

SERVICE MANUAL

LONCIN

Xwolf 700i

Maintenance troubleshooting repair

LX700AU
SERVICE MANUAL
©2022 by LONCIN Motor Corporation, China.
First edition, September 2022
All rights reserved.
Any reproduction or unauthorized use
without the written permission of
LONCIN Motor Corporation, China.
Is expressly prohibited.
Printed in China.

IMPORTANT

The LONCIN Motor Company primarily for use by LONCIN dealers and their qualified mechanics produced this manual. It is not possible to include all the knowledge of a mechanic in one manual, so it is assumed that anyone who uses this book to perform maintenance and repairs on LONCIN vehicle has a basic understanding of the mechanical ideas and the procedures of vehicle repair. Repairs attempted by anyone without this knowledge are likely to render the vehicle unsafe and unfit for use.

This model has been designed and manufactured to perform within certain specifications in regard to performance and emissions. Proper service with the correct tools is necessary to ensure that the vehicle will operate as designed. If there is any question about a service procedure, it is imperative that you contact a LONCIN dealer for any service information changes that apply to this model. This policy is intended to provide the customer with the most satisfaction from his vehicle and to conform to federal environmental quality objectives.

TIP:

- This Service Manual contains information regarding periodic maintenance to the emission control system. Please read this material carefully.
 - Designs and specifications are subject to change without notice.
-

IMPORTANT INFORMATION

Particularly important information is distinguished in this manual by the following notations.



This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.



A WARNING indicates a hazardous situation, which, if not avoided, could result in death or serious injury.

TIP:

NOTICE

A NOTICE indicates special precautions that must be taken to avoid damage to the vehicle or other property.

A TIP provides key information to make procedures easier or clearer.

HOW TO USE THIS MANUAL

MANUAL ORGANIZATION

This manual consists of chapters for the main categories of subjects. 1st title ①: This title indicates the section of the chapter and only appears on the first page of each section. It located in the upper left corner of the page. 2nd title ②: This title indicates a sub-section that is followed by systematic procedures accompanied by corresponding illustrations.

EXPLODED DIAGRAMS

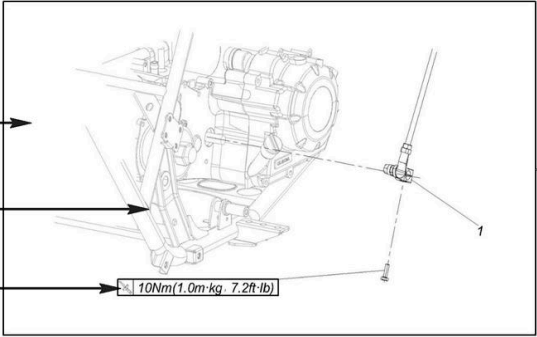
To help identify parts and clarify procedure steps, there are exploded diagrams at the start of each removal and disassembly section.

1. Numbers ③ is an explanation of the picture on the left
2. An easy-to-see exploded diagram④ is provided for removal and disassembly jobs.
3. Numbers⑤ are given in the order of the jobs in the exploded diagram. A number that is enclosed by a circle indicates a disassembly step.
4. An explanation of jobs and notes is presented in an easy-to-read way by the use of symbol marks⑥. The meanings of the symbol marks are given on the next page.
5. A job instruction chart⑦ accompanies the exploded diagram, providing the order of jobs, names of parts, notes in jobs, etc.

1

ENGINE

Shift arm

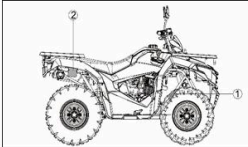


Order	Job/Part	Q'ty	Remarks
1	Removing the SHIFT ARM	1	Remove the parts in the order listed. For installation, reverse the removal procedure.

7

2

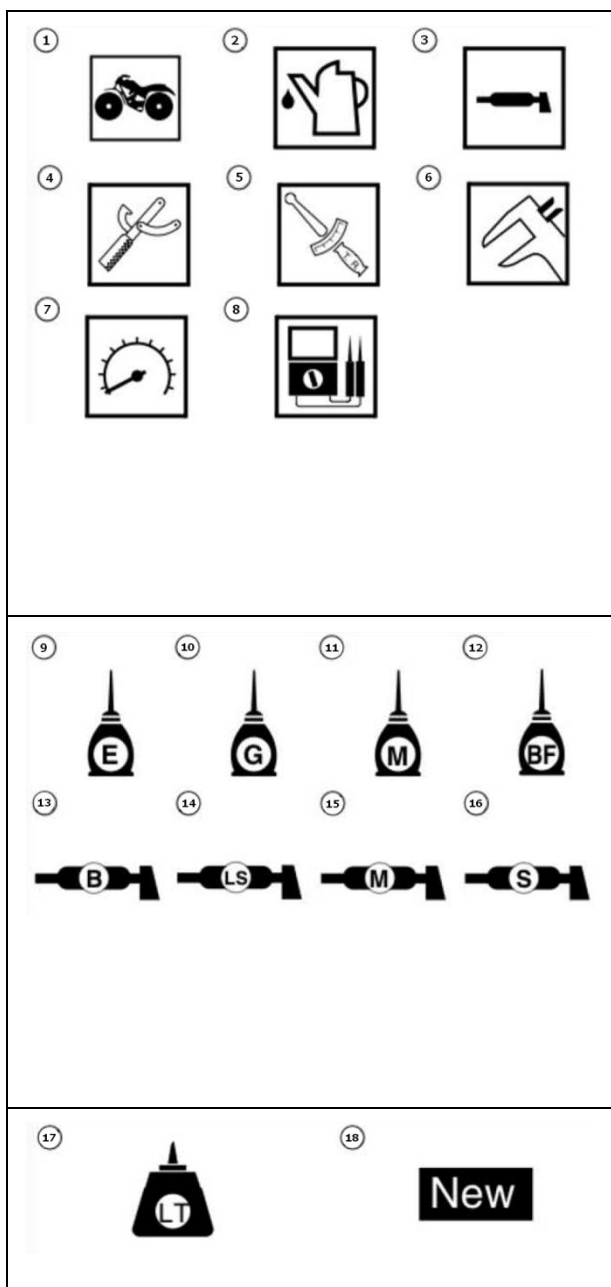
GENERAL INFORMATION



Vehicle identification
Vehicle identification number
The vehicle identification number ① is stamped into the frame.

Model label
The model label ② is attached to the rear frame. Record the information on this label in the space provided. This information will be needed to order spare parts.

3



Symbols

Symbols ① to ⑧ indicate the following

- ① Can be serviced with engine mounted
- ② Filling fluid
- ③ Lubricant
- ④ Special tool
- ⑤ Torque
- ⑥ Wear limit, clearance
- ⑦ Engine speed
- ⑧ Electrical data(Ω , V, A)

Symbols ⑨ to ⑯ in the exploded diagrams indicate the types of lubricants and lubrication points.

- ⑨ Apply engine oil
- ⑩ Apply gear oil
- ⑪ Apply molybdenum disulfide oil
- ⑫ Apply brake fluid
- ⑬ Apply wheel bearing grease
- ⑭ Apply lithium-soap-based grease
- ⑮ Apply molybdenum disulfide grease
- ⑯ Apply silicone grease

Symbols ⑰ to ⑱ in the exploded diagrams indicate where to apply a locking agent ⑰ and when to install a new part ⑱.

- ⑰ Apply the locking agent(LOCTITE[®])
- ⑱ Replace

CONTENTS

CHAPTER 1

GENERAL INFORMATION

Vehicle identification	1-1
Vehicle identification number	1-1
Model label.....	1-1
Safety	1-2
Handling Gasoline Safely.....	1-3
Cleaning Parts.....	1-3
Warning Labels.....	1-3
Important information	1-4
Preparation for removal and disassembly	1-4
Replacement parts	1-4
Gaskets,oil seals and O-rings	1-4
Lock washers/plates and cotter pins	1-5
Bearings and oil seals	1-5
Circlips	1-5
Checking the connections.....	1-6
Tools	1-7
Basic tools.....	1-7

CHAPTER 2

SPECIFICATIONS

General specifications	2-1
Engine specifications.....	2-4
Cylinder head tightening sequence	2-9
Chassis specifications.....	2-10
Electrical specifications.....	2-12
Tightening torques.....	2-12
Engine tightening torques	2-12
Chassis tightening torques	2-14
How to use the conversion	2-16
General tightening torque specifications	2-16
Lubrication points and lubricant types	2-17
Engine	2-17
Coolant flow diagrams	2-18
Cable routing	2-21

CHAPTER 3

PERIODIC CHECKS AND ADJUSTMENTS

Introduction.....	3-1
Periodic maintenance chart for the emission control system	3-1
General maintenance and lubrication chart.....	3-2
Vehicle bottom guard, seat, carriers and fenders	3-4
Vehicle bottom guard	3-4
Seat and side panels	3-5

Ront carrier and front guard	3-6
Front fenders and front grill	3-7
Rearcarrier and rear fender	3-8
Electricalcomponentstray	3-9
Electrical components tray 1/2	3-9
Electrical components tray 2/2	3-11
Footrestboards	3-13
Airfiltercase	3-14
Engine	3-15
Adjusting the valve clearance.....	3-15
Adjusting the engine idling speed.....	3-17
Adjusting the throttle lever free play	3-19
Adjusting the speed limiter	3-19
Checkingthe spapk plug	3-20
Checkingthe ignition timing	3-21
Measuring the compression pressure	3-22
Checkingthe engine oil level	3-24
Changingthe engine oil.....	3-25
Cleaningthe air filter element	3-26
Checkingthe throttle body joint	3-27
Checkingfuel pipe	3-28
Checkingthe breather hoses	3-28
Checkingthe coolant level	3-28
Changingthe coolant	3-29
Checkingthe cooling system	3-32
Checkingthe coolant temperature warning light	3-33
Checkingand replacing the v-belt	3-34
Checkingthe exhaust system	3-35

Cleaningthe spark arrester	3-35
Chassis.....	3-36
Adjusting the front brake	3-36
Adjusting the rear brake.....	3-36
Checkingthe brake fluid level	3-37
Checkingthe front brake pads.....	3-38
Checkingthe rear brake pads	3-38
Checkingthe brake hoses	3-39
Bleeding the hydraulic brake system	3-39
Adjusting the select lever control cable and shift rod	3-41
Checkingthe final gear oil level	3-41
Changingthe final gear oil	3-42
Checkingthe differential gear oil level	3-43
Changingthe differential gear oil.....	3-43
Checkingthe constant velocityjoint dust boots	3-44
Checkingthe steering system	3-44
Adjusting the toe-in.....	3-45
Checkingthe front and rear shock absorbers	3-46
Adjusting the front shock absorbers	3-47
Adjusting the rear shock absorbers	3-48
Checkingthe tires	3-48
Checkingthe wheels	3-50
Checkingand lubricating the cables	3-50
Lubricating the levers and pedals	3-50
Electricalsystem.....	3-51
Checkingand charging the battery	3-51
Checkingthe fuses	3-56
Adjusting the headlight beams	3-57

CHAPTER 4

ENGINE

Engine removal	4-1
V-belt cooling ducts, muffler and exhaust pipes	4-1
Cylinder head.....	4-4
Remove Cylinder head	4-4
Check cam chain	4-6
Check chain tensioner.....	4-7
Check Cylinder head	4-7
Installation Cylinder head	4-9
Rocker arms and camshaft	4-13
Removing the rocker arms and camshaft	4-13
Checking the camshaft.....	4-13
Checking the decompression system	4-14
Installing the camshaft and rocker arms	4-15
Valves and valve springs.....	4-17
Removing the valves and valve springs	4-17
Checking the valves and valve springs	4-18
Installing the valves and valve springs.....	4-19
Cylinder block and piston	4-20
Removing the cylinder block and piston	4-20
Check the cylinder block and piston	4-20
Checking the piston rings.....	4-21
Checking the piston pin.....	4-21
Installing the piston and cylinder block.....	4-22
Ac magnetos	4-24

Removingthe ac magneto rotor	4-24
Removingoil pipe	4-24
Checkingthe stator coil and crankshaft position sensor.	4-26
Checkingthe starter clutch	4-27
Installing the ACmagneto rotor.....	4-27
Balancergearsandoilpumpgears	4-29
Removingthe balancer driven gear and oil pump driven gear....	4-29
Checkingthe oil pump drive.....	4-31
Checkingthe balancer drive	4-31
Checkingthe springs and pins.....	4-31
Installing the balancer drive gear,balancer driven gear,and oil pump driven gear	4-31
Primaryandsecondarysheaves	4-33
Removingthe primary and secondary sheaves.....	4-33
Checkingthe primary sheave assembly	4-34
Assemblingthe primary sheave.....	4-34
Installing the primary and secondary sheaves	4-35
Centrifugalclutch.....	4-36
Removingthe clutch.....	4-36
Checkingthe clutch	4-38
Clutch housing overhaul	4-40
Installing the clutch	4-43
Crankcase	4-46
Removingoil filter and timing chain	4-46
Removingthe crankcase	4-46
Checkingthe timing chain and guides.....	4-48
Checkingthe oil pressure relief valve	4-49
Checkingthe crankcaseand bearings.....	4-49

Assembling the crankcase	4-51
Install the shift lever.....	4-54
Install oil filter	4-55
Crankshaft and oil pump	4-55
Oil pump	4-55
Removing the oil pump	4-56
Removing the crankshaft	4-56
Checking the oil pump.....	4-56
Checking the crankshaft.....	4-57
Assembling the oil pump	4-59
Installing the crankshaft	4-60
Transmission	4-63
Remove the transmission	4-63
Checking the shift forks.....	4-65
Checking the shift drum	4-66
Checking the transmission	4-66
Assembling the shift fork assembly.....	4-68
Installing the transmission	4-68
Middle gear.....	4-70
Removing the middle drive shaft	4-70
Removing the middle driven shaft.....	4-71
Checking the pinion gears.....	4-74
Installing the bearing and oil seals	4-74
Installing the middle driven shaft	4-75
Installing the middle drive shaft.....	4-77
Measuring the middle gear backlash	4-77
Starter motor.....	4-78
Removing the starter motor.....	4-78

Checkingthe starter motor	4-78
Install the starter motor	4-78

CHAPTER 5

COOLING SYSTEM

Radiatorandcoolantreservoir	5-1
Checkingthe radiator	5-2
Installing the radiator	5-2
Thermostat.....	5-3
Checkingthe thermostat	5-4
Installing the thermostat.....	5-4
Waterpump.....	5-5
Disassemblingthe water pump	5-6
Checkingthe water pump.....	5-6
Assemblingthe water pump.....	5-6

CHAPTER 6

FUEL INJECTION SYSTEM

Circuit diagram.....	6-2
ECUself-diagnostic function	6-4
Self-diagnostic function table.....	6-4
Communication error with the meter.....	6-5
Troubleshooting chart.....	6-6
Diagnostic code table	6-7
Airfilter.....	6-10

Replacethe air filter element combination	6-11
Installing the air filter connection pipe	6-11
Installing the oil and gasseparator	6-12
FuelTank.....	6-13
Removingthe fuel tank	6-14
Removingthe fuel pump.....	6-14
Checkingthe fuel pump body	6-14
Checkingthe fuel pump body	6-14
Installing the fuel pump	6-15
Checkingthe fuel filter	6-15
Installing the fuel hose	6-15
Throttlebody	6-16
Removingthe throttle body assembly	6-17
Checkingthe fuel injector	6-17
Checkingthe throttle body	6-17
Installing the throttle body assembly.....	6-18
Installing intake-tube.....	6-18
Installing fuel injector	6-18
Connectfuel hose	6-19
Checkingthe fuel pump and pressure regulator operation	6-19

CHAPTER 7

DRIVETRAIN

Troubleshooting	7-1
Checkingnoises.....	7-1
Troubleshooting chart.....	7-3

Front constant velocity joints and differential gear	7-4
Removing the differential gear assembly	7-7
Checking the front constant velocity joints	7-7
Checking the differential gears	7-7
Checking the differential gear motor	7-8
Assembling the front constant velocity joints	7-8
Assembling the differential gears	7-9
Measuring the differential gear lash	7-9
Adjusting the differential gear lash	7-10
Checking the differential gear operation	7-10
Rear constant velocity joints and final drive gear	7-11
Assembling the front constant velocity joints	7-14
Disassembling the final drive pinion gear assembly	7-14
Positioning the final drive pinion gear and ring gear	7-15

CHAPTER 8

CHASSIS

Front and rear wheels	8-1
Front wheels	8-1
Rear wheels	8-2
Checking the wheels	8-3
Checking the wheel hubs	8-3
Checking the brake discs	8-4
Installing the brake discs	8-4
Installing the wheel hubs	8-4
Installing the wheels	8-4

Front and rear brakes	8-5
Front brake pads	8-5
Rear brake pads	8-6
Replacing the front and rear brake pads	8-7
Front brake master cylinder	8-9
Primary brake master cylinder	8-11
Checking the master cylinder	8-13
Assembling the front and rear brake master cylinders	8-13
Installing the front brake master cylinder	8-13
Installing the primary brake master cylinder	8-15
Front brake caliper	8-16
Rear brake calipers	8-18
Disassembling the front and rear brake calipers	8-20
Checking the front and rear brake calipers	8-20
Assembling the front and rear brake calipers	8-21
Installing the front and rear brake calipers	8-21
Pedal assembly	8-23
Steering system	8-25
Handlebar	8-25
Removing the handlebar grips	8-26
Checking the handlebar	8-26
Installing the handlebar	8-26
Installing the handlebar grips	8-27
Installing the front brake master cylinder	8-27
Installing the throttle lever assembly	8-27
Steering stem	8-28
Checking the steering stem	8-29
Installing the steering stem	8-29

INSTALLING THE PITMAN ARM	8-30
Tie-rods and steering knuckles	8-31
Removing the steering knuckles	8-32
Checking the tie-rods	8-32
Checking the steering knuckles.....	8-32
INSTALLING THE TIE-RODS	8-34
Front arms and front shock absorber assemblies	8-35
Removing the front arms	8-37
Checking the front arms	8-37
Checking the front shock absorbers	8-38
Installing the front arms and front shock absorbers	8-39
Rear knuckles and stabilizer	8-40
Checking the rear knuckles	8-41
Checking the stabilizer	8-41
Rear arms and rear shock absorber assemblies	8-42
Checking the rear arms	8-43
Checking the rear shock absorber assemblies	8-43
Installing the rear arms and rear shock absorber assemblies	8-43

CHAPTER 9

ELECTRICAL

Electrical components	9-1
Checking switch continuity	9-2
Checking the switches	9-3
Checking the lamps	9-4
The type of lamps	9-4

Checkingthe condition of the lamps.....	9-4
Ignitionsystem	9-5
Circuit diagram.....	9-5
Troubleshooting	9-5
Electricstartingsystem	9-9
Circuit diagram.....	9-9
Starting circuit operation	9-9
Troubleshooting	9-10
Chargingsystem	9-13
Circuit diagram.....	9-13
Troubleshooting	9-14
Lightingsystem.....	9-15
Circuit diagram.....	9-15
Troubleshooting	9-15
Checkingthe lighting system	9-16
Signalingsystem	9-18
Circuit diagram.....	9-18
Troubleshooting	9-18
Checkingthe signaling system.....	9-19
Coolingsystem	9-25
Circuit diagram.....	9-25
Troubleshooting	9-25
Fuelpumpsystem	9-28
Circuit diagram.....	9-28
Troubleshooting	9-28
2WD/4WD selectingsystem.....	9-30
Circuit diagram.....	9-30
Troubleshooting	9-30

EPS(electric power steering) system	9-33
Circuit diagram.....	9-33
Eps control unit's self-diagnostic function.....	9-33

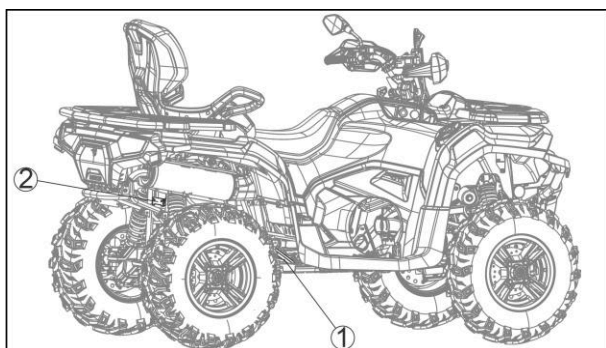
CHAPTER 10

TROUBLESHOOTING

Starting failure/hard starting	10-1
Fuel system	10-1
Electrical system.....	10-1
Compression system.....	10-1
Poor idle speed performance	10-1
Poor idle speed performance.....	10-1
Poor medium and high-speed performance.....	10-2
Poor medium and high-speed performance.....	10-2
Faulty gear shifting	10-2
Hard shifting	10-2
Shift lever does not move	10-2
Jump out of gear	10-2
Faulty clutch performance.....	10-3
Engine operates but vehicle will not move.....	10-3
Clutch slipping	10-3
Poor starting performance	10-3
Poor speed performance	10-3
Overheating	10-3
Overheating.....	10-3
Overcooling	10-3

Cooling system	10-3
Faulty brake	10-3
Poor braking effect	10-3
Shock absorber malfunction.....	10-4
Malfunction	10-4
Unstable handling	10-4
Unstable handling.....	10-4
Wiring diagram	10-5

1 GENERAL INFORMATION



Vehicle identification

Vehicle identification number

The vehicle identification number ① is stamped into the frame.

Model label

The model label ② is attached to the rear frame. Record the information on this label in the space provided. This information will be needed to order spare parts.

Safety

Follow these guidelines and practice common sense to safely service the vehicle:

1. Do not operate the vehicle in an enclosed area. The exhaust gases contain carbon monoxide, an odorless, colorless and tasteless poisonous gas. Carbon monoxide levels build quickly in small-enclosed areas and can cause unconsciousness and death in a short time. Make sure the work area is properly ventilated, or operate the vehicle outside.
2. Never use gasoline or any flammable liquid to clean parts. Refer to Handling Gasoline Safely and Cleaning parts in this section
3. Never smoke or use a torch in the vicinity of flammable liquids. Such as gasoline or cleaning solvent.
4. Do not remove the radiator cap or cooling system hoses. While the engine is, hot. The cooling system is pressurized and the high temperature coolant may cause injury.
5. Dispose of and store cooling in a safe manner. Do not allow children or pets to open containers of coolant. Animals are attracted to antifreeze.
6. Avoid contact with engine oil and other chemicals. Most are known carcinogens. Wash your hands thoroughly after coming in contact with engine oil. If possible, wear pair of disposable gloves.
7. If welding or brazing on the vehicle, remove the fuel tank and shocks to a safe distance at least 50 ft. (15 m) away.
8. Use the correct types and sizes of tools to avoid damaging fasteners.
9. Keep tools clean and in good condition. Replace or repair worn or damaged equipment.
10. When loosening a tight fastener, be guided by what would happen if the tool slips.
11. When replacing fasteners, make sure the new fasteners are the same size and strength as the originals. Refer to Fasteners in this chapter.
12. Keep the work area clean and organized.
13. Wear eye protection any time the safety of your eyes is in question. This includes procedures involving drilling, grinding, hammering, compressed air and chemicals.
14. Wear the correct clothing for the job. Tie up or cover long hair so it cannot catch in moving equipment.
15. Do not carry sharp tools in clothing pockets.
16. Always have an approved fire extinguisher available. Make sure it is rated for gasoline (Class B) and electrical (Class C) fires.
17. Do not use compressed air to clean clothes, the vehicle or the work area. Debris may be blown into the eyes or skin. Never direct compressed air at anyone. Do not allow children to use or play with any compressed air equipment.
18. When using compressed air to dry rotating parts, hold the part so it cannot rotate. Do not allow the force of the air to spin the part. The air jet is capable of rotating parts at extreme speeds. The part may be damaged or disintegrate, causing serious injury.
19. Do not inhale the dust created by brake pad wear. These particles may contain asbestos. In addition, some types of insulating materials and gaskets may contain asbestos. Inhaling asbestos particles is hazardous to health.
20. Never work on the vehicle while someone is working under it.
21. When supporting the vehicle with the wheel(s) off the ground, make sure the vehicle is secure and cannot roll.

Handling Gasoline Safely

Gasoline is a volatile flammable liquid and is one of the most dangerous items in the shop. Because gasoline is used so often, many people forget that it is hazardous. Only use gasoline as fuel for gasoline internal combustion engines. Keep in mind when working on a vehicle, gasoline is always present in the fuel tank, fuel line and carburetor. To avoid an accident when working around the fuel system, carefully observe the following precautions:

1. Never use gasoline to clean parts. Refer to Cleaning Parts in this section.
2. When working on the fuel system, work outside or in a well-ventilated area.
3. Do not add fuel to the fuel tank or service the fuel system while the vehicle is near open flames, sparks or where someone is smoking. Gasoline vapor is heavier than air, collects in low areas and is more easily ignited than liquid gasoline.
4. Allow the engine to cool completely before working on any fuel system component.
5. Do not store gasoline in glass containers. If the glass breaks, an explosion or fire may occur.
6. Immediately wipe up spilled gasoline with rags. Store the rags in a metal container with a lid until they can be properly disposed. Or place them outside in a safe place for the fuel to evaporate.
7. Do not pour water onto a gasoline fire. Water spreads the fire and makes it more difficult to put out. Use a class B, BC or ABC fire extinguisher to extinguish the fire.
8. Always turn off the engine before refueling. Do not spill fuel onto the engine or exhaust system. Do not overfill the fuel tank. Leave an air space at the top of the tank to allow room for the fuel to expand due to temperature fluctuations.

Cleaning Parts

Cleaning parts is one of the more tedious and difficult service jobs performed in the home garage. Many types of chemical cleaners and solvents are available for shop use. Most are poisonous and extremely flammable. To prevent chemical exposure, vapor buildup, fire and injury, observe each product's warning label and note the following:

1. Read and observe the entire product label before using any chemical. Always know what type of chemical is being used and whether it is poisonous and/or flammable.
2. Do not use more than one type of cleaning solvent at a time. If mixing chemicals is required, measure the proper amounts according to the manufacturer.
3. Work in a well-ventilated area.
4. Wear chemical-resistant gloves that are appropriate for the chemical being used.
5. Wear safety glasses.
6. Wear a vapor respirator if the instructions call for it.
7. Wash hands and arms thoroughly after cleaning parts.
8. Keep chemicals away from children and pets, especially coolant.
9. Thoroughly clean all oil, grease and cleaner residue from any part that must be heated.
10. Use a nylon brush when cleaning parts. Metal brushes may cause a spark.
11. When using a parts washer, only use the solvent recommended by the manufacturer. Make sure the parts washer is equipped with a metal lid that will lower in case of fire.

Warning Labels

Most manufacturers attach information and warning labels to the vehicle. These labels contain instructions that are important to safety when operating, servicing, transporting and storing the vehicle. Refer to the owner's manual for the description and location of labels. Order replacement labels from the manufacturer if they are missing or damaged.

Important information

Preparation for removal and disassembly

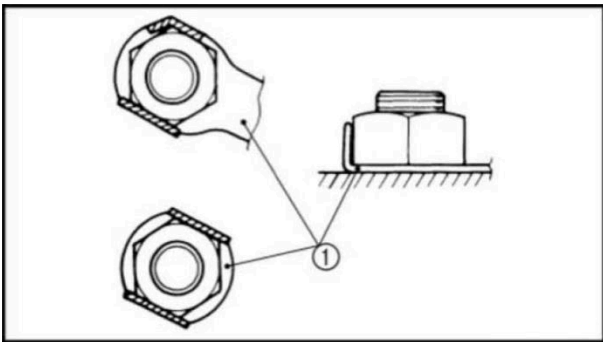
1. Before removal and disassembly remove all dirt, mud, dust and foreign material.
2. Use only the proper tools and cleaning equipment..
3. When disassembling always keep mated parts together. This includes gears, cylinders, pistons and other parts that have been “ mated” through normal wear. Mated parts must always be reused or replaced as an assembly.
4. During disassembly, clean all of the parts and place them in trays in the order of disassembly. This will speed up assembly and allow for the correct installation of all parts.
5. Keep all parts away from any source of fire.

Replacement parts

1. Use only genuine LONCIN parts for all replacements. Use oil and grease recommended by LONCIN for all lubrication jobs. Other brands may be similar in function and appearance, but inferior in quality.

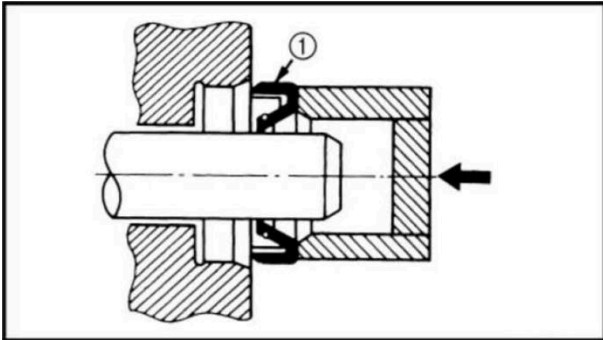
Gaskets, oil seals and O-rings

1. When overhauling the engine, replace all gaskets, seals and O-rings. All gasket surfaces, oil seal lips and O-rings must be cleaned.
2. During reassembly properly oil all mating parts and bearings, and lubricate the oil seal lips with grease.



Lockwashers/plates and cotter pins

After removal, replace all lock washers/plates ① and cotter pins. After the bolt or nut has been tightened to specification, bend the lock tabs along a flat of the bolt or nut.



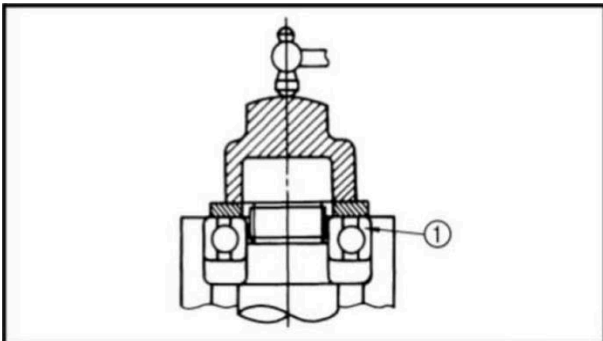
Bearings and oil seals

Install bearings and oil seals so that the manufacturer's marks or numbers are visible. When installing oil seals, lubricate the oil seal lips with a light coat of lithium-soap-based grease. Oil bearings liberally when installing, if appropriate.

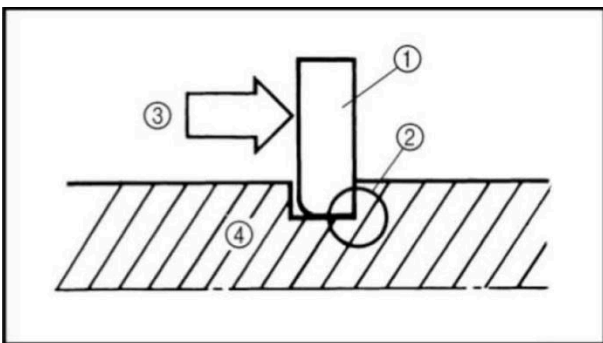
① Oil seal

NOTICE

Do not spin the bearing with compressed air because this will damage the bearing surfaces.



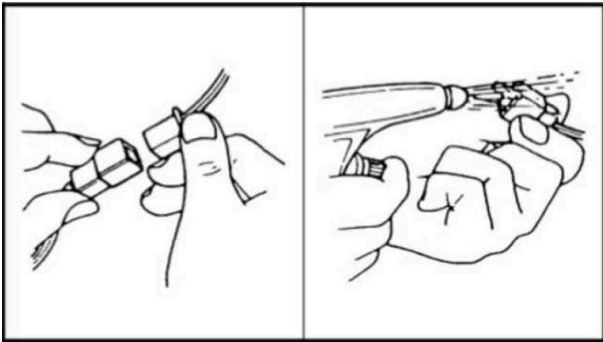
① Bearing



Circlips

Before reassembly, check all circlips carefully and replace damaged or distorted circlips. Always replace piston pin clips after one use. When installing a circlip ①, make sure the sharp-edged corner ② is positioned opposite the thrust ③ that the circlip receives.

④ Shaft



Checking the connections

Check the leads, couplers, and connectors for stains, rust, moisture, etc.

1. Disconnect:

- lead
- coupler
- connector

2. Check:

- lead
- coupler
- Connector

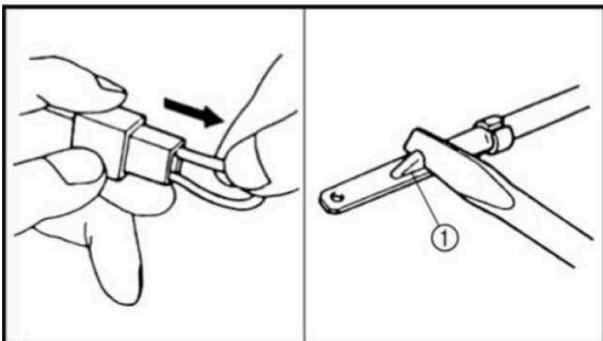
Moisture → Dry with an air blower.

Rust/stains → Connect and disconnect several times.

3. Check:

- All connections

Loose connection → Connect properly.



TIP:

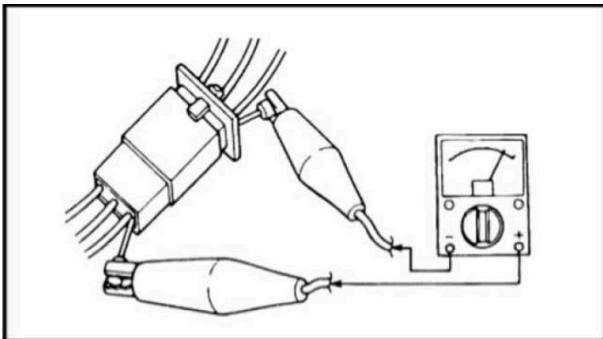
If the pin ① on the terminal is flattened, bend it up.

4. Connect:

- Lead
- Coupler
- Connector

TIP:

Make sure all connections are tight.

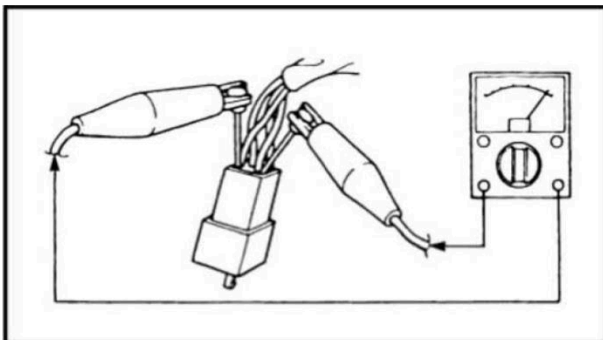


5. Check:

- Continuity (with the pocket tester)

TIP:

- If there is no continuity, clean the terminals.
- When checking the wire harness, perform steps (1) to (3).
- As a quick remedy, use a contact revitalizer available at most part stores.



Tools

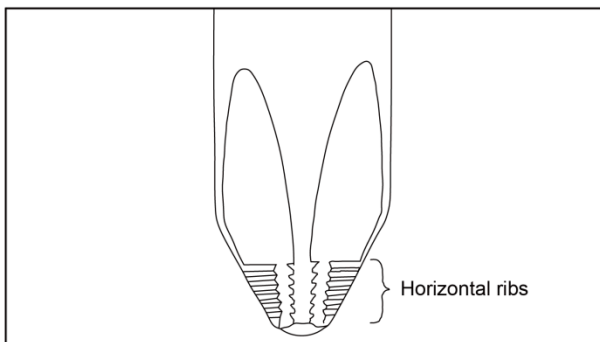
Basic tools

Most of the procedures in this manual can be carried out with hand tools and test equipment familiar to the home mechanic. Always use the correct tools for the job. Keep tools organized and clean and store them in a tool chest with related tools organized together.

Quality tools are essential. The best are constructed of high-strength alloy steel. These tools are light, easy-to-use and resistant to wear. Their working surfaces are devoid of sharp edges and the tools are carefully polished. They have an easy-to-clean finish and are comfortable to use. Quality tools are a good investment.

When purchasing tools to perform the procedures covered in this manual, consider the tools potential frequency of use. If tool kit is just now being started, consider purchasing a tool set from a quality tool supplier. These sets are available in many tool combinations and offer substantial savings when compared to individually purchased tools. As work experience grows and tasks become more complicated, specialized tools can be added.

Some of the procedures in this manual specify special tools. In most cases, the tool is illustrated in use. Well-equipped mechanics may be able to substitute similar tools or fabricate a suitable replacement. However, in some cases, the specialized equipment or expertise may make it impractical for the home mechanic to attempt the procedure. When necessary, such operations are identified in the text with the recommendation to have a dealership or specialist perform the task. It may be less expensive to have a professional perform these jobs, especially when considering the cost of the equipment.

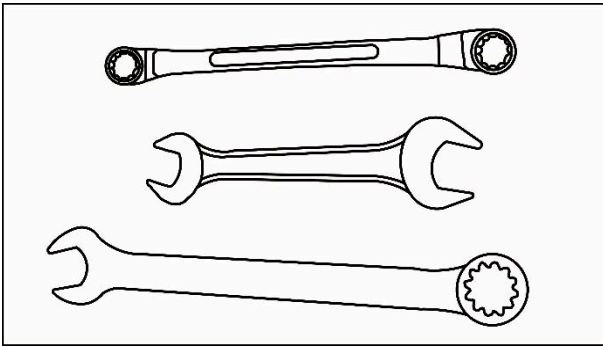


Screwdrivers

The two basic types of screwdrivers are the slotted tip (flat blade) and the Phillips tip. These are available in sets that often include an assortment of tip sizes and shaft lengths.

As with all tools, use the correct screwdriver. Make sure the size of the tip conforms to the size and shape of the fastener. Use them only for driving screws. Never use a screwdriver for prying or chiseling. Repair or replace worn or damaged screwdrivers. A worn tip may damage the fastener, making it difficult to remove. Phillips-head screws are often damaged by incorrectly fitting screwdrivers. Quality Phillips screwdrivers are manufactured with their crosshead tip machined to Phillips Screw Company specifications. Poor quality or damaged Phillips screwdrivers can back out (cam-pout) and round over the screw head. Compounding the problem of using poor quality screwdrivers are Phillips-head screws made from weak or soft materials and screws initially installed with air tools.

The best type of screwdriver to use on Phillips screws is the ACR Phillips II screwdriver, patented by the Phillips Screw Company. ACR stands for the horizontal anti-campout ribs found on the driving faces or flutes of the screwdrivers tip. ACR Phillips II screwdrivers were designed as part of a manufacturing drive system to be used with ACR Phillips II screws, but they work well on all common Phillip screws. A number of tool companies offer ACR Phillips I screwdrivers in different tip sizes and interchangeable bits to fit screwdriver bit holders.



Wrenches

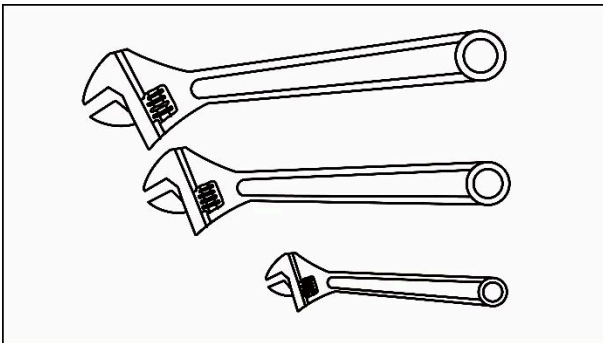
Open-end, box-end and combination wrenches are available in a variety of types and sizes.

The number stamped on the wrench refers to the distance between the work areas. This size must match the size of the fastener head.

The box-end wrench is an excellent tool because it grips the fastener on all sides. This reduces the chance of the tool slipping. The box-end wrench is designed with either a 6- or 12- point opening. For stubborn or damaged fasteners, the 6-point provides superior holding ability by contacting the fastener across a wider area at all six edges. For general use, the 12- point works well. It allows the wrench to be removed and reinstalled without moving the handle over such a wide arc.

An open-end wrench is fast and works best in all-ways with limited overhead access. It contacts the fastener at only two points, and is subject to slipping under heavy force or if the tool or fastener is worn. A box-end wrench is preferred in most instances, especially when breaking loose and applying the final tightness to a fastener.

The combination wrench has a box-end on one end, and an open-end on the other. This combination makes it a convenient tool.



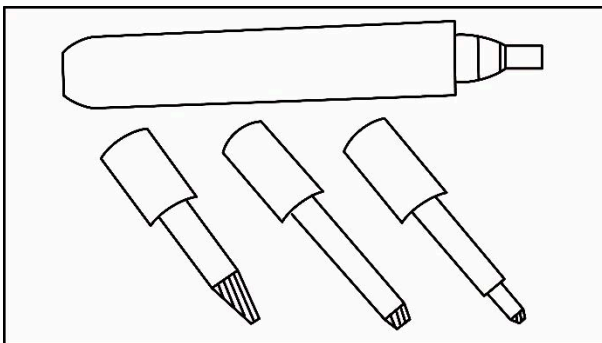
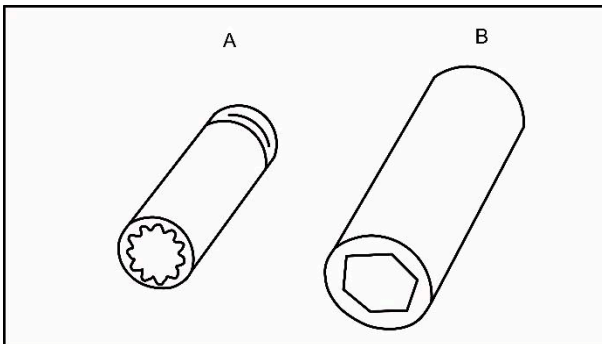
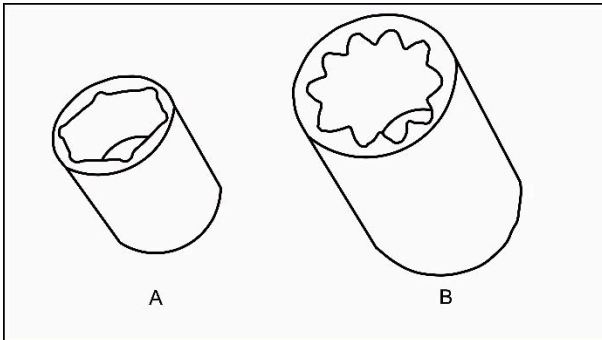
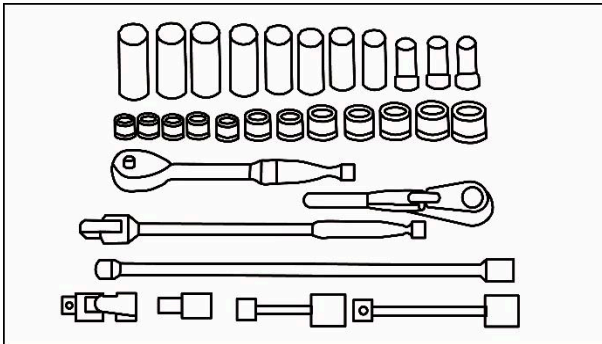
Adjustable Wrenches

An adjustable wrench can fit nearly any nut or bolt head that has clear access around its entire perimeter. However, adjustable wrenches contact the fastener at only two points, which makes them more subject to slipping off the fastener. One jaw is adjustable and may loosen, which increases this possibility. Make certain the solid jaw is the one transmitting the force. However, adjustable wrenches are typically used to prevent a large nut or bolt from turning while the other end is being loosened or tightened with a box-end or socket wrench.

Socket Wrenches, Ratchets and Handles

⚠ WARNING

Do not use hand sockets with air or impact tools: they may shatter and cause injury. Always wear eye protection when using impact or air tools.



Sockets that attach to a ratchet handle are available with 6-point or 12-point (B) openings and different drive sizes. The drive size indicates the size of the square hole that accepts the ratchet handle; the number slumped on the socket is the size of the work area and must match the fastener head. As with wrenches, a 6-point socket provides superior holding ability, while a 12-point socket needs to be moved only half as far to reposition it on the fastener.

Sockets are designated for either hand or impact use. Impact sockets are made of a thicker material for more durability. Compare the size and wall thickness of a 19-mm hand socket and the 19-mm impact socket (B). Use impact sockets when using an impact driver or air tool. Use hand sockets with hand-driven attachments.

Various handles are available for sockets. The speed handle is used for fast operation. Flexible ratchet heads in varying lengths allow the socket to be timed with varying force and at odd angles. Extension bars allow the socket setup to reach difficult areas. The ratchet is the most versatile. It allows the user to install or remove the nut without removing the socket.

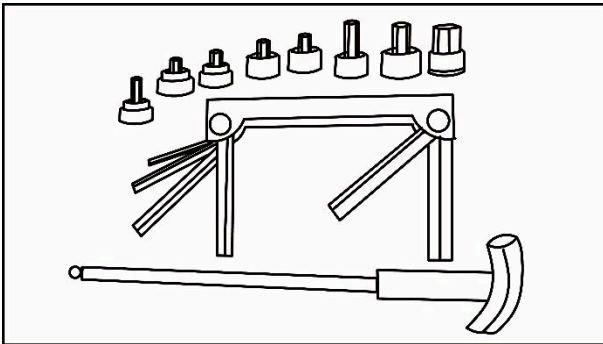
Sockets combined with any number of drivers make them undoubtedly the fastest, safest and most convenient tool for fastener removal and installation.

Impact Driver

⚠ WARNING

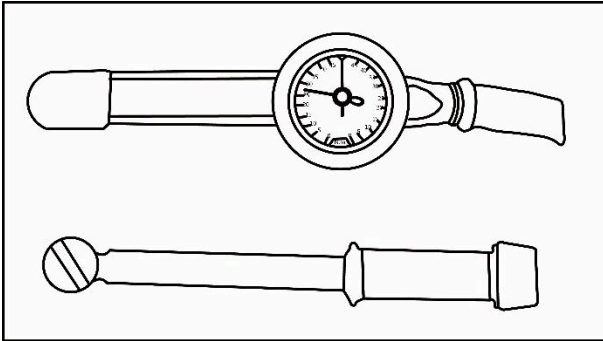
Do not use hand sockets with air or impact tools because they may shatter and cause injury. Always wear eye protection when using impact or air tools.

An impact driver provides extra force for removing fasteners by converting the impact of a hammer into a timing motion. This makes it possible to remove stubbed fasteners without damaging them. Impact drivers and interchangeable bits are available from most tool suppliers. When using a socket with an impact driver, make sure the socket is designed for impact use. Refer to Socket Wrenches, Ratchets, and Handles in this section.



Allen Wrenches

Allen, or setscrew wrenches, are used on fasteners with hexagonal recesses in the fastener head. These wrenches are available in a L-shaped bar, socket and-handle types. Allen bolts are sometimes called socket bolts.

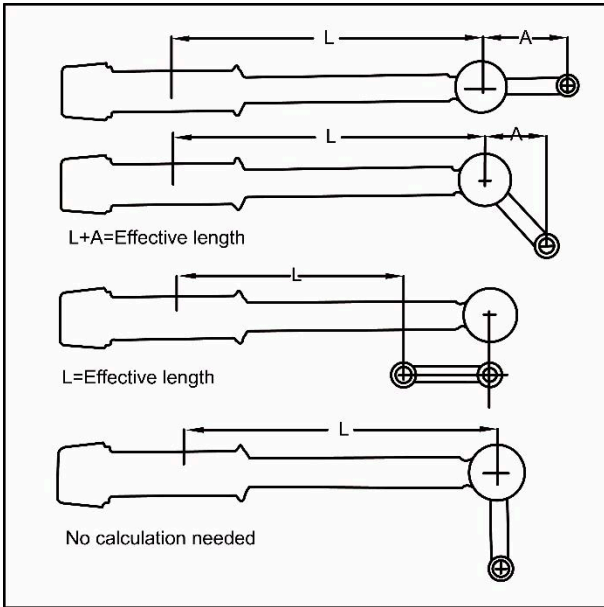
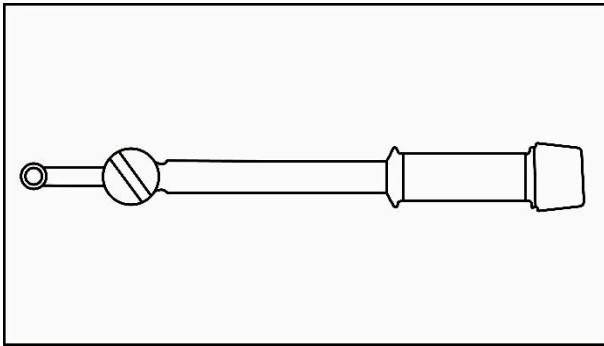


Torque Wrenches

A torque wrench is used with a socket torque adapter or similar extension to tighten a fastener to a measured torque. Torque wrenches come in several drive sizes (1/4, 3/8, 1/2 and 3/4) and have various methods of reading the torque value. The drive size indicates the size of the square drive that accepts the socket, adapter or extension. Common methods of reading the torque value are the reacting beam, the dial indicator and the audible click.

When choosing a torque wrench, consider the torque range, drive size and accuracy. The torque specifications in this manual provide an indication of the range required.

A torque wrench is a precision tool that must be properly cared for to remain accurate. Store torque wrenches in cases or separate padded drawers within a toolbox. Follow the manufacturer's instructions for their care and calibration.



Torque Adapters

Torque adapters, or extensions, extend or reduce the reach of a torque wrench. Specific adapters are required to perform some of the procedures in this manual. These are available from the vehicle manufacturer, aftermarket tool suppliers, or can be fabricated to suit a specific purpose.

If a torque adapter changes the effective lever length, the torque reading on the wrench will not equal the actual torque applied to the fastener. It is necessary to recalibrate the torque setting on the wrench to compensate for the change of lever length. When a torque adapter is used at a right angle to the drive head, calibration is not required because the lever length has not changed.

To recalculate a torque reading when using a torque adapter, use the following formula, and refer to Figure 24

$$TW = \frac{TA \times L}{L + A}$$

TW is the torque setting or dial reading on the wrench. TA is the torque specification and the actual amount of torque that will be applied to the fastener.

A is the amount the adapter increases (or in some cases reduces) the effective lever length as measured along the centerline of the torque wrench.

L is the lever length of the wrench as measured from the center of the drive to the center of the grip.

The effective lever length is the sum of L and A.

Example:

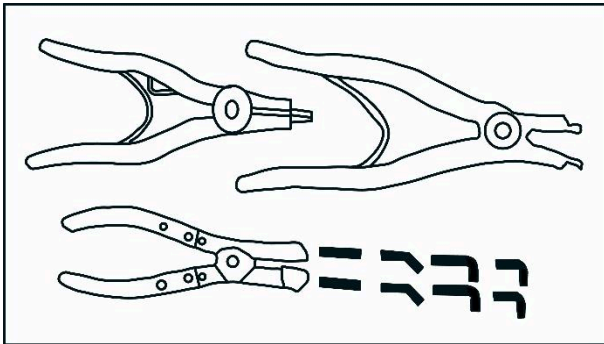
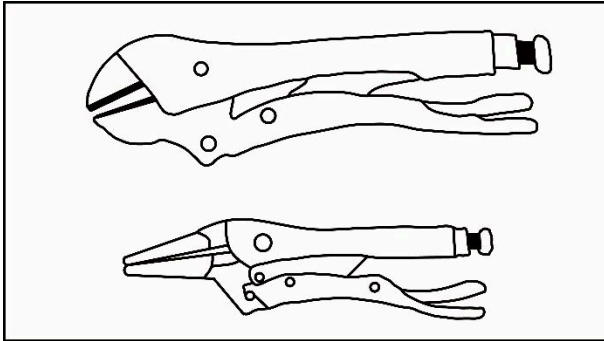
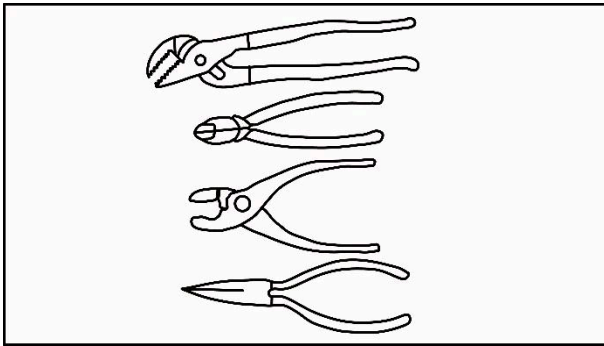
TA= 20 ft.-lb.

A= 3 in.

L=14in.

$$TW = \frac{20 \times 14}{14 + 3} = \frac{280}{17} = 16.5 \text{ ft} \cdot \text{lb}$$

In this example, the torque wrench would be set to their calculated torque value (Tw= 16.5 ft.-lb). When using a beam-type wrench, tighten the fastener until the pointer aligns with 16.5 ft.-lb. in this example, although the torque wrench is preset to 16.5 ft.-lb, the actual torque is 20 ft.-lb.



Pliers

Pliers come in a wide range of types and sizes. Pliers are useful for holding, cutting, bending, and crimping. Do not use them to turn fasteners unless they are designed to do so. Figure 25 and Figure 26 show several types of pliers. Each design has a specialized function. Slip-joint pliers are general-purpose pliers used for gripping and bending. Diagonal cutting pliers are needed to cut wire and can be used to remove cotter pins. Needle nose pliers are used to hold or bend small objects. Locking pliers hold objects tightly. They have many uses ranging from holding two parts together, to gripping the end of broken stud. Use caution when using locking pliers; the sharp jaws will damage the objects they hold.

Snap Ring Pliers

⚠ WARNING

Snap rings can slip and fly off when removing and installing them. In addition, the snapping pliers' tips may break. Always wear eye protection when using snapping pliers.

Snap ring pliers are specialized pliers with tips that fit into the ends of snap rings to remove and install them. Snap ring pliers are available with a fixed action (either internal or external) or are convertible (one tool works on both internal and external snap rings). They may have fixed tips or interchangeable ones of various sizes and angles. For general use, select convertible type pliers with interchangeable tips.

Hammers

WARNING

Always wear eye protection when using hammers. Make sure the hammer face is in good condition and the handle is not cracked. Select the correct hammer for the job and make sure to strike the object squarely. Do not use the handle or the side of the hammer to strike an object.

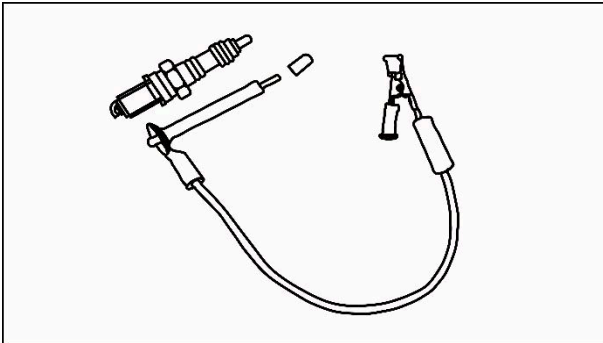
Various types of hammers are available to fit a number of applications. A ball-peen hammer is used to strike another tool, such as a punch or chisel. Soft-faced hammers are required when a metal object must be struck without damaging it. Never use a metal-faced hammer on engine and suspension components, damage will occur in most cases. Ignition Grounding Tool

Ignition grounding tool

Some test procedures in this manual require kicking the engine over without starting it. Do not remove the spark plug cap and crank the engine without grounding the plug cap. Doing so will damage the ignition system.

An effective way to ground the system is to fabricate the tool shown in Figure 28 from a No. 6 screw, two washers and a length of wire with an alligator clip soldered on one end. To use the tool, insert it into the spark plug cap and attach the alligator clip to a known engine ground.

This tool is safer than a spark plug or spark tester because there is no spark firing across the end of the plug/tester to potentially ignite fuel vapor spraying from an open spark plug hole or leaking fuel component.



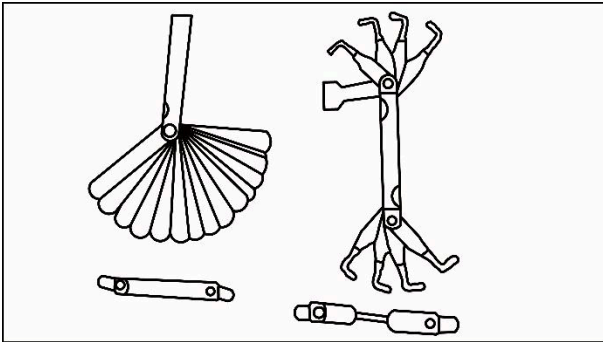
MEASURING TOOLS

The ability to accurately measure components is essential to successfully service many components. Equipment is manufactured to close tolerances, and obtaining consistently accurate measurements is essential.

Each type of measuring instrument is designed to measure a dimension with a certain degree of accuracy and within a certain range. When selecting the measuring tool, make sure it is applicable to the task.

As with all tools, measuring tools provide the best results if cared for properly. Improper use can damage the tool and cause inaccurate results. If any measurement is questionable, verify the measurement using another tool. A standard gauge is usually provided with measuring tools to check accuracy and calibrate the tool if necessary.

Accurate measurements are only possible if the mechanic possesses a feel for using the tool. A heavy-handed use of measuring tool produces less accurate results. Hold the tool gently by the fingertips so the point at which the tool contacts the object is easily felt. This feel for the equipment will produce more accurate measurements and reduce the risk of damaging the tool or component. Refer to the following sections for specific measuring tools

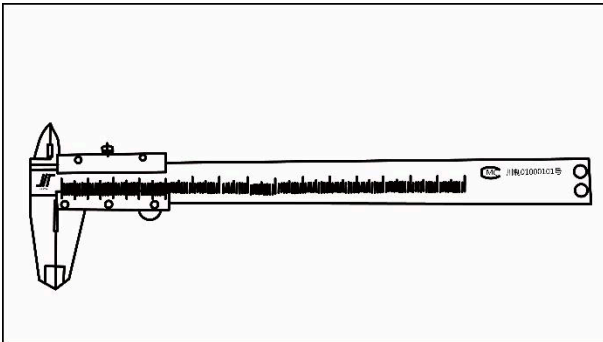


Feeler Gauge

The feeler, or thickness gauge, is used for measuring the distance between two surfaces.

A feeler gauge set consists of an assortment of steel strips of graduated thicknesses. Each blade is marked with its thickness. Blades can be of various lengths and angles for different procedures.

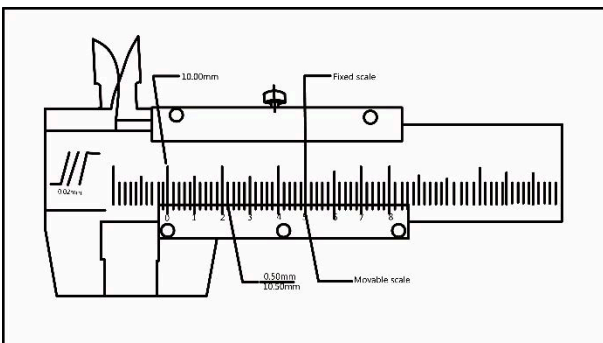
A common use for a feeler gauge is to measure valve clearance. Wire (round) type gauges are used to measure spark plug gap.



Calipers

Calipers are excellent tools for obtaining inside, outside and depth measurements. Although not as precise as a micrometer, they allow reasonable precision, typically to within 0.05 mm (0.001 in.). Most calipers have a range up to 150 mm (6 in.).

Calipers are available in dial, vernier or digital versions. Dial calipers have a dial readout that provides convenient reading. Vernier calipers have marked scales that must be compared to determine the measurement. The digital caliper uses a LCD to show the measurement. Properly maintain the measuring surfaces of the caliper. There must not be any dirt or burrs between the tool and the object being measured. Never force the caliper closed around an object; close the caliper around the highest point so it can be removed with a slight drag. Some calipers require calibration. Always refer to the manufacturer's instructions when using a new or unfamiliar caliper.



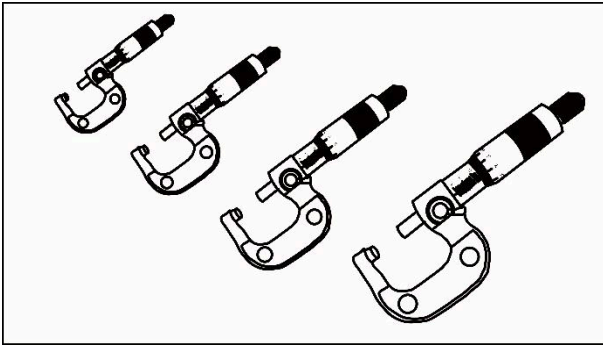
To read a vernier caliper, refer to left. The fixed scale is marked in 1 mm increments. Ten individual lines on the fixed scale equal 1 cm. The moveable scale is marked in 0.05 mm (hundredth) increments. To obtain a reading, establish the first number by the location of the 0 line on the moveable scale in relation to the first line to the left on the fixed scale. In this example, the number is 10 mm. To determine the next number, note which of the lines on the movable scale align with a mark on the fixed scale? Number of lines will seem close, but only one will align exactly. In this case, 0.50 mm is the reading to add to the first number. The result of adding 10 mm and 0.50 mm is a measurement of 10.50 mm.

Micrometers

A micrometer is an instrument designed for linear measurement using the decimal divisions of the inch or meter. While there are many types and styles of micrometers, most of the procedures in this manual call for an outside micrometer. The outside micrometer is used to measure the outside diameter of cylindrical forms and the thicknesses of materials.

A micrometer's size indicates the minimum and maximum size of a part that it can measure. The usual sizes are 0-25 mm (0-1 in.), 25-50 mm (1-2 in.), 50-75 mm (2-3 in.) and 75-100 mm (3-4 in.).

Micrometers that cover a wider range of measurements are available. These use a large frame with interchangeable anvils of various lengths. This type of micrometer offers cost savings; however, its overall size may make it less convenient.



Adjustment

Before using a micrometer, check its adjustment as follows

1. Clean the anvil and spindle faces.

2A. To check a 0-1 in. or 0-25 mm micrometer:

a. Turn the thimble until the spindle contacts the anvil. If the micrometer has a ratchet stop, use it to ensure the proper amount of pressure is applied.

b. If the adjustment is correct, the 0 mark on the thimble will align exactly with the 0 mark on the sleeve line. If the marks do not align, the micrometer is out of adjustment.

c. Follow the manufacturer's instructions to adjust the micrometer.

2B. To check a micrometer larger than 1 in. or 25 mm, use the standard gauge supplied by the manufacturer. A standard gauge is a steel block, disc or rod that is machined to an exact size.

a. Place the standard gauge between the spindle and anvil and measure its outside diameter or length. If the micrometer has a ratchet stop, use it to ensure the proper amount of pressure is applied.

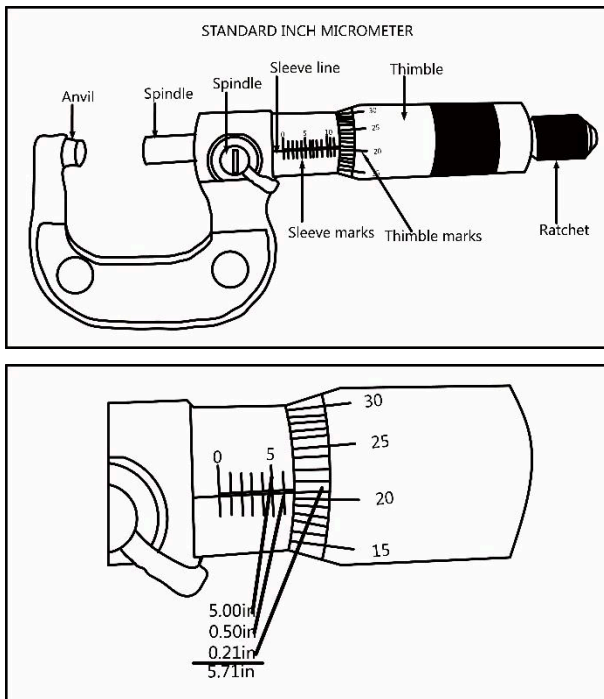
b. If the adjustment is correct, the 0 mark on the thimble will align exactly with the 0 mark on the sleeve line. If the marks do not align, the micrometer is out of adjustment.

c. Follow the manufacturer's instructions to adjust the micrometer

Care

Micrometers are precision instruments. They must be used and maintained with great care. Note the following:

1. Store micrometers in protective cases or separate padded drawers in a toolbox.
2. When in storage, make sure the spindle and anvil faces do not contact each other or another object. If they do, temperature changes and commission may damage the contact faces.
3. Do not clean a micrometer with compressed air. Dirt forced into the tool causes wear.
4. Lubricate micrometers to prevent corrosion.



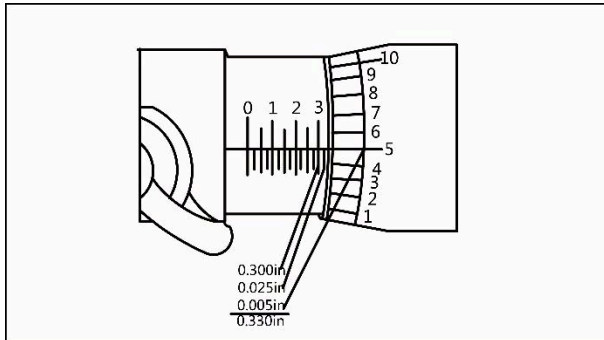
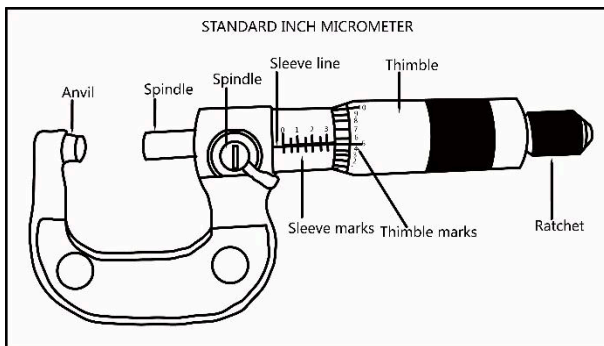
Metric micrometer

The standard metric micrometer is accurate to one hundredth of a millimeter (0.01 mm). The sleeve line is graduated in millimeter and half millimeter increments. The marks on the upper half of the sleeve line equal 1.00 mm. Each fifth mark above the sleeve line is identified with number. The number sequence depends on the size of the micrometer. A 0-25 mm micrometer, for example, will have sleeve marks numbered 0 through 25 in 5 mm increments. This numbering sequence continues with larger micrometers. On all metric micrometers, each mark on the lower half of the sleeve equals 0.50 mm.

The tapered end of the thimble has 50 lines marked around it. Each mark equals 0.01 mm. One complete turn the thimble aligns its 0 mark with the first line on the lower half of the sleeve line, or 0.50 mm.

When reading a metric micrometer, add the number of millimeters and half-millimeters on the sleeve line to the number of one one-hundredth millimeters on the thimble. Perform the following steps while referring to Figure 33.

1. Read the upper half of the sleeve line and count the number of lines visible. Each upper line equals 1 mm.
2. See if the half-millimeter line is visible on the lower sleeve line. If so, add 0.50 mm to the reading in Step 1.
3. Read the thimble mark that aligns with the sleeve line. Each thimble mark equals 0.01 mm.
4. If a thimble mark does not align exactly with the sleeve line, estimate the amount between the lines. For accurate readings in two-thousandths of a millimeter (0.002 mm), use a metric vernier micrometer.
5. Add the readings from Steps 1-4.



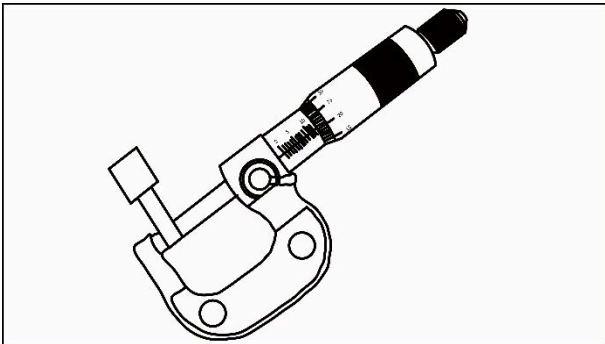
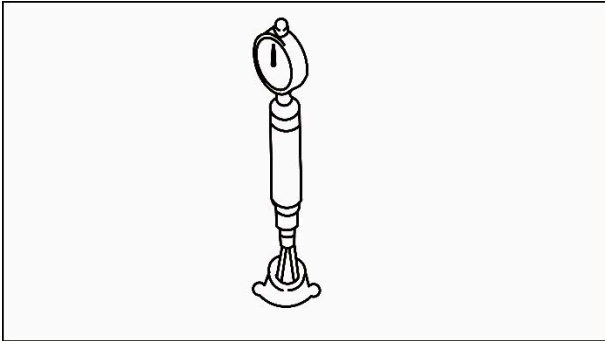
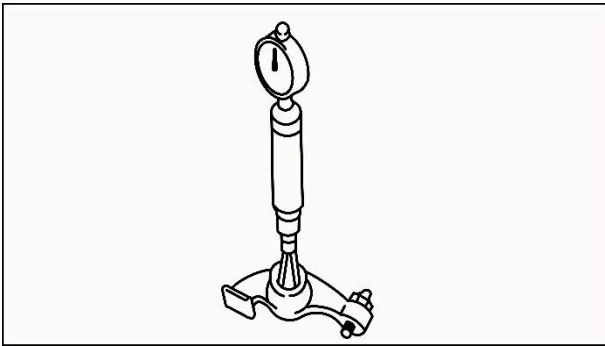
Standard inch micrometer

The standard inch micrometer is accurate to one-thousandth of an inch or 0.001. The sleeve is marked in 0.025 in. increments. Every fourth sleeve mark is numbered 1,2,3,4,5,6,7,8,9. These numbers indicate 0.100, 0.200, 0.300, and so on.

The tapered end of the thimble has 25 lines marked around it. Each mark equals 0.001 in. One complete turn of the thimble will align its zero mark with the first mark on the sleeve or 0.025 in.

To read a standard inch micrometer, perform the following steps and refer to the diagram.

1. Read the sleeve and find the largest number visible. Each sleeve number equals 0.100 in.
2. Count the number of lines between the numbered sleeve mark and the edge of the thimble. Each sleeve mark equals 0.025 in.
3. Read the thimble mark that aligns with the sleeve line. Each thimble mark equals 0.01 in.
4. If a thimble mark does not align exactly with the sleeve line, estimate the amount between the lines. For accurate readings in ten-thousandths of a inch (0.0001 in),use a Vernier inch micrometer.
5. Add the readings from Steps 1-4.

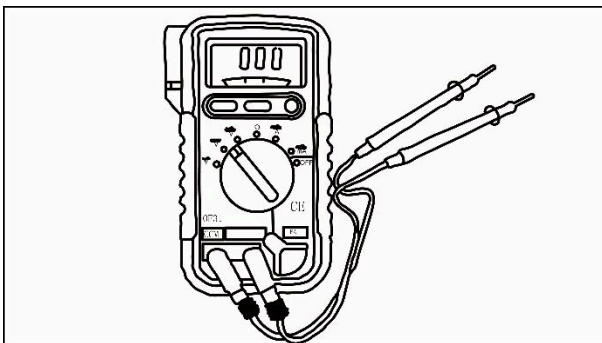
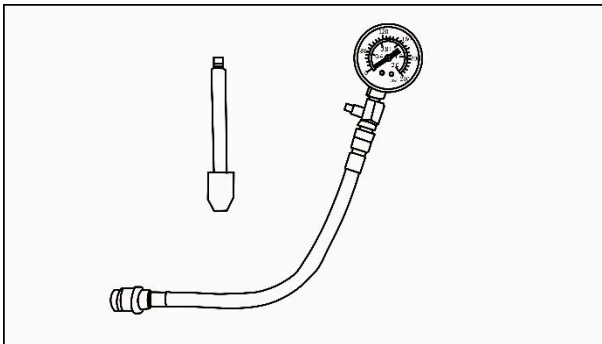
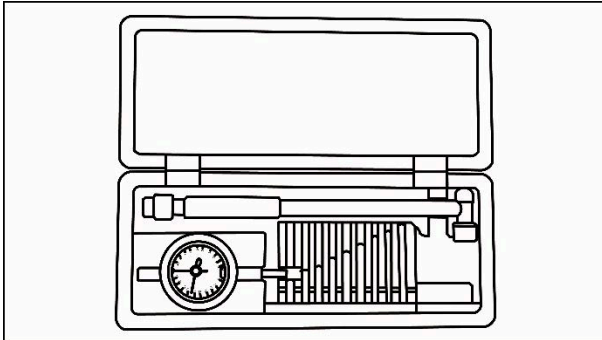
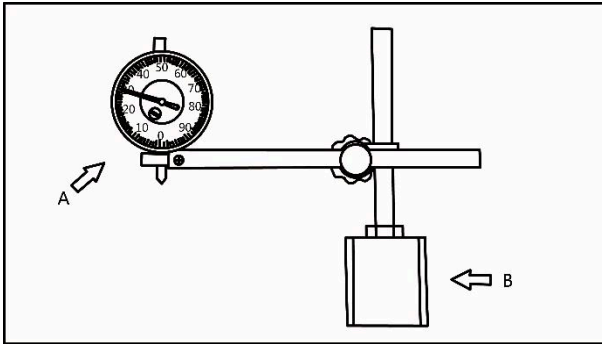


Telescoping and Small Bore Gauges

Use telescoping gauges and small whole gauges to measure bores. Neither gauge has a scale for direct readings. An outside micrometer must be used to determine the reading.

To use a telescoping gauge, select the correct size gauge for the bore. Compress the moveable post and carefully insert the gauge into the bore. Move the gauge in the bore to make sure it is centered. Tighten the knurled end of the gauge to hold the moveable post in position. Remove the gauge and measure the length of the posts. Telescoping gauge is typically used to measure cylinder bores.

To use a small whole gauge, select the correct size gauge for the bore. Insert the gauge into the bore. Tighten the knurled end of the gauge to carefully expand the gauge fingers to the limit within the bore. Do not over tighten the gauge; there is no built-in release. Excessive tightening can damage the bore surface and tool. Remove the gauge and measure the outside dimension with a micrometer. Small whole gauges are typically used to measure valve guides.



Dial Indicator

A dial indicator is a gauge with a dial face and needle used to measure variations in dimensions and movements. Measuring brake rotor run out is a typical use for a dial indicator.

Dial indicators are available in various ranges and graduations and with three types of mounting bases: magnetic, clamp or screw-in stud.

A cylinder bore gauge is similar to a dial indicator. The gauge set shown in consists of a dial indicator, handle, and different length adapters (anvils) to fit the gauge to various bore sizes. The bore gauge is used to measure bore size, taper and out-of-round. When using a bore gauge, follow the manufacturer's instructions.

Compression Gauge

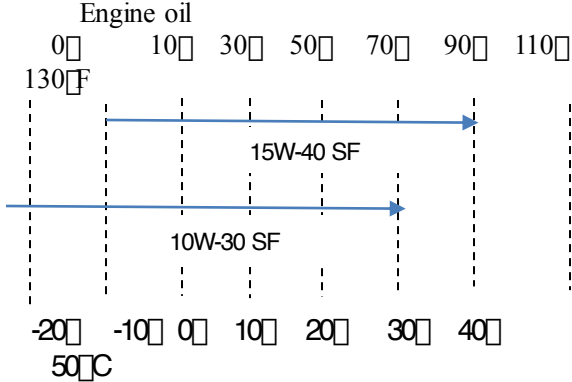
A compression gauge measures combustion chamber(cylinder) pressure, usually in psi or kg/cm2 The gauge adapter is either inserted and held in place or screwed into the spark plug hole to obtain the reading. Disable the engine so it will not start and hold the throttle in the wide-open position when performing a compression test. An engine that does not have adequate compression cannot be properly tuned. Refer to Chapter Three.

Millimeter

A millimeter is an essential tool for electrical system diagnosis. The voltage function indicates the voltage applied or available to various electrical components. The ohmmeter function tests circuits for continuity, or lack of continuity, and measures the resistance of a circuit. Some manufacturers' specifications for electrical components are based on results using a specific test meter. Results may vary if using a meter not recommended by the manufacturer. Such requirements are noted when applicable.

2 SPECIFICATIONS

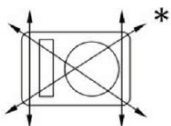
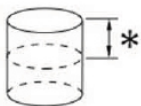
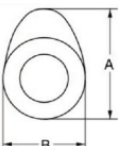
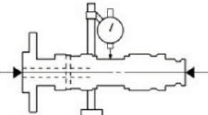
General specifications

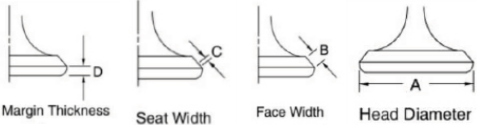
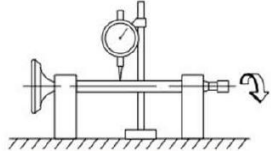
Item	Standard	
Model code	Xwolf 700	Xwolf 700L
Dimensions Overall length Overall width Overall height Seat height Wheelbase Minimum ground clearance Minimum turning radius	2,040mm (80.3 in) 1,180mm (46.5 in) 1,240mm (48.8 in) 8,90mm (35.0 in) 1,300mm (51.2 in) 280mm (11.0 in) 3,600mm (163.8 in)	2,220 mm (87.4 in) 1,180 mm (46.5 in) 1385 mm (54.5 in) 8,90 mm (35.0 in) 1,480 mm (58.3 in) 280 mm (11.0 in) 4,160 mm (163.8 in)
Basic weight With oil and fuel	365kg(805 lb)	395 kg (871 lb)
Engine Engine type Cylinder arrangement Displacement Bore × stroke Compression ratio Standard compression pressure (at sea level) Starting system	Liquid-cooled 4-stroke, SOHC Forward-inclined single cylinder 686.0 cm ³ (41.86 cu. in) 102.0 × 84.0 mm (4.02 × 3.31 in) 9.5 : 1 450 kPa (4.50 kg/cm ² , 64.0 psi) Electric starter	
Lubrication system	Wet sump	
Oil type or grade Engine oil  Final gear oil Differential gear oil	API service SE, SF, SG type or higher JASO standard MA SAE 80W/90 gear oil SAE 80W/90 gear oil	

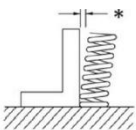
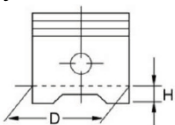
Item	Standard
Oil quantity	
Engine oil	
Periodic oil change	1.90 L (1.68 Imp qt, 2.00 US qt)
With oil filter replacement	2.00 L (1.77 Imp qt, 2.11 US qt)
Total amount	2.30 L (2.04 Imp qt, 2.42 US qt)
Final gear oil	
Periodic oil change	0.22 L (0.19 Imp qt, 0.23 US qt)
Total amount	0.25 L (0.22 Imp qt, 0.26 US qt)
Differential gear caseoil	
Periodic oil change	0.22 L (0.19 Imp qt, 0.23 US qt)
Total amount	0.25 L (0.22 Imp qt, 0.26 US qt)
Radiator capacity(including all routes)	2.7 L (2.4 Imp qt, 2.8 US qt)
Air filter	Dry type element
Fuel	
Type	Unleaded gasoline only
Fuel tank capacity	23.0 L (5.06 Imp gal, 6.07 US gal)
Fuel reserve amount	4.5 L (0.99 Imp gal, 1.19 US gal)
Fuel injector	
Type/quantity	6118A/1
Manufacturer	DELPHI
Spark plug	
Type/manufacturer	DCPR8E (NGK)
Spark plug gap	0.8~1.0 mm(0.031~ 0.039 in)
Clutch type	Wet, centrifugal automatic
Transmission	
Primary reduction system	V-belt
Secondary reduction system	Shaft drive
Secondary reduction ratio	41/21 × 24/18 × 33/9 (9.544)
Transmission type	CVT
Operation	Right hand operation
Single speed automatic	2.37 ~ 0.73 : 1
Sub transmission ratio	5.359
high	4.165
Reverse gear	4.288
Chassis	
Frame type	Steel tube frame
Caster angle	5°
Camber angle	0°
Kingpin angle	10°
Kingpin offset	0 mm (0 in)
Trail	26.0 mm (1.02 in)
Tread front (STD)	940.0 mm (37.0 in)
Tread rear (STD)	910.0 mm (35.8in)
Toe-in (with tires touching the ground)	0 ~ 10.0 mm (0 ~ 0.39 in)

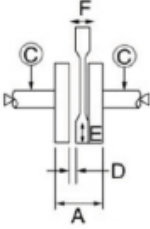
Item		Standard
Tire		
Type	front	Tubeless
rear		Tubeless
Size	front	AT25 × 8-12
rear		AT25 × 10-12
Manufacturer/model	front	ARISUN
rear		ARISUN
Tire pressure (cold tire)		
Maximum load*		230.0 kg (507 lb)
Off-road riding	front	45 kPa (6.5 psi)
rear		45 kPa (6.5 psi)
*Load is total weight of cargo, rider, accessories, and tongue		
Brake		
Front brake	type	Dual disc brake
operation		Right hand and right foot operation
Rear brake	type	Dual disc brake
operation		Right foot operation
Suspension		
Front suspension		Double wishbone
Rear suspension		Double wishbone
Shock absorber		
Front shock absorber		Coil spring/oil damper
Rear shock absorber		Coil spring/oil damper
Wheel travel		
Front wheel travel		190 mm (7.5 in)
Rear wheel travel		230 mm (9.1 in)
Electrical system		
Ignition system		Transistorized coil ignition (digital)
Generator system		AC magneto
Battery type		6MF32L-BS
Battery capacity		12 V 32.0 Ah
Bulb type		Krypton type
Bulb voltage/wattage ×quantity		
Headlight		12 V 12W/120W/5W/3.8W×2
Tail/brake light		12 V 5.0W/4W/4W×2
Indicator light		
Neutral indicator light		LED
Reverse indicator light		LED
Coolant temperature warning light		LED
Engine trouble warning light		LED
EPS warning light		LED
Park indicator light		LED
On-command four-wheel drive/differential gear lock indicator		LED
High-range indicator light		LED
Low-range indicator light		LED
Differential gear lock indicator light		LED

Engine specifications

Item	Standard	Limit
Cylinder head Maximum war page 	----	0.03 mm (0.0012 in)
Cylinder Bore Measuring point  Maximum taper Out of round	102.000 ~ 102.010 mm (4.0157 ~ 4.0161 in) 50.0 mm (1.97 in)	102.080 mm (4.0189 in) ---- 0.05 mm (0.002 in) 0.05 mm (0.002 in)
Camshaft Drive system Camshaft lobe dimensions  Intake measurement “B” Exhaust measurement “A” “B” Maximum camshaft run out 	Chain drive (left) 40.861 mm ~ 40.961 mm (1.6087 ~ 1.6126 in) 33.950 mm ~ 34.050 mm (1.3366 ~ 1.3406 in) 40.569 mm ~ 40.669 mm (1.5972 ~ 1.6011 in) 33.950 mm ~ 34.050 mm (1.3366 ~ 1.3406 in)	---- 40.761 mm (1.6048 in) 33.850 mm (1.3327 in) 40.469 mm (1.5933 in) 33.850 mm (1.3327 in) 0.015 mm (0.0006 in)

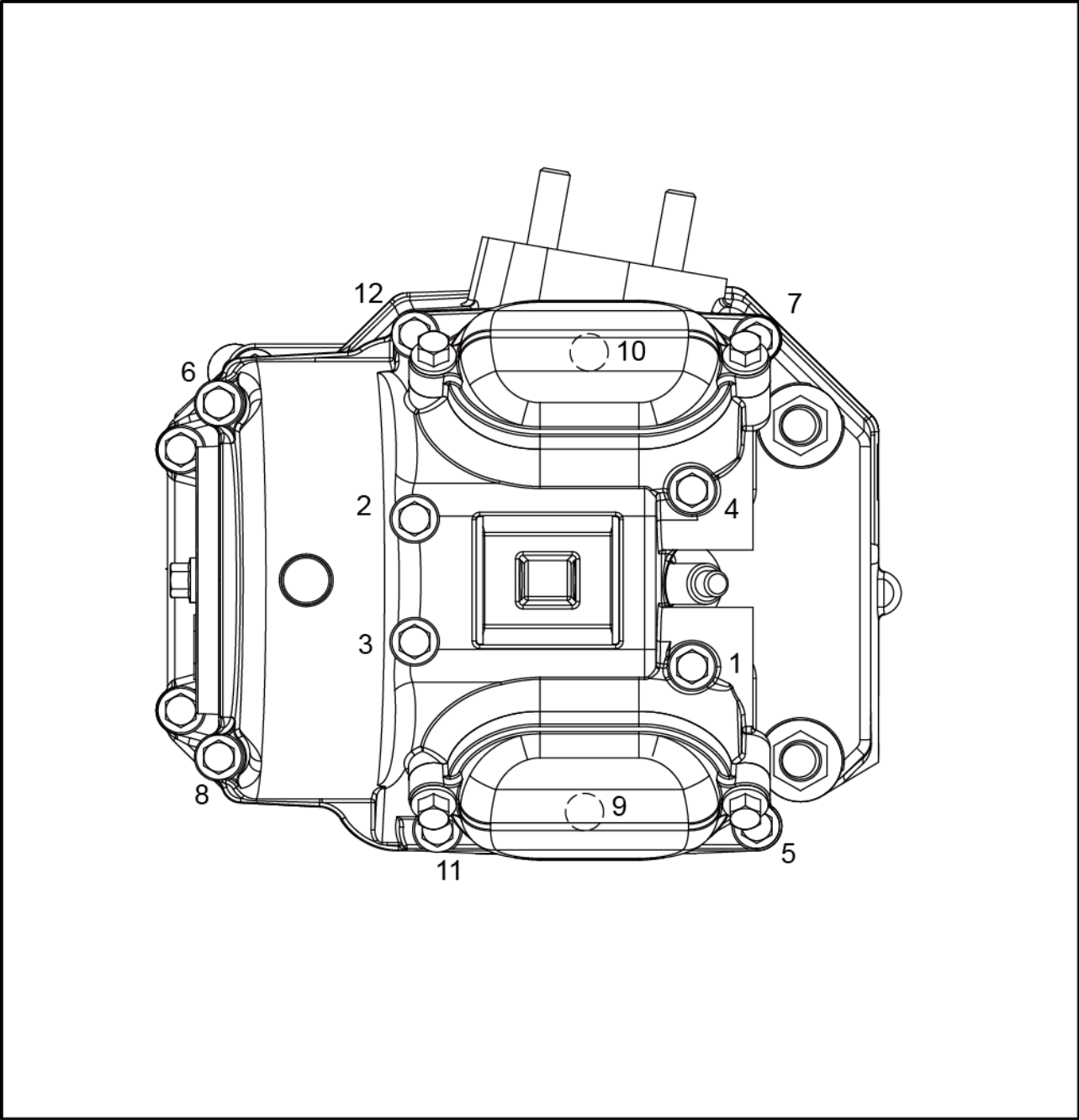
Item	Standard	Limit
Timing chain		
Model/number of links	104	...
Tensioning system	Automatic	...
Rocker arm/rocker arm shaft		
Rocker arm inside diameter	16.000 ~ 16.018 mm (0.6299 ~ 0.6306 in)	...
Shaft outside diameter	15.976 ~ 15.995 mm (0.6290 ~ 0.6297 in)	...
Rocker-arm-to-rocker-arm-shaft clearance	0.005 ~ 0.042 mm (0.0002 ~ 0.0017 in)	...
Valve, Valve seat, Valve guide		
Valve clearance intake (cold)	0.08 ~ 0.15 mm (0.0032 ~ 0.0059 in)	...
Valve clearance exhaust (cold)	0.1 ~ 0.15 mm (0.0039 ~ 0.0059 in)	...
Valve dimensions		
 Margin Thickness Seat Width Face Width Head Diameter		
Valve head diameter "A"		
Intake		
Exhaust	36.92 ~ 37.08 mm (1.4535 ~ 1.4598 in)	...
Valve face width "B"		
Intake	32.92 ~ 33.08 mm (1.2961 ~ 1.3024 in)	...
Exhaust	1.98 mm (0.7795 in)	...
Valve seat width "C"		
Intake	1.95 mm (0.7677 in)	...
Exhaust	1.05 ~ 1.35 mm (0.0413 ~ 0.0531 in)	1.75 mm (0.0689 in)
Valve margin thickness "D"		
Intake	1.25 ~ 1.55 mm (0.0492 ~ 0.0610 in)	1.95 mm (0.0768 in)
Exhaust	0.8 ~ 1.2 mm (0.0315 ~ 0.0472 in)	
Valve guide inside diameter		
Intake	1.02 ~ 1.42 mm (0.0402 ~ 0.0559 in)	
Exhaust	6.008 ~ 6.018 mm (0.2365 ~ 0.2369 in)	6.050 mm (0.2382 in)
	6.008 ~ 6.018 mm (0.2365 ~ 0.2369 in)	6.050 mm (0.2382 in)
Valve-stem-valve-guide clearance		
Intake	0.028 ~ 0.052 mm (0.0011 ~ 0.0020 in)	0.080 mm (0.0031 in)
Exhaust	0.038 ~ 0.062 mm (0.0015 ~ 0.0024 in)	0.100 mm (0.0039 in)
Valve stem run out	...	0.040 mm (0.0016 in)
		

Item	Standard	Limit
Valve spring		
Free length		
Intake	46.37 mm (1.8256 in)	44.05 mm (1.73 in)
Exhaust	46.37 mm (1.8256 in)	44.05 mm (1.73 in)
Installed length (valve closed)		
Intake	37.00 mm (1.4567 in)	...
Exhaust	37.00 mm (1.4567 in)	...
Compressed spring force (installed)		
Intake	226 ~ 254 N (23.05 ~ 25.90 kgf, 50.81 ~ 57.10 lb)	...
Exhaust	226 ~ 254 N (23.05 ~ 25.90 kgf, 50.81 ~ 57.10 lb)	...
Spring tilt *		
		
Intake	...	2.5°/1.80 mm (2.5°/0.071 in)
Exhaust	...	2.5°/1.80 mm (2.5°/0.071 in)
Winding direction (top view)		
Intake	Clockwise	...
Exhaust	Clockwise	...
Piston		
Piston-to-cylinder clearance	0.005 ~ 0.05 mm (0.0002 ~ 0.0020 in)	0.13 mm (0.051 in)
		
Diameter "D"	101.940 ~ 101.960 mm (4.0133 ~ 4.0142 in)	...
Height "H"	10.00 mm (0.39 in)	...
Offset	0.50 mm (0.0197 in)	...
Offset direction	Intake side	...
Piston pin bore inside diameter	22.012 ~ 22.018 mm (0.8666 ~ 0.8669 in)	22.045 mm (0.8680 in)
Piston pin bore outside diameter	21.996 ~ 22.000 mm (0.8660 ~ 0.8661 in)	21.976 mm (0.8652 in)
Piston-pin-to-piston-pin-bore clearance	0.012 ~ 0.022 mm (0.0005 ~ 0.0009 in)	0.069 mm (0.0027 in)

Item	Standard	Limit
Piston rings Top ring  Ring type Dimensions(B×T) End gap (installed) Ring side clearance 2nd ring  Ring type Dimensions(B×T) End gap (installed) Ring side clearance	Barrel 1.20×3.80 mm (0.05×0.15 in) 0.20 ~ 0.35 mm (0.008 ~ 0.014 in) 0.030 ~ 0.070 mm (0.0012 ~ 0.0028 in) Taper 1.50×4.20 mm (0.06×0.17 in) 0.20 ~ 0.35 mm (0.008 ~ 0.014 in) 0.020 ~ 0.060 mm (0.0008 ~ 0.0024 in)	 0.60 mm (0.024 in) 0.12 mm (0.0047 in) 0.7 mm (0.028 in) 0.13 mm (0.0051 in)
Oil ring  Dimensions(B×T) End gap (installed) Ring side clearance	2.50 ×2.75 mm (0.10 × 0.11 in) 0.20 ~ 0.70 mm (0.008 ~ 0.028 in) 0.030 ~ 0.170 mm (0.0012 ~ 0.0067 in)	
Crankshaft  Crank width “A” Maximum run out “C” Big end side clearance “D” Big end radial clearance “E” Small end free play “F”	74.9 ~ 75.00 mm (2.949 ~ 2.953 in) ... 0.250 ~ 0.550 mm (0.0098 ~ 0.0217 in) 0.003 ~ 0.018 mm (0.0001 ~ 0.0007 in) ...	... 0.050 mm (0.0020 in) 0.9 mm (0.04 in)
Balancer Balancer drive method	Gear	...

Item	Standard	Limit
Automatic centrifugal clutch		
Clutch shoe thickness	1.5 mm (0.06 in)	1.0mm (0.04 in)
Clutch-in revolution	1,800 ~ 2,200r/min	...
Clutch-stall revolution	3,400 ~ 3,800r/min	...
V-belt		
V-belt width	31.4 mm (1.24 in)	28.3 mm (1.11 in)
Transmission		
Maximum main axle run out	...	0.06 mm (0.0024 in)
Maximum drive axle run out	...	0.06 mm (0.0024 in)
Shifting mechanism		
Shift mechanism type	Shift drum and guide bar	...
Decompression device		
Device type	Auto decamp	...
Throttle body		
Model ×quantity	ATV700×1	...
Engine idle speed	1,400 ~ 1,600r/min	...
Intake vacuum	35.0 ~ 39.0 kpa (300 mmHg, 11.8 inHg)	...
Fuel pump		
Pump type	Electrical	...
Oil filter type	Cartridge (paper)	...
Oil pump		
Oil pump type	Tracheid pump	...
Inner-rotor-to-outer-rotor-tip clearance	Less than 0.15 mm (0.0059 in)	0.20 mm (0.0079 in)
Outer-rotor-to-oil-pump-housing clearance	0.140 ~ 0.220mm (0.0055 ~ 0.0087in)	0.29 mm (0.0114 in)
Oil-pump-housing-to-inner-and-outer-rotor clearance	0.06 ~ 0.11 mm (0.0024 ~ 0.0043 in)	0.17 mm (0.0067 in)
Oil pressure (hot)	50.0 kPa at 1,600 r/min (0.5 kg/cm ² atr/min 1,600 r/min, 7.1 psi at 1,600 r/min)	...
Pressure check location	Cylinder head	...
Cooling system		
Radiator core		
Width	338.0 mm (13.3 in)	...
Height	260.0 mm (10.23 in)	...
Depth	43.8 mm (1.72 in)	...
Radiator cap opening pressure	110 kPa (1kg/cm ² , 15.95psi)	...
Cooling reservoir capacity		
Up to the maximum level mark	0.16 L (0.14 lmp qt, 0.17 US qt)	...
From low to full lever	0.39 L (0.35 lmp qu, 0.41 US qt)	...
Water pump		
Water pump type	Single-suction centrifugal pump	...
Reduction ratio	32/31 (1.032)	...

Cylinder head tightening sequence



Chassis specifications

Item	Standard	Limit
Steering system		
Steering bearing type	Ball and race bearing	----
Steering tension	50 N (5.0 kgf)	----
Front suspension		
Shock absorber travel	82 mm (3.57 in)	----
Spring free length	275 mm (10.83 in)	----
Installed length	254 mm (10.0 in)	----
Spring rate (K1)	34.4 N/mm (3.51 kg/mm, 196.57 lb/in)	----
Spring rate (K2)	83.38 N/mm (8.5 kg/mm, 476.46 lb/in)	----
Spring stroke (K1)	0~ 35 mm (0 ~ 1.38 in)	----
Spring stroke (K2)	35 ~ 82 mm (1.38 ~ 3.57 in)	----
Optional spring available	No	----
Rear suspension		
Shock absorber travel	104.5 mm (4.11 in)	----
Spring free length	330.0 mm (12.99 in)	----
Installed length	305.2 mm (12.02 in)	----
Spring rate (K1)	35.78 N/mm (3.65 kg/mm, 204.45 lb/in)	----
Spring rate (K2)	65.6 N/mm (6.69 kg/mm, 374.86 lb/in)	----
Spring stroke (K1)	0 ~ 35 mm (0 ~ 1.38 in)	----
Spring stroke (K2)	35~ 104.5 mm (1.38 ~ 4.11 in)	----
Optional spring available	No	----
Front wheel		
Type	Panel	----
Rim size	25×8-10 or 26×9-10 AT	----
Rim material	Aluminum	----
Maximum radial wheel run out	----	2.0 mm (0.08 in)
Maximum lateral wheel run out	----	2.0 mm (0.08 in)
Rear wheel		
Type	Panel	----
Rim size	25 x 8 - 12 or 26×10-12 AT	----
Rim material	Aluminum	----
Maximum radial wheel run out	----	2.0mm (0.08 in)
Maximum lateral wheel run out	----	2.0mm (0.08 in)
Front disc brake		
Type	Dual	----
Disc outside diameter □ thickness	210.0 □ 4.0 mm (8.27 □ 0.16 in)	----
Brake disc minimum thickness	3.5 mm (0.14 in)	----
Brake disc maximum deflection	0.08mm (0.003 in)	1.0 mm
Pad thickness inner	7 mm (0.28 in)	(0.04 in)
Pad thickness outer	7 mm (0.28 in)	1.0 mm
Master cylinder inside diameter	15.80 mm (0.62 in)	(0.04 in)
Caliper cylinder inside diameter	44.5mm (1.75 in)	----
Brake fluid type	DOT 4	----

SPECIFICATIONS

Item	Standard	Limit
Rear disc brake		----
Type	Dual	----
Disc outside diameter □ thickness	210.0 □ 4.0 mm (8.27 □ 0.16 in)	----
Brake disc minimum thickness	3.5 mm (0.14 in)	----
Brake disc maximum deflection	0.08 mm (0.003 in)	1.0 mm
Pad thickness inner	5 mm (0.20 in)	(0.04 in)
Pad thickness outer	5 mm (0.20 in)	1.0 mm
Master cylinder inside diameter	22 mm (0.87 in)	(0.04 in)
Caliper cylinder inside diameter	2×25 mm (2 ×0.98 in)	----
Brake fluid type	DOT 4	----
Brake lever and brake pedal		
Brake pedal position	81mm (3.18 in)	----
Brake pedal free play	0 ~ 5.0 mm (0 ~ 0.20 in)	----
Throttle lever free play	3.0 ~ 5.0 mm (0.12 ~ 0.20 in)	----
System voltage	12 V	----
Ignition system		
Ignition timing (B.T.D.C.)	12°/1,400 r/min	----
Advancer type	Digital	----
Transistorized coil ignition		
Crankshaft position sensor resist- trance/color	459 ~ 561 at 20 °C (68 °F)/ black-green/yellow	----
ECU		
Model/manufacture	28329656 /DELPHI	----
Ignition coil		
Model/manufacture	DELPHI	----
Minimum ignition spark gap	6.0 mm (0.24 in)	----
Primary coil resistance	2.16 - 2.64 n at 20 °c (68 °F)	----
Secondary coil resistance	8.64 - 12.96 kΩat 20 °c (68 °F)	----
Spark plug cap		
Material	Resin	----
Resistance	10.0 k□	----
AC magneto		
Model/manufacture	F4T393/MITSUBISHI	----
Standard output	14.0 V 33.5 A at 5,000 r/min	----
Stator coil resistance/color	0.108 ~ 0.132 □ at 20 °C (68 °F)/white-white	----
Rectifier/regulator		
Type	Semiconductor-short-circuit	----
Model/manufacture	FH012AA/SHINDENGEN	----
No load regulated voltage (DC)	14.2 ~ 14.8 V	----
Rectifier capacity	50.0 A	----
Withstand voltage	40.0 V	----
Electric starting system		
Type	Constant mesh	----
Starter motor		
Model/manufacture	SM-13/MITSUBA	----
Power output	0.80 kW	----
Armature coil resistance	0.0250 ~ 0.0350 □ at 20 °C (68 °F)	----
Brush overall length	12.5 mm (0.49 in)	5.00 mm
Spring force	7.65 ~ 10.01 N (780 ~ 1,021 gf, 27.54 ~ 36.03 oz)	(0.20 in)
Commentator diameter	28.0 mm (1.10 in)	----
Mica undercut	0.70 mm (0.03 in)	27.0 mm (1.06 in)

Electrical specifications
Tightening torques
Engine tightening torques

Item	Part name	Thread size	Qty				Remarks
				Nm	m · kg	ft . lb	
Cylinder head (exhaust pipe)	Stud bolt	M8	2	15	1.5	11	
Cylinder head	Bolt	M8	3	30	3.0	22	
Cylinder head	Bolt	M6	10	10	1.0	7.2	
Spark plug	-	M12	1	18	1.8	13	
Oil check bolt	Bolt	M6	1	10	1.0	7.2	
Cylinder	Bolt	M10	4	50	5.0	36	
AC magneto rotor	Nut	M20	1	150	15.0	180	
Balancer driven gear	Nut	M18	1	110	11.0	79	Use a lock washer.
Thermostat cover	Bolt	M6	2	10	1.0	7.2	
Cylinder head air bleed bolt	Bolt	M6	1	10	1.0	7.2	
Valve adjusting screw	Nut	M6	4	14	1.4	10	
Timing chain guide (intake side)	Bolt	M6	1	10	1.0	7.2	
Timing chain tensioner cap	Bolt	M12	1	20	2.0	14	
Timing chain tensioner	Bolt	M6	2	10	1.0	7.2	
Camshaft sprocket cover	Bolt	M6	2	10	1.0	7.2	
Tappet cover	Bolt	M6	8	10	1.0	7.2	
Camshaft sprocket	Bolt	M7	2	20	2.0	14	
Crankcase	Bolt	M8	3	26	2.6	19	
	Bolt	M6	5	10	1.0	7.2	
	Bolt	M6	10	10	1.0	7.2	
Engine oil drain bolt	Bolt	M12	1	28	2.8	20	
Oil filter cartridge	-	M20	1	17	1.7	12	
Oil filter cartridge union bolt	Union bolt	M20	1	63	6.3	45	
Oil pipe (dipstick)	Bolt	M6	1	10	1.0	7.2	
Oil delivery pipe	Union bolt	M14	4	35	3.5	25	
Oil pump	Bolt	M6	3	10	1.0	7.2	
Air filter case	Bolt	M6	4	7	0.7	5.1	

SPECIFICATIONS

Item	Part name	Thread size	Qty	Tightening torque			Remarks
				Nm	m · kg	ft · lb	
Middle driven pinion gear bearing retainer	Nut	M65	1	110	11.0	80	Left-hand thread   
Universal joint yoke nut (middle gear side)	Nut	M16	1	97	9.7	70	
Middle driven pinion gear bearing housing	Bolt	M8	4	25	2.5	18	
Drive shaft coupling gear nut (middle gear side)	Nut	M16	1	97	9.7	70	
Primary sheave assembly	Nut	M16	1	100	10.0	72	
Secondary sheave spring retainer	Nut	M36	1	90	9.0	65	
Secondary sheave assembly	Nut	M16	1	110	11.0	80	
Shift lever cover	Bolt	M6	4	10	1.0	7.2	
Shift lever 2 assembly	Bolt	M6	1	10	1.0	7.2	
Shift drum stopper	Bolt	M14	1	18	1.8	13	
Crankcase plug bolt	Bolt	M14	1	18	1.8	13	
Select lever unit	Bolt	M6	1	10	1.0	7.2	
Shift arm	Bolt	M6	1	10	1.0	7.2	
Stator coil assembly	Bolt	M6	3	10	1.0	7.2	
Crankshaft position sensor	Bolt	M5	2	7	0.7	5.1	
Coolant temperature sensor	-	M12	1	15	1.5	11	
Gear position switch	Bolt	M6	2	10	1.0	7.2	
Reverse switch	-	M10	1	14	1.4	10	
Speed sensor	Bolt	M6	1	10	1.0	7.2	

NOTE:

Temporarily tighten the cylinder bolts to 15 Nm (1.5 m · kg, 11 ft · lb) and then tighten them to 50 Nm (5.0 m kg, 36 ft · lb).

Chassistightening torques

Item	Thread size	Tightening torque			Remarks
		Nm	m · kg	ft . lb	
Engine and front rubber damper	M10	45	4.5	33	
Engine and front rubber damper	M6	10	1.0	7.2	
Engine and rear rubber damper	M10	52	5.2	38	
Engine and rear rubber damper	M6	10	1.0	7.2	
Rubber damper and frame	M10	45	4.5	33	
Engine and suspension plate	M8	25	2.5	18	
Front differential gear case and mounting plate	M10	60	6.0	44	
Front differential gear case and mounting plate	M10	40	4.0	29	
Front differential gear case and frame	M8	25	2.5	18	
Rear differential gear case and mounting plate	M10	60	6.0	44	
Rear differential gear case and frame	M8	25	2.5	18	
Front shock absorber and frame	M10	60	6.0	44	
Front shock absorber and front lower arm	M10	60	6.0	44	
Front upper arm and frame	M10	60	6.0	44	
Front lower arm and frame	M10	60	6.0	44	
Rear shock absorber and frame	M10	60	6.0	44	
Rear shock absorber and rear lower arm	M10	60	6.0	44	
Rear upper arm and frame	M10	60	6.0	44	
Rear lower arm and frame	M10	60	6.0	44	
Rear knuckle and rear upper arm	M10	60	6.0	44	
Rear knuckle and rear lower arm	M10	60	6.0	44	
EPS and mounting plate	M8	25	2.5	18	
EPS unit and frame	M8	25	2.5	18	
Steering knuckle and front lower arm	M10	35	3.5	25	
Steering knuckle and front upper arm	M10	35	3.5	25	
Steering knuckle and tie-rod	M10	35	3.5	25	
Pitman arm and tie-rod	M10	35	3.5	25	
Pitman arm nut	M16	80	8.0	58	
Steering stem and EPS	M8	25	2.5	18	

SPECIFICATIONS

Item	Thread size	Tightening torque			Remarks
		Nm	m · kg	ft . lb	
Steering stem bracket and frame	M8	25	2.5	18	
Handlebar holder and steering stem	M8	25	2.5	18	
Stabilizer joint and rear lower arm	M10	50	5.0	36	
Stabilizer joint and stabilizer	M10	50	5.0	36	
Stabilizer holder and frame	M8	25	2.5	18	
Front wheel axle nut	M20	260	26	190	
Rear wheel axle nut	M20	260	26	190	
Front brake caliper and steering knuckle	M10	50	5.0	36	
Front brake disc and connecting disc	M8	25	2.5	18	
Connecting disc and front wheel hub	M10	55	5.5	40	
Rear brake disc and connecting disc	M8	25	2.5	18	
Connecting disc and rear wheel hub	M10	55	5.5	40	
Rear brake caliper and steering knuckle	M10	50	5.0	36	
Steering wheel and steering shaft assembly	M10	52	5.2	38	
Brake pedal support and frame	M8	25	2.5	18	
Brake pedal support and brake pedal	M10	30	3.0	22	
Intake pipe and engine	M6	10	1.0	7.2	
Intake pipe and injector cap	M6	10	10	7.2	
Exhaust pipe and engine	M8	2	2.5	18	
Muffler and frame	M10	30	3.0	22	
Front carrier and front guard	M8	30	3.0	22	
Front guard and frame	M8	30	3.0	22	
Front guard 2 and front guard	M8	30	3.0	22	
Rear guard and frame	M8	30	3.0	22	
rear carrier bracket and frame	M8	30	3.0	22	
Rear carrier and rear carrier bracket	M8	30	3.0	22	
Rear carrier and rear guard	M8	30	3.0	22	

How to use the conversion

Table

All specification data in this manual are listed in SI and METRIC UNITS.
Use this table to convert METRIC unit data to IMPERIAL unit data.

Ex.

METRIC		MULTIPLIER		IMPERIAL
**mm	×	0.03937	=	**in
2 mm	×	0.03937	=	0.08 in

Conversion table

METRIC TO IMPERIAL			
Torque	Metric unit	Multiplier	Imperial unit
		7.233	ft · lb in · lb
	cm · kg	86.794	
	cm · kg	0.0723	ft · lb
	cm · kg	0.8679	in · lb
Weight	kg	2.205	lb
	g	0.03527	oz
Speed	km/hr	0.6214	mph
Distance	km	0.6214	mi
	m	3.281	ft
	m	1.094	yd
	cm	0.3937	in
	mm	0.03937	in
Volume/ Capacity	cc (cm ³) cc	0.03527	oz (IMP liq.) cu · in
	(cm ³)	0.06102	
	lt (liter)	0.8799	qt (IMP liq.)
	lt (liter)	0.2199	gal (IMP liq.)
Misc.	kg/mm	55.997	lb/in
	kg/cm ²	14.2234	psi (lb/in ²) Fahrenheit
	Centigrade	9/5+32	
	(°C)		(°F)

General tightening torque specifications

This chart specifies tightening torques for standard fasteners with a standard ISO thread pitch. Tightening torque specifications for special components or assemblies are provided for each chapter of this manual. To avoid war page, tighten multi-fastener assemblies in a crisscross pattern and progressive stages until the specified tightening torque is reached. Unless otherwise specified, tightening torque specifications require clean, dry threads. Components should be at room temperature.

A: Distance between flats

B: Outside thread diameter

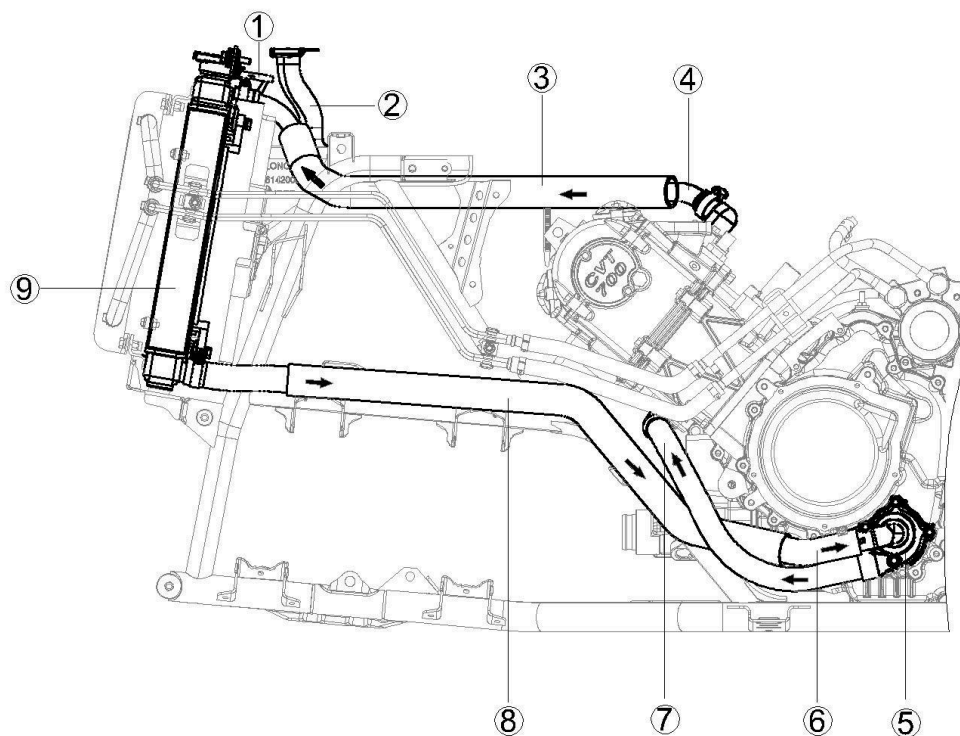
A (nut)	B (bolt)	General tightening torques		
		Nm	m · kg	ft · lb
10 mm	6 mm	6	0.6	4.3
12 mm	8 mm	15	1.5	11
14 mm	10 mm	30	3.0	22
17 mm	12 mm	55	5.5	40
19 mm	14 mm	85	8.5	61
22 mm	16 mm	130	13.0	94

Lubrication points and lubricant types
Engine

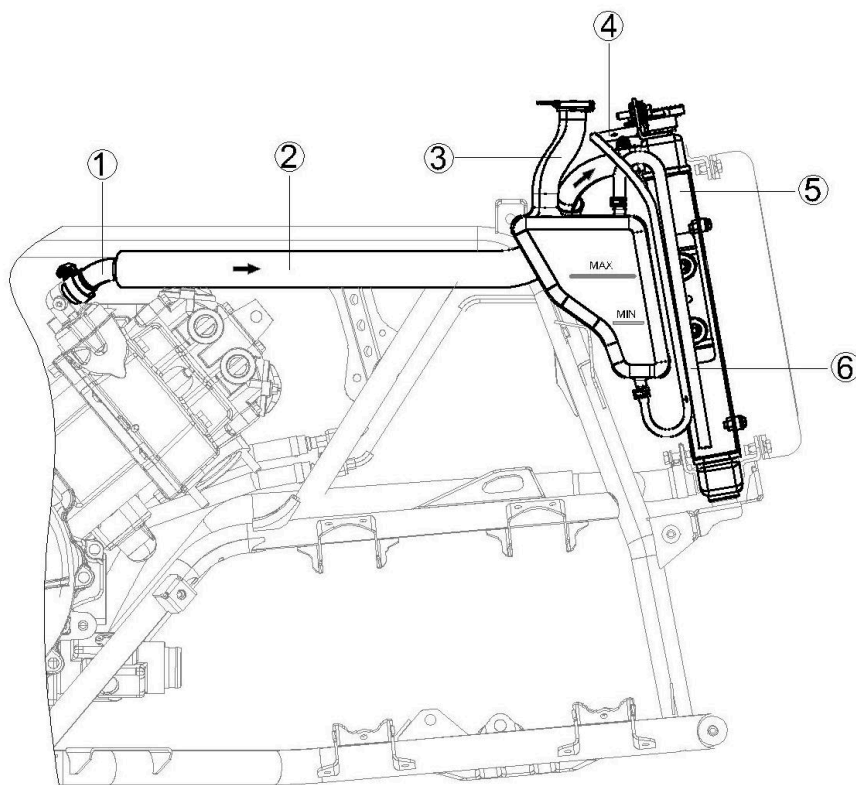
Item	Lubricant
Oil seal lips	
Bearings	
O-ring	
Cylinder head bolts	
Crankshaft pin	
Connecting rod big end thrust surface	
Crankshaft sprocket	
Inner race (crankshaft)	
Buffer boss (crankshaft)	
Crankshaft seal	
Piston pin	
Piston and ring grooves	
Valve stems (intake and exhaust)	
Valve stem ends (intake and exhaust)	
Rocker arm shafts	
Camshaft lobes	
Decompress or lever pin	
Decompress or lever spring	
Rocker arms (intake and exhaust)	
Oil pump shaft	
O-ring (oil filter cartridge)	
Water pump impeller shaft	
Dipstick mating surface	
Starter idler gear inner surface	
Starter idler gear shaft	
Starter wheel gear	
Torque limiter	
Clutch housing shaft end	
Clutch carrier assembly	
One-way clutch bearing	
Clutch dog and middle drive gear	
Reverse idle gear shaft	
Middle driven shaft splines	
Shift drum	
Shift forks and shift fork guide bar	
Ball (shift drum stopper)	
Shift lever 2 inner surface	
Shift lever 1	
Shift lever 1 gear teeth and shift lever 2 gear teeth	

Coolant flow diagrams

- | | |
|--------------------------|--------------------------|
| ① Coolant reservoir hose | ⑥ Radiator outlet pipe |
| ② Coolant reservoir | ⑦ Water pump outlet pipe |
| ③ Radiator inlet hose | ⑧ Radiator outlet hose |
| ④ Radiator inlet pipe | ⑨ Radiator |
| ⑤ Water pump | |

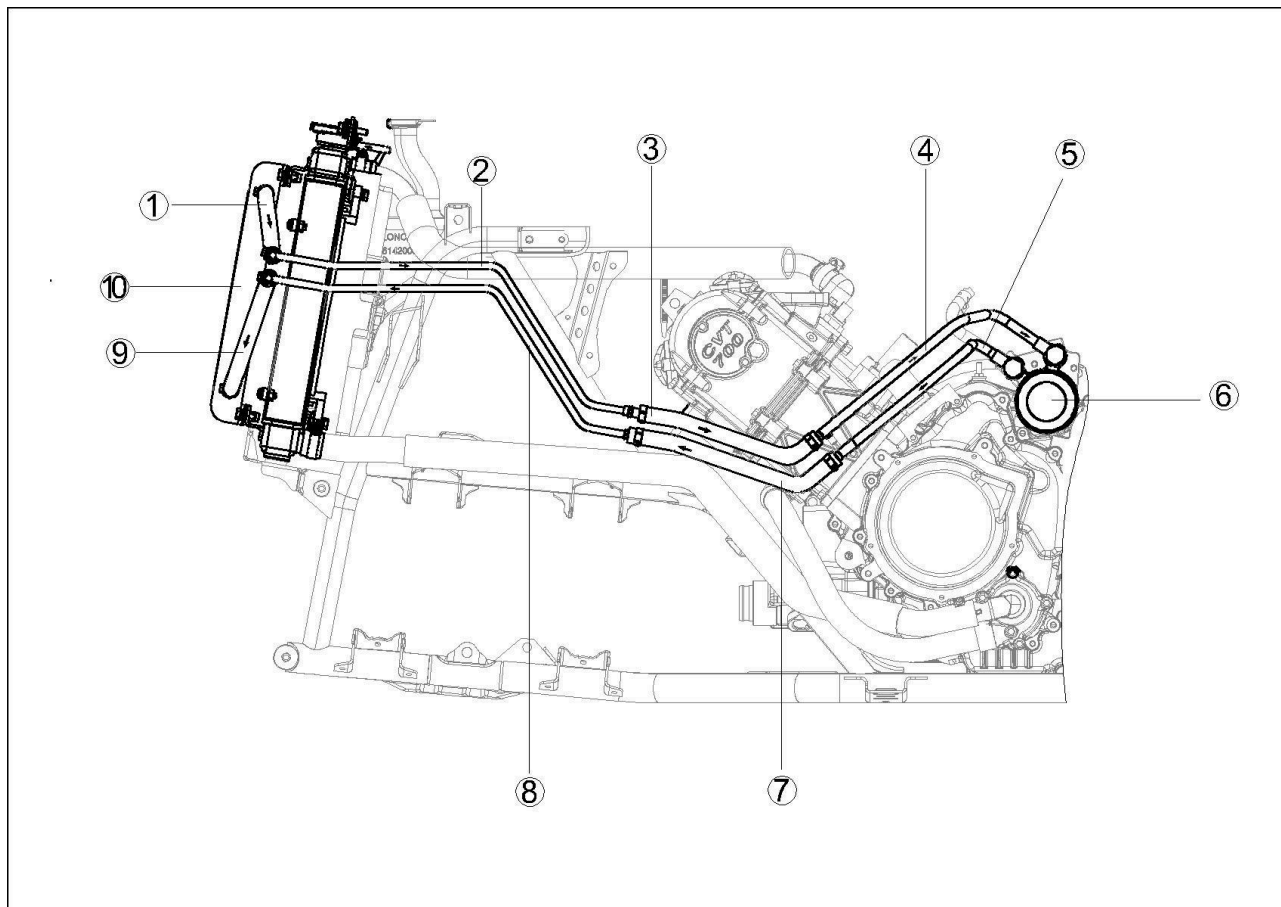


- | | |
|-----------------------|--------------------------|
| ① Radiator inlet pipe | ④ Coolant reservoir hose |
| ② Radiator inlet hose | ⑤ Coolant reservoir |
| ③ Coolant reservoir | ⑥ Water cooled valve |



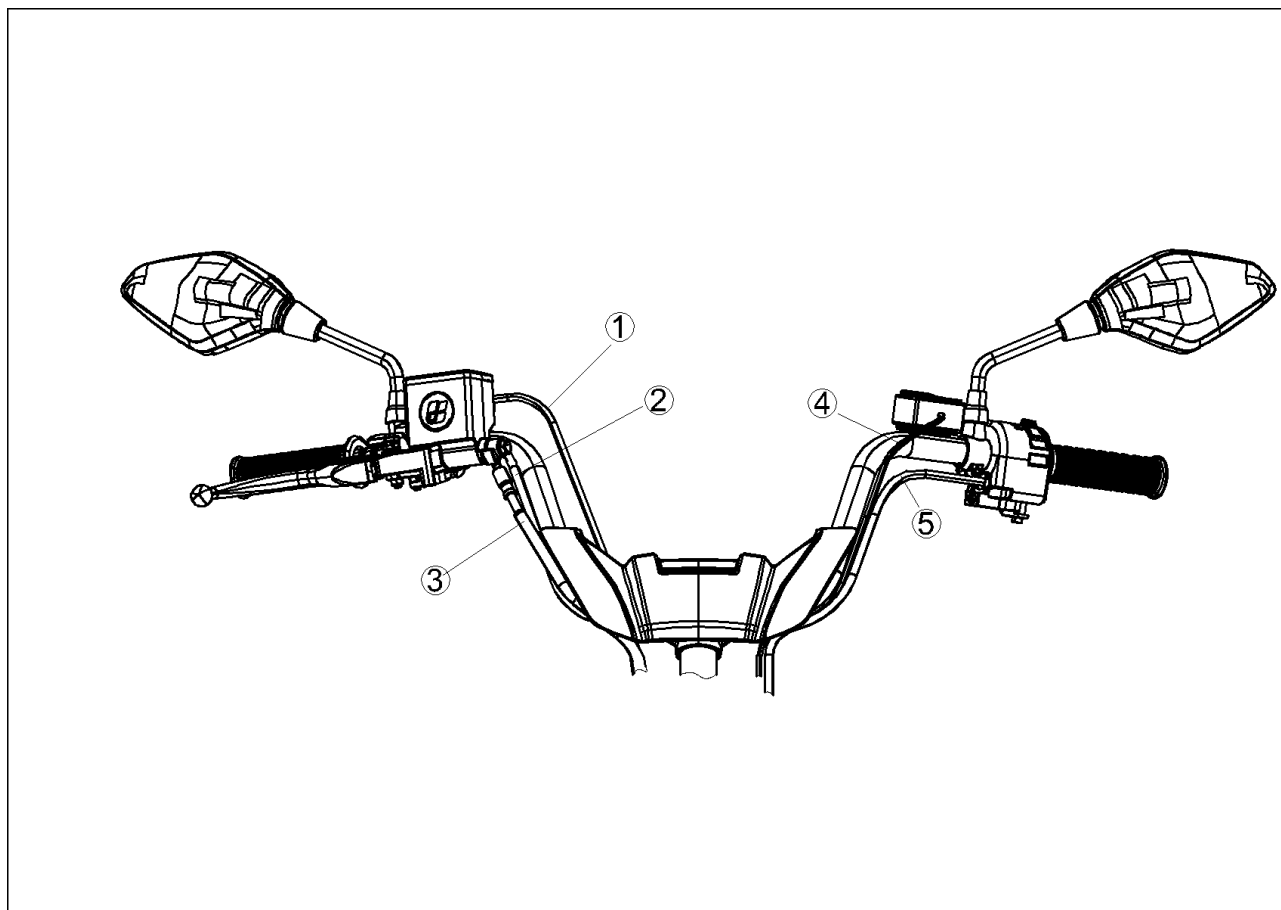
Oil flow diagrams

- | | |
|--------------------------|---------------------------|
| ① Oil cooler outlet pipe | ⑥ Oil filter cartridge |
| ② Oil cooler outlet hose | ⑦ Oil outlet pipe |
| ③ Oil inlet pipe | ⑧ Oil cooler inlet t hose |
| ④ Oil inlet hose | ⑨ Oil cooler inlet pipe |
| ⑤ Oil outlet hose | ⑩ Oil cooler |

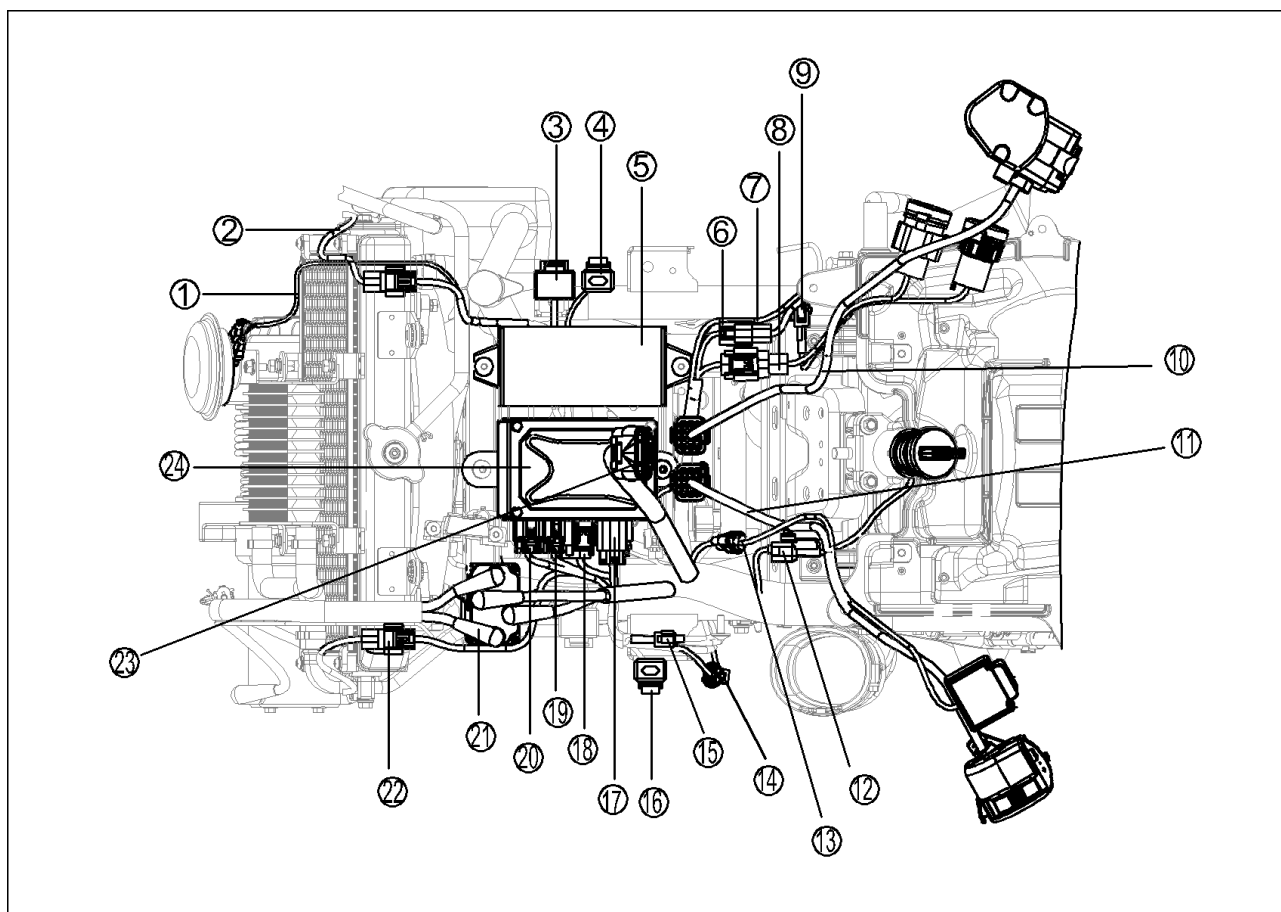


Cable routing

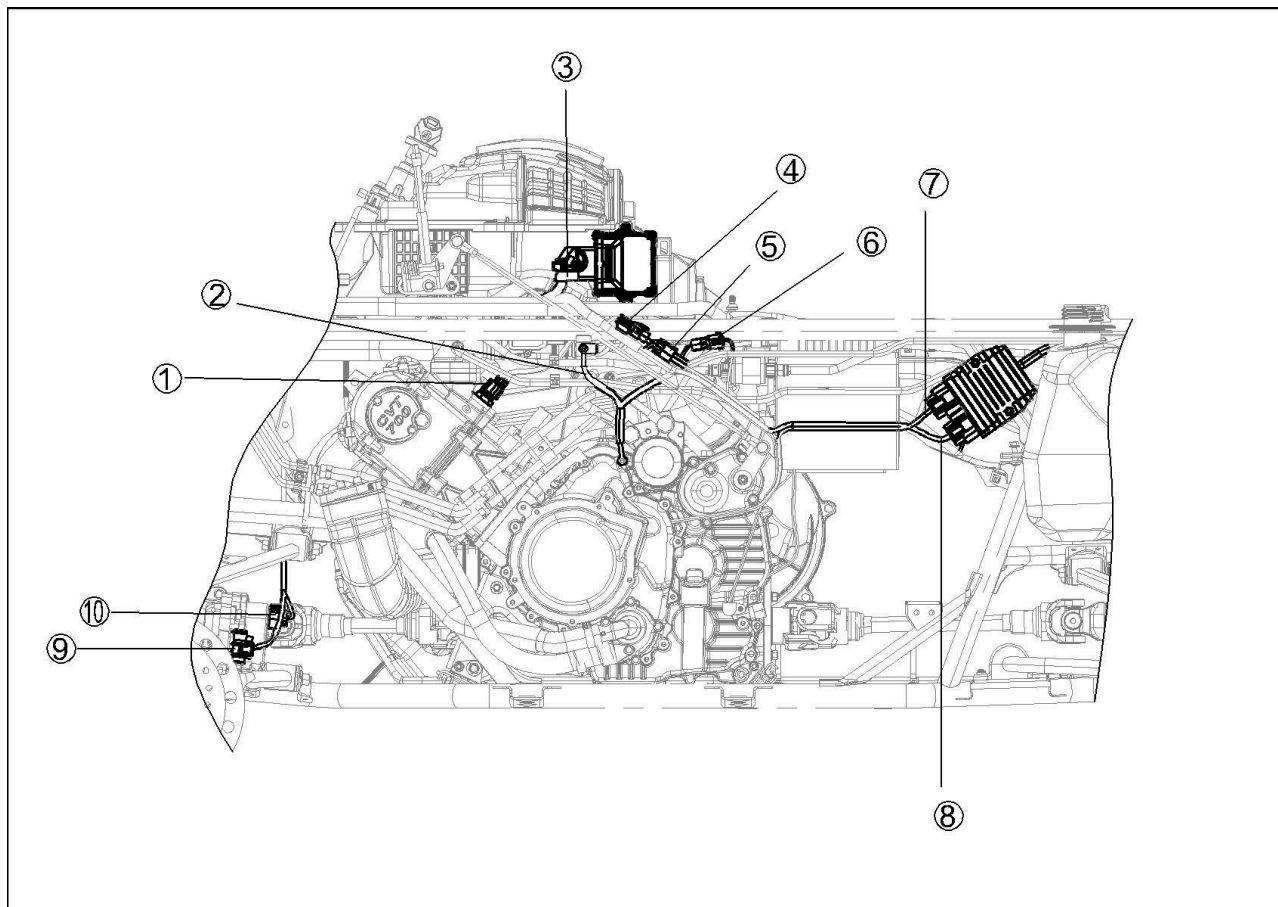
- ① Throttlecable
- ② On-command four-wheel-drivemotor switch and differential gear lock switch lead
- ③ Frontbrakehose
- ④ Left handlebar switch lead
- ⑤ Capstan control switch wire



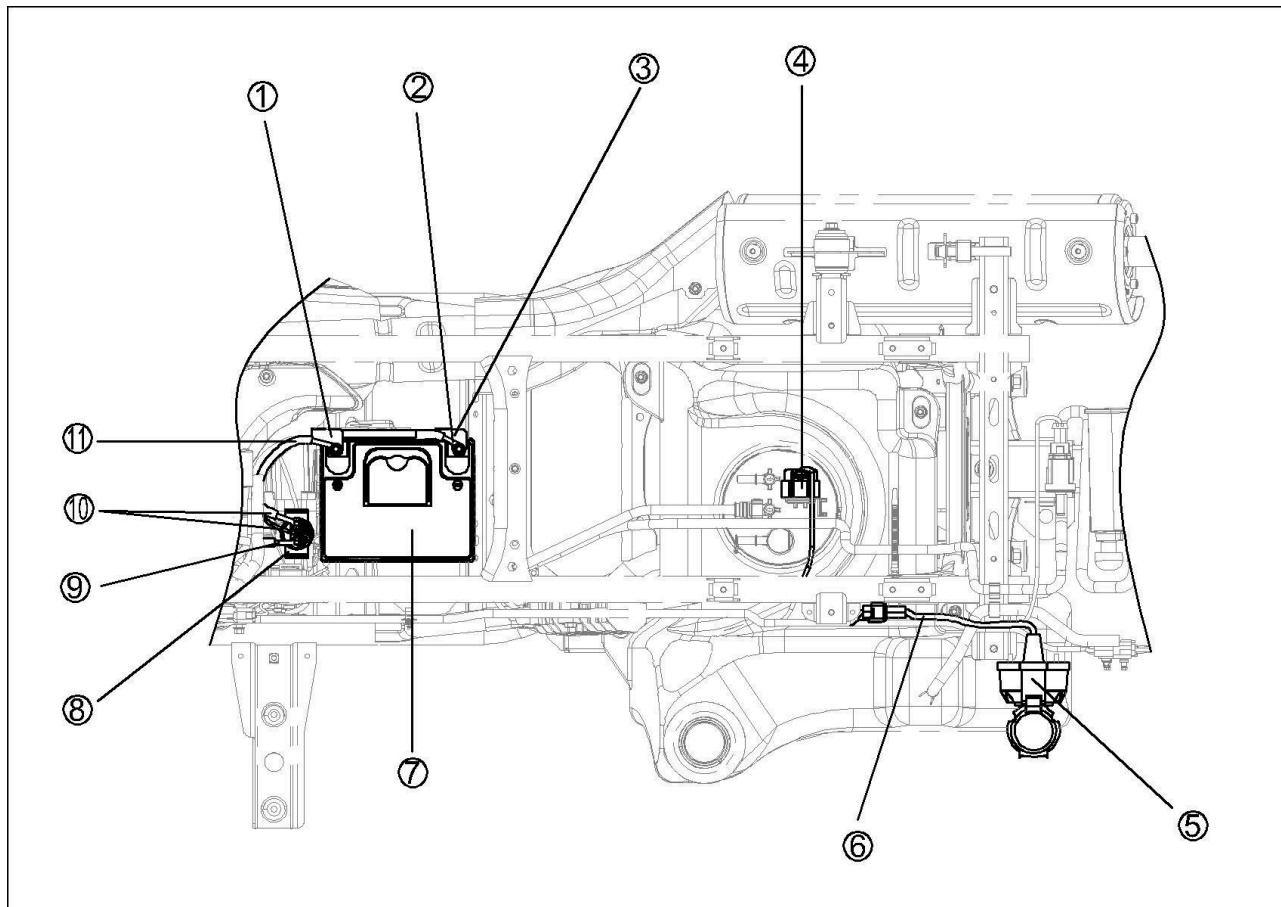
- | | |
|------------------------------------|-------------------------------|
| ① Trumpetlead | ⑬ Capstan control switch wire |
| ② Right headlight lead | ⑭ Radiator fan lead |
| ③ Alarm controller | ⑮ Rear brake lead |
| ④ Relay assy., starting | ⑯ Headlight long on relay |
| ⑤ Fusebox | ⑰ EPS lead |
| ⑥ Oxygen sensor lead | ⑱ EPS lead |
| ⑦ Brake fluid switch | ⑲ EPS lead |
| ⑧ Cigarette lighter wiring harness | ⑳ EPS lead |
| ⑨ USB lead | ㉑ Capstan control switch wire |
| ⑩ 2/4-wheel-drivelead | ㉒ Left headlight lead |
| ⑪ Left handlebar switch lead | ㉓ Instrument lead |
| ⑫ Ignition switch | ㉔ ECU |



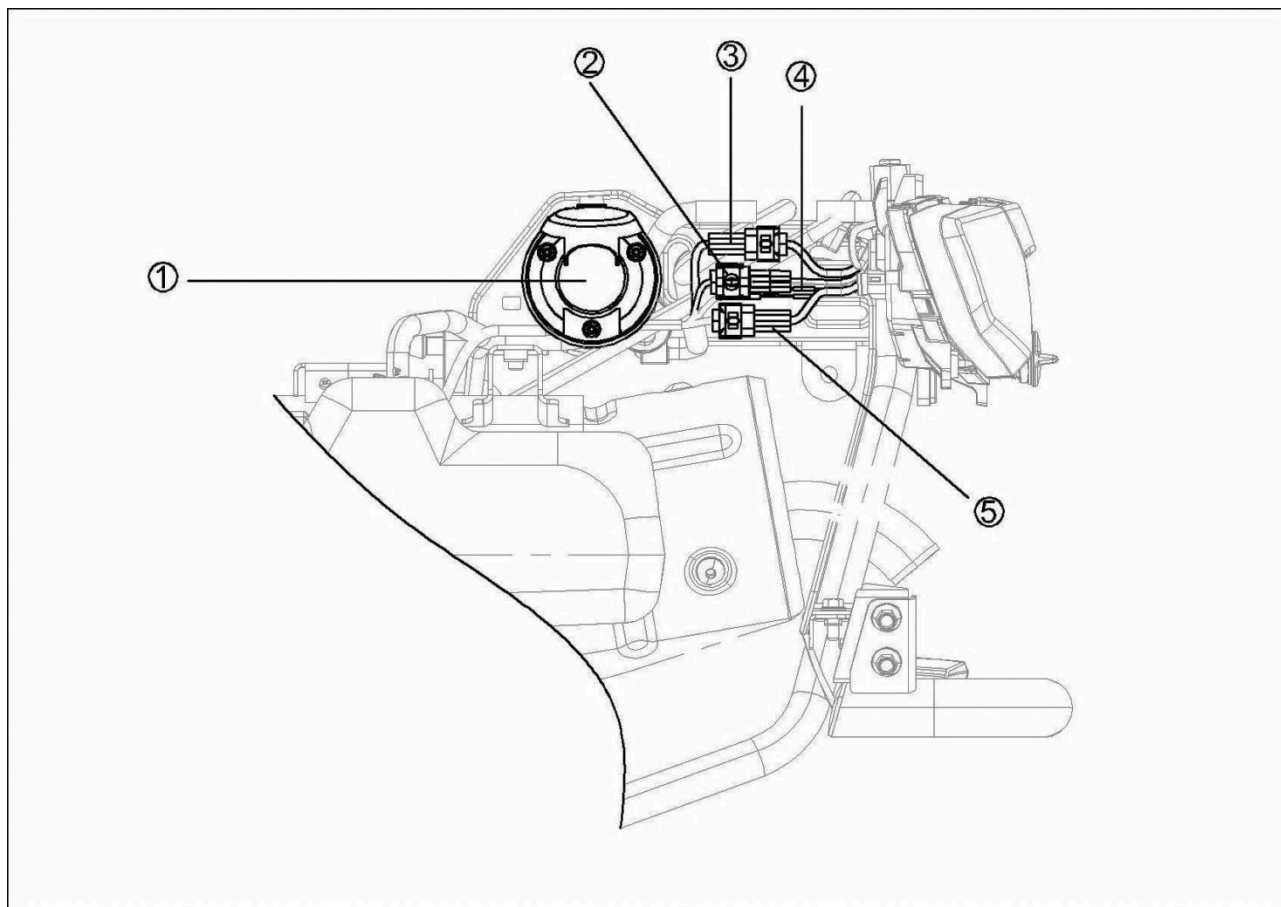
- | | |
|----------------------------------|------------------------------|
| ① Engine temperature sensor lead | ⑥ AC magneto lead |
| ② Negative battery lead | ⑦ AC magneto lead |
| ③ ECU lead | ⑧ Rectifier/regulator lead |
| ④ Shift control cable | ⑨ Four-wheeldrive motor line |
| ⑤ Speed sensor lead | ⑩ Four-wheeldrive motor line |



- | | |
|---------------------------------|----------------------|
| ① Positive battery lead | ⑦ Battery |
| ② Capstan lead | ⑧ Starter relay |
| ③ Negative battery lead | ⑨ Starter motor lead |
| ④ Fuel pump lead | ⑩ Starter relay lead |
| ⑤ Power connector | ⑪ Capstan lead |
| ⑥ Power connector cable harness | |

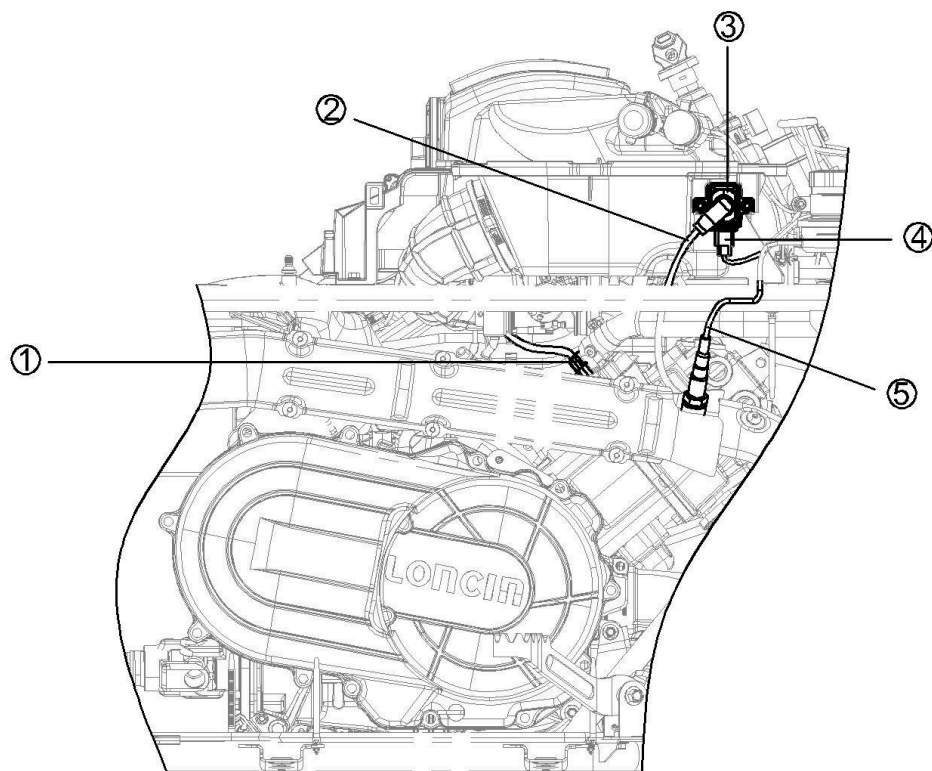


- ① Power connector
- ② Rear position lamp wiring harness
- ③ Left tail light lead
- ④ License plate lamp wiring harness
- ⑤ Right tail light lead

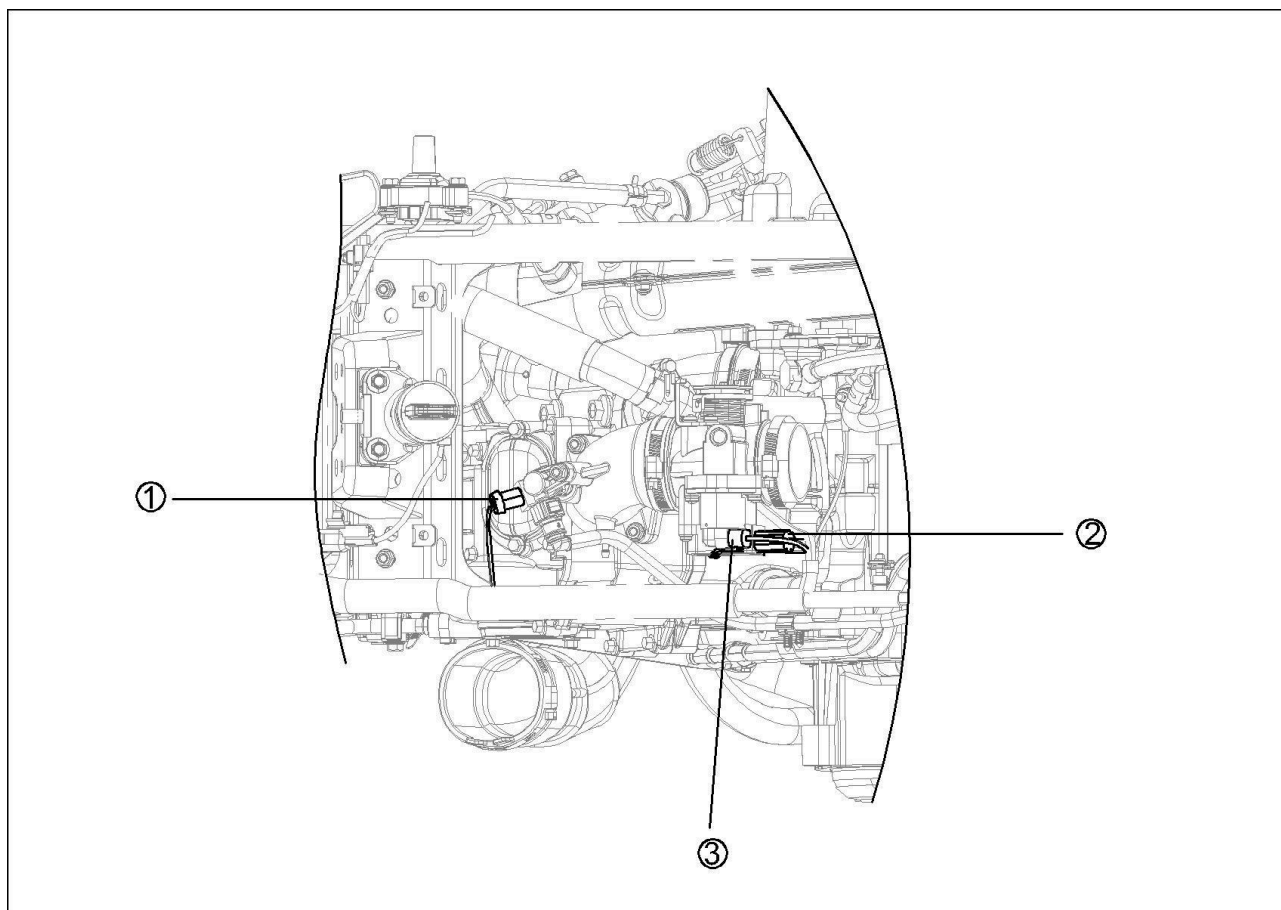


- ① Engine temperature sensor lead
- ② Ignition coil lead
- ③ Ignition coil

- ④ Ignition coil lead
- ⑤ Oxygen sensor lead



- ① Fuel injector lead
- ② Intake temperature sensor lead
- ③ Idle actuator line speed



3 PERIODIC CHECKS AND ADJUSTMENTS

Introduction

This chapter includes all information necessary to perform recommended checks and adjustments. These preventive maintenance procedures, if followed, will ensure more reliable vehicle operation and a longer service life. The need for costly overhaul work will be greatly reduced. This information applies to vehicles already in service as well as to new vehicles that are being prepared for sale. All service technicians should be familiar with this entire chapter.

Periodic maintenance chart for the emission control system

NOTE:

- For ATVs not equipped with an odometer or an hour meter, follow the month maintenance intervals.
- For ATVs equipped with an odometer or an hour meter, follow the km (mi) or hour's maintenance intervals. However, keep in mind that if the ATV is not used for a long period, the month maintenance intervals should be followed.
- Items marked with an asterisk should be performed by a dealer as they require special tools, data and technical skills

ITEM	CHECK OR MAINTENANCE JOB	Whichever comesfirst 		INITIAL			EVERY	
			month	1	3	6	6	12
			Km (mi)	320 (200)	1300 (800)	2500 (1600)	2500 (1600)	5000 (3200)
			hour	20	80	160	160	320
Fuel line	• Check fuel hose for cracks or damage. • Replace if necessary.				✓	✓	✓	
Spark plug	• Check condition and clean, remap, or re- place if necessary.		✓	✓	✓	✓	✓	
Valves	• Check valve clearance and adjust if neces- sary		✓		✓	✓	✓	
Fuel injection	• Check and adjust engine idle speed.		✓	✓	✓	✓	✓	
Crankcase Breather system	• Check breather hose for cracks or other damage, and replace if necessary				✓	✓	✓	
Exhaust system	• Check for leakage and replace gasket(s) if necessary. • Check for looseness and tighten all screw clamps and joints if necessary.				✓	✓	✓	
Spark arrester	• Clean.				✓	✓	✓	

PERIODIC CHECKS AND ADJUSTMENTS

General maintenance and lubrication chart

ITEM	CHECK OR MAINTENANCE JOB	Whichever comes first 		INITIAL			EVERY	
			month	1	3	6	6	12
			Km (mi)	320 (200)	1300 (800)	2500 (1600)	2500 (1600)	5000 (3200)
			hour	20	80	160	160	320
Air filter element	• Clean and replace if necessary.		Every 20–40 hours (more often in wet or dusty areas)					
Front brake	• Check operation and correct if necessary. • Check fluid level and ATV for fluid leakage, and correct if necessary		✓	✓	✓	✓	✓	
	• Replace brake pads.		Whenever worn to the limit					
Rear brake	• Check operation and correct if necessary. • Check brake pedal free play and adjust if necessary. • Check fluid level and ATV for fluid leakage, and correct if necessary.		✓	✓	✓	✓	✓	
	• Replace brake pads.		Whenever worn to the limit					
Brake hoses	• Check for cracks or other damage, and replace if necessary.			✓	✓	✓	✓	
	• Replace		Every 4 years					
Rear brake hose protectors	• Check for wear, cracks or other damage, and replace if necessary.		✓	✓	✓	✓	✓	
Wheels	• Check run out and for damage, and replace if necessary.		✓		✓	✓	✓	
Tires	• Check tread depth and for damage, and replace if necessary. • Check air pressure and balance, and correct if necessary.		✓		✓	✓	✓	
Wheel bearings	• Check for looseness or damage, and replace if necessary		✓		✓	✓	✓	
Upper and lower arm pivots	• Lubricate with lithium-soap-based grease.				✓	✓	✓	
V-belt	• Check for wear, cracks or other damage, and replace if necessary.		✓		✓	✓	✓	
Drive shaft universal joint	• Lubricate with lithium-soap-based grease.				✓	✓	✓	
Chassis fasteners	• Make sure that all nuts, bolts, and screws are properly tightened.		✓	✓	✓	✓	✓	
Shock absorber assemblies	• Check operation and correct if necessary. • Check for oil leakage and replace if necessary.				✓	✓	✓	
Stabilizer bushes	• Check for cracks or other damage, and replace if necessary				✓	✓	✓	
Knuckle pivots	• Lubricate with lithium-soap-based grease.				✓	✓	✓	
Knuckle shafts	• Lubricate with lithium-soap-based grease				✓	✓	✓	
Steering shaft	• Lubricate with lithium-soap-based grease.				✓	✓	✓	

PERIODIC CHECKS AND ADJUSTMENTS

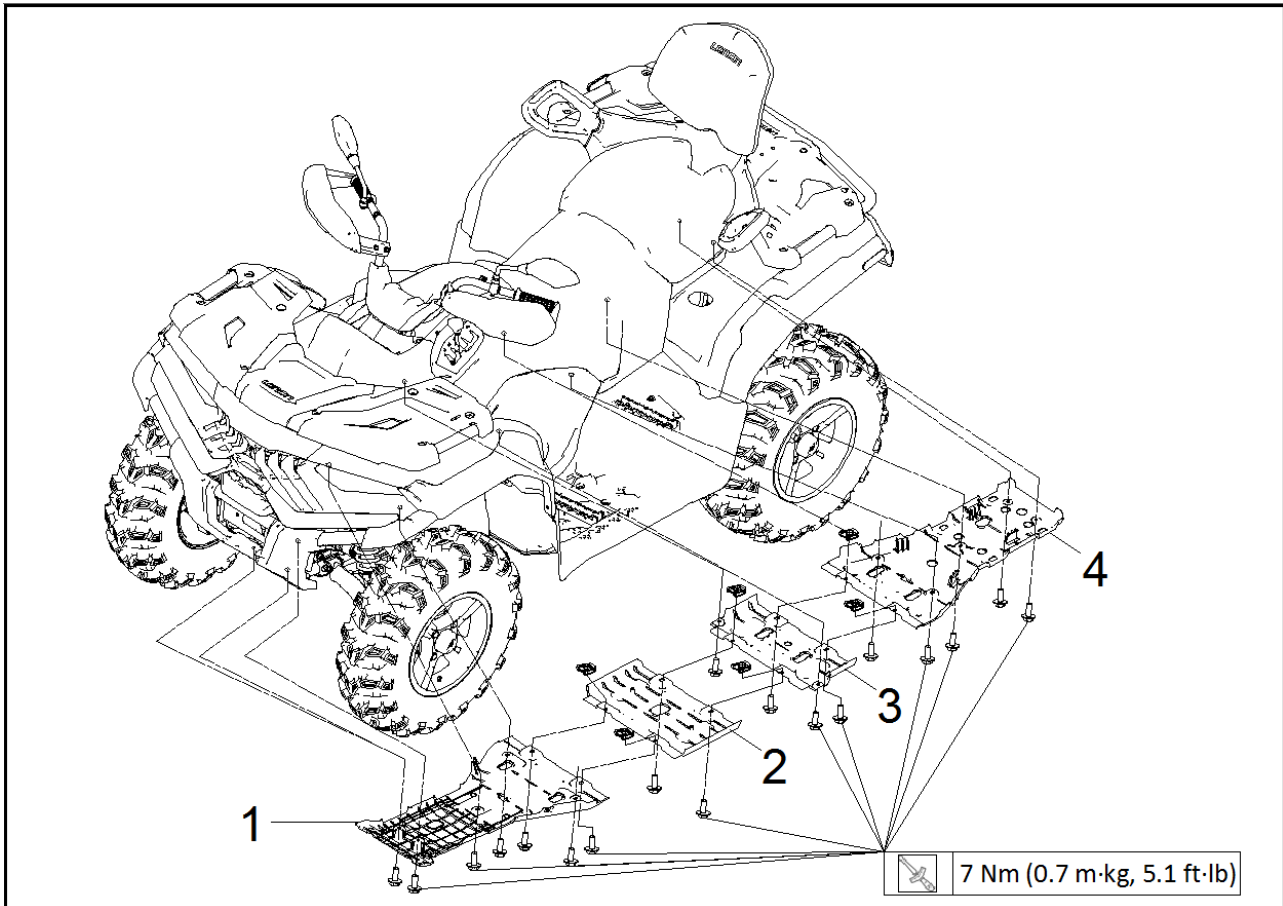
ITEM	CHECK OR MAINTENANCE JOB	Whichever comesfirst 		INITIAL			EVERY	
			month	1	3	6	6	12
			Km (mi)	320 (200)	1300 (800)	2500 (1600)	2500 (1600)	5000 (3200)
			hour	20	80	160	160	320
Steering system	• Check operation and repair or replace if damaged. • Check toe-in and adjust if necessary.		✓	✓	✓	✓	✓	
Engine mount	• Check for cracks or other damage, and replace if necessary.				✓	✓	✓	
Axle boots	• Check for cracks or other damage, and replace if necessary.		✓	✓	✓	✓	✓	
Engine oil	• Change. • Check ATV for oil leakage, and correct if necessary.		✓		✓	✓	✓	
Engineoil filter cartridge	• Replace.		✓		✓		✓	
Differential gear oil	• Change. • Check ATV for oil leakage, and correct if necessary.		✓				✓	
Final gear oil	• Change. • Check ATV for oil leakage, and correct if necessary		✓				✓	
Cooling system	• Check coolant level and ATV for coolant leakage, and correct if necessary.		✓	✓	✓	✓	✓	
	• Replace coolant.		Every 2 years					
Moving parts and cables	• Lubricate.			✓	✓	✓	✓	
Drive select lever safety system cable	• Check operation and adjust or replace if necessary.				✓	✓	✓	
Throttle lever housing and cable	• Check operation and correct if necessary. • Check throttle cable free play and adjust if necessary. • Lubricate throttle lever housing and cable.		✓	✓	✓	✓	✓	
Front and rear brake switches	• Check operation and correct if necessary		✓	✓	✓	✓	✓	
Lights and switches	• Check operation and correct if necessary. • Adjust headlight beams.		✓	✓	✓	✓	✓	

NOTE:

- The air filter needs service that is more frequent if you are riding in unusually wet or dusty areas.
- Hydraulic brake service
- Regularly check and, if necessary, correct the brake fluid level.
- Every two years replace the internal components of the brake master cylinders and calipers, and change the brake fluid.
- Replace the brake hoses every four years and if cracked or damaged.

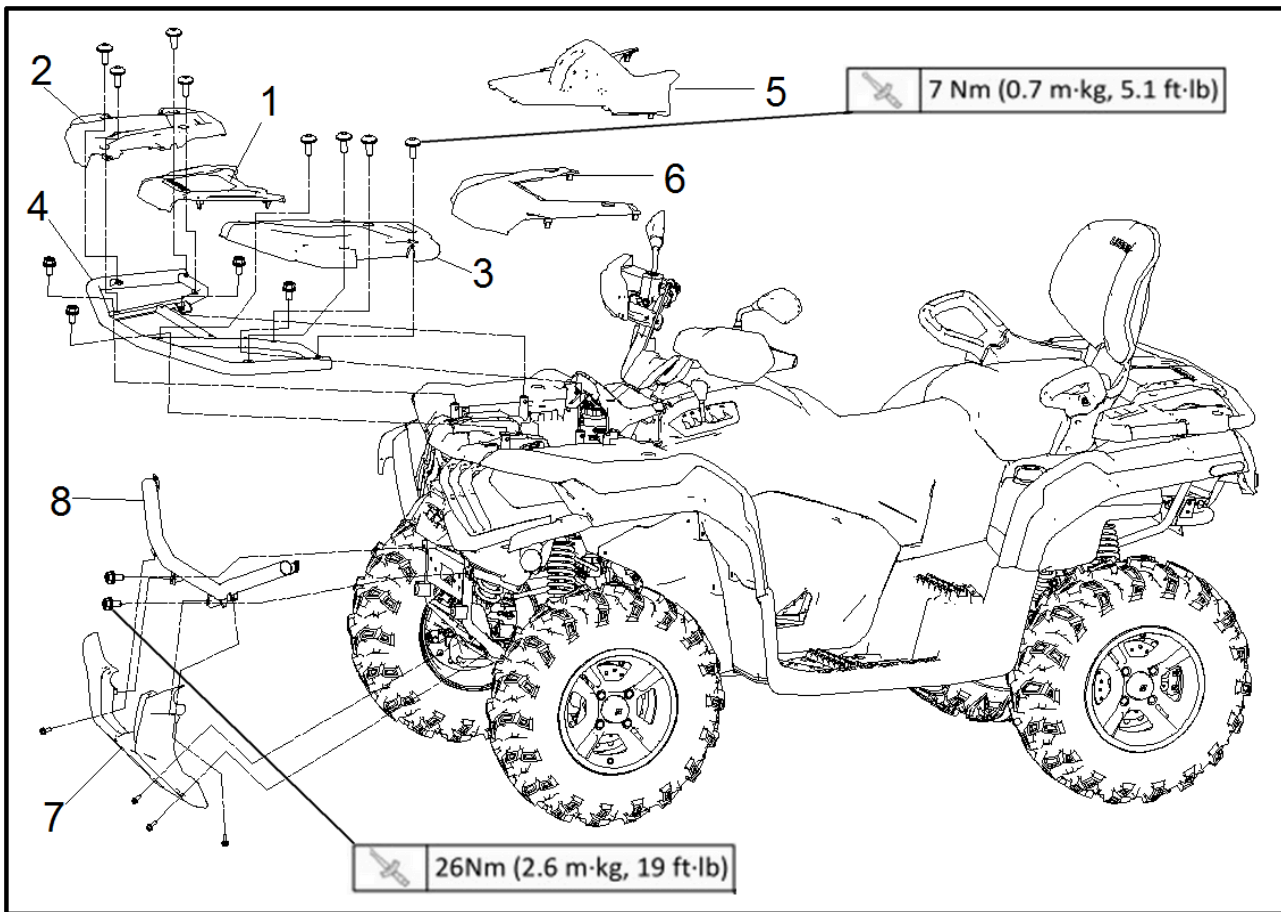
Vehicle bottom guard, seat, carriers and fenders

Vehicle bottom guard



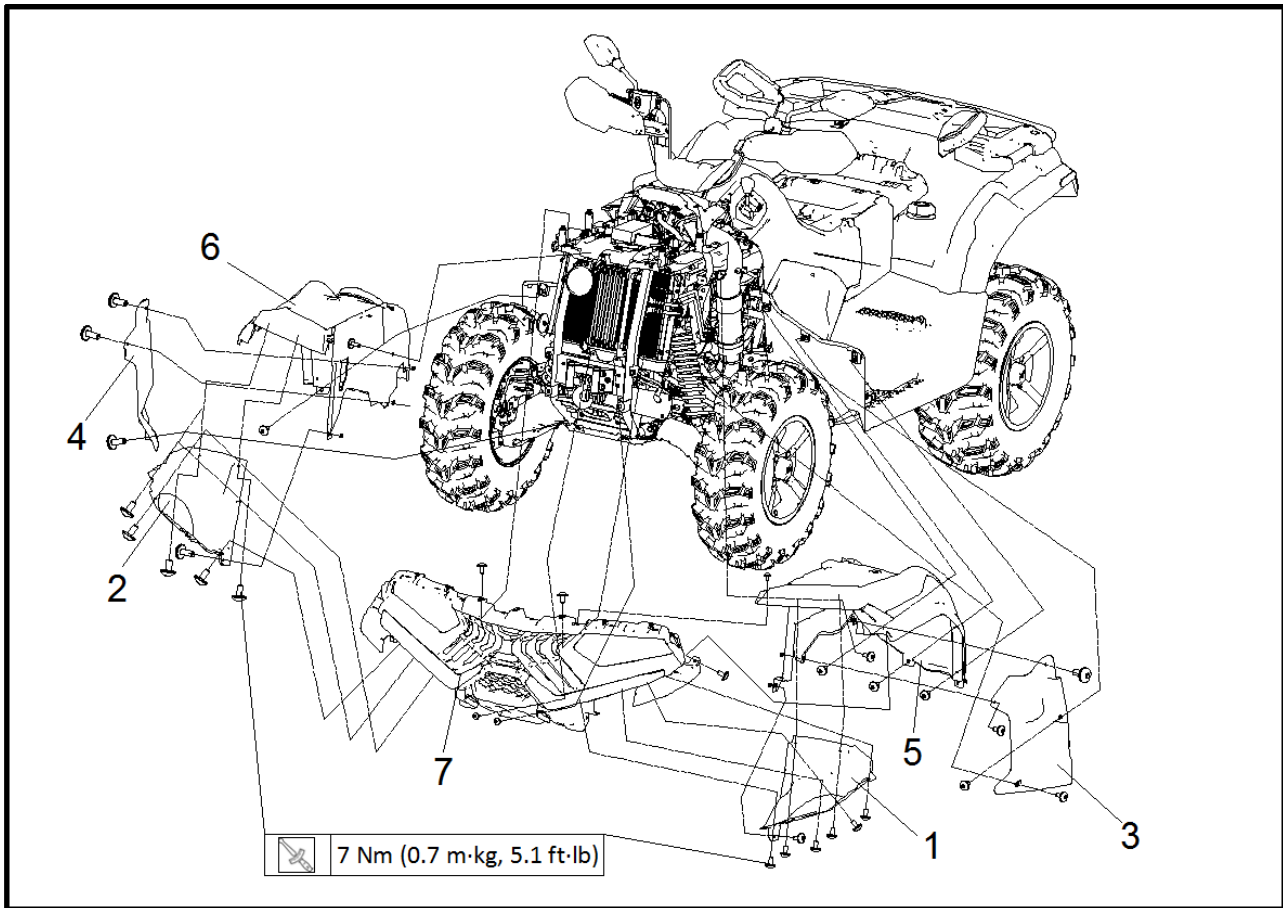
Order	Job/Part	Q'ty	Remarks
	Remove vehicle bottom guard		
1	Front bottom guard plate of vehicle	1	Remove the parts in the order listed.
2	Middle bottom guard plate of vehicle	1	
3	Middle bottom guard plate of vehicle	1	
4	Rear bottom guard plate of vehicle	1	
			For installation, reverse the removal procedure.

Ront carrier and front guard



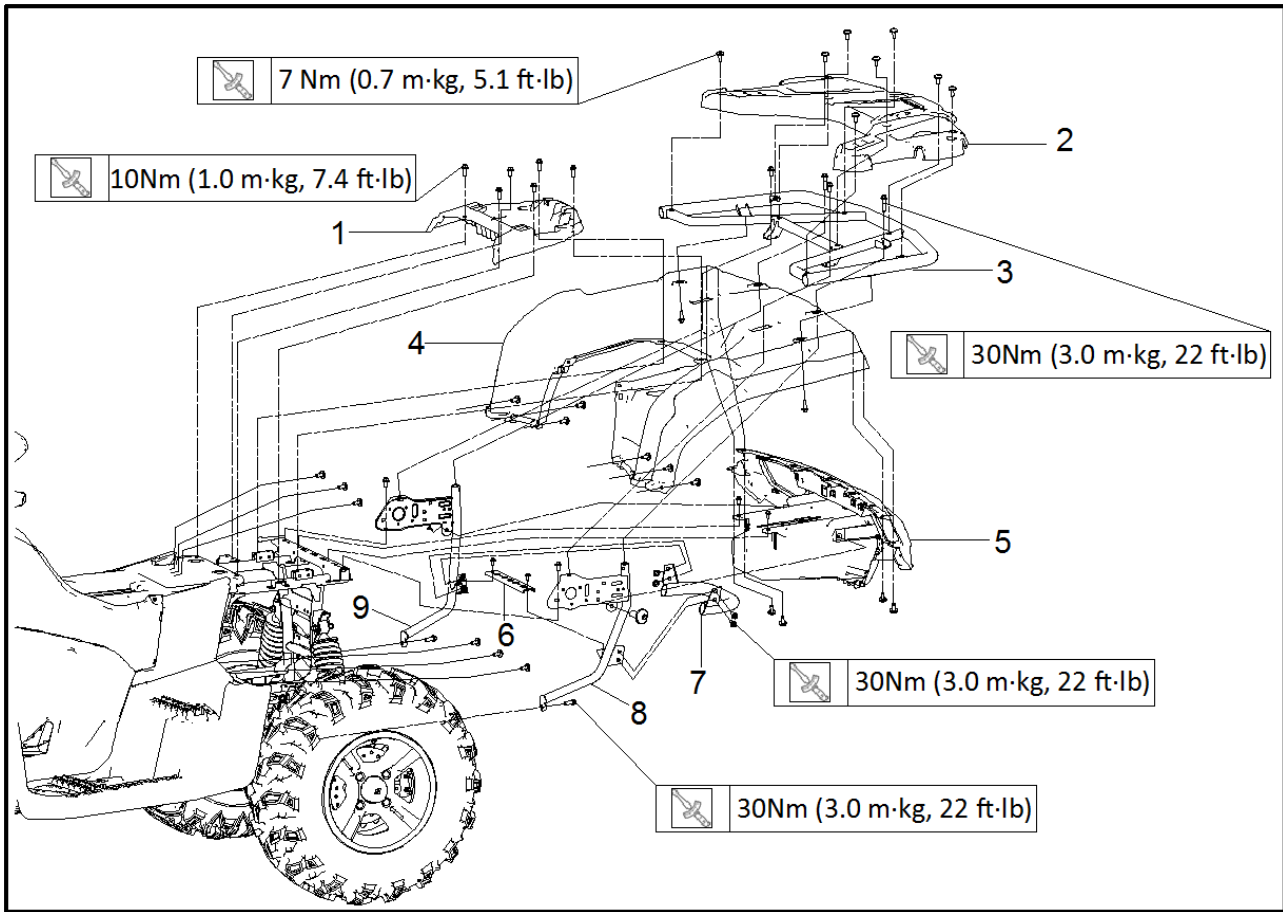
Order	Job/Part	Q'ty	Remarks
	Removing the front carrier and front Guard		Remove the parts in the order listed
1	Front carrier middle cover plate	1	
2	Front cargo carrier right cover plate	1	
3	Front cargo carrier left cover plate	1	
4	Front carrier	1	
5	Instrument cover	1	
6	front panel	1	
7	Bumper guard	1	
8	Front guard	1	
			For installation, reverse the removal procedure.

Front fenders and front grill



Order	Job/Part	Q'ty	Remarks
	Removing the front fenders and front grill Seat/side panels Front carrier/front guard		Remove the parts in the order listed Refer to "SEAT AND SIDE PANELS". Refer to "FRONT CARRIER AND FRONT GUARD".
1	Headlight left protective cover	1	
2	Headlight right protection hood	1	
3	Front left bottom mud	1	
4	Front right bottom mud	1	
5	Front top left mud combination	1	
6	Front right upper mud combination	1	
7	Headlight bracket assembly	1	
			For installation, reverse the removal procedure.

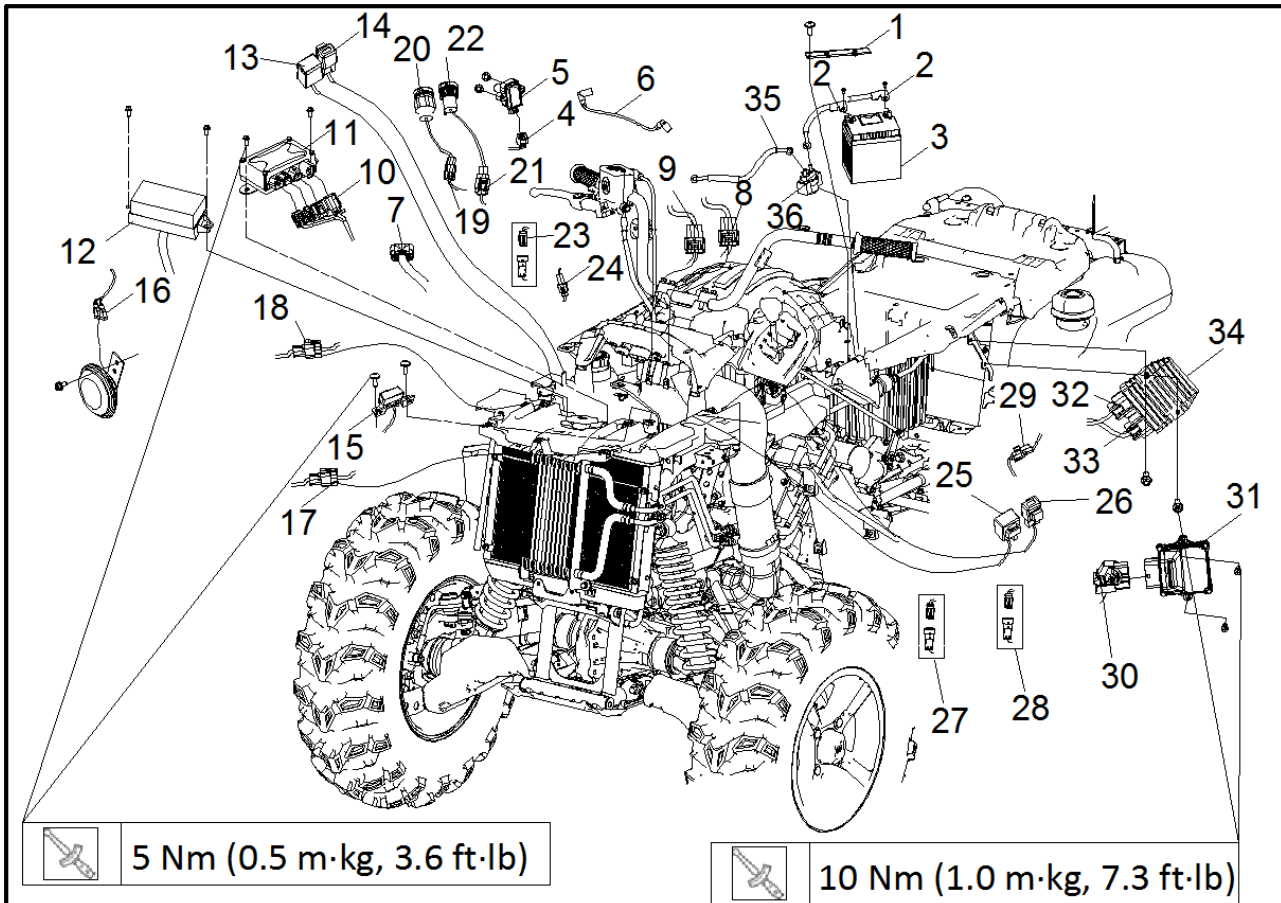
Rear carrier and rear fender



Order	Job/Part	Q'ty	Remarks
	Removing the rear carrier and rear Fender		Remove the parts in the order listed
	Seat/side panels		Refer to "SEAT AND SIDE PANELS".
1	Seat support plate	1	
2	Rear cargo carrier cover plate	1	
3	After the cargo carrier	1	
4	Rear fender	1	
5	Rear left taillight bracket	1	
6	reinforcing plate	1	
7	After the bar	1	
8	Left mounting support for carrier	1	
9	Right mounting support for carrier	1	
			For installation, reverse the removal procedure.

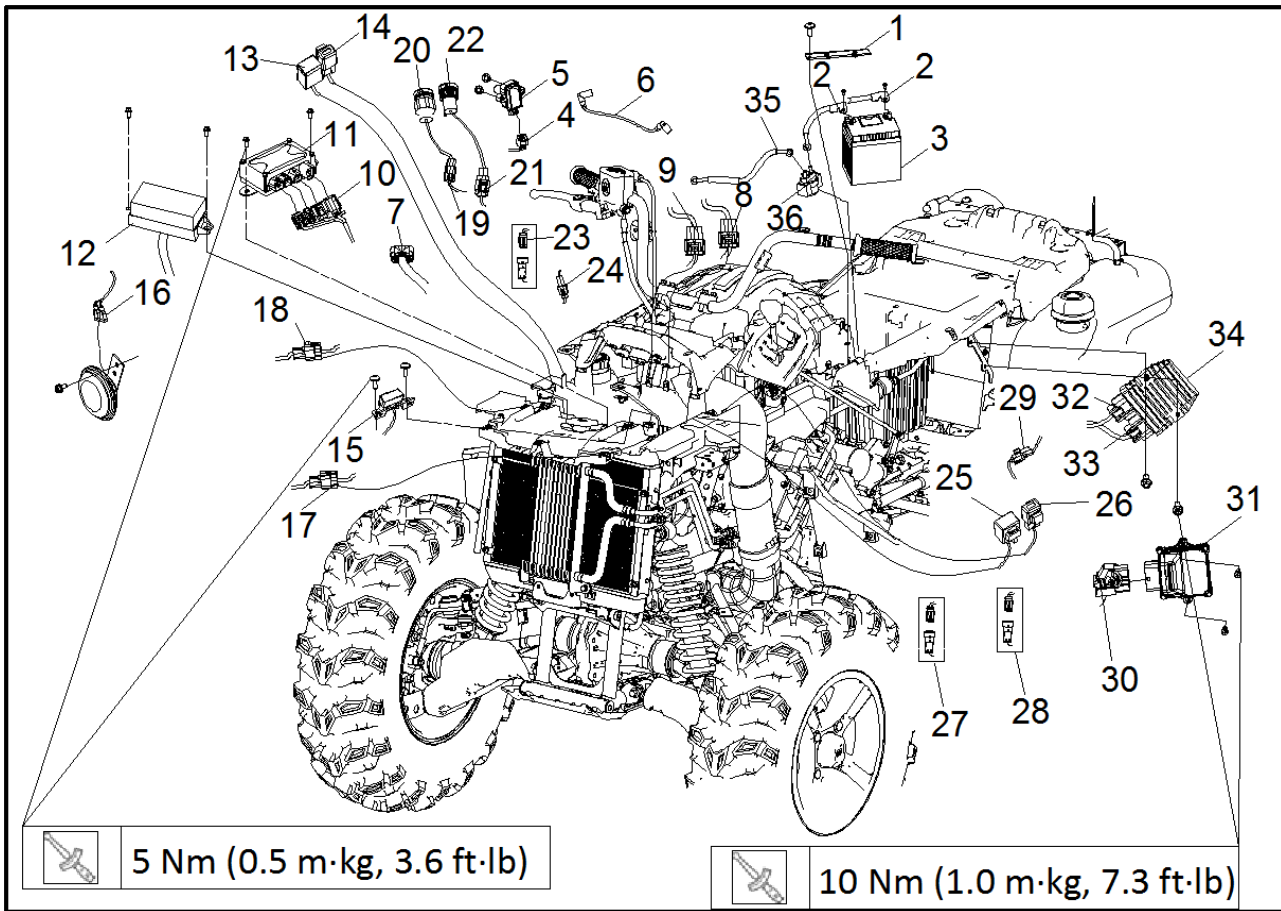
Electrical components tray

Electrical componentstray 1/2



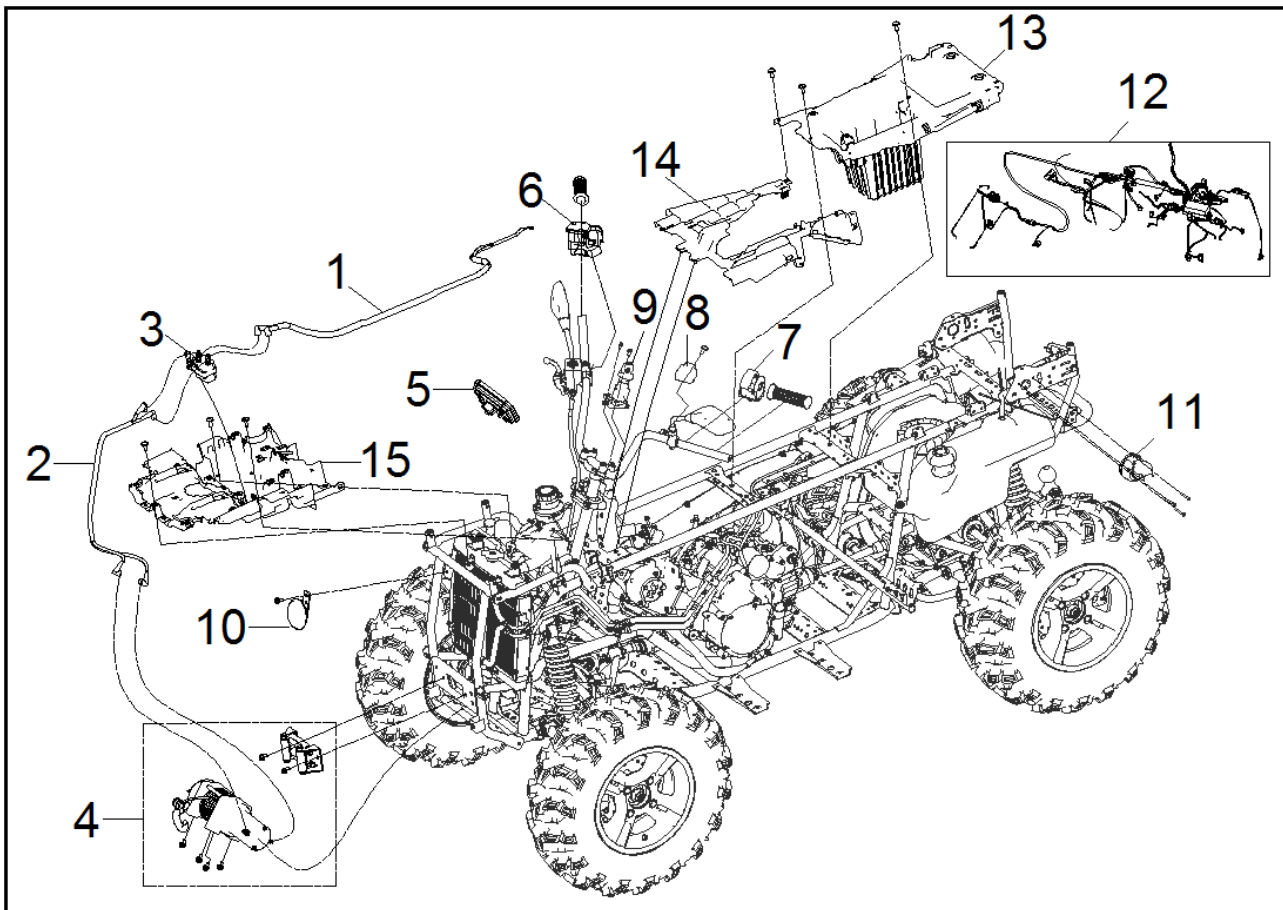
Order	Job/Part	Q'ty	Remarks
	Removing the electrical components tray		Remove the parts in the order listed
	Seat/side panels		Refer to "SEAT AND SIDE PANELS".
	front carrier and front Guard		Refer to "FRONT CARRIER AND FRONT GUARD".
	front fenders and front grill		Refer to "FRONT FENDERS AND FRONT GRILL".
	rear carrier and rear Fender		Refer to "REAR CARRIER AND REAR FENDER".
1	Battery holding bracket	1	Disconnect.
2	Battery lead	2	CAUTION: _____
3	Battery	1	First, disconnect the negative battery lead, and then disconnect the positive lead.
4	Ignition Coil coupler	1	
5	Ignition Coil	1	
6	Ignition coil harness	1	Disconnect.
7	Instrument Panel coupler	1	
8	The left brake handle coupler	1	Disconnect.
9	The right brake handle coupler	1	Disconnect.
10	EPS control unit coupler	1	Disconnect.
11	EPS (electric power steering) control unit	1	Disconnect.

PERIODIC CHECKS AND ADJUSTMENTS



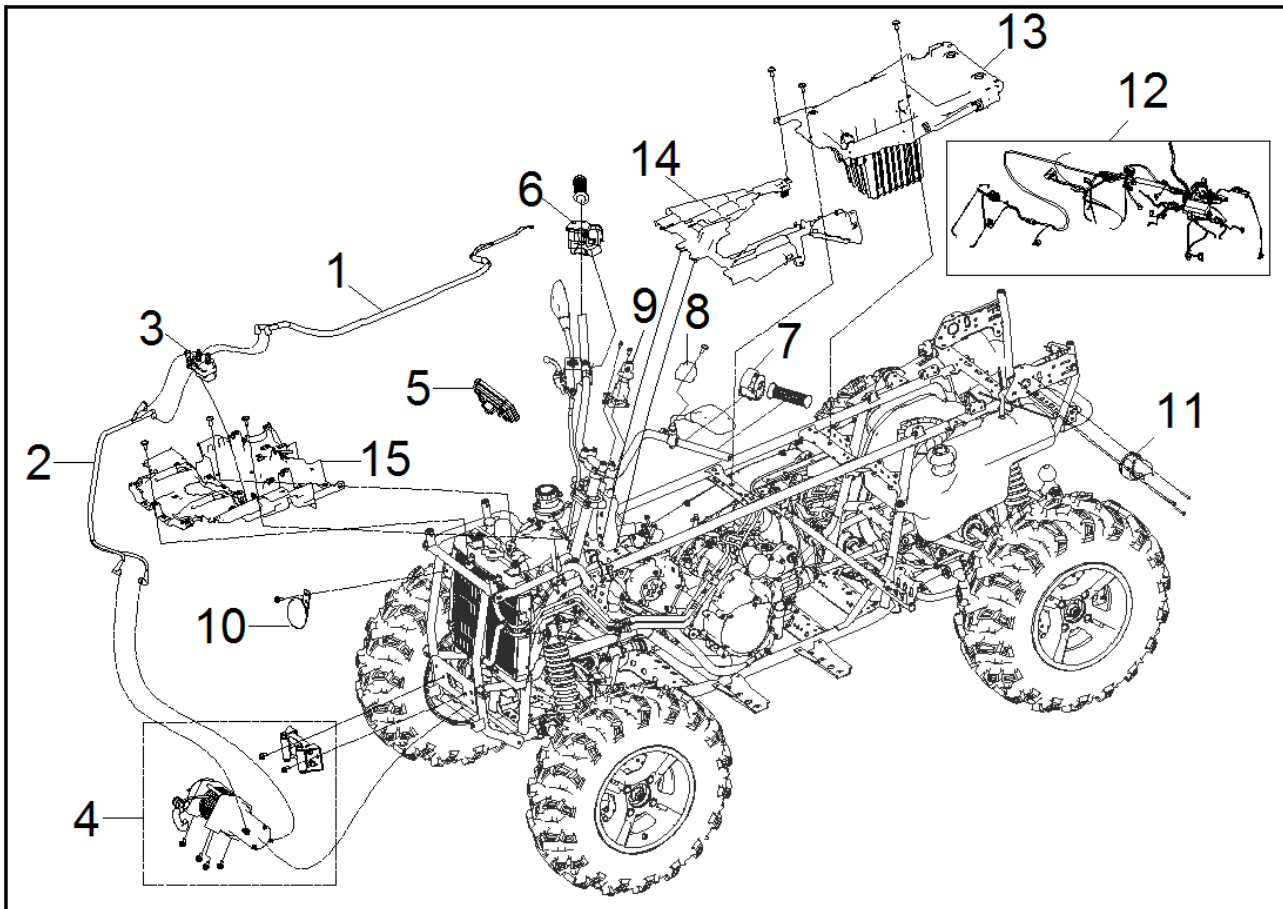
Order	Job/Part	Q'ty	Remarks
12	Disaster box	1	
13	Control Unit	1	
14	Start auxiliary relay	1	
15	Diagnostics Interface	1	Disconnect.
16	Trumpet coupler	1	Disconnect.
17	Left headlight coupler	1	Disconnect.
18	Right headlight coupler	1	Disconnect.
19	USB socket coupler	1	
20	USB socket	1	Disconnect.
21	DC socket coupler	1	
22	DC socket	1	Disconnect.
23	Oxygen sensor coupler	1	Disconnect.
24	Brake fluid switch coupler	1	
25	Flasher	1	
26	Headlight on relay	1	Disconnect
27	Tail light switch coupler	1	Disconnect
28	Fan coupler	1	Disconnect
29	Ignition lock coupler	1	Disconnect
30	ECU coupler	1	
31	ECU (engine control unit)	1	Disconnect
32	Magneto coupler	1	Disconnect
33	Variable voltage rectifier coupler	1	
34	Variable voltage rectifier	1	
35	Positive wire	1	
36	Starting relay	1	For installation, reverse the removal procedure.

Electrical component stray 2/2



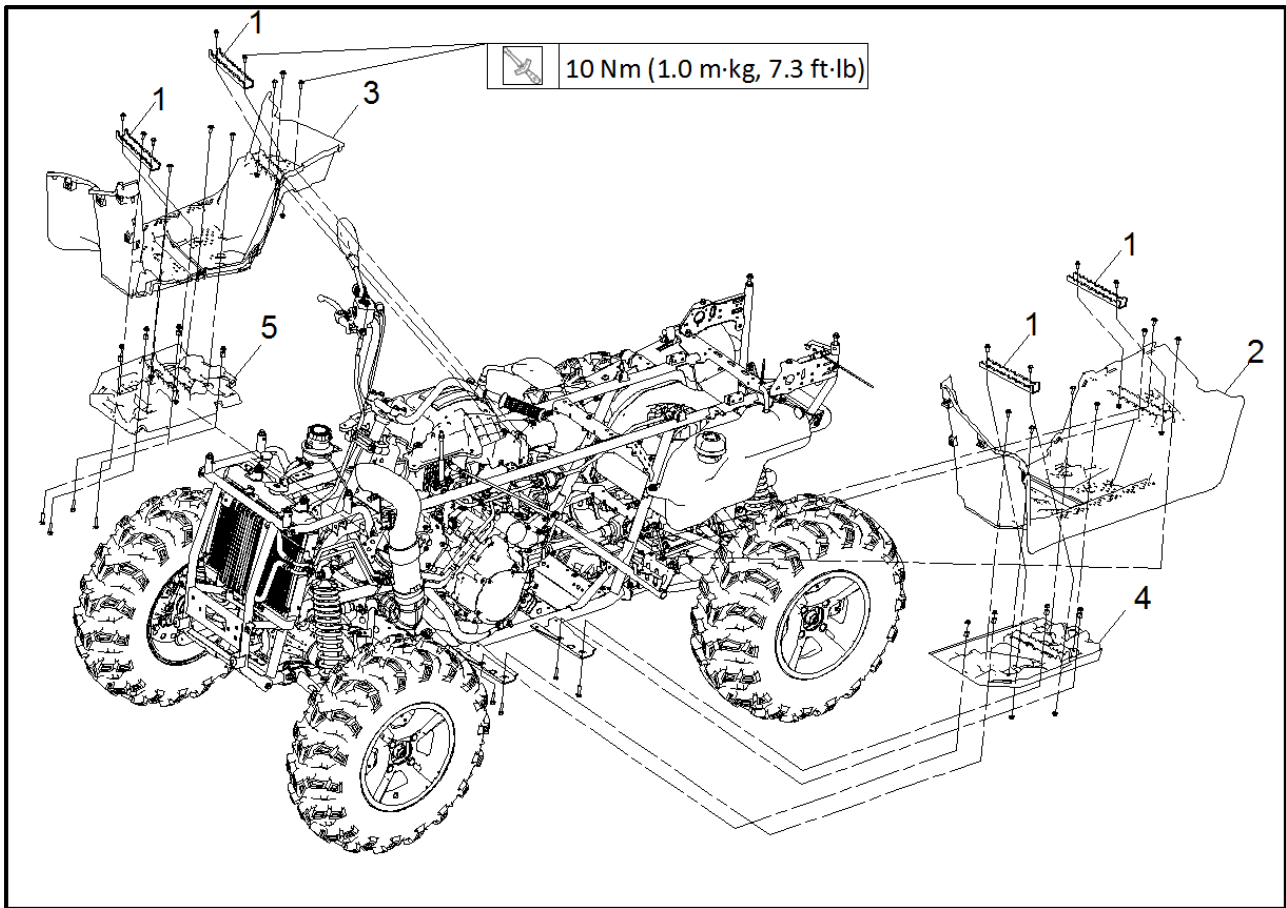
Order	Job/Part	Q'ty	Remarks
1	Removing the electrical components tray Seat/side panels front carrier and front Guard front fenders and front grill rear carrier and rear Fender Air filter case Front capstan wire harness 1	1	Remove the parts in the order listed Refer to "SEAT AND SIDE PANELS". Refer to "FRONT CARRIER AND FRONT GUARD". Refer to "FRONT FENDERS AND FRONT GRILL". Refer to "REAR CARRIER AND REAR FENDER". Refer to "AIR FILTER CASE". Disconnect. CAUTION: <u>First, disconnect the negative battery lead, and then disconnect the positive lead.</u>
2	Front capstan wire harness 2	1	
3	Capstan controller	1	
4	Winch	1	
5	Instrument	1	

PERIODIC CHECKS AND ADJUSTMENTS



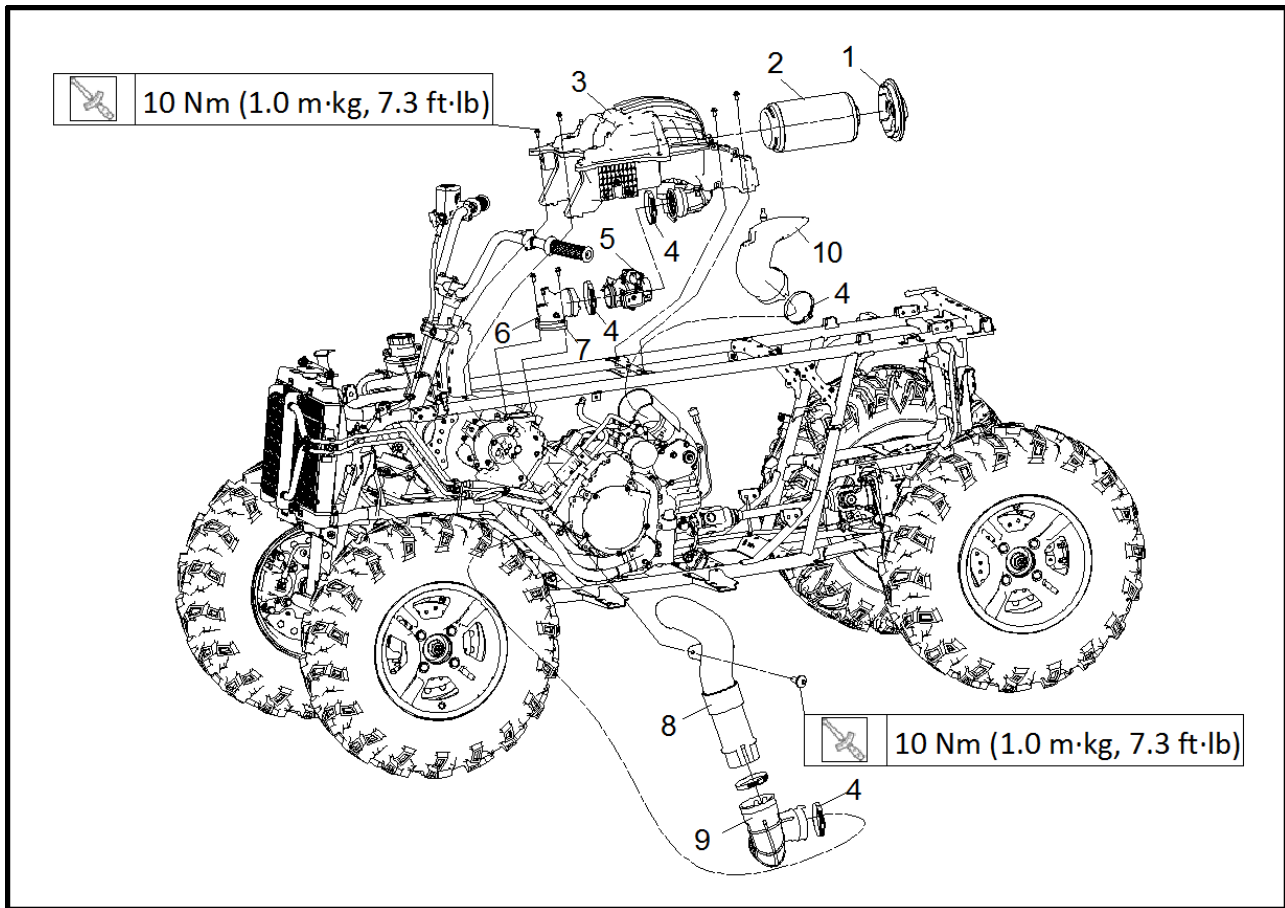
Order	Job/Part	Q'ty	Remarks
6	The right brake handle	1	For installation, reverse the removal procedure.
7	The left brake handle	1	
8	Port handle winch control switch	1	
9	Ignition Switch	1	
10	Trumpet	1	
11	leader cable	1	
12	power connector	1	
13	Battery box	1	
14	Air filter base plate	1	
15	Electric box	1	

Footrest boards



Order	Job/Part	Q'ty	Remarks
	Removing the footrest boards		Remove the parts in the order listed
	Seat/side panels		Refer to "SEAT AND SIDE PANELS".
	front carrier and front Guard		Refer to "FRONT CARRIER AND FRONT GUARD".
	front fenders and front grill		Refer to "FRONT FENDERS AND FRONT GRILL".
	rear carrier and rear Fender		Refer to "REAR CARRIER AND REAR FENDER".
1	Auxiliary foot support plate	4	
2	Left foot bottom plate	1	
3	Right foot bottom plate	1	
4	Left main foot support	1	
5	Right main foot support	1	
			For installation, reverse the removal procedure.

Air filter case



Order	Job/Part	Q'ty	Remarks
	Removing the air filter case		Remove the parts in the order listed
	Seat/side panels		Refer to "SEAT AND SIDE PANELS".
	front carrier and front Guard		Refer to "FRONT CARRIER AND FRONT GUARD".
	front fenders and front grill		Refer to "FRONT FENDERS AND FRONT GRILL".
	rear carrier and rear Fender		Refer to "REAR CARRIER AND REAR FENDER".
1	Filter element cover	1	
2	Air filter elements	1	
3	Air filter housing	1	
4	Band combination	5	
5	Throttle body assembly	1	
6	Intake	1	
7	Potholder	1	
8	CVT upper intake pipe	1	
9	CVT lower intake pipe	1	
10	CVT upper exhaust pipe	1	
			For installation, reverse the removal procedure.

Engine

Adjusting the valve clearance

The following procedure applies to all of the valves.

NOTE:

- Valve clearance adjustment should be made on a cold engine, at room temperature.
- When the valve clearance is to be measured or adjusted, the piston must be at top dead center (TDC) on the compression stroke.

1. Remove:

- left side panel

Refer to “SEAT AND SIDE PANELS”.

- front fender

Refer to “FRONT FENDERS AND FRONT GRILL”.

- footrest board

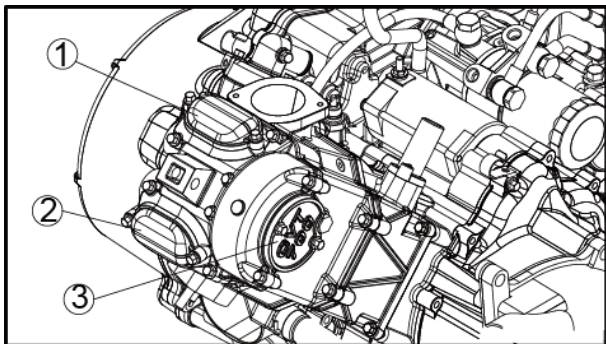
Refer to “FOOTREST BOARDS”.

- air filter case

Refer to “AIR FILTER CASE”.

2. Remove:

- intake tappet cover ①
- exhaust tappet cover ②
- camshaft sprocket cover ③

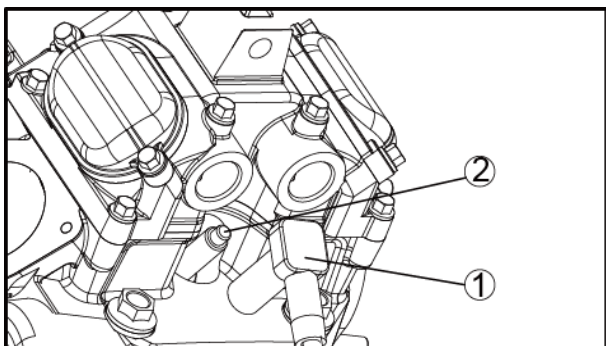


3. Remove:

- spark plug cap ①

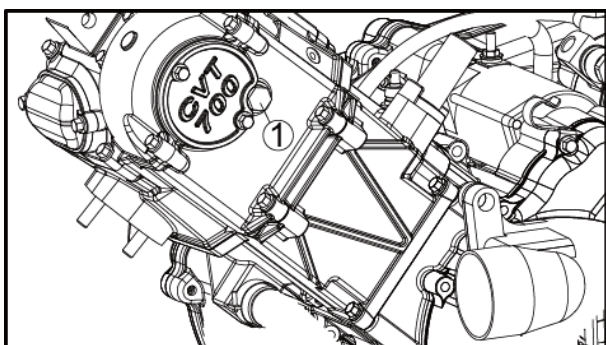
4. Remove:

- spark plug ②

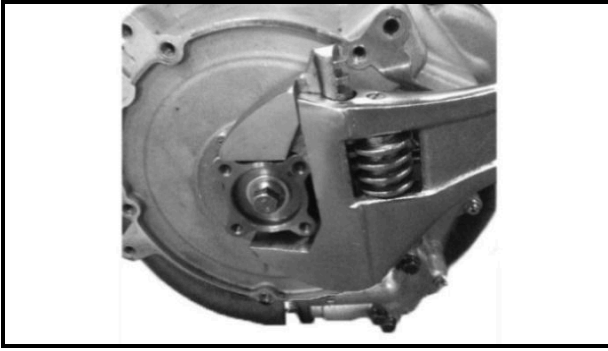


5. Remove:

- crankshaft end accessing screw ①



PERIODIC CHECKS AND ADJUSTMENTS



6. Measure:

- valve clearance

Out of specification → Adjust.



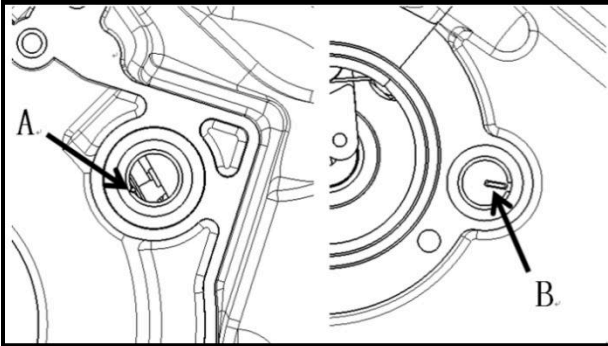
Valve clearance (cold)

Intake valve

0.08 ~ 0.15 mm (0.0032 ~ 0.0059 in)

Exhaust valve

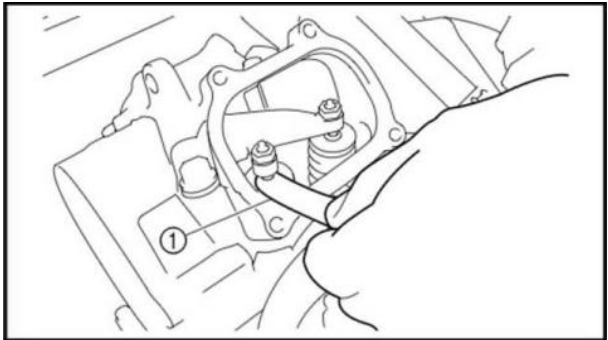
0.10 ~ 0.15 mm (0.0039 ~ 0.0059 in)



- Use the adjustable spanner to turn the crankshaft counterclockwise until the Magneto rotor index mark aligns with the index notch in the timing whole (A).

NOTE:

To position the piston at top dead center (TDC) on the compression stroke, align the "I" mark @ on the camshaft sprocket with the stationary pointer @ on the cylinder head, as shown in the illustration.



- Verify that the other timing hole in the cylinder head can see the index mark (B). If not, turn the crankshaft one revolution counterclockwise and realign the Magneto rotor index mark with the index notch. (The detail step of TDC)
- Measure the valve clearance with a thickness gauge ①
Out of specification → Adjust.

7. Adjust:

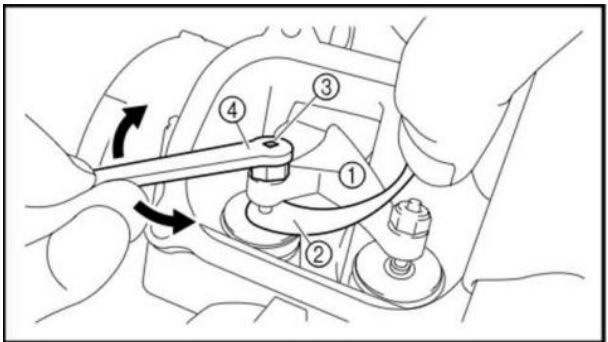
- valve clearance

- Loosen the locknut ①
- Insert a thickness gauge ② between the adjusting screw and the valve tip.
- Turn the adjusting screw ③ with the tappet adjusting tool ④ until the specified valve clearance is obtained.
- Hold the adjusting screw to prevent it from moving and tighten the locknut to the specified torque.



Locknut

14 N·m (1.4m·kg, 10ft·lb)



PERIODIC CHECKS AND ADJUSTMENTS

8. Measure the valve clearance again.
- e. If the valve clearance is still out of specification, repeat all of the valve clearance adjustment steps until the specified clearance is obtained.

9. Install:
 - crankshaft end accessing screw

	10 N·m (1.0m·kg, 7.2ft·lb)
--	----------------------------

10. Install:
 - spark plug

	13 N·m (1.3m·kg, 9.4ft·lb)
--	----------------------------

11. Connect:
 - spark plug cap

12. Install:
 - O-ring **New**
 - Camshaft sprocket cover

	10 N·m (1.0m·kg, 7.2ft·lb)
--	----------------------------

- O-ring ① **New**

- intake tappet cover

	10 N·m (1.0m·kg, 7.2ft·lb)
--	----------------------------

- O-ring **New**

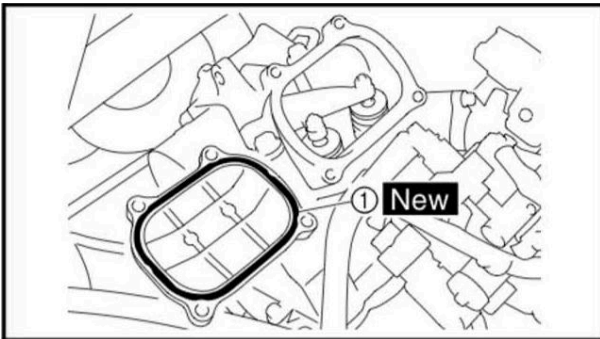
- exhaust tappet cover

	10 N·m (1.0m·kg, 7.2ft·lb)
--	----------------------------

13. Install:
 - center protector
 - Refer to "PANELS AND FRONT CONSOLE" in chapter 8.
 - rear console
 - seats
 - Refer to "SEATS, REAR CONSOLE AND INSTRUMENT PANELS" in chapter 8.

Adjusting the engine idling speed

1. Remove:
 - side cover
 Refer to "SEAT AND SIDE PANELS".
2. Start the engine and let it warm up for several minutes.
3. Attach:
 - tachometer (to the spark plug lead)



PERIODIC CHECKS AND ADJUSTMENTS



Digital tachometer

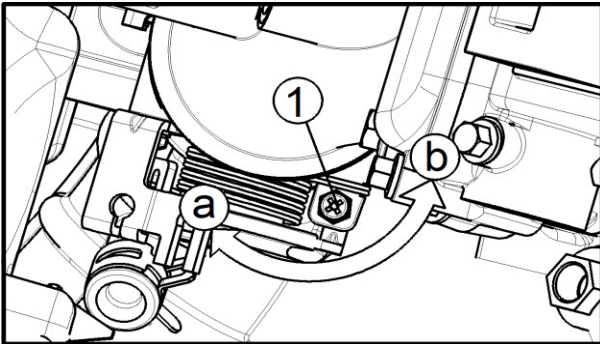
4. Measure:

- engine idling speed

Out of specification → Adjust.



Engine idling speed
1,350 ~ 1,450 r/min



5. Adjust:

- engine idling speed

a. Turn the idle speed adjusting screw 1 in direction or b until the specified idling speed is obtained.

Direction ①	Idling speed becomes higher.
Direction ②	Idling speed becomes lower.

6. Detach:

- tachometer

7. Adjust:

- throttle lever free play

Refer to “ADJUSTING THE THROTTLE LEVER FREE PLAY”.



Throttle lever free play
3.0 ~ 5.0 mm (0.12 ~ 0.20 in)

8. Install:

- side cover

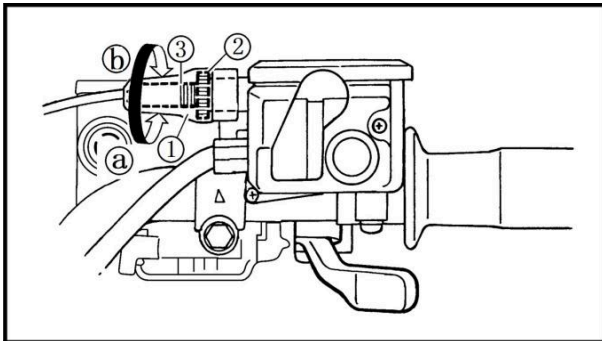
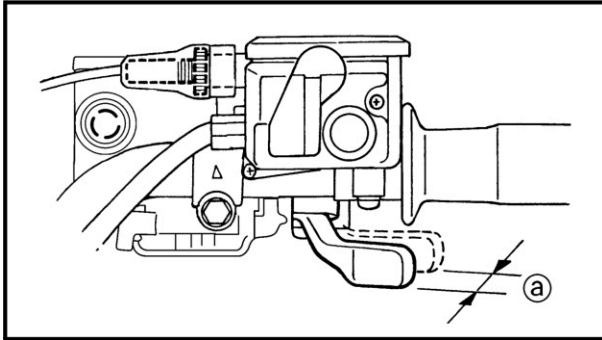
Refer to “SEAT AND SIDE PANELS”.

PERIODIC CHECKS AND ADJUSTMENTS

Adjusting the throttle lever free play

NOTE:

Engine idling speed should be adjusted properly before adjusting the throttle lever free play.



1. Measure:

- throttle lever free play (a)

Out of specification → Adjust.



Throttle lever free play
3.0 ~ 5.0 mm (0.12 ~ 0.20 in)

2. Adjust:

- throttle lever free play

a. Slide back the rubber cover (1).

b. Loosen the locknut (2).

c. Turn the adjusting bolt (3) in direction (a) or (b) until the correct free play is obtained.

Direction (a)	Free play is increased.
Direction (b)	Free play is decreased.

d. Tighten the locknut.

e. Slide the rubber cover to its original position.

⚠ WARNING

After adjusting the free play, turn the handle bar to the right and left to make sure that the engine idling speed does not increase.

Adjusting the speed limiter

The speed limiter keeps the throttle from becoming fully-opened even when the throttle lever is applied to the maximum position. Screwing in the adjusting screw stops the engine speed from increasing.

1. Measure:

- speed limiter length (a)

Out of specification → Adjust.



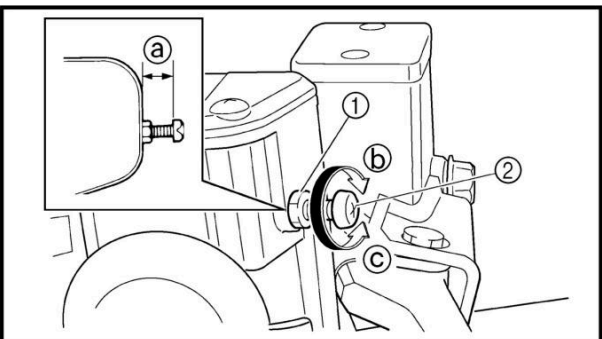
Speed limiter length
Less than 12 mm (0.47 in)

2. Adjust:

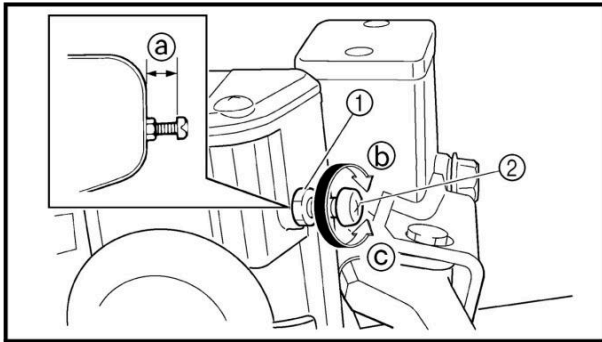
- speed limiter length

a. Loosen the locknut (1).

b. Turn the adjuster (2) in direction (b) or (c) until the specified speed limiter length is obtained.



PERIODIC CHECKS AND ADJUSTMENTS



Direction ⑥	Speed limiter length is decreased.
Direction ⑦	Speed limiter length is increased.

c. Tighten the locknut.

⚠ WARNING

- **Particularly for a beginner rider, the speed limiter should be screwed in completely. Screw it out little by little, as their riding technique improves. Never remove the speed limiter for a beginner rider.**
- **For proper throttle lever operation do not turn out the adjuster more than 12 mm (0.47 in). Also, always adjust the throttle lever free play to 3.0 ~ 5.0 mm (0.12 ~ 0.20 in).**

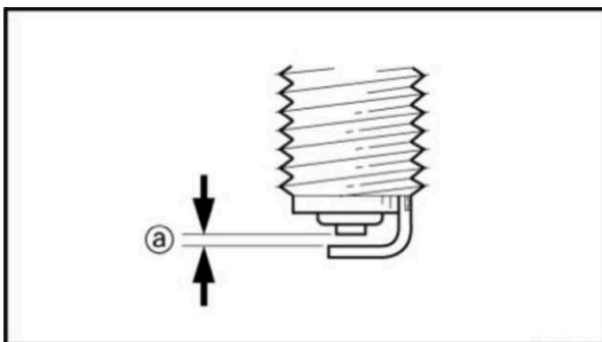
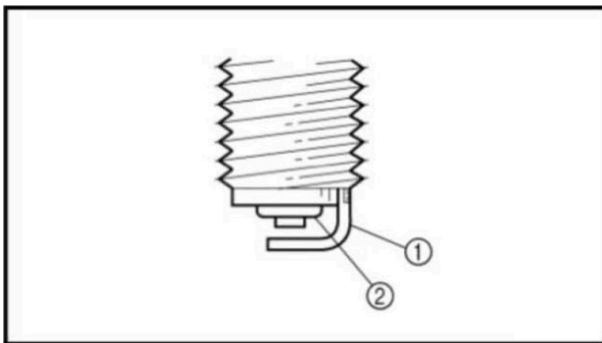
Checking the spark plug

1. Remove:
 - right side panel
 - Refer to “SEAT AND SIDE PANELS” rear console
2. Disconnect:
 - spark plug cap
3. Remove:
 - spark plug
4. Check:
 - spark plug type
 Incorrect → Change.



Standard spark plug
DCPR8/NGK

5. Check:
 - electrode ①
 Wear/damage → Replace.
 - insulator ②
 Abnormal color → Replace.
Normal color is a medium-to-light tan color.
6. Clean:
 - spark plug (with a spark plug cleaner or wire brush)



7. Measure:
 - spark plug gap ③
 Use a wire gauge or thickness gauge.
Out of specification → Re gap.



Spark plug gap
0.8 ~ 1.0 mm (0.031 ~ 0.039 in)

PERIODIC CHECKS AND ADJUSTMENTS

8. Tighten:

- spark plug

	19 N·m (1.9 m·kg, 13.7 ft·lb)
--	-------------------------------

NOTE:

Before installing a spark plug, clean the gasket surface and plug surface.

9. Connect:

- spark plug cap

10. Install:

- right side panel

Refer to “SEAT AND SIDE PANELS”.

Checking the ignition timing

NOTE:

Engine idling speed and throttle cable free play should be adjusted properly before checking the ignition timing.

1. Remove:

- left side panel
- right side panel

Refer to “SEAT AND SIDE PANELS”.

- footrest board

Refer to “FOOTREST BOARDS”.

2. Attach:

- tachometer
- timing light
(to spark plug lead)

	Digital tachometer Timing light Inductive clamp timing light.
---	--

3. Check:

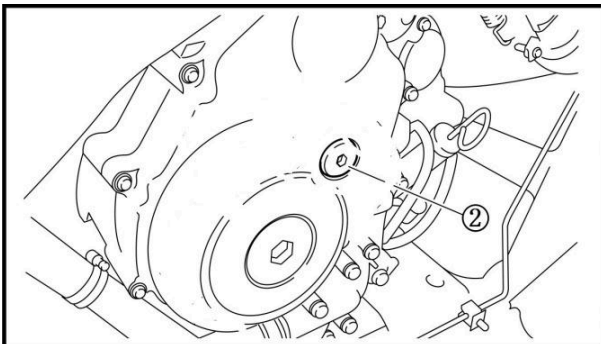
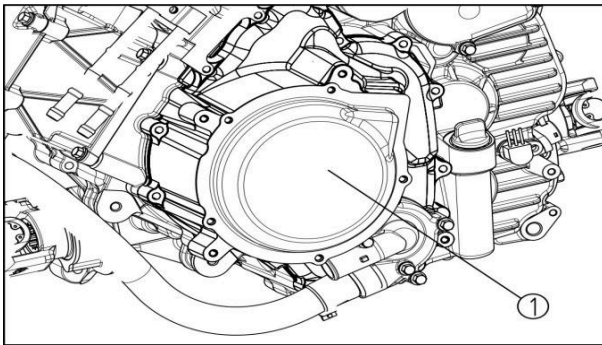
- ignition timing

a. Warm up the engine and keep it at the specified speed.

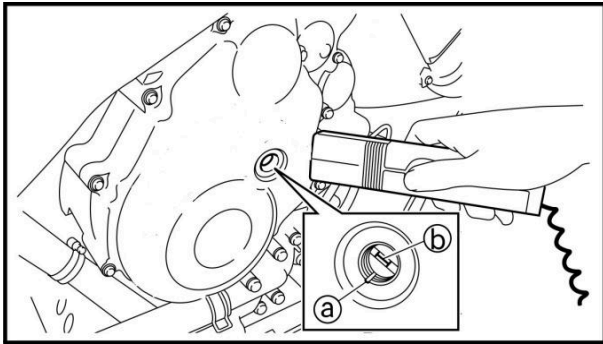
	Engine speed 1,350 ~ 1,500 r/min
---	-------------------------------------

b. Remove the starting mechanism cover ①.

c. Remove the timing mark accessing screw ②.



PERIODIC CHECKS AND ADJUSTMENTS



- d. Visually check the stationary pointer @ to verify it is within the required firing range ⑥ indicated on the AC magneto rotor. Incorrect firing range → Check the pulsar coil assembly.

NOTE:

When checking the ignition timing, make sure that the timing light cord does not come in contact with the exhaust muffler.

- e. Install the timing mark accessing screw.



Timing mark accessing screw
6 Nm (0.6 m · kg, 4.3 ft · lb)

4. Detach:

- timing light
- tachometer

5. Install:

- footrest board

Refer to “FOOTREST BOARDS”.

- right side panel
- left side panel

Refer to “SEAT AND SIDE PANELS”.

Measuring the compression pressure

NOTE:

Insufficient compression pressure will result in a loss of performance.

1. Measure:

- valve clearance

Out of specification → Adjust.

Refer to “ADJUSTING THE VALVE CLEARANCE”.

2. Start the engine, warm it up for several minutes, and then turn it off.

3. Remove:

- right side panel

Refer to “SEAT AND SIDE PANELS”.

- V-belt cooling duct 2

Refer to “ENGINE REMOVAL” in chapter 4.

4. Disconnect:

- spark plug cap

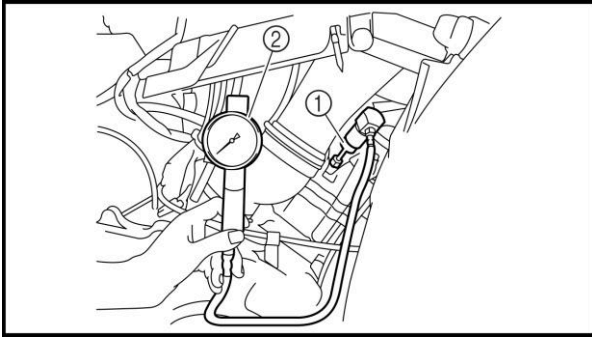
5. Remove:

- spark plug

CAUTION:

Before removing a spark plug, use compressed air to blow away any dirt accumulated in the spark plug well to prevent it from falling into the cylinder.

PERIODIC CHECKS AND ADJUSTMENTS



6. Attach:

- extension ①
- compression gauge ②



**Compression gauge
Engine compression tester
Extension**

7. Measure:

- compression pressure
- Out of specification → Refer to steps (c) and (d).



Compression pressure (at sealevel)

Minimum

392 kPa (3.92 kg/cm², 55.8 psi)

Standard

450 kPa (4.50 kg/cm², 64.0 psi)

Maximum

504 kPa (5.04 kg/cm², 71.7 psi)

- Set the main switch to “ON”
- With the throttle wide open, crank the engine until the reading on the compression gauge stabilizes.

WARNING

To prevent sparking, ground the spark plug lead before cranking the engine.

- If the compression pressure is above the maximum specification, check the cylinder head, valve surfaces and piston crown for carbon deposits.
Carbon deposits → Eliminate.
- If the compression pressure is below the minimum specification, squirt a few drops of oil into the cylinder and measure again. Refer to the following table.

Compression pressure (with oil applied into the cylinder)	
Reading	Diagnosis
Higher than without oil	Piston ring(s) wear or damage → Repair.
Same as without oil	Piston, valves, cylinder head gasket or piston rings possibly defective → Repair.

PERIODIC CHECKS AND ADJUSTMENTS

8. Install:

- spark plug

 **13 Nm (1.3 m · kg, 9.4 ft · lb)**

9. Connect:

- spark plug cap

10. Install:

- V-belt cooling duct 2

Refer to “ENGINE REMOVAL” in chapter 4.

- right side panel

Refer to “SEAT AND SIDE PANELS”.

Checking the engine oil level

1. Place the vehicle on a level surface.

2. Check the engine oil level on a cold engine.

NOTE: _____

If the engine was started before checking the oil level, be sure to warm up the engine sufficiently, and then wait at least 10 minutes until the oil settles for an accurate reading.

3. Remove:

- dipstick accessing panel

Refer to “SEAT AND SIDE PANELS”.

4. Check:

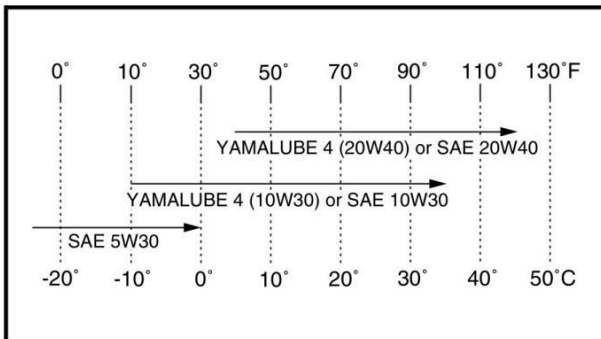
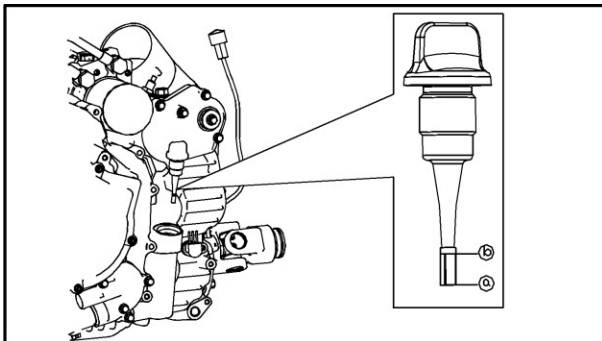
- engine oil level

Oil level should be between the minimum level mark a and maximum level mark b.

Oil level low → Add oil to the proper level.

NOTE: _____

To obtain an accurate oil level reading, the dipstick must be inserted completely into the oilfields hole.



**Recommended engine oil type,
SAE 5W30, SAE 10W30 or SAE 20W40**

CAUTION: _____

Do not allow foreign material to enter the crankcase.

5. Check the engine oil level again.

CAUTION: _____

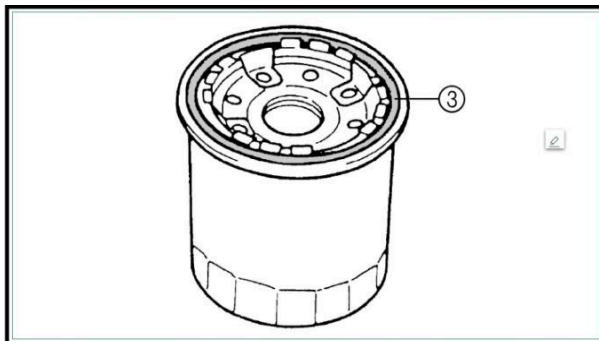
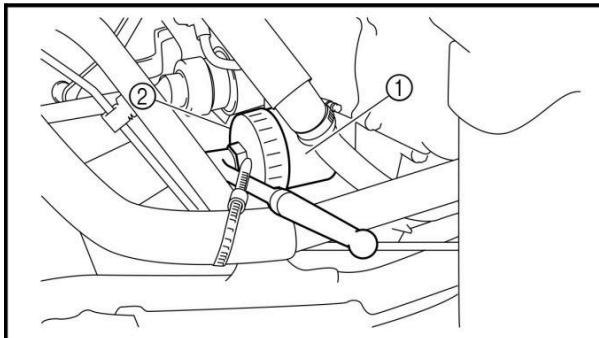
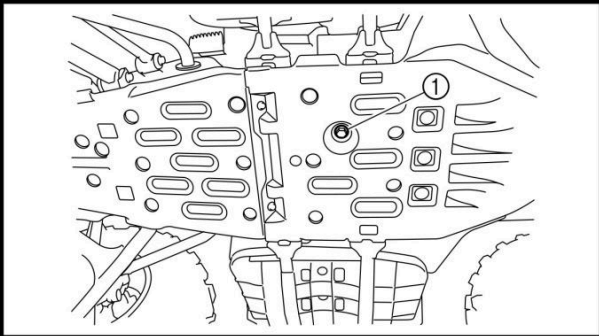
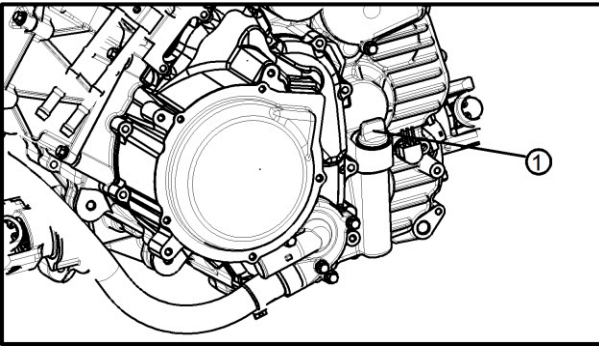
Be sure the engine oil is at the correct level, otherwise engine damage may result.

6. Install:

- dipstick accessing panel

Refer to “SEAT AND SIDE PANELS”.

PERIODIC CHECKS AND ADJUSTMENTS



Changing the engine oil

1. Start the engine, warm it up for several minutes, and then turn it off.
2. Place a container under the engine oil drain bolt.
3. Remove:
 - dipstick accessing panel
Refer to "SEAT AND SIDE PANELS".
4. Remove:
 - dipstick ①
5. Remove:
 - engine oil drain bolt 1
(along with the gasket)
6. Drain:
 - engine oil
(completely from the crankcase)
7. If the oil filter cartridge is also to be replaced, perform the following procedure.
 - a. Remove the oil filter cartridge ① with an oil filter wrench ②.



Oil filter wrench

- b. Lubricate the O-ring 3 of the new oil filter cartridge with a thin coat of engine oil.

CAUTION:

Make sure the O-ring 3 is positioned correctly in the groove of the oil filter cartridge.

- c. Tighten the new oil filter cartridge to specific caption with an oil filter wrench.



Oil filter cartridge
17 Nm (1.7 m · kg, 12 ft · lb)

8. Check:
 - engine oil drain bolt gasket
Damage → Replace.

9. Install:
 - engine oil drain bolt
(along with the gasket)



30 Nm (3.0 m · kg, 22 ft · lb)

10. Fill:
 - crankcase
(with the specified amount of the recommended engine oil)



Quantity
Total amount
2.30 L (2.03 imp qt, 2.42 US qt)
With oil filter cartridge replacement
2.00 L (1.76 imp qt, 2.11 US qt)
Without oil filter cartridge replacement
1.90 L (1.68 imp qt, 2.00 US qt)

11. Install:

- dipstick

12. Start the engine, warm it up for several minutes, and then turn it off.

13. Check:

- engine (for engine oil leaks)

14. Check:

- engine oil level

Refer to “CHECKING THE ENGINE OIL LEVEL”.

15. Check:

- engine oil pressure

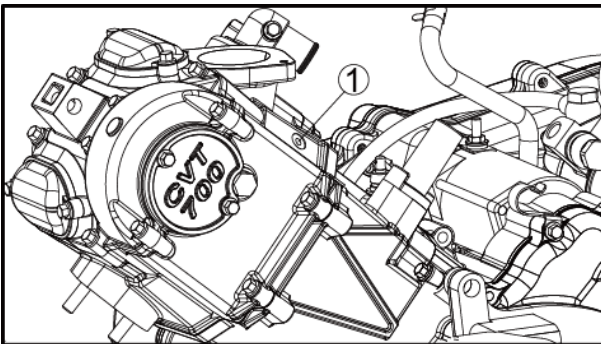
a. Slightly loosen the oil check bolt ①.

b. Start the engine and keep it idling until engine oil starts to seep from the oil check bolt. If no engine oil comes out after one minute, turn the engine off so that it will not seize.

c. Check the engine oil passages, the oil filter cartridge and the oil pump for damage or leakage. Refer to “CRANKSHAFT AND OIL PUMP” in chapter 4.

d. Start the engine after solving the problem(s) and check the engine oil pressure again.

e. Tighten the oil check bolt to specification.



Oil check bolt
10 N·m (1.0 m·kg, 7.2 ft·lb)

Cleaning the air filter element

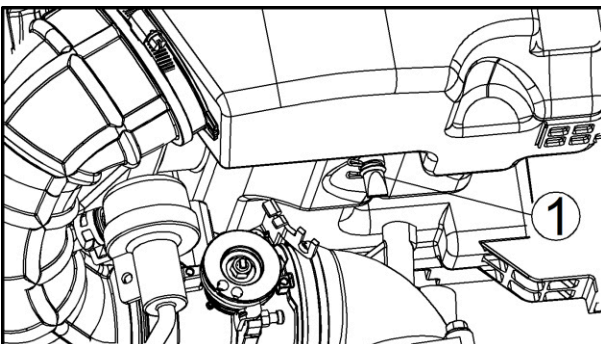
1. Remove:

- Air filter cover plate
- left side panel
- right side panel

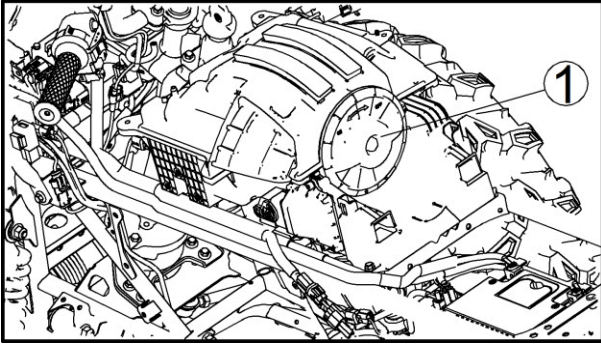
Refer to “SEAT AND SIDE PANELS”.

NOTE:

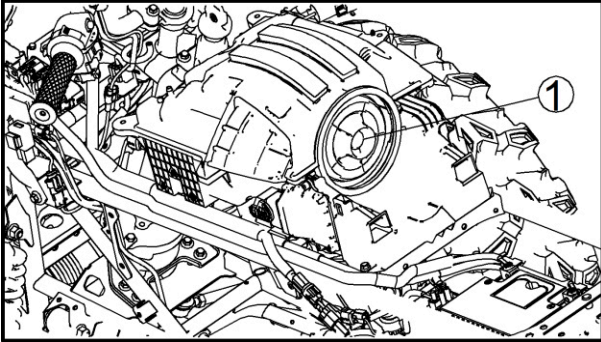
There are two check hoses 1 at the bottom of the air filter case. If dust and/or water collect in them, clean the air filter element, air filter mesh and air filter case.



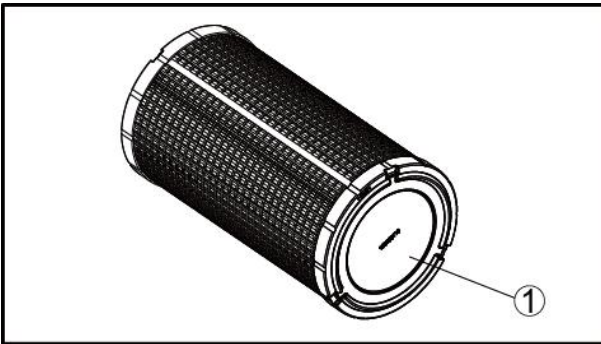
PERIODIC CHECKS AND ADJUSTMENTS



2. Remove:
- air filter case cover ①



3. Remove:
- air filter element ①



4. Check:
- air filter element
- Damage → Replace.
5. Clean:
- air filter element
- Use compressed air to blow off dust from the inner surface of the element.
6. Install:
- air filter element

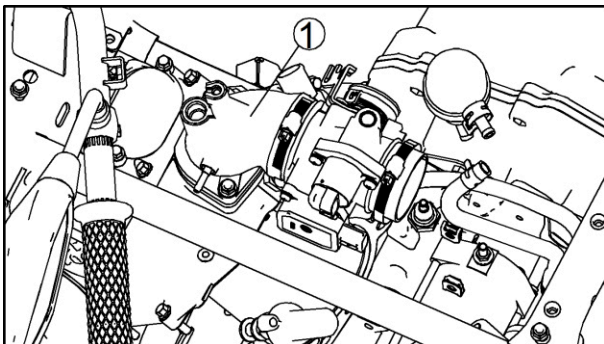
NOTE:

Make sure its sealing surface matches the sealing surface of the case so there is no air leak.

7. Install:
- air filter case cover
8. Install:
- right side panel
 - left side panel
 - fuel tank cover

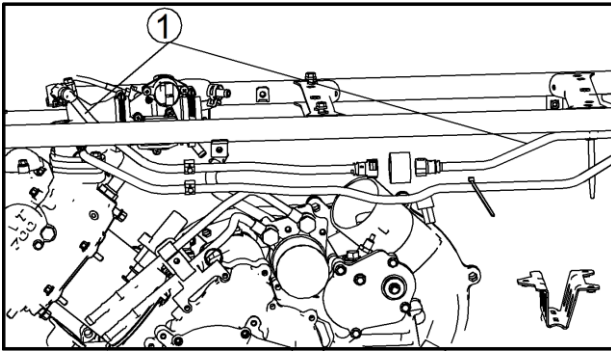
Refer to “SEAT AND SIDE PANELS”.

Checking the throttle body joint



1. Remove:
- seat and side panels
- Refer to “SEAT AND SIDE PANELS”.
2. Check:
- throttle body joint 1
- Cracks/damage → Replace.
- Refer to “THROTTLE BODY” in chapter 6.
3. Install:
- seat and side panels
- Refer to “SEAT AND SIDE PANELS”.

PERIODIC CHECKS AND ADJUSTMENTS



Checking fuel pipe

1. Remove:

- seat
- side panel

Refer to “SEAT AND SIDE PANELS”.

- V-belt cooling duct 2

Refer to “ENGINE REMOVAL” in chapter 4.

2. Check:

- fuel hose ①

Cracks/damage → Replace.

Loose connection → Connect properly.

3. Install:

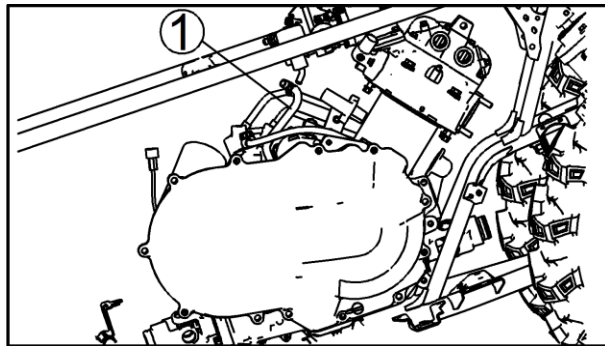
- V-belt cooling duct 2

Refer to “ENGINE REMOVAL” in chapter 4.

- side panel

- seat

Refer to “SEAT AND SIDE PANELS”.



Checking the breather hoses

1. Remove:

- left side panel

Refer to “SEAT AND SIDE PANELS”.

- air filter case

Refer to “AIR FILTER CASE”.

2. Check:

- crankcase breather ①

Cracks/damage → Replace.

Loose connection → Connect properly.

CAUTION:

Make sure the breather hoses are routed correctly.

Checking the coolant level

1. Place the vehicle on a level surface.

NOTE:

The coolant level must be checked on a cold engine since the level varies with engine temperature.

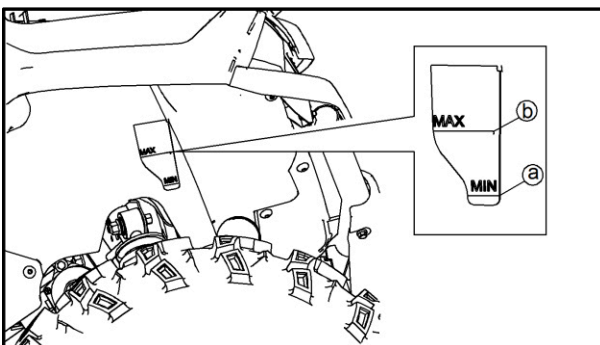
2. Check:

- coolant level

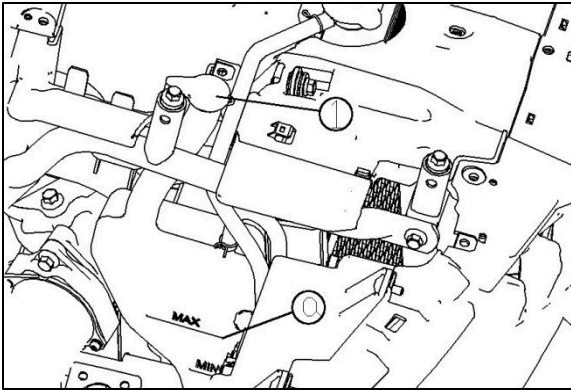
The coolant level should be between the minimum level mark ① and maximum level mark ② in the coolant reservoir.

CAUTION:

- **Adding water instead of coolant lowers the anti-freeze content of the coolant. If water is used instead of coolant, check and if necessary, correct the antifreeze concentration of the coolant.**
- **Use only distilled water. However, soft water may be used if distilled water is not available.**



PERIODIC CHECKS AND ADJUSTMENTS



3. If the coolant is at or below the minimum level mark, remove the front panel. Refer to “FRONT CARRIER AND FRONT GUARD”.

4. Remove the reservoir cap ①, add coolant or distilled water to the maximum level mark ②, install the reservoir cap, and then install the panel.



Coolant reservoir capacity (up to the maximum level mark):
0.17 L (0.15 Imp qt, 0.18 US qt)

Changing the coolant

1. Remove:

- Seat
- side panel

Refer to “SEAT AND SIDE PANELS”.

- Front carrier middle cover plate
- Instrument cover

Refer to “FRONT CARRIER AND FRONT GUARD”.

2. Remove:

- coolant reservoir cap ①

3. Disconnect:

- coolant reservoir hose ②

4. Drain:

- coolant
(from the coolant reservoir)

5. Connect:

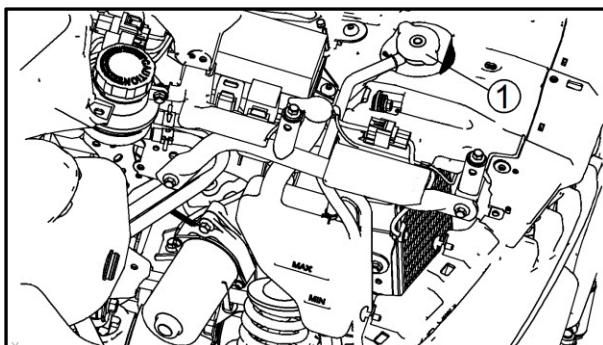
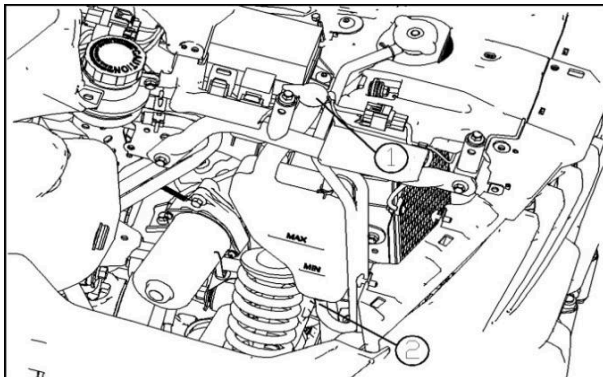
- coolant reservoir hose

6. Remove:

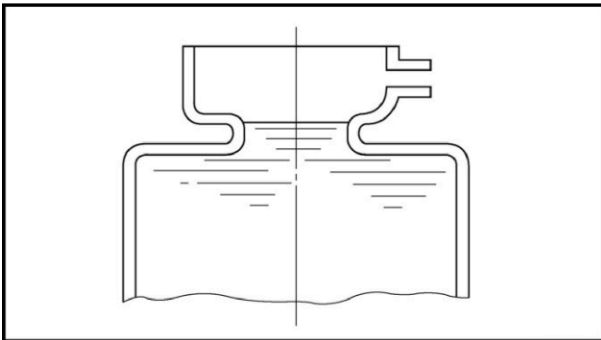
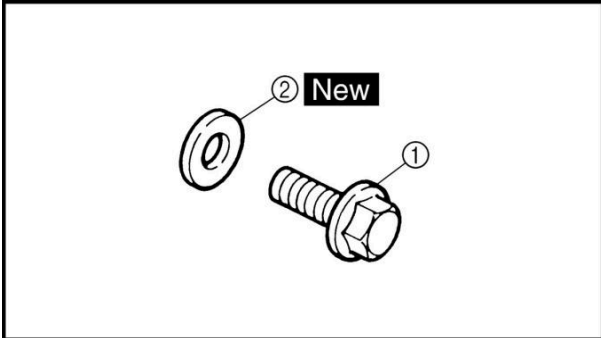
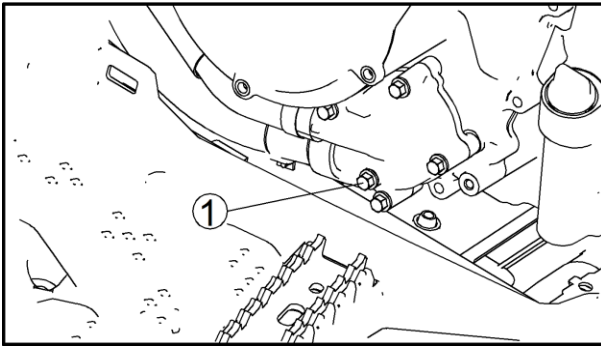
- radiator cap ①



WARNING: A hot radiator is under pressure. Therefore, do not remove the radiator cap when the engine is hot. Scalding hot fluid and steam may be blown out, which could cause serious injury. When the engine has cooled, open the radiator cap as follows: Place a thick rag or a towel over the radiator cap and slowly turn the radiator cap counterclockwise toward the detent to allow any residual pressure to escape. When the hissing sound has stopped, press down on the radiator cap and turn it counterclockwise to remove.



PERIODIC CHECKS AND ADJUSTMENTS



7. Remove:
- coolant drain bolt ①
(along with the copper washer)
8. Drain:
- coolant
(from the engine and radiator)

9. Check:
- coolant drain bolt ①
Damage → Replace.

10. Install:
- copper washer ② **New**
 - coolant drain bolt

10 Nm (1.0 m · kg, 7.2 ft · lb)

11. Fill:
- cooling system (with the specified amount of the recommended coolant)



Recommended antifreeze
High-quality ethylene glycol antifreeze containing corrosion inhibitors for aluminum engines
Mixing ratio
1 : 1 (antifreeze water)
Quantity
Total amount
3.3 L (2.92 Imp qt, 3.47 US qt)
Coolant reservoir capacity (up to the minimum level mark over 10 mm (0.39 in))
0.16 L (0.14 Imp qt, 0.17 US qt)
From minimum to maximum level mark
0.24 L (0.21 Imp qt, 0.25 US qt)

Handling notes for coolant

Coolant is potentially harmful and should be handled with special care.

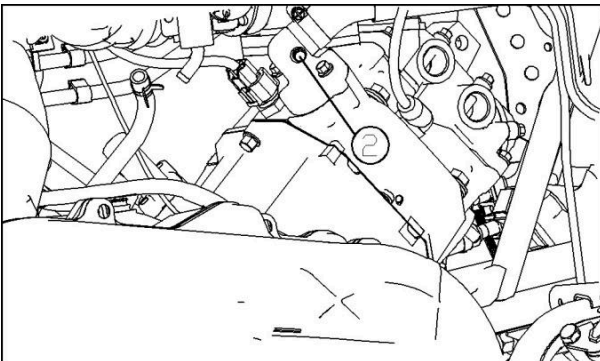
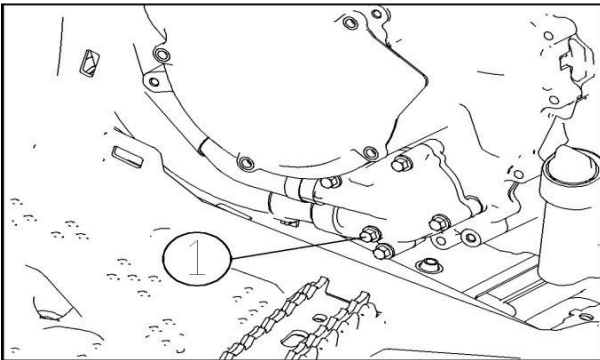
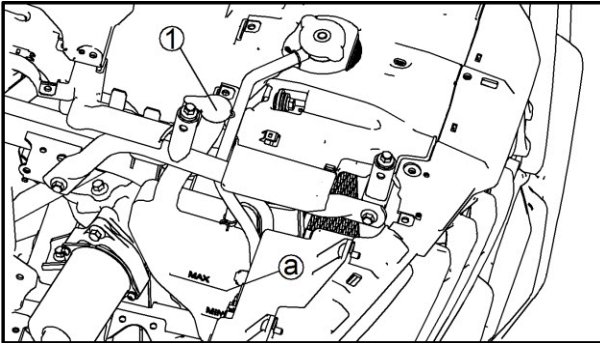
WARNING

- If coolant splashes in your eyes, thoroughly wash them with water and consult a doctor.
- If coolant splashes on your clothes, quickly wash it away with water and then with soap and water.
- If coolant is swallowed, induce vomiting and get immediate medical attention.

PERIODIC CHECKS AND ADJUSTMENTS

CAUTION:

- Adding water instead of coolant lowers the anti-freeze content of the coolant. If water is used instead of coolant, check, and if necessary, correct the antifreeze concentration of the coolant.
- Use only distilled water. However, if distilled water is not available, soft water may be used.
- If coolant comes into contact with painted surfaces, immediately wash them with water.
- Do not mix different types of antifreeze.



12. Fill:

- coolant reservoir (with the recommended coolant to the maximum level mark **a**)

13. Install:

- coolant reservoir cap **1**

14. Bleed:

- coolant system

- a. Loosen the water pump air bleed bolt **1**, without removing it, to allow all of the air to escape from the air bleed bolt hole.
- b. When coolant begins to flow out of the bolt hole, tighten the water pump air bleed bolt to specification.



Water pump air bleed bolt
10 N·m (1.0 m·kg, 7.2 ft·lb)

- c. Loosen the thermostat cover air bleed bolt **2**, without removing it, to allow all of the air to escape from the air bleed bolt hole.
- d. When coolant begins to flow out of the bolt hole, tighten the thermostat cover air bleed bolt to specification.



Water pump air bleed bolt
10 N·m (1.0 m·kg, 7.2 ft·lb)

15. Start the engine, warm it up for ten minutes, and then rev the engine five times.
16. Pour the recommended coolant into the radiator until it is full.
17. Stop the engine and allow it to cool. If the coolant level has dropped after the engine has cooled, add sufficient coolant until it reaches the top of the radiator, and then install the radiator cap.
18. Start the engine, and then check for coolant leakage.
19. Install:

- Instrument cover
- Front carrier middle cover plate

Refer to “FRONT CARRIER AND FRONT GUARD”.

- Side panel
- Seat

Refer to “SEAT AND SIDE PANELS”.

Checking the cooling system

1. Remove:

- Seat and Side panel

Refer to "SEAT AND SIDE PANELS".

- front carrier and front Guard

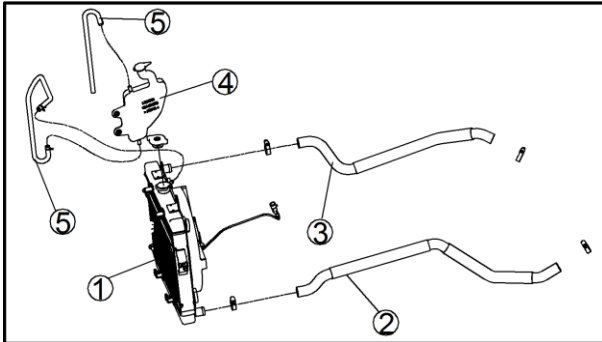
Refer to "FRONT CARRIER AND FRONT GUARD".

- front fenders

Refer to "FRONT FENDERS AND FRONT GRILL".

2. Check:

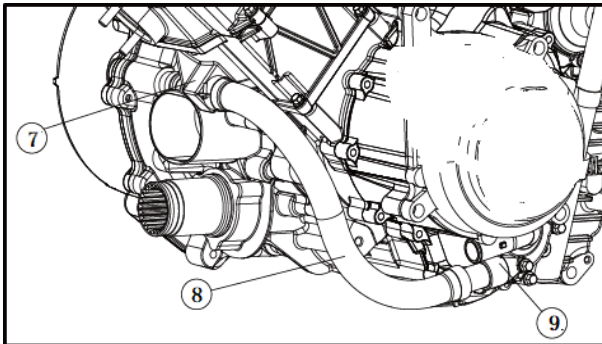
- radiator ①
- radiator outlet hose ②
- radiator inlet hose ③
- coolant reservoir ④
- coolant reservoir hose ⑤
- ventilation hose ⑥



- water jacket ⑦
- water pump outlet hose ⑧
- water pump housing ⑨

Cracks/damage → Replace.

Refer to "COOLING SYSTEM" in chapter 5.



- oil cooler ⑩
- oil cooler outlet hose ⑪
- oil cooler inlet hose ⑫
- oil cooler inlet pipe ⑬
- oil cooler outlet pipe ⑭
- oil inlet hose ⑮
- oil outlet hose ⑯

3. Install:

- front fenders

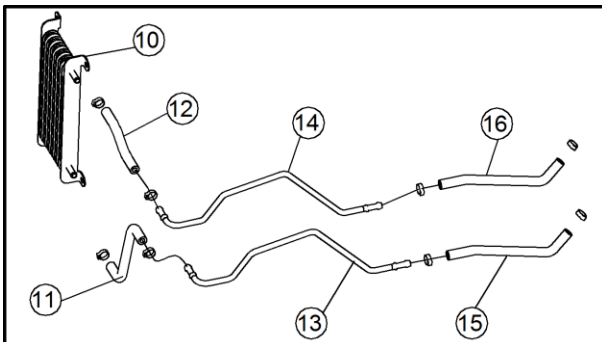
Refer to "FRONT FENDERS AND FRONT GRILL".

- front carrier and front Guard

Refer to "FRONT CARRIER AND FRONT GUARD".

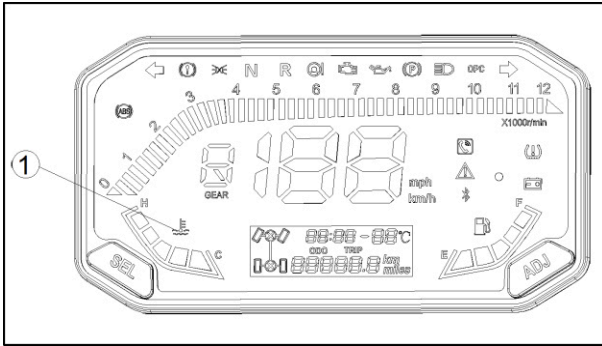
- Seat and Side panel

Refer to "SEAT AND SIDE PANELS".

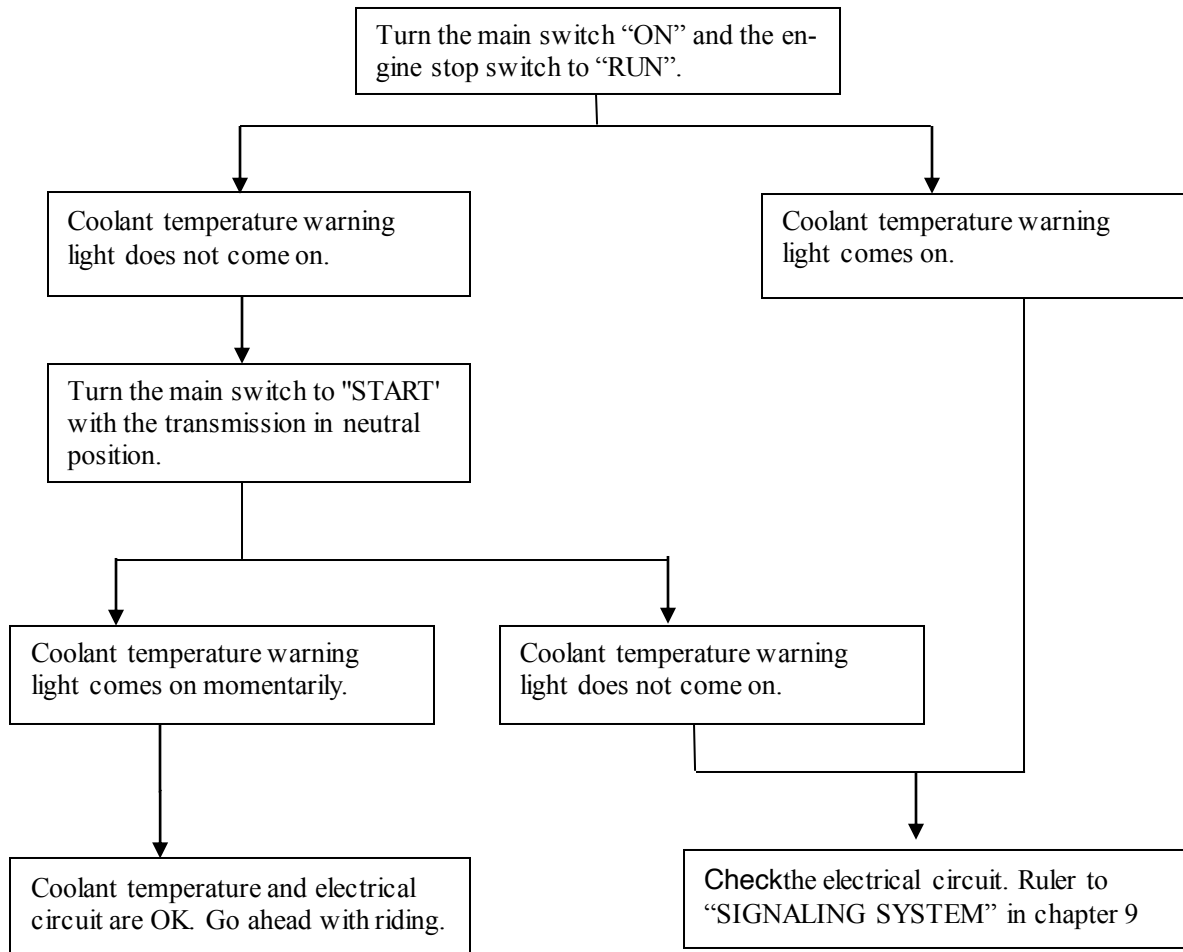


Checking the coolant temperature warning light

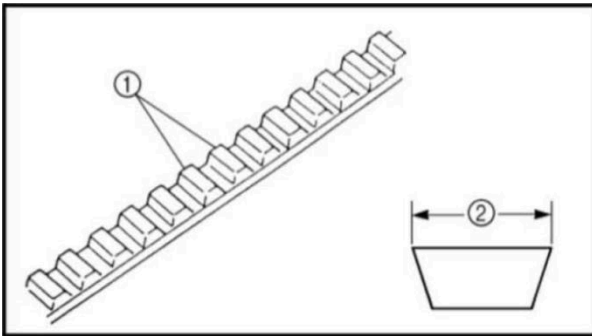
- ① Coolant temperature warning light



Coolant temperature warning light checking method



PERIODIC CHECKS AND ADJUSTMENTS



Checking and replacing the v-belt

1. Remove:

- drive belt cover

Refer to "PRIMARY AND SECONDARY SHEAVES" in chapter 4.

2. Check:

- V-belt ①

Cracks/wear/scaling/chipping → Replace.

Oil/grease → Check primary sheave and secondary sheave.

3. Measure:

- V-belt width ②

Out of specification → Replace.



V-belt width
31.4mm(1.24 in)
<Limit>:28.3 mm (1.11 in)

4. Replace:

- V-belt

a. Install the bolts ① (90101-06018) into the secondary fixed sheave hold.

NOTE:

Tightening the bolts ① will push the secondary sliding sheave away, causing the gap between the secondary fixed and sliding sheaves to widen.

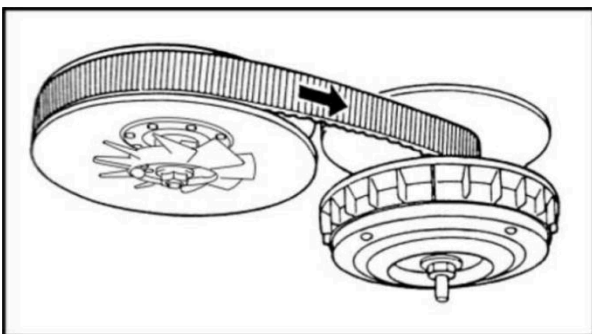
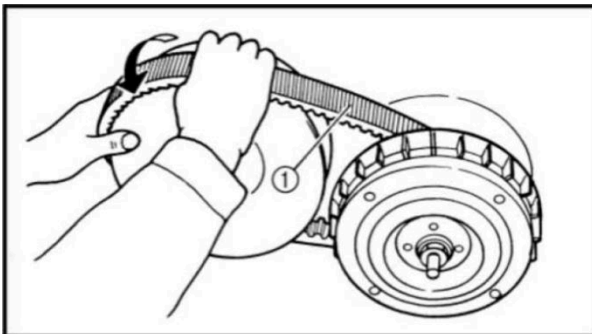
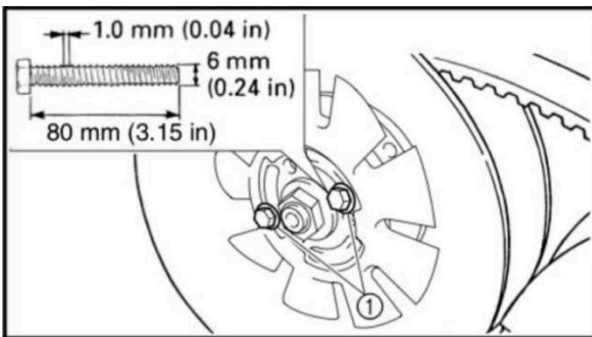
b. Remove the V-belt ① from the primary sheave and secondary sheave.

c. Install the new V-belt.

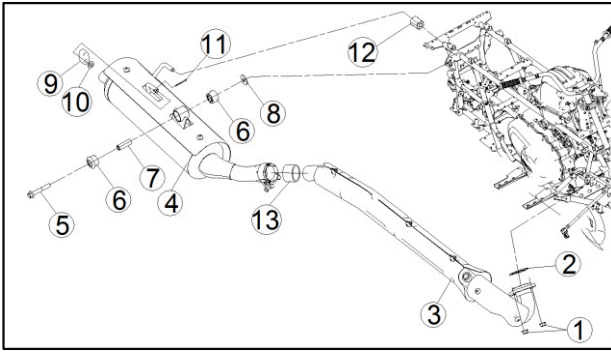
NOTE:

Install the V-belt so that its arrow faces the direction shown in the illustration.

d. Remove the bolts.



PERIODIC CHECKS AND ADJUSTMENTS



Checking the exhaust system

The following procedure applies to all of the exhaust pipe gaskets.

1. Check:

- gaskets ②
- exhaust pipe ③
- muffler ④
- graphite annulus ⑬

Exhaust gas leaks → Replace.

- muffler rubber 1 ⑥

Cracks/damage → Replace

- muffler rubber 2 ⑨

Cracks/damage → Replace

- muffler rubber 3 ⑫

Cracks/damage → Replace

2. Check:

- tightening torques



Exhaust pipe nut ⑦

20 Nm (2.0 m · kg, 14 ft · lb)

Muffler bolt ⑤

20 Nm (2.0 m · kg, 14 ft · lb)

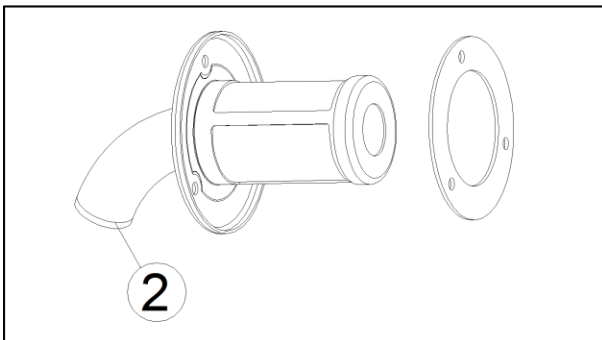
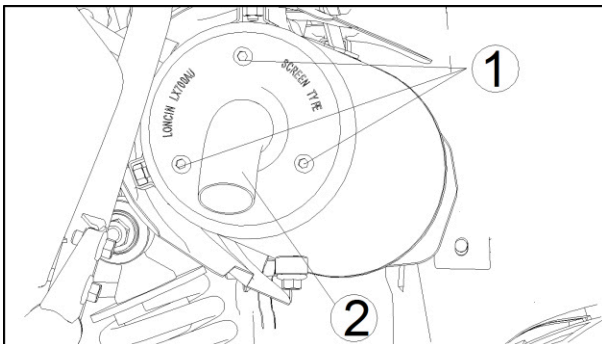
Cleaning the spark arrester

1. Clean:

- spark arrester

⚠ WARNING

- **Select a well-ventilated area free of combustible materials.**
- **Always let the exhaust system cool before performing this operation.**
- **Do not start the engine when removing the tailpipe from the muffler.**
- **Make sure that the transmission is in neutral.**



a. Remove the bolts ①.

b. Remove the tailpipe ② by pulling it out of the muffler and the gasket.

c. Tap the tailpipe lightly with a soft-face hammer or suitable tool, then use a wire brush to remove any carbon deposits from the spark arrester portion of the tailpipe and inside of the tail pipe housing.

d. Install the gasket, and then insert the tailpipe into the muffler and align the bolt holes.

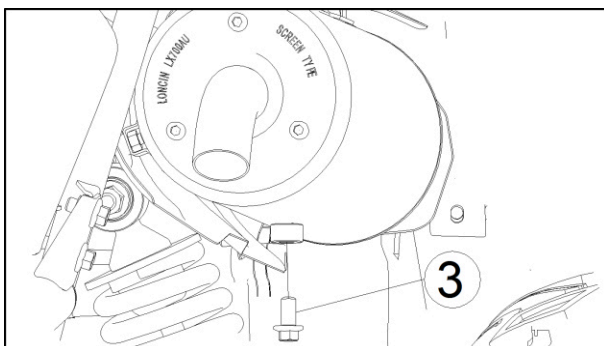
e. Insert the bolts CD and tighten them.



Bolt

10 N·m (1.0 m · kg, 7.2 ft · lb)

PERIODIC CHECKS AND ADJUSTMENTS



- f. Remove the purging bolt 3.
- g. Start the engine and rev it up approximately twenty times while momentarily creating exhaust system back pressure by blocking the end of the muffler with a shop towel.
- h. Stop the engine and allow the exhaust pipe to cool.
- i. Install the purging bolt 3 and tighten it.

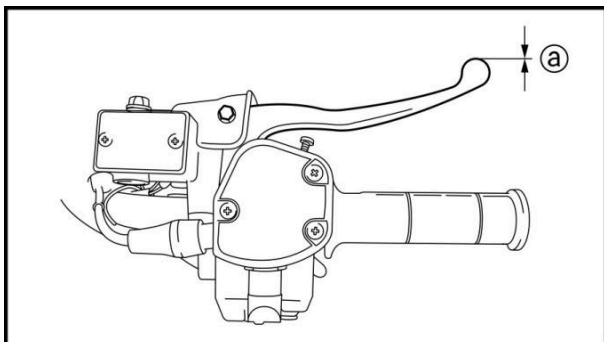


Purging bolt
27 Nm (2.7 m · kg, 19 ft · lb)

Chassis

Adjusting the front brake

1. Measure:
 - front brake lever free play a
- Out of specification → Bleed the front brake system.
Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM”.



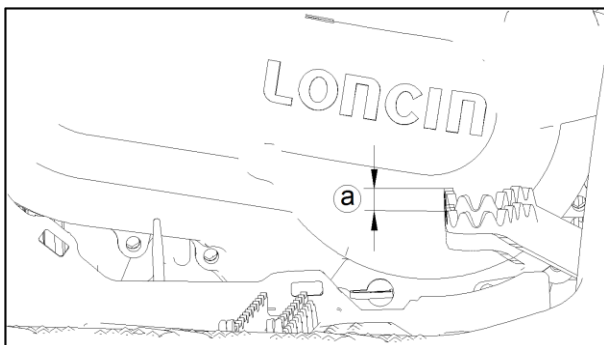
Front brake lever free play
(at the end of the brake lever)
0 mm (0 in)

Adjusting the rear brake

⚠ WARNING

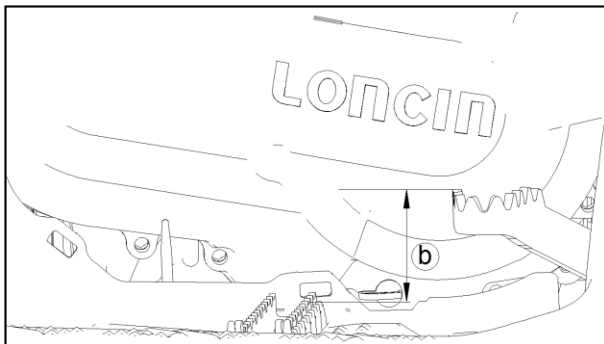
Always adjust both the brake pedal and the rear brake lever whenever adjusting the rear brake.

1. Measure:
 - brake pedal free play ①
- Out of specification → Adjust.



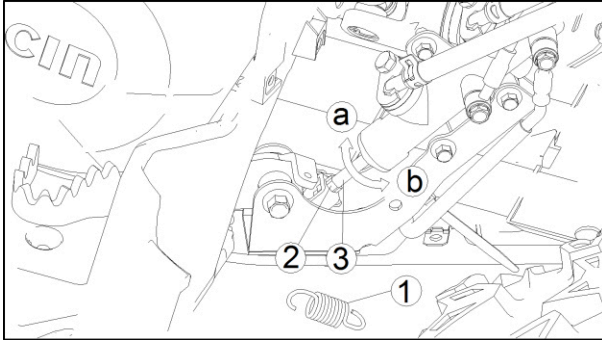
Brake pedal free play
0 ~ 5.0 mm (0 ~ 0.20 in)

2. Measure:
 - brake pedal height ②
- Out of specification → Adjust.



Brake pedal height
56.7 mm (2.23 in)

PERIODIC CHECKS AND ADJUSTMENTS



4. Adjust:

- brake pedal free play

5. Remove:

- seat and side panels

Refer to “SEAT AND SIDE PANELS”

- front fender inner panel

Refer to “FRONT FENDERS AND FRONT GRILL”.

- tension spring ①

a. Loosen the locknut ②.

b. Adjust the plunger ③ in direction ④ or ⑤ until the specified brake pedal free play is obtained.

Direction ④	Brake pedal free play is increased.
Direction ⑤	Brake pedal free play is decreased.

c. Tighten the locknut ②.



Purging bolt

27 Nm (2.7 m · kg, 19 ft · lb)

⚠ WARNING

After this adjustment is performed, lift the front and rear wheels off the ground by placing a block under the engine, and spin the rear wheel to ensure there is no brake drag. If any brake drag is noticed, perform the above steps again.

6. Install:

- tension spring ①

- front fender inner panel

Refer to “FRONT FENDERS AND FRONT GRILL”.

- seat and side panels

Refer to “SEAT AND SIDE PANELS”

Checking the brake fluid level

1. Place the vehicle on a level surface.

NOTE:

When checking the brake fluid level, make sure that the top of the brake fluid reservoir top is horizontal.

2. Check:

- brake fluid level

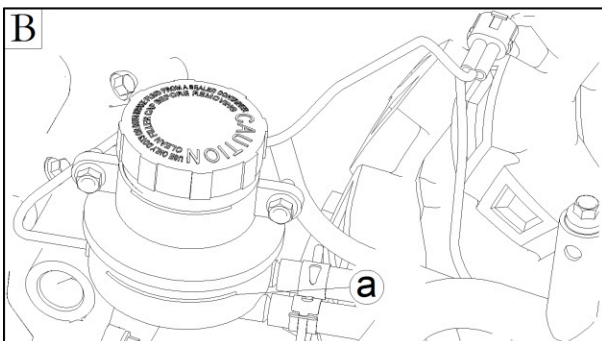
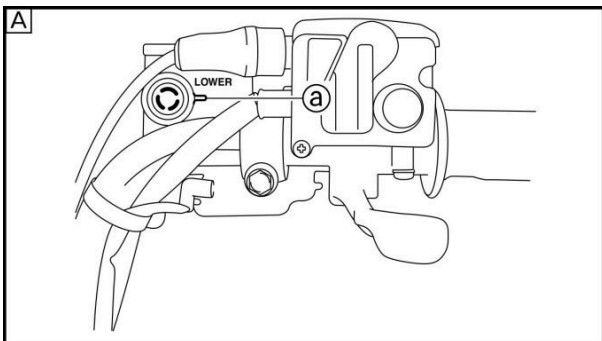
Below the minimum level mark → Add the recommended brake fluid to the proper level.



Recommended brake fluid
DOT 4

☐ Front brake

☐ Rear brake



PERIODIC CHECKS AND ADJUSTMENTS

⚠ WARNING

- Use only the designated brake fluid. Other brake fluids may cause the rubber seals to deteriorate, causing leakage and poor brake performance.
- Refill with the same type of brake fluid that is already in the system. Mixing brake fluids may result in a harmful chemical reaction, leading to poor brake performance.
- When refilling, be careful that water does not enter the brake fluid reservoir. Water will significantly lower the boiling point of the brake fluid and could cause vapor lock.

CAUTION:

Brake fluid may damage painted surfaces and plastic parts. Therefore, always clean up any spilt brake fluid immediately.

NOTE:

In order to ensure a correct reading of the brake fluid level, make sure that the top of the brake master cylinder reservoir is horizontal.

Checking the front brake pads

1. Remove:
 - front wheelsRefer to “FRONT AND REAR WHEELS” in chapter 8.
 2. Check:
 - brake padsWear indicator groove almost disappeared → Replace the brake pads as a set.
- Refer to “FRONT AND REAR BRAKES” in chapter 8.

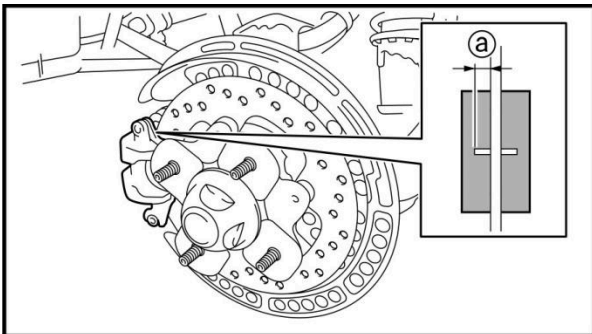
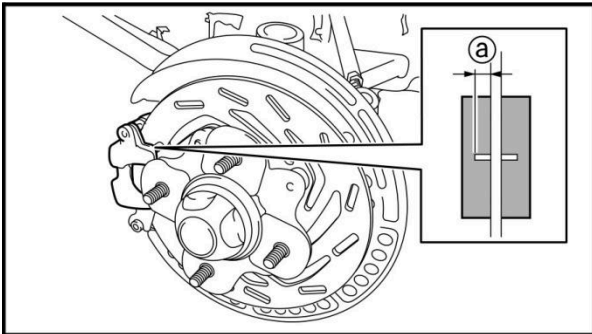


Brake pad wear limit a
1.0 mm (0.04 in)

3. Operate the brake lever.
4. Install:
 - front wheelsRefer to “FRONT AND REAR WHEELS” in chapter 8.

Checking the rear brake pads

1. Remove:
 - rear wheelsRefer to “FRONT AND REAR WHEELS” in chapter 8.

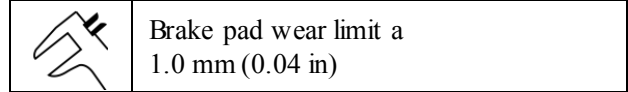


PERIODIC CHECKS AND ADJUSTMENTS

2. Check:

- brake pads

Wear indicator groove almost disappeared → Replace the brake pads as a set. Refer to “FRONT AND REAR BRAKES” in chapter 8.



3. Operate the brake lever or brake pedal.

4. Install:

- rear wheels

Refer to “FRONT AND REAR WHEELS” in chapter 8.

Checking the brake hoses

1. Check:

- front brake hoses ①
- rear brake hoses ②

Cracks/wear/damage → Replace.

2. Check:

- brake hose holders
- Loosen → Tighten.

3. Hold the vehicle in an upright position and apply the front or rear brake.

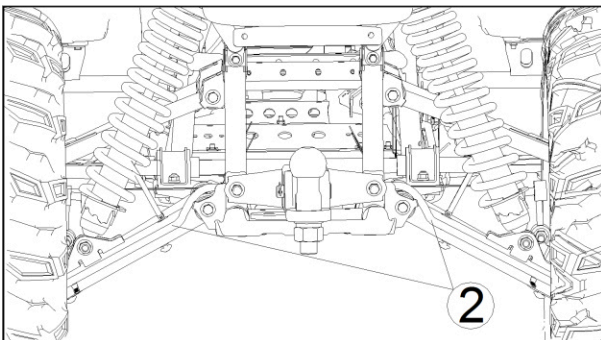
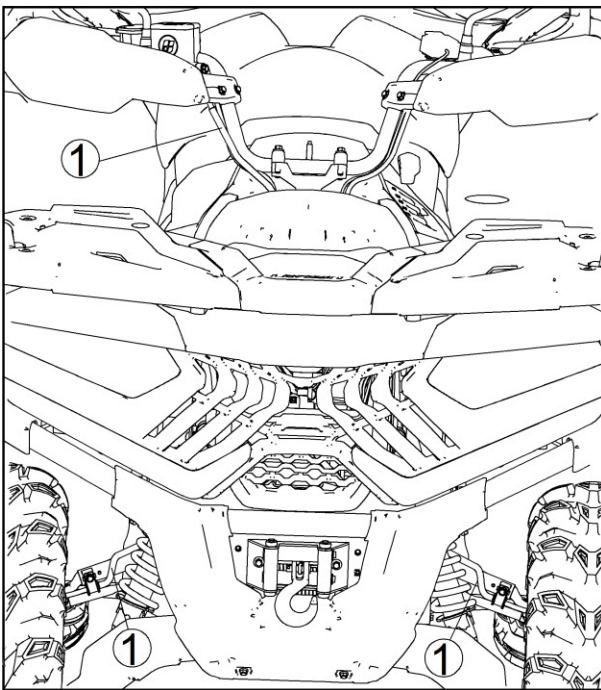
4. Check:

- brake hoses

Apply the brake lever several times.

Fluid leakage → Replace the hoses.

Refer to “FRONT AND REAR BRAKES” in chapter 8.



Bleeding the hydraulic brake system

⚠ WARNING

Bleed the hydraulic brake system whenever:

- the system is disassembled,
- a brake hose is loosened, disconnected or replaced,
- the brake fluid level is very low,
- brake operation is faulty.

PERIODIC CHECKS AND ADJUSTMENTS

NOTE:

- Be careful not to spill any brake fluid or allow the brake master cylinder reservoir to overflow.
- When bleeding the hydraulic brake system, make sure there is always enough brake fluid before applying the brake. Ignoring this precaution could allow air to enter the hydraulic brake system, considerably lengthening the bleeding procedure.
- If bleeding is difficult, it may be necessary to let the brake fluid settle for a few hours. Repeat the bleeding procedure when the tiny bubbles in the hose have disappeared.

1. Remove:

- rear wheel

Refer to “FRONT AND REAR WHEELS” in chapter 8.

2. Bleed:

- hydraulic brake system
 - a. Fill the brake master cylinder reservoir to the proper level with the recommended brake fluid.
 - b. Install the diaphragm (brake master cylinder reservoir).
 - c. Connect a clear plastic hose 1 tightly to the bleed screw 2.
 - ▣ Front
 - ▣ Rear
 - d. Place the other end of the hose into a container.
 - e. Slowly apply the brake several times.
 - f. Fully squeeze the brake lever or fully depress the brake pedal and hold it in position.
 - g. Loosen the bleed screw.

NOTE:

Loosening the bleed screw will release the pressure and cause the brake lever to contact the handlebar grip or the brake pedal to fully extend.

- h. Tighten the bleed screw and then release the brake lever or brake pedal.
- i. Repeat steps (e) to (h) until all of the air bubbles have disappeared from the brake fluid in the plastic hose.
- j. Tighten the bleed screw to specification.



Bleed screw
5 Nm (0.5 m · kg, 3.6 ft · lb)

- k. Fill the brake master cylinder reservoir to the proper level with the recommended brake fluid. Refer to “CHECKING THE BRAKE FLUID LEVEL”.

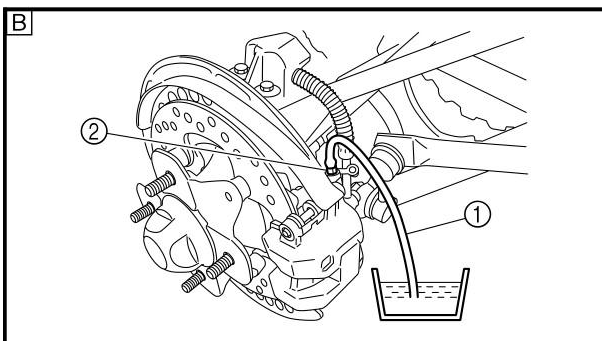
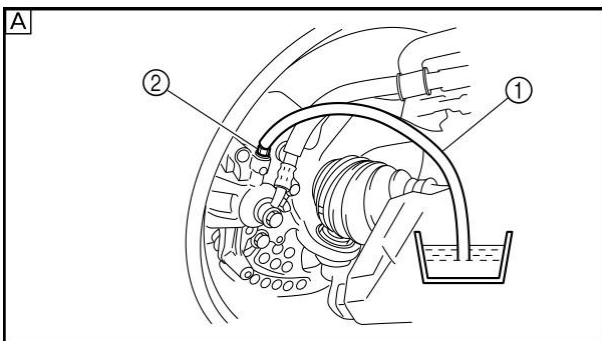
⚠ WARNING

After bleeding the hydraulic brake system, check the brake operation.

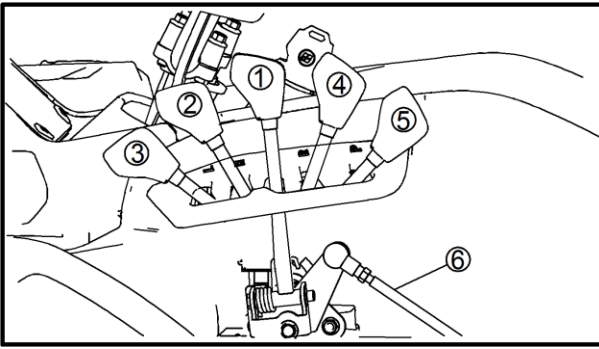
3. Install:

- rear wheel

Refer to “FRONT AND REAR WHEELS” in chapter 8.



PERIODIC CHECKS AND ADJUSTMENTS



Adjusting the select lever control cable and shift rod

- ① Neutral
- ② High
- ③ Low
- ④ Reverse
- ⑤ Park
- ⑥ Select lever shift rod

⚠ WARNING

Before moving the select lever, bring the vehicle to a complete stop. Otherwise the transmission may be damaged.

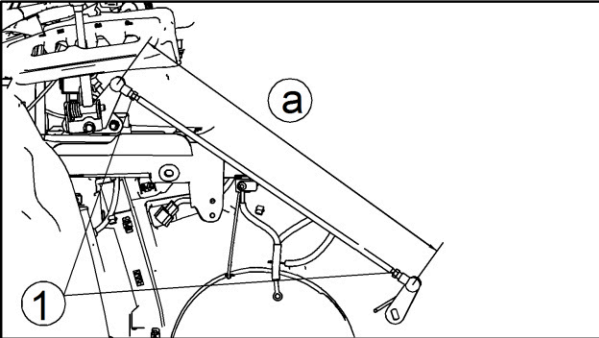
Shift rod:

- a. Make sure that the select lever and Tran's mission are in HIGH.
- b. Loosen both locknuts ①.
- c. Adjust the length ② of the shift rod to 413 mm (16.3 in).
- d. Tighten the locknuts.



Bleed screw
5 Nm (0.5 m · kg, 3.6 ft · lb)

- e. Start the engine, and then check that the select lever can be shifted to each shift position and that the appropriate indicator light comes on when the lever is in each position.
- f. Adjust the shift control cable again.



Checking the final gear oil level

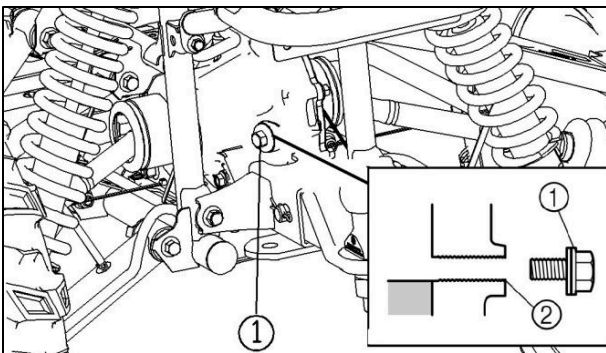
- 1. Place the vehicle on a level place.
- 2. Remove:
 - final gear oil level check bolt ①
- 3. Check:
 - oil level

Oil level should be up to the bottom brim ② of the hole.

Oil level low → Add oil to the proper level.



Recommended oil
SAE 80w-90 Hypoid gear oil



CAUTION:

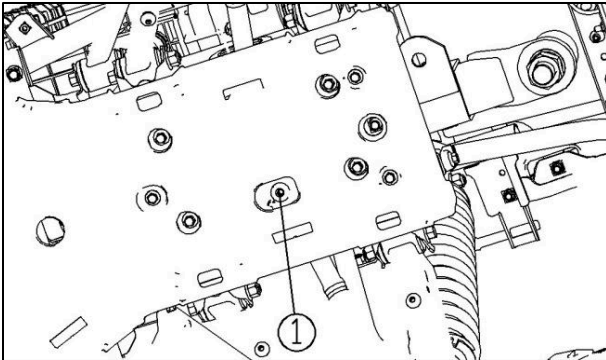
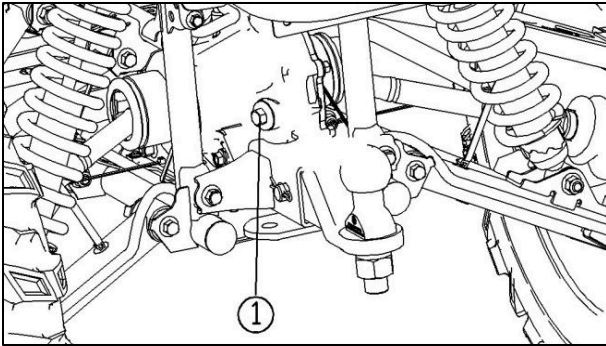
Take care not allow foreign material to enter the final gear case.

- 4. Install:
 - final gear oil level check bolt



23 Nm (2.3 m · kg, 17 ft · lb)

PERIODIC CHECKS AND ADJUSTMENTS



Changing the final gear oil

1. Place the vehicle on a level surface.
2. Remove:
 - final gear oil filler bolt ①
3. Place a receptacle under the final gear case.

4. Remove:
 - final gear oil level check bolt
 - final gear oil drain bolt ①
5. Drain:
 - final gear oil
6. Install:
 - final gear oil drain bolt

 **23 Nm (2.3 m · kg, 17 ft · lb)**

NOTE: _____

Check the gasket (drain bolt). If it is damaged, replace it with a new one

7. Fill:
 - final gear case



Periodic oil change
0.20 L(0.18 imp qt, 0.21 US qt)
Total amount
0.22 L(0.19 imp qt, 0.23 US qt)
Recommended oil
SAE 80w-90 Hypoid gear oil

CAUTION: _____

Take care not to allow foreign material to enter the final gear case.

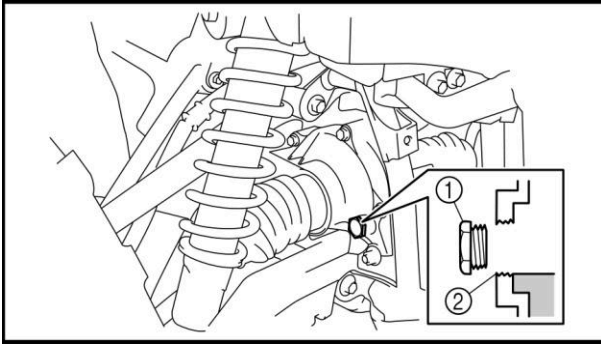
8. Check:
 - oil levelRefer to “CHECKING THE FINAL GEAR OIL LEVEL”.
9. Install:
 - final gear oil level check bolt

 **23 Nm (2.3 m · kg, 17 ft · lb)**

- final gear oil filler bolt

 **23 Nm (2.3 m · kg, 17 ft · lb)**

PERIODIC CHECKS AND ADJUSTMENTS



Checking the differential gear oil level

1. Place the vehicle on a level surface.

2. Remove:

- differential gear oil filler bolt ϕ

3. Check:

- oil level

Oil level should be up to the brim ϕ of hole.

Oil level low $\rightarrow$ Add oil to proper level.



Recommended oil
SAE 80w-90 Hypoid gear oil

CAUTION:

Take care not to allow foreign material to enter the final gear case.

4. Install:

- differential gear oil filler bolt

23 Nm (2.3 m · kg, 17 ft · lb)

Changing the differential gear oil

1. Place the vehicle on a level surface.

2. Place a receptacle under the differential gear case.

3. Remove:

- differential gear oil filler bolt
- differential gear oil drain bolt ①

4. Drain:

- differential gear oil

5. Install:

- differential gear oil drain bolt

23 Nm (2.3 m · kg, 17 ft · lb)

6. Fill:

- differential gear case



Periodic oil change
0.20 L(0.18 imp qt, 0.21 US qt)

Total amount

0.22 L(0.19 imp qt, 0.23 US qt)

Recommended oil

SAE 80w-90 Hypoid gear oil

NOTE:

If gear oil is filled to the brim of the oil filler hole, oil may start leaking from the differential gear case breather hose. Therefore, check the quantity of the oil, not its level.

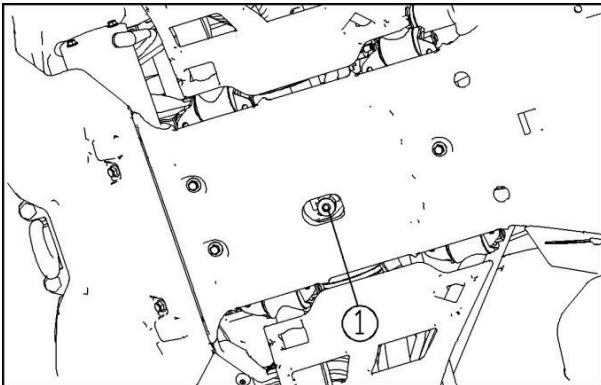
CAUTION:

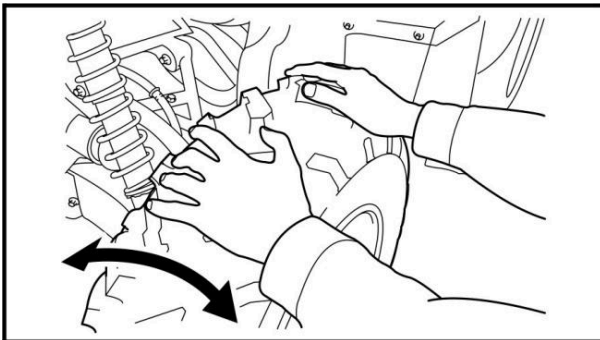
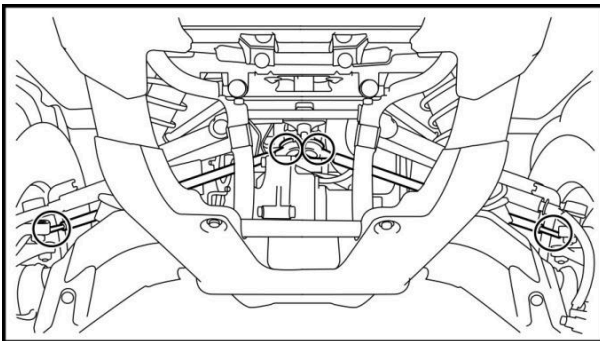
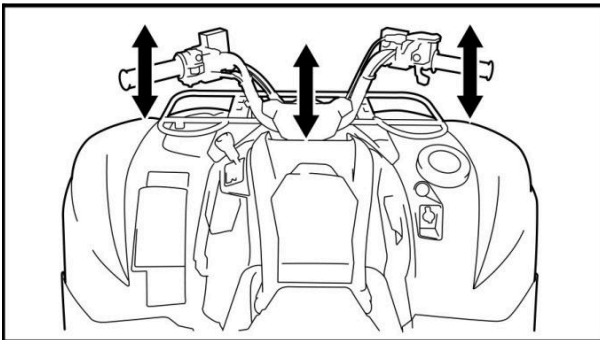
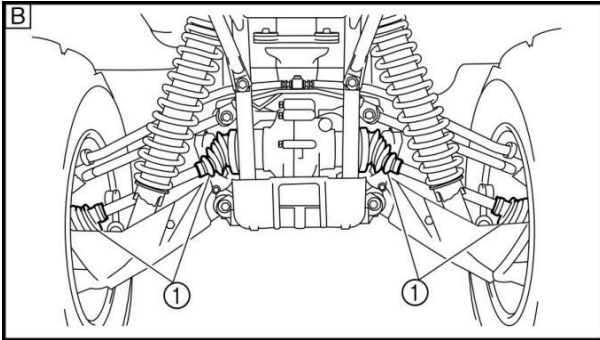
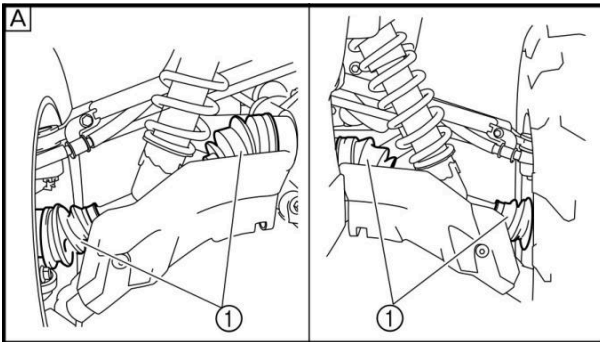
Take care not to allow foreign material to enter the final gear case.

7. Install:

- differential gear oil filler bolt

23 Nm (2.3 m · kg, 17 ft · lb)





Checking the constant velocity joint dust boots

1. Check:

- dust boots 1

Damage → Replace.

Refer to “FRONT CONSTANT VELOCITY JOINTS AND DIFFERENTIAL GEAR” and “REAR CONSTANT VELOCITY JOINTS AND FINAL DRIVE GEAR” in chapter 7.

▣ Front

▣ Rear

Checking the steering system

1. Place the vehicle on a level surface.

2. Check:

- steering assembly bushings

Move the handlebar up and down, and/or back and forth.

Excessive play → Replace the steering stem bushings.

3. Check:

- tie-rod ends

Turn the handlebar to the left and/or right until it stops completely, then move the handlebar from the left to the right slightly.

Tie-rod end has any vertical play → Replace the tie-rod end(s).

4. Raise the front end of the vehicle so that there is no weight on the front wheels.

5. Check:

- ball joints and/or wheel bearings

Move the wheels laterally back and forth.

Excessive free play → Replace the front arms (upper and lower) and/or wheel bearings.

6. Measure:

- steering tension

Above specification → Adjust.

	Steering tension 50 N (5.0 kgf)
--	------------------------------------

a. Turn the main switch to “OFF”.

b. Place the vehicle on a suitable stand so that the front wheels are elevated.

c. Point the front wheels straight ahead.

PERIODIC CHECKS AND ADJUSTMENTS

- d. Hold the belt tension gauge 1 at a 90° angle to the handlebar, push the gauge against the handlebar, and then record the measurement when the handlebar starts to turn.



Belt tension gauge
Rear drive belt tension gauge

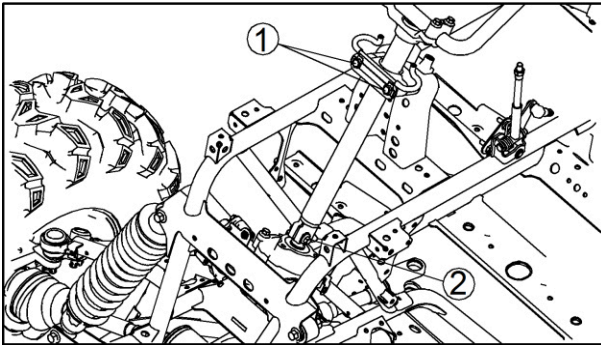
7. Adjust:

- steering tension

- a. Remove the electrical components tray.
Refer to “ELECTRICAL COMPONENTS TRAY”.
- b. Loosen the steering stem bearing bolts ①, and steering stem joint bolts ② completely.

NOTE:

After loosening the bolts, be sure to check that the steering stem joint moves smoothly on the serrations of the steering stem and shaft of the EPS unit.



- c. Tighten the steering stem bearing bolts to specification.



Steering stem bearing bolt
30 Nm 3.0 m·kg, 22 ft·lb)

- d. Tighten the steering stem joint bolts to specification.



Steering stem joint bolt
30 Nm 3.0 m·kg, 22 ft·lb)

- e. Measure the steering tension again.
- f. Repeat the above procedure until the steering tension is below specification.

Adjusting the toe-in

1. Place the vehicle on a level surface.
2. Measure:

- toe-in

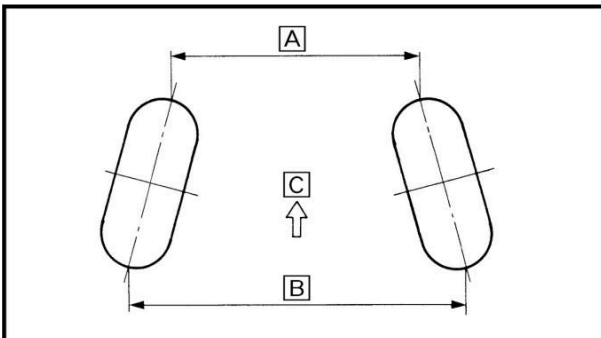
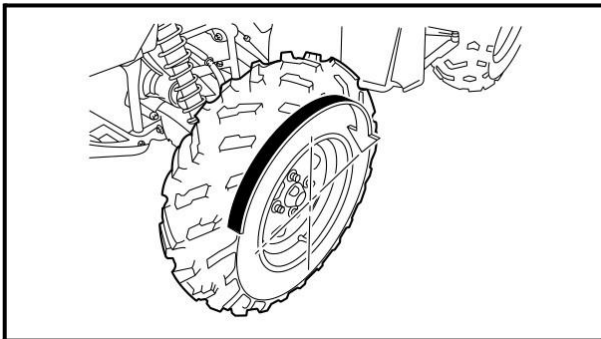
Out of specification → Adjust.



Toe-in
0 ~ 10 mm (0 ~ 0.39 in)
(with tires touching the ground)

NOTE:

Before measuring the toe-in, make sure that the tire pressure is correct.



- a. Mark both front tire tread centers.
- b. Face the handlebar straight ahead.
- c. Measure the width $\bar{A}$ between the marks.
- d. Rotate the front tires 180° until the marks are exactly opposite one another.
- e. Measure the width $\bar{B}$ between the marks.
- f. Calculate the toe-in using the formula give below.

$$\text{Toe-in} = \bar{B} - \bar{A}$$

- g. If the toe-in is incorrect, adjust it.

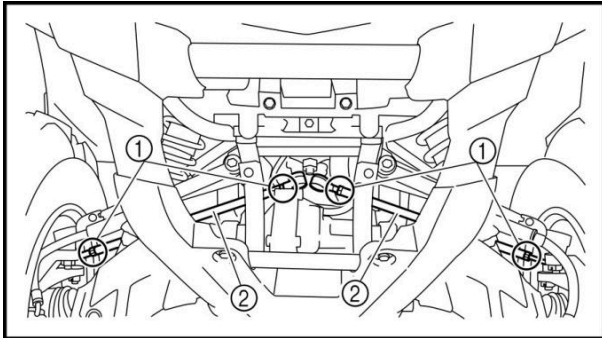
☐ Forward

3. Adjust:

- toe-in

⚠ WARNING

- **Be sure that both tie-rods are turned the same amount. If not, the vehicle will drift right or left even though the handlebar is positioned straight. This may lead to mishandling and an accident.**
- **After setting the toe-in to specification, run the vehicle slowly for some distance with both hands lightly holding the handlebar and check that the handlebar responds correctly. If not, turn either the right or left tie-rod within the toe-in specification.**



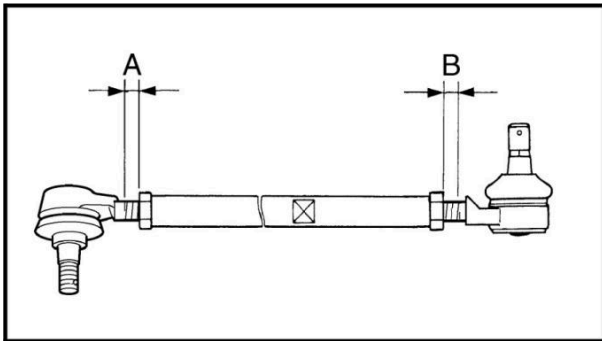
- Mark both tie-rods ends.
This reference point will be needed during adjustment.
- Loosen the locknuts (tie-rod end) ① of both tie-rods.
- The same number of turns should be given to both the right and left tie-rods ② until the specified toe-in is obtained. This is to keep the length of the rods the same.
- Tighten the rod end locknuts of both tie rods.



Locknut (rod end)
30 Nm 3.0 m·kg, 22 ft·lb)

NOTE:

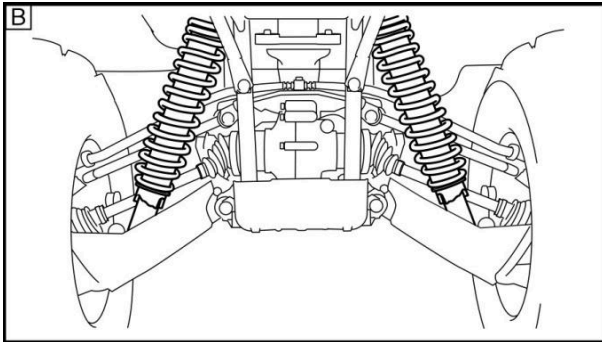
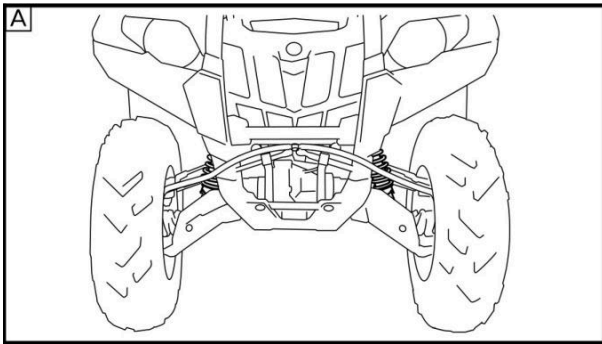
Adjust the rod ends so that A and B are equal.



Checking the front and rear shock absorbers

- Place the vehicle on a level place.
- Check:
 - damper rod
Bends/damage → Replace the front/rear shock absorber assembly.
Refer to “FRONT ARMS AND FRONT SHOCK ABSORBER ASSEMBLIES” and “REAR ARMS AND REAR SHOCK ABSORBER ASSEMBLIES” in chapter 8.
 - oil leakage
Excessive oil leakage → Replace the front/ rear shock absorber assembly. Refer to “FRONT ARMS AND FRONT SHOCK ABSORBER ASSEMBLIES” and “REAR ARMS AND REAR SHOCK ABSORBER ASSEMBLIES” in chapter 8.

PERIODIC CHECKS AND ADJUSTMENTS



• spring

Fatigue → Replace the front/rear shock absorber assembly. Refer to “FRONT ARMS AND FRONT SHOCK ABSORBER ASSEMBLIES” and “REAR ARMS AND REAR SHOCK ABSORBER ASSEMBLIES” in chapter 8.

3. Check:

• operation

Pump the shock absorbers up and down for several times.

Unsmooth operation → Replace front/rear shock absorber.

Refer to “FRONT ARMS AND FRONT SHOCK ABSORBER ASSEMBLIES” and “REAR ARMS AND REAR SHOCK ABSORBER ASSEMBLIES” in chapter 8.

Ⓐ Front shock absorber

Ⓑ Rear shock absorber

Adjusting the front shock absorbers

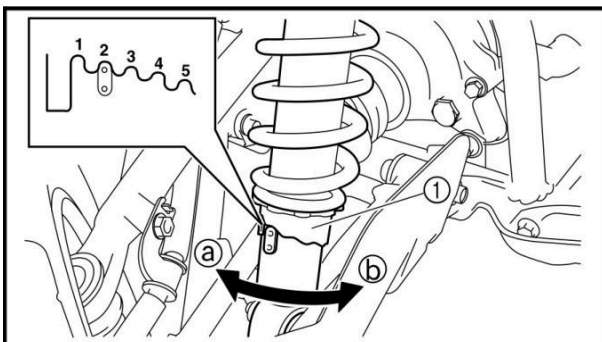
⚠ WARNING

Always adjust the spring preload for both front shock absorber to the same setting. Uneven adjustment can cause poor handling and loss of stability.

1. Adjust:

• spring preload

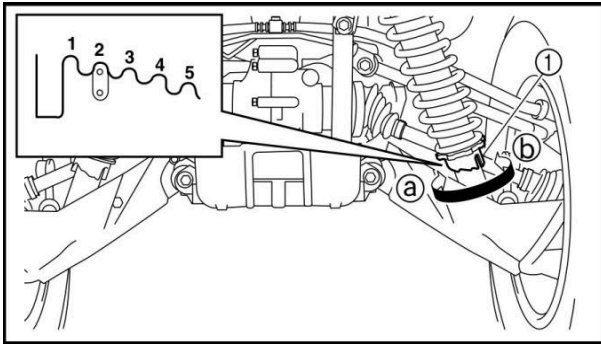
Turn the adjuster ① in direction Ⓐ or Ⓑ.



Direction Ⓐ	Spring preload is increased (suspension is harder).
Direction Ⓑ	Spring preload is decreased (suspension is softer).

Standard position: 2
Minimum position: 1
Maximum position: 5

PERIODIC CHECKS AND ADJUSTMENTS



Adjusting the rear shock absorbers

⚠ WARNING

Always adjust the spring load for both rear shock absorber springs preload to the same setting. Uneven adjustment can cause poor handling and loss of stability.

1. Adjust:

- spring preload

Turn the adjuster Ⓐ in direction Ⓐ or Ⓑ.

Direction Ⓐ	Spring preload is increased (suspension is harder).
Direction Ⓑ	Spring preload is decreased (suspension is softer).

Standard position: 2
Minimum position: 1
Maximum position: 5

Checking the tires

⚠ WARNING

This model is equipped with low-pressure tires. It is important that they be inflated correctly and maintained at the proper pressures.

• TIRE CHARACTERISTICS

- 1) Tire characteristics influence the handling of ATVs. The tires listed below have been approved by Yamaha Motor Co., Ltd. for this model. If other tire combinations are used, they can adversely affect your vehicle's handling characteristics and are therefore not recommended.

	Manufacturer	Size	Type
Front	ARISUM	AT25 x8-12	AT12
Rear	ARISUM	AT25 x10-12	AT12

• TIRE PRESSURE

- 1) Recommended tire pressure

Front 45 Kpa (0.45 kg/cm² , 6.5 psi)

Rear 45 Kpa (0.45 kg/cm² , 6.5 psi)

- 2) Tire pressure below the minimum specification could cause the tire to dislodge from the rim under severe riding conditions.

The following are minimums:

Front 45 Kpa (0.45 kg/cm² , 6.5 psi)

Rear 45 Kpa (0.45 kg/cm² , 6.5 psi)

- 3) Use no more than

Front 250 kPa (2.5 kg/cm² , 36 psi)

Rear 250 kPa (2.5 kg/cm² , 36 psi)

When seating the tire beads. Higher pressures may cause the tire to burst.

Inflate the tires slowly and carefully.

Fast inflation could cause the tire to burst.

PERIODIC CHECKS AND ADJUSTMENTS

• MAXIMUM LOADING LIMIT

- 1) Vehicle load limits: 230 kg (507 lb)
*Total weight of the cargo, trailer hitch, vertical load, rider, and accessories.
- 2) Front carrier: 35.0 kg (77 lb)
- 3) Rear carrier: 45.0 kg (99 lb)
- 4) Front storage box: 0.5 kg (1 lb)
- 5) Rear storage box: 2.0 kg (4 lb)
- 6) Trailer hitch:
Pulling load (total weight of trailer and cargo): 900 kg, 1984 lb
Tongue weight (vertical weight on trailer hitch point): 48 kg, 106 lb
Be extra careful of the vehicle balance and stability when towing a trailer.

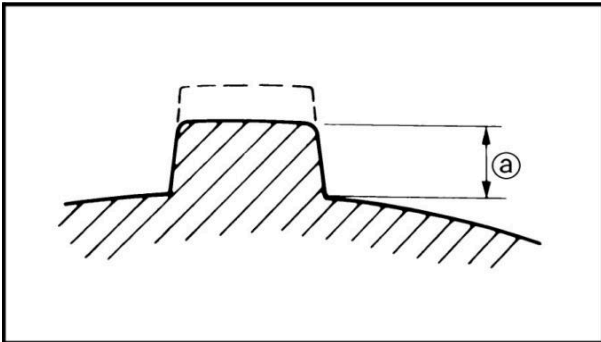
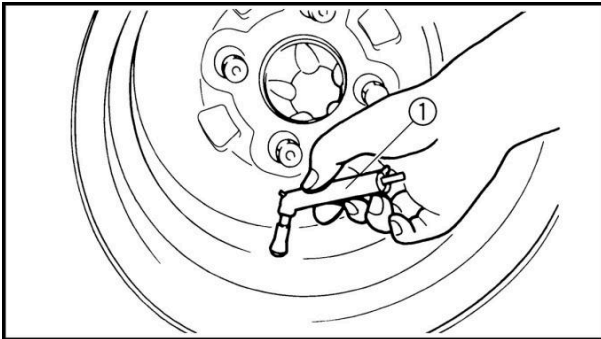
1. Measure:

• tire pressure

Out of specification → Adjust.

NOTE:

- The low-pressure tire gauge ① is included as standard equipment.
- If dust or the like is stuck to this gauge, it will not provide the correct readings. Therefore, take two measurements of the tire's pressure and use the second reading.



Cold tire pressure	Front	Rear
Standard	45 kPa (0.45 kg/cm ² , 6.4 psi)	45 kPa (0.45 kg/cm ² , 6.4 psi)
Minimum	42 kPa (0.42 kg/cm ² , 6.0 psi)	42 kPa (0.42 kg/cm ² , 6.40 psi)
Maximum	48 kPa (0.48 kg/cm ² , 6.8 psi)	48 kPa (0.48 kg/cm ² , 6.8 psi)

⚠ WARNING

Uneven or improper tire pressure may adversely affect the handling of this vehicle and may cause loss of control.

- Maintain proper tire pressures.
- Set tire pressures when the tires are cold.
- Tire pressures must be equal in both front tires and equal in both rear tires.

2. Check:

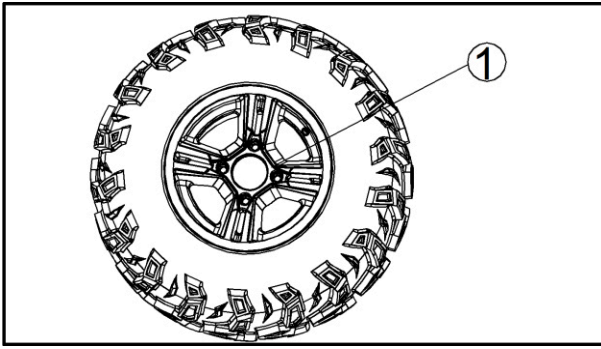
• tire surfaces

Wear/damage → Replace.

	Tire wear limit a Front and rear: 3 mm (0.12 in)
---	--

⚠ WARNING

It is dangerous to ride with a worn-out tire. When tire wear is out of specification, replace the tire immediately.



Checking the wheels

1. Check:

- wheel ①

Damage/bends → Replace.

NOTE: _____

Always balance the wheel when a tire or wheel has been changed or replaced.

WARNING

- **Never attempt even small repairs to the wheel.**
- **Ride conservatively after installing a tire to allow it to seat itself properly on the rim.**

Checking and lubricating the cables

WARNING

A damaged cable sheath may cause corrosion and interfere with the cable movement. An unsafe condition may result, so replace a damaged cable as soon as possible.

1. Check:

- cable sheath

Damage → Replace.

2. Check:

- cable operation

Unsmooth operation → Lubricate or replace.

	Recommended lubricant Yamaha chain and cable lube or engine oil
---	--

NOTE: _____

Hold the cable end up and apply several drops of lubricant to the cable.

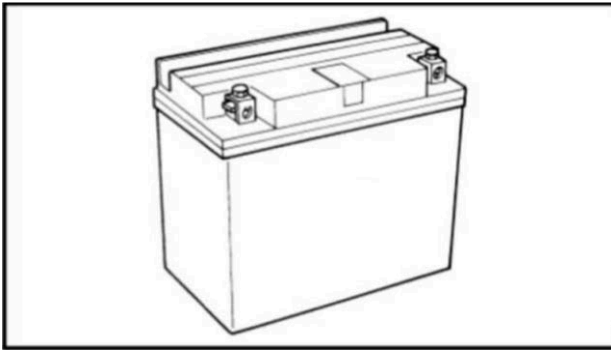
3. Apply:

- lithium-soap-based grease (onto end of the cable)

Lubricating the levers and pedals

Lubricate the pivoting point and metal-to-metal moving parts of the levers and pedals.

	Recommended lubricant Lithium-soap-based grease
---	--



Electrical system

Checking and charging the battery

⚠ WARNING

Batteries generate explosive hydrogen gas and contain electrolyte, which is made of poisonous and highly caustic sulfuric acid. Therefore, always follow these preventive measures:

- Wear protective eye gear when handling or working near batteries.
- Charge batteries in a well-ventilated area.
- Keep batteries away from fire, sparks or open flames (e.g., welding equipment, lighted cigarettes).
- DO NOT SMOKE when charging or handling batteries.
- KEEP BATTERIES AND ELECTROLYTE OUT OF REACH OF CHILDREN.
- Avoid bodily contact with electrolyte as it can cause severe burns or permanent eye injury.

FIRST AID IN CASE OF BODILY CONTACT:

EXTERNAL

- Skin - Wash with water.
- Eyes - Flush with water for 15 minutes and get immediate medical attention.

INTERNAL

- Drink large quantities of water or milk followed with milk of magnesia, beaten egg or vegetable oil. Get immediate medical attention.

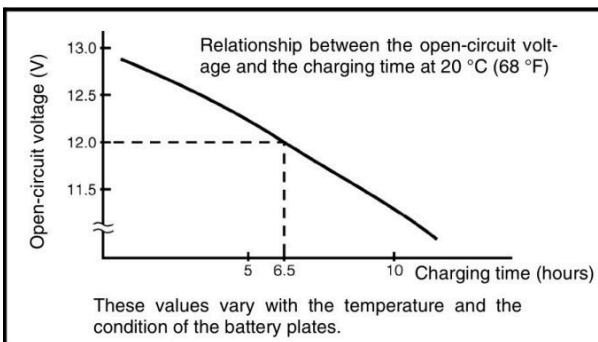
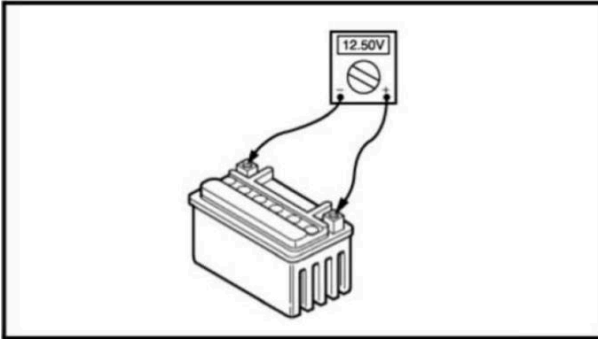
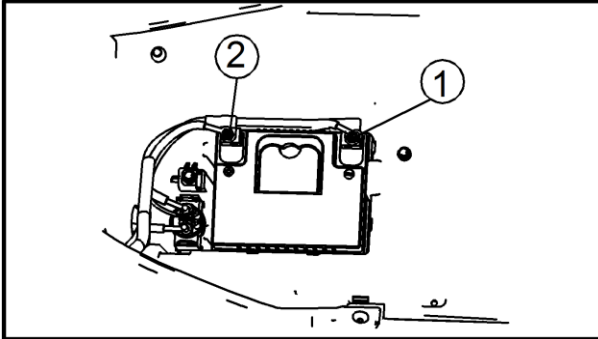
NOTICE

- This is a sealed battery. Never remove these sealing caps because the balance between cells will not be maintained and battery performance will deteriorate.
- Charging time, charging amperage and charging voltage for an MF battery are different from those of conventional batteries. The MF battery should be charged as explained in the charging method. If the battery is overcharged, the electrolyte level will drop considerably. Therefore, take special care when charging the battery.

NOTE:

Since MF batteries are sealed, it is not possible to check the charge state of the battery by measuring the specific gravity of the electrolyte. Therefore, the charge of the battery has to be checked by measuring the voltage at the battery terminals.

PERIODIC CHECKS AND ADJUSTMENTS



1. Remove:

- battery cover

Refer to “SEAT AND SIDE PANELS”.

- Battery holding bracket

2. Disconnect:

- battery leads (from the battery terminals)

CAUTION:

First, disconnect the negative battery lead ①, and then the positive battery lead ②.

3. Remove:

- battery

4. Check:

- battery charge

a. Connect a pocket tester to the battery terminals.

Red tester probe → positive battery terminal
Black tester probe → negative battery terminal

NOTE:

- The charge state of an MF battery can be checked by measuring its open-circuit voltage (i.e., the voltage when the positive terminal is disconnected).
- No charging is necessary when the open circuit voltage equals or exceeds 12.8 V.

b. Check the charge of the battery, as shown in the charts and the following example.

Example

c. Open-circuit voltage = 12.0 V

d. Charging time = 6.5 hours

e. Charge of the battery = 20 ~ 30%

5. Charge:

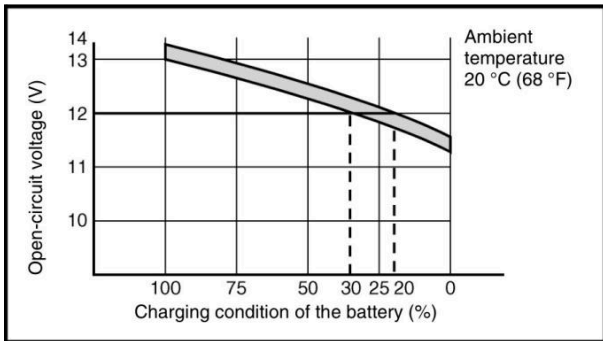
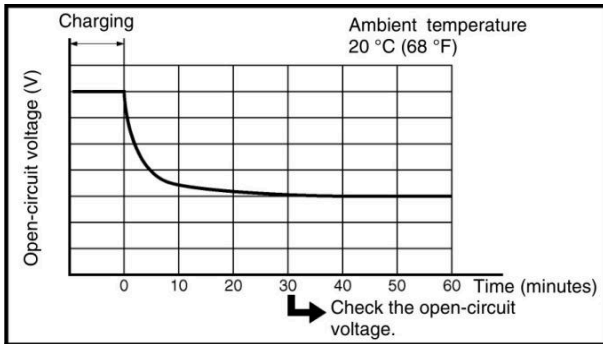
- battery

(refer to the appropriate charging method illustration)

⚠ WARNING

Do not quick charge a battery.

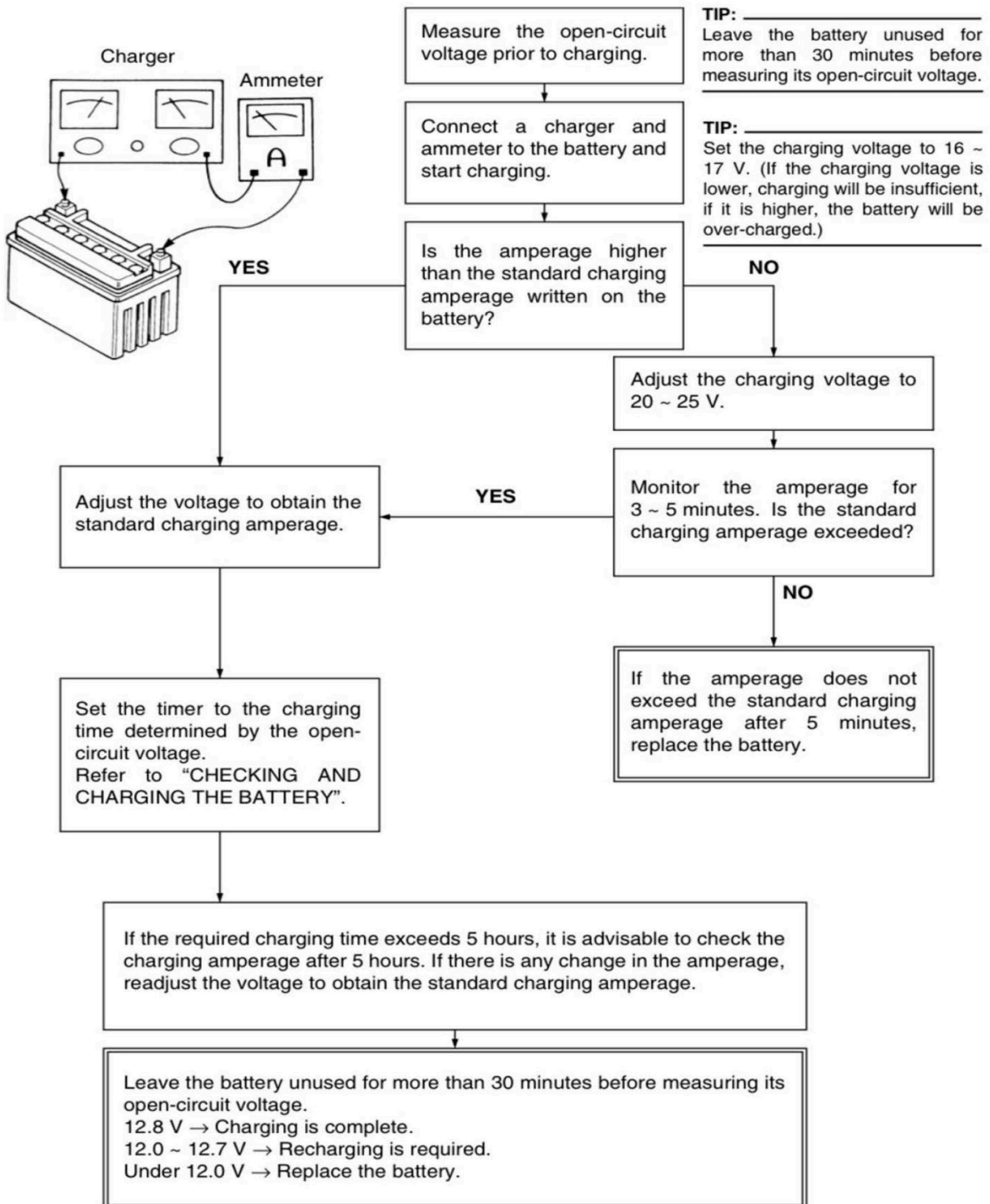
PERIODIC CHECKS AND ADJUSTMENTS



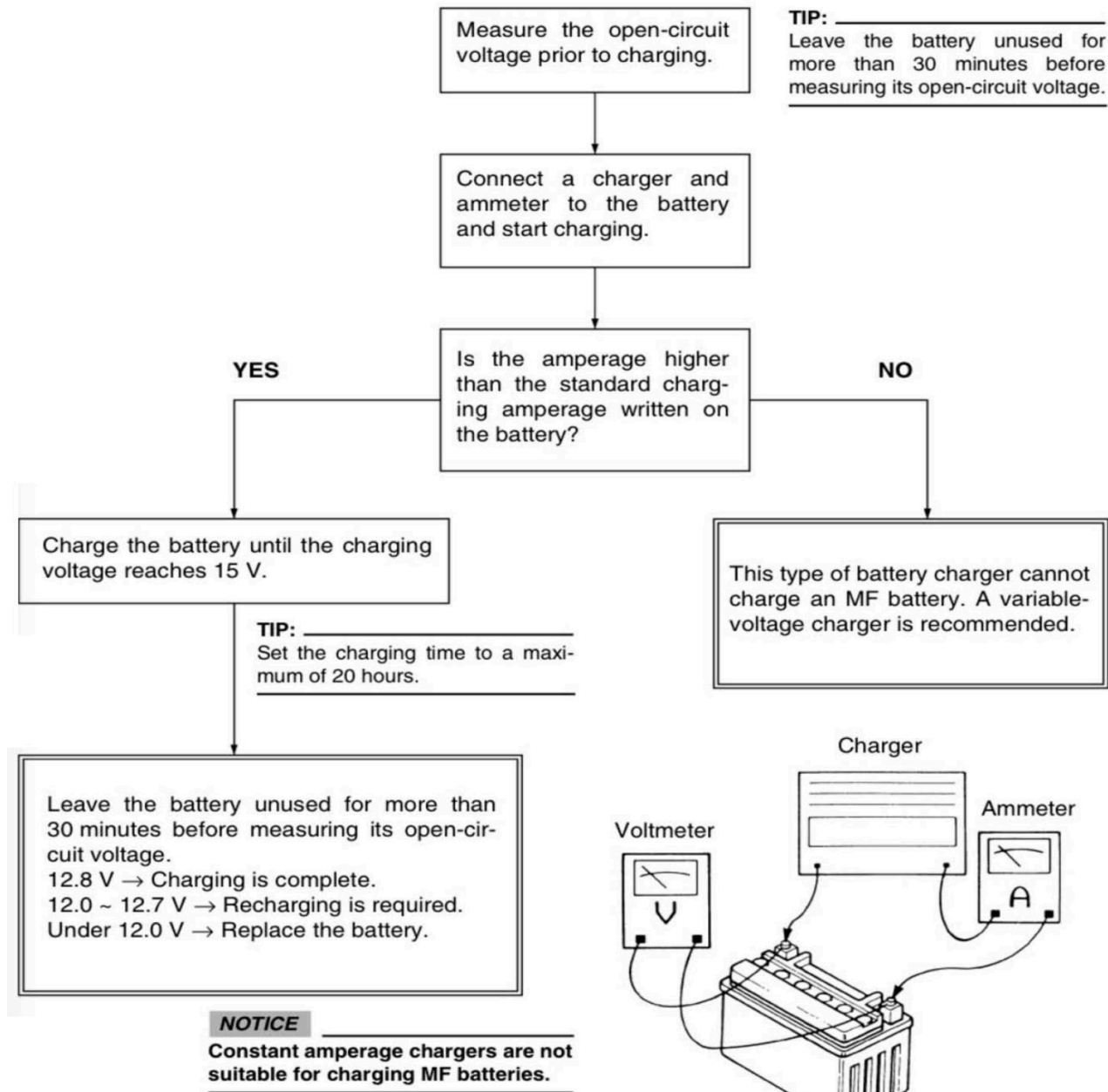
CAUTION:

- Never remove the MF battery sealing caps.
- Do not use a high-rate battery charger since it forces a high-amperage current into the battery quickly and can cause battery overheating and battery plate damage.
- If it is impossible to regulate the charging current on the battery charger, be careful not to overcharge the battery.
- When charging a battery, be sure to remove it from the vehicle. (If charging has to be done with the battery mounted on the vehicle, disconnect the negative battery lead from the battery terminal.)
- To reduce the chance of sparks, do not plug in the battery charger until the battery charger leads are connected to the battery.
- Before removing the battery charger lead clips from the battery terminals, be sure to turn off the battery charger.
- Make sure the battery charger lead clips are in full contact with the battery terminal and that they are not shorted. A corroded battery charger lead clip may generate heat in the contact area and a weak clip spring may cause sparks.
- If the battery becomes hot to the touch at any time during the charging process, disconnect the battery charger and let the battery cool before reconnecting it. Hot batteries can explode!
- As shown in the following illustration, the open-circuit voltage of an MF battery stabilizes about 30 minutes after charging has been completed. Therefore, wait 30 minutes after charging is completed before measuring the open-circuit voltage.

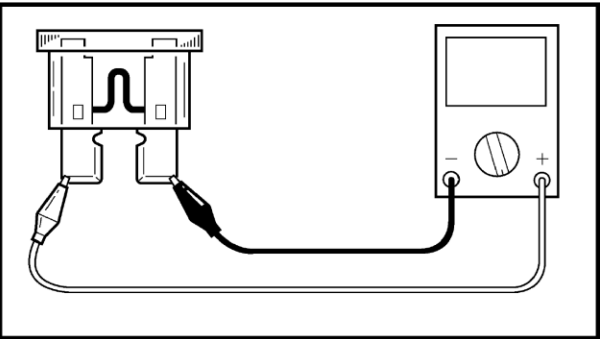
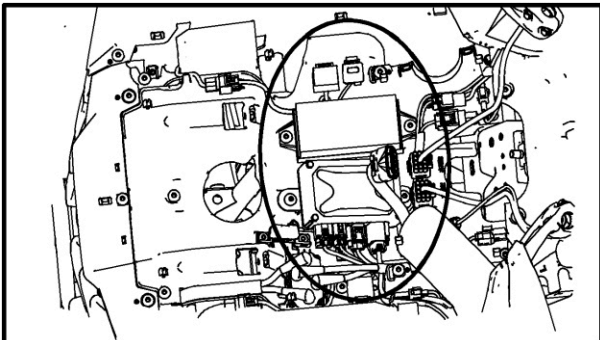
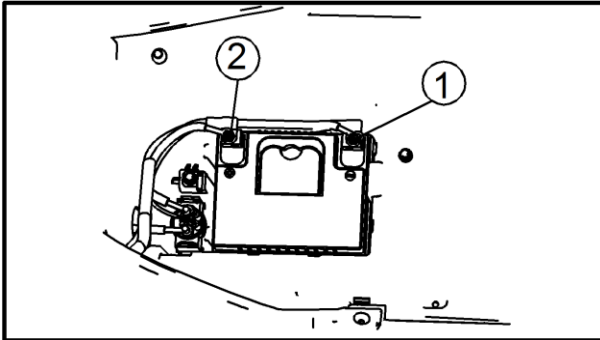
Charging method using a variable-current (voltage) charger



Charging method using a constant voltage charger



PERIODIC CHECKS AND ADJUSTMENTS



6. Install:

- battery

7. Connect:

- battery leads
(to the battery terminals)

CAUTION:

First, disconnect the negative battery lead ①, and then the positive battery lead ②.

8. Check:

- battery terminals
Dirt → Clean with a wire brush.
Loose connection → Connect properly.

9. Lubricate:

- battery terminals



10. Install:

- Battery holding bracket
- battery cover
Refer to "SEAT AND SIDE PANELS"

Checking the fuses

The following procedure applies to all of the fuses.

CAUTION:

To avoid a short circuit, always set the main switch to "OFF" when checking or replacing a fuse.

1. Remove:

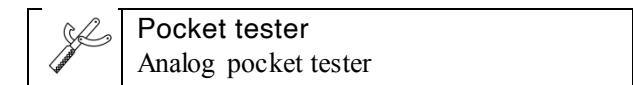
- Instrument cover
Refer to "FRONT CARRIER AND FRONT GUARDS".

2. Check:

- fuse
a. Connect the pocket tester to the fuse and check the continuity.

NOTE:

Set the pocket tester selector to " $\Omega \times 1$ ".



- b. If the pocket tester indicates " ∞ ", replace the fuse.

3. Replace:

- blown fuse

PERIODIC CHECKS AND ADJUSTMENTS

- Set the main switch to “OFF”.
- Install a new fuse of the correct amperage.
- Set on the switches to verify if the electrical circuit is operational.
- If the fuse immediately blows again, check the electrical circuit.

Items	Amper- agerating	Q'ty
Main fuse	40A	1
Backup fuse	10 A	1
Fuel injection system fuse	10 A	1
Ignition fuse	10 A	1
Headlight fuse	15 A	1
Four-wheel-drive motor fuse	10 A	1
Radiator fan motor fuse	25 A	1
Signaling system fuse	10 A	1
Auxiliary DC jack fuse	10 A	1
Spare fuse	25 A	1
	15 A	1
	10 A	1

⚠ WARNING

Never use a fuse with an amperagerating other than that specified. Improvising or using a fuse with the wrong amperage rating may cause extensive damage to the electrical system, cause the lighting and ignition systems to malfunction and could possibly cause a fire.

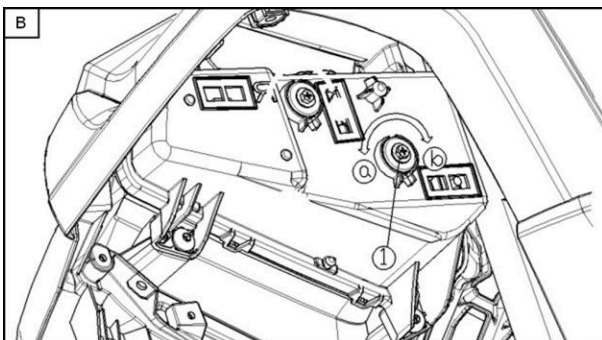
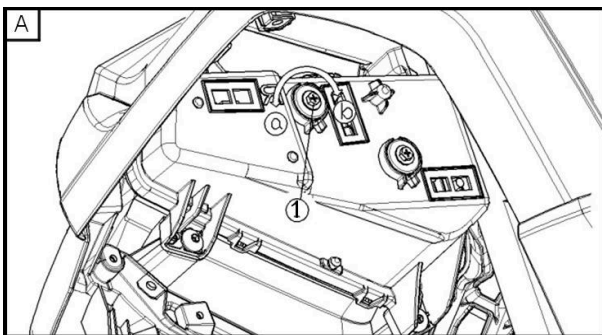
- Install:
 - Instrument cover
Refer to “FRONT CARRIER AND FRONT GUARDS”.

Adjusting the headlight beams

- Adjust:
 - headlight beam (vertically)
Turn the adjusting screw 1 in direction ④ or ⑤.

Direction ④	Headlight beam is raised.
Direction ⑤	Headlight beam is lowered.

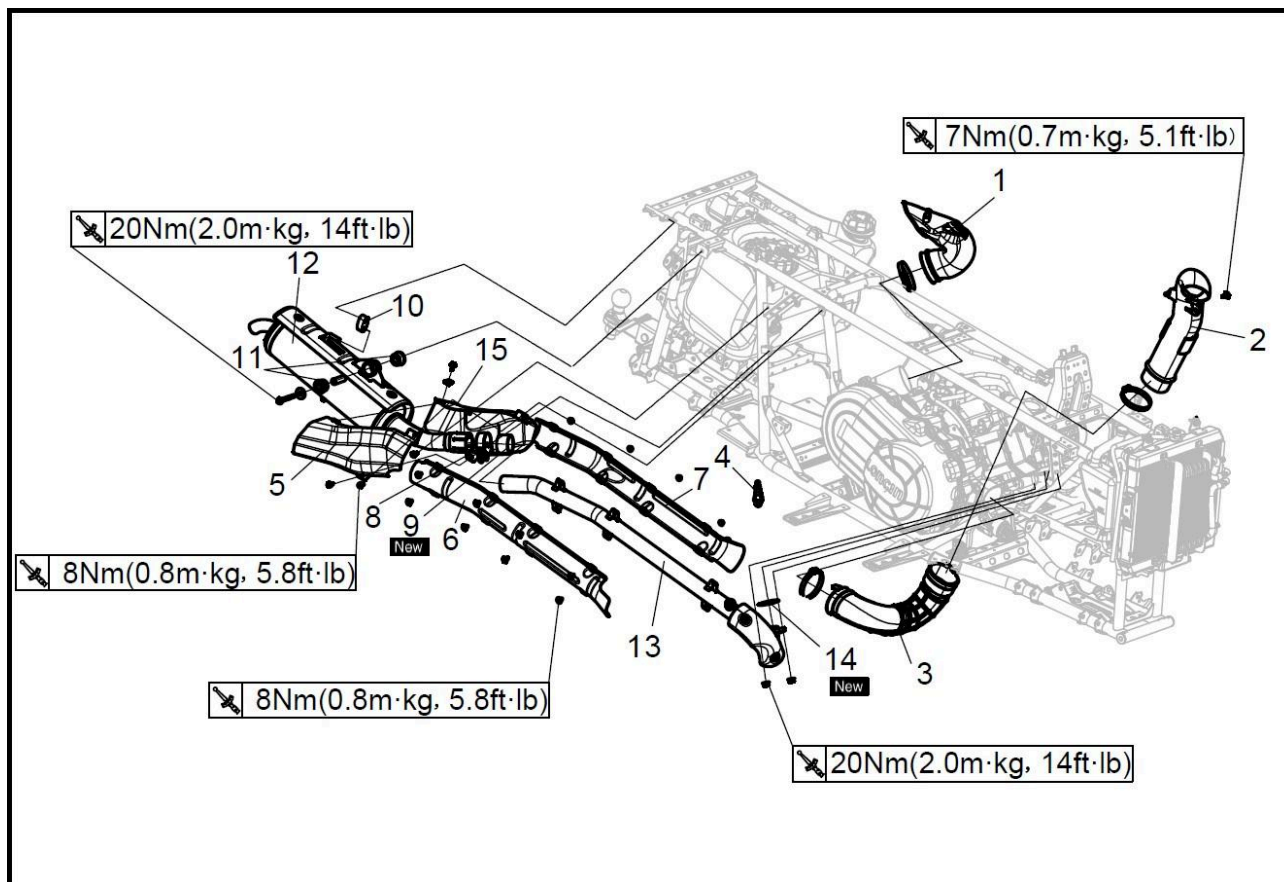
- Ⓐ headlights on full beam
 Ⓑ dipped headlight



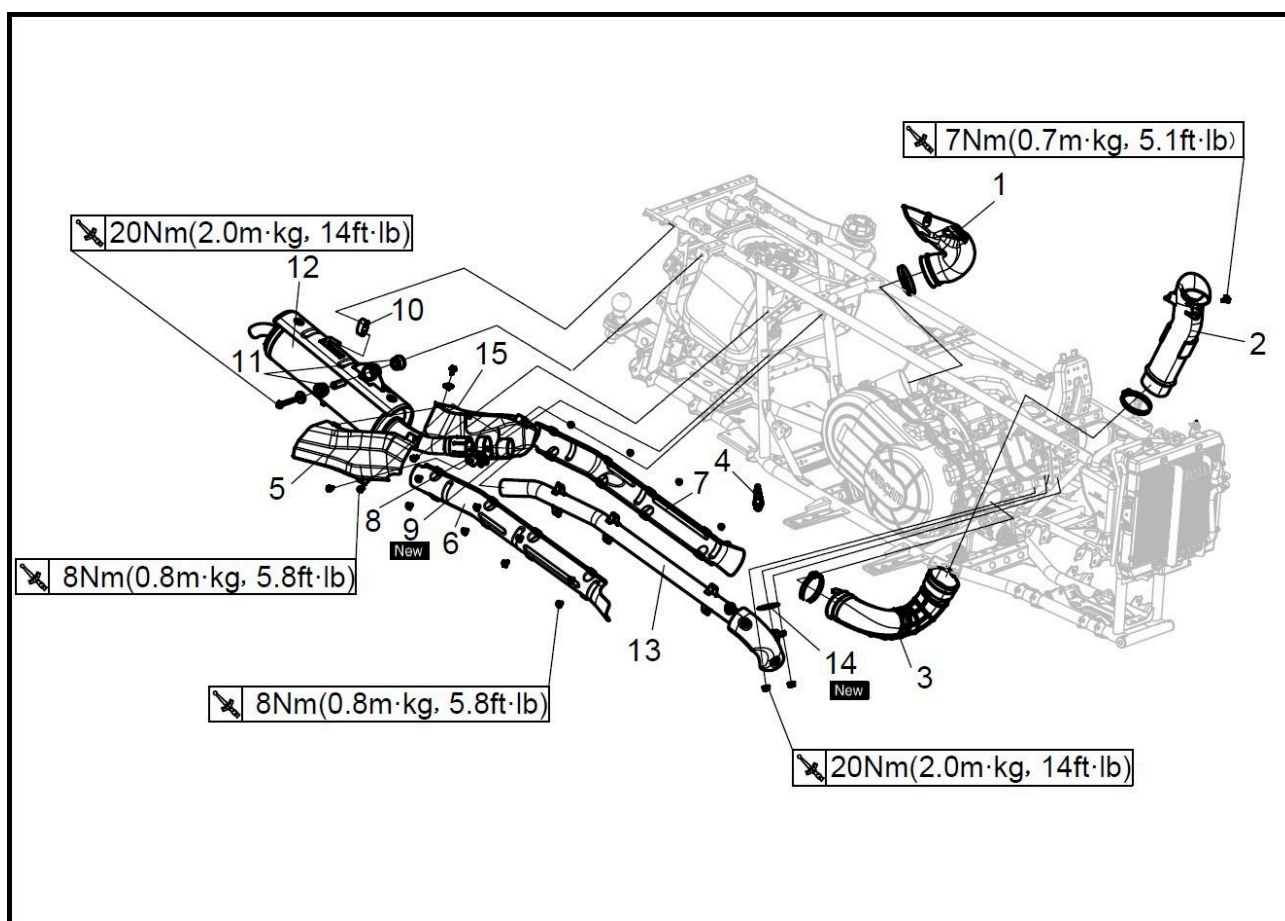
4 ENGINE

Engine removal

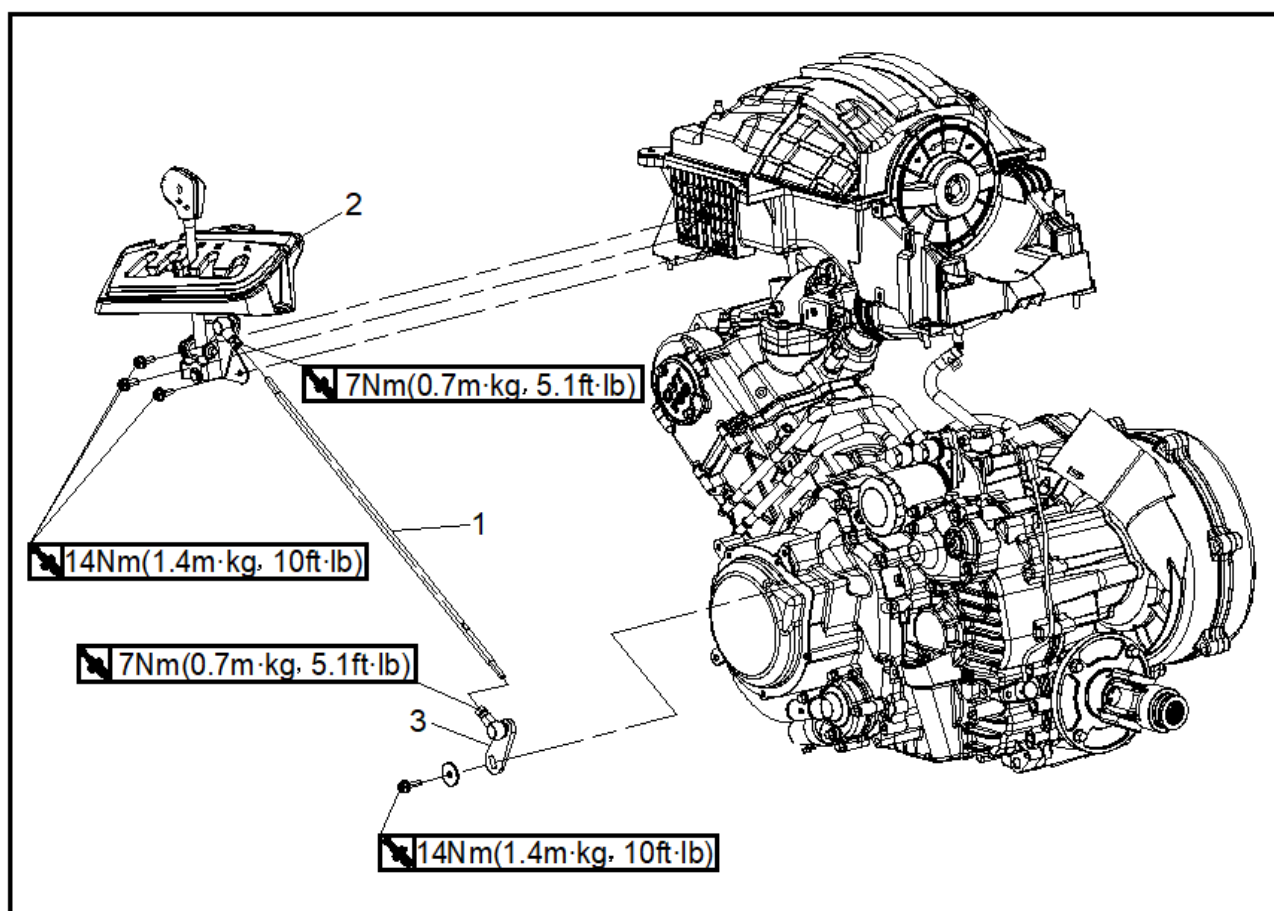
V-belt cooling ducts, muffler and exhaust pipes



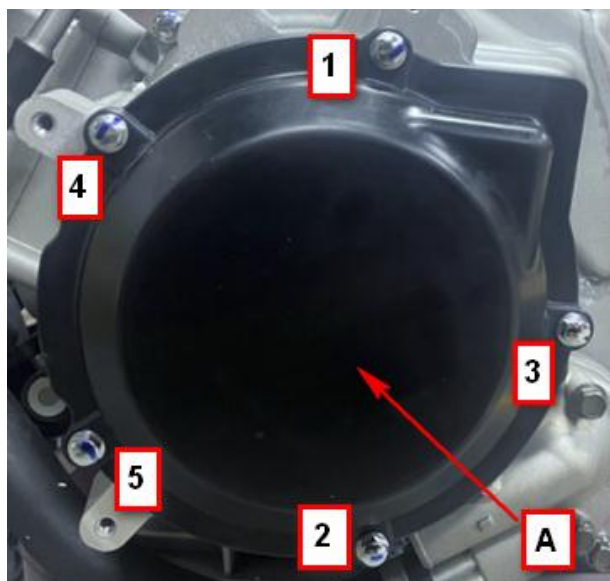
Order	Job/Part	Q'ty	Remarks
	Removing the V-belt cooling ducts, muffler and exhaust pipes Engine oil Coolant Seats/rear console Left protector Cargo bed Air intake duct Throttle body assembly Fuel tank		Remove the parts in the order listed Drain. Refer to "CHANGING THE ENGINE OIL" in chapter 3. Drain. Refer to "CHANGING THE COOLANT" in chapter 3. Refer to "SEATS, REAR CONSOLE AND INSTRUMENT PANELS" in chapter 8. Refer to "PANELS AND FRONT CONSOLE" in chapter 8. Refer to "CARGO BED" in chapter 8. Refer to "AIR FILTER CASE AND AIR INTAKE DUCT" in chapter 6. Refer to "THROTTLE BODY" in chapter 6. Refer to "FUEL PUMP AND FUEL TANK" in chapter 6. Refer to "FRONT CONSTANT VELOCITY JOINTS, DIFFERENTIAL GEAR AND DRIVE SHAFT" in chapter 7.



Order	Job/Part	Q'ty	Remarks
	Front drive shaft Rear drive shaft		Refer to "REAR CONSTANT VELOCITY JOINTS, FINAL DRIVE GEAR AND DRIVE SHAFT" in chapter 7.
1	V-belt cooling duct 1	1	
2	V-belt cooling duct 2	1	
3	V-belt cooling duct 3	1	
4	Oxygen sensors	1	
5	Heat Protector 1	1	
6	Heat Protector 2	1	
7	Heat Protector 3	1	
8	Clamp	1	
9	Gasket	1	
10	Rubber damper 1	1	
11	Rubber damper 2	2	
12	Muffler	1	
13	Exhaust Pipe cooling duct	1	
14	Gasket	1	
15	Heat Protector 4	1	
			For installation, reverse the removal procedure.



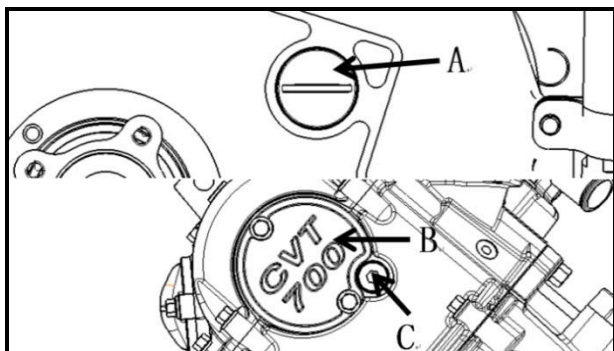
Order	Job/Part	Q'ty	Remarks
1	Removing the select lever unit	1	Remove the parts in the order listed. Refer to "INSTALLING THE SELECT LEVER UNIT". NOTE: • Make sure that the select lever and transmission are in NEUTRAL . • The installed length 1 of the shift rod is 413 mm (16.3 in).
2	Select lever shift rod	1	
3	Select lever unit	1	
	Shift arm	1	For installation, reverse the removal procedure.



Cylinder head

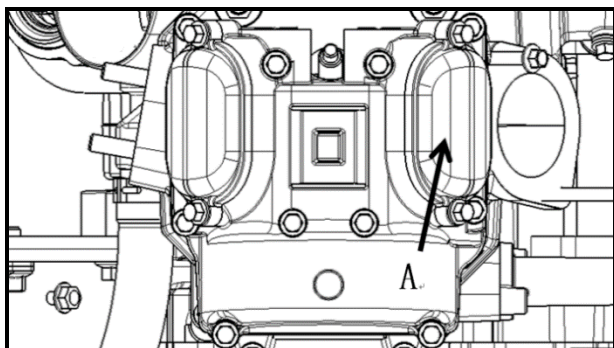
Remove Cylinder head

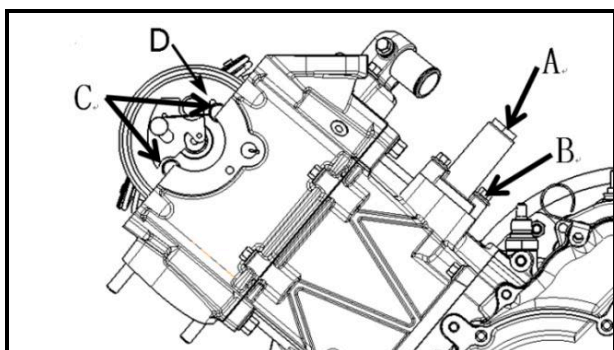
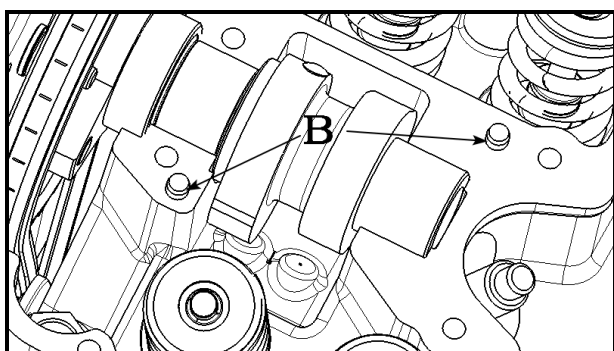
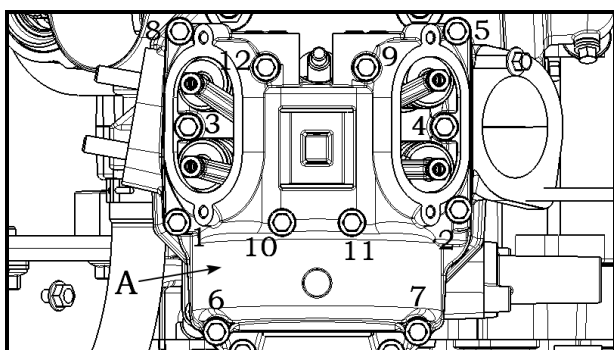
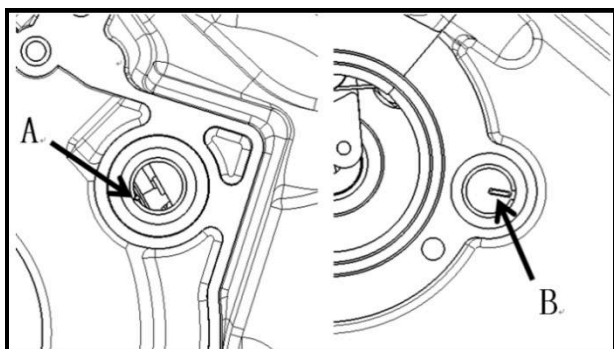
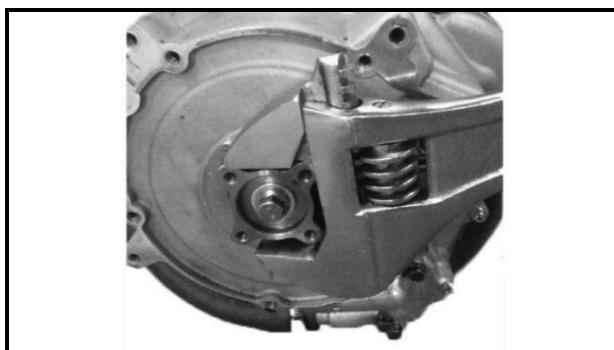
1. Remove:
 - Remove the bolts in the proper sequence as shown (1~5) to remove the cover assembly, starting mechanism (A).
 - Remove the opercula (A). Check the O shape seal ring on it. If the seal ring is out of shape or damaged, replace a new seal ring.
 - Remove the side cover (B).
 - Remove Cylinder head orifice (C) and the washer on it.



TIP:

- The seal gasket (A) of the side cover should be kept intact while removing. If it is damaged, replace it.
- Check the O shape seal ring (B). If it is out of shape or damaged, replace it.
- If necessary, remove the spark plug.
- Remove the valve covers (A).





2. Align:

- The engine must be set at top dead center (TDC) on its compression stroke before removing Cylinder cover. Perform the following:

a. Use the adjustable spanner to turn the crankshaft counterclockwise until the Magneto rotor index mark aligns with the index notch in the timing whole (A).

b. Verify that the other timing hole in the cylinder head can see the index mark (B). If not, turn the crankshaft one revolution counterclockwise and realign the Magneto rotor index mark with the index notch.

c. Move each rocker arm by hand. There should be some movement or free play, indicating that the marks are properly aligned.

d. Remove:

- Loosen the bolts in the proper sequence as shown (1~12) to remove the cylinder cover (A).

TIP:

Loosen each bolt 1/2 of a turn at a time. After all of the bolts are fully loosened, remove them.

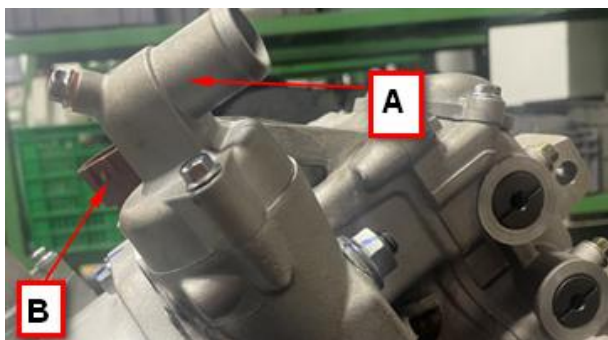
- Check the dowel pins (B) on the cylinder head.

- Loosen, but do not remove, the cam chain tensioner cap bolt (A).
- Remove the cam chain tensioner mounting bolts (B) and remove the tensioner from the cylinder block.
- Remove the camshaft sprocket bolts (C), then separate the camshaft sprocket (D) from the camshaft and remove it.

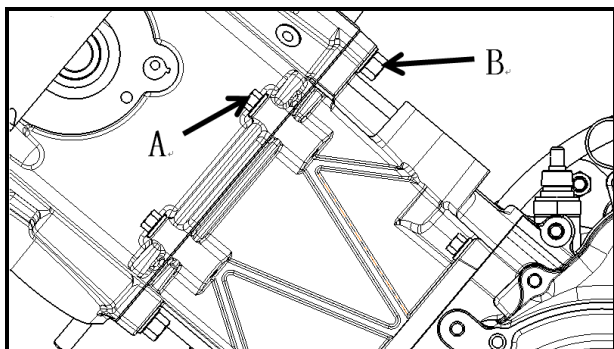
TIP:

To prevent the timing chain from falling in to the left crankcase cover, fasten it with a wire.

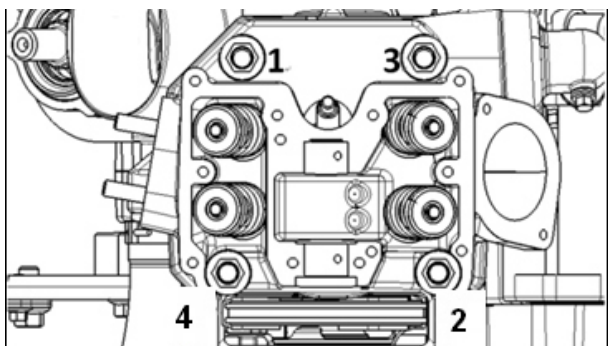
- Remove the camshaft.



- If necessary, remove the section temperature valve (A). If the seal gasket under the cover is damaged, replace it.
- If necessary, remove the temperature sensor (B).



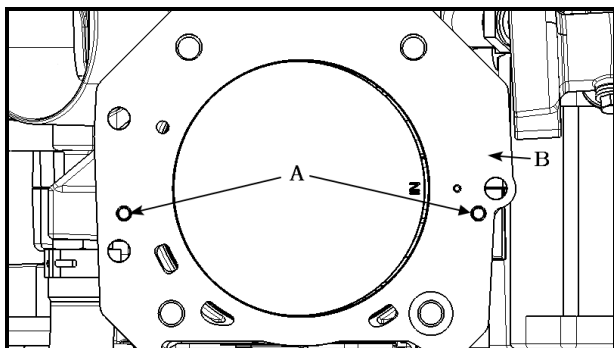
- Remove the two bolts (A).
- Use the open scanner to loosen the three bolts (B) clockwise then remove them.



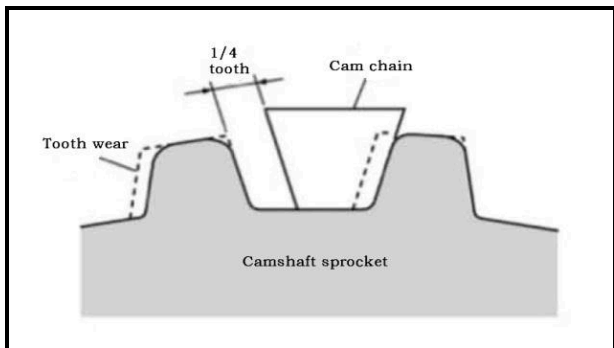
- Loosen the nut in the proper sequence as shown (1~4) to remove the cylinder head.

TIP:

Loosen each nut 1/2 of a turn at a time. After all of the nuts are fully loosened, remove them and the washers.

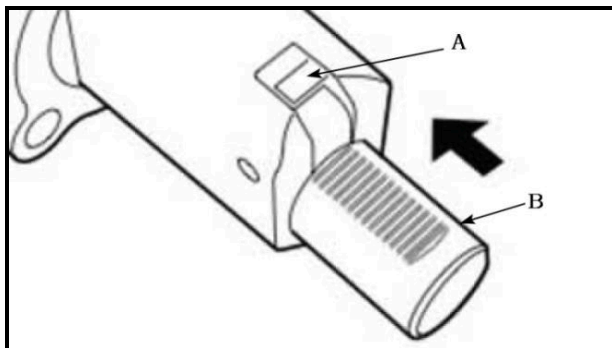
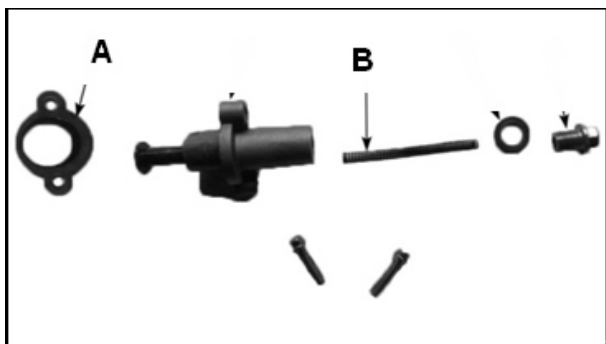


- Check the dowel pins (A) on the cylinder block.
- Remove the seal gasket (B) of the cylinder head.
- Cover the cylinder block with a clean shop rag.



Check cam chain

- Check:
- Inspect the camshaft sprocket for broken or chipped teeth. If the upper sprocket is damaged, check the lower sprocket for damage.
Fit the camshaft sprocket onto the cam chain and check for wear. If there is more than 1/4 tooth wear as shown, replace the sprocket and cam chain as a set. Replace the lower sprocket and cam chain.



Check chain tensioner

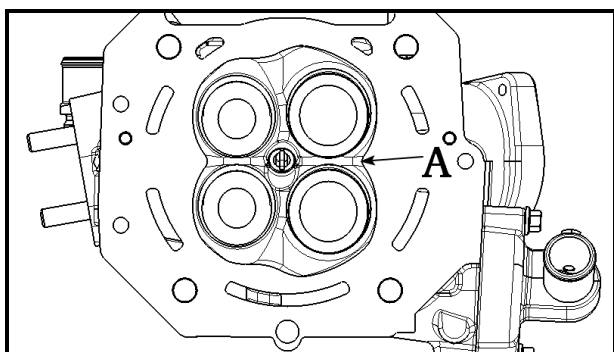
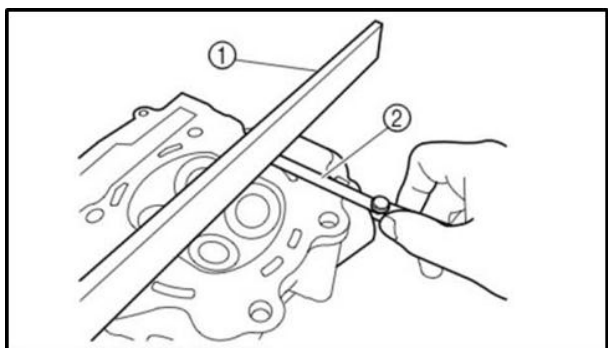
1. Check:
 - Clean and dry the cam chain tensioner assembly as shown. If the seal gasket (A) is damaged, replace it.
 - Inspect the spring (B) for cracks, bending or uneven gaps between the coils.
- Depress the lock(A) and push the tensioner rod(B) into the tensioner body until it stops and locks in place. Make sure the tensioner rod move smoothly and dose not bind. Also make sure when it is locked in placed it cannot move in by hand.
- Replace the cam chain tensioner if damaged, if the cam chain jumped teeth on the sprocket or if the cam chain and spruce are severely worn

Check Cylinder head

1. Check:
 - Before removing the valves from the cylinder head, perform a solvent test to check the valve face-to-valve seat seal.
 - a. Support the cylinder head with the exhaust port facing up. Pour solvent or kerosene into the port. Check the combustion chamber for fluid leaking past the exhaust valves. There should be no fluid leaking into the combustion chamber.
 - b. Repeat Step a for the intake valves.
 - c. If the combustion chamber is wet, one or more valves are not seating correctly.
 - d. If there is a leak, cheek for a damaged valve stem, valve seat and/or face, or possibly a cracked combustion chamber.
- Remove the spark plug.
- Clean the cylinder head and cylinder block gasket surfaces. Do not scratch the gasket surface. If the gasket residue is hard to remove, place a solvent soaked rag across the cylinder head gasket surface to soften the deposits.

CAUTION:

Cleaning the combustion chamber with the valves removed can damage the valve seat surfaces. A damaged or even slightly scratched valve seat will cause poor valve seating.



2. Measure:

- Place a straightedge ① and a thickness gauge ② across the cylinder head.
- Measure the war page.



Maximum cylinder head warpage: 0.05mm

- If the limit is exceeded, resurface the cylinder head. Place 400 ~ 600 grit wet sandpaper on the surface plate and resurface the cylinder head using a figure-eight sanding pattern.

TIP:

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

3. Check:

- Before removing the valves, remove all carbon deposits from the combustion chamber(A) with a wire brush. To protect the cylinder head and hold in place while cleaning the combustion chamber. Do not damage the head, valves or spark plug threads.
- Examine the spark plug threads in the cylinder head for damage. If damage is minor or if the threads are contaminated with carbon, use a spark plug thread tap to clean the threads following the manufacturer's instructions. If thread damage is severe, repair the head by installing a steel thread insert.

CAUTION:

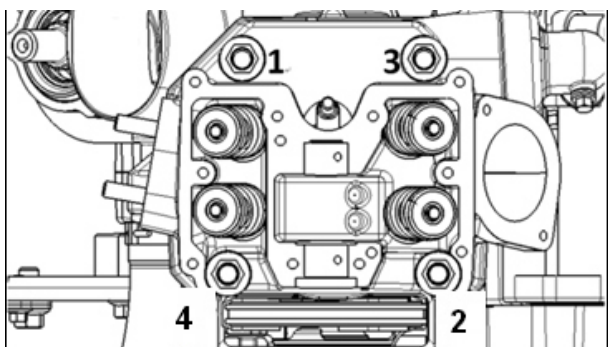
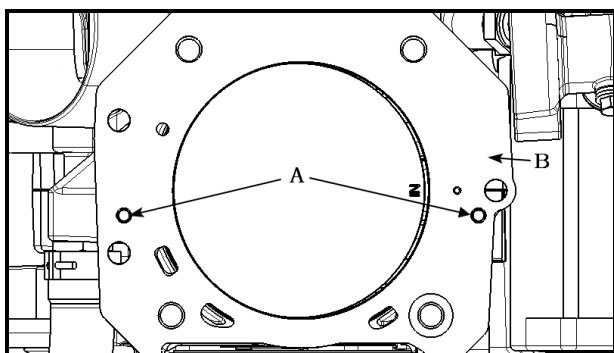
When using a tap to clean the spark plug threads, lubricate the tap with aluminum tap cutting fluid or kerosene.

- Clean the entire head in solvent and flush both oil passages. Dry the cylinder head with compressed air.
- Plug the oil hose fitting on top of the cylinder head to prevent debris from entering the oil passage before the hose is attached
- Check for cracks in the combustion chamber and exhaust port. A cracked head must be replaced.
- Examine the piston crown. The crown should show no signs of wear or damage. If the crown appears pecked or spongy-looking, check the spark plug, valves and combustion chamber for aluminum deposits. If these deposits are found, the cylinder is overheating.

CAUTION:

Do not clean the piston crown while the piston is installed in the cylinder block. Carbon scraped from the top of the piston may fall between the cylinder wall and piston and onto the piston rings. Because carbon grit is very abrasive, premature cylinder, piston and ring wear will occur. Excessive carbon buildup on the piston crown reduces piston cooling, raises engine compression and causes overheating.

Installation Cylinder head



1. Clean:

- If necessary, clean the gasket surface of Cylinder head, Cylinder cover and Cylinder block with dust-free wiping rag.
- If necessary, clean the removed parts with gasoline and the parts should be dry before installation.

2. Install:

- Verify the dowel pins (A) on cylinder block.
- Install the seal gasket (B) of cylinder head at right direction, if it is damaged, replace it.
- Install the cylinder head.

CAUTION:

Do not damage the cam chain.

3. Lubricate:

- Lubricate the flange face of the nuts as shown (1~4).

	Recommended lubricant Engine oil
--	-------------------------------------

- Lubricate the two faces of washers of the above nuts.

	Recommended lubricant Engine oil
--	-------------------------------------

- Lubricate the mounting faces of the above washers on cylinder head.

	Recommended lubricant Engine oil
--	-------------------------------------

- Install the nuts and washers.

4. Tighten:

- Tighten the nuts. Perform the following:

- First tighten the nuts in the sequence as shown:

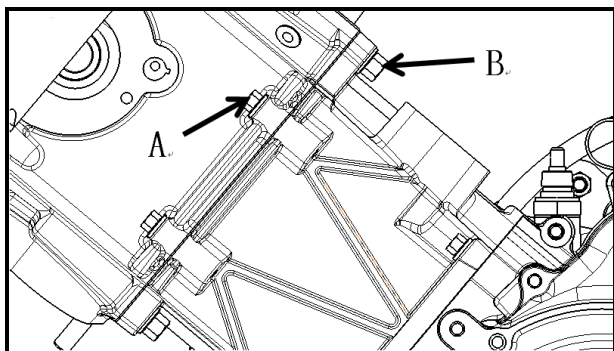
	15Nm(1.5m.kg.11ft.lb)
--	-----------------------

- Second tighten the nuts in the same sequence:

	55Nm(5.0m.kg.41ft.lb)
--	-----------------------

- Third tighten the nuts in the same sequence:

	75Nm(7.5m.kg.53ft.lb)
--	-----------------------



Tighten the bolts(B):

 30Nm(3.0m.kg.22ft.lb)

- Tighten the bolts(A):

 10Nm(1.0m.kg.7ft.lb)

- Verify the dowel pins (B) on cylinder head.

5. Lubricate:

- Lubricate the camshaft-mounting hole.

 Recommended lubricant
Engine oil

- Install the camshaft.

TIP:

Keep the camshaft lobes at the bottom.

- Lubricate the camshaft.

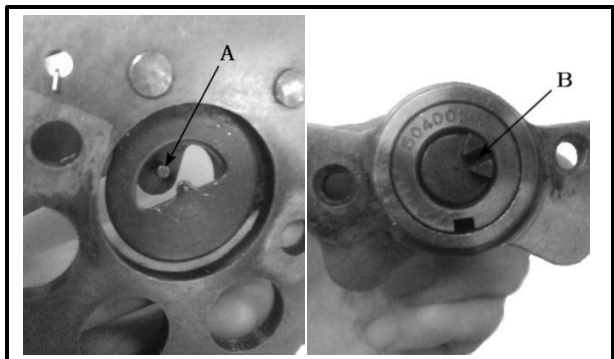
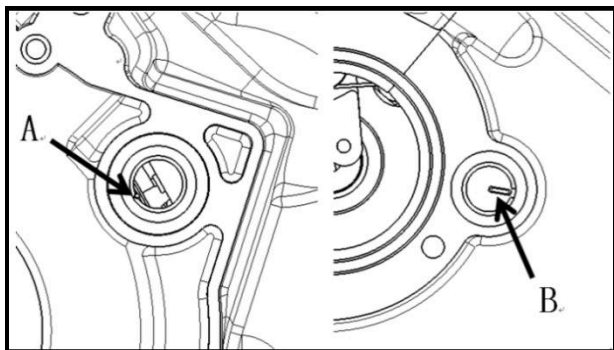
 Recommended lubricant
Engine oil

6. Align:

- Check that the Magneto rotor index mark (A) and the index notch in the timing hole are aligned (B). If not, turn the crankshaft counterclockwise until they are aligned.

TIP:

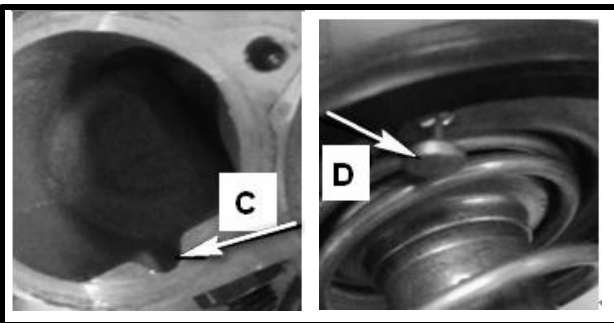
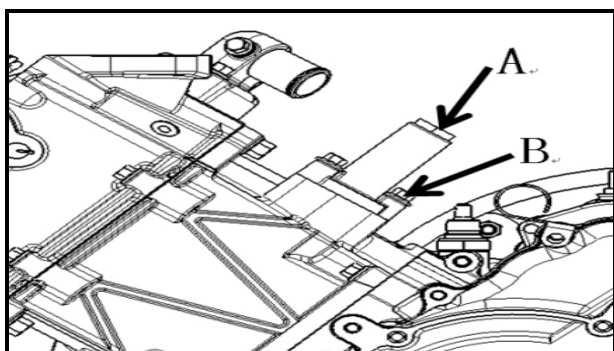
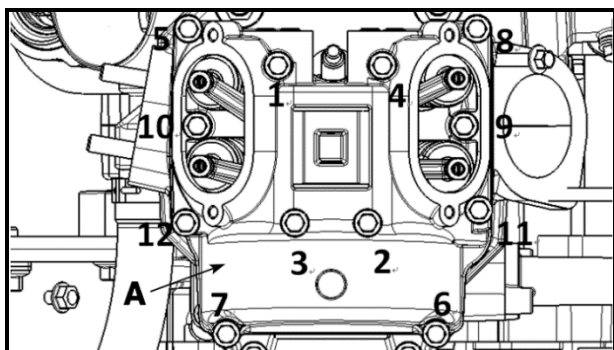
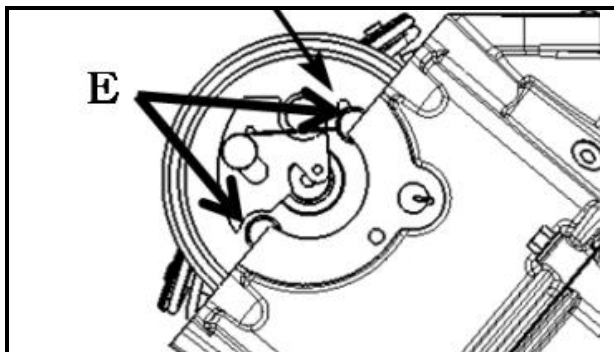
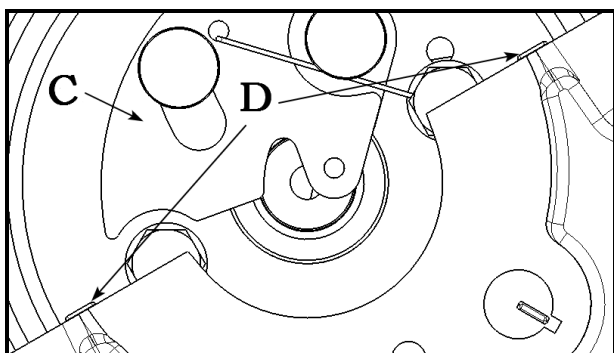
Prevent the crankshaft from turning after aligning.



7. Install

- Install the camshaft sprocket, Perform the following:
 - a. Make sure that the decompress or weight(C) is at the top and put the cam chain on the camshaft sprocket.
 - b. Make the pin (A) of decompress or stuck in the notch (B) of shaft in the camshaft to install the camshaft sprocket on the camshaft.

Check that two index mark on camshaft sprocket is parallel to the surface of cylinder head(D). If not, adjust the relative position between camshaft sprocket and the cam chain until it is parallel.



c. Verify that the other timing hole in the cylinder head can see the index mark.

d. Apply 2~3 teeth sealant to bolts(E) :

	Recommended sealant Thread locker sealant
--	--

e. Turn the camshaft to make the thread hole aligned and keep the camshaft lobes still at the bottom, and then install the bolts.

f. Tighten the bolts:

	20Nm(2.0m.kg.14ft.lb)
--	-----------------------

• Apply the sealant to the contacted surfaces of cylinder cover and cylinder head equally:

	Recommended sealant Silicone flange sealant
--	--

• Install the cylinder cover (A).
• Install the bolts as shown (1~12).

8. Tighten:

• Tighten the bolts in the sequence as shown:

	10Nm(1.0m.kg.7ft.lb)
--	----------------------

9. Install:

• Install the tensioner.
• Install the bolts (B).

10. Tighten:

• Tighten the bolts(B):

	10Nm(1.0m.kg.7ft.lb)
--	----------------------

• Tighten the bolts(A):

	18Nm(1.8m.kg.13ft.lb)
--	-----------------------

• If remove the spark plug, install and tighten it:

	19Nm(1.9m.kg.14ft.lb)
--	-----------------------

11. Install:

• If removed, install the section temperature valve.

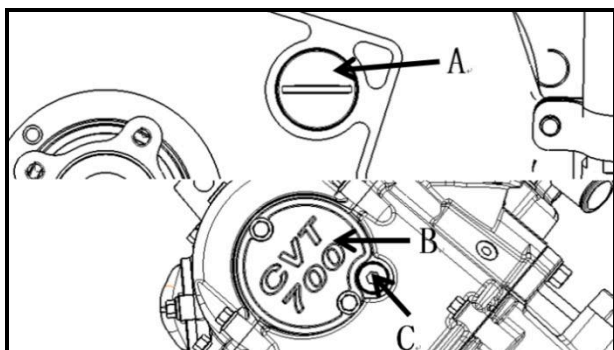
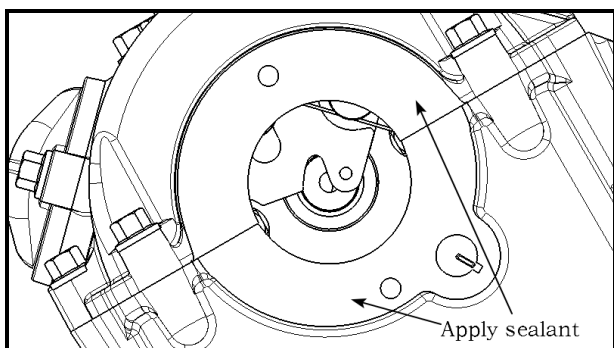
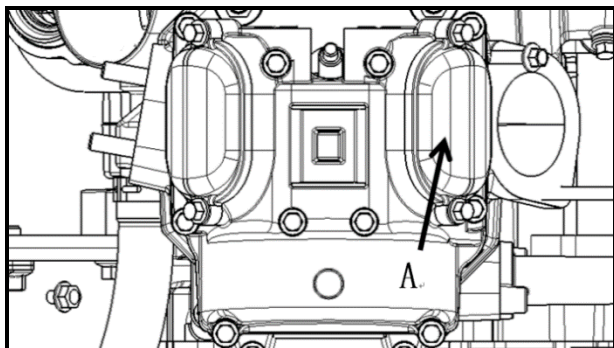
TIP:

The boss (D) align the notch(C) while installing.

12. Tighten:

• Tighten the section temperature valve bolts:

	10Nm(1.0m.kg.7ft.lb)
--	----------------------



13. Install:
 - Install the temperature sensor if removed.
14. Tighten:
 - Tighten the temperature sensor:

	15Nm(1.5m.kg.11ft.lb)
--	-----------------------

15. Adjust:
 - Adjust the valve clearance.
Intake valve: 0.08mm~0.15mm.
Exhaust valve: 0.10mm~0.15mm;
 - Verify the valve clearance after turning two revolution counterclockwise and realigning the Magneto rotor index mark with the index notch. Readjust the valve clearance if it is out of range.

16. Install:
 - Install the valve covers (A).
 - Install the bolts.

17. Tighten:
 - Tighten the bolts:

	10Nm(1.0m.kg.7ft.lb)
--	----------------------

- Apply the sealant to the surface of cylinder head and cylinder cover as shown equally:

	Recommended sealant Silicone flange sealant
--	--

18. Install:
 - Install the side cover (B) and seal gasket.
 - Install the bolts.

19. Tighten:
 - Tighten the bolts:

	10Nm(1.0m.kg.7ft.lb)
--	----------------------

20. Install:
 - Install Cylinder head opercula (C) and the gasket.
 - Install opercula (A) with the seal ring.
 - Install the fan windshield.
 - Tighten the bolts:

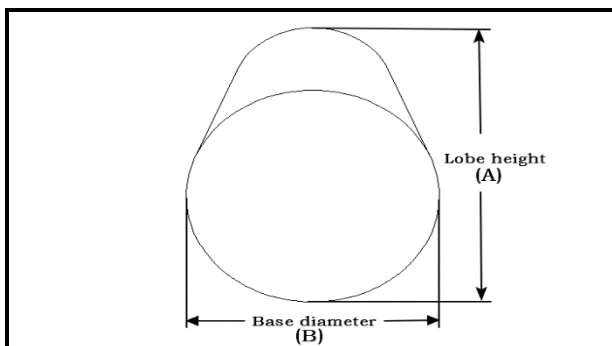
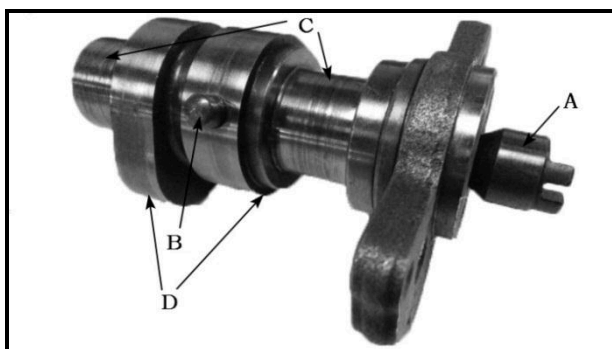
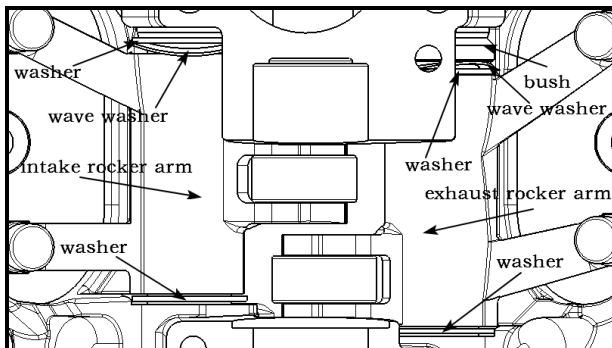
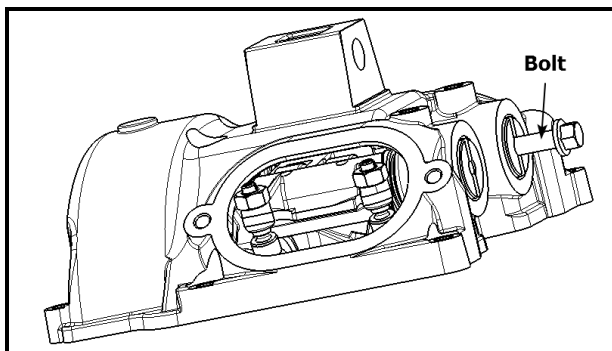
	10Nm(1.0m.kg.7ft.lb)
--	----------------------

- Install the fan impeller.
- Tighten the bolts:

	10Nm(1.0m.kg.7ft.lb)
--	----------------------

- Install the fan housing.
- Tighten the bolts:

	10Nm(1.0m.kg.7ft.lb)
--	----------------------



Rocker arms and camshaft

Removing the rocker arms and camshaft

1. Remove:
 - Screw M6x30 bolt in rockshaft as shown.
 - Slowly pull out the exhaust rocker shaft by the bolt.

TIP: _____

There are five parts on the exhaust rocker shaft as shown. Be careful not to lose.

- Remove the exhaust rocker arm and the other four parts.
- Repeat for the other assembly.

TIP: _____

There are four parts on the intake rocker shaft as shown. Be careful not to lose.

- Remove the shaft (A) from the camshaft.
- Remove the pin (B).

Checking the camshaft

Replace worn or damaged parts as described in this section.

1. Clean:
 - Clean the camshafts in solvent and dry thoroughly. Flush the camshaft oil passages with solvent and compressed air.

2. Measure:
 - Check the cam lobes (D, The up one Figure) for wear. Measure each cam lobe height (A) and base diameter (B) with a micrometer. Replace the camshaft if the lobes are pitted, scored or damaged.



Camshaft lobe dimensions

Intake

A: $40.9111 \pm 0.05 \text{ mm}$

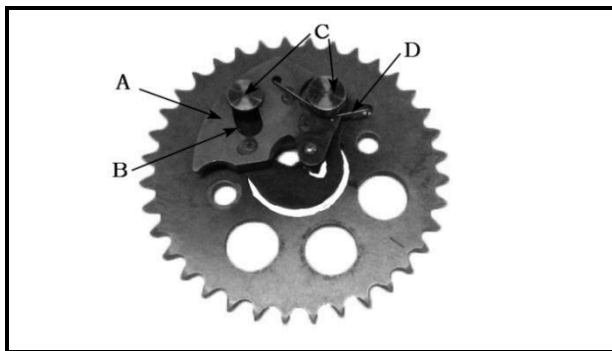
B: $34 \pm 0.05 \text{ mm}$

Exhaust

A: $40.6195 \pm 0.05 \text{ mm}$

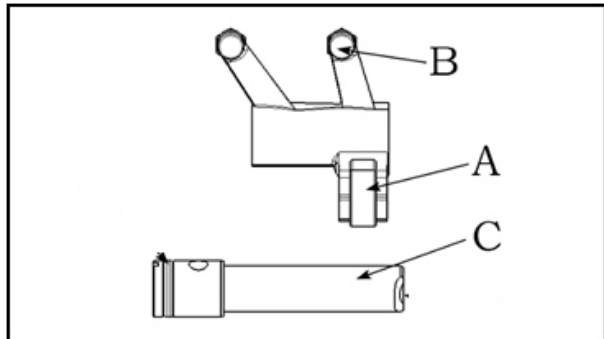
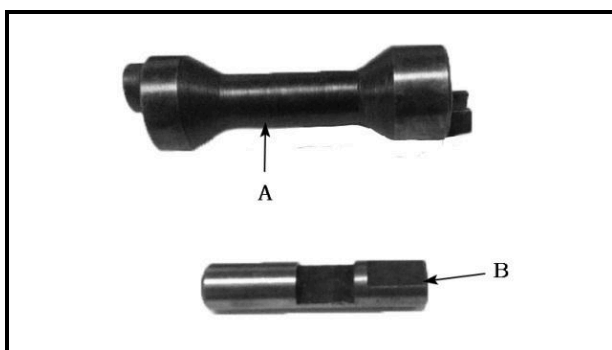
B: $34 \pm 0.05 \text{ mm}$

3. Check:
 - Check the camshaft journal (C, The up one Figure) for wear or scoring. If wear or damage is noted, check the bearing surface inside the cylinder head for damage.



Checking the decompression system

1. Check:
 - Inspect the decompress or weight assembly as follows:
 - a. Make sure the decompress or weight (**A**) moves under spring tension. If not, check the tension spring (**D**) for damage. If the tension spring is good but there is binding, check the pivots for damage.
 - b. Inspect the groove (**B**) in the weight for scoring and other damage.
 - c. Make sure both pins (**C**) are tight.
 - d. Inspect the pin on the weight plate for damage. If damage is noted; inspect the outer shaft end for damage.
 - Inspect the shaft (**A**) as follows:
 - a. Inspect the bearing surfaces for scoring, bluing and other damage. All surfaces must be smooth.
 - b. Inspect both engagement ends for damage.
 - Inspect the pin (**B**) as follows:
 - a. Inspect the bearing surfaces for scoring, bluing and other damage. The pin must be smooth so it can move freely in the camshaft bore.
 - b. Inspect the engagement notch for damage.
 - Check the rocker arms and rocker arm shafts



1. Check:
 - Clean all parts in solvent. Dry with compressed air.
 - Inspect the rocker arm roller (**A**) for damage. Make sure the roller turns freely without excessive play or roughness.
 - Inspect the adjusters (**B**). Check for flat spots, uneven wear and scoring. Replace the valve adjuster if damaged.
 - Inspect the rocker arm shaft (**C**) for wear or scoring.
 - Calculate rocker arm shaft clearance as follows:

- a. Measure the rocker arm inside diameter and record the measurement.
- b. Measure the rocker arm shaft outside diameter and record the measurement.
- c. Subtract the measurement in sub-step b from the measurement in sub-step a to determine rocker arm shaft clearance. Replace the worn parts if clearance exceeds range.



Rocker arm and rocker arm shaft
Rocker arm inside diameter
16.000 ~ 16.018mm
Rocker arm shaft outside diameter
15.976 ~ 15.995mm
Rocker arm shaft clearance
0.005 ~ 0.042mm

- Repeat for the other rocker arm assembly.

Installing the camshaft and rocker arms

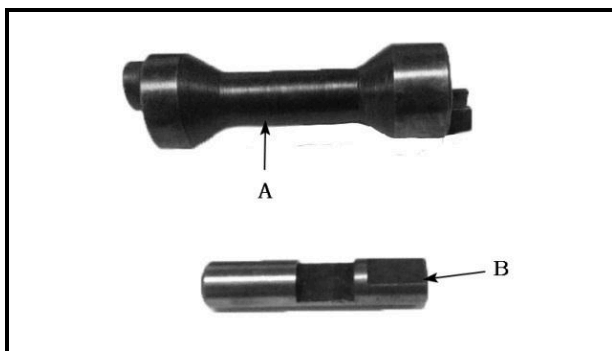
1. Clean:
 - If necessary, clean the removed parts with gasoline and the parts should be dry before installation.
2. Install:
 - Install the decompress or shaft(A) and pin(B) into the camshaft as follows:

- a. Lubricate the decompress or shaft and pin with engine oil.



Recommended lubricant
Engine oil

- b. Install the pin (B) into the camshaft with its rounded end facing out. Then position the pin so that its notch is facing toward the camshaft's sprocket end as shown in the left.
- c. Insert the shaft (A) into the camshaft so that its boss end enter first. Then engage the boss end of the shaft into the notch in the pin as shown in the left. Rotating the shaft should raise and lower the pin(B). If not, remove the parts and reinstall





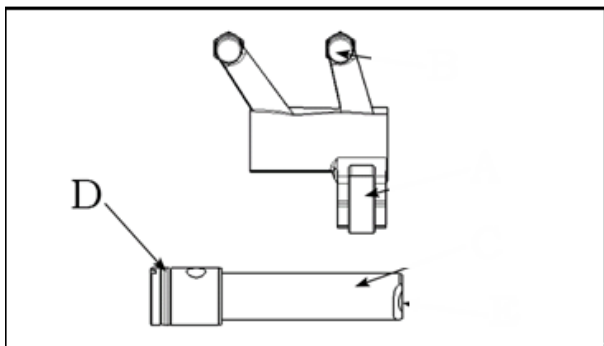
Lubricate the cam lobes with molybdenum disulfide oil or engine oil.

	Recommended lubricant Molybdenum disulfide oi
---	--

- Install the camshaft so the flange surface are positioned as shown (B). This positions the camshaft with the lobe facing down.

NOTE:

The decompress or shaft can slide out of the camshaft if the head is tilted.



3. Check:

- Check the seal ring (D). Replace it if it is out of shape or damaged.

4. Install:

- Install the rocker arms, Perform the following:

- Lubricate the rocker arm inside hole:

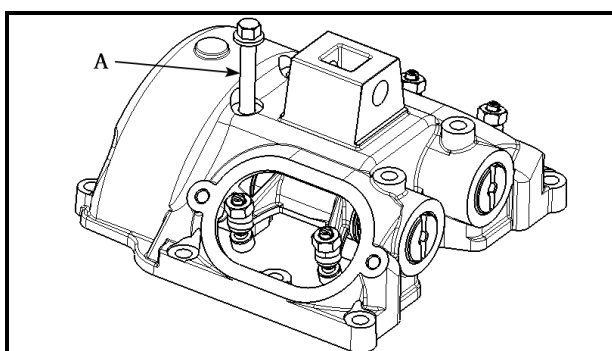
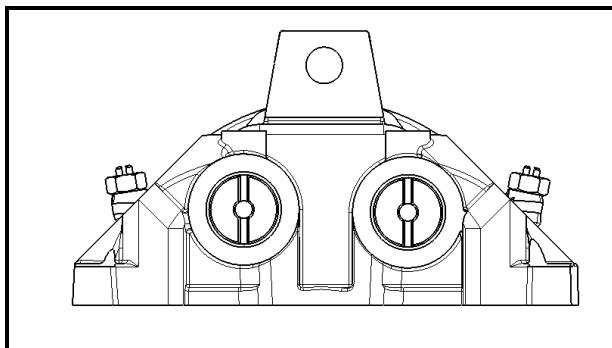
	Recommended lubricant Engine oil
---	-------------------------------------

- Install the rocker arm, shaft and small parts in it original positions.

- Press the rocker shaft into the hole of cylinder cover.

TIP:

Do not break the seal ring (D) while pressing.



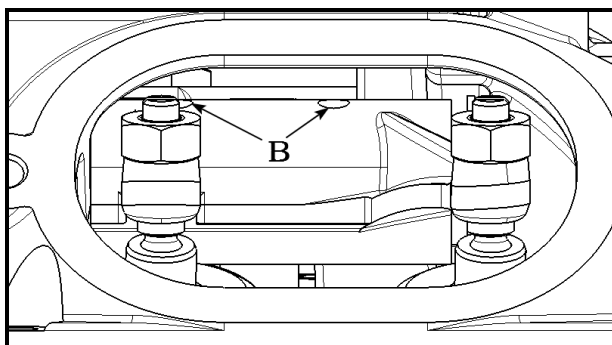
- Use the straight screwdriver to turn the rocker shaft to make its straight-line groove vertical as shown in the left.

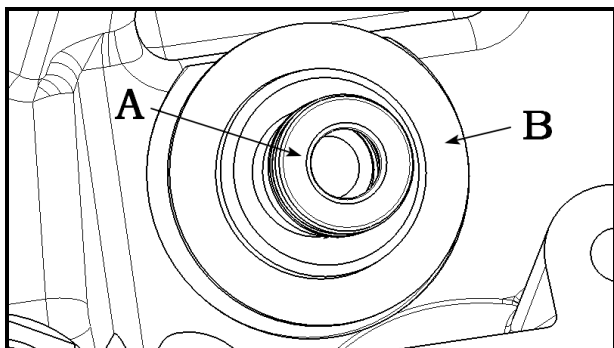
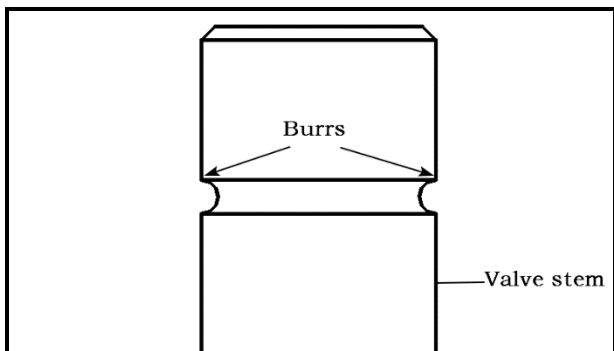
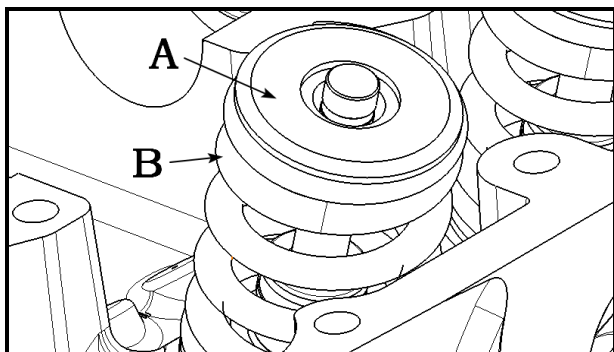
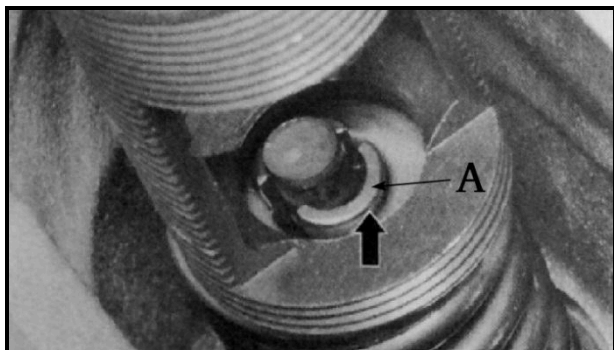
- Install the M6x60 bolt (A) to verify the rocker shaft's position because the notch of rocker shaft is designed to give the space for the bolt can go through. If the bolt can't go through the cylinder cover, turn the rocker shaft 180 degree until it can go through the cylinder cover.

- Repeat for the other assembly.

- Lubricate the rocker arms by the oil hole (B).

- Move each rocker arm by hand. It should be flexible.





Valves and valve springs

A valve spring compressor is required to remove and install the valve springs.

Removing the valves and valve springs

- Remove:
- Remove the cylinder head as described in this chapter.
- Identify the individual valve assemblies as shown so they can be reinstalled in their original position.
- Install a valve spring compressor squarely over the upper retainer with the other end of the tool placed against the cylinder head. Handle the tool carefully to avoid damaging the cylinder head gasket surface.
- Press the valve spring compressor until the valve keepers (A) separate and remove them.



Valve spring compressor



- Gradually loosen the valve spring compressor and remove it from the head. Remove the upper retainer (A) and valve spring (B).

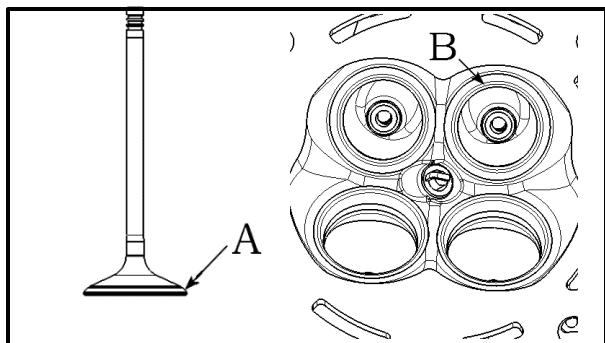
CAUTION:

Remove any burrs from the valve stem groove as shown before removing the valve; otherwise, the valve guide may be damaged as the valve stem passes through it.

NOTE:

If a valve is difficult to remove, it may be bent, causing it to stick in its valve guide. This condition will require valve and valve guide replacement.

- Remove the valve from its guide while rotating it slightly.
- Use a pair of pliers to pull the oil seal (A) off the valve guide and discard it.
- Remove the spring seat (B).
- Repeat for the remaining valves.
- Service the valve assembly and valve seats as described in this section.



Checking the valves and valve springs

Valve components

1. Clean:

- Clean the valve components in solvent. Do not damage the valve seating surface.

2. Check:

- Inspect the valve face (A) for burning, pitting or other signs of wear. Unevenness of the valve face is an indication that the valve is not serviceable. If the wear on a valve is too extensive to be corrected by hand-lapping the valve into its seat, replace the valve. The face on the valve cannot be ground. Replace the valve if defective.
- Inspect the valve stems for wear and roughness. Check the valve keeper grooves for damage.
- Place the valve on V-blocks and measure valve stem run out with a dial indicator.



Run out limit: 0.05mm

3. Measure:

- Measure each valve stem outside diameter with a micrometer. If a valve stem is out of specification, discard the valve.

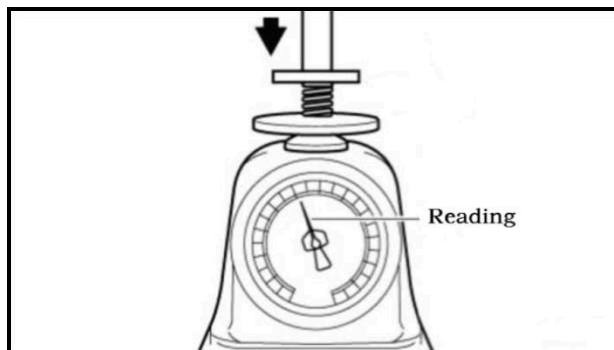


Intake valve stem outside diameter

5.966 ~ 5.980mm

Exhaust valve stem outside diameter

5.956 ~ 5.970mm



- Insert each valve into its respective valve guide and move it up and down by hand. The valve should move smoothly.

- Measure each valve guide inside diameter at the top, center and bottom. Record the measurements and use the largest bore diameter measurement when determining its size. If a valve guide is out of specification, replace the cylinder head.



Valve guide inside diameter

5.4 ~ 5.6mm

4. Check:

- Inspect each spring for any cracks or other visual damage.
- Using a spring compression tool as shown, compress the springs at the height specified and measure the valve spring pressure. Replace the springs if out of specification.



Compressed spring force

226 ~ 254Nm at 37mm

552 ~ 608Nm at 26.4mm

- Replace weak or defective springs.
- Check the valve keepers for cracks and any surface spots. Replace in pairs.
- Inspect the spring retainer and spring seat for damage.
- Inspect the valves and valve seats for damage.
- Clean the valves (A, The up one figure) and valve seats (B, The up one figure) mating areas with contact cleaner.
- Clean all carbon deposits from the valve faces with solvent and dry thoroughly.

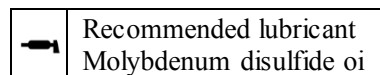
Installing the valves and valve springs

1. Install:

- Install the spring seat with its shoulder facing up.

2. Lubricate:

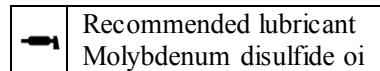
- Lubricate the inside of a new oil seal and the oil seal lip:



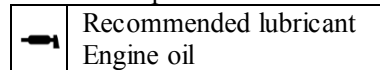
3. Install:

- Align and push the oil seal straight down the valve guide until snaps into the groove in the top of the guide (B).
- Install the valve as follows:

a. Coat the valve stem.



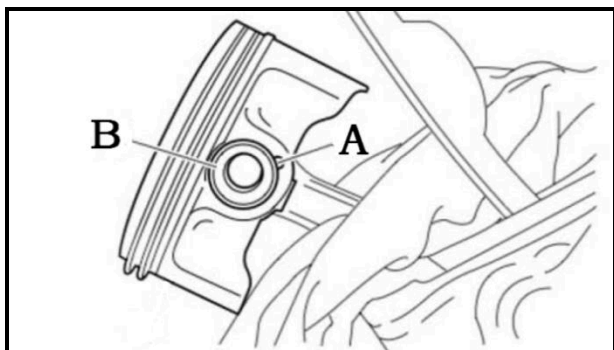
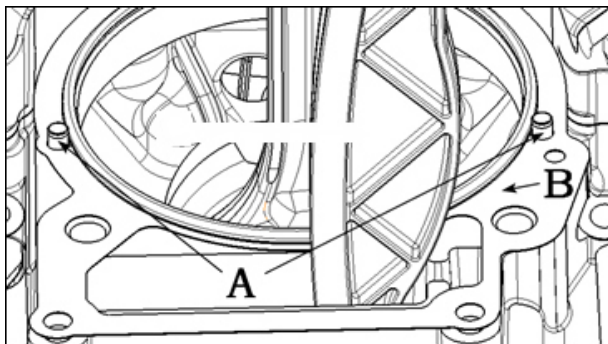
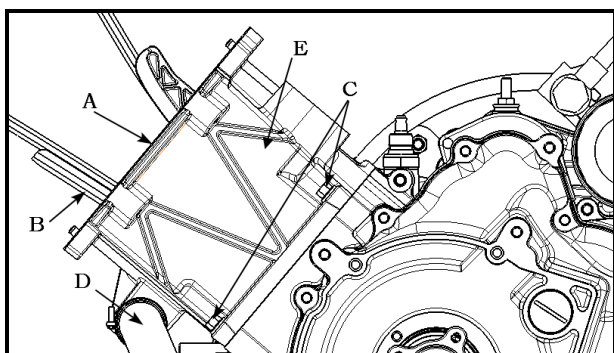
b. Lubricate the groove on the top of the valve.



- c. Install the valves. Hold the valve stem seal in place and slowly turn the valve as it enters the oil seal. Continue turning the valve until it is installed all the way.
- d. Make sure the valve moves up and down smoothly.

- Install the valve springs with the color marks facing upwards.
- Install the retainer on top of the valve spring.
- Compress the valve spring with a valve spring compressor tool and install the valve keeper around the valve stem and into the hole in the top of the retainer. Then slowly release tension on the valve spring while watching the movement of the retainer and keepers. Make sure the keepers fit into the groove in the valve stem. Gently tap the upper retainer with a plastic hammer to ensure the keepers are fully seated in the valve stem groove.
- Repeat for the remaining valves.





Cylinder block and piston

Removing the cylinder block and piston

Remove:

- Remove the water pipe (D).
- Check the dowel pins on cylinder block.
- Remove the seal gasket (A) of cylinder head. If it is damaged, replace it.
- Remove the chain guide rail (B)
- Remove the bolts (C).
- Remove the cylinder block (E).
-
- Check the dowel pins (A).
- Remove the seal gasket (B) of cylinder block. If it is damaged, replace it.
-
- Block off the crankcase below the piston with a clean shop cloth to prevent the piston pin circles from falling into the crankcase.
- Remove a circle (A) from the side of the piston opposite the cam chain side.
- Remove the piston pin (B).
- If necessary, remove the piston rings.

CAUTION:

The piston pin operates with a sliding fit and can be removed by hand. However, problems such as varnish on the piston pin, a burred pin bore or circle groove, or a damaged piston can make it difficult to remove the piston pin. Do not drive the pin out as the piston and connecting rod assembly may be damaged.

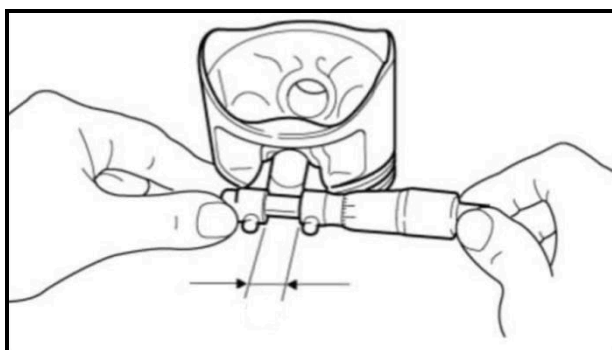
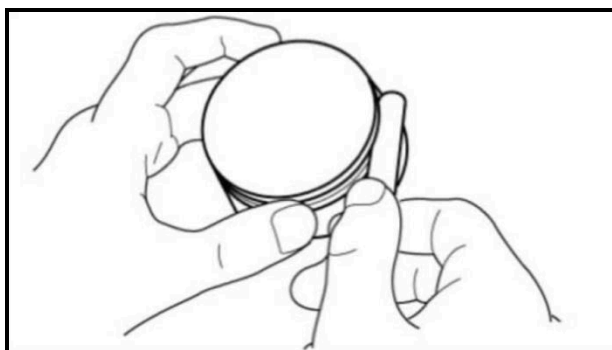
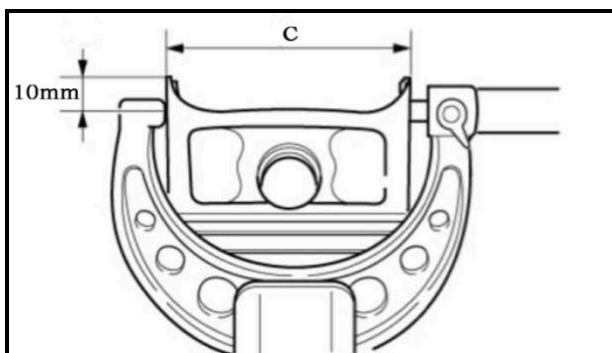
- Remove the piston.

Check the cylinder block and piston

1. Check:
 - Inspect the bore of cylinder block for crack and wear.
2. Measure:
 - Measure the bore of cylinder block wall diameter at the top, center and bottom. Record the measurements and use the largest bore diameter measurement when determining its size. If the measurement is out of specification, replace the cylinder block.



Bore of cylinder block wall diameter	
Group "A"	:101.965 ~ 101.977mm
Group "B"	:101.978 ~ 101.990mm



3. Check:

- Inspect the pin bore of piston for crack and wear.

4. Measure:

- Measure the piston diameter 10 mm up from the bottom edge of the piston skirt and 90° to the direction of the piston pin as shown. Record the measurement (C). If it is out of specification, replace the piston and piston rings as a set.

	Piston size "C": Group "A" 101.94 ~ 101.95mm Group "B" 101.95 ~ 101.96mm
--	--

Checking the piston rings

1. Measure:

- Measure the side clearance of each ring in its groove with a flat feeler gauge as shown after eliminate any carbon deposits from the piston ring grooves and piston rings. If the clearance is out of the specification replace the piston and piston rings as a set.

	Piston ring side clearance Top ring: 0.03 ~ 0.07mm 2nd ring: 0.02 ~ 0.06mm
--	--

TIP:

Before measuring the piston ring side clearance, eliminate any carbon deposits from the piston ring grooves and piston rings.

Checking the piston pin

1. Check:

- Inspect the piston pin for crack and wear.
- Oil the piston pin and install it in the piston. Slowly rotate the piston pin and check for tightness or excessive play.

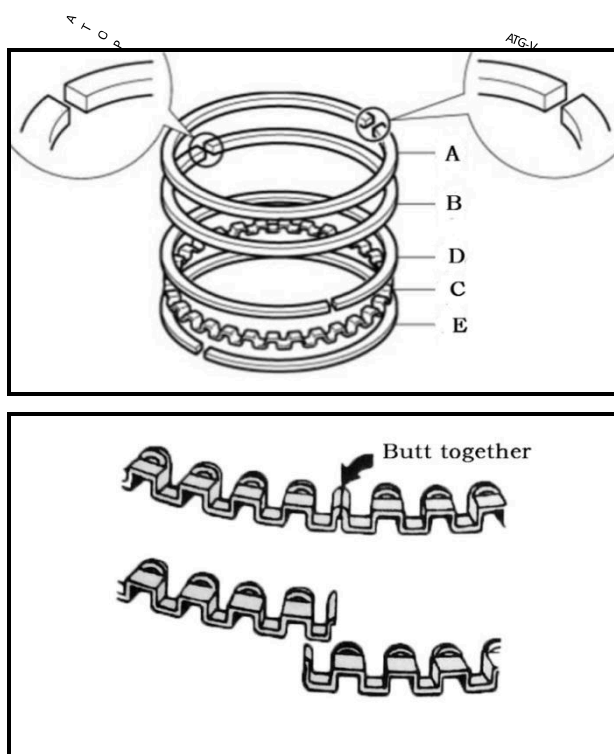
2. Measure:

- Measure the piston pin bore inside diameter as shown. Replace the piston if the bore diameter is out of the specification.

	Piston pin bore inside diameter 22.012 ~ 22.018mm
--	--

- Measure the piston pin outside diameter. Replace the piston pin if the pin outside diameter is out of the specification.

	Piston pin bore outside diameter 19.996 ~ 22mm
--	---



Installing the piston and cylinder block

1. Clean :

- Clean and dry the piston and rings.

2. Install:

- Install the piston rings as follows if remove it:
- Install the oil ring assembly into the bottom ring groove. Install the spacer first(C), and then the bottom and top ring rails(E,D). Make sure the ends of the spacer butt together as shown. They should not overlap. If reassembling used parts, install the ring rails in their original position.
- Install the compression rings with a ring expander tool or by spreading the ring ends by hand (Inspect the bore of cylinder block for crack and wear.
- Install the second ring (B) with its mark facing up.
- Install the top ring (A) with its mark facing up.

TIP:

- The end gaps of two near piston rings offset $180^{\circ} \pm 60^{\circ}$.
- The end gaps of piston rings cannot align the intake and exhaust direction.

3. Lubricate:

- Lubricate the small hole of connecting rod.

	Recommended lubricant Engine oil
--	-------------------------------------

- Lubricate the piston pin bore.

	Recommended lubricant Engine oil
---	-------------------------------------

- Lubricate the piston pin.

	Recommended lubricant Engine oil
---	-------------------------------------

4. Install:

- Install the piston pin from the side of the piston opposite the cam chain side. Go through the piston pin bore and the small hole of connecting rod.

CAUTION:

The mark “△” of piston align the exhaust direction.

- Install the circle.

TIP:

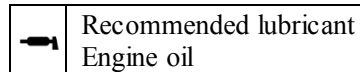
The piston pin can rotate flexibly and have the clearance at the axial direction after install the circle.

- Verify the dowel pins.
- Install the seal gasket of cylinder block at right direction.

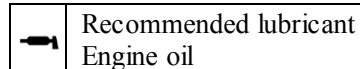


5. Lubricate:

- Lubricate the cylinder block wall.



- Lubricate the piston skirt.

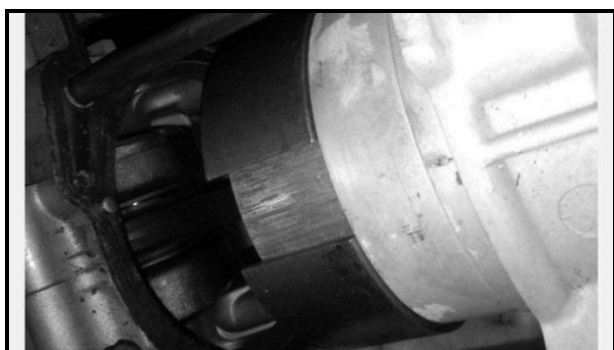


6. Install:

- Use the special tool of compressing piston rings to compress the piston rings.

TIP:

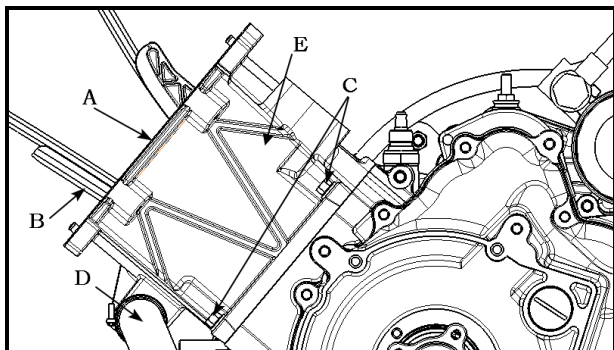
Install the special tool from the up to the bottom of piston with the conical surface facing down until all piston rings are compressed as shown.



- Lower the cylinder block onto the piston as shown, routing the cam chain and chain tighten board through the chain tunnel.

CAUTION:

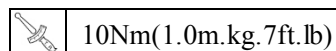
Do not force the cylinder block past the rings. Push the cylinder block down until piston go in completely.



- Paired cylinder block(E) with piston, group A to group A, group B to group B
- Remove the special tool and push the cylinder block down into place over the dowel pins.

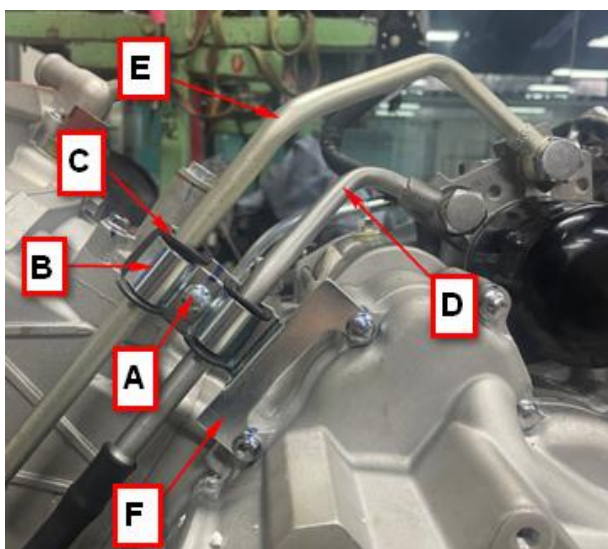
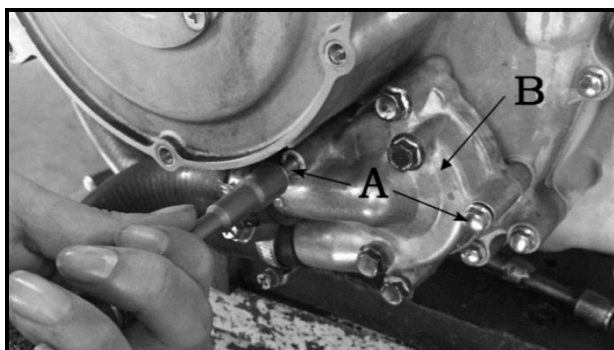
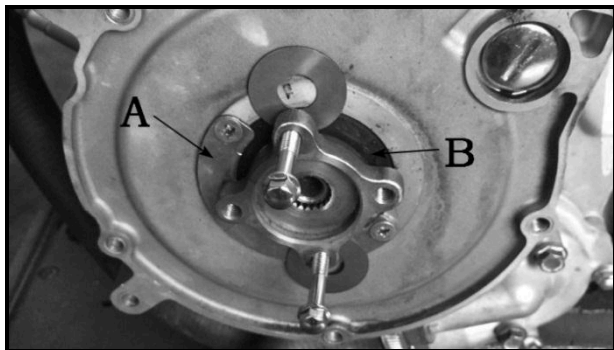
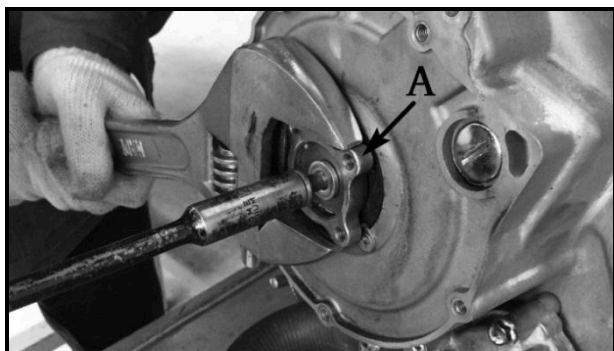
7. Tighten:

- Tighten the mounting blots(C).



8. Install:

- Verify the dowel pins on cylinder block.
- Install the chain guide rail (B).
- Install the cylinder head gasket (A)
- Install the water pipe (D).



Ac magneto

Removing the ac magneto rotor

Remove:

- Remove the fan mount(**A**) as follows:
 - a. Use the adjustable spanner to fix the fan mount as shown.
 - b. Loosen the bolts. Then remove it and washer.
 - c. Found two other M6x35bolts and gaskets.
 - d. Screw two bolts into the fan mount against the gaskets as shown.
 - e. Equally, screw two bolts to push out the fan mount slowly.

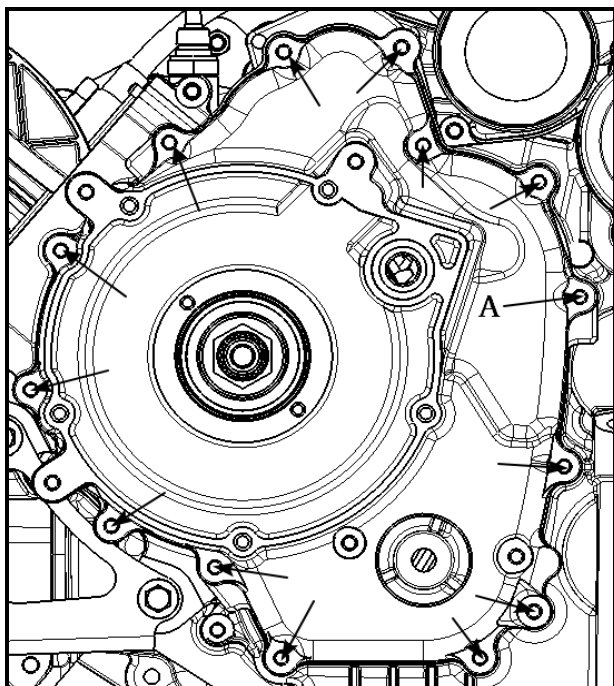
CAUTION:

Keeps the bottom of bolts touching the gaskets while screwing the bolts? Otherwise, the bolts maybe will cause damage to the oil seal baffle (**A**) or oil seal (**B**).

- Remove the bolts (**A**) to remove the water pump(**B**). If the seal ring on the water pump is damaged, replace it.

Removing oil pipe

- Removing the oil pipe as follows:
 - a. Remove the bolt (**A**).
 - b. Remove the clamp, middle fixing double tube (**B**) and l-rubber(**C**).
 - c. Remove the inlet oil pipe (**D**) and outlet oil pipe (**E**).
 - d. Remove the support, oil hose (**F**)

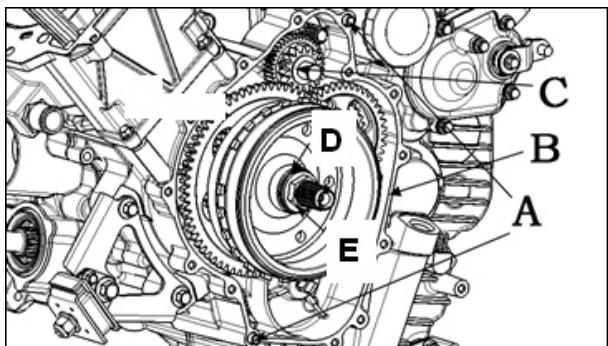


- Remove the mounting bolts of left crankcase cover as shown.

TIP:

- Loosen each bolt 1/4 of a turn at a time, in stages and in a crisscross pattern. After all of the bolts are fully loosened, remove them.

- Remove the left crankcase cover (A).



- Remove the dowel pins (A)
- Remove the left cover seal gasket (B). If it is damaged, replace it.

CAUTION:

The outside washer (C) and inside washer is easy to lose while removing the left cover. Pay attention to it.

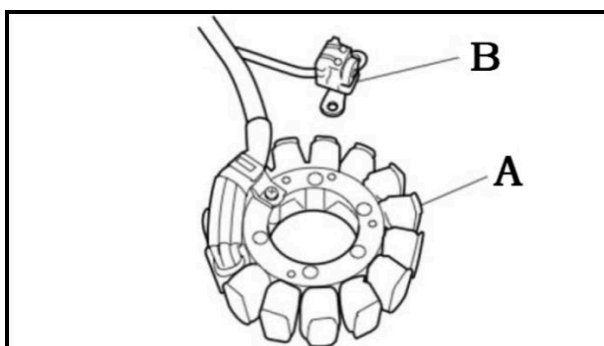
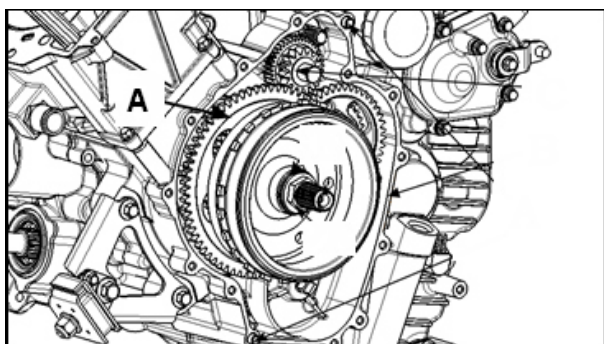
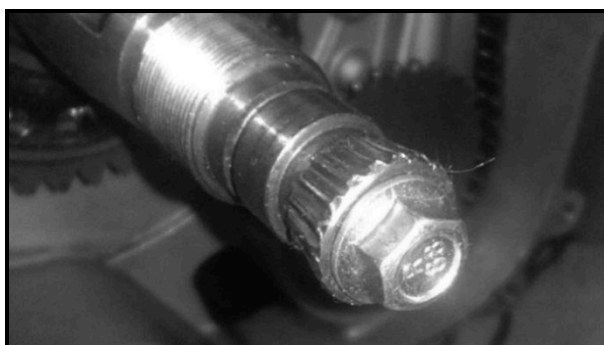
- Using the rotor holder to fix hold the AC magneto rotor as shown.



Rotor holder
GJ0110196-1

- Remove the nut (E) and washer (D).





- Using the tool of removing rotor to remove the AC magneto rotor as shown.



Tool of removing rotor



CAUTION:

To protect the end of the crankshaft, place an appropriate sized bolt between the center bolt of the above special tool and the crankshaft as shown.

TIP:

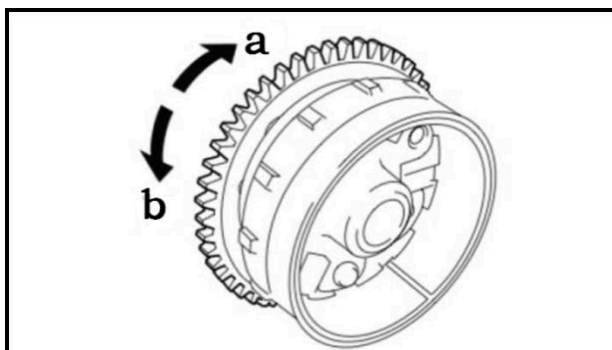
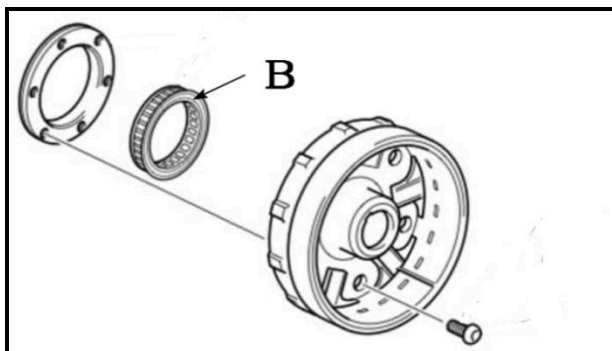
- Use the above special tool.
- Screw the special tool on the AC magneto rotor.
- Make the center bolts of special tool turn counter-clockwise to push out the AC magneto rotor.

- Remove the woodruff key on crankshaft.
- Remove the starter wheel gear (A).

- Check the seal ring on crankshaft. If the seal ring (A) is damaged, replace it.

Checking the stator coil and crankshaft position sensor.

- Check:
 - Check the stator coil (A) if removed. Replace the stator coil assembly if it is damaged.
 - Check the crankshaft position sensor (B) if removed. Replace the crankshaft position sensor assembly if it is damaged.



Checking the starter clutch

1. Check:

- Check the starter one-way clutch (B). Replace it if cracked and damaged.

TIP:

The arrow mark on the starter clutch must face inward, away from the AC magneto rotor.

- Check the assembly of the starter wheel gear and the starter clutch as follows:
 - a. Install the starter wheel gear to the starter clutch, and hold the starter clutch.
 - b. When turning the starter wheel gear counterclockwise (b), the starter clutch and the wheel gear should be engaged. If not, the starter clutch is faulty. Replace it.
 - c. When turning the starter wheel gear clockwise (a) the starter wheel gear should turn freely. If not, the starter clutch is faulty. Replace it.
- Check the starter wheel gear. Replace it if there is damage/pitting/ wear on the starter wheel gear.

Installing the AC magneto rotor

1. Clean:

- Clean and dry the outside surface of the crankshaft and the inside bore of the rotor.

2. Lubricate:

- Lubricate the bore of starter wheel gear.

	Recommended lubricant Engine oil
--	-------------------------------------

3. Install:

- Install the starter wheel gear.
- Install the woodruff key on crankshaft.
- Apply the sealant to the crankshaft's conical surface.

	Recommended sealant Cylinder sealant
--	---

- Align the woodruff key and Install the AC magneto rotor.

TIP:

Check that the rotor rotates smoothly. If not, reinstall the key and rotor.

4. Lubricate:

- Lubricate the two surfaces of AC magneto washer and the flange surface of nut.

	Recommended lubricant Engine oil
---	-------------------------------------

5. Install:

- Install the AC magneto rotor nut and washer.

6. Tighten:

- Tighten the AC magneto rotor nut with the special tool to fix the magneto rotor:

	150Nm(15m.kg.111ft.lb)
---	------------------------

7. Install:

- Lubricate the seal ring on crankshaft.

	Recommended lubricant Engine oil
---	-------------------------------------

- Apply the sealant to the left crankcase cover's contact surface (a). The position (b) need more sealant.

	Recommended sealant Silicone flange sealant
---	--

- Install the dowel pins.
- Install the left cover seal gasket.
- Install the left crankcase cover.
- Turn the oil pipe back to its original position.
- Install the bolts of mounting left crankcase cover.

8. Tighten:

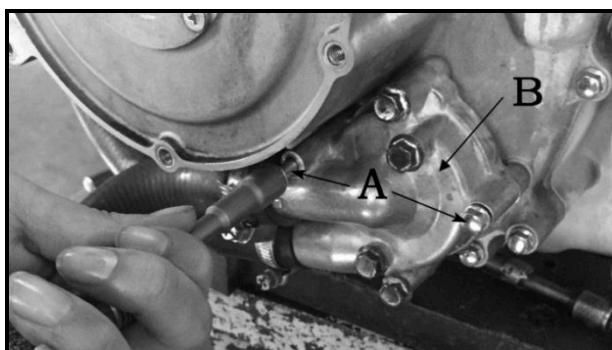
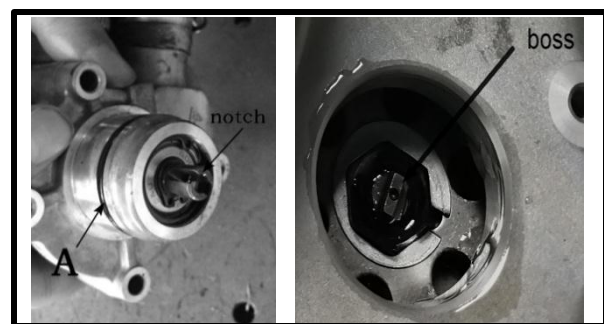
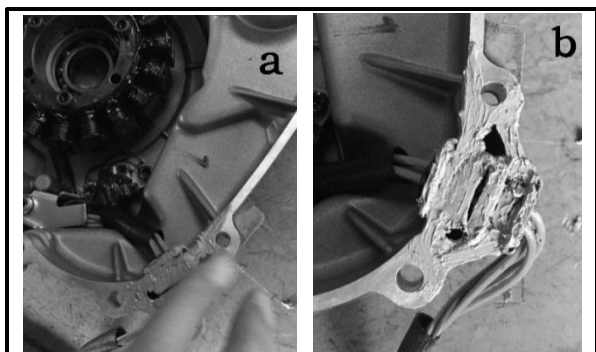
- Tighten the left crankcase cover bolts in stages, using a crisscross pattern.

	10Nm(1.0m.kg.7ft.lb)
---	----------------------

9. Lubricate:

- Lubricate the seal ring (A) on the water pump.

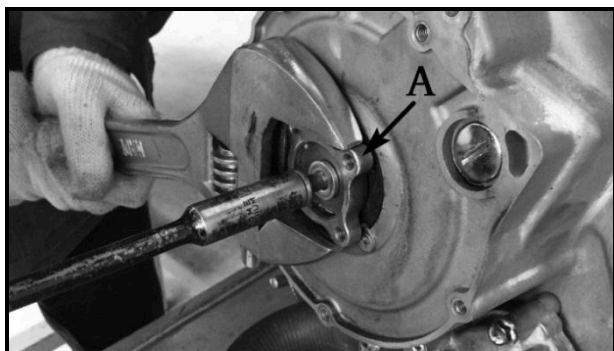
	Recommended lubricant Engine oil
---	-------------------------------------



10. Install:

- Align the straight notch of water pump with the boss as shown to install the water pump (B).
- Tighten the bolts (A).

	10Nm(1.0m.kg.7ft.lb)
---	----------------------



11. Lubricate:

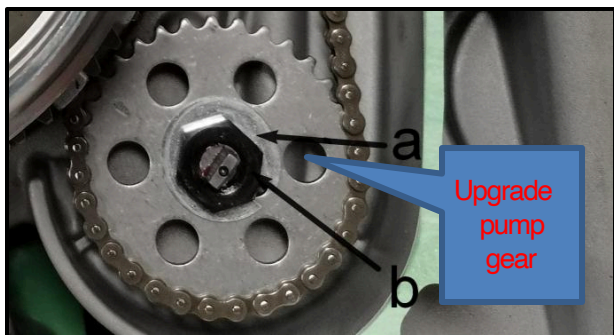
- Lubricate the outside cylindrical surface and the inside bore of fan mount (A).

	Recommended lubricant Engine oil
--	-------------------------------------

12. Install:

- Install the fan mount.
- Install the bolt and washer.
- Tighten the bolt:

	30Nm(3.0m.kg.22ft.lb)
--	-----------------------



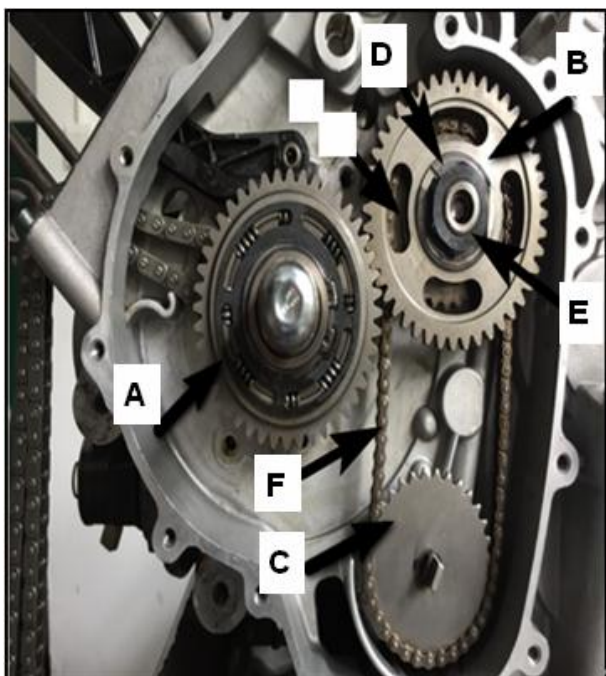
Balancer gears and oil pump gears

Removing the balancer driven gear and oil pump driven gear

1. Remove the circle as shown.

NOTICE

- Upgrade engine operating according to following :
- Flat the bent side of lock washer (a).
- Remove oil pump gears nut (b).



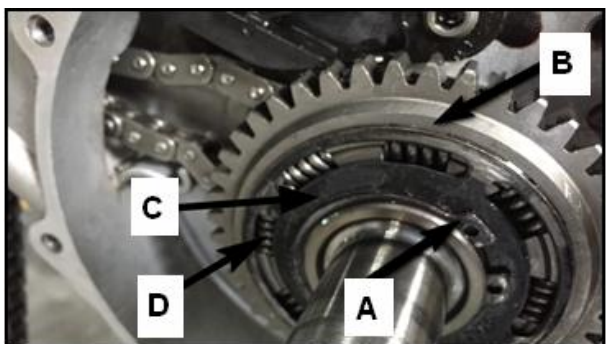
2. Remove:

- Flat the bent side of lock washer (D).
Remove the balancer driven nut (E).

TIP:

Place a copper gasket between the upper teeth of the balancer drive gear (A) and balancer driven gear (B), then loosen the nut (E).

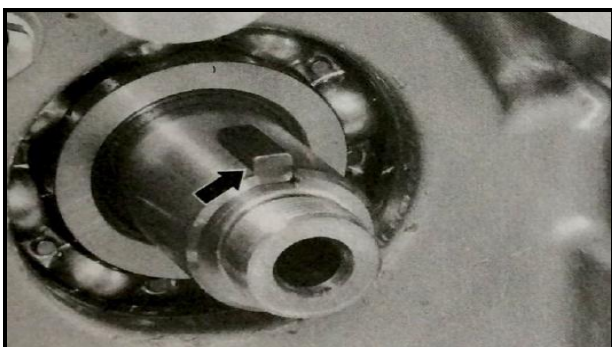
- Remove the lock washer (A) and (D)



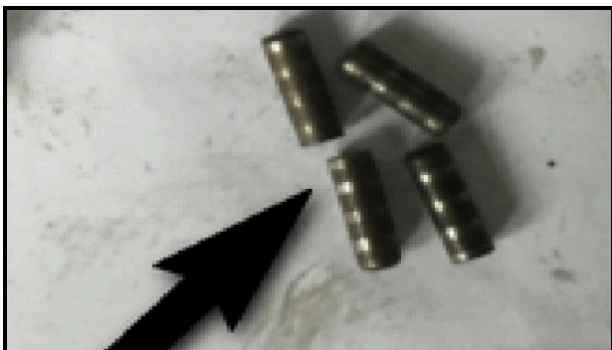
3. Remove

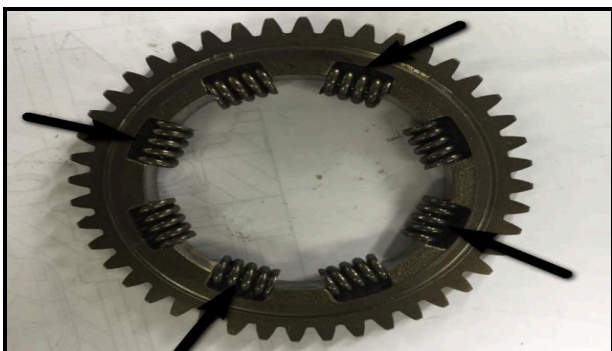
- Remove the big circle (A,)
- Remove the baffle (C)
- Remove the oil pump driven gear (C, The first Figure), balancer driven gear (B, The first Figure) and oil pump chain (F, The first Figure) together. Check the chain as described in Cylinder head chapter.

Remove the key on balance shaft as shown.



- Remove the balancer drive gear (B, The up two Figure), springs (D, The up two Figure) that have four pins as shown in the left inside together. Do not lose the pins and springs.



**CAUTION:**

Mark the positions where the spring have pin inside on the balancer drive gear as shown. Then remove the four pins in springs.

Checking the oil pump drive

1. Check:

- Check the oil pump driven gear. Replace it if damaged/Cracked/ wearied.

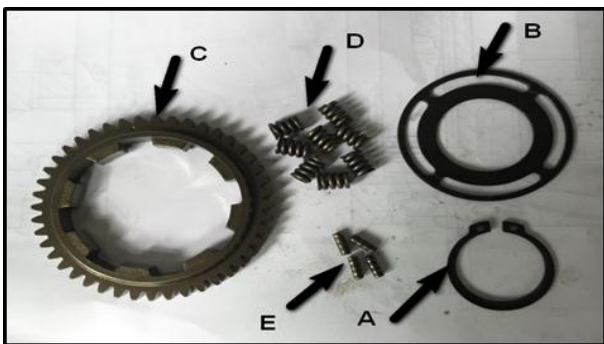
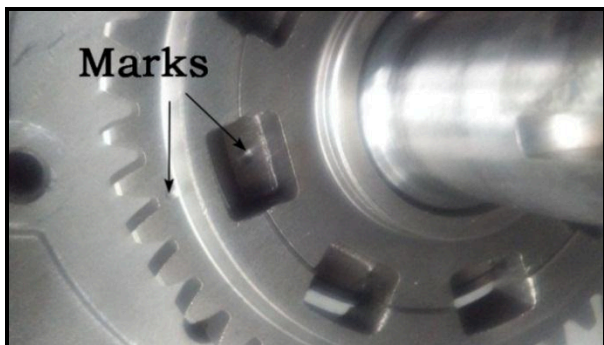
Checking the balancer drive

1. Check

- Check the balancer drive gear Replace it if damaged /warded.
- Check the balancer driven gear. Replace it if damaged/Cracked/wearied.

Checking the springs and pins

- Check:
- Check the springs. If it is damaged, replace it.
- Check the pins. If it is damaged, replace it.

**Installing the balancer drive****gear, balancer driven gear, and oil pump driven gear.**

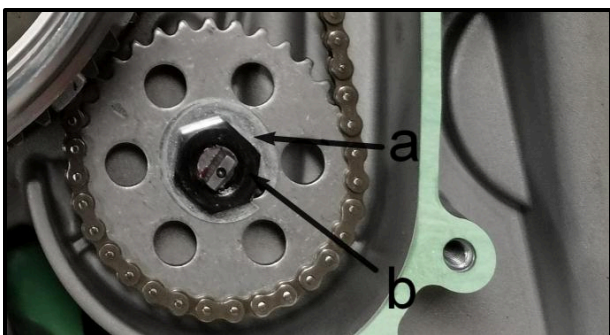
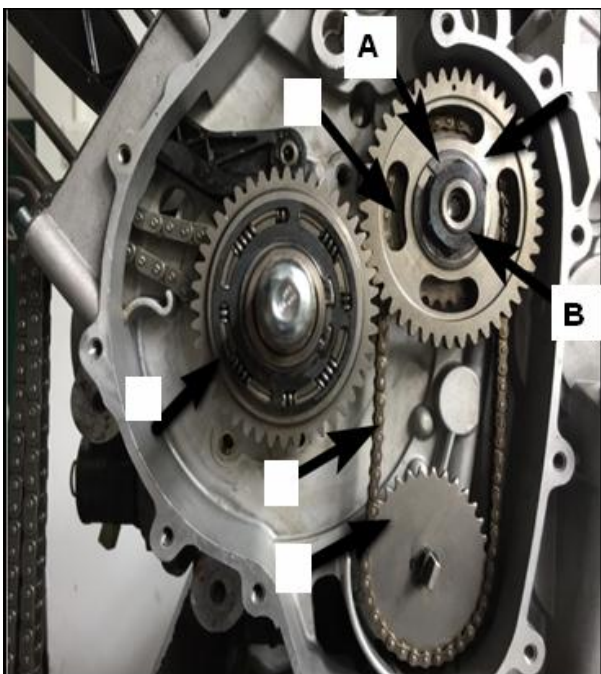
1. Clean:

- If necessary, clean the removed parts with gasoline.

2. Install:

- Align the notch marks as shown on balancer drive gear(C) and the gear ring on the crankshaft, and then install the balancer drive gear.
- Install the springs (D) that have pins (E) inside on the marked position of balancer drive gear.
- Install the rest of springs.
- Install the baffle (B).

Install the big circle (A)



3. Lubricate:

- Lubricate the optical axis and the bore of the balancer driven gear.

	Recommended lubricant Engine oil
---	-------------------------------------

- Install the key on the balance shaft.
- Install the oil pump chain on the balancer driven gear.
- Install the oil pump driven gear on the oil pump chain.

4. Align:

- Align the notch marks as shown on the balancer drive gear and balancer driven gear, also the balancer driven gear align the key, then install the balancer drive gear, the oil pump driven gear assembly.
- Install the circle on the pump driven gear.

5. Install:

- Install the lock washer (A).
- Apply 2~3 teeth sealant to nut (B) :

	Recommended sealant Thread locker sealant
---	--

- Install the balancer driven nut.

6. Tighten:

- Place and copper gasket between the under teeth of the balancer drive gear and balancer driven gear and retain it.
- Tighten the balancer driven nut:

	110Nm(11m.kg.81ft.lb)
---	-----------------------

- Bend the lock washer tabs along the balancer driven gear nut.

7. Install:

- Install the lock washer (a).
- Apply 2~3 teeth sealant to nut(b) :

	Recommended sealant Thread locker sealant
---	--

8. Tighten:

- Place and copper gasket between the under teeth of the balancer drive gear and balancer driven gear and retain it.
- Tighten the bolt:

	22Nm(2.2m.kg.15ft.lb)
---	-----------------------

- Bend the lock washer (a) tabs along the oil pump driven gear nut.

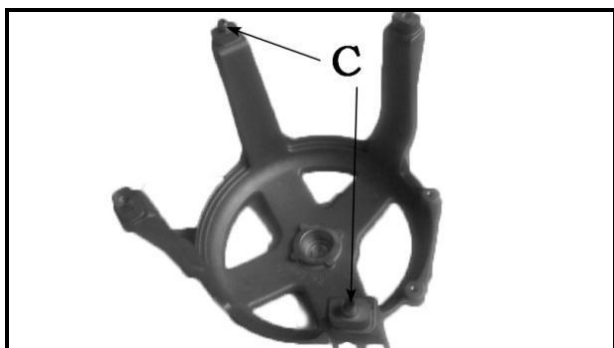


Primary and secondary sheaves

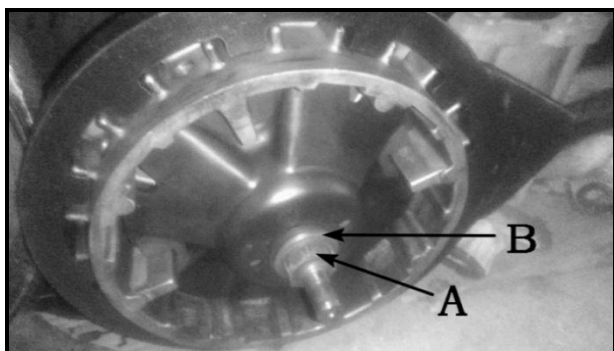
Removing the primary and secondary sheaves

1. Remove:

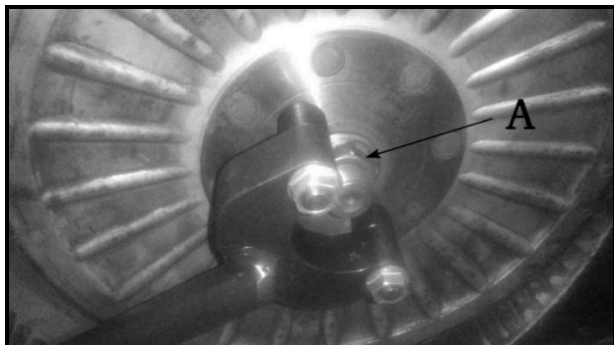
- Remove the right cover.(A)
- Remove the bolts at the position of the CVT holder four feet as shown.
- Remove the CVT holder (B).



- Remove the dowel pins(C) on CVT holder.



- Remove the primary sheave nut(A) and washer(B)

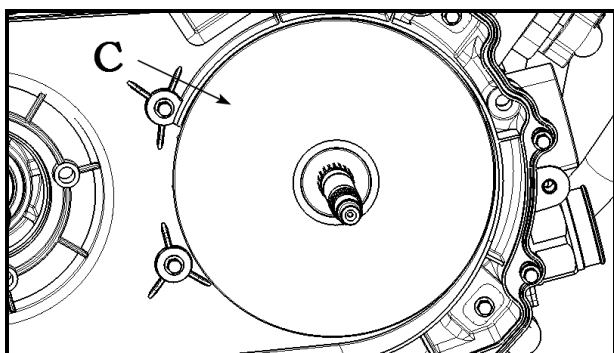


- Remove the secondary sheave nut (A).

TIP: _____
Use the primary sheave holder to hold the primary sheave.



Primary sheave holder
GJ0110196-1



- Use the secondary sheave holder to hold the secondary sheave.

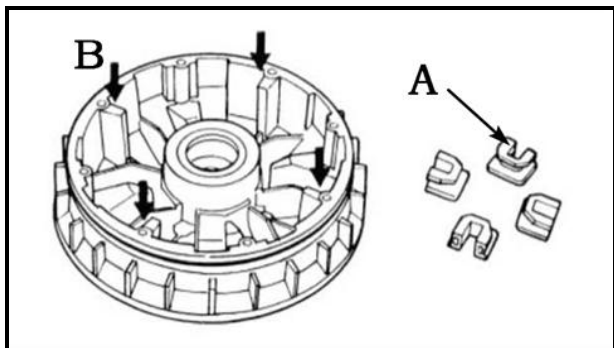


Secondary sheave holder
GJ0110195-1

- Remove the primary sheave assembly.
- Remove the secondary sheave assembly.
- Remove the belt away from the secondary sheave assembly.
- Remove the Primary fixed sheave(C).

Checking the primary sheave assembly

1. Check:
 - Check the primary pulley slider(A)
 - Check the primary sliding sheave splines (B):
Wear/cracks/damage→Replace.
 - Check the primary pulley cam.
Cracks/damage→Replace.
 - Check primary sliding sheave.
Cracks/damage→Replace.
 - Check primary fixed sheave.
Cracks/damage→Replace.



Assembling the primary sheave

1. Clean:
 - Clean and dry primary sliding sheave (A) face.
 - Clean and dry primary fixed sheave (B) face.

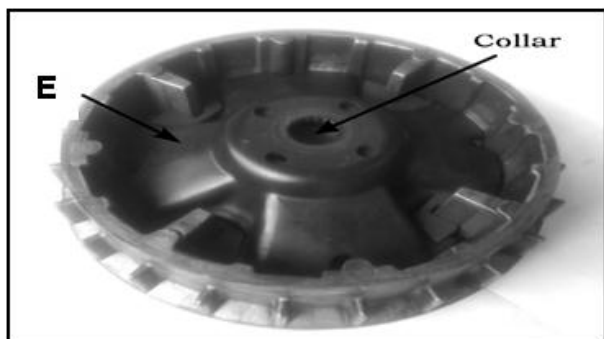
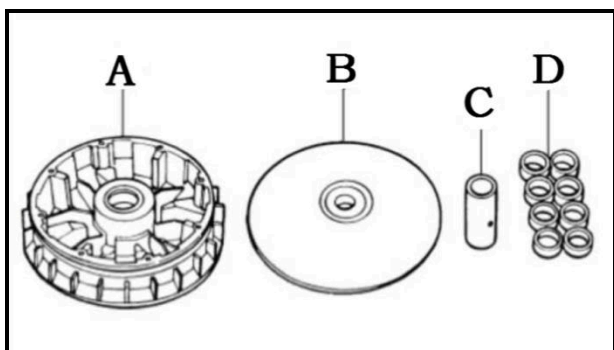
CAUTION:

The faces of primary sliding and fixed sheave cannot attach engine oil.

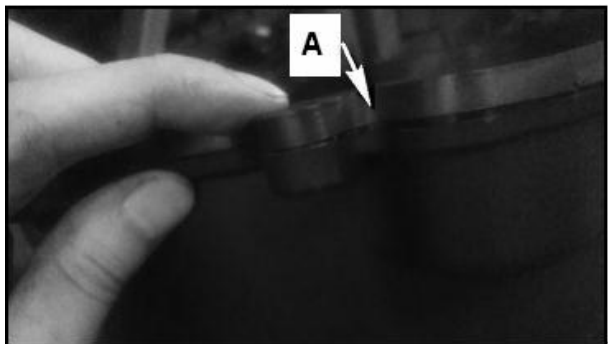
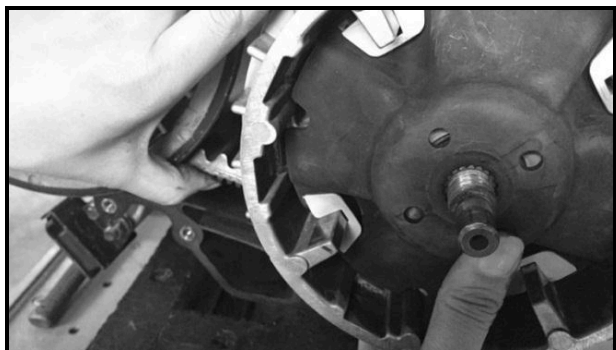
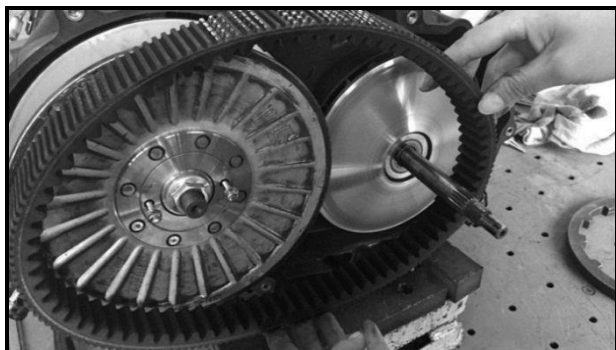
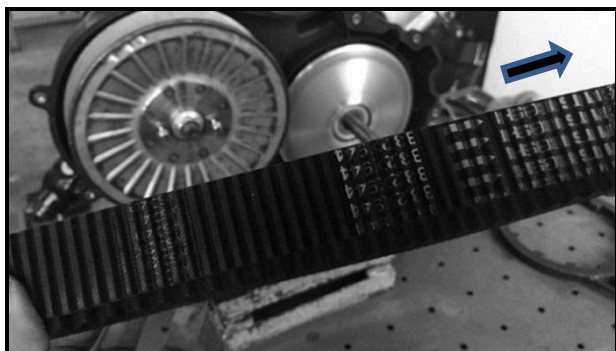
- Clean collar(C)
- Clean Weights(D)
- Clean Primary sliding sheave cam (E) face.

TIP:

Remove any excess grease.



2. Install:
 - Install the parts as shown.



Installing the primary and secondary sheaves

1. Lubricate:

- Lubricate the bore of fixed sheave:

	Recommended sealant Engine oil
--	-----------------------------------

2. Install:

- Install the primary fixed sheave.
- Install the secondary sheave assembly.
- Install the secondary sheave nut.

3. Tighten:

- Use the holder tool to hold secondary sheave assembly.
- Tighten the nut:

	120Nm(12m.kg.87ft.lb)
--	-----------------------

4. Install:

- Screw two M6x35 bolts in the secondary sheave assembly to create the space for installing belt.
- Install the belt with the arrow on belt aligning the direction of engine work as shown.

5. Lubricate:

- Lubricate the spline of the crankshaft.

	Recommended sealant Engine oil
--	-----------------------------------

6. Install:

- Install the primary sheave assembly as shown.
- Check the spline to verify whether install well.

7. Lubricate:

- Lubricate the flange surface of the primary sheave nut.

	Recommended sealant Engine oil
--	-----------------------------------

8. Install:

- Install the nut and washer.

9. Tighten:

- Use the holder to hold primary sheave assembly.
- Tighten the nut:

	100Nm(10m.kg.74ft.lb)
--	-----------------------

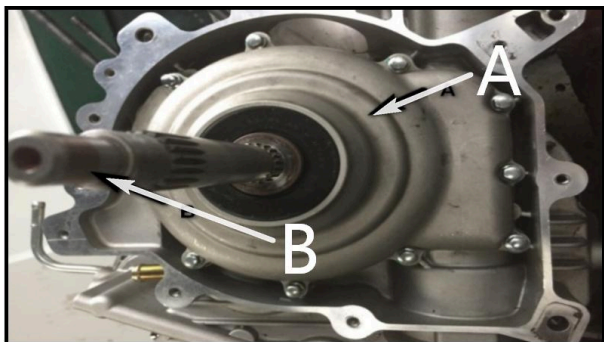
10. Check:

- Loosen the M6x35 bolts on secondary sheave assembly.
- Counterclockwise turn the belt until it is tight as shown.
- Install the dowel pins on the CVT holder.
- Install the CVT holder.
- Tighten the bolts:

	10Nm(1.0m.kg.7ft.lb)
--	----------------------

- Install the right cover with the seal ring (A).
- Tighten the bolts:

	10Nm(1.0m.kg, 7ft.lb)
---	-----------------------



Centrifugal clutch

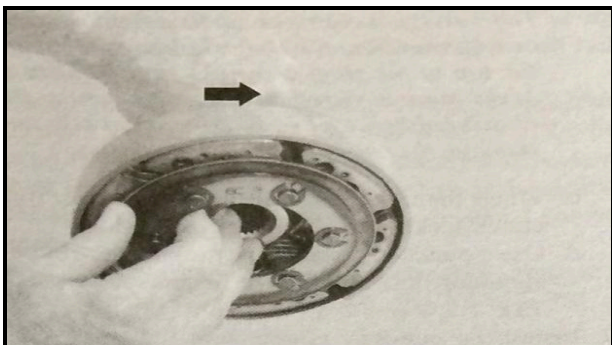
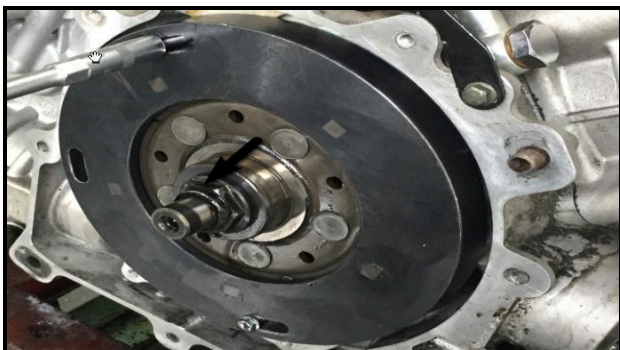
The centrifugal clutch assembly is located in a housing (A) at the end of the crankshaft and transmits housing and a centrifugal shoe assembly that is locked to the crankshaft. As engine speed is raised, the shoe assembly centrifugally expands, engaging with clutch housing. As the engine speed is lowered, the shoe assembly contracts and disengages from the clutch housing. The clutch is also equipped with one-way clutch. Located between the clutch housing and shoe assembly. The one-way clutch provides engine braking when the shoe assembly is disengaged from the clutch housing, as when descending a hill at idle speed.

Removing the clutch

1. Remove:
 - Remove the left crankcase cover as described in this chapter.
2. Check:
 - Check the general condition of the one-way clutch before removing the clutch from the engine. Check the one-way clutch as follows:

- a. Turn the clutch-housingshaft (B) counterclockwise. The shaft should turn freely.
- b. Turn the clutch-housing shaft clockwise. The shaft should lock.
- c. If the one-way clutch fails either test, remove and inspect the one-way clutch as described in this section.

- Drain the engine oil.
- Loosen the clutch housing bolts in several steps in a crossing pattern. Then remove the bolts and clutch housing (A). Remove the two dowel pins.



3. Remove:

- Remove the one-way clutch as shown if it did not come off with the clutch housing.
- Remove the clutch locknut the as follows:

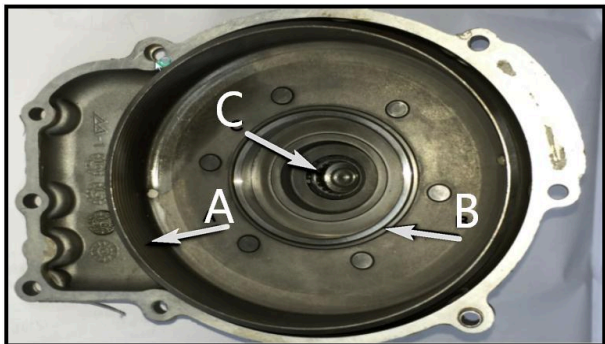
- Turn the crankshaft until the staked portion on the clutch locknut is accessible as shown.
- Carefully grind the staked portion of the clutch locknut with a small grinding stone to weaken it. Do not grind through the nut or the crankshaft will be damaged. Remove the tape from the end of the crankshaft and spray the clutch locknut with electrical contact cleaner.
- Hold the shoe assembly with a clutch-holding tool as shown.
- Turn the clutch locknut clockwise to loosen and remove it. Discard the locknut.
- Remove the clutch-holding tool. (A)

- Remove the shoe assembly (B).
- Remove the gasket from the crankcase. Make sure none of the gasket residue falls into the crankcase.
- Inspect and service the clutch housing, shoe assembly and one-way clutch as described in this section.

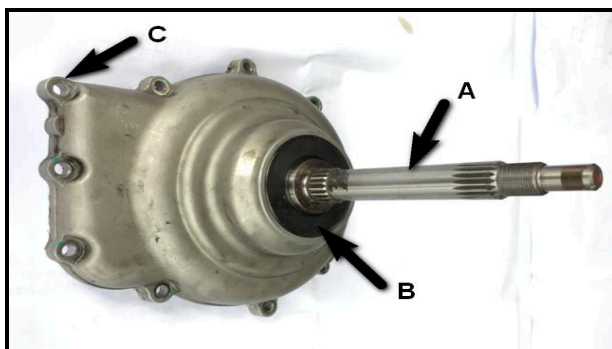
Checking the clutch

1. Check:

- Clean the parts in solvent and dry with compressed air.
- If the one-way clutch is damaged, replace the one-way clutch and clutch housing as a set. Inspect the one-way clutch as follows:



- Inspect the clutch sprigs (**A**) for scoring, wear and heat damage. Make sure the retainer spring (**B**) firmly holds the sprigs in place.
- Make sure each sprig is free to pivot and that all sprigs are resting in the same position.
- Inspect the clutch cage (**C**) for cracks and damage.
- Test the one-way clutch. Install the one-way clutch with the arrow facing away from the shoe assembly as shown. Insert the shoe assembly into the clutch housing. Hold the shoe assembly and turn the housing shaft. The shaft should turn clockwise as shown and lock when turned counterclockwise.

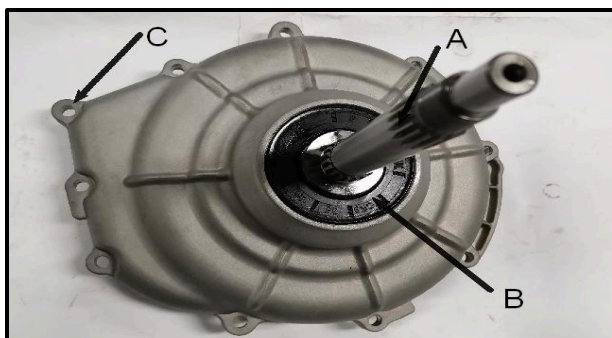


- Inspect the clutch housing and bearing housing:

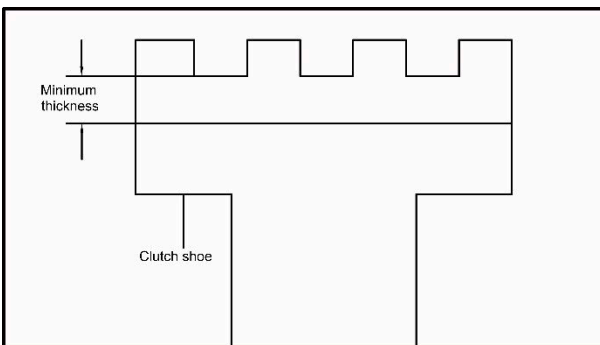
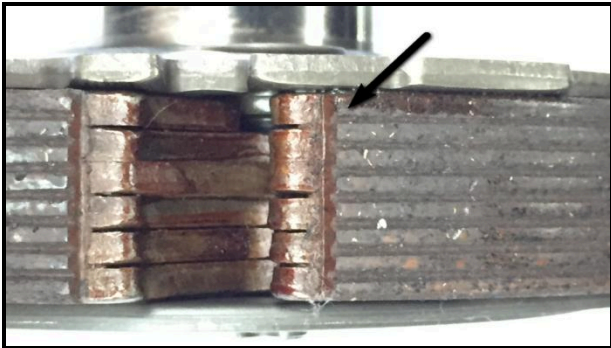
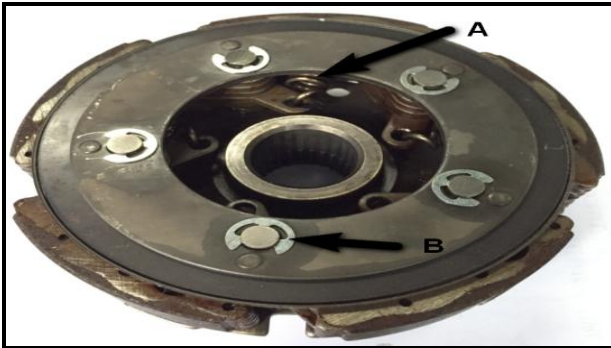
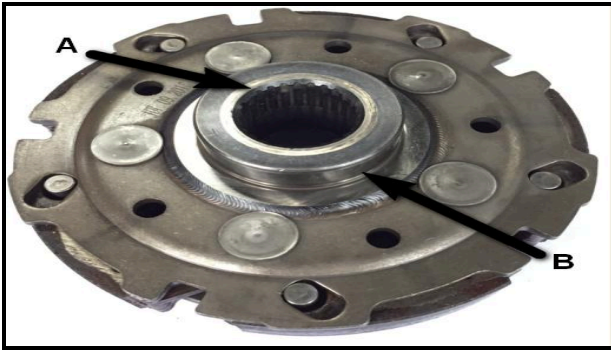
- Inspect the clutch shoe contact area (**A**) for scoring, wear and heat damage.
- Inspect the one-way clutch contact area (**B**) for scoring, wear and heat damage.
- Inspect the needle bearing (**C**). The rollers should be smooth and polished with no flat spots, burrs or other damage. Inspect the bearing cage for cracks or other damage. If damaged, replace the bearing as described in this section.

NOTE:

If the needle bearing is damaged, check the mating end of the crankshaft for damage.



- Check the clutch housing shaft (**A**) for damaged threads and splines.
- Rotate the clutch housing shaft (**A**) and check for smooth operation. If the clutch housing turns roughly, replace the clutch housing bearing as described in this section.
- If the clutch housing oil seal (**B**) is leaking oil or appears damaged, replace it as described in this section.
- Inspect the bearing housing (**C**) for damage.

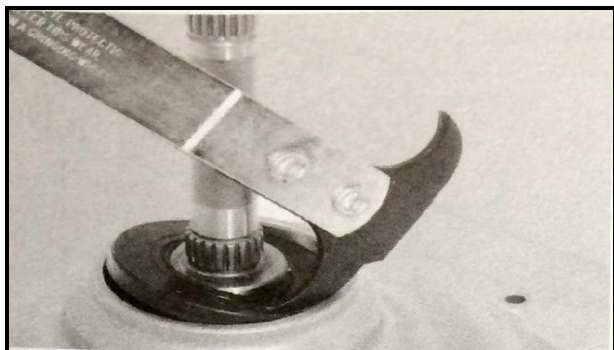
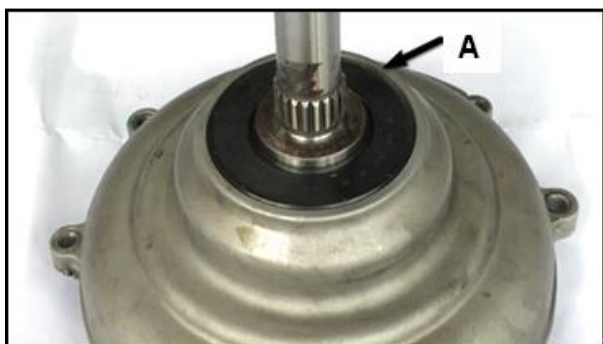


• Inspect the clutch shoe assembly:

a. Inspect the splines (A), guides and one-way clutch contact area (B) for damage.

b. Inspect the springs (A), levers, pivots and E-clips (B). Look for broken or weak springs. Inspect the pivots for tightness and missing E-clips. Make sure all shoes are equally seated. If not, check for worn or jammed levers, pivots and springs.

c. Inspect the shoes as shown for wear, heat damage and contamination. Measure the shoe thickness as shown and compare to specifications in Table 1. Replace the shoe assembly if the shoes are worn to the service limit or when the grooves are no longer visible.



Clutch housing overhaul

1. Remove:
Refer to the explosion view

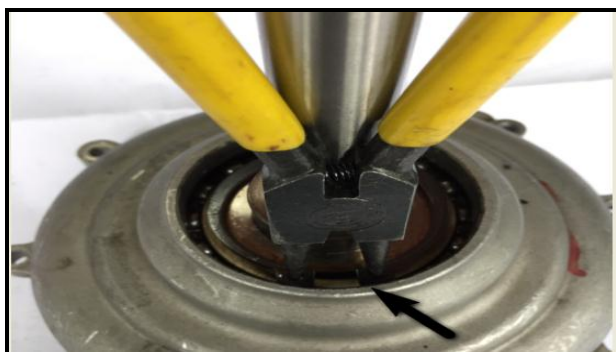
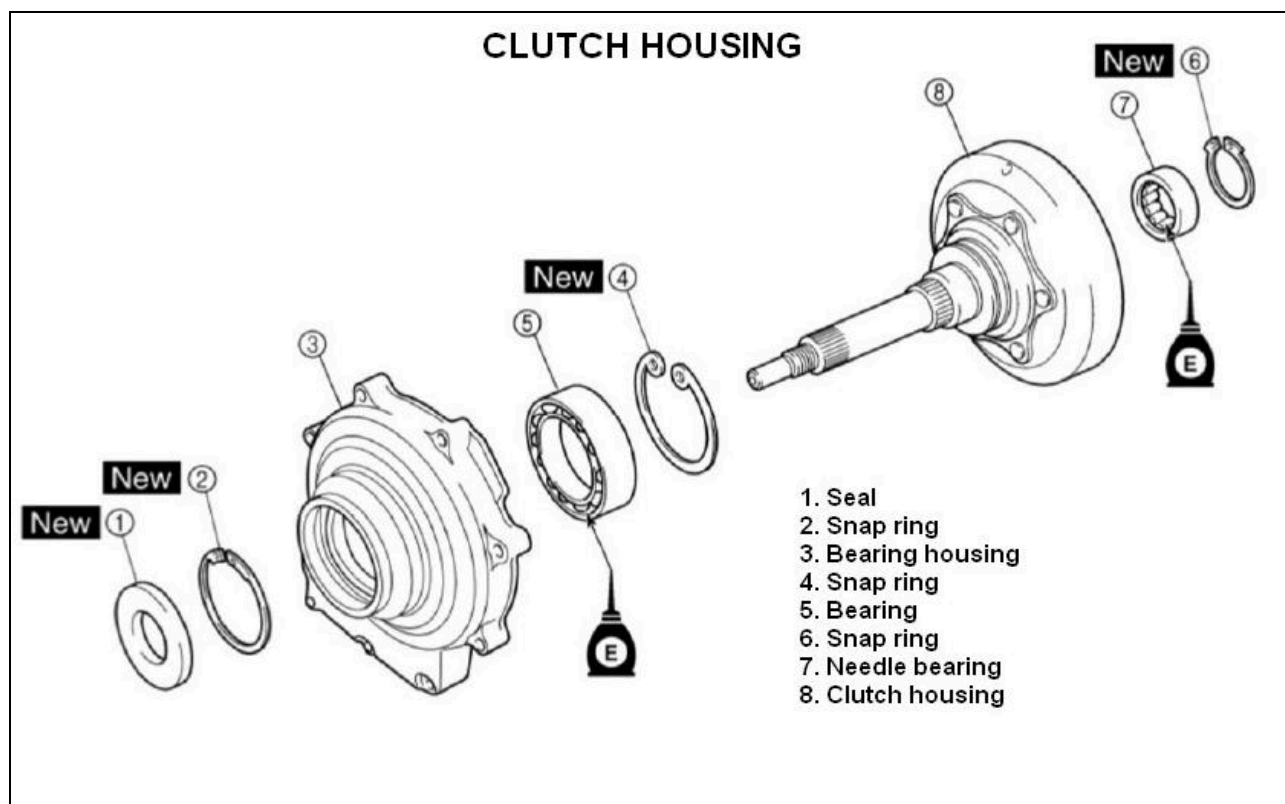
NOTE: _____

The oil seal (**A**) can be replaced without having to remove the clutch housing.

- Carefully drill a 1/8 in. hole through the middle of the oil seal as shown in the left. Then insert a seal puller into the hole and pry the oil seal out of the housing as shown. Check the seal bore for damage.

NOTE: _____

If additional service is not required, install the new seal.

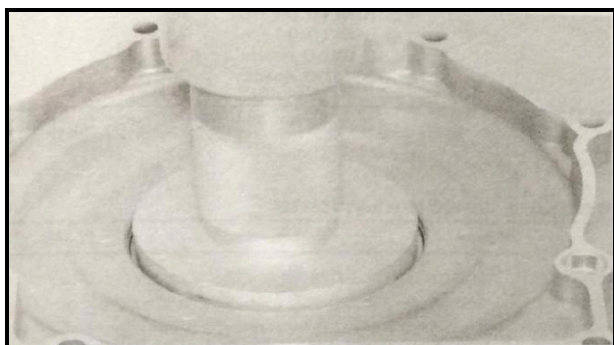
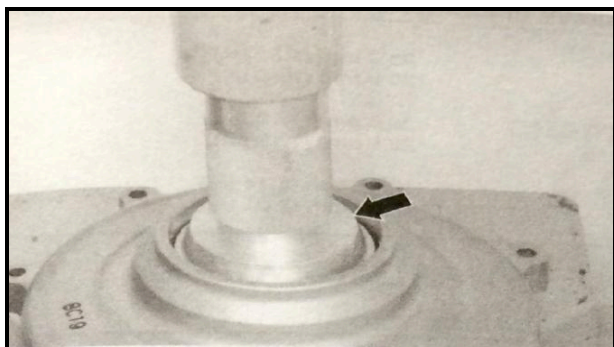
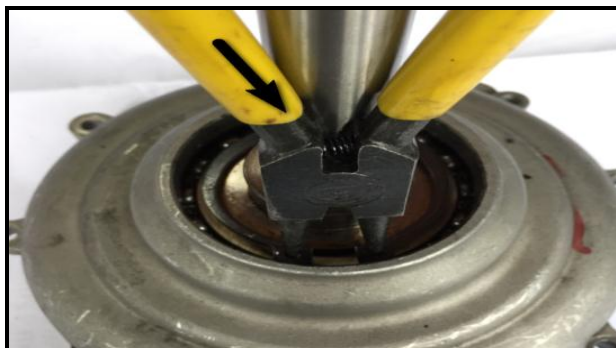
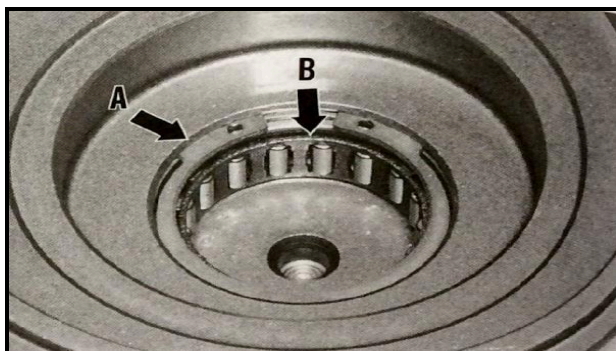


- Remove the snap ring as shown from the groove in the clutch housing and remove the clutch housing (A). Separate the clutch housing (A) from the bearing housing (B).

NOTE:

The Motion pro Blind Bearing and Bushing Remover is used to remove the bearing.



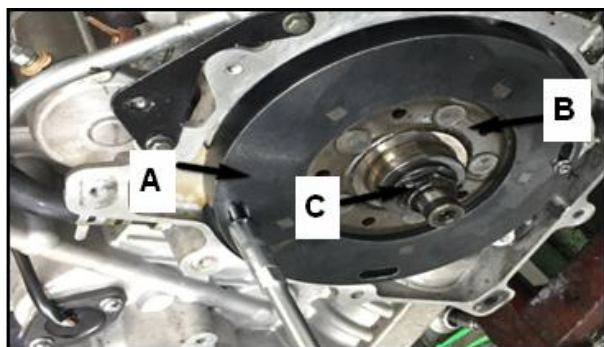
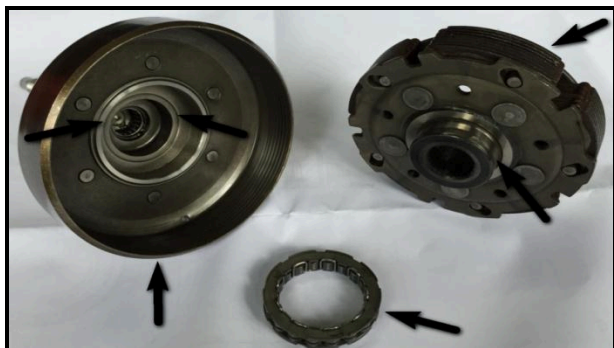
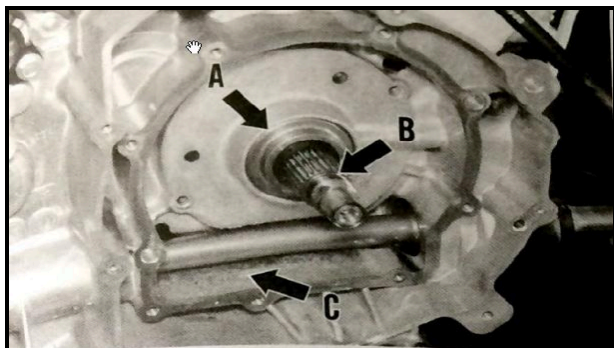
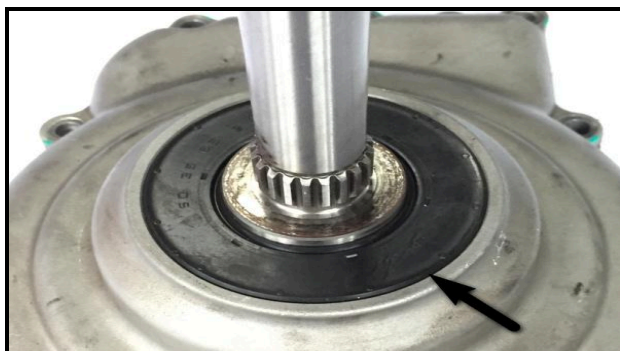


- Replace the needle bearing (7) as follows:

- Remove and discard the snap ring (A).
- Insert a 15mm bearing collet as shown into the needle bearing (B). Expand the collet to lock it against the bearing.
- Support the clutch housing and remove the bearing with the blind bearing remover as shown. Discard the bearing.
- Inspect the bearing bore for scoring, cracks and other damage.
- Align the new bearing with the bearing bore and press or drive the bearing into the bore. Then turn the bearing needles to make sure the bearing was not damaged during installation.
- Install a new snap ring into the clutch housing groove with its flat side facing out. Make sure the snap ring seats in the groove completely.
- Lubricate the bearing needles with engine oil.

- Replace the bearing (4) as follows:

- Remove the snap ring (A) from the groove in the bearing housing (B) and discard it.
- Support the bearing housing in a press and use a bearing friver as shown to remove the bearing.
- Inspect the bearing bore for damage.
- Align the new bearing with the bearing bore and press as shown or drive the bearing into the bore. Then turn the bearing inner race to make sure the bearing was not damaged during installation.
- Install a new snap ring into the bearing groove with its flat side facing out. Make sure the snap ring seats in the groove completely.
- Lubricate the bearing with engine oil.
- Turn the clutch housing to make sure the seal lip as shown seats evenly around the clutch housing shoulder.



Installing the clutch

1. Clean:

- Make sure the crankcase and clutch housing gasket surfaces are clean.
- Make sure the spacer (A) is seated against the crankshaft main bearing.
- Clean the exposed end of the crankshaft (B) and allow to dry.

CAUTION:

Make sure there is no debris remaining in the crankcase/clutch housing area (C) that could fall into the crankcase.

- Lubricate the clutch housing, clutch housing bearing, one-way clutch and shoe assembly areas identified with engine oil as shown.

NOTE:

If installing a new shoe assembly, soak the new shoe surfaces with engine oil.

2. Install:

- Install the shoe assembly (A) over the crankshaft with the one-way clutch shoulder (B) facing out.
- Install and tighten the clutch locknut (C) as follows:

**NOTE:**

The clutch locknut uses left-hand threads.

- Lubricate the crankshaft threads and the threads and seating surfaces on a new clutch locknut with molybdenum disulfide oil. Turn the clutch locknut counterclockwise to install it on the crankshaft and tighten finger-tight.
- Hold the shoe assembly with a clutch-holding tool.
- Crack the top edge of the nut to the crankshaft to prevent the nut from exiting as shown.

 160Nm (16m.kg, 118ft.lb)

CAUTION:

The area between the shoe assembly and crankcase where the clutch-holding tool grips the top of the shoe assembly is very narrow. Make sure to carefully lock and secure the clutch-holding tool so that it cannot slip and damage the shoe surface or crankcase.



- Install the one-way clutch with the arrow facing away from the shoe assembly. Refer to the left.
- Install the two dowel pins and a new gasket.
- Install the clutch housing, making sure to engage it with the dowel pins.
- Install the two longer mounting bolts through the dowel pins holes, then install the remaining bolts and tighten finger-tight.
- Tighten the clutch housing mounting bolts in a crossing pattern to 10 ± 2 N.m.

 10Nm (1.0m.kg, 7ft.lb)

Check the one-way clutch for proper operation:

- Turn the clutch-housing shaft counterclockwise. The shaft should turn freely.
- Turn the clutch-housing shaft clockwise. The shaft should lock.
- If the one-way clutch fails either test, it is either damaged or installed incorrectly. Remove and inspect the one-way clutch as described in this section.

Refill the engine with the correct type and quantity oil (Chapter 3).

Install the left crankcase cover as described in this chapter.

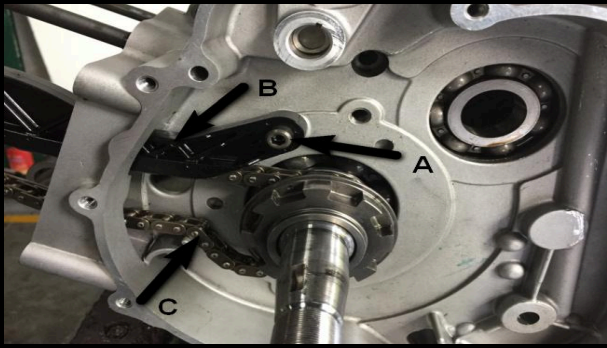
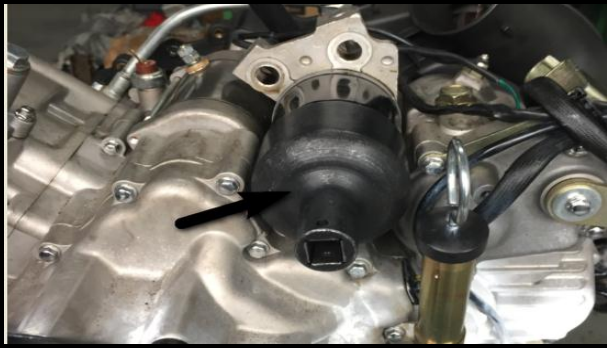
Table 1 CLUTCH SPECIFICATIONS

Type	Wet, centrifugal automatic
Clutch shoe thickness	
New	1.5mm (0.06in.)
Service limit	1.0mm (0.04in.)
Clutch-in revolution	1800-2200 rpm
Clutch-stall revolution	3400-3800 rpm

Crankcase

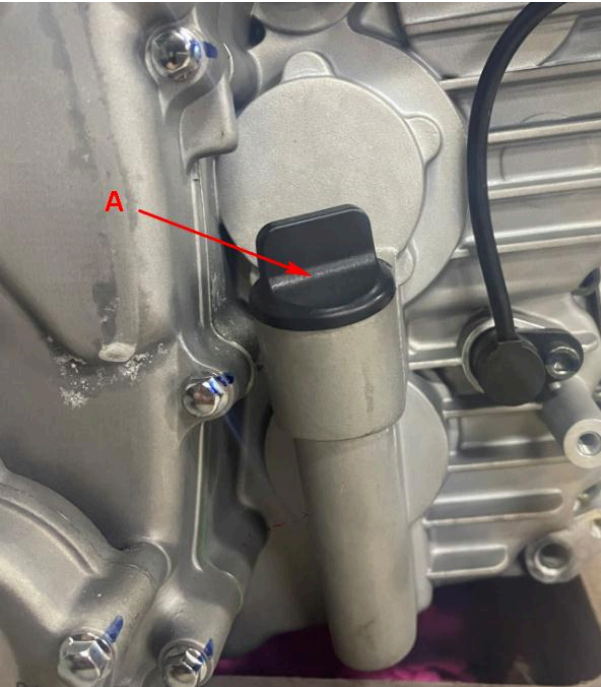
Removing oil filter and timing chain

Removing the oil filter with the tool as shown.



• Removing the timing chain as follows:

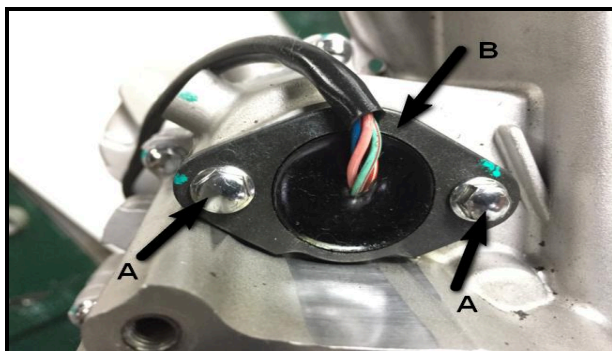
- a. Remove the rear timing chain guide mounting bolts (A) and the guide (B).
- b. Remove the timing chain (C).



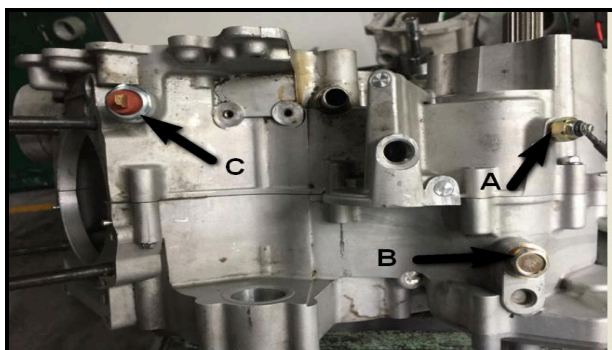
Removing the crankcase

1. Remove:

- Remove the oil lever (A).



- Remove the gear position switch mounting bolts (A), Switch (B) and O-ring.



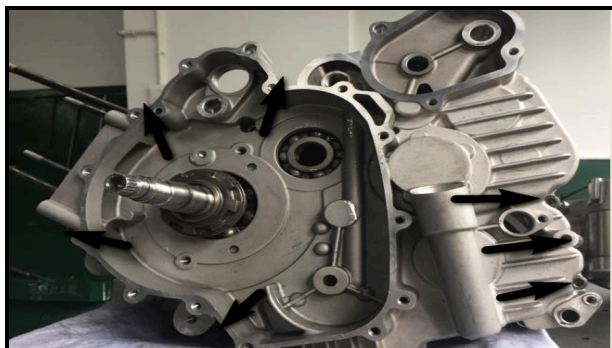
- Remove the reverse switch (A) and its gasket.
- Remove the bolt and washer (B) and the shift drum detent assembly. Refer to the left.

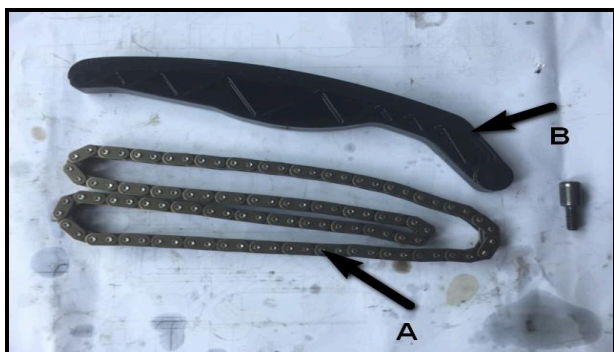
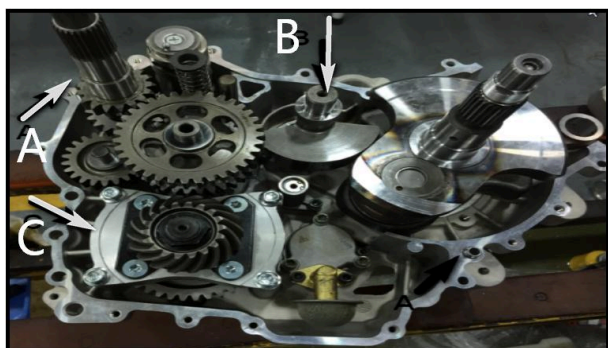
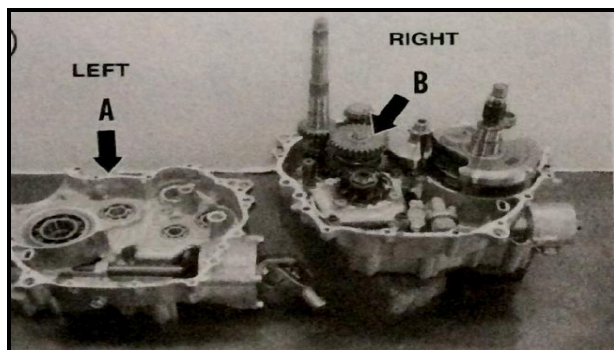
NOTE:

The plug bolt (C) does not require removal unless loose or its gasket is leaking.



- Loosen the left and right crankcase bolts as shown in the left. Loosen each bolt one-fourth turn, working in a crossing pattern. Remove all bolts from the left crankcase.
- Place the engine on wooden blocks with the left crankcase facing up. Remove the bolts from the left crankcase. The crankshaft, balancer shaft and transmission components will remain in the right crankcase half. The crankshaft is a press fit and will be removed after the other components.
- Separate and remove the left crankcase as follows:





CAUTION:

Do not hammer or pry on areas of the engine cases that are not reinforced. Do not pry on gasket surfaces. If the left crankcase is tight, check for an installed crankcase mounting bolt or seized shaft.

- a. Begin tapping upward on the left the crankcase to break the sealer bond.
- b. Because the input shaft is supported by two bearings in left case half, the shaft can bind as the left crankcase is being removed. Tap the shaft to free it and case left crank case removal.
- c. Two dowel pins are used for case half alignment and can bind crankcase separation if corroded. These are found at the front and rear of the engine.
- d. Make sure the left crankcase remains parallel with the right crankcase during its removal as shown in the left.
- e. Remove the left crankcase (A). Account for the washer (B) installed on the output shaft and reinstall in onto the shaft, if necessary.

- Remove the two dowel pins (A).
- Remove the balancer shaft (B).

Checking the timing chain and guides

1. Check:
 - Check the timing chain (A) for wear and damage. Check for excessive play between the links, indicating worn rollers and pins. If chain replacement is necessary, also inspect the crankshaft drive sprocket and camshaft driven sprocket.
 - Check the guides (B) for excessive wear, cuts or other damage. Replace both front and rear guides as a set.



Checking the oil pressure relief valve

1. Check:

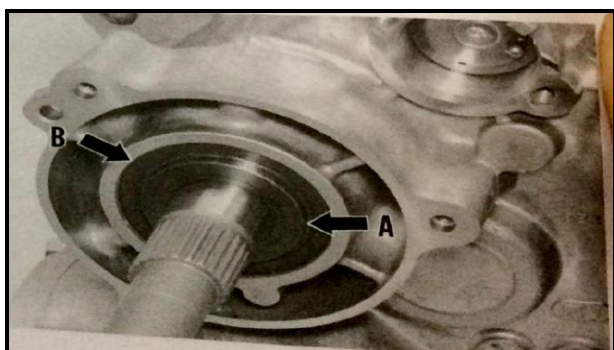
- Check the oil pressure relief valve as shown as follows:

- a. Spring seat, spring, and plunger valve.
- b. Clean and dry the parts. Do not scratch the plunger valve or valve bore.
- c. Check the spring for cracks and unevenly spaced spring coils. Do not attempt to stretch or repair the spring as this will change the relief valve pressure setting and possibly if the spring appears damaged, stretched or worn.
- d. Check the valve and the valve body bore surfaces for cracks, scoring and other damage. The valve must slide through the bore smoothly
- e. With no roughness or binding. Replace the valve assembly if the surfaces show wear or damage.
- f. If the valve assembly does not show any wear or damage, lubricate the valve and bore with new engine oil. Then install the valve with its open side facing the spring. Then install the spring, spring seat and secure with a new cotter pin that is that same size as the original. Bend the cotter pin arms over to lock it.

CAUTION:

Make sure to use a new cotter pin and to lock it carefully. If the cotter pin should fail and allow the spring and plunger valve to release from the valve. The engine may seize from a lack of oil pressure.

- g. Lubricate a new O-ring with lithium grease and install it onto the valve groove.



Checking the crankcase and bearings

1. Check:

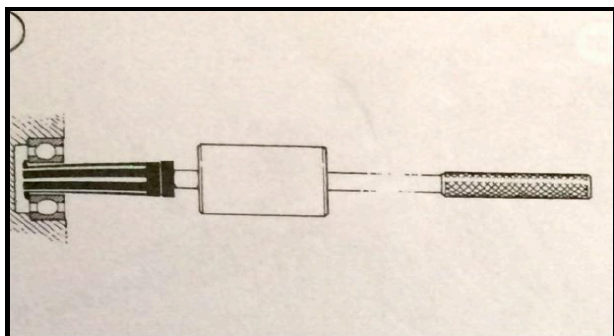
- Remove all sealer residue from the gasket surfaces with solvent and a scraper. Remove sealer residue (A) from the threaded holes in both case halves with a small brush.
- Temporarily rinse the cases in solvent to remove the sealer residue. Recheck the gasket surfaces and reclaim if necessary.
- Remove and discard the input shaft seal (B) as shown, lubricate a new seal with grease and install it into the input shaft hole.
- When the gasket surfaces are clean, clean the crankcase halves with solvent. Thoroughly flush, the oil passage bores with solvent.

- Check the crankcases for fractures around all mounting and bearing bosses, stiffening ribs and threaded holes. If repair is required, refer inspection to a dealership.
- Using clean solvent, flush each bearing.
- Inspect all threaded holes for damage or debris buildup. Clean threads with the correct size metric tap. Lubricate the tap with kerosene or aluminum tap fluid. Clean all debris from the threads. Rinse again with solvent.
- Dry the crankcase halves with compressed air. Blow through all oil passages and oil holes.

NOTE:

When drying a bearing with compressed air, do not allow the inner bearing race to spin. The air can spin the bearing at excessive speed, possibly damaging the bearing.

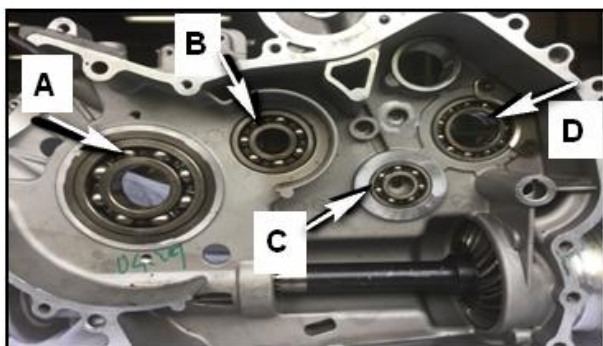
- Lightly oil the engine bearings with new engine oil before inspecting their condition. A dry bearing will exhibit more sound and looseness than a properly lubricated bearing.
- Check the bearings for roughness, pitting, galling and play. Replace any bearing that is not good condition. Always replace the opposite bearing at the same time.
- When replacing crankcase bearings, note the following:



- The input shaft bearings installed in the left crankcase are secured with a bearing retainer as shown in the left. After removing the bolts, remove all thread locking compound residue from the bolt and case half threads. Apply a medium-strength thread locking compound to the bolt threads and tighten to 10N.m.

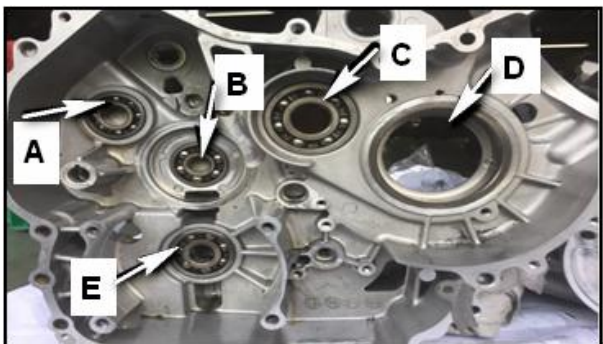
	10Nm(1.0m.kg.7ft.lb)
---	----------------------

- Identify and record the size code of each bearing before it is removed from the crankcase. This will eliminate confusion when installing the new bearings.
- Record the orientation of each bearing in its bore. Note if the size code faces toward the inside or outside of the case half.
- Heat the crankcase area around the bearing or bearing bore to approximately 160°C before
- Removing and installing the bearing.
- Remove bearings that are only accessibly from one side with a blind bearing puller as shown. The puller is fitted through the bearing, then expanded to grip the back-side of the bearing.



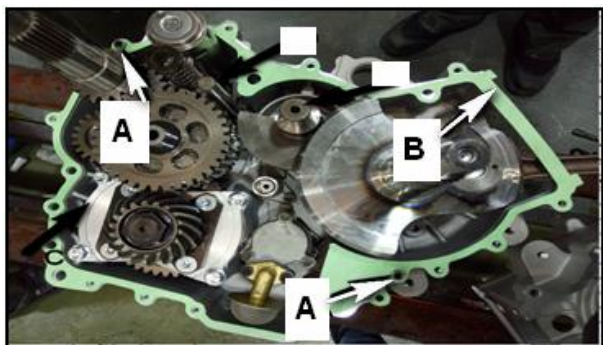
The right crankcase half houses the following bearings:

- a. Crankcase bearing insert (A).
- b. Balancer shaft bearing (B).
- c. Input shaft bearing (C).
- d. Output shaft bearing (D).



The left crankcase half houses the following bearings:

- a. Input shaft bearing (A).
- b. Output shaft bearing (B).
- c. Balancer shaft bearing (C).
- d. Main bearing (D).
- e. Middle drive shaft bearing (E).



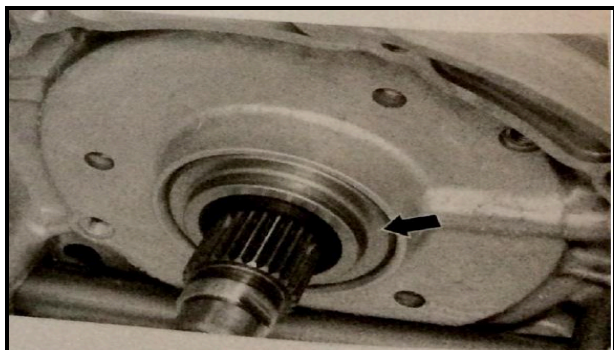
Assembling the crankcase

1. Install:

- Install the two dowel pins (A) in the right crankcase.
- Install the sealing paper pad (B).
- Position the connecting rod at TDC so it does not interfere with crankcase installation.
- Install the left crankcase squarely onto the right crankcase. The crankcase may go all the way down by hand pressure. However, if necessary tap the case with a soft-faced mallet while making sure the dowel pins engage the mating holes. Continue until the left crankcase seats on the right crankcase. The gasket surfaces must be flush all the way around the case halves. Now make sure all shafts rotate freely, there must be no binding.

CAUTION:

If the crankcase halves do not fit together completely, do not pull them together with the crankcase bolts. Separate the crankcase halves and investigate the cause of the interference. If the output shaft was disassembled, make sure a gear was not installed backward. Do not risk damage by trying to force the crankcase together.



- Install the crankcase bolts as follows:

NOTE:

Make sure the crankcase-mounting bolt and crankshaft threads are clean and dry.

- Use the cardboard templates made during disassembly to identify the crankcase bolts.
- Install the left crankcase bolts finger tight as shown in the left.
- Turn the engine over so the right side face up.
- Install the right crankcase bolts finger tight as shown in the left.

2. Tighten:

- Tighten the crankcase bolts as follows:

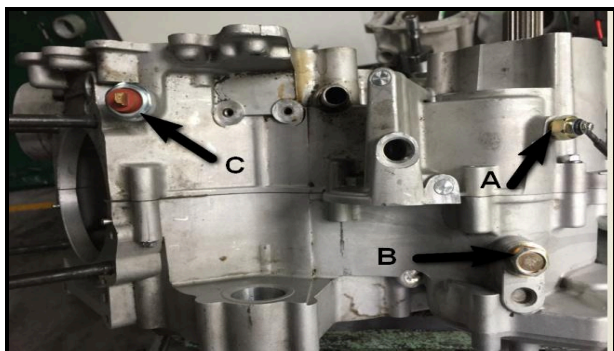
- Tighten all of the right and left crankcase 6-mm bolts in a crossing pattern to 8-12Nm.

	10Nm(1.0m.kg.7ft.lb)
---	----------------------

- Tighten the right crankcase 8-mm crankcase bolts to 28-32Nm.

	30Nm(3.0m.kg.22ft.lb)
---	-----------------------

- Make sure the input shaft collar and spacer/crank seal assembly as shown is properly seated in the left crankcase.



- If removed, install the plug bolt (C) and a new washer and tighten to 18N.m.

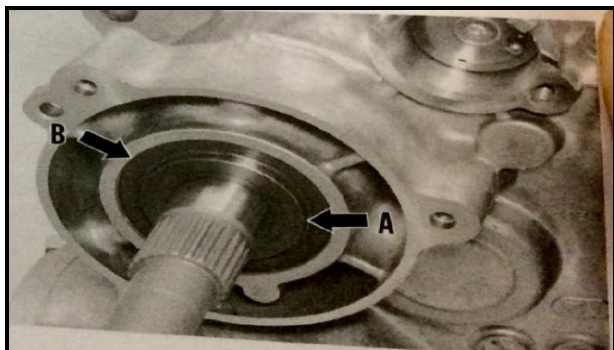
 18Nm(1.8m.kg.13ft.lb)

- Install the shift drum detent assembly in the order. Install a new washer and tight the shift drum detent bolt (B) to 18N.m.

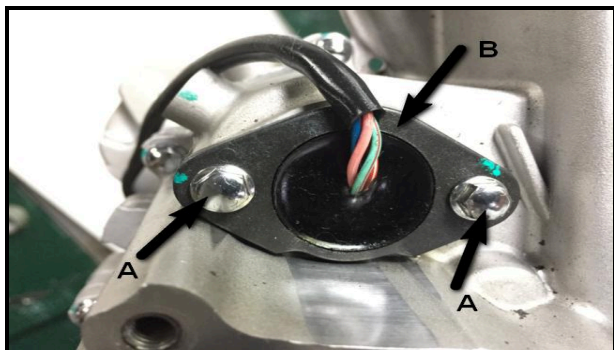
 18Nm(1.8m.kg.13ft.lb)

- Install the reverse switch (A) with a new washer and tighten to 17N.m.

 17Nm(1.7m.kg.12ft.lb)

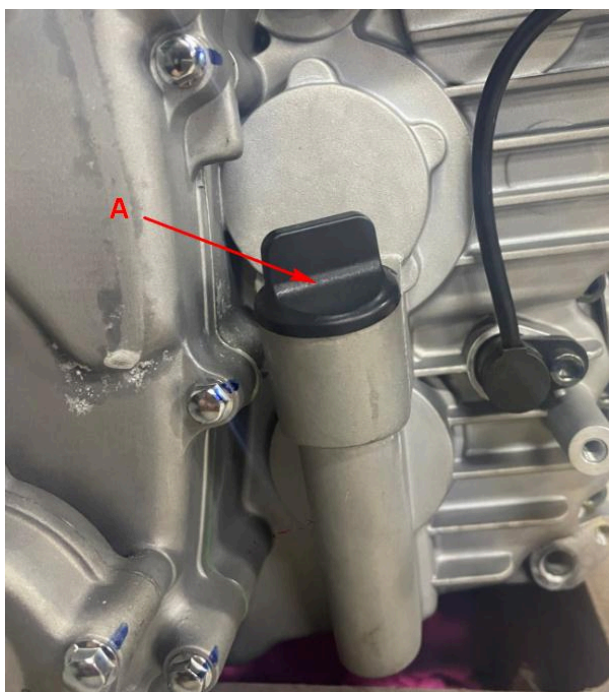


- Install sealer residue (A).
- Install the input shaft seal (B) as shown, lubricate a new seal with grease and install it into the input shaft hole.

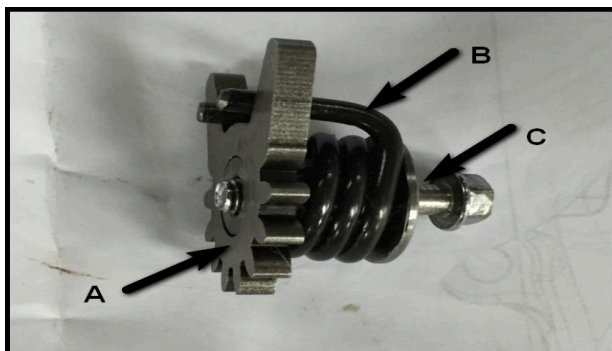


- Lubricate a new O-ring with grease and install it on the gear position switch. Install the switch with its notched side facing up (B) and tighten the mounting bolts (A) to 8-12N.m.

 10Nm(1.0m.kg.7ft.lb)



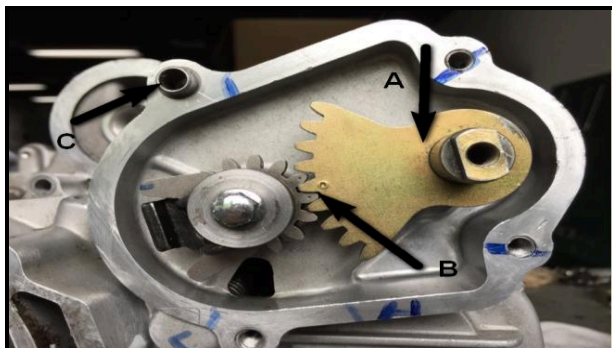
- Lubricate a new O-ring with grease and install it on the oil lever. Install the oil lever (A).
- Perform shifting check in this chapter.



Install the shift lever

1. Install:

- Install the drum fan gear (A), torsion spring (B), washer combination (C) onto the drum, then pre-loaded 2-3 teeth with the 6-mm bolt and the washer onto the drum.

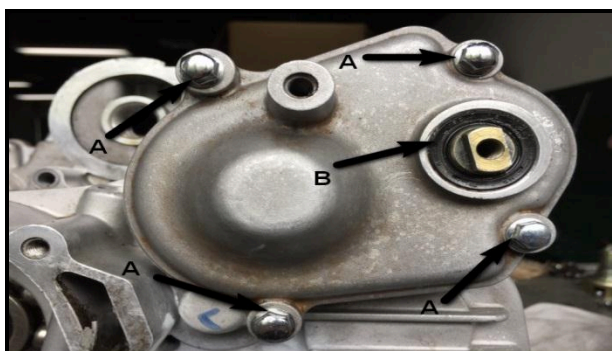


- Install the shift shaft assembly (A) onto crankcase hole.

NOTE:

Make sure the drum fan gear point correspond to the shift shaft assembly point. Refer to (B).

- Install the two dowel pins (C) in crankcase.
- Lubricate a new ring with grease and install it in the inner shifting device cover groove as shown.



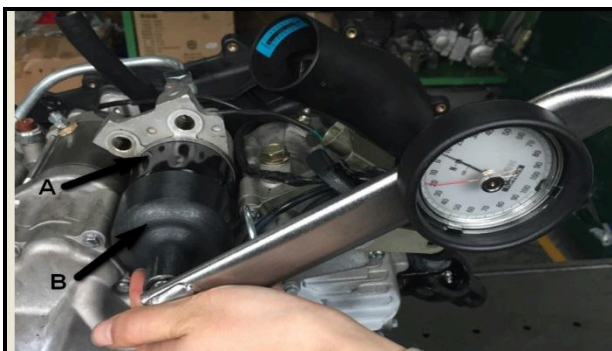
- Install the shifting device cover bolts (A).
- Slide the seal over the shift shaft and tap it into the shifting device cover with the flat side facing out. Install the seal until its out edge is equal the seal bore edge. Refer to (B).

Install oil filter

1. Install:

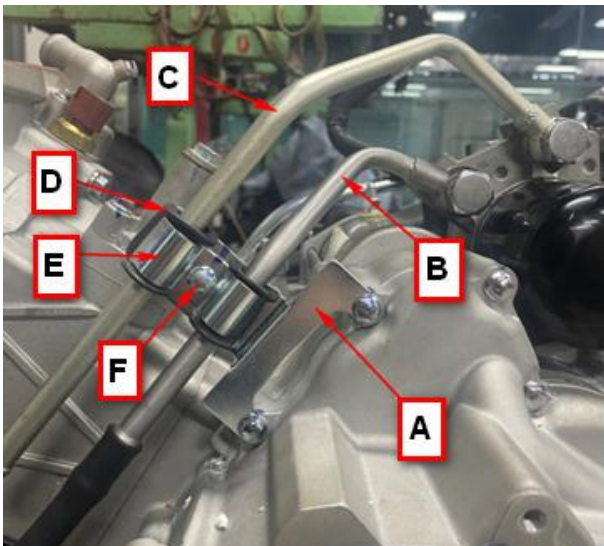
- Install the oil filter (A) with the tool (B) and tighten to 17N.m.

	17Nm(1.7m.kg.12ft.lb)
---	-----------------------



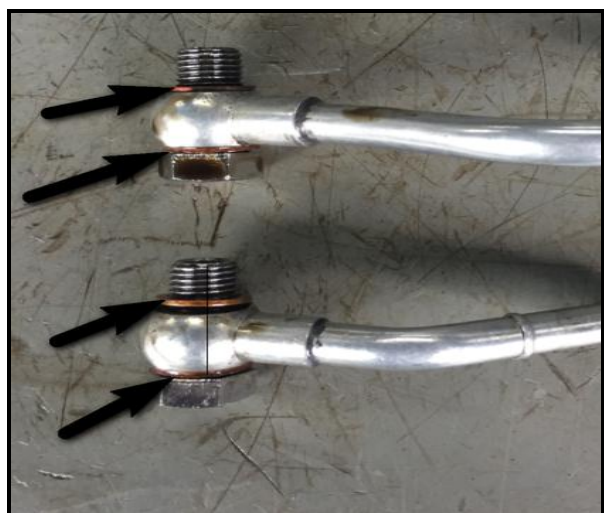
- Install the support, oil hose (A)
- Install the inlet oil pipe (B) and outlet oil pipe (C)
- Install the I-rubber (D)
- Install the clamp, middle fixing double tube (E)
- Install the bolt (F) and tighten to 8~12 N.m.

	10Nm(1.0m.kg.7ft.lb)
---	----------------------



- Tighten the inlet oil pipe (B) and outlet oil pipe (C) to 28±4 N.m.

	28Nm(2.8m.kg.21ft.lb)
---	-----------------------



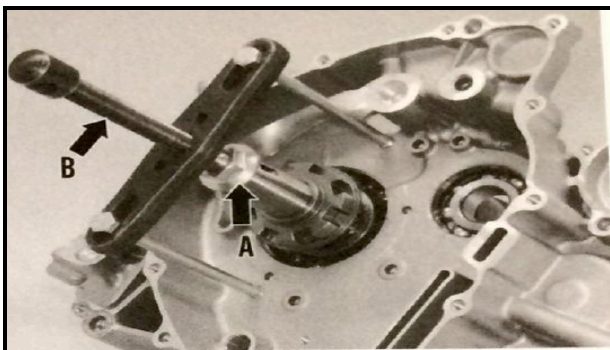
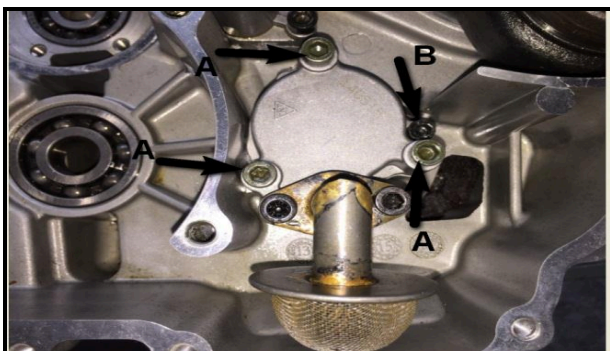
NOTE:

Make sure all the copper washers are clean as shown; replace the new washers if necessary.

Crankshaft and oil pump

Oil pump

The oil pump is chain-driven by the balancer shaft. The oil pump shaft not only operates the rotors in the oil pump, but also drives the water pump. The tang at the exposed end of the oil pump shaft engages with the back of the water pump. If the oil pump is badly worn, it cannot maintain oil pressure.



Removing the oil pump

1. Remove:
 - Removing the three mounting bolts (**A**), the oil pump, and its gasket. Do not loosen the Phillips screw (**B**) unless the pump will be disassembled.

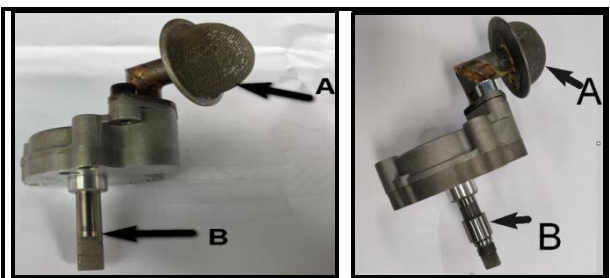
Removing the crankshaft

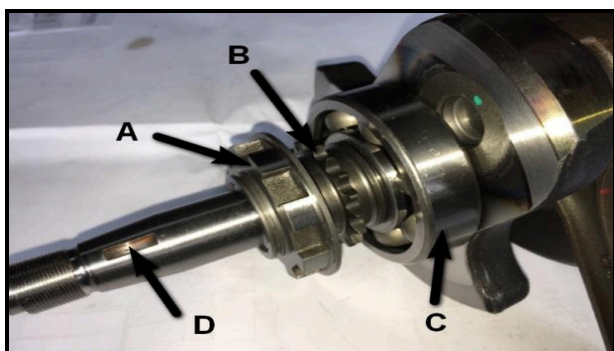
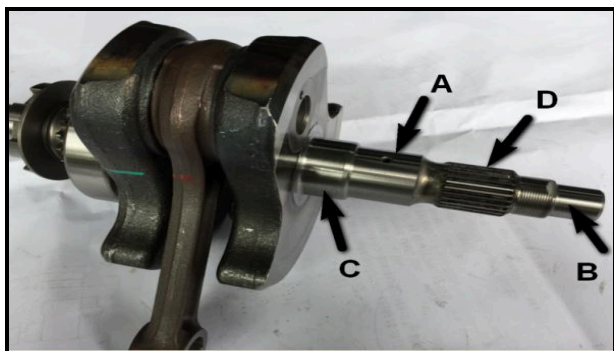
1. Remove:
 - Remove the crankshaft as follows:

- a. Install the flywheel nut (**A**) onto the end of the flywheel.
 - b. Attach the crankshaft-separating tool (**B**) to the right crankcase. Thread the bolts fully into the crankcase.
 - c. Lubricate the separating tool center bolt and crankshaft and with grease.
 - d. Set the crankcase upright. Then while holding the crankshaft, tighten the center bolt to push the crankshaft and its main bearing out of the crankcase.

Checking the oil pump

1. Check:
 - Check the pump screen (**A**) for sealer and other debris. Carefully clean by picking the material off the screen, making sure not to damage or penetrate the screen. If the screen is clogged, disassemble the pump as described in this section and back flush the screen with solvent.
 - Turn the oil pump shaft (**B**) to check rotor operation. If the rotors turn roughly or if there is binding, replace the oil pump assembly.
 - Clean and dry all parts.
 - Inspect the housing cover and housing for cracks and other damage.
 - Check the rotors and bore surfaces for scoring and other damage.
 - Inspect the pump screen for damage.
 - Inspect the shaft and drive pin for cracks or other damage.
 - Install the rotors into the housing and facing in their original direction.
 - Measure the axial clearance between the rotors and pump housing with a straightedge and flat feeler gauge as shown.





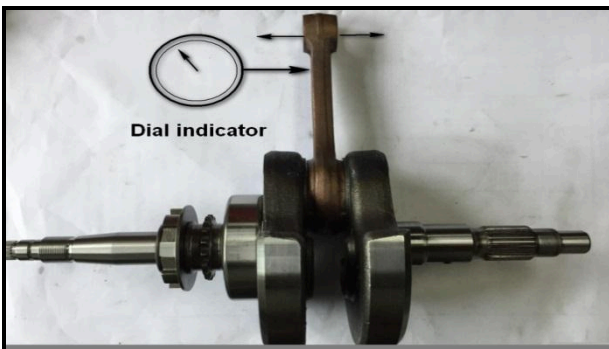
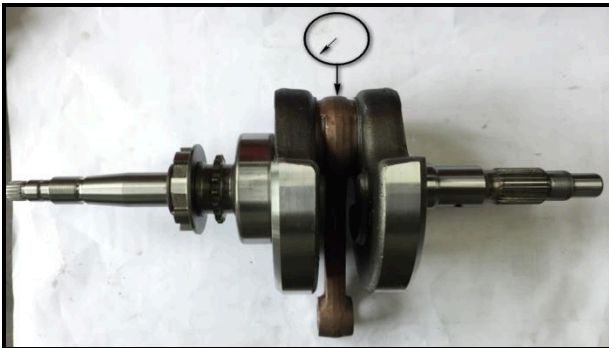
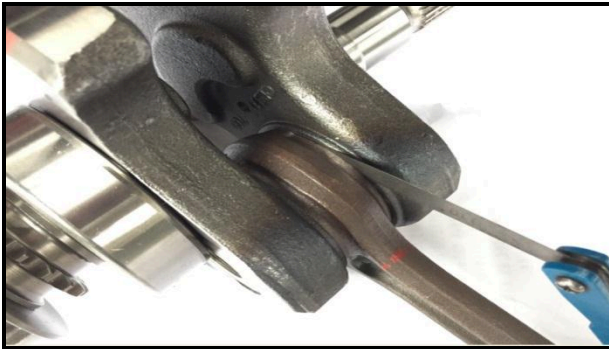
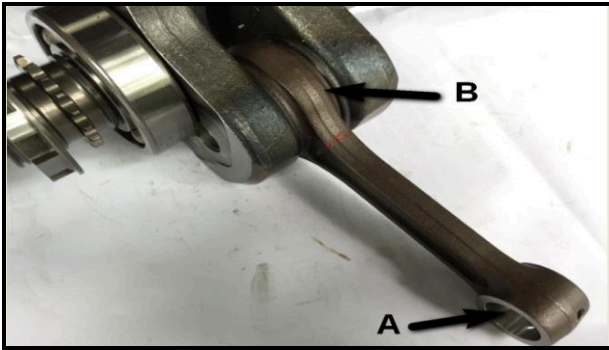
- Install the drive pin into the shaft, install the shaft, and pin into the inner rotor. Turn the inner rotor until one of its tips aligns directly with a ramp on the outer rotor. Then measure the tip clearance between the inner and outer rotor with a flat feeler gauge as shown. Turn the inner rotor and measure the clearance at each tip position.
- Measure the side clearance between the outer rotor and housing bore with a flat feeler gauge as shown. Measure at different locations around the bore and outer rotor.

Checking the crankshaft

1. Check:

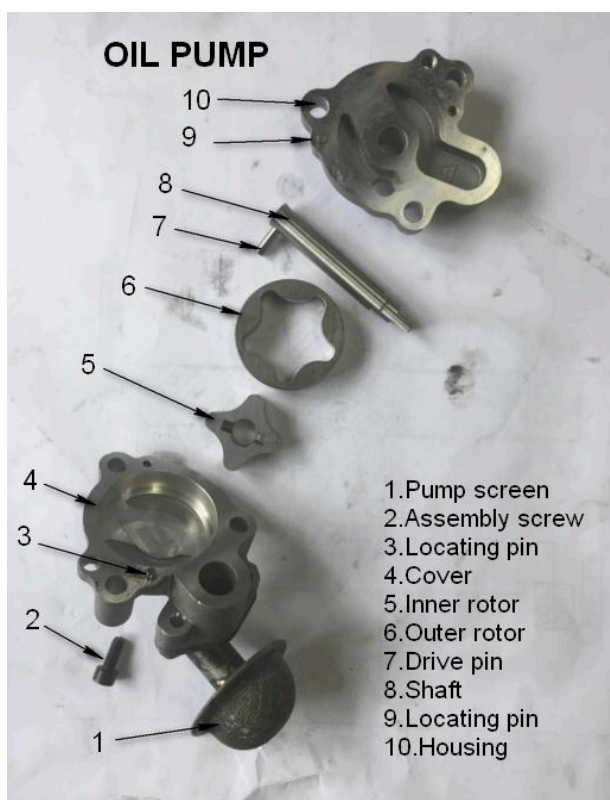
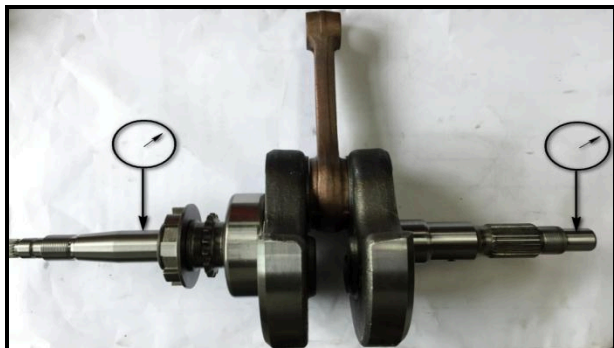
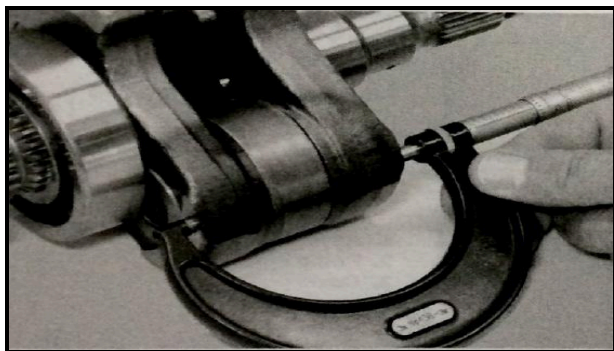
- Clean the crankshaft with solvent while thoroughly flushing its oil passages (A and B).
- Dry the crankshaft and oil passages with compressed air.
- Inspect the crankshaft bearing surfaces (C) for scoring, heat discoloration or other damage. Repair minor damage with 320-grit carborundum cloth. If the bearing surfaces show damage, check the mating inner bearing races and the splines (D) for damage.
- Inspect the buffer boss (A), sprocket (B), bearing (C) shaft taper and keyway (D) for wear or damage. Note the following:

- If the splines are damaged, check the clutch carrier splines for damage.
- If the buffer boss is damaged, inspect the balancer drive gear, springs and pins as described in this chapter.
- If the sprocket is damaged, check the cam chain, upper cam sprocket, chain guides and cam chain tensioner for damage.
- If the bearing is damaged, either replace or rebuild the crankshaft by replacing its right crank wheel assembly.
- If the shaft taper or keyway is damaged, check the flywheel taper and keyway for damage.



- Inspect the connecting rod small end (A) as described in Piston and Piston Rings.
- Refer to Table 1 and inspect the connecting rod big (B) as follows:

- a. Hold the crankshaft and turn the rod by hand. If there is any roughness or grinding, the bottom rod end bearing and connecting rod has suffered some type of damage. Refer further inspection to a dealership.
- b. Slide the connecting rod to one side and measure the connecting rod side clearance with a flat feeler gauge as shown.
- c. Support the crankshaft on a set of V-blocks and position the pointer of a dial indicator in the middle of the connecting rod lower end as shown. Hold the crankshaft securely and then move the connecting rod as shown to measure the big end radial clearance.
- d. Support the crankshaft and measure the small end free play as shown in the left.



- Measure the crankshaft width along its machined surfaces as shown. If the width is out of specification (Table 1), have a dealership inspect and possibly true the crankshaft.

CAUTION:

Do not place the crankshaft between centers to measure run out. Doing so may damage the oil plug in the right end of the crankshaft.

- Place the crankshaft on a set of V-blocks at the points indicated as shown. Rotate the crankshaft and measure crankshaft run out with a dial indicator at the two points indicated as shown. If the run out exceeds the service limit in Table 1, have a dealership evaluate and possibly true the crankshaft.

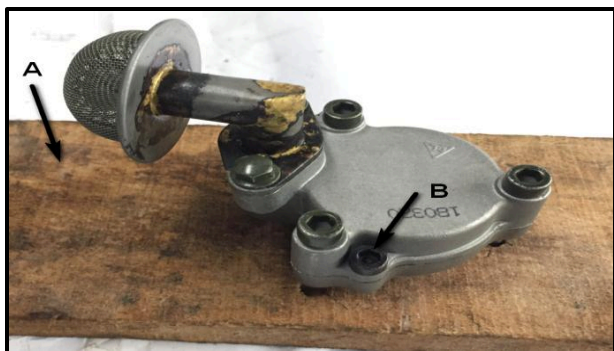
Assembling the oil pump

1. Check:

- Refer to the left.

NOTE:

The oil pump assembly screw (2) is tight and difficult to remove. Make sure to secure the pump body when loosening and tightening the screw.



- Either secure the oil pump into the right crankcase with its mounting bolts or bolt the pump onto a wooden block (A) secured in a vise.
- Loosen the screw (B) with a Phillips bit mounted in a hand impact driver.

NOTE:

Identify the inner and outer rotors so they can be reinstalled facing their original direction.

- Disassembly the oil pump as shown in top one figure.
- Inspect the oil pump assembly as described in this section.

2. Install:

- Lubricate the rotors, rotor bores and shaft with engine oil. Do not lubricate the screw or the screw threads in the housing.
- Install the outer rotor (6) into the housing so it faces in its original direction as identified during disassembly.
- Install the drive pin (7) into the shaft, then install the inner rotor (5) over the shaft and engage its slot with the pin. Make sure the rotor faces in its original direction.
- Install the inner rotor and shaft by meshing the inner rotor into the outer rotor. Make sure the pin remains in the slot in the inner rotor.
- Install the cover and the screw finger-tight. Secure the oil pump and tighten the screw to 5 N.m.



5Nm(0.5m.kg.4ft.lb)

- Turn the oil pump shaft. If there is any binding or roughness, disassemble the oil pump and inspect the parts as described in this section.

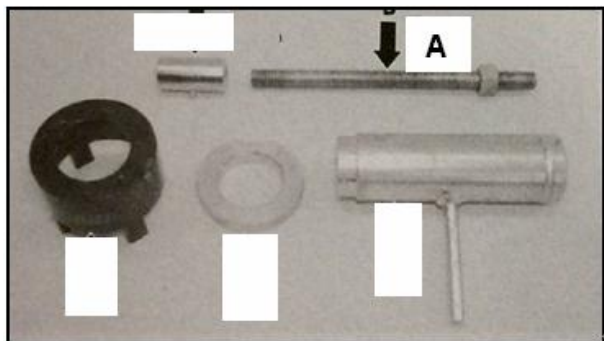
Installing the crankshaft

1. Install:

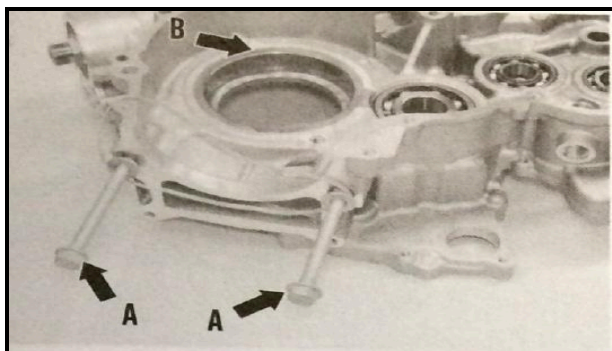
- Install the crankshaft as follows:

CAUTION:

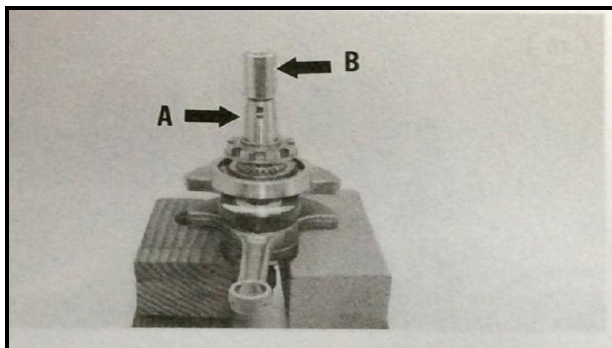
Do not use a hammer to drive the crankshaft bearing into the crankcase.



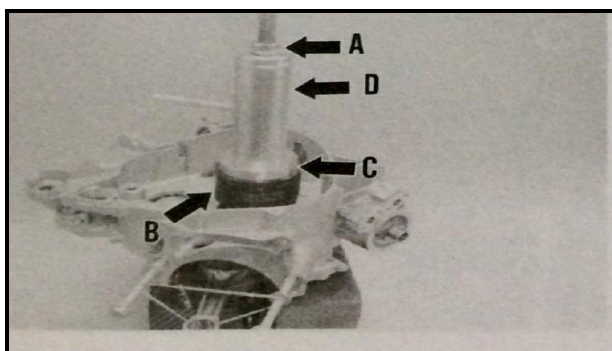
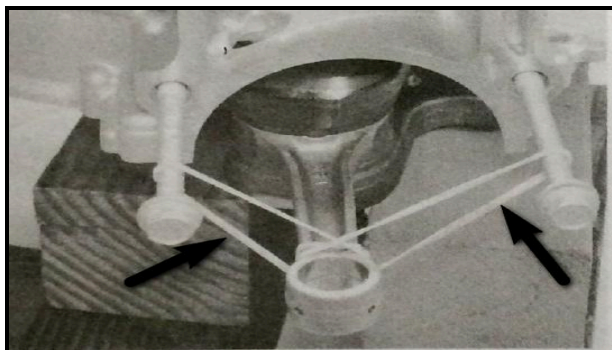
- Refer to Tools in this section to identify the crankshaft installation tools.
- Lubricate the bolt threads (A) with a high-pressure lubricant or anti-seize. This will help turn the bolt and ease crankshaft installation when pressing its bearing into the crankcase.



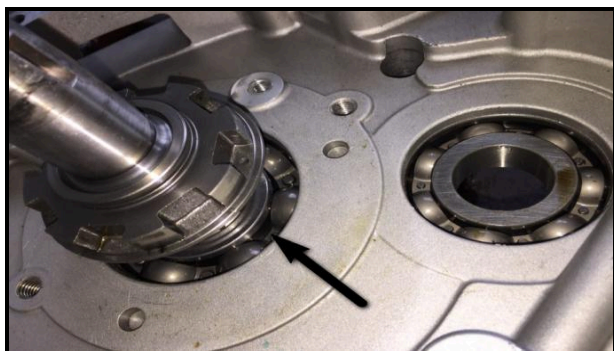
- Install two of the cylinder block mounting bolts (A) into the left crankcase.
- Lubricate the right crankcase main bearing bore (B) with engine oil.



- Place the crankshaft (A) on wooden blocks with its right side facing up.
- Thread the adapter (B) onto the crankshaft.
- Place the right crankcase over the crankshaft so that its bearing bore is resting on the crankshaft bearing. Have an assistant hold the crankcase in place.
- Secure the connecting rod at TDC with a large rubber band wrapped around the rod and two bolts as shown in Figure. The rubber band will help to control the connecting rod and prevent it from catching against the crankcase gasket surface when installing the crankshaft.



- Thread the bolt (A) fully into the adapter.
- Place the pot spacer (B) over the bolt. The pot spacer must seat parallel to the crankcase.
- Install the spacer (C) and installer pot (D) over the bolt and center them into the pot spacer. Make sure the pin on the adapter enters the groove in the installer pot. Then install the nut onto the bolt.

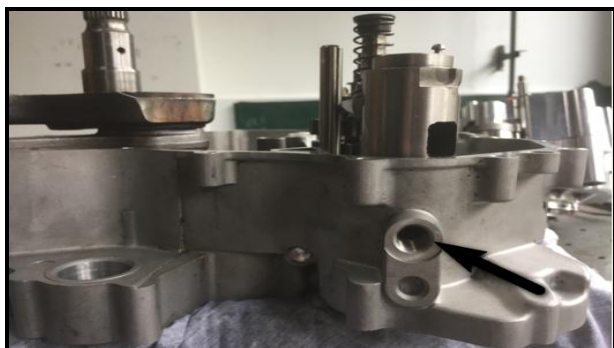
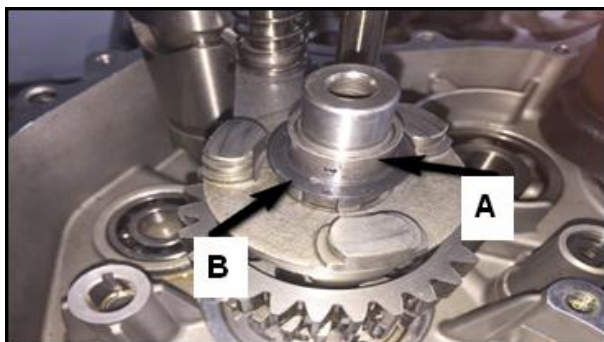
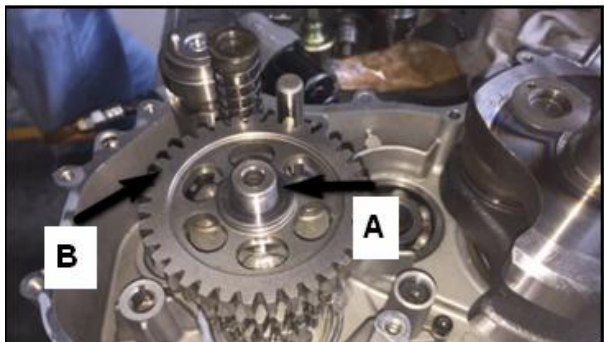
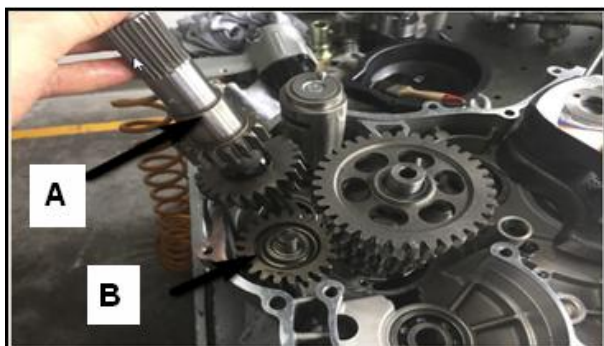
**CAUTION:**

Make sure the crankcase and crankshaft bearing remains centered. If the bearing enters the bore at an angle, loosen the nut and realign the parts before damaging the bore.

- Hold the installer pot and tighten the nut to press the bearing into the crankcase. At the same time, make sure the connecting rod remains centered so that it does not catch against and damage the crankcase gasket surface. Continue to tighten the nut until the bearing bottoms inside the bearing bore as shown.
- Remove the tools and rubber band from the crankshaft. Then turn the crankshaft by hand, make sure it turns freely and there is no binding or roughness.

Table 1 ENGINE LOWER END SPECIFICATIONS

	New mm	Service limit mm
Connecting rod		
Big end radial clearance	0.010-0.025	-
Side clearance	0.350-0.650	1.0
Small end free play	0.16-0.40	-
Crankshaft		
Runout	-	0.030
Width	74.95-75	-
Oil pump		
Axial clearance	0.03-0.10	0.17
Side clearance	0.09-0.17	0.24
Tip clearance	0.0035-0.0067	0.20

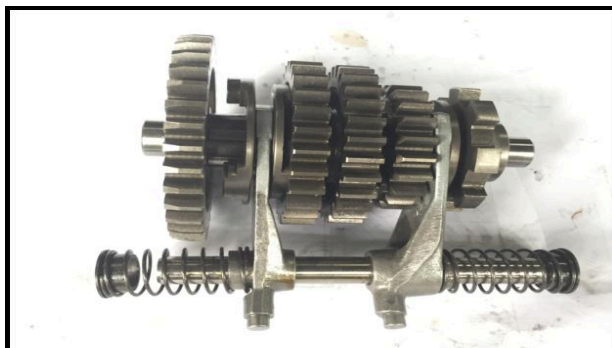
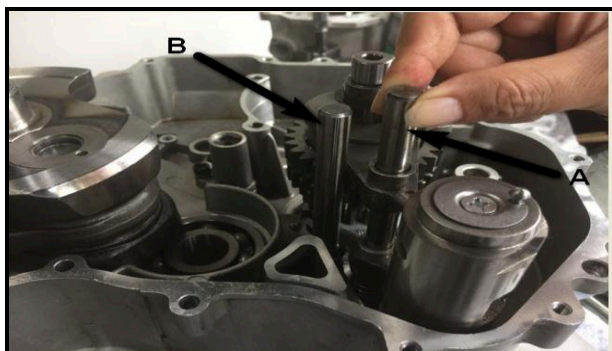


Transmission

Remove the transmission

- Remove
- Remove the transmission as follows:

- Lift the input shaft, then tilt it toward the outside (A) and remove it from the crankcase.
- Lift the reverse idler gear shaft (B), then tilt it toward the outside and remove it from the crankcase. The gear is secured to the shaft with snap rings and the gear and shaft will come out as an assembly.
- Remove the washer (A), high gear (B), collar (A, The next) and washer (B, Thenext) from the output shaft.
- Turn the shift drum and shift the output shaft into neutral as the same time remove the four bolts and lift out the middle gear bearing housing (A). Neutral can be confirmed when the gear dogs on the clutch dog and middle drive gear are free. Refer to the left.

**NOTE:**

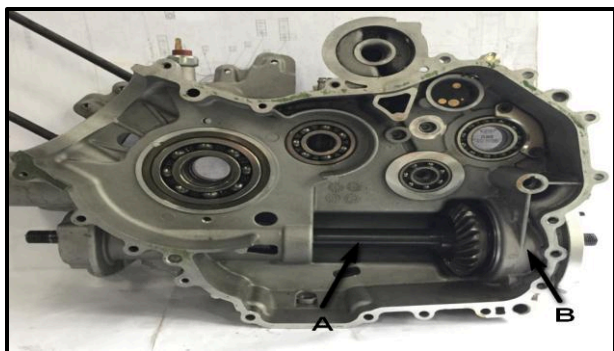
Neutral can also be confirmed by viewing the shift drum detent ramps through the detent hole as shown in the crankcase.

- e. Pull the shift fork shaft up **(A)** until it is free from its bore in the crankcase. Then pivot the shift fork away from the shift drum and shift drum as shown.
- f. Pull the parking arm shaft up **(B)** until it is free from its bore in the crankcase.
- g. Lift and remove the output shaft and shift forks as an assembly as shown.



- Remove the spacer/crank seal assembly from the left crankcase as shown.

- Remove the input shaft collar (A) from the left crankcase.

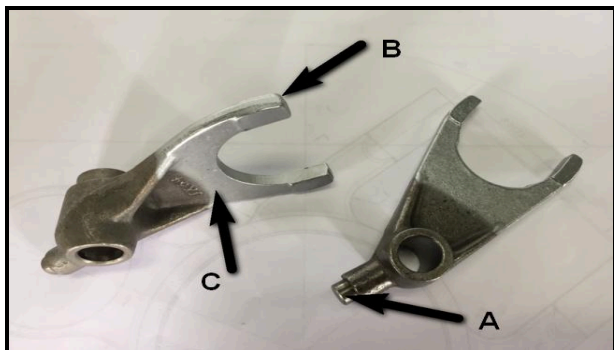
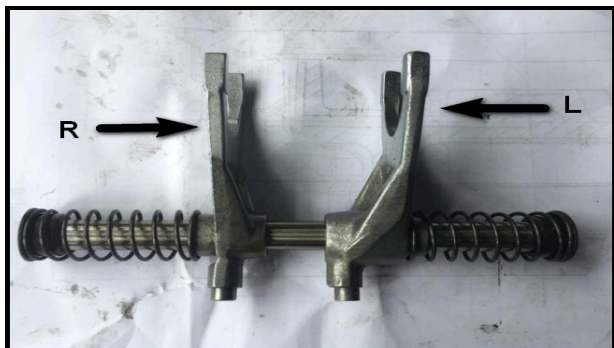


- Remove the middle driven pinion gear bearing housing (A) and the middle driven shaft (B) from the left crankcase as described in this chapter.
- Inspect the crankcase halves, input shaft seal, bearing and the other components removed in this procedure as described in this chapter.

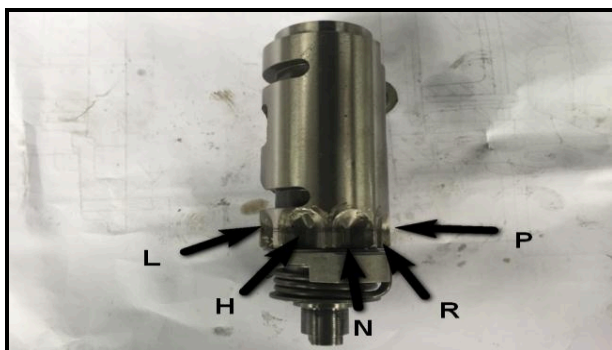
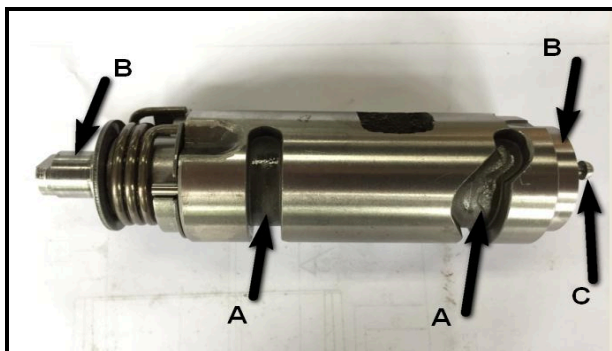
Checking the shift forks

1. Check:

- If the shift fork assembly shown is in good condition, it is not necessary to disassemble the parts. If parts are worn, or if the cause of poor shifting is unknown, remove the snap rings and disassemble the parts. Check the parts in the following steps.



- Make sure the guide pin (A) is symmetrical with no flat spots. Make sure the pin passes through the mating groove on the shift drum without binding or excessive looseness.
- Make sure the shift fork claw (B) is not worn. The claw surfaces must be smooth with no signs of excessive wear, bending, and cracks, scored surface, heat discoloration or other damage. A polished appearance at the contact points is normal.
- Make sure the radius and sides (C) are not worn. If wear is evident (scored surface), the fork is binding in the groove. A worn or damaged fork bore; shift drum, clutch dog or gear could cause this. The shift fork shaft may be bent or damaged.
- Check the shift fork shift for bending or other damaged. Install each shift fork on the shaft and slide it back and forth. Each shift fork must slide smoothly with no binding or tight spots. If any fork binds, check the shaft for bending by rolling it on a flat surface.
- Inspect the spring for cracks, unevenly spaced coils or other damage.



Checking the shift drum

1. Check:

- Clean and dry the shift drum. Checking the shift drum grooves (**A**). The grooves should be a uniform width with no signs of roughness or damage. Worn grooves can prevent complete gear engagement, which can cause rough shifting.
- Inspect the journals (**B**) on each end of the shift drum for excessive wear, scoring or overheating. Fit the shift drum into each crankcase and check for play, blinding or roughness.
- Inspect the shift drum detent holes shown in the left for cracks, excessive wear or other damage.
- Inspect the neutral pin (**C**) for damage. The pin is spring-loaded and should return when pressed and released. If damage is noted, perform the following:

- a. Remove the screw, side plate, pin and spring.
- b. Inspect and replace the damaged parts. Replace the screw if the Torx shoulders were damaged during screw removal.
- c. Remove all thread locking compound from the screw and shift drum threads if previously used.
- d. Install the spring, pin and side plate. Fit the groove in the side plate around pin.
- e. Apply a medium-strength thread locking compound onto the screw and tighten securely.

Checking the transmission

1. Check:

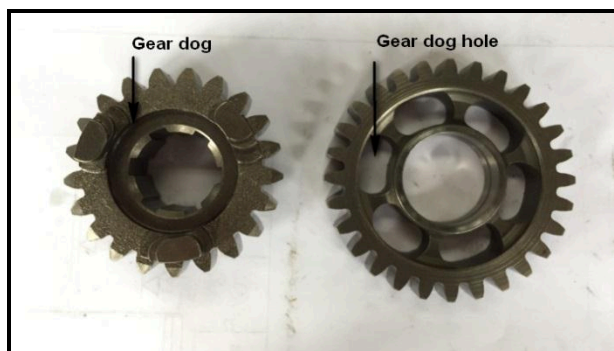
- Check the input shaft shown for:

- a. Worn or damaged splines.
- b. Missing, broken or chipped gear teeth.
- c. Worn or damaged bearing surfaces.
- d. Damaged threads.

- Check the output shaft shown for:

- a. Worn or damaged splines.
- b. Worn or damaged bearing surfaces.
- c. Cracked or rounded snap ring grooves.
- d. Excessive run out. Place the output shaft on V-blocks and check run out with a dial indicator. Replace the output shaft if run out exceeds 0.06mm.

- Check the reverse idle gear assembly shown for:

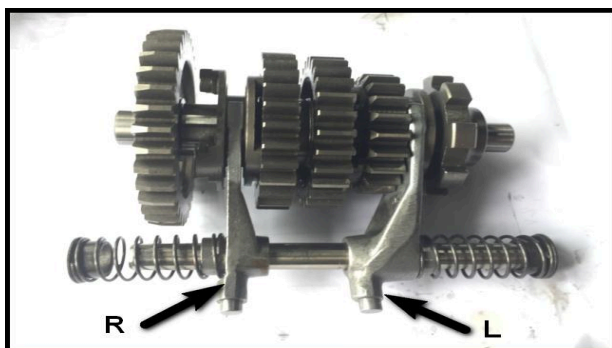


- a. Missing, broken or chipped gear teeth.
- b. Worn or damaged shaft surfaces.
- c. Damaged needle-bearing rollers.
- d. Damaged washer.

- Check the splines on the clutch dog and middle drive gear and the bore on the stationary for excessive wear or damaged.
- To check stationary gears for wear, install them and their bushing or needle bearing on the output shaft and in their original operating position. If necessary, use the old snap rings to secure them in place. Then spin the gear by hand. The gear should turn smoothly. A rough turning gear indicates heat damaged. Check for a dark blue color or galling on the operating surfaces. Rocking indicates excessive wear, to either the gear, bushing, needle bearing or shaft.
- To check the clutch dog and middle drive gear, install them on the output shaft and in their original operating position. The clutch dog and gear should slide back and forth without any binding or excessive play.
- Check the dogs and dog holes shown on the clutch dog and gears for excessive wear, rounding, cracks or other damage. Any wear on the dogs and mating recesses should be uniform. If the dogs are not worn evenly, the remaining dogs will be overstressed and possibly fail.
- Check engaging output shaft gears and the clutch dog by installing mating parts on the output shaft and in their original operating position, and then twist the parts together to engage the dogs. Check for positive engagement in both directions. If damage is evident, also inspect the condition of the shift forks.
- Check for worn or damaged shift fork grooves. Check the clutch dog and middle drive gear grooves and mating shift forks.
- Check the low gear and high gear bushing for:

- a. Severely worn or damaged bearing surface.
- b. Worn or damaged bore.
- c. Cracked or scored gear bore (on the mating gear).

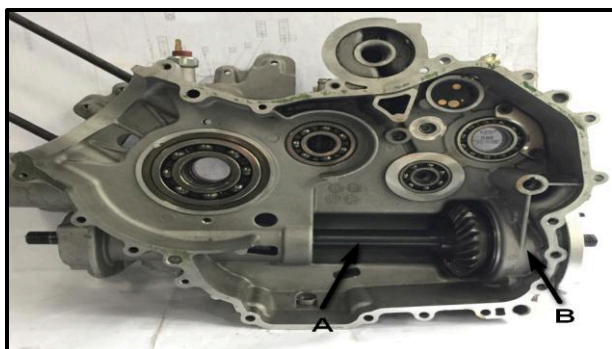
- Check the reverse gear needle bearing. The rollers should be smooth and polished with no flat spots, burrs or other damage. Inspect the bearing cage for cracks or other damage. Replace the bearing if necessary.
- Check the spline washers. The teeth in the washer should be uniform and show no signs of thrust wear.
- Check the thrust washers. The washers should be smooth and show no signs of thrust wear or heat damage.



Assembling the shift fork assembly

1. Install:

- Mesh the R (right) shift fork with the clutch dog groove and the L (left) shift fork with the middle drive gear groove (Figure).



Installing the transmission

1. Install:

- Install the middle driven shaft (A) and middle driven pinion gear bearing housing (B) as described in this chapter.
- Make sure all of the crankcase oil passages are clean.
- Lubricate the crankcase bearings with engine oil.

- Install the spacer/crank seal assembly as follows:

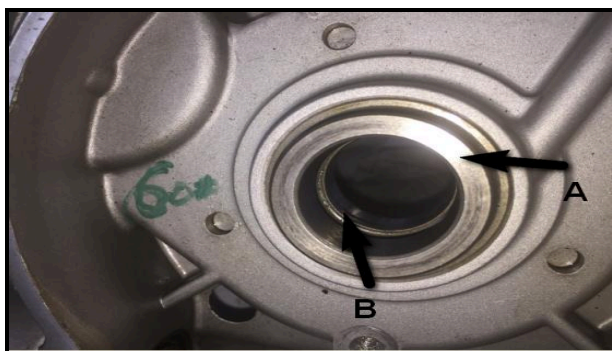


- Lubricate the two crank seals on the spacer with engine oil. Make sure seal ends are hooked together as shown (A).

- Install the spacer/crank seal assembly with its shoulder (B) facing out. Refer to the left.

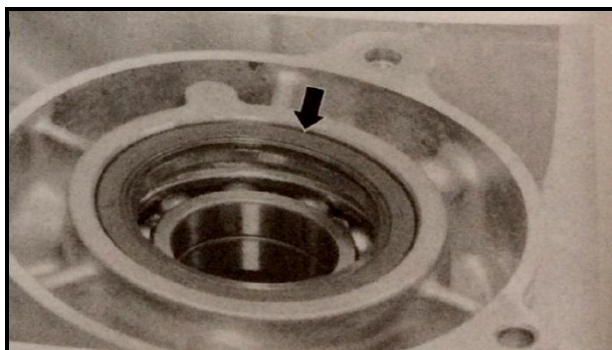
CAUTION:

Do not force the spacer into the crankcase. If the spacer will not slide into place, one or both crank seal are improperly installed.

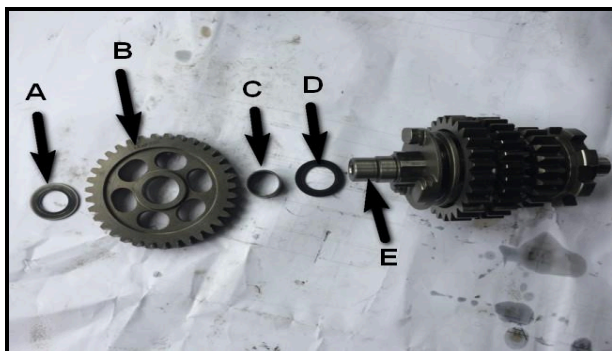


- Lubricate the input shaft seal lip with grease.
- Install the input shaft collar as follows:

- Lubricate a new O-ring with grease and install it in the inner collar groove. Make sure the O-ring seats squarely in the groove and is not twisted.
- Install the collar with its flat side facing out.



- Install the crankshaft as detail described in next chapter.
- Position the right crankcase on wooden blocks with the crankshaft facing up.
- Install the oil pump as detail described in next chapter.



- Install the output shaft as follows:

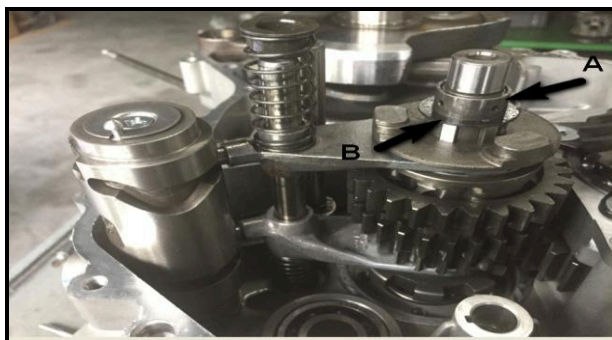
a. If installed, remove the washer (A), high gear (B), collar (C) and washer (D) from the output shaft (E).

b. Install the output shaft and shift forks as an assembly, as the same time install the middle gear bearing housing. Apply a medium-strength thread locking compound onto the mounting bolt threads and tighten to 28-32 N.m.

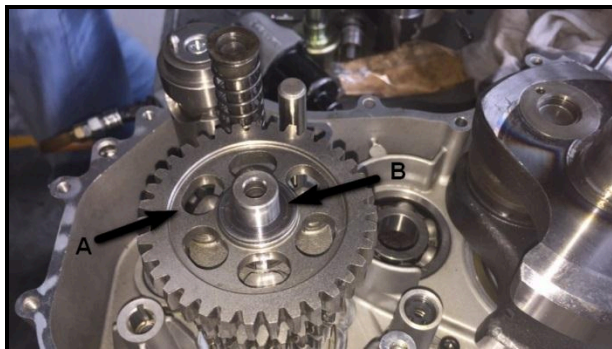
 30Nm(3.0m.kg.22ft.lb)



c. Lift the shift forks (and not the shift fork shaft) as required to install the shift fork pins into the shift drum grooves while sliding the shift drum into position. Make sure the shift fork shaft and shift drum are both bottomed in the case half.

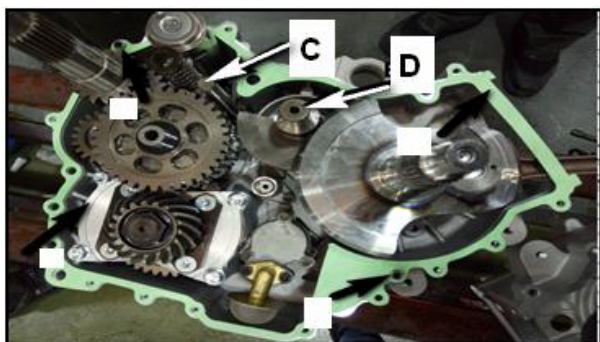


d. Install the collar (A), washer (B), high gear (A, The next Figure) and washer (B, The next Figure).



- Install the reverse idler gear shaft (A), mesh it with the input, and output shafts.
- Install the input shaft (B) and mesh it with the output shaft.
- Install the parking arm shaft (C, The next Figure) and mesh it with the output shaft.





- Install the balancer shaft (D).
- Lubricate all exposed shaft-bearing surfaces with engine oil. Also, lubricate the bearings in the left crankcase with engine oil.
- Clean all crankcase gasket mating surfaces with electrical contact cleaner or isopropyl alcohol and allow to dry.

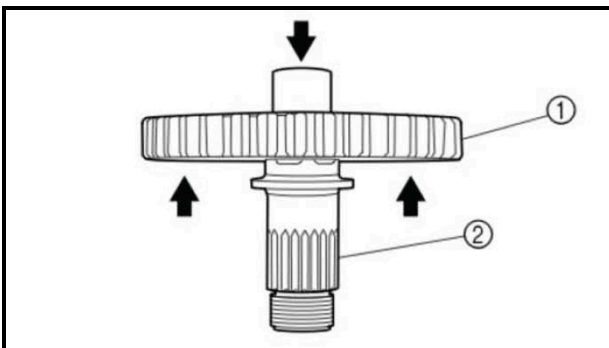
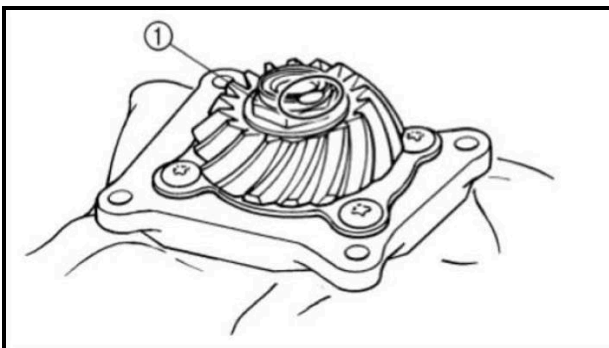
Middle gear

Removing the middle drive shaft

1. Straighten:
 - Punched portion of the middle drive pinion gear nut.
2. Loosen:
 - Middle drive pinion gear nut ①

TIP:

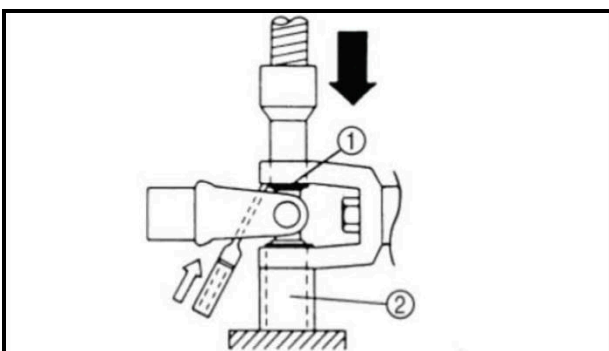
Secure the middle drive shaft in the vise with a clean rag.

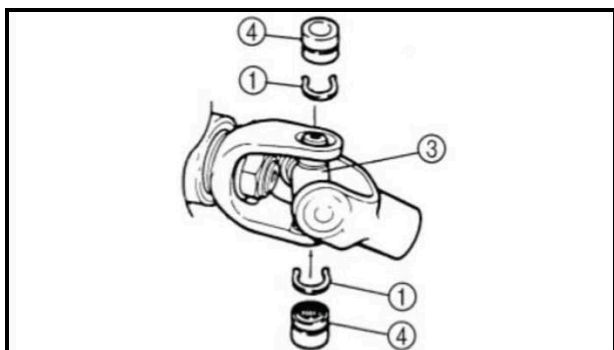


3. Remove:
 - middle drive pinion gear nut
 - middle drive pinion gear
 - shim(s)
4. Remove:
 - middle driven gear ① circlip
 - middle drive shaft ②

TIP:

Press the middle drive shaft end and remove the middle driven gear





Removing the middle driven shaft

1. Remove:

- universal joint (middle gear side)

a. Remove the circlips ①.

b. Place the universal joint in a press.

c. With a suitable diameter pipe ② beneath the yoke ③, press the bearing ④ into the pipe as shown.

TIP: _____

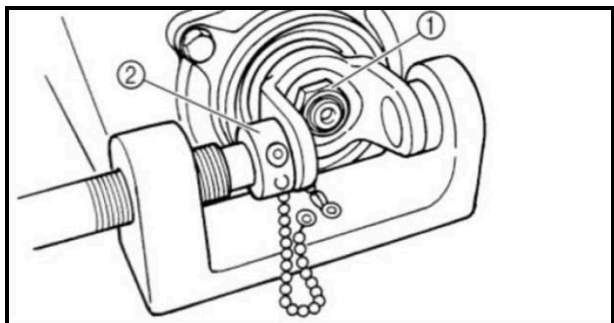
If may be necessary to lightly tap the yoke with a punch.

d. Repeat the steps for the opposite bearing.

e. Remove the yoke.

TIP: _____

It may be necessary to lightly tap the yoke with a punch.



2. Remove:

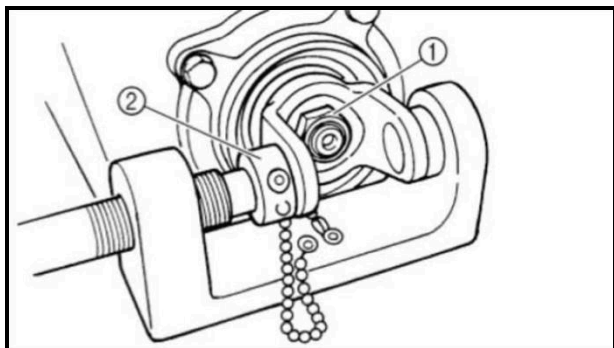
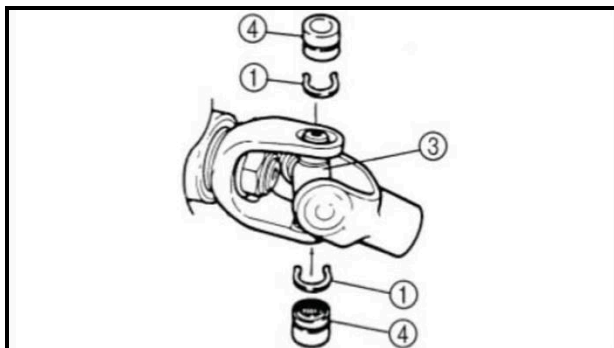
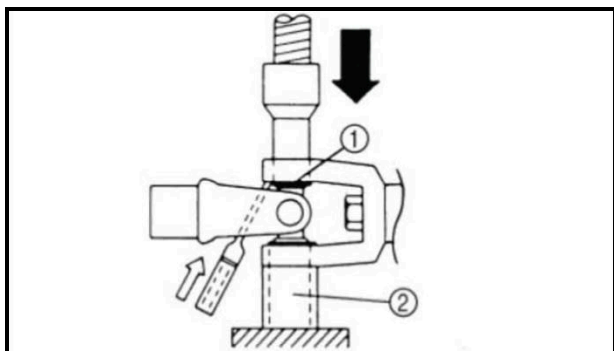
- universal joint yoke nut (middle gear side) ①
- universal joint yoke (middle gear side)

TIP: _____

Use the universal joint holder ② to hold the universal joint yoke.

3. Remove:

- Collar (A)
- Ring seal (B)



4. Remove:
- universal joint (middle gear side)

- a. Remove the circlips ①.
b. Place the universal joint in a press.
c. With a suitable diameter pipe ② beneath the yoke ③, press the bearing ④ into the pipe as shown.

TIP: _____
If may be necessary to lightly tap the yoke with a punch.

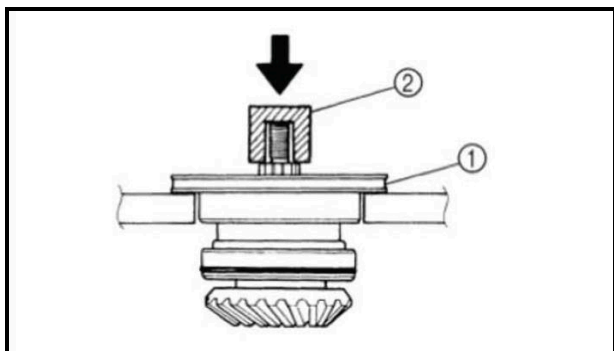
- d. Repeat the steps for the opposite bearing.
e. Remove the yoke.

TIP: _____
It may be necessary to lightly tap the yoke with a punch.

5. Remove:
- universal joint yoke nut (middle gear side) ①
 - universal joint yoke (middle gear side)

TIP: _____
Use the universal joint holder ② to hold the universal joint yoke.

6. Remove:
- Collar(A)
 - Ring seal(B)



7. Remove:

- bearing housing assembly ①

- a. Clean the outside of the bearing housing assembly.
- b. Place the bearing housing assembly onto a hydraulic press.

NOTE:

- Never directly press the middle driven pinion gear end with a hydraulic press; this will result in damage to the middle driven pinion gear thread.
- Install a suitable socket ② on the middle driven pinion gear end to protect the thread from damage.

- c. Press the middle driven pinion gear end and remove the bearing housing.

8. Remove:

- middle driven pinion gear bearing retainer bearing

- a. Fold a rag around the bearing housing ①.
- b. Secure the bearing housing edge in the vise.
- c. Attach the bearing retainer wrench ②.

NOTE:

The middle driven pinion gear-bearing retainer has left-handed threads. To loosen the retainer, turn it clockwise.

- d. Remove the bearing retainer and bearing.

9. Remove:

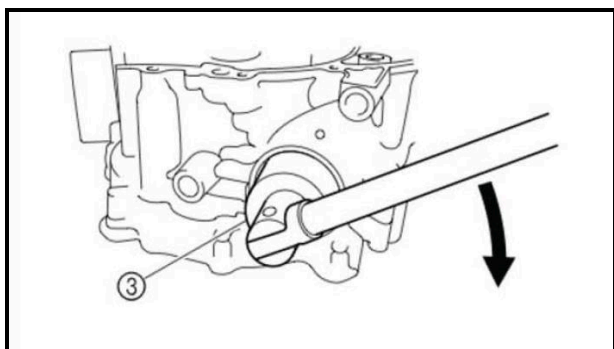
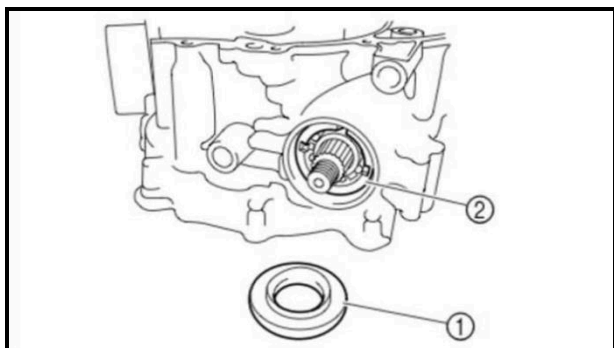
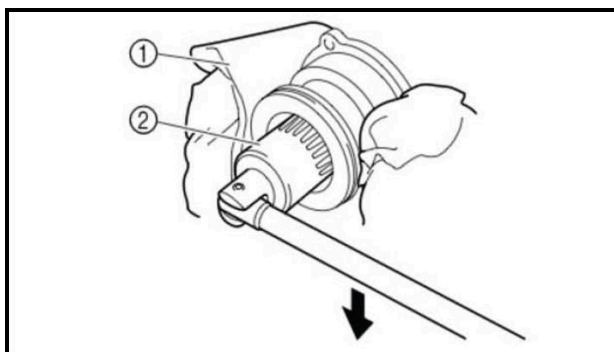
- oil seal ①
- middle driven shaft bearing retainer ②

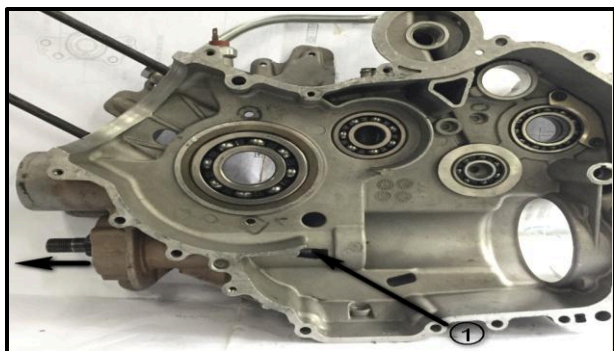
TIP:

Attach the ring nut wrench ③.

NOTE:

The middle driven shaft-bearing retainer has left-handed threads. To loosen the retainer turn it clockwise.





10. Remove:

- middle driven shaft ①

Checking the pinion gears

1. Check:

- drive pinion gear teeth
- driven pinion gear teeth
- Pitting/galling/wear → Replace.

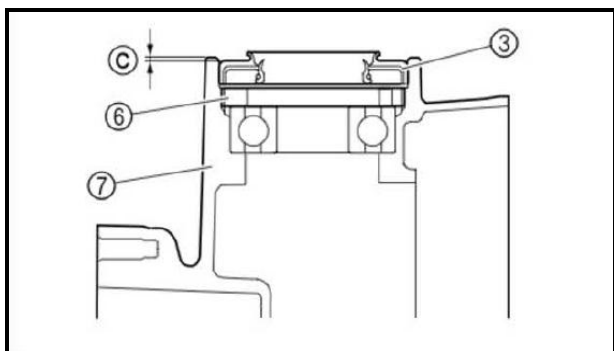
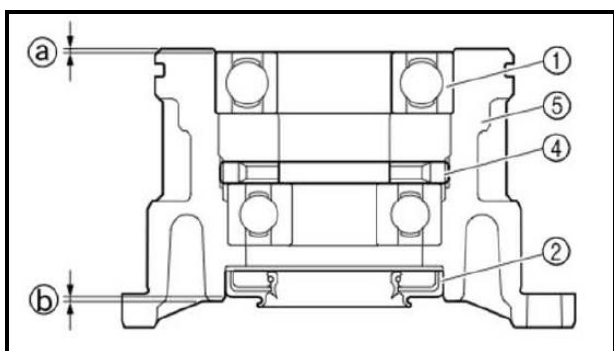
2. Check:

- Ring
Damage → Replace.
- Bearings
Pitting/damage → Replace.

Installing the bearing and oil seals

1. Install:

- bearing ①
- oil seal ②
- oil seal ③



Installed depth of bearing ①

0.9 ~ 1.4mm

Installed depth of oil seal ②

1.0 ~ 1.5mm

Installed depth of oil seal ③

1.0 ~ 1.5mm

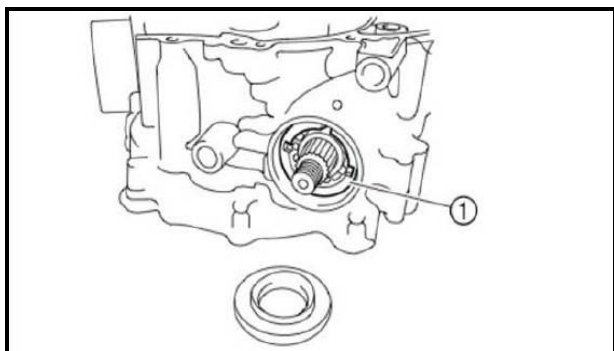
- middle drive pinion gear bearing retainer ④
- bearing housing ⑤
- middle driven shaft bearing retainer ⑥
- crankcase ⑦

Installing the middle driven shaft

1. Install:

- middle driven shaft bearing retainer ①

	100Nm(10.0m.kg.74ft.lb)
---	-------------------------

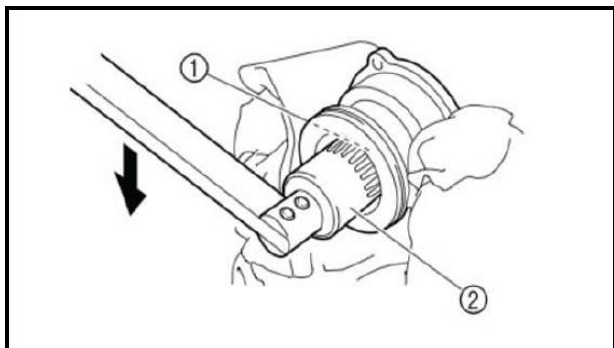
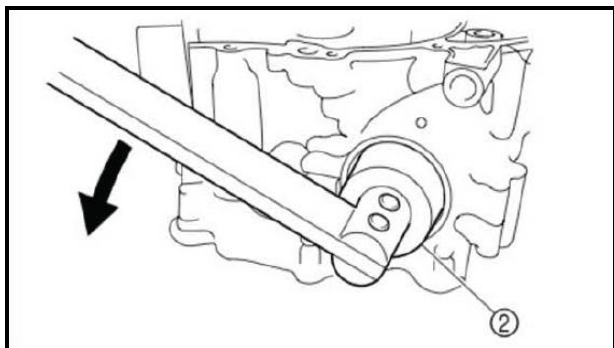


TIP: _____

Attach the ring nut wrench ②.

NOTE: _____

The middle driven shaft-bearingretainer has left-handed threads.To tighten the retainer turn counter-clockwise.



2. Install:

- middle driven pinion gear bearing retainer ①

- Secure the bearing housing edge in the vise with a clean rag.
- Attach the bearing retainer wrench ②.
- Tighten the bearing retainer.

	110Nm(11.0m.kg.81ft.lb)
---	-------------------------

NOTE: _____

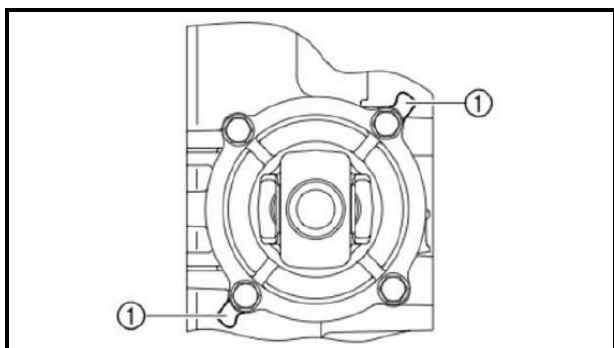
The middle driven pinion gear-bearingretainer has left-handed threads.To tighten the retainer turn counterclockwise.

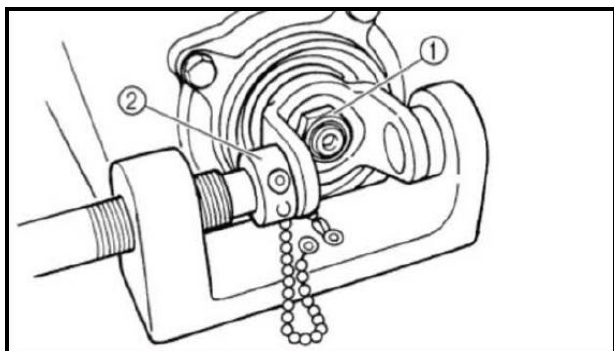
3. Install:

- Middle driven gear shim ①
- Bearing housing

TIP: _____

Install the shim(s) so that the tabs are positioned as shown in the illustration.





4. Install:

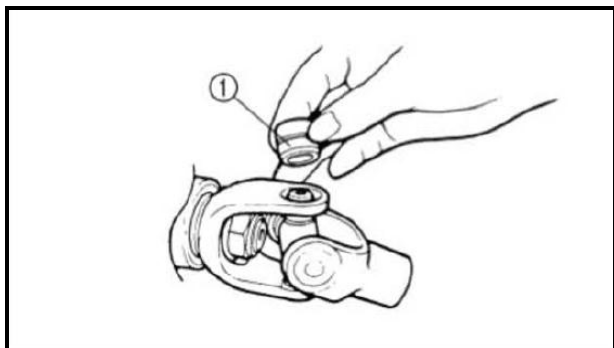
- universal joint yoke (middle gear side)
- washer
- universal joint yoke nut (middle gear side) ①

TIP:

Install the shim(s) so that the tabs are positioned as shown in the illustration.



110Nm(11.0m.kg.81ft.lb)



5. Install:

- universal joint (middle gear side)

a. Install the yoke into the universal joint.

b. Apply wheel-bearing grease to the bearings.

c. Install the bearing ① onto the yoke.

NOTE:

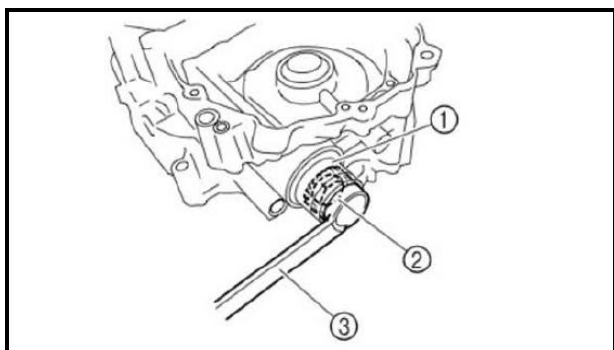
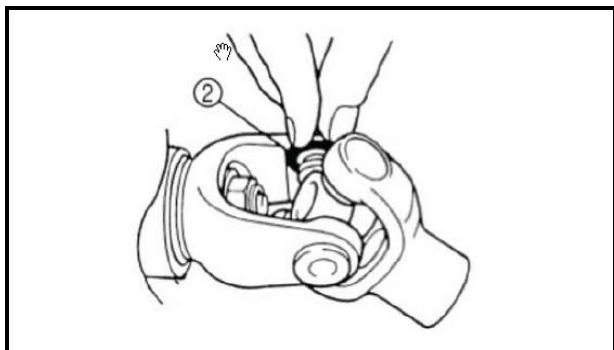
Check each bearing. The needles can easily fall out of their races. Slide the yoke back and forth on the bearings; the yoke will not go all the way onto a bearing if a needle is out of place.

d. Press each bearing into the universal joint using a suitable socket.

TIP:

The bearing must be inserted far enough into the universal joint so that the circlip can be installed.

e. Install the circlips ② into the groove of each bearing.



6. Install:

- drive shaft coupling gear (middle gear side) ①
- washer
- drive shaft coupling gear nut (middle gear side) ②



98Nm(9.8m.kg.72ft.lb)

TIP:

Use the coupling gear/middle shaft tool ③ to hold the coupling gear.

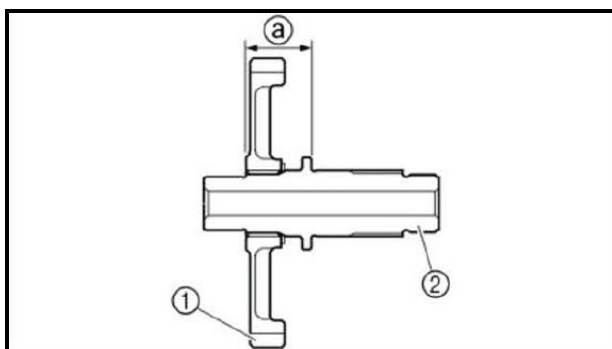
Installing the middle drive shaft

1. Install:

- circlip
- middle drive gear ①
- (to the middle drive shaft ②)



Installed depth of middle driven gear ①
24.7 ~ 24.9mm

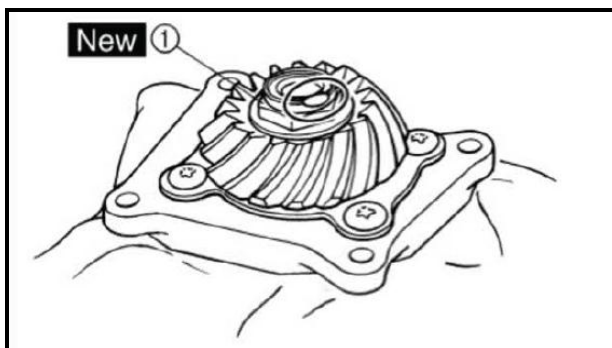


2. Tighten:

- middle drive pinion gear nut ① **New**



145Nm(14.5m.kg, 107ft.lb)



TIP:

Secure the middle drive shaft in the vise with a clean rag.

- Lock the threads with a drift punch.

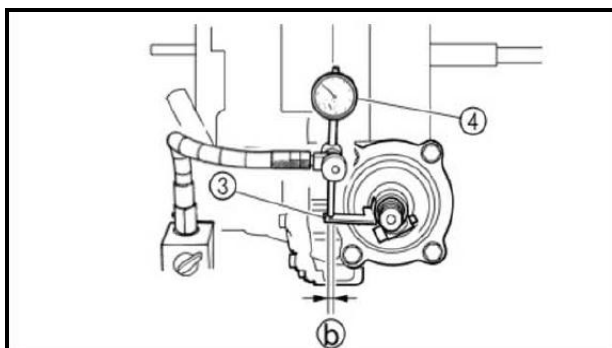
Measuring the middle gear backlash

1. Measure:

- gear lash



Middle gear lash
0.10 ~ 0.30mm



a. Temporarily install the right crankcase.

b. Wrap a rag ① around a screwdriver ②, and then insert it into the installation hole ① of right crankcase speed sensor to hold the middle drive gear.

c. Attach the gear lash measurement tool ③ and dial gauge ④.

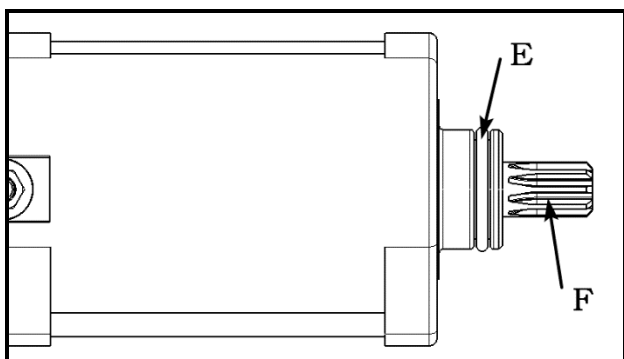
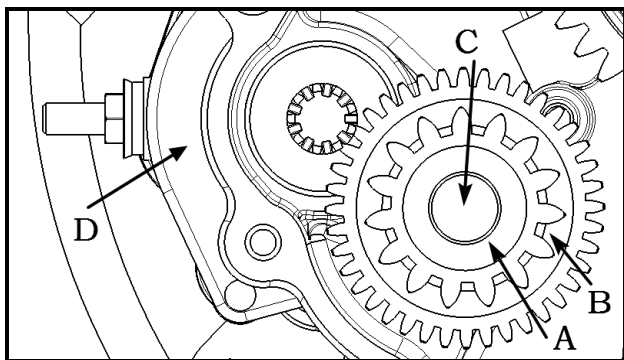
d. $b = 12.3\text{mm}$

e. Measure the gear lash while rotating the middle driven shaft back and forth.

TIP:

Measure the gear lash at ④ positions. Rotate the middle driven gear 90° each time.

f. If the gear lash is incorrect, adjust the gear lash with middle driven pinion gear shims and /or middle drive pinion gear shim(s).



Starter motor

Removing the starter motor

Remove the starter motor after removing the starter wheel gear in **AC magneto** chapter

- Remove:
- Remove the outside washer (A).
- Remove the double-gear (B).
- Remove the double-gear axis (C) and the inside washer.
- Loosen the bolts to remove the starter motor (D).

Checking the starter motor

1. Check:
 - Check the output gear (F). Replace it if there is damage/pitting/ wear on the output gear.
 - Check the double-gear. Replace it if there is damage/pitting/ wear on the double-gear.
 - Check the seal ring (E). If it is out of shape or damaged, replace it.
 - If the starter motor has abnormal sound while the engine working, replace it.
2. Measure:
 - Measure the outside diameter of double-gear axis. If the measurement is out of specification, replace it.



Outside diameter of double-gear axis
13.966 ~ 13.984mm

Install the starter motor

1. Lubricate:
 - Lubricate the seal ring (E):



Recommended lubricant
Engine oil

2. Install:
 - Install the starter motor.
 - Tighten the bolts:



10Nm (1.0m.kg, 7ft.lb)

- Install the double-gear axis.
 - Install the inside washer.
3. Lubricate:
 - Lubricate the double-gear axis:

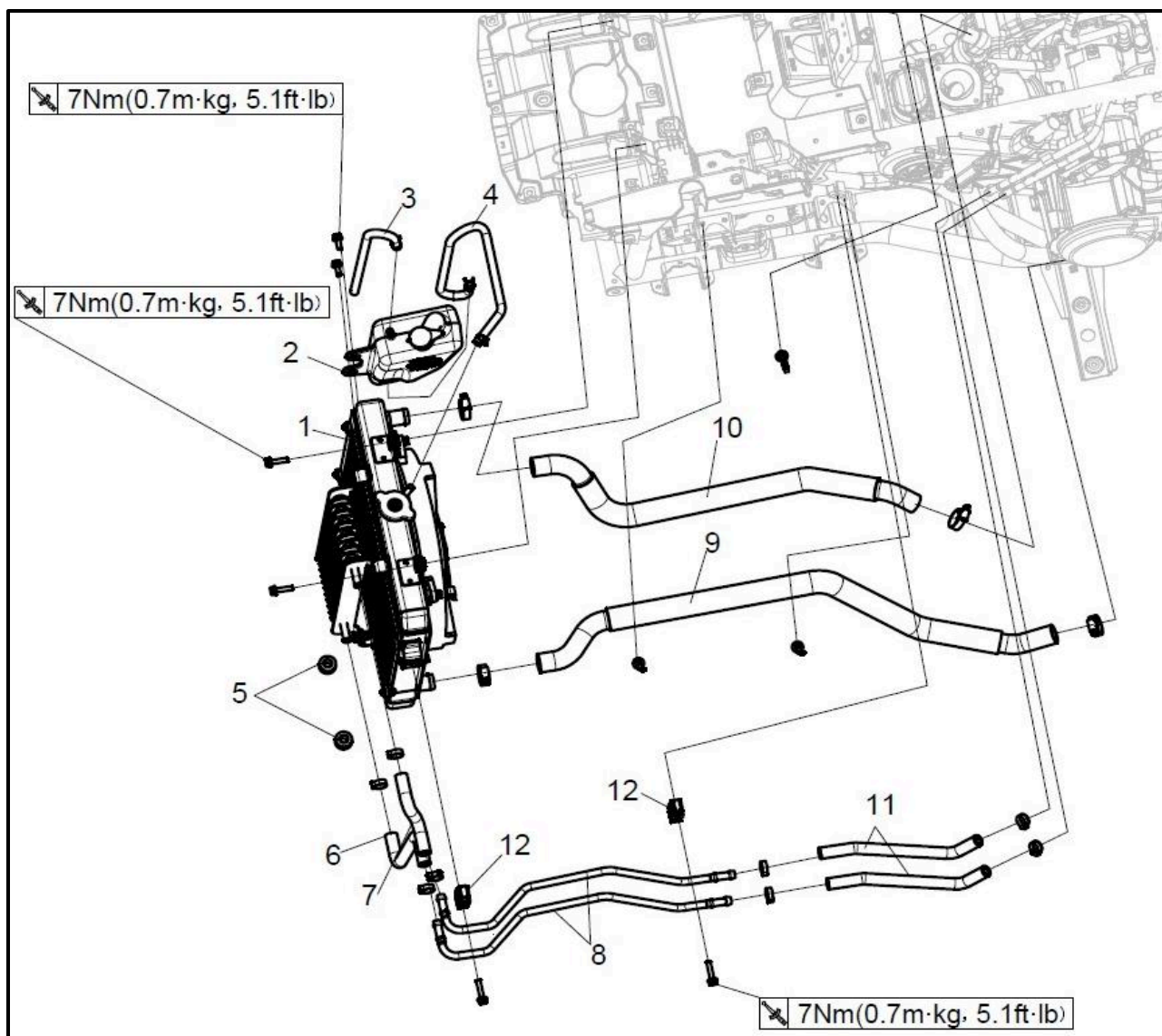


Recommended lubricant
Engine oil

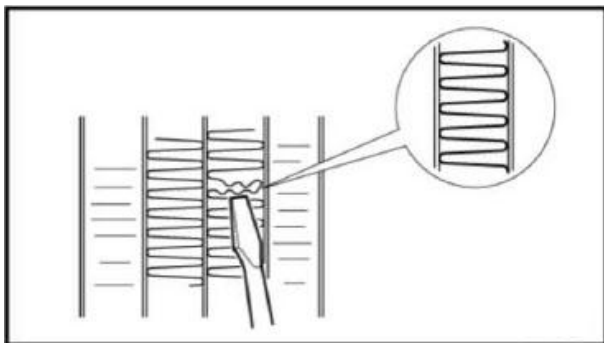
4. Install:
 - Install the double-gear.
 - Install the outside washer

5 COOLING SYSTEM

Radiator and coolant reservoir



Order	Job/Part	Q'ty	Remarks
	Removing the radiator and coolant reservoir		Remove the parts in the order listed. Refer to "CHANGING THE COOLANT" in chapter 3. Disconnect
1	Radiator fan motor coupler		
2	Coolant reservoir		
3	Coolant reservoir hose 1		
4	Coolant reservoir hose 2	1	
5	Rubber damper	2	
6	Oil cooler inlet hose 1	1	
7	Oil cooler outlet hose 1	1	
8	Oil cooler inlet pipe /oil cooler outlet pipe	1/1	
9	Radiator outlet hose	1	
10	Radiator inlet hose	1	
11	Oil cooler inlet hose 2/oil cooler outlet hose 2	1/1	
12	Clamp	2	
			For installation, reverse the removal procedure.



Checking the radiator

1. Check:

- radiator fins

Obstruction→Clean.

Apply compressed air to the rear of the radiator.

Damage→Repair or replace.

TIP:

Straighten any flattened fins with a thin, flathead screwdriver.

2. Check:

- Radiator hoses

Cracks/damage→Replace.

3. Measure:

- Radiator cap opening pressure

Below the specified pressure→Replace the radiator cap



Radiator cap opening pressure

93.3~122.7 kPa

(0.933~1.227 kg/cm²,

13.27~17.45 psi)

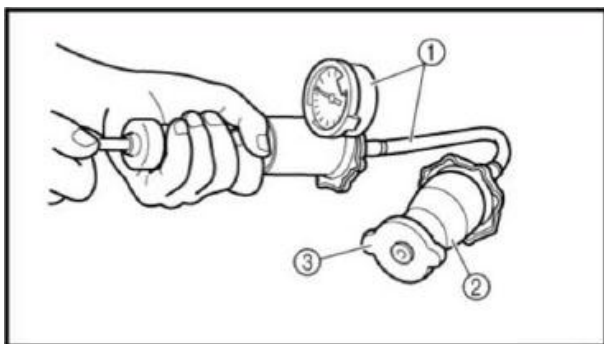
- Install the radiator cap tester ① and adapter ② onto the radiator cap ③.

- Apply the specified pressure for ten seconds and make sure that there is no drop in pressure.

4. Check:

Radiator fan Damage → Replace. Malfunction → Check and repair.

Refer to “ COOLING SYSTEM” in chapter 9.



Installing the radiator

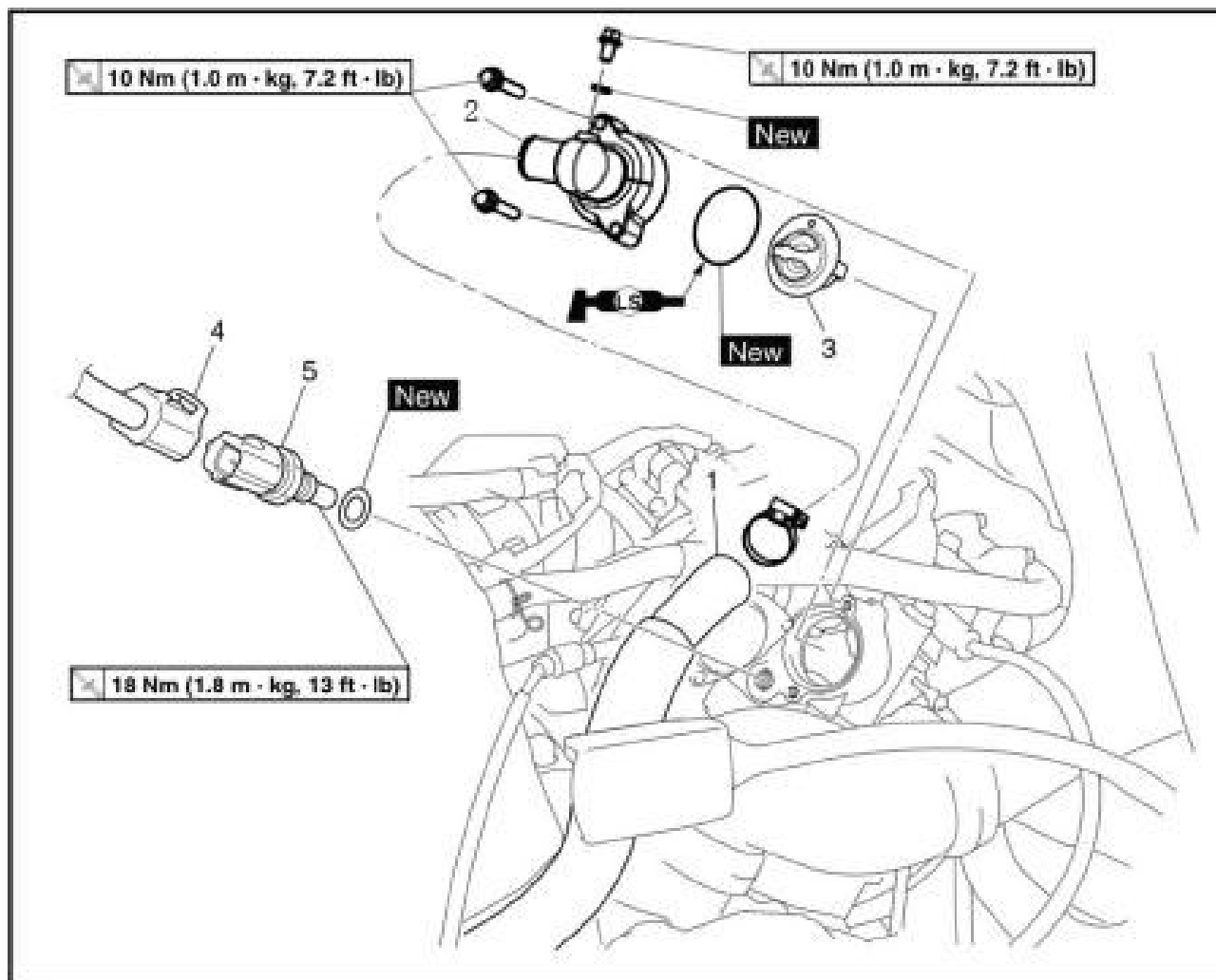
1. Fill:

- Cooling system
(with the specified amount of the recommended coolant)
Refer to “ CHANGING THE COOLANT ” in chapter 3.

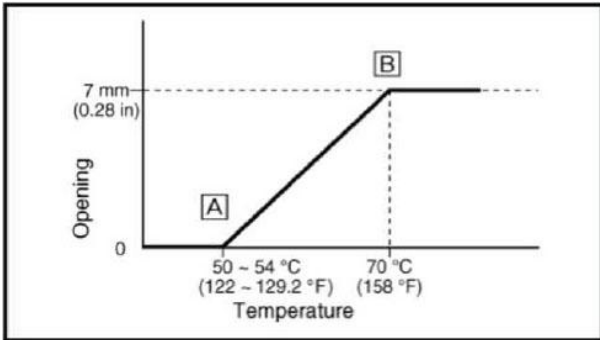
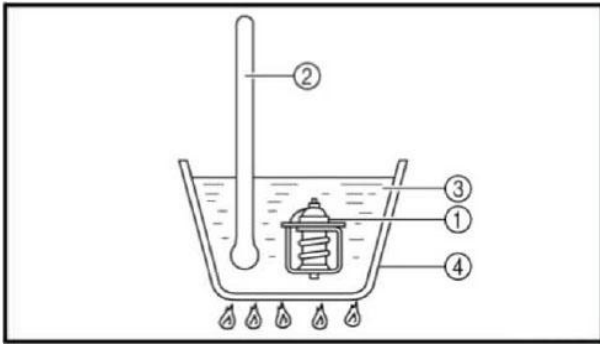
2. Check:

- Cooling system
Leaks→Repair or replace any faulty part.

Thermostat



Order	Job/Part	Q'ty	Remarks
	Removing the thermostat Seats/rear console		Remove the parts in the order listed. Refer to "SEATS, REAR CONSOLE AND INSTRUMENT PANELS" in chapter 8. Drain. Refer to "CHANGING THE COOLANT" in chapter 3. Disconnect. Refer to "INSTALLING THE THERMOSTAT".
1	Thermostat outlet hose	1	
2	Thermostat cover	1	
3	Thermostat	1	
4	Coolant temperature sensor coupler	1	Disconnect.
5	Coolant temperature sensor	1	
			For installation, reverse the removal procedure.



Checking the thermostat

1. Check:

- Thermostat ①

Does not open at 50 ~ 54°C (122 ~ 129.2°F) → Replace.

- Suspend the thermostat in a container filled with water.
- Slowly heat the water.
- Place a thermometer in the water.
- While stirring the water, observe the thermostat and thermometer's indicated temperature.

- ① Thermostat
- ② Thermometer
- ③ Water
- ④ Container
- Ⓐ Fully closed
- Ⓑ Fully open

TIP

If the accuracy of the thermostat is in doubt, replace it. A faulty thermostat could cause serious overheating or overcooling.

2. Check:

- Thermostat cover
- Thermostat housing (cylinder head)
Cracks/damage → Replace.

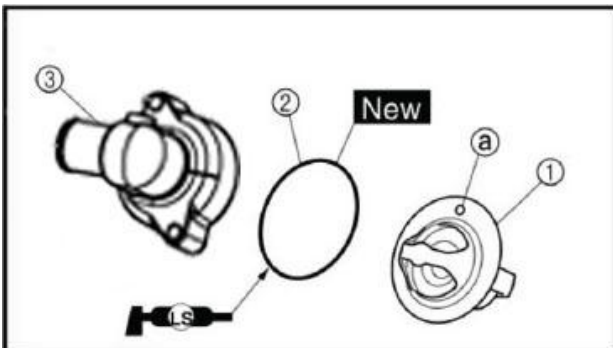
Installing the thermostat

1. Install:

- Thermostat ①
- O-ring ② **New**
- Thermostat cover ③

TIP

Install the thermostat with its breather hole (a) facing up.



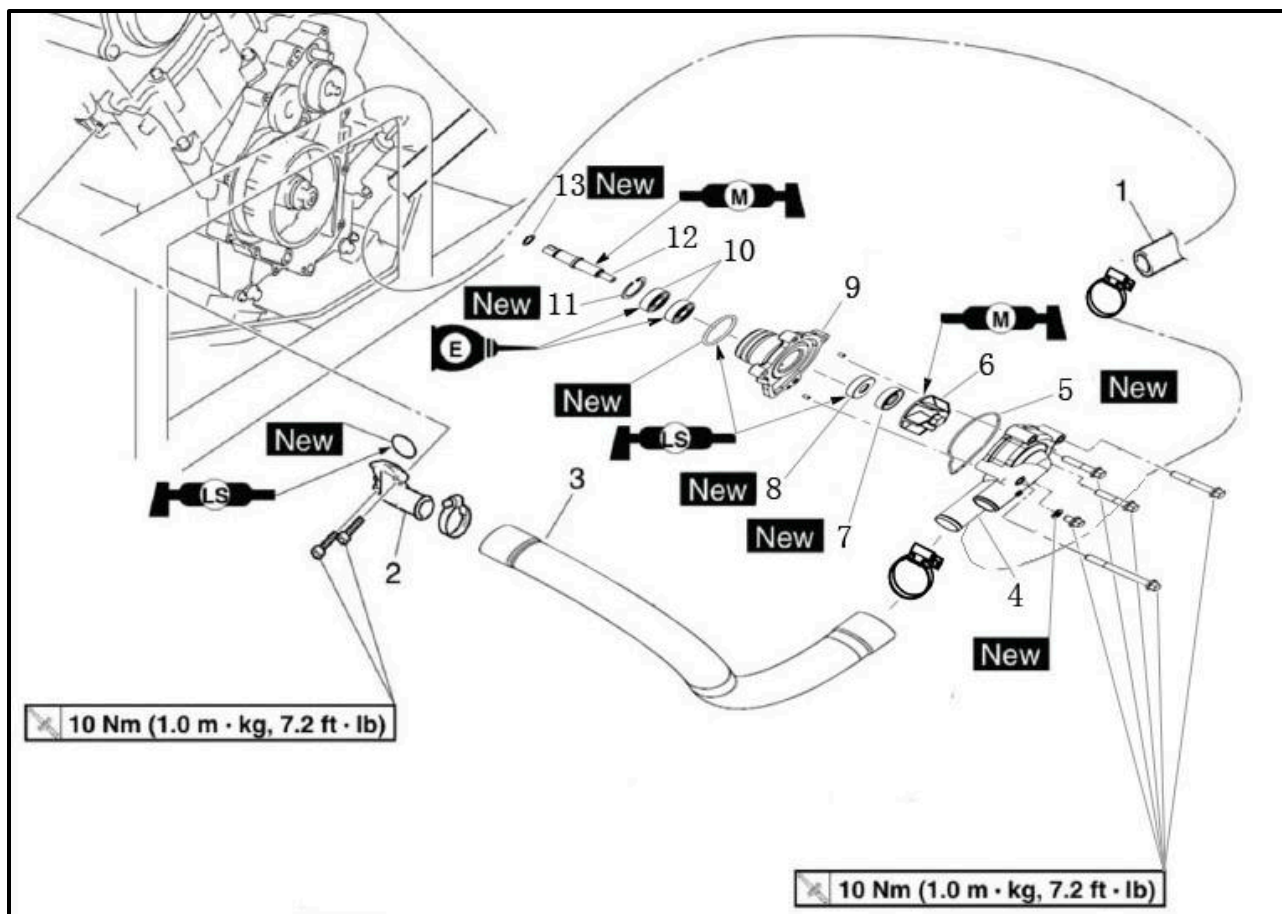
2. Fill:

- Cooling system
(with the specified amount of the recommended coolant)
Refer to "CHANGING THE COOLANT" in chapter 3.

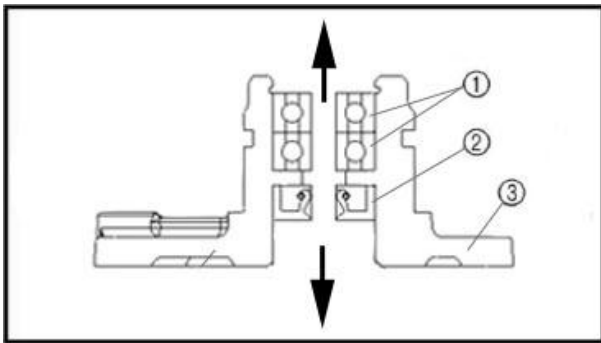
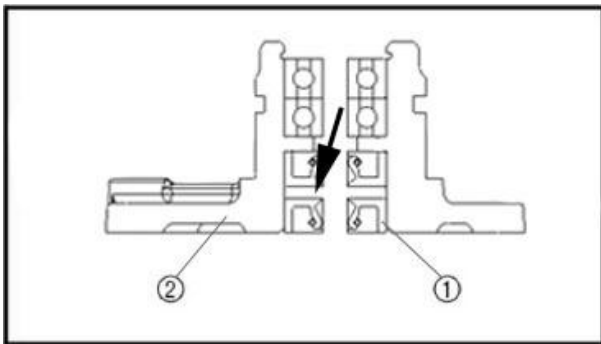
3. Check:

- Cooling system
Leak → Repair or replace any faulty part.

Water pump



Order	Job/Part	Q'ty	Remarks
	Removing the water pump		
	Seats/rear console		Remove the parts in the order listed. Refer to "SEATS, REAR CONSOLE AND INSTRUMENT PANELS "in chapter 8.
	Engine oil		Drain. Refer to "CHANGING THE ENGINE OIL "in chapter 3.
	Coolant		Drain. Refer to "CHANGING THE COOLANT"IN CHAPTER 3.
1	Water pump inlet hose	1	Disconnect.
2	Water jacket joint	1	
3	Water pump outlet hose	1	
4	Water pump housing	1	Refer to "DISASSEMBLING THE WATER PMP"and"ASSEMBLING THE WATER PUP".
5	Gasket ring	1	
6	Impeller	1	
7	Water pump seal	1	
8	Oil seal	1	
9	Water pump seat	1	
10	Bearing	2	
11	Circlip	1	
12	Impeller shaft	1	
13	Circlip	1	For installation, reverse the removal procedure.



Disassembling the water pump

1. Remove:
 - Water pump seal ①

TIP

Tap out the water pump seal from the inside of the water pump seat ②.

2. Remove:
 - Bearing ①
 - oil seal ②

TIP

Tap out the bearing and oil seal from the inside of the water pump seat ③.

Checking the water pump

1. Check:
 - water pump housing
 - impeller shaft
 - impeller

Cracks/damage/wear → Replace.
2. Check:
 - Water jacket
 - Water jacket outlet hose

Cracks/damage/wear → Replace.

 - Bearing

Rough movement → Replace.

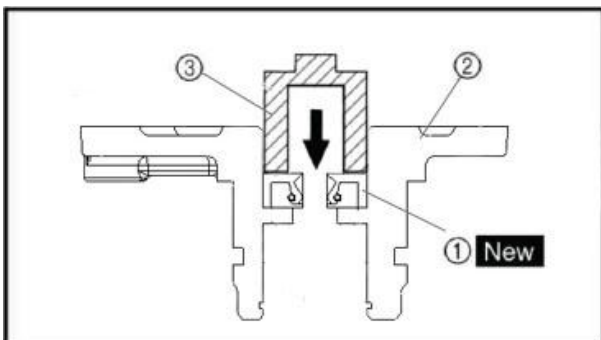
Assembling the water pump

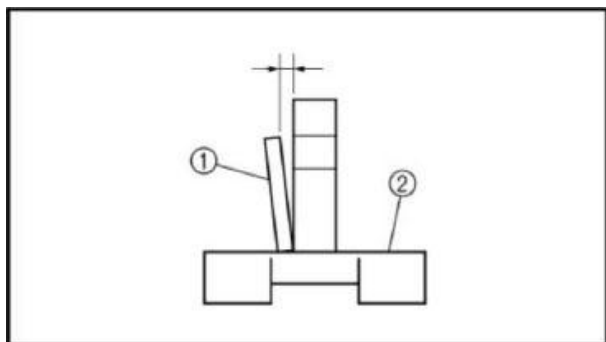
1. Install:
 - Oil seal ① **New**

(into the water pump seat ②)

TIP:

- Before installing the oil seal, apply tap water or coolant onto its outer surface.
- Install the oil seal with a socket ③ that matches its outside diameter.





2. Install:

- Water pump seal ① **New**
(into the water pump seat ②)

NOTICE

Never lubricate the water pump seal surface with oil or grease.

TIP:

Install the water pump seal with the special tools.

3. Measure:

- Impeller shaft tilt

Out of specification → Replace.

NOTICE

Make sure the rubber damper and rubber damper holders are flush with the impeller.

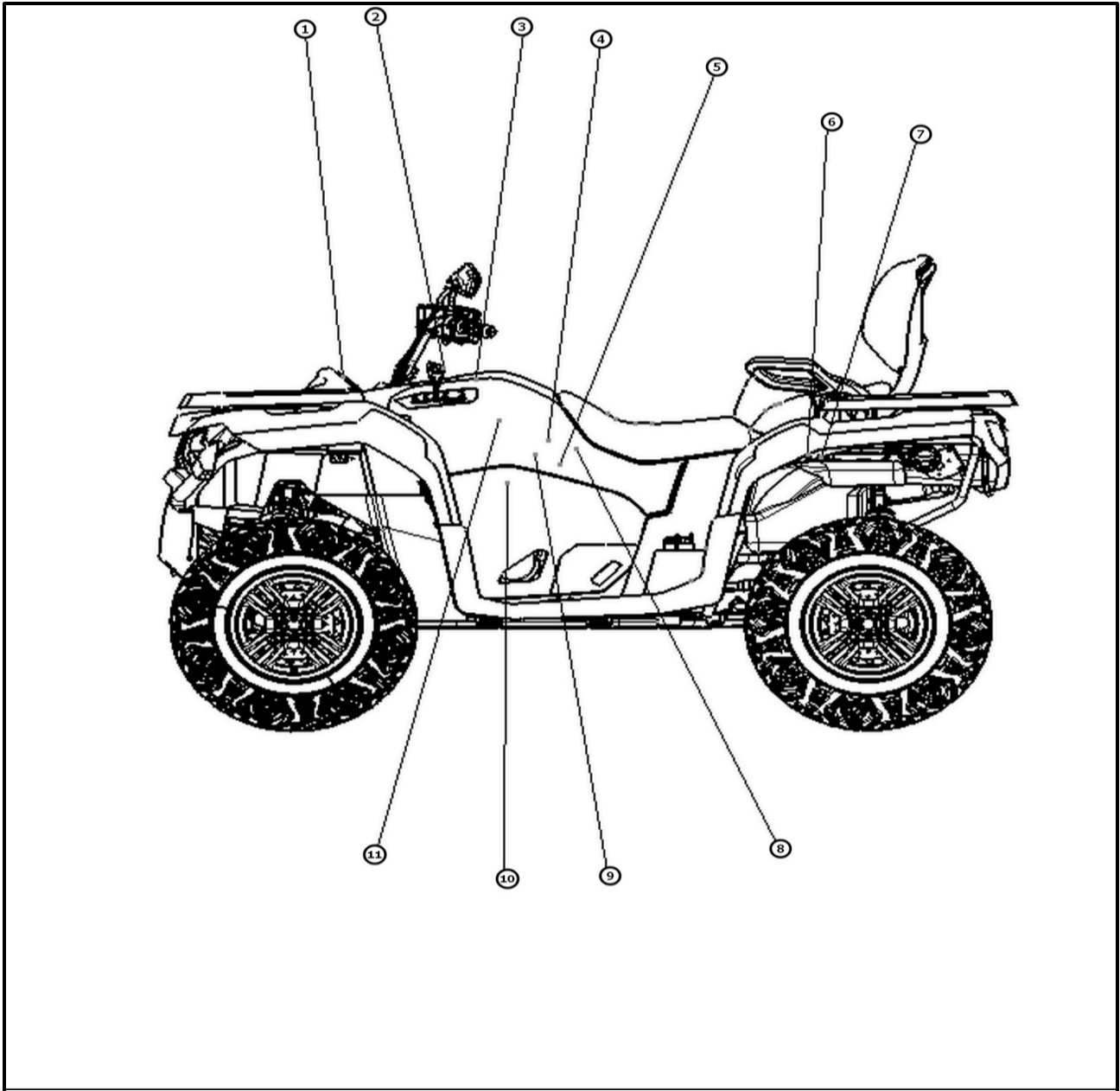


Impeller shaft tilt limit
0.15 mm (0.006 in)

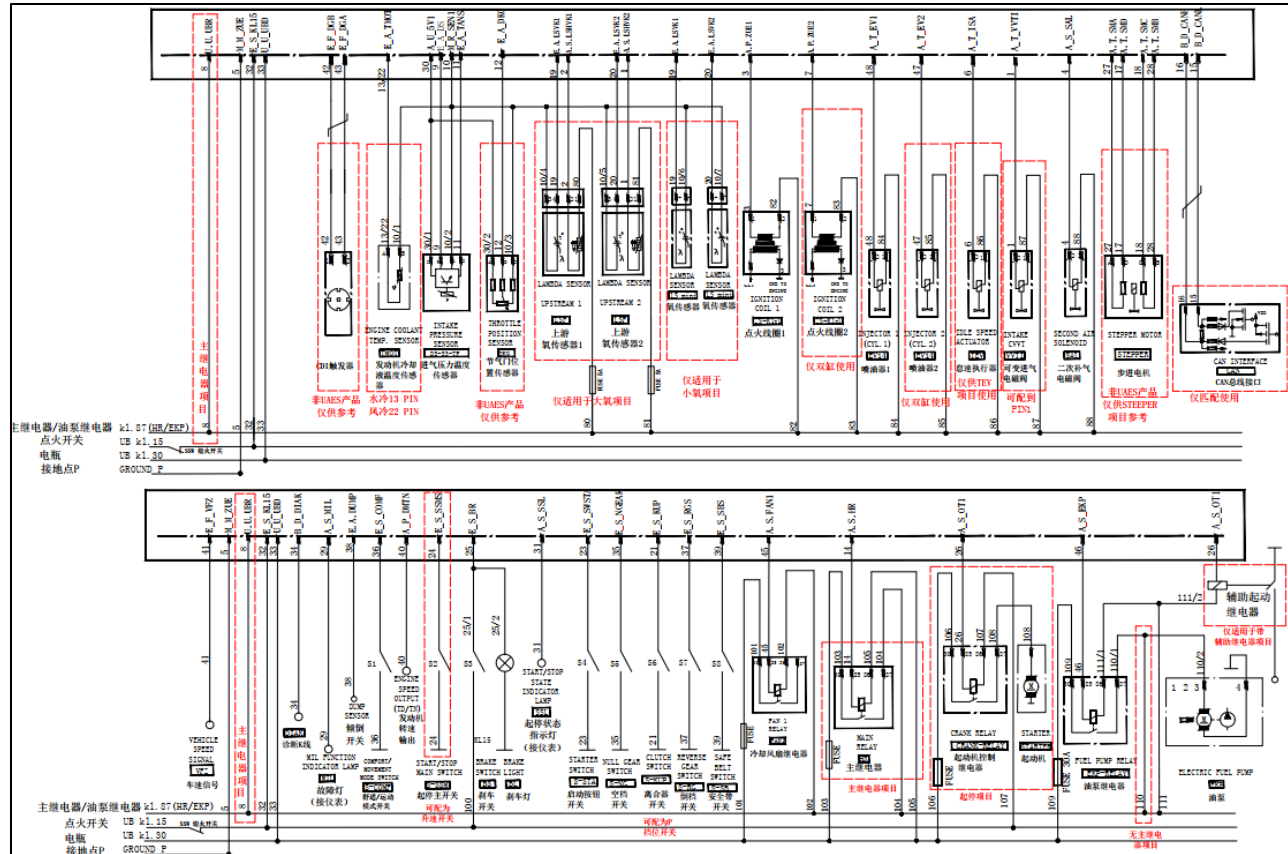
Straightedge
Impeller shaft

6 FUEL INJECTION SYSTEM

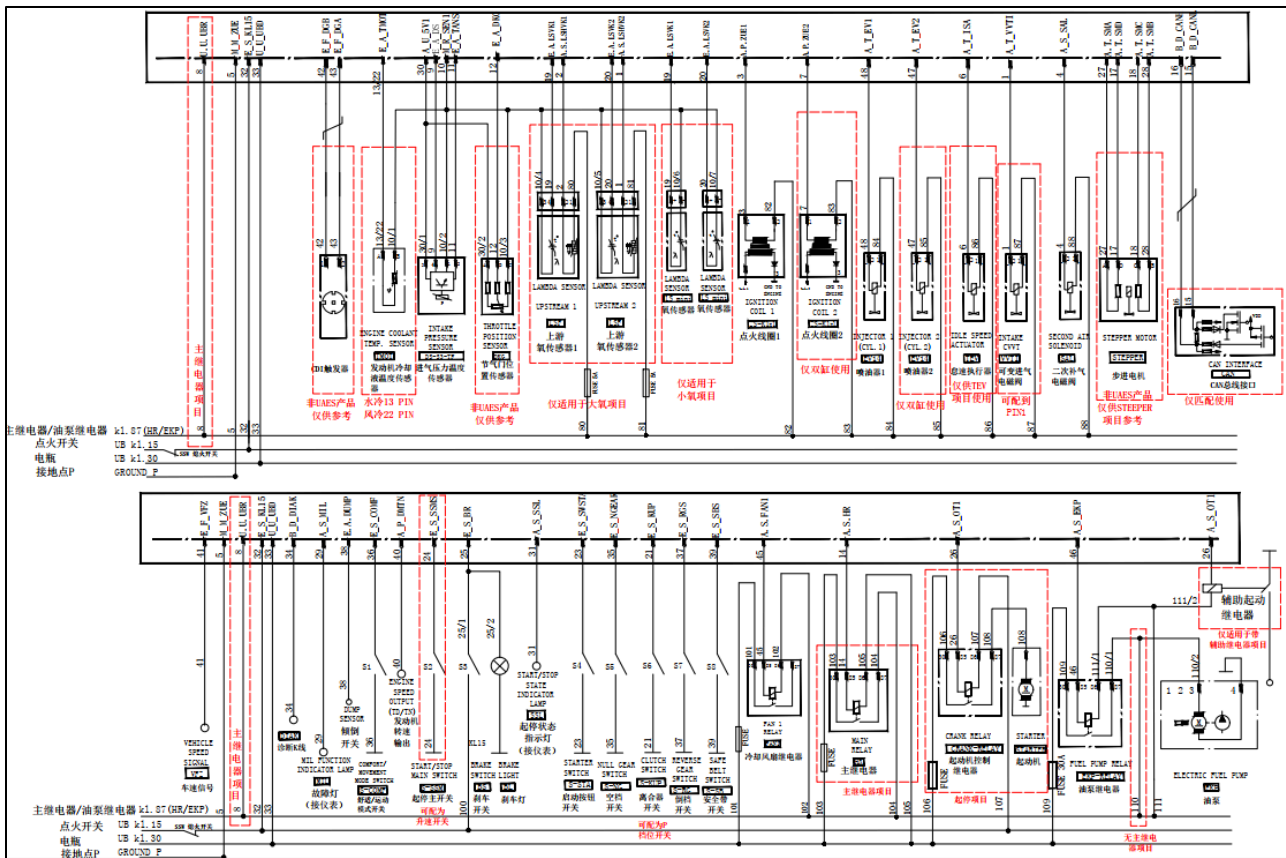
- | | |
|--|-------------------------------|
| ① Engine trouble warning light | ② Ignition coil |
| ③ Spark plug | ④ ECU (engine control unit) |
| ⑤ Crankshaft position sensor | ⑥ Fuel injection system relay |
| ⑦ Fuel pump | ⑧ Speed sensor |
| ⑨ Three-in-one sensor coupler (Intake air pressure sensor
throttle position sensor Intake air temperature sensor) | |
| ⑩ Coolant temperature sensor | ⑪ Fuel injector |



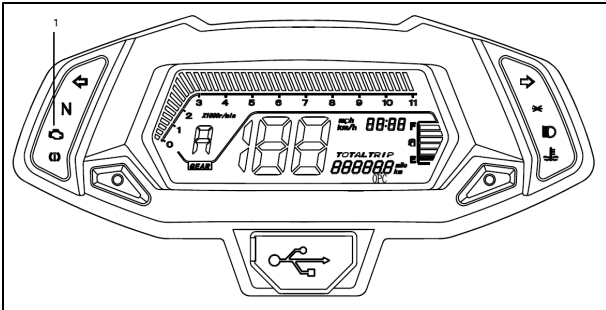
Circuit diagram



PIN-NO.	Signal	Function
2(L1)	A-S-LSHVK1	Lambda sensor heating upstream 1
3(M2)	A-P-ZUE1	Ignition coil
4(L2)	A-S-SAL	Second air solenoid-
5(M3)	M-M-ZUE	Ignition ground
8(L4)	U-U-UBR	Switched battery voltage
9(K1)	E-A-DS	Intake air pressure sensor
10(J1)	M-R-SEN1	Sensor ground 1
11(H1)	E-A-TANS	Intake air temperature sensor-
12(G1)	E-A-DKG	Throttle position sensor-
13(F1)	E-A-TMOT	Engine coolant temp.sensor-
14(E1)	A-S-HR	Main relay
17(B1)	A-T-SMD	Stepper motor phase d-
18(A1)	A-T-SMC	Stepper motor phase c-
19(K2)	E-A-LSVK1	Lambda sensor upstream 1
22(G2)	E-A-TMOT	Engine coolant temp.sensor-
23(F2)	E S RES1	Side shore switch-
27(B2)	A-T-SMA	Stepper motor phase a
28(A2)	A-T-SMB	Stepper motor phase b-
29(K3)	A-S-MIL	Mil function indicator light- mil
30(J3)	A-U-5V1	Regulated sensor supply 1-5V



PIN-NO.	Signal	Function
31(H3)	A-S-CTW	Coolant temp. warning-
32(G3)	E-S-KL15	Ignition switch-
33(F3)	U-U-UBD	Continuous supply voltage-
34(E3)	B-D-DIAK	Diagnosis k-line-
35(D3)	E-S-NGEAR	Null gear switch-
38(A3)	E-A-DUMP	Dump sensor-
40(J4)	A-P-DMTN	Engine speed output(td/tn)-
41(H4)	E-F-VFZ	Vehicle speed signal
42(G4)	E-F-DGB	Engine speed sensor b-
43(F4)	E-F-DGA	Engine speed sensor a
44(E4)	A-S-KVA	Fuel consume output
45(D4)	A-S-FAN1	Fan relay
46(C4)	A-S-EKP	Fuel pump relay-
48(A4)	A-T-EV1	Injector 1(CYL.1)



1. Engine trouble warning light

ECU self-diagnostic function

The ECU is equipped with a self-diagnostic function in order to ensure that the fuel injection system is operating normally. If this function detects a malfunction in the system, it immediately operates the engine under substitute characteristics and illuminates the engine trouble warning light to alert the rider that a malfunction has occurred in the system. Once a malfunction has been detected, a fault code is stored in the memory of the ECU.

- If a malfunction is detected in the system by the self-diagnostic function, the ECU provides an appropriate substitute characteristic operation, and alerts the rider of the detected malfunction by illuminating the engine trouble warning light.
- After the engine has been stopped, the lowest fault code number appears on the odometer/trip meter LCD. Once a fault code has been displayed, it remains stored in the memory of the ECU until it is deleted.

Engine trouble warning light indication and fuel injection system operation

Warning light indication	ECU operation	Fuel injection operation	Vehicle operation
Remains on	Malfunction detected	Operated with substitute characteristics in accordance with the description of the malfunction	Can or cannot be operated depending on the fault code

Self-diagnostic function table

If the ECU detects an abnormal signal from a sensor while the vehicle is being driven, the ECU illuminates the engine trouble warning light and provides the engine with alternate operating instructions that are appropriate for the type of malfunction.

When an abnormal signal is received from a sensor, the ECU processes the specified values that are programmed for each sensor in order to provide the engine with alternate operating instructions that enable the engine to continue to operate or stop operating, depending on the conditions.

Self-diagnostic function table

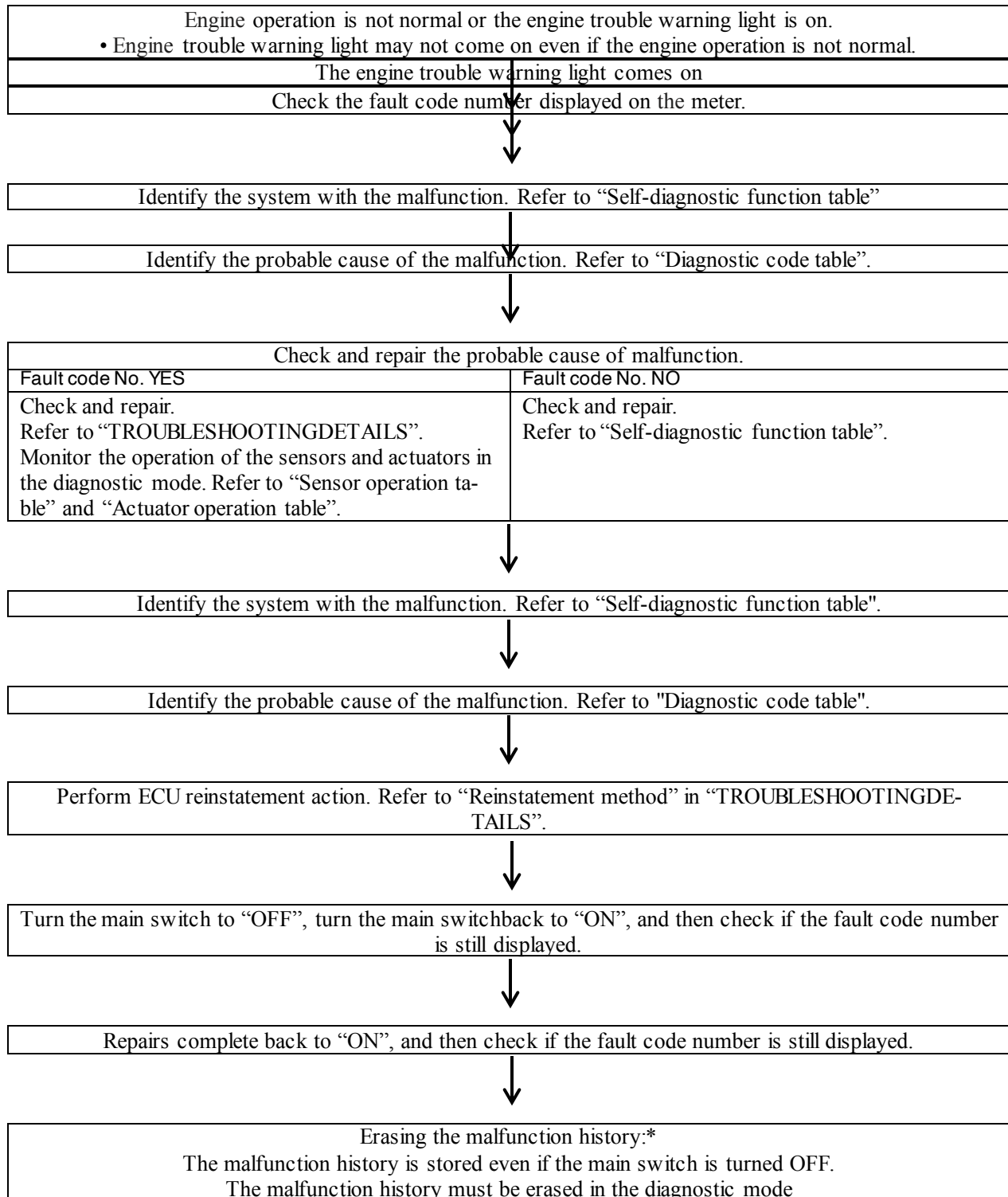
Fault code No.	Item	Symptom	Able I unable to start	Able I unable to drive
P0030	Oxygen sensor circuit	Circuit disconnect for heat controlling of oxygen sensor for upper 1 st cylinder		
P0031	Oxygen sensor circuit	Too low the voltage of heat controlling of oxygen sensor for upper 1 st cylinder		
P0032	Oxygen sensor circuit	Too high the voltage of heat controlling of oxygen sensor for upper 1 st cylinder		
P0131	Oxygen sensor circuit	Too low the voltage of oxygen sensor for upper 1 st cylinder		
P0132	Oxygen sensor circuit	Too high the voltage of oxygen sensor for upper 1 st cylinder		
P0134	Oxygen sensor circuit	Signal failure of oxygen sensor circuit of upper 1 st cylinder		
P0107	Air inlet pressure sensor	Too low the voltage of air inlet pressure sensor circuit		

Fault code No.	Item	Symptom	Able I unable to start	Able I unable to drive
P0108	Air inlet pressure sensor	Too high the voltage of air inlet pressure sensor circuit		
P0112	Air inlet pressure sensor	Too low the voltage of air inlet temperature sensor circuit		
P0113	Air inlet pressure sensor	Too high the voltage of air inlet temperature sensor circuit		
P0117	Engine temperature sensor	Too low the voltage of engine temperature sensor circuit		
P0118	Engine temperature sensor	Too high the voltage of engine temperature sensor circuit		
P0122	Throttle valve position sensor	Less than limit the voltage of throttle valve position sensor circuit		
P0123	Throttle valve position sensor	More than limit the voltage of throttle valve position sensor circuit		
P0201	Fuel injector	Controlling circuit disconnect of 1 st cylinder		
P0261	Fuel injector	Controlling circuit short circuit to ground of 1 st cylinder		
P0262	Fuel injector	Controlling circuit short circuit to power resource of 1 st cylinder		
P2300	Ignition coil	Ignition coil short circuit to ground of 1 st cylinder		
P0560	Battery	Wrong voltage signal for battery system		
P0562	Battery	Too low the battery voltage		
P0563	Battery	Too high the battery valuate		
P0627	Oil pump relay	Controlling circuit disconnect of oil pump relay		
P0628	Oil pump relay	Too low the voltage of controlling circuit of oil pump relay		
P0629	Oil pump relay	Controlling short circuit to power resource of oil pump relay		
P0650	MI light	Driving circuit failure of MIL light		
P1116	Engine water temperature	The engine coolant temperature more than limit		
P2300	Ignition coil	Ignition coil short circuit of 1 st cylinder		
P0480	Cooling fan	Controlling circuit disconnect of cooling fan		
P0691	Cooling fan	Too low the voltage in controlling circuit of cooling fan		
P0692	Cooling fan	Too high the voltage in controlling circuit of cooling fan		

Communication error with the meter

Fault code No.	Item	Symptom	Able I unable to start	Able I unable to drive
Er-1	ECU internal malfunction(output signal error)	No signals are received from the ECU.	unable	unable
Er-2	ECU internal malfunction (output signal error)	No signals are received from the ECU within the specified duration.	unable	unable
Er-3	ECU internal malfunction(output signal error)	Data from the ECU cannot be received correctly.	unable	unable
Er-4	ECU internal malfunction (input signal error)	Non-registered data has been received from the meter.	unable	unable

Troubleshooting chart



Diagnostic code table

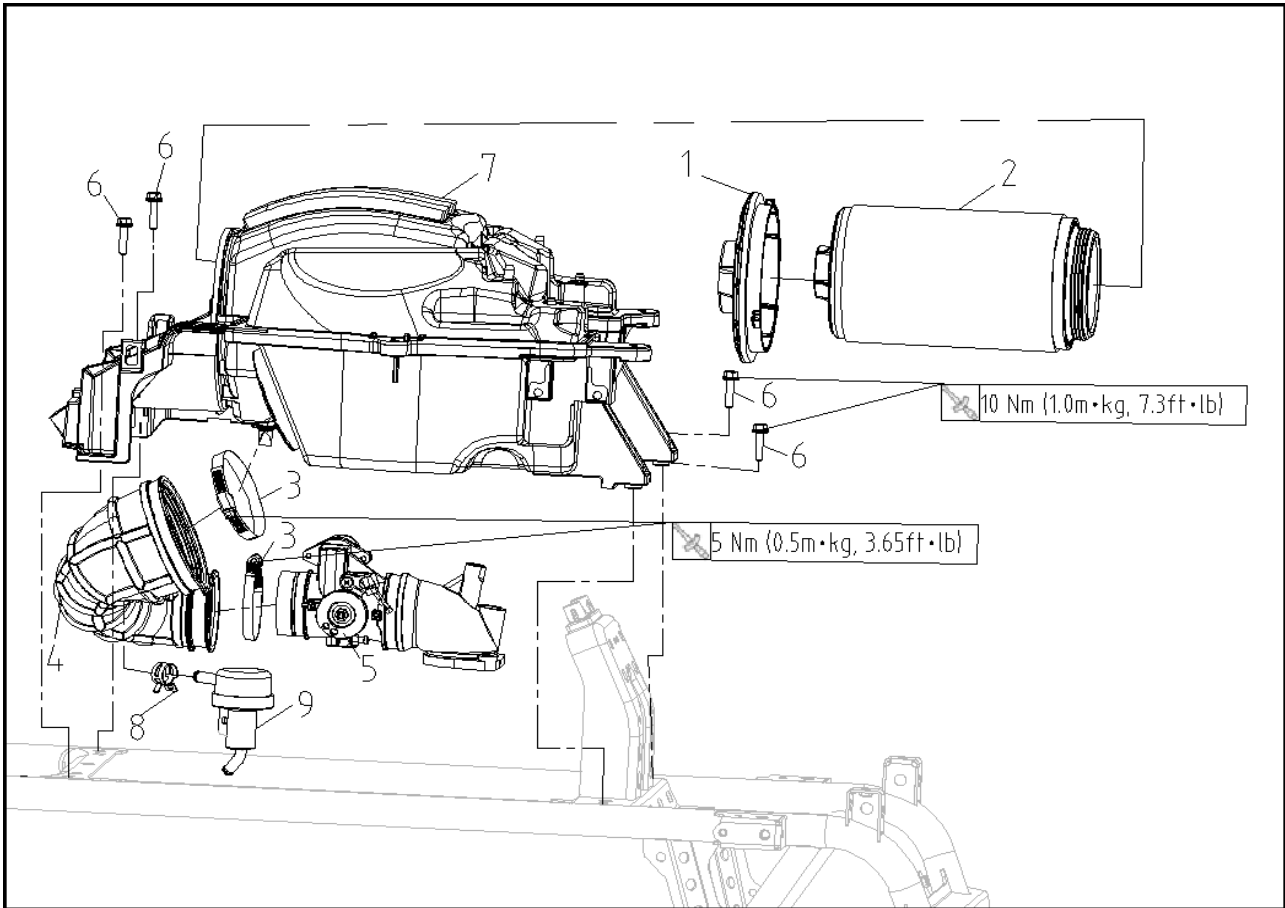
Fault code No	Symptom	Probable cause of malfunction	Checking method
P0030	Circuit disconnect of heat controlling of 1 st cylinder oxygen sensor	•The circuit between 2nd foot of oxygen sensor connects to ECU and upper 1st cylinder cut off. •The circuit between 1st feet of upper 1st oxygen sensor of 1st cylinder connect to main relay cut off. •The circuit between 1st foot and 2nd foot of oxygen sensor of upper 1st cylinder cut off.	•Measure the resistance in the circuit between 1st foot and 2nd one of oxygen sensor of 1st cylinder and the foot of ECU connector, judge if their normal work. •Measure the resistance between 1st foot of oxygen sensor of 1st cylinder and main relay, judge their normal work. •Measure the circuit disconnect between 1st and 2nd foot of oxygen sensor of upper 1st cylinder
P0031	Too low the voltage in heat controlling circuit of oxygen sensor of upper 1 st cylinder	•The circuit connect to ECU foot short circuit to ground	•Check the normal resistance of ECU foot to ground
P0032	Too high the voltage in heat controlling circuit of oxygen sensor of upper 1 st cylinder	•Short circuit between the 1st foot of upper oxygen sensor and ECU foot. •Short circuit between ECU foot and other power resource circuit.	•Check the voltage of ECT. •Measure the resistance between ECU foot and 1st foot of oxygen sensor of upper 1st cylinder.
P0131	Too low the voltage in circuit of oxygen sensor of upper 1 st cylinder	•Short circuit of ECU foot signal to the ground.	•Measure the resistance between ECU foot of signal circuit to the ground.
P0132	Too high the voltage in circuit of oxygen sensor of upper 1 st cylinder	•Short circuit between ECU foot signal and 1st foot of the oxygen sensor of upper 1st cylinder. •Short circuit of ECU foot signal to the ground.	•Measure the resistance between ECU foot signal circuit and 1st foot of oxygen sensor of 1st cylinder. •Measure the voltage in signal circuit connect to ECU foot.
P0134	Circuit failure of oxygen sensor of upper 1 st cylinder	•Circuit disconnection between ECU foot and oxygen sensor of upper 1st cylinder •Bad connection of connector of oxygen sensor of upper 1st cylinder	•Measure the resistance between 4th foot of oxygen sensor of upper 1st cylinder and ECU connector.
P0107	Too low the voltage in circuit of air inlet pressure sensor	•Short circuit to ground detected of sensor signal by ECU	•Measure the resistance between ECU foot and ground.
P0108	Too high the voltage in circuit of air inlet pressure sensor	•Short circuit to ground detected of sensor signal by ECU	•Measure the resistance between ECU foot and ground.
P0112	Too low the voltage of air inlet temperature sensor signal	•Short circuit to the ground of sensor signal from ECU foot	•Measure the resistance between sensor signal circuits of ECU foot to the ground.
P0113	Too high the voltage of air inlet temperature sensor signal	•Short circuit to power resource of sensor signal of ECU foot	•Measure the voltage of sensor signal circuit of ECU foot.
P0117	Too low the voltage in circuit of engine temperature sensor	•Short circuit to the ground of sensor signal from ECU foot	•Measure the resistance between ECU foot and ground.
P0118	Too high the voltage in circuit of engine temperature sensor	•Short circuit to other power resources of sensor signal of ECU foot	•Measure the voltage connect to ECU foot.
P0122	Circuit voltage less than limit of throttle valve position sensor	•Short circuit to the ground of ECU foot	•Measure the resistance between ECU foot and ground.

Fault code No	Symptom	Probable cause of malfunction	Checking method
P0123	The voltage of throttle valve position sensor circuit higher than limit	•Circuit short between ECU foot and other power resource.	•Check the voltage connect to ECU foot.
P0201	Controlling circuit disconnection to 1st cylinder fuel injector	• Check if there is circuit disconnection of fuel injector coil of 1st cylinder. •Check the connection between ECU foot and needle foot of 1st cylinder connector. •Check the connection between main relay and needle foot of 1st cylinder connector.	•Check the connection between ECU foot and needle foot of fuel injector's connector of 1st cylinder. •Check the connection between main relay and needle foot of fuel injector of 1st cylinder.
P0261	Controlling circuit short of 1st cylinder fuel injector to ground	•Circuit short to the ground of ECU foot connects to each driving circuits.	•Measure the resistance between ECU foot and ground.
P0262	Controlling circuit short of 1st cylinder fuel injector to power resource.	•Short circuit between ECU foot to other power resource	•Measure the voltage of circuit connect to ECU foot.
P0563	Too high the battery voltage	•The power generator damaged fail to generate power or battery power leakage. •Circuit disconnection of generator magnetic circuit. •Generator adjustor damaged fail to control power producing and lead to power get out and too high the voltage.	•Check the generator's capacity for producing power (Measure the generator voltage after started).
P0627	Controlling circuit disconnection of oil pump relay	•The circuit connects to ECU's controlling circuit of oil pump relay and oil pump relay disconnected/short to the ground/To power resource. •Circuit disconnection between relay and main relay. •Open circuit of magnetic coil of relay.	Measure the resistance or voltage connect to controlling circuit of oil pump relay of ECU. •Measure the resistance between relay and main relay. •The resistance between two feet of relay.
P0629	Controlling circuit.		

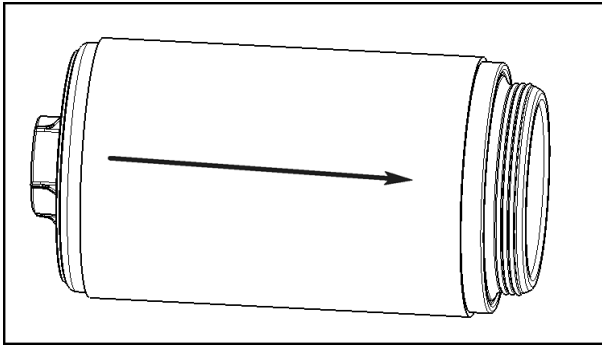
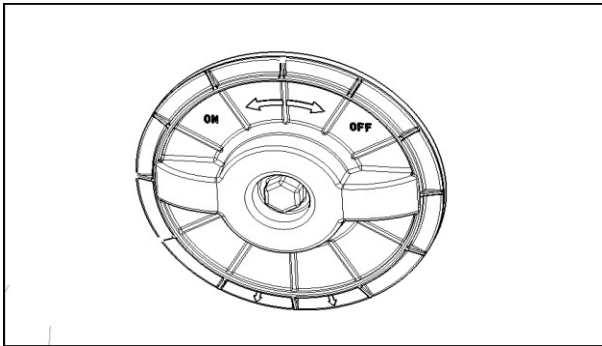
FUEL INJECTION SYSTEM

Fault code No	Symptom	Probable cause of malfunction	Checking method
P0650	Driving circuit failure of MIL light	•Driving circuit connect between ECU and MIL light disconnect/short to ground/short to power resource. •Open circuit between MIL to main relay. •MIL light burned out.	•Measure the resistance or voltage connect driving circuit of MIL light of ECU.
P1116	Alarm of engine water temperature higher than limit.	•The engine temperature higher than limit, the alarm light of water temperature on instrument permanently on.	•Let the engine water temperature cool down until alarm light off, and run the vehicle for three circulations, the fault indicator light goes off; Or manually erase the historic failure record; Turn off the key, then open, then the vehicle started and fault indicator light goes off. •Meaning of running circulation: Start the vehicle and run above seconds or meet the demands of corresponding parts' activation, this is a running circulation.

Air filter



Order	Job/Part	Q'ty	Remarks
	Removing the air filter		
	cushion		Remove the parts in the order listed.
	Instrument decoration cover		
	Cover plate of air filter		
	On the left side of the cover	1	
1	Air filter case cover	1	
2	Air filter element combination	1	
3	joint clamp	1	
4	Air filter connection pipe	1	
5	Throttle body assembly	1	
6	bolt	1	
7	Air filter house	1	
8	clamp	1	For installation, reverse the removal procedure.
9	oil-gas separator	1	



Replace the air filter element combination

1. Remove:
 - cushion
 - air filter case cover
 - air filter element combination
2. Replace:
 - air filter element combination

NOTE:

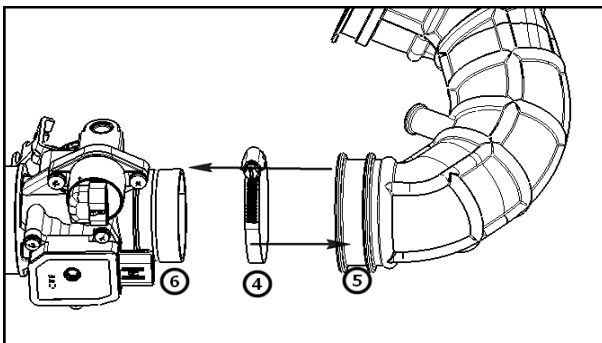
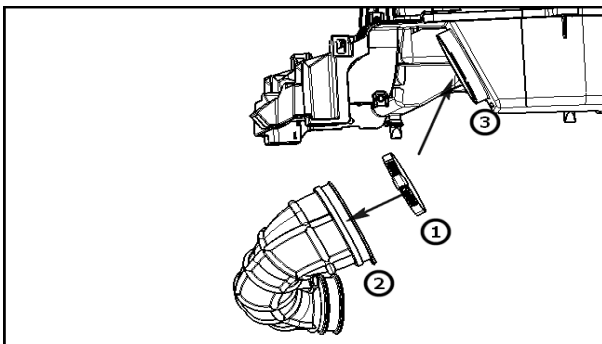
- Open the air filter case cover by pushing it forward and turning to ON, then replace air filter element combination with a new one.
- Place the new air filter element combination into the air filter housing according to the drawing direction.
- Close the air filter case cover as above, turning to OFF.

⚠ WARNING

- If dirt or dust is allowed to pass through into the carburetor, the throttle may become stuck, possibly causing an accident. Replace the air cleaner element according to the maintenance chart.

NOTICE

- If dirt gets through into the engine, excessive engine wear and possibly engine damage will occur.



Installing the air filter connection pipe

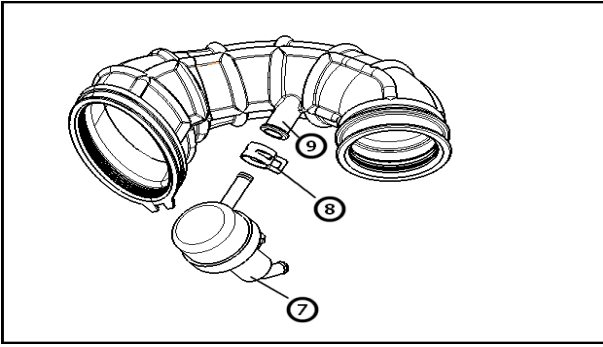
1. Install
 - Air filter joint
 - Throttle body joint

NOTE:

- Align the worm gear hoop ① with the air filter connection pipe ②, then put them into air filter house ③ and lock the worm gear hoop, finally apply the torque.
- Align the worm gear hoop ④ with the air filter connection pipe ⑤, then put them into the throttle body joint ⑥ and lock the worm gear hoop, finally apply the torque.

NOTICE

- The locking torque of worm wheel and worm hoop is 5 Nm (0.5m·kg, 3.65ft·lb).

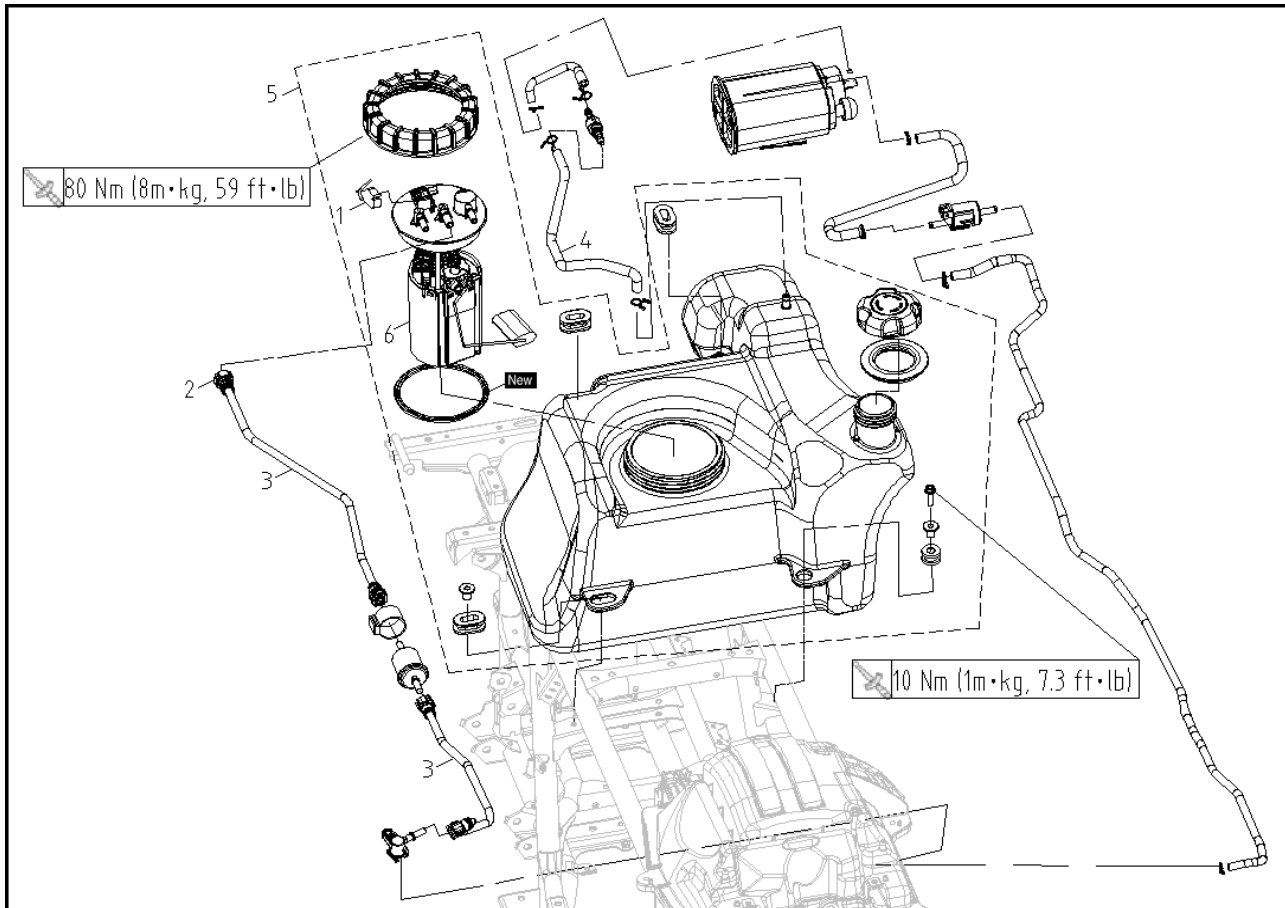


Installing the oil and gas separator

NOTE:

- Align the clamp ⑧ with the air filter connection pipe ⑨, and align the oil and gas separator, then lock clamp.

Fuel Tank



Order	Job/Part	Q'ty	Remarks
	Removing the fuel tank		
	Seat and support plate		Remove the parts in the order listed.
	Covering parts	1	
	The left rear wheel	1	
	The left rear shock absorbers	1	
		1	
1	Fuel pump coupler	1	
2	Fuel hose connector	1	
3	Fuel hose	1	
4	Fuel tank breather hose	1	For installation, reverse the removal procedure.
5	Fuel tank	1	
6	Fuel pump assembly	1	

Removing the fuel tank

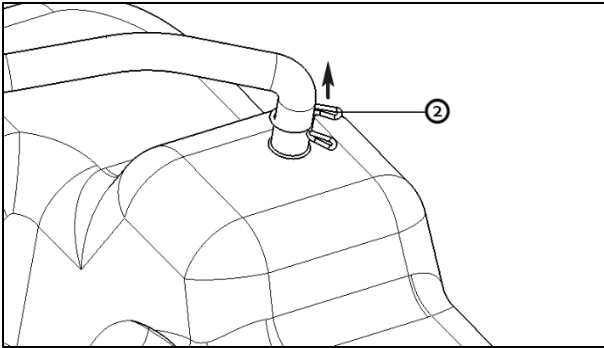
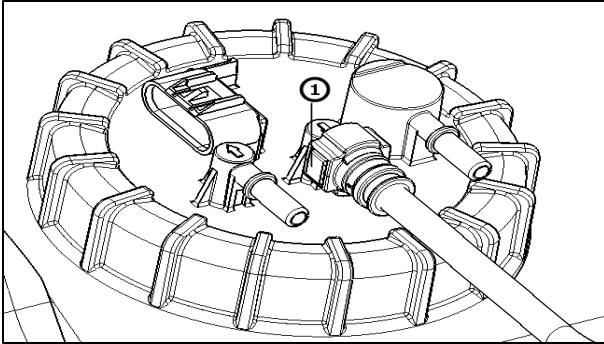
1. Extract the fuel in the fuel tank through the fuel tank cap with a pump.

2. Remove:

- Bolt and nut
- fuel hose connector
- fuel hose
- fuel tank breather hose

CAUTION:

- Be sure to disconnect the fuel hose by hand. Do not forcefully disconnect the hose with tools.
- Although the fuel has been removed from the fuel tank, be careful when removing the fuel hose, since there may be fuel remaining in it.



NOTICE

- When removing the fuel hose from the fuel pump, remove the fuel hose connector first, press the two buttons ① on the sides of the connector, and then remove the hose.
- Before removing the hose, place a few rags in the area under where it will be removed.
- When removing the fuel tank breather hose from the fuel tank, remove the hoop ② up the hose first, and then remove the hose.

3. Remove:

- fuel tank

NOTE:

Do not set the fuel tank down on the installation surface of the fuel pump. Be sure to lean the fuel tank against a wall or like.

Removing the fuel pump

1. Remove:

- fuel pump cover
- fuel pump
- fuel pump gasket

Checking the fuel pump body

1. Check:

- fuel pump body

Obstruction → Clean.

Cracks/damage → Replace the fuel pump assembly.

Checking the fuel pump body

1. Check:

- fuel pump body

Obstruction → Clean.

Cracks/damage → Replace the fuel pump assembly.

Installing the fuel pump

1. Install:

- fuel pump gasket
- fuel pump
- fuel pump cover

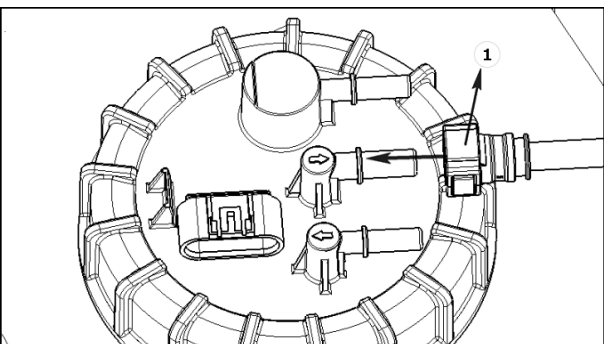
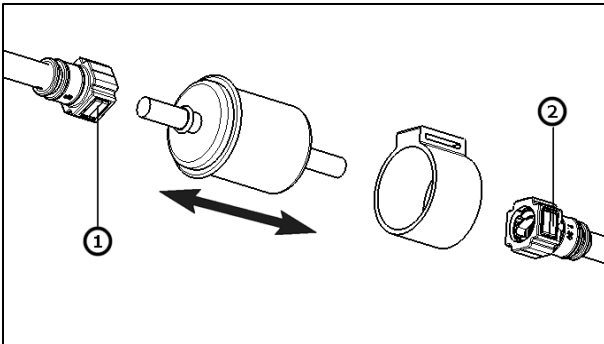
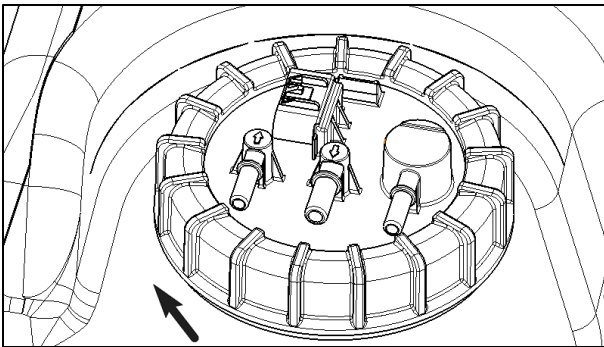
New



80Nm (8m·kg, 59ft·lb)

NOTICE

- Do not damage the installation surface of the fuel tank when installing the fuel pump.
- Always use a new fuel pump gasket.
- Install the fuel pump in the direction shown in the illustration.
- Install the fuel pump cover by special tool and turn it clockwise, when the oil pump cover is suspended, measuring the torque with a torque meter.



Checking the fuel filter

1. Remove:

- fuel hose
- fuel filter

2. Check:

Obstruction → Replace the fuel filter.

NOTICE

- Refer to the above method to remove fuel hose to remove ① and ②.
- As the fuel filter is used for longer, the impurities will be increase. in this way, the filtering effect will be greatly reduced, so when you find that the fuel supply is insufficient, then eliminate engine and ignition coil failures, you can check whether the fuel filter is blocked.

Installing the fuel hose

1. Install:

- fuel hose

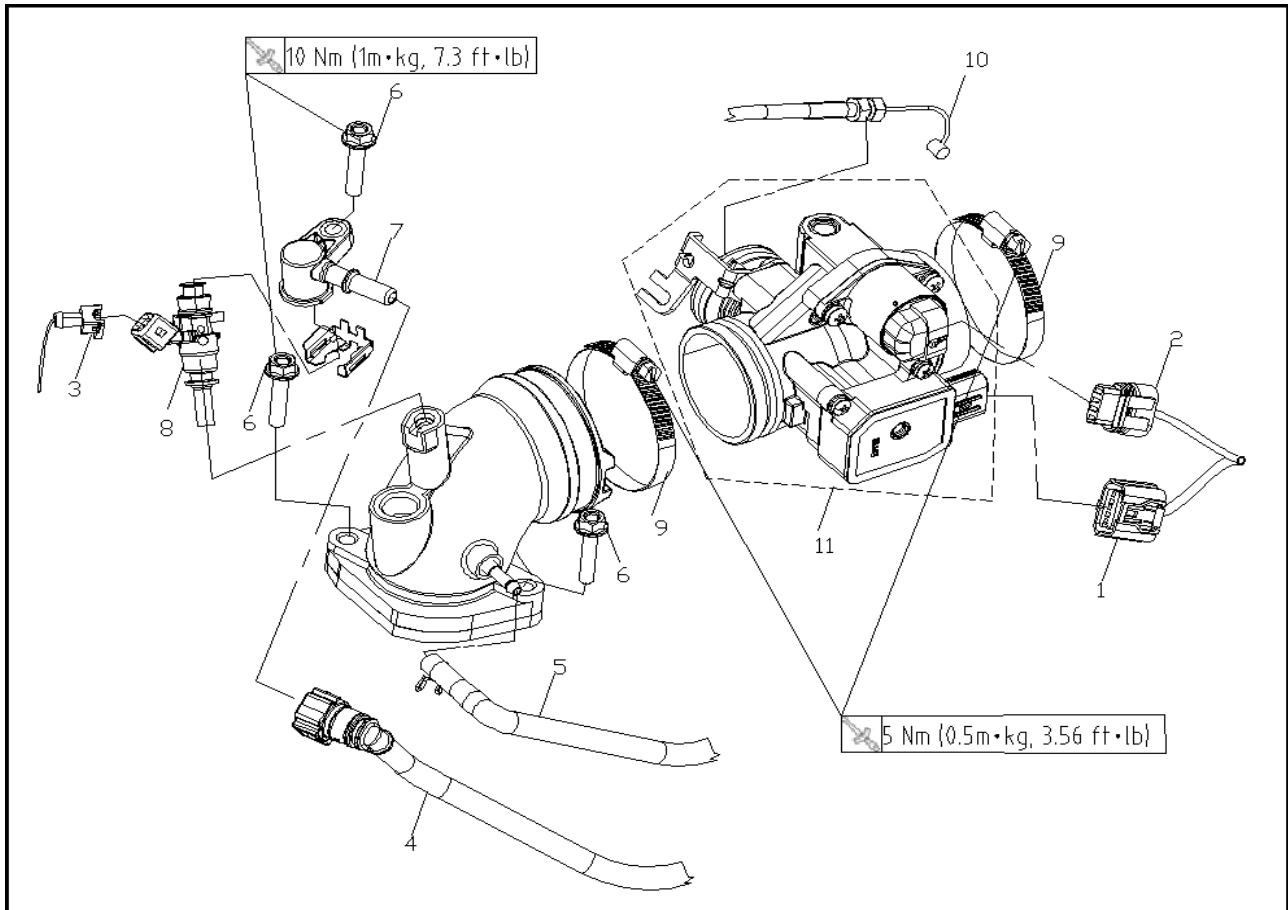
CAUTION:

When installing the fuel hose, make sure that it is securely connected, and that the fuel hose holder is in the correct position, otherwise the fuel hose will not be properly installed.

NOTE:

- Install the fuel hose connector holder 1 securely onto the fuel pump until a distinct “click” is heard, and then make sure that it does not come loose.

Throttle body



Order	Job/Part	Q'ty	Remarks
	Removing the throttle body		
	Air filter case		Remove the parts in the order listed.
	Coolant		
1	Three-in-one sensor coupler	1	
2	Idle speed sensor coupler	1	
3	Fuel injector coupler	1	
4	Fuel hose	1	
5	Breather hose	1	
6	Intake pipe and cylinder block clamp screw	1	
	Fuel injector cap	1	
7	Fuel injector	1	
8	Throttle body joint clamp screw	1	
9	Throttle cable	1	For installation, reverse the removal procedure.
10	Throttle body assembly	1	
11		1	

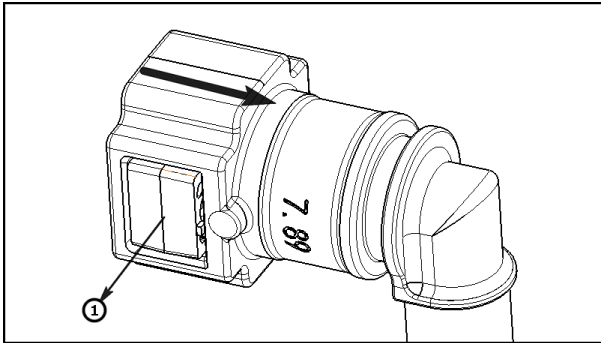
Removing the throttle body assembly

1. Disconnect:

- fuel hose

CAUTION:

- Be sure to disconnect the fuel hose by hand. Do not forcefully disconnect the hose with tools.
- Although the fuel has been removed from the fuel tank, be careful when disconnecting the fuel hose, since there may be fuel remaining in it.



NOTICE

- To disconnect the fuel hose from the fuel injector cap, press the two buttons ① on the sides of the connector, slide the fuel hose connector in direction of the arrow shown, and then disconnect the hose.
- Before disconnecting the hose, place a few rags in the area under where it will be disconnected.

Checking the fuel injector

1. Check:

- fuel injector

Damage → Replace.

Checking the throttle body

1. Check:

- throttle body

Cracks/damage → Replace the throttle body.

2. Check:

- fuel passages

Obstructions → Clean.

NOTICE

- Wash the throttle body in a petroleum based solvent.
- Do not use any caustic carburetor cleaning solution.
- Blow out all of the passages with compressed air.

Installing the throttle body assembly

1. Install:
 - throttle body joint ①

NOTE:

Align the throttle body joint ① with the inlet pipe notch ②, align and lock the worm gear hoop ③ with position ④ on the inlet pipe notch.

2. Install:
 - throttle body joint ②

NOTE:

Align the throttle body joint ② with the interface of the air filter ⑤, align the worm wheel and worm hoop ⑥ with position ⑦ and lock it tightly on the interface of the air filter.

NOTICE

• The locking torque of worm wheel and worm hoop is 5 Nm (0.5 m·kg, 3.65 ft·lb).

3. Install:
 - throttle cable

Installing intake-tube

1. Install:
 - heat insulation pad
 - sealing ring **New**
 - intake-tube

NOTE:

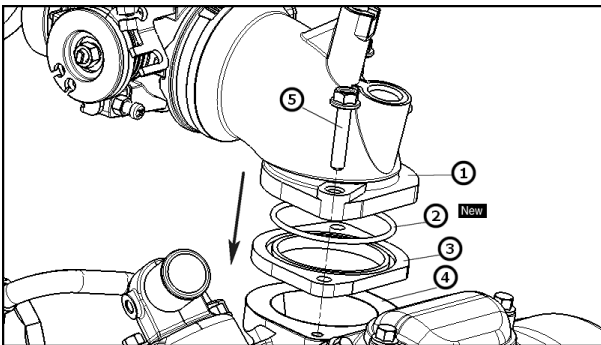
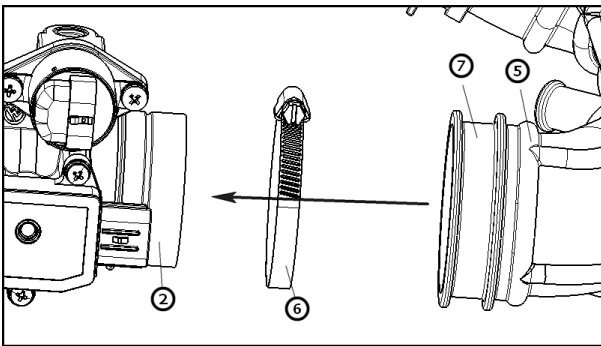
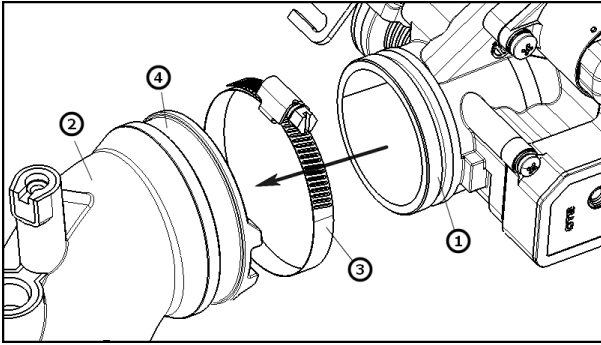
Align the holes of heat insulation pad ③, sealing ring ②, air cylinder mouth ④ and intake-tube ① first, then tighten the bolts ⑤ in the direction of the arrow.

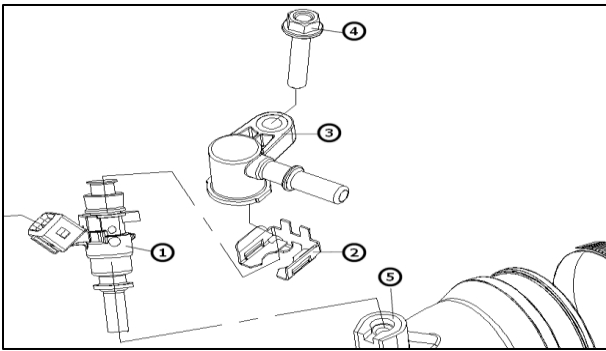
NOTICE

• Always use a new sealing ring.
 • The locking torque range of ⑤ is 9 to 11 Nm (0.9 m·kg, 6.64 ft·lb) ~ (1.1 m·kg, 8.12 ft·lb).

Installing fuel injector

1. Install:
 - fuel injector
 - fuel injector stuck
 - fuel injector cap
 - bolt





NOTICE

- The locking torque range of ④ is 9 to 11 Nm (0.9 m·kg, 6.64 ft·lb) ~ (1.1 m·kg, 8.12 ft·lb).
- The fuel injector ① is mounted along the dotted line to the intake-tube ⑤.

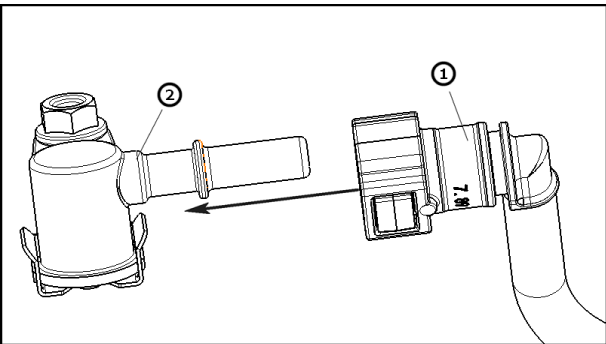
Connect fuel hose

CAUTION:

When connecting the fuel hose, make sure that it is securely connected, and that the fuel hose holder is in the correct position, otherwise the fuel hose will not be properly installed.

NOTE:

- To connect the fuel hose onto the fuel injector cap ②, slide the fuel hose connector ① on the end of the hose in direction of the arrow shown.
- Install the fuel hose connector ① securely onto the fuel injector cap until a distinct “click” is heard, and then make sure that it does not come loose.



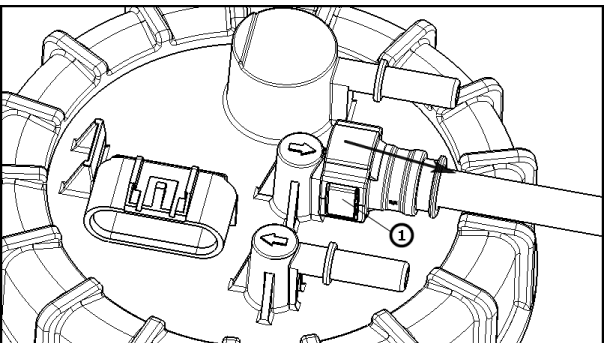
Checking the fuel pump and pressure regulator operation

1. Check:

- pressure regulator operation
 - a. Remove the fuel hose connector.
 - b. Disconnect the fuel hose from the fuel pump.

NOTE:

- When removing the fuel hose from the fuel pump, remove the fuel hose connector first, and press the two buttons on the sides of the connector ①, then slide it in the direction of the arrow, and remove the fuel hose.
- Before removing the hose, place a few rags in the area under where it will be removed.



- c. Connect the pressure gauge ③ and adapter ④ to the fuel pump and fuel hose.

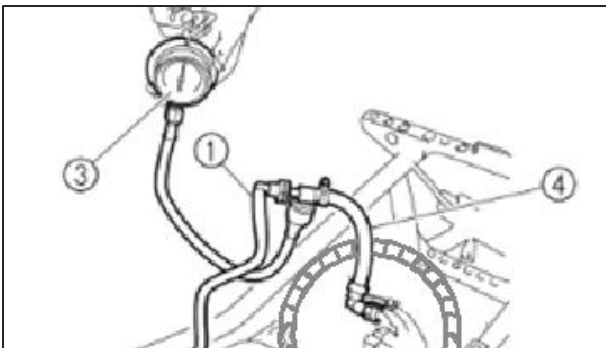


Pressure gauge
Fuel pressure adapter

- d. Start the engine.
- e. Measure the fuel pressure.



Fuel pressure
350 kPa (3.5 kg/cm², 50.76 psi)



Out of specification → Replace the fuel pump.

7 DRIVETRAIN

Troubleshooting

The following conditions may indicate damaged shaft drive components:

Symptoms	Possible Causes
1. A pronounced hesitation or “jerky” movement during acceleration, deceleration or sustained speed. (This must not be confused with engine surging or transmission characteristics.) 2. A “rolling rumble” noticeable at low speed; a high-pitched whine; a “clunk” from a shaft drive component or area. 3. A locked-up condition of the shaft drive train mechanism, no power transmitted from the engine to the front and/or rear wheel.	A. Bearing damage. B. Improper gear lash. C. Gear tooth damage. D. Broken drive shaft. E. Broken gear teeth. F. Seizure due to lack of lubrication. G. Small foreign objects lodged between the moving parts.

NOTE:

Areas A, B, and C above may be extremely difficult to diagnose. The symptoms are quite subtle and difficult to distinguish from normal vehicle operating noise. If there is reason to believe these components are damaged, remove the components and check them.

Checking noises

1. Investigate any unusual noises.
 - a. A “rolling rumble” noise during coasting, acceleration, or deceleration. The noise increases with front and/or rear wheel speed, but it does not increase with higher engine or transmission speeds.
Diagnosis: Possible wheel bearing damage.
 - b. A “whining” noise that varies with acceleration and deceleration.
Diagnosis: Possible incorrect reassembly, too-little gear lash.

CAUTION:

Too little gear lash is extremely destructive to the gear teeth. If a test ride following reassembly indicates this condition, stop riding immediately to minimize gear damage

- c. A slight “thank” evident at low speed operation. This noise must be distinguished from normal vehicle operation.
Diagnosis: Possible broken gear teeth.

WARNING:

Stop riding immediately if broken gear teeth are suspected. This condition could result in the shaft drive assembly locking up, causing loss of control of the vehicle and possible injury to the rider.

2. Check:

- drained oil

Drained oil shows large amounts of metal particles

→ Check the bearing for seizure.

NOTE: _____

A small amount of metal particles in the oil is normal.

3. Check:

oil leakage

- a. Clean the entire vehicle thoroughly, and then dry it.

- b. Apply a leak-localizing compound or dry powder spray to the shaft drive.

- c. Road test the vehicle for the distance necessary to locate the leak.

Leakage → Check the component housing, gasket, and/or seal for damage.

Damage → Replace the component.

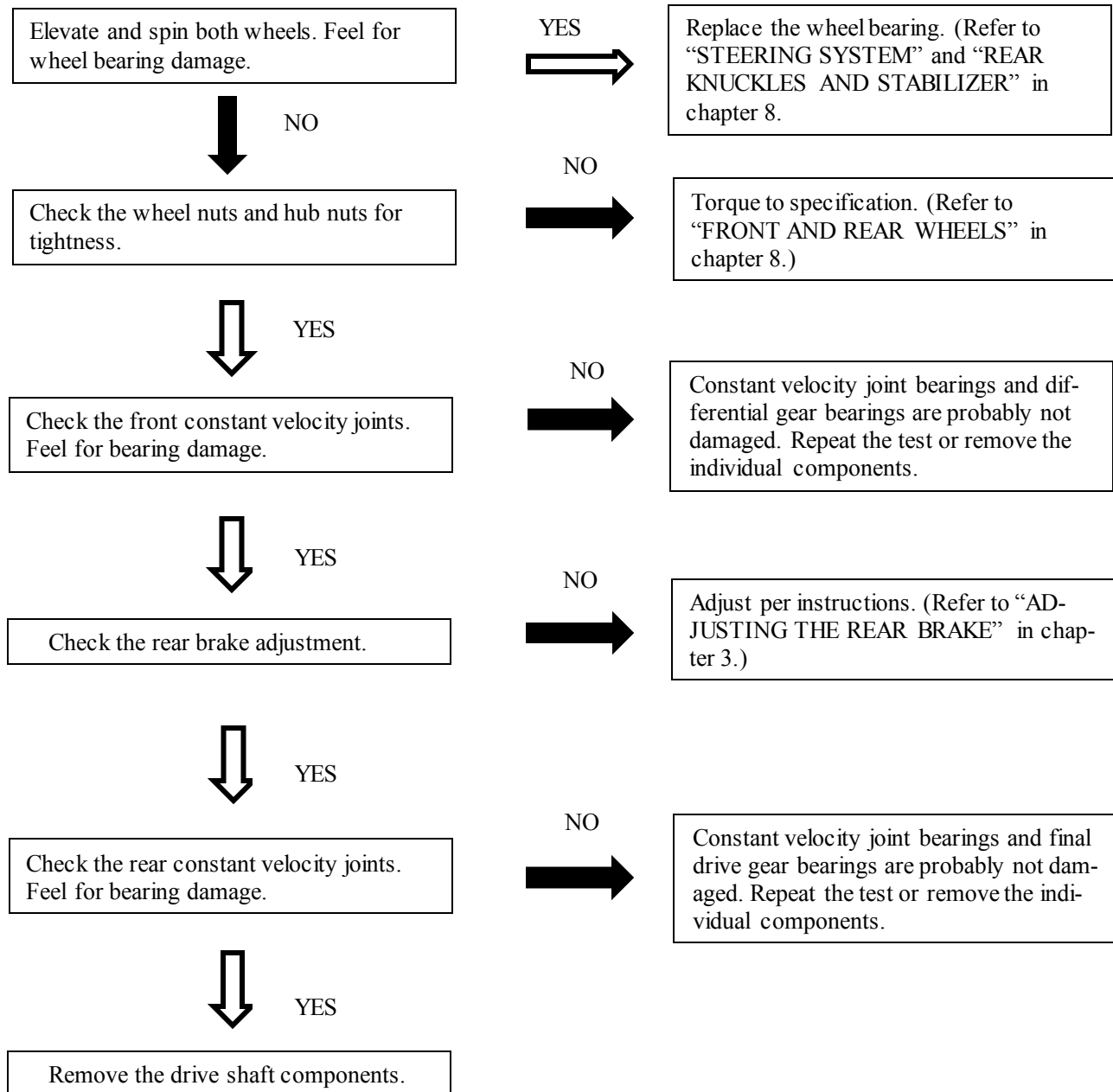
NOTE: _____

An apparent oil leak on a new or nearly new vehicle may be the result of a rust preventative coating or excessive seal lubrication.

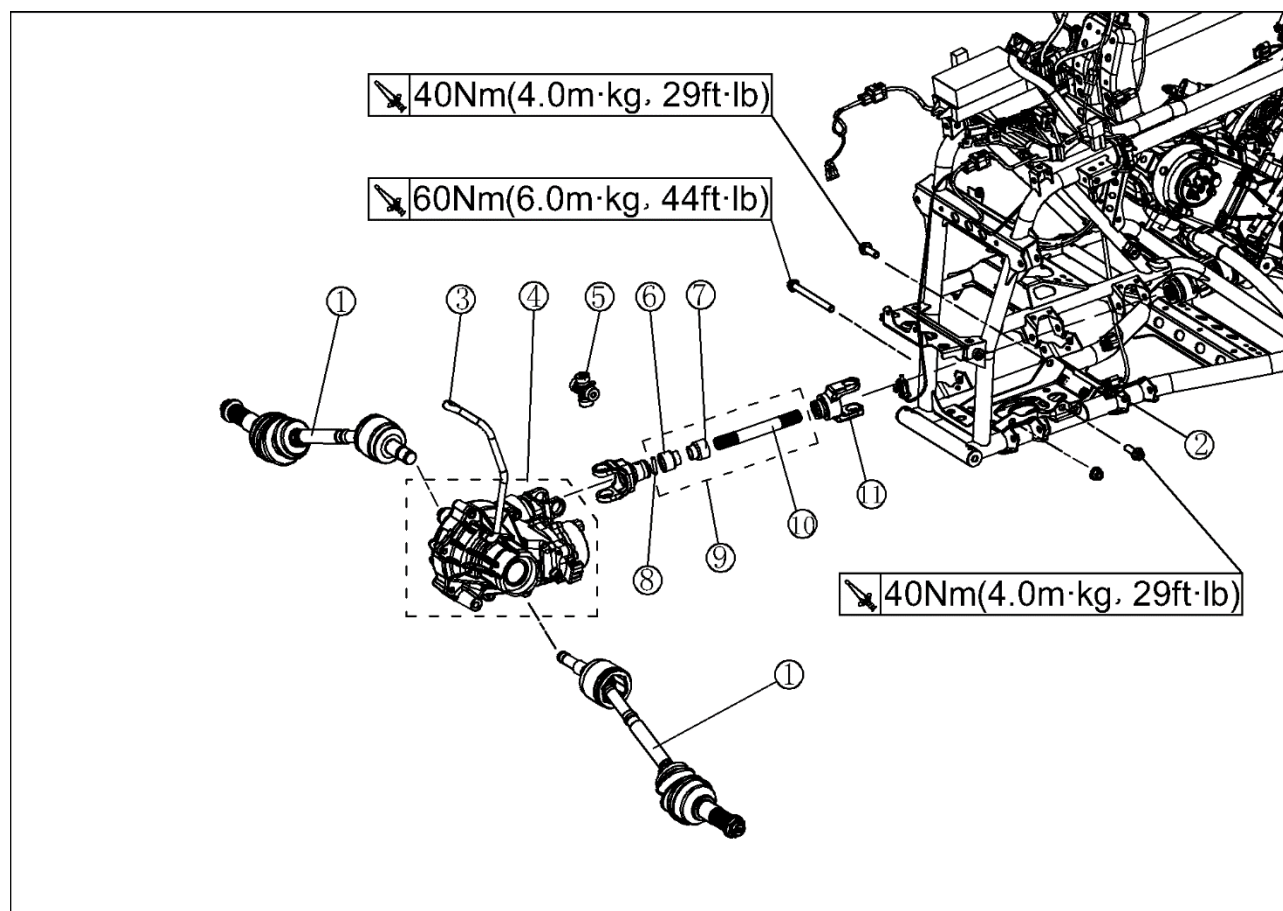
Always clean the vehicle and recheck the suspected location of an apparent leakage.

Troubleshooting chart

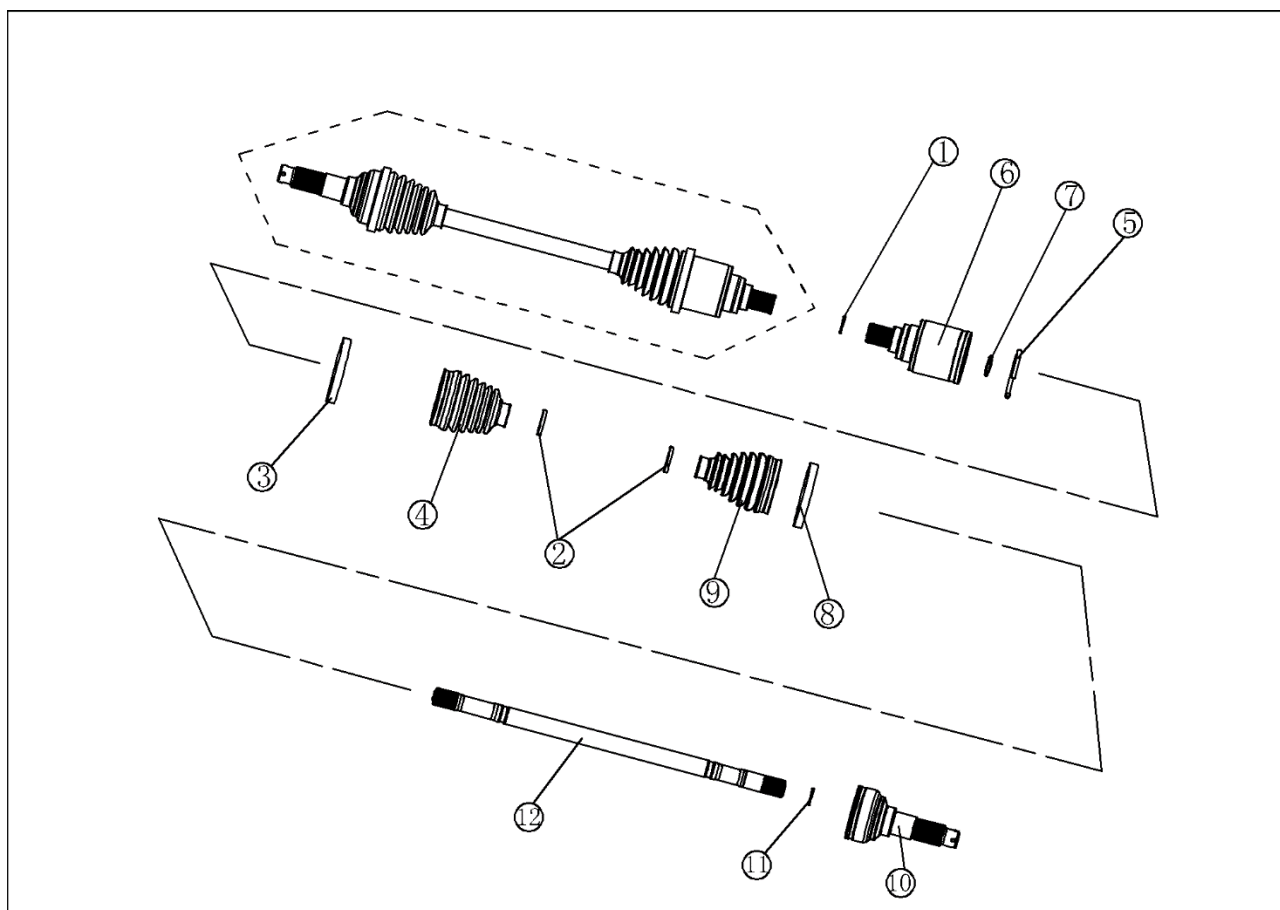
When basic condition “a” and “b” exist, check the following point



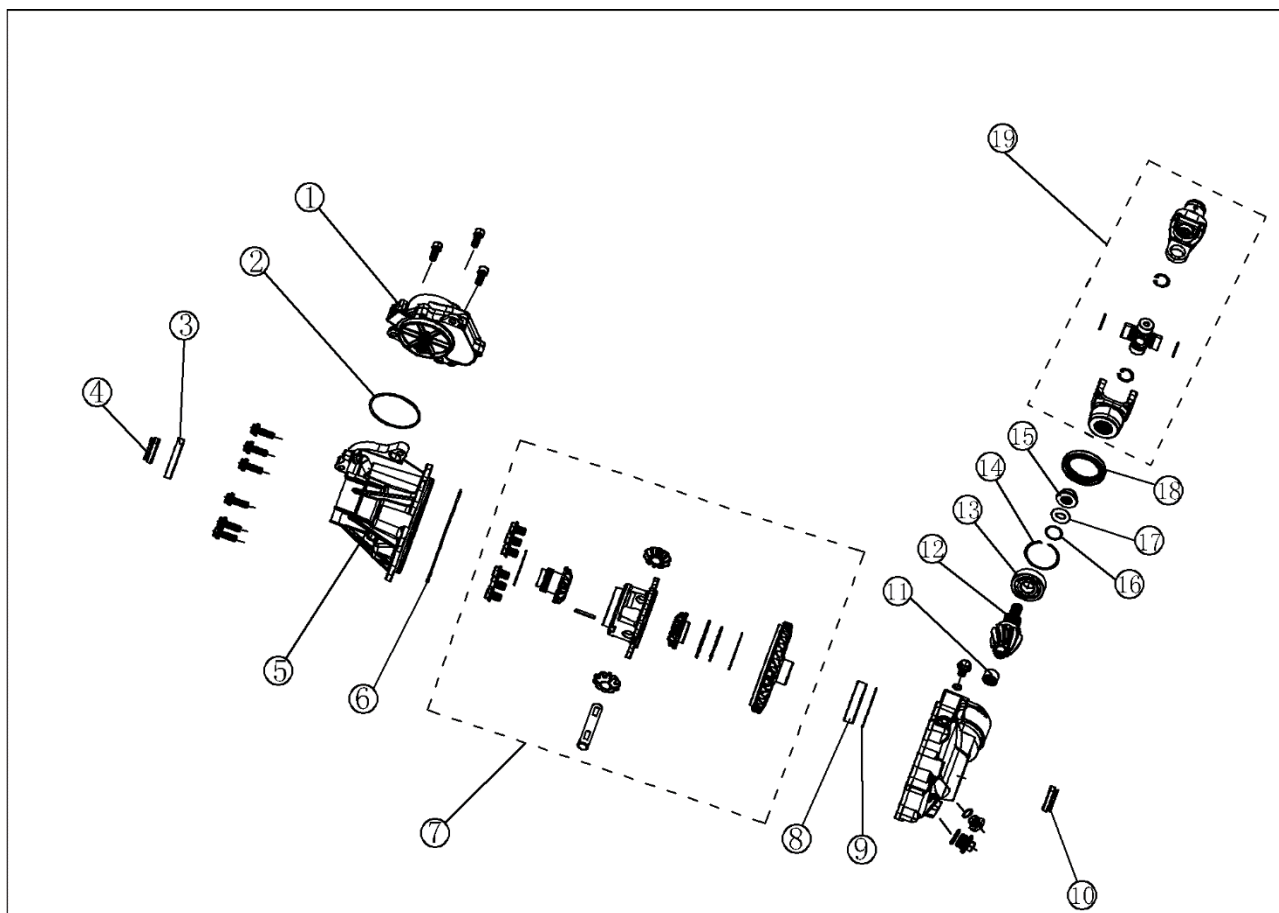
Front constant velocity joints and differential gear



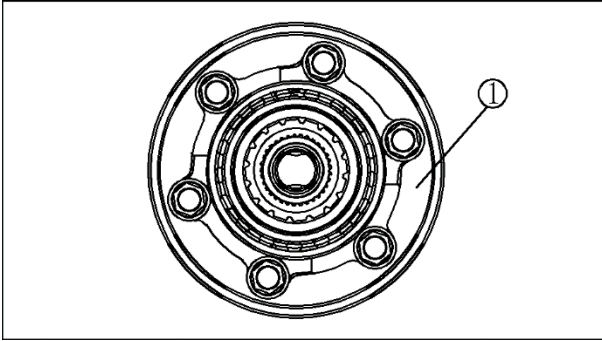
Order	Job/Part	Q'ty	Remarks
	Removing the front constant velocity-joints and differential gear Front engine skid plate/front fender		Remove the parts in the order listed.
	Steering knuckles		Refer to "ENGINE SKID PLATES, SEAT, CARRIERS AND FENDERS" in chapter 3
	Front arms		Refer to "STEERING SYSTEM" in chapter 8.
	Differential gear oil		Refer to "FRONT ARMS AND FRONT SHOCK ABSORBER ASSEMBLIES" in chapter 8.
			Drain.
			Refer to "CHANGING THE DIFFERENTIAL GEAR OIL" in chapter 3.
1	Front constant velocity joint	2	
2	Differential gear motor coupler	1	
3	Differential gear case breather hose	1	Disconnect.
4	Differential gear case assembly	1	Disconnect
5	Cross shaped shaft assy	1	
6	Dust seal	1	
7	Dust seal	1	
8	Pin dowel	1	
9	Front drive shaft	1	
10	Power shaft	1	
11	Fork of universal joint	1	
			For installation, reverse the removal procedure.



Order	Job/Part	Q'ty	Remarks
	Disassembling the front constant velocity joints		Remove the parts in the order listed. The following procedure applies to both of the front constant velocity joints.
1	Clip	1	
2	Boot band	2	
3	Boot band	2	
4	Dust boot	1	
5	Clip	1	
6	Double off-set joint	1	
7	Circlip	1	Refer to "ASSEMBLING THE FRONT CONSTANT VELOCITY JOINTS".
8	Boot band	1	
9	Dust boot	1	
10	Off-set joint	1	
11	Clip	1	
12	Joint shaft	1	For assembly, reverse the disassembly procedure.



Order	Job/Part	Q'ty	Remarks
	Disassembling the final gear case assembly		Remove the parts in the order listed.
1	Differential gear motor	1	Refer to "ASSEMBLING THE DIFFERENTIAL GEARS".
2	O-ring	1	
3	Bearing	1	
4	Oil seal	1	
5	Differential gear case	1	
6	O-ring	1	
7	Differential gear assembly	1	
8	Bearing	1	
9	Differential drive pinion gear shim	1	
10	Oil seal	1	
11	Bearing	1	
12	Differential drive pinion gear	1	
13	Bearing	1	
14	Clip	1	
15	Front drive shaft coupling gear nut	1	
16	O-ring	1	
17	Washer	1	
18	Oil seal	1	
19	Cross shaped universal joint	1	
			For assembly, reverse the disassembly procedure.



Removing the differential gear assembly

1. Remove:

Differential gear assembly ①

NOTE:

The ring gear and the differential gear should be fastened together. Do not disassemble the differential gear.

CAUTION:

The differential gears are assembled into a proper unit at the factory by means of specialized equipment. Do not attempt to disassemble this unit. Disassembly will result in the malfunction of the unit.

Checking the front constant velocity joints

1. Check:

- double off-set joint spline
 - ball joint spline
 - shaft spline
- Wear/damage → Replace.

2. Check:

- dust boots
- Cracks/damage → Replace.

CAUTION:

Always use a new boot band.

3. Check:

- balls and ball races
 - inner surface of double off-set joint
- Pitting/wear/damage → Replace.

Checking the differential gears

1. Check:

- gear teeth
- Pitting/galling/wear → Replace.
- bearing
- Pitting/damage → Replace.
- oil seal
 - O-ring
- Damage → Replace.

2. Check:

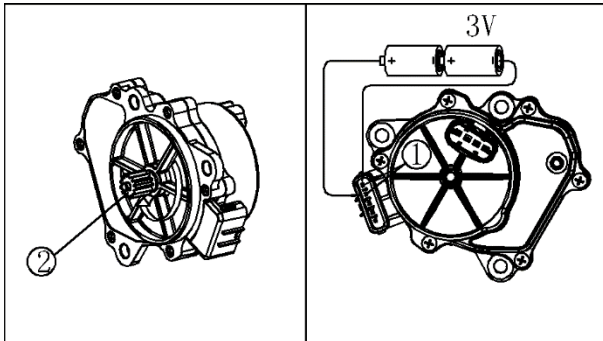
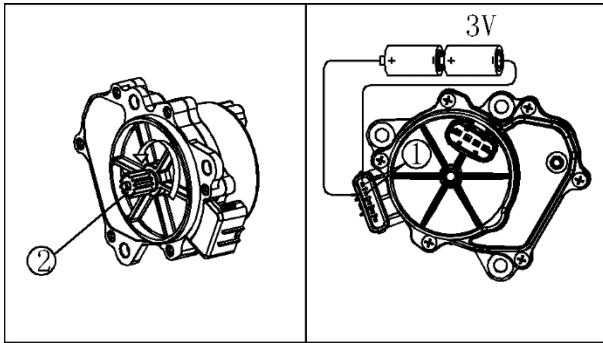
- front drive shaft splines
 - differential drive pinion gear splines
- Wear/damage → Replace.
- spring
- Fatigue → Replace.
- Move the spring up and down.

3. Check:

- front drive shaft
- Bends → Replace.

WARNING:

Do not attempt to straighten a bent shaft; this may dangerously weaken the shaft



Checking the differential gear motor

1. Check:

- differential gear motor
- a. Connect two C size batteries to the gear motor terminals 1 (as shown in illustration).

CAUTION:

- **Be sure to check the motor operation after removing it from the differential gear case assembly.**
- **Do not use a 12 V battery to operate the pinion gear.**

☐ Check that the pinion gear ② turns counter clockwise.

☐ Check that the pinion gear 2 turns clockwise.

NOTE:

Be sure not to disassemble the gear motor and remove the pinion gear.

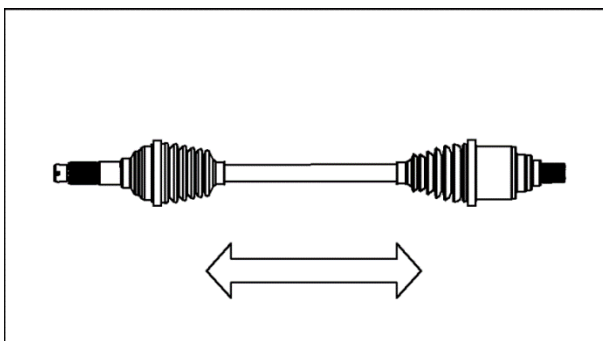
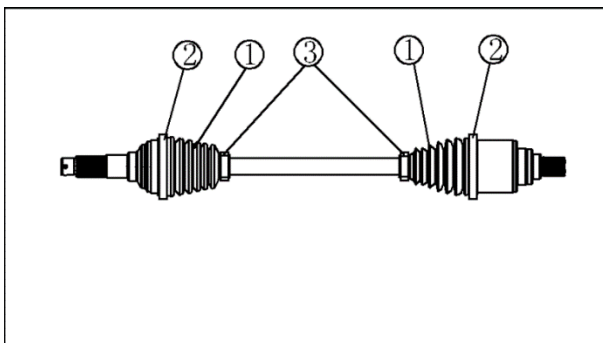
Assembling the front constant velocity joints

1. Apply:

- molybdenum disulfide grease
(into the ball joint assembly)

NOTE:

Molybdenum disulfide grease is included in the repair kit.



2. Install:

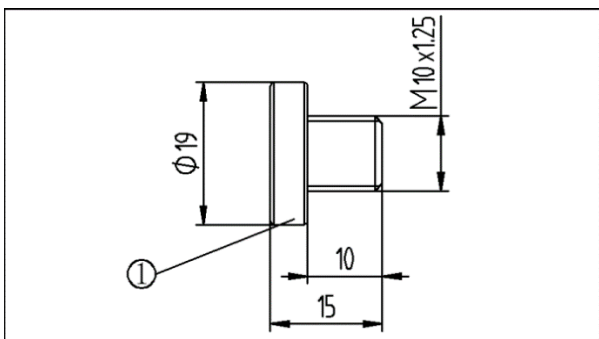
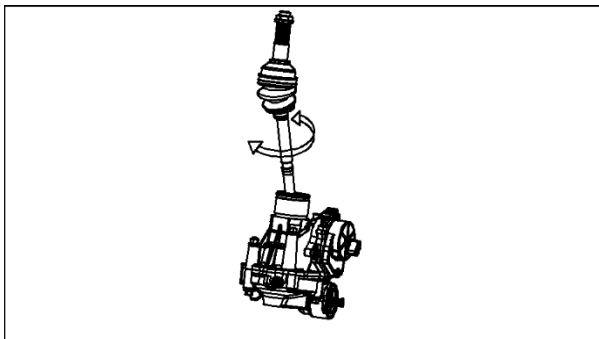
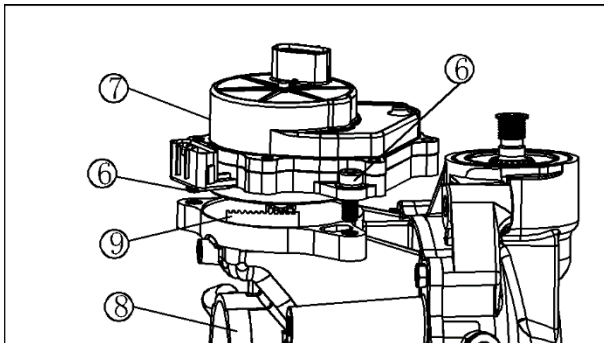
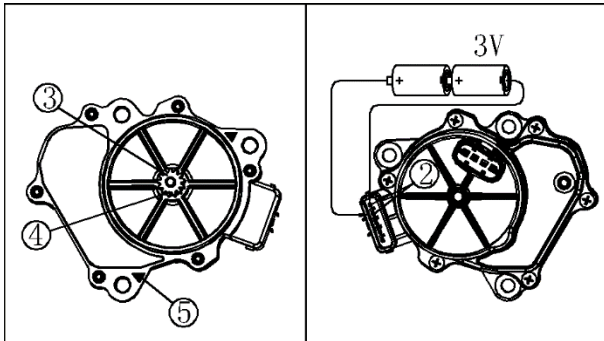
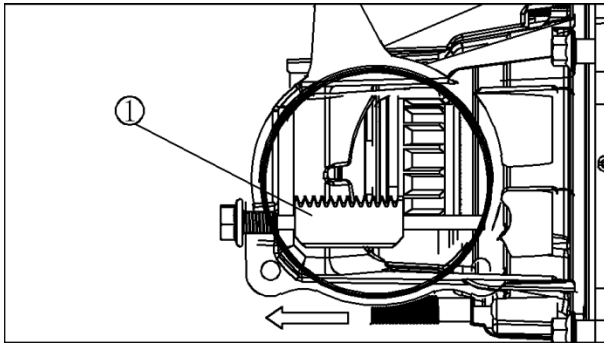
- dust boots ①
- bootbands ②, ③
- a. Apply molybdenum disulfide grease into the dust boots.
- b. Install the dust boots 1.
- c. Install the dust boot bands.

NOTE:

- **The new boot bands may differ from the original ones.**
- **The dust boots should be fastened with the boot bands 3 at the grooves in the joint shaft.**

3. Check:

- thrust movement free play
- Excessive play → Replace the joint assembly.



Assembling the differential gears

1. Measure:

- gear lash
Refer to "MEASURING THE DIFFERENTIAL GEAR LASH".

2. Install:

- differential gear motor
- a. Slide the shift fork sliding gear (1), which is installed to the differential gear, to the left to put it into the 2WD mode.
- b. Connect two C size batteries to the gear motor terminal (2) to operate the pinion gear (3), and operate it until the mark (4) on the gear is aligned with the mark (5) on the gear motor case.

CAUTION:

Do not use a 12 V battery to operate the pinion gear.

- c. Insert 8 mm bolts (6) into the gear motor (7) and use them as a guide to set the motor on the differential gear assembly (8) so that the shift fork sliding gear (9) does not move.

CAUTION:

If the position of the shift fork sliding gear is moved, the position of the differential gear and the indicator light display may differ, and the 2WD or differential lock mode may not be activated.

- d. Remove the 8 mm bolts, and then install the motor with the gear motor bolts.

3. Check:

- differential gear operation
Unsmooth operation → Replace the differential gear assembly.
Insert the double off-set joint into the differential gear, and turn the gear back and forth.

Measuring the differential gear lash

- Secure the gear case in a vise or another supporting device.

2. Remove:

- drain plug
- gasket

3. Install:

- a bolt of the specified size (1)
(into the drain plug hole)

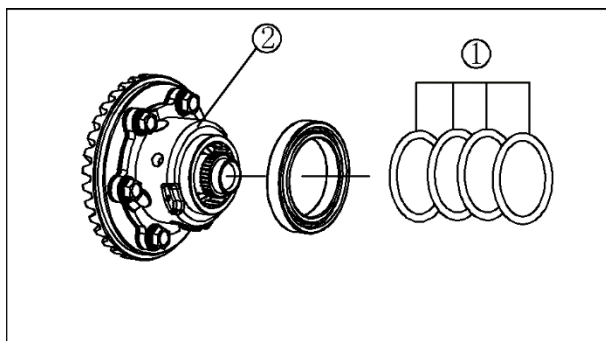
CAUTION:

Finger tighten the bolt until it holds the ring gear. Otherwise, the ring gear will be damaged.

4. Attach:
 - gear lash measurement tool dial gauge
 - Measuring point is 22.5 mm (0.86 in)
5. Measure:
 - gear lash
 - Gently rotate the coupling gear from engagement to engagement.
 - Differential gear lash 0.05 ~ 0.25 mm(0.0020 ~ 0.0098 in)

NOTE:

Measure the gear lash at four positions. Rotate the shaft 90° eachtime.



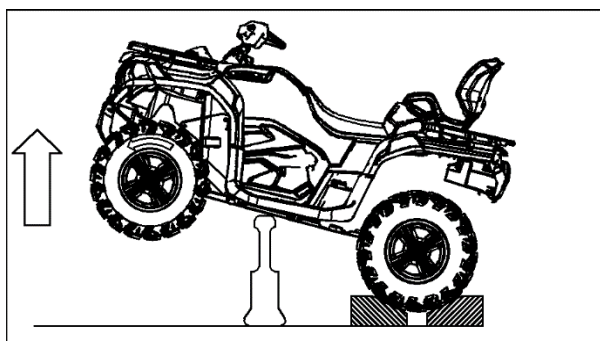
Adjusting the differential gear lash

1. Remove:
 - differential drive pinion gear shim(s) ①
 - differential gear assembly ②
2. Adjust:
 - gear lash

a. Select the suitable shims using the following chart.

Too little gear lash	Reduce shim thickness
Too large gear lash	Increase shim thickness

Thickness (mm)	
0.1	
0.2	
0.3	
0.4	



Checking the differential gear operation

1. Block the rear wheels, and elevate the front wheels by placing a suitable stand under the frame.
2. Remove the wheel cap from the axle nut (right or left).
3. Measure the starting torque of the front wheel (i.e differential gear preload) with the torque wrench.

NOTE:

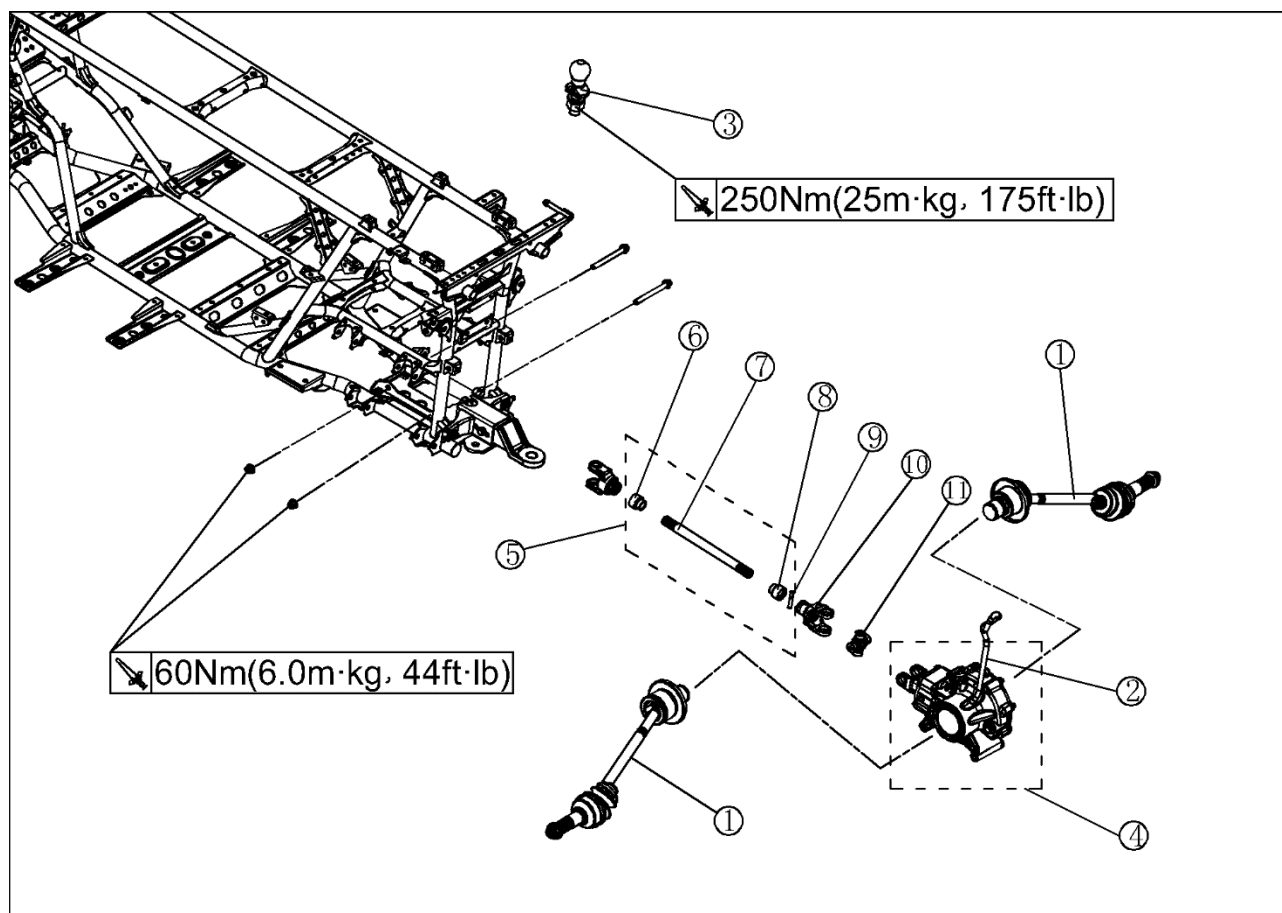
Repeat this step several times to obtain an average figure.

During this test, the other front wheel will turn in the oppositedirection.

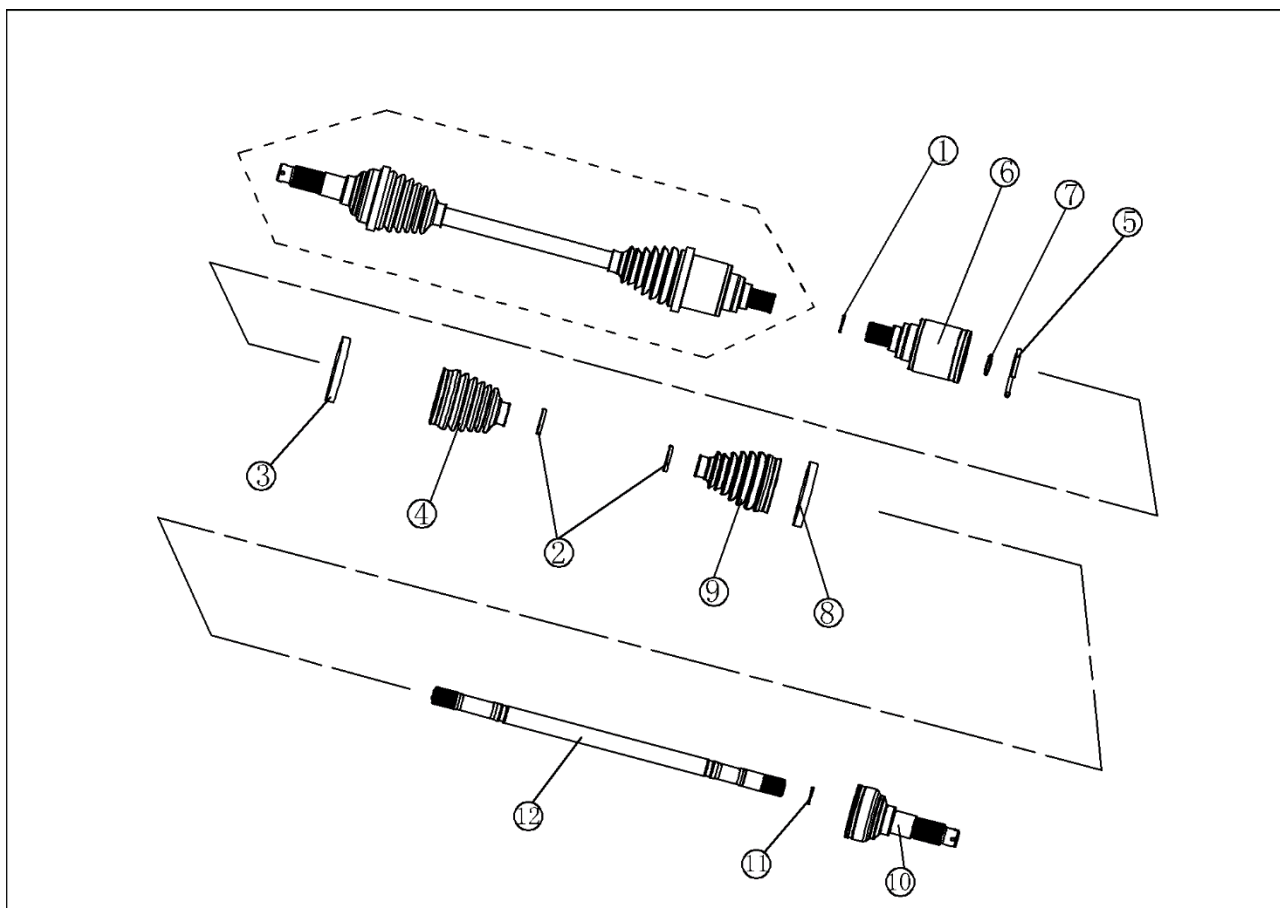
Front wheel starting torque (differential gear preload)
 New unit 17 ~ 25 Nm (1.7 ~ 2.5 m · kg, 12 ~ 18 ft · lb)
 Minimum 10 Nm (1.0 m · kg, 7.2 ft · lb)

4. Out of specification → Replace the differential gear assembly.
5. Within specification → Install the new cotter pin and wheel cap.

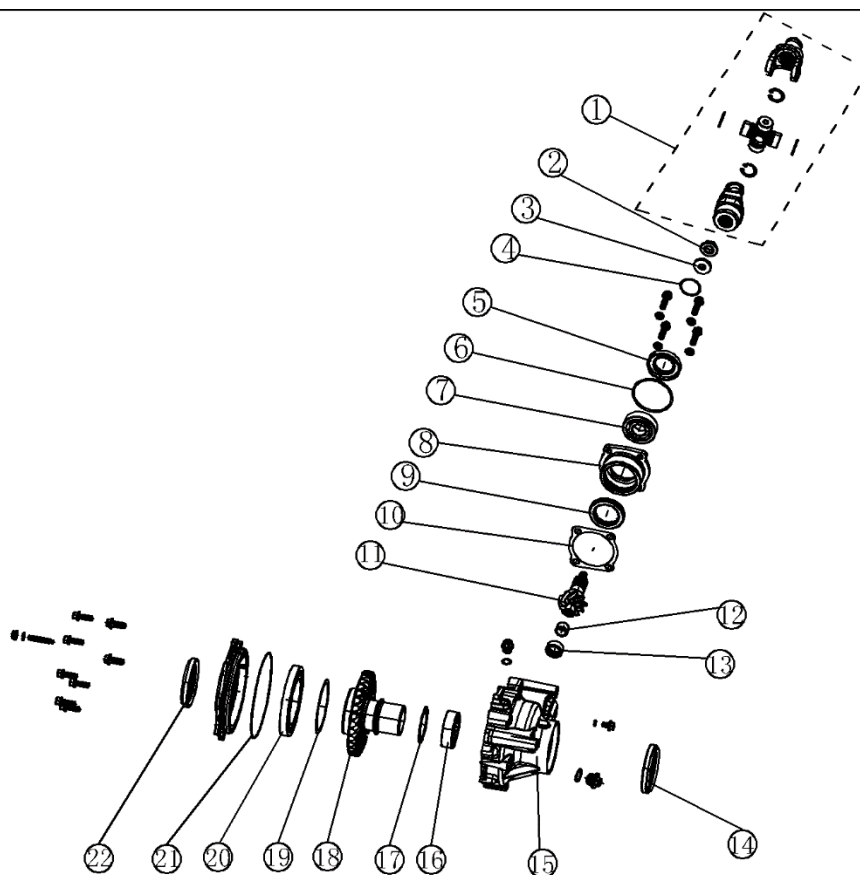
Rear constant velocity joints and final drive gear



Order	Job/Part	Q'ty	Remarks
	Removing the rear constant velocity joints and final drive gear		Remove the parts in the order listed.
	Rear engine skid plate/rear fender		Refer to "ENGINE SKID PLATES, SEAT, CARRIERS AND FENDERS" in chapter 3
	Rear arms		Refer to "STEERING SYSTEM" in chapter 8.
	Final gear oil		Refer to "FRONT ARMS AND FRONT SHOCK ABSORBER ASSEMBLIES" in chapter 8.
			Drain.
			Refer to "CHANGING THE FINAL GEAR OIL" in chapter 3.
1	Rear constant velocity joint	2	Disconnect
2	Final gear case breather hose	1	
3	Trailer hitch	1	
4	Final gear case assembly	1	
5	Rear drive shaft	1	
6	Dust seal	1	
7	Power shaft	1	
8	Dust seal	1	
9	Pin dowel	1	
10	Fork of universal joint	1	
11	Cross shaped shaft assay	1	
			For installation, reverse the removal procedure.



Order	Job/Part	Q'ty	Remarks
	Disassembling the rear constant velocity joints		Remove the parts in the order listed. The following procedure applies to both of the rear constant velocity joints.
1	Clip	1	Refer to "ASSEMBLING THE REAR CONSTANT VELOCITY JOINTS"
2	Boot band	2	
3	Boot band	1	
4	Dust boot	1	
5	Clip	1	
6	Double off-set joint	1	
7	Circlip	1	
8	Boot band	1	
9	Dust boot	1	
10	Off-set joint	1	
11	Clip	1	
12	Joint shaft	1	For assembly, reverse the disassembly procedure.



Order	Job/Part	Q'ty	Remarks
	Disassembling the final gear case assembly		Remove the parts in the order listed.
1	Cross shaped universal joint	1	NOTE: _____ Working in a crisscross pattern, loosen each bolt 1/4 of a turn. After all the bolts are loosened, remove them.
2	Rear drive shaft coupling gear nut	1	
3	Washer	2	
4	O-ring	1	
5	Oil seal	1	
6	O-ring	1	
7	Bearing	1	
8	Final drive pinion gear bearing housing	1	
9	Nut round	1	
10	Gasket rear gearbox	1	
11	Final drive pinion gear	1	
12	Collar	1	
13	Bearing	1	
14	Oil seal	1	
15	Final gear case	1	
16	Bearing	1	
17	Adjusting washer rear gearbox	1	
18	Final driven pinion gear	1	
19	Adjusting washer rear gearbox	1	
20	Bearing	1	
21	O-ring	1	
22	Oil seal	1	
		1	For assembly, reverse the disassembly procedure.

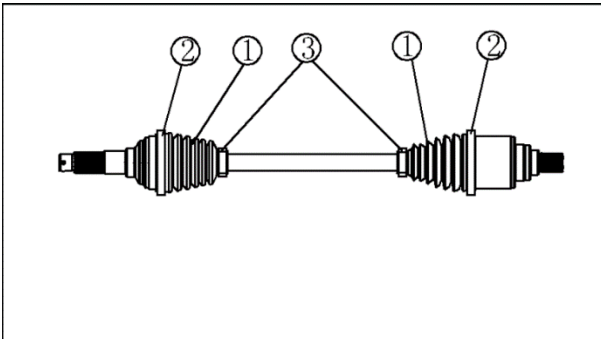
Assembling the front constant velocity joints

1. Apply:

- molybdenum disulfide grease
(into the ball joint assembly)

NOTE:

Molybdenum disulfide grease is included in the repair kit.



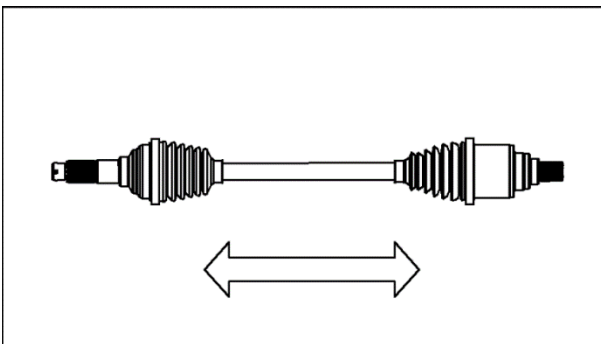
2. Install:

- dust boots ①
 - boot bands ② ③
- Apply molybdenum disulfide grease into the dust boots.
 - Install the dust boots ①.
 - Install the dust boot bands.

NOTE:

The new boot bands may differ from the origin inhale ones.

The dust boots should be fastened with the boot bands 3 at the grooves in the joint shaft.



3. Check:

- thrust movement free play
Excessive play → Replace the joint assembly.

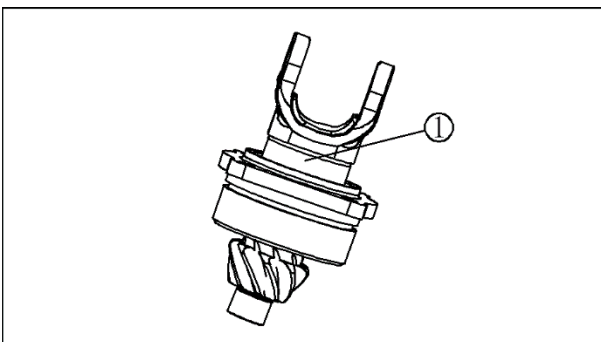
Disassembling the final drive pinion gear assembly

1. Loosen:

- rear drive shaft coupling gear (final gear side) nut ①

NOTE:

Secure the final drive pinion gear teeth in the vise with a clean rag.



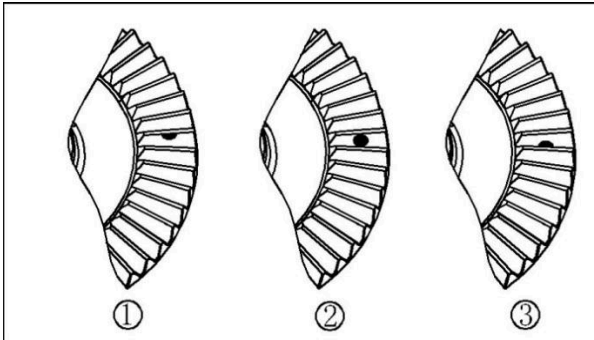
Positioning the final drive pinion gear and ring gear

When the final drive pinion gear, wheel gear, final gear case and/or final driven pinion gear are replaced, be sure to adjust the positions of the final drive pinion gear, wheel gear and final driven pinion gear using the shim(s).

Check the gear tooth contact pattern through the oil filler hole. This will provide a contact pattern on the coated teeth of the gear. Compare the coated teeth to the exam plus shown in [1], [2] and [3].

Contact is normal if the machinist's layout dye to the approximate center of each tooth (example [2]).

If tooth contact is found to be incorrect (example [1] and [3]), the shim between the pinion gear bearing and pinion gear must be changed and the tooth contact re-checked until correct.



Tooth Contact	Shim Adjustment
Contact at tooth top [1]	Decrease shim thickness
Contact at tooth root [3]	Increase shim thickness

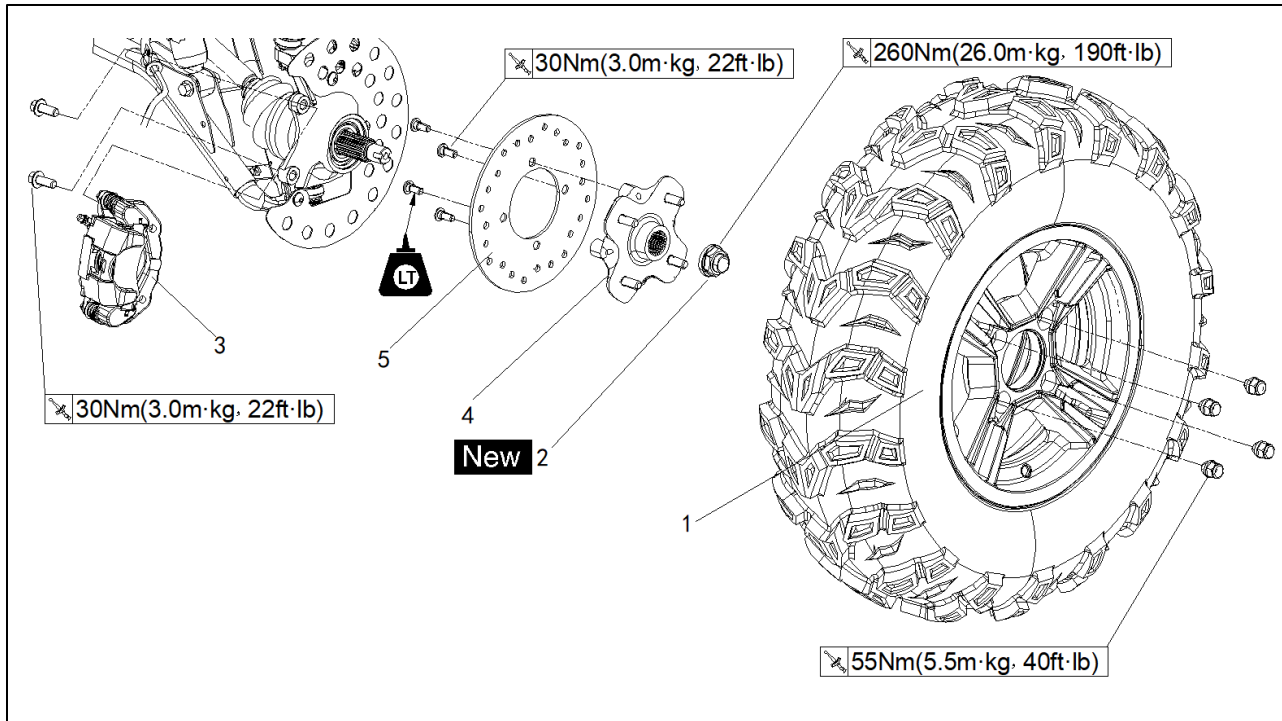
NOTE:

Make sure to check the backlash and shim thickness after the tooth contact has been adjusted, since it may have changed. Adjust the tooth contact and backlash until they are both within specification. If the correct tooth contact cannot be maintained when adjusting the backlash, replace the pinion gear and ring gear as a set.

8 CHASSIS

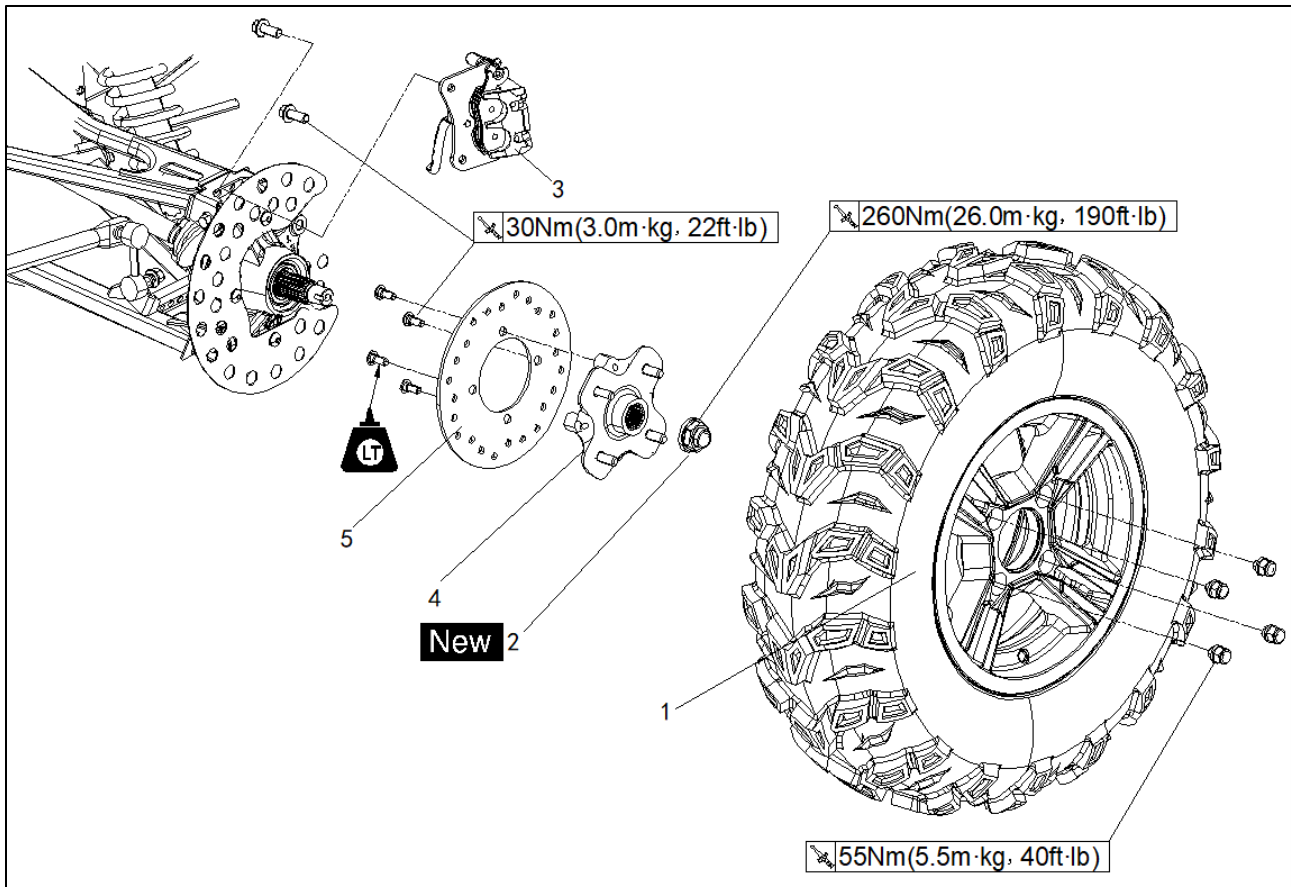
Front and rear wheels

Front wheels



Order	Job/Part	Q'ty	Remarks
	Removing the front wheels		
		1	Remove the parts in the order listed.
		1	The follows procedure applies to both of the front wheels.
		1	Place the vehicle on the level surface.
		1	⚠ WARNING _____
		1	Securely support the vehicle so there is no danger of it falling over.
1	Front wheels	1	Refer to "INSTALLING THE WHEELS"
3	Front wheel axle nut	1	Refer to "INSTALLING THE WHEELS HUBS".
4	Front brake caliper assembly	1	NOTE: _____ Do not squeeze the front brake lever when the brake caliper is off the brake disc as the brake pads will be forced shut.
5	Front wheel hub	1	
6	Front brake disc	1	Refer to "INSTALLING THE FRONT BRAKE DISCS". For installation, reverse the removal procedure

Rear wheels



Order	Job/Part	Q'ty	Remarks
	Removing the rear wheels		
		1	Remove the parts in the order listed.
		1	The follows procedure applies to both of the rear wheels.
			Place the vehicle on the level surface.
		1	⚠ WARNING
		1	Securely support the vehicle so there is no danger of it falling over.
1	Rear wheels	1	Refer to "INSTALLING THE WHEELS"
3	Rear wheel axle nut	1	Refer to "INSTALLING THE WHEELS HUBS".
4	Rear brake caliper assembly	1	NOTE: Do not squeeze the front brake lever when the brake caliper is off the brake disc as the brake pads will be forced shut.
5	Rear wheel hub	1	
6	Rear brake disc	1	Refer to "INSTALLING THE FRONT BRAKE DISCS". For installation, reverse the removal procedure

Checking the wheels

1. Check:

- wheels

2. Measure:

- wheel run out

Over the specified limit → Replace the wheel of check the wheel bearing play①.



Wheels run out limit

Front

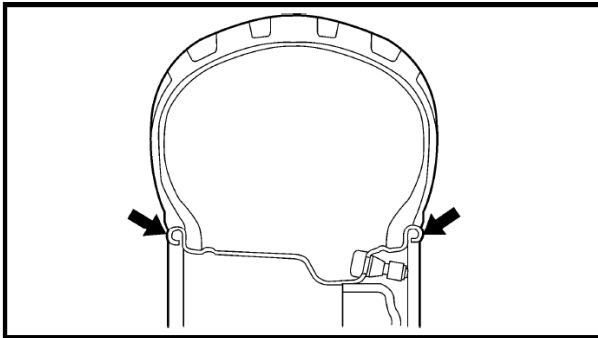
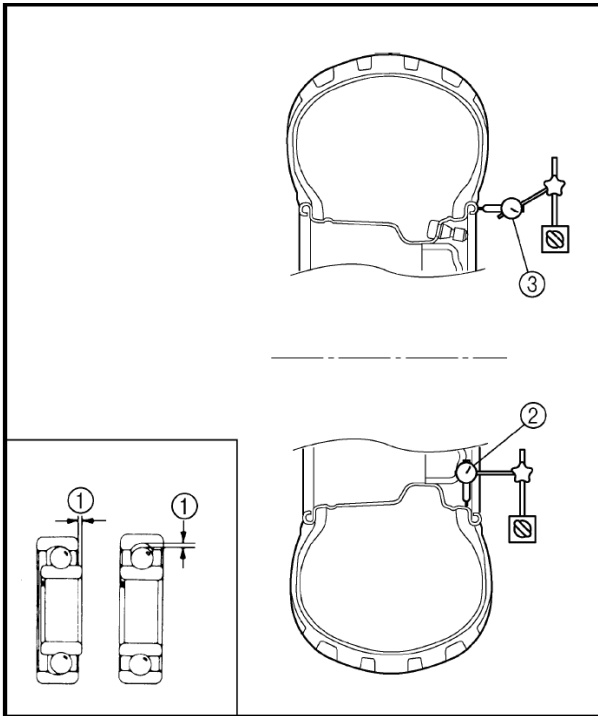
Radial②:2.0mm(0.08 in)

Lateral③:2.0mm(0.08in)

Rear:

Radial②:2.0mm(0.08 in)

Lateral③:2.0mm(0.08in)



3. Check:

Wheels balance

Out of balance → Adjust

⚠ WARNING:

After replace the tire, ride conservatively to allow the tire to be properly seated in the rim. Failure to do so may cause an accident resulting in vehicle damage and possible operator injury.

Checking the wheel hubs

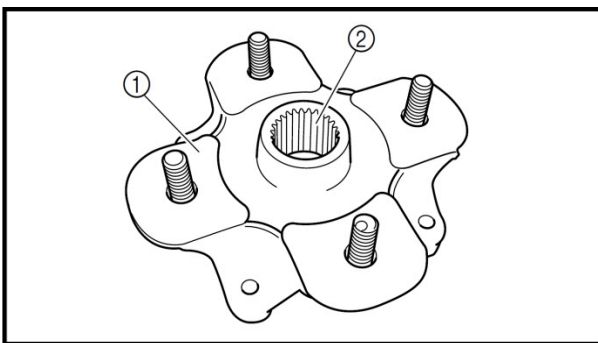
1. Check:

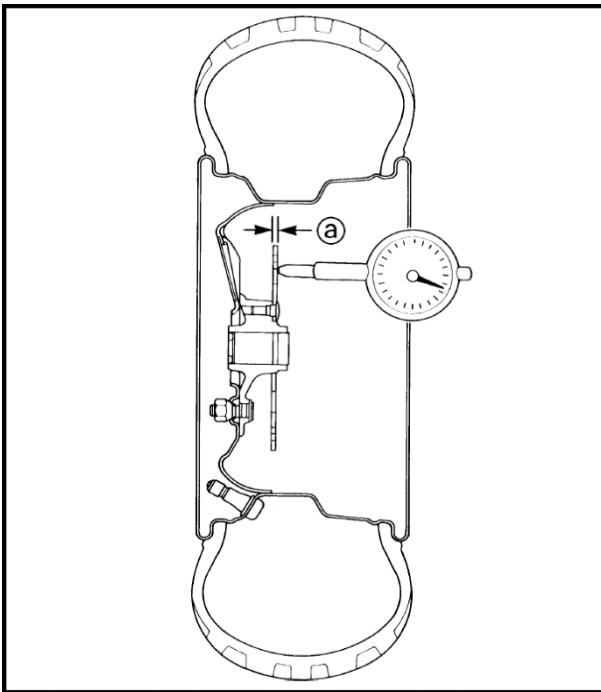
- wheel hubs ①

cracks/damage → Replace.

- splines(wheel hub) ②

Wear/damage → replace the wheel hub.





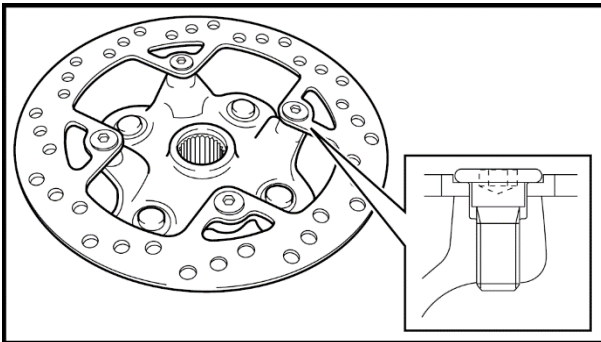
Checking the brake discs

1. Check:
 - brake disc
 - Galling/damage → Replace
2. Measure:
 - brake disc deflection
 - Out of specification → Check the wheel run out.
 - handlebar holders

	Brake disc maximum deflection Front: 0.1 mm (0.004 in) Rear: 0.1 mm (0.004 in)
--	---

- Brake disc thickness
- Out of specification → replace

	Brake disc minimum thickness Front: 3.0 mm (0.12 in) Rear: 3.0 mm (0.12 in)
--	--



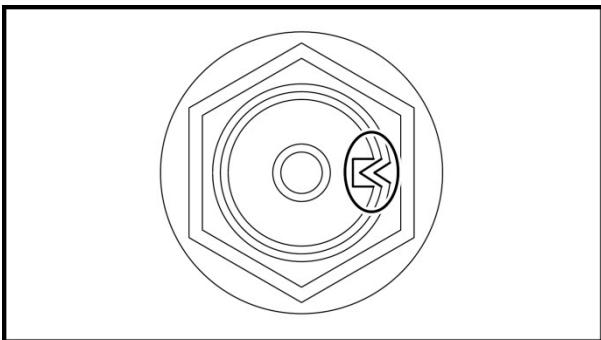
Installing the brake discs

1. Install:
 - brake disc

	Brake disc bolt 30 Nm (3.0 m· kg, 22 ft· lb)
--	---

NOTE:

Install the brake discs with their spot-faced side facing the bolt heads.



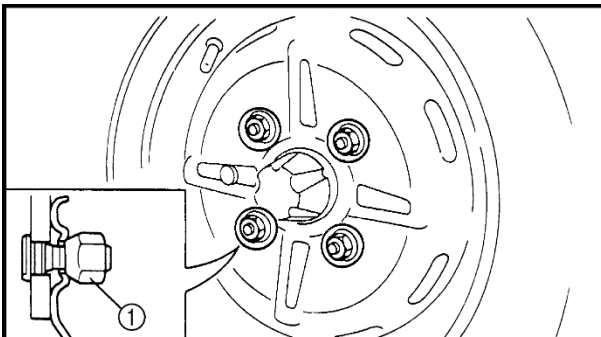
Installing the wheel hubs

1. Install:
 - wheel nut **New**

	260 Nm (26.0 m.kg, 190 ft.lb)
--	--------------------------------------

NOTE:

Do not apply oil to the seat of the nut.
After tightening the nut, stake the collar of the nut into the notch of the shaft.



Installing the wheels

1. Install:
 - wheels
2. Tighten:
 - wheel nuts ①

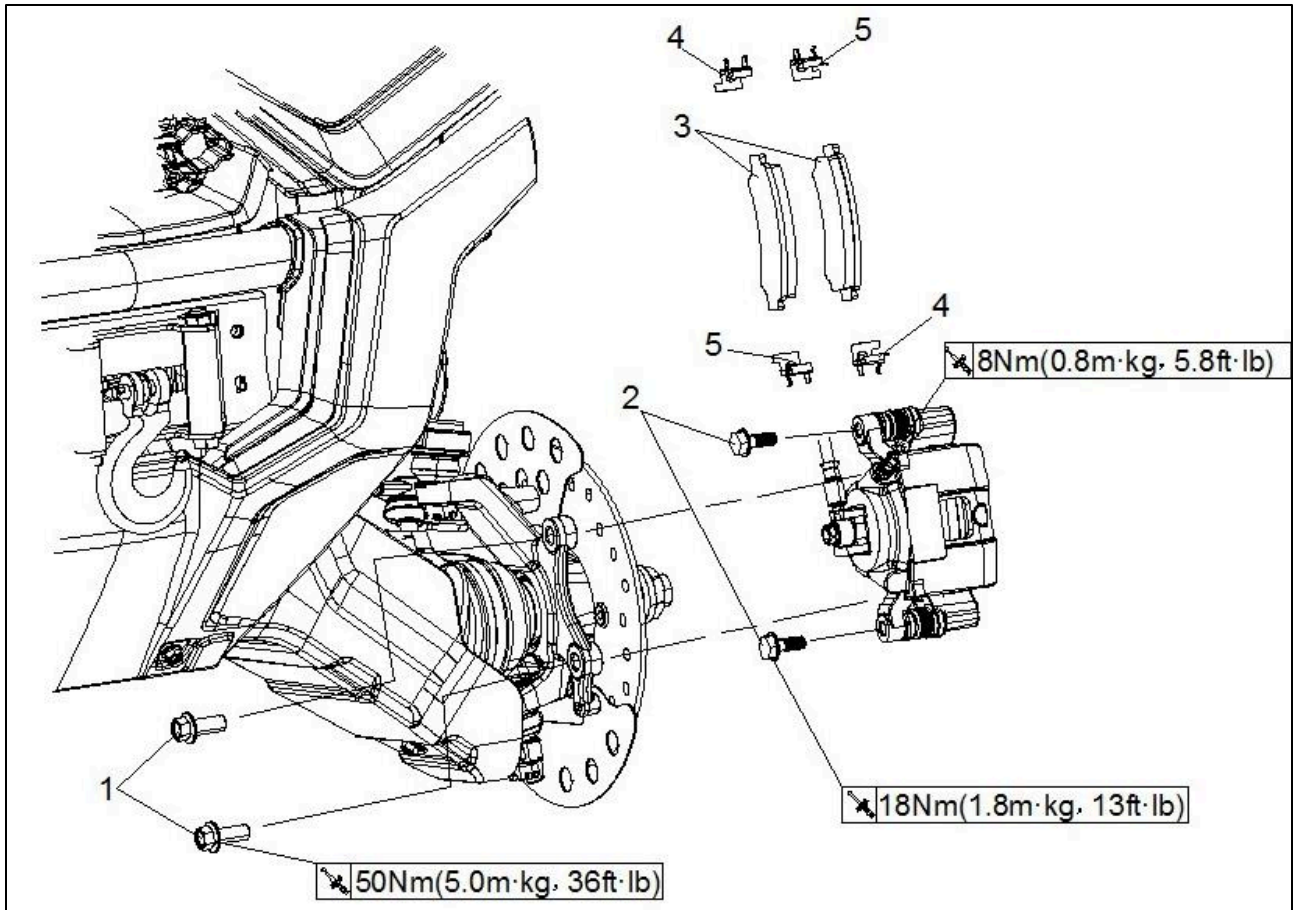
	55 Nm (5.5 m.kg, 40 ft.lb)
--	-----------------------------------

⚠ WARNING:

Tapered wheel nuts ① are used for both the front and rear wheels, install each nut with its tapered side towards the wheels.

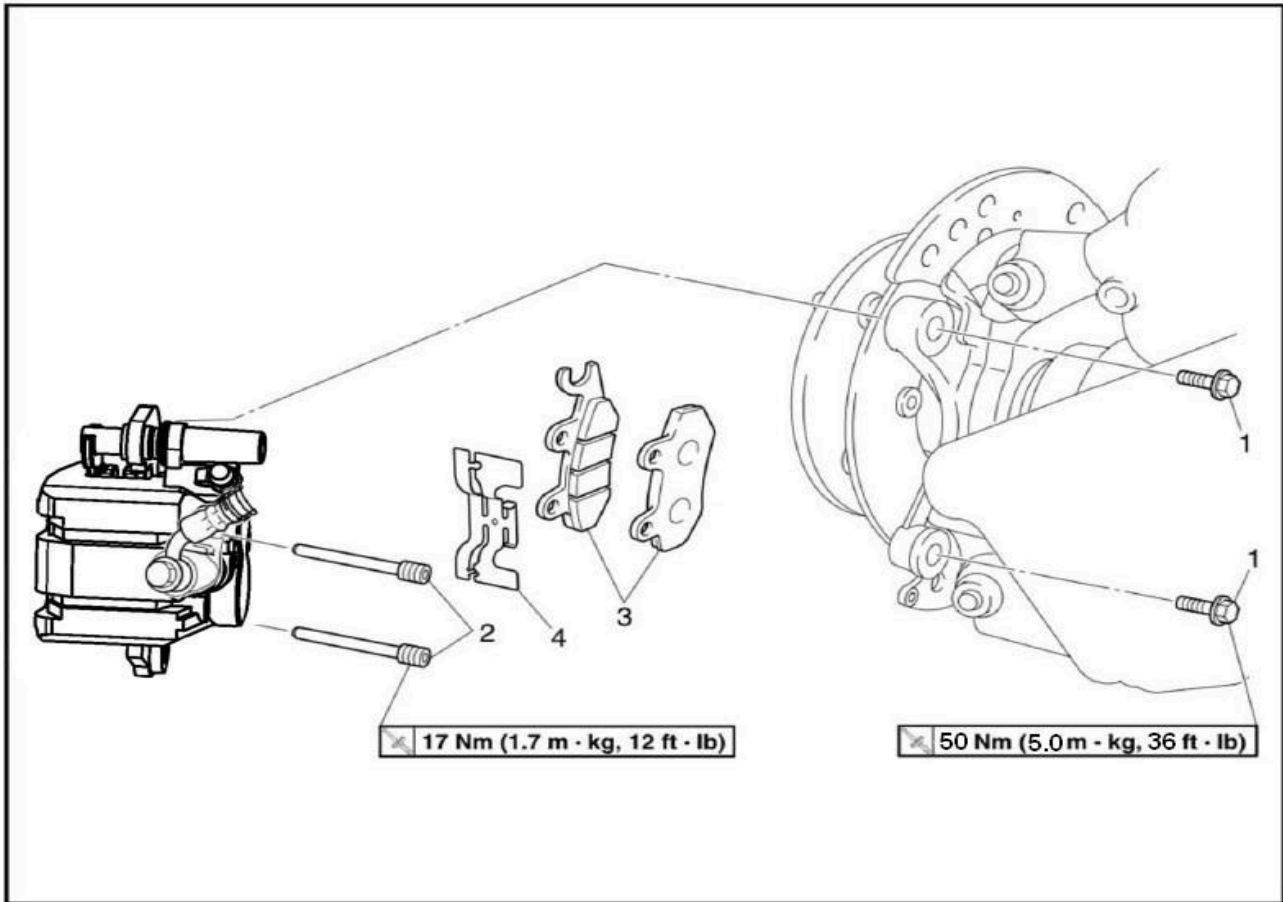
Front and rear brakes

Front brake pads



Order	Job/Part	Q'ty	Remarks
	Removing the front brake pads		
1	Front wheel	2	Remove the parts in the order listed. The following procedure applies to both of the front brake calipers. Refer to "FRONT AND REAR WHEELS".
2	Front brake caliper bolt	2	
3	Front brake caliper bracket bolt	2	Refer to "REPLACING THE FRONT AND REAR BRAKE PADS".
4	Front brake pad	2	
5	Brake pad spring	2	
	Brake pad spring2	2	For installation, reverse the removal procedure.

Rear brake pads



Order	Job/Part	Q'ty	Remarks
	REMOVING THE REAR BRAKE PADS		
1	Rear wheel	2	Remove the parts in the order listed.
2	Rear brake caliper bolt	2	The following procedure applies to both of the rear brake calipers.
3	Brake pad holding bolt	2	Refer to " FRONT AND REAR WHEELS ".
4	Rear brake pad	2	Refer to " REPLACEING THE FRONT AND REAR BRAKE PADS ".
	Brake pad spring	1	
			For installation, reverse the removal procedure.

NOTICE

Disc brake components rarely require disassembly.

DO NOT:

- disassemble components unless absolutely necessary;
- use solvent on internal brake components;
- use spent brake fluid for cleaning; (use only clean brake fluid)
- allow brake fluid to come in contact with the eyes, as this may cause eye injury;
- splash brake fluid onto painted surfaces or plastic parts, as this may cause damage;
- disconnect any hydraulic connection, as this would require the entire brake system to be disassembled, drained, cleaned, properly filled and bled after reassembly.

Replacing the front and rear brake pads**NOTE**

It is not necessary to disassemble the brake caliper and brake hose to replace the brake pads.

1. Measure:

- brake pad wear limit (a)

Out of specification → Replace the brake pads as a set.



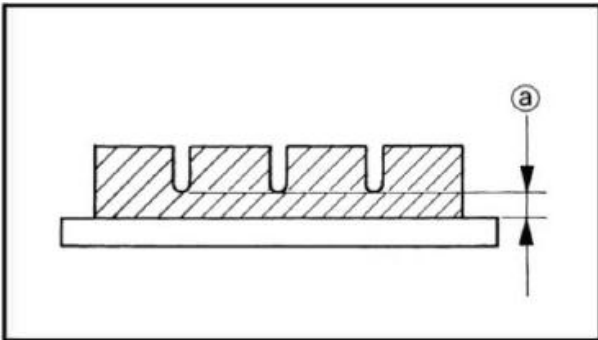
Brake pad wear limit
Front: 1.5 mm (0.06 in)
Rear: 1.5 mm (0.06 in)

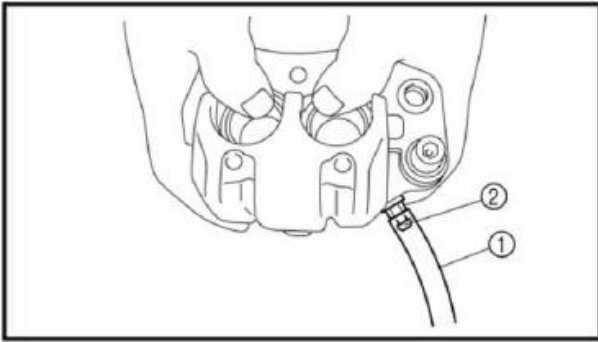
2. Install:

- brake pad spring
- brake pads

TIP

Always install new brake pads and brake pad spring as a set.





- Connect a suitable hose ① tightly to the brake caliper bleed screw ②. Put the other end of this hose into an open container.
- Loosen the brake caliper bleed screw and , using a finger, push the caliper piston into the brake caliper.
- Tighten the brake caliper bleed screw.



Brake caliper bleed screw
8 Nm (0.8 m · kg, 5.8 ft · lb)

- Install the new brake pads and a new brake pad spring

Tighten the brake pad holding bolts and brake caliper bolts.



Brake pad holding bolt
17 Nm (1.7 m · kg, 12 ft · lb)
Brake caliper bolt
50 Nm (5.0 m · kg, 36 ft · lb)

3. Check:

- Brake fluid level

Refer to “ CHECKING THE BRAKE FLUID LEVEL” in chapter 3.

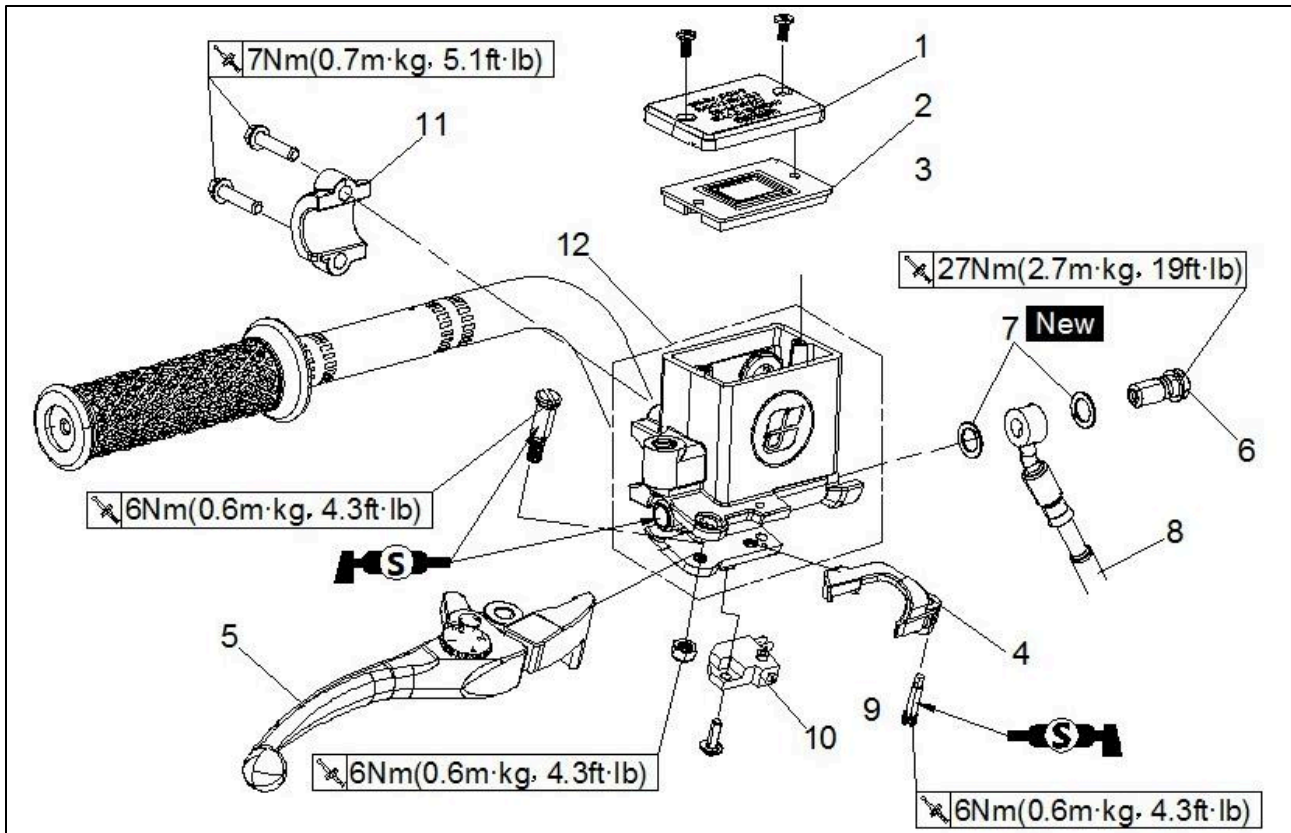
4. Check:

- Brake lever operation

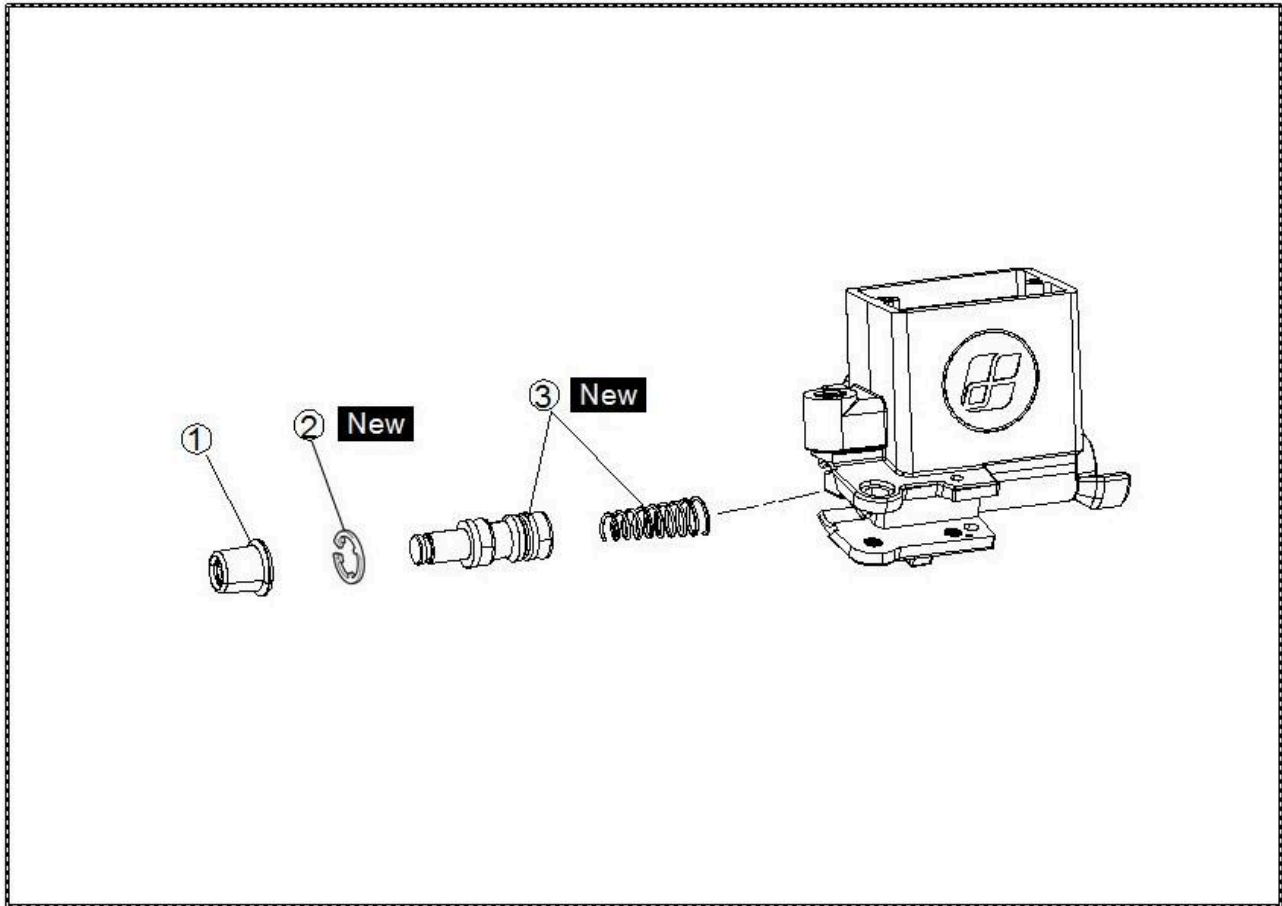
Soft or spongy feeling → Bleed the brake system.

Refer to “ BLEEDING THE HYDRAULIC-BRAKE SYSTEM” IN CHAPTER 3.

Front brake master cylinder

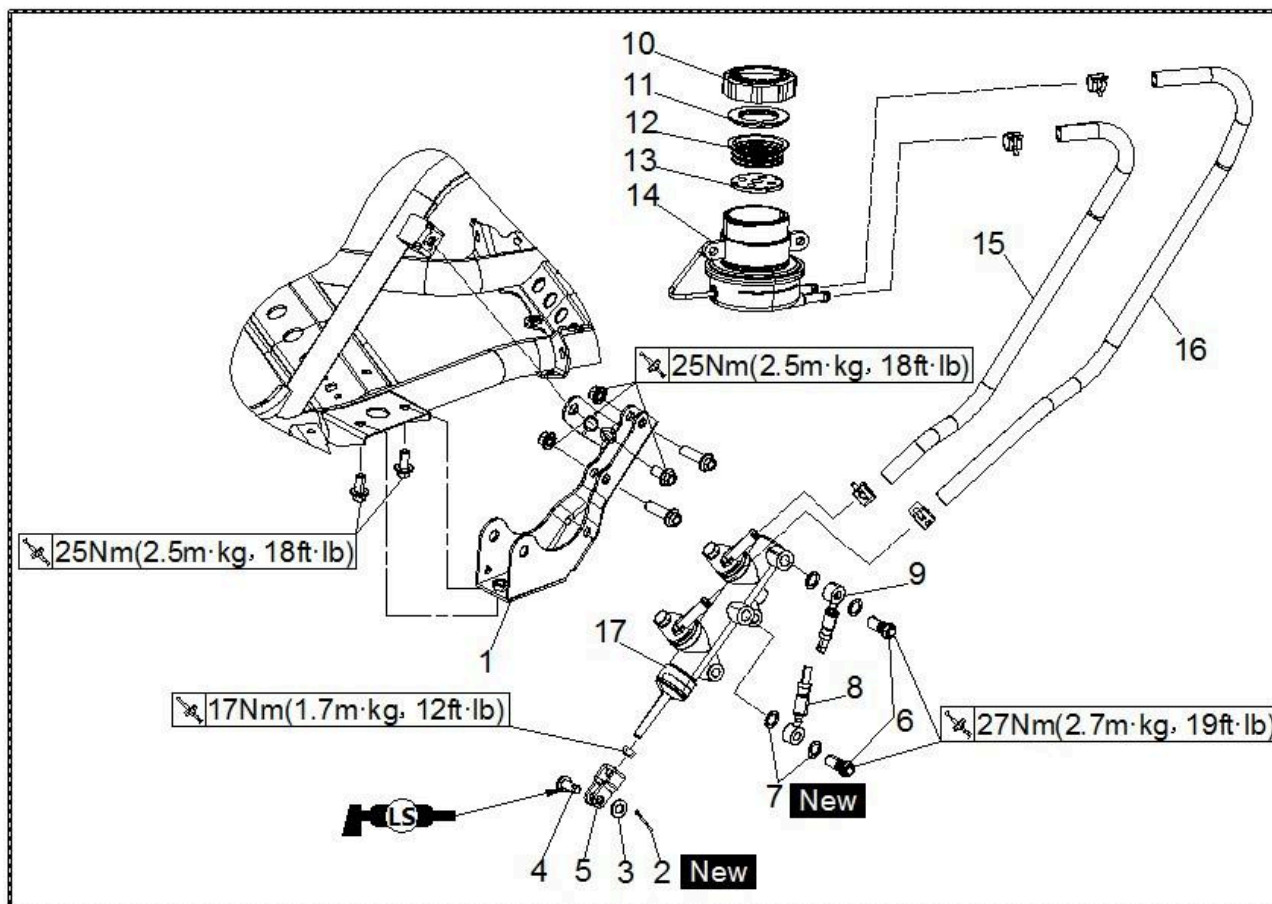


Order	Job/Part	Q'ty	Remarks
	Removing the front brake master cylinder		
	Brake fluid		Remove the parts in the order listed.
	On-command four-wheel-drive motor switch and differential gear lock switch		Drain.
			Refer to "HANDLEBAR".
1	Brake fluid reservoir cap	1	
2	Brake fluid reservoir diaphragm holder	1	
3	Brake fluid reservoir diaphragm	1	
4	Parking brake lever	1	
5	Brake lever	1	
6	Union bolt	1	Refer to "INSTALLING THE FRONT BRAKEMASTER CYLINDER".
7	Copper washer	2	Disconnect.
8	Front brake hose	1	Disconnect.
9	Front brake light switch connector	1	
10	Front brake light switch	1	
11	Front brake master cylinder holder	1	
12	Front brake master cylinder		
			For installation, reverse the removal procedure.

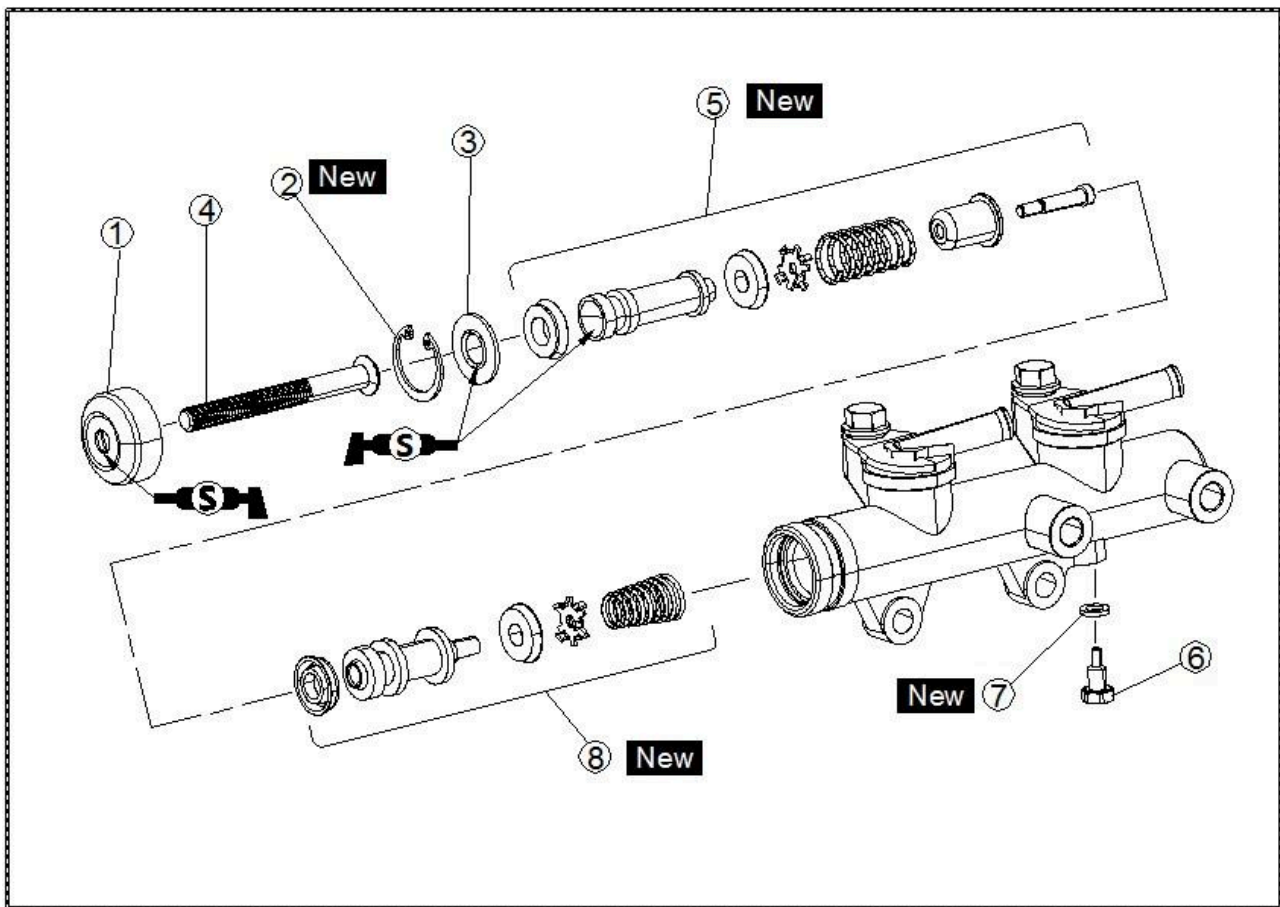


Order	Job/Part	Q'ty	Remarks
①	Disassembling the front brake master Cylinder		Remove the parts in the order listed.
②	Dust boot	1	Drain.
③	Circlip	1	Refer to "ASSEMBLING THE FRONT AND REAR BRAKE MASTER CYLINDERS"
④	Brake master cylinder kit	1	For assembly, reverse the disassembly procedure.

Primary brake master cylinder



Order	Job/Part	Q'ty	Remarks
	Removing the rear brake master cylinder		
	Brake fluid		Remove the parts in the order listed. Drain.
1	Brake pedal bracket	1	
2	Pin cotter	1	
3	Wash	1	
4	Pin clevis	1	
5	Joint	1	
6	Union bolt	2	
7	Copper washer	4	
8	Front brake hose	1	Disconnect.
9	Rear brake hose	1	Disconnect.
10	Brake fluid reservoir cap	1	Disconnect.
11	Brake fluid reservoir diaphragm holder	1	
12	Brake fluid reservoir diaphragm	1	
13	Brake fluid reservoir float	1	
14	Brake fluid reservoir	1	
15	Brake fluid reservoir hose	1	
16	Brake fluid reservoir hose2	1	Disconnect.
17	Primary brake master cylinder	1	Disconnect.
			For installation, reverse the removal procedure.



Order	Job/Part	Q'ty	Remarks
	Disassembling the primary brake master cylinder.		Remove the parts in the order listed.
①	Dust boot	1	
②	Circlip	1	
③	Push rod bracket	1	
④	Push rod comp	1	
⑤	Primary brake master cylinder kit	1	
⑥	Secondary brake master cylinder kit stopper	1	
⑦	Gasket	1	
⑧	Secondary brake master cylinder kit	1	
			For assembly, reverse the disassembly procedure.

Checking the master cylinder

1. Check:
 - Brake master cylinder
Wear/scratches→Replace the brake master cylinder assembly.
 - Brake master cylinder body
Cracks/damage→Replace.
 - Brake fluid delivery passage (Brake master cylinder body)
Blockage→Blow out with compressed air.
2. Check:
 - Brake master cylinder kit
Scratches/wear/damage→Replace as a set.
3. Check:
 - Brake fluid reservoir
 - Brake fluid reservoir diaphragm
 Cracks/damage→Replace.

Assembling the front and rear brake master cylinders

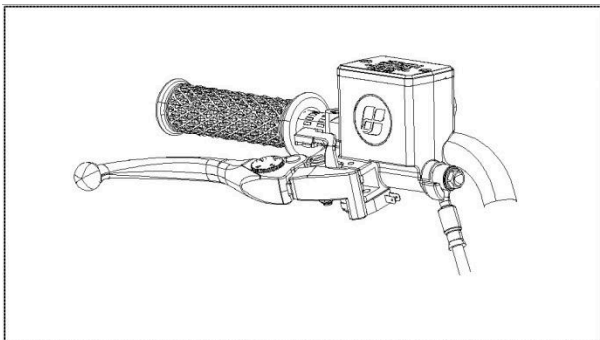
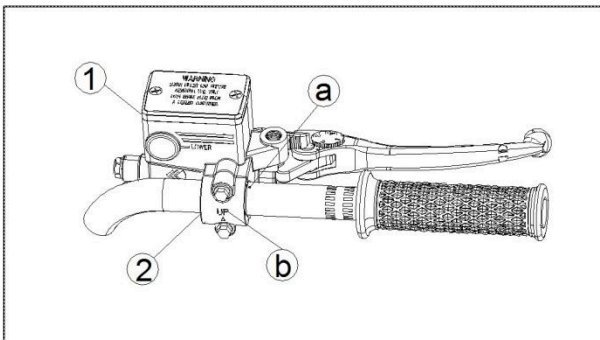
WARNING

All internal brake components should be cleaned and lubricated with new brake fluid only before installation.



Recommended brake fluid
DOT 4

Whenever a master cylinder is disassembled, replace the piston seals and dust seals.



Installing the front brake master cylinder

1. Install:
 - Brake master cylinder ①
 - Brake master cylinder holder ②

 **7 Nm (0.7 m · kg, 5.1 ft · lb)**

NOTE:

- Align the front of the brake master cylinder holder with the punch mark **a** on the handlebar.
- The “UP” mark **b** on the brake master cylinder holder should face up.

2. Install:
 - brake hoses
 - copper washers
 - union bolt

New

 **27 Nm (2.7 m · kg, 19 ft · lb)**

NOTE:

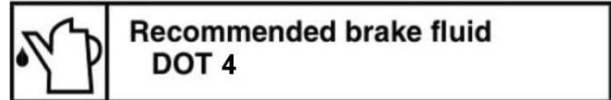
- Tighten the union bolt while holding the brake hose as shown.
- Turn the handlebar to the left and to the right to check that the brake hose does not touch other parts (throttle cable, wire harness, leads, etc.). Correct if necessary.

⚠ WARNING

Proper brake hose routing is essential to insure safe vehicle operation. Refer to “CABLE ROUTING” in chapter 2.

3. Fill:

- brake fluid reservoir

**CAUTION:**

Brake fluid may damage painted surfaces or plastic parts. Always clean up spilled brake fluid immediately.

⚠ WARNING

- Use only the designated quality brake fluid: other brake fluids may deteriorate the rubber seals, causing leakage and poor brake performance.
- Refill with the same type of brake fluid: mixing brake fluids may result in a harmful chemical reaction and lead to poor brake performance.
- Be careful that water does not enter the brake master cylinder when refilling. Water will significantly lower the boiling point of the brake fluid and may result in vapor lock.

4. Air bleed:

- Brake system
Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” in chapter 3.

5. Check:

- Brake fluid level
Brake fluid level is under the “LOWER” level line → Fill up.
Refer to “CHECKING THE BRAKE FLUID LEVEL” in chapter 3.

Installing the primary brake master cylinder

1. Install:
 - Brake master cylinder

 25 Nm (2.5 m · kg, 18 ft · lb)

2. Install:
 - brake hoses

 27 Nm (2.7 m · kg, 19 ft · lb)

WARNING

Proper brake pipe routing is essential to insure safe vehicle operation. Refer to “ CABLE ROUTING” in chapter2.

3. Fill:
 - brake fluid reservoir



**Recommended brake fluid
DOT 4**

NOTICE

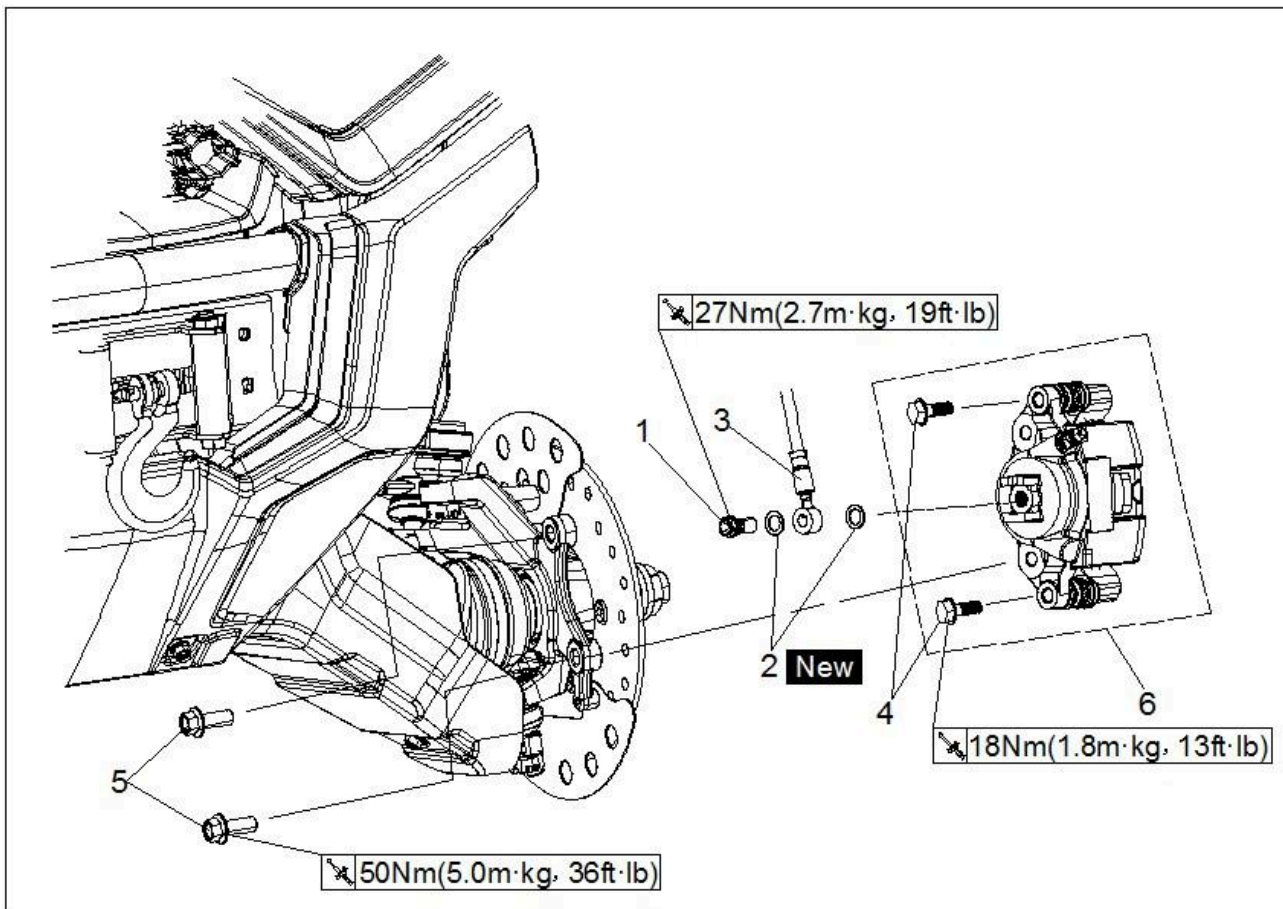
Brake fluid may damage painted surfaces or plastic parts. Always clean up spilled brake fluid immediately.

WARNING

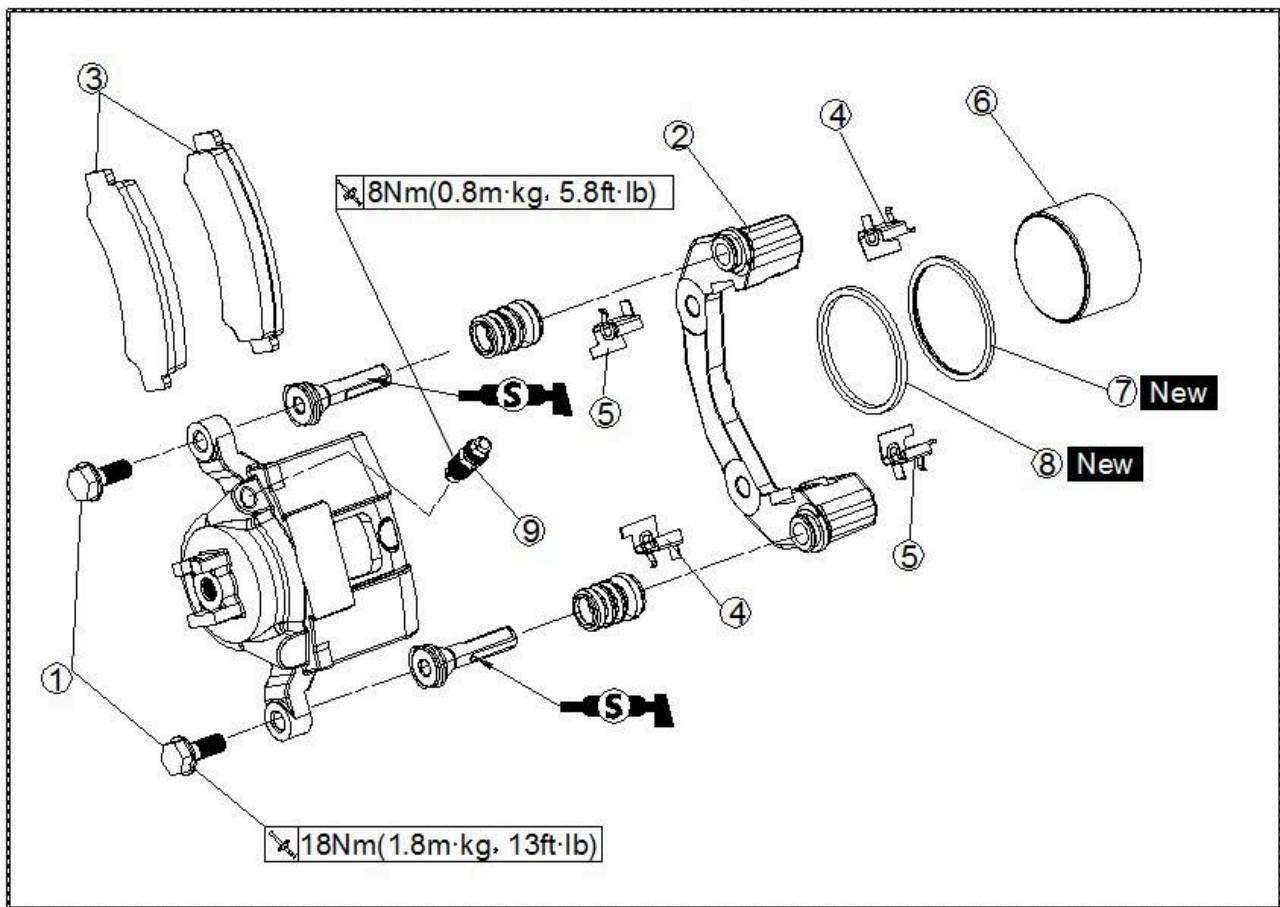
- Use only the designated quality brake fluid: other brake fluids may deteriorate the rubber seals, causing leakage and poor brake performance.
- Refill with the same type of brake fluid: mixing brake fluids may result in a harmful chemical reaction and lead to poor brake performance.
- Be careful that water does not enter the brake master cylinder when refilling. Water will significantly lower the boiling point of the brake fluid and may result in vapor lock.

4. Air bleed:
 - Brake system
 - Refer to “ BLEEDING THE HYDRAULIC BRAKE SYSTEM” in chapter 3.
5. Check:
 - Brake fluid level
 - Brake fluid level is under the “ L” level line → Fill up.
 - Refer to “ CHECKING THE BRAKE FLUID LEVEL” in chapter 3.
6. Adjust:
 - Brake pedal free play
 - Refer to “ ADJUSTING THE BRAKE PEDAL” in chapter 3.

Front brake caliper

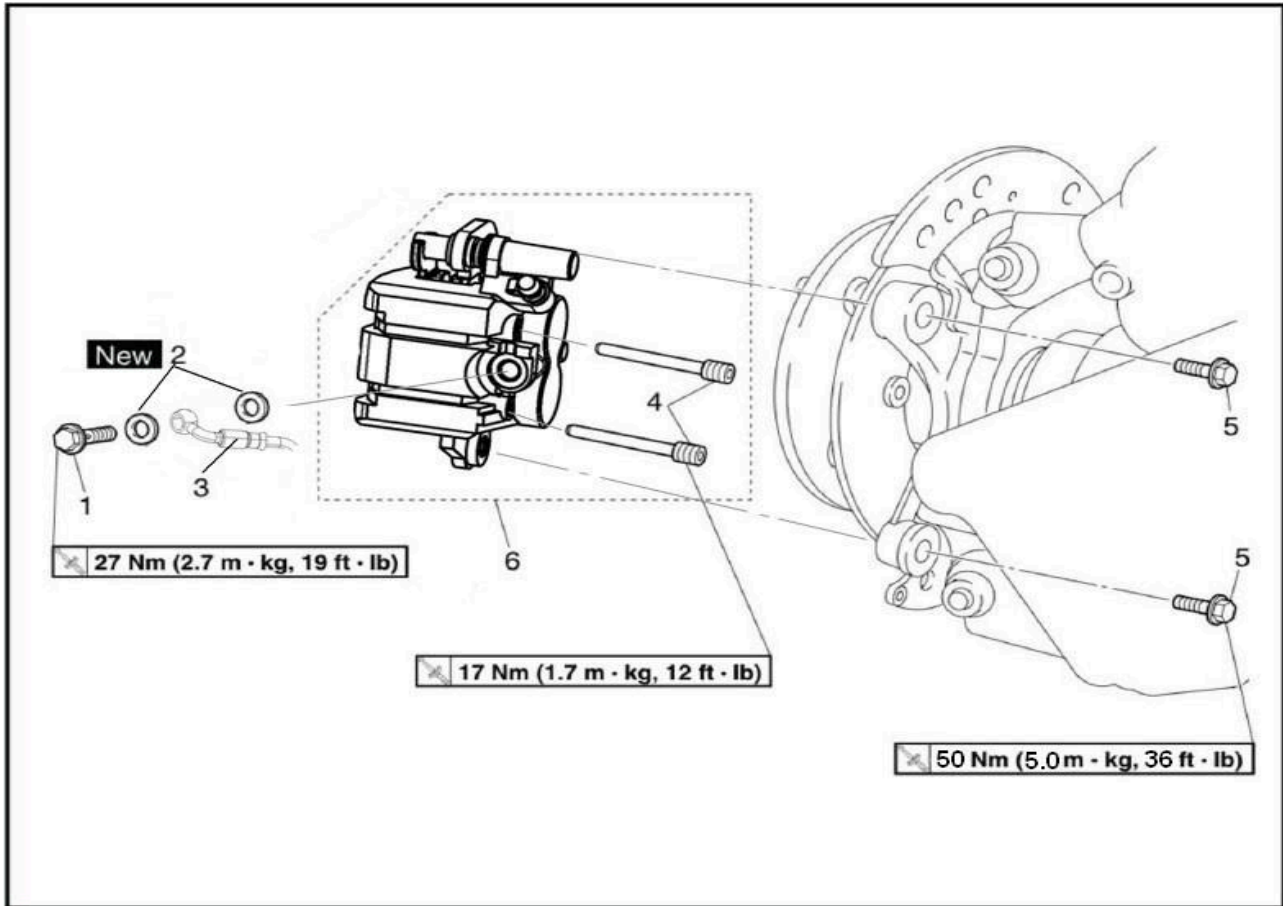


Order	Job/Part	Q'ty	Remarks
	Removing the front brake caliper		Remove the parts in the order listed. The following procedure applies to both of the front brake calipers. Drain. Refer to "FRONT AND REAR WHEELS".
1	Brake fluid		
	Front wheel		
1	Union bolt	1	
2	Copper washer	2	
3	Front brake hose	1	Disconnect.
4	Front brake caliper bracket bolt	2	Loosen.
5	Front brake caliper bolt	2	
6	Front brake caliper assembly	1	For installation, reverse the removal procedure.

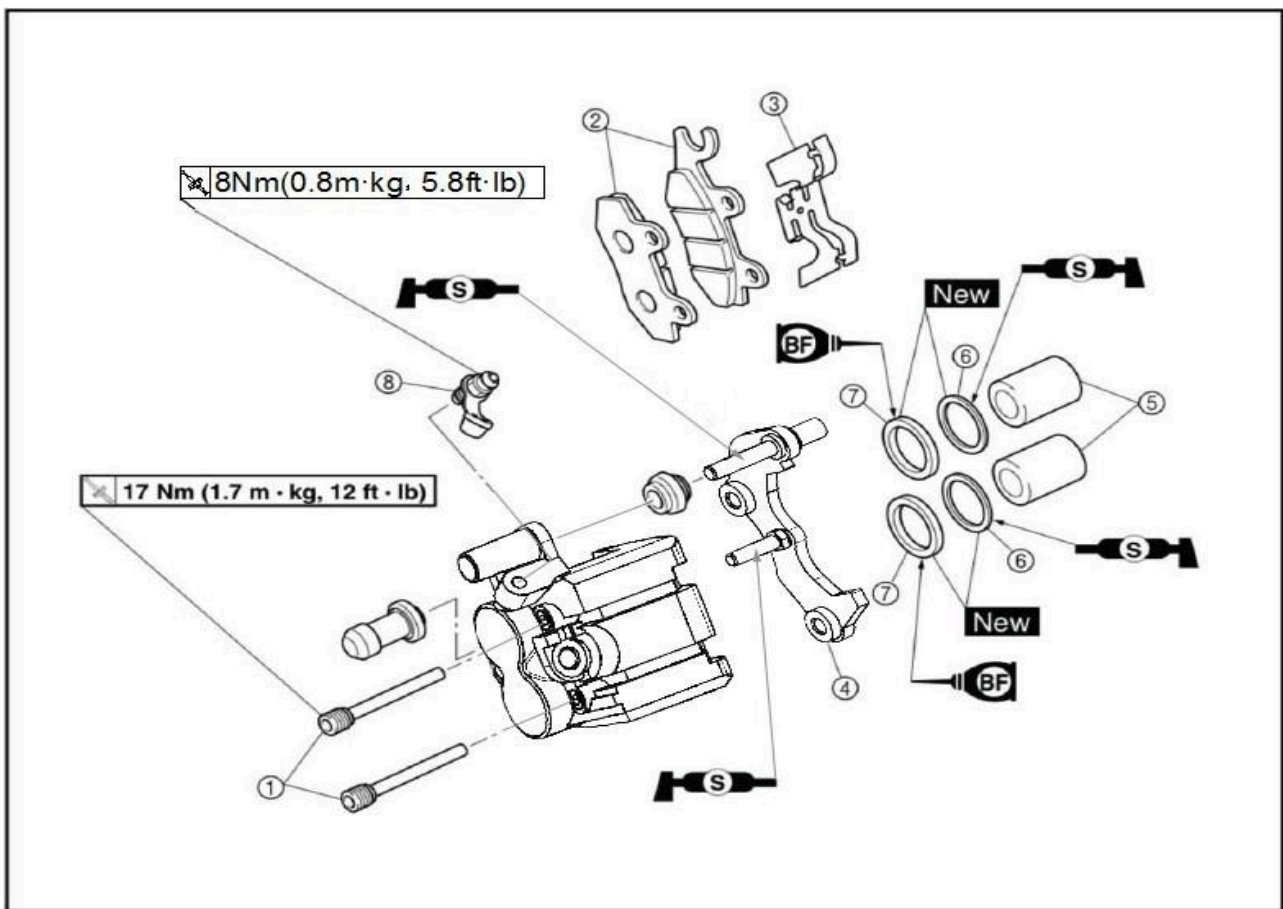


Order	Job/Part	Q'ty	Remarks
	Disassembling the front brake caliper		Remove the parts in the order listed. The following procedure applies to both of the front brake calipers.
①	Front brake caliper bracket bolt	2	
②	Brake caliper bracket	1	
③	Front brake pad	1	
④	Brake pad spring	2	
⑤	Brake pad spring2	2	
⑥	Brake caliper piston	1	Refer to "DISASSEMBLING THE FRONT AND REAR BRAKE CALIPERS".
⑦	Brake caliper dust seal	1	
⑧	Brake caliper piston seal	1	
⑨	Bleed screw	1	For assembly, reverse the disassembly procedure.

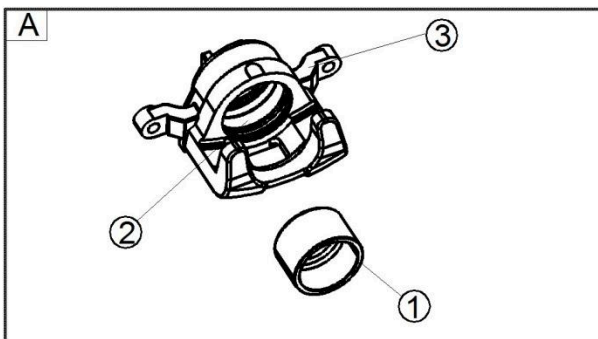
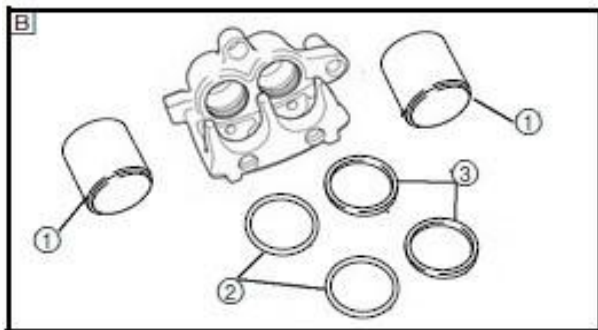
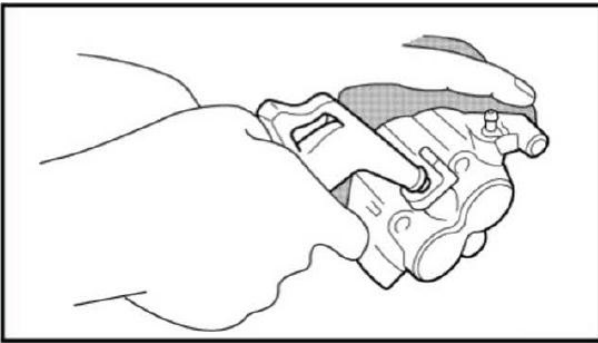
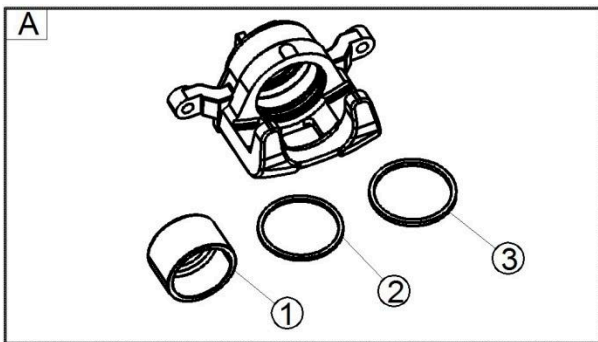
Rear brake calipers



Order	Job/Part	Q'ty	Remarks
	Removing the rear brake calipers		Remove the parts in the order listed. The following procedure applies to both of the rear brake calipers. Drain Refer to "FRONT AND REAR WHEELS".
1	Brake fluid	1	
2	Rear wheel	2	
3	Union blot	1	Disconnect.
4	Copper washer	2	Loosen.
5	Rear brake hose	2	
6	Brake pad holding bolt	1	
	Rear brake caliper bolt		
	Rear brake caliper assembly		For installation, reverse the removal procedure.



Order	Job/Part	Q'ty	Remarks
	Disassembling the rear brake calipers		Remove the parts in the order listed. The following procedure applies to both of the front brake calipers.
①	Brake pad holding bolt	2	
②	Rear brake pad	2	
③	Brake pad spring	1	
④	Brake caliper bracket	1	
⑤	Brake caliper piston	2	Refer to "DISASSEMBLING THE FRONT AND REAR BRAKE CALIPERS".
⑥	Brake caliper dust seal	2	
⑦	Brake caliper piston seal	2	
⑧	Bleed screw	1	
			For assembly, reverse the disassembly procedure.



Disassembling the front and rear brake calipers

1. Remove:

- Brake caliper pistons ①
- Brake caliper dust seals ②
- Brake caliper piston seals ③

Ⓐ Front

Ⓑ Rear

- a. Blow compressed air into the hose joint opening to force out the caliper piston from the brake caliper body.

⚠ WARNING

- Never try to pry out a caliper piston.
- Cover the caliper piston with a rag. Be careful not to get injured when the piston is expelled from the caliper cylinder.

- b. Remove the dust seals and piston seals.

Checking the front and rear brake calipers

Recommended brake component replacement schedule:

Brake pads	As required
Piston seals, dust seals	Every two years
Brake hoses	Every four years
Brake fluid	Replace when brakes are disassembled.

⚠ WARNING

All internal brake components should be cleaned in new brake fluid only. Do not use solvents as they will cause seals to swell and distort.

1. Check:

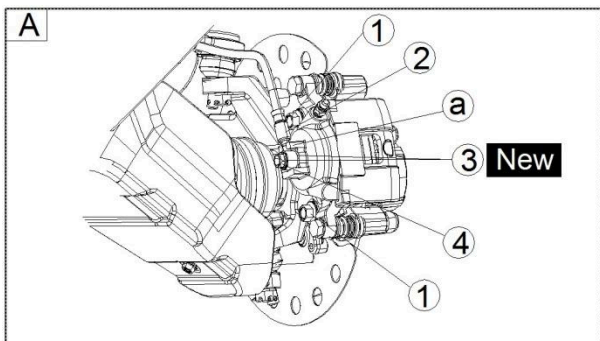
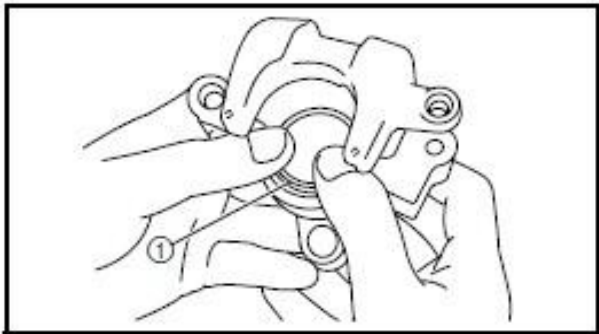
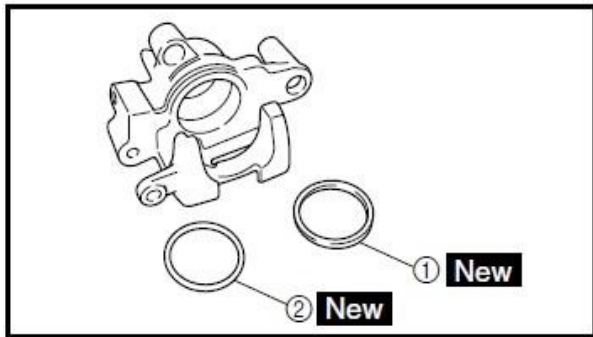
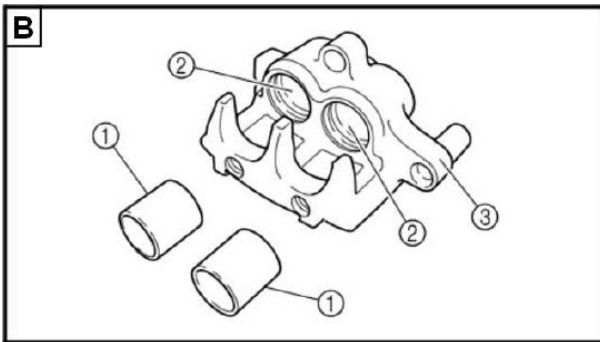
- Brake caliper pistons ①

Scratches/rust/wear → Replace the brake caliper assembly.

- Brake caliper cylinders ②

Wear/scratches → Replace the brake caliper assembly.

- Brake caliper body ③



Cracks/damage→Replace.

- Brake fluid delivery passage (brake caliper body)

Blockage→Blow out with compressed air.

⚠ WARNING

Replace the caliper piston seals and dust seals whenever the brake caliper is disassembled.

Ⓐ Front

Ⓑ Rear

Assembling the front and rear brake calipers

⚠ WARNING

- All internal brake components should be cleaned and lubricated with new brake fluid only before installation.



**Recommended brake fluid
DOT 4**

- Replace the caliper piston seals and dust seal whenever a brake caliper is disassembled.

1. Install
 - caliper piston seal ① **New**
 - dust seal ② **New**
2. Install
 - Brake caliper piston ①

Installing the front and rear brake calipers

1. Install:
 - Brake caliper assembly
 - Brake caliper bolts ①

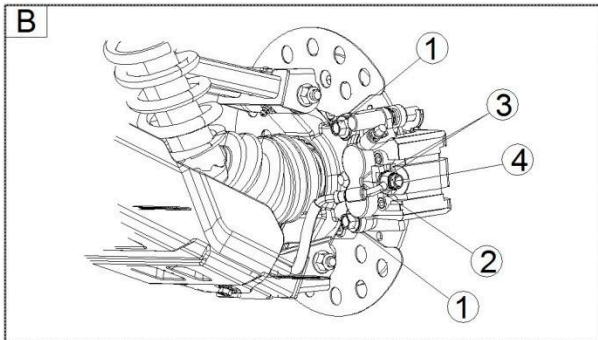
50Nm (5.0m · kg, 36ft · lb)

- Brake hose ②
- Copper washers ③ **New**
- Union bolt ④

27 Nm (2.7 m · kg, 19 ft · lb)

NOTICE

When installing the brake hose on the brake caliper, make sure that the brake pipe touches the projection ㊤ on the brake caliper.


⚠ WARNING

Proper brake hose routing is essential to insure safe vehicle operation. Refer to “ CABLE ROUTING” in chapter 2.

Ⓐ Front

Ⓑ Rear

2. Fill:

- Brake master cylinder reservoir



**Recommended brake fluid
DOT 4**

NOTICE

Brake fluid may damage painted surfaces or plastic parts. Always clean up spilled brake fluid immediately.

⚠ WARNING

- Use only the designated quality brake fluid: other brake fluids may deteriorate the rubber seals, causing leakage and poor brake performance.
- Refill with the same type of brake fluid: mixing brake fluids may result in a harmful chemical reaction and lead to poor brake performance.
- Be careful that water does not enter the master cylinder when refilling. Water will significantly lower the boiling point of the brake fluid and may result in vapor lock.

3. Air bleed:

- brake system

Refer to “ BLEEDING THE HYDRAULIC BRAKE SYSTEM” in chapter 3.

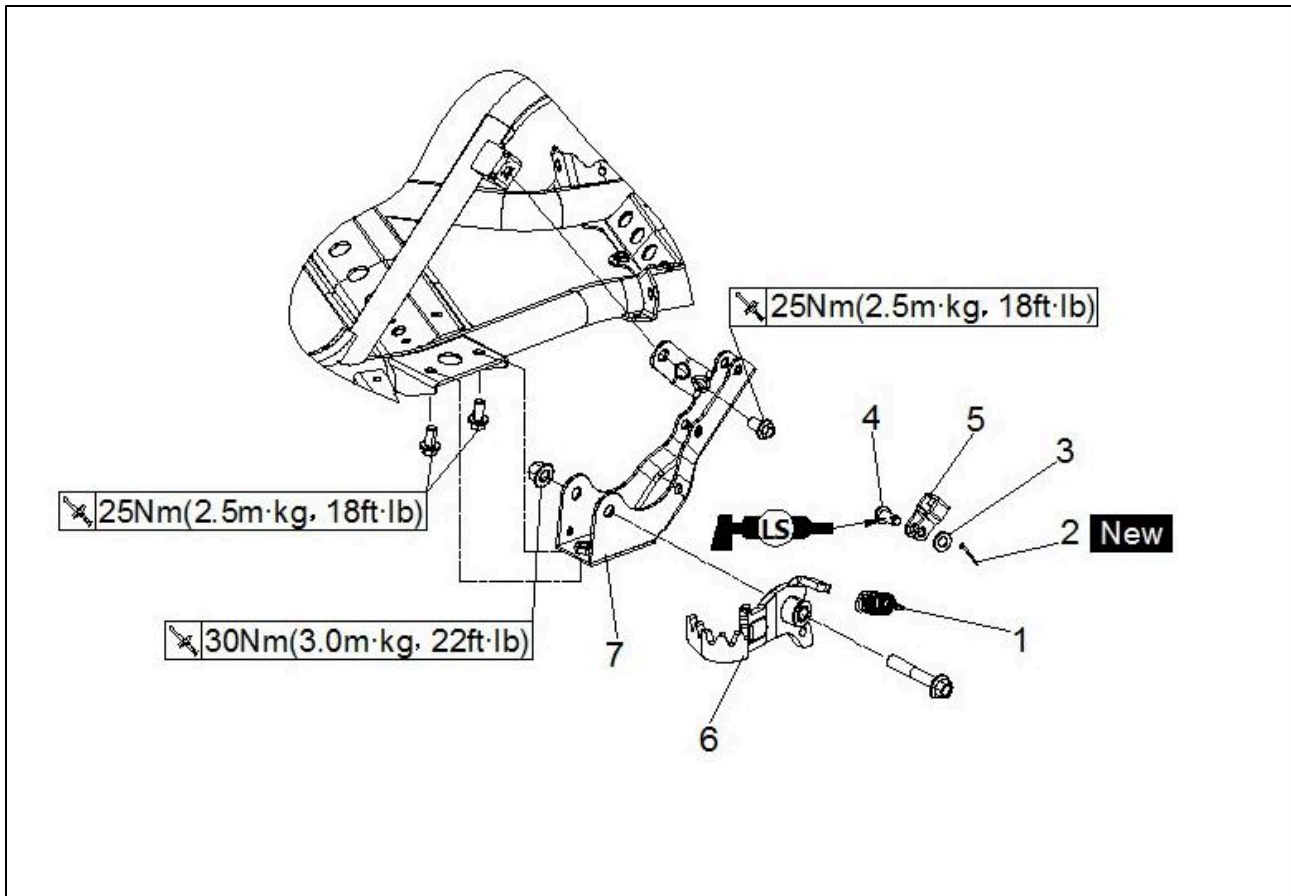
4. Check:

- brake fluid level

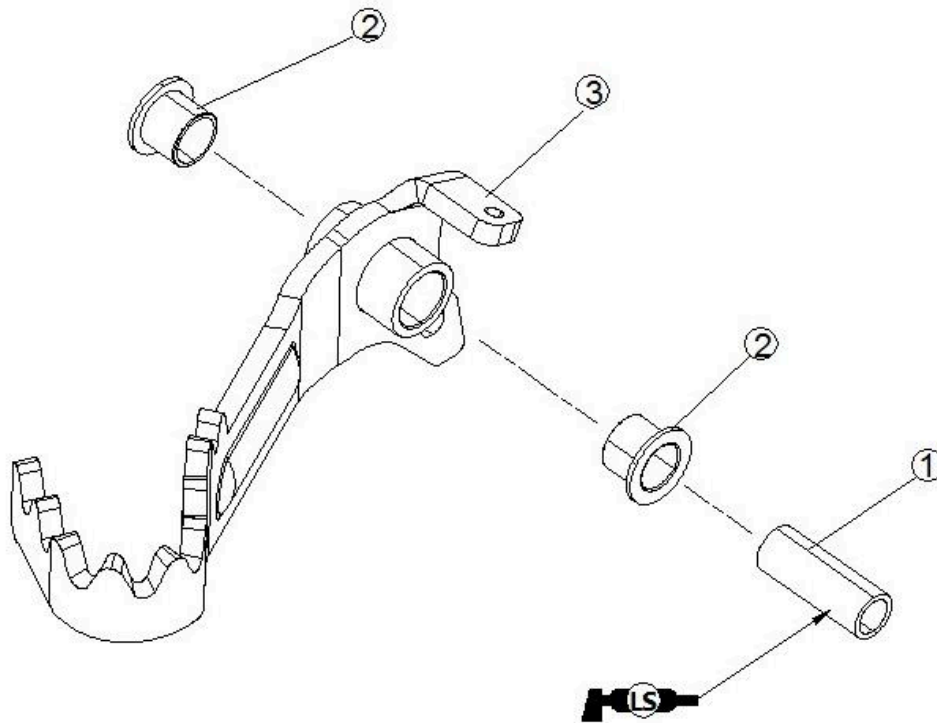
Brake fluid level is below the “ LOWER” level line
→ Add the recommended brake fluid to the proper level.

Refer to “ CHECKING THE BRAKE FLUID LEVEL” in chapter 3.

Pedal assembly



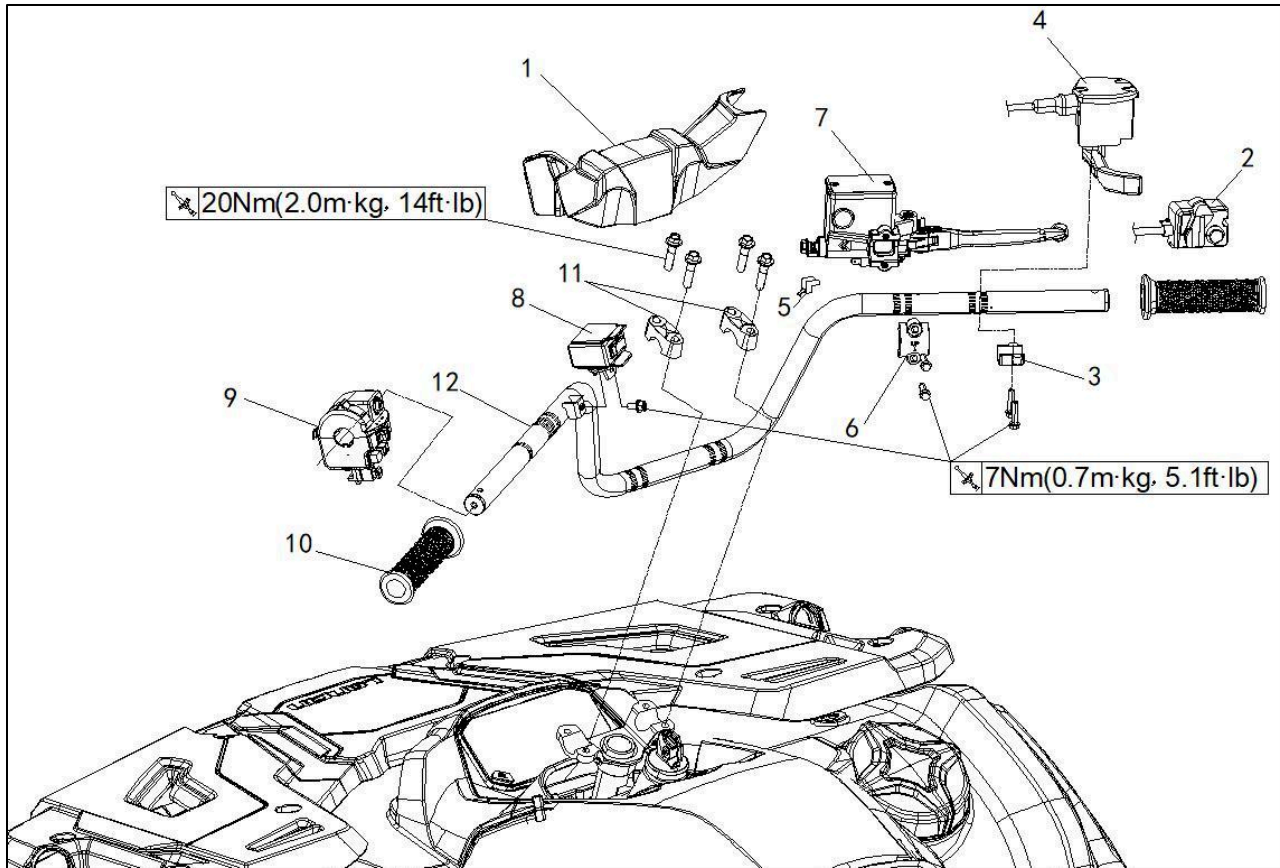
Order	Job/Part	Q'ty	Remarks
	Removing the pedal assembly		
1	Brake master cylinder	1	Remove the parts in the order listed. Refer to "FRONT AND REAR BRAKES".
2	Spring	1	
3	Pin cotter	1	
4	Wash	1	
5	Pin clevis	1	
6	Joint	1	For assembly, reverse the disassembly procedure.
7	Pedal assembly	1	
	Brake pedal bracket	1	



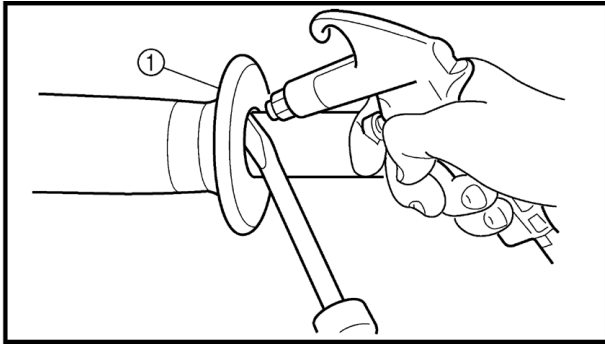
Order	Job/Part	Q'ty	Remarks
	Disassembling the pedal assembly		
①	Bush	1	Remove the parts in the order listed.
②	Bush T	1	
③	Brake pedal	1	
			For assembly, reverse the disassembly procedure.

Steering system

Handlebar



Order	Job/Part	Q'ty	Remarks
	Removing the handlebar		
1	Handlebar cover	1	Remove the parts in the order listed.
2	ON-command four-wheel-drive motor switch and differential gear lock switch	1	
3	Throttle lever assembly holder	1	
4	Throttle lever assembly	1	
5	Rear brake light switch connector	2	Disconnect.
6	Rear brake master cylinder holder	1	Refer to "INSTALLING THE REAR BRAKE MASTER CYLINDER".
7	Rear brake master cylinder	1	
8	Capstan controller switch	1	
9	Left handlebar switch	1	Refer to "INSTALLING THE REAR BRAKE MASTER CYLINDER".
10	Handlebar grip	2	Refer to "REMOVING THE HANDLEBAR GRIPS" and "INSTALLING THE HANDLEBAR GRIPS".
11	Handbag holder	2	Refer to "INSTALLING THE HANDLEBAR".
12	Handlebar	1	Refer to "INSTALLING THE HANDLEBAR". For installing, reverse the removal procedure.



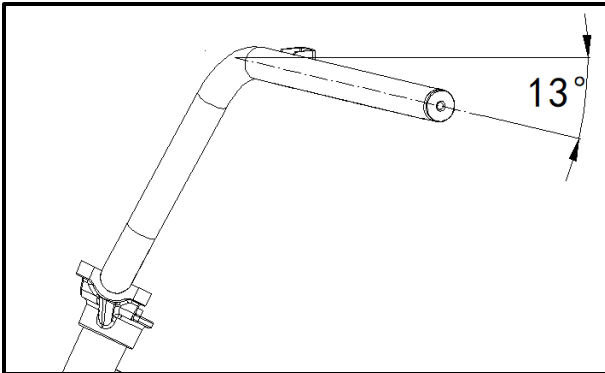
Removing the handlebar grips

1. Remove:

- handlebar grips ①

NOTE:

Blow compressed air between the handlebar and handlebar grip, and gradually push the grip off the handlebar.



Checking the handlebar

1. Check:

- handlebar

Bends/cracks/damage → Replace.

⚠ WARNING

Do not attempt to straighten a bent handlebar as this may dangerously weaken the handlebar.

Installing the handlebar

1. Install:

- handlebar
- handlebar holders



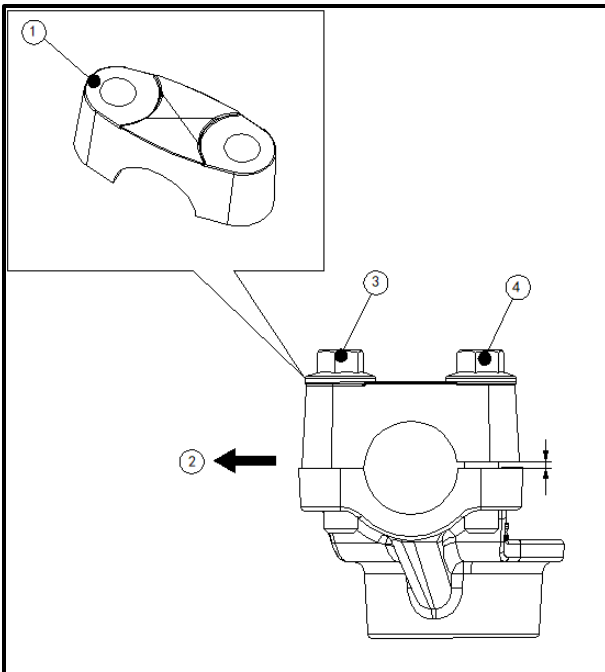
20Nm(2.0m.kg. 14ft.lb)

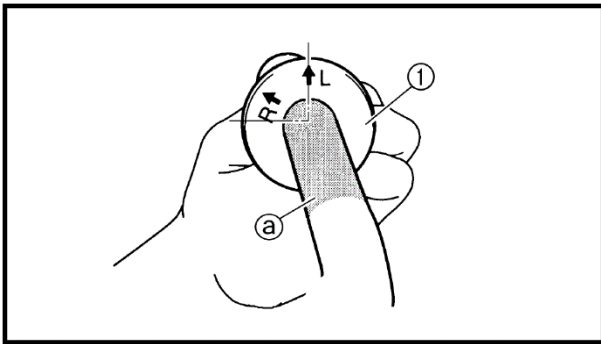
NOTE:

- Install the handlebar within 15° from the horizontal line shown in the illustration.
- The upper handlebar holders should be installed with the punched mark ① forward ②.

CAUTION:

First tighten the bolts ③ on the front side of the handlebar holders, and then tighten the bolts ④ on the rear side.





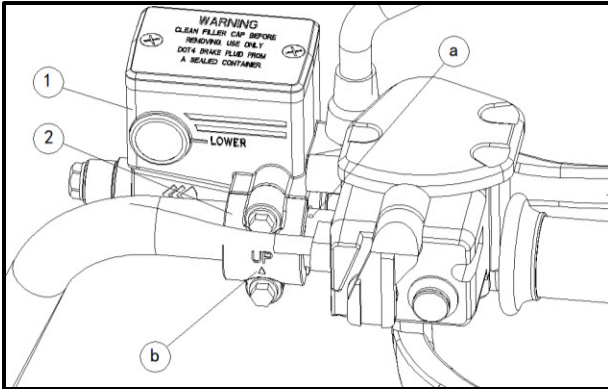
Installing the handlebar grips

1. Remove:

- handlebar grips ①

NOTE:

- Before applying adhesive, wipe off grease or oil on the handlebar surface ③ with a lacquer thinner.
- Install the handlebar grips to the handlebar so that arrow mark L faces up on the left handlebar grip and the arrow mark Races out on the right handlebar.



Installing the front brake master cylinder

1. Install:

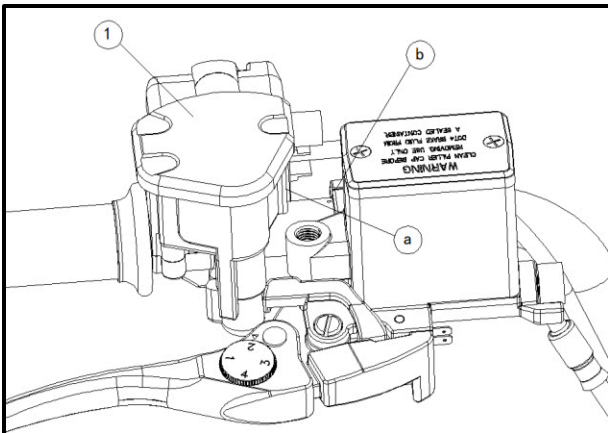
- Right handlebar switch
- Front brake master cylinder ①
- Front brake master cylinder holder ②



7Nm(0.7m.kg.5.1ft.lb)

NOTE:

- Align the end of the brake master cylinder holder with the punch mark ③ on the handlebar.
- The “UP” mark ④ on the brake master cylinder holder should face up.



Installing the throttle lever assembly

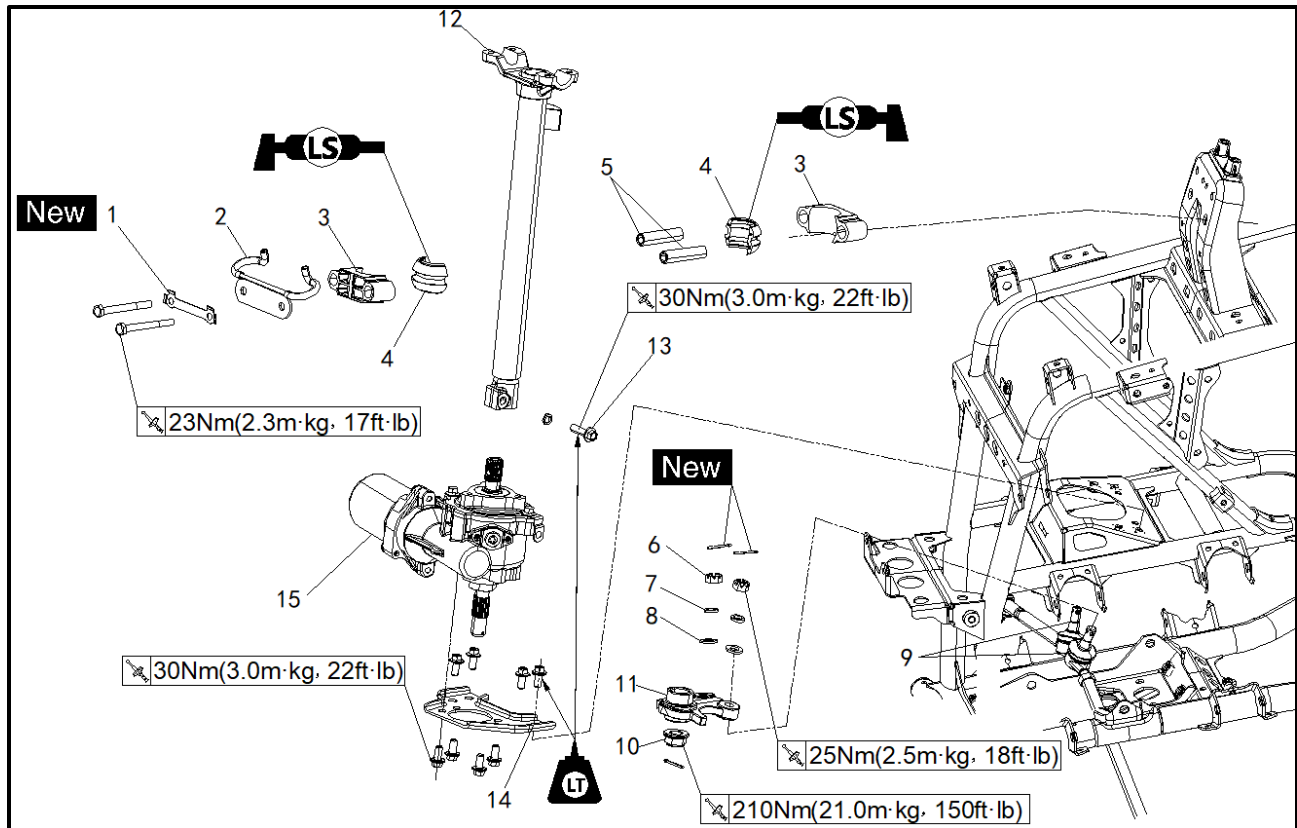
1. Install:

- throttle lever assembly ①
- throttle lever assembly holder

NOTE:

Align the projection ③ on the throttle lever assembly with the end of the brake master cylinder holder ④.

Steering stem



Order	Job/Part	Q'ty	Remarks
	Removing the steering stem Front fender		Remove the parts in the order list. Refer to "ENGINE SKID PLATES, SEAT, and CARRIERS AND FENDERS" in chapter 3.
	Air filter case		Refer to "AIR FILTER CASE" in chapter 3.
	Handlebar		Refer to "HANDLEBAR".
	Electrical components tray		Refer to "ELECTRICAL COMPONENT TRAY" in chapter 3.
1	Lock washer	1	
2	Cable guide	1	
3	Steering stem bushing	2	
4	Bearing bushing	2	Refer to "INSTALLING THE STEERING STEM". (Step 1 to 5)
5	Collar	2	
6	Tie rod end nut	2	
7	Retaining rings	2	
8	Plain washers	2	
9	Tie rod	2	
10	Pitman arm nut	1	
11	Pitman arm	1	Disconnect
12	Steering stem	1	Refer to "INSTALLING THE PITMAN ARM".
13	Steering stem joint bolt	1	
14	EPS bracket	1	
15	EPS unit	1	Refer to "INSTALLING THE STEERING STEM". (Step 12 to 15) For installation, reverse the removal procedure.

Checking the steering stem

1. Check:

- steering stem

Bends → Replace

⚠ WARNING

Do not attempt to straighten a bent stem; this may dangerously weaken the stem.

2 Check:

- steering stem bushings

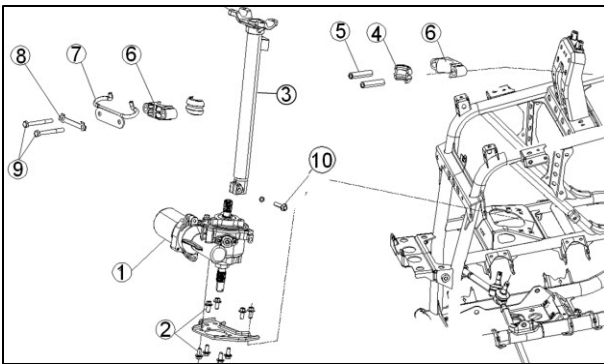
- Bearing bushings

Wear/damage → Replace

3 Check:

- steering stem joint

Crack/damage → Replace



Installing the steering stem

1. Install:

- EPS unit ①

- EPS unit bolts ②



EPS unit bolt
30Nm(0.7m.kg, 5.1 ft. lb)

2. Install:

- steering stem ③

3. Install:

- bearing bushings ④

- Collars ⑤

- Steering stem bushings ⑥

- cable guide ⑦

- Lock washer ⑧

- Steering stem bolts ⑩

(temporarily tighten)

NOTE:

Apply lithium-soap-based grease to the bearing bushings.

4. Install:

- steering stem joint bolts ⑩

(temporarily tighten)

NOTE:

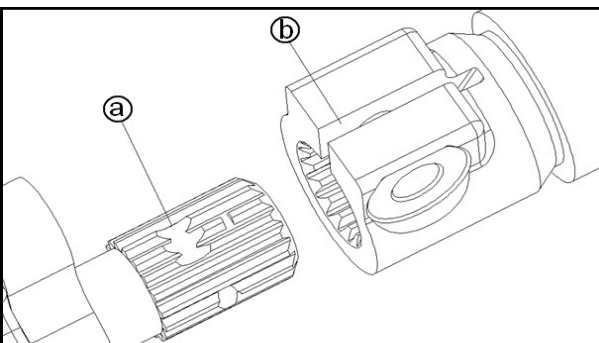
- Align the spline ① on the steering stem with the groove ② in the steering stem joint.

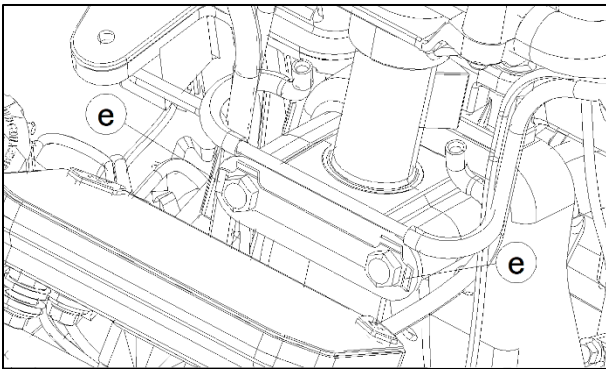
5. Tighten:

- steering stem bracket bolts



50Nm(5.0m.kg, 36ft. lb)





- steering stem bearing bolts

	50Nm(5.0m.kg.36ft.lb)
--	-----------------------

NOTE:

Apply LOCTITE® to the steering stem bracket bolts.

- steering stem joint bolts

	30Nm(3.0m.kg.22ft.lb)
--	-----------------------

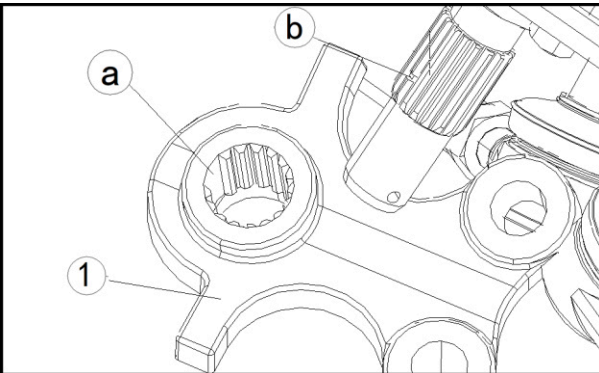
6.Tighten

- steering stem bolts

	23Nm(2.3m.kg.17ft.lb)
--	-----------------------

NOTE:

Bend the lock washer tab along a flat side of the bolt. Pass the cable and hoses through the cable guide. Refer to “CABLE ROUTING” in chapter 2.



INSTALLING THE PITMAN ARM

1.Install:

- pitman arm
- washer
- pitman arm nut

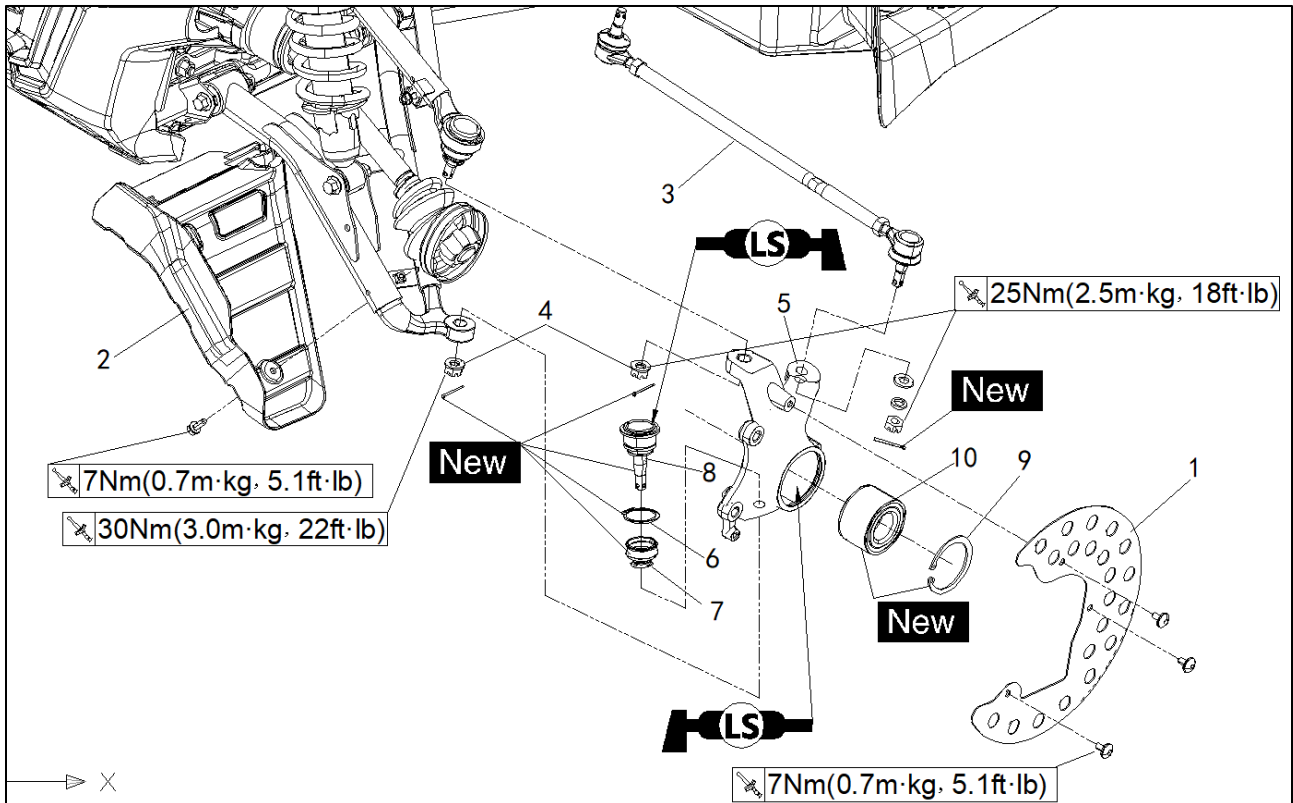
	210Nm(21.0m.kg.150ft.lb)
--	--------------------------

- clip

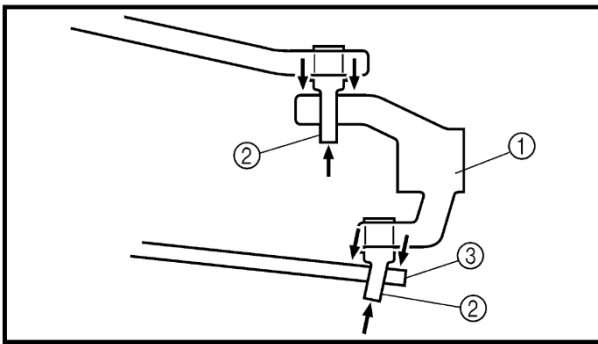
NOTE:

Align the punch mark (b) on the EPS unit with the groove (a) in the pitman arm.

Tie-rods and steering knuckles



Order	Job/Part	Q'ty	Remarks
	Removing the tie-rods and steering knuckles		Remove the parts in the order list. The flowing procedure applies to both of the tie-rods and steering knuckle Refer to "FRONT WHEELS".
1	Front wheel/brake disc	1	
2	Brake disc guard	1	
3	Tie-rod	1	Refer to "INSTALLATION THE TIE-RODS"
4	Nut	2	
5	Steering knuckle	1	
6	Circlip	1	Refer to "REMOVING THE STEERING KUNCKLE".
7	Rubber boot	1	
8	Ball joint	1	
9	Circlip	1	
10	Bearing	1	
			For installation, reverse the removal procedure.



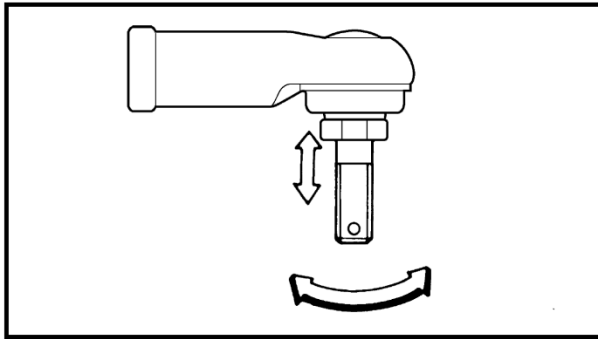
Removing the steering knuckles

1. Remove:

- steering knuckle ①
Bends → Replace

NOTE:

Use a general puller to separate the ball joint ② from the steering knuckle or the front lower arm ③



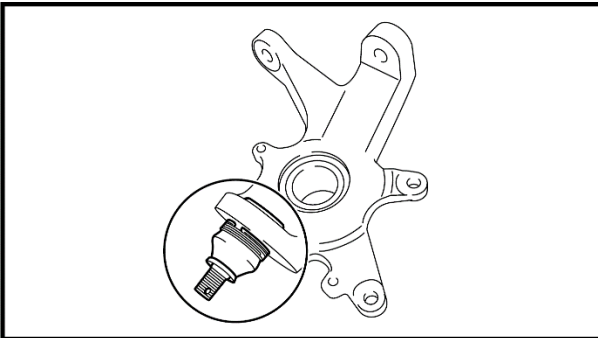
Checking the tie-rods

1. Check:

- tie-rod free play and movement
Free play → replace the tie-rods end.
Bends → Replace

2. Check:

- Tie-rods
Bend/damage → replace



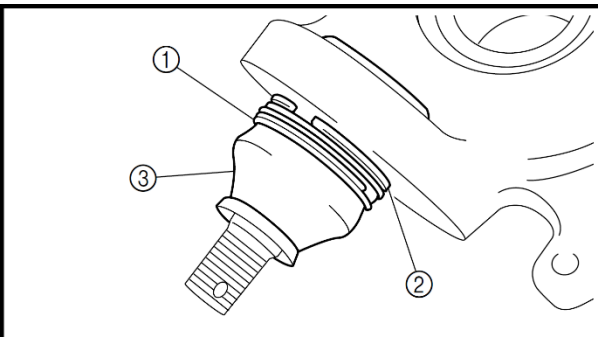
Checking the steering knuckles

1. Check:

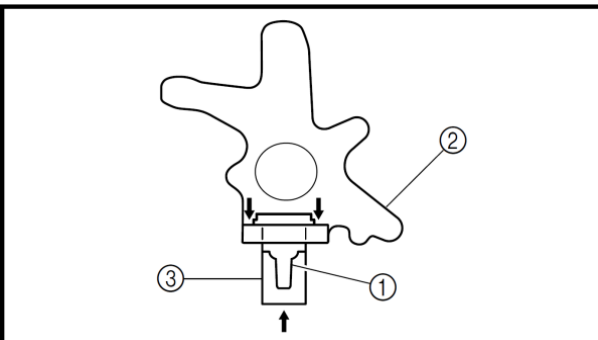
- steering knuckle
Damage/pitting → Replace

2. Check:

- ball joints
Damage/pitting → Replace the ball joint.
Free play → Replace the ball joint.
Turns roughly → Replace the ball joint.



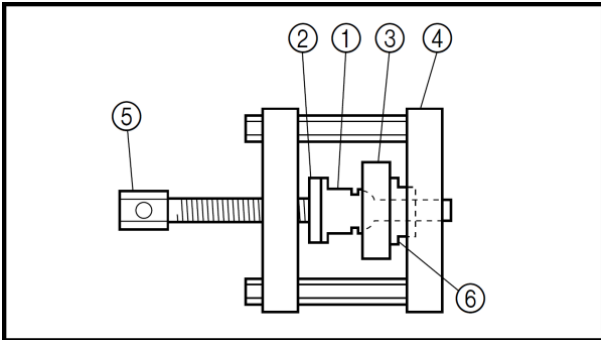
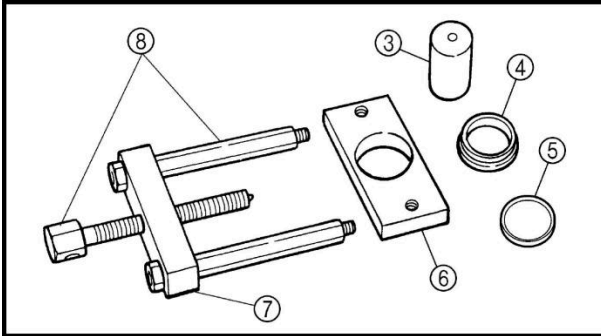
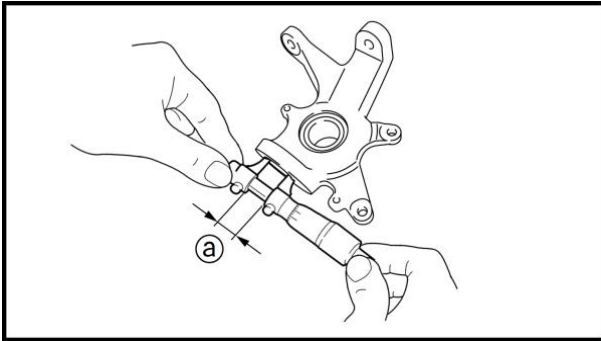
- Clean out side of the steering knuckle.
- Remove the clip ①, circlip ② and rubber boot ③.



- Remove the ball joint.

NOTE:

Use a remover attachment ③ to separate the ball joint ① from the steering knuckle ②.



d. measure the ball joint bore inside diameter ③.
Out of specification → replace the steering knuckle

	Ball joint bore inside diameter 32-32.05 mm (1.260-1.280 in)
--	--

e. install the new ball joint.
Use the ball joint remove/installer set.

	Ball joint remover Ball joint remover attachment set Ball joint adapter set Ball joint remover short shaft set
--	---

- ③ Remover attachment
- ④ **Install spacer**
- ⑤ **Install washer**
- ⑥ **Base**
- ⑦ **Body**
- ⑧ **Ball joint remover short shaft set**

f. attach the ball joint remover/installer, new ball joint (with rubber boot and retaining ring) ①, installer spacer ⑥ and installer washer ② to the steering knuckle ③.

NOTE:

Do not tap or damage the top of the ball joint.

g. Hold the body in place while turning in the bolt ⑤ to install the new ball joint ① into the steering knuckle

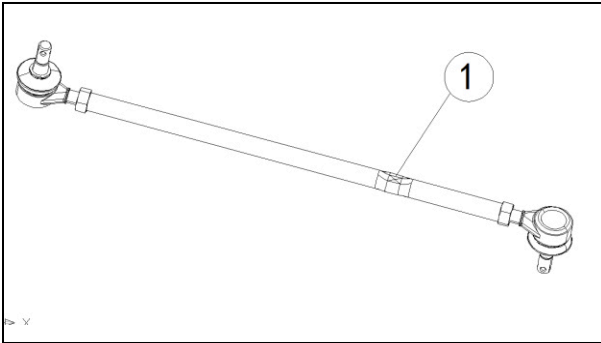
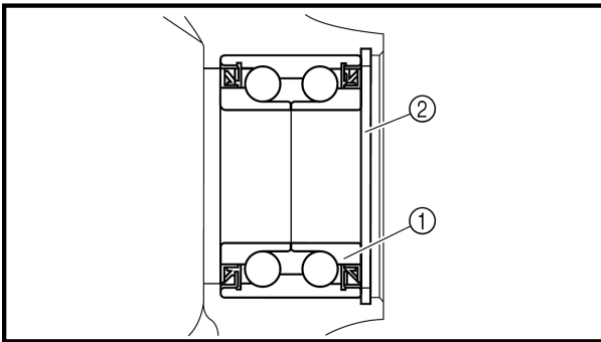
h. remove the ball joint remover/installer.

i. install a new ball joint.

NOTE:

Always use a new ball joint set.





3. Check:

- front wheel bearing ①

Bearing allow play in the wheel hubs or the wheel turns roughly replace



- clean the out side of the steering knuckle.
- remove the circlip.
- drive out the bearing.

△WARNING:

Eye protection is recommended when using striking tools.

- apply lithium-soap-based grease to the outer side of the bearing.
- install the new bearing.

CAUTION:

do not stick the center race or balls of the bearing. Should be made only with the outer race.

- install the new circlip.



INSTALLING THE TIE-RODS

1. install:

- tie-rods(left and right)



25Nm(2.5m.kg. 18ft.lb)

NOTE:

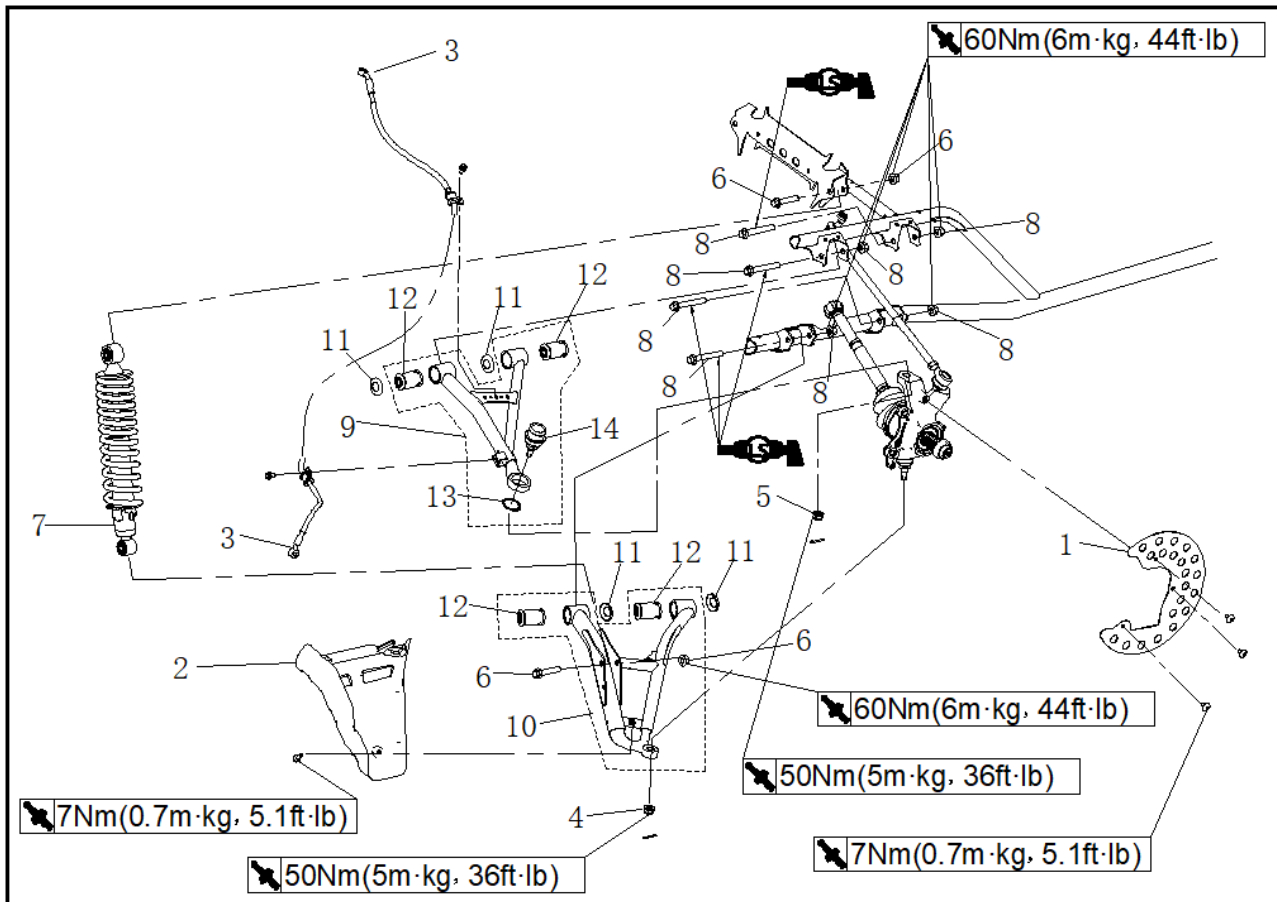
The tie-rod side which must be install on the out side has grooves ①.

2.adjust:

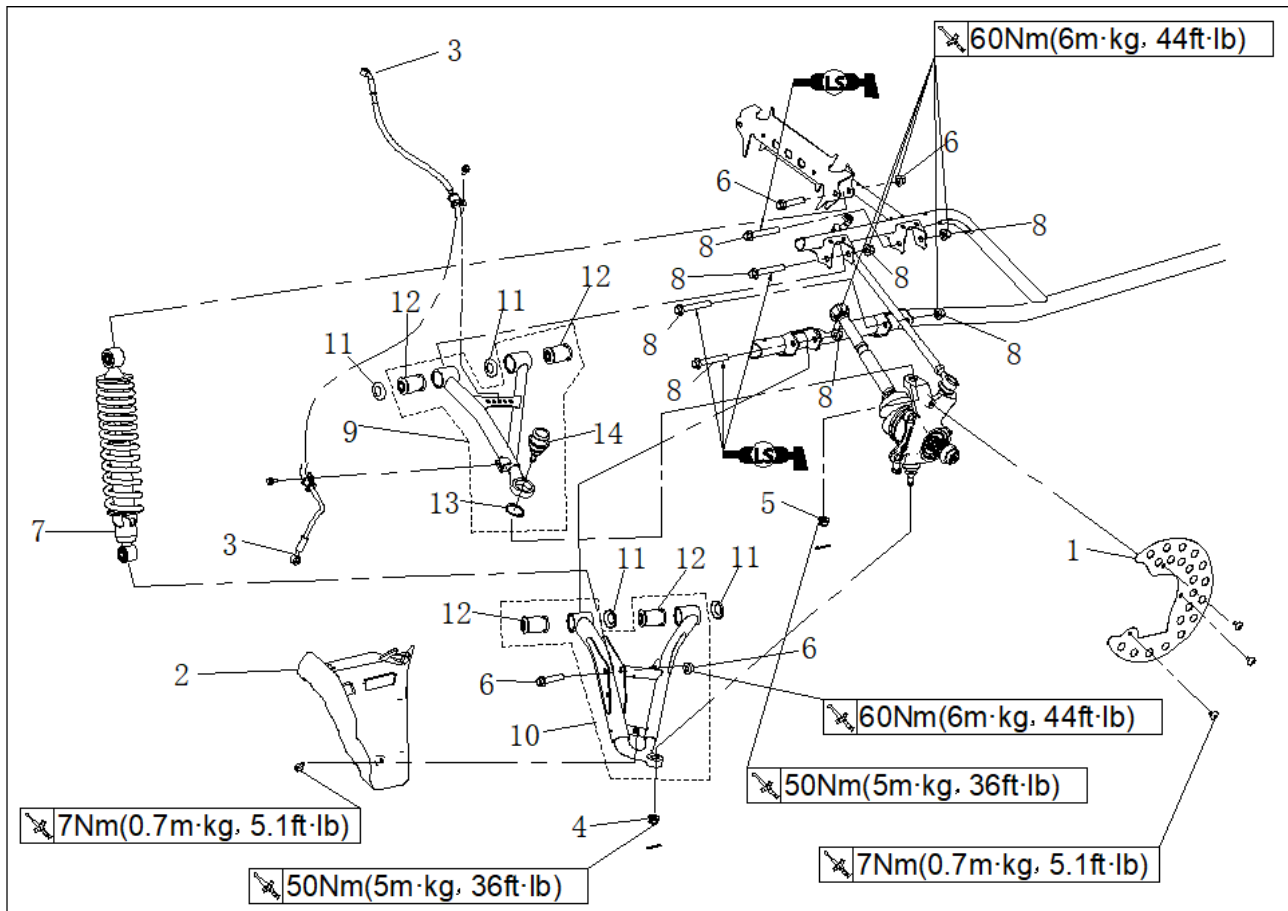
- Toe-in

Refer to “ADJUSTING THE TOE-IN” in chapter 3.

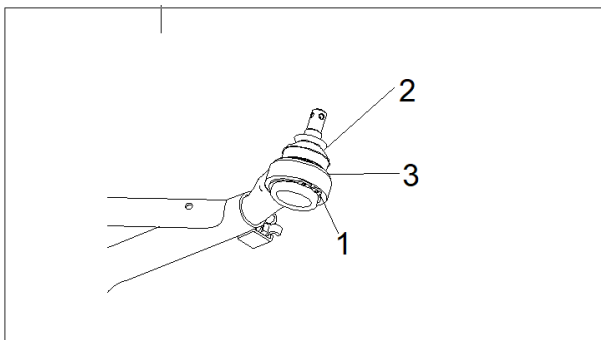
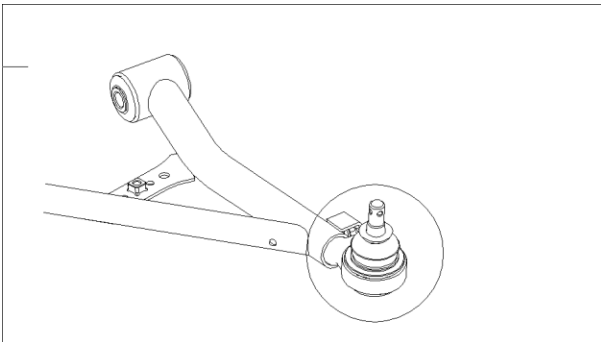
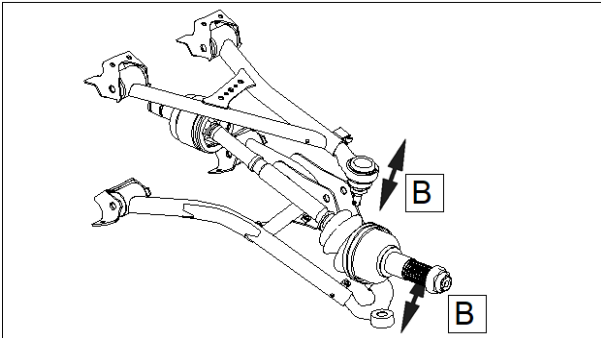
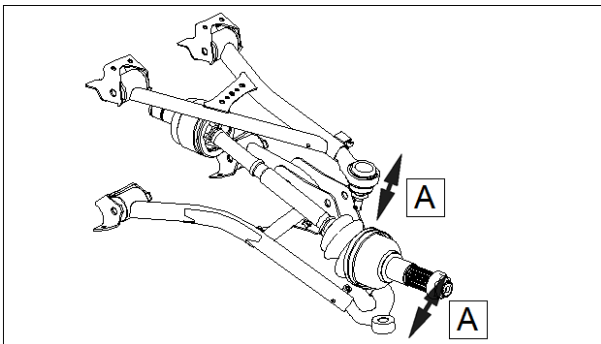
Front arms and front shock absorber assemblies



Order	Job/Part	Q'ty	Remarks
	Removing the front arms and front shock absorber assemblies		Remove the parts in the order listed. The following procedure applies to both of the front arms and front shock absorber assemblies.
1	Front wheel/brake disc	1	Refer to "FRONT AND REAR WHEELS".
2	Front brake caliper assemblies	1	Refer to "FRONT AND REAR BRAKES".
3	Brake disc guard	2	
4	Front arm protector	1	
5	Front brake hose holder	1	
6	Nut	1	Refer to "REMOVING THE FRONT ARMS" and "INSTALLING THE FRONT ARMS AND FRONT SHOCK ABSORBER".
7	Nut/bolt	2/2	
8	Front shock absorber assembly	1	
9	Nut/bolt	2/2	
10	Front upper arm	1	



Order	Job/Part	Q'ty	Remarks
10	Front lower arm	2/2	Refer to "REMOVING THE FRONT ARMS" and "INSTALLING THE FRONT ARMS AND FRONT SHOCK ABSORBERS".
11	Dust cover	1	
12	Bushing	2	
13	Circlip	2	
14	Ball joint	1	
		1	For installation, reverse the removal procedure.
		1	
		2	

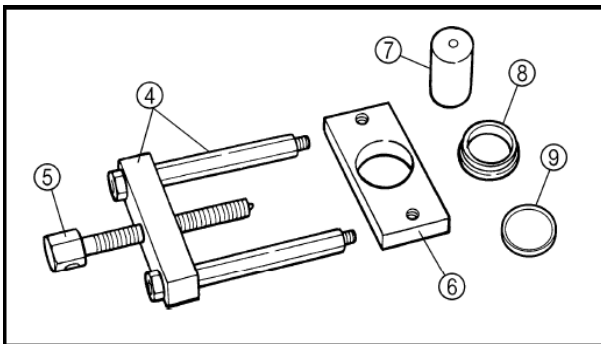


Removing the front arms

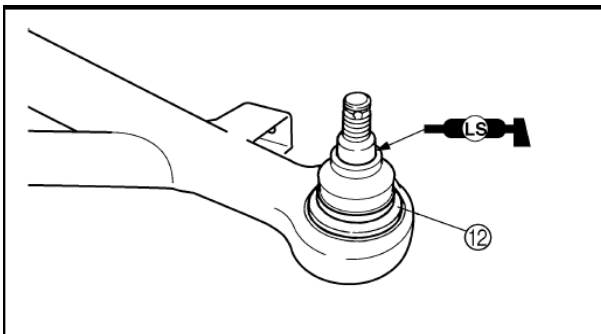
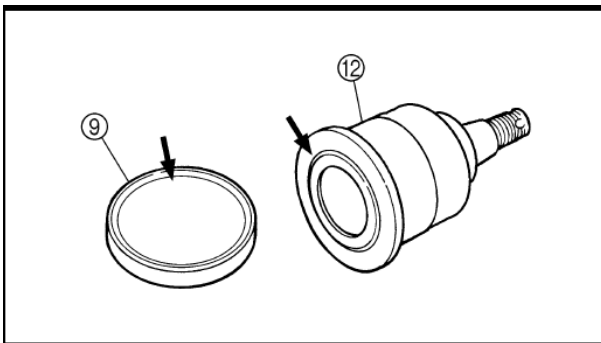
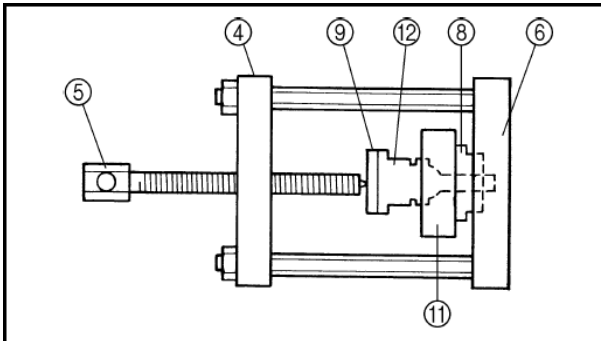
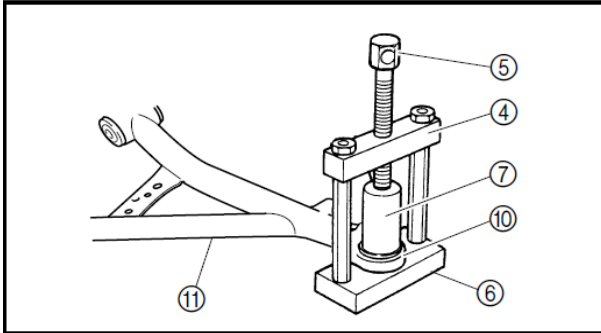
1. Check:
Front arm free play
 - a. Check the front arm side play A by moving it from side to side. If side play is noticeable, check the bushings.
 - b. Check the front arm vertical movement B by moving it up and down. If the vertical movement is tight or rough, or if there is binding, check the bushings.
2. Remove:
Front arms

Checking the front arms

1. Check:
Front arms
Bends/damage → Replace.
 2. Check:
Bushings
Wear/damage → Replace.
 3. Check:
Ball joint
Damage/pitting → Replace the ball joint.
Free play → Replace the ball joint.
Turns roughly → Replace the ball joint.
- a. Clean the outside of the front upper arm.
 - b. Remove the circlip ①, boot retaining ring ② and rubber boot ③.
Use the ball joint remover and installer set.



Ball joint remover
Ball joint remover attachment set
Ball joint adapter set



- ④ Body
- ⑤ Long bolt
- ⑥ Base
- ⑦ Remover attachment
- ⑧ Installer spacer
- ⑨ Installer washer
- c. Install the body ④, long bolt ⑤, base ⑥ and attachment ⑦ onto ball joint.
- d. Hold the body ④ in place while turning in the long bolt ⑤ to remove the ball joint ⑩ from the front upper arm ⑪.
- e. Remove the ball joint remover.
- f. Attach the assembled ball joint remover/installer, new ball joint (with rubber boot and retaining ring) ⑫, installer spacer ⑧ and installer washer ⑨ to the front upper arm ⑪.

NOTE:

Do not tap or damage the top of the ball joint.
Installer washer ⑨ must be aligned with the projection on the head of the ball joint ⑫.

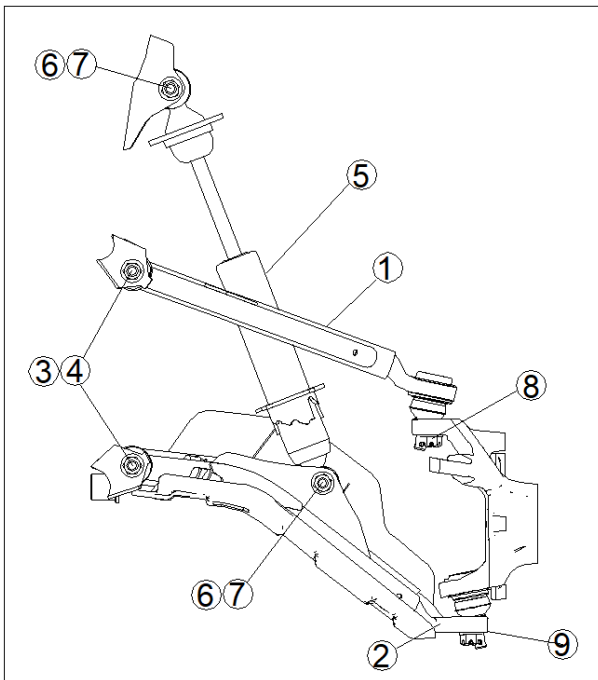
- g. Remove the ball joint remover.
- h. Install a new circlip.

NOTE:

Always use a new ball joint set.

Checking the front shock absorbers

- 1. Check:
 - shock absorber assembly
 - Oil leaks → Replace the shock absorber assembly
 - spring
 - Fatigue → Replace the shock absorber assembly.
 - Move the spring up and down.



Installing the front arms and front shock absorbers

1. Install:

Front arms

Front shock absorber

- a. Install the front upper arm ① and front lower arm ②.

NOTE:

Lubricate the bolts ③ with lithium-soap-based grease. Be sure to position the bolts ③ so that the bolt head faces forward. Temporarily tighten the nuts ④.

- b. Install the front shock absorber ⑤ and bolts ⑥.

	NUT ⑦ 60 Nm (6.0 m·kg, 44 ft·lb)
--	-------------------------------------

- c. Install the steering knuckle.

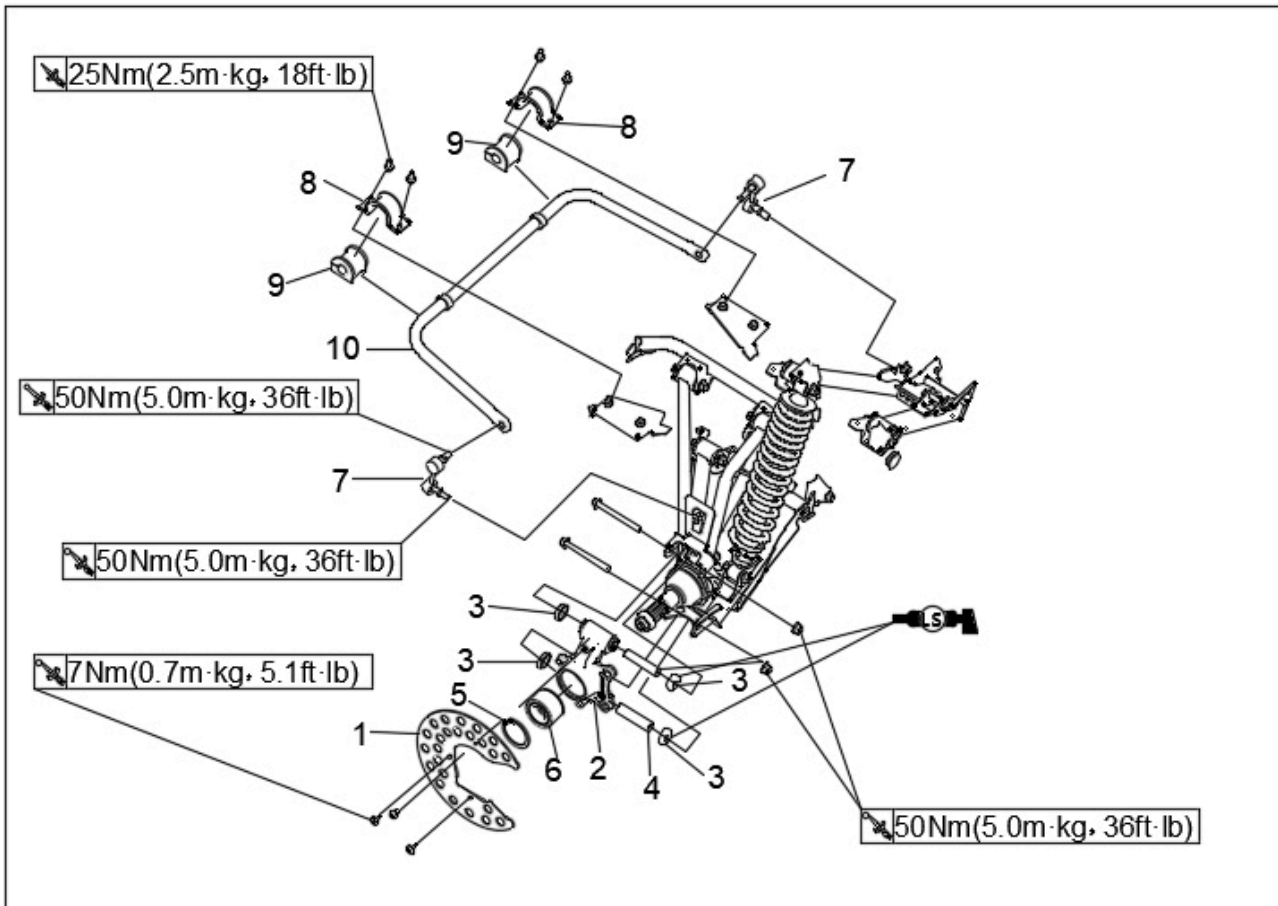
	NUT ⑧ 50 Nm (5.0 m·kg, 36 ft·lb)
	NUT ⑨ 50 Nm (5.0 m·kg, 36 ft·lb)

- d. Install the new cotter pins.

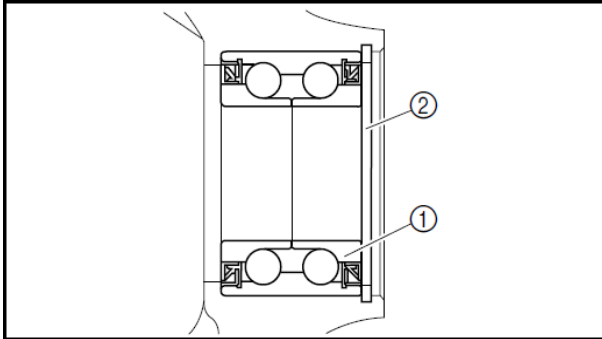
- e. Tighten the nuts ④.

	NUT ④ 60 Nm (6.0 m·kg, 44 ft·lb)
--	-------------------------------------

Rear knuckles and stabilizer



Order	Job/Part	Q'ty	Remarks
	Removing the rear knuckles and stabilizer		Remove the parts in the order listed. The following procedure applies to both of the rear knuckles. Refer to "FRONT AND REAR WHEELS".
1	Rear wheel hubs	1	
2	Brake disc guard	1	
3	rear knuckles	1	
4	Spacer cover	1	
5	Spacer	1	
6	Circlip	1	
7	Bearing	1	
8	Stabilizer joint	4	
9	Stabilizer holder	2	
10	Bushing	1	
	Stabilizer	1	
		2	
			For installation, reverse the removal procedure.



Checking the rear knuckles

1. Check:
Rear knuckle
Damage/pitting → Replace.
2. Check:
Rear wheel bearing ①
Bearing allow play in the wheel hub or the wheel turns roughly → Replace.
 - a. Clean the outside of the rear knuckle.
 - b. Remove the circlip ②.
 - c. Drive out the bearing.

WARNING

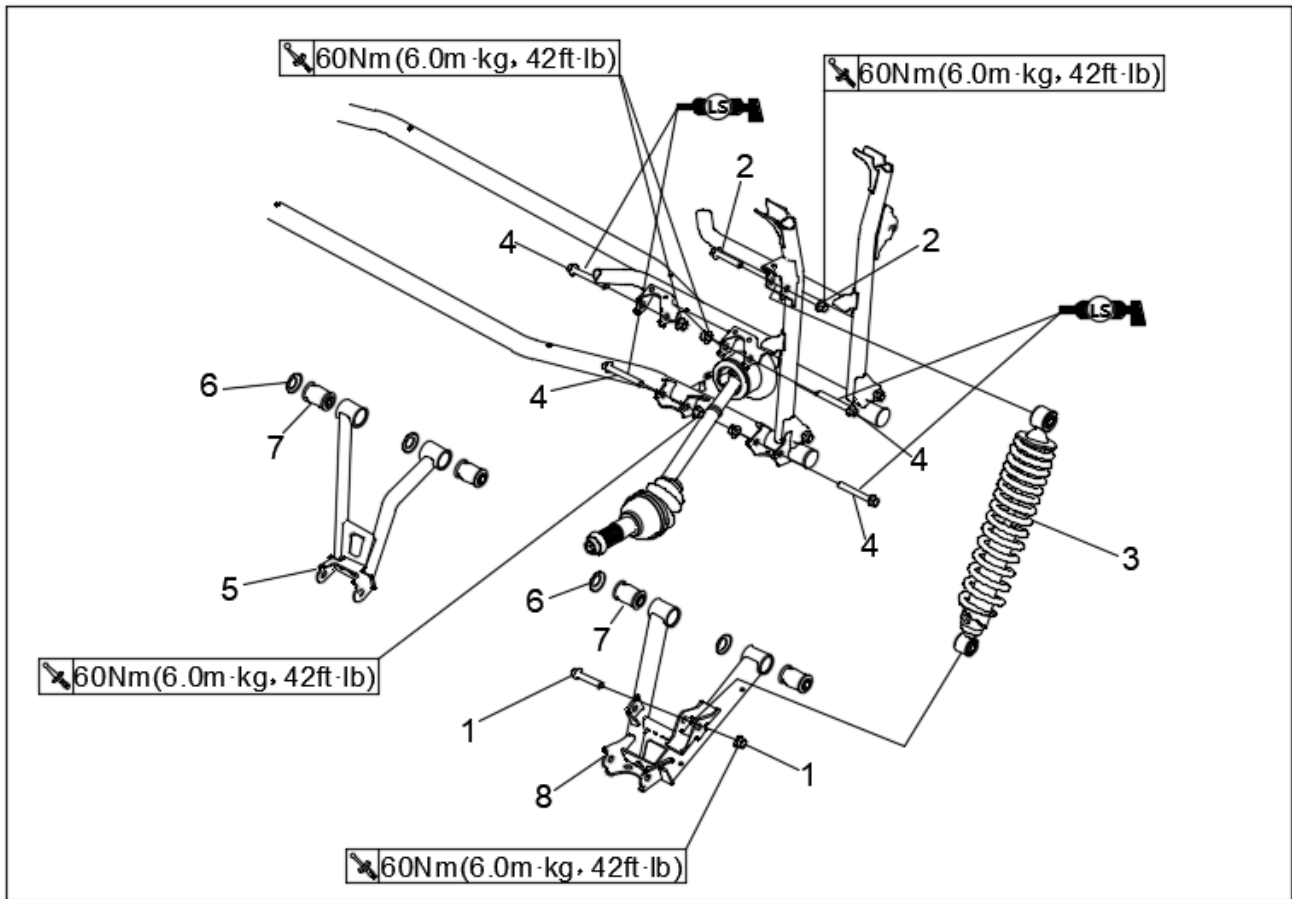
Eye protection is recommended when using striking tools.

- d. Apply lithium-soap-based grease to the outer side of the bearing.
- e. Install the new bearing.
- f. Install the new circlip.

Checking the stabilizer

1. Check:
stabilizer
Bends/cracks/damage → Replace

Rear arms and rear shock absorber assemblies



Order	Job/Part	Q'ty	Remarks
	Removing the rear arms and rear shock absorber assemblies		Remove the parts in the order listed.
	Rear knuckle/stabilizer		The following procedure applies to both of the rear arms and rear shock absorber assemblies. Refer to "REAR KNUCKLES AND STABILIZER".
1	Nut/bolt	2	
2	Nut/bolt	2/1/2	Refer to "INSTALLING THE REAR ARMS AND REAR SHOCK ABSORBER ASSEMBLIES".
3	Rear shock absorber assembly	1	
4	Nut/bolt	2/2	
5	Rear upper arm	1	
6	Dust cover	1	
7	Bushing	2/2	
8	Rear lower arm	1	For installation, reverse the removal procedure.

Checking the rear arms

1. Check:
Rear arms
Bends/damage→Replace.
2. Check:
bushings
Wear/damage→Replace.

Checking the rear shock absorber assemblies

1. Check:
Shock absorber assemblies
Oil leaks→Replace the shock absorber assemblies.
Spring
Fatigue→Replace the shock absorber assemblies.
Move the spring up and down.

Installing the rear arms and rear shock absorber assemblies

1. Install:
Rear arms
Rear shock absorber assemblies
 - a. Install the rear upper arm① and rear lower arm ②.

NOTE: _____
Lubricate the bolt③ with lithium-soap-based grease. Be sure to position the bolts ③ so that the bolt head faces outward. Temporarily tighten the nuts④.

- b. Install the rear shock absorber assembly⑤ and bolts⑥.

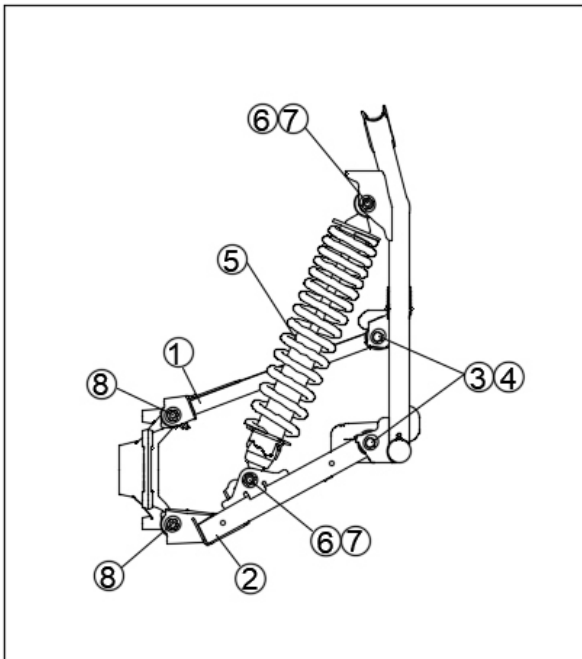
	NUT ⑦ 60 Nm (6.0 m·kg, 44 ft·lb)
---	-------------------------------------

- c. Install the rear knuckle.

	NUT ⑧ 50 Nm (5.0 m·kg, 36 ft·lb)
---	-------------------------------------

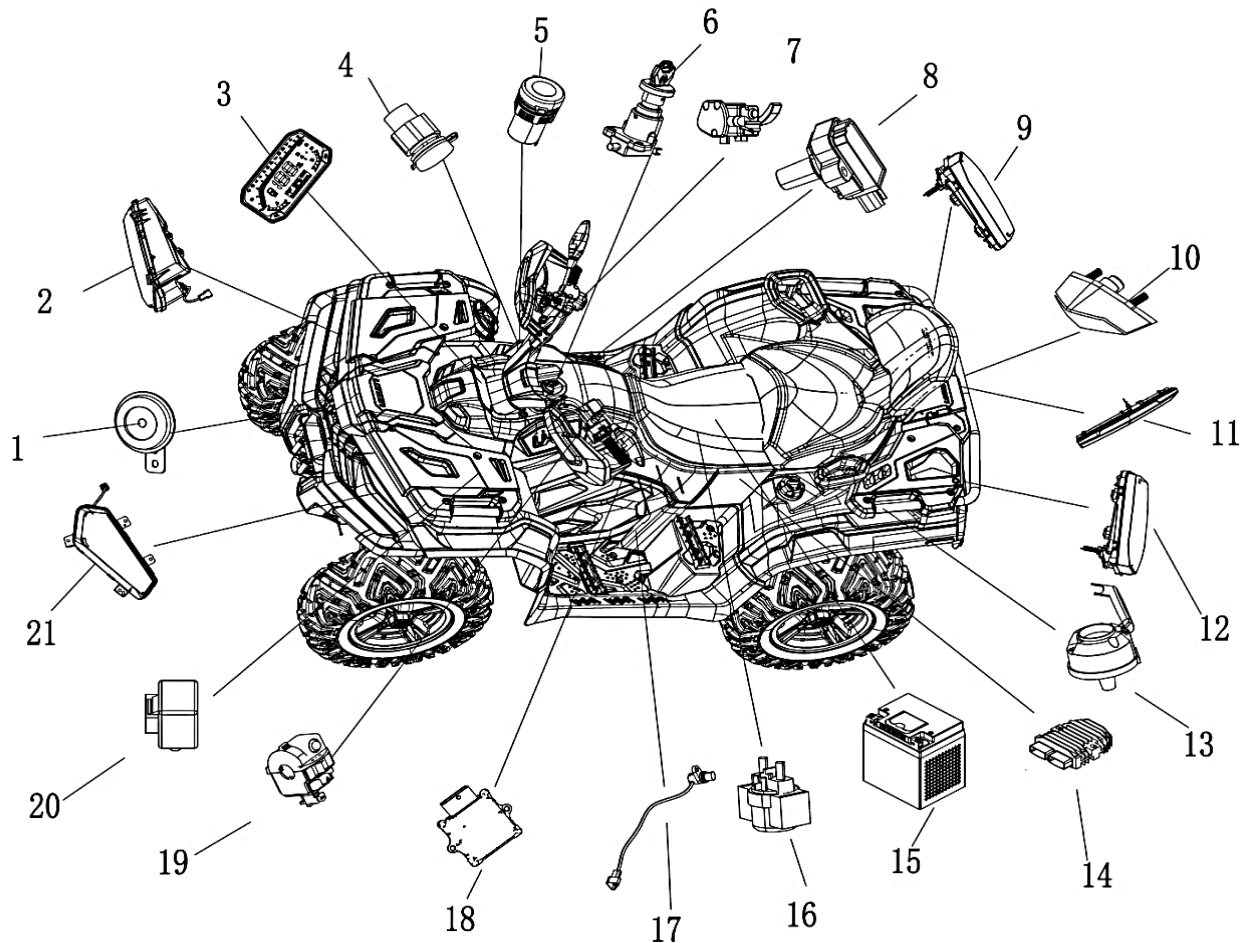
- d. Tighten the nuts④.

	NUT ④ 60 Nm (6.0 m·kg, 44 ft·lb)
---	-------------------------------------

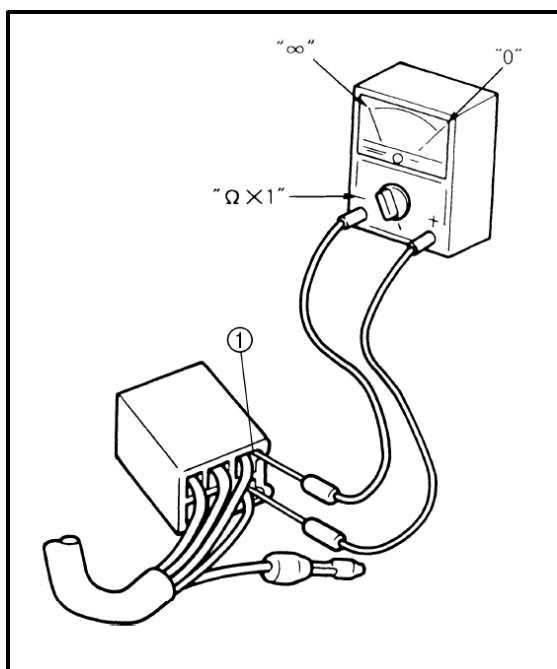


9 ELECTRICAL

Electrical components



No	Name	No	Name	No	Name
1	Horn	8	Ignition Coil	15	Battery
2	Headlight RH	9	Tail Light ,R	16	Stater Relay
3	Meter Assy	10	License Plate Lamp	17	Speed Sensor
4	DC Outlet	11	Rear position Light	18	ECU
5	USB	12	Tail Light ,L	19	Left Handlebar Switch
6	Ignition Switch	13	Power Connector	20	Flasher
7	Right Handlebar Switch	14	Rectifier&Regulator	21	Headlight LH

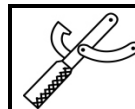


Checking switch continuity

Check each switch for continuity with the pocket tester. If the continuity reading is incorrect, check the wiring connections and if necessary, replace the switch.

CAUTION:

Never insert the tester probes into the coupler terminal slots ①. Always insert the probes from the opposite end of the coupler, taking care not to loosen or damage the leads.



Multi-meter

NOTE:

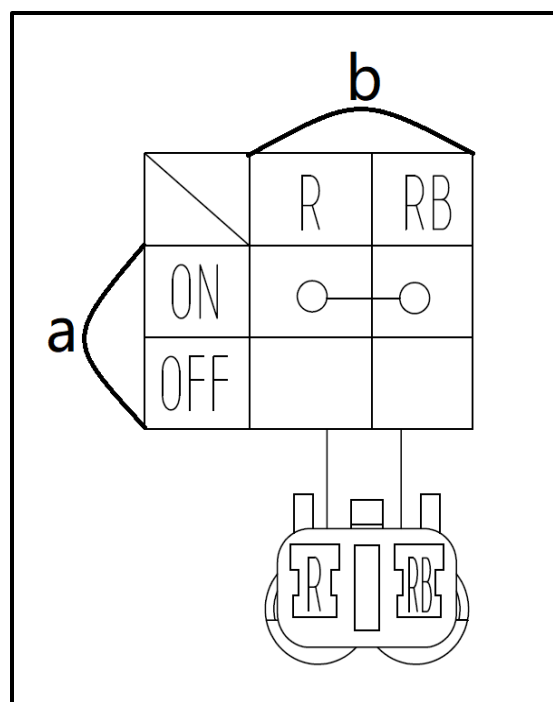
- Before checking for continuity, set the pocket tester to "0" and to the " $\Omega \times 1$ " range.
- When checking for continuity, switch back and forth between the switch positions a few times.

The terminal connections for switches (e.g., main switch, engine stop switch) are shown in an illustration similar to the one on the left.

The switch positions a are shown in the far left column and the switch lead colors b are shown in the top row in the switch illustration.

NOTE:

"○—○" indicates a continuity of electricity between switch terminals (i.e., a closed circuit at the respective switch position).



The example illustration on the left shows that:

There is continuity between red and red/black when the switch is set to "ON"

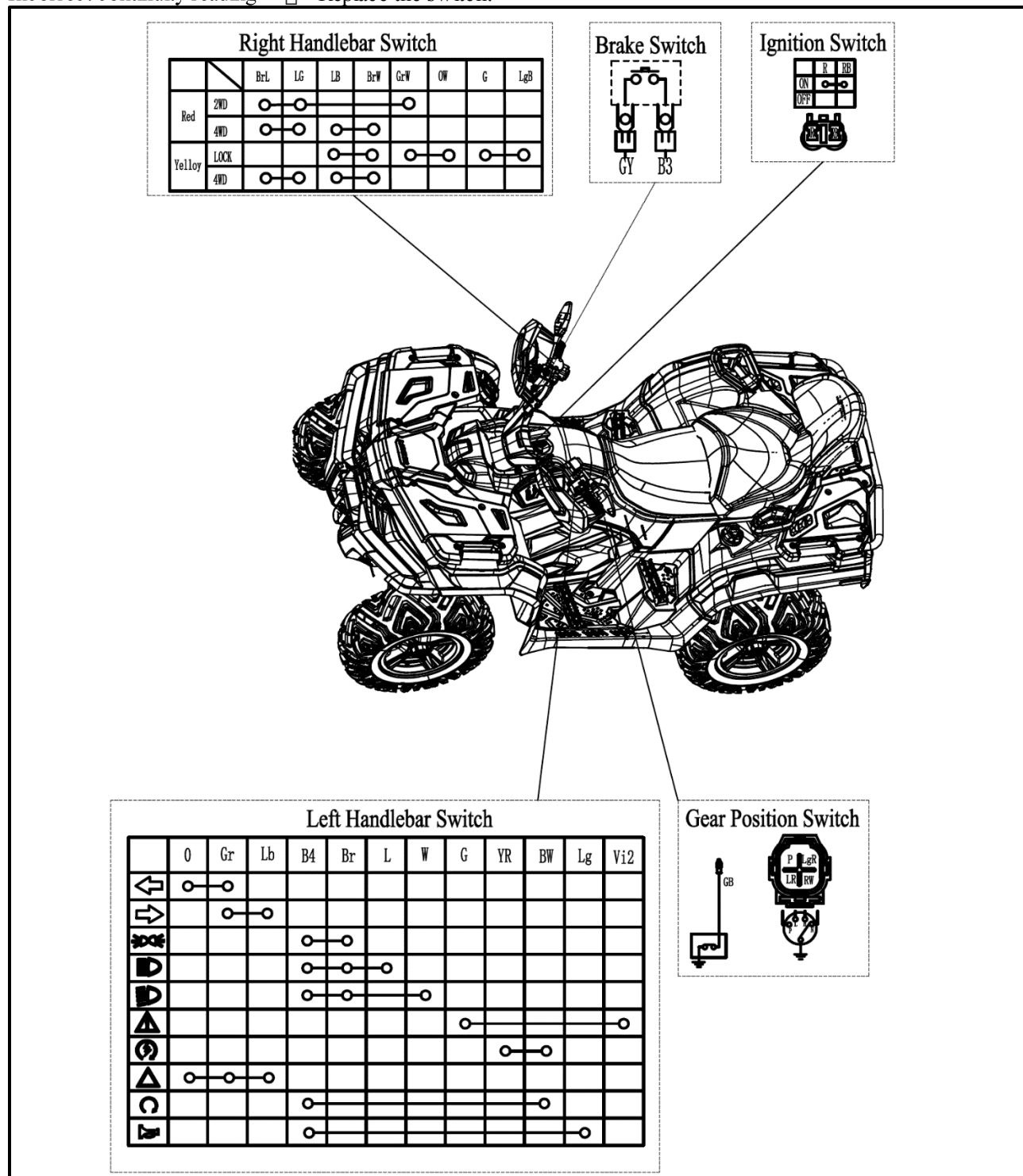
Checking the switches

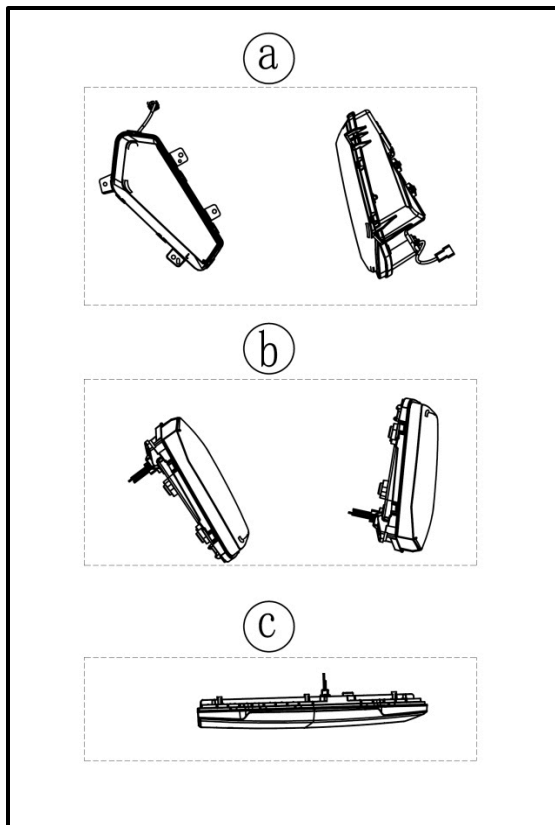
Check each switch for damage or wear, proper connections, and also for continuity between the terminals. Refer to “CHECKING SWITCH CONTINUITY”.

Damage/wear ☐ Repair or replace.

Improperly connected ☐ Properly connect.

Incorrect continuity reading ☐ Replace the switch.





Checking the lamps

Check each the lamp for damage or wear, proper connections, and also for continuity between the terminals.
 Damage/wear ☐ Repair or replace the lamp.

Improperly connected ☐ Properly connect.

No continuity ☐ Repair or replace the lamp.

The type of lamps

The lamps used on this vehicle are shown in the illustration on the below.

- Lamps (a) is used for the headlights.
- Lamps (b) is used for the taillights.
- Lamps (c) is used for the rear position light.

Checking the condition of the lamps

The following procedure applies to all of the lamps.
 Check:

- Lamp (for continuity)
 (with the pocket tester)
 No continuity ☐ Replace.



Multi-meter

NOTE:

Before checking for continuity, set the pocket tester to "0" and to the " $\Omega \times 1$ " range.

Ignition system

Circuit diagram

See electrical system schematic diagram.

Troubleshooting

The ignition system fails to operate (no spark or intermittent spark).

Check:

1. main and headlight fuses
2. battery
3. spark plug
4. ignition spark gap
5. Ignition coil harness resistance
6. ignition coil resistance
7. ignition switch
8. engine stop switch
9. crankshaft position sensor resistance
10. wiring connections (of the entire ignition system)

NOTE:

- Before troubleshooting, remove the following part(s):

1. seat
2. right side cover
3. instrument trim cover

- Troubleshoot with the following special tool(s).



**Ignition checker
Multi-meter**

1. Main and headlight fuses

- Check the main and headlight fuses for continuity. Refer to “CHECKING THE FUSES” in chapter 3.
- Are the main and headlight fuses OK?

↓ YES

↓ NO

Replace the fuse(s)

2. Battery

- Check the condition of the battery. Refer to “CHECKING AND CHARGING THE BATTERY” in chapter 3.



**Minimum open-circuit voltage
12.8 V or more at 20 °C (68 °F)**

- Is the battery OK?

↓ YES

↓ NO

- Clean the battery terminals.
- Recharge or replace the battery.

3. Spark plug

- Check the condition of the spark plug.
- Check the spark plug type.
- Measure the spark plug gap. Refer to “CHECKING THE SPARK PLUG” in chapter 3.



Standard spark plug
DCPR8E (NGK)
Spark plug gap
0.9 ~ 1.0 mm (0.035 ~ 0.0039 in)

- Is the spark plug in good condition, is it of the correct type, and is its gap within specification?

↓ YES

↓ NO

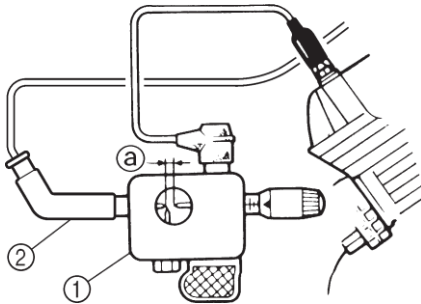
Re-gap or replace the spark plug.

4. Ignition spark gap

- Disconnect the spark plug cap from the spark plug.
- Connect the ignition checker 1 as shown.
- 2 Spark plug cap
- Set the Ignition switch to "ON".
- Measure the ignition spark gap **a**.
- Crank the engine by pushing the start switch and gradually increase the spark gap until a misfire occurs.



Minimum ignition spark gap
6.0 mm (0.24 in)



- Is there a spark and is the spark gap within specification?

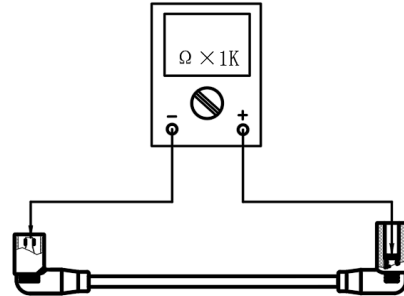
↓ NO

↓ YES

The ignition system is OK.

5. Ignition coil harness resistance

- Remove the ignition coil harness from the ignition coil.
- Connect the pocket tester ($\Omega \times 1k$) to the ignition coil harness as shown.
- Measure the ignition coil harness resistance.



Ignition coil harness resistance
 $2.5 \pm 0.2K\Omega$ at 20°C(68°F)

- Is the ignition coil harness OK?

↓ YES

↓ NO

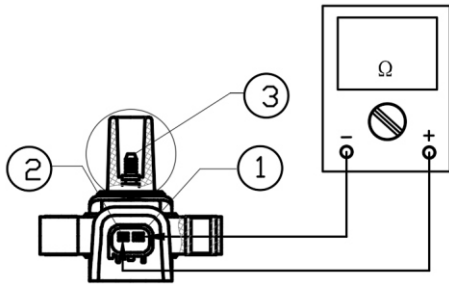
Replace the ignition coil harness.

6. Ignition coil resistance

- Disconnect the ignition coil connectors from the ignition coil terminals.
- Connect the pocket tester ($\Omega \times 1$) to the ignition coil as shown.

Positive tester probe lead terminal ①

Negative tester probe lead terminal ②



- Measure the primary coil resistance.

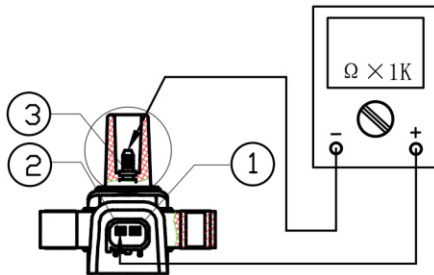
**Primary coil resistance**

$0.475 \pm 0.045 \Omega$ at 20°C (68°F)

- Connect the pocket tester ($\Omega \times 1\text{k}$) to the ignition coil as shown.

Positive tester probe lead terminal ①

Negative tester probe spark plug lead ③



- Measure the secondary coil resistance.

**Secondary coil resistance**

$1.8 \pm 0.3 \text{k}\Omega$ at 20°C (68°F)

- Is the ignition coil OK?

↓ YES

↓ NO

Replace the ignition coil.

7. Ignition switch

- Check the ignition switch for continuity. Refer to "CHECKING THE SWITCHES".
- Is the ignition switch OK?

↓ YES

↓ NO

Replace the ignition switch

8. Engine stop switch

- Check the engine stop switch for continuity. Refer to "CHECKING THE SWITCHES".
- Is the engine stop switch OK?

↓ YES

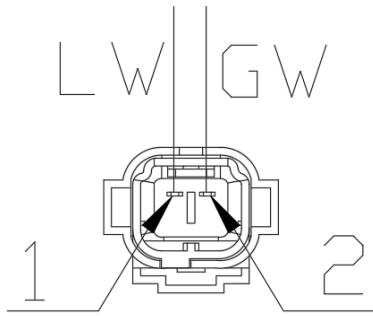
↓ NO

Replace the left handle-bar switch.

9. Crankshaft position sensor resistance

- Disconnect the crankshaft position sensor coupler from the wire harness.
- Connect the pocket tester ($\Omega \times 100$) to the crankshaft position sensor coupler as shown.

Positive tester probe □ **blue/white 1**
Negative tester probe □ **green/white 2**



- Measure the crankshaft position sensor resistance.



Crankshaft position sensor resistance
145 ~ 175 Ω at 20 °C (68 °F)

- Is the crankshaft position sensor OK?

↓ YES

↓ NO

Replace the crankshaft position sensor/stator assembly.

10. Wiring

- Check the entire ignition system's wiring. Refer to "CIRCUIT DIAGRAM".
- Is the ignition system wiring properly connected and without defects?

↓ YES

Replace the ECU.

↓ NO

Properly connect or repair the ignition system's wiring.

Electric starting system

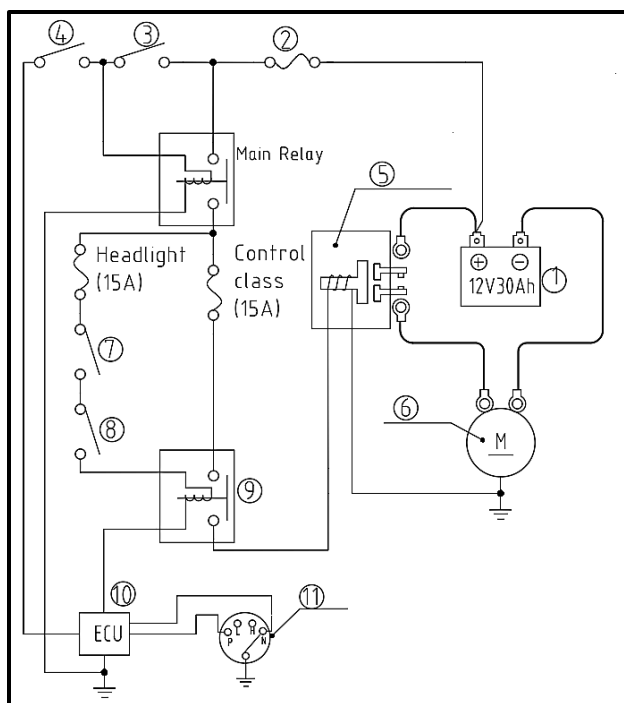
Circuit diagram

See electrical system schematic diagram.

Starting circuit operation

The starting circuit on this model consists of the starter motor, starter relay, starting auxiliary relay and ECU. If the ignition switch is "START" position, the starter motor can be operated only if:

- The transmission is in neutral or park (the neutral or park switch circuit of the gear position switch is closed).
- Or**
- The brake pedal is pressed (the brake light switch circuit is closed).



- ① Battery
- ② Fuse
- ③ Ignition switch
- ④ Front Brake Switch
- ⑤ Starter relay
- ⑥ Starter motor
- ⑦ Engine stop switch
- ⑧ Start switch
- ⑨ Starting auxiliary relay
- ⑩ ECU
- ⑪ Gears Sensor

Troubleshooting

The starter motor fails to turn.

Check:

1. main, headlight and control fuses
2. battery
3. starter motor
4. ignition switch
5. starting auxiliary relay
6. starter relay
7. engine stop switch
8. start switch
9. wiring connections(of the entire starting system)

NOTE:

- Before troubleshooting, remove the following part(s):
 1. seat
 2. left side cover
 3. instrument trim cover
- Troubleshooting with the following special tool(s).



Multi-meter

1. Main, headlight and control fuses

- Check the main, headlight and control fuses for continuity.
Refer to “CHECKING THE FUSES” in chapter 3.
- Are the main, headlight and control fuses OK?

↓ YES

↓ NO

Replace the fuse(s).

2. Battery

- Check the condition of the battery.
Refer to “CHECKING AND CHARGING THE BATTERY” in chapter 3.



**Minimum open-circuit voltage
12.8 V or more at 20 °C (68 °F)**

- Is the battery OK?

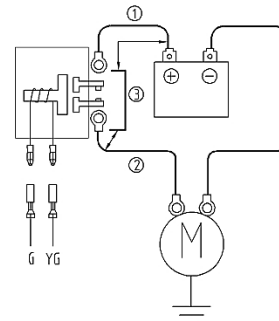
↓ YES

↓ NO

- Clean the battery terminals.
- Recharge or replace the battery.

3. Starter motor

- Connect the positive battery terminal① and starter motor lead② with a jumper lead③.



⚠ WARNING

- A wire that is used as a jumper lead must have at least the same capacity or more as that of the battery lead, otherwise the jumper lead may burn.
- This check is likely to produce sparks, therefore make sure nothing flammable is in the vicinity.

- Does the starter motor turn?

↓ YES

↓ NO

Repair or replace the starter motor.

4. Ignition switch

- Check the ignition switch for continuity. Refer to "CHECKING THE SWITCHES".
- Is the ignition switch OK?

↓ YES

↓ NO

Replace the ignition switch

5. Starting auxiliary relay

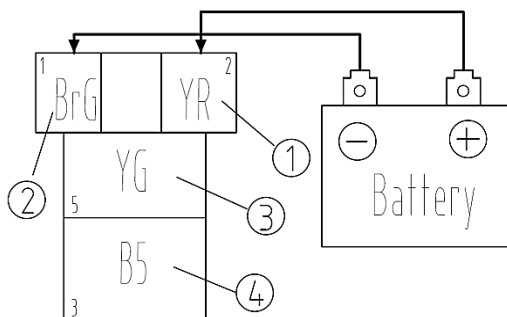
- Remove the starting auxiliary relay.
- Connect the pocket tester ($\Omega \times 1$) and battery (12 V) to the starting auxiliary relay as shown.

Positive battery terminal □ yellow/red①

Negative battery terminal □ brown/green②

Positive tester probe □ yellow/green③

Negative tester probe □ black④



- Does the starting auxiliary relay have continuity between yellow/green and black?

↓ YES

↓ NO

Replace the starting auxiliary relay.

6. Starter relay

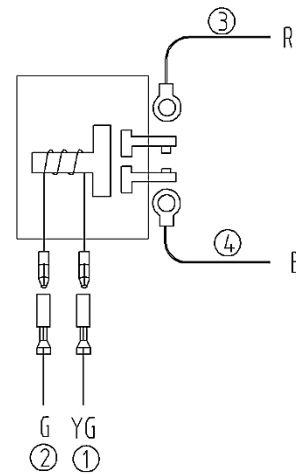
- Remove the starter relay from the wire harness.
- Connect the pocket tester ($\Omega \times 1$) and battery (12 V) to the starter relay as shown.

Positive battery terminal □ yellow/green①

Negative battery terminal □ green②

Positive tester probe □ red③

Negative tester probe □ black④



- Does the starter relay have continuity between red and black?

↓ YES

↓ NO

Replace the starter relay.

7. Engine stop switch

- Check the engine stop switch for continuity. Refer to “CHECKING THE SWITCHES”.
- Is the engine stop switch OK?

↓ YES

↓ NO

Replace the left handle-bar switch.

9. Wiring

- Check the entire starting system’s wiring. Refer to “CIRCUIT DIAGRAM”.
- Is the starting system’s wiring properly connected and without defects?

↓ YES

↓ NO

The starting system circuit is OK.

Properly connect or repair the starting system’s wiring.

8. Start switch

- Check the start switch for continuity. Refer to “CHECKING THE SWITCHES”.
- Is the start switch OK?

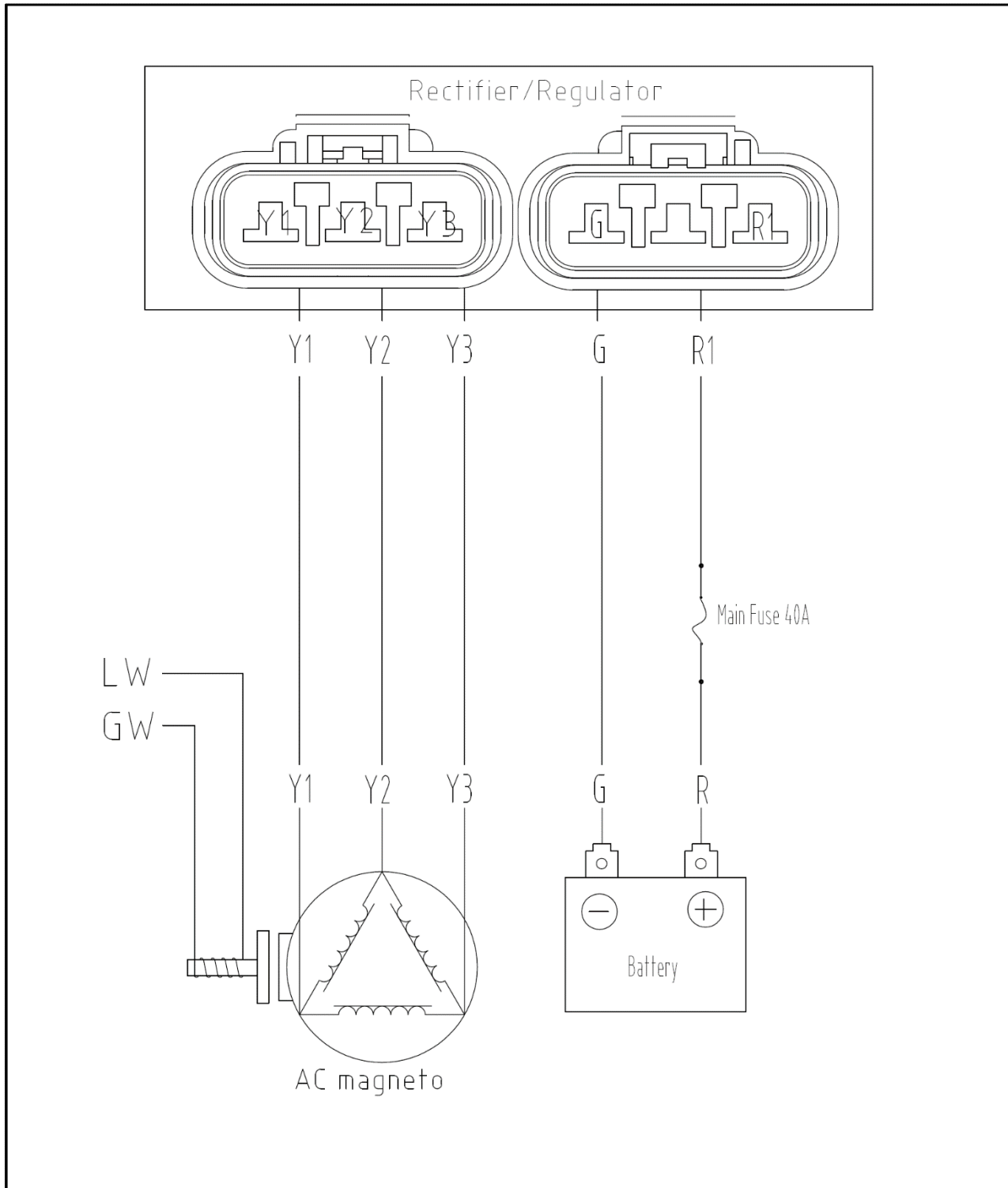
↓ YES

↓ NO

Replace the left handle-bar switch.

Charging system

Circuit diagram



Troubleshooting

The battery is not being charged.

Check:

1. main fuse
2. battery
3. charging voltage
4. stator coil resistance
5. wiring connections(of the entire charging system)

NOTE:

- Before troubleshooting, remove the following part(s):
 1. seat
 2. left side cover
 3. instrument trim cover
- Troubleshooting with the following special tool(s).



Multi-meter

1. Main fuse

- Check the main fuse for continuity.
Refer to “CHECKING THE FUSES” in chapter 3.
- Is the main fuse OK?

↓ YES

↓ NO

Replace the main fuse.

2. Battery

- Check the condition of the battery.
Refer to “CHECKING AND CHARGING THE BATTERY” in chapter 3.



Minimum open-circuit voltage
12.8 V or more at 20 °C (68 °F)

- Is the battery OK?

↓ YES

↓ NO

- Clean the battery terminals.
- Recharge or replace the battery.

3. Charging voltage

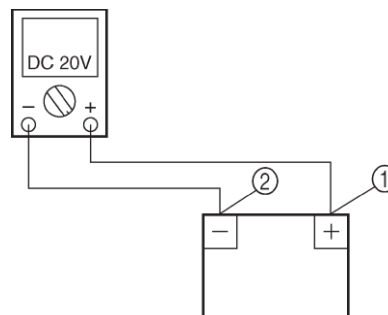
- Connect the engine tachometer to the spark plug lead.
- Connect the pocket tester (DC 20 V) to the battery as shown.

Positive tester probe □

positive battery terminal ①

Negative tester probe □

negative battery terminal ②



- Start the engine and let it run at approx. - mutely 1500 ~ 2000 r/min.
- Measure the charging voltage.



Charging voltage
14 V at 5,000 r/min

NOTE:

Make sure the battery is fully charged.

- Is the charging voltage within specification?

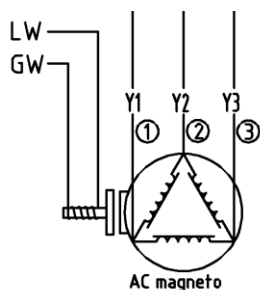
↓ NO

↓ YES

The charging circuit is OK.

4. Stator coil resistance

- Disconnect the AC magneto coupler from the wire harness.
- Connect the pocket tester ($\Omega \times 1$) to the stator coils.

Positivetester probe  yellowterminal ①Negativetester probe  yellow terminal ②Positivetester probe  yellowterminal ①Negativetester probe  yellowterminal ③Positivetester probe  yellowterminal ②Negativetester probe  yellowterminal ③

- Measure the stator coil resistance.

**Stator coil resistance****0.108~0.132 Ω at 20°C (68°F)**

↓ YES

↓ NO

Replace the crankshaft
position sensor/stator
assembly.

5. Wiring

- Check the entire charging system's wiring. Refer to "CIRCUIT DIAGRAM".
- Is the charging system's wiring properly connected and without defects?

↓ YES

↓ NO

Replace the recti-
fier/regulator.

Properly connect or re-
pair the charging sys-
tem's wiring.

Lighting system

Circuit diagram

See electrical system schematic diagram.

Troubleshooting

Any of the following fail to light: headlight and taillight.

Check:

1. main and headlight fuses
2. battery
3. ignition switch
4. light switch(including Far and near beam switch, position light switch, turn signal switch, emergency light switch)
5. wiring connections(of the entire lighting system)

NOTE:

- Before troubleshooting, remove the following part(s):

 1. seat
 2. instrument trim cover

- Troubleshooting with the following special tool(s).

**Multi-meter**

1. Main and headlight fuses

- Check the main and headlight fuses for continuity. Refer to "CHECKING THE FUSES" in chapter 3.
- Are the main and headlight fuses OK?

↓ YES

↓ NO

Replace the fuse(s).

2. Battery

- Check the condition of the battery. Refer to "CHECKING AND CHARGING THE BATTERY" in chapter 3.



Minimum open-circuit voltage
12.8 V or more at 20 °C (68 °F)

- Is the battery OK?

↓ YES

↓ NO

- Clean the battery terminals.
- Recharge or replace the battery.

3. Ignition switch

- Check the ignition switch for continuity. Refer to "CHECKING THE SWITCHES".
- Is the ignition switch OK?

↓ YES

↓ NO

Replace the ignition switch

4. Light switch

- Check the light switch for continuity. Refer to "CHECKING THE SWITCHES".
- Is the light switch OK?

↓ YES

↓ NO

Replace the left handle-bar switch.

5. Wiring

- Check the entire lighting system's wiring. Refer to "CIRCUIT DIAGRAM".
- Is the lighting system wiring properly connected and without defects?

↓ YES

↓ NO

Check the condition of each of the lighting system circuits. Refer to "CHECKING THE LIGHTING SYSTEM".

Properly connect or repair the lighting system's wiring.

Checking the lighting system

1. The headlights fail to come on.

1. Headlight

Check the headlight. Refer to "CHECKING THE CONDITION OF THE LAMPS".

- Are the headlight OK?

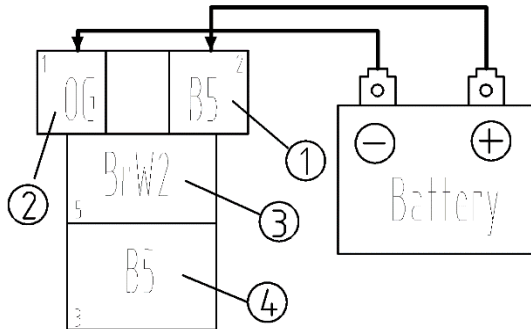
↓ YES

↓ NO

Replace the headlight.

2. daylight control relay

- Remove the daylight control relay.
- Connect the pocket tester ($\Omega \times 1$) and battery (12 V) to the daylight control relay as shown.

Positive battery terminal $\square$ black①Negative battery terminal $\square$ orange/green②Positive tester probe $\square$ brown/white③Negative tester probe $\square$ black④

- Does the daylight control relay have continuity between brown/white and black?

YES

NO

Replace the daylight control relay.

3. Voltage

Connect the pocket tester (DC 20V) to the headlight coupler (wire harness side) as shown.

When the light switch is set to "OFF";

Positive tester probe $\rightarrow$ brown/white ⑤

Negative tester probe $\rightarrow$ green ③

When the light switch is set to "L";

Positive tester probe $\rightarrow$ white ①

Negative tester probe $\rightarrow$ green ③

When the light switch is set to "D";

Positive tester probe $\rightarrow$ blue ②

Negative tester probe $\rightarrow$ ③

When the light switch is set to "A";

Positive tester probe $\rightarrow$ orange (left headlight) light blue (right headlight) ④

Negative tester probe $\rightarrow$ green ③

When the light switch is set to "R";

Positive tester probe $\rightarrow$

orange (left headlight) ④

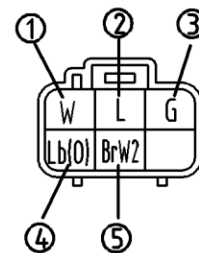
Black tester probe $\rightarrow$ green ③

When the light switch is set to "L";

Positive tester probe $\rightarrow$

light blue (right headlight) ④

Negative tester probe $\rightarrow$ green ②



- Set the ignition switch to "ON".
- Open the light switch.
- Measure the voltage (12V) of headlight (wire harness side).
- Is the voltage within the specification?

YES

NO

This circuit is OK.

The wiring circuit from the ignition switch to the headlight coupler is faulty and must be repaired.

2. The taillight fails to come on.

1. Taillight

- Check the taillight
Refer to "CHECKING THE CONDITION OF THE LAMPS".
- Are the taillight OK?

↓ YES

↓ NO

Replace the taillight.

2. Voltage

Connect the pocket tester (DC 20V) to the taillight coupler (wire harness side) as shown.

When the light switch is set to "DOOR";

Positive tester probe → brown/white ④

Negative tester probe → green ①

When the light switch is set to "△";

Positive tester probe → orange (left taillight) light blue (right taillight) ②

Negative tester probe → green ①

When the light switch is set to "←";

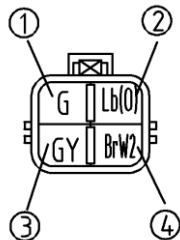
Positive tester probe → orange (left taillight) ②

Black tester probe → green ①

When the light switch is set to "→";

Positive tester probe → light blue (right taillight) ②

Negative tester probe → green ①



- Set the ignition switch to "ON".
- Open the light switch.
- Measure the voltage (12V) of taillight (wire harness side).
- Is the voltage within the specification?

↓ YES

↓ NO

This circuit is OK.

The wiring circuit from the ignition switch to the taillight coupler is faulty and must be repaired.

Signaling system

Circuit diagram

See electrical system schematic diagram.

Troubleshooting

Any of the following fail to light: warning light, brake light or an indicator light.

Check:

- main and signal fuses
- battery
- ignition switch
- wiring connections (of the entire signaling system)

NOTE:

- Before troubleshooting, remove the following part(s):
 - seat
 - instrument trim cover
- Troubleshooting with the following special tool(s).



Multi-meter

1. Main and signal fuses

- Check the main and signal fuses for continuity. Refer to "CHECKING THE FUSES" in chapter 3.
- Are the main and signal fuses OK?

↓ YES

↓ NO

Replace the fuse(s).

2. Battery

- Check the condition of the battery.
Refer to “CHECKING AND CHARGING THE BATTERY” in chapter 3.



Minimum open-circuit voltage
12.8 V or more at 20 °C (68 °F)

- Is the battery OK?

↓ YES

↓ NO

- Clean the battery terminals.
- Recharge or replace the battery.

3. Ignition switch

- Check the ignition switch for continuity.
Refer to “CHECKING THE SWITCHES”.
- Is the ignition switch OK?

↓ YES

↓ NO

Replace the ignition switch

4. Wiring

- Check the entire signaling system's wiring.
Refer to “CIRCUIT DIAGRAM”.
- Is the signaling system wiring properly connected and without defects?

↓ YES

↓ NO

Check the condition of each of the signaling system circuits. Refer to “CHECKING THE SIGNALING SYSTEM”.

Properly connect or repair the signaling system's wiring.

Checking the signaling system

1. The brake light fails to come on.

1. Brake light

- Check the brake light.
Refer to “CHECKING THE CONDITION OF THE LAMPS”.
- Are the brake light OK?

↓ YES

↓ NO

Replace the taillight.

2. Brake switches

- Check the brake switches for continuity.
Refer to “CHECKING THE SWITCHES”.
- Is the brake switch OK?

↓ YES

↓ NO

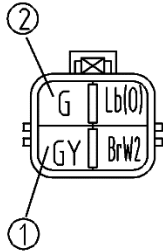
Replace the brake switch.

3. Voltage

Connect the pocket tester (DC 20V) to the tail/brake light coupler (wire harness side) as shown.

Positive tester probe → green/yellow ①

Negative tester probe → green ②



- Set the ignition switch to "ON".
- Open the light switch.
- Measure the voltage (12V) of taillight (wire harness side).
- Is the voltage within the specification?

↓ YES

This circuit is OK.

↓ NO

The wiring circuit from the ignition switch to the taillight coupler is faulty and must be repaired.

2. The neutral, park, high-range, and/or low-range indicator light fails to come on.

1. Gear position switch

- Check the gear position switch for continuity. Refer to "CHECKING THE SWITCHES".
- Is the gear position switch OK?

↓ YES

↓ NO

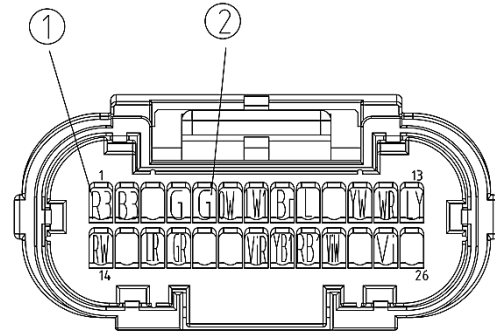
Replace the gear position switch.

2. Voltage

- Connect the pocket tester (DC 20 V) to the meter assembly coupler as shown.

Positive tester probe □ red ①

Negative tester probe □ green ②



- Set the ignition switch to "ON".
- Measure the voltage (DC 12 V) of red ① and green ② at the meter assembly coupler.
- Is the voltage within specification?

↓ YES

Replace the meter assembly or ECU.

↓ NO

The wiring circuit from the ignition switch to the meter assembly coupler is faulty and must be repaired.

3. The reverse indicator light fails to come on.

1. Reverse switch

- Check the reverse switch for continuity. Refer to "CHECKING THE SWITCHES".
- Is the reverse switch OK?

↓ YES

↓ NO

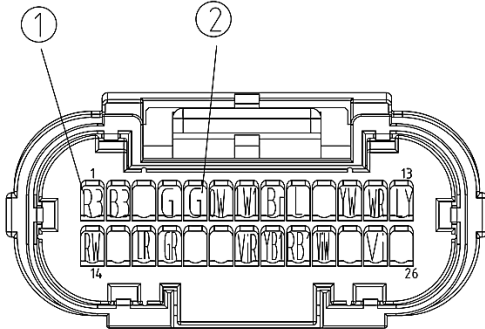
Replace the reverse switch.

2. Voltage

- Connect the pocket tester (DC 20 V) to the meter assembly coupler as shown.

Positive tester probe □ red ①

Negative tester probe □ green ②



- Set the ignition switch to "ON".
- Measure the voltage (DC 12 V) of red① and green② at the meter assembly coupler.
- Is the voltage within specification?

↓ YES

Replace the meter assembly or ECU.

↓ NO

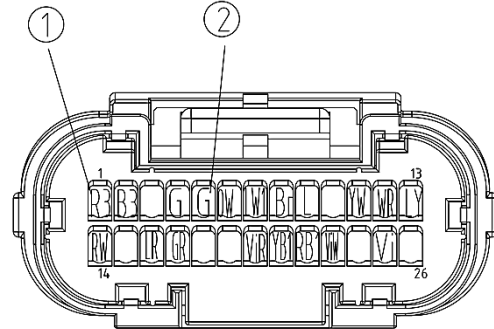
The wiring circuit from the ignition switch to the meter assembly coupler is faulty and must be repaired.

2. Voltage

- Connect the pocket tester (DC 20 V) to the meter assembly coupler as shown.

Positive tester probe □ red ①

Negative tester probe □ green ②



- Set the ignition switch to "ON".
- Measure the voltage (DC 12 V) of red① and green② at the meter assembly coupler.
- Is the voltage within specification?

↓ YES

Replace the meter assembly or ECU.

↓ NO

The wiring circuit from the ignition switch to the meter assembly coupler is faulty and must be repaired.

4. The differential gear lock indicator light and/or four-wheel-drive motor indicator light fails to come on.

1. Right handlebar switch

- Check the right handlebar switch for continuity. Refer to "CHECKING THE SWITCHES".
- Is the right handlebar switch OK?

↓ YES

↓ NO

Replace the right handlebar switch.

5. The coolant temperature warning light does not come on when the main switch is set to "ON", or if the coolant temperature warning light does not come on when the temperature is high (more than 110 °C (230 °F)).

1. Coolant temperature sensor

- Remove the coolant temperature sensor from the cylinder head.
- Connect the pocket tester ($\Omega \times 100$) to the coolant temperature sensor ① as shown.
- Immerse the coolant temperature sensor in a container filled with coolant ②.

NOTE:

Make sure the coolant temperature sensor terminals do not get wet.

- Place a thermometer ③ in the coolant.
- Slowly heat the coolant, and then let it cool to the specified temperature indicated in the table.
- Measure the coolant temperature sensor resistance.



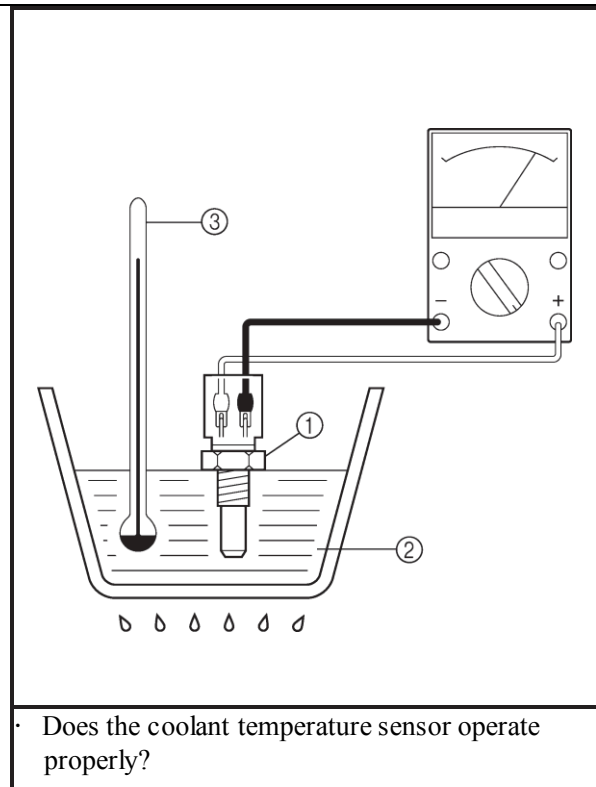
Coolant temperature sensor resistance
149 ~ 303 Ω at 80 °C (176 °F)

⚠ WARNING

- Handle the coolant temperature sensor with special care.
- Never subject the coolant temperature sensor to strong shocks. If the coolant temperature sensor is dropped, replace it.



Coolant temperature sensor
18 Nm (1.8 m · kg, 13 ft · lb)



↓ YES

↓ NO

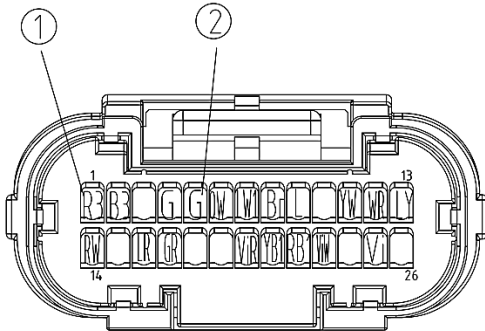
Replace the coolant temperature sensor.

2. Voltage

- Connect the pocket tester (DC 20 V) to the meter assembly coupler as shown.

Positive tester probe red ①

Negative tester probe green ②



- Set the ignition switch to "ON".
- Measure the voltage (DC 12 V) of red① and green② at the meter assembly coupler.
- Is the voltage within specification?

↓ YES

Replace the meter assembly or ECU.

↓ NO

The wiring circuit from the ignition switch to the meter assembly coupler is faulty and must be repaired.

6. The fuel level indicator light fails to come on.

1. Fuel sender

- Drain the fuel from the fuel tank and then remove the fuel pump assembly (fuel sender) from the fuel tank.
- Connect the pocket tester ($\Omega \times 1$) to the fuel pump terminals as shown.

Positive tester probe yellow/white ①

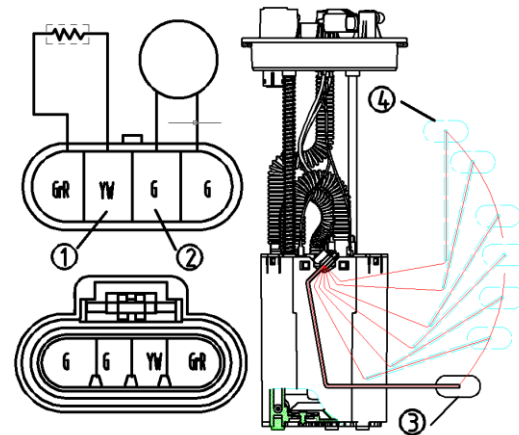
Negative tester probe green ②

- Move the fuel sender float to the minimum ③ and maximum ④ level positions.
- Measure the fuel sender resistance.

**Fuel sender resistance**

Minimum③: 110±6

Maximum④: 3±2



- Is the fuel sender OK?

↓ YES

↓ NO

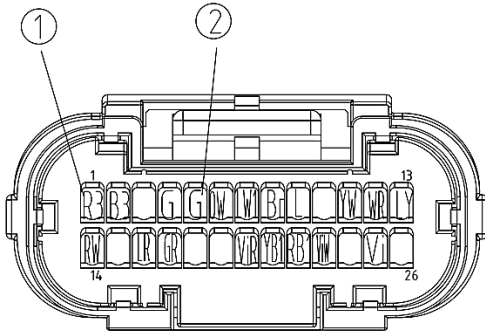
Replace the fuel pump assembly.

2. Voltage

- Connect the pocket tester (DC 20 V) to the meter assembly coupler as shown.

Positive tester probe □ red ①

Negative tester probe □ green ②



- Set the ignition switch to "ON".
- Measure the voltage (DC 12 V) of red① and green② at the meter assembly coupler.
- Is the voltage within specification?

↓ YES

Replace the meter assembly or ECU.

↓ NO

The wiring circuit from the ignition switch to the meter assembly coupler is faulty and must be repaired.

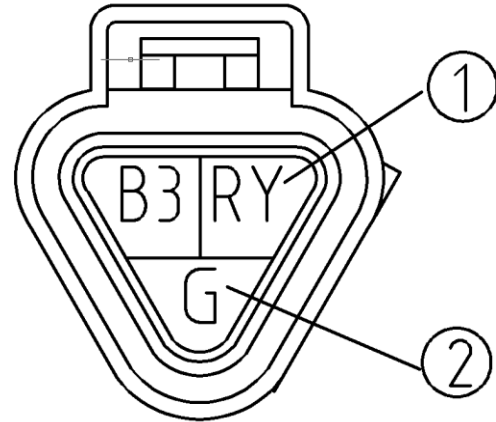
7. The speedometer fails to come on.

1. Speed sensor

- Connect the pocket tester (DC 20 V) to the speed sensor coupler (wire harness side) as shown.

Positive tester probe □ red/yellow ①

Negative tester probe □ green ②



- Turn the ignition switch to "ON".
- Elevate the rear wheels and slowly rotate them.
- Measure the voltage of red/yellow and green. With each full rotation of the rear wheels, the voltage reading should cycle from 0 V to 12 V to 0 V to 12 V.
- Is the speed sensor OK?

↓ YES

↓ NO

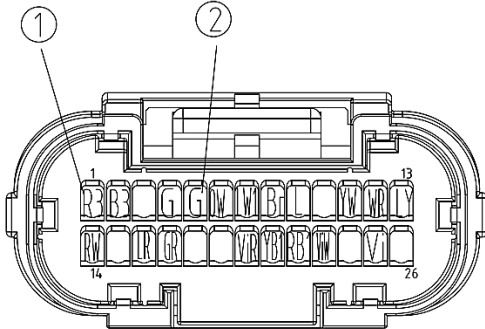
Replace the speed sensor.

2. Voltage

- Connect the pocket tester (DC 20 V) to the meter assembly coupler as shown.

Positive tester probe □ red ①

Negative tester probe □ green ②



- Set the ignition switch to "ON".
- Measure the voltage (DC 12 V) of red① and green② at the meter assembly coupler.
- Is the voltage within specification?

↓ YES

Replace the meter assembly or ECU.

↓ NO

The wiring circuit from the ignition switch to the meter assembly coupler is faulty and must be repaired.

Cooling system

Circuit diagram

See electrical system schematic diagram.

Troubleshooting

The radiator fan motor fails to turn.

Check:

- main and fan fuses
- battery
- ignition switch
- radiator fan motor
- fan relay
- coolant temperature sensor
- wiring connections (the entire cooling system)

NOTE:

- Before troubleshooting, remove the following part(s):
 - seat
 - instrument trim cover
 - front fenders
- Troubleshooting with the following special tool(s).



Multi-meter

1. Main and fan fuses

- Check the main and fan fuses for continuity. Refer to "CHECKING THE FUSES" in chapter 3.
- Are the main and fan fuses OK?

↓ YES

↓ NO

Replace the fuse(s).

2. Battery

- Check the condition of the battery. Refer to "CHECKING AND CHARGING THE BATTERY" in chapter 3.



Minimum open-circuit voltage
12.8 V or more at 20 °C (68 °F)

- Is the battery OK?

↓ YES

↓ NO

- Clean the battery terminals.
- Recharge or replace the battery.

3. Ignition switch

- Check the ignition switch for continuity. Refer to "CHECKING THE SWITCHES".
- Is the ignition switch OK?

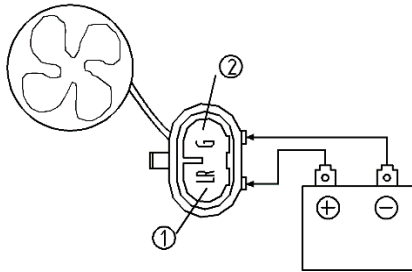
↓ YES

↓ NO

Replace the ignition switch.

4. Radiator fan motor

- Disconnect the radiator fan motor coupler from the wire harness.
- Connect the battery (12 V) as shown.

Positive battery lead ☐ blue/red ①Negative battery lead ☐ green ②

- Does the radiator fan motor turn?

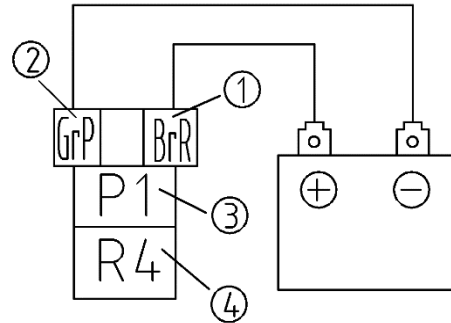
↓ YES

↓ NO

The radiator fan motor is faulty and must be replaced.

5. Fan relay

- Remove the fan relay from the wire harness.
- Connect the pocket tester ($\Omega \times 1$) and battery (12 V) to the fan relay as shown.

Positive battery terminal ☐ brown/red ①Negative battery terminal ☐ grey/pink ②Positive tester probe ☐ pink ③Negative tester probe ☐ red ④

- Does the fan relay have continuity between pink and red?

↓ YES

↓ NO

The fan relay is faulty and must be replaced.

6. Coolant temperature sensor

- Remove the coolant temperature sensor from the cylinder head.
- Connect the pocket tester ($\Omega \times 100$) to the coolant temperature sensor ① as shown.
- Immerse the coolant temperature sensor in a container filled with coolant ②.

NOTE:

Make sure the coolant temperature sensor terminals do not get wet.

- Place a thermometer ③ in the coolant.
- Slowly heat the coolant, and then let it cool to the specified temperature indicated in the table.
- Measure the coolant temperature sensor resistance.



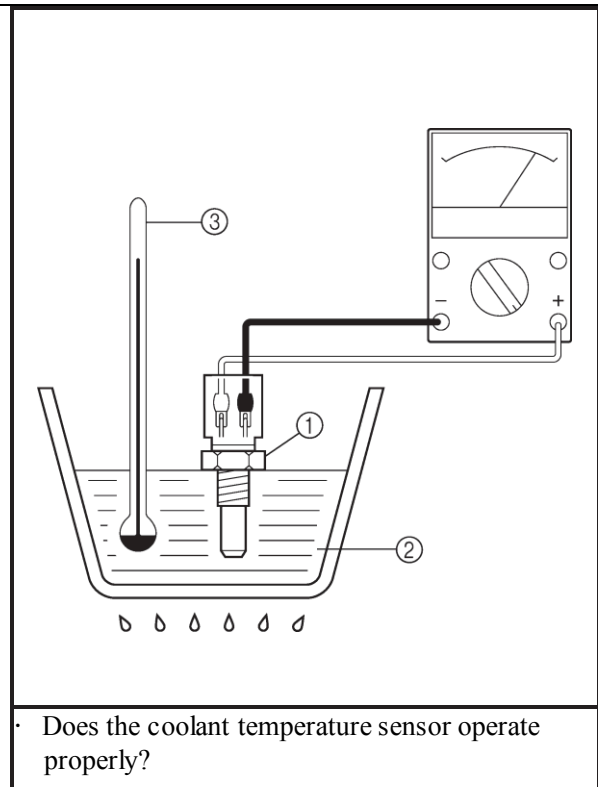
Coolant temperature sensor resistance
149 ~ 303 Ω at 80 °C (176 °F)

⚠ WARNING

- Handle the coolant temperature sensor with special care.
- Never subject the coolant temperature sensor to strong shocks. If the coolant temperature sensor is dropped, replace it.



Coolant temperature sensor
18 Nm (1.8 m · kg, 13 ft · lb)



↓ YES

↓ NO

Replace the coolant temperature sensor.

7. Wiring

- Check the entire cooling system's wiring. Refer to "CIRCUIT DIAGRAM".
- Is the cooling system wiring properly connected and without defects?

↓ YES

↓ NO

Replace the ECU.

Properly connect or repair the cooling system's wiring.

Fuel pump system

Circuit diagram

See electrical system schematic diagram.

Troubleshooting

The fuel pump fails to operate.

Check:

1. main and ECU fuses
2. battery
3. ignition switch
4. engine stop switch
5. ECU relay
6. fuel pump relay
7. fuel pump
8. wiring connections (the entire fuel pump system)

NOTE:

- Before troubleshooting, remove the following part(s):
 1. seat
 2. instrument trim cover
- Troubleshooting with the following special tool(s).



Multi-meter

1. Main and ECU fuses

- Check the main and ECU fuses for continuity. Refer to “CHECKING THE FUSES” in chapter 3.
- Are the main and ECU fuses OK?

↓ YES

↓ NO

Replace the fuse(s).

2. Battery

- Check the condition of the battery. Refer to “CHECKING AND CHARGING THE BATTERY” in chapter 3.



Minimum open-circuit voltage

12.8 V or more at 20 °C (68 °F)

- Is the battery OK?

↓ YES

↓ NO

- Clean the battery terminals.
- Recharge or replace the battery.

3. Ignition switch

- Check the ignition switch for continuity. Refer to “CHECKING THE SWITCHES”.
- Is the ignition switch OK?

↓ YES

↓ NO

Replace the ignition switch

4. Engine stop switch

- Check the engine stop switch for continuity. Refer to “CHECKING THE SWITCHES”.
- Is the engine stop switch OK?

↓ YES

↓ NO

Replace the left handle-bar switch.

5. ECU relay

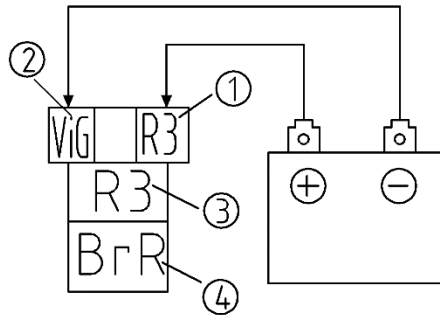
- Remove the ECU relay from the wire harness.
- Connect the pocket tester ($\Omega \times 1$) and battery (12 V) to the ECU relay as shown.

Positive battery terminal □ red ①

Negative battery terminal □ violet/green ②

Positive tester probe □ red ③

Negative tester probe □ brown/red ④



- Does the ECU relay have continuity between red and brown/red?

↓ YES

↓ NO

The ECU relay is faulty and must be replaced.

6. Fuel pump relay

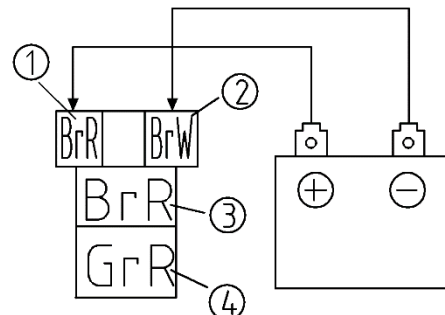
- Remove the fuel pump relay from the wire harness.
- Connect the pocket tester ($\Omega \times 1$) and battery (12 V) to the fuel pump relay as shown.

Positive battery terminal □ brown/red ①

Negative battery terminal □ brown/white ②

Positive tester probe □ brown/red ③

Negative tester probe □ grey/red ④



- Does the fuel pump relay have continuity between brown/red and grey/red?

↓ YES

↓ NO

The fuel pump relay is faulty and must be replaced.

7. Fuel pump

- Check the condition of the fuel pump. Refer to "CHECKING THE FUEL PUMP BODY" in chapter 6.
- Is the fuel pump OK?

↓ YES

↓ NO

Replace the fuel pump assembly.

8. Wiring

- Check the entire fuel pump system wiring. Refer to “CIRCUIT DIAGRAM”.
- Is the fuel pump system wiring properly connected and without defects?

↓ YES

Replace the ECU.

↓ NO

Properly connect or repair the fuel pump system wiring.

1. Main and 2/4 drive fuses

- Check the main and 2/4 drive fuses for continuity. Refer to “CHECKING THE FUSES” in chapter 3.
- Are the main and 2/4 drive fuses OK?

↓ YES

↓ NO

Replace the fuse(s).

2WD/ 4WD selecting system

Circuit diagram

See electrical system schematic diagram.

Troubleshooting

The four-wheel-drive motor indicator light fails to come on.

Check:

1. main and 2/4 drive fuses
2. battery
3. ignition switch
4. 2WD relay
5. 4WD relay
6. lock relay
7. four-wheel-drive motor switch and differential gear lock switch
8. differential gear motor
9. wiring connection
(the entire 2WD/4WD selecting system)

NOTE:

- Before troubleshooting, remove the following part(s):

 1. seat
 2. instrument trim cover

- Troubleshooting with the following special tool(s).



Multi-meter

2. Battery

- Check the condition of the battery. Refer to “CHECKING AND CHARGING THE BATTERY” in chapter 3.

**Minimum open-circuit voltage
12.8 V or more at 20 °C (68 °F)**

- Is the battery OK?

↓ YES

↓ NO

- Clean the battery terminals.
- Recharge or replace the battery.

3. Ignition switch

- Check the ignition switch for continuity. Refer to “CHECKING THE SWITCHES”.
- Is the ignition switch OK?

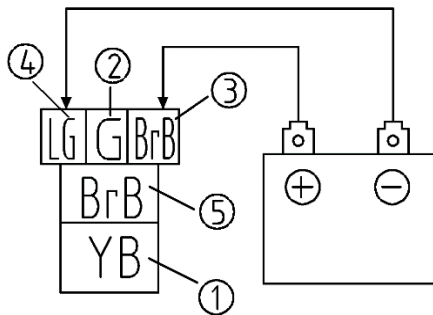
↓ YES

↓ NO

Replace the ignition switch.

4. 2WD relay

- Remove the 2WD relay from the wire harness.
- Connect the pocket tester ($\Omega \times 1$) and battery (12 V) to the 2WD relay as shown.

Positive tester probe $\square$ yellow/black ①Negativetester probe $\square$ green ②Positive battery terminal $\square$ brown/black ③Negative battery terminal $\square$ blue/green ④Positive tester probe $\square$ yellow/black ①Negativetester probe $\square$ brown/black ⑤

- Check the 2WD relay for continuity.

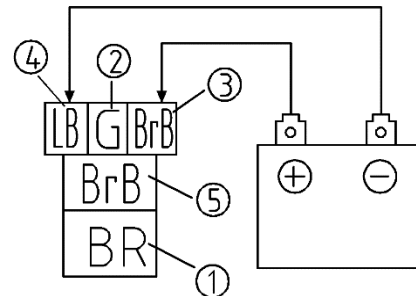
↓ YES

↓ NO

The 2WD relay is faulty and must be replaced.

5. 4WD relay

- Remove the 4WD relay from the wire harness.
- Connect the pocket tester ($\Omega \times 1$) and battery (12 V) to the 4WD relay as shown.

Positive tester probe $\square$ black/red ①Negativetester probe $\square$ green ②Positive battery terminal $\square$ brown/black ③Negative battery terminal $\square$ blue/black ④Positive tester probe $\square$ black/red ①Negativetester probe $\square$ brown/black ⑤

- Check the 4WD relay for continuity.

↓ YES

↓ NO

The 4WD relay is faulty and must be replaced.

6. Lock relay

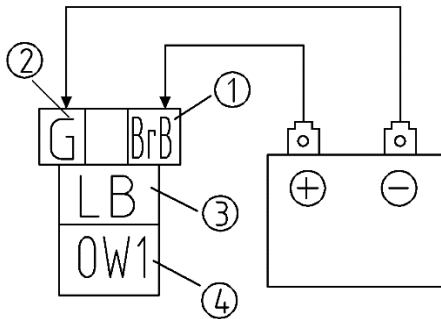
- Remove the lock relay from the wire harness.
- Connect the pocket tester ($\Omega \times 1$) and battery (12 V) to the lock relay as shown.

Positive battery terminal □ **brown/black** ①

Negative battery terminal □ **green** ②

Positive tester probe □ **blue/black** ③

Negative tester probe □ **orange/white** ④



- Check the lock relay for continuity.

↓ YES

↓ NO

The lock relay is faulty and must be replaced.

7. four-wheel-drive motor switch and differential gear lock switch

- Check the four-wheel-drive motor switch and differential gear lock switch for continuity. Refer to "CHECKING THE SWITCHES".
- Is the four-wheel-drive motor switch and differential gear lock switch OK?

↓ YES

↓ NO

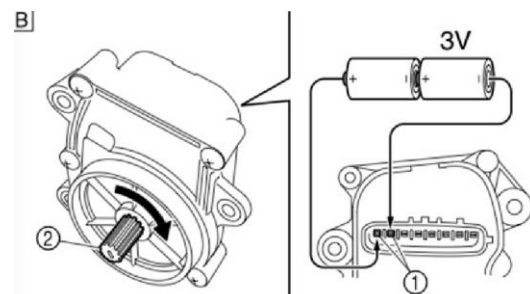
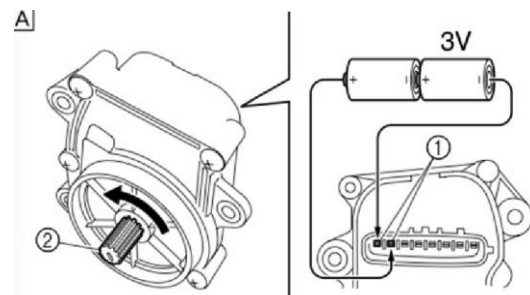
Replace the right handlebar switch.

8. Differential gear motor

- Disconnect the differential gear motor coupler.
- Remove the differential gear motor from the differential gear case. Refer to "FRONT CONSTANT VELOCITY JOINTS AND DIFFERENTIAL GEAR" in chapter 7.
- Connect two C size batteries to the differential gear motor terminals ① (as shown illustrations).

Ⓐ Check that the pinion gear ② turns counter-clockwise.

Ⓑ Check that the pinion gear ② turns clockwise.



- Make sure that the drive gear (shift fork sliding gear) operates correctly.

NOTE:

When installing the differential gear motor, refer to "FRONT CONSTANT VELOCITY JOINTS AND DIFFERENTIAL GEAR" in chapter 7.

↓ YES

↓ NO

Replace the differential gear motor.

9. Wiring connection

- Check the connection of the entire 2WD/4WD selecting system.
Refer to "CIRCUIT DIAGRAM".
- Is the 2WD/4WD selecting system wiring properly connected and without defects?

↓ YES

↓ NO

Properly connect or repair the 2WD/4WD selecting system wiring.

EPS(electric power steering) system

Circuit diagram

See electrical system schematic diagram.

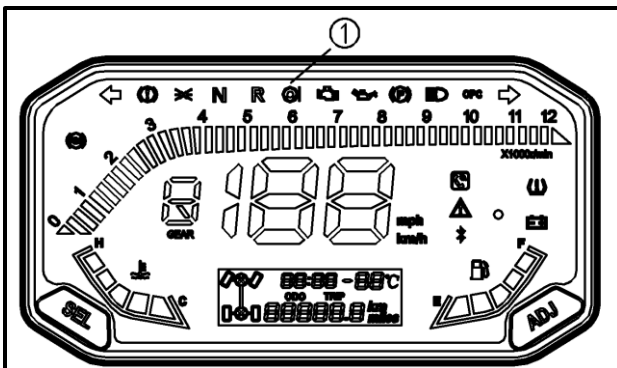
Eps control unit' s self-diagnostic function

The EPS control unit is equipped with a self-diagnostic function. If this function detects a malfunction in the EPS system, it lights the EPS warning light to alert the rider that a malfunction has occurred in the system. Once a malfunction has been detected, it becomes stored in the EPS control unit memory in the form of a fault code.

① EPS warning light

NOTE:

- If the steering usage is too heavy (i.e., excessive steering use when the vehicle is traveling at a slow speed), the power assist is reduced to protect the EPS motor from overheating.



10 TROUBLESHOOTING

TIP:

The following troubleshooting does not cover all the possible causes of trouble. It should be helpful. However, as a guide to troubleshooting. Refer to the relative procedure in this manual for check. Adjustment and replacement of parts.

Starting failure/hard starting

Fuel system

Fuel tank

- Empty
- Clogged fuel tank breather hoses
- Deteriorated or contaminated fuel

Fuel pump

- Faulty fuel pump
- Faulty fuel injection system relay

Electrical system

Spark plug

- Improper plug gap
- Worn electrodes
- Wire between terminals broken
- Improper heat range
- Faulty spark plug cap

Ignition coil

- Broken or shorted primary/secondary
- Faulty spark plug lead
- Broken body

Ignition system

- Faulty ECU
- Broken AC magneto rotor woodruff key

Compression system

Cylinder and cylinder head

- Loose spark plug
- Loose cylinder head or cylinder
- Broken cylinder head gasket
- Broken cylinder gasket
- Worn, damaged or seized cylinder

Valves, camshaft and crankshaft

- Improperly sealed valve
- Improperly contacted valve and valve seat
- Improper valve timing
- Broken valve spring
- Seized camshaft

Throttle body

- Deteriorated or contaminated fuel
- Sucked-in air

Air filter

- Clogged air filter element

Switches and wiring

- Faulty main switch
- Broken or shorted wiring
- Faulty brake light switch

Starting system

- Faulty starter motor
- Faulty starter relay
- Faulty starter clutch

Battery

- Faulty battery

Fuse(s)

- Blown, damaged or incorrect fuse
- Improperly installed fuse

Piston and piston rings

- Improperly installed piston ring
- Worn, fatigued or broken piston ring
- Seized piston ring
- Seized or damaged piston

Crankcase and crankshaft

- Improperly seated crankcase
- Seized crankshaft

Valve train

- Improperly adjusted valve clearance
- Improperly adjusted valve timing

Poor idle speed performance

Poor idle speed performance

Throttle body

- Damaged or loose throttle body joint
- Improper throttle cable play
- Flooded throttle body

Electrical system

- Faulty spark plug
- Faulty ECU
- Faulty crankshaft position sensor
- Faulty ignition coil

Valve train

- Improperly adjusted valve clearance

Air filter

- Clogged air filter element

Poor medium and high-speed performance

Poor medium and high-speed performance

Refer to "STARTING FAILURE/HARD STARTING" and "POOR IDLE SPEED PERFORMANCE"

Fuel pump

- Faulty fuel pump

Air filter

- Clogged air filter element
- Faulty drive train

The following conditions may indicate damaged shaft drive components:

Symptoms	Possible Causes
• A pronounced hesitation or “jerky” movement during acceleration, deceleration, or sustained speed. (This must not be confused with engine surging or transmission characteristics.). • A “rolling rumble” noticeable at low speed; a high-pitched whine; a “clunk” from a shaft drive component or area. • A locked-up condition of the shaft drive mechanism, no power transmitted from the engine to the front and/or rear wheels.	• Bearing damage. • Improper gear lash,, • Gear tooth damage. • Broken drive shaft. • Broken gear teeth. • Seizure due to lack of lubrication. • Small foreign objects lodged between the moving parts.

TIP:

Areas A, B, and C above may be extremely difficult to diagnose. The symptoms are quite subtle and difficult to distinguish from normal vehicle operating noise. If there is reason to believe these components are damaged, remove the components and check them.

Faulty gear shifting

Hard shifting

Refer to "FAULTY CLUTCH PERFORMANCE"

Shift lever doesnot move

Shift drum, shift forks

- Groove jammed with impurities
- Seized shift fork
- Bent shift fork guide bar

Transmission

- Seized transmission gear
- Jammed impurities
- Incorrectly assembled transmission

Shift guide

- Broken shift guide

Jumpsout of gear

Shift forks

- Worn shift fork

Shift drum

- Improper thrust play
- Worn shift drum groove

Transmission

- Worn gear dog

Faulty clutch performance**Engine operates but vehicle will not move****V-belt**

- Bent, damaged or worn V-belt
- V-belt slips

Primary pulley cam and primary pulley slider

- Damaged or worn primary pulley cam
- Damaged or worn primary pulley slider

Transmission

- Damaged transmission gears

Clutch slipping**Clutch spring**

- Damaged, loose or worn clutch shoe spring

Clutch shoe

- Damaged or worn clutch shoe

Primary sliding sheave

- Seized primary sliding sheave

Poor starting performance**V-belt**

- V-belt slips
- Oil or grease on the V-belt

Primary sliding sheave

- Faulty operation
- Worn pin groove
- Worn pin

Clutch shoe

- Bent, damaged or worn clutch shoe

Poor speed performance**V-belt**

- Oil or grease on the V-belt

Primary pulley weight

- Faulty operation
- Worn primary pulley weight

Primary fixed sheave

- Worn primary fixed sheave

Primary sliding sheave

- Worn primary sliding sheave

Secondary fixed sheave

- Worn secondary fixed sheave

Secondary sliding sheave

- Worn secondary sliding sheave

Overheating**Overheating****Ignition system**

- Improper spark plug gap
- Improper spark plug heat range
- Faulty ECU/CDI

Fuel system

- Faulty throttle body
- Damaged or loose throttle body joint
- Clogged air filter element

Compression system

- Heavy carbon build-up

Engine oil

- Improper oil level
- Improper oil viscosity
- Inferior oil quality

Overcooling**Cooling system****Thermostat**

- Thermostat stays open

Faulty brake**Poor braking effect****Disc brake**

- Worn brake pads
- Worn disc
- Air in brake fluid
- Leaking brake fluid
- Faulty master cylinder kit cup
- Faulty caliper kit seal
- Loose union bolt
- Broken brake hose and pipe
- Oily or greasy disc/brake pads
- Improper brake fluid level

Shock absorber malfunction

Malfunction

- Bent or damaged damper rod
- Damaged oil seal lip
- Fatigued shock absorber spring

Unstable handling

Unstable handling

Steering wheel

- Improperly installed

Steering

- Incorrect toe-in
- Bent steering shaft
- Improperly installed

Damaged bearing

- Bent tie-rods
- Deformed steering knuckles

Tires

- Uneven tire pressures
- Incorrect tire pressure
- Uneven tire wear

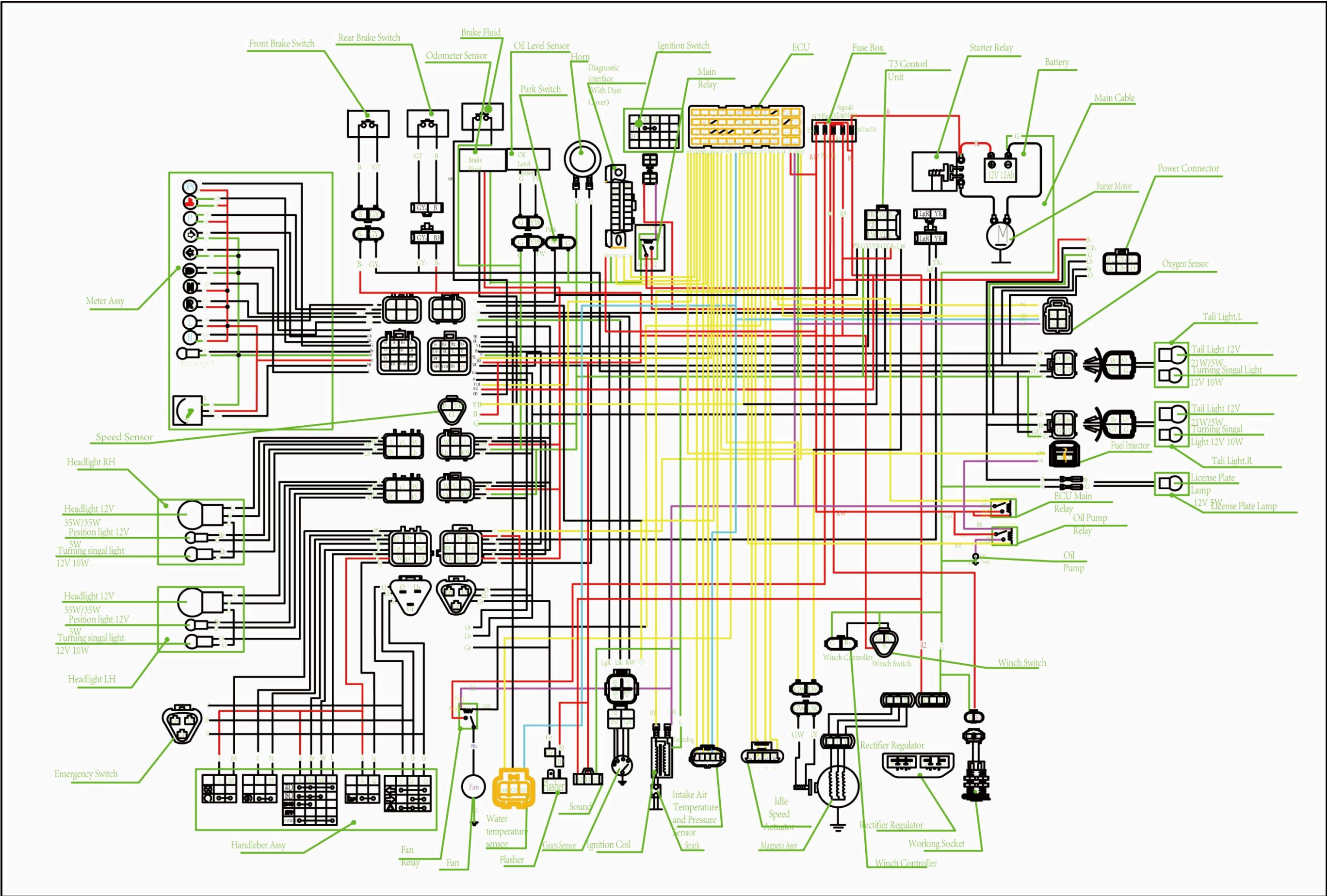
Wheels

- Deformed wheel
- Loose bearing
- Bent or loose wheel axle
- Excessive wheel run out

Frame

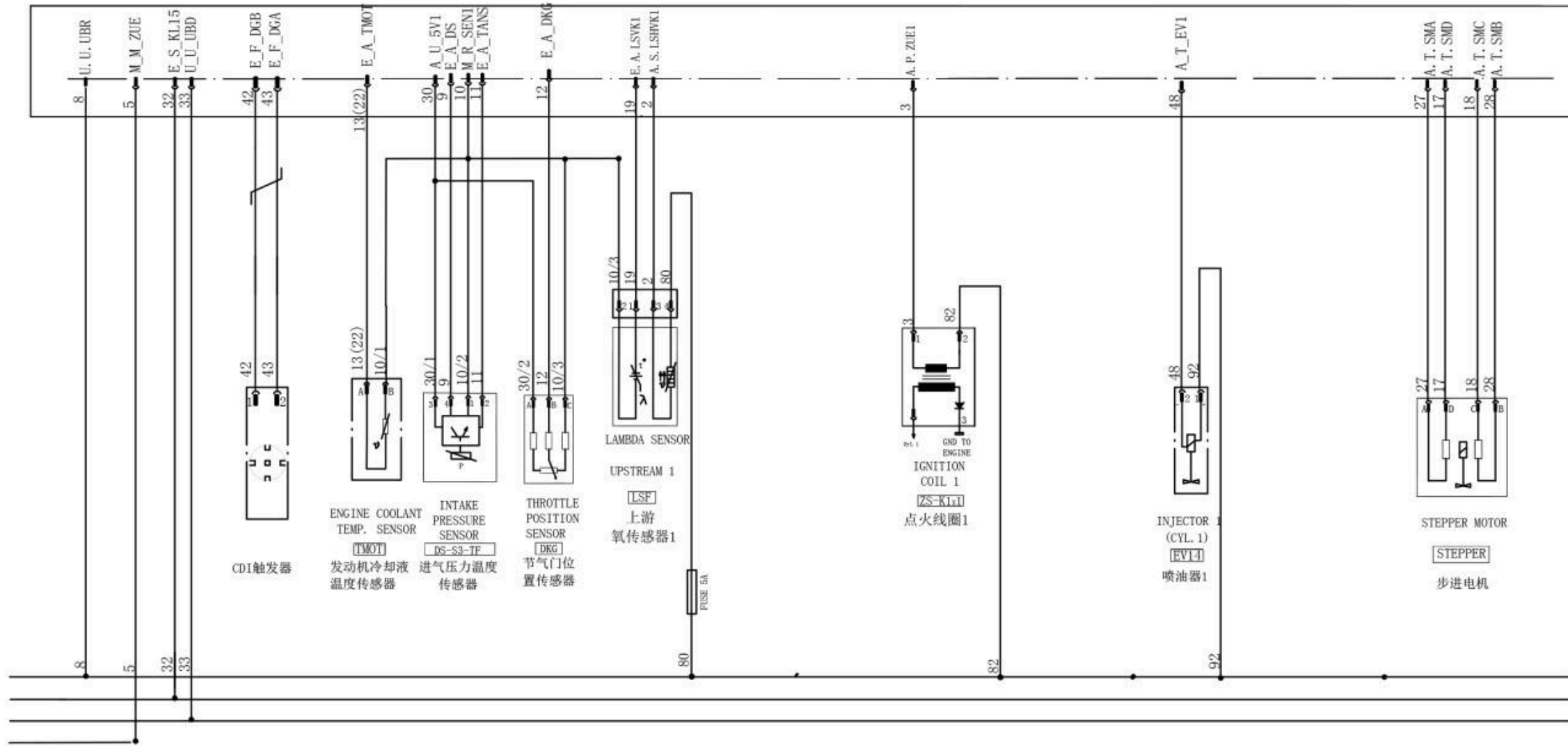
- Bent
- Damaged frame

Wiring diagram



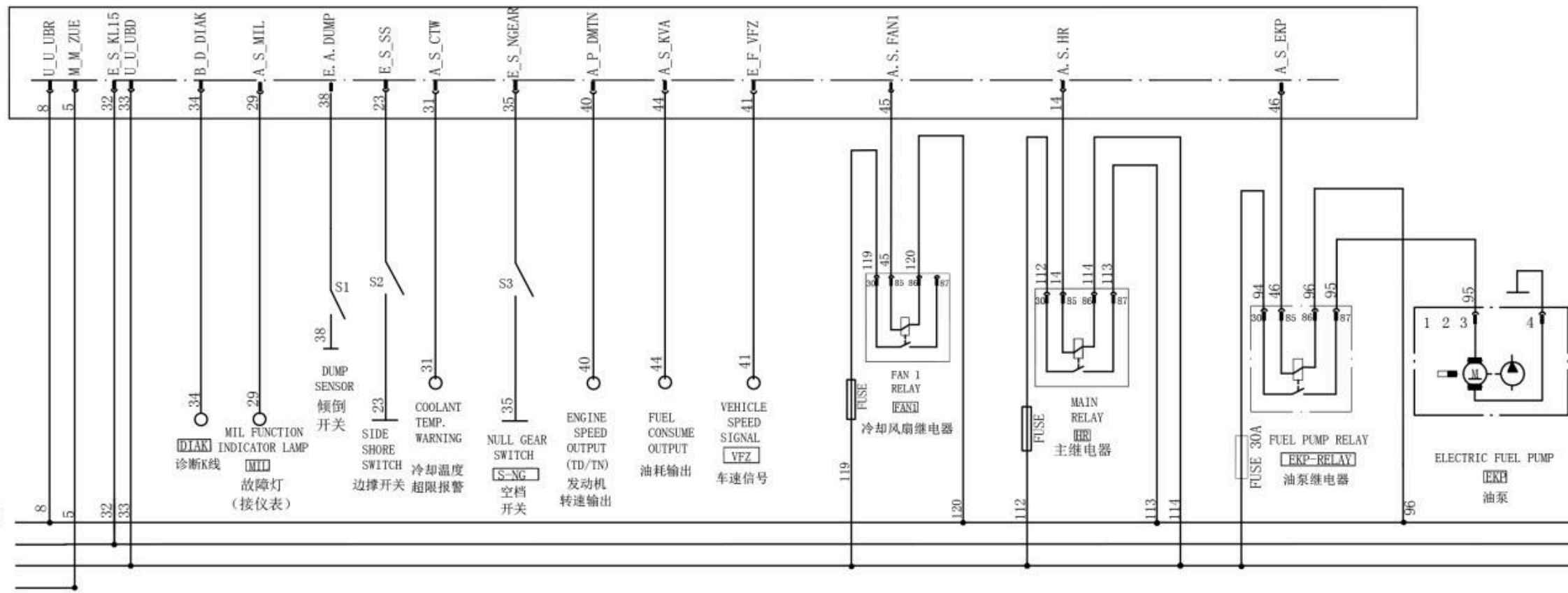
主继电器
点火开关
电瓶
接地点P

k1. 87 (HR)
UB k1. 15
UB k1. 30
GROUND P



主继电器
点火开关
电瓶
接地点P

k1. 87 (HR)
UB k1. 15
UB k1. 30
GROUND P



Every service manual contains hundreds of photographs and exploded parts views developed from a complete disassembly and assembly of the ATV. This, in addition to extensive research, allows service manual to achieve an unmatched level of detail, accuracy, and clarity.

Designed for the reader who may be working on the ATV for the first time, the step-by-step instructions and two-column text with large print are user-friendly. This LX700AU manual includes a Quick Reference Data section with frequently-used specifications and the following chapters:

GENERAL INFORMATION

SPECIFICATIONS

PERIODIC CHECKS AND ADJUSTMENTS

ENGINE

COOLING SYSTEM

FUEL INJECTION SYSTEM

DRIVE TRAIN

CHASSIS

ELECTRICAL

TROUBLESHOOTING