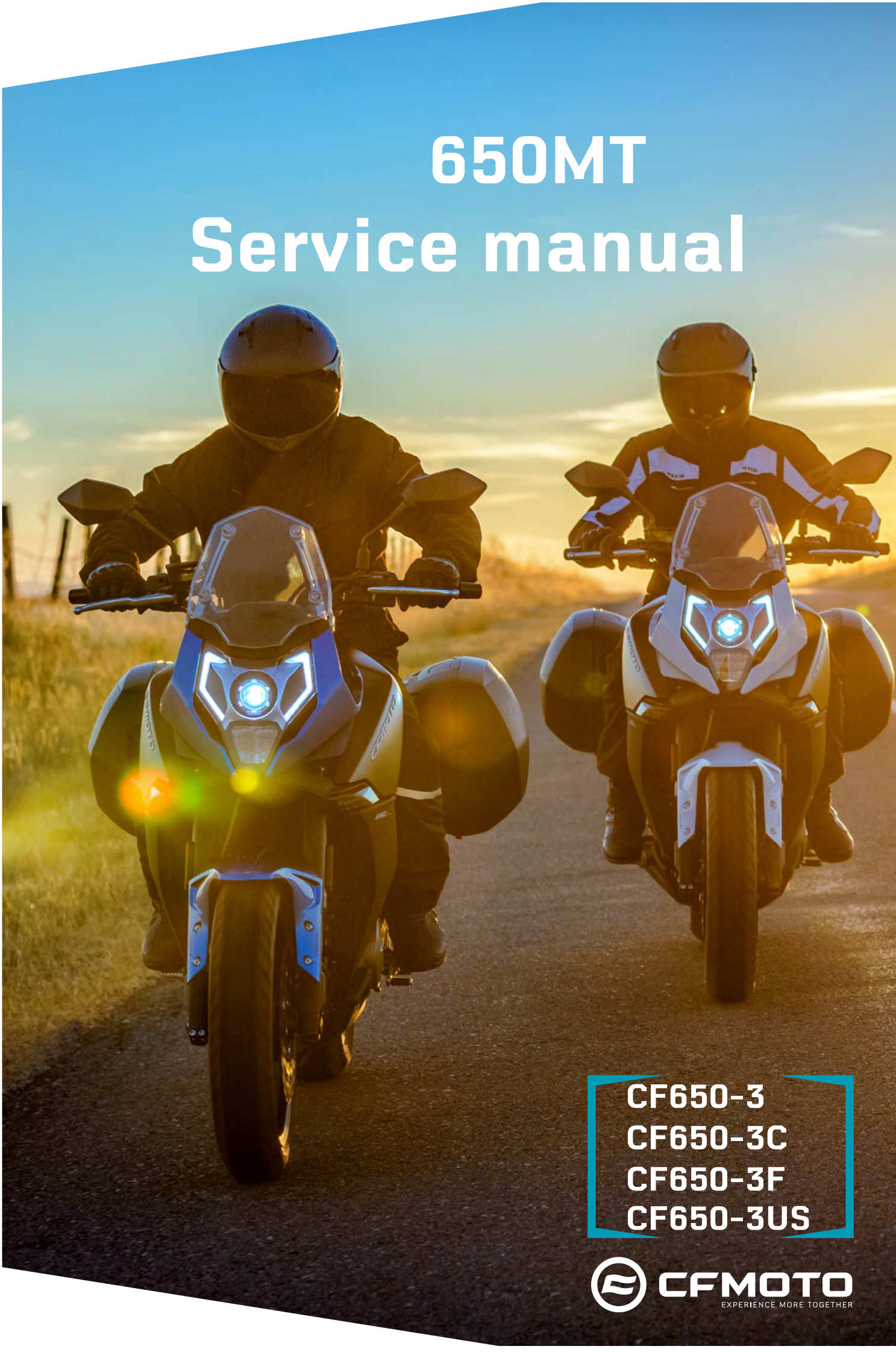
650MT
Service manual



CF650-3
CF650-3C
CF650-3F
CF650-3US

CFMOTO
EXPERIENCE MORE TOGETHER

Edition NO. : 20220627
Edition item : CF650-3 CF650-3C CF650-3F CF650-3US (6NTV-00WX01-2400) SM -20220627

FOREWORD

This manual introduces CF650-3 CF650-3C CF650-3F CF650-3US mainte-nance information, disassembly procedure, check & adjustment methods, troubleshooting and technical specifications. There are illustrations, drawings to guide your operation.

CFMOTO has final explanations to this manual information.Without our prior written approval,

Any part in this manual is not allowed to be copied and translated. approval, the manual cannot be duplicated anddisclosed. Do not use this manual to makethe video.

CFMOTO tried many ways and efforts to make this manual perfect and accurate. But this manual isn't response for any different and missing.

CFMOTO reserves rights to make improvements and modifications to the products without prior notice. Overhaul and maintenance should be done according to actual condition of vehicle.And isn't response for the product. This manual only for reference. If any problems comes .Please connect to your dealer to get the news for product.

The information in this manual refer to the newest product when comes out. The pictures, drawings and photos in this manual doesn'tstand for the real model, assy and parts.

This manual is compiled according to standard.

GB/T9969-2008 and GB/
T19678-2005.

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Contents can help you find out the topic you want and the chapter number. Use the page label to see the chapter page. And find more accurate in contents each chapter.

CFMOTO CO.LTD
R&D department
1st brand

Units form

A	Ampere	lb	Pounds
ABDC	After bottom dead center	m	Meter
AC	Alternating current	min	Minutes
ATDC	After top dead center	N	Newton
BBDC	Before bottom dead center	Pa	Pascal
BDC	Bottom dead center	PS	Horsepower
BTDC	Before top dead center	psi	Pound/Square inches
°C	Celsius	r	Rounds
DC	Direct current	rpm	Rounds per minutes
F	Farad	TDC	Top dead center
°F	Fahrenheit	TIR	Times indicator record
ft	Feet	V	Volt
g	Gram	W	Watt
h	Hour	Ω	Ohm
L	liter	in	Inches
US gal	US gallon	US qt	US quart
oz	Ounce	HP	Horse power
cm Hg	Hg deepness in cm	pint	Pint
cu in	Cubical inches	mL	mililiter

Introduction

This manual is designed primarily for use by well-trained mechanics in a properly equipped workshop. So the operator should have basic and necessary mechanical and electrical knowledge, as well as knowledge of proper use of tools. If you don't have enough experience, it is better to ask qualifi ed operator to work. In order to perform the work efficiently and to avoid costly mistakes, it is important to read the manual thoroughly.

For the warranty period, it is recommended to repair and maintain completely following this service manual. Any maintenance or repair procedure not performed in accordance with this manual may void warranty.

To get the longest life out of your vehicle.

- Follow the maintenance schedule in this manual.
- Be alert for problems and non-scheduled maintenance.
- Use genuine CFMOTO parts and proper tools.

There are necessary information about genuine parts and special tools in our parts catalogue and special tools list.

- Follow the service manual procedures step by step. Do not take shortcuts.
- Remember to keep complete records of maintenance and repair with dates and any new parts installed.

How to Use This Manual

This production seperate into several mainly systems in this manual. These systems make up each chapters in this manual. The contents has shown all the system in this production and can help you find out each chapters. Each chapter also has its own contents.

Example:If you want to find out the ignition coil information.Find out electrical system chapter in contents first. Then find the ignition in electrical system contents.

If you see the warning signal. Please pay more attention. And follow the safety handle and service method.

Danger
This signal shows special indication. It may cause injury or death if the instruction not followed.

⚠Warning
This signal shows special indication. It may cause vehicle damaged if the instruction not fallowed.

Note
This signal shows information about highly efficiency working way.

This manual has also 3 signals below(Except the warnings on top). They will help you see different level sign.

- Shows the job needs to be done

Shows the job step or after step work. It maybe before the caution note.

Shows the step's solution. Depends on the step for testing or inspection result. For most chapter after contents shows the exploded view. In the view, you can see the tighten torque, lubrication oil, grease or glue.

1 General Information

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1.1 Notice

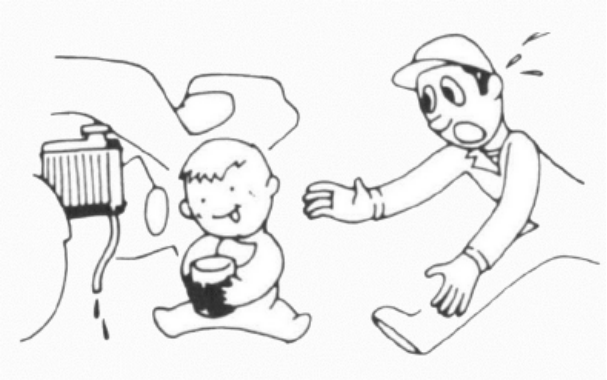
Safety Precautions

Exhaust contains toxic ingredients. Do not run the engine in enclosed or poorly-ventilated areas.

The liquor (dilute sulfuric acid) in Battery is strongly corrosive; it may burn the skin and blind the eyes when it contacts them. In case of contact, please wash it with a great deal of clear water immediately, and seek medical treatment in hospital. Besides, please also wash it by a great deal of clear water when it contacts the clothes, for avoiding skin burn. The Battery and Battery liquor must be stored strictly out of reach of children.

When the engine just stops, the temperature of engine, muffler is still high; please do not touch them with bare hands, for avoiding burn. Please wear uniform with long sleeves as well as gloves when maintaining.

The coolant is poisonous, please do not drink it, do not let it contact the skin, eyes neither clothes. In case it contacts the skin or clothes, please rinse it immediately. When it contacts the eyes, please wash it thoroughly with a great deal of clear water immediately, and seek medical treatment in hospital. In case the coolant is drunk by mistake, please try to throw it up, and seek medical treatment im-mediately after gargling. The coolant must be stored strictly out of reach of children.

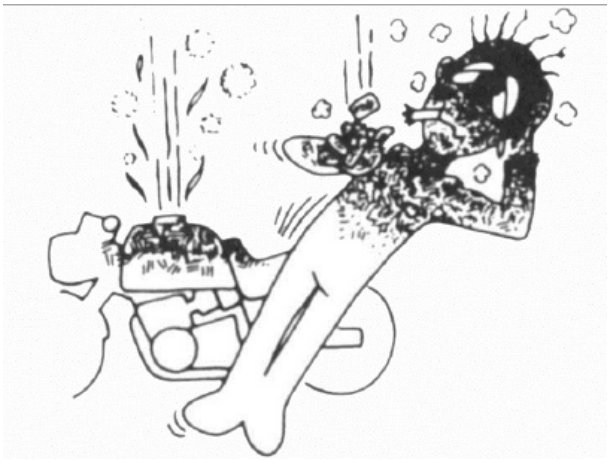


Uniform (pilot uniform etc), cap, safety boots suitable for the operation must be worn, and the safety articles such as dustproof goggles, dust proof respirator and gloves shall be worn for protection when necessary.

Do not touch the turning or movable pieces such as rear wheel, clutch, etc. Pay attention not to get pinched when servicing.

The Battery may produce combustible and explosive hydrogen when it is being charged. So it may explo-de if there is fame or electric spark. So please charge it in the place with nice ventilation.

No smoking or naked fire is allowed at the operation site, for the gasoline is combustible. Not only fames, but electric sparks shall be avoided. Besides, the vapored gasoline is explosive, please operate it in the place with nice ventilation.



The personnel shall make them be aware of each other from time to time when operating, for safety confirmation.

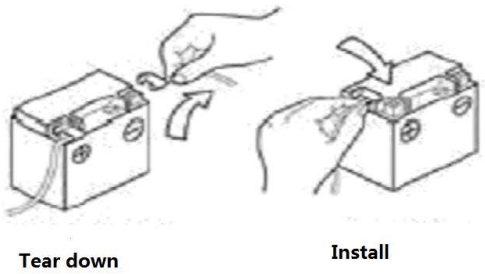
1.2 Removal & Installation Attention

Before starting to perform an inspection service or carry out disassembly and installation on a motorcycle, read the precautions given below. To facilitate acutal operations, notes, illustrations, photograghs, cautions and descriptions have been included in each chapter wherever necessary.This section explains the items that require particular attentions during removal and reassembly.

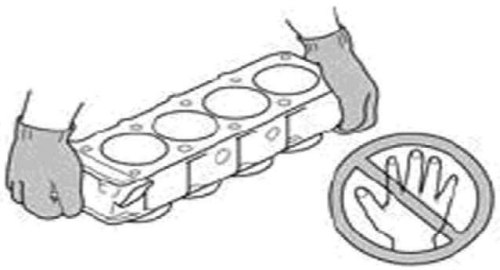
Battery Connecting

Before completing any service on the motorcycle, disconnect the battery cables from the battery to prevent the engine from accidentally turning over.

Disconnect the ground cable (-) first and then the positive (+).When finishing the service, first connect positive (+) cable to the positive (+) terminal of the battery and then the negative (-) cable to the negative (-) terminal.



Tear down Install

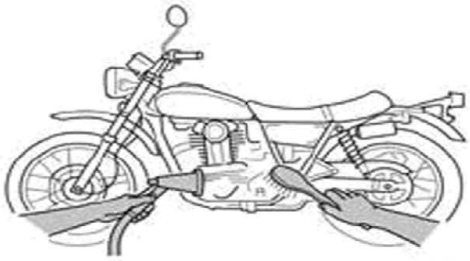


Edges of Parts

When service parts with edges, wearing gloves to prevent injury.

Solvent

Use a high-flush point solvent when cleaning parts. High-flush point solvent should be used according to directions of solvent manufacturer.

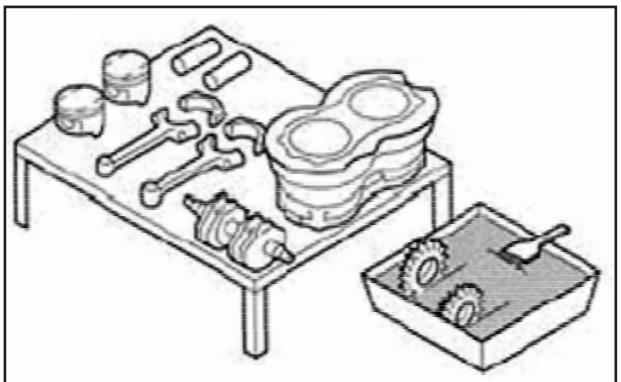


Cleaning Vehicle Before Removal

Clean the vehicle completely before disassembly.Dirt or other foreign materials entering into sealed areas during vehicle disassembly can cause excessive wear and reduce vehicle performance.

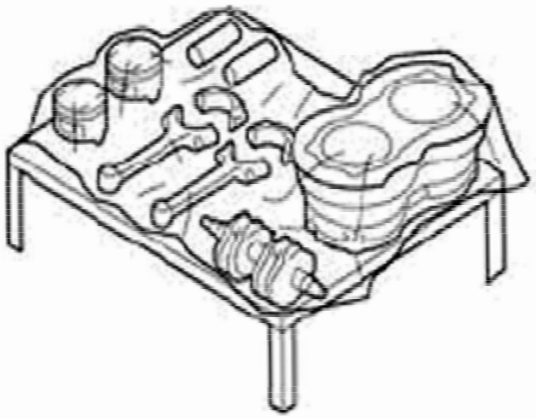
Arrangement and Cleaning of Removed Parts

Disassembled parts are easy to confuse. Arrange the parts according to the order of parts disassembled and clean the parts in order prior to installation.



Storage of Removed Parts

After all the parts including subassembly parts have been cleaned, store the parts in a clean area, put a clean cloth or plastic sheet over the parts to protect from any foreign materials that may collect before reassembly.

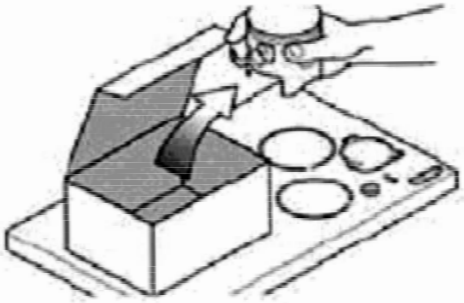


Inspection

Reuse of worn or damaged parts may lead to serious accidents.Visually inspect removed parts for corrosion, discoloration or other damage.Refer to the appropriate sections of this manual for service limits on individual parts. Replace the parts if any damage has been found or if the part beyond the service limits.

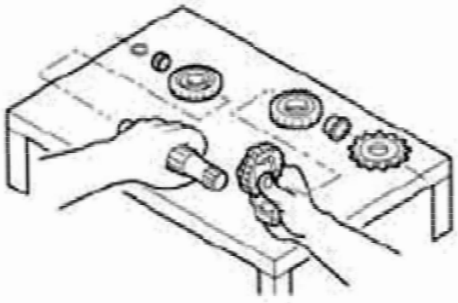
Replacement of Parts

Replacement parts must be CFMOTO genuine or recommended by CFMOTO. Gaskets, O-rings, oil seals, grease seals, circlips or cotter pins must be replaced with new ones whenever disassembled.



Assembly Order

In most cases assembly order is the reverse of disassembly.However,if assembly order is provided in the Service Manual, follow the procedures given.



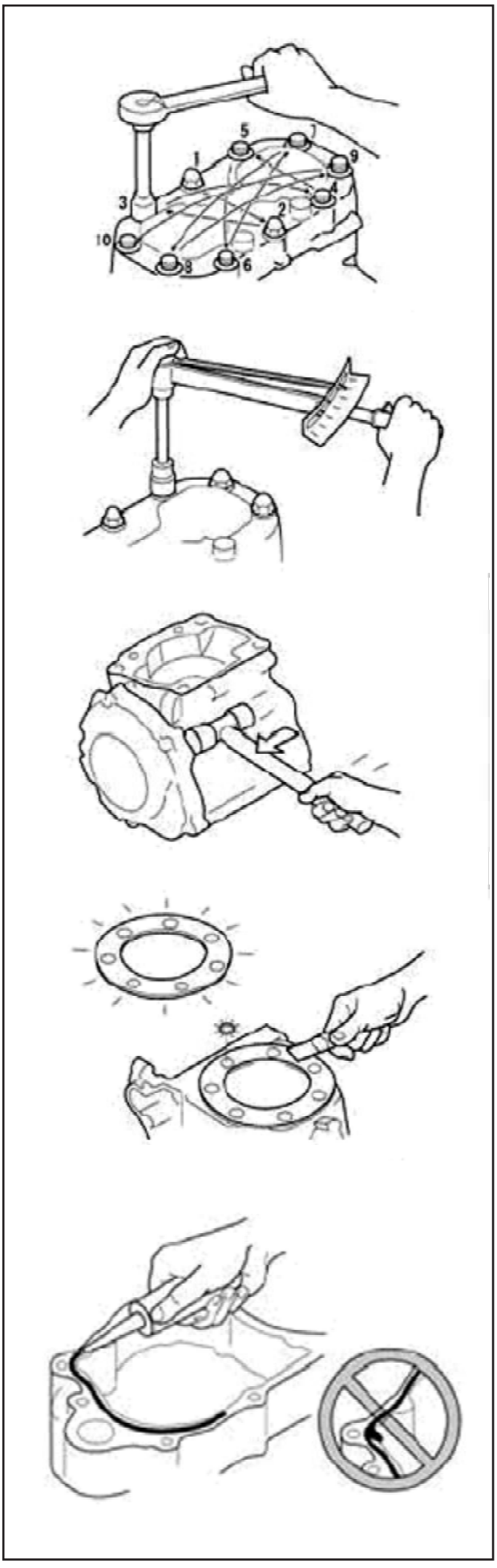
Tightening Sequence
Generally, when installing a part with several bolts, nuts or screws, start them allin their holes and tighten them in snug fit. Then tighten them according to specified se-quence to prevent case warpage or deforma-tion which can lead to malfunction.Conversely when loosening the bolts, nuts or screws, first loosen all of them by a quarter turn and then remove them. If the specified sequences is not indicated, tighten the fasteners alternat-ing diagnoally.

Tightening Torque
Incorrect torque applied to a bolt, nut or screw may lead to serious damage. Tighten fasteners to the specified torque by using a good quality torque wrench. Often, the tight-ening sequence is followed twice initial tightening and final tightening torque.

Porper Force
Use common sense during disassembly and assembly.excessive force can cause expen-sive or hard to repair damage.When necessary, remove screws that have non-permanent locking agent applied using an impact driver. Use a plastic-faced mallet whenever tapping is necessary.

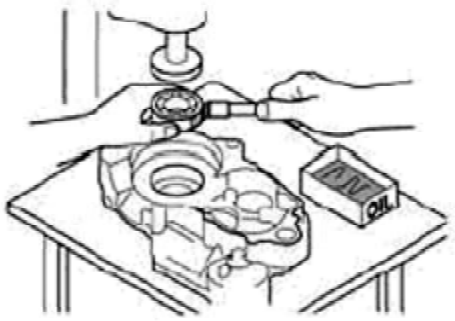
Gasket and O-ring
Hardening, shrinkage, or damage of both gaskets and O-ring after disassembly can reduce sealing performance. Clean the surface after remova. Use new gasket and o-ring for replacement.

Liquid Gasket,Non-permanent Locking Agent
For applications that require Liquid Gasket or a nonpermanent locking agent, clean the surfaces so that no oil residue remains before applying liquid gasket or non-perma-nent locking agent. Do not apply them excessively, excessive application can clog oil passages and causes serious damage.



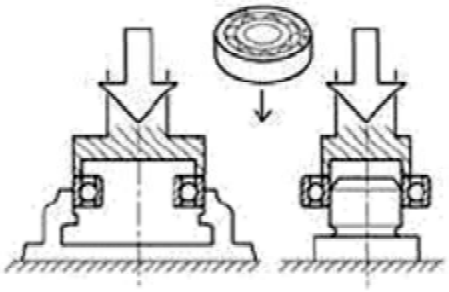
Bearing & oil seals

For items such as bearing or oil seals that must bepressed into place, apply small amount of oil on contact area. Be sure to maintain proper alignment and use smooth movements when installing.



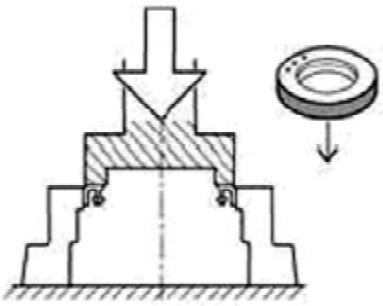
Ball Bearing and Needle Bearing

Do not remove ball or needle unless re-moval is absolutely necessary. Replace with new ones whenever removed. Press bear-ings with manufacturer and size marks facing out. Press bearing into place by putting pressure on the correct bearing race as shown.

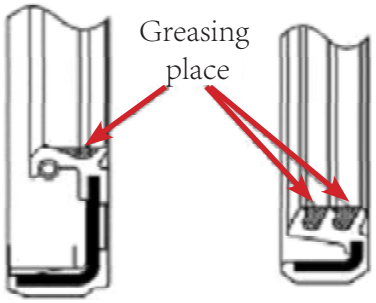


Oil seal & Grease Seal

Do not remove pressed oil or grease seals unless removal is absolutely necessary. Replace with new ones whenever removed. Press new oil seals with manufacturer and size marks facing out.Make sure the seal is aligned properly when installing.

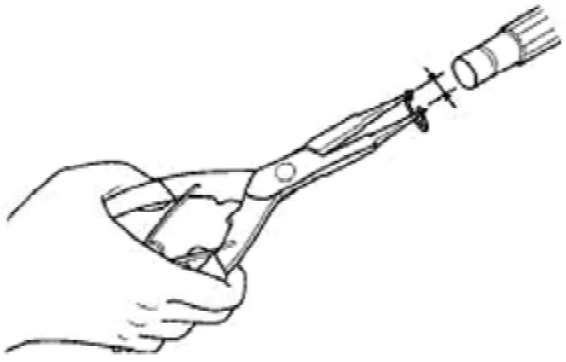


Apply specified grease to the lip of the seal before installing the seal.

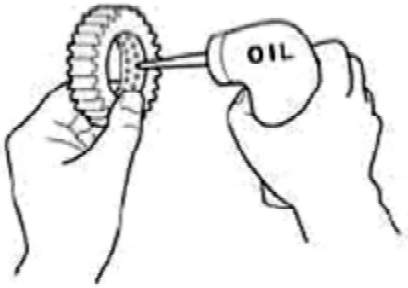


Circlips, Cotter Pins

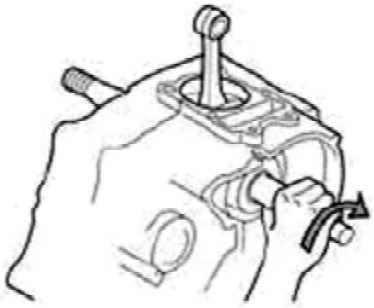
Replace circlips or cotter pins that were removed with new ones. Take care not to open the clip excessively when installing to prevent deformation.



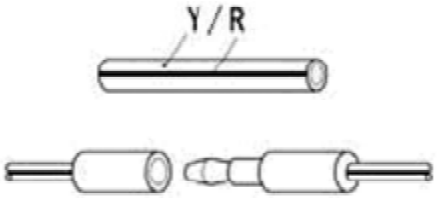
Lubrication
It is important to lubricate rotating or sliding parts during assembly to minimize wear during initial operation. Lubrication points are called out throughout this manual. Apply specific oil or grease as specified.



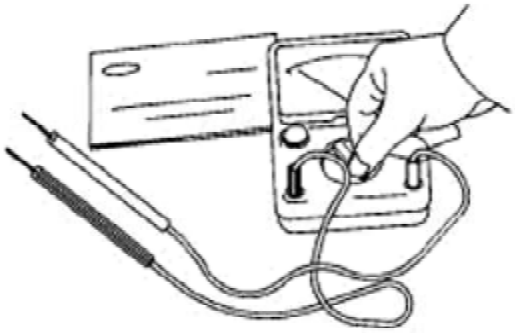
Direction of Engine Rotation
When rotating crankshaft by hand, the free play of amount of rotating direction will affect adjustment. Rotate the crankshaft to positive direction (Clockwise viewed from output side).



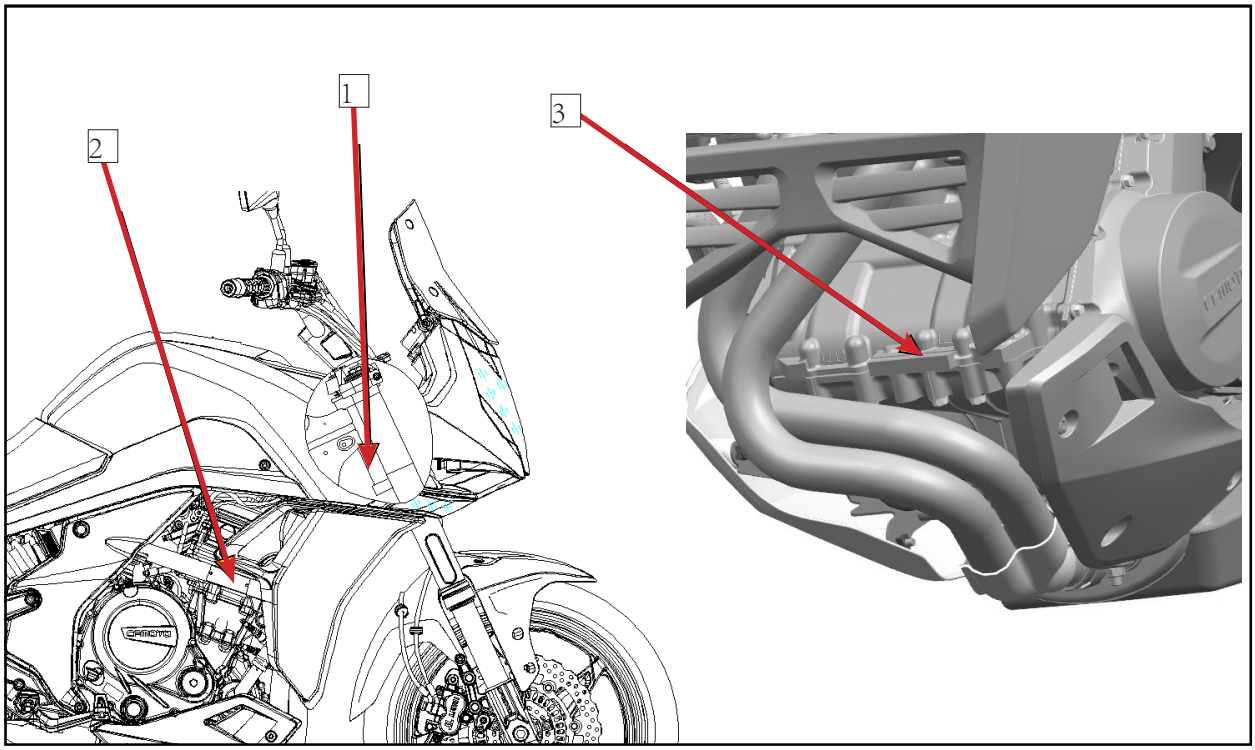
Electrical Wires
When connecting electrical wires, first to check color of wires and unless special instruction, same color of wires should be connected.



Instrument
Use a meter that has enough accuracy for an accurate measurement. Read the manufacturer's instructions completely before using the meter.Incorrect values may lead to improper adjustments.



1.3 Model Identification



① VIN: _____

② Name Plate: _____

③ Engine Number: _____

1.4 General Specifcations

Item	
Dimensions:	
Overall length	2150mm (84.6in.)
Overall width	835mm (32.9in.)
Overall height	1332mm (52.4in.)
Road clearance Seat	170mm (6.7in.)
height	840mm (33.1in.)
Dry mass	213kg (469.6b)
Curb mass:	
distribution Front:	108kg (238.1b)
Rear:	105kg (231.5b)
Fuel tank capacity	18L (4.76Sgal)
Performance	
Minimum turning radius (LH or RH)	2.7m (8.9ft)
Engine	
Type	2-cylinder, 4-strokes, DOHC
Cooling system	liquid-cooled
Bore and stroke	83×60mm (3.3in×2.4in.)
Displacement	649.3cm^3 (39.60cu in.)
Compression ratio	11.3 : 1
Max. power	52 kW (70.6 PS) @8750 r/min (rpm)
Max. torque	62 N•m (6.3 kgf•m, 46 ft•lb) @7000 r/min (rpm)，
Carburetion system	EFI
Starting system	Electric starter
Ignition system	ECU
Timing advance	Electric starter (Digital ignitor)
Ignition timing	From10° BTDC @1450r/min (rpm) to 35° BTDC @4800r/min (rpm)
Spark plug	CR8EI
Cylinder numbering methods	left to right 1-2
Firing order	1-2
Valve timing	
Intake	
Open	31°BTDC
Close	61°ABDC
Duration	272°

Items	
Exhaust valve:	
Open	50°BBDC
Close	30°ATDC
Duration	260°
Lubrication system	Forced lubrication (semi-dry sump)
Engine oil:	
Type	ELF 10W-40/SJ with JASOMA2
Viscosity	SAE10W-40
Oil capacity	2.6L (2.7USqt)
Drive train	
Primary reduction system:	
Type	Gear
Reduction ratio	2.095 (88/42)
Clutch type	Wet,multi disc
Transmission:	
Type	6-speed
Gear ratios:	
1st	2.353 (40/17)
2nd	1.714 (36/21)
3rd	1.333 (32/24)
4th	1.111 (30/27)
5th	0.966 (28/29)
6th	0.852 (23/27)
Main reduction system:	
Type	Chain drive
Reduction ratio	3.067 (46/15)
Overall drive ratio	5.474 (Top gear)
Frame	
Type	Steel tube, steel plate welding
Caster angle（Rake angle）	24.5°
Trail	137mm (5.4 in.)
Front tire	
Type	Tubeless
Size	120/70 ZR17M/C (58W)
Rim size	17×3.50
Rear tire	
Type	Tubeless
Size	160/60 ZR17M/C (69W)
Rim size	17×4.50
Front suspension	
Type	Telescopic fork
Wheel travel	127mm (5.0 in.)

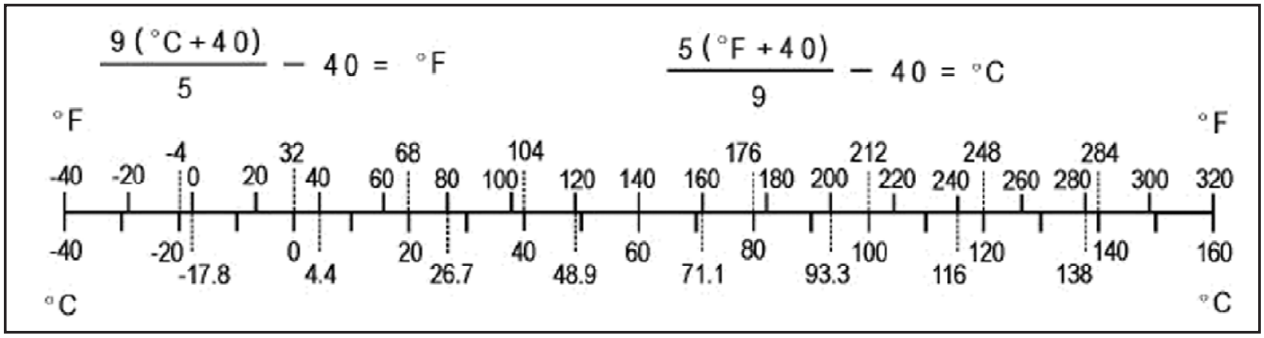
Items	
Rear suspension:	
Type	Swing arm
Wheel travel	118mm (4.6in.)
Brake type:	
Front	Double disc
Rear	Single disc
Electrical system	
Battery	12V 10Ah
Headlight	
Type	partially closed type
Bulb	High-beam:LED×2； low-beam:LED×1
Tail/Brake light	High-beam:LED×2； low-beam:LED×1
Alternator	
Type	Three-phase AC
Rated output	24A/14V@5000r/min (rpm)

With the change of order status, the above parameters may differ from the real car. This specification does not stand for all models.

1.5 Unit Conversion Table

Prefixes for units			Units of Length
Prefix	Symbol	Power	km × 0.6214 = mile
Mega	M	×1000000	m × 3.281 = ft
Kilo	k	×1000	mm × 0.03937 = in
Centi	c	×0.01	**Units of Torque:**
Milli	m	×0.001	N•m × 0.1020 = kgf•m
Micro	μ	×0.000001	N•m × 0.7376 = ft•lb
Units of Mass:			N•m × 8.851 = in•lb
			kgf•m × 9.807 = N•m
kg × 2.205 = lb			kgf•m × 7.233 = ft•lb
g × 0.03527 = oz			kgf•m × 86.80 = in•lb
Units of Volume:			**Units of Pressure:**
L × 0.2642 = gal (US)			kPa × 0.01020 = kgf/cm^2
L × 0.2200 = gal (imp)			kPa × 0.1450 = psi
L × 1.057 = qt (US)			kPa × 0.7501 = cmHg
L × 0.8799 = qt (imp)			kgf/cm^2× 98.07 = kPa
L × 2.113 = pint (US)			kgf/cm^2× 14.22 = psi
L × 1.816 = pint (imp)			cmHg × 1.333 = kPa
mL × 0.03381 = oz (US)			**Units of Speed:**
mL × 0.02816 = oz (imp)			
mL × 0.06102 = cu in			km/h × 0.6214 = mph
Units of Force:			**Units of Power:**
N × 0.1020 = kg			kW × 1.360 = PS
N × 0.2248 = lb			kW × 1.341 = HP
kg × 9.807 = N			PS × 0.7355 = kW
kg × 2.205 = lb			PS × 0.9863 = HP

emperature Conversion Table



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2.1 Periodic Maintenance Chart

The sc heduled maintenance must be done in accordance with this chart to keep the motor-cycle in good running condition.The initial maintenance is vitally important.

Maintenance Information

Cautions:

►=Severe Use Item. Reduce interval by 50% on vehicles subjected to severe use

■=Have an authorized dealer perform repairs that involve this component or system

Maintenance Schedule

Item		Maintenance before operation			
		Hour	Calendar	km	Remarks
Fuel system					
	Fuel hose	-	Daily	-	Inspect for aging
Electrical system					
	Switches	-	Daily	-	Inspect
	Lights and horns	-	Daily	-	

Break-in Maintenance Schedule

Item		Break-in Maintenance Interval (Service whichever interval comes first)			
		Hour	Calendar	km	Remarks
Engine					
■	Engine oil and oil filter	-	-	1000	Replace
	Idle	-	-	1000	Inspect
■	Coolant	-	-	1000	
	Throttle system	-	-	1000	
Electrical system					
■	Functions of electrical parts	-	-	1000	Inspect
	Battery	-	-	1000	
	Fuses or circuit breakers	-	-	1000	
Brake system					
	Brake discs	-	-	1000	Inspect
	Brake pads	-	-	1000	
	Brake fluid level	-	-	1000	
	Brake lever	-	-	1000	Inspect for free play
■	Brake hoses	-	-	1000	Inspect for damage and sealing
Wheels					
	Tire condition	-	-	1000	Inspect
	Tire pressure	-	-	1000	
Suspension system					
■	Rear shock absorber and front forks	-	-	1000	Inspect for leaking (maintain parts according to the requirement)
Cooling system					
	Coolant level	-	-	1000	Inspect
■	Coolant	-	-	1000	
■	Radiator fan function	-	-	1000	
	Coolant hoses	-	-	1000	
Steering system					
■	Steering bearings	-	-	1000	Inspect
Other parts					
■	Diagnosis connector	-	-	1000	Read with PDA
■	Mobile parts	-	-	1000	Lubricate; inspect for flexibility
■	Bolts and nuts	-	-	1000	Inspect for fastness。
■	Cables and wires	-	-	1000	Inspect for damage, bending and routing

Periodic Maintenance Schedule

Item		Periodic Maintenance Interval (Service whichever interval comes first)			
		Hour	Calendar	km	Remarks
Engine					
	Engine oil and oil filter	-	6M	5000	Replace
■	Clutch	-	-	10000	Inspect
	Idle	-	-	10000	
■	Coolant	-	-	10000	
		-	24M	30000	Replace
	Throttle system	-	-	10000	Inspect
■	Throttle valve	-	-	5000	Clean
► ■	Air filter element	-	-	10000	Inspect
		-	24M	-	Replace
■	Spark plug	-	-	10000	
■	Valve clearance	-	-	40000	Inspect
Electrical system					
■	Functions of electrical parts	-	12M	10000	Inspect
	Battery	-	6M	5000	
	Fuses or circuit breakers	-	6M	5000	
■	Wires	-	12M	10000	Inspect for damage, bending and routing
Brake system					
	Front and rear brake system	-	12M	10000	Inspect
		-	24M	20000	
	Brake discs	-	12M	10000	
		-	24M	20000	
►	Brake pads	-	12M	10000	
		-	24M	20000	
	Brake fluid level	-	12M	10000	
		-	-	20000	
	Brake lever	-	24M	20000	Inspect for free play
		-	12M	10000	
■	Brake hoses	-	24M	20000	Inspect for damage and sealing
		-	12M	10000	
■	Brake fluid	-	24M	-	Replace
Wheels					
	Tire condition	-	12M	10000	Inspect
		-	24M	20000	
	Tire pressure	-	12M	10000	
		-	24M	20000	
■	Wheel bearings	-	-	10000	
		-	-	30000	

Item		Periodic Maintenance Interval (Service whichever interval comes first)			
		Hour	Calendar	km	Remarks
Suspension system					
■	Suspension system	-	-	5000	Inspect
		-	-	10000	
		-	-	15000	
■	Rear shock absorber and front forks	-	12M	10000	Inspect for leaking (maintain parts according to the requirement)
		-	24M	20000	
■	Swing arms	-	-	10000	Inspect
		-	-	30000	
Cooling system					
	Coolant level	-	12M	10000	Inspect
		-	24M	20000	
■	Coolant	-	12M	10000	
		-	24M	20000	
■	Radiator fan function	-	12M	10000	
		-	24M	20000	
■	Coolant hoses	-	12M	10000	
		-	48M	30000	
Frame system					
	Frame	-	-	30000	Inspect
Steering system					
■	Steering bearings	-	12M	10000	Inspect
		-	24M	20000	
Chain					
►	Chain,rear sprocket and engine sprocket	-	12M	10000	Inspect
		-	24M	20000	
Other parts					
■	Diagnosis connector	-	12M	10000	Read with PDA
		-	24M	20000	
■	Mobile parts	-	12M	10000	Lubricate; inspect for flexibility
		-	48M	30000	
■	Bolts and nuts	-	12M	10000	Inspect for fastness
		-	48M	30000	
■	Cables and wires	-	12M	5000	Inspect for damage, bending and routing
		-	24M	15000	
■	Pipes ,ducts ,hoses and sleeves	-	12M	10000	Inspect for cracks, sealing and routing
		-	48M	30000	

2.2 Torque Specifcations for tighten parts

The following tables list the tightening torque for the major fasteners requiring use of a threadlocker.

Letters used in “remarks” column mean:

AL: Tighten the two clamp bolts alternately two times to ensure even tightening torque;
EO: Apply engine oil;
L: Apply a threadlocker to the threads;
Lh: Left-hand threads;
MO: Apply molibdenum disulfi de oil solution(mixture of engine oil and molybdenum disulfi de grease in a weight ratio 10:1);
R: Replacement Parts;
S: Follow the specifi ed tightening sequence;
Si: Apply silicone grease (ex.PBC grease);
SS: Apply silicone sealant

Fastener	Torque			Remarks
	N•m	kgf•m	ft•lb	
Electronic Fuel Injection(EFI)				
Water Temp. Sensor	12	1.2	106in•lb	
Speed Sensor Bolt	8	0.80	69in•lb	L
Fuel Pump Bolts	5	0.5	—	L,S
Oxygen Sensor	60	6.60	44.3	
Cooling System				
Radiator Hose Clamp Bolts	2.5	0.25	—	
Water Pump Impeller Bolt	10	1.0	87in•lb	
Water Pump Cover Bolts	10	1.0	87in•lb	
Water Pump Drain Bolt	7.0	0.70	62in•lb	
Thermostat Housing Bolts	10	1.0	87in•lb	
Engine Base Plate Bolts	6	0.60	52in•lb	See text
Cylinder Head				
Cylinder Cover Bolts	10	1.0	87in•lb	
Camshaft Cap Bolts	12	1.2	106in•lb	S
Cylinder Head Bolts (M10 New)	54	5.5	40	MO,S
Cylinder Head Bolts (M10 Used)	49	5.0	36	MO,S
Cylinder Bolt (M8)	27.5	2.8	20	MO,S
Cylinder Nut (M10)	49	5.0	36	MO,S
Cylinder Cover Bolts (M6)	12	1.2	106in•lb	S
Cylinder Bolts (M6)	12	1.2	106in•lb	S
Bolts ,Air Intake Hose	12	1.2	106in•lb	
Clamp, Air Intake Hose	2.0	0.2	1.5	
Bolts, Tensioner	12	1.2	12	
Nuts, Tensioner	20	1.2	20	
Camshaft Sprocket Bolts	15	1.5	11	L
Spark Plug	15	1.5	11	
Fixed Nuts,Exhaust Pipe	17	1.7	12	
Front Mounting Bolts,Muffler	20	2.0	15	

Fastener	Torque			Remarks
	N•m	kgf•m	ft•lb	
Mounting Bolts ,Rear Muffler	20	2.0	15	
Bolts, Anti Scald Plate	6	0.60	52in•lb	See text
Clutch				
Oil Filler Cover	–	–	–	tighten
Mounting Bolts, Clutch Cover	12	1.2	106in•lb	
Spring Bolts, Clutch	10	1.0	87in•lb	
Hub Nut, Clutch	132	13.5	98	R
Wheel bracket, clutch	10	1.0	87in•lb	S
Cable bracket, clutch	10	1.0	87in•lb	L
Tighten bolts, clutch	10	1.0	87in•lb	
Engine Lubrication				
Drain Bolt	30	3.0	22	
Filler Plate Bolts	10	1.0	87in•lb	L
Oil Filter	17	1.75	13	EO,R
Mounting bolts, oil filter	25	2.5	18	L
Oil Pan Bolts	12	1.2	106in•lb	
Oil Pump Chain Guide Bolts	12	1.2	106in•lb	L
Bolt, strainer	10	1.0	87in•lb	L
Oil Pressure Warning Switch	15	1.5	11	SS
Bolt, oil pump cover	12	1.2	106in•lb	L
Bolts ,Lower Fairing Bracket	12	1.2	106in•lb	L
Bolt(Left), oil pump chain	12	1.2	106in•lb	L,Lh
Oil Passage Plug	20	2.0	15	L
Engine Removal/Installation				
Rear Mounting Nuts, Engine	45	4.6	32	S
Mounting Bracket Bolts, Engine	25	2.5	18	S
Front Mounting Nuts, Engine	45	4.6	32	S
Crankshaft/Transmission				
Breather Plate Bolts	7	0.7	70in•lb	L
Crankcase Bolts(M9,L=113mm)	44	4.5	32	MO,S
Crankcase Bolts (M9,L=83mm)	44	4.5	32	MO,S
Crankcase Bolts (M8,L=73mm)	35	3.6	26	MO,S
Crankcase Bolts (M8,L=60mm)	35	3.6	26	MO,S
Crankcase Bolts(M8,L=110mm)	27.5	2.8	20	S
Crankcase Bolts (M8,L=50mm)	27.5	2.8	20	S
Crankcase Bolts (M7)	20	2.0	15	S
Bolts, Upper Crankcase	27.5	2.8	20	S

Fastener	Torque			Remarks
	N•m	kgf•m	ft•lb	
Screw ,Shift Drum Bearing Holder	5	0.50	43in•lb	L
Nuts ,Connecting Rod Big End	see text	←	←	MO
Timing Rotor Bolt	40	4.1	30	
Relief Valve	15	1.5	11	SS
Gear Positioning Lever Bolt	12	1.2	106in•lb	L
Shift Shaft Return Spring Pin	29	2.9	22	L
Shift Drum Cam Bolt	12	1.2	106in•lb	L
Neutral Sensor	15	1.5	11	
Bolt, Gearshift Chamber Cover	20	2.0	15	L
Fixed Screw ,Neutral Switch	5	0.50	43in•lb	L
Bolts ,Shift Shaft Cover	10	1.0	87in•lb	L(2)
Screw, Transmission Cover	5	0.50	43in•lb	L
Wheels/Tires				
Front Axle	108	11.0	80	
Lock Bolt ,Front Axle	34	3.5	25	
Nut ,Rear Axle	108	11.0	80	
Final Drive				
Engine Sprocket Nut	125	12.7	92	L
Nut ,Rear Axle	108	11.0	80	
Nuts ,Rear Sprocket	59	6.0	44	
Bolt ,Speed Sensor	8	0.80	69in•lb	L
Bracket Bolts ,Speed Sensor	10	1.0	87in•lb	
Brakes				
Bleed Valve	7.8	0.80	69in•lb	
Brake Hose Banjo Bolts	25	2.5	18	
Brake Lever Pivot Bolt	1.0	0.10	9in•lb	Si
Brake Lever Pivot Bolt Lock nut	5.9	0.60	52in•lb	
Bolt ,Brake Pedal	8.8	0.90	78in•lb	
Nut, Brake Pipe	18	1.8	13	
Mounting Bolts ,Front Brake Disc	27	2.8	20	L
Screw ,Front Brake Light Switch	1.0	0.10	9in•lb	
Screw, Front Brake Reservoir Cap	1.0	0.10	9in•lb	
Mounting Bolts , Front Caliper	34	3.5	25	
Mounting Bolts , Front Brake Master Pump	8.8	0.90	78in•lb	S
Mounting Bolts ,Rear Brake Disc	27	2.8	20	L
Mounting Bolts , Rear Caliper	25	2.5	18	
Mounting Bolts , Rear Brake Master Pump	25	2.5	18	
Rear Master Cylinder Push Rod Locknut	18	1.8	13	
Suspension				
Front Axle Clamp Bolt	34	3.5	25	
Allen Bolts ,Front Fork Bottom	30	3.1	22	L

Fastener	Torque			Remarks
	N•m	kgf•m	ft•lb	
Front Fork Clamp Bolts (Lower)	20	2.0	15	AL
Front Fork Clamp Bolts (Upper)	20	2.0	15	
Front Fork Top Plugs	25	2.5	18	
Bolt ,Rear Shock Absorber	59	6.0	44	
Nut ,Rear Shock Absorber	59	6.0	44	
Nut ,Swing arm Pivot Shaft	180	—	—	
Steering				
Front Fork Clamp Bolts (Lower)	20	2.0	15	AL
Front Fork Clamp Bolts (Upper)	20	2.0	15	
Handlebar Holder Bolts	25	2.5	18	S
Left Switch Housing Screws	3.5	0.36	31in•lb	
Right Switch Housing Screws	3.5	0.36	31in•lb	
Steering Stem Head Bolt	108	11.0	80	
Steering Stem Nut	20	2.0	15	
Frame				
Footrest Stay Bolts	34	3.5	25	
Front Fender Bolts	3.9	0.40	35in•lb	
Front Fender Bracket Bolts	8.8	0.90	78in•lb	L
Front Turn Light Mounting Screws	1.2	0.12	11in•lb	
Grab Rail Mounting Bolts	25	2.5	18	
Lower Fairing Mounting Bolts	8.8	0.90	78in•lb	
Seat Lock Mounting Screws	1.2	0.12	11in•lb	
Side stand Bolt	44	4.5	32	
Side stand Switch Bolt	8.8	0.90	78in•lb	L
Electrical System				
Alternator Cover Bolts	12	1.2	106in•lb	
Alternator Lead Holding Plate Bolt	10	1.0	87in•lb	L
Alternator Rotor Bolt	155	15.8	114	L
Crankshaft Position Sensor Bolts	6.0	0.60	53in•lb	L
Engine Ground Cable Terminal Bolt	9.8	1.0	87in•lb	
Front Brake Light Switch Screw	1.2	0.12	11in•lb	
Front Turn Light Mounting Screws	1.2	0.12	11in•lb	
Left Switch Housing Screws	3.5	0.36	31in•lb	
License Plate Light Cover Screws	0.90	0.090	8in•lb	
License Plate Light Mounting Screws	1.2	0.12	11in•lb	
Neutral Switch	15	1.5	11	
Oil Pressure Switch	15	1.5	11	SS
Oxygen Sensor	60	6.10	44.3	
Regulator/Rectifier Bolts	8.8	0.90	78in•lb	
Right Switch Housing Screws	3.5	0.36	31in•lb	
Side stand Switch Bolt	8.8	0.90	78in•lb	L
Spark Plugs	15	1.5	11	

Fastener	Torque			Remarks
	N•m	kgf•m	in•lb	
Cable Terminal Nut ,Starter Motor	6.0	0.60	53	
Mounting Bolts ,Starter Motor	12	1.2	106	SS
Bolts ,Stator Coil	12	1.2	106	L
Bolt ,Timing Rotor	40	4.1	362	
Water Temp. Sensor	12.0	1.2	106	

The table below, relating tightening torque to thread diameter, lists the basic torque for the bolts and nuts. Use this table for only the bolts and nuts which do not require a specific torque value.

Basic Torque for General Fasteners

Threads Diameter	Torque		
	N•m	kgf•m	ft•lb
5	4.5~6.0	0.45~0.60	3.3~4.4
6	8.0~12.0	0.80~1.20	6~8.8
8	18~25	1.8~2.5	13.0~17.5
10	25~34	2.6~3.5	19.0~25
12	44~61	4.5~6.2	33~45
14	73~98	7.4~10.0	54~72
16	115~155	11.5~16.0	83~115
18	165~225	17.0~23.0	125~165
20	225~325	23.0~33.0	165~240

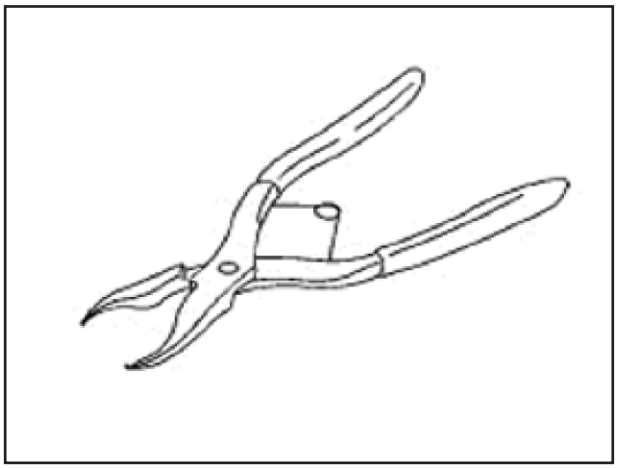
2.3 Standard Data & Service limit

Item	Standard	Service limit
EFI		
Throttle Grip Free Play	2mm~3mm (0.08in~0.12in.)	
Idle Speed	1450r/min±145r/min(rpm)	
Air Filter Element	Polyurethane Foam	
Cooling System		
Coolant:		
Type (recommended)	Permanent type of antifreeze	
Color	Green	
Mixed Ratio	Soft water 50%, Coolant 50%	
Freezing Point	–35°C (–31°F)	
Total Amount	2.0L (2.1USqt)	
Cylinder Head		
Valve Clearance		
Exhaust	0.20mm~ 0.26mm (0.0078in~0.0102in .)	
Intake	0.08mm~0.13mm (0.0031in~0.0051in.)	
Clutch		
Clutch Lever Free Play	2mm~3mm (0.08in~0.12in.)	
Engine Lubrication System		
Engine Oil::	ELF 10W-40/SJ JASO MA2	
Type	10W-40	
Viscosity	2.0L (1.8USqt)(when filter is not replaced)	
Capacity	2.2L (2.0USqt) (when filter is replaced)	
	2.6L (2.5USqt)(total capacity)	
Level	Between upper and lower level lines (after idling or running)	
Wheels/Tires		
Tread Depth:		
Front	4.5mm (0.18in.)	0.8mm~1.0mm
Rear	5.5mm (0.22in.)	0.8mm~1.0mm
Air Pressure (when Cold):		
Front	225kPa (1 or 2 person(s))	
Rear	250kPa (1 person) 280kPa (2 persons)	

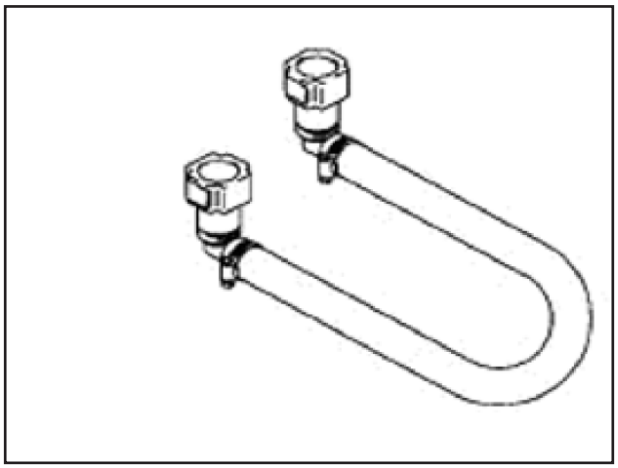
Item	Standard	Service Limit
Chain reduction system		
Drive Chain Tightness	30mm~40mm (1.18in~1.575in.)	
Drive Chain Wear	317.5mm~318.2mm	320mm
(20-link Length)	(12.50in~12.53in.)	(12.6in.)
Standard Chain:		
Make in	Japan RK or DID 520×S01 or	
Type	520VP2-T	
Link	116 Links	
Brake		
Brake Fluid:		
Grade	DOT4	
Brake Pad Lining Thickness		
Front	4mm (0.15in.)	1mm (0.04in.)
Rear	5mm (0.196in.)	1mm (0.04in.)
Brake light timing	On	
Front		
Rear	About 10mm (0.39in.) after pedal play	
Electrical System		
Spark Plug Gap	0.7mm~0.9mm (0.027in~0.035in.)	

2.4 Special Tool

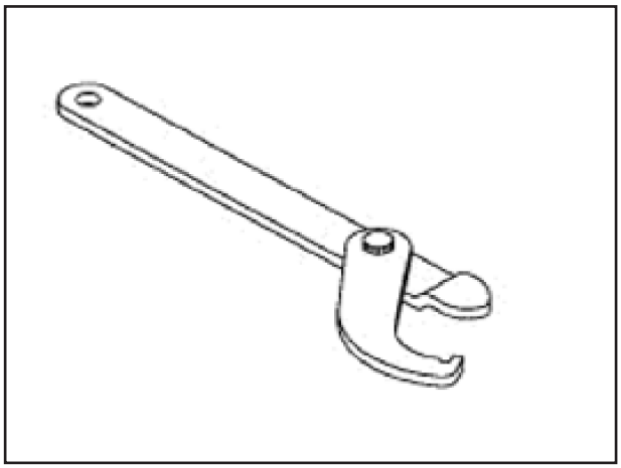
Caplier, inner circlip



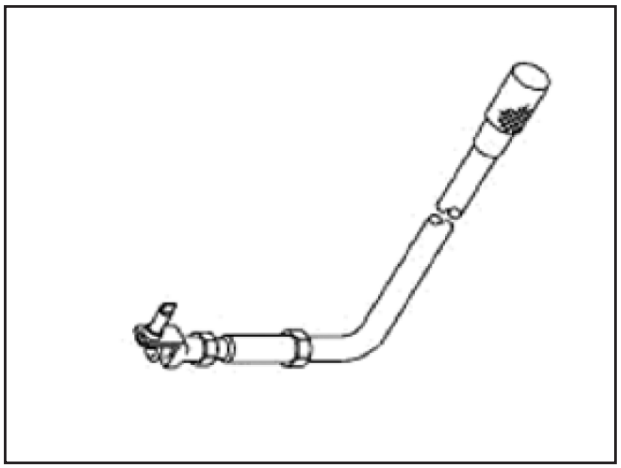
Extension tube



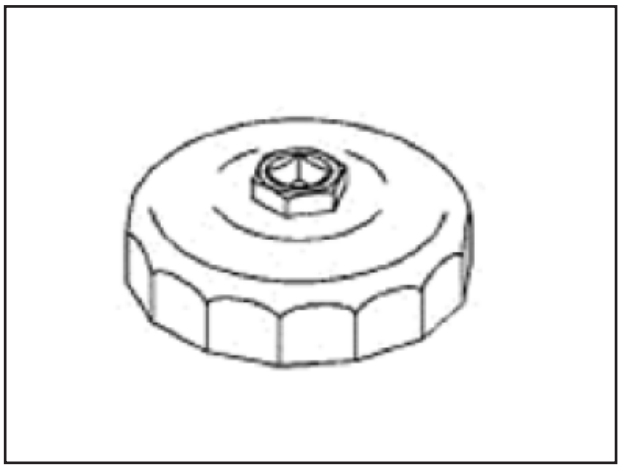
Wrench, lock nut of steering column



Adjustor, screw



Wrench, oil filter



2.5 Ele ctronic Fuel Injection

2.5.1 Air Filter Element Cleaning

Attention
In dusty areas, the element should be cleaned frequently than recommended interval **After riding through rain or on muddily road, element should be cleaned immediately.**

Attention
If dirt or dust is allowed to pass through into the throttle assy, the throttle may become stuck, possibly causing accident.

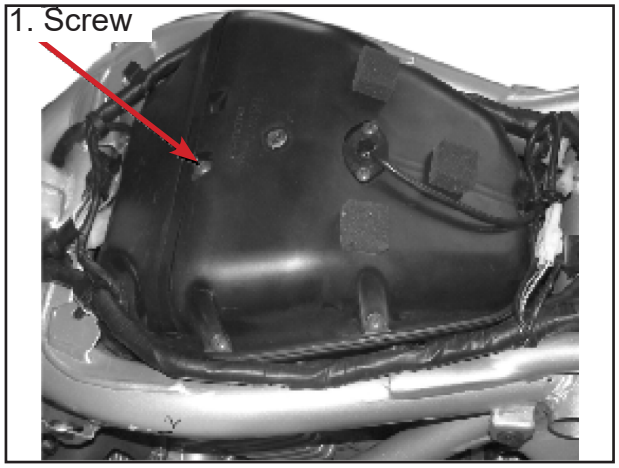
⚠Attention
If dirt gets through into the engine, excessive engine wear and possibly engine damage will occur.

Removal:

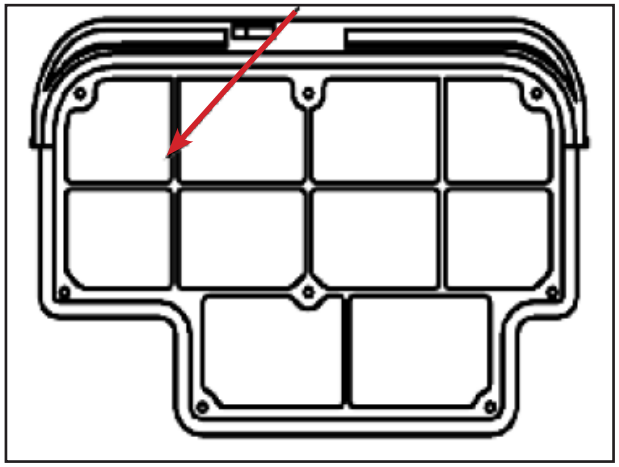
Fuel tank(see Fuel Tank Removal in the Fuel System Chapter);

Remove air filter element screw;

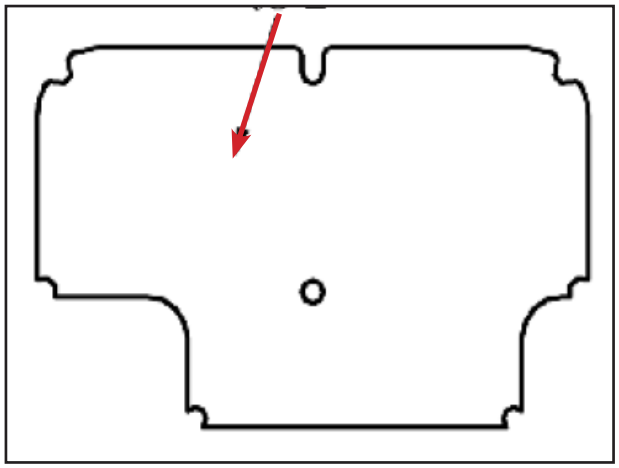
Remove air filter element comp.



2. Element Comp.



3. Filter element



Remove:

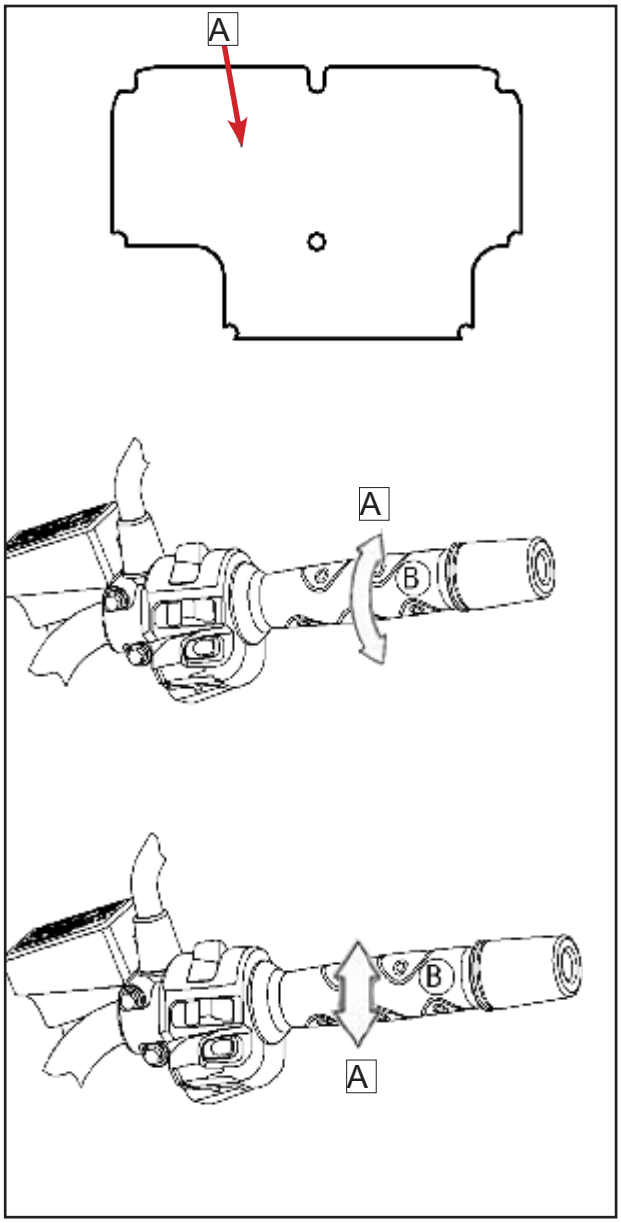
Remove the holder.

Remove element

NOTE

The wire screen is fastened with an adhesive for the shaded portion.Do not remove the wire screen

Warning
Clean the element in a well-ventilated area, and make sure that there are no sparks or flame anywhere nears the working area. **Because of the danger of highly flammable liquids, do not use gasoline or flammable solution to clean the element.**



- Clean the element element [A] in a bath of non-flammable cleaning solution, and then dry it .
- After cleaning, saturate a clean, lint-free towel with SAE 15W/40 30 oil and apply the oil to the element by tapping the element outside with the towel.
- Visually check the element for tears or breaks.
- If the element has any tears or breaks, re-place the element.
- Install the element unit [A] with the foam ele-ment outside (gray) facing down.

2.5.2 Throttle Control System Inspection

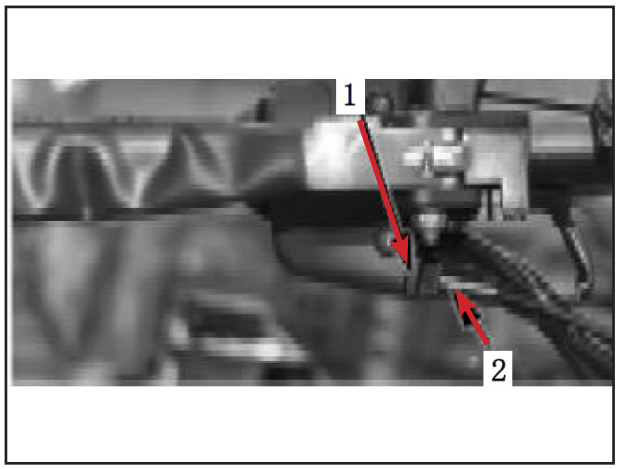
- Check that the throttle grip moves smoothly from full open to close [A], and the throttle closes quickly and completely by the return spring in all steering positions.
- If the throttle grip doesn't return properly, check the throttle cable routing, grip free play, and cable damage. Then lubricate the throttle cable.

- Check the throttle grip free play [A].
- If the free play is incorrect, adjust the throttle cable.

Throttle Grip Free Play
Standard:2mm~3mm (0.08in~0.12in)

If necessary, adjust the throttle cable as follows.

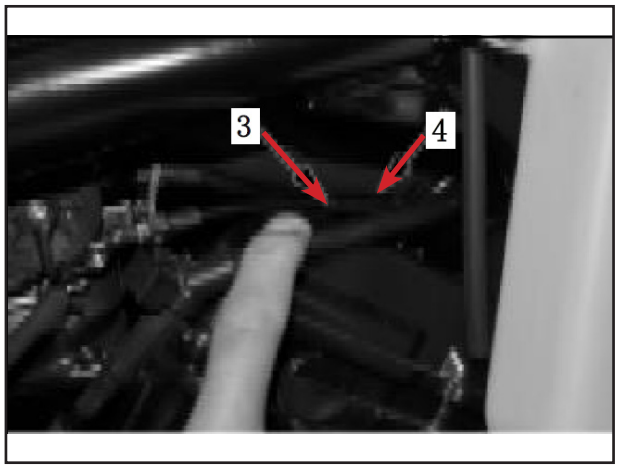
- Loosen the locknut [1] at the upper end of the throttle cable.
- Turn the adjuster [2] in completely so as to give the throttle grip plenty of play.



1. lock nut 2. Adjust nut

- Loosen the locknut [3] at the middle of the throttle cable.
- Turn the adjuster [4] until there is no play when the throttle grip is completely closed.
- Tighten the locknut.
- Turn the throttle cable adjuster until reach the proper throttle grip free play.
- Tighten the locknut.

(Fuel system chapter mainly introduces input voltage check of throttle sensor).

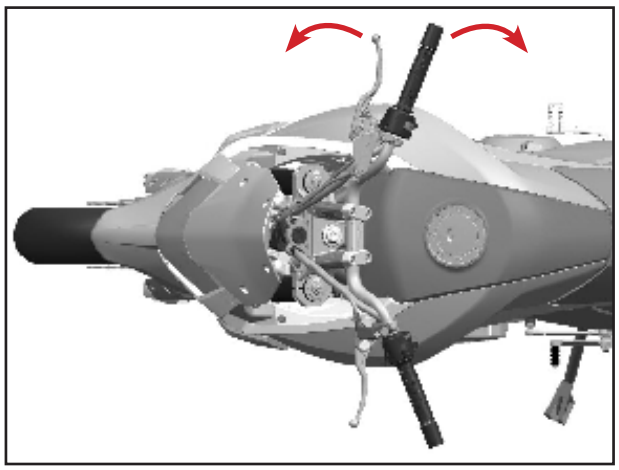


3. lock nut 4. Adjust nut

2.5.3 Idle Speed Inspection

- Start the engine and warm it up thoroughly.
- With the engine idling,turn the handlebar to both sides.

If handlebar movement changes the idle speed, the throttle cables may be improperly adjusted or incorrectly routed or damaged. Be sure to correct all of these conditions before diding. (Refer to Appendix)



5. Handlebar turning direction

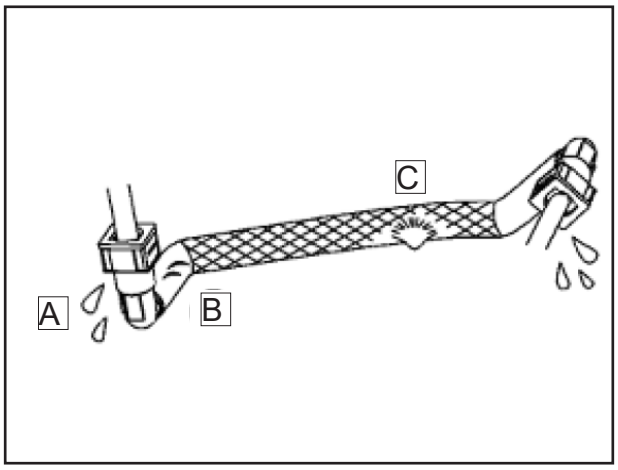
- Check the idle speed.

If the idle speed is out of the specified range, check throttle body for air leaks and calibration.

Idle Speed

Standard:1450r/min±145r/min (rpm)

2.5.4 Fuel Line Inspection (fuel leak, damage, installation condition)



The fuel hose is designed to be used thr oughout the motorcycle's life without any ma intenance. However, if the motorcycle is not properly operated, the high pressure ins ide the fuel line can cause fuel to leak [A] or the line to burst. Remove the fuel tank (refer to Fuel Tank Removal in the Fuel Sys tem chapter) and check the fuel line.

Replace the fuel line if any fraying, cracks [B] or bulges [C] are noticed.

- Check the line if it has been sharply bent or kinked.

Hose Joints [A]
Fuel hose [B]

- Check that the hose joints are securely con-nected

Push and pull [A] the hose hose [B] back and forth more than two times,and make sure it is locked.
If it is not locked,reinstall the hose joint.

⚠WARNING
Make sure the hose joint is installed correctly on the delivery pipe by sliding the joint, or the fuel would leak.

2.6 Cooling System

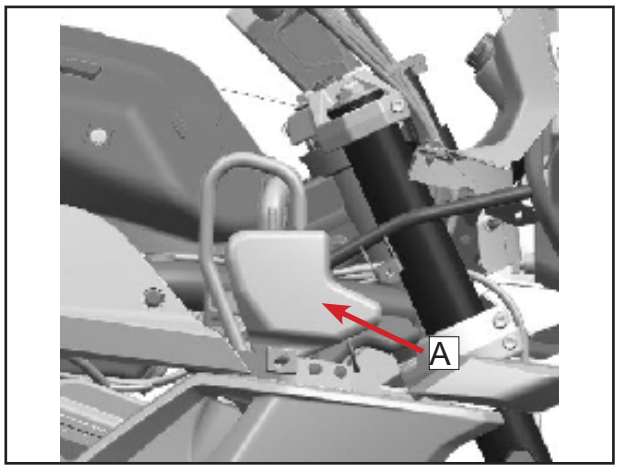
2.6.1 Coolant Level Inspection

NOTE

Check the level when the engine is cold (room or ambient temperature).

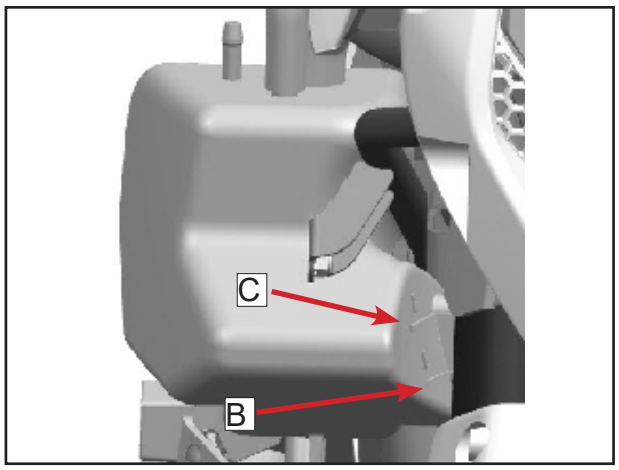
- Check the coolant level in the reserve tank

[A]with the motorcycle placed perpendicular (Do not use the sidestand).



If the coolant level is lower than the “L”level line[B], remove the right protection panel (see Center Fairing Removal in the Frame chapter) and unscrew the reserve tank cap, and add coolant to the “F” level line [C].

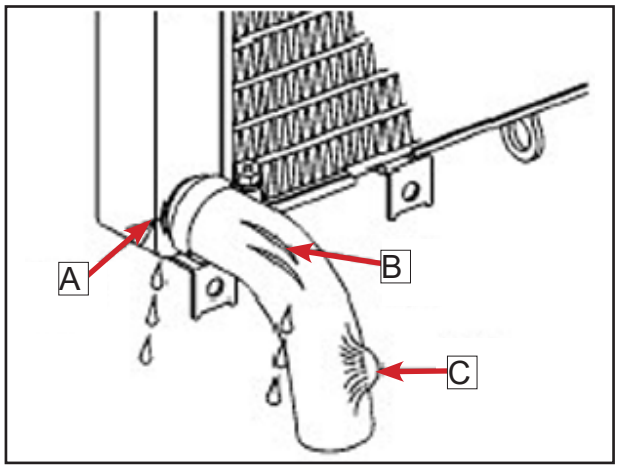
“L ”: low “F”: full



CAUTION
For refilling, add the specified mixture of coolant and soft water. Adding water alone dilutes the coolant and degrades its anticorrosion properties. The diluted coolant can attack the aluminum engine parts. In an emergency, soft water alone can be added. But the diluted coolant must be returned to the correct mixture ratio within a few days. If coolant must be added often or the reservoir tank has run completely dry, there is a probably leakage in the cooling system. Check the system for leaks. Coolant ruins painted surfaces. Immediately wash away any coolant that spills on the frame, engine, wheels or other painted parts.

2.6.2 Radiator Hose Damage and Installation Con-dition Inspection

The high pressure inside the radiator hose can cause coolant leak [A] or the hose burst if the hose line is not properly maintained.



- Visually inspect the hoses for signs of deterioration. Squeeze the hoses. Hoses should not be neither hard and brittle,nor be soft or swollen.

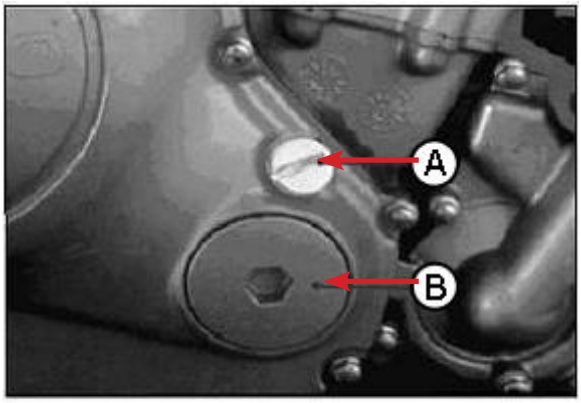
Replace the hose if any fraying, cracks [B] or bulges [C] are noticed.

Check that the hoses are securely connected and clamps are tightened correctly.

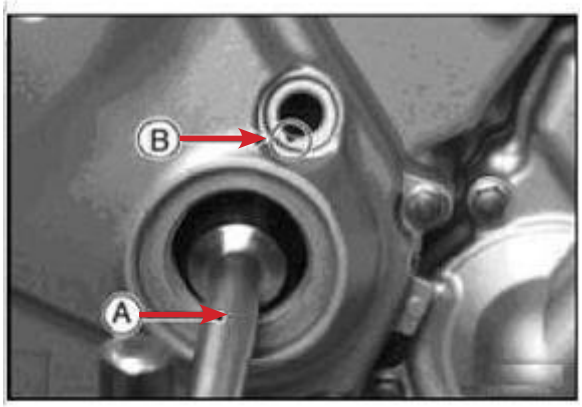
2.7 Cylinder Head

2.7.1 Valve Clearance Inspection

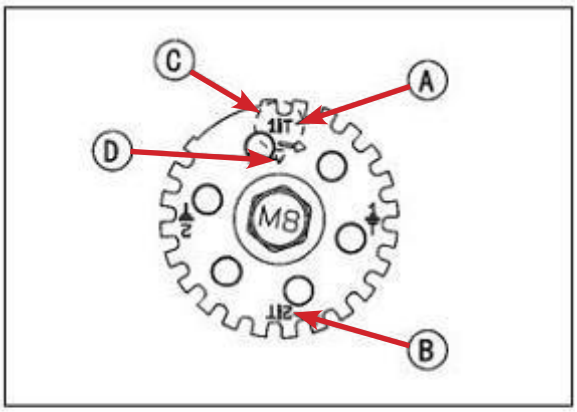
NOTE
Valve clearance must be checked and adjusted when the engine is cold (room temperature).



- Remove the cylinder head cover (see Cylinder Head Cover Removal in the En-gine Top End chapter)
- Unscrew the upper [A] and lower [B] caps on the clutch cover.
- Check the valve clearance when the pistons are at TDC.
- Using a wrench [A] to turn the crankshaft clockwise until the “1/T” mark is aligned with the notch [B].

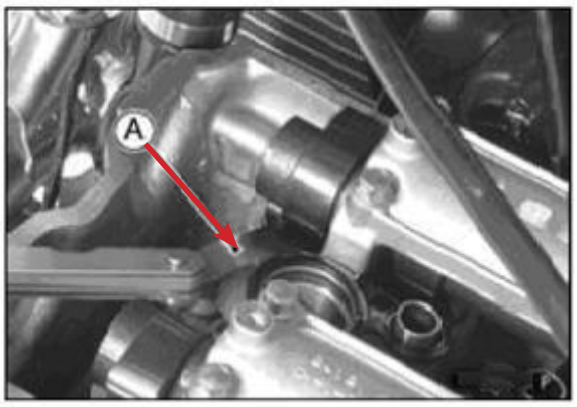


“1/T” mark for #1 piston and “2/T”mark for #2 piston.
1/T Mark [A]
2/T Mark [B]
Holeof Upper Cap [C]
Notch in Edge of Upper Hole[D]



- Using the feeler gauge [A], measure the valve clearance between cam and valve lifter.

Valve Clearance Standard:
Exhaust: 0.20mm~0.26mm
Intake: 0.08mm~0.13mm
Every piston has two intake and exhaust valve.



2.7.2 Valve Clearance Adjustment

Cylinder #1, Valve Clearance Measuring Po-sition

#1 Piston TDC at End of Compression Stroke Intake valve clearances of #1 piston,and Ex-haust valve clearances of #1 piston

NOTE
Check the valve clearance by using this method only. Checking the clearance at any other cam position may result in inaccurate valve clearance.

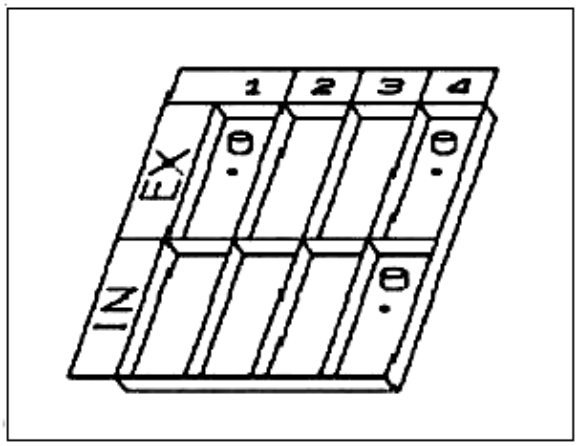
Cylinder #2 Valve Clearance Measuring Po-sition

#2 Piston TDC at End of Compression Stroke Intake valve clearances of #2 piston, and Ex-haust valve clearances of #2 piston

If the valve clearance is not within the specified range,first record the clearance,and adjust it.

- To change the valve clearance, remove the cam shaft chain tensioner,camshafts and valve lifters.

Replace the shim with one of a different thickness.



NOTE
Mark and record the valve lifter and shim location so they can be reinstalled in their origi-nal positions **If there is no clearance,select a shim which is normal sizes smaller and then measure the clearance.**

- To select a new proper shim in order to have the valve clearance within specified range, refer to the Valve Clearance Adjust-ment Charts.
- Apply a thin coat of molybdenum disulfide grease to the valve lifters.
- Install the camshafts. Be sure that cam shafts is installed properly (see Camshaft In-stallation chapter).
- Remeasure any valve clearance that was adjusted. Readjust if necessary.

Valve Adjustment Chart(Intake Valve)

Valve Adjustment Chart(Intake Valve)

Example Valve Clearance Measurement	Present Shim															Example								
Mark	320	322	324	326	328	330	332	334	336	338	340	342	344	346	348	350	352	354	356	358	360	362	364	366
Thickness	3.2	3.22	3.24	3.26	3.28	3.3	3.32	3.34	3.36	3.38	3.4	3.42	3.44	3.46	3.48	3.5	3.52	3.54	3.56	3.58	3.6	3.62	3.64	3.66
0~0.01	—	—	—	—	—	3.2	3.22	3.24	3.26	3.28	3.3	3.32	3.34	3.36	3.38	3.4	3.42	3.44	3.46	3.48	3.5	3.52	3.54	3.56
0.02~0.03	—	—	—	—	3.2	3.22	3.24	3.26	3.28	3.3	3.32	3.34	3.36	3.38	3.4	3.42	3.44	3.46	3.48	3.5	3.52	3.54	3.56	3.58
0.04~0.05	—	—	—	3.2	3.22	3.24	3.26	3.28	3.3	3.32	3.34	3.36	3.38	3.4	3.42	3.44	3.46	3.48	3.5	3.52	3.54	3.56	3.58	3.6
0.06~0.07	—	—	3.2	3.22	3.24	3.26	3.28	3.3	3.32	3.34	3.36	3.38	3.4	3.42	3.44	3.46	3.48	3.5	3.52	3.54	3.56	3.58	3.6	3.62
0.08~0.13	Specified Clearance/No Change Required																							
0.14~0.15	3.22	3.24	3.26	3.28	3.3	3.32	3.34	3.36	3.38	3.4	3.42	3.44	3.46	3.48	3.5	3.52	3.54	3.56	3.58	3.6	3.62	3.64	3.66	3.68
0.16~0.17	3.24	3.26	3.28	3.3	3.32	3.34	3.36	3.38	3.4	3.42	3.44	3.46	3.48	3.5	3.52	3.54	3.56	3.58	3.6	3.62	3.64	3.66	3.68	3.7
0.18~0.19	3.26	3.28	3.3	3.32	3.34	3.36	3.38	3.4	3.42	3.44	3.46	3.48	3.5	3.52	3.54	3.56	3.58	3.6	3.62	3.64	3.66	3.68	3.7	3.72
0.20~0.21	3.28	3.3	3.32	3.34	3.36	3.38	3.4	3.42	3.44	3.46	3.48	3.5	3.52	3.54	3.56	3.58	3.6	3.62	3.64	3.66	3.68	3.7	3.72	3.74
0.22~0.23	3.3	3.32	3.34	3.36	3.38	3.4	3.42	3.44	3.46	3.48	3.5	3.52	3.54	3.56	3.58	3.6	3.62	3.64	3.66	3.68	3.7	3.72	3.74	3.76
0.24~0.25	3.32	3.34	3.36	3.38	3.4	3.42	3.44	3.46	3.48	3.5	3.52	3.54	3.56	3.58	3.6	3.62	3.64	3.66	3.68	3.7	3.72	3.74	3.76	3.78
0.26~0.27	3.34	3.36	3.38	3.4	3.42	3.44	3.46	3.48	3.5	3.52	3.54	3.56	3.58	3.6	3.62	3.64	3.66	3.68	3.7	3.72	3.74	3.76	3.78	3.8
0.28~0.29	3.36	3.38	3.4	3.42	3.44	3.46	3.48	3.5	3.52	3.54	3.56	3.58	3.6	3.62	3.64	3.66	3.68	3.7	3.72	3.74	3.76	3.78	3.8	3.82
0.30~0.31	3.38	3.4	3.42	3.44	3.46	3.48	3.5	3.52	3.54	3.56	3.58	3.6	3.62	3.64	3.66	3.68	3.7	3.72	3.74	3.76	3.78	3.8	3.82	3.84
0.32~0.33	3.4	3.42	3.44	3.46	3.48	3.5	3.52	3.54	3.56	3.58	3.6	3.62	3.64	3.66	3.68	3.7	3.72	3.74	3.76	3.78	3.8	3.82	3.84	3.86
0.34~0.35	3.42	3.44	3.46	3.48	3.5	3.52	3.54	3.56	3.58	3.6	3.62	3.64	3.66	3.68	3.7	3.72	3.74	3.76	3.78	3.8	3.82	3.84	3.86	3.88
0.36~0.37	3.44	3.46	3.48	3.5	3.52	3.54	3.56	3.58	3.6	3.62	3.64	3.66	3.68	3.7	3.72	3.74	3.76	3.78	3.8	3.82	3.84	3.86	3.88	3.9
0.38~0.39	3.46	3.48	3.5	3.52	3.54	3.56	3.58	3.6	3.62	3.64	3.66	3.68	3.7	3.72	3.74	3.76	3.78	3.8	3.82	3.84	3.86	3.88	3.9	3.92
0.40~0.41	3.48	3.5	3.52	3.54	3.56	3.58	3.6	3.62	3.64	3.66	3.68	3.7	3.72	3.74	3.76	3.78	3.8	3.82	3.84	3.86	3.88	3.9	3.92	3.94
0.42~0.43	3.5	3.52	3.54	3.56	3.58	3.6	3.62	3.64	3.66	3.68	3.7	3.72	3.74	3.76	3.78	3.8	3.82	3.84	3.86	3.88	3.9	3.92	3.94	3.96
0.44~0.45	3.52	3.54	3.56	3.58	3.6	3.62	3.64	3.66	3.68	3.7	3.72	3.74	3.76	3.78	3.8	3.82	3.84	3.86	3.88	3.9	3.92	3.94	3.96	3.98
0.46~0.47	3.54	3.56	3.58	3.6	3.62	3.64	3.66	3.68	3.7	3.72	3.74	3.76	3.78	3.8	3.82	3.84	3.86	3.88	3.9	3.92	3.94	3.96	3.98	4
0.48~0.49	3.56	3.58	3.6	3.62	3.64	3.66	3.68	3.7	3.72	3.74	3.76	3.78	3.8	3.82	3.84	3.86	3.88	3.9	3.92	3.94	3.96	3.98	4	4.02
0.50~0.51	3.58	3.6	3.62	3.64	3.66	3.68	3.7	3.72	3.74	3.76	3.78	3.8	3.82	3.84	3.86	3.88	3.9	3.92	3.94	3.96	3.98	4	4.02	4.04
0.52~0.53	3.6	3.62	3.64	3.66	3.68	3.7	3.72	3.74	3.76	3.78	3.8	3.82	3.84	3.86	3.88	3.9	3.92	3.94	3.96	3.98	4	4.02	4.04	4.06
0.54~0.55	3.62	3.64	3.66	3.68	3.7	3.72	3.74	3.76	3.78	3.8	3.82	3.84	3.86	3.88	3.9	3.92	3.94	3.96	3.98	4	4.02	4.04	4.06	4.08
0.56~0.57	3.64	3.66	3.68	3.7	3.72	3.74	3.76	3.78	3.8	3.82	3.84	3.86	3.88	3.9	3.92	3.94	3.96	3.98	4	4.02	4.04	4.06	4.08	4.1
0.58~0.59	3.66	3.68	3.7	3.72	3.74	3.76	3.78	3.8	3.82	3.84	3.86	3.88	3.9	3.92	3.94	3.96	3.98	4	4.02	4.04	4.06	4.08	4.1	4.12
0.60~0.61	3.68	3.7	3.72	3.74	3.76	3.78	3.8	3.82	3.84	3.86	3.88	3.9	3.92	3.94	3.96	3.98	4	4.02	4.04	4.06	4.08	4.1	4.12	4.14
0.62~0.63	3.7	3.72	3.74	3.76	3.78	3.8	3.82	3.84	3.86	3.88	3.9	3.92	3.94	3.96	3.98	4	4.02	4.04	4.06	4.08	4.1	4.12	4.14	4.16
0.64~0.65	3.72	3.74	3.76	3.78	3.8	3.82	3.84	3.86	3.88	3.9	3.92	3.94	3.96	3.98	4	4.02	4.04	4.06	4.08	4.1	4.12	4.14	4.16	4.18
0.66~0.67	3.74	3.76	3.78	3.8	3.82	3.84	3.86	3.88	3.9	3.92	3.94	3.96	3.98	4	4.02	4.04	4.06	4.08	4.1	4.12	4.14	4.16	4.18	
0.68~0.69	3.76	3.78	3.8	3.82	3.84	3.86	3.88	3.9	3.92	3.94	3.96	3.98	4	4.02	4.04	4.06	4.08	4.1	4.12	4.14	4.16	4.18		
0.70~0.71	3.78	3.8	3.82	3.84	3.86	3.88	3.9	3.92	3.94	3.96	3.98	4	4.02	4.04	4.06	4.08	4.1	4.12	4.14	4.16	4.18			
0.72~0.73	3.8	3.82	3.84	3.86	3.88	3.9	3.92	3.94	3.96	3.98	4	4.02	4.04	4.06	4.08	4.1	4.12	4.14	4.16	4.18				
0.74~0.75	3.82	3.84	3.86	3.88	3.9	3.92	3.94	3.96	3.98	4	4.02	4.04	4.06	4.08	4.1	4.12	4.14	4.16	4.18					
0.76~0.77	3.84	3.86	3.88	3.9	3.92	3.94	3.96	3.98	4	4.02	4.04	4.06	4.08	4.1	4.12	4.14	4.16	4.18						
0.78~0.79	3.86	3.88	3.9	3.92	3.94	3.96	3.98	4	4.02	4.04	4.06	4.08	4.1	4.12	4.14	4.16	4.18							
0.80~0.81	3.88	3.9	3.92	3.94	3.96	3.98	4	4.02	4.04	4.06	4.08	4.1	4.12	4.14	4.16	4.18								
0.82~0.83	3.9	3.92	3.94	3.96	3.98	4	4.02	4.04	4.06	4.08	4.1	4.12	4.14	4.16	4.18									
0.84~0.85	3.92	3.94	3.96	3.98	4	4.02	4.04	4.06	4.08	4.1	4.12	4.14	4.16	4.18										
0.86~0.87	3.94	3.96	3.98	4	4.02	4.04	4.06	4.08	4.1	4.12	4.14	4.16	4.18											
0.88~0.89	3.96	3.98	4	4.02	4.04	4.06	4.08	4.1	4.12	4.14	4.16	4.18												
0.90~0.91	3.98	4	4.02	4.04	4.06	4.08	4.1	4.12	4.14	4.16	4.18													
0.92~0.93	4	4.02	4.04	4.06	4.08	4.1	4.12	4.14	4.16	4.18														
0.94~0.95	4.02	4.04	4.06	4.08	4.1	4.12	4.14	4.16	4.18															
0.96~0.97	4.04	4.06	4.08	4.1	4.12	4.14	4.16	4.18																
0.98~0.99	4.06	4.08	4.1	4.12	4.14	4.16	4.18																	
1.00~1.01	4.08	4.1	4.12	4.14	4.16	4.18																		
1.02~1.03	4.1	4.12	4.14	4.16	4.18																			
1.04~1.05	4.12	4.14	4.16	4.18																				
1.06~1.07	4.14	4.16	4.18																					
1.08~1.09	4.16	4.18																						
1.10~1.11	4.18																							

Valve Clearance Adjustment Chart(Intake Valve)

Valve Clearance Adjustment Chart(Intake Valve)																											
		Present Shim																									
Mark		368	370	372	374	376	378	380	382	384	386	388	390	392	394	396	398	400	402	404	406	408	410	412	414	416	418
Thickness		3.68	3.7	3.72	3.74	3.76	3.78	3.8	3.82	3.84	3.86	3.88	3.9	3.92	3.94	3.96	3.98	4	4.02	4.04	4.06	4.08	4.1	4.12	4.14	4.16	4.18
Clearance Measurement	0~0.01	3.58	3.6	3.62	3.64	3.66	3.68	3.7	3.72	3.74	3.76	3.78	3.8	3.82	3.84	3.86	3.88	3.9	3.92	3.94	3.96	3.98	4	4.02	4.04	4.06	4.08
	0.02~0.03	3.6	3.62	3.64	3.66	3.68	3.7	3.72	3.74	3.76	3.78	3.8	3.82	3.84	3.86	3.88	3.9	3.92	3.94	3.96	3.98	4	4.02	4.04	4.06	4.08	4.1
	0.04~0.05	3.62	3.64	3.66	3.68	3.7	3.72	3.74	3.76	3.78	3.8	3.82	3.84	3.86	3.88	3.9	3.92	3.94	3.96	3.98	4	4.02	4.04	4.06	4.08	4.1	4.12
	0.06~0.07	3.64	3.66	3.68	3.7	3.72	3.74	3.76	3.78	3.8	3.82	3.84	3.86	3.88	3.9	3.92	3.94	3.96	3.98	4	4.02	4.04	4.06	4.08	4.1	4.12	4.14
	0.08~0.13	Specified Clearance/No Change Required																									
	0.14~0.15	3.7	3.72	3.74	3.76	3.78	3.8	3.82	3.84	3.86	3.88	3.9	3.92	3.94	3.96	3.98	4	4.02	4.04	4.06	4.08	4.1	4.12	4.14	4.16	4.18	
	0.16~0.17	3.72	3.74	3.76	3.78	3.8	3.82	3.84	3.86	3.88	3.9	3.92	3.94	3.96	3.98	4	4.02	4.04	4.06	4.08	4.1	4.12	4.14	4.16	4.18		
	0.18~0.19	3.74	3.76	3.78	3.8	3.82	3.84	3.86	3.88	3.9	3.92	3.94	3.96	3.98	4	4.02	4.04	4.06	4.08	4.1	4.12	4.14	4.16	4.18			
	0.20~0.21	3.76	3.78	3.8	3.82	3.84	3.86	3.88	3.9	3.92	3.94	3.96	3.98	4	4.02	4.04	4.06	4.08	4.1	4.12	4.14	4.16	4.18				
	0.22~0.23	3.78	3.8	3.82	3.84	3.86	3.88	3.9	3.92	3.94	3.96	3.98	4	4.02	4.04	4.06	4.08	4.1	4.12	4.14	4.16	4.18					
	0.24~0.25	3.8	3.82	3.84	3.86	3.88	3.9	3.92	3.94	3.96	3.98	4	4.02	4.04	4.06	4.08	4.1	4.12	4.14	4.16	4.18						
	0.26~0.27	3.82	3.84	3.86	3.88	3.9	3.92	3.94	3.96	3.98	4	4.02	4.04	4.06	4.08	4.1	4.12	4.14	4.16	4.18							
	0.28~0.29	3.84	3.86	3.88	3.9	3.92	3.94	3.96	3.98	4	4.02	4.04	4.06	4.08	4.1	4.12	4.14	4.16	4.18								
	0.30~0.31	3.86	3.88	3.9	3.92	3.94	3.96	3.98	4	4.02	4.04	4.06	4.08	4.1	4.12	4.14	4.16	4.18									
	0.32~0.33	3.88	3.9	3.92	3.94	3.96	3.98	4	4.02	4.04	4.06	4.08	4.1	4.12	4.14	4.16	4.18										
	0.34~0.35	3.9	3.92	3.94	3.96	3.98	4	4.02	4.04	4.06	4.08	4.1	4.12	4.14	4.16	4.18											
	0.36~0.37	3.92	3.94	3.96	3.98	4	4.02	4.04	4.06	4.08	4.1	4.12	4.14	4.16	4.18												
	0.38~0.39	3.94	3.96	3.98	4	4.02	4.04	4.06	4.08	4.1	4.12	4.14	4.16	4.18													
	0.40~0.41	3.96	3.98	4	4.02	4.04	4.06	4.08	4.1	4.12	4.14	4.16	4.18														
	0.42~0.43	3.98	4	4.02	4.04	4.06	4.08	4.1	4.12	4.14	4.16	4.18															
	0.44~0.45	4	4.02	4.04	4.06	4.08	4.1	4.12	4.14	4.16	4.18																
	0.46~0.47	4.02	4.04	4.06	4.08	4.1	4.12	4.14	4.16	4.18																	
	0.48~0.49	4.04	4.06	4.08	4.1	4.12	4.14	4.16	4.18																		
	0.50~0.51	4.06	4.08	4.1	4.12	4.14	4.16	4.18																			
	0.52~0.53	4.08	4.1	4.12	4.14	4.16	4.18																				
	0.54~0.55	4.1	4.12	4.14	4.16	4.18																					
	0.56~0.57	4.12	4.14	4.16	4.18																						
	0.58~0.59	4.14	4.16	4.18																							
	0.60~0.61	4.16	4.18																								
	0.62~0.63	4.18																									

1.Measure the clearance (when engine is cold).
2.Check present shim size.
Example:Present shim is 3.50mm.
Measured clearance is 0.25mm.
Replace 3.50mm shim with 3.62mm shim.
Remeasure the valve clearance and readjust if necessary.

Valve Clearance Adjustment(Exhaust Valve)

Example Clearance Measurement	Present Shim Example																									
Mark	320	322	324	326	328	330	332	334	336	338	340	342	344	346	348	350	352	354	356	358	360	362	364	366	368	370
Thickness	3.2	3.22	3.24	3.26	3.28	3.3	3.32	3.34	3.36	3.38	3.4	3.42	3.44	3.46	3.48	3.5	3.52	3.54	3.56	3.58	3.6	3.62	3.64	3.66	3.68	3.7
0~0.01	—	—	—	—	—	—	—	—	—	—	3.2	3.22	3.24	3.26	3.28	3.3	3.32	3.34	3.36	3.38	3.4	3.42	3.44	3.46	3.48	3.5
0.02~0.03	—	—	—	—	—	—	—	—	—	3.2	3.22	3.24	3.26	3.28	3.3	3.32	3.34	3.36	3.38	3.4	3.42	3.44	3.46	3.48	3.5	3.52
0.04~0.05	—	—	—	—	—	—	—	—	3.2	3.22	3.24	3.26	3.28	3.3	3.32	3.34	3.36	3.38	3.4	3.42	3.44	3.46	3.48	3.5	3.52	3.54
0.06~0.07	—	—	—	—	—	—	—	3.2	3.22	3.24	3.26	3.28	3.3	3.32	3.34	3.36	3.38	3.4	3.42	3.44	3.46	3.48	3.5	3.52	3.54	3.56
0.08~0.09	—	—	—	—	—	—	3.2	3.22	3.24	3.26	3.28	3.3	3.32	3.34	3.36	3.38	3.4	3.42	3.44	3.46	3.48	3.5	3.52	3.54	3.56	3.58
0.10~0.11	—	—	—	—	—	3.2	3.22	3.24	3.26	3.28	3.3	3.32	3.34	3.36	3.38	3.4	3.42	3.44	3.46	3.48	3.5	3.52	3.54	3.56	3.58	3.6
0.12~0.13	—	—	—	—	3.2	3.22	3.24	3.26	3.28	3.3	3.32	3.34	3.36	3.38	3.4	3.42	3.44	3.46	3.48	3.5	3.52	3.54	3.56	3.58	3.6	3.62
0.14~0.15	—	—	—	3.2	3.22	3.24	3.26	3.28	3.3	3.32	3.34	3.36	3.38	3.4	3.42	3.44	3.46	3.48	3.5	3.52	3.54	3.56	3.58	3.6	3.62	3.64
0.16~0.17			3.2	3.22	3.24	3.26	3.28	3.3	3.32	3.34	3.36	3.38	3.4	3.42	3.44	3.46	3.48	3.5	3.52	3.54	3.56	3.58	3.6	3.62	3.64	3.66
0.18~0.19	—	3.2	3.22	3.24	3.26	3.28	3.3	3.32	3.34	3.36	3.38	3.4	3.42	3.44	3.46	3.48	3.5	3.52	3.54	3.56	3.58	3.6	3.62	3.64	3.66	3.68
0.20~0.26	Specified Clearance/No Change Required																									
0.27~0.28	3.26	3.28	3.3	3.32	3.34	3.36	3.38	3.4	3.42	3.44	3.46	3.48	3.5	3.52	3.54	3.56	3.58	3.6	3.62	3.64	3.66	3.68	3.7	3.72	3.74	3.76
0.29~0.30	3.28	3.3	3.32	3.34	3.36	3.38	3.4	3.42	3.44	3.46	3.48	3.5	3.52	3.54	3.56	3.58	3.6	3.62	3.64	3.66	3.68	3.7	3.72	3.74	3.76	3.78
0.31~0.32	3.3	3.32	3.34	3.36	3.38	3.4	3.42	3.44	3.46	3.48	3.5	3.52	3.54	3.56	3.58	3.6	3.62	3.64	3.66	3.68	3.7	3.72	3.74	3.76	3.78	3.8
0.33~0.34	3.32	3.34	3.36	3.38	3.4	3.42	3.44	3.46	3.48	3.5	3.52	3.54	3.56	3.58	3.6	3.62	3.64	3.66	3.68	3.7	3.72	3.74	3.76	3.78	3.8	3.82
0.35~0.36	3.34	3.36	3.38	3.4	3.42	3.44	3.46	3.48	3.5	3.52	3.54	3.56	3.58	3.6	3.62	3.64	3.66	3.68	3.7	3.72	3.74	3.76	3.78	3.8	3.82	3.84
0.37~0.38	3.36	3.38	3.4	3.42	3.44	3.46	3.48	3.5	3.52	3.54	3.56	3.58	3.6	3.62	3.64	3.66	3.68	3.7	3.72	3.74	3.76	3.78	3.8	3.82	3.84	3.86
0.39~0.40	3.38	3.4	3.42	3.44	3.46	3.48	3.5	3.52	3.54	3.56	3.58	3.6	3.62	3.64	3.66	3.68	3.7	3.72	3.74	3.76	3.78	3.8	3.82	3.84	3.86	3.88
0.41~0.42	3.4	3.42	3.44	3.46	3.48	3.5	3.52	3.54	3.56	3.58	3.6	3.62	3.64	3.66	3.68	3.7	3.72	3.74	3.76	3.78	3.8	3.82	3.84	3.86	3.88	3.9
0.43~0.44	3.42	3.44	3.46	3.48	3.5	3.52	3.54	3.56	3.58	3.6	3.62	3.64	3.66	3.68	3.7	3.72	3.74	3.76	3.78	3.8	3.82	3.84	3.86	3.88	3.9	3.92
0.45~0.46	3.44	3.46	3.48	3.5	3.52	3.54	3.56	3.58	3.6	3.62	3.64	3.66	3.68	3.7	3.72	3.74	3.76	3.78	3.8	3.82	3.84	3.86	3.88	3.9	3.92	3.94
0.47~0.48	3.46	3.48	3.5	3.52	3.54	3.56	3.58	3.6	3.62	3.64	3.66	3.68	3.7	3.72	3.74	3.76	3.78	3.8	3.82	3.84	3.86	3.88	3.9	3.92	3.94	3.96
0.49~0.50	3.48	3.5	3.52	3.54	3.56	3.58	3.6	3.62	3.64	3.66	3.68	3.7	3.72	3.74	3.76	3.78	3.8	3.82	3.84	3.86	3.88	3.9	3.92	3.94	3.96	3.98
0.51~0.52	3.5	3.52	3.54	3.56	3.58	3.6	3.62	3.64	3.66	3.68	3.7	3.72	3.74	3.76	3.78	3.8	3.82	3.84	3.86	3.88	3.9	3.92	3.94	3.96	3.98	4
0.53~0.54	3.52	3.54	3.56	3.58	3.6	3.62	3.64	3.66	3.68	3.7	3.72	3.74	3.76	3.78	3.8	3.82	3.84	3.86	3.88	3.9	3.92	3.94	3.96	3.98	4	4.02
0.55~0.56	3.54	3.56	3.58	3.6	3.62	3.64	3.66	3.68	3.7	3.72	3.74	3.76	3.78	3.8	3.82	3.84	3.86	3.88	3.9	3.92	3.94	3.96	3.98	4	4.02	4.04
0.57~0.58	3.56	3.58	3.6	3.62	3.64	3.66	3.68	3.7	3.72	3.74	3.76	3.78	3.8	3.82	3.84	3.86	3.88	3.9	3.92	3.94	3.96	3.98	4	4.02	4.04	4.06
0.59~0.60	3.58	3.6	3.62	3.64	3.66	3.68	3.7	3.72	3.74	3.76	3.78	3.8	3.82	3.84	3.86	3.88	3.9	3.92	3.94	3.96	3.98	4	4.02	4.04	4.06	4.08
0.61~0.62	3.6	3.62	3.64	3.66	3.68	3.7	3.72	3.74	3.76	3.78	3.8	3.82	3.84	3.86	3.88	3.9	3.92	3.94	3.96	3.98	4	4.02	4.04	4.06	4.08	4.1
0.63~0.64	3.62	3.64	3.66	3.68	3.7	3.72	3.74	3.76	3.78	3.8	3.82	3.84	3.86	3.88	3.9	3.92	3.94	3.96	3.98	4	4.02	4.04	4.06	4.08	4.1	4.12
0.65~0.66	3.64	3.66	3.68	3.7	3.72	3.74	3.76	3.78	3.8	3.82	3.84	3.86	3.88	3.9	3.92	3.94	3.96	3.98	4	4.02	4.04	4.06	4.08	4.1	4.12	4.14
0.67~0.68	3.66	3.68	3.7	3.72	3.74	3.76	3.78	3.8	3.82	3.84	3.86	3.88	3.9	3.92	3.94	3.96	3.98	4	4.02	4.04	4.06	4.08	4.1	4.12	4.14	4.16
0.69~0.70	3.68	3.7	3.72	3.74	3.76	3.78	3.8	3.82	3.84	3.86	3.88	3.9	3.92	3.94	3.96	3.98	4	4.02	4.04	4.06	4.08	4.1	4.12	4.14	4.16	4.18
0.71~0.72	3.7	3.72	3.74	3.76	3.78	3.8	3.82	3.84	3.86	3.88	3.9	3.92	3.94	3.96	3.98	4	4.02	4.04	4.06	4.08	4.1	4.12	4.14	4.16	4.18	
0.73~0.74	3.72	3.74	3.76	3.78	3.8	3.82	3.84	3.86	3.88	3.9	3.92	3.94	3.96	3.98	4	4.02	4.04	4.06	4.08	4.1	4.12	4.14	4.16	4.18		
0.75~0.76	3.74	3.76	3.78	3.8	3.82	3.84	3.86	3.88	3.9	3.92	3.94	3.96	3.98	4	4.02	4.04	4.06	4.08	4.1	4.12	4.14	4.16	4.18			
0.77~0.78	3.76	3.78	3.8	3.82	3.84	3.86	3.88	3.9	3.92	3.94	3.96	3.98	4	4.02	4.04	4.06	4.08	4.1	4.12	4.14	4.16	4.18				
0.79~0.80	3.78	3.8	3.82	3.84	3.86	3.88	3.9	3.92	3.94	3.96	3.98	4	4.02	4.04	4.06	4.08	4.1	4.12	4.14	4.16	4.18					
0.81~0.82	3.8	3.82	3.84	3.86	3.88	3.9	3.92	3.94	3.96	3.98	4	4.02	4.04	4.06	4.08	4.1	4.12	4.14	4.16	4.18						
0.83~0.84	3.82	3.84	3.86	3.88	3.9	3.92	3.94	3.96	3.98	4	4.02	4.04	4.06	4.08	4.1	4.12	4.14	4.16	4.18							
0.85~0.86	3.84	3.86	3.88	3.9	3.92	3.94	3.96	3.98	4	4.02	4.04	4.06	4.08	4.1	4.12	4.14	4.16	4.18								
0.87~0.88	3.86	3.88	3.9	3.92	3.94	3.96	3.98	4	4.02	4.04	4.06	4.08	4.1	4.12	4.14	4.16	4.18									
0.89~0.90	3.88	3.9	3.92	3.94	3.96	3.98	4	4.02	4.04	4.06	4.08	4.1	4.12	4.14	4.16	4.18										
0.91~0.92	3.9	3.92	3.94	3.96	3.98	4	4.02	4.04	4.06	4.08	4.1	4.12	4.14	4.16	4.18											
0.93~0.94	3.92	3.94	3.96	3.98	4	4.02	4.04	4.06	4.08	4.1	4.12	4.14	4.16	4.18												
0.95~0.96	3.94	3.96	3.98	4	4.02	4.04	4.06	4.08	4.1	4.12	4.14	4.16	4.18													
0.97~0.98	3.96	3.98	4	4.02	4.04	4.06	4.08	4.1	4.12	4.14	4.16	4.18														
0.99~1.00	3.98	4	4.02	4.04	4.06	4.08	4.1	4.12	4.14	4.16	4.18															
1.01~1.02	4	4.02	4.04	4.06	4.08	4.1	4.12	4.14	4.16	4.18																
1.03~1.04	4.02	4.04	4.06	4.08	4.1	4.12	4.14	4.16	4.18																	
1.05~1.06	4.04	4.06	4.08	4.1	4.12	4.14	4.16	4.18																		
1.07~1.08	4.06	4.08	4.1	4.12	4.14	4.16	4.18																			
1.09~1.10	4.08	4.1	4.12	4.14	4.16	4.18																				
1.11~1.12	4.1	4.12	4.14	4.16	4.18																					
1.13~1.14	4.12	4.14	4.16	4.18																						
1.15~1.16	4.14	4.16	4.18																							
1.17~1.18	4.16	4.18																								
1.19~1.20	4.18																									

Valve Clearance Adjustment Exhaust Valve(Continued)

Clearance Measurement	Present Shim																							
Mark	372	374	376	378	380	382	384	386	388	390	392	394	396	398	400	402	404	406	408	410	412	414	416	418
Thickness	3.72	3.74	3.76	3.78	3.8	3.82	3.84	3.86	3.88	3.9	3.92	3.94	3.96	3.98	4	4.02	4.04	4.06	4.08	4.1	4.12	4.14	4.16	4.18
0～0.01	3.52	3.54	3.56	3.58	3.6	3.62	3.64	3.66	3.68	3.7	3.72	3.74	3.76	3.78	3.8	3.82	3.84	3.86	3.88	3.9	3.92	3.94	3.96	3.98
0.02～0.03	3.54	3.56	3.58	3.6	3.62	3.64	3.66	3.68	3.7	3.72	3.74	3.76	3.78	3.8	3.82	3.84	3.86	3.88	3.9	3.92	3.94	3.96	3.98	4
0.04～0.05	3.56	3.58	3.6	3.62	3.64	3.66	3.68	3.7	3.72	3.74	3.76	3.78	3.8	3.82	3.84	3.86	3.88	3.9	3.92	3.94	3.96	3.98	4	4.02
0.06～0.07	3.58	3.6	3.62	3.64	3.66	3.68	3.7	3.72	3.74	3.76	3.78	3.8	3.82	3.84	3.86	3.88	3.9	3.92	3.94	3.96	3.98	4	4.02	4.04
0.08～0.09	3.6	3.62	3.64	3.66	3.68	3.7	3.72	3.74	3.76	3.78	3.8	3.82	3.84	3.86	3.88	3.9	3.92	3.94	3.96	3.98	4	4.02	4.04	4.06
0.10～0.11	3.62	3.64	3.66	3.68	3.7	3.72	3.74	3.76	3.78	3.8	3.82	3.84	3.86	3.88	3.9	3.92	3.94	3.96	3.98	4	4.02	4.04	4.06	4.08
0.12～0.13	3.64	3.66	3.68	3.7	3.72	3.74	3.76	3.78	3.8	3.82	3.84	3.86	3.88	3.9	3.92	3.94	3.96	3.98	4	4.02	4.04	4.06	4.08	4.1
0.14～0.15	3.66	3.68	3.7	3.72	3.74	3.76	3.78	3.8	3.82	3.84	3.86	3.88	3.9	3.92	3.94	3.96	3.98	4	4.02	4.04	4.06	4.08	4.1	4.12
0.16～0.17	3.68	3.7	3.72	3.74	3.76	3.78	3.8	3.82	3.84	3.86	3.88	3.9	3.92	3.94	3.96	3.98	4	4.02	4.04	4.06	4.08	4.1	4.12	4.14
0.18～0.19	3.7	3.72	3.74	3.76	3.78	3.8	3.82	3.84	3.86	3.88	3.9	3.92	3.94	3.96	3.98	4	4.02	4.04	4.06	4.08	4.1	4.12	4.14	4.16
0.20～0.26	Specified Clearance/No Change Required																							
0.27～0.28	3.78	3.8	3.82	3.84	3.86	3.88	3.9	3.92	3.94	3.96	3.98	4	4.02	4.04	4.06	4.08	4.1	4.12	4.14	4.16	4.18			
0.29～0.30	3.8	3.82	3.84	3.86	3.88	3.9	3.92	3.94	3.96	3.98	4	4.02	4.04	4.06	4.08	4.1	4.12	4.14	4.16	4.18				
0.31～0.32	3.82	3.84	3.86	3.88	3.9	3.92	3.94	3.96	3.98	4	4.02	4.04	4.06	4.08	4.1	4.12	4.14	4.16	4.18					
0.33～0.34	3.84	3.86	3.88	3.9	3.92	3.94	3.96	3.98	4	4.02	4.04	4.06	4.08	4.1	4.12	4.14	4.16	4.18						
0.35～0.36	3.86	3.88	3.9	3.92	3.94	3.96	3.98	4	4.02	4.04	4.06	4.08	4.1	4.12	4.14	4.16	4.18							
0.37～0.38	3.88	3.9	3.92	3.94	3.96	3.98	4	4.02	4.04	4.06	4.08	4.1	4.12	4.14	4.16	4.18								
0.39～0.40	3.9	3.92	3.94	3.96	3.98	4	4.02	4.04	4.06	4.08	4.1	4.12	4.14	4.16	4.18									
0.41～0.42	3.92	3.94	3.96	3.98	4	4.02	4.04	4.06	4.08	4.1	4.12	4.14	4.16	4.18										
0.43～0.44	3.94	3.96	3.98	4	4.02	4.04	4.06	4.08	4.1	4.12	4.14	4.16	4.18											
0.45～0.46	3.96	3.98	4	4.02	4.04	4.06	4.08	4.1	4.12	4.14	4.16	4.18												
0.47～0.48	3.98	4	4.02	4.04	4.06	4.08	4.1	4.12	4.14	4.16	4.18													
0.49～0.50	4	4.02	4.04	4.06	4.08	4.1	4.12	4.14	4.16	4.18														
0.51～0.52	4.02	4.04	4.06	4.08	4.1	4.12	4.14	4.16	4.18															
0.53～0.54	4.04	4.06	4.08	4.1	4.12	4.14	4.16	4.18																
0.55～0.56	4.06	4.08	4.1	4.12	4.14	4.16	4.18																	
0.57～0.58	4.08	4.1	4.12	4.14	4.16	4.18																		
0.59～0.60	4.1	4.12	4.14	4.16	4.18																			
0.61～0.62	4.12	4.14	4.16	4.18																				
0.63～0.64	4.14	4.16	4.18																					
0.65～0.66	4.16	4.18																						
0.67～0.68	4.18																							

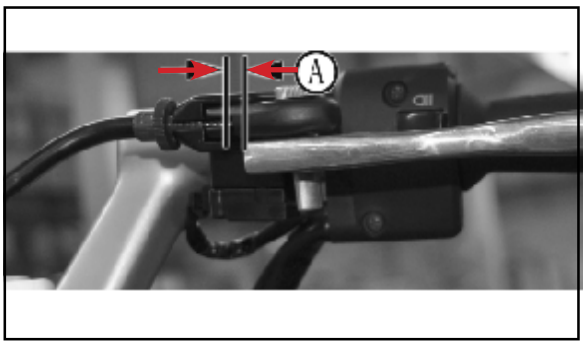
1.Measure the clearance (when engine is cold).
2.Check present shim size.
Example: Present shim is 3.52mm.
Measured clearance is 0.31mm.
Replace 3.52mm shim with 3.62mm shim.
Remeasure the valve clearance and readjust if necessary.

2.8 Clutch

2.8.1 Clutch Operation Inspection

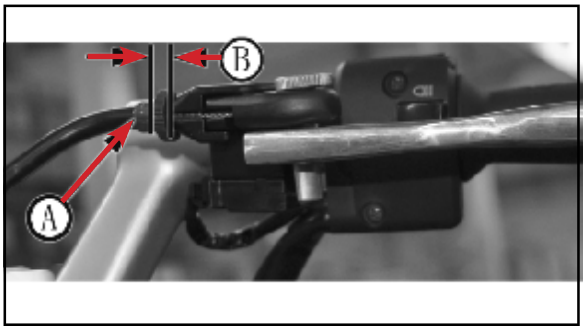
- Pull the clutch lever just enough to take up the free play [A].
- Measure the gap between the lever and the lever holder.

If the gap is too wide,the clutch may not release fully. If the gap is too narrow, the clutch may not engage fully. In either case, adjust it.

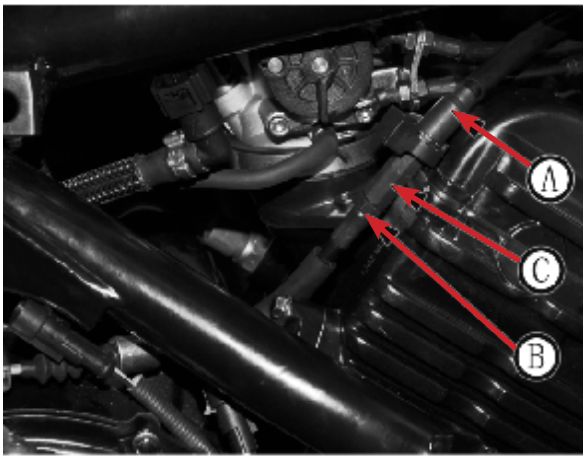


WARNING
To avoid a serious burn, never tough the engine or exhaust pipe during clutch adjustment.

Clutch Lever Free Play
Standard: 2mm~3mm(0.08in~0.12in.)



- Turn the adjuster [A] so that 5mm~6mm (0.20in~0. 2 4 in.) [B] of threads are visible.
- Slide the dust cover [A] at the middle of the clutch cable out of place.
- Loosen the locknut [B] at the middle of clutch cable.
- Turn the adjustment nut [C] until the free play is correct.



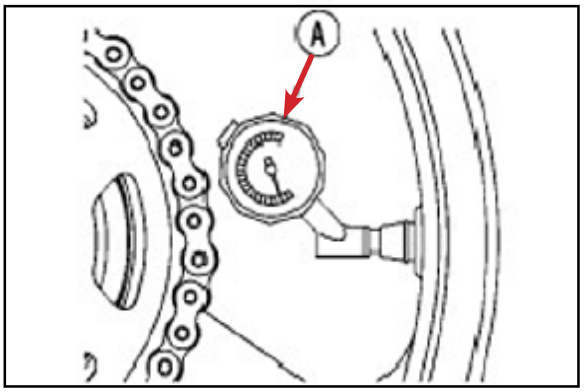
⚠WARNING
Be sure that the outer cable end at the clutch lever is fully seated in the adjuster at the clutch lever, or it could slip into place later, creating enough cable play to prevent clutch disengagement.

After the adjustment, tighten the locknut and start the engine. Check the clutch if it releases properly.

2.9 Wheels/Tires

2.9.1 Air Pressure Inspection

- Remove the air valve cap.
- Measure the tire air pressure with an air pressure gauge [A] when the tires are cold (that is,when the motorcycle has not been ridden more than a mile during the past 3 hours).
- Install the air valve cap.



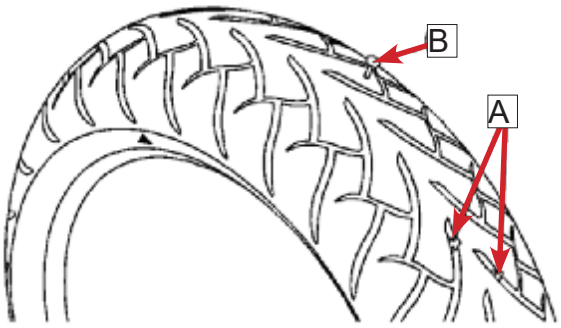
Adjust the tire pressure according to the specifications if necessary.

Air Pressure (when cold)
Front:250kPa(2.25kgf/cm^2,39.8psi)
Rear:290kPa(2.50kgf/cm^2,46.2psi)

2.9.2 Wheel/Tire Damage Inspection

- Remove any imbedded stones [A] or other foreign particles [B] of tread.
- Visually inspect the tire for cracks and cuts,and replace the tire if necessary. Swelling or high spots indicate internal damage, requiring tire replacement.
- Visually inspect the wheel for cracks, cuts and dents damage.

If any damage is found, replace the wheel if necessary.

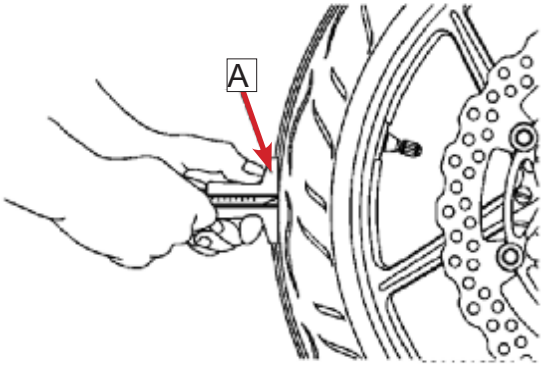


2.9.3 Tire Tread Wear, Abnormal Wear Inspec-tion

When the tire tread is worn, the tire becomes more susceptible to puncture and failure. An accepted estimate is that 90% of all tire failures occur during the last 10% of tread life (90% worn).So it is unsafe to use the tires until they are bald.

- Measure the tread depth at the center of the tread with a depth gauge [A].Since the tire may be worn unevenly,take measurement at several places.

If any measurement is less than the service limit, replace the tire (see Tire Removal/Installation in the Wheels/Tires chapter).



Tread Depth Standard:
Front: 4.5mm (0.18in.)
Rear: 5.5mm (0.22in.)
Service Limit:
Front: 0.8mm~1.0 mm
Rear: 0.8mm~1.0mm

⚠WARNING
To ensure safe handling and stability, use only the recommended standard tires for replacement, inflated to the standard pressure.

NOTE

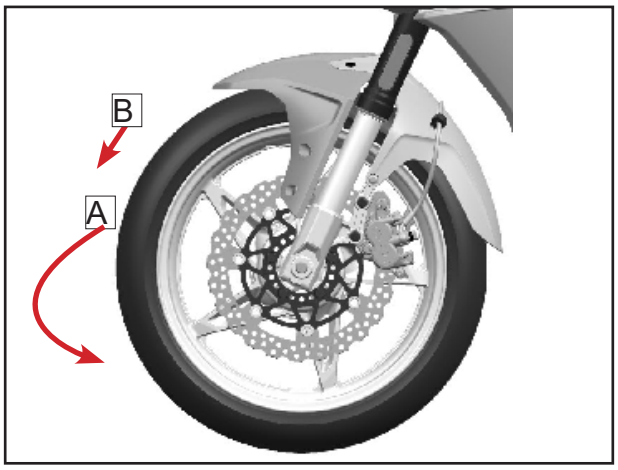
Most countries may have their own regulations a minimum tire tread depth:be sure to follow them.

Check and balance the wheel when a tire is replaced with a new one.

2.9.4 Wheel Bearing Damage Inspection

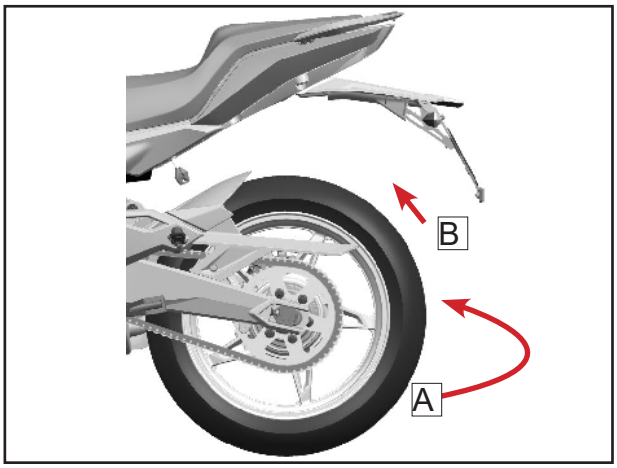
- Raise the front wheel off the ground with jack (see Front Wheel Removal in the Wheels/Tires chapter).
- Turn the handlebar to the right or left.
- Inspect the roughness of the front wheel bearing by pushing and pulling [A] the wheel.
- Spin[B] the front wheel lightly, and check for smoothly turn, roughness, binding or noise.

If roughness,binding or noise is found, remove the front wheel and inspect the wheel bearing (see Front Wheel Removal, Hub Bearing Inspection in the Wheels/ Tires chapter).



- Raise the rear wheel off the ground with side stand(see Rear Wheel Removal in the Wheels/Tires chapter).
- Inspect the roughness of the rear wheel bearing by pushing and pulling[A] the wheel.
- Spin[B] the rear wheel lightly, and check for smoothly turn, roughness,binding or noise.

If roughness, binding or noise is found, remove the rear wheel and inspect the wheel bearing (see Rear Wheel Removal, Hub Bearing Inspection in the Wheels/ Tirechapter) and coupling (see Coupling Bearing Inspection in the Final Drive chapter).



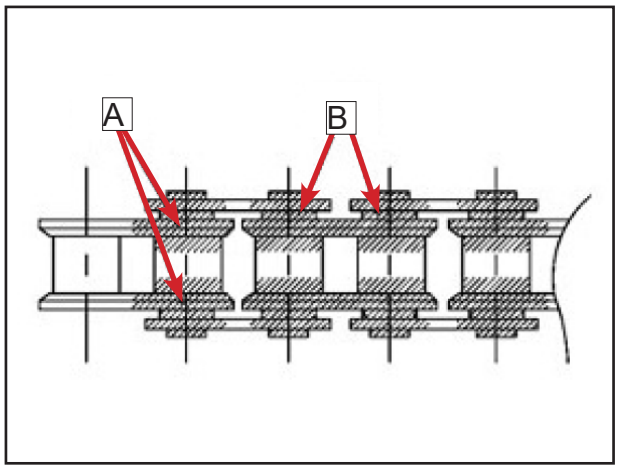
2.10 Drive Train

2.10.1 Drive Chain Lubrication Condition Inspection

- Using special chain lubricant only when use chain for 500km to 800km. If the chain is es-pecially dirty, clean it before lubrication.

CAUTION
To avoid damage of the O-ring and loss of lubricant, observe the following rules. **Use only kerosene or diesel oil for cleaning.Any other cleaning solution such as gasoline or trichloroethylene will cause deterioration and swelling of the O-ring.Immediately blow the chain dry with compressed air after cleaning. Complete cleaning and drying the chain within 10 minutes.**

- Apply oil to the each sides of the rollers, oil will penetrate to the rollers and bushings. Apply the oil to the O-rings.
- Wipe off any excess oil.Oil Applied Areas [A] O-rings [B]

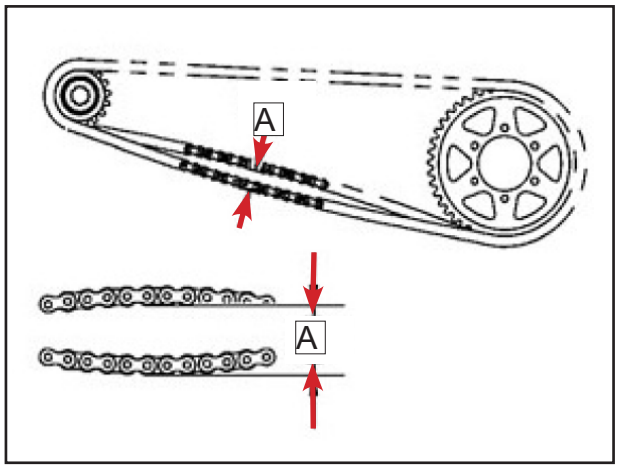


2.10.2 Drive Train Slack Inspection
NOTE
Check the slack with the motorcycle setting on its side stand.
Clean the chain if it is dirty, and lubricate it if it appears diry.

- Check the wheel alignment (see Wheel Alignment Inspection).
- Rotate the rear wheel to find the position where the chain is tightest.
- Measure the vertical movement (chain slack) [A] midway between the sprockets.

If the chain slack exceeds the standard, adjust it.

Chain Slack
Standard: 30mm~40mm (1.18in~1.57in.)



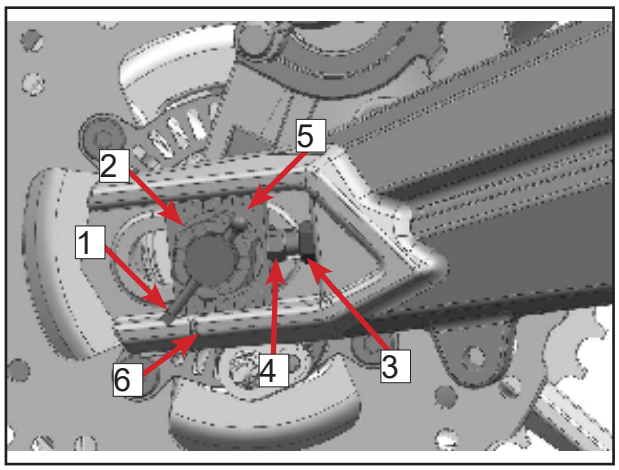
2.10.3 Drive Chain Slack Adjustment

- Remove the cotter pin [1], and loosen the axle nut [2].
- Loosen the both chain adjuster locknuts [3].

If the chain is too loose, turn in the left and right chain adjuster bolts [4] evenly.

If the chain is too tight, turn out the left and right chain adjuster nuts evenly, and kick the wheel forward.

- Turn both chain adjuster nuts evenly until the drive chain has the correct amount of slack.To keep the chain and wheel properly aligned, the value on the left wheel alignment adjuster [5] should align with the same (left or right) edge [6] of inspection window on the swingarm that the right wheel alignment ad-juster value aligns with.



⚠WARNING

Misalignment of the wheel will result in abnormal wear and may result in an unsafe riding condition.

- Tighten both chain adjuster locknuts securely.
- Tighten the rear axle nut.

Torque-Rear Axle Nut:108N•m (11.0kgf•m, 80ft•lb)
Bend cotter pin [A] on the nut[B].

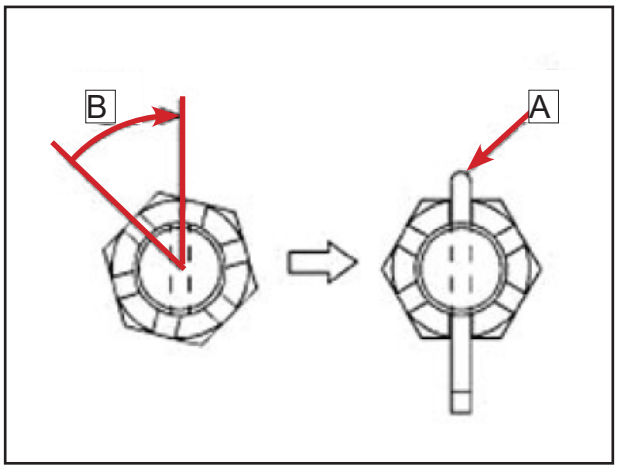
- Turn the wheel,measure the chain slack again the tightest position,and readjust if necessary.Insert a new cotter pin [A].

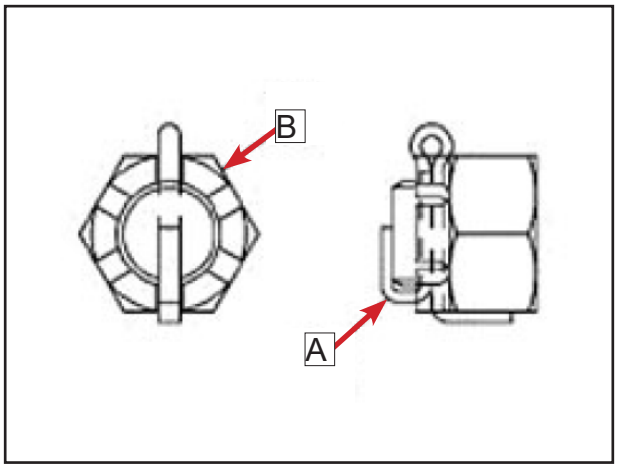
NOTE

- When inserting the cotter pin, if the slots in the nut do not align with the cotter pin hole in the axle.

tighten the nut clockwise [B] up to next alignment.

- It should be within 30 degree .
-
- Loosen once and tighten again when the slot goes past the nearest hole.
-
- Bend cotter pin [A] than nut [B]





⚠WARNING

If the rear axle nut is not securely tightened or the cotter pin is installed incorrectly,an unsafe riding condition may happens

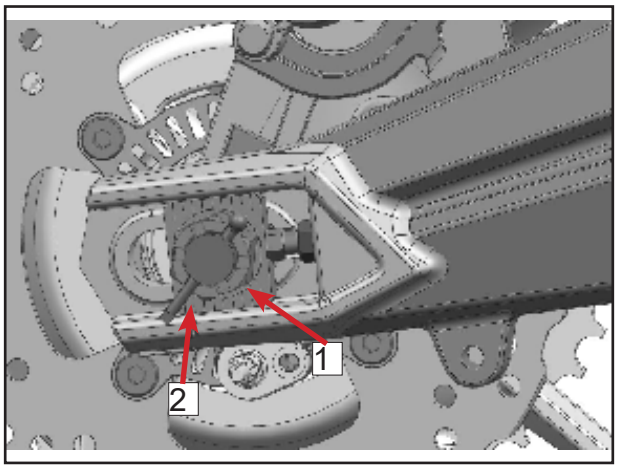
2.11 Wheel Alignment Inspection

- Check that the value on the left wheel align-ment adjuster [1] aligns with the same (left or right) edge [2] of inspection window on swingarm that the right wheel alignment ad-juster value aligns with.

If they do not, adjust the chain slack and align the wheel alignment (see Drive Chian SlackAdjustment).

NOTE

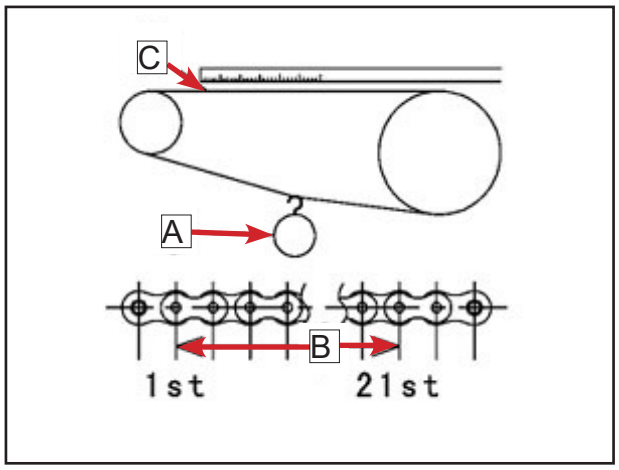
Wheel alignment can be also checked us-ing the straightedge or string method.



⚠WARNING

Misalignment of the wheel will result in abnormal wear,and may result in an unsafe riding condition.

2.12 Drive Chain Wear Inspection



- Removal:

Chain Cover (see Swing arm Removal in the Suspension chapter)

- Rotate the rear wheel to inspect the drive chain for damaged rollers, and loose pins and links.

If there is any irregularity,replace the drive chain.Lubricate the drive chain if it appears dry.

Stretch the chain taut by hanging a 98N(10kg,20lb)weight [A] on the chain. Mea-sure the length of 20 links [B] on the straight part [C] of the chain from the pin center of the 1st pin to the pin center of the 21st pin.

- Since the chain may wear unevenly, take measurements at several places.

If any measurements exceed the service limit, replace the claim. Also, replace the front and rear sprockets when the drive chain is replaced.

Drive Chain 20-link Length

Standard: 317.5mm~318.2mm(12.50in~12.53in.)

- **Service limit:320mm(12.6in.)**

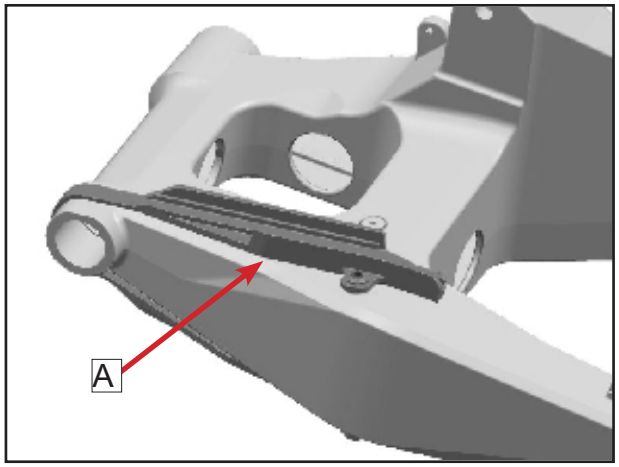
⚠WARNING

If the drive train wear exceeds the service limit,replace the chain or an unsafe riding condition may result. A chain that breaks or jumps off the sprockets could snap on the engine sprocket or lock the rear wheel, severely damaging the motorcycle and causing it to go out of control. For safety, use only the standard chain. It is an endless type and should not be cut for installation.

Standard Chain Made by:RK,Japan

Type:520xS01 or 520 VP2-T

Link:116 links



2.13 Chain Guide Inspection

- Removal:

Swing arm (see Swing arm Removal in the Suspension chapter)

- Visually inspect the chain guide [A].

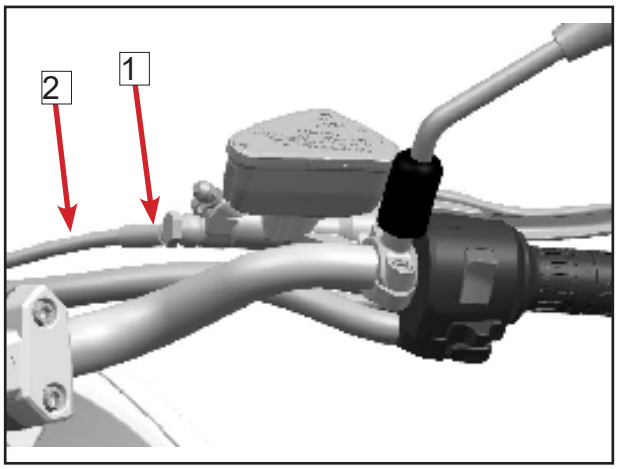
Replace the chain guide if it shows any signs of abnormal wear or damage.

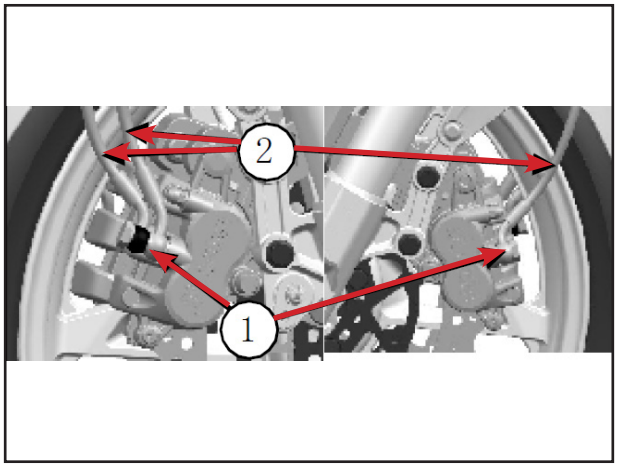
2.14 Brake System

2.14.1 Brake Fluid Leak (Brake Hose and Pipe)Inspection

- Apply the brake lever or pedal and inspect brake hoses [A],connector [B] for leakage.

If the brake fluid leaked from any position, inspect or replace the problem part.





2.14.2 Brake Hose and Pipe Damage and Installation Condition Inspection

- Inspect the brake hoses,fittings and pipes for deterioration,cracks and signs of leakage.

The high pressure inside the brake line can cause fluid to leak [A] or the hose to burst.

Bend and twist the rubber hose while examing it. Replace the hose and pipe if any crack [B],bulge [C] of leakage is noticed.

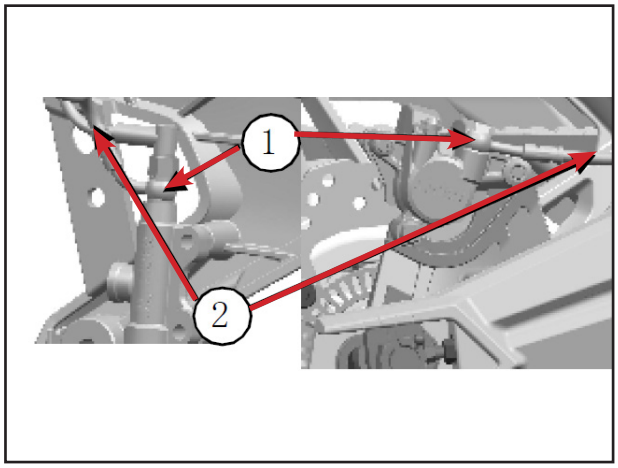
Tighten any brake hose banjo bolts and brake pipe joint nuts.

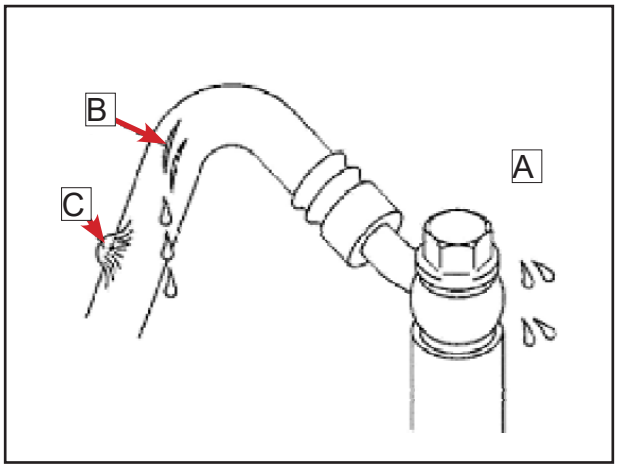
Torque-Brake Hose Banjo Bolts: 25N•m (2.5kgf•m, 18ft•lb)

Brake Pipe Joit Nuts(18N•m, 1.8kgf•m, 13ft•lb)

- Inspect the brake hose routing.

If any brake hose routing is incorrect, reroute the brake hose (refer to chapter 1)



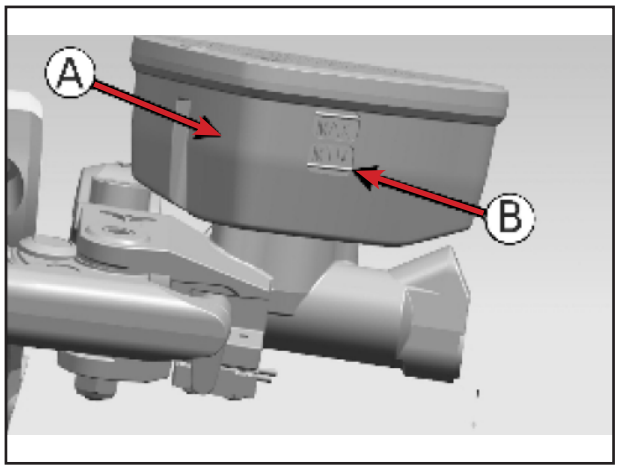


2.14.3 Brake Operation Inspection

Inspect the operation of the front and rear brake while running the vehicle on the dry road.

If the brake operation is insufficient, inspect the brake system.

CAUTION
Inspect while running the vehicle,pay attention to the surro unding traffic.



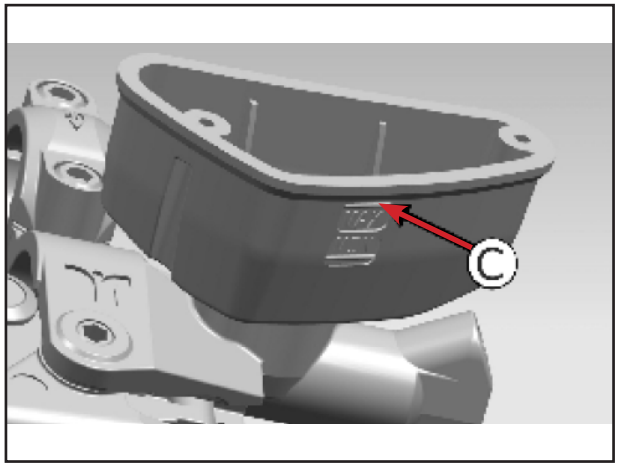
2.14.4 Brake Fluid Level Inspection

Check that the brake fluid level in the front brake reservoir [A] is above the lower level line [B].

Caution

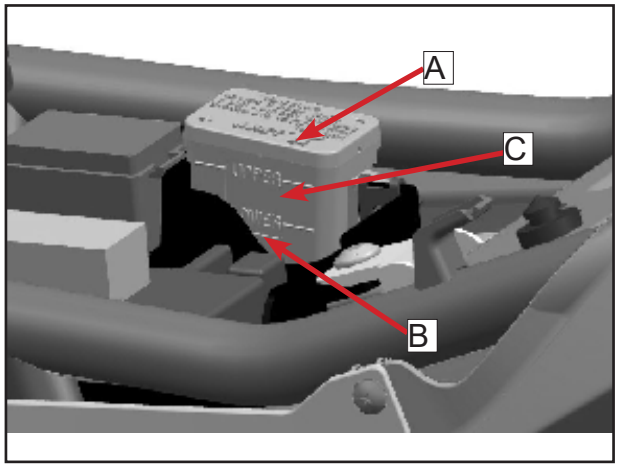
Hold the reservoir horizontal by turning the handlebar when checking brake fluid level.

If the fluid level is lower than the lower level line, fill to the upper level line [C] in the reservoir.



- Remove the seat (see Seat Removal in the Frame Chapter).
- Check that the brake fluid level in the rear brake reservoir [A] is above the lower level line [B].

If the fluid level is lower than the lower level line, fill the reservoir to the upper level line [C].

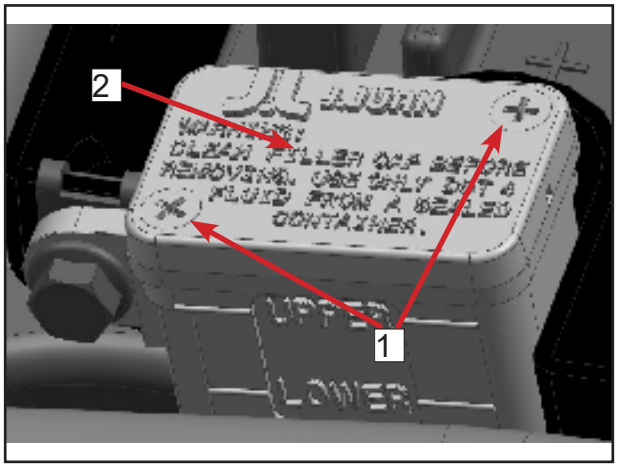


CAUTION
If the type and brand of the brake fluid in the reservoir are unidentified,change the brake fluid in the brake line completely. After changing the fluid, use the same type and brand of fluid thereafter.

Recommended Brake Fluid
Grade:DOT4

- Follow the procedures to install the rearbrake fluid reservoir cap correctly.

With a cross-head screwdriver [1] to tighten the cap [2].

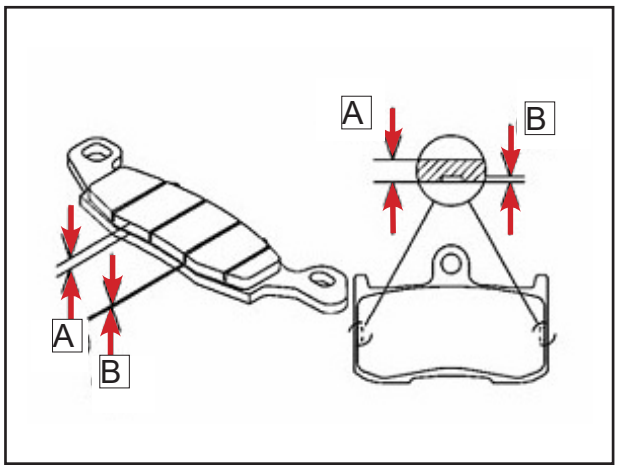


2.14.5 Brake Pad Wear Inspection

- Check the lining thickness [A] of the pads in each caliper.

If the lining thickness of either pad is less than the service limit [B], replace both pads in the caliper as a set.

Pad Lining Thickness
Standard:
Front : 4.0mm(0.16in)
Rear: 5.0mm(0.20in)
Service Limit: 1mm(0.04in)



2.14.6 Brake Light Switch Operation Inspection

- Turn on the ignition switch

The brake light [A] should go on when the brake lever is applied or after the brake pedal is depressed about 10mm (0.39in.)

If it does not,adjust the brake light switch. Disconnect the connector [A].

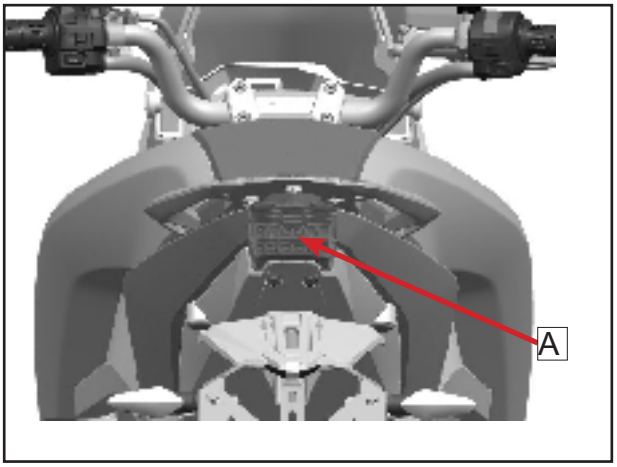
If it does not go on,inspect or replace the following items.

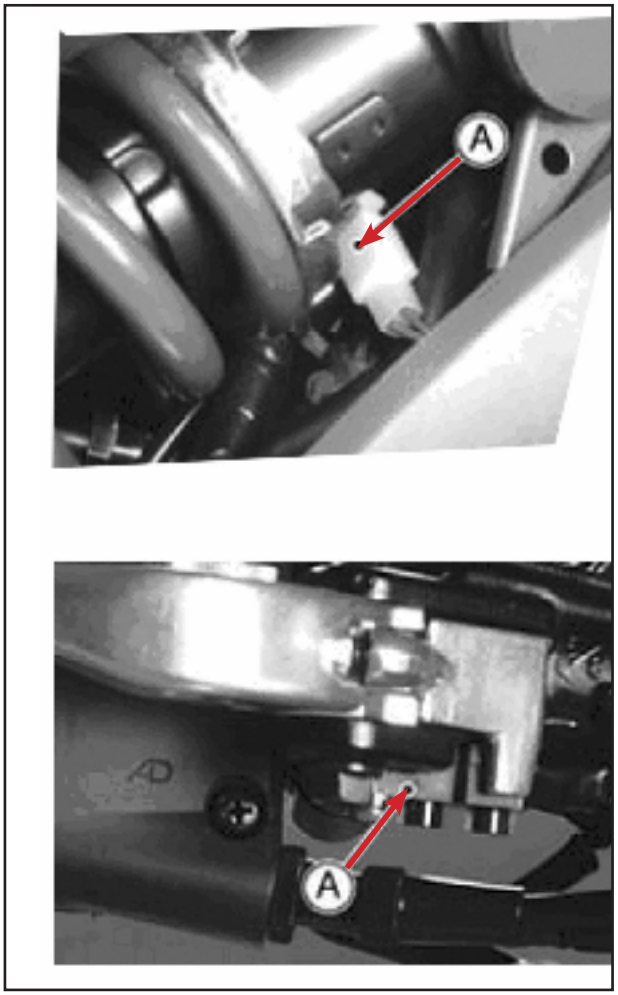
Battery(see Charging Condition Inspection in the Electrical System chapter)

Brake Light(see Tail/Brake Light Removal in the Electrical System chapter)

Main Fuse 20 A and Taillight Fuse 10A (see Switch Inspection in the Electrical System chapter)

Front Brake Light Switch [A] (see Switch In-spection in Electrical System chapter) Rear Brake Light Switch (see Switch Inspec-tion in the Electrical System chapter) Harness (see Wiring Inspection in the Elec-trical System)

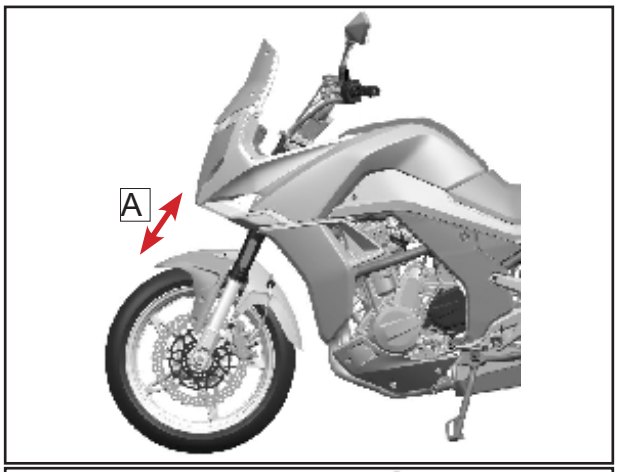




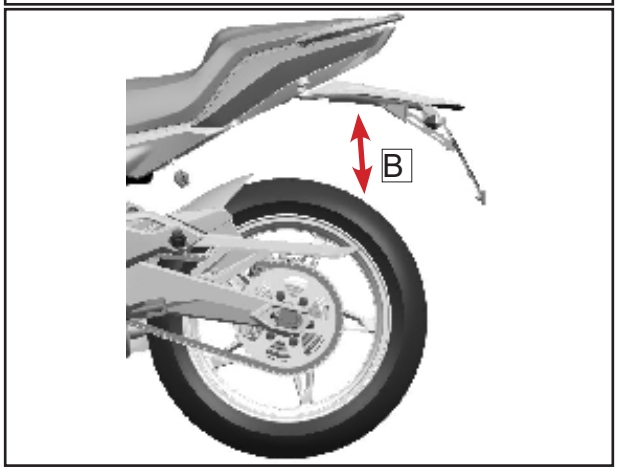
2.15 Suspensions

2.15.1 Front Forks/Rear Shock Absorber Opera-tion Inspection

- Pump the forks down and up [A] 4 or 5 times, and inspect the smooth stroke. If the forks do not work smoothly or noise is found,inspect the fork oil level or fork clamps (see Front Fork Oil Change in the Suspension chapter).



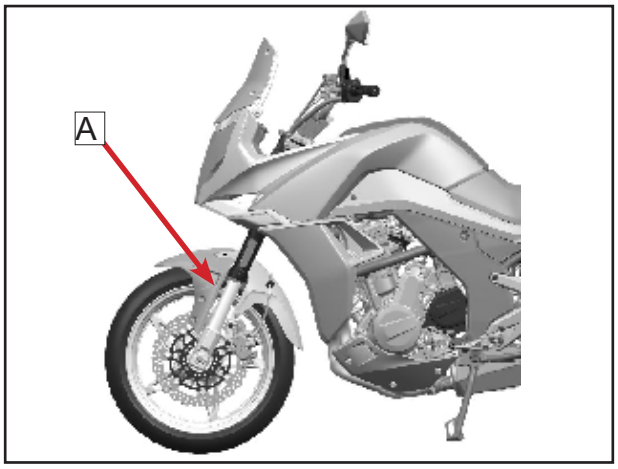
- Pump the seat down and up [B] 4 or 5 times, and inspect the smooth stroke.



2.15.2 Front Fork Oil Leak Inspection

- Visually inspect the front forks [A] for oil leakage.

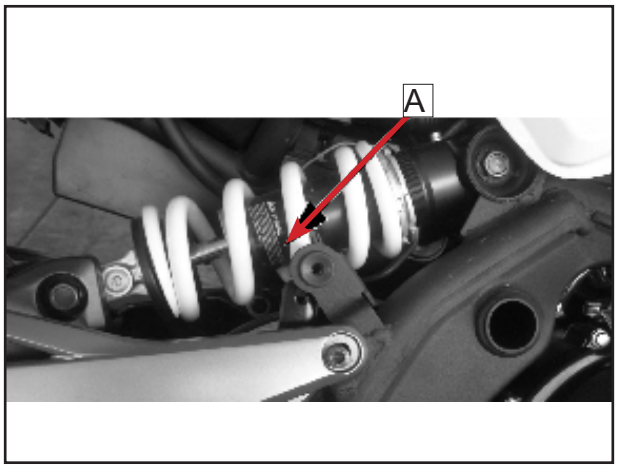
Replace or repair any defective parts, if necessary.



2.15.3 Rear Shock Absorber Oil Leak Inspection

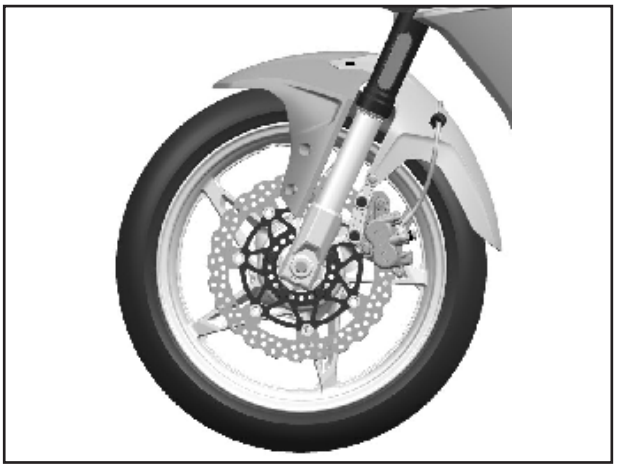
- Visually inspect the shock absorber [A] for oil leakage.

If the oil leakage is found, replace the shock absorber with a new one.



2.16 Steering System

2.16.1 Steering Play Inspection



- Raise the front wheel off the ground with jack (see Front Wheel Removal in the Wheels/Tires chapter).
- With the front wheel pointing straight ahead,alternately tap each end of the handlebar.Handlebar should be turned flexibly.

If the wheel binds or catches before the stop,the steering is too tight.

Feel for steering looseness by pushing and pulling the forks.

If you feel looseness, the steering is too loose.

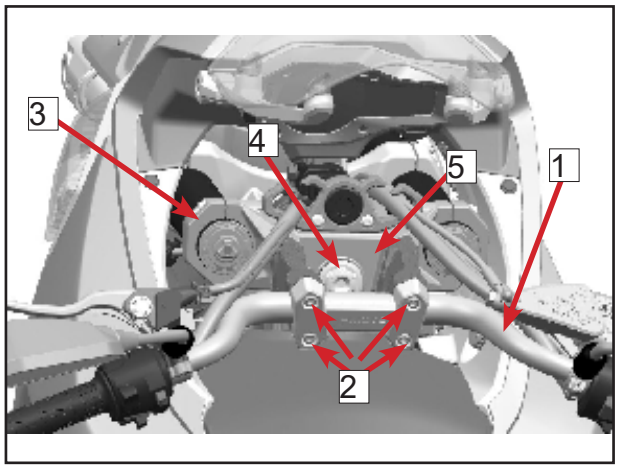
NOTE

The cables and wiring will have some effect on the motion of the fork which must be taken into account.

Be sure the wires and cables are properly routed.

The bearings must be in good condition and properly lubricated in order for any test to be valid

2.16.2 Steering Play Adjustment



- Removal:

Headlight Assy (see Headlight Removal/ Installation in the Electrical System chapter) Handlebar cover (see Handlebar Removal in the Steering chapter)

Remove bolt (2), take off LH handlebar assy. [1] Lock bolt]3] of front fork Rotate boltr[4]

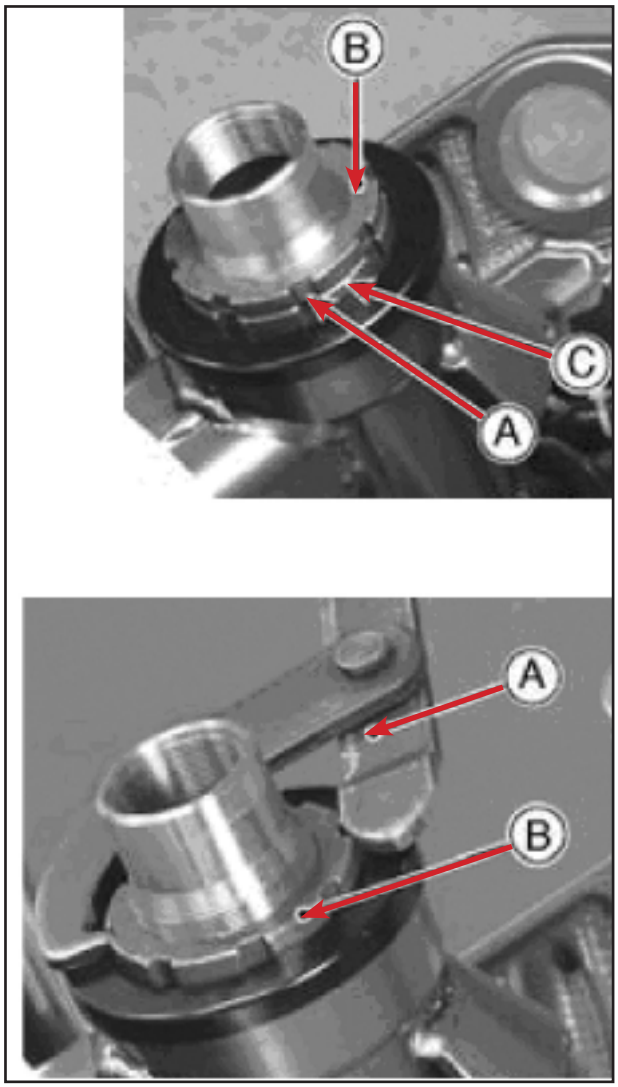
Loosen connector of ignition switch lock. Remove upper board assy.[5]

Bend the claws [A] of the claw washer straighten.Remove the steering stem locknut [B] and claw washer [C].

Adjust the steering
Special Tool - Steering Stem Nut Wrench [A]
If the steering is too tight, loosen the stem nut [B] a fraction of a turn.

If the steering is too loose, ltight the stem nut [B] a fraction of a turn.

NOTE
Turning steering stem nut 1/8 at most.



Install the claw washer [A] so that its bent side [B] faces upward, and engage the bent claws with the grooves of stem locknut [C].

- Tighten the stem locknut by hand until it touches the claw washer.
- Tighten the stem locknut clockwise until the claws are aligned with the grooves (ranging from 2nd to 4th) of stem nut [D], and bend the 2 claws downward [E].
- Install the steering stem board.
- Install the washer, and tighten the stem head bolt.
- Tighten:

Torque - Steering Stem Head Bolt: 108N•m (11.0kgf•m, 80ft•lb)
Front Fork Clamp Bolts(upper): 20N•m (2.0kgf•m, 15ft•lb)

- Check the steering again.

If the steering is still too tight or too loose, repeat the adjustment.

Install the removed parts

2.16.3 Steering Stem Bearing Lubrication

- Remove the steering stem (see Stem, Stem Bearing Removal in the Steering chapter).
- Using a high-flash point solvent, wash the upper and lower ball bearings in the cages, and wipe the upper and lower outer races, which are press-fitted into the frame head pipe, clean off grease and dirt.

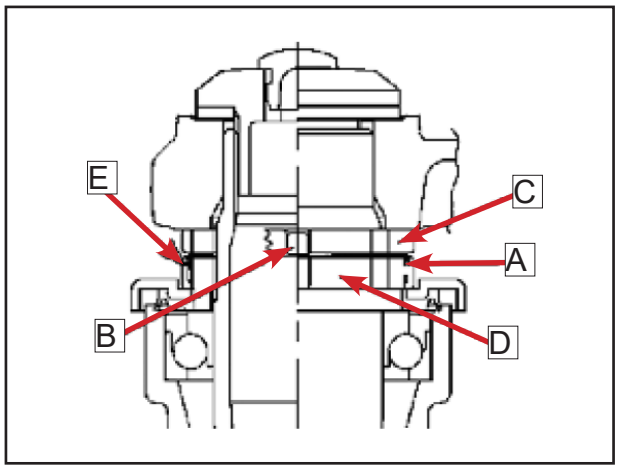
Visually check the outer races and the ball bearings. Replace the bearing assemblies if they show wear or damage.

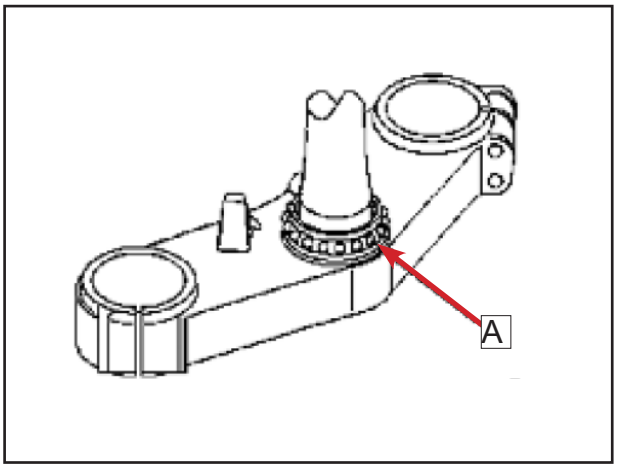
- Pack the upper and lower ball bearings [A] in the cages with grease, and apply a light coat of grease to the upper and lower outer races.
- Install the steering stem (see Stem, Stem Bearing Installation in the Steering chapter).
- Adjust the steering (see Steering Play Adjustment).

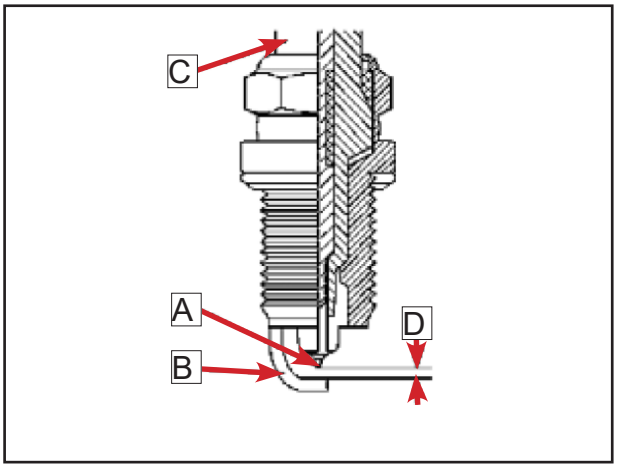
2.17 Electrical System

2.17.1 Spark Plug Condition Inspection

- Remove the spark plugs(see Spark Plug Replacement).







- Visually inspect the spark plugs
- If the spark plug center electrode [A] and/or side electrode [B] are corroded or damaged,or if the insulator [C] is cracked, replace the plug.

If the spark plug is dirtied or the carbon is accumulated, replace the spark plug.

- Measure the gap [D] with a thickness gauge.

If the gap is incorrect, replace the spark plug

Spark plug clearance:0.7mm~0.9mm(0.028in~0.035in)

Spark Plug Condition Inspection

- Use the standard spark plug or its uivalent.

Spark plug: CR8EI

2.17.2 Lights and Switches Operation Inspection

First step

- Turn the ignition switch on
- The following light should be on according to below table.

Position light [A]	on
Taillight[B]	on
Rear license light [C]	on
Dashboard LCD	on
Neutral indicator(LED)	on
MIL(LED)	on for about 5s

If the light does not on. Inspect or replace the following item.

Battery

Applicable bulb(LED)

LCD dashboard

Neutral indicator light(LED)

EFI indicator (LED)

ECU

Main fuse 20A and taillight fuse 10A

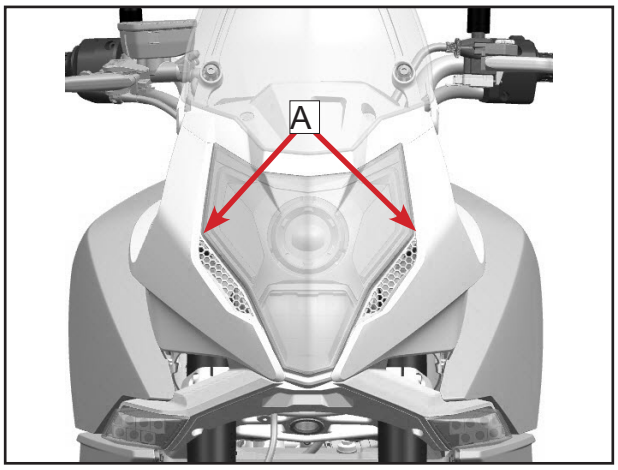
Ignition switch

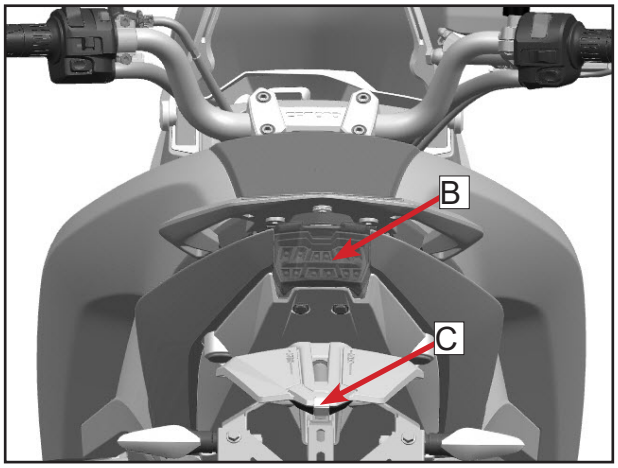
Neutral switch

Wire

- Ignition switch off
- All the indicators should be off

Replace the ignition switch if not off.





Second step

- Turn the ignition switch[A]on and turn the position light [B] on.
- The position light, tail light and licence light should be on.

If the light does not on. Inspect or replace the item below.

Ignition switch or right handlebar switches or inspect the wire (See switch inspection in electrical system chapter)

Third step

- Turn the steering indicating light on[D] (LH or RH).
- Accorading to the switch position. Steering indicator [E] should be blinking.
- The indicator in the dashboard should be blinking.

If the light doesn't blinking. Inspect or replace the item below.

Steering indicator light bulb(See steering in-dicator light bult on electrical system chapter)

Steering indicator(LED)(See dashboard in-spection in electrical system chapter)

Flasher fuse 15A(See fuse inspection on electrical system chapter)

Steering indicator switch(See switch inspec-tion in electrical system chapter)

Flash (See inspection on electrical system chapter)

Cable(See cable inspection on electrical sys-tem chapter)

- Press steering indicator switch.
- Steering indicator and indicating light should be off.

If the light does not off. Inspect or replace the item below.

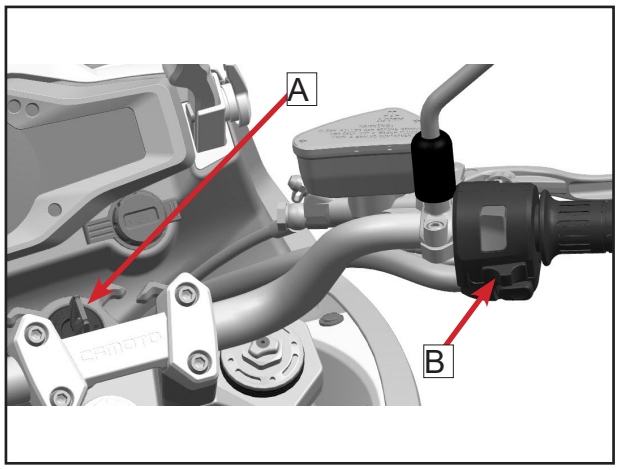
Steering signal switch(See switch inspection in electrical system chapter)

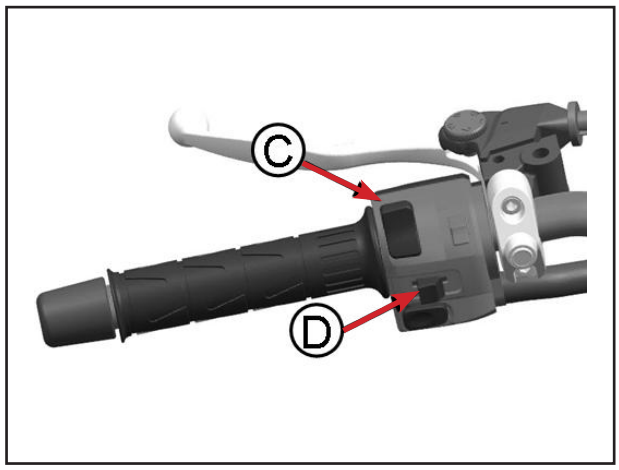
Flash(See flash relay inspection on electrical system chapter)

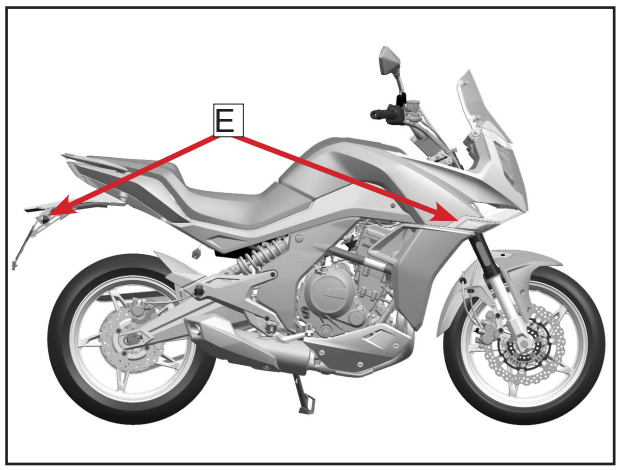
Fourth step

- Turn the dimmer switch to low beam
- Start the engine.
- Low beam headlight should be on.

If low beam is not on. Inspect or replace the item below.







Low beam bulb of headlight. (See headlight bulb replacement in electrical system chapter)
Headlight relay fuse 10A (See fuse inspection in electrical system chapter)
Dimmer switch (See switch inspection in electrical system chapter)
Headlight relay (See headlight relay inspection in electrical system chapter).
Wire (See electrical system chapter).

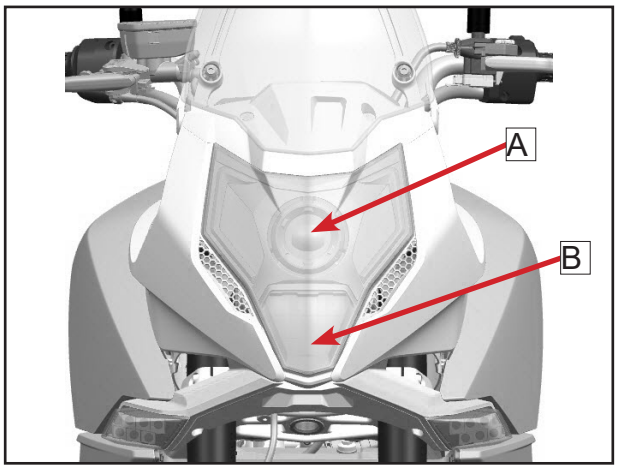
- Turn dimmer switch to highbeam.
- Low beam [A] and high beam [B] headlight should be on.
- Highbeam indicator (LED) should be on.

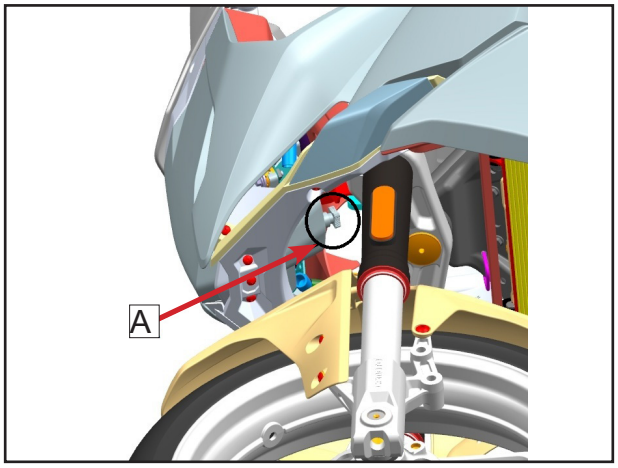
If highbeam head light and/or indicator is not on. Inspect or replace the item below.
Highbeam bulb of headlight (See headlight bulb replacement in electrical system chapter)
Dimmer switch(See switch inspection in electrical system chapter)

- Turn the engine stop switch off
- Low beam and high beam headlight should be on.

If high beam and low beam indicator goes off. Inspect or replace the item below.
Headlight relay (See high beam and low beam relay inspection in electrical system chapter)

- Turn the ignition switch off.
- High beam indicator (LED) should be off.





2.17.3 Headlight axis inspection

- Inspect the ray axis.

If the axis point to one side insdead of straight ahead.Adjust the horizontal axis

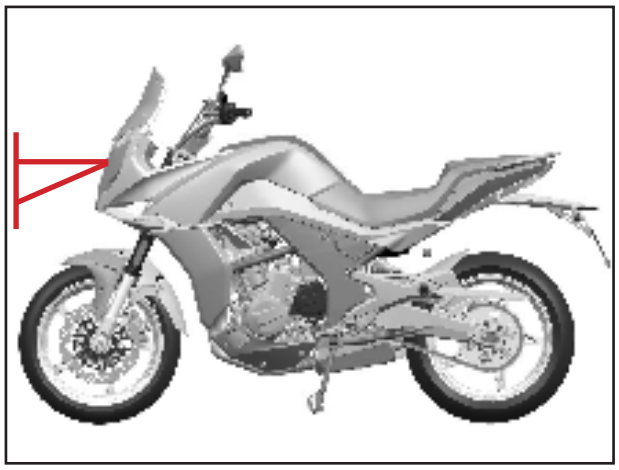
Headlight axis horizontal adjustment

- Use screwdriver to turn the horizontal adjuster on headlight [A] Until the axis straight ahead. If the head-light too low or too high. Adjust the vertical adjuster.

Headlight axix vertical adjustment

- Use screw driver to turn the vercital adjuster [A] To adjust the headlight.

NOTE:
For high beam headlight, when driver on the seat, the axis of headlight should be a ittle lower then horizontal point.
Adjust headlight angel according to the local law.

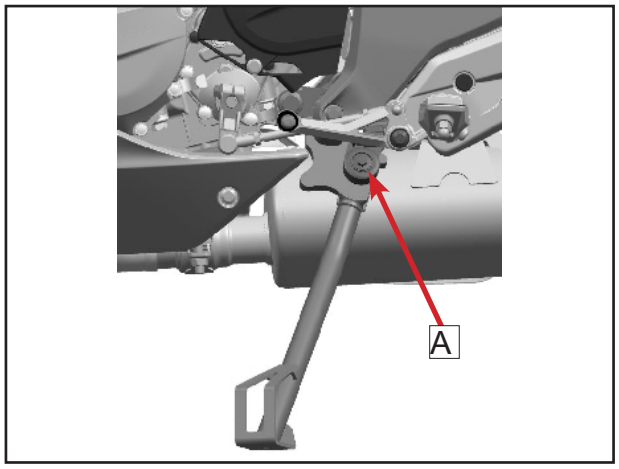


2.17.4 Side stand switch Operation inspection

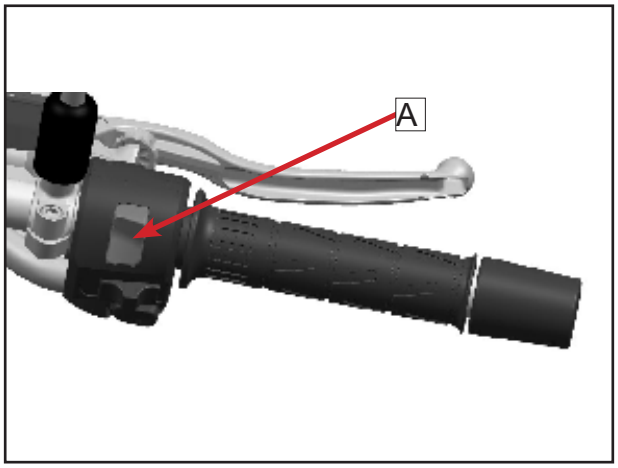
- Inspect the side stand switch[A] according to the form below.

Side stand operation

Side stand	Gear	Clutch	Engine start	Engine running
Up	Neutral	Release	Start	run
Up	Neutral	Tight	Start	run
Up	Not neutral	Release	Cannot start	Stop
Up	Not neutral	Tight	Start	run
Down	Neutra	Release	Start	run
Down	Neutra	Tight	Start	run
Down	Not neutral	Release	Cannot start	Stop
Down	Not neutral	Tight	Cannot start	Stop



If sidestand is normal but the engine still cannot work. Inspect or replace the item below.
Battery(See charging inspection in electrical system chapter)
Main fuse 20A (See fuse inspection in elec-trical system chapter)
Fuel pump relay fuse 15A (See fuse inspection in electrical system chapter)
Ignition switch (See switch inspection in electrical system chapter)
Side stand switch (See switch inspection in electrical system chapter)
Engine stop switch (See switch inspection in electrical system chapter)
Start button (See switch inspection in electrical system chapter)
Neutral switch (See switch inspection in electrical system chapter)
Starting relay (See start system inspection in electrical system chapter)
Relay box (See relay inspection in electrical system chapter)
Auxilary relay (See start system inspection in electrical system chapter)
Wire (See wire inspection in electrical system chapter)
If all the parts are OK. Replace the ECU. (See ECU replace ment on EFI chapter)



2.17.5 Engine stop switch Operation inspection

First step

- Turn on the ignition switch.
- Set the vehicle on N gear.
- Set the engine stop switch to start position
- Press the start button and run the engine
- Set the engine stop switch to stop position
- Stop engine immediately.

If the engine is still running. Inspect or replace the item below.

Engine stop switch.(See switch inspection in electrical system chapter)

If the switch is OK, Replace the ECU (See ECU replace ment on EFI chapter)

2.18 Others

2.18.1 Chassis Parts lubrication

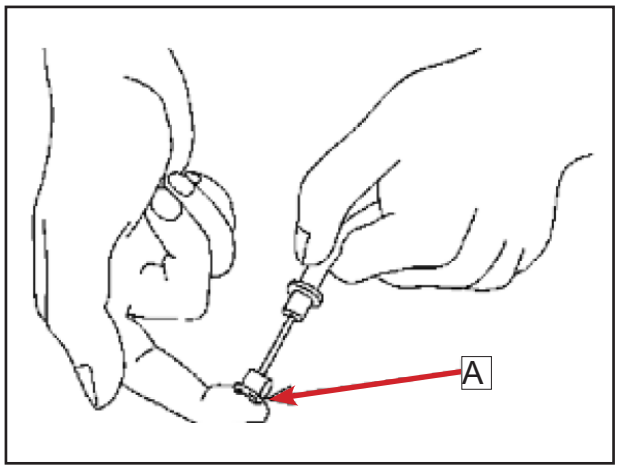
- Before lubricate the parts. Use the cleaning solution to clean up the rustese, grease,oil, dust and dirt.
- Use named lubricant to lubricate the points below.

Note

Use normal lubricant whenever the humit, rainy or washed.

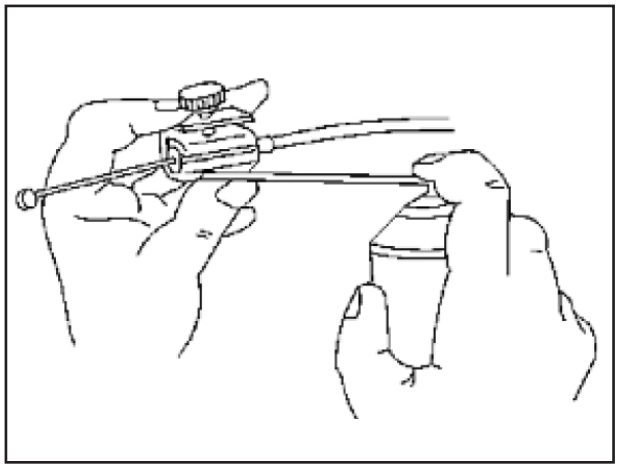
Points: Lubricate with Grease

Brake Lever
Brake Pedal
Clutch Lever
Rear Brake Joint Pin
Sidestand



Points: Lubricate with Grease.

Clutch Inner Cable Upper and Lower Ends
[A] Throttle Inner Cable Upper and Lower Ends

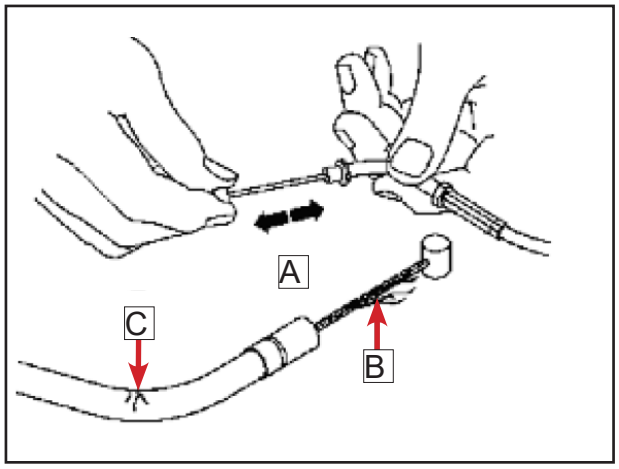


Cables: Lubricate with Rust Inhibitor.

Clutch Cable
Throttle Cables

- Lubricate the cables by seeping the oil between the cable and housing

The cable may be lubricated by using a commercially available pressure cable lubri-cator with an aerosol cable lubricant. With the cable disconnected at both ends, the in-ner cable should move freely [A] within the cable housing.



If cable movement is not free after lubricating, if the cable is frayed [B], or if the cable housing is kinked [C], replace the cable.

2.18.2 Bolts, Nuts and Fasteners Tightness Inspection

- Check the tightness of the bolts and nuts listed here. Also, check to see that each cotter pin is in place and in good condition.

NOTE

For the engine fasteners, check the tightness of them when the engine is cold (at room temperature).

If there are loose fasteners, retighten them to the specified torque following the specified tightening sequence. Refer to the appropriate chapter for torque specifications. If torque speci-fications are not in the appropriate chapter, see the Standard Torque Table. For each fastener, first loosen it by 1/2 turn, then tighten it.

If cotter pins are damaged, replace them with new ones.

Bolt, Nut and Fastener to be checked

Engine:
Clutch Lever Pivot Nut
Engine Mounting Bolts and Nuts Exhaust Pipe Manifold Holder Nuts Muffler Body Mounting Bolts

Wheels:
Front Axle
Front Axle Clamp Bolt
Rear Axle Nut
Rear Axle Nut Cotter Pin

Brakes:
Brake Lever Pivot Nut
Brake Pedal Bolt
Brake Rod Joint Cotter Pin
Caliper Mounting Bolts
Front Master Cylinder Clamp Bolts
Rear Master Cylinder Mounting Bolts

Suspension:
Front Fork Clamp Bolts
Rear Shock Absorber Bolt and Nut
Swingarm Pivot Shaft Nut

Steering:
Steering Stem Head Bolt
Handlebar Holder Bolts

Others:
Footpeg Stay Bolts
Front Fender Bolts
Sidestand Bolt

2.19 Replacement Parts

2.19.1 Air Filter Element Replacement

- Refer to the Air Cleaner Element Cleaning

2.19.2 Fuel hose Replacement

⚠ WARNING

When removing and installing the fuel line joint, do not apply strong force to the outlet pipe on the fuel pump and delivery pipe on the throttle body assy. The pipes made from resin could be damaged.

- Remove the fuel tank (see Fuel Tank Re-moval in the Fuel System(EFI) chapter).
- Pull the fuel pipe joint[A] out from the pump [B].

⚠ WARNING

Be prepared for fuel spillage; any spilled fuel must be completely wiped up immediately.When the fuel line is disconnected, fuel spills out from the line and the pipe. Cover the line connection with a clean shop towel to prevent fuel spillage.

Install the new fuel hose

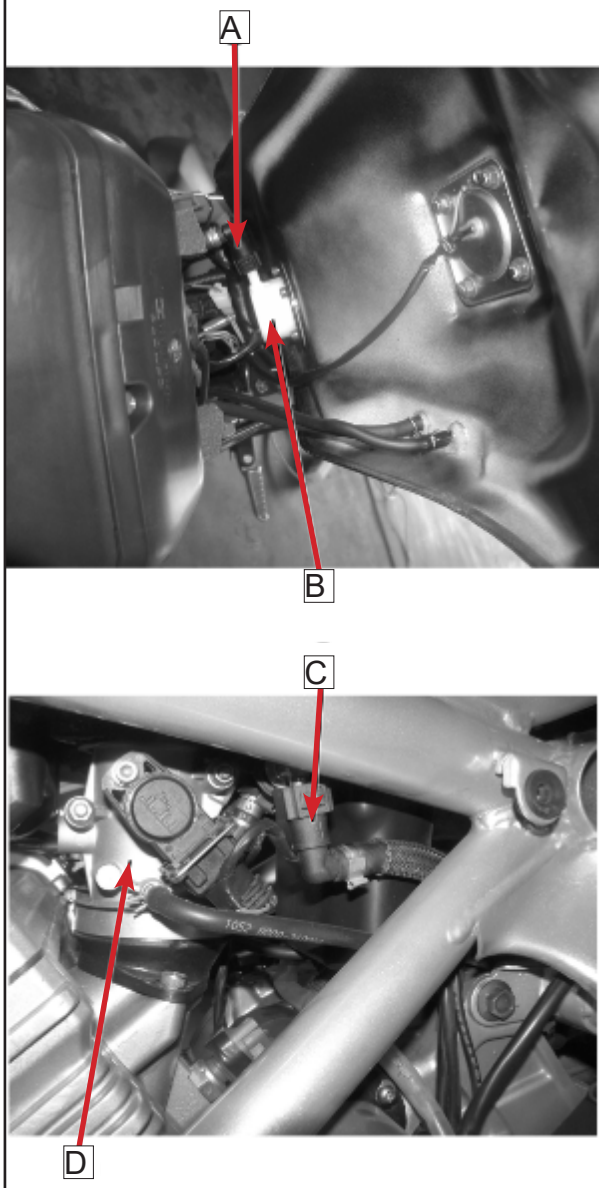
- Insert [A] the fuel hose joint [B] straight onto the delivery pipe until the hose joint clicks.
- Push and pull the fuel hose joint back and forth more than two times and make sure it is locked and doesn't come off.

If it comes off, reinstall the hose joint.

- Run the fuel line correctly.(See the wires ,cables and pipe goes in attached chapter)
- Install the removed parts (see appropriat
- Start the engine and check the fuel hose for leaks.

⚠ WARNING

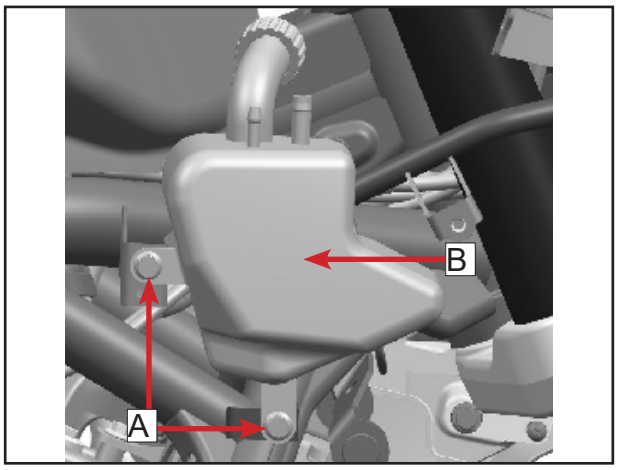
Make sure the fuel hose joint is installed correctly on the delivery pipe or the fuel could leak.



2.19.3 Coolant Change

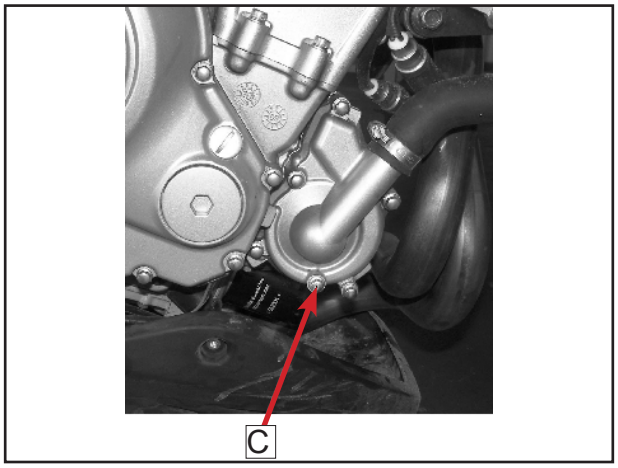
⚠ WARNING

To avoid burns, do not remove the radiator cap or try to change the coolant when the engine is still hot. Wait until it cools down. Coolant on tires will make them slippery and can cause an accident and injury. Immediately wipe up or wash away any coolant that spills on the frame, engine, or other painted parts. Since coolant is harmful to the human body, do not use for drinking.



- Removal:

Right Center Fairing (see Center Fairing Removal in the Frame chapter)
Lower Fairing(see Lower Fairing Removal in the Frame chapter)
Reserve Tank Bolts [A]
Reserve Tank [B]



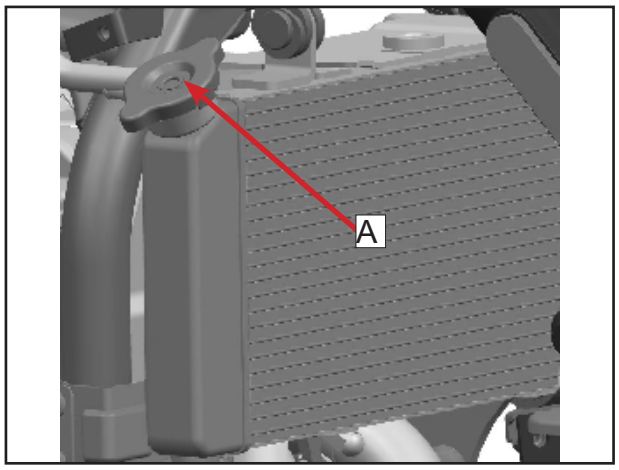
Put a tank under the leaking bolt [C]. Then remove the leaking bolt.

- Remove the rediator cap [A] by 2 steps. First turn the cap counter wclockwise to the first stop.Then push and turn it further in the same di-rection and remove the cap.
- The coolant will drain from the radiator and engine.
- Turn over [A] the reservoir tank, remove the cap, and pour the coolant into a suitable container.
- Place the reserve tank on the right side of frame.
- Tighten the drain bolt with the gasket

Replace the drain bolt gasket with a new one.

Torque - Water Pump Drain Bolt:
7.0N•m (0.70kgf•m, 62in•lb)

- When filling the coolant, choose a suitable mixture ratio by referring to the cool-ant manufacturer's directions.



CAUTION
Soft or distilled water must be used with the antifreeze in the cooling system. **If hard water is used in the system,it causes scales accumulation in the water passages,and considerably reduces the efficiency of the cooling system.**

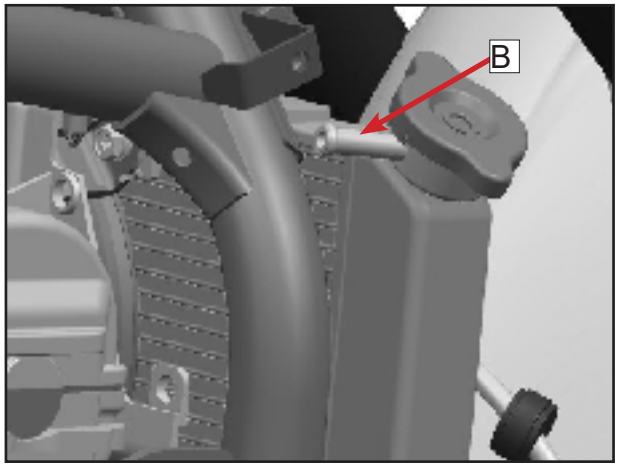
Water and Coolant Mixture Ratio
(Recommended)
SoftWater: 50%
Coolant: 50%
Freezing Point: –35°C (–31°F)
TotalAmount: 1.7L (1.8USqt)

- Fill the radiator up to the filler neck [A] with coolant.

NOTE

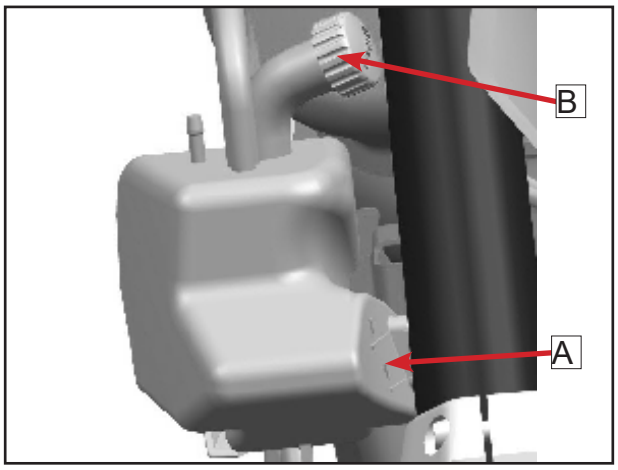
Pour in the coolant slowly so that it can expel the air from the engine and radiator.

- Check the cooling system for leaks.
- Tap the radiator hoses to force any air bubbles caught inside.
- Fill the radiator up to the filler neck with coolant.



- Temporarily install the reserve tank to the frame with two bolts.
- Fill the reserve tank up to the “F”(full) level line [A] with coolant and install the cap [B].
- Start the engine, warm it up thoroughly until the radiator fan turns on and then stop the engine.
- Check the coolant level in the reserve tank after the engine cools down.

If the coolant level is lower than the “L” level line, add coolant to the “F” level line.

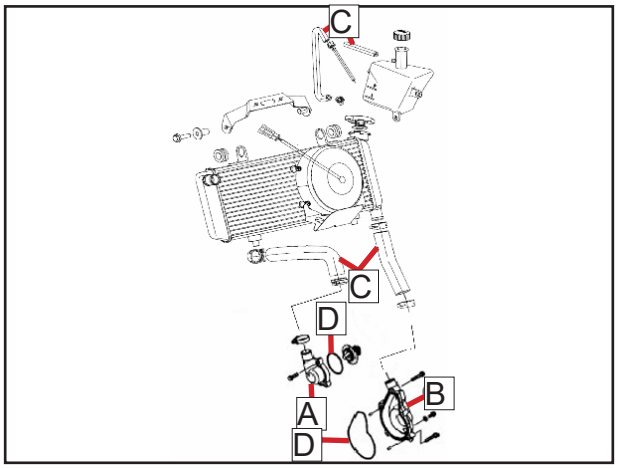


CAUTION
Do not add more coolant above the "F" Level line.

2.19.4 Radiator Hose and O-ring Replacement

- Drain the coolant (see Coolant Change).
- **Removal:**

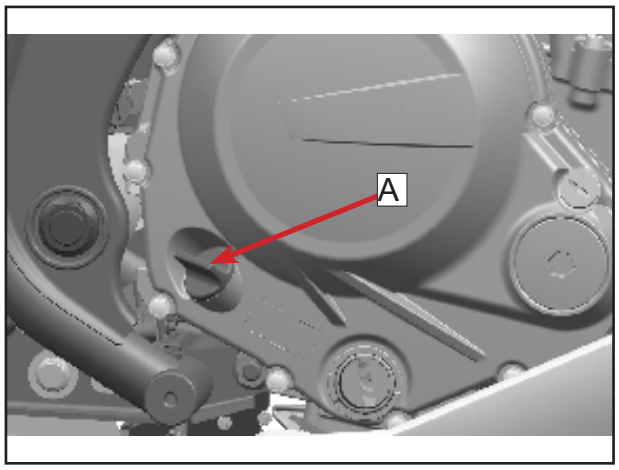
Thermostat Housing [A] (see Water Pump Removal in the Cooling System chapter)
Water Pump Cover [B] (see Water Pump Removal in the Cooling System chapter)
Hoses [C]
O-rings [D]



- Apply grease to the new O-rings and install them.Installation
- Install the new hoses and tighten the clamps securely.
- Fill the coolant (see Coolant Change).
- Check the cooling system for leaks.

2.19.5 Engine Oil Replacement

- Place the motorcycle vertically after warm-ing up the engine.
- Unscrew the oil filler plug [A].
- Place on oil pan beneath the engine.



- Remove the engine oil drain bolt [B] to drain the oil.

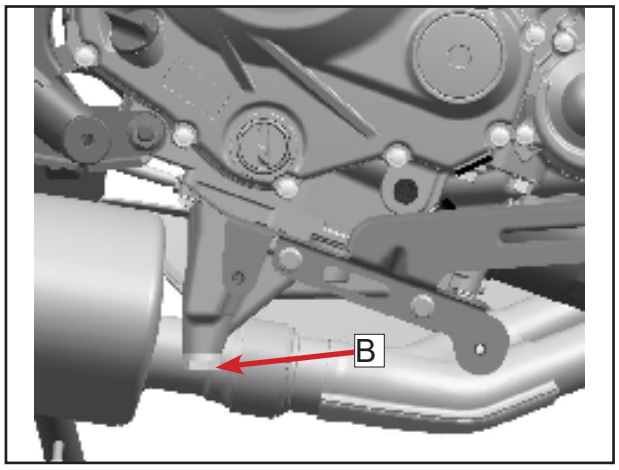
The oil in the oil filter can be drained by removing the filter (see Oil Filter Replacement).

Replace the drain bolt gasket with a new one.

- Tighten the drain bolt.

Torque - Engine Oil Drain Bolt:
30N•m (3.0kgf•m, 22ft•lb)

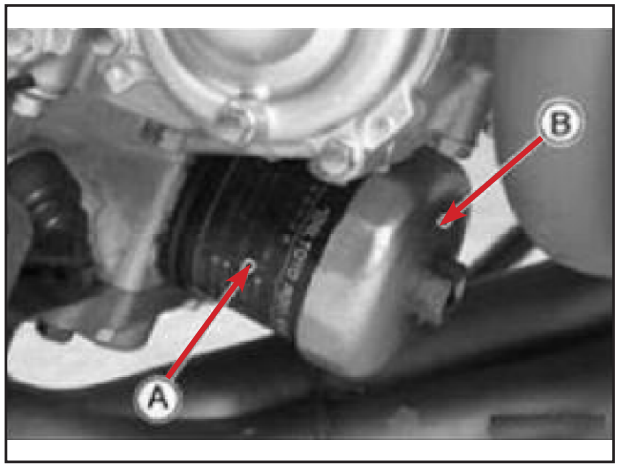
- Pour in the specified type and amount of oil.



Recommended Engine Oil
Type: ELF,10W-40/SJ level JASO MA2
Capacity: 2.2L (2.3US qt) (when filter is removed)
2.6L (2.7US qt) (when engine is completely dry)
NOTE

Although SAE15W-40 engine oil is the recommended oil for most conditions, the oil viscosity may need to be changed to accom-modate atmospheric conditions in your riding area.

- Check the oil level (see Oil Level Inspec-tion in the Engine Lubrication System chapter).



2.19.6 Oil Filter Replacement

- Drain the engine oil (see Engine Oil Change).
- Remove the oil filter [A] with the oil filter wrenc [B].

Special Tool - Oil Filter Wrench

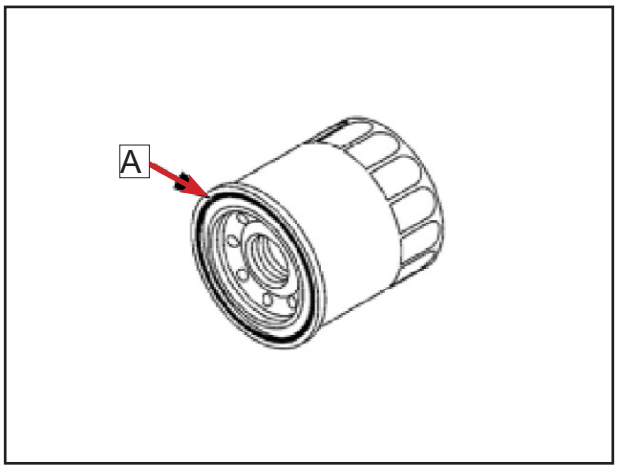
- Replace the filter with a new one.
- Apply engine oil to the gasket [A] before installation.
- Tighten the filter with the oil filter wrench.

Torque-Oil Filter:17N•m (1.75kgf•m, 13ft•lb)

NOTE

Oil filter can not be tightend by hand since it does not reach to specified tightening torque.

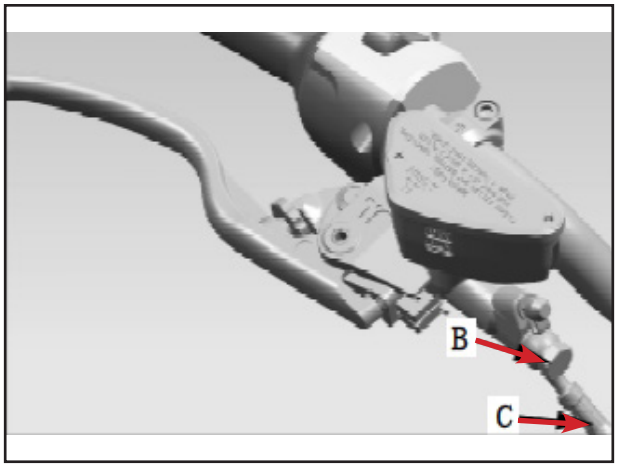
- Pour in the specified type and amount of oil (see Engine Oil Change).



2.19.7 Brake Hose and Pipe Replacement

CAUTION
Brake fluid quickly ruins painted plastic surfaces;any spilled fluid should be completely washed away immediately.

- When removing the brake hose,take care not to spill the brake fluid on the painted or plastic parts.
- When removing the brake hoses [C]. tem-porarily secure the end of the brake hose to some high place to keep fluid loss to a minimum.
- Immediately wash away any brake fluid that spills.

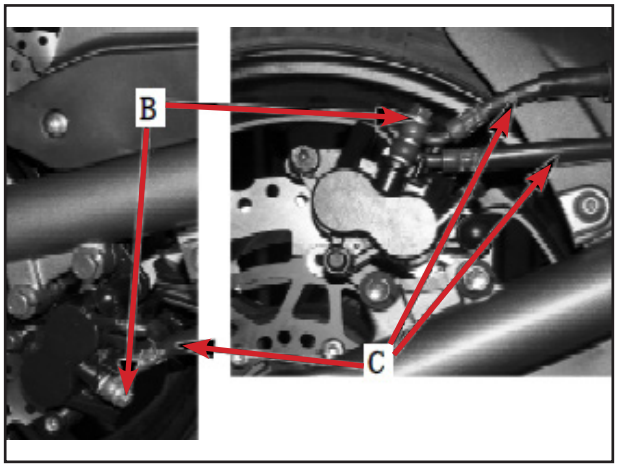


2.19.8 Brake Fluid Replacement

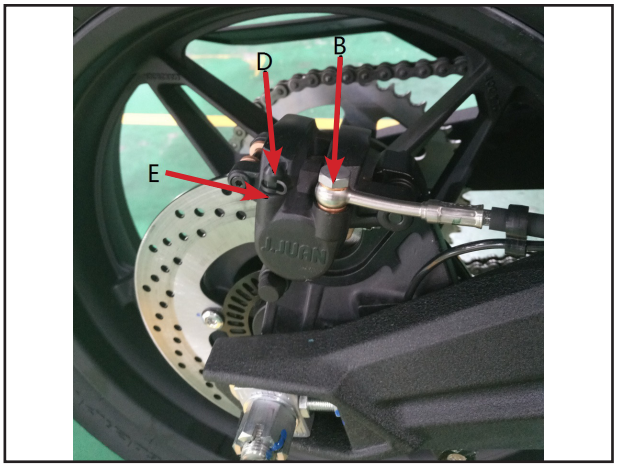
NOTE

The procedure to change the front brake fluid is as follows. Changing the rear brake fluid is the same as for the front brake.

- Level the brake fluid reservoir.
- Remove the reservoir cap and diaphragm.



- Remove the rubber cap from the bleed valve [D] on the caliper.
- Attach a clear plastic hose [E] to the bleed valve.and run the other end of the hose into a container.
- Fill the reservoir with fresh specified brake fluid.



Change the brake fluid.
Repeat this operation until fresh brake fluid comes out from the plastic hose or the color of the fluid changes.
1.Open the bleed valve [A].
2.Apply the brake and hold it [B].
3.Close the bleed valve [C].
4.Release the brake [D].

NOTE
The fluid level must be checked often during the changing operation and replenished with fresh brake fluid. If the fluid in the reser-voir runs out any time during the changing operation, the brakes will need to be bled since air will have en tered the brake line.
Front Brake:Repeat the above steps for the other caliper.

- Remove the clear plastic hose.
- Install the diaphragm and reservoir cap.
- Tighten

Torque-Front Brake Reservoir Cap Screws
1.0N•m (0.10kgf•m, 9in•lb)

- Follow the procedure below to install the rear brake fluid reservoir cap correctly.

Use criss cross screw driver [C] to tight the screw [D].
Torque - Bleed Valve:
7.8N•m (0.80kgf•m, 69in•lb)

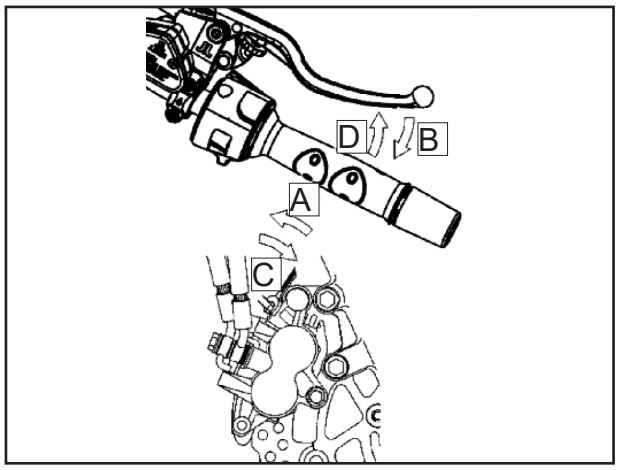
- After changing the fluid, check the brake for good braking power, no brake drag, and no fluid leakage.

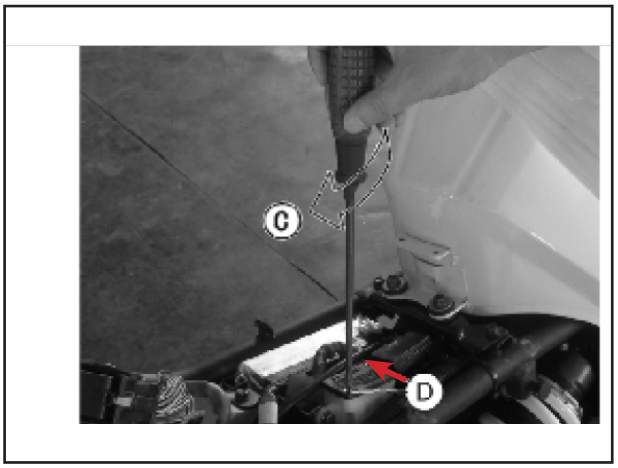
Bleed the air from the lines is a must.

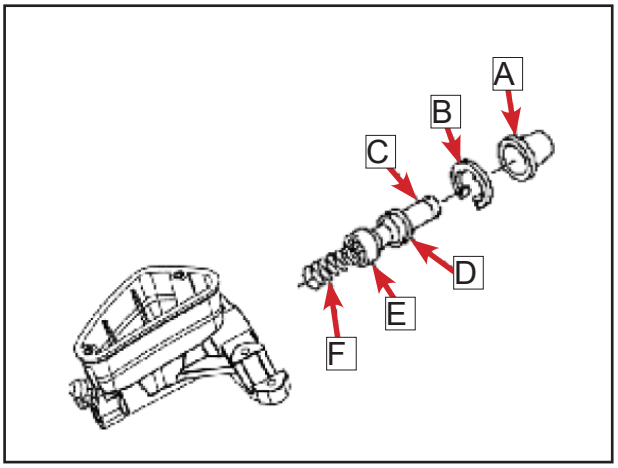
2.19.9 Master Cylinder Rubber Parts Replacement
Front Master Cylinder Disassembly

- Remove the front master cylinder (see Front Master Cylinder Removal in the Brakes chapter).
- Remove the reservoir cap and diaphragm, and pour the brake fluid into a container.
- Unscrew the locknut and pivot bolt, and remove the brake lever.
- Pull the dust cover [A] out of place, and remove the circlip [B].

Special Tool - Inside Circlip Pliers

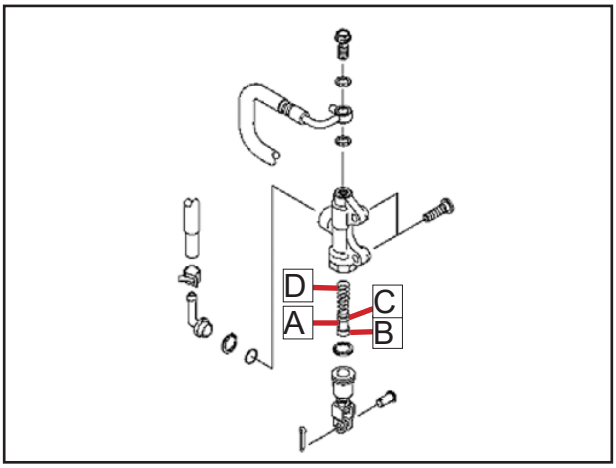






- Pull out the piston [C], secondary cup [D], primary cup [E], and return spring [F].

Rear Master Cylinder Disassembly
NOTE
Do not remove the push rod clevis for master cylinder disassembly since remova reguires brake position adjustment.



Remove rear master cylinder
Remove dust cover and circlip.
Special Tool - Inside Circlip Pliers
Pull out the push rod with the piston stop.
- Take off the piston [A], secondary cup [B],primary cup [C] and return spring [D]

CAUTION
Do not remove the secondary cup from the piston since removal will damage it.

Master Cylinder Assembly
- Before assembly, clean all parts including the master cylinder with brake fluid or alcohol.

CAUTION
Except for the disc pads and disc, use only disc brake fluid, isopropyl alcohol, or ethyl alcohol for cleaning brake parts. Do not use any other fluid for cleaning these parts. **Gasoline, engine oil, or any other petroleum distillate will cause deterioration of the rubber parts. Oil spilled on any part will be difficult to wash off completely, and will eventually deteriorate the rubber used in the disc brake.**

- Apply brake fluid to the new parts and to the inner wall of the cylinder.
- Take care not to scratch the piston or the inner wall of the cylinder.
- Tighten the brake lever pivot bolt and locknut.
- Apply silicone grease.
- Brake Lever Pivot Bolt
- Tighten:

Torque - Brake Lever Pivot Bolt:
1.0N•m (0.10kgf•m, 9in•lb)
Brake Lever Pivot Bolt Locknut:
6.0N•m (90.60kgf•m, 52in•lb)

2.19.10 Caliper Rubber Parts Replacement

Front Caliper Disassembly

- Removal:

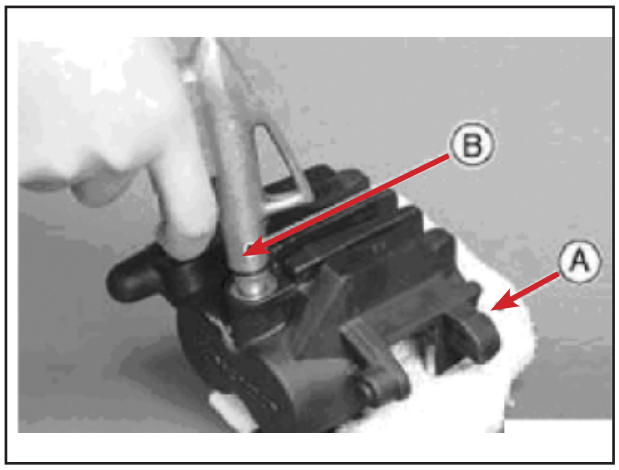
Front Caliper (see Front Caliper Removal in the Brakes chapter)

Brake Padal (see Front Brake Pad Removal in the Brakes chapter)

- Using compressed air,remove the pistons.

Cover the piston area with a clean, thick cloth [A].

Blow compressed air [B] into the hole for the banjo bolt to remove the piston.



⚠WARNING

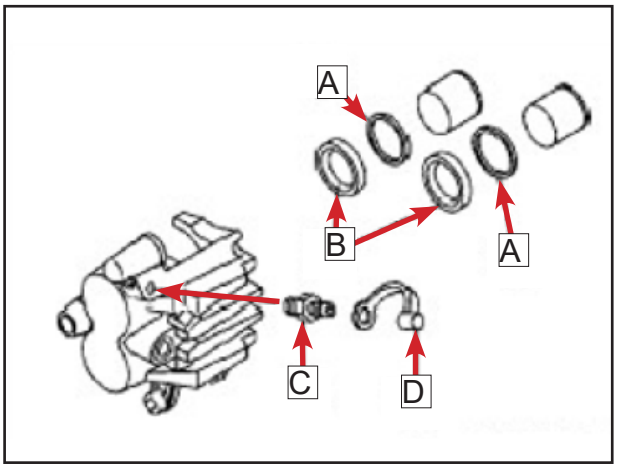
To avoid serious injury, never place your fingers or palmin front of the piston. If you apply compressed air into the caliper, the piston may crush your hand or fingers.

Pull out the pistons by hand.

- Remove the dust seals [A] and fluid seals [B].
- Remove the bleed valve [C] and rubber cap [D].

NOTE

If compressed air is not available,with the brakehose still attached,apply the brake le-ver toremove the piston. The remaining pro-cess is asdescribed above.



Front Caliper Assembly

- Clean the caliper parts except for the pads.

CAUTION

For cleaning the parts, use only disc brake fluid, isopropyl alcohol, or ethyl alcohol.

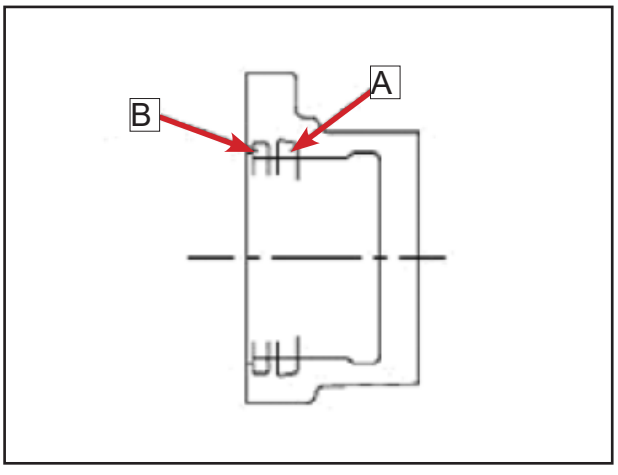
- Install the bleed valve and rubber cap.
- **Torque - Bleed Valve:**

7.8N•m (0.80kgf•m, 69in•lb)

Replace the fluid seals [A] with new ones.

Apply brake fluid to the fluid seals, and install them into the cylinders by hand.

- Replace the dust seals [B] with new ones if they are damaged.
- Apply brake fluid to the dust seals, and install them into the cylinders by hand.



- Apply brake fluid to the outside of the pistons, and push them into each cylinder by hand.
- Check the shaft rubber friction boot [A] and the dust cover [B] replace them with new ones if they are damaged.
- Apply a thin coat of PBC (Poly Butyl Cuprysil) grease to the caliper holder shafts

[C] and holder holes [D] (PBC is a special high-temperature, water-resistance grease).

- Install the anti-rattle spring [A].
- Install the pads (see Front Brake Pad Instal-lation in the Brakes chapter).
- Wipe up any spilled brake fluid on the cali-per with wet cloth.

Rear Caliper Disassembly

- Remove the rear caliper (see Rear Caliper Removal in the Brakes chapter).
- Remove the pads and anti-rattle spring (see Rear Brake Pad Removal in the Brakes chapter).
- Using compressed air, remove the piston.

Cover the piston area with a clean, thick cloth [B].

Blow compressed air [A] into the hole for the banjo bolt to remove the piston.

- Remove the dust seal and fluid seal.
- Remove the bleed valve and rubber cap.

NOTE

If compressed air is not available, with the brake hose still attached,apply the brake pedal to remove the piston. The remaining process is as described above.

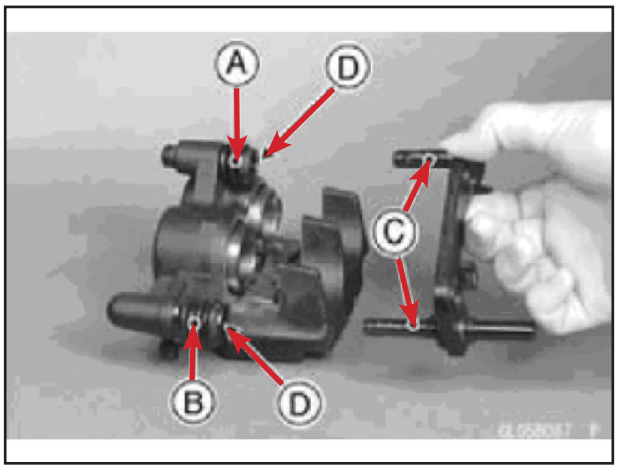
Rear Caliper Assembly

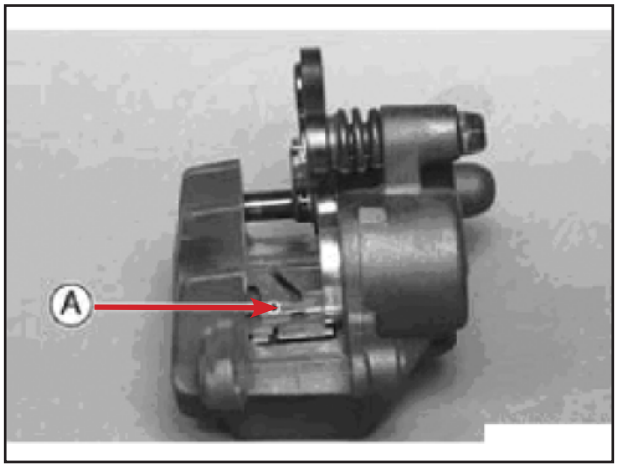
- Clean the caliper parts except for the pads.
- Install the bleed valve and rubber cap.
- **Torque - Bleed Valve:**

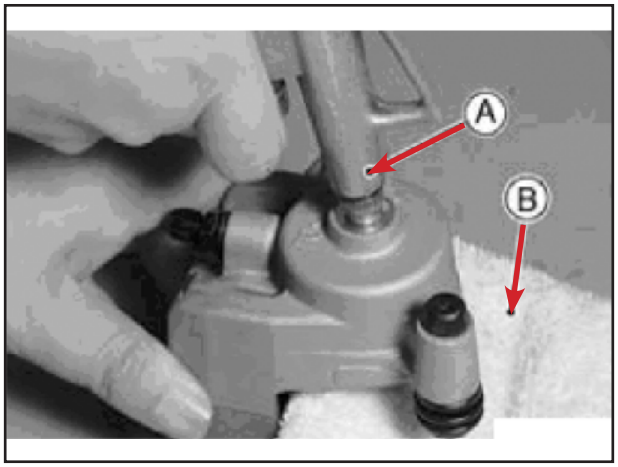
7.8N•m (0.80kgf•m,69in•lb)

- Replace the fluid seal [A] with a new one.

Apply brake fluid to the fluid seal, and instal







it into the cylinder by hand.

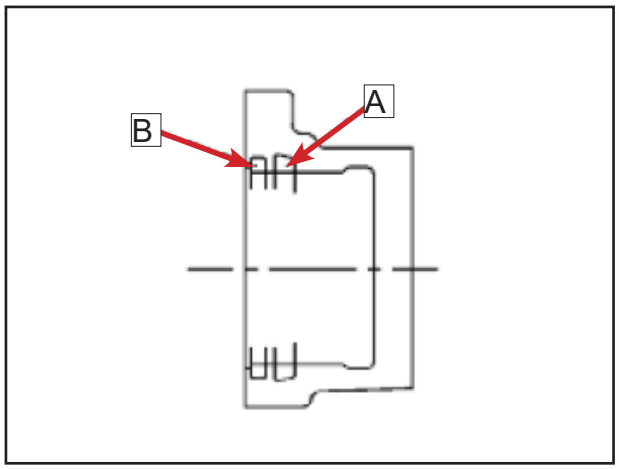
- Replace the dust seal [B] with a new one if it is damaged.

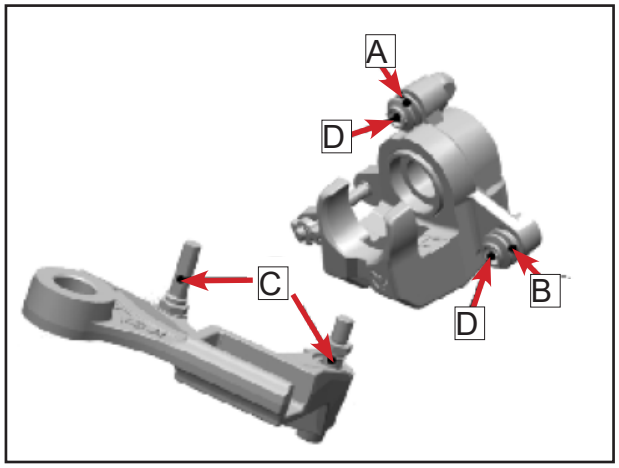
Apply brake fluid to the dust seal, and install it into the cylinder by hand.

- Apply brake fluid to the outside of the piston, and push it into the cylinder by hand.
- Replace the shaft rubber friction boot [A] and dust cover [B] if they are damaged.
- Apply a thin coat of PBC (Poly Butyl Cuprysil) grease to the caliper holder shafts

[C] and holderholes [D](PBC is a special high temperature, water-resistance grease).

- Install the anti-rattle spring [A] in the caliper as shown.
- Install the pads (see Rear Brake Pad Instal-lation in the Brakes chapter).
- Wipe up any spilled brake fluid on the cali-per with wet cloth.





2.19.11 Spark Plug Replacement

- Removal:

Ignition Coils (see Ignition Coil (Ignition Coil together with Spark Plug Cap) Removal in the Electrical System chapter)

- Remove the spark plugs using the 16 mm plug wrench [A].

Owner's Tool - Spark Plug Wrench 16mm

- Insert the spark plug vertically into the plug hole with the spark plug installed in the plug wrench [A].

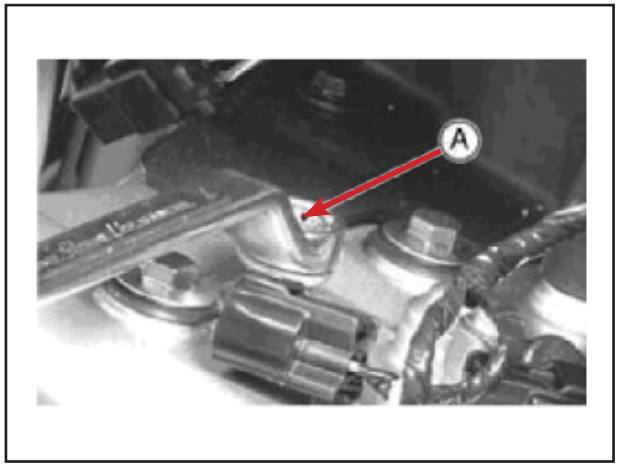
Owner's Tool - Spark Plug Wrench, 16 mm

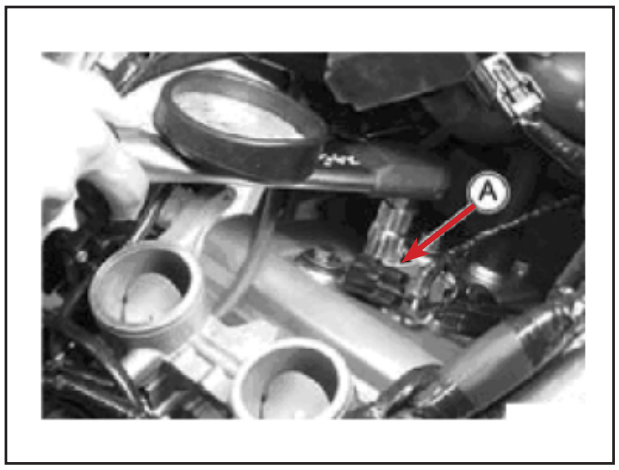
- Tighten:

Torque-Spark Plugs:15N•m (1.5kgf•m, 11ft•lb)

- Installation

Ignition Coils (see Ignition Coil (Ignition Coil together with Spark Plug Cap) Installation in the Electrical System chapter)





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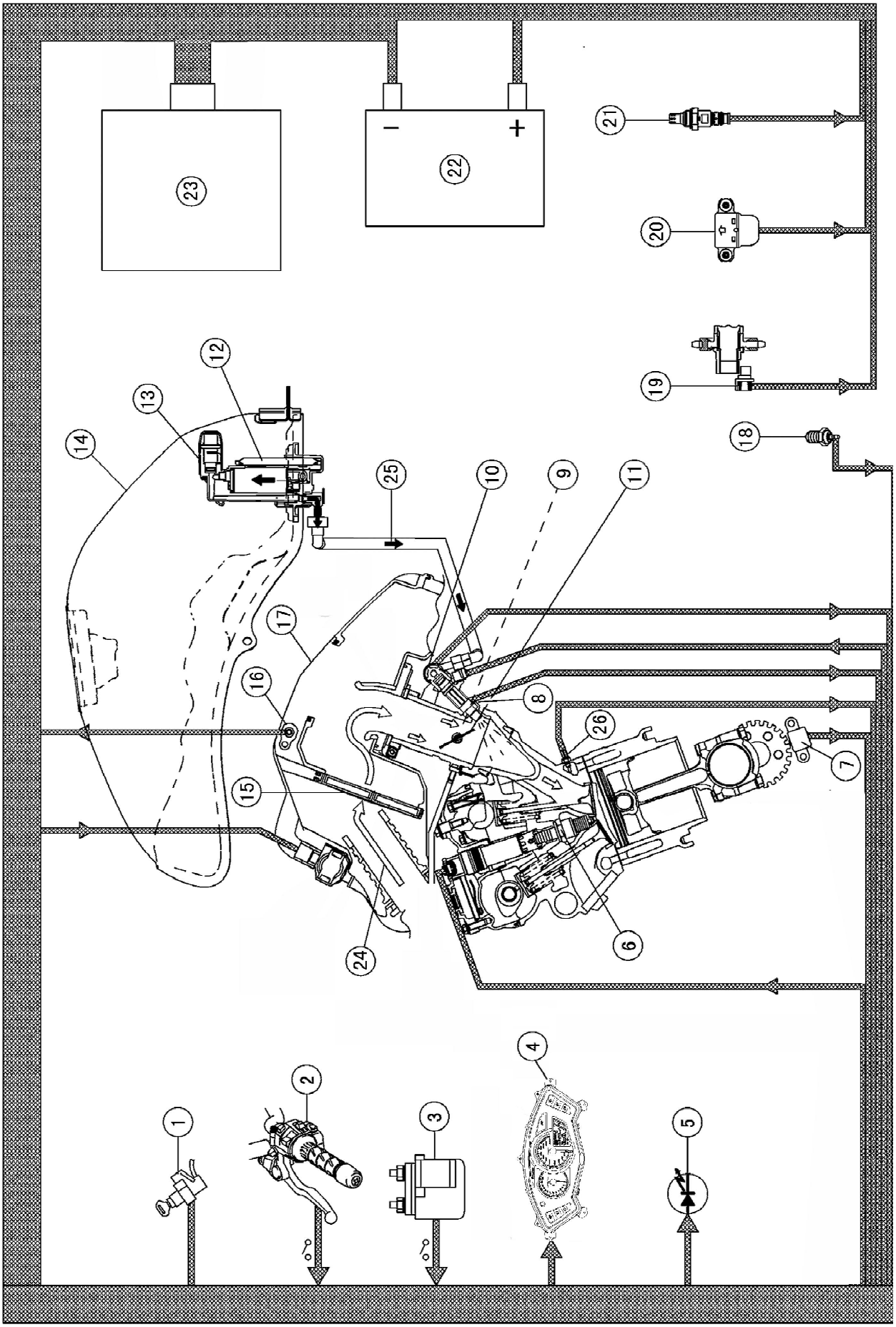
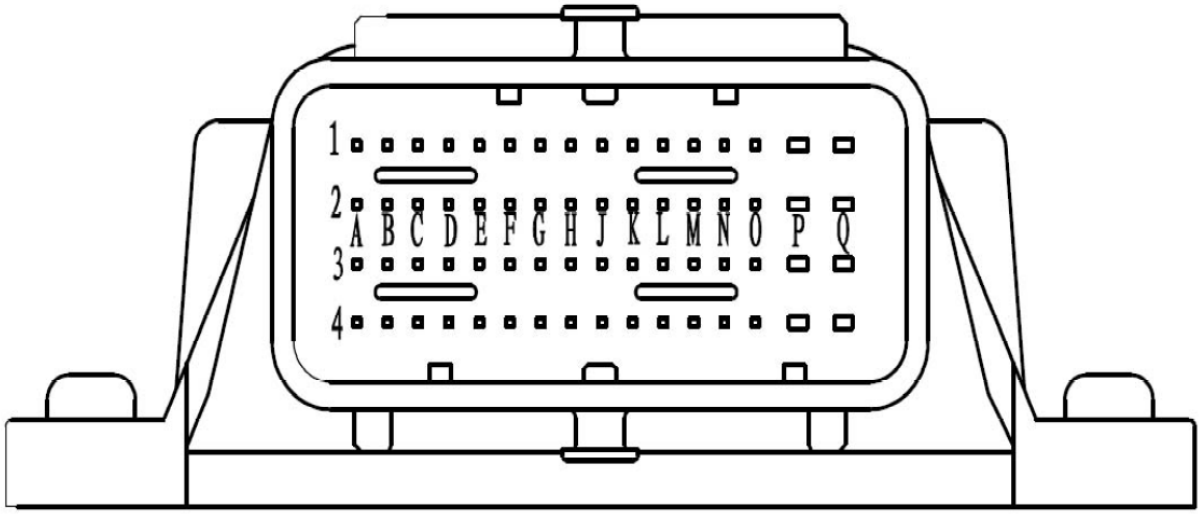
3.1 Composition of EFI system

△ FUEL SYSTEM (EFI)



1. Ignition Switch
2. Engine Stop Switch
3. Starter Relay
4. Tachometer
5. MIL (LED)
6. Spark Plug
7. Trigger (Crankshaft Position Sensor)
8. Fuel Injector
9. Throttle Position Sensor
10. Fuel Rail
11. Throttle Body Valve
12. Fuel Pump
13. Pressure Regulator
14. Fuel Tank
15. Air Filter Element
16. Inlet Air Temperature Sensor
17. Air Filter Housing
18. Neutral Switch
19. Speed Sensor
20. Roll-over Sensor
21. Oxygen Sensor
22. Battery
23. ECU
24. Inlet Airf low Direction
25. Pressurized Fuel Direction
26. Coolant Temperature Sensor

3.2 ECU Pin and Function



ECU pin and function
1(Q1) Null
2(P1) Oxygen sensor 1 heating
3(Q2) Ignition Coil 1
4(P2) Oxygen sensor 2 heating
5(Q3) Ignition ground wire
6(P3) Null
7(Q4) Ignition coil 2
8(P4) Uncontinuous power
9(O1) Engine RPM output
10(N1) Null
11(M1) Roll-Over switch
12(L1) Null
13(K1) Confort/Sport mode switch
14(J1) Neutral Switch
15(H1) Cable K diagnosis
16(G1) Continuous power
17(F1) Ignition switch
18(E1) 5V Power 2
19(D1) 5V Power 1
20(C1) MIL Light
21(B1) Stepper motor phase B
22(A1) Stepper motor phase A
23(O2) Null
24(N2) Null
25(M2) Air inlet temperature signal
26(L2) Throttle position sensor
27(K2) Clutch switch
28(J2) Null
29(H2) Oxygen Sensor 2
30(G2) Null
31(F2) Null
32(E2) Main Relay
33(D2) Null
34(C2) Null
35(B2) Stepper motor phase C
36(A2) Stepper motor phase D
37(O3) Carbon solenoid valve
38(N3) Null
39(M3) Ground to sensors1
40(L3) Ground to sensors2
41(K3) Coolant temperature sensor
42(J3) Side stand switch
43(H3) Ground to electric
44(G3) Null
45(F3) Oxygen Senor 1
46(E3) Engine phase sensor B
47(D3) Engine phase sensor A
48(C3) Power to ground
49(B3) Injector 2
50(A3) Injector 1

ECU pin and function

51 (O4) Uncontinuous power
52 (N4) Auxiliary Relay
53 (M4) Null
54 (L4) Ground to Sensors 3
55 (K4) Null
56 (J4) Null
57 (H4) Null
58 (G4) Null
59 (F4) Air intake pressure sensor
60 (E4) Oil pump sensor
61 (D4) Null
62 (C4) Fan Relay
63 (B4) Unused
64 (A4) Unused

3.3 EFI Specifications

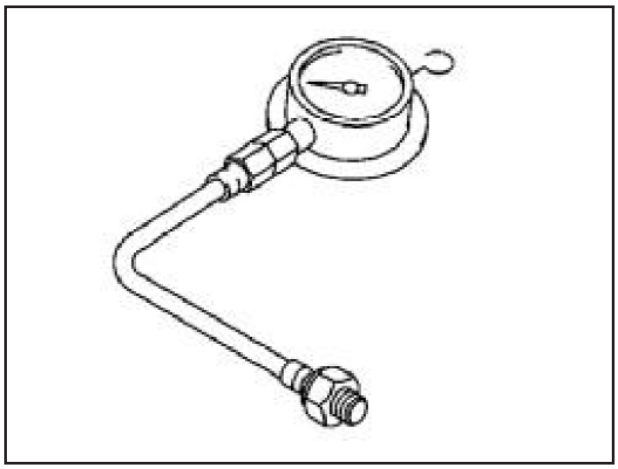
Item	Standard
EFI	
Idle Speed	1450r/min±145r/min (rpm)
Throttle Body Assy:	
Type	Two barrel type
Bore	Φ38mm
ECU:	
Make	UAES
Type	Digital memory type, with IC igniter,sealed with resin
Available Engine Speed	100r/min~11000r/min (rpm)
Fuel Pressure (High Pressure Line):	
After Ignition Switch is ON	323kPa (3.3kgf/cm^2,47psi) with fuel pump running.
After 3 Seconds from Ignition Switch is ON	265kPa (2.7kgf/cm^2,38psi) with fuel pump stopped
With Engine Idling	333kPa (3.4kgf/cm^2,48psi) with fuel pump running
Fuel Pump:	
Type	In-tank friction pump
Leakage	60mL or more in every 3 seconds
Fuel Injectors:	
Type	F01R00M139
Nozzle Type	One spray with 4 holes
Resistance	About 12 Ω at 20°C (68°F)
Throttle Position Sensor	Non-adjustable and non-movable
Input Voltage	4.75V~5.25V DC between Lg/Y and Gr/R
Output Voltage at Idle Throttle Opening	0.34V~0.64V DC between Lg/Y and Br/R
Output Voltage at Full Throttle Opening	More than or equal to 4V DC between Lg/Y and Br/R
Inlet Air Temperature Sensor:	
Resistance	See text in Inlet Air Temperature Sensor Section
Output Voltage at ECU	About 2.5V~3.50V at 20°C
Coolant Temperature Sensor:	
Resistance	See Electrical System chapter
Output Voltage at ECU	About 2.5V~3.50V at 20°C
Speed Sensor:	
Input Voltage at Sensor	About 9V~11V DC at Ignition Switch is ON
Output Voltage at Sensor	About 0.05V~1V DC at Ignition Switch is ON and speed at 0 km/h
Roll-Over Sensor:	
Detection Method	Resistance detection method
Detection Angle	More than 55°~75° for each bank

EFI Specifications

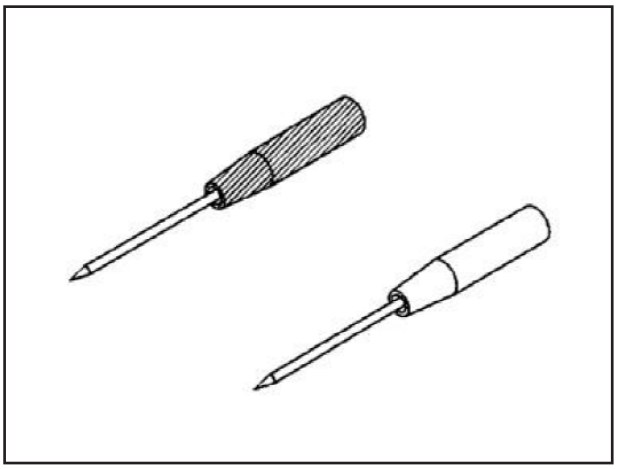
Item	Standard
Oxygen Sensor:	
Output Voltage (high)	0.7V or higher
Output Voltage (low)	0.2V or lower
Throttle Grip and Cables Throttle Grip Free Play	2mm~3mm (0.08in~0.12in.)

3.4 Maintanence Tool

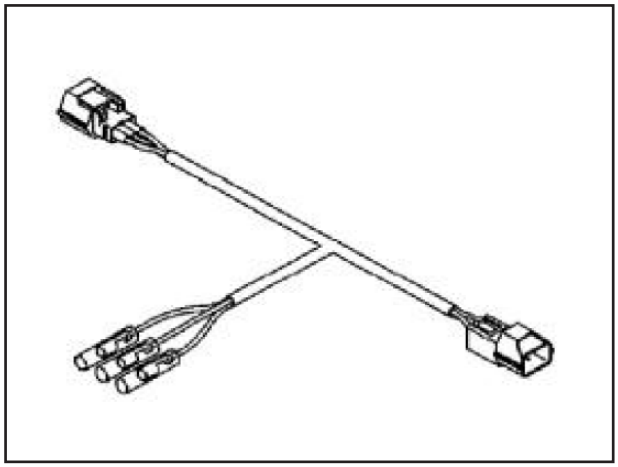
Oil Pressure Gauge



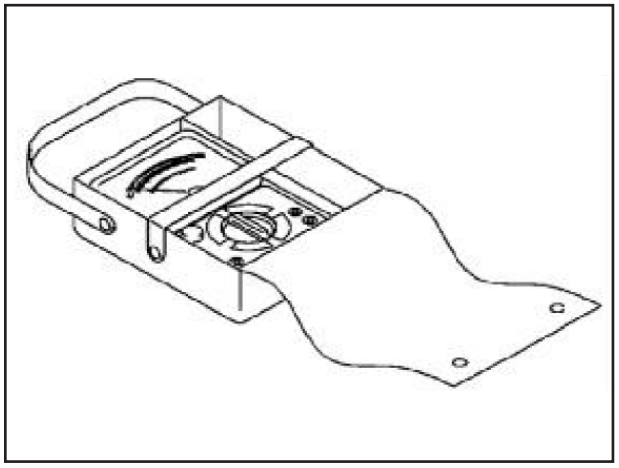
Needle Adaptor Set



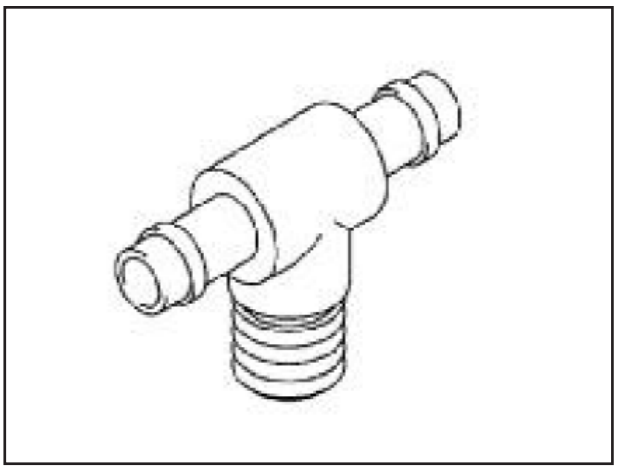
Throttle Sensor Setting Harness



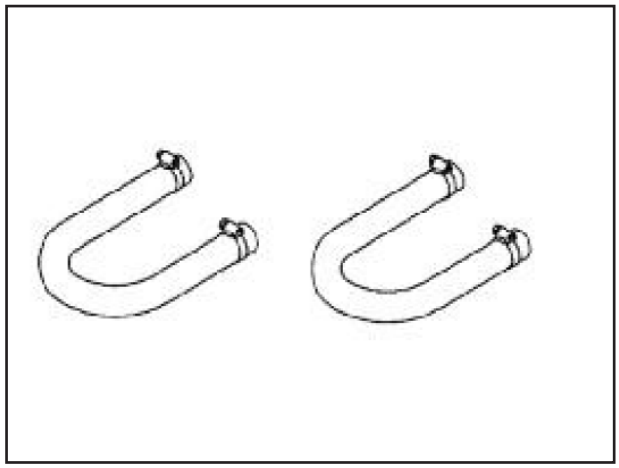
Hand Tester



T-joint

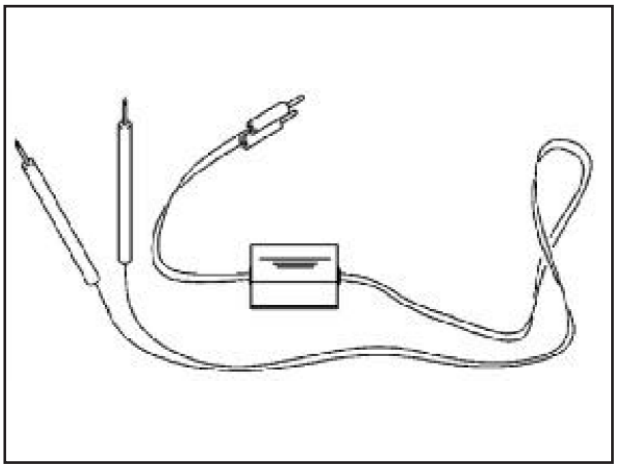


Fuel Hose



Maintanence Tool

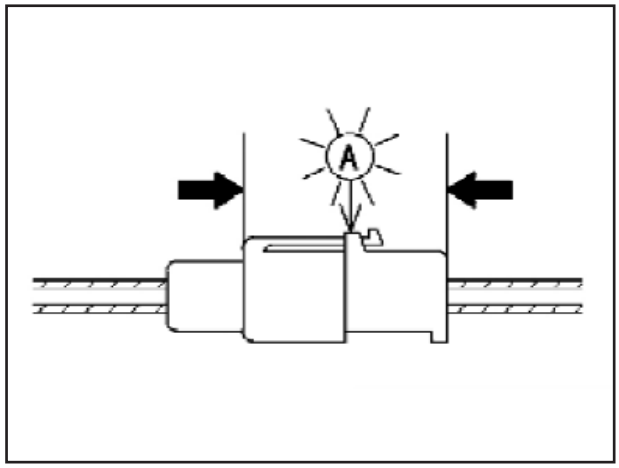
Peak Voltage Adapter



3.5 EFI Servicing Precautions

There are some important precautions that should be followed when service the EFI system.

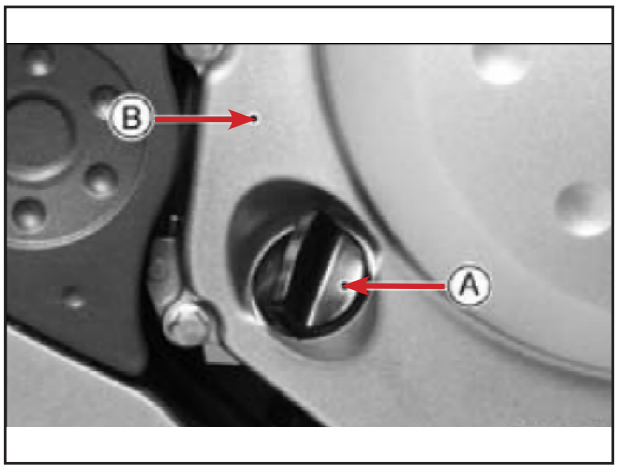
- This EFI system is designed to be used with a 12V sealed battery as its power source.Do not use any other battery except for a 12V sealed battery as a power source.
- Do not reverse the battery cable connections. This will damage the ECU.
- To prevent damage to the EFI parts, do not disconnect the battery cables or any other electrical connections when the ignition switch is on or while the engine is running.
- Take care not to short the leads that are directly connected to the battery positive (+) terminal to the chassis ground.
- When charging, remove the battery from the motorcycle. This is to prevent ECU damage by excessive voltage.
- Do not turn the ignition switch ON while any of the EFI electrical connectors are disconnected. The ECU memorizes service codes.
- Do not spray water on the electrical parts,EFI parts, connectors, leads, and wiring
- Whenever the EFI electrical connections are to be disconnected, first turn off the ignition switch, and disconnect the battery (-) terminal. Do not pull the lead, only the connector. Conversely, make sure that all the EFI electrical connections are firmly reconnected before starting the engine.
- Connect these connectors until they click [A].
- If a transceiver is installed on the vehicle,makesure that EFI system operation is not influenced by electric wave radiated from the antenna. Check operation of the system with the engine at idle. Locate the antenna as far as possible away from the ECU.



EFI Servicing Precautions

- When any fuel hose is disconnected, fuel may spout out by residual pressure in the fuel line. Cover the hose joint with a piece of clean cloth to prevent fuel spillage.
- When any fuel hose is disconnected, do not turn on the ignition switch. Otherwise,the fuel pump will operate and fuel will spout from the fuel hose.
- Do not operate the fuel pump if the pump is completely dry.
- Before removing the fuel system parts, blow the outer surfaces of these parts clean with compressed air.
- To prevent corrosion and deposits in the fuel system, do not add to fuel any fuel an tifreeze chemicals.

To maintain the correct fuel/air mixture (F/A), there must be no inlet air leaks in the EFI system. Be sure to install the oil filler plug [A] and Clutch Cover [B] properly after filling the engine oil.



3.6 EFI Malfunction Excluded

3.6.1 Outline

When an abnormality in the system occurs, the MIL (LED) goes on to alert the rider on the meter panel. In addition, the condition of the problem is stored in the memory of the ECU (electronic control unit). With the engine stopped and turned in the self diagnosis mode, the ser-vice code [A] is indicated by the number of times the FI indicator light (LED) blinks.

When due to a malfunction, the MIL (LED) re-mains lit, ask the rider about the conditions [B] under which the problem occurred and try to determine the cause [C].

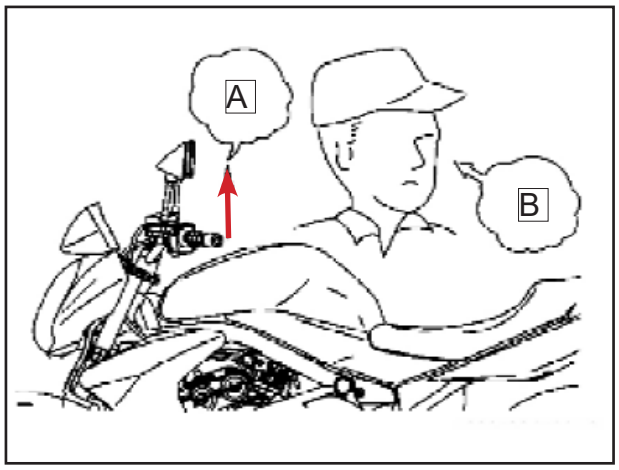
First, conduct a self-diagnosis inspection and then a non-self-diagnosis inspection. The non-self-diagnosis items are not indicated by the MIL (LED). Don't rely solely on the EFI

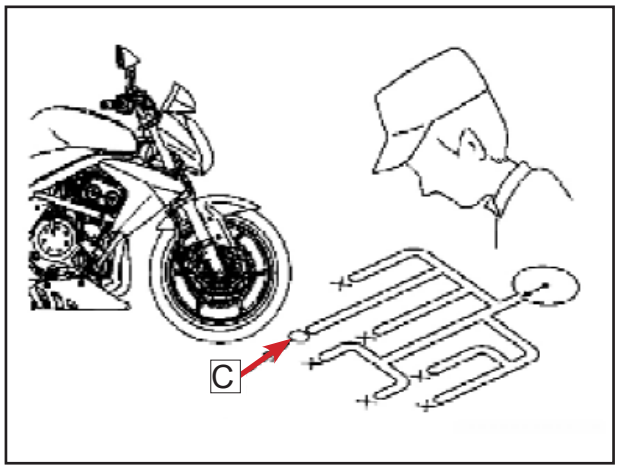
self-diagnosis function,use common sense. Even when the EFI system is operating normally, the FI indicator light (LED) [A] may light up un-der strong electrical interference. No repair needed. Turn the ignition switch OFF to stop the indicator light.

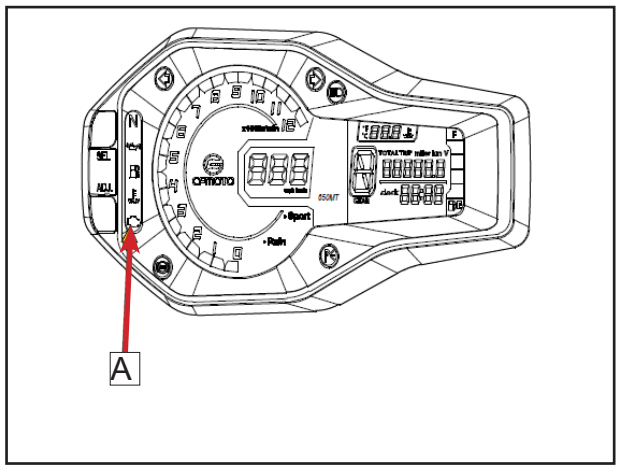
When the MIL (LED) goes on and the motorcycle is brought in for repair, check the service codes. When the repair has been done, the light (LED) doesn't go on. But the service codes stored in memory are not erased to preserve the prob-lem history, and the light (LED) can display the codes in the self-diagnosis mode. The problem history is referred when solving unstable problems.

When the motorcycle is down, the vehicle-down sensor is turned OFF and the ECU shuts off the fuel injectors and ignition system. The MIL (LED) blinks but the service code cannot be displayed. The ignition switch is left ON. If the starter button is pushed, the electric starter turns but the en-gine doesn't start.

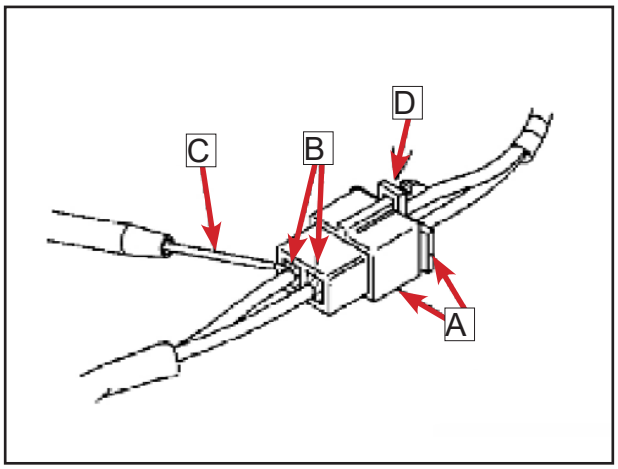
To start the engine again, raise the motorcycle, turn the ignition switch OFF, and then ON. The vehicledown sensor is turned ON and the light (LED) goes OFF.





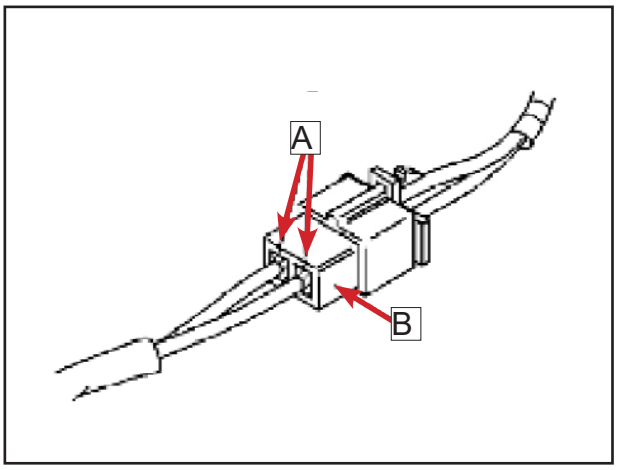


- The DFI part connectors [A] have seals [B], including the ECU.
- Join the connector and insert the needle adapters[C] inside the seals [B] from behind the connector until the adapter reaches the terminal.



CAUTION
Insert the needle adapter straight along the terminal in the connector to preve nt short-circuit between terminals.

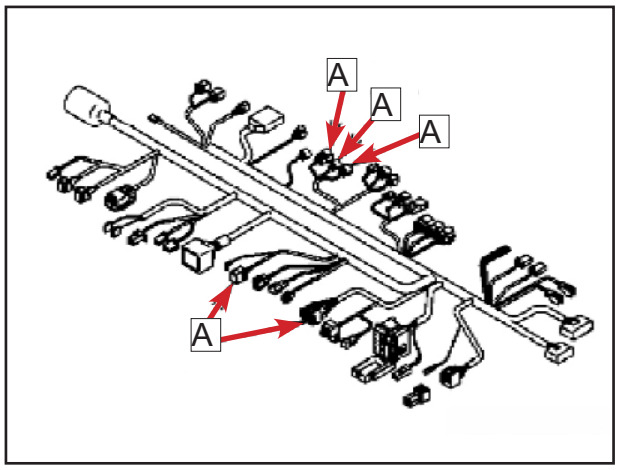
- Make sure that measuring points are cor-rect in the connector, noting the position of the lock [D] and the lead color before measurement.Do not reverse connections of the hand tester or a digital meter.
- Becareful not to short-circuit the leads of the EFI or electrical system parts by contact between adapters.
- Turn the ignition switch ON and measure the voltage with the connector joined.

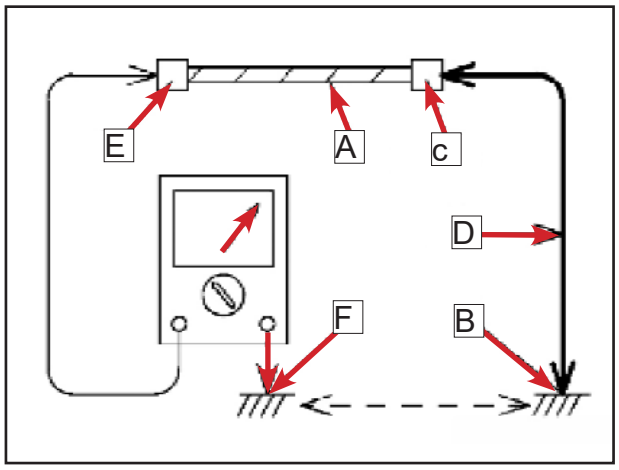


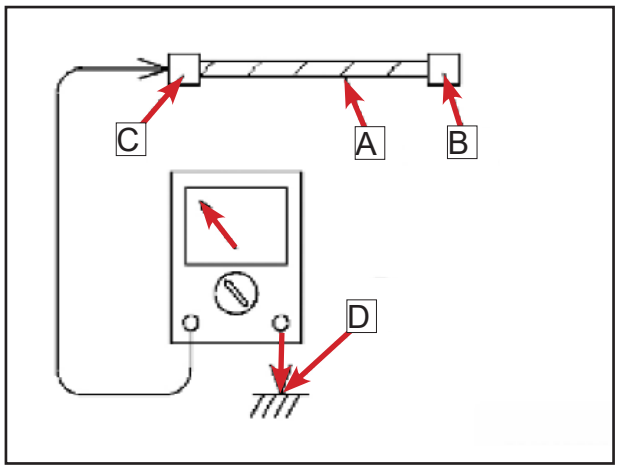
CAUTION
Incorrect, reverse connection or short circuit by needle adapters could dam-age the DFI or electrical system parts.

- After measurement, remove the needle adapters and apply silicone sealant to the seals [A] of the connector [B] for waterproofing.
- Always check battery condition before replacing the EFI parts. A fully charged bat-tery is a must for conducting accurate tests of the EFI system.
- Trouble may involve one or in some cases all items. Never replace a defective part with out determining what CAUSED the problem. If the problem was caused by some other item or items, they too must be repaired or replaced, or the new replacement part will soon fail again.

- Measure the electrical resistance of the coil after the EFI parts cool down.
- Make sure the electric connection clean and tight. And check the wire if it got burned, abrasion,too short and etc. Damaged cable and bad connection can cause the trouble comes out again and again and make the EFI system running unstable.
- If the cable is damaged or aging. Please replace the cable.
- Disconnect each connectors[A]And check if there is any corrosion, dust or damaged.
- If connectors getting corrosions or dusted. Please clean up carefully. If the connectors get-ting damaged.Plase replace the connectors. Connectors should be well connected.
- Check the wiring continuity. Use the wir-ing diagram to find the trouble wire termination.
- Connect the AVO meter on wire termination.
- Set the AVO meter on X1Ω mode. And read out the data showing on AVO meter.
- If the data is not 0Ω. Means the prob-lem on cable.Replace the maincable or sec-ondary cable.
- If the cable[A] is far. Use a Cable[D] Con-nect [C] o the ground[B] and check another connector[E] and[F] to make sure it is OK. That can check the connection of the long cable. If connection is poor, replace the cable.
- When check the cable[A] shortcut or not,Open[B] side and check the connection from another side [C] to [D]. If OK, the cable has shortcut and needs repairing.
- Check the ECU connection again and again, To make the trouble easier point out.
- If the wire and connector has no trouble, then EFI parts may be next point. Use input and out put voltage checking way. But it cannot check the ECU itself.







- If you find trouble, replace the trouble parts. If the wire, connector and EFI parts has no trouble. Replace the ECU

- **Lead Color Codes:**

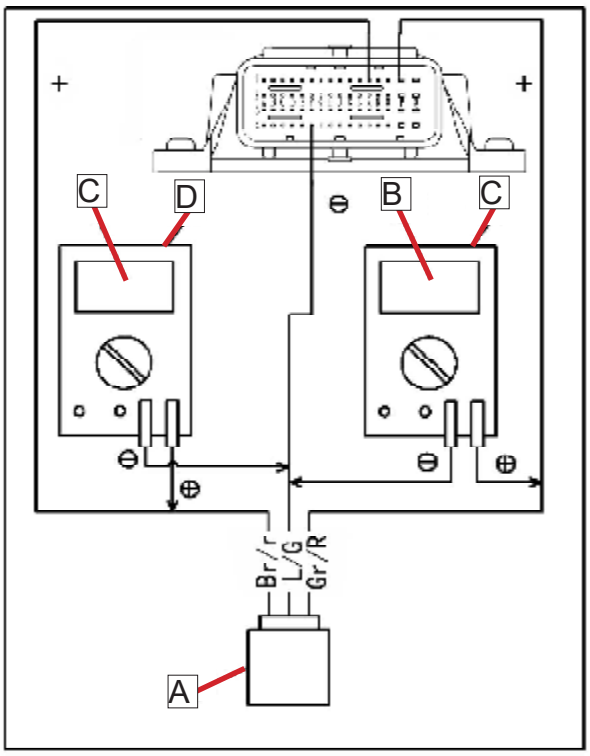
B:Black L:Blue Gr:Grey
Br:Brown G: Green Lg:Light Green
Sb:Sky Blue O:Orange R:Red
P:Purple W:White Y:Yellow

EFI Malfunction Excluded

There are two ways to inspect the EFI system. One is voltage Check Method and the other is Resistance Check Method.

(Voltage Check Method)

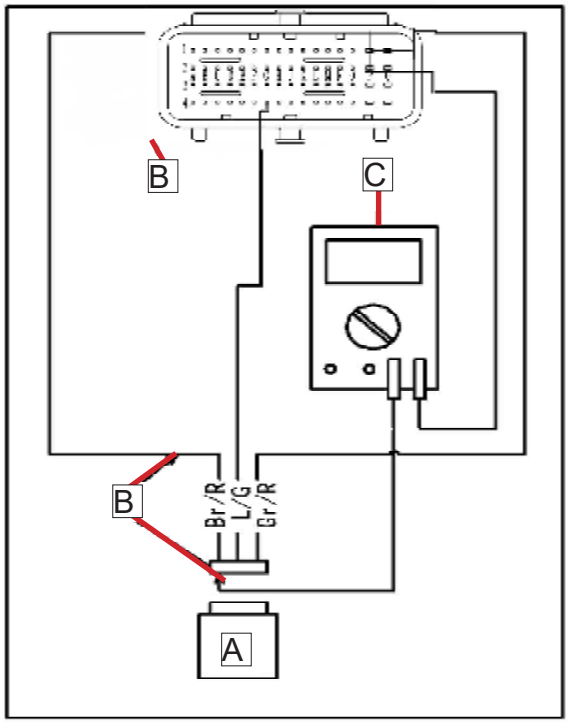
- This method is conducted by measuring the input voltage [B] to a sensor [A] first and then the output voltage [C] from the sensor.
- Sometimes this method can detect a fault of the ECU.
- Refer to each sensor inspection section for detail in this chapter.
- Use a fully charged battery and a digital meter [D] which can be read two decimal places voltage or resistance.



(Resistance Check Method)

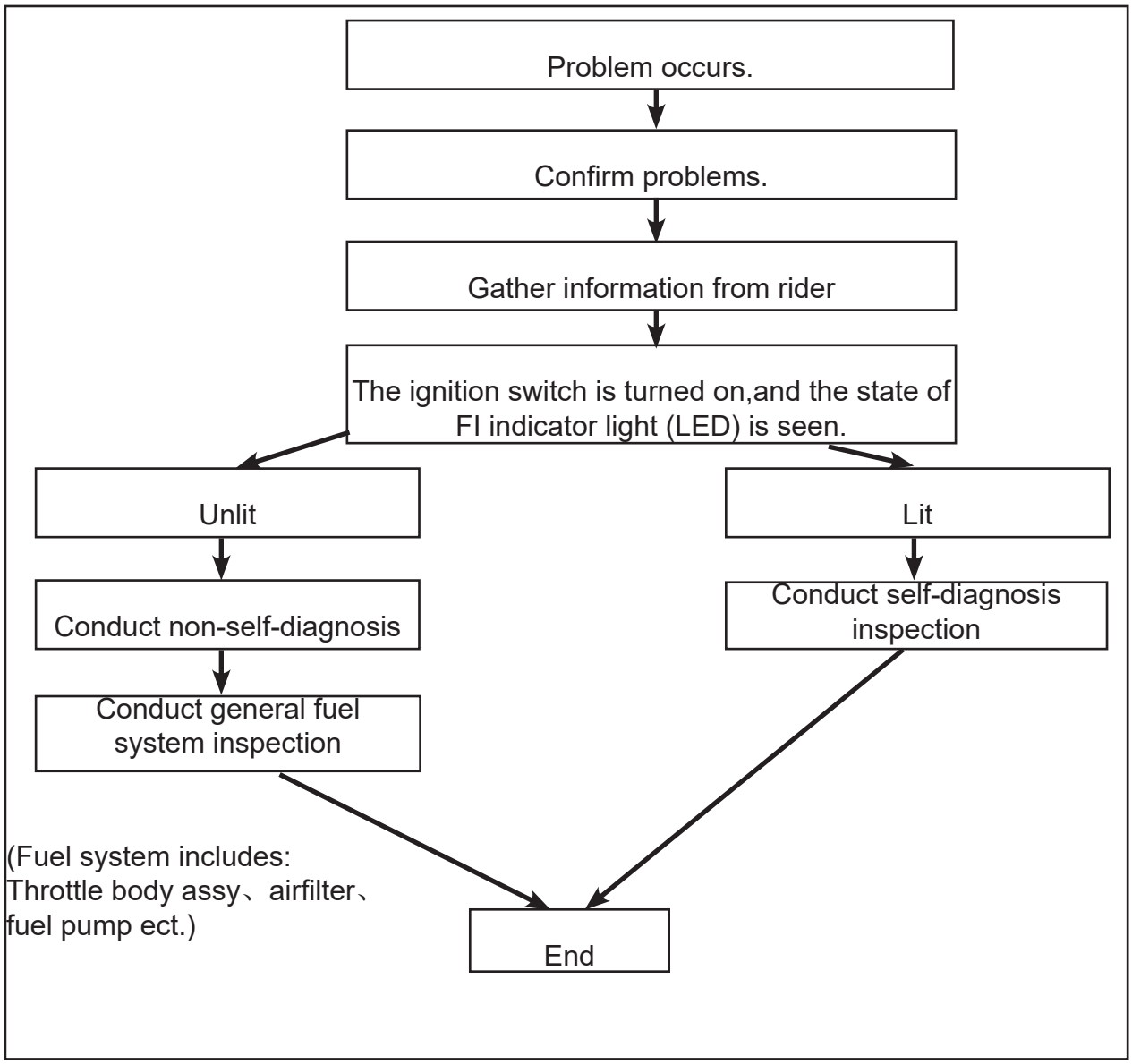
- This method is simple. No need for a fully charged battery and the needle adapter.Just do the following especially when a sen sor [A] is suspect.
- Turn the ignition switch OFF and discon-nect the connectors.
- Inspect the sensor resistance, using a digital meter (see each sensor inspection).
- Inspect the wiring and connectors [B] for continuity, using the hand tester [C] (analog tester) rather than a digital meter.

If the sensor, the wiring and connections are good, inspect the ECU for its ground and power supply (see ECU Power Supply Inspection). If the ground and power supply are good, the ECU is suspect. Replace the ECU.



EFI Malfunction Excluded

3.6.2 EFI Diagnosis Process Chart



Inquiries to Rider

- Each rider reacts to problems in different ways, so it is important to confirm what kind of symptoms the rider has encountered.
- Try to find out exactly what problem occurred under exactly what conditions by asking the rider; knowing this information may help you reproduce the problem.
- The following sample diagnosis sheet will help prevent you from overlooking any areas, and will help you decide if it is an EFI system problem, or a general engine problem.

EFI Malfunction Excluded

3.6.3 Sample Diagnosis Sheet

Rider name:		Registration No. (License plate No.):
Year of initial registration:		Model:
Engine No.:		Frame No.:
Date problem occurred:		Mileage:
Environment when problem occurred.		
Weather	fine, cloudy, rain, snow, always, other:	
Temperature	hot, warm, cold, very cold, always	
Problem frequency	chronic, often, once	
Road	street, highway, mountain road (uphill, downhill), bumpy,	
Altitude	normal, high (about 1000 m), higher (more than 2000m)	
Motorcycle conditions when problem occurred.		
FI indicator light (LED)	□light up immediately after ignition switch ON, and goes off after 5s	
	□lights blinks 10s after ignition switch ON, and stays on (EFI problem)	
	□light up 5s after ignition switch on，then blink 15 times and stay on (indicate mantainence)	
	□Non-lights (light (LED), ECU, speedometer or its wiring fault)	
	□sometimes lights up (probably wiring fault)	
Starting difficulty	□starter motor not rotating	
	□starter motor rotating but engine doesn't turn over	
	□starter motor and engine don't turn over	
	□no fuel flow (no fuel in tank, no fuel pump sound)	
	□engine flooded (do not crank engine with throttle opened, which promotes engine flooding)	
	□no spark	
	□other	
Engine stops	□after starting	
	□when opening throttle grip	
	□when closing throttle grip	
	□when moving off	
	□when stopping the motorcycle	
	□when cruising	
	□others	
Bad operation at low speed	□very low idle speed, very high idle speed, rough idle speed	
	□battery voltage is low (charge the battery)	
	□spark plug loose (tighten it)	
	□spark plug dirty, broken, or gap maladjusted (remedy it)	
	□back firing	
	□after firing	
	□hesitation when acceleration	
	□engine oil viscosity too high	
	□brake dragging	

	□clutch slipping
	□others
Poor running or no power at high speed	□spark plug loose (tighten it)
	□spark plug dirty, broke, or gap maladjusted (remedy it)
	□spark plug incorrect (replace it)
	□knocking (fuel poor quality or incorrect，use high-octane gasoline)
	□brake dragging
	□clutch slipping
	□engine overheated
	□engine level too high
	□engine oil viscosity too high
	□others

EFI Malfunction Excluded

3.6.4 EFI System Trouble Shooting Guide

NOTE

- This is not an exhaustive list, giving every possible cause for each problem listed. It is meant simply as a rough guide to assist the troubleshooting for some of the more common diffi culties.
- The ECU may be involved in the EFI electrical and ignition system troubles. If these parts andcircuits are checked out good, be sure to check the ECU for ground and power supply. If the ground and power supply are checked good, replace the ECU.

Engine Doesn’t Start, Starting Diffculty

Symptoms or possible Causes	Actions (chapter)
Starter motor doesn't rotate:	
Ignition and engine stop switches not ON	Turn both switches ON.
Clutch switch or neutral switch trouble	Inspect (see chapter 16).
Starter motor trouble	Inspect (see chapter 16).
Low battery voltage	Inspect and charge (see chapter 16)
Starter or auxiliary relays not contacting or operating	Inspect the starter relay (see chapter 16)
Starter button not contacting	Inspect and replace (see chapter 16).
Starter system wiring open or shorted	Inspect the wiring (see chapter 16).
Ignition switch trouble	Inspect and replace (see chapter 16)
Engine stop switch trouble	Inspect and repair or replace (see chapter 16).
Main 20A or ECU ignition fuse blown	Inspect and replace (see chapter 16).
Starter motor rotating but engine doesn't turn:	
Starter clutch trouble	Inspect (see chapter 16).
Starter idle gear trouble	Inspect (see chapter 16).
engine doesn't turn:	
Valve seizure	Inspect and replace (see chapter 5).
Cylinder, piston seizure	Inspect and replace (see chapter 5).
Camshaft seizure	Inspect and replace (see chapter 5).
Connecting rod small end seizure	Inspect and replace (see chapter 9).
Connecting rod big end seizure	Inspect and replace (see chapter 9).
Crankshaft seizure	Inspect and replace (see chapter 9).
Transmission gear or bearing seizure	Inspect and replace (see chapter 9).
Balancer bearing seizure	Inspect and replace (see chapter 9).
No fuel:	
No or little fuel in tank	Supply fuel (see Owner's Manual).
Fuel pump not rotating	Inspect (see chapter 3).
Fuel injector trouble	Inspect and replace (see chapter 3).
Fuel filter or pump screen clogged	Inspect and replace fuel pump (see chapter 3).
Fuel pressure regulator clogged	Inspect and replace fuel pump (see chapter 3).
Fuel line clogged	Inspect and repair (see chapter 3).
Engine overflow:	
Spark plug dirty, broken or gap maladjusted	Replace (see chapter 2).
Starting technique faulty	When flooded, don't crank engine with throttle fully opened.
No spark or spark weak:	
Ignition and engine stop switches not ON	Turn both switches ON

EFI Malfunction Excluded

Symptoms or possible Causes	Actions (chapter)
Clutch lever not pulled in and gear not in neutral whether side stand up or not	Pull the lever in and shift the gear in neutral
Though clutch lever pulled in, side stand up and gear not in neutral	Side stand down and clutch lever pulled in whether gear in neutral or not
Vehicle-down-sensor coming off	Reinstall (see chapter 3).
Vehicle-down-sensor trouble	Inspect (see chapter 3).
ECU ground or power supply trouble	Inspect (see chapter 3).
low battery voltage	Inspect and charge (see chapter 16).
Spark plug dirty, broken or gap maladjusted	Replace (see chapter 2).
Ignition coil trouble	Inspect ignition coil (see chapter 16).
Stick coil shorted or not in good contact	Reinstall or inspect stick coil(see chapter 16).
Spark plug incorrect	Replace it with the correct plug(see chapter 16).
IC igniter in ECU trouble	Inspect (see chapter 16).
Neutral, starter lockout or side stand switch trouble	Inspect each switch (see chapter 16).
Crankshaft sensor trouble	Inspect (see chapter 16).
Ignition switch shorted	Inspect and replace(see chapter 16).
Engine stop switch shorted	Inspect and repair or replace(see chapter 2).
Starter system wiring shorted or open	Inspect and repair or replace(see chapter 16).
Main 20A or fuse (15V) of fuel pump relay blown	Inspect and replace (see chapter 16).
Fuel/air mixture is incorrect:	
Air cleaner clogged, poorly sealed or missing	Clean or reinstall (see chapter 3).
Leak from oil filler cap, crankcase breather hose or air cleaner drain hose	Inspect and repair or replace (see chapter 3).
Water or foreign matter in fuel	Change fuel. Inspect and clean fuel system (see chapter 3).
Fuel pressure regulator trouble	Inspect fuel pressure and replace fuel pump (see chapter 3).
Main throttle sensor trouble	Inspect (see chapter 3).
Fuel pressure may be low	Inspect (see chapter 3).
Fuel pump trouble	Inspect (see chapter 3).
Fuel injector trouble	Inspect (see chapter 3).
Inlet air pressure sensor trouble	Inspect (see chapter 3).
Water temperature sensor trouble	Inspect (see chapter 3).
Crankshaft sensor trouble	Inspect (see chapter 3).
Cylinder pressure is low:	
Spark plug loose	Reinstall (see chapter 16).
Cylinder head not sufficiently tightened down	Tighten (see chapter 5).
Cylinder, piston worn	Inspect and replace (see chapter 5).
Piston ring bad (worn, weak, broken or sticking)	Inspect and replace (see chapter 5).

Piston ring/groove clearance excessive	Inspect and replace (see chapter 5).
Cylinder head gasket damaged	Replace (see chapter 5).

EFI Malfunction Excluded

Symptoms or Possible Causes	Actions (chapter)
Cylinder head warped	Inspect and replace (see chapter 5).
No valve clearance	Adjust (see chapter 2).
Valve guide worn	Inspect and replace (see chapter 5).
Valve spring broken or weak	Inspect and replace (see chapter 5).
Valve not seating properly (valve bent, worn or carbon accumulating on seating surface)	Inspect and repair or replace (see chapter 5).

Poor running at low speed

Symptoms or Possible Causes	Actions (chapter)
Spark weak:	
low battery voltage	Inspect and charge (see chapter 16).
Spark plug dirty, broken or gap maladjusted	Replace (see chapter 2).
Stick coil trouble	Inspect the stick coil (see chapter 16).
Stick coil shorted or not in good contact	Reinstall or inspect stick coil (see chapter 16).
Spark plug incorrect	Replace it with the correct plug (see chapter 16).
IC igniter in ECU trouble	Inspect (see chapter 16).
Crankshaft position sensor trouble	Inspect (see chapter 16).
Fuel/air mixture is incorrect:	
Little fuel in tank	Supply fuel (see Owner's Manual).
Air cleaner clogged, poorly sealed, or missing	Clean element or inspect sealing (see chapter 2,3)
Air cleaner duct loose	Reinstall (see chapter 3).
Throttle body assy loose	Reinstall (see chapter 3).
Throttle body sensor not calibrated or calibration is incorrect	Recalibrate (see diagnosis).
Air inlet pipe damage	Replace (see chapter 3).
Fuel filter or pump screen clogged	Inspect and replace fuel pump (see chapter 3).
Fuel pressure regulator clogged	Inspect fuel pressure and replace fuel pump (see chapter 3)
Fuel line clogged	Inspect and repair (see chapter 3).
Inlet air pressure sensor trouble	Inspect (see chapter 3).
Thermostat trouble	Inspect and replace (see chapter 4).
Unstable (rough) idling:	
Fuel injector trouble	Inspect (see chapter 3).
Main throttle sensor trouble	Inspect (see chapter 3).
Crankshaft position sensor trouble	Inspect (see chapter 3).
Throttle valves not synchronizing	Inspect (see chapter 2).
Inlet air temperature sensor trouble	Inspect (see chapter 3).
Coolant temperature sensor trouble	Inspect (see chapter 3).
Fuel pressure too low or too high	Inspect (see chapter 3).
low battery voltage	Inspect and charge (see chapter 16).
Incorrect idle speed:	
Coolant temperature sensor trouble	Inspect (see chapter 3).

EFI Malfunction Excluded

Symptoms or Possible Causes	Actions (chapter)
Main throttle sensor trouble	Inspect (see chapter 3).
Throttle body sensor not calibrated or calibration is incorrect	Recalibrate (see diagnosis).
Engine stalls easily:	
Fuel pump trouble	Inspect (see chapter 3)
Fuel injector trouble	Inspect (see chapter 3)
Main throttle sensor trouble	Inspect (see chapter 3)
Throttle body sensor not calibrated or calibration is incorrect	Recalibrate (see diagnosis).
Fuel pressure too low or too high	Inspect (see chapter 3).
Coolant temperature sensor trouble	Inspect (see chapter 3).
Inlet air temperature sensor trouble	Inspect (see chapter 3).
Fuel line clogged	Inspect and repair (see chapter 3).
Fuel pressure regulator trouble	Inspect fuel pressure and replace fuel pump (see chapter 3).
Crankshaft sensor trouble	Inspect (see chapter 16).。
Stick coil trouble	Inspect (see chapter 16).
Compression Low:	
Spark plug loose	Reinstall (see chapter 16).
Cylinder head not sufficiently tightened down	Tighten (see chapter 5).
No valve clearance	Adjust (see chapter 2).
Cylinder, piston worn	Inspect and replace (see chapter 5).
Piston ring bad (worn, weak, broken or sticking)	Inspect and replace (see chapter 5).
Piston ring/groove clearance excessive	Inspect and replace (see chapter 5).
Cylinder head gasket damaged	Replace (see chapter 5).
Cylinder head warped	Inspect and replace (see chapter 5).
Valve guide worn or stem seal damaged	Inspect and replace (see chapter 5).
Valve spring broken or weak	Inspect and replace (see chapter 5).
Valve not seating properly (valve bent, worn or carbon accumulating on seating surface)	Inspect and repair or replace (see chapter 5).
Camshaft cam worn	Inspect and replace (see chapter 5).
Work with hesitation:	
fuel pressure too low	Inspect (see chapter 3)
fuel line clogged	Inspect and repair (see chapter 3).
Fuel pump trouble	Inspect (see chapter 3)
Fuel injector trouble	Inspect (see chapter 3)
Inlet air temperature sensor trouble	Inspect (see chapter 3)
Main throttle sensor trouble	Inspect (see chapter 3)
Coolant temperature sensor trouble	Inspect (see chapter 3)
injector connectors loose	Remedy (see chapter 3).
Crankshaft position sensor trouble	Inspect and repair or replace (see chapter 16).
Stick coil trouble	Inspect and repair or replace (see chapter 16).
Loose terminal of battery (–) cable or engine	Inspect and repair (see chapter 16).

EFI Malfunction Excluded

Symptoms or Possible Causes	Actions (chapter)
Delay of ignition timing	Inspect crankshaft sensor and IC igniter in ECU (see chapter 16).
Poor acceleration:	
Fuel pressure too low	Inspect (see chapter 3).
Water or other matter in fuel	Change fuel. Inspect and clean fuel system (see chapter 3).
Fuel filter or pump screen clogged	Inspect and replace fuel pump (see chapter 3).
Fuel pump trouble	Inspect (see chapter 3).
Fuel injector trouble	Inspect (see chapter 3).
Inlet air temperature sensor trouble	Inspect (see chapter 3).
Coolant temperature sensor trouble	Inspect (see chapter 3).
Stick coil trouble	Inspect and replace (see chapter 16).
Engine oil level to high	Repair (see chapter 7).
Spark plug dirty, broken or gap maladjusted	Replace (see chapter 2).
Stumble:	
Fuel pressure too low	Inspect (see chapter 3).
Fuel injector trouble	Inspect (see chapter 3).
Main throttle sensor malfunction	Inspect (see chapter 3).
Coolant temperature sensor trouble	Inspect (see chapter 3).
Surge:	
Unstable fuel pressure	Fuel pressure regulator trouble (Inspect and replace fuel pump) or kinked fuel line (Inspect and repair fuel line) (see chapter 3).
Fuel injector trouble	Inspect (see chapter 3).
Water temperature sensor trouble	Inspect (see chapter 3).
Backfiring when deceleration:	
Spark plug dirty, broken or gap maladjusted	Replace (see chapter 2).
Fuel pressure too low	Inspect (see chapter 3).
Fuel pump trouble	Inspect (see chapter 3).
Main throttle sensor trouble	Inspect (see chapter 3).
Inlet air temperature sensor trouble	Inspect (see chapter 3).
Water temperature sensor trouble	Inspect (see chapter 3).
After fire:	
Crankshaft position sensor trouble	Inspect (see chapter 16).
Spark plug burned or gap maladjusted	Replace (see chapter 2).
Inlet air temperature sensor trouble	Inspect (see chapter 3).
Water temperature sensor trouble	Inspect (see chapter 3).
Fuel injector trouble	Inspect (see chapter 3).

EFI Malfunction Excluded

Symptoms or Possible Causes	Actions (chapter
Fuel injector trouble	Inspect (see chapter 3).
Loose terminal of battery (–) cable or ECU ground lead	Inspect and repair (see chapter 16).
Carbon accumulating on valve seating surface	Repair (see chapter 5).
Engine overheating	(see Overheating of Troubleshooting Guide, see chapter 17)
Other:	
Engine oil viscosity too high	Change (see chapter 2).
Drive train trouble	Inspect drive chain (see chapter 2) and sprocket (See chapter 11).
Brake dragging	Inspect caliper fluid seal damage or clogging of master cylinder relief and supply ports (see chapter 12)
Clutch slipping	Inspect friction plates for wear (see chapter 6).
Engine overheating	(see Overheating of Troubleshooting Guide, see chapter 17)
Intermittent any EFI fault and its recovery	Check that EFI connectors are clean and tight, and examine wires for signs of burning or fraying (see chapter 3).。

Poor Running or No Power at High Speed:

Symptoms or Possible Causes	Actions (chapter)
Firing incorrect:	
Spark plug dirty, broken or maladjusted	Replace (see chapter 2).
Stick coil trouble	Inspect stick coil (see chapter 16).
Stick coil shorted or not in good contact	Reinstall or inspect stick coil (see chapter 16).
Spark plug incorrect	Replace it with the correct plug (see chapter 16).
IC igniter in ECU trouble	Inspect (see chapter 16).
Crankshaft sensor trouble	Inspect (see chapter 16).
Fuel/air mixture incorrect:	
Air cleaner clogged, poorly sealed, or missing	Clean element or inspect sealing (see chapter 3).
Air cleaner duct loose	Reinstall (see chapter 3).
Air cleaner O-ring damaged	Replace (see chapter 3).
Water or foreign matter in fuel	Change fuel. Inspect and clean fuel system (see chapter 3).
Throttle body assy loose	Reinstall (see chapter 3).
Throttle body assy O-ring damaged	Replace (see chapter 3).
Fuel line clogged	Inspect and repair (see chapter 3).
Fuel pump operates intermittently and often EFI fuse (15A)blows.	Pump bearings may wear. Replace the pump (see chapter 3).

EFI Malfunction Excluded

Symptoms or Possible Causes tightened down	Actions (chapter)
Fuel pump trouble	Inspect (see chapter 3).
Inlet air temperature sensor trouble	Inspect (see chapter 3).
Main throttle sensor trouble	Inspect (see chapter 3).
Fuel injector clogged	Visually inspect and replace (see chapter 3).
Compression low:	
Spark plug loose	Reinstall (see chapter 16).
Cylinder head not sufficiently	Tighten (see chapter 5).
No valve clearance	Adjust (see chapter 2).
Cylinder, piston worn	Inspect and replace (see chapter 5).
Piston ring bad (worn, weak, broken or sticking)	Inspect and replace (see chapter 5).
Piston ring/groove clearance excessive	Inspect and replace (see chapter 5).
Cylinder head gasket damaged	Replace (see chapter 5) .
Cylinder head warped	Inspect and replace (see chapter 5).
Valve spring broken or weak	Inspect and replace (see chapter 5).
Valve not seating properly (valve bent , worn	Inspect and repair or replace (see chapter 5).
Knocking:	
Carbon built up in combustion chamber	Repair (see chapter 5).
Fuel poor quality or incorrect (Use the gasoline (See Owner's Manual)	Change fuel (see chapter 3).
Spark plug incorrect	Replace it with the correct plug (see chapter 16).
Stick coil trouble	Inspect (see chapter 16).
IC igniter in ECU trouble	Inspect (see chapter 16).
Inlet air temperature sensor trouble	Inspect (see chapter 3).
Others:	
Throttle valves won't fully open	Inspect throttle cable and lever linkage (see chapter 3).
Brake dragging	Inspect caliper fluid seal damage or clogging of master cylinder relief and supply ports (see chapter 12).
Clutch slipping	Inspect friction plates for wear (see chapter 6).
Engine overheating - Water temperature sensor	(See Overheating of Troubleshooting Guide in chapter 17).
Engine oil level too high	Repair (see chapter 7)
Engine oil viscosity too high	Change (see chapter 2).
Drive train trouble	Inspect drive chain (see chapter 2) and sprockets (see chapter 11).
Camshaft cam worn	Inspect and replace (see chapter 5).

Symptoms or Possible Causes tightened down	Actions (chapter)
Exhaust Smokes Excessively:	
(White smokes)	
Piston oil ring worn	Inspect and replace (see chapter 5).
Cylinder worn	Inspect and replace (see chapter 5).
Valve oil seal damaged	Replace (see chapter 5)
Valve guide worn	Replace the guide (see chapter 5).
Engine oil level too high	Repair (see chapter 7).
Water into fuel	

EFI Malfunction Excluded

Symptoms or Possible Causes	Actions (chapter)
(Black smoke)	
Air cleaner clogged	Clean (see chapter 3).
Too high fuel pressure	Inspect (see chapter 3).
Injector stuck open	Inspect (see chapter 3).
Coolant temperature sensor trouble	Inspect and replace (see chapter 3).
Inlet air temperature sensor trouble	Inspect and replace (see chapter 3).

3.7 Self-diagnosis

3.7.1 Self-diagnosis Outline

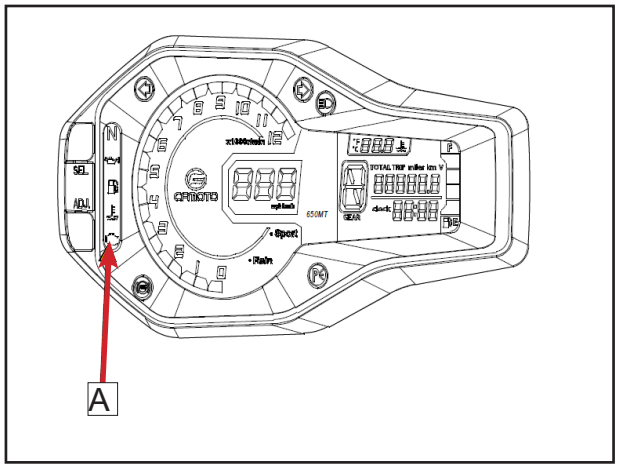
ECU constantly monitor sensors, actuators and circuits, MIL and battery voltage, etc, even ECU itself and inspect the sensor output signal, actuator drive signal and internal sig-nal (such as close loop control, coolant temperature, idle speed control and battery voltage control, etc.) for reliablity. If any pro-cess or signal is suspect, ECU records the trouble code in the RAM memory.

Faulty information is recorded in the form of trouble code, and in the sequence of which trouble comes first.

When servicing, using PDA and MIL, the de-fective parts can be promptly foud to improve the service efficiency and quality.

Self-diagnosis Procedures

When a problem occurs with the EFI system and ignition system, the MIL (LED) [A] goes on.



Note

Use a fully charged battery when conducting self-diagnosis. Otherwise, the light (LED) blinks very slowly or doesn't blink.

MIL Flashing Conditions

IF:Turn on the ignition switch and the en-gine does not work. No trouble code appears:

- MIL keeps on for 4 seconds and then turns off. Or start engine before MIL off.

IF:Turn on the ignition switch and the en-gine dose not work. Trouble code appears:

- Diagnosing light keep on for 4s and off for 1s. Then blinking for 2Hz.

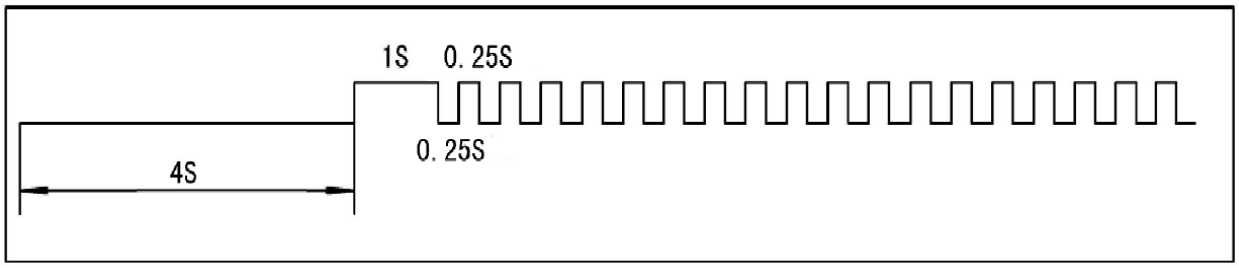
IF:Turn on the ignition switch and the engine works. Trouble code appear:

- Diagnosing light blinking in 2Hz.

Indicator light blinking control

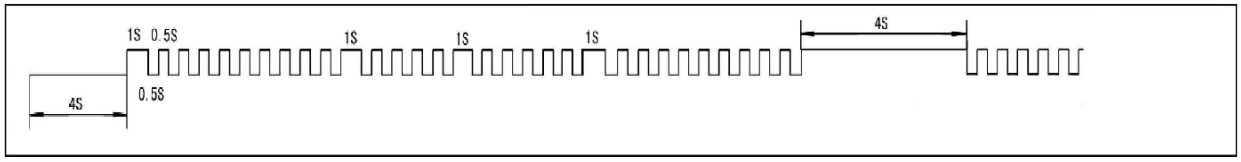
Flashing code needs special function to become true. Before the engine start.(Speed is 0 and engine RPM is 0) Turn the throttle into full opened (Or throttle valve opened over 65.1) And keep the throttle full opened. Then turn the ignition on. If the EMS hasn't diagnose the trouble out. The indicator light will be off after shining 4s. If the EMS diagnosed the trouble. Indicator light will blinking the code. Trouble light will stop blinking for 1s between 2 numbers. If EMS diagnosed two troubles at the same time. Indicator light will blinking from the sequence of troubles. Between two trouble codes. Indicator light will be off for 4s. After blinking all trouble codes. The light turns off automatically.

During the running of engine, MIL is on when system diagnoses fault parts, and flash fre-quency is 2Hz. Restart ignition switch after engine flameout. If the system detected that the fault is repaired, FI light will be on constantly until start engine. If the system still detected fault, then FI light will be on for 4s and off for 1s, flashing frequency is 2Hz, until start engine.



Error Code Instruction

Fault codes based on five code. For example P0560. MIL through left side to right side at 1 Hz frequency showing fault. If one code is 0, MIL will flash 10 times. For example, error code P0560 flash way is :light on for 4s and off for 1s-flash for 10 times-stop- flash for 5 times-stop-flash for 6 times-stop-flash for 10 times. Error codeP0112,P0122 flash way:light on for 4s and off for 1s-flash for 10times-stop-flash for 1 time-stop-flash for 1 time-stop-flash for 2 times-off for 4s-flash for 10 times-stop-flash for 1 time-stop-flash for 2 times-stop-flash for 2 time-off.



How to Erase Error Codes

- Even if ignition switch is turned off, the battery or the ECU is disconnected or the prob-lem is solved, all trouble codes remain in ECU.
- For the current fault code, if a fault does exist, then the current fault code cannot be eliminated; Restart the vehicle after troubleshooting eliminated, and advance the throttle above 2500upm, fault light is off when failover.But previously fault still can be read by PDA that had been stored in the system information, this information can be cleared directly through PDA, or automatically cleared after five warm up cycle.(Warm up cycle means a loop that water temperature is less than 51 degrees after engine start , and water tempera-ture is higher than 71 degrees after warming)
- Refer to the eliminated parts of PDA error code to eliminated error code.

Diagnose error by PDA

PDA has many functions which is more intuitive, more accurately and more quickly than FI light. We recommend you to use PDA for the following functions:

- PDA can read “Error code” directly and eliminate them.
- PDA has the function of “Read data stream” which can reflect vehicle operating situation, and also judge EFI error.
- PDA with an “actuator test” function, you can use this feature to check the continuity of the cable and whether the electronic fuel injection parts is good.

PDA usage refer to chapter “PDA Use”

3.7.2 Trouble Code Chart

NO.	Pcode	Decription(UAES)
1	P0030	O2 Sensor 1 Heater Contr. Circ. Open
2	P0031	O2 Sensor 1 Heater Contr. Circ. Low
3	P0032	O2 Sensor 1 Heater Contr. Circ. High
4	P0050	O2 Sensor 2 Heater Contr. Circ. Open
5	P0051	O2 Sensor 2 Heater Contr. Circ. Low
6	P0052	O2 Sensor 2 Heater Contr. Circ. High
7	P0107	Manifold Abs.Pressure or Bar.Pressure Low Input
8	P0108	Manifold Abs.Pressure or Bar.Pressure High Input
9	P0112	Intake Air Temp.Circ. Low Input
10	P0113	Intake Air Temp.Circ. High Input
11	P0117	Engine Coolant Temp.Circ. Low Input
12	P0118	Engine Coolant Temp.Circ. High Input
13	P0122	Throttle Pos.Sensor Circ. Low Input
14	P0123	Throttle Pos.Sensor Circ. High Input
15	P0130	O2 Sensor Circ.,Bank1-Sensor1 Malfunction
16	P0131	O2 Sensor Circ.,Bank1-Sensor1 low Voltage
17	P0132	O2 Sensor Circ.,Bank1-Sensor1 High Voltage
18	P0134	O2 Sensor Circ.,Bank1-Sensor1 No Activity Detected
19	P0150	O2 Sensor Circ.,Bank1-Sensor2 Malfunction
20	P0151	O2 Sensor Circ.,Bank1-Sensor2 low Voltage
21	P0152	O2 Sensor Circ.,Bank1-Sensor2 High Voltage
22	P0154	O2 Sensor Circ.,Bank1-Sensor2 No Activity Detected
23	P0201	Cylinder 1- Injector Circuit
24	P0261	Cylinder 1- Injector Circuit Low
25	P0262	Cylinder 1- Injector Circuit High
26	P0202	Cylinder 2- Injector Circuit
27	P0264	Cylinder 2- Injector Circuit Low
28	P0265	Cylinder 2- Injector Circuit High
29	P0322	Ign./Distributor Eng.Speed Inp.Circ. No Signal
30	P0480	cooling fan control Circuit Open
31	P0511	Idle Air Control Circui
32	P0560	System Voltage Malfunction
33	P0562	System Voltage Low Voltage
34	P0563	System Voltage High Voltage
35	P0627	Fuel Pump “A” Control Circuit /Open
36	P0629	Fuel Pump “A” Control Circuit High
37	P0650	Malfunction Indicator Lamp Control Circ.
38	P0691	cooling fan control Circuit Low
39	P0692	cooling fan control Circuit High
40	P0501	Vehicle Speed No Sensor
41	P1116	Engine Coolant Temp High
42	P0602	Control Module Programming Error
43	P0116	Engine Coolant Temp Sensor Circuit Range/ Performance
44	P1098	ROLL Sensor Malfunction

Self-diagnosis Procedures

Note:

- If all the parts and circuits checked out good, be sure to check the ECU for ground and power supply. If the ground and power supply are checked good, replace the ECU.
- If theere is no trouble code is displayed, then the electrical parts of the EFI system has no fault, but the mechanical parts of the EFI system and the engine are suspect.

Self-diagnosis Procedures

3.7.3 Solutions

The ECU takes the following measures to prevent engine damage when the EFI or the ignition system parts have troubles.

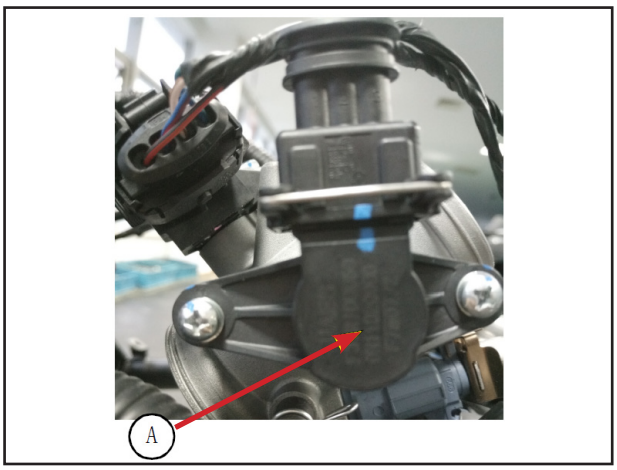
Trouble Codes	Parts	Output Signal Unstable Range or Criteria	Backups by ECU
P0112 or P0113	Inlet Air Temp Sensor	Inlet Air Temp Ta=-40°C~+130°C	If the inlet air tem sensor fails(the signal is out of the usable range, wiring short or open), the ECU sets temperature at -40°C or 130°C ;
P0117 or P0118	Coolant Temp Sensor	Water Temp Sensor Tw=-40°C~+129°C	If the water temp sensor system fails(the signal is out of the usable range, wiring short or open), the ECU sets Temp. at -40°C or 129°C
P0130, P0131, P0132& P0134	Oxygen Sensor #1	The oxygen sensor is active and sensor must send signals (output voltage) continuously to the ECU.。	If the oxygen sensor is not activated or correct, the ECU stops oxygen sensor feedback mode.
P0150, P0151, P0152& P0154	Oxygen Sensor #2	The oxygen sensor is active and sensor must send signals (output voltage) continuously to the ECU.	If the oxygen sensor is not activated or correct, the ECU stops oxygen sensor feedback mode.

3.8 EFI System Service

3.8.1 Throttle Position Sensor Service

Throttle Position Sensor Removal/Adjustment

CAUTION
Do not remove or adjust the throttle po-sition sensor [A] since it has been ad-justed and set with precision at the factory. **Never drop the throttle body assy, espe-cially on a hard surface. Such a shock to the sensor can damage it.**



Throttle Position Sensor Input Voltage Inspection

NOTE

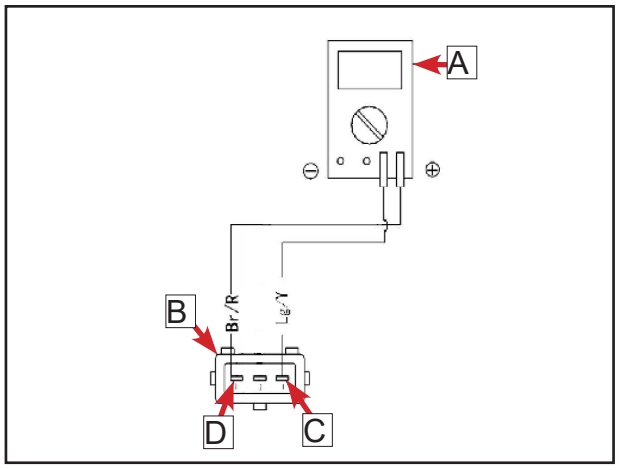
- Be sure the battery is fully charged.
- Turn the ignition switch OFF.
- Disconnect the throttle position sensor connector and connect the harness adapter [A] between these connectors.
- Connect a digital meter to the harness adapter lead.
- Measure the sensor input voltage with the engine stopped and with the connector joined.
- Turn the ignition switch ON.

Throttle Position Sensor Input Voltage
Connections to Adapter
Meter(+) → Gr/R(C)
Meter(-) → Lg/Y(D)
Standard: 4.75V~5.25V DC
(connector off)
Standard:4.0V~4.5V DC
(connector on)

- Turn the ignition switch OFF.

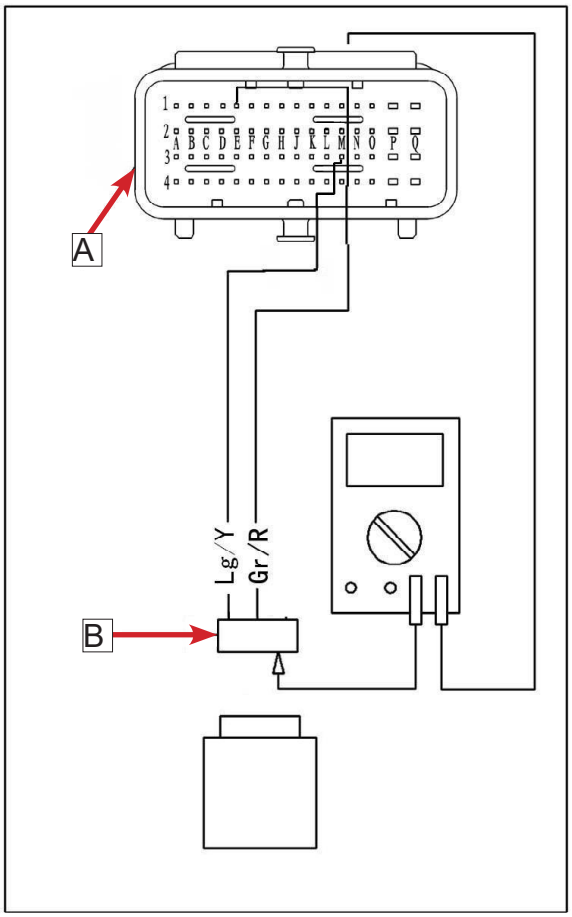
If the input voltage is normal, check the sen-sor output voltage.

If the input voltage is less than the standard,remove the ECU and check the wiring be-tween these connectors.



- Turn the ignition switch OFF.
- Disconnect ECU connector and throttle position sensor connector.
- Using multimeter to test the continuity of the 2 lead wires

ECU Connector[A]←→**Throttle Body Connector**[B]
Throttle Body Connector Gr/R ←→ECU terminal 18
Throttle Body ConnectorLg/Y ←→ECU terminal 39
Standard:0 Ω
If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection).

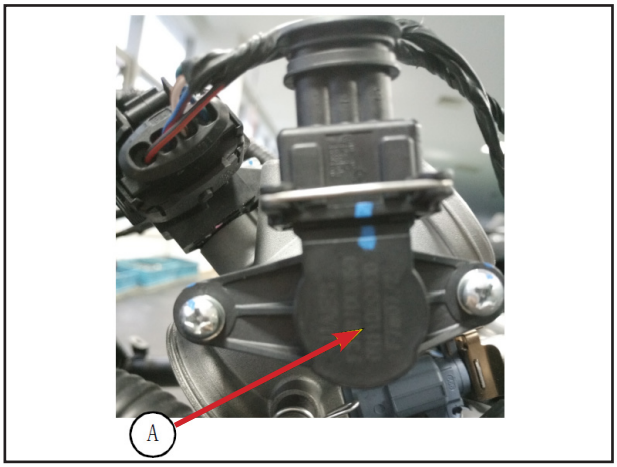


Main Throttle Sensor Output Voltage Inspection
Measure the output voltage at the main throttle sensor in the same way as input voltage inspection, Note the following:

- Disconnect the main throttle sensor connector and connect the harness adapter [A] between these connectors.
- Start the engine and warm it up thoroughly. (Above 80°C)
- Check idle speed to ensure the throttle opening is correct and adjust screw is ok.

Idle Speed Standard:1450r/min ± 145r/min
If the idle speed is out of the specified range, adjust it (Inspect throttle cable and EFI system).

- Turn the ignition switch OFF.
- Measure the output voltage of the sensor with the engine stopped, and with the con-nector joined.
- Turn the ignition switch ON.

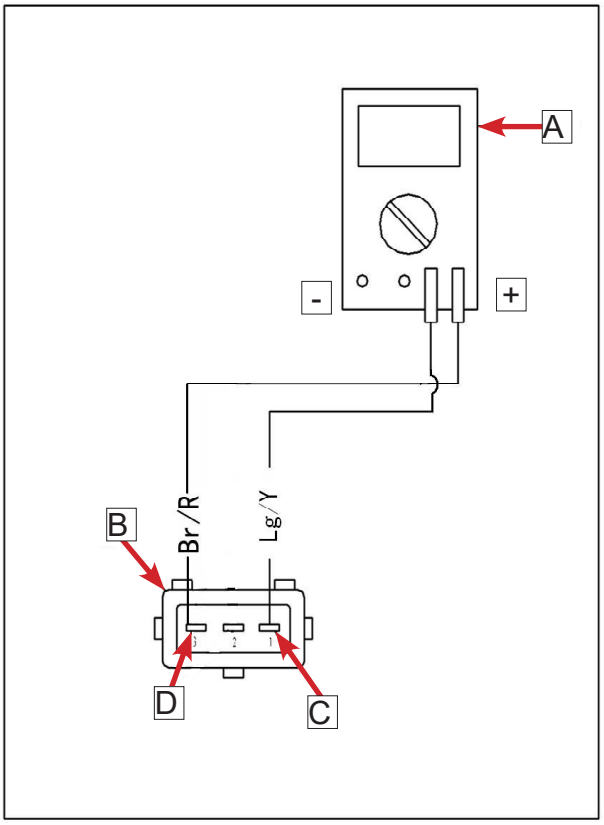


Throttle Service

Throttle Position Sensor Output Voltage
Connections to Adapter
Meter(+)→Br/R(sensor output) lead
Meter(+)→Lg/Y((sensor ground)lead
Standard:
Idle throttle opening: 0.34V~0.64V DC
Full throttle opening:≥4V DC

If the output voltage is out of the standard, inspect the main throttle sensor resistance.

If the output voltage is normal, check the wiring for continuity.

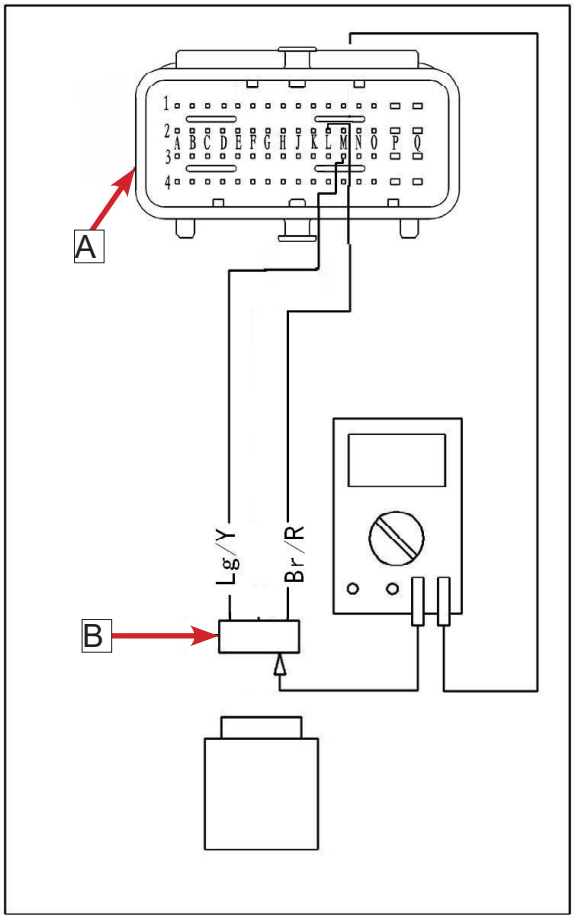


Wiring Connection

- Turn the ignition switch OFF.
- Disconnect ECU connector and throttle position sensor connector.
- Test the continuity of the 2 lead wires.

ECU Connector[A]←→Throttle Body Connector[B]
Throttle Body Connector Br/R ←→ ECU terminal 26
Throttle Body Connector Lg/Y←→ECU terminal 39
Standard:0 Ω

If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection).



Throttle Service

Throttle Position Sensor input Voltage

- Turn the ignition switch OFF.
- Disconnect throttle position sensor con nector
- Connect a hand tester [A] to the throttle position sensor connector [B].
- Measure the throttle position sensor resistance.

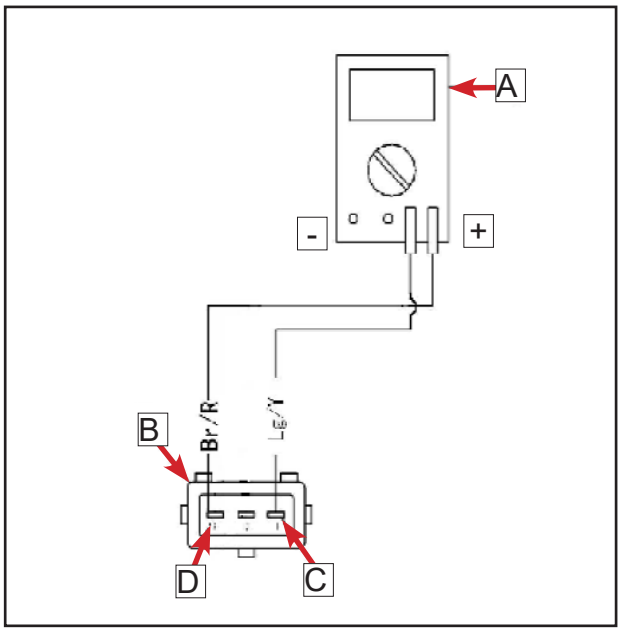
Main Throttle Sensor Resistance

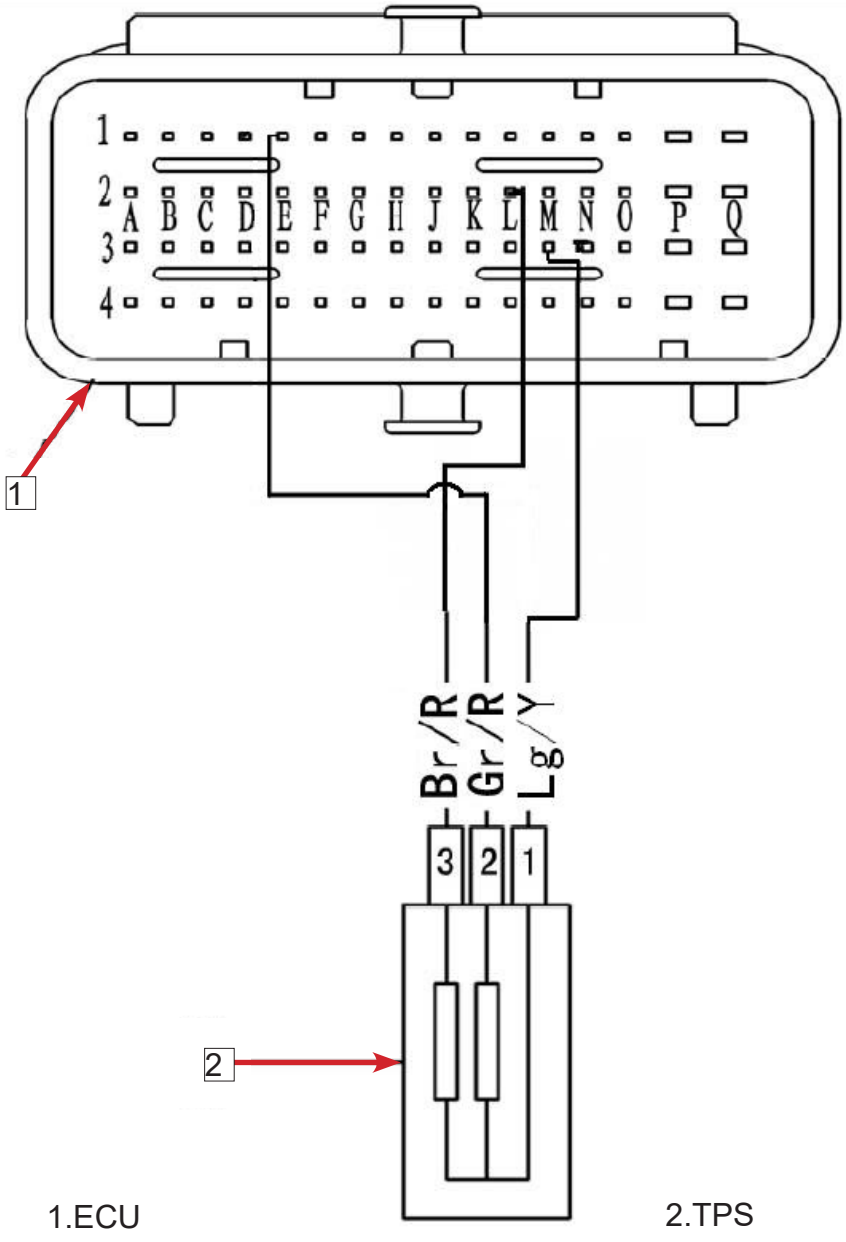
Connections: Gr/R lead[C]←→Br/R lead[D]

Standard:1.1kΩ~1.4kΩ(20°C)

If the reading is out of the range, replace the throttle body assy.

If the reading is within the range, but the problem still exists, replace the ECU (see ECU Removal/ Installation).





1.ECU 2.TPS

3.8.2 T-MAP Sensor Service

CAUTION
Never drop the sensor, especially on a hard surface. Such a shock to the part can damage

T-MAP sensor output voltage inspection.

- Make sure the battery get fully charged
- The output voltage changement follows the intake

tempchanging.

- Remove the ECU(See ECUremoval). Do not disconnect theECUconnector
- Use adapter to connecter and ECU.
- Stop the engine and meter connected. Measure

the out put voltege.

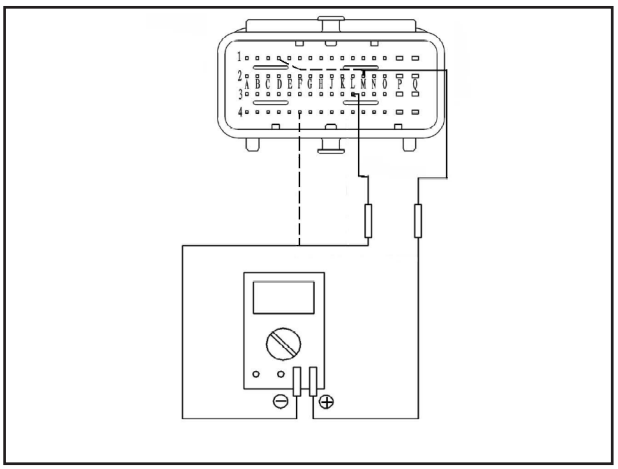
- Turn the ignition switch on.

Intake temp sensor output voltage. (Active line)
Meter(+) →W/Br(ECUpin 25)
Meter(-)→ L/G(ECUpin 40)
Standard: Output voltage when intake temp 20°C
About 2.5V ~3.5V
Intakepressuresensor output voltage (Dottedline)
Meter(+) →L/R(ECUpin 19)
Meter(-) →R/B(ECUpin 59)
Standard:Output voltagein normal atmosphere.
About 4V~ 4.7V
Turnoff the ignitionswitch
If theoutput voltageisnot in standard. Remove the fuel tank and check the wire. If the output voltage is 5V.ECUis normal.

If theoutput voltage isin standard. Inspect theECU groundwireandpowerline (SeeECUpower inspection).

If the wires are OK. Inspect the intake temp sensor resistance.

- Remove the adapter and use the silicon glue to seal the connector avoid water.



Inlet Air Temperature Sensor Service

Inlet Air Temperature Sensor Resistance Inspection

- Remove the inlet air temperature sensor
- Suspend the sensor [A] in a container of machine oil so that the heat-sensitive por-tion is submerged.
- Suspend a thermometer [B] with the heatsensitive portion [C] located in almost the same depth with the sensor.

NOTE

- The sensor and thermometer must not touch the container side or bottom.
- Place the container over a source of heat and gradually raise the temperature of the oil while stirring the oil gently for even temperature.
- Using a hand tester, measure the internal resistance of the sensor across the termi-nals at the temperatures shown in the table.

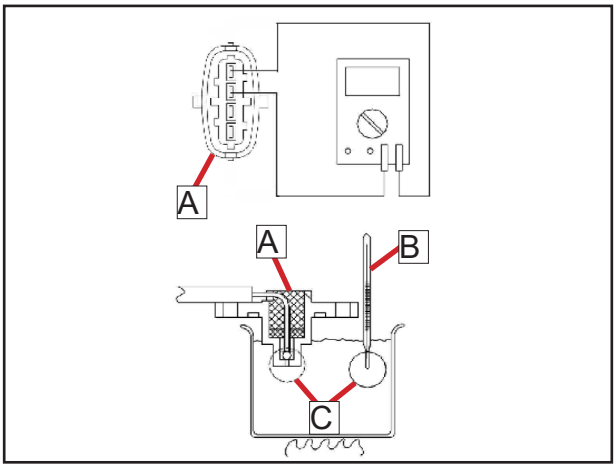
Inlet Air Temperature Sensor Resistance

Standard:241.6Ω~258.3Ω(20°C)

273.2Ω~285.8Ω(85°C)

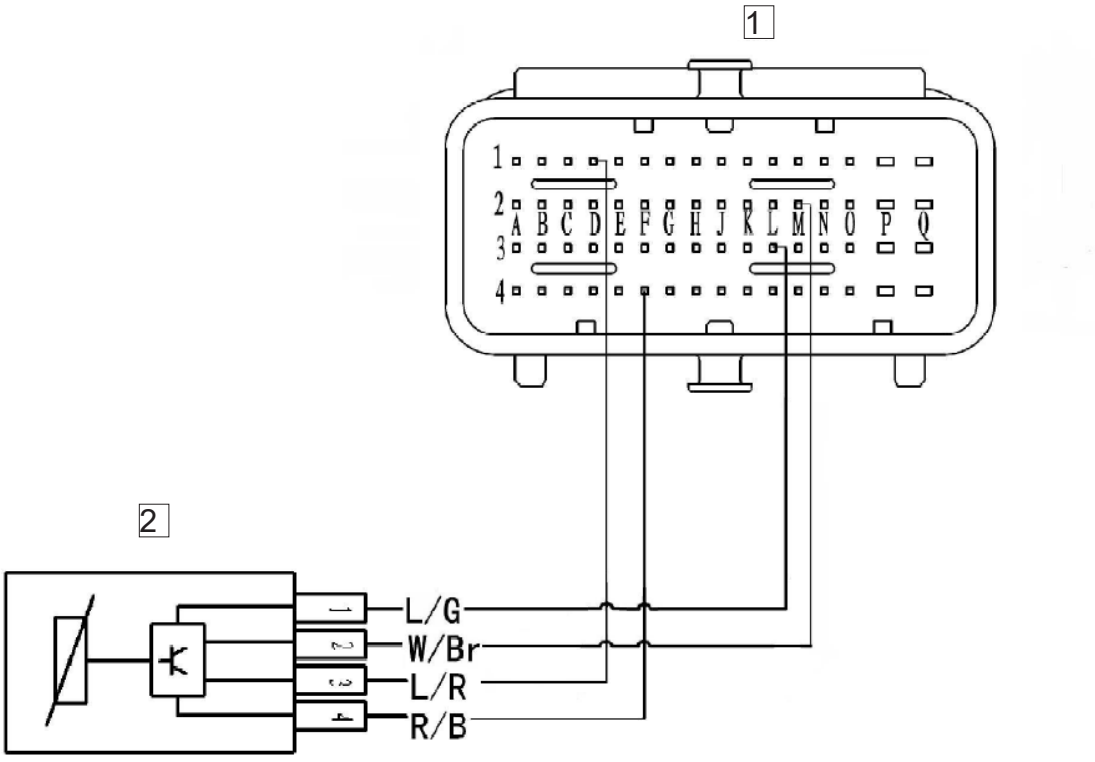
If the measurement is out of the range, replace the sensor. If in ,replace the ECU.

Temp(°C)	Min Resistance(OHM)	Standard Resistance(OHM)	Max Resistance(OHM)
-40±1	42661	48153	54224
-35±1	31810	35763	40118
-30±1	23970	26885	30015
-25±1	18258	20376	22695
-20±1	14039	15614	17333
-15±1	10895	12078	13365
-10±1	8529.5	9428.0	10399
-5±1	6733.5	6733.5	8161.4
0±1	5358.1	5886.7	6457.8
5±1	4295.9	4706.9	5149.8
10±1	3469.2	3791.1	4137.3
15±1	2820.9	3074.9	3347.5
20±1	2308.8	2510.6	2726.8
25±1	1904.0	2062.9	2235.6



Temp(°C)	Min Resistance(OHM)	Standard Resistance(OHM)	Max Resistance(OHM)
30±1	1586.1	1715.4	1853.1
35±1	1326.3	1431.8	1544.1
40±1	1113.0	1199.6	1291.5
45±1	937.41	1008.6	1081.2
50±1	792.27	851.10	913.15
55±1	671.90	720.65	772.28
60±1	571.72	612.27	655.16
65±1	488.07	521.91	557.67
70±1	417.98	446.33	476.24
75±1	359.08	382.89	407.99
80±1	309.41	329.48	350.61
85±1	267.40	284.06	302.22
90±1	231.76	246.15	261.27
95±1	201.44	213.68	226.53
100±1	175.52	186.00	196.95
105±1	153.18	162.35	171.88
110±1	134.01	142.08	150.43
115±1	117.59	124.66	132.00
120±1	103.12	109.65	116.12
125±1	91.80	96.68	102.39
130±1	30.58	85.45	90.51

Inlet Air Temperature Sensor Service
T-MAP Sensor Circuit



1. ECU
2. Inlet Temperature & Pressure Sensor

3.8.3 Water Temperature Sensor Service

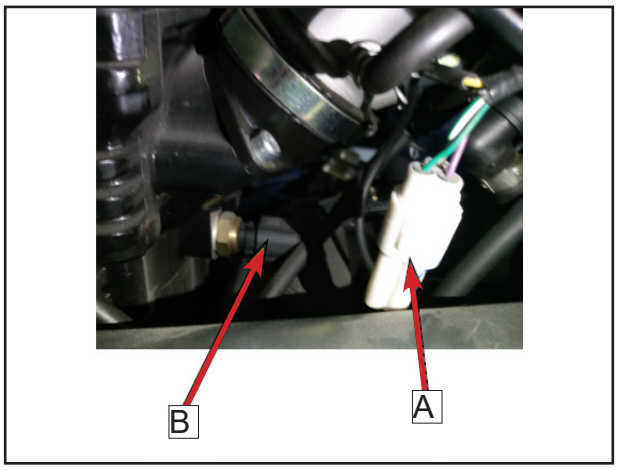
Water Temperature Sensor Removal/ Installation

Note
Never drop the sensor, especially on a hard surface. Such a shock to the part can dam-age it.

- Drain the coolant (see Coolant Change in the Periodic Maintenance chapter).
- Disconnect the sensor connector [A], and unscrew the water temperature sensor [B].

Torque :12N•m

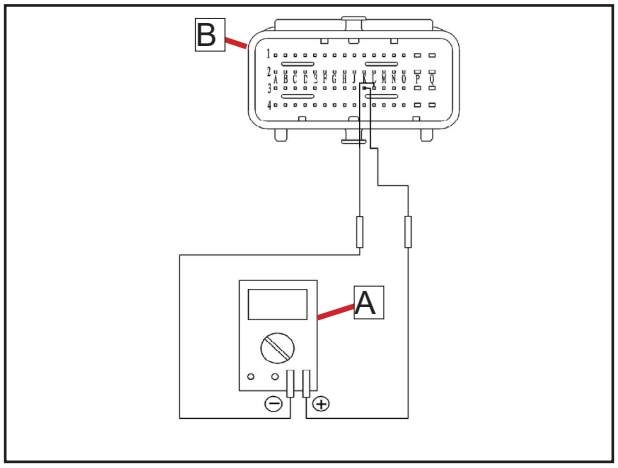
- Apply grease to new O-ring on the water temperature sensor.
- Fill the engine with coolant and bleed the air from the cooling system (see Coolant Change in the Periodic Maintenance chapter).



Water Temperature Sensor Output Voltage Inspection

- Be sure the battery is fully charged.
- Remove the ECU (see ECU Removal). Do not disconnect the connectors.
- Connect a hand tester [A] to the ECU connector [B] with the needle adapter set.
- Measure the sensor output voltage with the engine stopped and the connector joined.
- Turn the ignition switch ON.

Water Temperature Sensor Output Voltage
Meter (+)→Gr/Wlead(ECU terminal 41)
Meter (-)→L/G lead (ECU terminal40)
Standard: 2.5V~3.5V(20°C)



Coolant Temperature Sensor Service

NOTE

- Coolant temperature sensor output voltage varies with the coolant temperature change
- Turn the ignition switch off.

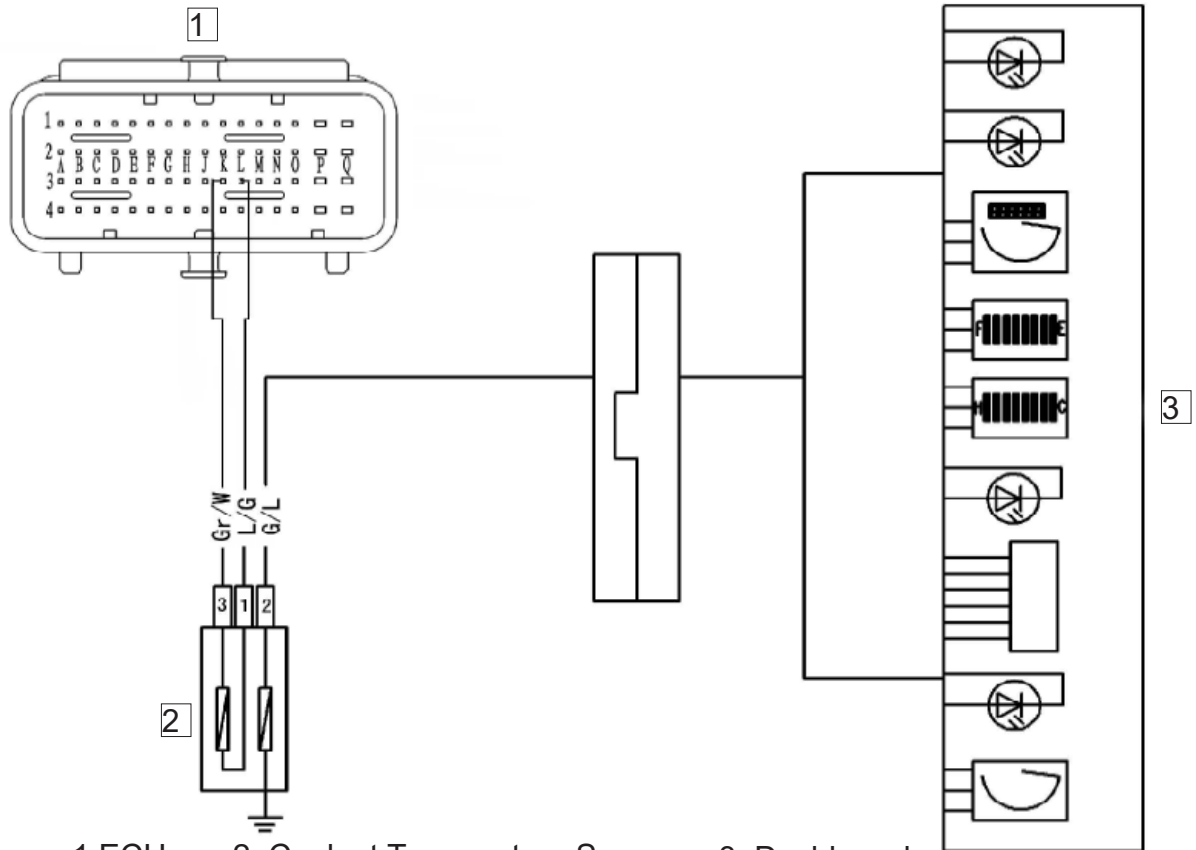
If the output voltage is within the standard, check the ECU for its ground, and power supply (see ECU Power Supply Inspection).

If the output voltage is out of the standard, check the wiring. And if the output voltage is 4.8V, the ECU is normal.

If the wiring is good, check the water temperature sensor resistance.

- Remove the needle adapter set, and apply silicone sealant to the seals of the connector for waterproofing.

Water Temperature Sensor Circuit



1.ECU 2. Coolant Temperature Sensor 3. Dashboard

Coolant Temperature Sensor Resistance Inspection

- Remove coolant temperature sensor (refer to Coolant Temperature Sensor Removal/Installation).
- Refer to Coolant Temperature Sensor Inspection.

3.8.4 Crankshaft Position Sensor Service

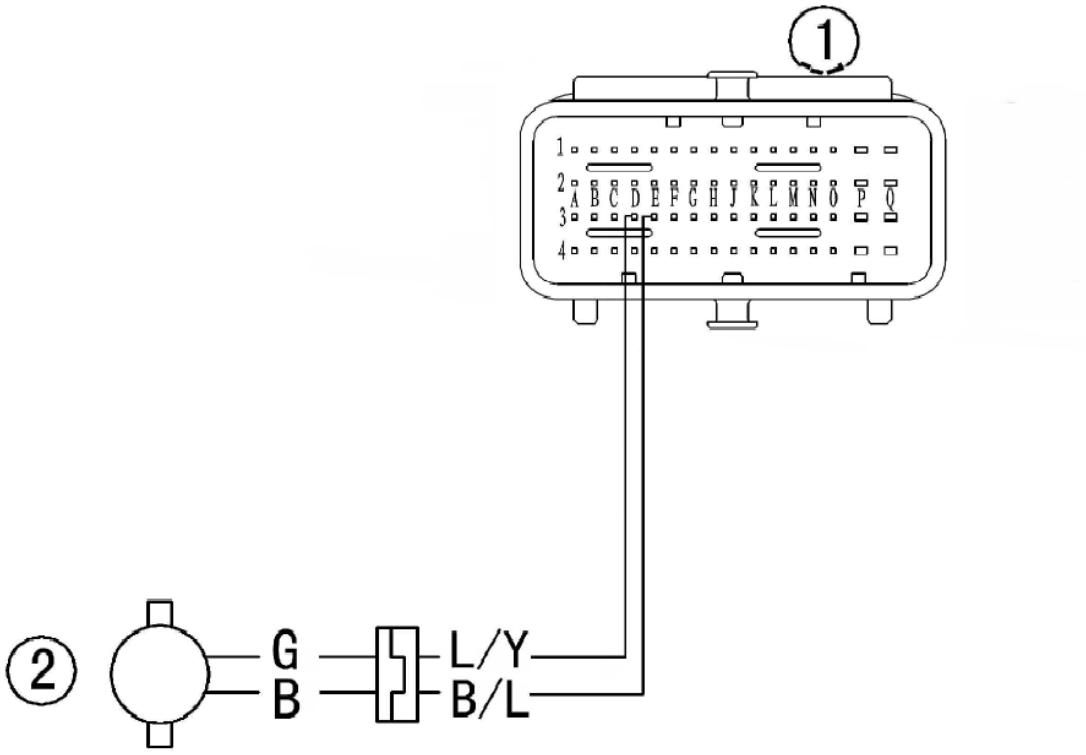
Crankshaft Position Sensor Removal/Installation

- Refer to the Crankshaft Sensor Removal/Installation in the Electrical System chapter.

Crankshaft Position Sensor Inspection

- The crankshaft sensor has no power source, and when the engine stops, the crankshaft sensor generates no signals.
- Crank the engine and measure the peak voltage of the crankshaft position sensor (see Crankshaft Sensor Inspection in the Electrical System) in order to check the sensor.
- Check the wiring for continuity, using the following diagram.

Crankshaf Position Sensor Circuit



1.ECU

2. Crankshaft Position Sensor

3.8.5 Speed Sensor Service

Speed Sensor Removal/Installation

- Refer to the Speed Sensor Removal/ Instal-lation in the Electrical System chapter.

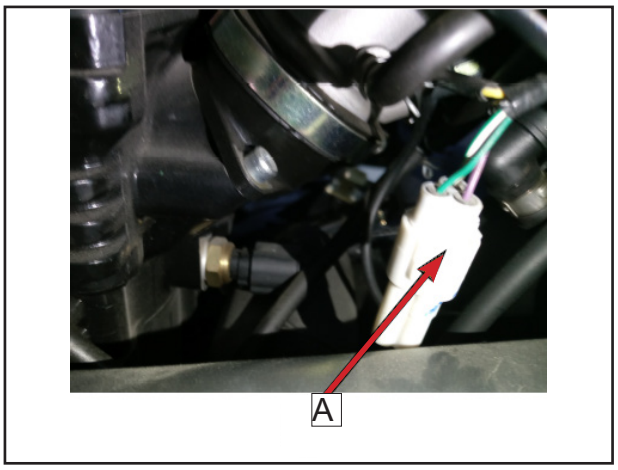
Speed Sensor Inspection

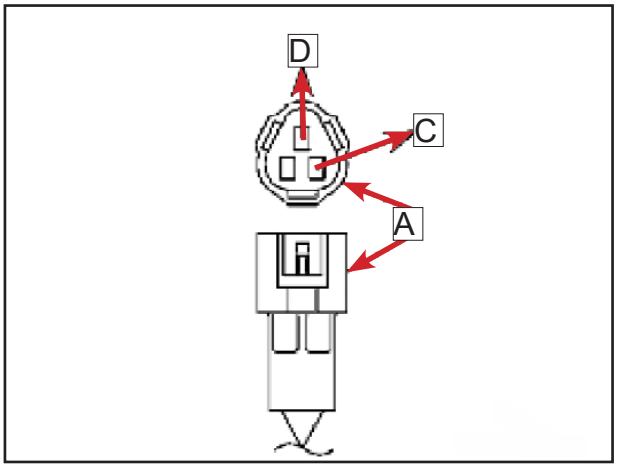
- Refer to the Speed Sensor Inspection in the Electrical System chapter.

Speed Sensor Input Voltage Inspection

NOTE

- Be sure the battery is fully charged.
- Turn the ignition switch OFF.
- Disconnect the speed sensor connector and connect the harness adapter [A] between the harness connector and speed sensor connector.
- Connect a hand tester to the harness adapter leads.
- Measure the sensor input voltage with the engine stopped, and with the connector joined.
- Turn the ignition switch ON.





Speed Sensor Input Voltage
Meter(+)→W/G(sensor)lead[C]
Meter(-)→G/B (sensor)lead[D]
Standard: About 9V~13VDC at Ignition Switch ON

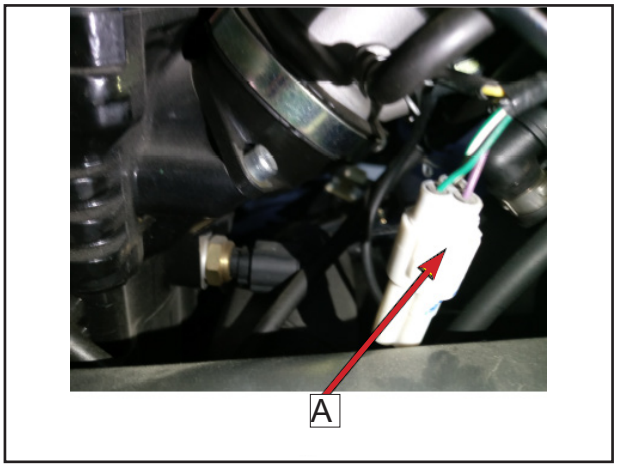
If the reading is out of the range, check the wiring (see wiring diagram in this section)

If the reading is good, check the output voltage.

- Turn the ignition switch OFF.

Speed Sensor Output Voltage

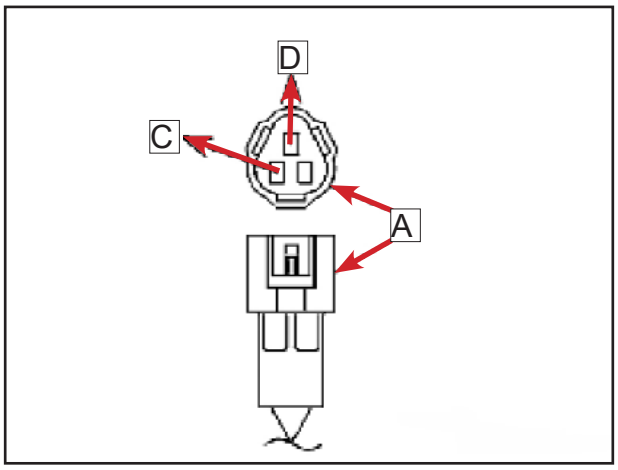
- Before this inspection, inspect the input voltage (see Speed Sensor Input Voltage Inspection).



NOTE

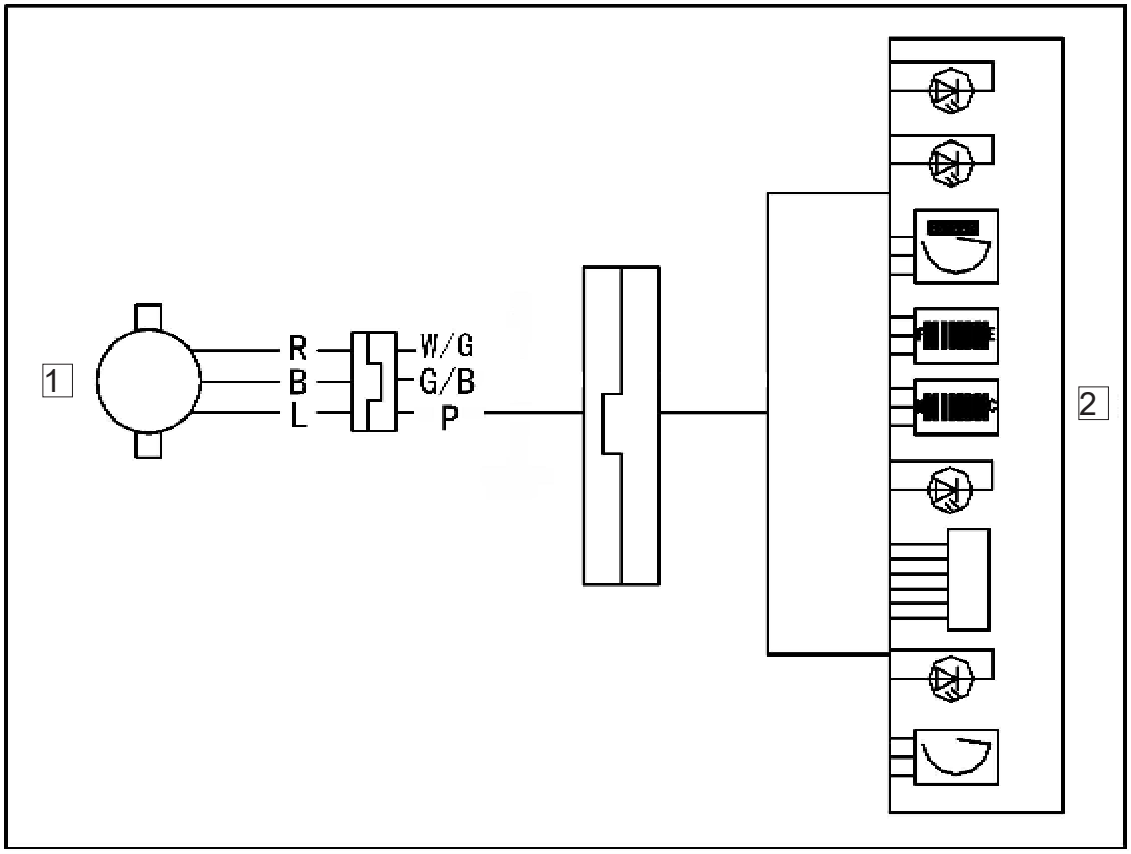
- Be sure the battery is fully charged.
- Turn the ignition switch OFF.
- Disconnect the speed sensor connector and con nect the harness adapter [A] between the harness connector and speed sensor connector.

- Connect a hand tester to the harness adapter leads.
- Measure the sensor output voltage with the engine stopped, and with the connector joined.
- Turn the ignition switch ON.



Speed Sensor Output Voltage at Sensor Connections to Adapter
Meter(+)→P(sensor) lead [C]
Meter(-)→G/B(sensor) lead [D]
Standard: About 0.05V~1.0VDC

Speed Sensor Circuit



1. Speed Sensor
2. Dashboard

3.8.6 Roll-over Sensor Service
Roll-over Sensor installation/ Removal

CAUTION
Never drop the sensor, especially on a hard surface. Such a shock to the part can damage it.

Removal:
- Disconnect connector [B] and roll-over sensor [A].

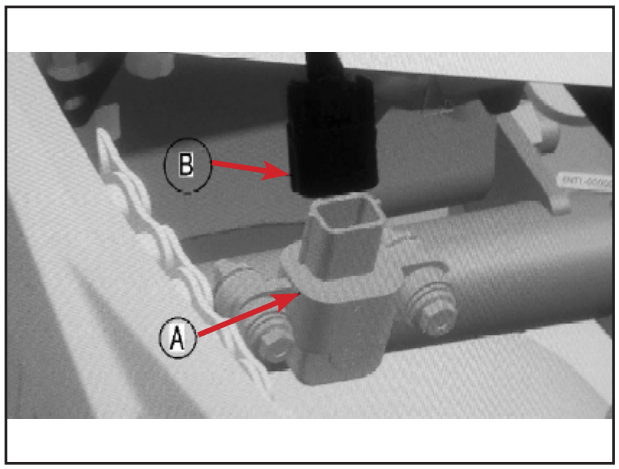
Installation:
- Roll-over sensor should be installed as il-lustrated

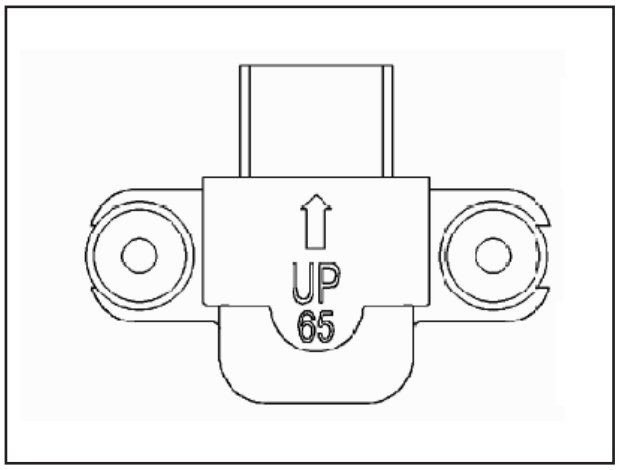
⚠WARNING
Incorrect installation of the vehicle-down sensor could cause sudden loss of en-gine power.The rider could lose balance during certain riding situations like leaning over in a turn with the potential for an accident resulting in injury or death. En-sure that the down sensor is held in place by the sensor brackets.

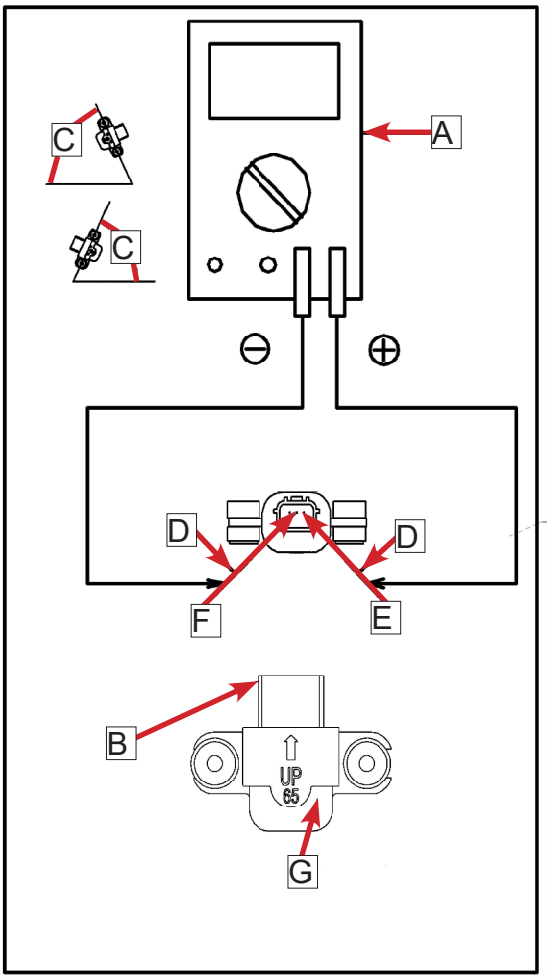
Roll-over Sensor Output Voltage In-spection(No tilt)

NOTE
- Be sure the battery is fully charged.
- Connect a hand tester [A] to the connector [B] of the roll-over sensor [C] with the needle adapter set [D].
- Measure the sensor output voltage with the engine stopped, and with the connector joined.
- Turn the ignition switch ON.

Roll-over Sensor Output Voltage
Meter(+)→Gr/B lead[E]
Meter(-)→L/G lead[F]







Roll-over Sensor Service

- Turn the ignition switch on and measure roll-over sensor power source voltage.

Roll-over Sensor Output Voltage(No tilt):

Standard: 12V DC (battery voltage)

- Turn the ignition switch OFF.

If the reading of input voltage is less than the standard, check the ECU for its ground, power supply and wiring shorted.

If the wiring is normal, check roll-over sensor resistance.

- Remove the whole set of needle adapter and with silicone sealant applied to the connector.

Roll-over Sensor Output Voltage Inspection (when tilted)

- Remove the sensor [G] (see Roll-over Sen-sor Removal).
- Connect a hand tester [A] to the connec-tor [B] with needle adapter set [D].

Roll-over Sensor Output Voltage
Meter(+)→Gr/B lead[E]
Meter(-)→L/G lead[F]

- Hold the sensor vertically.
- Turn the ignition switch ON, and measure the output voltage with the connector joined.
- Tilt the sensor 55°~75° degrees or more [C] right or left, then and measure the output voltage.

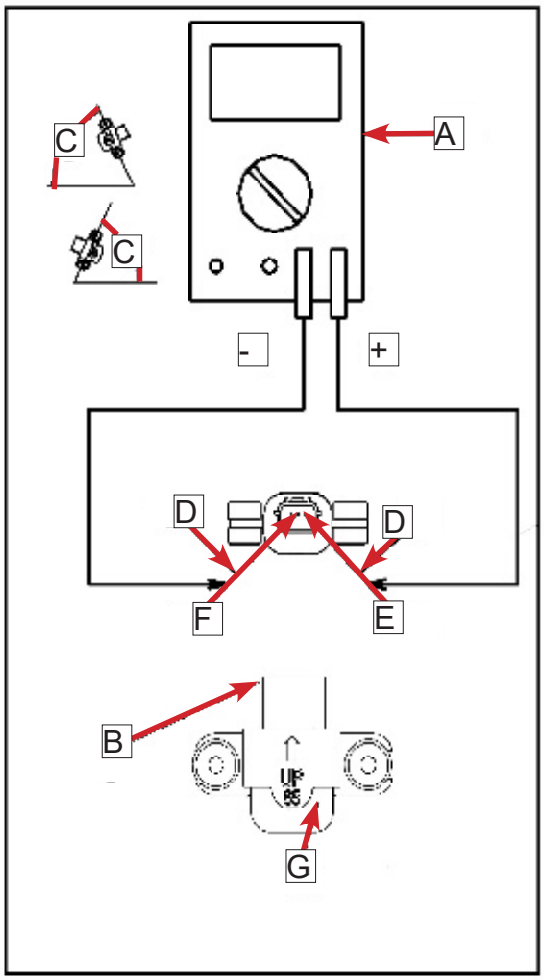
Sensor Output Voltage
Standard: 0V~0.5V

NOTE

- If you need to test again, turn the ignition switch OFF, and then ON.
- Turn the ignition switch OFF.
- Remove the needle adapter set, and ap-ply silicone sealant to the seals of the con-nector for waterproofing.

If the output voltage is normal, the wiring is suspect. Check the wiring.

If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection).

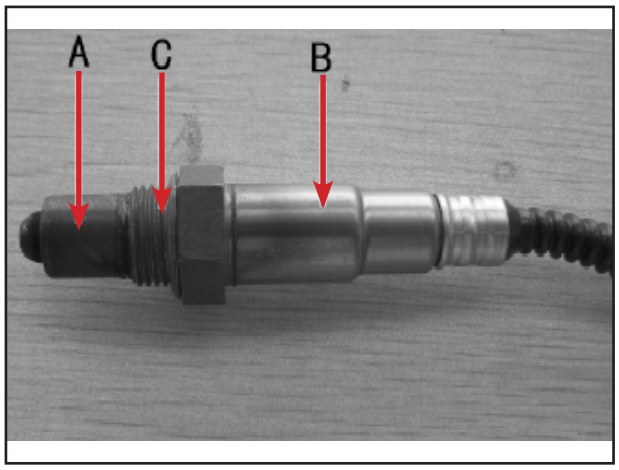


If the output voltage is out of the specified, replace the roll-over sensor.

3.8.7 Oxygen Sensor Service
Oxygen Sensor Removal / Installation

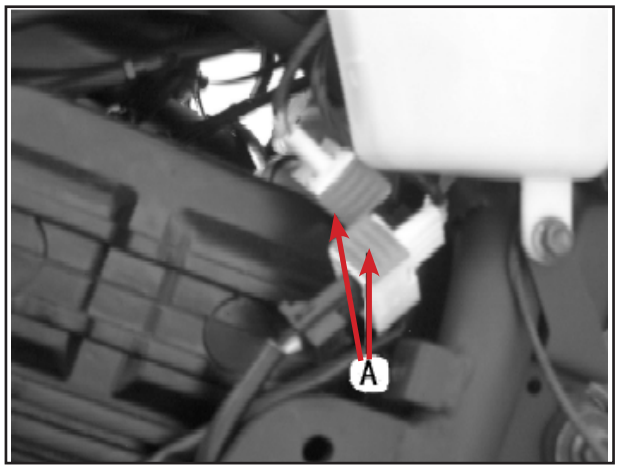
⚠WARNING

Never drop the sensor [B], especially on a hard surface. Such a shock to the part can damage it. Do not touch the portion [A] of the sensor, otherwise, the oil residue on your hand may contaminate the sensor and cause performance degeneration.



Oxygen Removal

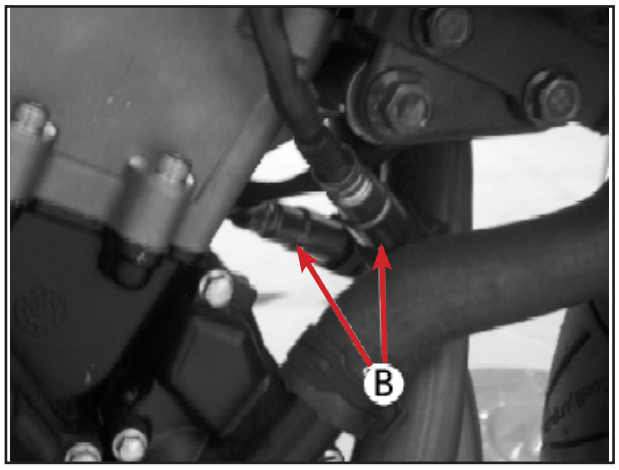
Disconnect connector[A] and remove oxygen sensor [B].



Oxygen Sensor Installation

Connect oxygen sensor [B] and connector [A].

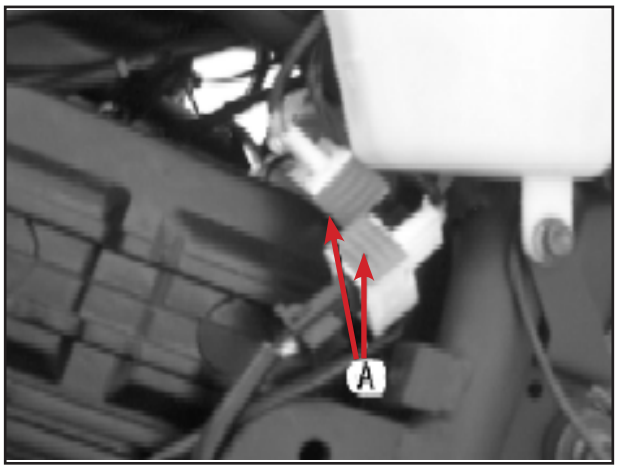
Torque:60N•m±2N•m



Oxygen Sensor Service

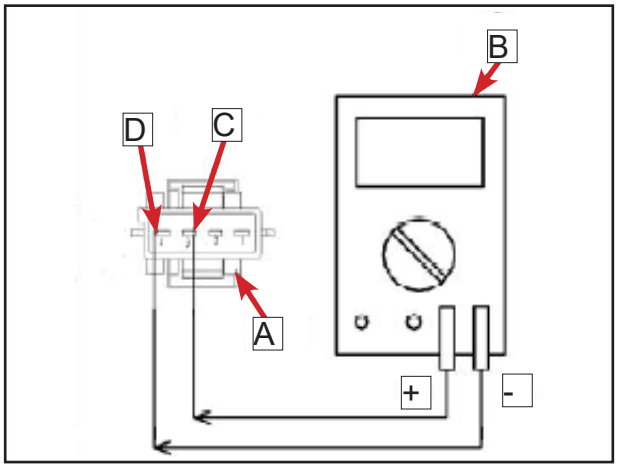
Oxygen Sensor Output Signal Inspection

- Disconnect the oxygen sensor connec tor [A] of one cylinder.
- Place the transmission in neutral
- Start the engine and throughly warm it up, then have the engine run at more than 8000rpm.
- Measure oxygen sensor output volatage using meter[B].

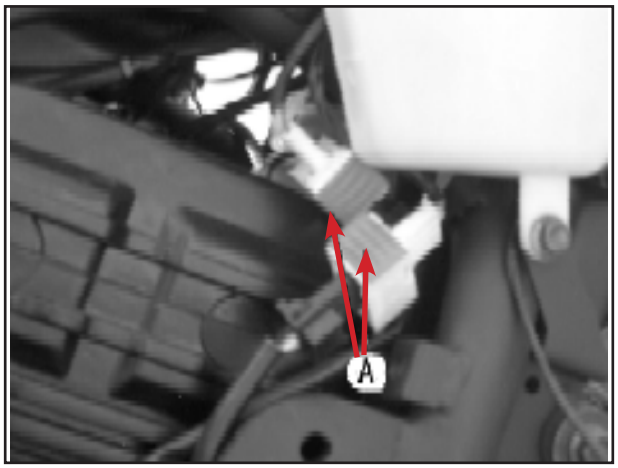


Oxygen Sensor Output Voltage
Cylinder 1:
Meter(+)→3 terminal[C]
Meter(-)→4 terminal[D]
Cylinder 2:
Meter(+)→3 terminal[C]
Meter(-)→4 termina[D]

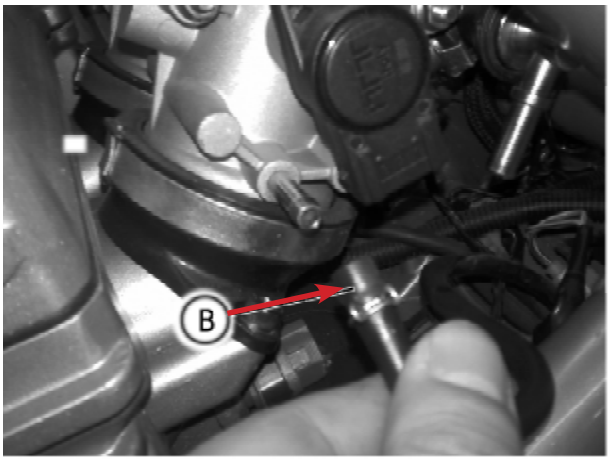
Oxygen Sensor Output Voltage:
Standard:About 0.8V



- Disconnect the oxygen sensor connec tor [A] of one cylinder.
- Place the transmission in neutral.
- Start the engine and let it idle.

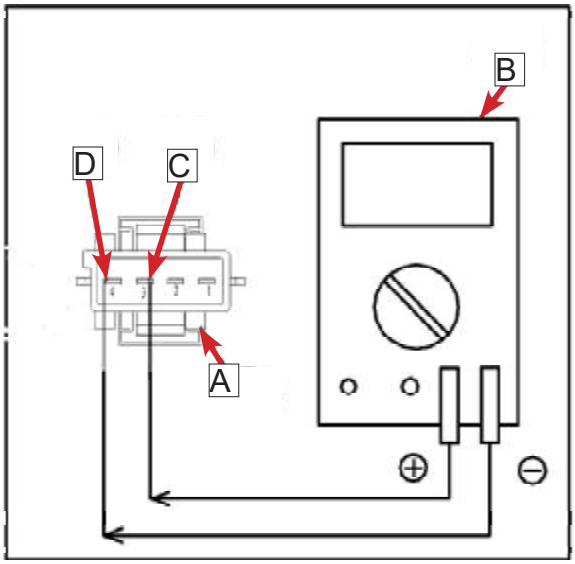


Oxygen Sensor Service
Remove the hose [B].



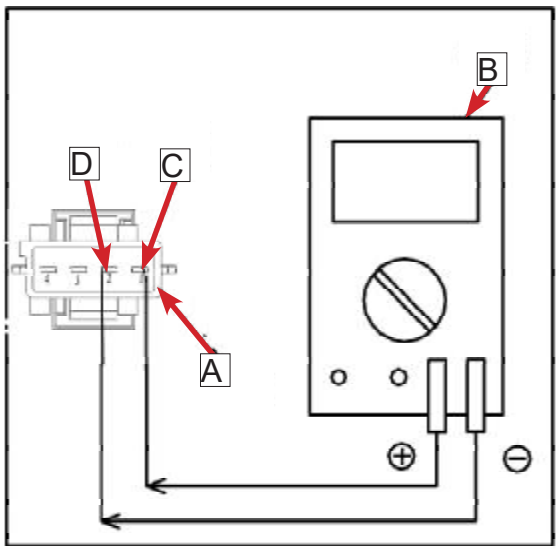
- Measure oxygen sensor output voltage with hand tester [B].

Oxygen Sensor Output Voltage:
Cylinder 1:
Meter(+)→3 terminal[C]
Meter(-)→4terminal[D]
Cylinder 2:
Meter(+)→3terminal[C]
Meter(-)→4terminal[D]
Oxygen Sensor Output Voltage:
Standard: about 0.1V



- Use the meter [B] to measure the sensors resistance.

Sensor heat up resistance
Cylinder 1
Meter(+) →Pin 2 [C]
Meter(-) →Pin 1 [D]
Cylinder 2
Meter(+) →Pin 2 [C]
Meter(-) →Pin 1 [D]
Standard: About 1 Ohm.



3.8.8 Ignition Coil Service

Ignition Coil Removal/Installation

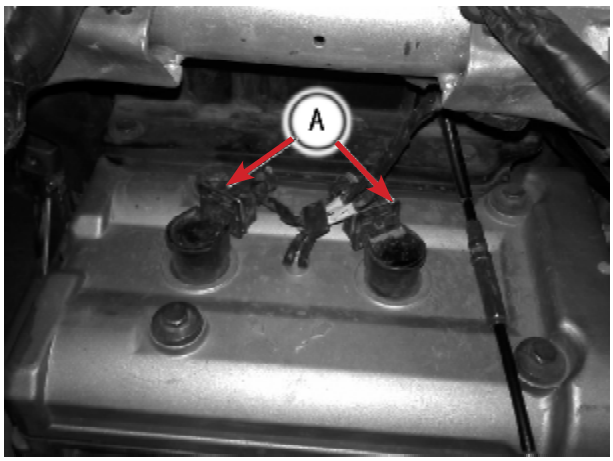
⚠WARNING

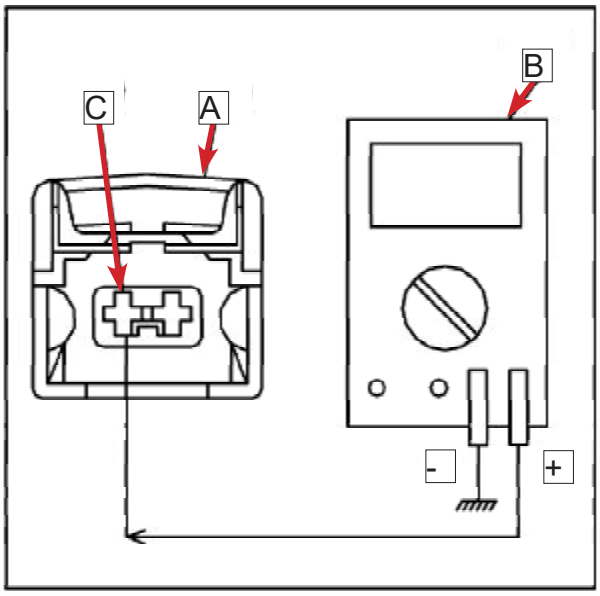
Never drop the sensor, especially on a hard surface. Such a shock to the part can damage it.

Ignition Coil Input Voltage Inspection

NOTE

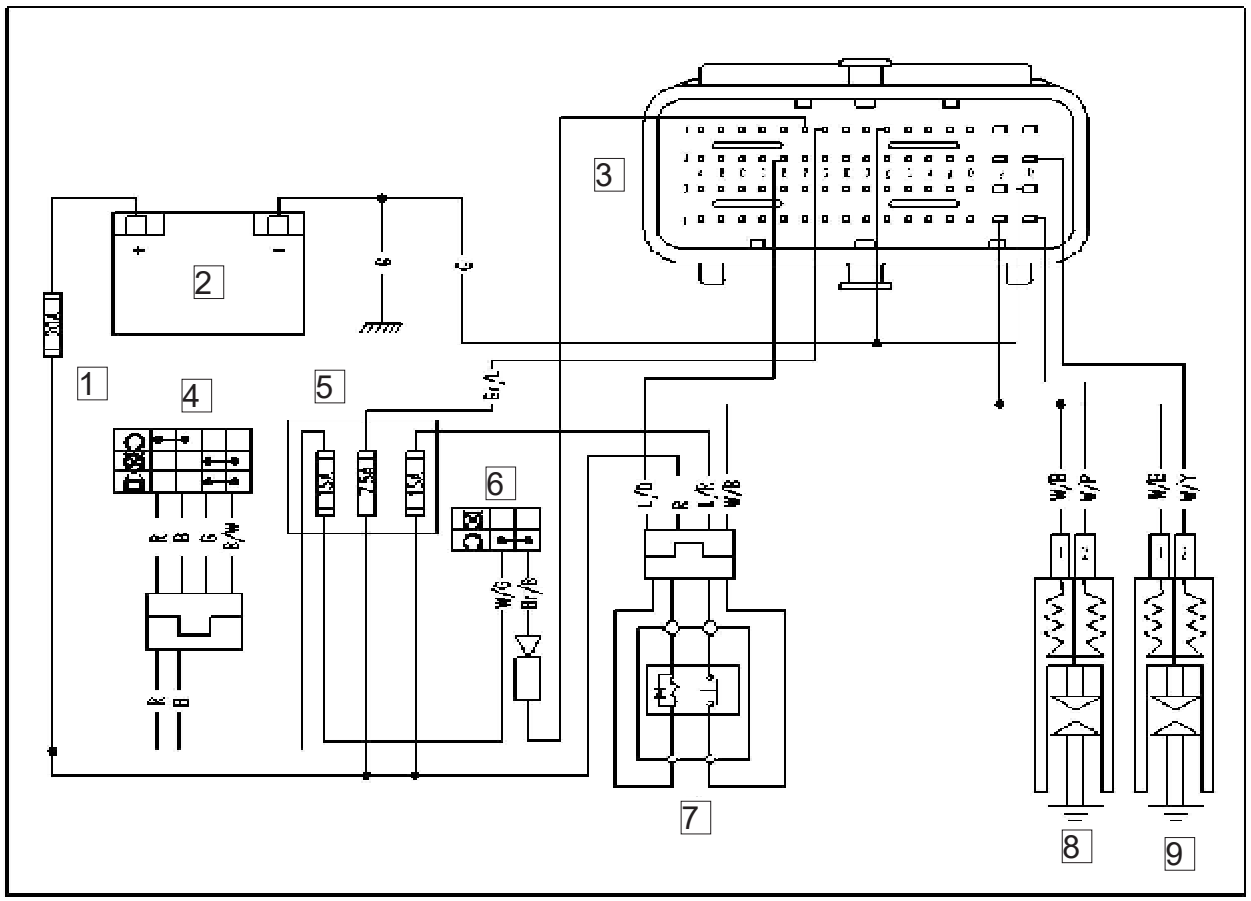
- Be sure the battery is fully charged.
- Turn the ignition switch OFF.
- Remove the fuel tank.
- Remove the air filter
- Remove the ignition switch connector [A].
- Connect a hand tester [B] as shown.
- Measure the input voltage to each primary winding of the ignition coils with the engine stopped, and with the connectors joined.
- Turn the ignition switch ON. Measure the ignition coil input voltage during fuel pump working time.





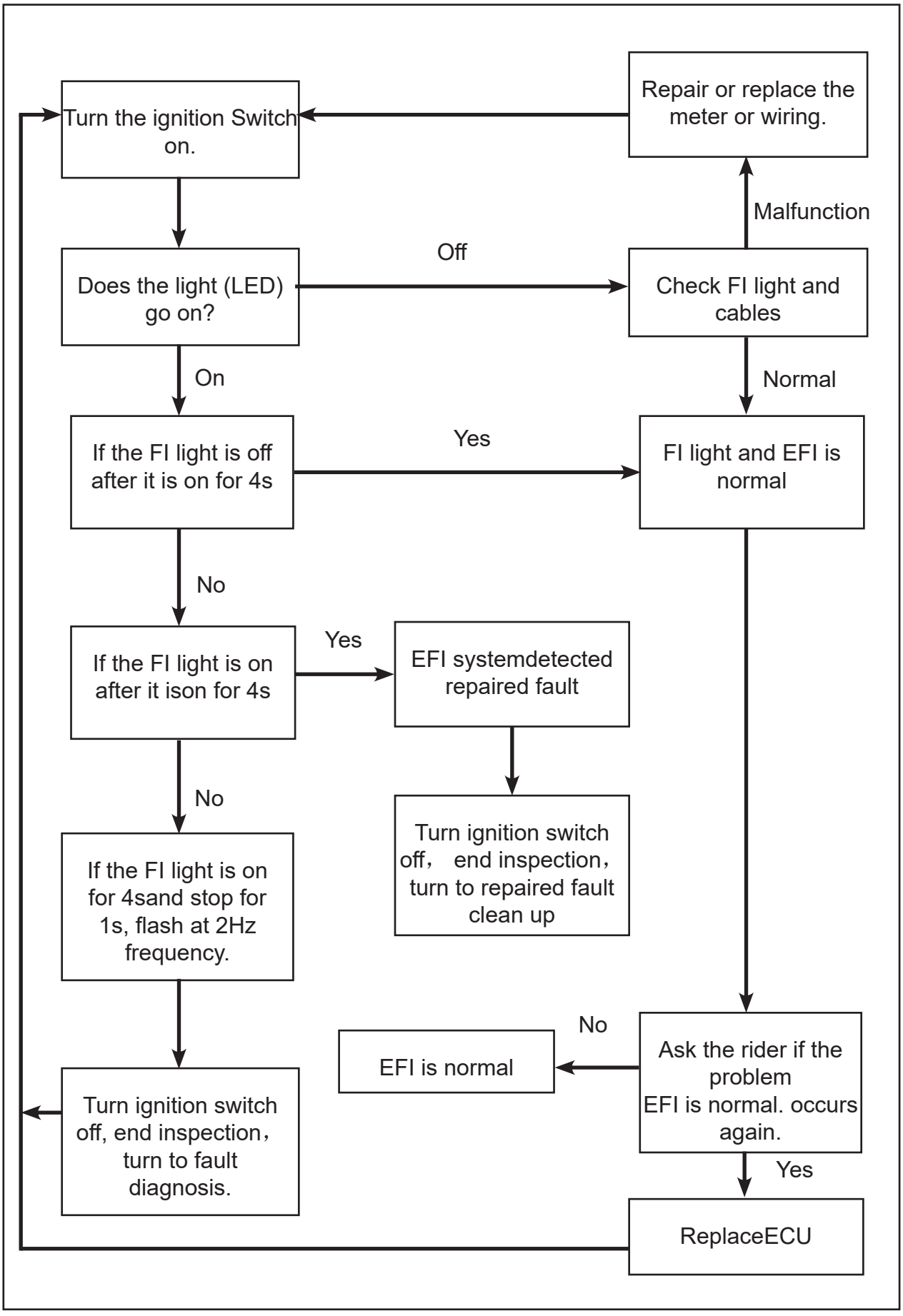
Ignition Coil Input Voltage:
Ignition coil 1#:
Meter(+)→W/Blead[C]
Meter(-)→Ground
Standard: About 12VDC
Ignition coil 2#:
Meter(+)→W/Blead[C]
Meter(+)→Ground
Standard: About12VDC

Ignition Coil
Ignition Coil Circuit



1. Main Fuse
2. Battery
3. ECU
4. Ignition Switch
5. Fuse Box
6. Engine Stop Switch
7. Main Relay
8. Ignition Coil 2#
9. Ignition Coil 1#

3.8.9 MIL Service
Flowing diagram of MIL



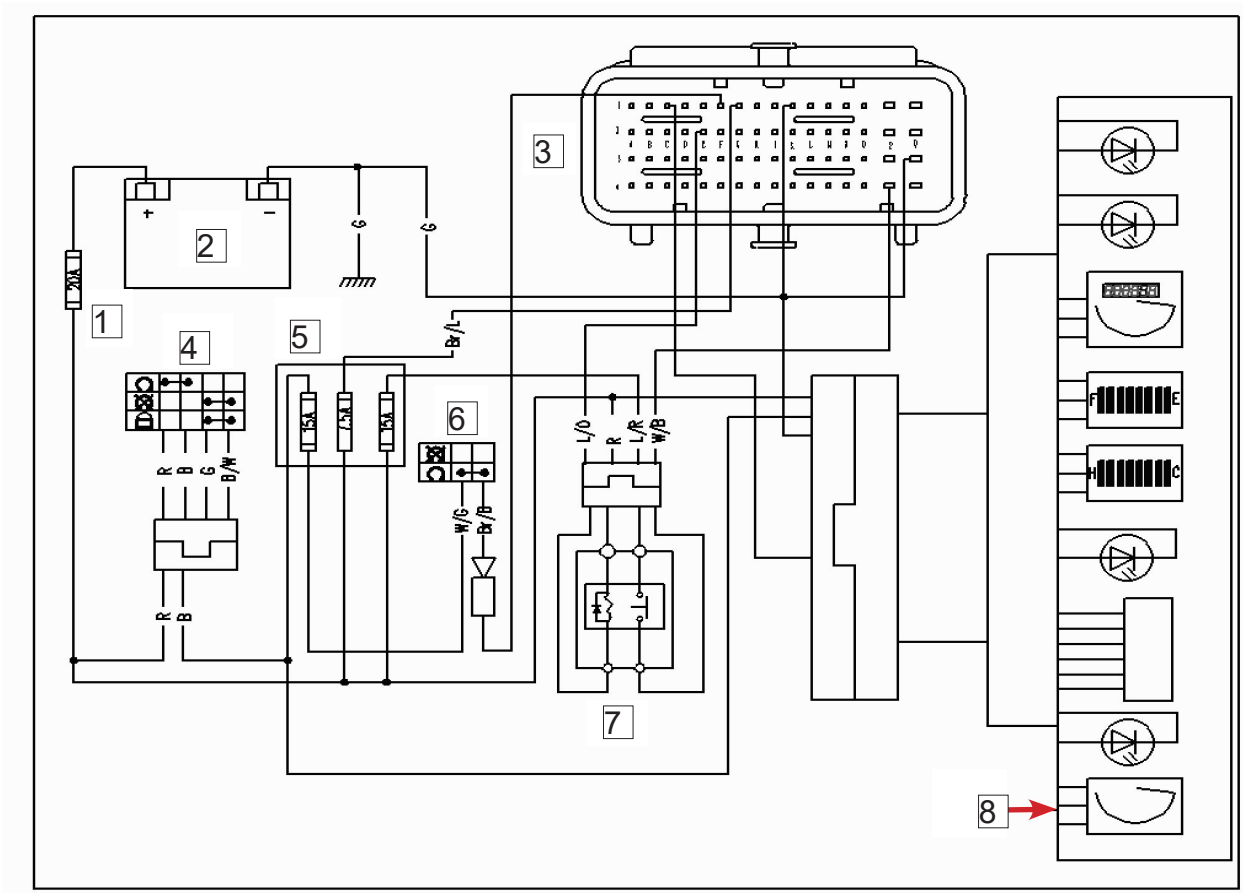
MIL Service
MIL check

- Disassemble the dashboard (See dashboard replacement on chapter 16).
- Use four auxilary connect the dashboard to the battery for MIL.

The battery voltage should be 12V
Positive pole(+)→Dashboard pin 1 and pin 2
Negative pole(-)→Dashboard pin 3 and pin 13
MIL should be on after connected.

- If the trouble indicator light doesnot on. Replace the dashboard.

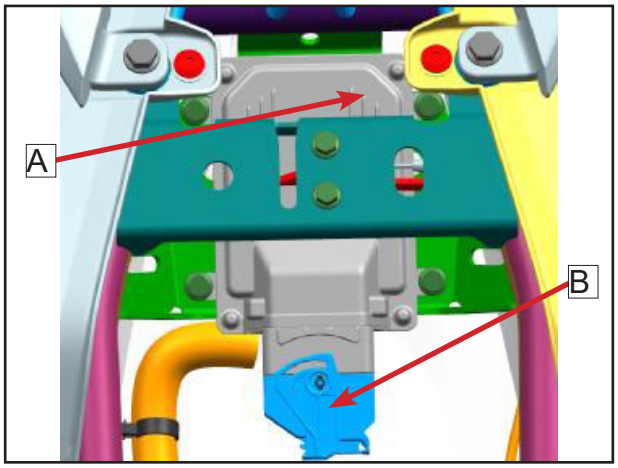
MIL Circuit



1. Main Fuse
2. Battery
3. ECU
4. Ignition Switch
5. Fuse Box
6. Engine Stop Switch
7. Main relay
8. Dashboard

3.8.10 ECU Service
ECU assembly/ disassembly

Attention
Do not drop the ECU, especially hard cover. Or the shock from the impact will damage the ECU.



ECU disassembly

- Disassemble the seat.
- Take out the ECU[A] and wires.
- Disconnect the ECU connector[B]

ECU Assembly

- Assemble the ECU and connect the connector.

ECU power and ground wire checking

- Eye check the ECU connector.

If the connector is jammed by the dust or mud. Use the compressed air clean up.
If the cable connector has cracks, bent or damage.Replace the maincable.
If the ECU connector has cracks,bent or damaged.Replaced the ECU.

- With the ECU connector[A]connected. Off the ignition switch. Use the AVO meter To check the ground wire connection below.

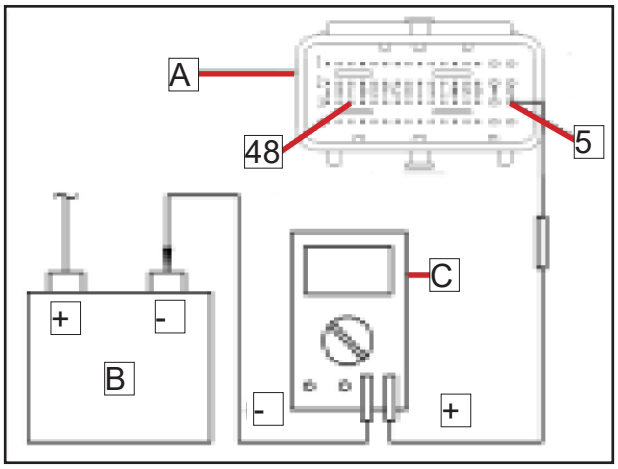
Battery[B]
AVO meter[C]

ECU ground wire check

Connector pin 5, pin 48←→Battery(-):0 ohm

Engine ground wire ←→ Battery(-):0 ohm

If the ground wire is not connected.Check the connector,engine ground wire or main cable. Replace or repair if nacessary.



- Check the ECU power voltage with a hand tester [A].
- Use the drawings in this chapter to see the ECU connector [B] numbers and position the pins.

Battery [C]

Meter Connections:

Pin 16←→Battery (-) between pins

Pin 8←→Battery (-) between pins

Pin 51←→Battery (-) between pins

When ignition Switch is OFF:

Pin 16 and battery(-):Battery voltage (12.8V or higher)

When ignition Switch is ON and Engine Stop Switch is ON:

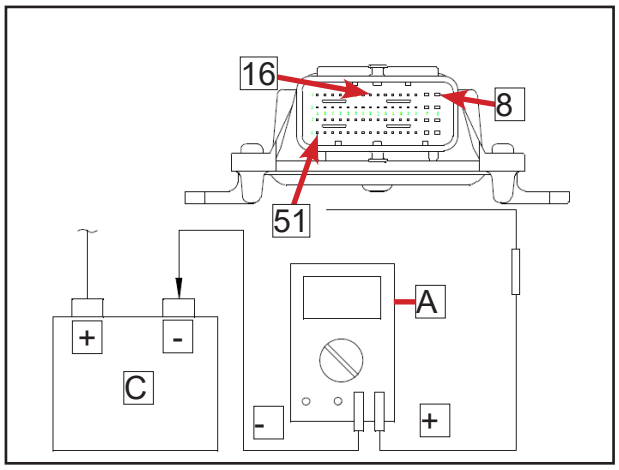
Pin 8,51 and Battery(-): 0V

If the meter does not read as specified, check the following.

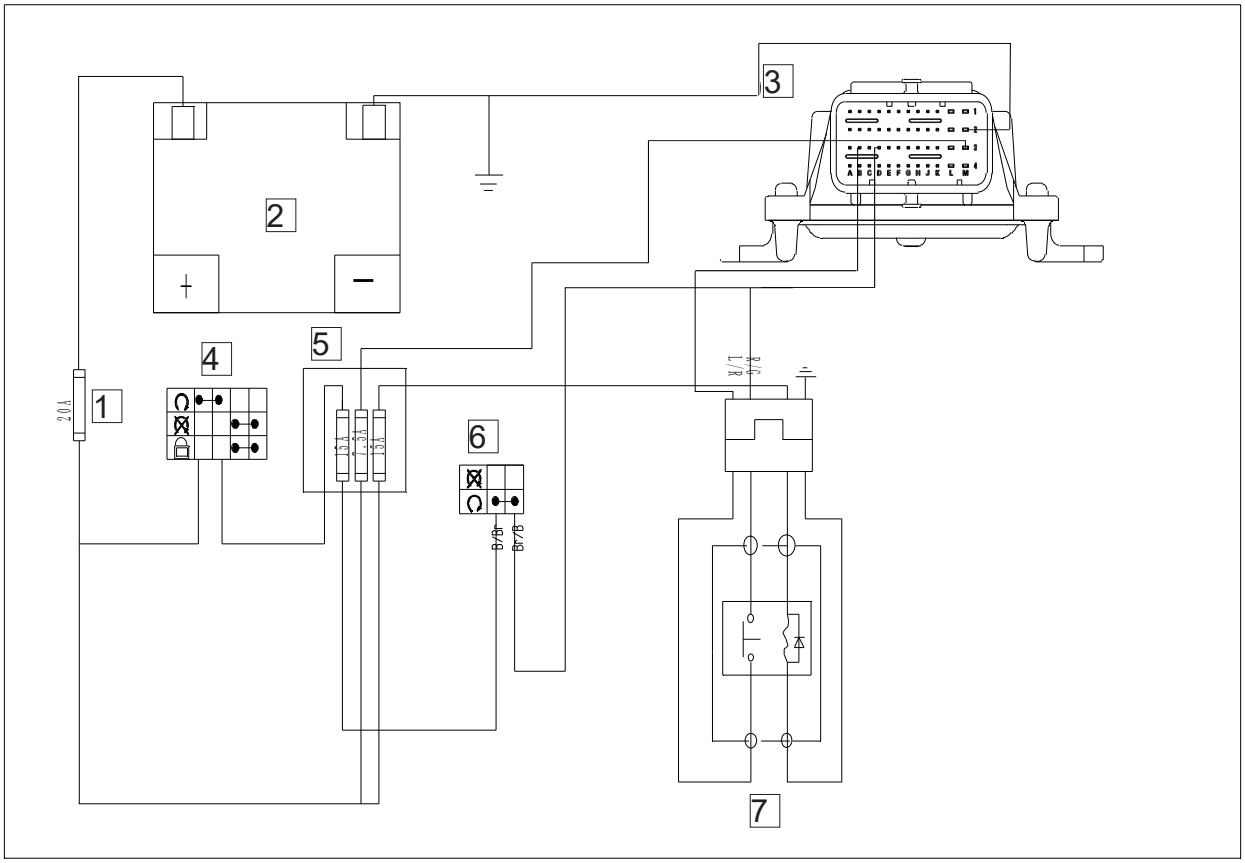
- Main Fuse 20A(see Fuse Inspection in the Electrical System chapter)
- ECU fuse 7.5A(see Fuse Inspection in the Electrical System chapter)

Power SourceWiring (see wiring diagram below)

If the inspection checks good, the ECU is damaged. Replace the ECU (see ECU Removal/Installation). The ECU itself cannot be checked or serviced.



E C U Service
ECU wiring diagram



1. Fuse
2.Battery
3. ECU
4. Ignition switch
5. Main fuse
6. Engine stop switch
7.Main relay

3.8.11 High pressure fuel pipe service

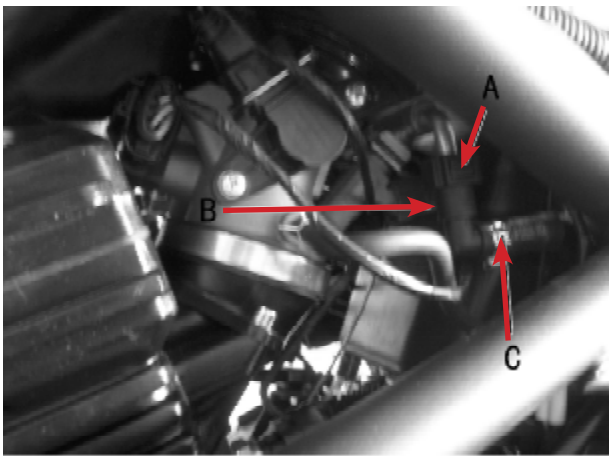
Fuel pressure check

Attention

- Pressure check can tell you where the problem comes from. Including EFI system problem, mechanical problem or electrical problem.
- If the vehicle got problem on running. The fuel pressure test can be easier to find the reason.
- Make sure that battery is fully charged.

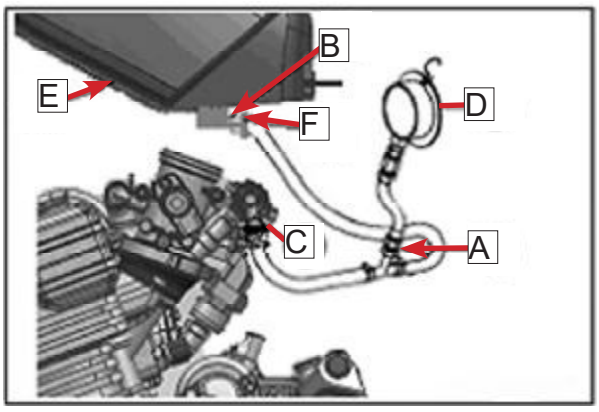
Fuel pressure test

- Disassemble the fuel tank.
- Make sure the fure pipe connector has been wrap around by a cloth to avoid the fuel leaking.
- Pressure the lock [A].
- Disconnect the connector [B].
- Disassemble the fuel pipe[C].



⚠Warning
Avoid the fuel leaking. Leaked fuel must be cleaned up immediately. Fuel will flow from hose and pipe when fuel hose is disconnected. Use a clean cloth to cover hose connection part.

- Assemble the fuel pressure adapter[A] between the fuel outlet pipe[B]and the fuel rail[C].



⚠Warning
Do not start the engine with thefuel pipe disconnected.

Fuel tank[E],Pressuremeter[D],Connector [F].

- Connect the connector tightly, make sure there is no leak.
- Turn the ignition switch on. Let the fuel pump running 3 second,then stop.

⚠Warning
Do not start the fuel pump when the tank is empty .

High pressure fuel pipe service
Fuel pressure check

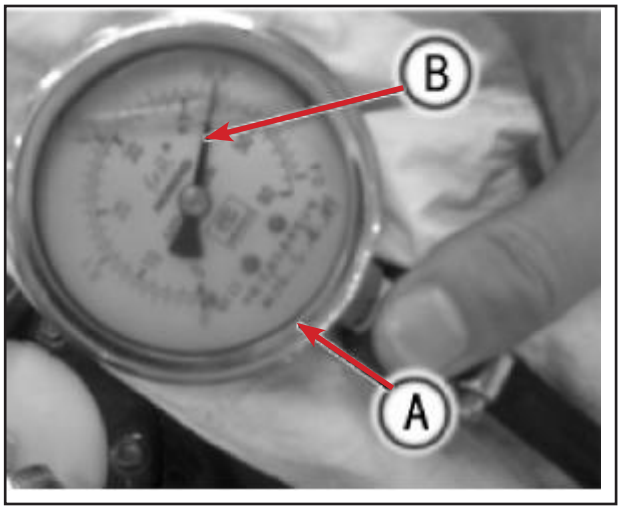
- Stop the engine to test the fuel pressure.

Fuel pressure
When ignition switch is on and fuel pump is running:
Standard: 330kPa(0.33MPa)
After the ignition switch is on for 3s and fuel pump stoped.
Standard: 265kPa(0.265MPa)
The pressure should be kept for 30s
The pressure meter[A] tip[B] will wave when testing. Get the average pressure between the Max and min.
If the fuel pressure is normal. The fuel circulation system(Fuel pump, Pressure adjuster, Fuel pipes)is OK.Check the EFI system (Injector, Each sensor,ECU).
If the pressure is lower than mormal standard. Check the item below.

- Fuel pipe leaking.
- Fuel pump running(Check the fuel pipe sound).
- Fuel pump flow(See the fuel pump flowing inspection).

If the pressure is higher than normal standard. Inspect the item below:

- Fuel pipe jammed.
- Injector jammed.
- Adjuster of the fuel pump damaged.



3.8.12 Fuel pump service

Fuel pump flowing check

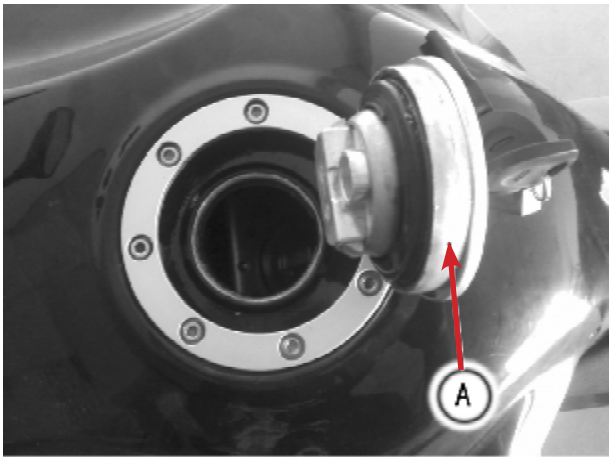
Attention

- Make sure the pattery fully charged.

⚠Warning

Gasoline is extremely flammable and can be explosive under certain conditions. Make sure the area is well-ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light. Do not smoke. Turn the ignition switchOFF. Be prepared for fuel spillage; any spilled fuelmust be completely wiped up immediately.

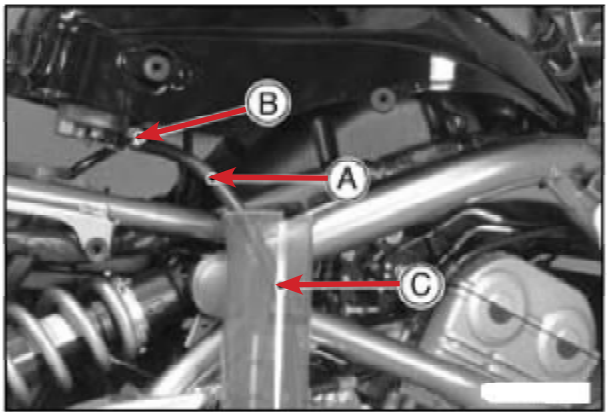
- Turn the ignition switch and engine stopswitch off.
- Waiting for engine cool down.
- Prepare a plastic hose of the inside diameter 7.5mm(0.30in.) and a measuring cylinder.
- Disassemble the fuel tank bolt.
- Open the fuel tank cap[A] To release the pressure.



⚠Warning

Be prepared for fuel spillage; any spilled fuel must be completely wiped up immediately. When the fuel hose is disconnected, fuel spills out from the hose and the pipe because of residual pressure. Cover the hose connection with a piece of clean cloth to prevent fuel spillage.

- Connect the plastic hose [A] to the fuel pump outlet pipe.
- Secure the plastic hose with a clamp [B].
- Insert the plastic pipe into measuring cylin-der [C]



Fuel pump service

Fuel pump flowing check

⚠Warning
Wipe off spilled out fuel immediately. Be sure to hold the measuring cylinder vertical.

- Assemble the fuel tank.
- Ignition on with the engine stop. Running the fuel pump for 3s.Then stop. Repeat several times until the pipe full of fuel.

⚠Warning
Do not drive the fuel pump without the fuel inthe fuel tank.

- Measure the discharge for 3 seconds with the plastichose filled with fuel.
- Repeat this operation several times.

Amount of Fuel Flow

Standard: 60 mL or more for 3 seconds

If the fuel flow is much less than the specified, check the battery condition (see Charging Condition In spection in the Electrical System chapter). If the battery is good, replace the fuel pump (see Fuel Pump Removal/ Installation).

- After inspection, install the fuel tank (see Fuel Tank Installation).
- Start the engine and check for fuel leakage.

Fuel Pump

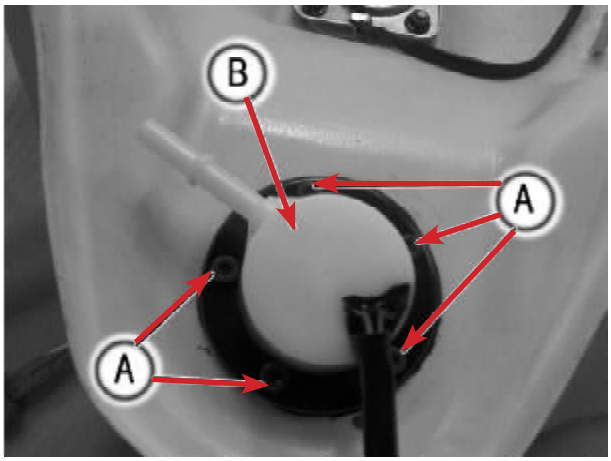
Fuel Pump Removal

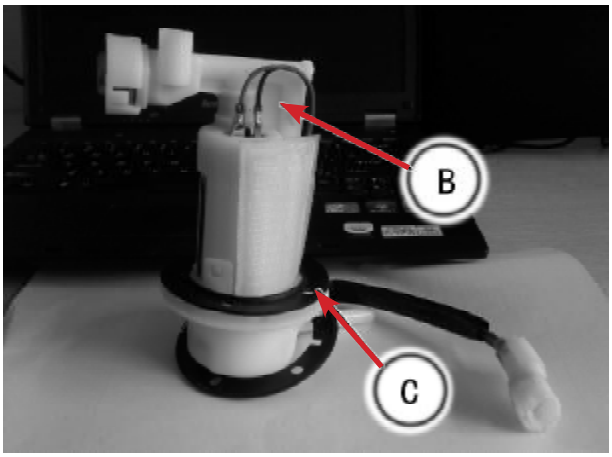
⚠Warning

Never drop the fuel pump, especially on a hard surface. Such a shock to the pump can damage it.

⚠Warning

Gasoline is extremely flammable and can be explosive under certain conditions. Make sure the area is well-ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light. Do not smoke. Turn the ignition switch OFF. Disconnect the battery (-) terminal.To make fuel spillage minimum, draw the fuel out from the fuel tank when the engine is cold. Be prepared for fuel spillage; any spilled fuel must be completely wiped up immediately.





- Draw the fuel out from the fuel tank.
- Remove the fuel tank (see Fuel Tank Removal).
- Be careful of fuel spillage from the fuel tank since fuel still remains in the fuel tank and fuel pump. Plug the fuel pipe of the fuel tank.
- Turn the fuel tank upside down.

Remove:

- Fuel Pump Bolts [A].
- Fuel Pump [B].
- Replace fuel pump gasket [C] if damaged

⚠Warning

Do not pull the lead of the fuel pump. If they are pulled, the lead terminals may be damaged.

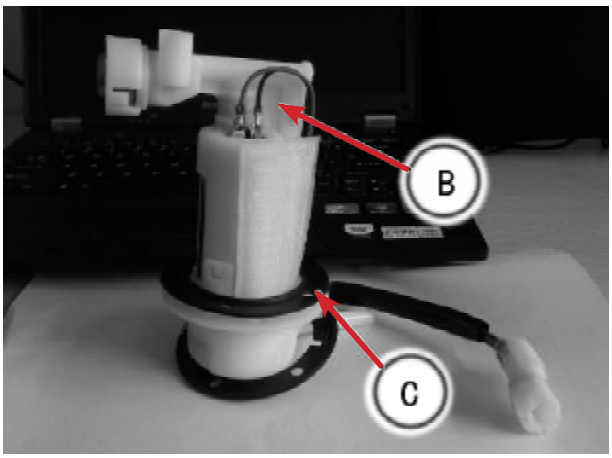
Fuel Pump

Fuel Pump Installation

- Clean dirt or dust from the fuel pump [B] by lightly using compressed air.
- Replace the fuel pump gasket [C] with a new one if damaged.
- Tighten the fuel pump bolts to a snug fit, tighten them in a crisscross pattern.

Torque - Fuel Pump Bolts:5N•m

- Tighten the pump bolts again in a crisscross pattern to check the tightness.



Fuel Pump Operation Inspection

NOTE

- Be sure the battery is fully charged.
- Just listen to the pump sound in the fuel tank to confirm pump operation.
- Turn the ignition switch ON and make sure that the fuel pump operates (make light sounds) for 3 seconds, and then stops.
- Turn the ignition switch OFF

If the pump does not work as described above, inspect the operating voltage.

Fuel Pump Operating Voltage Inspection

NOTE

- Be sure the battery is fully charged.
- Turn the ignition switch OFF and disas semble the tank.
- Disconnect fuel pump connector[A]
- Measure the voltage when engine stops.
- Turn the ignition switch ON.
- The tester needle should indicate battery voltage for 3 seconds, and then 0V.

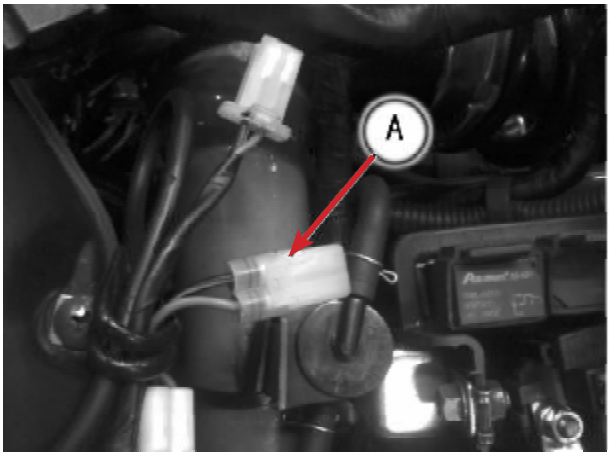
Tester Connections:

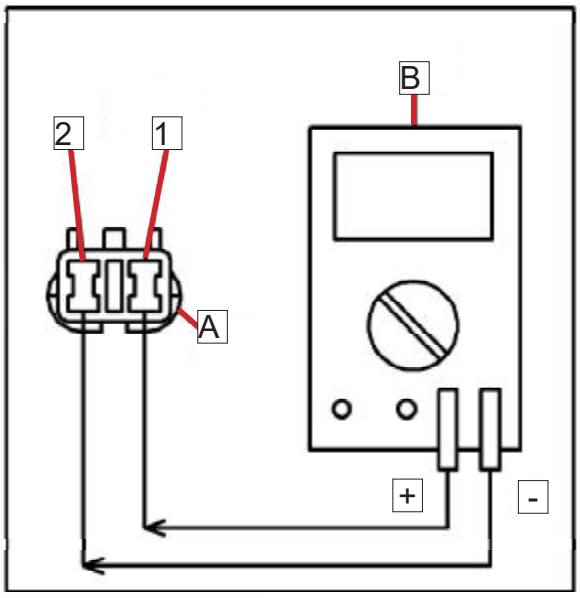
Tester(+) → terminal 1(lead B/Y)

Tester(-) → terminal 2(lead G)

With the ignition switch on:

Standard: Battery Voltage keeps for 3 seconds, and then goes to 0 V.





Fuel Pump

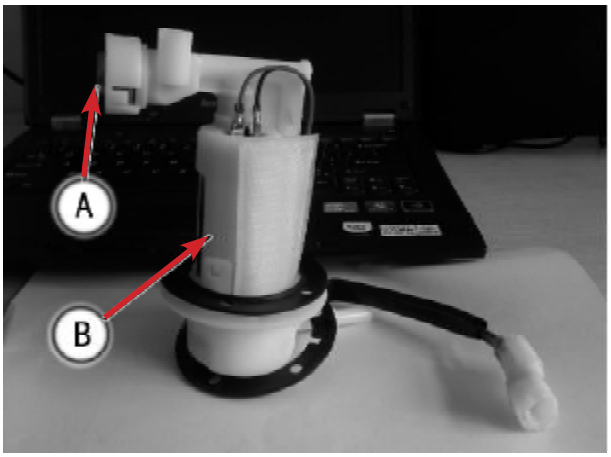
If the reading stays on battery voltage, and never shows 0V. Check the ECU and fuel pump relay.

If the voltage is normal but fuel pump does not work, replace the fue pump.

If thereis no battery voltage, check the fuel pump relay.

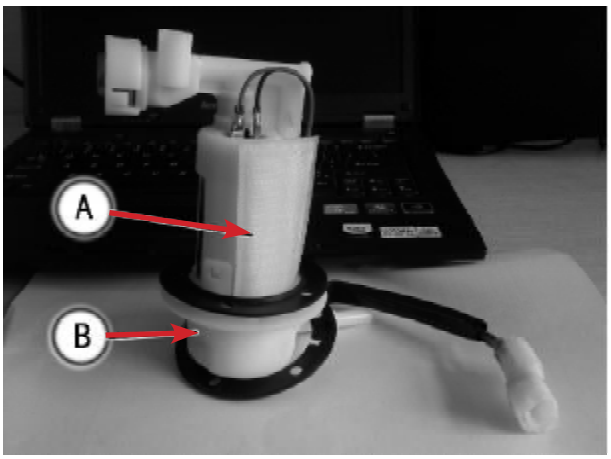
Pressure Regulator Removal

- The pressure regulator [A] is built into the fuel pump [B] and cannot be removed.
- If the pressure regulator is suspected of clogging or being damaged, replace the fuel pump as a set.

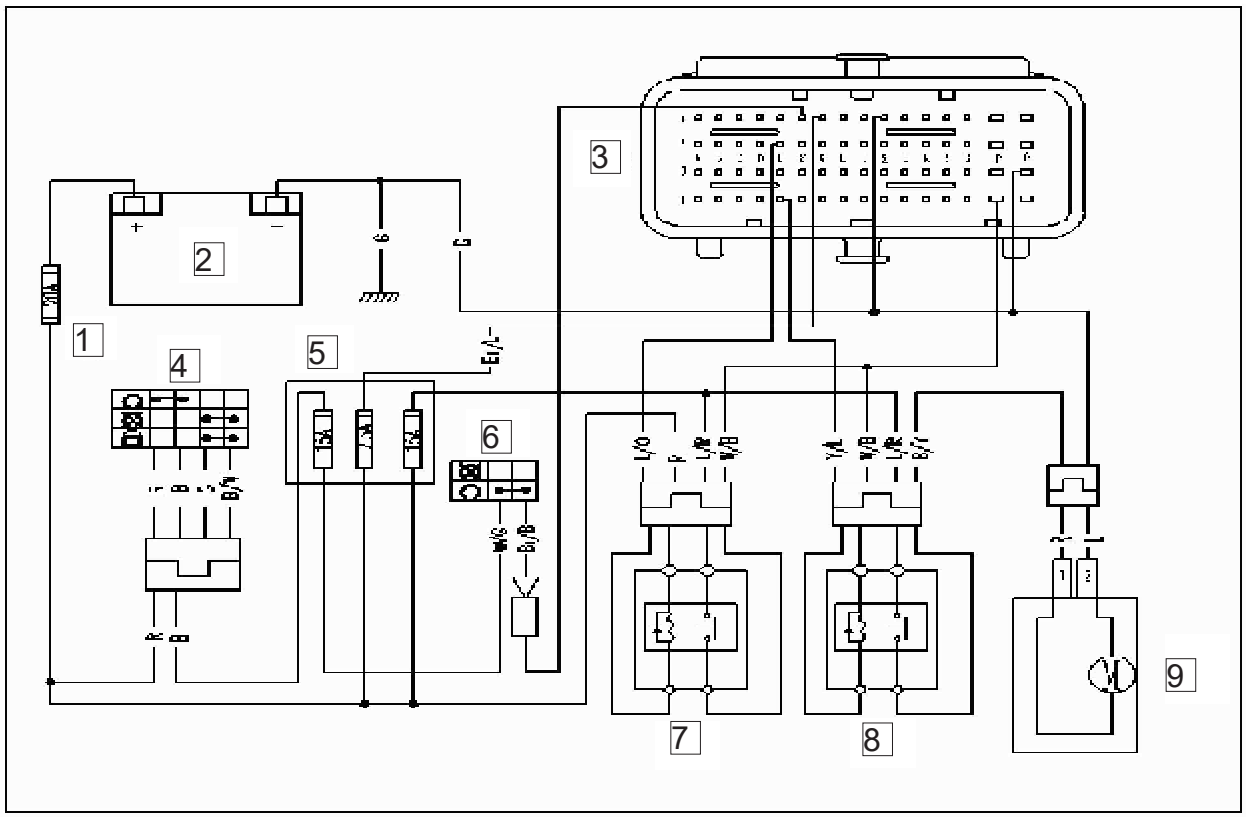


Pump Screen, Fuel Filter Cleaning

- The fuel filter [A] is built into the pump and cannot be cleaned or checked.
- If the fuel filter is suspected of clogging or being damaged, replace ithe fuel pump as a set.



Fuel pump
Fuel pump wiring diagram



1. Fuse
2. Battery
3. ECU
4. Ignition Switch
5. Fuse Box
6. Engine Stop Switch
7. Main relay
8. Relay, fuel pump
9. Fuel pump1

3.8.13 Fuel Injector Service

Fuel Pump Removal/Installation

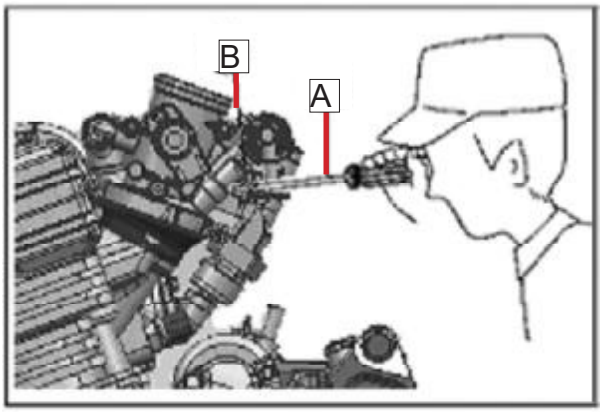
- Refer to the Throttle Body Assy Disassem-bly/ Assembly.

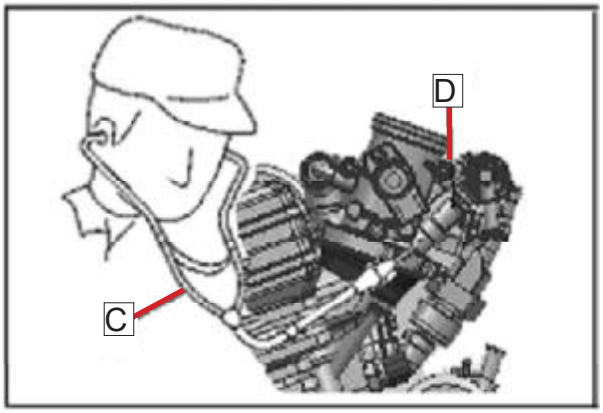
Audible Inspection

- Start the engine.
- Apply the tip of a screwdriver [A] to the in-jector [B]. Put the grip end onto your ear, and listen where the injector is clicking or not.(A sound scope [C] can also be used.
- Do the same for the other injectors

If all the injectors click at a regular intervals, the injectors are good. The trouble may be related to the fuel line, requiring fuel pres-sure inspection.

- The click interval becomes shorter as the engine speed rises.
- If any injector(s) doesn't click, the EFI cir-cuit or the injector is suspect. Perform fuel In-jector Power Source Voltage Inspection", first.

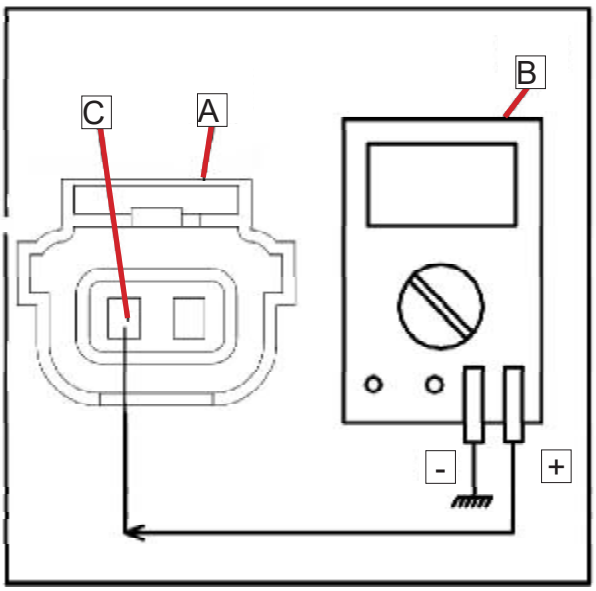




Fuel Injector Power Source Voltage Inspec-tion

- Turn the ignition coil OFF
- Remove the fuel tank.
- Remove the air filter.
- Connect the fuel injector connector [A].
- Connect a hand tester [B] to the fuel injector connector.

Fuel Injector Output Voltage:
Cylinder 1:
Meter (+)→lead [C]
Meter (-) →Battery (-)
Cylinder 2:
Meter (+) → lead [C]
Meter (-) →Battery (-)



Fuel Injector

- Turn the ignition switch ON

Fuel fump input voltage is the battery voltage in first 3 seconds, then 0V.

If the output voltage is normal, perform injector Signal Test

If the meter does not read as specified, check the following :

- Main Fuse 20 A fuel pump relay fuse 15A(see Fuse Inspection in the Electrical System chapter)
- Fuel Pump Relay (see Relay Circuit In-spection in the Electrical System chapter)
- Power Source Wiring (see wiring diagram below)

Fuel Injector Wiring Inspection

- Connect a hand tester [A] to check the con-tinuity between ECU connector [B] and fuel injector connector [C]. Break-line part is cyl-inder 2.

Cylinder 1:

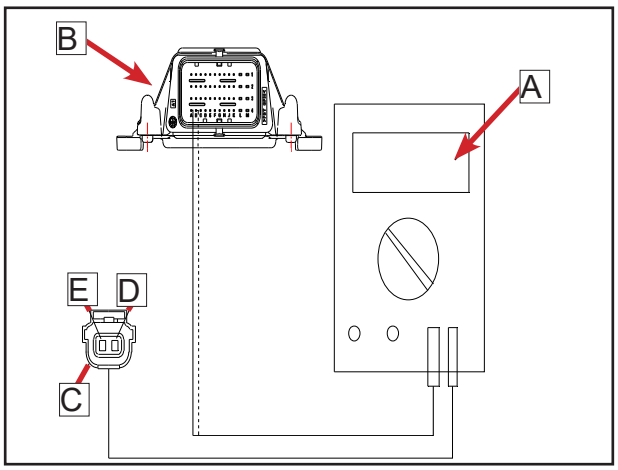
ECU terminal 50 ----- lead [D]

Standard: continuity

Cylinder 2:

ECU terminal 49 -------lead [E]

Standard: continuity



Fuel Injector

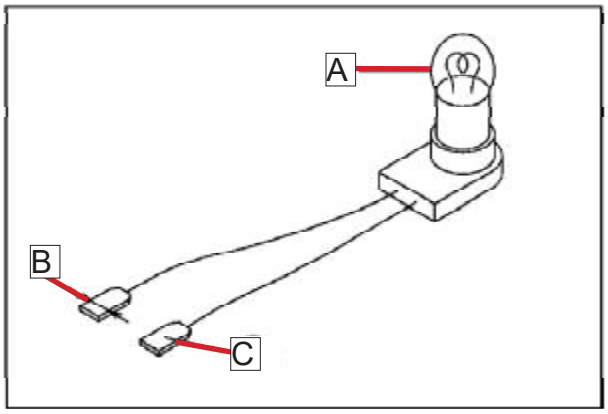
Injector Signal Test

- Prepare two test light sets with male ter-minals as shown.

Rating of Bulb [A]:12Vx(3~3.4)W

Terminal Width [B]:1.8 mm (0.071 in.)

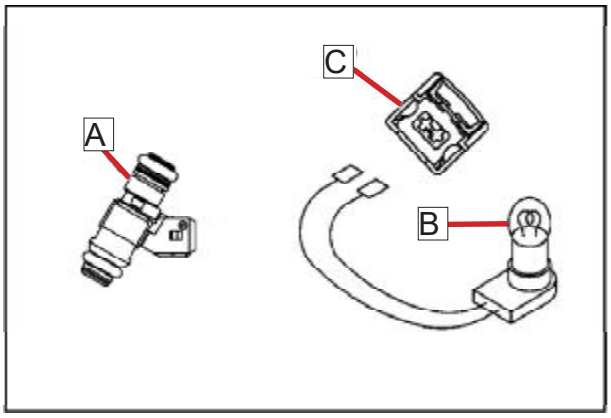
Terminal Thickness [C]:0.8 mm (0.031 in.)



CAUTION
Do not use larger terminals than specified above. A larger terminal could dam-age the injector main harness connector (female), leading to harness repair or replacement. Be sure to connect bulbs in series. The bulb works as a current lim-iter to protect the solenoid in the injector from excessive current.

Test Lights Wiring

- Remove the fuel tank(see Fuel Tank)
- Remove the air filter
- Disconnect the connector of fuel injector [A].
- Connect each test light set [B] to the injector sub harness connector [C].
- Turn the ignition switch ON.
- While cranking the engine with the starter motor, watch the test lights.



If the test lights flicker at regular intervals, the injector circuit in the ECU, and the wiring are good. Perform the "Injector Resistance Inspection". Injector Signal Test :Prepare two test light sets with male terminals as shown. Rating of Bulb [A]:12 V×3 ~3.4 W Terminal Width [B]:1.8

If the test light doesn’t flicker (or the tester needle doesn’t oscillates), check the wiring and connectors.

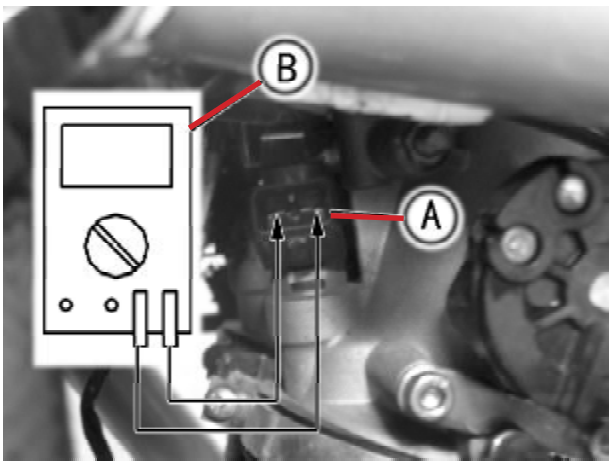
If the wiring is good, check the injector voltage.

If the wiring is good, inspect the ECU for its ground and power supply (see ECU Power Supply Inspection).

Fuel Injector

Fuel Injector Resistance Inspection

- Remove the fuel tank(see Fuel Tank Removal).
- Remove the air filter housing(see Air Fil-ter Housing Removal).
- Disconnect the connector from the con-nector [A].
- Measure the injector resistance with the hand tester [B].



Injector Resistance:
Standard: 12.1Ω± 1Ω(20°C)

If the reading is out of the range, perform the “Injector Unit Test”.

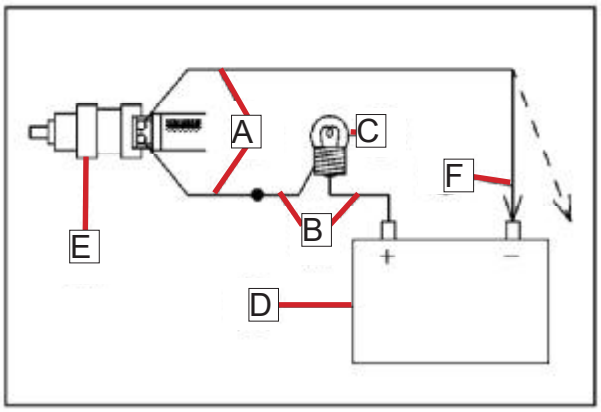
Injector Unit Test

- Use two leads [A] and the same test light set [B] as in “Injector Signal Test”.

Rating of Bulb [C]: 12 V×(3 ~ 3.4) W
12 V Battery [D]

⚠CAUTION
Be sure to connect the bulb in series. The bulb works as a current limiter to protect the solenoid

- Connect the test light set to the injector [E] as shown.
- Open and connect [F] the end of the lead to the battery (-) terminal repeatedly. The in-jector should click.

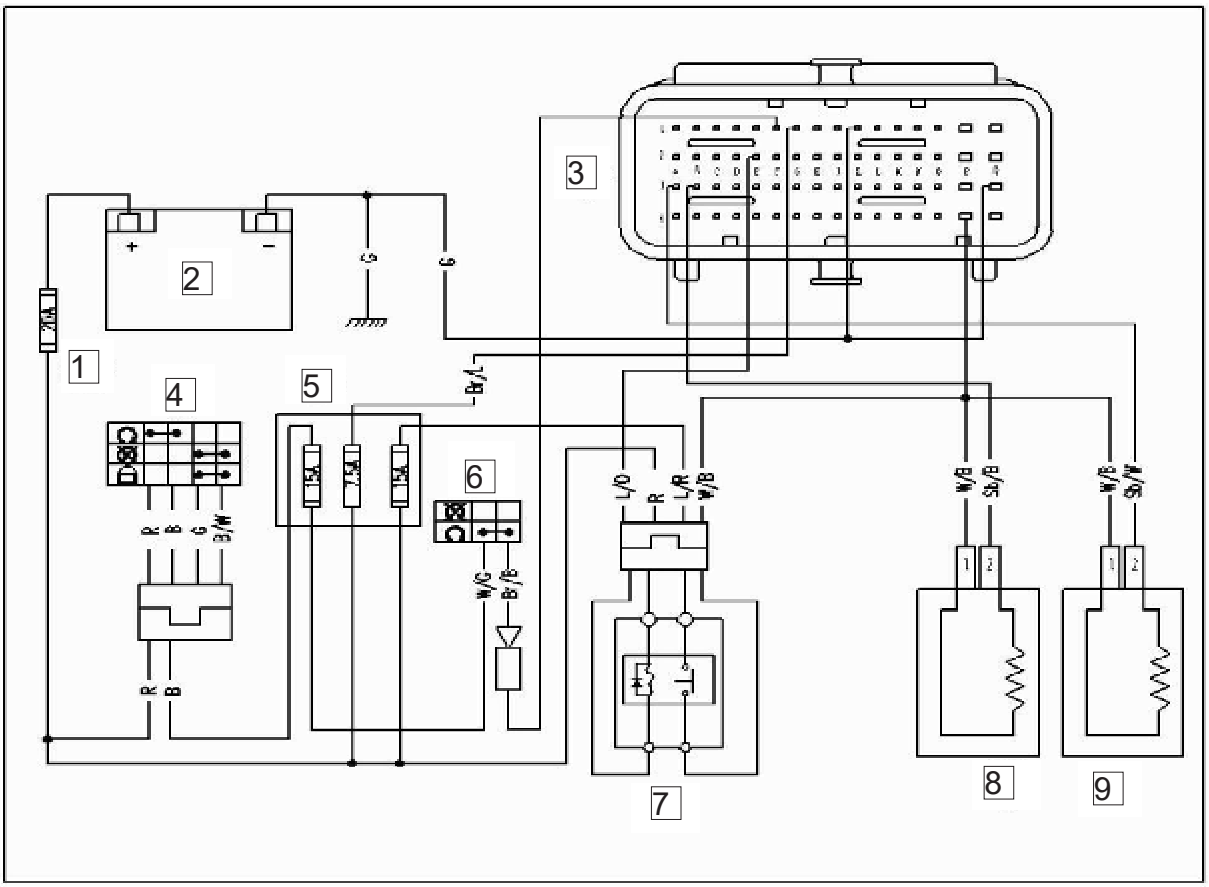


If the injector does not click, replace the injector.

If the injector clicks, check the wiring again. If the wiring is good, replace the injector (may be clogged) or ECU.

Fuel Injector

Fuel Injector Wiring Diagram



1. Fuse
2. Battery
3. ECU
4. Ignition Switch
5. Fuse Box
6. Engine Stop Switch
7. Main relay
8. Fuel Injector 2
9. Fuel Injector 1

3.8.14 Throttle Grip and Cables Service

Throttle Grip Free Play Inspection

- Refer to the Throttle Control System Inspection in the Periodic Maintenance chapter. Throttle Grip Free Play Adjustment
- Refer to the Throttle Control System Inspection in the Periodic Maintenance chapter. Throttle Cable Installation
- Install the throttle cables in accordance with Cable, Wire, and Hose Routing section in the Appendix chapter.
- Install the lower ends of the throttle cables in the cable bracket on the throttle body assy after installing the upper ends of the throttle cables in the grip.
- After installation, adjust each cable properly.

⚠Warning
Operation with incorrectly routed or improperly ad-justed cables could result in an unsafe riding condition.

Throttle Cable Lubrication

- Refer to the Chassis Parts Lubrication in the Periodic Maintenance chapter.

3.8.15 Throttle Body Assy

Idle Speed Inspection

- Refer to the Idle Speed Inspection in the Periodic Maintenance chapter.

Engine Vacuum Synchronization Inspection/Adjustment

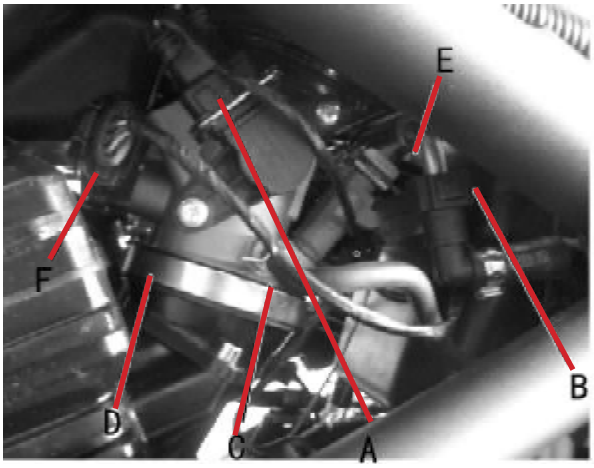
- Refer to the Engine Vacuum Synchronization Inspection in the Periodic Maintenance chapter.

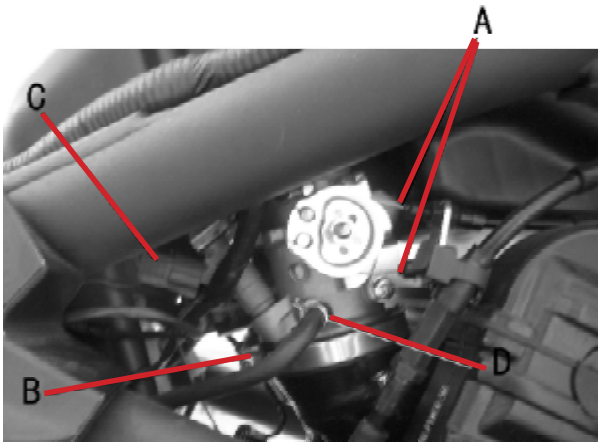
Throttle Body Assy Removal

⚠WARNING

Gasoline is extremely flammable and can be explosive under certain conditions. Turn the ignition switch OFF. Disconnect the battery (-) cable terminal. Do not smoke. Make sure the area is well-venti-lated and free from any source of flame or sparks; this includes any appliance with a pilot light. Be prepared for fuel spillage: any spilled fuel must be com-pletely wiped up immediately.

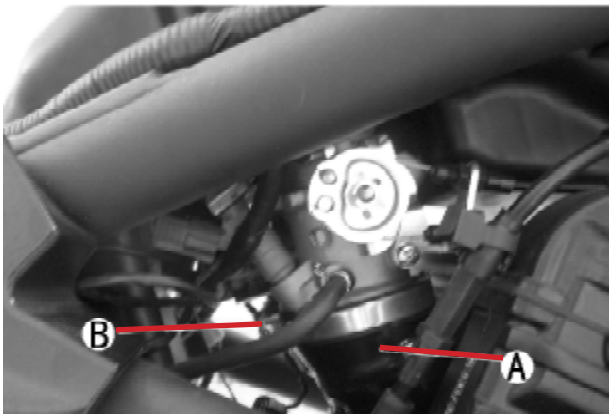
- Remove fuel tank (see Fuel Tank Removal)
- Air filter housing (see Air Filter Housing Removal)
- Disconnect throttle Body Sensor Connec-tor [A]
- Disconnect fuel Hose Lower End [B]
- Disconnect evaporative emission control hose [C] of cylinder 1
- Loosen Clamp [D] of cylinder 1
- Disconnect Fuel injector connector [E] of cylinder 1
- Disconnect Air intake tempreature and pressure sensor[F].
- Disconnect the throttle cable[A].
- Loosen: Clamp [B]
- Disconnect fuel injector connector [C] of clinder 2
- Disconnect evaporative emission control hose [D] of cylinder 2





Throttle Body Assy

- After removed the throttle body assy, put clean cloth into the throttle body holders.



⚠WARNING

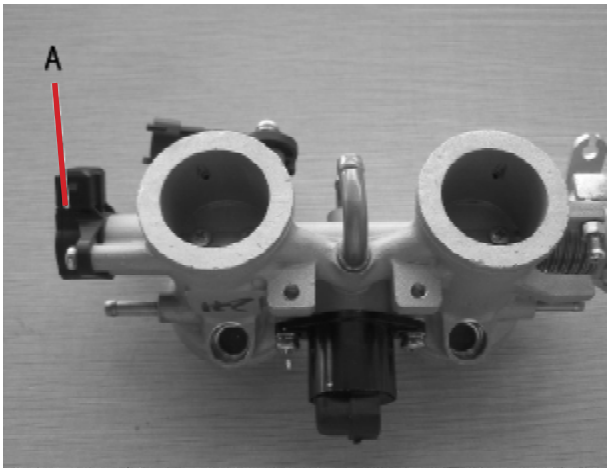
If dirt gets into the engine, it will cause engine excessive wear and damage .

Throttle Body Assy Installation

- Install the throttle body on the intake mani-fold [A].
- Install the clamp bolts [B] in the direction shown, facing outwards.
- Install the fuel injector connector, evapora-tive emission control hose, throttle cable, high pressure fuel line joint.

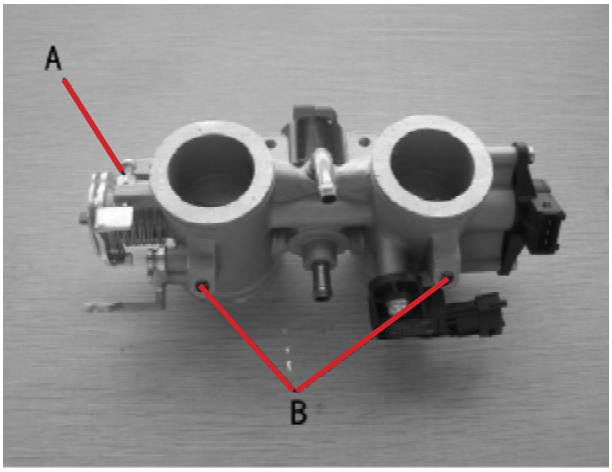
⚠WARNING

Operation with an incorrectly routed cable could result in an unsafe riding condition.



⚠WARNING

Do not remove, disassemble or adjust the throttle position sensor [A], because it is adjusted or set by the manufacturer. Adjustment of these parts could result in poor performance, or replacement of the throttle body assy.



⚠WARNING

Do not remove, disassemble or adjust the idle adjusting screw [A], [B], because they are adjusted or set by the manufacturer. Adjustment of these parts could result in poor performance, or replacement of the throttle body assy.

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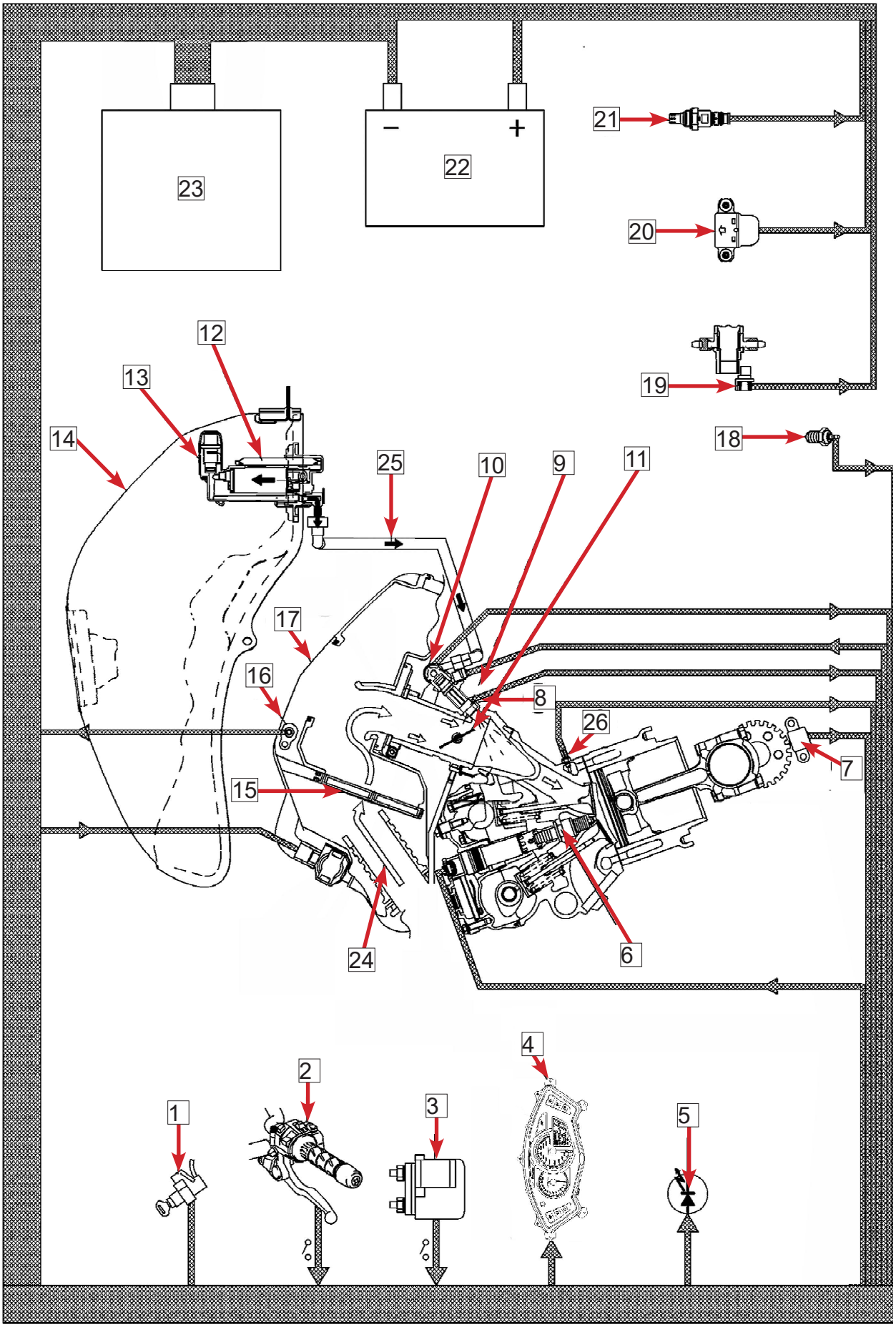
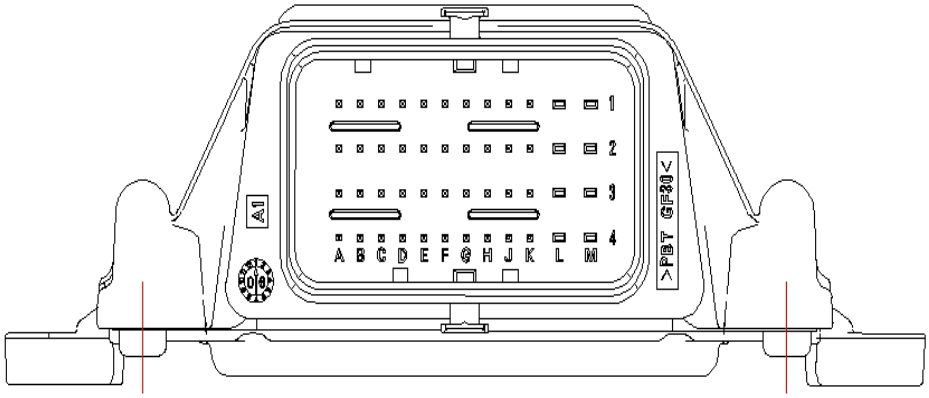
3.1 Composition of EFI System △ FUEL SYSTEM (EFI)



1. Ignition Switch
2. Engine Stop Switch
3. Starter Relay
4. Tachometer
5. MIL(LED)
6. Spark Plug
7. Trigger(Crankshaft Position Sensor)
8. Fuel Injector
9. Throttle Position Sensor
10. Fuel Rail
11. Throttle Body Valve
12. Fuel Pump
13. Pressure Regulator
14. Fuel Tank
15. Air Filter Element
16. Inlet Air Temperature Sensor
17. Air Filter Housing
18. Neutral Switch
19. Speed Sensor
20. Roll-over Sensor
21. Oxygen Sensor
22. Battery
23. ECU
24. Inlet Airf low Direction
25. Pressurized Fuel Direction
26. Coolant Temperature Sensor

3.2 ECU Pin and Function



ECU pin and function:
1(M1) Oxygen sensor 2 heating
2(L1) Oxygen sensor 1 heating
3(M2) Ignition Coil 1
4(L2) Null
5(M3) Ignition ground wire
6(L3) Null
7(M4) Ignition coil 2
8(L4) Uncontinuous power
9(K1) Air intake pressure sensor
10(J1) Ground to sensors1
11(H1) Air intake temperature sensor
12(G1) Throttle position sensor
13(F1) Coolant temperature sensor
14(E1) Main relay
15(D1) CAN low
16(C1) CAN high
17(B1) Stepper motor phase D
18(A1) Stepper motor phase C
19(K2) Oxygen Senor 1
20(J2) Oxygen Senor 2
21(H2) Ignition coil 2
22(G2) Null
23(F2) Side stand switch
24(E2) Null
25(D2) Null
26(C2) Auxiliary Relay
27(B2)Stepper motor phase A
28(A2) Stepper motor phase B
29(K3) MIL Light
30(J3) 5V Power 1
31(H3) Null
32(G3) Ignition switch
33(F3) Continuous power
34(E3) Cable K diagnosis
35(D3) Neutral Switch
36(C3) Ignition Coil 1
37(B3) Clutch switch
38(A3) Roll-Over switch
39(K4) Confort/Sport mode switch
40(J4) Engine RPM output
41(H4) Speed sensor
42(G4)Engine phase sensor B
43(F4) Engine phase sensor A
44(E4) Headlamp relay
45(D4) Fan Relay
46(C4)Oil pump sensor
47(B4) Injector 2
48(A4)Injector 1

3.3 EFI Specifications

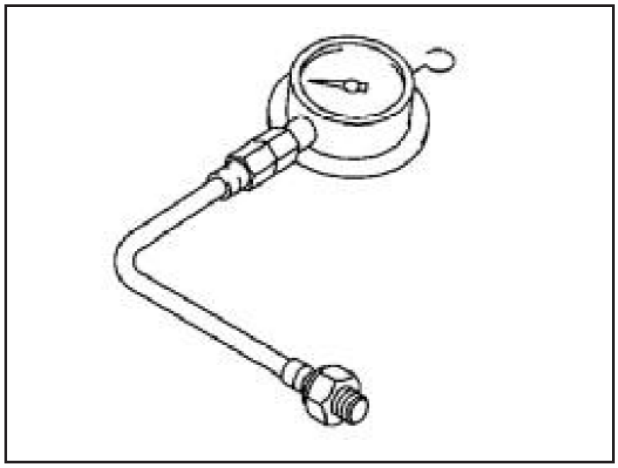
Item	Standard
EFI	
Idle Speed	1450 r/min ±145 r/min (rpm)
Throttle Body Assy:	
Type	Two barrel type
Bore	Φ38 mm
ECU:	
Make	UAES
Type	Digital memory type, with IC igniter, sealed with resin
Available Engine Speed	100r/min ~11000r/min (rpm)
Fuel Pressure (High Pressure Line):	
After Ignition Switch is ON	323kPa(3.3 kgf/cm2,47 psi) with fuel pump running.
After 3 Seconds from Ignition Switch is ON	265kPa (2.7 kgf/cm2,38 psi) with fuel pump stopped
With Engine Idling	333kPa (3.4 kgf/cm2,48 psi) with fuel pump running
Fuel Pump:	
Type	In-tank friction pump
Leakage	60 mL or more in every 3 seconds
Fuel Injectors:	
Type	F01R00M140
Nozzle Type	One spray with 6 holes
Resistance	About 12Ω at 20°C (68°F)
Throttle Position Sensor	Non-adjustable and non-movable
Input Voltage	4.75V~5.25 V DC between Lg/Y and Gr /R
Output Voltage at Idle Throttle Opening	0.4V~0.8V DC between Lg /Y and Br/R
Output Voltage at Full Throttle Opening	More than or equal to 3.9 V DC between Lg /Y and Br/R
Inlet Air Temperature Sensor:	
Resistance	See text in Inlet Air Temperature Sensor Section
Output Voltage at ECU	About 2.0V~3.50V at 20°C
Coolant Temperature Sensor:	
Resistance	See Electrical System chapter
Output Voltage at ECU	About 2.0V~3.50V at 20°C
Speed Sensor:	
Input Voltage at Sensor	About 9V~11V DC at Ignition Switch is ON
Output Voltage at Sensor	About 0.05V~1V DC at Ignition Switch is ON and speed at 0km/h
Roll-Over Sensor :	
Detection Method	Resistance detection method
Detection Angle	More than 55°~75° for each bank

EFI Specifications

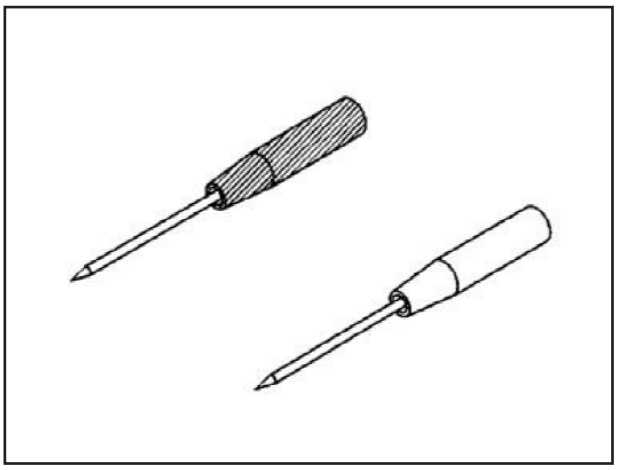
Item	Standard
Oxygen Sensor:	
Output Voltage (high)	0.7V or higher
Output Voltage (low)	0.2Vor lower
Throttle Grip and Cables Throttle Grip Free Play	2 mm ~3mm (0.08in ~0.12in.)

3.4 Maintanence Tool

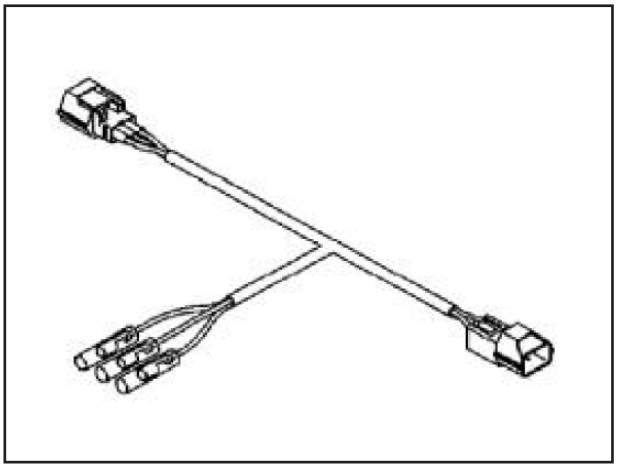
Oil Pressure Gauge



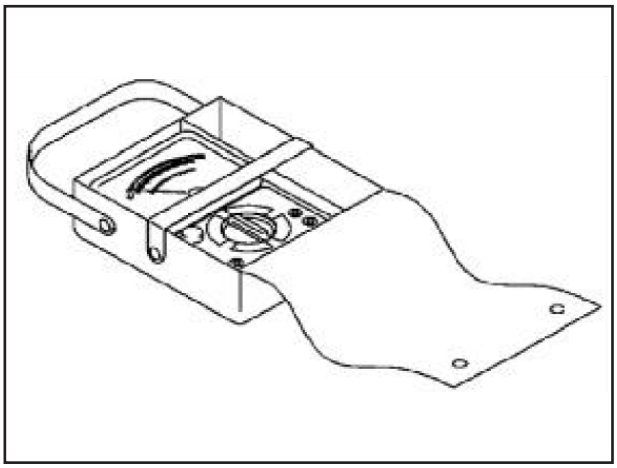
Needle Adaptor Set



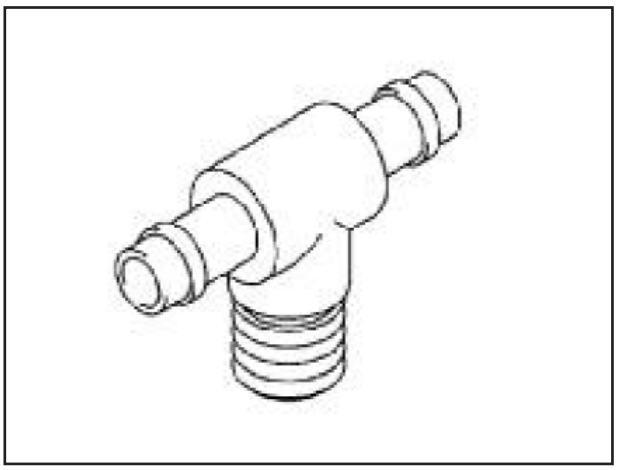
Throttle Sensor Setting Harness



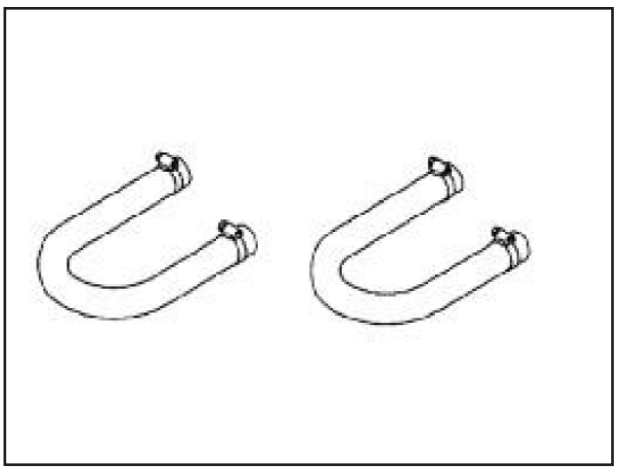
Hand Tester



T-joint

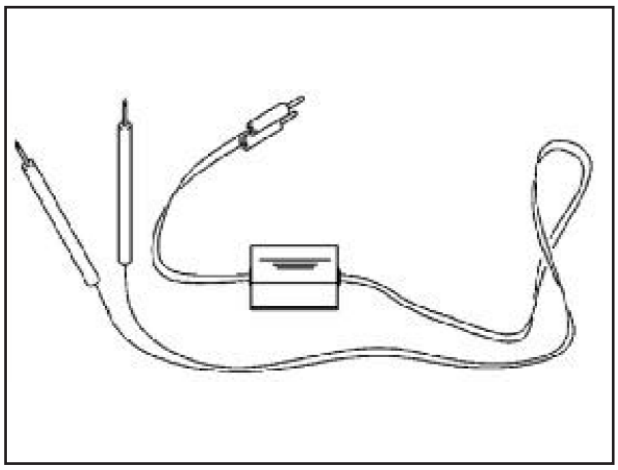


Fuel Hose



Maintanence Tool

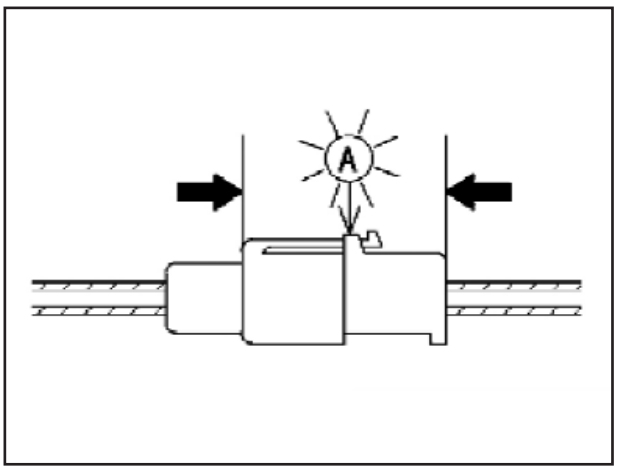
Peak Voltage Adapter



3.5 EFI Servicing Precautions

There are some important precautions that should be followed when service the EFI system.

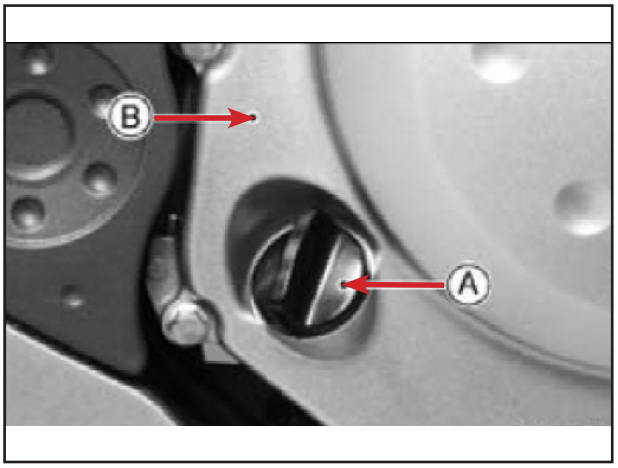
- This EFI system is designed to be used with a 12V sealed battery as its power source. Do not use any other battery except for a 12V sealed battery as a power source.
- Do not reverse the battery cable connections. This will damage the ECU.
- To prevent damage to the EFI parts, do not disconnect the battery cables or any other electrical connections when the ignition switch is on or while the engine is running.
- Take care not to short the leads that are directly connected to the battery positive (+) terminal to the chassis ground.
- When charging, remove the battery from the motorcycle. This is to prevent ECU dam-age by excessive voltage.
- Do not turn the ignition switch ON while any of the EFI electrical connectors are disconnected. The ECU memorizes service codes.
- Do not spray water on the electrical parts, EFI parts, connectors, leads, and wiring
- Whenever the EFI electrical connections are to be disconnected, first turn off the igni-tion switch, and disconnect the battery (-) terminal. Do not pull the lead, only the con-nector. Conversely, make sure that all the EFI electrical connections are firmly reconnected before starting the engine.
- Connect these connectors until they click [A].
- If a transceiver is installed on the vehicle, makesure that EFI system operation is not influenced by electric wave radiated from the antenna. Check operation of the system with the engine at idle. Locate the antenna as far as possible away from the ECU.



EFI Servicing Precautions

- When any fuel hose is disconnected, fuel may spout out by residual pressure in the fuel line. Cover the hose joint with a piece of clean cloth to prevent fuel spillage.
- When any fuel hose is disconnected, do not turn on the ignition switch. Otherwise, the fuel pump will operate and fuel will spout from the fuel hose.
- Do not operate the fuel pump if the pump is completely dry.
- Before removing the fuel system parts, blow the outer surfaces of these parts clean with compressed air.
- To prevent corrosion and deposits in the fuel system, do not add to fuel any fuel an tifreeze chemicals.

To maintain the correct fuel/air mixture (F/A), there must be no inlet air leaks in the EFI system. Be sure to install the oil filler plug [A] and Clutch Cover [B] properly after filling the engine oil.



3.6 EFI Malfunction Excluded

3.6.1 Outline

When an abnormality in the system occurs, the MIL (LED) goes on to alert the rider on the meter panel. In addition, the condition of the problem is stored in the memory of the ECU (electronic control unit). With the engine stopped and turned in the self diagnosis mode, the ser-vice code [A] is indicated by the number of times the FI indicator light (LED) blinks.

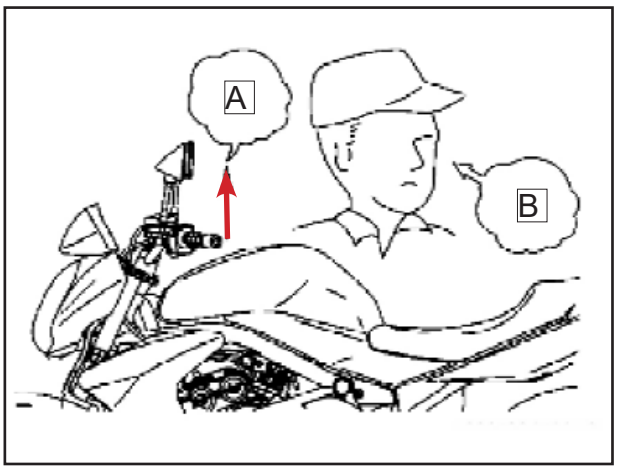
When due to a malfunction, the MIL (LED) re-mains lit, ask the rider about the conditions [B] under which the problem occurred and try to determine the cause [C].

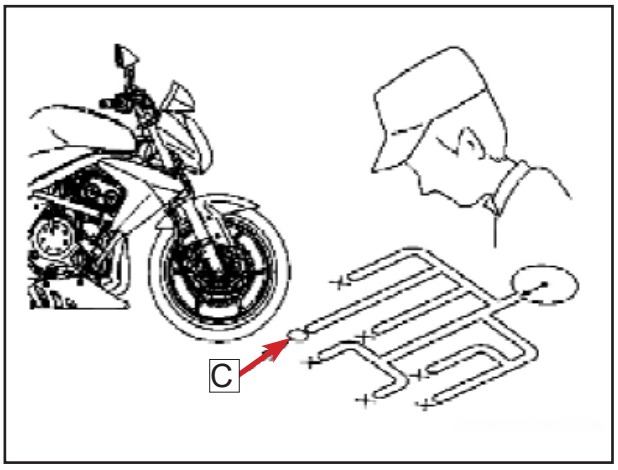
First, conduct a self-diagnosis inspection and then a non-self-diagnosis inspection. The non-self-diagnosis items are not indicated by the MIL (LED). Don't rely solely on the EFI

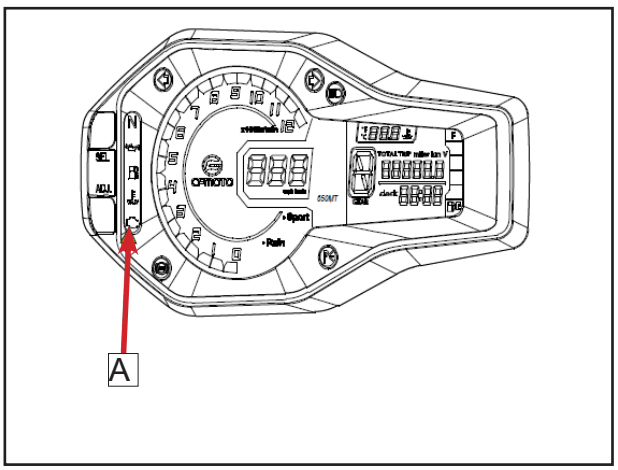
self-diagnosis function,use common sense. Even when the EFI system is operating normally, the FI indicator light (LED) [A] may light up un-der strong electrical interference. No repair needed. Turn the ignition switch OFF to stop the indicator light.

When the MIL (LED) goes on and the motorcycle is brought in for repair, check the service codes. When the repair has been done, the light (LED) doesn't go on. But the service codes stored in memory are not erased to preserve the prob-lem history, and the light (LED) can display the codes in the self-diagnosis mode. The problem history is referred when solving unstable problems.

When the motorcycle is down, the vehicle-down sensor is turned OFF and the ECU shuts off the fuel injectors and ignition system. The MIL(LED) blinks but the service code cannot be displayed. The ignition switch is left ON. If the starter button is pushed, the electric starter turns but the en-gine doesn't start.

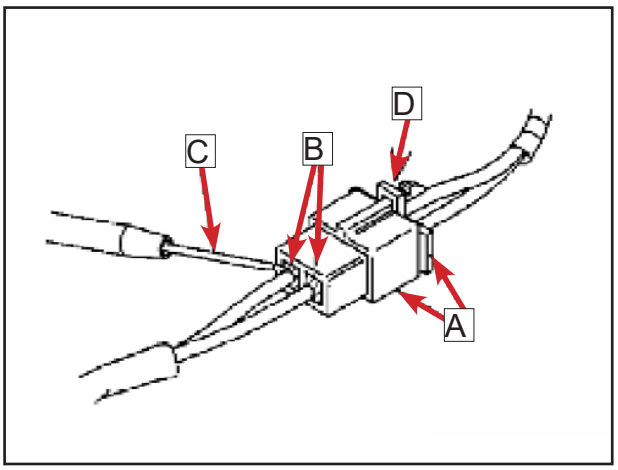






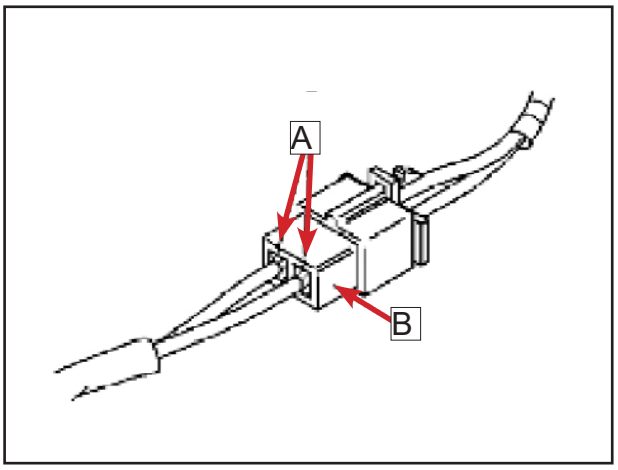
To start the engine again, raise the motorcycle, turn the ignition switch OFF, and then ON. The vehicledown sensor is turned ON and the light (LED) goes OFF.

- The DFI part connectors [A] have seals [B], including the ECU.
- Join the connector and insert the needle adapters[C] inside the seals [B] from behind the connector until the adapter reaches the terminal.



CAUTION
Insert the needle adapter straight along the terminal in the connector to prevent short-circuit between terminals.

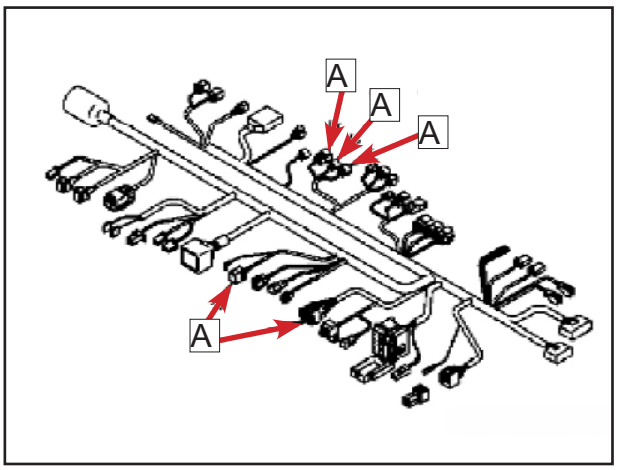
- Make sure that measuring points are cor-rect in the connector, noting the position of the lock [D] and the lead color before measurement. Do not reverse connections of the hand tester or a digital meter.
- Be careful not to short-circuit the leads of the EFI or electrical system parts by contact between adapters.
- Turn the ignition switch ON and measure the voltage with the connector joined.

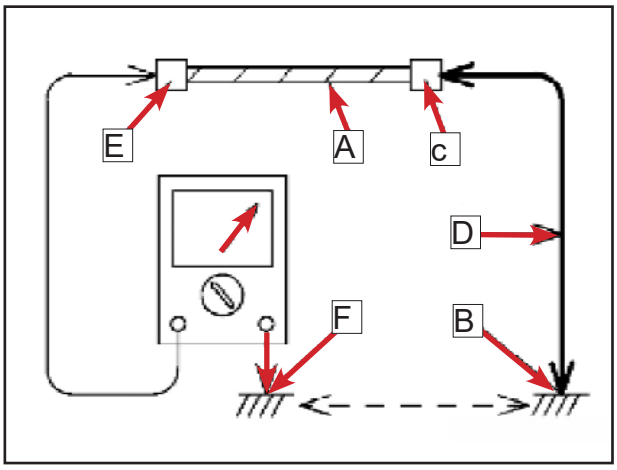


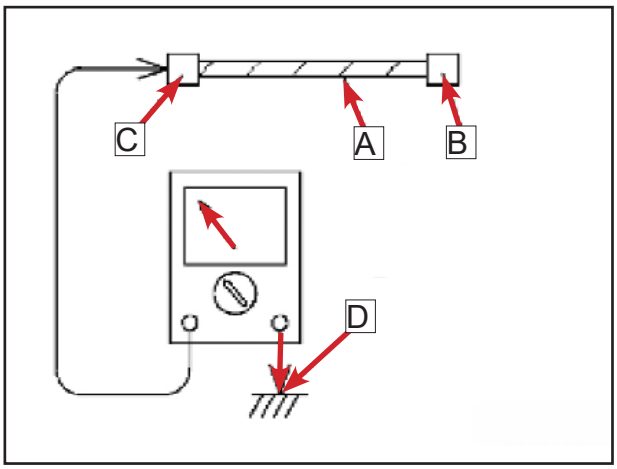
CAUTION
Incorrect, reverse connection or short circuit by needle adapters could damage the DFI or electrical system parts.

- After measurement, remove the needle adapters and apply silicone sealant to the seals [A] of the connector [B] for waterproofing.
- Always check battery condition beforereplacing the EFI parts.A fully charged bat-tery is a must for conducting accurate tests of the EFI system.
- Trouble may involve one or in some cases all items. Never replace a defective part with out determining what CAUSED the problem. If the problem was caused by some other item or items, they too must be repaired or replaced, or the new replacement part will soon fail again.

- Measure the electrical resistance of the coil after the EFI parts cool down.
- Make sure the electric connection clean and tight.And check the wire if it got burned, abrasion,too short and etc. Damaged cable and bad connection can cause the trouble comes out again and again and make the EFI system running unstable.
- If the cable is damaged or aging. Please replace the cable.
- Disconnect each connectors[A]And check if there is any corrosion, dust or damaged.
- If connectors getting corrosions or dusted. Please clean up carefully. If the connectors get-ting damaged.Plase replace the connectors. Connectors should be well connected.
- Check the wiring continuity. Use the wir-ing diagram to find the trouble wire termination.
- Connect the AVO meter on wire termination.
- Set the AVO meter on X1Ω mode. And read out the data showing on AVO meter.
- If the data is not 0 Ω. Means the prob-lem on cable.Replace the maincable or sec-ondary cable.
- If the cable[A] is far. Use a Cable[D] Con-nect [C] o the ground[B] and check another connector[E] and[F] to make sure it is OK. That can check the connection of the long cable. If connection is poor, replace the cable.
- When check the cable[A] shortcut or not,Open[B] side and check the connection from another side [C] to [D]. If OK, the cable has shortcut and needs repairing.
- Check the ECU connection again and again, To make the trouble easier point out.
- If the wire and connector has no trouble, then EFI parts may be next point. Use input and out put voltage checking way. But it cannot check the ECU itself.







- If you find trouble, replace the trouble parts. If the wire, connector and EFI parts has no trouble. Replace the ECU

- Lead Color Codes:

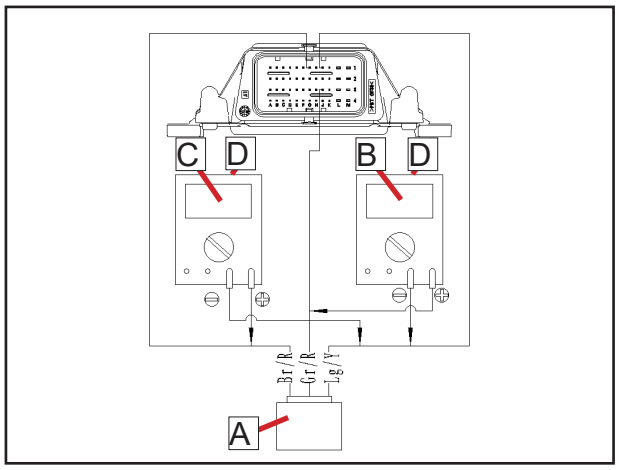
B: Black L: Blue Gr: Grey
Br: Brown G: Green Lg: Light Green
Sb: Sky Blue O: Orange R: Red
P: Purple W: White Y: Yellow

EFI Malfunction Excluded

There are two ways to inspect the EFI system. One is voltage Check Method and the other is Resistance Check Method.

(Voltage Check Method)

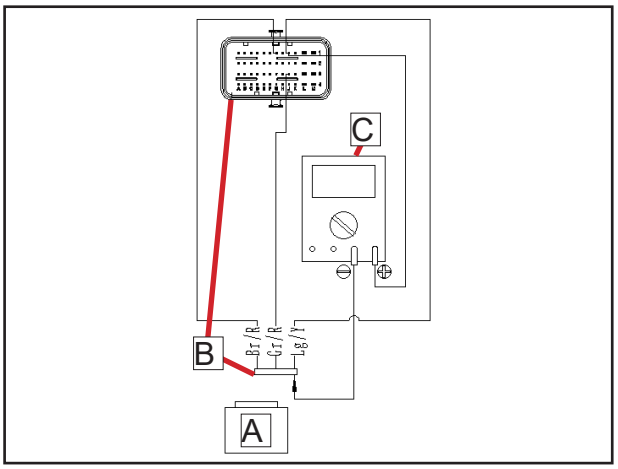
- This method is conducted by measuring the input voltage [B] to a sensor [A] first and then the output voltage [C] from the sensor.
- Sometimes this method can detect a fault of the ECU.
- Refer to each sensor inspection section for detail in this chapter.
- Use a fully charged battery and a digital meter [D] which can be read two decimal places voltage or resistance.



(Resistance Check Method)

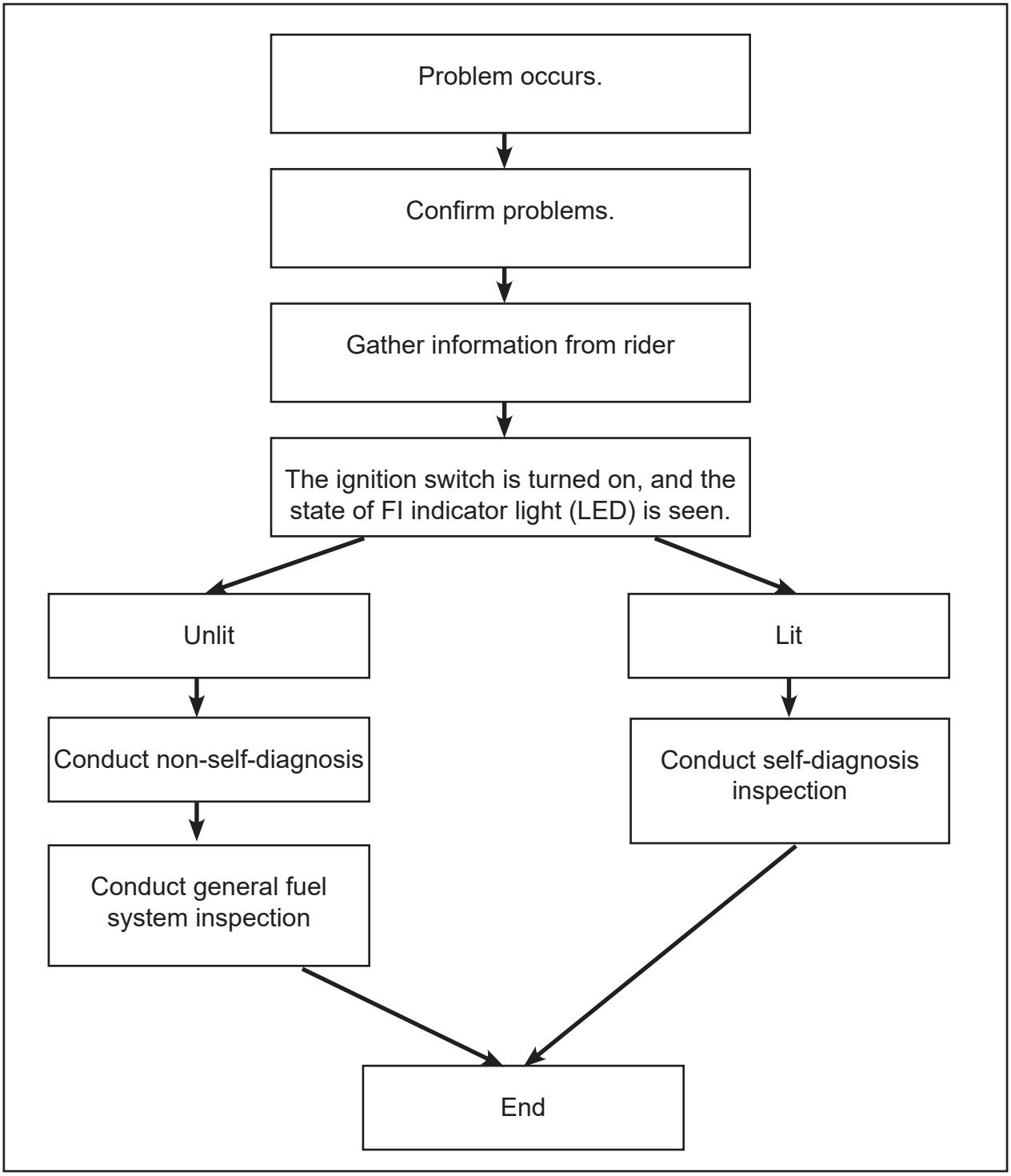
- This method is simple. No need for a fully charged battery and the needle adapter. Just do the follow ing especially when a sen sor [A] is suspect.
- Turn the ignition switch OFF and discon-nect the connectors.
- Inspect the sensor resistance, using a digital meter (see each sensor inspection).
- Inspect the wiring and connectors [B] for continuity, using the hand tester [C] (analog tester) rather than a digital meter.

If the sensor, the wiring and connections are good, inspect the ECU for its ground and power supply (see ECU Power Supply Inspection). If the ground and power supply are good, the ECU is suspect. Replace the ECU.



EFI Malfunction Excluded

3.6.2 EFI Diagnosis Process Chart



Inquiries to Rider

- Each rider reacts to problems in different ways, so it is important to confirm what kind of symptoms the rider has encountered.
- Try to find out exactly what problem occurred under exactly what conditions by asking the rider; knowing this information may help you reproduce the problem.
- The following sample diagnosis sheet will help prevent you from overlooking any areas, and will help you decide if it is an EFI system problem, or a general engine problem.

EFI Malfunction Excluded

3.6.3 Sample Diagnosis Sheet

Rider name:	Registration No. (License plate No.):
Year of initial registration:	Model:
Engine No.:	Frame No.:
Date problem occurred:	Mileage:
Environment when problem occurred.	
Weather	fine, cloudy, rain, snow, always, other:
Temperature	hot, warm, cold, very cold, always
Problem frequency	chronic, often, once
Road	street, highway, mountain road (uphill, downhill), bumpy,
Altitude	normal, high (about 1000m), higher(more than 2000m)
Motorcycle conditions when problem occurred.	
FI indicator light (LED)	□light up immediately after ignition switch ON, and goes off after 5s (normal)
	□lights blinks 10s after ignition switch ON, and stays on (EFI problem)
	□light up 5s after ignition switch on，then blink 15 times and stay on (indicate maintenance)
	□Non-lights (light (LED), ECU, speedometer or its wiring fault)
	□sometimes lights up (probably wiring fault)
Starting difficulty	□starter motor not rotating
	☐ starter motor rotating but engine doesn’t turn over
	☐ starter motor and engine don’t turn over
	□no fuel flow (no fuel in tank, no fuel pump sound)
	□engine flooded (do not crank engine with throttle opened, which promotes engine flooding)
	□no spark
	□other
Engine stops	□after starting
	□when opening throttle grip
	□when closing throttle grip
	□when moving off
	□when stopping the motorcycle
	□when cruising
	□others
Bad operation at low speed	□very low idle speed, very high idle speed, rough idle speed
	□battery voltage is low (charge the battery)
	□spark plug loose (tighten it)
	□spark plug dirty, broken, or gap maladjusted (remedy it)
	□back firing
	□after firing
	□hesitation when acceleration
	□engine oil viscosity too high
	□brake dragging

	☐ clutch slipping
	☐ others
Poor running or no power at high speed	☐ spark plug loose (tighten it)
	☐ spark plug dirty, broke, or gap maladjusted (remedy it)
	☐ spark plug incorrect (replace it)
	☐ knocking (fuel poor quality or incorrect，use high-octane gasoline)
	☐ brake dragging
	☐ clutch slipping
	☐ engine overheated
	☐ engine level too high
	☐ engine oil viscosity too high
	☐ others

EFI Malfunction Excluded

3.6.4 EFI System Trouble Shooting Guide

NOTE

- This is not an exhaustive list, giving every possible cause for each problem listed. It is meant simply as a rough guide to assist the troubleshooting for some of the more common diffi culties.
- The ECU may be involved in the EFI electrical and ignition system troubles. If these parts andcircuits are checked out good, be sure to check the ECU for ground and power supply. If the ground and power supply are checked good, replace the ECU.

Symptoms or possible Causes	Actions (chapter)
Starter motor doesn't rotate:	
Ignition and engine stop switches not ON	Turn both switches ON.
Clutch switch or neutral switch trouble	Inspect (see chapter 16).
Starter motor trouble	Inspect (see chapter 16).
Low battery voltage	Inspect and charge (see chapter 16)
Starter or auxiliary relays not contacting or operating	Inspect the starter relay (see chapter 16)
Starter button not contacting	Inspect and replace (see chapter 16).
Starter system wiring open or shorted	Inspect the wiring (see chapter 16).
Ignition switch trouble	Inspect and replace (see chapter 16)
Engine stop switch trouble	Inspect and repair or replace (see chapter 16).
Main 20A or ECU ignition fuse blown	Inspect and replace (see chapter 16).
Starter motor rotating but engine doesn't turn:	
Starter clutch trouble	Inspect (see chapter 16).
Starter idle gear trouble	Inspect (see chapter 16).
engine doesn't turn:	
Valve seizure	Inspect and replace (see chapter 5).
Cylinder, piston seizure	Inspect and replace (see chapter 5).
Camshaft seizure	Inspect and replace (see chapter 5).
Connecting rod small end seizure	Inspect and replace (see chapter 9).
Connecting rod big end seizure	Inspect and replace (see chapter 9).
Crankshaft seizure	Inspect and replace (see chapter 9).
Transmission gear or bearing seizure	Inspect and replace (see chapter 9).
Balancer bearing seizure	Inspect and replace (see chapter 9).
No fuel:	
No or little fuel in tank	Supply fuel (see Owner's Manual).
Fuel pump not rotating	Inspect (see chapter 3).
Fuel injector trouble	Inspect and replace (see chapter 3).
Fuel filter or pump screen clogged	Inspect and replace fuel pump (see chapter 3).
Fuel pressure regulator clogged	Inspect and replace fuel pump (see chapter 3).
Fuel line clogged	Inspect and repair (see chapter 3).
Engine overflow:	
Spark plug dirty, broken or gap maladjusted	Replace (see chapter 2).
Starting technique faulty	When flooded, don't crank engine with throttle fully opened.
No spark or spark weak:	
Ignition and engine stop switches not ON	Turn both switches ON

EFI Malfunction Excluded

Symptoms or possible Causes	Actions (chapter)
Clutch lever not pulled in and gear not in neutral whether side stand up or not	Pull the lever in and shift the gear in neutral
Though clutch lever pulled in, side stand up and gear not in neutral	Side stand down and clutch lever pulled in whether gear in neutral or not
Vehicle-down-sensor coming off	Reinstall (see chapter 3).
Vehicle-down-sensor trouble	Inspect (see chapter 3).
ECU ground or power supply trouble	Inspect (see chapter 3).
low battery voltage	Inspect and charge (see chapter 16).
Spark plug dirty, broken or gap maladjusted	Replace (see chapter 2).
Ignition coil trouble	Inspect ignition coil (see chapter 16).
Stick coil shorted or not in good contact	Reinstall or inspect stick coil (see chapter 16).
Spark plug incorrect	Replace it with the correct plug (see chapter 16).
IC igniter in ECU trouble	Inspect (see chapter 16).
Neutral, starter lockout or side stand switch trouble	Inspect each switch (see chapter 16).
Crankshaft sensor trouble	Inspect (see chapter 16).
Ignition switch shorted	Inspect and replace (see chapter 16).
Engine stop switch shorted	Inspect and repair or replace (see chapter 2).
Starter system wiring shorted or open	Inspect and repair or replace (see chapter 16).
Main 20A or fuse (15V) of fuel pump relay blown	Inspect and replace (see chapter 16).
Fuel/air mixture is incorrect:	
Air cleaner clogged, poorly sealed or missing	Clean or reinstall (see chapter 3).
Leak from oil filler cap, crankcase breather hose or air cleaner drain hose	Inspect and repair or replace (see chapter 3).
Water or foreign matter in fuel	Change fuel. Inspect and clean fuel system (see chapter 3).
Fuel pressure regulator trouble	Inspect fuel pressure and replace fuel pump (see chapter 3)
Main throttle sensor trouble	Inspect (see chapter 3).
Fuel pressure may be low	Inspect (see chapter 3).
Fuel pump trouble	Inspect (see chapter 3).
Fuel injector trouble	Inspect (see chapter 3).
Inlet air pressure sensor trouble	Inspect (see chapter 3).
Water temperature sensor trouble	Inspect (see chapter 3).
Crankshaft sensor trouble	Inspect (see chapter 3).
Cylinder pressure is low:	
Spark plug loose	Reinstall (see chapter 16).
Cylinder head not sufficiently tightened down	Tighten (see chapter 5).
Cylinder, piston worn	Inspect and replace (see chapter 5).
Piston ring bad (worn, weak, broken or sticking)	Inspect and replace (see chapter 5).

Symptoms or Possible Causes	Actions (chapter)
Piston ring/groove clearance excessive	Inspect and replace (see chapter 5).
Cylinder head gasket damaged	Replace (see chapter 5).
Cylinder head warped	Inspect and replace (see chapter 5).
No valve clearance	Adjust (see chapter 2).
Valve guide worn	Inspect and replace (see chapter 5).
Valve spring broken or weak	Inspect and replace (see chapter 5).
Valve not seating properly (valve bent, worn or carbon accumulating on seating surface)	Inspect and repair or replace (see chapter 5).

Poor running at low speed

Symptoms or Possible Causes	Actions (chapter)
Spark weak:	
low battery voltage	Inspect and charge (see chapter 16).
Spark plug dirty, broken or gap maladjusted	Replace (see chapter 2).
Stick coil trouble	Inspect the stick coil (see chapter 16).
Stick coil shorted or not in good contact	Reinstall or inspect stick coil (see chapter 16).
Spark plug incorrect	Replace it with the correct plug (see chapter 16).
IC igniter in ECU trouble	Inspect (see chapter 16).
Crankshaft position sensor trouble	Inspect (see chapter 16).
Fuel/air mixture is incorrect:	
Little fuel in tank	Supply fuel (see Owner's Manual).
Air cleaner clogged, poorly sealed, or missing	Clean element or inspect sealing (see chapter (2,3)
Air cleaner duct loose	Reinstall (see chapter 3).
Throttle body assy loose	Reinstall (see chapter 3).
Throttle body sensor not calibrated or calibration is incorrect	Recalibrate (see diagnosis).
Air inlet pipe damage	Replace (see chapter 3).
Fuel filter or pump screen clogged	Inspect and replace fuel pump (see chapter 3).
Fuel pressure regulator clogged	Inspect fuel pressure and replace fuel pump (see chapter 3)
Fuel line clogged	Inspect and repair (see chapter 3).
Inlet air pressure sensor trouble	Inspect (see chapter 3).
Thermostat trouble	Inspect and replace (see chapter 4).
Unstable (rough) idling:	
Fuel injector trouble	Inspect (see chapter 3).
Main throttle sensor trouble	Inspect (see chapter 3).
Crankshaft position sensor trouble	Inspect (see chapter 3).
Throttle valves not synchronizing	Inspect (see chapter 3).
Inlet air temperature sensor trouble	Inspect (see chapter 3).
Coolant temperature sensor trouble	Inspect (see chapter 3).
Fuel pressure too low or too high	Inspect (see chapter 3).

EFI Malfunction Excluded

Symptoms or Possible Causes	Actions (chapter)
low battery voltage	Inspect and charge (see chapter 16).
Incorrect idle speed:	
Coolant temperature sensor trouble	Inspect (see chapter 3).
Main throttle sensor trouble	Inspect (see chapter 3).
Throttle body sensor not calibrated or calibration is incorrect	Recalibrate (see diagnosis).
Engine stalls easily:	
Fuel pump trouble	Inspect (see chapter 3).
Fuel injector trouble	Inspect (see chapter 3).
Main throttle sensor trouble	Inspect (see chapter 3).
Throttle body sensor not calibrated or calibration is incorrect	see diagnosis
Fuel pressure too low or too high	Inspect (see chapter 3).
Coolant temperature sensor trouble	Inspect (see chapter 3).
Inlet air temperature sensor trouble	Inspect (see chapter 3).
Fuel line clogged	Inspect and repair (see chapter 3).
Fuel pressure regulator trouble	Inspect fuel pressure and replace fuel pump (see chapter 3).
Crankshaft sensor trouble	Inspect (see chapter 16).
Stick coil trouble	Inspect (see chapter 16).
Compression Low:	
Spark plug loose	Reinstall (see chapter 16).
Cylinder head not sufficiently tightened down	Tighten (see chapter 5).
No valve clearance	Adjust (see chapter 2).
Cylinder, piston worn	Inspect and replace (see chapter 5).
Piston ring bad (worn, weak, broken or sticking)	Inspect and replace (see chapter 5).
Piston ring/groove clearance excessive	Inspect and replace (see chapter 5).
Cylinder head gasket damaged	Replace (see chapter 5).
Cylinder head warped	Inspect and replace (see chapter 5).
Valve guide worn or stem seal damaged	Inspect and replace (see chapter 5).
Valve spring broken or weak	Inspect and replace (see chapter 5).
Valve not seating properly (valve bent, worn or carbon accumulating on seating surface)	Inspect and repair or replace (see chapter 5).
Camshaft cam worn	Inspect and replace (see chapter 5).
Work with hesitation:	
Fuel pressure too low	Inspect (see chapter 3)
Fuel line clogged	Inspect and repair (see chapter 3).
Fuel pump trouble	Inspect (see chapter 3)
Fuel injector trouble	Inspect (see chapter 3)
Inlet air temperature sensor trouble	Inspect (see chapter 3)
Main throttle sensor trouble	Inspect (see chapter 3)
Coolant temperature sensor trouble	Inspect (see chapter 3)
Injector connectors loose	Remedy (see chapter 3).
Crankshaft position sensor trouble	Inspect and repair or replace (see chapter 16).

Stick coil trouble	Inspect and repair or replace(see chapter 16).
Loose terminal of battery (–) cable or engine	Inspect and repair (see chapter 16).

EFI Malfunction Excluded

Symptoms or Possible Causes	Actions (chapter)
Delay of ignition timing	Inspect crankshaft sensor and IC igniter in ECU (see chapter 16).
Poor acceleration:	
Fuel pressure too low	Inspect (see chapter 3).
Water or other matter in fuel	Change fuel. Inspect and clean fuel system (see chapter 3).
Fuel filter or pump screen clogged	Inspect and replace fuel pump (see chapter 3).
Fuel pump trouble	Inspect (see chapter 3).
Fuel injector trouble	Inspect (see chapter 3).
Inlet air temperature sensor trouble	Inspect (see chapter 3).
Coolant temperature sensor trouble	Inspect (see chapter 3).
Stick coil trouble	Inspect and replace (see chapter 16).
Engine oil level to high	Repair (see chapter 7).
Spark plug dirty, broken or gap maladjusted	Replace (see chapter 2).
Stumble:	
Fuel pressure too low	Inspect (see chapter 3).
Fuel injector trouble	Inspect (see chapter 3).
Main throttle sensor malfunction	Inspect (see chapter 3).
Coolant temperature sensor trouble	Inspect (see chapter 3).
Surge:	
Unstable fuel pressure	Fuel pressure regulator trouble (Inspect and replace fuel pump) or kinked fuel line (Inspect and repair fuel line) (see chapter 3).
Fuel injector trouble	Inspect (see chapter 3).
Water temperature sensor trouble	Inspect (see chapter 3).
Backfiring when deceleration:	
Spark plug dirty, broken or gap maladjusted	Replace(see chapter 2).
Fuel pressure too low	Inspect (see chapter 3).
Fuel pump trouble	Inspect (see chapter 3).
Main throttle sensor trouble	Inspect (see chapter 3).
Inlet air temperature sensor trouble	Inspect (see chapter 3).
Water temperature sensor trouble	Inspect (see chapter 3).
After fire:	
Crankshaft position sensor trouble	Inspect (see chapter 16).
Spark plug burned or gap maladjusted	Replace (see chapter 2).
Inlet air temperature sensor trouble	Inspect (see chapter 3).
Water temperature sensor trouble	Inspect (see chapter 3).
Fuel injector trouble	Inspect (see chapter 3).
Engine can’t be stopped:	
Ignition switch trouble	Inspect and replace (see chapter 16).

EFI Malfunction Excluded

Symptoms or Possible Causes	Actions (chapter)
Engine stop switch trouble	Inspect and repair or replace (see chapter 2).
Fuel injector trouble	Inspect (see chapter 3).
Loose terminal of battery (–) cable or ECU ground lead	Inspect and repair (see chapter 16).
Carbon accumulating on valve seating	Repair (see chapter 5).
Engine overheating	(see Overheating of Troubleshooting Guide, see chapter 17)
Other:	
Engine oil viscosity too high	Change (see chapter 2).
Drive train trouble	Inspect drive chain (see chapter 2) and sprocket (See chapter 11).
Brake dragging	Inspect caliper fluid seal damage or clogging of master cylinder relief and supply ports (see chapter 12)
Clutch slipping	Inspect friction plates for wear (see chapter 6).
Engine overheating	(see Overheating of Troubleshooting Guide, see chapter 17)
Intermittent any EFI fault and its recovery	Check that EFI connectors are clean and tight, and examine wires for signs of burning or fraying (see chapter 3).

Poor Running or No Power at High Speed:

Symptoms or Possible Causes	Actions (chapter)
Firing incorrect:	
Spark plug dirty, broken or maladjusted	Replace (see chapter 2).
Stick coil trouble	Inspect stick coil (see chapter 16).
Stick coil shorted or not in good contact	Reinstall or inspect stick coil (see chapter 16).
Spark plug incorrect	Replace it with the correct plug (see chapter 16).
IC igniter in ECU trouble	Inspect (see chapter 16).
Crankshaft sensor trouble	Inspect (see chapter 16).
Fuel/air mixture incorrect:	
Air cleaner clogged, poorly sealed, or missing	Clean element or inspect sealing (see chapter 3).
Air cleaner duct loose	Reinstall (see chapter 3).
Air cleaner O-ring damaged	Replace (see chapter 3).
Water or foreign matter in fuel	Change fuel. Inspect and clean fuel system (see chapter 3).
Throttle body assy loose	Reinstall (see chapter 3).
Throttle body assy O-ring damaged	Replace (see chapter 3).
Fuel line clogged	Inspect and repair (see chapter 3).
Fuel pump operates intermittently and often EFI fuse (15V)blows.	Pump bearings may wear. Replace the pump (see chapter 3).

EFI Malfunction Excluded

Symptoms or Possible Causes tightened down	Actions (chapter)
Fuel pump trouble	Inspect (see chapter 3).
Inlet air temperature sensor trouble	Inspect (see chapter 3).
Main throttle sensor trouble	Inspect (see chapter 3).
Fuel injector clogged	Visually inspect and replace (see chapter 3).
Compression low:	
Spark plug loose	Reinstall (see chapter 16).
Cylinder head not sufficiently	Tighten (see chapter 5).
No valve clearance	Adjust (see chapter 2).
Cylinder, piston worn	Inspect and replace (see chapter 5).
Piston ring bad (worn, weak, broken or sticking)	Inspect and replace (see chapter 5).
Piston ring/groove clearance excessive	Inspect and replace (see chapter 5).
Cylinder head gasket damaged	Replace (see chapter 5) .
Cylinder head warped	Inspect and replace (see chapter 5).
Valve spring broken or weak	Inspect and replace (see chapter 5).
Valve not seating properly (valve bent , worn	Inspect and repair or replace (see chapter 5).
Knocking:	
Carbon built up in combustion chamber	Repair (see chapter 5).
Fuel poor quality or incorrect (Use the gasoline (See Owner's Manual)	Change fuel (see chapter 3).
Spark plug incorrect	Replace it with the correct plug (see chapter 16).
Stick coil trouble	Inspect (see chapter 16).
IC igniter in ECU trouble	Inspect (see chapter 16).
Inlet air temperature sensor trouble	Inspect (see chapter 3).
Others :	
Throttle valves won't fully open	Inspect throttle cable and lever linkage (see chapter 3).
Brake dragging	Inspect caliper fluid seal damage or clogging of master cylinder relief and supply ports (see chapter 12).
Clutch slipping	Inspect friction plates for wear (see chapter 6).
Engine overheating - Water temperature sensor	(See Overheating of Troubleshooting Guide in chapter 17).
Engine oil level too high	Repair (see chapter 7)
Engine oil viscosity too high	Change (see chapter 2).
Drive train trouble	Inspect drive chain (see chapter 2) and sprockets (see chapter 11).
Camshaft cam worn	Inspect and replace (see chapter 5).

Symptoms or Possible Causes tightened down	Actions (chapter)
Exhaust Smokes Excessively:	
(White smokes)	
Piston oil ring worn	Inspect and replace (see chapter 5).
Cylinder worn	Inspect and replace (see chapter 5).
Valve oil seal damaged	Replace (see chapter 5)
Valve guide worn	Replace the guide (see chapter 5).
Engine oil level too high	Repair (see chapter 7).
Water into fuel	

EFI Malfunction Excluded

Symptoms or Possible Causes	Actions (chapter)
(Black smoke)	
Air cleaner clogged	Clean (see chapter 3).
Too high fuel pressure	Inspect (see chapter 3).
Injector stuck open	Inspect (see chapter 3).
Coolant temperature sensor trouble	Inspect and replace (see chapter 3).
Inlet air temperature sensor trouble	Inspect and replace (see chapter 3).

3.7 Self-diagnosis

3.7.1 Self-diagnosis Outline

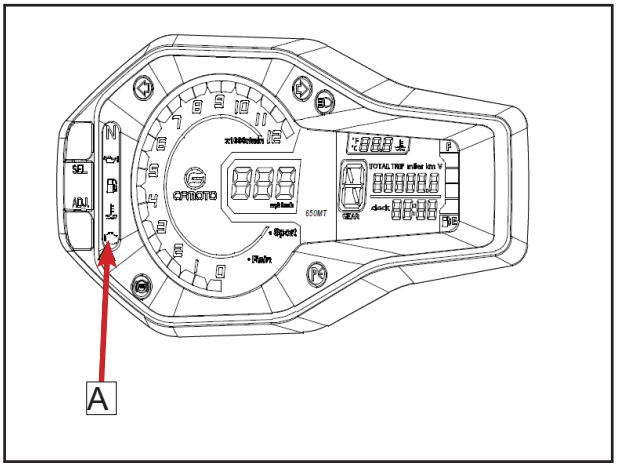
ECU constantly monitor sensors, actuators and circuits, MIL and battery voltage, etc, even ECU itself and inspect the sensor output signal, actuator drive signal and internal sig-nal (such as close loop control, coolant temperature, idle speed control and battery voltage control, etc.) for reliablity. If any pro-cess or signal is suspect, ECU records the trouble code in the RAM memory.

Faulty information is recorded in the form of trouble code, and in the sequence of which trouble comes first.

When servicing, using PDA and MIL, the de-fective parts can be promptly foud to improve the service efficiency and quality.

Self-diagnosis Procedures

When a problem occurs with the EFI system and ignition system, the MIL (LED) [A] goes on.



Note

Use a fully charged battery when conducting self-diagnosis. Otherwise, the light (LED) blinks very slowly or doesn't blink.

MIL Flashing Conditions

IF: Turn on the ignition switch and the en-gine does not work. No trouble code appears:

- MIL keeps on for 4 seconds and then turns off. Or start engine before MIL off.

IF: Turn on the ignition switch and the en-gine dose not work. Trouble code appears:

- Diagnosing light keep on for 4s and off for 1s. Then blinking for 2Hz.

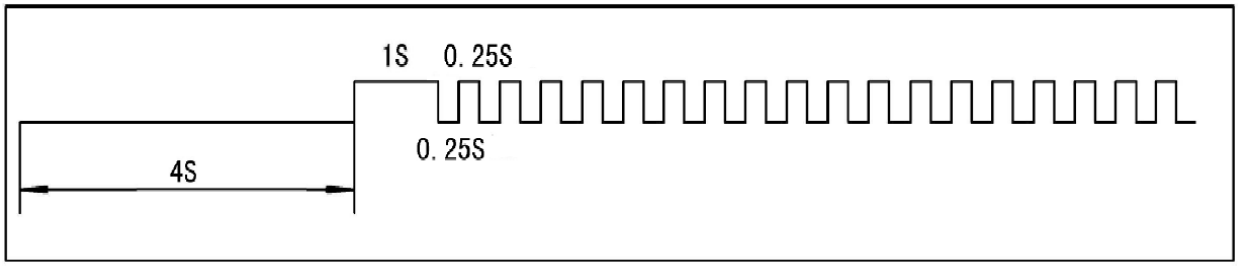
IF: Turn on the ignition switch and the engine works. Trouble code appear:

- Diagnosing light blinking in 2Hz.

Indicator light blinking control

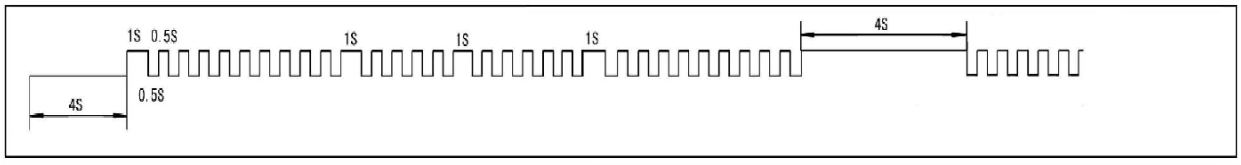
Flashing code needs special function to become true. Beore the engine start (Speed is 0 and engine RPM is 0),turn the throttle into full opened(Or throttle valve opened over 65.1),and keep the throttle full open;then turn the ignition on,if the EMS diagnosed the trouble out,the indicator light will be off after shining 4s, then flash frequency is 2Hz.If the EMS diagnosed the trouble,indicator light will blinking the code,trouble light will stop blinking for 1s between 2 numbers. If EMS diagnosed two trouble at the same time,indicator light will blinking from the sequence of troubles. Between two trouble codes,indicator light will be off for 4s,after blinkong all trouble codes,the light turns off aeronautically.

During the running engine,MIL is on when system diagnoses fault parts. Restart ignition switch after engine flame out,if the system detected that the fault is repaired,fault light will be on constantly until start engine. If the system still de-tected fault,the fault light will be on,after the engine starts,the fault light will be on constantly.



Error Code Instruction

Fault codes based on five code. For example P0560. MIL through left side to right side at 1 Hz frequency showing fault. If one code is 0, MIL will flash 10 times. For example, error code P0560 flash way is : light on for 4s and off for 1s- flash for 10 times-stop- flash for 5 times-stop-flash for 6 times-stop-flash for 10 times. Error codeP0112,P0122 flash way: light on for 4s and off for 1s-flash for 10times-stop-flash for 1 time-stop-flash for 1 time-stop-flash for 2 times-off for 4s-flash for 10 times-stop-flash for 1 time-stop-flash for 2 times-stop-flash for 2 time-off.



How to Erase Error Codes

- Even if ignition switch is turned off, the battery or the ECU is disconnected or the prob-lem is solved, all trouble codes remain in ECU.
- For the current fault code, if a fault does exist, then the current fault code cannot be eliminated; Restart the vehicle after troubleshooting eliminated, and advance the throttle above 2500upm, fault light is off when failover.But previously fault still can be read by PDA that had been stored in the system information, this information can be cleared directly through PDA, or automatically cleared after five warm up cycle.(Warm up cycle means a loop that water temperature is less than 51 degrees after engine start , and water tempera-ture is higher than 71 degrees after warming)
- Refer to the eliminated parts of PDA error code to eliminated error code.

Diagnose error by PDA

PDA has many functions which is more intuitive, more accurately and more quickly than FI light. We recommend you to use PDA for the following functions:

- PDA can read ”Error code” directly and eliminate them.
- PDA has the function of ”Read data stream” which can reflect vehicle operating situation, and also judge EFI error.
- PDA with an “actuator test” function, you can use this feature to check the continuity of the cable and whether the electronic fuel injection parts is good.

PDA usage refer to chapter ”PDA Use”

3.7.2 Trouble Code Chart

NO.	Pcode	Decription(UAES)
1	P0030	O2 Sensor 1 Heater Contr. Circ. Open
2	P0031	O2 Sensor 1 Heater Contr. Circ. Low
3	P0032	O2 Sensor 1 Heater Contr. Circ. High
4	P0050	O2 Sensor 2 Heater Contr. Circ. Open
5	P0051	O2 Sensor 2 Heater Contr. Circ. Low
6	P0052	O2 Sensor 2 Heater Contr. Circ. High
7	P0107	Manifold Abs.Pressure or Bar.Pressure Low Input
8	P0108	Manifold Abs.Pressure or Bar.Pressure High Input
9	P0112	Intake Air Temp.Circ. Low Input
10	P0113	Intake Air Temp.Circ. High Input
11	P0117	Engine Coolant Temp.Circ. Low Input
12	P0118	Engine Coolant Temp.Circ. High Input
13	P0122	Throttle Pos.Sensor Circ. Low Input
14	P0123	Throttle Pos.Sensor Circ. High Input
15	P0130	O2 Sensor Circ.,Bank1-Sensor1 Malfunction
16	P0131	O2 Sensor Circ.,Bank1-Sensor1 low Voltage
17	P0132	O2 Sensor Circ.,Bank1-Sensor1 High Voltage
18	P0134	O2 Sensor Circ.,Bank1-Sensor1 No Activity Detected
19	P0150	O2 Sensor Circ.,Bank1-Sensor2 Malfunction
20	P0151	O2 Sensor Circ.,Bank1-Sensor2 low Voltage
21	P0152	O2 Sensor Circ.,Bank1-Sensor2 High Voltage
22	P0154	O2 Sensor Circ.,Bank1-Sensor2 No Activity Detected
23	P0201	Cylinder 1- Injector Circuit
24	P0261	Cylinder 1- Injector Circuit Low
25	P0262	Cylinder 1- Injector Circuit High
26	P0202	Cylinder 2- Injector Circuit
27	P0264	Cylinder 2- Injector Circuit Low
28	P0265	Cylinder 2- Injector Circuit High
29	P0322	Ign./Distributor Eng.Speed Inp.Circ. No Signal
30	P0480	cooling fan control Circuit Open
31	P0511	Idle Air Control Circui
32	P0560	System Voltage Malfunction
33	P0562	System Voltage Low Voltage
34	P0563	System Voltage High Voltage
35	P0627	Fuel Pump “A” Control Circuit /Open
36	P0629	Fuel Pump “A” Control Circuit High
37	P0650	Malfunction Indicator Lamp Control Circ.
38	P0691	cooling fan control Circuit Low
39	P0692	cooling fan control Circuit High
40	P0501	Vehicle Speed No Sensor
41	P1116	Engine Coolant Temp High
42	P0602	Control Module Programming Error
43	P0116	Engine Coolant Temp Sensor Circuit Range/Performance
44	P1098	ROLL Sensor Malfunction

Self-diagnosis Procedures

Note:

- If all the parts and circuits checked out good, be sure to check the ECU for ground and power supply. If the ground and power supply are checked good, replace the ECU.
- If theere is no trouble code is displayed, then the electrical parts of the EFI system has no fault, but the mechanical parts of the EFI system and the engine are suspect.

Self-diagnosis Procedures

3.7.3 Solutions

The ECU takes the following measures to prevent engine damage when the EFI or the ignition system parts have troubles.

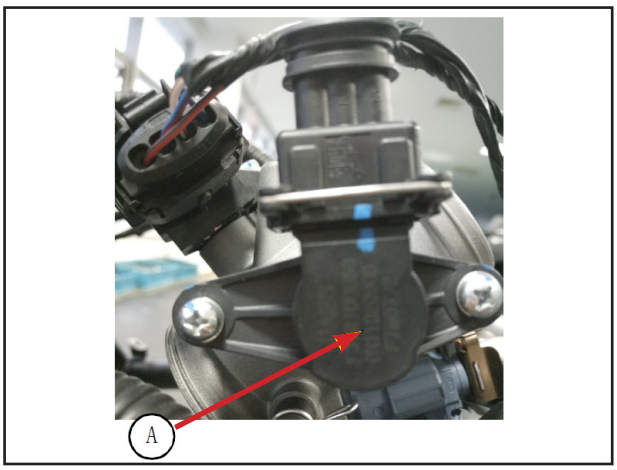
Trouble Codes	Parts	Output Signal Unstable Range or Criteria	Backups by ECU
P0112 or P0113	Inlet Air Temp Sensor	Inlet Air Temp Ta=-40°C~+130°C	If the inlet air tem sensor fails(the signal is out of the usable range, wiring short or open), the ECU sets temperature at -40°C or 130°C ;
P0117 or P0118	Coolant Temp Sensor	Water Temp Sensor Tw=-40°C~+129°C	If the water temp sensor system fails(the signal is out of the usable range, wiring short or open), the ECU sets Temp. at -40°C or 129°C
P0130, P0131, P0132& P0134	Oxygen Sensor #1	The oxygen sensor is active and sensor must send signals (output voltage) continuously to the ECU.	If the oxygen sensor is not activated or correct, the ECU stops oxygen sensor feedback mode.
P0150, P0151, P0152& P0154	Oxygen Sensor #2	The oxygen sensor is active and sensor must send signals (output voltage) continuously to the ECU.	If the oxygen sensor is not activated or correct, the ECU stops oxygen sensor feedback mode.

3.8 EFI System Service

3.8.1 Throttle Position Sensor Service

Throttle Position Sensor Removal/Adjustment

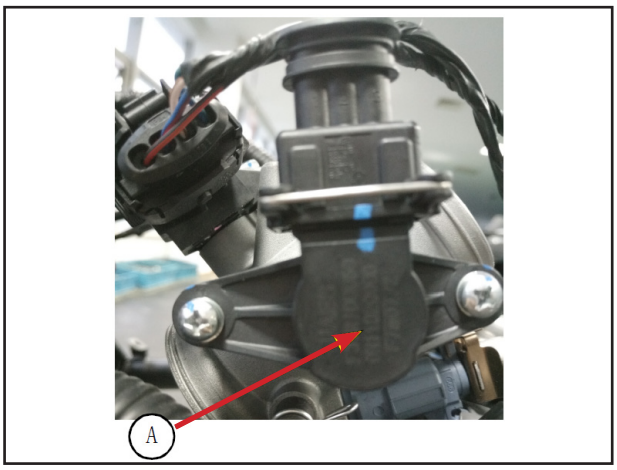
CAUTION
Do not remove or adjust the throttle po-sition sensor [A] since it has been ad-justed and set with precision at the factory. **Never drop the throttle body assy, espe-cially on a hard surface. Such a shock to the sensor can damage it.**



Throttle Position Sensor Input Voltage Inspection

NOTE

- Be sure the battery is fully charged.
- Turn the ignition switch OFF.
- Disconnect the throttle position sensor connector and connect the harness adapter [A] between these connectors.
- Connect a digital meter to the harness adapter lead.
- Measure the sensor input voltage with the engine stopped and with the connector joined.
- Turn the ignition switch ON.

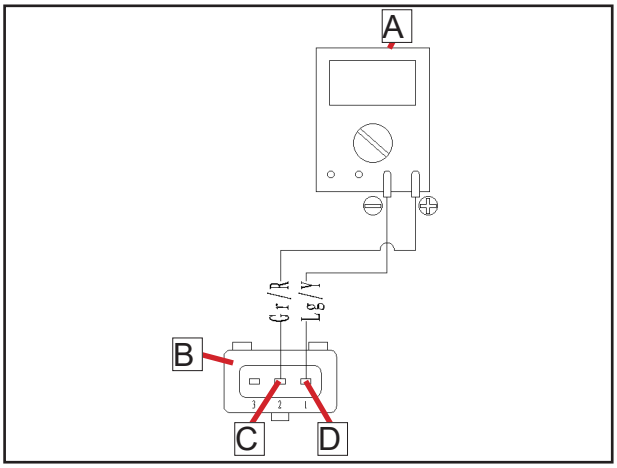


Throttle Position Sensor Input Voltage
Connections to Adapter
Meter(+)→ Gr/R(C)
Meter(-)→ Lg/Y(D)
Standard: 4.75V~5.25V DC
(connector off)

- Turn the ignition switch OFF.

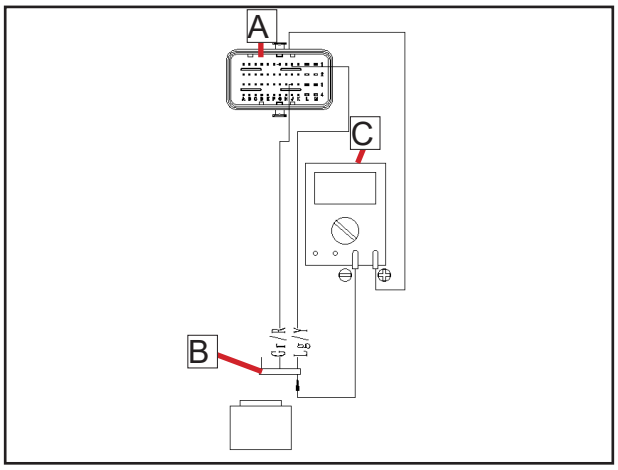
If the input voltage is normal, check the sen-sor output voltage.

If the input voltage is less than the standard,remove the ECU and check the wiring be-tween these connectors.



- Turn the ignition switch OFF.
- Disconnect ECU connector and throttle position sensor connector.
- Using multimeter to test the continuity of the 2 lead wires

ECU Connector[A]←→Throttle Body Connector[B]
Throttle Body ConnectorGr/R ←→ECU terminal 30
Throttle Body ConnectorLg/Y ←→ECU terminal 10
Standard:0 Ω
If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection).

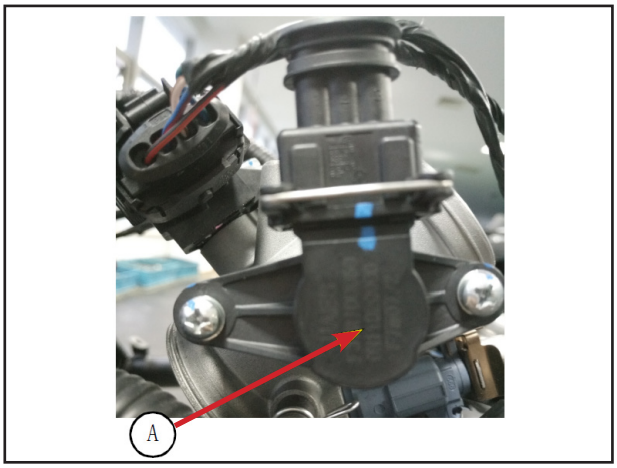


Main Throttle Sensor Output Voltage Inspection
Measure the output voltage at the main throttle sensor in the same way as input voltage inspection, Note the following:

- Disconnect the main throttle sensor connector and connect the harness adapter [A] between these connectors.
- Start the engine and warm it up thoroughly. (Above 80°C)
- Check idle speed to ensure the throttle opening is correct and adjust screw is ok.

Idle Speed Standard: 1450r/min± 145r/min
If the idle speed is out of the specified range, adjust it (Inspect throttle cable and EFI system).

- Turn the ignition switch OFF.
- Measure the output voltage of the sensor with the engine stopped, and with the connector joined.
- Turn the ignition switch ON.



Throttle Service

Throttle Position Sensor Output Voltage Connections to Adapter

Meter(+)→Br/R(sensor output) lead

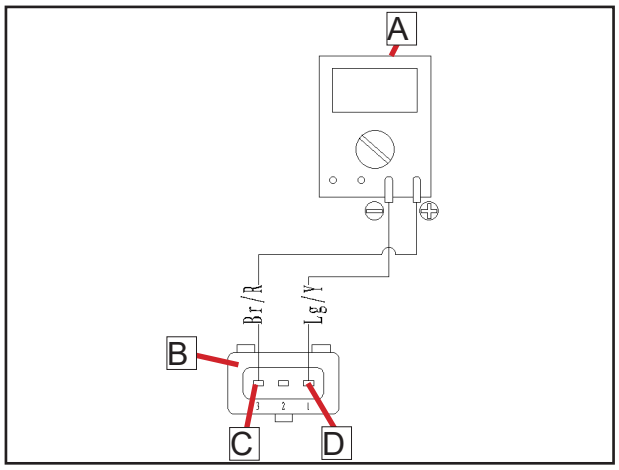
Meter(+)→Lg/Y((sensor ground)lead

Standard:

Idle throttle opening: 0.4V~0.8V DC

Full throttle opening :≥3.9V DC

If the output voltage is out of the standard, inspect the main throttle sensor resistance. If the output voltage is normal, check the wiring for continuity.



Wiring Connection

- Turn the ignition switch OFF.
- Disconnect ECU connector and throttle position sensor connector.
- Test the continuity of the 2 lead wires.

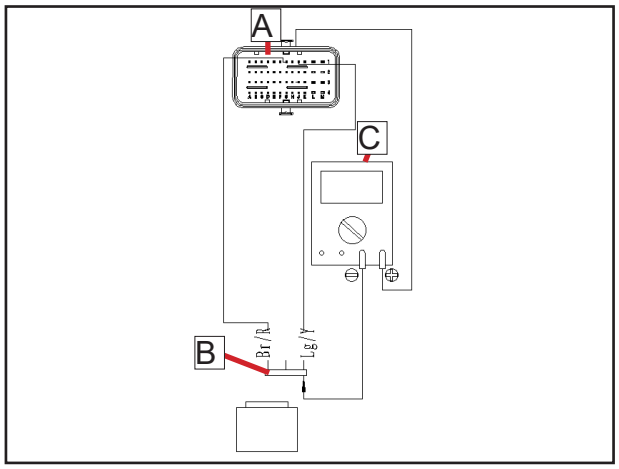
ECU Connector[A]←→Throttle Body Connector[B]

Throttle Body Connector Br/R ←→ ECU terminal 12

Throttle Body Connector Lg/Y←→ECU terminal 10

Standard:0 Ω

If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection).



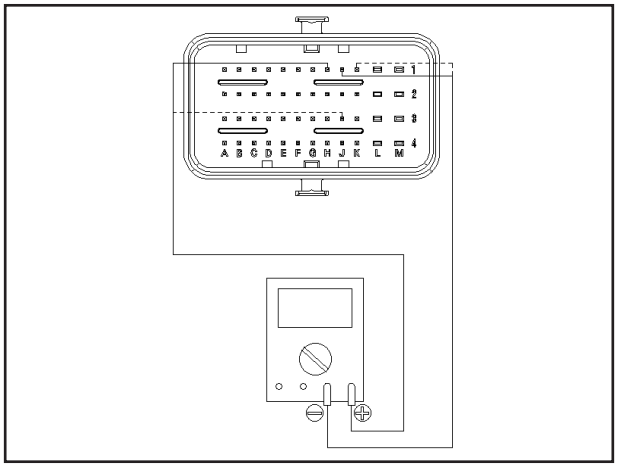
3.8.2 T-MAP Sensor Service

CAUTION
Never drop the sensor, especially on a hard surface. Such a shock to the part can damage it.

T-MAP sensor output voltage inspection.

- Make sure the battery get fully charged
- The output voltage changement follows the intake tempchanging.
- Remove the ECU (See ECUremoval). Do not disconnect theECUconnector.
- Use adapter to connecter and ECU.
- Stop the engine and meter connected. Measure the out put voltege.
- Turn the ignition switch on.

Intake temp sensor output voltage. (Active line)
Meter(+) →W/Br (ECUpin 11)
Meter(-)→ L/G (ECUpin 10)
Standard: Output voltage when intake temp 20°C
About 2.0V ~3.5V
Intakepressuresensor output voltage (Dottedline)
Meter(+) →L/R (ECUpin 30)
Meter(-) →R/B (ECUpin 9)
Standard:Output voltagein normal atmosphere.
About 3.5V~ 4.5V



Turnoff the ignitionswitch
If theoutput voltageisnot in standard. Remove the fuel tank and check the wire. If the output voltage is 5V.ECUis normal.
If theoutput voltage isin standard. Inspect theECU groundwireandpowerline (SeeECUpower inspection).
If the wires are OK. Inspect the intake temp sensor resistance.

- Remove the adapter and use the silicon glue to seal the connector avoid water.

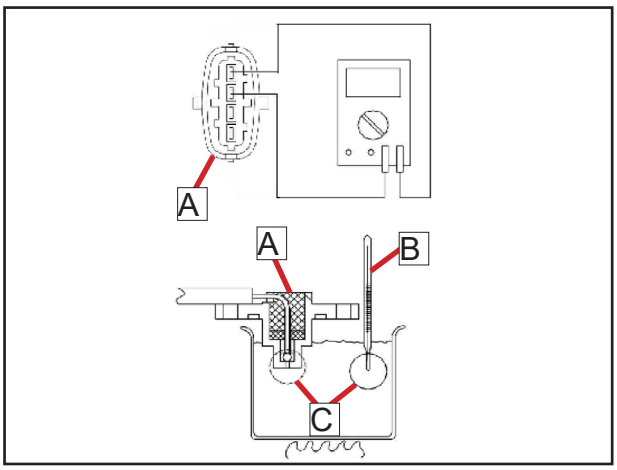
Inlet Air Temperature Sensor Service

Inlet Air Temperature Sensor Resistance Inspection

- Remove the inlet air temperature sensor
- Suspend the sensor [A] in a container of machine oil so that the heat-sensitive por-tion is submerged.
- Suspend a thermometer [B] with the heatsensitive portion [C] located in almost the same depth with the sensor.

NOTE

- The sensor and thermometer must not touch the container side or bottom.
- Place the container over a source of heat and gradually raise the temperature of the oil while stirring the oil gently for even temperature.
- Using a hand tester, measure the internal resistance of the sensor across the termi-nals at the temperatures shown in the table.

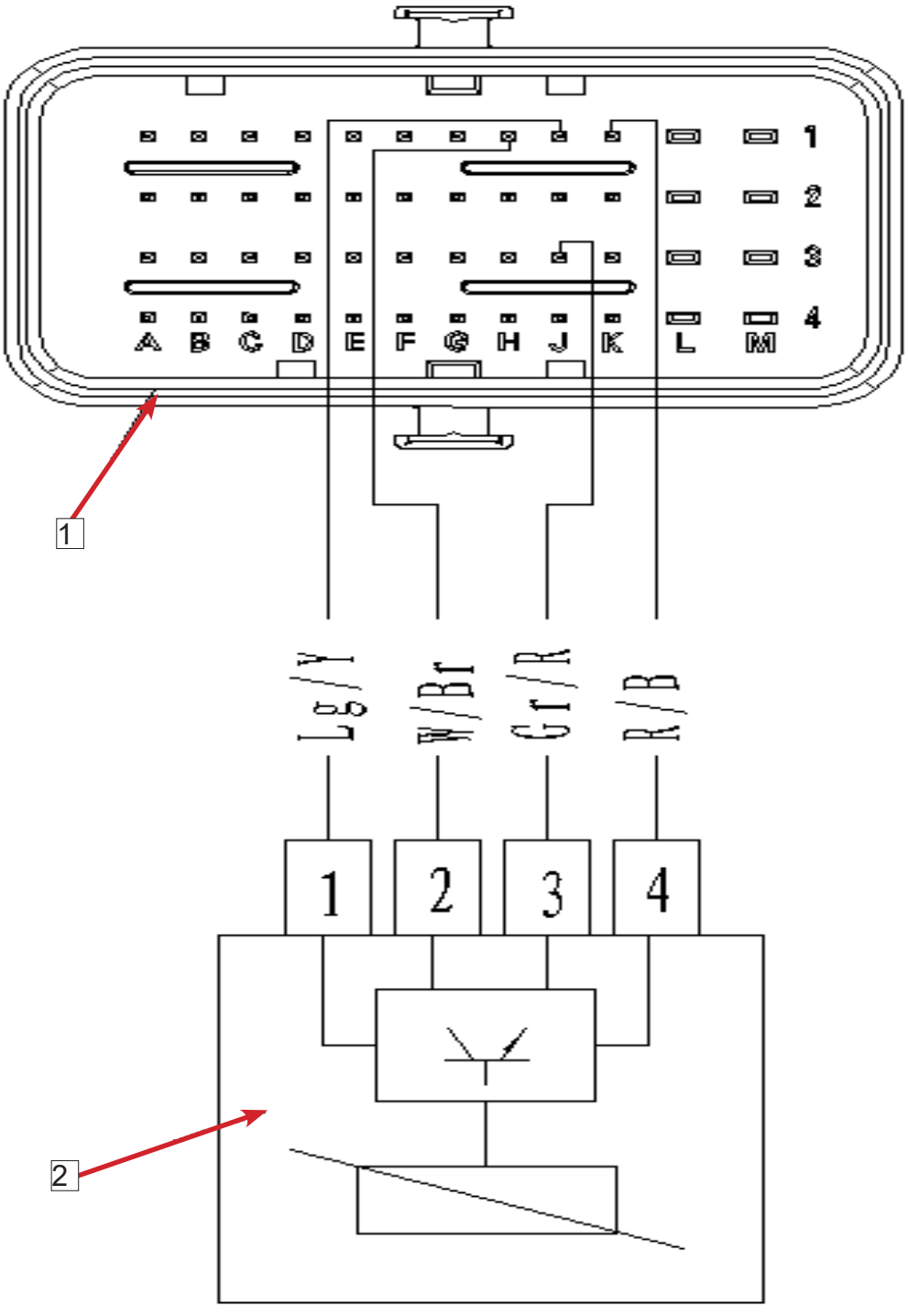


Inlet Air Temperature Sensor Resistance

Standard:241.6 Ω~258.3 Ω (20°C)
273.2 Ω~285.8 Ω (85°C)

If the measurement is out of the range, replace the sensor. If in ,replace the ECU.

Intake temp and pressure sensor
Wiring diagram



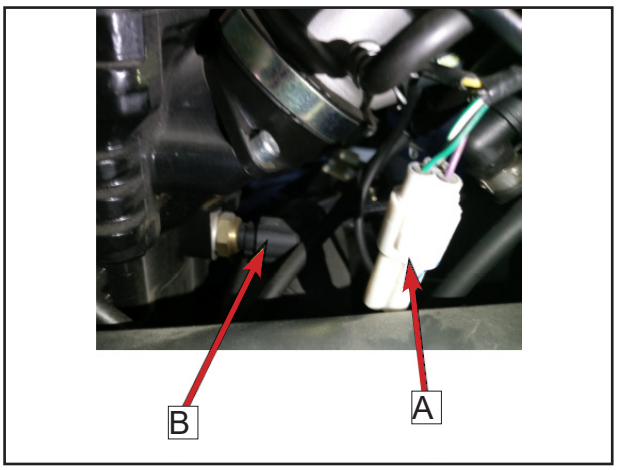
1.ECU 2. Inlet Temperature & Pressure Sensor

3.8.3 Water Temperature Sensor Service

Water Temperature Sensor Removal/ Installation

Note
Never drop the sensor, especially on a hard surface. Such a shock to the part can damage it.

- Drain the coolant (see Coolant Change in the Periodic Maintenance chapter).
- Disconnect the sensor connector [A], and unscrew the water temperature sensor [B].

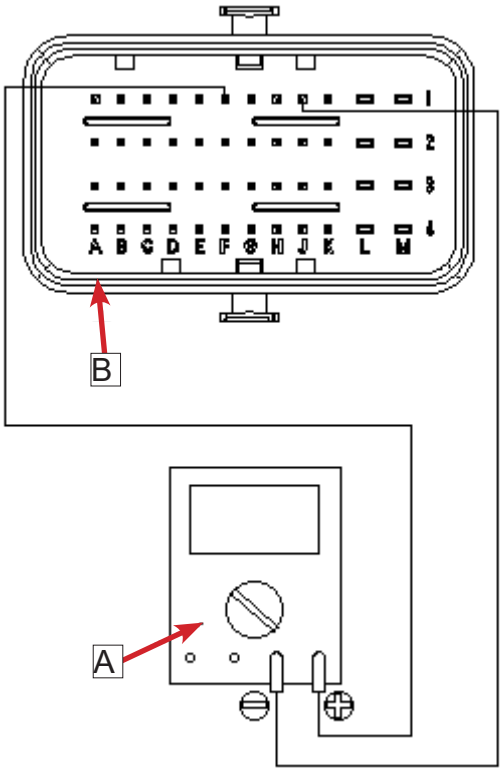


Torque : 12N•m

- Apply grease to new O-ring on the water temperature sensor.
- Fill the engine with coolant and bleed the air from the cooling system (see Coolant Change in the Periodic Maintenance chapter).

Water Temperature Sensor Output Voltage Inspection

- Be sure the battery is fully charged.
- Remove the ECU (see ECU Removal). Do not disconnect the connectors.
- Connect a hand tester [A] to the ECU connector [B] with the needle adapter set.
- Measure the sensor output voltage with the engine stopped and the connector joined.
- Turn the ignition switch ON.



Water Temperature Sensor Output Voltage
Meter (+)→Gr/Wlead(ECU terminal 13)
Meter (-)→L/G lead (ECU terminal 10)
Standard: 2.0V~3.5V (20°C)

Coolant Temperature Sensor Service

NOTE

- Coolant temperature sensor output voltage varies with the coolant temperature change.
- Turn the ignition switch off.

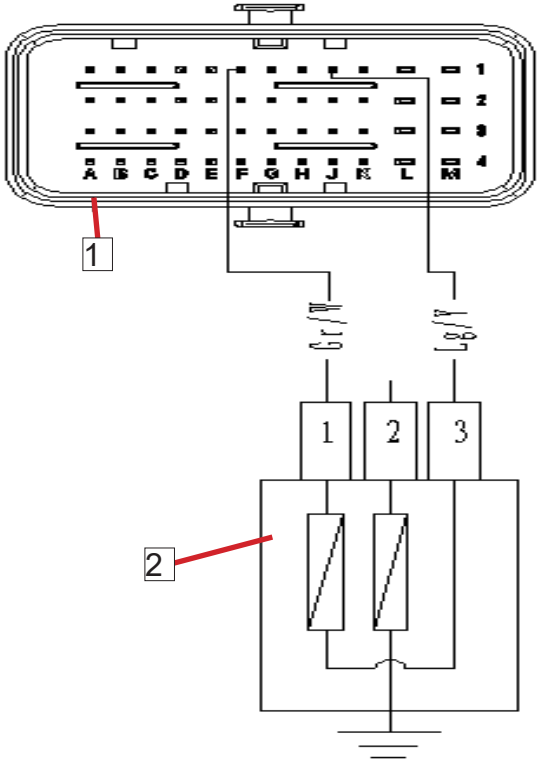
If the output voltage is within the standard, check the ECU for its ground, and power supply (see ECU Power Supply Inspection).

If the output voltage is out of the standard, check the wiring. And if the output voltage is 4. 8 V, the ECU is normal.

If the wiring is good, check the water temperature sensor resistance.

- Remove the needle adapter set, and apply silicone sealant to the seals of the connector for waterproofing.

Water Temperature Sensor Circuit



1.ECU 2.Coolant Temperature Sensor

Coolant Temperature Sensor Resistance Inspection

- Remove coolant temperature sensor (refer to Coolant Temperature Sensor Removal/ Installation).
- Refer to Coolant Temperature Sensor Inspection.

3.8.4 Crankshaft Position Sensor Service

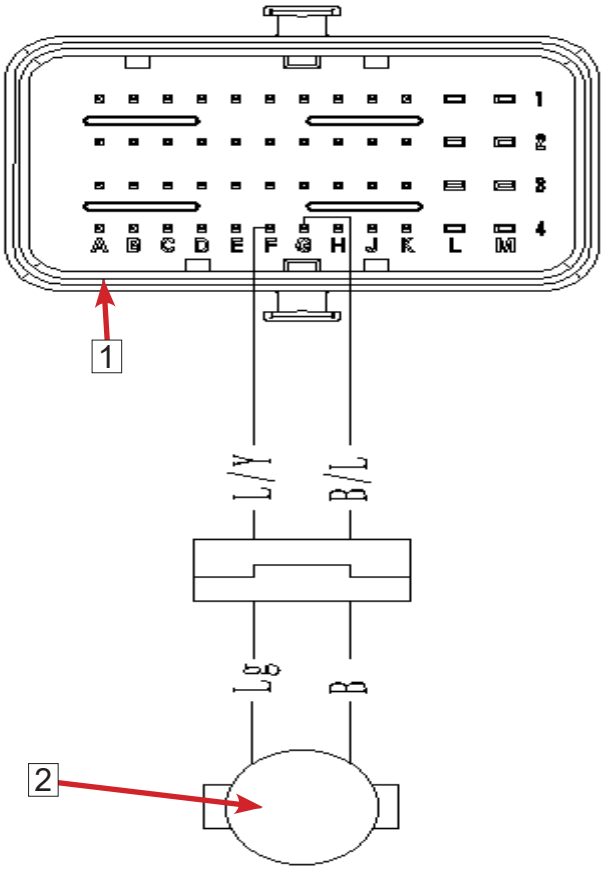
Crankshaft Position Sensor Removal/Installation

- Refer to the Crankshaft Sensor Removal/Installation in the Electrical System chapter.

Crankshaft Position Sensor Inspection

- The crankshaft sensor has no power source, and when the engine stops, the crankshaft sensor generates no signals.
- Crank the engine and measure the peak voltage of the crankshaft position sensor (see Crankshaft Sensor Inspection in the Electrical System) in order to check the sensor.
- Check the wiring for continuity, using the following diagram.

Crankshaf Position Sensor Circuit



1.ECU 2.Crankshaft Position Sensor

3.8.5 Speed Sensor Service

Speed Sensor Removal/Installation

- Refer to the Speed Sensor Removal/ Instal-lation in the Electrical System chapter.

Speed Sensor Inspection

- Refer to the Speed Sensor Inspection in the Electrical System chapter.

Speed Sensor Input Voltage Inspection

NOTE

- Be sure the battery is fully charged.
- Turn the ignition switch OFF.
- Disconnect the speed sensor connector and connect the harness adapter [A] between the harness connector and speed sensor connector.
- Connect a hand tester to the harness adapter leads.
- Measure the sensor input voltage with the engine stopped, and with the connector joined.
- Turn the ignition switch ON.

Speed Sensor Input Voltage
Meter(+)→W/G(sensor)lead[C]
Meter(-)→G/B (sensor)lead[D]
Standard: About 9~13VDC at Ignition Switch ON

If the reading is out of the range, check the wiring (see wiring diagram in this section)

If the reading is good, check the output voltage.

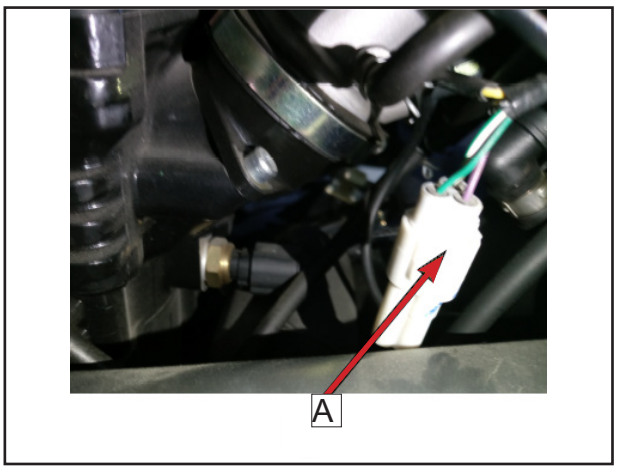
- Turn the ignition switch OFF.

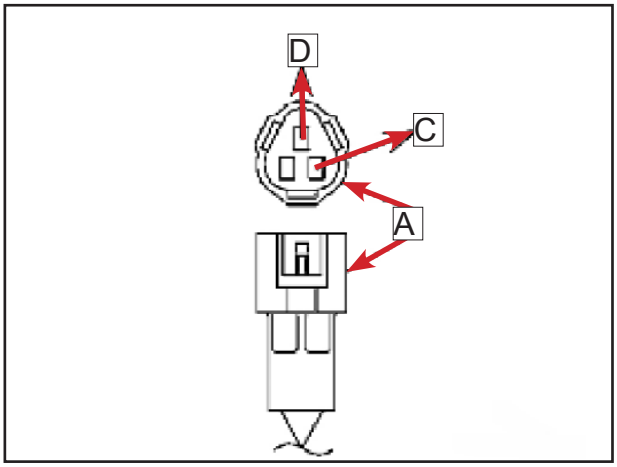
Speed Sensor Output Voltage

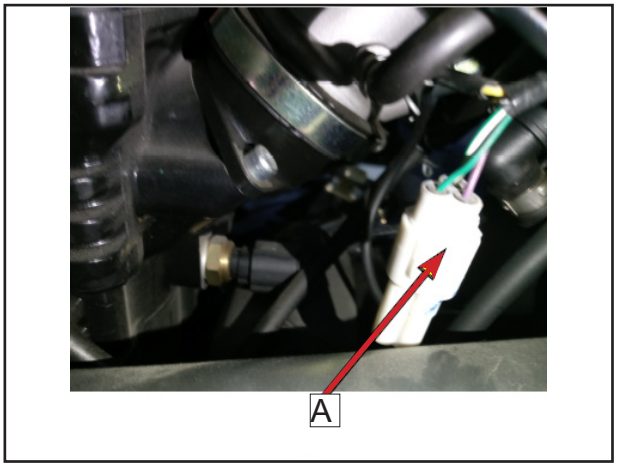
- Before this inspection, inspect the input voltage (see Speed Sensor Input Voltage Inspection).

NOTE

- Be sure the battery is fully charged.
- Turn the ignition switch OFF.
- Disconnect the speed sensor connector

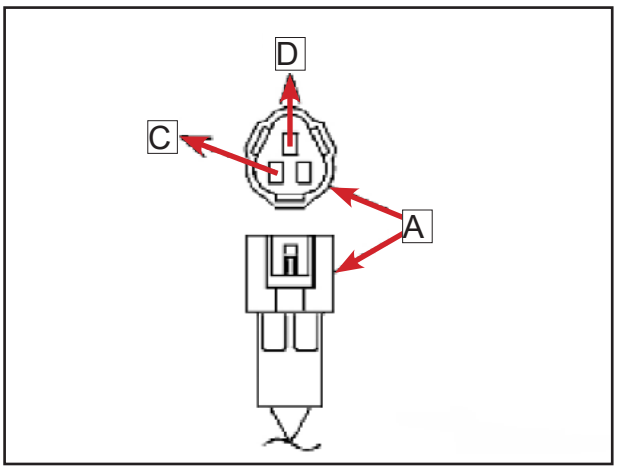






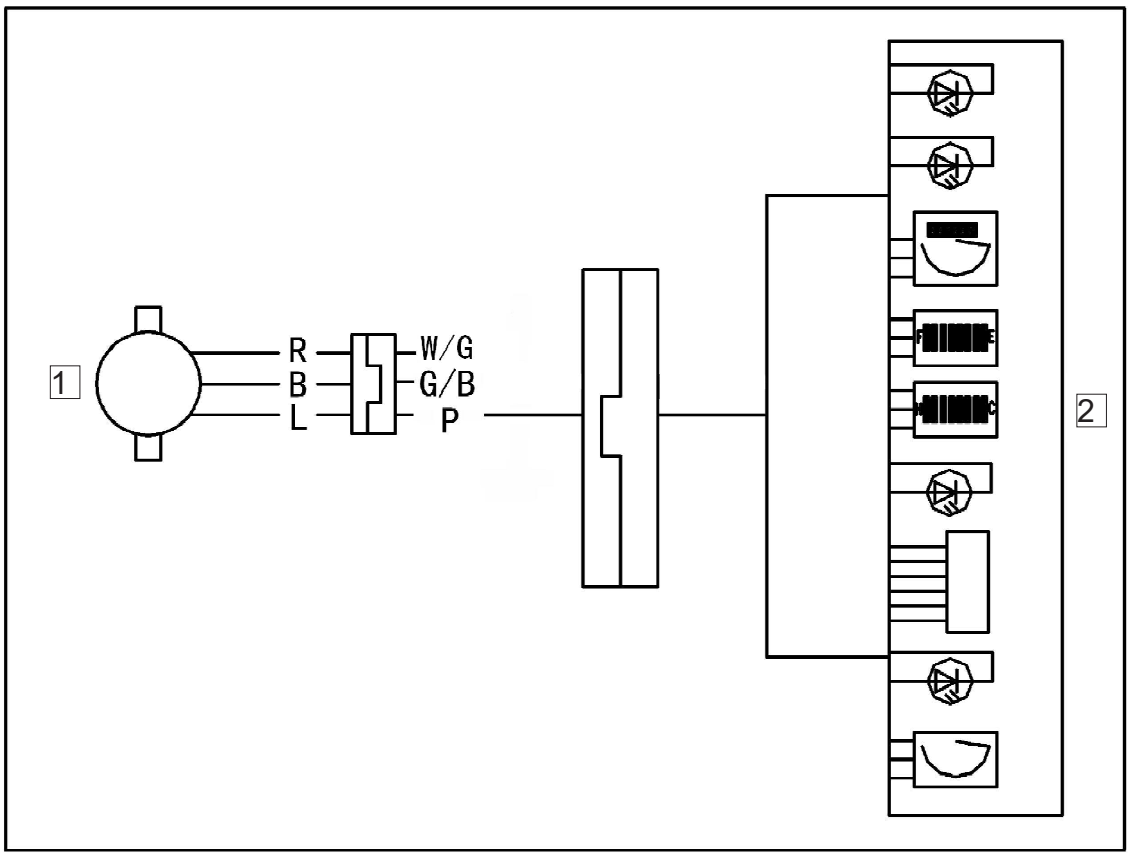
and con nect the harness adapter [A] between the harness connector and speed sen-sor connector.

- Connect a hand tester to the harness adapter leads.
- Measure the sensor output voltage with the engine stopped, and with the connector joined.
- Turn the ignition switch ON.



Speed Sensor Output Voltage at Sensor Connections to Adapter
Meter(+)→ P(sensor) lead [C]
Meter(-)→ G/B(sensor) lead [D]
Standard: About 0.05~1.0VDC

Speed Sensor Circuit



1.ECU 2.Dashboard

3.8.6 Roll-over Sensor Service

Roll-over Sensor installation/ Removal

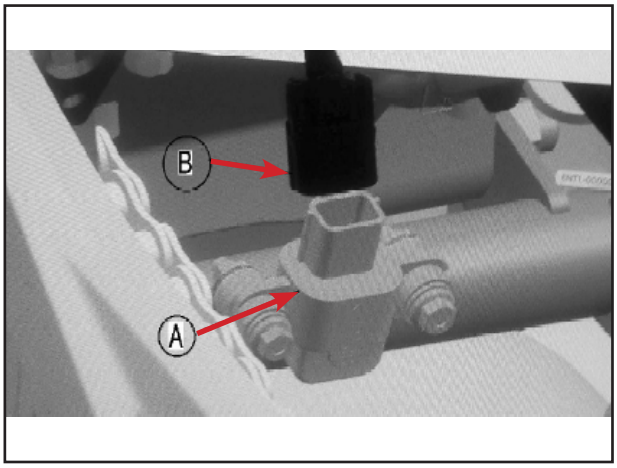
CAUTION
Never drop the sensor, especially on a hard surface. Such a shock to the part can damage it.

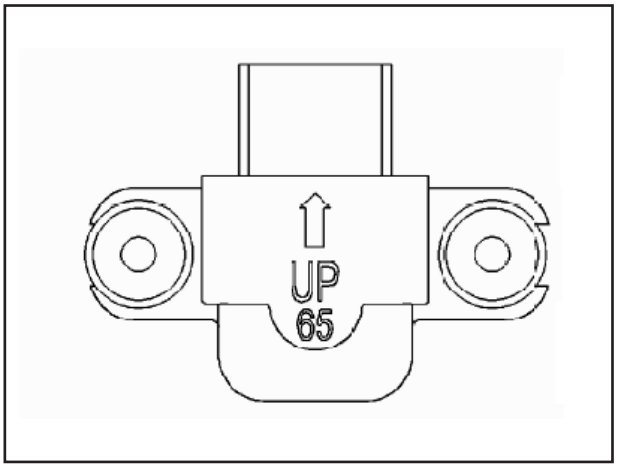
Removal:

- Disconnect connector [B] and roll-over sensor [A].

Installation:

- Roll-over sensor should be installed as il-lustrated





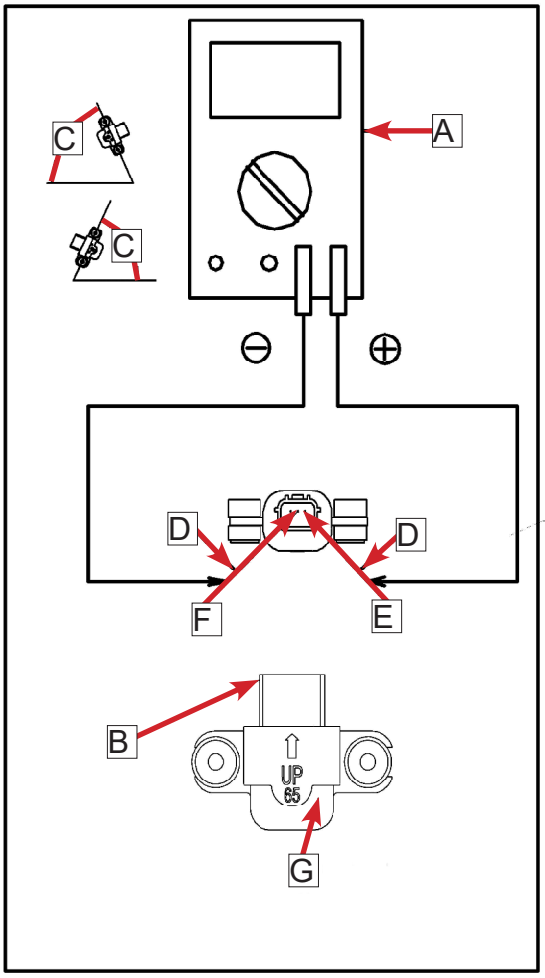
⚠WARNING
Incorrect installation of the vehicle-down sensor could cause sudden loss of en-gine power.The rider could lose balance during certain riding situations like lean-ing over in a turn with the potential for an accident resulting in injury or death. En-sure that the down sensor is held in place by the sensor brackets.

Roll-over Sensor Output Voltage In-spection (No tilt)

NOTE

- Be sure the battery is fully charged.
- Connect a hand tester [A] to the connec-tor [B] of the roll-over sensor [C] with the needle adapter set [D].
- Measure the sensor output voltage with the engine stopped, and with the connector joined.
- Turn the ignition switch ON.

Roll-over Sensor Output Voltage
Meter(+)→ Gr/B lead[E]
Meter(-)→ L/G lead[F]



Roll-over Sensor Service

- Turn the ignition switch on and measure roll-over sensor power source voltage.

Roll-over Sensor Output Voltage(No tilt):

Standard: 12V DC (battery voltage)

- Turn the ignition switch OFF.

If the reading of input voltage is less than the standard, check the ECU for its ground, power supply and wiring shorted.

If the wiring is normal, check roll-over sensor resistance.

- Remove the whole set of needle adapter and with silicone sealant applied to the connector.

Roll-over Sensor Output Voltage Inspection (when tilted)

- Remove the sensor [G] (see Roll-over Sen-sor Removal).
- Connect a hand tester [A] to the connec-tor [B] with needle adapter set [D].

Roll-over Sensor Output Voltage
Meter(+)→Gr/B lead[E]
Meter(-)→L/G lead[F]

- Hold the sensor vertically.
- Turn the ignition switch ON, and measure the output voltage with the connector joined.
- Tilt the sensor 55°~75 °degrees or more [C] right or left, then and measure the output voltage.

Sensor Output Voltage
Standard: 0V~0.5V

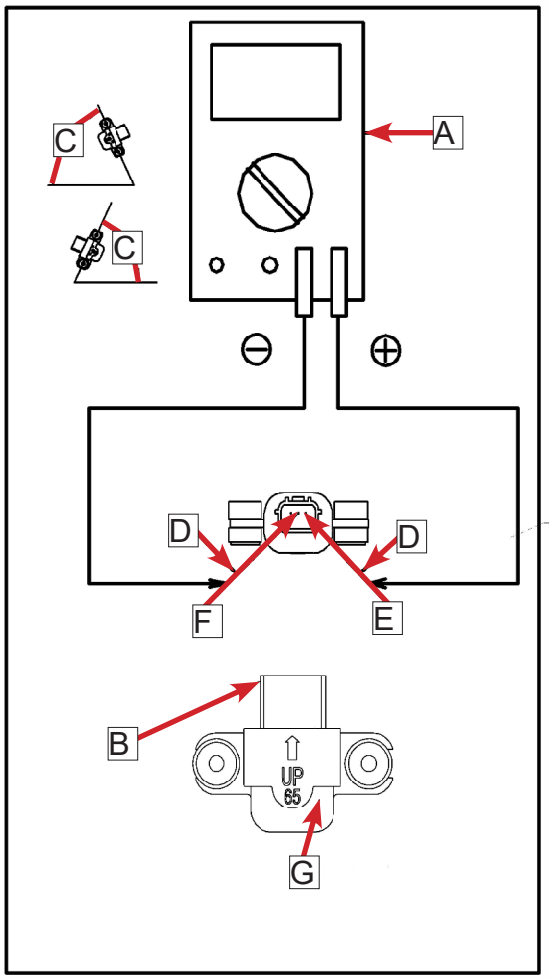
NOTE

- If you need to test again, turn the ignition switch OFF, and then ON.
- Turn the ignition switch OFF.
- Remove the needle adapter set, and ap-ply silicone sealant to the seals of the con-nector for waterproofing.

If the output voltage is normal, the wiring is suspect. Check the wiring.

If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection).

If the output voltage is out of the specified, replace the roll-over sensor.

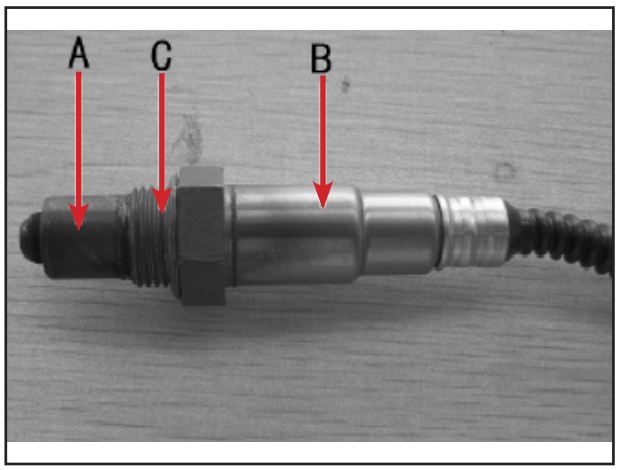


3.8.7 Oxygen Sensor Service

Oxygen Sensor Removal/Installation

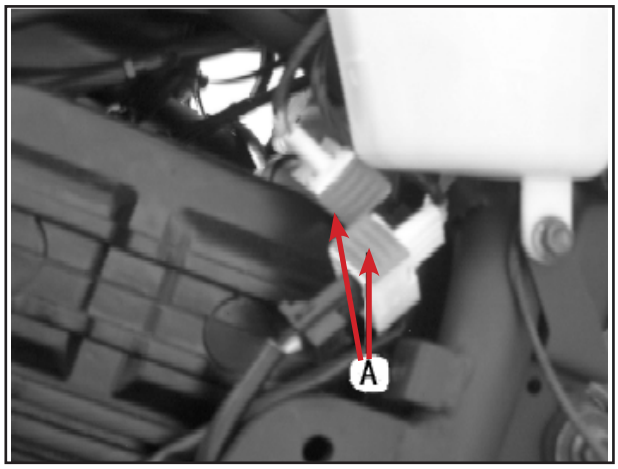
⚠WARNING

Never drop the sensor [B], especially on a hard surface. Such a shock to the part can damage it. Do not touch the portion [A] of the sensor, otherwise, the oil resi-due on your hand may contaminate the sensor and cause performance degeneration.



Oxygen Removal

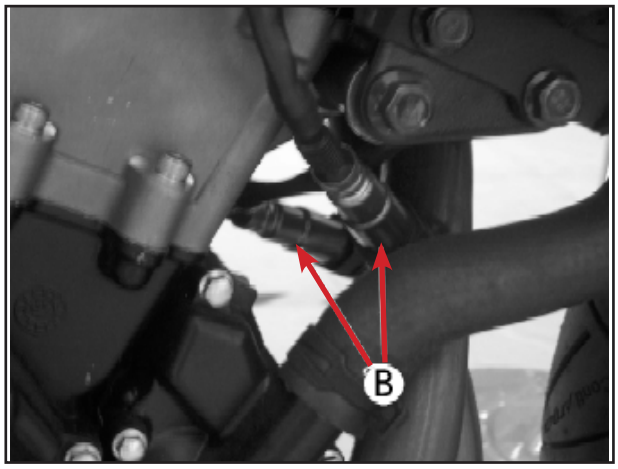
Disconnect connector[A] and remove oxygen sensor [B].



Oxygen Sensor Installation

Connect oxygen sensor [B] and connector [A].

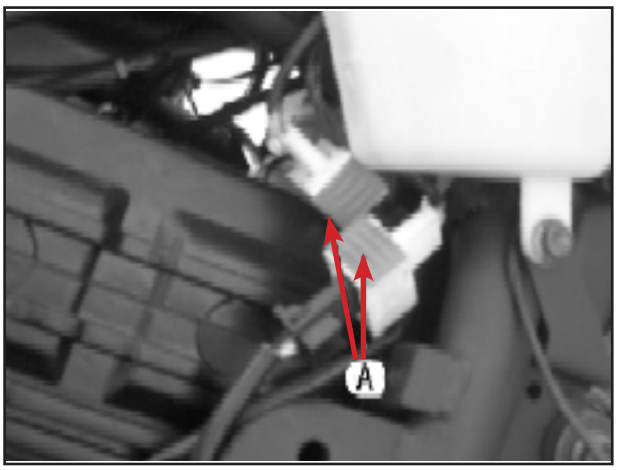
Torque:60N•m±2N•m



Oxygen Sensor Service

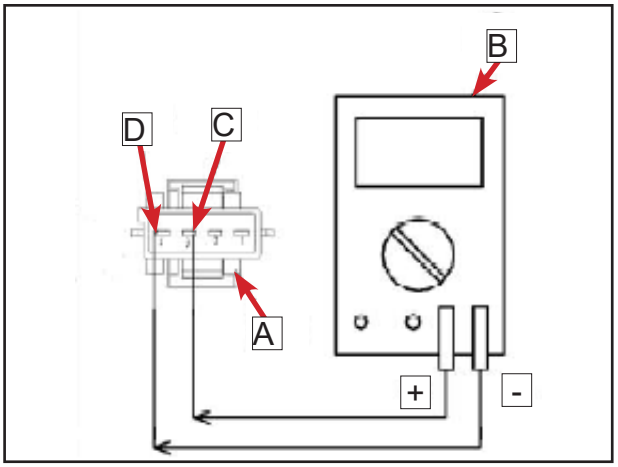
Oxygen Sensor Output Signal Inspection

- Disconnect the oxygen sensor connec tor [A] of one cylinder.
- Place the transmission in neutral
- Start the engine and throughly warm it up, then have the engine run at more than 8000rpm.
- Measure oxygen sensor output volatage using meter[B].

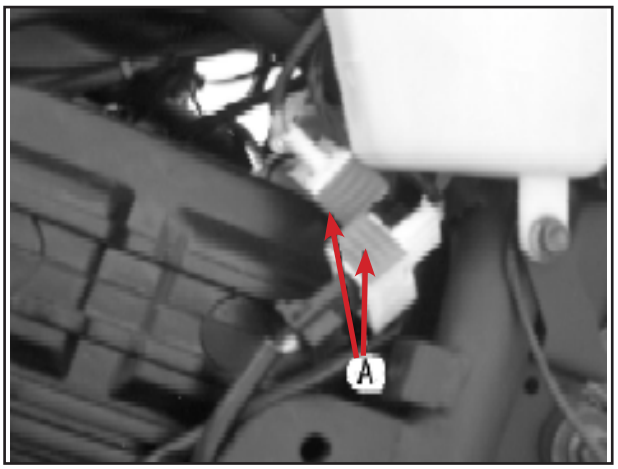


Oxygen Sensor Output Voltage
Cylinder 1:
Meter(+)→3 terminal[C]
Meter(-)→4 terminal[D]
Cylinder 2:
Meter(+)→3 terminal[C]
Meter(-)→4 termina[D]

Oxygen Sensor Output Voltage:
Standard:About 0.8V

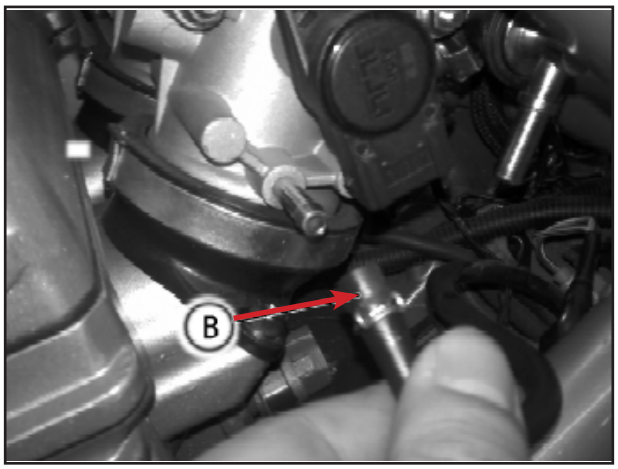


- Disconnect the oxygen sensor connec tor [A] of one cylinder.
- Place the transmission in neutral.
- Start the engine and let it idle.



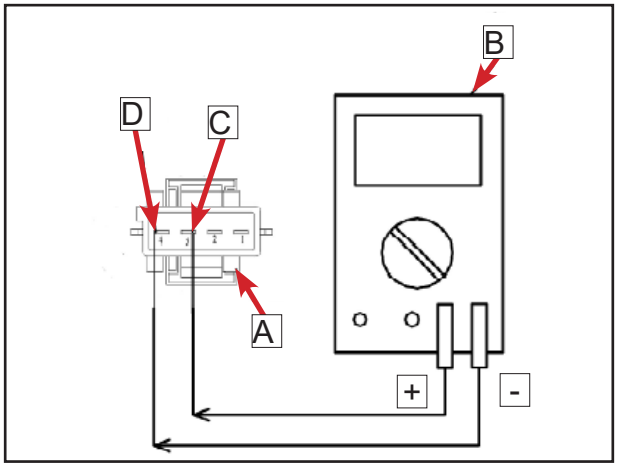
Oxygen Sensor Service

- Remove the hose [B].



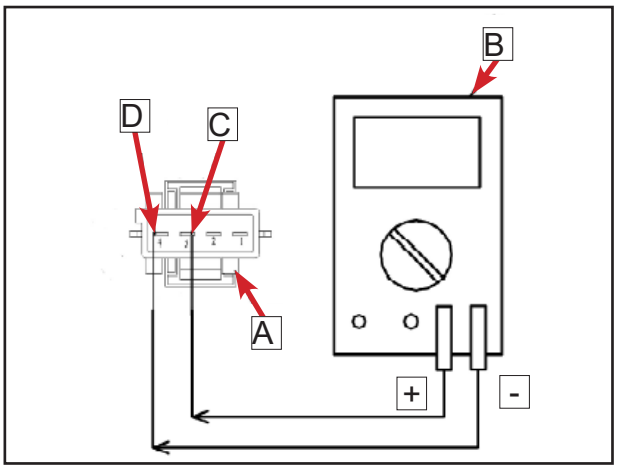
- Measure oxygen sensor output voltage with hand tester [B].

Oxygen Sensor Output Voltage:
Cylinder 1:
Meter(+)→3 terminal[C]
Meter(-)→4terminal[D]
Cylinder 2:
Meter(+)→3terminal[C]
Meter(-)→4terminal[D]
Oxygen Sensor Output Voltage:
Standard: about 0.1V



- Use the meter [B] to measure the sensors resistance.

Sensor heat up resistance
Cylinder 1:
Meter(+) →Pin 2 [C]
Meter(-) →Pin 1 [D]
Cylinder 2:
Meter(+) →Pin 2 [C]
Meter(-) →Pin 1 [D]
Standard: About 1 Ohm.



3.8.8 Ignition Coil Service

Ignition Coil Removal/Installation

⚠WARNING

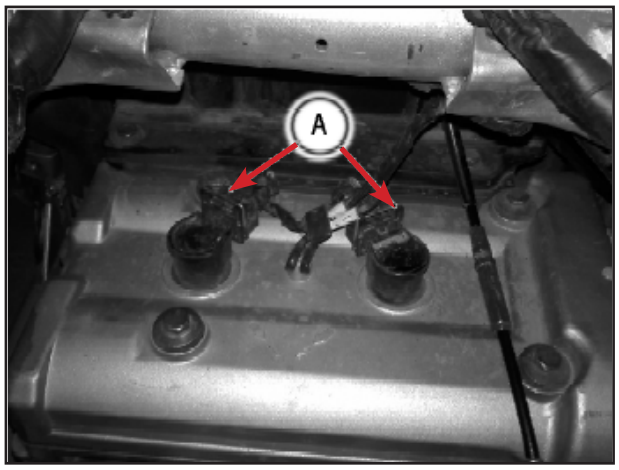
Never drop the sensor, especially on a hard surface. Such a shock to the part can damage it.

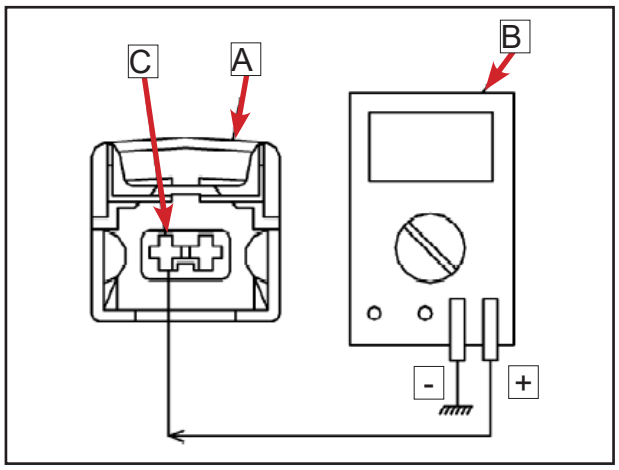
Ignition Coil Input Voltage Inspection

NOTE

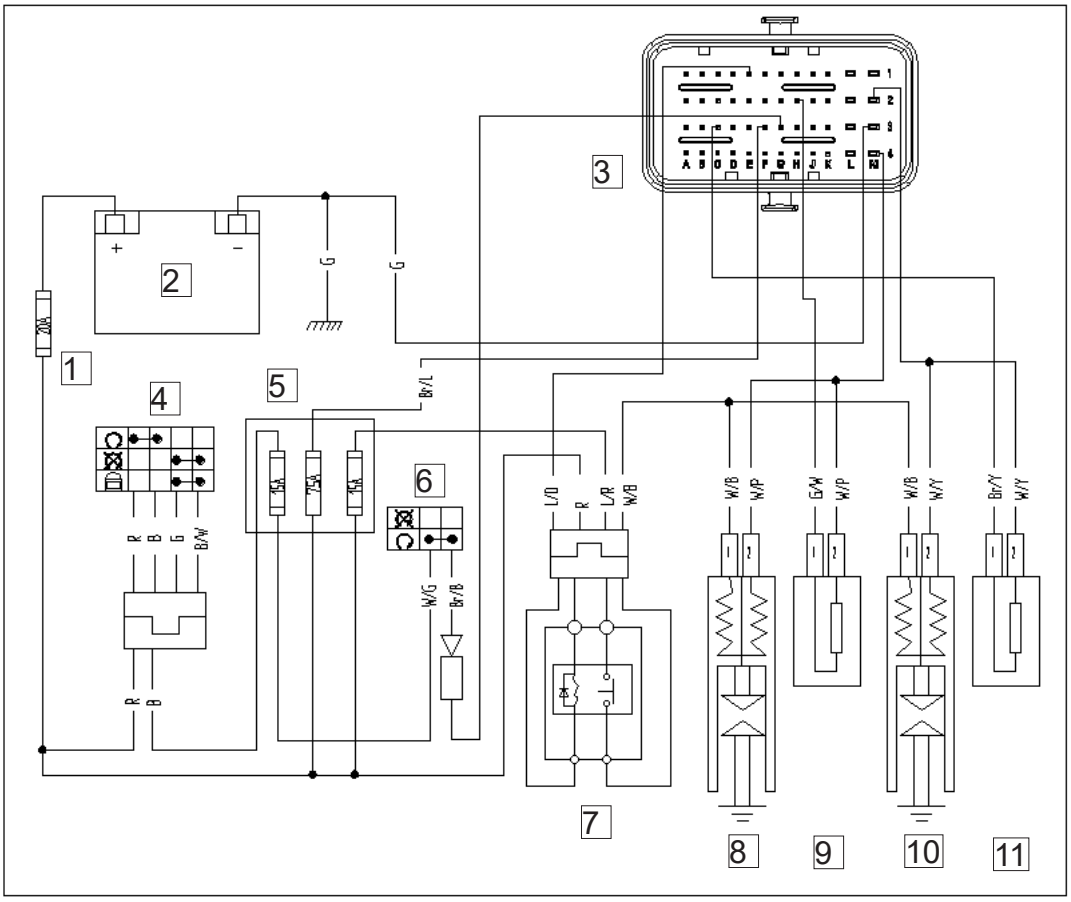
- Be sure the battery is fully charged.
- Turn the ignition switch OFF.
- Remove the fuel tank.
- Remove the air filter
- Remove the ignition switch connector [A].
- Connect a hand tester [B] as shown.
- Measure the input voltage to each pri-mary winding of the ignition coils with the engine stopped, and with the connectors joined.
- Turn the ignition switch ON. Measure the ignition coil input voltage during fuel pump working time.

Ignition Coil Input Voltage:
Ignition coil 1#:
Meter(+)→ W/Blead[C]
Meter(-)→ Ground
Standard: About 12VDC
Ignition coil 2#:
Meter(+)→ W/Blead[C]
Meter(+)→ GroundV
Standard: About12VDC



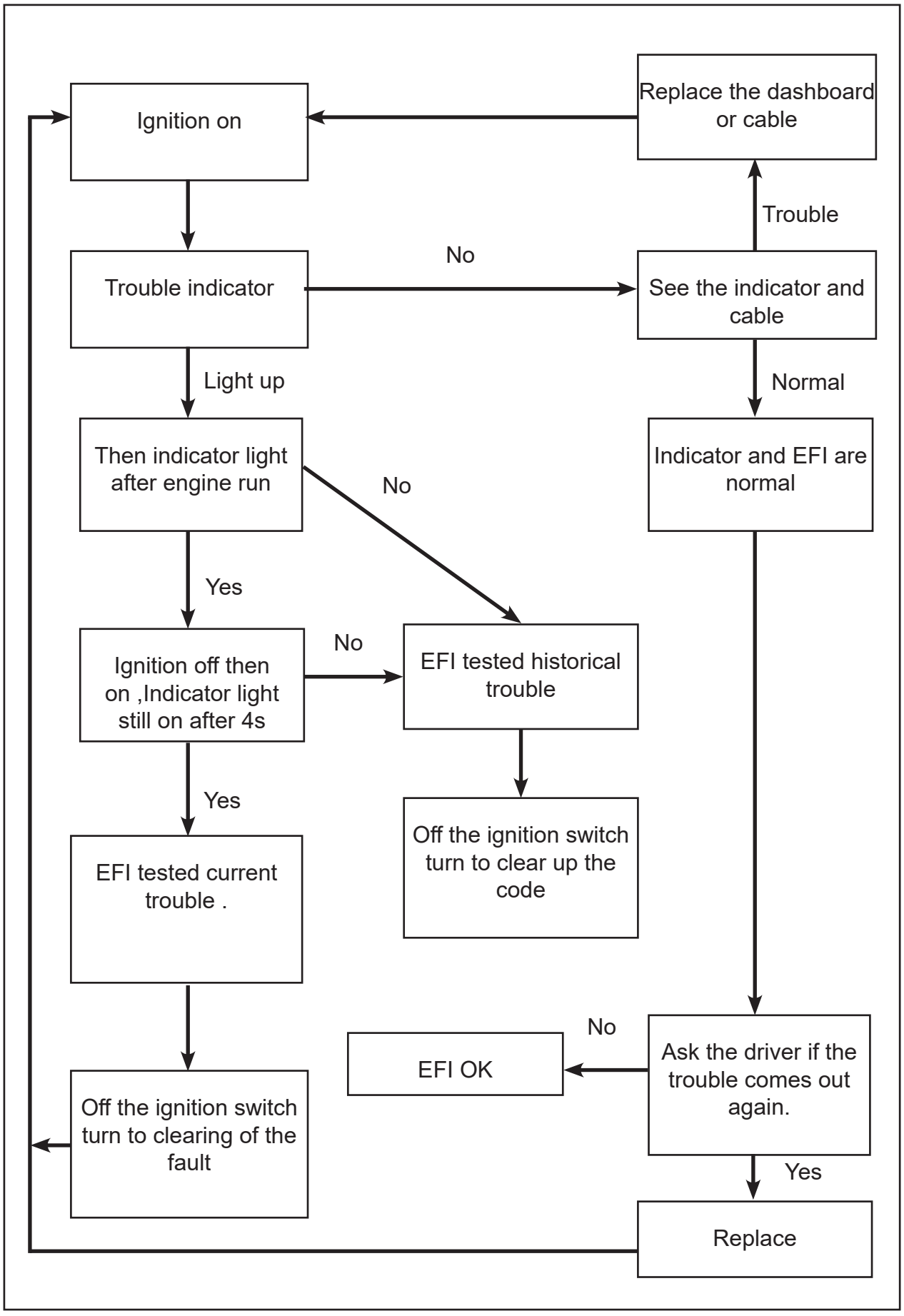


Ignition Coil
Ignition Coil Circuit



1. Main Fuse
2. Battery
3. ECU
4. Ignition Switch
5. Fuse Box
6. Engine Stop Switch
7. Main Relay
8. Ignition Coil 2#
9. Ignition resistor 2#
10. Ignition Coil 1#
11. Ignition resistor 1#

3.8.9 MIL Service
Flowing diagram of MIL



MIL Service

MIL check

- Disassemble the dashboard (See dashboard replacement on chapter 16).
- Use four auxilary connect the dashboard to the battery for MIL.

The battery voltage should be 12V

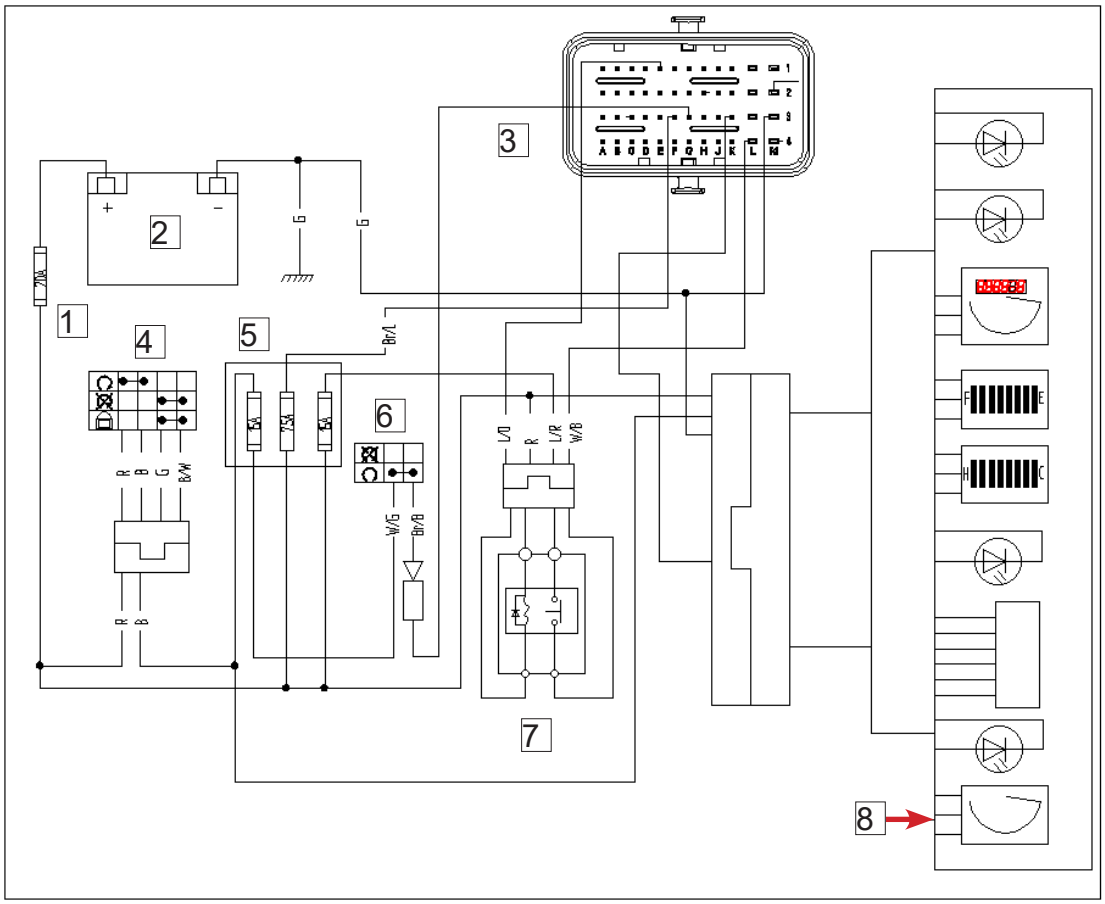
Positive pole(+)→Dashboard pin 1 and pin 2

Negative pole(-)→Dashboard pin 3 and pin 13

MIL should be on after connected.

- If the trouble indicator light doesnot on. Replace the dashboard.

MIL Circuit



1. Main Fuse
2. Battery
3. ECU
4. Ignition Switch
5. Fuse Box
6. Engine Stop Switch
7. Main relay
8. Dashboard

3.8.10 ECU Service

ECU assembly/ disassembly

Attention
Do not drop the ECU, especially hard cover. Or the shock from the impact will damage the ECU.

ECU disassembly

- Disassemble the seat.
- Take out the ECU[A] and wires.
- Disconnect the ECU connector[B]。

ECU Assembly

- Assemble the ECU and connect the connector.

ECU power and ground wire checking

- Eye check the ECU connector.

If the connector is jammed by the dust or mud. Use the compressed air clean up.

If the cable connector has cracks, bent or damage.Replace the maincable.

If the ECU connector has cracks,bent or damaged.Replaced the ECU.

- With the ECU connector[A]connected. Off the ignition switch. Use the AVO meter To check the ground wire connection below.

Battery[B]

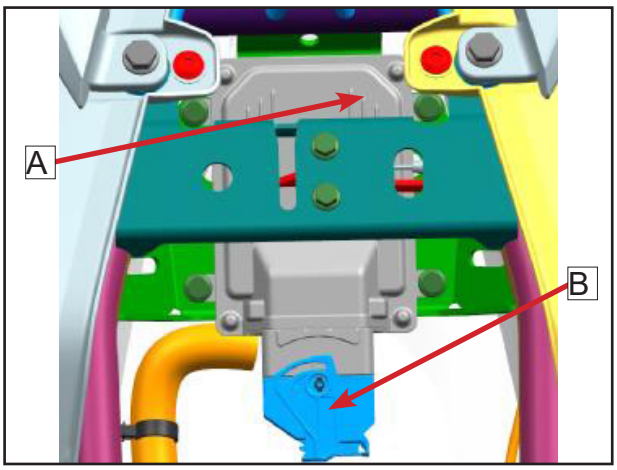
AVO meter[C]

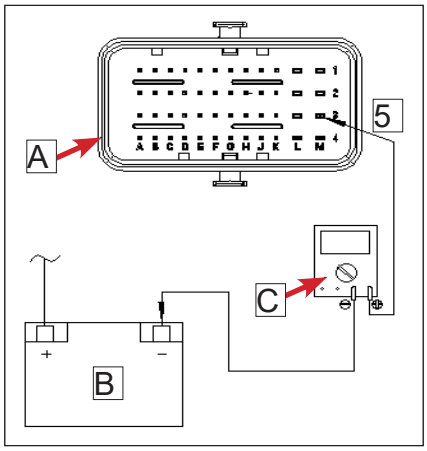
ECU ground wire check

Connector pin 5, pin 48←→Battery(-):0 ohm

Engine ground wire ←→Battery(-):0 ohm

If the ground wire is not connected.Check the connector,engine ground wire or main cable. Replace or repair if nacessary.





- Check the ECU power voltage with a hand tester [A].
- Use the drawings in this chapter to see the ECU connector [B] numbers and position the pins.

Battery [C]

Meter Connections:

Pin 33←→Battery (-) between pins

Pin 8←→Battery (-) between pins

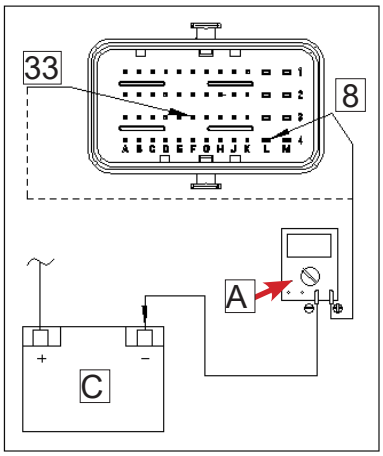
When ignition Switch is OFF:

Pin 33 and battery(-): Battery voltage (12.8V or higher)

Pin 8 and battery(-):0V

When ignition Switch is ON and Engine Stop Switch is ON:

Pin 8 and Battery(-): Battery voltage (12.8V or higher)



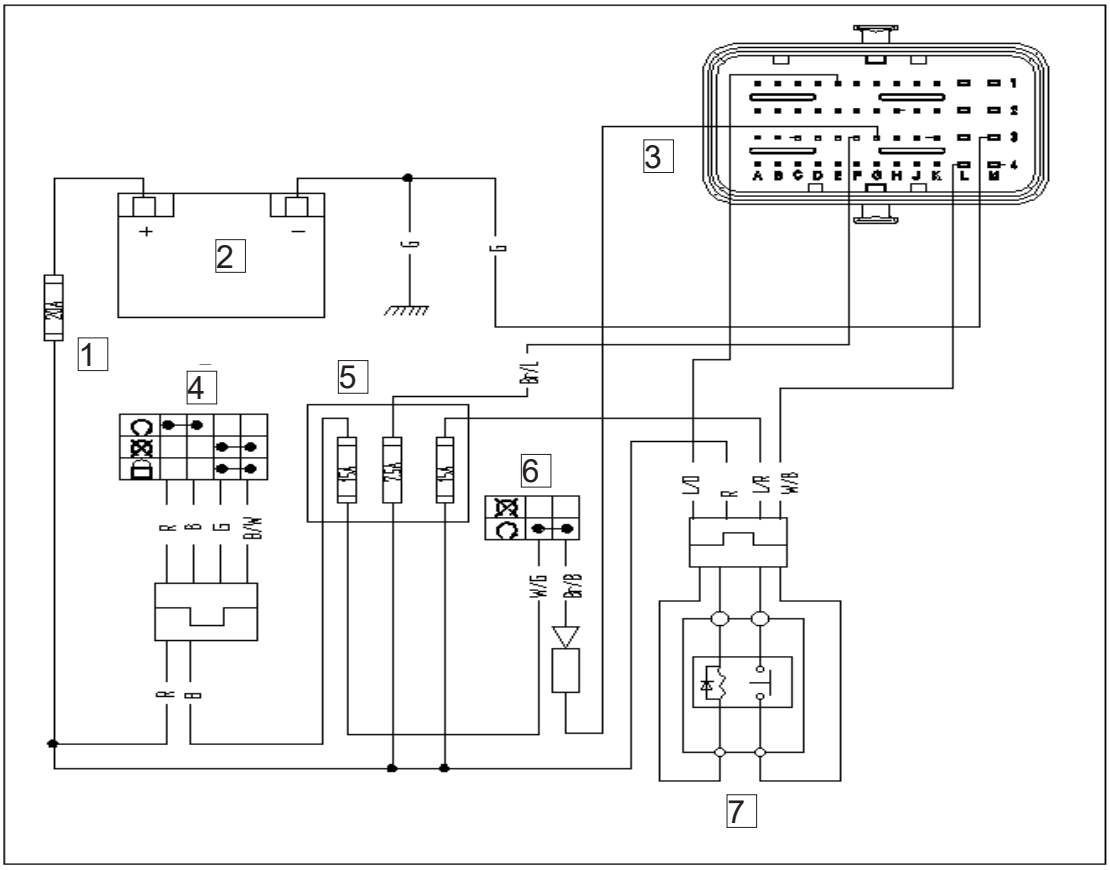
If the meter does not read as specified, check the following.

- Main Fuse 20A(see Fuse Inspection in the Electrical System chapter)
- ECU fuse 7.5A(see Fuse Inspection in the Electrical System chapter)

Power SourceWiring (see wiring diagram below)

If the inspection checks good, the ECU is damaged. Replace the ECU (see ECU Removal/Installation). The ECU itself cannot be checked or serviced.

E C U Service
ECU wiring diagram



1. Fuse
2.Battery
3. ECU
4. Ignition switch
5. Main fuse
6. Engine stop switch
7.Main relay

3.8.11 High pressure fuel pipe service

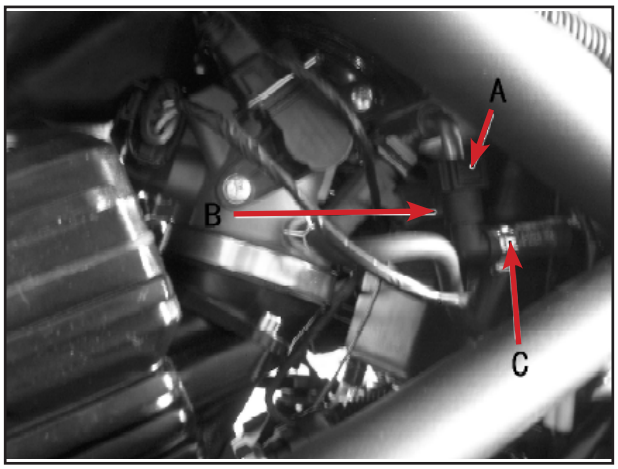
Fuel pressure check

Attention

- Pressure check can tell you where the problem comes from. Including EFI system problem, mechanical problem or electrical problem.
- If the vehicle got problem on running. The fuel pressure test can be easier to find the reason.
- Make sure that battery is fully charged.

Fuel pressure test

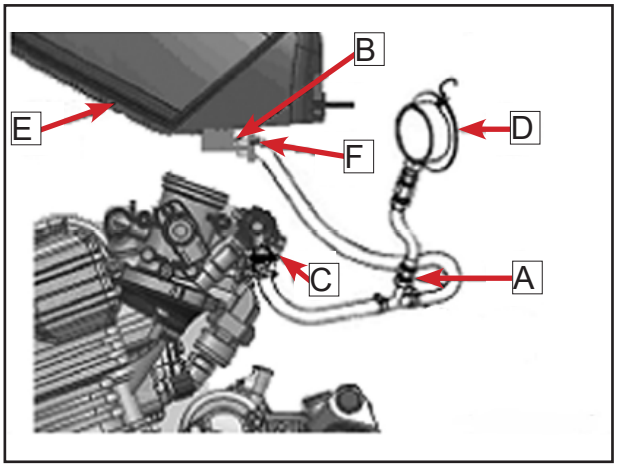
- Disassemble the fuel tank.
- Make sure the fure pipe connector has been wrap around by a cloth to avoid the fuel leaking.
- Pressure the lock [A].
- Disconnect the connector [B].
- Disassemble the fuel pipe[C].



⚠WARNING

Avoid the fuel leaking. Leaked fuel must be cleaned up immediately.
Fuel will flow from hose and pipe when fuel hose is disconnected. Use a clean cloth to cover hose connection part.

- Assemble the fuel pressure adapter[A] be-tween the fuel outlet pipe[B]and the fuel rail[C].



⚠WARNING

Do not start the engine with thefuel pipe disconnected.

Fuel tank[E], Pressure meter[D], Connector [F]

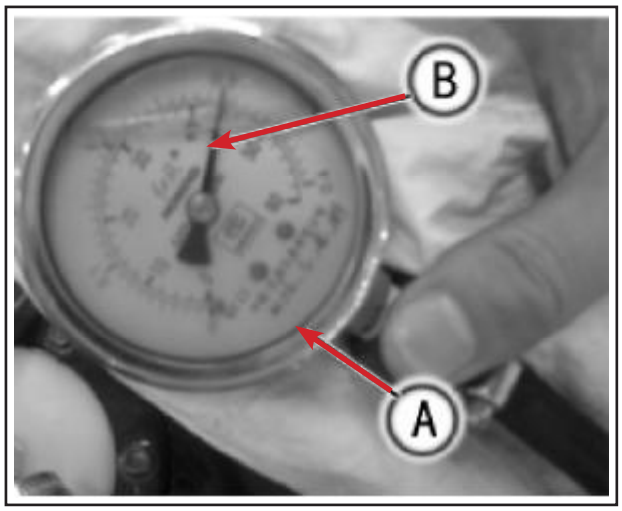
- Connect the connector tightly, make sure there is no leak.
- Turn the ignition switch on. Let the fuel pump running 3 second,then stop.

⚠WARNING

Do not start the fuel pump when the tank is empty .

High pressure fuel pipe service
Fuel pressure check
- Stop the engine to test the fuel pressure.

Fuel pressure
When ignition switch is on and fuel pump is running:
Standard: 330kPa(0.33MPa)
After the ignition switch is on for 3s and fuel pump stoped.
Standard: 265kPa(0.265MPa)
The pressure should be kept for 30s
The pressure meter[A] tip[B] will wave when testing. Get the average pressure between the Max and min.



If the fuel pressure is normal. The fuel circu-lation system(Fuel pump, Pressure adjuster, Fuel pipes)is OK.Check the EFI system (Injector, Each sensor,ECU).

If the pressure is lower than mormal standard. Check the item below.
- Fuel pipe leaking.
- Fuel pump running(Check the fuel pipe sound).
- Fuel pump flow(See the fuel pump flowing inspection).

If the pressure is higher than normal standard. Inspect the item below:
- Fuel pipe jammed.
- Injector jammed.
- Adjuster of the fuel pump damaged.

3.8.12 Fuel pump service

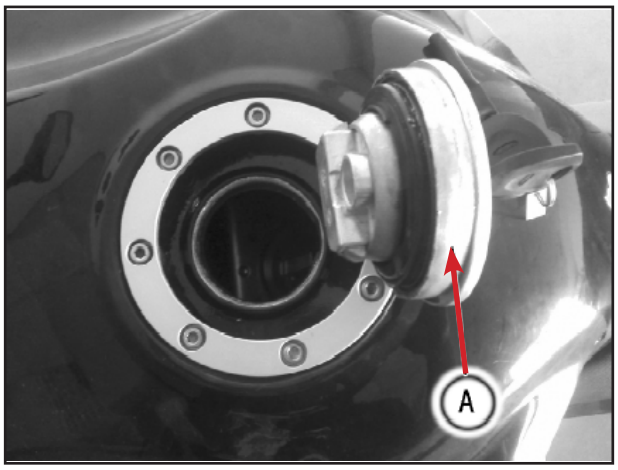
Fuel pump flowing check

Attention

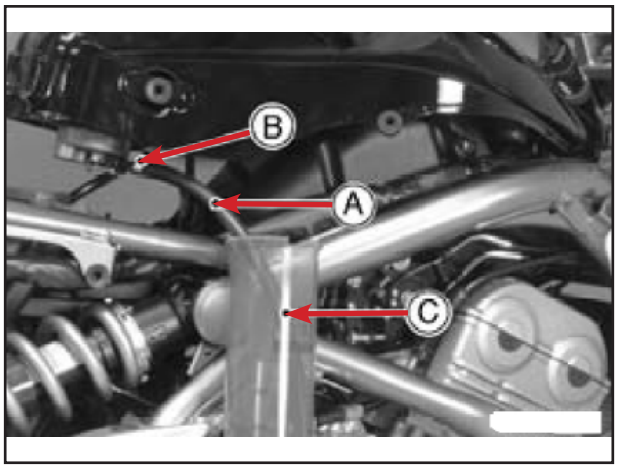
- Make sure the pattery fully charged.

⚠WARNING

Gasoline is extremely flammable and can be explosive under certain conditions. Make sure the area is well-ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light. Do not smoke. Turn the ignition switch OFF. Be prepared for fuel spillage; any spilled fuel must be completely wiped up immediately.



- Turn the ignition switch and engine stop switch off.
- Waiting for engine cool down.
- Prepare a plastic hose of the inside diam-eter 7.5mm (0.30in.) and a measuring cylinder.
- Disassemble the fuel tank bolt.
- Open the fuel tank cap[A] To release the pressure.



⚠WARNING

Be prepared for fuel spillage; any spilled fuel must be completely wiped up immediately. When the fuel hose is disconnected, fuel spills out from the hose and the pipe because of residual pressure. Cover the hose connection with a piece of clean cloth to prevent fuel spillage.

- Connect the plastic hose [A] to the fuel pump outlet pipe.
- Secure the plastic hose with a clamp [B].
- Insert the plastic pipe into measuring cylin-der [C]

Fuel pump service

Fuel pump flowing check

⚠WARNING
Wipe off spilled out fuel immediately. Be sure to hold the measuring cylinder vertical.

- Assemble the fuel tank.
- Ignition on with the engine stop. Running the fuel pump for 3s.Then stop. Repeat several times until the pipe full of fuel.

⚠WARNING
Do not drive the fuel pump without the fuel inthe fuel tank.

- Measure the discharge for 3 seconds with the plastichose filled with fuel.
- Repeat this operation several times.

Amount of Fuel Flow

Standard: 60 mL or more for 3 seconds

If the fuel flow is much less than the specified, check the battery condition (see Charging Condition In spection in the Electri-cal System chapter). If the battery is good, replace the fuel pump (see Fuel Pump Re-moval/Installation).

- After inspection, install the fuel tank (see Fuel Tank Installation).
- Start the engine and check for fuel leakage.

Fuel Pump
Fuel Pump Removal

⚠WARNING

Never drop the fuel pump, especially on a hard surface. Such a shock to the pump can damage it.

⚠WARNING

Gasoline is extremely flammable and can be explosive under certain conditions. Make sure the area is well-ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light. Do not smoke. Turn the ignition switch OFF. Disconnect the battery (-) terminal.To make fuel spillage minimum, draw the fuel out from the fuel tank when the engine is cold. Be prepared for fuel spillage; any spilled fuel must be completely wiped up immediately.

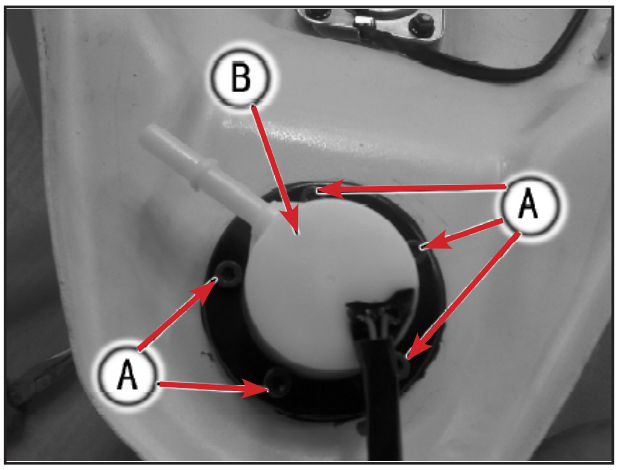
- Draw the fuel out from the fuel tank.
- Remove the fuel tank (see Fuel Tank Removal).
- Be careful of fuel spillage from the fuel tank since fuel still remains in the fuel tank and fuel pump. Plug the fuel pipe of the fuel tank.
- Turn the fuel tank upside down.

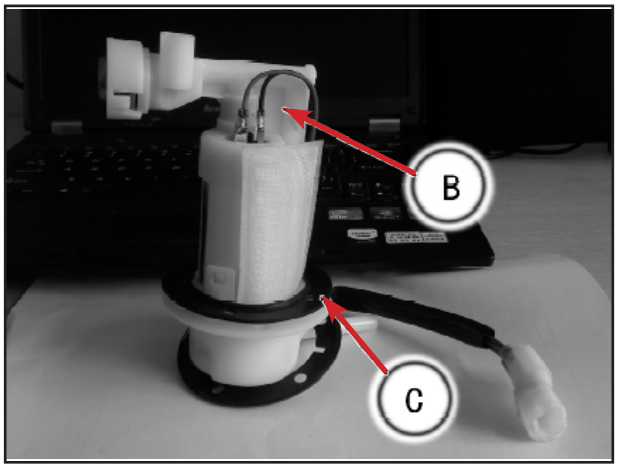
Remove:

- Fuel Pump Bolts [A].
- Fuel Pump [B].
- Replace fuel pump gasket [C] if damaged

⚠WARNING

Do not pull the lead of the fuel pump. If they are pulled, the lead terminals may be damaged.





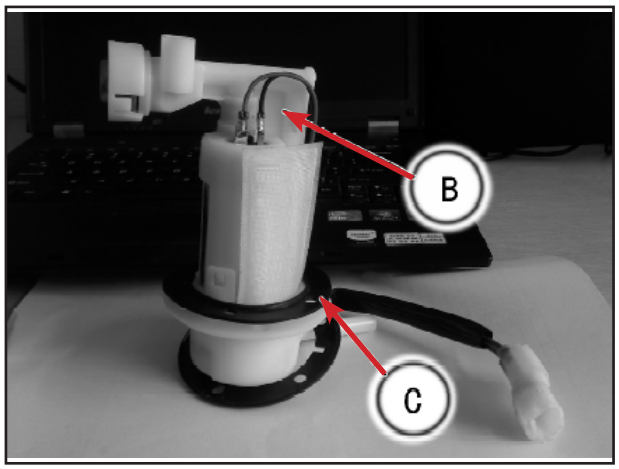
Fuel Pump

Fuel Pump Installation

- Clean dirt or dust from the fuel pump [B] by lightly using compressed air.
- Replace the fuel pump gasket [C] with a new one if damaged.
- Tighten the fuel pump bolts to a snug fit, tighten them in a crisscross pattern.

Torque - Fuel Pump Bolts: 5 N•m

- Tighten the pump bolts again in a criss-cross pattern to check the tightness.

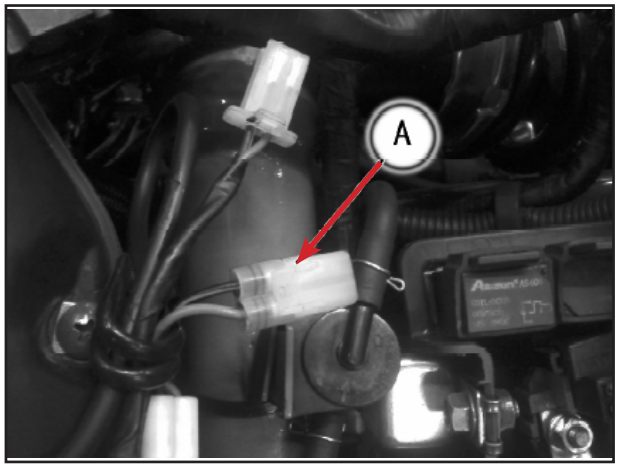


Fuel Pump Operation Inspection

NOTE

- Be sure the battery is fully charged.
- Just listen to the pump sound in the fuel tank to confirm pump operation.
- Turn the ignition switch ON and make sure that the fuel pump operates (make light sounds) for 3 seconds, and then stops.
- Turn the ignition switch OFF

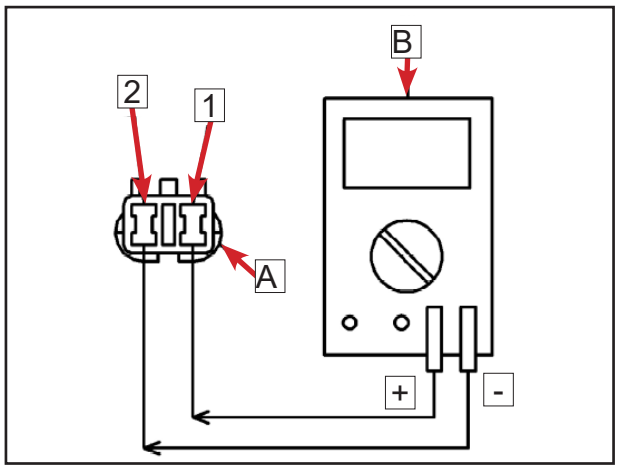
If the pump does not work as described above, inspect the operating voltage.



Fuel Pump Operating Voltage Inspection

NOTE

- Be sure the battery is fully charged.
- Turn the ignition switch OFF and disas semble the tank.
- Disconnect fuel pump connector[A]
- Measure the voltage when engine stops.
- Turn the ignition switch ON.
- The tester needle should indicate battery voltage for 3 seconds, and then 0V.



Tester Connections:

Tester(+) → terminal 1(lead B/Y)

Tester(-) → terminal 2(lead G)

With the ignition switch on:

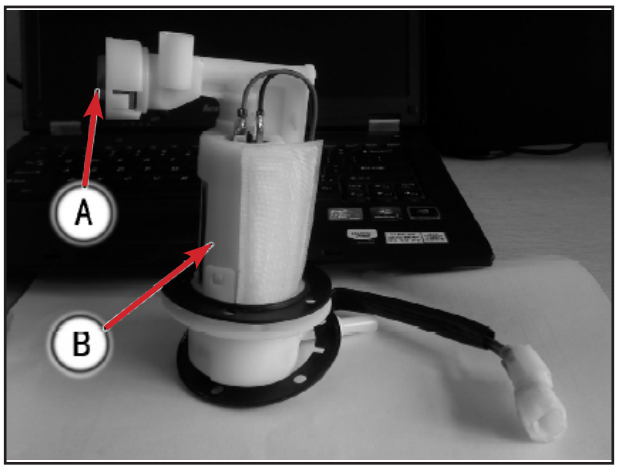
Standard: Battery Voltage keeps for 3 seconds, and then goes to 0 V.

Fuel Pump

If the reading stays on battery voltage, and never shows 0V. Check the ECU and fuel pump relay.

If the voltage is normal but fuel pump does not work, replace the fue pump.

If thereis no battery voltage, check the fuel pump relay.

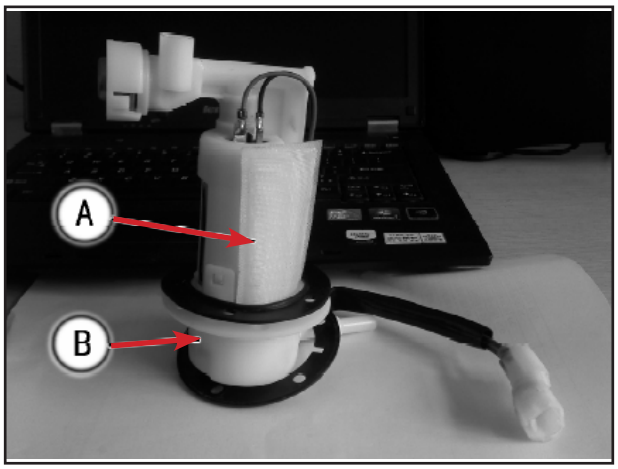


Pressure Regulator Removal

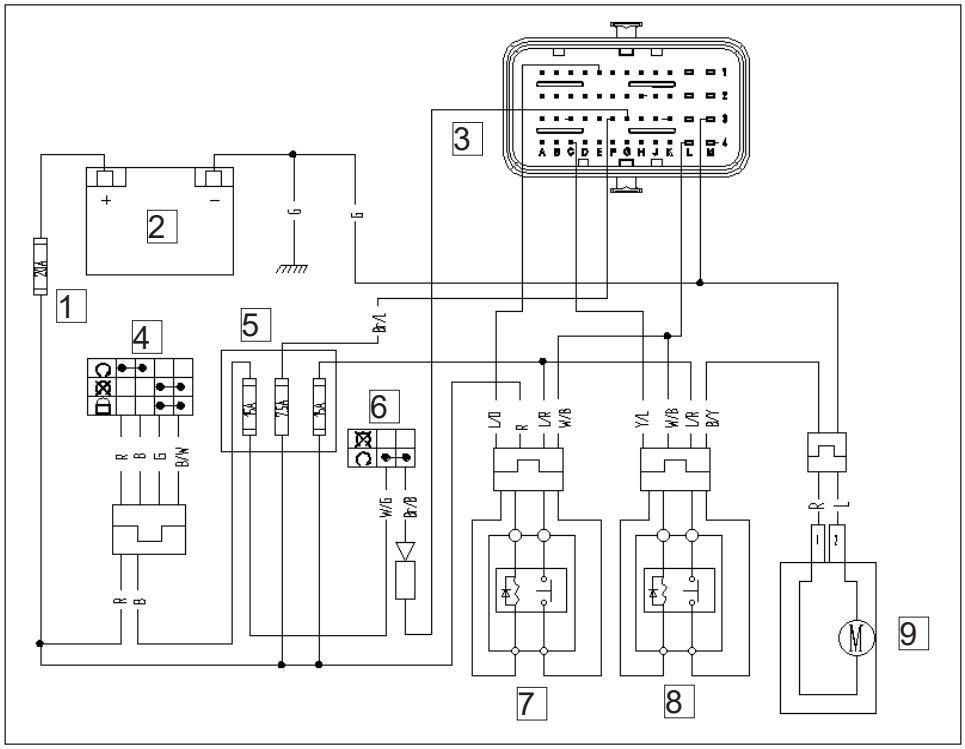
- The pressure regulator [A] is built into the fuel pump [B] and cannot be removed.
- If the pressure regulator is suspected of clogging or being damaged, replace the fuel pump as a set.

Pump Screen, Fuel Filter Cleaning

- The fuel filter [A] is built into the pump and cannot be cleaned or checked.
- If the fuel filter is suspected of clogging or being damaged, replace ithe fuel pump as a set.



Fuel pump
Fuel pump wiring diagram



1. Fuse
2. Battery
3. ECU
4. Ignition Switch
5. Fuse Box
6. Engine Stop Switch
7. Main relay
8. Relay, fuel pump
9. Fuel pump1

3.8.13 Fuel Injector Service

Fuel Pump Removal/Installation

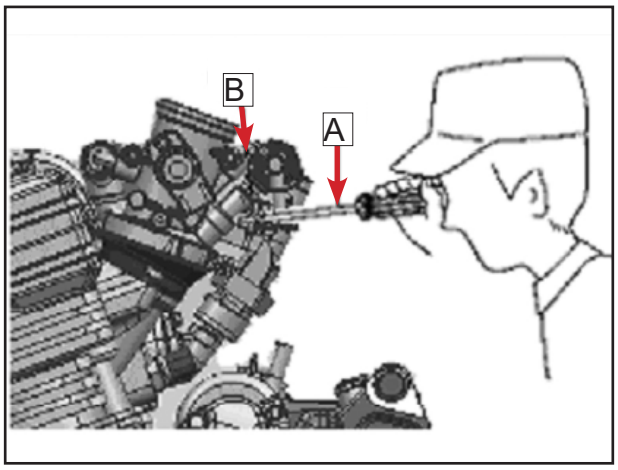
- Refer to the Throttle Body Assy Disassem-bly/Assembly.

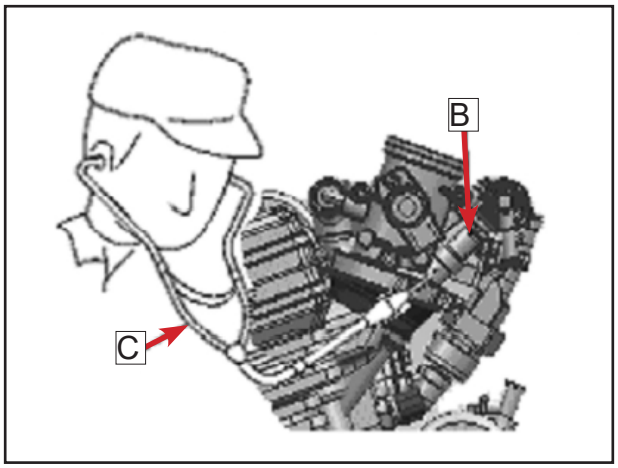
Audible Inspection

- Start the engine.
- Apply the tip of a screwdriver [A] to the in-jector [B]. Put the grip end onto your ear, and listen where the injector is clicking or not.(A sound scope [C] can also be used.
- Do the same for the other injectors

If all the injectors click at a regular intervals, the injectors are good. The trouble may be related to the fuel line, requiring fuel pres-sure inspection.

- The click interval becomes shorter as the engine speed rises.
- If any injector(s) doesn't click, the EFI cir-cuit or the injector is suspect. Perform fuel In-jector Power Source Voltage Inspection", first.

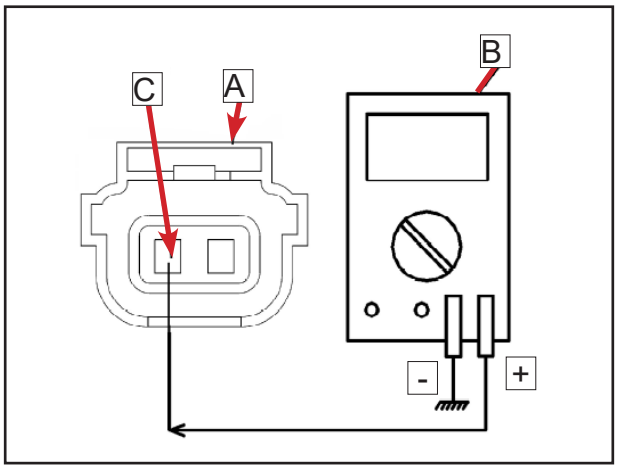




Fuel Injector Power Source Voltage Inspec-tion

- Turn the ignition coil OFF
- Remove the fuel tank.
- Remove the air filter.
- Connect the fuel injector connector [A].
- Connect a hand tester [B] to the fuel injec-tor connector.

Fuel Injector Output Voltage:
Cylinder 1:
Meter (+)→lead [C]
Meter (-) →Battery (-)
Cylinder 2:
Meter (+) → lead [C]
Meter (-) →Battery (-)



Fuel Injector

- Turn the ignition switch ON Fuel fump input voltage is the battery volt-age in first 3 seconds, then 0V.

If the output voltage is normal, perform injector Signal Test

If the meter does not read as specified, check the following :

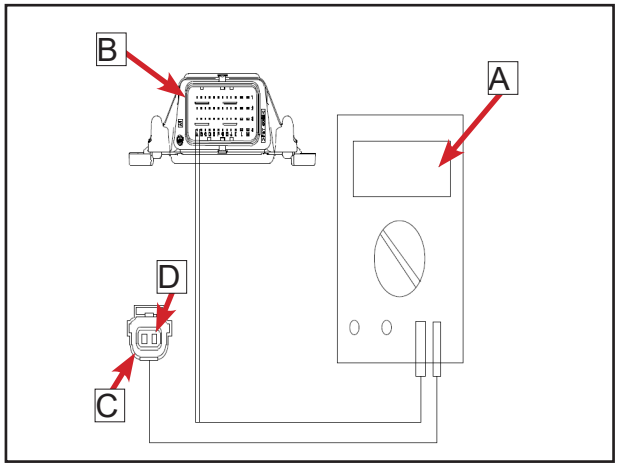
- Main Fuse 20 A fuel pump relay fuse 15A (see Fuse Inspection in the Electrical System chapter)
- Fuel Pump Relay (see Relay Circuit In-spection in the Electrical System chapter)
- Power Source Wiring (see wiring diagram below)

Fuel Injector Wiring Inspection

Connect a hand tester [A] to check the con-tinuity between ECU connector [B] and fuel injector connector [C]. Break-line part is cyl-inder 2.

Cylinder 1:
ECU terminal 48 ----- lead [D]
Standard: continuity
Cylinder 2:
ECU terminal 47-------lead [D]
Standard: continuity

If the wiring is good, inspect the resistance of the injectors (see Injector Resistance Inspection).



Fuel Injector

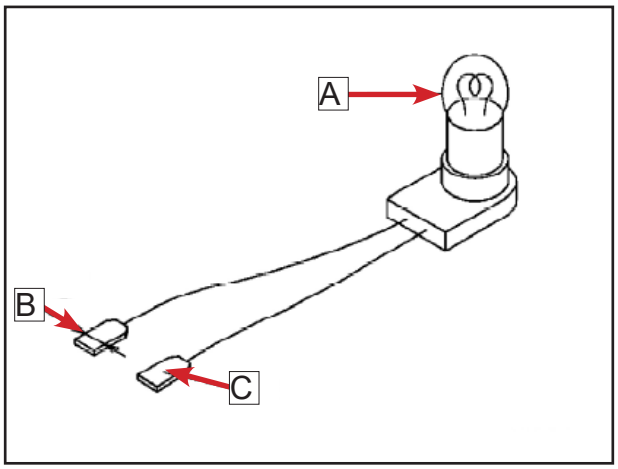
Injector Signal Test

- Prepare two test light sets with male ter-minals as shown.
- Rating of Bulb [A]: 12 V ×3 ~ 3.4 W

Terminal Width [B]: 1.8 mm (0.071in.)

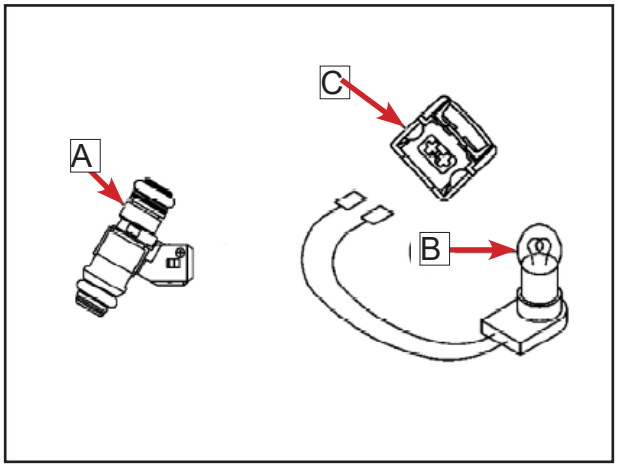
Terminal Thickness [C]: 0.8 mm (0.031in.)

CAUTION
Do not use larger terminals than specified above. A larger terminal could dam-age the injector main harness connector (female), leading to harness repair or replacement. Be sure to connect bulbs in series. The bulb works as a current lim-iter to protect the solenoid in the injector from excessive current.



Test Lights Wiring

- Remove the fuel tank(see Fuel Tank)
- Remove the air filter
- Disconnect the connector of fuel injector [A].
- Connect each test light set [B] to the injector sub harness connector [C].
- Turn the ignition switch ON.
- While cranking the engine with the starter motor, watch the test lights.



If the test lights flicker at regular intervals, the injector circuit in the ECU, and the wiring are good. Perform the “Injector Resistance Inspection”. Injector Signal Test : Prepare two test light sets with male terminals as shown. Rating of Bulb [A]: 12 V ×3 ~ 3.4 W Termi-nal Width [B]: 1.8

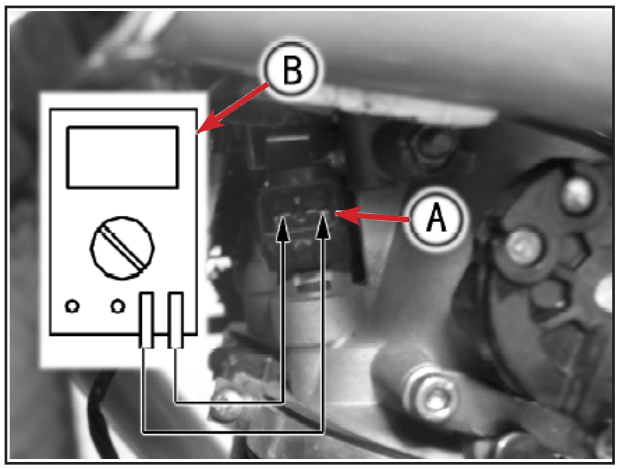
If the test light doesn’t flicker (or the tester needle doesn’t oscillates), check the wiring and connectors.

If the wiring is good, check the injector voltage. If the wiring is good, inspect the ECU for its ground and power supply (see ECU Power Supply Inspection).

Fuel Injector

Fuel Injector Resistance Inspection

- Remove the fuel tank (see Fuel Tank Removal).
- Remove the air filter housing (see Air Fil-ter Housing Removal).
- Disconnect the connector from the con-nector [A].
- Measure the injector resistance with the hand tester [B].



Injector Resistance:

Standard: 12.1 Ω± 1 Ω(20°C)

If the reading is out of the range, perform the “Injector Unit Test”.

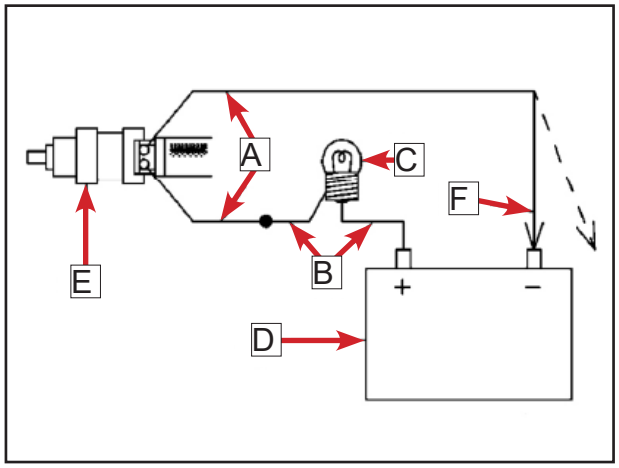
Injector Unit Test

- Use two leads [A] and the same test light set [B] as in “Injector Signal Test”.

Rating of Bulb [C]: 12 V× (3 ~ 3.4) W 12 V Battery [D]

CAUTION
Be sure to connect the bulb in series. The bulb works as a current limiter to protect the solenoid

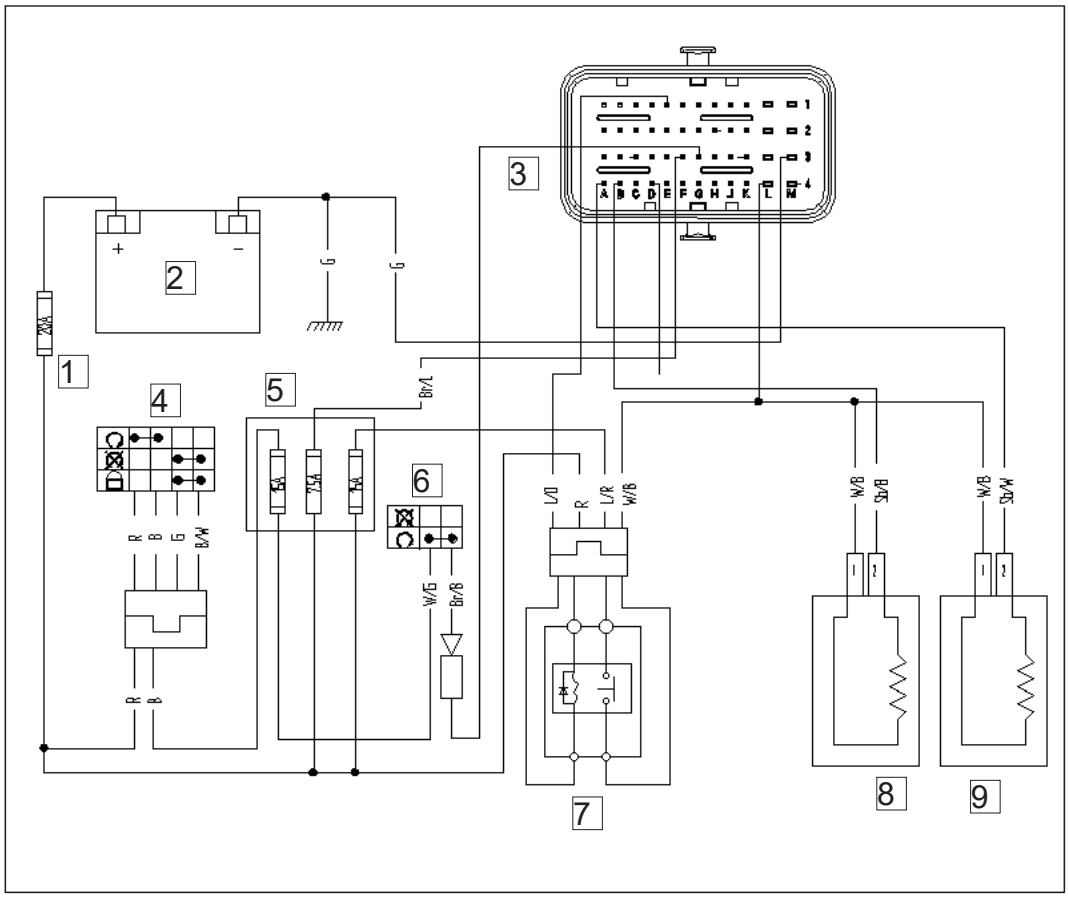
- Connect the test light set to the injector [E] as shown.
- Open and connect [F] the end of the lead to the battery (-) terminal repeatedly. The in-jector should click.



If the injector does not click, replace the injector.

If the injector clicks, check the wiring again. If the wiring is good, replace the injector (may be clogged) or ECU.

Fuel Injector
Fuel InjectorWiring Diagram



1. Fuse
2. Battery
3. ECU
4. Ignition Switch
5. Fuse Box
6. Engine Stop Switch
7. Main relay
8. Fuel Injector 2
9. Fuel Injector 1

3.8.14 Throttle Grip and Cables Service

Throttle Grip Free Play Inspection

- Refer to the Throttle Control System Inspection in the Periodic Maintenance chapter. Throttle Grip Free Play Adjustment
- Refer to the Throttle Control System Inspection in the Periodic Maintenance chapter. Throttle Cable Installation
- Install the throttle cables in accordance with Cable, Wire, and Hose Routing section in the Appendix chapter.
- Install the lower ends of the throttle cables in the cable bracket on the throttle body assy after installing the upper ends of the throttle cables in the grip.
- After installation, adjust each cable properly.

⚠WARNING
Operation with incorrectly routed or improperly ad-justed cables could result in an unsafe riding condition.

Throttle Cable Lubrication

- Refer to the Chassis Parts Lubrication in the Periodic Maintenance chapter.

3.8.15 Throttle Body Assy

Idle Speed Inspection

- Refer to the Idle Speed Inspection in the Periodic Maintenance chapter.

Engine Vacuum Synchronization Inspection/Adjustment

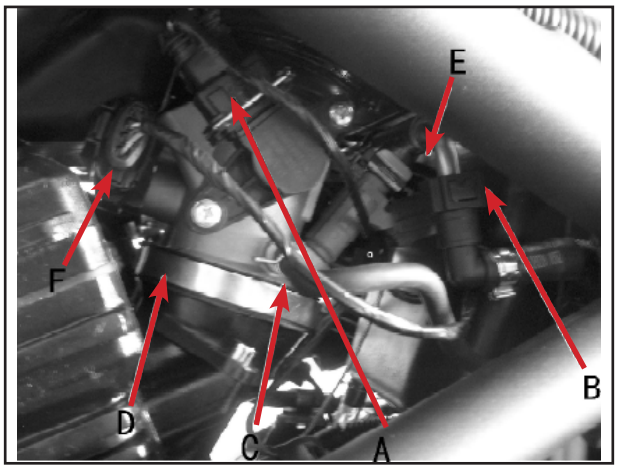
- Refer to the Engine Vacuum Synchronization Inspection in the Periodic Maintenance chapter.

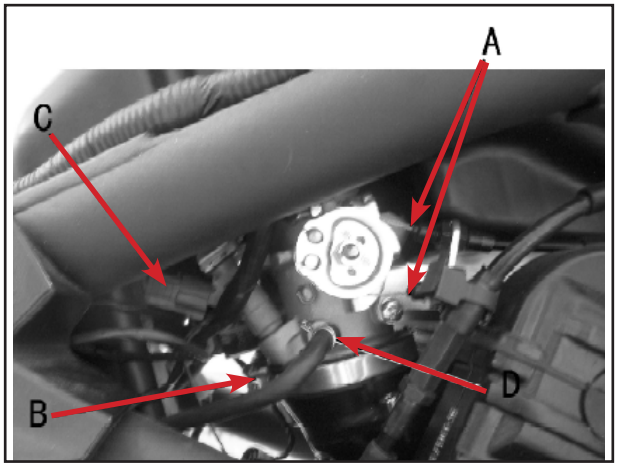
Throttle Body Assy Removal

⚠WARNING

Gasoline is extremely flammable and can be explosive under certain conditions. Turn the ignition switch OFF. Disconnect the battery (-) cable terminal. Do not smoke. Make sure the area is well-venti-lated and free from any source of flame or sparks; this includes any appliance with a pilot light. Be prepared for fuel spillage: any spilled fuel must be com-pletely wiped up immediately.

- Remove fuel tank (see Fuel Tank Removal)
- Air filter housing (see Air Filter Housing Removal)
- Disconnect throttle Body Sensor Connec-tor [A]
- Disconnect fuel Hose Lower End [B]
- Disconnect evaporative emission control hose [C] of cylinder 1
- Loosen Clamp [D] of cylinder 1
- Disconnect Fuel injector connector [E] of cylinder 1
- Disconnect Air intake tempreature and pressure sensor[F].
- Disconnect the throttle cable[A].
- Loosen: Clamp [B]
- Disconnect fuel injector connector [C] of clinder 2
- Disconnect evaporative emission control hose [D] of cylinder 2





Throttle Body Assy

- After removed the throttle body assy, put clean cloth into the throttle body holders.

⚠WARNING
If dirt gets into the engine, it will cause engine excessive wear and damage .

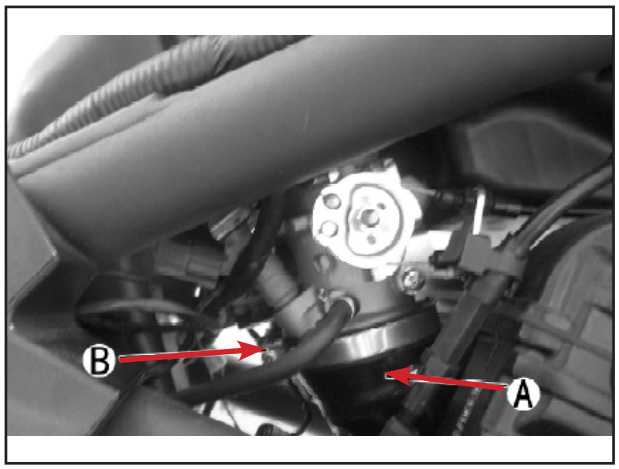
Throttle Body Assy Installation

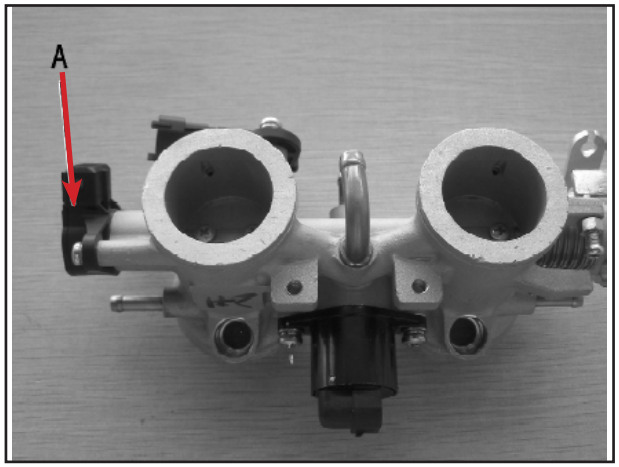
- Install the throttle body on the intake mani-fold [A].
- Install the clamp bolts [B] in the direction shown, facing outwards.
- Install the fuel injector connector, evapora-tive emission control hose, throttle cable, high pressure fuel line joint.

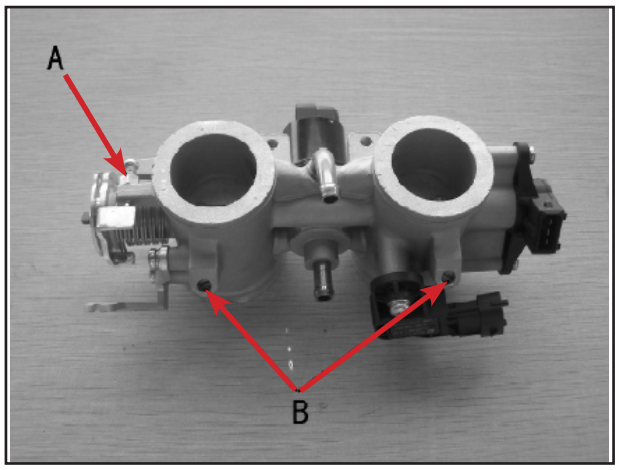
⚠WARNING
Operation with an incorrectly routed cable could result in an unsafe riding condition.

CAUTION
Do not remove, disassemble or adjust the throttle position sensor [A], because it is adjusted or set by the manufacturer. Adjustment of these parts could result in poor performance, or replacement of the throttle body assy.

CAUTION
Do not remove, disassemble or adjust the idle adjusting screw [A], [B], because they are adjusted or set by the manufacturer. Adjustment of these parts could result in poor performance, or replacement of the throttle body assy.







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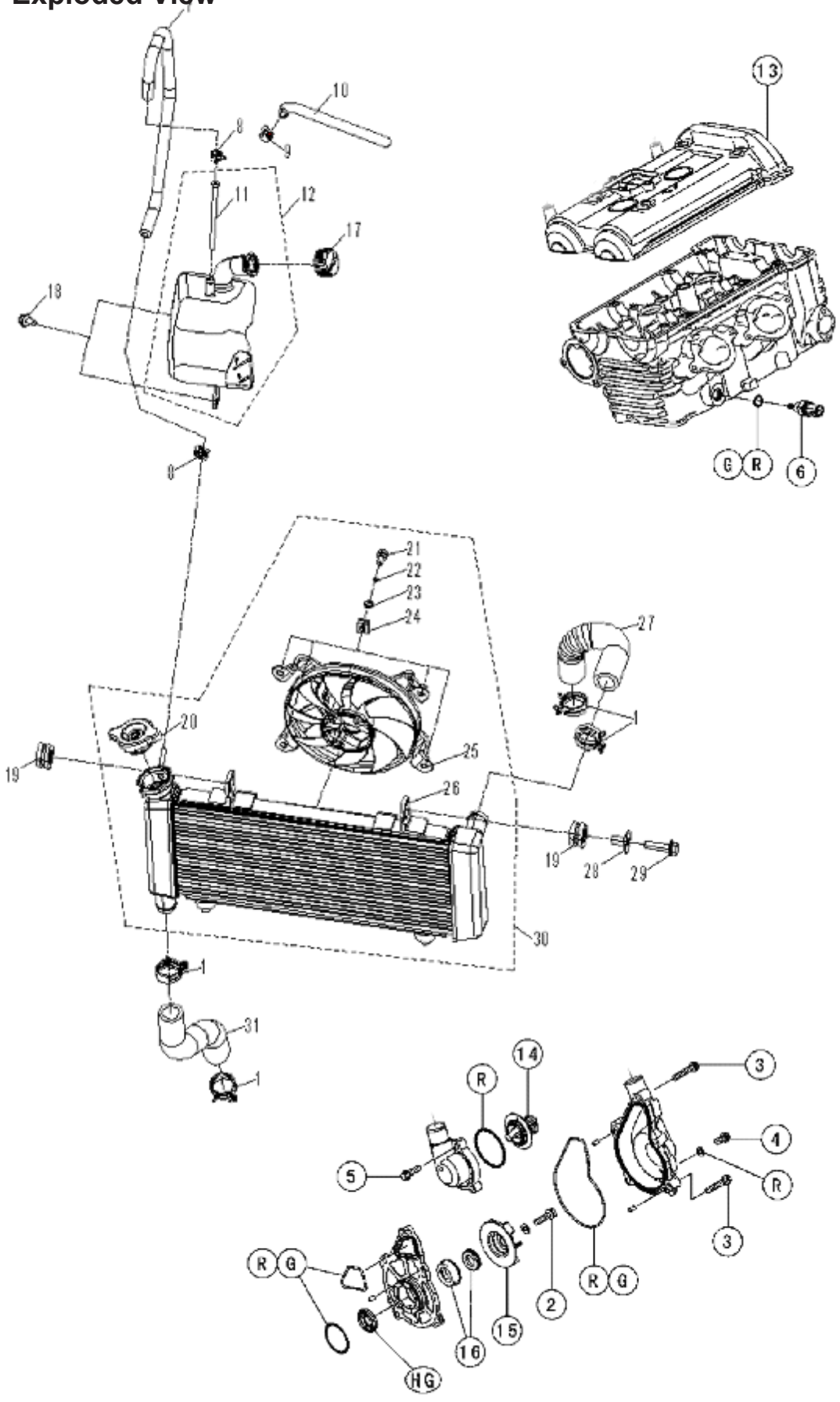
4.1 Exploded View

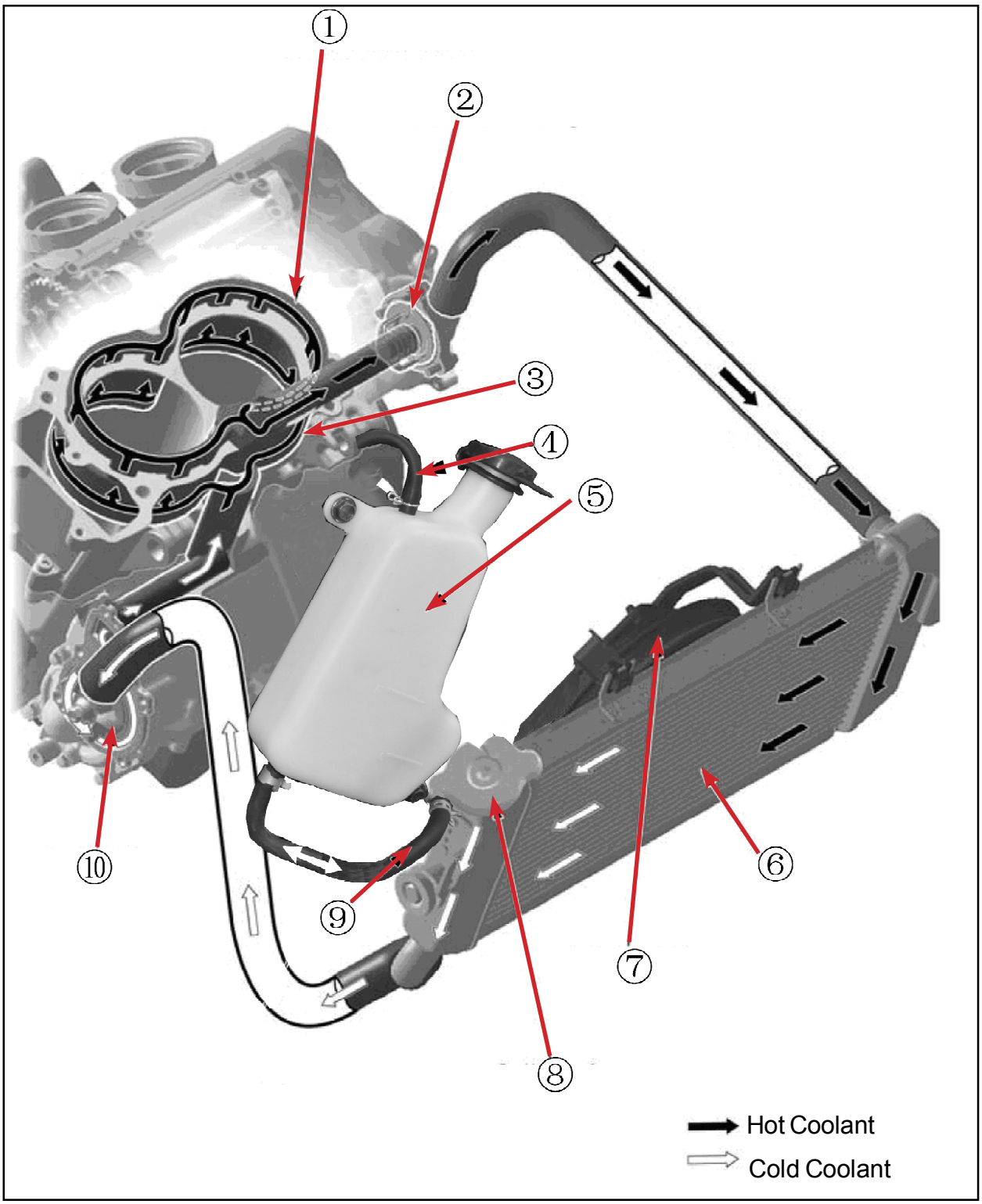


No.	Fastener	Torque			Remark
		N •m	kgf •m	ft •lb	
2	Bolt, water pump impeller	10	1.0	87in •lb	
3	Bolt, water pump cover	10	1.0	87in •lb	
4	Bolt, water pump exhaust	7.0	0.70	62in •lb	
5	Bolt, thermostat housing	10	1.0	87in •lb	
6	Water temp. sensor	12	1.2	106in •lb	
18	Bolt, reservoir tank	5.9	0.60	52in •lb	

1. Clamp B30
7. Water outlet pipe, reservoir tank
8. Clamp B12.5
9. Clamp B7
10. Vacuum pipe, canister
11. Guide pipe, reservoir tank
12. Reservoir tank
13. Cylinder head cover
14. Thermostat
15. Impeller, water pump
16. Seal
17. Cap, reservoir tank
19. Rubber Ⅱ
20. Cap, water filler
21. GB/T5789 bolt M6×12
22. GB/T93 washer 6
23. GB/T96 washer 6
24. Nut M6
25. Fan assy.
26. Radiator assy.
27. Water inlet pipe, radiator
28. Rubber Ⅱ bushing
29. GB/T5789 bolt M8×30
30. Radiator comp.
31. Water outlet pipe, radiator

G:Grease
HG:High temperature grease
L:Locker
R:Replace part

4.2 Coolant Flow Chart



1. Cylinder head sleeve
2. Thermostat
3.Cynlinder sleeve
4. Overflow pipe
5. Reservoir tank
6. Raditor
7. Cooling fan
8. Raditor cap
9. Cooling pipe
10.Water pump

Antifreeze is added into coolant to protect the cooling system from rust and corrosion. When the engine starts, the water pump turns and impels the coolant circulate.

The thermostat is a wax pellet type which opens or closes with coolant temperature changes. The thermostat continuously changes its valve opening to keep the coolant temperature at the proper level. When coolant temperature is below 7 0°C ~ 74°C (158°F~165°F), thermo-stat closes so that the coolant fl ow is restricted and engine will warm up more quickly. When coolant temperature is more than 70°C ~ 74°C, thermostat opens and the coolant flows. When the coolant temperature goes up beyond 83°C ~ 93°C (181°F ~ 199°F), the radiator fan relay conducts to operate the radiator fan. The radiator fan draws air through the radiator core when there is not sufficient air flow such as at low speeds. This increases up the cooling action of the radiator.

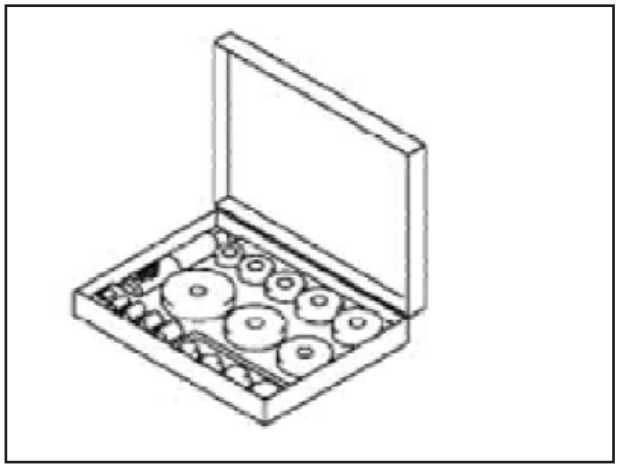
When the temperature is below 81°C (178°F), the fan relay disconnetcts and the radiator fan stops. In this way, this system controls the engine temperature within narrow limits where the engine operates most efficiently even if the engine load varies. The system is pressurized by the radiator cap to suppress boiling and the resultant air bubbles which can cause engine overheating. As the engine warms up, the coolant in the radiator and the water jacket expands. The excess coolant flows through the radiator cap and hose to the reserve tank to be stored there temporarily. Conversely, as the engine cools down, the coolant in the radiator and the water jacket contracts, and the stored coolant flows back to the radiator from the reserve tank. The radiator cap has two valves. One is a pressure valve which holds the pressure in the system when the engine is running. When the pressure exceeds 112.3 kPa~ 141.7 kPa (1.15 kgf/cm² ~ 1.45 kgf/cm², 16.3 psi ~ 20.5 psi), the pressure valve opens and releases the pressure to the reserve tank. As soon as pressure escapes, the valve closes, and keeps the pressure at 112.3 kPa~ 141.7 kPa (1.15kgf/cm² ~ 1.45 kgf/cm², 16.3 psi ~ 20.5 psi). When the engine cools down, another small valve (vacuum valve) in the cap opens. As the coolant cools, the coolant contracts to form a vacuum in the system. The vacuum valve opens and allows the coolant from the reserve tank to enter the radiator.

4.3 Specifications

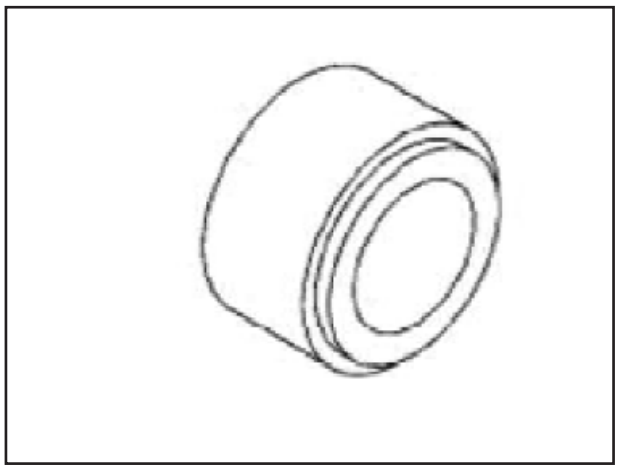
Item	Standard
Coolant	
Model（Recommend）	Permanent type of antifreeze (soft water and ethylene glycol plus corrosion and rust inhibitor chemicals for aluminum engines and radiators)
Color	Green
Mix ratio	Water 50%，Coolant 50%
Freezing point	-35°C(-31°F)
Capacity	1.8L (Reservoir F level，Including radiator and the Engine)
Radiator cap	
Release pressure	112.3kPa~141.7kPa(1.15kgf/cm^2~1.45kgf/cm^2,16.3psi~20.5psi)
Thermostat	
Valve open temp	70°C~74°C (158°F ~ 165°F)
Full open clearance	85°C (185°F), 8mm (0.31in)

4.4 Special tool

Tools kit, bearing installation



Tool, oil seal installation



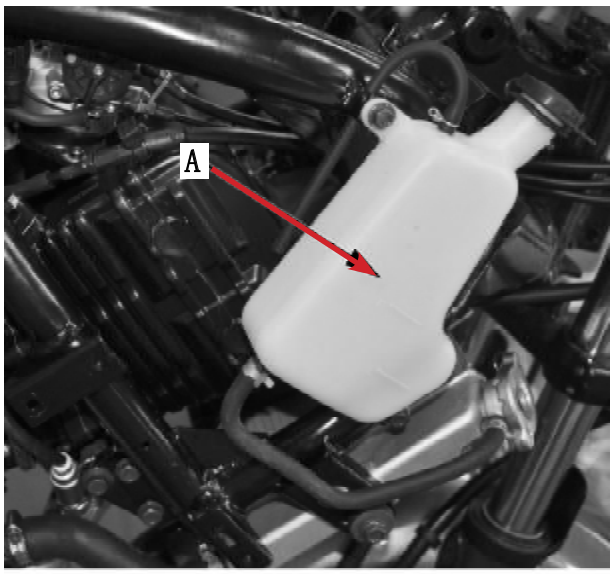
4.5 Coolant

4.5.1 Coolant Deterioration Inspection

- Remove the right center fairing (see Center Fairing Removal in the Frame chapter).
- Visually inspect the coolant [A] in the reserve tank.

If whitish cotton-like wafts are observed, aluminum parts in the cooling system are corroded. If the coolant is brown, iron or steel parts are rusting. In either case, flush the cool-ing system.

If the coolant gives off an abnormal smell, check for a cooling system leak. It may be caused by exhaust gas leaking into the cool-ing system.



4.5.2 Coolant Level Inspection

- Refer to the Coolant Level in the Periodic M aintenance chapter

4.5.3 Coolant Draining

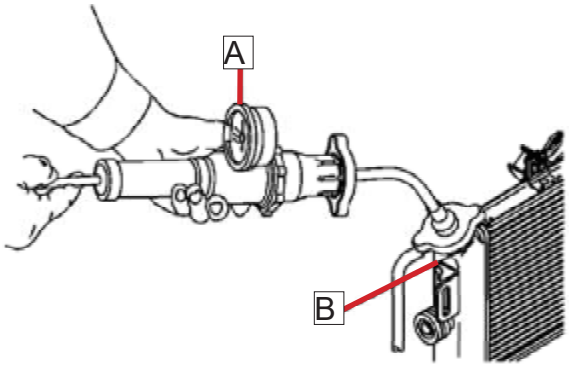
- Refer to the Coolant Change in the Periodic M aintenance chapter.

4.5.4 C oolant Filling

- Refer to the Coolant Change in the Periodic M aintenance chapter.

4.5.5 Pressure Testing

- Remove the reserve tank (see Coolant C hange in the Periodic Maintenance c hapter).
- R emove the radiator cap, and install a cool-ing system pressure tester [A] on the fi ller n eck [B].



NOTE

Wet the cap sealing surfaces with water or coolant to prevent pressure leaks.

- Build up pressure in the system carefully until the pressure reaches 141.7kPa (1.45kgf/cm^2, 0.5psi).

⚠WARNING
Do not beyond design pressure during pressure test procedures. The maximum pressure is:141.7kPa(1.45kgf/cm^2,20.5psi)。

- Watch the gauge for at least 6 seconds.

If the pressure holds steady, the system is allright.
If the pressure drops and no external source is found, check for internal leaks. Droplets in the engine oil indicate internal leakage. Check the cylinder head gasket and the water pump.
Check inside leaking
If the oil appeard for means leaking out. Check cylinder head gasket and waterpump.

- Remove the pres sure tester, replenish the coolant, and install the radiator cap

4.5.6 Cooling System Flushing

Over a period of ti me, the cooling system accumulates rust, scale, and lime in the water jacket and radiator. When this accumulation is suspected or observed, fl ush the cooling system. If this accu mulation is not removed, it will clog up the water passage and consider-able reduce the effici ency of the cooling system. Drain the cooling system (see Coolant Change in the Periodic Main tenance chapter).

- Fill the cooling sys tem with fresh water mixed with a flushing compound.

⚠WARNING
Do not use chemical liquid which can cause aluminum corrosion. **Follow the owner's manual from suppliers.**

- Warm up the eng ine, and run it at normal operating temperature for about ten minutes
- Stop the engine , and drain the cooling system.
- Fill the system with fresh water.
- Warm up the engine and drain the system.
- Repeat the previous two steps once more.
- Fill the system with a permanent type coolant and bleed the air from the system (see Cool-ant Change in the Periodic Maintenance chapter).

4.5.7 Coolant Reserve Tank Removal/Installation

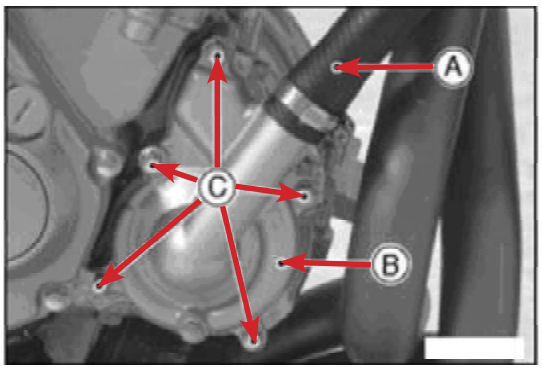
- The coolant reserve tank is removed and installed during coolant change (see Coolant Change in the Periodic Maintenance chapter).

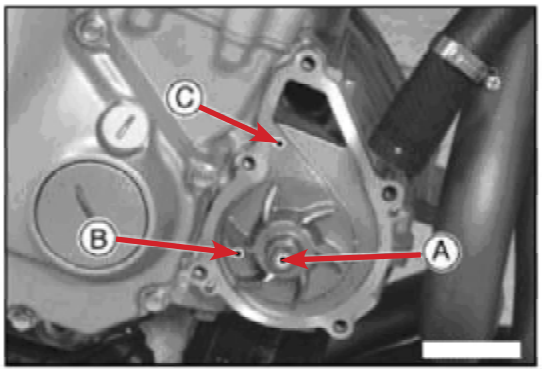
4.6 Water Pump Remova

4.6.1 Water Pump Removal

- Drain the coolant (see Coolant Change in the Periodic Maintenance chapter).
- Loosen the clamp and remove the radia-tor hose [A] from the water pump cover [B].
- Remove the water pump cover bolts [C].
- Shift the transmission into 1st gear
- While applying the rear brake, remove the water pump impeller bolt [A].
- Removal:

Impeller [B]
Water Pump Housing [C]

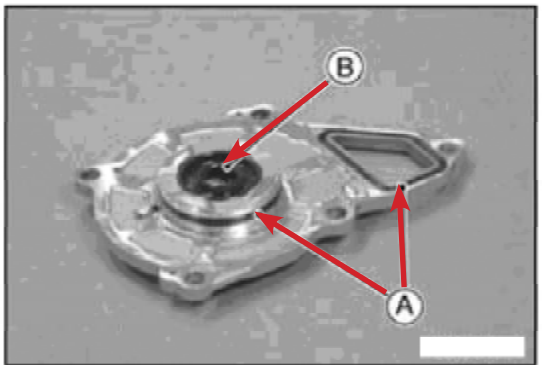


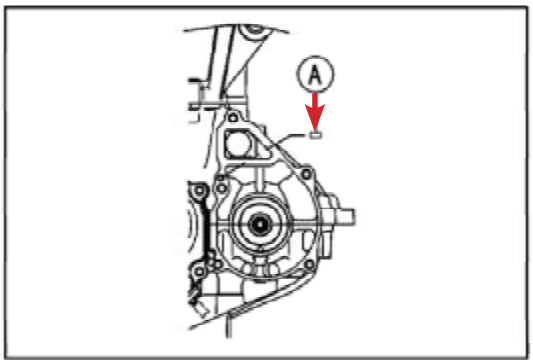


4.6.2 Water Pump Installation

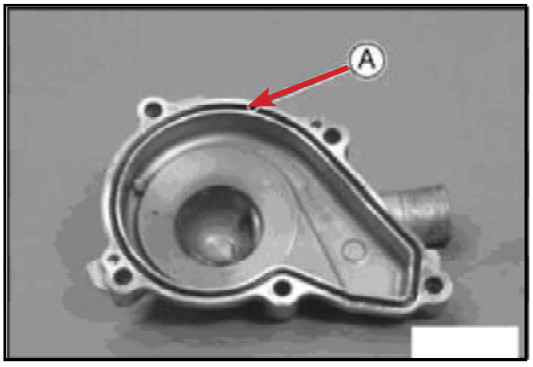
- When installing the water pump impeller bolt,shift the transmission into 1st gear and apply therear brake.
- Replace the O-rings [A] on the water pumphousing with new ones and apply grease them.
- Apply high-temperature grease to the lips of the water pump housing oil seal [B].
- Be sure that the dowel pin [A] is in position
- Install the water pump housing.
- Tighten:

Torque - Water Pump Impeller Bolt:
10N •m(1.0kgf •m,87in •lb)



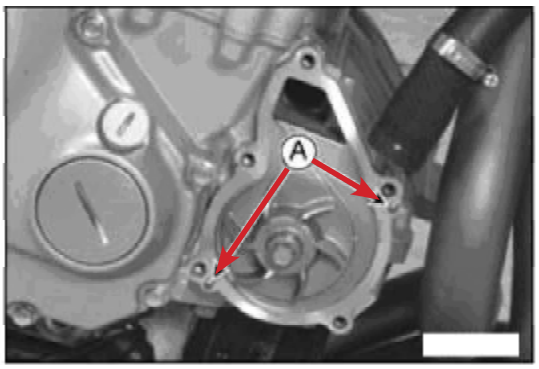


- Replace the O-ring [A] on the water pump cover with a new one and grease it.



- Install the water pump cover, being careful of the two dowel pins [A].

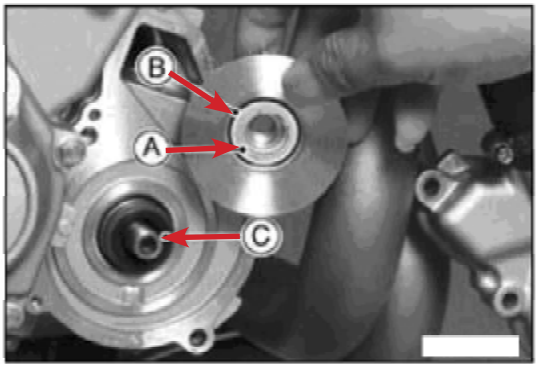
Torque - Water Pump Cover Bolts: 10N •m(1.0kgf •m,87in •lb)



4.6.3 Mechanical Seal Inspection

- Visually inspect the mechanical seal.

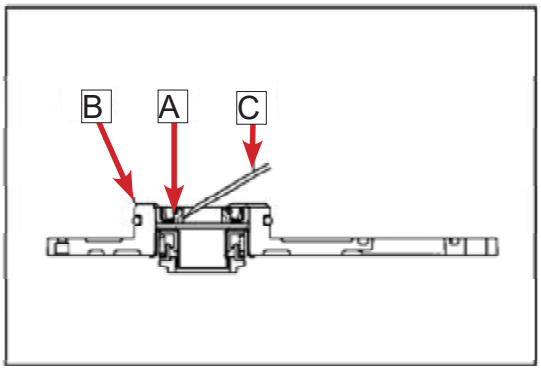
If any one of the parts is damaged, replace the mechanical seal as a unit.
The sealing seat and rubber seal may be removed easily by hand.
Impeller Sealing Seat Surface [A]
Rubber Seal [B]
Mechanical Seal Diaphragm [C]



4.6.4 Water Pump Housing Disassembly

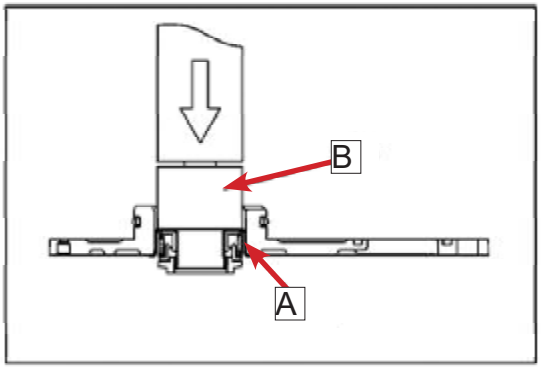
Note
Do not damaged the sealant surface.

- Take the oil seal [A] out of the housing [B] with a hook [C].



- Press the mechanical seal [A] out of the housing with a bearing driver [B].

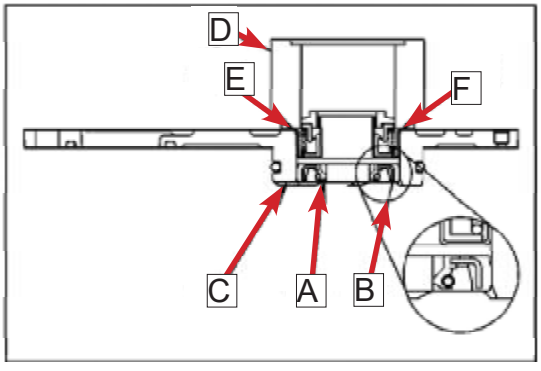
Special Tool - Bearing Driver Set



4.6.5 Water Pump Housing Assembly

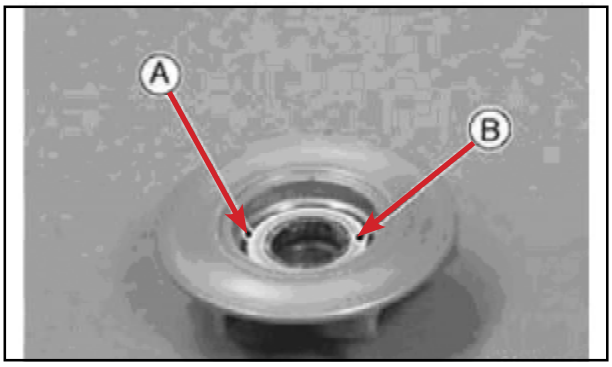
- Apply high-temperature grease [A] to the newoil seal [B].
- Press the oil seal into the housing with a bearing driver so that the seal surface isfl ush [C] withtheend of the hole.
- Press the newmechanical seal into the housing with the oil seal driver [D] until its fl ange [E] touches the surface [F] of the housing.

Special Tool - Oil Seal Driver



4.6.6 Impeller Assembly

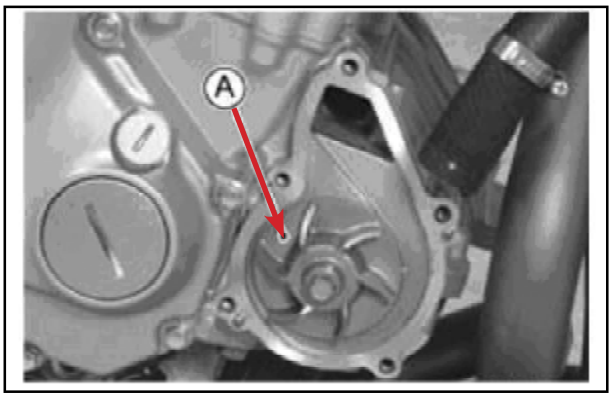
- Clean the sliding surface of the mechani-cal seal with a high-fl ash point solvent, and apply a little coolant to the sliding surface to give the mechanical seal initial lubrication.
- Apply coolant to the surfaces of the rub-ber seal [A] and sealing seat [B], and in-stall the rubber seal and sealing seat into the impeller by pressing them by hand until the seat stops at the bottom of the hole.



4.6.7 Pump Impeller Inspection

- Visually check the impeller [A].

If the surface is corroded, or if the blades are damaged,replace the impeller (see Water Pump Removal).



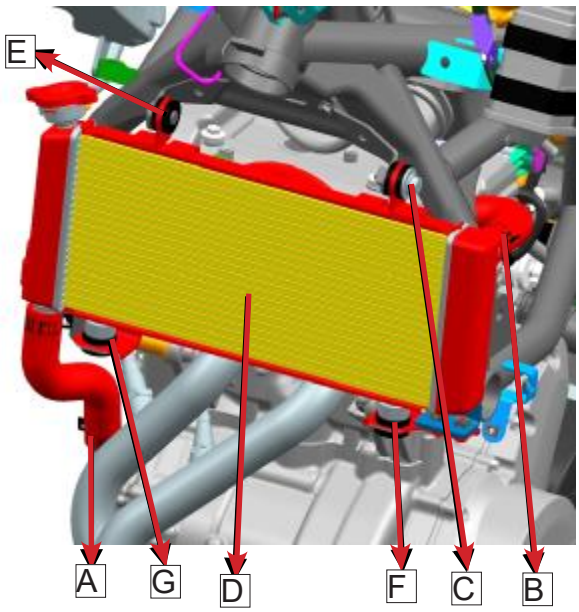
4.7 Radiator

4.7.1 Radiator and Radiator Fan Removal

- Drain the coolant (see Coolant Change in the Periodic Maintenance chapter).
- Removal:

Center Fairings (see Center Fairing in the Frame chapter)
Reserve Tank (see Coolant Change in the Periodic Maintenance chapter)
Radiator Fan Motor Connector [A] (Disconnect)
Radiator Hose Clamp Screw [B] (Loosen)

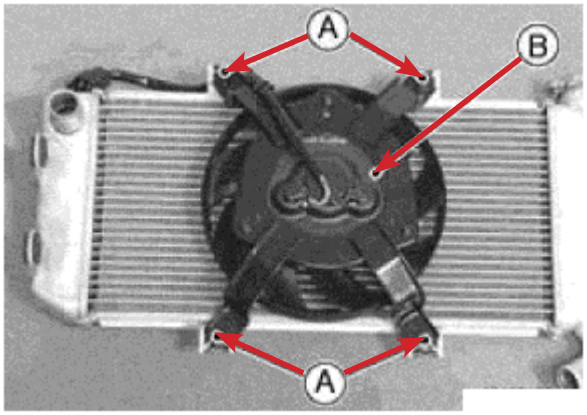
- Loosen: Radiator Hose Clamp Screw [A]
- Remove: Radiator Bolt [B]
- Pull [A] the radiator [B] toward the left, not-ing the baffl e plate [C] on the cylinder head cover.



⚠WARNING

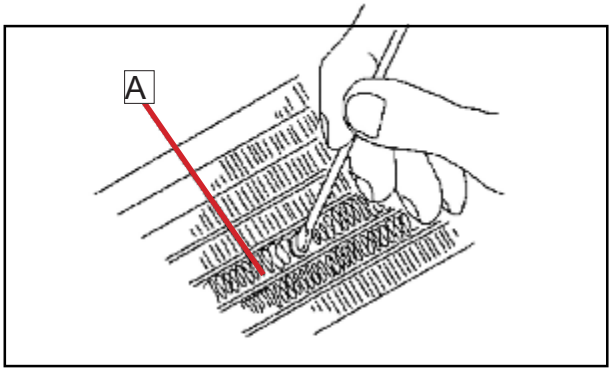
Do not touch the cooling fin. It will cause the fin damaged and finally cause the cooling bad.

- If necessary, remove: Radiator Fan Mounting Bolts [A] Radiator Fan [B]



4.7.2 Radiator and Radiator Fan Installation

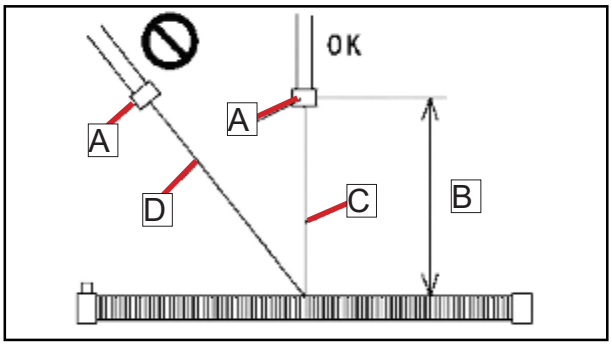
- Install the grommets [A] so that its large side faces the front.
- Install the radiator [B] to the frame.
- Align [C] the projection on the frame with the hole on the radiator.
- Tighten the radiator bolt [D].
- Note the baffl e plate on the cylinder head cover when installing the radiator.
- Position the radiator hose clamp screws [E] as shown.



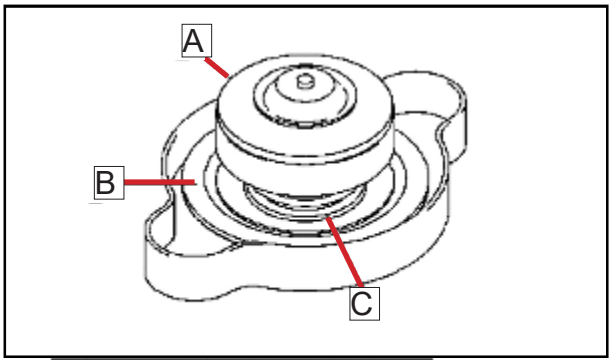
4.7.3 Radiator Inspection

- Check the radiator core.
- If there are obstructions to air flow,remove them
- If the corrugated fins[A]are deformed,care-fully straighten them

If the air passages of the radiator core are blocked more than 20% by unremovable ob-structions or irreparably deformed fins,re-place the radiator with a new one.



CAUTION
When cleaning the radiator with steam cleaner, be careful of the following to prevent radiator damage: Keep the steam gun [A] away more than 0.5m (1.6 ft) [B] from the radiator core. Hold the steam gun perpendicular [C] (not oblique [D]) to the core surface. Run the steam gun, following the corefn direction.



4.7.4 Radiator Cap Inspection

- Removal:

Reserve Tank (see Coolant Change in the Periodic Maintenance chapter)
Radiator Cap

- Check the condition of the bottom [A] and top [B] valve seals and valve spring [C].

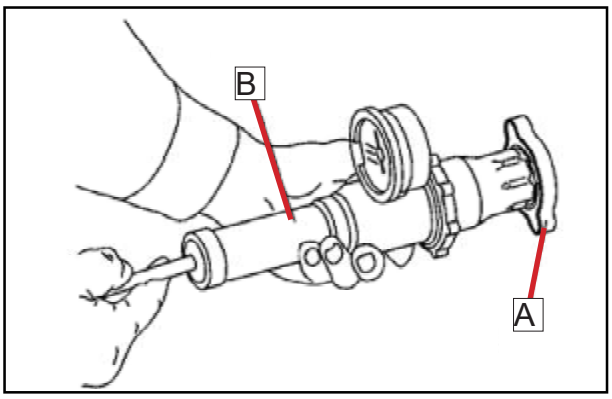
If any one of them shows visible damage, replace

Install the cap [A] on a cooling system pres-sure tester [B].

NOTE

Wet the cap sealing surfaces with water or coolant to prevent pressure leaks.

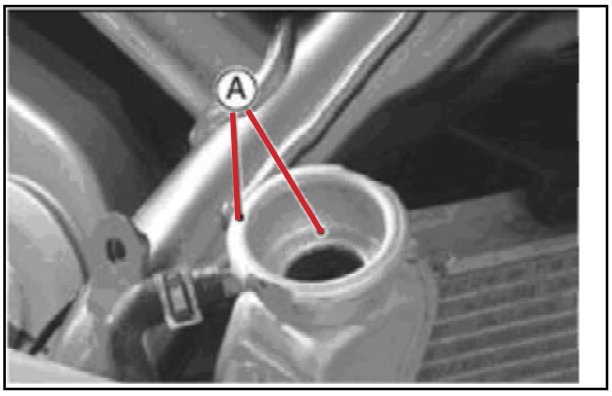
- Watching the pressure gauge, pump the pressure tester to build up the pressure until the relief valve opens: the gauge needle fl icks downward. Stop pumping and measure leak time at once. The relief valve must open within the specifi ed range in the table below and the gauge hand must remain within the same range at least 6 seconds.



Radiator Cap Relief Pressure

Standard:112.3kPa~141.7kPa(1.15kgf/cm^2~1.45kgf/cm^2,16.3psi~20.5psi)

If the cap can not hold the specifi ed pres-sure or if it holds too much pressure, replace it with a new one.



4.7.5 Radiator Filler Neck Inspection

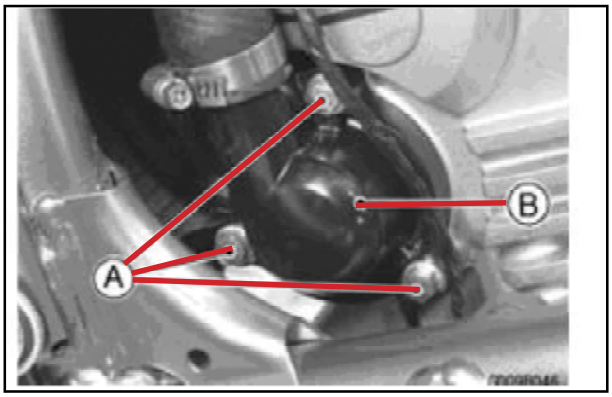
- Remove the reserve tank (see Coolant Change in the Periodic Maintenance chapter).
- Remove the radiator cap.
- Check the radiator fi ller neck for signs of damage.
- Check the condition of the top and bottom sealing seats [A] in the filler neck. They must be smooth and clean for the radiator cap to function properly.

4.8 Thermostat

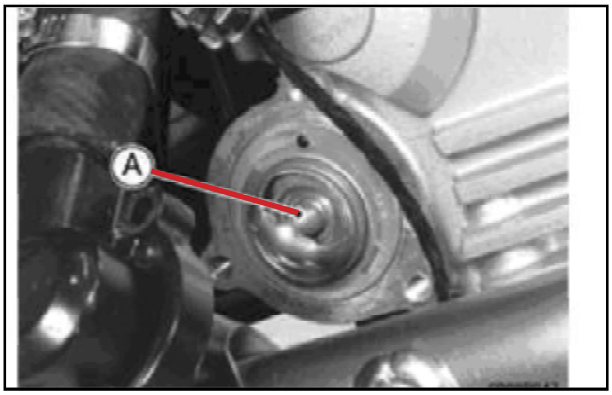
4.8.1 Thermostat Removal

- **Drain the coolant (see Coolant Change in the Periodic Maintenance chapter).**
- **Remove:**

Left Center Fairing (see Center Fairing Removal in the Frame chapter)
Thermostat Hosing Bolts [A]
Thermostat Hosing [B]

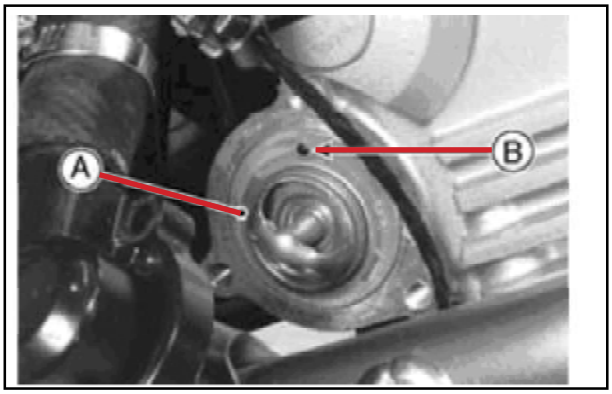


Pull the thermostat [A] out of the cylinder head.



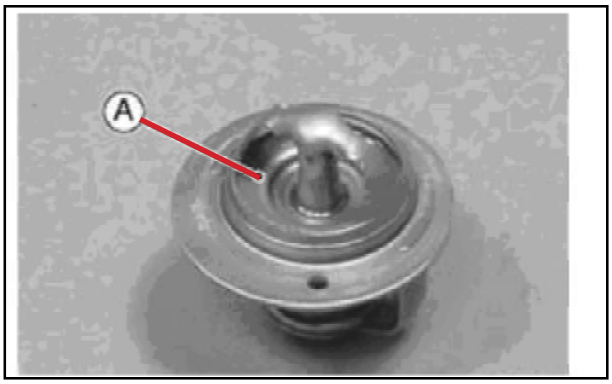
4.8.2 Thermostat Installation

- Install the thermostat [A] in the cylinder head so that the air bleeder hole [B] is on top.
- Install a new O-ring into the housing and apply grease it.
- Tighten:
- **Torque - Thermostat Hosing Bolts: 10N •m(1.0kgf •m,87in •lb)**
- Fill the radiator with coolant (see Coolant Change in the Periodic Maintenance chapter).



4.8.3 Thermostat Inspection

- Remove the thermostat, and inspect the thermostat valve [A] at room temperature. If the valve is open, replace the thermostat with a new one

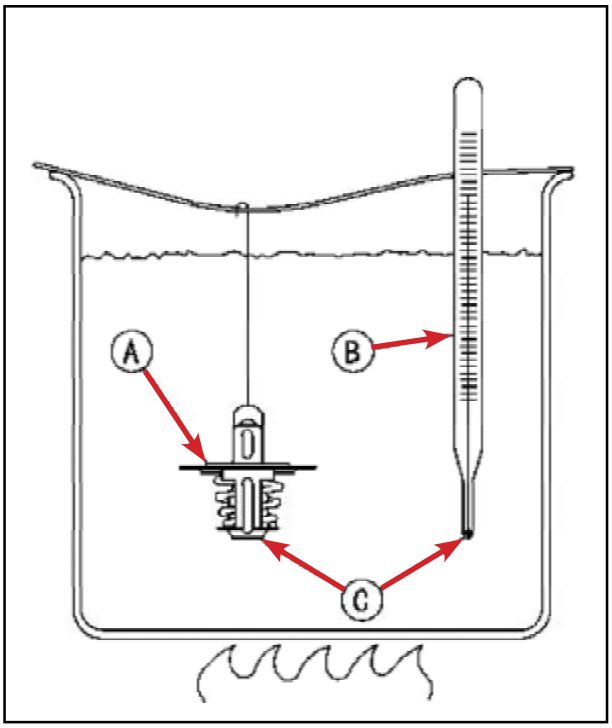


- To check valve opening temperature, sus pend the thermostat [A] in a container of water and raise the temperature of the water.

The thermostat must be completely submerged and must not touch the container sides or bottom. Suspend an accurate thermometer [B] in the water so that the heat sensitive portions [C] are located in almost the same depth. It must not touch the container, either.

If the measurement is out of the specifi ed range, replace the thermostat with a new one.

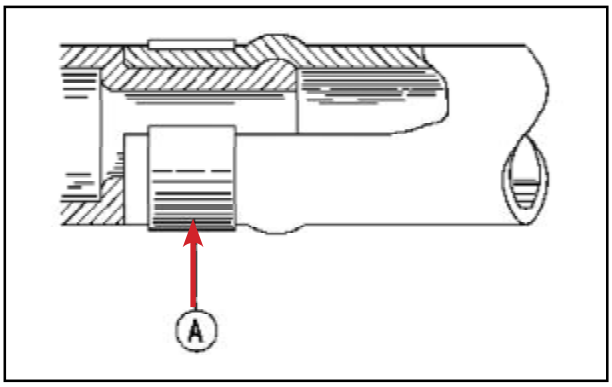
Thermostat Valve Opening Temperature
70°C~74°C(158°F~165°F)



4.9 Hose and Pipes

4.9.1 Hose Installation

- Install the hoses and pipes, being careful to follow bending direction. Avoid sharp bending, kinking, flattening or twisting.
- Run the hoses (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- nstall the clamp [A] as near as possible to the hose end to clear the raised rib of the fiting. This will prevent the hoses from working loose.



The clamp screws should be positioned correctly to prevent the clamps from contacting the other parts.

Torque - Radiator Hose Clamp Screws: 2.5N •m(0.25kgf •m,17in •lb)

4.9.2 Hose Inspection

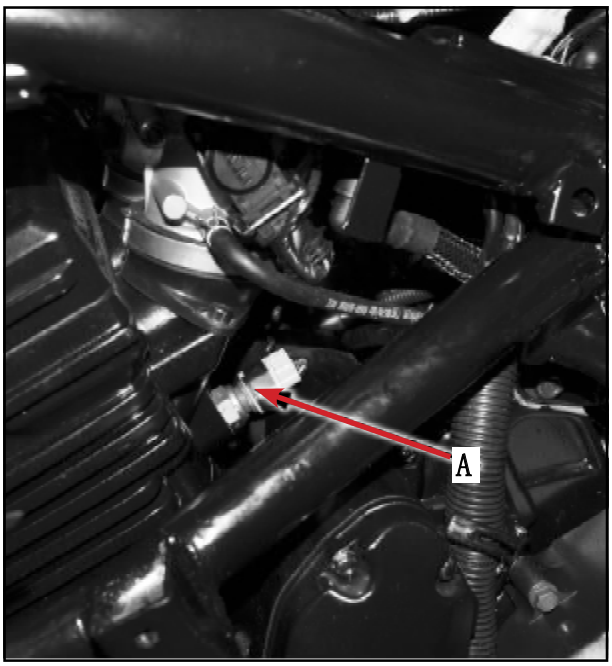
Refer to the Radiator Hose Damage and Installation Condition Inspection in the Peri-odic Maintenance chapter.

4.10 Coolant Temperature Sensor

CAUTION
The coolant temperature sensor should never be allowed to fall on a hard surface. Such a shock to the water temperature sensor can damage coolant temperature sensor .

4.10.1 Coolant Temperature Sensor Removal/Installation

- Refer to the Water Temperature Sensor Removal/Installation in the Fuel System (EFI) chapter. Coolant Temperature Sensor [A]



4.10.2 Coolant Temperature Sensor Inspection

- Refer to the Water Temperature Sensor In-spection in the Electrical System chapter.

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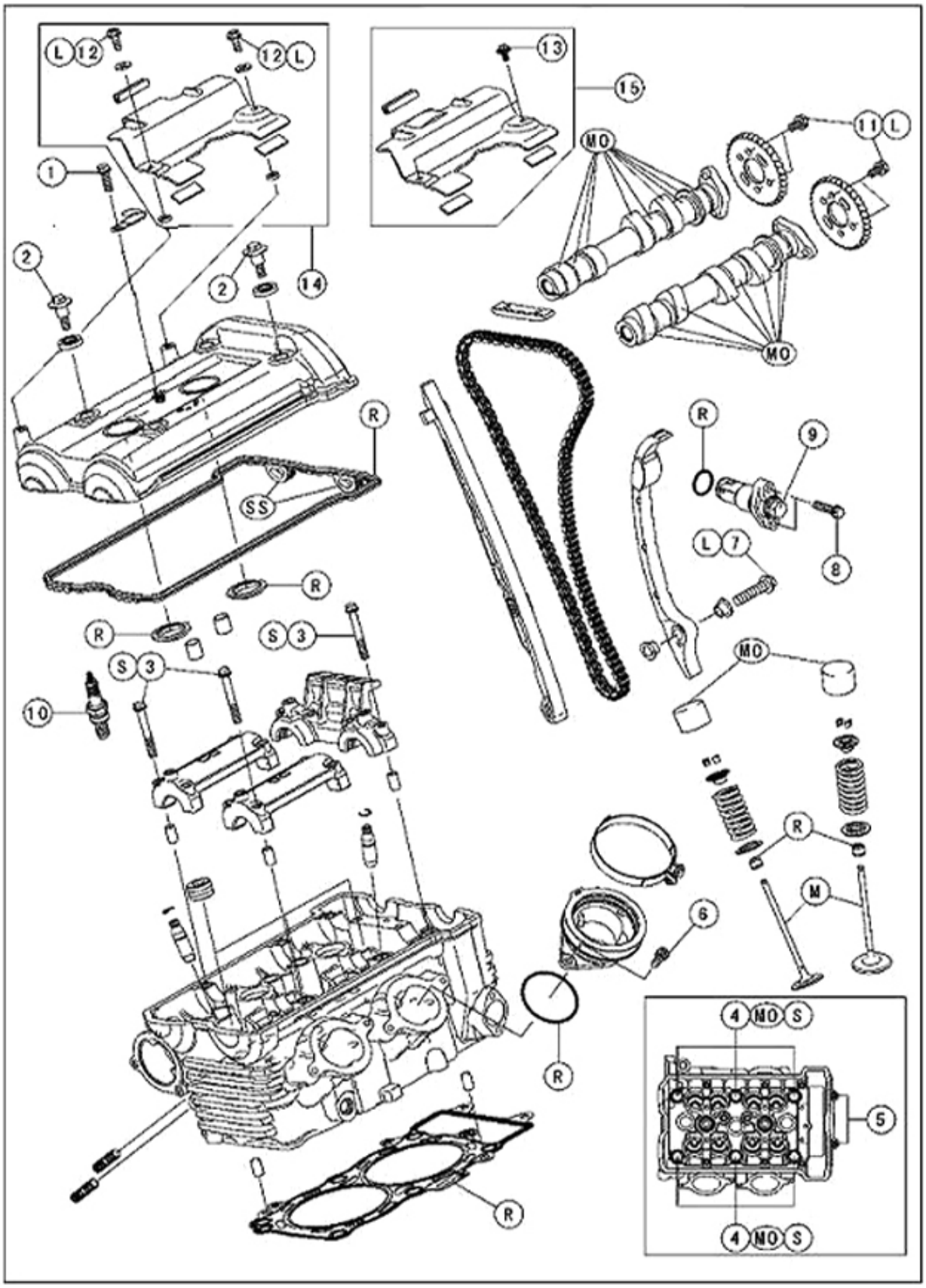
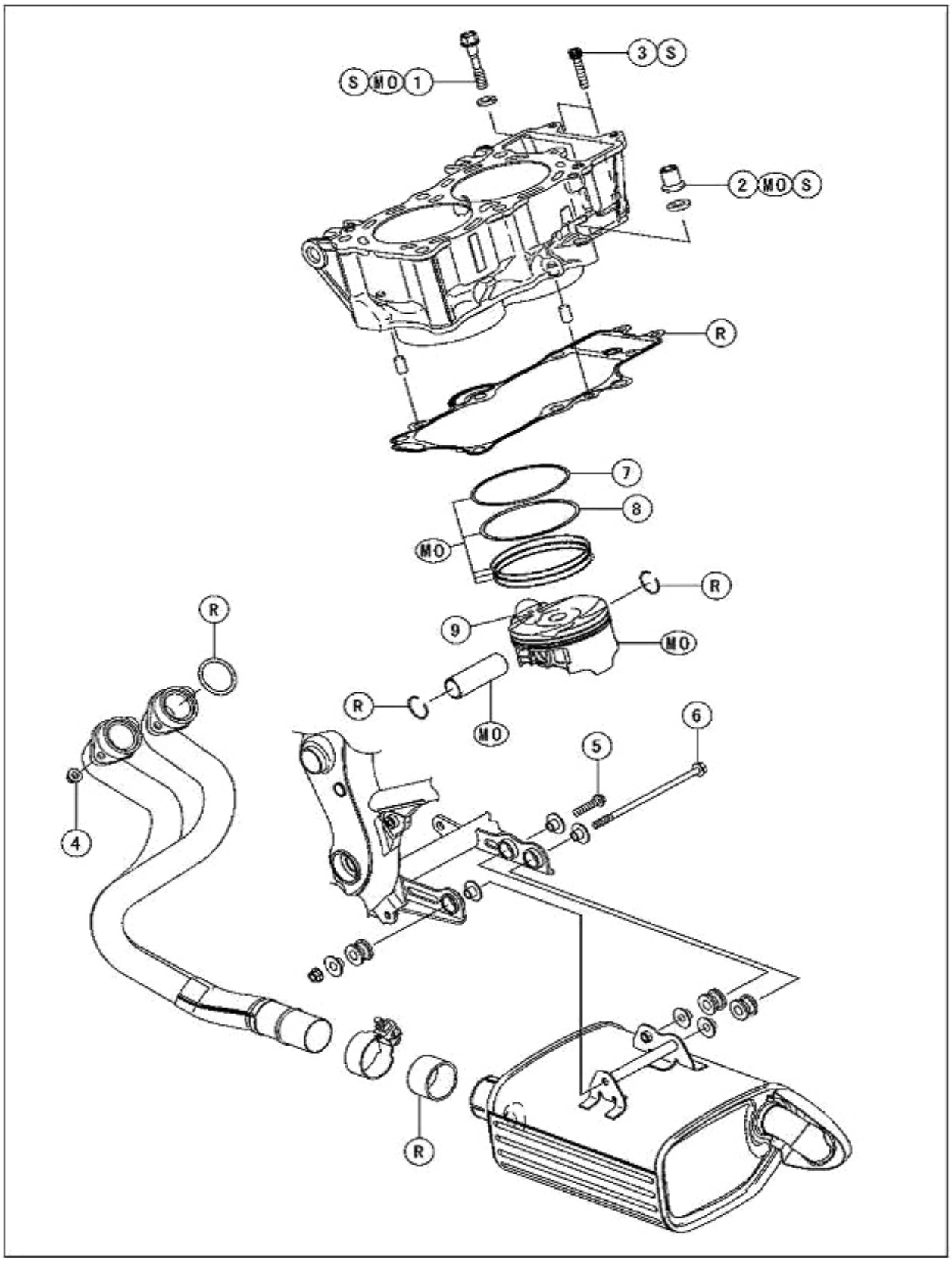
5.1 Exploded View



NO	Fastener	Torque			Remark
		N•m	kgf•m	ft•lb	
1	Bolt, clamp	10	1.0	87in•lb	
2	Bolt, cylinder head cover	10	1.0	87in•lb	
3	Bolt, camshaft cover	12	1.2	106in•lb	S
4	Bolt, cylinder head (M10 new bolt)	54	55	40	MO,S
	Bolt, cylinder head (M10 old bolt)	49	50	36	MO,S
5	Bolt, cylinder head (M6)	12	1.2	106in•lb	S
6	Bolt, air inlet pipe	12	1.2	106in•lb	
7	Bolt, tension plate	20	2.0	15	L
8	Bolt, tensioner	10	1.0	87in•lb	
9	Plug, tensioner	28	2.9	21	
10	Bolt, spring seat	20	2.0	15	
11	Spark plug	15	1.5	11	
12	Bolt, camshaft sprocket	15	1.5	11	L
13	Bolt, top plate	6	0.60	52in•lb	L
14	Bolt, top plate	6	0.60	52in•lb	

L: Apply a non-permanent locking agent.
M: Apply molybdenum disulfi de grease.
MO: Apply molybdenum disulfide oil solution.(mixture of the engine oil and molybdenum disulfide grease in a weight ratio of 10 : 1)
R: Replacement Parts
S: Follow the specifi ed tightening sequence.
SS:Apply silicone sealant.

Exploded View



No.	Fastener	Torque			Remark
		N•m	kgf•m	ft•lb	
1	Bolt, cylinder body (M8)	27.5	2.8	20	MO,S
2	Nut, cylinder body (M10)	49	5.0	36	MO,S
3	Bolt, cylinder head (M6)	12	1.2	106in•lb	S
4	Fixed nut, exhaust pipe	17	1.7	12	
5	Mount bolt, muffler(front)	20	2.0	15	
6	Mount bolt, muffler(rear)	20	2.0	15	

7: “A”marked side faces up.
8: “A”marked side faces up
9: Hollow mark faces forward.
MO: Apply molybdenum disulfi de oil solution.
(mixture of the engine oil and molybdenum disulfi de grease in a weight ratio of 10 : 1)
R: Replacement Parts
S: Follow the specifi ed tightening sequence.

5.2 Specifications

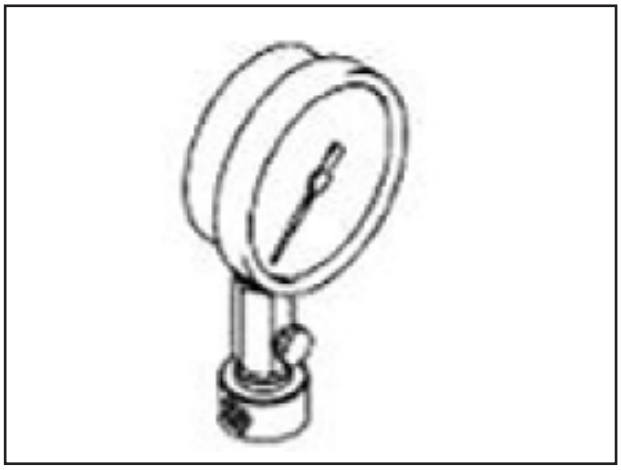
Item	Standard	Service limit
Camshaft		
Cam height		
Exhaust	35.843mm~35.957mm (1.4111in~1.4156in.)	35.74mm(1.4071in.)
Intake	36.543mm~36.657mm (1.4387in~1.4432in.)	36.44mm(1.4346in.)
Camshaft journal and camshaft cover	0.028mm~0.071mm (0.0011in~0.0028in.)	0.16mm(0.0063in.)
Camshaft diameter	23.950mm~23.972mm (0.9429in~0.9438in.)	23.92mm(0.942in.)
Camshaft cover hole diameter	24.000mm~24.021mm (0.9449in~0.9457in.)	24.08mm(0.948in.)
Camshaft wearing	0.02mm(0.0008in.)	0.1mm(0.004in.)
Cylinder head		
Cylinder compression pressure	961kPa ~ 1471kPa(9.8kgf/cm^2~15.0kgf/cm^2)at400r/min(rpm)	– – –
Cylinder head flatness	– – –	0.05mm(0.002in.)
Valve		
Valve clearance:		
Exhaust	0.20mm~0.26mm (0.0078in~0.0102in.)	– – –
Intake	0.08mm~0.13mm (0.0031in~0.0051in.)	– – –
Valve rod straightness	0.01mm(0.0004in.)	0.05mm(0.002in.)
Valve rod diameter:		
Exhaust	4.455mm~4.470mm (0.1754in~0.1760in.)	4.44mm(0.175in.)
Intake	4.475mm~4.490mm (0.1762in~0.1768in.)	4.46mm(0.176in.)
Valve conducting pipe inner diameter:		
Exhaust	4.500mm~4.512mm (0.1772in~0.1776in.)	4.58mm(0.180in.)
Intake	4.500mm~4.512mm (0.1772in~0.1776in.)	4.58mm(0.180in.)
Valve/valve conducting pipe		
Exhaust	0.07mm~0.14mm (0.0028in~0.0055in.)	0.27mm(0.0106in.)
Intake	0.02mm~0.08mm (0.0008in~0.0032in.)	0.22mm(0.0087in.)
Valve seat sealant		
Width :		
Exhaust	0.5mm~1.0mm (0.020in~0.039in.)	– – –
Intake	0.5mm~1.0mm (0.020in~0.039in.)	– – –
Out diameter :		
Exhaust	26.6mm~26.7mm(1.087in~1.094in.)	– – –
Intake	31.2mm~31.3mm(1.283in~1.291in.)	– – –

Specifications

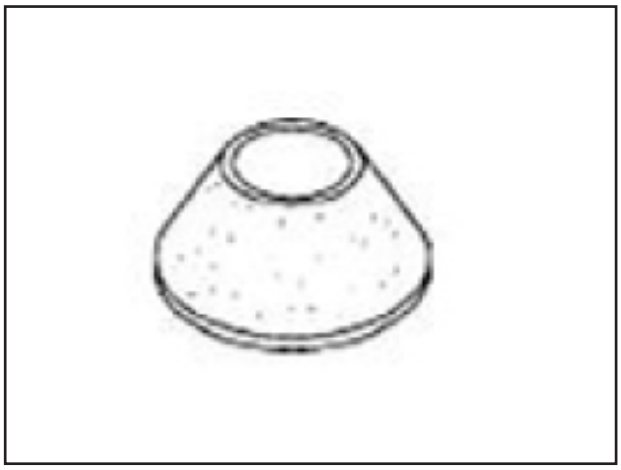
Item	Standard	Service limit
Valve spring free length		
Exhaust	41.6mm (1.638in.)	40mm (1.575in.)
Intake	41.6mm (1.638in.)	40mm (1.575in.)
Cylinder,Piston		
Cylinder inner diameter	82.98mm~83.00mm (3.2669in~3.2677in.)	83.10mm (3.2716in.)
Piston skirt diameter	82.975mm~82.995mm (3.2667in~3.2675in.)	82.82mm (3.2606in.)
Piston and cylinder clearance	0.002mm~0.030mm (0.0004in-0.0015in.)	– – –
Piston ring /groove clearance:		
1st air ring	0.04mm~0.075mm (0.00157in~0.00295in.)	0.17mm (0.0067in.)
2nd air ring	0.02mm~0.06mm (0.0008in~0.0024in.)	0.16mm (0.0063in.)
Piston groove width:		
1st air ring	0.92mm~0.94mm (0.0362in~0.0370in.)	1.02mm (0.040in.)
2nd air ring	1.01mm~1.03mm (0.0398in~0.0406in.)	1.11mm (0.044in.)
Piston ring thickness:		
1st air ring	0.865mm~0.88mm (0.0341in~0.03465in.)	0.80mm (0.031in.)
2nd air ring	0.97mm~0.99mm (0.0382in~0.0390in.)	0.90mm (0.035in.)
Piston ring close clearance:		
1st air ring	0.15mm~0.30mm (0.0059in~0.0118in.)	0.7mm (0.028in.)
2nd air ring	0.30mm~0.45mm (0.0118in~0.0177in.)	0.8mm (0.031in.)

5.3 Special tools and sealing glue

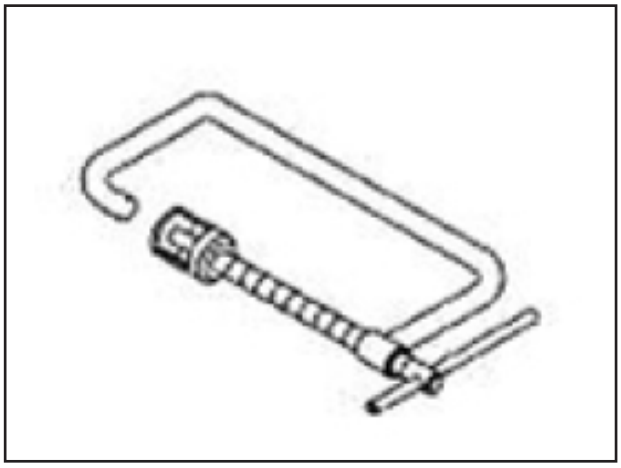
Pressure gauge 20Kgf/cm^2



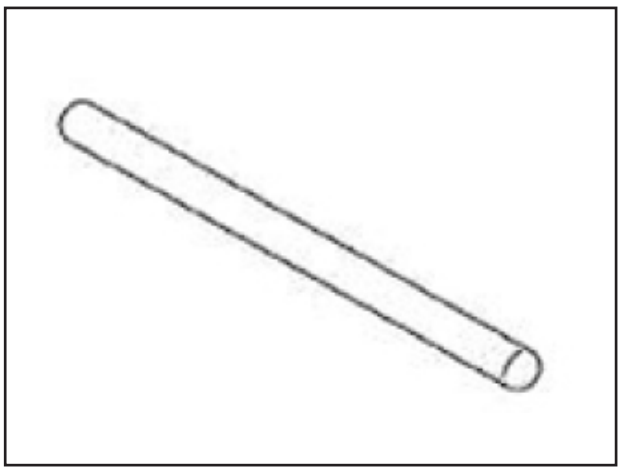
Valve seat knife tool 60°--φ30



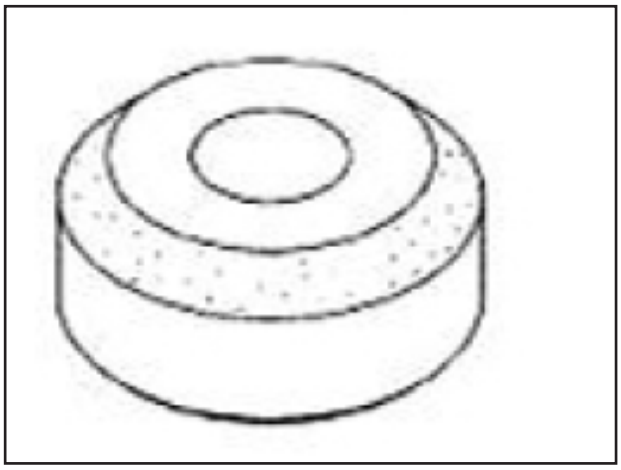
Valve spring fixture tool



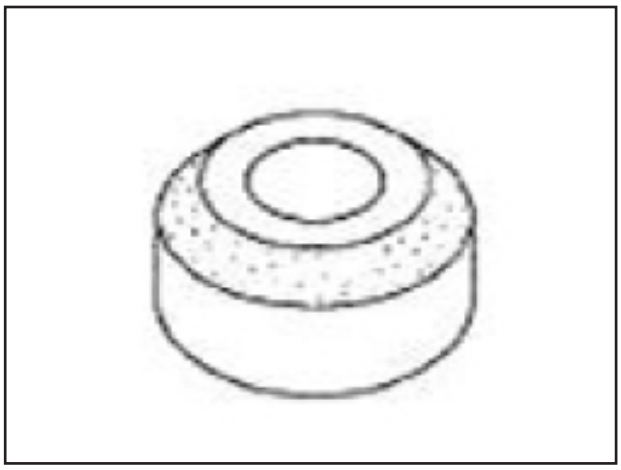
Valve seat knife locking axle



Valve seat knife tool 45°--φ35

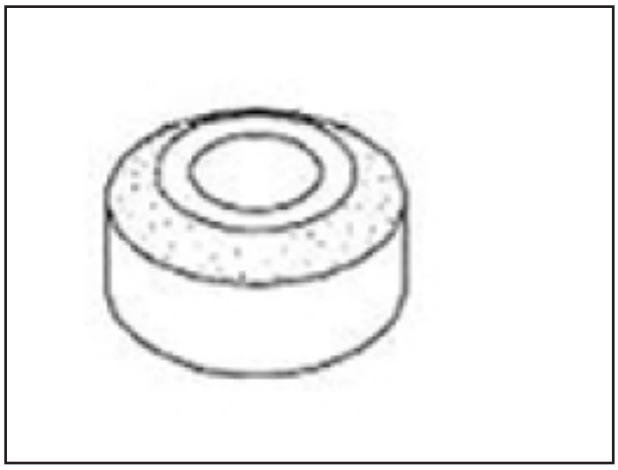


Valve seat knife tool 45°--φ30°

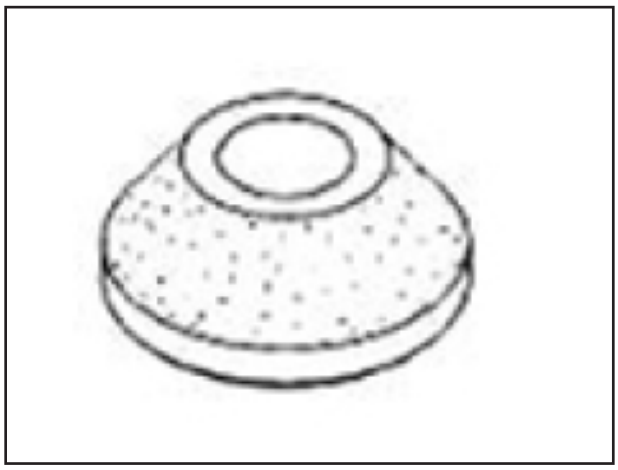


Special tools and sealing glue

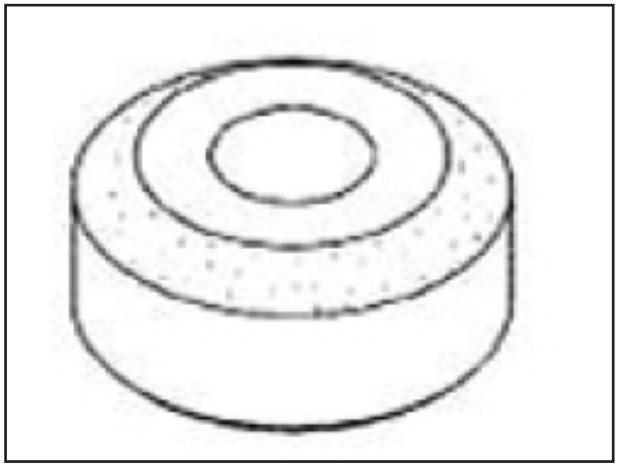
Valve seat knife tool 32°--φ35



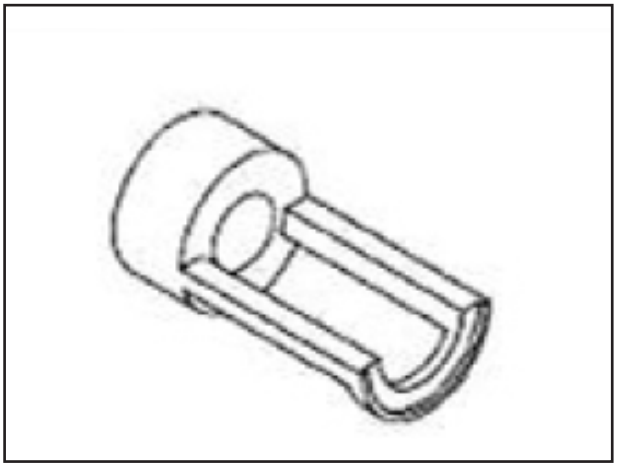
Valve seat knife tool 55°--φ35



Valve seat knife tool 32° -- ϕ 30

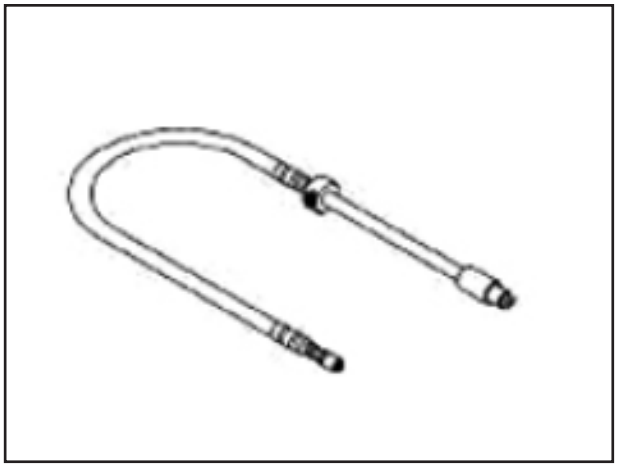


Spring compression adpator

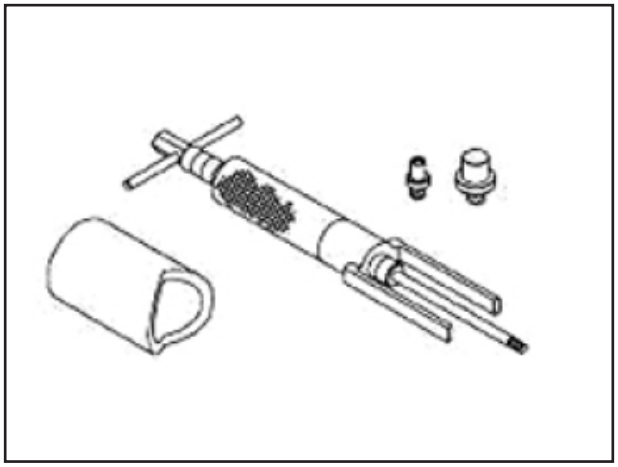


Special tools and sealing glue

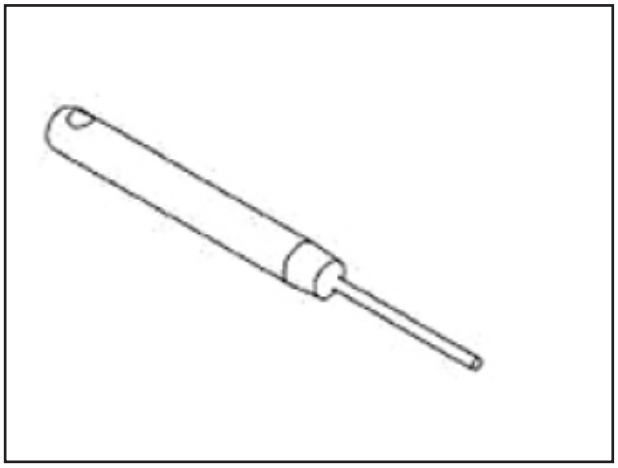
Pressure gauge adaptor，M10x1.0



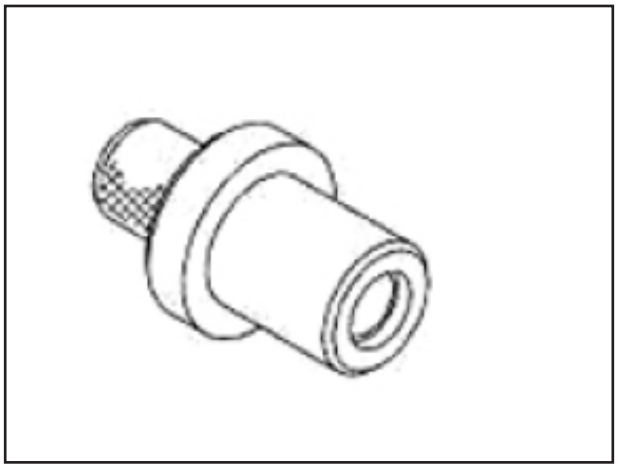
Piston pin puller



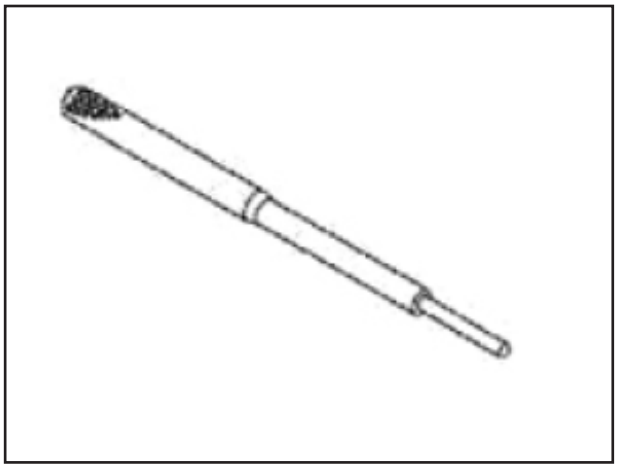
Valve seat knife bracket Φ4.5



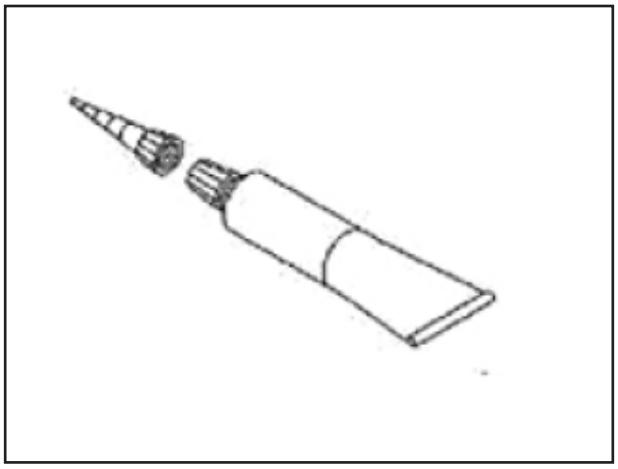
Puller seat



Guide axle Φ4.5



Sealing glue



Special tools and sealing glue

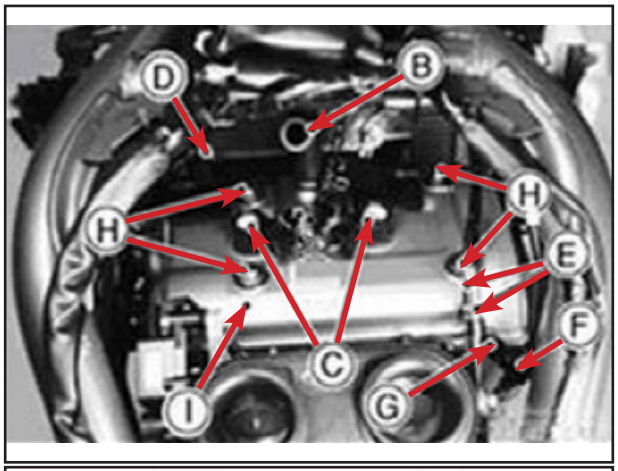
Valve conducting pipe knife Φ4.5

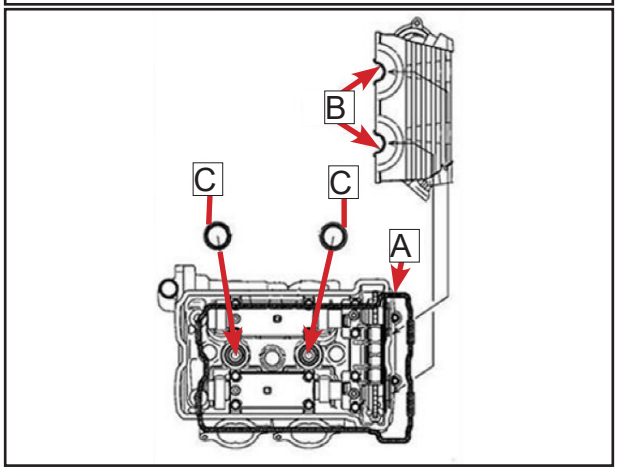
5.4 Cylinder Head Cover

5.4.1 Cylinder Head Ccover Removal

- **Remove:**

1. Fuel Tank (see Fuel Tank Removal in the Fuel System (EFI) chapter)
2. Housing of air filter (see Air filter Housing Removal in the Fuel System (EFI) chapter)
3. Ignition coil[C]
4. Baffle plate[D]
5. Throttle cables[E]
6. Clutch Cable Holder [F] with Bolt [G]
7. Cylinder Head Cover Bolts [H]
8. Cylinder Head Cover [I]
9. Spring valve[J] (CF650-3F)

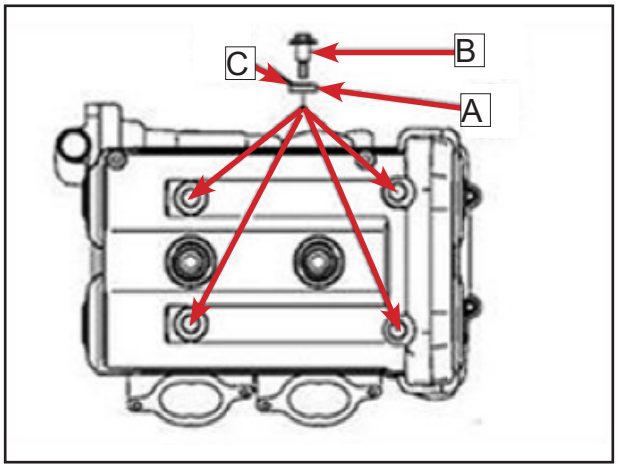




5.4.2 Cylinder Head Cover Installation

- Replace the head cover gasket [A] with a new one.
- Apply silicone sealant [B] to the cylinder head as shown.
- Install gaskets of spark plug hole [C].
- Install:

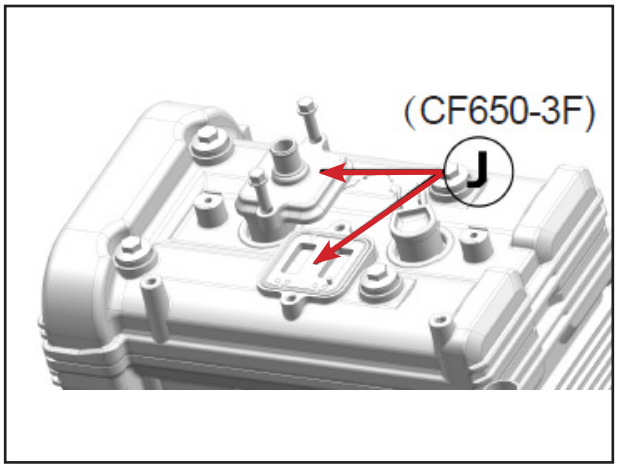
Washers [A]
Cylinder Head Cover Bolts [B]
Spring valve[J] (CF650-3F)



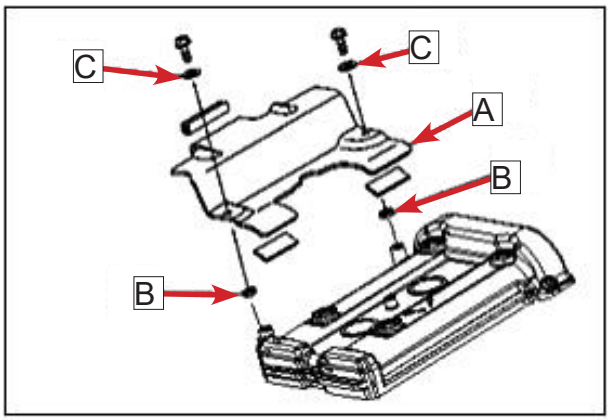
I nstall the washers with metal side [C] faces upward.

- Tighten bolt of cylinder head over.

Torque-Cylinder Head Cover Bolts 10 N•m



Cylinder Head Cover



- Install the baffle plate [A].

Put the insulators [B] under the baffle plate and the washers [C] .
Apply a non-permanent locking agent to the baffle plate bolts and tighten them.

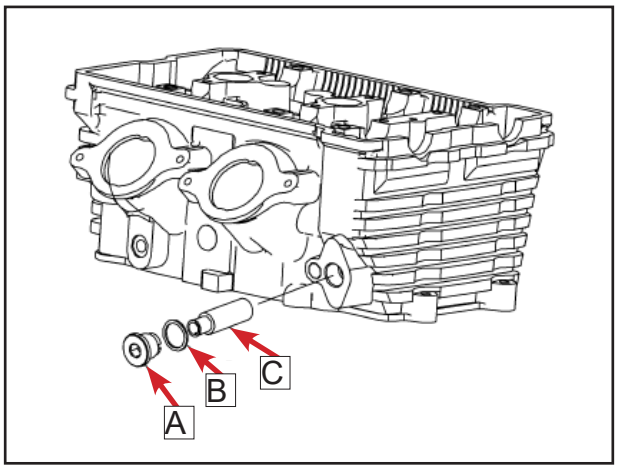
Torque - Baffl e Plate Bolts: 6N•m

5.5 Timing Chain Tensioner

5.5.1 Timing Chain Tensioner Removal

- Remove:

Plug [A]
Washer[B]
Tensioner[C]



5.5.2 Timing Chain Tensioner Installation

- Install tensioner[C]. There should be no any stuck after installation.
- Install plug[A] and washer[B].
- Tighten plug.

Torque: Plug 28N•m

- Turn the crankshaft for 2~3 rounds clockwisely to let the tensioner tight the chain up and check the timing again.

Timing Chain Tensioner Removal

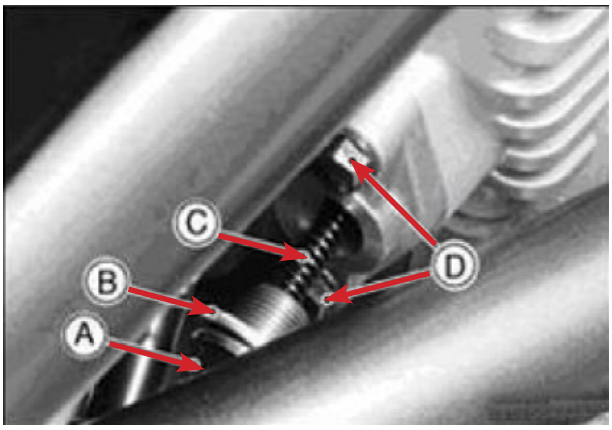
Caution
This is a non-return type camshaft chain tensioner. The push rod does not return to its original position once it moves out to take up camshaft chain slack. Observe all the rules listed below: **When removing the tensioner, do not take out the mounting bolts only halfway. Re-tightening the mounting bolts from this position could damage the tensioner and the camshaft chain.** **Once the bolts are loosened, the tensioner must be removed and reset as described in "Camshaft Chain Tensioner Installation". Do not turn over the crankshaft while the tensioner is removed. This could upset the camshaft chain timing, and damage the valves.**

Timing Chain Tensioner

- Remove:

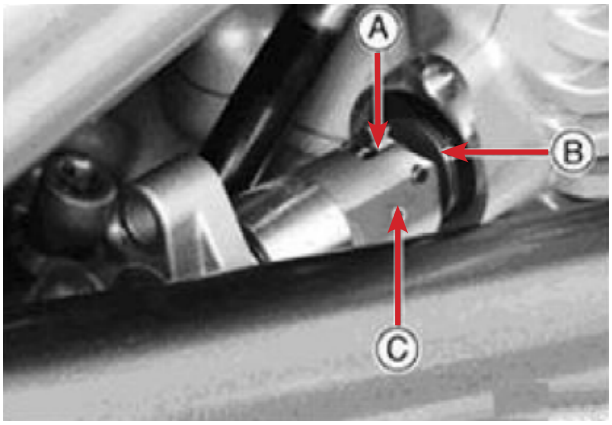
Bolt [A]
Washer[B]
Spring [C]

- Remove the mounting bolts [D] and take off the timing chain tensioner.



Timing Chain Tensioner Installation

- Release the stopper [A] and push the push rod [B] into the tensioner [C].
- Install the tensioner so that the stopper faces upward.



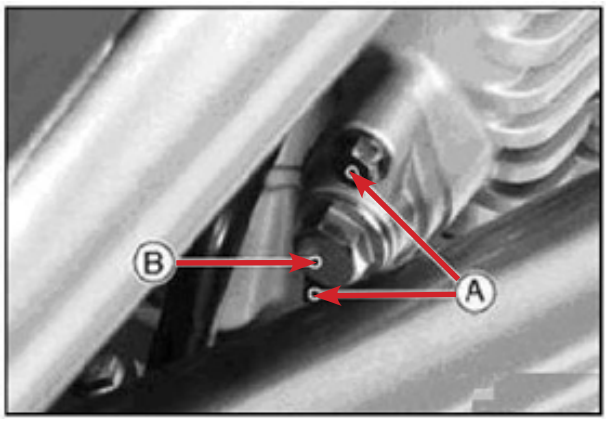
- Tighten the tensioner mounting bolts [A].

Torque: Tensioner Mounting Bolts : 12N •m

- Install the spring and washer
- Tighten the cap bolt [B].

Torque: Spring seat bolt 20N•m

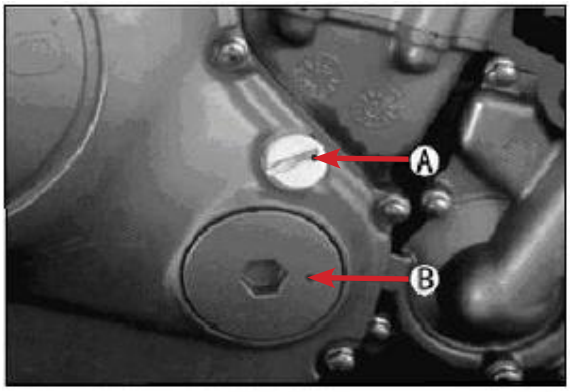
- Turn the crankshaft clockwise for 2 rounds to let the tensioner getting tight. And check the camtiming again.



5.6 Camshaft/Timing Chain

⚠Warning

The crankshaft maybe tured while the crankshafts are removed.Aways pull the chain taut while turning the crankshaft. This avoids kinking the chain on the lower(crankshaft) sprocket. A kinked chain could damage both the chain and the sprocket.



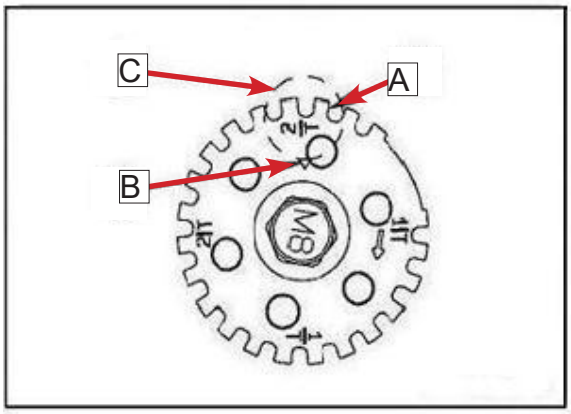
5.6.1 Camshaft Removal

- Remove:

Cylinder Head Cover (see Cylinder Head Cover Removal)

- Position the crankshaft as follows

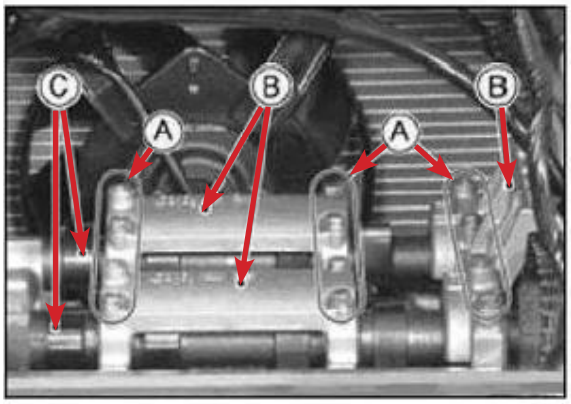
Remove the upper [A] and lower [B] caps on the clutch cover(right side cover).



Using a wrench on the crankshaft rotation bolt, turn the crankshaft clockwise until the 2/ T mark line [A] on the timing rotor is aligned with the notch [B] in the edge of the upper hole [C] in the clutch cover.

- Remove:

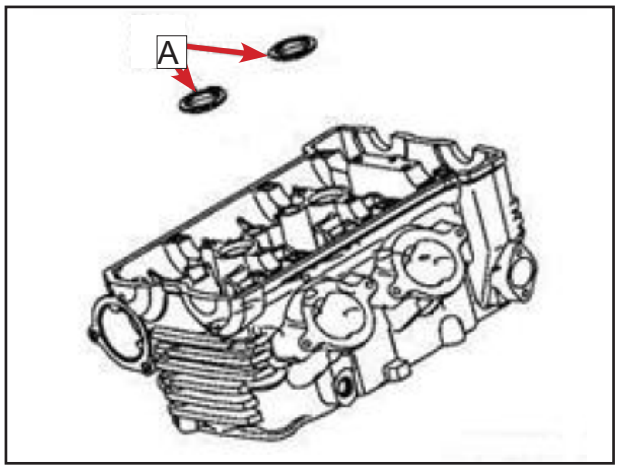
Camshaft Chain Tensioner (see Camshaft Chain Ten-sioner Removal)
Camshaft Cap Bolts [A]
Camshaft Caps [B]
Camshafts [C]



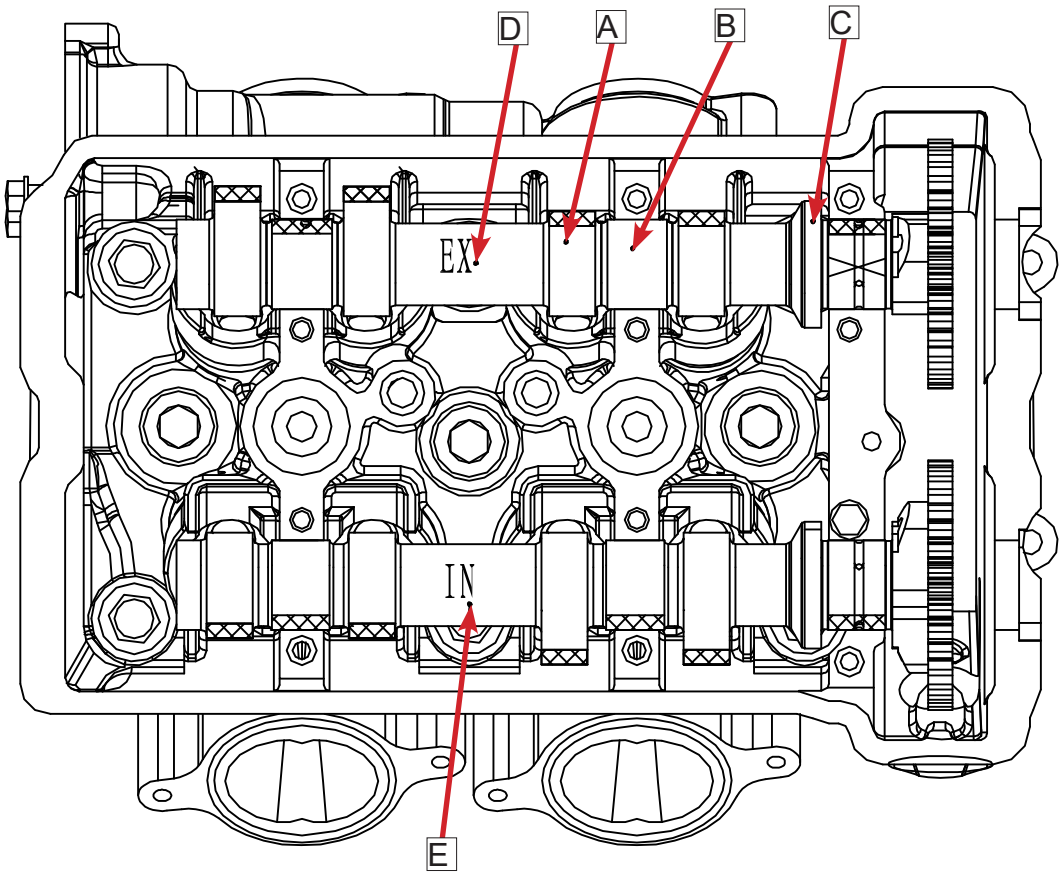
Camshaft/Timing Chain

5.6.2 Camshaft Installation

- Be sure to install the Plug Hole Gaskets [A]
- Apply molybdenum disulfide oil solution to all cams [A] journals [B] and thrust blocks [C] with ×marks.
- If a new camshaft is to be used, apply a thin coat of molyb-denum disulfide grease to the cam surfaces.



NOTE
The exhaust camshaft has a EX mark [D] and the inlet camshaft has a IN mark [E]. Be careful not to mix up two shafts.



Camshaft/Timing Chain

- Pull the tension side (exhaust side) of the chain taut to install the chain.
- Engage the camshaft chain with the cam-shaft sprockets so that the timing marks on the sprockets are positioned as shown.

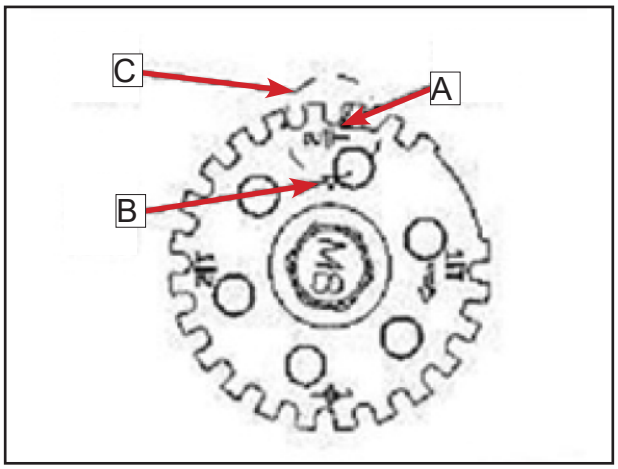
Using a wrench on the crankshaft rotation bolt, turn thecrankshaft clockwise until the 2/T mark line [A] on the timing rotor is aligned with the notch [B] in the edge of the upper hole [C] in the clutch cover.

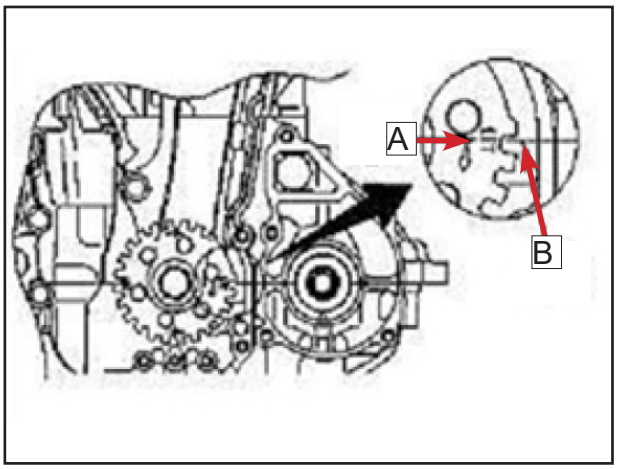
- If the clutch cover is removed, perform the next procedure.

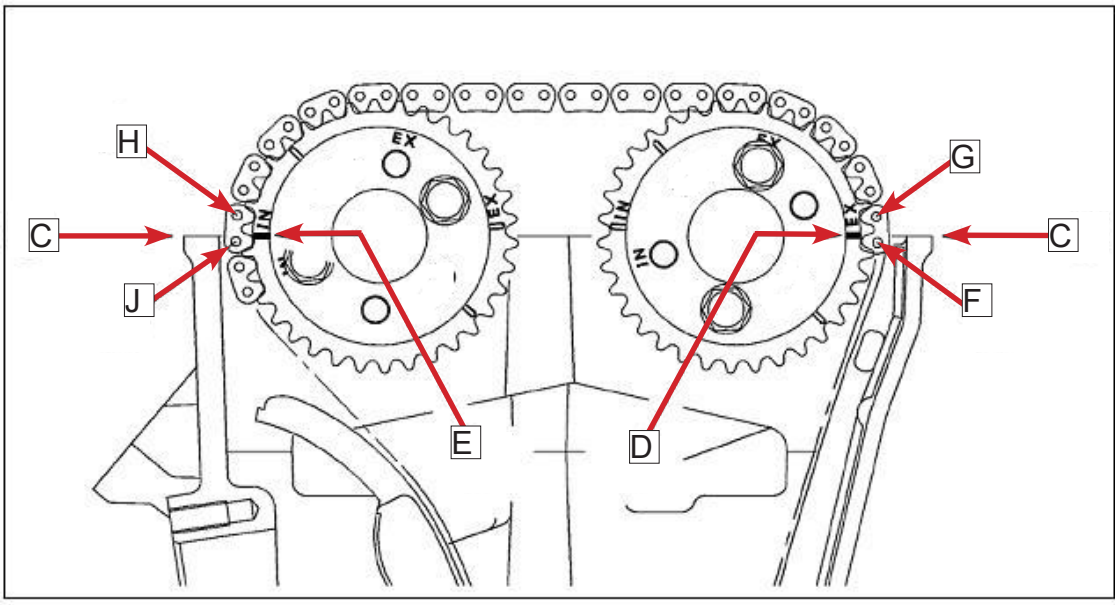
Using a wrench on the crankshaft rotation bolt, turn the crankshaft clockwise until the 1/T mark line [A] on the timing rotor is aligned with the wating surface [B] of the crankcase halves.

The timing marks must be aligned with the cylinder head upper surface [C].

EXMark [D] (between #1 pin and #2 pin)
INMark [E] (between #31 pin and #32 pin)
#1 Pin [F]
#2 Pin [G]
#31 Pin [H]
#32 Pin [J]



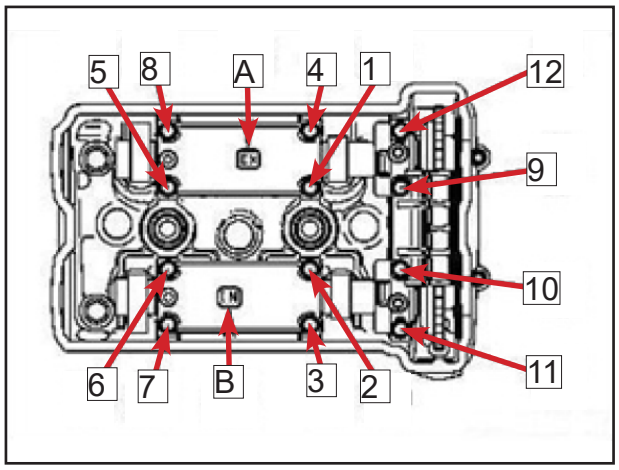




Camshaft/Timing Chain

NOTE
The exhaust cap has a “EX” mark [A] and the inlet cap has a “IN” mark [B]. Be care-ful not to mix up these caps.

- Assemble the bolts of the camshaft



First tighten all the camshaft cap bolts evenly to seat the camshaft in place, then tighten all bolts following the specified tightening sequence.

Torque-Camshaft Cap Bolts (1 < 12) 12N•m

- Installation:

Camshaft Chain Tensioner (see Timing Chain Tensioner Installation)

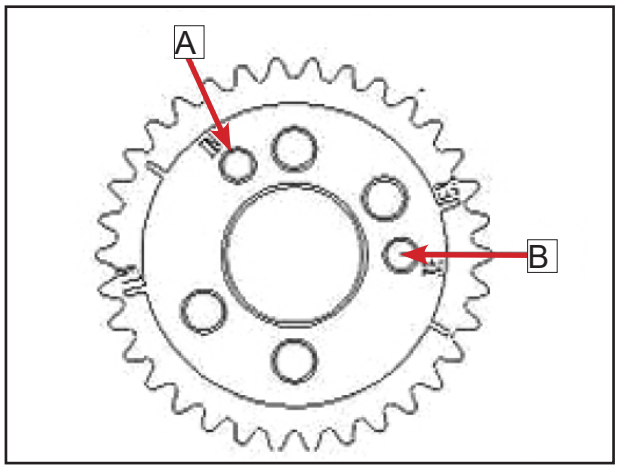
Cylinder Head Cover (see Cylinder Head Cover Installation)

5.6.3 Camshaft and Sprocket Assembly

The inlet and exhaust sprockets are identical.

- Install the sprockets so that the marked (“IN” and “EX”) side faces to the right side.
- Apply a non-permanent locking agent to the camshaft sprockets bolts and tighten them.

Torque-Camshaft Shaft Sprockets Bolts :15N•m



Camshaft/Timing chain

5.6.4 Camshaft/Camshaft Cap Wear

- Remove Camshaft Caps and camshaft (see Camshaft Removal)
- Retighten camshaft cap and measure hole diameter of camshaft cap <A>,<B>,<C>.

Torque: Camshaft cap bolt 12N.m

Hole diameter of camshaft cap

Standard : 24.00mm~24.021mm

Service Limit: 24.05mm

If out of service limit, replace new cylinder head.

- Measure camshaft journal diameter.

Diameter of Camshaft Journal Standard : 23.950mm~23.972mm

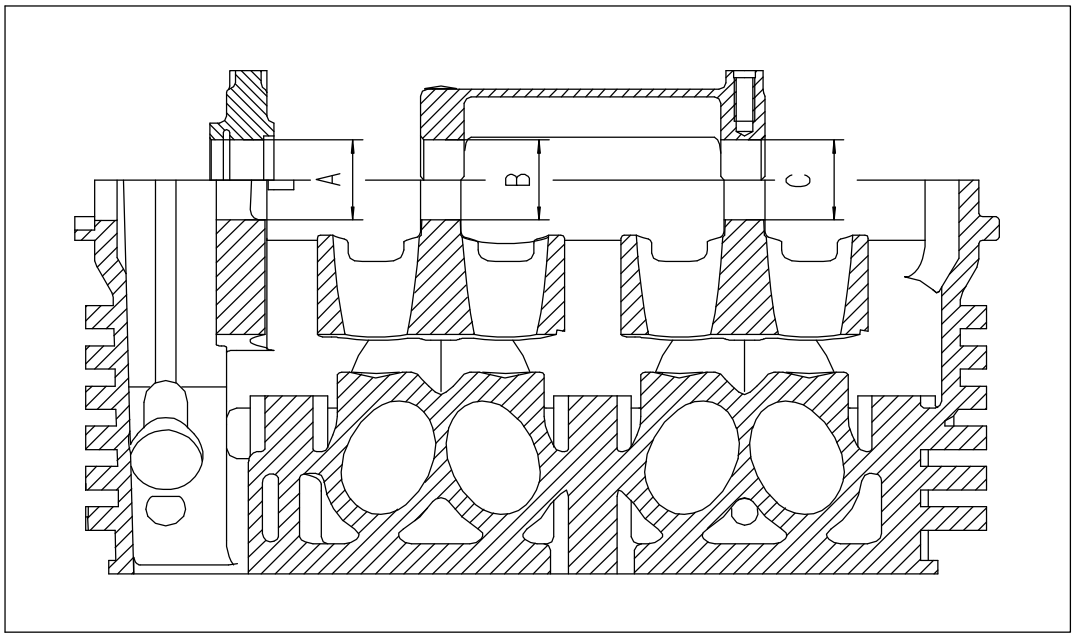
Service Limit : 23.920mm

If the camshaft journal diameter is less than the service limit, replace the camshaft with a new one and measure the clearance again. If the clearance still remains out of the limit, replace the cylinder head unit.

Camshaft Journal, Camshaft Cap Clearance

Standard: 0.028mm~0.071mm

Service Limit : 0.13mm



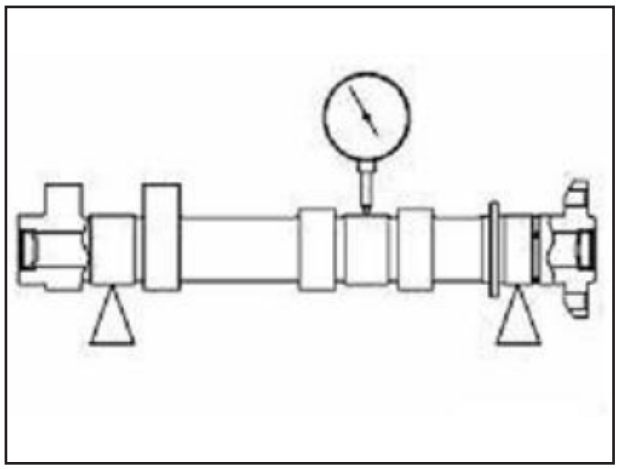
Camshaft run-out

- Remove the camshaft (see Camshaft Removal).

If the runout exceeds the service limit, replace the shaft.

Camshaft/Timing Chain

- Set the camshaft in a camshaft alignment jig or on V blocks.
- Measure runout with a dial gauge at the specified place as shown.

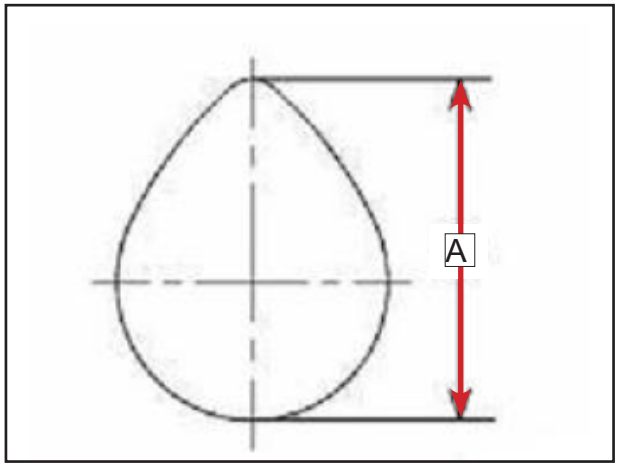


5.6.5 Camshaft Runout
Standard: Less than 0.02mm
Service limit: 0.04mm

5.6.6 Camshaft wear

- Remove the camshaft (see Camshaft Removal).
- Measure the height [A] of each cam with a micrometer.

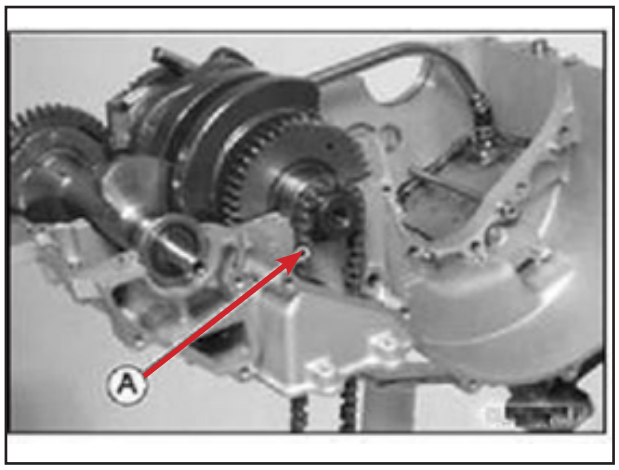
If the cams are worn down past the service limit, replace the camshaft.



Cam Height
EX:35.843mm~35.957mm
IN:36.543mm~36.657mm
Service Limit
EX:35.74mm
IN:36.44mm

5.6.7 Camshaft Chain Removal

- Split the crankcase (see Crankcase Split-ting in the Crankshaft/ Transmission chapter).
- Disassemble the timing chain ont the crankshaft [A].



5.7 Cylinder head

5.7.1 Cylinder Compression Measurement

NOTE:Use the battery which is fully charged.

- Warm up the engine thoroughly.
- Stop the engine.
- Remove

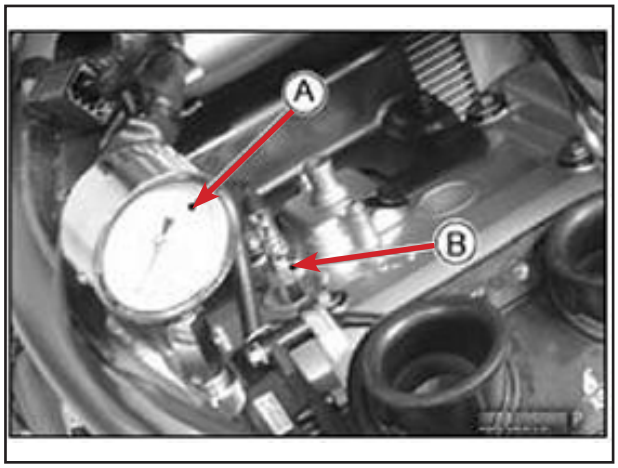
Fuel Tank (see Fuel Tank Removal in the Fuel System (EFI) chapter)
Air Cleaner Housing (see Air Cleaner Hous-ing Removal in the Fuel System (EFI) chapter)
Ignition Coils (see Ignition Coil together with Spark Plug Cap Removal in the Electrical System chapter)
Spark Plugs (see Spark Plug Replacement in the Periodic Maintenance chapter)

Owner's Tool - Spark Plug Wrench 16mm

- Attach the compression gauge [A] and adapter [B] firmly into the spark plug hole. Using the starter motor, turn the engine over with the throttle fully open until the compres-sion gauge stops rising; the compression is the highest reading obtainable.

Special tools: Compression Gauge, 20kgf/cm^2
Pressure meter adjuster M10x1.0
Cylinder pressure standard: 961kPa~1471kPa(9.8kgf/cm^2~15.0kgf/cm^2) at400r/min(rpm)

- Use same way to test the other cylinder.
- Assemble the spark plug. **Spark plug torque: 15N•m**
- If the pressure is not in standard please follow form below .



Cylinder head

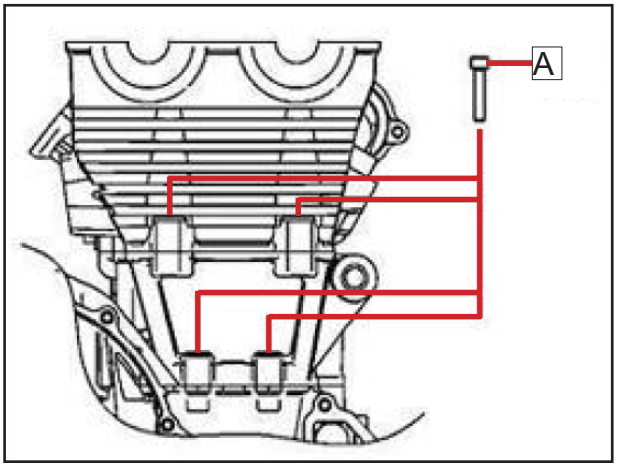
Question	Diagnose	Solution
Cylinder Pressure is beyond specified range	Too much carbon on piston and Combustion room	Clean the carbon and replace the damaged pars
	Gasket thickness is wrong	Replace the gasket into standard
Cylinder pressure is less than specified range	Gasket leaking	Replace the gasket and check the flatness
	Valve seat leaking	Repair the valve seat
	Valve clearance not right	Adjust the valve clearance
	Piston and cylinder clearance too much	Replace the piston and cylinder body
	Piston jammed	Check the cylinder. Replace the cylinder or piston if needs
	Piston ring or groove wearing	Replace the piston or piston ring

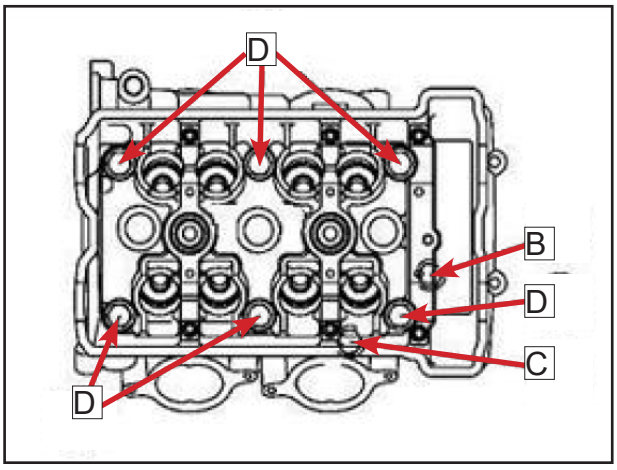
5.7.2 Cylinder Head Removal

- Remove:

Exhaust Pipes (see Exhaust Pipe Removal)
Cylinder Head Cover (see Cylinder Head Cover Removal)
Camshafts (see Camshaft Removal)
Throttle Body Assy (see Throttle Body Assy Removal in the Fuel System (EFI) chapter)
Intake manifold
Water Hose
Water Temperature Sensor Connector
Chain Guide Plate

- Firstly remove the 4 pcs of M6 cylinder head bolts and M6 cylinder bolts [A].
- Secondly, remove the M8 bolts [B].
- Thirdly, remove the M10 nut [C].
- Finally, remove the M10 bolts [D].

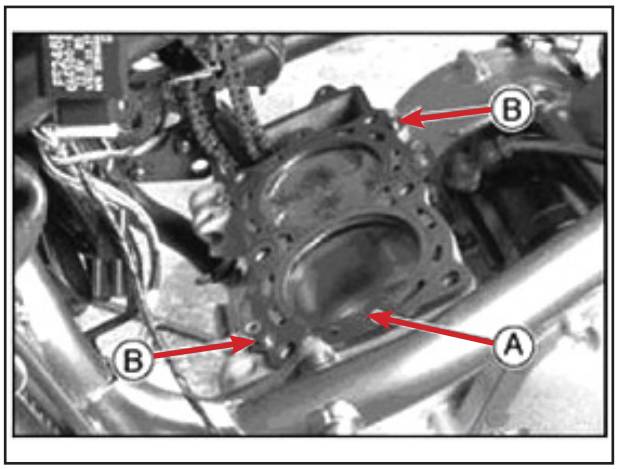




Cylinder head

5.7.3 Cylinder head installation

NOTE
The camshaft cap is machined with the cyl-inder head,so if a new cylinder head is installed, replace camshaft at the same time. Number of the two should be same.



- Install a new cylinder head gasket [A] and dowel pins [B]

- Apply molybdenum disulfide oil solution [A] to both sides of washers and the threads of bolts and nut

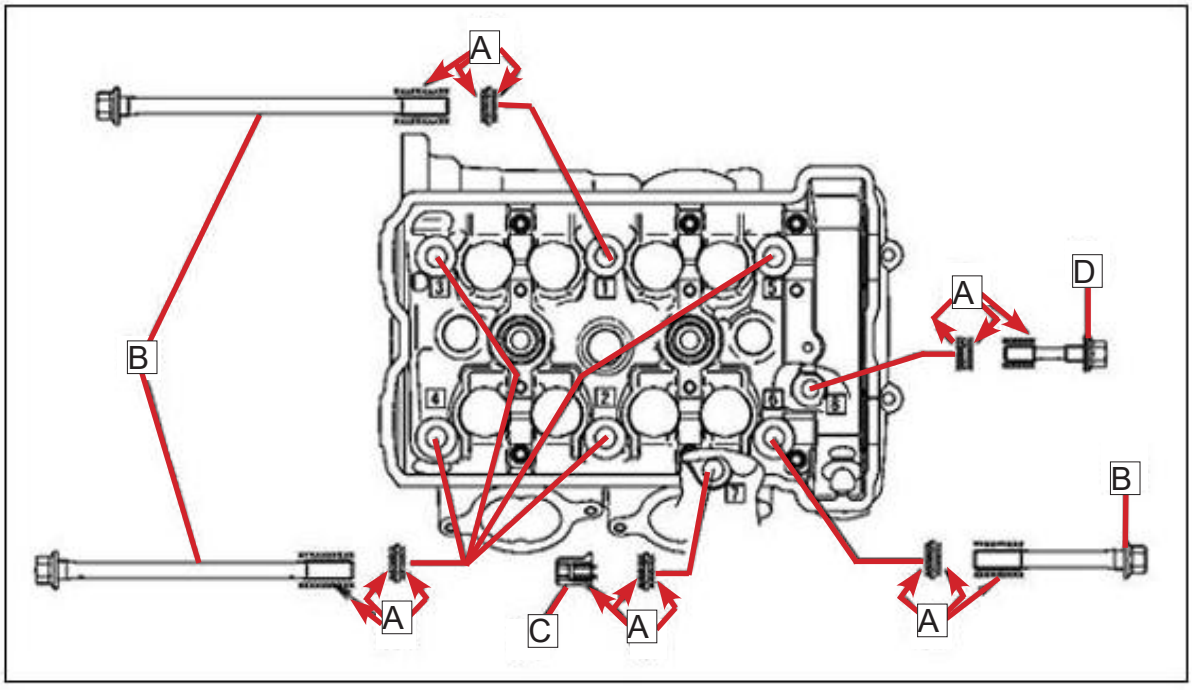
M10 Cylinder Head Bolts [B]

M10 Cylinder Nut [C]

M8 Cylinder Bolt [D]

- Follow the order to tight up the bolts and nuts[1-8]

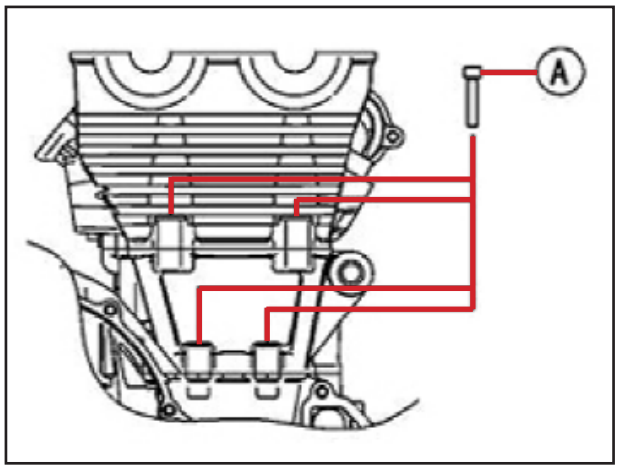
Torque - Cylinder head bolt (M10):
First: 25N•m
Final:
Used Cylinder Head Bolts: 49 N•m
New Cylinder Head Bolts: 54 N•m
Cylinder Nut(M10): 49 N•m



Cylinder head

- Tighten the M6 cylinder head bolts and M6 cylinder bolts [A].

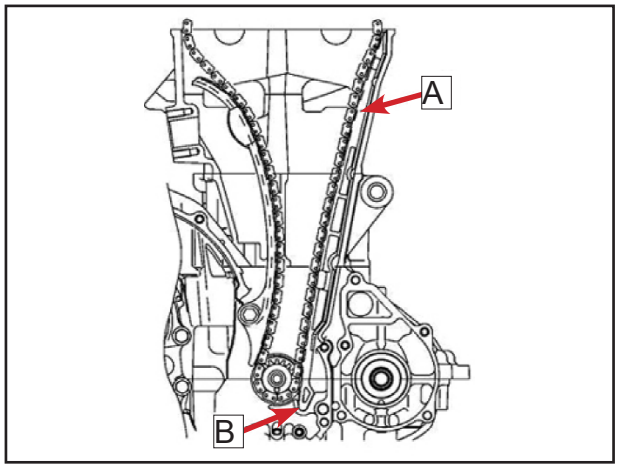
Torque - Cylinder Head Bolts (M6):
12 N•m(1.2 kgf•m, 106 in•lb)
Cylinder Bolts (M6):
12 N•m (1.2 kgf•m, 106 in•lb)



- Install the front camshaft chain guide [A].

Insert the end [B] of front camshaft chain guide into the hollow on the lower crankcase half.

- Install the removed parts (see appropriate chapters).



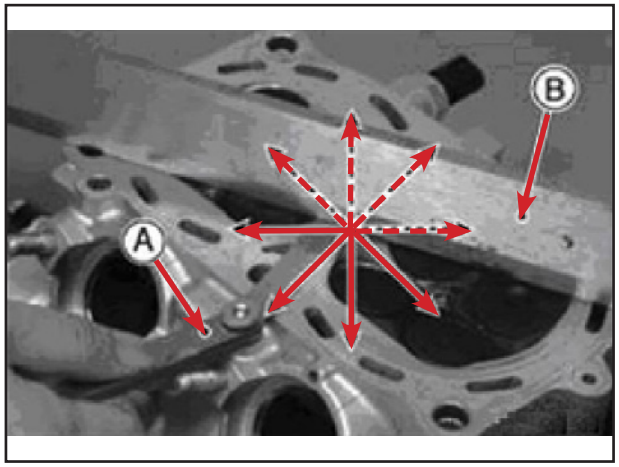
5.7.4 Cylinder Head wear

- Clean the cylinder head.
- Lay a straightedge across the lower sur-face of the cylinder head at several positions.
- Use a thickness gauge [A] to measure the space between the straightedge [B] and the head.

Cylinder Head Warp Standard: Service Limit: 0.05mm

If the cylinder head is warped more than the service limit, replace it.

If the cylinder head is warped less than the service limit, repair the head by rubbing the lower surface on emery paper secured to a surface plate (fi rst No. 200, then No.400).



5.8 Valves

5.8.1 Valve Clearance Inspection

- Refer to the Valve Clearance Inspection in the Periodic Maintenance chapter.

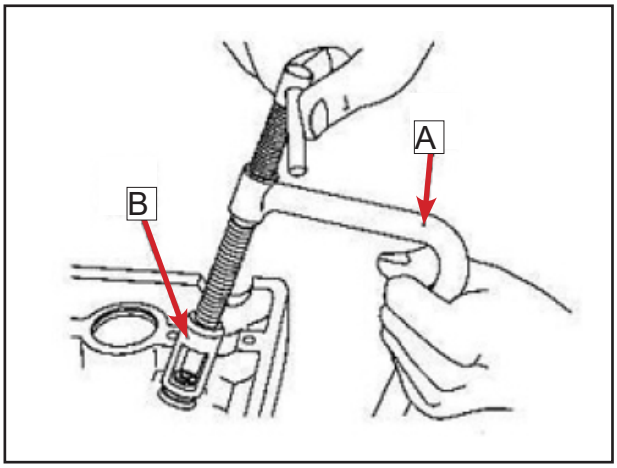
5.8.2 Valve Clearance Adjustment

- Refer to the Valve Clearance Adjustment in the Periodic Maintenance chapter.

5.8.3 Valve Removal

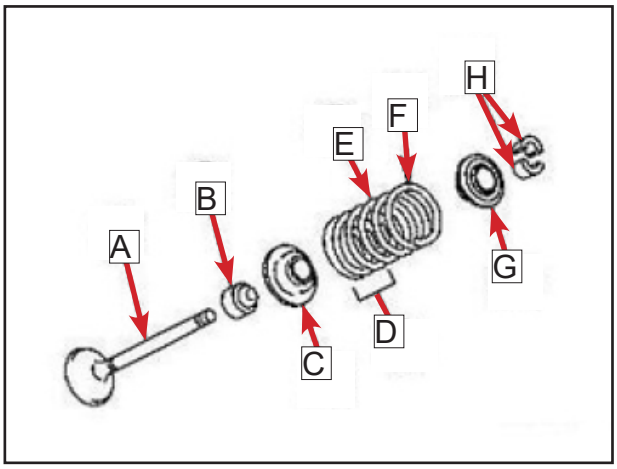
- Remove cylinder head (see Cylinder Head Removal).
- Remove the valve lifter and shim Mark and record the valve lifter and shim locations so they can be installed in their original positions.
- Using the valve spring compressor assembly, remove the valve.

Special Tools -Valve Spring Compressor Assembly [A]:
Valve Spring Compressor Adapter, [B]:

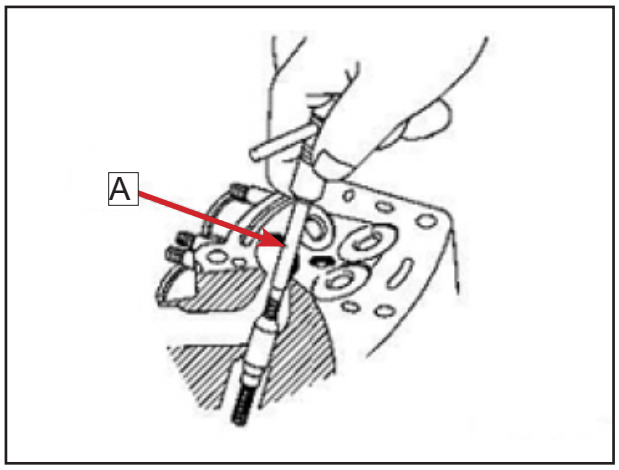


5.8.4 Valve Installation

- Replace the oil seal with a new one.
- Apply engine oil to the oil seal lip. Apply a thin coat of molybdenum disulfi de grease to the valve stem before valve installation.
- Install the springs so that the closed coil end faces downwards (the side painted in green faces upwards).
- Valve[A] Valve spring[E]
  Valve oil seal[B] Side Painted [F]
  Spring lower seat[C] Spring upper seatG]
  Closed coil end[D] Split Keepers[H]



Valves



5.8.5 Valve Guide Removal

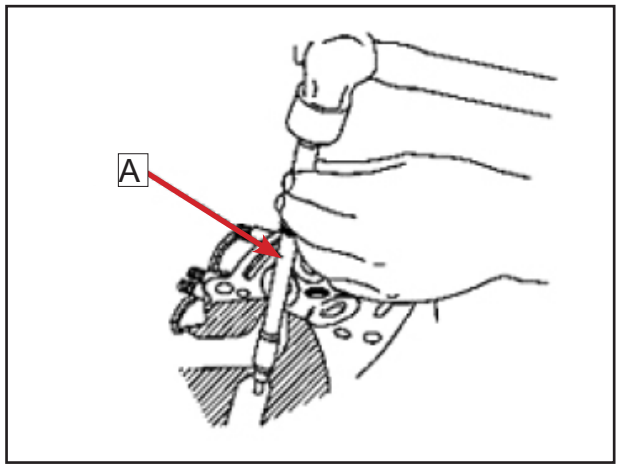
- Remove:

Valve (see Valve Removal)
Oil Seal
Spring Seat

- Heat the area around the valve guide to 120°C<150°C , and hammer lightly on the valve guide arbor [A] to remove the guide from the top of the head.

CAUTION
Do not heat the cylinder head directly. This will warp the cylinder head. Soak the cylinder head in oil and heat the oil.

Special Tool-Valve Guide Arbor: 4.5mm diameter.



5.8.6 Valve Guide Installation

- Apply engine oil to the valve guide outer surface before installation.
- Heat the area around the valve guide hole to about 120°C < 150°C.
- Drive the valve guide in from the top of the head using the valve guide arbor. The flange stops the guide from going in too far.

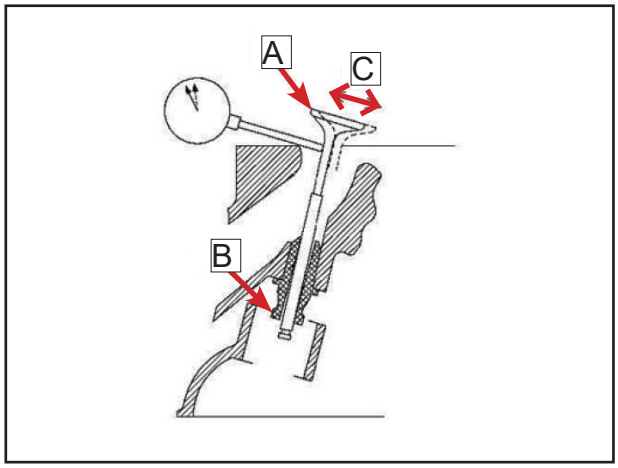
Special Tool-Valve Guide Arbor:4.5mm diameter.

- Wait until the cylinder head cools down and then ream the valve guide with the valve guide reamer [A] even if the old guide is reused.

Valves

Turn the reamer in a clockwise direction until the reamer turns freely in the guide. Never turn the reamer counter-clockwise or it will be dulled.

Once the guides are reamed they must be cleaned thoroughly.
Special tool - Valve Guide Reamer
Φ 4.5



5.8.7 Valve-to-Guide Clearance Measurement (Wobble Method)

- Insert a new valve [A] into the guide [B] and set a dial gauge against the stem per-pendicular to it as close as possible to the cylinder head mating surface.
- Move the stem back and forth [C] to mea-sure valve/valve guide clearance.
- Repeat the measurement in a direction at a right angle to the fi rst.

NOTE
The reading is not actual valve/ valve guide clearance because the measuring point is above the guide.

Valve/Valve guide clearance
Standard:
EX: 0.07mm~0.14mm
IN: 0.02mm~0.08mm
Service limit:
EX: 0.27mm

Valves

5.8.8 Valve Seat Inspection

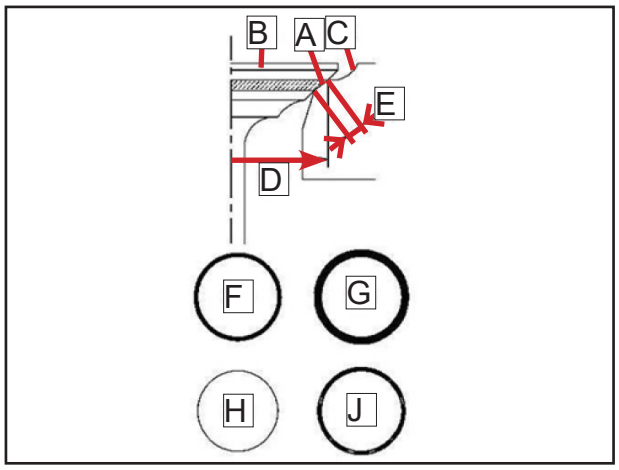
- Remove the valve(see Valve Removal).
- Check the valve seating surface [A] between the valve [B] and valve seat [C]. Measure the outside diameter [D] of the seating pattern on the valve seat.

If the outside diameter is too large or too small, repair the seat (see Valve Seat Repair).

Valve Seating Surface Outside Diameter
EX:27.6mm ~ 27.7mm
IN:32.6mm ~32.7mm

Measure the seat width [E] of the portion where there is no build-up carbon (white portion) of the valve seat with a vernier caliper. If the width is too wide [G], too narrow [H] or uneven [J], repair the seat (see Valve Seat Repair).

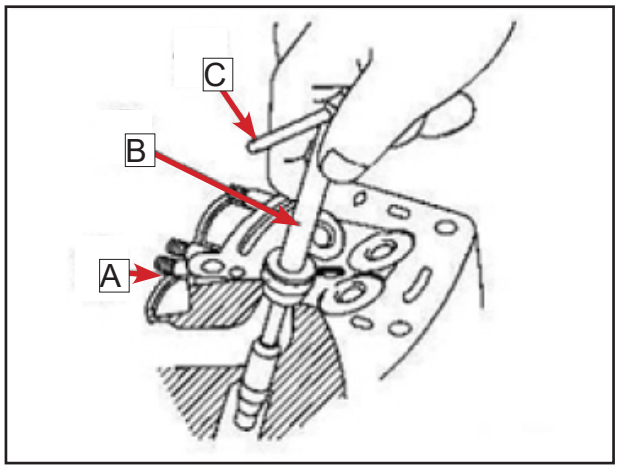
Valve Seating Surface Width
EX:0.5mm~1.0mm
IN:0.5mm~1.0mm



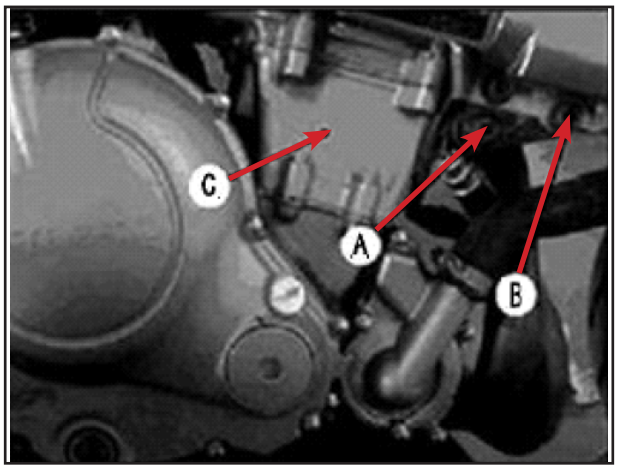
5.8.9 Valve Seat Repair

- Repair the valve seat with the valve seat cutters [A].

Special Tools -
Valve Seat Cutter Holder Bar [C]:
Valve Seat Cutter Holder[B]:



5.9 Cylinder body/piston



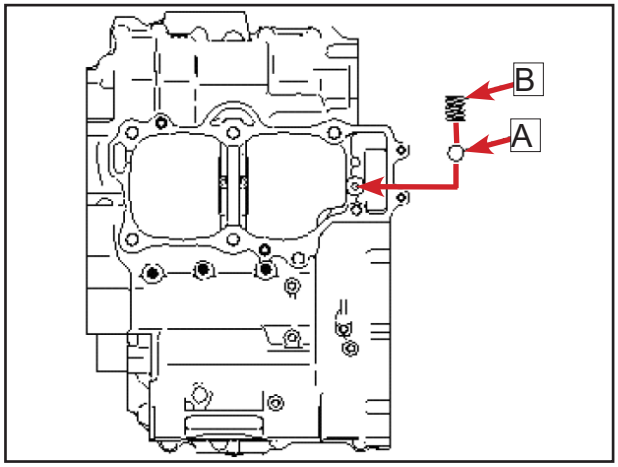
5.9.1 Cylinder Removal

- Remove:

Cylinder Head (see Cylinder Head Removal)
Front Engine Mounting Bolts(Both Side) [A] (see Engine Removal in the Engine Removal/ Installation chapter)

Front Engine Brackets (Both Side) [B] (see Engine Removal in the Engine Removal/ Installation chapter)
Cylinder [C]

- Inspect and make sure the ball [A] and spring [B] are in order like photo in upper crankcase oil line (283MT no steel ball and spring).

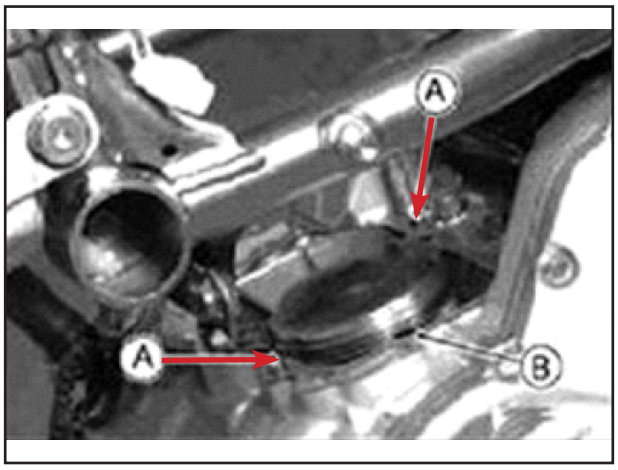


5.9.2 Cylinder Installation

NOTE
If a new cylinder is used, use a new pis-tonring at the same time.

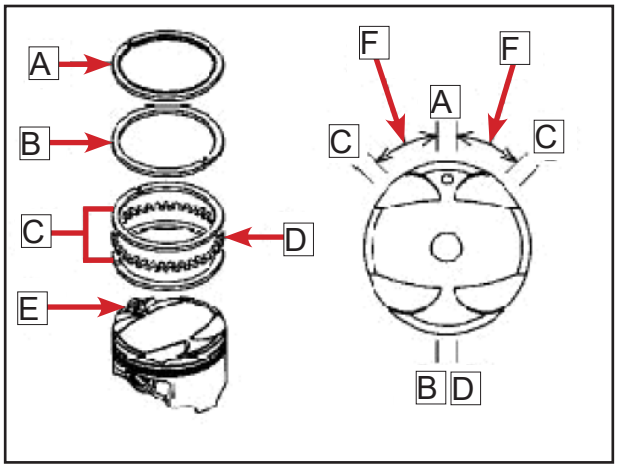
- Install the dowel pins [A] and new cylinder gasket [B].

- The piston ring openings must be positioned as shown in the figure. The openings of the oil ring steel rails must be about 30 ~ 40 degree of angle from the opening of the top ring.



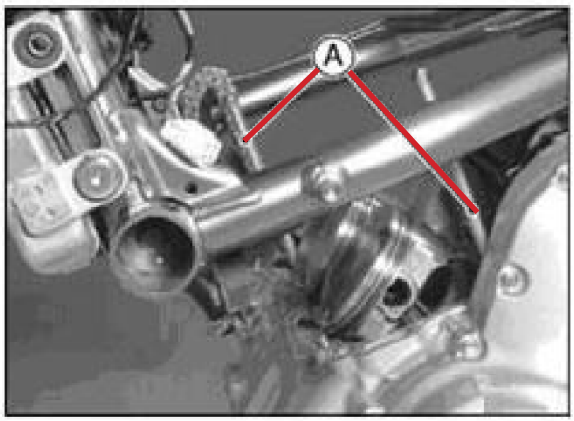
- Top Ring [A]

Second Ring [B]
Oil Ring Steel Rails [C]
Oil Ring Expander [D]
Hollow [E]
30° [F]



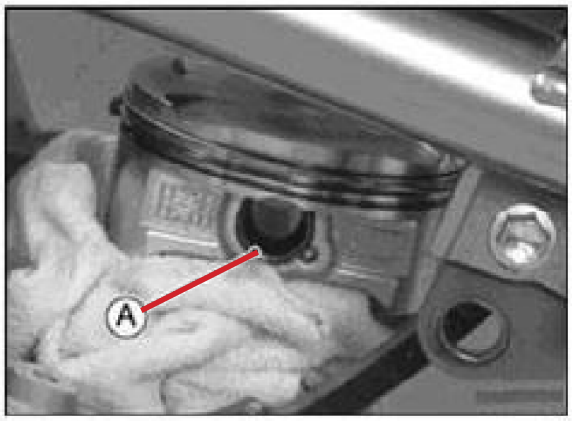
Cylinder body/piston

- Apply molybdenum disulfi de oil solution to the cylinder bore, piston rings and piston.
- Prepare two auxiliary head bolts with their head cut.
- Install the two bolts [A] diagonally in the crankcase.
- Position the crankshaft so that all the piston heads are almost level.
- Install the cylinder block. Insert the piston rings with your thumbs.

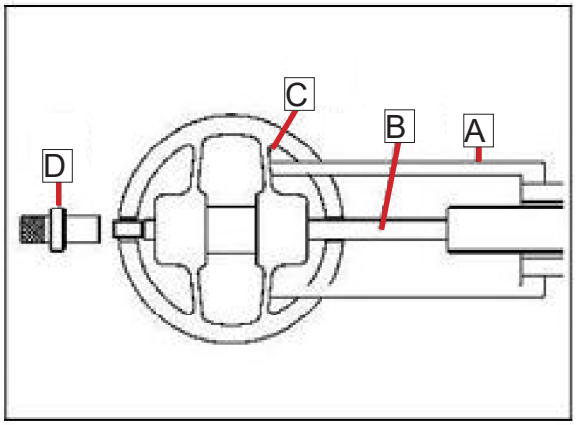


5.9.3 Piston Removal

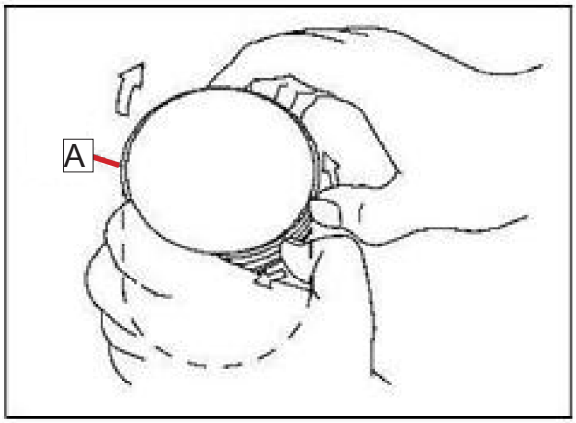
- Remove the cylinder (see Cylinder Removal).
- Place a clean cloth under the pistons and remove the piston pin snap ring [A] from the outside of each piston.
- Remove the piston pin



Special tool :Pistonpinpuller [A]
Bolt [B]
Piston [C]
Piston Pin Puller Adapter [D]



- Remove pistons.
- Carefully spread the ring opening with your thumbs and then push up on the oppo-site side of the ring [A] to remove it.
- Remove the 3-piece oil ring with your thumbs in the same manner.



Cylinder body/piston

5.9.4 Piston installation

- Install the oil ring expander [A] in the bottom piston ring groove so the ends [B] butt together
- Install the oil ring steel rails, one above the expander and one below it.

NOTE
Do not mix up the top [A] and second [C] ring.

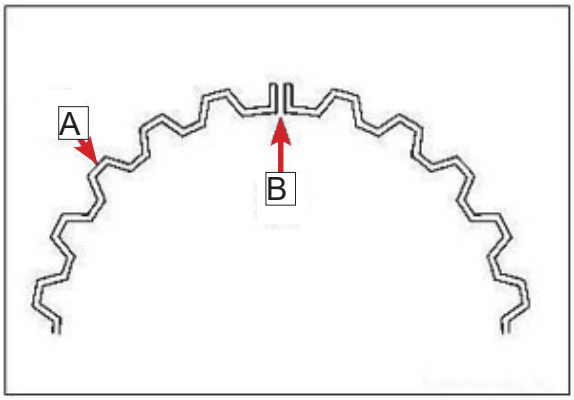
- Install the top ring [A] so that the “R” mark [B] faces up.
- Install the second ring [C]so that the “RN” mark [D] faces up.

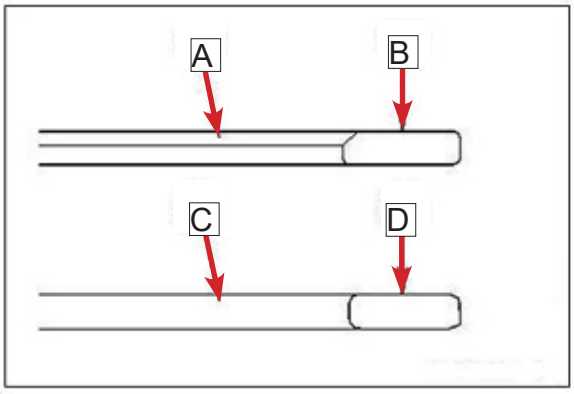
NOTE
If a new piston is used, use new piston ring.

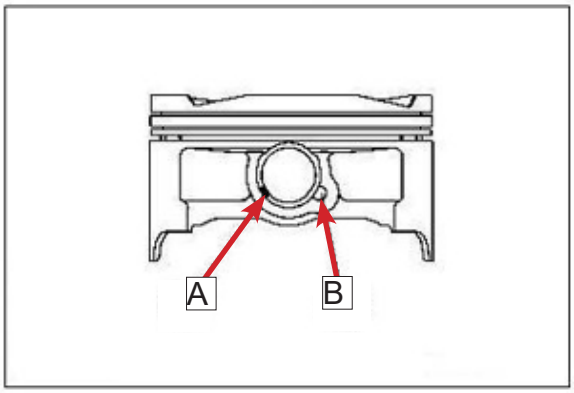
- Install the piston with its marking hollow fac-ing forward.
- Fita new piston pin snap ring into the side of the piston so that the ring opening [A] does not coincide with the slit [B] of the piston pin hole.
- Install piston pin.
- Use same way to install the other piston pin ring.

Apply molybdenum disulfi de oil solution to the piston pins and piston journals. When installing the piston pin snap ring, compress it only enough to install it and no more.

CAUTION
Do not reuse snap rings, as removal weak-ens and deforms them. They could fall out and score the cylinder wall.







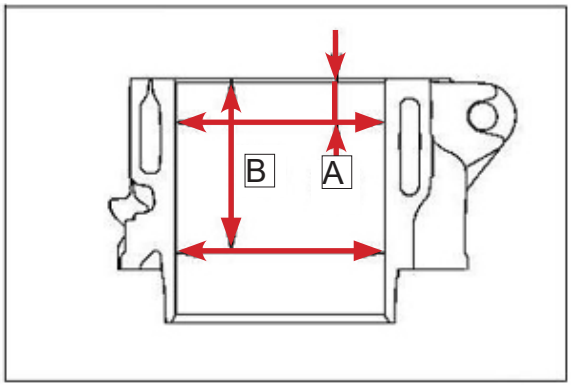
Cylinder/Piston

5.9.5 Cylinder Wear

Since there is a difference in cylinder wear in different directions, take a side-to-side and a front-to-back measurement at each of the two locations (total of four mea-sure-ments) shown in the figure.

10mm [A]

60mm [B]



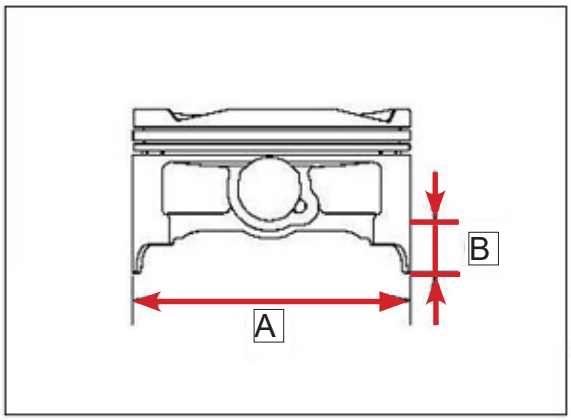
Cylinder Inside Diameter

Standard:83.00mm~83.02mm

Service limit:83.10mm

Piston wear

- Measure the outside diameter [A] of each piston 10mm [B] (283MT is 14mm) up from the bottom of the piston at a right angle to the direction of the piston pin.



Piston diameter

Standard:82.975mm~82.995mm

Service limit : 82.90mm

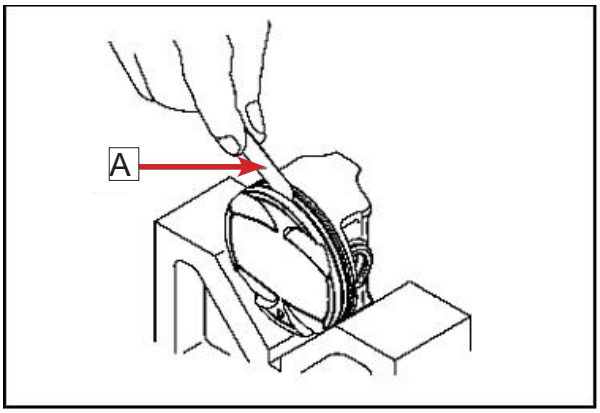
5.9.6 Piston Ring, Piston Ring Groove Wear

- Check for uneven groove wear by in-specting the ring seat.

Cylinder/Piston

The rings should fit perfectly parallel to groove surfaces. If not, replace the piston and all the piston rings.

- With the piston rings in their grooves, make several measurements with a thickness gauge [A] to determine piston ring/groove clearance.



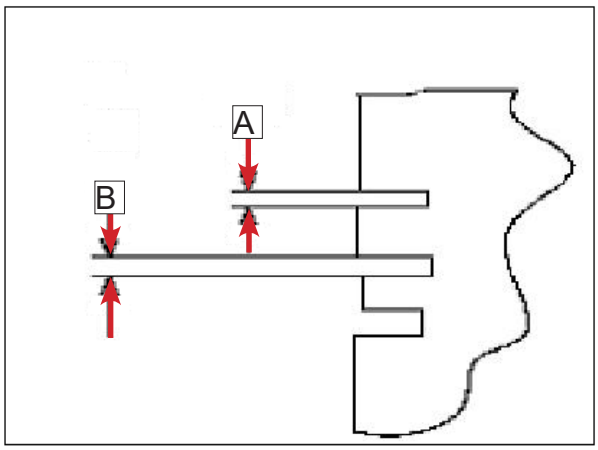
Top Ring/Groove Clearance
Top ring
Standard: 0.04mm~0.075mm
Service limit : 0.17mm
Second Ring/Groove Clearance
Standard: 0.02mm~ 0.06mm
Service limit: 0.16mm

5.9.7 Piston Ring Groove Width

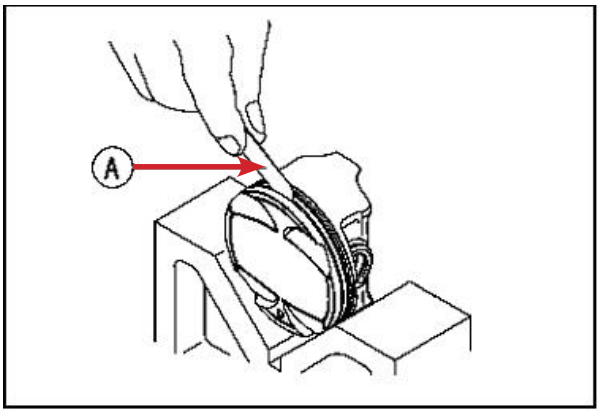
- Measure the piston ring groove width. Use a vernier caliper at several points around the piston.

Top Ring Groove Width[A]
Standard 0.92mm~0.94mm
Service limit:1.02mm

Second Ring Groove Width
Standard: 1.01mm ~1.03mm
Service limit: 1.11mm



Cylinder/Piston

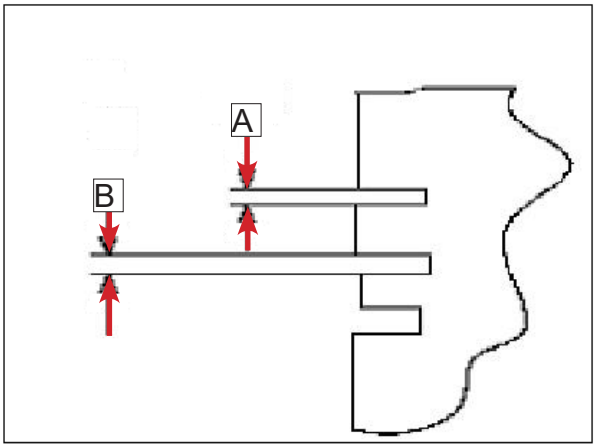


Measure the piston ring thickness:
Use the micrometer to measure at several points around the ring.

5.9.8 Piston Ring Thickness
Top ring [A]
Standard: 0.865mm ~0.88mm
Service limit: 0.80mm

Second ring [B]
Standard: 0.97mm~0.99mm
Service limit: 0.90mm
If any of the measurements is less than the service limit on either of the rings, re-place all the rings.

NOTE
When using new rings in a used piston, check for un-even groove wear. The rings should fit perfectly parallel to the groove sides. If not, replace the piston.



5.9.9 Piston Ring End Gap

- Place the piston ring [A] inside the cylinder, using the piston to locate the ring squarely in place. Set it close to the bottom of the cylinder, where cylinder wear is low.
- Measure the gap [B] between the ends of the ring with a thickness gauge.

Piston Ring End Gap
Top ring
Standard: 0.15mm~ 0.30mm
Service limit: 0.60mm

Cylinder/Piston

Second ring
Standard: 0.30mm~ 0.45mm
Service limit: 0.70mm

If the end gap of either ring is greater than the service limit, replace all the rings.

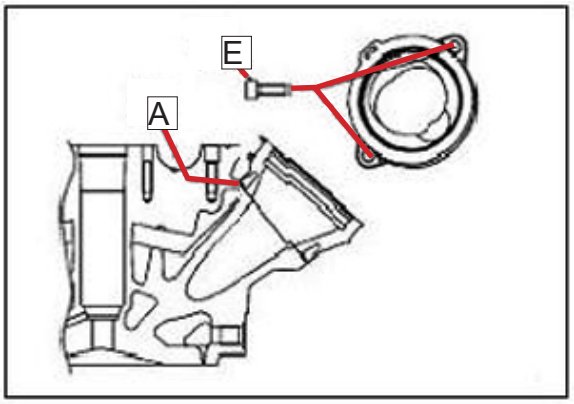
5.10 Intake manifold

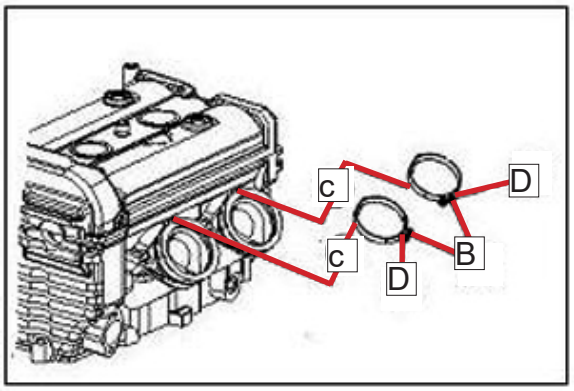
5.10.1 Intake manifold installation

Install the clamps [B] as shown and so that their projections fi t [C] on the holes of intake manifold. Be sure that the clamp bolt heads [D] face outwards.

- Tighten screw [E].

Torque - Intake manifold screw 12N•m





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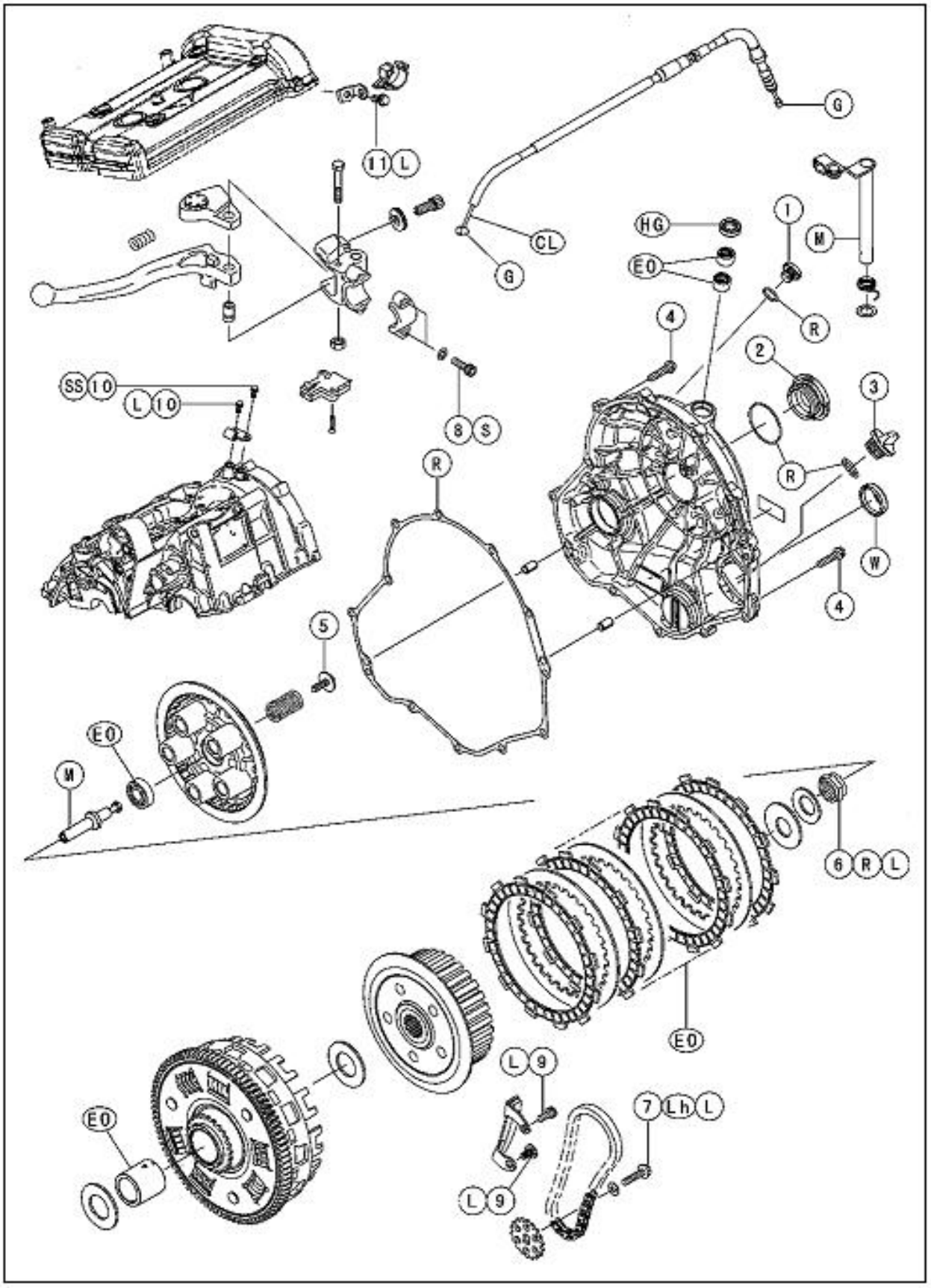
6.1 Exploded View



Exploded View

No.	Fastener	Torque			Remark
		N•m	kgf•m	ft•lb	
1	Timing checking hole cap	–	–	–	Tighten by hand
2	CPS checking hole cap	(25)	(2.5)	(18)	Tighten by hand
3	Oil filler cap	–	–	–	Tighten by hand
4	Mount bolt , right cover	12	1.2	106 in•lb	
5	Bolt, clutch spring	10	1.0	87 in•lb	
6	Nut,clutch	132	13.5	98	L,R
7	Bolt,oil pump sprocket	12	1.2	106 in•lb	L,Lh
8	Bolt,clutch rod	7.8	0.80	69 in•lb	S
9	Screw,oil pump chain guide	10	1.0	87 in•lb	L
10	Bolt,clutch cable bracket	10	1.0	87 in•lb	L/SS
11	Bolt,clutch cable bracket	10	1.0	87 in•lb	L

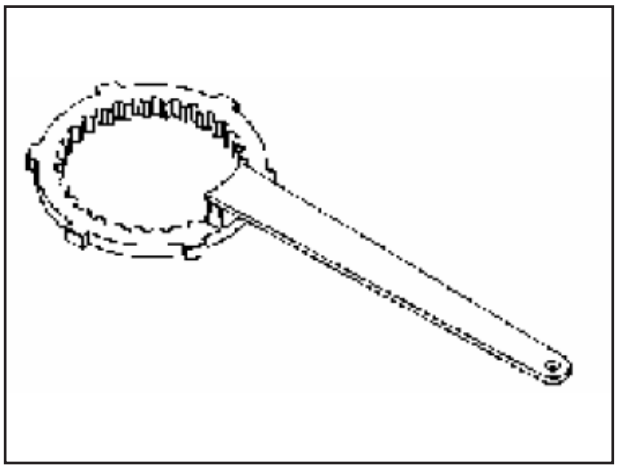
CL: Apply cable lubricant.
EO: Apply engine oil.
G: Apply grease.
HG: Apply high-temperature grease.
L: Apply a non-permanent locking agent.
Lh: Left-hand threads
M: Apply molybdenum disulfi de grease.
R: Replacement Parts
S: Follow the specifi ed tightening sequence.
W: Apply cylindrical surface grease.
SS: Apply Silicone sealant

6.2 Specifcations

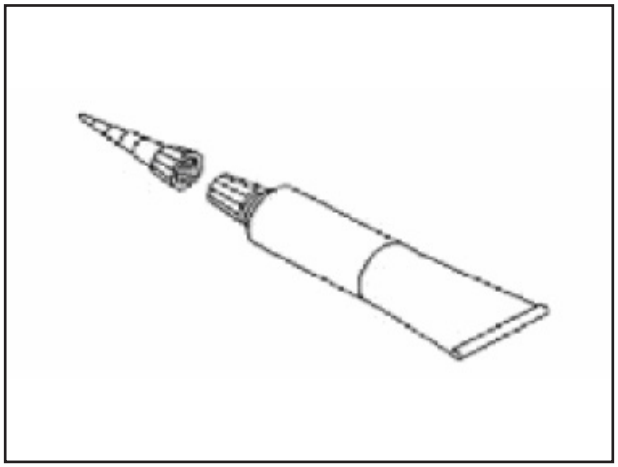
Item	Standard	Service
Clutch lever free play	2mm~3mm (0.08in~0.12in.)	– – –
Clutch		
Disc pad thickness	2.7mm~2.9mm (0.106in~0.114in.)	2.6mm (0.102in.)
Disc pad distortion	0.15mm (0.006in.)or less	0.3mm (0.012in.)
Steel pad distortion	0.15mm (0.006in.)or less	0.3mm (0.012in.)
Clutch spring free play	33.6mm (1.32in.)	32.6mm (1.28in.)

6.3 Special Tool and Sealant

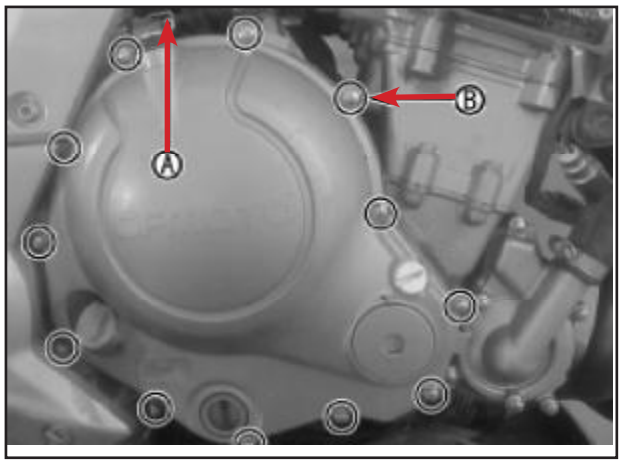
Clutch Holder



Silicone Sealant



6.4 Clutch Cover

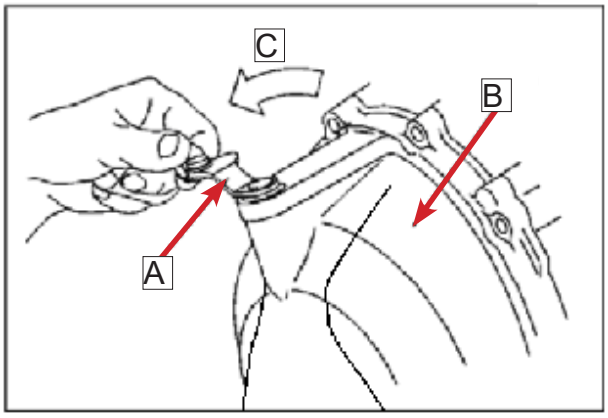


6.4.1 Clutch Cover Removal

- Remove:

Engine Oil (Drain, see Engine Oil Change in the Periodic Maintenance chapter)
Right Frame Cover (see Frame Cover Removal in the Frame chapter)
Clutch Cable Lower End [A]
Mounting Bolts, clutch Cover [B]

Turn the release lever [A] toward the rear as shown, and remove the clutch cover [B] About 90°[C].

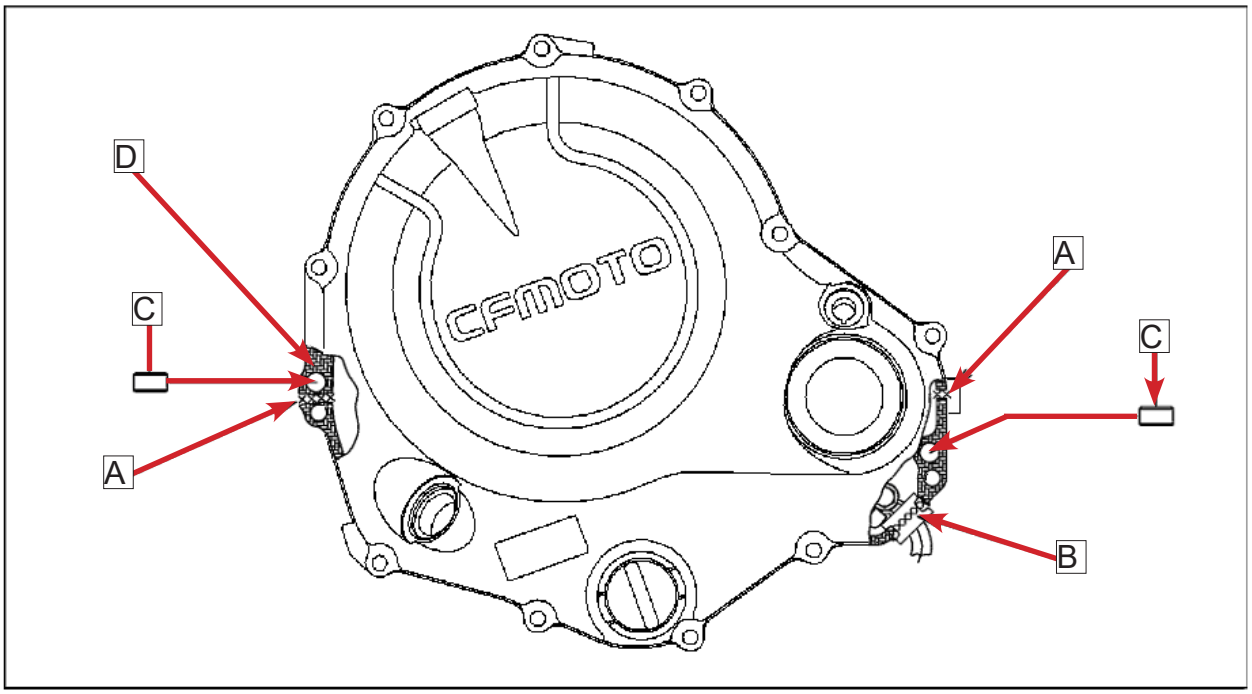


Clutch Cover

6.4.2 Right Clutch Cover Installation

- Apply silicone sealant to the area [A] where the mating surface of the crankcase touches the clutch cover gasket and to the crankshaft sensor lead grommet [B].
- Be sure that the dowel pins [C] are in position.
- Replace the clutch cover gasket [D] with a new one.
- Tighten the clutch cover mounting bolts

Torque-Clutch Cover Mounting Bolts: 12N•m

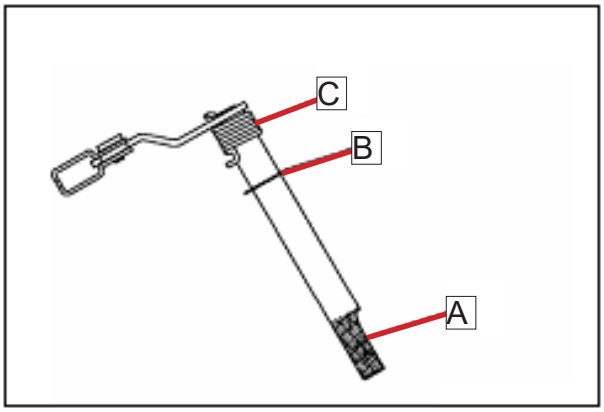


Clutch Cover

6.4.3 Release Shaft Removal

CAUTION
Do not remove the realease shaft assy unless it is necessary.If the shaft assy is removed already. Please replace the oil seal.

- Remove the clutch cover (see Clutch Cover Removal).
- Pull the lever and shaft assembly straight out of the clutch cover



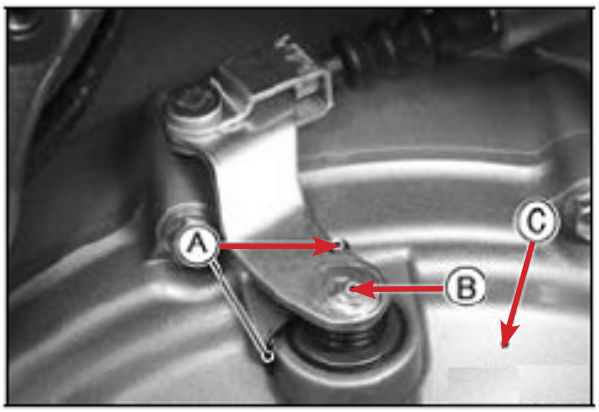
6.4.4 Release Shaft Installation

- Apply high-temperature grease to the oil seal lips on the upper ridge of the clutch cover.
- Apply engine oil to the needle bearings in the hole of the clutch cover.
- Apply molybdenum disulfide grease to the pusher-holding portion [A] on the release shaft.
- Install the washer [B] and spring [C].
- Insert the release shaft straight into the upper hole hole of theclutch cover.

CAUTION
When inserting the release shaft, be care-ful not to remove the spring of the oil seal.

- Fit the spring [A] as shown.

Release Shaft [B]
Right Clutch Cover [C]



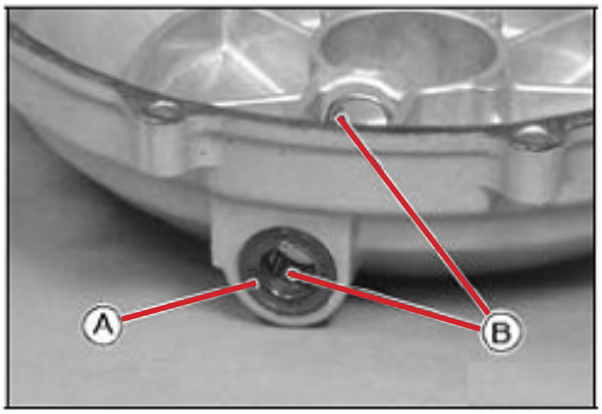
Clutch Cover

6.4.5 Right Clutch Cover Disassembly

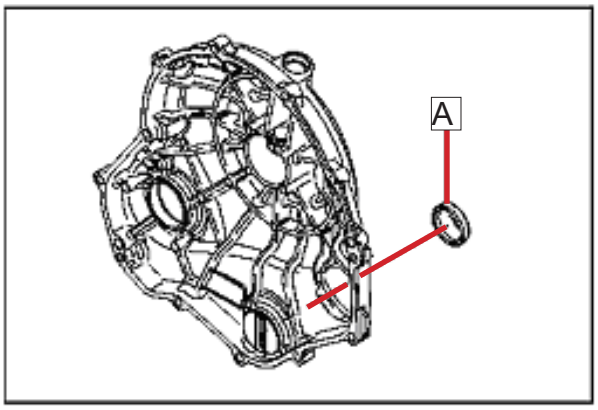
- Remove:

Oil Seal [A]

Needle Bearings [B]



- Remove the oil level viewing window [A].



Clutch Cover

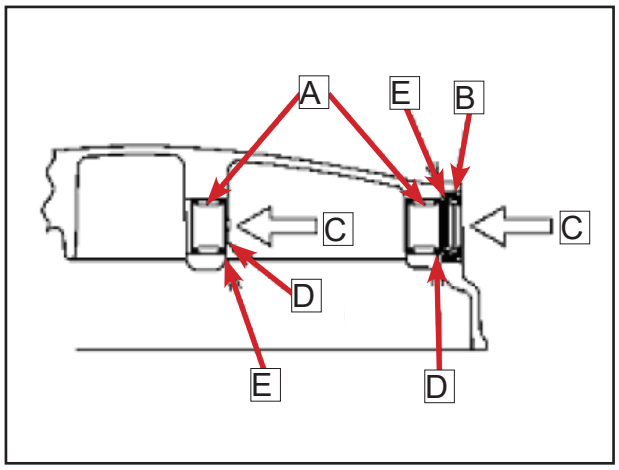
6.4.6 Clutch Cover Assembly

- Replace the needle bearings and oil seal with new ones

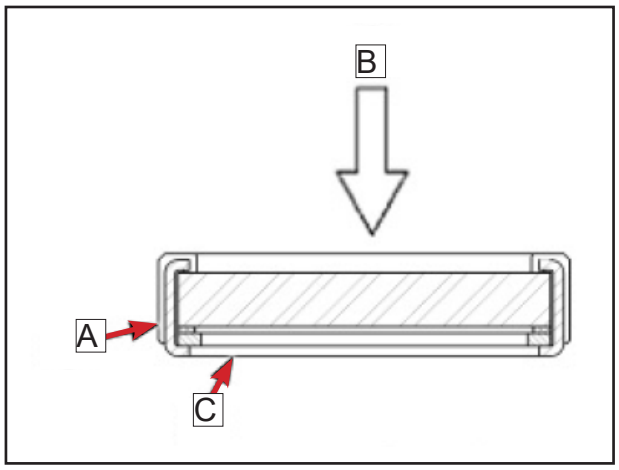
NOTE
Install the needle bearings so that the manufacture's mark face out.

- Install the needle bearings [A] and oil seal [B] position as shown.

Then press [C] the bearing so that the bearing surface [D] is flush with the housing end of clutch cover [E].



- Apply grease to the rubber of the oil gauge [A] and press [B] it so that the ring [C] face outside.

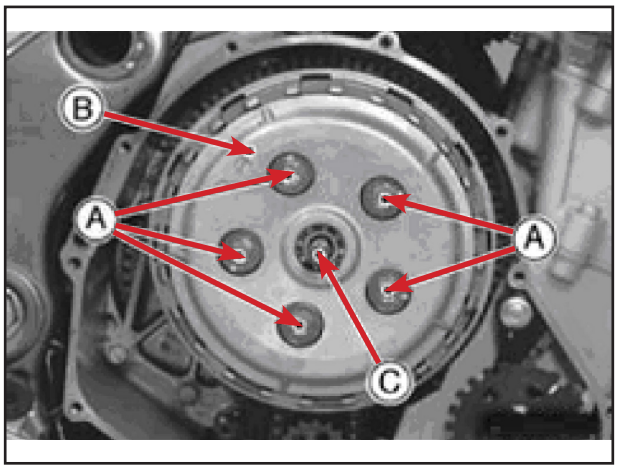


6.5 Clutch

6.5.1 Clutch Removal

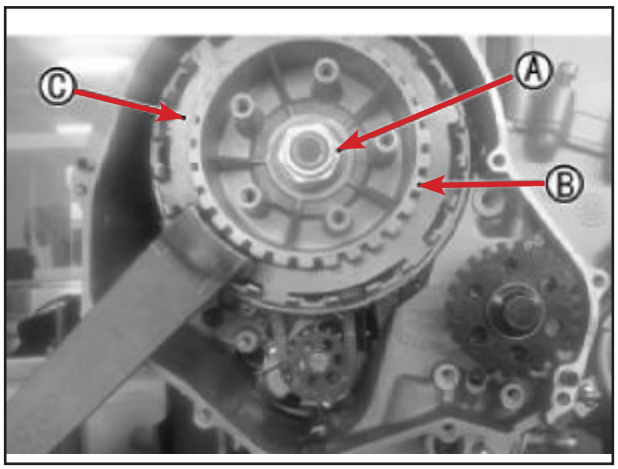
• Remove:

Engine Oil (Drain, see Engine Oil Change in the Periodic Maintenance chapter)
Clutch Cover (see Clutch Cover Removal)
Clutch Spring Bolts [A]
Clutch Springs
Clutch Spring Plate [B] (with thrust bearing and pusher [C])



• Remove:

Friction Plates, Steel Plates
Clutch Hub Nut [A]
Holding the clutch hub [B]
Nut and washer.
Special Tool - Clutch Holder [C]



• Remove:

Clutch Hub Spacer
Washer, shaft sleeve

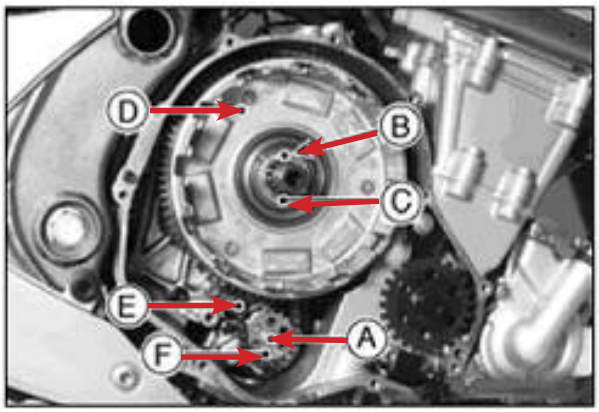
Clutch

- Remove the oil pump sprocket bolt [A].

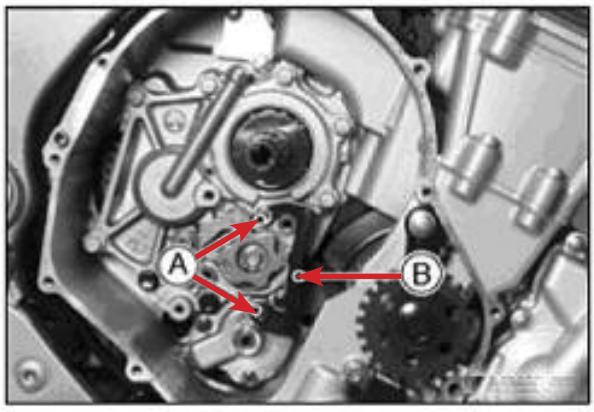
NOTE
The oil pump sprocket bolt has a left-hand threads.

- Using the hole [B], pull out the sleeve [C].
- Remove the following as a set.

Clutch Housing [D]
Oil Pump Chain [E]
Oil Pump Sprocket [F]



- Unscrew the bolts [A] and remove the oil pump chain guide [B].

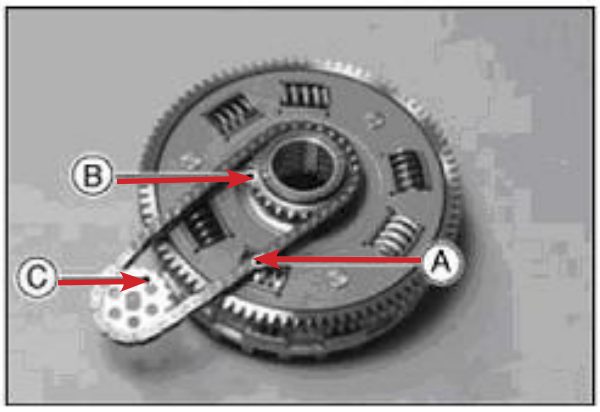


6.5.2 Clutch Installation

- Apply a non-permanent locking agent to the oil pump chain guide bolts and tighten them.

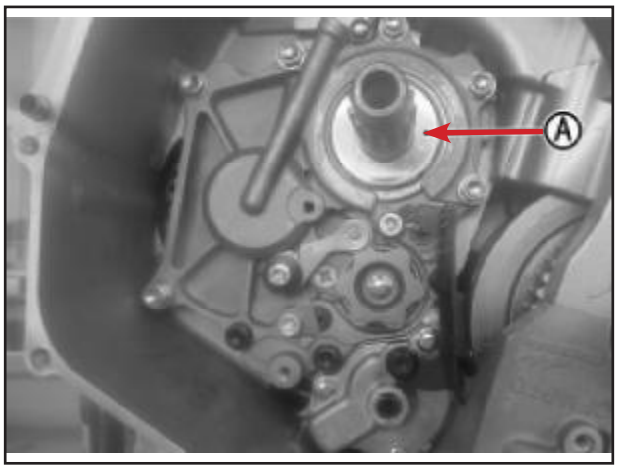
Torque - Oil Pump Chain Guide Bolts: 10 N•m

- Put the oil pump chain [A] on the clutch housing gear [B] and the oil pump sprocket [C].

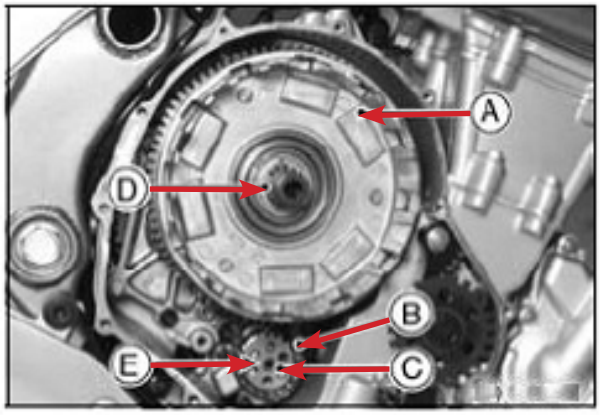


Clutch

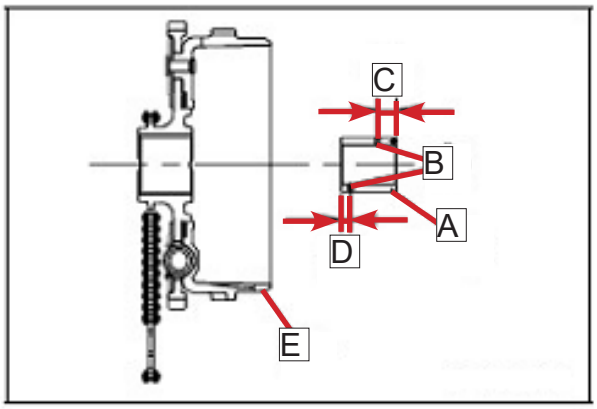
- Be sure that the spacer [A] is in position.
- Insert the following on the drive shaft. Clutch Housing [A] with Chain [B] and Sprocket [C]
- Align [E] the hole on the oil pump sprocket with the oil pump shaft.
- Apply engine oil on the sleeve [D] and insert to Clutch Housing [A].



NOTE
Insert the sleeve into the clutch housing, noting its direction as shown.



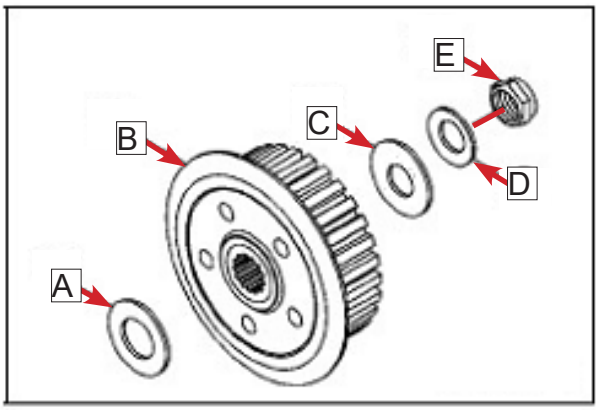
Sleeve [A]
Oil Holes [B]
Long Distance [C]
Short Distance [D]
Clutch Housing [E]



Clutch

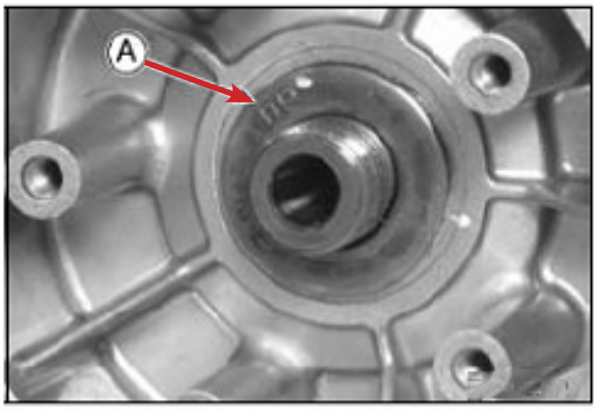
- Install the following parts on the drive shaft.

Spacer [A]
Clutch Hub [B]
Washer [C]
Elastic washer[D]
Nut [E]



Install the washer so that the OUTSIDE mark [A] faces outward.
Replace the clutch hub nut with a new one and apply screw fastening grease.
Holding the clutch hub, tighten the clutch hub nut

Special Tool - Clutch Holder
Torque - Clutch Hub Nut: 132 N•m

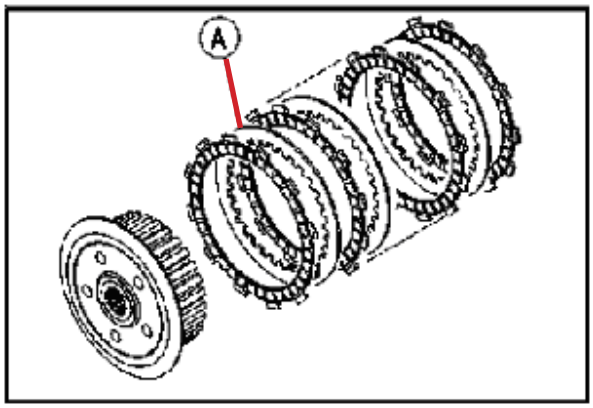


Clutch

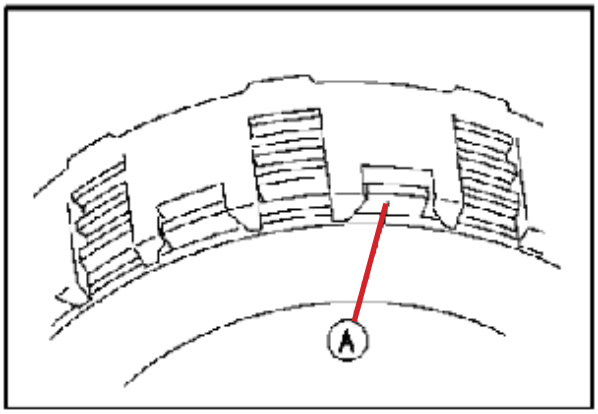
- Install the friction plates and steel plates, starting with a friction plate and alternating them

CAUTION
If new dry friction plates and steel plates are installed, apply engine oil to the sur-faces of each plate to avoid clutch plate seizure.

For the first and second steel plate [A], its thickness is 2mm The others are 2.5mm



Install the last friction plate [A] fitting the tangs in the grooves in the housing as shown.



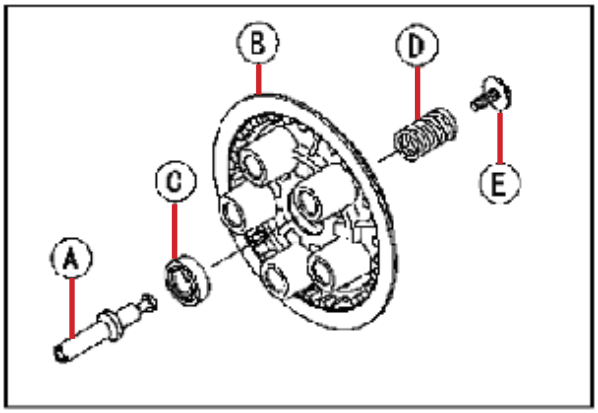
- Apply molybdenum disulfi de grease to the pusher ends [A] and install it in the clutch spring plate [B].

Apply engine oil to the bearing [C].

- Install the clutch spring plate and springs [D], and tighten the clutch spring bolts [E].

Torque - Clutch Spring Bolts:10N•m

- Install the clutch cover (see Clutch Cover Installation).



Clutch

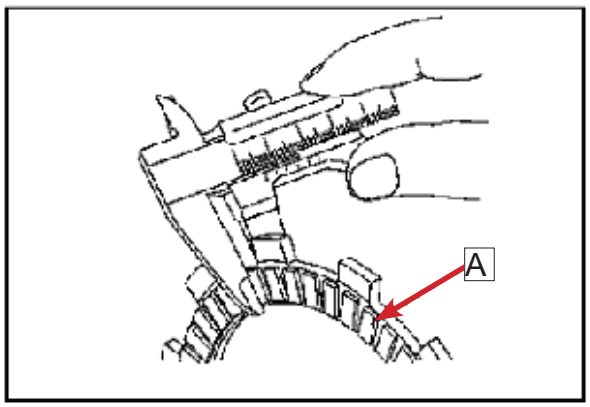
6.5.3 Clutch Plate Wear, Damage Inspection

Visually inspect the friction and steel plates for signs of seizure,overheating (discoloration), or uneven wear

- Measure the thickness of each friction plate [A] at several points.

If any plates show signs of damage, or if they have worn past the service limit, replace them with new ones.

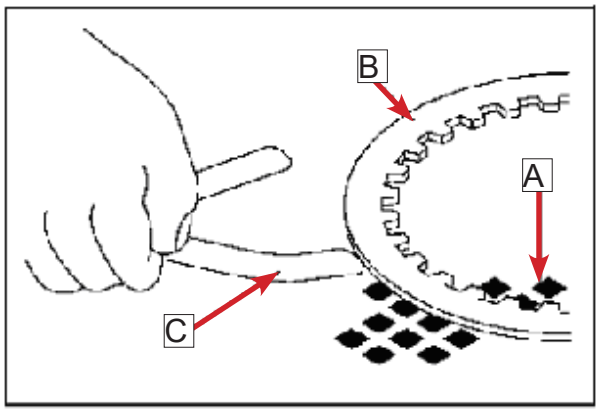
Friction Pad Thickness
Standard: 2.7mm~2.9mm
Service Limit: 2.6 mm



6.5.4 Clutch Plate Warp Inspection

- Place each friction plate or steel plate on a surface plate and measure the gap between the surface plate [A] and each friction plate or steel plate [B] with a thickness gauge [C]. The gap is the amount of friction or steel plate warp. If any plate is warped over the service limit, replace it with a new one.

Friction and Steel Plate Warp
Standard: 0.15 mm or less
Service Limit: 0.3 mm

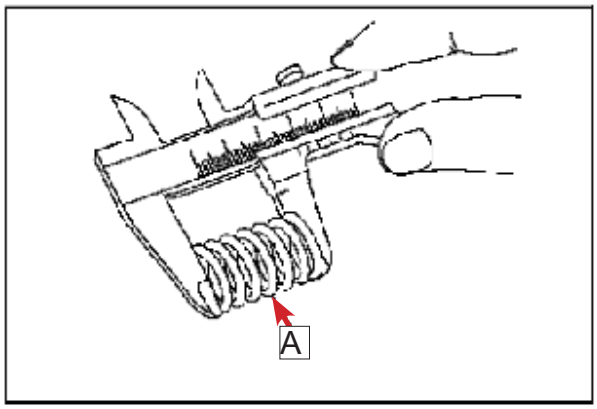


6.5.5 Clutch Spring Free Length Measurement

- Measure the free length of the clutch springs [A].

If any spring is shorter than the service limit, it must be replaced.

Clutch Spring Free Length
Standard: 33.6mm
Service Limit: 32.6 mm

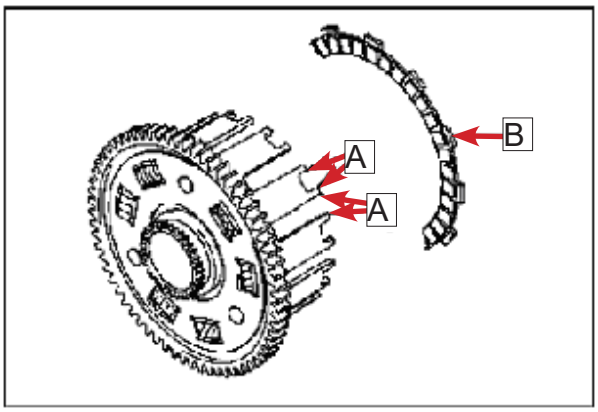


Clutch

6.5.6 Clutch Housing Finger Inspection

- Visually inspect the clutch housing fingers [A] where the friction plate tangs [B] hit them.

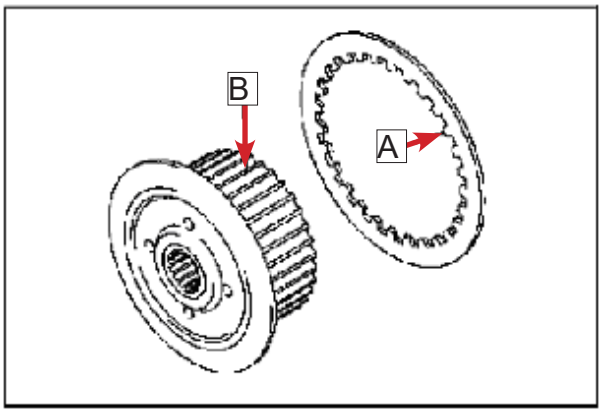
If they are badly worn or if there are groove cuts where the tangs hit, replace the housing. Also, replace the friction plates if their tangs are damaged.



6.5.7 Clutch Housing Spline Inspection

- Visually inspect where the teeth [A] on the steel plates wear against the clutch hub splines [B].

If there are notches worn into the splines, replace the clutch hub. Also, replace the steel plates if their teeth are damaged.



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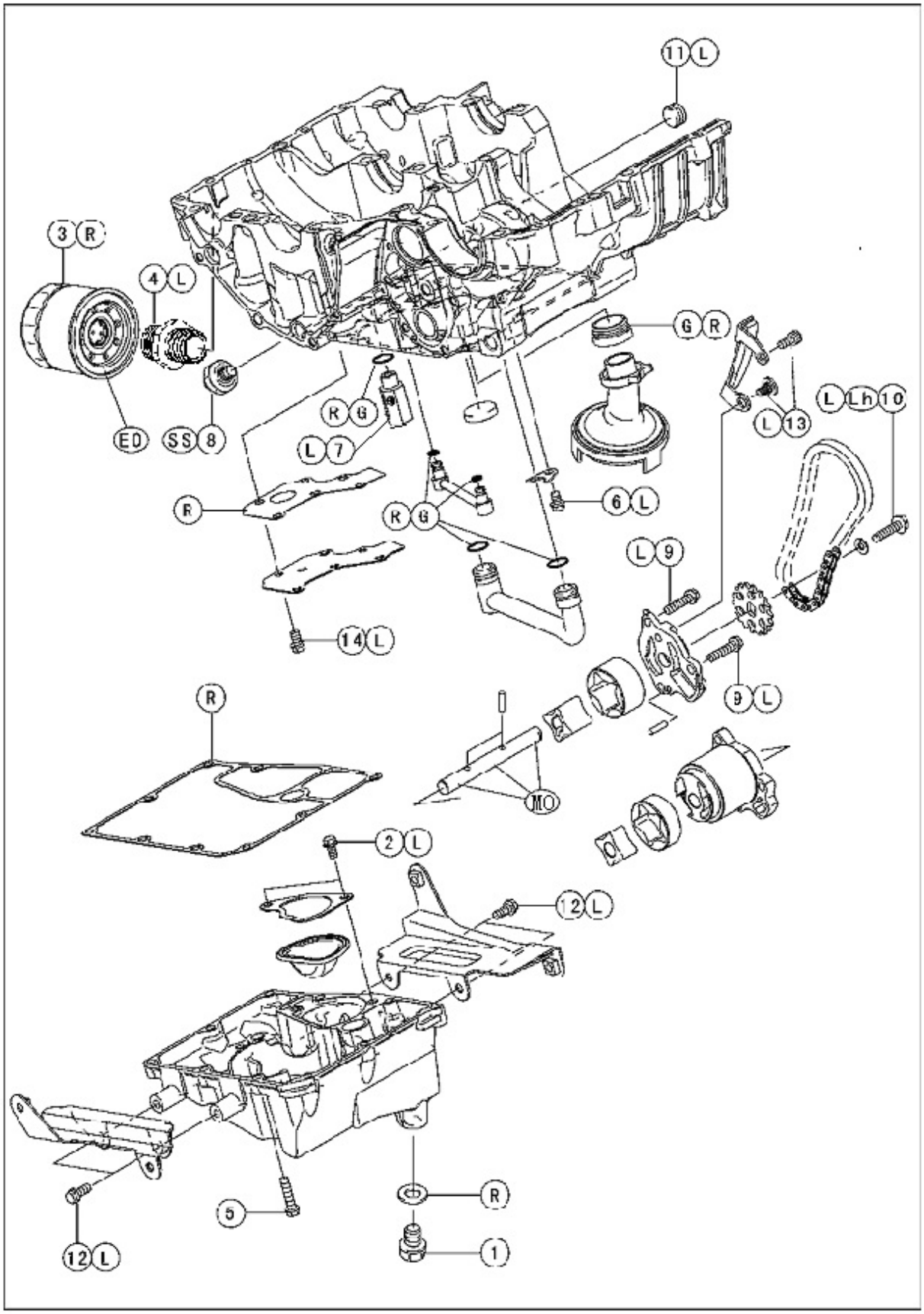
7.1 Exploded View

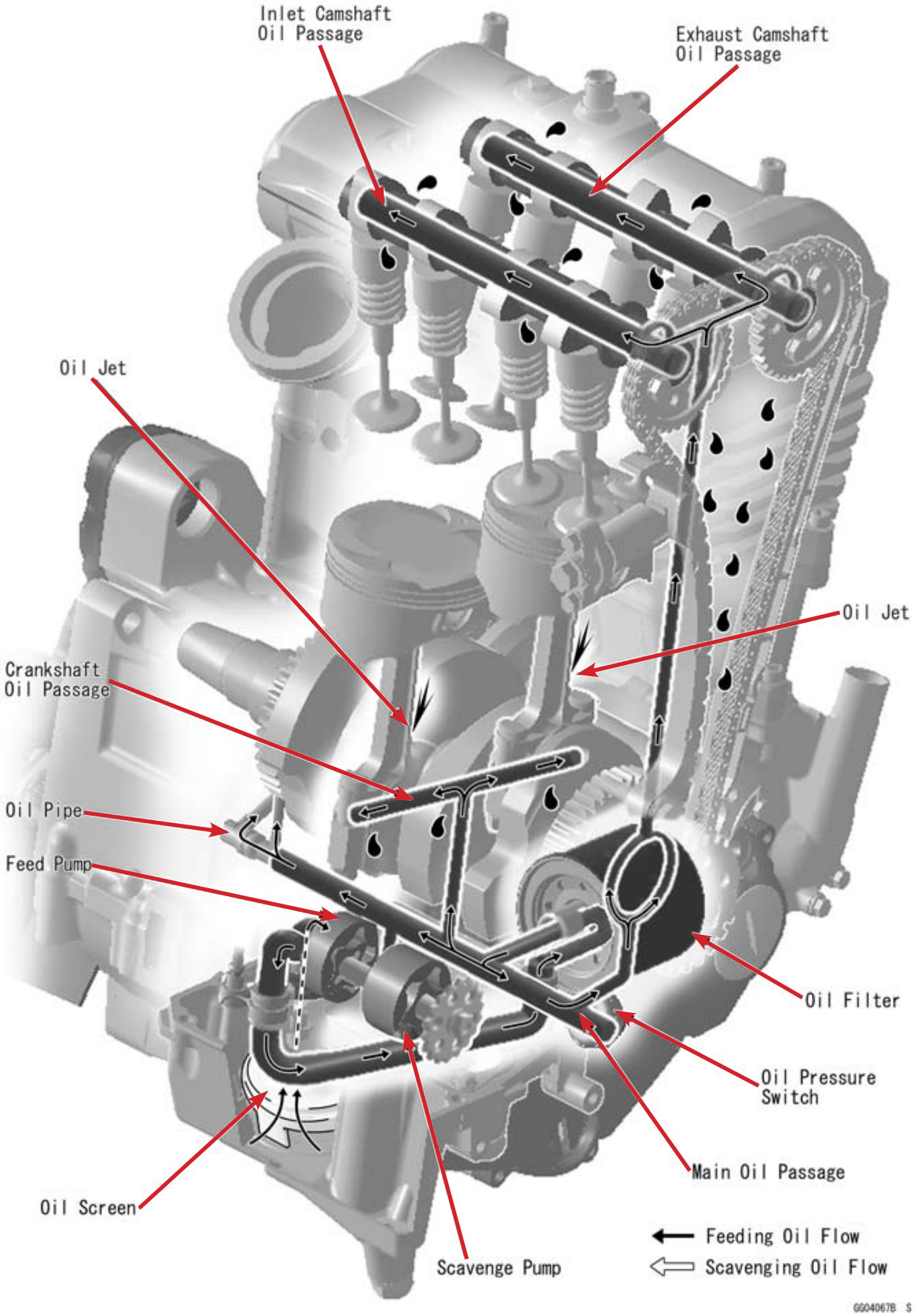


Exploded View

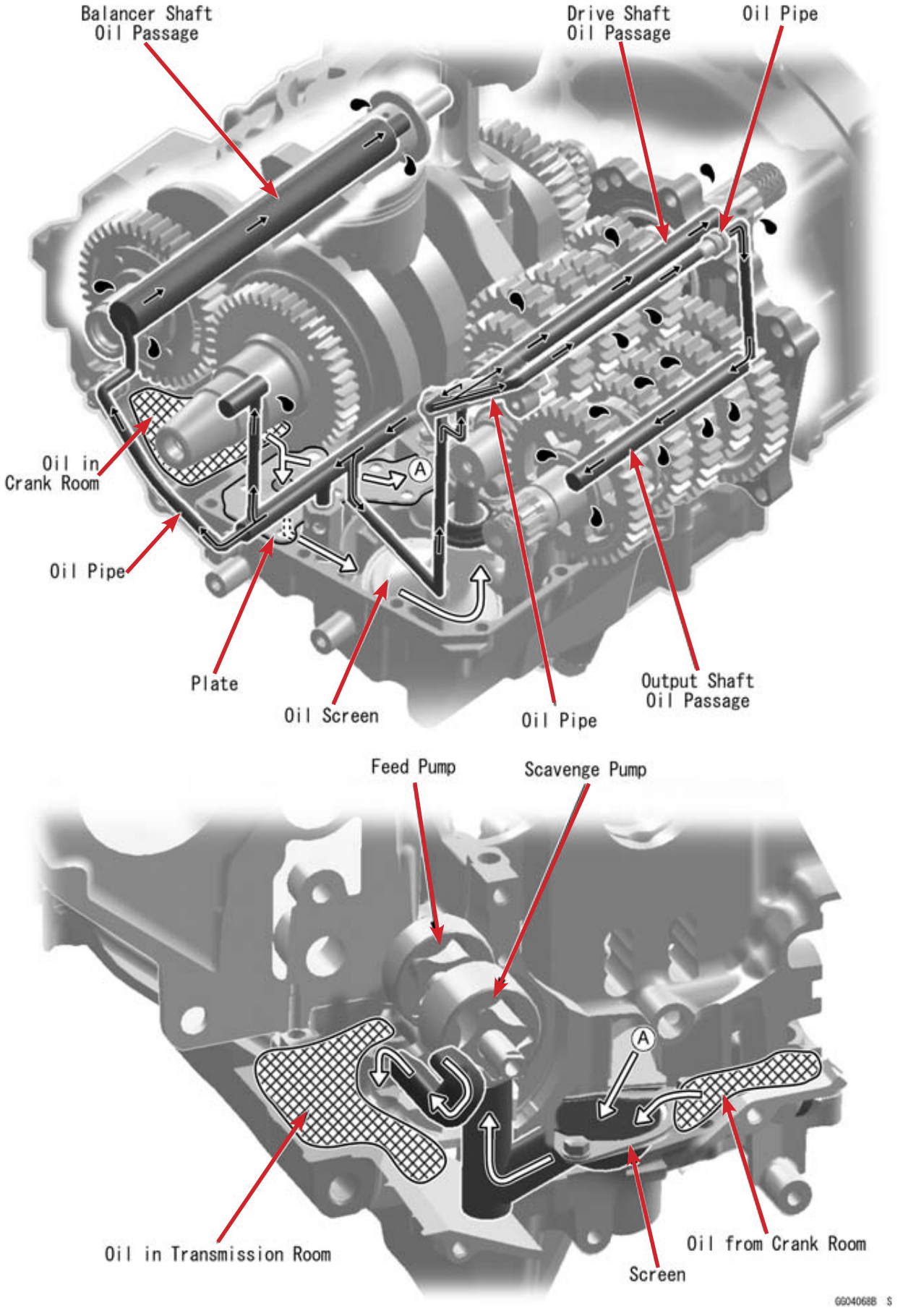
No.	Fastener	Torque			Remark
		N•m	kgf•m	ft•lb	
1	Oil drain bolt	30	3.0	22	
2	Oil strainer plate bolt	10	1.0	87in•lb	L
3	Oil filter	17	1.75	13	EO,R
4	Oil filter mounting bolt	25	2.5	18	L
5	Oil pan bolt	12	1.2	106in•lb	
6	Oil pipe I plate bolt	8	0.8	71in•lb	L
7	Oil pressure limit valve	15	1.5	11	L
8	Oil pressure warning switch	(15)	(1.5)	(11)	Tighten by
9	Oil pump cover bolt	12	1.2	106in•lb	L
10	Oil pump sprocket bolt	12	1.2	106in•lb	L,Lh
11	Main oil line screw plug	20	2.0	15	L
12	Lower fairing bracket bolt	12	1.2	106in•lb	L
13	Oil pump chain conducting screw	10	1.0	87in•lb	L
14	Lower crankcase cover bolt	10	1.0	87in•lb	L

EO: Apply engine oil
G: Apply grease
L: Apply an on-permanent locking agent
Lh: Left-hand threads
MO: Apply molybdenum disulfi de oil solution
(Mixture of the engine oil and molybdenum disulfi de grease in a weight ratio10:1)
R: Replacement Parts
SS: Applysiliconesealant

7.2 Engine Oil Flow Chart



Engine Oil Flow Chart

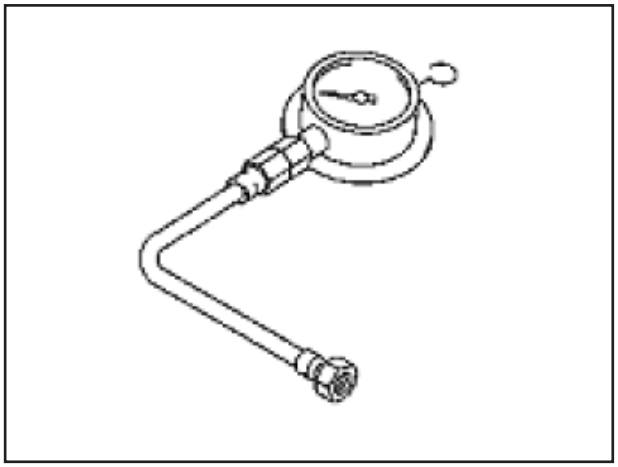


7.3 Specifcations

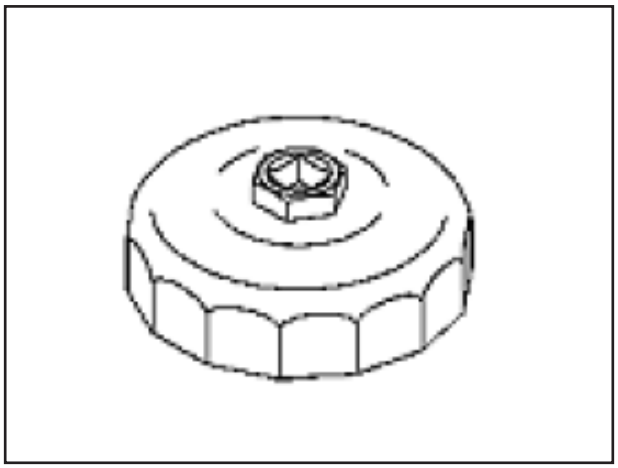
Item	Standard
Engine oil Style Viscosity Capacity Level	 ELF 10W-40/SJ JASO MA2 10W-40 2.2L (2.3US qt) (With filter replaced) 2.6L (2.7US qt) (When engine is totally dried) Between upper and lower line
Oil pressure	216kPa~294kPa(2.2kgf/cm^2~3.0kgf/cm^2,31psi~43psi)at 4000r/min(rpm),oil temperature is 90°C (194°F)

7.4 Special Tools and Sealant

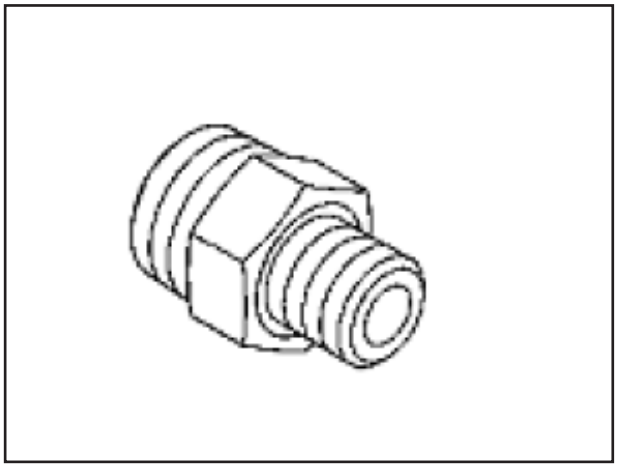
Oil Pressure Gauge,10kgf/cm²



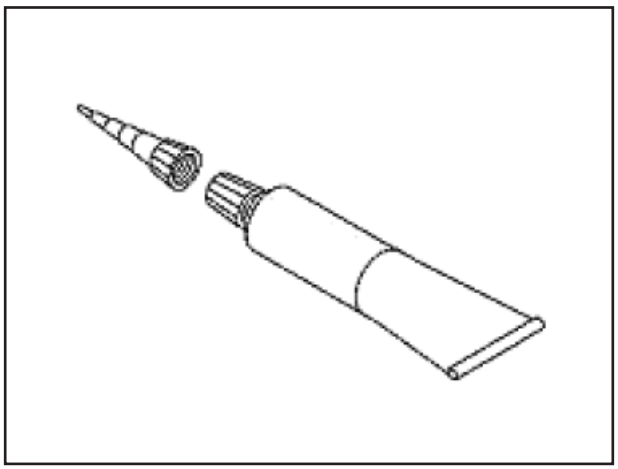
Oil Filter Wrench



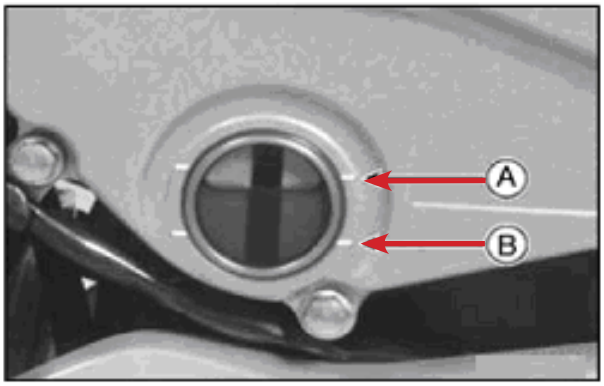
Oil Pressure Gauge Adapter,PT3/8



Silicone Sealant



7.5 Engine Oil and Oil Filter



⚠WARNING

Motorcycle operation with insufficient, deteriorated, or contaminated engine oil will cause accelerated wear and may re-sult in engine or transmission seizure, accident, and injury.

7.5.1 Oil Level Inspection

- Check that the engine oil level is between the upper [A] and lower [B] levels in the engine.

NOTE

Situate the motorcycle so that it is perpendicular to the ground.
If the motorcycle has just been used,wait several minutes for all the oil to drain down.
If the oil has just been changed, start the engine and run it for several minutes at idle speed. This fills the oil filter with oil. Stop the engine, then wait several minutes until the oil settles.

⚠WARNING

Racing the engine before the oil reaches every part can cause engine seizure. If the engine oil gets extremely low or if the oil pump or oil passages clog up or oth-erwise do not function properly, the oil pressure warning light will light. If this light stays on when the engine is running above idle speed, stop the engine imme-diately and f nd the cause.

Engine Oil and Oil Filter

If the oil level is too high, remove the excess oil, using a syring or some other suitable device.

If the oil level is too low, add the correct acmount of oil through the oil fi lter opening. Use the same type and make of oil that is already in the engine.

NOTE
If the engine oil type and make are unknown, use any brand of the specifi ed oil to top off the level in preference to run-ning the engine with the oil level low. Then at your earliest convenience, change the oil completely.

7.5.2 Engine Oil Change

- Refer to the Engine Oil Change in the Periodic Maintenance chapter.

7.5.3 Oil Filter Replacement

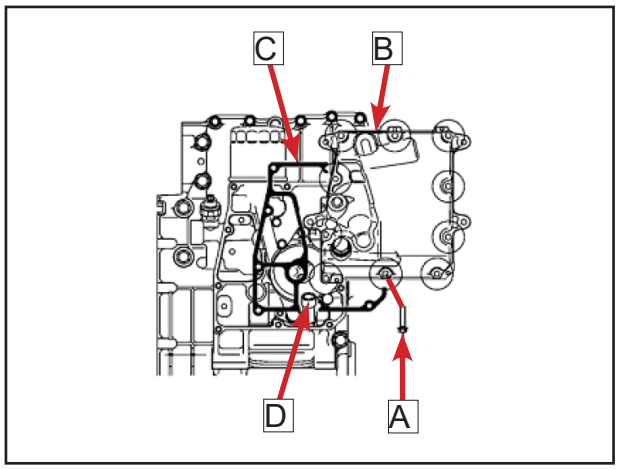
- Refer to the Oil Filter Replacement in the Periodic Maintenance chapter.

7.6 Oil Pan

7.6.1 Oil Pan Removal

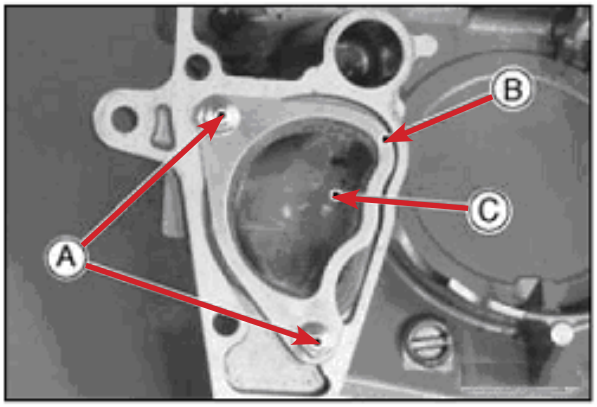
- Remove:

Engine oil (Drain, see Engine Oil Change in the Periodic Maintenance chapter)
Exhaust Pipe (see Exhause Pipe Removal in the Engine Top End chapter)
Muffler body (see Muffler Body Removal in the Engine Top End chapter)
Oil Pan Bolts [A]
Oil Pan [B]
Gasket [C]
Damper [D]



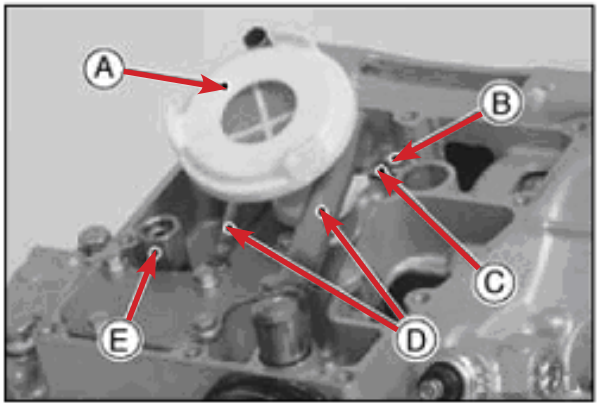
- Remove the following from the oil pan as necessary.

Filter Plate Bolts [A]
Filter Plate [B]
Filter [C]



- Remove the following from the lower crankcase when necessary.

Oil Screen [A]
Oil Pipe I Plate Bolt [B]
Oil PipeI Plate [C]
Oil Pipes I and III [D]
Oil Pressure Relief Valve [E]



Oil Pan

7.6.2 Oil Pan Installation

- Apply grease to the O-rings on the oil pipes [A]
- Install the oil pipe I plate [B] so that its guide portion [C] fi ts the breather pipe [D] as shown.
- Apply a non-permanent locking agent to the oil pipe I plate bolt.

Torque:Oil Pipe I Plate Bolt [E]: 8N•m

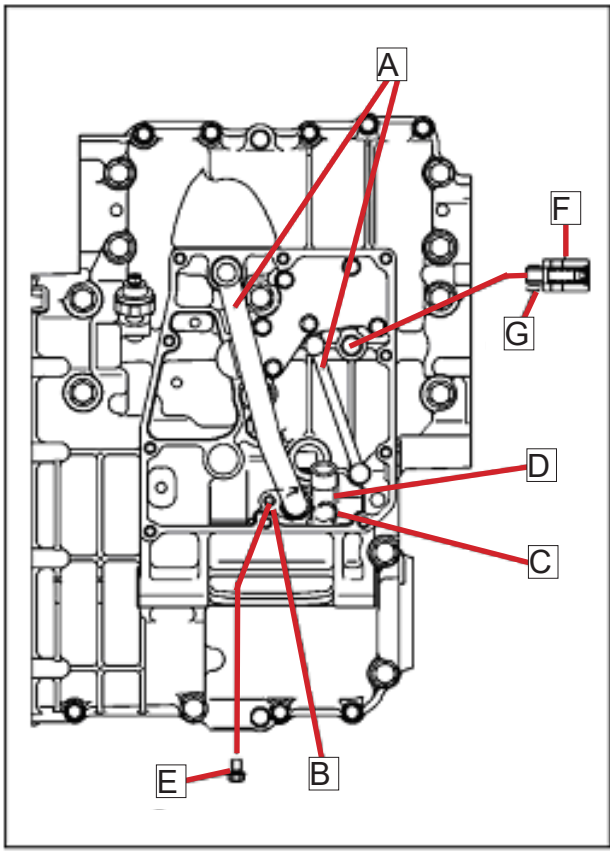
If the oil pressure relief valve [F] was removed, install it.

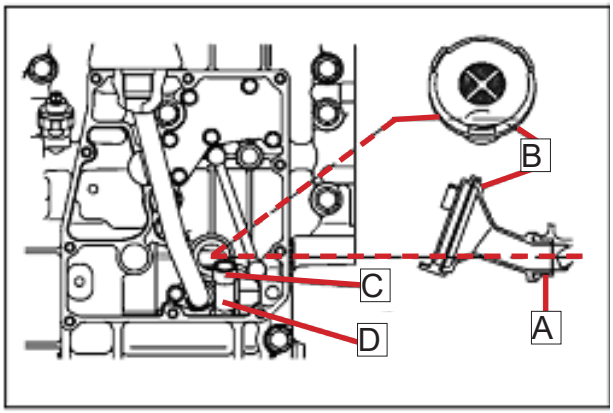
Apply a non-permanent locking agent to the threads [G] of the oil pressure relief valve, and tighten it.

Torque: Oil Pressure Relief Valve:15N•m

CAUTION
Do not apply too much non-permanent locking agent to the threads. This may block the oil passage.

- Apply grease to the O-ring [A] on the oil screen [B] and install it on the lower crank-case hald as shown.
- Be sure the damper [C] is on the end of the breather pipe [D].

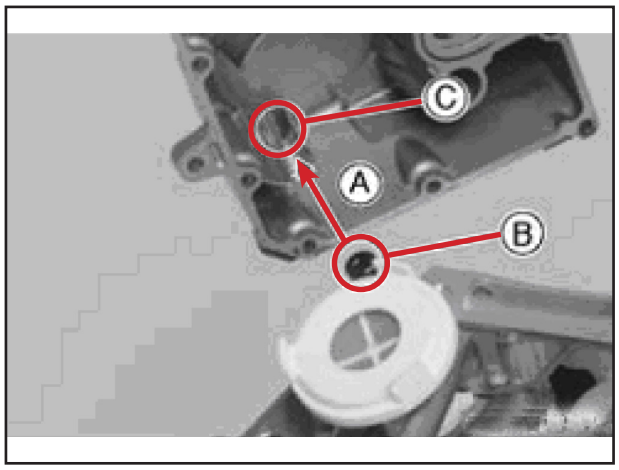




Oil Pan

- Replace the oil pan gasket with a new one.
- When installing the oil pan, align [A] the damper [B] on the breather pipe with the hol-low [C] on the oil pan.
- Tighten Oil Pan Bolts

Torque:Oil Pan Bolts: 12N•m



7.7 Oil Pressure Relief Valve

7.7.1 Oil Pressure Relief Valve Removal

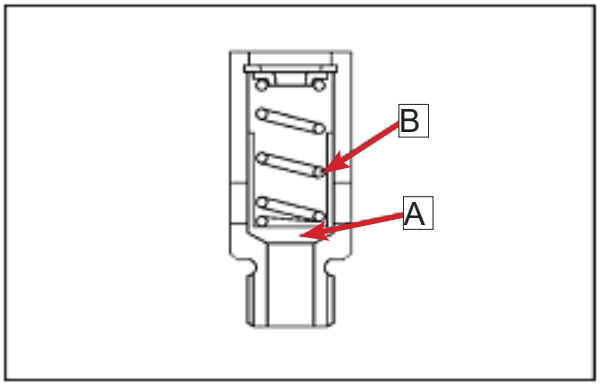
- Refer to the Oil Pan Removal.

7.7.2 Oil Pressure Relief Valve Installation

- Refer to the Oil Pan Installation

7.7.3 Oil Pressure Relief Valve Inspection

- Check to see if the valve [A] slides smoothly when pushing it in with a wooden or other soft rod, and see if it comes back to its seat by spring [B] pressure



NOTE
Inspect the valve in its assembled state Disassembly and assembly may change the valve performance. **If any rough spots are found during above inspection, wash the valve clean with a high-flash point solvent and blow out any foreign particles that may be in the valve with compressed air.**

⚠WARNING
Clean the oil pressure relief valve in a well ventilated area, and take care that there is no spark or flame anywhere near the working area. Because of the danger of highly flammable liquids, do not use gasoline or low fash point solvent.

If cleaning does nos solve the problem, re-place the oil pressure relief valve as an accessory. The oil pressure relief valve is pre-cision made with no allowance for replace-ment of individual parts.

7.8 Oil Pump

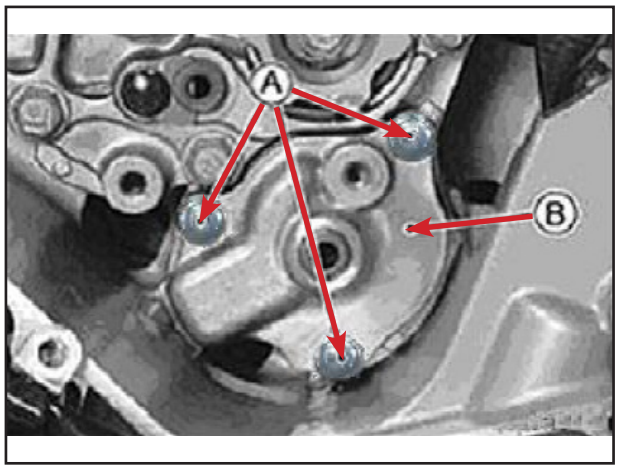
7.8.1 Oil Pump Removal

- Drain:

Engine Oil (see Engine Oil Change in the Periodic Maintenance chapter)

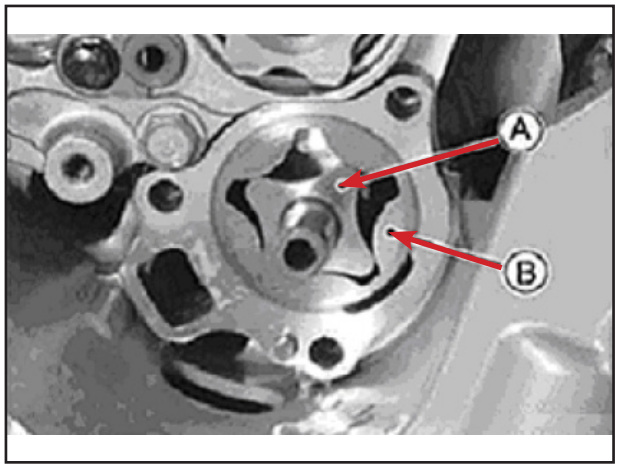
- Remove:

Clutch (see Clutch Removal in the Clutch chapter)
Oil Pump Cover Bolts [A]
Oil Pump Cover [B]



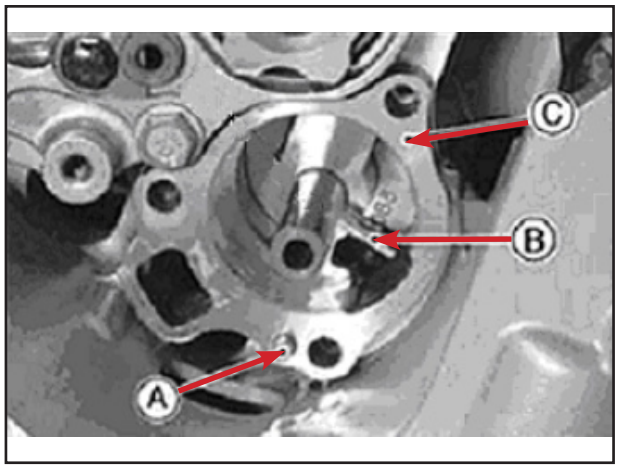
- Remove:

Inner Rotor [A] for Scavenge Pump
Outer Rotor [B] for Scavenge Pump



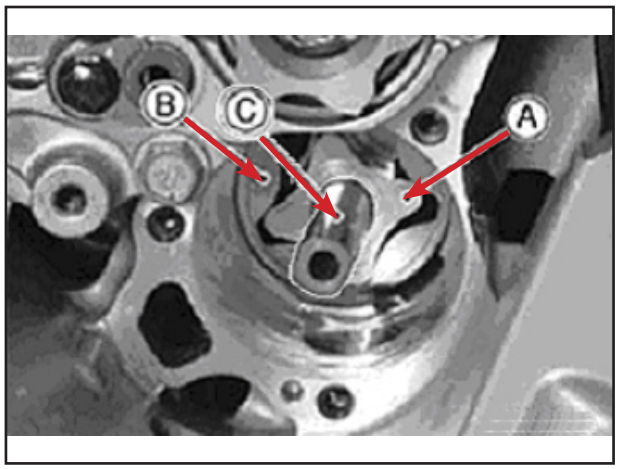
- Remove:

Dowel Pin [A]
Pin [B]
Oil Pump Body [C]

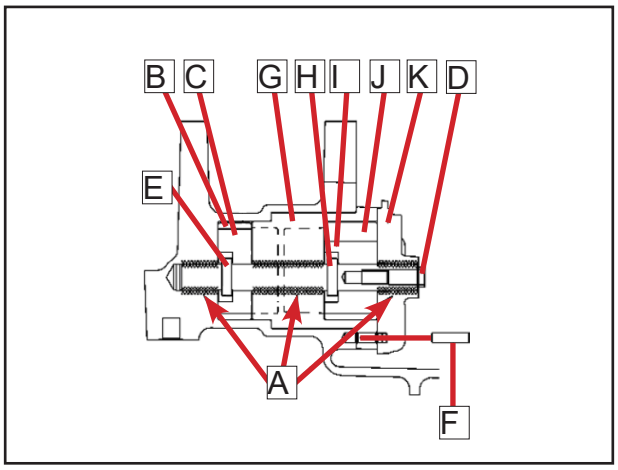


- Remove:

Oil Pump Shaft [C] with Inner Rotor [A] and Pin for Feed Pump
Outer Rotor [B] for Feed Pump



Oil Pump



7.8.2 Oil Pump Installation

- Apply molybdenum disulfi de grease to the portion [A] of the oil pump shaft as shown.
- Install:

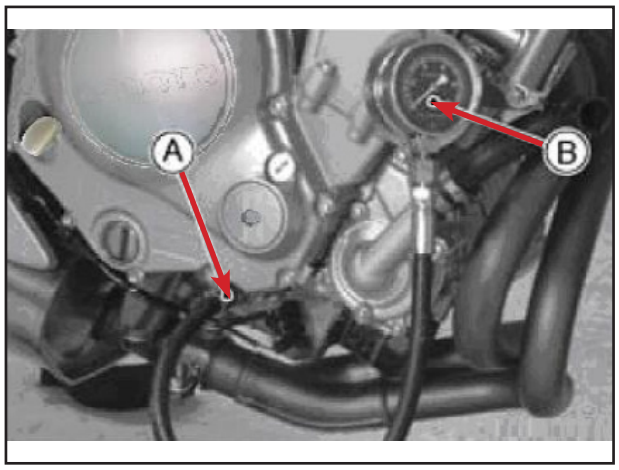
uter Rotor [B] for Feed Pump
Inner Rotor [C] for Feed Pump
Oil Pump Shaft [D] and Pin [E]
Dowel Pin [F]
Oil Pump Body [G]
Pin [H] and Inner Rotor [I] for Scavenge Pump Outer Rotor [J] for Scavenge Pump
Oil Pump Cover [K]

NOTE
The scavenge pump rotors are wider than the feed pump rotors.

- Apply a non-permanent locking agent to the oil pump cover bolts and tighten them.

Torque: Oil Pump Cover Bolts:12N•m

7.9 Oil Pressure Measurement



Oil Pressure Measurement

- Remove the lower fairing (see Lower Fair-ing Removal in the Frame chapter)
- Remove the oil passage plug, and attach the adapter [A] and gauge [B] to the plug hole.

Special Tools:
Oil Pressure Gauge 10kgf/cm2
Oil Pressure Gauge Adapter, PT3/8

- Start the engine and warm up the engine
- Run the engine at the specifi ed speed, and read the oil pressure gauge.

If the oil pressure is much lower than the standard, check the oil pump, relief valve, and/or crankshaft bearing insert wear immediately.

If the reading is much higher than the standard, check the oil passages for clogging

Oil Pressure

Standard: When RPM is at 4000r/min (rpm), oil temperature shoule be 90°C (194 °F) 216kPa~294kPa (2.2kgf/cm^2~3.0kgf/cm^2,31psi~43psi)

- Stop the engine
- Remove the oil pressure gauge and adapter

⚠WARNING

Take care against burns form hot engine oil that will drain through the oil passage when the gauge adapter is removed.

- Apply a non-permanent locking agent to the oil passage plug, and install it.

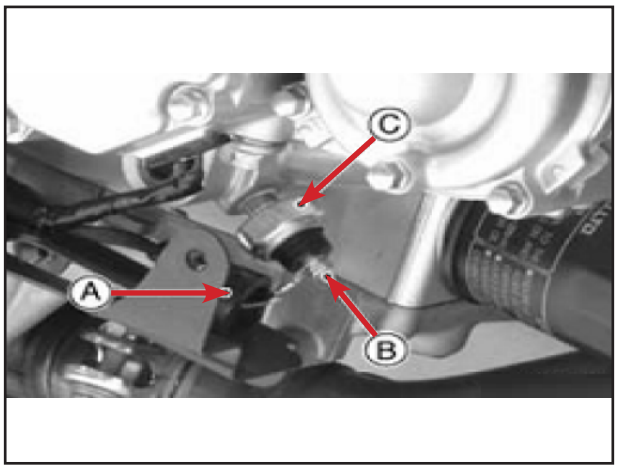
Torque: Oil Passage Plug:20N•m

7.10 Oil Pressure Warning Switch

7.10.1 Oil Pressure Switch Removal

- Remove:

Engine Oil (Drain, see Engine Oil Change in the Periodic Maintenance chapter)
Switch Cover [A]
Switch Terminal Bolt [B]
Oil Pressure Warning Switch [C]



7.10.2 Oil Pressure Switch Installation

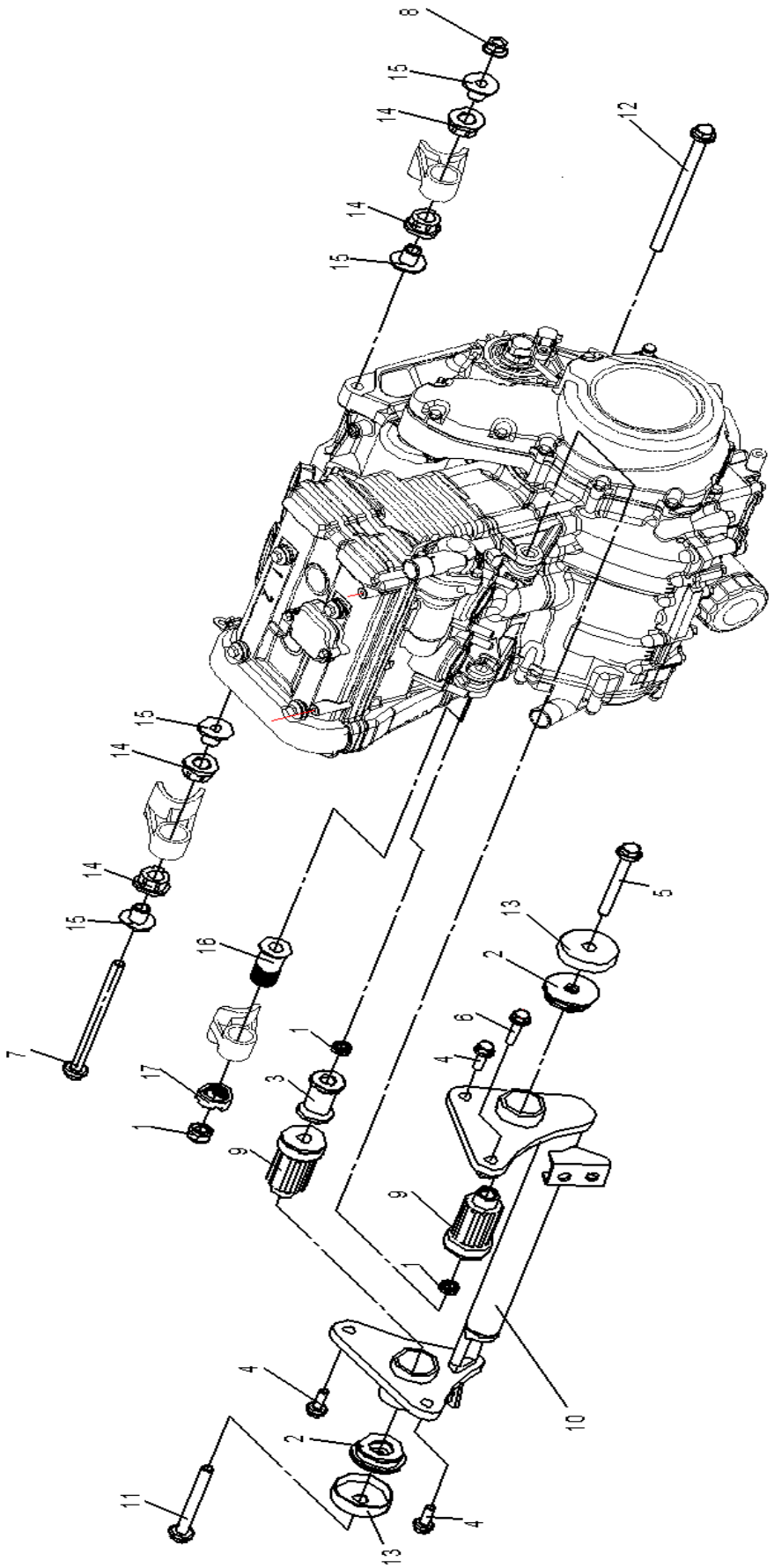
- Apply silicone sealant to the threads of the oil pressure switch and tighten it.

Sealant: Silicone Sealant
Torque: Oil Pressure Switch 15N•m

- Tighten the terminal bolt securely

8.1 Exploded view..... 8-2
8.2 Engine Removal/Installation..... 8-4
8.2.1 Engine Removal 8-4
8.2.2 Engine installation(Pic.8-2) 8-6

8.1 Exploded view



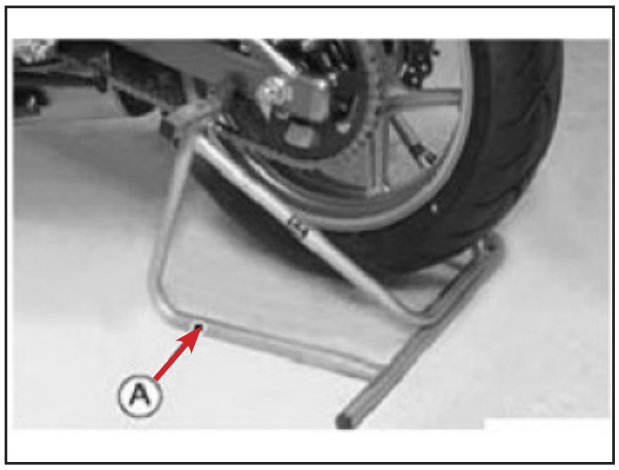
No.	Tighten part	Torque			Remark
		N•m	kgf•m	ft•lb	
1	GB/T6186 Nut M10×1.25	40~45	4.08~4.59	29.5~33	S
4	GB/T5789 Bolt M8×25	25~30	2.55~3.0	18.5~22	S
5	GB/T5787 Bolt M10×1.25×110	40~45	4.08~4.59	29.5~33	S
6	GB/T5789 Bolt M8×28	25~30	2.55~3.0	18.5~22	S
8	GB/T6187 Nut M10×1.25	40~45	4.08~4.59	29.5~33	S
11	GB/T5787 Bolt M10×1.25×150	40~45	4.08~4.59	29.5~33	S

2:Engine front rubber pad LH Ⅱ
3:Engine front mounting sleeve RH
7:Engine rear upper mounting shaft
9: Engine front rubber pad LH Ⅰ
10:Engine front bracket
12:Engine rear lower mounting shaft
13:Engine rubber dust boot
14:Engine rear upper rubber
15:Engine rear upper rubber sleeve
16:Engine rear lower screw
17:M18 nut
S:Follow special tighten order

8.2 Engine Removal/Installation

8.2.1 Engine Removal

- Support the rear part of the swingarm with a stand.
- Squeeze the brake lever slowly and hold it with a band [A].



Danger
Hold the front break lever when removing the engine. Or the motorcycle will fall. It will cause accident or injury.

⚠Warning
Hold the front break lever when removing the engine. Or the motorcycle will fall. The engine or motorcycle may damaged.

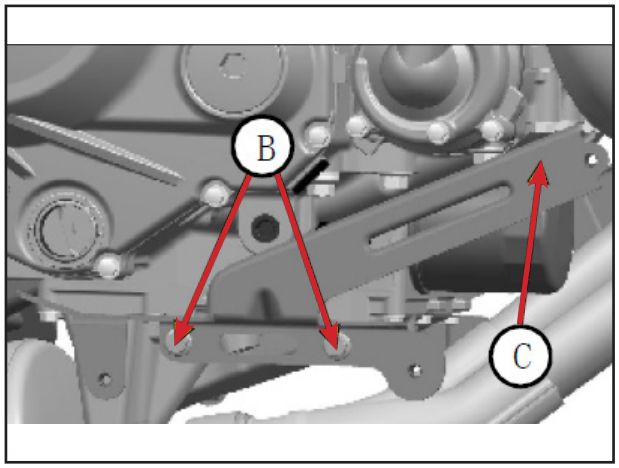
- Drain up the oil and coolant

Engine Oil (see Engine Oil Change in the Periodic Maintenance chapter)
Coolant (see Coolant Change in the Periodic Maintenance chapter)

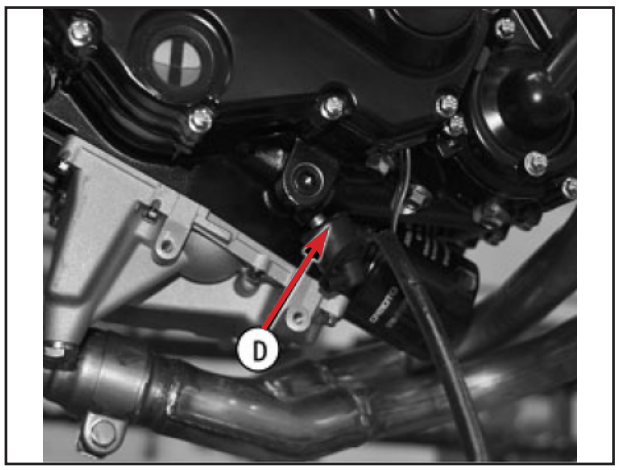
- Remove:

Seat (see Seat Removal in the Frame chapter)
Lower Fairing and Center Fairings (see Fairing section in the Frame chapter)
Side Covers (see Side Cover Removal in the Frame chapter)
Frame Covers (see Frame Cover Removal in the Frame chapter)
Radiator and Hoses (see Radiator and Radiator Fan Removal in the Cooling System chapter)

- Unscrew the lower fairing bracket bolts (both sides) [B] and remove the brackets (both sides)[C].



- Disconnect the oil pressure switch terminal [D].



- Disconnect the crankshaft sensor lead con-nector [A].
- Remove

Exhaust Pipe (see Exhaust Pipe Removal in the Engine Top End chapter)

Muffler Body (see Muffler Body Removal in the Engine Top End chapter)

Fuel Tank (see Fuel Tank Removal in the Fuel System (EFI) chapter)

Air Filter Housing (see Air Filter Housing Removal in the Fuel System (EFI) chapter)

Throttle Body Assy (see Throttle Body Assy Removal in the Fuel System (EFI) chapter)

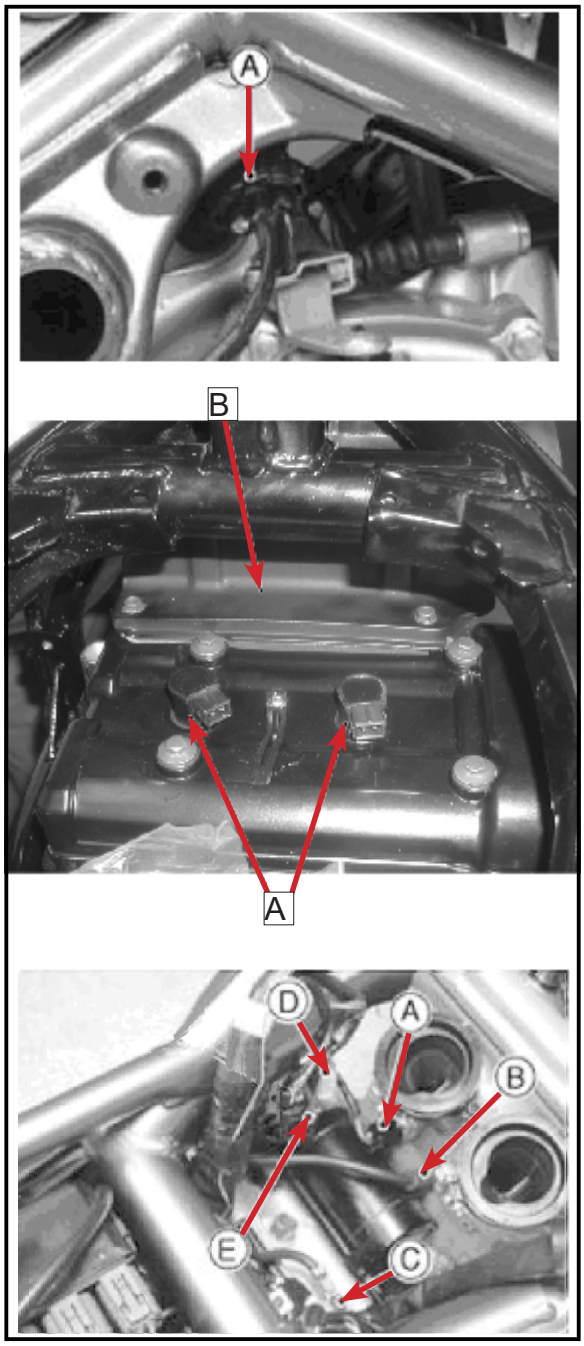
Clutch Cable (see Clutch Cable Removal in the Clutch chapter)

- Remove:

Stick Coils [A]
Baffle Plate [B]

- Remove or Disconnect:

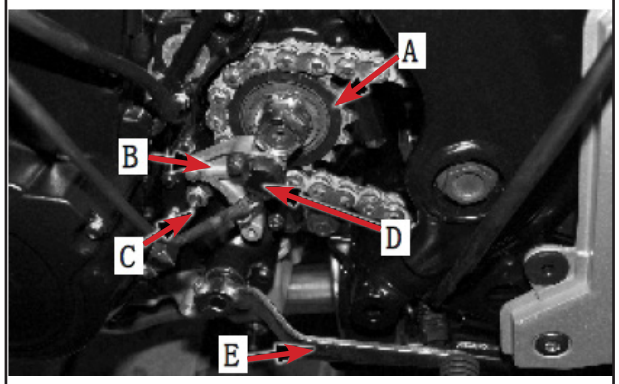
Coolant Temperature Sensor Lead Connec-tor [A]
Starter Motor Cable [B]
Engine Ground Cable Terminal Bolt [C]
Alternator Lead Connector [D]
Sidestand Switch Lead Connector [E]



- Remove the engine sprocket cover (see Engine Sprocket Removal in the Final Drive chapter).
- Remove the shift pedal[E](see Shift Pedal Removal in the Crankshaft/ Transmission chapter).
- Disconnect:

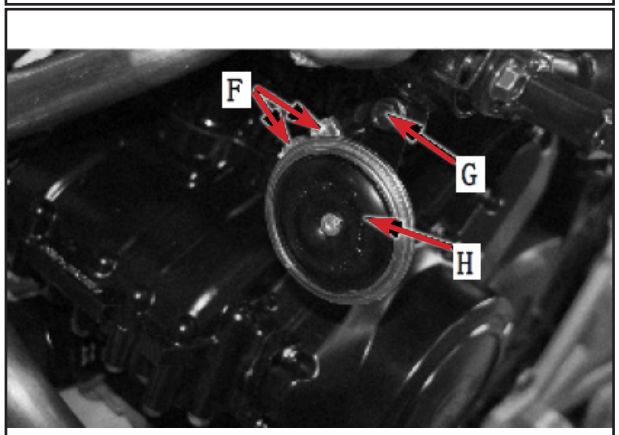
Oxygen Sensor Lead Connector [B]
Neutral Switch Lead Terminal [C]

- Remove the bracket [D] and the engine sprocket [E] (see Engine Sprocket Removal in the Final Drive chapter).

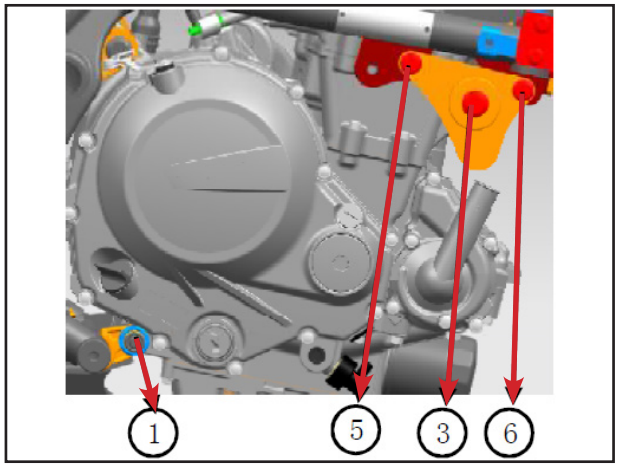


- Remove:

Horn Leads [F] (Disconnect)
Horn Bolt [G]
Horn [H]

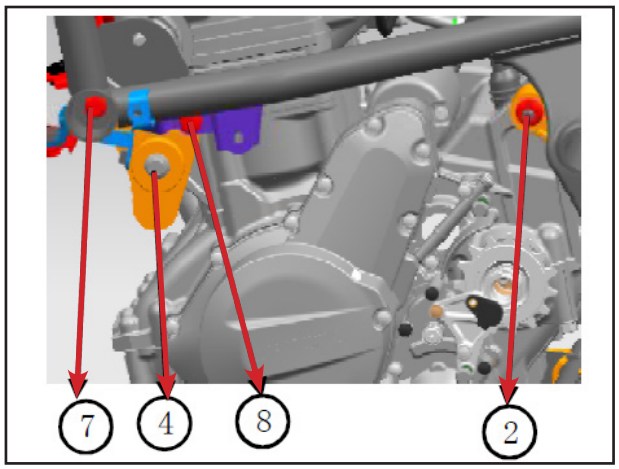


- Support the engine with a stand or jack Put a wooden board[K] on the suitable stand
- Remove the engine mounting bolt [1],[2]
- Remove engine front bracket bolt [3],[4] (both sides)
- Remove front bracket bolt[5],[6],[7],[8]
- Remove the front bracket.
- Remove the engine [I]



8.2.2 Engine installation
(Pic.8-2)

- Put the engine rear lower screw [16] on the frame and tight M18 nut[17].Do not tight up and make sure [16] can be moved.
- Put engine rear rubber pad [14] and rear upper rubber sleeve [14] on the frame.
- From the engine front rubber pad [9] to en-gine front bracket [10]
- Put engine front bracket[10] on the frame. And tight (without tight up)with the bolt [4],[6]



- Hang the engine into the frame and align the hole position.
- Insert the mounting bolt[12] from engine left side. Pre-tight by nut [1].
- Insert the mounting bolt[7] from right side. Pre-tight by nut[8].

Position the collor[3], rubber sleeve [2], Dust boot [13].

- Tighten bolt [11] and bolt [5]
- Tighten bolt [4] and bolt [6]

Torque-engine bracket bolt[4],[6]:
25N•m~30N•m(2.55kgf•m~3.0kgf•m, 18.5ft•lb~22ft•lb)

- Tighten the mounting nut[8]

Torque-engine mounting nut[8]:
40N•m~45N•m(4.08kgf•m~4.59kgf•m,29.5ft•lb~33ft•lb)

- Tighten the mounting nut[1]

Torque-engine mounting bolt[1]:
40N•m~45N•m(4.08kgf•m~4.59kgf•m,29.5ft•lb~33ft•lb)

- Tighten M18 nut[17]
- Tighten bolt [11]and bolt[5].

Torque:40N•m~45N•m(4.08kgf•m~4.59kgf•m,29.5ft•lb~33ft•lb)

- Install the engine sprocket (see Engine Sprocket Installation in the Final Drive chapter).
- Run the leads, cables, and hoses correctly.(See the leads,cables and hoses in appendix)
- Install all removed parts(See related chapter)
- Adjust:Throttle cable(See throttle control-ling inspection in periodic maintenance chapter)

Clutch cable (See clutch inspection in peri-odic maintenance chapter)

See the picture in page 8-2

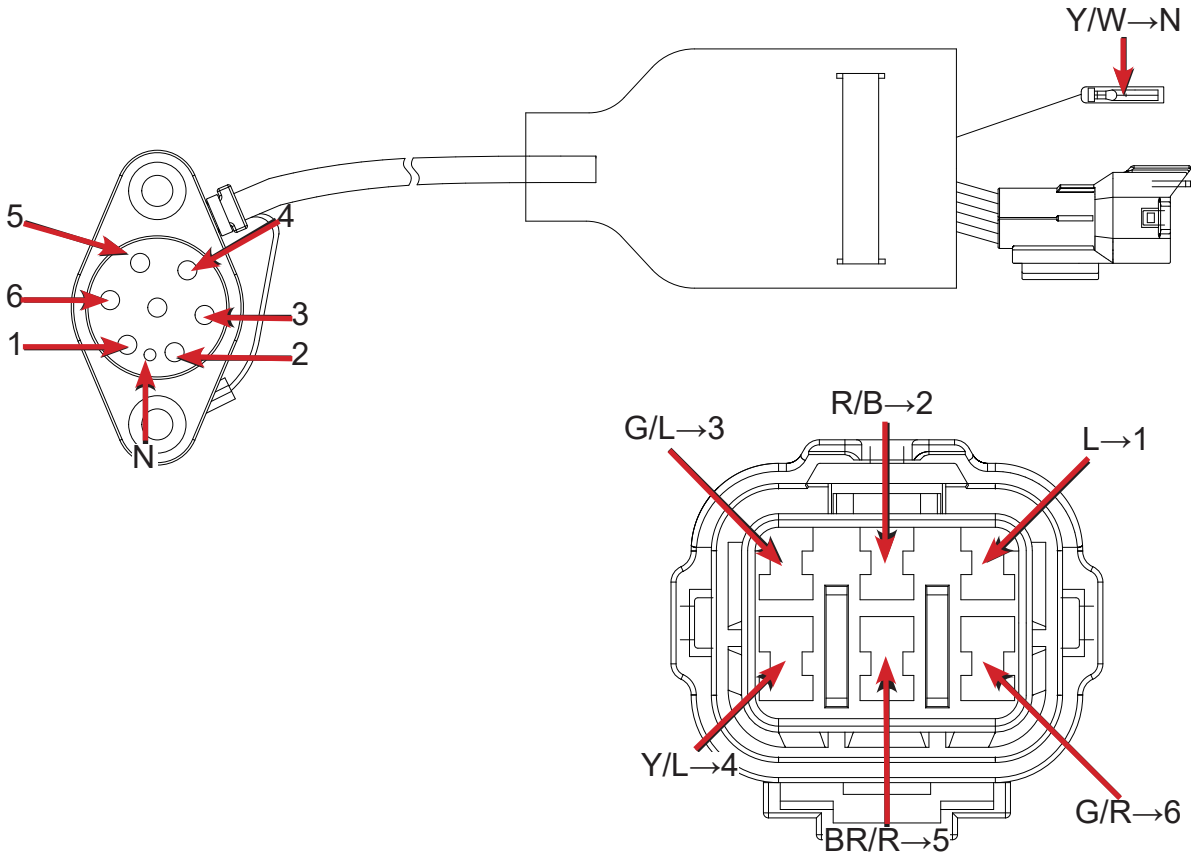
Drive chain (See drive chain tightness inspection in periodic maintenance chapter)

- Fill the engine oil (See engine oil replace-ment in periodic maintenance chapter)
- Fill the coolant in the cooling system and drain out the air from it.(See coolant replacement in periodic maintenance chapter)
- Adjust the idle speed(See idle speed adjust-ment in periodic maintenance chapter)

External gear display

Vehicles will be equipped with external gear display after model year 2022.

See the picture in page 8-2



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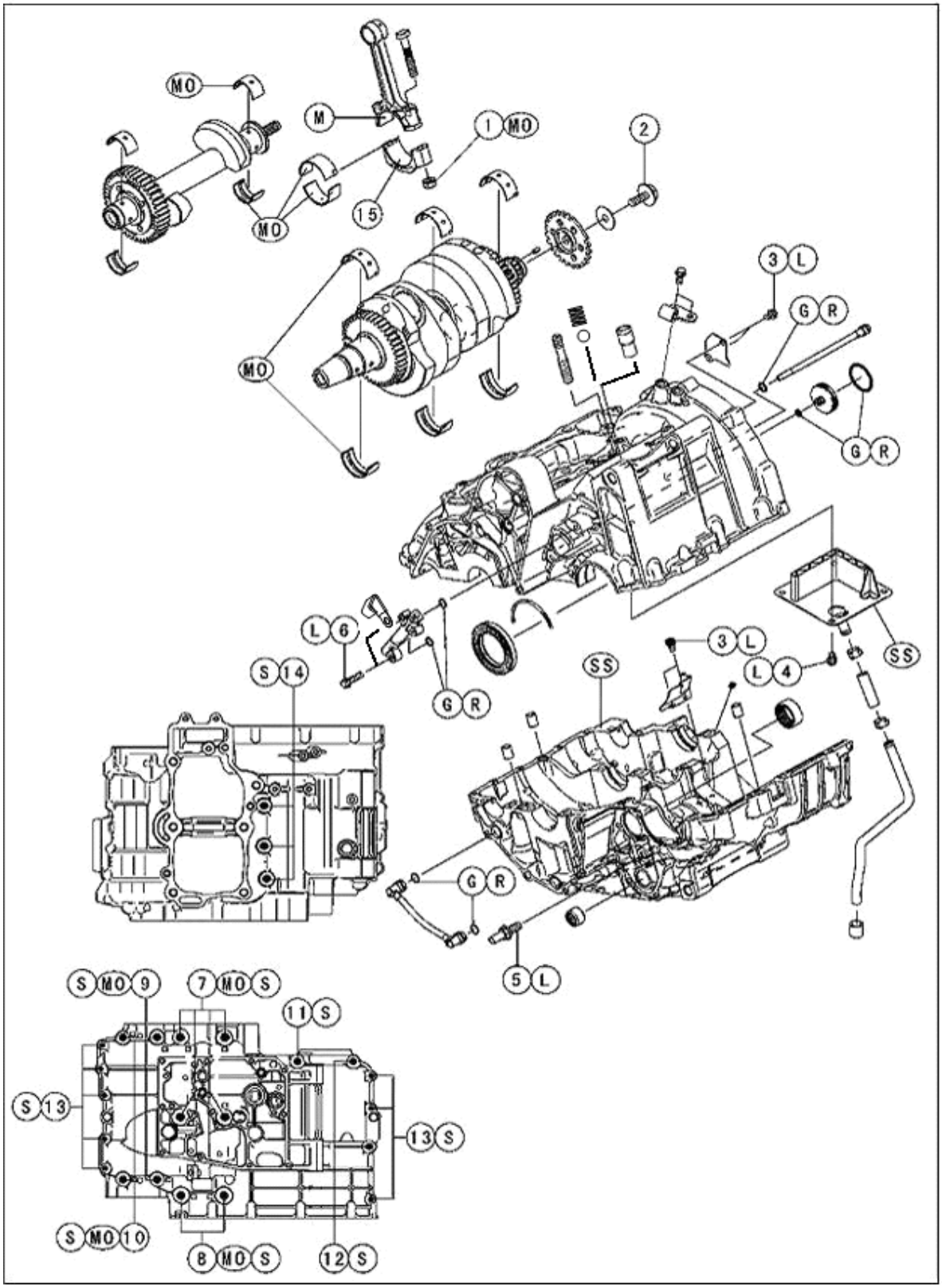
9.1 Exploded view

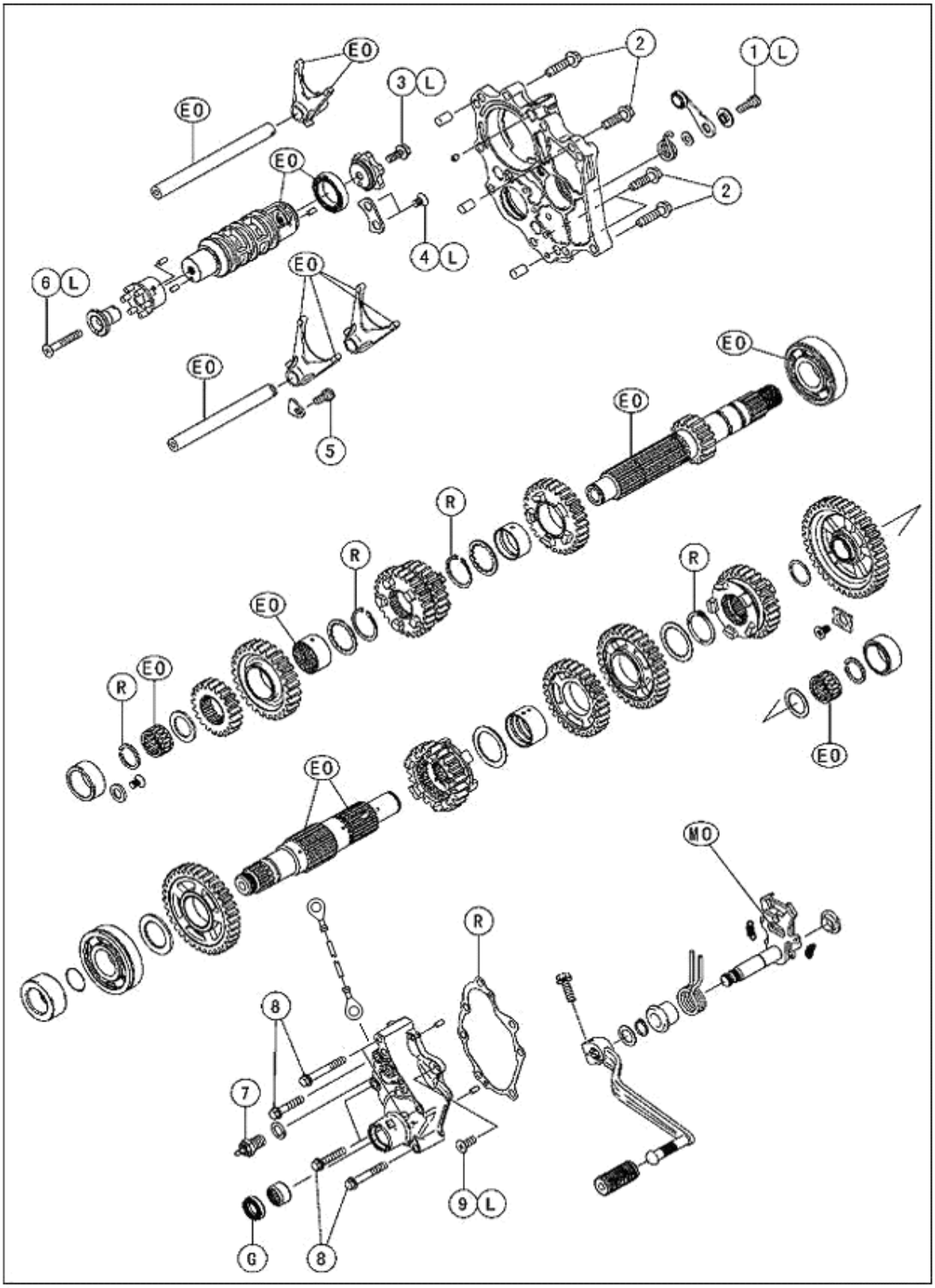


Exploded view

No.	Tighten parts	Torque			Remark
		N·m	kgf·m	ft·lb	
1	Connecting rod nut	See test	---	---	MO
2	CPS disc	40	4.1	30	
3	Oil separator plate bolt	10	1.0	87in·lb	L
4	Oil separator bolt	7	0.7	61in·lb	L
5	Shift spring locking pin	29	2.9	22	L
6	Oil pipe bolt	10	1.0	87in·lb	L
7	Crankcase bolt(M9,L=113mm)	44	4.5	32	MO,S
8	Crankcase bolt(M9,L=83mm)	44	4.5	32	MO,S
9	Crankcase bolt(M8,L=73mm)	35	3.6	26	MO,S
10	Crankcase bolt(M8,L=60mm)	35	3.6	26	MO,S
11	Crankcase bolt(M8,L=110mm)	27.5	2.8	20	S
12	Crankcase bolt(M8,L=50mm)	27.5	2.8	20	S
13	Crankcase bolt(M7)	20	2.0	15	S
14	Crankcase bolt	27.5	2.8	20	S

15.Do not apply any grease or oil.
G: Apply grease.
L: Apply a non-permanent locking agent.
LG: Apply liquid gasket.
M: Apply molybdenum disulfi de grease.
MO: Apply molybdenum disulfi de oil solution.
(mixture of the engine oil and molybdenum disulfi de grease in a weight ratio 10 : 1)
R: Replacement Parts
S: Follow the specifi ed tightening sequence.
SS: Apply silicone sealant.

Exploded view



Exploded view

No.	Tighten part	Torque			Remark
		N·m	kgf·m	ft·lb	
1	Locking rocker arm screw	12	1.2	106in·lb	L
2	Shifting room cover bolt	20	2.0	15	L
3	Locking gear bolt	12	1.2	106in·lb	L
4	Shifting drum bearing screw	5	0.50	43in·lb	L
5	Shifting fork plate screw	10	1.0	87in·lb	
6	Neutral sensor screw	5	0.50	43in·lb	L
7	Neutral sensor	15	1.5	11	
8	Shifting axel cover screw	12	1.0	87in·lb	
9	Shifting axel cover bolt	5	0.50	43in·lb	L

G: Apply grease.
L: Apply a non-permanent locking agent.
MO: Apply molybdenum disulfi de oil solution.
(mixture of the engine oil and molybdenum disulfi de grease in a weight ratio 10 : 1)
R: Replacement Parts

9.2 Specification

Item	Standard	Service limit
Crankshaft, connecting rod		
Connecting rod parallelism	0.04mm/100mm	0.2/100mm
Connecting rod torsion	0.08mm/100mm	0.2/100mm
Connecting rod big end side clearance	0.15mm~0.30mm	0.55mm
Connecting rod big end bearing/ Connecting joint clearance	0.03mm~0.045mm	0.08mm
Connecting rod big end bearing/ Connecting joint clearance(283MT-A)	0.032mm~0.042mm	0.08mm
Crankshaft connecting joint diameter:	37.984mm~38.00mm	37.97mm
Mark:		
2	37.984mm~37.992mm	– – –
1	37.993mm~38.000mm	– – –
Connecting rod big end hole diameter:	41.000mm~41.016mm	– – –
Mark:		
1	41.000mm~41.008mm	– – –
2	41.009mm~41.016mm	– – –
Connecting rod bearing diameter		
Mark:		
Black	1.490mm~1.495mm	– – –
Blue	1.495mm~1.500mm	– – –
Green	1.500mm~1.505mm	– – –

Connecting rod big end hole/Joint/Bearing rigging：

Connecting rod big end mark	Connecting joint mark	Bearing color
1	1	Black
1	2	Blue
2	1	
2	2	Green

Specification

Item	Standard	Service limit
Crankshaft/upper crankcase locking clearance	0.10mm~0.30mm	0.40mm
Crankshaft radial runout	0.02mm	0.05mm
Main joint/Main joint clearance	0.025mm~0.04mm	0.07mm
Main joint/Main joint clearance (283MT-A)	0.020mm~0.035mm	0.07mm
Main joint diameter	37.984mm~38.00mm	37.96mm
Mark:		
2	37.984mm~37.992mm	– – –
1	37.993mm~38.000mm	– – –
Crankcase main hole diameter:	41.000mm~41.016mm	– – –
Mark:		
Yellow	41.000mm~41.008mm	– – –
Green	41.009mm~41.016mm	– – –
Main bearing thickness:		
Mark：		
Brown	1.496mm~1.500mm	– – –
Black	1.500mm~1.504mm	– – –
Blue	1.504mm~1.508mm	– – –

Crankcase main hole/Main joint/Main bearing		
Crankcase main hole color	Crankcase main joint diameter	Main bearing color
Yellow	1	Brown
Yellow	2	Black
Green	1	
Green	2	Blue

Balance bearing/shaft clearance	0.025mm~0.04mm	0.07mm
Balance bearing/shaft clearance (283MT-A)	0.023mm~0.038mm	0.07mm
Balance joint diameter	27.987mm~28.00mm	27.96mm
Mark:		
1	27.987mm~27.993mm	– – –
2	27.993mm~28.000mm	– – –

Specification

Crankcase balance shaft clearance:	31.000mm~31.016mm	– – –
Mark:		
Yellow	31.000mm~31.008mm	– – –
Green	31.009mm~31.016mm	– – –
Balance bearing thickness:		
Mark：		
Brown	1.490mm~1.494mm	– – –
Black	1.494mm~1.498mm	– – –
Blue	1.498mm~1.502mm	– – –
Balance hole/shaft diameter/Bearing fitness		
Balance hole	Shaft diameter	Bearing
Yellow	2	Brown
Yellow	1	Black
Green	2	
Green	1	Blue
Transmission system：		
Shift fork thickness	5.9mm~6.0mm	5.8mm
Fork groove wideness	6.05mm~6.15mm	6.25mm
Shift fork shaft diameter	6.90mm~7.0mm	6.8mm
Shift drum groove wideness	7.1mm~7.17mm	7.3mm

9.3 Crankcase Splitting

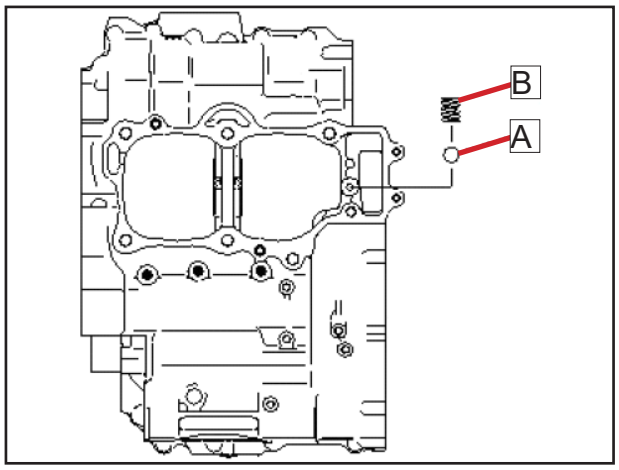
9.3.1 Crankcase Splitting

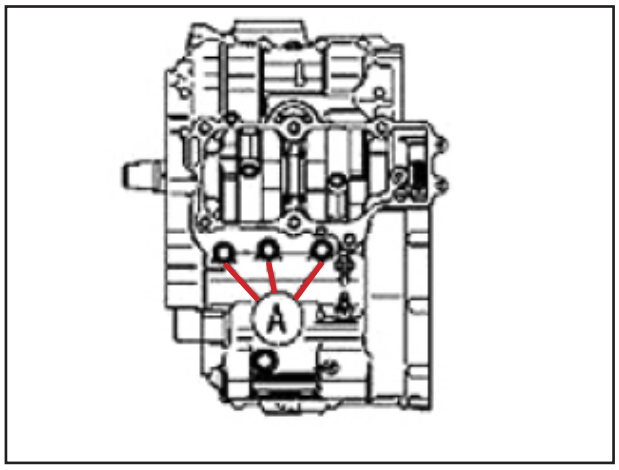
• Remove:

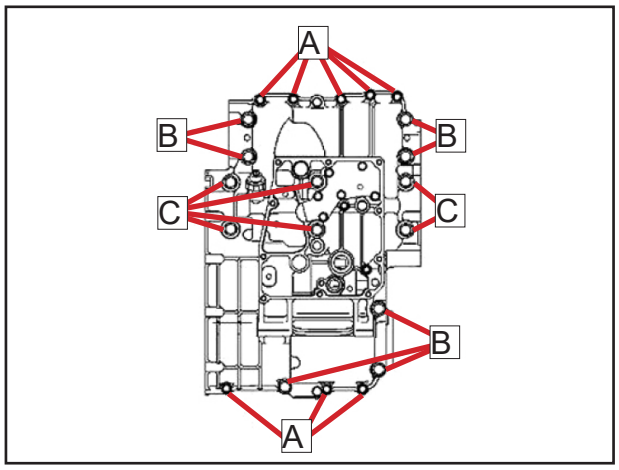
Engine (see Engine Removal in the Engine Removal/Installation chapter)
Cylinder (see Cylinder Removal in the Engine Top End chapter)
Pistons (see Piston Removal in the Engine Top End chapter)
Stater Motor (see Starter Motor Removal in the Electrical System chapter)
Clutch (see Clutch Removal in the Clutch chapter)
Transmission Assy (see Transmission Assy Removal)
Alternator Rotor (see Alternator Rotor Re moval in the Electrical System chapter)

- Remove the spring[B] and ball[A] in upper body.(283MT has no spring and balls)
- Remove the upper crankcase bolts [A] and the washers
- Remove the oil pan, relief valve, oil screen and oil pipes (see Oil Pan Removal in the Engine Lubrication System chapter).
- Remove the lower crankcase bolts.

Firstly loosen the M7 bolts, secondly the M8 bolts and lastly the M9 bolts.
M7 Bolts [A]
M8 Bolts [B]
M9 Bolts [C] and Washers

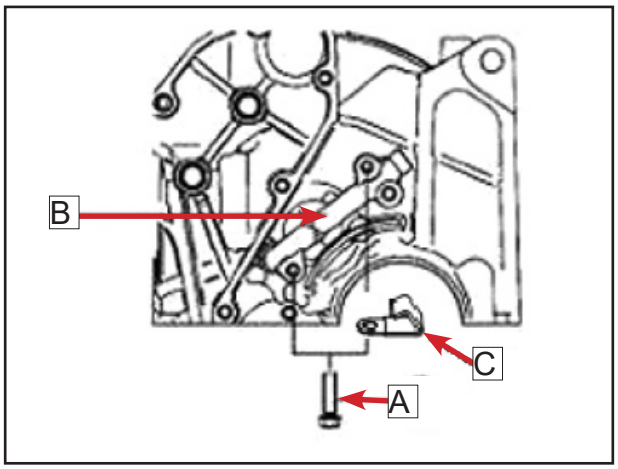




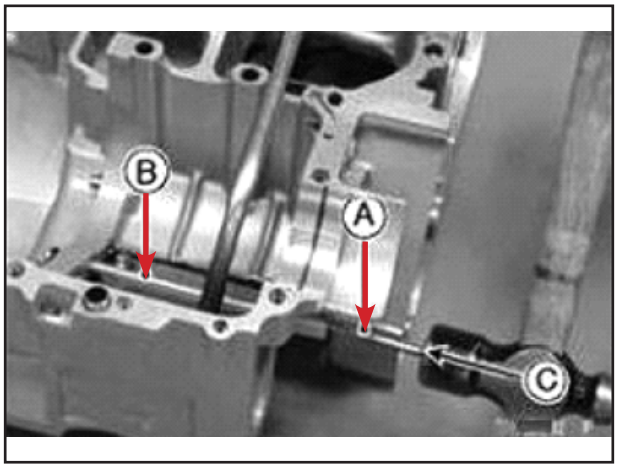


Crankcase Splitting

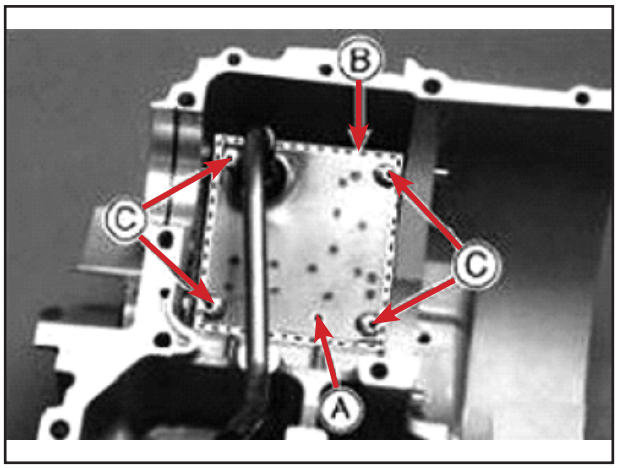
• Tap lightly around the crankcase mating surface with a plastic mallet, and split the crankcase.Take care not to damage the crankcase.
If the oil pipe is to be removed, follow the next procedure.
Unscrew the bolts [A] and remove the oil pipe [B].



Prepare a 5 mm rod [A], and insert it to the hole of the upper crankcase half.
Remove the oil pipe [B], tapping [C] the rod as shown.



If the breather plate [A] is to be removed, follow the next procedure
Remove the oil pipe (see above).
Cut the gasket around the plate [B].
Remove
Breather Plate Bolts [C]
Breather Plate with Pipe

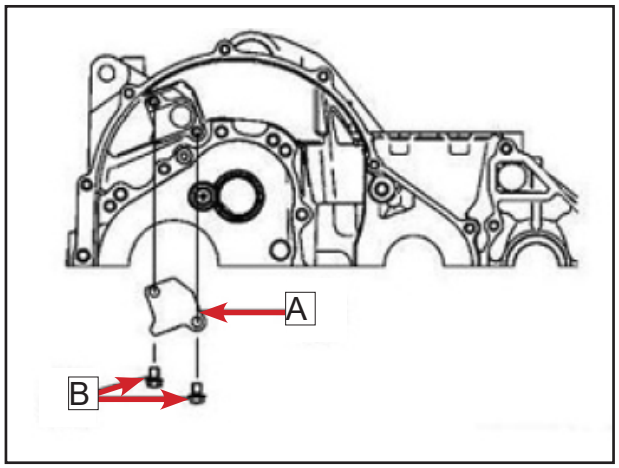


Crankcase Splitting
9.3.2 Crankcase Assembly

CAUTION
The upper and lower crankcase halves are machined at the factory in the as-sembled state, so the crankcase halves must be replaced as a set.

- With a high-flash point solvent, clean off the mating surfaces of the crankcases halves and wipe dry.
- Using compressed air, blow out the oil passages in the crankcase halves.
- If the oil plate [A] on the upper crankcase half was removed, install it as shown.
- Apply a non-permanent locking agent to the oil plate bolts and torque them.

Torque-Oil Plate Bolts [B]10N·m

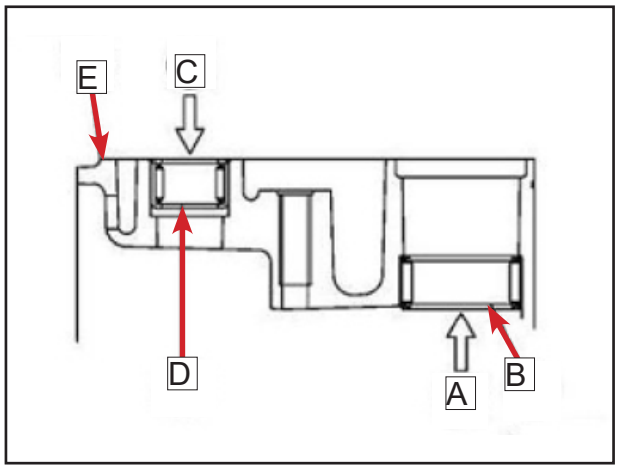


- Press and insert [A] the new needle bearing [B] for the shift drum until it is bottomed.

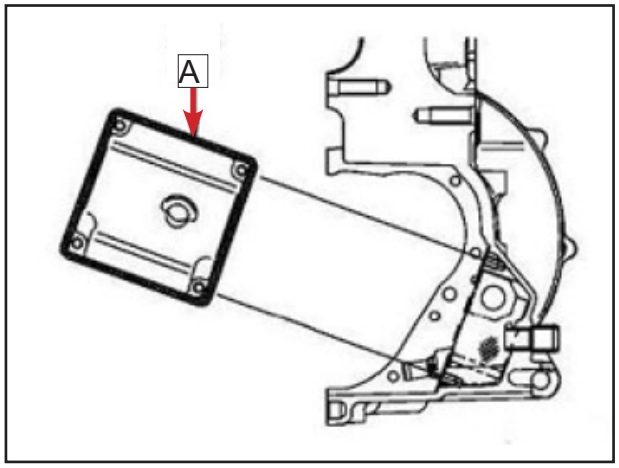
Special Tool - Bearing Driver Set

- Press and insert [C] the new needle bear-ing [D] for the shift shaft so that the bearing sur-face is flush with the end of the hole.

Special Tool - Bearing Driver Set
Lower Crankcase Half [E]



- Apply silicone sealant to the breather plate mating surface [A] 1 mm (0.04 in.) or more thick, and then install the breather plate.

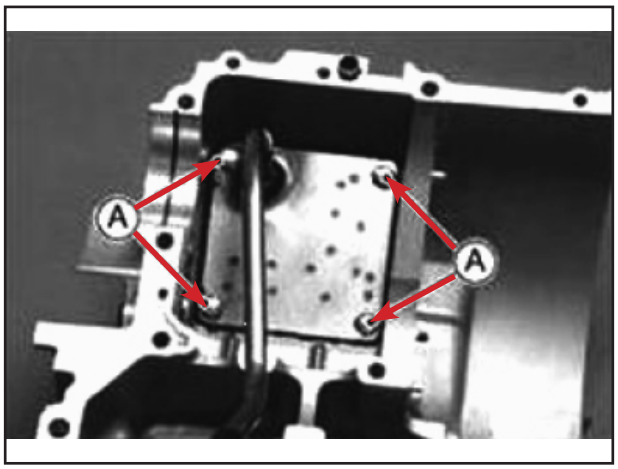


Crankcase Splitting

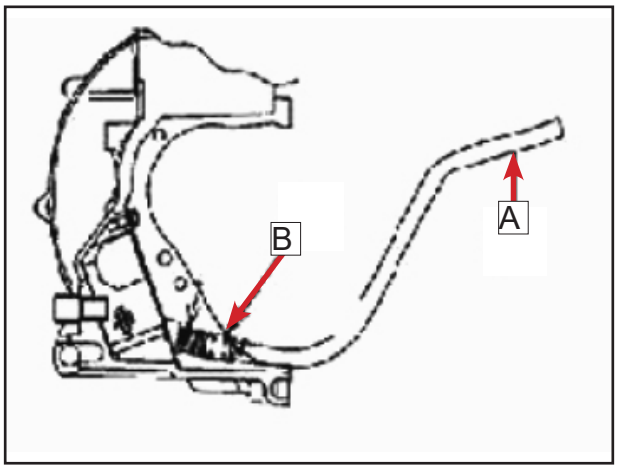
NOTE
Make the application finish within 7 min-utes when the liquid gasket to the mating surface of the breather plate is applied.

- Apply a non-permanent locking agent to the threads and tighten the bolts [A].

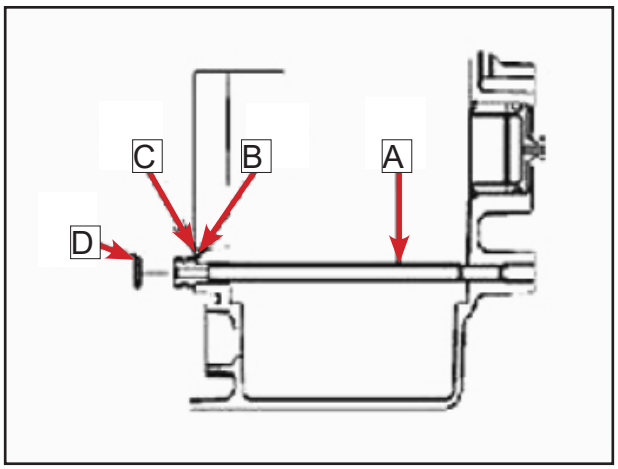
Torque - Breather Plate Bolts 10N·m



- Install the breather pipe [A].Align the white mark [B] on the pipe with the white mark [C] on the breather fittling.



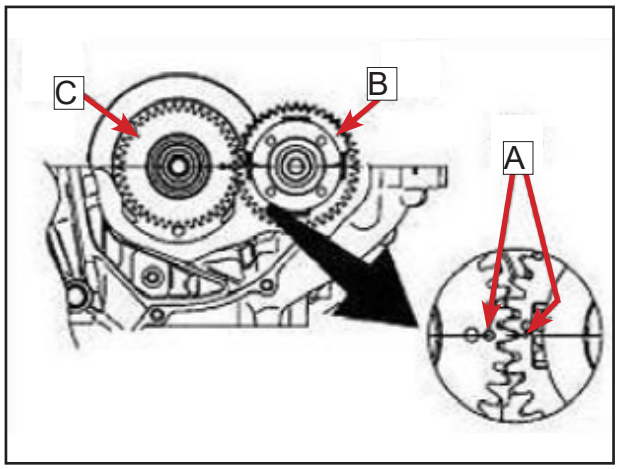
- Install the oil pipe [A] so that its flange [B] touches to the surface [C] of the upper crank-case half.
- Apply grease to the O-ring [D] on the oil pipe.



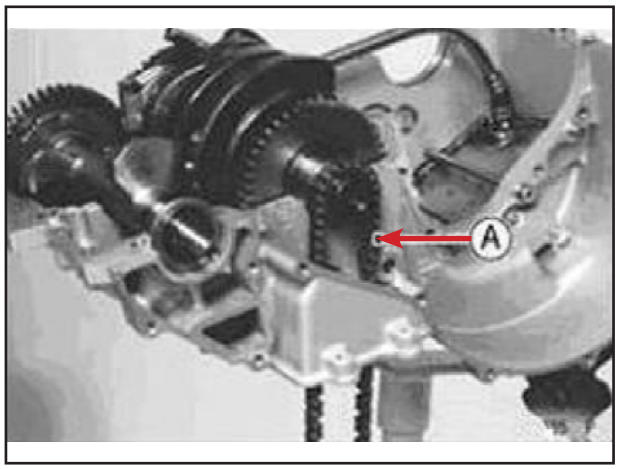
Crankcase Splitting

- Install the crankshaft assembly and the balancer shaft assembly on the upper crank-case half.

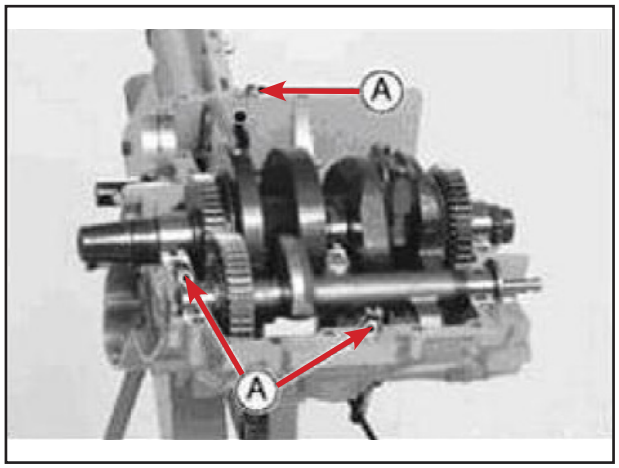
Align [A] the timing mark on the balancer gear [B] with the timing mark on the balancer drive gear [C] of the crankshaft



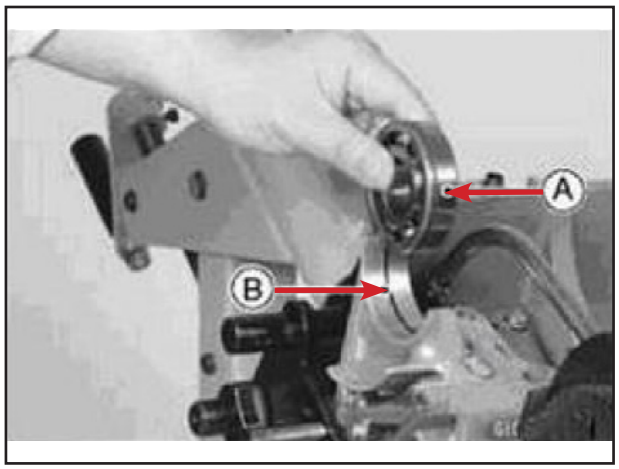
- Be sure to hang the camshaft chain [A] on the crankshaft.



- Be sure that the dowel pins [A] are in position.



- Set the bearing groove [A] on the positioning ring [B] as shown



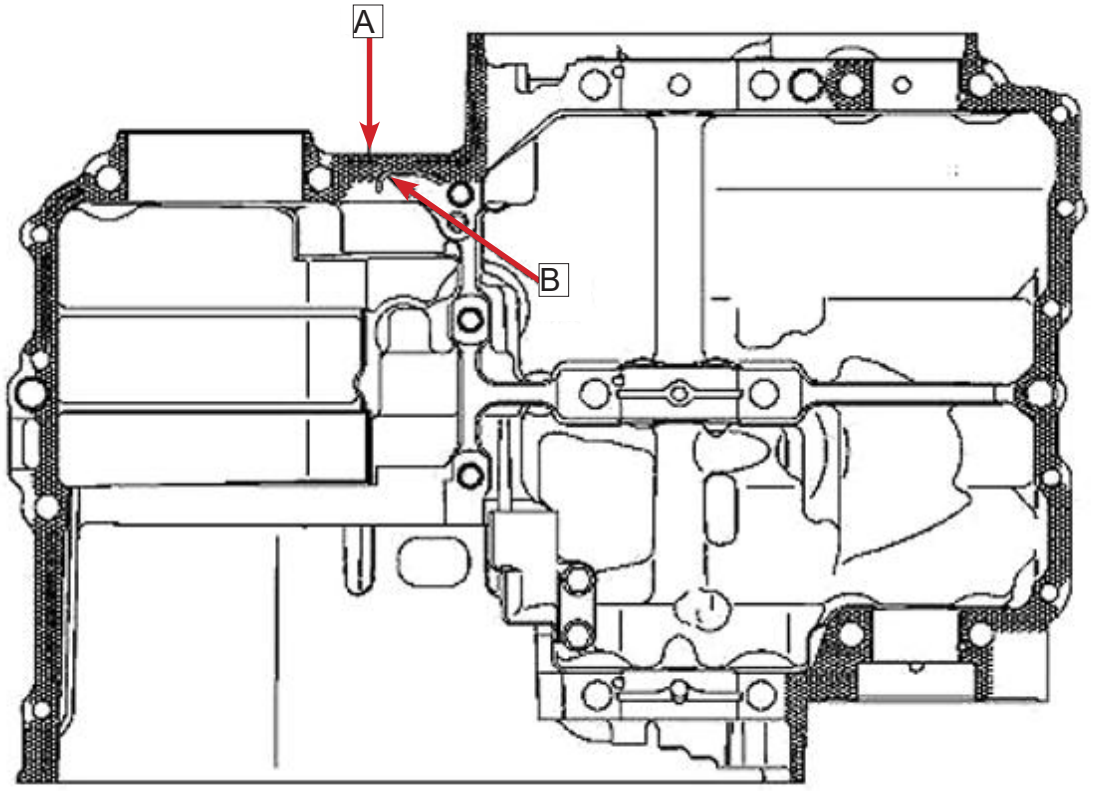
Crankcase Splitting

- Apply liquid gasket [A] to the mating surface of the lower crankcase half.

NOTE
Apply the sealant evenly on the mating surfcae without cutting.

CAUTION
Do not apply liquid gasket around the crankshaft main bearing inserts, and oil passage holes.

Do not apply liquid gasket to the oil passage [B].

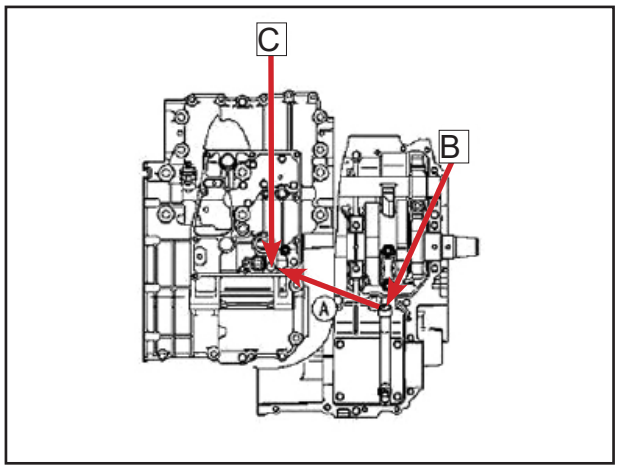


Crankcase Splitting

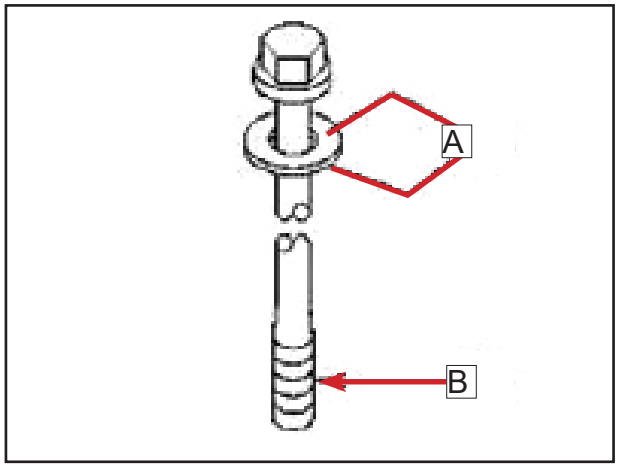
- Fit the lower crankcase half to the upper crankcase half.

Insert [A] the breather pipe [B] on the upper crankcase half through the hole [C]

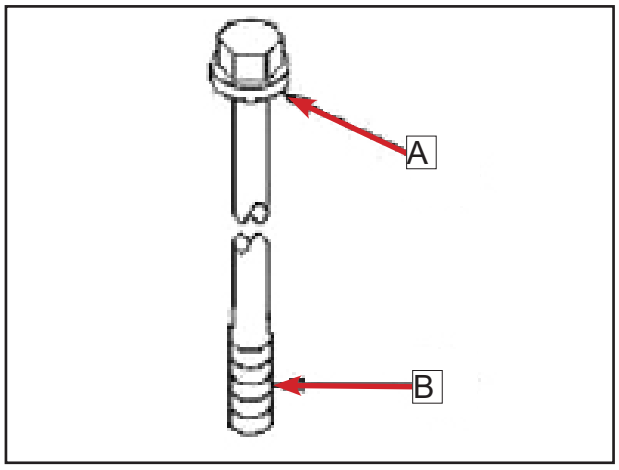
NOTE
Make the application finish within 20 minutes when the liquid gasket to the mating surface of the lower crank-case half is applied. **Moreover fi t the case and tighten the case bolts just after fi nishing the application of the liquid gasket.**



- Apply molybdenum disulfide oil solution to both sides [A] of the M9 bolts washers and the threads [B] of the M9 bolts.



- Apply molybdenum disulfi de oil solution to fl ange [A] and the threads [B] of the M8 bolts which is tightening order is [7~10] only (see the next figure).



Crankcase Splitting

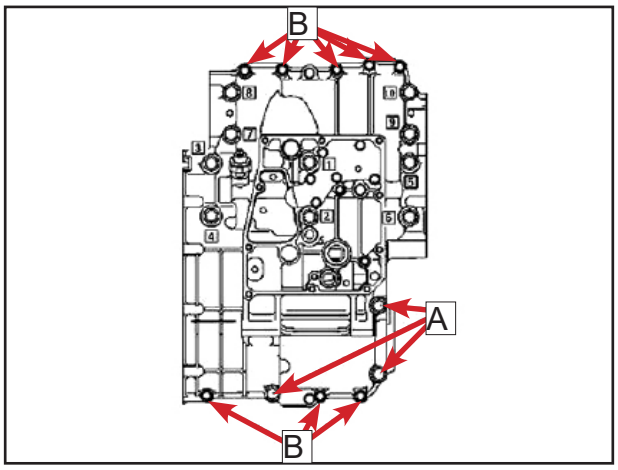
- Tighten the lower crankcase bolts using the followwing steps.

Tighten the M9 bolts[1,2]L=113mm(4.45 in.) with washers.

Torque-Crankcase Bolts (M9):44N·m (4.5kgf·m, 32ft·lb)

Tighten the M9 bolts [3, 4] L= 83 mm (3.27 in.) with washers.

Torque-Crankcase Bolts(M9): 44N·m (4.5kgf·m, 32ft·lb)

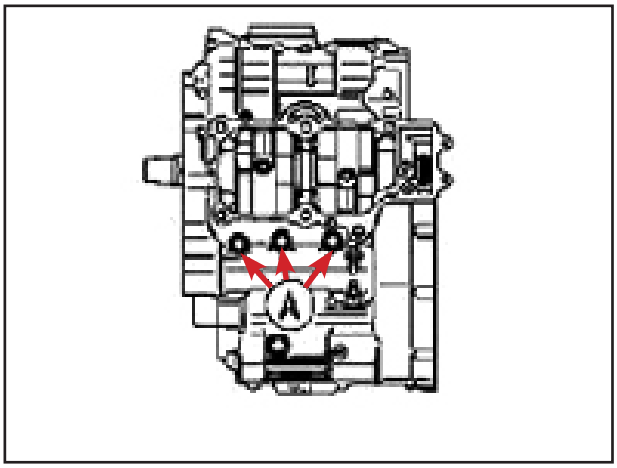


Tighten the M9 bolts [5, 6] L= 113 mm (4.45 in.) with washers.

Torque-Crankcase Bolts (M9):44N·m (4.5 kgf·m, 32ft·lb)

Tighten the M8 bolts [7~10].

Torque-Crankcase Bolts (M8):35N·m (3.6 kgf·m, 26 ft·lb)



Tighten the M8 bolts [A] (Do not apply molyb-denum oil solution).

Torque-Crankcase Bolts (M8):27.5N·m (2. 8kgf·m, 20ft·lb)

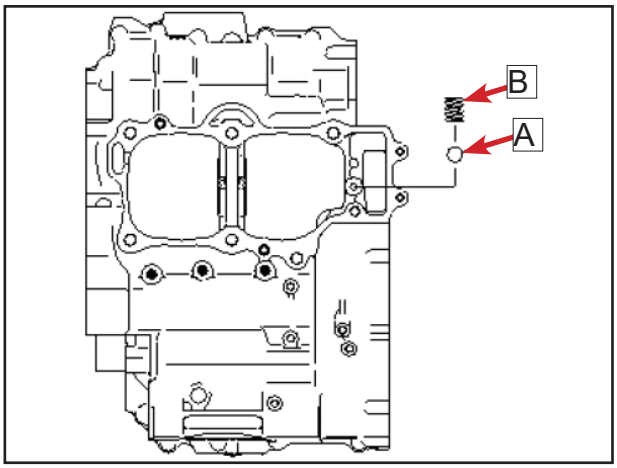
Tighten the M7 bolts [B].

Torque-Crankcase Bolts (M6):20N·m (2.0 kgf·m, 15ft·lb)

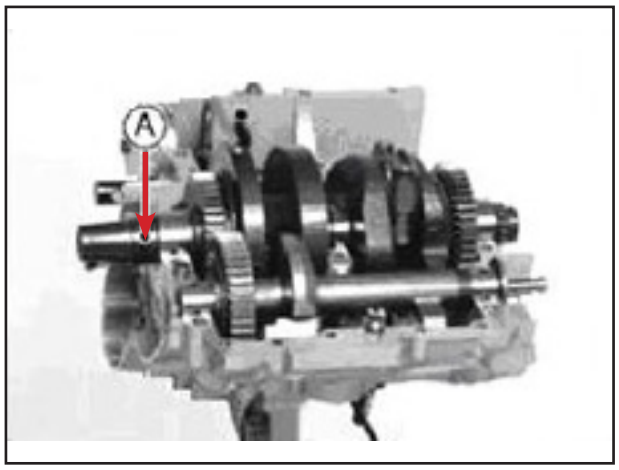
Tighten the upper crankcase bolts [A].

Torque-Upper Crankcase Bolts [A]:27.5 N·m (2.8kgf·m,20ft·lb)

- After tightening all crankcase bolts, check the following items.Crankshaft and balancer shafts turn freely.



9.4 Crankshaft and Connecting Rods



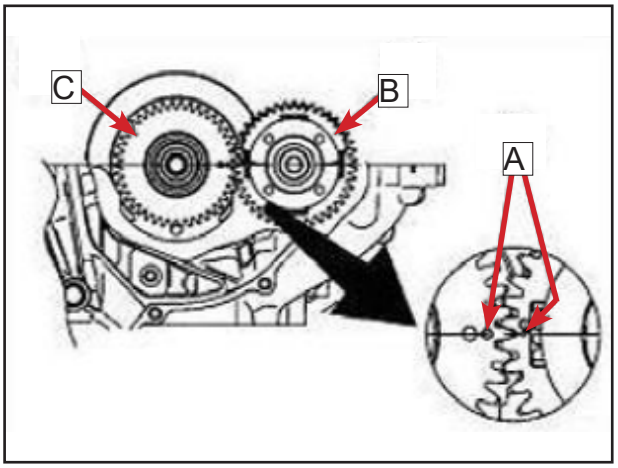
9.4.1 Crankshaft Removal

- Split the crankcase (see Crankcase Splitting).
- Remove the crankshaft [A].

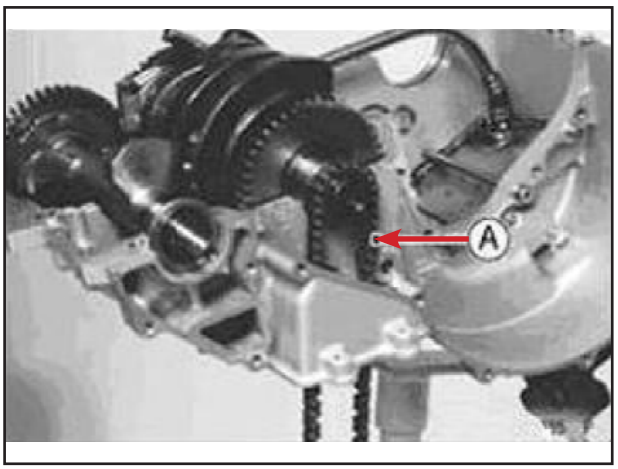
9.4.2 Crankshaft Installation

CAUTION
If the crankshaft, bearing inserts, or crankcase halves are replaced with new ones, select the bearing inserts and check clearance with a plastigage (press gauge) before assembling engine to be sure the correct bearing inserts are installed.

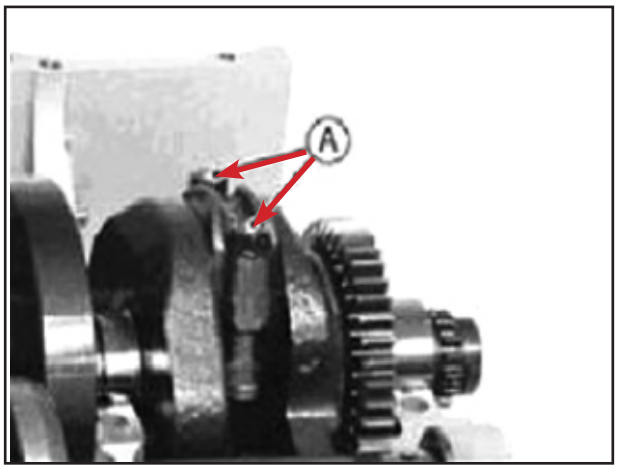
- Apply molybdenum disulfi de oil solution to the crankshaft main bearing inserts. Align [A] the timing mark on the balancer gear [B] with the timing mark on the bal-ancer drive gear [C] of the crankshaft.



- Install the crankshaft with the camshaft chain [A] hanging on it.



Crankshaft and Connecting Rods



9.4.3 Connecting Rod Removal

- Split the crankcase (see Crankcase Splitting).
- Remove the connecting rod nuts [A].
- Remove the connecting rod.
- Remove the connecting rod bolts.

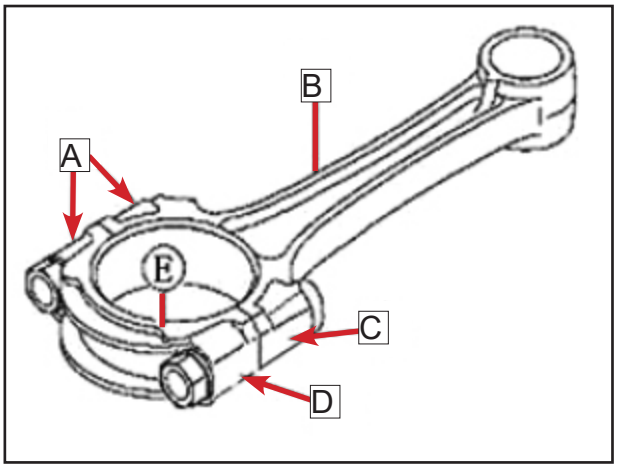
CAUTION
To prevent damage to the crankpin surfaces, do not allow the connecting rod bolts to bump against the crankpins.

9.4.4 Connecting Rod Installation

CAUTION
To minimize vibration, the connecting rods should have the same weight mark. Always use new connecting rod bolts and nuts.

Match Mark [A]
Connecting Rod [B]
Diameter Mark [C]
Weight Mark [D]
Connecting Rod Big End Cap [E]

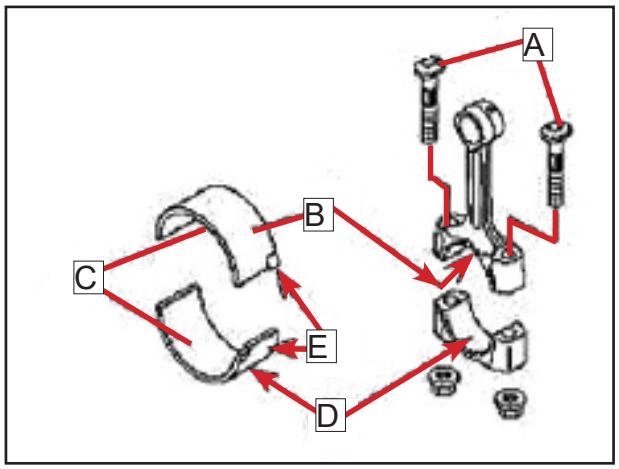
CAUTION
If the connecting rods, big end bearing inserts, or crankshaft are replaced with new ones, select the bearing insert and check clearance with a plastigage (press gauge) before assembling engine to be sure the correct bearing inserts are installed.



Crankshaft and Connecting Rods

- Install the 2 connecting rod bolts.
- Apply molybdenum disulfide grease [B] to the outer surface of the upper insert and the inner surface of the connecting rod big end.

The molybdenum disulfi de oil solution is a mixture of engine oil and molybdenum disulfide grease with a weight ratio (10:1).



Do not apply any grease or oil [D] to the cap inside, cap insert outside, connecting rod in-ner hole upper surface and upper bearing sur-face [B].

Align the bearing lip [E] to upper groove on connecting rod.

CAUTION
Wrong application of oil and grease could cause bearing damage.

When installing the inserts [A], be careful not to damage the insert surface with the edge of the connecting rod [B] or the cap [C].

One way to install inserts is as follows.

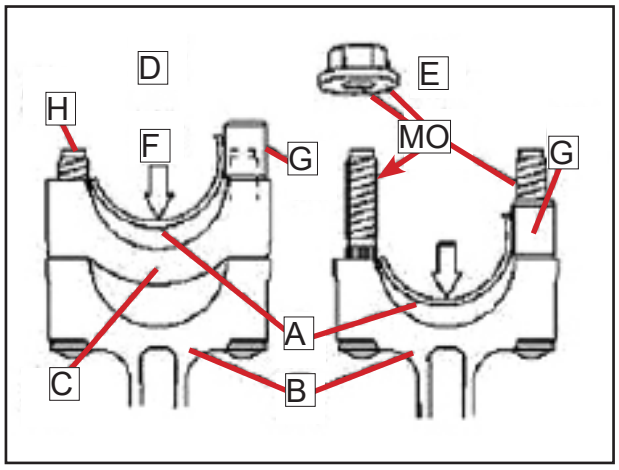
Installation [D] to Cap

Installation [E] to Connecting Rod

Push [F]

Spare Dowel Pin [G]

Connecting Rod Bolts [H]



Crankshaft and Connecting Rods

- Apply molybdenum disulfi de oil solution [MO] to the threads and seating surfaces of the big end nuts and bolts.
- Install the crankshaft (see Crankshaft Installation).
- Install each connecting rod on its original crankpin.
- Install the connecting rod big end cover align up the code.

NOTE
Use angle way to tight up the connecting rod nut,this can make the torque tight and accurate.

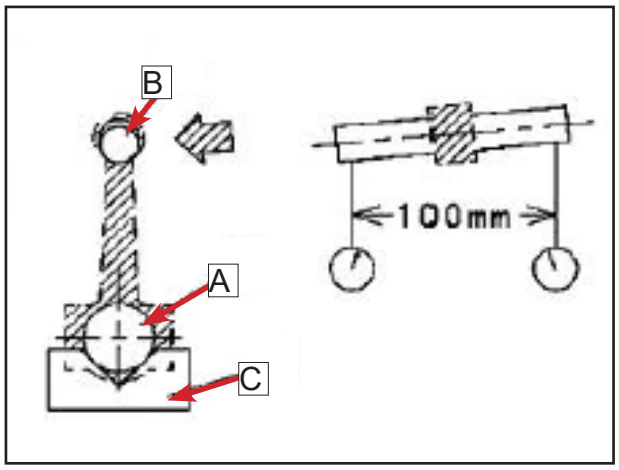
- First tighten the 2 nuts of a connecting rod alter nately to 40N·m. Loosen the 2 nuts completely.Tighten them alternatly to 29N·m.

After the connecting bolts are tightened to 29N·m, the connecting rod can turn freely.

- Turn the connecting rod nuts clockwise 100 degree. The final torque should be between 65N·m and 90N·m.

Check if the connecting rod turns freely. If not, reinstall the connecting rod bearing.

Crankshaft and Connecting Rods

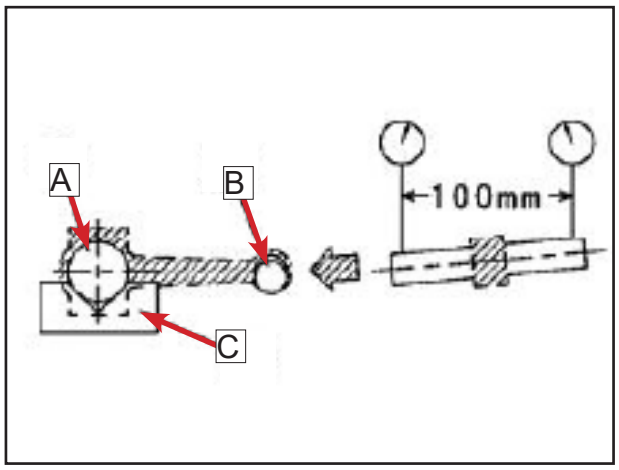


9.4.5 Connecting Rod Bend

- Remove the connecting rod big end bear-ing inserts, and reinstall the connecting rod big end cap.
- Insert the arbor [A] through the connecting rod big end.
- Select an arbor of the same diameter as the piston pin and at least 100 mm (3.94 in.) long, and insert the arbor [B] through the connecting rod small end.
- On a surface plate, set the big-end arbor on V block [C].
- With the connecting rod held vertically, use a height gauge to measure the difference in the height of the arbor above the surface plate over a 100 mm (3.94 in.) length to determine the amount of connecting rod bend.

If connecting rod bend exceeds the ser-vice limit, the connecting rod must be replaced.

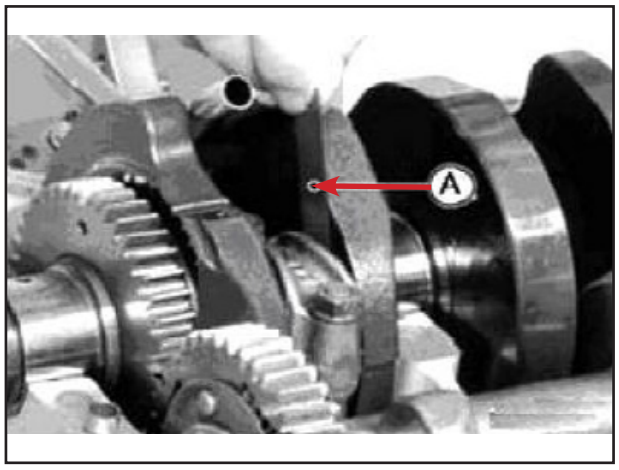
Connecting Rod Bend Service Limit: 0.2 mm



9.4.6 Connecting Rod Twist

- With the big-end arbor [A] still on V block [C].
- Hold the connecting rod horizontally. Measure the arbor[B] hight different to see the twist.

Connecting Rod Twist limit:0.2mm



9.4.7 Connecting Rod Big End Side Clearance

- Measure connecting rod big end side clearance.First to let the connecting rod big end to paste a side of the joint.Then insert a thick-ness gauge [A] between the big end and either crank web to determine clearance.

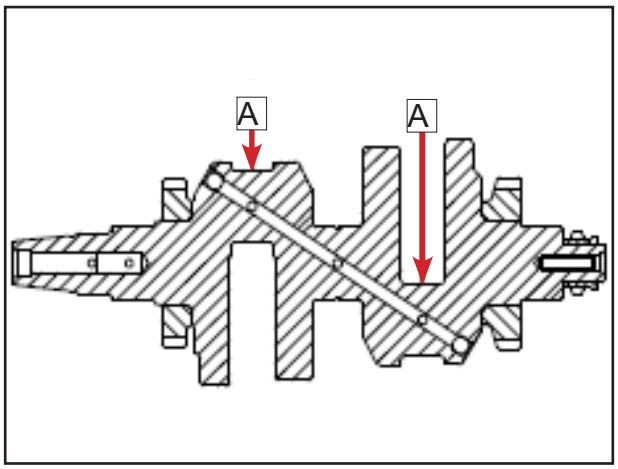
Connecting Rod Big End Side Clearance Standard:0.15mm~0.30mm
Service Limit: 0.55mm

Crankshaft and Connecting Rods

If the clearance exceeds the service limit, replace the connecting rod with new one and then check clearance again. If clearance is too large after connecting rod replacement, the crankshaft also must be replaced.

9.4.8 Crankpin/Connecting Rod Big End Bearing Insert Wear

- Measure the crankpin [A] diameter using a micrometer



Crankpin Diameter Standards: 37.984mm~38.00mm

Service Limit: 37.97mm

If any crankpin has worn past the service limit, re place the crankshaft with a new one.

If the measured crankpin diameters are not less than the service limit, but do not coincide with the original diameter markings on the crankshaft, make new marks on it.

Crankpin Diameter Marks:

2:37.984mm~37.992mm

1:37.993mm~38.000mm

- Measure the connecting rod big end inside diameter, and mark each connecting rod big end in accordance with the inside diameter.

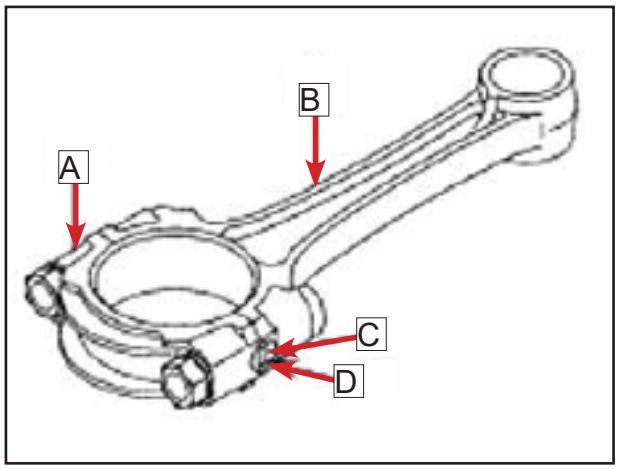
Connecting Rod Big End Inside Diameter Marks:1:41.00mm~41.008mm

2:41.009mm~41.016mm

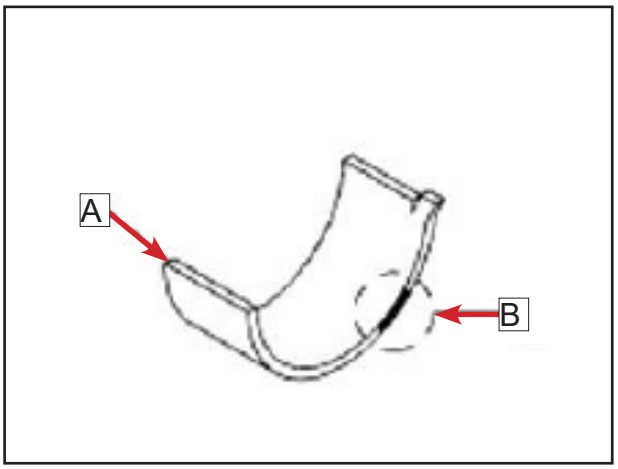
Crankshaft and Connecting Rods

Match Mark[A]
Connecting Rod body[B]
Diameter Mark[C]
Weight Mark[D]
Connecting rod big end cover[E]

- Select the proper bearing insert [A] according to the crankpin diameter mark and the big end inside diameter mark. Size Color [B]



Big end hole/Connecting joint/Bearing		
Big end hole	Connecting joint	Bearing
1	1	Black
1	2	Blue
2	1	
2	2	Green

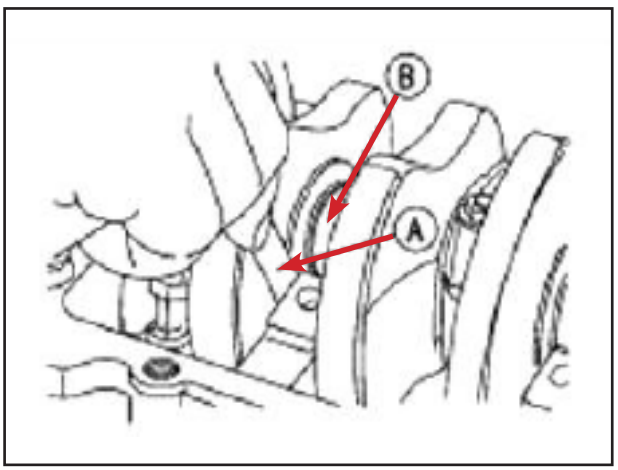


9.4.9 Crankshaft Side Clearance

- Insert a thickness gauge [A] between the crankcase main bearing and the crank web at the No.2 journal [B] to determine clearance.

Crankshaft Side Clearance Standard: 0.10mm~0.30mm
Service Limit:0.40mm

If the clearance exceeds the service limit, replace the crankcase halves as a set.



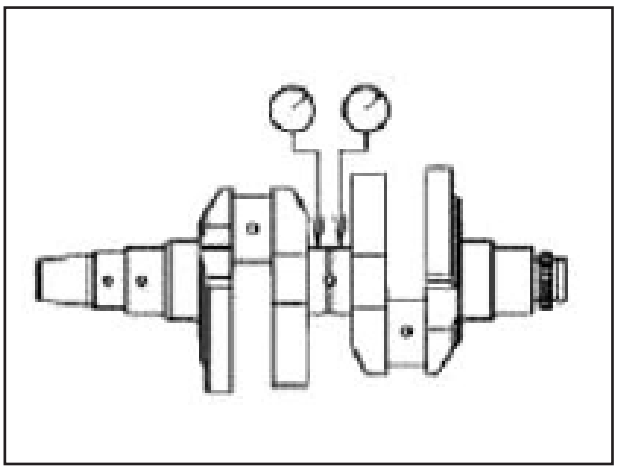
Crankshaft and Connecting Rods

9.4.10 Crankshaft Runout

- Measure the crankshaft runout

Crankshaft Runout Standard: 0.02mm
Service limit: 0.05mm

If the measurement exceeds the service limit, replace the crankshaft.



9.4.11 Crankshaft Main Bearing Insert/ Journal Wear

- Using a micrometer, measure the diameter of the main bearing journal [A].

Main Bearing Journal Diameter Standards: 37.984mm~38.00mm
Service limit: 37.97mm

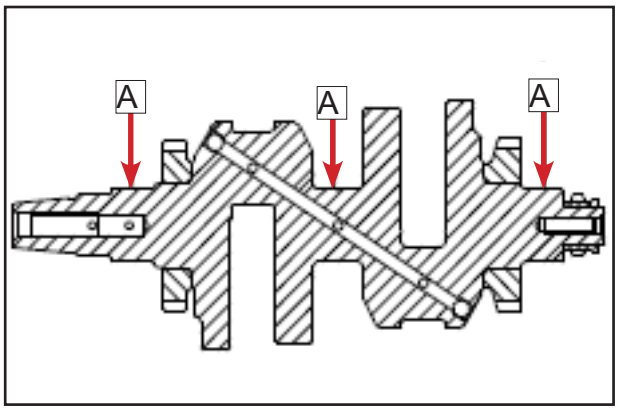
If the main bearing journal has worn past the service limit, replace the crankshaft with a new one.

If the measured main bearing journal diameters are not less than the service limit, but do not coincide with the original diameter markings on the crankshaft, make new marks on it.

Main Bearing Journal Diameter Marks:
2:37.984mm~37.992mm
1:37.993mm~38.000mm

- Measure the crankshaft hole diameter on the crankcase the diameter mark should be as same as shaft. or make a new mark on it.

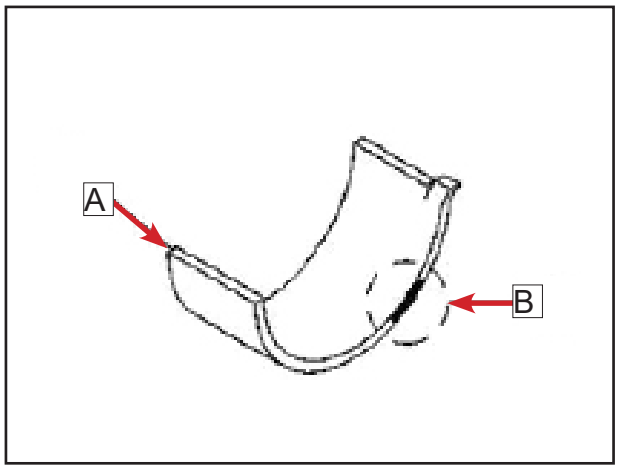
Crankshaft hole diameter marks
1:41.00mm~41.008mm
2:41.009mm~41.016mm



Crankshaft and Connecting Rods

- Select the proper bearing insert [A] in accordance with the combination of the crankcase and crankshaft coding. Size Color [B]

Crankshaft hole/shaft neck/Bearing		
Crank hole mark	Crankshaft neck mark	Bearing color
Yellow	1	Brown
Yellow	2	Black
Green	1	
Green	2	Blue



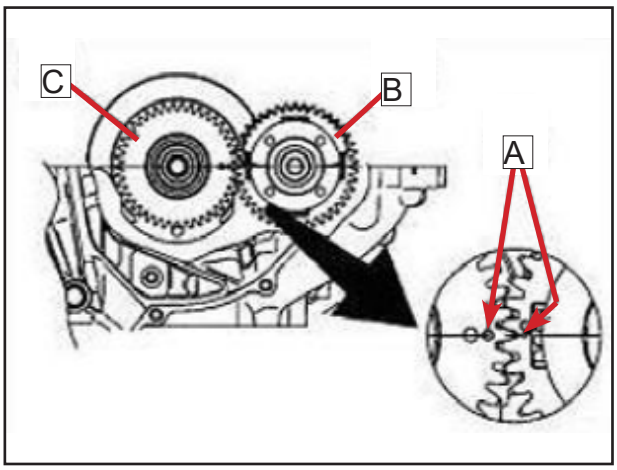
9.5 Balance shaft

9.5.1 Balance shaft removal

- Disassemble the crankcase(Refer to crankcase assemble)
- Take the balance shaft out from crankcase.

9.5.2 Balance shaft installation

- Pre-lubricate the balance shaft bearing.
- Aline [A] balance shaft mark [B]and crank shaft mark[C].
- Assemble the crankcase(See crankcase assemble).



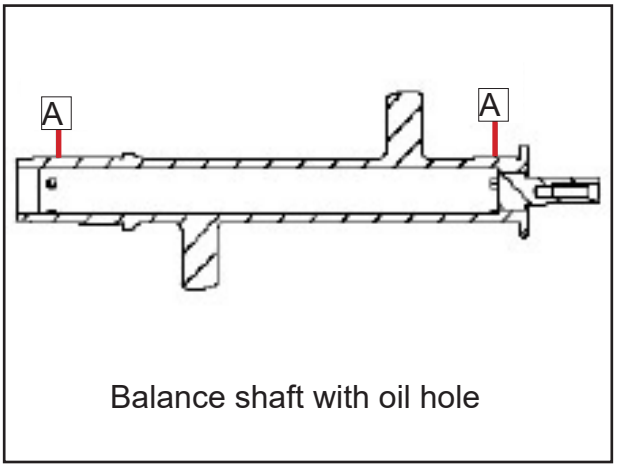
9.5.3 Balance shaft neck/Balance bearing wearing

- Use micrometer to measure the diameter of balance shaft neck [A].

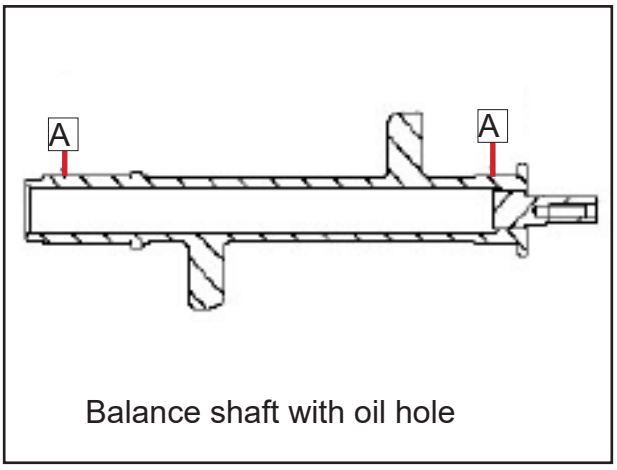
Balance shaft neck standard:
27.987mm~28.000mm
Service limit: 27.96mm
If balance bearing is out of service limit. Replace the balance shaft.

Note
Balance shaft without oil hole cannot mixed with the balance shaft with oil hole.

If balance shaft diameter is out of service limit but balance shaft diameter sign is different. Remark again.
Balance shaft diameter sign:
2:27.987mm~27.993mm
1:27.994mm~28.000mm



Balance shaft with oil hole



Balance shaft with oil hole

Balance shaft

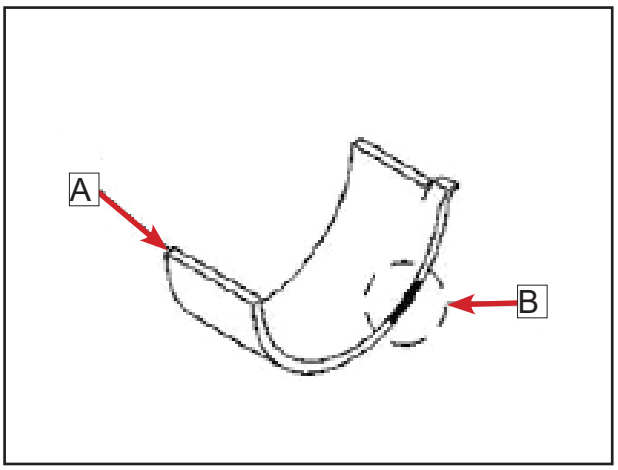
- Measuer the balancer hole diameter on crankcase. The diameter should be fit the mark. Or mark again to the truth.

Crankcase Bearing Bore Diameter Marking

1:31.000mm~31.008mm

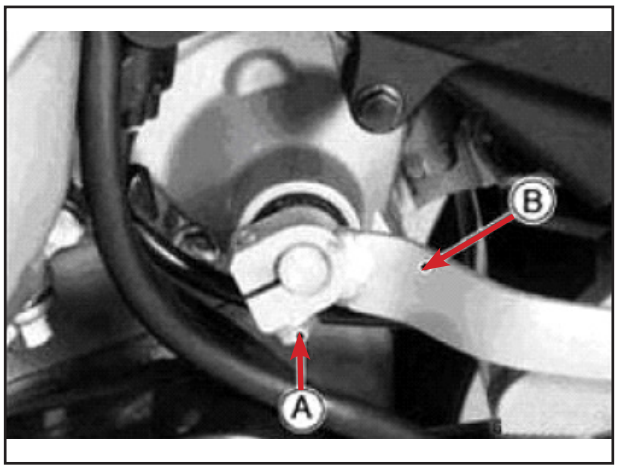
2:31.009mm~31.016mm

- Select the proper bearing insert [A] in accor dance with the combination of the crankcase and the balancer shaft coding. Size Color [B]



Balance shaft hole/Balance shaft/Balance bearing		
Balance shaft hole sign	Balance shaft sign	Balance shaft bearing color
Yellow	2	Brown
Yellow	1	Black
Green	2	
Green	1	Blue

9.6 Transmission



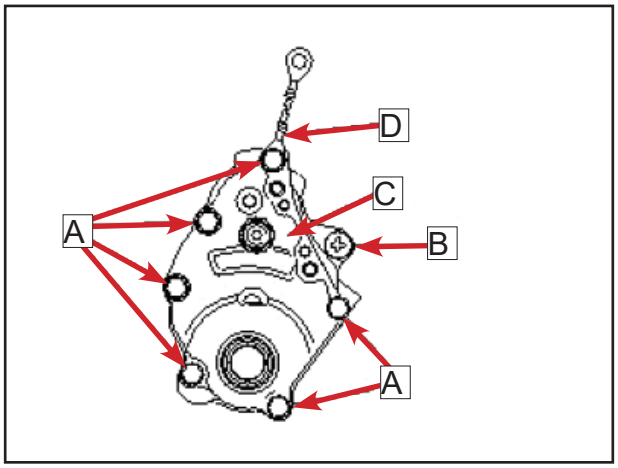
9.6.1 Shift Pedal Removal

- Remove:

Shift Lever Bolt [A]
Shift Lever [B]

9.6.2 Shift Pedal Installation

- Align the mark [A] on the shift shaft with the slit [B] on the shift lever.
- Tighten the shift lever bolt securely



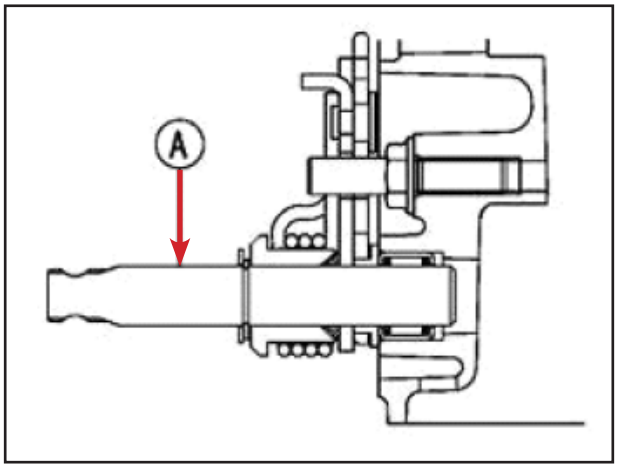
9.6.3 External Shift Mechanism Removal

- Remove

Engine Oil (Drain, see Engine Oil Change in the Periodic Maintenance chapter)
Shift Pedal (see Shift Pedal Removal)
Engine Sprocket(see Engine Sprocket Removal in the Final Drive chapter)
Neutral Switch Lead Connector (Disconnect)
Shift Shaft Cover Bolts [A]
Shift Shaft Cover Screw [B]
Shift Shaft Cover [C]

- Remove the shift shaft assembly [A].
- Remove:

Clutch (see Clutch Removal in the Clutch chapter).



Transmission

Gear Positioning Lever Bolt [A]

Gear Positioning Lever [B], Spacer,Washer and Spring.

9.6.4 External Shift Mechanism Installation

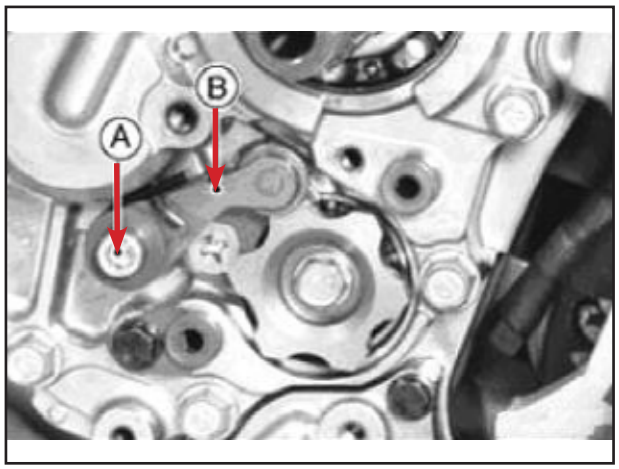
- Install the gear positioning lever [A] as shown. Spring [B], Washer [C], Spacer [D], Bolt [E]

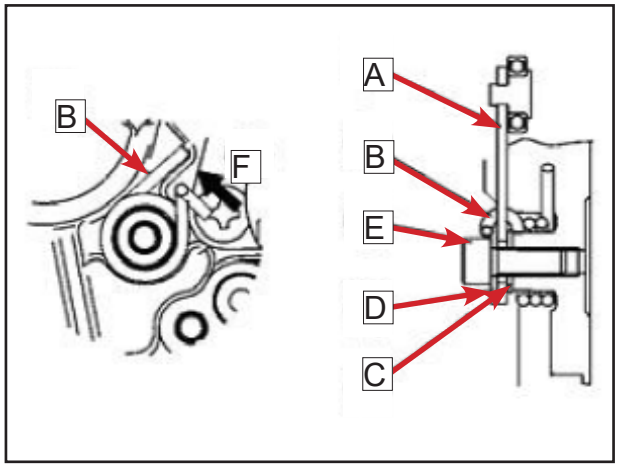
Hook the spring at gear positioning lever, pushing up [F] the hook portion, as shown.

- Apply a non-permanent locking agent to the gear positioning lever bolt and tighten it.

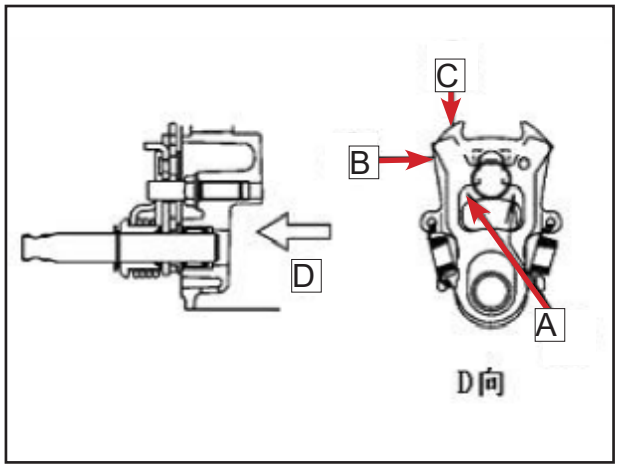
Torque - Gear Positioning Lever Bolt :12N·m

- Install the shift shaft assembly

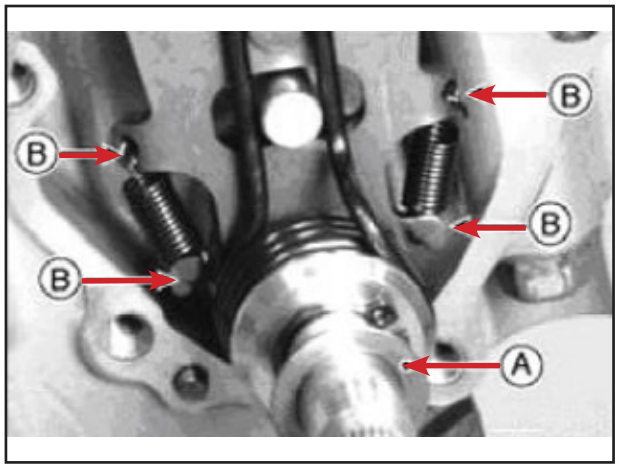




Apply [A] molybdenum disulfi de oil solution to the rubbing surface between the lever [B] and pawl [C] and move them two or three times up and down to lubricate them.



Be sure that the washer [A] is on the shaft. Be sure that the spring hook portions [B] are as shown.



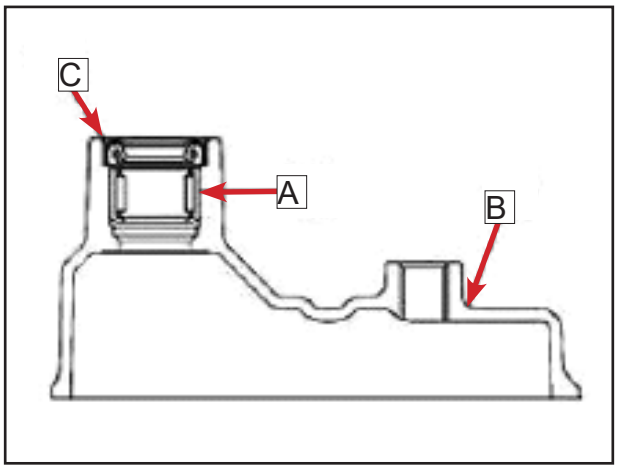
Transmission

- When the new needle bearing [A] is installed in the shift shaft cover [B], press and insert the new needle bearing until it is bottomed

Special Tool - Bearing Driver Set

- When the new oil seal [C] is installed in the shift cover, press and insert the new oil seal so that its surface is fl ush with the end of the hole.

Special Tool - Oil Seal Installer



- Install the shift shaft cover.

Be sure that the dowel pins [A] are in position.

Install the new gasket [B].

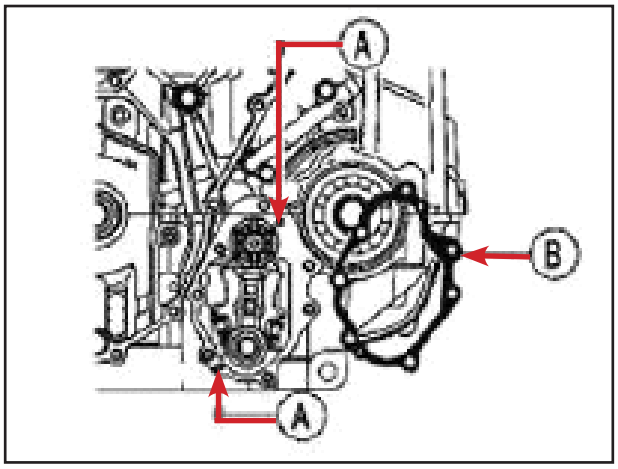
- Apply a non-permanent locking agent to the shift shaft cover screw [A].

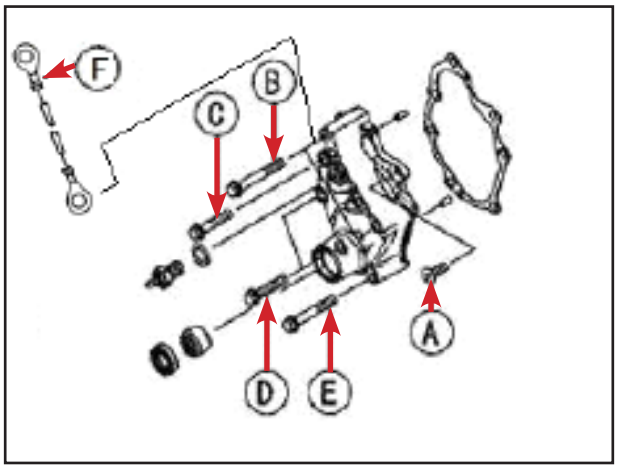
Do not apply a non-permanent locking agent to the shift shaft cover bolts [B,C,D, E].

Install the auxilary ground wire [F].

- Tighten the cover screw lastly.

Torque - Shift Shaft Cover Bolts:12N·m
Shift Shaft Cover Screw:5N ·m



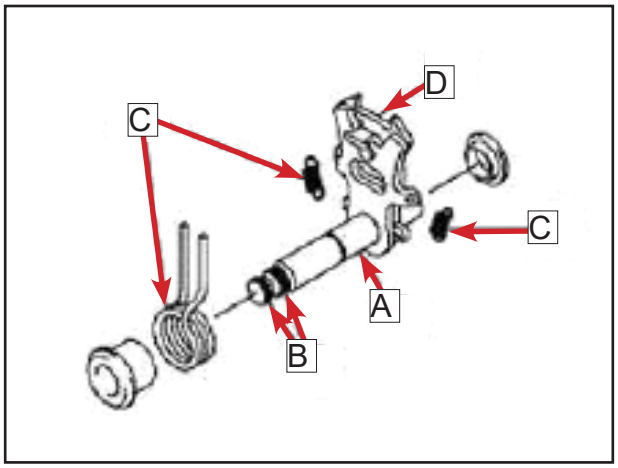


9.6.5 External Shift Mechanism Inspection

- Inspect the shift shaft [A] for any damage.

If the shaft [A], spline [B] or shift board [D] are bent or damaged. Replace the damaged parts.

If the spring [C] damaged, replace the spring.

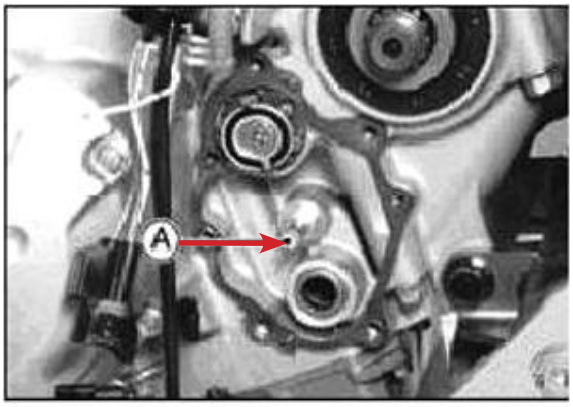


Transmission

- Check the return spring pin [A] is not loose.

If it is loose, unscrew it, apply a non-permanent locking agent to the threads, and tighten it.

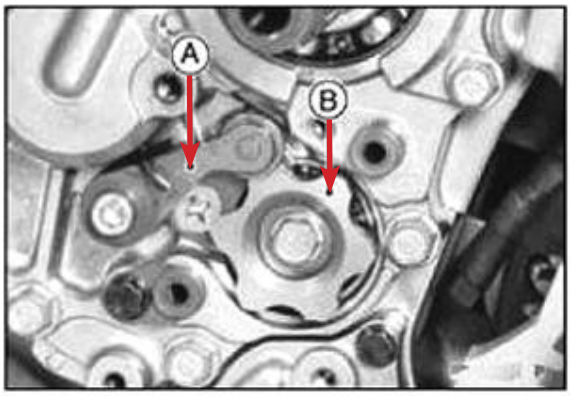
Torque-Shift Shaft Return Spring Pin :29N·m



- Check the gear positioning lever [A] and its spring for breaks or distortion.

If the lever or spring are damaged in any way, replace them.

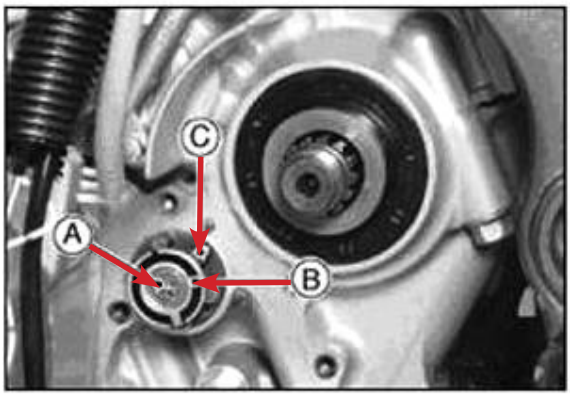
- Visually inspect the shift drum cam [B]. If they are badly worn or if they show any damage, replace it.



9.6.6 Transmission Assy Removal

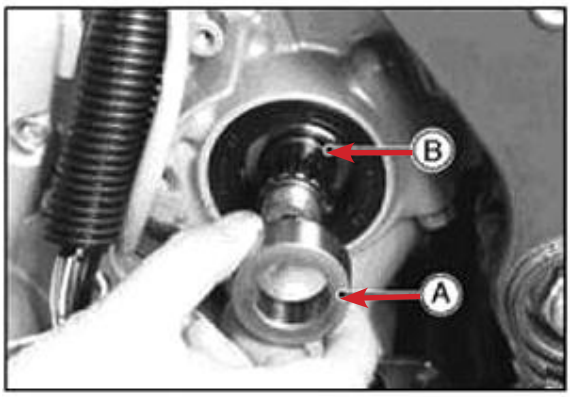
- Remove

Shift Shaft Assembly (see External Shift Mechanism Removal)
Neutral Switch Holder Bolt [A] Neutral Switch
Holder [B] and Pin Shift Drum
Holder [C] and Pin

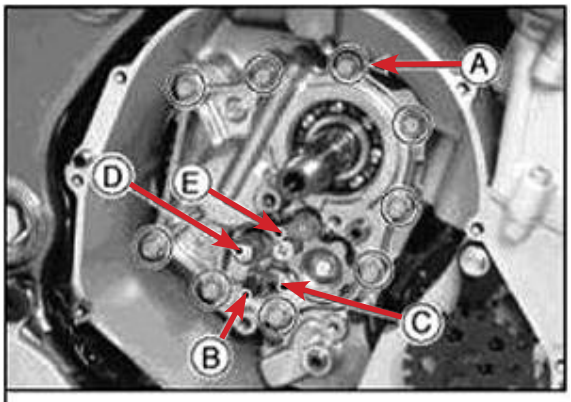


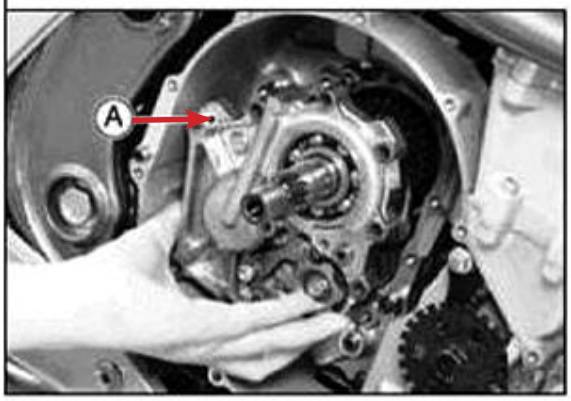
- Remove

Collar [A]
O-ring [B]



Transmission





- Remove:

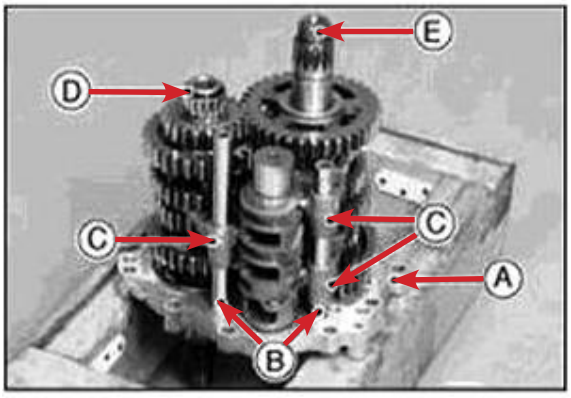
Clutch (see Clutch Removal in the Clutch chapter)
Transmission Case Bolts [A]
If the transmission assy is to be disassembed, remove the following.
Shift Rod Plate Bolt [B]
Shift Rod Plate [C]
Gear Positioning Lever Bolt [D]
Gear Positioning Lever [E] with Spring, Washer and Spacer.

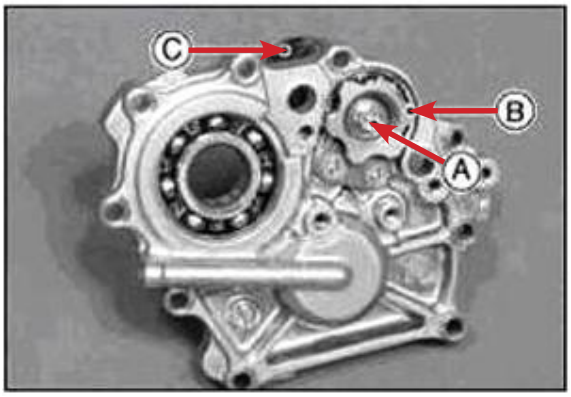
- Pull the transmission assy [A] out of the crankcase.

9.6.7 Transmission Assy Disassembly

- Remove the transmission assy (see Transmission Assy Removal).
- Remove the following from the transmis-sion case [A].

Shift Rods [B]
Shift Forks [C]
Drive Shaft [D]
Output Shaft [E]





- Remove:

Shift Drum Cam Bolt [A]
Shift Drum [B] and Pin
Shift Drum [C]

Transmission

9.6.8 Transmission Assy Assembly

- When the new ball bearings [A] are installed in the transmission case [B], press and insert them until they are bottomed.

Special Tool - Bearing Driver Set

- Install the following on the transmission case [A]. Shift Drum [B],Pin [C],Shift Drum Cam [D]
- Apply a non-permanent locking agent to the shift drum cam bolt [E] and tighten it.

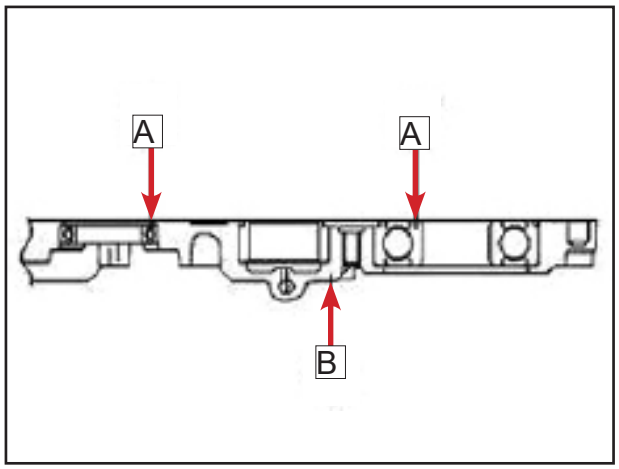
Torque - Shift Drum Cam Bolt 10N·m

- Install the Drive Shaft [F] and output shaft [G].
- Install the forks as shown.

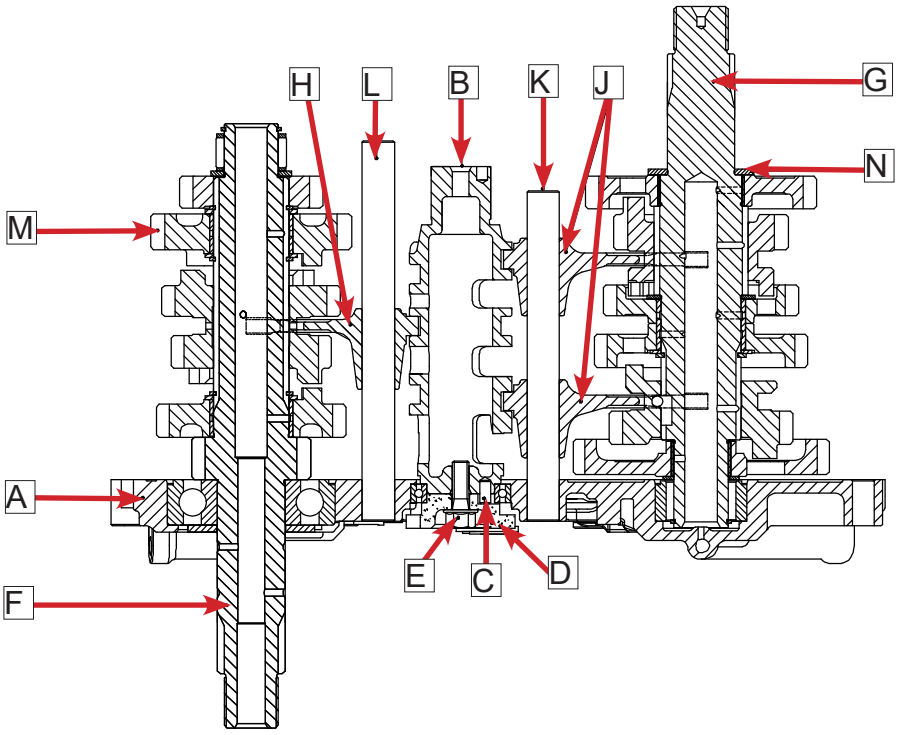
Position the one [H] with shortest ears on the drive shaft and place the pin in the center groove in the shift drum.

The two forks [J] on the output shaft are identical install the shift rods, noting the groove position.

- Install the fork rods [K] and [L]



- Apply molybdenum disulfide oil solution to the transmission gears shown with x marks [M].
- Be sure that the spacer [N] is on the output shaft.



Transmission

9.6.9 Transmission Assy Installation

- Assemble the transmission assy (see Transmission Assy Assembly).
- Be sure that the dowel pins [A] are in position.
- Apply grease to the O-ring [B] on the oil pipe.
- Install the transmission assy on the crankcase.
- Cover the threadlocker on the bolt screw.
- Tighten the transmission case bolts.

Torque-Transmission Case Bolts 20N·m

- Install the gear positioning lever (see External Shift Mechanism Installation).
- Install the locking gear.
- Cover the threadlocker on the bolt and tight up.

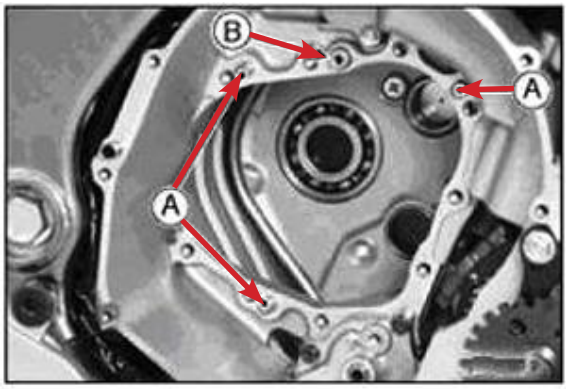
Locking gear bolt torque: 12N·m

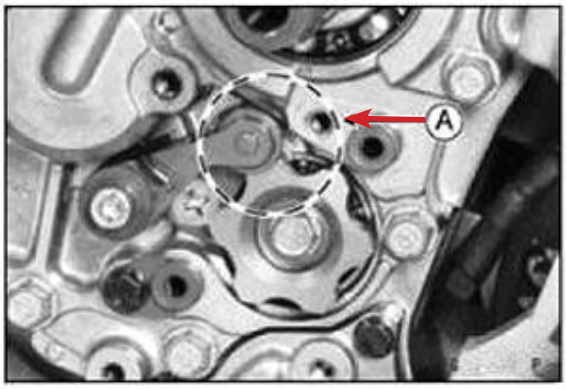
- Set the gear positioning lever to the neu-tral position [A].
- Install:

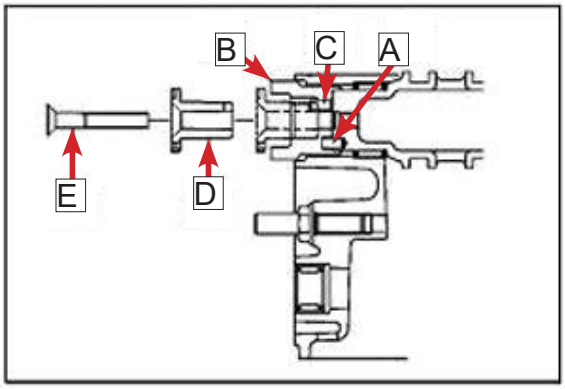
Pin [A],Shift Drum Holder [B]
Pin [C],Gear sensor [D]
Gear sensor screw[E]
Apply the thread locker on screw [E] and tight up.

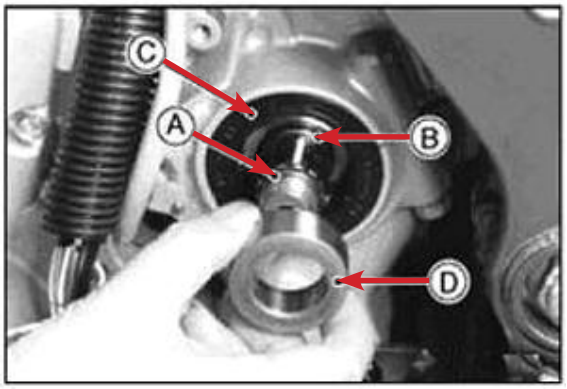
Torque - Neutral Switch Holder Screw 5N·m

- Apply grease to the O-ring [A] and install its position [B] on the output shaft.
- Apply grease to the lip of the oil seal [C].
- Install the collar [D].









Transmission

9.6.10 Transmission Shaft Disassembly

- Remove the transmission assy (see Transmission Assy Removal).

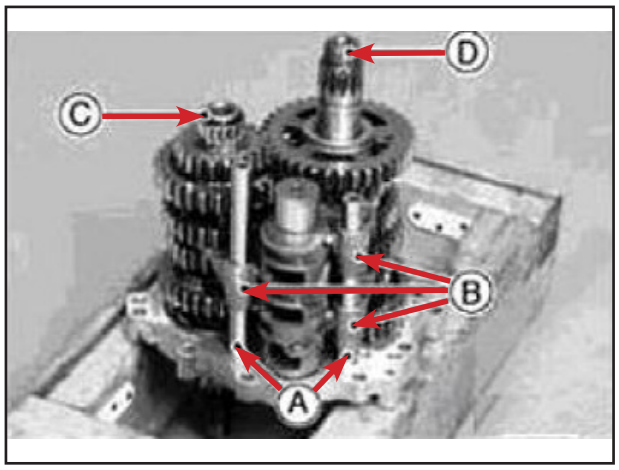
- Remove:

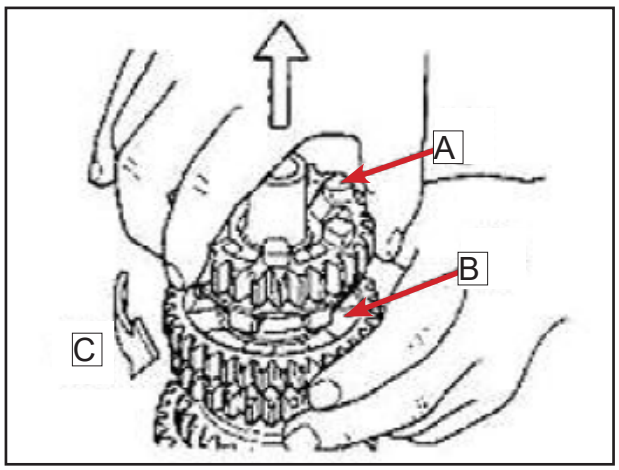
Shift Rods [A],Shift Forks [B]

Drive Shaft [C],Output Shaft [D]

- Remove the circlips, disassemble the transmission shafts.

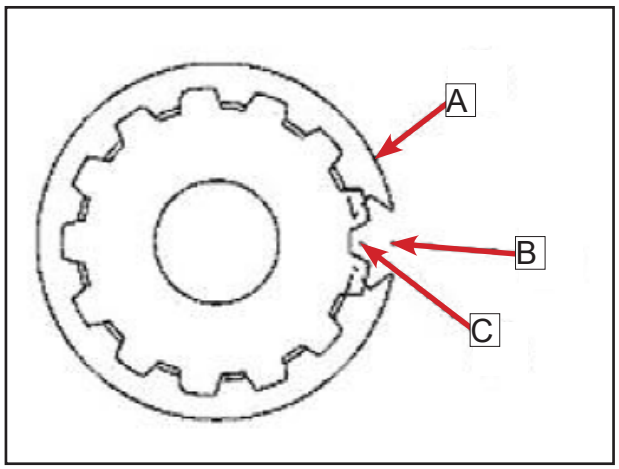
- Remove the fifth 5th gear





9.6.11 Transmission Shaft Assembly

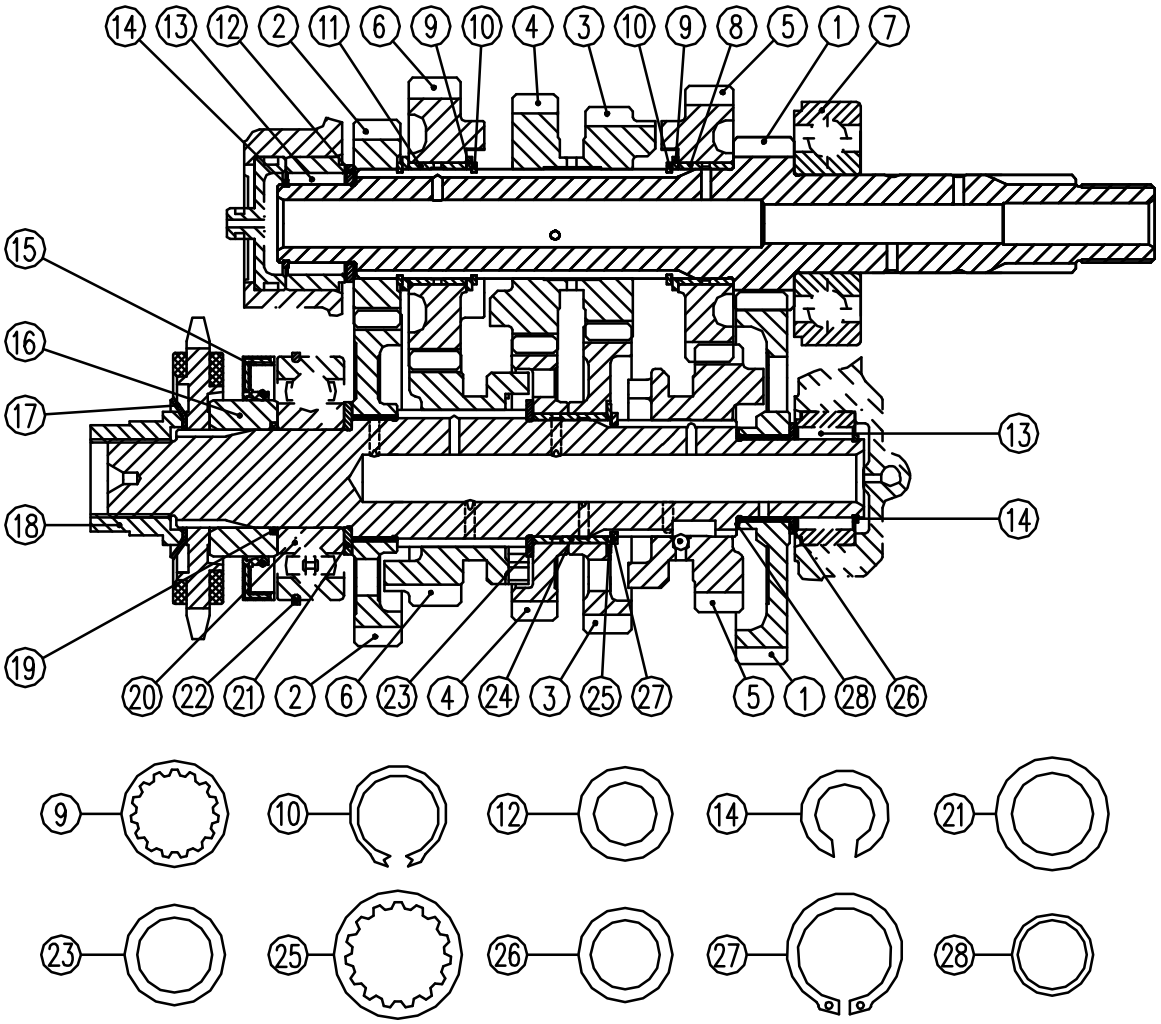
- Apply engine oil to the collar, needle bearing and the shaft.
- Install the collar to the shaft
- Replace all the removed circlips
- Install the circlips [A] so that the opening [B] is aligned with a spline groove [C].



Transmission

- The drive shaft gears can be recognized by size: the gear with the smallest diameter is 1st gear, and the largest one is 6th gear. Be sure that all parts are put back in the correct sequence and all circlips and washers are properly in place.
- Install the fifth gear and the bushing onto the drive shaft.
- Install the 3rd/4th gear onto the drive shaft with their oil holes aligned.
- Install the 6th gear and the bushing onto the drive shaft with their oil holes aligned.
- the drive shaft with their oil holes aligned. nized by size:the gear with the largest diam-eter is 1st gear, and the smallest one is 6th gear. Be sure that all parts are put back in the correct sequence and all circlips and washers are properly in place.
- Install the 3rd/4th gear and the bushings onto the output shaft with their oil holes aligned.
- Install the fifth gear onto the output shaft.
- Check that each gear spins or slides freely on the transmission shafts without binding after assembly.

Transmission

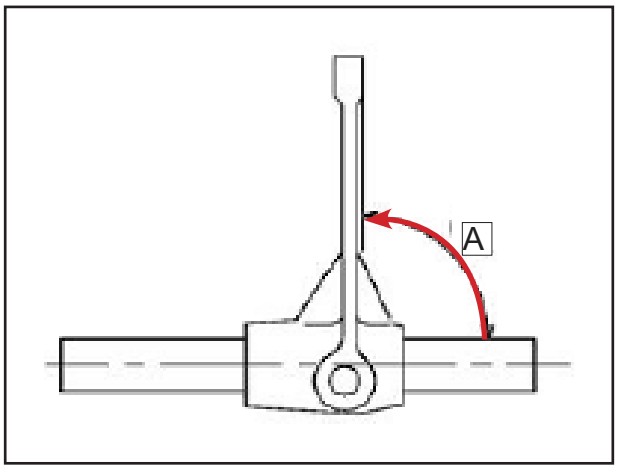


1.1st gear	9.Toothed washer	17.Washer	25.Toothed washer
2.2nd ge	10.Circlip 28	18.Nut	26.Washer ϕ 28
3.3re gea	11.Bushing	19.O-ring	27.Circlip ϕ 30
4.4th gea	12.Washer ϕ 30	20.Ball bearing	28.Washer ϕ 25
5.5th ge	13.Needle bearing	21.Washer ϕ 39	
6.6th ge	14.Circlip	22.Positioning ring	
7.Ball Bearing	15.Oil seal	23.Washer ϕ 38.5	
8.Bushing	16.Collar	24.Bushing	

Transmission

9.6.12 Shift Fork Bending

- Visually inspect the shift forks, and replace any fork that is bent. A bent fork could cause diffi culty in shifting, or allow the transmission to jump out of gear when under power. 90 degree [A]



9.6.13 Shift Fork/Gear Groove Wear

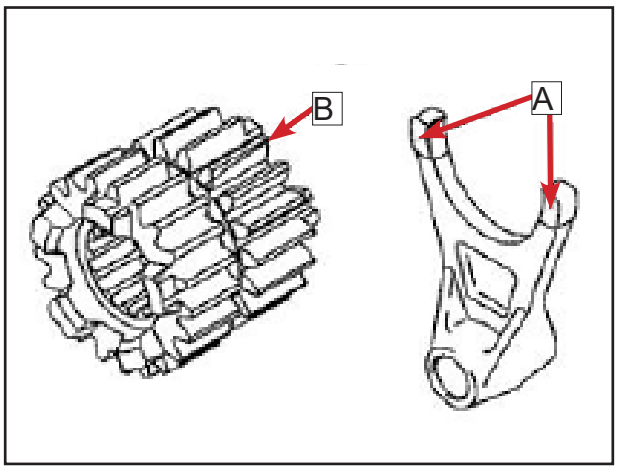
- Measure the thickness of the shift fork ears [A], and measure the width [B] of the gear grooves.

If the thickness of a shift fork ear is less than the service limit, the shift fork must be replaced.

Shift Fork Ear Thickness
Standard : 5.9mm~6.0mm
Service limit: 5.8mm

If the gear groove is worn over the service limit, the gear must be replaced.

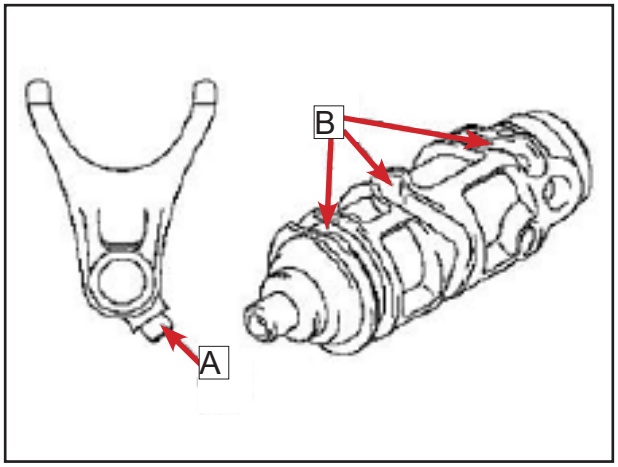
Gear Groove Width
Standard : 6.05mm~6.15mm
Service limit :6.25mm



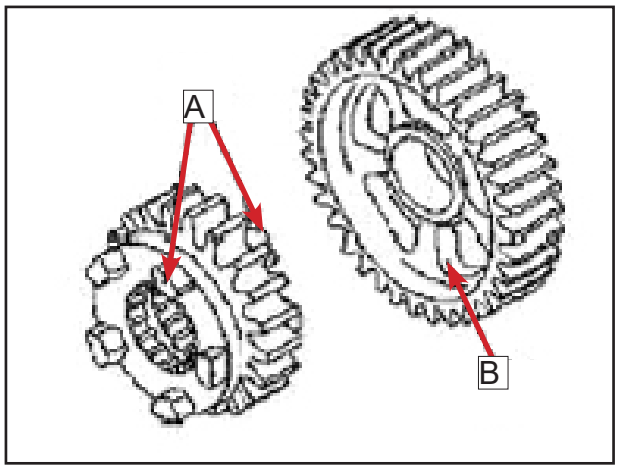
9.6.14 Shift Fork Guide Pin/Drum Groove Wear

- Measure the diameter of each shift fork guide pin [A], and measure the width [B] of each shift drum groove.

If the guide pin on any shift fork is less than the service limit, the fork must be replaced.



Transmission
Shift fork drum diameter
Standard:Φ6.9mm~Φ7.0mm
Service limit:Φ6.8mm
Shift Drum Groove Width
Standard: 7.10mm~7.17mm
Service limit:7.30mm

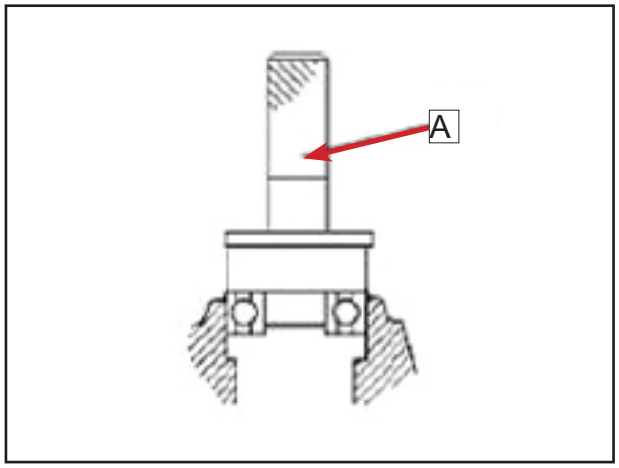


9.6.15 Gear Dog and Gear Dog Hole Damage

- Visually inspect the gear dogs [A] and gear dog holes [B].Replace any damaged gears or gears with excessively worn dogs or dog holes.

9.6.16 Ball and Needle Bearing Replacement

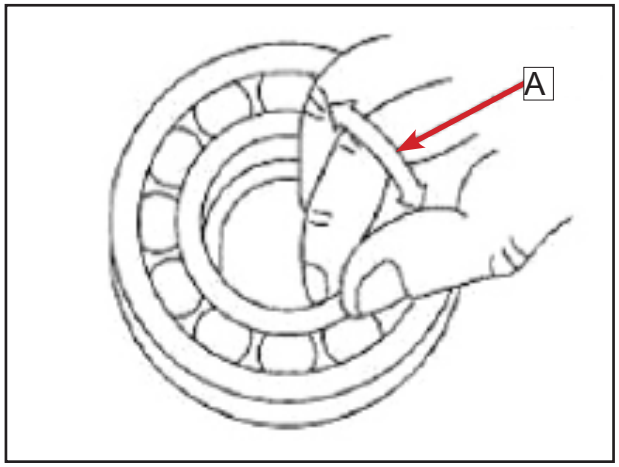
- Using a press or puller, remove the ball bearing and/or needle bearings.
- Using a press and the bearing driver set [A], install the new ball bearing until it stops at the bottom of its housing.



9.6.17 Ball and Needle Bearing Wear

- Spin [A] the bearing by hand to check its condition.

If the bearing is noisy, does not spin smoothly, or has any rough spots, replace it.



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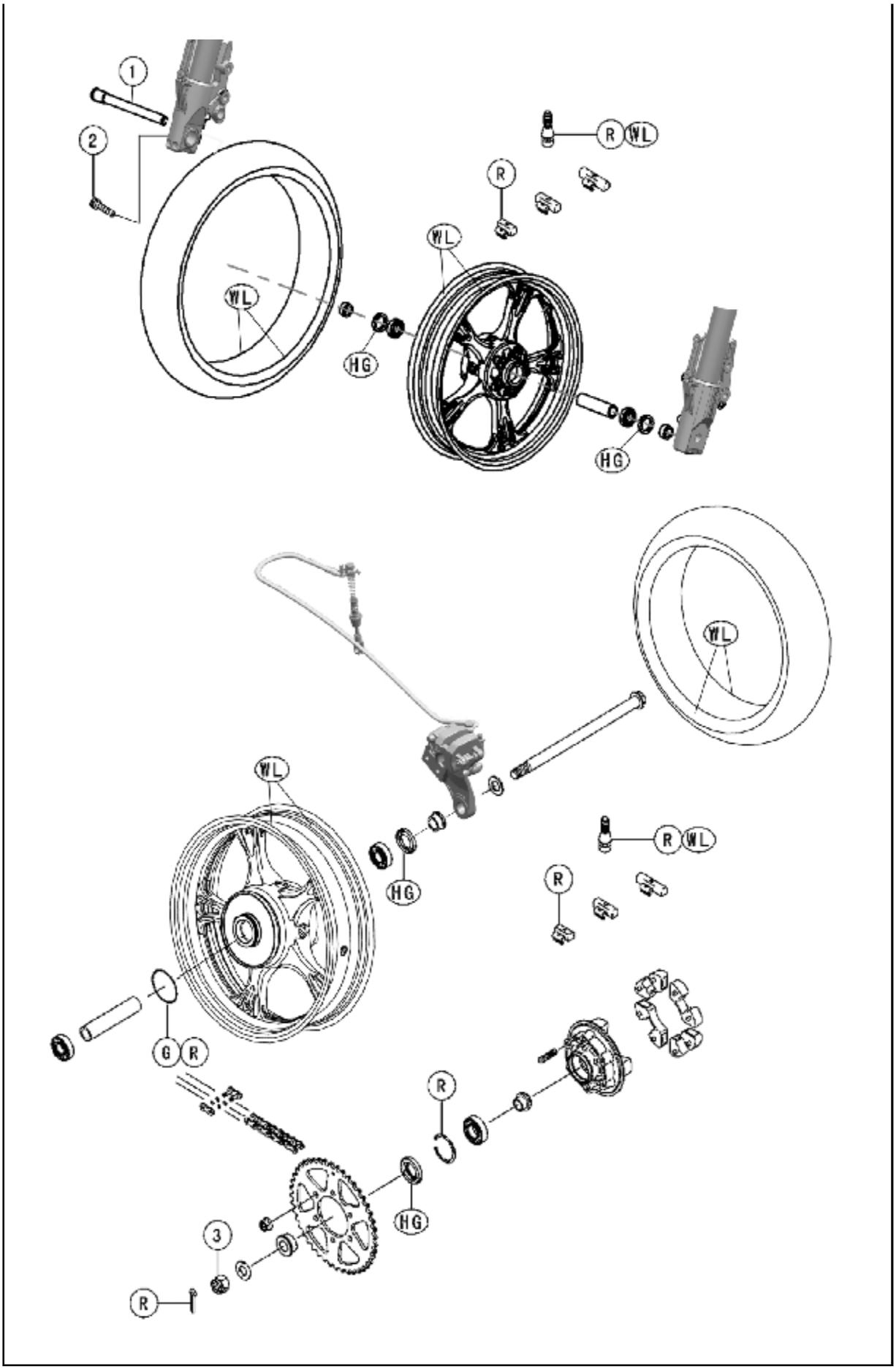
10.1 Exploded view



No.	Tighten parts	Torque			Remark
		N·m	kgf·m	ft·lb	
1	Front wheel axel	108	11.0	80	
2	Front axel locking screw	34	3.5	25	Two stars
3	Rear Axel nut	108	11.0	80	

G:Use grease
HG:Use high heat grease
R:Replace the parts
WL： Use soapy water or special rubber washing liquid.

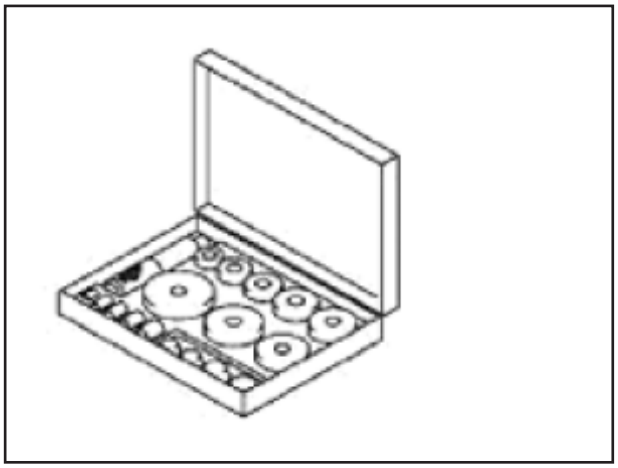
10.2 Specifications and service limit

Item	Standard	Service limit
Rim		
Rim runout		
Axial	TIR0.5mm(0.02in.)or smaller	TIR1.0mm(0.04in.)
Radial	TIR0.8mm(0.03in.)or smaller	TIR1.0mm(0.04in.)
Wheel axle twisting angle /100mm(3.94in.)Wheel balance	TIR0.03mm(0.0012in.)or smaller	TIR0.2mm(0.008in.)
Balance weight	10g(0.35oz.)or smaller	——
	10g(0.35oz.)	——
	20g(0.71oz.)，30g(1.06oz.)	——
Rim size		
Front	3.50×17	——
Rear	4.50×17	——
Tire		
Tire pressure(cold)		
Front	180kg（397lb）： 250kPa（2.50kgf/cm2，36.3psi）	——
Rear	180kg（397lb）： 280kPa（2.80kgf/cm2，40.6psi）	——
Tire pattern deepness		
Front	6.5mm(0.26in.)	1mm(0.04in.) (AT，CH，DE)1.6mm (0.06in.)
Rear	9.0mm(0.35in.)	Upto130km/ h(80mph)： 2mm(0.08in.) Over130km/ h(80mph)： 3mm(0.12in.)
Tire standard	Style	Size
Front	DUNLOP，SPORTMAX RADIAL D221FAJ	120/70ZR17M/C(58W)
Rear	DUNLOP，SPORTMAX D221J	160/60ZR17M/C(69W)

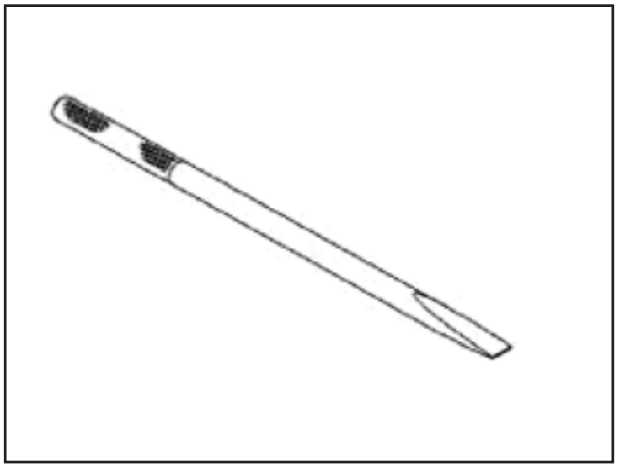
⚠Warning
Use same supplier and same size rimand tire.

10.3 Special tool

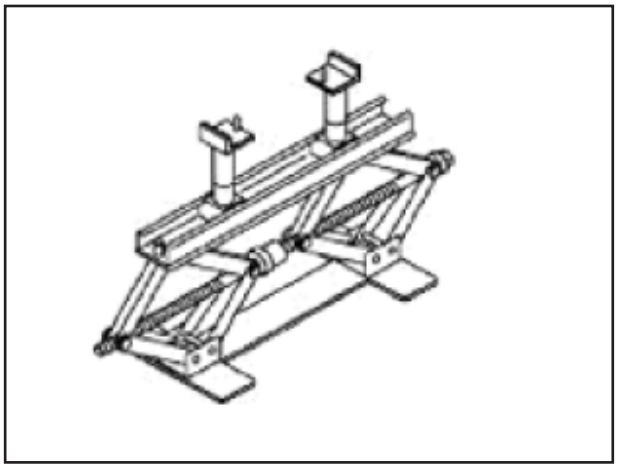
Bear



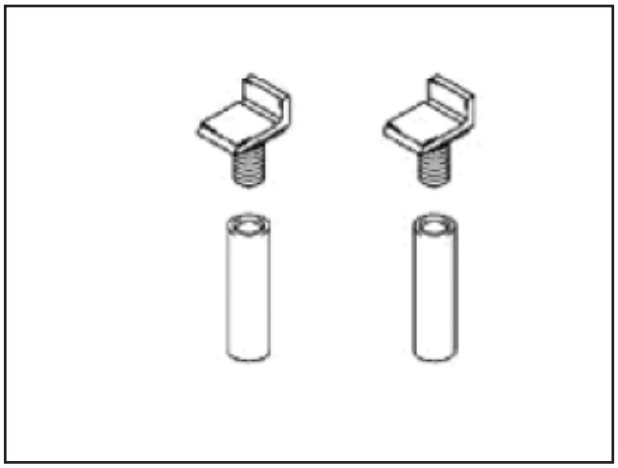
Screw driver



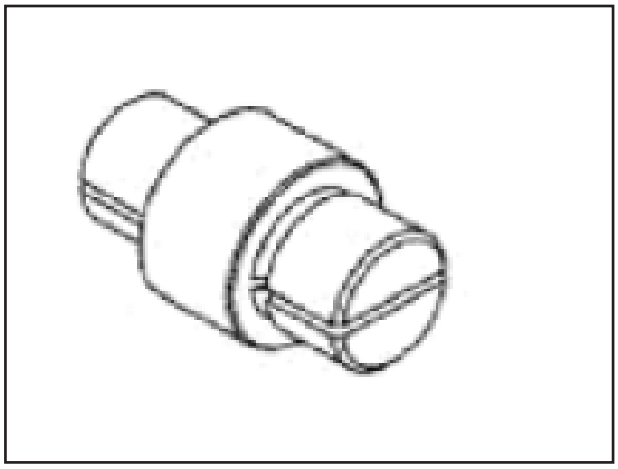
Jack



Jack accesesories



Bearing remover

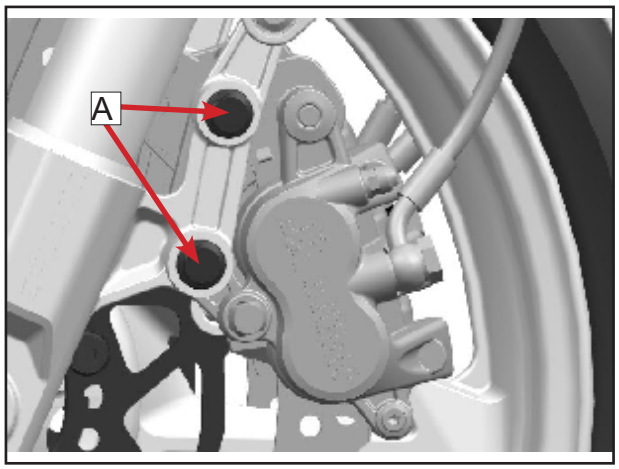


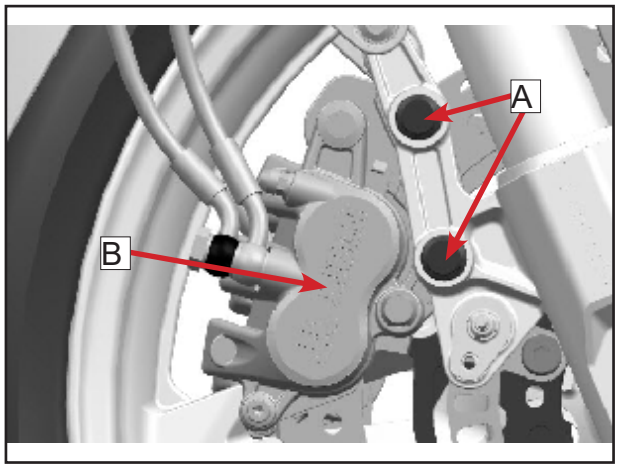
10.4 Wheel (Rim)

10.4.1 Front wheel removal

- Remove:

Brake Caliper Mounting Bolts [A]
Front Brake Calipers [B]





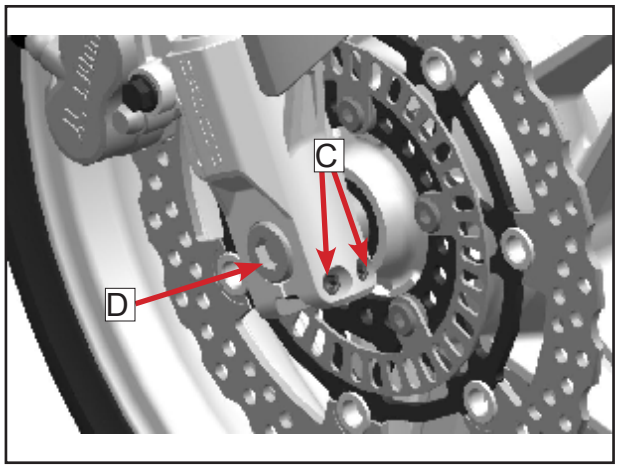
- Loosen:

Axle Clamp Bolt[C]

- Remove the front axle [D]
- Remove the lower fairing (see Lower Fair-ing Removal in the Frame chapter).
- Raise the front wheel off the ground with jack.

Special Tools - Jack
Jack Attachmen

- Pull out the axle to the right and drop the front wheel out of the forks.



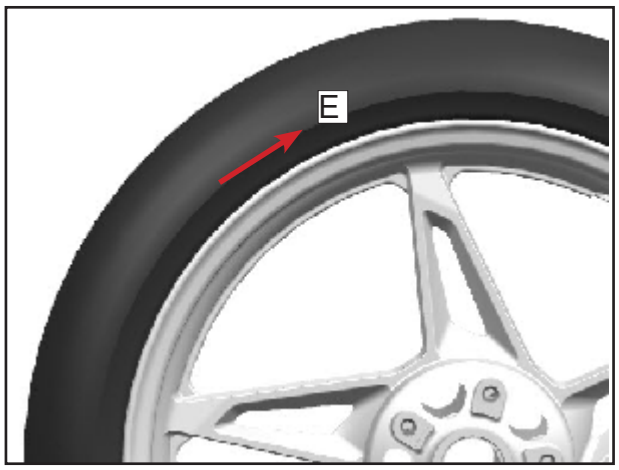
⚠ Warning

Do not let the break disc down on the ground, or the break disc will be damaged or wrapped. Put a piece of wood under it to avoid it touched the ground.

10.4.2 Front Wheel Installation

The direction of the wheel rotation is shown by an arrow [E]

- Check the wheel rotation mark on the front wheel and install it.

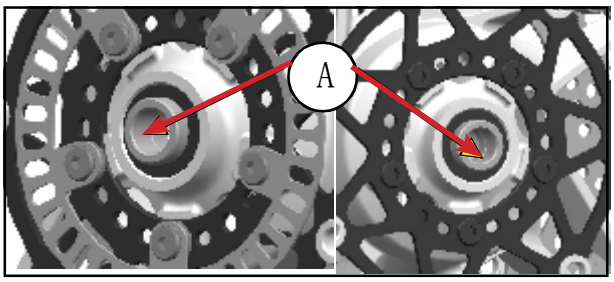


Wheel (Rim)

- Apply high-temperature grease to the grease seal lips.
- Fit the collars [A] on the both sides of the hub.
- Insert the front axle, and tighten the axle.
- **Torque-Front Axle:**

108N·m (11.0kgf·m,80ft·lb)

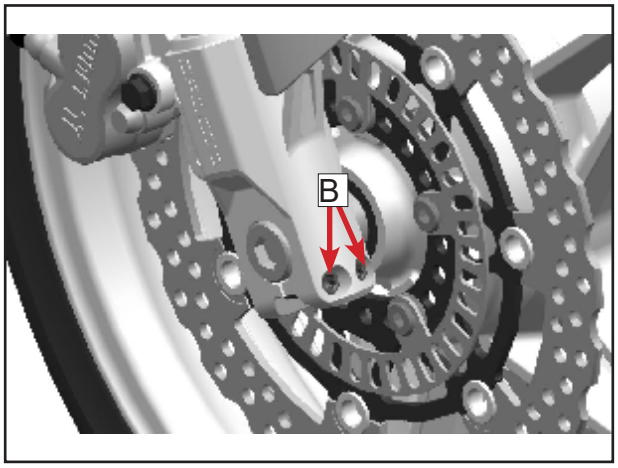
- Before tightening the axle clamp bolt on the right front fork leg, pump the front fork up and down 4 or 5 times to allow the right front fork leg to seat on the front axle.



NOTE

Put a block in front of the front wheel to stop moving

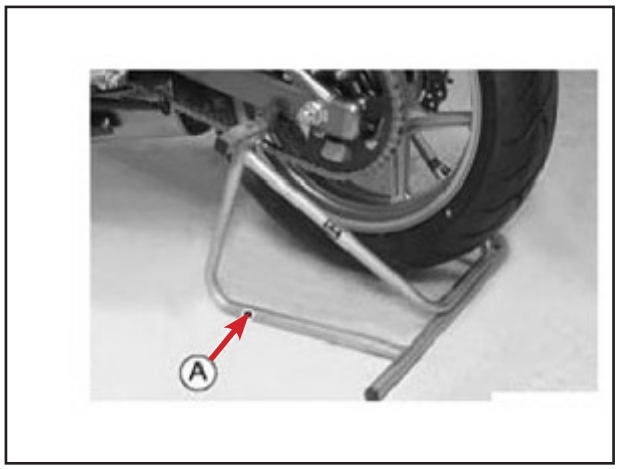
- Tighten the axle clamp bolt [B]
- **Torque-Front Axle Clamp Bolt :34N·m (3.5kgf·m,25ft·lb)**
- Install the lower fairing (see Lower Fairing Installation in the Frame chapter).
- Install the front brake calipers (see Caliper Installation in the Brakes chapter).
- Check the front brake effectiveness (see Brake Operation Inspection in the Periodic Maintenance chapter).



⚠ Warning
Inspe ct breaking performance before driving to make sure safty.

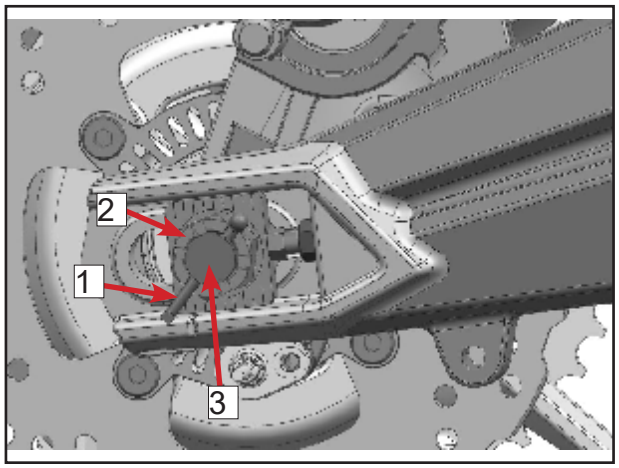
10.4.3 Rear Wheel Removal

- Raise the rear wheel off the ground with stand [A].

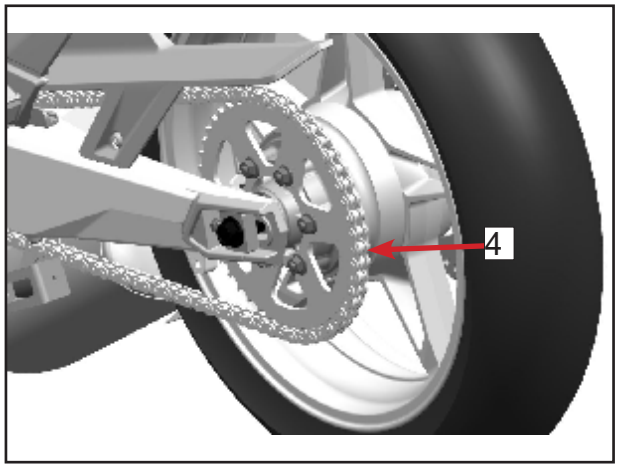


- Remove

Cotter Pin [A]
Axle Nut [B]
Axle [C] with Washer

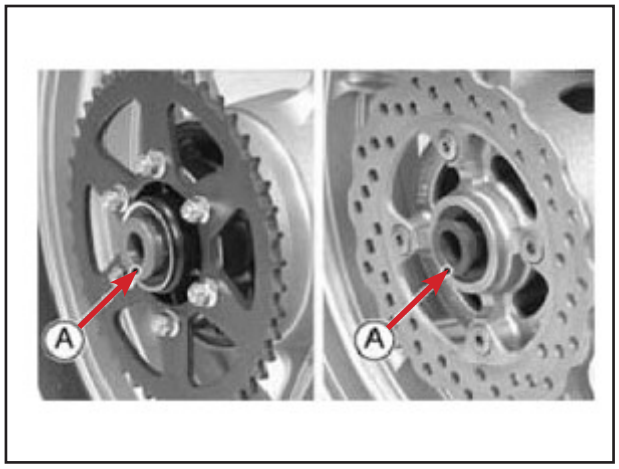


- Remove the drive chain [D] from the rear sprocket toward the left
- Move the rear wheel back and remove it.



10.4.4 Rear Wheel Installation

- Apply high-temperature grease to the grease seal lips.
- Fit the collars [A] on the both sides of the hub.



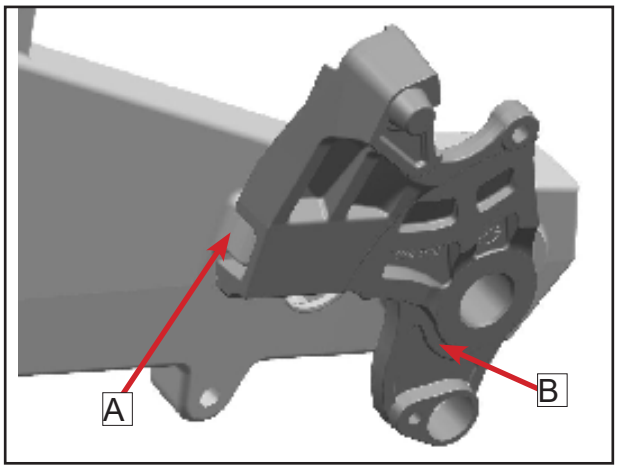
Wheel (Rim)

- Engage the drive chain with the rear sprocket.

Install the caliper bracket [A] onto the swing-arm stop [B].

- Insert the axle from the right side of the wheel, and tighten the axle nut.

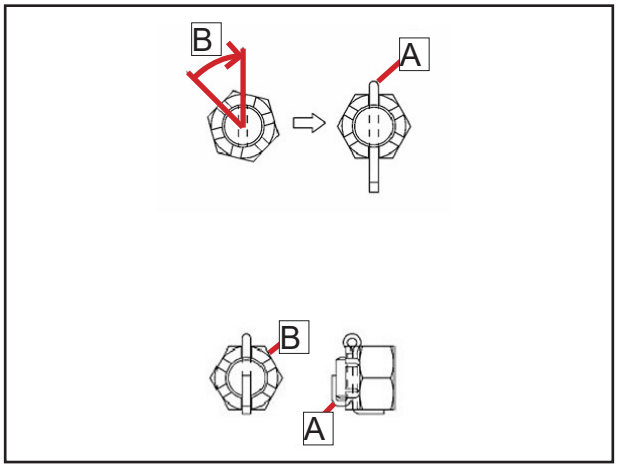
Torque-Rear Axle Nut:
108N·m(11.0kgf·m, 80ft·lb)
Insert a new cotter pin [A].



Note

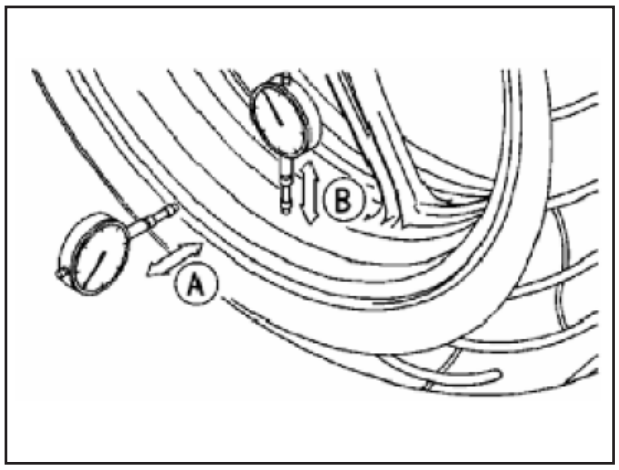
When inserting the cotter pin, if the slots in the nut do not align with the cotter pin hole in the axle, tighten the nut clockwise [B] up to next alignment.
It should be within 30°.
When groove goes the nearesr hole.Loose again and bend the cotter pin on ght nut

Danger
Please check the vehicle breaking performance. Or it may cause accident.



- Adjust the drive chain slack after installa-tion(see Drive Chain Slack Inspection in the Periodic Maintenance chapter).
- Install the rear brake caliper(see Caliper Installation in the Brakes chapter).
- Check the rear brake effectiveness (see Brake Operation Inspection in the Periodic Maintenance chapter).

10.5 Wheel Inspection



- Raise the front/rear wheel off the ground with jack.

Special Tools – Jack, Jack Attachment

- Spin the wheel lightly, and check for rough-ness or binding. If roughness or binding is found, replace the hub bearing Wheel Inspec-tion
- Inspect the wheel to see cracks,dent, bent or other damage.

If there is any damage to the wheel, replace the wheel.

- Remove the wheel
- Measure the rim runout, axial [A] and radial [B], with a dial gauge

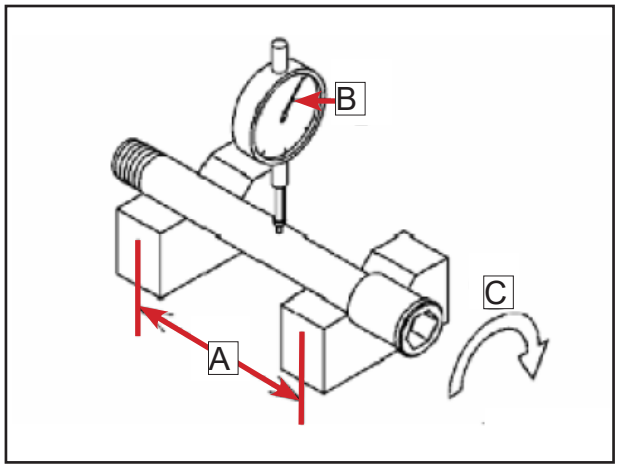
If rim runout exceeds the service limit, check the hub bearings.If the problem is not due to the bearings, replace the wheel.

Rim run out standard:
Axial TIR0.5mm(0.02in.) or less
RadialTIR0.8mm(0.03in.) or less
Service limit:
Axial TIR1.0mm(0.04in.)
RadialTIR1.0mm(0.04in.)

⚠Warning
Do not try to repair the damaged wheel. If other parts damaged together with bearing. Wheel change is a must for safety.

10.5.1 Axle Inspection

- Remove the front and rear axles (see Front/Rear Wheel Removal).
- Visually inspect the front and rear axle for damages.If the axle is damaged or bent, replace it.
- Place the axle in V blocks that are 100 mm(3.94in.)[A]apart, and set a dial gauge [B] on the axle at a point halfway between the blocks.Turn [C] the axle to measure the runout. The difference between the highest and lowest dial readings is the amount of runout.



If axle runout exceeds the service limit, re-place the axle.

Axle Runout/100mm(3.94in.)
Standard:TIR0.03mm(0.0012in.) Or less
Service limit:TIR0.2mm(0.008in.)

Wheel Inspection

10.5.2 Balance Inspection

- Remove the front and rear wheels (see Front/Rear Wheel Removal).
- Support the wheel so that it can be spun freely.
- Spin the wheel lightly, and mark [A] the wheel at the top when the wheel stops.

Repeat this procedure several times. If the wheel stops of its own accord in various positions, it is well balanced.If the wheel al-ways stops in one position, adjust the wheel balance (see Balance Adjustment).

10.5.3 Balance Adjustment

If the wheel always stops in one position, provisionally attach a balance weight [A] on the rim at the marking using adhesive tape.

- Rotate the wheel 1/4 turn [B], and see whether or not the wheel stops in this position. If it does, correct the balance weight .

If the wheel rotates and the weight goes up replace the weight with the next heavier size. If the wheel rotates and the weight goes down, replace the weight with the next lighter size.

- Rotate the wheel another 1/4 turn and then another 1/4 turn to see if the wheel is correctly balanced.
- Permanently install the balance weight.

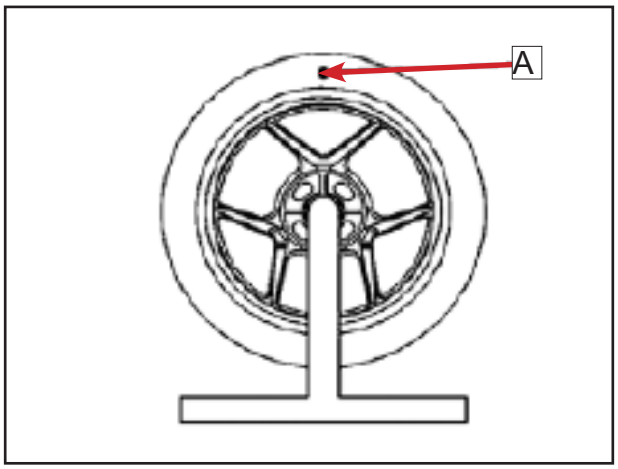
10.5.4 Balance Weight Removal

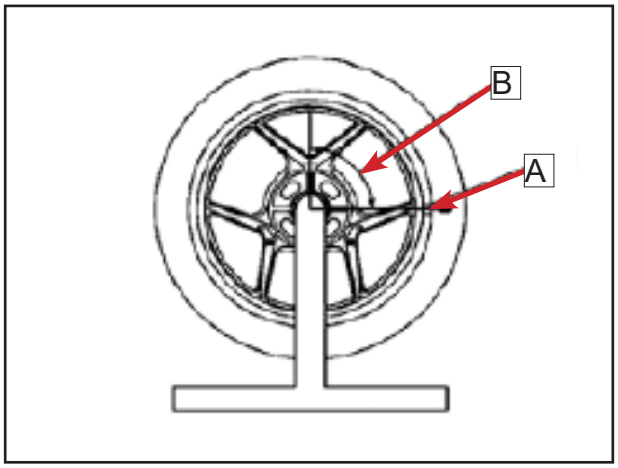
- Insert a regular tip screwdrivers [A] [B] be-tween the rib [C] and the weight [D] as shown.
- Pry the balance weight with two screwdriv-ers and remove the balance weight..
- Discard the used balance weight.

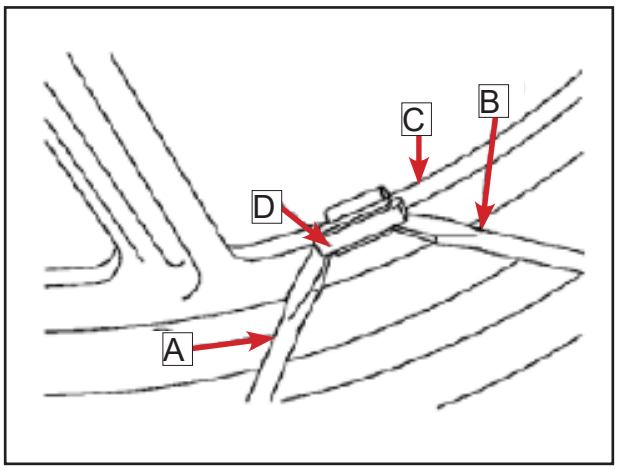
⚠Warning
Do not knock the scr ew drivers. or the rim will be damaged.

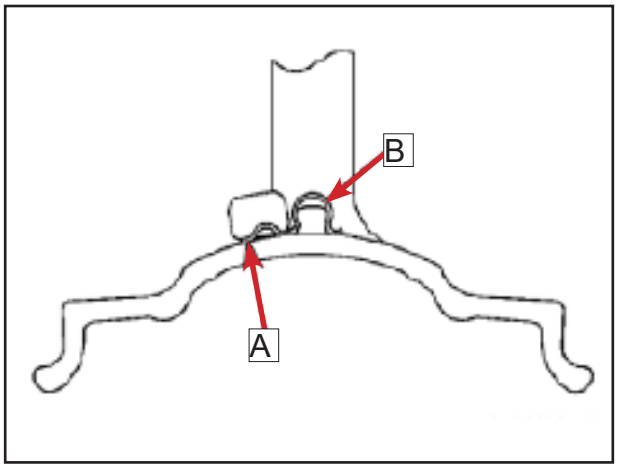
10.5.5 B alance Weight Installation

- Check if the weight portion has any play on the blade [A] and clip [B]. If it does, dis-card it.





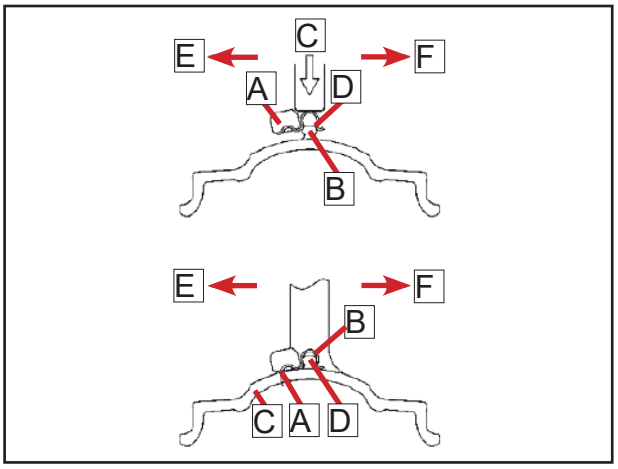




⚠Warning
If the rim balance position has any clear ance. And pellers has been pulled. Replace the balance weight got loosed. Do not reuse the balance weight. And wheels unbalanced can cause dangerous situation.

Balance Weight

No.	Balance weight
1	10g (0.35oz.)
2	20g (0.71oz.)
3	30g (1.06oz.)



NOTE

Balance weights are available from cfmoto dealers in 10, 20, and 30 grams(0.35, 0. 71, and 1.06 oz.) sizes.

An imbalance of less than 10 grams (0.35 oz.) will not usually affect running stability.

Do not use four or more balance weight (more than 90gram, 3.17oz.).If the wheel re-quires an excess balance weight, disas-semble the wheel to find the reason.

- Slip the balance weight [A] onto the rib [B] by pushing or lightly hammering [C] the clip [D].

Left Side [E]

Right Side [F]

- Be sure to install the balance weight.

Check that the blade [A] and clip [B] are fully seated on the rim [C] and that the clip is hooked over the rib [D].

Left Side [E]

Right Side [F]

10.6 Tire Pressure Inspection/ Adjustment

- Refer to the Air Pressure Inspection in the Periodic Maintenance chapter.
- Refer to the Wheel/Tire Damage Inspection in the Periodic Maintenance chapter.

10.6.1 Tire Removal

- Remove

Wheel (see Front/Rear Wheel Removal)
Valve Core (Let out the air)

- To maintain wheel balance, mark the valve stem position on the tire with chalk so that the tire can be reinstalled in the same position.

Chalk Mark or Yellow Mark [A]
Air Valve [B]
Align [C]

- Lubricate the tire beads and rim fl anges on both sides with a soap and water solution or rubber lubricant. This helps the tire beads slip off the rim flanges.

⚠Warning
Do not use engine oil or petro element to lubricate. Because it will damage the tires.

- Remove the tire from the rim using a suitable commercially available tire changer.

NOTE

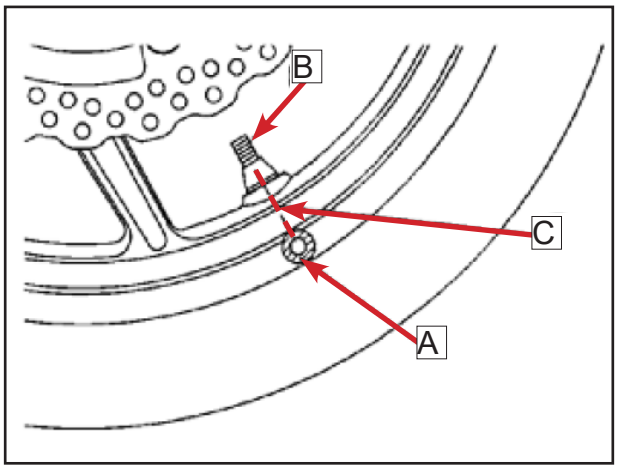
The tires cannot be removed with hand tools because they fit the rims too tightly.

10.6.2 Tire Installation

Dangerous
Use same supplier's tire in front and rear wheels.

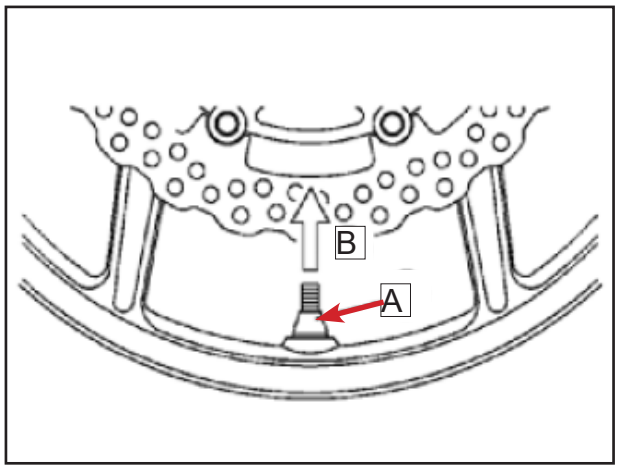
- Inspect the rim and tire, and replace them if necessary.
- Clean the sealing surfaces of the rim and tire, and smooth the sealing surfaces of the rim with a fine emery cloth if necessary.
- Remove the air valve and discard it.

⚠Warning
Replace the air inject valve together with the tire. Do not reuse the air inject valve.



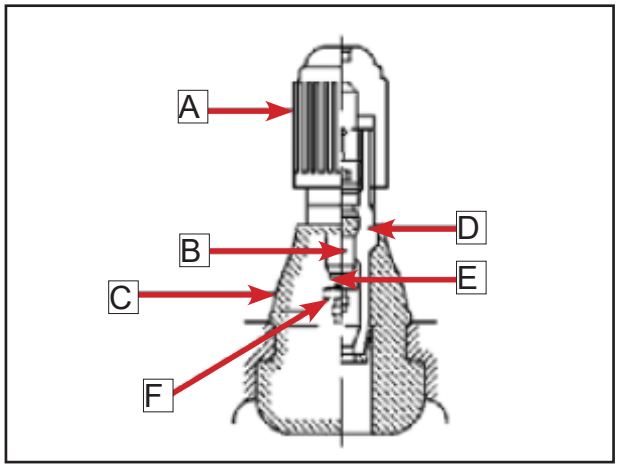
- Install a new valve in the rim.

Remove the valve cap, lubricate the stem seal [A]
with a soap and water solution or rubber lubricant, and pull [B] the valve stem through the rim from the inside out until it snaps into place.



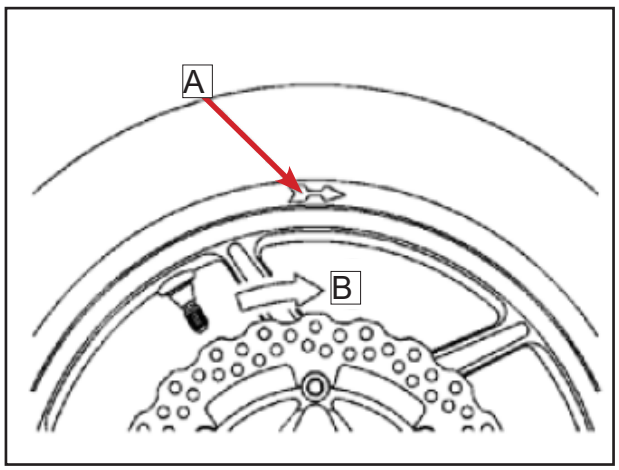
⚠Warning
Do not use the oil or petro element to lubricate the valve rod. That will make the rubber becoming bad.

The air valve is shown in the figure.
Valve Cap [A]
Valve Core [B]
Stem Seal [C]
Valve Stem [D]
Valve Seat [E]
Valve Opened [F]



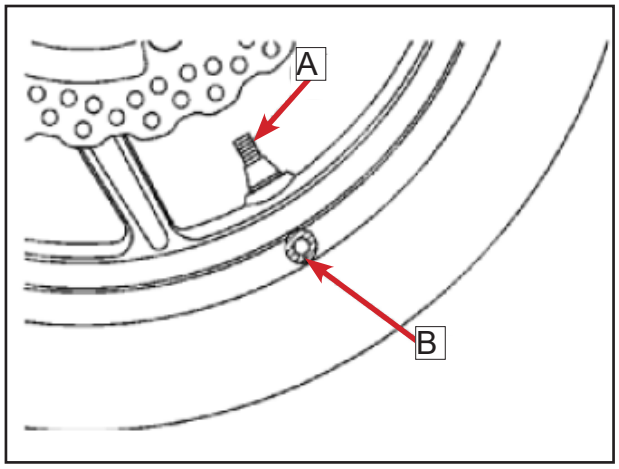
- Check the tire rotation mark on the front and rear tires and install them on the rim a ccordingly. Tire Rotation Mark [A] Rotating Direction [B]

- Position the tire on the rim so that the valve [A] align with the tire balance mark [B] (the c halk mark made during removal, or the yel-lo w paint mark on a new tire).
- Install the tire bead over the rim flange us-ing a suitable commercially available tire changer.



Danger
Make sure the valve is on and do not over 400kPa(4.0kgf/cm^2,57psi).To much injection will cause the tire explosion makes people injure or death.

- Lubricate the tire beads and rim flanges with a soap and water solution or rubber lubricant to help seat the tire beads in the sealing sur-faces of the rim while infl ating the tire.
- Center the rim in the tire beads, and infl ate the tire with compressed air until the tire beads seat in the sealing surfaces.



- Check to see that the rim lines [A] on both sides of the tire sidewalls are parallel with the rim flanges.

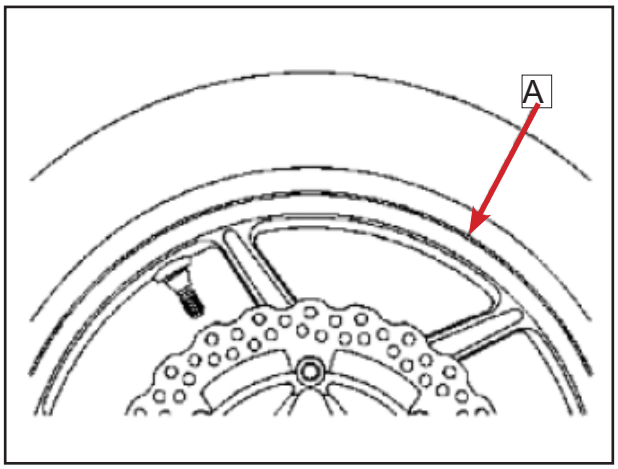
If the rim flanges and tire sidewall rim lines are not parallel, remove the valve core.

- Lubricate the rim flanges and tire beads.
- Install the valve core and inflate the tire again.
- After the tire beads seat in the rim flanges, check for air leakage.

Inflate the tire slightly above standard inflation.

Use a soap and water solution or sub-merge the tire, and check for bubbles that would indicate leakage.

- Adjust the air pressure to the specified pres-sure (see Air Pressure Inspection in the Peri-odic Maintenance chapter).
- Install the air valve cap.
- Adjust the wheel balance (see Balance Adjustment).



10.6.3 Tire Repair

- Currently two types of repair for tubeless tires have come into wide use. One type is called a temporary (external) repair which can be carried out without removing the tire from the rim, and the other type is called perma-nent (internal) repair which requires tire removal. It is generally understood that higher running durability is obtained by permanent (internal) repairs than by tempo-rary (external) ones. Also, permanent (internal) repairs have the advantage of permitting a thorough examination for sec-ondary damage not visible from external inspection of the tire. For these reasons, CFMOTO does not recommend temporary (external) repair. Only appropriate perma-nent (internal) repairs are recommended. Repair methods may vary slightly from make to make. Follow the repair methods indicated by the manufacturer of the repair tools and materials so that safe results can be obtained.

10.7 Hub Bearing

10.7.1 Hub Bearing Removal

- Remove the wheel (see Front/Rear Wheel Removal), and take out the following.
- Sleeve

Collars Coupling (Out of rear hub)
Grease Seals

- Use the bearing remover to remove the hub bearings [A].

Special Tools :Bearing Remover Head: 2 0x22[B] Bearing Remover Shaft, 13 [C]

⚠Warning
Do not let the wheel disc down to the ground. Or the disc will be damaged. Make a heel block under it to avoid the disc touch the ground.

10.7.2 Hub Bearing Installation

- Before installing the hub bearings, blow any dirt or foreign particles out of the hub with com-pressed air to prevent contamination of the bearings.
- Replace the bearings with new ones.

NOTE

Install the bearings so that the marked side faces out.

- Install the bearings by using the bearing driver set which does not contact the bearing inner race.
- Press in each bearing [A] right until they are bottomed.

Special Tool - Bearing Driver Set [B]

- Replace the grease seals with new ones.
- Press in the grease seals [A] so that the seal surface is flush [B] with the end of the hole.

Apply high-temperature grease to the grease seal lips

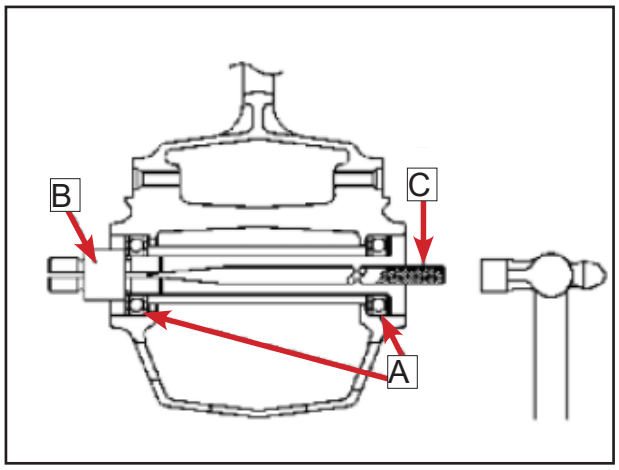
Special Tool-Bearing Driver Set [C]

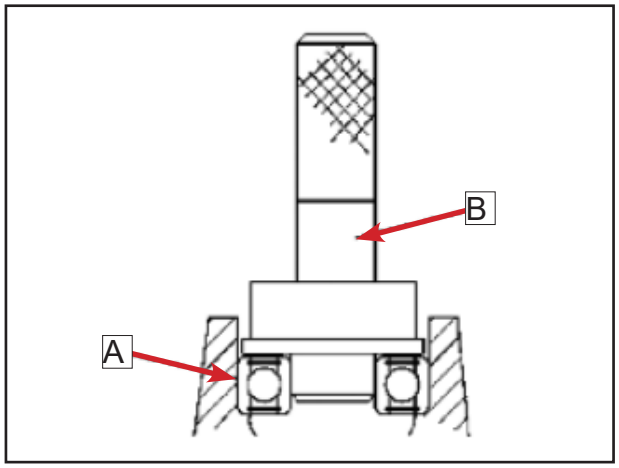
10.7.3 Hub Bearing Inspection

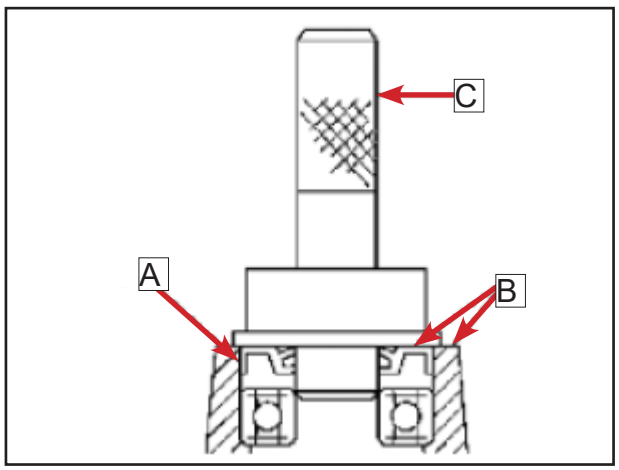
Since the hub bearings are made to ex-tremely close tolerances, the clearance can not normally be measured.

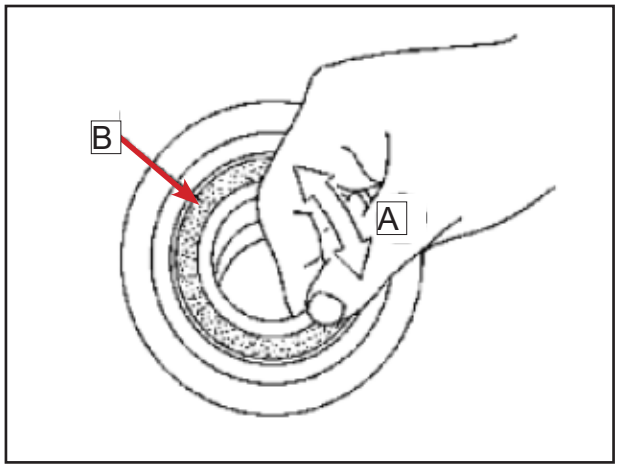
Do not remove any bearings for inspection. If any bearings are removed, they will need to be replaced with new ones.

- Turn each bearing in the hub back and forth [A] while checking for plays, roughness or binding.









If bearing play, roughness or binding is found, replace the bearing.

- Examine the bearing seal [B] for tears or leakage.

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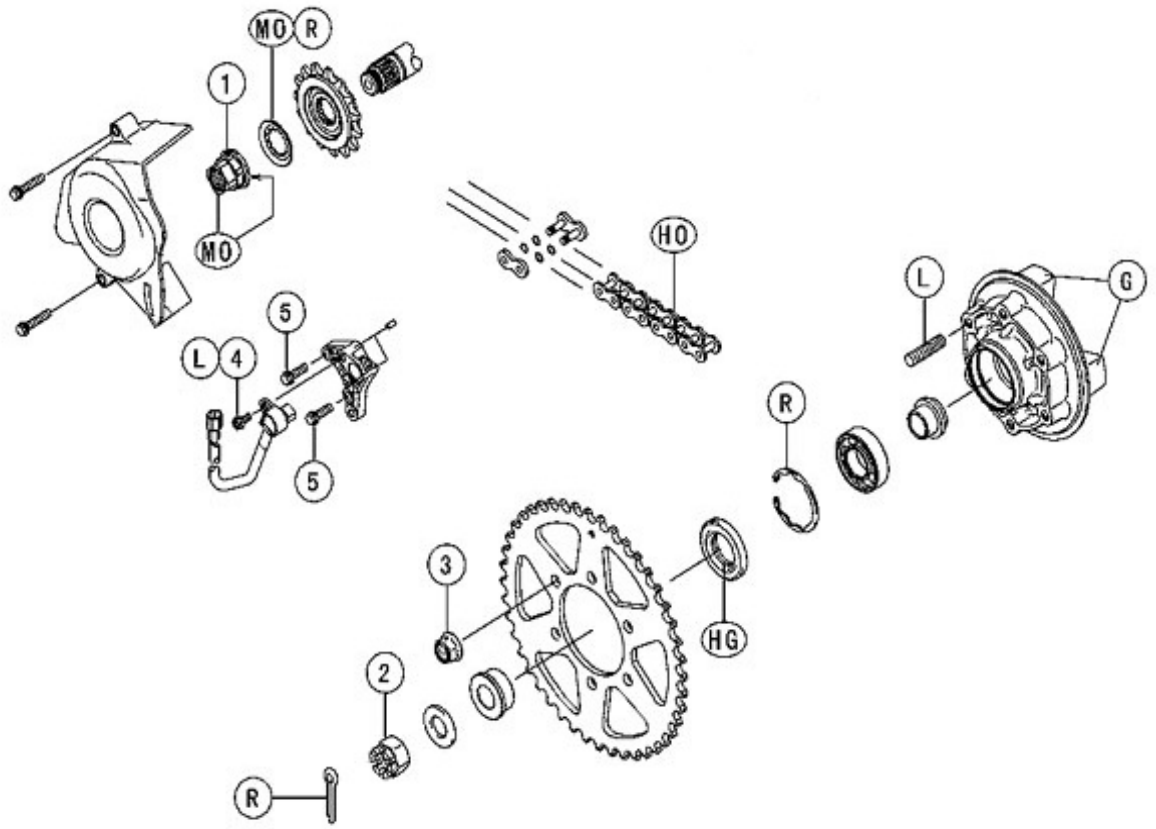
11.1 Exploded view



No.	Tighten parts	Torque			Remark
		N·m	kgf·m	ft·lb	
1	Engine sprocket nut	125	12.7	92	MO
2	Rear axel nut	108	11.0	80	
3	Chain sprocket nut	59	6.0	44	
4	Speed sensor bolt	7.8	0.80	69in·lb	L
5	Speed sensor bracket bolt	9.8	1.0	87in·lb	

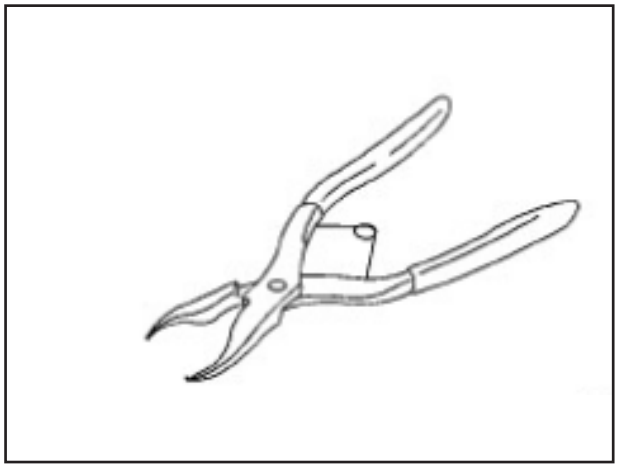
G:Use grease
HG:Use high heat grease
HO:Use heavy oil
L:Use permanent thread locker
MO:Use molybdenum disulfide lubricant
(Mix with engine oil in ratio 10:1)
R:Replace the parts

11.2 Chain specification and service limit

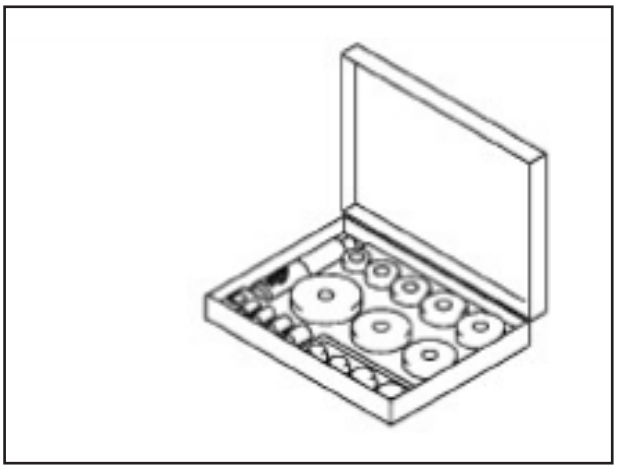
Item	Standard	Service limit
Drive chain		
Chain looseness	30mm~40mm(1.2in~1.6in.)	——
Chain wearing（20 pieces）in standard	317.5mm~318.2mm(12.50in~12.53in.)	320mm(12.6in.)
Suppliers	RK or DID	——
Style	520×S01	——
Pcs	116	——
Sprocket		
Rear sprocket wearing	0.4mm（0.016in.）or less	0.5mm（0.02in.）

11.3 Special tool

Inner retainer pliers



Bearing tools



11.4 Drive Chain

11.4.1 Drive Chain Slack Inspection

- Refer to the Drive Chain Slack Inspection in the Periodic Maintenance chapter

11.4.2 Drive Chain Slack Adjustment

- Refer to the Drive Chain Slack Adjustment in the Periodic Maintenance chapter.

11.4.3 Wheel Alignment Inspection/ Adjustment

- Refer to the Wheel Alignment Inspection in the Periodic Maintenance chapter.

11.4.4 Drive Chain Wear Inspection

- Refer to the Drive Chain Wear Inspection in the Periodic Maintenance chapter.

11.4.5 Drive Chain Lubrication

- Refer to the Drive Chain Lubrication Condi-tion Inspection in the Periodic Maintenance chapter.

11.4.6 Drive Chain Removal

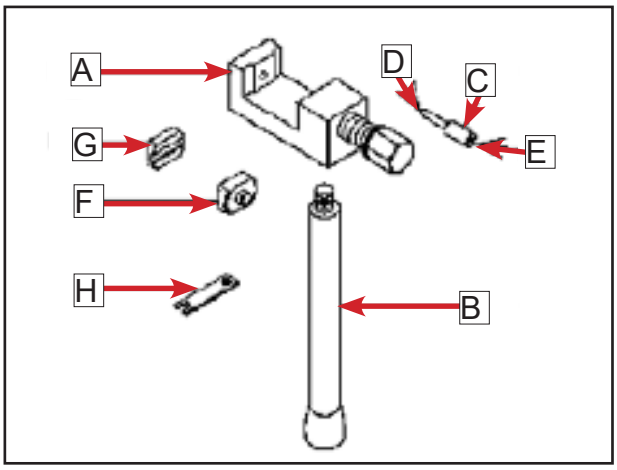
NOTE

Since the drive chain is installed through the swingarm, the chain cannot be removed other than by cutting it.Prepare the new link pin, link plate, grease seals, and tools for re-joining the chain

- Using a suitable tool, cut the drive chain by removing the link pins.

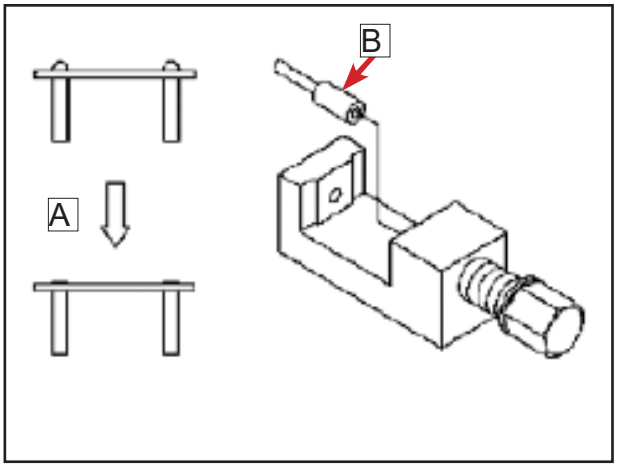
Rec ommended Tool:RK

⚠ Warning
Read the tool user's manual first before removal.

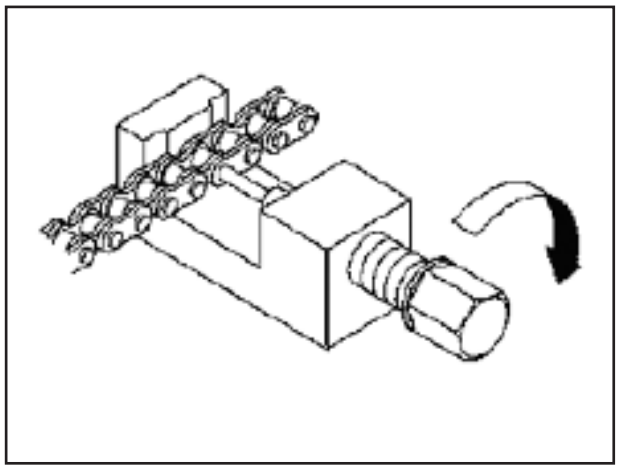


Body [A]
Handlebar [B]
Cutting and Riveting Pin [C]
For Cutting [D]
Riveting [E]
Plate Holder (a)[F]
Plate Holder (b)[G]
Gauge [H]

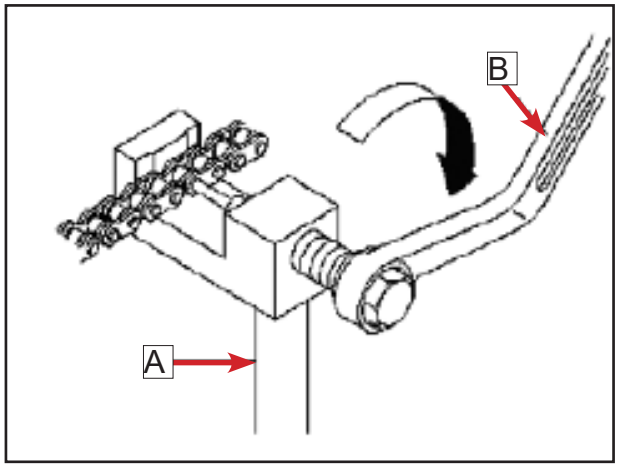
- Grind [A] the pin head to make it flat.
- Set the cutting and riveting pin[B]as shown



- Screw the pin holder until it touches chain pin
- Be sure that the cutting pin hits center of chain pin.

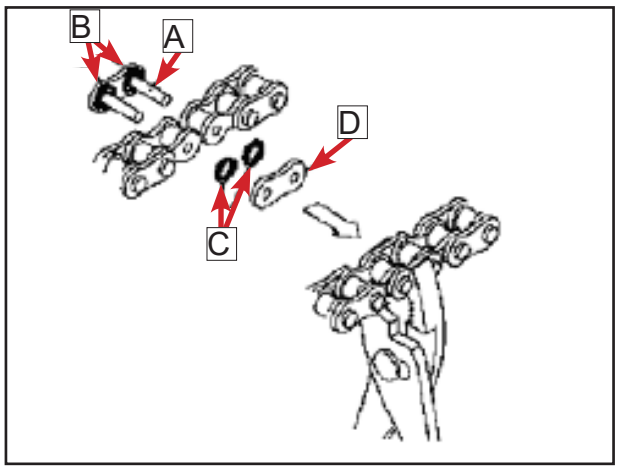


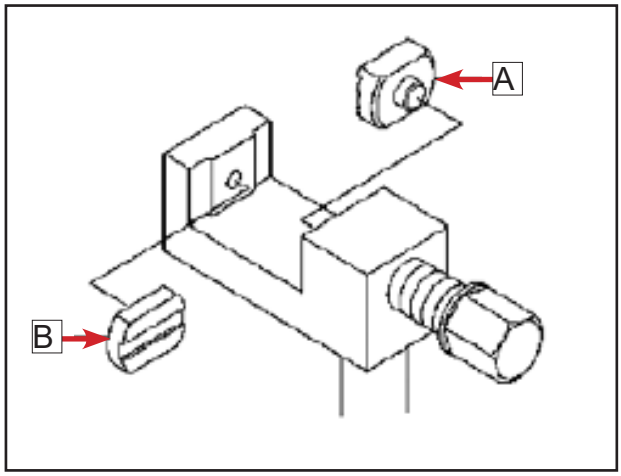
- Screw the handlebar [A] into body.
- Turn the pin holder with wrench [B] clock-wise to extract chain pin.



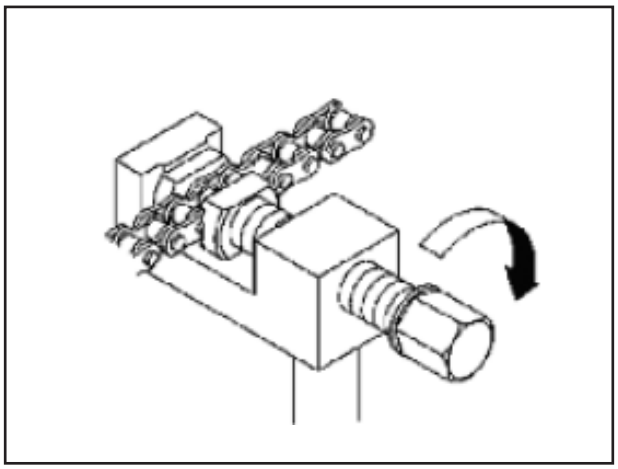
11.4.7 Drive Chain Installation

- Engage the new drive chain to the old drive chain and pull the end of the old drive chain until they are changing the position.
- Remove the old drive chain from the new drive chain.
- Apply grease to the link pins [A] and grease seals [B] [C]
- Engage the drive chain on the rear sprocket
- Insert the link pins in the drive chain ends.
- Install the grease seals [C].
- Install the link plate so that the mark [D] faces out.
- Push the link plate by hand or plier to fix it.
- In case of grease seal chain, be sure to set the grease seals correctly.
- Set the plate holder (a) [A] and plate holder (b) [B] on the body.

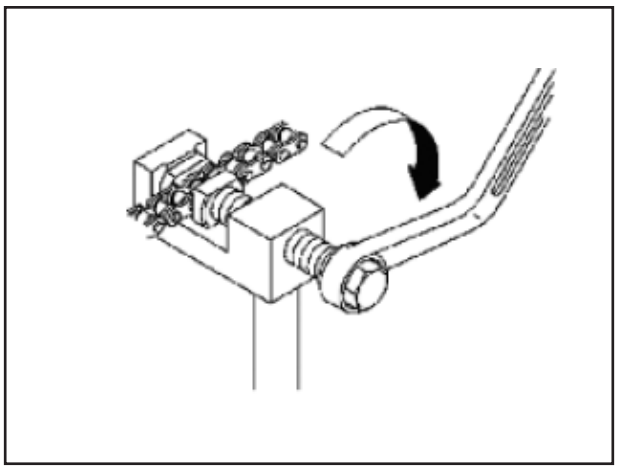




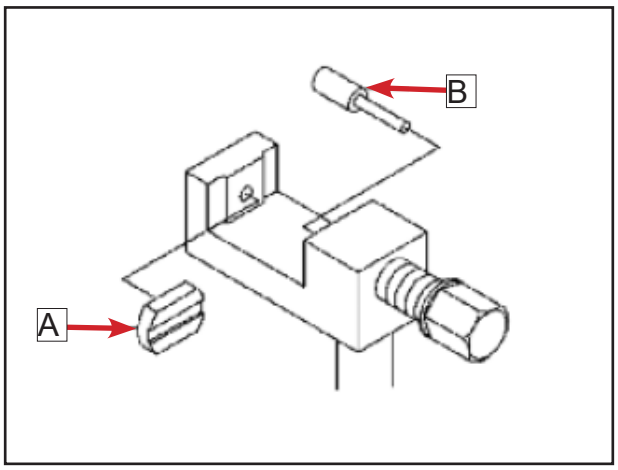
- Fit the plate holder (a) to link plate
- Turn the pin holder by hand until plate holder (b) touches the other link plate.



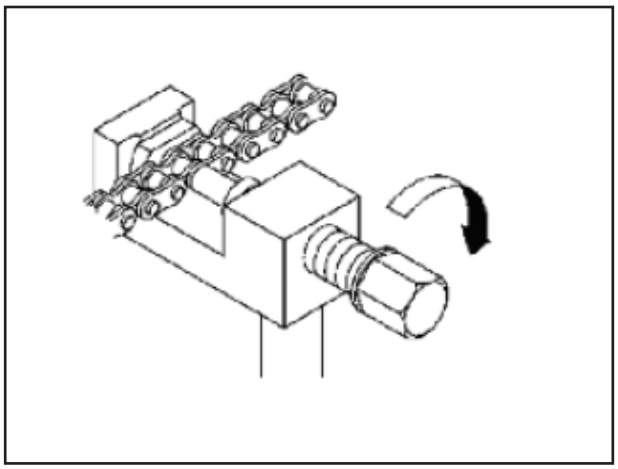
- Turn the pin holder by wrench clockwise until two pins of link come into groove of plate holder (a).
- Take off the plate holder (a).



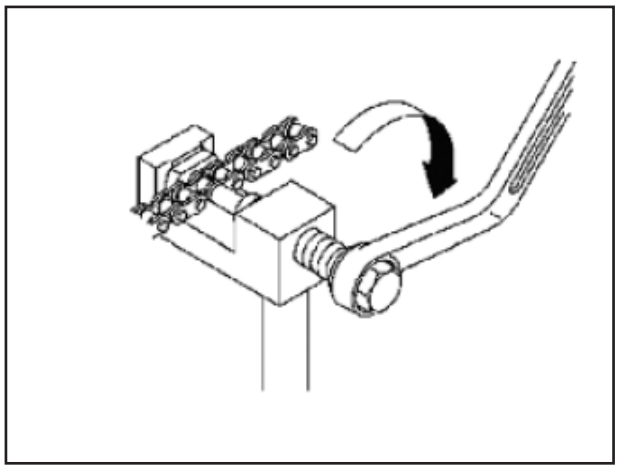
- Set the plate holder (b) [A] and cutting and riv-eting pin [B]as shown.



- Turn the pin holder until riveting pin touches link pin.



- Turn the wrench clockwise until tip of riveting pin hits of link pin.
- Rivet it.
- Same work for the other link pin.



- After staking, check the staked area of the link pin for cracks.
- Measure the outside diameter [A] of the link pin and link plates width [B].

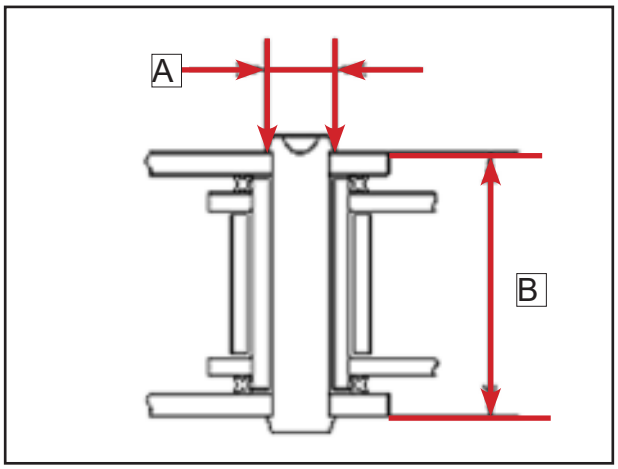
Link Pin Outside Diameter
Standard:5.45mm~5.55mm
Link Plates Outside Width
Standard:17.25mm~17.45mm(0.679in~0.687in.)

If the reading exceeds the specified length, cut and rejoin the chain again.

- Check

Movement of the Rollers

- Adjust the drive chain slack after installing the chain (see Drive Chain Slack Adjustment in the Periodic Maintenance chapter).

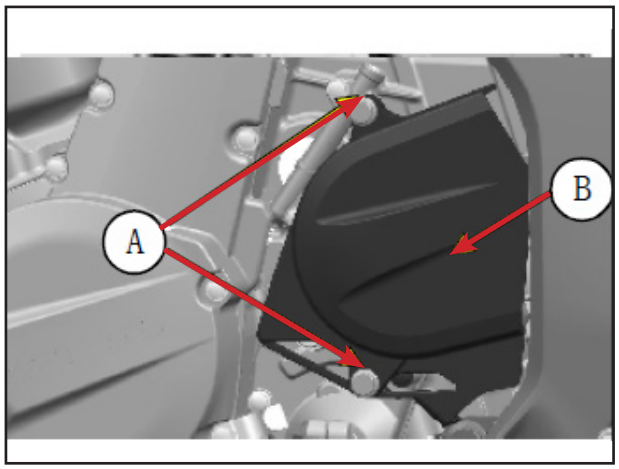


11.5 Sprocket, Coupling

11.5.1 Engine Sprocket Removal

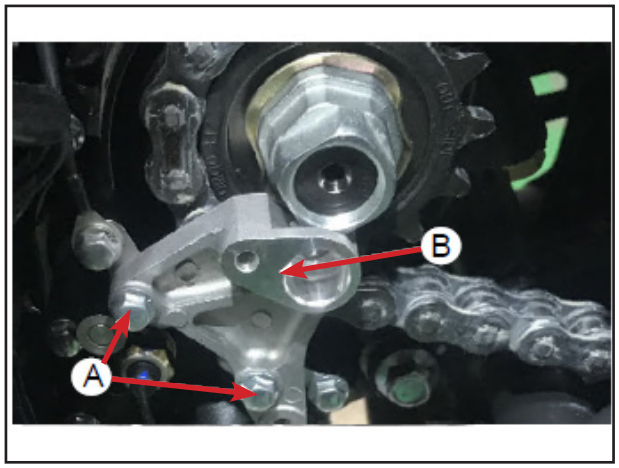
- Remove:

Engine Sprocket Cover Bolts [A]
Engine Sprocket Cover [B]



- Remove:

Speed Sensor Bracket Bolts [A]
Speed Sensor Bracket [B]



- Flatten out the bended washer [A]
- Remove the engine sprocketnut [B] amd washer

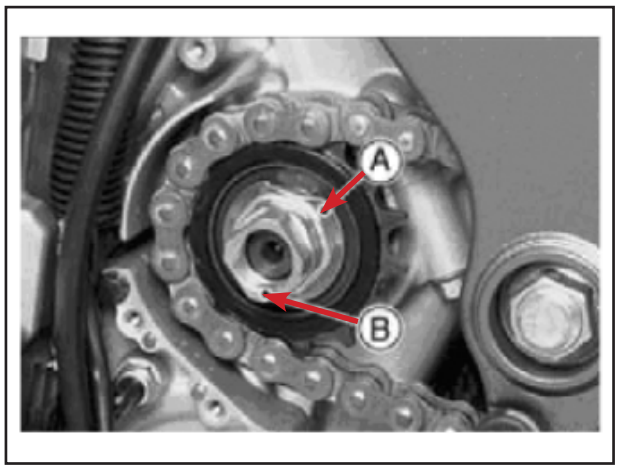
NOTE

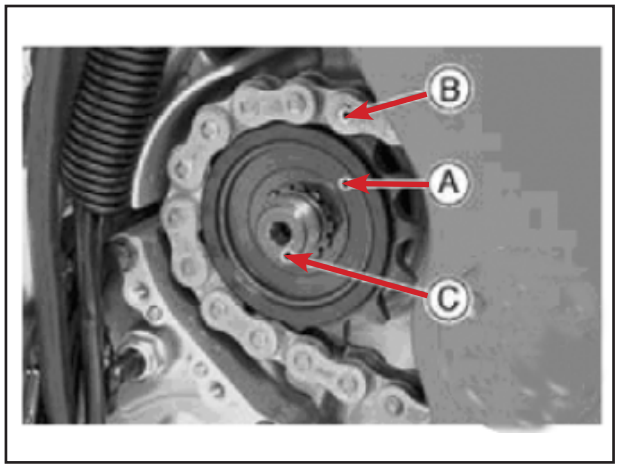
When loosening the engine sprocket nut, hold the rearbrake on.

- Raise the rear wheel off the ground with stand.
- Remove the axle cotter pin, and loosen the rear axle nut.
- Loosen the drive chain (see Drive Chain Slack.

Adjustment in the Periodic Maintenance chapter).

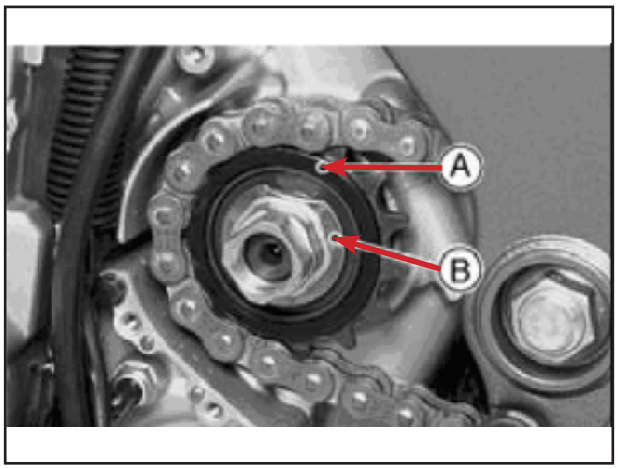
- Remove the drive chain from the rear sprocket toward the right.
- Pull the engine sprocket [A] with drive chain [B] off the output shaft [C].
- Disengage the drive chain from the engine sprocket.





11.5.2 Engine Sprocket Installation

- Replace the sprocket washer and axle cot-ter pin.
- Install the engine sprocket [A] so that “OUT-SIDE” letters face outward.
- Apply molybdenum disulfide oil solution to the threads of the output shaft and seating sur-face of the engine sprocket nut.
- After torquing the engine sprocket nut, bend the one side of the washer [B] over the nut.



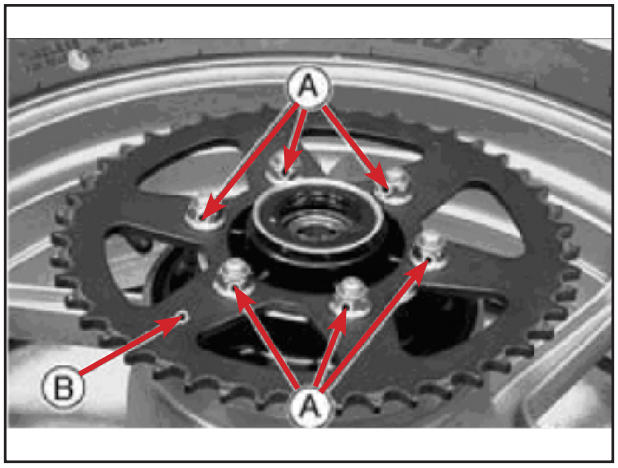
NOTE

Tighten the engine sprocket nut while ap-plying the rear brake

- **Tighten:**

Engine Sprocket Nut:
125N·m(12.7kgf·m, 92ft·lb)
Speed Sensor Bracket Bolts:
9.8N·m(1.0kgf·m,87in·lb)

- Install the engine sprocket cover, and tighten the bolts.
- Adjust the drive chain slack after installing the sprocket (see Drive Chain Slack Adjust-ment in the Periodic Maintenance chapter).
- Bend the end of axle cotter pin surely after tightening the axle nut (see Rear Wheel In-stallation in the Wheels/Tires chapter).

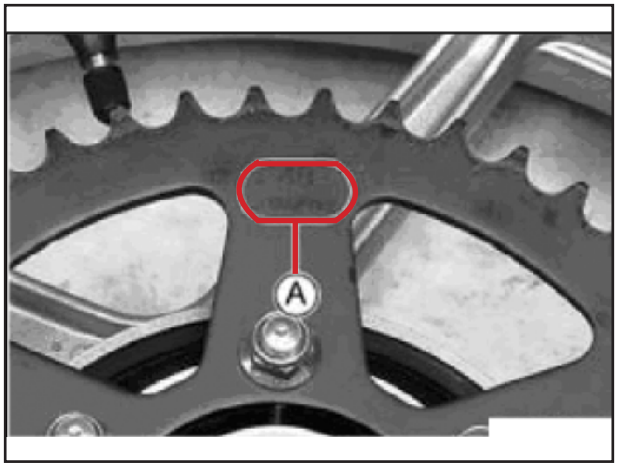


11.5.3 Rear Sprocket Removal

- Remove the rear wheel (see Rear Wheel Removal in the Wheels/Tires chapter).

⚠Warning

Do not let the break disc or chain sprocket down to the ground or the sprocket or disc will be damaged. Put a heel block under the ground to avoid touch the ground.



- Remove the rear sprocket nuts [A].
- Remove the rear sprocket [B].

11.5.4 Rear Sprocket Installation

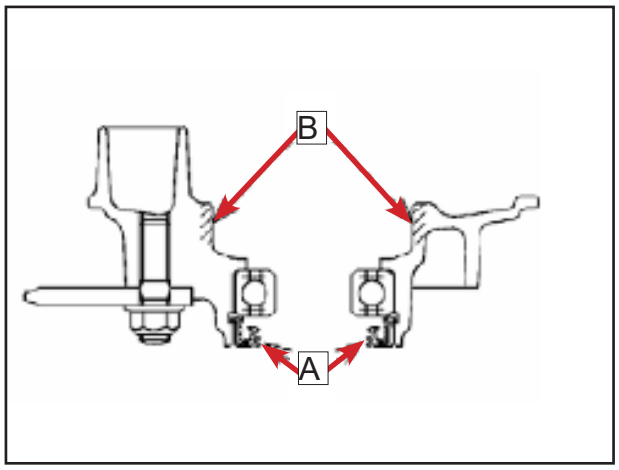
- Install the sprocket facing the tooth number marking [A] outward.
- Tighten the rear sprocket nuts.

Rear Sprocket Nuts torque:
59N·m(6.0kgf·m,44ft·lb)

Install the rear wheel (see Rear Wheel In-stallation in the Wheels/Tires chapter).

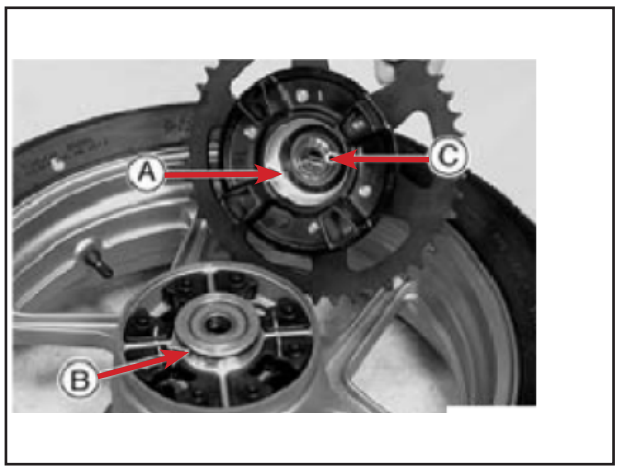
11.5.5 Coupling Installation

- Apply high-temperature grease to the coupling grease seal lips [A].
- Apply grease to the coupling internal surface [B].



- Grease the following

Wheel Flange Portion [A]
o-ring [B]
Install the collar [C]

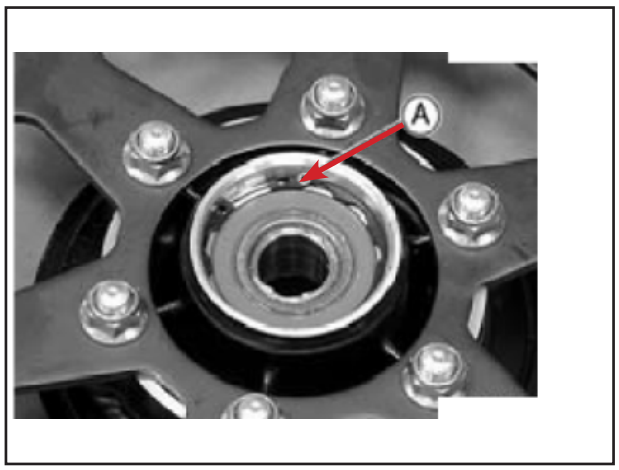


11.5.6 Coupling Bearing Removal

- Remove:

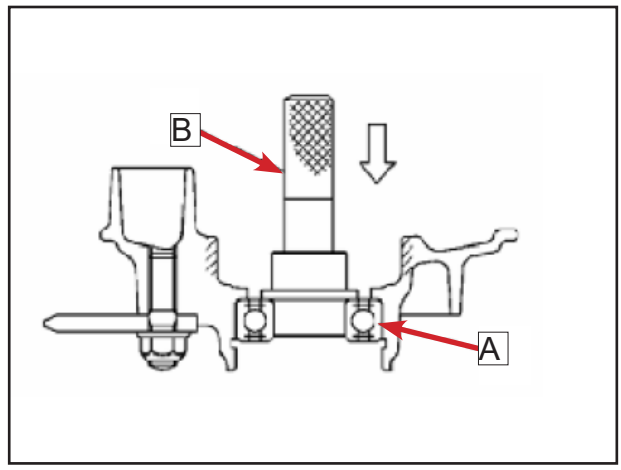
Coupling
Grease Seal
Circlip [A]

Special Tool - Inside Circlip Pliers



- Remove the bearing [A] by tapping from the wheel side.

Special Tool-Bearing Driver Set [B]



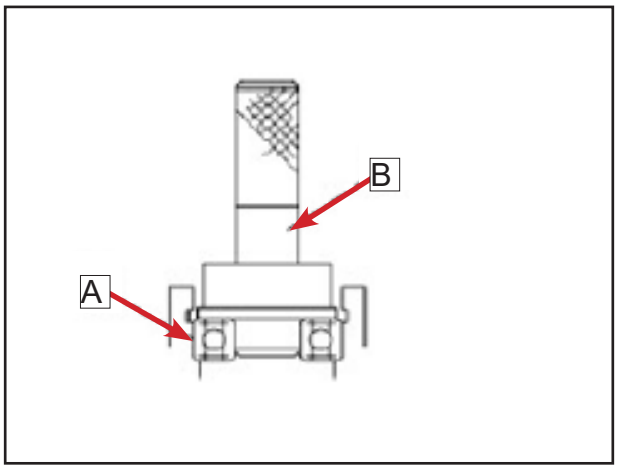
11.5.7 Coupling Bearing Installation

- Replace the bearing with a new one.
- Press in the bearing [A] until it is bottomed.

Special Tool - Bearing Driver Set [B]

- Replace the circlip with a new one.

Special Tool - Inside Circlip Pliers



- Replace the grease seal with a new one.
- Press in the grease seal so that the seal surface is flush with the end of the hole.

Apply high-temperature grease to the grease seal lips.

Special Tool-Bearing Driver Set

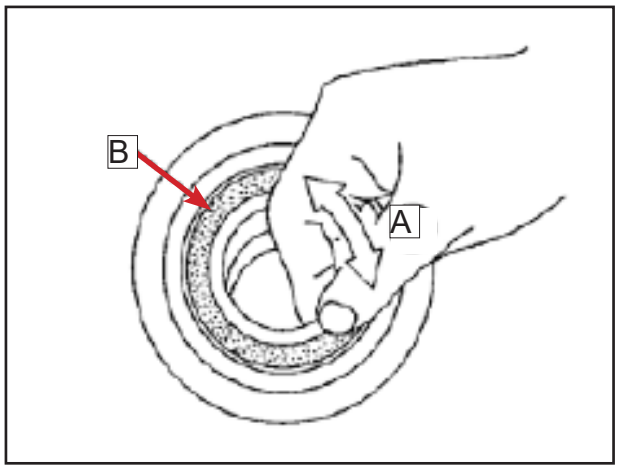
11.5.8 Coupling Bearing Inspection

Since the coupling bearing is made to extremely close tolerances, the clearance can not normally be measured.

NOTE

It is not necessary to remove the coupling bearing for inspection. If the bearing is removed, it will need to be replaced with a new one.

- Turn the bearing in the coupling back and forth [A] while checking for plays, roughness or binding. If the bearing play, roughness or binding is found, replace the bearing.



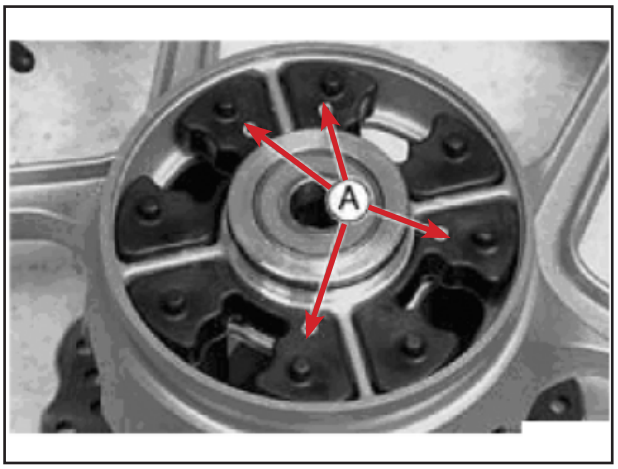
11.5.9 Coupling Bearing Oil Seal

- Examine the bearing seal [B] for tears or leakage.

If the seal is torn or is leaking, replace the bearing.

NOTE

Since the coupling bearing is packed with grease and sealed, lubrication is not required.



11.5.10 Coupling Damper Inspection

- Remove the rear wheel coupling, and inspect the rubber dampers [A].
- Replace the damper if it appears damaged or deteriorated.

11.5.11 Sprocket Wear Inspection

- Visually inspect the engine and rear sprocket teeth for wear and damage.

If the teeth are worn as illustrated, replace the sprocket, and inspect the drive chain wear(see Drive Chain Wear Inspection in the Pe-riodic Maintenance chapter).

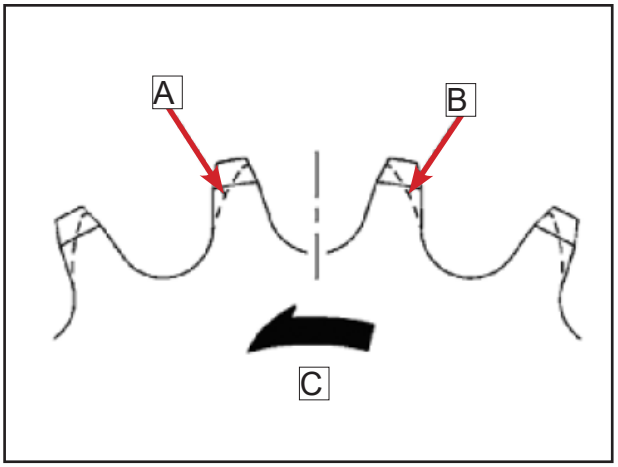
Worn Tooth (Engine Sprocket)[A]

Worn Tooth (Rear Sprocket)[B]

Direction of Rotation[C]

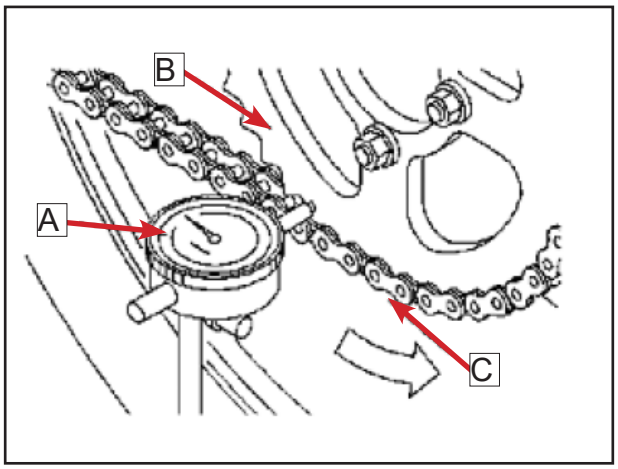
NOTE

If a sprocket requires replacement, the chain is probably worn also.



11.5.12 Rear Sprocket Warp Inspection

- Raise the rear wheel off the ground with stand so that it will turn freely.
- Set a dial gauge [A] against the rear spro-cket [B] near the teeth as shown, and rotate [C] therear wheel to measure the sprocket runout (warp).
- The difference between the highest and lowest dial gauge readings is the amount of runout (warp).
- If the runout exceeds the service limit, replace the rear sprocket.



Rear Sprocket Warp
Standard:0.4mm(0.016in.)or less
Service Limit:0.5mm(0.020in.)

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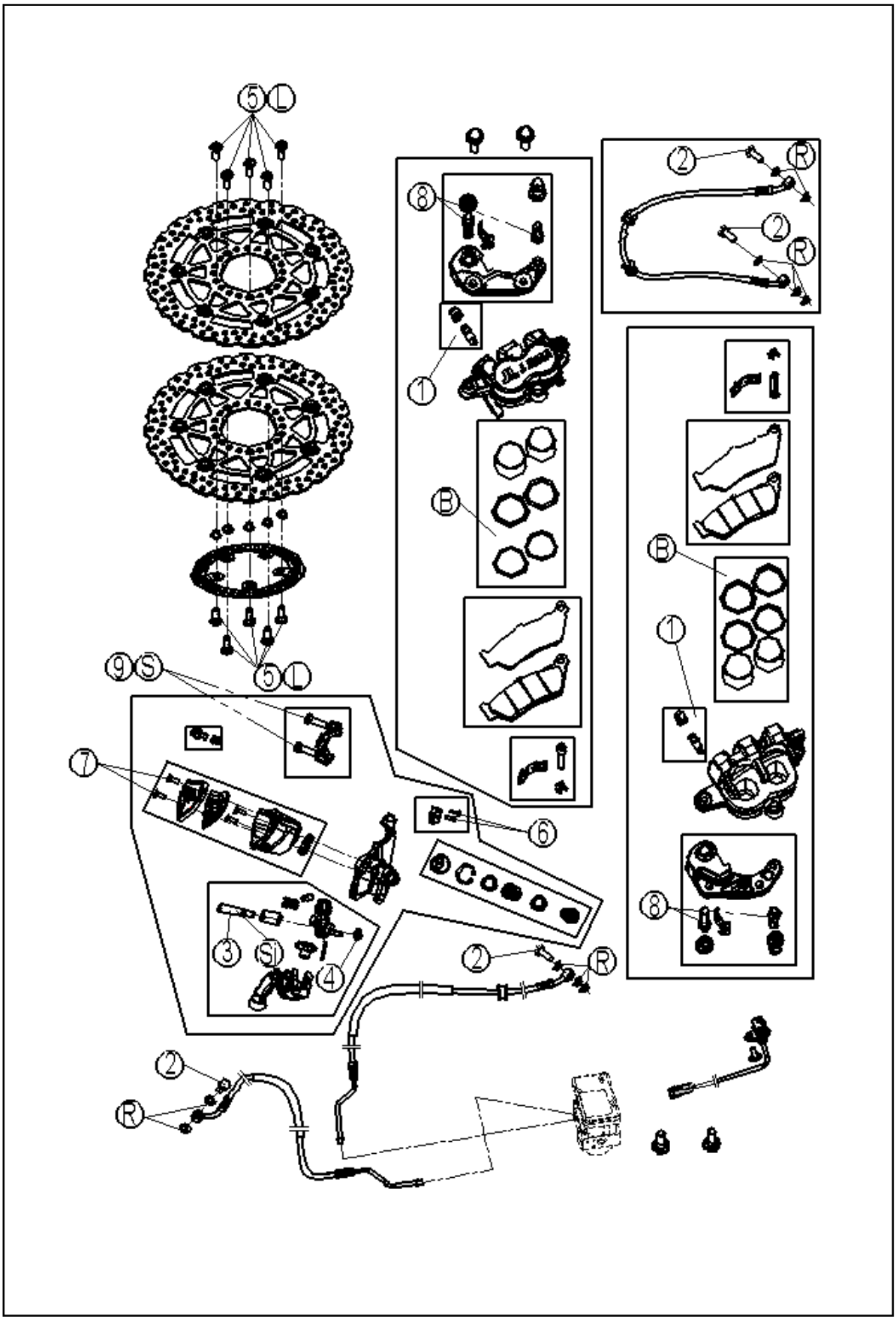
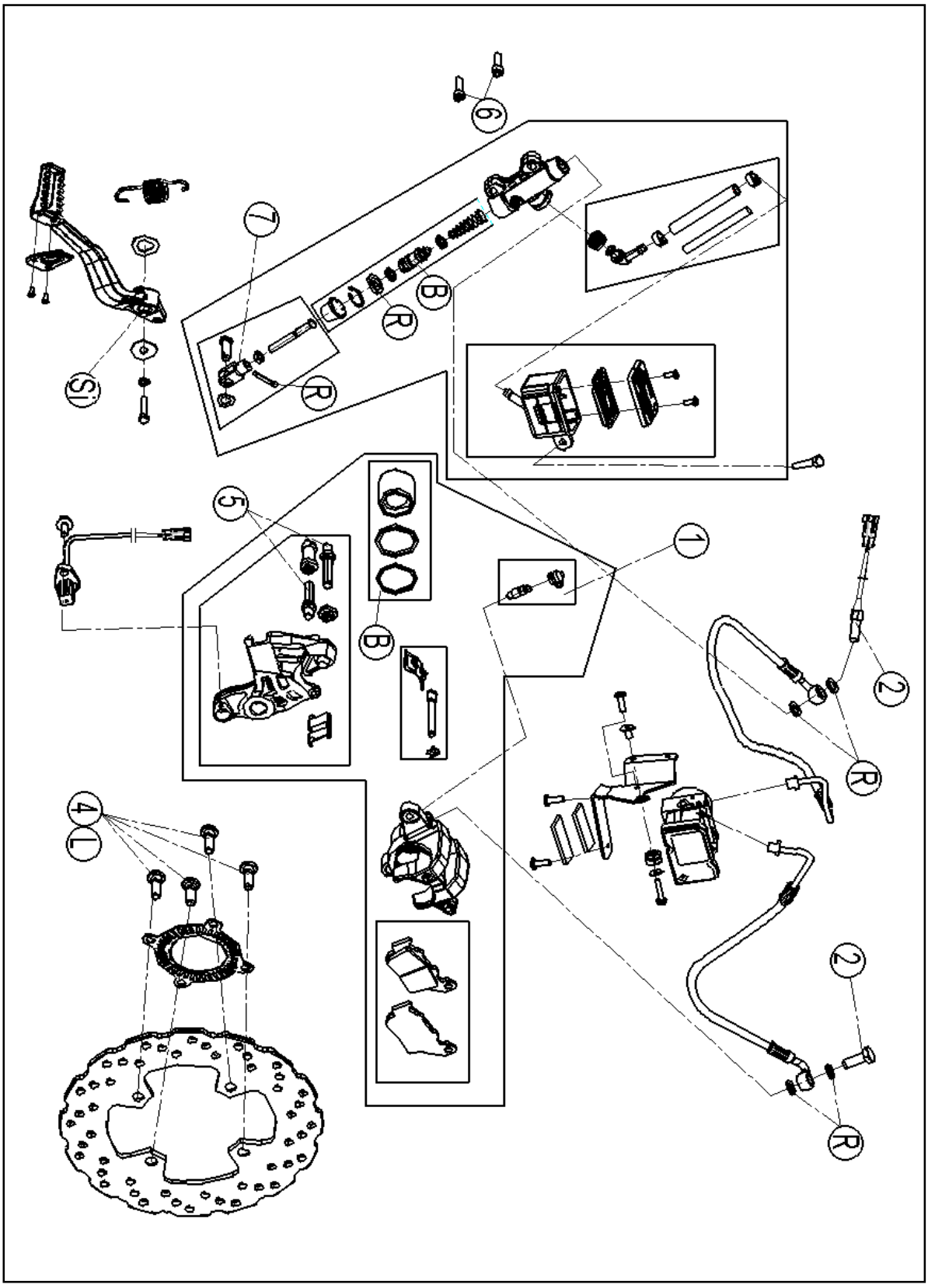
12.1 Front braking explosive view



No.	Tighten parts	Torque			Remark
		N•m	kgf•m	ft•lb	
1	Drain out valve	7.8	0.80	69in•lb	
2	Braking hose flow bolt	25	2.5	18	
3	Braking lever mounting bolt	1.0	0.10	9in•lb	Si
4	Braking lever mounting nut	5.9	0.60	52in•lb	
5	Front braking disc bolt	27	2.8	20	L
6	Front braking switch screw	1.0	0.10	9in•lb	
7	Front braking fluid tank cover	1.0	0.10	9in•lb	
8	Front caliper mounting bolt	34	3.5	25	
9	Front cylinder mounting bolt	8.8	0.90	78in•lb	S

B:Use braking fluid
L:Use thread locker
R:Replace the part
S:Tighten in special order
T,Si:Use silicon oil(Such as PBC)

12.2 Rear braking exploded view



No.	Tighten parts	Torque			Remark
		N•m	kgf•m	ft•lb	
1	Drain out valve	7.8	0.80	69in•lb	
2	Braking hose flowing bolt	25	2.5	18	
3	Brake pedal mounting bolt	8.8	0.90	78in•lb	
4	Rear breaking disc mounting bolt	27	2.8	20	L
5	Rear caliper mounting bolt	25	2.5	18	
6	Rear main cylinder mounting bolt	25	2.5	18	
7	Rear breaking cylinder rod locking nut	18	1.8	13	

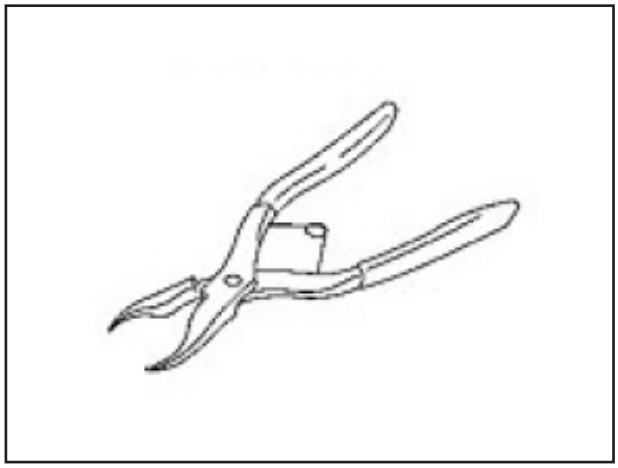
B:Use braking fluid
G:Use grease
L:Use thread locker
R:Replace the part
Si:Use silicon grease(Such as PBC)

12.3 Specification

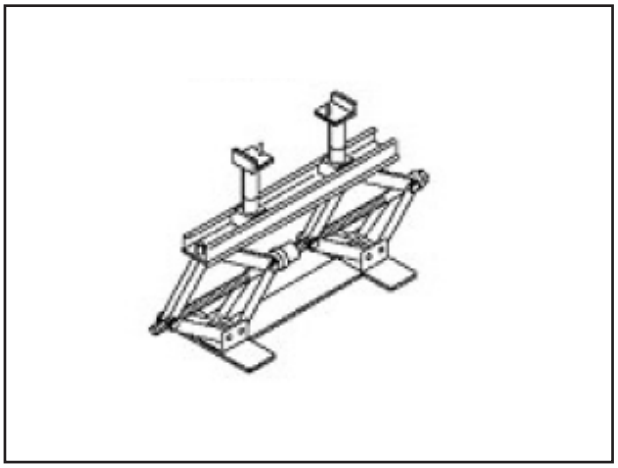
Item	Standard	Service limit
Brake handle/pedal Brake handle position Brake handle clearance Brake pedal clearance Pedal	 5 positions can adjust Cannot adjust Cannot adjust Under the foot pedal top about 40mm(1.6in.)	———
Brake pad thickness Front： Rear：	 4.0mm(0.16in) 5.0mm(0.20in)	 1mm(0.04in) 1mm(0.04in)
Brake disc clearance Front： Rear： Run out：	 4.3mm~4.7mm(0.17in~0.19in) 4.8mm~5.2mm(0.19in~0.20in) Less than 0.15mm(0.006in)	 4.0mm(0.16in) 4.5mm(0.18in) 0.3mm(0.01in)
Brake fluid	DOT4	———

12.4 Special tool

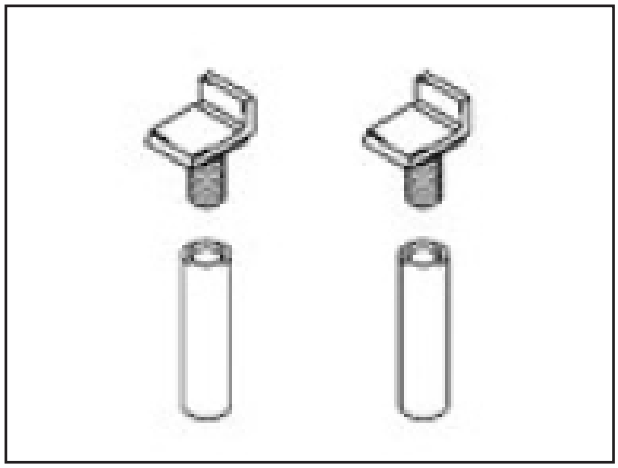
Retainer plier



Jack



Jack accessories

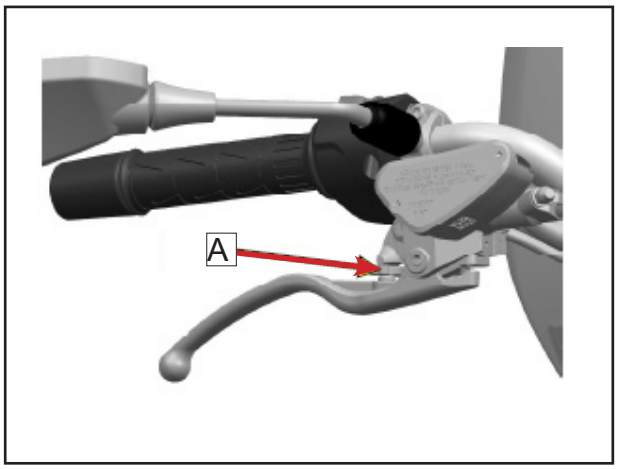


12.5 Brake Lever/Break padel

12.5.1 Brake Lever Position Adjustment

- The brake lever adjuster can be adjusted to suit the operator's hand

The distance from the grip to the lever is minimum at 103mm and maximum at 118mm.



12.5.2 Brake Pedal Position Inspection

- Check that the brake pedal [D] is in the correct position
- Footpeg [E]

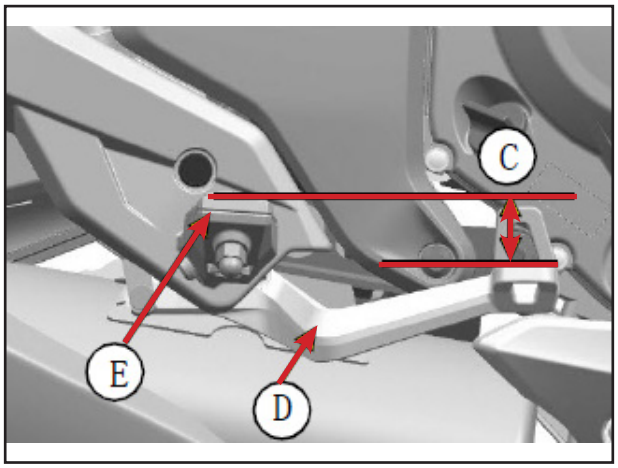
Pedal position standard

Lower than front foot rest top:40mm (1.6in.)[C]

If it is incorrect, adjust the brake pedal position.

NOTE

Usually it is not necessary to adjust the pedal position, but always adjust it when the push rod locknut has been loosened.



12.5.3 Brake Pedal Position Adjustment

- Remove:Frame Cover (see Frame Cover Removal in the Frame chapter)

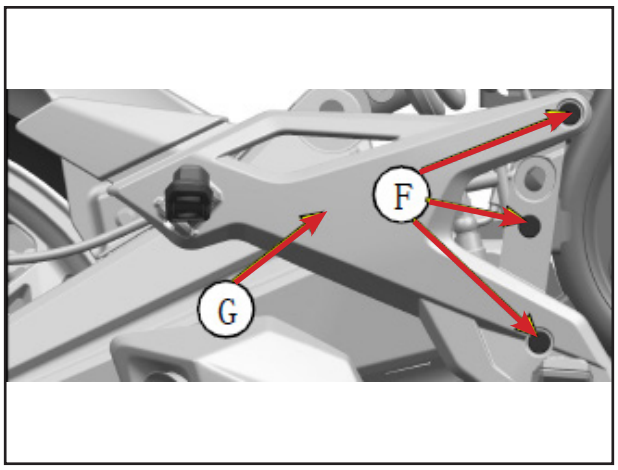
Bolts [F]

Right footrest brecket[G]

- Loosen the locknut[A]and turn the push rod with the hex head [B]to achieve the correct pedal position

If the length [C] shows **53±1mm(2.087±0.04in.)**

The rear breaking pedal position should be in standard.



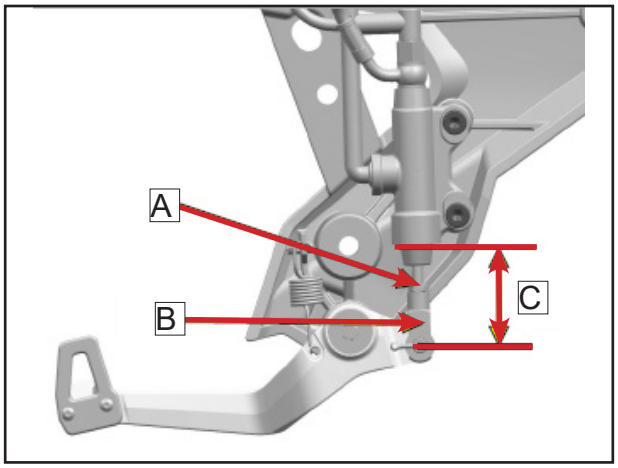
- Tighten torque

Rear Master Cylinder Push Rod nut :18N•m(1.8kgf•m,13ft•lb)

- Install the foot peg stay, and tighten the bolts

Footpeg Stay Bolts : 30N•m(3.1kgf•m,22ft•lb)

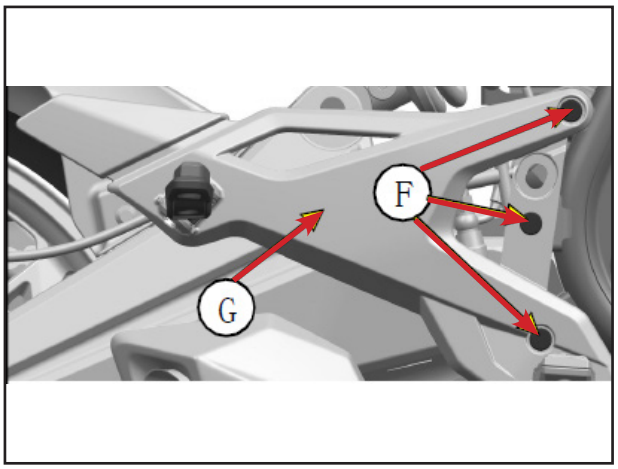
- Check the brake light switch operation (see Brake Light Switch Operation Inspection in the Periodic Maintenance chapter).



12.5.4 Brake Pedal Removal

- Remove:

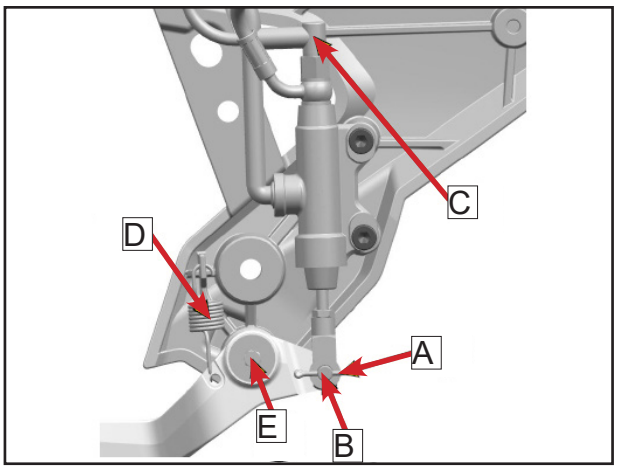
Frame Cover (see Frame Cover Removal in the Frame chapter)
Bolts [A]
Right Footpeg Stay [B]



- Remove:

Cotter Pin[A]
Joint Pin [B]
Rear Brake Light Switch Spring [C]
Return Spring [D]

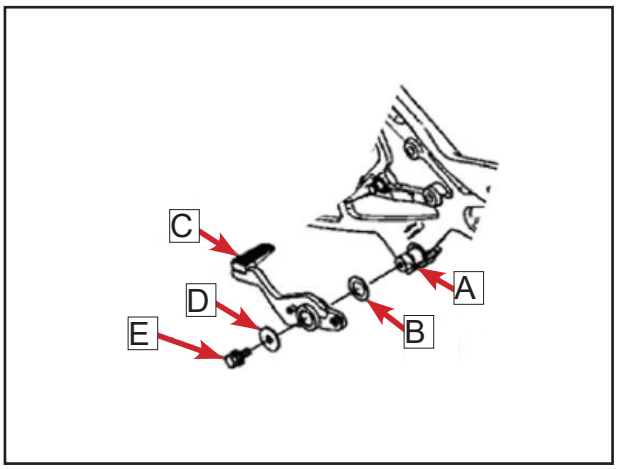
- Remove the mounting bolt [E] and take out the brake pedal.



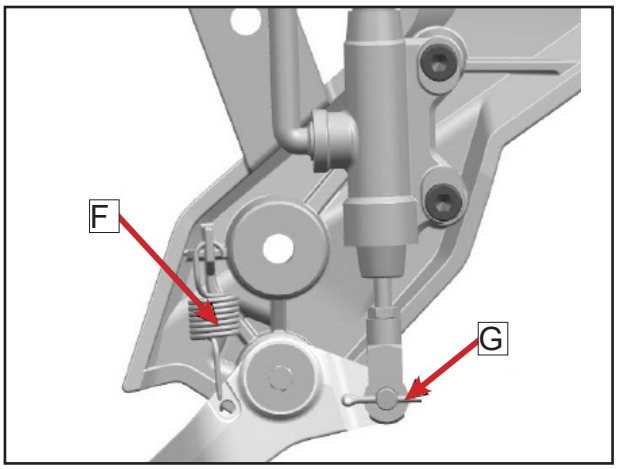
12.5.5 Brake Pedal Installation

- Apply grease to the pivot shaft [A] and in-stall the washer [B].
- nstall:

Brake Pedal [C]
Washer [D]
Brake Pedal Bolt [E]
Torque - Brake Pedal Bolt:
8.8N•m(0.90kgf•m,78in•lb)



- Install the spring [F]
- Replace to new cottor pin
- nsert the cottor pin [G] and bend up like [H] points



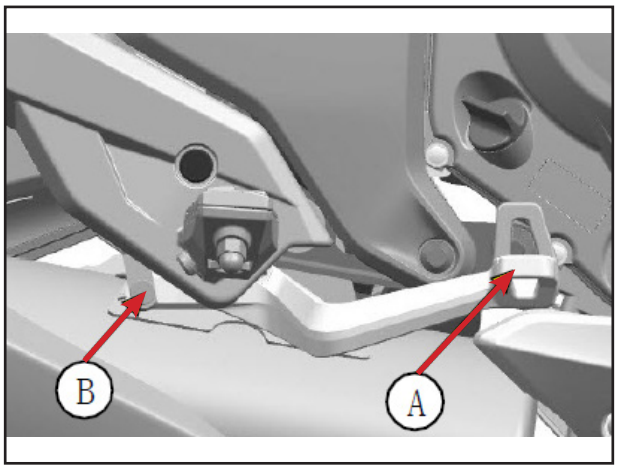
- Install the foot rest bracket and tight up to standard torque

Torque-Footpeg Rest Bolts: 30N•m(3.1kgf•m,22ft•lb)

Depress the brake pedal [A] and then align the bolts holes of the master cylin-der [B].

Torque-Rear Master Cylinder Mounting Bolts:25N•m(2.5kgf•m,18ft•lb)

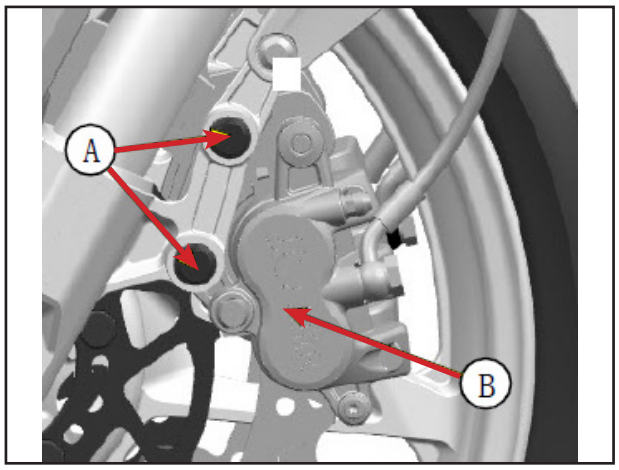
- Check the brake pedal position(see Brake Pedal Position Inspection).



12.6 Breaking Caliper

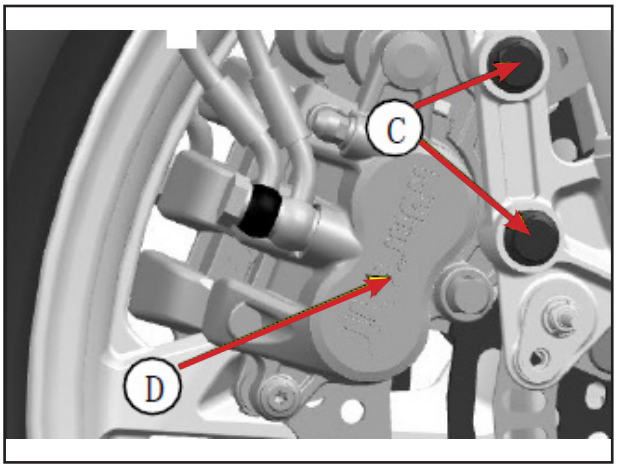
12.6.1 Front Caliper Removal

- Loose the front caliper LH mounting bolt [A] and remove the caliper from break disc [B].



- Loose the front caliper RH mounting bolt [C] and remove the caliper from break disc [D].

CAUTION
Immediately wash away any brake fluid that spills



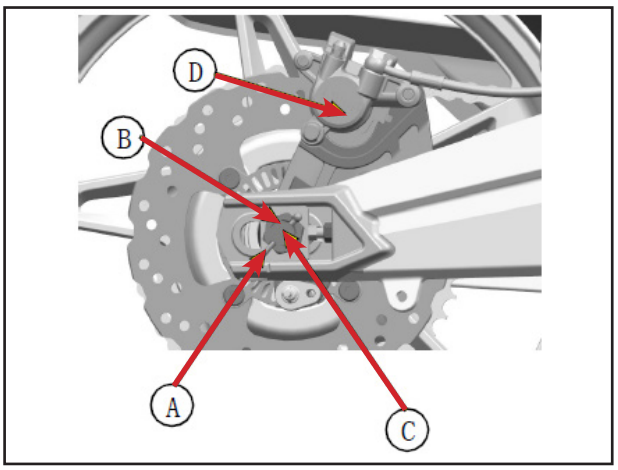
12.6.2 Rear Caliper Removal

- Use display stand to lift up the rear wheel.
- Remove:Cottor pin [A] and rear wheel axel nut [B].
- Pull out the rear wheel axel [C].
- Saperate the caliper from rear breaking disc [D].
- Install rear caliper and breaking hose lower side.

Replase the washer on the hose each side into new.

- Tighten torque:

Rear Caliper Mounting Bolts
Front:34N•m(3.5kgf•m,25ft•lb)
Rear:25N•m(2.5kgf•m,18ft•lb)
Breaking hose bolt:
25N•m(2.5kgf•m,18ft•lb)



- Check the oil level in breaking fluid reservior.
- Drain out the air of the breaking pipe (See air draining chapter).
- Inspect the breaking performance to see the leaking.

Danger
Inspect the breaking performance before driving or it may cause accident.

12.6.3 Front Caliper Disassembly

- Refer to the Caliper Rubber Parts Replace-ment in the Periodic Maintenance chapter.

12.6.4 Front Caliper Assembly

- Refer to the Caliper Rubber Parts Replace-ment in the Periodic Maintenance chapter.

12.6.5 Rear Caliper Disassembly

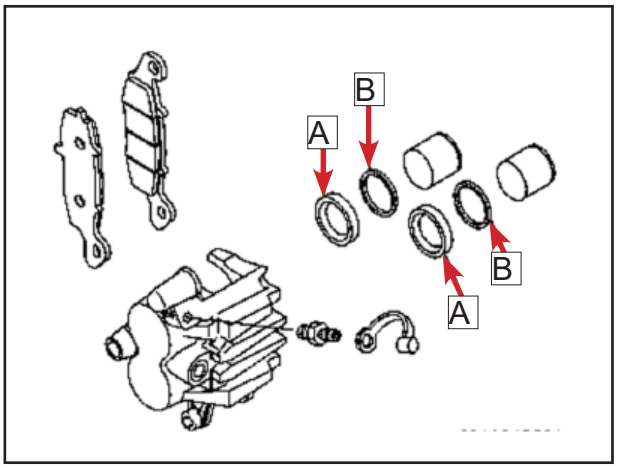
- Refer to the Caliper Rubber Parts Replace-ment in the Periodic Maintenance chapter.

12.6.6 Rear Caliper Assembly

- Refer to the Caliper Rubber Parts Replace-ment in the Periodic Maintenance chapter.

12.6.7 Caliper Fluid Seal Damage

- The fluid seal (piston seal) [A] is placed around the piston to maintain clearance be-tween the pad and the disc. If the seal is in a poor condition, it could lead the pad to wear excessively or the brake to drag, which may cause the temperature of the discs or the brake fluid to increase.



Replace the fluid seal if it exhibits any of the conditions listed below.

Brake fluid leakage around the pad.

Brakes overheat.

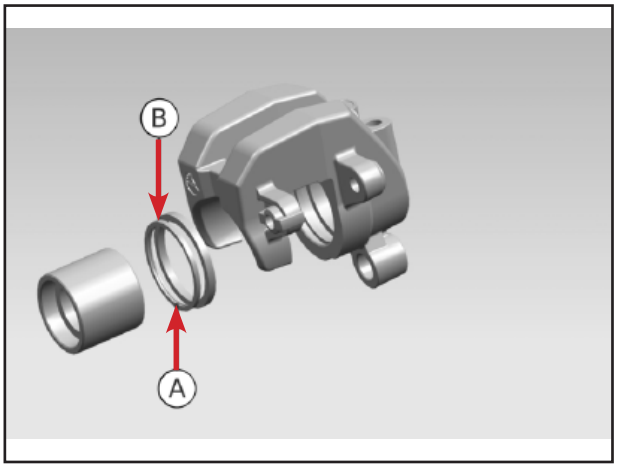
Considerable difference in inner and outer pad wear.

Seal and piston are stuck together.

If the fluid seal is replaced, replace the dust seal [B].

If the washer relaced.Replace all the sealing part together.

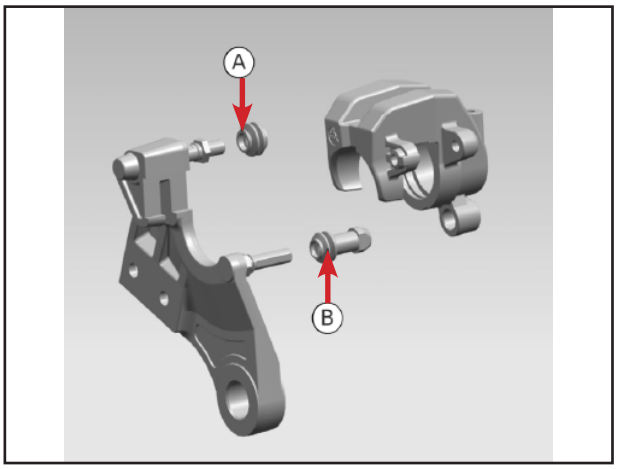
Rear Caliper Dust Boot and Friction Boot.



12.6.8 Rear brake caliper dust cover and sliding cover damaged

- Check that the dust boot [A] and friction boot [B] are not cracked, worn, swollen, or otherwise damaged.

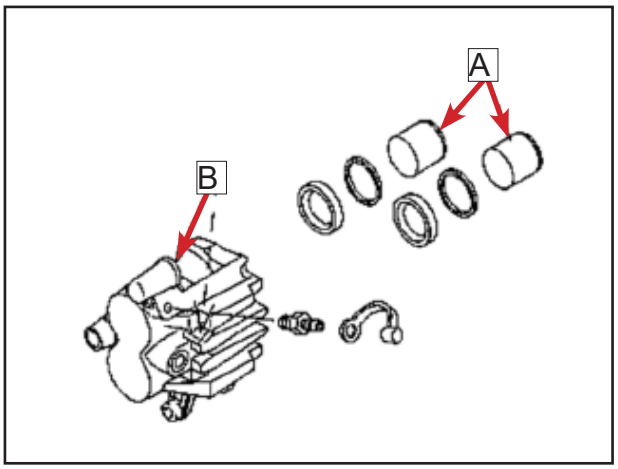
If they show any damage, replace it.



12.6.9 Caliper Piston and Cylinder Damage

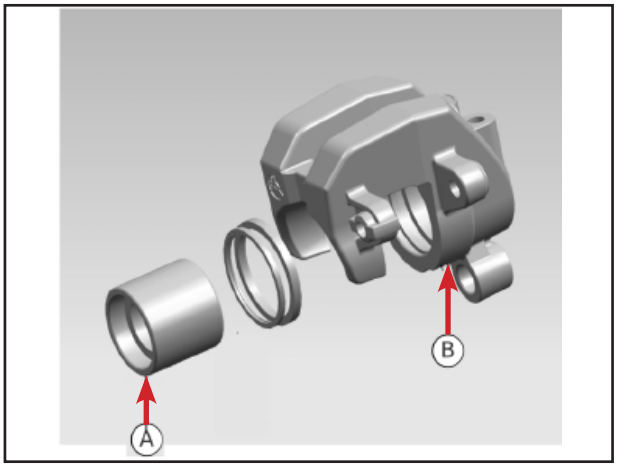
- Visually inspect the pistons [A] and cylinder surfaces [B].

Replace the caliper if the cylinder and piston are badly scores or rusty.



12.6.10 Rear Caliper Holder Shaft Wear

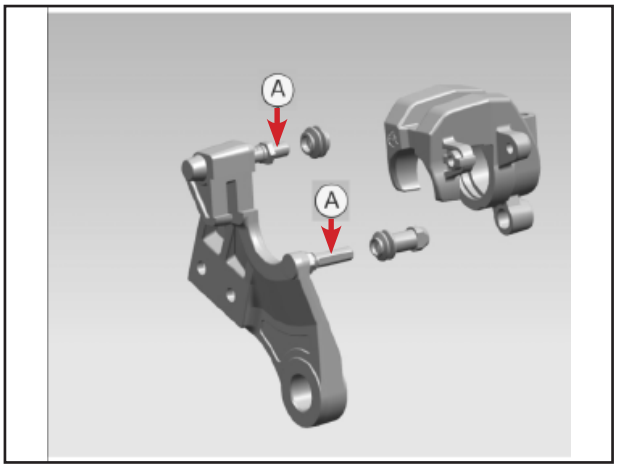
The caliper body must slide smoothly on the caliper holder shafts [A]. If the body does not slide smoothly, one pad will wear more than the other, pad wear will increase, and constant drag on the disc will raise brake and brake fluid temperature.



- Check to see that the caliper holder shafts are not badly worn or stepped, and that the rubber friction boots are not damaged.

If the rubber friction boot is damaged, replace the rubber friction boot. To replace the friction boot, remove the pads and the cali-per bracket.

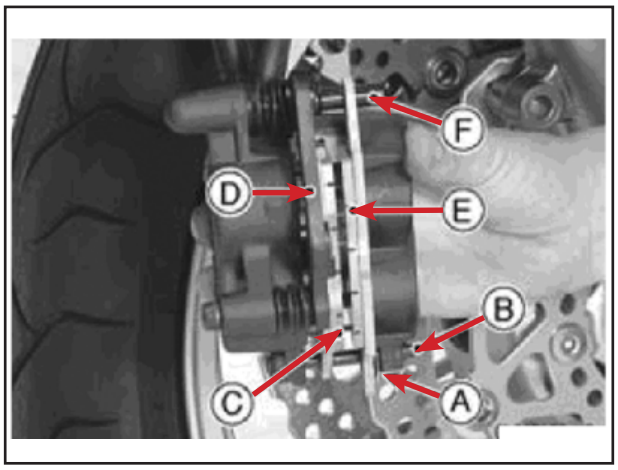
If the caliper holder shaft is damage, replace the caliper bracket.



12.7 Brake Pad

12.7.1 Front Brake Pad Removal

- Remove the front caliper with the hose in-stalled (see Front Caliper Removal). Draw out the holder shaft pin [A], and take off the holder shaft [B].
- Remove the pad [C] on the piston side. Push the holder [D] towards the piston, and remove the pad of the other side [E] from the holder shaft [F].



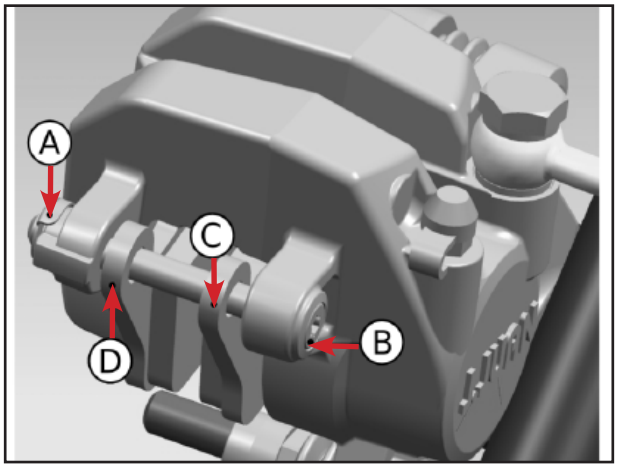
12.7.2 Front Brake Pad Installation

- Push the caliper pistons in by hand as far as they will go.
- Install the anti-rattle spring in its correct position.
- Install the pad on the piston side first, then install the other pad on the holder.
- Install the front caliper (see Caliper Installation).

Danger
Inspect the breaking performance first before driving. Make sure it is well working.

12.7.3 Rear Brake Pad Removal

- Remove the rear caliper with the hose in-stalled (see Rear Caliper Removal).
- Draw out the holder shaft pin [A], and take off the holder shaft [B].
- Remove the pad [C] and [D].



12.7.4 Rear Brake Pad Installation

- Push the caliper piston in by hand as far as it will go.
- Install the anti-rattle spring in its correct po-sition.
- Install the pad on the piston side first, then install the other pad on the holder.
- Install the rear caliper (see Caliper Installation).

12.7.5 Brake Pad Wear Inspection

- Refer to the Brake Pad Wear Inspection in the Periodic Maintenance chapter.

Danger
Inspect the breaking performance first before driving. Make sure it is well working.

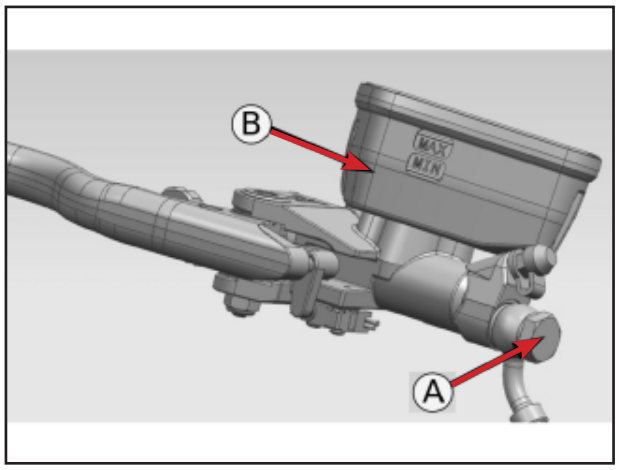
12.8 Master Cylinder

12.8.1 Front Master Cylinder Removal

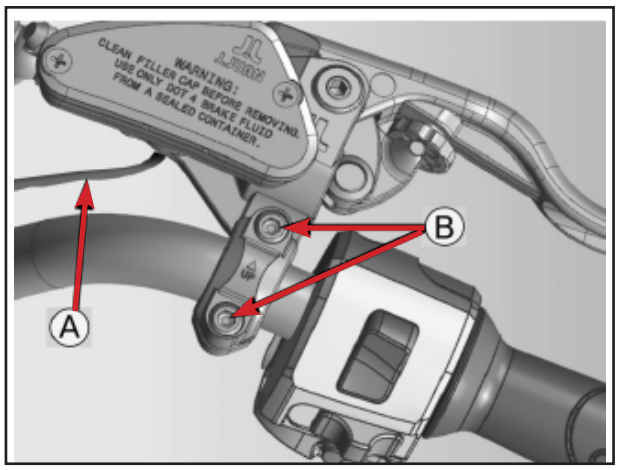
- Remove the banjo bolt[A]to disconnect the brake hose from the master cylinder[B].

(see Brake Hose Removal/Installation).

- Disc onnect the front brake light switch con-nectors [A].
- Unscr ew the clamp bolts [B], and take off the master cylinder as an assembly with the reserv oir, brake lever and brake switch installed.

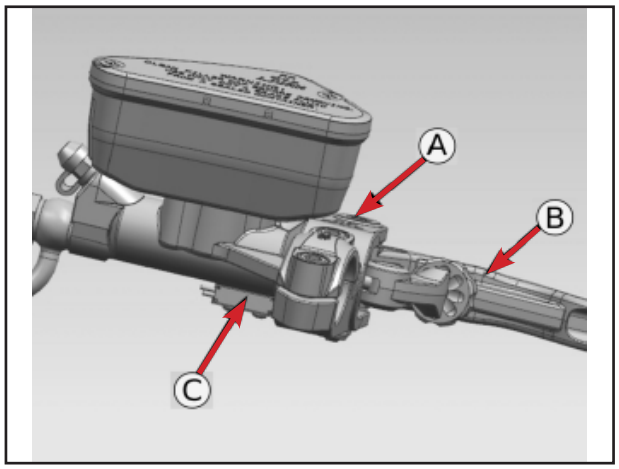


CAUTION
Immediately wash away any brake fluid that spills.



Remove:

- Brake Lever Pivot Bolt [A] and locknut.
- Brake Lever [B].
- Front B rake Light Switch [C].



12.8.2 Front Master Cylinder Installation

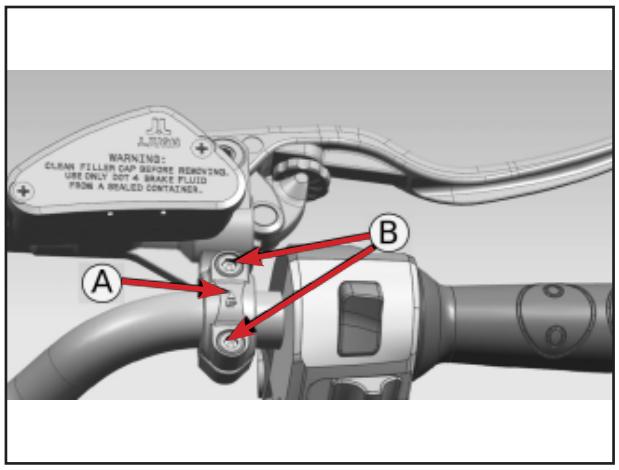
- Make sure the mark [A] to the front when in-stall the front master cylinder.
- Tight up the upper tighten bolt [B] first then the lower one [C] The tighten place needs several clearance.

Torque-Front Master Cylinder Clamp Bolts:8.8N·m(0.90kgf•m,78in•lb)

- Replace the washers on each side of the hose fitting with new ones.
- Tighten the brake hose banjo bolt.

Torque-Brake Hose Banjo Bolt: 25N·m(2.5kgf•m,18ft•lb)

- Drain out the air in breaking system (See breaking system air draining way)
- Check the brake for good braking power, no brake drag, and no fluid leakage.



12.8.3 Rear Master Cylinder Removal

- Unscrew the brake hose banjo bolt [A] on themaster cylinder (see Brake Hose Removal/Installation).
- Unscrew the master cylinder mounting bolts [A].
- Remove the cotter pin [B].

NOTE

Pull off the joint pin while pressing down the brake pedal.

- Pull off the reservoir hose lower end [C], and drain the brake fluid into a container.
- Remove the master cylinder.

12.8.4 Rear Master Cylinder Installation

- Replace the cotter pin [A] with a new one.
- Replace the washers on each side of hose fitting with new ones.
- Tighten the following bolts.

Torque-Rear Master Cylinder Mounting bolts:25N•m (2.5kgf•m,18ft•lb)
Brake Hose BanjoBolt:
25N·m(2.5kgf·m,18ft·lb)

- Drain out the air in breaking system (See break-ing system air draining way)
- Check the brake for good braking power, no brake drag, and no fluid leakage.

12.8.5 Front Master Cylinder Disassembly

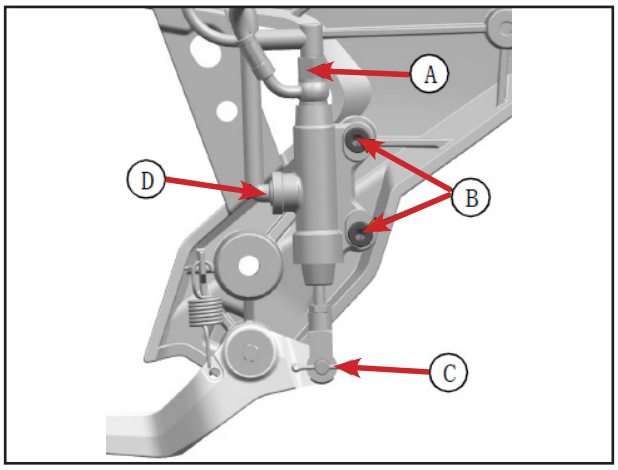
- Refer to the Master Cylinder Rubber Parts Re-placement in the Periodic Maintenance chapter.

12.8.6 Rear Master Cylinder Disassembly

- Refer to the Master Cylinder Rubber Parts Replacement in the Periodic Maintenance chapter.

12.8.7 Master Cylinder Assembly

- Refer to the Master Cylinder Rubber Parts Re-placement in the Periodic Maintenance chapter.



12.9 Master Cylinder Inspection

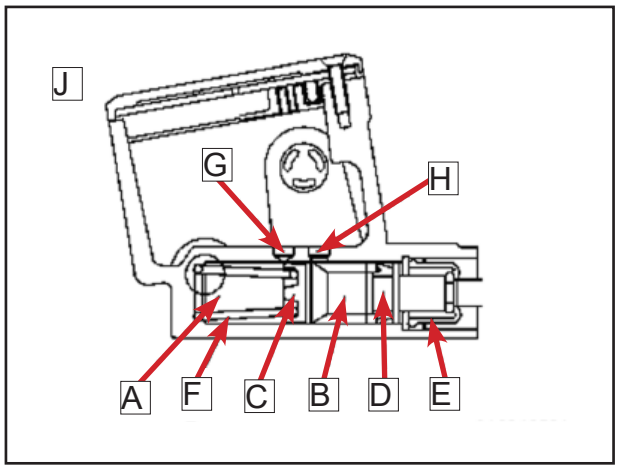
Front master cylinder[J]

- Remove the master cylinders (see Front/Rear Master Cylinder Removal).
- Disassemble the front and rear master cyl-inders
- Check that there are no scratches, rust or pitting on the inner wall [A] of each master cylinder and on the outside of each piston [B].

If a master cylinder or piston shows any damage, replace them.

- Inspect the primary cup [C] and secondary cup [D].If a cup is worn, damaged softened (rotted), or swollen, the piston assembly should be replaced to renew the cups.

If fluid leakage is noted at the brake lever, the piston assembly should be replaced to renew the cups.



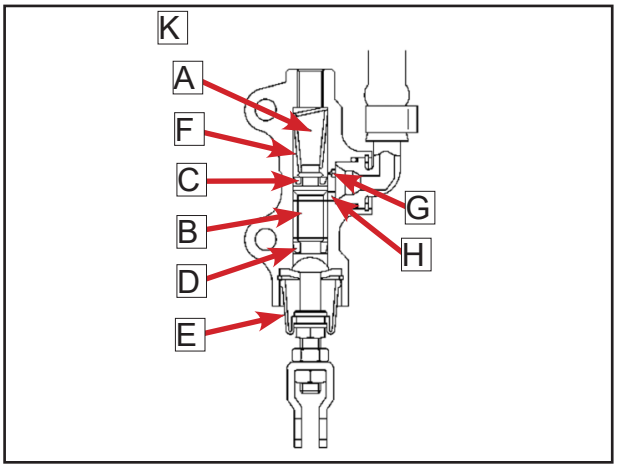
Rear Master Cylinder [K]

- Check the dust covers [E] for damage

If they are damaged, replace them.

- Check the piston return springs [F] for any damage.If the springs are damaged, replace them.
- Check that relief port [G] and supply port [H] are not plugged.

If the relief port becomes plugged, the brake pads will drag on the disc. Blow the ports clean with compressed air.



12.10 Brake Disc

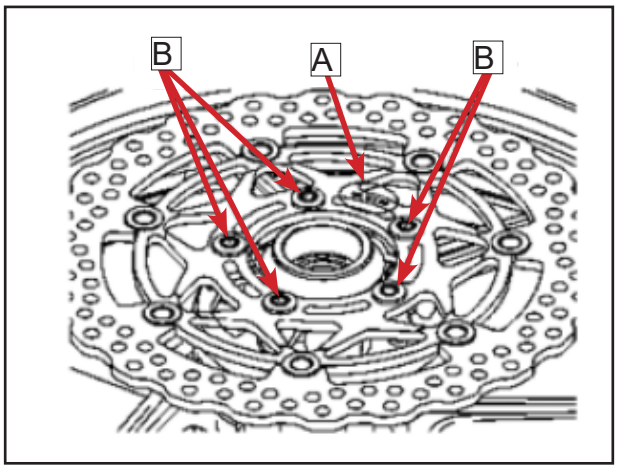
12.10.1 Brake Disc Removal

- Remove the wheel (see Front/Rear Wheel Removal in the Wheels/Tires chapter).
- Unscrew the mounting bolts, and take off the disc.
- Remove the gaskets

12.10.2 Brake Disc Installation

- Replace the gaskets with new ones.
- Install the brake disc on the wheel so that the marked side [A] faces out.
- Apply a non-permanent locking agent to the threads of the front and rear brake disc mounting bolts [B].
- Tighten torque

Brake Disc Mounting Bolts:27N·m(2.8kgf·m,20ft·lb)

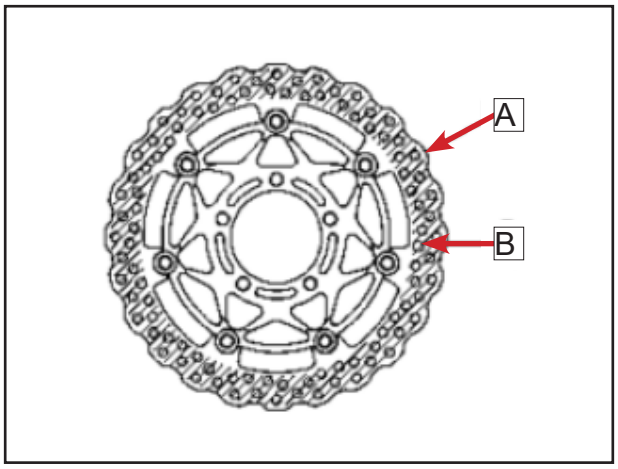


12.10.3 Brake Disc Wear

Measure the thickness of each disc [A] at the point where it has worn the most.

If the disc has worn past the service limit, replace it.

Measuring Area [B].



Brake Discs Thickness Standard:
Front:4.3mm~4.7mm(0.17in~0.19in.)
Rear:4.8mm~5.2mm(0.19in~0.20in.)
Service limit:
Front:4.0mm(0.16in.)
Rear:4.5mm(0.18in.)

12.10.4 Brake Disc Warp

- Raise the wheel off the ground with jack (see Front/Rear Wheel Removal in the Wheels/Tires chapter).

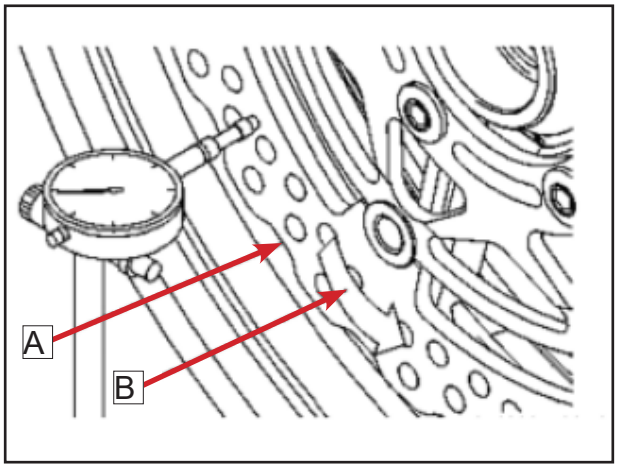
Special Tools-Jack, Jack Attachment

For front disc inspection, turn the handle-bar fully to one side.

- Set up a dial gauge against the disc [A] as shown and measure disc runout, while turning [B] the wheel by hand.

If runout exceeds the service limit, replace the disc.

Disc Runout
Standard :0.15mm(0.006in.) or less
Service limit :0.3mm(0.01in.)



12.11 Brake Fluid

12.11.1 Brake Fluid Level Inspection

- Refer to the Brake Fluid Level Inspection in the Periodic Maintenance chapter.

12.11.2 Brake Fluid Replacement

- Refer to the Brake Fluid Change in the Peri-odic Maintenance chapter.

12.12 Drain out the air in pipes

The brake fluid has a very low compression coefficient so that almost all the movement of the brake lever or pedal is transmitted directly to the caliper for braking action. Air, however, is easily compressed. When air enters the brake lines, brake lever or pedal movement will be partially used in com-pressing the air. This will make the lever or pedal feel spongy, and there will be a loss in braking power.

CAUTION
Be sure to bleed the air from the brake line whenever brake lever or pedal action feels soft or spongy after the brake fluid is changed, or whenever a brake line fitting has been loosened for any reason

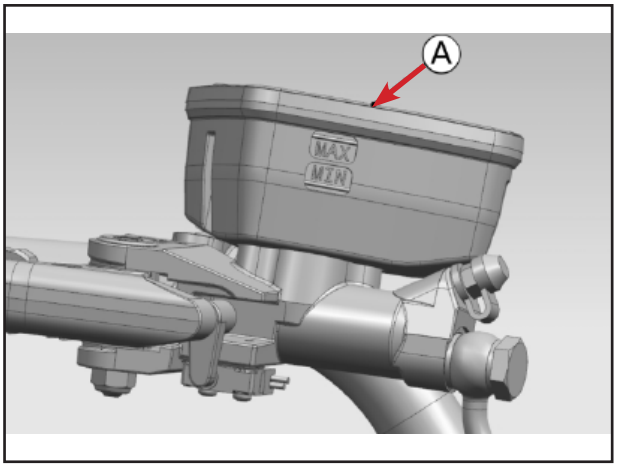
NOTE

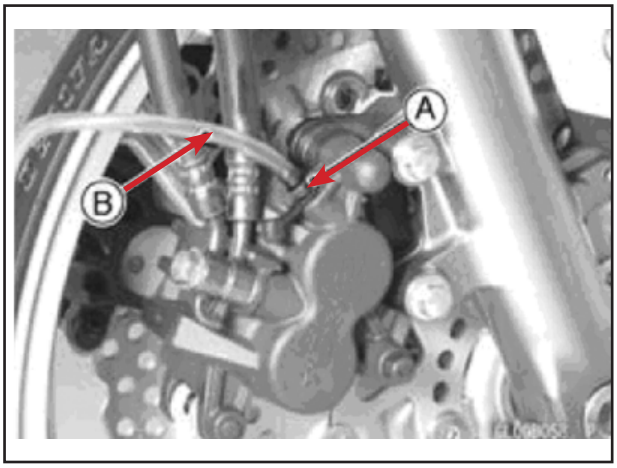
The procedure to bleed the front brake line is as follows. Bleeding the rear brake line is the same as for the front brake.

- Remove the reservoir cap [A]
- Fill the reservoir with fresh brake fluid to the MAX level line in the reservoir.
- Slowly pump the brake lever several times until no air bubbles can be seen rising up through the fluid from the holes at the bottom of the reservoir.

Bleed the air completely from the mas-ter cylinder by this operation.

- Remove the rubber cap from the bleed valve [A] on the caliper.
- Attach a clear plastic hose [B] to the bleed valve, and run the other end of the hose into a container.





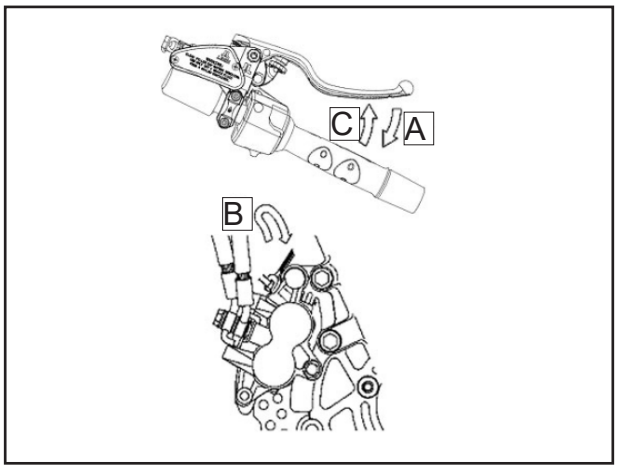
Drain out the air in pipes

Repeat this operation until no more air can be seen coming out into the plastic hose.

1.Pump the brake lever until it becomes hard, and apply the brake and hold it [A].

2.Quickly open and close [B] the bleed valve while holding the brake applied.

3.Release the brake [C].



NOTE

The fluid level must be checked often during the bleeding operation and replenished with fresh brake fluid as necessary. If the fluid in the reservoir runs completely out any time during bleeding, the bleeding operation must be done over again from the beginning since air will have entered the line.

Tap the brake hose lightly from the caliper to the reservoir for more complete bleeding.

Front Brake:First bleeding the right caliper then repeat the above steps for the left caliper.

- Remove the clear plastic hose.
- Install the diaphragm and reservoir cap.
- Tighten torque:

Front Brake Reservoir Cap Screws: 1.0N•m(0.10kgf•m,9in•lb)

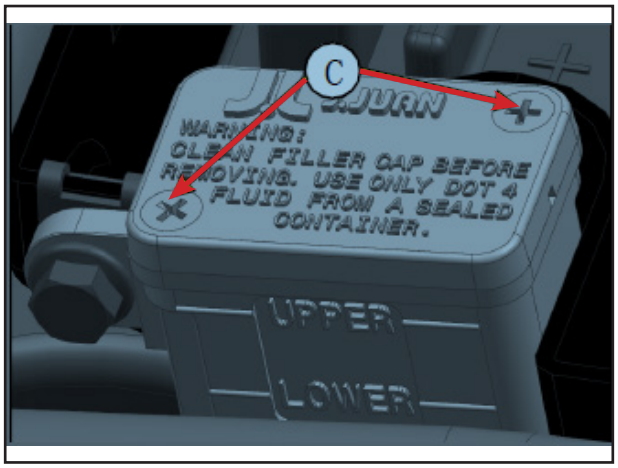
- Follow the procedure below to install the rear brake fluid reservoir cap correctly.

First, tighten the rear brake fluid reser-voir cap [B] clockwise [C] by hand until slight resistance is felt indicating that the cap is seated on the reservoir body, then tighten the cap an additional 1/6 turn [D] while holding the brake fluid reservoir body [A].

- Tighten the bleed valve, and install the rub-ber cap.

Torque-Bleed Valve:7.8N·m(0.80kgf·m, 69in·lb)

- Check the fluid level (see Brake Fluid Level Inspection in the Periodic Maintenance chapter).
- After bleeding is done, check the brake for good braking power, no brake drag, and no fluid leakage.



Danger
When working with the disc brake, observe the precautions listed below.: **1.Never reuse old brake fluid.** **2.Do not use fluid from a container that has been left unsealed or that has been open for a long time.** **3.Do not mix two types and brands of fluid for use in the brake. This lowers the brake fluid boiling point and could cause the brake to be ineffective. It may also cause the rubber brake parts to deteriorate.** **4.Don't leave the reservoir cap off for any length of time to avoid moisture contamination of the fluid.** **5.Don't change the fluid in the rain or when a strong wind is blowing.** **6.Except for the disc pads and disc, use only disc brake fluid, isopropyl alcohol, or ethyl alcohol for cleaning of the brake parts. Do not use any other fluid for cleaning these parts. Gasoline, engine oil, or any other petroleum distillate will cause deterioration of the rubber parts. Oil spilled on any part will be diff cult to wash off completely and will eventually deteriorate the rubber used in the disc brake.** **7.When handling the disc pads or disc, be careful that no disc brake fluid or any oil gets on them. Clean off any fluid or oil that inadvertently gets on the pads or disc with a high-fash point solvent. Do not use one which will leave an oily residue. Replace the pads with new ones if they cannot be cleaned satisfactorily.** **8.Brake fluid quickly ruins painted surfaces; any spilled fluid should be completely wiped up immediately.** **9.If any of the brake line fittings or the bleed valve is opened at any time, the AIRMUSTBEBLEDFROM THE BRAKE LINE.**

12.13 Braking hose

12.13.1 Brake Hose Removal/Installation

Refer to the Brake Hose and Pipe Replacement in the Periodic Maintenance chapter

12.13.2 Brake Hose Inspection

Refer to the Brake Hose Damage and Installation Condition Inspection in the Periodic Maintenance chapter

12.14 ABS Trouble code

C1D90 Front wheel speed sensor trouble

C1D91 Front wheel speed sensor physical trouble

C1D92 Front wheel speed sensor period trouble

C1D93 Front wheel speed sensor self-testing failure

C1D94 Front wheel speed sensor signal phase trouble

C1D95 Front wheel speed sensor frequency testing failure.

C1DA0 Rear wheel speed sensor trouble

C1DA1 Rear wheel speed sensor physical trouble

C1DA2 Rear wheel speed sensor period trouble

C1DA3 Rear wheel speed sensor self-testing failure

C1DA4 Rear wheel speed sensor signal phase trouble

C1DA5 Rear wheel speed sensor frequency testing failure.

C1DD3 OSEK deadly fault

C1DF0 Pump wrong function (MAB damaged)

C1DF1 Pump connection trouble(MAB damaged)

C1DF2 Hardware trouble(MAB damaged)

C1DF5 Inner hardware trouble

C1DF3 Low voltage

C1DF4 Low voltage

C1DF7 High voltage

C1E59 Wrong vehicle number

C1E5A ABS Switch trouble

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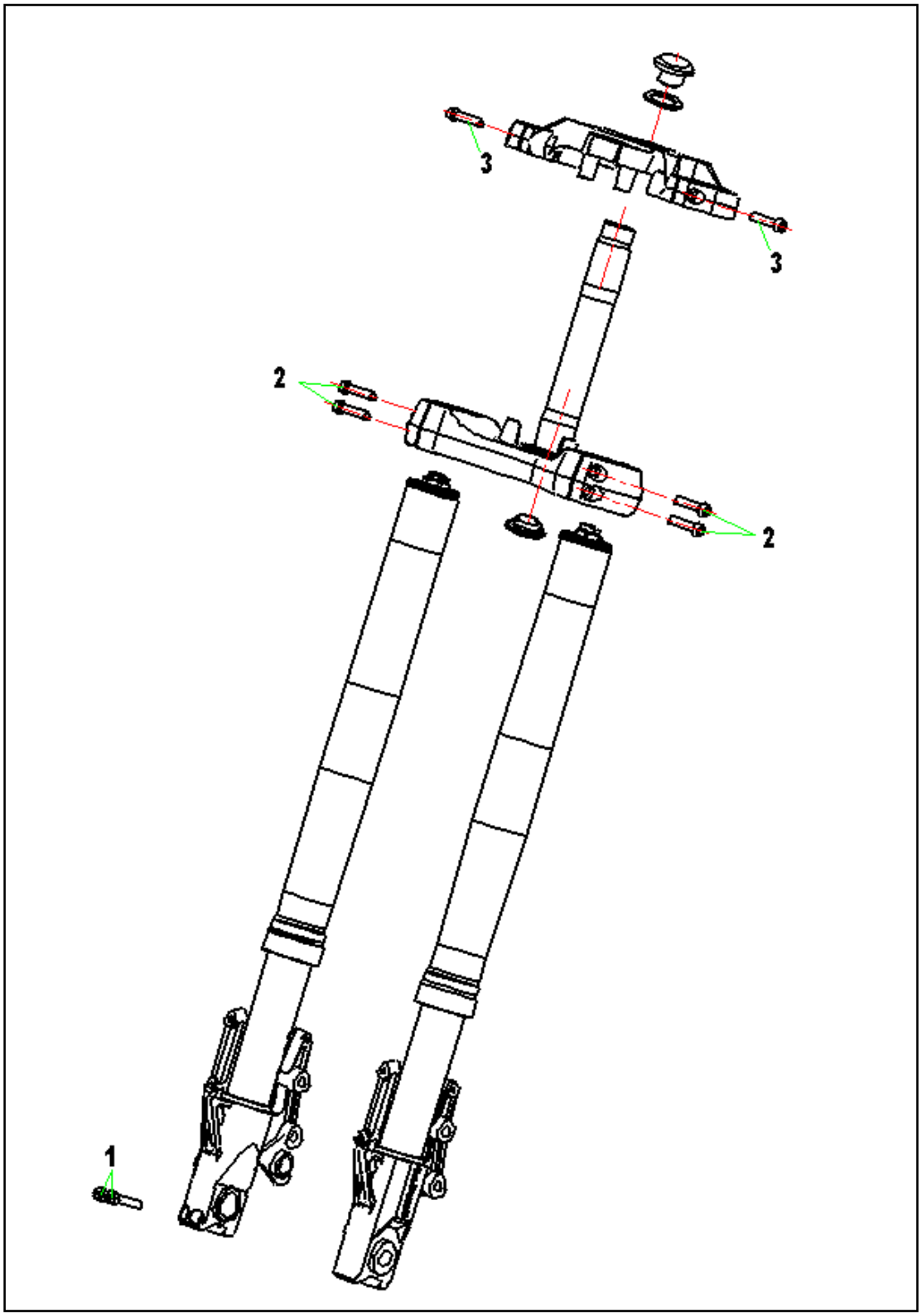
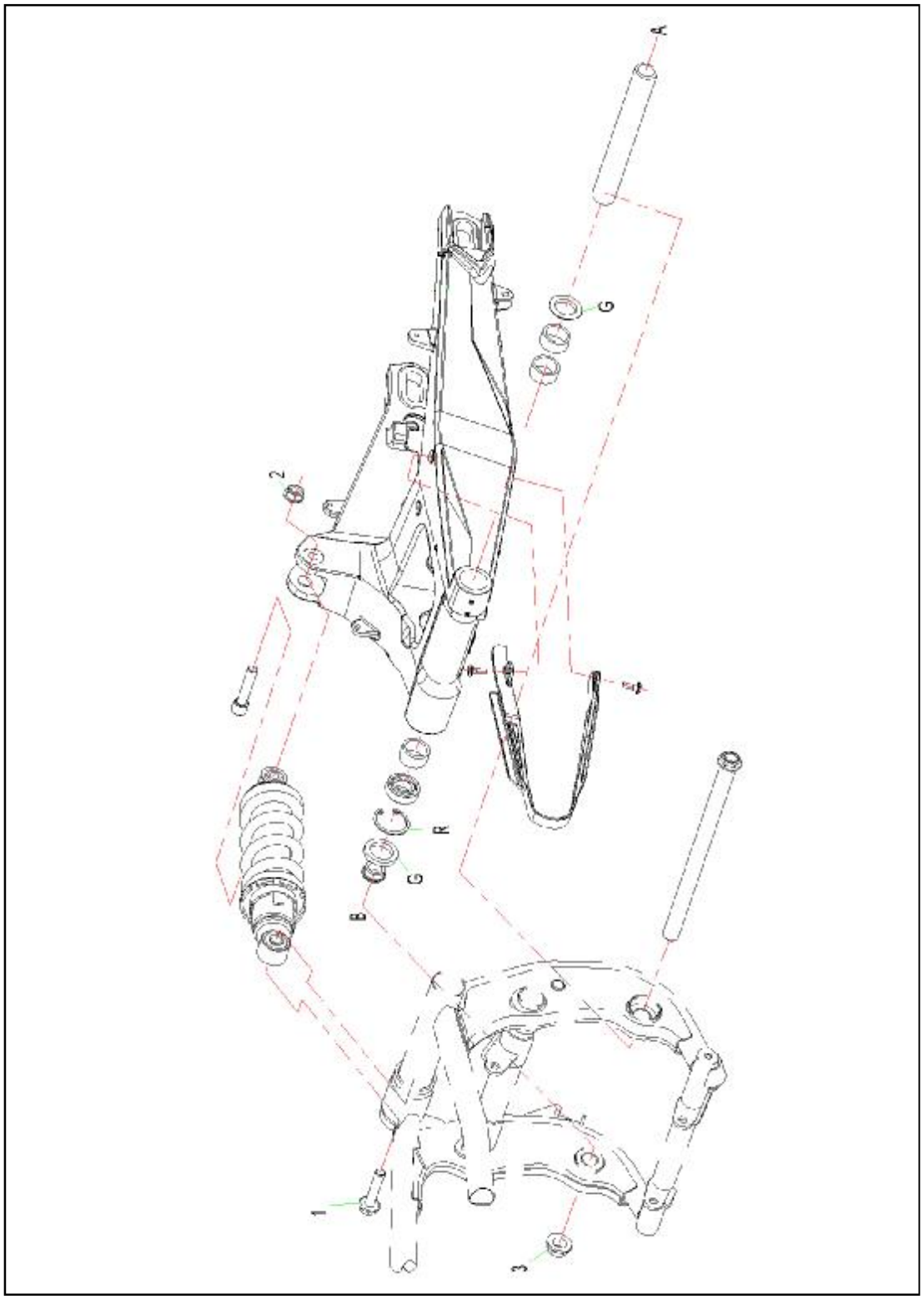
13.1 Front fork exploded view



No.	Tighten parts	Torque			Remark
		N·m	kgf·m	ft·lb	
1	Front wheel shaft locking screw	34	3.5	25	
2	Front shock absorber locking screw（L）	20	2.0	15	AL
3	Front shock absorber locking screw（U）	20	2.0	15	

13.2 Rearswing arm exploded view



No.	Tighten parts	Torque			Remark
		N·m	kgf·m	ft·lb	
1	Rear shock absorber bolt	59	6.0	44	
2	Rear shock absorber nut	59	6.0	44	
3	Rear rocker arm mounting nut	180	18.0	133	

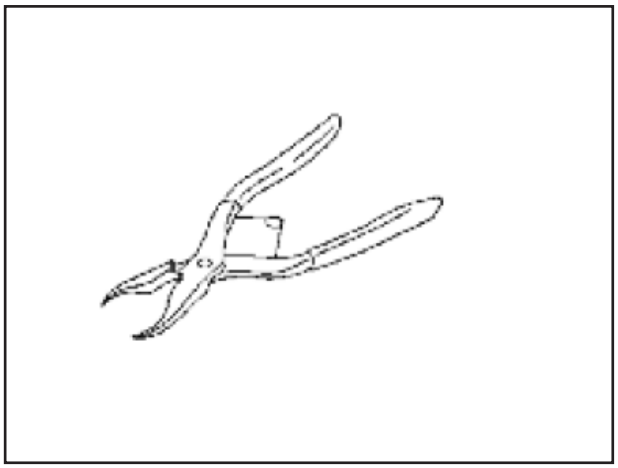
G:Use grease
R:Replace the parts

13.3 Specifications

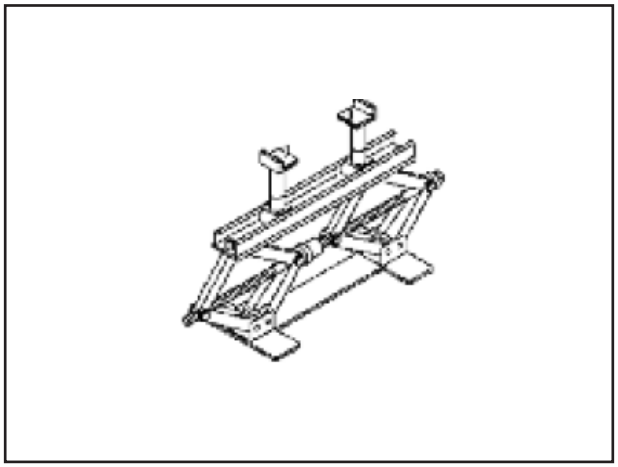
Name	Item	Standard
Front shock absorber	Inner Tube Outside Diameter	Φ43mm
	Oil style	TOP46# or same level
	Capacity	Oil only:400mL±3 mL Total dry: 445mL±3mL
	Shock spring length	300mm，Service limit: 295mm
Rear shock absorber	Spring and pre-load	Free length:165mm，Continuously adjustable:-4mm~+5mm
	Pressure	1MPa，No adjustable
	Recovering damp	Tolerant 4th，Clockwise add damp，Counterclowise decrease damp from level 1 to 7.

13.4 Special tool

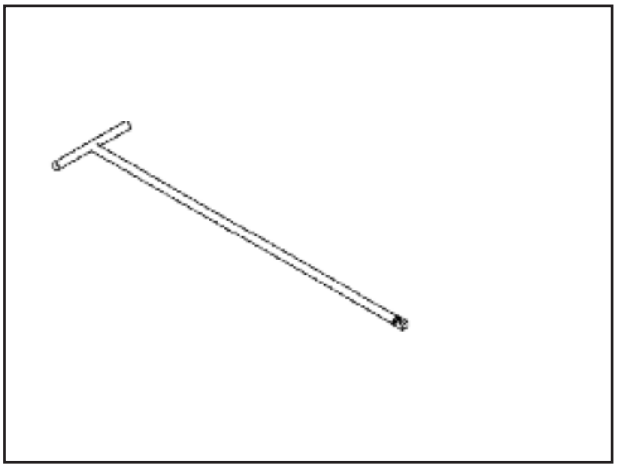
Retainer plier



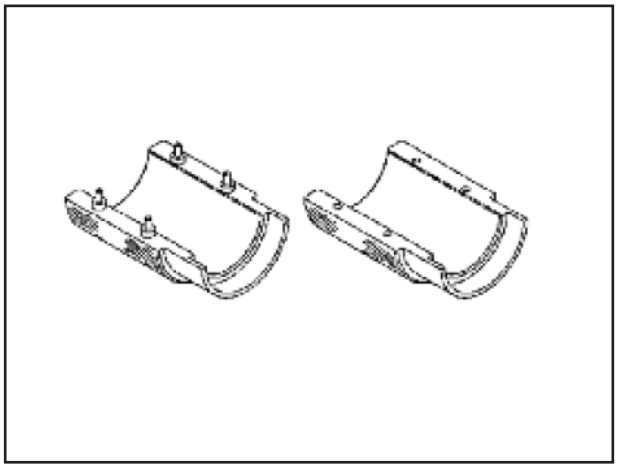
Jack



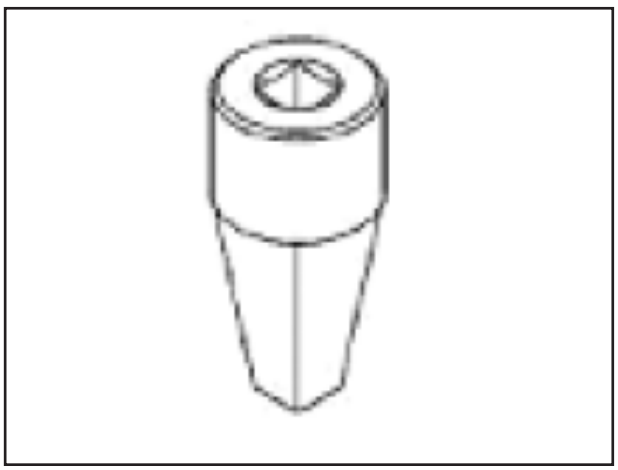
Front shock absorber handle



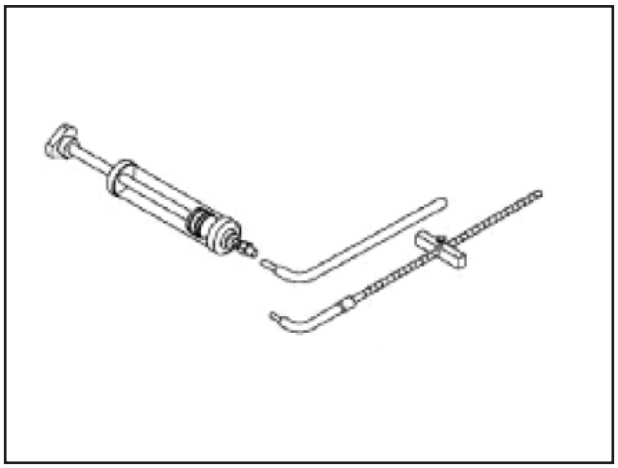
Front shock absorber oil seal remover



Shock absorver cylinder head adjuster

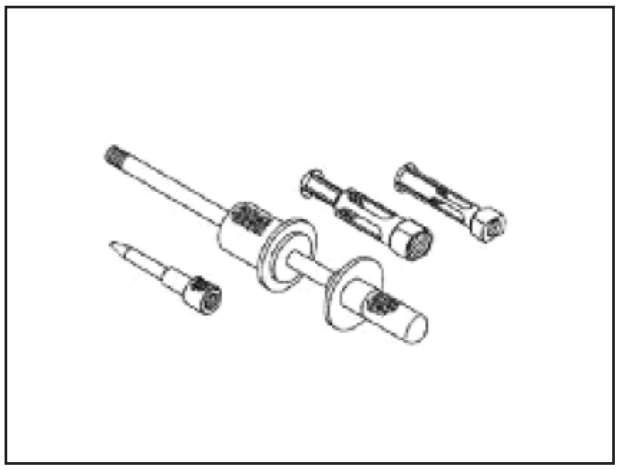


Shock absorber oil gauge

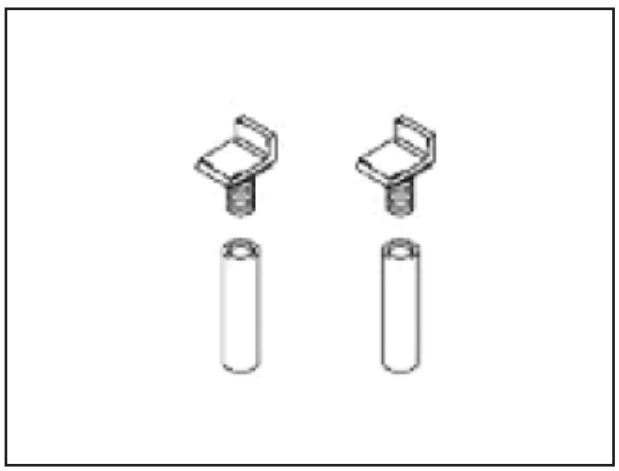


Special tool

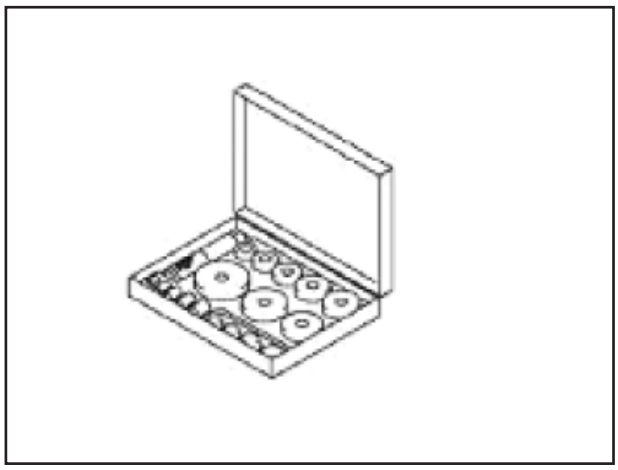
Oil seal bearing remover



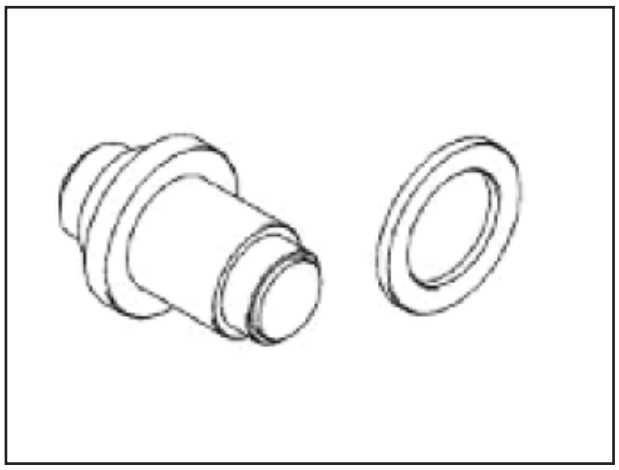
Jack accessories



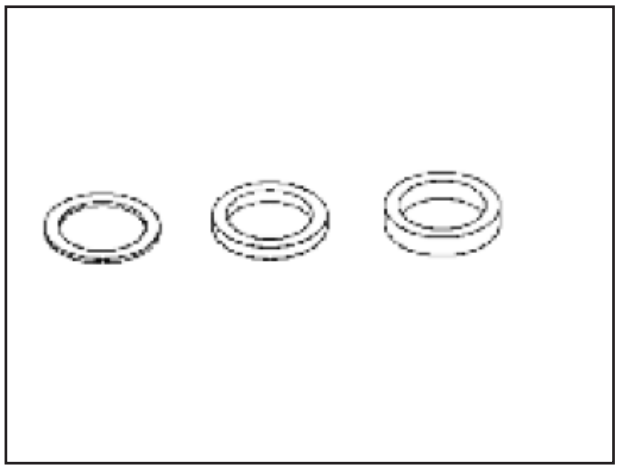
Bearing pressor



Valve rod bearing pressor

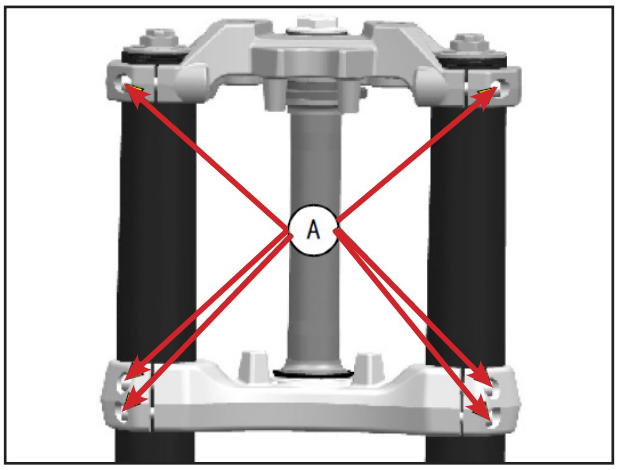


Washer



13.5 Front Shock absorber

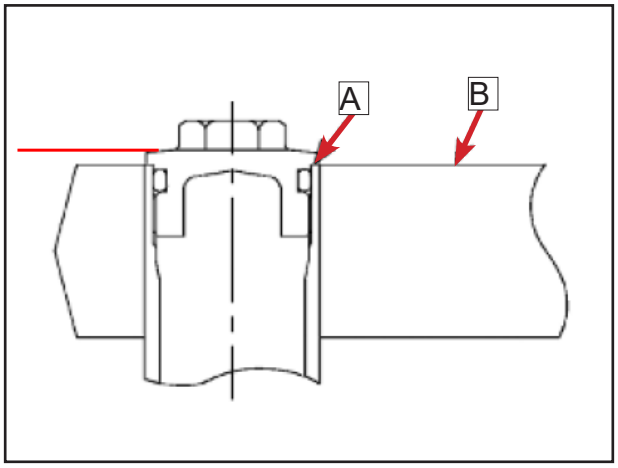
13.5.1 Front Shock absorber removal



- Remove:

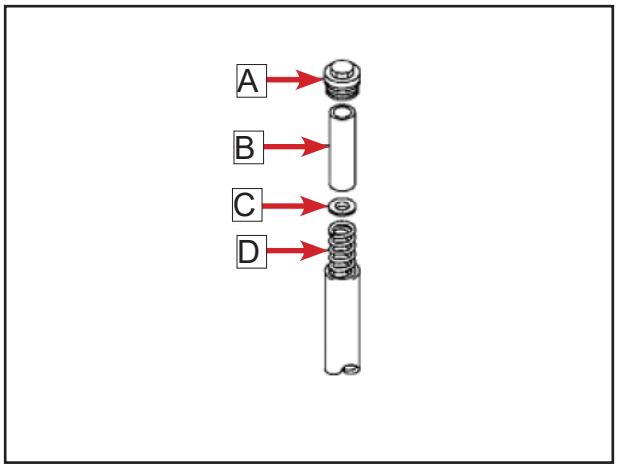
Front Wheel (see Front Wheel Removal in the Wheels/Tires chapter)
Front Fender (see Front Fender Removal in the Frame chapter)
If you want to remove the shockabsorber, Remove the locking bolts [A] first and turn the shock absorber and pull it out.

13.5.2 Front shock absorber installation



- Install the fork with the upper end of the inner tube flush [A] against the top surface of the stem head [B]
- Tighten torque:

Front Fork Clamp Bolt(lower):
20N·m(2.0kgf·m,15ft·lb)
Front Fork Top Plug:
25N·m(2.5kgf·m, 18ft·lb)
NOTE
Tighten the top plug before tightening the upper Fork clamp bolt.
Tighten the two clamp bolts alternately two times to ensure even tightening torque.
Tighten torque:
Front Fork Clamp Bolt (Upper):
20N·m(2.0kgf·m,15ft·lb)



- Install the removed parts (see appropriate chapters)

Front Fork Oil Replacement

- Remove the front fork (see Front Fork Removal).
- Remove

Top Plug [A] with O-ring Collar [B]
Fork Spring Seat [C] Fork Spring [D]

Compress [A] the fork [B] upside down to draw out the oil into the suitable container [C].

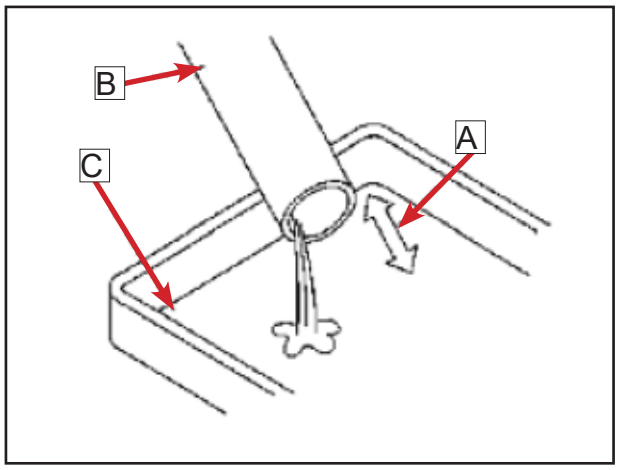
- Pour in the specified amount of oil.

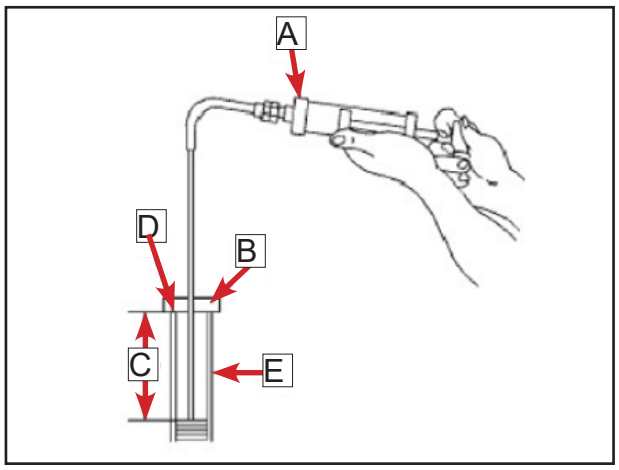
Shockabsorber oil viscosity:
KAYABAKHL34-G10 or equivalent
Amount (Per Side)
Replace the oil only:
About 390mL(13.2US oz).
Total dry:
458mL±4mL(15.5US oz±0.14US oz)
NOTE
Move the outer tube up and down a few times, to remove the air that is trapped in the fork oil in order to stabilize the oil level.

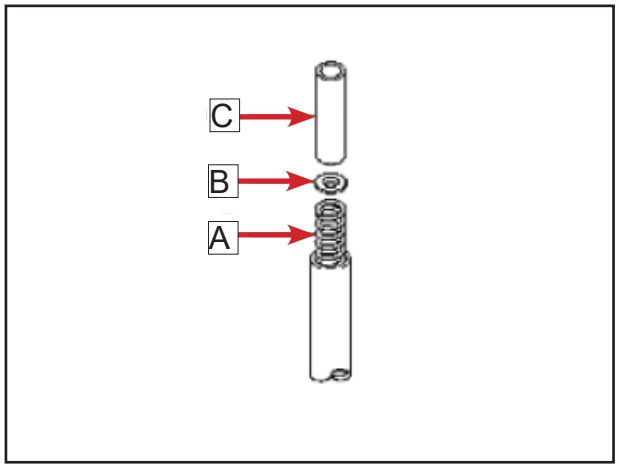
- Hold the outer tube vertically in a vise and compress the Fork completely
- Wait until the oil level stabilizes
- Use the fork oil level gauge [A] to measure the distance between the top of the inner tube to the oil level.

Special Tool - Fork Oil Level Gauge
Set the oil level gauge stopper [B] so that the distance [C] from the bottom of the stopper to the lower end of the pipe is the standard oil level distance.
A correct measurement can not be obtained unless the level gauge pipe is placed in the center of the inner tube.
Oil Level (fully compressed, without spring) Standard:
115mm±2mm(4.5in±0.08in.)
Place the stopper of the level gauge at the top [D] of the inner tube [E] and pull the handle slowly to draw out the excess oil from fork into the gauge, thus attaining the standard level.
If not oil is drawn out, there is not enough oil in the fork.Pour in some more oil and measure again.

- Repeat the same procedure for adjusting the other fork.
- Install the fork spring [A], fork spring seat [B] and collar [C].
- Inspect the top plug O-ring and replace it with a New.
- Install the front shock absorber(See front shockabsorber installation)







13.6 Rear shock absorber

13.6.1 Spring Preload Adjustment

- Using the hook wrench [A], turn the adjust-ing nut [B] to adjust the spring preload.

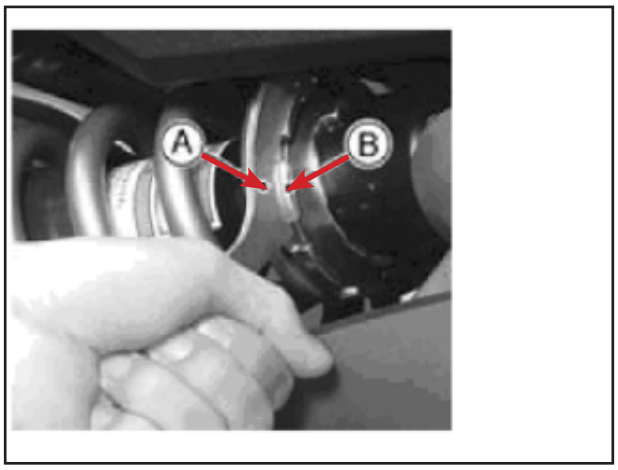
Riders in average level 68kg(150lb) with no passenger and no accessories is 3rd position.

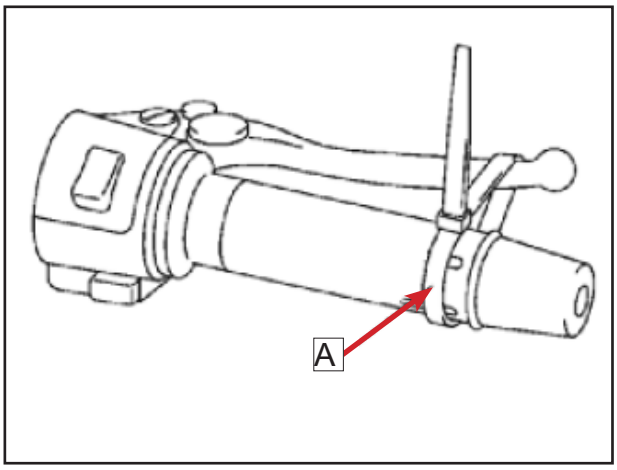
Spring Preload Setting
Standard Position:3rd position
Adjustable Range:1st to 7th position

- If the compression of the spring is not suited to the operating conditions, adjust it to an ap-propriate position by referring to the table below.

Spring Preload Adjustment

Adjuster Position	1st ↑ ↓ 7th
Damping Force	weak ↑ ↓ Strong
Shock Absorber Hardness	Soft ↑ ↓ Hard
Load	Light ↑ ↓ Heavy
Road Conditions	Good ↑ ↓ Bad
Driving Speed	Low speed ↑ ↓ High speed





13.6.2 Rear Shock Absorber Removal

Remove:
Frame Covers (see Frame Cover Removal in the Frame chapter)
Muffler Body (see Muffler Body Removal in the Engine Top End Chapter)
Raise the rear wheel off the ground with jack

Special Tools–Jack Jack Attachment

- Squeeze the brake lever slowly and hold it with band[A].

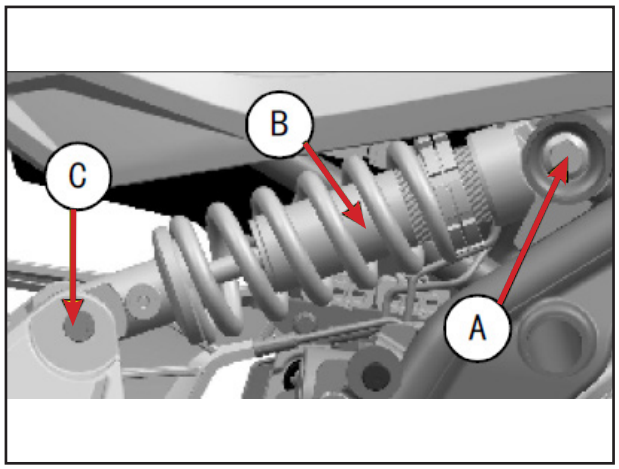
⚠WARNING

Be sure to hold the front brake when removing the shock absorber, or the motorcyclemay roll over. It could cause an accident and injury.

- Remove:

Upper Shock Absorber Bolt [A].
Lower Shock Absorber Nut and Washer.
Lower Shock Absorber Bolt[C].

- Remove shockabsorber [B] from backward.



13.6.3 Rear Shock Absorber Installation

- Installation is the reverse of removal.
- Apply grease to the lip of oil seals

Be sure to install the oil seals to the shock absorber

- **Tighten torque:**

Rear Shock Absorber Bolt:
59N·m(6.0kgf·m,44ft·lb)
Rear Shock Absorber Nut:
59N·m(6.0kgf·m,44ft·lb)

- Install the removed parts (see appropriate chapters).

13.6.4 Rear Shock Absorber Inspection

- Remove the rear shock absorber (see Rear Shock Absorber Removal)
- Visually inspect the following items. Smooth Stroke Oil Leakage Crack or Dent.

If there is any damage to the rear shock absorber, replace it.
If it shows any signs of damage, replace it.

13.7 Swingarm

13.7.1 Swingarm Removal

- Remove:

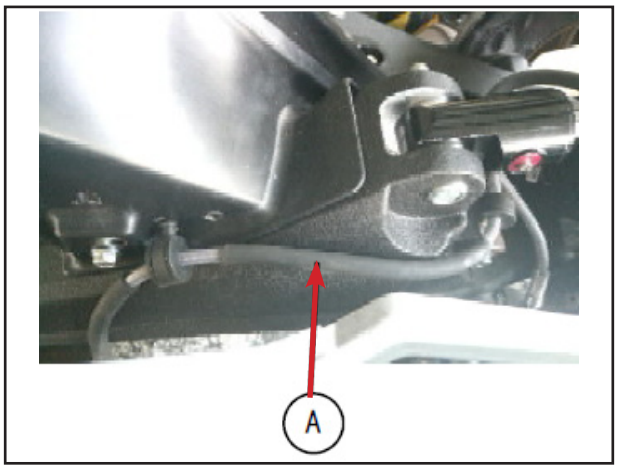
Chain Cover Bolts [A] and Cover [B].

- Remove:

Left, right side cover (see Side Cover Removal in the Frame chapter)

Left, right foost rest bracket (see Foot Rest Bracket Remobal in Frame chapter)

- Remove the brake hose banjo bolt from the rear caliper,free the brake hose [A] from the clamps [B], and removethe foot peg stay with the rear master cylinder.(see Rear Caliper Removal in the Brakes chapter)



- Remove:

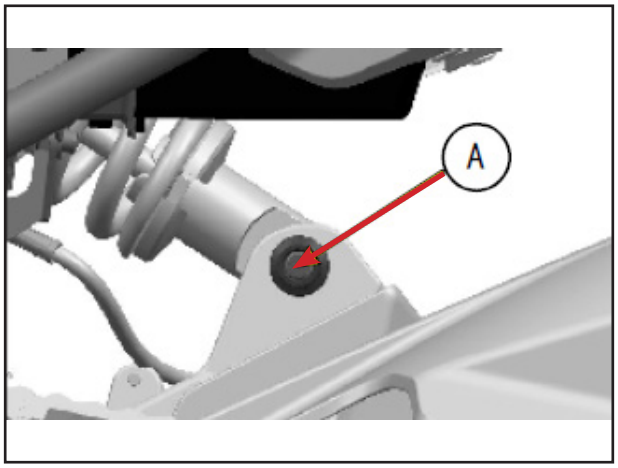
Muffl er Body (see Muffl er Body Removal in the Engine Top End chapter).

Rear Wheel (see Rear Wheel Removal in the Wheels/Tires chapter).

Raise the rear wheel off the ground with jack.

Special Tools-Jack Jack Attachment

- Remove the lower shock absorber nut and bolt [A].
- Remove the drive chain (see Drive Chain Removal in the Final Drive chapter).
- Unscrew the swingarm pivot shaft nut [B].
- Pull off the pivot shaft [C], and remove the swingarm.



13.7.2 Swingarm Installation

- Installation is the reverse of removal

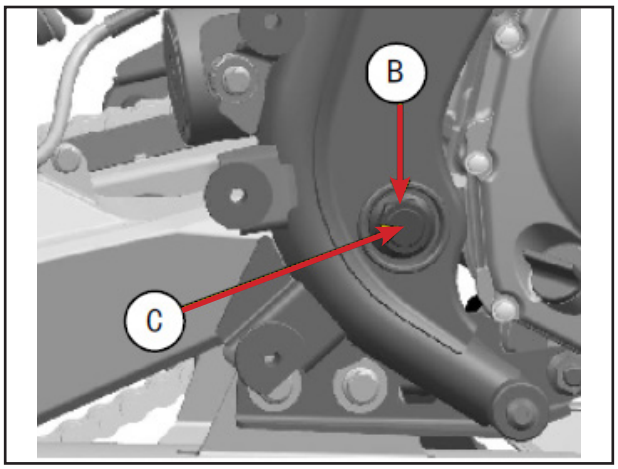
Apply grease to the lip of the oil seals.

Be sure to install the oil seal and collar to the swingarm.

- Tighten the pivot shaft nut.

Swingarm Pivot Shaft Nut Tighten torque:180N·m(18.0kgf·m,133ft·lb)

- Install the removed parts (see appropriate chapters).

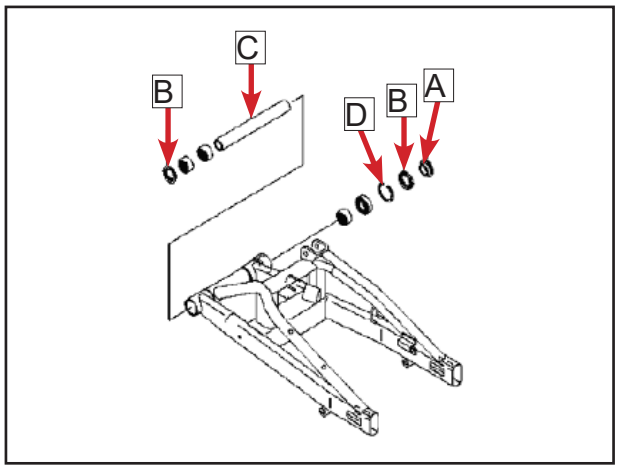


13.7.3 Swingarm Bearing Removal

- Remove:

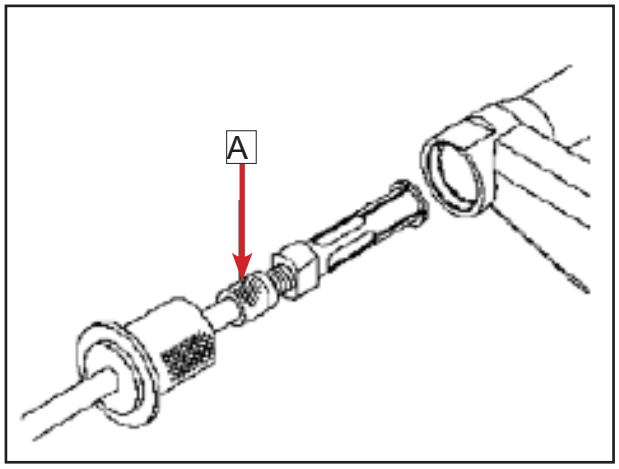
Swingarm (see Swingarm Removal)
Collar [A]
Oil Seals [B]
Sleeve [C]
Circlip [D]

Special Tool-Inside Circlip Pliers



- Remove the ball bearing and needle bearings.

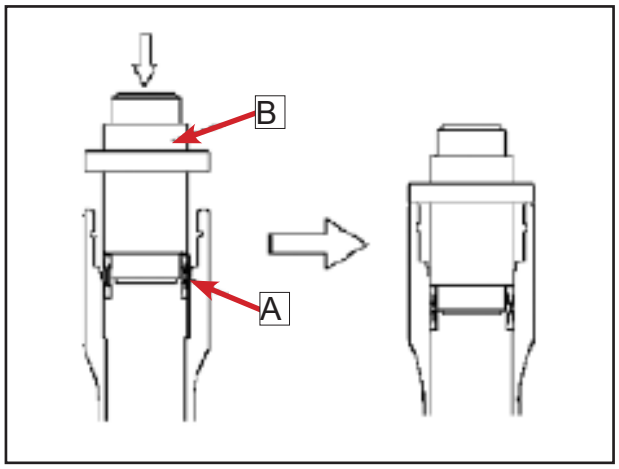
Special Tool-Oil Seal & Bearing Remover [A]



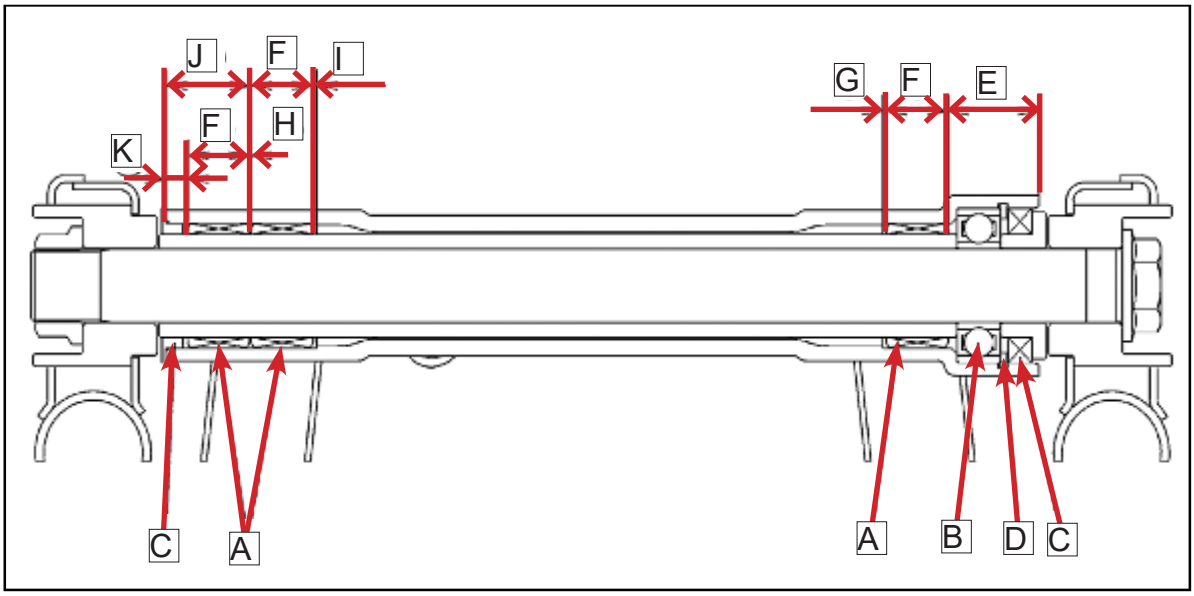
13.7.4 Swingarm Bearing Installation

- Replace the ball and needle bearings [A] with new ones.
- Install the ball and needle bearings so that the manufacturer's marks face out.

Special Tools-Bearing Driver Set:
Stem Bearing Driver 28[B]
Spacer:Φ28

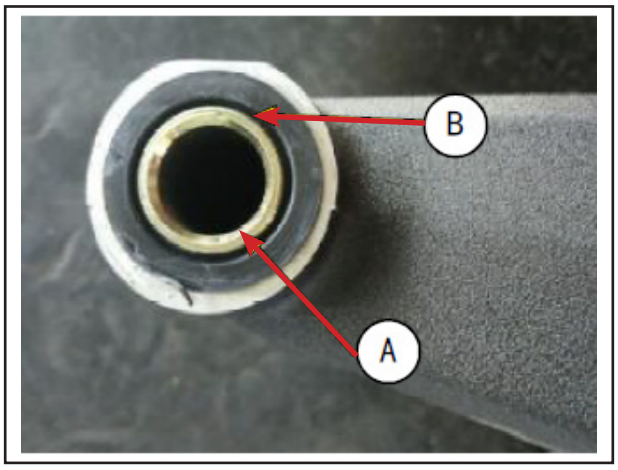


• Install the needle bearings [A], ball bearing [B] and oil seals [C] position as shown.
25mm(0.98in.)[E]
17mm(0.67in.)[F]
1mm(0.04in.)[G]
0.5mm(0.02in.)[H]
1mm(0.04in.)[I]
23.5mm(0.93in.)[J]
6mm(0.24in.)[K]



13.7.5 Swingarm Bearing, Sleeve Inspection

CAUTION
Do not remove the bearing for inspection. Removal may damage them.



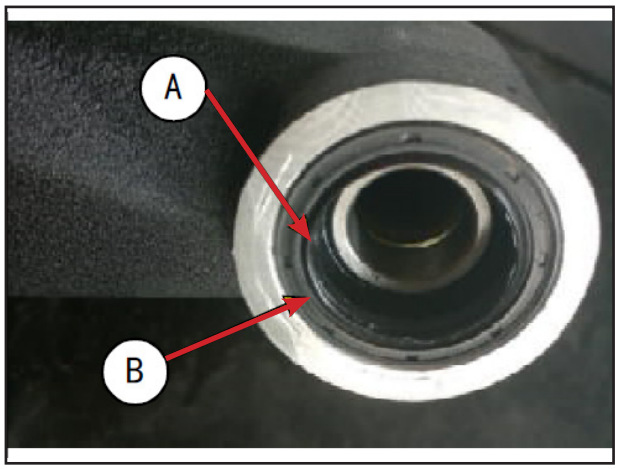
• Inspect the needle bearings [A] and ball bearing installed in the swingarm.
The rollers and ball in a bearing normally wear very little, and wear is difficult to measure. Instead of measuring, visually inspect the bearing for abrasion, discoloration, or other damage.
If the needle bearing and sleeve [B] show any sings of abnormal wear, discoloration, or damage, replace them as a set.

- Turn the bearing in the swingarm back and forth [A] while checking for plays, roughness, or binding.

If the bearing play, roughness, or binding is found, replace the bearing.

- Examine the bearing seal [B] for tears or leakage.

If the seal is torn or is leaking, replace the bearing.



13.7.6 Swingarm Bearing Lubrication

NOTE

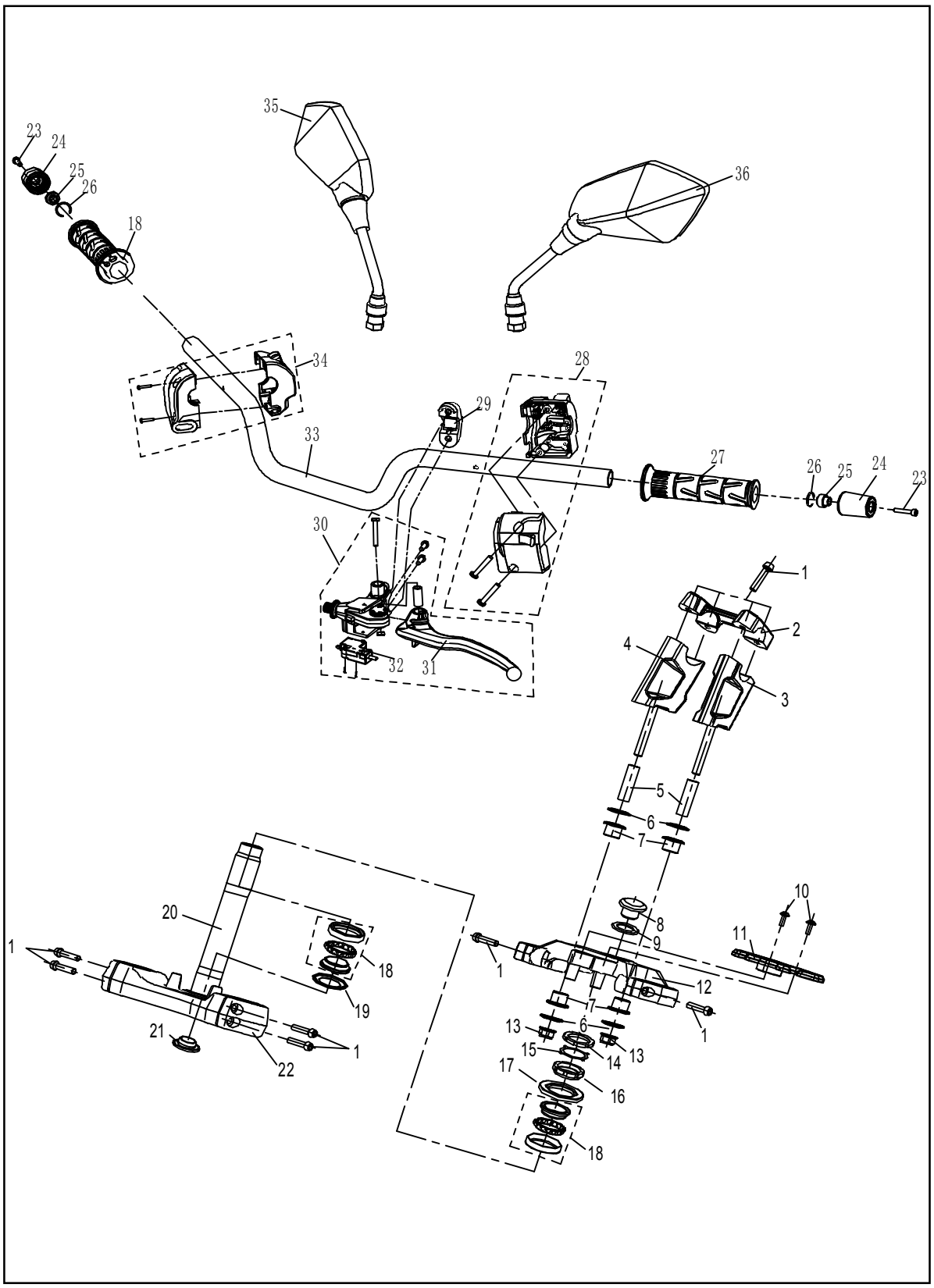
Since the bearings are packed with grease and sealed lubrication is not required.

13.8 Chain Guide Inspection

- Refer to the Chain Guide Wear Inspection in the Periodic, Maintenance chapter.

14.1 Exploded view..... 14-2
14.2 Special tool 14-4
14.3 Steering bearing removal 14-5
14.4 Steering bearing installation 14-6
14.5 Steering Bearing Lubrication 14-9
14.6 Steering Stem Warp 14-9
14.7 Handlebar..... 14-10
14.7.1 Handlebar Removal..... 14-10
14.7.2 Handlebar Installation..... 14-10
14.8 Clutch lever assy installation..... 14-11

14.1 Exploded view

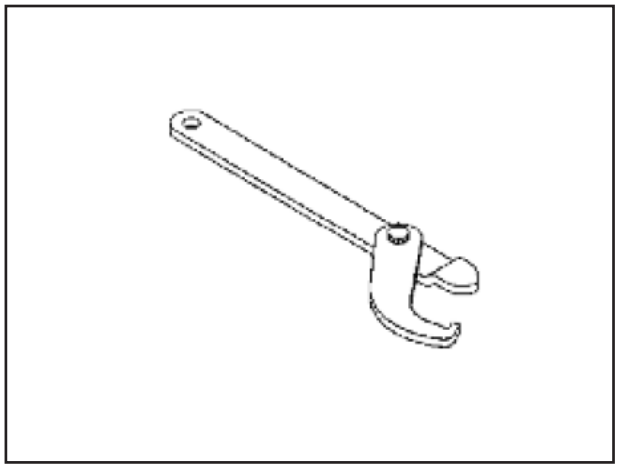


Num	Tighten part	Torque			Remark
		N·m	kgf·m	ft·lb	
1	Front shock absorber locking screw（L）	20	2.0	15	AL
1	Front shock absorber locking screw（U）	20	2.0	15	
1	Handlebar locking screw	25	2.5	18	S
34	LH switch locking screw	3.5	0.36	31in·lb	
28	RH switch locking screw	3.5	0.36	31in·lb	
8	Upper plate locking screw	108	11.0	80	
16	Steering column locking nut	20	2.0	15	

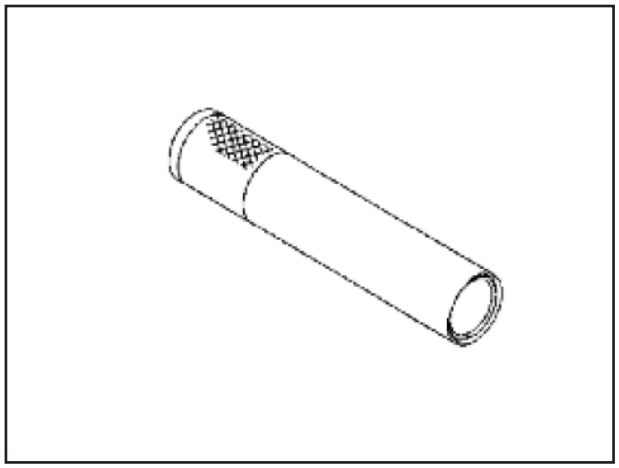
AD:Use glue
AL:Tight the bolt in criss cross way to make sure the tighten torque is average.
G:Use grease
L:Use thread locker
R:Replace the parts
S:Tighten in special order

14.2 Special tool

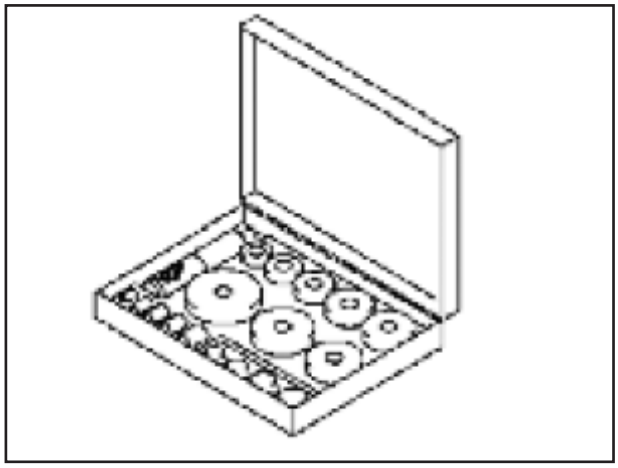
Steering rod tighten wrench



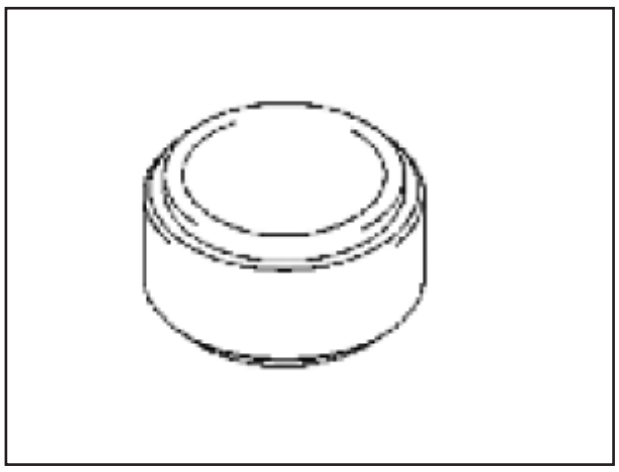
Steering rod bearing remover



Bearing pressor



Steering bearing removin adapter



14.3 Steering bearing removal

- Remove

Front Wheel (see Front Wheel Removal in the Wheels/Tires chapter)
Headlight Assy (see Headlight Removal/ Installation in the Electrical System chapter)
Handlebar (see Handlebar Removal)
Steering Stem Head Bolt Plug [A]
Steering Stem Head Bolt [B] and Washer
Front Fork Clamp Bolts (Upper) [C]. (Loosen)
Steering Stem Head [D].

- Remove

Under Bracket [A] (see Upper Fairing Bracket Removal in the Frame chapter)
Front Forks (see Front Fork Removal in the Suspension chapter)

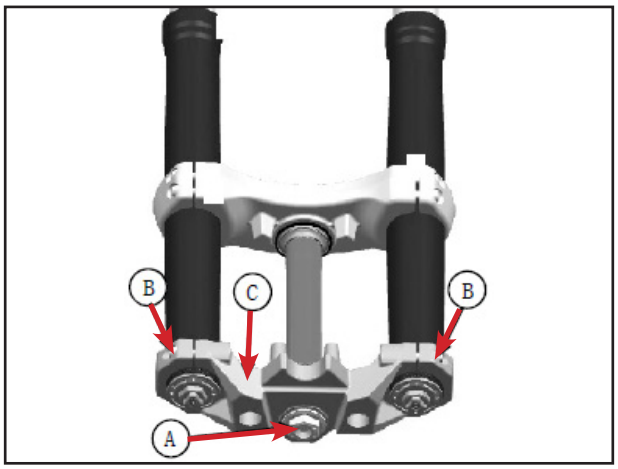
- Bend the claws of the claw washer straighten.
- Remove the steering stem locknut [B] and claw washer [C].
- Pushing up the stem base, and remove the steering stem nut [A] with stem cap [B].

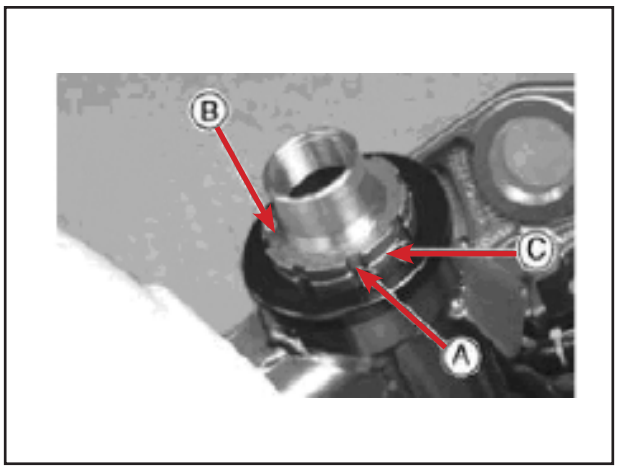
Special Tool - Steering Stem Nut Wrench [C]

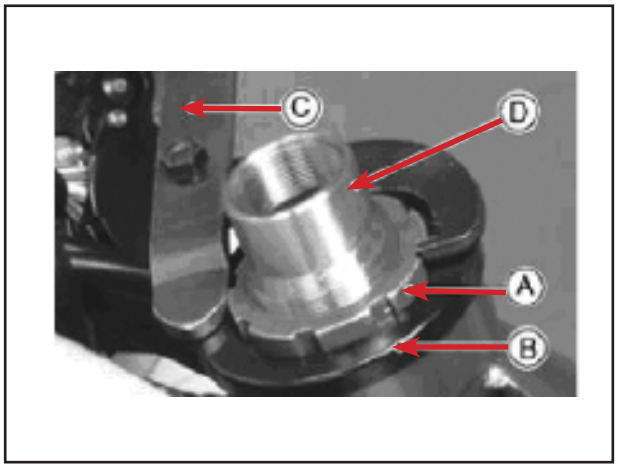
- Remove the steering stem [D] under side.
- Remove the upper stem bearing inner race and bearing.
- To remove the bearing outer races [A] pressed into the head pipe [B], insert a bar [C] into the recesses of head pipe, and ap-plying it to both recess alternately hammer it to drive the race out.

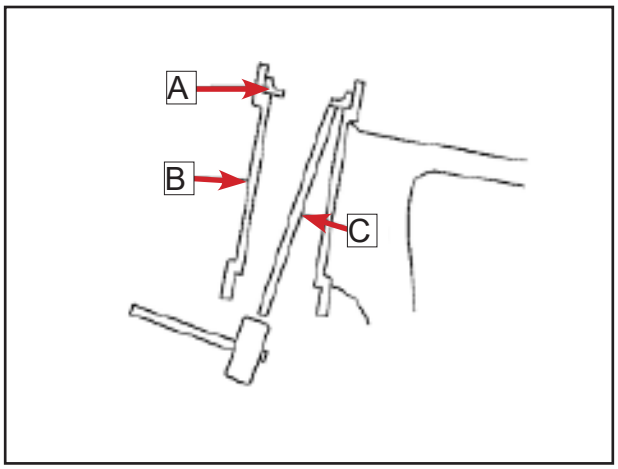
NOTE

If either steering stem bearing is damaged, it is recommended that both the upper and lower bearings (including outer races) should be replaced with new ones.

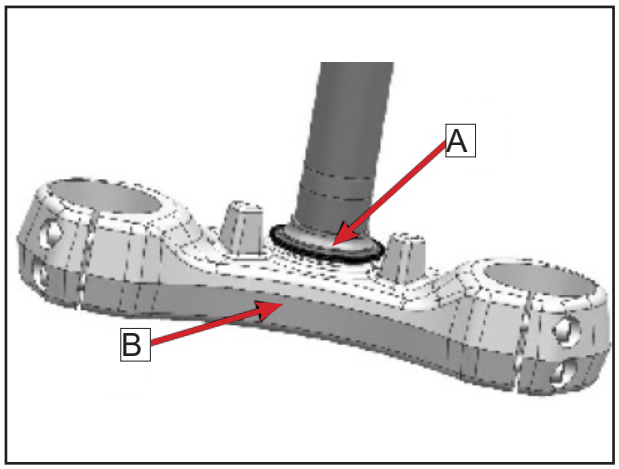








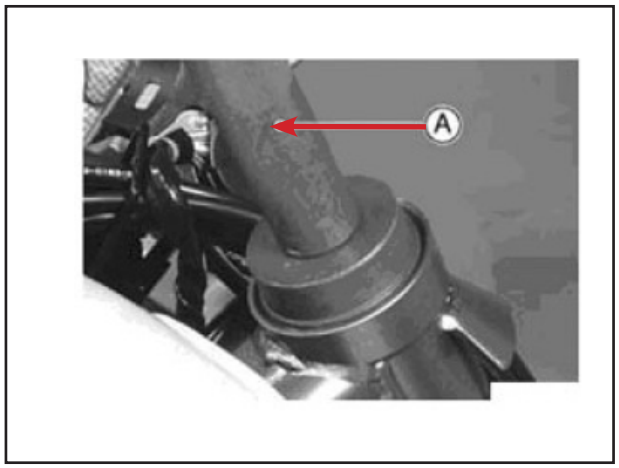
- Remove the lower bearing inner race [A] which is pressed onto the steering stem with a suitable commercially available chisel [B].



14.4 Steering bearing installation

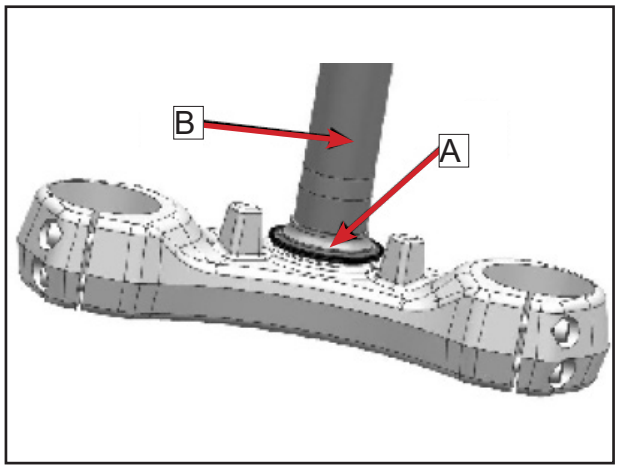
- Replace the bearing outer races with new ones.
- Apply grease to the outer races, and drive them into the head pipe at the same time.

Special Tool-Bearing Driver Set [A]

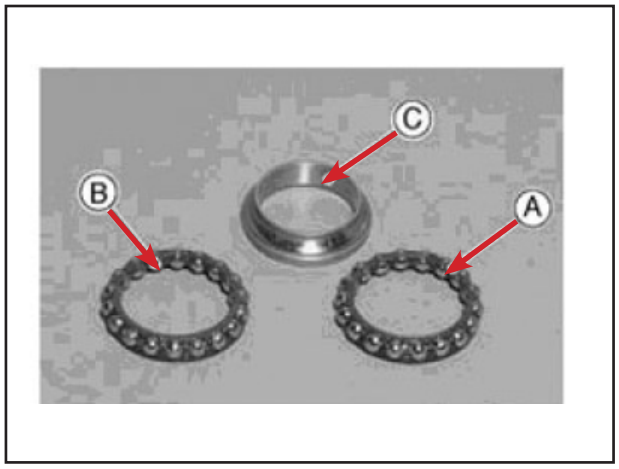


- Replace the bearing inner races and oil seal with new ones.
- Apply grease to the oil seal.
- Drive the lower ball bearing inner race ap-plied the grease onto the stem.

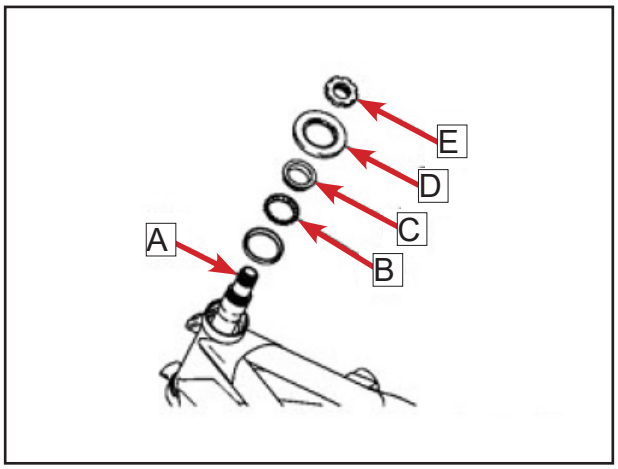
Special Tools-Steering Stem Bearing Driver
Steering Stem Bearing Driver Adapter



- Apply grease to the lower ball bearing [A], and install it onto the stem.
- Apply grease to the upper ball bearing [B] and inner race [C].



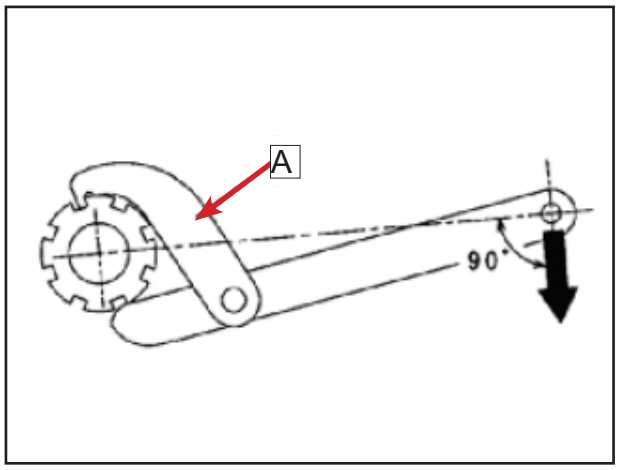
- Install the stem [A] through the head pipe and install the ball bearing [B] and inner race [C] on it.
- Install the stem cap [D] and steering stem nut [E].



- Settle the inner races in place as follows.

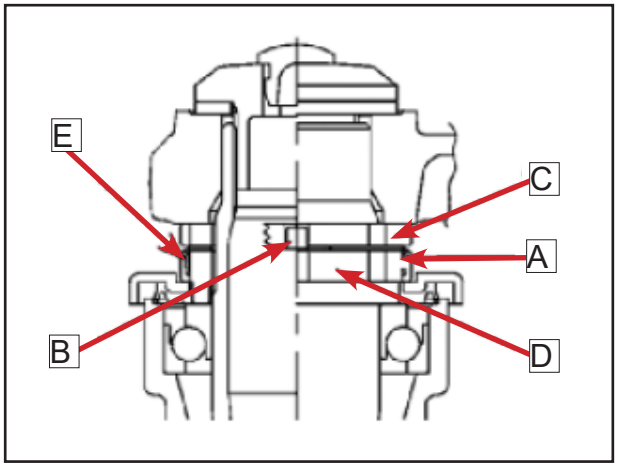
Tighten the steering stem nut with 39N•m(4.0kgf•m,29ft•lb) of torque first, and loosen it a fraction of a turn untilit turns lightly. After-ward tighten it again withspecifi ed torque using a stem nut wrench [A] in the direction shown.

Check that there is no play and the steering stem turns smoothly without rattles. If not, the steering stem bearings may be damaged.



Special Tool-Steering Stem Nut Wrench
Torque-Steering Stem Nut:
20N·m(2.0kgf·m,15ft·lb)

- Install the claw washer [A] so that its bent side [B] faces upward, and engage the bent claws with the grooves of stem locknut [C].
- Hand tighten the stem locknut until it touches the claw washer.
- Tighten the stem locknut clockwise until the claws arealigned with the grooves (ranging from 2nd to 4th) of stem nut [D], and bend the 2 claws downward [E].
- Install the stem head.
- Install the washer, and tighten the stem head bolt with specified torque.
- Install the front forks (see Front Fork Instal-lation in the Suspension chapter).



NOTE

Tighten the upper fork clamp bolts first, next the stem head bolt, last the lower fork clamp bolts.

Tighten the two clamp bolts alternately two times to ensure even tightening torque.

Torque-Front Fork Clamp Bolts (Upper):
20N·m(2.0kgf·m,15ft·lb)
Steering Stem Head Bolt:
108N·m(11. 0kgf·m,80ft·lb)
Front Fork Clamp Bolts (Lower):
20N·m (2.0kgf·m,15ft·lb)

⚠WARNING
Do not impede the handlebar turning by routing the cables, harnesses and hoses improperly.

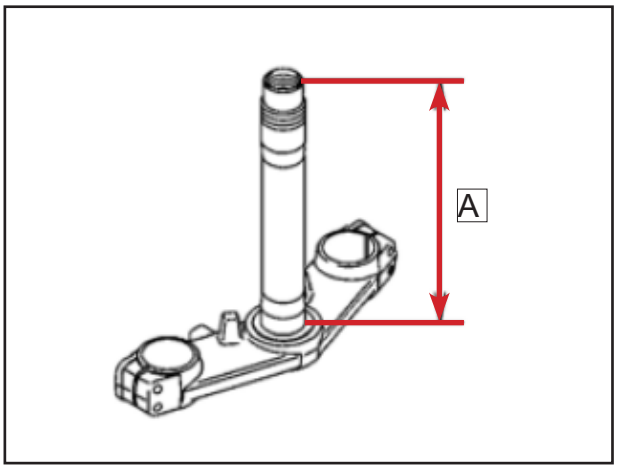
- Install the steering stem head bolt plug.
- Install the removed parts (see appropriate chapters).

14.5 Steering Bearing Lubrication

- Refer to the Steering Stem Bearing Lubri-cation in the Periodic Maintenance chapter.

14.6 Steering Stem Warp

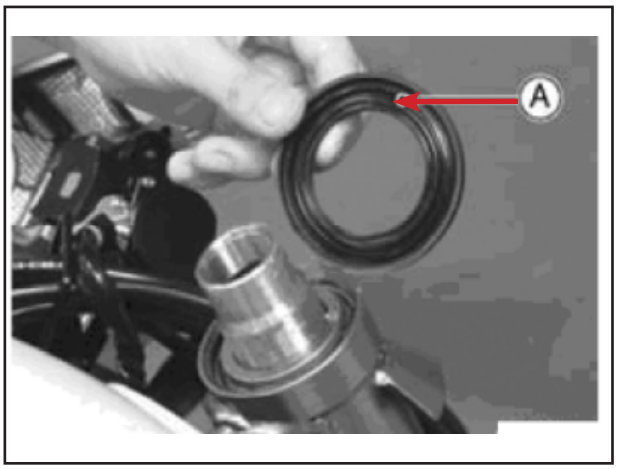
- Whenever the steering stem is removed, or if the steering cannot be adjusted for smooth action, check the steering stem for straightness.



If the steering stem [A] is bent, replace the steering stem.

Steering parts damaged

Replace the stem cap if its oil seal [A] shows damage.

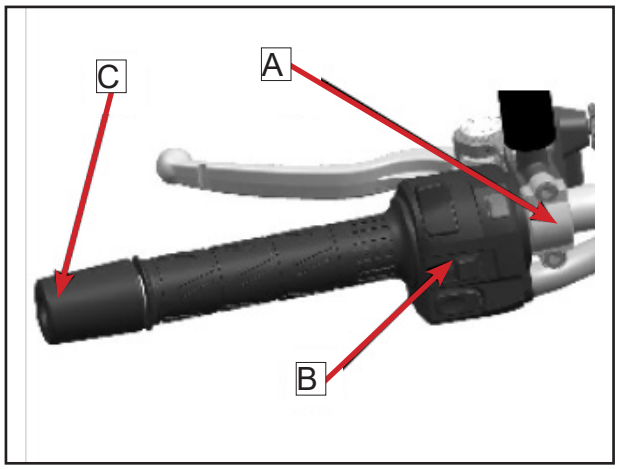


14.7 Handlebar

14.7.1 Handlebar Removal

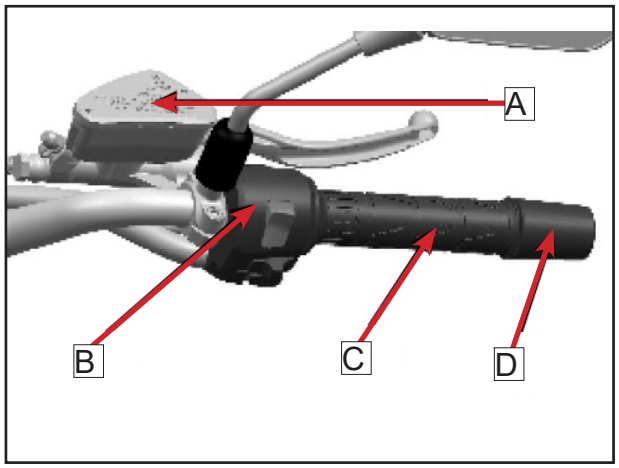
- Remove:

Clutch Lever Assembly [A]
Left Switch Housing [B]
Left Handlebar Weight [C]



- Remove:

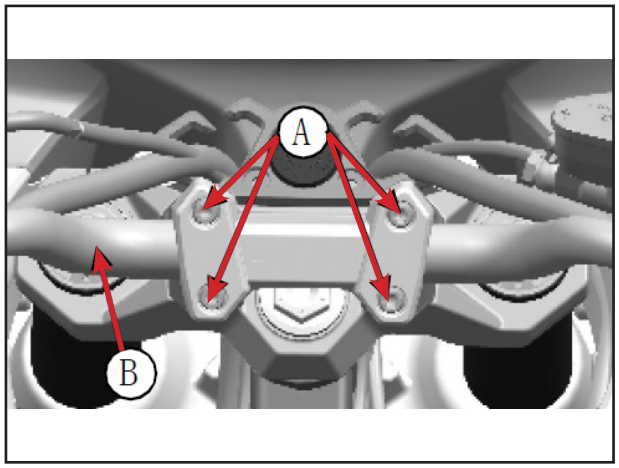
Front Brake Master Cylinder[A]
(see Front Master Cylinder Removal in the Brakes chapter)
Right Switch Housing [B]
Right Handlebar Weight [D]
Throttle Grip [C]



- Remove the handlebar holder bolts [B] and then pull out the handlebar.

14.7.2 Handlebar Installation

Torque - Handlebar Holder Bolts:
25N·m(2.5kgf·m,18ft·lb)

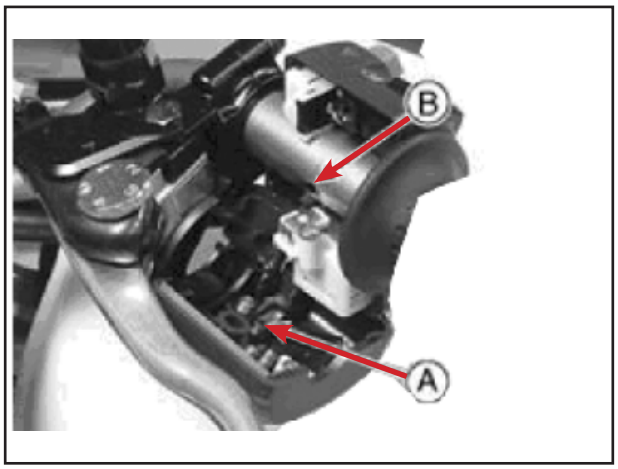


14.8 Clutch lever assy installation

(see Clutch Lever Installation in the Clutch chapter)

- Apply adhesive cement to the inside of the left handlebar grip.
- Apply a non-permanent locking agent to the left handlebar weight bolt.
- Install the left switch housing. Fit the projec-tion [A] into a small hole [B] in the handlebar.

Torque-Left Switch Housing Screws: 3.5N·m(0.36kgf·m,31in·lb)

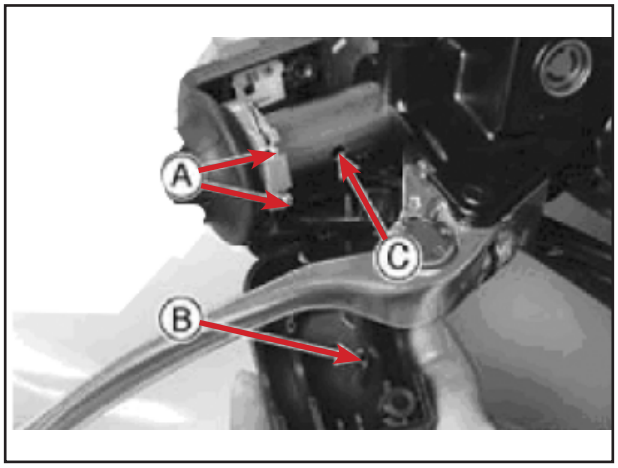


- Install:

Throttle Grip
Throttle Cable Tips [A]
Right Switch Housing
Fit the projection [B] into a small hole [C] in the handlebar.

Torque-Right Switch Housing Screws: 3.5N·m(0.36kgf·m,31in·lb)

- Apply a non-permanent locking agent to the right handlebar weight bolt.
- Install the front brake master cylinder (see Front Master Cylinder Installation in the Brakes chapter).



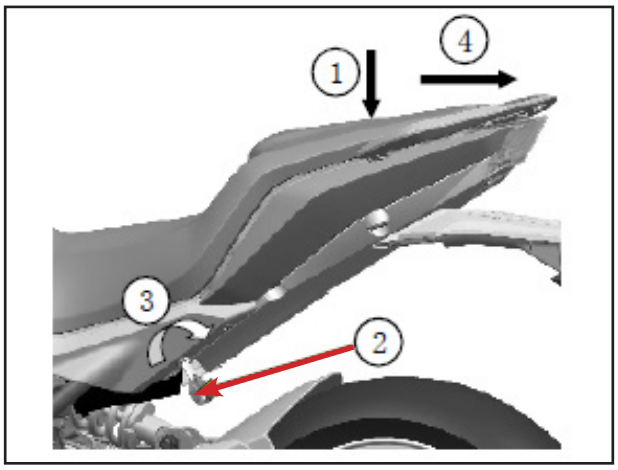
15.1 Seat removal and installation 15-3
15.2 Frame plate removal and installation 15-3
15.3 Seat side plate removal and installation 15-4
15.4 Seat lock removal and installation..... 15-5
15.5 Fuel tank side plate removal and installation 15-6
15.6 Radiator front plate removal and installation 15-6
15.7 Reservior side plate removal and installation 15-7
15.8 Inner plate removal and installation 15-8
15.9 Windshield removal and installation 15-8
15.10 Head light upper cover removal and installation 15-9
15.11 Head cover removal and installation 15-9
15.12 Front lower plate removal and installation. 15-10
15.13 Front and rear steering light removal and installation (LH). . 15-10
15.14 Front plate removal and installation Front plate LH removal 15-10
15.15 Steering light mounting bracket removal and installation 15-11
15.16 Headlight removal and installation 15-11
15.17 Dashboard removal and installation..... 15-11
15.18 Dashboard cover removal and in-stallation..... 15-12
15.19 Rediator rear side plate removal and installation. 15-12
15.20 Radiator rear mid plate removal and installation 15-13
15.21 Front fender removal and installa-tion 15-13
15.22 Engine side plate removal and in-stallation..... 15-13
15.23 Rear rocker arm fender removal and installation..... 15-14
15.24 Rear handlebar removal and instal-lation 15-14
15.25 Taillight side plate removal and installation 15-15
15.26 Taillight removal and installation..... 15-15
15.27 Rear fender removal and installation 15-15
15.28 Frame bottom plate removal and installation 15-16
15.29 Fuel tank removal and installation..... 15-16

15.30 Rearview mirror removal and in-stallation..... 15-16
15.31 Frame inspection..... 15-17

15.1 Seat removal and installation

Seat removal

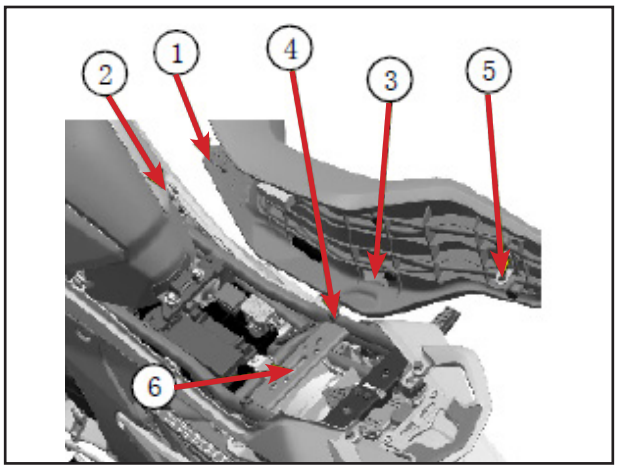
- Press the seat by following the arrow [1] direction.
- Use the key to turn the seat lock [2] by following the arrow [3] direction.
- Pull out the seat pad by following the arrow [4] direction.



Seat installation

- Put point [1] to point [2](LH & RH)
- Put point [3] into point [4] (LH & RH)
- Lock the hook[5] into the lock [6].Until you heard the click sound.

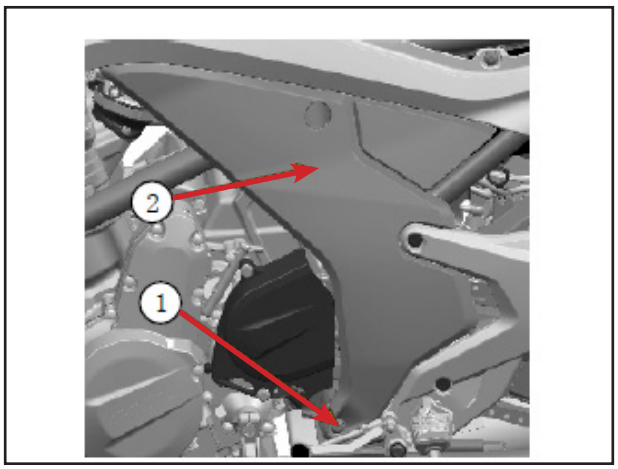
Note: After installed the seat. Shake the seat to make sure it is tight enough.



15.2 Frame plate removal and installation

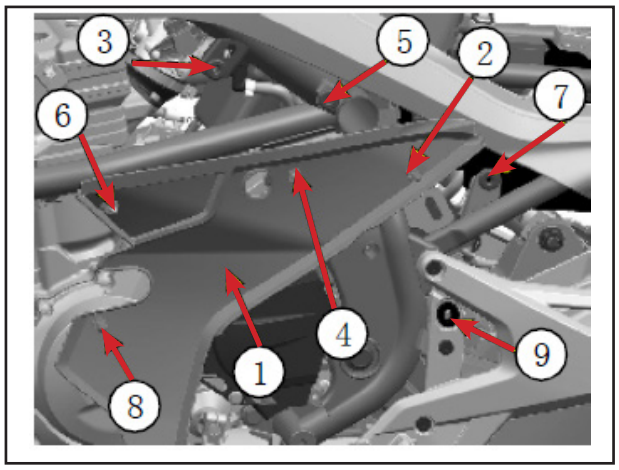
Frame plate LH remova

- Remove locking screw[1]
- Pull the plate[2] to remove it.



Frame panel LH installation

- Insert the plate[1] point [2] into point [3]
- Point [4] to point [5]
- Point [6] to point [7]
- Point [8] to point [9]
- Tight the mounting screw

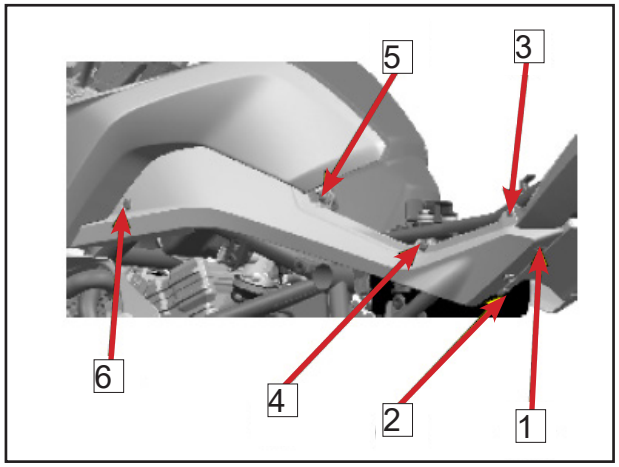


Note: The frame panes RH use the same way installation removal with the LH.

15.3 Seat side plate removal and installation

Seat side plate LH removal

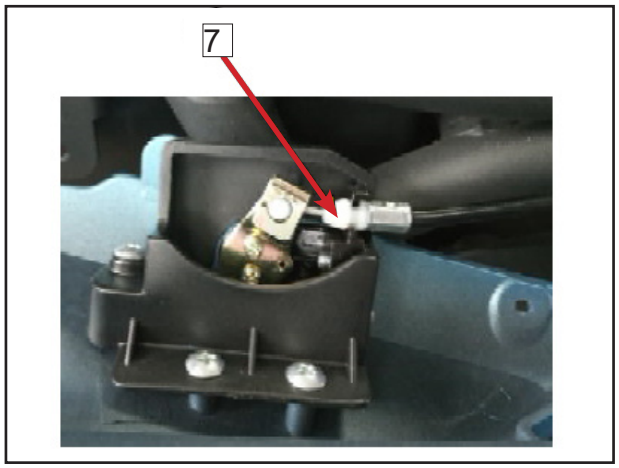
- Remove the seat(Refer to 15-2)
- Remove the frame side plate LH(Refer to 15-2)
- Remove the screw [1]
- Remove the clip [2]
- Remove the screw [3]
- Remove the bolt [4]
- Remove tighten bolt [5]
- Remove the bolt [6]
- Remove the seat cable [7]
- Remove the seat side plate



Seat side plate LH installation

- Reverse the removal prodedure for installation

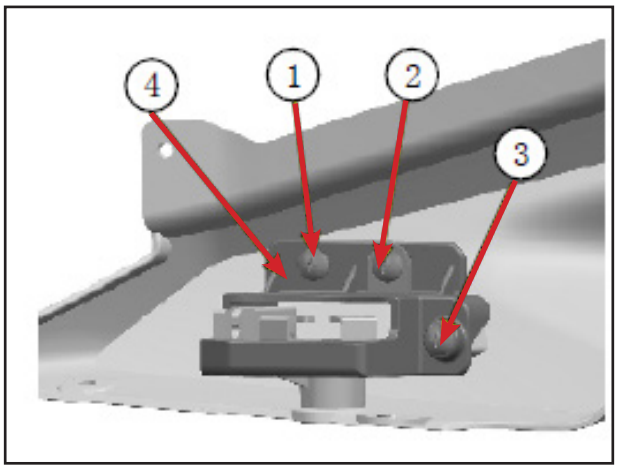
Note: The seat side plate RH Use the same method for installation and removal With out seat cable removal.



15.4 Seat lock removal and installation

Seat lock cover removal

- Remove seat side plate LH(See 15-3)
- Remove the screw[1]
- Remove the screw[2]
- Remove the screw[3]
- Remove the seat lock cover[4]

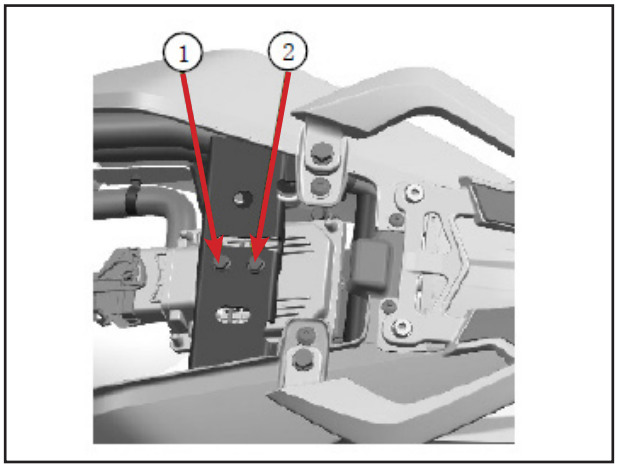


Seat lock installation

- Reverse the removal proce-dure for installation

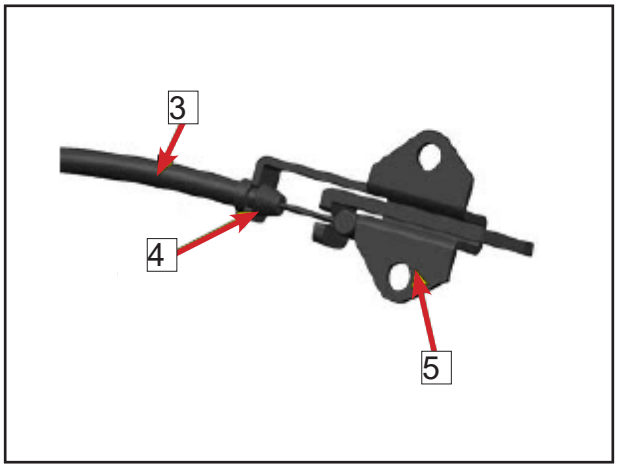
Seat lock bracket removal

- Remove seat locking bolt[1]
- Remove seat locking bolt[2]
- Put the seat bracket out from the clearance. Take out the cable [3] from the hook [4].
- Remove the seat bracket [5]



Seat lock bracket installation

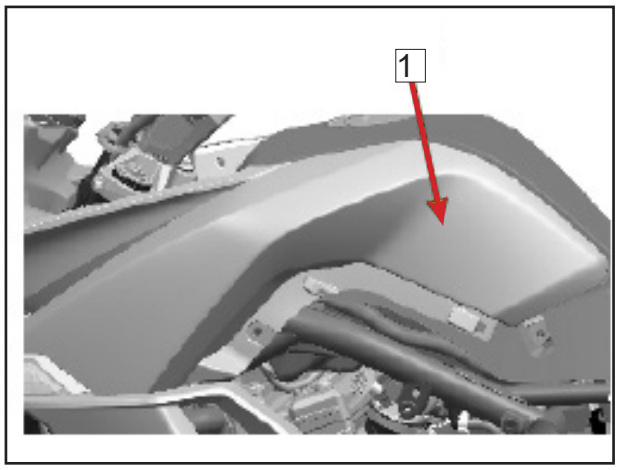
- Reverse the removal proce-dure for installation.



15.5 Fuel tank side plate removal and installation

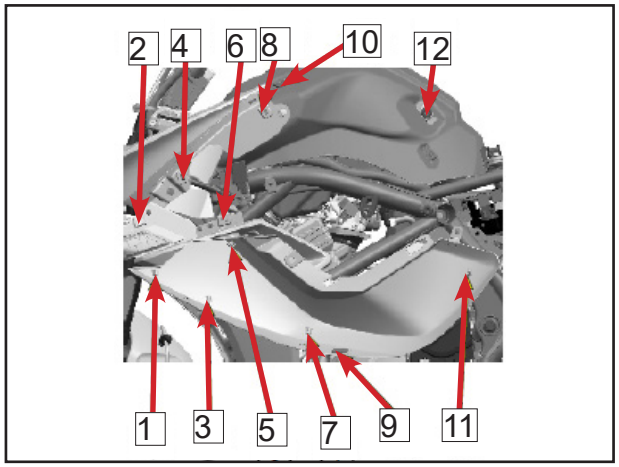
Fuel tank side plate LH removal

- Remove the seat side plate LH (See 15-3)
- Pull the plate [1] out.



Fuel tank side plate LH installation

- Point [1] into hole [2]
- Point [3] into hole [4]
- Point [5] into hole [6]
- Point [7] into hole [8]
- Paste point [9] and [10] to-gether
- Insert point [11] into tank hole [12]

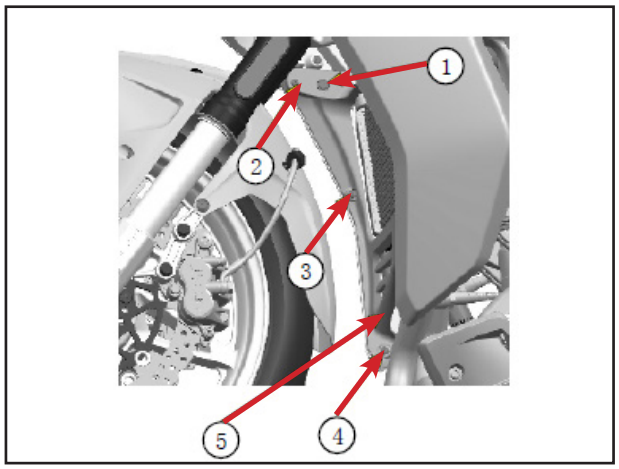


Note: The fuel tank side plate RH use same removal and installation method with the LH.

15.6 Radiator front plate removal and installation

Radiator front plate removal

- Remove fuel tank side plate(see 15-5)
- Remove the clip [1] (Both sides)
- Remove the locking screw[2](Both sides)
- Remove the locking screw[3](Both sides)
- Remove the locking screw[4](Both sides)
- Remove reservior front plate [5]



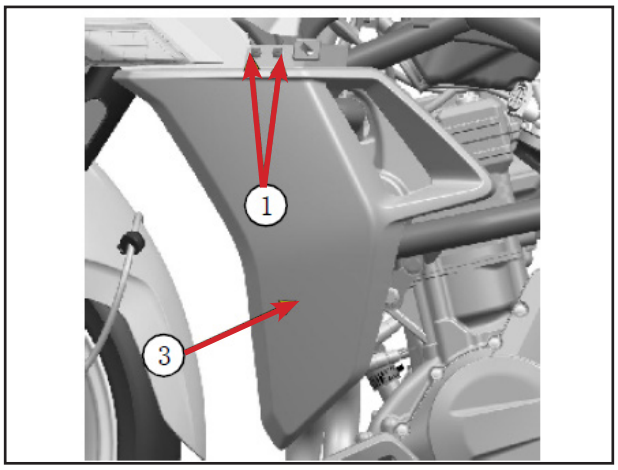
Radiator front plate installation

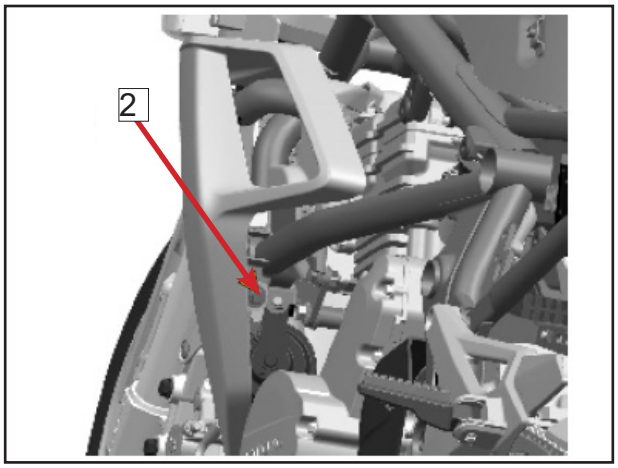
- Reverse the removal proce-dure for installation

15.7 Reservior side plate removal and installation

Reservior side plate LH removal

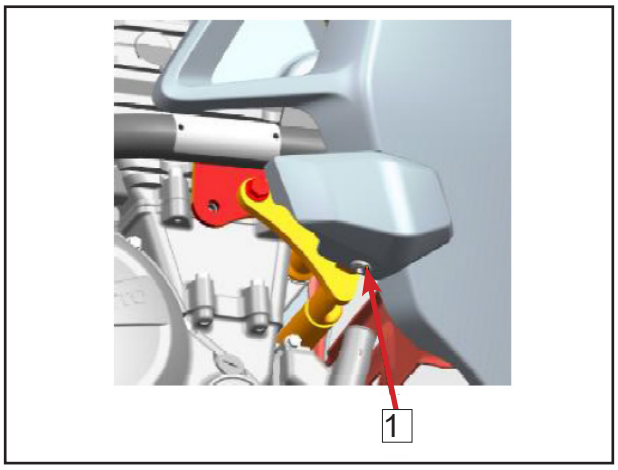
- Remove reservior front plate(see 15-6)
- Remove two locking screws[1]
- Remove the locking screw [2]
- Remove the reservior side plate LH [3]





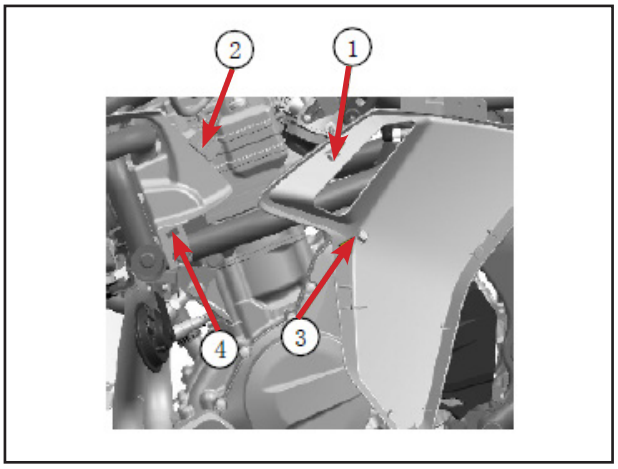
Reservior side plate RH removal

- Remove the reservior front plate(See 15-6)
- Remove the locking bolt [1]
- Other steps are the same as the LH.



Reservior side plate LH installation

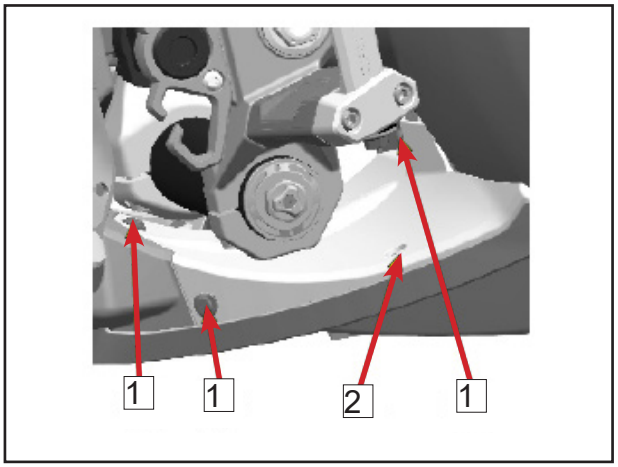
- Insert point [1] to hole [2]
- Insert point [3] to hole [4]
- Install 2 screws and one bolt then tight up.(See 15-6 removal procedure)



15.8 Inner plate removal and installation

LH inner plate removal

- Remove 3 clips[1]
- Remove screw [2]
- Remove the LH inner plate



LH inner plate installation

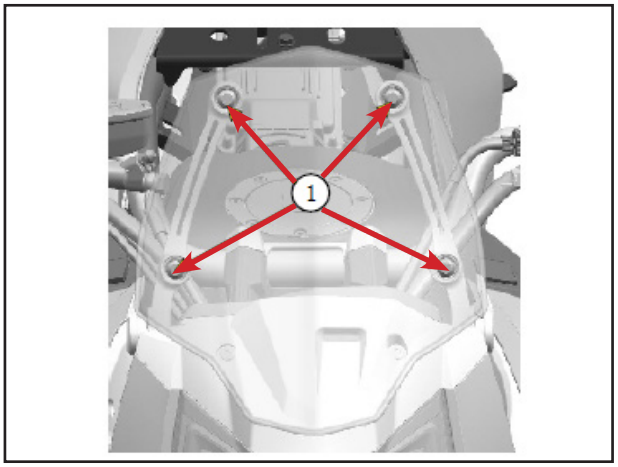
- Reverse the removal proce-dure for installation

Note:RH inner plate use the same method to removal and installation.

15.9 Windshield removal and installation

Windshield removal

- Loose 4 screws [1] up
- Remove the windshield



Windshield installation

- Reverse the removal proce-dure for installation.

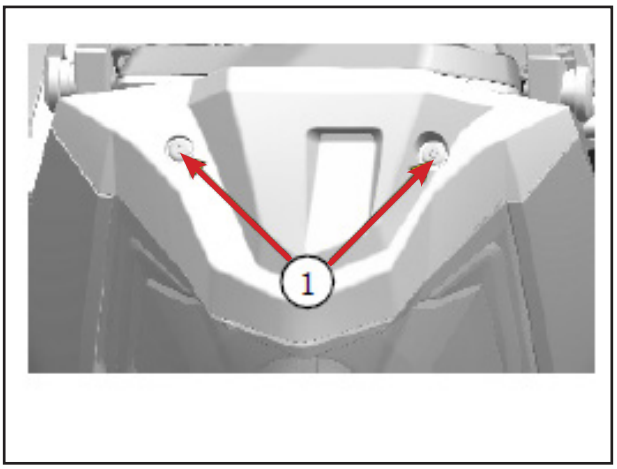
15.10 Head light upper cover removal and installation

Headlight upper cover removal

- Remove the windshield(See 15-7)
- Remove 2 plastic clips [1]
- Remove the headlight upper cover

Headlight upper cover installation

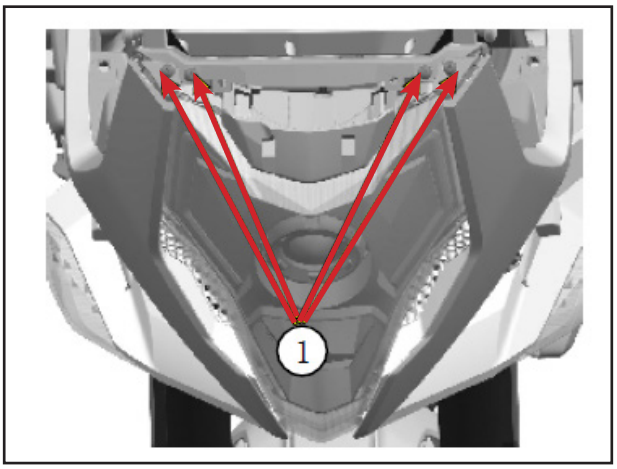
- Reverse the removal proce-dure for installation



15.11 Head cover removal and installation

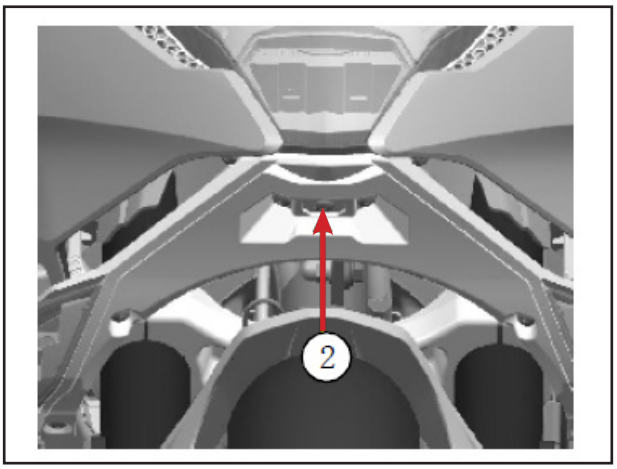
Headcover removal

- Reservior side plate(See 15-6)
- Remove inner side plate(See 15-7)
- Remove the headlight upper cover(See 15-8)
- Remove 4 screws [1]
- Remove screw [2]
- Remove 4 tighten bolt [3](Both sides)
- Remove the head cover.

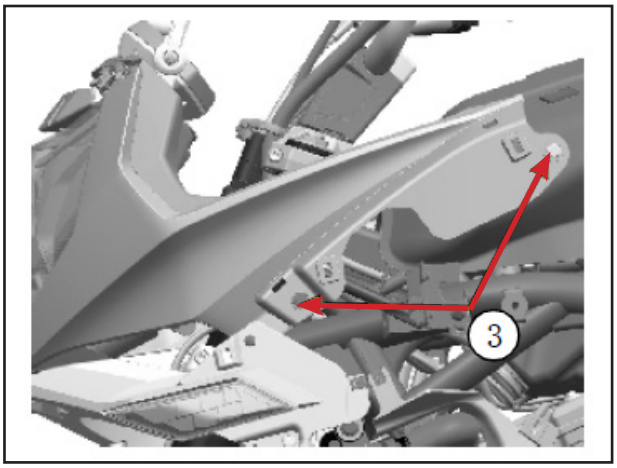


Head cover installation

- Reverse the removal proce-dure for installation



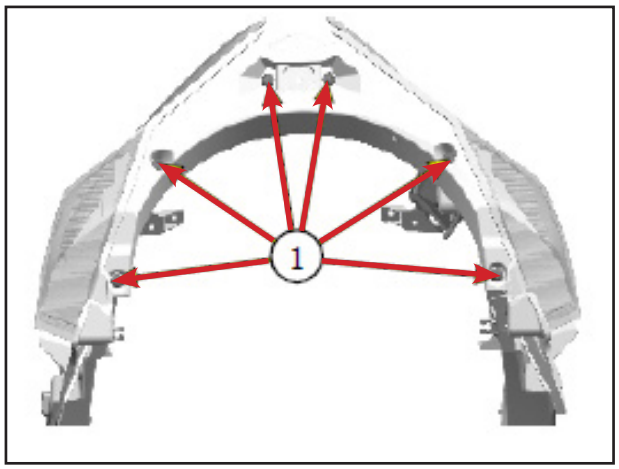
Note: The head cover including the cover, front plate LH & RH, Steering light connecting plate, Front lower plate and steering light.



15.12 Front lower plate removal and installation.

Front lower plate removal

- Remove the head cover(See 15-8)
- Loose 6 screws [1]
- Remove the plate



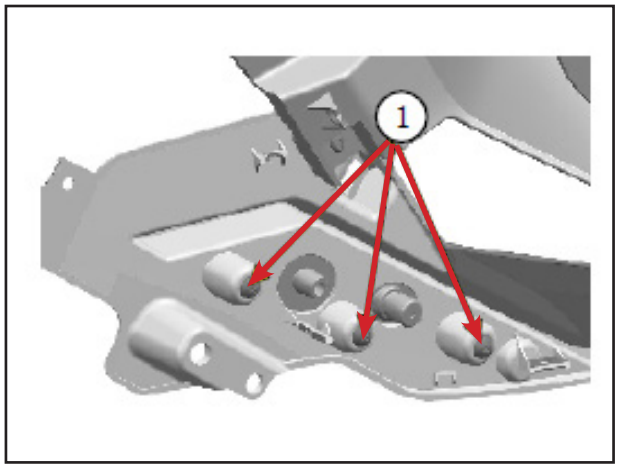
Front lower plate removal

- Reverse the removal procedure for installation.

15.13 Front and rear steering light removal and installation (LH).

Front steering light removal(LH)

- Remove the front plate(See 15-9)
- Remove 3 screws [1]
- Remove front steering light(LH)



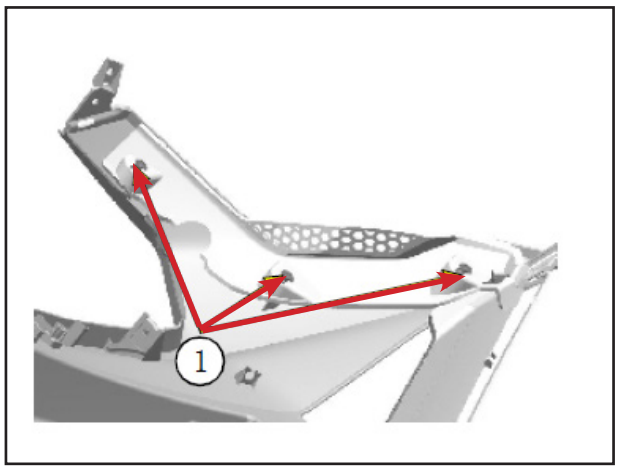
Front steering light installation(LH)

- Reverse the removal procedure for installa-tion

Note: Front steering light(RH) use same method of removal and instal-lation with LH. It is unnecessary to remove the head cover when working.

15.14 Front plate removal and installation Front plate LH removal

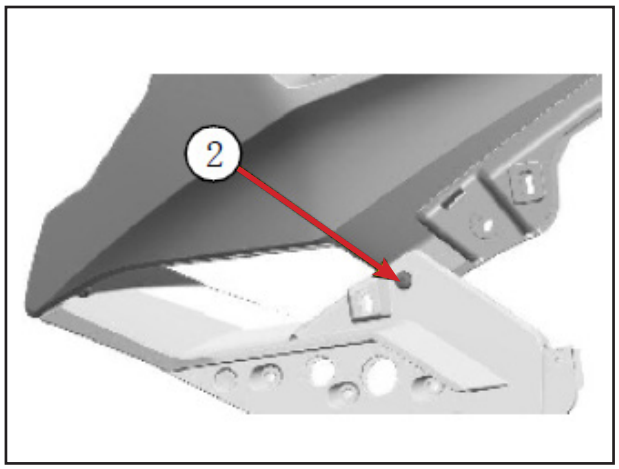
- Remove front lower plate(See 15-9)
- Loose 3 screws [1]
- Loose 1 screw [2]
- Remove front plate LH



Front plate LH installation

- Reverse the removal procedure for installation.

Note: The front plate RH use the same method for removal and installation in symmertrical direction.



15.15 Steering light mounting bracket removal and installation

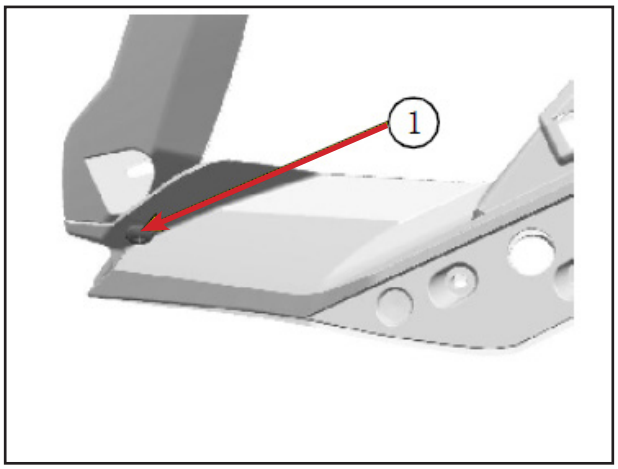
Steering light mounting bracket LH removal

- Remove front cover LH(See 15-9)
- Remove plastic clip[1]
- Remove steering light mounting bracket LH

Steering light mounting bracket LH installation

- Reverse the removal proce-dure for installation

Note: Steering light mounting bracket RH use the same method of removal and installation as the LH in symmertrical way.



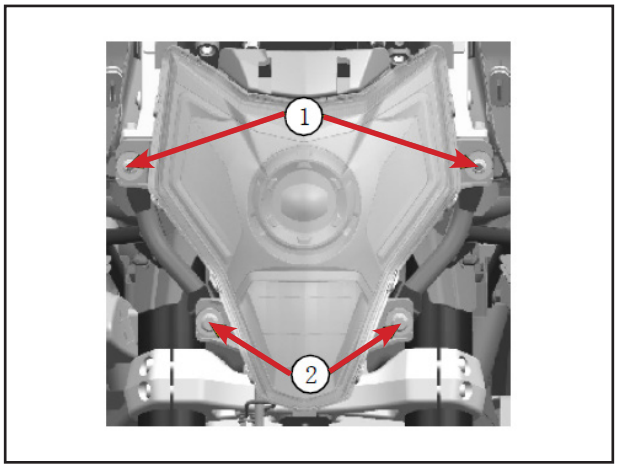
15.16 Headlight removal and installation

Headlight removal

- Remove the head cover(See 15-8)
- Remove 2 nuts [1]
- Remove 2 tighten bolts [2]
- Remove the headlight assy

Headlight installation

- Reverse the removal proce-dure for installation



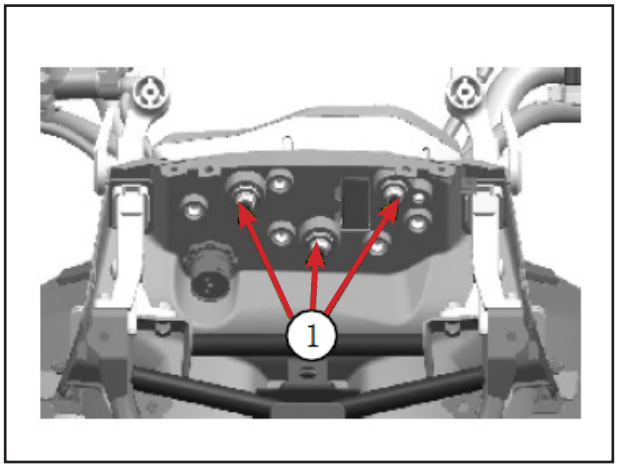
15.17 Dashboard removal and installation

Dashboard removal

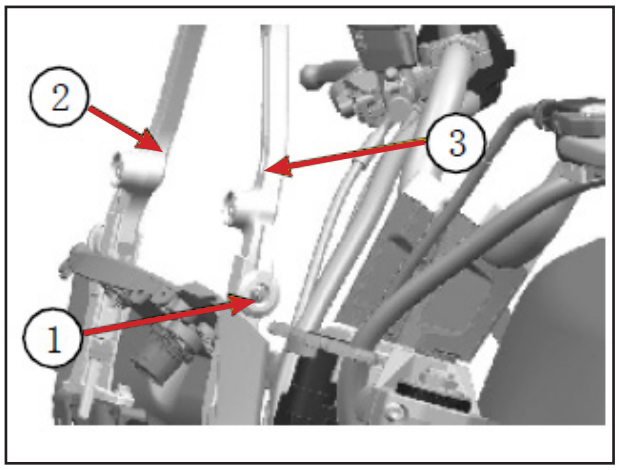
- Remove the headlight assy(See 15-10)
- Unplug the dashboard(See chap 16)
- Remove 3 locking nut [1]
- Remove the dashboard.

Dashboard assembly

- Reverse the removal proce-dure for installation

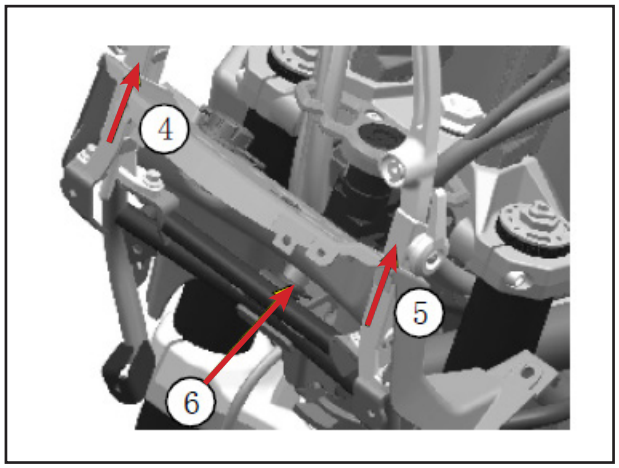


15.18 Dashboard cover removal and in-stallation



Dashboard cover removal

- Remove the screw [1](Both sides)
- Remove windshield left moving rod[2]
- Remove windshield right moving rod[3]
- Follow [4] and [5] direction to pull out the point[6]
- Remove the dashboard cover



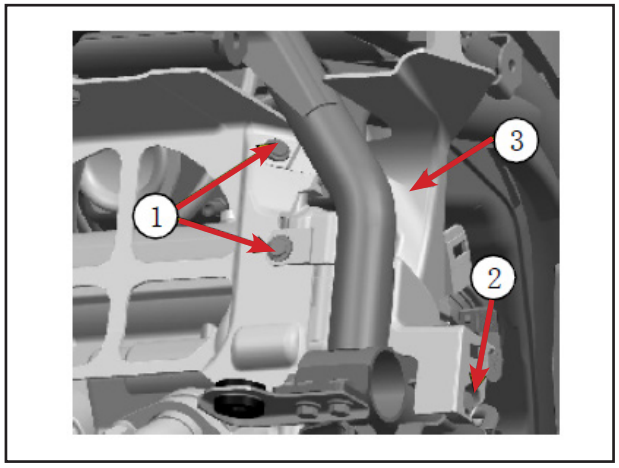
Dashboard cover installation

- Reverse the removal procedure for installa-tion

15.19 Rediator rear side plate removal and installation.

Rediator rear side plate LH removal

- Remove rediator and fan(See chapter 04)
- Remove 2 plastic clips[1]
- Loose tighten bolt[2]
- Remove reservior side plate LH[3]



Rediator rear side plate LH installa-tion

- Reverse the removal procedure for installation.

Note: The reservior rear side plate RH use the same method to removal and installation in symmertrical direction.

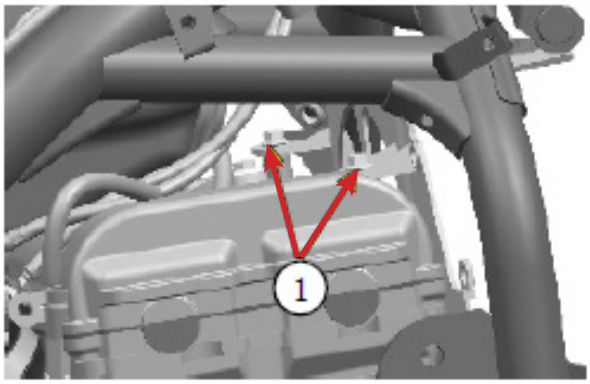
15.20 Radiator rear mid plate removal and installation

Radiator rear mid plate removal

- Remove the radiator side plate(both sides)(See 15-11)
- Remove tighten bolts [1]
- Remmove radiator rear mid plate.

Radiator rear mid plate installation

- Reverse the removal proce-dure for installation



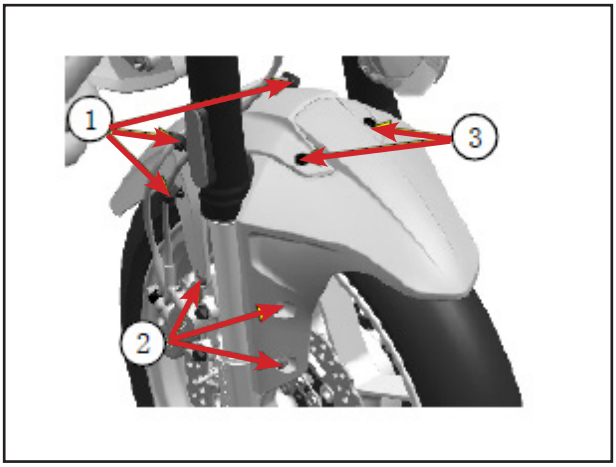
15.21 Front fender removal and installa-tion

Front fender removal

- Remove 3 line holder [1]
- Remove 6 screws [2](Both sides)
- Remove plastic clips[3]
- Remove front fenders

Front fender installation

- Reverse the removal proce-dure for installation



15.22 Engine side plate removal and in-stallation

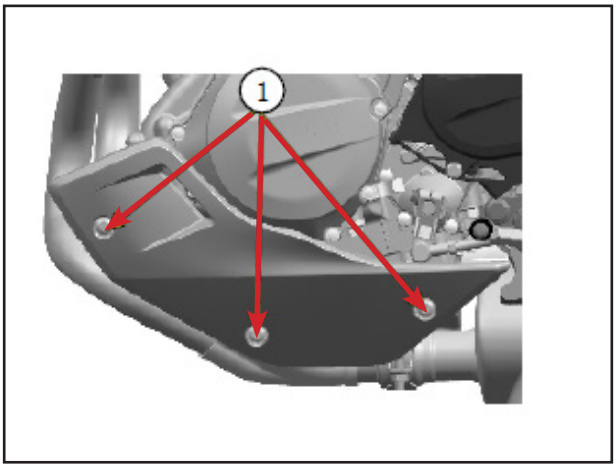
Engine side plate LH removal

- Loose up 3 screws [1]
- Remove the engine side plate LH

Engine side plate LH installation

- Reverse the removal proce-dure for installation.

Note: Engine side plate RH re-moval and installation is the same as LH.



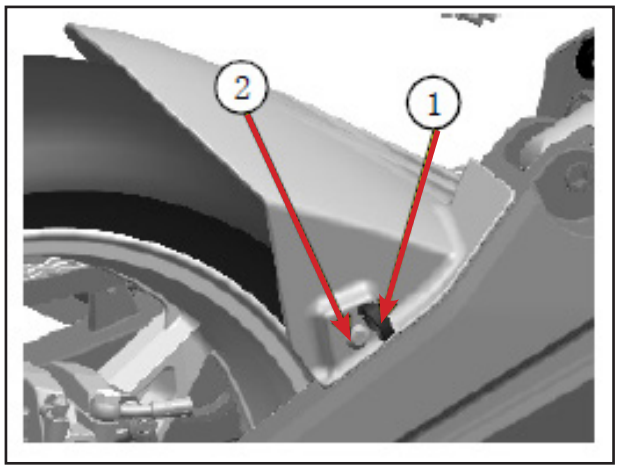
15.23 Rear rocker arm fender removal and installation

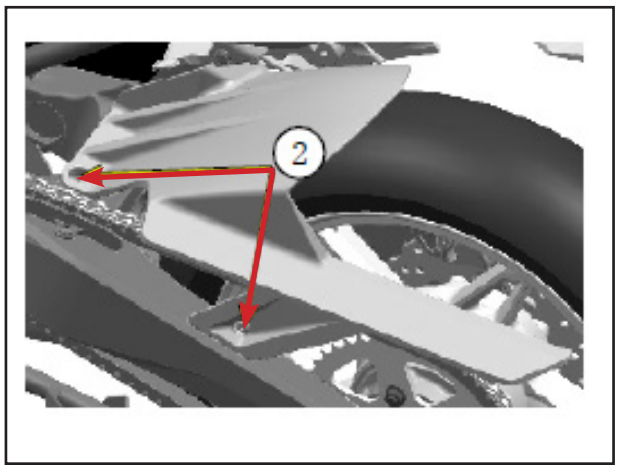
Rear rocker arm fender removal

- Unplug the line holder [1]
- Loose 3 screws[2] up
- Remove the fender

Rear rocker arm fender installation

- Reverse the removal procedure for installation.





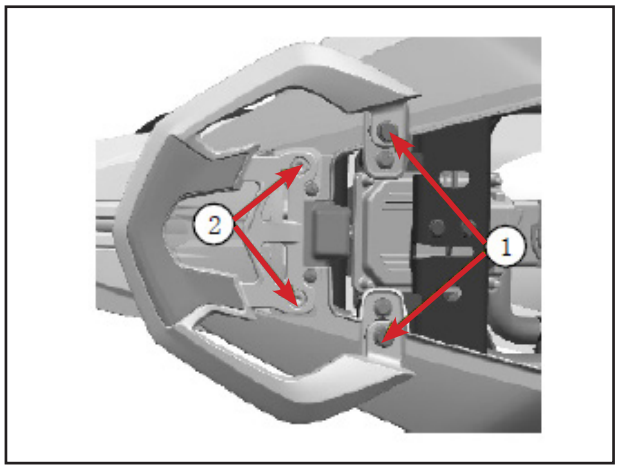
15.24 Rear handlebar removal and instal-lation

Rear handlebar removal

- Remove the seat(See 15-2)
- Remove two tighten screws[1]
- Loose 2 screws [2] up
- Remove the handlebar

Rear handlebar installation

- Reverse the removal procedure for installation.



15.25 Taillight side plate removal and installation

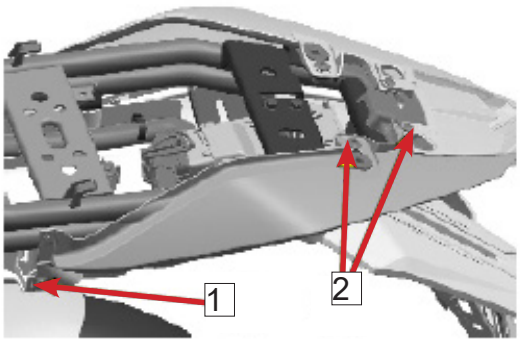
Taillight side plate LH removal

- Remove the rear handle bar(See 15-13)
- Remove the plastic clip [1]
- Loose 2 screws up [2]
- Remove taillight side plate

Taillight side plate LH installation

- Reverse the removal proce-dure for installation.

Note: Taillight side plate RH use the same method removal and installation with LH in symmertrical direction.



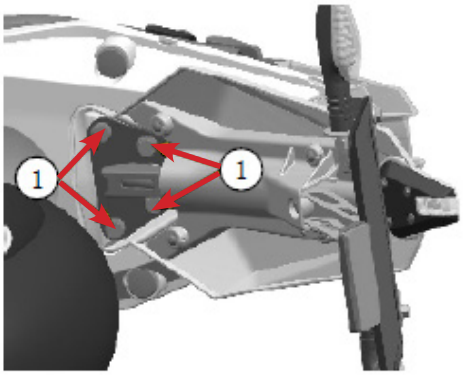
15.26 Taillight removal and installation

Taillight removal

- Remove taillight side plates (See 15-14)
- Remove 2 plastic clips[1]
- Disconnect the connector
- Remove the taillight

Taillight installation

- Reverse the removal proce-dure for installation



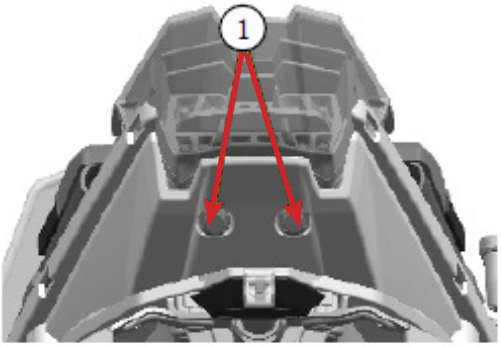
15.27 Rear fender removal and installation

Rear fender removal

- Remove the seat pad(See 15-2)
- Disconnect the rear steering light(both sides) and the licence light
- Remove 4 tighten bolt from the bottom [1]
- Remove the rear fender

Rear fender installation

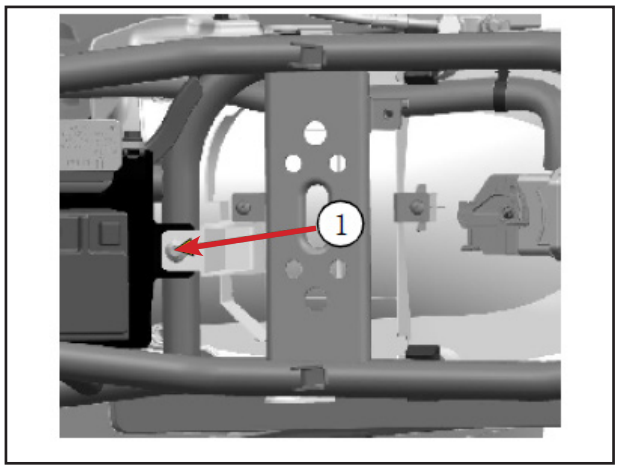
- Reverse the removal proce-dure for installation



15.28 Frame bottom plate removal and installation

Frame bottom plate removal

- Remove the taillight(See 15-14)
- Remove rear fender(See 15-14)
- Remove the screw [1]
- Frame bottom plate



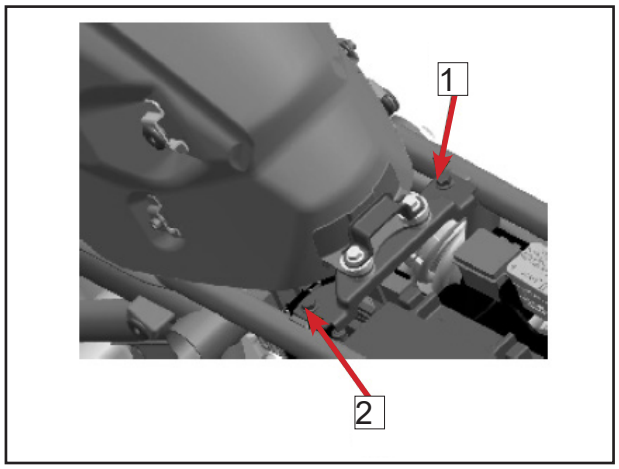
Frame bottom plate installation

- Reverse the removal procedure for installa-tion

15.29 Fuel tank removal and installation

Fuel tank removal

- Remove the seat(See 15-2)
- Remove related covering parts (See 15-3, 15-5)
- Remove mounting bolt [1] [2]
- Disconnect fuel sensor connector
- Disconnect fuel pump connector
- Remove fuel hose.
- Pull out the fuel tank



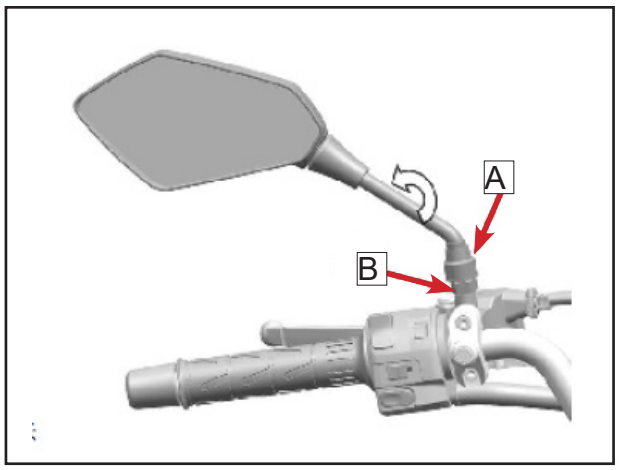
Fuel tank installation

- Reverse the removal procedure for installa-tion

15.30 Rearview mirror removal and in-stallation

Rearview mirror removal

- Push the dust boot[A] out to shows up the adjusting nut [B].
- Loose the adjusting nut [B]
- Loose the mirror rod to remove the mirror.



Rearview mirror installation

- Reverse the removal procedure for installa-tion

(Becareful with the safty angle)

Note: The drawing shows the rearview mirror LH. RH is the same.

15.31 Frame inspection

- Inspect the frame to see the cracks, hurt, bent or other damage.

If any damaged inspected on the frame. Replace the frame.

⚠Warning
Repaired frame may be defect on driving. And may cause accident. If any damage inspect on the frame. Replace the frame into new one.

16.1 Electric system form 16-2
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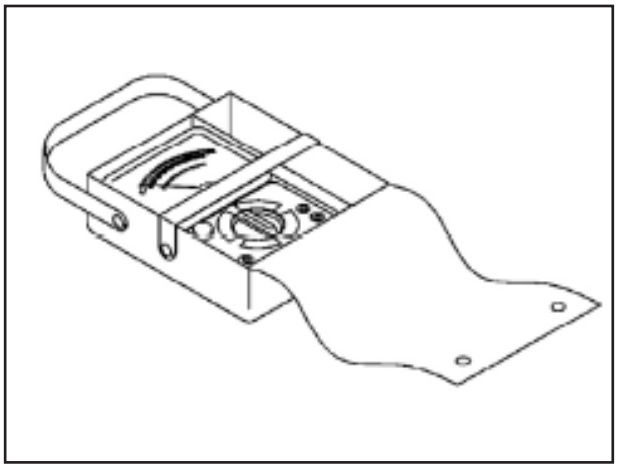
16.1 Electric system form

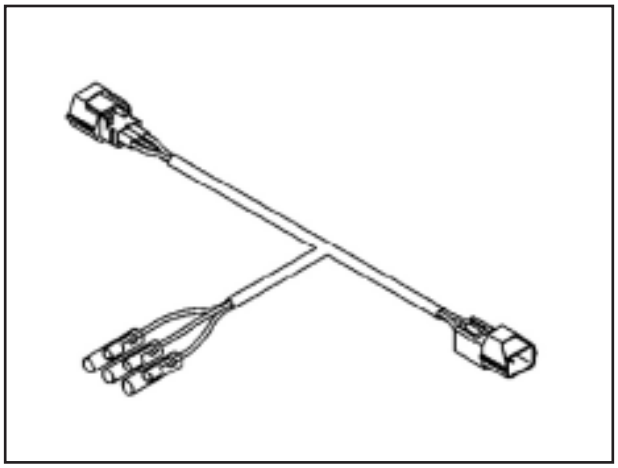
Item	Standard
Battery	
Style	Full sealed battery
Model	YTX12-BS
Capacity	12V10Ah
Voltage	12.8Vor higher
Charging system	
Style	AC 3-phase
Magneto output voltage	4000r/min (rpm) 42V or higher
Stator coil resistance	0.18Ω~0.27Ω
Charging voltage	14.2V~15.2V
Ignition system	
CPS resistance	260Ω~300Ω
CPS peak voltage	1.9V or higher
First level coil resistance	1.1Ω~1.5Ω
Secondary coil resistance	10.816kΩ
First level coil resistance	88V or higher
Spark plug	
Spark clearance	0.8mm~0.9mm(0.03in-0.04in)
Start system	
Start motor：	
Brush length	12mm(0.47in)(Service limit:6.0mm,0.24in)
Commutator diameter	28mm(1.10in)(Service limit:27mm,1.06in)
Switch and sensor	
Rear breaking light switch	Pedal clearance 10mm(0.39in) then on
Oil pressure switch	Engine stop:ON Engine running:OFF
Thermo sensor resistance	See below

16.2 Special tool

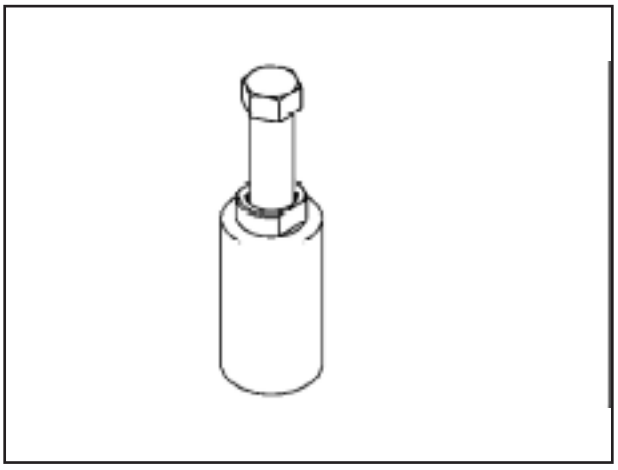
AVO meter



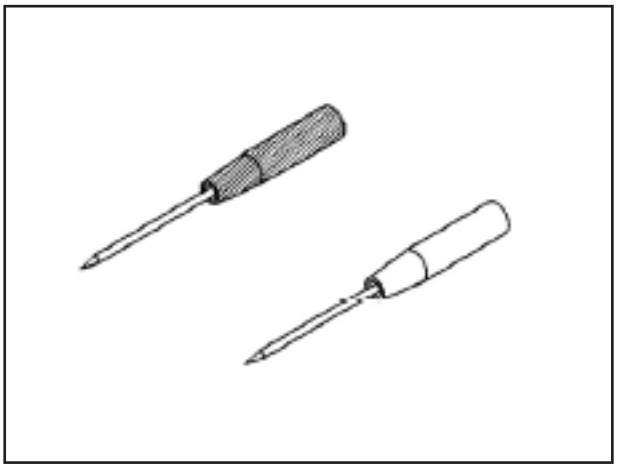
Auxilary testing line



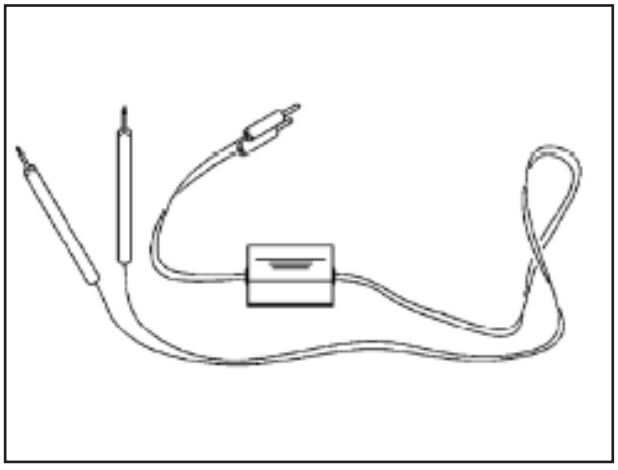
Magneto rotor puller



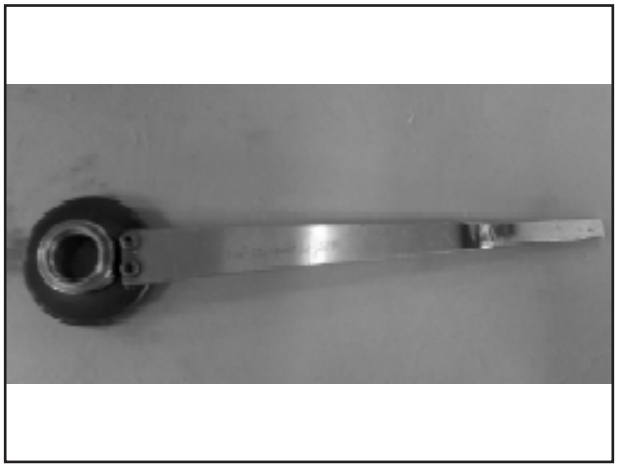
Pin fitter



Peak voltage tester

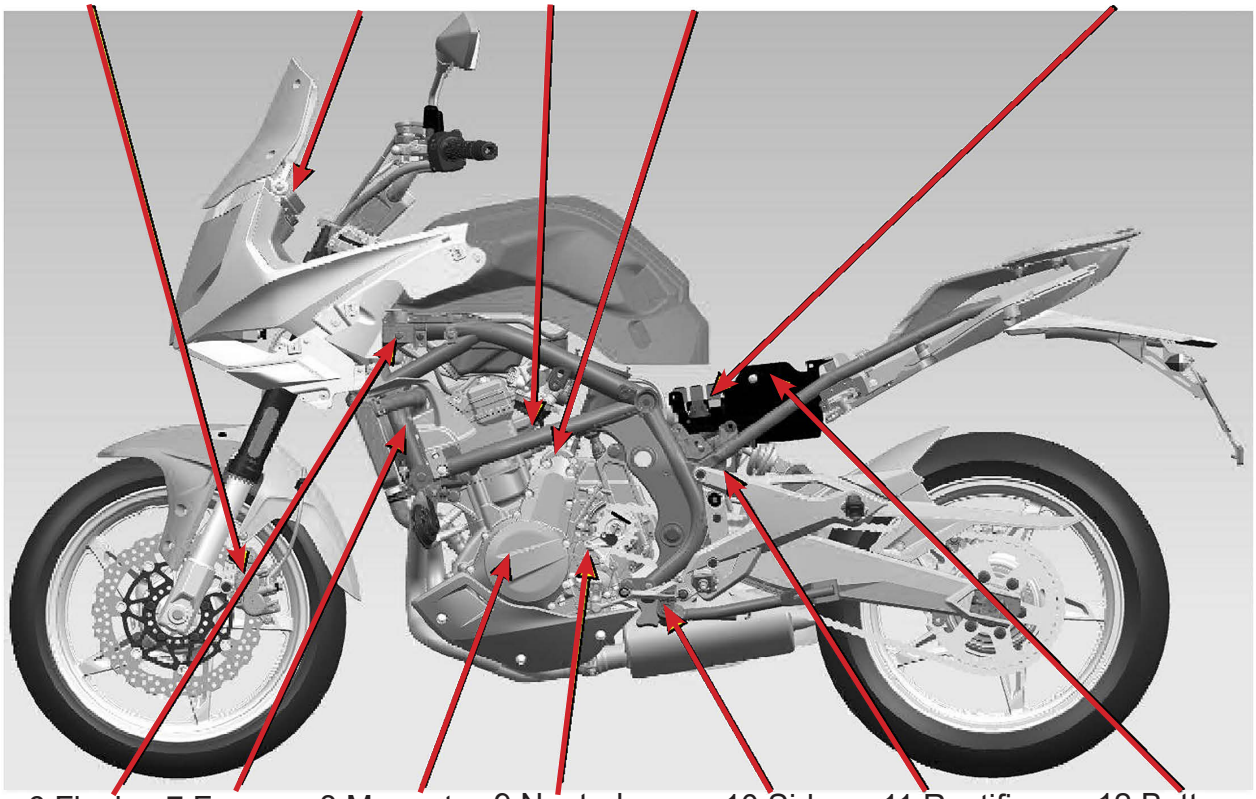


Magneto rotor locking wrench



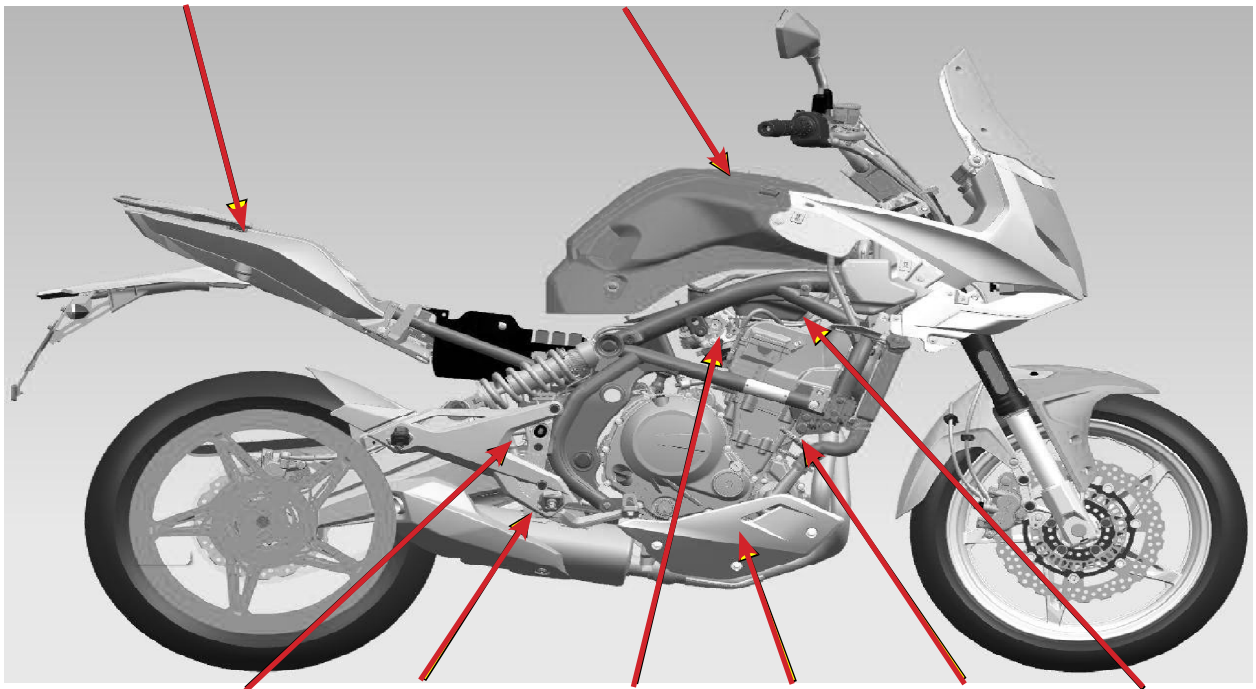
16.3 Part position

4.Speed sensor 1.Dash-board 2.Thermosensor3.Start motor 5.Start relay



6.Flash relay 7.Fan motor 8.Magneto 9.Neutral switch 10.Side stand switch 11.Rectifier 12.Battery

13.ECU 14.Fuel pump



15.Breaking light switch 16.Rollover sensor 17.Throttle body 18.CPS 19.Oxygen sensor 20.Ignition coil

Electric system
Part position

1.Dashboard
2.Thermosensor
3.Startmotor
4.Speed sensor
5.Start relay
6.Flasher
7.Fan motor
8.Magneto
9.Neutral switch
10.Side stand switch
11.Rectifie
12.Battery
13.ECU
14.Fuel pump In tank
15.Breaking light switch
16.Rollover sensor
17.Throttle body
18.CPS
19.Oxygen sensor
20.Ignition coil

Note: The wiring diagram is the appendix

Electric system

16.4 Caution

There are many pre-cautions when repairing the electric system.Please becareful with the rules below.

1.Do not connecting the battery wrong. Or the diode will be burnt.

2.Inspect the battery first when working on electric system. Make sure the battery is fully charged.

3.Do not knock hardly or drop the electric parts. Or the extremly shock will dam-age the parts.

4.When the ignition switch ON or engine on running. Do not loose the wire or other electric connection to avoid electric parts damaged.

5.As the current is large. Do not keep the start switch on if the start motor not run. Or the motor coil will be burned and finally cause damaged.

6.Do not use the bulb not in standard. Or it may cause the dashboard or tester melted.

7.Becareful not to let the (+) pole touch the ground wire. Or it will cause the shortcut.

8.The trouble may cause by one part or different parts. So do not replace the trouble part without finding the real reason. If the trouble causes from other part(s). Replace them together, or the new parts will get trouble very soon.

9.Make sure all the connectors is clean without loose. And check the wire if got burned or wearing. If the wire or bad connection can cause the electric system running unstable.

10.Measure the coil's resistance when the parts cooled down. Color sign:

R:red R/W:red/white R/G:red/green B:Black B/W:Black/White B/Y:Black/Yellow B/Br: Black/Brown

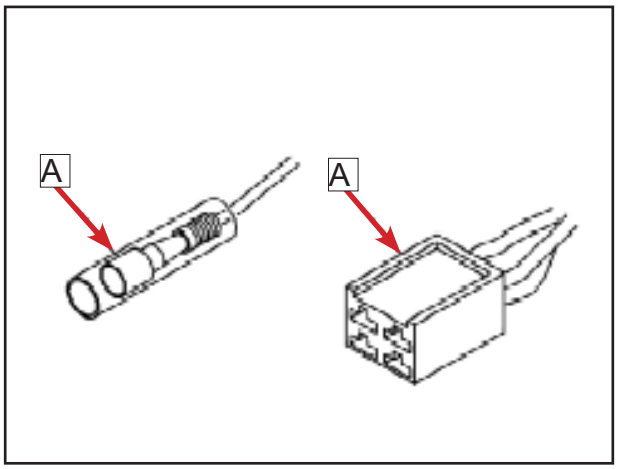
B/L:Black/Blue G:Green Gr:Grey Lg:Light green Lg/G:Light green/Green Lg/Y:Light green/Yellow Sb:Light blue

Sb/W:Light blue/White Y:Yellow O:Orange L:Blue P:Purple Br:Brown W:White

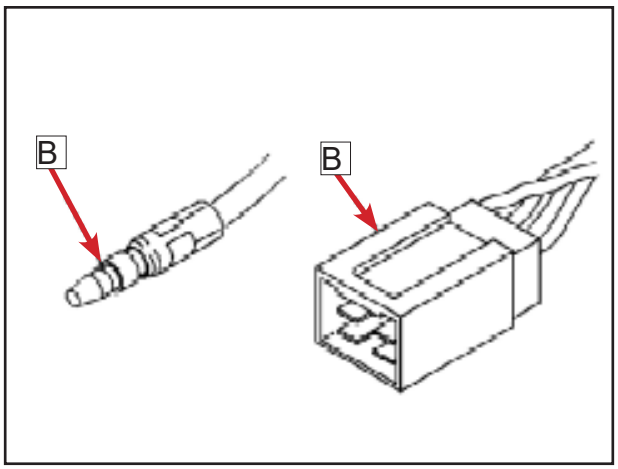
Electric system

16.5 Wire basic

Connector [A]



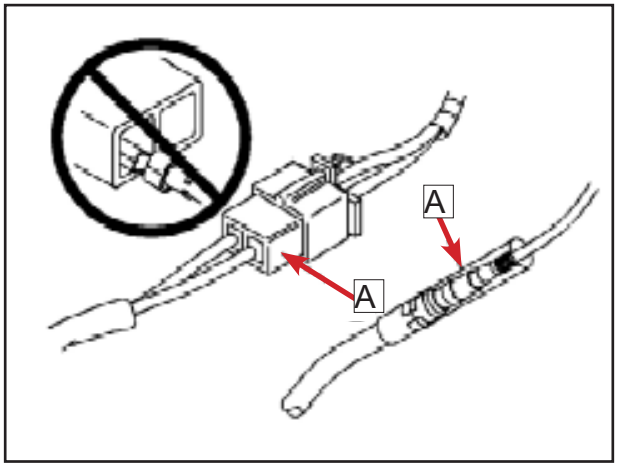
Connector [B]

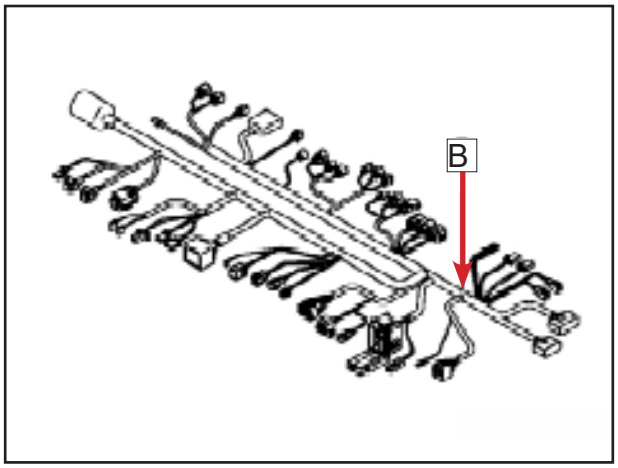


Wiring inspection

- Inspect the wiring to see burned, wearing or other damage. If any damage inspected. Replace the wiring.
- Disconnect all the connector [A] to see any corrosions, dirt or other damage.
- If connector got corrosion or dirt. Clean the connector carefully. If any damage inspected, replace the connector.
- Inspect the wiring connection by using the AVO meter.Follow the wiring diagram to see the wiring may got trouble.
- Set the tester to x1 Ω rate and read te data.
- If tester is not 0 Ω. The cable may got trouble.

Replace the wire or cable if need.

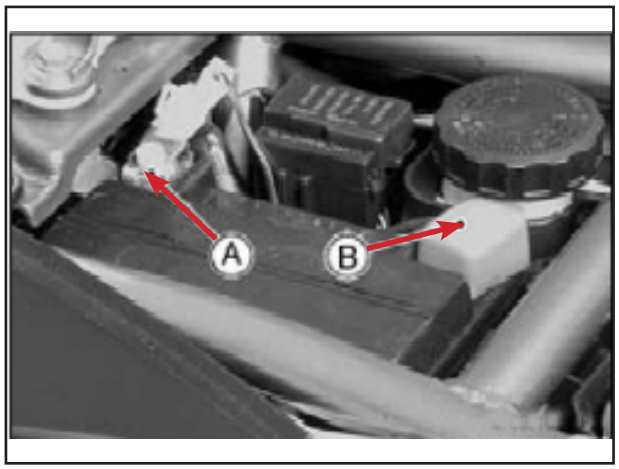




16.6 Battery

Battery removal

- Remove the seat.
- Disconnect (-) pole and cable [A].
- Slide out the (+) pole cover [B] and (+) pole.

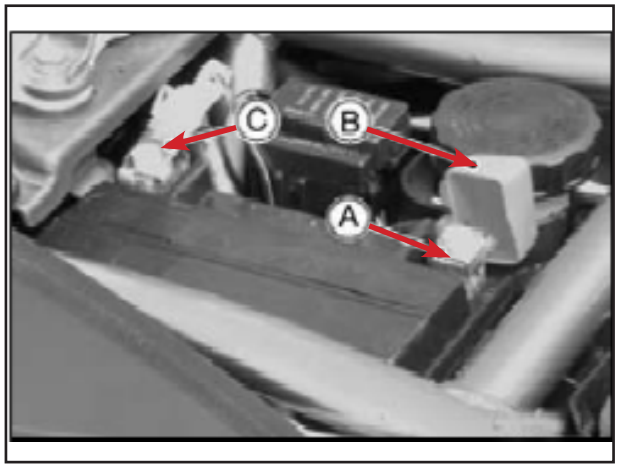


⚠Warning
Disconnect the (-) pole cable first

- Remove the battery.

Battery installation:

- Place the battery in front of the rear fender.
- Cover a little grease on the pole to avoid corrosion.
- Connect (+) pole and cable [A] first.
- Use the sleeve (B) to cover (+) pole.
- Connect (-) pole and cable (C).



Battery activation

Electrolyte filling

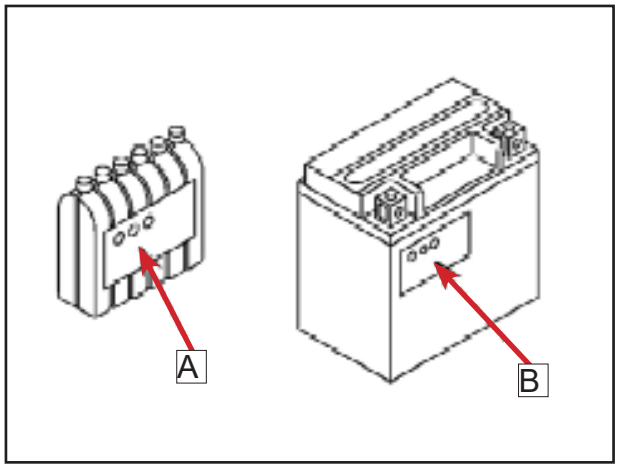
- Make sure the electrolyte mode [A] is fit for battery model[B]. This is a must.

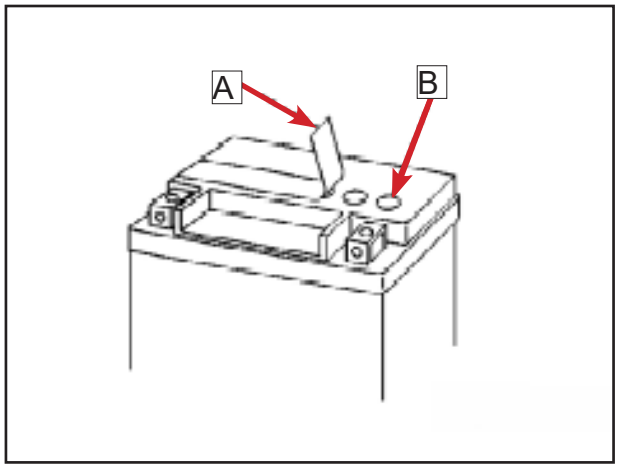
Battery model for CF650: YTX12-BS.

⚠Warning
Because of the electrolyte capacity and weight depends on battery. Make sure the electrolyte container size is fit for the battery to avoid overflow. Or the battery reliability may be bad cause the performance bad.

⚠Warning
Do not open aluminum cover [A] until start using. Fill the electrolyte from holes [B] and make sure the capacity is right.

- Put the battery on a flat surface
- Make sure the aluminum cover has no damage
- Remove the cover.



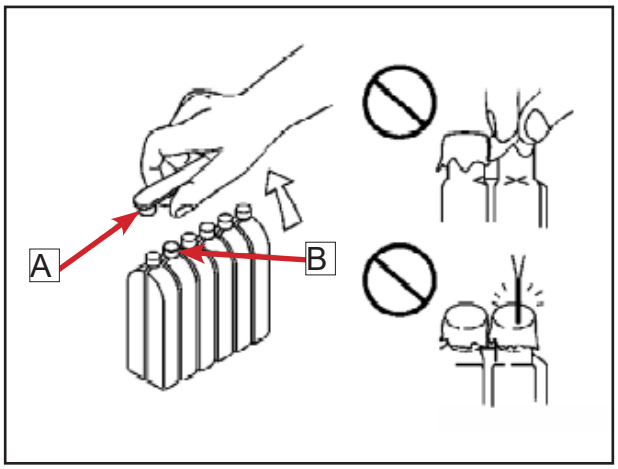


Battery

Note

Battery is vaccum sealant. If any air into the battery. It will take more time to charge the battery.

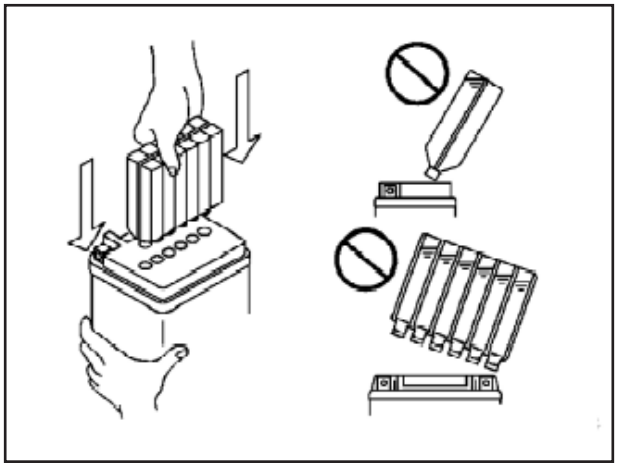
- Remove the plastic bag of the electrolyte.
- Remove the cap [A] from the container and set aside for seal the battery.



Note

Do not use pin or other way to open the sealed electrolyte container [B].Do not try to seperate the singal unit.

- Put 6 sealed unit into battery injecting hole. Then up side down. Hold the container horizontally. Break all the unit sealing part. You can see bubbles up to each unit.



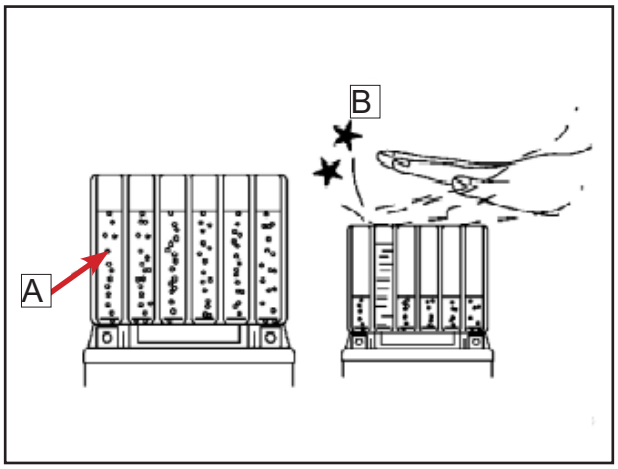
Note

Do not tilt the container.

- Inspect the electrolyte flow.

If no air bubbles [A] are coming up from the filler ports, or if the container cells have not emptied completely, tap the container [B] a few times.

- Keep the container in place for 20 min-utes or more. Don't remove the container from the battery until it's empty, the battery requires all the electrolyte from the container for proper operation.



CAUTION
Removal of the container before it is completely empty can shorten the service life of the battery. Do not re-move the electrolyte container until it is completely empty and 20 minutes have elapsed.

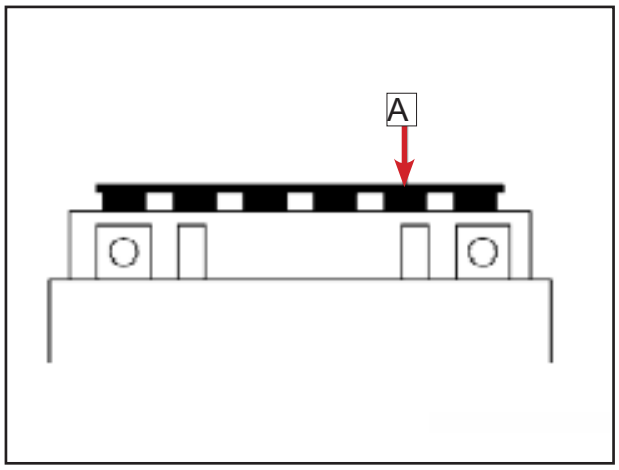
- Gently remove the container from the battery.
- Let the battery sit for 30 minutes prior to charging to allow the electrolyte to permeate into the plates for optimum performance.

Note

Charging the battery immediately after filling can shorten service life. Let the battery sit for at least 30 minutes after filling.

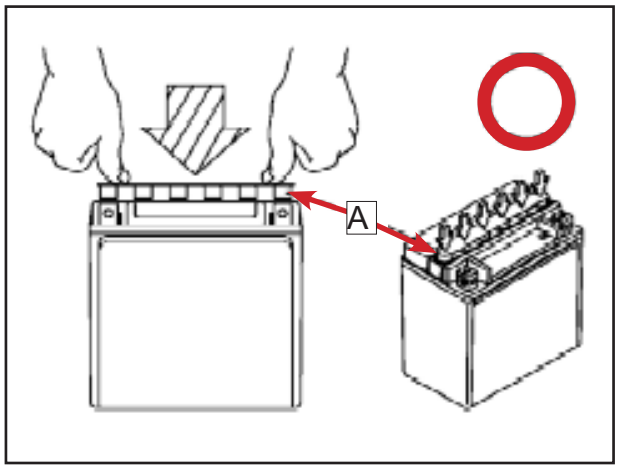
Battery
Initial Charge

- Place the strip [A] of caps loosely over the filler ports.
- Newly activated sealed batteries require

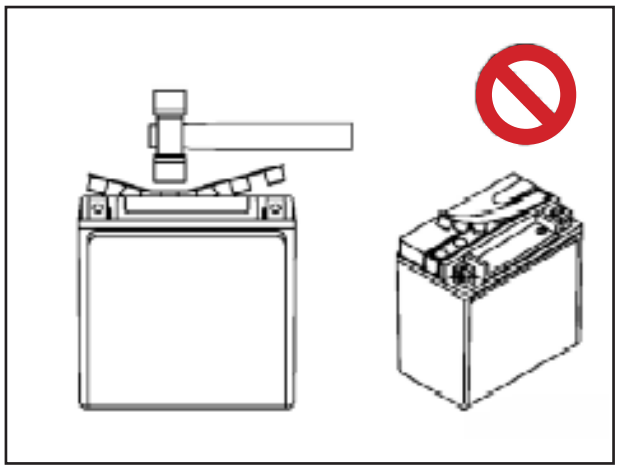


Charging rates will vary depending on how long the battery has been stored, temperature, and the type of charger used. Let battery sit 30 minutes after initial charge, then check voltage using a voltmeter.
If it is not at least 12.8V, repeat charging cycle.

- After charging is completed, press down firmly with both hands to seat the strip of caps [A] into the battery (don't pound or hammer.). When properly installed, the strip of the caps will be level with the top of the battery.



CAUTION
Once the strip of the caps [A] is installed onto the battery, never remove the caps, nor add water or electrolyte to the attery.



Note

To ensure maximum battery life and customer satisfaction, it is recommended the battery be load tested at three times its amp-hour rating for 15 seconds. Recheck voltage and if less than 12.8V repeat the charging cycle and load test. If still below 12.8V the battery is defective.

Battery

Precautions

1)No need of topping-up.

No topping-up is necessary in this battery until it ends its life under normal use. Forcibly prying off the seal cap to add water is very dangerous. Never do that.

2)Refreshing charge.

If an engine will not start, a horn sounds weak, or lamps are dim, it indicates the battery has been discharged. Give refresh charge for 5 to 10 hours with charge current shown in the specification (see Specifications).

When a fast charge is inevitably required, do it following precisely the maximum charge current and time conditions indicated on the battery.

CAUTION
This battery is designed to sustain no unusual deterioration if refresh-charged according to the method specified above. However, the battery's performance may be reduced noticeably if charged under conditions other than given above. Never remove the seal cap during refresh charge. If by chance an excessive amount of gas is generated due to overcharging, the relief valve releases the gas to keep the battery normal.

3)When you do not use the motorcycle for months.

Give a refresh charge before you store the motorcycle and store it with the negative cable removed. Give a refresh charge once a month during storage.

4)Battery life

If the battery will not start the engine even after several refresh charges, the battery has exceeded its useful life. Replace it (Provided, however, the vehicle's starting system has no problem).

5)Battery change

Sealed battery should be fit the vehicle electrical system. So, make sure the battery is sealed style original before replacement.

⚠WARNING
Keep the battery away from sparks and open flames during charging, since the battery gives off an explosive gas mixture of hydrogen and oxygen. When using a battery charger, connect the battery to the charger before turning on the charger. This procedure prevents sparks at the battery terminals which could ignite any battery gases. No fire should be drawn near the battery, or no terminals should have the tightening loos-ened. The electrolyte contains sul-furic acid. Be careful not to have it touch your skin or eyes. If touched, wash it off with liberal amount of water. Get medial attention if severe.

Note

If motorcycle use normal battery as original. The sealed battery will shorter life period after replaced into.

Battery

Charging Condition Inspection

Battery charging condition can be checked by measuring battery terminal voltage with a digital voltmeter [A].

- Remove:

Seat (see Seat Removal in the Frame chapter)

Battery Cable Cap (see Battery Removal)

- Disconnect the battery terminals.

CAUTION
Be sure to disconnect the negative (-) cable first.

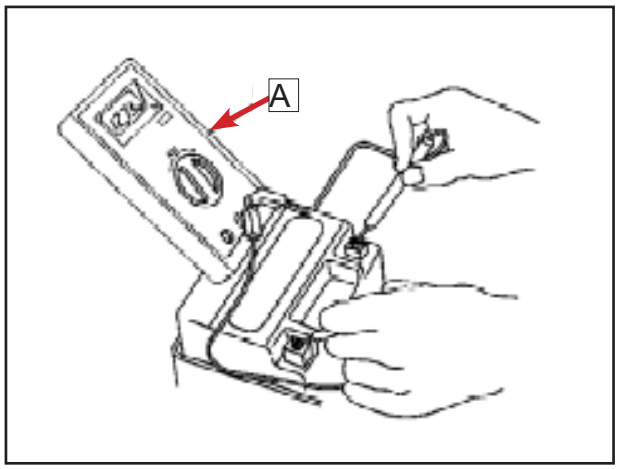
- Measure the battery terminal voltage.

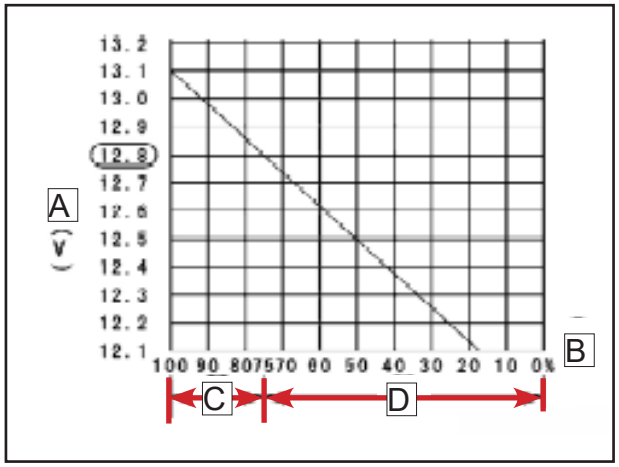
Note

Measure with a digital voltmeter which can be read one decimal place voltage.

If the reading is 12.8V or more, no refresh charge is required, however, if the read is below the specified, refresh charge is required.

Battery Terminal Voltage Standard:
12.8V or higher
Terminal Voltage (V) [A]
Battery Charge Rate (%) [B]
Good [C]
Refresh charge is required [D]

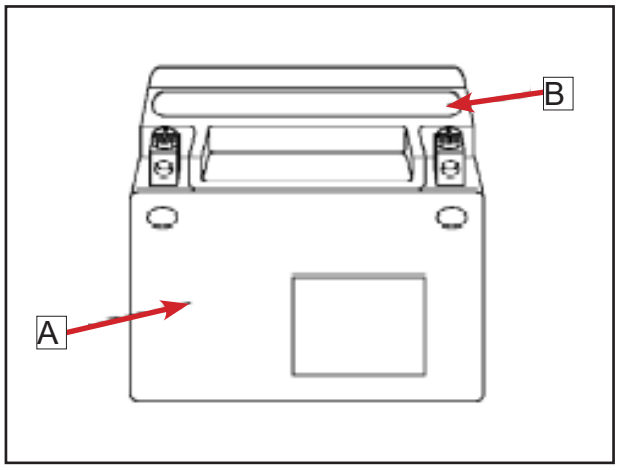




Refreshing Charge

- Remove the battery [A] (see Battery Removal).
- Do refresh charge by following method ac-cording to the battery terminal voltage.

⚠WARNING
This battery is sealed type. Never remove sealing cap [B] even at charging. Never add water. Charge with current and time as stated below.



Battery Charge
Terminal Voltage:11.5V~12.8V
Standard Charge:1.2Ax5-10h(See form below)
Quick Charge:5Ax1h
If possible, do not quick charge. If quick charge is done unavoidably, do standard charge later on.
Terminal Voltage less than 11.5V Charging Method 1.2Ax20h

Note

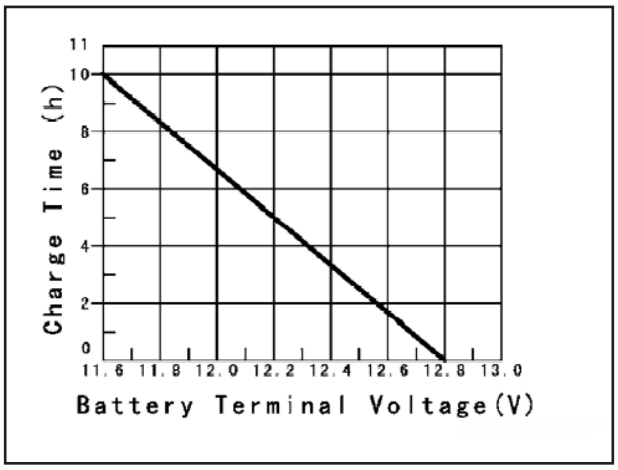
Increase the charging voltage to a maximum voltage of 25V if the battery will not accept current initially. Charge for no more than 5 min-utes at the increased voltage then check if the battery is drawing current. If the battery will accept current decrease the voltage and charge by the standard charging method described on the battery case. If the battery will not accept current after 5 min- utes, replace the battery.

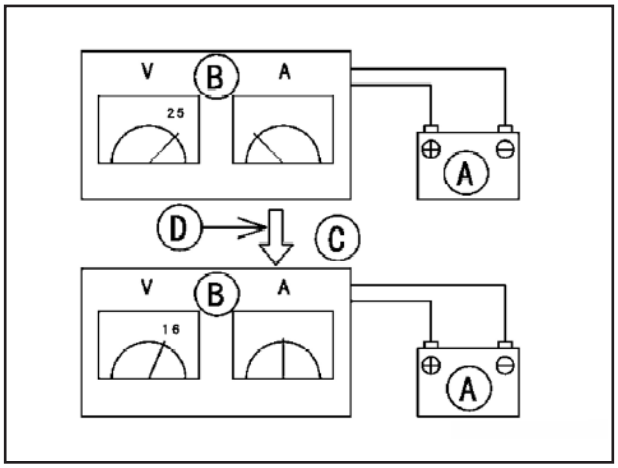
Battery [A]
Battery Charger [B]
Standard Value [C]
Current starts to flow [D]

- Determine the battery condition after re-fresh charge.

Determine the condition of the battery left for 30 minutes after completion of the charge by measuring the terminal voltage according to the table below.

Standard	Judgement
12.8V or higher	OK
12.0V~12.8V	Unfully charged
Lower then 12.0V	Replace



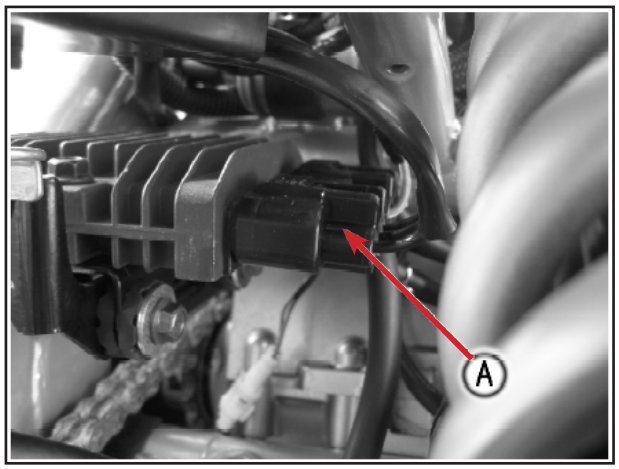


16.7 Charging System

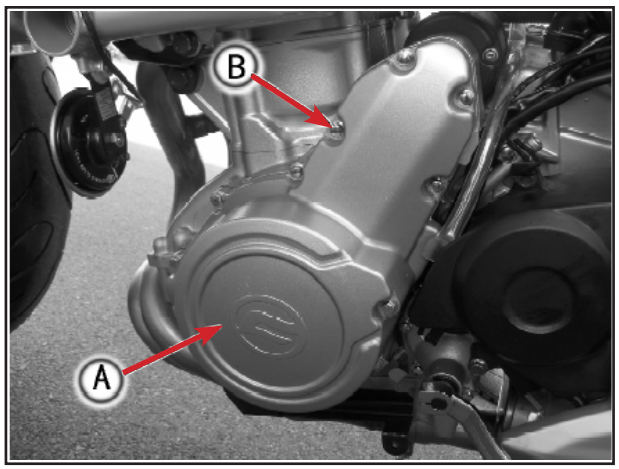
Alternator Cover Removal

- Remove:
- Lower Fairing (see Lower Fairing Removal in the Frame chapter)

Alternator Lead Connector [A]



- Place a suitable container under the alter-nator cover [A], and remove the cover bolts [B].
- Pull the alternator cover outside.

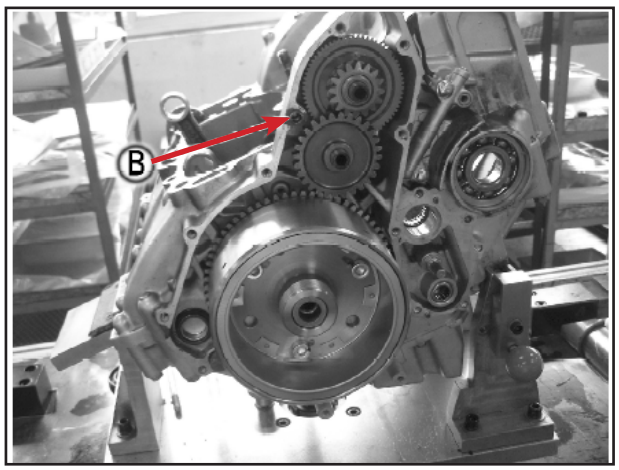


Alternator Cover Installation

- Apply silicone sealant to the alternator lead grommet and crankcase halves mating sur-face [A] on the front and rear sides of the cover mount.
- Check that dowel pins [B] are in place on the crankcase.
- Install a new gasket and the alternator cover.
- Tighten:

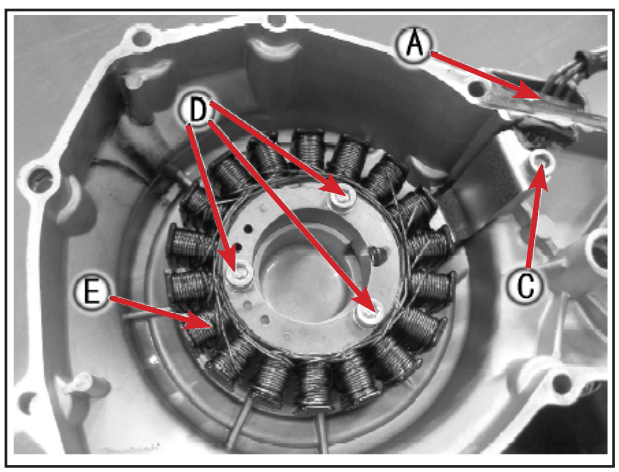
Tighten

Torque-Alternator Cover Bolts:9.8N•m



Stator Coil Removal

- Remove Alternator Cover
- Remove the magneto rubber sleeve [B].
- Remove the stator coil.[E]



Charging system

Stator Coil Installation

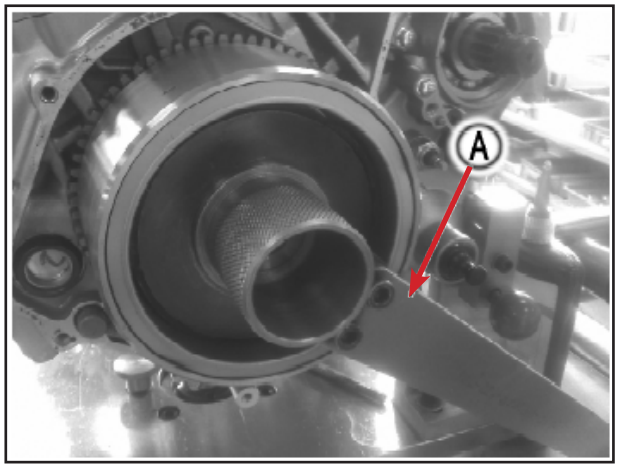
- Apply a non-permanent locking agent to the threads of the stator coil bolts and tighten them.

Torque-Stator Coil Bolts:12N•m

- Secure the alternator lead with a holding plate, and tighten the bolt.

Torque-Alternator Lead Holding Plate Bolt:9.8N•m

- Apply silicone sealant to the circumference of the alternator lead grommet, and fit the grommet into the notch of the cover securely.
- Install the alternator cover



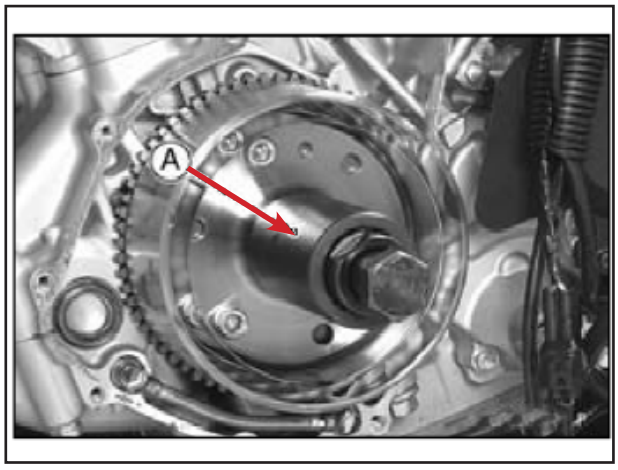
Magneto Rotor Removal

- Remove the alternator cover
- Remove the starter idle gear, torque lim-iter and shafts.
- Wipe oil off the outer circumference of the rotor.
- Hold the alternator rotor steady with the rotor holder [A], and remove the rotor bolt [B] and washer.

Special Tool: Rotor Locker

- Using the flywheel puller [A], remove the alternator rotor from the crankshaft.

Special Tool-Flywheel Puller Assembly

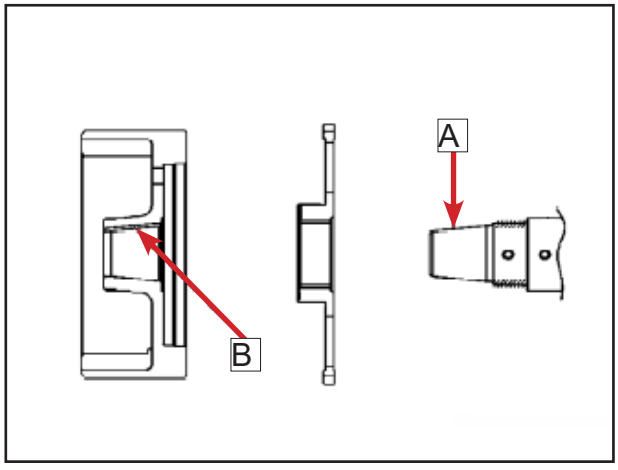


CAUTION
Do not attempt to strike the alternator rotor itself. Striking the rotor can cause the magnets to lose their magnetism.

Magneto Rotor Installation

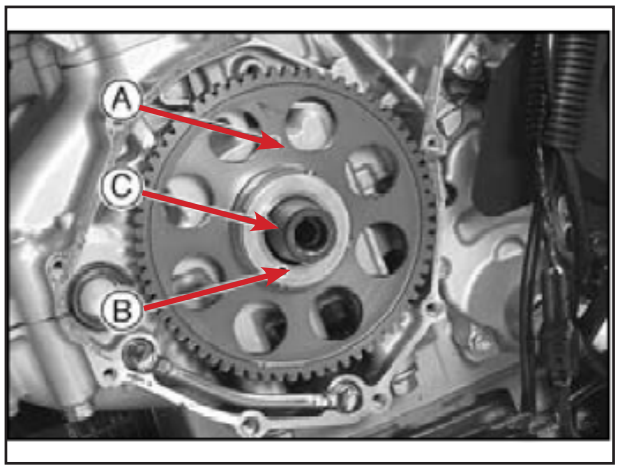
- Using a cleaning fluid, clean off any oil or dirt on the following portions and dry them with a clean cloth.

Crankshaft Tapered Portion [A]
Alternator Rotor Tapered Portion [B]

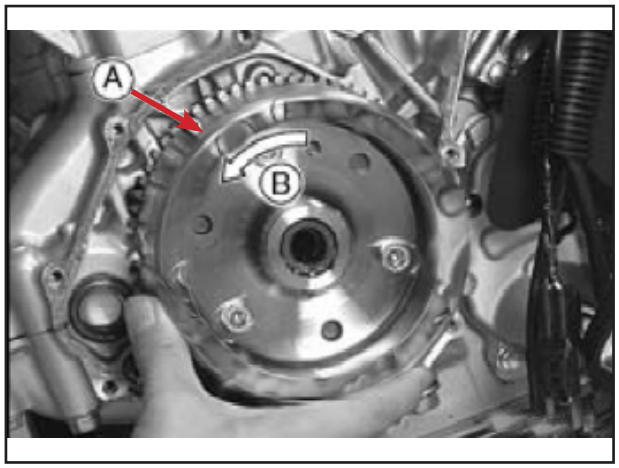


Charging system

- Install the start gear [A] and washer [B]
- Clean the bevel [C] of the crankshaft and clean it up.



- Install magneto rotor [A] and turn counter-clockwise [B].



- Install the washer [A].

Note

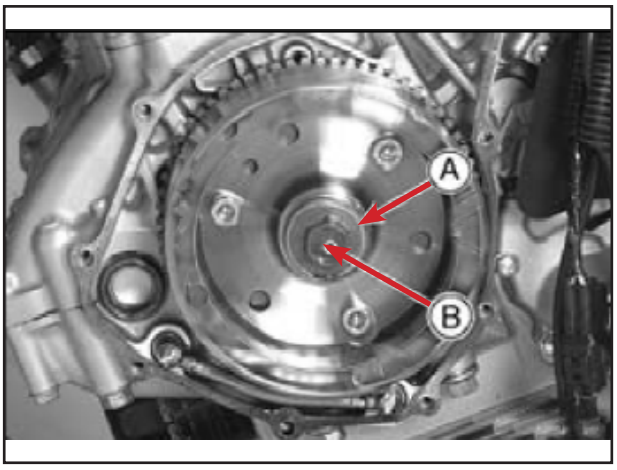
Confirm the alternator rotor fit or not to the crankshaft before tightening it with specified torque.

- Install the rotor bolt [B] and tighten it with 70N•m(7.0kgf•m,52ft•lb) of torque.
- Remove the rotor bolt and washer.
- Check the tightening torque with flywheel puller.

If the rotor is not pulled out with 20N·m (2.0kgf·m,15ft·lb) of drawing torque, it is installed correctly.

If the rotor is pulled out with under 20 N·m (2.0kgf·m,15ft·lb) of drawing torque, clean off any oil dirt or flaw of the crankshaft and rotor tapered portion, and dry them with a clean cloth. Then, confirm that it is not pulled out with above torque.

- Tighten the alternator rotor bolt while hold-ing the alternator rotor steady with the rotor holder.



Special Tools-Rotor Locker

Torque-Alternator Rotor Bolt:155N·m

Charging system

- Install the starter double gear [A] and starter idle gear [B].
- Install the alternator cover.

Magneto inspection

There are three types of alternator failures: short, open (wire burned out), or loss in rotor magnetism. A short or open in one of the coil wires will result in either a low output, or no output at all. A loss in rotor magnetism, which may be caused by dropping or hitting the alternator, by leaving it near an electromagnetic field, or just by aging, will result in low output.

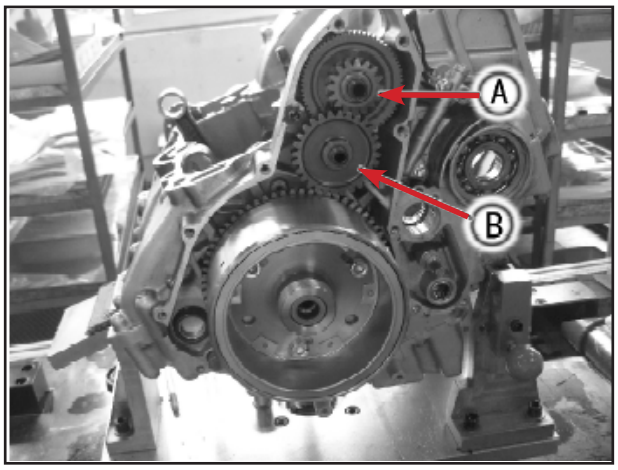
To check the alternator output voltage, do the following procedures:

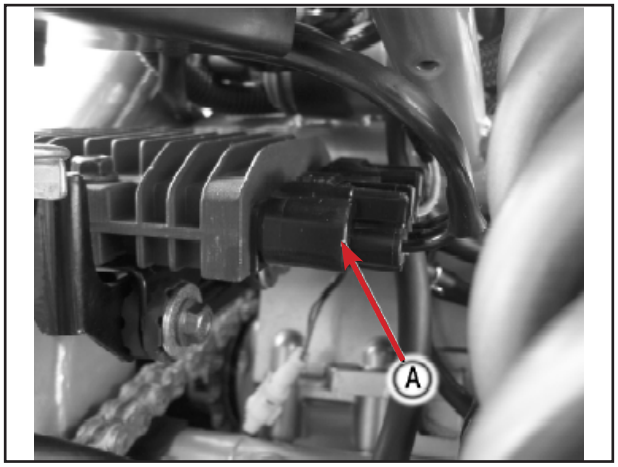
- Turn off the ignition switch.
- Disconnect the alternator lead connector [A].
- Connect the hand tester as shown in the table 1.
- Run it at the rpm given in the table 1.
- Note the voltage readings (total 3 measurements).

Table 1 Alternator Output Voltage

AVO meter	Connecting pin		4000rpm
	(+)	(-)	
250VAC	Black line	Another black line	40V or higher

- If the output voltage shows the value in the table, the alternator operates properly.
- If the output voltage shows the value in the table, the alternator operates properly.
- A much lower reading than that given in the table indicates that the alternator is defective.





Charging System

Check the stator coil resistance as follows.

- Stop the engine.
- Connect the hand tester as shown in the table 2.
- Note the readings (total 3 measurement).

AVO meter	Connecting pin		Meter standard
	(+)	(-)	
×1Ω	Black line	Another black line	0.10~0.3 Ω

- If there is more resistance than shown in the table, or no hand tester reading (infinity) for any two leads, the stator has an open lead and must be replaced.
- Much less than this resistance means the stator is shorted, and must be replaced.

Follow the steps below to inspect the resis-tance between stator and stator.

- Stop the engine
- Connect the AVO meter follow the form below.
- Note the readings (total 3 measurement).

AVO meter	Connecting pin		Data
	(+)	(-)	
Highest resistance	Magneto random black line	Engine case	∞

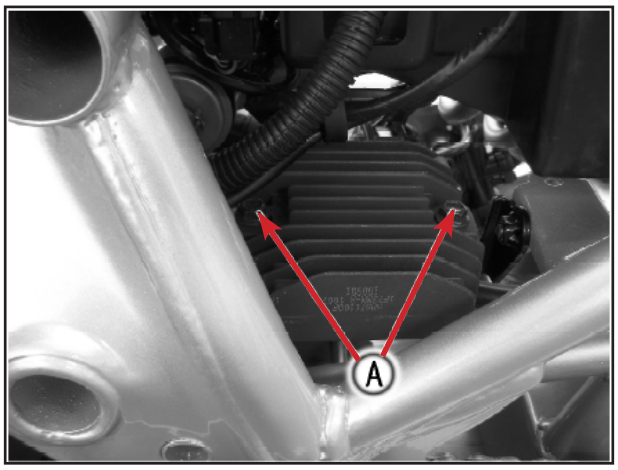
- Using the highest resistance range of the hand tester, measure the resistance between each of the black leads and chassis ground.

Any hand tester reading less than infinity indicates a short, necessitating stator replacement.

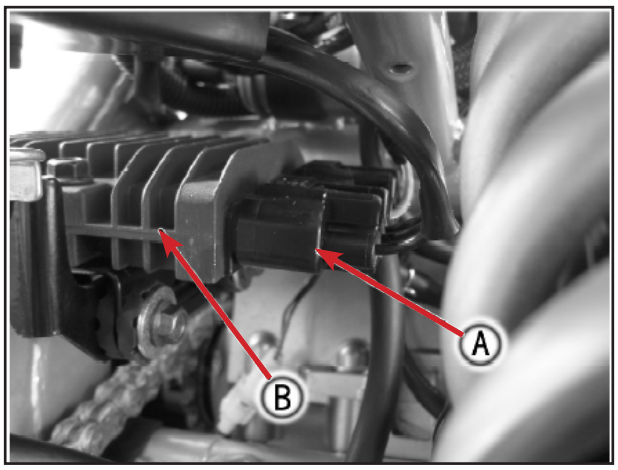
If the stator coils have normal resistance, but the voltage check showed the alternator to be defective; then the rotor magnets have probably weakened, and the rotor must be replaced.

Charging System
Regulator/Rectifier
Regulator/Rectifier Removal

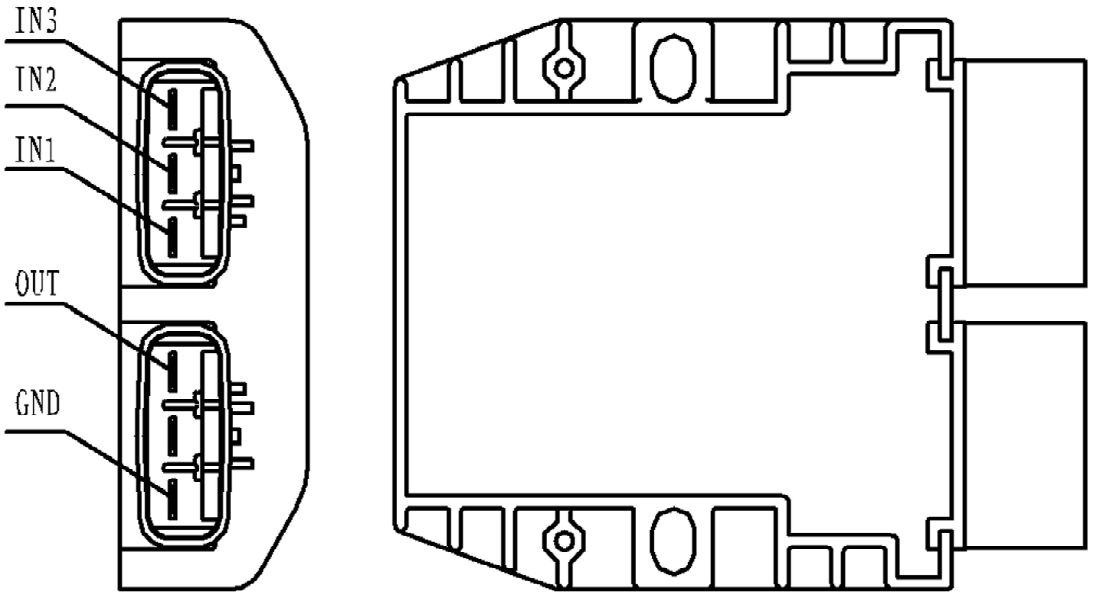
- Remove Bolts [A]



- Disconnect the connector [A].
- Remove the regulator/rectifier [B].



Charging System



- Using a hand tester, measure the resistance be tween the following pair of terminals. If any reading is out of the specifi cation, re-place the regulator/ rectifi er with a new one

Set the hand tester to Diode range (mv).

NOTE

If the hand tester displays less than 1.4 V when the probes are not connected, replace the batteries.

- After is the engine is running(at 5000 r/min), when the magneto is normal and the battery is fully charged, if the voltage between the red and green terminals is more than 15V or less than 13.5V, replace the regulator/rectifi er with a new one.

		红表笔⊕				
		IN1	IN2	IN3	GND	OUT
黑表笔①	IN1		∞	∞	100-800	∞
	IN2	∞		∞	100-800	∞
	IN3	∞	∞		100-800	∞
	GND	∞	∞	∞		∞
	OUT	100-800	100-800	100-800	100-800	

Charging System
Overriding clutch
Overriding Clutch Removal/Installation

- Refer to the Alternator Rotor Removal/ Installation.

Overriding Clutch inspection

- Remove alternator cover
- Remove starter idle gear and starter double gear.
- Turn the starter motor clutch gear [A] by hand. The starter motor clutch gear should turn clockwise [B] freely, but should not turn coun-terclockwise [C].

If the starter motor clutch does not operate as it should or if it makes noise, go to the next step.

- Disassemble the starter motor clutch, and visually inspect the clutch parts.

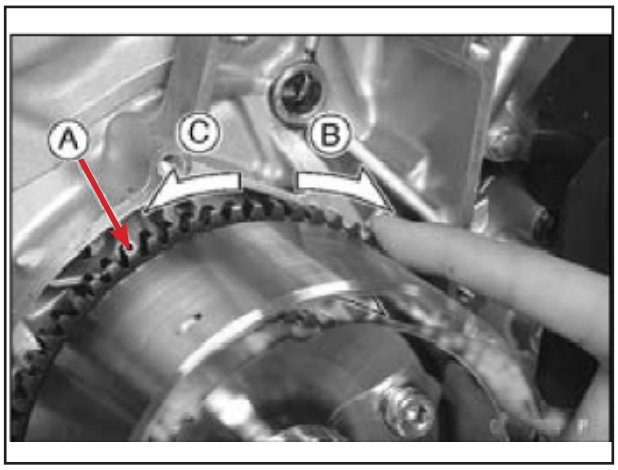
If there is any worn or damaged part, re-place it.

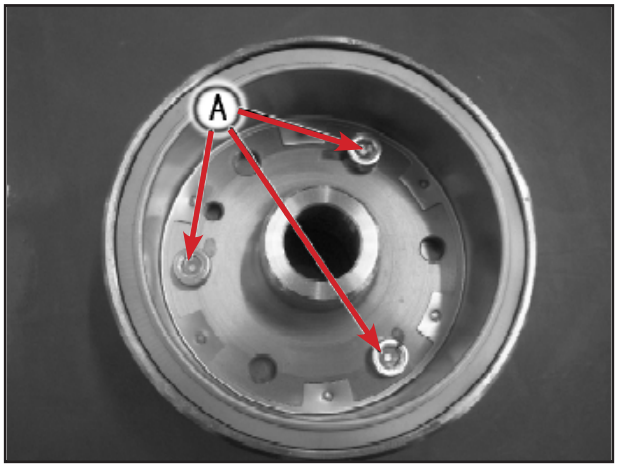
NOTE

Examine the starter motor clutch gear as well. Replace it if it worn or damaged.

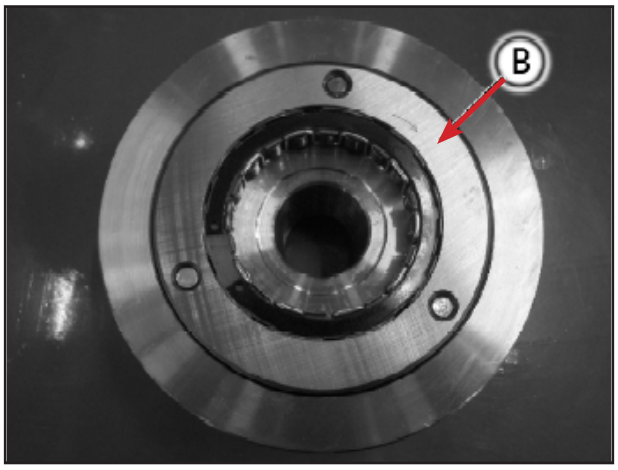
Overriding clutch removal

- Remove magneto rotor clutch bolt [A].





- Remove the overriding clutch [B].



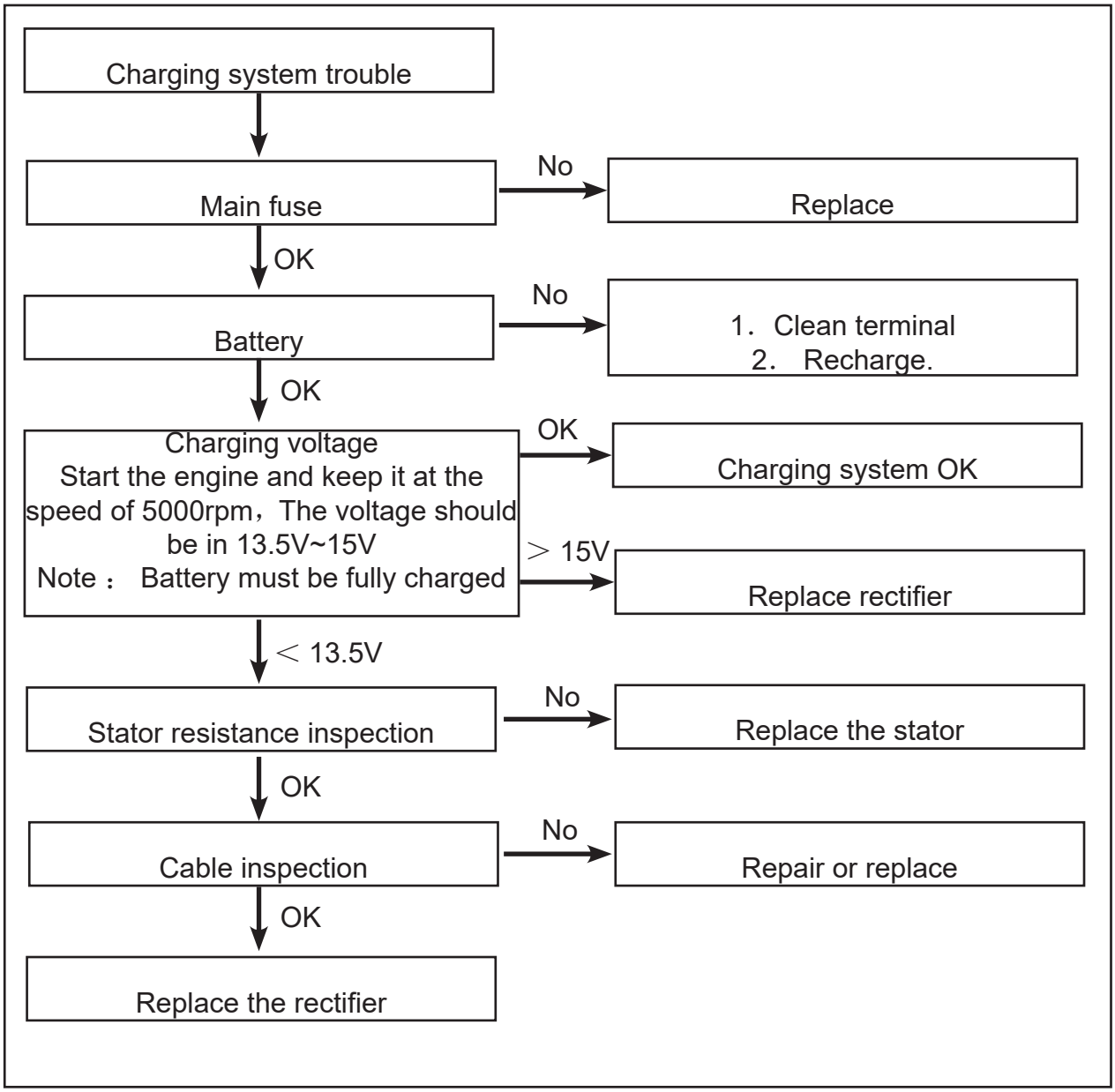
Overriding clutch installation

- Apply a non-permanent locking agent to the threads of the starter motor clutch bolts and tighten them.

Torque: 34N·m

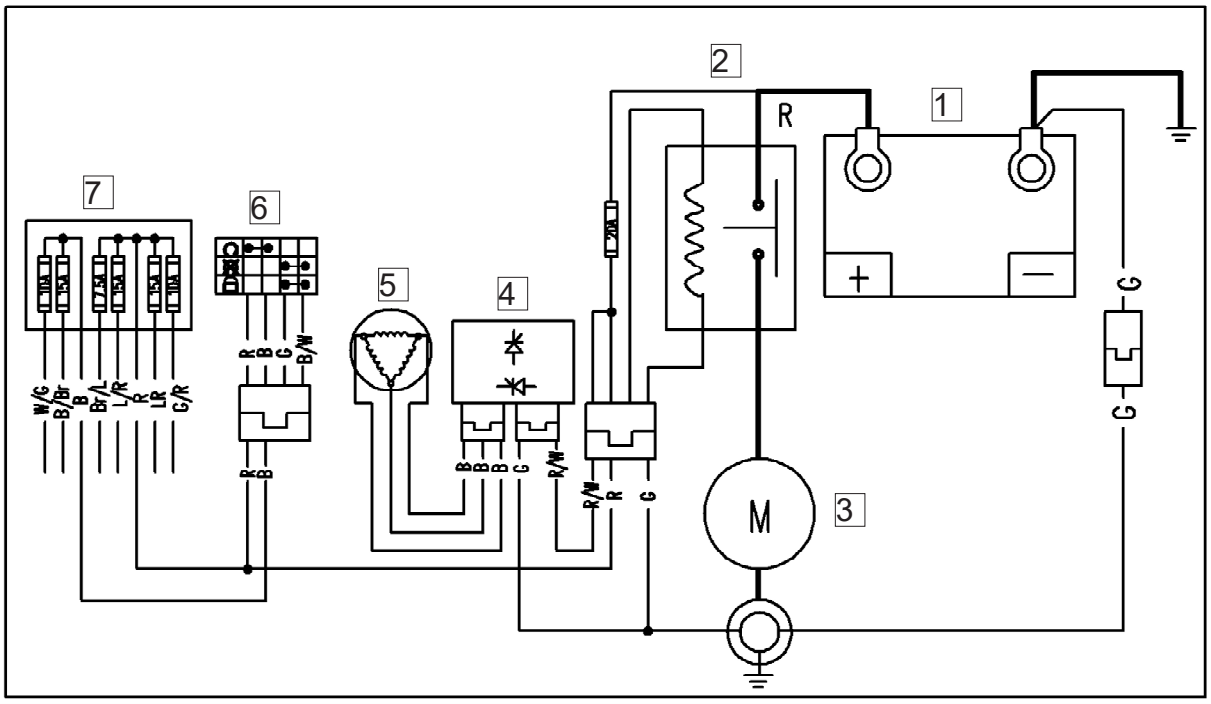
Charging System

Charging System Troubleshooting Chart



Charging system

Charging wiring diagram



1.Battery
2.Start relay
3.Start motor
4.Rectifier
5.Magneto
6.Ignition switch
7.Fuse box

16.8 Ignition system

⚠WARNING

The ignition system produces extremely high voltage. Do not touch the spark plugs or stick coils while the engine is running, or you could receive a severe electrical shock.

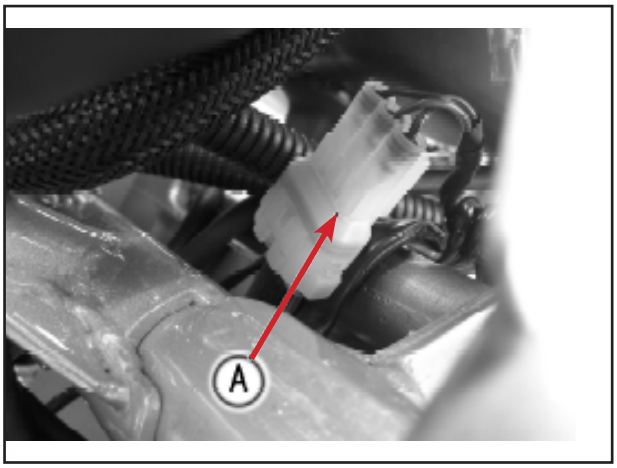
⚠WARNING

Do not disconnect the battery cables or any other electrical connections when the ignition switch is on, or while the engine is running. This is to pre-vent ECU (Electric Control Unit) damage.Do not install the battery backwards. The negative side is grounded. This is to prevent damage to the ECU.

Crankshaft Position Sensor Removal

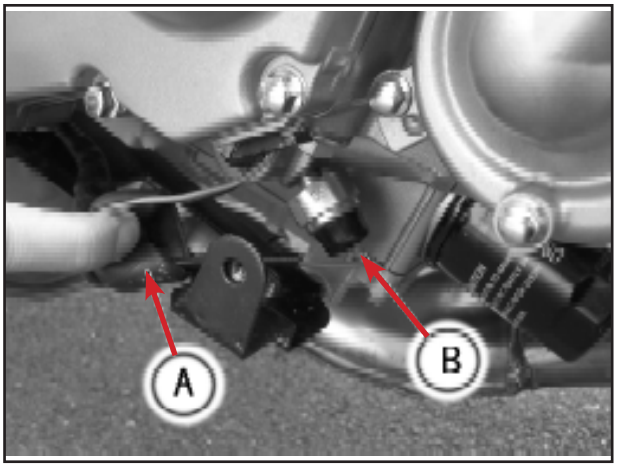
Remove:

- Lower Fairing (see Lower Fairing Removal in the Frame chapter)
- Right frame cover(See frame chapter).
- Crankshaft position sensor connector[A]



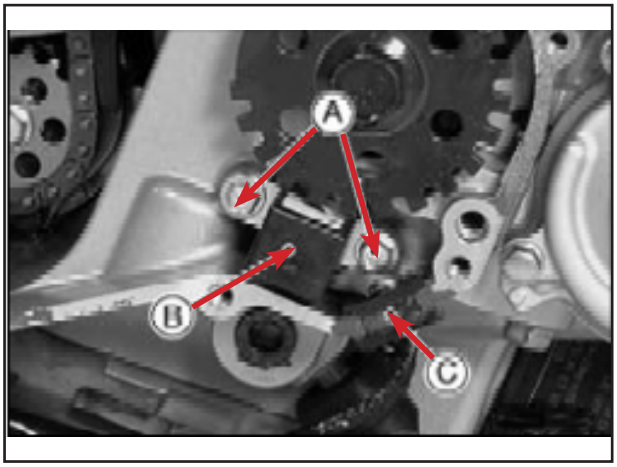
Remove:

- Bolt[A].
- Oil pressure switch connector[B].
- Clutch cover



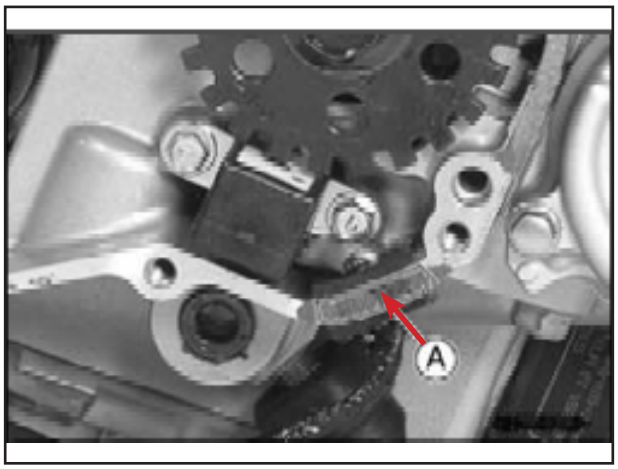
Remove:

- Rubber sleeve(Slide out)[A].
- CPS [B].
- Remove rubber sealing sleeve [C].



Ignition system
CPS installation
- Connect the CPS line in the right way.

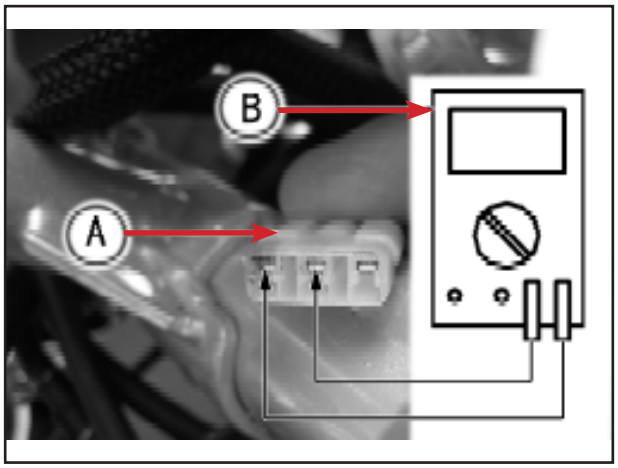
CPS tighten torque:6N·m
- Apply silicone sealant [A] to the crankshaft sensor lead grommet.
- Install the removed parts (see appropriate chapters).



CPS inspection
CPS resistance inspection
Removal:
- Right Frame Cover (see Frame Cover Re-moval inthe Frame chapter)
- Crankshaft Sensor Lead Connector [A].

Measure the CPS resistance
- Set the meter [B]on x 100 ohm position

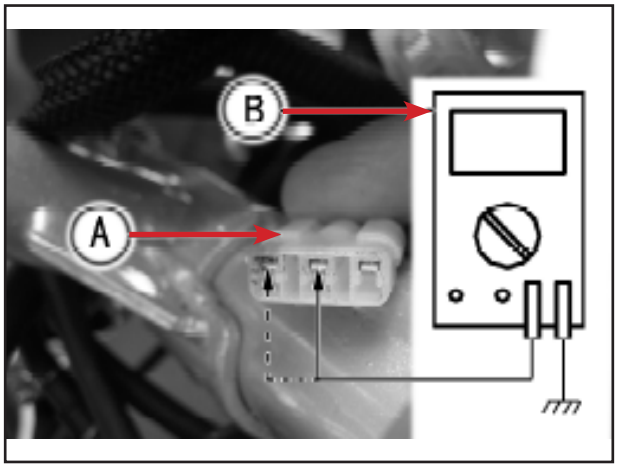
Meter(+)→ Black line
Meter(-)→Green line
If there is more resistance than the specified value, the coil has an open lead and must be replaced. Much less than this resis-tance means the coil is shorted, and must be replaced.
CPS resistance:260Ω~300 Ω (In 20**°C**)



Measure the resistance to the ground
- Set the AVO meter [B] on highest resistance level

Meter(+)→Black line or green line
Resistance to the ground: ∞
- Using the highest resistance range of the tester, measure the resistance between the crankshaft sensor leads [A] and chassis ground.

Any tester reading less than infinity (∞) indicates a short, necessitating replacement of the crankshaft sensor assembly.



Ignition system

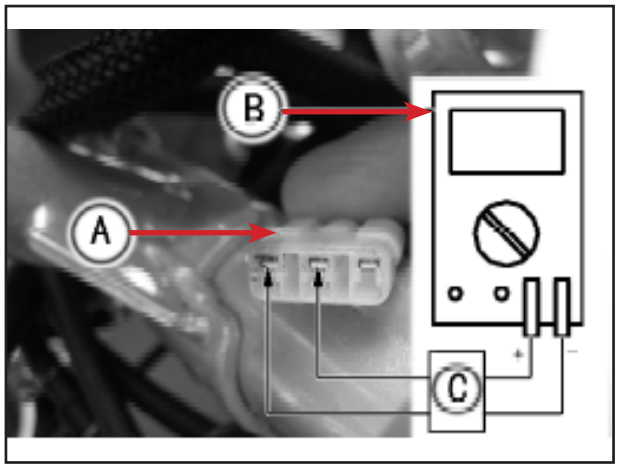
CPS peak voltage inspection

Note

- Be sure the battery is fully charged.
- Using the peak voltage adapter [A] is a more reliable way to determine the condition of the crankshaft sensor than crankshaft sen-sor internal resistance measurements.

Remove:

- Crankshaft Sensor Lead [A] Connector (see Crank shaft Sensor Removal)
- Set the hand tester [B] to the DC 10V range, and connect it to peak voltage adapter.
- Connect the positive terminal of the adapter [C] to green lead and connect the negative terminal of the adapter to black lead in the crankshaft sensor connector
- Turn the ignition switch and engine stop switch ON.
- Pushing the starter button, turn the engine 4~5 seconds with the transmission gear in neutral to measure the crankshaft sensor peak voltage.
- Repeat the measurement 5 or more times.



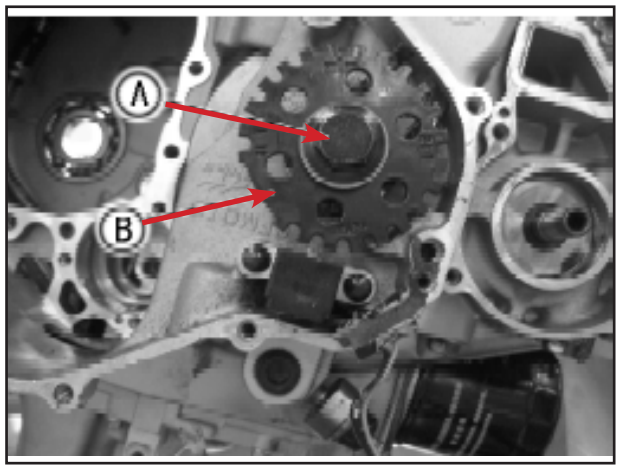
Standard:1.9 V or higher

If the tester reading is not specified one,check the crankshaft sensor.

Timing Rotor Removal

Remove

- Clutch Cover (see Clutch Cover Removal in the Clutch chapter)
- Remove the timing rotor bolt [A].
- Remove the timing rotor.[B]



Timing Rotor Installation:

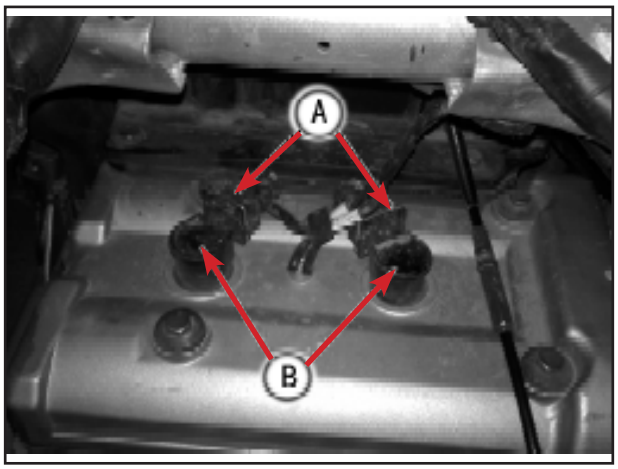
- Fit the rotor to the crankshaft.
- Tighten the rotor bolt.

Torque-Timing Rotor Bolt:40N·m

Ignition system
Ignition coil
Ignition coil removal

- Remove air filter.
- Disconnect the ignition coil connectors [A].
- Pull the ignition coils [B] off the spark plugs.

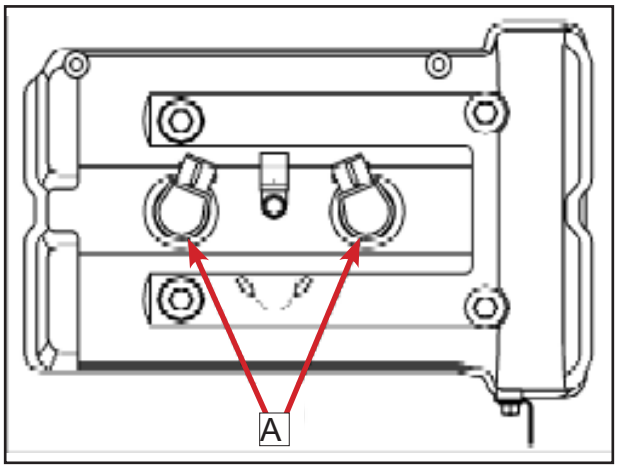
CAUTION
Do not pry the connector part of the coil while removing the coil.



Ignition Coil Installation

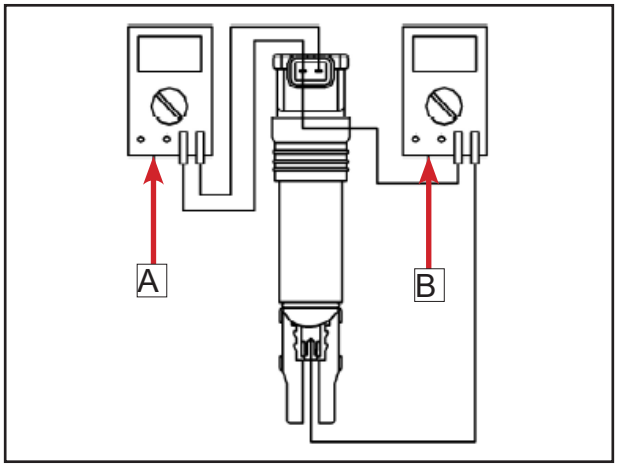
- Insert the coil as shown being careful of the coil heads [A] direction.
- Connect the connectors

CAUTION
Do not tap the coil head while installing the coil.



Ignition Coil Inspection

- Remove the ignition coils (see Ignition Coil (Ignition Coil together with Spark Plug Cap) Removal).
- Measure the primary winding resistance [A] as follows.
- Connect the AVO meter between the coil terminals.
- Set the tester to the x 10 ohm range, and read the tester.
- Measure the secondary winding resistance [B]
- Connect the tester between the plug ter-minal and (-) coil terminal.
- Set the tester to the x1k Ω range and read the tester.



Primary Windings resistance:
1.1Ω~1.5Ω (20°C)
Secondary Windings resistance:
11k Ω~15k Ω (20°C)
If the tester does not read as specified, replace the coil.

Ignition system
Ignition coil
Ignition Coil Primary Peak Voltage
Be sure the battery is fully charged
- Remove the ignition coils, but without sparkplug.

Measure the primary peak voltage as follows:
- Install the new spark plug [A] into each ig-nition coil [B], and ground them onto the engine.
- Connect the peak voltage adapter [C] into the hand tester [D] which is set to the x DC 250V range.
- Connect the adapter to the lead wire-peak voltage adapter [E] which is connected be-tween the ignition coil connector and igni-tion coil.

ECU [F]
Battery [G].

⚠WARNING

To avoid extremely high voltage shocks, do not touch the spark plugs or tester connections.

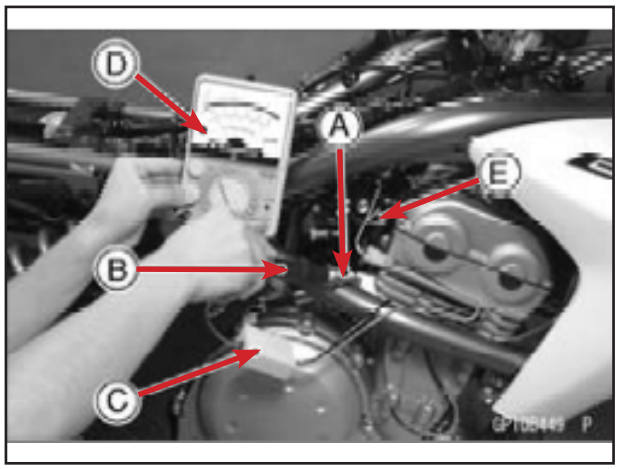
- Turn the ignition switch and the engine stop switch ON.
- Pushing the starter button, turn the engine 4~5 sec onds with the transmission in neu-tral to measure the primary peak voltage.
- Repeat the measurements 5 times for one ignition coil.

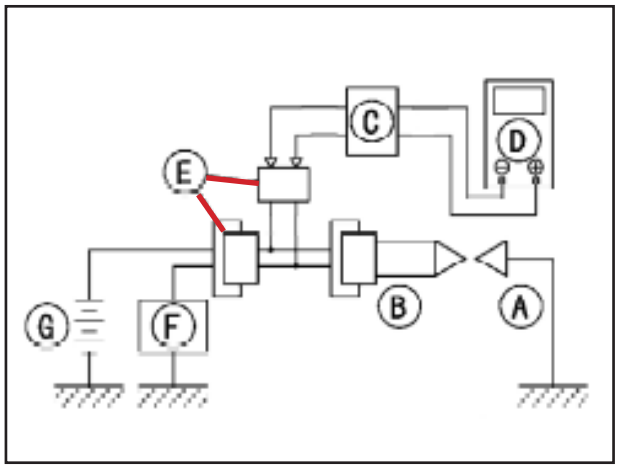
Stick Coil Primary Peak Voltage
Standard:88V or more
- Repeat the test for the other stick coil.

If the reading is less than the specified value, check the following.
- Ignition Coils
- Crankshaft Position Sensor
- ECU

Spark Plug
Spark Plug Removal
- Refer to the Spark Plug Replacement in the Periodic Maintenance chapter.

Spark Plug Installation
- Refer to the Spark Plug Replacement in the Periodic Maintenance chapter.





Spark Plug Condition Inspection
- Refer to the Spark Plug Condition Inspec-tion in the Periodic Maintenance chapter.

Ignition system
Interlock Operation Inspection
- Raise the rear wheel off the ground with stand.

1st Check
- Start the engine to the following conditions.

Condition:
Transmission Gear:Not neutral
Clutch Lever: Release
Side stand: Down or up
- Turn the ignition switch ON and push the start button.
- Then the starter motor should not run when the starter system circuit is normality.

If the engine start. Inspect the neutral switch, auxilary relay and start relay.
If their parts are normality replace the ECU.

2nd Check
- Start the engine to the following conditions.

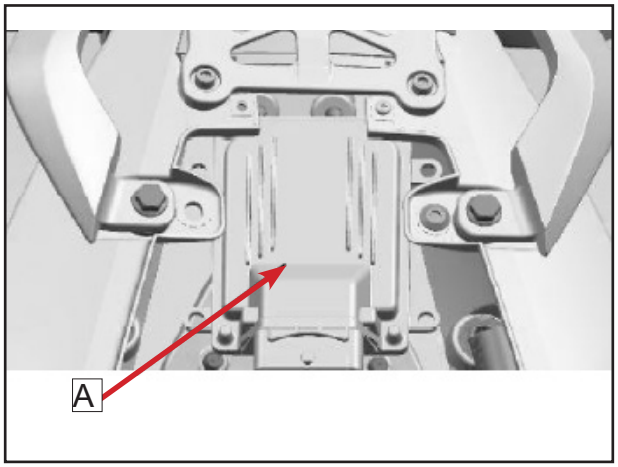
Condition:
Transmission Gear:Not neutral
Clutch Lever:Pulled in
Sidestand: Up
- Turn the ignition switch ON and push the starter button.
- Then the starter motor should turn when the starter system circuit is normality.

If the engine start. Inspect the neutral switch, auxilary relay and start relay.
If their parts are normality replace the ECU.

3rd Check
- Running the engine as below

Condition:
Transmission Gear: Not neutral
Clutch Lever: Pulled in
Sidestand: Up
- Set the sidestand on the ground, then the engine will stop. If whichever may not be stopped, inspect the neutral switch, clutch switch, sidestand switch and relay box.

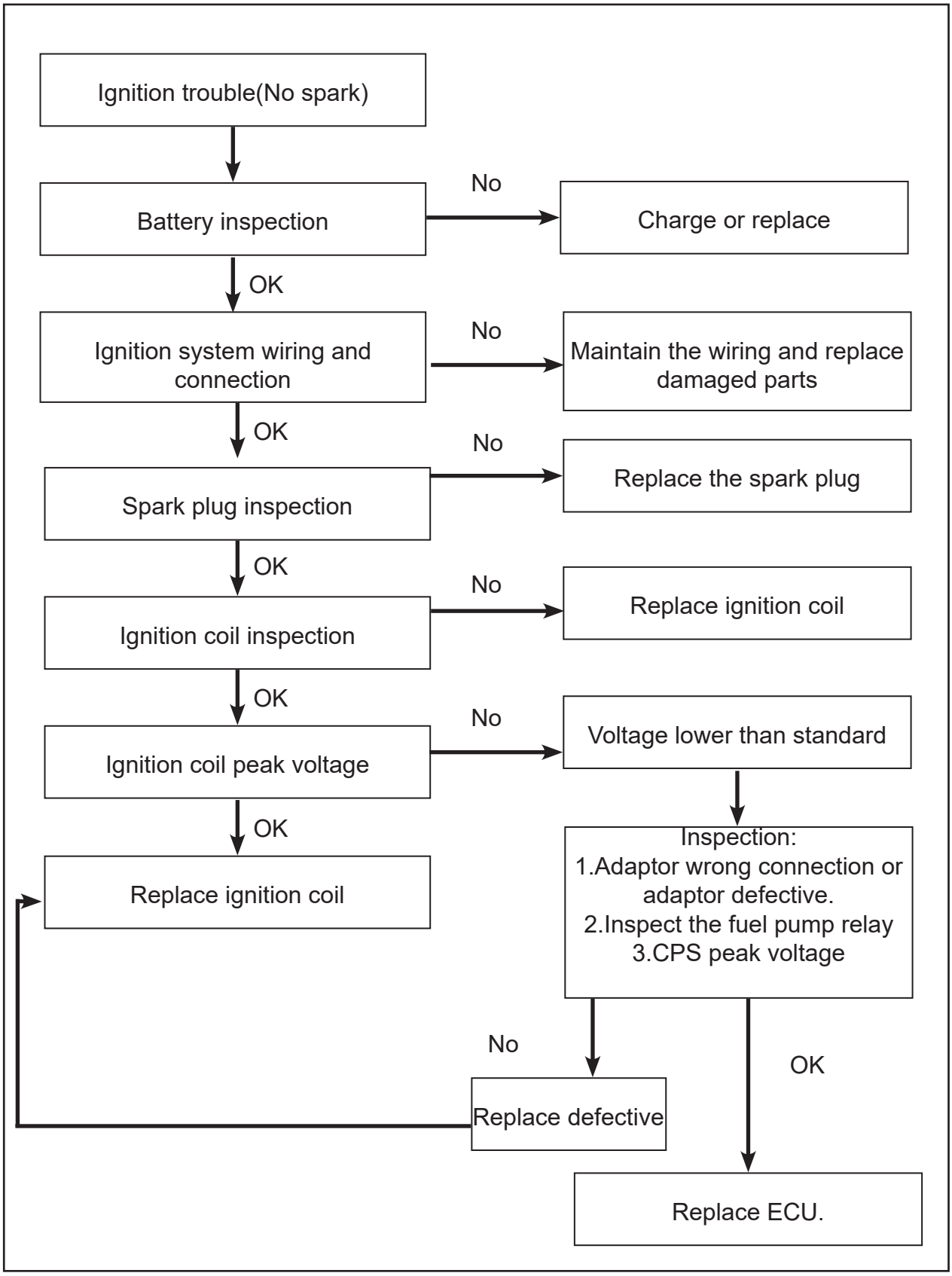
If their parts are normality replace the ECU.



ECU
- The IC igniter is built in the ECU

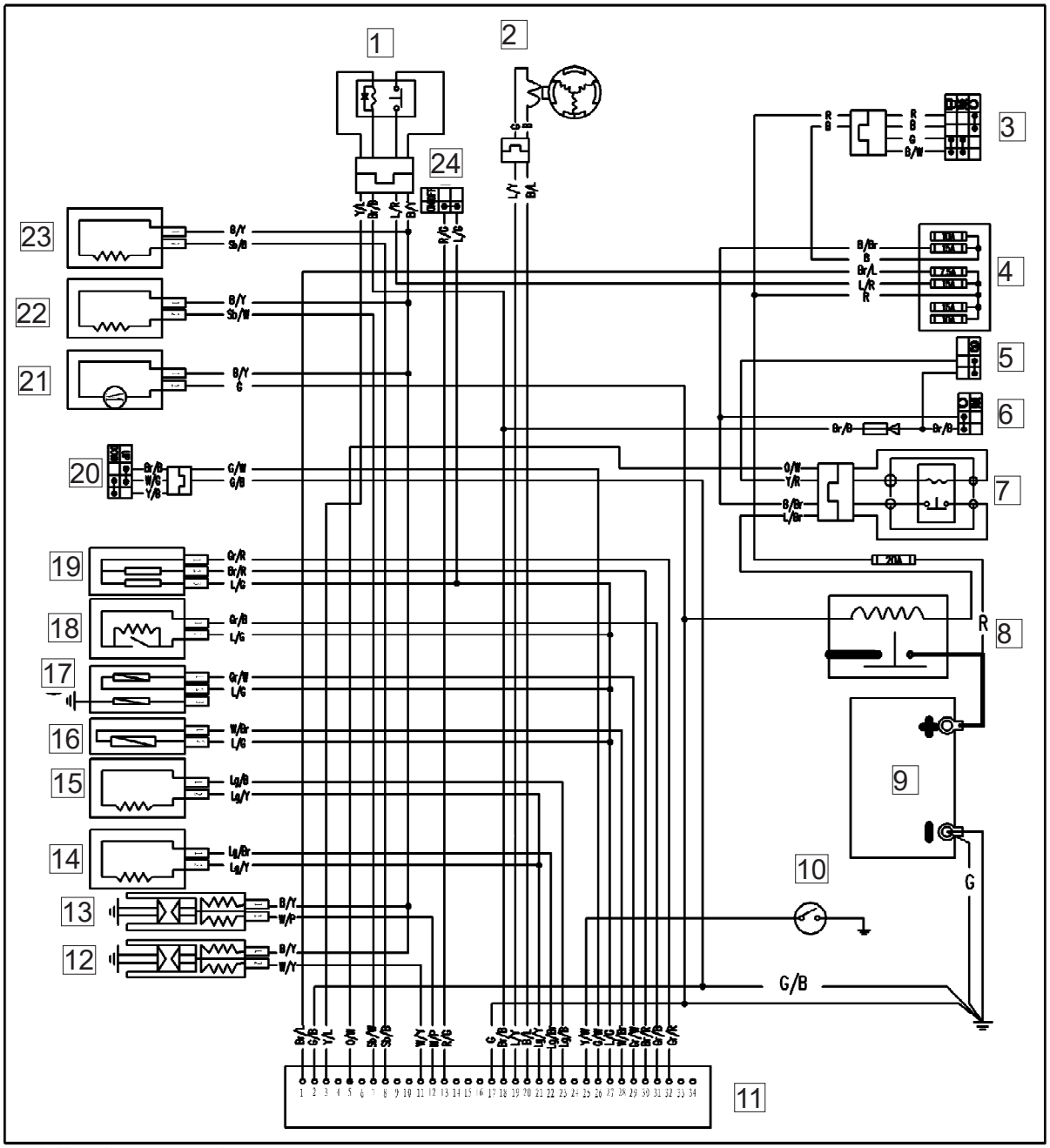
Ignition System

Ignition System Troubleshooting Chart



Ignition System(64 pin ECU for CF650-3)

Ignition System Diagram



1.Fuel pump relay
2.Trigger
3. Ignition switch
4. Fuse box
5. Start button
6. Engine stop switch
7. Start auxilary relay
8. Start relay
9. Battery
10. Neutral switch
11. ECU
12. Ignition coil and spark plug 1
13. Ignition coil and spark plug 2
14. Oxygen sensor 1
15. Oxygen sensor 2
16. TPS
17. Thermo sensor
18. Roll over sensor
19.TPS
20. Sidestand switch
21. Fuel pump
22. Injector 1
23. Injector 2
24. Clutch switch

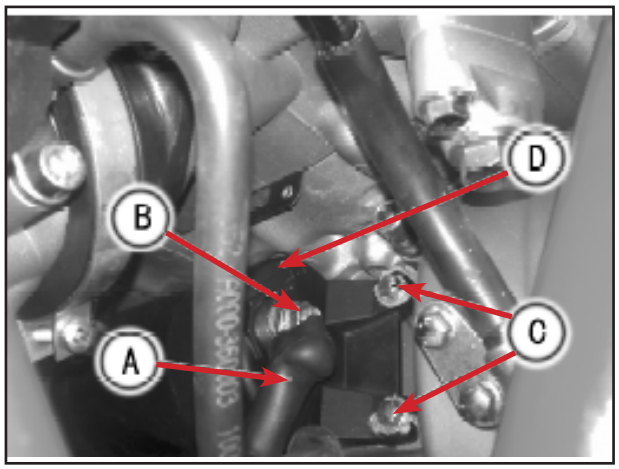
16.9 Starting system

Start motor

CAUTION
Do not tap the starter motor shaft or body. Tapping the shaft or body could damage the motor.

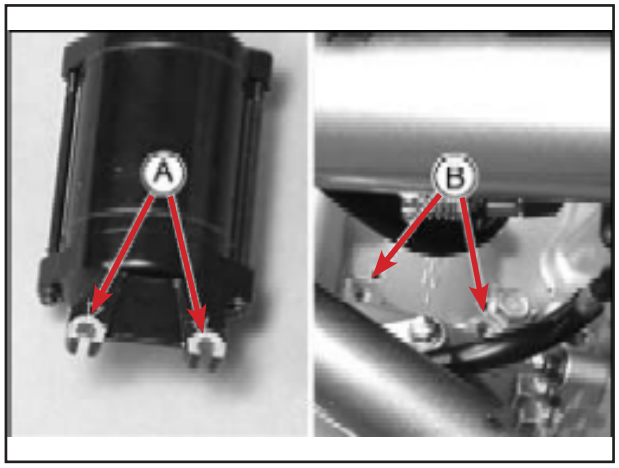
Start motor removal

- Slide out the rubber sleeve [A].
- Remove start motor cable nut [B].
- Remove mounting bolt [C].
- Pull out the start motor [D].



Start motor installation

- When installing the starter motor, clean the starter motor legs [A] and crankcase [B] where the starter motor is grounded.



- Apply grease to the O-ring.
- Tight up the bolt.

Torque-Starter Motor Mounting Bolts: 9.8N·m

- Install the start motor cable.

Torque-Starter Motor Cable Terminal Nut: 6.0N·m

Starter Motor Test

- Using a cable as thick as or thicker than starter motor cable [A], connect the 2 termi-nals of starter relay [B].

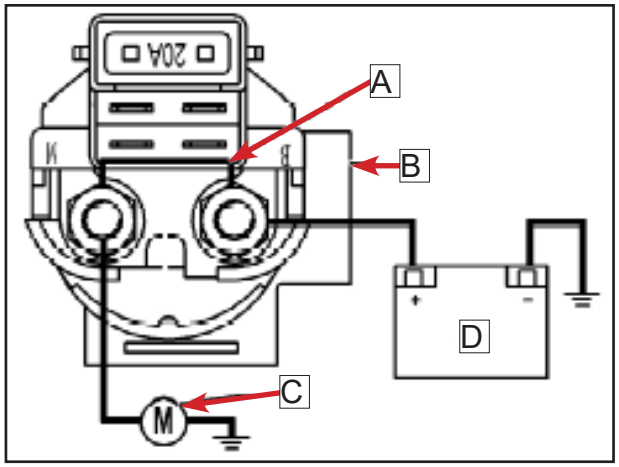
Starter Motor [C]

Battery [D]

Be sure the battery is fully charged.

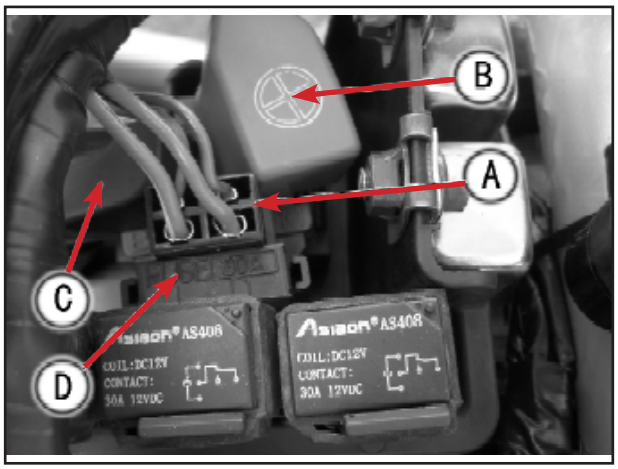
If the starter motor turns, that indicates it's normal.

Otherwise, the starter motor is defective and needs to be replaced.



Starting system
Start relay
Start relay removal

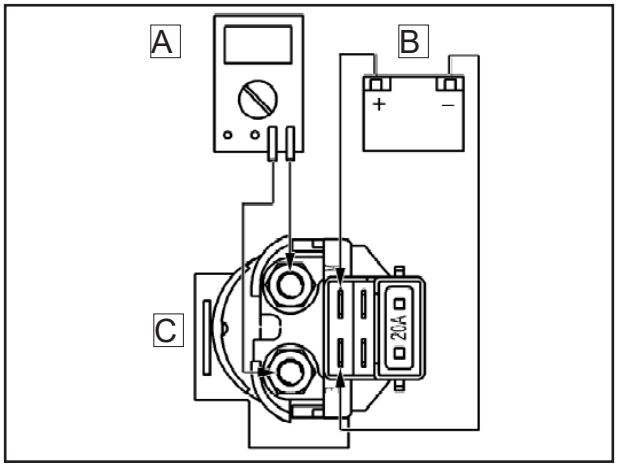
- Remove the tank
- Disconnect the connectors [A].
- Disconnect the start motor cable[C] on start relay[D]and battery (+) cable [B].



Start relay test

- Connect the hand tester [A] and 12V bat-tery [B] to the starter relay [C] as shown.

CAUTION
The battery positive (+) cable with the rubber cap is connected directly to the battery positive (+) terminal even when the ignition switch off, so take care not to short the removed cable to chassis ground.

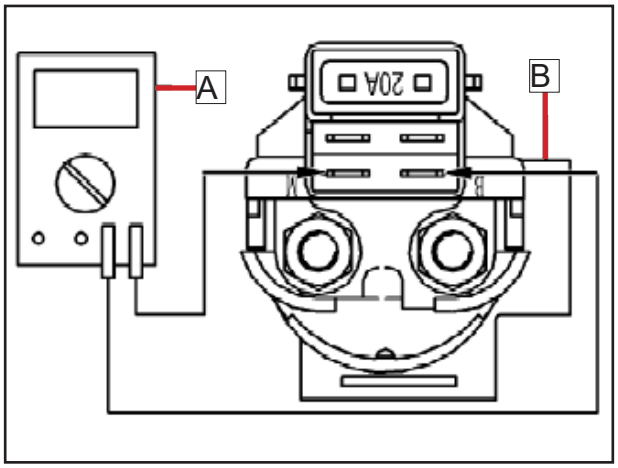


When battery is connected:0Ω
When battery is disconnected:∞Ω

If the relay does not work as specified, the relay is defective. Replace the relay.

Start Relay Resistance Measurement

- Connect the hand tester [A] and starter re-lay [B] as shown.



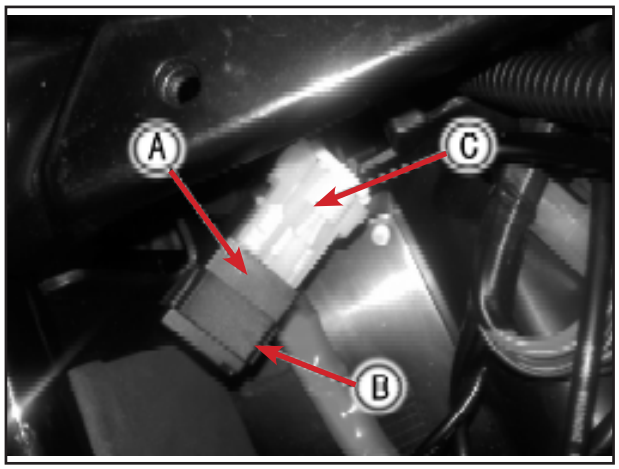
Starter Relay Resistance:3Ω~5Ω(20°C)

If the reading is out of specification, the re-lay is defective. Replace the relay.

Using the relay connection and disconnec-tion test is a more reliable way to determine the condition of the starter relay than starter relay resistance measurements.

Starting system
Start auxilary relay
Start auxilary removal

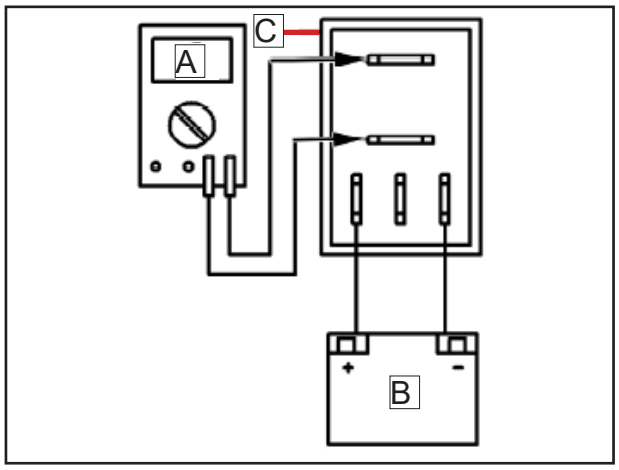
- Remove the tank.
- Take out the auxilary relay[A] with rubber sleeve [B] from the frame.
- Disconnect the connector [C].



Start auxilary relay test

- Connect the hand tester [A] and 12V bat-tery [B] to the starter auxilary relay [C] as shown.

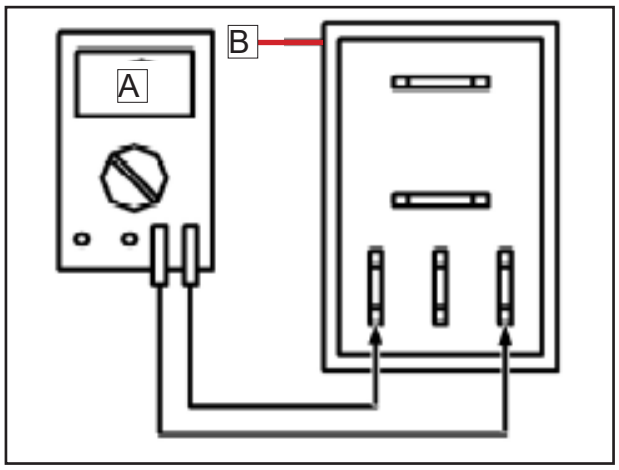
When battery is connected:0Ω
When battery is disconnected:∞Ω
If the relay does not work as specified, the relay is defective. Replace the relay.



Start Auxilary Relay Resistance Measurement

- Connect the hand tester [A] and starter auxilary relay [B] as shown.

Starter Auxilary Relay Resistance: 90Ω~105Ω(20°C)
If the reading is out of specification, the relay is defective. Replace the relay.
Using the relay connection and disconnection test is a more reliable way to determine the condition of the starter relay than starter relay resistance measurements.



Starting system

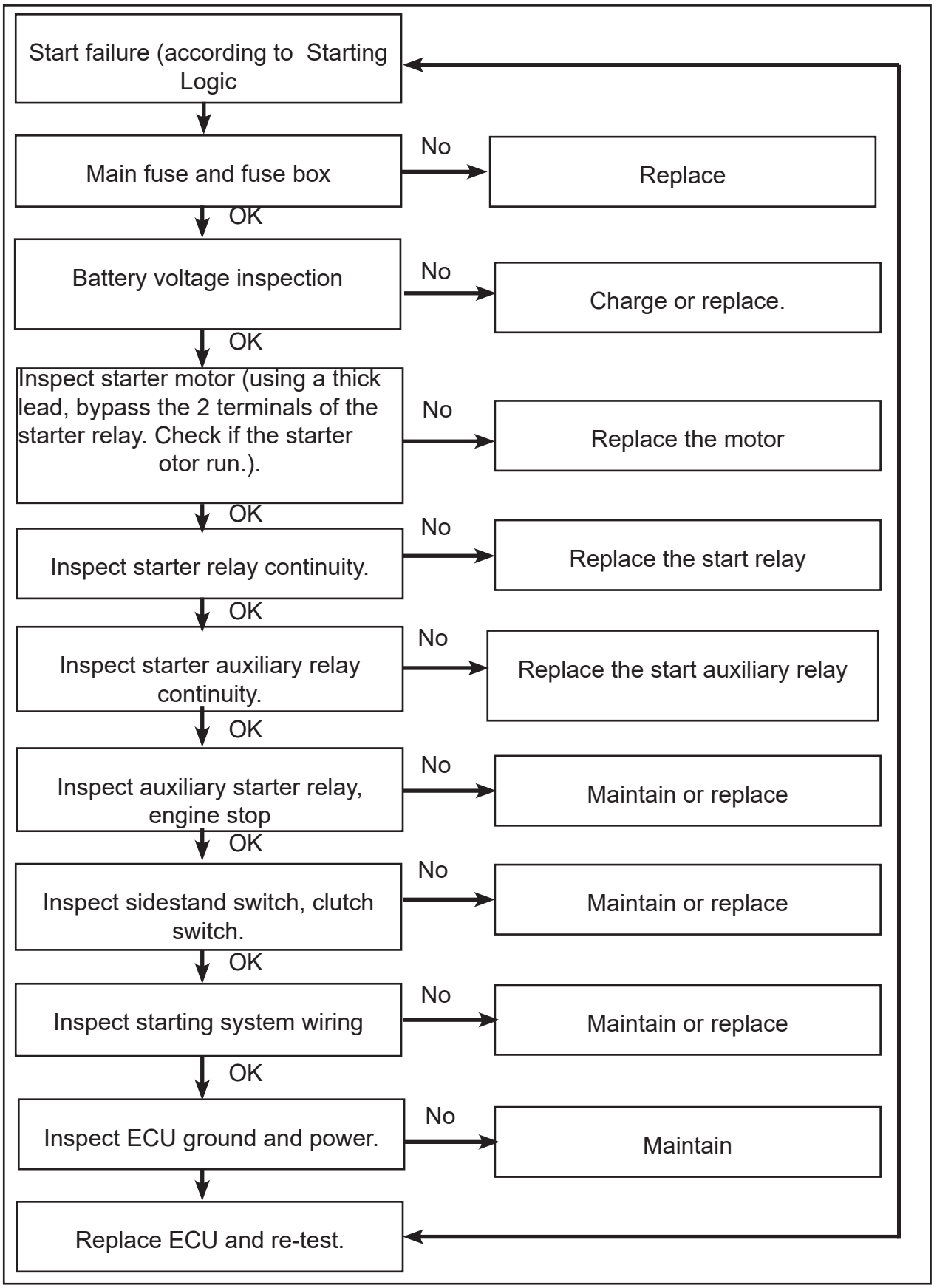
Starting Logic Table

Side stand switch		Gear position		Clutch		Start or cannot
Up	To ground	Neutra	To ground	Loose	Disconnect to ground	Start
Up	To ground	Neutra	To ground	Hold	To ground	Start
Up	To ground	Not Neutral	Disconnect to ground	Neutral	Disconnect to ground	Cannot
Up	To ground	Not Neutral	Disconnect to ground	Hold	To groun	Start
Down	Disconnect to ground	Neutra	To ground	Neutral	Disconnect to ground	Start
Down	Disconnect to ground	Neutra	To ground	Hold	To groun	Start
Down	Disconnect to ground	Not Neutral	Disconnect to ground	Neutral	Disconnect to ground	Cannot
Down	Disconnect to ground	Not Neutral	Disconnect to ground	Hold	To groun	Cannot

- Start the engine according to the Starting Logic Table above, otherwise, the engine can not be started.
- Starting logic is controlled by ECU.
- If the engine can not be started in accordance with the logic table, check sidestand switch, gear position sensor, clutch switch, engine stop switch, ignition switch, starter switch, ECU, fuse, starter relay, starter motor clutch, double gear,etc.

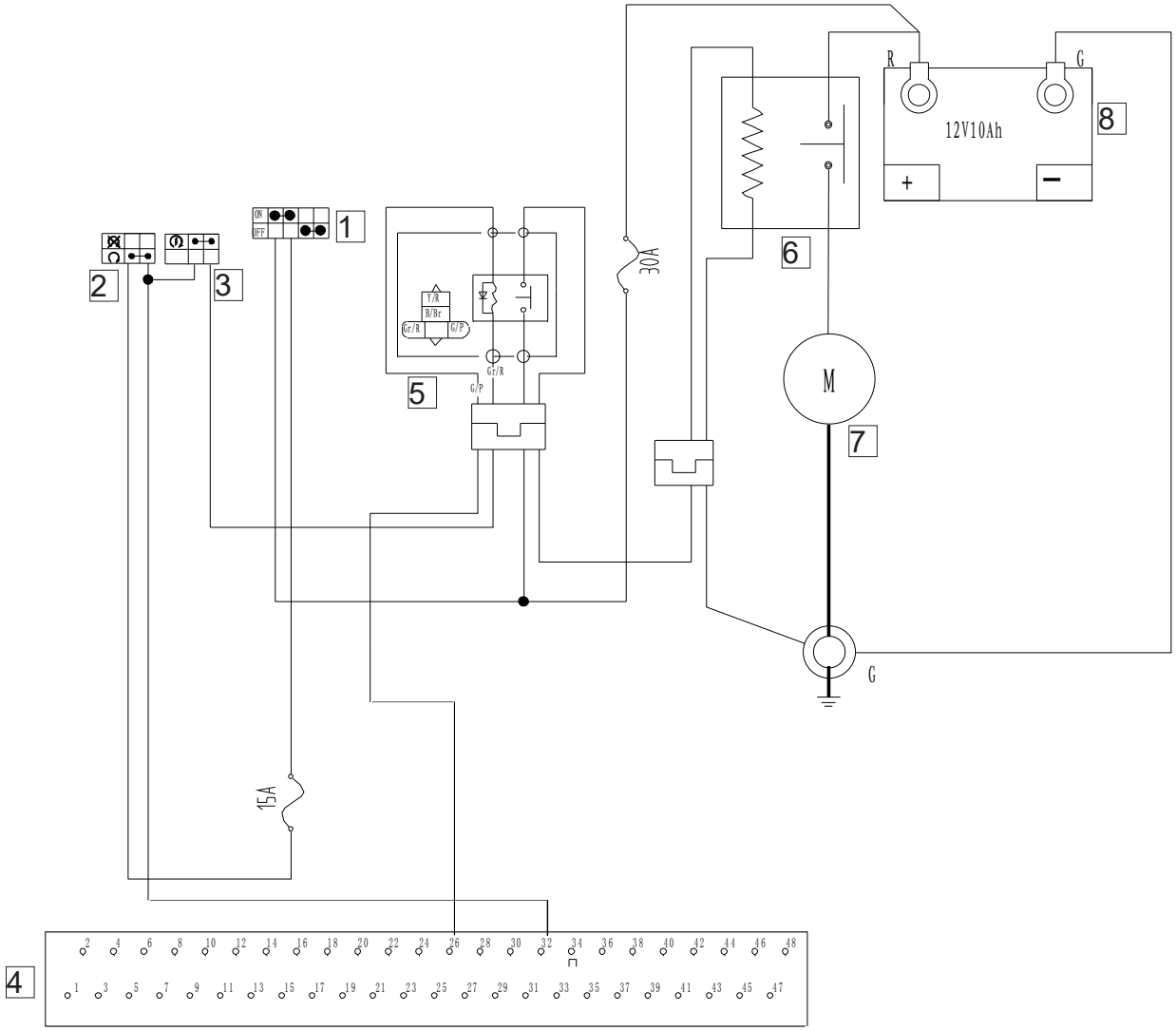
Starting system

Starting system trouble shooting



Starting system(48 pin ECU for CF650-3C)

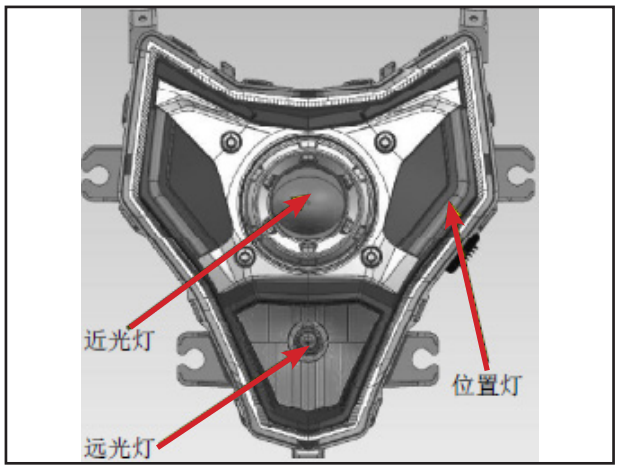
Starting system trouble shooting



1.Ignition switch
2.Engine stop switch
3.Start switch
4.ECU
5.Start auxilary relay
6.Start relay
7.Start motor
8.Battery

16.10 Lighting system

Then motorcycle use fila light with relay. The headlight goes on when the ignition switch and the light switch are turned on.Meanwhile, the head light beam can be switched be-tween high beam and low beam.



Headlight horizontal adjustment

- Refer to headlight inspection in maintenance chapter.

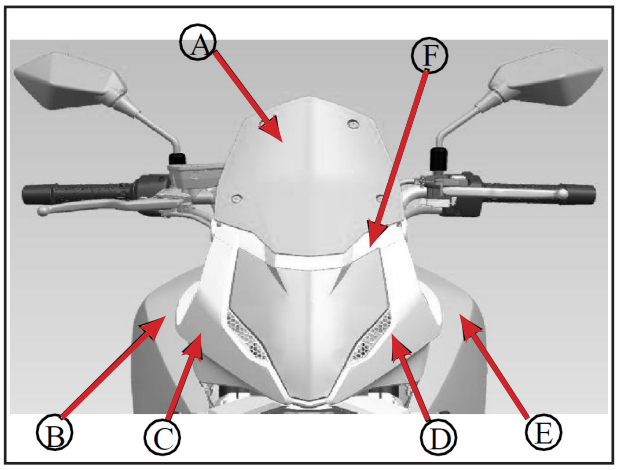
Headlight vertical adjustment

- Refer to headlight inspection in maintenance chapter.

Lighting System
Headlight Removal/Installation

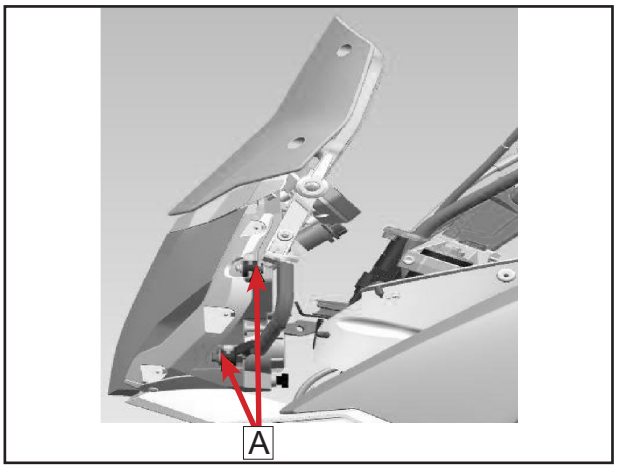
- Remove body covering parts[B], [C],[D],[E].
- Remove the windshield [A].
- Remove plastic parts [F].
- Remove 3 bolts [A].
- Disconnect the headlight connector.

Reverse the removal procedure for installa-tion



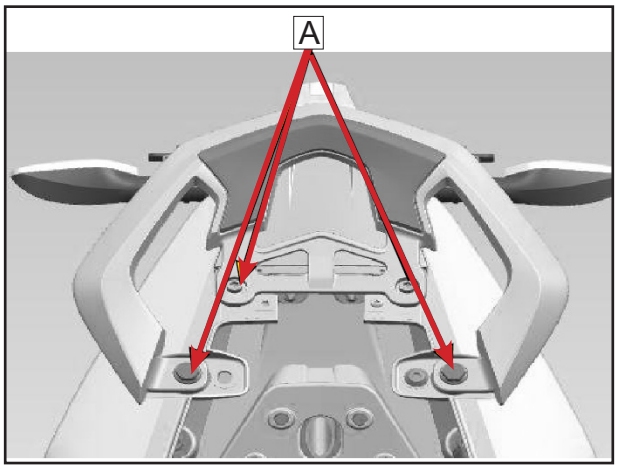
Taillight/ breaking light removal

- Loose 4 bolts on rear handle [A].
- Disconnect the connector
- Remove the taillight.



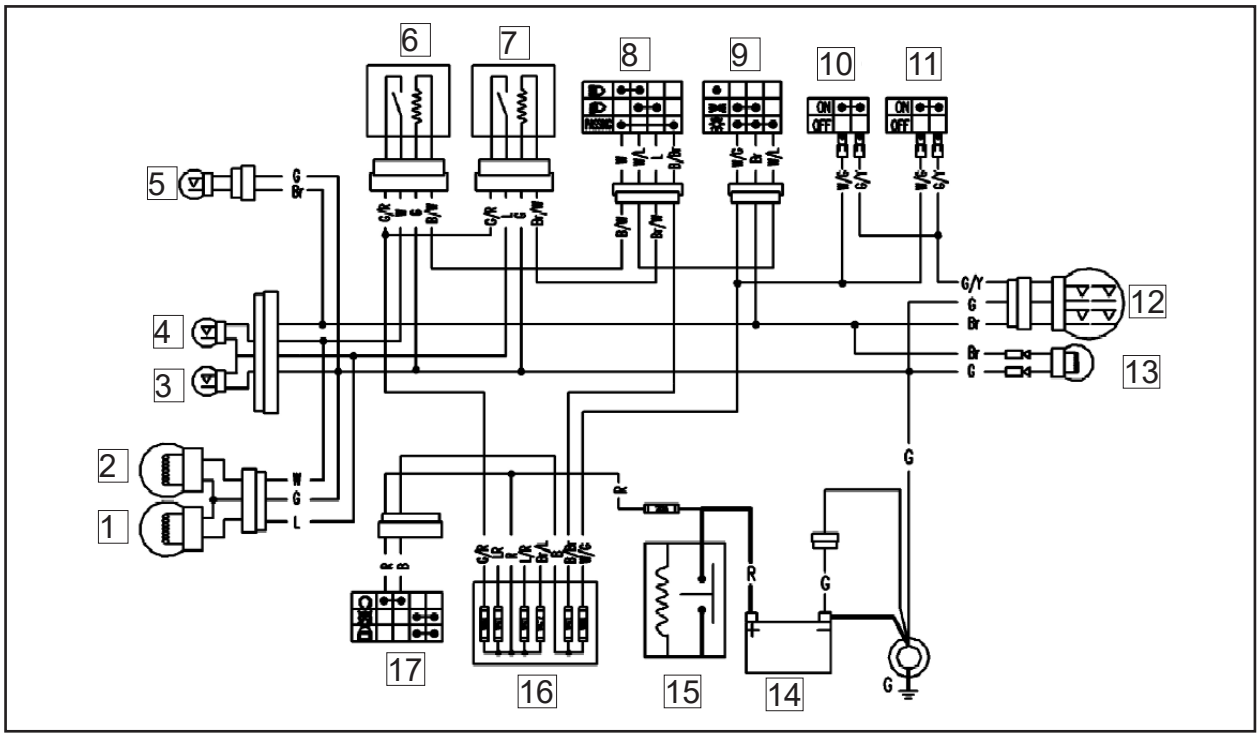
Taillight/ breaking light installation

- Reverse the removal procedure for installaion
- Reverse the whole taillight/breaking assy, because it cannot be seperated.



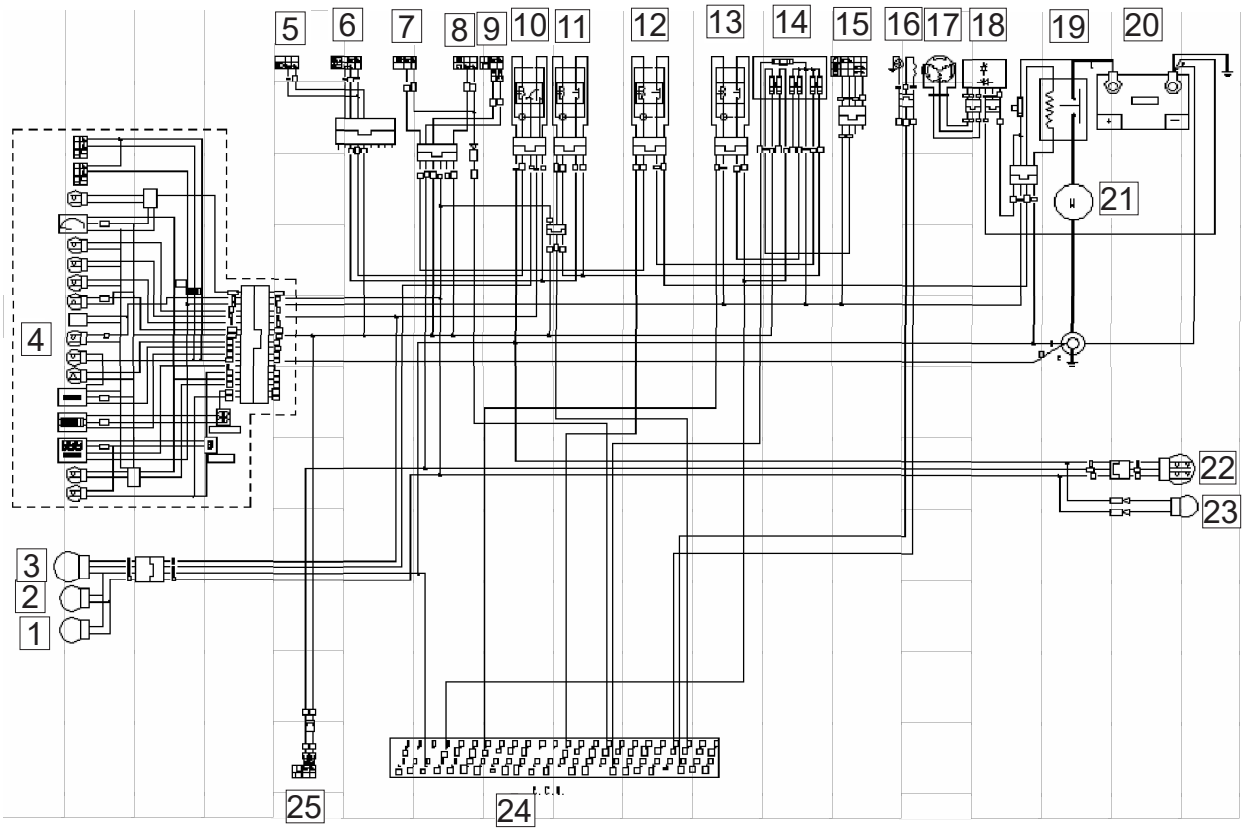
Lighting System(64 pin ECU for CF650-3)

Headlight and position light wiring diagram



1.Headlight(High beam)
2.Headlight (Low beam)
3.High beam indicator
4.Dashboard indicator
5.Position light
6.High beam relay
7.Low beam relay
8.Dimmer switch
9.Light switch
10.Front breaking switch
11.Rear breaking switch
12.Taillight/breaking light
13.Rear licence light
14.Battery
15.Start relay
16.Fuse box
17.Ignition switch

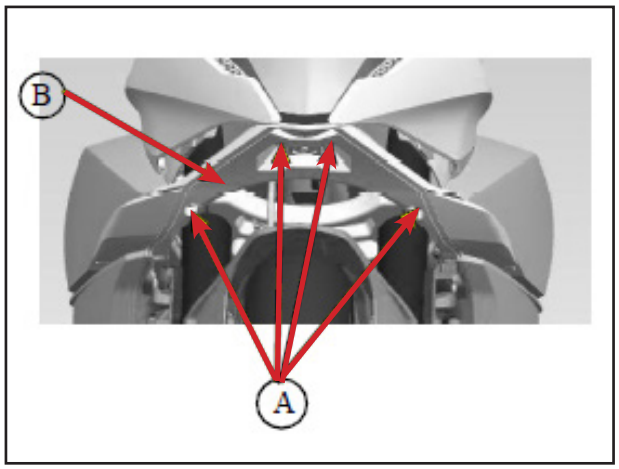
Lighting System(48 pin ECU for CF650-3C)
Headlight and position light wiring diagram



1. Front position light
2. Front position light
3. Low/High beam light
4. Dashboard light
5.Warning light switch
6.Beam switch
7. Start switch
8. Engine stop switch
9. Front Breaking switch
10. High beam relay
11. Low beam relay
12. Start auxilary relay
13. Main relay
14. Fuse box
15. Ignition switch
16. CPS
17.Magneto
18. Rectifier
19. Start relay
20. Battery
21. Start motor
22. Taillight
23. Rear Licence light
24. ECU
25. Rear breaking switch

Lighting System
Turn Signal Light
Front Turn Signal Light Assy RH Replacement

- Loose 4 bolts [A].
- Remove the front plate [B].
- Remove front steering light RH connector.
- Loose 3 steering light mounting screws.
- Remove front steering light RH.
- Reverse the removal procedure for installation.

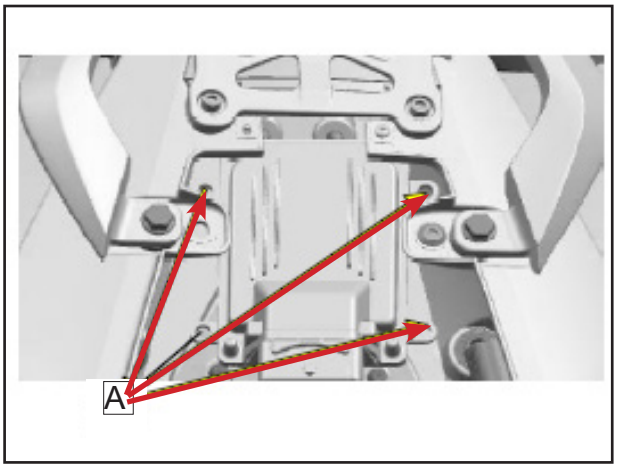


Front Turn Signal Light Assy LH Replacement

- The method is the same as the front turn signal light RH replacement.

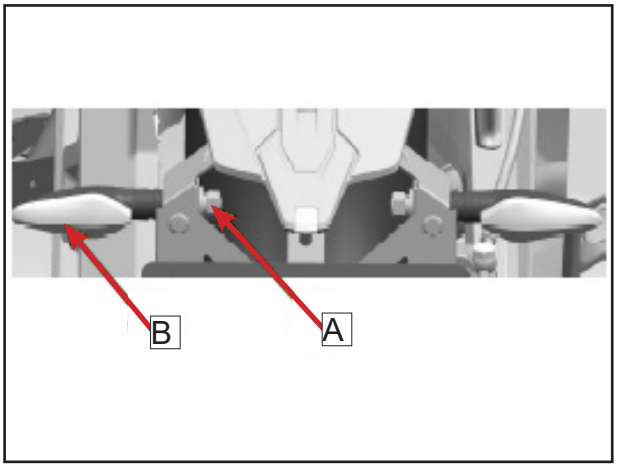
Rear Turn Signal Light Assy RH Replacement

- Remove the seat
- Remove 4 mounting bolts for ECU.
- Unplug the rear turn signal light RH connector.
- Loose up the bolt[A].
- Remove the steering light [B].
- Reverse the removal procedure for installation.



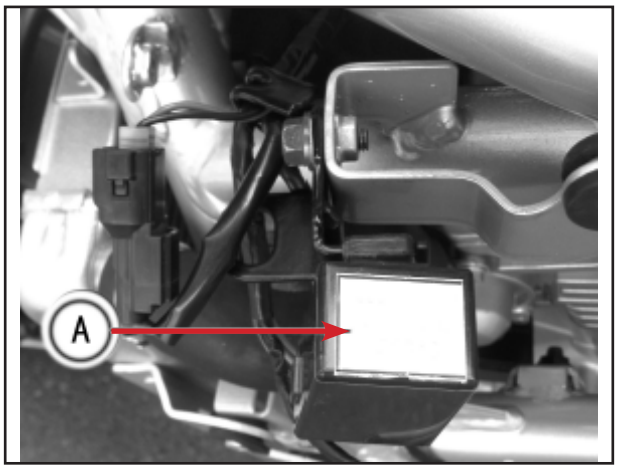
Rear Turn Signal Light Assy LH Replacement

- The method is the same as the front turn signal light RH replacement.



Lighting System
Turn Signal Light
Flasher
Flasher removal

- Remove the bodycovering parts
- Remove the flasher [A].



Flasher inspection

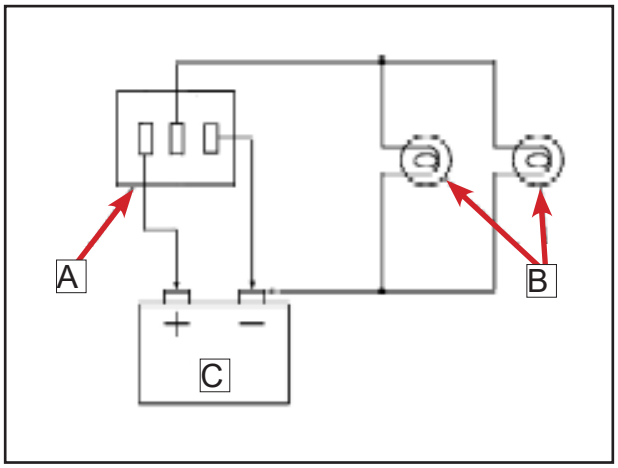
- Connect a 12V battery and turn signal light as shown and count how many times the flasher blinks in one minute.

Flasher [A]
Turn Signal Light [B]
12V Battery [C]
If the flasher does not blink as specifi ed, replace the flasher.

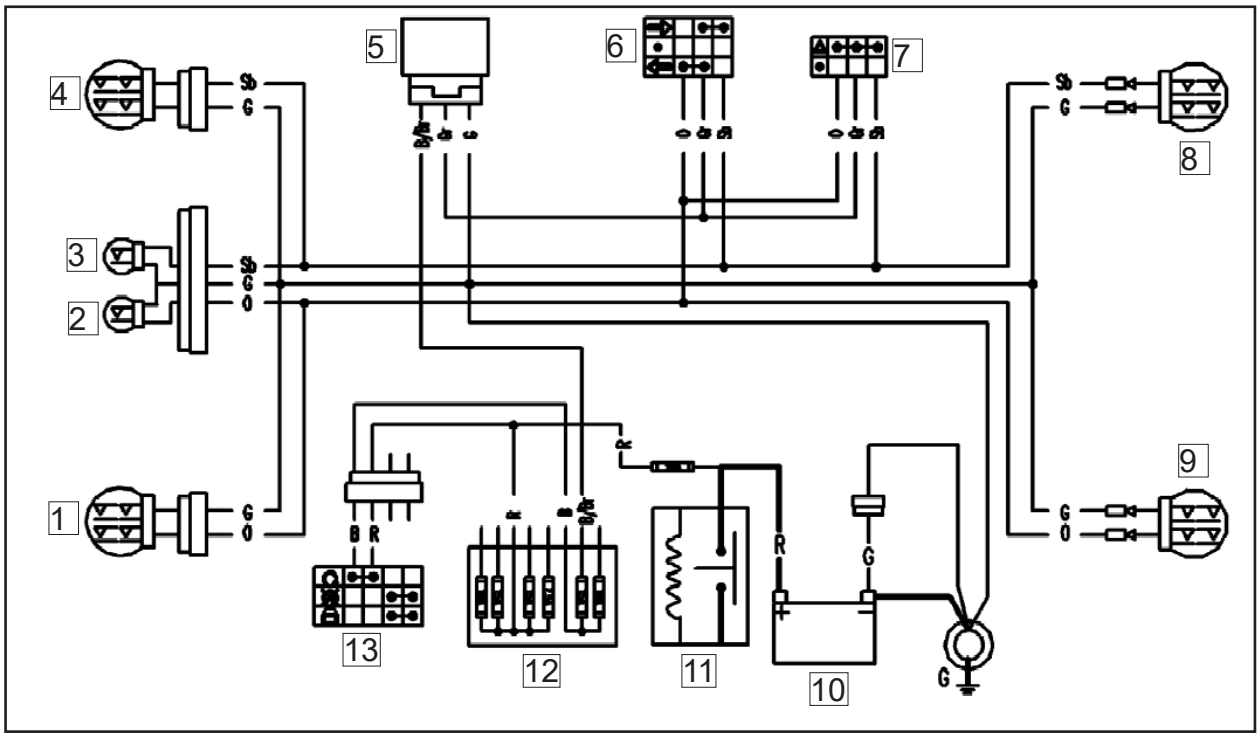
Test the flasher

Steering lights	Blinks(Timis/Min)
1##	150 times or more
2	60~120

1##: Means one light burned.



Light system
Steering light
Steering wiring diagram



1.Front turn signal light LH
2.Turn indicating light LH
3.Front turn signal light RH
4.Turn indicating light RH
5.Flasher
6.Turn signal switch
7.Indicating switch
8.Rear turn signal light RH
9.Rear turn signal light LH
10.Battery
11.Start relay
12.Fuse box
13.Ignition switch

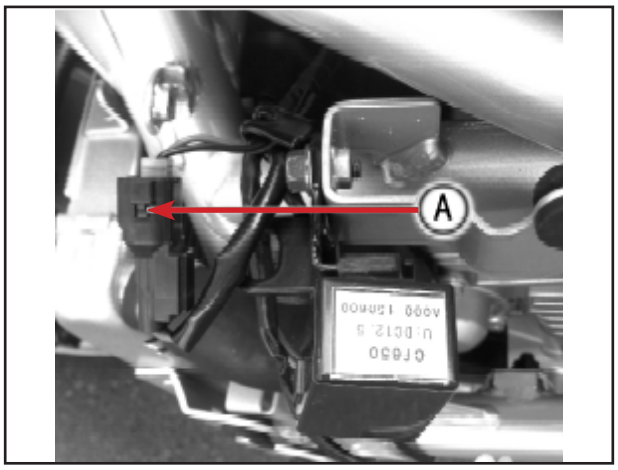
16.11 Radiator fan cooling system

Fan motor

Fan motor inspection

- Disconnect the connector[A].
- Use auxilary line to connect the power and fan motor.

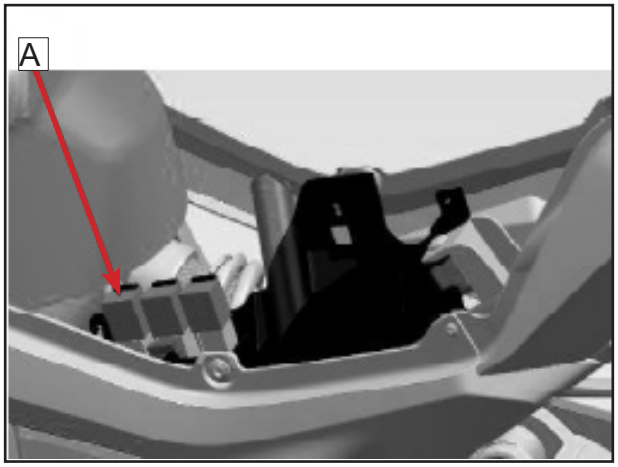
If fan motor doesn't turn. Replace the motor.



Fan relay

Fan relay inspection

- Reove the seat
- Remove body covering parts on the tank.
- Remove the tank.
- Slide out the relay [A] with rubber ring from the frame.
- Unplug the relay.



Fan Relay Test

- Refer to Auxiliary Starter Relay Test.

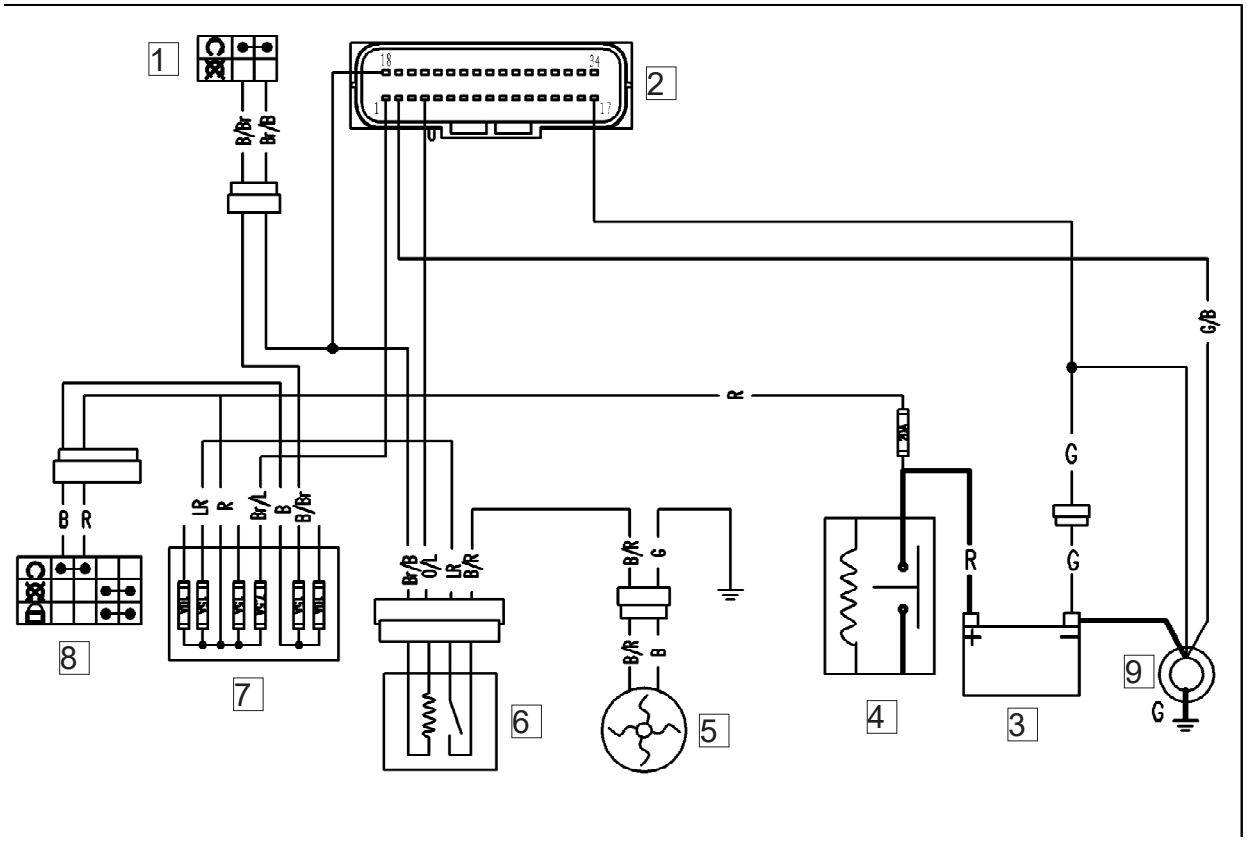
Fan Relay Resistance Measurement

- Refer to Auxiliary Starter Relay Resistance Measurement.

Fan relay and fan motor can be tested with PDA. Using active diagnosis/fan relay test to control fan operation, if it runs, that indicates fan relay and motor , along with the circuit are normal.

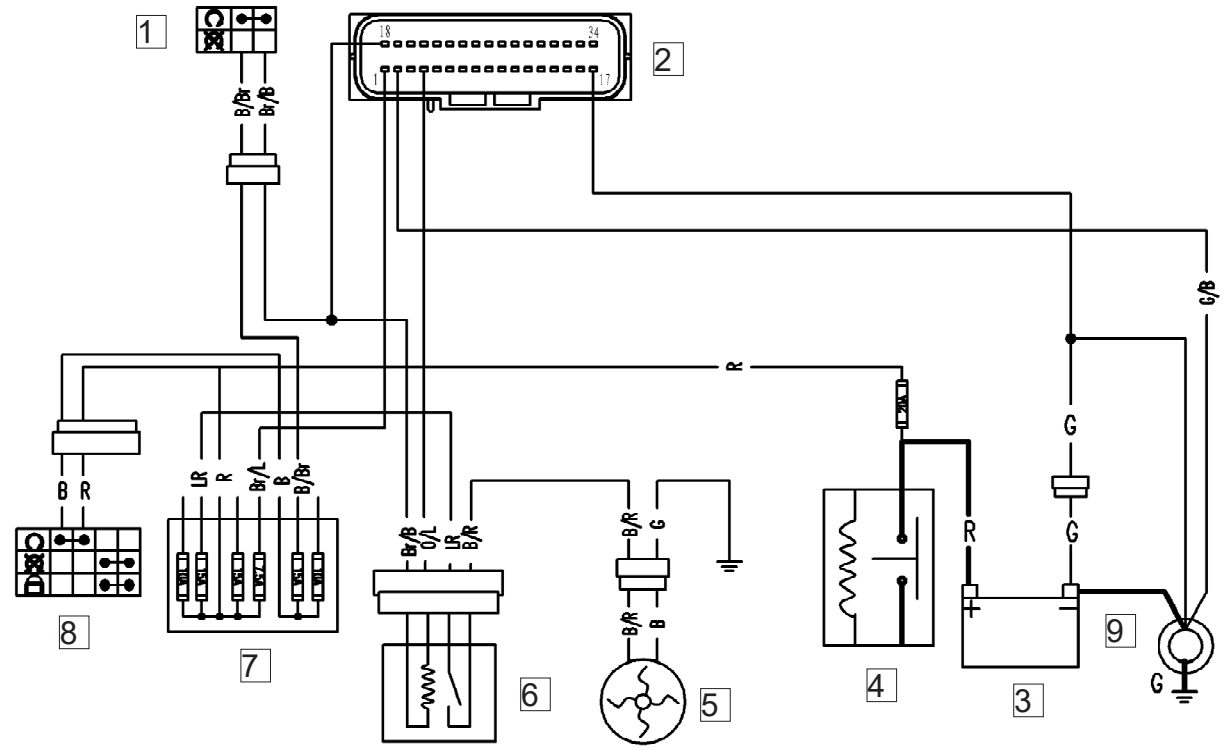
Radiator fan cooling system(64 pin ECU for CF650-3)

Radiator fan cooling system wiring diagram



1.Engine stop switch
2.ECU
3.Battery
4.Start relay
5.Fan motor
6.Fan relay
7.Fuse box
8.Ignition switch
9.ECU

Radiator fan cooling system(48 pin ECU for CF650-3C)
Radiator fan cooling system wiring diagram



1. Battery
2. Start relay
3. Ignition switch
4. Fuse box
5.Fan motor
6. Fan relay
7.Main relay
8. Engine stop switch
9. ECU

16.12 Switches and sensors

Brake Light Timing Inspection

- Refer to the Brake Light Switch Operation Inspection in the Periodic Maintenance chapter.

Brake Light Timing Adjustment

- Refer to the Brake Light Switch Operation Inspection in the Periodic Maintenance chapter.

Switch Inspection

- Using a hand tester, check to see that only the connections shown in the table have con-tinuity (about zero ohms).
- For the switch connections and continuity, refer to the tables given below.

If the switch has an open or short, repair it or repl ace it with a new one.

Front and rear breaking switch		
Color	W/G	G/Y
Press the break pedal(ON)	O———	———O
Release the break peda (OFF)		

Side stand switch connection			
Color	Br/B	W/G	Y/B
UP	O———	———O	
DOWN		O———	———O

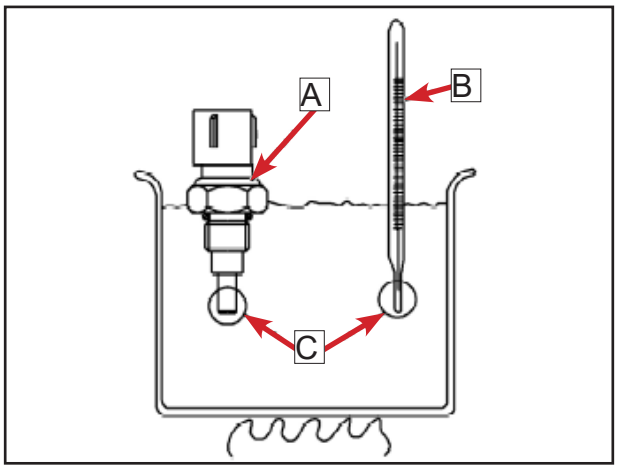
Neutral switch connection		
Color	SW.pin	Ground
In neutral	O———	———O
Not in neutral		

Oil pressure warning light（When the engine well lubricated）		
Color	SW.pin	Ground
Engine stop	O———	———O
Engine running		

Clutch switch		
Color	R/G	L/G
Hold(ON)	O———	———O
Loose(OFF)		

Switches and Sensors
Water temp sensor
Water temp sensor inspection

- Remove the water temp sensor(See EFI chapter removal and installation).
- Suspend the sensor [A] in a container of coolant so hat the temperature-sensing pro-jection [C] and threaded portion [C] are submerged.
- Suspend an accurate thermometer [B] with temperature-sensing projection located in al-most the same depth.

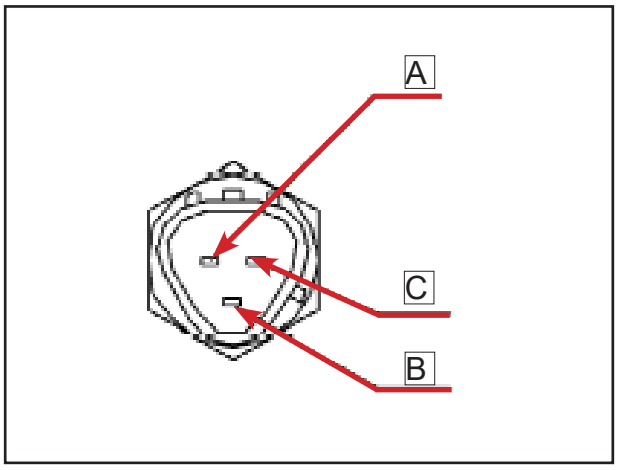


NOTE

The sensor and thermometer must not touch the container side or bottom.

- Place the container over a source of heat and gradually raise the temperature of the coolant while stirring the coolant gently.
- Using the hand tester, measure the inter-nal resistance of the sensor

If the hand tester does not show the speci-fied values, replace the sensor.



Water Temperature Sensor Resistance
See the right table.

A, C pin resistance

Temp.(**°C**)	Resistance(k Ω)
-20	12~18
0	5~7
20	2~3
80	0.3~0.35
100	0.12~0.18

B pin resistance

Temp.(**°C**)	Resistance(Ω)
50	135~220
120	16~20

Switches and Sensors
Water temp sensor
Water temp sensor inspection

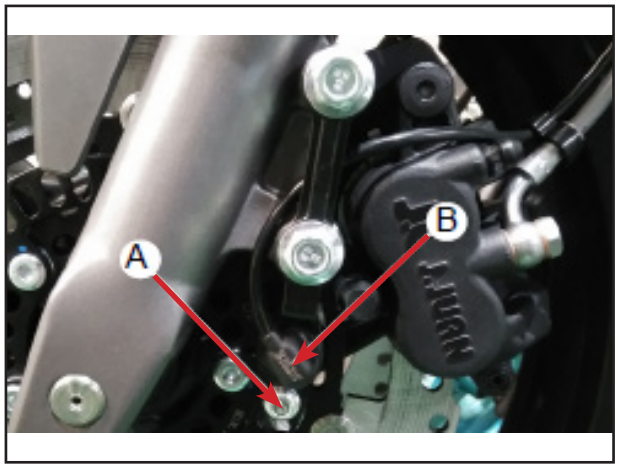
- Disconnect the speed sensor lead connector [A].
- Remove the engine sprocket cover (see Engine Sprocket Removal in the Fi-nal Drive chapter).

- Remove:Bolt[A]
- Remove:Bolt[B]

Speed Sensor Installation

- Installation is the reverse of removal.

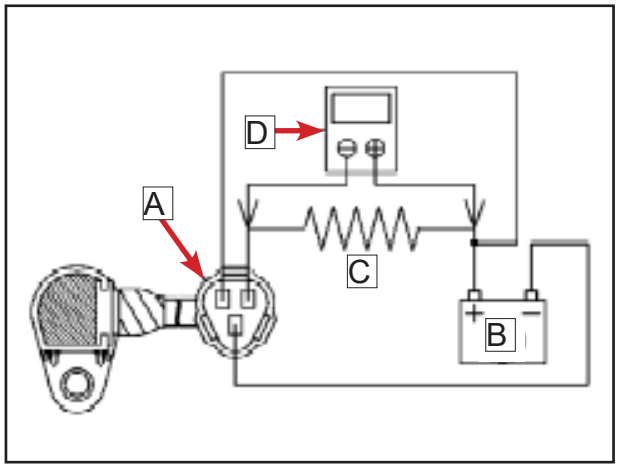
Torque-Speed Sensor Bolt:7N·m

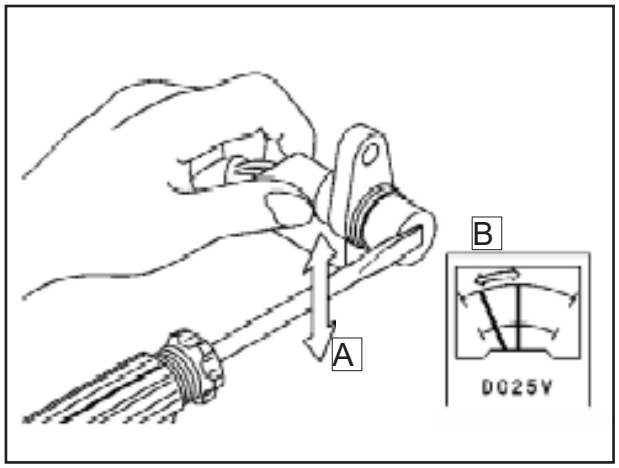


Speed Sensor Inspection

- Remove the speed sensor (see Speed Sensor Removal).
- Connect the speed sensor connector [A] with the battery [B] 10k Ω resistor [C] and hand tester [D] as shown.
- Set the tester to the DC 25V range.
- Trace [A] each side of the speed sensor surface with the screw driver.
- Then the tester indicator should flick [B].

If the tester indicator does not flick, replace

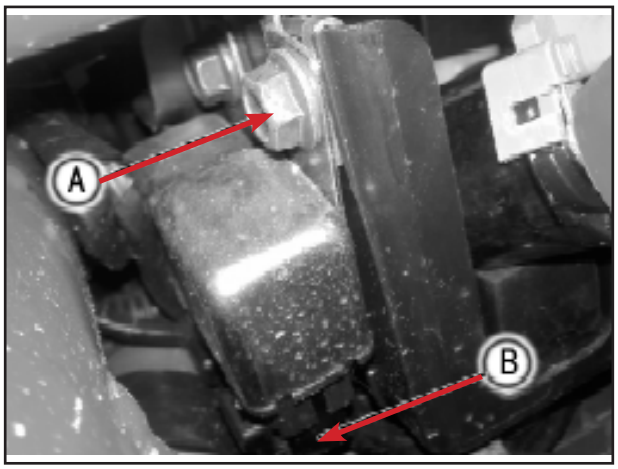




Relay and Fuse
Hi Beam Relay & Lo Beam Relay
Hi Beam Relay Removal

- Remove the fuel tank
- Remove the bolt [A].
- Disconnect the connector [B].

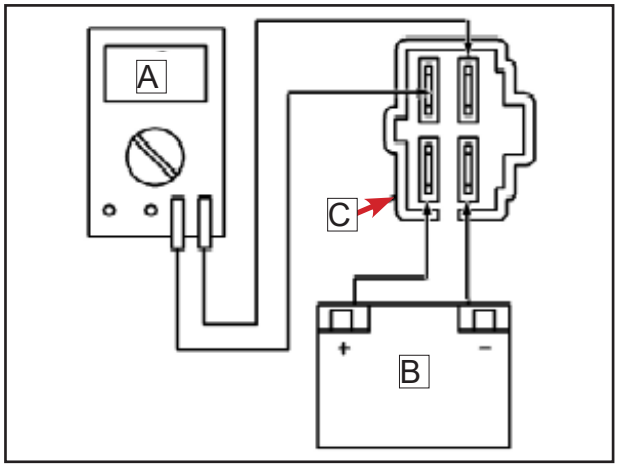
High beam relay installation
Installation is the reverse of the removal.



High beam relay inspection

- Follow the drawing use AVO meter[A] and 12V battery[B] to test the high beam relay [C].

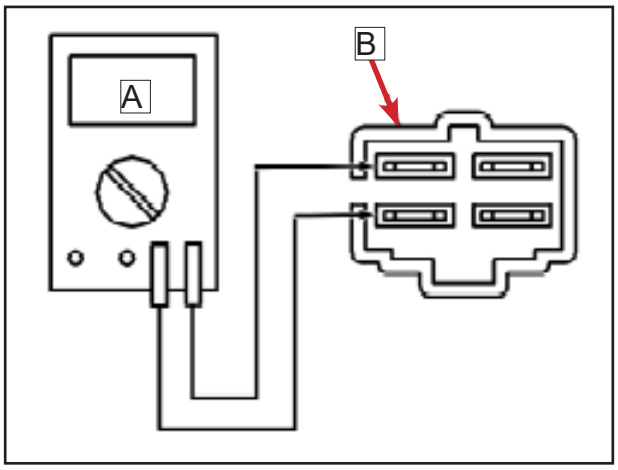
When battery connected:0Ω
When disconnected:∞Ω
If the relay is wrong function. It shows the relay got trouble. Replace the relay.



High beam relay resistane inspection

- Follow the drawing use AVO meter [A] and high beam relay [B].

High beam relay resistance:90Ω~105 Ω(20°C)
If the relay is wrong function. It shows the relay got trouble. Replace the relay.
It is more reliable to use battery connecting inspection then using resistance measurement.
Low beam relay
Low beam relay use the same method as the high beam relay.

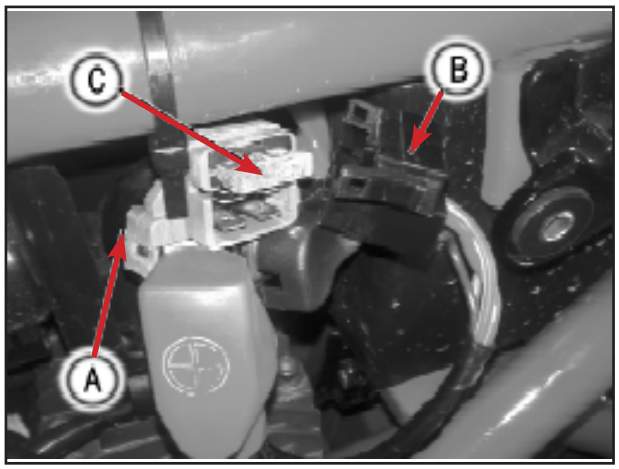


16.13 Relay and Fuse

Main fuse

Main fuse removal

- Remove left side cover
- Remove starter relay [A].
- Disconnect the leads connector[B]
- Pull out the main fuse[C]

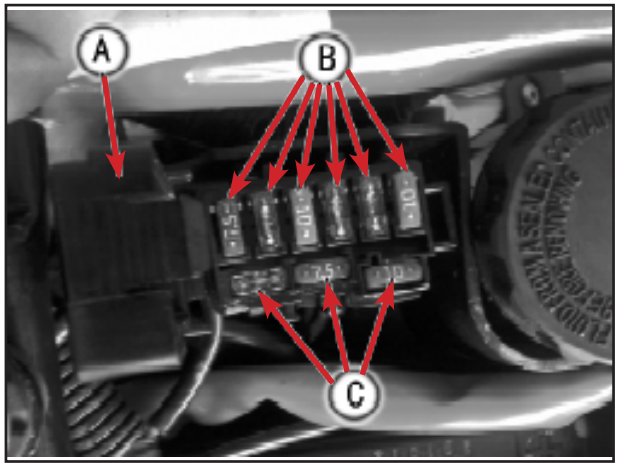


Main Fuse Installation

- Installation is the reverse of removal.

Fuse removal

- Remove the seat
- Pull out the fuse box cover[A].
- Fuses on use [B].
- Auxilary fuse [C].



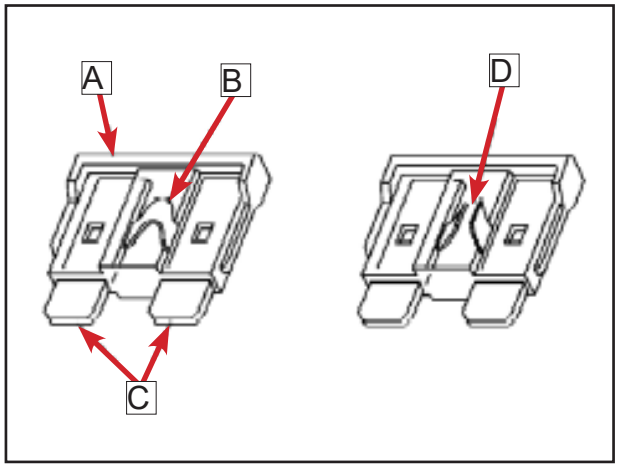
Fuse Box Fuse Installation

- Installation is the reverse of removal.

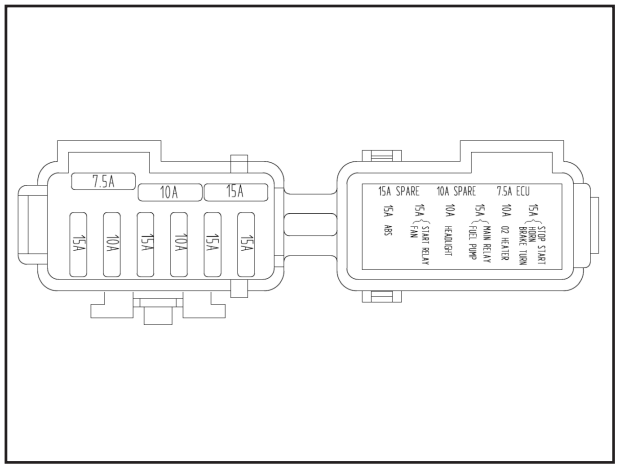
Fuse Inspection

- Remove the fuse .
- Inspect the fuse element.
- If it is blown out, replace the fuse. Before replacing a blown fuse, always check the am-perage in the affected circuit. If the amper-age is equal to or greater than the fuse rating, check the wiring and related components for a short circuit.

Housing [A]
Fuse Element [B]
Terminals [C]
Blown Element [D]

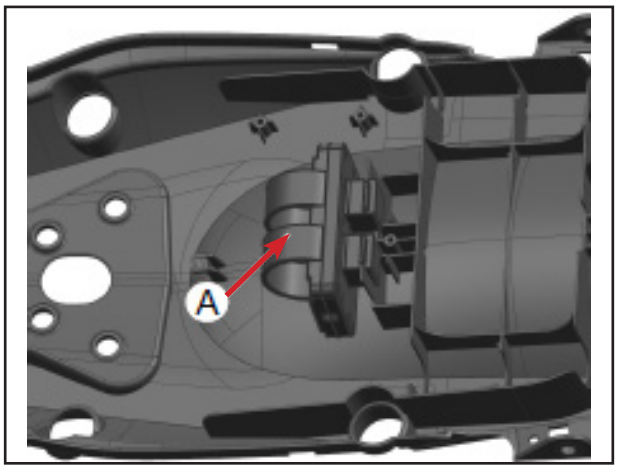


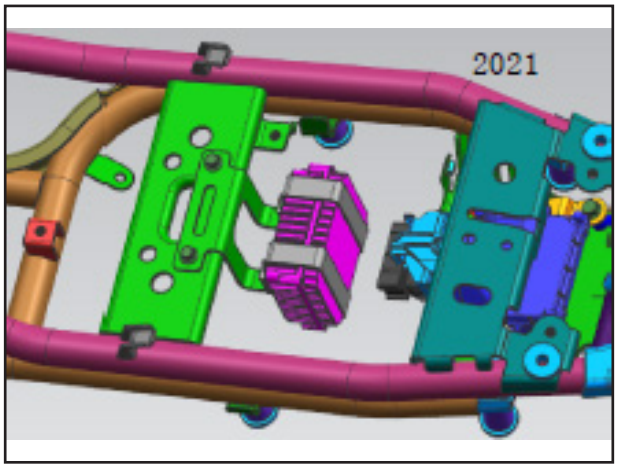
CAUTION
When replacing a fuse, be sure the new fuse matches the specified fuse rating for that circuit. Installation of a fuse with a higher rating may cause damage to wiring and components.



T-BOX
T-BOX is located under the rear seat.

Remove seat.
Unplug connectors.
Remove T-BOX.
Inpection
Inspect T-BOX connectors connection status.

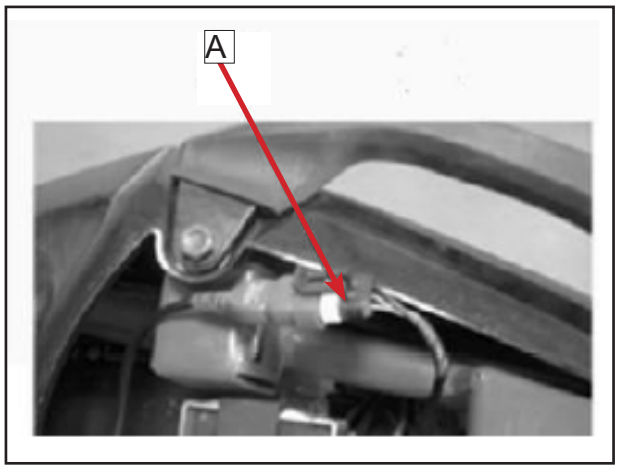




17.1 PDA connections 17-2
17.2 PDA functions 17-3
17.3 Language 17-5
17.4 Auto diagnosis 17-5
17.5 Read DTC 17-6
17.6 Clear DTC 17-7
17.7 Data stream 17-8
17.8 Actuator test 17-13
17.9 Lamp off 17-14
17.10 Read ECU ID 17-15
17.11 ECU Reset 17-15

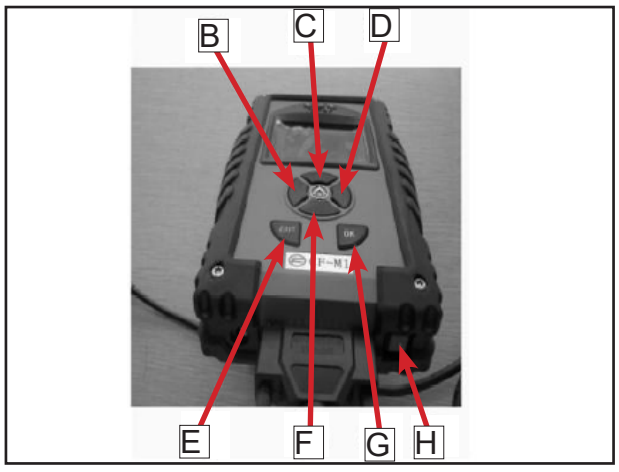
17.1 PDA connections

Open the seat connect the PDA and diagnose cable [A].



Note

Turn off the ignition switch when connecting. And turn the ignition switch on after connected.



Button functions:

Power[H]:PDA power button

Up[C]:Move the arrow up side.

Down[F]:Move the arrow down side.

Left[B]:Turn the page from the left side.

Right[D] :See the items data.
Turn the page from the right.

OK button [G] :Confirm

EXIT[E]:Cancel
Back to upper level:
Back to main menu:

17.2 PDA functions

Connect the PDA turn the ignition switch on. Then turn the PDA on. It will shows the CFMOTO sign(FIG1);

FIG 1

After 3s will shows “ 按确定键换下一步操作 ” (FIG2);

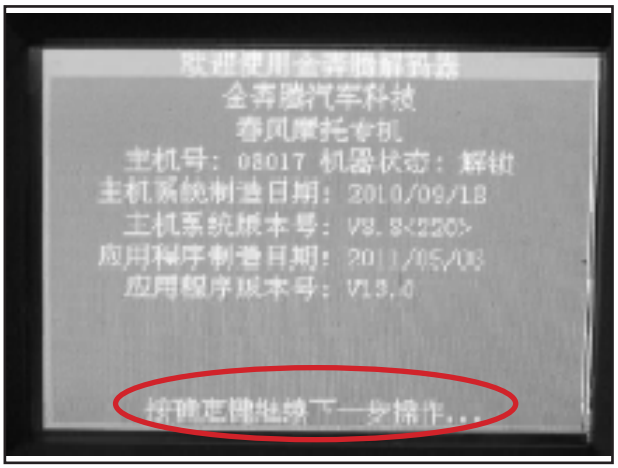


FIG 2

Press OK button to choose function slection.
Choose“ 春风摩托 ” to next step. The screen shows like(FIG3):
1. 春风摩托
2. 演 示 程 序 (Cannot be seted, do not choose)

FIG 3

Press up or down arrow button to choose “ 语 言 (LANGUAGE)”.Then press OK button to continue. The screen shows like this(FIG4)

1. 车辆诊断测试
2. 语言（LANGUAGE）
3. 历史测试记录
4. 系统参数设置
5. 数据流参数维护
6. 帮助

FIG 4

17.3 Language

Press up and down arrow to move the arrow.
Choose“ 语　言 LANGUAGE FIG5” Then press OK button to choose languages. The screen will shows like below(FIG6):

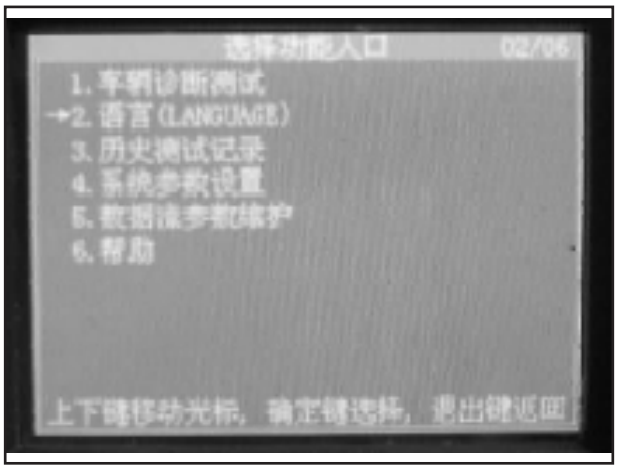


FIG 5

1. 中文 (Chinese)
2. 英文 (English)
Press up and down button to move the arrow to choose “　英　文 English” Then press OK button to back to upper level.

FIG 6

17.4 Auto diagnosis

Press up and down button to move the arrow to choose AUTO DIAGNOSIS item. Then press the OK button to enter the item.(FIG7).

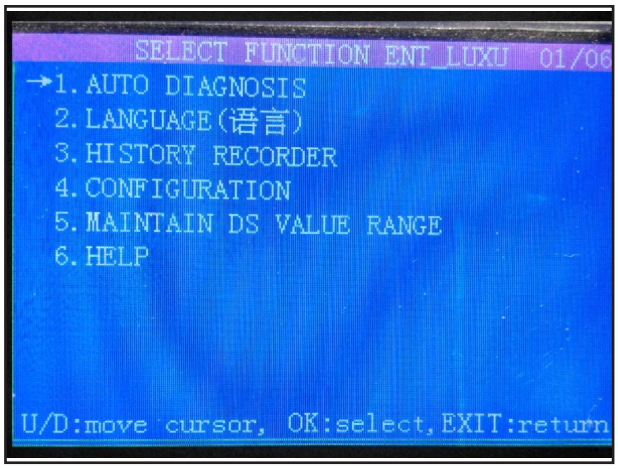


FIG 7

The PDA screen will shows (FIG8)
1.UAES ME3.0 SYSTEM
2.DUCATI SYSTEM
3.DELPHI SYSTEM
4.CF650
5.CF_MOTO_ABS
6.CF_MOTO_EPS
7.UAES ME6.0 SYSTEM

Press up and down arrow to choose UAES ME6.0 SYSTEM to read the ECU.

FIG 8

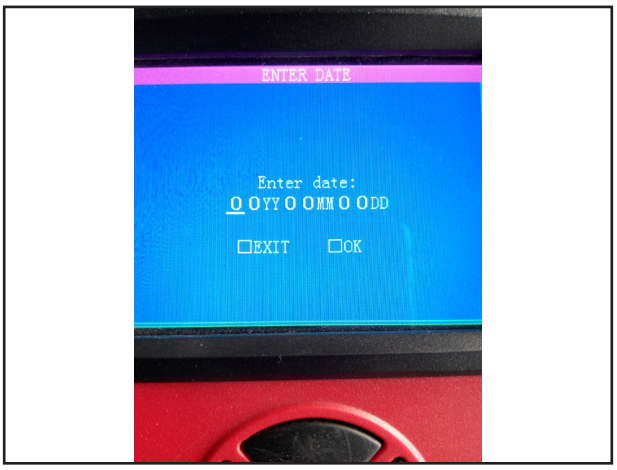
Press OK button to enter the function list. The screen will shows up like below:
READ ECU ID
READ DTC
CLEAR
DATASTREAM
ACTUATOR TEST
ECU RESET

17.5 Read DTC

Press up and down to move the arrow to READ DTC. Then press the OK button.

Press left and right button to choose the trouble code. Then press OK button to enter the trouble code to see trouble discriptions.

Press EXI button to back to the trouble code list. Then press the EXIT button again to en-ter the testing date. After entered the date the screen will shows the tested date.



Without entering work. Press EXIT button to back the upper level.

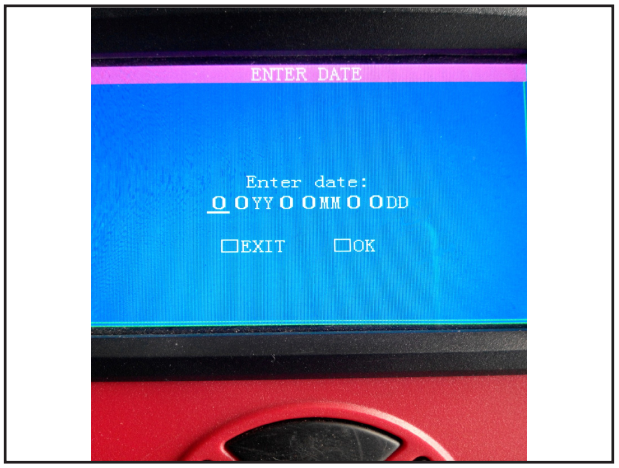
17.6 Clear DTC

Press up or down button to move the arrow to CLEAR DTC. Then press the OK button.

After you pressed the OK button the screen will shows “Clear DTC command has sent!Read DTC again?”

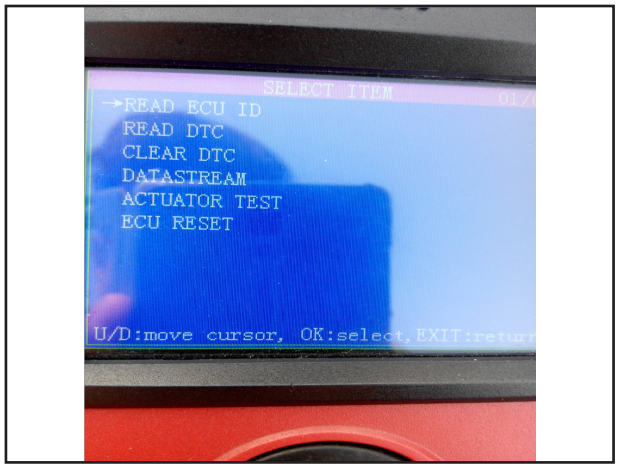
Press OK button the screen will shows “Syetem is OK”

Press the EXIT button to enter the tested date.
Without entering. Press the EXIT button to upper level.

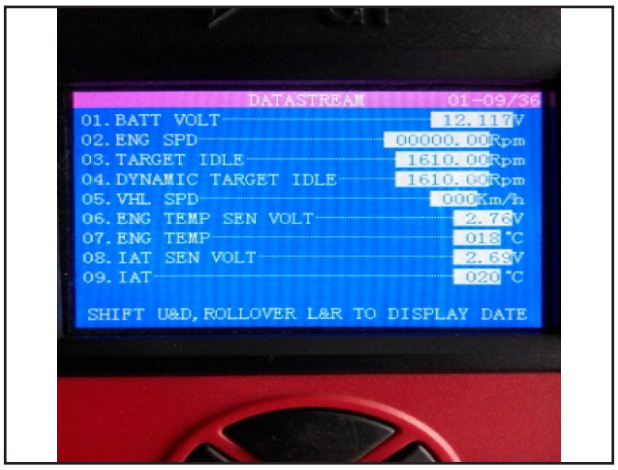


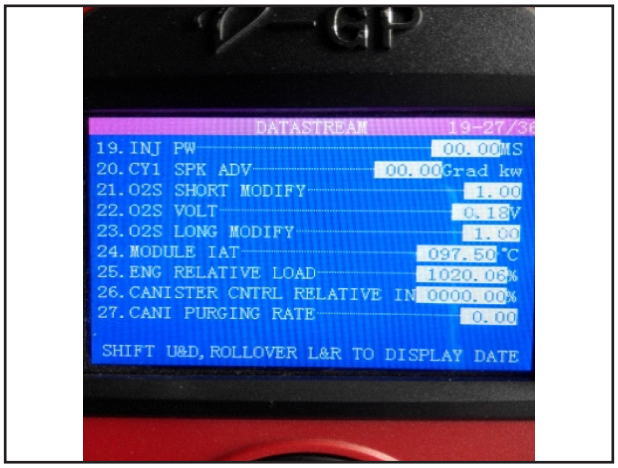
17.7 Data stream

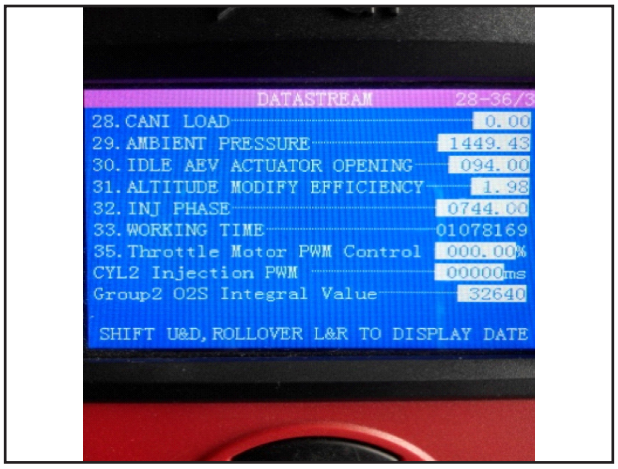
Press up and down to move the arrow to DATASTREAM. Then press the OK button.



Ater pressed the OK button. The datastream will be show up.Like right side. Press left or right button to turn pages.







Datastream contents

1.BATT VOLT
2.ENG SPD
3.TARGET IDLE
4.DYNAMIC TARGET IDLE
5.VHL SPD
6.ENG TEMP SEN VOLT
7.ENG TEMP
8.IAT SEN VOLT
9.IAT
10.IAP SEN VOLT
11.IAP
12.IAV
13.STEP MOTOR TARGET POSIT
14.TP VOLT SIG
15.TP ANGLE SIG
16.RELATIVE TP
17.CANI CNTRL VLV DUTY
18.CHARGING TIME
19.INJ PW
20.CY1 SPK ADV
21.O2S SHORT MODIFY
22.O2S VOLT
23.O2S LONG MODIFY
24.MODULE IAT
25.ENG RELATIVE LOAD
26.CANISTER CENTRL RELATIVE IN
27.CANI PURGING RATE
28.CANI LOAD
29.AMBIENT PRESSURE
30.IDLE AEV ACTUATOR OPENING
31.ALTITUDE MODIFY EFFICIENCY
32.INJ PHASE
33.WORKING TIME
35.Throttle Motor PWM control CYL2 Injection PWM Group2 O2S integral value

CF_MOTO_ABS

Press up and down button to move the arrow. Choose CF_MOTO_ABS. Then press the OK button to see the function slection(FIG32)

FIG 32

After press the OK button the screen will shows like (FIG 33).

READ ECU ID
READ DTC
CLEAR DTC
DATASTREAM
ACTUATOR TEST
ECU RESET

FIG 33

ECU RESET

Press up and down button to choose READ DTC. Then press the OK button to see the DTC list(FIG34)

FIG 34

Press left and right button to choose the trouble code and press OK button to see the trouble discription(FIG12)

FIG 35

Press the EXIT button to return the code list. Then press the EXIT button again to enter the tested date. The screen shows the date Without entering. Press the EXIT button to upper level list(FIG37)

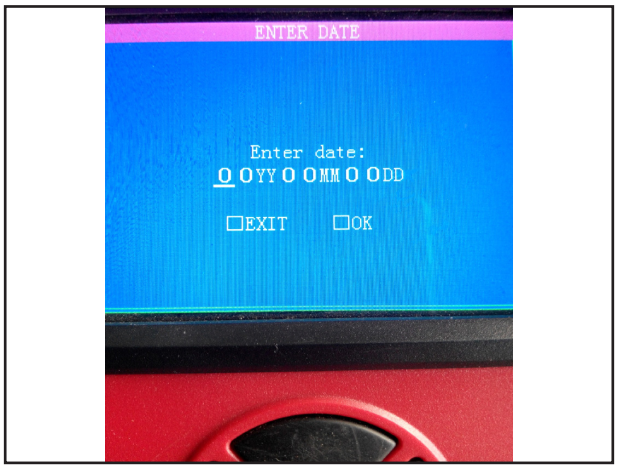


FIG 37

CLEAR DTC

Press up and down button to move the arrow.Choose the CLEAR DTC and press the OK button(FIG38)

FIG 38

After press the OK button. The screen shows “Clear DTC command has sent!Read DTC again?”(FIG39)

FIG 39

Press OK button shows “System is OK ”(FIG40)

FIG 40

Press the EXIT button to return the code list. Then press the EXIT button again to enter the tested date. The screen shows the date(FIG41)
Without entering. Press the EXIT button to upper level.

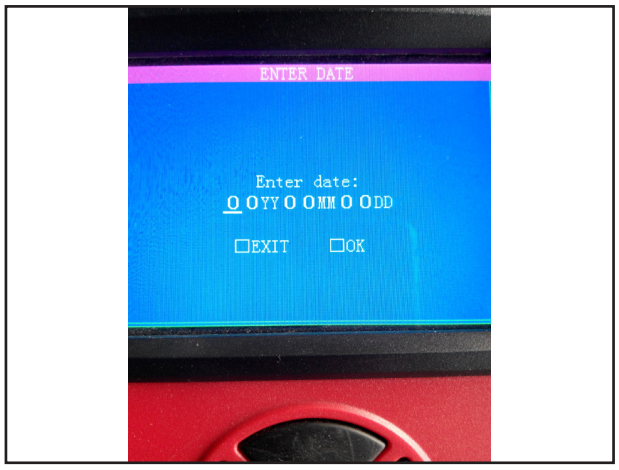


FIG 41

DATASTREAM

Press up and down button to move the arrow. Choose the DATASTREAM and press the OK button(FIG42).

FIG 42

After press the OK button. The screen will shows the data stream. The screen will shows like below(FIG43).

Datastream item

1.ABS Switch-raw signal
2.ABS Switch, system status
3.Reference Voltage
4.Pump
5.Connector PIN 30
6.External Vcc
7.Front Sensor
8.Rear Sensor

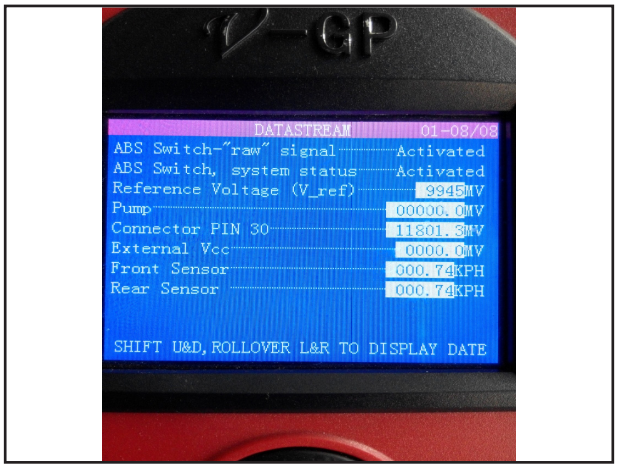


FIG 43

17.8 Actuator test

Press the up and down button to move the arrow. Choose ACTUATOR TEST and press the OK button(FIG44).

FIG 44

After pressed the OK button the screen will shows the testing items for choose like (FIG 45).

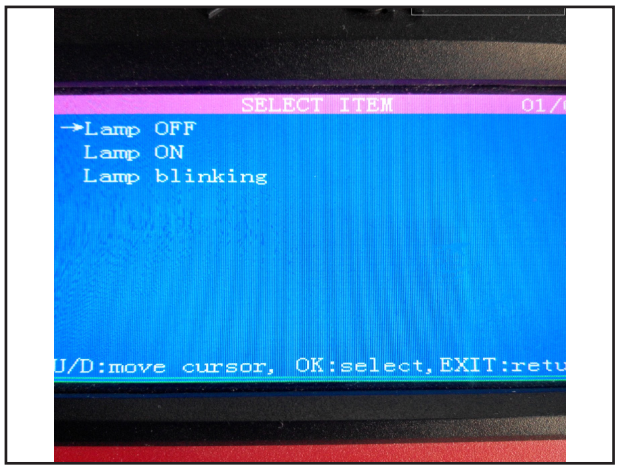


FIG 45

17.9 Lamp off

Press up and down button to move the arrow. Choose the “Lamp OFF” item.
Press OK button the screen shows on testing(FIG 46).

FIG 46

After 3s.The screen shows NO ACTUATOR CONTROL LIMIT. Then press the EXIT but-ton to upper level(FIG47).
Then Lamp on and Lamp blinking test are handle in the same way.

FIG 47

17.10 Read ECU ID

Press the up and down button to move the arrow. Choose READ ECUID(FIG48).

FIG 48

Press the OK button to see the ECU version information that the screen will shows(FIG49).
Press EXIT button to upper level.

FIG 49

17.11 ECU Reset

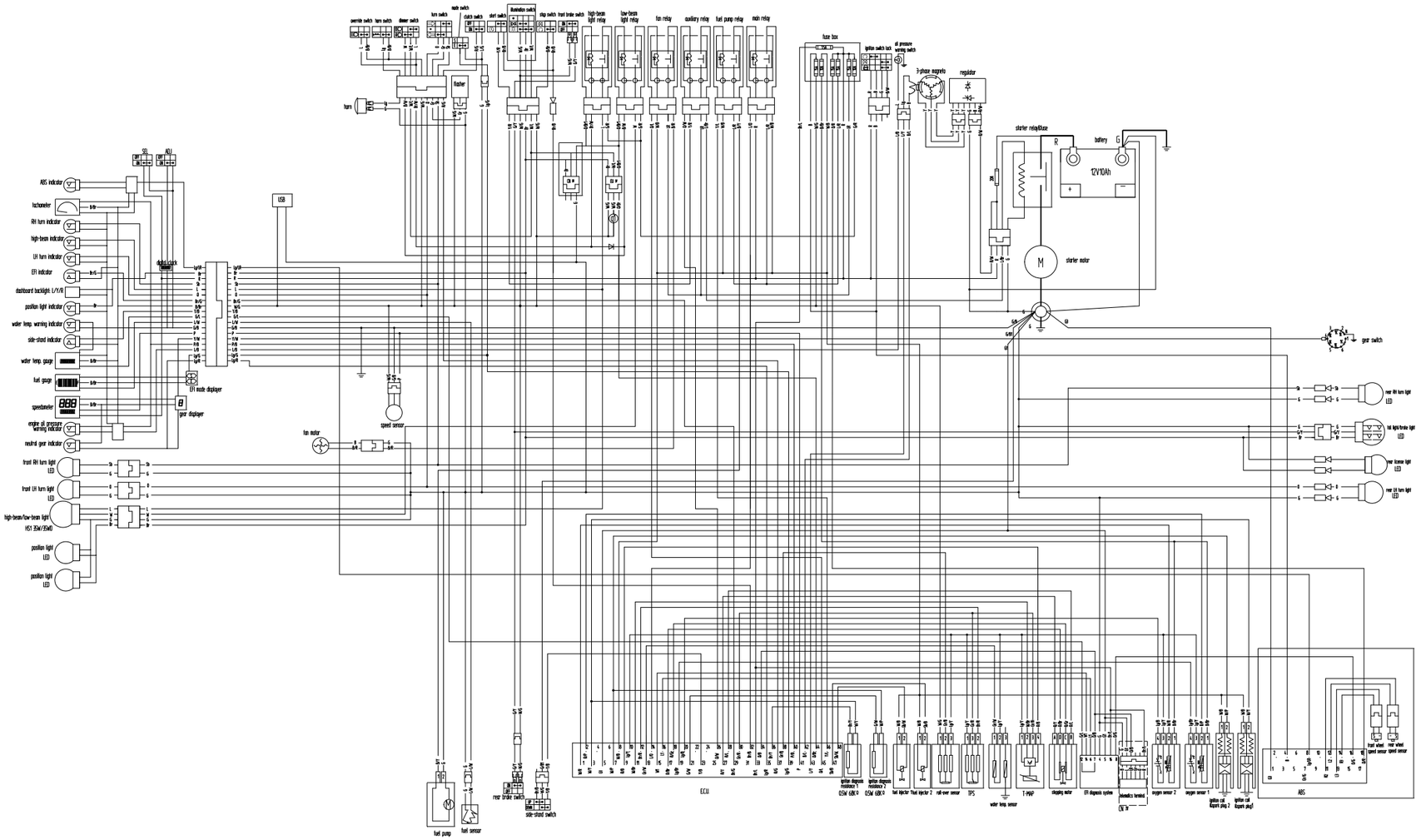
Press up and down arrow to move the arrow. Choose ECU RESET and press the OK button(FIG50).

FIG 50

After press the OK button. The screen will shows “Communicate with auto ECU error!” (FIG51)
Press EXIT button to upper level.

FIG 51

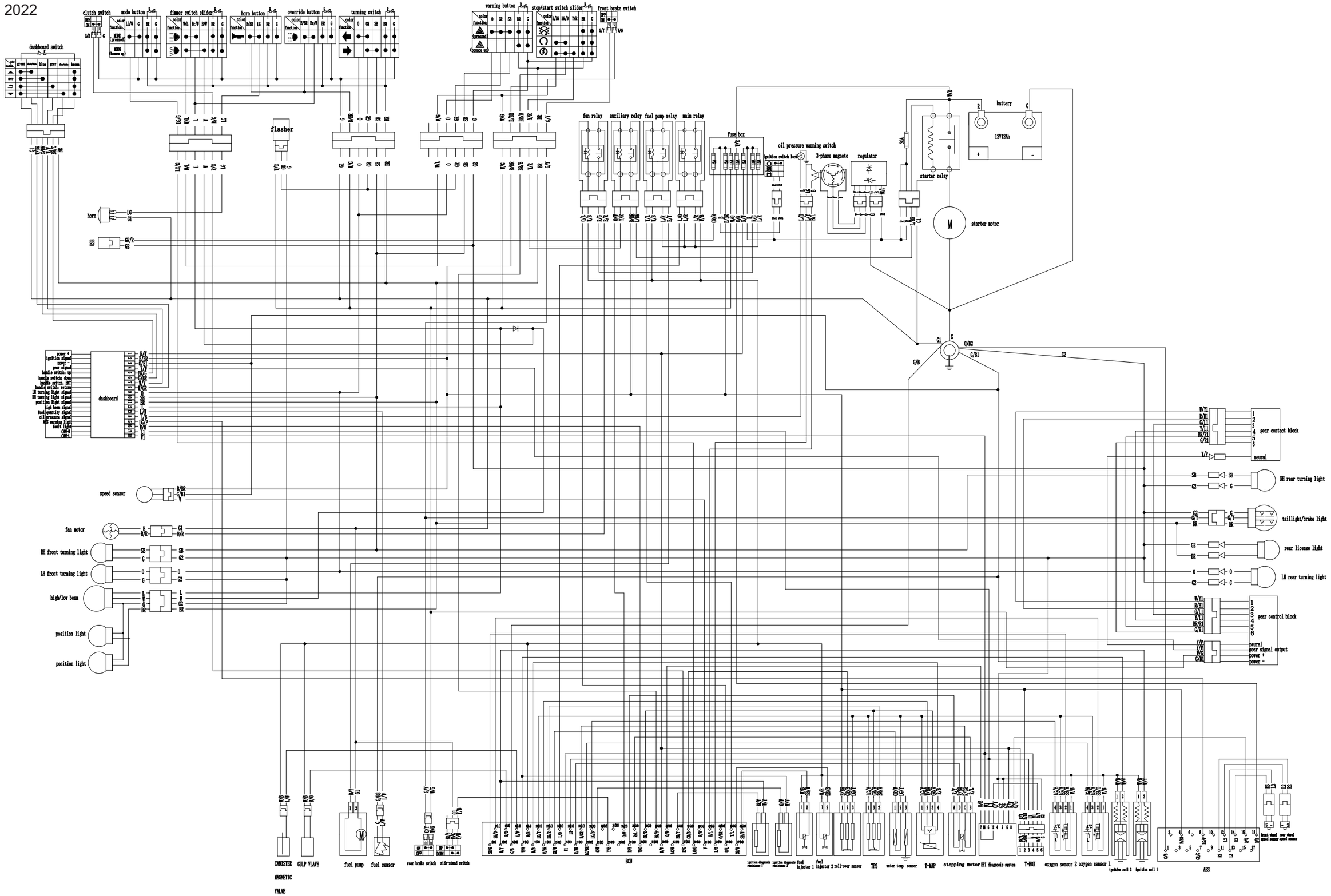
Ignition System(48 pin ECU for CF650-3C)
Ignition System Diagram



Color table:

Code	R	R/Br	R/Y	R/G	R/L	R/P	R/Gr	R/W	R/B	O	O/Br	O/R	O/G	O/L	O/W	O/B	Y	Y/R	Y/L	Y/W	Y/B	G	G/R	G/Y	G/L	G/W	G/B	L	L/Br	L/R	L/O	L/Y	L/G	L/W	L/B	LR	Sb/B
Color	Red	Red/ Brown	Red/ Yellow	Red/ Green	Red/Blue	Red/ Purple	Red/Grey	Red/ White	Red/ Black	Orange	Orange/ Brown	Orange/ Red	Orange/ Green	Orange/ Blue	Orange/ White	Orange/ Black	Yellow	Yellow/ Red	Yellow/ Blue	Yellow/ White	Yellow/ Black	Green	Green/ Red	Green/ Yellow	Green/ Blue	Green/ White	Green/ Black	Blue	Blue/ Brown	Blue/Red	Blue/ Orange	Blue/ Yellow	Blue/ Green	Blue/ White	Blue/ Black	Light red	Sky Blue /Black
Code	Br	Br/R	Br/Y	Br/G	Br/L	Br/W	Br/B	P	P/B	Gr	Gr/R	Gr/G	Gr/W	Gr/B	W	W/Br	W/R	W/Y	W/G	W/L	W/P	W/B	B	B/Br	B/R	B/Y	B/L	B/W	Lg	Lg/Br	Lg/R	Lg/Y	Lg/G	Lg/B	Lg/LR	Sb	Sb/W
Color	Brown	Brown/ Red	Brown/ Yellow	Brown/ Green	Brown/ Blue	Brown/ White	Brown/ Black	Purple	Purple/ Black	Grey	Grey/Red	Grey/ Green	Grey/ White	Grey/ Black	White	White/ Brown	White/ Red	White/ Yellow	White/ Green	White/ Blue	White/ Purple	White/ Black	Black	Black/ Brown	Black/ Red	Black/ Yellow	Black/ Blue	Black/ White	light green	light green /Brown	light green /Red	light green /Yellow	light green /Green	light green /Black	light green /Light red	Sky blue	Sky blue /White

2022


clutch switch
mode button
dimmer switch slider
horn button
override button
turning switch
warning button
stop/start switch slider
front brake switch
dashboard switch
flasher
fan relay
auxiliary relay
fuel pump relay
main relay
fuse box
oil pressure warning switch
ignition switch lock
3-phase magneto
regulator
starter relay
battery
12V12Ah
starter motor
horn
dashboard
speed sensor
fan motor
RH front turning light
LH front turning light
high/low beam
position light
position light
gear contact block
neural
RH rear turning light
taillight/brake light
rear license light
LH rear turning light
gear control block
neural
gear signal output
power +
power -
CANISTER MAGNETIC VALVE
GELP VLAVE
fuel pump
fuel sensor
rear brake switch
side-stand switch
ECU
ignition diagnosis resistance 1
ignition diagnosis resistance 2
fuel injector 1
fuel injector 2
roll-over sensor
TPS
water temp. sensor
T-MAP
stepping motor
EFI diagnosis system
T-BOX
oxygen sensor 2
oxygen sensor 1
ignition coil 2
ignition coil 1
ABS
front wheel speed sensor
rear wheel speed sensor