LINHAI

SERVICE MANUAL

LANDFORCE 650

NOTICE

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

Linhai Group is continually striving to improve all its models. Modifications and significant changes in specifications or procedures will be forwarded to all authorized Linhai dealers and will appear in future editions of this manual where applicable.

NOTE:
Designs and specifications are subject to change without notice.

IMPORTANT INFORMATION

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

The Safety Alert Symbol means ATTENTION! BECOME ALERT! YOUR SAFETY IS INVOLVED!

⚠ WARNING Failure to follow WARNING instructions could result in severe injury or death to the vehicle operator, passenger, a bystander, or a person checking or repairing the vehicle.

CAUTION: A CAUTION indicates special precautions that must be taken to avoid damage to the vehicle.

NOTE: A NOTE provides key information to make procedures easier or clearer.

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CHAPTER1 ……*General Information*

CHAPTER2 ……*Maintenance*

CHAPTER3……*Engine*

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CHAPTER5……*Final Drive*

CHAPTER6……*Brakes*

CHAPTER7……*Electrical*

⚠ WARNING

Never run an engine in an enclosed area. Carbon monoxide exhaust gas is poisonous and can cause severe injury or death. Always start engines outdoors.

Gasoline is extremely flammable and explosive under certain conditions. Battery electrolyte is poisonous. It contains sulfuric acid. Serious burns can result from contact with skin, eyes or clothing. Always keep alert and wear protection.

Exhaust system components are very hot during and after use of ATV. Never service when the engine is warm or hot. Escaping steam from cooling system or hot oil from the machine can cause severe burns. The engine must be cool before service.

Crate of the ATV and parts in the ATV maybe have sharp edge, always pay attention and wear protection.

CHAPTER 1 GENERAL INFORMATION

⚠ WARNING

The parts of different types/ variants/ versions maybe un-interchangeable, even some parts have almost same appearance. Always refer to Parts Manual of each ATV model for spare parts information and service.

1.1 IMPORTANT INFORMATION

1.2 V.I.N AND ENGINE SERIAL NUMBER

1.3 VEHICLE DIMENSIONS

1.1 IMPORTANT INFORMATION

PREPARATION FOR REMOVAL PROCEDURES

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

REPLACEMENT PARTS

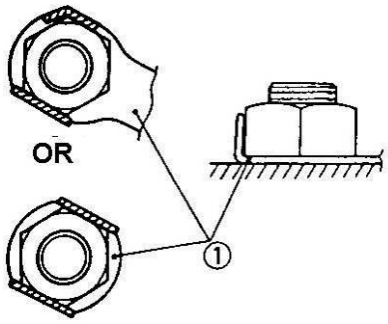
Use only genuine parts for all replacements. Use recommended oil and grease for all lubrication jobs. Other brands may be similar in function and appearance, but inferior in quality.

GASKETS,OIL SEALS AND O-RINGS

1. Replace all gaskets seals and O-rings when overhauling the engine. All gasket surfaces, oil seal lips and O-rings must be cleaned.
2. Properly oil all mating parts and bearings during reassembly. Apply grease to the oil seal lips.

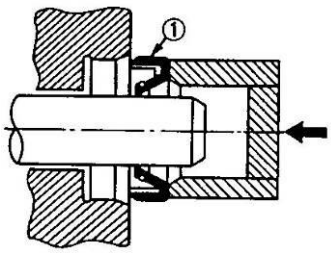
LOCK WASHERS/PLATES AND COTTER PINS

Replace all lock washers/plates and cotter pins after removal. Bend lock tabs along the bolt or nut flats after the bolt or nut has been tightened to specification.



BEARINGS AND OIL SEALS

Install bearings and oil seals so that the manufacturer’s marks or numbers are visible. When installing oil seals, apply a light coating of lightweight lithium base grease to the seal lips. Oil bearings liberally when installing, if appropriate.



① oil seal

CAUTION:

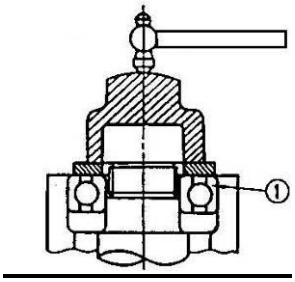
Do not use compressed air to spin the bearings dry. This will damage the bearing surfaces.

① Bearing

CIRCLIPS

1. Check all circlips carefully before reassembly. Always replace piston pin clips after one use. Replace distorted circlips. When installing a circlip ①, make sure that the sharp-edged corner ② is positioned opposite the thrust ③ it receives. See sectional view.

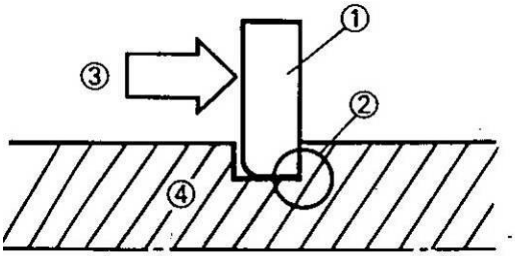
④Shaft



CHECKING OF CONNECTIONS

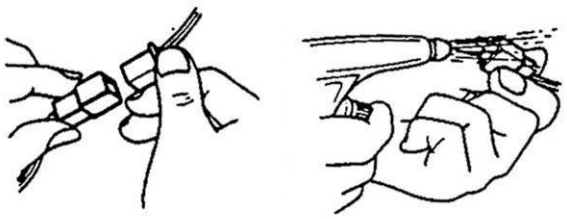
Dealing with stains, rust, moisture, etc. on the connector.

1. Disconnect:
   ●Connector
2. Dry each terminal with an air blower.
3. Connect and disconnect the connector two or three.
4. Pull the lead to check that it will not come off.
5. If the terminal comes off, bend up the pin ①and reinset the terminal into the connector.
6. Connect:
   ●Connector



NOTE:

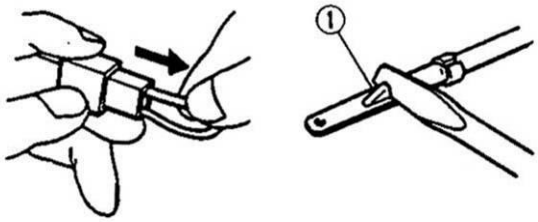
The two connectors ” click ” together.



7. Check for continuity with a tester.

NOTE:

- If there is no continuity, clean the terminals.
- Be sure to perform the steps 1 to 7 listed above when checking the wire harness.
- Use the tester on the connector as shown.



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CONVERSION TABLE

How to use the CONVERSION TABLE

Use this table to convert METRIC unit data to IMPERIAL unit data.
Ex.

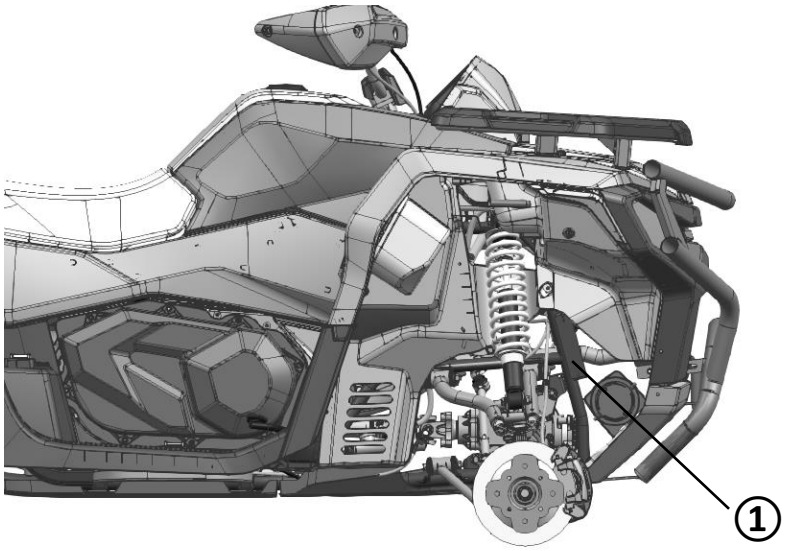
METRIC		MULIPLIER		IMP
**mm	x	0. 3937	=	**in
**cm	x	0.03937	=	**in

CONVERSION TABLE

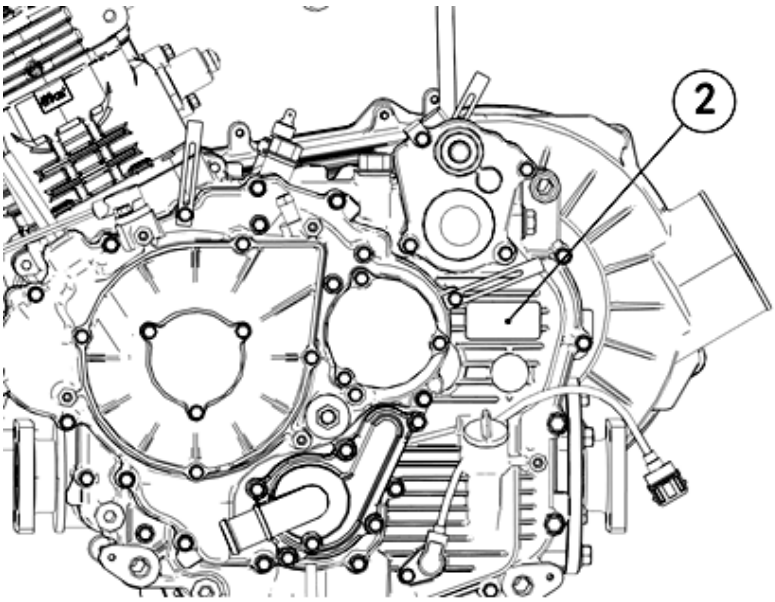
METRIC TO IMP			
	Known	Multiplier	Result
Torque	m • kg m • kg cm • kg cm • kg	7.233 86.794 0.0723 0.8679	ft • lb In • lb ft • lb In • lb
Weight	kg g	2.205 0.03527	lb oz
Distance	km/h km m m cm mm	0.6214 0.6214 3.281 1.094 0.3927 0.03927	mph mi ft yd in in
Volume/ Capacity	cc(cm^3) cc(cm^3) lit(liter) lit(liter)	0.03527 0.06102 0.8799 0.2199	oz(IMP liq.) cu • in qt (IMP liq.) gal(IMP liq.)
Miscellaneous	kg/mm kg/cm^2 Centigrade	55.997 14.2234 9/5(℃)+32	lb/in psi(lb/in^2) Fahrenheit(° F)

1.2 V.I.N AND ENGINE SERIAL NUMBER

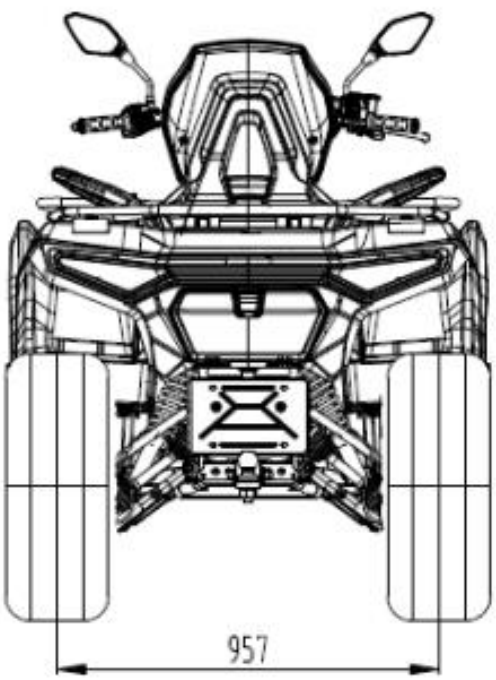
The vehicle identification number ① is stamped into the right side of front vertical beam of the frame.

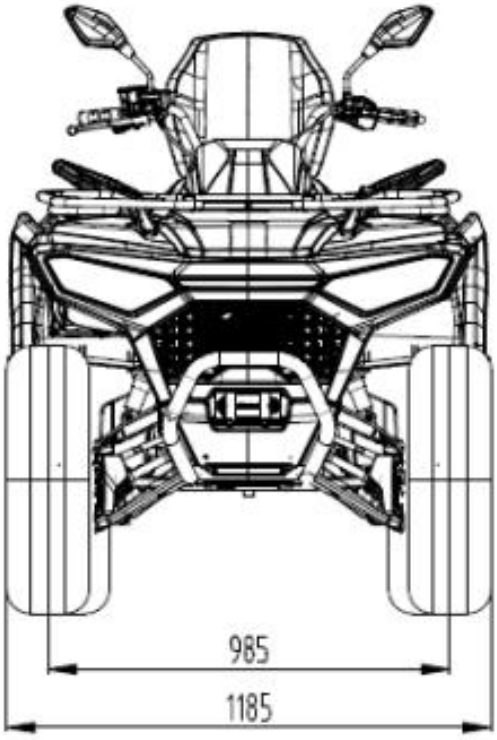


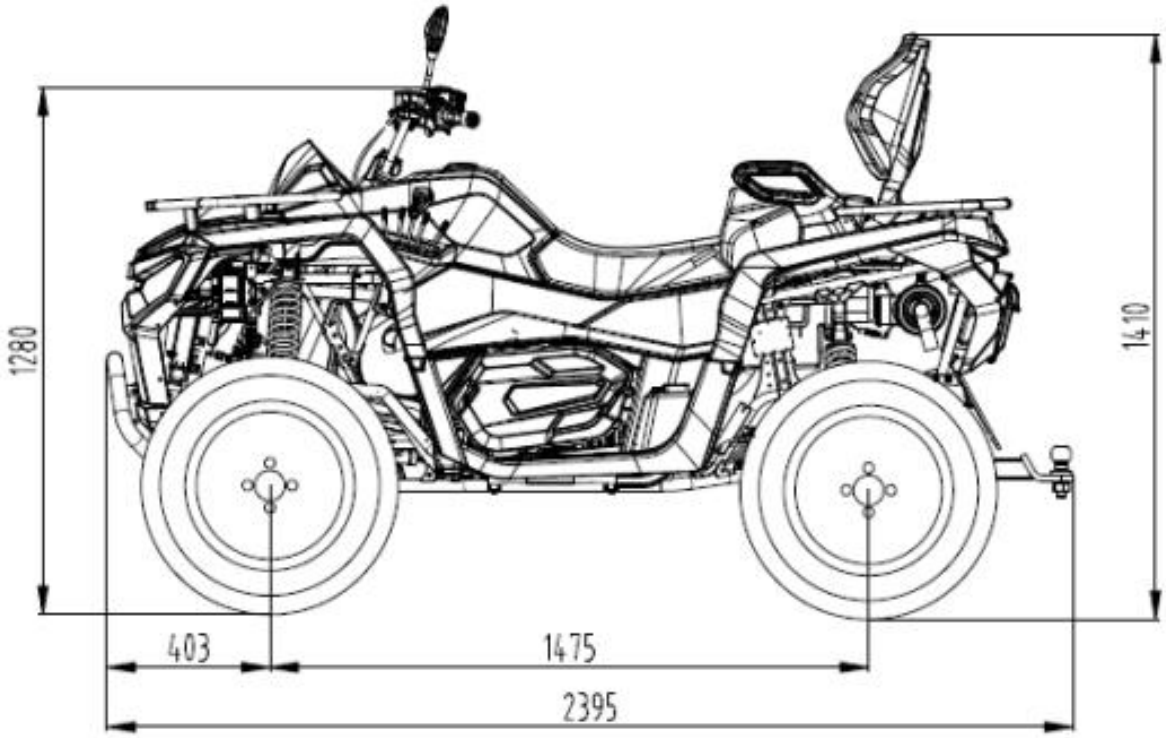
The engine serial number ② is stamped into left side of engine crankcase.



1.3 VEHICLE DIMENSIONS







NOTES

CHAPTER 2 MAINTENANCE

⚠ WARNING

The parts of different types/ variants/ versions maybe un-interchangeable, even some parts have almost same appearance. Always refer to Parts Manual of each ATV model for spare parts information and service.

2.1 PERIODIC MAINTENANCE

2.2 THROTTLE LEVER INSPECTION

2.3 FUEL SYSTEM

2.4 TOE ALIGNMENT

2.5 BRAKING SYSTEM INSPECTION

2.6 SUSPENSION SPRING RPELOAD ADJUSTMENT

2.7 WHEELS

2.8 TIRE PRESSURE

2.9 FRAME, NUTS, BOLTS, FASTENERS

2.1 PERIODIC MAINTENANCE

Any qualified repair shop or person may maintain, replace or repair the emission control devices or systems on your vehicle. An authorized dealer can perform any service that may be necessary for your vehicle. We also recommends LINHAI parts for emissions-related service, however equivalent parts can be used.

It is a potential violation of the Clean Air Act if a part supplied by an aftermarket parts manufacturer reduces the effectiveness of the vehicle’ s emission controls. Tampering with emission controls is prohibited by federal law.

Owners are responsible for performing the scheduled maintenance identified in this owner’s manual.

Careful periodic maintenance will help keep your vehicle in the safest, most reliable condition. Inspection, adjustment and lubrication of important components are explained in the periodic maintenance chart.

Inspect, clean, lubricate, adjust and replace parts as necessary. When inspection reveals the need for replacement parts, genuine parts are available from your dealer. Equivalent parts may be used for emissions-related service.

Service and adjustments are important for proper vehicle operation. If you’re not familiar with safe service and adjustment procedures, a qualified dealer can perform these operations.

Vehicles subjected to heavy or severe use patterns must be inspected and serviced more frequently.

SEVERE USE DEFINITION

- Frequent immersion in mud, water or sand
- Frequent or prolonged operation in dusty environments
- Short trip cold weather operation
- Racing or race-style high RPM use
- Prolonged low speed, heavy load operation
- Extended idle

Pay special attention to the oil level. A rise in oil level during cold weather can indicate contaminants collecting in the oil sump or crankcase. Change oil immediately if the oil level begins to rise. Monitor the oil level, and if it continues to rise, discontinue use and determine the cause. Your dealer can assist.

MAINTENANCE CHART KEY

SYMBOL	DESCRIPTION
I	Inspect
A	Adjust
R	Replace
C	Clean

The maintenance interval charts blew is operated for normal use and a clean environment.

Maintenance period / Items	Odometer (km)											
	300	1000	2000	3000	4000	5000	6000	7000	8000	9000	10000	Everyday check before riding
Crankcase lube		R		R			R			R		I
Lube filter		R		R			R			R		
Air filter	Clean filter every 2000~3000 km. change it when necessary											
Spark plug	Initial 4000km and Clean every 3000~4000km change it when necessary											
Valve gap		A		A			A			A		
Gas filter		C		C			C			C		
Brake function, brake pads		I	I	I	I	I	I	I	I	I	I	I
Brake fluid												
Fasteners(Excluding Engine Bolt)	T						T				T	
* When the mileage is over the highest on the table, please perform according to the period set on the table * Driving on dust place, it is recommended to clean it frequently.												

WARNING

Vehicles subjected to heavy or severe use patterns must be maintenanced with the maintenance interval charts below.

SYMBOL	DESCRIPTION
XU	Perform these procedures more often for vehicles subjected to severe use.
D	Have an authorized dealer or other qualified person perform these services.

WARNING

Improperly performing the procedures marked with a **D** could result in component failure and lead to serious injury or death. Have an authorized dealer or other qualified person perform these services.

MAINTENANCE INTERVALS

NOTE：

The maintenance interval charts outline required maintenance and inspection based on estimated vehicle engine hours / calendar / miles. Each table states the number of hours / calendar /miles that service is required on the vehicle. Some items or components may need to be serviced more often due to severe use, such as operation in water or under severe loads.

Pre-Ride SERVICE

ITEM		REMARKS
D	Steering system	Visually inspect, test, or check components. Make adjustments and/ or schedule repairs when required.
D	Throttle return	
	Front suspension and axles	
	Rear suspension and axles	
	Tires	
	Brake fluid level	
	Brake lever / foot brake function	
	Brake system function	
	Wheels / fasteners	
	Engine oil level	
XU	Air filter / Air box and connections	Visually inspect. Replace filter when dirty.
D	Headlight aim /	Inspect. Adjust or replace lights when

	General lighting and turn indicators (if equipped)	necessary.
XU	Radiator	Inspect for mud or debris blocking airflow. Clean surfaces when necessary.

BREAK-IN SERVICE/20 HOUR / 200 MILE (320 KM)

ITEM		REMARKS
	General lubrication	Lubricate all grease points, pivots, cables, etc.
	Engine oil / oil filter / oil strainer	Change oil and filter. Clean oil strainer.
XU	Engine air filter	Inspect. replace if dirty. do not clean
D	Engine valve clearance	Check and adjust as necessary.
	Front / Rear gear case oil	Check level. Inspect for leaks.
	Coolant	Check level. Inspect for leaks.
XU	Brake pads	Inspect pad thickness.
	Battery	Check terminals, clean, test battery condition if required.
D	Idle condition	Inspect for proper rpm. See dealer for service if out of spec or erratic.
D	Steering / Wheel Alignment	Inspect steering system. See dealer for service if wheel alignment is required.
XU	Foot brake / Hand brake	Inspect function. Adjust as necessary.
	Gear cases, CV shafts, Propshafts	Inspect for leaks.
	Engine hoses, gaskets and seals	Inspect for leaks.

50 HOUR /6 MONTH /500 MILE (800 KM) SERVICE

ITEM		REMARKS
XU	Air filter	Always inspect pre-ride. Inspect frequently if subjected to severe use. Replace if dirty. Do not clean.
XU	General lubrication	Lubricate all fittings, pivots, cables, etc.
	Cooling system	Test coolant strength. Pressure test system yearly.
XU	Radiator	Inspect. clean external surfaces. Clean more frequently if subjected to severe use.
D	Steering system	Inspect. Lubricate.
XU	Front suspension	Lubricate. Check fasteners.
XU	Rear suspension	Lubricate. Check fasteners.
XU	Gear shift	Inspect, lubricate, adjust as necessary.

XU D	Throttle body / throttle cable	Inspect. Clean carbon deposits. Inspect cable and lubricate frequently if subjected to severe use.

100 HOUR /12 MONTH /1000 MILE (1600 KM) SERVICE

ITEM		REMARKS
XU	Front gear case oil	Inspect level. Change yearly if hours or distance interval is not met.
XU	Rear gear case oil	Inspect level. Change yearly if hours or distance interval is not met.
XU	Engine oil / oil filter / oil strainer	Inspect for color change. Change if dirty and clean strainer. Change yearly if hours or distance interval is not met.
XU D	CVT drive belt	Inspect. Replace as necessary. See dealer for service.
D	CVT drive and driven pulleys	Clean and Inspect pulleys. Replace worn parts. See dealer for service.
	Fuel filter and hoses	Inspect routing and condition. Replace filter and high-pressure hoses every 4 years.
	Cooling hoses	Inspect routing and condition.
XU	Valve clearance	Inspect and adjust as necessary. See dealer for service.
D	Fuel system	Inspect fuel tank, cap, fuel pump and fuel pump relay
	Spark plug	Inspect. Replace if worn or fouled.
D	Engine mounts	Inspect condition.
	Exhaust pipe and spark arrestor	Inspect. Clean spark arrestor.
XU	Wiring, fuses, connectors, relays, and cables	Inspect wire routing for wear, security. Apply dielectric grease as necessary to connectors subjected to water, mud, etc.
XU D	Wheel bearings	Inspect for noise or looseness Replace as necessary.
	Idle condition	Inspect for proper rpm. See dealer for service if out of spec or erratic.
D	Steering / Wheel Alignment	Inspect steering system. See dealer for service whenever steering parts or wheel alignment are required.
XU	Foot brake height	Inspect. Replace brake pads or adjust height as required.

200 HOUR /24 MONTH /2000 MILE (3200 KM) SERVICE

ITEM		REMARKS
	Coolant	Change coolant every 2 years if hours or distance interval is not met.
XU	Brake fluid	Inspect fluid for color change. Change fluid every two years.

LUBRICATION RECOMMENDATIONS

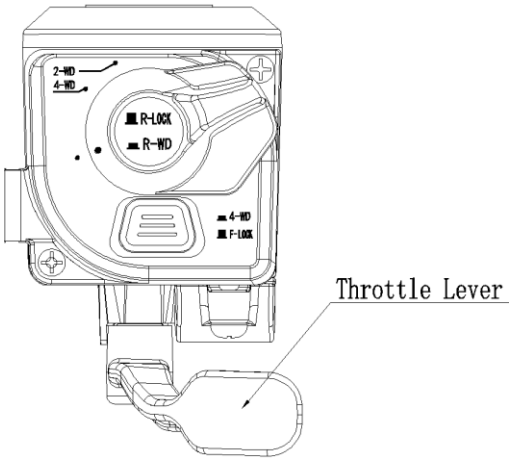
Check and lubricate all components at the intervals outlined in the Periodic Maintenance Chart beginning, or more often under severe use, such as wet or dusty conditions. Items not listed in the chart should be lubricated at the general lubrication interval.

	ITEM	LUBE
	Engine Oil	SAE 5W-40 SAE 10W-40 / SAE 15W-40
	Brake Fluid	DOT 3 Brake Fluid
	Front gear case oil	SAE85W-90 GL-4
	Rear gear case oil	SAE85W-90 GL-4
	Suspension pivots and drive train	All Season Grease

2.2 THROTTLE LEVER INSPECTION

THROTTLE FREE PLAY

The vehicle is equipped with electronic throttle lever. Check the lever for free movement and return before starting the engine,also check occasionally during operation.



THROTTLE FREE PLAY INSPECTION

1. Apply the parking brake.
2. Put the gear shift lever in the N(Neutral) position.
3. Start the engine, and warm it up thoroughly.
4. Use the data stream function of the scanner（see 7.18）, When the throttle lever goes to the bottom，check if the throttle opening can meet 100%.

CAUTION:

Electronic throttle lever cannot be adjusted or repaired. If the electronic throttle lever performance is poor or invalid, contact the dealer.

2.3 FUEL SYSTEM

EFI

⚠ WARNING

⚠ Always stop the engine and refuel outdoors or in a well venltilated area.

⚠ Do not smoke or allow open flames or sparks in or near the area where refueling is performed or where gasoline is stored.
Do not overfill the tank. Do not fill the tank neck.

⚠ If you get fuel in your eyes or if you swallow gasoline, see your doctor immediately.

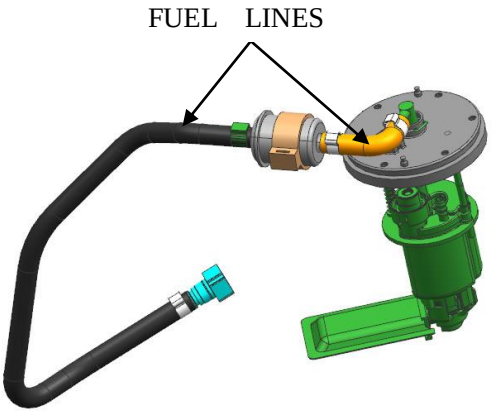
⚠ If you spill fuel on your skin or clothing, immediately wash it off with soap and water and change clothing.

⚠ Never start the engine or let it run in an enclosed area. Fuel powered engine exhaust fumes are poisonous and can cause loss of consciousness and death in a short time.

⚠ Never drain the float bowl when the engine is hot. Severe burns may result.

FUEL LINES

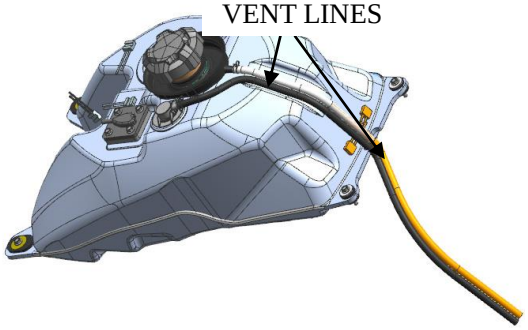
1. Check fuel lines for signs of wear, deterioration, damage or leakage. Replace if necessary.
2. Be sure fuel lines are routed properly and secured with cable ties.



CAUTION:
Make sure lines are not kinked or pinched.
Replace all fuel lines every two years.

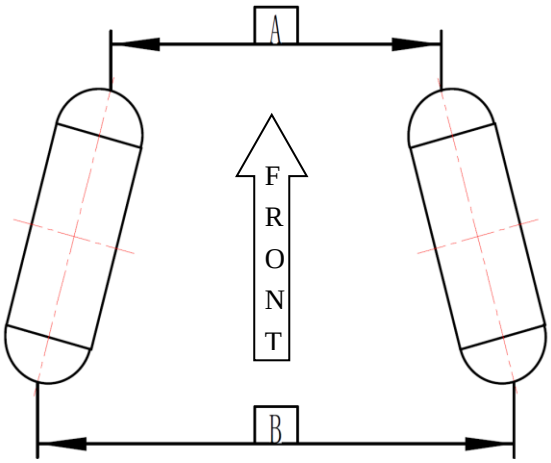
VENT LINES

1. Check fuel tank, oil tank, battery and transmission vent lines for signs of wear, deterioration, damage of leakage. Replace every two years.
2. Be sure vent lines are routed properly and secured with cable ties.



CAUTION: Make sure lines are not kinked or pinched.

2.4 TOE ALIGNMENT



METHOD: STRAIGHTEDGE OR STRING

Be sure the steering wheel in a straight ahead position.

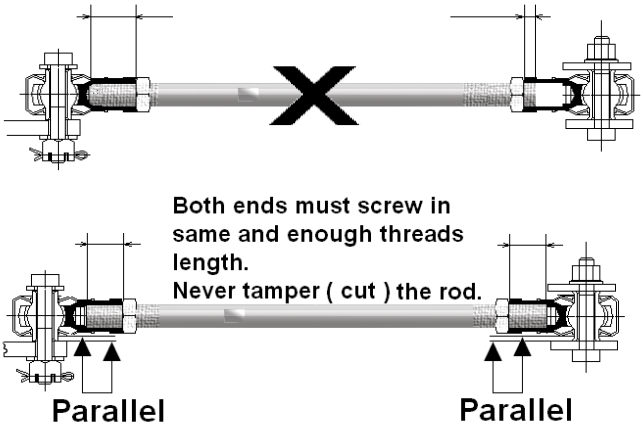
NOTE: String should just touch side surface of rear tire on each side of the ATV.

Measure from string to rim at front and rear of rim.

Rear rim measurement (B) should be 5 to 10 mm more than front rim measurement (A).

⚠ WARNING

Always pay attention to tie rods assembly, Both ends must screw in same and enough threads length.



2.5 BRAKING SYSTEM INSPECTION

The following checks are recommended to keep the braking system in good operating condition. Service life of braking system components depends on operating conditions. Inspect brakes in accordance with the maintenance schedule and before each ride

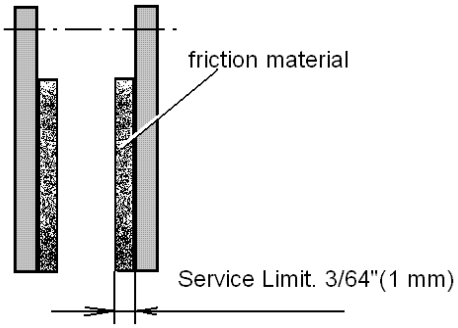
- Keep fluid level in the master cylinder reservoir to the indicated level on reservoir.
- Use DOT 4 brake fluid.

NOTE: Use new brake fluid or brake fluid from a sealed container to avoid contamination to system.

- Check brake system for fluid leaks.
- Check brake for excessive travel or spongy feel.
- Check friction pads for wear, damage and looseness.
- Check surface condition of the disc.

BRAKE PAD INSPECTION

Pads should be changed when friction material is worn to 3/64" (1mm).



HOSE/FITTING INSPECTION

Check braking system hoses and fittings for cracks, deterioration, abrasion, and leaks. Tighten any loose fittings and replace any worn or damaged parts.

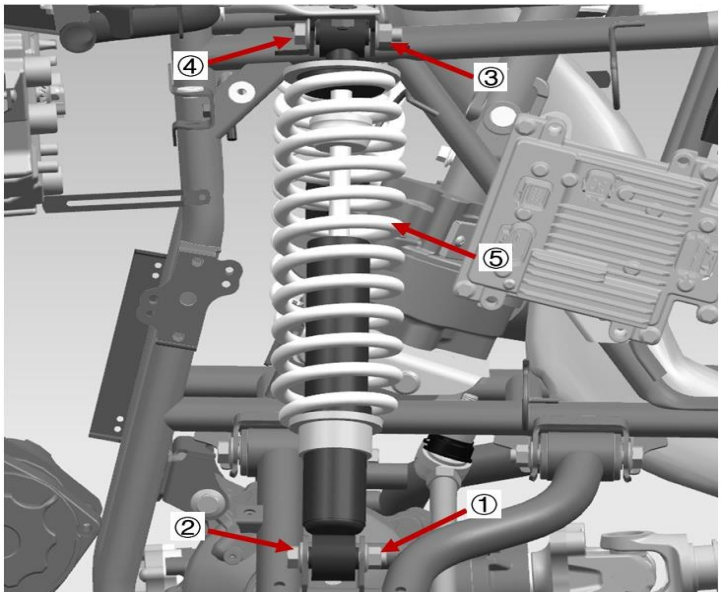
2.6 SUSPENSION SYSTEM

SHOCK ABSORBER

(1)Front Shock Absorber

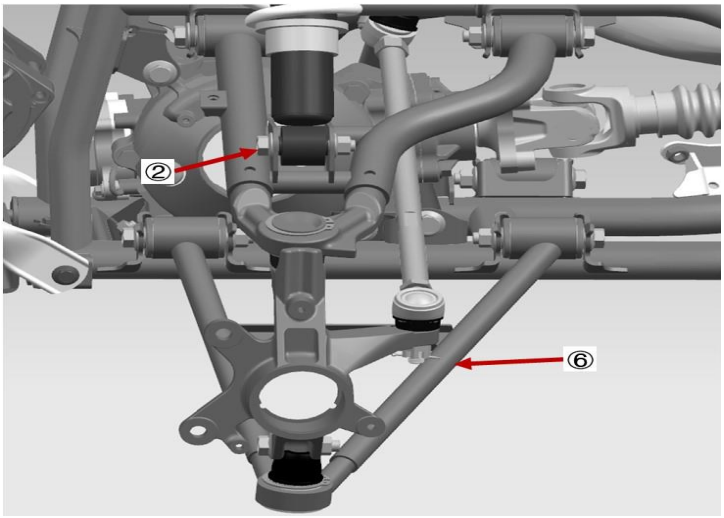
Removal

Remove nut ①.
Remove bolt ②.
Remove nut ③.
Remove bolt ④.
Remove shock absorber ⑤.



⚠ WARNING

When removing bolt ②, hold the swing arm ⑥ to avoid it falling down to cause injury damage.

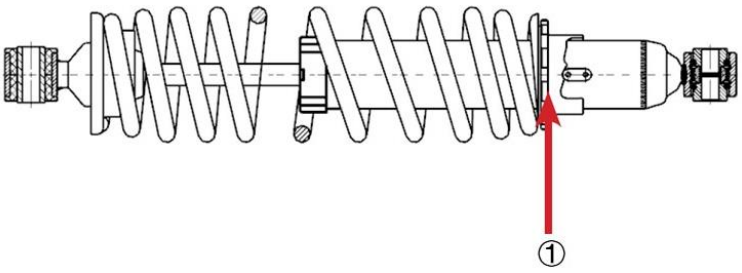


Inspection

Inspect shock absorber appearance for cracks or damage. Replace if any defect is found.
Clean the dirt on shock absorber.

Shock Absorber Adjustment

Turn the adjusting retainer ① on shock absorber with absorber wrench.



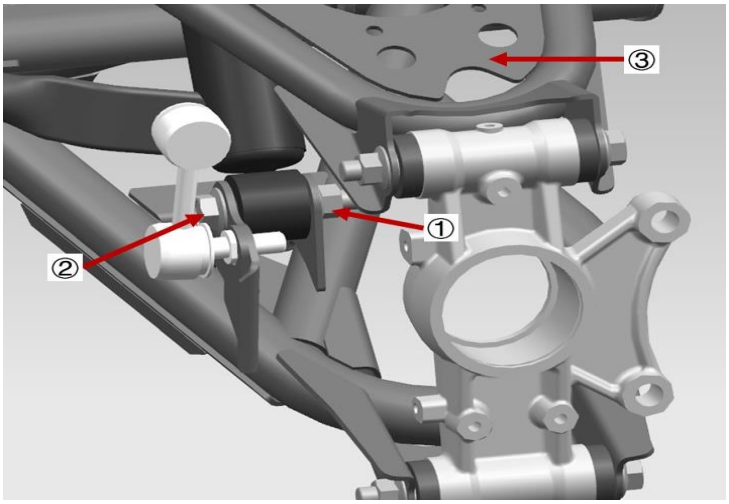
Adjust shock absorber according to its load.
Turn clockwise to increase spring tension.
Turn counter-clockwise to decrease tension.

NOTE: Make sure the LH and RH shock absorber are parallel after adjustment.

(2)Rear Shock Absorber

Removal

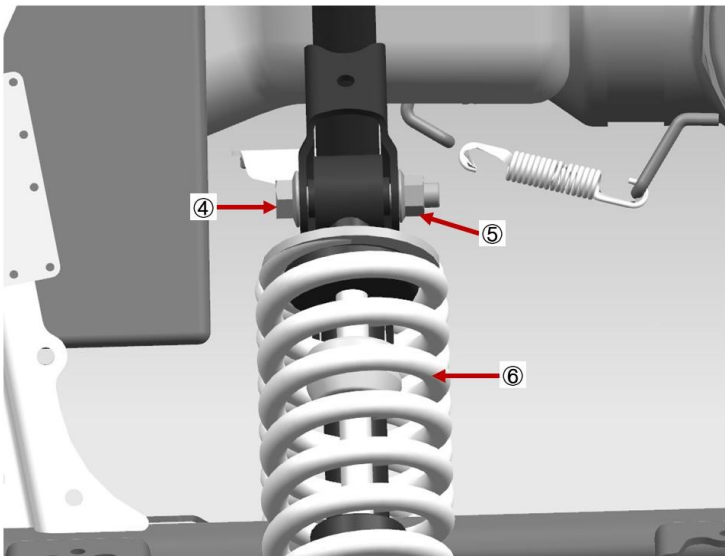
Remove nut ①.
Remove bolt ②.
Remove swing arm assy. ③.



WARNING

When removing bolt ② ,hold the swing arm ③ to avoid it falling down to cause injury and damage.

Remove bolt ④.
Remove nut ⑤.
Remove shock absorber ⑥.



Inspection

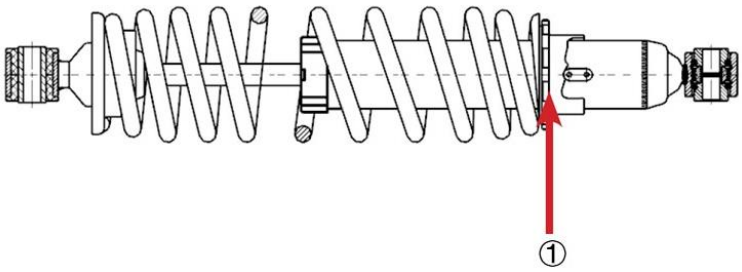
Inspect shock absorber appearance for cracks or damage. Replace if any defect is found.
Inspect shock absorber for leakage. Replace if necessary.
Clean the dirt on shock absorber.

Shock Absorber Adjustment

Turn the adjusting retainer ① on

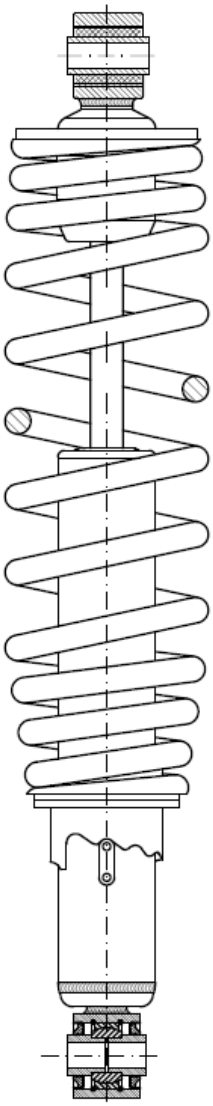
shock absorber with absorber wrench.

Adjust shock absorber according to its load.
Turn clockwise to increase spring tension.
Turn counter-clockwise to decrease tension.

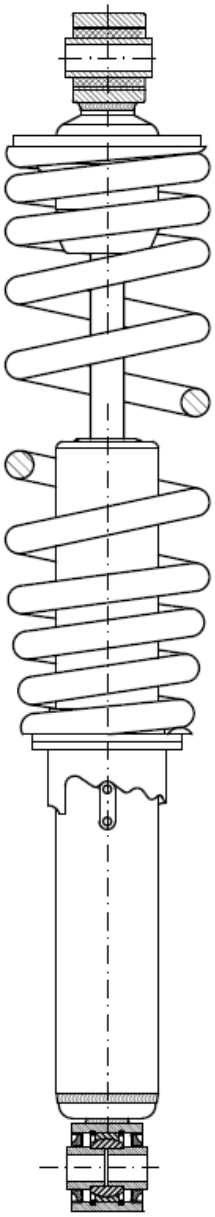


NOTE: Make sure the LH and RH shock absorber are parallel after adjustment.

Front Shock Absorber



Rear Shock Absorber



2.7 WHEELS

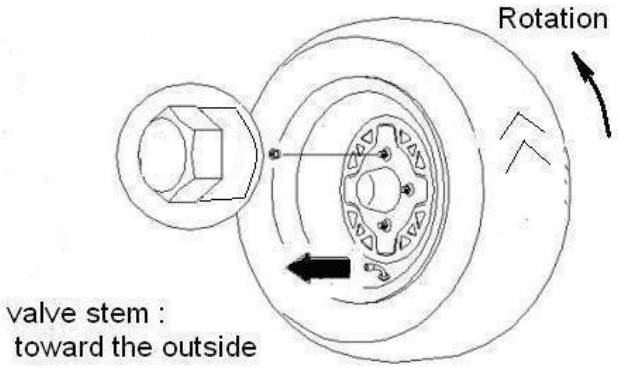
Inspect all wheels for runout of damage.
Check wheel nuts and ensure they are tight.
Do not over tighten the wheel nuts.

WHEEL REMOVAL

1. Stop the engine, place the transmission in gear and lock the parking brake.
2. Loosen the wheel nuts slightly.
3. Elevate the side of the vehicle by placing a suitable stand under the footrest frame.
4. Remove the wheel nuts and remove the wheel.

WHEEL INSTALLATION

1. With the transmission in gear and the parking Brake locked, place the wheel in the correct Position on the wheel hub. Be sure the valve stem is toward the outside and rotation arrows on the tire point toward rotation.
2. Attach the wheel nuts and finger tighten them. Install as shown at left for front or rear wheels.
3. Lower the vehicle to the ground.
4. Securely tighten the wheel nuts to the proper Torque listed in the table. On wheel nuts, Make sure tapered end of nut goes into taper on wheel.



Front and rear

Wheel Nut Torque Specifications

Bolt Size	Specification	
Front M10X1.25	55Lbs.Ft	75Nm
Rear M10X1.25	55Lbs.Ft	75Nm

CAUTION: If wheels are improperly installed it could affect Vehicle handling and tire wear.

2.8 TIRE PRESSURE

TIRE INSPECTION

CAUTION:

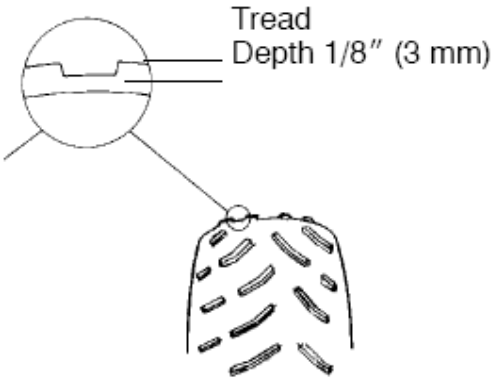
- Maintain proper tire pressure. Refer to the warning tire pressure decal applied to the vehicle.

- Improper tire inflation may affect ATV maneuverability.
- When replacing a tire always use original equipment size and type and replace in pairs, especially in 4X4 model.
- The use of non- standard size or type tires may affect ATV handling and cause machine damage, especially in 4X4 model.

Tire Pressure Inspection	
Front	**Rear**
see detail on the mark of sidewall	see detail on the mark of sidewall

TIRE TREAD DEPTH

Always replace tires when tread depth is worn to 1/8" (3mm) or less.



⚠ WARNING

Operating an ATV with worn tires will increase the possibility of the vehicle skidding easily with possible loss of control.

Worn tires can cause an accident.
Always replace tires when the tread depth measures 1/8" (3mm) or less.

2.9 FRAME , NUTS, BOLTS, FASTENERS

Periodically inspect the tightness of all fasteners in accordance with the maintenance schedule. Check that all cotter pins are in place. Refer to specific fastener torques listed in each chapter.

NOTES

CHAPTER 3 ENGINE

3.1 SERVICE INFORMATION

3.2 INSPECTION AND ADJUSTMENT

3.3 ENGINE REMOVAL, INSPECTION AND INSTALLATION

3.4 COOLING AND LUBRICATION SYSTEM

3.5 TROUBLESHOOTING

3.1 SERVICE INFORMATION

UNIT CONVERSION TABLE

3.1.1 GENERAL PRECAUTIONS

3.1.2 FUEL, OIL AND ENGINE COOLANT RECOMMENDATION

3.1.3 ENGINE RUNNING-IN

3.1.4 ENGINE SHAPE & LOCATION OF ENGINE IDENTIFICATION NUMBER

3.1.5 ENGINE GENERAL INFORMATION

3.1.6 MAINTENANCE SPECIFICATIONS

3.1.7 ENGINE TIGHTENING TORQUE LIST

3.1.8 ENGINE SERVICE TOOLS

Unit conversion table

Item	Conversion
Pressure	1kgf/cm^2=98.0665kPa1kPa=1000Pa 1mmHg=133.322Pa=0.133322kPa
Torque	1kgf • m=9.80665N • m
Volume	1mL=1cm^3=1cc 1L=1000cm^3
Force	1kgf=9.80665N

DANGER/WARNING/CAUTION

Please read the following notification carefully which emphasize the special meaning of DANGER, WARNING and CAUTION. Always pay attention to these notifications when servicing the engine.

DANGER: indicates a high risk which should be alert to.
WARNING: indicates a moderate risk which should be alert to.
CAUTION: indicates a minor risk which should be paid attention to.

However, DANGER, WARNING and CAUTION notification included in this service manual don’t cover all the potential risk in the engine operation and repair. Therefore, mechanics should be equipped with knowledge of basic mechanical safety beside the notification of DANGER and WARNING. If you are not confident to complete the whole repair, please refer to the senior mechanic for support.

3.1.1 GENERAL PRECAUTIONS

Warning: Proper service and repair procedures are important for the safety of the service mechanic and the safety and reliability of the vehicle.

· When two or more persons working together, pay attention to the safety of each other.

· When it is necessary to run the engine indoors, make sure that exhaust gas is forced out doors.

· When working with toxic or flammable materials, make sure that the area you work in is well ventilated and that you follow all of the manufacturer's instruction.

· Never use gasoline as a cleaning solvent.

· To avoid getting burned, do not touch the engine, engine oil, radiator, and exhaust system until they have cooled.

· After servicing the fuel, oil, engine coolant, exhaust or brake system, check all of the lines, and fittings related to the system for leaks.

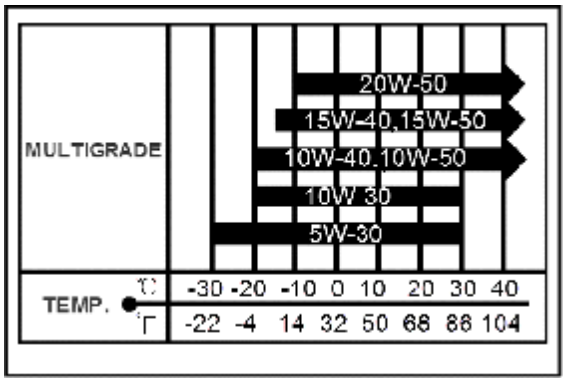
· In order to protect the environment, do not unlawfully dispose of motor oil, engine coolant or parts no longer used.

Warning :
·If parts replacement is necessary, replace the parts with LINHAI genuine parts or their equivalent.
·When removing parts that are to be reused, keep them arranged in an orderly manner so that they may be reinstalled in proper order.
·Be sure to use special tools when instructed.
·Make sure that all parts used in reassembly are clean. Lubricate them when specified.
·Use the specified lubricate, bonds, or sealants.
·When tightening bolts, screws and nuts, tighten the larger sizes first. Always tighten the nuts and bolts from the inside working out, diagonally and to the specified torque.
·Use a torque wrench to tighten fasteners to the specified torque. Wipe off grease and oil if a thread is smeared with them.
·After removing the parts, need to double check them, cleaning all the parts before measure.
·After reassembling, check parts for tightness and proper operation.
·Never reuse an oil seal, O-ring, gasket, self-locking nut, locking washer, cotter pin, snap ring, and other specified parts, be sure to remove them with new ones.

3.1.2 FUEL, OIL AND ENGINE COOLANTRECOMMENDATION

FUEL: Use unleaded gasoline that is Graded 92 octane or higher.

ENGINE OIL: Use 4-stroke motor oil, the oil need to meet API service Classification SG or higher. If engine oil with a SAE 15W-40 is not available, choose from the right chart according to the environmental temperature.



ENGINE COOLANT: Since antifreeze also has corrosion and rust-inhibiting properties, engine coolant contains antifreeze, and the freezing point should below the atmospheric temperature like 5℃.

Recommended coolant type: -35℃ anti-frozen, antisepsis, high-boil coolant.

Danger: Keep the engine coolant properly and do not drink it as it is poisonous

Warning: Do not mix other brand engine coolant together.

3.1.3 ENGINE RUNNING-IN

As the engine has a lot of relative motions parts, such as pistons, piston rings, cylinder blocks and inter-meshing gears, thus, good operation at the beginning is necessary. It helps a good adaptation to each part, adjust working gap, and make a smooth friction surface to bear heavy load.

Recommended running-in time: 20 hours, see detailed specification below:

0 ~ 10 hours

Avoid continuous operation above half-throttle or vary the speed of the vehicle from time to time. Do not operate it at one set throttle position. Allow a cooling-off period of 5 to 10 minutes after every hour of operation. Avoid acceleration heavily. T he accelerator should be changed smoothly, avoid changing heavily from small to bigger

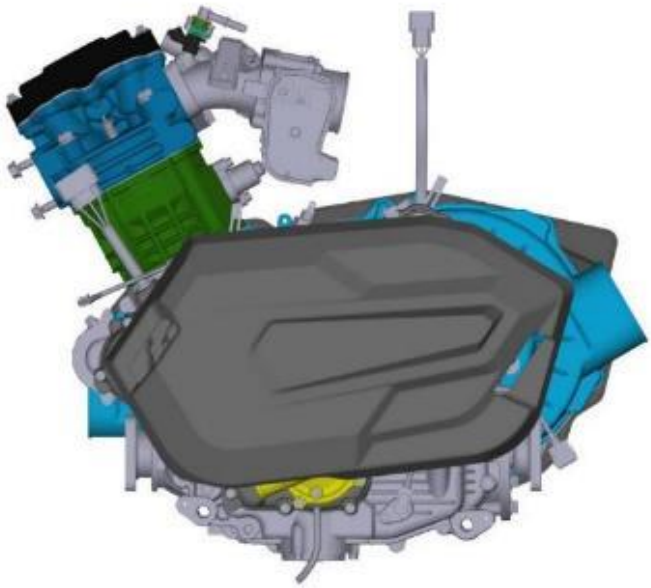
10 ~ 20 hours

Avoid prolonged operation above three-quarter throttle. Allow using freely but not full throttle.

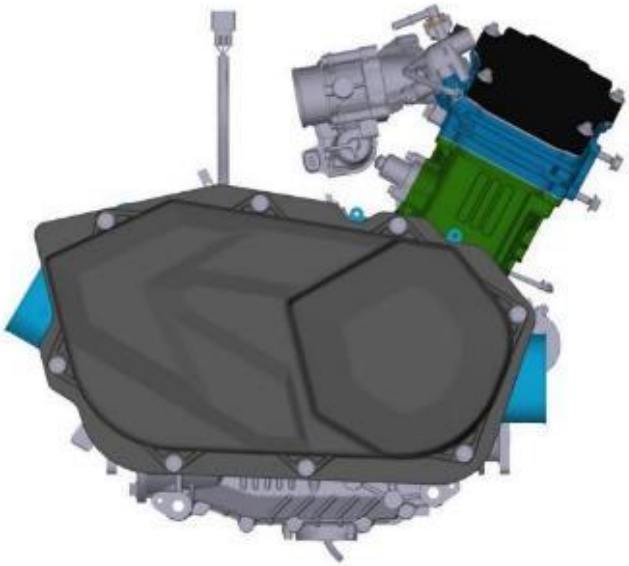
CAUTION： Maintain and repair as regular procedures during break-in period;
After break-in, do not forget to check and maintain the engine before normal use.

3.1.4 ENGINE SHAPE & LOCATION OFENGINE IDENTIFICATION NUMBER(EIN)

Location of Engine
identification number



Engine left side



Engine Right side

3.1.5 ENGINE GENERAL INFORMATION

NO.	ITEM			TYPE/SPECIFICATION
1	Type			Single-cylinder, liquid-cooled, 4-stroke, SOHC
2	Bore × Stroke			91mm×89.2mm
3	Displacement			580mL
4	Compression ratio			10.68:1
5	Low idling speed(Idling)			1500r/min±100r/min
6	Starting			Electric
7	Electrical system	ignition type/ ignition timing		ECU / BTDC10º1450r/min
		Sparkplug/Electrode gap		DPR8EA-9 NGK /0.8mm～0.9mm
		Magneto type/ Power		Permanent Magnet AC Type
8	Combustion system	Combustion chamber		Triangular combustion chamber
		Throttle body type		F01R00Y212 (BOSCH)
		Air filter type		Paper filter
		Gasoline		RQ-92
9	Valves system	Valves type		SOHC/ Timing chain drive
10	Lubrication System	Lubrication type		Pressure and splash
		Oil pump type		Rotor drive
		Oil filter type		Paper type, replaceable
		Engine oil type		SAE10W/50/SN
11	Cooling system	Cooling type		Liquid-cooled/close-loop cooling
		Coolant type		—35℃anti-corrosion and anti-freezing
12	Drive train system	Transmission type		CVT+ Gearshift
		Reducer gear		Two forward gear, one reverse gear, one park
		Gearshift methods/ orders		Manual operation/L-H-N-R-P
		CVT ratio range		3.106～0.678
		Gearshift ratio	Final ratio Secondary ratio	1.333（24/18，bevel gear） 1.952(41/21)
			Variable gear Total ratio	L:2.53(38/15)； H：1.35(27/20) ； R:2.07(29/14) L:6.595；H：3.514；R:5.392
13	Overall size			L（mm）×W（mm）×H（mm）：621×515×506
14	Dry weight			62kg
15	Output type			Front/Rear shaft drive
16	Rotation of engine output			When forward, clockwise(rear view)

Valves &Cylinder Head **(mm)**

Item	Standard value		Service limit	Remarks
Dia. Of valve neck	Intake valve	Φ33	——	
	Exhaust valve	Φ29	——	
Thickness of valve neck	Intake/Exhaust	1	0.5	
Valve clearance(cold engine)	Intake	0.06～ 0. 08	——	
	Exhaust	0.08～ 0. 10	——	
Inner dia. Of valve guide	Intake/Exhaust	5.000～5.012	5.045	
Outer dia. of valve stem	Intake	4.96～ 4.975	4.93	
	Exhaust	4.95～ 4.965	4.93	
Gap between valve guide and stem	Intake	0.020～0.047		
	Exhaust	0.030～0.057		
Valve stem roundness（diameter difference）		0.006	0.06	
Valve end run-out	Intake/Exhaust	0.03	0.05	
Valve length	Intake	90		
	Exhaust	89		
valve plate cone run-out	Intake/Exhaust	0.03	0.05	
Width of valve seat seal	Intake	1.5±0.15	1.7	
	Exhaust	1.7±0.15	1.8	
Valve spring free length	Intake/Exhaust	40	38.2	
Elasticity of valve spring	Intake/Exhaust	33:200N～235N 23:530N～587N		
Cam length	Intake	32.971～33.011	32.871	
	Exhaust	32.985～33.025	32.865	
Camshaft shaft neck	Φ35	34.959～34.975	34.95	
	Φ22	21.959～21.980	21.95	
Gap between outer dia. of camshaft and holes	Φ35	34.993～35.025	35.04	
	Φ22	22.012～22.025	22.04	
Gap between outer dia. of camshaft and holes	Φ35	0.018～0.066	0.09	
	Φ22	0.032～0.066	0.09	
Axial clearance of	0.12～0.28			
Camshaft run-out			0.10	
Bore diameter of rocker	Intake/Exhaust	12.000～12.025	12.03	
Dia. of rockshaft	Intake/Exhaust	11.973～11.984	11.96	
Fit gap between	Intake/Exhaust	0.016～0.045	0.07	
Axial gap between	Intake/Exhaust	0.06～0.34		
Flatness of cylinder head bottom surface	0.03		0.05	
Flatness of cylinder head cover combination	0.08		0.10	

Cylinder, Piston, Piston Ring & Crankshaft (mm)

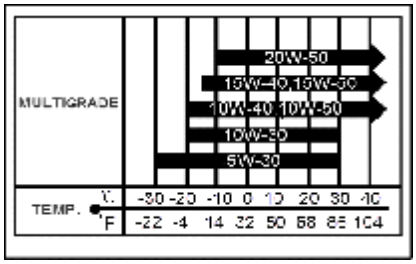
Item	Standards			Service limit	Remarks
Cylinder compression	1000kPa			———	
Piston/Cylinder clearance	0.030～0.050			0.10	
Dia. of Piston	90.95mm～90.979 mm down along to the piston			90.85	
Inner diameter of cylinder	90～91.015			———	
Flatness of cylinder top and bottom surface	0.03			0.05	
Free open of piston ring	1st ring	R	round 11.7	8.9	
	2nd ring	R	round12	9.5	
Gap of piston ring	1st ring		0.25～0.40	0.15	
	2nd ring		0.30～0.45	0.15	
	Oil ring		0.2～0.7	0.15	
Height of piston ring	1st ring		0.02～0.06		
	2nd ring		0.02～0.06		
	Oil ring		0.03～0.15		
Height of piston ring	1st ring		1.17～1.19	———	
	2nd ring		1.47～1.49	———	
	Oil ring		2.37～2.47		
Width of piston ring	1st ring		1.21～1.23	———	
	2nd ring		1.51～1.53	———	
	Oil ring		2.50～2.52	———	
Inner diameter of piston pin hole	22.004～22.010				
Diameter of piston pin Inner diameter of small end of connecting rod	21.991～22.000 22.01～22.02			21.980 22.06	
Gap of piston/piston pin Small end hole of connecting rod / gap of piston pin	0.004～0.015 0.010～0.025			0.08 0.08	
Side gap of big end of connecting rod	0.1～0.45			0.7	
Thickness of big end of connecting rod	22.95～23.00				

To Be Continue (mm)

Item	Standards	Service limit	Remarks
Thickness of big end of connecting rod	22.95～23.00		
Crankshaft beat	0～0.025	0.055	
Connecting rod bearing journal	36.992～36.996	36.068	
Connecting rod bearing bore	37.006～37.028	37.06	
Gap of connecting rod bearing	0.01～0.032	0.065	
Main journal	41.955～41.970	41.935	
Case main bearing bore	41.980～42.000	42.10	
Gap of main bearing	0.045～0.01	0.08	
Gap of crankshaft axial direction	0.05～0.45	0.6	

3.1.6 MAINTENANCESPECIFICATIONS

Lubrication System

Item		Standards	Service Limit
Engine Oil Capacity	Oil Change	2600mL （ without oil filter replacement）	—
	Oil Change	2700mL（withoilfilterreplacement）	
	Oil Capacity	3000mL	—
Recommended engine oil (see original) Grade/TEMP 		·Special for four stroke motorcycle SAE-15W/40 if it's not available, select alternative according to the following specifications. ·API classifications: SG or higher ·SA E classifications: according to the left chart.	
Oil Pump Rotor	Clearance Between Inner and Outer Rotor	0.1mm ～ 0.15mm	0.2mm
	Clearance Between Outer Rotor and Case	0.08mm ～0.15mm	0.2mm
	Oil Pump Rotor End Clearance	0.1mm～0.15 mm	0.2mm
	Engine oil pressure	1500r/min， 90℃， 200 kPa～400kPa，general 240 kPa 6000r/min， 90℃， 600 kPa～700kPa，general 600 kPa	

COOLING SYSTEM

Item		Standards		Service Limit
Thermostat	Opening temperature	65℃±2℃		
	Fully opening	85℃		
	Travel when fully opening	When 85℃,≥5mm		
Radiator cap opening pressure		110 kPa±15kPa(1.1kgf/cm ^{2})		
Relations between water temp and resistant of water temp. sensor	Water temperature（℃）	Resistant of B terminal(Ω)	Resistant of A,C Terminal(kΩ)	
	-20	——	13.71～16.94	
	25	——	1.825～2.155	
	50	176～280	——	
	80	63.4～81.4	0.303～0.326	
	110	24.6～30.6	0.138～0.145	
Coolant type		-35℃anti-freezing,anti –corrosive and high boiling point		

Clutch +Transmission mechanism (mm)

Item	Standards		Service limit	Remarks
Belt width	35.2		33.5	
Free length of driven pulley spring	238.5		214	
Hole dia. of driven pulley collar	38.10～38.14		38.30	
Clearance between gearshift fork and engagement groove	0.10～0.35		0.45	
Thickness of gearshift fork	5.8～5.9		5.7	
Groove width of high/low sliding	6.05～6.15		6.25	
Output gear groove width of driven shaft	6.05～6.15		6.25	
Groove width of gearshift drum	8.05～8.10			
Dia. of gearshift pawl pin	7.90～7.95		7．83	
Hole dia. of gear box	25～25.021		25.025	
Hole dia. of Reverse gear transition	25～25.021		25.025	
Dia. of main shaft	Φ30	28.980～29.993	29．970	
	Φ17	16.983～16.994	16.978	
Dia. of secondary shaft	Φ15	14.983～14.994	14.978	
	Φ17	16.983～16.994	16.978	
	Φ20	19.980～19.993	19.974	
Dia. of drive bevel gear shaft	Φ17	16.983～16.994	16.978	
	Φ25	24.980～24.993	24.974	
Dia. of reverse intermediate gear	Φ20	19.980～19.993		

Air Intake System

Item	Standards
Throttle Body Part NO.	F01R00Y212 (BOSCH)
Fuel Injector Part NO.	F01R00MG51 (BOSCH)
Idle Speed	1500 r/min±100r/min

Electric system

Item		Standards	Remarks
Sparkplug	Type	DPR8EA-9 (NGK)	
	Gap of sparkplug	0.8mm～0.9mm	
Characteristic		＞8mm,under0.1MPa	
Resistance of ignition coil	Primary	0.74Ω～0.78Ω	
	Secondly	10.1Ω～11.1kΩ	
Resistance of magneto coil		0.5Ω～1.5Ω	
Resistance of speed sensor (trigger）		900Ω～1000Ω	
Voltage without load(cold engine)		＞ 50V(AC), 5000r/min	
Max. output power of magneto		320W, 5000r/min 460W/5000r/min	
Stable voltage		13.5V～15V	
Secondly voltage of ignition coil		⩾25kV	
Peak voltage of Trigger coil		Peakvoltage⩾3V， 200r/min	
Resistance of starter relay coil		3Ω ～5Ω	
Resistance of auxiliary relay coil		90Ω ～100Ω	

3.1.7 ENGINE TIGHTENING TORQUE LIST

Item	Qty	Dia. Of thread(mm)	Torque（N·m）	Remarks
Oil drain boltM12×1.5	1	M12×1.5	28～32	
OIL PASSAGE BOLT M14×1.5(left case)	2	M14×1.5	32～36	
Plug screw, oil passage pressing plate (left case)	4	M6×12	8~12	Thread locker glue
Primary screen cover bolt	3	M6×20	8~12	Thread locker glue
Oil pressure switch	1	M10×1	12~15	Thread locker glue
ScrewR21/8(CVT oil passage)	1	R21/8	18～22	Apply seal gum
Bolt, CVT air intake plate	4	M6×12	8~12	Thread locker glue
CVT cover screw Plug screw(left crankcase cover)	8	M6	6~8	
Relief valve(left crankcase cover)	1	M20×1.5	28~32	
Bolt of wiring clamper (left crankcase cover)	1	M6×10	8~12	Thread locker glue
Screw of oil seal plate(left crankcase cover)	3	M6×8	8~12	
Adjust nut, valve clearance	8	M6	8~12	
Bolt, timing sprocket	2	M6×10	8~12	
Bolt, decompressor, starter	1	M8×32	28~32	
Bolt, cylinder	4	M10	55~65	
Bolt, cylinder installation	2	M6×132	8~12	
Plug, spark	1	M12×1.25	18~20	
Sensor, water TEMP	1	M12×1.5	16~20	
StudboltM8×42（exhaust port）	2	M8×42	20~25	Thread locker glue
Nut, thrustM8（exhaustport）	2	M8	13	

Item	Qty	Dia. Of thread(mm)	Torque （N·m）	Remarks
Plug,ScrewM12×1.5	1	M12×1.5	28~32	
BoltM6×45(thermostat cap)	2	M6×45	6~10	
Injector seat installation bolt	2	M8×25	20~25	
Bolt COMP. Cylinder head cover	4	M6	6~8	
Thread tension plate pin	1	M8	22~28	Thread locker glue
Bolt, magneto stator	3	M6×30	8~12	Thread locker glue
Bolt, overriding clutch COMP	6	M8×20	28~32	Thread locker glue
Bolt, drive pulley(CVT drive pulley)	1	M12×1.5-LH	55~60	
Screw, CVT driven pulley	1	M20×1.5	110~120	Thread locker glue
Lock nut, drive bevel gear	1	M22×1	140~150	
Bolt(bearing seat, drive bevel gear)	4	M8×28	38~42	
Screw （bearing holder, drive bevel gear）	4	M8×25	15~20	
Stopper nut (driven bevel gear)	1	M65×1.5	100~120	Thread locker glue
Bolt(bearing seat, driven bevel gear)	4	M8×28	38~42	
Nut, Driven Bevel Gear	1	M16×1.5	140~160	
Nut, Front output shaft	1	M14×1.5	95~100	
Bolt, gear orientation	1	M14×1.5	38~42	Thread locker glue
Bolt, oil pump cover	3	M5×16	6~8	Thread locker glue
Bolt, oil guard	2	M6×12	8~12	Thread locker glue
Magnetor Rotor nut	1	M16×1.5	160~170	Thread locker glue

3.1.8 ENGINE SERVICE TOOLS

Measurement Tools

Measurement Tools			
No.	Description	Specification	Purpose
1	Vernier Caliper	0-150mm	For measuring the length and thickness
2	Micrometer	0-25mm	For measuring outer diameters of rocker arm, valve stem and camshaft
3	Micrometer	25-50mm	For measuring the max. lift of camshaft
4	Micrometer	75-100mm	For measuring piston skirt
5	Cylinder Gauge		For measuring cylinder bore diameter
6	Small Bore Gauge	10-34mm	For measuring inner gauge of rocker arm, piston pin bore, connecting rod small end bore
7	Dial Indicator	1/100	For measuring the play
8	Straightedge Gauge		Plane measuring
9	Feeler Gauge		Plane and valve clearance measuring
10	Fuel Level Gauge		For measuring the carburetor fuel level
11	Thickness Gauge		For measuring the clearance
12	Spring Balance		For measuring the spring tension
13	Tachometer		For measuring engine speed
14	Oil Pressure Gauge		For measuring oil pressure
15	Compression Gauge & Adapter		For measuring cylinder compression
16	Radiator Cap Tester		For measuring radiator cap opening pressure
17	Ohmmeter		For measuring resistance and voltage
18	Ammeter		For measuring current/switches
19	Thermometer		For measuring liquid temperature
20	Timing Light		For checking the ignition timing
21	Torque Wrench		For measuring the tightening torque
General-purpose and Auxiliary Tools			
22	Alcohol Burner		Heating up
23	Magnetic Stand		For micrometer
24	Slab		Auxiliary tool for measuring
25	V-block		For measuring the play
26	Tweezer		For installation of valve cotter
27	Circlip Pliers		For removal and installation of circlips
28	Long Nose Pliers		For removal and installation of retainers
29	Impact Driver		For removal of cross-headed bolts

Special Tools

No.	Description	Specifications	Purpose
1	Rotor assy puller	1BE-85610-00	Remove magneto rotor
2	Bearing retainer, nut wrench	LH188MR FZ/24	Removal of Front output shaft Bearing
3	Bearing limit nut, nut wrench	LH188MR FZ/25	For removing Bearing limit nut
4	Drive pulley puller	1BX-17653-00	Removal of drive pulley
5	Driven pulley expander	1BX-17654-00	Removal/installation of drive belt
6	Driven pulley spring compressor	1BA-17730-00 FZ/1	Disassemble driven pulley
7	The tool for one way clutch of drive pulley	1BA-17628-00 FZ/1	Assemble one way clutch of drive pulley

Materials for Operation and Fixing

Materials for engine operation engine oil, grease and coolant. Fixing materials include sealant, thread locker, etc.

Description	Type	Application Area	Remark
Lubricating Oil/Engine Oil	4-stroke motor oil SAE15W-40 Or SAE10W-50 API : SG or higher	Cylinder rotating parts, sliding parts Inner crankcase rotating parts, sliding parts Cylinder head rotating parts, sliding parts Refer to Engine Lubrication System (→5-99)	capacity 2600ml (for changing oil) 2700ml (for replacing filter) 3000ml (for engine repairing)
Molybdenum lubrication oil		piston pin、 valve stem、 valve oil seal、 camshaft	
Grease	#3 MoS2 Lithium Base Grease	Oil seal, O-ring and other rubber seals. Sealed bearing	
Coolant	-35℃ antifreeze, corrosion-resistant, high boiling point coolant	Cooling system、 Water-seal	Capacity according to radiator and water hose system
Joint Face Sealant		Crankcase splitting surfaces, contact surface between crankcase and cylinder,	
Thread Locker		Thread Parts	See 3.1.7

3.2 INSPECTION ANDADJUSTMENT

3.2.1 PERIOD MAINTENANCE TABLE

3.2.2 PROCEDURE OF MAINTENANCE & ADJUSTMENT

3.2.3 VALVE CLEARANCE

3.2.4 ENGINEIDLE SPEED

3.2.5 SPARK PLUG

3.2.6 AIR FILTER

3.2.7 DRIVING BELT, CVT

3.2.8 INSPECTION OFLUBRICATION SYSTEM

3.2.9 INSPECTION OFCOOLINGSYSTEM

3.2.10 INSPECTION OFCYLINDERPRESSURE

3.2.1 PERIOD MAINTENANCE TABLE

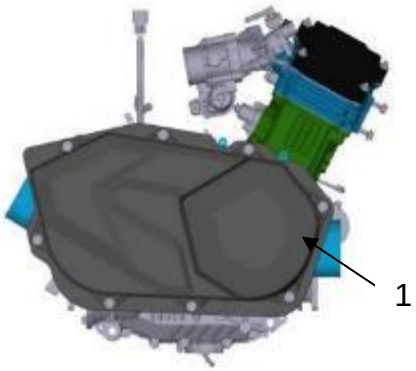
Engine maintenance is a periodic job, careful periodic maintenance is very important, will assure your vehicle having a good performance, reliability, economy and durability. Details are explained in below 191MR engine periodic maintenance chart.

ATTENTION： Maintenance intervals in the following chart are based upon average riding conditions. Vehicles subjected to severe use must be inspected and serviced more frequently

A：Adjust C:Clean I:Inspect L:Lubricate R:Replace		10 hours or 300km	20 hours or 750km	Every 50 hours or 1500km	Every 100 hours or 3000km or 1 year	Every 200 hours or 6000km or 2years	Remark
Engine	Facilitating Conditions & abnormal sound	I		I	I		
	Exhaust condition		I	I	I		No black smoke or blue smoke
	Valve setting		I，A		I，A		In：0.06mm～0.08mm Out：0.08mm～0.10mm
	Idle speed	I		I			1500 r/min±100r/min
Spark Plug			I		I	R	No carbon deposition, electrode gap: 0.8mm～0.9mm
Air Filter			C	R			
CVT system	CVT Belt			I	R		Replace every 2000km
	Primary Pulley, Driven pulley				I，C		
Engine oil, filter			R		R		
Throttle Body		I			I，L		
Cooling System	Water volume	I		I			
	Water pipe	I			I		
	Radiator valve opening pressure	I		I	I		0.75 kg/cm～1.05kg/cm
	Replace coolant	Replace every 2 years					

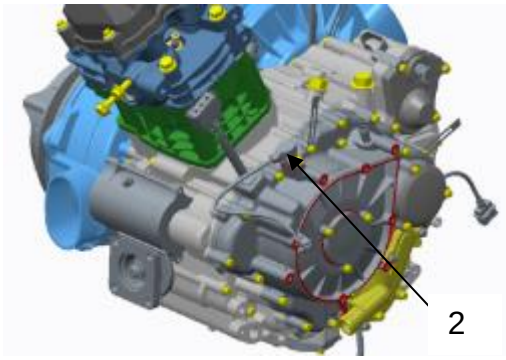
3.2.2 PROCEDURE OF MAINTENANCE & ADJUSTMENT

This section describes the maintenance procedures for each item mentioned in the periodic maintenance chart.



3.2.3 Valve clearance

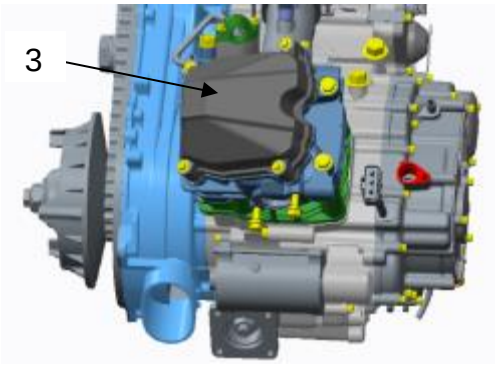
Inspect initially at 20-hour break-in and every 40 hours or every 1000km thereafter. Inspect the clearance after removing cylinder head



Excessive valve clearance results in valve noise and insufficient valve clearance results in valve damage and reduced power.

Check the valve clearance at the period indicated above and adjust the valve clearance to specification, if necessary.

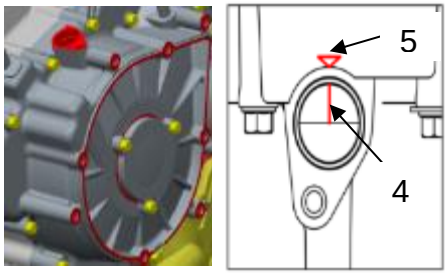
- Remove CVT case cover (1);
- Remove RPM sensor(2) of left crankcase cover;
- Remove cylinder head cover (3);
- Turn the crankshaft until the line(4) of T.



D.C. on rotor is aligned with mark (5) of inspection hole on left crankcase..

- Insert feeler gauge to check the clearance between the valve stem end and the adjust bolt on the rocker arm.

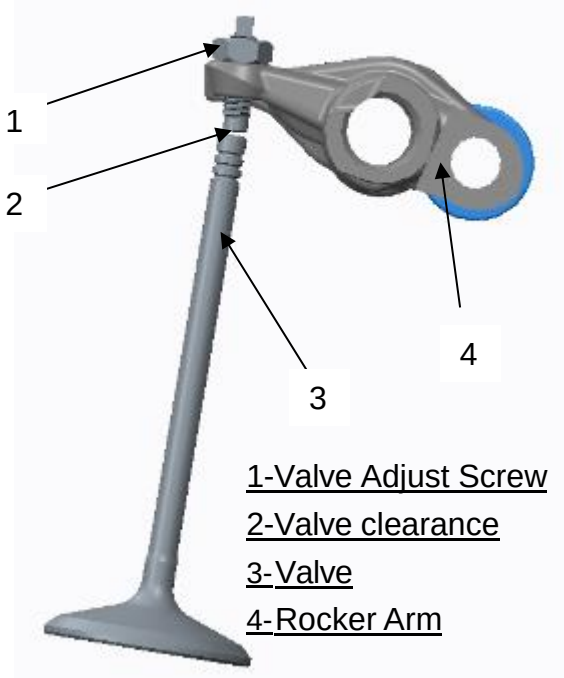
Valve clearance Intake valve 0.06mm～0.08mm （When cold） Exhaust valve 0.08mm～0.10mm



Attention: **● The valve clearance must be adjusted when the engine is cold.** **● Adjust the valve clearance when the piston is at the Top Dead Center (T.D.C.) on the compression stroke.**

● If the clearance is incorrect, bring it into the specified range using the special tool.

Loosen valve adjust bolt and nut, insert a feeler gauge between the valve stem end and valve adjusting bolt (0.06mm thickness for intake valve, 0.08mm thickness for exhaust valve), tighten valve adjust bolt, make sure it slightly contacts the feeler gauge, tighten bolt and nut.



1-Valve Adjust Screw
2-Valve clearance
3-Valve
4-Rocker Arm

● Take out the feeler gauge, measure the clearance. If the clearance is incorrect, repeat the above steps until the proper clearance is obtained.

Locknut：12N·m
Tools： Valve adjuster
Feeler gauge Material： Thread
Locker

Caution:
Securely tighten the locknut after completing adjustment

Ignition Coil

3.2.4 ENGINE IDLESPEED

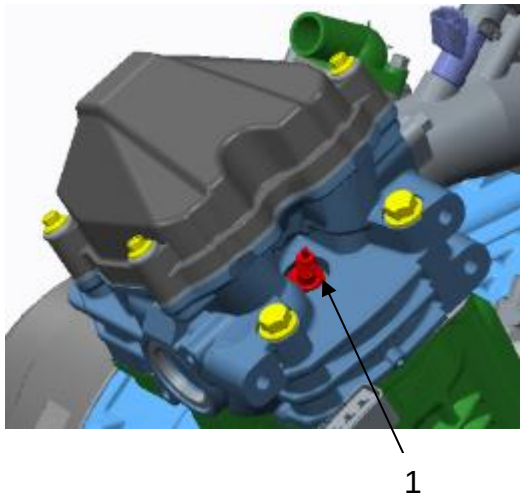
Inspect initially at 20 hours run-in and every 50 hours or 1500km thereafter.

● Install cylinder head, speed sensor
Start the engine and warm it up for several minutes, measure engine speed with a tachometer.
Engine idle speed：1500r/min ± 100r/ min
Tool： Tachometer

3.2.5 SPARKPLUG

Inspect initially at 20 hours run-in and every 100 hours or 3000km

●Remove the spark plug（1)with a special tool；
Specification: DPR8EA-9(NGK)



● Spark plug inspection： If the electrode is extremely worn or burnt, or spark plug has a broken

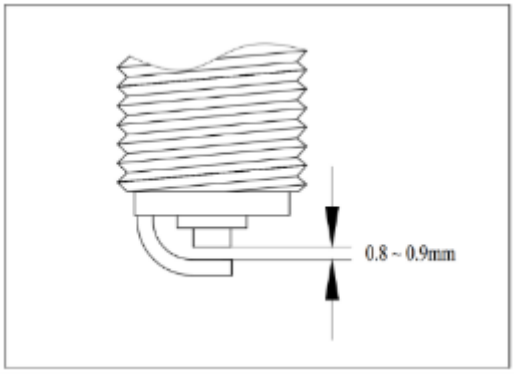
insulator, damaged thread, etc, replace the spark plug with a new one

In case of carbon deposit, clean with a proper tool.

SPARK PLUG GAP： Measure the spark plug gap with a feeler gauge.

Out of specification: Adjust

Spark plug gap：0.8mm～0.9mm



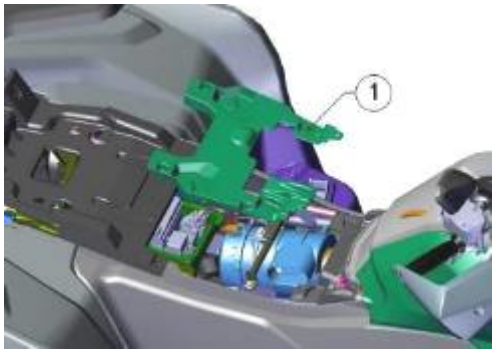
Caution:

Check the thread size and reach when replacing the spark plug. If the reach is too short, carbon will be deposited on the screw portion of the spark plug hole and engine damage may result

● Spark plug installation

Caution:

To avoid damaging the cylinder head threads; first, tighten the spark plug with fingers, and then tighten it to the specified torque using the spark plug wrench.



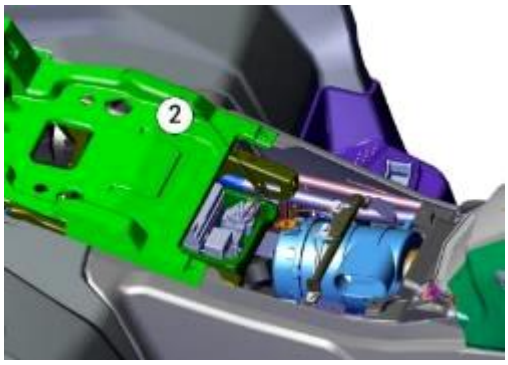
Tightening Torque：18~20N.m

Tool： Spark Plug Wrench

Feeler Gauge

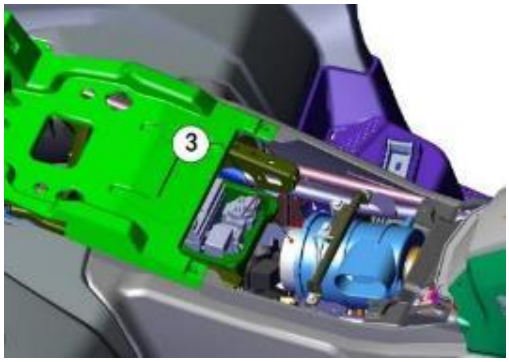
3.2.6 AIR FILTER

Inspect every 20 hours or 750km, clean it if necessary. Change it every 1500km



If the air cleaner is clogged with dust, in- take resistance will be increased, with a resultant decrease in power output and an in- crease in fuel consumption. Check and

clean the air filter as following:



●Remove ①

●Disengage the three cover latches②

●Unlatch the cover and carefully remove it from the air box.

●Remove the filter element ③.

●Inspect the air box for oil or water deposits.

Wipe away any deposits with a clean shop towel.

Note： If the filter has been soaked with fuel or oil it must be replaced.

●Inspect the air filter and replace if necessary.

Note： do not attempt to clean the air filter with compressed air .

●Place the air filter into the air box and reinstall the air box cover.

●Inspect the filter element for tears, torn element must be replaced.

●Engage the cover latches.

Note： Make sure the tabs are properly positioned into the hinge. Ensure the O-ring is installed inside the lid properly.

3.2.7 DRIVE BELT, CVT

Removal

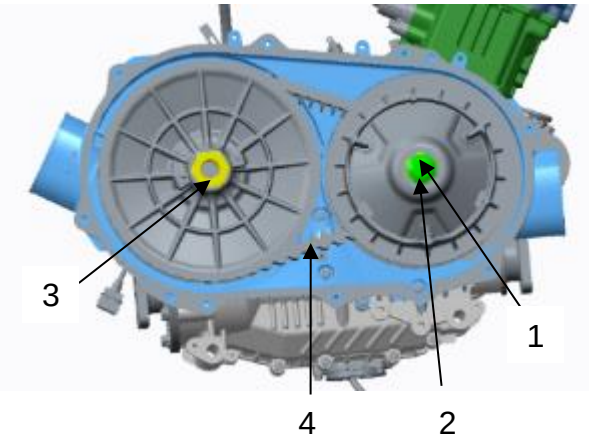
● Remove CVT cover.

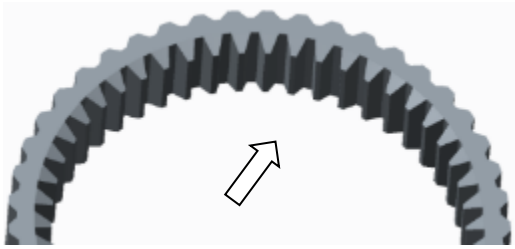
● Loosen primary bolt(1) and gasket(2), take drive disk.

● Loosen / driven pulley nut (3).

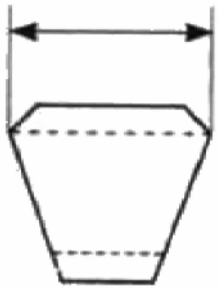
● Remove / driven pulley together with drive belt.

● Remove drive belt (4) from / driven wheel.





Inspection



● Inspect CVT friction disk for wear and damage. If any cracks or damages are found, replace CVT with a new one.

● Inspect drive belt for wear and damage. If any cracks or damages are found, replace drive belt with a new one.

● Inspect drive belt for width, if width is out

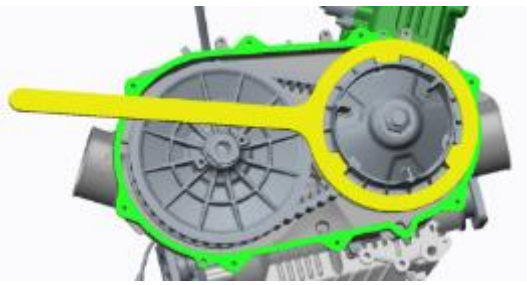
Of service limit, replace drive belt with a new one.

Service Limit：33.5mm

Tool：Vernier Caliper

Installation

Reverse the removal procedure for installation. Pay attention to the following:

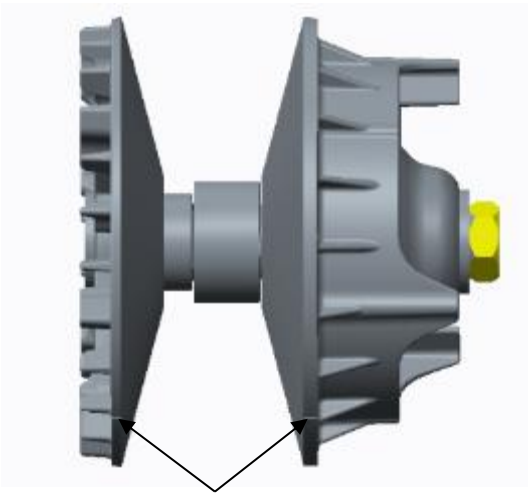


● Insert drive belt with a special tool , as low as possible, between secondary sliding sheave and primary fixed sheave:

● Hold / driven wheel with a special tool and tighten the nut to the specified torque.

Nut, / driven pulley：110~120N. m

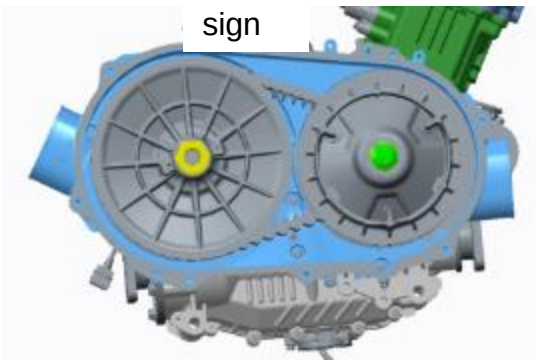
● Install driving pulley and bolt. Hold the driving pulley with a special tool and tighten the bolt to the specified torque.



Bolt, drive pulley：55~60N. m

Caution: Fit the drive belt with the arrow on the drive belt points towards normal turning direction.

● Screw off Driven pulley Expander, turn driving pulley, until the drive belt is properly seated.



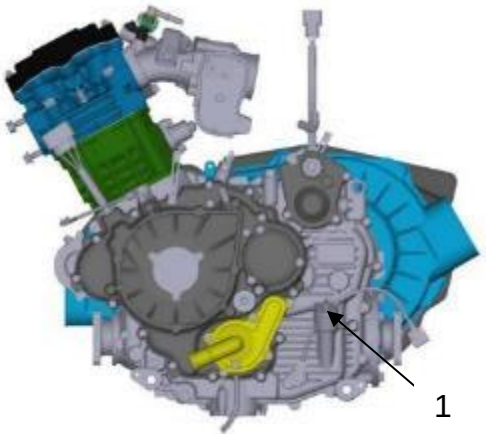
Warning：
The drive belt contact surface of the driven face should be thoroughly cleaned.

● Install CVT cover

3.2.8 INSPECTION OF LUBRICATION SYSTEM

Replace engine oil and oil filter initially at 20 hours or 750km and every 100 hours or 3000km thereafter.

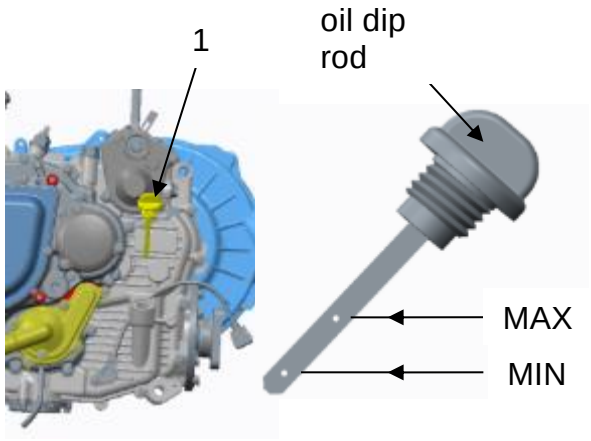
Check Engine Oil Level



- Keep the engine in a plan position
- Remove oil dip rod(1)

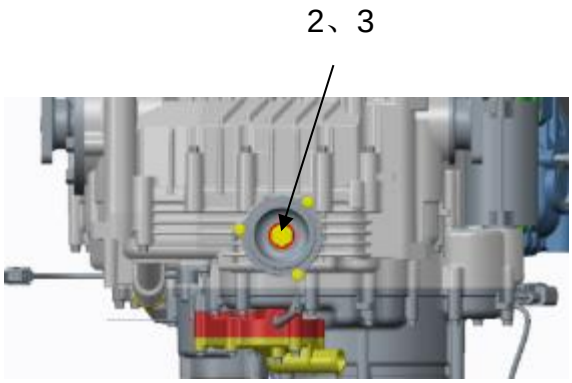
- Clean oil dip rod, insert oil dip rod but do not tighten it.
- Take out oil dip rod and check if oil is between upper and lower limit.
- If the engine oil is insufficient, fill more oil until the sufficient oil is obtained.

Engine oil：SAE15W/40 SG or higher



Note：
Keep the engine in a plan position Do not tighten oil dip rod when measuring oil level.

Replace Engine Oil



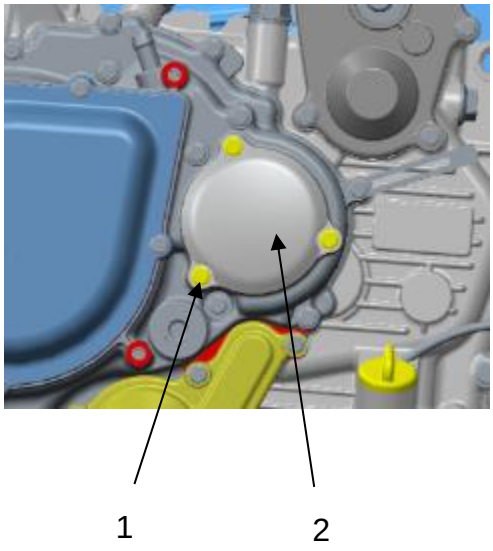
- Remove oil dip rod (1), drain bolt (2)and washer (3);
- Drain out the engine oil while the engine is still warm.
- Clean oil dip rod, drain bolt and washer with solvent.
- Install washer and drain bolt;
  DrainBolt：
  28~32N. m
- Fill engine oil（about2700mL）

● Install oil dip rod, start the engine and allow it to run for several minutes at idling speed.

● Turn off the engine and wait for about3minutes,and then check the oil level on the dipstick.

Caution :

The engine oil should be changed when the engine is warm. If the oil filter should be replaced, replace engine oil at the same time.

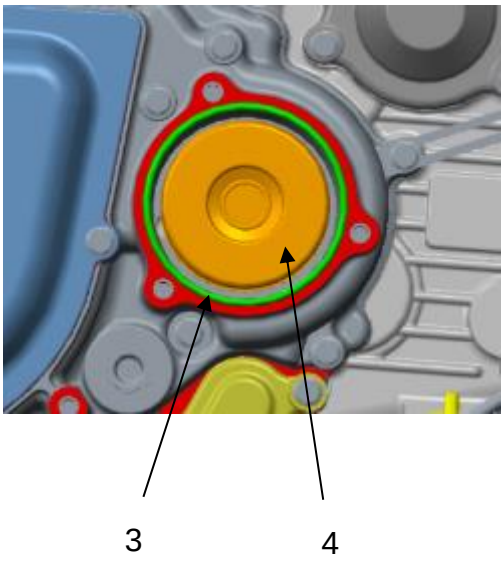


Replacing Oil Filter

● Remove relative parts (see Replacing Engine Oil)

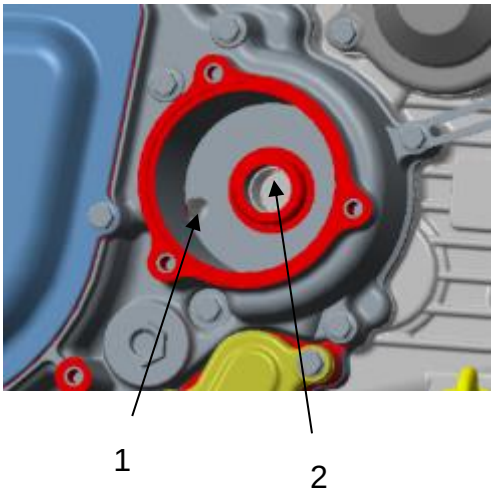
● Remove oil filter cover bolt (1) and filter cover(2)

● Remove O ring (3) , then oil filter(4)



Oil Filter Element Inspection

Check and clean the engine oil filter inlet 1 and outlet area 2 for dirt and other contaminations.



Oil Filter Element Installation

Install a **NEW** o-ring on oil filter cover, Apply engine oil on o-ring and the end of filter;

Install the element into oil filter bore; Install the element into oil filter bore, bolt. Torque screws to:8~12N. m

3.2.9 INSPECTION OF COOLING SYSTEM

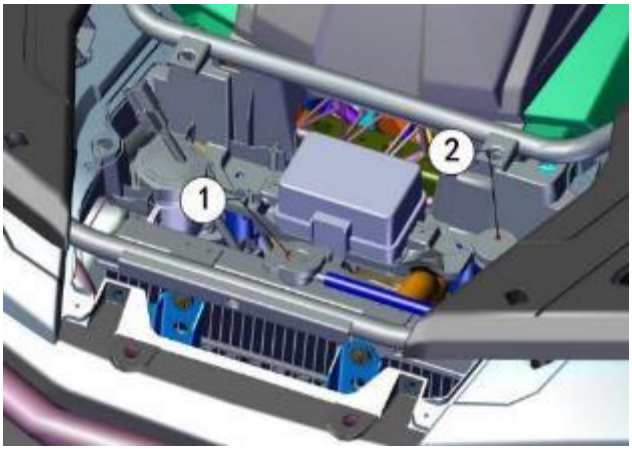
Check initially at 50 hours or 1500km, replace coolant every 2 years

Check radiator, reservoir tank and water hoses.

Leakage or Damage—

—Replace Inspection of engine coolant

Check coolant level by observing the upper and the lower limit on the reservoir tank. If the level is below lower limit, fill coolant until the level reaches the upper limit.



Replacing Coolant

● Remove radiator cap (1)and reservoir tank cap (2)

● Place a pan below water pump, and drain cool- ant by removing drain plug (3) and

Warning:

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

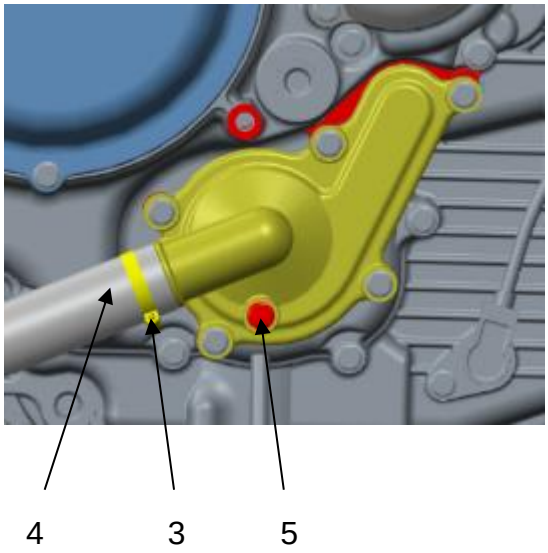
Engine coolant is harmful. If coolant splashes in your eyes or clothes, thoroughly wash it away with water and consult a doctor. If coolant is swallowed, induce vomiting and get immediate medical attention.

Keep coolant away from reach of children.

water hose (4)

● Drain coolant from reservoir tank.

● Clean radiator with fresh water, if necessary.



● Connect water hose (4), and tighten clamp (3) securely

● Fill the fresh specified coolant into the radiator

● Loosen bleed bolt (5), on water pump, when coolant flow from bleed bolt, tighten the bolt. Install radiator cap (1) securely after filling coolant.

● Start the engine and keep it running for several minutes. After warm up and cooling down the engine, open radiator cap and check coolant. Fill the specified coolant until the level is between the upper and lower lines on the reservoir tank.

Caution :
Repeat the above procedures several times and make sure the radiator is filled with coolant and air is discharged.

● Fill coolant into the reservoir tank till between upper and lower limit. Install reservoir tank cap.

Warning : Never mix with other brand

Inspection of Radiator Hose

Perform inspection every 40 hours or 3000km

Check radiator hose and clamp, leakage or damage----- Replace.

3.2.10 INSPECTION OF CYLINDER PRESSURE

Cylinder pressure can reflect the inner cylinder working status. Check cylinder pressure is necessary.

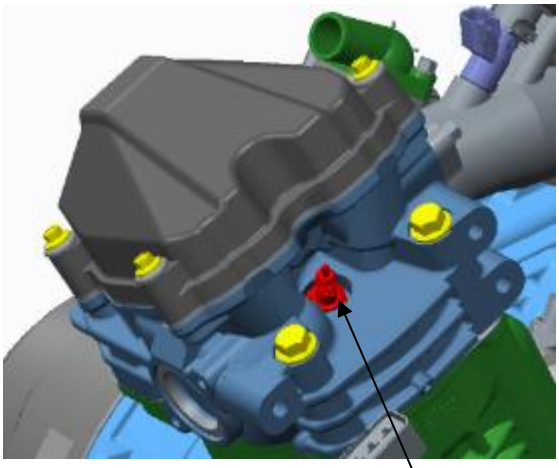
Cylinder pressure: 1000kPa

A lower cylinder pressure may be caused by:

- ●Excessive wear of cylinder
- ●Wear of piston or piston ring
- ● Piston ring jam in groove
- ● Poor closure of valve seat
- ● Damaged cylinder gasket or other defects

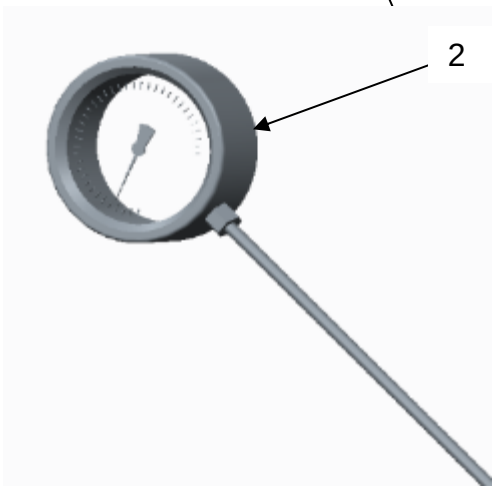
> **Note：**
> When cylinder pressure is too low, check the above items.

Testing Cylinder Pressure



> **Note:**
> Before testing of cylinder pressure, make sure that cylinder head bolts are tightened to the specified torque and valve clearance has been properly adjusted.

- ●Warm up the engine before testing
- ●Make sure battery is fully charged
- ●Remove spark plug 1
- ●Installcylinderpressuregauge2inspark plug hole
- ●Keep throttle full open
- ●Press start button crank the engine a few seconds. Record the maximum reading of cylinder pressure.



Tools：Cylinder Pressure Gauge

3.3 ENGINE REMOVAL, INSPECTION & INSTALLATION

3.3.1 REMOVAL/INSTALLATION ORDERS AND THE PAGE NUMBERS TABLE

3.3.2 ENGINE REMOVAL

3.3.3 ENGINE INSPECTION

3.3.4 ENGINE INSTALLATION

3.3.1 ENGINE REMOVAL/INSTALLATION ORDERS AND THE RELATIVE PAGE NUMBERS

Item	Description	Disassembly	Inspection/Maintenance	Assembly	Remarks
Engine Front Side	Spark Plug	3-31	3-20	3-88	
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	Start decompression COMP	3-31	3-41	3-87	
	Timing driven sprocket	3-32	3-41	3-87	
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To be continue

Item	Description	Disassembly	Inspection/Maintenance	Assembly	Remarks
↓ Engine Center	Gear Position Bolt	3-37	/	3-80	
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	Shift Drum / Shift Fork COMP	3-39	3-73	3-78	
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	Filter Net	3-40	/	3-80	
	Left Crankcase	/	3-66	/	

Notes: Arrowhead direction is for engine removal orders. Reverse the direction for assembly and installation.

3.3.2 ENGINE REMOVAL

Preparation before engine removal

● Prepare a proper tray used for load of components

● Prepare necessary removal and assembly tools

● Drain up engine oil（see 3.2.8）

● Drain up coolant（see 3.2.9）

● Remove seats.

● Remove left cap.

● Remove LH&RH side cover deco plates.

● Remove LH&RH footrests.

● Remove LH&RH front inner fenders.

● Remove air filter wearing plate.

● Remove fuel tank lower protection plate.

● Remove fuel tank.

● Remove air filter.

● Remove muffler.

● Remove throttle cable.

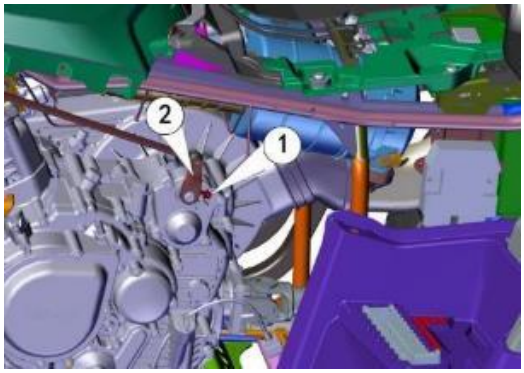
● Unplug connectors of electrical parts

● on engine (such as crankshaft position sensor, gear sensor, oil pressure sensor, etc.)

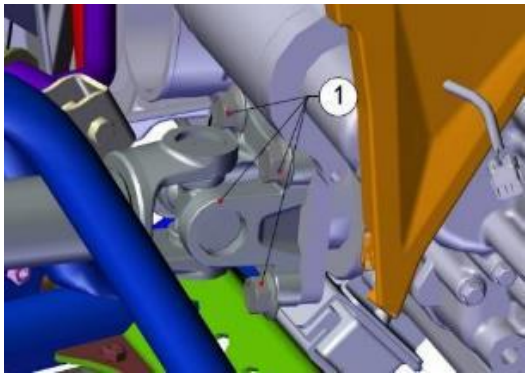
Drive Shaft Removal

● Remove bolt ①.

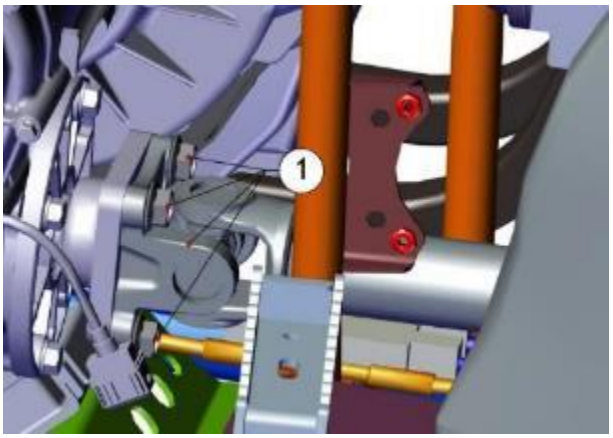
● Remove shift lever ② from engine.



● Remove 4 bolts ①.



● Remove 4 bolts ①.

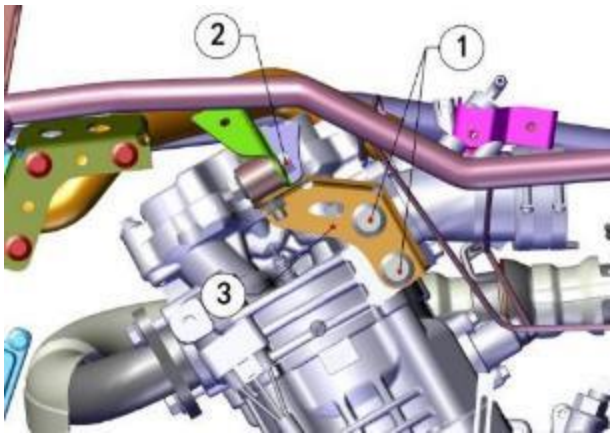


Engine Removal

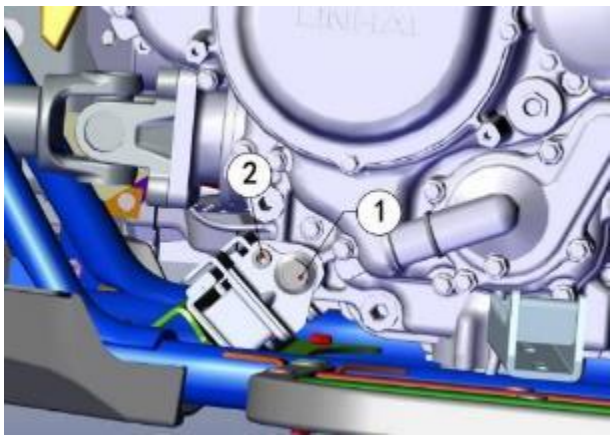
● Remove bolts ①.

● Remove bolt ②.

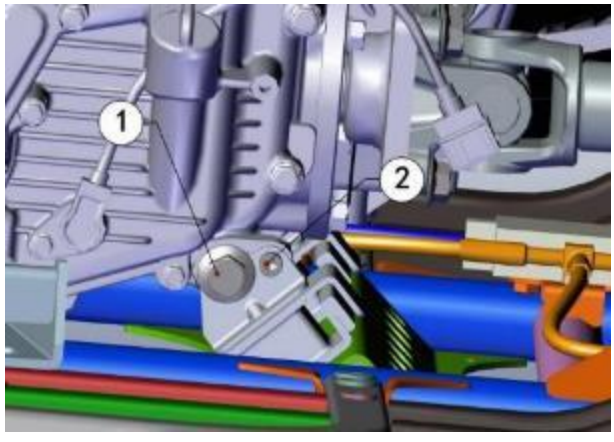
● Remove connecting bracket ③ on engine.



● Remove bolts ①②.



● Remove bolts ①②.



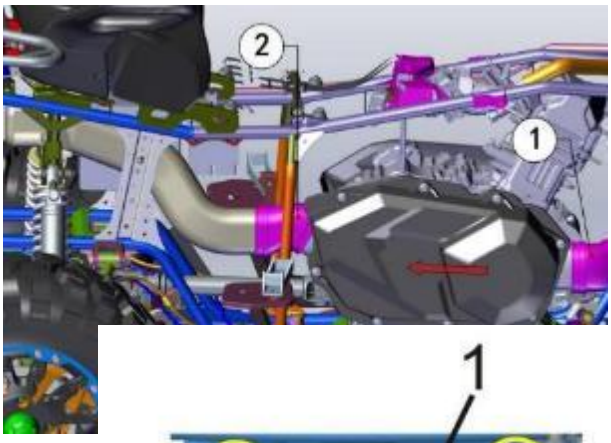
● Remove CVT air intake pipe ① .

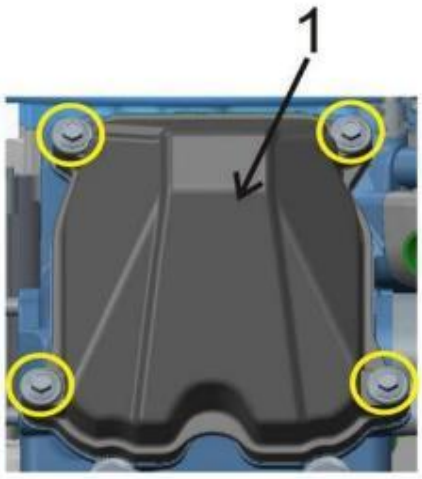
● Remove CVT air exhaust pipe ② .

● Wrap the engine until it is loosened. .

● Remove the engine (it is recommended to
remove the engine from right side).

● Put the engine on service bench.



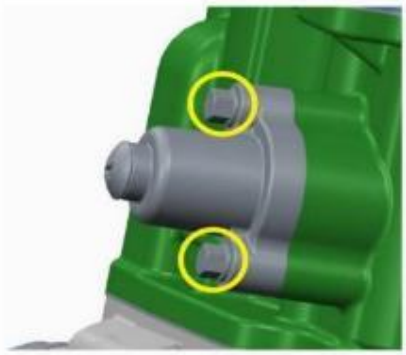


Engine Front Side
Spark Plug

● Remove spark plug with special wrench (see5.2.5）

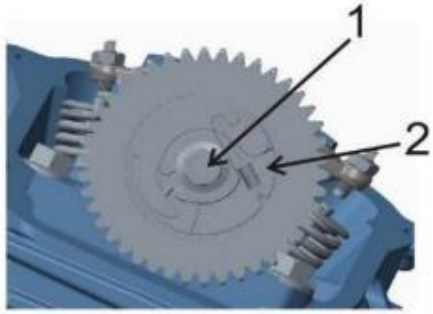
Cylinder Head Cover

● Remove 4 bolts of cylinder head cover. Remove cylinder head cover (1)



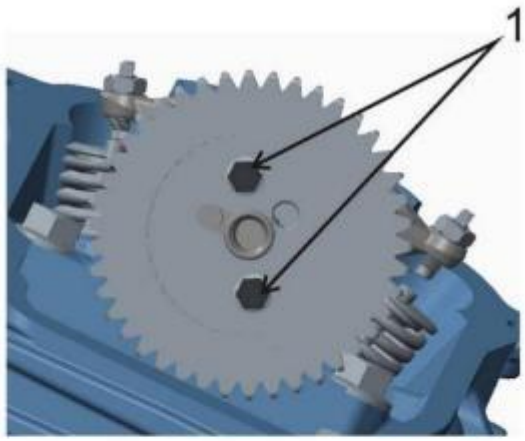
Timing Chain Tensioner

● Remove screw plug ①，insert a flat screwdriver into slot of timing chain tensioner adjuster , turn it clockwise to lock tensioner spring;
● Remove tensioner fix bolt
● Remove tensioner and gasket



Start decompression COMP

● Remove bolt (1)，Remove Start decompression COMP(2)



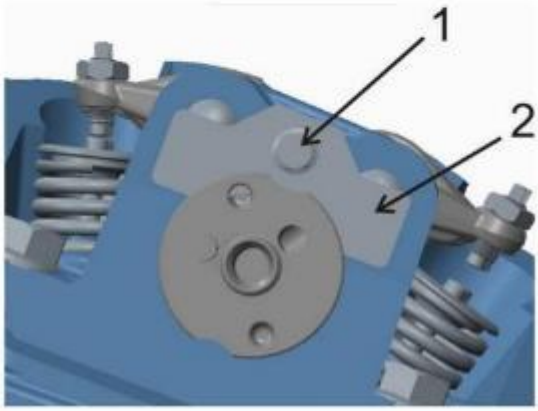
Timing driven sprocket

● Loosen two bolts (1)of timing driven sprocket
● Remove timing driven sprocket

Camshaft, rocker arm

● Loosen bolt(1)
● Remove camshaft holder
● Remove rocker arm shaft, Remove rocker arm
● Remove camshaft

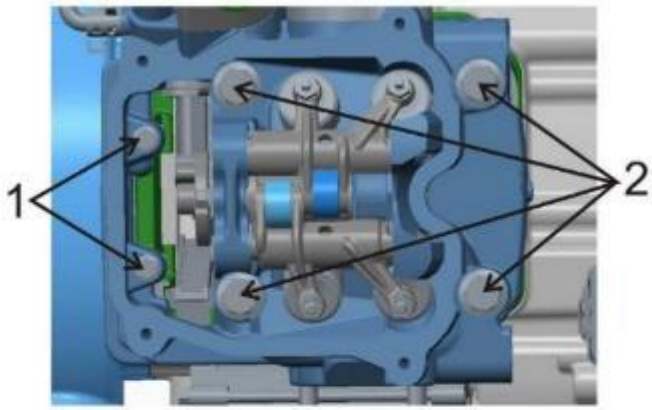
Note: Turn camshaft to Free State.



Cylinder Head, Guide Chain Plate

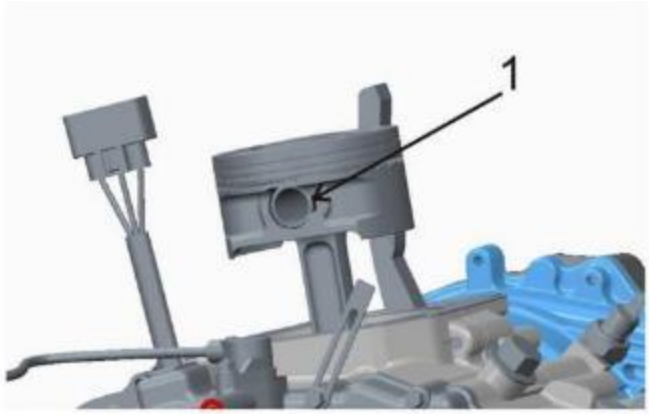
● Remove 2 bolts (1) of cylinder head
● Remove 4 cylinder head bolts 2 diagonally
● Remove cylinder head
● Remove guide chain plate
● Remove dowel pin and cylinder head gasket

Note: Take care not to drop dowel pin into crankcase



Cylinder

● Remove cylinder



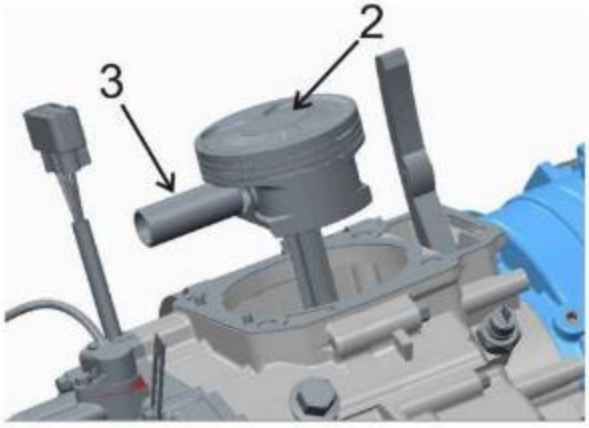
Piston

Put a clean rag under piston so as not to drop piston pin circlip into crankcase.

Warning: Piston pin circlip is spring-loading

● Remove piston pin circlip (1) and discard it.

Note: No need to remove two piston pin circlip



Remove piston pin circlip (1) from piston pin hole (connecting rod hole)

Remove piston (2) from connecting rod

Engine Right Side

CVT Cover

● Remove CVT cover（see5.2.7）

Driving pulley / driven pulley /Drive Belt

● Remove drive bolt (1) clockwise and driven screw (2) anticlockwise

Drive pulley / driven pulley /Drive Belt

● Remove drive pulley with special tools

● Remove drive pulley / driven pulley /drive belt

Tool: Drive pulley puller (3)
(1BX-17653-00)

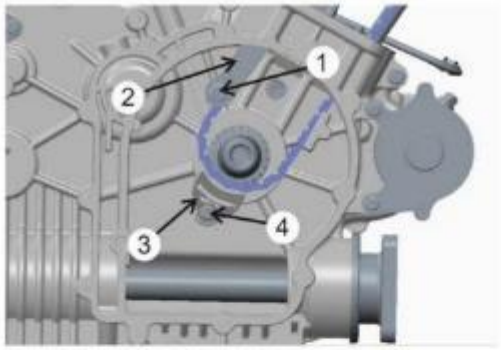
CVT Case

● Remove bolt of air intake plate Remove air intake plate

● Remove bolt of CVT case
● Remove CVT case
● Remove dowel pin
Remove paper gasket and discard it.

Chain holder, Tension plate

● Remove bolt 1 of tension plate Remove tension plate2
● Remove bolt 4 of chain holder Remove chain holder3

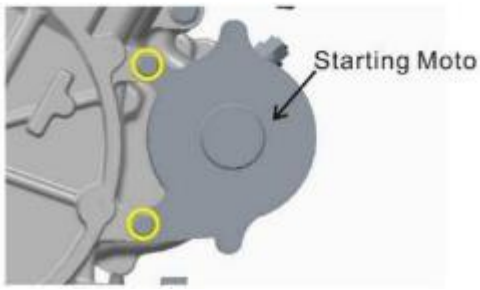


Timing Chain

● Remove timing chain from crankshaft sprocket

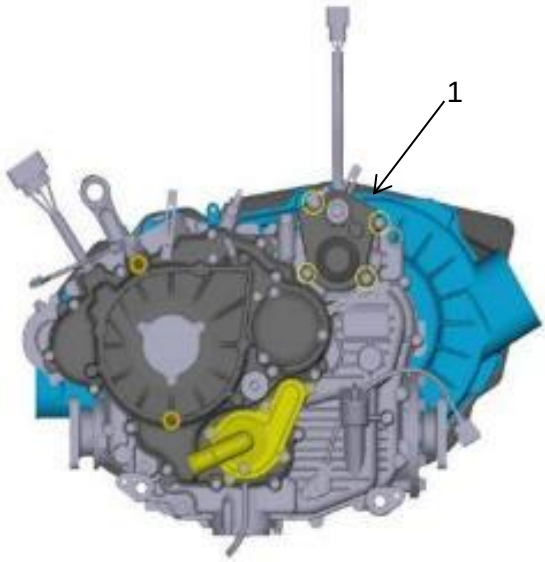
Starting Motor

● Remove 2 bolts of starting motor
● Remove starting motor

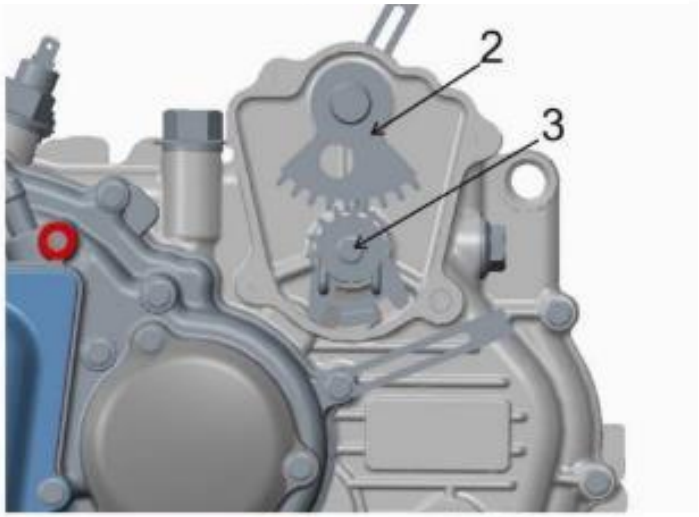


Sector Gear

● Remove 4 bolts of sector gear housing cover
● Remove sector gear housing cover1

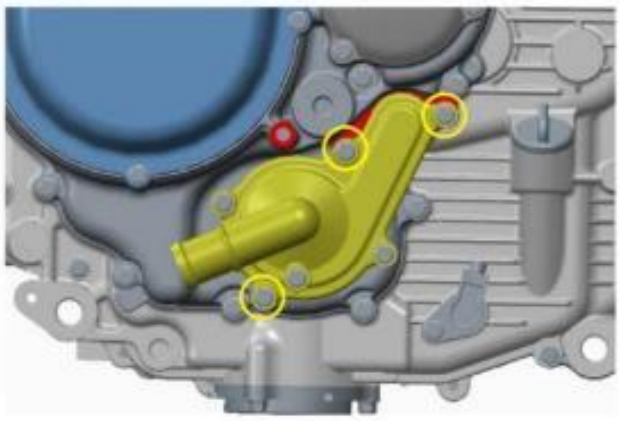


● Remove dowel pin and gasket
● Remove drive sector gear
● Loosen bolt 3, remove driven sector gear



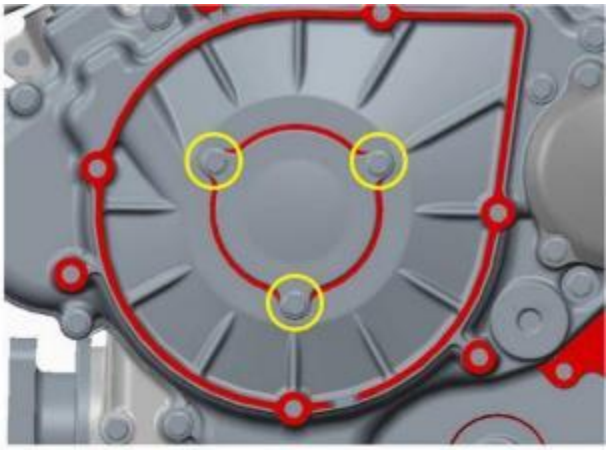
Water Pump

● Screw out bolt of water pump
● Remove water pump



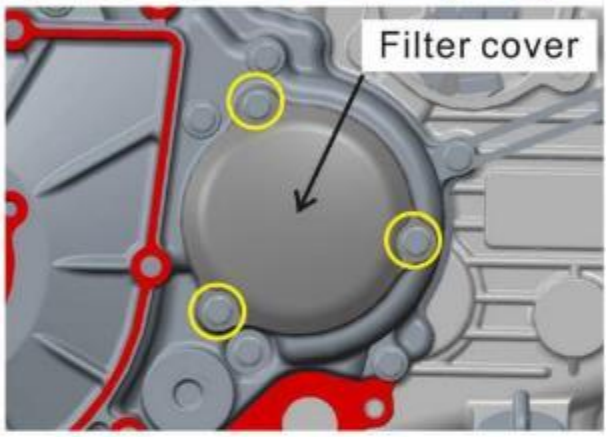
Cap

● Remove 3 bolts, remove cap



Oil Filter

● Screw out 3 bolts of filter cover
● Remove filter cover, O ring
● Remove oil filter



Left Crankcase Cover/Magneto Stator

● Remove bolts of left
● Remove left crankcase cover
● Remove dowel pin and gasket

Magneto Rotor

● Remove nut of Magneto Rotor

● Install special tool to rotor thread Remove rotor and woodruff key

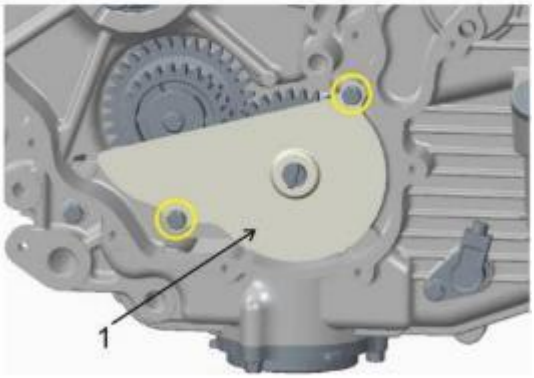
Tool: Rotor assy puller (1BE-85610-00)

Starting Driven Gear/Starting Dual Gear

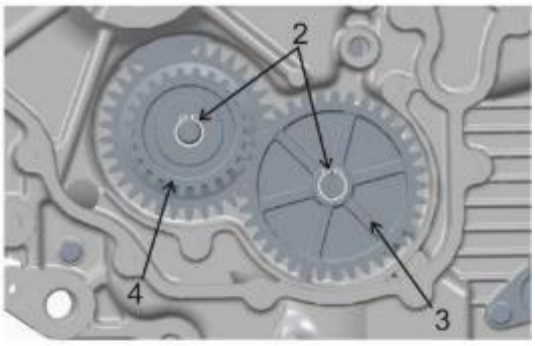
● Remove starting driven gear 1 and needle bearing
● Remove starting dual gear 2 and shaft

Oil pump drive gear/Oil pump dual gear

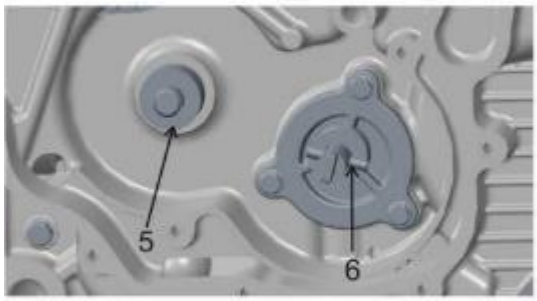
● Remove oil guard bolt
● Remove oil guard(1)



● Remove two Circlip (2) by circlip plier
● Remove oil pump drive gear (3), oil pump dual gear (4) and gasket



● Remove needle bearing(5)
● Remove pin shaft (6),gasket



Engine Center

Gear position bolt

● Remove gear position bolt(1)
● Remove spring and steel ball

Right Crankcase

● Remove left crankcase bolts

● Remove right crankcase bolts

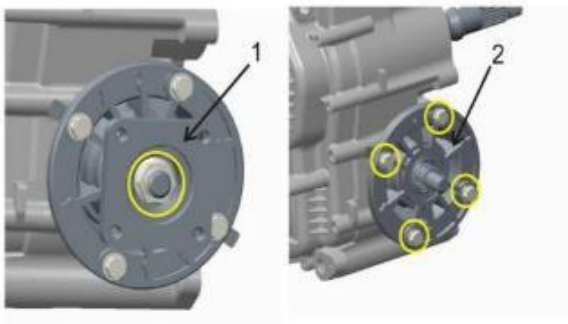
● Separate crankcase carefully with rubber hammer knocking the case

Caution:

Do not damage the seal surface of right/left crankcase when separating Crankshaft should remain in the left crankcase half.

Front Output Shaft, Driven Bevel Gear

● Remove nut of Real output coupler(1)
● Remove bevel gear cover bolt
● Remove driven bevel gear(2)



● Remove nut 1 , gasket 2 , front output coupler3,oilseal4,frontoutputshaftbearing ring5(LH)
● Remove Front Output Shaft6

Drive Bevel Gear

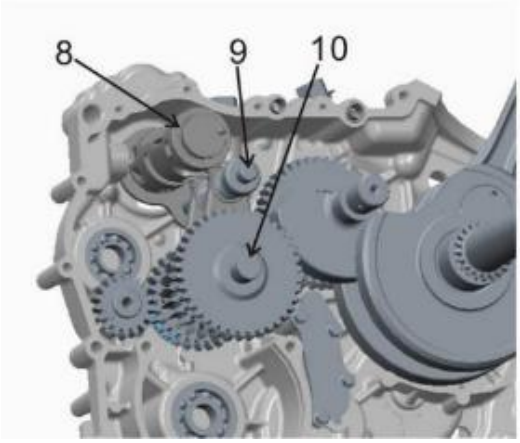
● Screw out driven bevel gear bearing seat bolt
● Remove driven bevel gear from left crankcase

Transmission Main Shaft

● Remove transmission main shaft7

Shift Drum, Shift Fork, Drive counter-shaft

● Remove shift drum 8, shift fork 9, and drive countershaft10



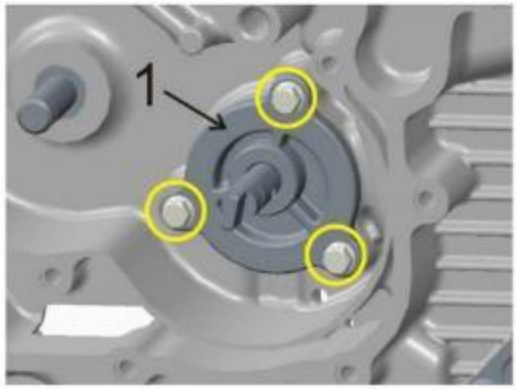
Note: Shift drum, shift fork and drive countershaft should be removed together.

Crankshaft

● Remove crankshaft from left crankcase

Balance Shaft

● Remove balancer shaft from left crank- case



Oil bump

● Screw out oil pump bolt
● Remove oil bump(1)

Note: Oil pump bolt size M5 X 16

Filter Net

● Screw out the bolt
● Remove filter cap(2)
● Remove filter net

3.3.3 ENGINE INSPECTION

Cylinder Head Cover

1. Cylinder Head Cover
2. Cylinder Head Cover Seal

Ring
Check if any scratch is on the cap.
Check is any crack, crush or hardening on the sealer ring. If so, change accordingly.

Timing Chain Tensioner

● Check tensioner for any damage or poor Function. Damage, poor function: Replace

● Performance stability inspection methods

■ Insert screw driver 3 into the slotted end of adjusting screw, turn it clockwise to loosen the tension and release the screw- driver

■ Move the screw driver and let go of the arm slowly, ensuring the arm snaps back smoothly. If not, replace the chain tensioner with a new one.

Start decompression COMP

● Check if any crack is on the reducer. If any, change a new one.

● Move pressure reducing arm4. Check if pressure-reducing rocker arm and cam- shaft can move flexibly and return automatically.

Timing Driven sprocket

● Check any scratch or damage on cam- shaft timing chain wheel. If the gear is scratched or damaged, change a new one completely(including camshaft

timing chain wheel and timing chain).

Camshaft Inspection

● Check any scratch, abrasion, crack or other damage on each camshaft and journal.

● Check journal dia. And height of camshaft by micrometer

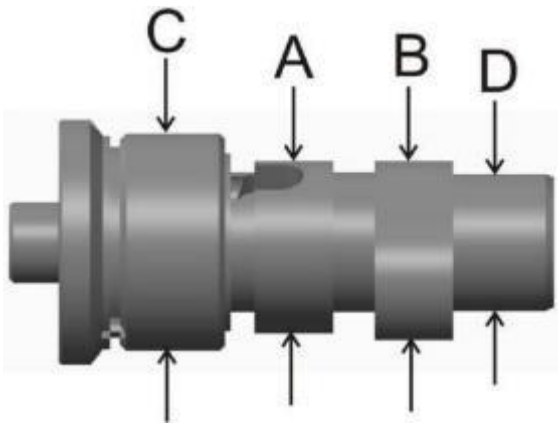
Camshaft	
Cam(intake)	
New part	32.985mm～33.025 mm
Maintenance limit	32.865 mm
Cam(exhaust)	
New part	32.971mm～33.011mm
Maintenance limit	32.871 mm

Camshaft journal(timing chain side)	
New part	34.959mm～34.975 mm
Maintenance limit	34.950 mm
Camshaft bearing shaft (ignition plug side	
New part	21.959mm～21.980 mm
Maintenance limit	21.950 mm

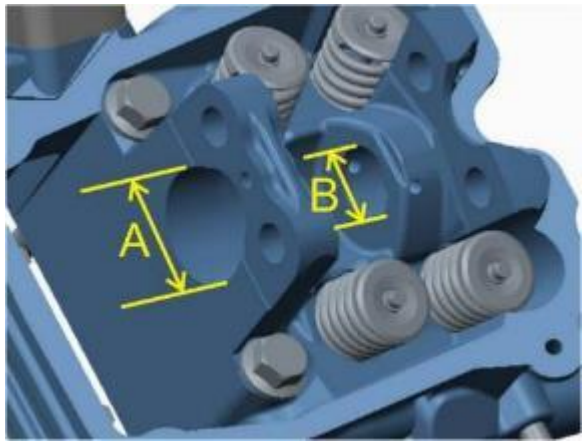
● Test tolerant clearance of camshaft sides and cylinder cap

Camshaft bearing hole(timing chain side)	
New part	35.007mm～35.025 mm
Maintenance limit	35.040 mm
Camshaft bearing hole(spark plug side)	
New part	22.012mm～22.025 mm
Maintenance limit	22.040 mm

If parameters are beyond standards, change the parts.



A. Cam(exhaust valve)
B. Cam(intake valve)
C. Camshaft journal(timing chain side)
D. Camshaft journal(ignition plug side)



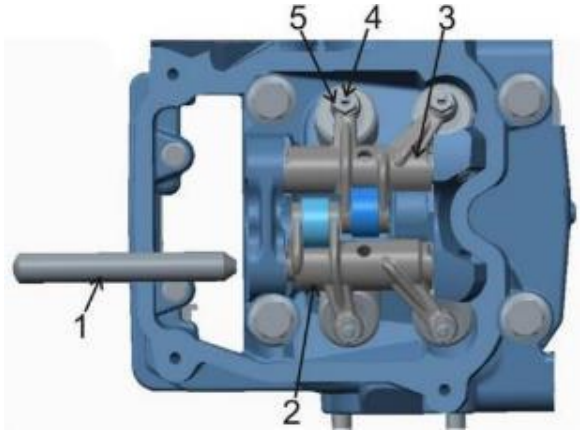
A. Camshaft bearing hole(timing chain side)
B. Camshaft bearing hole(spark plug side)

Cylinder head cover Remove rocker arm

● Remove rocker arm shaft(1)

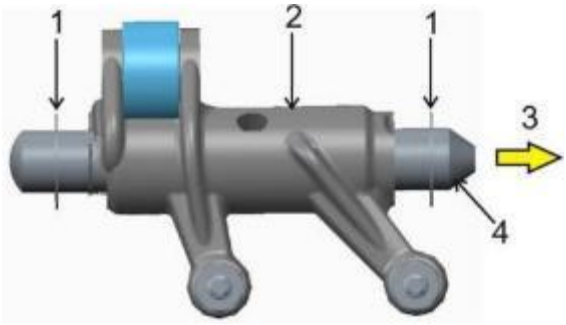
● Remove rocker arm(intake and exhaust) Including adjusting screw and nut.

1.Rocker shaft 2.Exhaust rocker arm 3.Intake rocker arm 4.Adjusting screw 5.Nut



● Remove washer(1).

CAUTION: Pay attention not to lose thrust washers or drop them into the timing chain compartment.



1. Washers

2. Rocker Arm, Exhaust

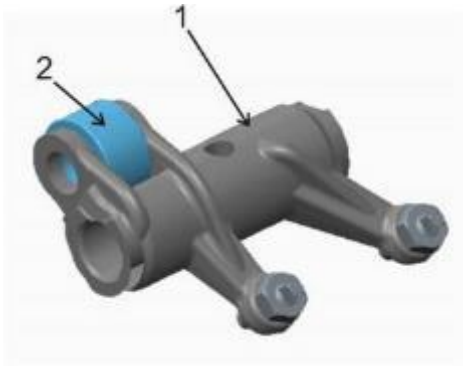
3. Cylinder Head Spark Plug Side 4.Big Taper to Spark Plug Side

Rocker Arm Inspection

● Inspect each rocker arm for cracks and scored friction surfaces. If any, replace rocker arm assembly.

● Check the rocker arm rollers for free movement, wear and excessive radial play. Replace rocker arm assembly if necessary.

● Check rocker arm bore diameter. If Diameter is out of specification, change rocker arm assembly.



1. Rocker Arm, Exhaust 2.Roller

A. Bore for Rocker Arm

Rocker Arm Bore Diameter	
New	12.000mm～12.018mm (0.4724in～0.4731in)
Service Limit	12.030mm (0.4736in)

● Check adjustment screws for free movement, cracks and/or excessive play.

1. Free Movement of Adjustment

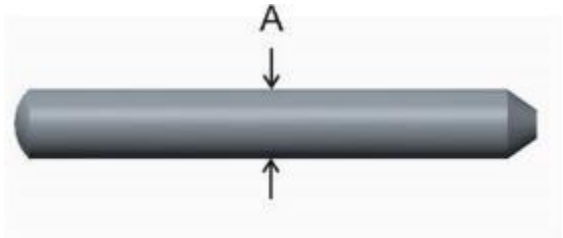
Rocker Arm Shaft

● Check for scored friction surfaces; if any, replace parts.

● Measure rocker arm shaft diameter.

Rocker Arm Shaft Diameter	
New	11.973mm～11.984mm
Service Limit	11.960mm

Any area worn excessively will require parts replacement.



A. Measure rocker arm shaft diameter here

Valve Spring Removal

● Use valve spring compressor clamp to compress valve spring

WARNING

Always wear safety glasses when disassembling valve springs. Be careful when unlocking valves. Components could fly away because of the strong spring preload

Valve Spring Compressor Clamp

Valve Spring Compressor Cup

Align valve spring compressor clamp with the center of Valve

● Remove valve lock clips.

●Withdraw valve spring compressor, valve spring retainer and valve spring.

1.Valve Spring Compressor Clamp 2.Valve Spring Compressor Cup 3.Valve lock clip

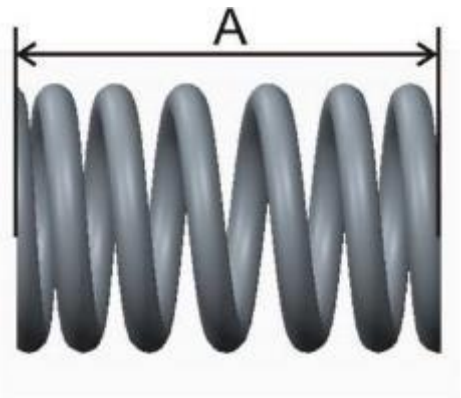
Valve Spring Inspection

● Check valve spring for visible damages, If any, replace valve spring.

● Check valve spring for free length and straightness.

Valve Spring Free Length	
Normal New	40 mm
Service Limit	38.2 mm

Replace valves springs if not within specifications.



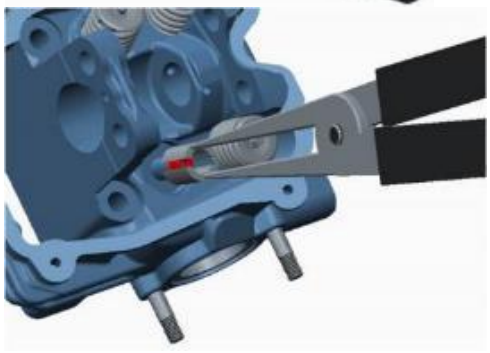
A. *Valve Spring Length*

Valve Removal

●Push valve stem, then pull valves(intake and exhaust)out of valve guide.

1. Intake Valve33mm
2. Exhaust Valve29mm

● Remove valve stem seal with Snap-on plier and discard it.



1. Plier
2. Valve Stem Seal

Valve Inspection Valve

Stem Seal

Always install new seals whenever valves are removed

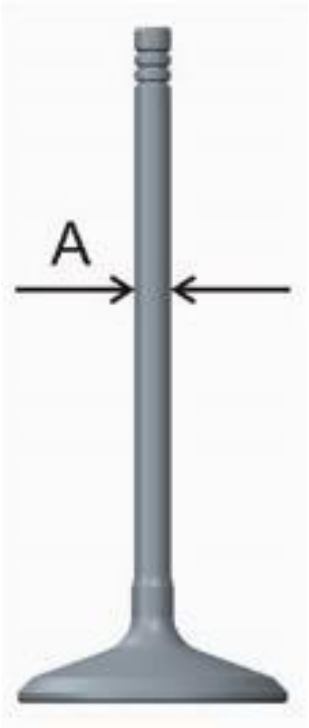
Valve

● Inspect valve surface, check for abnormal stem wear and bending. If out of specification, replace by a new one.

Valve Out of Round (Intake and Exhaust Valves)	
New	0.005 mm
Service limit	0.06 mm

Valve Stem and Valve Guide Clearance

● Measure valve stem and valve guide in three places using a micrometer and a small bore gauge.



A. alve Stem Diameter

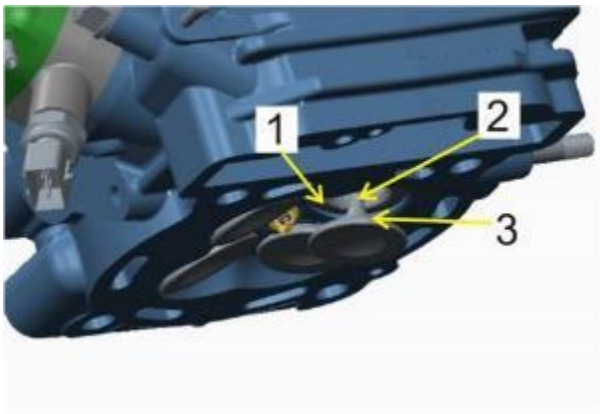
Change valve if valve stem is out of specification or has other damages

Valve Stem Diameter	
Exhaust Valve	
New	4.95mm～4.965 mm
Service limit	4.930 mm
Intake Valve	
New	4.96mm～4.975 mm
Service limit	4.930 mm

such as wear or friction surface.

Replace valve guide if valve guide is out of Specification or has other damages, such as wear or friction surface

Valve Guide Diameter (Intake and Exhaust Valves)	
New	5.000mm～5.012 mm
Service limit	5.045 mm



1.Valve Seat
2.Exhaust Valve Contaminated Area
3.Valve Face(Contact Surface to Valve Seat)

Valve Face and Seat

●Check valve face and seat for burning or pitting and replace valve or cylinder head if there are signs of damage.

●Ensure to seat valves properly. Apply some lapping compound to valve face and work valve on its seat with a lapping tool (see Valve Guide Procedure below).

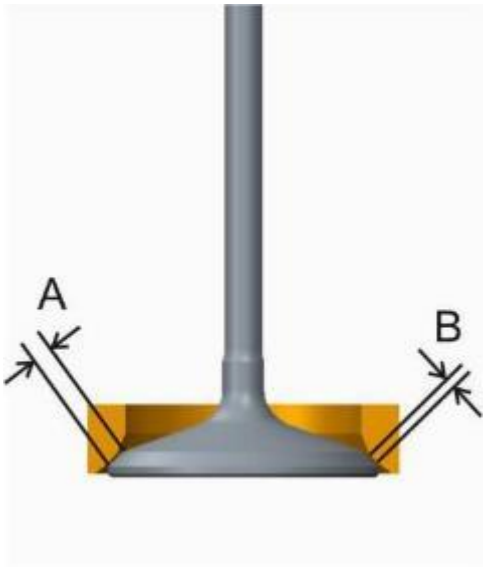
●Measure valve face contact width.

NOTE: The location of contact area should be in center of valve seat.

●Measure valve seat width using a caliper.

Valve Seat Contact Width	
Exhaust Valve	
NEW	1.20mm～1.40mm
Service limit	1.80 mm
Intake Valve	
New	1.10mm～1.30mm
Service limit	1.70 mm

If valve seat contact width is too wide or has dark spots, replace the cylinder head.



A. Valve Contact Surface Width

B. Valve Seat Contact Width

Valve Guide Removal

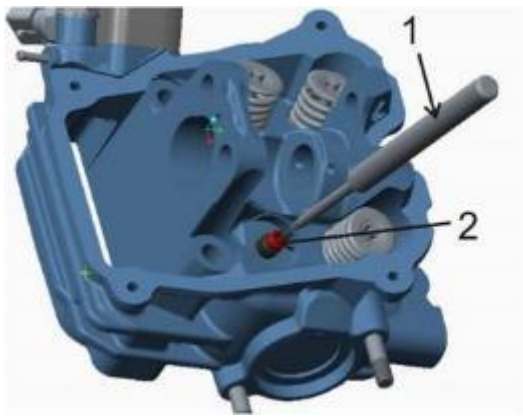
NOTE: Clean valve guide area from contamination before removal.

● Use valve guide remover and a hammer, drive the valve guide out of cylinder head.

Valve Guide Remover

Valve Guide Inspection

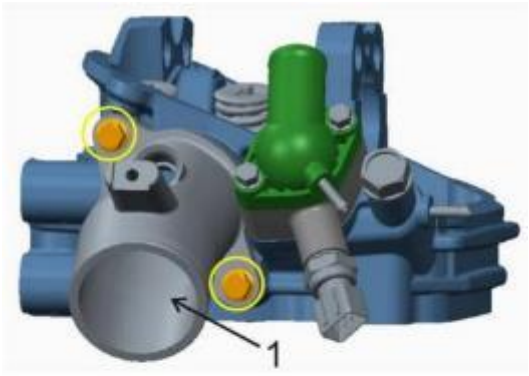
Always replace valve stem seals when- ever valve guides are removed. Clean the valve guide bore before rein- stalling the valve guide into cylinder head.



1. Valve Guide Remover

2. Valve Guide

Injector Seat



- Unscrew the set bolt and remove the injector seat(1)

Injector Seat Inspection

- Inspect Injector Seat for cracks or other damage. Check the seal for wear or excessive using. Replace it if necessary.

Water Temperature Sensor and Thermostat

- Unscrew the Thermostat bolt, remove the Thermostat Cover, Thermostat, Thermostat Seat and Water Temperature Sensor.
- Water Temperature Sensor Inspection (Check 5. 4. 6)
- Thermostat Inspection (Check 3.4.7)

Cylinder Head Installation

Valve Guide Installation

For installation, reverse the removal procedure. Pay attention to the following details.

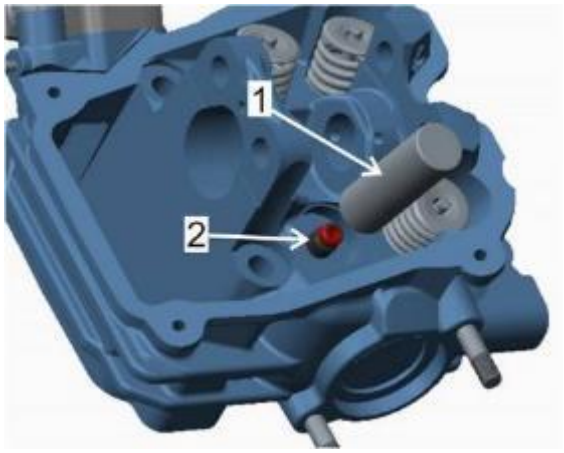
● Use valve guide installer to install valve guide.

NOTE: Apply loctite (antiseize lubricant) on valve guide prior to install it into the cylinder head.

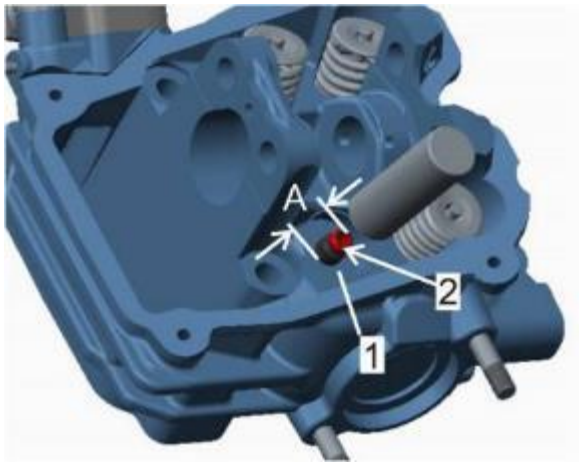
● Push valve guide in the cold cylinder head as per following illustration.

Valve Guide (Measurement "A")	
NEW	14.70mm～15.30 mm

Valve Guide Installer



1. *Valve Guide Installer*
2. *Valve Guide*



1. Thrust Surface of Cylinder Head

2.Valve Guide

A. Measurement from Thrust Surface to Valve Guide Top

● Valve guide to be adjusted in diameter by using a reamer.

Valve Guide Diameter (Intake and Exhaust Valves)	
New	5.000mm～5.012 mm

NOTE: Ensure to turn reamer in the right direction. Use cutting oil and make brakes to clean reamer/valve guide from metal shavings.

● Apply some lapping compound to valve face and work valve on its seat with a lapping tool.

NOTE: Ensure to seat valves properly. Apply marking paste to ease checking contact pattern.

● Repeat procedure until valve seat/valve face fits together.

Note: Clear up the abradant.

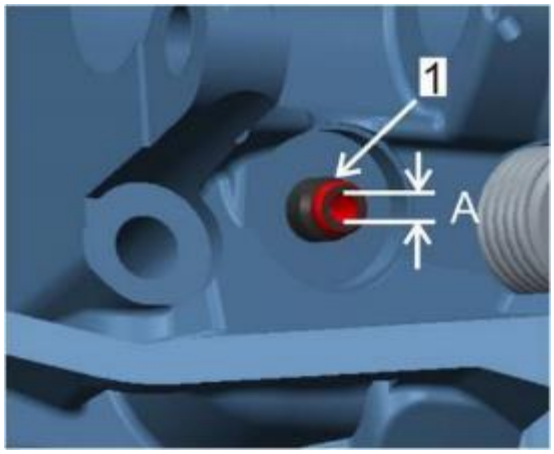
Valve Installation

For installation, reverse the removal procedure(Check 5-45).Pay attention to the following details.

● Install a **NEW** valve stem seal. Make sure thrust washer is installed before installing seal.

● Apply engine oil on valve stem and install it.

CAUTION: Be careful when valve stem is passed through sealing lips of valve stem seal.



1. Valve Guide

A. Valve Guide Diameter

1. Valve Seat

2. Valve Face(contact surface to valve seat)

3. Turn valve while pushing against cylinder head

A. Valve Seat Angle45

1. Valve Spring Lower Seat

2. Sealing Lips of Valve Stem Seal

Valve Spring Installation

For installation, reverse the removal procedure(Check 5-45). Pay attention to the following details.

●Colored area of the valve spring must be placed on top.

●To ease installation of cotters, apply oil or grease on them so that they remain in place while releasing the spring.

NOTE: Valve cotter must be properly engaged in valve stem grooves.

●After spring is installed, ensure it is properly locked by tapping on valve stem end with a soft hammer so that valve opens and closes a few times.

CAUTION: An improper locked valve spring will cause engine damage.

Rocker Arm Installation

NOTE: Use the same procedure for exhaust and intake rocker arm.

● Apply engine oil on rocker arm shaft.

● Installtherockerarmshaftwiththechamfereded gefirstandusefollowingprocedure.

1、Insert a rocker arm pin through rocker arm pin bore.

2、Install a thrust washer then proper rocker arm(exhaust side)or (intake side).

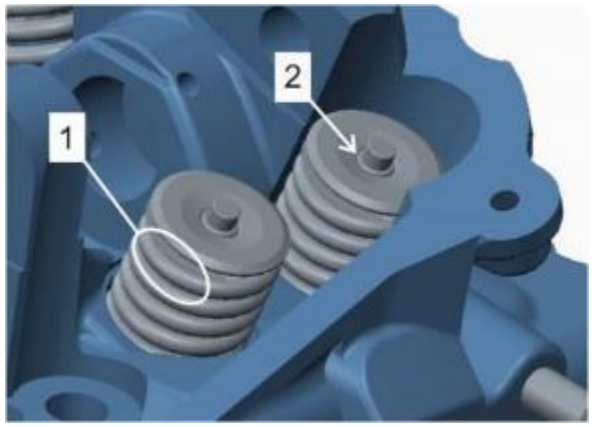
3、Push in rocker arm shaft until its chamfer reaches the end of rocker arm bore.

● Place the other thrust washer and push rocker arm shaft to end position.

Thermostat Installation

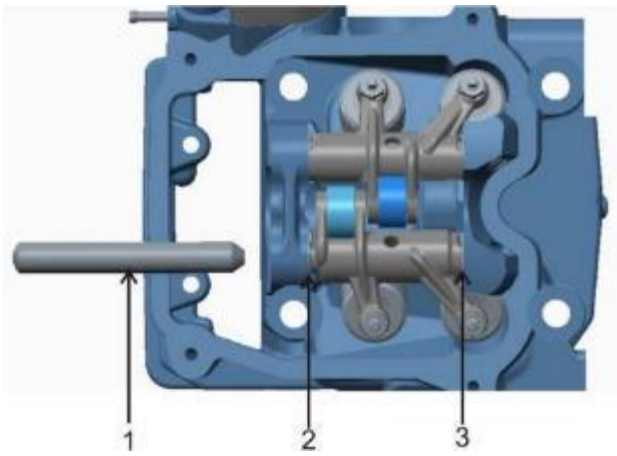
● Install the Thermostat seat(1), Thermostat(2),Thermostat cover (3) and two bolts (4)

Note: Don't miss to install the "O" seal ring



1. Position of the ValveSpring

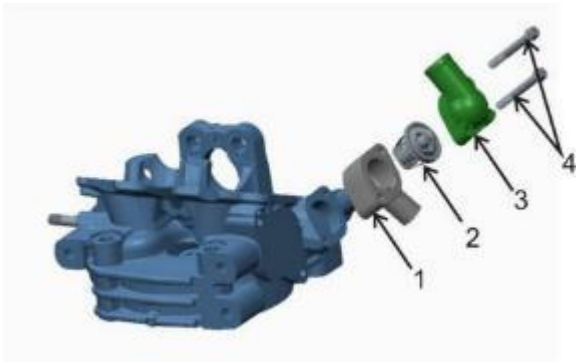
2.Valve Cotter



1.Rocker Arm

2.Thrust Washer(Timing Chain Side)

3.Thrust Washer(Spark Plug Side)



Injector Seat Installation

●For installation, reverse the removal procedure (Check 3-48).

Note: Don't miss to install the seal ring.

1 .Injector Seat

Upper Guide Chain Inspection

●Inspect Upper guide chain, check for abnormal wear, cracks and rubber fall off. If out of specification, replace by a new one.

Cylinder Body Inspection

Cylinder Body Distortion

●Check the planeness of gasket surface, total 7 point to inspect with a straight edge and thickness gauge. Take clearance readings from several places. If any clearance reading is out of the service limit, replace with a new cylinder body.

Cylinder Body Distortion Service Limit:
0.05mm
Tool: Thickness Gauge, straight edge

Cylinder Body Inner Diameter Inspection

●Check the scoring or other damages in the inner wall of Cylinder Body, Replace it if necessary.

●Measure the diameter of bore by Inner diameter gauge from upper, middle and lower places of cylinder inner diameter to check with two mutual vertical directions.

Standard Cylinder Bore: 91.0-91.015mm

Tool: Inner diameter gauge

Pistion

Pistion Diameter

● Inspect pistion for cracks or other damage. Replace pistion and pistion ring if necessary.

● Vertical measure the pistion on the 8mm direction between pistion pin by micrometer

Replace pistion if out of service limit.

Pistion Parameter	
New	90.950mm～90.970 mm
Service Limit	90.85 mm

Pistion Ring Groove Clearance

● Measure the one-sided clearance of pistion 1 and 2 by Straight edge, if out of service limit, replace pistion and pistion ring.

Service limit (Clearance)

Pistion ring1: 0.15mm

Pistion ring 2: 0.15mm

Service limit (Width)

Pistion ring 1: 1.21mm~1.23mm

Pistion ring 2: 1.51mm~1.53mm

Oil ring: 2.50mm~2.52mm

Service limit (Thickness)

Pistion ring 1: 1.17mm~1.19mm Pistion ring 2:

1.47mm~1.49mm

Tool: Straight edge

Micrometer(0~25mm)

Pistion ring free gap and pistion ring end gap

●Using a feeler gauge measure each ring free gap, place the ring in the cylinder To measure the ring end gap, If the clearance is too large, the piston and piston rings should be replaced.

Pistion ring free gap (service limit)

Pistion ring 1: 8.9mm Pistion ring 2:9.5mm

Pistion ring end gap (service limit)

Pistion ring 1: 1.5mm Pistion ring 2: 1.5mm

Tool: Vernier caliper. Feeler gauge

Pistion Pin and Pin Bore

●To measure the inner diameter of Pistion pin bore by Bore dial indicator.

To measure the outer diameter of Pistion pin by micrometer

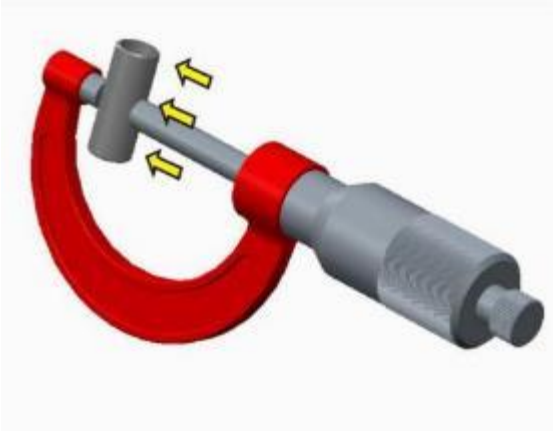
If out of service limit, replace Pistion and Pistion pin

Pistion Pin Bore(service limit): 22.02mm

● To measure the outer diameter of Pistion Pin in three difference positions by micrometer.

Pistion Pin outer diameter(service limit): 21.980mm

Tool: Inner diameter gauge(18mm~35mm)
Micrometer(0~25mm)

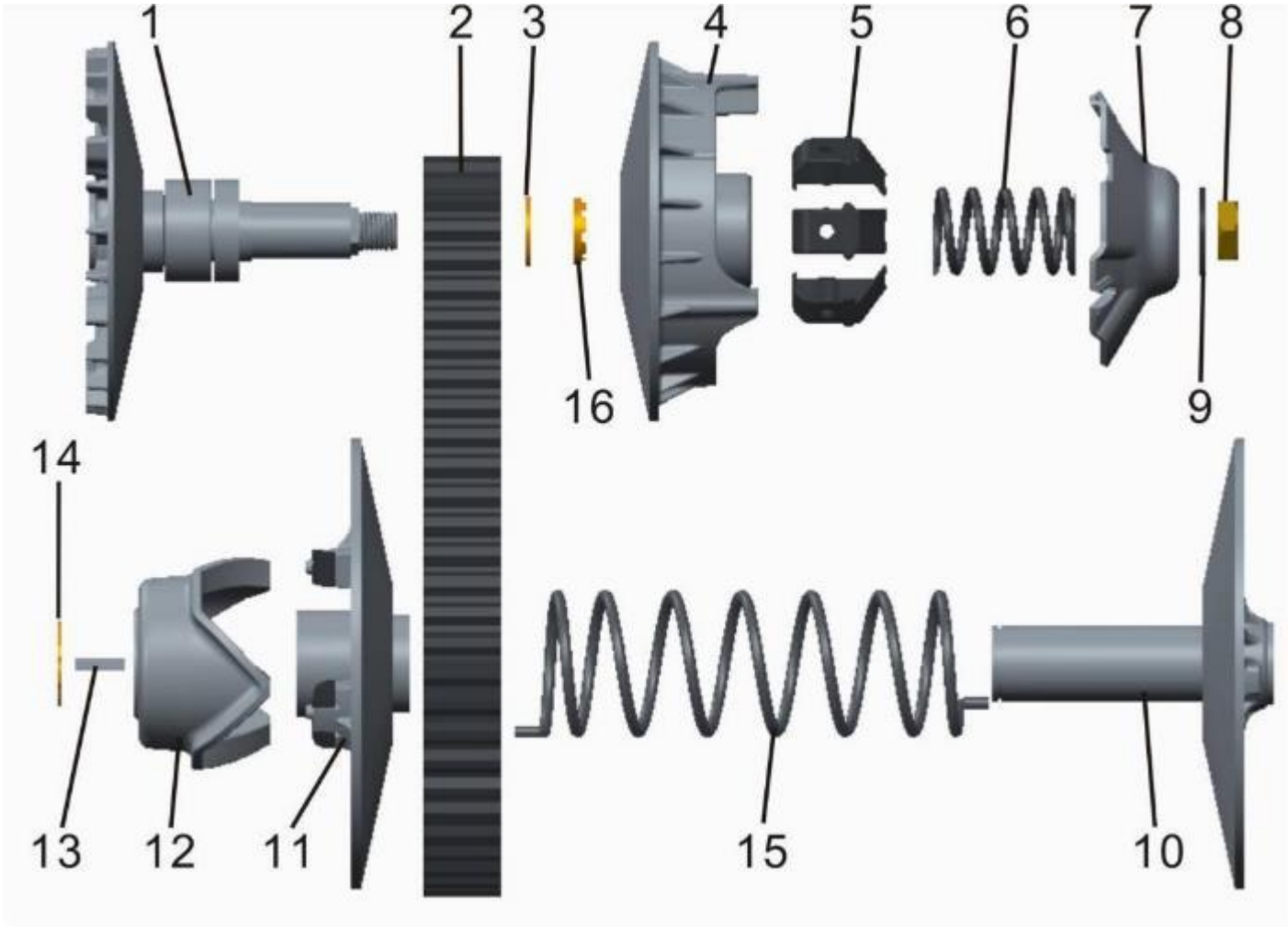


CVT Cover

●Inspect CVT Cover for cracks. Replace a new CVT Case if necessary

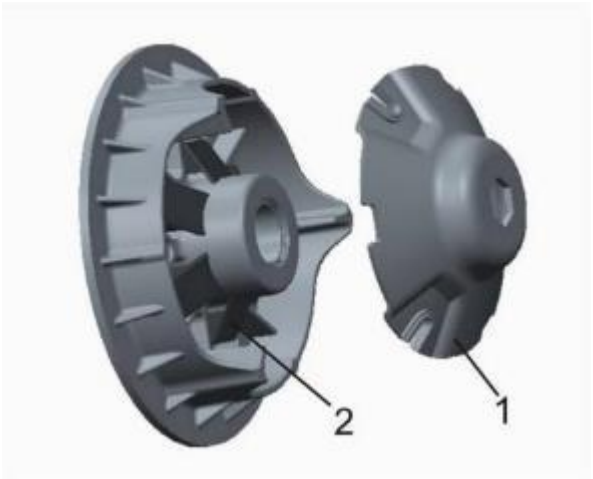
●Inspect seal ring of CVT Cover for ageing, damage. Replace a new one if necessary

Drive Pulley, Driven Pulley, Drive Belt



1 、Drive Pulley Fixed Sheave
2 、Drive Belt
3、Ajusting Washer
4、Spring,Drive Pulley
5、Drive Pulley Sliding Sheave
6、Centrifugal weight
7 、Cam
8 、Nut
9 、Washer
10 、Driven Pulley Fixed Sheave
11 、Driven Pulley Sliding Sheave
12、Spring holder
13 、Locating pin
14 、Circlip
15 、Spring
16 、Washer

Drive Pulley



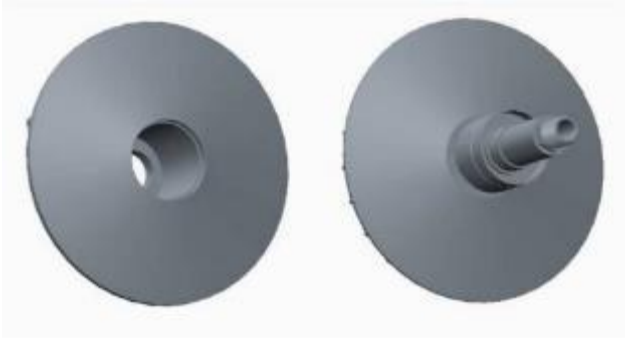
- Loosen Drive Pulley Nut, remove, CVT, Drive pulley fixed And Sliding Sheave
- Remove the Cam (1) and Centrifugal Weight (2)

Centrifugal Weight Inspection

- Inspect Centrifugal Weight and Sliding surface for wear or damage, Replace a set of centrifugal weight if abnormal

Note: Centrifugal Weight should be replaced by complete set.

Drive Pulley Fixed and Sliding Sheave Inspection



- Inspect the abnormal conditions of drive surface for multistep wear or other damage. Replace it if abnormal
- Inspect one-way clutch if equipped. Replace it if abnormal

Drive Pulley Installation

To install it as contrary process of removal

Note: The nut washer should be stucked in the hexagon shaft to stand-still locking.

Driven Pulley

Disassembly

NOTE: Before disassembly, mark on the spring installation holes and cam feet to sliders positions.

1. Cam and slider marks
2. Spring Installation Holes Marks

● As the illustration shows, place driven pulley on the special tool base.

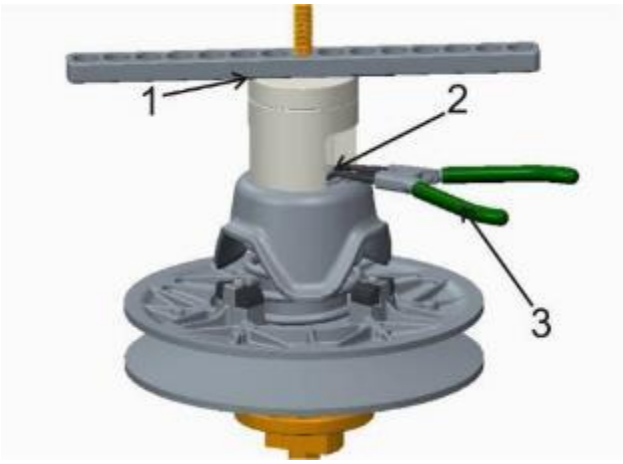
Special tool: Driven pulley spring compressor

(1BA-17730-00 FZ/1)

1. Driven Pulley Spring Compressor
2. Driven Pulley

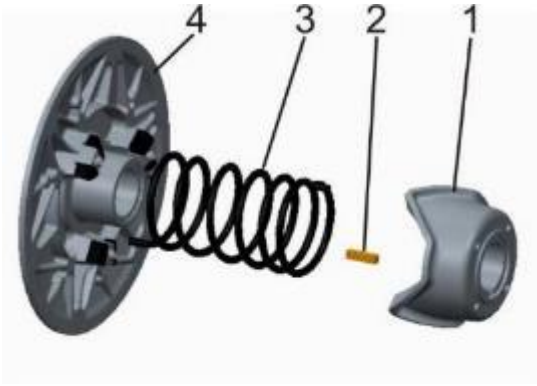
● Turn special tool handle to compress the cam and spring. Using a circlip remover(a plier),remove circlip.

Note: Use special tool to remove circlip in order to avoid any wounding if spring seat flying up.



1. Driven Pulley Spring Compressor
2. Circlip
3. Circlip Remover

● Slowly loosen tool handle to release the spring tension and remove the special tool; Remove cam; Remove
guide pin;
Remove spring and sliding sheave of driven pulley.



1.Cam 2.Guide Pin 3.Spring
4.Sliding Sheave of Driven Pulley

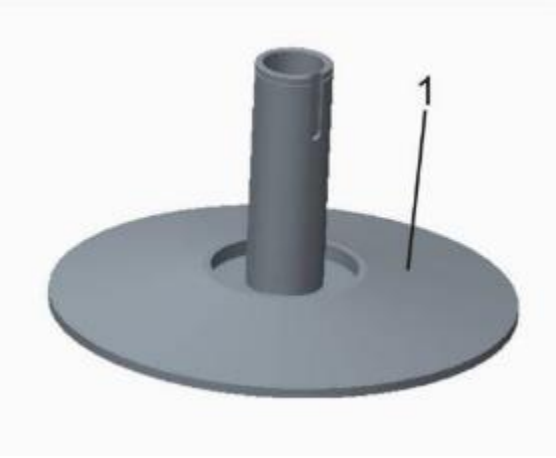
Driven Pulley Inspection

Driven Pulley Fixed Sheave Inspection

●Check driven pulley faces for any abnormal conditions, such as heavy wear or visible damage. Replace if necessary.

NOTE: Clean fixed sheave of driven pulley before inspection.

NOTE: Driven pulley assembly is precisely matched. If only fixed sheave or sliding sheave is replaced, the vibration may increase. It’s recommended to replace both when necessary.



1. *Drive Face of Fixed Sheave*

Driven Pulley Sliding Sheave Inspection

● Inspect the drive face of sliding sheave for heavy wear and damage. Replace it if necessary.

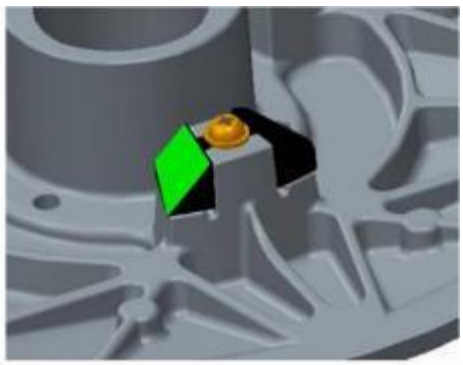
1. Drive Face of Sliding Sheave

● Inspect the 3 sliders on driven pulley for wear and other damages. If the worn thickness is over the measurement illustrated in the following figure, replace all 4 sliders at the same time.

1. Slider

2. Sliding Sleeve

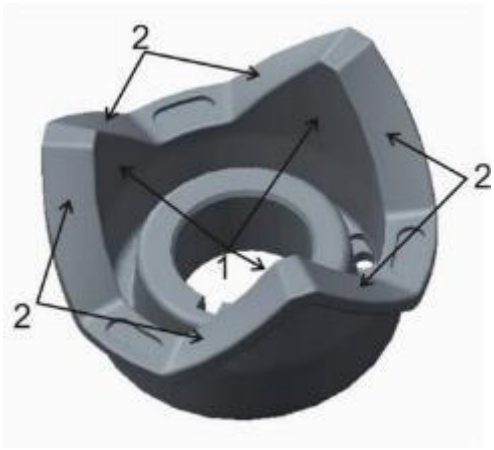
NOTE: Clean the sliding sheave before inspection



A ⩾1.5mm

Cam Inspection

● Check spring cam sliding face for wear and other damages. Replace if necessary.

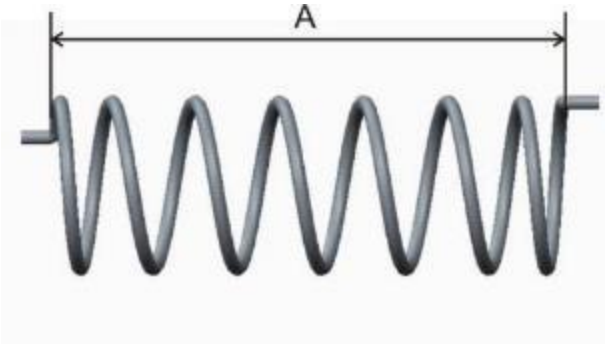


1.Cam
2.SlidingFace

Driven Pulley Spring Inspection

● Check spring free length. If it is shorter than limit length, replace it.

Spring free limit length A: 214.0mm.



1.*Spring*

Driven Pulley Assembly

Reverse the disassembly procedure for driven pulley assembly.

NOTE: Special tool is also required in driven pulley assembly.

Drive Belt

● To inspect Belt for greasy dirt

● To inspect Belt for cracks and damage

● To measure width of belt by vernier caliper

Replace a new one if any damage or out of Service limit

Drive Belt service limit: 33.5mm

Tools: Vernier Caliper

Caution: Clean the Drive belt if any greasy dirt or lubricating oil.

CVT Case Inspection

●Inspect Bearing Sleeve (1) and Oil seal (2).Replace it If necessary

Lower Timing Chain Guide Inspection

●To inspect the lower timing chain guide for damage or ageing Replace it if necessary

Tensioner Plate Inspection

●To inspect tensioner plate for damage or ageing. Replace it if necessary.

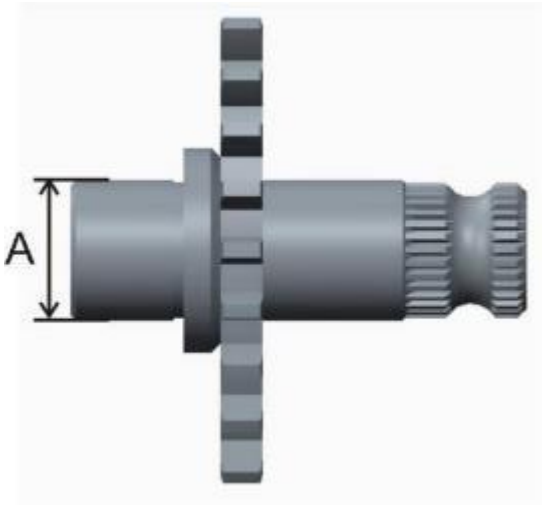
Timing Chain Inspection

●To inspect the radial clearance of timing Chain.
●To inspect timing chain for excessive wear
Replace timing chain and timing chain sprocket if excessive wear or damage

Gearshift Sector Gear Inspection

Gearshift, Drive Sector Gear

●To inspect drive sector gear for cracks or other defects. Replace it if necessary.
●To measure Gear shaft diameter (A) for cracks or other defects. Replace it if out of service limit.
Service limit: 14.976mm~14.994mm



Gearshift driven sector gear inspection

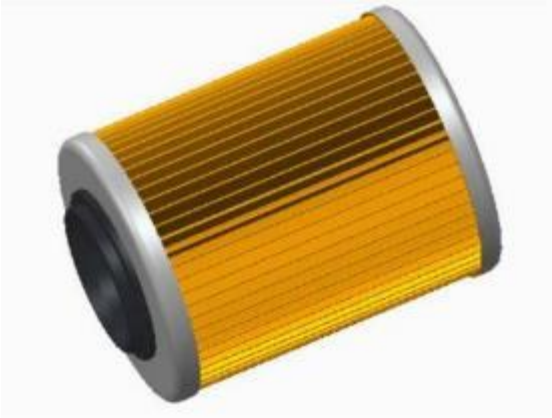
● To inspect driven sector gear for dam- age or abnormal Replace it if necessary.

Oil filter

● To replace a new oil filter

Note: Replace a new oil filter after Disassemble each time.

● Periodic replacement oil filter base on requirements of Maintenance period.

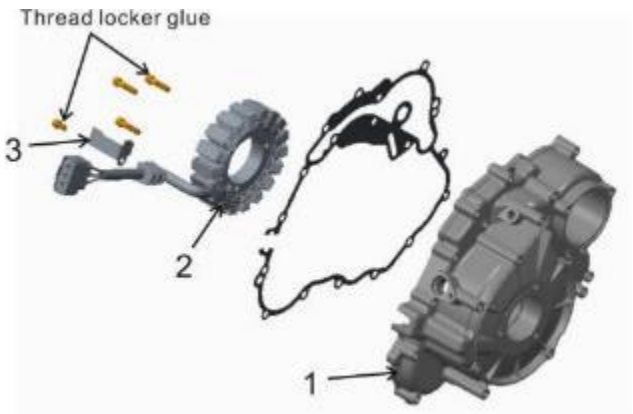


Crankcase (LH)Cover

● To inspect magneto coil(2) for damage or Short circuit, Replace it if abnormal.

● Smear Thread-locking Adhesives on bolts and fasten base on standard torque while assembling.

Torque:10N. m



Magneto rotor

● Remove the set bolt of overrun clutch by wrench

● To inspect the overrun clutch roller and Cam for wear or damage. Replace it if defected.

● To install the overrun clutch as right direction.

Note: To confirm the direction of "A" is right while Assemble the overrun clutch into magneto rotor.

■ Smear lubricating oil on the overrun clutch

■ Tighten the bolt after smear thread-locking adhesives by Wrench as standard torque.

Bolt Torque：30N • m

Accessory： Thread-locking adhesives

●Install driven gear

●Driven gear will be locked if turn it as the direction of arrow by "B" indicated. Otherwise, it is smooth running.

●Turning the driven gear bearing. Replace it if not well running.

●Remove driven gear bearing by special tools

●Install the driven gear bearing by special tools

Tool： Bearing installation &removal tool

Dual Gear

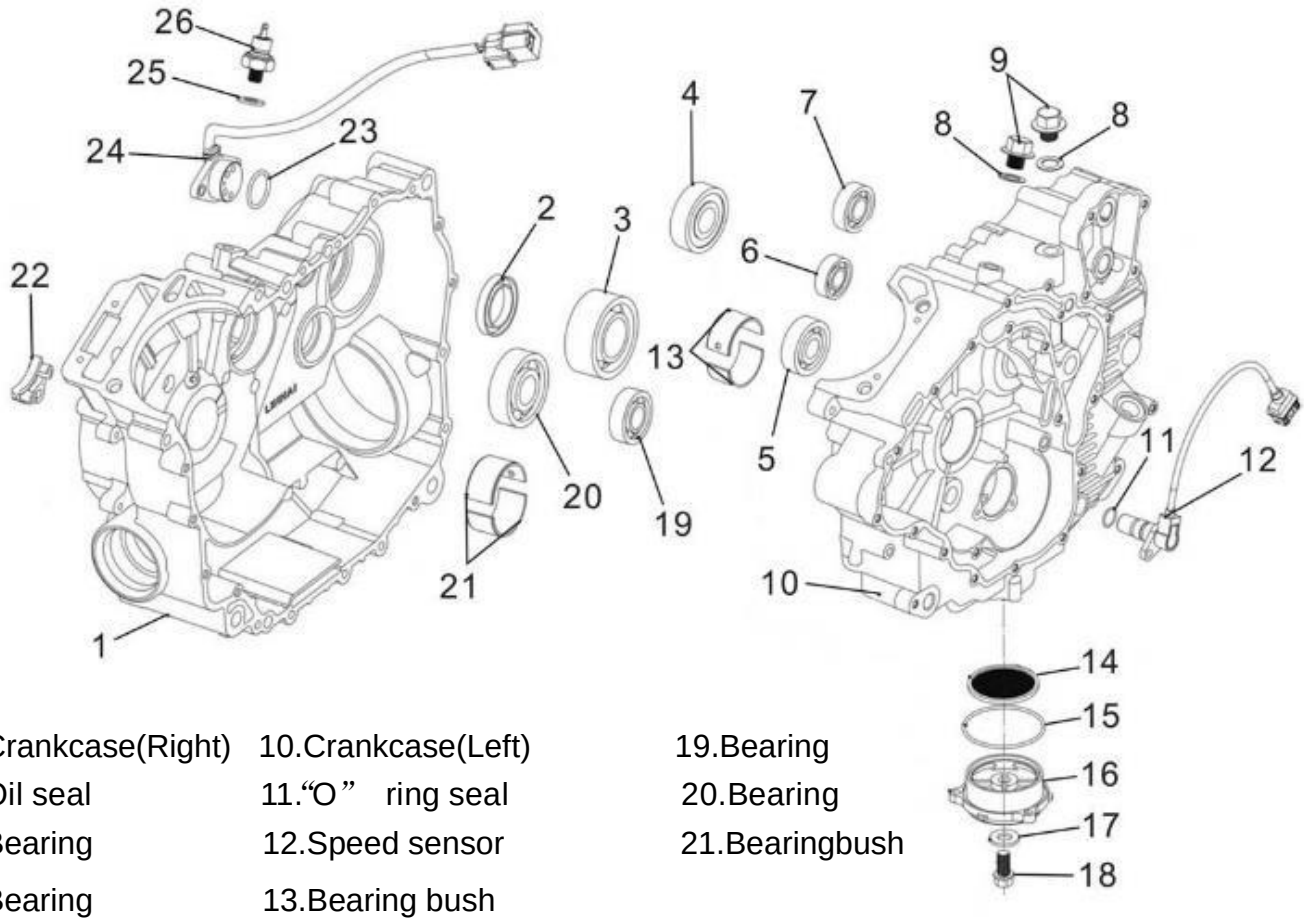
● To inspect the dual gear surface for scratch or bump against. Replace it if abnormal.

Oil Pump Transmission Gear

● To inspect the gear surface for scratch, bump against or plastic ageing. Replace it if abnormal

Oil Pump Dual Gear

● To inspect the gear surface for scratch, bump against or plastic ageing. Replace it if abnormal



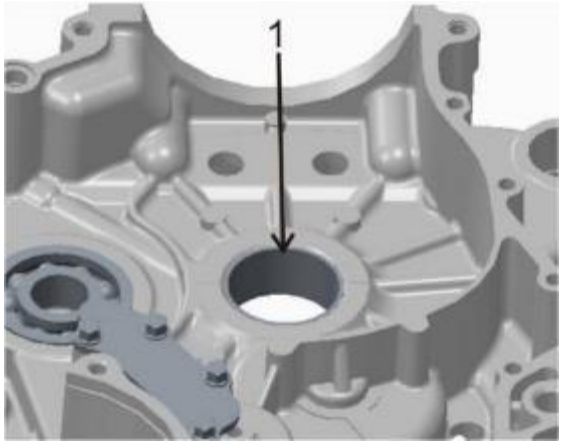
1.Crankcase(Right)	10.Crankcase(Left)	19.Bearing
2.Oil seal	11.“O” ring seal	20.Bearing
3.Bearing	12.Speed sensor	21.Bearingbush
4.Bearing	13.Bearing bush	
5.Bearing	14.Oilstrainer	22.Lower timing chain guide
6. Bearing	15.“ O”ring seal	23.“O” ring seal
7. Bearing	16. Oil strainer cover	24.Gearshift sensor
8.Copper spacer	17.Copper spacer	25.Spacer
9. Bolt	18.DrainBolt	26.Oil pressure sensor

Crankcase inspection

●Check crankcase halves for cracks or other damage. Replace if necessary.

●Measure plain bearing inside diameter and compare to magneto and CVT side journal diameter of crankshaft (refer to CRANKSHAFT).Replace if the measurements are out of specification.

Plain bearing inside diameter	
Service limit	42.100mm



1、Plain bearing bore diameter

Plain Bearing Replacement

Plain Bearing Removal

Caution: Always support crankcase halves properly when ball bearings or plain bearings are removed .Damages to crankcase halves may occur if this procedure is not performed correctly.

NOTE: Always use a press for removal of plain bearing. Remove plain bearing with the proper plain bearing remove/installer.

● Carefully push the plain bearings out from the crankcase half inside towards the outside.

2.Plain bearing remover/installer

NOTE: Place the proper crankcase sup- port sleeve under crankcase halves before removing plain bearing

NOTE: During disassembly ,do not dam- age the sealing surface of the crankcase halves.

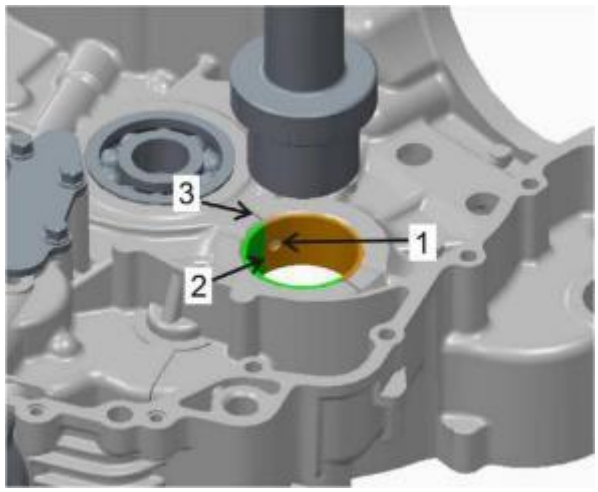
Plain Bearing Installation

NOTE: Crankcase and plain bearing must be installed as a pair as shown in the following table:

Crankcase	Plain Bearing
A	Red
B	Blue

CAUTION: Unless otherwise instructed, never use hammer to install ball bearings or plain

Install plain bearings with the proper plain bearing remover/installer in a cool crankcase. Do not lubricate plain bearing and /or crankcase for installation.



1. Oil bore

2. The partition of the plain bearing

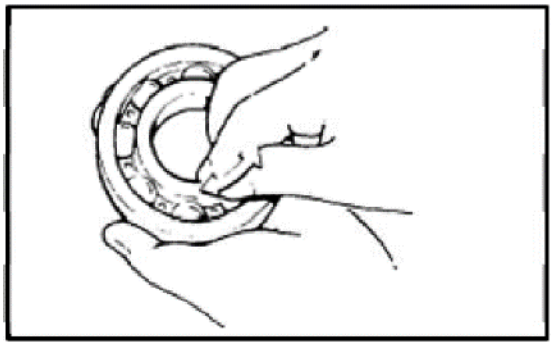
3. Crankcase mark

NOTE: Place proper crankcase support sleeve under the crankcase before installing the plain bearings (refer to bearing

●Carefully press-in the plain bearings in the same direction as during installation, from then crankcase inside towards the outside. During installation, make sure not to damage the 3 sealing surface of the crankcase.

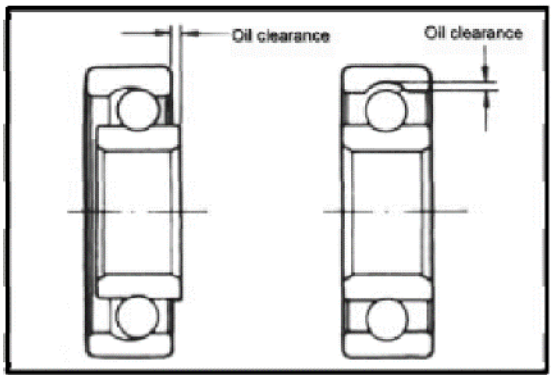
CAUTION: Mark position of oil bore on crankcase and on plain bearing re-mover/installer .Align mark on plain bearing remover/installer with mark on crankcase. Wrong oil bore will stop supply to plain bearing and will cause engine damaged.

Ball Bearing and oil sealing Inspection



●To inspect the ball bearing for oil clearance, sound or turning stationarity after Cleaned and lubricated the ball bearing. Replace it if abnormal by special tools.

●To inspect all oil sealing for wear, cracks. Replace it if abnormal by special tool



●To remove and inspect the gearshift sensor (24) for break over performance by multimeter. Replace it if abnormal

●To remove and clean the drain bolt(18) and Oil strainer(14)

●To install bearing, oil seal by special tools. Bearing with lubricating oil, Oil seal lips with lubricating grease

Note: To inspect running performance after bearing has been installed

● Install new “O” ring “O” ring with lubricating grease

● Install gearshift sensor(24)and speed sensor(12).

● Install spacer(17) and drain bolt(18), tighten it as standard torque.
Torque(Drain Bolt):30N • m
Tool: Bearing remover and installer
Multimeter

Drive Bevel Gear

● To protect the drive bevel gear shaft by one clean duster cloth and clamp by vise

● Loosen the Drive Bevel Gear Nut (3),remove Drive Bevel Gear(4) and Adjusting spacer(5).

● To inspect Drive Bevel Gear(4)and Output Driven Gear (2) for rust, cracks, wear. Replace it if necessary.

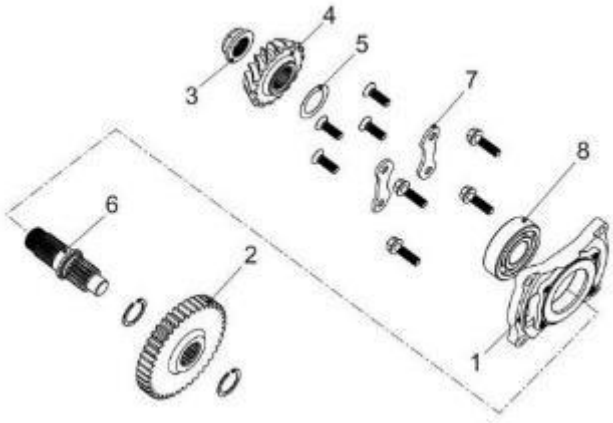
● To inspect Bearing(8)for turning. Replace it if abnormal.

● To adjust Adjusting Spacer(5) if replace any one of Crankcase(Right),Drive Bevel Gear (4),Drive Bevel Gear cover(1). Detail to check Bevel Gear adjusting method

● To tighten tight Nut(3)by standard torque and with lubricating oil on bearing (8) before install.

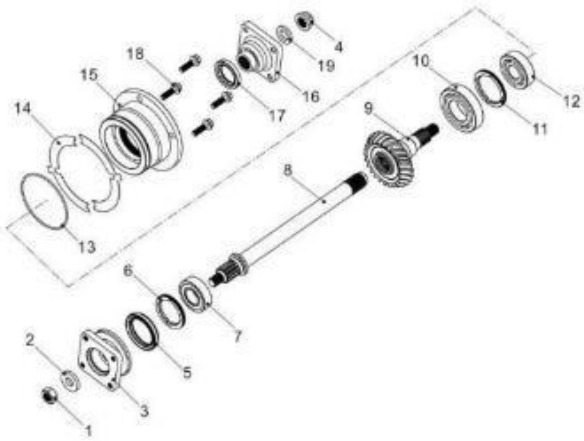
Service Limit(Drive Bevel Gear Tight Nut)： 140~150N.m

Note: Drive Bevel Gear (4) and Driven Bevel Gear should be together



1- Drive Bevel Gear Cover
2- Output Driven Gear Bear
3- Drive Bevel Gear Nut
4- Drive Bevel Gear
5- Adjusting spacer
6- Drive Bevel Gear Shaft
7- Bearing Plate
8- Bearing

Front Output Shaft



●To inspect Bearing (7) for wear or well running. To inspect Oil seal (5) for damage. Replace if abnormal.

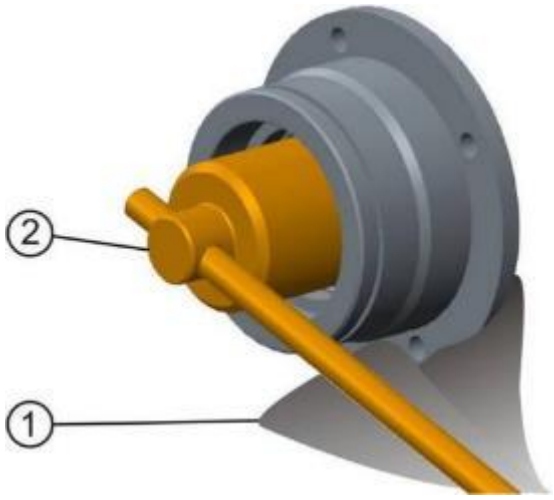
● To inspect Bearing(7) for lubrication oil and Oil seal (5)lips for grease before install output shaft

● To tighten Bearing Stop Nut(6) with thread glue as standard torque

Bearing Stop Nut Torque:78~82N·m

Front Output Shaft Nut Torque：95~100N·m

Driven Bevel Gear



●To remove Nut(4),Gasket (19),Coupler（16）and Oil seal(17)

●To proper protect the thread of Driven Bevel gear by protector, fixed bevel gear cover(15),Push out the Driven bevel gear.

●Put one clean duster cloth ①，under the bevel gear cover, to remove the Bearing stop nut(11) and Bearing By special wrench ②

● To inspect Driven Bevel Gear(9)for crack, wear. Replace it if necessary.

●To inspect bearing(10)and (12) for well running. Replace it If not

●To install by use new oil seal(17)and “O” ring seal(13)

●To adjust Adjusting Spacer(14) if replace any one of Crankcase(Right),Driven Bevel Gear (9),Driven Bevel Gear cover(15). Detail to check Bevel Gear adjusting method

●To tighten stop Nut(11) with thread glue by standard torque and with lubricating oil on Bearing (10) ,Bearing (12),Oil seal(17) and “O” ring seal before install.

BearingStopNutTorque：100~120N.m

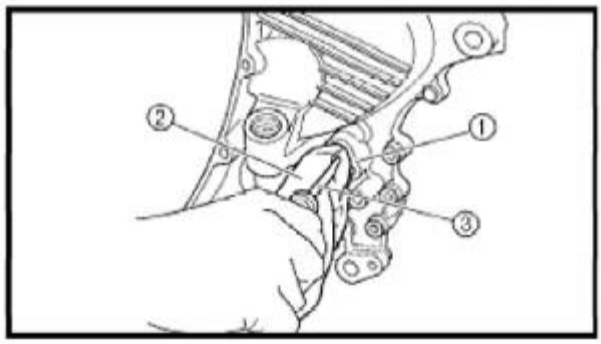
Driven Bevel Gear Nut Torque：140~160N. m

Bevel Gear Spacer Adjusting Method

●To adjust spacer ① and ② if replace any one of Crankcase, Bevel gear or Bevel Gear Cover.

Bevel Gear Adjustment

Caution: Keep the Gear backlash and contact surface within the proper scope in order to best match the bevel gear mesh



Measure Bevel Gear Backlash

● To install Drive and Driven Bevel Gear on the Crankcase.

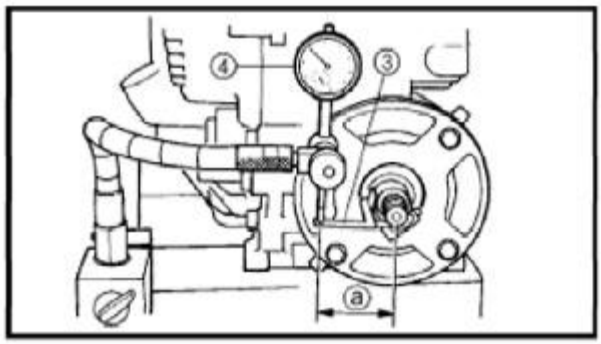
To tighten the Drive Bevel Gear by straight Screwdriver ③with duster cloth ② into the Speed sensor hole①

● To install special tool③ and dial indicator ④

Tool: Bevel Gear backlash measuring tool

Dial indicator

a=46mm



● To measure backlash by running the Driven Bevel Gear shaft.

Note: Four points to measure on the mutual vertical direction.

● To adjust spacer thickness if out of ser- vice limit. Remeasure the backlash of Bevel Gear till to accord with service limit.

Bevel Gear backlash service limit：

0.1mm～0.2mm

Adjustment Method：

Measured Backlash	Washer Thickness Adjustment
＜0.1mm	Reduce washer thickness
0.1~0.2m	**Correct**
＞0.2mm	Increase washer thickness

Gear Surface Contact Inspection

To inspect Gear surface contact after back- lash adjusted. Detail as follows：

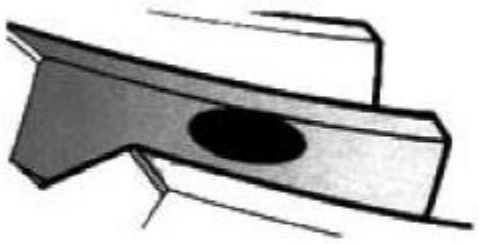
- Remove Drive and Driven Bevel Gear Shaft from Crankcase.
- Clean splodge and grease for each gears of Drive and Driven Bevel Gear.
- With dyestuff for each gears surface of Driven Bevel gear
- To install Drive and Driven Bevel Gear
- Running the Driven Bevel Gear from front and back direction.
- To inspect dyestuff of Bevel Gears after removed Drive and Driven Bevel Gear.

① Top contacted on the Gear Surface	**Improper**
② Middle contacted on the Gear Surface	**Proper**
③ Bottom contacted on the Gear Surface	**Improper**

- If it is proper gear contact surface ②, move to next Step.
- If it is improper gear contact surface ① and ③, adjust spacer thickness of Bevel Gear and recheck till to accord with standard requirement.

Adjusting Method	
Gear Contact Surface	**Adjusting spacer thickness**
Gear Contact Surface ①	Reduce spacer thickness
Gear Contact Surface ③	Increase spacer thickness

①



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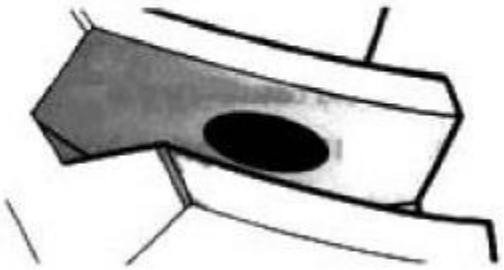
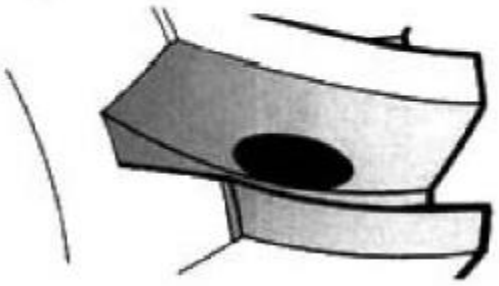


③



Drive Shaft Inspection

● To inspect gear surface for hard spot, damage, excessive wear. Replace it if necessary.

Drive layshaft Combination

● To remove the layshaft as picture

● To inspect gear surface for hard spot, damage, excessive wear.

To inspect bearing and bush for damage or wear. Replace it if necessary.

> **Note:** Rear Retainer couldn't reuse after removed. Must to be replaced by new one

Shift Drum, Shifting Fork

● To inspect shifting fork clearance as pic-ture indication: Check fit clearance by feeler gauge. Replace shifting fork ,or gears, or together replacement if clearance out of service limit

Shifting fork standard gap:
0.10mm～0.35mm

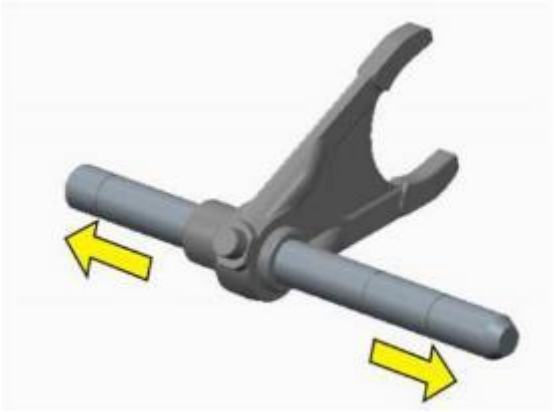
Service limit:0.45mm

●To measure the width of shifting fork slot by vernier caliper
Standard values: 6.05mm～6.15mm

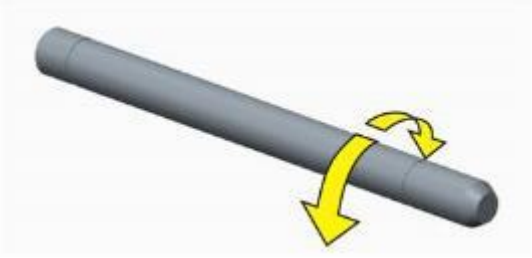
●To measure the thickness of shifting fork by vernier caliper
Standard values: 5.80mm～5.90mm

●To inspect shifting fork ① and ② for damage, curve. Replace it if with defects.

●Install shift fork on the shift fork rod to move it by left and right. If not smooth. Replace it.



●To roll the shift fork rod on the slab. Re- place it if curve



Caution: Don't try to straightening the Shift fork rod.

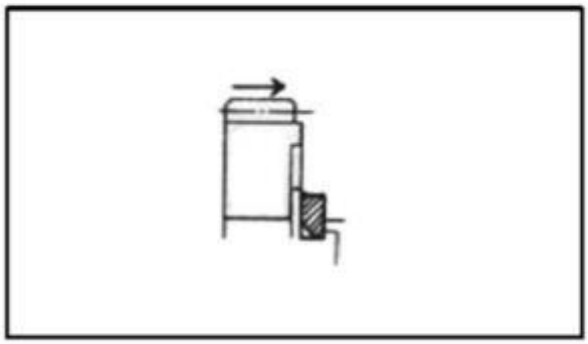
● To inspect the shift fork spring for broken, damage. Replace it if any defects.

● To inspect Shift Drum Cam for crack, wear. Replace it if any defects.

Installation

Reverse process for installation and removal. Attention as follows:

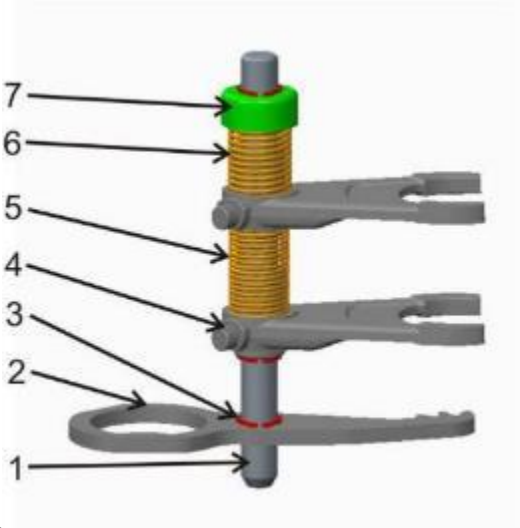
Note:
With right installation process to install the new retainer
To install it base on picture indication
Gears or shaft should be installed with engine lubrication oil



Caution:
Retainer ring couldn't reuse if removed it from shaft Install a new one.
Don't too wide open when install retainer ring.
To confirm the retainer ring has been fully installed after assembled.

● Don't reverse install the shift fork and spring when assemble the shift fork.

1. Shift fork, shaft.
2. Parking Arm;
3. Retainer ring
4. shift fork



5.Thin shift fork spring
6.Thick shift fork spring
7.Springseat

Crankshaft Inspection

NOTE: Check each bearing journal of crank-shaft for scoring, scuffing, cracks and other signs of wear.
NOTE: Replace the crankshaft if the gears are worn or otherwise damaged.
CAUTION: Components with less than the service limit always have to be replaced. Otherwise severe damage may be caused to the engine.

Connecting Rod Small End Inner Diam-eter

●To measure connecting rod small end inner Diameter by bore dial indicator. Re-place it if out of service limit
Service limit：22.060mm
Tool: Bore dial indicator(18mm～35mm)

Crankshaft Axial Play

NOTE: Axial play of crankshaft needs to be measured before splitting the crankcase.

● Use dial gauge to measure crankshaft axial play at MAG side.

Crankshaft Axial Play	
New	0.050mm～0.450mm
Service Limit	0.6mm

If play is out of specification, replace crankcase and/ or crankshaft.

Connecting Rod Big End Axial Play

● Using a feeler gauge, measure the distance between butting face of connecting rods and crankshaft counterweight.

Connecting Rod Big End Axial Play	
New	0.130mm～0.350mm
Service Limit	0.7mm

1.Crank shaft
2.Connecting
Rod 3.Gauge

Balance Shaft

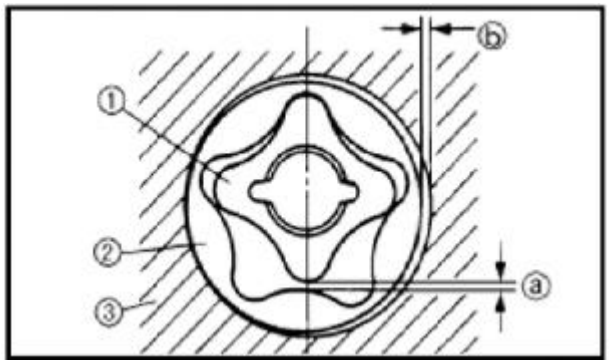
● To inspect balance shaft and balance shaft gear Replace it if damage.

● To inspect balance shaft gears for crack, scratch or others. Replace it if damage

Oil Pump Inspection

● To inspect all parts of Oil Pump. Replace it if any defects.

● To measure bottom clearance (a) (clearance between inner and outer rotor) and backlash(b) (clearance between outer rotor and crankcase), Replace oil pump if out of service limit



Bottom Clearance standard value:
0.1mm ~ 0.15mm Limit value:
0.2mm
Backlash Standard value：
0.08mm～0.15m
Limit value：0.2mm

3.3.4 ENGINE INSTALLATION

The installation essentially the reverse of the removal procedure, special attention as follows:

Note: Clean all parts before install. Without any cracks for all parts before install. All motion parts should with lubrication oil before install Oil seal lips and O ring seal with lubrication grease

Caution: Without any grease in belt, drive and driven pulley

Middle parts of Engine Installation

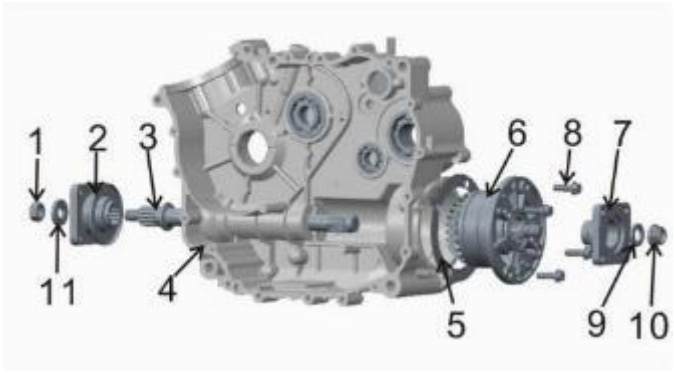
Crankcase (right),Front output shaft, Driven Bevel Gear

● To install Crankcase(right), Front output shaft, Driven Bevel Gear and fasten bolt as tandard torque, Detail as picture indication.

Front output shaft nut(1)

standard torque：95~100N. m

Driven Bevel Gear Seat erection bolt (8)standard torque:40N. m



1.Nut *5.Adjusting Spacer*
2.Land *6.Driven Bevel Gear*
3.front output shaft *7.Coupler*
4.Crankcase(right) *8.Bolt*
9. Washer *10.Nut*
11. Washer

Shifting Drum, Shifting fork, Drive layshaft

● Insert the shifting fork into the sliding sleeve, then install the drive layshaft, shifting fork, shifting drum into crankcase(left)

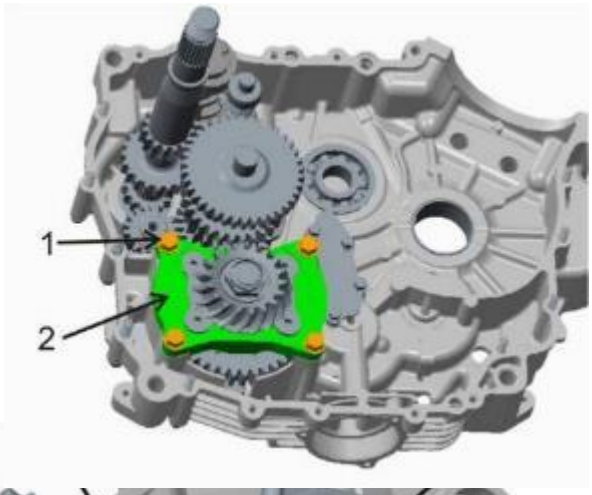
Main Shaft

● Install the Mail Shaft

Drive Bevel Gear

● Install Drive Bevel (2) and tighten 4 bolts (1)

Erection Bolt torque (M8X 28):40N. m



Balance Shaft, Crankshaft, Connection rod
Install balance shaft

● Turn the balance shaft into proper position(as picture indication), install into crankshaft

● Keep a strip of straight line for marks on crankshaft, oil bore of balance shaft neck

Running the crankshaft and balance shaft to inspect whether match for balance shaft bore and gap of crankshaft. If not, reinstall

1. Balance shaft bore
2.Crankshaftgap

Crankcase (right)

● Wipe Sealant on the crankcase(left) junction surface

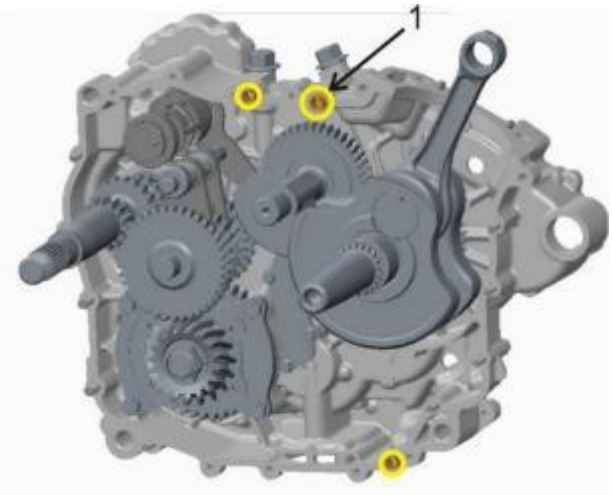
Note: Sealant should be uniformity and continuous threadiness

● Install three locating pin and “O” ring seal as picture indicated

● Mould assembling, light touch to well done by rubber hammer

● Tighten the bolt as standard torque Torque:M6：10N • m
M8：25N • m

Note: opposite angles cross and grading to tighten the bolt.



Gears Set Bolt

● Put in steel ball, install the set bolt(1), tighten It as standard torque

Standard torque: 40N • m

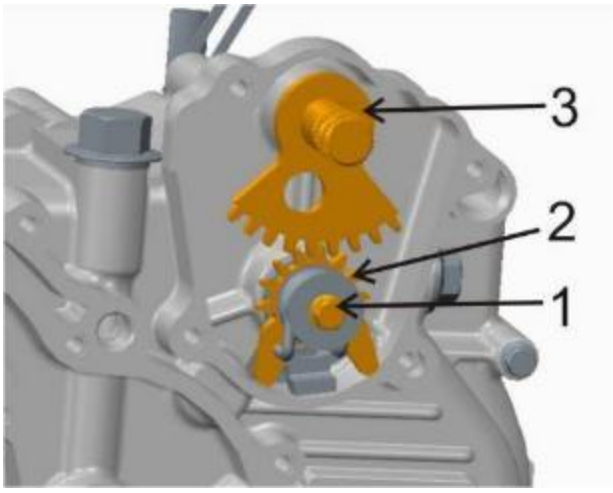
Primary Strainer

● Install primary strainer and cover(2)
● Tighten bolt as standard torque

Standardtorque:8N • m

Shift Sector Gear

● Install shift sector gear, tighten bolt
● Install locating pin and gasket
● Close the shift cover. Tighten bolt
● To inspect gears for smooth changing or others. If not, recheck all parts and install again.

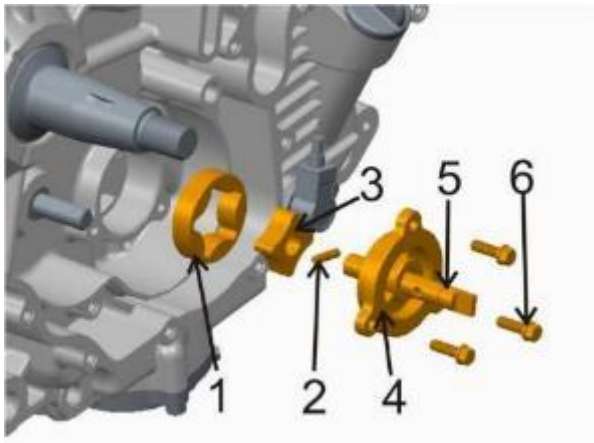


1.Bolt
2.Shifting Drive Sector Gear
3 .Shifting Driven Sector Fear

Engine (left parts)Installation
Oil Pump

● Install oil pump as right picture indication
● Tighten bolt
● Inspect oil pump for smooth running that hold by pliers. Replace and reinstall it if not

Standard Torque： 7N • m



1. Outer rotor, Oil pump 4.Oil Pump
2. Roller pin 5.Oil pump shaft
3. Inner rotor, Oil pump 6.Bolt

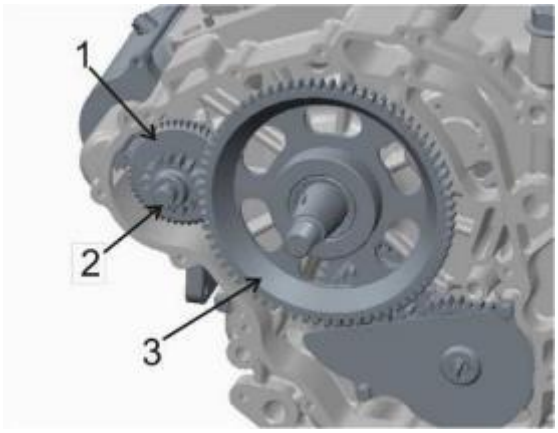
Oil Pump driving gear, Oil pump dual gear

- Install dual gear and driving gear.
- Install cir-clip by cir-clip plier

> **Note:** Don't open when install, and the new cir-clip have to be used.

- Install oil baffle plate, tighten bolt as standard torque.

Torque: 8N • m



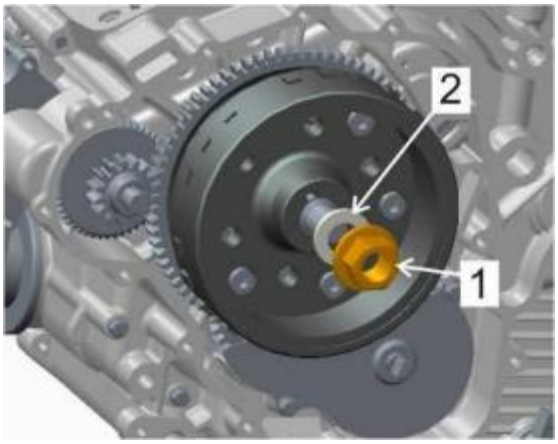
Dual gear

- Install dual gear(1) and dual gear shaft (2)

Driven gear

- Install driven gear(3)

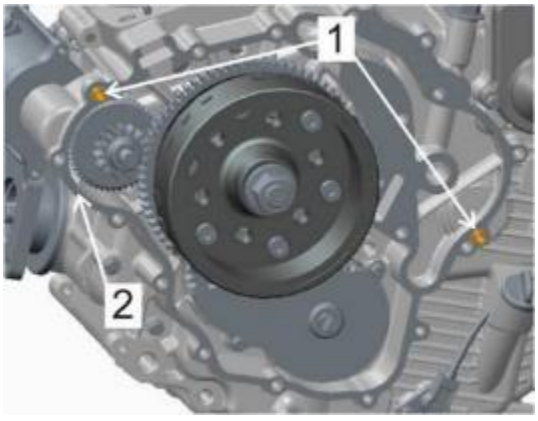
Magnetor Rotor Combination



- Install woodruff key into crankshaft key groove
- Install Magnetor Rotor Combination
- Install Nut (1)and Washer (2)

Standard Torque： 160~170N • m

> **Caution: Clean out grease on the surface of Magnetor Rotor and Crankshaft Conical surface by noncombustible materials and keep drying.**

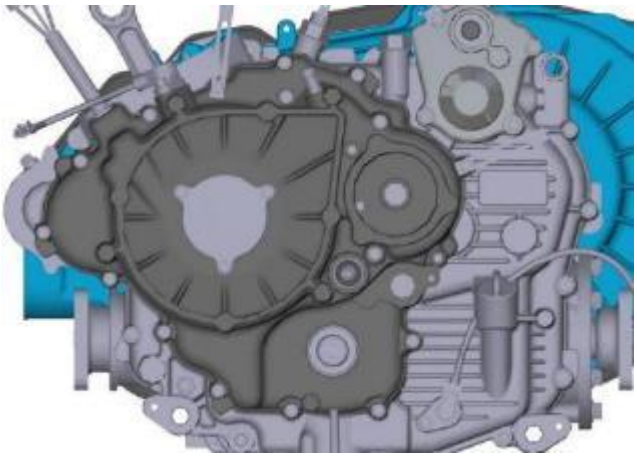


Left Crankcase

- Install Locating Pin(1) and sealing gasket(2)

> **Note:** Use new sealing gasket

- Install left crankcase
- Install left crankcase fastening bolt



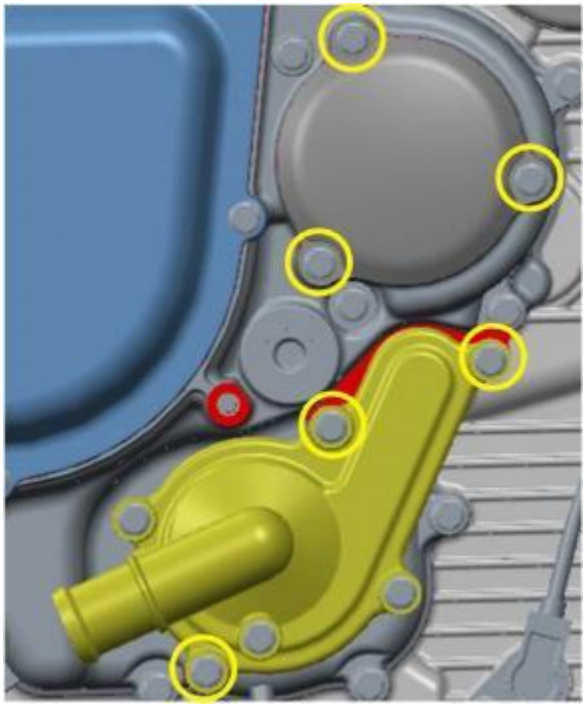
Shaft Sleeve, Blanking Cap

- Install shaft sleeve
- Install blanking cap and tighten bolt.

Installation keeps the Reverse procedure with removal

Oil filter

- Install new oil filter and O ring seal, tighten bolt.

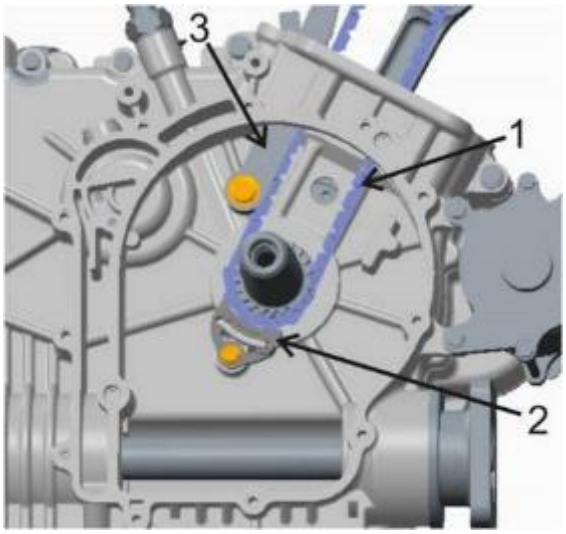


Water Pump

- Install water pump and tighten bolt.

Starting motor

- Install starting motor, tighten fixed bolt



Engine right side

Upper guide chain

- Install upper guide chain

> **NOTE:** Hook up timing chain to prevent It from falling into crankcase

Lower timing chain guide

Install Lower timing chain guide

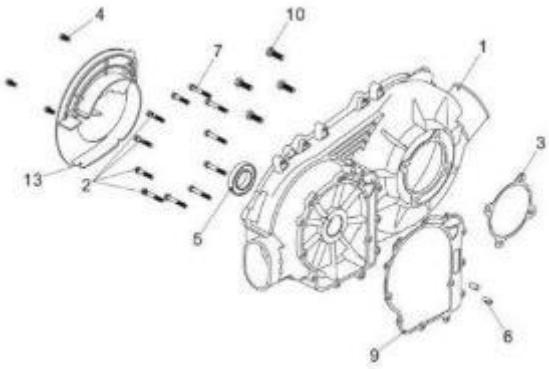
Tensioner plate

- Install tensioner plate, tighten bolt

1. Upper Guide Chain
2. Lower Timing Chain Guide
3. Tensioner plate

CVT case

- Install dowel pin 6, gasket 3 and gasket 9,install CVT case to the right crankcase.



- Install bolt 2, bolt 7and bolt10

- Install guide 13 and screw4

Drive pulley, driven pulley, drive belt

- Use special tool to open fixed plate and sliding plate
- Install drive belt on drive pulley and driven pulley

> **WARNING:**
> Drive belt contact surface should be free from any grease or oil.

Tool: Driven pulley expander
(1BX-17654-00)

1. driven pulley expander
2. driven pulley
3. Drive belt

●Install CVT assy and tighten bolt and nut to the specified torque

NOTE: Install bolt of primary sheave anticlockwise. Install nut of secondary sheave clockwise.

Drive pulley bolt tightening torque: 55~60N. m

Driven pulley nut tightening torque: 110~120N. m

1. CVT assy 2. Bolt

3. Nut

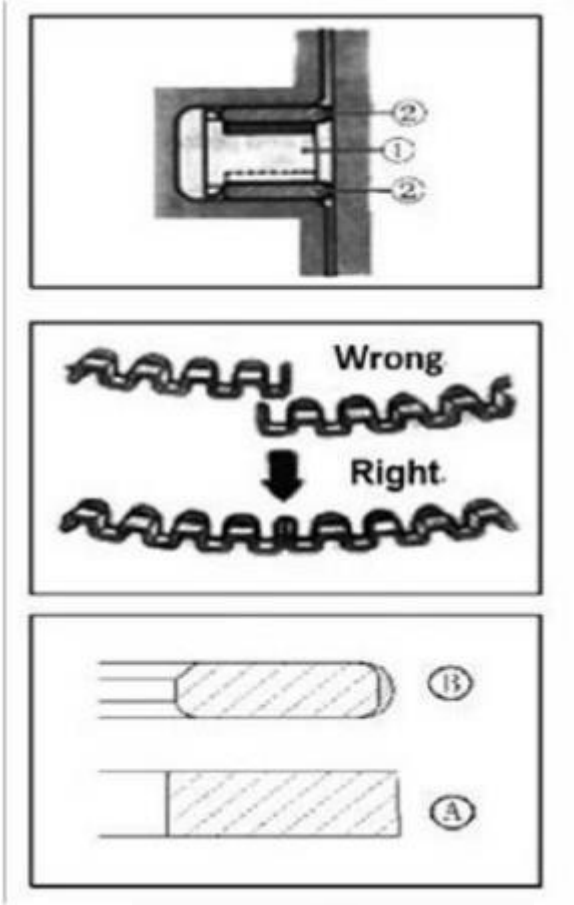
Engine top side

Piston

●Install the piston rings in the order of oil ring, ②ring, ①ring.

●the first member to go to the oil ring groove is spacer①, after placing the spacer fit the two side rails②.

WARNING: When installing the spacer ①, do not overlap its two ends in the groove.



●Install the second ring A and the first ring B.

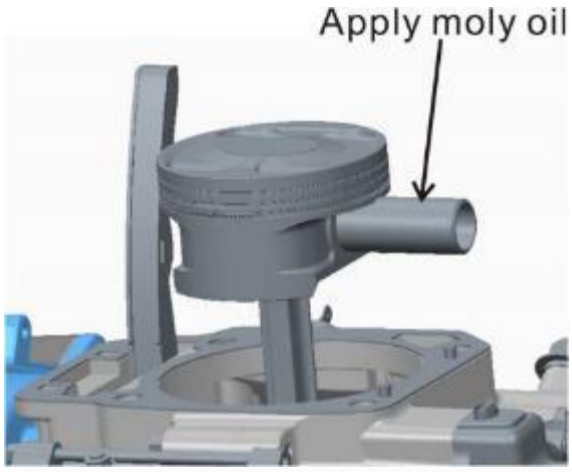
NOTE:
Ring 1 and ring 2 differ in shape. Ring 1 and ring 2 marks “N and TOP” The marks should be face up when installing

●After installing, inspect the smoothness of piston ring moving.

●The gaps of three rings should tagger 120°, and the gaps should not face the axial direction of piston pin or the main push surface of piston.

1. Do not face to the main push surface of piston.
2. Do not face to the axial direction of piston pin.

● Apply a light coat of moly oil to the piston pin.



● Install piston pin into holes of piston and connecting rod small end

NOTE: When installing the piston, the " ▲ " mark on piston top is located to the intake side. The cylinder block and piston must be mounted in pairs. Piston Ⅰ with cylinder 1 and Piston Ⅱ with cylinder 2.

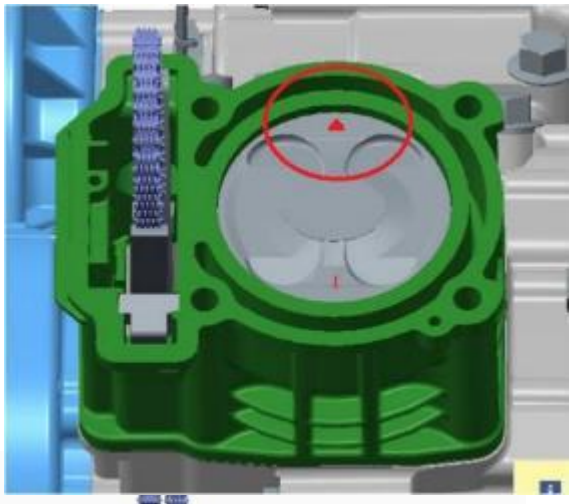
NOTE: Piston and cylinder should be installed according to grouping pairing

● place a clean rag beneath piston and in- stall piston pin circlip ①;

NOTE: While rotating crankshaft, pull the cam chain upward, or the chain will be caught between sprocket and crankcase.

● Install the dowel pins and the new cylin- der gasket.

WARNING: Use a new cylinder gasket to prevent oil leakage



Cylinder

● Apply engine oil to piston skirt and cylin- der wall.

● Hold each piston ring with proper position, insert piston into the cylinder.

NOTE: Pull timing chain from chain cavity, and then install cylinder properly.

NOTE: Piston and cylinder should be in- stalled cording to grouping pairing

Chain Guide

● Install chain guide 2

● Install dowel pin 1 and new cylinder gas- ket 3

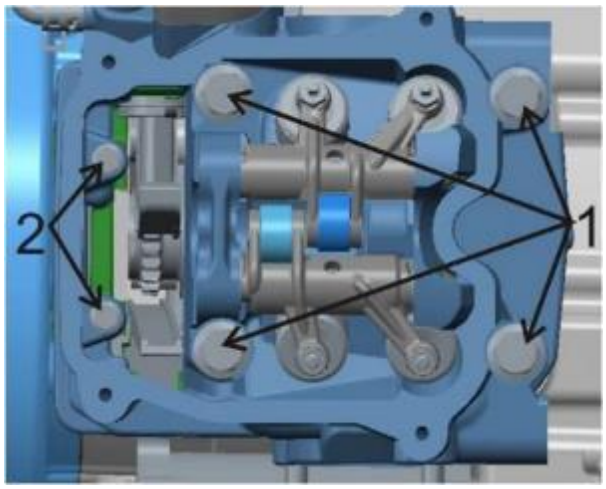
WARNING: Use new cylinder gasket to prevent oil leakage.

● Rotating crankshaft, and rotate the pis- ton to upper dead center of crankshaft

Cylinder head

●Install cylinder head, tighten bolts diagonally to the specified torque.

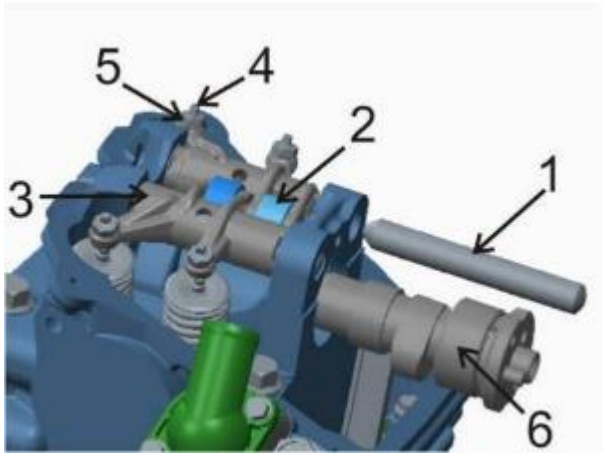
Cylinder head cover bolt tightening torque:
Initial: 20N. m
Final: 40~45N. m
●Install boltM6



1. Cylinder head cover bolt M10
2. Nut M6

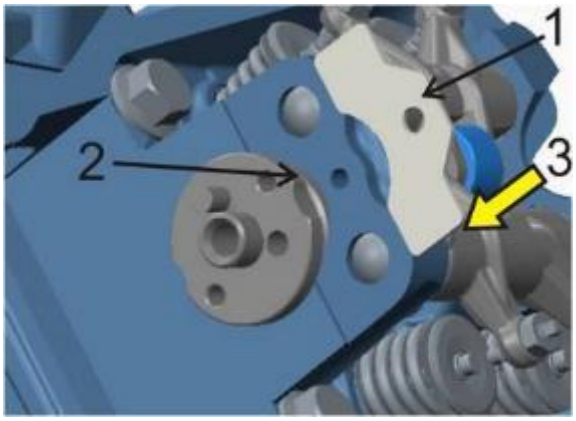
Camshaft, Rocker Arm

●Install camshaft
●Install rocker arm
●Install rocker shaft



1. Rocker arm *4. Adjusting screw*
2. Exhaust rocker *5.*Nut
3. Intake rocker *6. Camshaft*

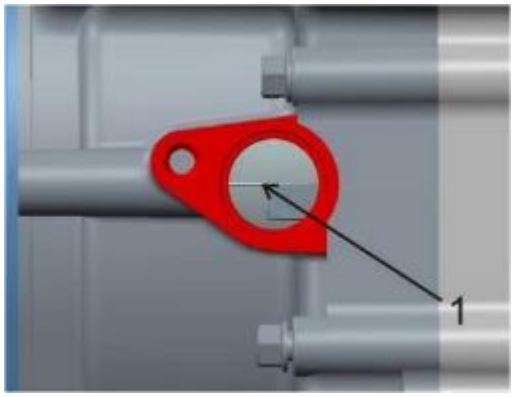
●Install camshaft holder into the groove of camshaft.
●Tighten bolt



1. The position of camshaft holder
2. The locating groove of camshaft
3. The moving direction

Timing Driven Sprocket

● Remove speed sensor and align the carved line of magneto and mark of left cover. If not alignment, rotate camshaft and make them be aligned.



1 .carved line of magneto

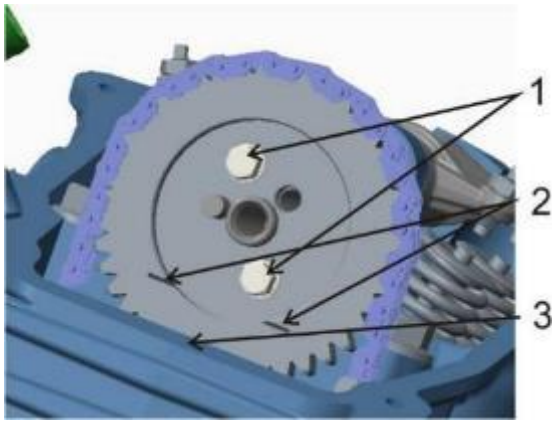
● Install timing driven sprocket, make the carved line of sprocket and the contact surface of cylinder head cover be parallel

● Hitch timing chain

● Tighten the fastening bolt to the specified torque

NOTE: make sure to apply screw locker on the fastening bolt of chain sprocket

Specified torque: 15N. m



1.chain sprocket fastening bolt

2.carved of timing chain sprocket

3.the contact surface of cylinder head cove

Decompressor Starter

● Install decompressor starter

● Tighten the bolt to the specified torque

Decompressor starter bolt specified torque: 30N. m

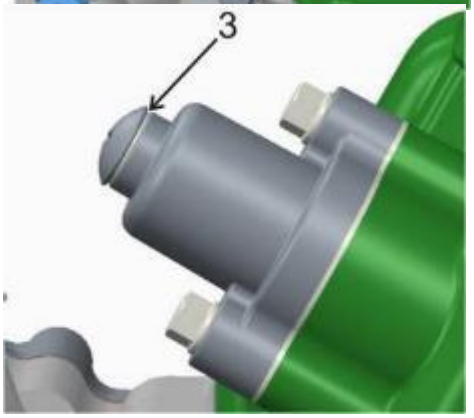
Timing Chain Tensioner

●Insert flat head screw driver into the end of tensioner groove, rotate clockwise and lock tensioner spring

● Install timing chain tensioner and new seal gasket (1)
● Install fixed bolt (2)and fasten it to the specified torque

Chain tensioner bolt specified torque: 10N. m

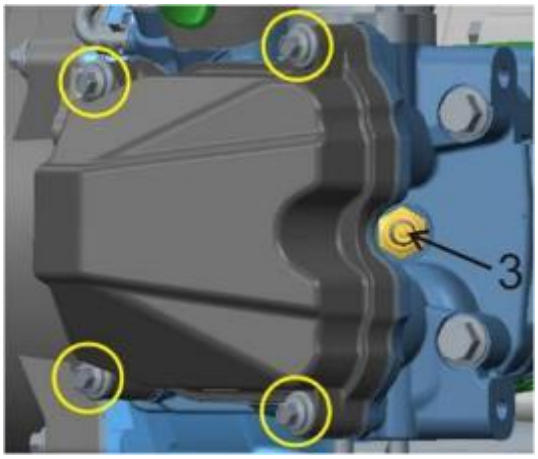
● after installing tensioner, use flat head screw driver to rotate it anticlockwise and make the spring press the tensioner adjuster to compress timing chain.



● Install new gasket 3
● Install tensioner screw to the specified torque；

Tensioner screw specified torque: 8N. m

Cylinder Head Cover



● Put rubber ring on cylinder head cover
● install cylinder head cover
● tighten bolt

Spark plug

● install and tighten spark plug(3)

CVT cover

● install CVT cover and tighten bolt

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3.4 COOLING AND LUBRICATION SYSTEM

3.4.1 ENGINE COOLING SYSTEM CHART

3.4.2 ENGINE COOLANT

3.4.3 INSPECTION OF COOLING CIRCUIT

3.4.4 INSPECTION & COOLING OF RADIATOR & WATER HOSES RADIATOR CAP

3.4.5 INSPECTION OF FAN MOTOR

3.4.6 INSPECTION OF WATER TEMPERATURE SENSOR

3.4.7 INSPECTION OF THERMOSTAT

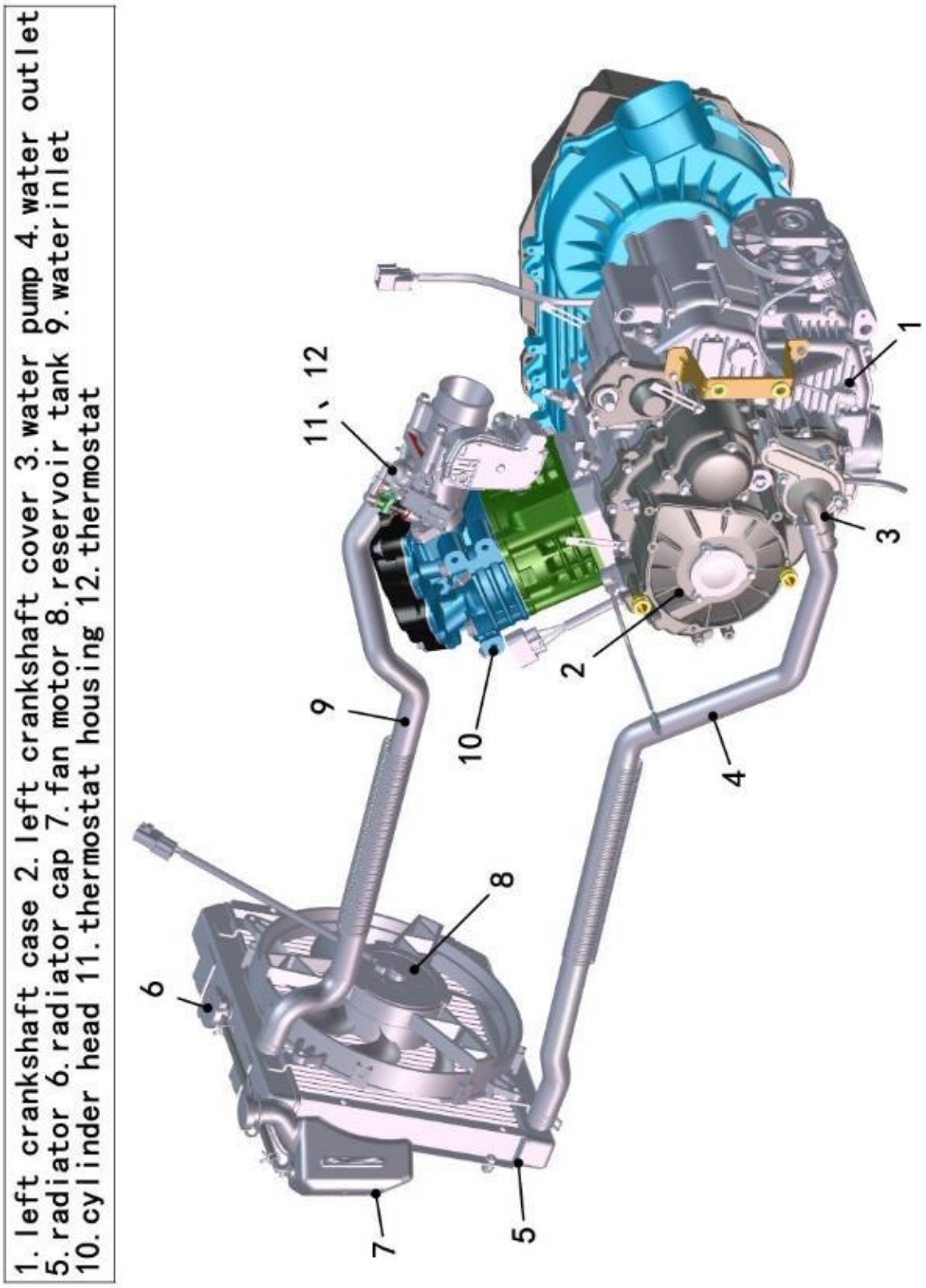
3.4.8 WATER PUMP

3.4.9 INSPECTION OF ENGINE LUBRICATION SYSTEM

3.4.10 INSPECTION OF LUBRICATION SYSTEM

3.4.11 INSPECTION OF ENGINE OIL PUMP

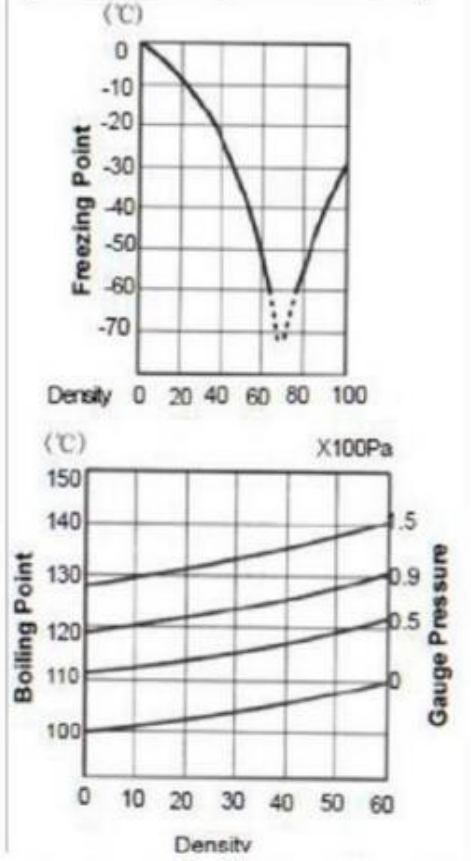
3.4.1 ENGINE COOLING SYSTEM CHART



3.4.2 ENGINE COOLANT

The cooling used in cooling system is mixture of 50% distilled water and 50% ethylene glycol antifreeze. This 50:50 mixture provides the optimized corrosion resistance and the fine heat protection. The coolant will protect the cooling sys- tem from freezing at temperature above - 30℃, the mixing ratio of coolant should be increased to 55% or 60% according to the figure on the right.

Anti-Freeze Density	Freezing Point
50%	-30℃
55%	-40℃
60%	-55℃



WARNING:

Use high quality ethylene glycol base antifreeze and mixed with distilled water.

Never mix alcohol base antifreeze and different brands of antifreeze

The ratio of antifreeze should not be more than 60% or less than 50%

Do not use anti-leak additive

DANGER:

DO NOT open radiator cap when the engine is still hot. Or you may be injured by scalding fluid or steam;

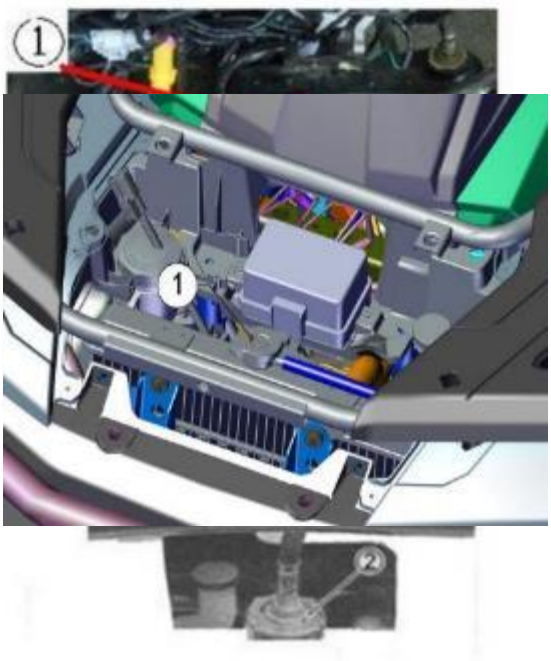
Coolant is harmful. DO NOT swallow or stain your skin or eyes with coolant. In case of accidental swallow or stain, flush with plenty of water and consult the doctor immediately;

Keep coolant away from reach of children.

3.4.3 INSPECTION OF COOLING CIRCUIT

●Remove radiator ①and connect tester②

DANGER: DO NOT open the radiator when the engine is still hot, or you may be injured by scalding fluid steam.



● Give a pressure of 105kPa, and check if the cap hold the pressure for at least 10 seconds

WARNING: When removing the radiator cap tester put a rag on the filler to pre-vent splash of coolant DO NOT allow a pressure to exceed the radiator cap re-lease pressure.

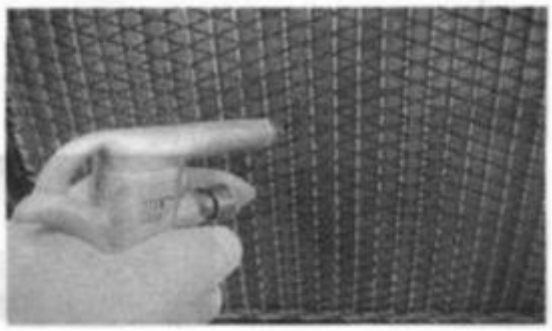
WARNING: When removing the radiator cap tester put a rag on the filler to pre- vent splash of coolant DO NOT allow a pressure to exceed the radiator cap release pressure.

● If the pressure drops during 10 seconds, it indicates that there is leakage with the cooling system. In this case, check the complete system and replace the leaking parts or components.

3.4.4 INSPECTION AND COOLING OF RADIATOR AND WATER HOSES RADIA-TOR CAP

● Remover radiator cap①

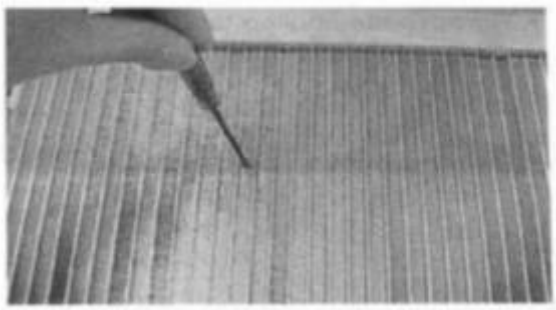
● Install radiator cap to cap tester②



● slowly increase pressure to 108kPa and if the cap hold the pressure for at least 10 seconds

● If the cap cannot meet the pressure requirement, replace it.

Radiator Cap Valve Opening Pressure Standard: 108kPa
Tool: Radiator Cap Tester



Radiator Inspection and Cleaning

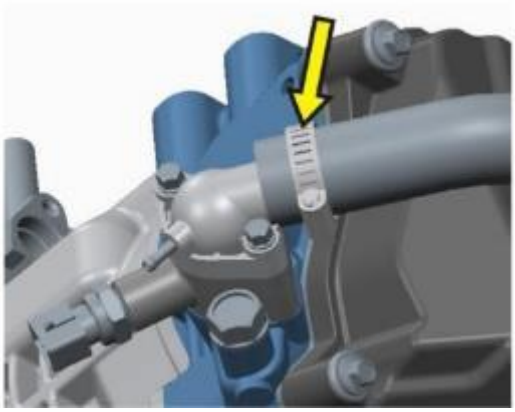
●Remove dirt or trash from radiator with compressed air

● Correct the radiator fins with a small screwdriver

Radiator Hose Inspection

● Check radiator hoses leakage or damage. If the hoses are leakage and damaged, replace them

● Check tightening of clamps. Replace the clamps if necessary



● After inspection and cleaning of radiator and hoses, check coolant level. Fill coolant if necessary

3.4.5 INSPECTION OF FAN MOTOR

● Remove fan motor from radiator

● Turn the vanes and check if they can turn smoothly

● Check fan motor. Make sure that the battery applies 12 volts to the motor and the motor will run at full speed while the ammeter will indicate the ampere not more than 5A. If the motor does not work or the ampere exceeds the limit, replace the motor

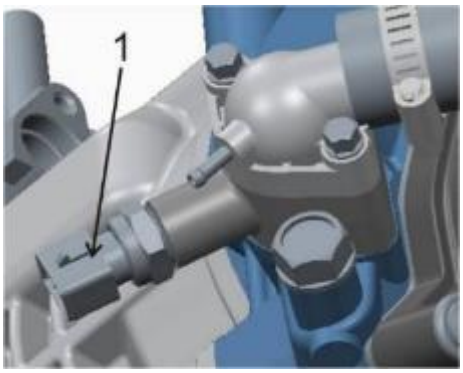
● Installation: Apply a little thread locker to the bolts and tighten to the specified torque.

Fan Motor Bolt Tightening Torque:
10N • m

1. Radiator; 2. Radiator Cap;
3. Fan Motor; 4. Combination Bolt;

3.4.6 INSPECTION OF WATER TEM-PERATURE SENSOR

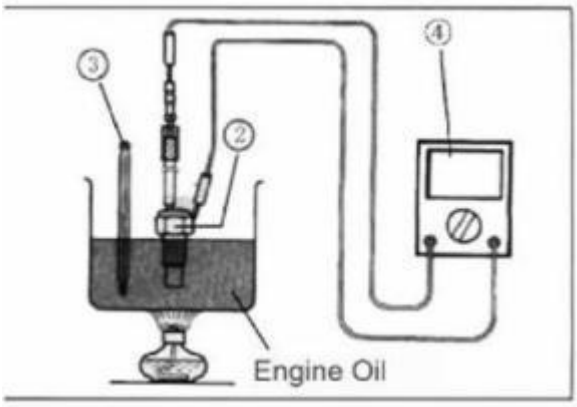
● Place a rag under water temperature sensor 1 and remove it from cylinder head



● Check the resistance of water tempera- ture sensor as illustrated on the right. Con- nect the temperature sensor 2 to the circuit tester, place it in a vessel with engine oil. Place the vessel above a stove

Tool: ohmmeter, thermometer

● Heat the oil raise the temperature slowly and take the reading from ohmmeter ④and thermometer ③



Resistance and Water Temperature

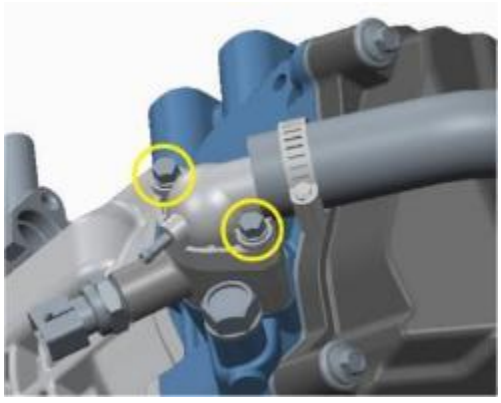
Temperature (℃)	50	80	100	120
Resistance (Ω)	154±16	52±4	27±3	16±2

● Installation: Apply a little thread locker and install it to the cylinder head by tightening to the specified torque

Water temperature Sensor Tightening Torque: 16N • m

WARNING:
Avoid sharp impact on temperature sensor; Avoid contact of temperature sensor with thermometer or vessel

● After installation, check the coolant level. Fill coolant if necessary



3.4.7 INSPECTION OF THERMOSTAT

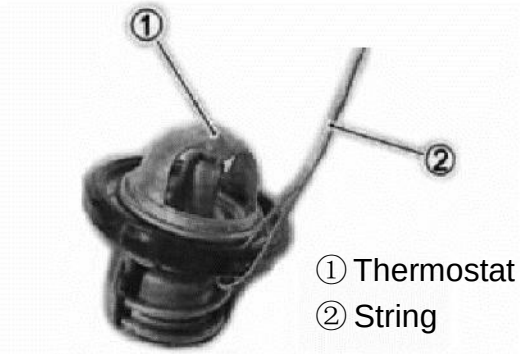
● Remove thermostat housing

● Remove thermostat

● Check thermostat pellet for cracks. If necessary, replace it.

● Test the thermostat according to the fol-lowing steps:

☆Pass a string between thermostat flange as illustrated on the right

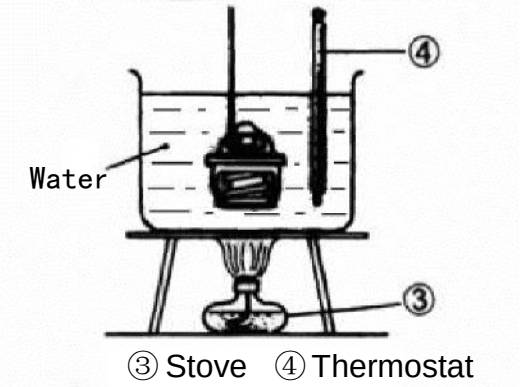


☆Immerse the thermostat in a beaker with water. Make sure the thermostat is in the suspended position without contact to the vessel. Heat the water by placing the beaker above a stove and observe the temperature rise on a thermometer

☆Take the temperature reading from thermometer when the thermostat valve opens.

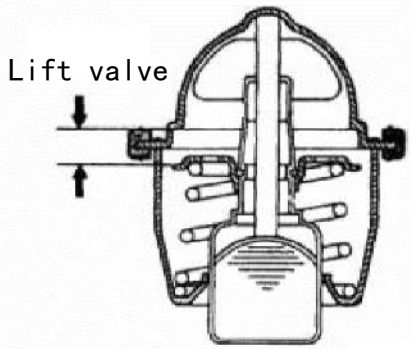
Thermostat Valve Opening Temperature:71℃±3℃

Tool: Thermometer



☆Keep heating the water to raise the wa-ter temperature. When the water tempera- ture reaches the specified valve, the ther-mostat valve should have been lifted by 3. 5-4.5mm

☆If thermostat valve opening temperature or thermostat valve lift does not reach the standards, replace it.

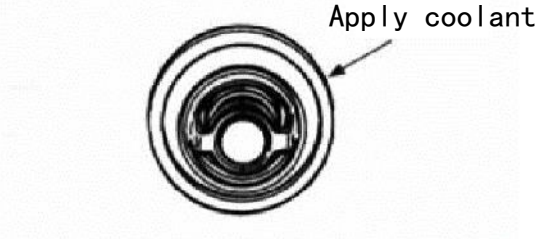


● Install thermostat: reserve the removal procedure for installation

☆Apply coolant to the rubber seal of ther-mostat

☆Install thermostat housing. Tighten to the specified torque:

Tightening Torques: 10N • m



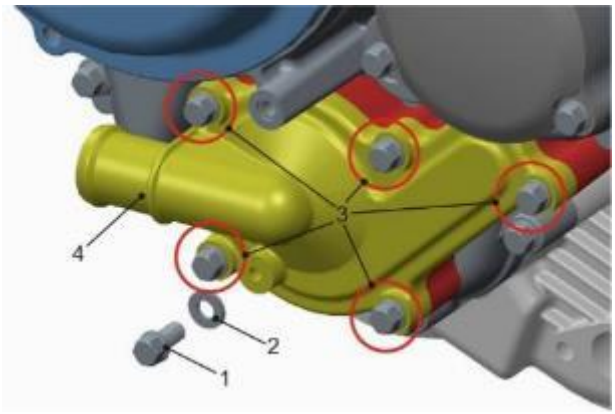
3.4.8 WATER PUMP

Water pump cover

Water pump is on engine left crank- shaft cover

Removal and Disassembly

WARNING:
When engine is hot, do not remove radiator cap or loose coolant discharge plug screw to prevent from injury.



Illustration

1. coolant drain plugs crew

2. Seal gasket

3. bolt

4. water pump cover

- Drain coolant
- Remove radiator water outlet from wa-ter pump cover
- Remove mounting bolt from water pump cover
- Remove water pump

Inspection of water pump cover

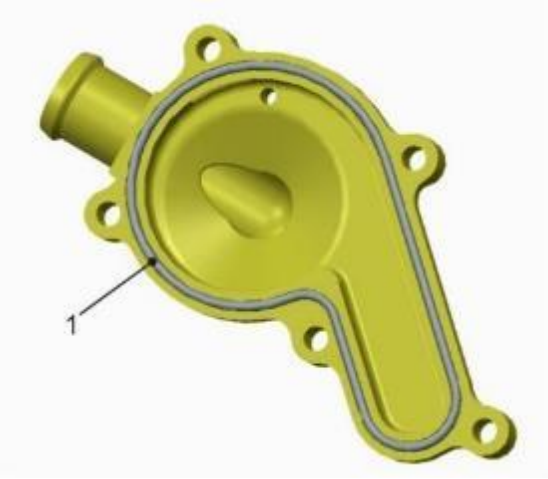
- Check water pump cover seal gasket, if necessary, replace it

Installation of water pump cover

- Install water pump cover reverse the re-moval procedure for installation

Water Pump Cover Bolts Tightening Torque: 6N.m

WARNING:
Install seal gasket in the groove of water pump cover correctly to prevent from leakage.



- Tighten mounting bolts diagonalcross.

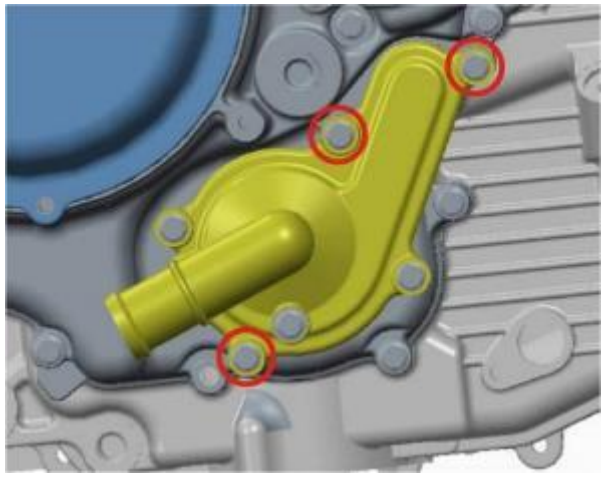
- Check impeller for smoothturning

- install the new O-ring

> Use the new O-ring to prevent leakage;
> Apply grease to O-ring

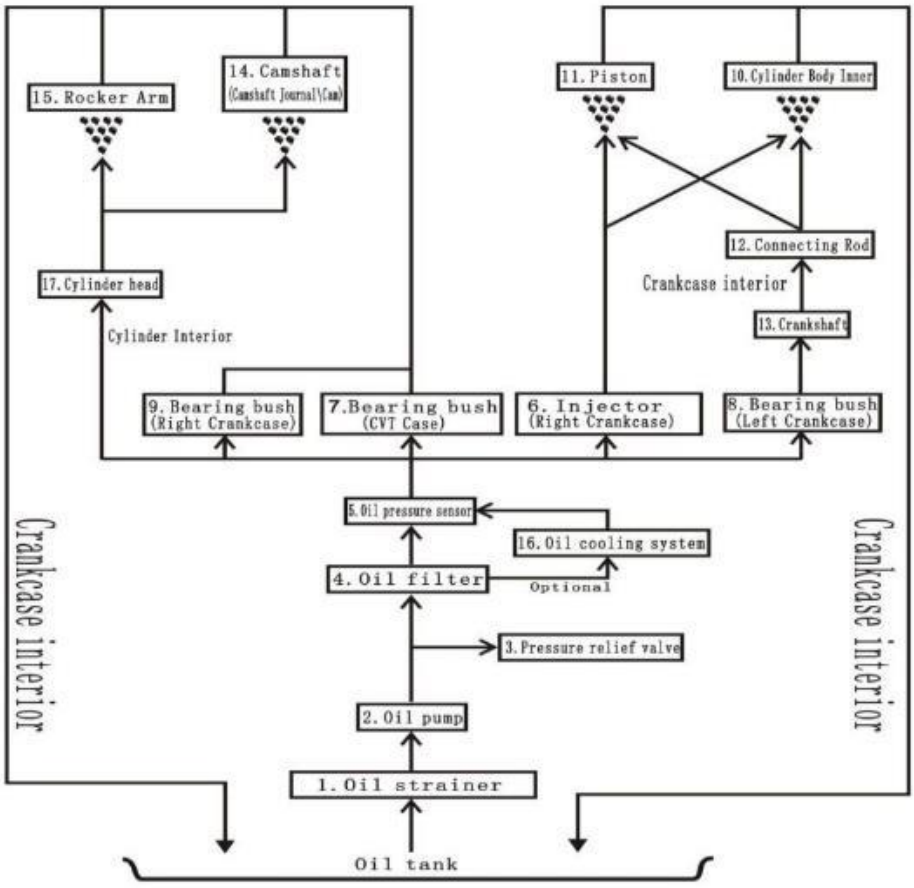
- Install water pump and tighten the bolts and bleed bolt

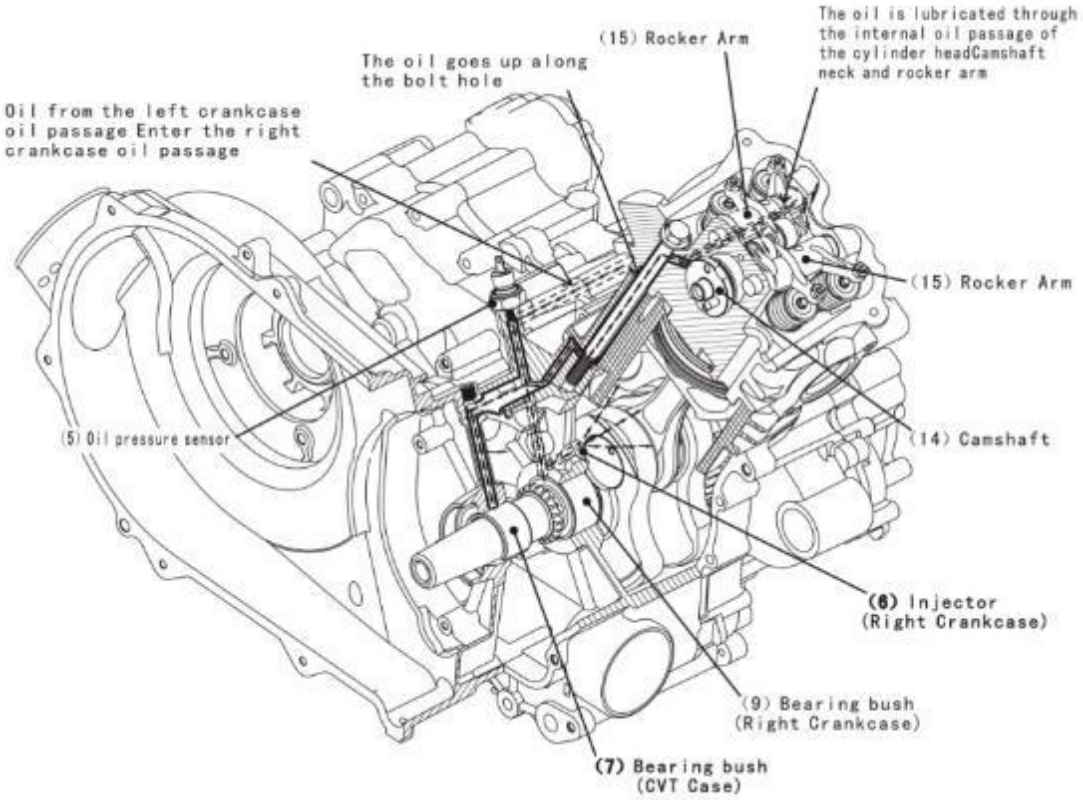
Water pump bolts tightening torque:
10N • m

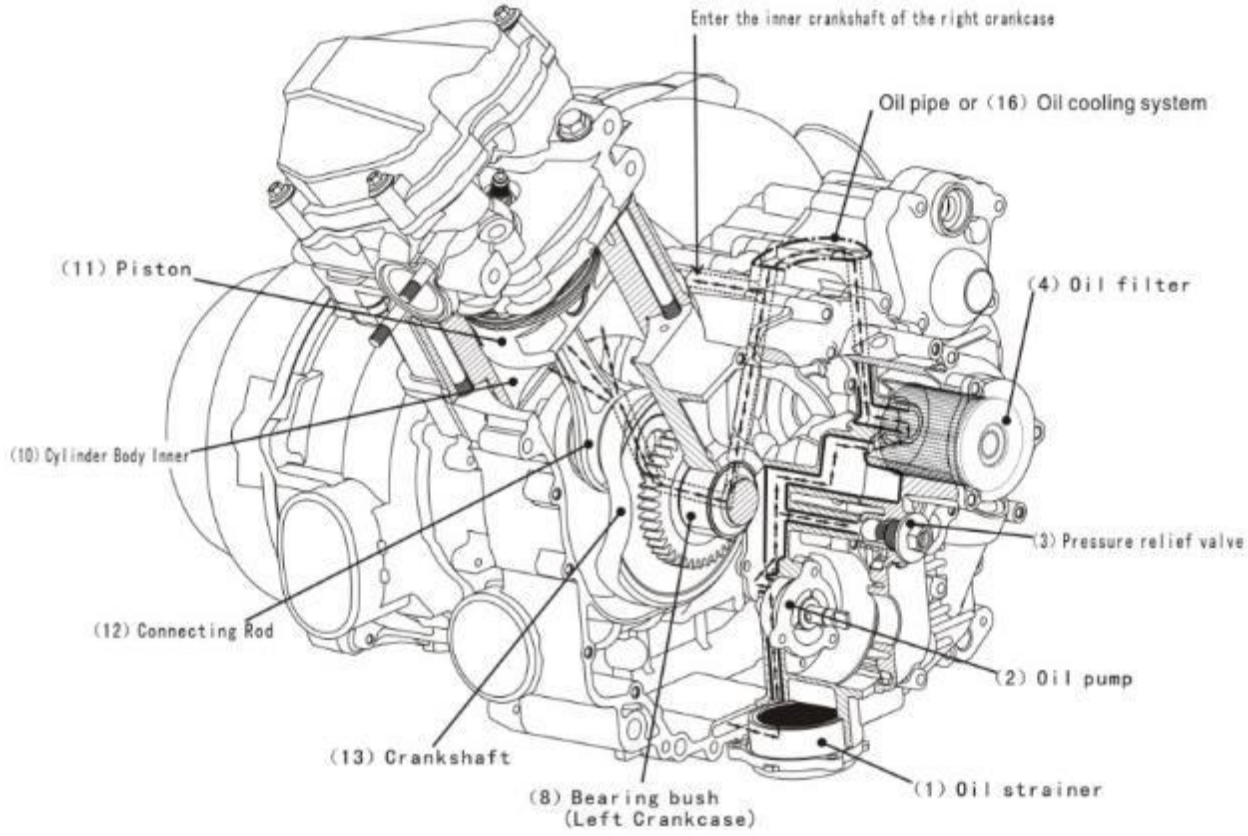


- Connect water tubes
- Inject coolant

3.4.9 INSPECTION OF ENGINE LUBRICATIONSYSTEM







Add oil to the engine parts (piston, cylin- der body, camshaft and so on) which run at high speed. Engine lubrication should be special oil. Engine oil is not only used as lubrication, but also used to wash, rustproof, seal and cool.

3.4.10INSPECTION OF LUBRICATION SYSTEM

(Refer to 5.2.8 inspection of lubrication system)

3.4.11 INSPECTION OF ENGINE OIL PUMP

(Refer to 3-77)

3.5 TROUBLESHOOTING

Complaint	Symptom and Possible Causes	Remedy
Engine will not start or is hard to start	**Compression is Too Low**	
	1. Worn cylinder	Replace
	2. Worn piston ring	Replace
	3. Leakage with cylinder gasket	Replace
	4. Wear valve guide or improper valve seating	Replace or repair
	5. Loose spark plug	Tighten
	6. Slow cranking of starting motor	Check electrical part
	7. Faulty valve timing	Adjust
	8. Improper valve clearance	Adjust
	No Sparking from Spark Plug	
	1. Fouled spark plug	Clean or Replace
	2. Wet sparkplug	Clean and dry or replace
	3. Defective ignition coil	Replace
	4. Open or short circuit with pickup coil	Replace
	5. Faulty generator	Replace
	No Fuel Reach Into Carburetor	Clean or Replace
	1. Clogged fuel tank vent tube	Clean or Replace
	2. Clogged or faulty fuel valve	Replace
	3. Faulty carburetor needle valve	Replace
	4. Clogged fuel hose	Clean or Replace
	5. Clogged fuel filter	Set to Neutral position
	Transfer is not in Neutral position	
Engine stalls easily or has unstable idle speed	1. Improper valve clearance	Adjust
	2. Improper valve seating	Replace or Correct
	3. Faulty valve guide	Replace
	4. Worn rocker arm or rocker arm shaft	Replace
	5. Fouled spark plug	Replace
	6. Improper spark plug gap	Replace or Adjust
	7. Faulty ignition coil	Replace
	8. Clogged idle-vale inlet & exhaust pipe	Adjust Fuel level
	9. Faulty magneto	Replace

Complaint	Symptom and Possible Causes	Remedy
Poor engine running in high-speed range	1. Weak valve spring 2. Worn camshaft 3. Fouled spark plug 4. Insufficient spark plug gap 5. Improper valve timing 6. Faulty ignition coil 7. Weak high pressure oil pump, resulting in poor fuel supply 8. Dirty air filter	Replace Replace Clean or replace Adjust or replace Adjust Replace Adjust or replace Clean or replace
Exhaust smoke is dirty or thick	1. Excessive engine oil 2. Worn piston ring 3. Worn valve guide 4. Scored or scuffed cylinder wall 5. Worn valve stem 6. Worn valve stem oil seal	Check oil level and drain Replace Replace Replace Replace Replace
Engine lacks power	1. Improper valve clearance 2. Weak valve spring 3. Improper valve timing 4. Worn cylinder 5. Worn piston ring 6. Improper valve seating 7. Fouled spark plug 8. Improper spark plug gap 9. Clogged carburetor jet 10. Improper fuel level in fuel chamber 11. Dirty air filter 12. Worn rocker arm or rocker arm shaft 13. Air leakage from air intake pipe 14. Excessive engine oil	Adjust Replace Adjust Replace Replace Replace or Correct Clean or replace Clean or replace Clean or replace Adjust fuel level Clean or replace Replace Tighten or replace Check oil level and drain
Engine overheats	1. Carbon deposit on piston top 2. Insufficient or excessive engine oil 3. Faulty oil pump 4. Clogged oil passage 5. Air leakage from air intake pipe 6. Incorrect engine oil 7. Faulty cooling system(see5.2.9)	Clean Check level, add or drain Replace Clean Tighten or replace Change engine oil

Complaint	Symptom and Possible Causes	Remedy
Engine is noisy	**Valve Chatter** 1. Excessive valve clearance 2. Worn or broken valve spring 3. Worn rocker arm or camshaft	Adjust Replace Replace
	Noise from Piston 1. Worn piston 2. Worn cylinder 3. Carbon deposit in combustion 4. Worn piston pin or pinhole 5. Worn piston ring or piston ring groove	Replace Replace Clean Replace Replace
	Noise from Timing chain 1. Stretched chain 2. Worn sprocket wheel 3. Faulty chain tensioner	Replace chain & sprocket Replace chain & sprocket Repair or replace
	Noise from Clutch 1. Worn or damaged crankshaft spline 2. Worn inner race spline	Replace Replace
	Noise from Crankshaft 1. Worn or burnt crank pin bearing 2. Excessive thrust clearance	Replace Replace
	Noise from CVT 1. Worn or slipping drive belt 2. Worn rollers in primary sheave	Replace Replace
	Noise from Transmission 1. Worn or damaged gear 2. Worn or damaged input or output shafts 3. Worn bearing	Replace Replace Replace
Slipping Clutch	1. Worn or damaged clutch shoes 2. Weakened clutch shoe spring 3. Worn clutch housing 4. Worn or slipping drive belt	Replace Replace Replace Replace

CHAPTER 4 CHASSIS

⚠ WARNING

The parts of different types/ variants/ versions maybe un-interchangeable, even some parts have almost same appearance. Always refer to Parts Manual of each ATV model for spare parts information and service.

4.1 FRONT A-ARM REPLACEMENT

4.2 REAR A-ARM REPLACEMENT

4.3 REAR STABILIZER BAR REMOVAL/INSTALLATION

4.4 FRONT SERVICE COVER

4.5 RACK COVER PLATE

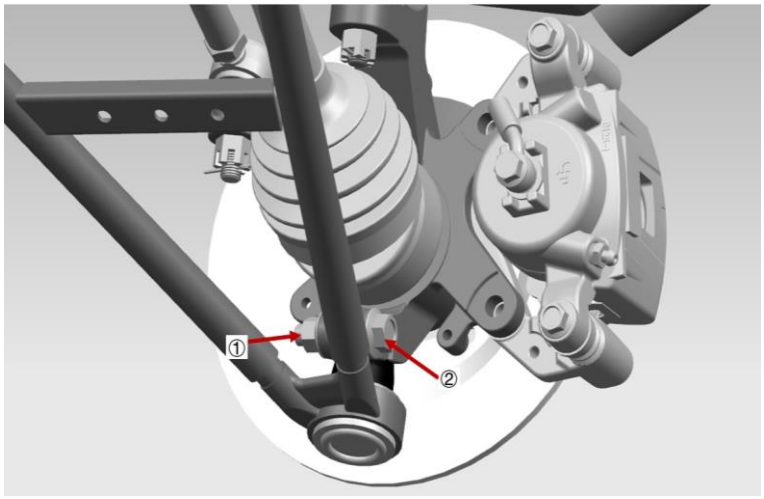
4.6 STEERING ASSEMBLY REMOVAL/INSTALLATION

4.1 FRONT A-ARM REPLACEMENT

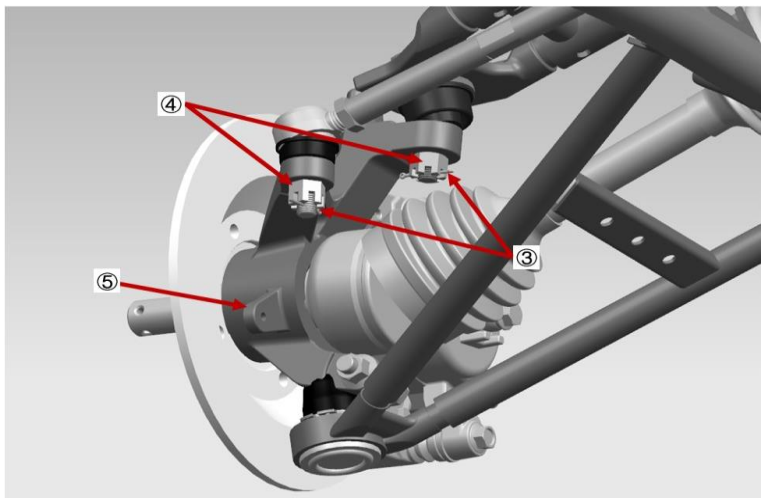
Front Suspension

Removal

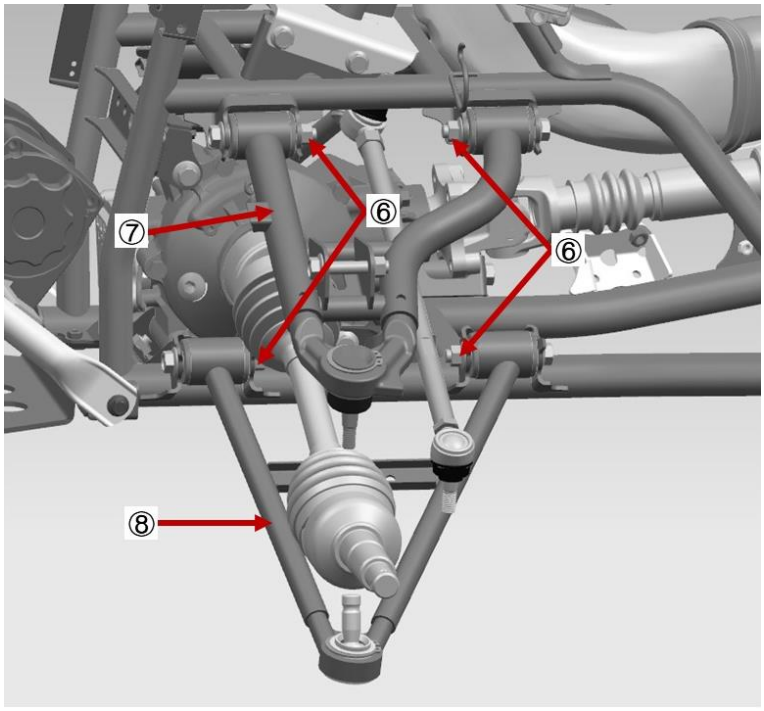
Remove nut ①.
Remove bolt ②.



Remove plug pin ③.
Remove slotted nut ④.
Remove steering knuckle ⑤.



Remove bolts and nuts ⑥.
Remove front upper swing arm ⑦.
Remove front lower swing arm ⑧.



Inspection
Inspect swing arm for cracks or damage.
Replace if any defect is found.

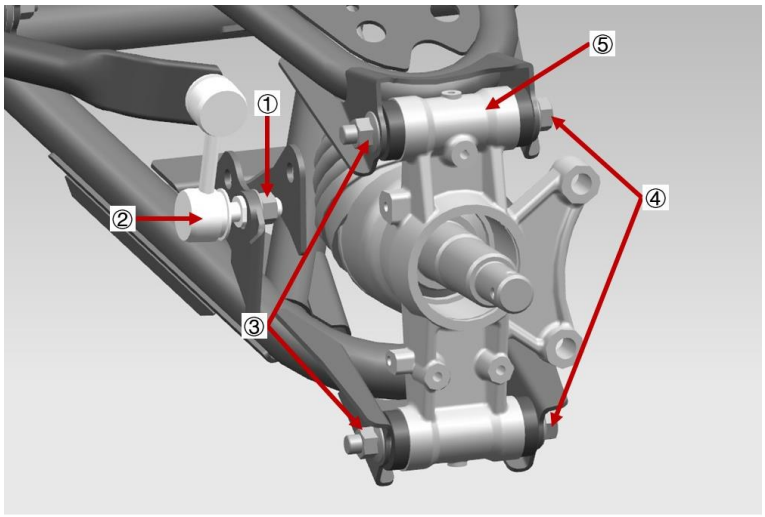
Inspect if swing arm movement is smooth or not.
Add grease from nozzle if there is stuck or blocking feeling.

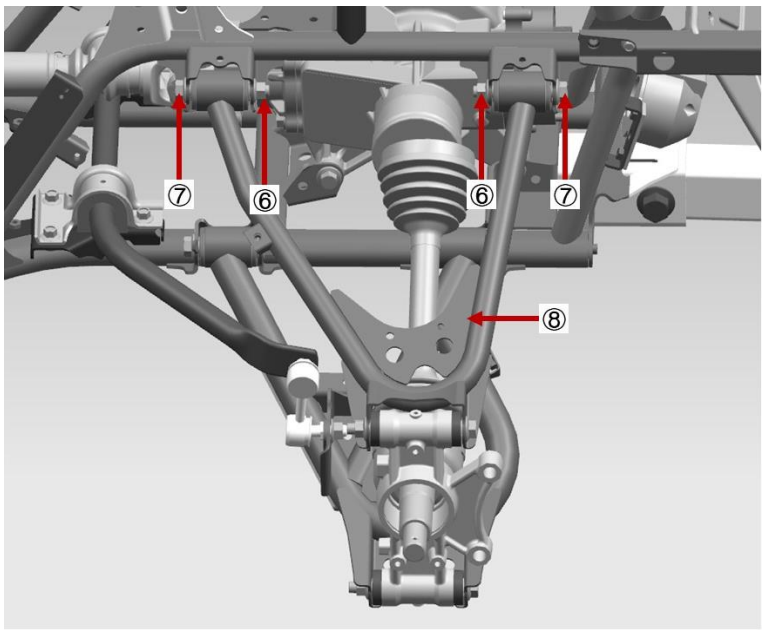
Inspect steering knuckle for dirt or rust.
Replace if any defect is found.

Installation
Reverse the removal procedures for installation.

4.2 REAR A-ARM REPLACEMENT

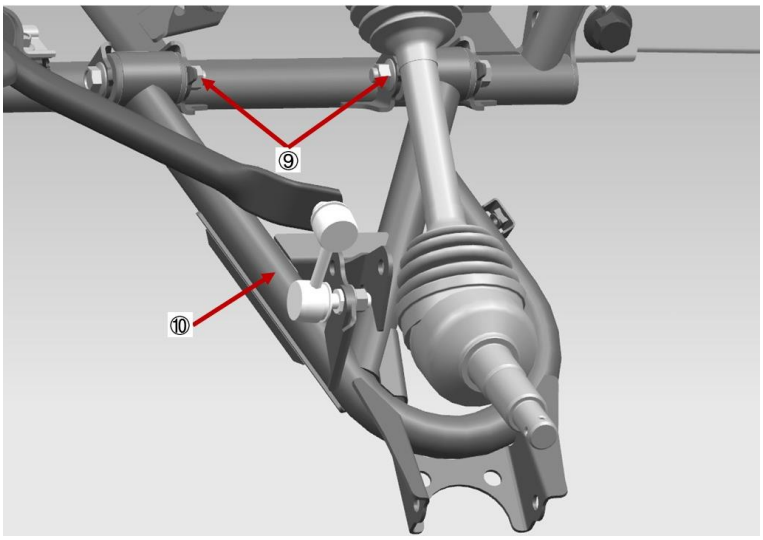
Rear Suspension
Rear Swing Arm
Removal
Remove nut ①.
Loosen sway bar ②.
Remove nuts ③.
Remove bolts ④.
Remove steering knuckle ⑤.





Remove nuts ⑥.
Remove bolts ⑦.
Remove rear LH upper swing arm ⑧.

Remove bolts and nuts ⑨.
Remove rear LH lower swing arm ⑩.
Rear RH swing arm assy refers to rear LH swing arm removal procedures.



Inspection
Inspect swing arm for cracks or damage. Replace if any defect is found.

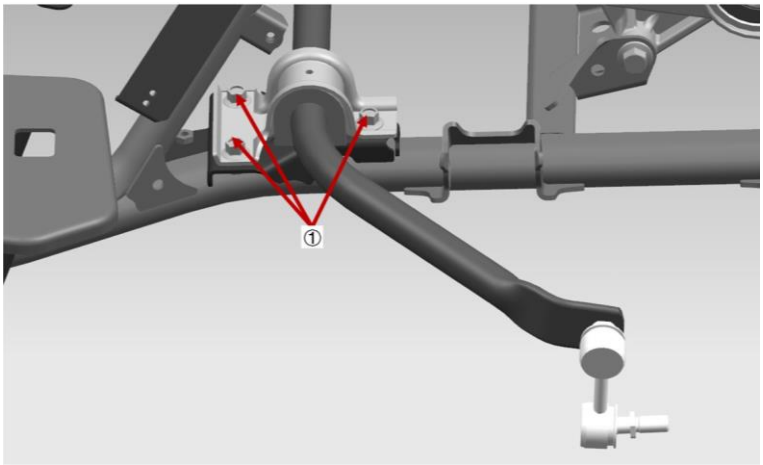
Inspect if swing arm movement is smooth or not.
Add grease from nozzle if there is stuck or blocking feeling (details refer to maintenance schedule).

Inspect steering knuckle for dirt or rust. Replace if any defect is found.

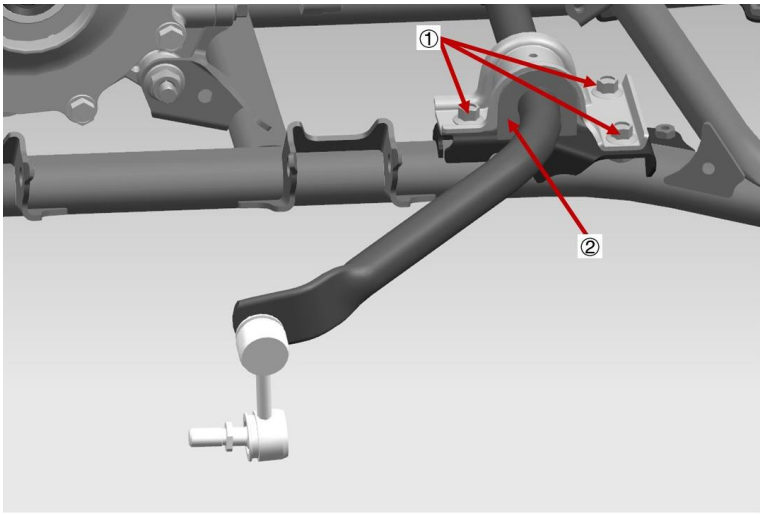
Installation
Reverse the removal procedures for installation.

4.3 REAR STABILIZER BAR REMOVAL/INSTALLATION

Sway Bar
Removal
Remove bolts ①.



Remove bolts ①.
Remove sway bar ②.

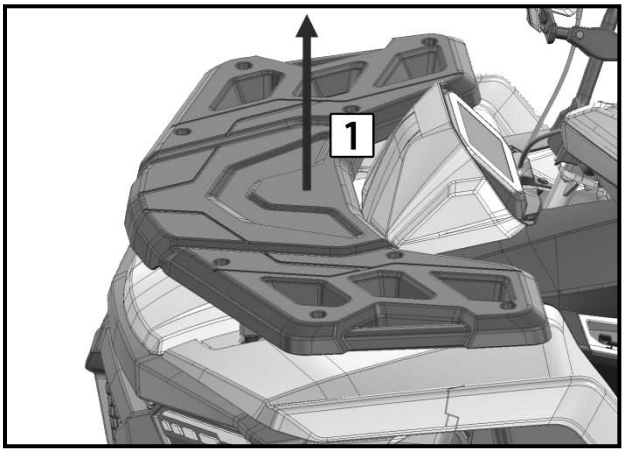


Installation
Reverse the removal procedures for installation.

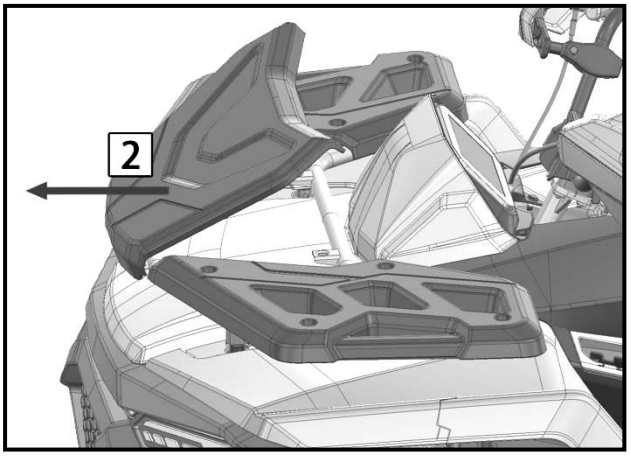
4.4 FRONT SERVICE COVER

Removal

1. Pull out front service cover rear part along the arrow direction 1 .



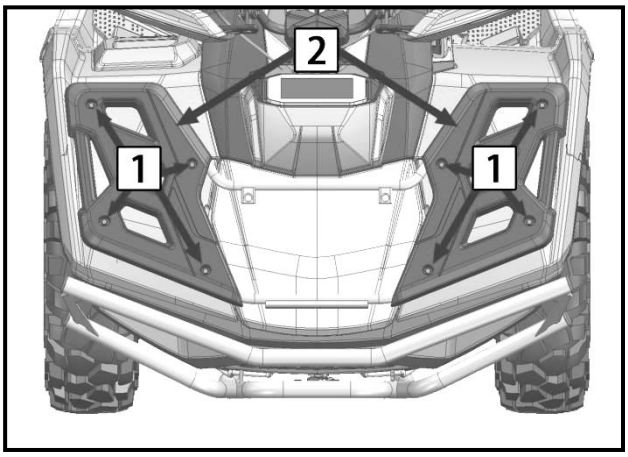
2. Pull out front middle rack cover along the arrow direction 2 .



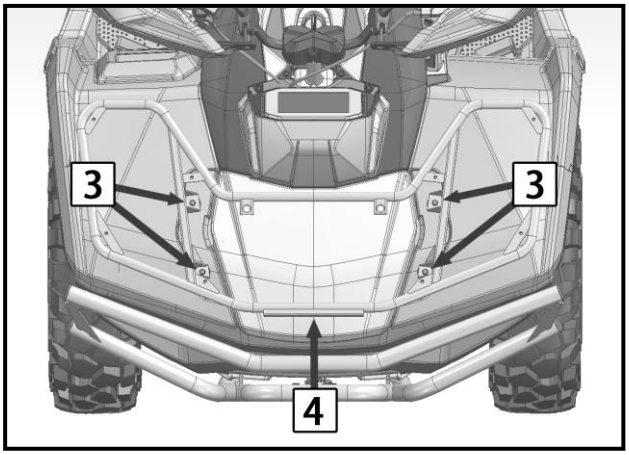
4.5 RACK COVER PLATE

4.5.1 FRONT RACK

1. Remove bolts 1 .
2. Remove front rack cover plate 2.



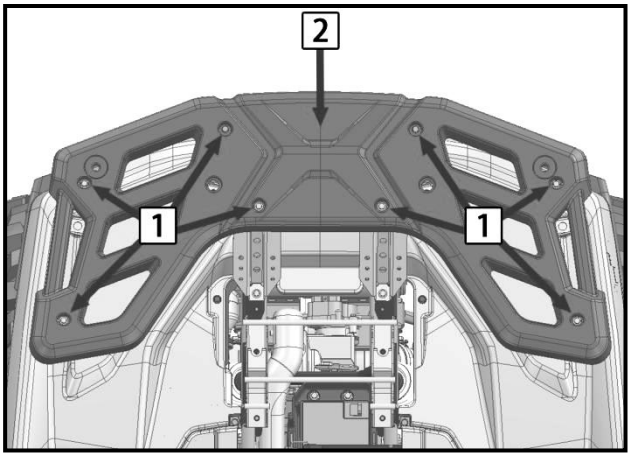
3. Remove bolts 3.
4. Remove front rack 4.



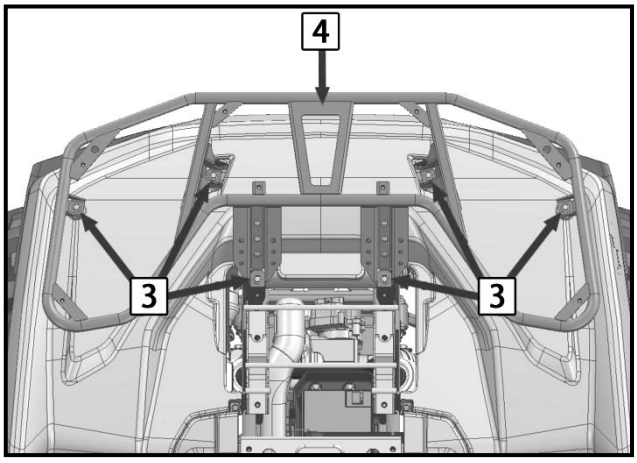
4.5.2 REAR RACK

Removal

1. Remove bolts 1 .
2. Remove rear rack cover plate 2.



3. Remove bolts 3.
4. Remove rear rack 4.



CAUTION: Safely support the box during the rest of the removal process. The box is not as stable with the shocks removed.

5. Remove the cotter pin from the hinge pin.
6. Remove the hinge pin.

CAUTION: Safely support the box during the rest of the removal process. The box is not as stable with the hinge pin removed.

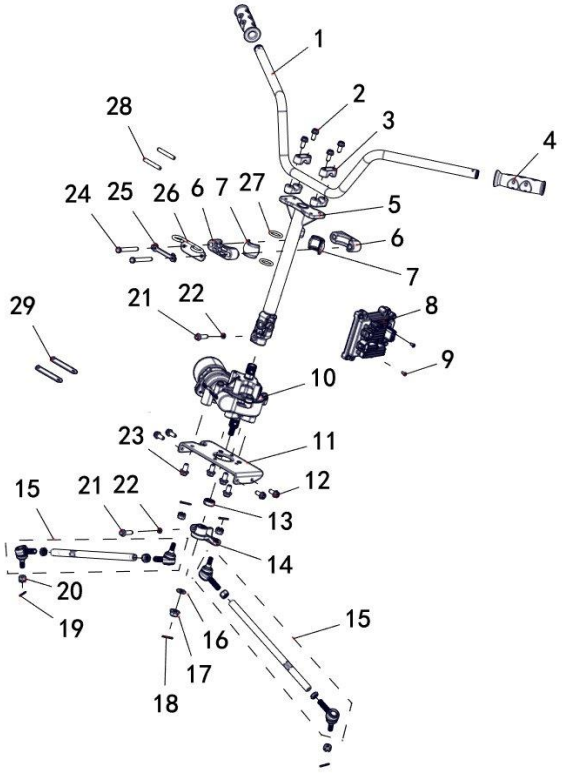
7. With the hinge pins removed, remove the box from the frame. Two people maybe needed to remove the bed from the frame.

CAUTION: Use caution when removing the box. It is recommended to have two people to carefully remove the box from the frame.

Box Installation

1. Place the box onto the frame. Align the hinges of the box with the frame.
2. Install the box hinges.
3. Secure the box hinges with the bolts.
4. With the hinges installed, decompress the box shocks and place them into the shock brackets on the frame.
5. Secure the box shocks with the shock pin.
6. Lower the box and secure the latch.
7. Connect taillight transition line to the wiring harness.

4.6 STEERING ASSEMBLY REMOVAL/INSTALLATION



1.Handlebar Assy.；	2.Bolt M8x55；	3.Handlebar Block
4.Hand Grip；	5.EPS Steering Stem Assy.；	6.Outer Bush, Steering Shaft SPH
7.Inner Bush, Steering Shaft SPHE；	8.EPS Controller；	9.Bolt M6x30
10.EPS Driver；	11.Plate, Steering Stem；	12.Bolt M8x20
13.Splines Sleeve；	14.Steering Arm；	15.Steering Rod
16.Washer 12；	17.Nut M12x1.25；	18.Cotter Pin 3x30
19.Cotter Pin 2.5x25；	20.1-Type Nut M10x1.25；	21. Bolt M8x35
22.Spring Washer,8；	23.Bolt M10x1.5x20；	24.Bolt M8x75
25.Locking Piece；	26.Linking Plate Assy.；	27.O-Ring 31.5x1.8
28.Protective Tubes	29.Rubber Cable Ties	

1. Remove Bolts ② & Handlebar Block ③, remove the Handlebar Assy. ①.
2. Remove bolt ㉑ and washer ㉒, Remove EPS Steering Stem Assy. ⑤.
3. Remove Nuts ⑳ & Cotter Pins ⑲, Remove Steering Rod ⑮.
4. Remove Bolts ⑫.
5. Remove the cotter pin ⑱, Nut ⑰, Washer ⑯, Steering Arm ⑭ & Splines Sleeve ⑬.
6. Remove Bolts ㉓,remove EPS Driver ⑩.
7. Reverse the procedure for installation.

NOTES

CHAPTER 5 FINAL DRIVE

⚠ WARNING

The parts of different types/ variants/ versions maybe un-interchangeable, even some parts have almost same appearance. Always refer to Parts Manual of each CUV model for spare parts information and service.

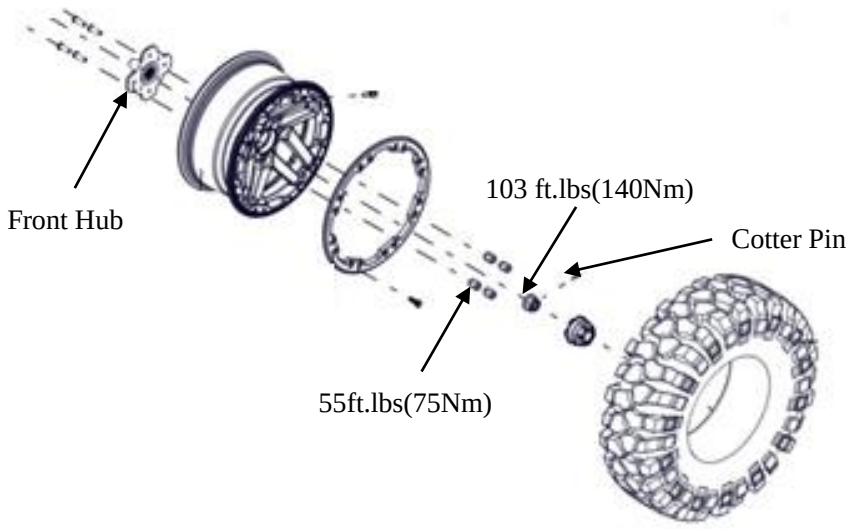
5.1 WHEEL, HUB, AND SPINDLE TORQUE TABLE
5.2 FRONT HUB EXPLODED VIEW
5.3 FRONT HUB REMOVAL/INSPECTION
5.4 FRONT HUB INSTALLATION
5.5 FRONT HUB BEARING REPLACEMENT
5.6 FRONT DRIVE AXLE REMOVAL/ INSPECTION
5.7 FRONT DRIVE AXLE INSTALLATION
5.8 FRONT DRIVE AXLE DISASSEMBLY/ INSPECTION
5.9 FRONT DRIVE AXLE ASSEMBLY
5.10 REAR HUB EXPLODED VIEW
5.11 REAR HUB AND KNUCKLE REMOVAL/INSPECTION
5.12 REAR HUB AND KNUCKLE INSTALLATION
5.13 REAR DRIVE SHAFT REMOVAL
5.14 REAR DRIVE SHAFT INSTALLATION
5.15 FRONT AXLE ASSY REMOVAL
5.16 FRONT AXLE ASSY
5.17 FRONT AXLE ASSY INSTALLATION
5.18 REAR AXLE ASSY REMOVAL
5.19 REAR AXLE ASSY
5.20 REAR AXLE ASSY INSTALLATION

5.1 WHEEL, HUB, AND SPINDLE TORQUE TABLE

Item	Specification
Front wheel Nuts	55 Ft.Lbs 75 Nm
Rear wheel Nuts	55 Ft.Lbs 75 Nm
Front Hub Nut on Spindle/ outer CV joint	103 Ft.Lbs 140 Nm
Rear Hub Retaining Nut	103Ft.Lbs 140 Nm

Refer to exploded views and text for torque values of other fasteners.
CAUTION: Locking nuts, and bolts with pre-applied locking agent should be replaced if removed. The self- locking properties of the nut or bolt are reduced or destroyed during removal.

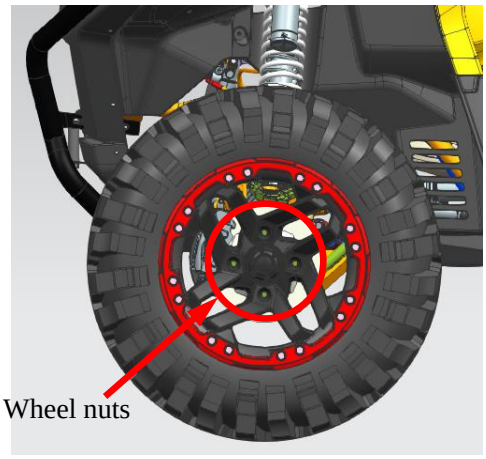
5.2 FRONT HUB EXPLODED VIEW



5.3 FRONT HUB REMOVAL/INSPECTION

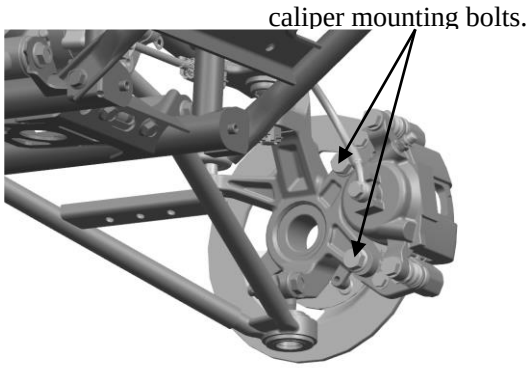
1. Position the vehicle on a level ground.Elevate the front part of the vehicle with tools. Remove wheel nuts then remove front wheel.

CAUTION: Operation must be made on the level ground during suspension maintenance. Make sure the vehicle is supported stably. Any part of body is not allowed to put under tires, in case it drops down to cause injury.



2. Remove the two brake caliper mounting bolts.

CAUTION: Do not hang the caliper by the brake line. Use wire to hang the caliper to prevent possible damage to the brake line.



3. Remove front hub nut and cotter pin.
4. Remove front hub assembly.
5. Inspect front hub for cracks or damage.Replace if any defect is found.

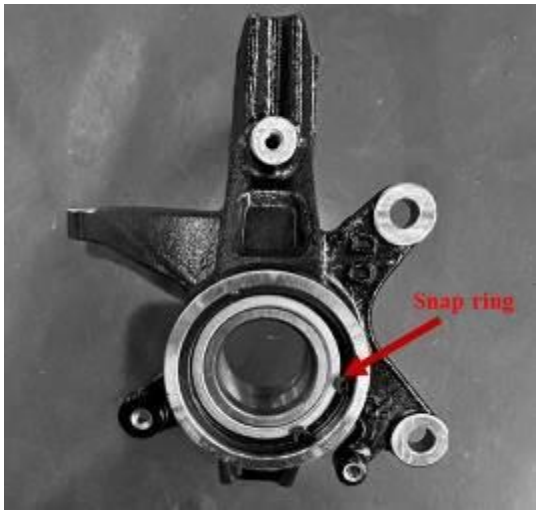
5.4 FRONT HUB INSTALLATION

1. Reverse the removal procedures for installation.
2. Install hub nut and tighten to 103 ft.lbs (140Nm).
3. Install brake caliper using new bolts. (Apply Loctite™ 243 to threads) Tighten bolts to 33 ft.lbs (45Nm).

CAUTION: New bolts have a pre-applied locking agent which is destroyed bolts upon removal. Always use new brake caliper mounting bolts upon assembly.

5.5 FRONT HUB BEARING REPLACEMENT

1. Remove outer snap ring.



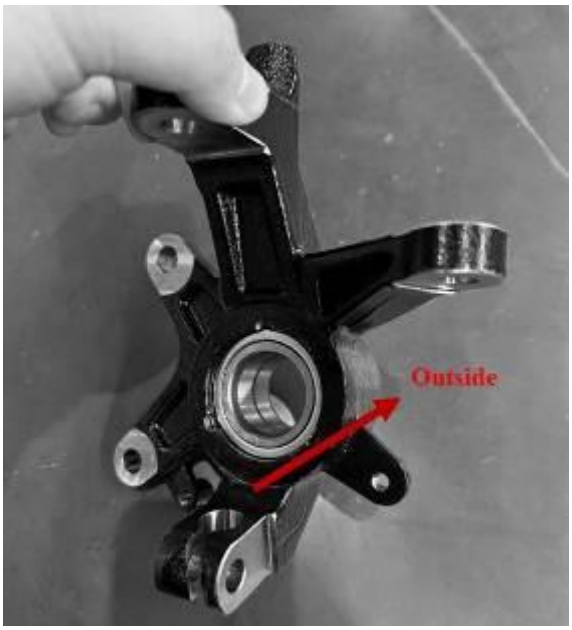
2. From the back side, tap on the outer bearing race with a drift punch in the reliefs as shown.
3. Drive bearing out evenly by tapping on outer race only. Once bearing is at bottom of casting, support casting on outer edges so bearing can be removed.

4. Inspect bearing.

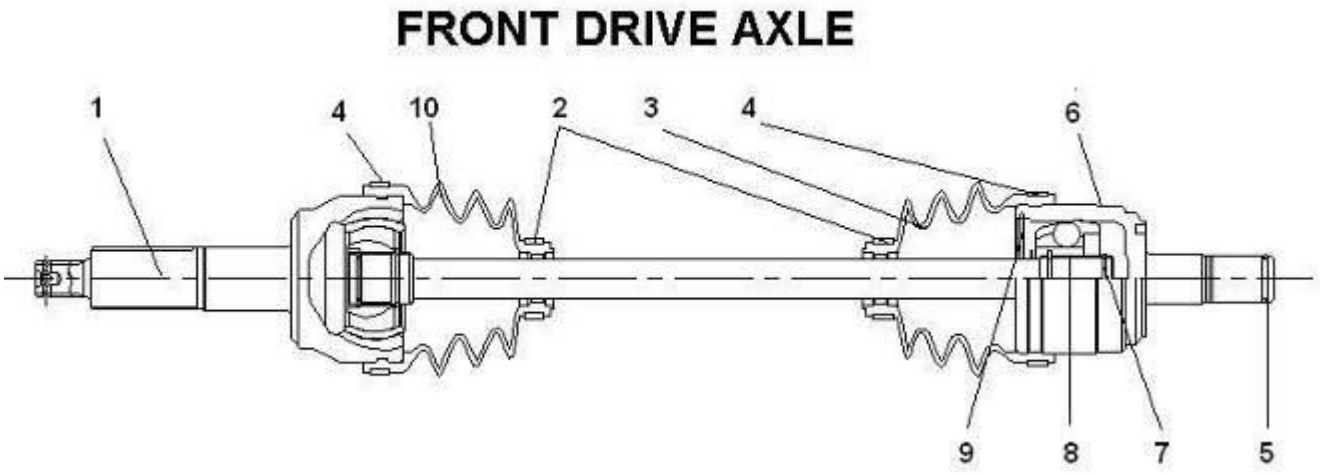
NOTE: Due to extremely close tolerances and

minimal wear, the bearings must be inspected visually, and by feel. While rotating bearings by hand, inspect for rough spots, discoloration, or corrosion. The bearings should turn smoothly and quietly, with no detectable up and down movement and minimal movement sideways between inner and outer race.

5. Inspect bearing housing for scratches, wear or damage. Replace new if damaged.

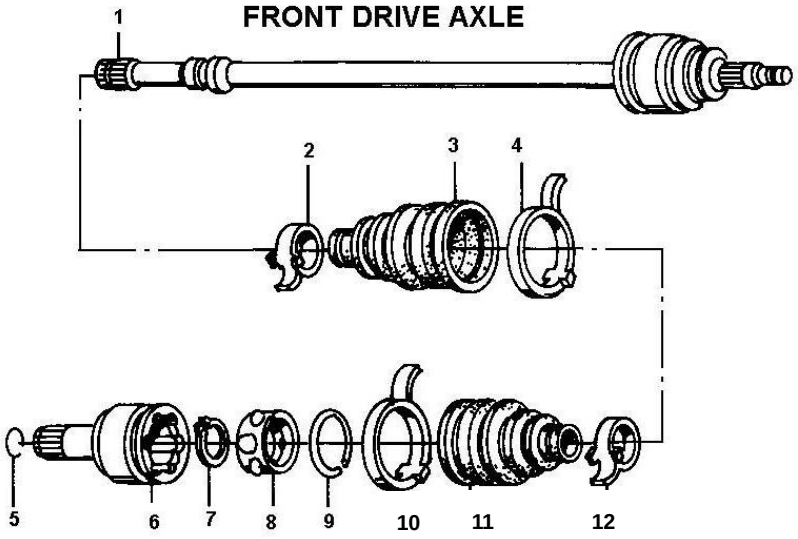


5.6 FRONT DRIVE AXLE REMOVAL/INSPECTION



NOTE: The outer CV joint cannot be disassembled or repaired, if damage or faulty the drive axle assembly must be replace.

1. Drive Axle/Outer CV Joint Assembly.
2. Boot Band “A”.
3. Outer Board Boot.
4. Boot Band “B”.
5. Stopper Ring
6. Plunging Joint
7. Circlip
8. Bearing
9. Stopper Ring

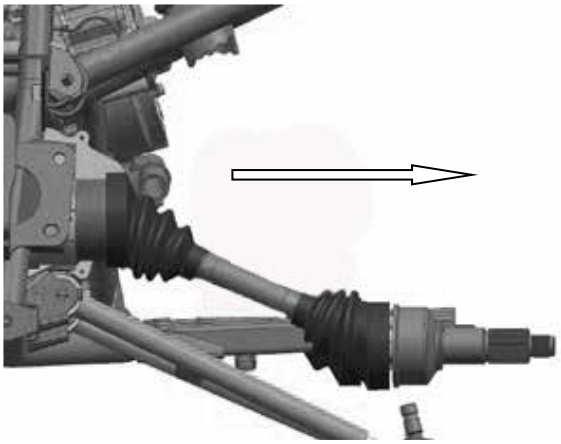


10. Boot Band “C”.
11. Inboard boot.
12. Boot Band “D”.

NOTE: Always order and replace 6 and 8 together.

REMOVAL

1. Place the vehicle on level ground and set the parking brake, Block the rear wheels so the vehicle will not roll in either direction.
2. Remove the front wheels, steering tie rods, disconnect the A arm on the ball joint end as described in this Chapter and Chapter 4.



CAUTION： To avoid damage to the front gearcase oil seal, hold the front drive shaft horizontal and straight out from the front differential during removal.

3. Hold the drive shaft straight out.
4. Place a tire lever between the inner CV joint and the differential housing, with a small piece of wood against the housing to help get "leverage" and protect the casting. "pop" the in inner CV joint out from the front gearcase.

INSPECTION

NOTE: The boots are subjected to a lot of abuse if the vehicle is ridden in rough terrain. If the boots are damage and left un-repaired, the driveshaft joints will fair prematurely by allowing the joint to be exposed to dirt, mud and moisture. This also allow the loss of critical lubrication.

1. Check the rubber boots for wear, cuts or damage and replace if necessary as described under the Disassembly / Assembly procedure in this chapter.
2. Move each end of the drive shaft in a circular motion (and also a reciprocate for inner one) and check the drive shaft joints for excessive wear or play.
3. This inner CV joint (inboard pivot joint) can be serviced if there is wear or play. The outer CV joint (outboard pivot joint) cannot be serviced if worn or damage and if necessary, the drive shaft assembly must be replaced.

5.7 FRONT DRIVE AXLE INSTALLATION

Reverse the removal procedures for installation.

5.8 FRONT DRIVE AXLE DISASSEMBLY/ INSPECTION

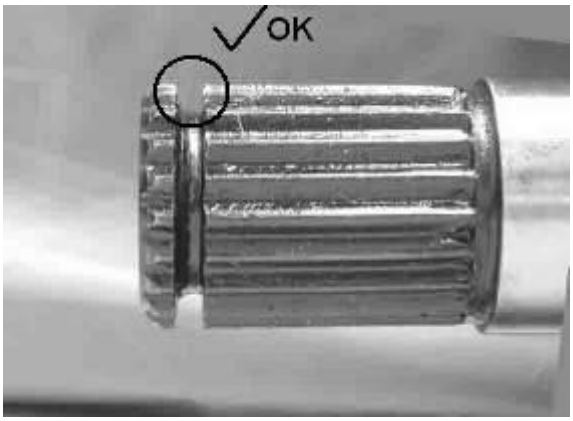
INNER CV JOINT DISASSEMBLY

NOTE: The outer CV joint cannot be disassembled or repaired, if damage or faulty the drive axle assembly must be replace.

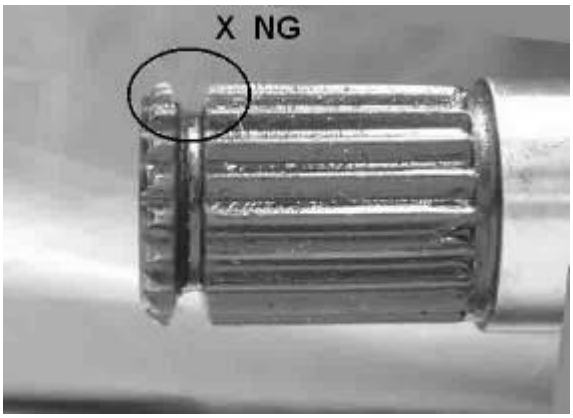
1. Open the clamps on both boot band ”A” and ”B” on the inner CV joint, then remove boot band ”B”. Discard the boot band, it cannot be reused.
2. Carefully slide the boot (A) onto the drive axle and off the inboard joint.
3. Wipe out all of the molybdenum disulfide grease within the inboard joint cavity.
4. Remove the stopper ring from the inboard joint.
5. Remove the inner CV joint.
6. Remove the circlip and slide off the bearing assembly. Be careful not to drop any of the steel balls from the bearing cage.
7. Slide the inner CV off the drive axle and discard the boot band ”A”, it cannot be reused.
8. If the outboard boot requires replacement, perform the following:
   a. Open the clamps on both boot bands ”A” and ”B” on the outer CV joint, then remove boot band ”B”. Discard the boot band, it cannot be reused.
   b. Slide the outboard boot off the drive axle and discard the boot band ”A”, it cannot be reused.
9. Inspect the drive axle as described in this chapter.

INNER CV JOINT INSPECTION

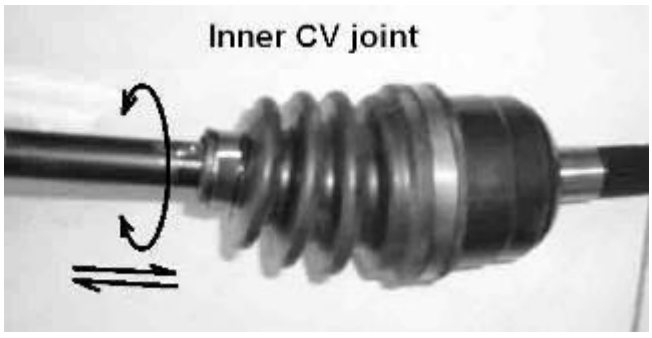
1. Clean the bearing assembly in solvent and thoroughly dry.
2. Inspect the steel balls, bearing case and the bearing race for wear or damage.
3. Check for wear or damage to the inner splines of the bearing race.
4. If necessary, disassembly the bearing assembly for further inspection. Carefully remove the steel balls from the bearing cage then remove the bearing race from the bearing cage.
5. If any of the components of the bearing assembly are damaged, replace the entire assembly as no replacement parts are available.

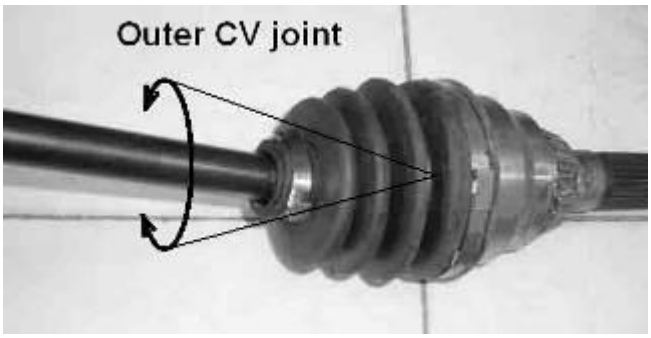


6. Clean the inner CV joint in solvent and thoroughly dry.
7. Inspect the interior of the inboard joint where the steel balls ride. Check for wear or damage and replace the joint if necessary.
8. Inspect the snap ring groove on the inboard joint for wear or damage.
9. Inspect the splines on the inner CV joint for wear or damage.
10. Check the stopper ring in the end of the inboard joint. Make sure it seats in the groove correctly, if damage the ring must be replaced. See right picture.
11. Inspect the exterior of the inner CV joint for cracks or damage, replace if necessary. Check the movement of the joint for excessive play or noise by moving the drive axle in a circular and reciprocate direction.
12. Inspect the drive axle for bending, wear or damage.
13. Inspect the inner end splines, the outer end splines and the front hub cotter pin hole for wear or damage. If any of these areas are worn or damaged, replace the drive axle.



Check the movement of the joint

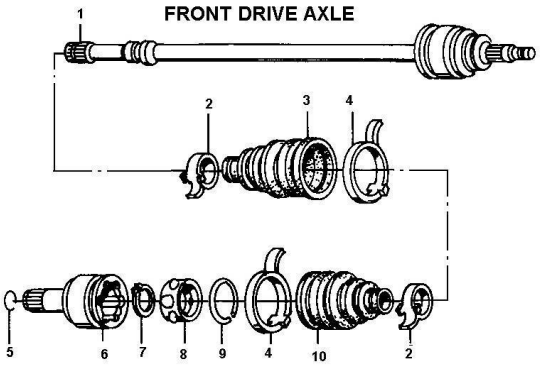




NOTE: Inner CV joint must be replaced with the bearing as an assembly.

5.9 FRONT DRIVE AXLE ASSEMBLY

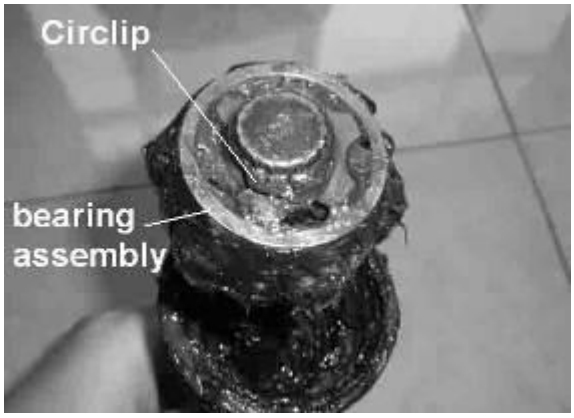
1. The rubber boots are not identical and must be installed on the correct joint. The boots are marked as follows:
   a. Inner CV joint boot : “inner”,
   b. Outer CV joint boot: “outer”.
2. If the outboard boot was removed, install a new boot onto the drive axle at this time.

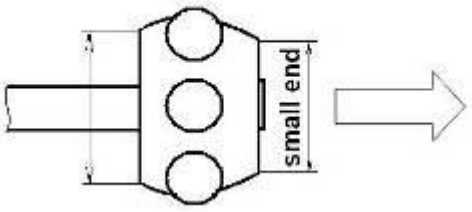


NOTE: Position the new boot bands with their tabs facing toward the rear of the vehicle.

3. Install two new small boot bands onto the drive axle.
4. Install the inboard boot and move the small boot band onto the boot. Bend down the tab on the boot band and secure the tab with the locking clips and tap them with a plastic hammer. Make sure they are locked in place.
5. If the bearing assembly was disassembled, assemble the bearing as follows:
   a. Position the bearing race and install the race into the bearing case. Align the steel ball receptacles in both parts.
   b. Install the steel balls into their receptacles in the bearing case.
   c. Pack the bearing assembly with molybdenum disulfide grease. This will help hold the steel balls in place.
6. Position the bearing assembly with the small end of the bearing going on first and install the bearing onto the drive axle.
7. Push the bearing assembly on until it stops, then install the circlip, Make sure the circlip seats correctly in the drive axle groove.
8. Apply a liberal amount of molybdenum disulfide grease to the bearing assembly. Work the grease in between the balls, the race and the case. Make sure all voids are filled with grease.
9. Apply a liberal amount of molybdenum disulfide grease to the inner surfaces of the inboard joint.
10. Install the inboard joint over the bearing assembly and install the stopper ring. Make sure it is seated correctly in the inboard joint groove.
11. After the stopper ring is in place, fill the inboard joint cavity behind the bearing assembly with additional molybdenum disulfide grease.
12. Pack each boot with the following amounts of molybdenum disulfide grease:
    a. Inboard boot:35-55grams(1.2-1.9oz.).
    b. Outboard boot:30-50grams(1.1-1.8oz.).
13. Move the inboard boot onto the inner CV joint.
14. Move the inboard joint on the drive axle.

NOTE: Position the new boot bands with their tabs



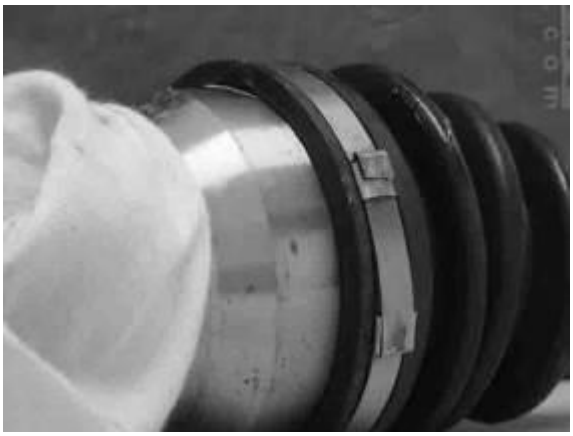


facing toward the rear of the vehicle .

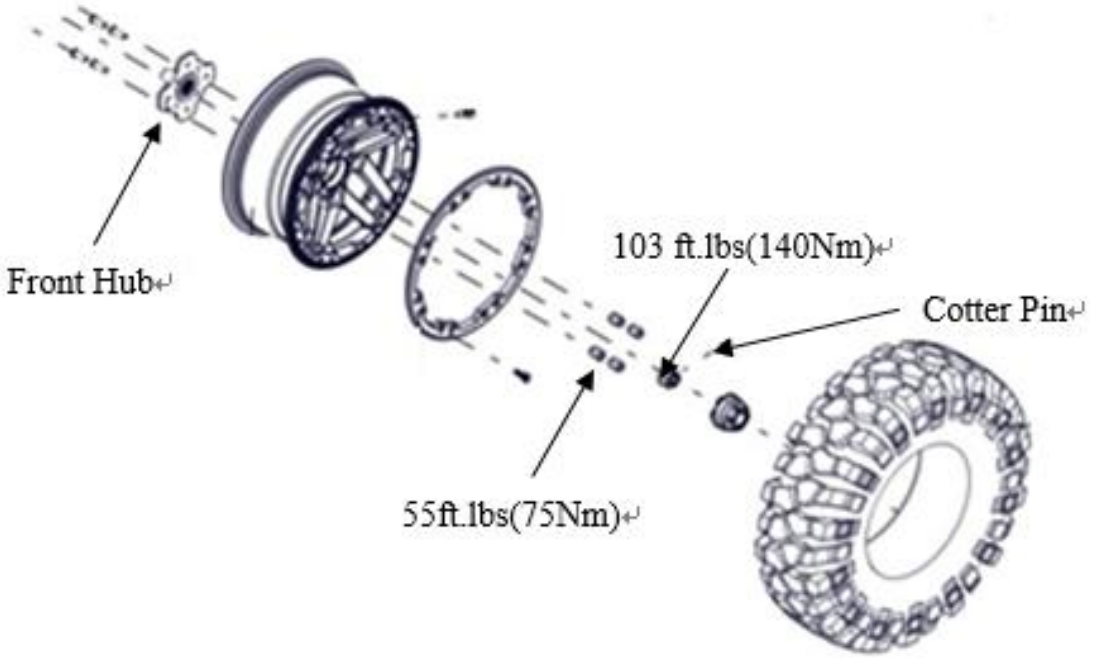
14. Move the small boot band onto the boot. Bend down the tab on the boot band and secure the tab with the locking clips and tap them with a plastic hammer. Make sure they are locked in place.
15. Install the large boot bands onto each boot.

CAUTION: It is critical to avoid undue stress on the rubber boots after the drive axle is installed and the vehicle is run. Don't twist the boot, and always set the both ends in designed position.

16. Secure all large boot bands. Bend down the tab on the boot band and secure the tab with the locking clip and tap them with a plastic hammer. Make sure they are locked in place.
17. If removed, install the stopper ring and make sure it is seated correctly in the drive axle groove.
18. Apply molybdenum disulfide grease to the end splines.

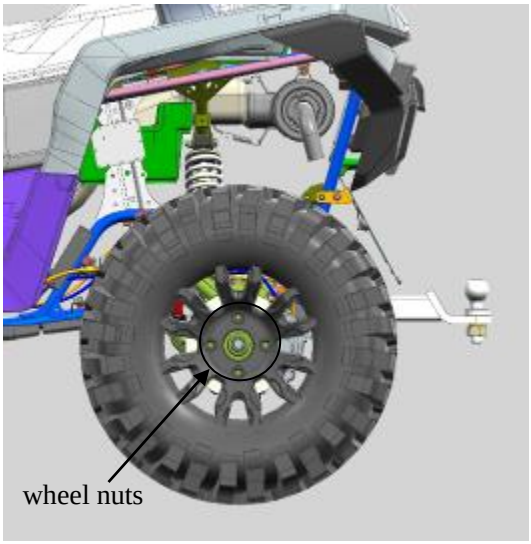


5.10 REAR HUB EXPLODED VIEW



5.11 REAR HUB AND KNUCKLE REMOVAL/INSPECTION

1. Position the vehicle on a level ground.Elevate the rear part of the vehicle with tools. Remove wheel nuts then remove rear wheel.

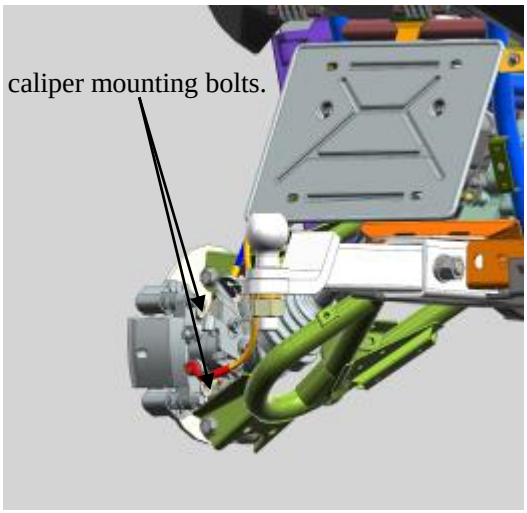


CAUTION: Serious injury may result if machine tips or falls. Be sure machine is secure before beginning this service procedure. Wear eye protection when removing bearings and seals.

2. Remove the two brake caliper mounting bolts.

CAUTION: Do not hang the caliper by the brake line. Use wire to hang the caliper to prevent possible damage to the brake line.

3. Remove front hub nut and cotter pin.
4. Remove front hub assembly.
5. Inspect rear hub for cracks or damage.Replace if any defect is found.



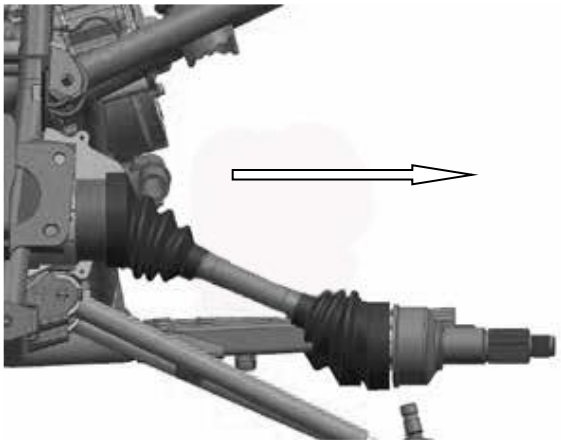
5.12 REAR HUB AND KNUCKLE INSTALLATION

1. Reverse the removal procedures for installation.
2. Install hub nut and tighten to 103 ft.lbs (140Nm).
3. Install brake caliper using new bolts. (Apply Loctite™ 243 to threads) Tighten bolts to 33 ft.lbs (45Nm).

CAUTION: New bolts have a pre-applied locking agent which is destroyed bolts upon removal. Always use new brake caliper mounting bolts upon assembly.

5.13 REAR DRIVE SHAFT REMOVAL

1. Repeat of the steps in the “REAR HUB AND KNUCKLE REMOVAL” section.
2. Slide the rear drive axle out of the knuckle by pulling the hub and knuckle assembly outward and down.
3. Pull the rear drive axle straight out of the frame. Use short sharp jerks to free the circlip from the gearcase. The circlip holds the axle in the gearcase.
4. Inspect the axle splines and CV boots for any damage.



5.14 REAR DRIVE SHAFT INSTALLATION

Reverse the removal procedures for installation.

5.15 FRONT AXLE ASSY REMOVAL

NOTE: Before inspection make sure the operation is made on a flat ground and the vehicle is jacked up.Do not put any limbs under the vehicle,in case of injury caused by sudden fall during inspection.

Removal

1.Remove bolts and spring washers①.
2.Remove nuts and bolts②.
3.Remove front axle assy③.→Fig1

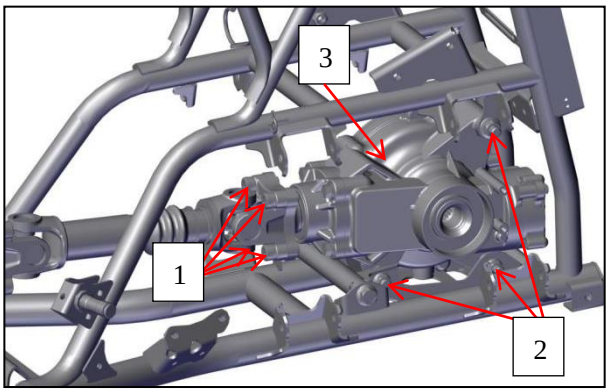
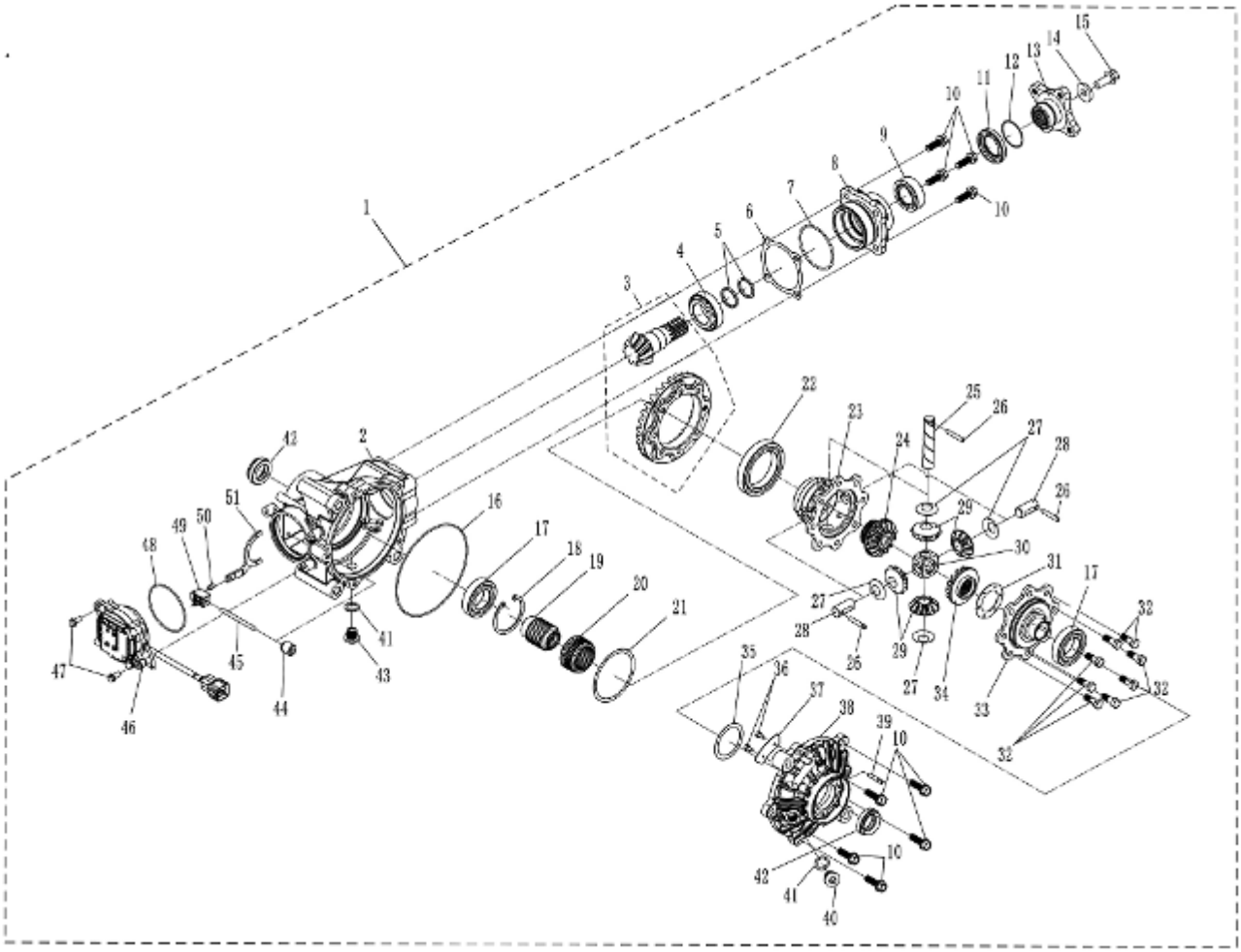


Fig 1

5.16 FRONT AXLE ASSY

5.16.1 FRONT AXLE ASSY EXPLODED VIEW

FRONT AXLE ASSY EXPLODED VIEW



1	FRONT AXLE	1	27	WEARING WASHER	4
2	CASE, FRONT GEAR CASE	1	28	PLANET GEAR SHAFT, SHORT	2
3	BEVEL GEAR ASSY, FRONT GEAR CASE	1	29	PLANET GEAR, DIFFERENTIAL	4
4	BEARING 32006	1	30	CROSS BUSHING	1
5	ADJUSTING WASHER 32X25.4	2	31	GEAR WASHER	1
6	ADJUSTING WASHER	1-3	32	BOLT M8X1X22	8
7	O-RING 55X2.5	1	33	COUPLER	1
8	BEARING SEAT	1	34	DRIVEN GEAR, DIFFERENTIAL	1
9	BEARING 33005	1	35	ADJUSTING WASHER 54.5X43	1-2
10	BOLT M8X28	9	36	SCREW, M4X8	2
11	OIL SEAL 35X50X7	1	37	OIL GUARD	1
12	O-RING 25X2	1	38	COVER, FRONT GEAR CASE	1
13	COUPLER	1	39	JOINT, BREATHER PIPE	1
14	WASHER 10X27.5X4	1	40	BOLT M14X1.25X12	1
15	BOLT M10X1.25X20	1	41	GASKET 14	2
16	O-RING 130X2	1	42	OIL SEAL 24X38X8	2
17	BEARING 6006	2	43	OIL DRAIN BOLT M14X1.25X12, MAGNETIC	1
18	CIRCLIP 55	1	44	SCREW M8X10	1
19	SPLINE SLEEVE	1	45	PIN SHAFT	1
20	SPLINE BUSHING	1	46	FRONT GEAR CASE MOTOR ASSY	1
21	ADJUSTING WASHER 79.5X68	1-2	47	BOLT M6X18	2
22	BEARING, 61911	1	48	O-RING 67.5X2	1
23	FRONT DIFFERENTIAL CASE	1	49	BLOCK ASSY	1
24	DRIVING GEAR, DIFFERENTIAL	1	50	PIN 3X5	1
25	CENTER GEAR SHAFT, DIFFERENTIAL	1	51	FORK	1
26	PIN 5X30	3			

5.16.2 FRONT AXLE ASSY DISASSEMBLY

Place a pan under the front gear case.
Remove the bolt㊵and washer㊶.
Remove the oil drain bolt㊸and washer㊶.
Drain the oil.→Fig1

Inspect the bolt and washer ,replace it with new parts if deformed ,broken or damaged.

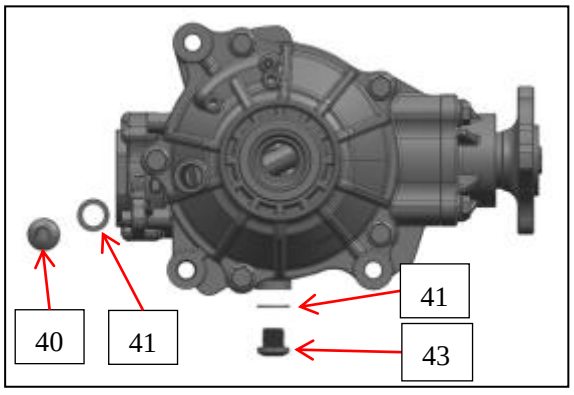


Fig 1

Remove the bolts47.
Remove the front gear case motor assy46.
Remove the O-ring48 inside.→Fig 2

Connect the motor with power and turn on motor switch to check whether it works. Replace with new parts if it doesn't.

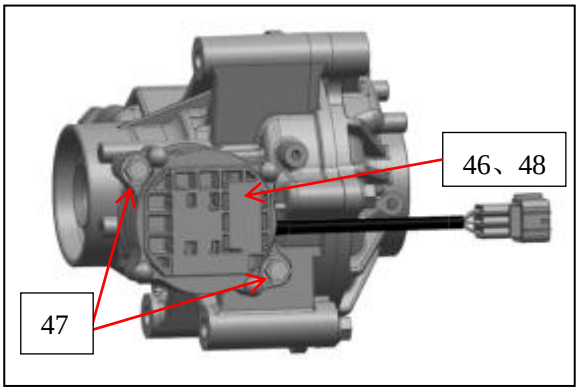


Fig 2

Remove the bolts10.
Remove the front gear case cover38→Fig 3

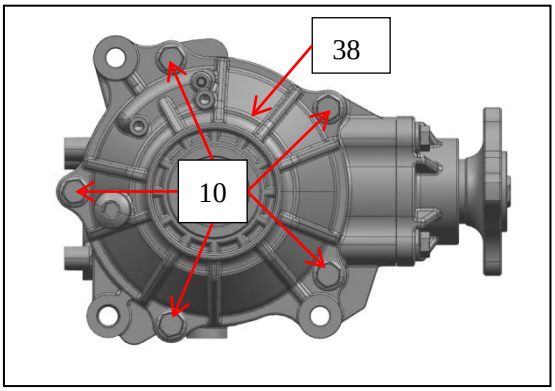


Fig 3

Remove the adjusting washer35.
Remove the bearing17.
Remove the O-ring16.
Remove the differential assy.→Fig 4

Replace the O-ring with new part.

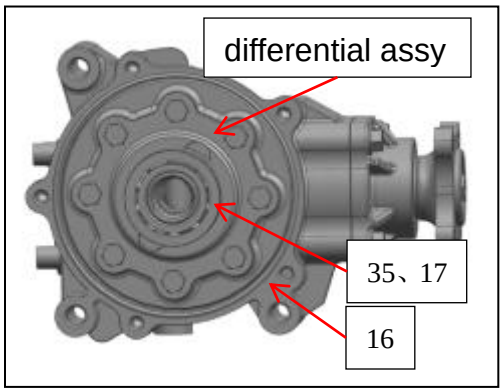


Fig 4

Remove the adjusting washer21.
Remove the screw44.→Fig 5

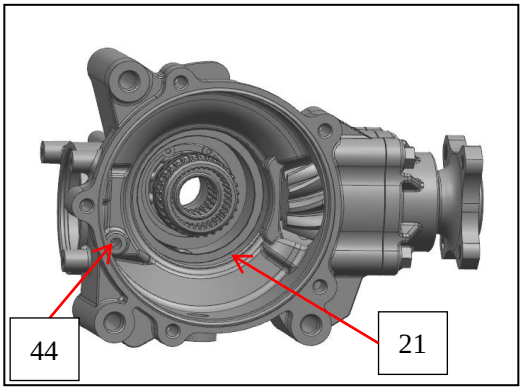


Fig 5

Remove the pin shaft㊺.
Remove the block assy㊾and pin㊿.
Remove the fork(51).→Fig 6

Inspect the block assy for break, damage, severe wear or teeth deletion. Replace it if any defect is found.

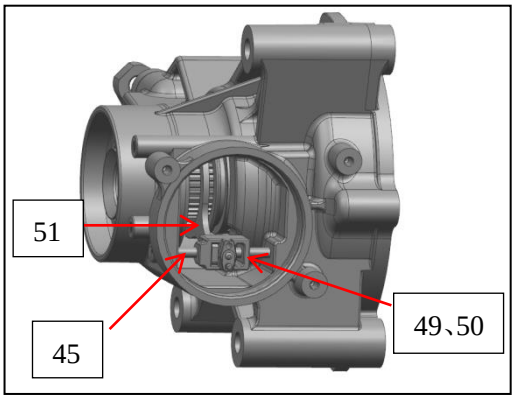


Fig 6

Remove the spline bushing⑳.→Fig 7

Inspect the spline bushing for break, damage, severe wear or teeth deletion. Replace it if any defect is found.

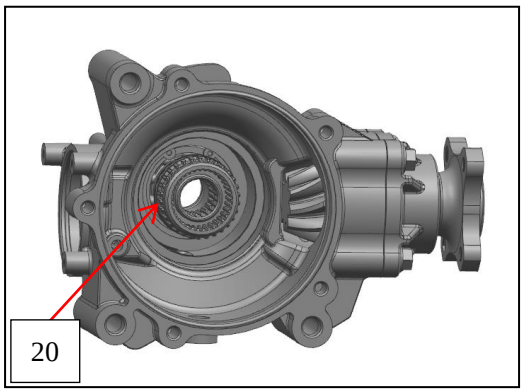


Fig 7

Remove the spline sleeve⑲.→Fig 8

Inspect the spline sleeve for break, damage, severe wear or teeth deletion. Replace it if any defect is found.

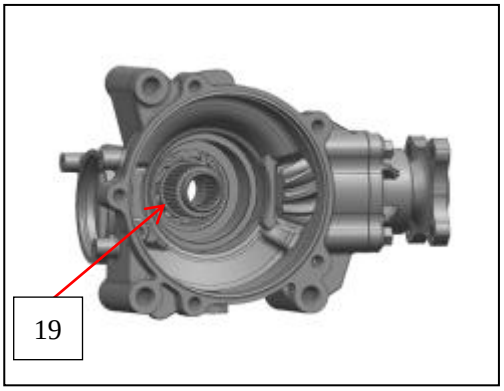


Fig 8

Inspect the bearing⑰ that the clearance is appropriate, the rotation is smooth, the raceway, steel balls, needle roller and retainer are in good condition.Replace it if any defect is found.
During replacement,remove the circlip⑱ first and then Remove the bearing with special tool→Fig 9

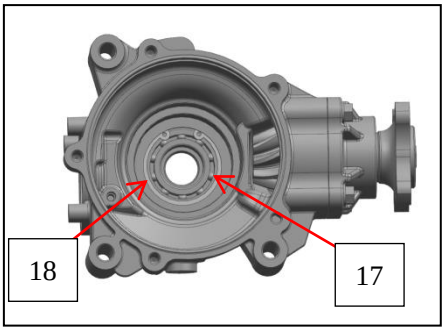


Fig 9

Remove the bolt⑮ and washer⑭.
Remove the coupler⑬.
Remove the O-ring⑫ on the coupler.→Fig 10

Inspect the washer for wear,crack or damage.Replace it if any defect is found.

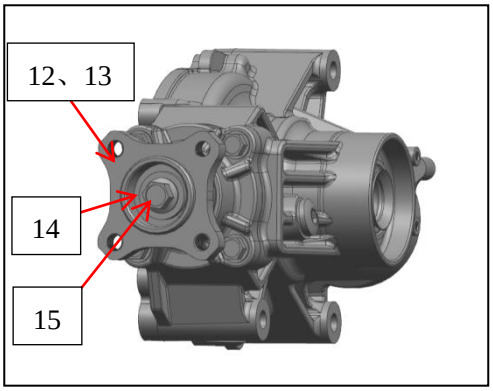


Fig 10

Remove the bolts⑩.
Remove the bearing seat assy⑧.→Fig 11

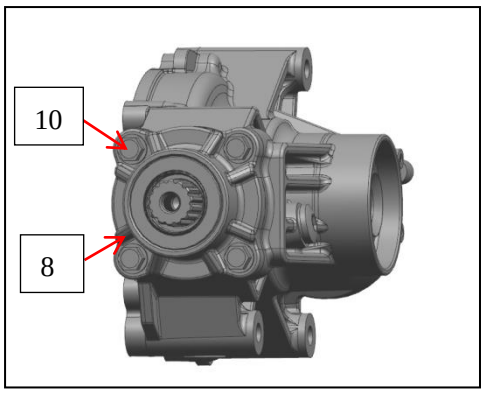


Fig 11

Remove the adjusting washer⑥.
Remove the O-ring⑦.
Remove the driving bevel gear③and bearing④ together.
Remove the adjusting washers⑤.
Remove the oil seal⑪.→Fig 12

Inspect the bearing in the same way(refer to Fig 9).Replace it if needed.

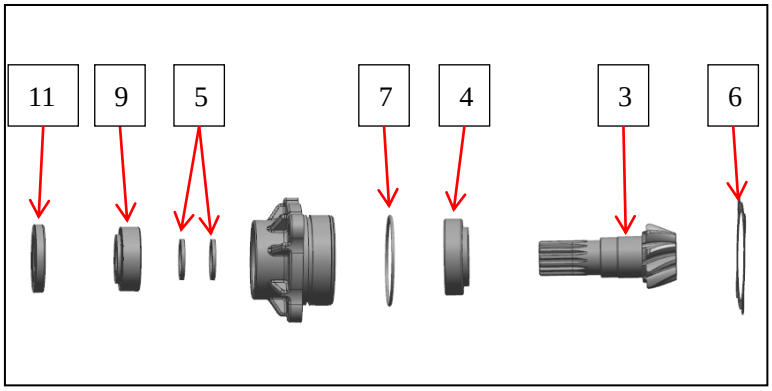


Fig 12

Remove the bolts㉜.
Remove the driven bevel gear③→Fig 13

Inspect the driven bevel gear for wear,crack or damage. Replace it if any defect is found.

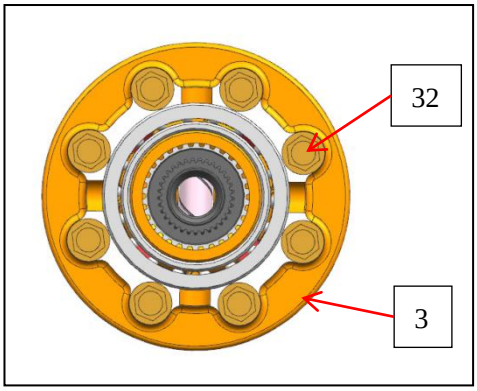


Fig 13

Remove the coupler㉝.→Fig 14

Inspect the bearing⑰in the same way.(refer to Fig 9)
Replace it if needed.

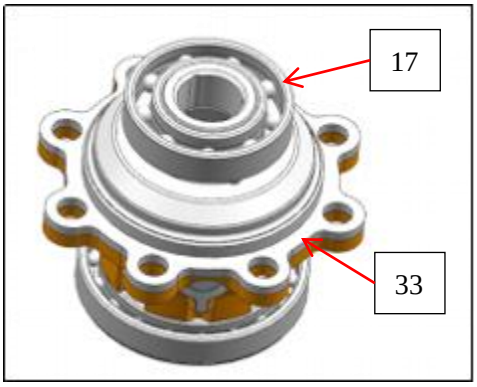


Fig 14

Remove the gear washer㉛.
Remove the driven gear(differential)㉞.→Fig 15

Inspect the bearing㉒ in the same way(refer to Fig 9).
Replace the bearing if needed.
Inspect the driven gear and the gear washer for wear,crack or damage.Replace it if any defect is found.

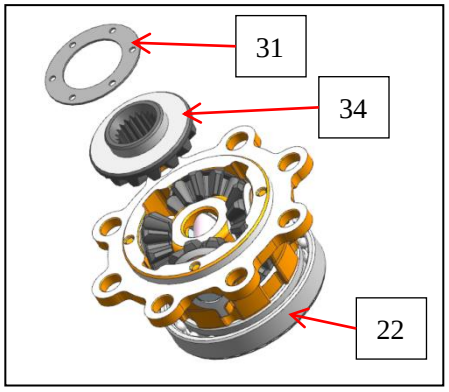


Fig 15

Remove the pins ㉖along the arrow direction with proper dowel.→Fig 16

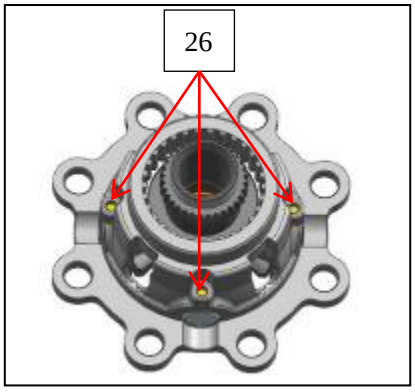


Fig 16

Remove the center gear shaft㉕.
Remove the planet gear shafts(short)㉘.→Fig 17

Inspect the gear shafts for abnormal wear or bending.
Replace if any defect is found.

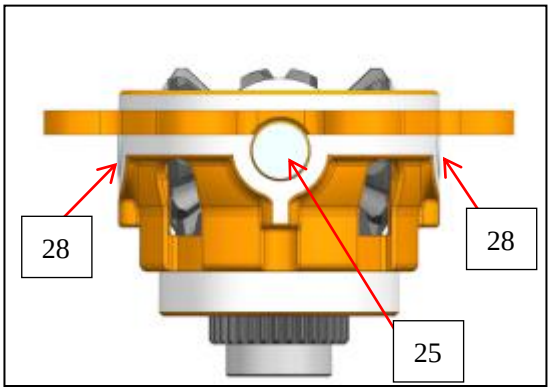


Fig 17

Remove the cross bushing㉚.
Remove the planet gears㉙.
Remove the wearing washers㉗.→Fig 18

Inspect the cross bushing for damage or abnormal wear.
Replace if any defect is found.
Inspect planet gear for cracks, damage or teeth wear.
Replace if any defect is found.
Inspect the wearing washers for cracks, damage
Replace if any defect is found.

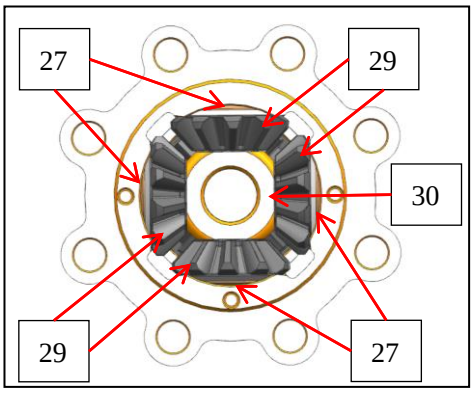


Fig 18

Remove the driving gear(differential)㉔.→Fig 19
Inspect the driving gear for wear,crack or damage.Replace it if any defect is found.
Inspect the front differential case㉓ for wear,crack or damage. Replace if it does.

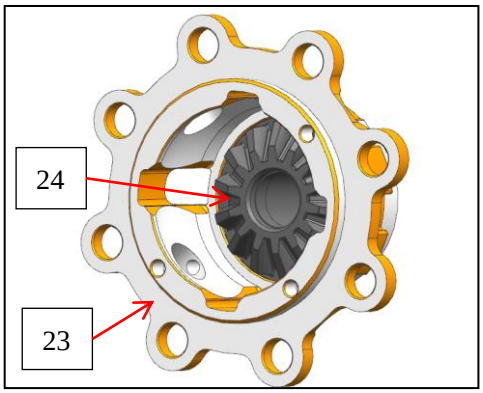


Fig 19

5.16.3 FRONT AXLE ASSY ASSEMBLY

WARING:Before installation,clean the gear case,gears and Washers with kerosene or gasoline.After cleaning,wipe with air-laid paper to make sure every part is clean before assembly.

Compress the bearing㉒ on the differential case㉓.→Fig 1

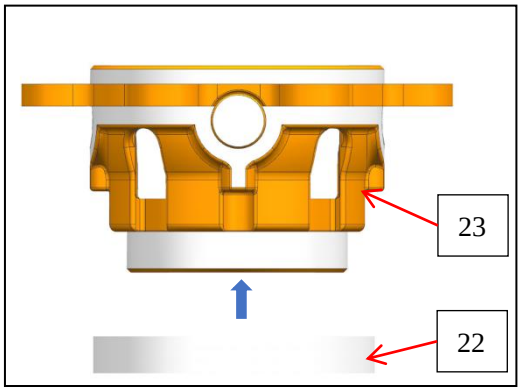


Fig 1

Install the driving gear(differential)㉔ into the differential case.→Fig 2

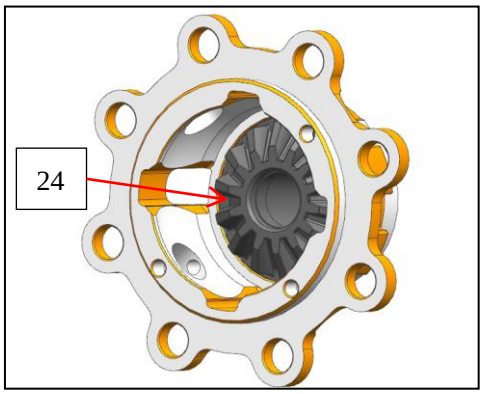


Fig 2

Install the wearing washers㉗.
Install the planet gears㉙.
Install the cross bushing㉚.→Fig 3

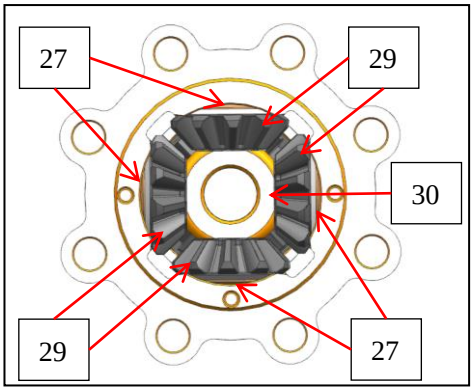


Fig 3

Install the center gear shaft㉕.
Install the planet gear shafts(short)㉘.→Fig 4

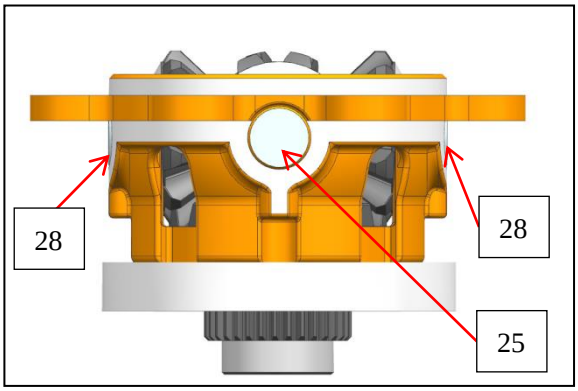


Fig 4

Install the pins㉖ through the differential case and the gear shaft.
The ends of the pins are parallel with the surface of the differential case.→Fig 5

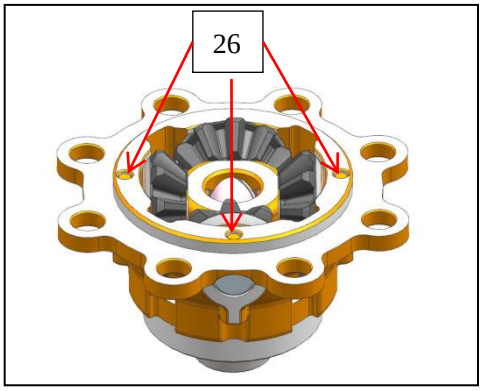


Fig 5

Install the driven gear(differential)34.
Install the gear washer31.→Fig 6

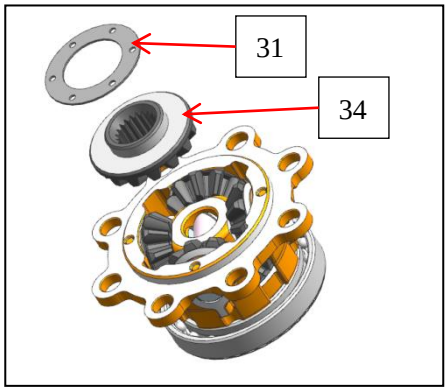


Fig 6

Compress the bearing17 onto the coupler33.→Fig 7

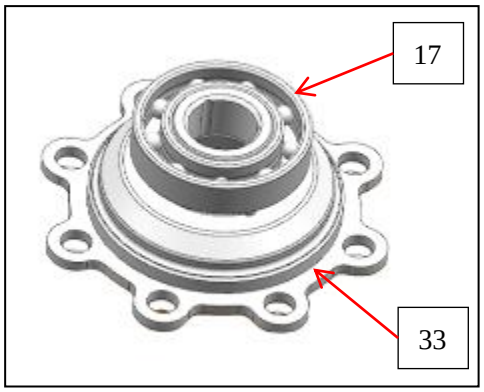


Fig 7

Assemble the driven bevel gear3,the differential case assy and the coupler assy,install bolt kits32 with thread locker. →Fig 8
Bolt torque: 43N•m
Note:Install the bolts in criss-cross way.Pre-tighten first,then tighten the bolts.

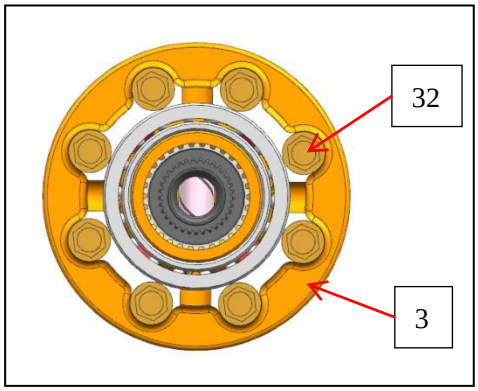


Fig 8

Compress the bearing17 into the front gear case2.
Install the circlip18 into the case.
Install the spline sleeve19 and the spline bushing20.→Fig 9
Install the adjusting washers as needed.

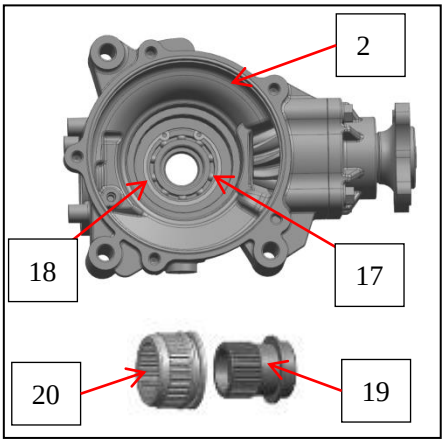


Fig 9

needed.
Install two washers[5] on the

Assemble the fork[51], the block assy[49] and pin[50].
Install the fork[51] into the spline bushing.
Install the pin shaft[45] through the front gear case,the block assy and the fork.
Install the screw and tighten the screw.→Fig 10
Screw torque: 13N•m

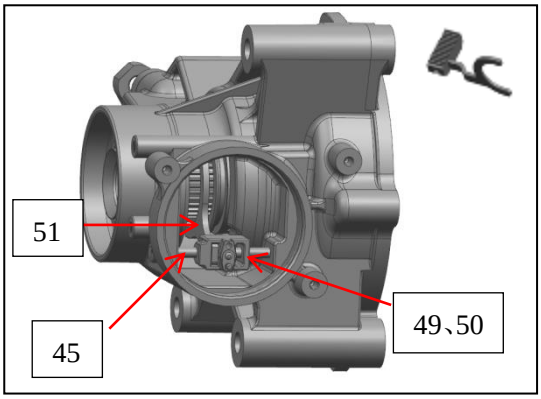


Fig 10

Install the differential assy into the front gear case.
Install the adjusting washers[35] as needed.
Install a new O-ring[16] on the front gear case.→Fig 11

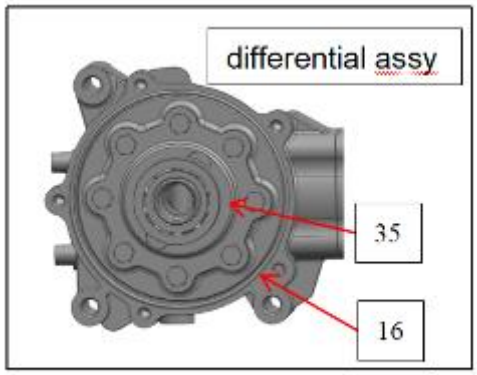


Fig 11

Assemble the front gear case and the cover[38].
Install bolts[10].→Fig 12
Bolt torque: 25N•m
Note:Install the bolts in criss-cross way.Pre-tighten first,then tighten the bolts.

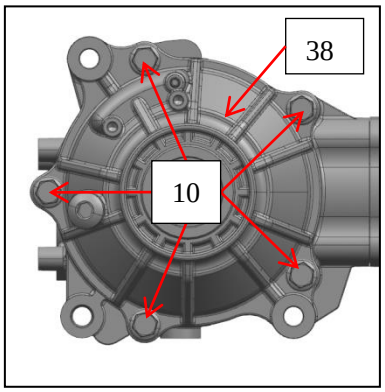


Fig 12

Compress the bearing[4] on the driving bevel gear[3].
Compress the bearing[9] in the bearing seat[8].
Install a new oil seal[11] in the bearing seat.
Install the driving bevel gear assy into the front gear case.Make sure the driving bevel gear engages with the driven bevel gear well.
Install a new O-ring[7] on the bearing seat.
Install the adjusting washers on the bearing seat as

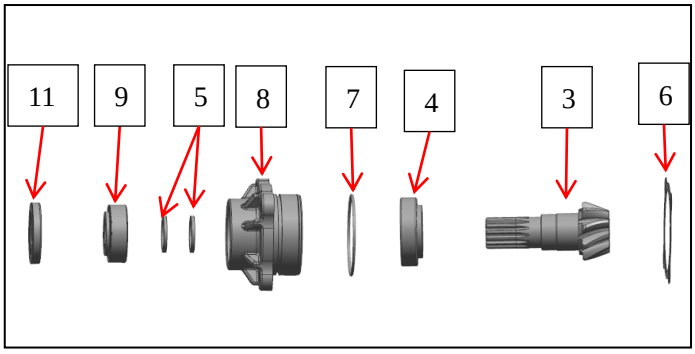


Fig 13

Install the bearing seat assy on the gear case.
Install bolts⑩→Fig 14
Bolt torque: 25N•m
Note:Install the bolts in criss-cross way.Pre-tighten first,then tighten the bolts.

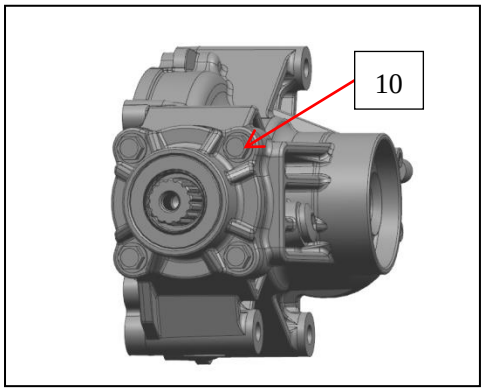


Fig 14

Install the O-ring⑫ on the coupler⑬.
Install the coupler on the driving bevel gear.
Install the washer⑭ and the bolts⑮.→Fig 15
Bolt torque: 75N•m
Note:Pre-tighten first,then tighten the bolt.

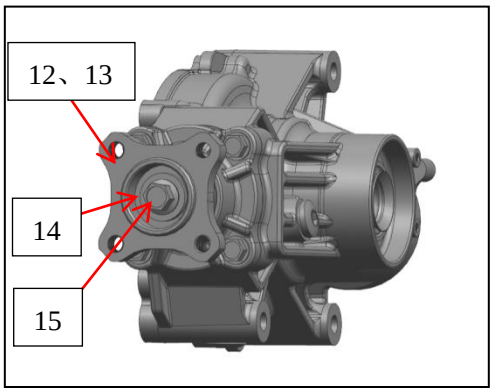


Fig 15

Before motor installation,set the motor to 2WD mode with special device or vehicle control circuit.Move the block assy along the pin shaft to 2WD position.→Fig 16

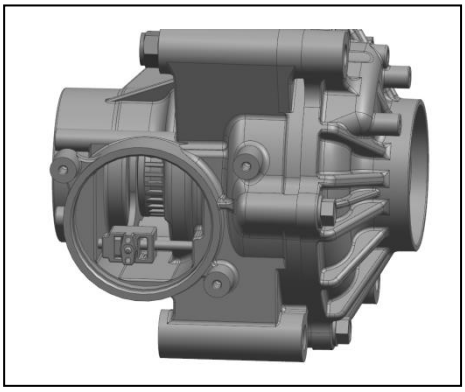


Fig 16

Install a new O-ring㊽ on the motor㊻.
Install the motor onto the front gear case.
Install bolts㊼→Fig 17
Bolt torque: 8N•m

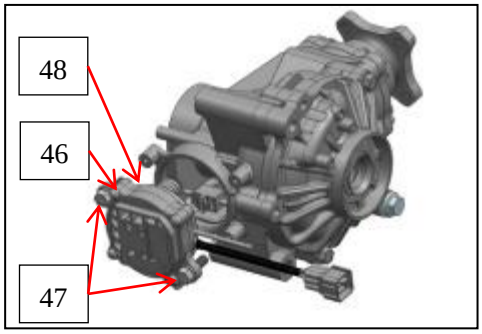


Fig 17

Front Gear Case Bevel Gear Clearance Adjustment

Follow the Fig 18 to adjusting the gear side clearance:
Install auxiliary measuring tool and tighten the bolt (M14X1.25X60). Set the dial gauge. Make sure the gauge testing point is 21mm to the center. Turn the measuring tool to read the data.
Adjusting the front gear case bevel gear teeth clearance by adding or decreasing the washers.
Dial gauge data standard: 0.17~0.34.→Fig18

No.	Name	Thickness
5	Adjusting washer 32X25.4	2.6 2.7 2.8
6	Adjusting washer	0.2 0.3
21	Adjusting washer 79.5X68	0.2 0.3 0.4 0.5
35	Adjusting washer 54.5X43	0.3 0.4 0.5

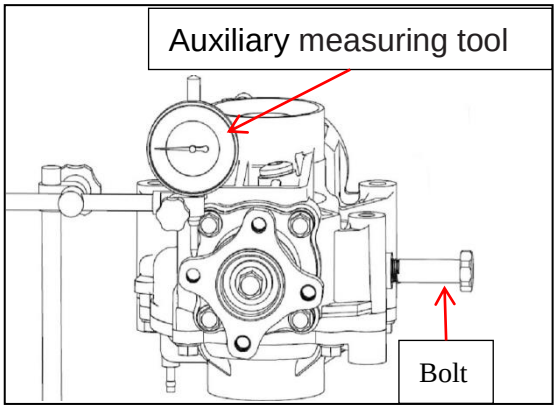


Fig 18

Install the washer41 on the oil drain bolt43.
Install the bolt.→Fig19
Bolt torque: 25N•m

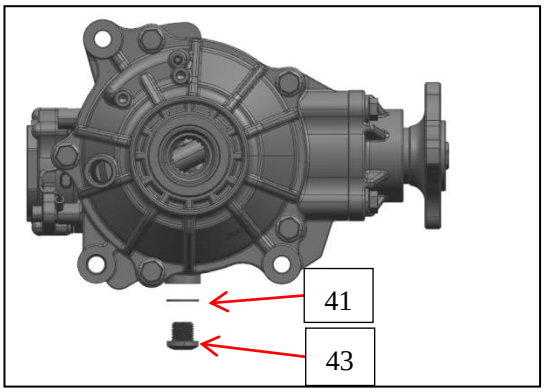


Fig 19

Fill the front gear case with oil.→Fig 20
Oil Change Capacity: 7.7 oz (0.23L)

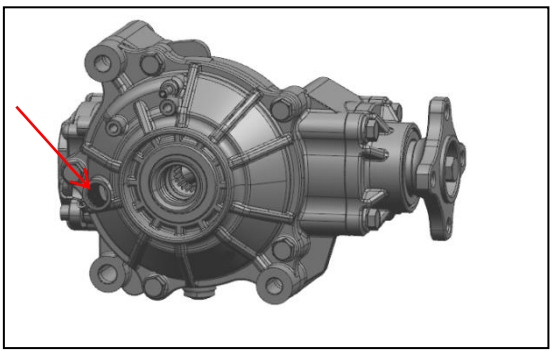


Fig 20

Install the washer41 on the bolt40.
Install the bolt.→Fig 21
Bolt torque: 25N•m

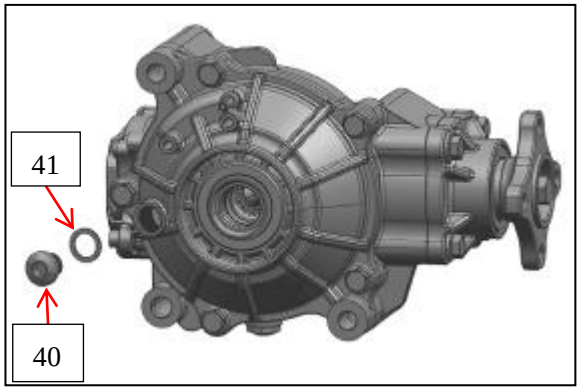


Fig 21

5.17 FRONT AXLE ASSY INSTALLATION

Install the front axle assy[1] onto the frame and align the mounting holes.
Install the bolts[2].Pre-secure with nuts
Bolt specification:M10X1.25X110
Nut specification:M10X1.25
Bolt torque: 40N•m
Install the bolts and spring washers[3].
Pre-tighten the bolts.
Bolt specification:M10X1.25X25
Spring washers specification: Φ10
Bolt torque: 45N•m
Tighten all the bolts to their specification.
Note:Install these bolt kits with thread locker.

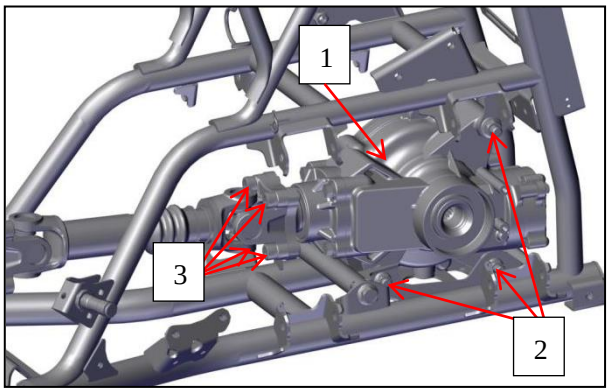


Fig 1

5.18 REAR AXLE ASSY REMOVAL

NOTE: Before inspection make sure the operation is made on a flat ground and the vehicle is jacked up.Do not put any limbs under the vehicle,in case of injury caused by sudden fall during inspection.

Removal

1.Remove bolts and spring washers①.
2.Remove nuts and bolts②.
3.Remove rear axle assy③.→Fig1

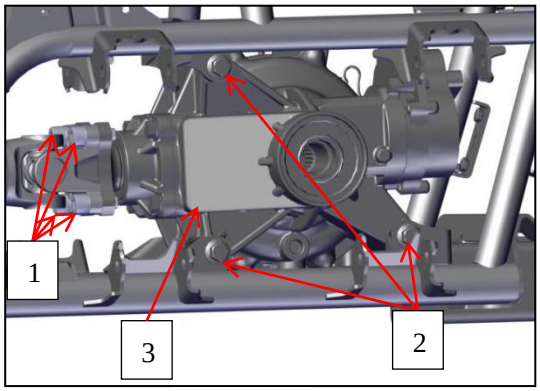
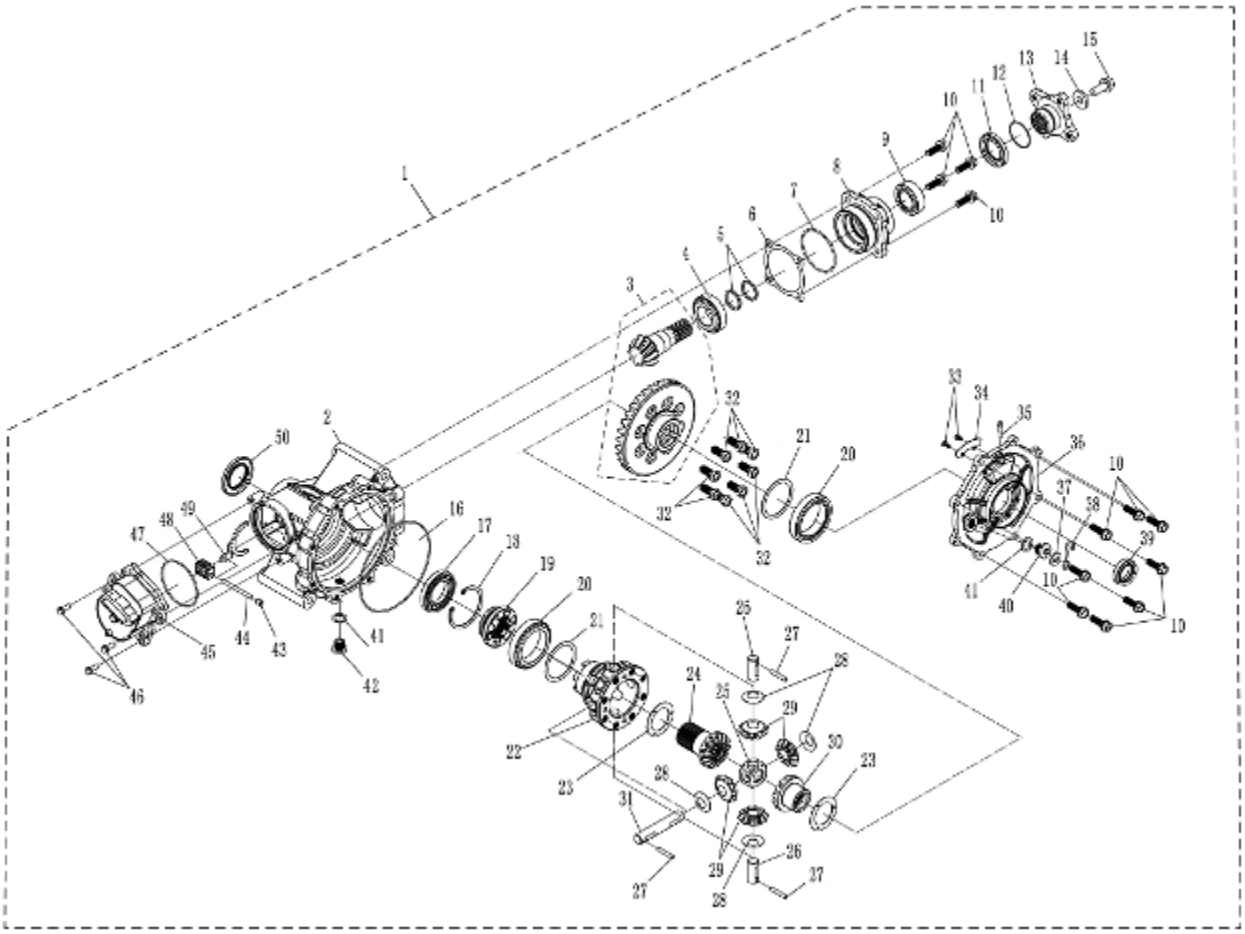


Fig 1

5.19 REAR AXLE ASSY

5.19.1 REAR AXLE ASSY EXPLODED VIEW

REAR AXLE ASSY EXPLODED VIEW



1	REAR AXLE	1	26	PLANET GEAR SHAFT, SHORT	2
2	CASE, REAR GEAR CASE	1	27	PIN 5X30	3
3	BEVEL GEAR ASSY,REAR GEAR CASE	1	28	WEARING WASHER	4
4	BEARING 32006	1	29	PLANET GEAR	4
5	ADJUSTING WASHER 32X25.4	2	30	SHAFT GEAR, RH	1
6	ADJUSTING WASHER	1	31	PLANET GEAR AXLE	1
7	O-RING 55X2.5	1	32	BOLT M10X1.25X22	8
8	BEARING SEAT	1	33	SCREW M4X8	2
9	BEARING 33005	1	34	OIL BAFFLE	1
10	BOLT M8X28	12	35	JOINT, BREATHER PIPE	1
11	OIL SEAL 35X50X7	1	36	COVER, REAR GEAR CASE	1
12	O-RING 25X2	1	37	WASHER 8	1
13	COUPLER	1	38	CLIP, REAR PARKING CABLE	1
14	WASHER 13X27.5X4	1	39	OIL SEAL 24X38X8	1
15	BOLT M12X1.25X25	1	40	BOLT M14X1.25X12	1
16	O-RING 141X2.4	1	41	GASKET 14	2
17	BEARING 16007	1	42	OIL DRAIN BOLT M14X1.25X12, MAGNETIC	1
18	CIRCLIP FOR HOLE 62	1	43	SCREW M8X10	1
19	RECTANGULAR SLEEVE	1	44	PIN SHAFT	1
20	BEARING 32910	2	45	MOTOR ASSY, FRONT GEAR CASE	1
21	ADJUSTING WASHER 61X50.5	2	46	BOLT M6X18	3
22	DIFFERENTIAL HOUSING	1	47	O-RING 67.5X2	1
23	GEAR WASHER 51.5X35.3	2	48	RACK	1
24	GEAR, LH SHAFT	1	49	SHIFT FORK	1
25	CROSS BUSHING	1	50	OIL SEAL 35X58X5	1

5.19.2 REAR AXLE ASSY DISASSEMBLY

Place a pan under the rear gear case.
Remove the bolt㊵and washer㊶.
Remove the oil drain bolt㊷and washer㊶.
Drain the oil.→Fig1

Inspect the bolt and washer ,replace it with new parts if deformed ,broken or damaged.

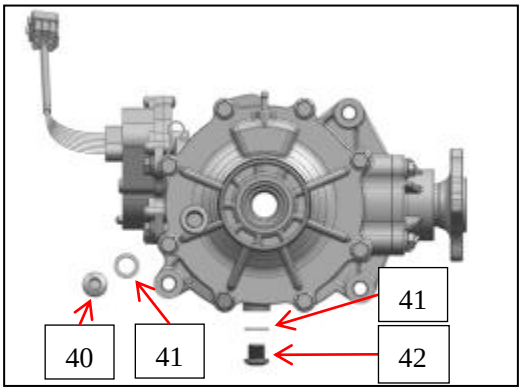


Fig 1

Remove the bolts㊻.
Remove the front gear case motor assy㊺.
Remove the O-ring㊼ inside.→Fig 2

Connect the motor with power and turn on motor switch to check whether it works. Replace with new parts if it doesn't.
Inspect the rear gear case motor output gear for damage or teeth wear.Replace it if any defect is found.

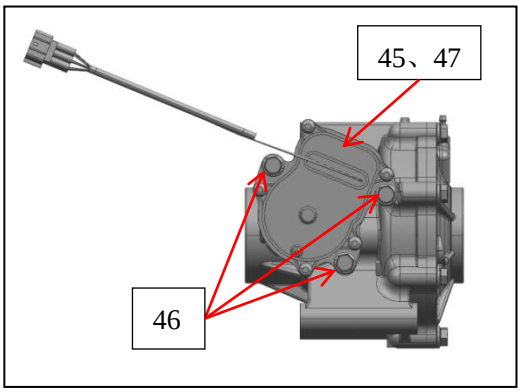


Fig 2

Remove the bolts⑩ and washer㊲.
Remove the clip㊳.
Remove the rear gear case cover㊱.→Fig 3

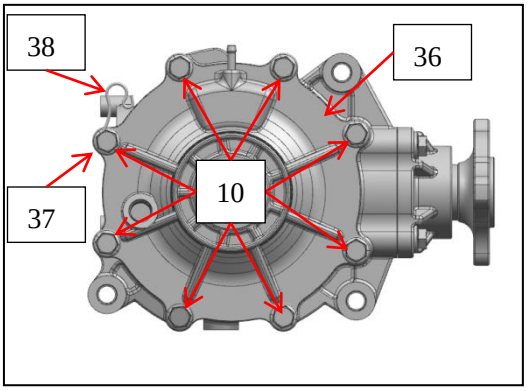


Fig 3

Remove the bearing⑳.
Remove the adjusting washer㉑.
Remove the O-ring⑯.
Remove the differential assy.→Fig 4

Replace the O-ring with new part.

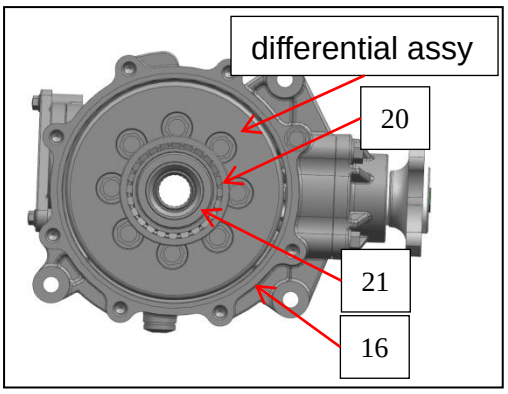


Fig 4

Remove the bolt⑮ and washer⑭.
Remove the coupler⑬.
Remove the O-ring⑫ on the coupler.→Fig 5

Inspect the washer for wear,crack or damage.Replace it if any defect is found.

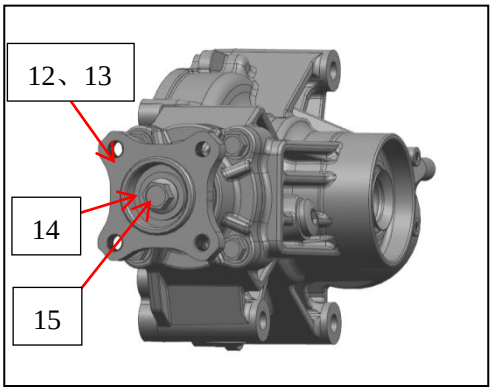


Fig 5

Remove the bolts⑩.
Remove the bearing seat assy⑧.→Fig 6

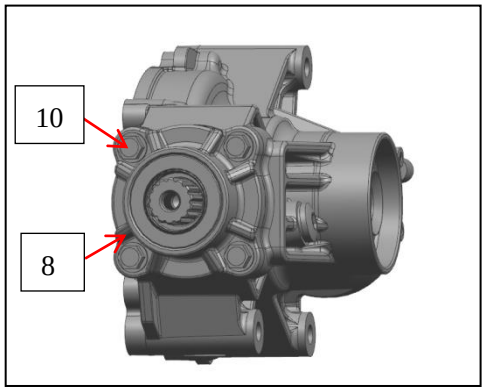


Fig 6

Remove the adjusting washer⑥.
Remove the O-ring⑦.
Remove the driving bevel gear③and bearing④together.
Remove the adjusting washers⑤.
Remove the oil seal⑪.→Fig 7

Inspect the bearing in the same way(refer to Fig 10).
Replace it if needed.

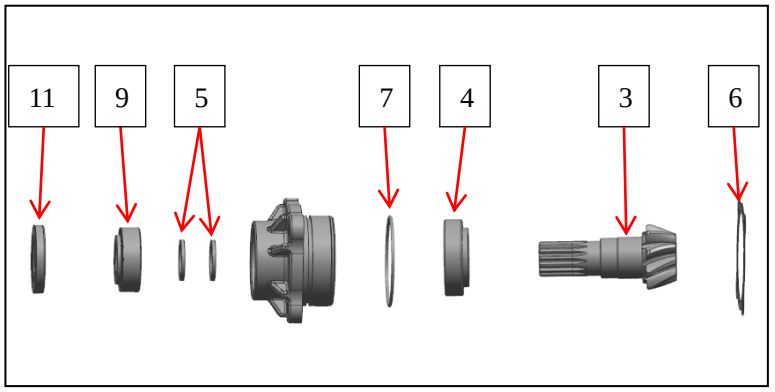


Fig 7

Remove the bolts㉜.
Remove the driven bevel gear③→Fig 8

Inspect the driven bevel gear for wear,crack or damage.
Replace it if any defect is found.

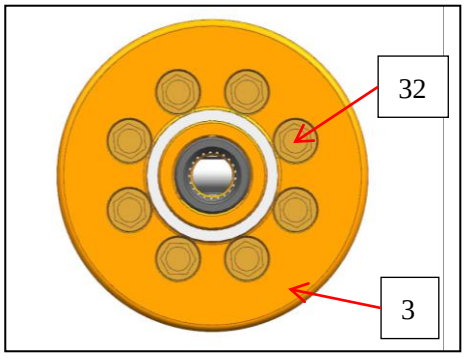


Fig 8

Remove the gear washer㉓.
Remove the right shaft gear㉚.→Fig 9

Inspect the right shaft gear and the gear washer for wear,crack or damage.Replace it if any defect is found.

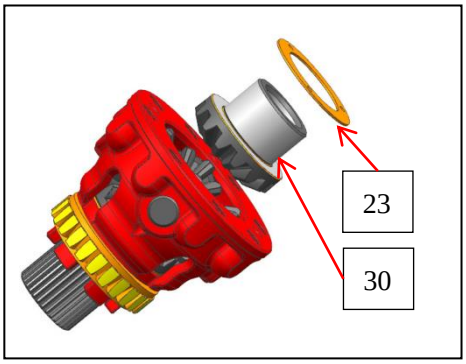


Fig 9

Remove the bearing⑳.
Remove the adjusting washer㉑.→Fig 10

Inspect the bearing that the clearance is appropriate, the rotation is smooth, the raceway, steel balls, needle roller and retainer are in good condition.Replace it if any defect is found.
Inspect the gear washer for wear,crack or damage.Replace it if any defect is found.

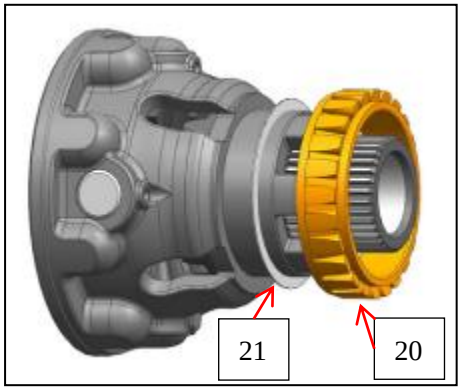


Fig 10

Remove the pins㉗ along the arrow direction with proper dowel.→Fig 11

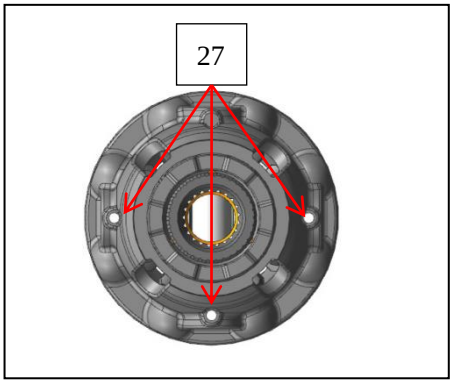


Fig 11

Remove the center gear shaft㉛.
Remove the planet gear shafts(short)㉖.→Fig 12

Inspect the gear shafts for abnormal wear or bending.
Replace if any defect is found.

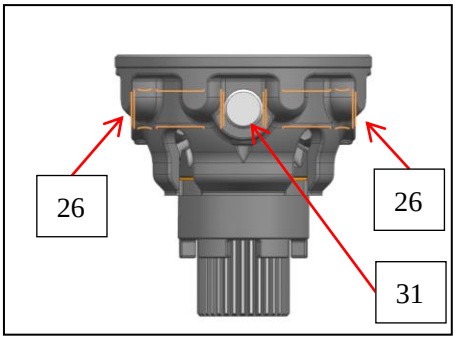


Fig 12

Remove the cross bushing㉕.
Remove the planet gears㉙.
Remove the wearing washers㉘.→Fig 13

Inspect the cross bushing for damage or abnormal wear.
Replace if any defect is found.
Inspect planet gear for cracks, damage or teeth wear.
Replace if any defect is found.
Inspect the wearing washers for cracks, damage
Replace if any defect is found.

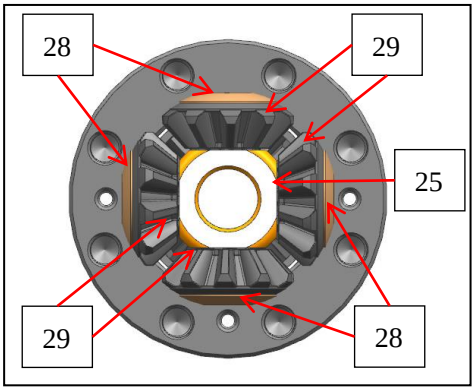


Fig 13

Remove the left shaft gear㉔.
Remove the gear washer㉓.→Fig 14

Inspect the left shaft gear for wear,crack or damage.Replace it if any defect is found.

Inspect the rear differential housing㉒ for wear,crack or damage. Replace if it does.

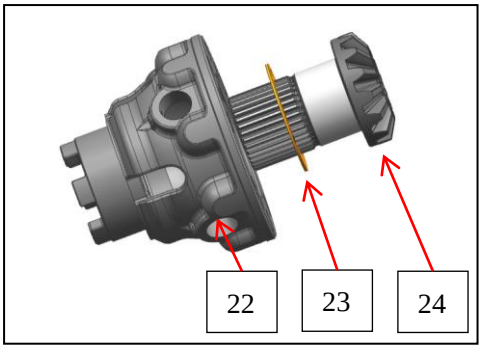


Fig 14

Remove the screw㊸.→Fig 15

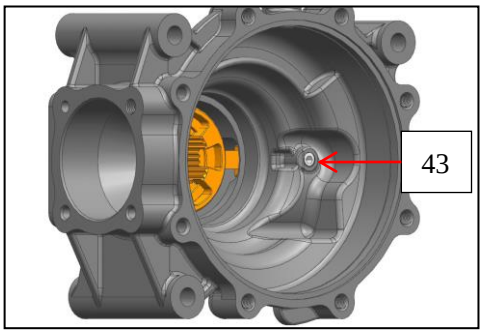


Fig 15

Remove the pin shaft㊹.
Remove the rack㊽.
Remove the fork㊾.→Fig 16

Inspect the rack for break, damage, severe wear or teeth deletion. Replace it if any defect is found.

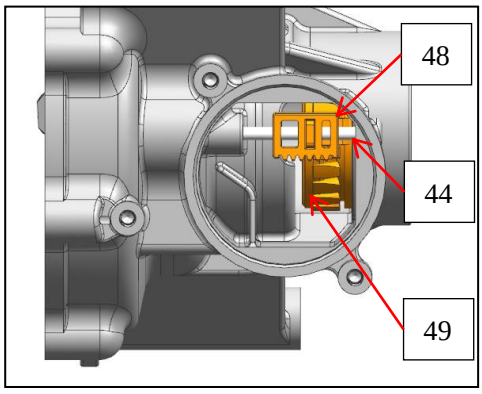


Fig 16

Remove the rectangular sleeve⑲.→Fig 17

Inspect the rack for break, damage, severe wear or teeth deletion. Replace it if any defect is found.

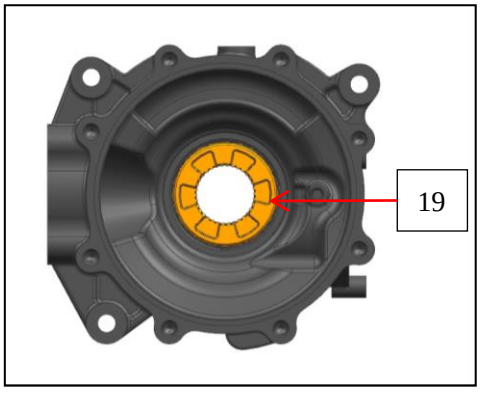


Fig 17

5.19.3 REAR AXLE ASSY ASSEMBLY

WARING:Before installation,clean the gear case,gears and Washers with kerosene or gasoline.After cleaning,wipe with air-laid paper to make sure every part is clean before assembly.

Compress the bearing17 into the rear gear case2.
Install the circlip18 into the case.
Install the rectangular sleeve19.→Fig 1

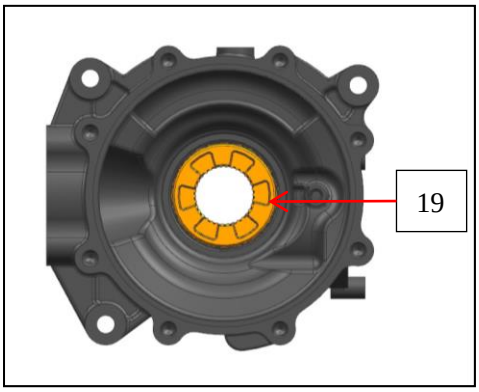


Fig 1

Install the fork49 on the rectangular sleeve.
Install the rack48.
Install the pin shaft44 through the rear gear case,the rack and the fork.→Fig 2

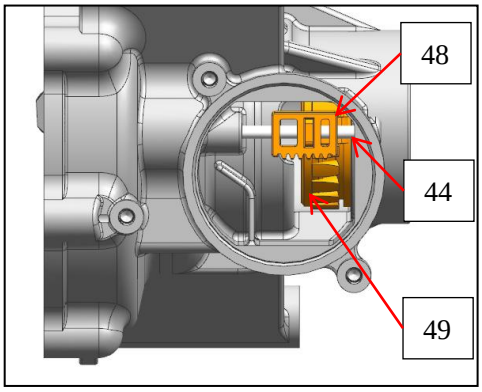


Fig 2

Install the screw and tighten the screw.→Fig 3
Screw torque: 13N•m

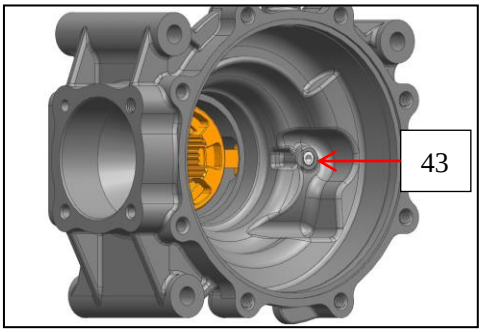


Fig 3

Install the washer23 onto the left shaft gear24.
Install the left shaft gear into the differential housing22.
→Fig 4

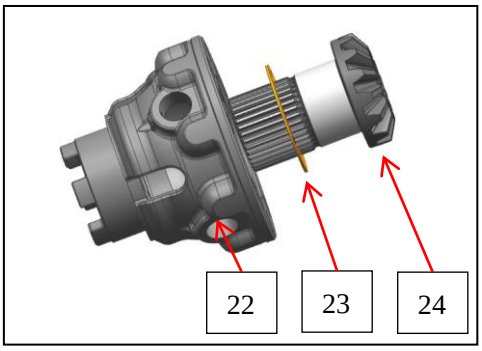


Fig 4

Install the wearing washers㉘.
Install the planet gears㉙.
Install the cross bushing㉕.→Fig 5

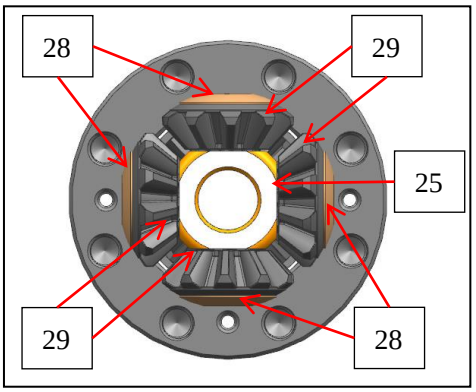


Fig 5

Install the center gear shaft㉛.
Install the planet gear shafts(short)㉖.→Fig 6

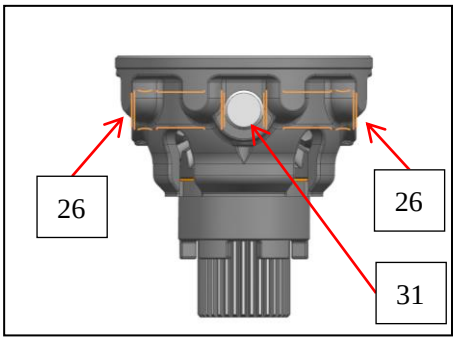


Fig 6

Install the pins㉗ through the differential housing and the gear shaft.
The ends of the pins are parallel with the surface of the differential case.→Fig 7

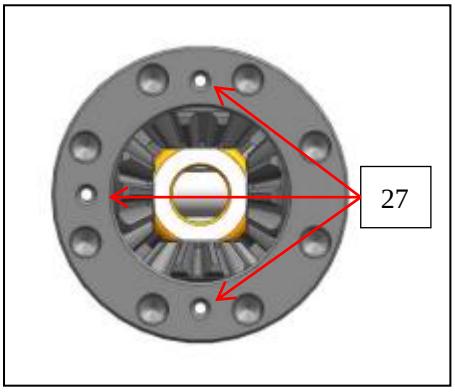


Fig 7

Install the the right shaft gear㉚.
Install the gear washer㉓.→Fig 8

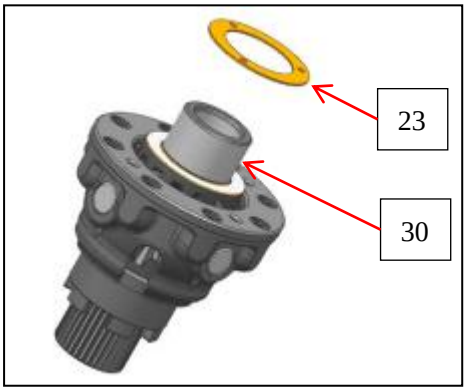


Fig 8

Assemble the driven bevel gear[3] and the differential housing assy,install bolt kits[32] with thread locker. →Fig 9
Bolt torque: 60N•m
Note:Install the bolts in criss-cross way.Pre-tighten first, then tighten the bolts.

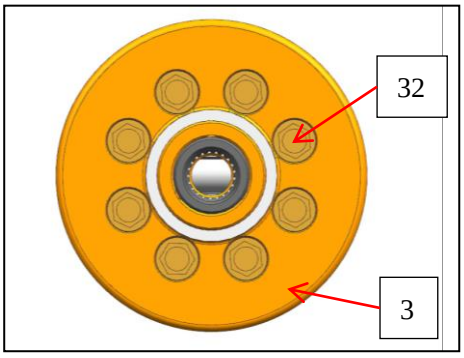


Fig 9

Install the adjusting washer[21].
Install the bearing[20] on the differential housing.→Fig 10

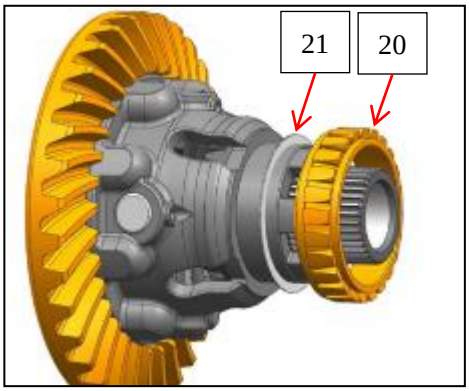


Fig 10

Install the differential assy into the rear gear case.
Install the adjusting washer[21].
Install the bearing[20].→Fig 11

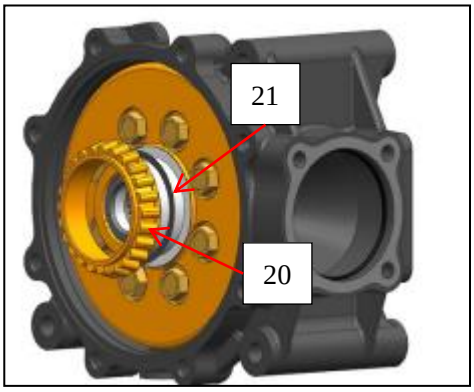


Fig 11

Assemble the rear gear case and the cover[36].
Install bolts[10].→Fig 12
Bolt torque: 25N•m
Note:Install the bolts in criss-cross way.Pre-tighten first, then tighten the bolts.
The washer[37] and the clip[38] are installed in the proper mounting point.

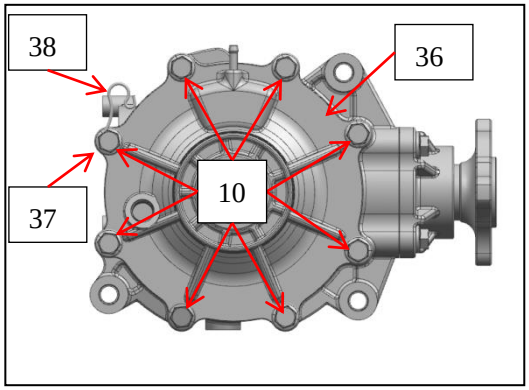


Fig 12

Compress the bearing[4] on the driving bevel gear[3].
Compress the bearing[9] in the bearing seat[8].
Install a new oil seal[11] in the bearing seat.
Install the driving bevel gear assy into the rear gear case.Make sure the driving bevel gear engages with the driven bevel gear well.
Install a new O-ring[7] on the bearing seat.
Install the adjusting washers[6] on the bearing seat as needed.
Install two washers[5] on the driving bevel gear.→Fig 13

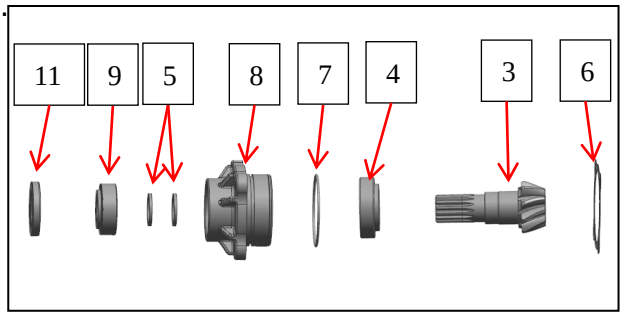


Fig 13

Install the bearing seat assy on the rear gear case.
Install bolts[10]→Fig 14
Bolt torque: 25N•m
Note:Install the bolts in criss-cross way.Pre-tighten first,then tighten the bolts.

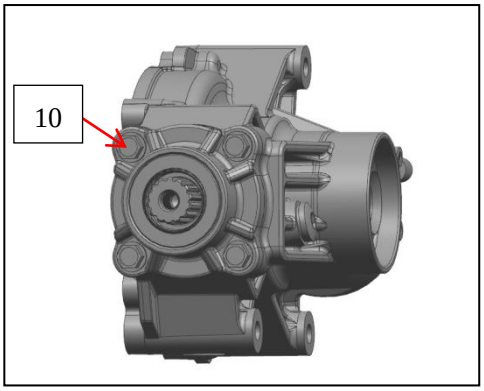


Fig 14

Install a new O-ring[12] on the coupler[13].
Install the coupler on the driving bevel gear.
Install the washer[14] and the bolts[15].→Fig 15
Bolt torque: 95N•m
Note:Pre-tighten first,then tighten the bolt.

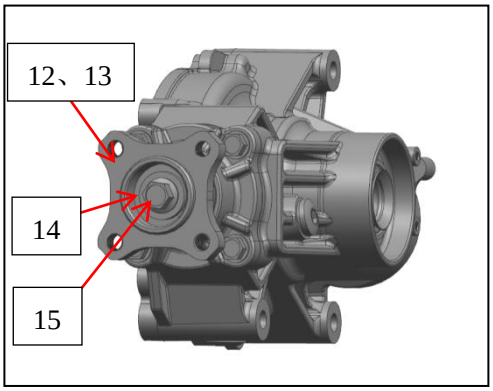


Fig 15

Before motor installation,set the motor to 4WD mode with special device or vehicle control circuit.Move the rack along the pin shaft to 4WD position.→Fig 16

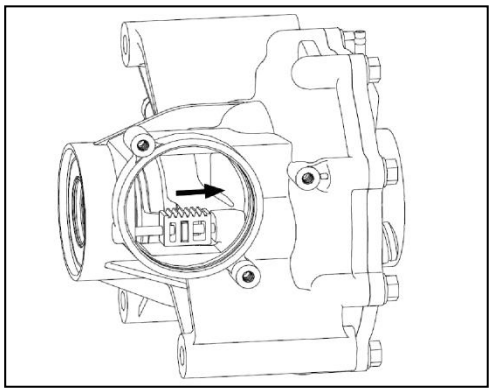


Fig 16

Install a new O-ring㊼ on the motor㊺.
Install the motor onto the rear gear case.
Install bolts㊻→Fig 17
Bolt torque: 8N•m

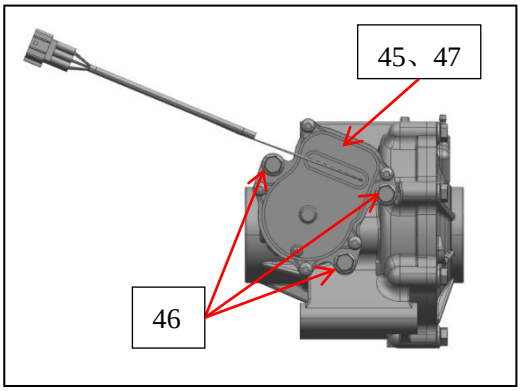


Fig 17

Rear Gear Case Bevel Gear Clearance Adjustment

Follow the Fig 18 to adjusting the gear side clearance:
Install auxiliary measuring tool and tighten the bolt (M14X1.25X60). Set the dial gauge. Make sure the gauge testing point is 21mm to the center. Turn the measuring tool to read the data.
Dial gauge data standard: 0.17~0.34.→Fig18

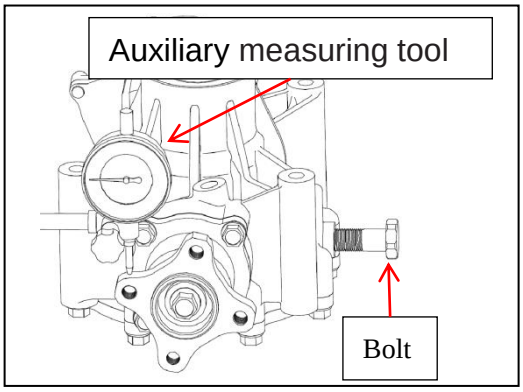


Fig 18

No.	Name	Thickness
5	Adjusting washer 32X25.4	2.6 2.7 2.8
6	Adjusting washer	0.2 0.3
21	Adjusting washer 61X50.5	0.1 0.3 0.5 1.0
23	Adjusting washer 51.5X35.3	1.0 1.2

Install the washer㊶ on the oil drain bolt㊷.
Install the bolt.→Fig19
Bolt torque: 25N•m

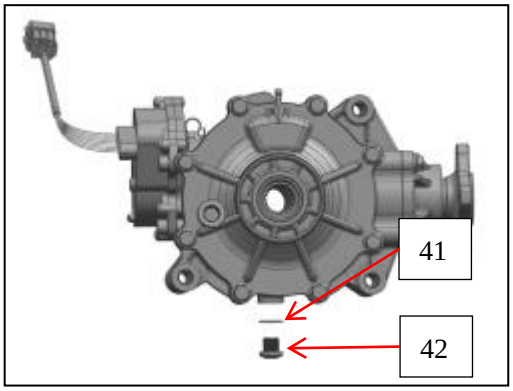


Fig 19

Fill the rear gear case with oil.→Fig 20
Oil Change Capacity: 6.7 oz (0.2L)

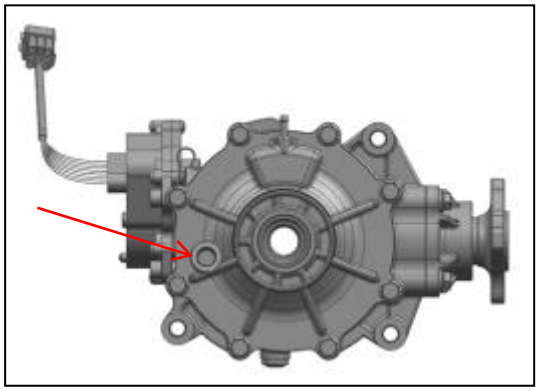


Fig 20

Install the washer㊶ on the bolt㊵.
Install the bolt.→Fig 21
Bolt torque: 25N•m

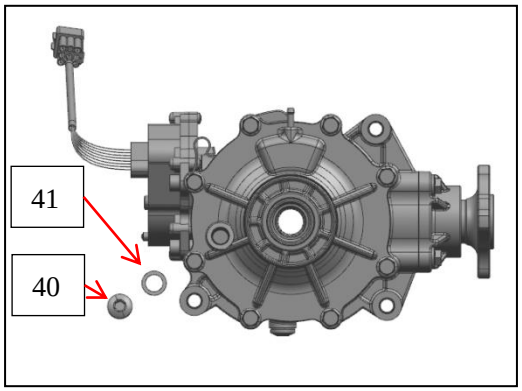


Fig 21

5.20 REAR AXLE ASSY INSTALLATION

Install the rear axle assy① onto the frame and align the mounting holes.
Install the bolts② and bolt③.Pre-secure with nuts.
Bolt② specification:M10X1.25X110
Bolt③ specification:M10X1.25X126
Nut specification:M10X1.25
Bolt torque: 40N•m
Install the bolts and spring washers④.Pre-tighten the bolts.
Bolt specification:M10X1.25X25
Spring washers specification: ϕ10
Bolt torque: 45N•m
Tighten all the bolts to their specification.
Note:Install these bolt kits with thread locker.

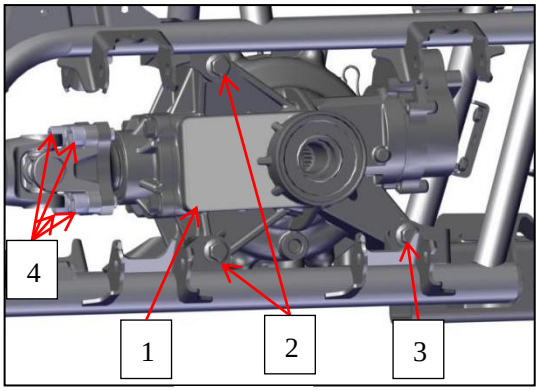


Fig 1

NOTES

CHAPTER 6 BRAKES

⚠ WARNING

The parts of different types/ variants/ versions maybe un-interchangeable, even some parts have almost same appearance. Always refer to Parts Manual of each ATV model for spare parts information and service.

NOTE: Also See Chapter 2 for Maintenance Information.

6.1 SPECIFICATIONS

6.2 TORQUE

6.3 BRAKE SYSTEM SERVICE NOTES

6.4 BURNISHING PROCEDURE

6.5 BRAKE BLEEDING-FLUID CHANGE

6.6 PARKING BRAKE AND BRAKE LINE INSPECTION

6.7 FRONT PAD INSPECTION / REMOVAL / REPLACEMENT

6.8 FRONT DISC INSPECTION / REMOVAL / REPLACEMENT

6.9 FRONT CALIPER REMOVAL/ INSPECTION / INSTALLATION

6.10 REAR BRAKE PAD REMOVAL/ INSPECTION / INSTALLATION

6.11 REAR CALIPER REMOVAL/ INSPECTION/ INSTALLATION

6.12 REAR BRAKE DISC INSPECTION / REMOVAL / REPLACEMENT

6.1 SPECIFICATIONS

Front Brake Caliper		
Item	**Standard**	**Service Limit**
Brake Pad Friction material Thickness	0.268"/ 6.8mm	0.04"/ 1mm
Brake Disc Thickness	0.197"/5mm	0.157"/ 4mm
Brake Disc Thickness Variance Between Measurements	-	0.008 "/ 0.2m m
Brake Disc Runout	-	0.003 "/0.08mm
Rear Brake Caliper		
Item	**Standard**	**Service Limit**
Brake Pad Friction material Thickness — Hydraulic with mechanics park	0.197"/ 5mm	0.04"/ 1mm
Brake Disc Thickness	0.197"/5mm	0.157"/ 4mm
Brake Disc Thickness Variance Between Measurements	-	0.008 "/ 0.2m m
Brake Disc Run out	-	0.003 "/0.08mm

6.2 TORQUE

Item	Torque (ft. lbs. except where noted*)	Torque (Nm)
Front Caliper Mounting Bolts	33	45
Rear Caliper Mounting Bolts	33	45
Front Brake Disc	18.0	25
Rear Brake Disc	18.0	25
Banjo Bolt	15.0	21

6.3 BRAKE SYSTEM SERVICE NOTES

- It is strongly recommended always change the caliper and (or) the master cylinder as an assembly. The parts inside maybe not interchangeable due to different brake manufactures and (or) different brake type.
- Do not over – fill the master cylinder fluid reservoir.
- Make sure the brake lever and pedal returns freely and completely.
- Check and adjust master cylinder reservoir fluid level after pad service.

- Make sure atmospheric vent on reservoir is unobstructed.
- Adjust foot brake after pad service.
- Test for brake drag after any brake system service and investigate cause if brake drag is evident.
- Make sure caliper moves freely on guide pins (where applicable) .
- Inspect caliper piston seals for foreign material that could prevent caliper pistons from returning freely.
- Perform a brake burnishing procedure after install new pads to maximize service life.
- DO NOT lubricate or clean the brake components with aerosol or petroleum products. Use only approved brake cleaning products.

6.4 BURNISHING PROCEDURE

Brake pads (both hydraulic and mechanical) must be burnished to achieve full braking effectiveness. Braking distance will be extended until brake pads are properly burnished. To properly burnish the brake pads, use the following procedure.

1. Choose an area large enough to safely accelerate the ATV to 50 km/h (30 mph) and to brake to a stop.
2. Using hi gear, accelerate to 50 km/h (30 mph); then compress brake lever (pedal) to decelerate to 0-8km/h (5 mph).
3. Repeat procedure on each brake system 20 times until brake pads are burnished.
4. Adjust the mechanical parking brake (if necessary).
5. Verify that the brake light illuminates when the hand lever is compressed or the brake pedal is depressed.

⚠ WARNING

Failure to properly burnish the brake pads could lead to premature brake pad wear or brake loss. Brake loss can result in severe injury.

6.5 BRAKE BLEEDING-FLUID CHANGE

NOTE: When bleeding the brakes or replacing the fluid always start with the caliper farthest from the master cylinder.

CAUTION:

Always wear safety glasses.

CAUTION:

Brake fluid is highly corrosive. Do not spill brake fluid on any surface of the ATV.

This procedure should be used to change fluid or

bleed brakes during regular maintenance.

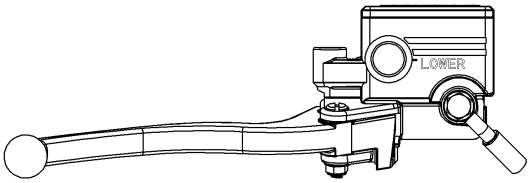
1. Clean reservoir cover thoroughly.
2. Remove cover from reservoir.

3. If changing fluid, remove old fluid from reservoir with a brake fluid pump or similar tool.
4. Add brake fluid up to the indicated MAX level on the reservoir.

   DOT Brake Fluid

5. Begin bleeding procedure with the caliper that is farthest from the master cylinder. Install a box end wrench on the caliper bleeder screw. Attach a clean, clear hose to the fitting and place the other end in a clean container. Be sure the hose fits tightly on the fitting.
6. Slowly pump foot pedal or hand lever until pressure builds and holds.
7. Hold brake pedal or hand lever on to maintain brake pressure, and open bleeder screw. Close bleeder screw and release foot pedal.

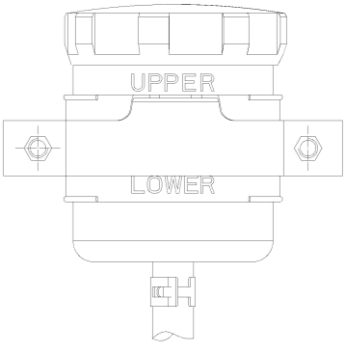
NOTE: Do not release foot pedal or hand lever before bleeder screw is tight or air may be drawn into master cylinder.



8. Repeat procedure until clean fluid appears in bleeder hose and all air has been purged. Add fluid as necessary to maintain level in reservoir.
9. Tighten bleeder screw securely and remove bleeder hose.
10. Repeat procedure steps 5- 9 for the remaining calipers.
11. Add brake fluid to MAX level inside reservoir.

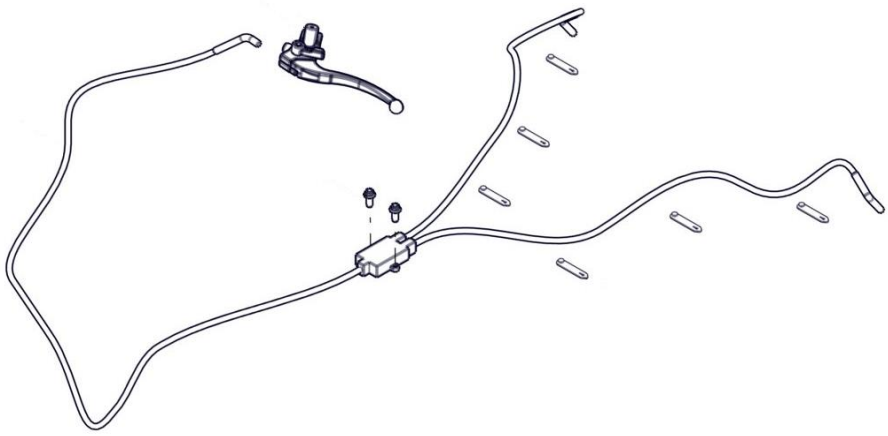
    Master Cylinder Fluid Level

    Between the MIN line and the MAX line of reservoir.



12. Install master cylinder reservoir cover.
13. Field test machine at low speed before putting into service. Check for proper braking action and pedal or hand lever reserve.
14. Check brake system for fluid leaks and inspect all hoses and lines for wear or abrasion. Replace hose if wear or abrasion is found.

6.6 PARKING BRAKE AND BRAKE LINE INSPECTION



1. Inspect the spring on the parking brake lever assembly.
2. Inspect the parking brake cable at the parking brake lever assembly on the brake caliper.
3. Inspect the brake lines and brake line connections for possible leaks or loose lines.

6.7 FRONT PAD REMOVAL / INSPECTION / INSTALLATION

NOTE: The brake pads should be replaced as a set.

REMOVAL

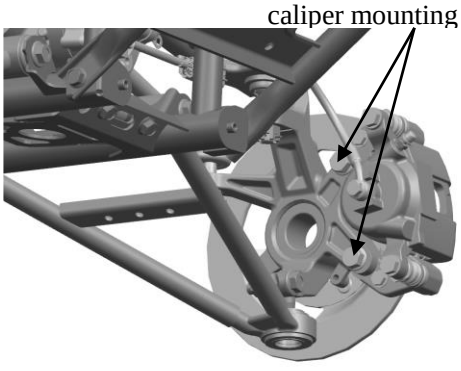
1. Elevate and support front of ATV safely.

CAUTION:

Use care when supporting vehicle so that it does not tip or fall. Severe injury may occur if machine tips or falls.

2. Remove the front wheel.

caliper mounting bolts.



3. Remove the two caliper bolts and caliper from mounting bracket.
4. Push caliper piston into caliper bore slowly using

a C-clamp or locking pliers with pads installed.

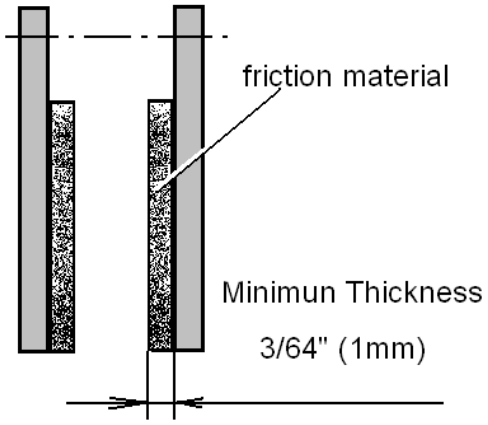
NOTE: Brake fluid will be forced through compensating port into master cylinder fluid reservoir when piston is pushed back into caliper. Remove excess fluid from reservoir as required.

5. Push mounting bracket inward and slip outer brake pad past edge. Remove inner pad.

INSPECTION

Measure the thickness of the pad friction material. Replace pads if worn beyond the service limit.

Service Limit 0.3/64"(1 mm)



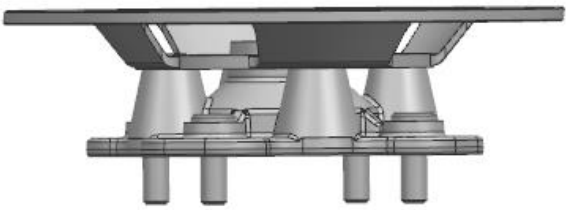
INSTALLATION

1. Lubricate mounting bracket pins with a light film of All Season Grease, and install rubber dust boots.
2. Compress mounting bracket and make sure dust boots are fully seated. Install pads with friction material facing each other. Be sure pads and disc are free of dirt or grease.
3. Install caliper on hub strut, and torque mounting bolts.
   Front Caliper Mounting Bolts
   Torque 33 ft. lbs. (45 Nm)
4. Be sure fluid level in reservoir is up to MAX line inside reservoir and install reservoir cap.
5. Install wheels and torque wheel nuts.
6. It is recommended that a burnishing procedure be performed after installation of new brake pads to extend service life and reduce noise. Start machine and slowly increase speed to 30 mph. Gradually apply brakes to stop machine. Repeat procedure 10 times.

6.8 FRONT DISC INSPECTION / REMOVAL / REPLACEMENT

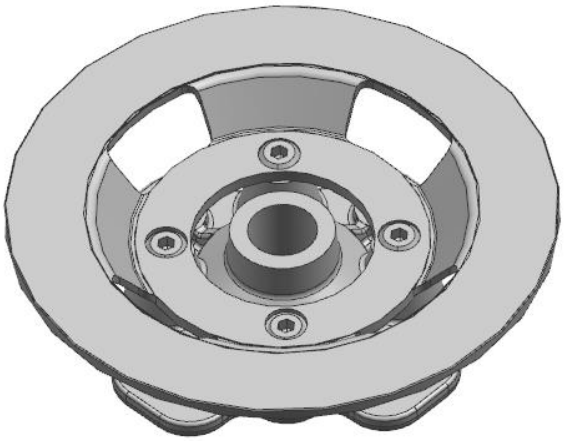
INSPECTION

1. Visually inspect the brake disc for nicks, scratches, or damage.
2. Measure the disc thickness at 8 different points around the pad contact surface using a 0-1" micrometer and a dial indicator. Replace disc if worn beyond service limit.
   Brake Disc Thickness
   New 0.197"/5mm
   Service Limit 0.157"/ 4mm
   Brake Disc Thickness Variance
   Service Limit 0.008 "/ 0.2m m
   difference between measurements
3. Mount dial indicator as shown to measure disc runout on the dial indicator. Replace the disc if runout exceeds specifications.
   Brake Disc Runout
   Service Limit 0.003 "/0.08mm



REMOVAL/ REPLACEMENT

1. Removal caliper and hub. Apply heat to the hub in the area of the brake disc mounting bolts to soften the bolt locking agent.
2. Remove bolts and disc.
3. Clean mating surface of disc and hub.
4. Install new disc on hub and tighten to specified.



CAUTION:

Always use new brake disc mounting bolts.
Front Brake Disc Mounting Bolt Torque :
18 ft. lbs. (25 Nm)

6.9 FRONT CALIPER REMOVAL/ INSPECTION / INSTALLATION

CAUTION:

The caliper is a non-serviceable component; it must be replaced as an assembly.

NOTE: If any special service needed, contact the ATV manufacture via the agent for the parts and special instruction.

REMOVAL

1. Remove wheel, remove caliper from the strut.
2. Loosen and remove brake hose to caliper. Place a container under caliper to catch fluid draining.

INSPECTION

Inspect caliper body for nicks, scratches or worn. Replace caliper as an assembly if any problem exists.

INSTALLATION

1. Install caliper on hub strut, Apply Loctite™ 243 to screw threads and Install new bolts.
   Front Caliper Mounting Bolt Torque
   33 ft. lbs. (45 Nm)
2. Install brake hose and tighten to specified torque.
   Banjo Bolt Torque: 15 ft. lbs. (21 Nm)

NOTE: If new brake pads are installed, it is recommended that a burnishing procedure be performed after installation of new brake pads to extend service life and reduce noise. Start machine and slowly increase speed to 30 mph. Gradually apply brakes to stop machine. Repeat procedure 10 times.

6.10 REAR BRAKE PAD REMOVAL/ INSPECTION / INSTALLATION

NOTE: The brake pads should be replaced as a set.

REMOVAL

1. Elevate and support rear of ATV safely.

CAUTION:

Use care when supporting vehicle so that it does not tip or fall. Severe injury may occur if machine tips or falls.

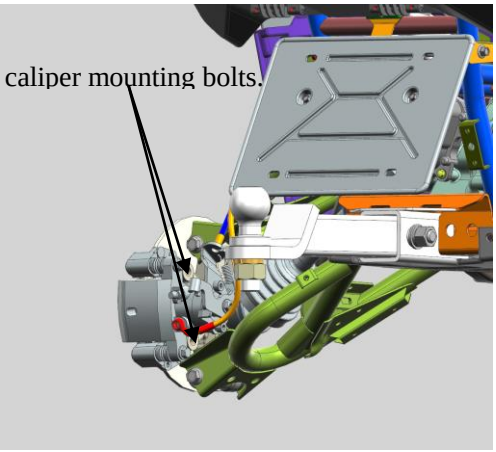
2. Remove the rear wheel.
3. Remove the two caliper bolts and lift caliper off of disc.

NOTE: When removing caliper, be careful not to damage brake line. Support caliper so as not to kink or bend brake line.

4. Push caliper piston into caliper bore slowly using a C-clamp or locking pliers with pads installed.

NOTE: Brake fluid will be forced through compensating port into master cylinder fluid reservoir when piston is pushed back into caliper. Remove excess fluid from reservoir as required.

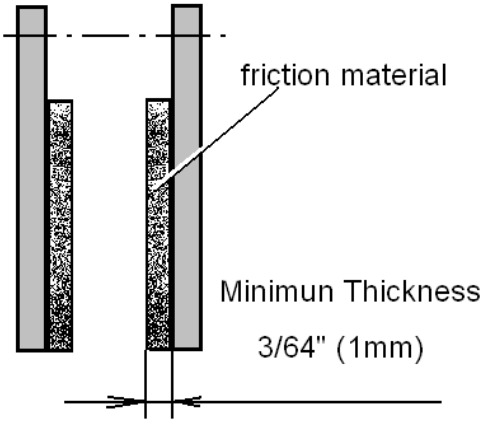
5. Remove the brake pads.
6. Clean the caliper with brake cleaner or alcohol.



INSPECTION

Measure the thickness of the pad friction material. Replace pads if worn beyond the service limit.

Service Limit 0.3/64"(1 mm)



INSTALLATION

1. Install new pads in caliper body.
2. Install caliper and torque mounting bolts.
   Brake Caliper Torque: 33 ft. lbs. (45 Nm)
3. Turn adjuster screw back in finger tight using a hex wrench.
4. Install wheels, burnishing procedure should be performed.

6.11 REAR CALIPER REMOVAL/ INSPECTION/ INSTALLATION

CAUTION:

The caliper is a non-serviceable Component; it must be replaced as an assembly.

NOTE: If any special service needed, contact the ATV manufacture via the agent for the parts and special instruction.

CAUTION:

Use care when supporting vehicle so that it does not tip or fall. Severe injury may occur if machine tips or falls.

1. Safely support the rear of the machine.
2. Use a wrench to remove the brake line. Place a container to catch brake fluid draining from brake lines.
3. After the fluid has drained into the container, remove the caliper mounting bolts and remove caliper.
4. Remove brake pad as described above.
5. Inspect surface of caliper for nicks, scratches or damage and replace if necessary.
6. Install brake pads in caliper body with friction material facing each other, with the spacer between the pads. Install retaining pin through outer pad, pad spacer and inner pad.
7. Install caliper and torque mounting bolts to 33 ft.lbs. (45 Nm).
8. Install brake hose and tighten to specified torque.
   Banjo Bolt Torque: 15 ft. lbs. (21 Nm)
9. Bleed.
10. Field test unit for proper braking action before putting into service. Inspect for fluid leaks and firm brakes. Make sure the brake is not dragging when lever is released. If the brake drags, recheck assembly and installation.
11. Install the rear wheel and wheel nuts. Carefully lower the vehicle.

NOTE: If new brake pads are installed, it is recommended that a burnishing procedure be performed after installation of new brake pads to extend service life and reduce noise.

6.12 REAR BRAKE DISC INSPECTION / REMOVAL / REPLACEMENT

INSPECTION

1. Visually inspect the brake disc for nicks, scratches, or damage.
2. Measure the disc thickness at 8 different points

around the pad contact surface using a 0-1" micrometer and a dial indicator. Replace disc if worn beyond service limit.

Brake Disc Thickness
New 0.197"/ 5mm
Service Limit 0.157"/ 4mm
Brake Disc Thickness Variance
Service Limit 0.008 "/ 0.2m m
difference between measurements

3. Mount dial indicator as shown to measure disc runout on the dial indicator. Replace the disc if runout exceeds specifications.

Brake Disc Runout
Service Limit 0.003 "/0.08mm

REMOVAL/ REPLACEMENT

1. Removal wheel/ hub and caliper.
2. Remove bolts and disc from the flange.
3. Clean mating surface of disc and hub.
4. Install new disc on flange.
   Tighten to specified.
   Rear Brake Disc Mounting Bolt Torque :
   18 ft. lbs. (25 Nm)

CAUTION:

Always use new brake disc mounting bolts.

NOTES

CHAPTER 7 ELECTRICAL

7.1 DIAGNOSIS TOOL

7.2 BATTERY

7.3 EARTH WIRE INSPECTION

7.4 FUSE

7.5 IGNITION SYSTEM

7.6 CHARGING SYSTEM

7.7 ELECTRICS STARTING SYSTEM

7.8 COOLING SYSTEM

7.9 LIGHTING SYSTEM

7.10 LIGHT REMOVAL AND INSTALLATION

7.11 GEAR SHIFT SWITCH TEST

7.12 SPEEDOMETER SYSTEM

7.13 SWITCHES

7.14 FUEL GAUGE/ FUEL LEVEL SENSOR

7.15 THE OPERATION PRINCIPLE OF THE ELECTRIC 4WD SHIFT

7.16 EFI SYSTEM

7.17 STRUCTURE AND PERFORMANCE OF EFI PARTS

7.18 EFI SELF-DIAGNOSIS

7.19 FAULT DIAGNOSIS

7.20 FAULT CODE TABLE

7.21 WIRING DIAGRAM

7.1 DIAGNOSIS TOOL

TooL:Scanner

Function:

Read/clear EFI system trouble codes, observe data stream.

Tool: Digital Multimeter Function:

Measure voltage, current and resistance and other parameters in EFI system.

7.2 BATTERY

WARNING:

1. Battery acid and gas will produce serious corrosion, avoid contacting with battery acid and gas.

2. Keep batteries out of reach of children.

3. When battery acid contacts skin, wash with plenty of water. If battery acid enters the eye, flush with water for at least 15 minutes and seek for medical help.

CAUTION:

1. Please wear protective clothing and goggles. Keep the battery away from sparks and open fire. Only charge the battery in a well-ventilated room.

2. Do not mis-connect the positive and negative pole of battery. Remove the negative wire first if disassembling battery, in case it damages electrical elements. The system of this vehicle uses negative earth mode.

3. Battery wires are not allowed to be removed while the engine is working.

4. Battery positive/negative wires and electrical control units have to be removed before welding on the vehicle.

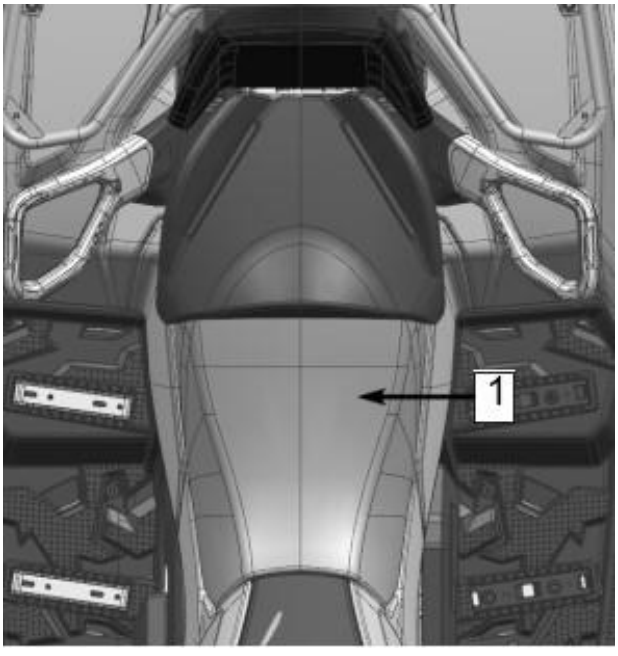
5. It is forbidden to puncture the wire to test the input/output electrical signals.

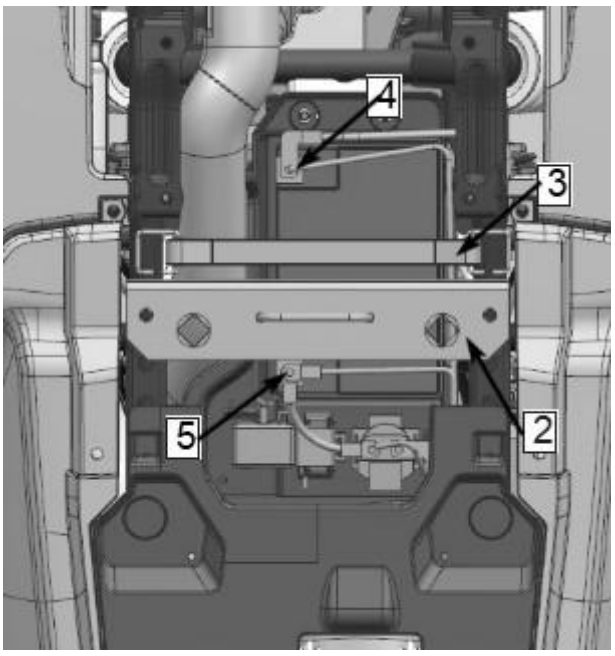
6. Establish the awareness of environmental protection and effective disposal of waste generated during maintenance.

Shut down all electrial devices and engine during removal.

Removal

1. Remove the passenger and operator seats 1
2. Remove the frame protection plate 2
3. Remove the belt 3 on the battery.
4. Disconnect the black (negative) battery cable 4 first.
5. Disconnect the red(positive) battery cable 5 next.
6. Lift the battery out of the ATV, being careful not to tip it sideways and spill electrolyte.





Installation
Reverse the removal procedures for installation.

Battery Charging

CAUTION:

1. Even if the battery is not used, it also loses power every day.
2. Charging condition and charging mode are very important for the service life of the battery. Using high charging current will have a negative impact on the service life.
3. If the charging current, charging voltage and charging time are exceeded, the battery will be damaged.
4. If the battery becomes empty due to repeated start of the vehicle, it needs to be charged immediately.
5. When the battery is stored in the discharge condition for a long time, deep discharge and sulfuric acid salination will occur, which damages the battery.
6. The battery does not need to be maintained, which means the acid level does not need to be checked.

Charging

Shut down all electrical devices and engine. Remove battery.Connect charger and battery.
After charging, remove the charger from the battery.

NOTE: If the vehicle is not used, recharge the battery every three months.

Charging Voltage Inspection

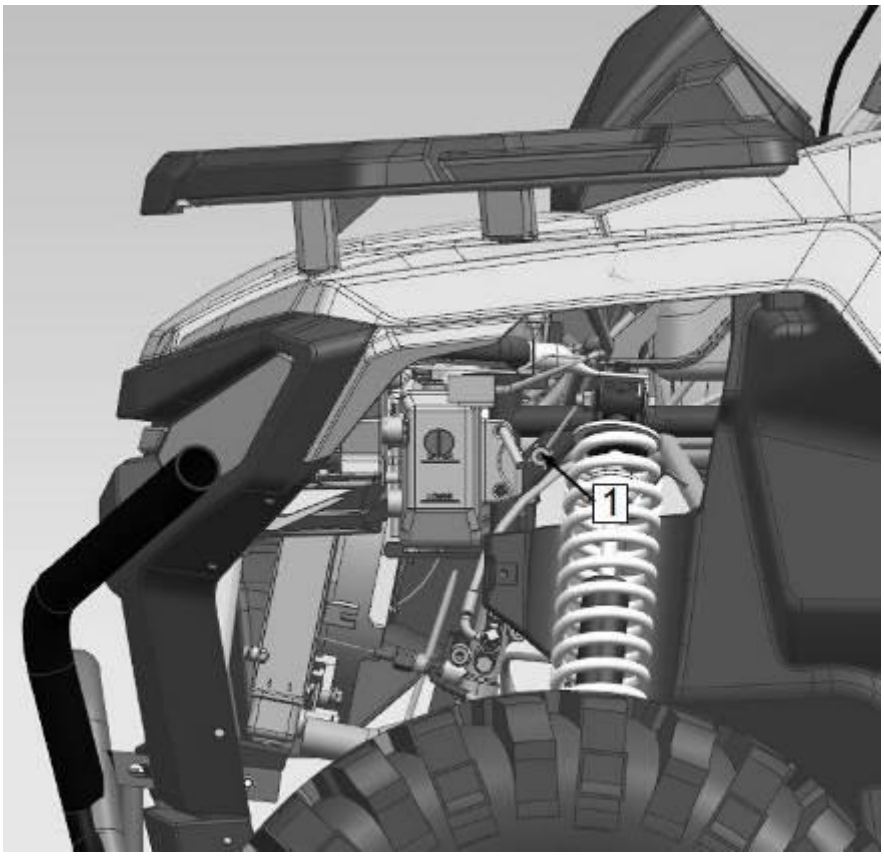
The battery has proper performance and is fully charged.
Start the vehicle and measure the voltage. Measuring point is positive pole (+), the other measuring point connects ground (-).

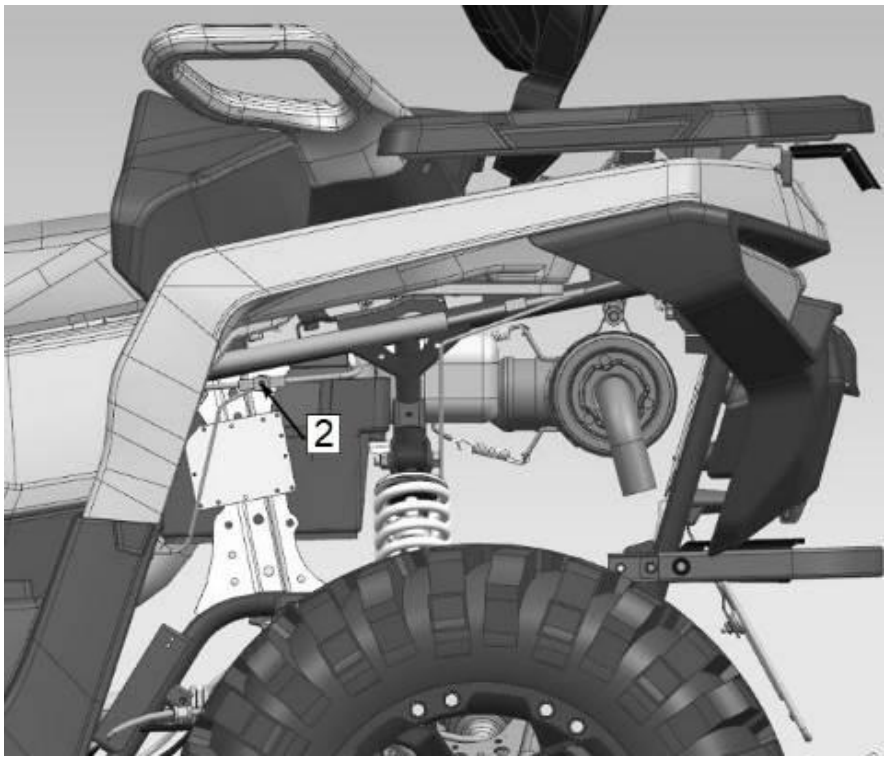
Charging Voltage	
5,000rpm	13.5V~14.5V

If less than specification:
Inspect the connectors between engine and regulator.
Inspect the connectors between regulator and cables.
Inspect engine electronic winding.
If more than specification:Replace regulator.Installation Reverse the removal procedures for installation.

7.3 EARTH WIRE INSPECTION

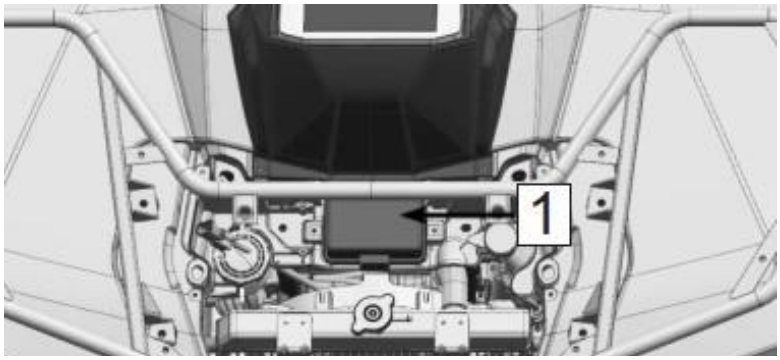
Shut down all electrical devices and engine. Inspect earth wire for normal function.Inspect bolt 1 and 2 for looseness.

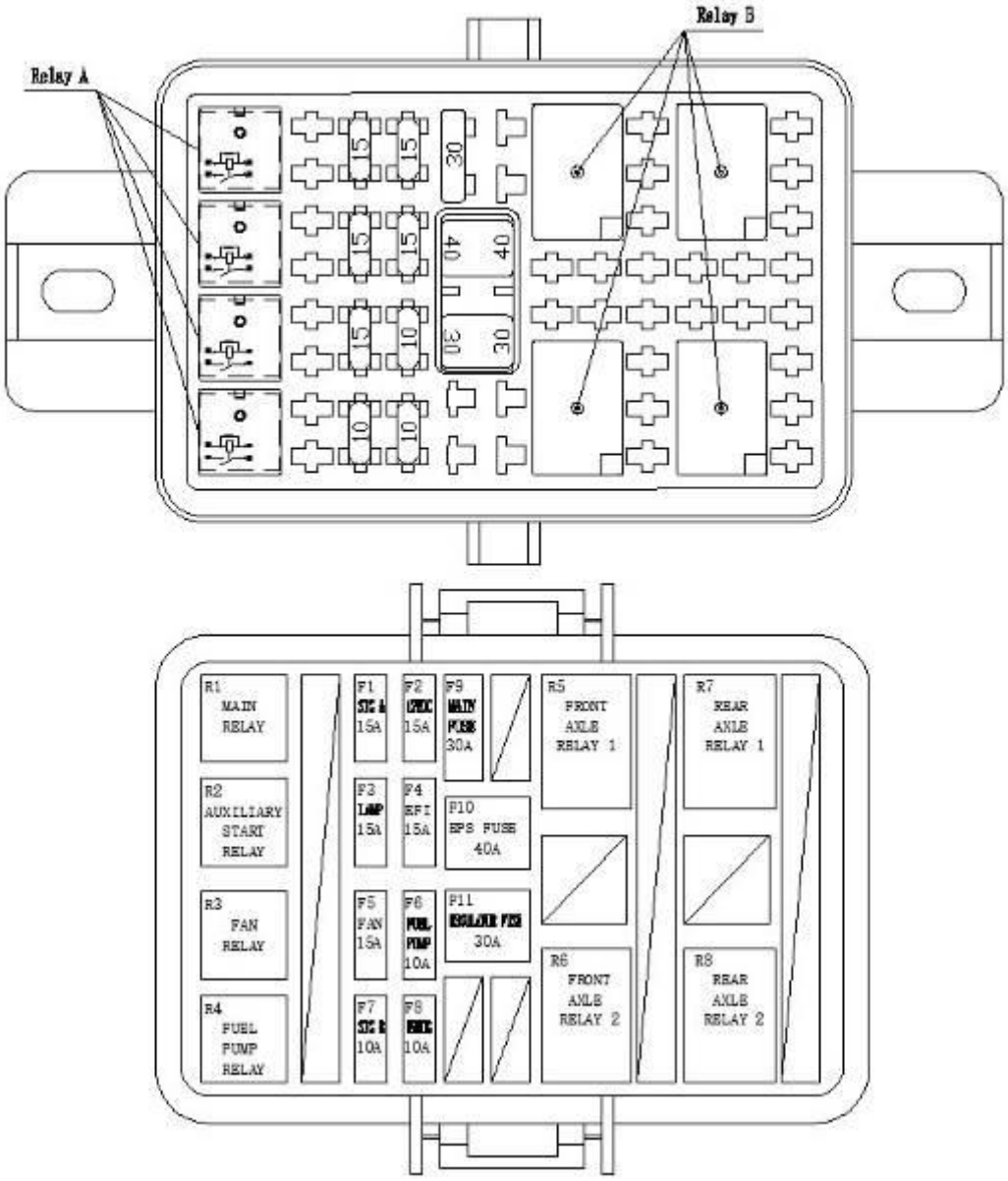




7.4 FUSE

Fuse box 1





7.5 IGNITION SYSTEM

IGNITION SYSTEM TROUBLESHOOTING

No Spark, Weak or Intermittent Spark

- Spark plug gap incorrect
- Fouled spark plug
- Faulty spark plug cap or poor connection to high tension lead
- Related wiring loose, disconnected, shorted, or corroded
- Engine stop switch or ignition switch faulty
- Terminal board or connections wet, corroded
- Poor ignition coil ground (e.g. coil mount loose or corroded)
- Faulty stator (measure resistance of all ignition related windings)
- Incorrect wiring (inspect color coding in connectors etc.)
- Faulty ignition coil winding (measure resistance of primary and secondary)
- Worn magneto (RH) end crankshaft bearings
- Sheared flywheel key
- Flywheel loose or damaged
- Trigger coil air gap too wide (where applicable) should be 0.030-0 .050" (0.75-1.25 mm)
- Excessive crankshaft run out on magneto (RH) end should not exceed 0.005" (0.13mm)

DIAGRAM REFER TO "7.21 WIRING DIAGRAM"

IF THE IGNITION SYSTEM FAILS TO OPERATE

Procedure

Check:

1. Fuse (Main)	6. Ignition coil
2. Battery	7.Pickup coil resistance
3. Spark plug	8.Main switch
4. Ignition spark gap	9.Wiring connection(entire ignition system)
5. Spark plug cap resistance	

1.Fuse → NO CONTINUITY → Replace the fuse

Check main fuse

⇩ CONTINUITY

2. Battery → INCORRECT

- Check the battery condition.

Refer to "7.2 BATTERY "

- Clean battery terminals.
- Recharge or replace the battery.

⇩ CORRECT

3.Spark plug

Standard spark plug: DPR8EA-9/ NGK

● Check the spark plug condition.
● Check the spark plug type.
● Check the spark plug gap.

Spark plug gap: 0.8 ~ 0.9mm

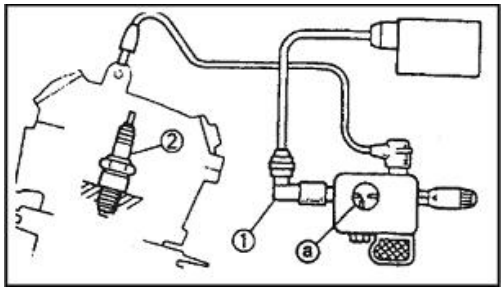
OUT OF SPECIFICATION

Repair or replace the spark plug

4.Ignition spark gap

● Disconnect the spark plug cap from the spark plug

● Connect the ignition tester 1 as shown. 2 Spark plug
●Turn the main switch to "ON".
●Check the ignition spark gap .
● Check the spark by pushing the starter switch, and increase the spark gap until a misfire occurs.



MEETS SPECIFICATION

The ignition system is not faulty.

Minimum spark gap: 6mm (0.24 in)

OUT OF SPECIFICATION OR NO SPARK

Tester (+) lead →
Spark plug side ②
Tester (—) lead→
High tension cord side ①

5.Spark plug cap resistance

●Remover the spark plug cap.

● Connect the pocket tester (ΩX20k) to the spark plug cap ① and ②.

NOTE:

● When removing the spark plug cap. do not pull the spark plug cap from high tension cord.
●Check the high tension cord when connecting the spark plug cap.

Spark plug cap resistance:

OUT OF SPECIFICATION

Replace the spark plug cap

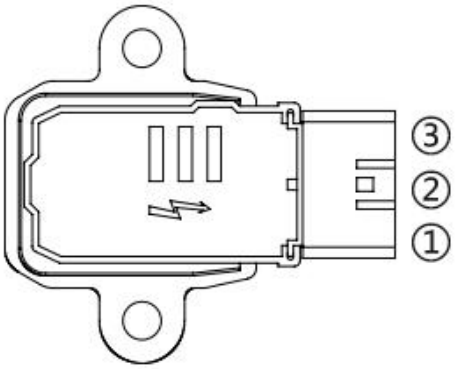
8.4-12.3KΩ(20 ℃)

⇩ CORRECT

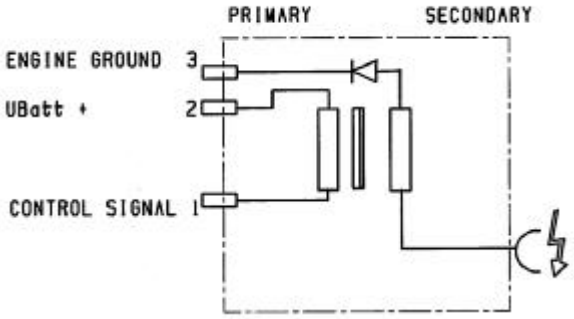
6. Ignition coil resistance

Disconnect the ignition coil connector from the wire harness.

- Connect the pocket tester (1) to the ignition coil.
- Check if the primary coil has the specified resistance.



CIRCUIT DIAGRAM



Primary coil resistance: 0.74-0.78Ω (20℃~25℃)

- Connect the pocket tester (Ω×10k) to the ignition coil.
- Check the secondary has the specified resistance

Secondary coil resistance: 10.1kΩ-11.1kΩ (20℃~25℃)

⇩ BOTH MEET SPECIFICATION

OUT OF SPECIFICATION

Replace the ignition coil.

7. Pickup coil resistance

● Disconnect the pickup coil coupler from the wire harness.
● Connect the pocket tester (Ω 100) to the pickup coil coupler.

Tester (+) lead →Terminal ①

Tester (-) lead→Terminal ②

● Check the pickup coil has the specified resistance.

Primary coil resistance:
950±20Ω (20℃)

OUT OF SPECIFICATION → Replace the pickup coil.

⇩ MEET SPECIFICATION

8.Main switch
CHECK SWITCHES
Refer to "7.13 SWITCHES "

NO CONTINUITY → Replace the main switch

⇩ CONTINUITY

9.Wiring connection
● Check the connection of the entire ignition system
Refer to “CIRCUIT DIAGRAM”.

NO CONTINUITY → Correct

⇩ CONTINUITY

Replace the igniter unit.

7.6 CHARGING SYSTEM

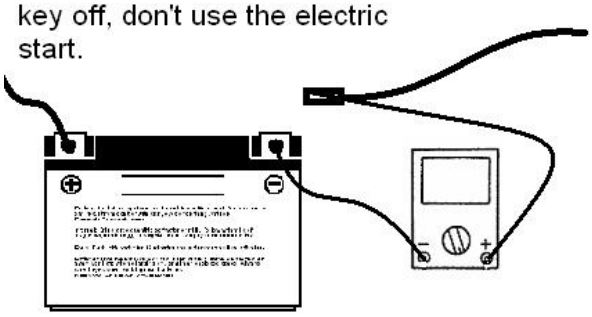
DIAGRAM REFER TO "7.21 WIRING DIAGRAM"

CURRENT DRAW - KEY OFF

CAUTION: Do not connect or disconnect the battery cable or ammeter with the engine running. Damage will occur to light bulbs and speed limiter.
Connect an ammeter in series with the negative battery cable. Check for current draw with the key off, if the draw is excessive, loads should be disconnected from the system one by one until the draw is eliminated. Check component wiring as well as the component for partial shorts to ground to eliminate the draw.

Current draw key off:
Maximum of 0.01DCA(10mA)

key off, don't use the electric start.



CHARGING SYSTEM
Proce
dure
Check:

1. Fuse (Regulator)	4.Stator coil resistance
2. Battery	5.Wiring system (entire charging system)
3.Charging voltage	

1. Fuse
Check regulator fuse
⇩ CONTINUITY
NO CONTINUITY
Replace the fuse

2. Battery
Check the battery condition.
Refer to "7.2 BATTERY "
⇩ CORRECT
INCORRECT
Clean battery terminals
Recharge or replace the battery

3.Charging voltage

Connect the engine tachometer to the spark plug lead.

● Connect the pocket tester (DC20V) to the battery

Test (+) lead→

Battery (+) terminal ①

Tester (-) lead→

Battery (-) terminal ②

Measure the battery terminal voltage.

start the engine and accelerate to about 5,000rpm

●check the terminal voltage

Measured voltage-terminal

Voltage:0.2-2.5V up

NOTE: Use a fully changed battery.

MEETS SPECITICATION

The charging circuit is not faulty

Replace the battery

OUT OF SPECICATION

4. Starter coil resistance

Remove the A.C. magneto coupler from wire harness

Connect the pocket tester (ΩX1) to the stator coil

Tester (+) lead –yellow terminal

Tester (-) lead –yellow terminal

Measure the stator coil resistance

Stator coil resistance :0.8-1.2Ω（20℃）

OUT OF SPECITICATION

Replace the stator coil

MEETS SPECIFICATION

5.Wiring connection

check the entire charging system for connections

Refer to “CIRCUIT DIAGRAM”

POOR CONNECTION

Correct

CORRECT

Replace the rectifier/regulator

7.7 ELECTRICS STARTING SYSTEM

1.Verify the gear selector is shifted to the Parking or Neutral position.

NOTE: When the drive select lever is in the neutral position or parking position, the Gear Position Indicator display “N” or “P”. If the Gear Position Indicator does not display “N” or “P”,ask a dealer to inspect the electric circuit.
It is recommended to shift into Neutral or Parking position before starting the engine.
2.Apply the foot brake or hand brake.
3.Turn the engine stop switch and main key switch to “ ” (ON).
4.Verify your hand off the throttle Lever, then push the start switch “ ” on the left-hand control.

DIAGRAM REFER TO "7.21 WIRING DIAGRAM"

TROUBLESHOOTING

THE STARTER MOTOR OPERATES WHEN THE BRAKE SWITCH IS ON

IF THE STARTER MOTOR FAILS TO OPERATE

Procedure

Check:

1. Fuse (Main)	5.Main switch
2. Battery	6.Brake switch
3. Starter motor	7.Starter switch
4. Starter relay	8.Gear position sensor
	9.Wiring connection (entire starting system)

1. Fuse
Check main and signal a fuses

NO CONTINUITY → Replace the fuses

⇩ CONTINUITY

2. Battery
Check the battery condition.
Refer to "7.2 BATTERY "

INCORRECT → Clean battery terminals
Recharge or replace the battery

⇩ CORRECT

3. Starter motor

Connect the battery positive terminal and starter motor cable using a jumper lead.

Check the starter motor operation

WARNING

• A wire that is used as a jumper lead must have at least the same capacity of the battery lead, otherwise the jumper lead may burn.

• This check is likely to produce sparks,therefore,make sure no flammable gas or fluid is in the vicinity.

DOES NOT MOVE

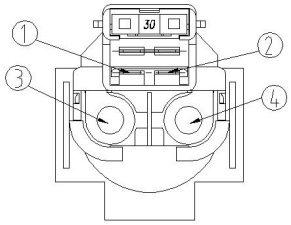
Repair or replace the starter motor

4.Starter relay

●Disconnect the relay unit coupler from the wire harness.

● Connect the pocket tester (Ωx1) and battery (12V) to the relay unit coupler terminals.

Battery (+) lead→terminal ①
Battery (-) lead→terminal ②



OUT OF SPECITICATION

●Check the starter relay for continuity.

Test (+) lead → ③ terminal
Test (-) lead → ④ terminal

Replace the starter replay

5.Main switch

Refer to "7.13 SWITCHES"

CONTINUITY

NO CONTINUITY

Replace the main switch

6.Brake switch

Refer to "7.13 SWITCHES"

CONTINUITY

NO CONTINUITY

Replace the brake switch

7. Starter switch

Refer to "7.13 SWITCHES"

⇩CONTINUITY

NO CONTINUITY → Replace the handlebar switch

8.Gear position sensor

Refer to “7.11 GEAR SHIFT SWITCH TEST”

⇩ CORRECT

INCORRECT → Replace the Gear position sensor

9. Wiring connection

Check the connections of the entire starting system.

Refer to “CIRCUIT DIAGRAM

POOR CONNECTION → Correct

7.8 COOLING SYSTEM

DIAGRAM REFER TO "7.21 WIRING DIAGRAM"

IF THE FAN MOTOR FAILS TO TURN

Procedure

Check:

1. Fuse (Main, Fan)	4. Fan motor
2. Battery	5. Fan relay
3. Main switch	6. Coolant temperature sensor
	7.Wiring connection (entire cooling system)

1.Fuse

Check main and fan fuses

NO CONTINUITY → Replace the fuse

CONTINUITY ⇩

2. Battery

Check the battery condition.

Refer to "7.2 BATTERY "

INCORRECT → Clean battery terminals
Recharge or replace the battery

CORRECT ⇩

3 Main switch

CHECK SWITCHES

Refer to "7.13 SWITCHES"

NO CONTINUITY → Replace the main switch

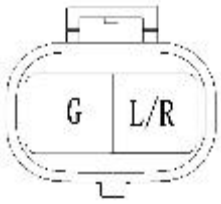
CONTINUITY ⇩

4. Fan motor

Connect the battery to the fan motor.

Battery (+) lead→Blue/Red terminal ①

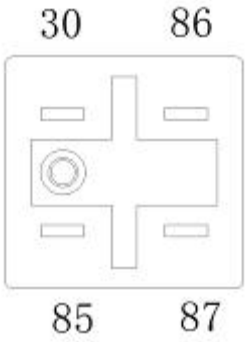
Battery (-) lead→Green ground ②



Check the fan motor operation

DOES NOT MOVE → Replace fan motor

CORRECT ⇩



5.Fan relay

● Disconnect the relay coupler from the fuse box.

● Connect the pocket tester (Ωx1) and battery (12V) to the relay coupler terminals.

Battery (+) lead→ terminal 85
Battery (-) lead → terminal 86

● Check the starting circuit cut-off relay for continuity.

Test (+) lead→ terminal 30
Test (-) lead → terminal 87

Result
Continuity between "30" and "87"

OUT OF SPECITICATION → Replace fan relay

MEET SPECIFICATION

6. Coolant temperature sensor
Refer to "7.17.4 Coolant temperature sensor "

NO CONTINUITY → Replace coolant temperature sensor

MEET SPECIFICATION

7.Wring connection
● Check the connection of the entire cooling system.
Refer to "CIRCUIT DIAGRAM"

UPPER CONNECTION → Correct

7.9 LIGHTING SYSTEM

DIAGRAM REFER TO "7.21 WIRING DIAGRAM"

TROUBLESHOOTING
Procedure
Check:

1.Fuse (Main and lamp)	4.High/low beam switch and turn switch
2.Battery	5.Scintillator
3.Main switch	6.Lights
	7. Wiring connection (entire lighting system)

1.Fuse
Check main and lamp fuses
⇩CONTINUITY
NO CONTINUITY → Replace the fuse

2. Battery
Check the battery condition.
Refer to "7.2 BATTERY "
⇩INCORRECT
INCORRECT → Clean battery terminals
Recharge or replace the battery

3. Main switch
CHECK SWITCHES
Refer to "7.13 SWITCHES"
⇩CONTINUITY
NO CONTINUITY → Replace the main switch

4.High/low beam switch and turn switch
CHECK SWITCHES
Refer to "7.13 SWITCHES"
⇩CONTINUITY
NO CONTINUITY → Replace the switch

5.Scintillator

Check Scintillator

NO CONTINUITY

Replace the scintillator

CONTINUITY

6.Lights

Check lights.
Refer to"7.10 LIGHT REMOVAL AND INSTALLATION"

NO CONTINUITY

Correct

CONTINUITY

7.Wiring connection

Check the connection of the entire lighting system

POOR CONNECTIONS

Replace the wiring

7.10 LIGHT REMOVAL AND INSTALLATION

Maintenance standard

Item Standard		Standard
Fuse	Main	30A
	Secondary	10A×3 15A×5 30A×1 40A×1
Light and bulb	Headlight	LED×3 (high-beam) LED×1(low-beam) LED×19(turn light) LEDx17（Front position lamp ）
	Tail light Assy	LED
	Signal indicator	LED
	Rear license light	H2 W5W bulb

7.10.1 Headlight Assy

Removal

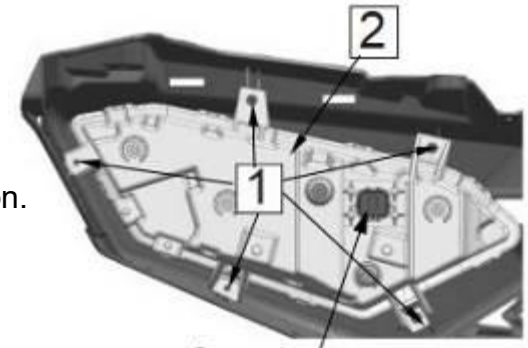
Remove five self-tapping screws 1.

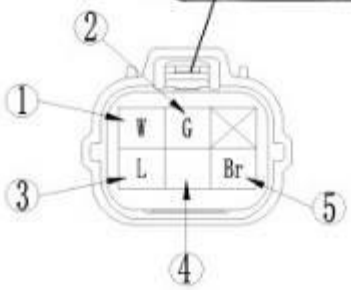
Remove headlight 2 .

Installation

Reverse the removal procedures for installation.

LH and RH headlight uses the same removal&installation procedures.





Pins and Function:

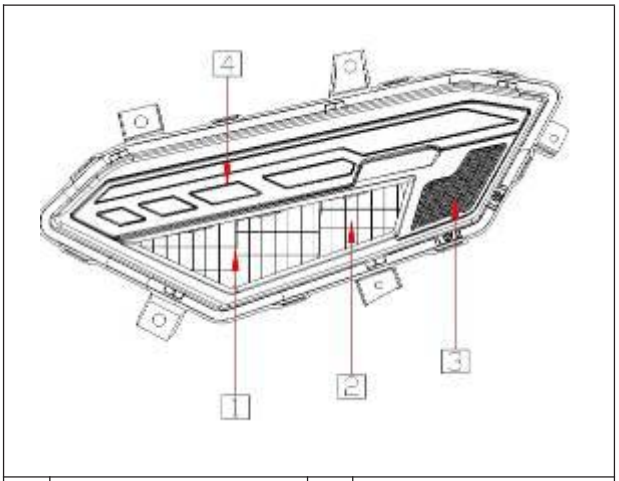
1：Low-beam light

2：GND

3：High-beam light

4：Front direction indicator lamp

5：Front position lamp



1	High-beam light	2	Low-beam light
3	Front direction indicator lamp	4	Front position lamp

Headlight Assy

7.10.2 Tail Light Assy

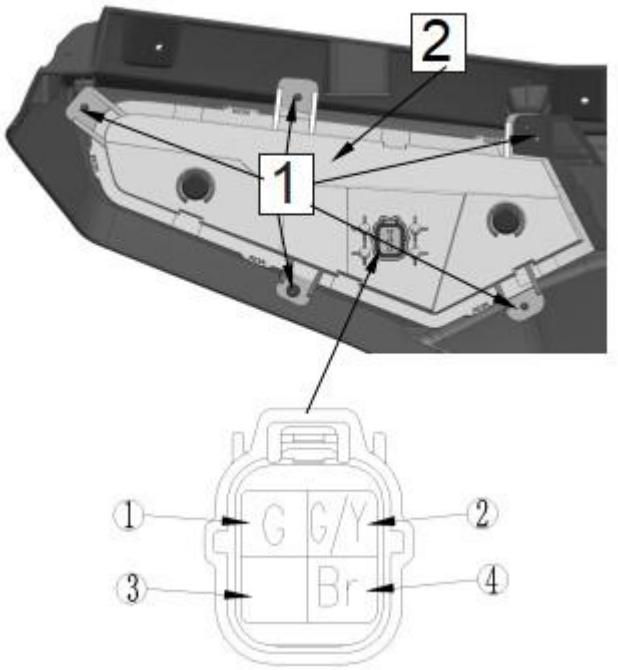
Removal

Remove self-tapping screws 1.

Remove tail light assy 2 .

Installation

Reverse the removal procedures for installation.



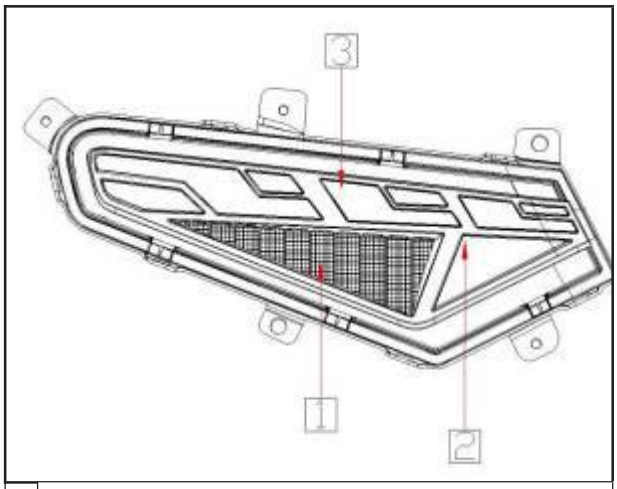
Pins and Function:

1：GND

2：Stop lamp

3：Rear direction indicator lamp

4：Rear position lamp



1	Rear direction indicator lamp		
2	Stop lamp	3	Rear position lamp

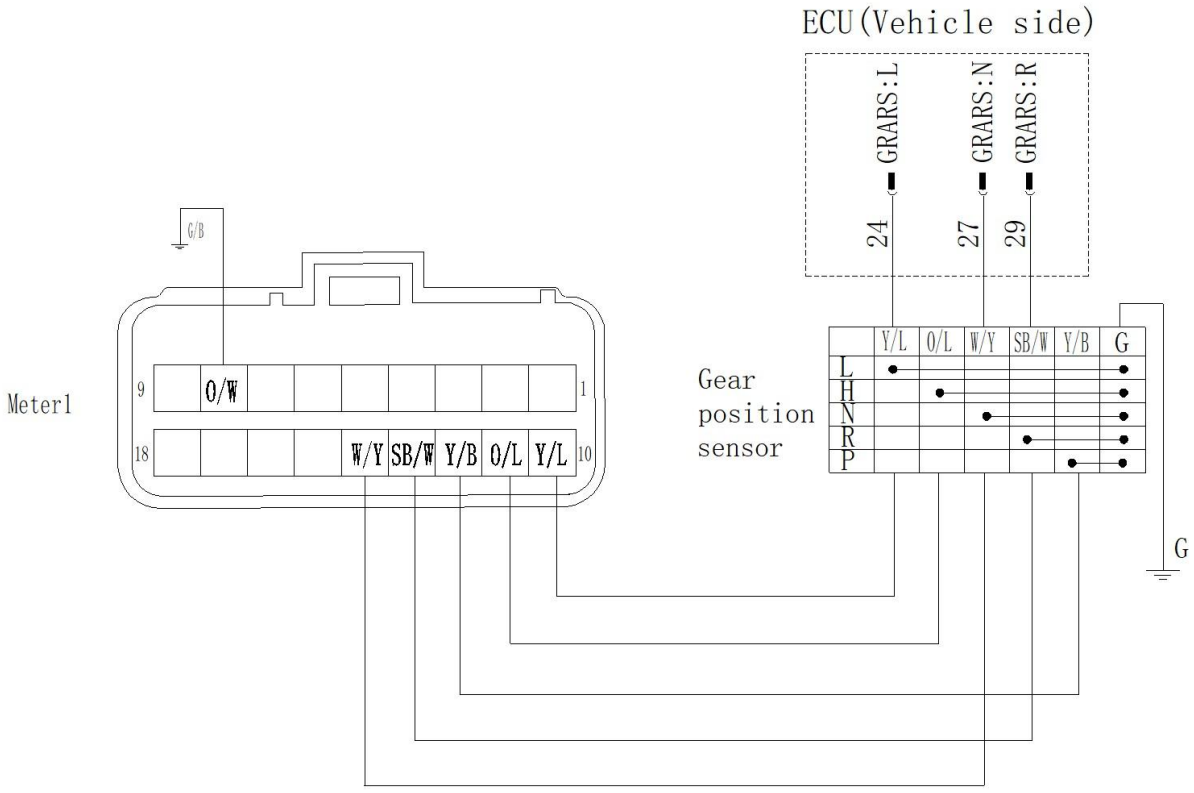
Tail light Assy

NOTE: The headlight and tail light are consisted of LED lights. When the light damages, replace the whole set.

7.11 GEAR SHIFT SWITCH TEST

This sensor is used to provide the gear position signal for meter display.

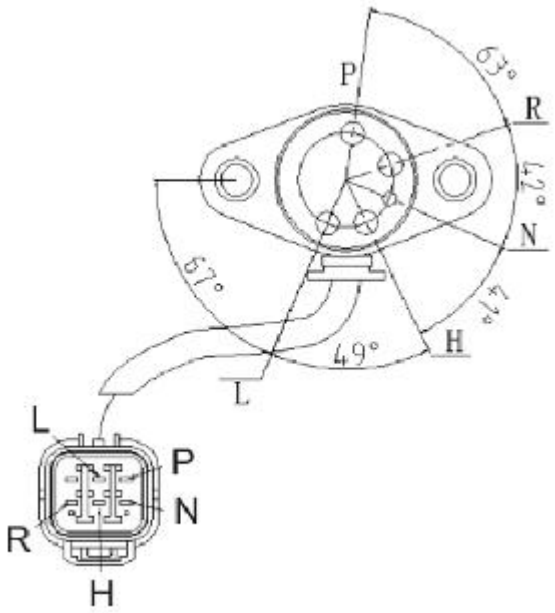
DIAGRAM



Switch table

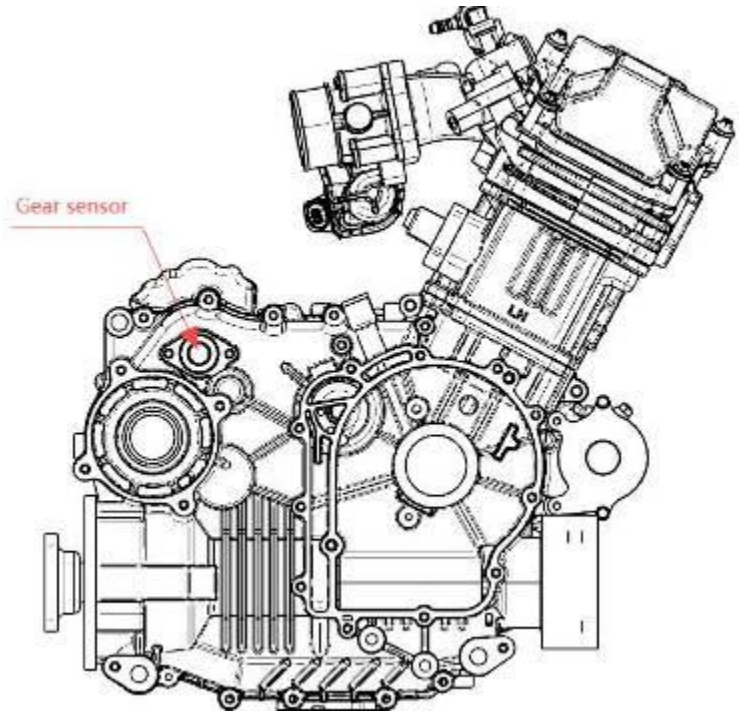
	Y/L	O/L	W/Y	SB/W	Y/B	G
L	●					●
H		●				●
N			●			●
R				●		●
P					●	●

Pin function:
L:Low gear
H:High gear
N:Neutral gear
R:Reverse gear
P:Parking gear

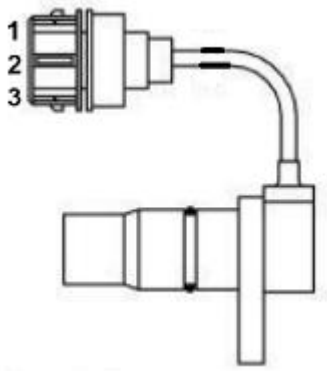


When each pin at a certain gear position, there is connection between this pin and engine. Otherwise, no connection exists.

WARNING
When driving in reverse, gear sensor sends the reverse signal to ECU and dashboard . ECU will limit the vehicle speed in response to the reverse signal.



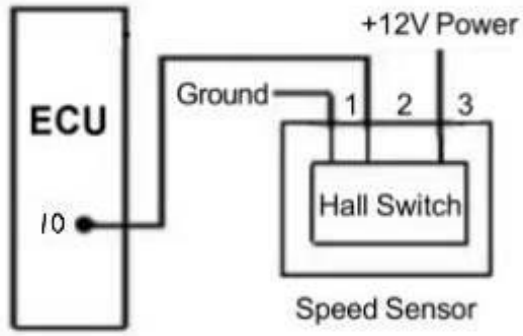
7.12 SPEEDMETER SYSTEM

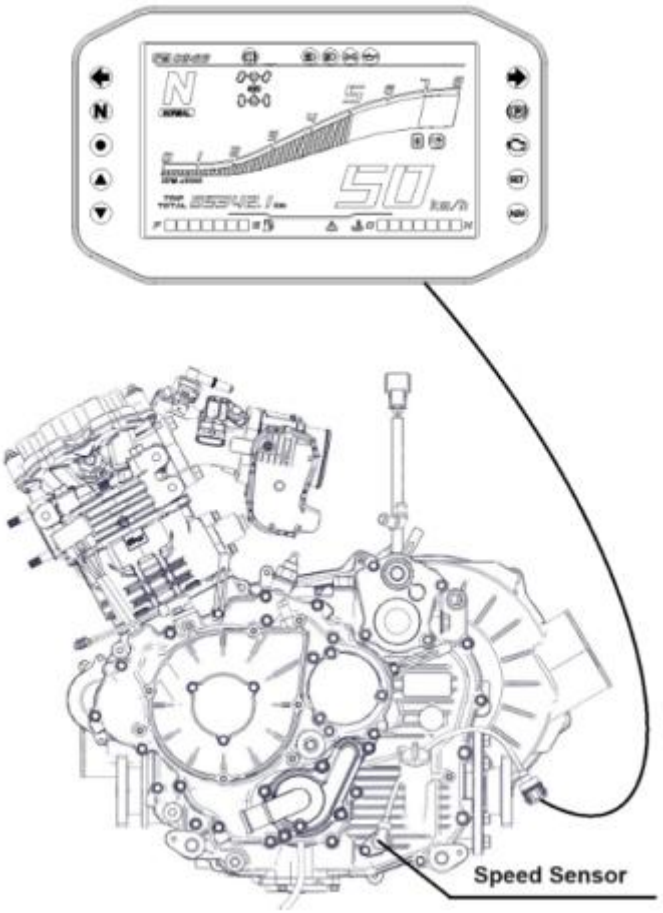


This sensor provides engine output shaft speed to ECU. Then ECU can calculate the speed according to this signal. It is a hall switch type device, which outputs square wave by the change of the magnetic field.

1. Ground
2. Output voltage signal (>80% of input voltage).
3. Power DC 12V(+)

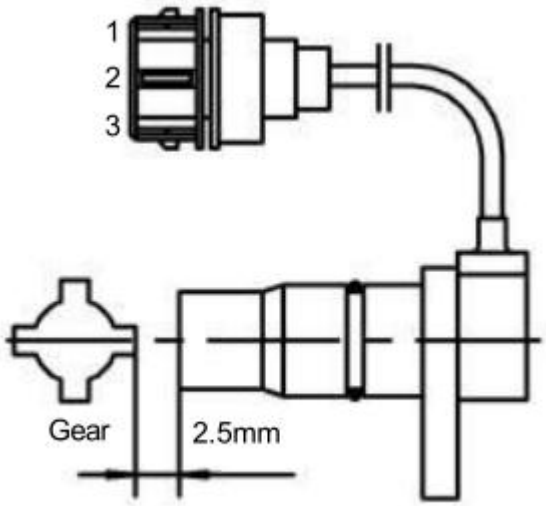
Circuit connecting with ECU.





Speed Sensor Test:

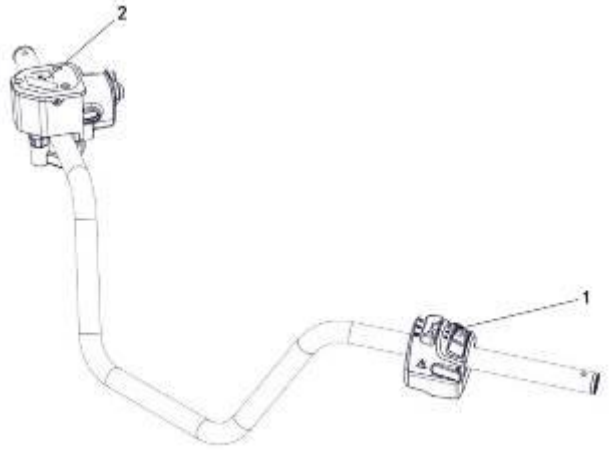
- Ground pin 1and connect pin 3 with +12V power;
- Fix a gear 2.5mm away from a speed sensor as the right figure illustrates;
- Turn multimeter to DCV range;
- Slowly turn the gear and measure the voltage between pin 2 and pin 3 to determine that if the reading varies from 0V-12V;
- If the reading doesn't vary, that indicates the sensor is defective and needs to be replaced



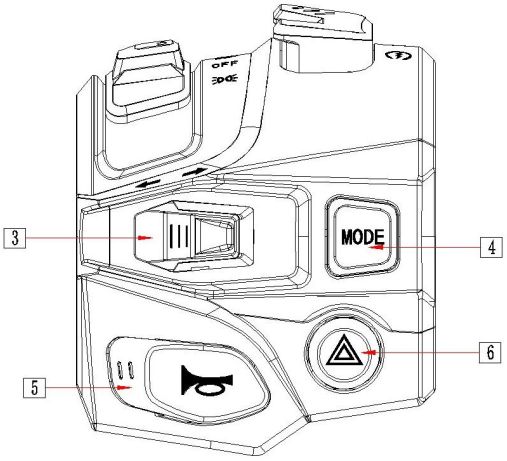
7.13 SWITCHES

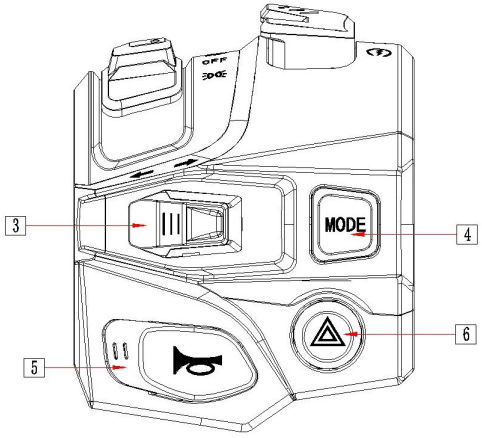
Unplug connectors between switches and main cable. Inspect switch performance

1.Left hand controls
2.2WD/4WD System Switch



1 ： illumination switch
2 ： Start/Stop switch
3 ： Emergency alarm switch
4 ： Mode switch
5 ： Horn Button
6 ： turn switch
7 ： Override switch

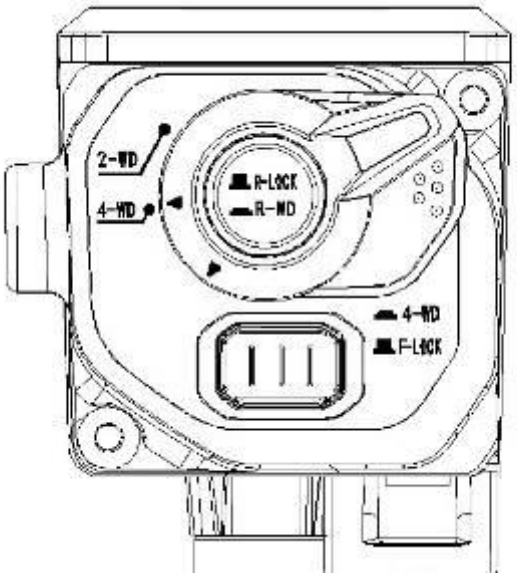




Left hand controls

	BR	W/L	B/BR	L	W	B/W	GR/R	LG	O/B	B/BR	LG	G	W/GR	L/R	R/L	GR/B	G	B/BR	G
⚠																●	●		
📯			●	—	—	—	—	●											
⇦									●	●									
⇨										●	●								
⚠														●	●				
≡D◐	●	●																●	●
🔦	●	●	—	—	●													●	●
🔦	●	●	—	●														●	●
OFF																		●	●
↻			●	—	—	●												●	●
⏲			●	—	—	●	●											●	●
✱																		●	●
MODE												●	●					●	●

R



2WD/4WD system switch

Color / Function	L/B	L/G	Br/R	Br/G	Gr	Gr/W	Y	B/L	L/Y	Br/O	G/Gr	Gr/O	W/Gr	LG/W	B/Br	G	LG/Gr
2WD/R-LOCK	●	●				●	●			●	●	●	●	●		●	
2WD/R-WD	●	●				●	●	●	●	●	●			●		●	
4WD/R-LOCK	●	●	●	●						●	●	●	●				
4WD/R-WD	●	●	●	●				●	●	●	●						
F-LOCK/R-LOCK			●	●	●	●				●	●	●	●			●	●
F-LOCK/R-WD			●	●	●	●		●	●	●	●					●	●

R

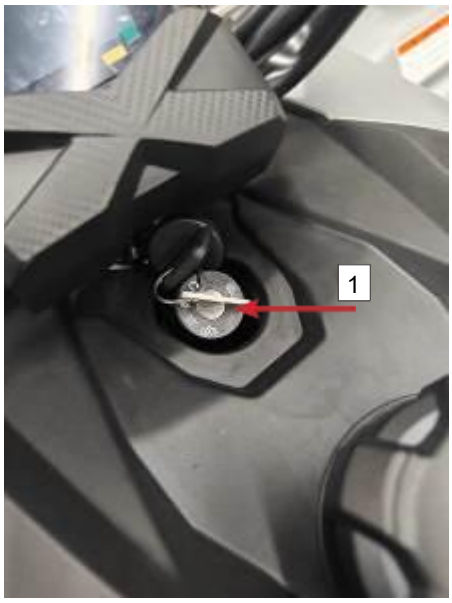
Ignition Switch Lock Removal

Remove ignition switch lock 1 by rotating it counter-clockwise.

Inspection

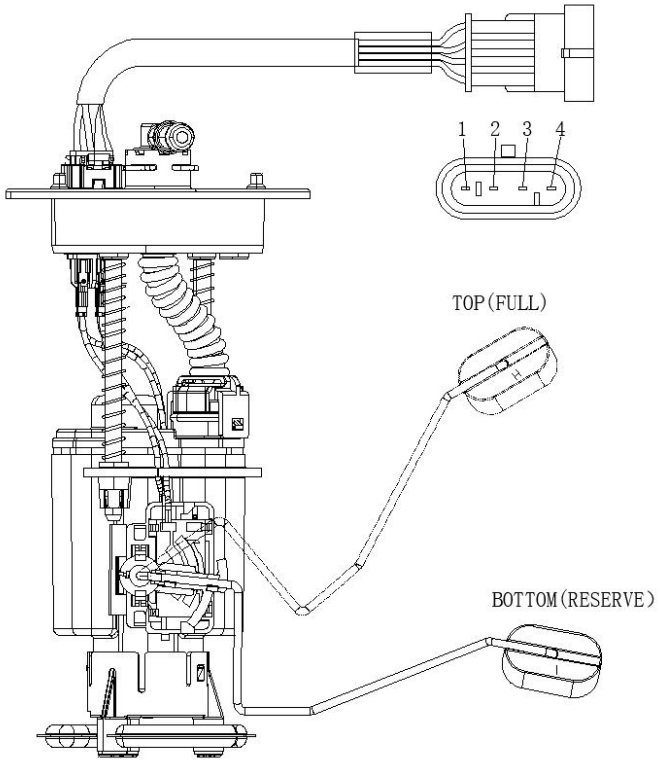
Follow the tables below to inspect ignition switch lock performance.

Color / Function	R	B
○	——	
⊠		
Lock		



7.14 FUEL GAUGE/ FUEL LEVEL SENSOR

This fuel pump assembly includes fuel pump,plastic support,preliminary filter, fine filter and pressure regulator. It supplies fuel for engine under a certain pressure and flow.



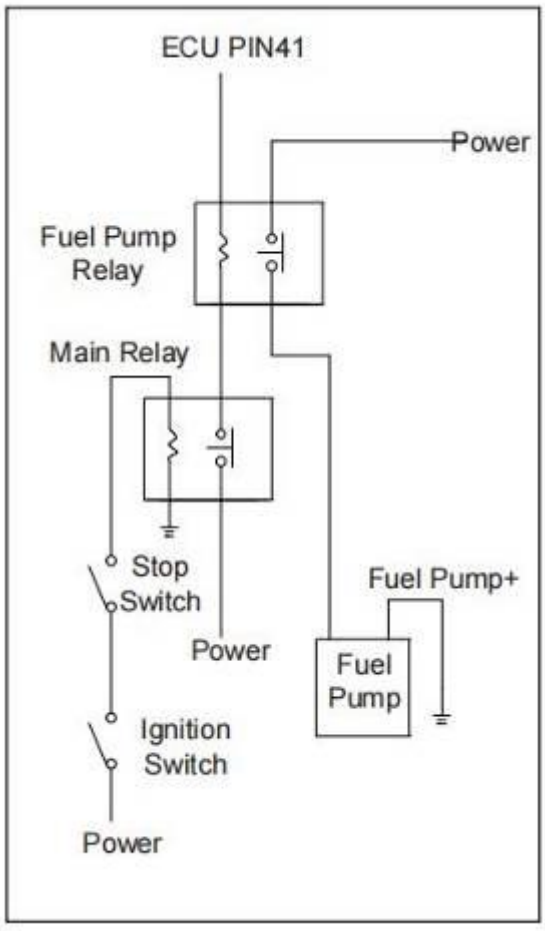
Pins and Function:

1:Fuel pump negative pole
2:Fuel pump positive pole
3:oil level black line
4:oil level red line

Parameters:

Pressure regulator opening pressure : $0.3^{0}_{-0.01}$MPa
Flow: Higher than 45L/h

- This fuel pump is located in fuel tank;
- Don't operate the fuel pump in dry condition to prevent damage.
- Always handle the fuel pump gently. Never drop the fuel pump.
- The battery supplies power to the fuel pump through fuel pump relay. The relay circuit is connected only when vehicle starts and engine is running



Fuel Pressure Measurement

Connect the fuel pressure gauge with fuel outlet and tighten the joint with a clamp to prevent fuel leaks.
Route according to the circuit.
Turn ON both ignition switch and stop switch. At this moment, fuel pump will operate for 5 seconds. After the fuel pump stops running, fuel pressure should reach to standard value. Otherwise, replace the fuel pump assy.
After the engine stops, fuel pressure should be kept 0.25MPa for more than 5 minutes. Otherwise, replace the fuel pump assy.

Pressure Relief in Fuel System:

In EFI model, pressure in fuel system is very high, as well as in fuel hoses. Even though the engine is not started, pressure in fuel system remains high. Therefore, it's not recommended to remove fuel hoses before pressure relief.

Follow the procedure below to perform pressure relief:

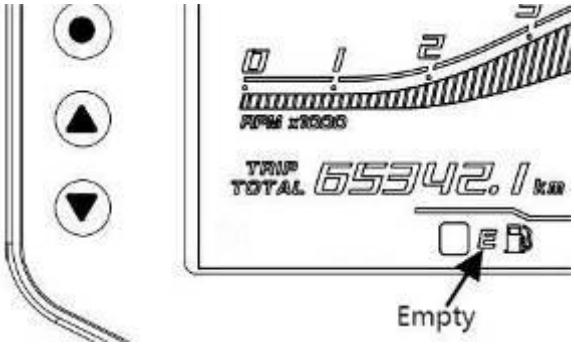
Remove fuel pump relay. Start the engine and allow it to idle until the engine stops automatically.

Parameters:

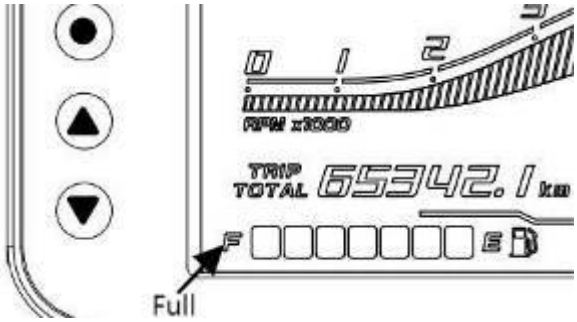
Test voltage (V)	Test pressure (MPa)	Flow (L/h)	Current (A)
12±0.1	$0.3^{0}_{-0.01}$	≥45	≤2.2

●This fuel pump is located in fuel tank;
●Don't operate the fuel pump in dry condition to prevent damage.
●Always handle the fuel pump gently. Never drop the fuel pump.
●The battery supplies power to the fuel pump through fuel pump relay. The relay circuit is connected only when vehicle starts and engine is running.

Move the fuel sender float to bottom position.It is normal if "E", the fuel symbol and the first grid display red and the non displayed grid display gray,otherwise, circuitry connection, fuel sensor or instrument should be inspected



Move the fuel sender float to top position.It is normal if the display grid is white and the "E" and fuel symbol are displayed in white, otherwise, circuitry connection, fuel sensor or instrument should be inspecte



Fuel sensor resistance range:

FLOAT POSITION	RESISTANCE(20℃/ 68° F)
TOP(FULL)	＜13Ω
BOTTOM(RESERVE)	＞165Ω

7.15 THE OPERATION PRINCIPLE OF THE ELECTRIC 4WD SHIFT

1.This vehicle is equipped with on-command “2-WD/4-WD”、“4-WD/F-LOCK” and “R-LOCK/R-WD” switches on the right handle.. Activate these switches according to the traction required for different driving conditions.
2. When shift 2WD/ 4WD or Diff Lock, the mechanics in the front gear box maybe still engaged/ disengaged, the mechanics would finally disengaged/ engaged when rides on a hard surface or rides in reverse.
3. Always shift as the vehicle stop.

WARNING
The vehicle should be stopped before applying or releasing the function of 2WD/4WD/F-lock. Applying or releasing drive modes while the vehicle is in motion can lead to component damage.

TROUBLESHOOTING
Procedure
Check:

1.Fuse (Main and signal A)	4.2WD/4WD system switch
2.Battery	5.Front/Rear axle relay
3.Main switch	6.Wiring connection (entire lighting system)
	7. Front/Rear axle motor

1.Fuse
Check main and signal A fuses

NO CONTINUITY → Replace the fuse

CONTINUITY ⇩

2. Battery
Check the battery condition.
Refer to "7.2 BATTERY "

INCORRECT → Clean battery terminals
Recharge or replace the battery

CONTINUITY ⇩

3. Main switch
CHECK SWITCHES
Refer to "7.13 SWITCHES"

NO CONTINUITY → Replace the main switch

CONTINUITY ⇩

4.2WD/4WD system switch

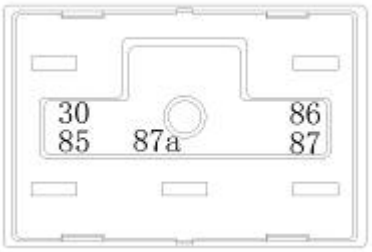
CHECK SWITCHE

Refer to "7.13 SWITCHES"

NO CONTINUITY

Replace the switch

CONTINUITY



5.Front/Rear axle relay

● Disconnect the relay from the fuse box.

● Connect the pocket tester (Ωx1) and check the relay for continuity.

STEP1:Test (+) lead → terminal 30
Test (-) lead → terminal 87

STEP2:Test (+) lead → terminal 30
Test (-) lead → terminal 87a

Result

Continuity between "30" and "87a"

No continuity between "30" and "87"

●Then battery (12V) to the relay coupler terminals.

Battery (+) lead→ terminal 85
Battery (-) lead→ terminal 86

●Check the relay for continuity.

STEP1:Test (+) lead → terminal 30
Test (-) lead → terminal 87

STEP2:Test (+) lead → terminal 30
Test (-) lead → terminal 87a

Result

Continuity between "30" and "87"

No continuity between "30" and "87a"

OUT OF SPECITICATION

Replace Front/Rear axle relay

MEET SPECIFICATION

7. Wiring connection (entire lighting system)

- Disconnect the front/Rear axle motor from the wire harness cable.
- Switch 2WD \ 4WD \ F-LOCK\R-LOCK
- Connect the pocket tester (Ωx1) and check the cable coupler for continuity.

 Result

To front axle motor

2WD:Continuity between "1" and "2" and Continuity between "3", "4" and "5";

4WD:Continuity between "1" and "2" and Continuity between "4", "8" and "9";

F-LOCK:Continuity between "1" and "2" and Continuity between "4", "6" and "7"

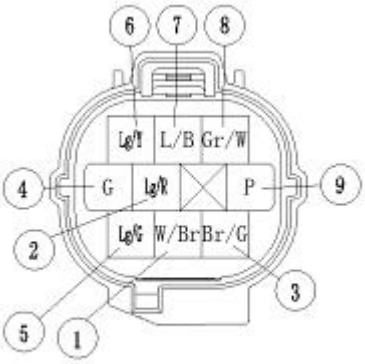
 Result

To rear axle motor

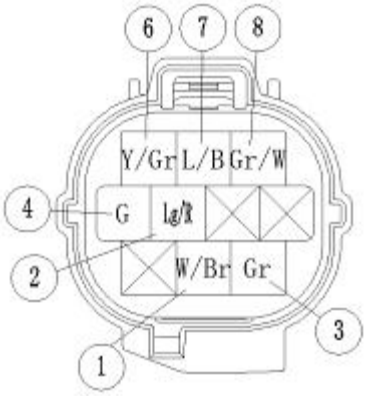
2WD:Continuity between "1" and "2" and Continuity between "3" and "4";

4WD:Continuity between "1" and "2" and Continuity between "4" and "8";

G-LOCK:Continuity between "1" and "2" and Continuity between "4", "6" and "7"



To Front axle motor



To Rear axle motor

NO CONTINUITY

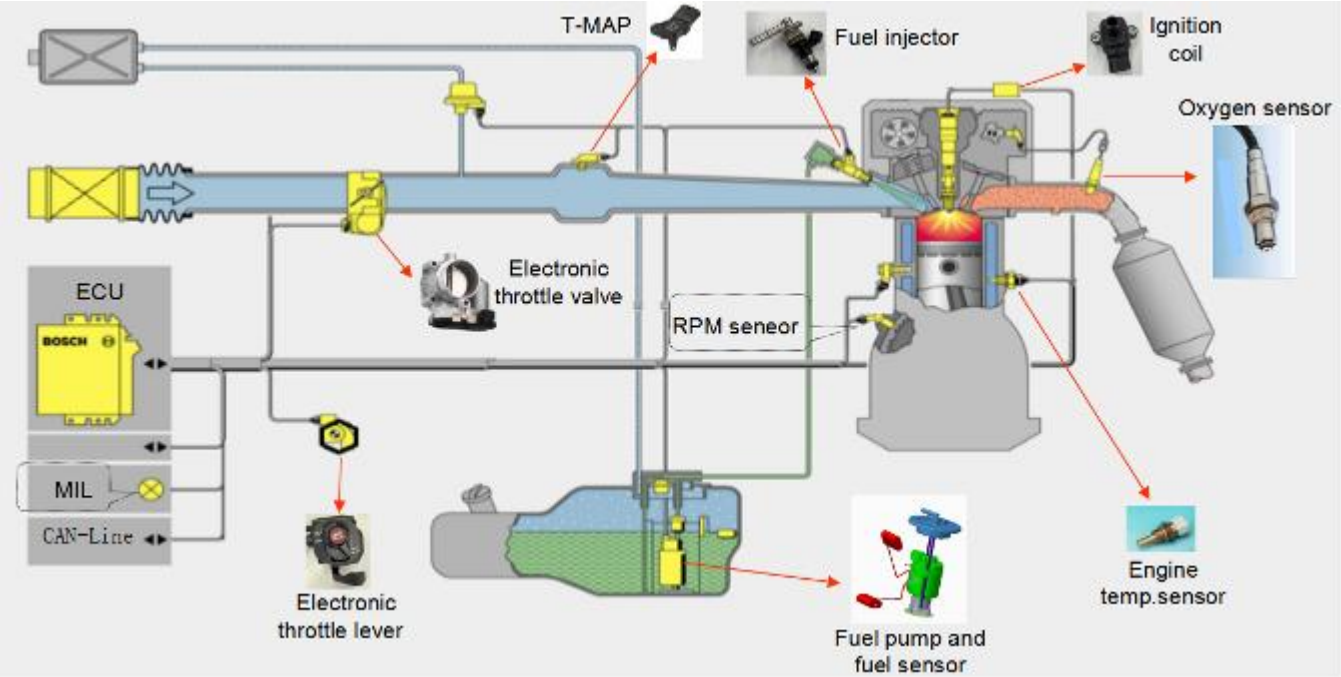
Replace the wiring

MEET SPECIFICATION

Replace the Front/Rear axle motor

7.16 EFI SYSTEM

7.16.1 EFI structure



7.16.2 Sensors

A sensor is a device that measures a physical quantity and converts it into a signal which can be read by an observer or by an instrument. Sensors in EFI system include:
Air pressure sensor (air density and pressure information)
Air temp. sensor (air density and temperature information)
Coolant temp. sensor (engine temp.)
Speedometer sensor (output shaft RPM information) Phase sensor (gear information)
Oxygen sensor (air factor= λ >1 or <1)

7.16.3 ECU

Electronic Control Unit, the brain of EFI system, which determines the amount of fuel injection, ignition TDC and other parameters a engine needs to keep running by calculating and analyzing values provided by sensors.

7.16.4 Actuators

Actuators execute the EFI instruction. Main actuators include:

- **Fuel Pump**（Provide high-press fuel）
- **Fuel Injector**（Inject the fuel to make it spray better）
- **Ignition Coil** (Provide high ignition energy to spark plug)
- **Electronic throttle Valve**(Provide engine with intake air)

7.16.5 EFI System Maintenance Notice

●Always use genuine parts for maintenance. Otherwise it can not assure a normal performance to EFI system.

●During the maintenance procedure, never try to breakdown the EFI components.

●In the course of maintenance, EFI parts must be handled carefully.

●Ignition switch must be shut off before connecting or disconnecting connectors. otherwise, it may cause the EFI parts damage.

●When removing fuel pump from fuel tank, do not energize the fuel pump. Otherwise, a spark can cause a fire.

●Fuel pump is not allowed to operate in a dry environment or under water. Otherwise, its life would be shortened. Besides, reverse connections between positive and negative terminal of fuel pump is not permitted.

●The fuel pressure in EFI fuel supply system is very high (about 300kPa), accordingly, all fuel lines are high pressure resisting. Even if the engine is not running, the fuel pressure is high. Therefore, do not disassemble the fuel line unless it's necessary.

When the fuel line needs to be repaired, release the fuel pressure as follow shows:

Remove fuel pump relay, start the engine and allow it to idle until the engine stalls automatically.

Fuel line removal and fuel filter replacement should be practiced by a professional person in a well-ventilated place.

●If possible, don't do the spark test. If spark test is done unavoidably, try to complete the test as soon as possible. Besides, don't open the throttle, otherwise, a large quantity of unburnt fuel would enter muffler, causing the catalytic converter damage.

●Idle speed is controlled by ECU and Electronic throttle valve, so it's unadjustable.

●Don't reverse the battery cable connections. This may damage electrical components.

●Never remove the battery cables When the engine is running.

●Always remove cables and electrical control units which are connected with battery terminals.

●Never test the component input and output electric signal by piercing the cable plastic jacket.

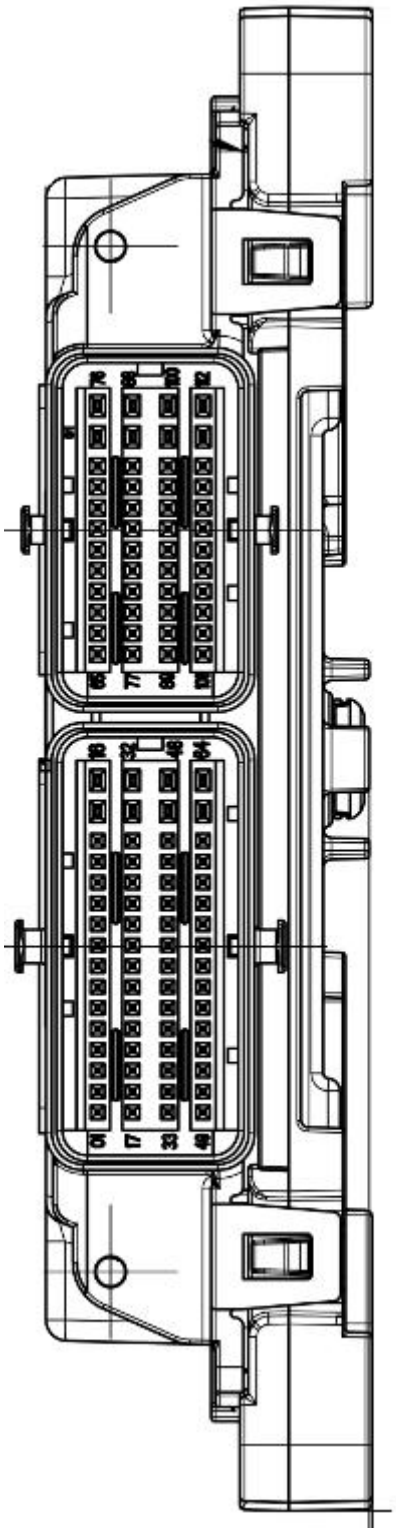
●Respect the environment and dispose of the waste left during maintenance.

7.17 STRUCTURE AND PERFORMANCE OF EFI PARTS

7.17.1 ECU

Electronic control unit , is the brain of EFI system. It analyzes and cope with the information provided by sensors, and send the conclusion in the form of instruction to actuator, then make the engine run in the optimal condition.

NOTE: It is not allowed to load on housing or cover. Gently handle it. Do not drop it on the ground.

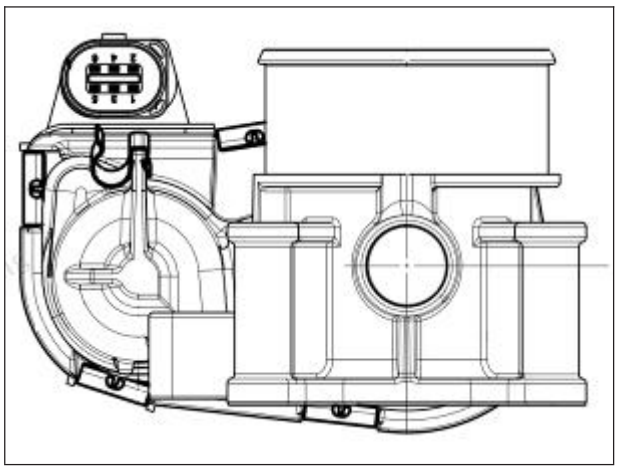


ECU pin function:

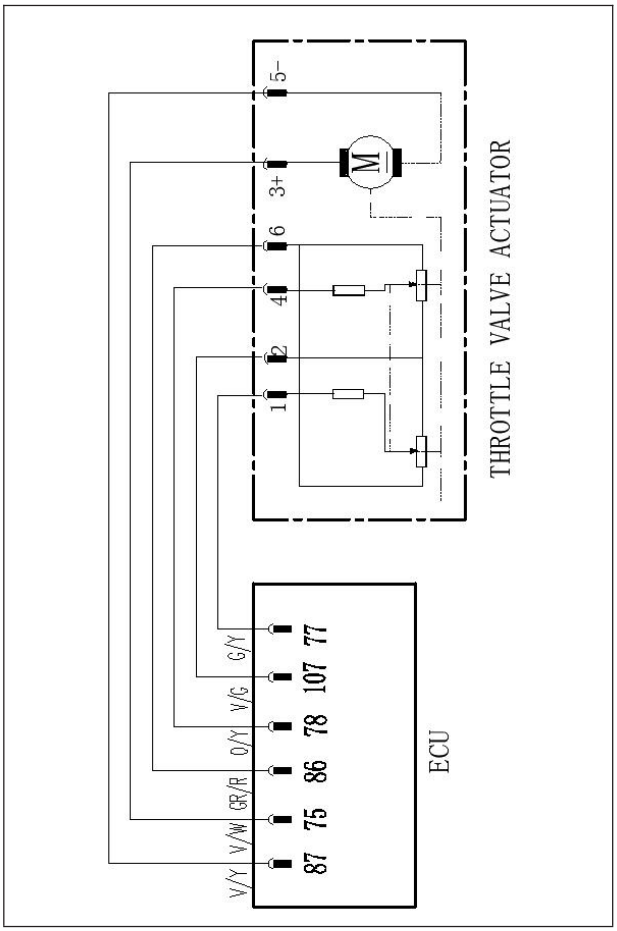
Pin	Function	Pin	Function	Pin	Function
1	CAN H	39	NULL	77	Throttle position sensor 1
2	NULL	40	NULL	78	Throttle position sensor 2
3	NULL	41	Pump relay	79	NULL
4	NULL	42	NULL	80	Oxygen sensor 1 GND
5	Main relay	43	NULL	81	NULL
6	4WD lock switch	44	SPORT/ECO switch	82	MIL light
7	Pedal 1 GND	45	Accelerator pedal sensor 1	83	NULL
8	NULL	46	NULL	84	Sensor GND
9	NULL	47	NULL	85	Intake manifold sensor GND
10	Speed sensor	48	NULL	86	Throttle position sensor GND
11	NULL	49	NULL	87	Throttle actuator B
12	NULL	50	NULL	88	NULL
13	P gear	51	NULL	89	NULL
14	Overriding switch	52	NULL	90	NULL
15	Non-continuous power 1	53	NULL	91	Air intake pressure sensor
16	Non-continuous power 2	54	NULL	92	NULL
17	CAN L	55	NULL	93	NULL
18	NULL	56	Fan control 1	94	NULL
19	NULL	57	NULL	95	NULL
20	Continuous power	58	Starter control relay	96	Engine RPM sensor A
21	NULL	59	Pedal 2 GND	97	Engine RPM sensor B
22	NULL	60	NULL	98	NULL
23	Brake switch	61	NULL	99	NULL
24	L gear switch	62	NULL	100	Ignition coil 1
25	Brake light switch	63	ECU GND 2	101	Engine temp. sensor
26	NULL	64	ECU GND 1	102	Air intake temp. sensor
27	N gear switch	65	NULL	103	NULL
28	NULL	66	NULL	104	Oxygen sensor 1
29	R gear switch	67	NULL	105	NULL
30	Accelerator pedal sensor 2	68	Fuel injector 1	106	P gear switch
31	NULL	69	NULL	107	Throttle position sensor 5V
32	NULL	70	NULL	108	NULL
33	NULL	71	NULL	109	Intake manifold sensor 5V
34	EPS control	72	NULL	110	NULL
35	Ignition switch	73	Oxygen sensor heating 1	111	ECU GND 4
36	Pedal 2 5V	74	NULL	112	ECU GND 3
37	Pedal 1 5V	75	Throttle actuator A		
38	NULL	76	NULL		

7.17.2 Electronic throttle valve

Connect with air filter and the engine, control the on-off angle of throttle by throttle cable. Send out the angle signal through TPS to ECU.



Circuit connecting with ECU

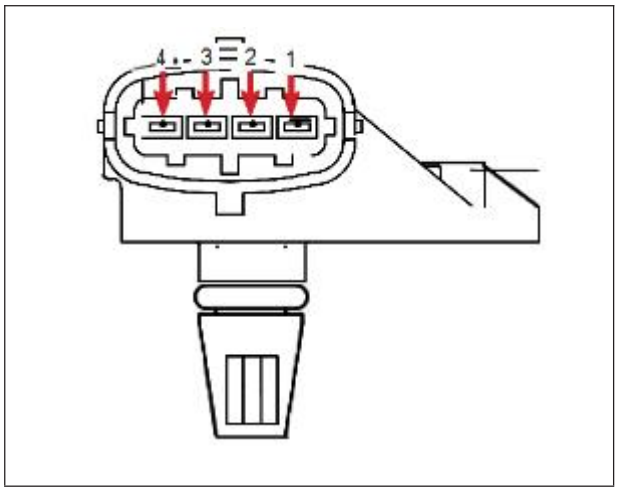


7.17.3 T-Map

Intake air pressure sensor: this sensor monitor intake air pressure, which provides the engine load signal to ECU.

Intake air temp. sensor: This sensor is an NTC thermo resistance. The resistance is getting higher with coolant temperature, but not in linear relationship.

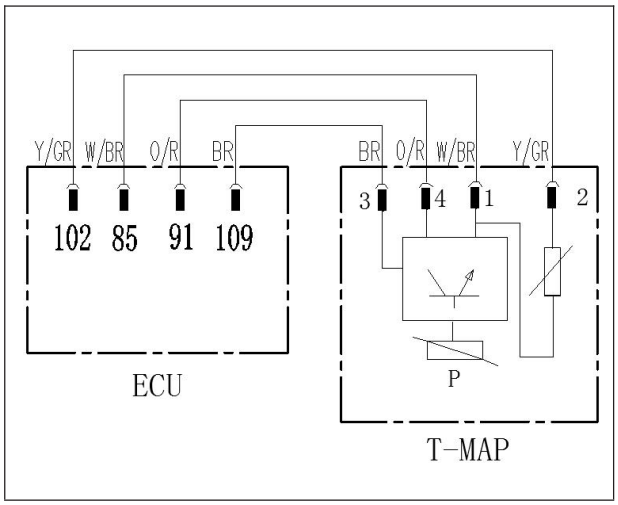
Air pressure sensor and temp. sensor are sealed together.



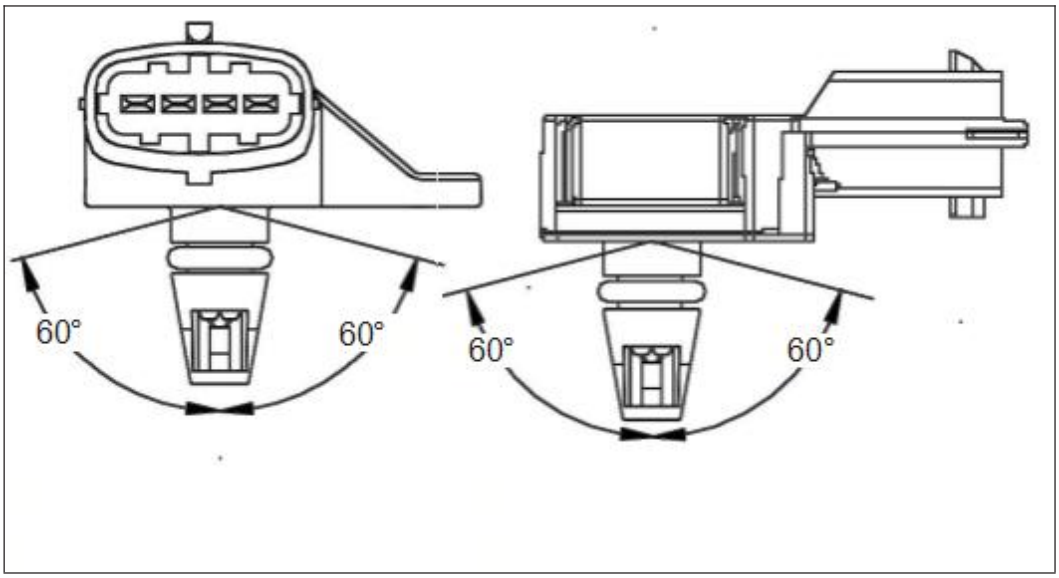
Pin function:

1.to ground
2.Intake air temp. Signal
3.to 5V power
4.Intake air pressure signal

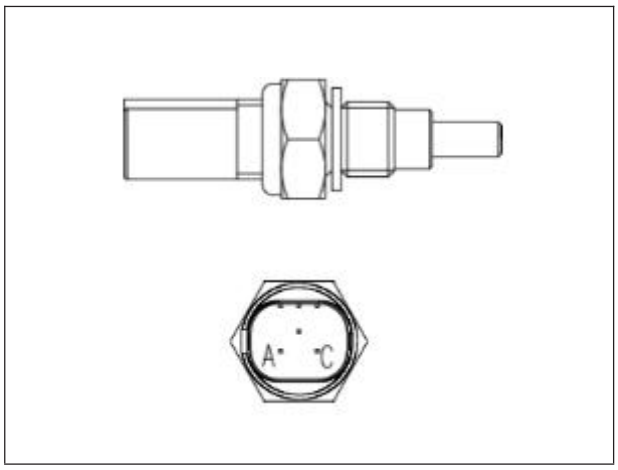
Circuit connecting with ECU.



The picture below shows the allowable mounting range, which ensures that condensation does not form inside the sensor, as the condensation damages pressure sensitive elements within the sensor.



7.17.4 Coolant Temp. Sensor

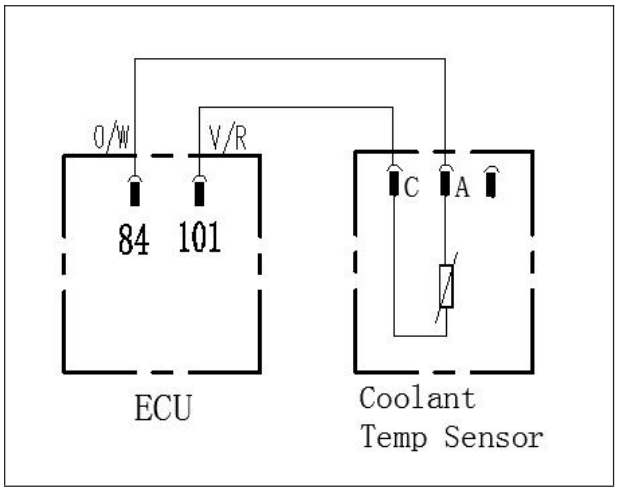


This sensor is a NTC thermo resistance. The resistance becomes lower when the air temperature becomes higher, but it is not a liner relationship.

One group of parameters is sent to ECU to monitor engine temperature condition, One group is sent to dashboard to monitor coolant temperature condition.

A and C are one group which provides coolant temperature signal to the ECU.

Circuit connecting with ECU.



Coolant Temp. Sensor Inspection

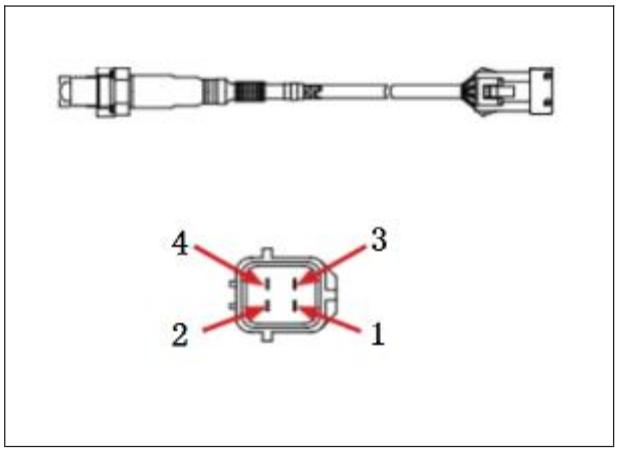
Measure resistance between pin A and C with multimeter:

ECU resistance (A-C)	
Temp. °C	Resistance(KΩ)
-20	13.71~16.49
20	2.2128~2.6391
80	0.303~0.326
110	0.1383~0.1451

If the resistance is beyond standard, the sensor is damaged. Replace with new one.

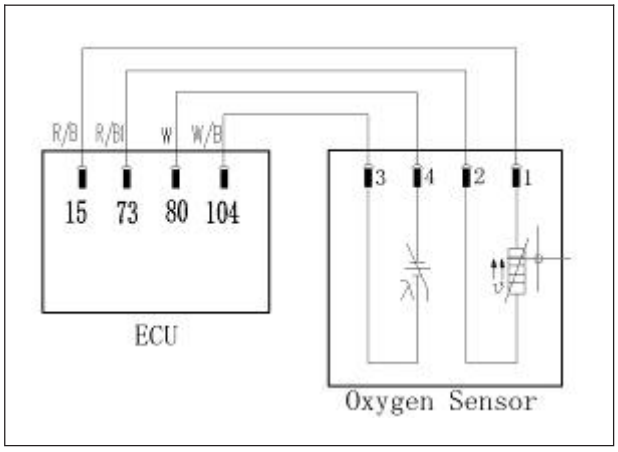
7.17.5 Oxygen Sensor

This sensor is used in closed- loop feedback controlled fuel injection to improve the air-to-fuel ratio accuracy and control the emission. It ' s located in the exhaust stream to measure the amount of oxygen in exhaust and send the signal to ECU, which can revise the fuel injector output, so as to reduce the amounts of unburnt fuel and make catalytic converter convert HC, CO and NOX of Nitrogen efficiently.



Pin function:
1.to heated power +
2.to heated power -
3.output signal voltage -
4.output signal voltage +

Circuit connecting with ECU.

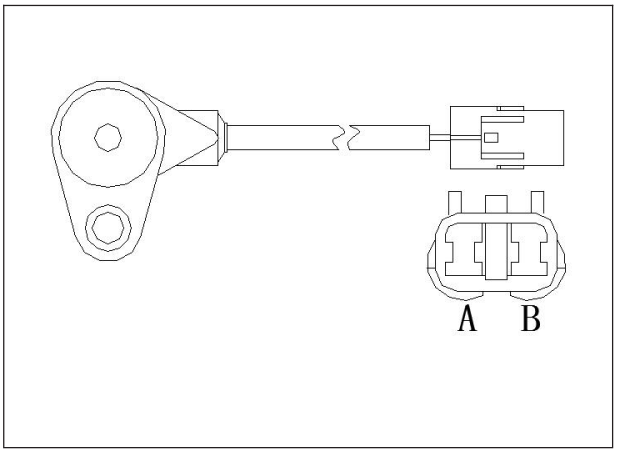


Oxygen sensor characteristic table

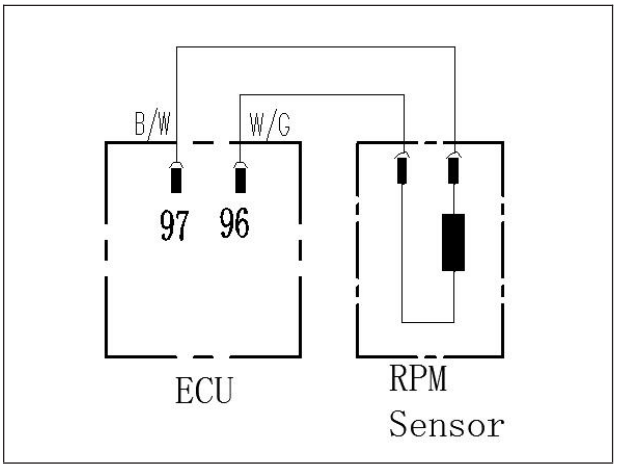
Item	Specification	
Exhaust air temp. (°C)	350	850
Voltage (mV) at λ=0.97(CO=1%)	800±55	700±70
Sensor voltage (mV) at λ=1.10	50±30	50±30
Sensor inner resistance (kΩ)	≤0.5	≤0.25
Response time (ms) (600mV to 300mV)	≤250	≤250
Response time (ms) (300mV to 600mV)	≤100	≤60

7.17.6 RPM Sensor

The trigger transfers signal of engine speed to ECU and by which ECU to confirm engine speed ignition angle and injecting phase.

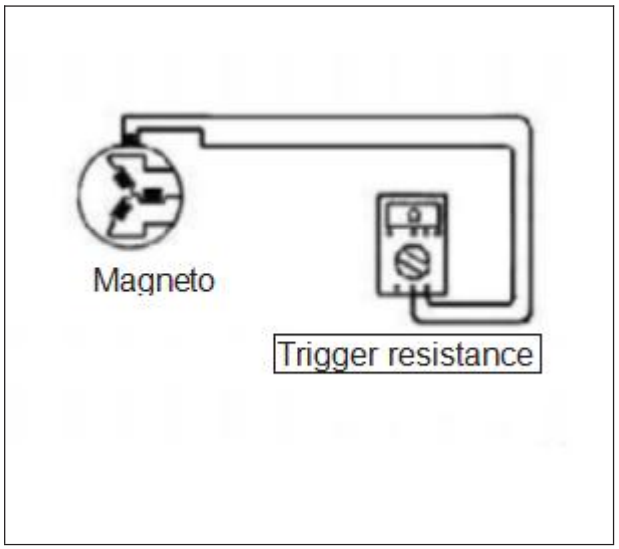


Circuit connecting with ECU.



RPM Sensor resistance Measurement

Set multimeter to 1×2kΩ .
RPM Sensor coil resistance: 950±50Ω(25°C)
Replace a new one when resistance is beyond value range.

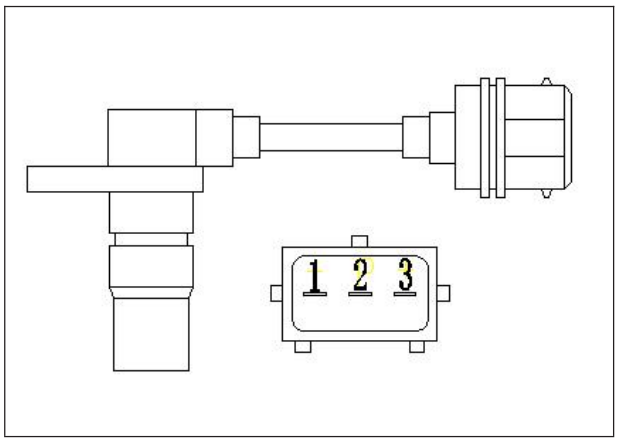


Trigger Peak Voltage Measurement

Connect multimeter and peak voltage adapter as shown as right picture
+Probe: White (B) wire
-Probe: Black (A) wire

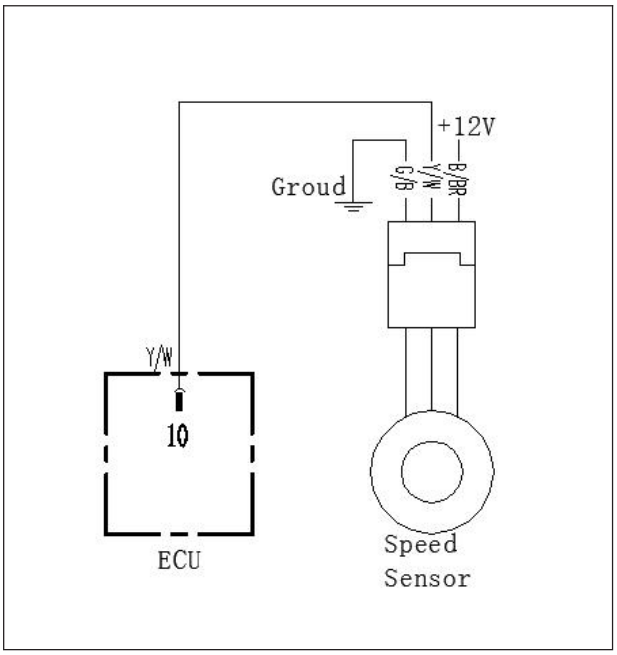
7.17.7 Speed Sensor

This sensor provides engine output shaft speed to ECU. Then ECU can calculate the speed according to this signal. It is a hall switch type device, which outputs square wave by the change of the magnetic field.



Pin function:
1.to groud
2.output voltage signal (>80% of input voltage)
3.to battery+DC12V

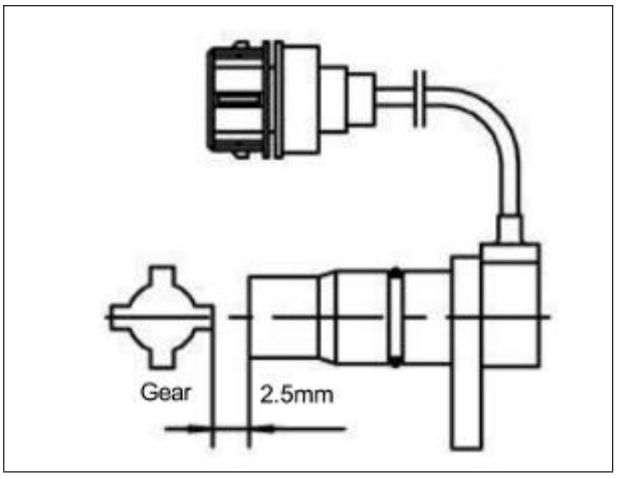
Circuit connecting with ECU.



Speed Sensor Inspection

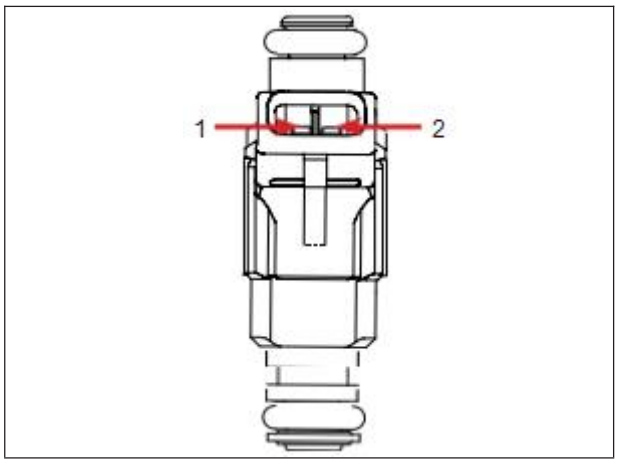
Ground pin 1. Connect pin 3 with +12V power. Fix the gear 2.5mm away from the speed sensor as the picture shows. Turn multimeter to DCV. Slowly rotate the gear and measure the voltage between pin 2 and pin 3 to determine that if the reading varies from 0V~12V.

If the reading does not vary, it indicates the sensor is defective and needs to be replaced.



7.17.8 Fuel Injector

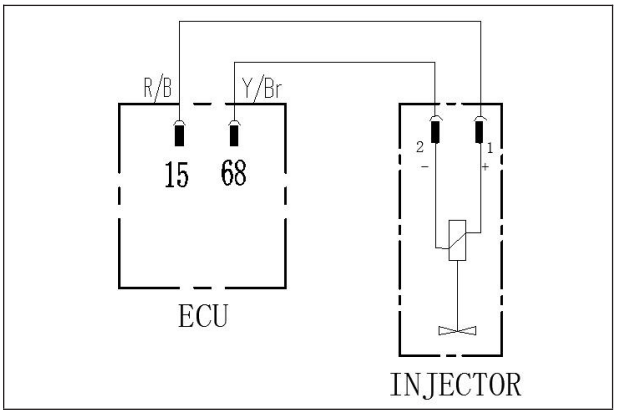
One end of fuel injector is installed on fuel injector seat, and the other attaches to the injector cap. Fuel injector is controlled by ECU to inject fuel at stated time into the engine . This injector nozzle is a 4-hole style. Don ' t turn injector after the join is installed.



Pin function:
1.to power +12V
2.to control signal

Fuel injector resistance: 12Ω(25°C)

Circuit connecting with ECU.

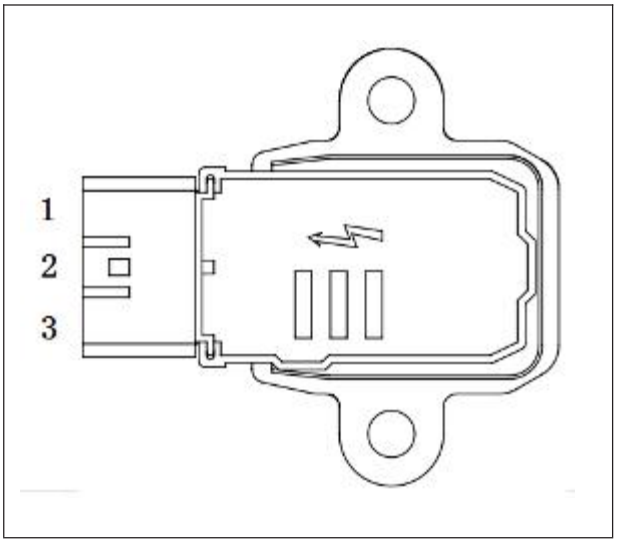


Fuel Injector Installation

Install fuel injector manually. Never knock fuel injector with a hammer.
Replace o-rings during fuel injector removal and installation.
Perform pressure relief before fuel injector removal if necessary.
Inspect the fuel injector for sealing after installation to ensure there is no leaking.

7.17.9 Ignition Coil

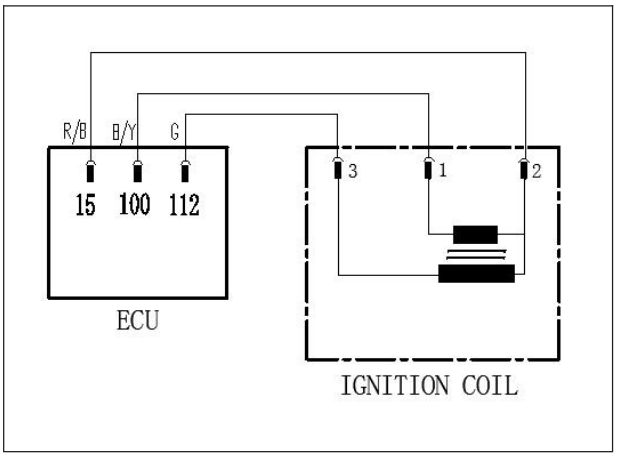
Ignition coil transforms the low voltage of primary coil to high voltage of secondary coil by sparking from spark plug and igniting the mixture of air and fuel in cylinder.



Pin function:

1.to control signal
2.to power +12V
3.to ground

Circuit connecting with ECU.



7.18 EFI SELF-DIAGNOSIS

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 signal (such as close loop control, coolant temperature, idle speed control and battery voltage control, etc.) for reliability. If any process 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 Scanner and MIL, the defective parts can be promptly found to improve the service efficiency and quality.

7.18.1 Malfunction Indicating Lamp (MIL)

When the engine is working, if any process or signal in EFI system,the MIL indicator in meter will light.

7.18.2 Diagnosis Tool and Connector

OBD diagnosis connector 1 is located under front service cover.

There are 16 pins on diagnosis tool, which connects to OBD diagnosis connector.

The picture refers to operation panel of Scanner. When it comes to detailed keys operation and function, refer to Scanner manual.

Scanner Key function:

Refer to the picture on the right

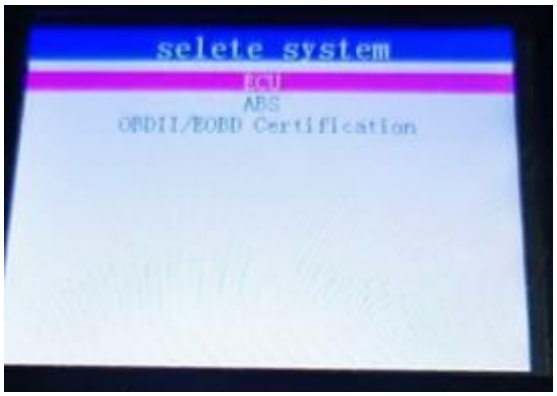
1	[⏮] Key	To return to the previous interface
2	[▲] Key	To move the cursor to upper item in the menu
3	[▼] Key	To move the cursor to down item in the menu
4	[◀] Key	To move the cursor to left item in the menu
5	[▶] Key	To move the cursor to right item in the menu
6	[↵] Key	To confirm and execute this operation

Scanner Functions

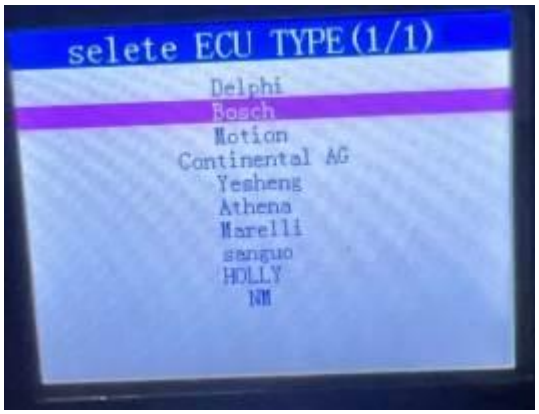
Scanner can be used to diagnose Engine Management System with functions: Read DTC, Clear DTC, Data Stream, , and Record Data.

Operations

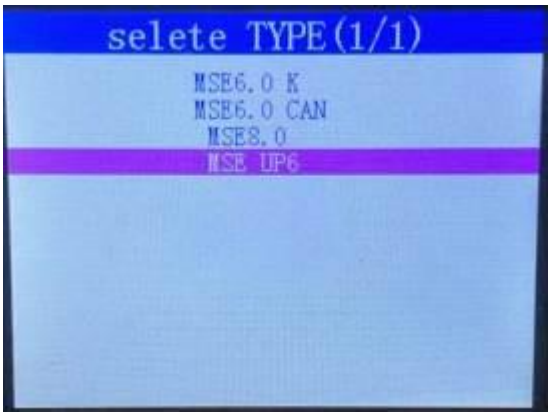
When the unit is powered up, the screen will display the interface as right.



we take diagnostic function for demonstration. Select ECU and press [↵] key, it will display an interface for EFI system selection, as shown right.



Select ‘Bosch’ and press [↵] key, it will display information about the ECU version list, as shown right



Select ‘MSE UP6’ and press [↵] key, it will display information abou function list, as shown right

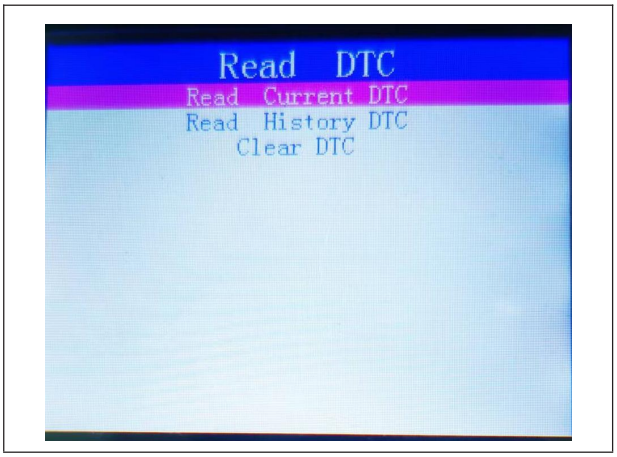
Available functions are as follows:

- Read DTC
- Clear DTC
- Data Stream
- Record Data

Press ▲ or ▼ or ◀ or ▶ key to select function you needed, as shown right

- Read DTC

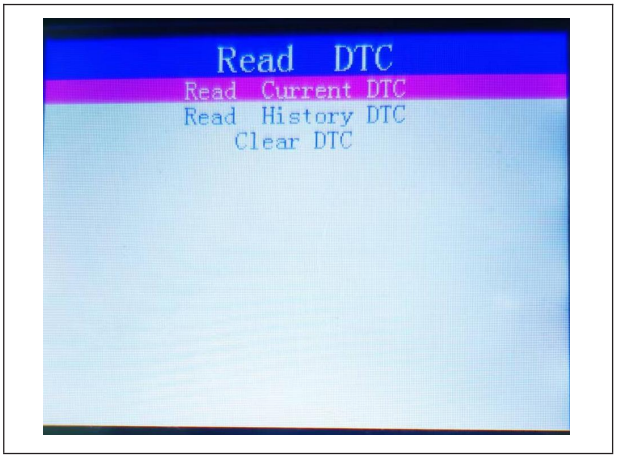
Select ‘Read DTC  ,and press [↵] , it will display function list as right.



Select ‘Read Current DTC’ and press [↵], If there are some malfunctions with the vehicle's EFI system, the screen will display fault information .

● Clear DTC

Select ‘Read DTC  , and press [↵] , it will display function list as right.

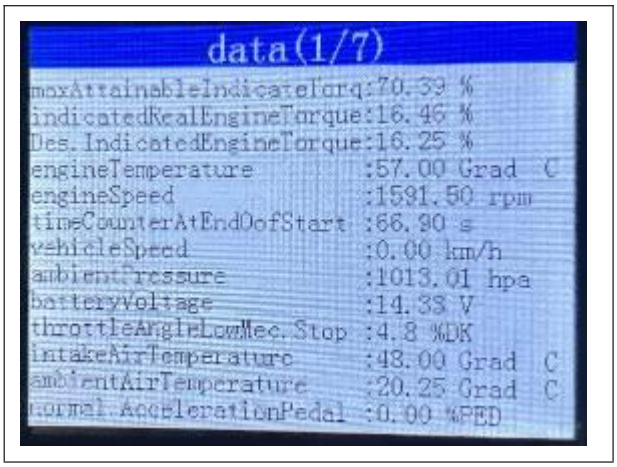


Press ▼ key to select ‘Clear DTC ’ , the screen will display "SUCCESS", as shown right. This means the fault code has been removed successfully.

● Data Stream

Select ‘Read Date  , and press [↵] it will display function list as right.

Select ‘Display Date’, and press [↵], it will display Engine information as right .



● Record Data

Select ‘Record Date  , and press [↵] it will display function list as right.

Press ▼ to select ‘Record Data ’ , it will display as right. (The recorded data can be used to analyze engine conditions)

7.19 FAULT DIAGNOSIS

7.19.1 Engine

Trouble	Reason	Solution
Engine cannot start	1.Inspect the electrical system	
	• Fuse melted	Inspect or replace
	• Battery low	Inspect or charge
	• Cable problem	Inspect or replace
	2.Inspect the spark plug	
	• Ignition coil bad connection	Inspect or replace
	• High voltage bad connection	Inspect or replace
	• RPM sensor trouble	Inspect or replace
	• Magneto trouble	Inspect or replace
	• Spark plug clearance not fit	Adjust or replace
	• Spark plug dirty	Clean or replace
	• Spark plug too wet	Dry or replace
	3.inspect fuel supply system	
	• Canister	
	• Fuel pump leaking or bad effect	Repair and replace
	• Fuel line leaking	Inspect or replace
	• Fuel low	Inspect the fuel tank
	• Injector jammed	Replace
	4. Inspect cylinder pressure	
	• Cylinder wearing	Replace
	• Piston ring wearing	Replace
	• Gasket leaking	Replace
	• Valve conducting pipe wearing	Replace
	• Valve seat bad sealing	Repair or replace
	• Valve wearing	Replace
	• Spark plug loose	Tighten
	• Starting RPM low	Inspect or replace
	• Valve TDC wrong	Adjust
	• Valve clearance not fit	Adjust
	5. Idle by pass valve jammed	Clean or replace
	6. Not in N gear	Shift to N gear
	7. Trouble code	Inspect
Engine hard to start	1. Idle valve bad	Inspect the reason
	2. TPS not in 0	Inspect the reason
	3. Engine pressure low	
	4. Inspect the spark plug	Inspect the reason
	• Spark plug bad	
	• Spark plug setting bad	
	• Spark plug damage	
	• Spark plug dirty	
	5. Fuel low or pressure low	Replace the parts
	6. CAPS or cable bad	

Trouble		Reason	Solution
Engine overheat		1. Coolant level low	Fill
		2. Cooling system got bubble	Drain and refill
		3. Water temp sensor problem	Replace
		4. Thermostat problem(Not open in high heat)	Replace
		5. Inspect the leaking hole to see leaking	Replace the water seal
		6. Inspect the pipe and clamp	
		• Pipe cracked or getting old	Replace
		• Clamp getting loose	Tighten
		7. Water pump impeller broken	Replace
		8. Water pump gasket leaking	Tighten or replace
		9. Cylinder head gasket leaking	Replace
		10. Water pump cover drain bolt gasket leaking.	Tighten or replace
		11. Water pump gear wearing cause coolant not enough.	Replace
		12. Water pump shaft jammed	Replace the bad parts
Lubrication	Oil wasting high/Oil pressure low or no oil pressure	1. Inspect the engine oil level to see the crankcase and oil seal leaking.	
		• Crankcase damage leaking	Replace and reassemble
		• Crankcase bolt loose	Tighten
		• Sealing ring/O-ring/Gasket cracked, old or damaged	Replace
		• Piston ring damaged(Blue smoke)	Replace
		• Piston ring damaged(Pressure low)	Replace
		• Valve oil seal damaged. Lip cracked or old.	Replace the oil seal
		2. Oil filter jammed	Replace the filter and oil
		3. Inspect the oil drain bolt	
		• Case bottom bevel bolt loose	Tighten
		• Oil drain bolt loose or without washer	Tighten or install washer
		4. Oil leaking	Replace the oil seal
		5. Oil strainer jammed	Clean and replace
		6. Inspect the oil pump	
		• Oil pump rotor wearing	Replace
		• Wasted oil or air inlet cause the oil pump jammed.	Replace
		• Oil pump gear damaged.	Replace
		• Use wrong oil	Use recommend oil
	Oil getting white	1. Leaking indicator shows the oil mixed with water	Replace oil seal and water seal.
		2. Cylinder gasket damaged or leaking.	Tighten or replace
		3. Cylinder head bolt loose.	Tighten and replace the oil
		4. Oil has dust inside	Replace damaged parts(Including filter and oil)

Trouble		Reason	Solution
CVT	Abnormal accelerate	1. Belt getting narrow	Replace
		2. Inspect the main sliding wheel	
		● Rolling ball wearing	Replace
		● Main roller track wearing	Replace
		3. Drive/Driven pulley axial sliding not smooth	Clean or replace
		4. Driven pulley sprint too strong	Replace
		5. Driven pulley clutch shoe/Surface wearing	Replace
		6. Drive/Driven pulley groove damaged.	Replace
		7. Connect the Scanner to find trouble	Replace
		8. Valve clearance not fit	Adjust
		9. Pressure low	
		10. Spark plug bad ignition	Replace
	Top speed low	Inspect“Abnormal accelerate” 1~3 CVT got dirty.	Clean and replace
		Drive pulley jammed	Clean and replace
		Driven pulley spring bad or damaged	Replace
	Shifting not smooth	1. Inspect the Shifting mechanism	
		● Inspect“Abnormal accelerate” 1~2	
		2. Inspect the driven pulley	
		● Driven pulley spring bad or damaged	Replace
		● Clutch shoe or surface got damaged	Replace
	Belt burnt	1. Inspect the CVT cooling pipe	
		● CVT room too hot	Clean
		● Main stable wheel impeller jammed	Clean
		2.Inspect the wheel groove surface	
		● Groove got dirty	Clean and replace the belt
		● CVT case got water in	Clean and replace the belt
	Drive belt trouble	Wearing too much	Replace
		Belt specification wrong	Replace
		Belt got wearing	Replace
		Belt cracked and reach the life period	Clean and replace the belt
		Groove got oil dirty	Clean
		Drive or driven pulley got damaged by stone	Clean or replace
		Belt getting old	Replace

Trouble		Reason	Solution
Engine noise or shocked	Cylinder head noise	1. Valve clearance not fit	Adjust or replace
		2. Tensioner bad	Replace
		3. Chain conductor wearing	Replace
		4. Chain getting longer or sprocket wearing	Replace
		5. Sprocket bolt loose	Tighten
		6. Valve rocker arm or camshaft wearing.	Adjust or replace
		7. Camshaft TDC wrong.	Adjust or replace
	Crankshaft noise	1. Main bearing damaged	Replace
		2. Connecting rod bearing damaged	Replace
		3. Magneto bolt getting loosed	Tighten or replace
		4. Left crankcase cover bearing damaged	Replace
	Case noise	1. Oil leaking	Replace,tighten and fill
		2. Gear teeth damaged	Replace
	CVT idle noise	1. Driven pulley sliding shaft sleeve jammed or wearing.	Replace the driven pulley
		2. Inspect the drive slide wheel	
		3. Roller ball wearing	Replace at same time
		4. Drive slide wheel track wearing	Replace
		5. Drive slide wheel track wearing	Replace
		6. Nylon part damaged	Replace at same time
		7. Axial sliding jammed	Clean or replaced
		8. Drive wheel nut loose	Tighten
	CVT noise	1. Inspect “Idle noise” 1~3	
		2. Drive pulley wet and dirt	Clean or drain
		3. Drive/Driven pulley nut loose	Tighten
		4. Driven pulley slide shoe surface damaged	Replace
		5. Belt or wheel damaged by other trash.	Clean or replace
	CVT Drive pulley shock	1. Drive pulley nut loose	Tight
		2. Drive slide wheel sleeve clearance large.	Replace
		3. Roller ball lost or wearing	Replace at same time
		4. Washer not in position	Reassemble or replace
	CVT driven pulley shock	Driven bearing sleeve clearance too large	Replace

7.20 FAULT CODE TABLE

No.	Code	Statement
1	P010817	Manifold Absolute Pressure/Barometric Pressure Circuit High
2	P010716	Manifold Absolute Pressure/Barometric Pressure Circuit Low
3	P1098 00	DUMP control Circuit low
4	P1099 00	DUMP control Circuit high
5	P011317	Intake Air Temperature Sensor 1 Circuit High
6	P011216	Intake Air Temperature Sensor 1 Circuit Low
7	P011817	Engine Coolant Temperature Sensor 1 Circuit High
8	P011716	Engine Coolant Temperature Sensor 1 Circuit Low
9	P068816	ECM/PCM Power Relay Sense Circuit/Open
10	P068829	ECM/PCM Power Relay Sense Circuit/Open
11	P065012	MIL Control Circuit High
12	P065011	MIL Control Circuit Low
13	P065013	MIL Control Circuit Open
14	P069212	Fan 1 Control Circuit High
15	P069111	Fan 1 Control Circuit Low
16	P048013	Fan 1 Control Circuit
17	P062912	Fuel Pump “A” Control Circuit High
18	P062811	Fuel Pump “A” Control Circuit Low
19	P062713	Fuel Pump “A” Control Circuit /Open
20	P045912	Evaporative Emission System Purge Control Valve Circuit High
21	P045811	Evaporative Emission System Purge Control Valve Circuit Low
22	P044413	Evaporative Emission System Purge Control Valve Circuit Open
23	P041212	Secondary Air Injection System Switching Valve “A” Circuit
24	P041411	Secondary Air Injection System Switching Valve “A” Circuit Shorted
25	P041313	Secondary Air Injection System Switching Valve “A” Circuit Open
26	P026212	Cylinder 1 Injector Circuit High
27	P026111	Cylinder 1 Injector Circuit Low
28	P020113	Injector Circuit/Open – Cylinder 1
29	P026512	Cylinder 2 Injector Circuit High
30	P026411	Cylinder 2 Injector Circuit Low
31	P020213	Injector Circuit/Open – Cylinder 2
32	P056317	System Voltage High
33	P056216	System Voltage Low
34	P05601C	System Voltage Not plausible
35	P050129	Vehicle Speed Sensor “A” Range/Performance
36	P064100	Sensor Reference Voltage "A" Circuit/Open
37	P065100	Sensor Reference Voltage "B" Circuit/Open

No.	Code	Statement
38	P057129	Brake Switch "A" Circuit
39	P05711C	Brake Switch "A" Circuit
40	P213800	Throttle/Pedal Position Sensor/Switch “D”/“E” Voltage Correlation
41	P012317	Throttle/Pedal Position Sensor/Switch "A" Circuit High
42	P012216	Throttle/Pedal Position Sensor/Switch "A" Circuit Low
43	P012129	Throttle/Pedal Position Sensor/Switch "A" Circuit Range/ Performance
44	P022317	Throttle/Pedal Position Sensor/Switch "B" Circuit High
45	P022216	Throttle/Pedal Position Sensor/Switch "B" Circuit Low
46	P022129	Throttle/Pedal Position Sensor/Switch "B" Circuit Range/ Performance
44	P022317	Throttle/Pedal Position Sensor/Switch "B" Circuit High
45	P022216	Throttle/Pedal Position Sensor/Switch "B" Circuit Low
46	P022129	Throttle/Pedal Position Sensor/Switch "B" Circuit Range/ Performance
47	P210612	Throttle Actuator Control System Forced Limited Power
48	P210619	Throttle Actuator Control System Forced Limited Power
49	P210692	Throttle Actuator Control System Forced Limited Power
50	P210613	Throttle Actuator Control System Forced Limited Power
51	P156800	Idle Speed Contr.Throttle Pos. mechanical Malfunction
52	P154500	Throttle Pos.Contr. Malfunction
53	P155900	Idle Speed Contr.Throttle Pos. Adaptation Malfunction
54	P154522	Throttle Pos.Contr. Malfunction
55	P154521	Throttle Pos.Contr. Malfunction
56	P157900	Idle Speed Contr.Throttle Pos. adaptation not started
57	P156400	Idle Speed Contr.Throttle Pos. Low Voltage During Adaptation
58	P156500	Idle Speed Control Throttle Position lower limit not attained
59	P155929	Idle Speed Contr.Throttle Pos. Adaptation Malfunction
60	P212317	Throttle/Pedal Position Sensor/Switch “D” Circuit High
61	P212216	Throttle/Pedal Position Sensor/Switch “D” Circuit Low
62	P213829	Throttle/Pedal Position Sensor/Switch “D”/“E” Voltage Correlation
63	P212817	Throttle/Pedal Position Sensor/Switch “E” Circuit High
64	P212716	Throttle/Pedal Position Sensor/Switch “E” Circuit Low
65	P060694	ECM/PCM Processor
66	P060692	ECM/PCM Processor
67	P210629	Throttle Actuator Control System Forced Limited Power
68	P060664	ECM/PCM Processor

No.	Code	Statement
69	P060661	ECM/PCM Processor
70	P060667	ECM/PCM Processor
71	P06061C	ECM/PCM Processor
72	P060655	ECM/PCM Processor
73	P060600	ECM/PCM Processor
74	P060662	ECM/PCM Processor
75	P060696	function monitoring: fault of ECU ADC - Null Load Test Pulse
76	P060697	function monitoring: fault of ECU ADC - test voltage
77	P060647	function monitoring:fault of ECU monitoring modul error
78	P060617	Reported Over Voltage of VDD5
79	P060616	Reported Under Voltage of VDD5
80	P060649	Diagnostic fault check to report "WDA active"
81	P060648	Diagnostic fault check to report "WDA active" due to errors in query-/response communication
82	P060691	Diagnostic fault check to report "WDA active" due to over voltage detection
83	P003111	O2 Sensor Heater Control Circuit Low Bank 1 Sensor 1
84	P003212	O2 Sensor Heater Control Circuit High Bank 1 Sensor 1
85	P003013	O2 Sensor Heater Control Circuit Bank 1 Sensor 1
86	P013217	O2 Sensor Circuit High Voltage Bank 1 Sensor 1
87	P013116	O2 Sensor Circuit Low Voltage Bank 1 Sensor 1
88	P013029	O2 Sensor Circuit Bank 1 Sensor 1
89	P013413	O2 Sensor Circuit No Activity Detected Bank 1 Sensor 1
90	P005212	O2 Sensor Heater Control Circuit High Bank 2 Sensor 1
91	P005111	O2 Sensor Heater Control Circuit Low Bank 2 Sensor 1
92	P005013	O2 Sensor Heater Control Circuit Bank 2 Sensor 2
93	P015217	O2 Sensor Circuit High Voltage Bank 2 Sensor 1
94	P015116	O2 Sensor Circuit Low Voltage Bank 2 Sensor 1
95	P015029	O2 Sensor Circuit Bank 2 Sensor 1
96	P015413	O2 Sensor Circuit No Activity Detected Bank 2 Sensor 1
97	U007388	Control Module Communication Bus Off
98	U014087	Lost Communication With Body Control Module
99	U012187	Lost Communication With Anti-Lock Brake System (ABS) Control Module
100	U015587	Lost Communication With Instrument Panel Cluster (IPC) Control Module
101	U019887	Lost Communication With Gateway "A"
102	U013187	Lost Communication With Power Steering Control Module
103	U016787	Lost Communication With Vehicle Immobilizer Control Module

No.	Code	Statement
104	P030000	Misfire detected
105	P030100	Misfire detected on cylinder 1
106	P130A00	Cylinder selective fuel cutoff active due to catalyst damaging misfire
107	P230100	Ignition Coil “A” Primary Control Circuit High
108	P230000	Ignition Coil “A” Primary Control Circuit Low
109	P030000	Misfire detected
110	P030100	Misfire detected on cylinder 1
111	P130A00	Cylinder selective fuel cutoff active due to catalyst damaging misfire
112	P230100	Ignition Coil “A” Primary Control Circuit High
113	P230000	Ignition Coil “A” Primary Control Circuit Low

7.21 WIRING DIAGR