LINHAI

SERVICE MANUAL

LANDFORCE 550

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.

CONTENTS

⚠ 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

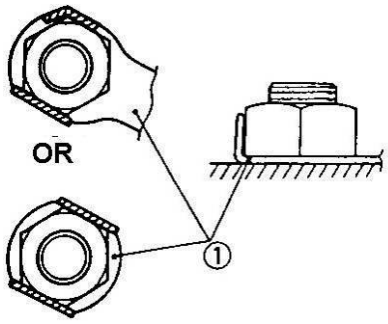
Use only genuine parts for all replacements. Use recommended oil and grease for all lubrication jobs. Other brands may be similar in function and appearance, but inferior in quality.

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

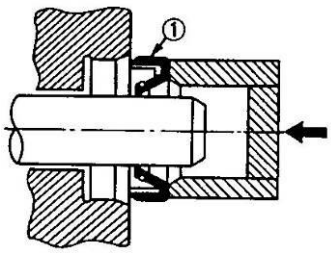
Replace all lock washers/plates and cotter pins after removal. Bend lock tabs along the bolt or nut flats after the bolt or nut has been tightened to specification.



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:

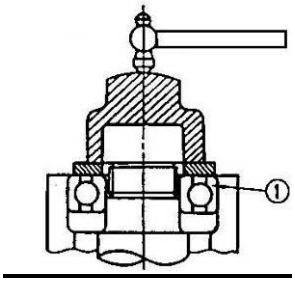
Do not use compressed air to spin the bearings dry. This will damage the bearing surfaces.

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



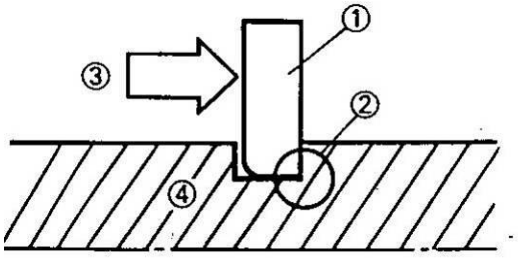
CHECKING OF CONNECTIONS

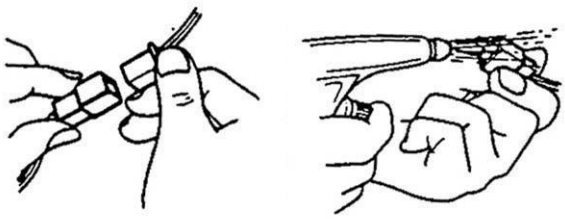
Dealing with stains, rust, moisture, etc. on the connector.

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.

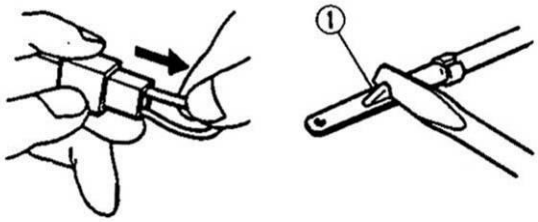




7. Check for continuity with a tester.

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.

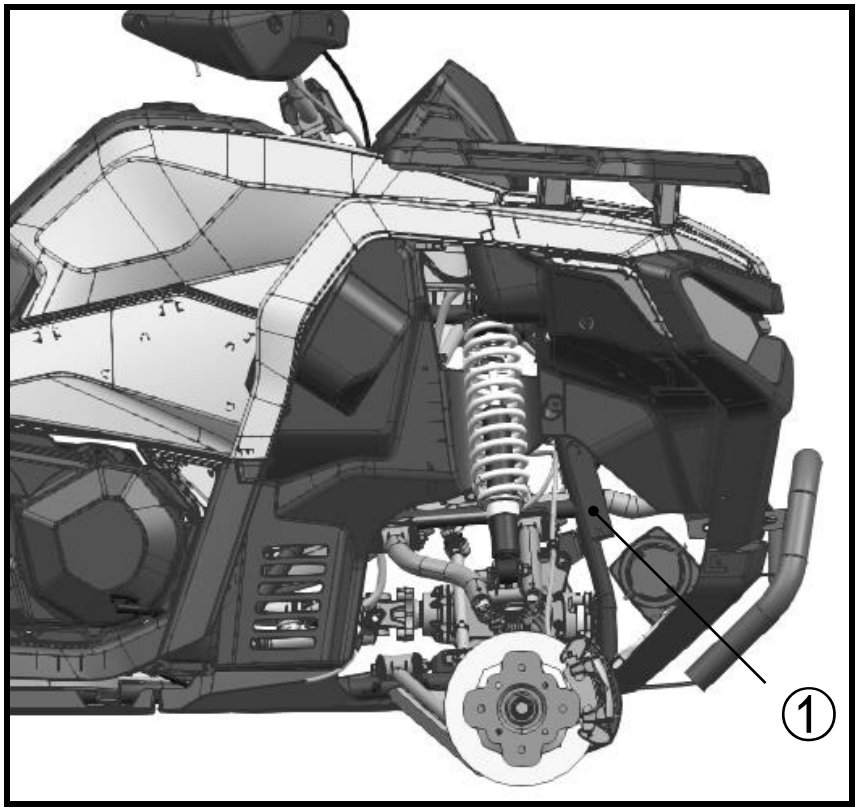
METRIC		MULIPLIER		IMP
**mm	x	0. 3937	=	**in
**cm	x	0.03937	=	**in

CONVERSION TABLE

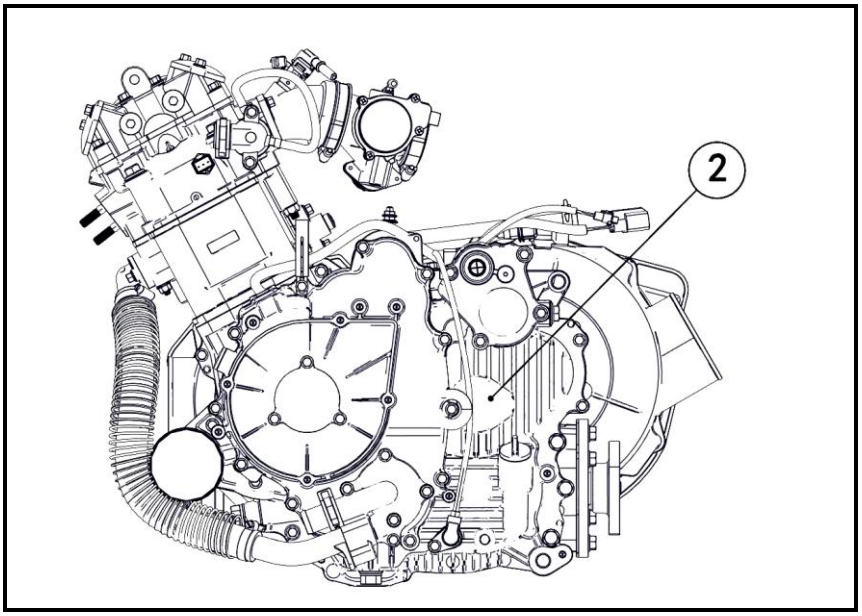
METRIC TO IMP			
	Known	Multiplier	Result
Torque	m • kg m • kg cm • kg cm • kg	7.233 86.794 0.0723 0.8679	ft • lb In • lb ft • lb In • lb
Weight	kg g	2.205 0.03527	lb oz
Distance	km/h km m m cm mm	0.6214 0.6214 3.281 1.094 0.3927 0.03927	mph mi ft yd in in
Volume/ Capacity	cc(cm^3) cc(cm^3) lit(liter) 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

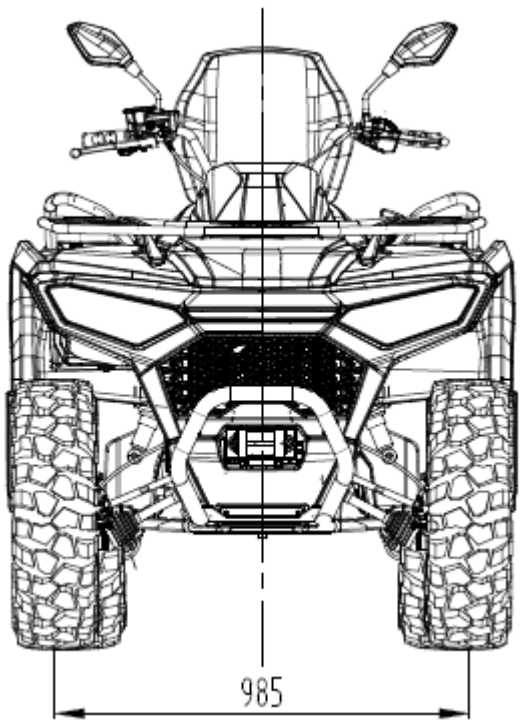
The vehicle identification number ① is stamped into the right side of front vertical beam of the frame.

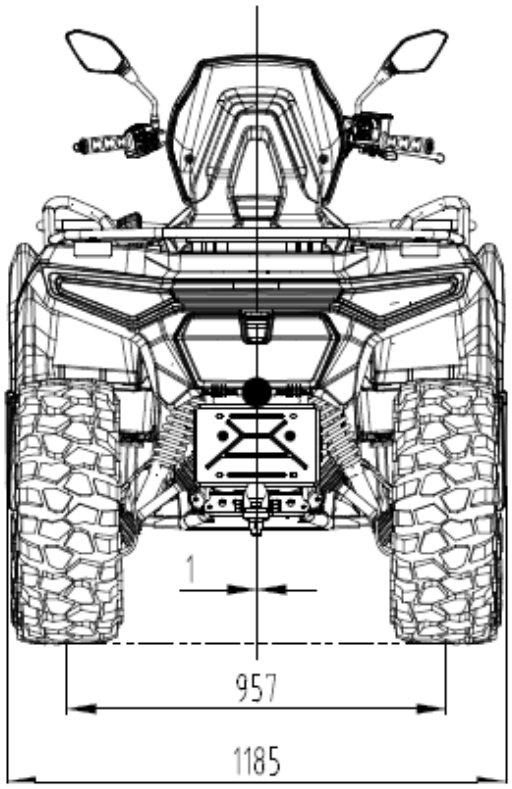


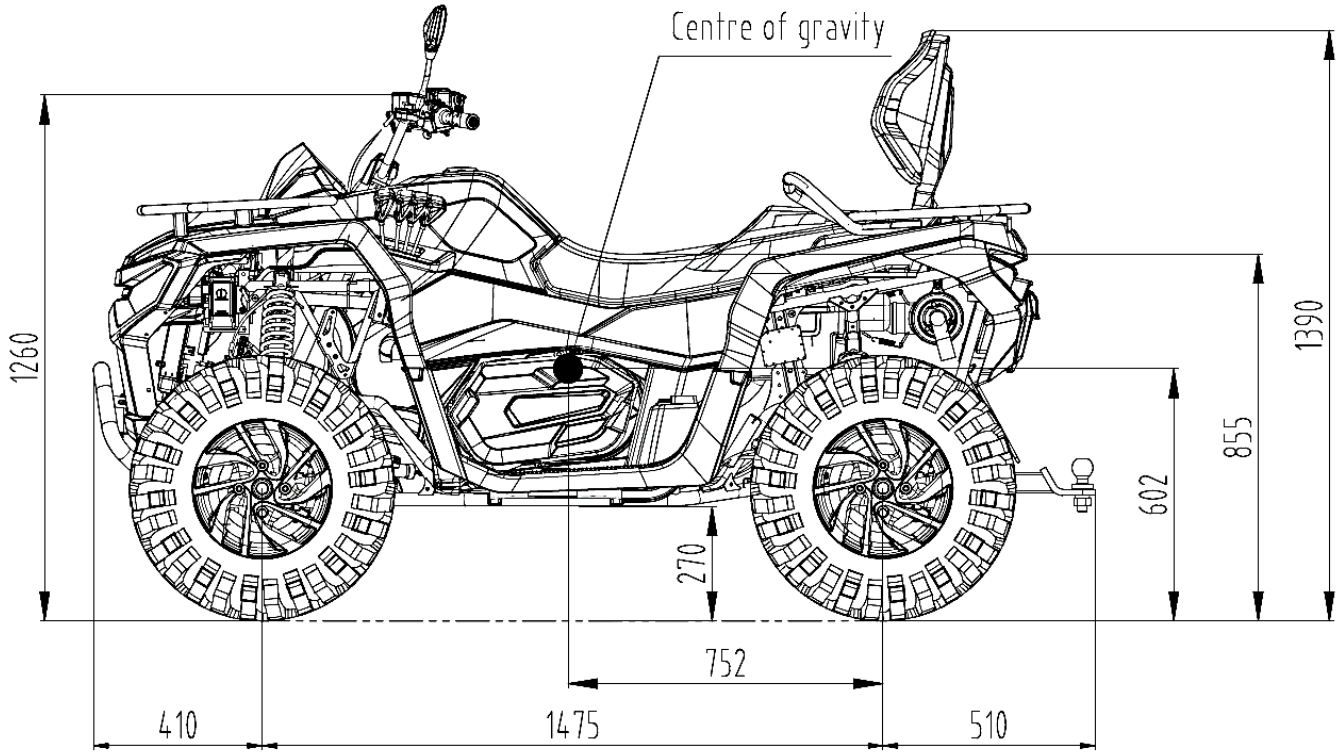
The engine serial number ② is stamped into left side of engine crankcase.



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

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.

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

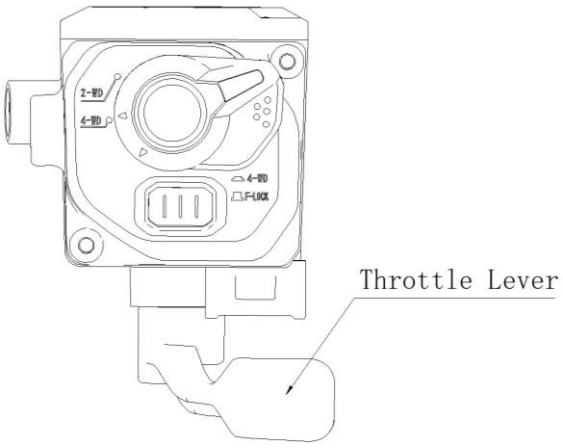
Check and lubricate all components at the intervals outlined in the Periodic Maintenance Chart beginning, or more often under severe use, such as wet or dusty conditions. Items not listed in the chart should be lubricated at the general lubrication interval.

	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 throttle lever. Check the lever for free movement and return before starting the engine, also check occasionally during operation.

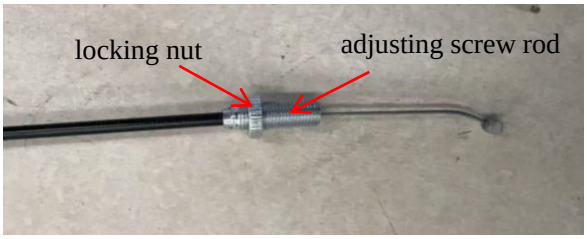


THROTTLE FREE PLAY INSPECTION

1. Put the gear shift lever in the N(Neutral) position.
2. Start the engine, and warm it up thoroughly.
3. Measure the distance the throttle pedal moves before the engine begins to pick up speed. Free play should be 1.5 – 3 mm.

Adjustment

1. Turn the locking nut to the bottom of the adjusting screw rod.
2. Turn the adjusting screw rod until 1.5 to 3 mm, free play is achieved pedal. NOTE: While adjusting free play, it is important you flip the throttle lever back and forth.
3. Tighten the locking nut.



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.

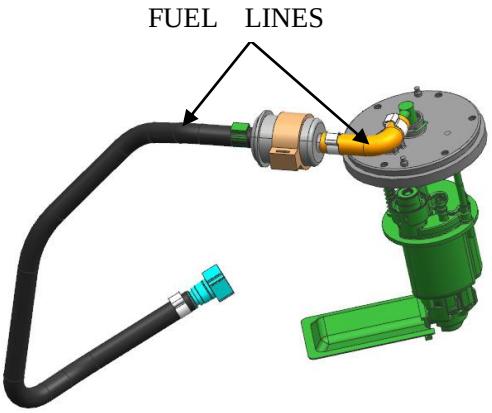
⚠ If you spill fuel on your skin or clothing, immediately wash it off with soap and water and change clothing.

⚠ 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

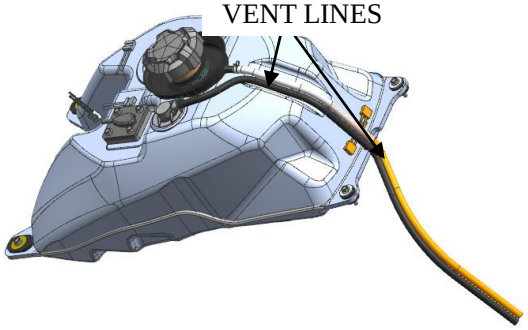
1. Check fuel lines for signs of wear, deterioration, damage or leakage. Replace if necessary.
2. Be sure fuel lines are routed properly and secured with cable ties.



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

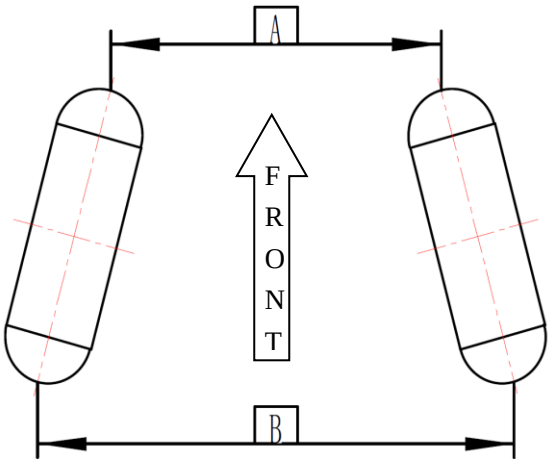
VENT LINES

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.

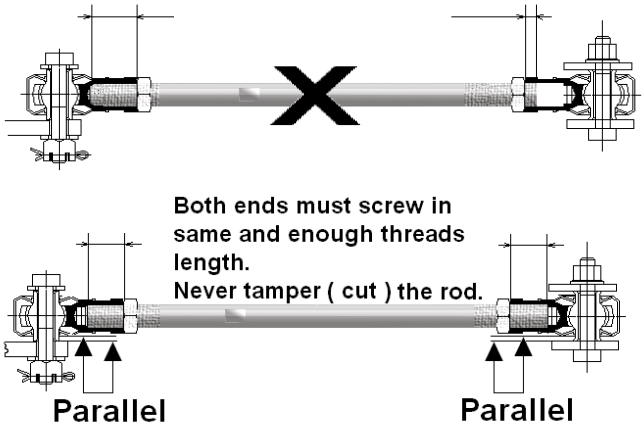
NOTE: String should just touch side surface of rear tire on each side of the ATV.

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

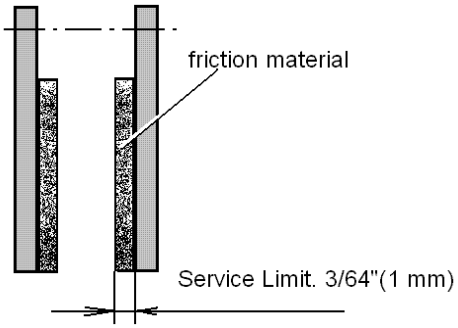
- Keep fluid level in the master cylinder reservoir to the indicated level on reservoir.
- Use DOT 4 brake fluid.

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.

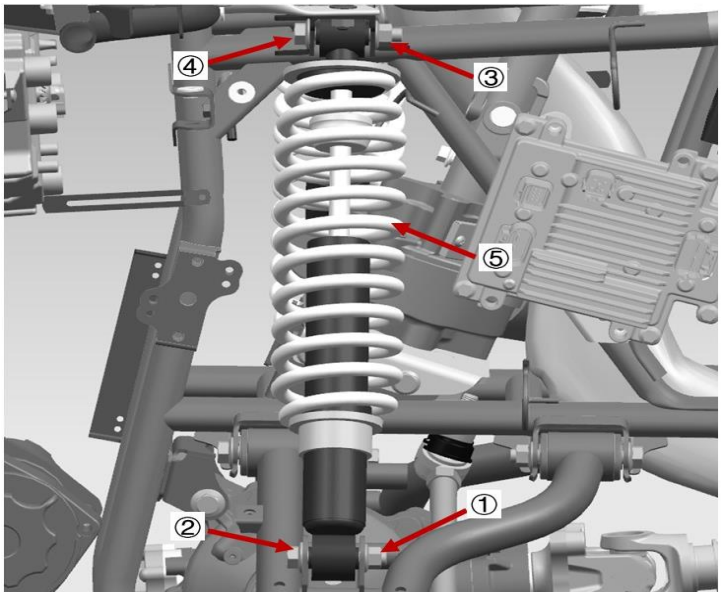
2.6 SUSPENSION SYSTEM

SHOCK ABSORBER

(1)Front Shock Absorber

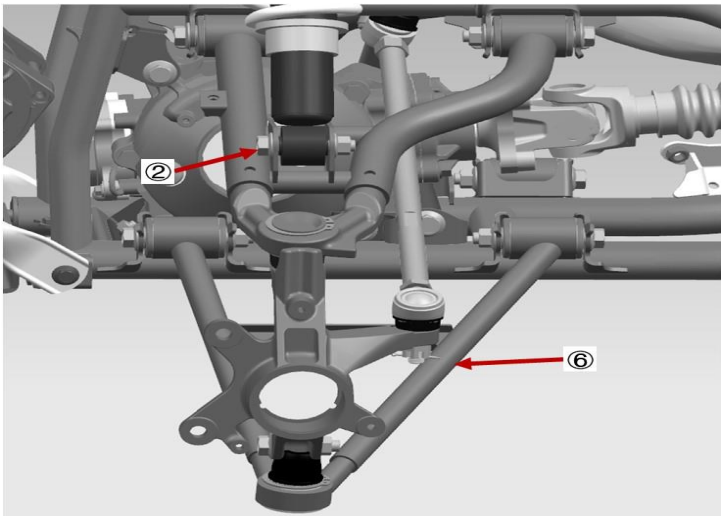
Removal

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.

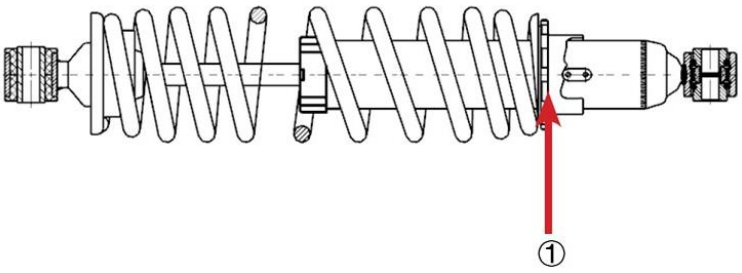


Inspection

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.



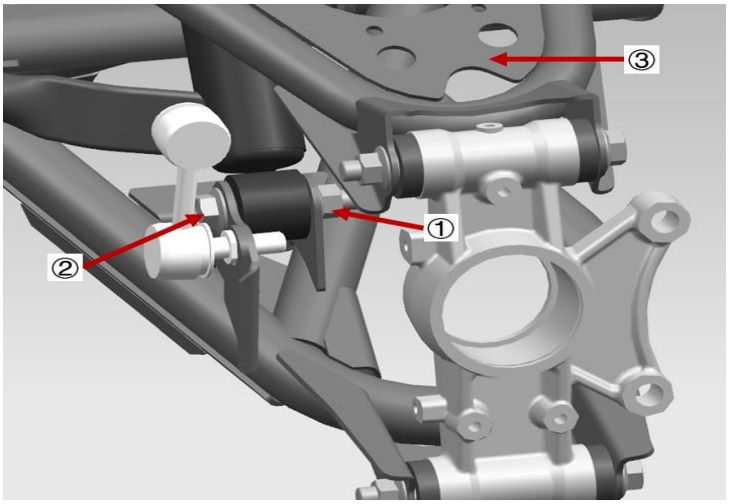
Adjust shock absorber according to its load.
Turn clockwise to increase spring tension.
Turn counter-clockwise to decrease tension.

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

(2)Rear Shock Absorber

Removal

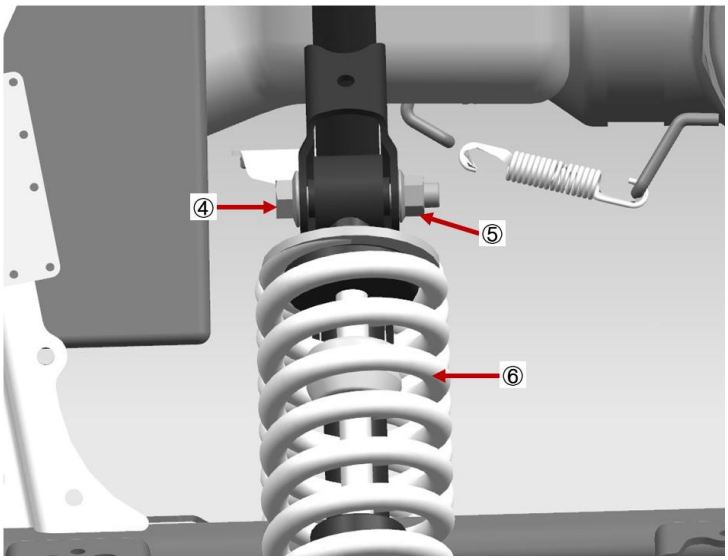
Remove nut ①.
Remove bolt ②.
Remove swing arm assy. ③.



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

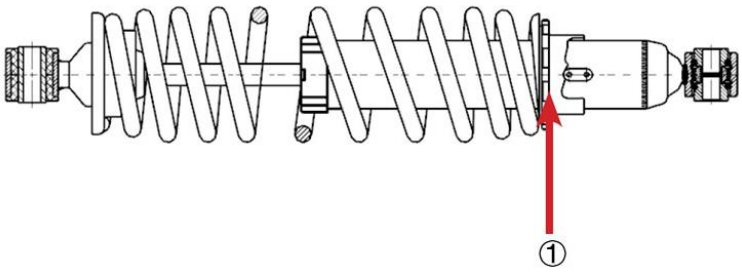
Inspect shock absorber appearance for cracks or damage. Replace if any defect is found.
Inspect shock absorber for leakage. Replace if necessary.
Clean the dirt on shock absorber.

Shock Absorber Adjustment

Turn the adjusting retainer ① on

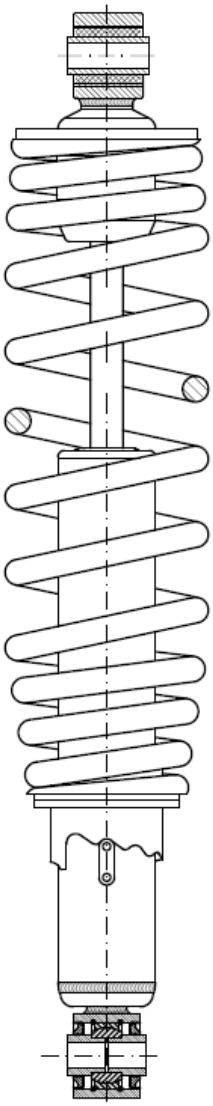
shock absorber with absorber wrench.

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

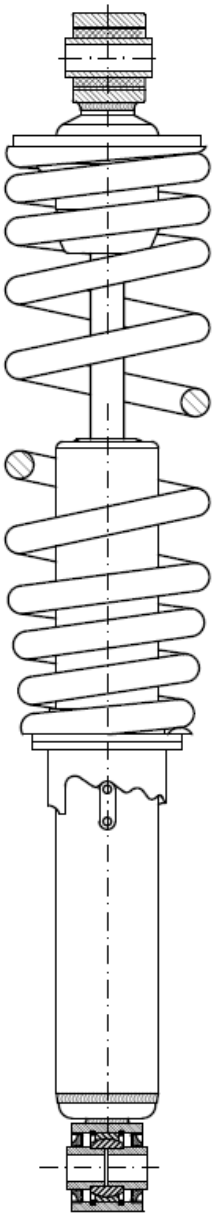


NOTE: Make sure the LH and RH shock absorber are parallel after adjustment.

Front Shock Absorber



Rear Shock Absorber



2.7 WHEELS

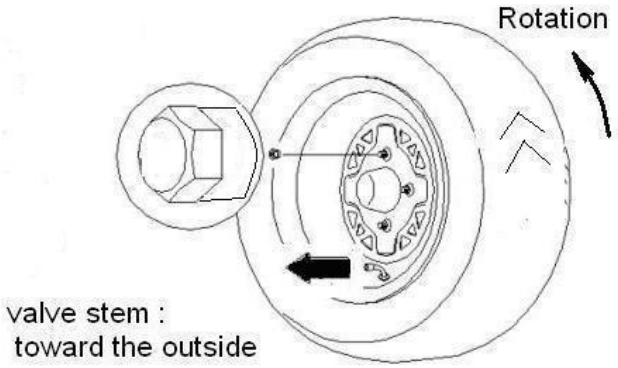
Inspect all wheels for runout of damage.
Check wheel nuts and ensure they are tight.
Do not over tighten the wheel nuts.

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:

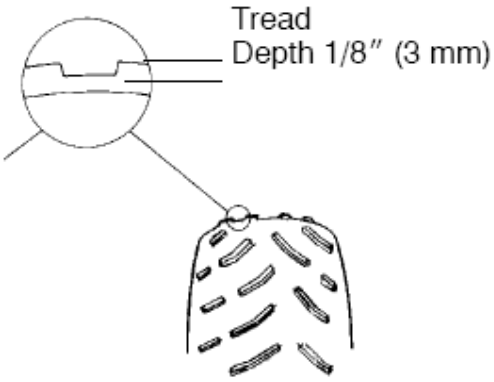
- Maintain proper tire pressure. Refer to the warning tire pressure decal applied to the vehicle.

- 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. Removal and Installation of Engine

3.1.1 Overhaul info

Operation cautions

●Securely support the ATV with bracket when removing or installing engine.
Take care not to damage frame, engine body, bolts and cables.

●Wrap the frame to avoid any possible damage when removing or installing the engine.

●Following operation doesn't require removal of engine from the vehicle:

—Fuel pump
—Throttle body, air filter
—Cylinder head cover, cylinder head, cylinder body, camshaft
—CVT system, CVT cover
—Right side cover, AC magneto, water pump
—Piston, piston ring, piston pin

●Following operation require removal of engine from vehicle:

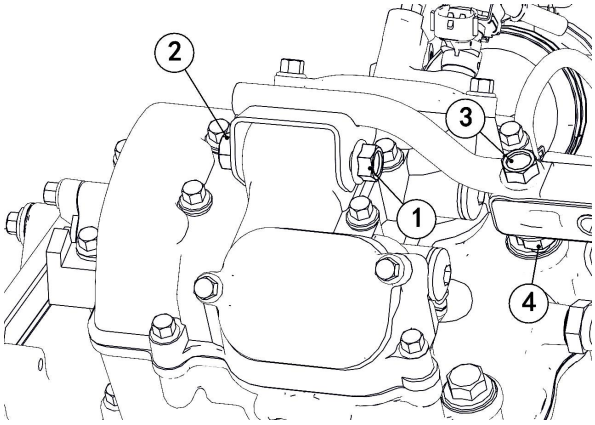
—Crankshaft
—Gearbox
—Oil pump

●Tightening torque:

Engine front upper mounting bolt: 50～60N • m
Engine front rear mounting bolt:50～60N • m
Nut, engine front rear mounting bracket:40～50N • m

●Engine Removal

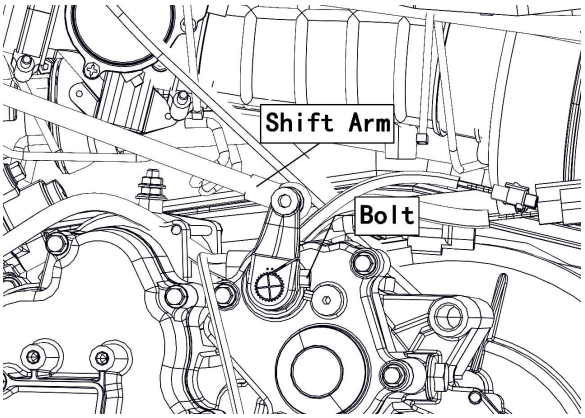
Remove:
--Plastic
--Cushion Support Component
--Air Filter
--Throttle Body



Remove bolt ①③
Remove nut ②④

Remove bolt

Remove shift arm

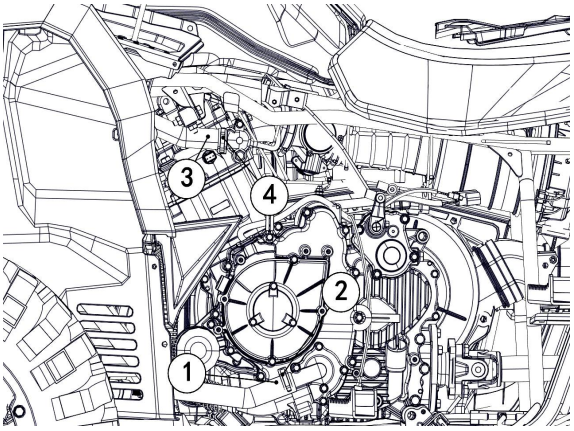


Remove connector of water temperature transducer

Remove clamp ②④

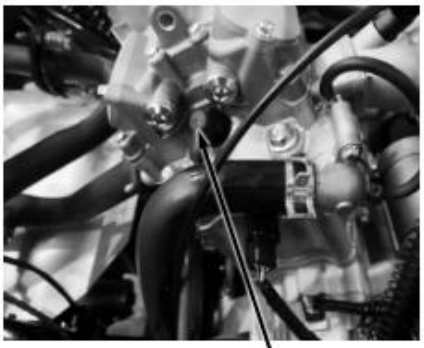
Remove water inlet hose（engine）①

water outlet hose（engine） ③



Remove connectors of magneto, enriching device lead, pickup, water temperature transducer, gear sensor as illustrated on the right.

Remove spark plug cap from cylinder.

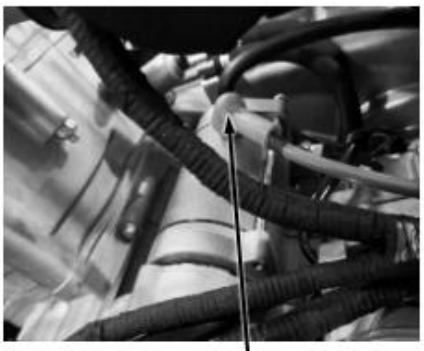


Spark Plug Cap

Remove protection sleeve of starter relay.

Remove Nut.

Disconnect positive wire of starter relay.



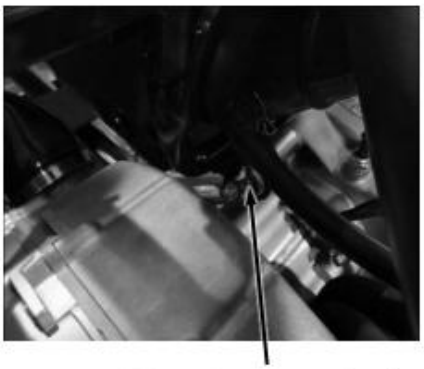
Positive Wire,Starting Motor

Remove Bolt.

Remove negative wire of starter relay.

Negative Wire,Starting Motor

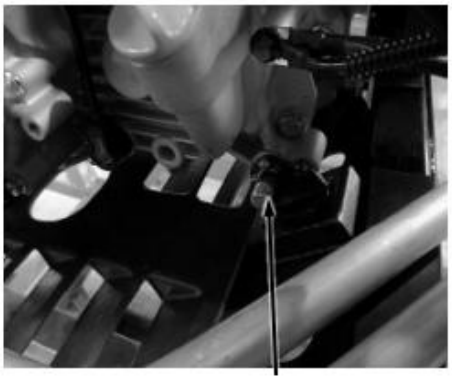
Remove the Bolt and Nut of upper engine hanger.



Bolt and Nut of upper engine hanger

.

Remove 2 Bolts and Nuts of lower engine hanger



2 Bolts and Nuts of lower engine hanger

Remove 4 Bolts of lower engine hanger.

4 Bolts of lower engine hanger

Remove 4 Bolts of front steering kunckle connected
with the engine

4 Bolts of front kunckle connected with the engine

Remove 4 Bolts of rear steering kunckle connected with the engine

4 Bolts of rear kunckle connected with the engine

3.1.2 Engine Installation

Put engine onto the frame，install the two lower mounting bolts and nuts.
Then install the upper and lower engine hangers.

Tightening torque: Engine upper hanger bolt:50～60N•m
Engine lower hanger bolt:50～60N•m

Install:
--Water outlet and inlet hoses to engine with proper clamps.
--Positive and negative starting wires to engine.
--Connect all the connectors.
--Spark plug cap.
--Shifting anchor plate and cable shifter to engine.
--Air filter, throttle body and removed parts.

3.2 Engine Overhaul Information

3.2.1 COVNERSION TABLE

Item	Conversion
Press	1mmHg=133.322Pa=0.133322KPa 1kgf/cm^2 =98.0665KPa 1KPa=1000Pa
Torque	1kgf.m=9.80665N.m
Volume	1ml=1cm^3 =1cc 1l=1000 cm^3
Force	1kgf=9.80665N

Warning/Caution/Note

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

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

Caution:
indicates a potential hazard that could be result in vehicle damage.

Note:
provides key information to make procedures easier or instruction clearer.

Please note, however, that the warnings and cautions contained in this manual can't possibly cover all the
potential dangerous information to the servicing, or lack of the vehicle. Except WARNINGS and CAUTIONS
stated in this manual, mechanic should have a basic understanding of the mechanical ideas and the procedure
of machine repair. If mechanic can't master all the troubleshooting operation, please consult with qualified
mechanic for advice.

3.2.2 GENERAL PRECAUTIONS

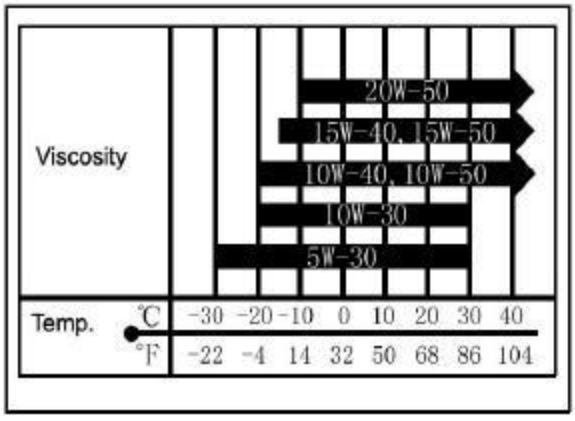
Warning ! Proper service and repair procedures are important for the safety of operator and the safety and reliability of the vehicle.

When two or more persons work together, keep reminding each other for safety purpose.
When the engine indoors starts, make sure that the exhaust gas is forced outdoors.
If use hazardous or flammable material, please strictly operate according to manufacturer's operation
manual. Operate in a well- ventilated place.
Never use gasoline as a cleaning solvent.
Do not touch the engine oil, radiator or muffler with bare hands to avoid scalding before it is cooled.
Check all the lines, and fittings related to the system for leakages, after repairing fuel, cooling, lubricating
or exhaust system .
Do not dispose used oil, coolant or defective parts optionally for environmental purpose.

CAUTION:
Use genuine LINHAI parts or their equivalent.
Place and store the disassembled parts separately in order for correct assemble.
Use special tools according to service manual.
Make sure that all parts used in reassembly are clean, lubricated them when specified.
Use the special lubricants, sealants and greases.
Pre-tighten the bolts, nuts and screws, then tighten according to the specified torque, from big to small and
from inner side to outer side.
Fix torque screw with torque wrench, clean grease or oil from the screw thread before fixing.
Check the parts after disassembling, clean the parts before measuring.
Check parts for tightness and proper operation, after assembling.
Replace the disassembled washers, o-rings, seals, locknuts, lockwashers, cotter pins, circlips with new ones.

3.2.3 FUEL, OIL AND COOLANT

Fuel
Use unleaded gasoline with octane number over 87
OIL
Use a premium quality 4-stroke motor oil to ensure longer service life of your vehicle. Use only oils that meet API service classifications SG and that have a viscosity rating of SAE15W/40. If oil with a rating of SAE 15W/40 is not available, select an alternative according to the chart.



ENGINE COOLANT

Since antifreeze also has corrosion and rust-inhibiting properties, always use coolant containing antifreeze,
even if the atmospheric temperature does not go below the freezing point.
It is suggested that the freezing point of antifreeze should be 5℃ lower than the lowest ambient temperature
where the vehicle is used.
Recommended Coolant: -35℃ antifreeze, corrosion-resistant, high boiling point coolant

Warning! Coolant is poisonous. Never drink it. Store it properly.

Caution: DO NOT mix coolant with that of other engines.

3.2.4 BREAK-IN PROCEDURES

During manufacturing only the best possible material are used and all machined parts are finished to a very
high standard. It is still necessary to allow the moving parts to “BREAK-IN” before subjecting the engine to
maximum stresses. The future performance and reliability of the engine depends on the care and restraint
exercised during its early life. Refer to the following break-in engine speed recommendations.
For better performance and durability, a new engine requires a run-in time of 20 hours as under:

0~10 Hours:

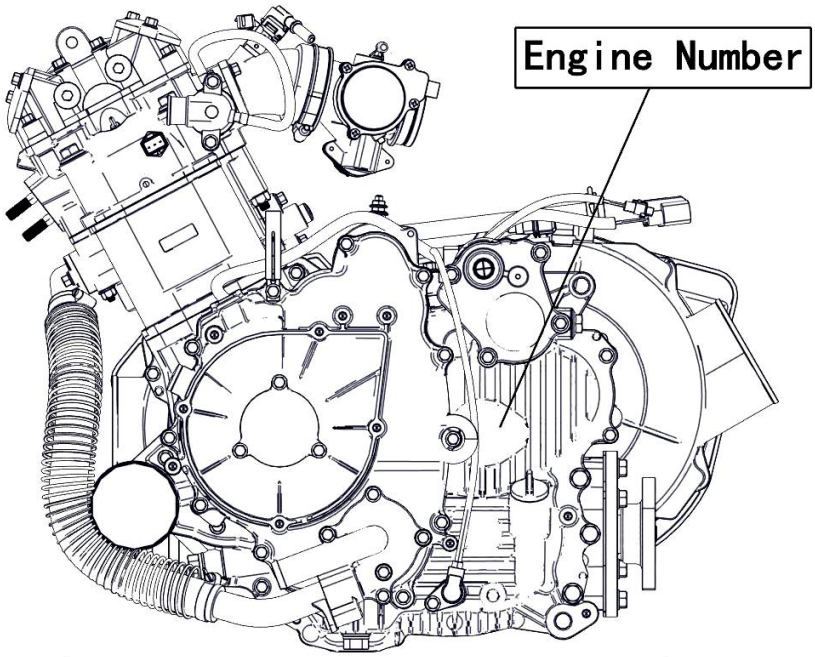
Avoid continuous operation above half throttle. Allow a cooling off period of five to ten minutes after every hour
of operation. Vary the speed of vehicle from time to time. Do not operate it at one set throttle position.

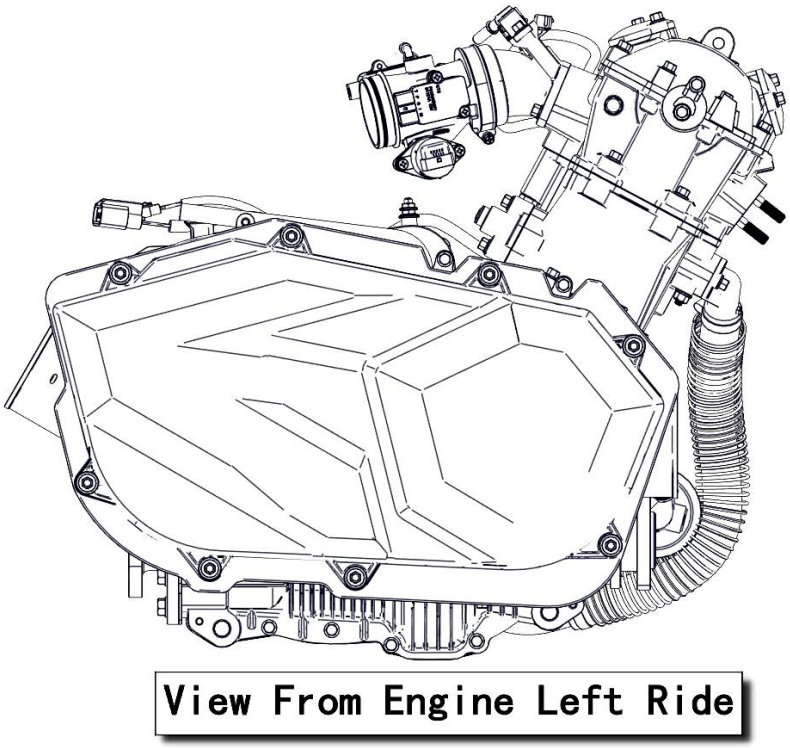
10~20 Hours

Avoid prolonged operation above 3/4 throttles. Rev the vehicle freely but do not use full throttle at any time.

Note: Keep the daily maintenance during the run-in time and eliminate the troubles, if any. After 20h run-in time, do the maintenance according to the owner’s manual for normal operation of the ATV.

3.2.5 Engine Exterior and Engine No





3.2.6 Engine Specification

REF. NO	ITEM			Type/SPECIFICATION
1	Type			Single Cylinder, 4-Storke, Liquid-cooled, 4 Valve, SOHC
2	Bore and stroke			87.5mm×82.0mm
3	Displacement			493ml
4	Compression ratio			10.2: 1
5	Lowest continuous idle speed with load			1400r/min±100r/min
6	Starting type			Electrical starting
7	Electrical System	Ignition / Ignition Timing		EFI ECU Magneto ignition/BTDC10°1500r/min
		Spark Plug/ Spark Plug Gap		DPR7EA-9 (NGK)/0.8mm-0.9mm
		Magneto		Permanent Magnet AC Type
8	Combustion System	Combustion Chamber		Triangle Combustion Chamber
		Air Filter		Sponge Element Filter
		Gasoline		RQ-87
9	Valve System	Valve Type		SOHC/Chain Drive
10	Lubrication System	Lubrication Type		Pressure & Splash
		Oil Pump		Trochoid
		Filter Type		Full Flow Filter Screen
		Oil Type		SAE15W-40/SG
11	Cooling System	Cooling Type		Closed Coolant Circulation
		Coolant Type		—35℃ Rust-resistant antifreeze
12	Drive System	Clutch type		Wet, Auto-centrifugal
		Operation Mode		Automatic(CVT)+Parking and Gear Shifting
		Gears		2 Forward Gears + 1 Reverse Gear
		Shift Type/Sequence		Hand Operation/L-H-N-R
		(CVT) Gear Ratio		2.88-0.70
		Transfer Gear Ratio	Final Ratio	1.333(24/18, bevel gear)
			Secondary Ratio	1.952(41/21)
			Gears	Low Gear:2.25(36/16) High Gear :1.35(27/20) Reverse Gear:1.471(25/17)
			Total	Low Gear:5.857, High Gear:3.514,Reverse Gear:3.828
13	Overall Dimension			610×568×519mm
14	Net Weight			70kg
15	Output type			Front and rear shaft output
16	Rotational Direction of Engine Output			Clockwise (from behind engine at forward gear)

3.2.7 Overhaul Data

Item	Standard		Service Limit	Remark
Valve Head Diameter	IN	30.6	----------	
	EX	27.0		
Valve Clearance	IN	0.05-0.10	----------	
	EX	0.010-0.037		
Clearance Between Valve Guide and Valve Stem	IN	0.010-0.037	----------	
	EX	0.030-0.057		
Inner Diameter of Valve Guide	IN & EX	5.000-5.012	----------	
Outer Diameter of Valve Stem	IN	4.975-4.990	----------	
	EX	4.955-4.970	----------	
Valve Stem Play	IN & EX	----------	0.05	
Length of Valve Stem End	IN & EX	2.9-3.1	2.3	
Valve Head Thickness	IN & EX	----------	0.5	
Play of Valve Head Seal	IN & EX	----------	0.03	
Width of Valve Seat Seal	IN & EX	0.9-1.1	----------	
Valve Spring Free Length	IN & EX	40	38.8	
Valve Spring Tension	IN & EX	182-210N,(when compressed to 31.5mm)	----------	
Cam Height	IN	33.430-33.490	33.130	
	EX	33.500-33.560	33.200	
Clearance Between Camshaft Outer Diameter & Hole	Φ22	0.032-0.066	0.150	
	Φ17.5	0.028-0.059	0.150	
Camshaft Outer Diameter	Φ22	21.959-21.980	----------	
	Φ17.5	17.466-17.484	----------	
Inner Diameter of Camshaft Hole	Φ22	22.012-22.025	----------	
	Φ17.5	17.512-17.525	----------	
Camshaft Play			0.10	
Inner Diameter of Rocker Arm	IN & EX	12.000-12.018	----------	
Outer Diameter of Rocker Arm	IN & EX	11.973-11.984	----------	
Cylinder Head Distortion	0.03		0.05	
Cylinder Head Cover Distortion	0.03		0.05	

Cylinder + Piston + Piston Ring + Connecting Rod

Item	Standard			Service Limit	Remark
Cylinder Pressure	1000KPa			----------	
Cylinder-Piston Clearance	0.030-0.051			0.15	
Piston Skirt Diameter	87.460-87.480 (10mm form skirt end)			87.380	
Inner Diameter of Cylinder	87.500-87.522			----------	
Cylinder Joint Face Distortion	0.015			0.05	
Piston Ring Free Gap	Top Ring	R	About 11.7	8.9	
	2ND Ring	R	About 12	9.5	
Piston Ring Gap In Bore	Top Ring		0.15-0.30	0.60	
	2ND Ring		0.15-0.30	0.60	
Piston Ring Groove Clearance	Top Ring		0.04-0.08	0.180	
	2ND Ring		0.03-0.07	0.150	
Piston Ring Thickness	Top Ring		0.97-0.99	----------	
	2ND Ring		1.17-1.19	----------	
Piston Ring Groove Width	Top Ring		1.03-1.05	----------	
	2ND Ring		1.22-1.24	----------	
	Oil Ring		2.51-2.53		
Inner Diameter of Piston Pin Hole	23.002-23.008			23.030	
Outer Diameter of Piston Pin	22.995-23.000			22.980	
Inner Diameter of Connecting Rod Small End	23.006-23.014			23.040	
Clearance of Connecting Rod Big End	0.10-0.55			1.0	
Thickness of Connecting Rod Big End	24.95-25.00				
Crankshaft Play	0.03			0.08	

Lubrication

Item	Standard		Service Limit	Remark
Clearance between Inner and Outer Rotors	0.03mm-0.10mm		0.15mm	
Clearance between Outer Rotor and Oil Pump Body	0.03mm-0.10mm		0.12mm	
Oil Pressure	130Kpa-170Kpa (3000r/min)		---------	
Oil Type	SAE15W-40, API SG		---------	
Oil Capacity	When changing	1900ml	----------	
	When Replacing Filter	2000ml	----------	
	Engine Repair	2200ml	---------	

Clutch + Transfer

Item	Standard	Service Limit	Remark
Clutch Plate Inner diameter	140.00-140.15	140.50	
Clutch Engagement Speed	2000-2400r/min	---------	
Drive Belt Width	35	33.5	
Free length of Secondary Sheave Spring	168	160	
Shift Fork to Groove Clearance	0.10-0.40	0.50	
Thickness of Left Shift Fork	5.8-5.9	----------	
Thickness of Right Shift Fork	5.8-5.9	----------	
Shift Fork Groove Width	6.0-6.2	----------	
Drive Output Gear Groove Width	6.0-6.2	----------	

Cooling System

Item	Standard		Service Limit	Remark
Thermostat Valve Opening Temperature	68-74℃		----------	
Thermostat Valve Lift	4.5-6.5mm (at 80℃)		----------	
Radiator Cap Opening Pressure	110-140Kpa		----------	
Corresponding Relation Between Water-temperature Transducer' resistance and water-temperature	Water Temperature (℃)	Resistance (kΩ)	----------	
	-20	13.71~16.49		
	20	2.2128~2.6391		
	80	0.303~0.326		
	110	0.1383~0.1451		
Coolant Type	-35℃ antifreeze, corrosion-resistant, high boiling point coolant		----------	

Electrical System

Item		Standard	Remark
Spark Plug	Type	NGK;DPR7EA-9	
	Gap	0.8-0.9	
Spark Character		>8mm	
Ignition coil Resistance	Primary	0.74Ω-0.78Ω	
	Secondary	10.1kΩ-11.1kΩ	
Magneto Coil Resistance	Pick-up	180Ω	
Magneto Voltage (Without load)		>100V(AC),5000r/min	
Max. Magneto Output Power		400W, 5000r/min	
Regulated Voltage		13.5V-15.0V, 5000r/min	

3.2.8 Tightening Torques

Item	Quantities	Thread Size (mm)	Tightening Torque (N.m)	Remark
Reverse Gear Sensor	1	M10×1.25	20	
Spark Plug	1	M12×1.25	18	
Water-temperature Sensor	1	M12×1.5	10	Apply Thread Locker
Adjusting Nut, Valve Clearance	4	M5	10	
Nut, Primary Sheave	1	M20×1.5	115	
Nut, Secondary Sheave	1	M20×1.5	115	
Ring Nut, Secondary Sheave	1	M30×1	100	
Nut, Front Drive Shaft	1	M14×1.5	97	
Nut, Drive Bevel Gear	1	M22×1	145	
Nut, Driven Bevel Gear	1	M16×1.5	150	
Limit Nut, Drive Bevel Gear Bearing	1	M60	110	Apply Thread Locker
Nut, Universal Joint Yoke	1	M55	80	Counter Clockwise, Apply Thread Locker
Bolt, Rocker Arm Shaft	2	M14×1.25	40	
Oil Drain Bolt	1	M12×1.5	30	
Bolt, Overriding Clutch	6	M8	26	Apply Thread Locker
Bolt, Magneto Stator	3	M6	10	Apply Thread Locker
Screw, CVT Plate	3	M6	10	Apply Thread Locker
Bolt, Oil Pipe	2	M14×1.5	40	
Bolt, Oil Pump	3	M6	10	
Bolt, Pressure Release Valve	2	M6	10	
Bolt, Drive Bevel Gear Cover	4	M8	32	
Bolt, Driven Bevel Gear Cover	4	M8	25	
Bolt, Gear Limit	1	M14×1.5	18	
Bolt, Splined Spacer	1	M10×1.25	60	
Bolt, drive pulley(CVT drive	1	M12×1.5-LH	55	
Nut, CVT driven pulley		M20×1.5	110	

Tightening Torques

Item	Quantities	Thread Size (mm)	Tightening Torque (N.m)	Remark
Bolt, Crankcase	14	M6	10	
	3	M8	25	
Bolt, Driven Sector Gear	1	M6	12	
Bolt, Oil Filter	1	M20×1.5	36	
Bolt, Oil Starter Motor	2	M6	10	
Bolt, Cylinder Head	4	M10	42	
Bolt, Cylinder Head	2	M6	10	
	1	M8	25	
Bolt, Cylinder (Upper & Lower)	4	M6	10	
Bolt, Cylinder Head Cover	12	M6	10	
Bolt, Chain Tensioner	2	M6	10	
Bolt, Chain Tensioner	1	M8	20	
Bolt, Fan Motor	3	M6	10	
Bolt, Thermostat Housing	2	M6	10	
Bolt, Water Pump Cover	3	M6	10	
Bolt, Water Pump	2	M6	10	
Fixing Bolt, Timing Chain	2	M6	15	Apply Thread Locker
Other Bolts		M5	4.5-6	
		M6	8-12	
		M8	18-25	

3.2.9 Maintenance 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
30	(-) Driver		
31	(+) Driver		

Special Tools

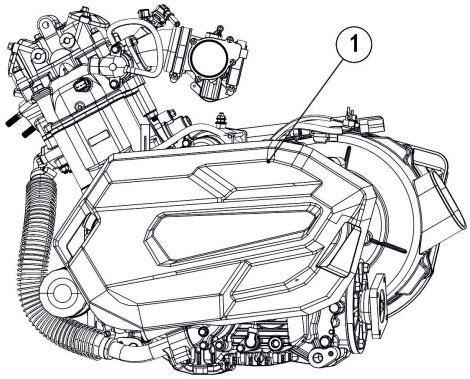
No.	Description	Specifications	Purpose
1	Spark Plug Wrench		Removal and installation of spark plug
2	Clutch Holder		For removing/installing clutch carrier nuts
3	Oil Filter Wrench		Removal and installation of oil filter cartridge
4	Piston Pin Puller		For removal of piston pin
5	Flywheel Puller		For removal of magneto rotor
6	Crankcase Separating Tool		For separation of left and right crankcase
7	Crankshaft Remover		For removal of crankshaft from left crankcase
8	Crankshaft Installation Set		For installing crankshaft to left crankshaft
9	Valve Spring Compressor		For removal and installation of valve spring
10	Valve Seat Cutter		For valve-seating
11	Ring Nut Wrench		Removal/installation of CVT secondary sheave
12	Sheave Holder		Removal/installation of CVT secondary sheave
13	Sheave Spring Compressor		Removal/installation of CVT secondary sheave
14	Couple Gear/Middle Shaft Tool		Removal/installation of the coupling gear nut
15	Bearing Driver	Set	For installation of bearing and oil seal
16	Bearing Removing Tool	Set	For removal of bearing
17	Oil Seal Removing Tool		For removal of oil seal
18	Universal Joint Holder		For removal/installation of the universal joint yoke nut

3.2.10 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	10W-50 SN	Cylinder bore Crankcase Refer to Engine Lubrication System (→14-14)	capacity 1900ml (for changing oil) 2000ml (for replacing filet) 2200ml (for engine repairing)
Molybdenum lubrication oil		piston pin、valve stem、valve oil seal、camshaft	
Lubricating Grease	#3 MoS_2 Lithium Base Grease	Oil seal lip, O-ring and sealing faces of other rubber seal materials, bearings with seals, CVT bearing and collar	
Coolant	-35℃ antifreeze, corrosion-resistant, high boiling point coolant	Cooling system、Water-seal	Capacity according to radiator and water hose system
Joint Face Sealant		Joint face of crankcase, crankcase and cylinder, cylinder head and cover	
Thread Locker		Thread Parts	

3.3 Checks & Adjustment



3.3.1 Procedures of Maintenance & Adjustment

This section describes the maintenance procedures for Maintenance Chart.

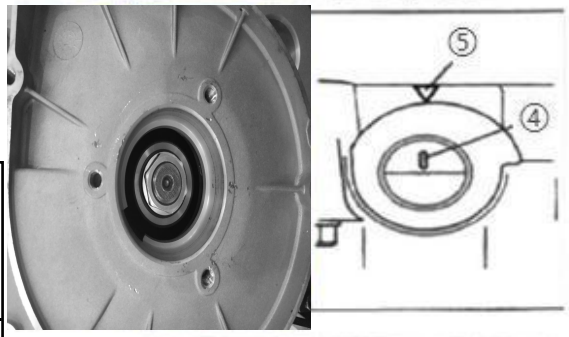
3.3.1.1 VALVE CLEARANCE

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 cover ①
Remove inspection cap ②on left crankcase.
Remove 2 valve adjusting cover ③
Turn the crankshaft until the line④ of T.D.C. on rotor is aligned with mark⑤ 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 (When cold)
IN: 0.05-0.10mm EX: 0.15-0.20mm



Note:

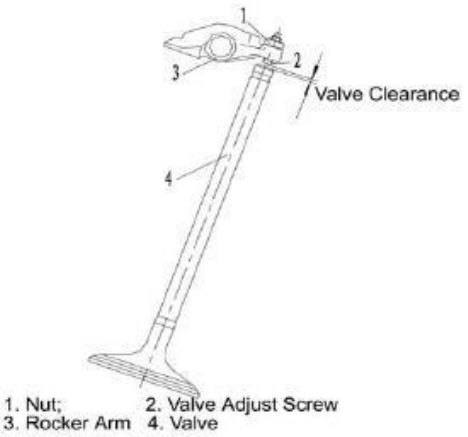
The valve clearance must be adjusted when the engine is cold.
Adjust the valve clearance when the piston is at the Top Dead Center (T.D.C.) on the compression stroke.

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

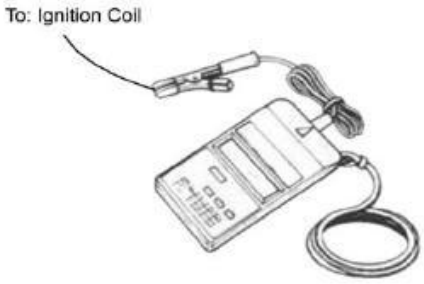
Loosen valve adjust bolt and nut, insert a feeler gauge between the valve stem end and valve adjusting bolt, tighten valve adjust bolt, make sure it slightly contacts the feeler gauge, tighten bolt and nut.

Take out the feeler gauge, measure the clearance.
If the clearance is incorrect, repeat the above steps until the proper clearance is obtained.
Locknut: 10 N•m

Caution:
Securely tighten the locknut after completing adjustment



Install:
2 valve adjusting cover;
Inspection cap;
Recoil starter;
Cover plate;
Apply a small quantity of THREAD LOCKER to recoil starter fixing bolts.



Tools:
Valve adjuster
Feeler gauge
Material:
Thread Locker

3.3.1.2 ENGINE IDLE SPEED

Inspect initially at 20 hours run-in and every 40 hours or 1000km thereafter.

Start the engine and warm it up for several minutes, measure engine speed with a tachometer. Set the engine idle speed between 1300~1500 r/min by turning the throttle stop screw of carburetor.
Engine idle speed: 1400r/min±100r/min

Note:
Make this adjustment when the engine is hot
Tool: Tachometer

3.3.1.3 SPARK PLUG

Inspect initially at 20 hours run-in and every 80 hours or 2000km thereafter. Replace every 6000km.

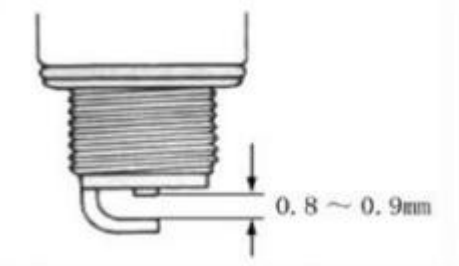
Remove the spark plug with a special tool
Specification: DER7EA-9(NGK)

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

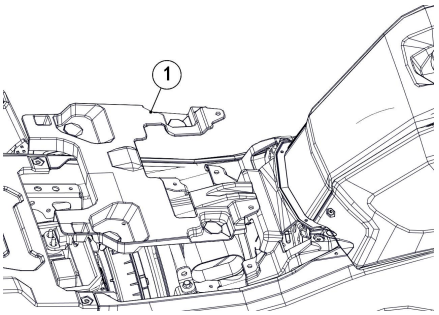
Measure the spark plug gap with a feeler gauge.
Out of specification: → Adjust
Spark plug gap: 0.8-0.9mm



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.

Installation:

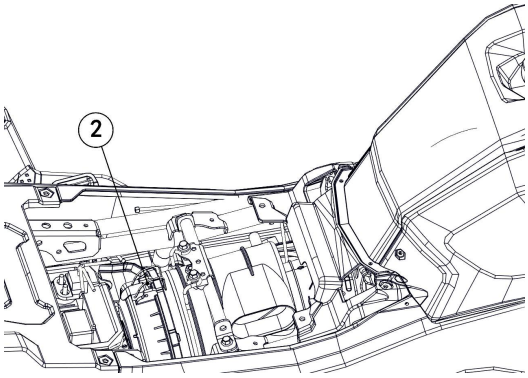
Caution:
To avoid damaging the cylinder head threads; first, tighten the spark plug with fingers, and then tighten it to the specified torque using the spark plug wrench.



Tightening Torque: 18 N•m
Tool: Spark Plug Wrench, Feeler Gauge

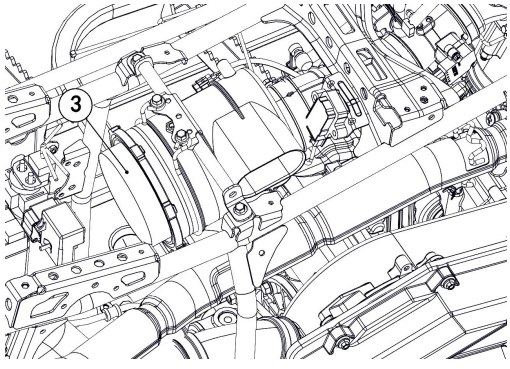
3.3.1.4 Air Filter

Inspect every 40 hours or 1000 km, clean it if necessary.



If the air cleaner is clogged with dust, intake resistance
will be increased, with a resultant decrease in power
output and an increase in fuel consumption.
Check and
clean the air filter as following:
Remove ①

Note:
Be careful not to drop the o-ring into the air filter box that is attached to the air filter top cover.



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.

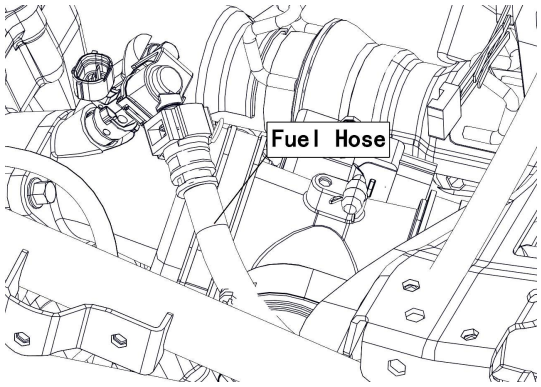
Warning:
Never use with gasoline or low flash point solvents to clean the filter element.
Inspect the filter element for tears. Torn element must be replaced.

Note:
If driving under dusty conditions, clean the air filter element more frequently. The surest way to accelerate engine wear is to operate the engine without the element or with torn element. Make sure that the air filter element is in good condition at all times.

3.3.1.5 Fuel Hose

Inspect every 80 hours or 2000 km, replace every 4 years.

Inspect the fuel hose for damage and fuel leakage. If any damages are found, replace the fuel hose with a new one.



3.3.1.6 Drive Belt

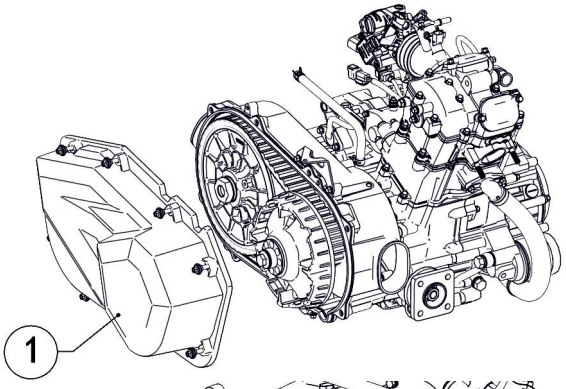
Removal:

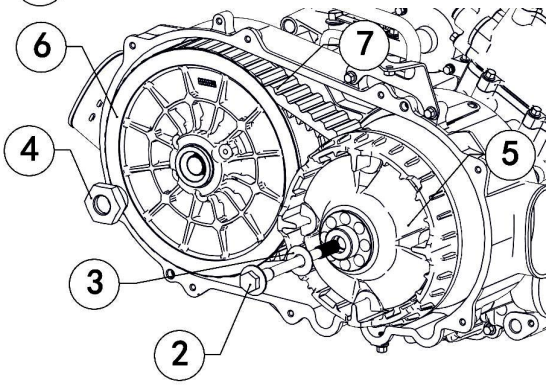
Remove CVT cover ①.
Loosen drive pulley bolt ②(left-hand threads) and washer ③,
use driving wheel puller(left-hand threads) to take drive disk.

Loosen / driven pulley nut ④.

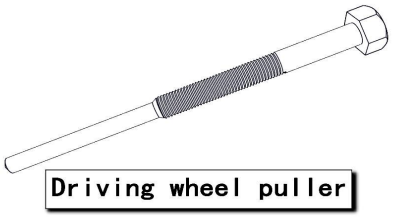
Remove drive pulley ⑤, driven pulley ⑥ together with
drive belt ⑦.

Remove drive belt ⑦





Inspection:



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 ⑦ as low as possible, between secondary
sliding sheave and primary fixed sheave.
Tighten driven pulley nut ④ to the specified torque.

Nut, / driven pulley：110~120N.m Install drive pulley ⑤, drive pulley bolt ②(counterclockwise) and washer ③. 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.

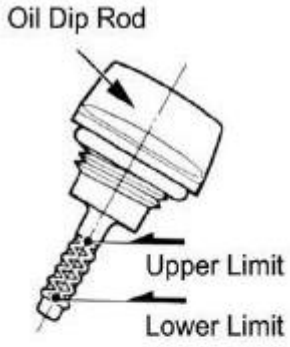
Warning：
The drive belt contact surface of the driven face should be thoroughly cleaned.

Install CVT cover ①.

3.3.2Inspection of Lubrication System

Replace engine oil and oil filter initially at 20 hours or 200km and every 80 hours or 2000km thereafter.

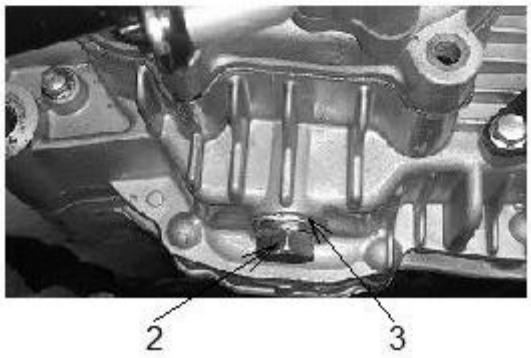
Check Engine Oil Level



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: SAE10W-50SN

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

Replacing Engine Oil



Remove oil dip rod 2, 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.

Drain Bolt:30 N•m

Fill engine oil. (about 1900ml)

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 about 3 minutes, 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 filter① with the special tool

Install washer and drain bolt

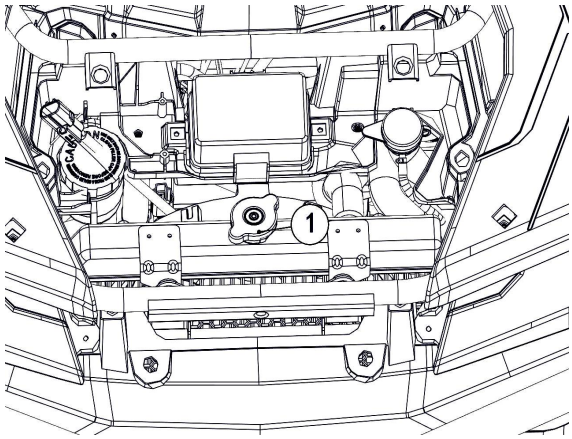
Install new oil filter with the special tool

Fill engine oil (about 2000ml) and check (see Replacing Engine Oil)

Tool: Oil Filter Wrench

Engine Oil Capacity
When replacing oil: 1.9L
When replacing oil filer: 2.0 L
Engine overhaul:2.2 L

3.3.3 Inspection of Cooling System



Check initially at 40 hours or 1000km, replace coolant every 2 years.

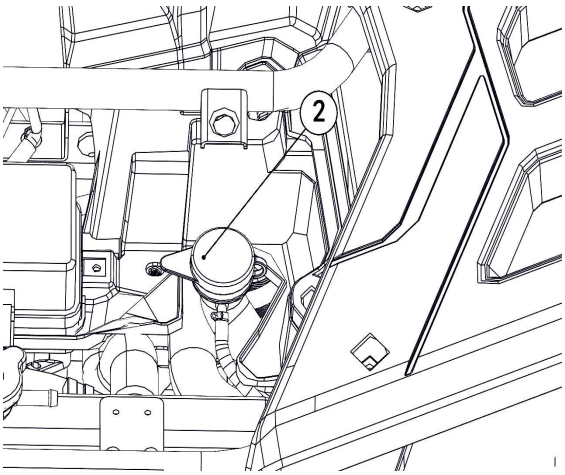
Check radiator, reservoir tank and water hoses.
Leakage or Damage: → Replace
Check coolant level by observing the upper and the lower limit on the reservoir tank.
If the level is below lower limit, fill coolant until the level reaches the upper limit.

Replacing Coolant

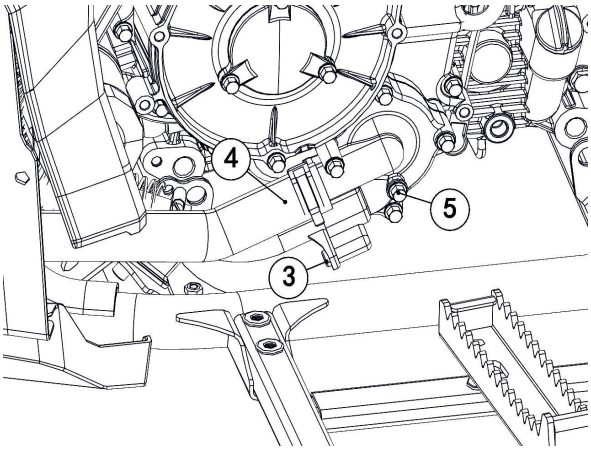
Remove radiator cap① and reservoir tank cap②.

Place a pan below water pump, and drain coolant by removing drain plug③ and water hose④.

Drain coolant from reservoir tank.



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



Clean radiator with fresh water, if necessary.
Connect water hose④ and tighten drain bolt③ securely.
Fill the specified coolant into the radiator.
Loosen bleed bolt⑤ on water pump, when coolant flow from bleed bolt, tighten the bolt. Install radiator cap ①securely 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.

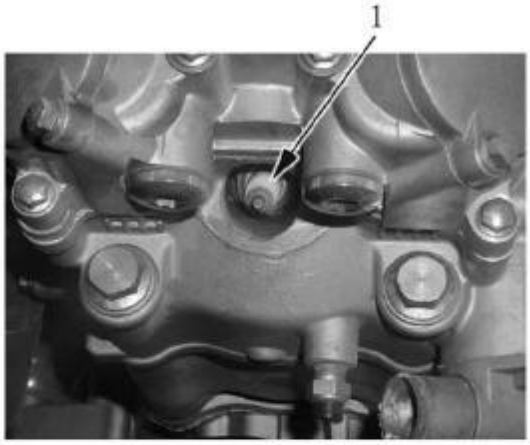
Fill coolant into the reservoir tank till between upper and lower limit.
Install reservoir tank cap.

Warning: Never mix with other brand

Inspection of Radiator Hose

Perform inspection every 40 hours

Check radiator hose and clamp.
Leakage or Damage: →Replace



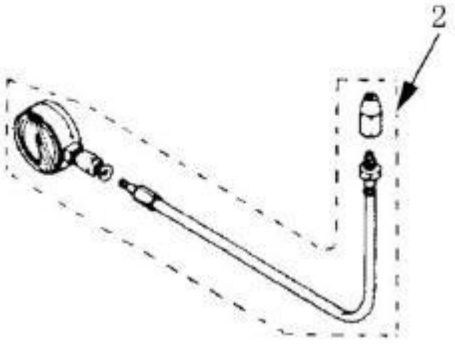
3.3.4 Inspection of cylinder pressure
Check cylinder pressure is necessary.
Cylinder Pressure: 1000kpa

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 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;

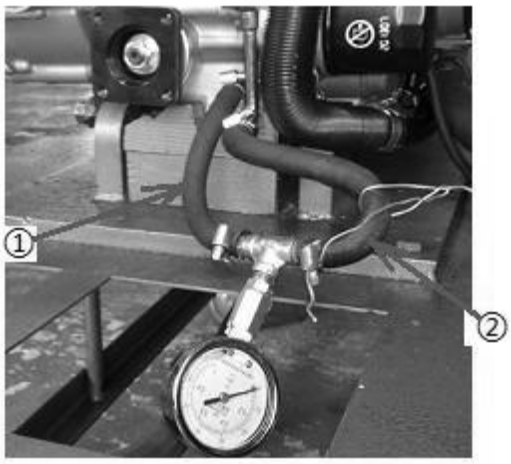
Install cylinder pressure gauge 2 in spark plug hole and tighten nut;

Keep throttle full open;

Press start button crank the engine a few seconds. Record the maximum reading of cylinder pressure.

Tools: Cylinder Pressure Gauge
Adaptor

3.3.5 Inspection of Oil Pressure



Oil Pressure: 130～170kpa at 3000r/min

Lower or higher oil pressure may be caused by:

Ⅰ Oil pressure is too low

Clogged oil filter;
Leakage from oil passage;
Damaged O-ring;
Oil pump failure;
Combination of above items;

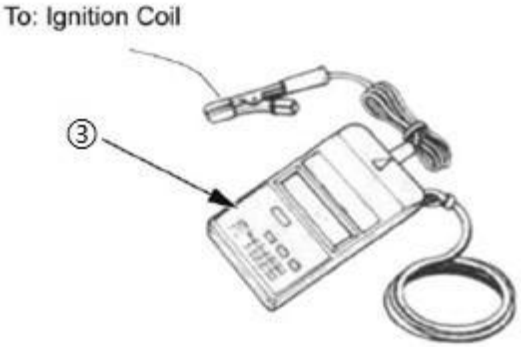
Ⅱ Oil pressure is too high

Oil viscosity is too high;
Clogged oil passage;
Combination of above items;

Testing Oil Pressure

Install hose① and hose②;

Connect tachometer③with ignition coil



Install oil pressure gauge④ and joint seat to main oil gallery.

Warm up engine as per following:
Summer: 10 minutes at 2000r/min
Winter: 20 minutes at 2000r/min

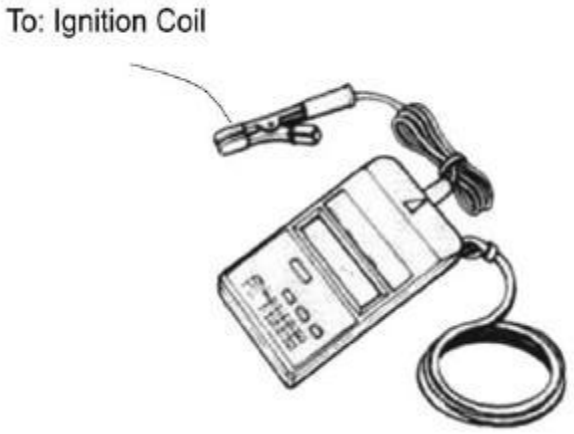
After warming up, increase engine speed to 3000r/min and record readings of oil pressure gauge.

Tools： Oil pressure gauge
Tachometer

3.3.6 Inspection of Clutch Engagement and Lock-up

Engine is equipped with a centrifugal type automatic clutch.

Before checking the initial engagement and clutch lock-up two inspection checks must be performed to thoroughly check the operation of the drive train.



I Initial Engagement Inspection

Connect tachometer to ignition coil

Start engine

Shift gear lever to “High” position

Slowly increase throttle and note down the engine speed (r/min) when the vehicle starts to move forward.

Engagement speed:1800r/min～2400r/min

If the engagement speed is out of the above range, check the following:

Clutch shoes

Clutch shoe wheel

Primary and secondary sheave

Refer to Chapter 12 for inspection of clutch

II Clutch Lock-up Inspection

Connect the tachometer to ignition coil;

Start the engine;

Shift gear lever to “High” position;

Apply front and rear brakes as firmly as possible;

Fully open the throttle for a brief period and note the maximum engine speed obtained during the test cycle.

Lock-up Speed: 3300r/min～3900r/min

Warning:
Do not apply full power for more than 5 seconds or damage to clutch or engine may occur.

If the lock-up speed is out of the above range, check the following:

Clutch shoes

Clutch wheel

Primary and secondary sheave

Refer to Chapter 12 for inspection of clutch

Tool: Tachometer

3.4 Engine Removal, Inspection & Installation

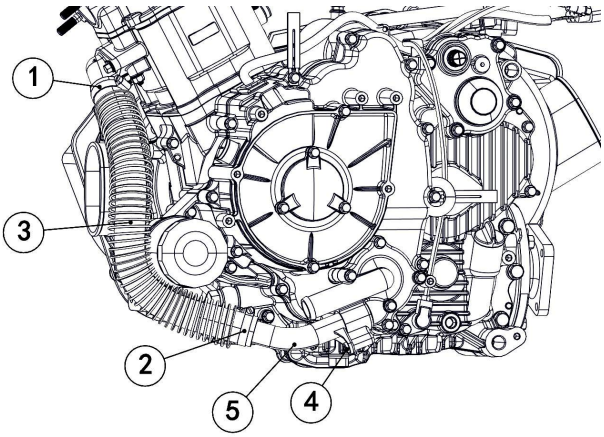
Engine Removal

Δ Preparation before engine removal

Prepare a proper tray used for load of components
Prepare necessary removal and assembly tools
Drain up engine oil
Drain up coolant

△ Engine Periphery

Water Hose/Pipe



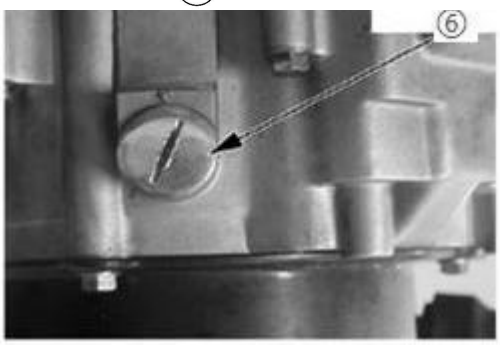
Remove water hose clamp① and②;

Remove water hose③

Remove screw④ and water hose⑤

Left Side Cover

Remove 4 bolts (M6X12) of left side cover
Remove left side cover



Inspection Plug

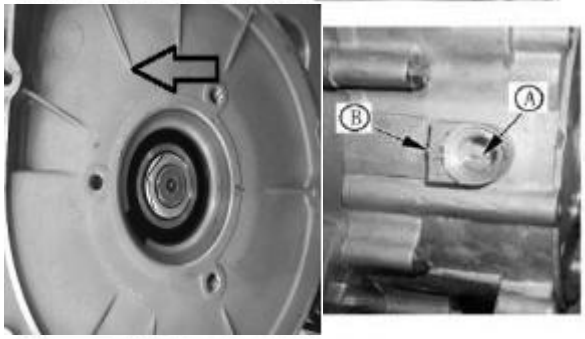
Remove inspection plug⑥ with screwdriver

Δ Engine Front Side

Spark Plug

Remove spark plug⑦ with special wrench

Tool: Spark Plug Wrench



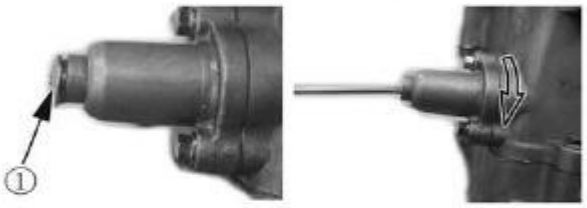
Turn crankshaft, align T.D.C. line A on magneto rotor with mark B of left crankcase

Cylinder Head Cover

Remove valve adjusting cover

Remove12 bolts of cylinder head cover

Remove cylinder head cover



Timing Chain Tensioner

Remove screw plug①, 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

Camshaft

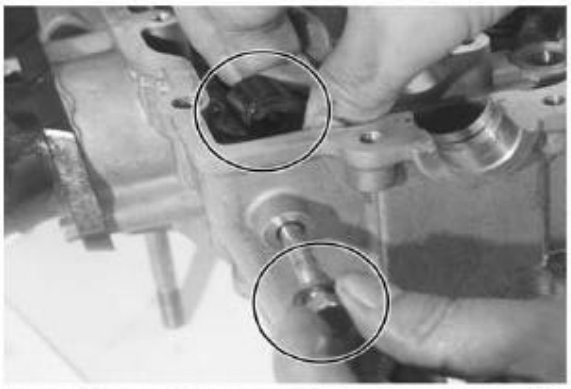
Loosen timing sprocket bolt;

Remove timing sprocket bolt and lock;

Remove C-ring①

Remove timing sprocket from camshaft, remove camshaft

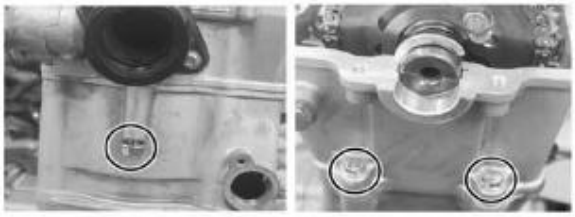
Note: Take care not to drop spacer, bolt, bolt lock and C-ring into crankcase.



Remove tensioner plate

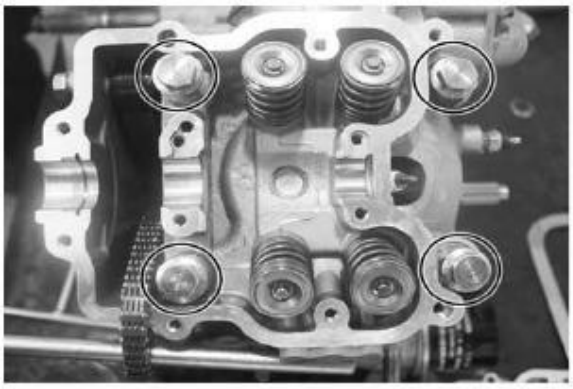
Cylinder Head

Remove cylinder head bolt



Remove cylinder head bolts diagonally;

Remove cylinder head



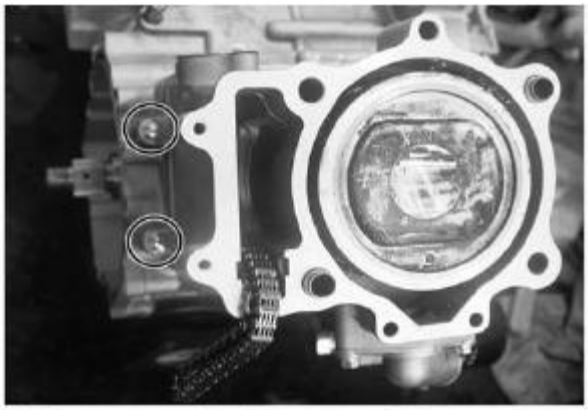
Note: Take care not to drop dowel pin into crankcase

Cylinder

Remove dowel pin and cylinder head gasket

Remove timing chain guide①

Remove cylinder bolt
Remove cylinder



Note：Take care not to drop dowel pin into crankcase

Remove dowel pin and cylinder gasket

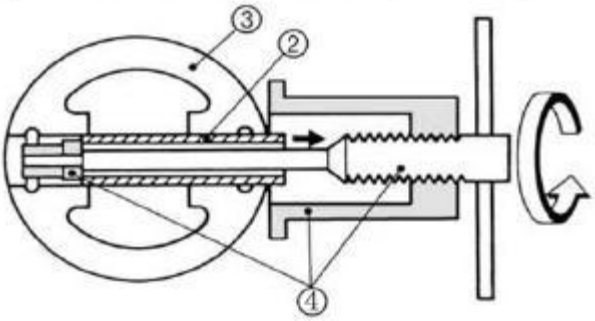
Note：When performing above removal process, be sure to hook up timing chain to prevent it from falling into crankcase

Piston

Remove piston pin circlip① with long nosed pliers

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

Remove piston pin②and piston③



Notes:
When installing piston, make sure its identification conforms to that of cylinder; When removing piston pin, clean off burrs of piston pin hole and groove. If it's difficult to remove the piston, DO NOT hammer, use a special remover ④

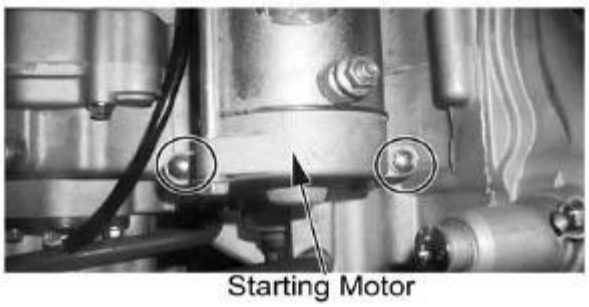
Tool: Piston Pin Remover

Δ Engine Left Side

Starting Motor

Remove 2 bolts of starting motor

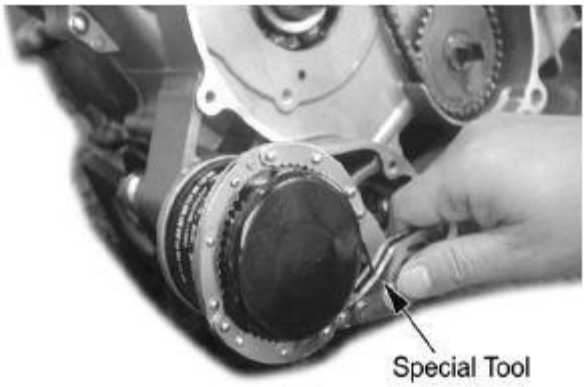
Remove starting motor



Oil Filter

Remove oil filter with special tools

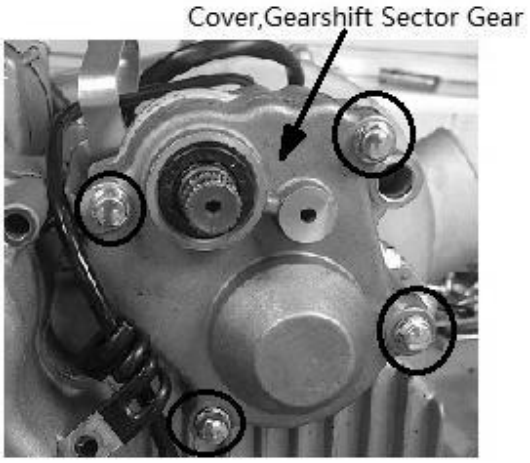
Tool: Oil filter Remover



Sector Gear

Remove bolt of sector gear housing cover

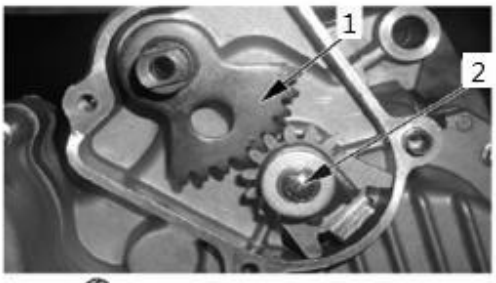
Remove wire clip and sector gear housing cover



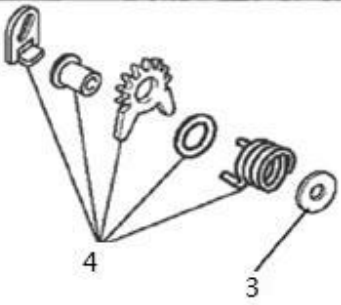
Remove dowel pin and gasket

Remove drive sector gear 1

Remove bolt 2 of driven sector gear

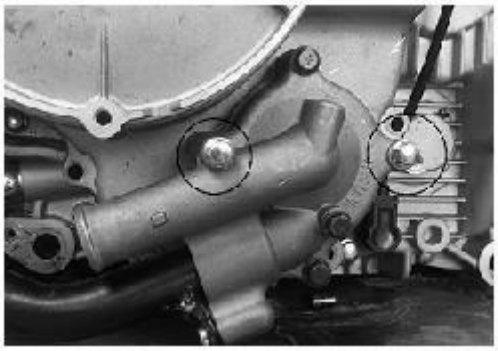


Remove washer3 and driven sector 4

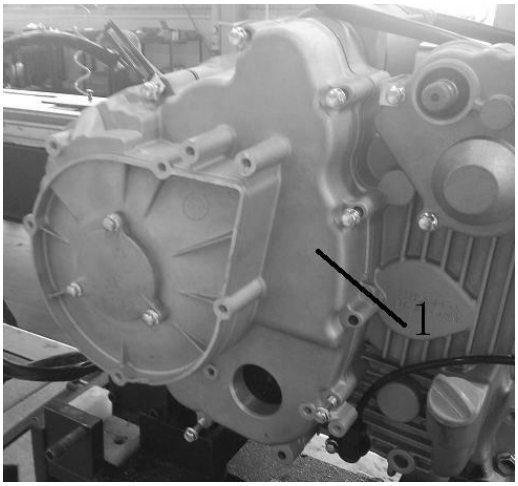


Water Pump

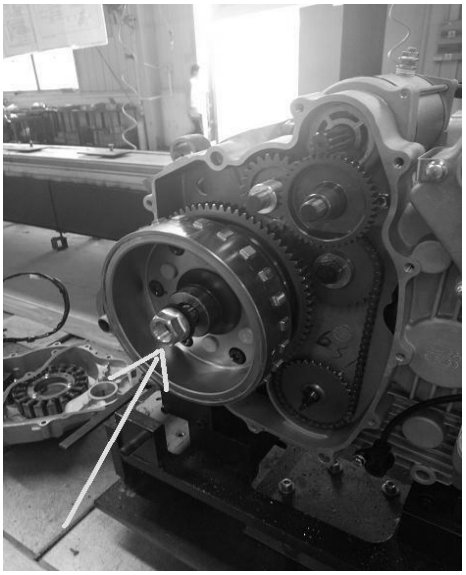
Screw out bolt of water pump
Remove water pump



Remove left crankcase cover 1.



Remove nut.

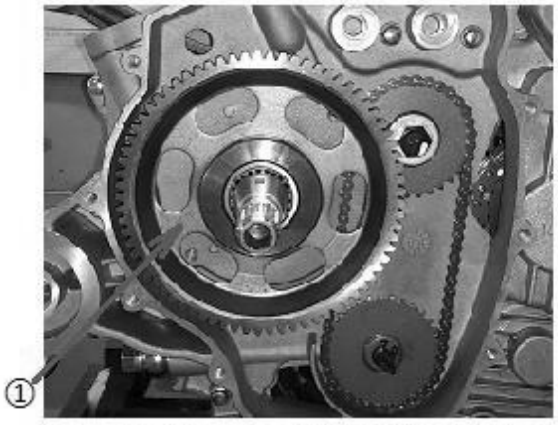


Install special tool to rotor thread;
Remove rotor and woodruff key

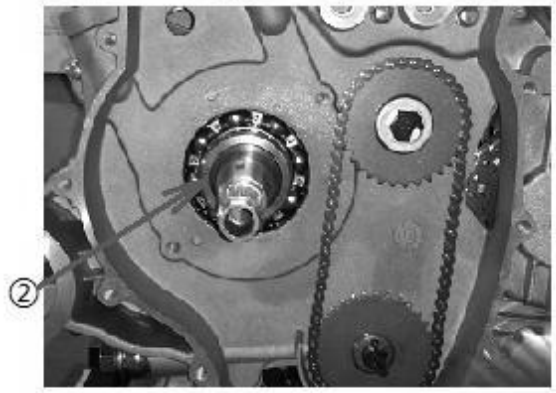
Tool: Rotor Remover

Starting Motor Gear

Remove driven gear ① and needle bearing

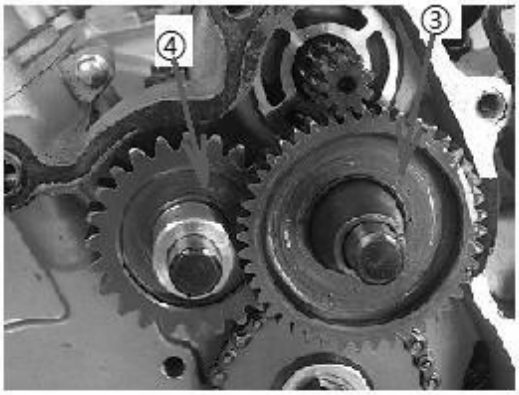


Remove spacer ②



·Remove dual gear and shaft ③

·Remove idle gear and shaft ④

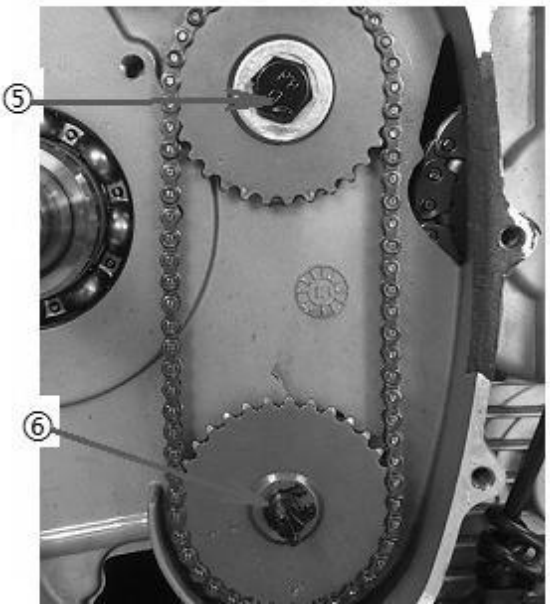


Oil Pump Sprocket and Chain

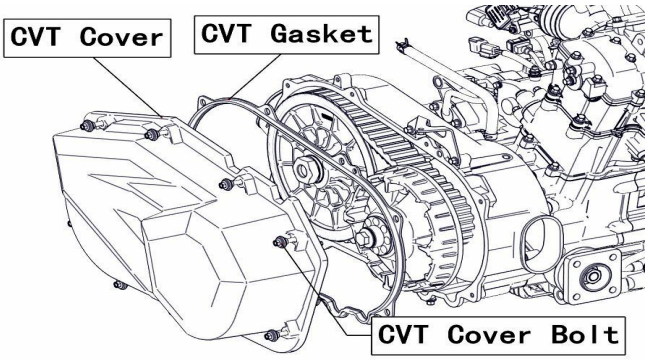
Remove drive sprocket nut ⑤

Remove C-ring ⑥

Remove oil pump drive and driven sprockets and chain

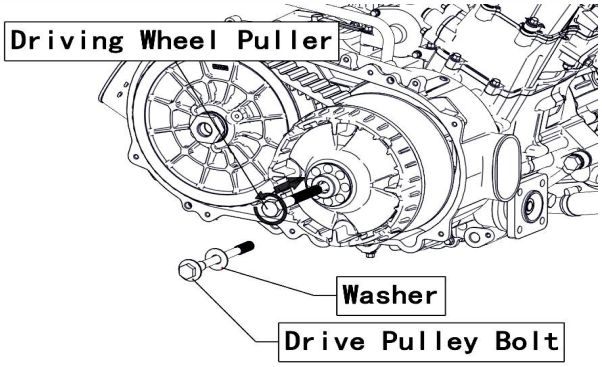


Δ Engine Right Side



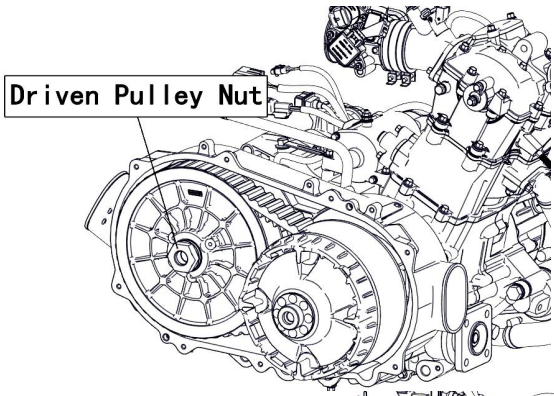
CVT Cover

Remove bolt of CVT cover
Remove CVT cover
Remove gasket

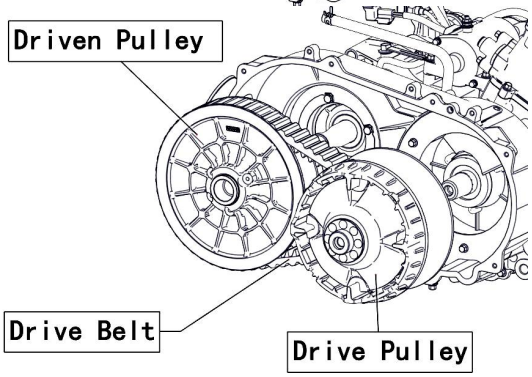


CVT(Continuously Variable Transmission)

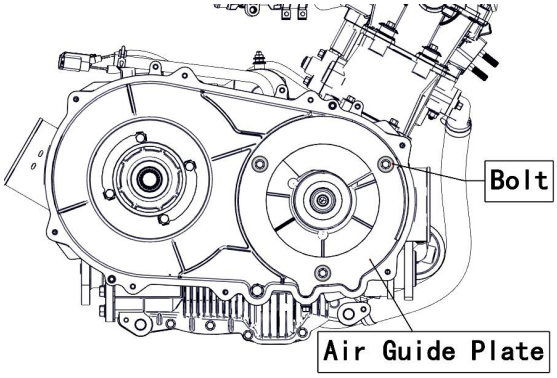
Remove drive pulley bolt (left-hand threads) and Washer. Use driving wheel puller(left-hand threads) to take drive disk



Remove driven pulley nut



Remove drive pulley , driven pulley together with drive belt .



Remove bolt for air guide plate.

Remove air guide plate

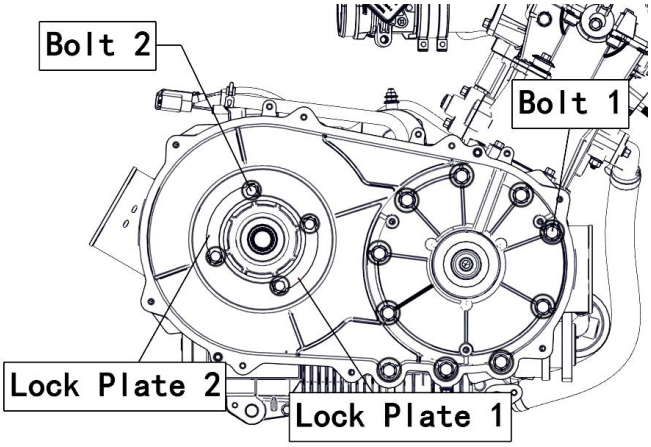
CVT Case

Remove bolt 1 of CVT case

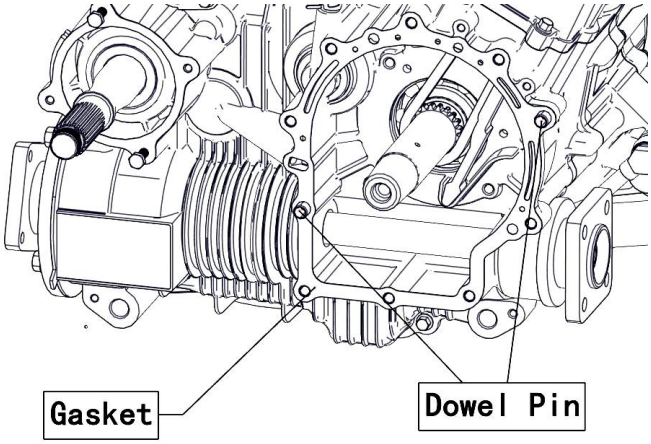
Remove bolt 2 of CVT case

Remove lock plate 1 and lock plate 2

Remove CVT case

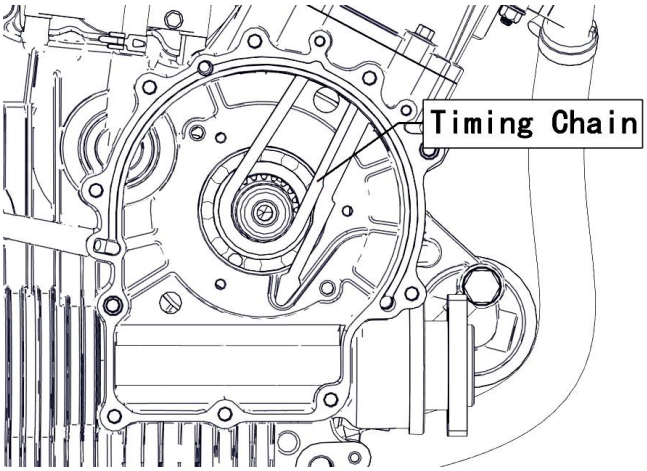


Remove dowel pin, front and rear gasket



Timing Chain

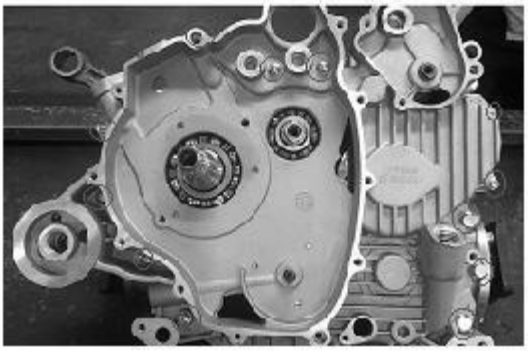
Remove timing chain



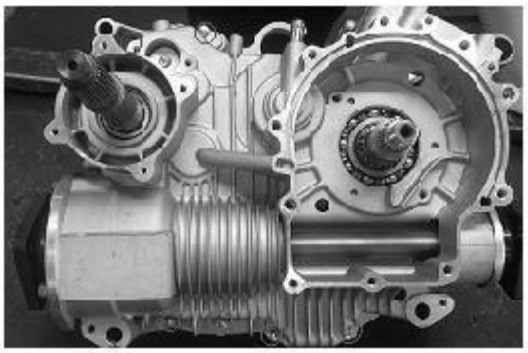
Engine Center

Gear position bolt

Remove gear position bolt 1
Remove spring and steel ball



Right Crankcase
Remove left crankcase bolts
Remove right crankcase bolts
Separate right crankcase with special tool

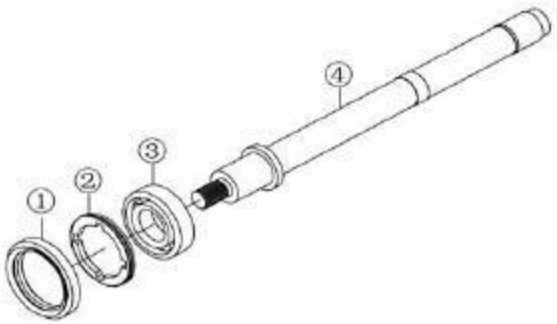


Caution
The Crankcase separator plate
should be parallel with the end face of crankcase
Crankshaft should remain in the left crankcase half.

Driven Bevel Gear, Front Output Shaft

Remove bevel gear cover bolt
Remove driven bevel gear ②
Remove front output shaft nut ③

Remove Oil seal①, Bearing limit nut②
Remove Bearing③, Front Output Shaft ④



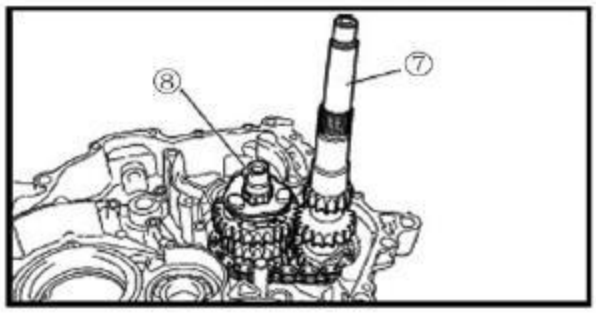
Shift Cam, Fork/Shaft

Remove Shift Cam⑤, Fork /Shaft⑥

Drive Bevel Gear
Remove left crankcase from driven bevel gear

Drive Shaft, Drive Shaft

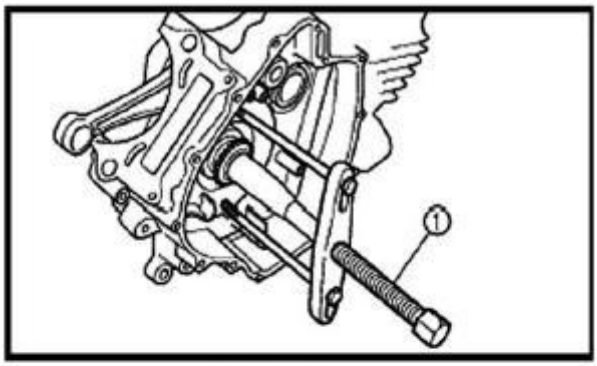
Remove drive shaft⑦ and driven shaft⑧



Balancer Shaft

Remove balancer shaft

Crankshaft



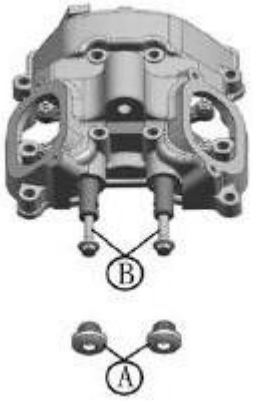
Separate crankshaft from left crankcase with Special tool
Tool: Crankshaft Separator

Oil bump, Relief Valve

Remove oil bump and relief valve

Engine Components Inspection

Cylinder Head Cover

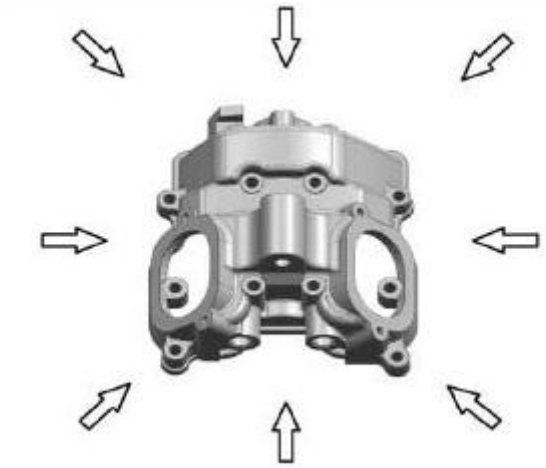


Disassembly
Caution: Each removed part should be identified to Its location, and the pars should be laid out in groups designated as “Exhaust”, “Intake”, so that each will be restored to the original location during assembly.

Remove rocker arm shaft bolts A

Remove rocker arm shaft by using M6 bolts B

Cylinder Head Cover Distortion



Clean off sealant from the fitting surface of cylinder Head cover, place cylinder head cover on a surface plate and measure distortion with a thickness gauge.

Cylinder head Cover Distortion
Limit: 0.05mm
Tool: Thickness Gauge
Distortion out of range: → Replace

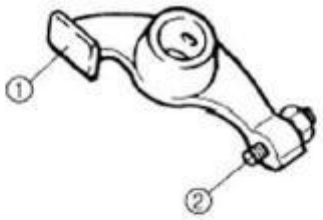
Note: Cylinder head cover and cylinder head should Be replaced together.

Rocker Arm Shaft

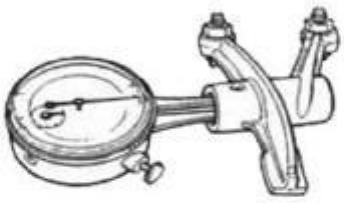
Measure out diameter of rocker arm shaft with a micrometer.
Rocker Arm Shaft O.D.: (IN, EX)
Limit: 11.973~11.984mm

Tool: Micrometer (0~25mm)

Rocker Arm



When checking the rocker arm, check the inner diameter of the valve rocker arm and wear of the camshaft contact surface.
Rocker Arm I.D. : .000~12.018mm
Tool: Dial Calipers

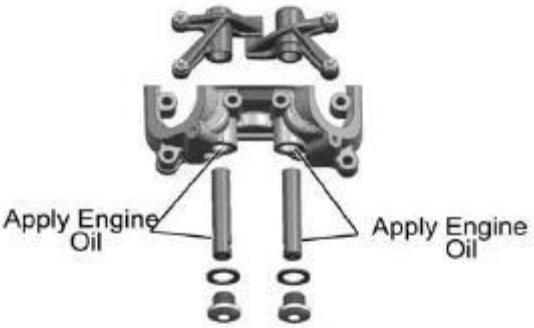


Assembly

Note: Intake rocker arm shaft A has oil holes.

Apply engine oil to rocker arms and shafts;
Install rocker arms and tighten rocker arm shaft to the specified torque:

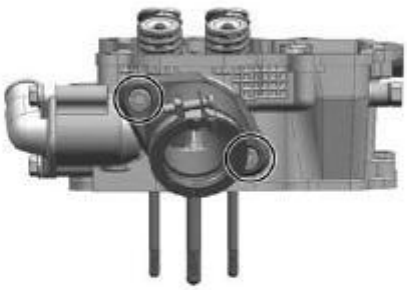
Rocker Arm Shaft Bolt: 28N•m



Cylinder Had

Disassembly

Remove intake pipe



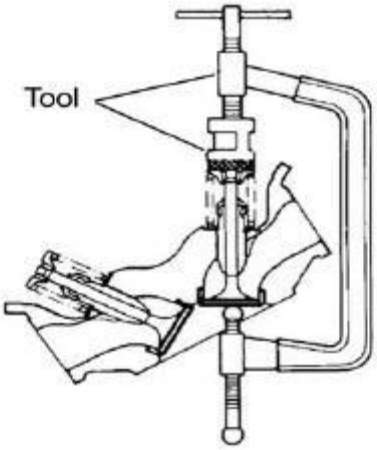
Remove water temperature sensor ①and

thermostat cover ②

Remove thermostat

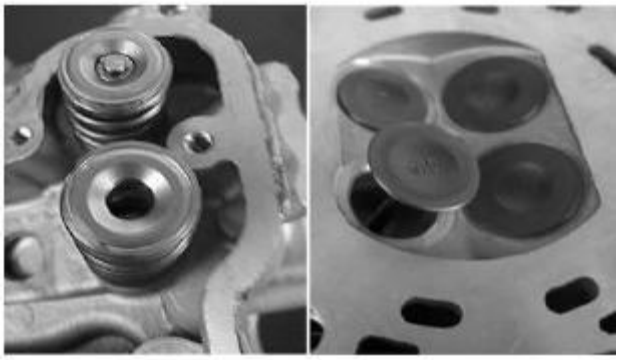
Compress the valve spring and remove valve cotter with tweezers.

Tools: Valve Spring Compressor
Tweezers



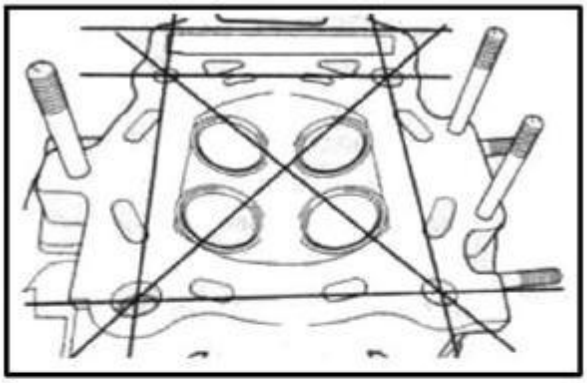
Remove valve spring upper seat and valve spring

Remove valve from the other side.



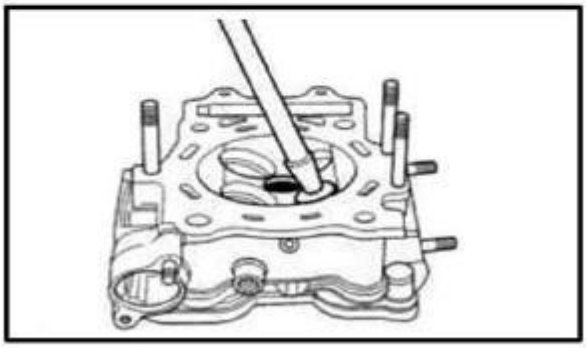
Remove valve stem seal ring and valve lower seat.

Cylinder Head Distortion



Clean off carbon deposit from combustion chamber; Check the gasket surface of the cylinder head for distortion with a straightedge and thickness gauge. Take clearance readings from several places. If any Clearance reading is out of the service limit, replace with a new cylinder head.

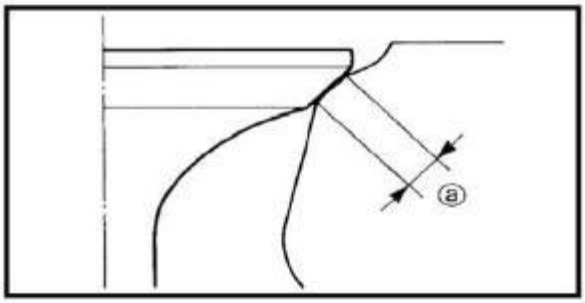
Cylinder Head Distortion Service Limit: 0.05mm
Tool: Thickness Gauge



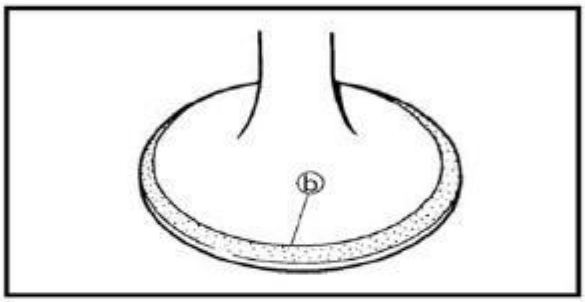
Valve Seat Width

Coat the valve seat with color uniformly. Fit the valve and tap the coated seat with the valve face in a rotating manner. To get a clear impression of the seating contact, use a valve lapper to hold the valve head.

The ring-like dye impression on the valve face should be continuous, without any break. The width of the dye ring, which is the visualized seat width, should be within the following range:

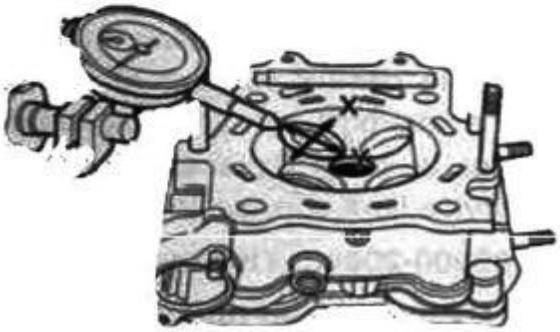


Valve Seat Width: 0.9-1.1mm
Tool: Valve Lapper



Valve Stem and Valve Guide

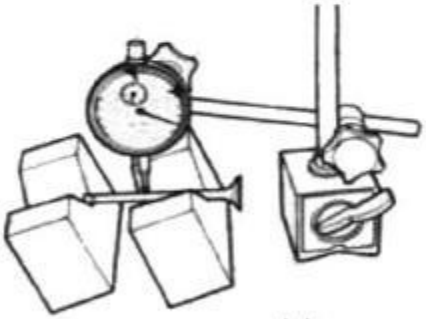
Lift the valve about 10mm from valve seat. Check the valve stem deflection in the directions of X and Y perpendicular to each other, with a dial gauge. If the deflection measured is out of the limit, replace either the valve or the valve guide. (If the valve stem is worn to the limit and the clearance is found to be in excess of the limit, replace the valve. If the valve stem is within the limit, replace the valve guide. Double check the clearance after replacing the valve stem or the guide).



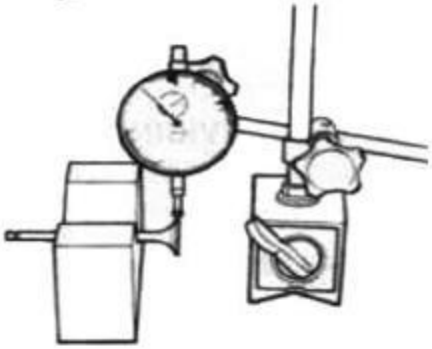
Valve Stem Deflection (IN & EX): 0.35mm
Tool: Micrometer
Magnetic Stand

Valve Stem O.D
Measure valve stem O.D with a micrometer
Service Limit
IN: 4.975-4.990mm
EX: 4.955-4.970mm
Tool: Micrometer (0-25mm)

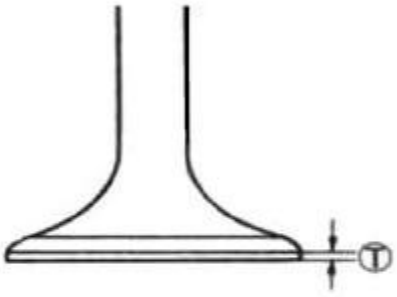
Valve Stem Run-out
Support valve stem with V block as illustrated on the right. Check the run-out with a dial gauge.
Service Limit: 0.05mm
Tool: Magnetism Stand
Dial Gauge (1/100)
V block



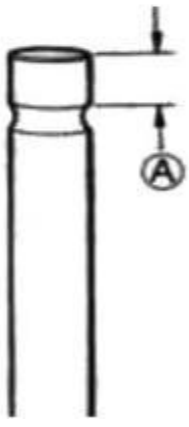
Valve Head Radial Run-out
Measure the valve head radial run-out as illustrated on the right.
Valve head Radial Run-out out of range: →Replace
Service Limit: 0.03mm
Tool: Dial Gauge (1/100)
Magnetic Stand
V Block



Valve Face Wear
Check each valve face for wear or damage. Replace valve with a new one if it is found to have abnormal wear. Measure valve head thickness T.
Valve head thickness T out of range: → Replace
Service Limit: 0.5mm
Tool: Vernier Caliper

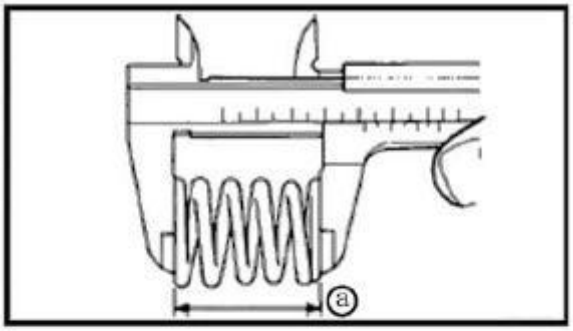


Valve Stem End
Check valve stem end for pitting or wear. In case of any pitting or wear, resurface the valve stem end. If the length T is less than service limit, replace valve with a new one.
Valve Stem End Length
Service Limit: 2.1mm
Tool: Vernier Caliper

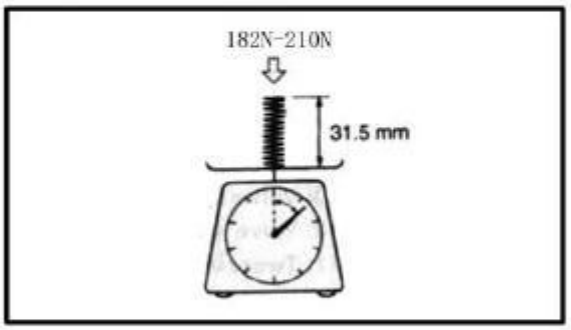


Valve Spring

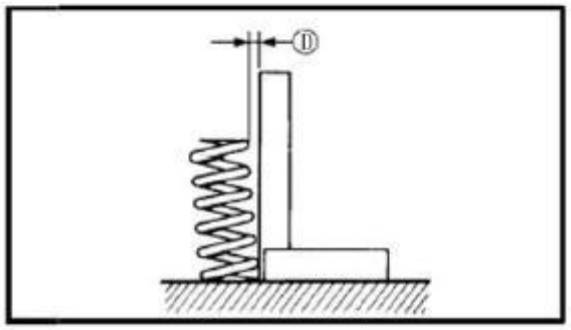
Valve Spring keeps valve and valve seat tight. Weakened spring results in reduced engine power output and chattering noise from valve mechanism.



Measure the spring free length.
Spring free length out of range: →Replace
Service Limit: 38.8mm
Tool: **Vernier Caliper.**

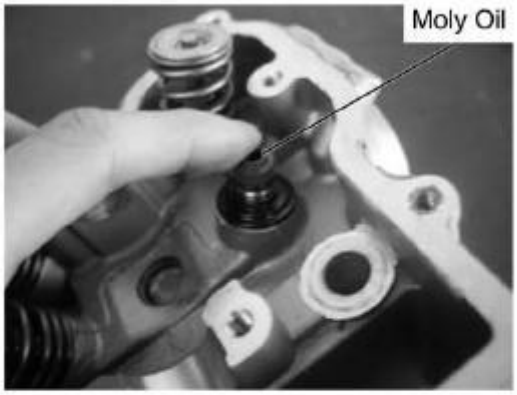


Measure the force to compress the spring to the specified length.
Valve spring tension out of range: → Replace
Service Limit: (IN/EX)
182N-210N/31.5mm
Tool: Spring Scale.



Measure valve spring incline.
Spring incline out of range:→ Replace
Valve Spring Incline Limit: 2.5º/1.7mm

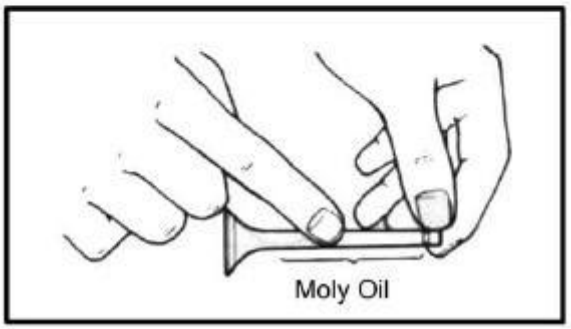
Assembly of Cylinder Head
Install each valve spring seat;
Apply moly oil to valve stem seal and fit into position.



Material: Moly oil

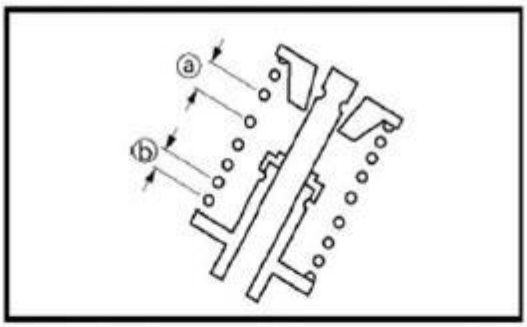
Note: Do not reuse the valve stem seal.

Insert the valves, with stems coated with moly oil all around.

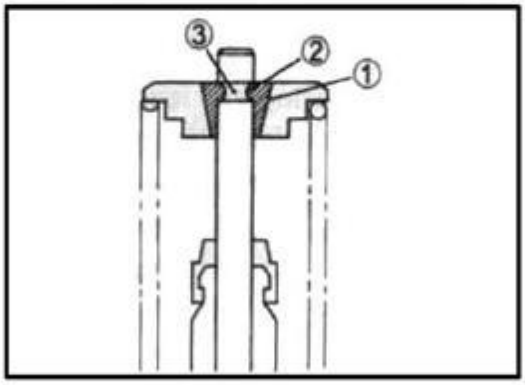


Note: When inserting the valve, be careful not to damage the lip of the stem seal.

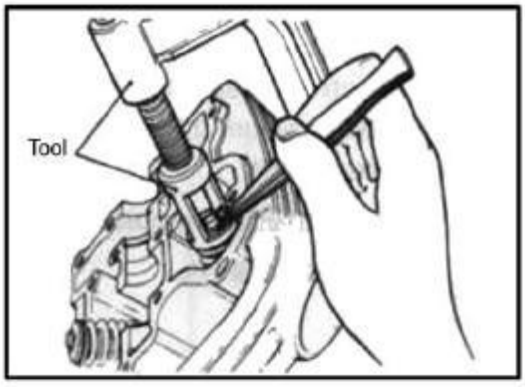
Install valve spring with small-pitch end “b” facing cylinder head. Big-pitch end “a” is marked.



Put on the valve spring retainer. Use the valve spring compressor to press down the spring. Fit the two cotter halves to the stem end and release compressor to allow the cotter ① to wedge in between seat and stem. Make sure that the rounded lip② of the cotter fits into the groove③ in the stem end.

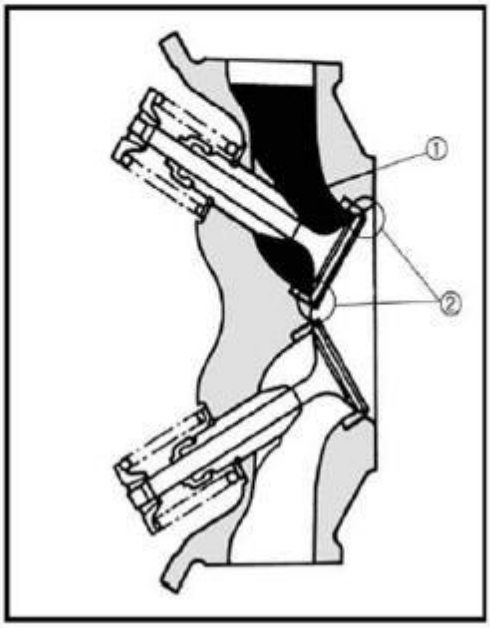


Tool: Valve Spring Compressor
Tweezers



NOTE: Knock the valve end with rubber hammer. Make sure valve cotter is fit into groove.

Check the sealing effectiveness of cylinder head. Dip clean solution into valve IN/EX ① and check for any leakage of valve seat ② after a few minutes.

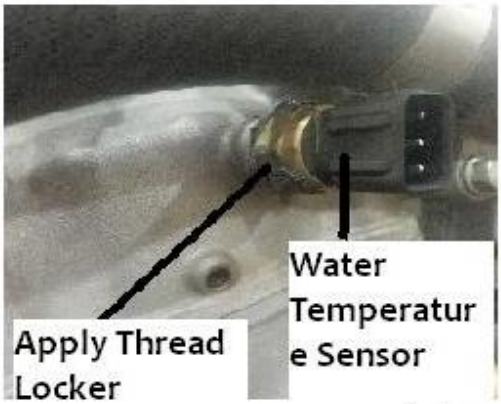


Install thermostat

Install thermostat cover

Install water temperature sensor, apply thread locker to the thread part, tighten it to the specified torque.

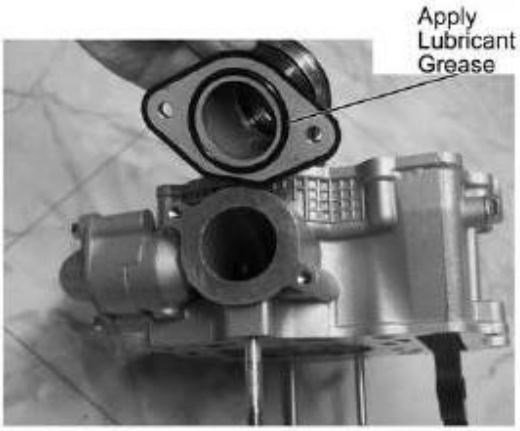
Water temperature sensor
Tightening torque: 10 N·m



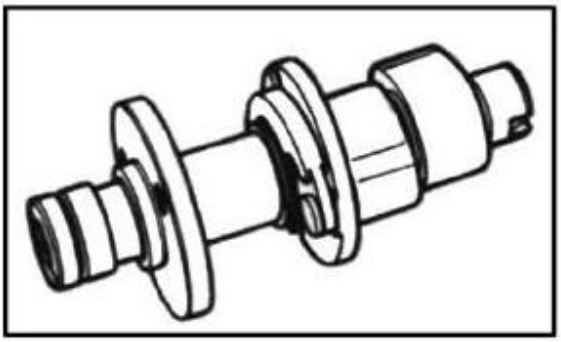
Install intake pipe, apply lubricant to 0-ring.

Camshaft

Check camshaft for wear and run-out of cams and journals if the engines produces abnormal noise or vibration or lacks power output. Any of these symptom could be caused by wear of camshaft.

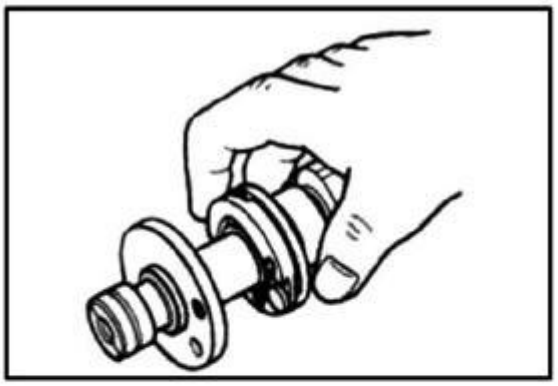


Note: Do not try to disassemble the camshaft/ Automatic decompression assembly. It is not serviceable.



Automatic Decompression

Move the automatic decompression weight with hand and check if it is operating smoothly. If it is not working smoothly, replace with a new camshaft/automatic decompression assembly.



Cam Wear

Worn cams can often cause mistimed valve operation resulting in reduced power output. The limit of cam wear is specified for both IN and EX cams in terms of cam height “a”. Measure with a micrometer the cam height.

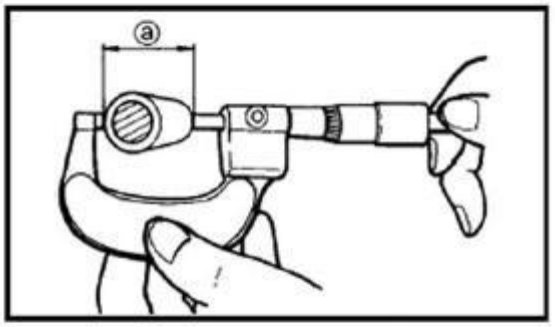
Cam height out of range: →Replace

Cam height service limit:

IN: 33.130mm

EX: 33.200mm

Tool: **micrometer (25-50mm)**



Camshaft Journal Wear

Check whether each journal is worn to the limit by measuring camshaft journal oil clearance with the camshaft installed.

Camshaft journal oil clearance

Service limit: 0.15mm

Check according to the following steps:

Clean off materials from cylinder head and cover;

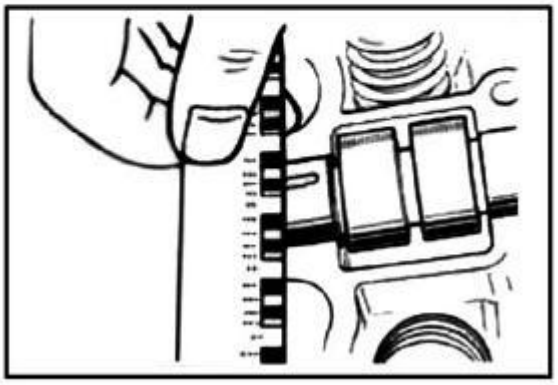
Install camshaft with plastic gauge;

Install cylinder head cover and tighten bolts evenly and diagonally to the specified torque:

Tightening torque: 10 N·m

Remove cylinder head cover, read the width of the compressed plastic gauge with envelop scale. The reading should be taken from the widest part.

Tool: Plastid Gauge

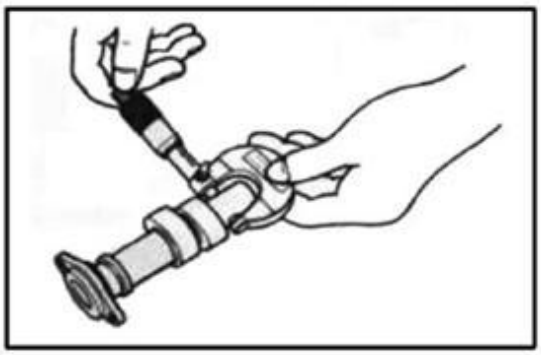


Note: Do not turn the camshaft with plastic gauge in place.

If the camshaft journal oil clearance exceeds the limit, measure the outer diameter of camshaft;

Replace either cylinder head set or the camshaft if the clearance is not correct.

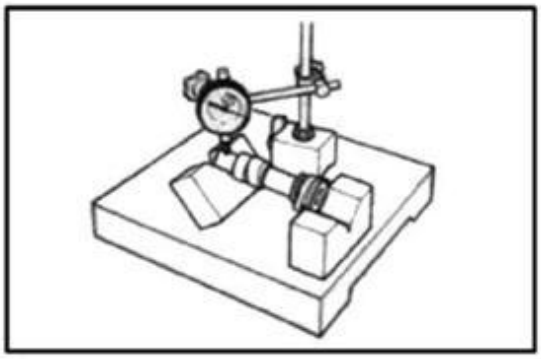
Camshaft Journal O.D.



Measure camshaft journal O.D. with a micrometer. If the O.D. is out of range, replace camshaft with a new one.
Camshaft journal O.D. service limit:

Sprocket end: 22.959 mm—21.980mm
Other end: 17.466mm—17.484mm

Tool: micrometer (0-25mm)



Camshaft Run-out
Measure the run-out with a micrometer. Replace camshaft is the run-out is out of range.

Service limit: 0.10mm

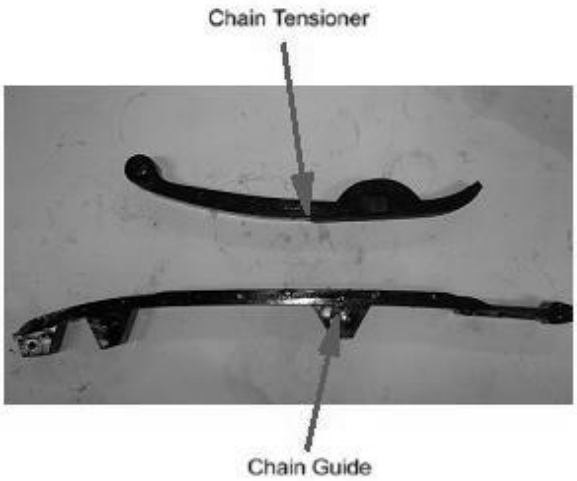
Timing Sprocket and Chain

Check timing sprocket and chain for wear or damage.
Replace with new parts if abnormal wear or damage is found.

Tensioner and Chain Guide

Check contact surface of tensioner and chain guide for wear and damage.

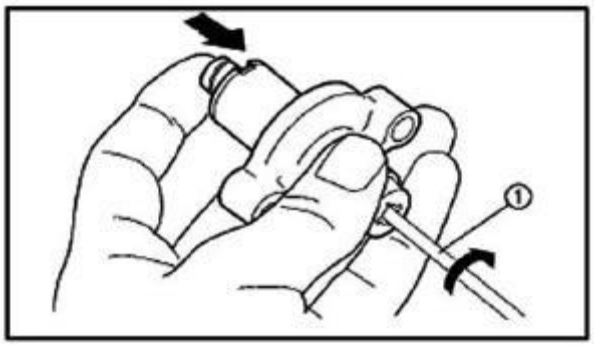
Replace with news parts if abnormal wear or damage is found.



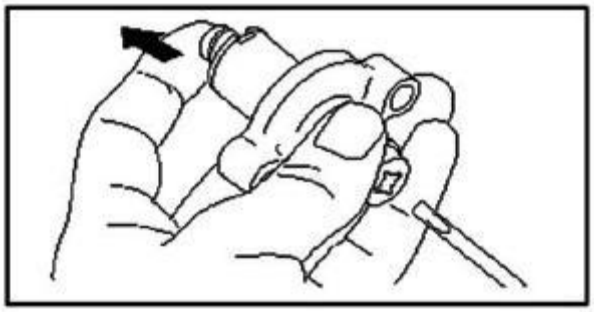
Chain Tensioner
Inspection

Check tensioner for any damage or poor function.

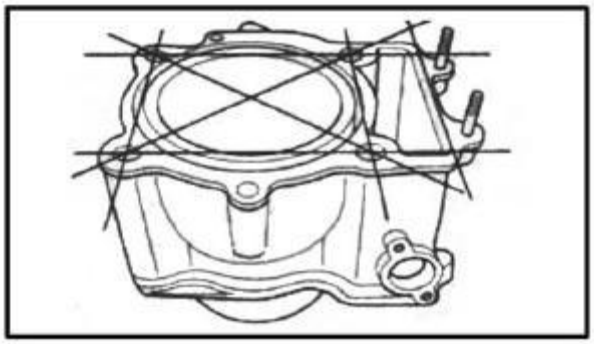
Damage, poor function: →Replace

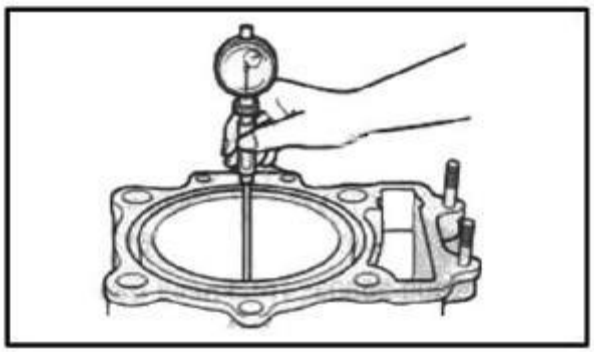


Insert screw driver into the slotted end of adjusting screw, turn it clockwise to loosen the tension and release the screwdriver.
Check the push rod movement. If the push rod is stuck or there is a failure with spring mechanism, replace the chain tensioner with a new one.



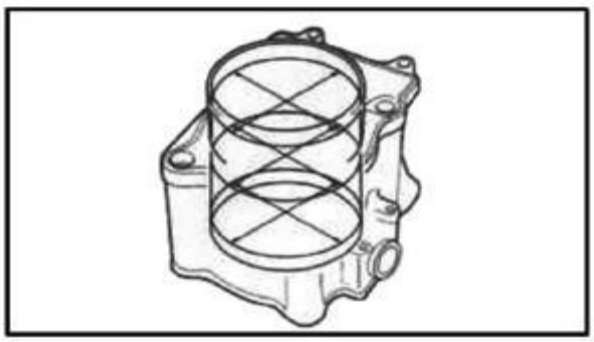
Cylinder
Cylinder Distortion
Check the gasket face of cylinder for distortion with a straightedge and thickness gauge and take clearance readings at 7 points as illustrated. If the largest reading at any of the 7 points of the straightedge is out of the range, replace the cylinder.
Cylinder Distortion Service Limit: 0.05mm
Tool: Straightedge
Thickness Gauge





Cylinder Bore
Check cylinder wall for scratches, nicks or other damage. Replace with a new one if any.
Measure cylinder bore diameter at three points of upper, middle and lower.

Standard Cylinder Bore: 87.500-87.522mm
Tool: Cylinder Gauge Set



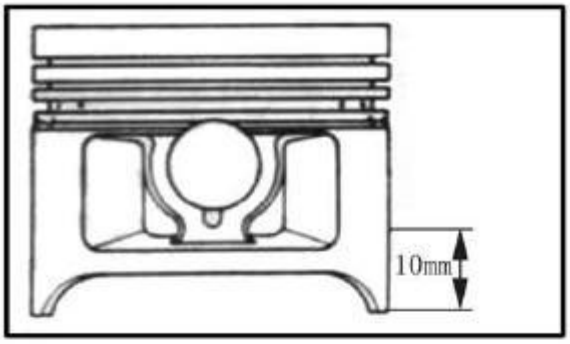
Piston

Piston Diameter

Use a micrometer to measure the diameter at the point 10mm above the piston end, as illustrated on the right. If the measurement is less that the limit, replace the piston

Standard: 87.460-87.480mm

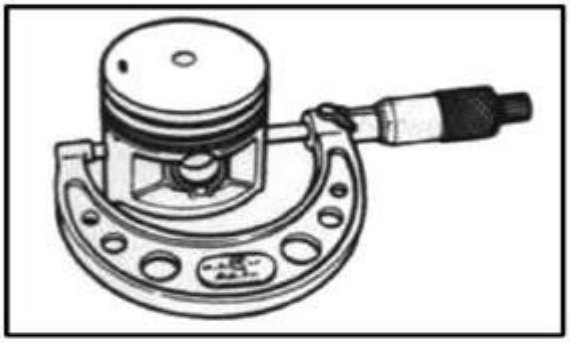
Limit: 87.380mm



Tool: Micrometer (75-100mm)

Calculate the piston to cylinder clearance according to the above measurement.

If the clearance is more than 0.15mm, replace the cylinder or piston, or both.



Piston Ring to Groove Clearance

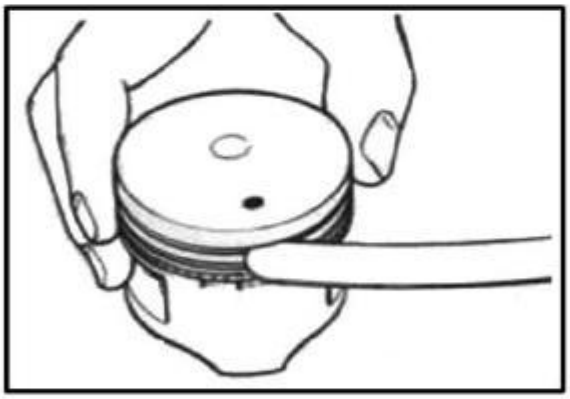
Use a thickness gauge to measure the side clearance of topt ring and 2nd ring.

If the clearance exceeds the limit, replace both piston and piston rings.

Service Limit:

Top ring: 0.18mm

2nd ring: 0.15mm



Standard width of piston ring groove

Top ring: 1.03-1.05mm

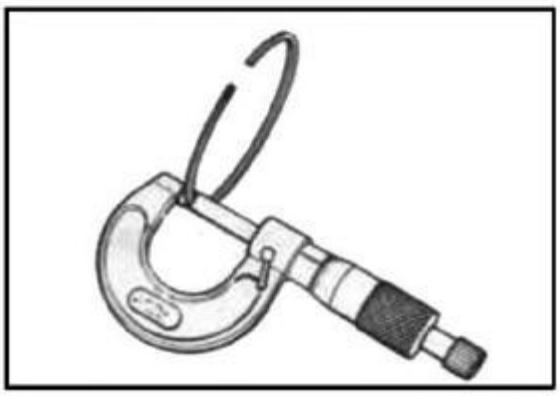
2nd ring: 1.22-1.24mm

Oil ring: 2.51-2.53mm

Standard thickness of piston ring

Top ring: 0.970-0.990mm

2nd ring: 1.170-1.190mm



Tools: Thickness gauge

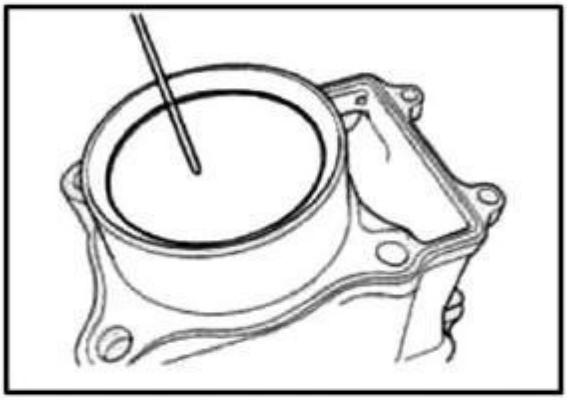
Micrometer (0-25mm)

Piston Ring Free End Gap and End Gap

Before installing piston rings, use vernier caliper to measure the free end gap of each ring, and then fit ring into the cylinder.

Use thickness gauge to measure each ring end gap, if any ring has an excess end gap, replace the piston ring.

Piston ring free end gap limit:
Top ring: 8.9mm
2nd ring: 9.5mm



Piston ring end gap limit:
Top Ring: 0.60mm
2nd ring: 0.60mm

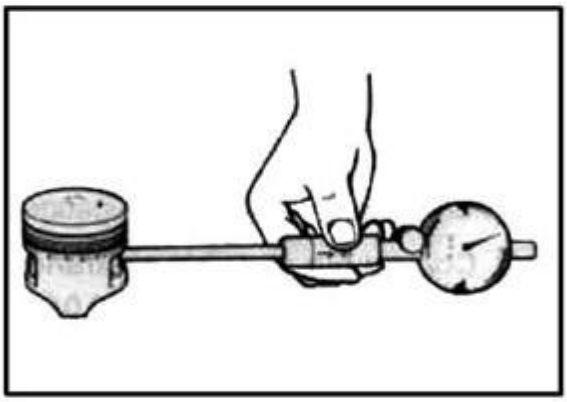
Tool: Vernier caliper
Thickness gauge

Piston Pin and Pin Bore

Use a bore gauge to measure the inner diameter of piston pin bore.

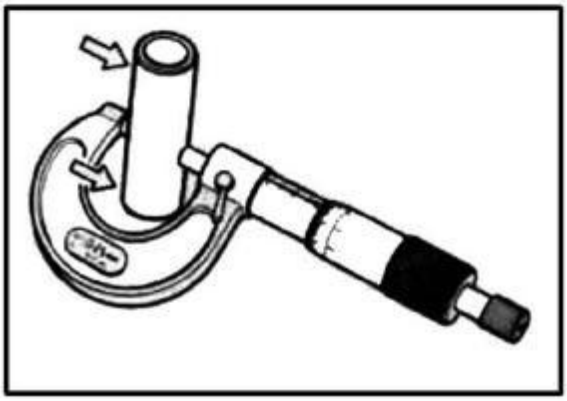
Use micrometer to measure outer diameter of piston pin.

If out of limit, replace both piston and piston pin.



Piston pin bore limit: 23.030mm

Use micrometer to measure piston pin outer diameter at three points

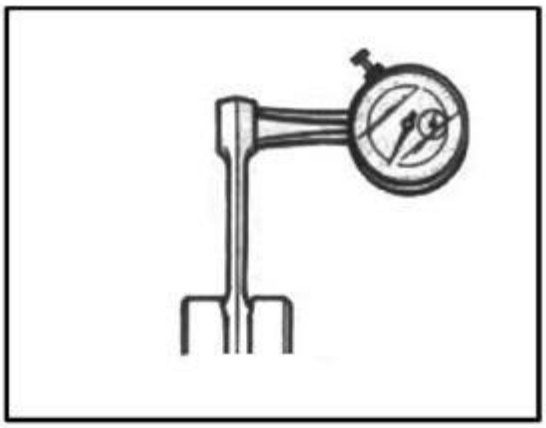


Piston pin outer diameter limit: 22.980mm
Tools: Bore gauge (18-35mm)
Micrometer (0-25mm)

Connecting Rod/Crankshaft

Connecting rod small end I.D.

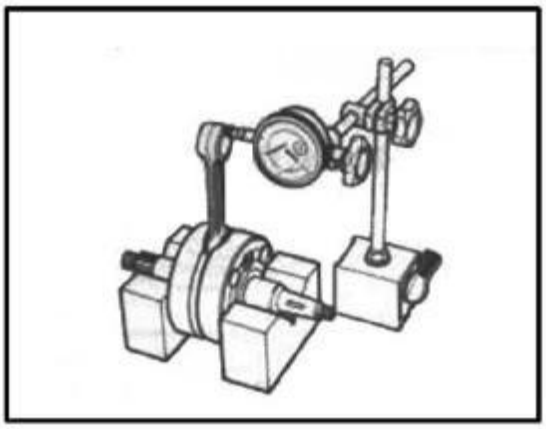
Use a dial gauge to measure the I.D. of connecting rod small end. If the measurement exceeds the limit, replace the connecting rod.



Connecting rod small end I.D. : 23.040mm
Tool: Dial Gauge (18-35mm)

Connecting Rod Deflection

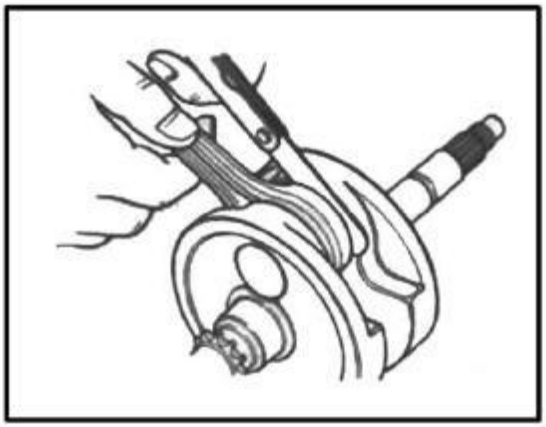
Check the movement of the small end of the rod and inspect the wear of the small end. This method is also applicable to check and inspection of big end.



Connecting Rod Deflection: 3.0mm
Tools: Dial Gauge
Magnetic stand
V-block

Connecting Rod Big End Side Clearance

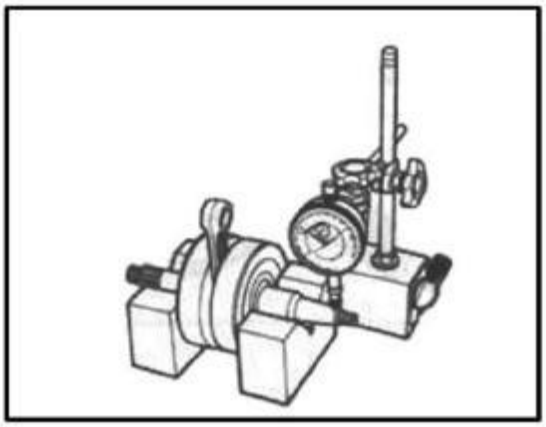
Push the big end to one side, and use thickness gauge to measure the other side clearance.
If out of limit, replace with a new crankshaft.



Connecting Rod big end side clearance: 1.0mm
Tool: Thickness Gauge

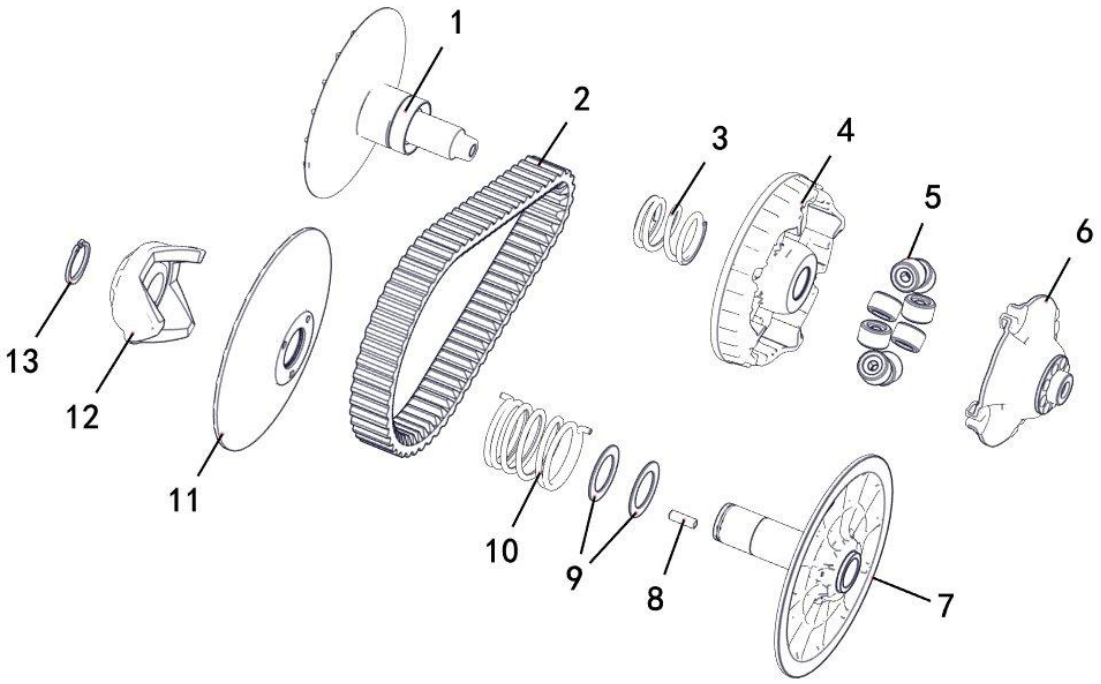
Crankshaft Run-out

Support crankshaft with “V” blocks as illustrated. Put the dial gauge, slowly turn the crankshaft and measure run-out with a dial gauge.
If the run-out exceeds the limit, correct or replace the crankshaft.



Run out limit: 0.08mm
Tools: dial gauge
Magnetic stand
V-block

Drive Pulley, Driven Pulley, Drive Belt



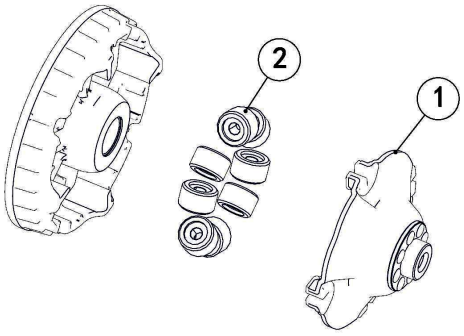
No.	Name
1	Drive Pulley Fixed Sheave
2	Drive Belt
3	Spring,Drive Pulley
4	Drive Pulley Sliding Sheave
5	Centrifugal Weight
6	Cam
7	Driven Pulley Fixed Sheave

No.	Name
8	Locating pin
9	Adjusting Washer
10	Spring,Driven Pulley
11	Driven Pulley Sliding Sheave
12	Spring Holder
13	Cir-clip

Drive Pulley

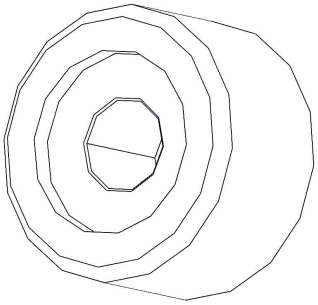
Disassembly

Remove Cam ①and Centrifugal Weight ②



Centrifugal Weight Inspection

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

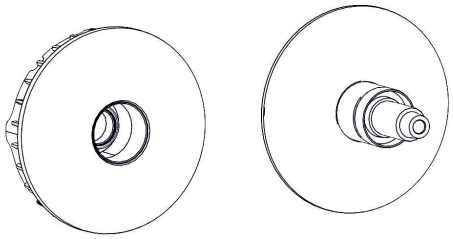


Note: Centrifugal Weight should be re- placed by complete set.

Drive Pulley Fixed and Sliding Sheave Inspection

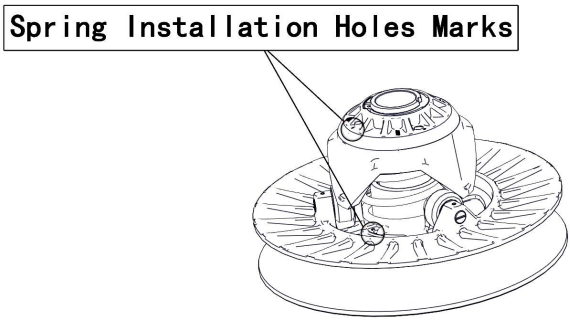
Inspect the abnormal conditions of drive surface for multi-step wear or other damage. Replace it if abnormal.

Inspect one-way clutch if equipped. Replace it if abnormal.



Driven Pulley

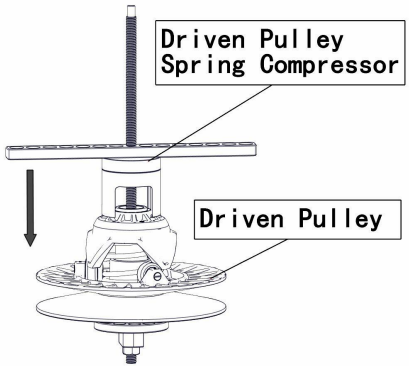
Disassembly



Note: Before disassembly, mark on the spring installation holes

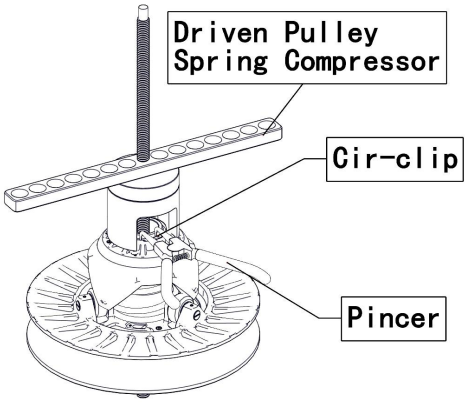
As the illustration shows, place driven pulley on the special tool base.

Special tool: Driven pulley spring compressor
(1BA-17730-00 FZ/1)



Turn special tool handle to compress the cam and spring. Using a cir-clip remover(pincer), remove cir-clip.

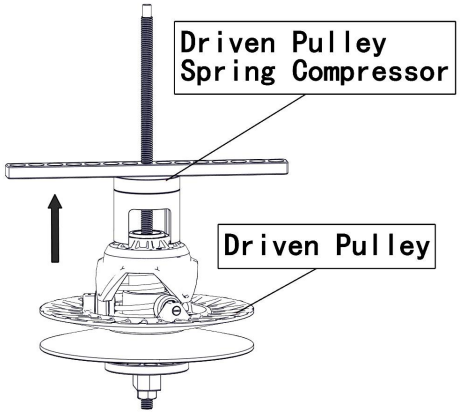
Note: Use special tool to remove cir-clip in order to avoid any wounding if spring seat flying up.



Slowly loosen tool handle to release the spring tension and remove the special tool(pincer);

Remove cam; Remove guide pin;

Remove spring and sliding sheave of driven pulley.

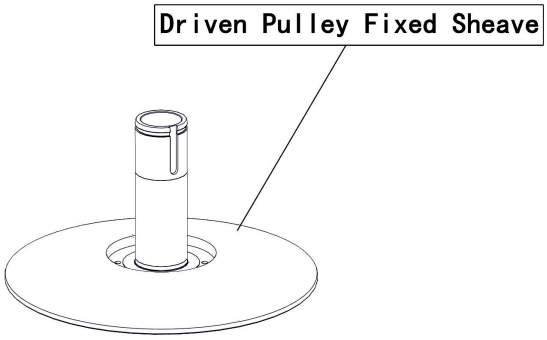


Driven Pulley Inspection

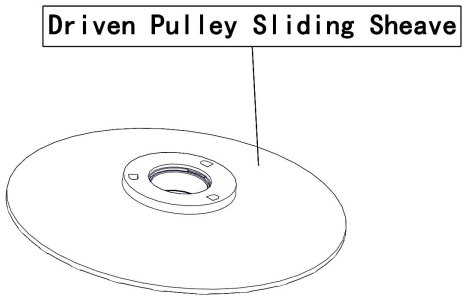
Driven Pulley Fixed Sheave Inspection

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.

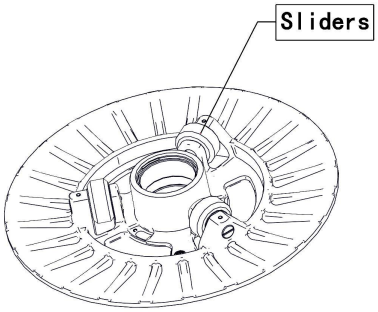


Note: Driven pulley assembly is precisely matched. If only fixed sheave or sliding sheave is replaced, the vibration may increase. It's recommended to replace both when necessary.



Driven Pulley Sliding Sheave Inspection

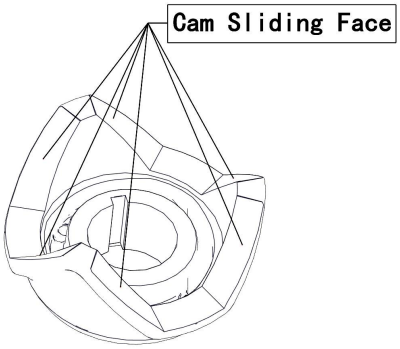
Inspect the drive face of sliding sheave for heavy wear and damage. Replace it if necessary.



Inspect the 3 sliders on driven pulley for wear and other damages. If the wear is severe ,replace all 4 sliders at the same time.

Cam Inspection

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



Driven Pulley Spring Inspection

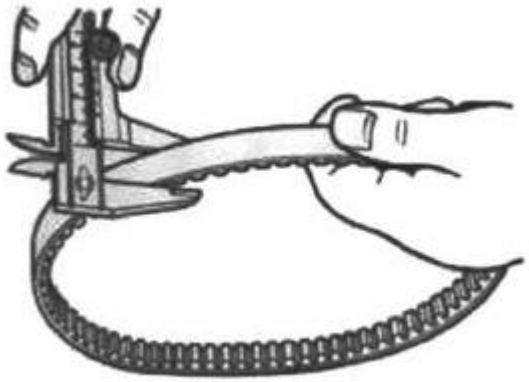
Check spring free length. If it is shorter than limit length, replace it.

Spring free limit length :

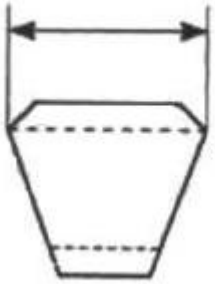
Drive belt

Check belt for any greasy substance.
Check contact surface of belt for any cracks and damage.
Check belt width with vernier caliper.

Damage, width out of range: →Replace

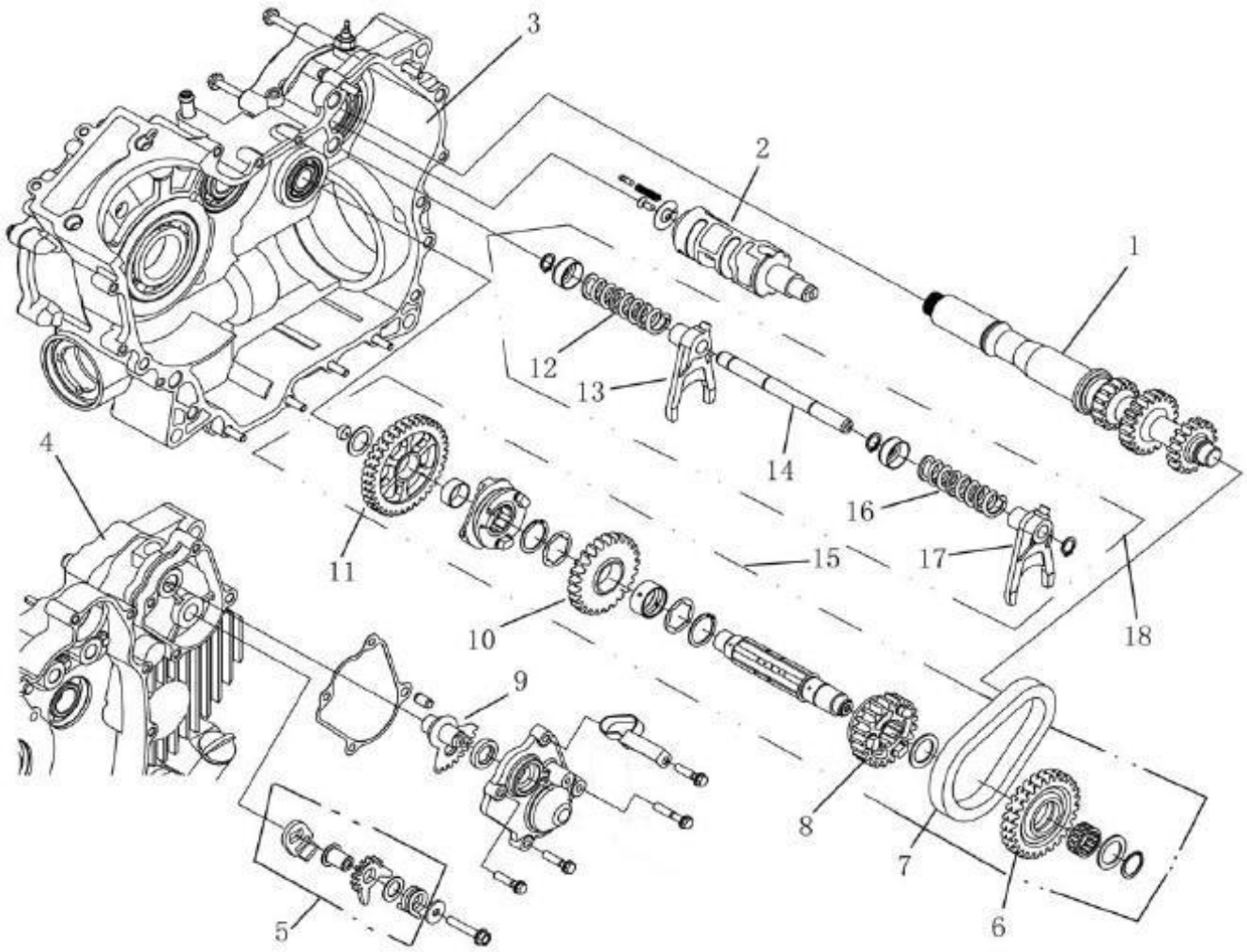


Belt width service limit: 33.5mm
Tool: vernier caliper



Caution:
If belt surface is stained with grease or oil, degrease the belt thoroughly.

Transmission

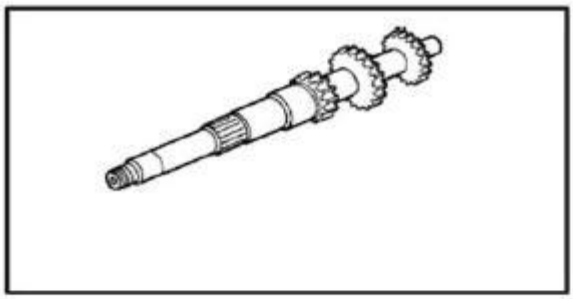


No.	Description	Qty		No.	Description	Qty.
1	MAIN SHAFT. GEARSHIFT	1		10	DRIVEN GEAR, HIGH RANGE	1
2	SHIFT CAM	1		11	DRIVEN GEAR, LOW RANGE	1
3	RIGHT CRANKCASE	1		12	SPRING, SHIFT FORK	1
4	LEFT CRANKCASE	1		13	RIGHT SHIFT FORK	1
5	DRIVEN SECTOR GEAR	1		14	GUIDE BAR	1
6	SPROCKET, REVERSE GEAR	1		15	DRIVEN SHAFT	1
7	CHAIN, REVERSE GEAR	1		16	SPRING, SHIFT FORK	1
8	DRIVEN OUTPUT GEAR	1		17	LEFT SHIFT FORK	1
9	DRIVE SECTOR GEAR	1		18	SHIFT FORK ASSEMBLY	1

Inspection

Check main shaft gear and sprocket surface for any damage or over wear.

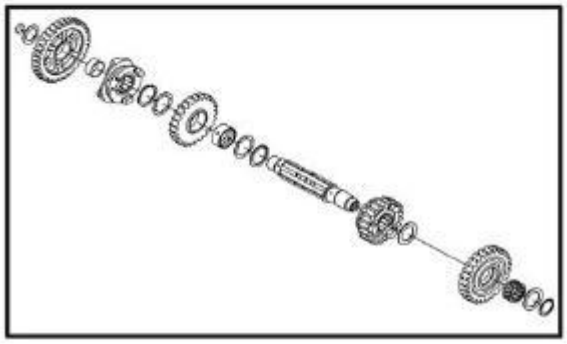
Damage or over wear: → Replace



Check reverse gear chain for any damage or over wear.

Damage or over wear: → Replace

Disassemble driven shaft as illustrated.



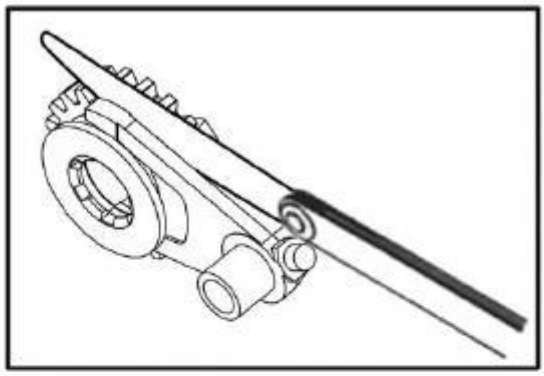
Check each gear surface for any damage or over wear.

Check bearing and collar for any wear or damage..

Damage or over wear: → Replace

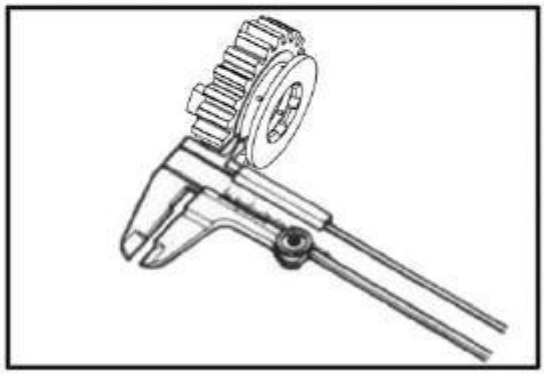
Check the shift fork clearance with a thickness gauge in the groove of its gear.
Clearance exceeds the limit: → Replace

Shift fork to Groove clearance
Standard clearance :0.10-0.30mm
Service Limit :0. 50mm



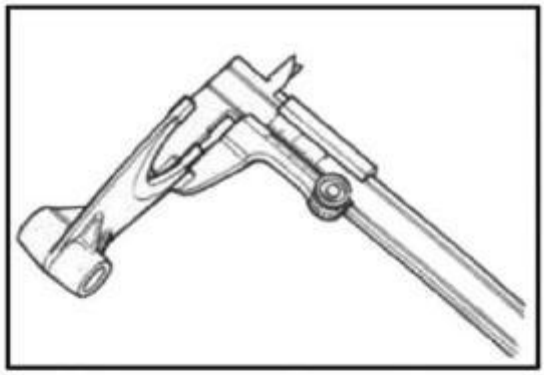
Measure shift fork groove width with vernier caliper

Standard shift fork groove width: 6.05-6.15mm



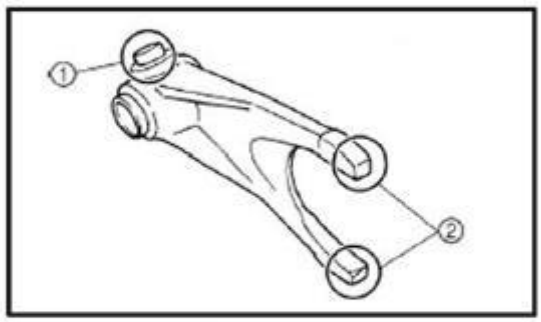
Measure shift fork thickness with vernier calipers;

Standard fork thickness: 5.08-5.90mm

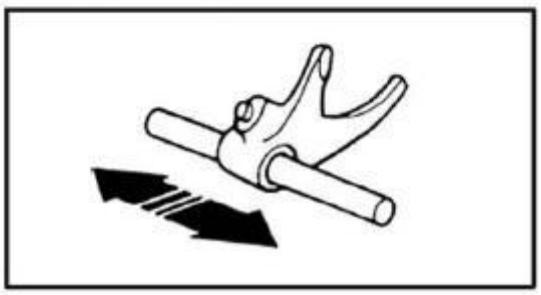


Check shift fork ① and ② for damage or bend

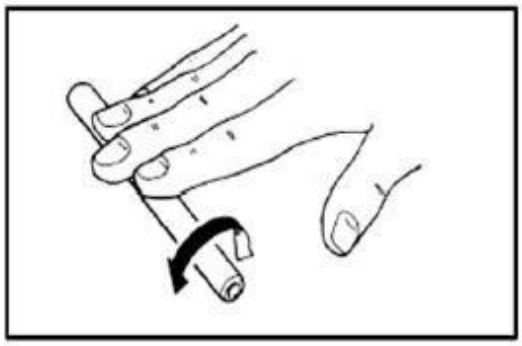
Damage, bend: → Replace



Install shift fork to guide bar and move left and right
In case of any unsmooth moving, replace with a new one.

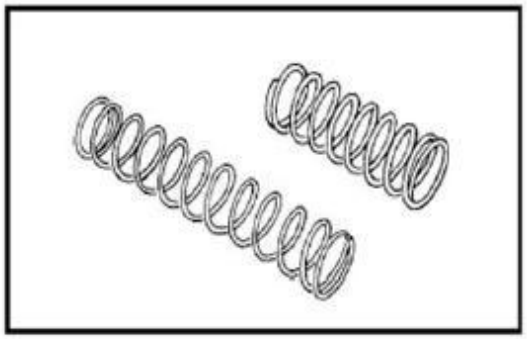


Put the guide bar on a flat plate and roll it. In case of any bend, replace with a new one.

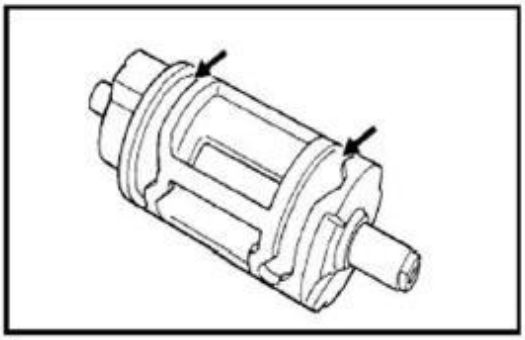


NOTE:DON NOT attempt to correct a bent guide bar.

Check shift fork spring for breakage, damage
Broken or damaged: → Replace



Check shift cam groove for scratches, damage.
Scratch or damage: → Replace



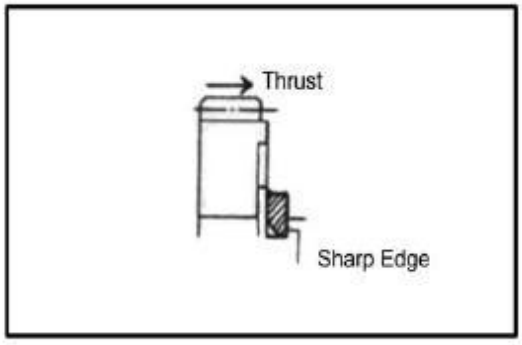
Assembly

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

Use new retainers. Pay attention to the direction of the retainers. Fit to the side where the thrust is as illustrated.

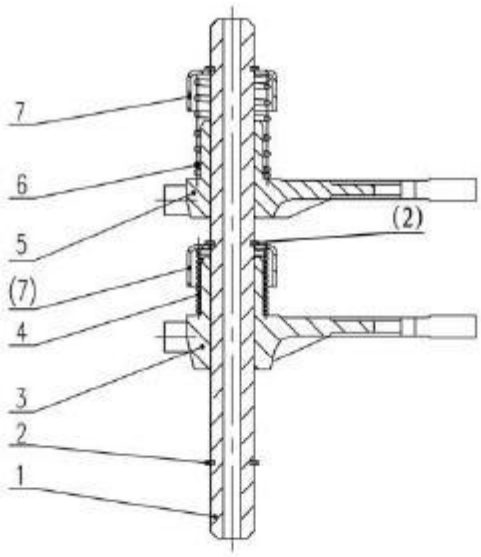
Coat the gears and shafts with engine oil before assembly.

Note:
Do not reuse the retainers
Do not expand of the gap end of new retainers too wide when assembling.
Make sure that all the retainers are properly fitted.



When assembling the guide bar, take care not to assemble the two shift forks and springs in the opposite direction.

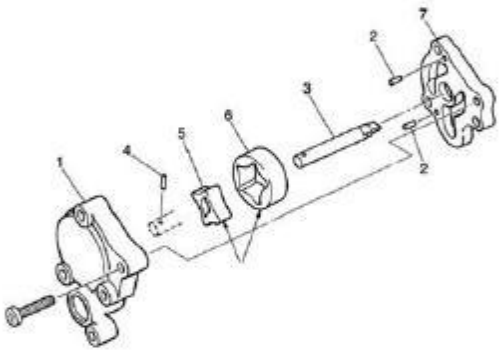
1. Guide bar 2. Retainer
3. Left shift fork 4. Shift fork Spring (small)
5. Right shift fork 6. shift fork spring (big)
7. Spring seat



OIL PUMP

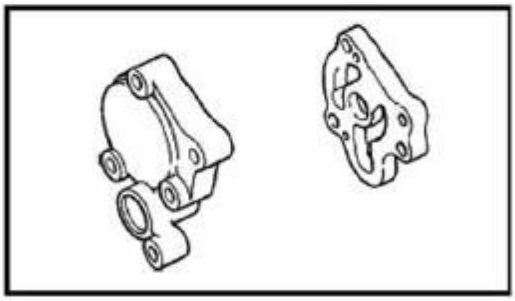
Disassembly oil pump as illustrated:

1. Oil pump housing 2.Dowel pin
3.Oil pump shaft 4.Straight pin
5.Inner rotor, oil pump 6.Outer rotor, oil pump
7. Oil pump cover

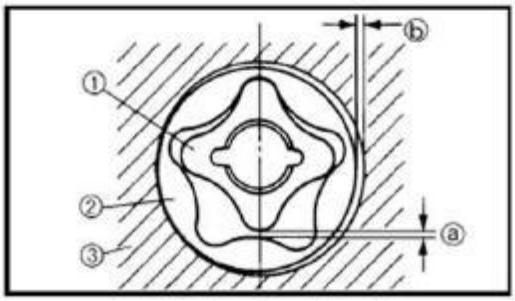


Check oil pump housing and cover for cracks and damage.

Crack or damage: → Replace



Measure top clearance “a” between inner and outer rotors and side clearance “b” between outer rotor and oil pump housing. If the clearance exceeds the limit, replace with new one.



Top Clearance:0. 03-0.10mm
Service Limit: 0. 15mm

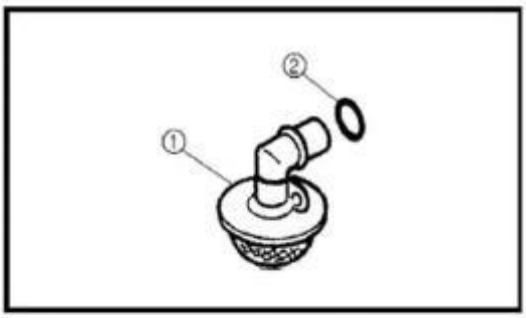
Side clearance: 0. 03-0.10mm
Service Limit: 0.12mm

Oil strainer

Check oil strainer ① and O-ring ② for damage

Damaged oil strainer: → Replace

Clean the surface of oil strainer with engine oil

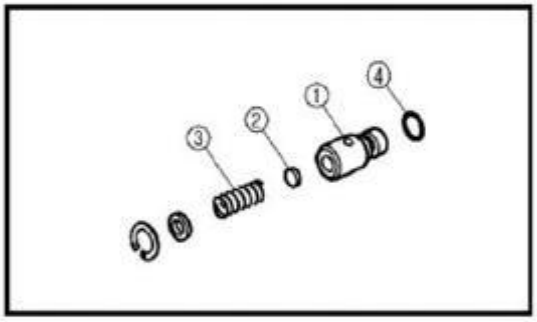


Relief Valve

Check the valve body ① 、valve ② and spring

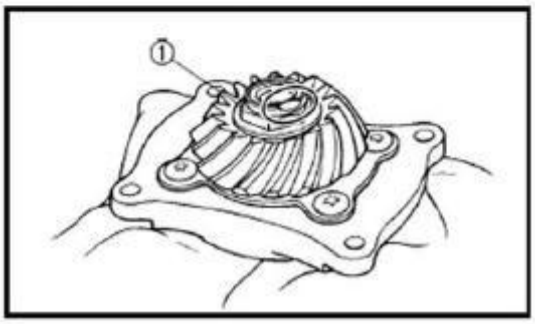
③O-ring④ for damage or wear.

Damage or wear: → Replace



Drive Bevel Gear

Use a clean rag to protect the drive bevel gear shaft, clamp it to the pliers.



Loosen drive bevel gear nut 3, remove the drive bevel gear 4 and adjust washer 5

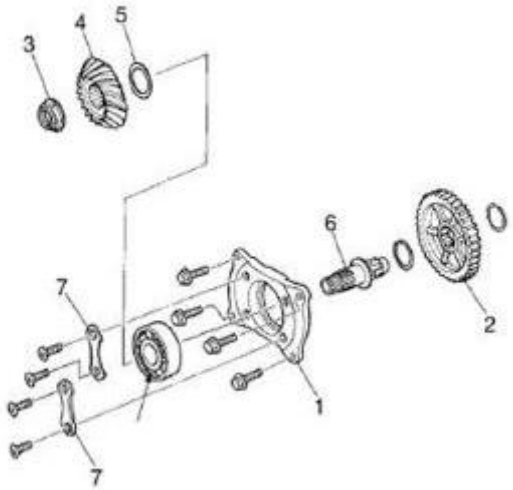
Check the drive bevel gear 4 and output driven gear 2 for rust, scratch, wear or damage. Replace if any.

Check if the bearing 8 turns smoothly, replace with a new bearing if necessary.

Adjust Washer 5 if any of right crankcase, drive bevel gear 4, or drive bevel gear cover 1 is replaced. Refer to bevel gear adjustment for details.

Apply engine oil to bearing 8 when assembling and tighten nut 3 to the specified torque.

1. Drive bevel gear cover
2. Output driven gear
3. Drive bevel gear nut
4. Drive bevel gear
5. Adjust washer
6. Drive bevel gear shaft
7. Bearing press
8. Bearing



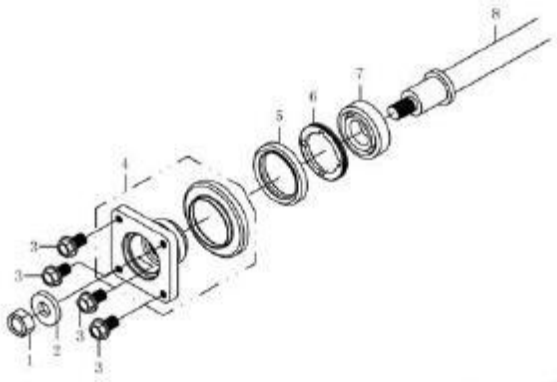
Drive bevel gear nut
Tightening torque: 145N•m

Front Output Shaft

Check bearing 7 for smooth turning and abnormal wear. Check oil seal 5 for damage.

Wear or damage: → Replace

Apply lubrication oil to bearing 7 and oil seal 5 lip before assembly.

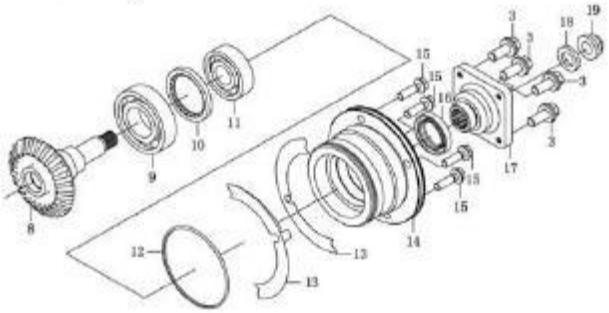


Apply thread locker to bearing limit nut 6 (left thread) and tighten to the specified torque.

Bearing limit nut Tightening torque: 80N•m

Tighten Nut 1 to the specified torque

Front output shaft nut tightening torque: 97N•m



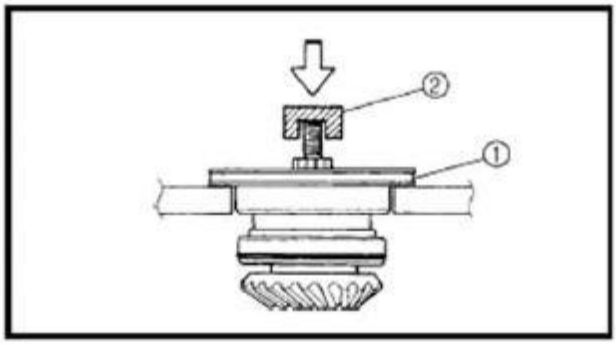
Driven Bevel Gear

Remove nut 19, washer 18, coupler 17 and oil seal 16.

Protect end thread of driven bevel gear with proper device ②. Fix bevel gear cover 14 and press out driven bevel gear.

Place a clean rag ① under bevel gear cover.

Remove bearing limit nut 10 with special tool ② and remove bearing.

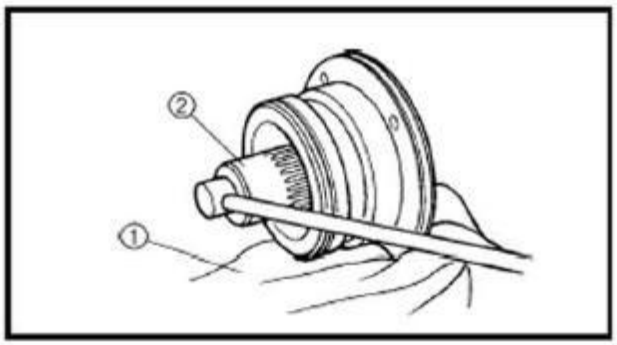


Check driven bevel gear 8 surface for scratches, wear. Scratch or wear: → Replace

Check free turning of bearing 9 and 11. Replace with a new one if any abnormal is found.

Use new oil seal 16 and O-ring 12 when assembling.

Adjust washer 13 if any of right crankcase, driven bevel gear 8 or driven bevel gear cover 14 is replaced. Refer to bevel gear adjustment for details.

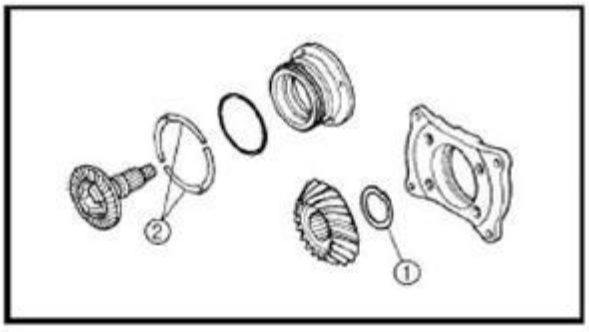


Apply lubrication oil to bearing 9 and 11 and oil seal 16, O-ring. Apply thread locker to nut 10 and tighten to the specified torque.

Tightening torque :110N•m

Tool: driven bevel gear nut wrench

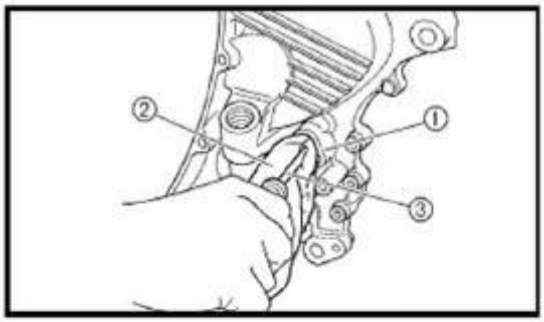
Driven bevel gear nut tightening torque:150N•m

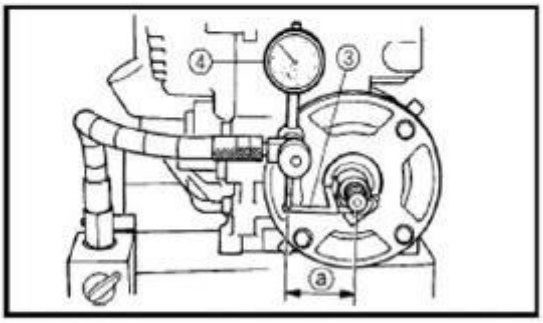


Bevel Gear Washer Adjustment

Adjust washer ① and ② when replacing crankcase and/or bevel gear and/or bevel gear cover.

Bevel Gear





Note: Proper bevel gear engagement depends on that the gear backlash and tooth contact are within the proper range.

Bevel Gear Backlash

Install drive and driven gears to the crankcase. Wrap a (--) screwdriver ③with a rag ② and insert it into the speed sensor hole ① of left crankcase to fix the drive bevel gear.

Install special tool ③ and micrometer ④.

Tool: Bevel gear side clearance dial gauge
Micrometer
a=46mm

Turn the driven bevel gear in each direction and measure the backlash.

NOTE: Measure four points in the mutual vertical direction

If the backlash is not within the specification, adjust the thickness of the driven bevel gear adjust washer. Re-check the backlash until the backlash is correct.

Bevel Gear Backlash: 0.1-0.2mm

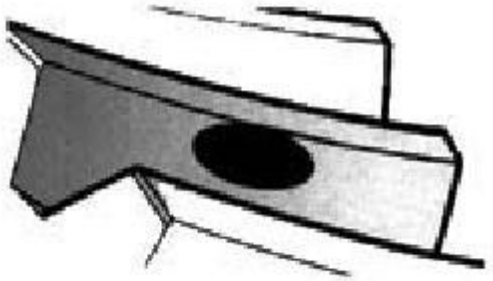
Adjustment

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

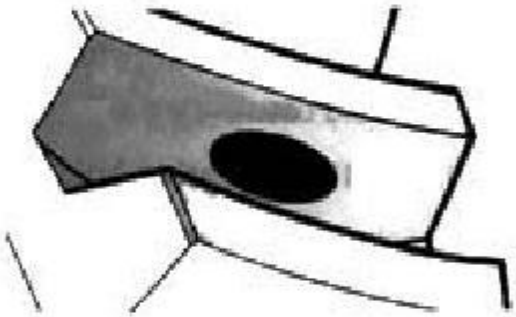
Tooth Contact

After adjusting the backlash, check the tooth contact according to the following procedures:
Remove drive and driven bevel gear shafts from crankcase;
Clean and degrease every tooh of drive and driven bevel gear;
Coat the driven bevel gear with machinist's layout dye or paste;
Install drive and driven bevel gear;
Rotate the driven bevel gear several turns in both directions;
Remove drive and driven bevel gear shafts and check the coated teeth of the drive bevel gear;
Refer to the illustration on the right for tooth contact pattern ①, ② and ③
① Incorrect (contact at tooth top)
② Correct
③ Incorrect (contact at tooth bottom)
If tooth contact is correct (Contact ②), continue the next procedure.
If tooth contact is not correct (② and ③), adjust the thickness of the washer of drive bevel gear. Repeat above steps to check tooth contact until it is correct.

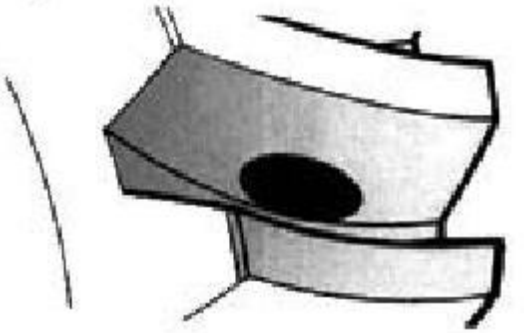
①



②



③



Adjustment

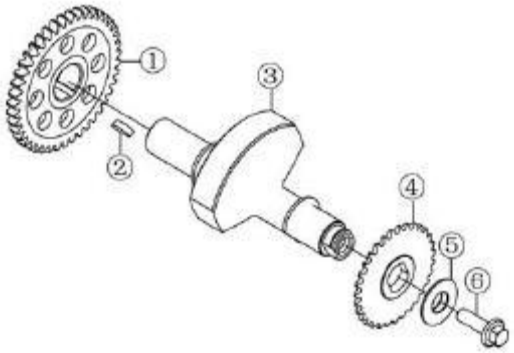
Tooth Contact	Washer Adjustment
Contact at tooth top ①	Increase Thickness
Contact at tooth bottom ③	Decrease Thickness

Note:
After adjusting the tooth contact, the backlash must be checked again;
If the backlash is adjusted but tooth contact is still out of specification, replace the drive and driven bevel gears;
Both tooth contact and backlash should be within the required specification.

Balancer Shaft

Remove the parts as illustrated on the right. Check each part for abnormal wear or damage.

Wear or damage: → Replace



① Balancer shaft gear
② Woodruff key
③ Balancer shaft
④ Balancer shaft sprocket
⑤ Washer
⑥ Bolt

Magneto Rotor

Remove starter clutch nut;

Check starter clutch roller and holder for abnormal wear or damage.
Wear or damage: → Replace
Install the starter clutch in the correct direction.

Note:
When install the starter clutch to the magneto rotor, make sure side “A” is in the right direction.

Face arrow mark “B” to the engine side;
Apply engine oil to starter clutch.

Apply thread locker to bolt and tighten to the specified torque:

Tightening torque of starter clutch bolt: 30N•m
Material: Thread Locker

Install the starter driven gear

Make that the starter driven gear turns in the opposite direction of the arrow mark “B”. The gear cannot turn in the direction of the arrow.

Check starter driven gear bearing. In case of anything unusual, replace the bearing.

Remove starter driven gear bearing with special tool

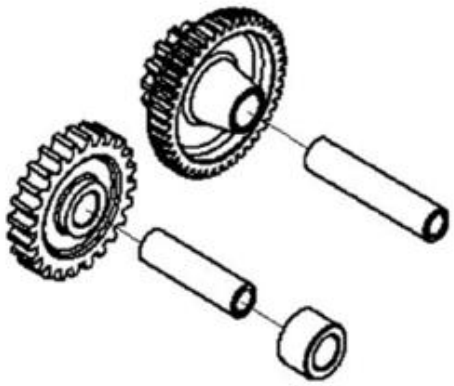
Install starter driven gear bearing with special tool.

Tool: Bearing Installer/Remover

Electric Starter Gear

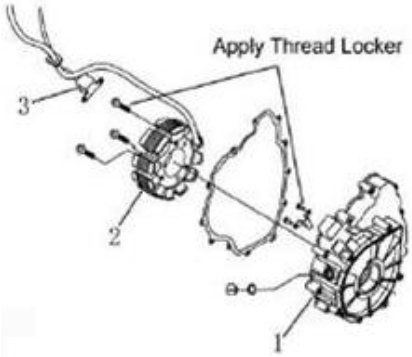
Check the gear surface for scrap or damage.

Scrape or Damage: → Replace



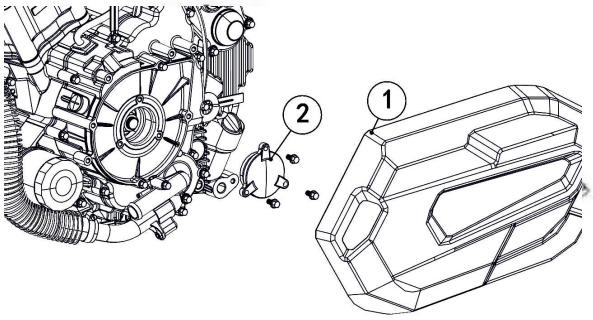
LEFT CRANKCASE COVER（MODEL2）

Check magneto stator coil 2, pickup coil 3 for damage,
burn or short circuit, if any , replace with new one;



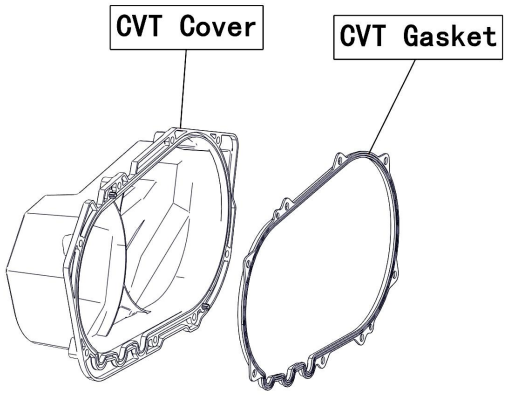
LEFT SIDE COVER

Disassembly



1— Left side cover
2— End cap

CVT Cover



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

Inspect CVT Gasket for ageing, damage. Replace a new one if necessary.

CVT Case

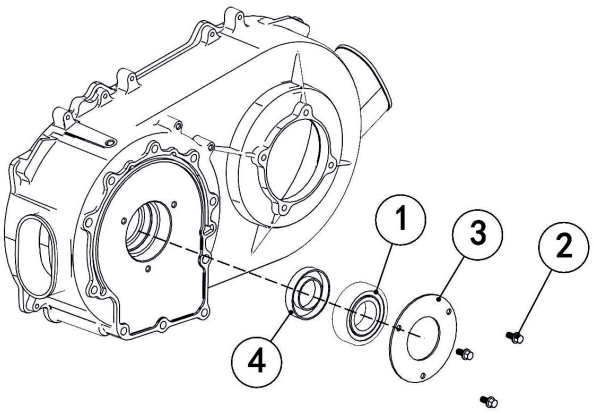
Check bearing ① for smooth turning. In case of any abnormal, remove screw ② and bearing retainer ③ and replace with a new bearing.

Check oil seal ④. In case of any damage, replace it;

Apply grease to oil seal lip and install with special tool.

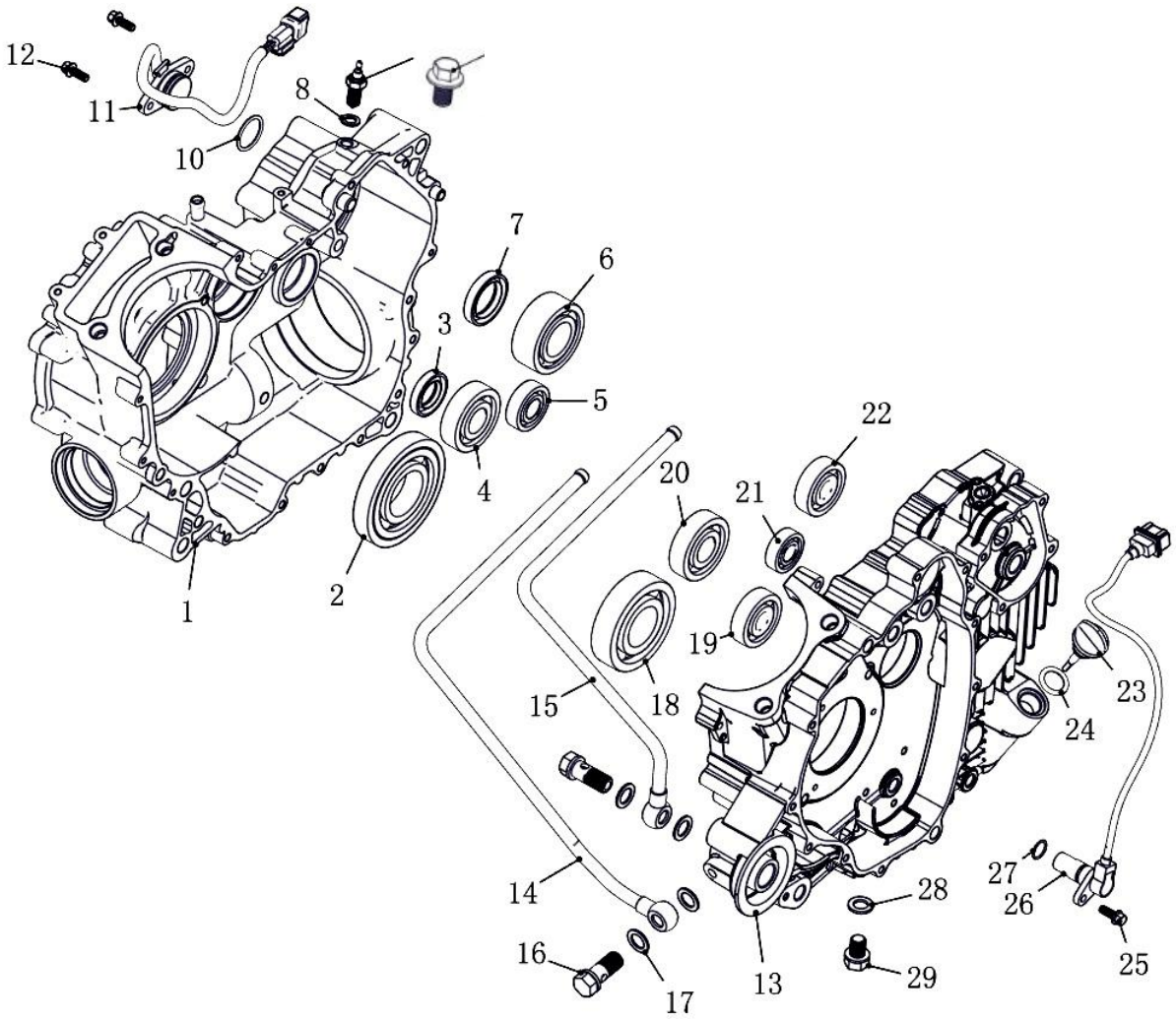
Apply lubrication oil to bearing ① and install with special tool; Check bearing for smooth turning. The seal side of bearing ① should face bearing retainer ③.

Install bearing retainer ③ and bolt ②.



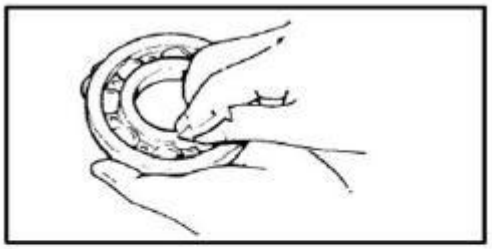
Tool: Oil Seal Installer
Bearing Installer

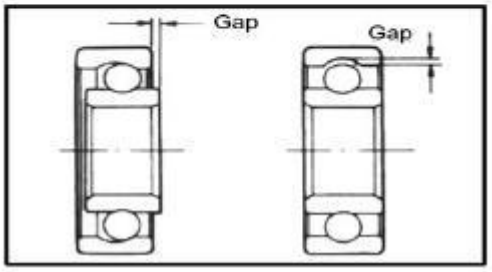
Crankcase



1.Right Crankcase	11.Gear Sensor	21.Bearing
2.Bearing	12.Bolt	22.Bearing
3.Seal	13.Left Crankcase	23.Oil Dip Rod
4.Bearing	14.Oil Pipe 1	24.O-ring
5.Bearing	15.Oil Pipe 2	25.Bolt
6.Bearing	16.Link Bolt	26.Speed Sensor
7.Oil Seal	17.Washer	27.O-ring
8.Washer,Reverse Gear Sensor	18.Bearing	28.Washer
9.Nut	19.Bearing	29.Oil Drainage Bolt
10.O-ring	20.Bearing	

Clean and grease the bearings, turn the inner race of bearing and check the play, noise and smooth turning. In case of any abnormal, remove bearing with special tool and replace;
Check all the oil seals for over wear or damage. In case of any over wear or damage, remove with special tool and replace with a new oil seal;
Remove gear sensor (11) and check for continuity with reverse gear sensor (9) with a multimeter.
Remove link bolt and oil pipe (14)(15) and check oil pipe for crack or clog. Replace with a new one if any;
Remove oil drainage bolt (29) and clean it.





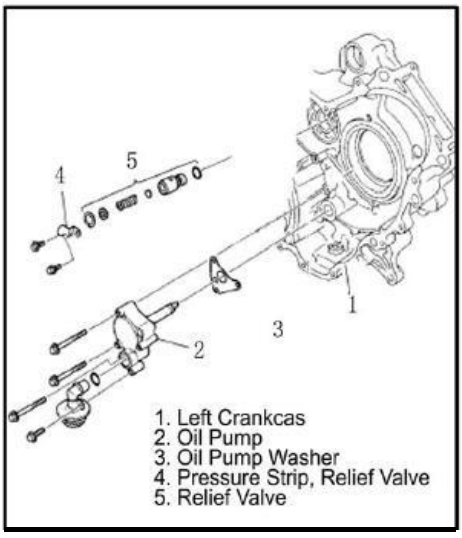
Note: Check bearing for smooth turning after installation.

Install new O-ring and apply grease;
Install gear sensor;
Install reverse gear sensor (9) and tighten to the specified torque.
Reverse gear sensor tightening torque: 20N•m
Install speed sensor (26)
Install oil pipe and tighten the link bolt to the specified torque;
Link bolt tightening torque: 40N•m
Install washer (28) and oil drainage bolt (29) and tighten to the specified torque;
Drain bolt tightening torque: 30N•m
Tool: Bearing Remover
Bearing Installer
Multimeter
III Engine Assembly
Reverse the engine removal procedure for installation.

Caution:
Clean all the parts before assembly;
Make sure that the parts are in good condition without any damage;
Apply engine oil to the moving parts before assembly;
Apply grease to oil seal lip and O-ring

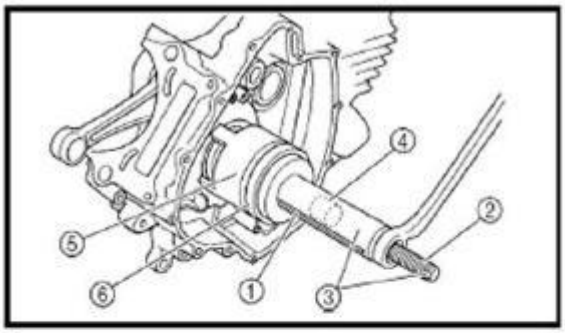
Caution:
Make sure that drive belt, primary and secondary sheaves are not stained with grease.

Engine Center
Oil Pump and Relief Valve
Install oil pump and relief valve to left crankcase, as illustrated on the right. Tighten to the specified torque:
Oil pump bolt: 10N•m
Relief valve bolt: 10N•m



Connecting Rod

Install connecting rod to left crankcase with special tool;



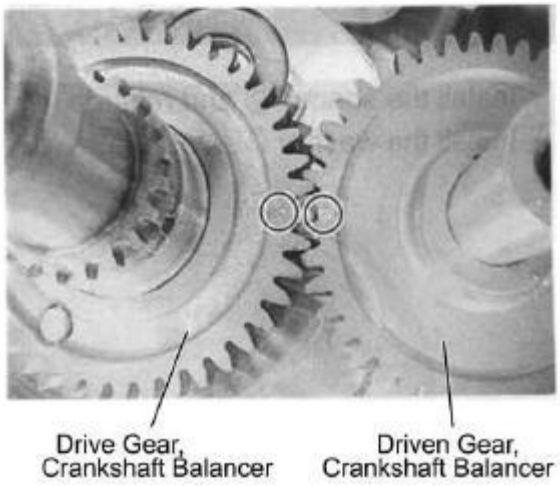
Note:
Do not hammer the conrod into crankcase with plastic mallet;
Use special tool to avoid affect of conrod precision

Tool: Conrod Installer

Balancer Shaft

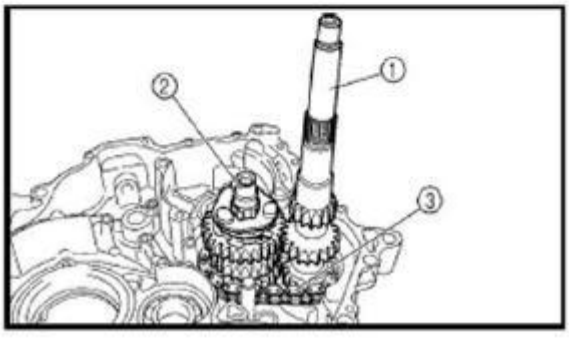
Install balancer shaft

Caution: Balancer shaft driven gear should be aligned to the mark as illustrated.

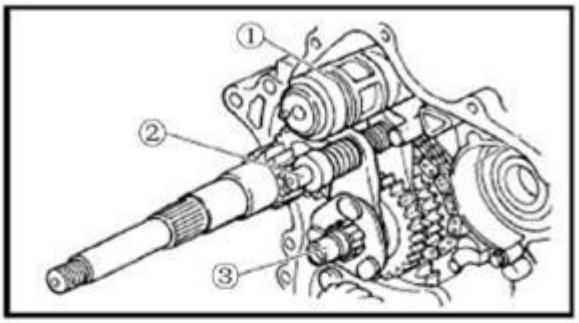


Main Shaft, Counter Shaft

Install main shaft and counter shaft.



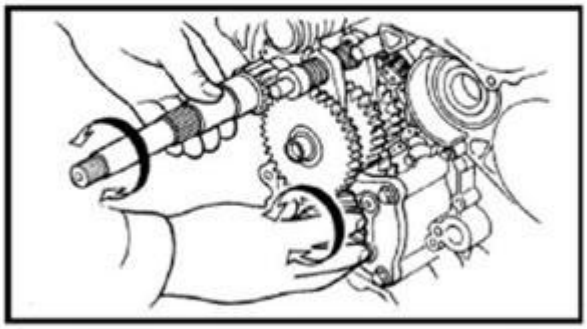
Shift Cam, Shift For



Install shift can① and shift fork②

Check each part for smooth turning

Install low range driven gear to counter shaft③



Spray adequate engine oil to each part.

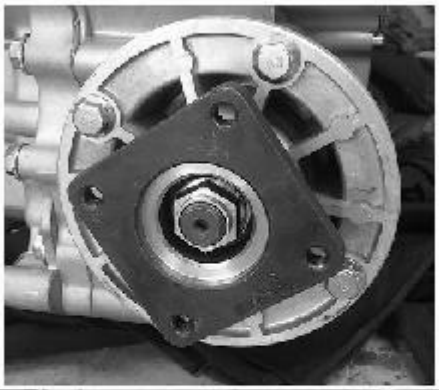
Drive Bevel Gear

Install drive bevel gear and tighten to the specified torque.

Drive bevel gear tightening torque: 32N. m
Material: Thread Locker

Right Crankcase

Driven Bevel Gear



Install driven bevel gear and tighten to the specified torque.

Driven bevel gear tightening torque: 25N. m

Check bevel gear backlash

Front Output Shaft

Install front output shaft to right crankcase

Apply sealant ①to the mating face of right crankcase.

Note: Apply sealant evenly in an uninterrupted thin line.

Install 5 dowel pins②

Assemble crankcase and tap slightly with a rubber hammer so that the crankcase is properly fitted.

Install bolt and tighten to the specified torque.

Crankcase bolt tightening torque: M6: 10N•m
M8: 25N•m

Note: Crankcase bolts should be tightened diagonally in several steps.

Place the steel ball and install gear positioning bolt and tighten the bolt to the specified torque.

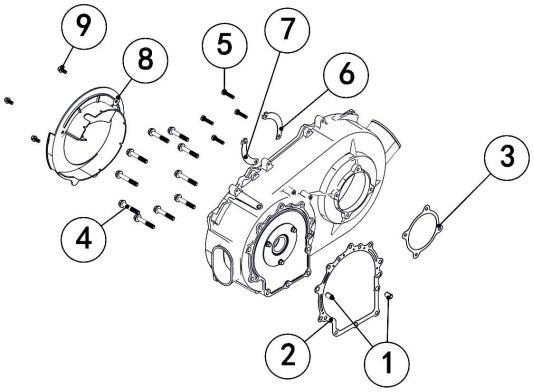
Gear positioning bolt tightening torque: 40N•m

Engine Right

Timing Chain

Put on timing chain （2）

CVT Case

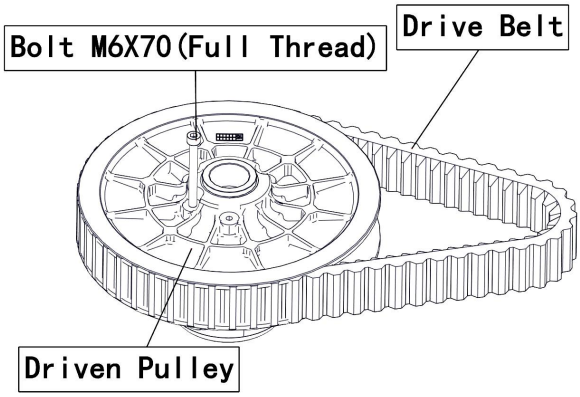


Install dowel pin ①, gasket ② and gasket ③ to the right crankcase. Install CVT case assembly to right crankcase.

Install bolt ④ and lock plate ⑤ , lock plate ⑦,bolt ⑤

Note: Tighten bolt/nut diagonally
Use a new gasket

Install air guide plate ⑧ and bolt ⑨.

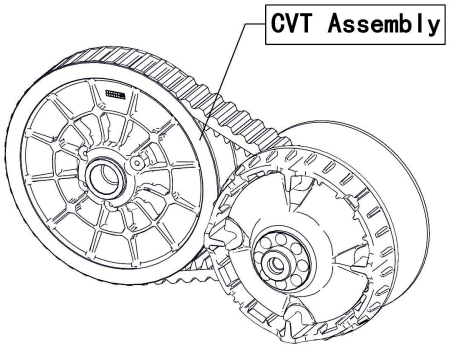


Drive pulley, driven pulley, drive belt

Use bolt M6X70(full thread) to open fixed plate and sliding plate.

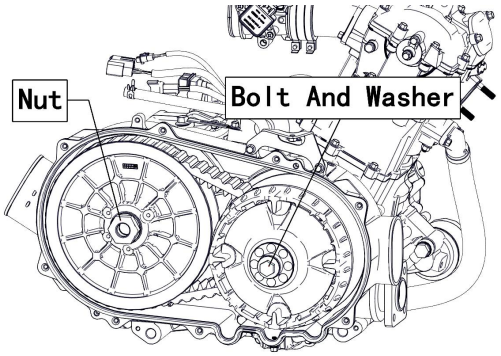
Install drive belt on drive pulley and driven pulley

Warning: Drive belt contact surface should be free from any grease or oil



Install CVT assembly and tighten bolt washer and nut to the specified Torque

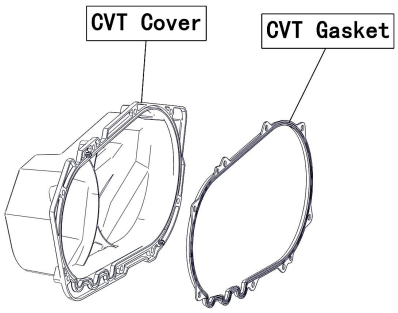
Note: Install bolt of primary sheave anticlockwise. Install nut secondary sheave clockwise.



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

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

CVT Cover

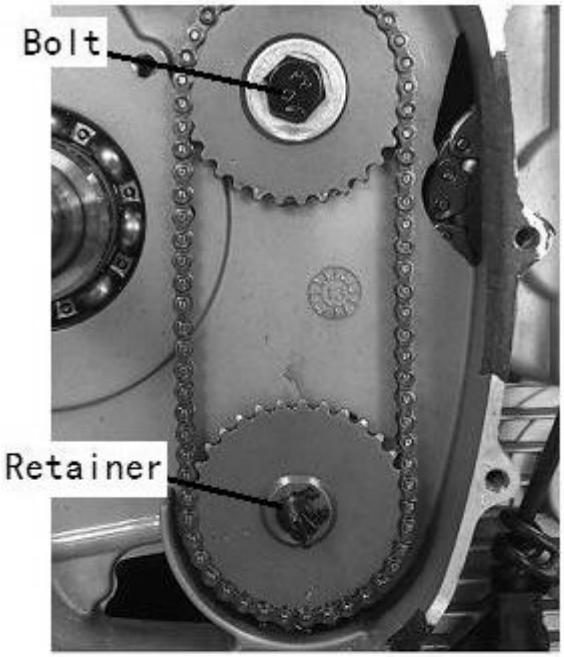


Install the CVT gasket and CVT cover.

Install CVT cover bolts and tighten diagonally in several steps.

Engine Left

Oil Pump Sprocket and Chain



Install oil pump drive sprocket;

Install oil pump driven sprocket;

Install oil pump drive chain;

Install oil pump sprocket bolt;

Install sprocket retainer with a long nose pliers

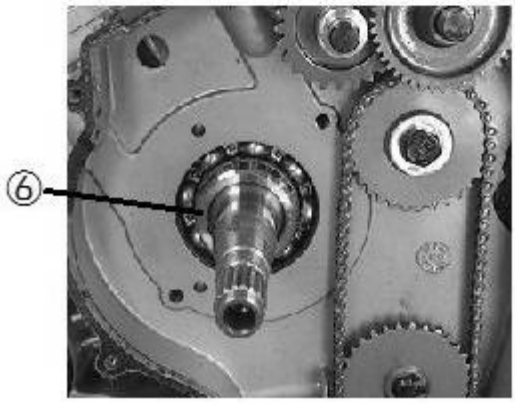
Tool: Long Nose Pliers

Dual Gear, Idle Gear

Install dual gear shaft① and dual gear ②

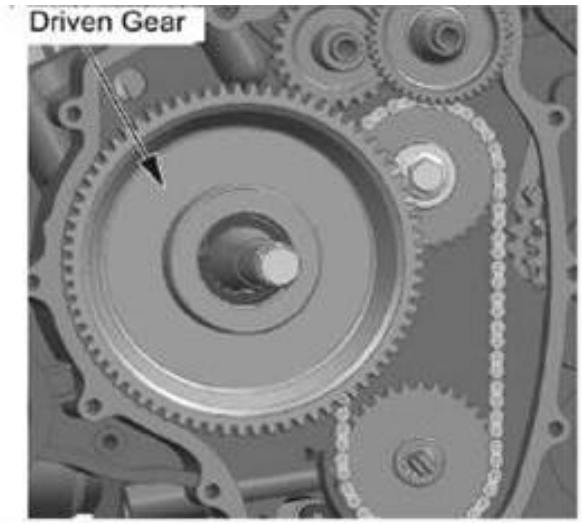
Install dual gear shaft③, dual gear ④and bush⑤

Starting Driven Gear

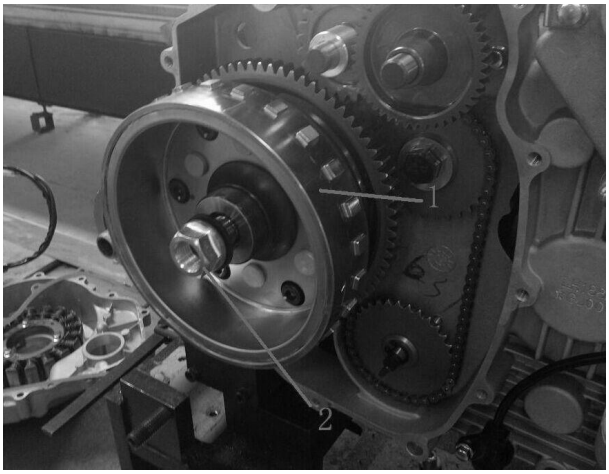


Install starting driven gear bush⑥

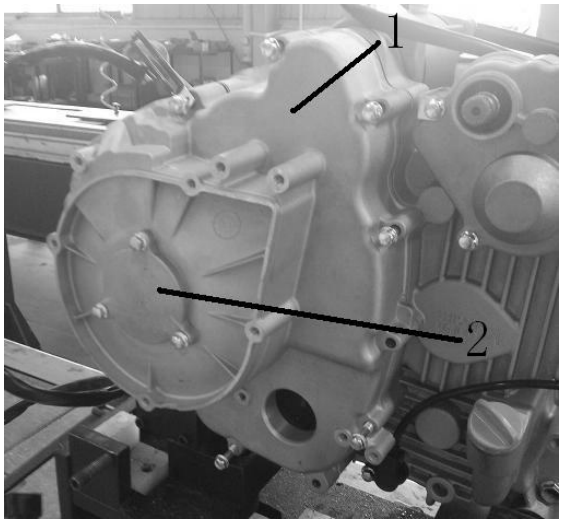
Install starting driven gear;



Magneto Rotor



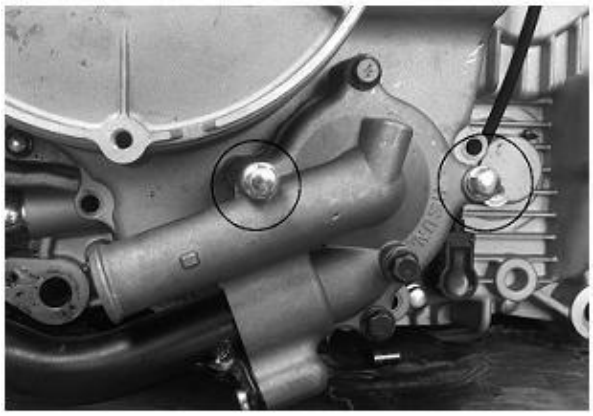
Install Magneto Rotor (1)
Install Nut (2)
Nut tightening torque: 160N•m



Install left crankcase cover (1)

Install end cap (2)

Water Pump

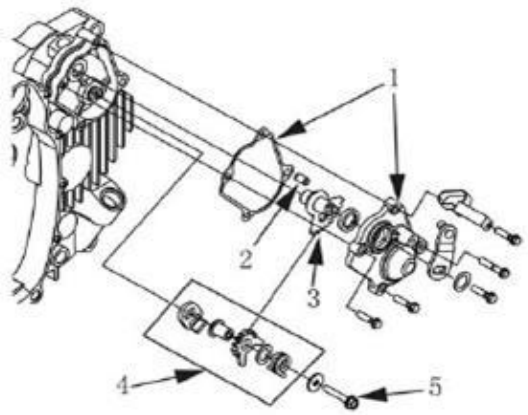


Install water pump;

Install water pump fixing bolts;

Note: Before tightening the bolts, be sure to insert oil pump shaft into groove of water pump shaft.

Sector Gear



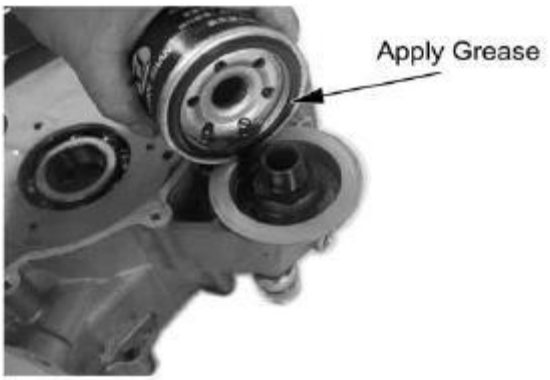
Install the parts as illustrated on the right.

1- sector gear cover and gasket
2-dowel pin
3-drive sector gear
4-driven sector gear
5-driven sector gear bolt

Note: When the shift cam is in the neutral position, the mark of drive sector gear should be between the two marks of the driven sector gear.

Driven sector gear tightening torque: 14N•m

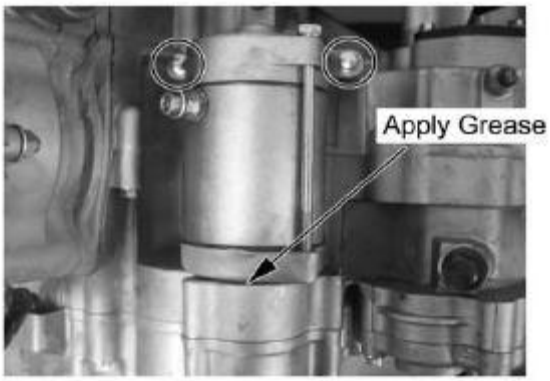
Oil Filter



Install oil filter bolt and tighten to the specified torque;

Oil filter bolt tightening torque: 36 N·m

Apply engine oil to O-ring;



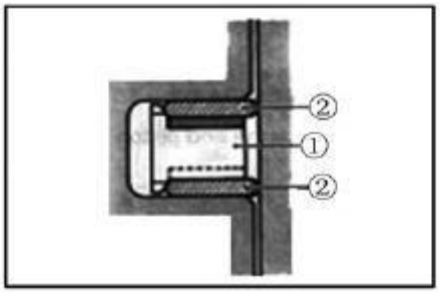
Install oil filter, turn it by hand until the filter gasket contacts the mating surface. Tighten the bolts to the specified torque.

Tool: Oil Filter Wrench

Starting Motor

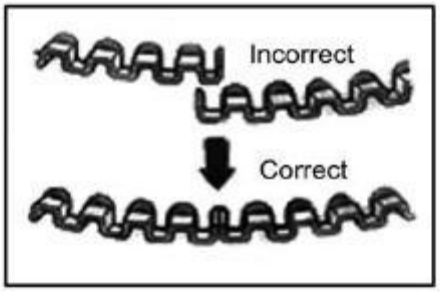
Apply engine oil to new O-ring;
Install starting motor;
Install bolt and tighten to the specified torque

Tightening torque: 10N·m

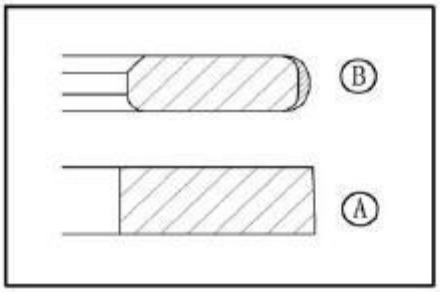


Engine Top Side

Piston
Install the piston rings in the order of oil ring, ②ring and ①ring.;
The first member to go into the oil ring groove is spacer①, after placing the spacer, fit the two side rails②.



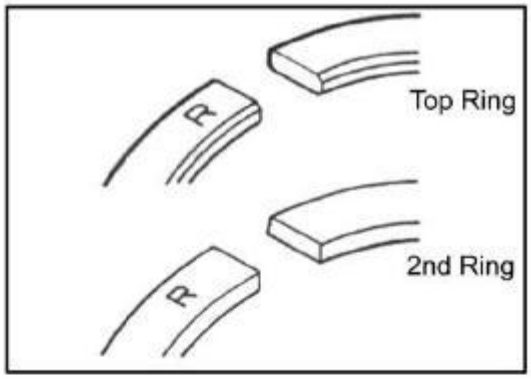
Warning: when installing the spacer①, do not overla two ends in the groove.



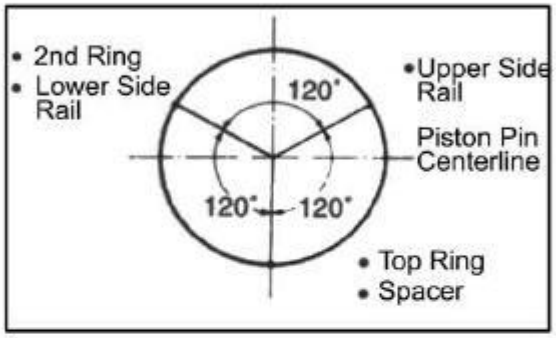
Install the second ring A and first ring B

Note: 1st ring and 2nd ring differ in shape

1st and 2nd rings have letter “R” marked on the side. Be sure to bring the marked side to the top when fitting them to the piston.



Position the gaps of the three rings as illustrated on the right. Before installing the piston into the cylinder, check that the gaps are so located.

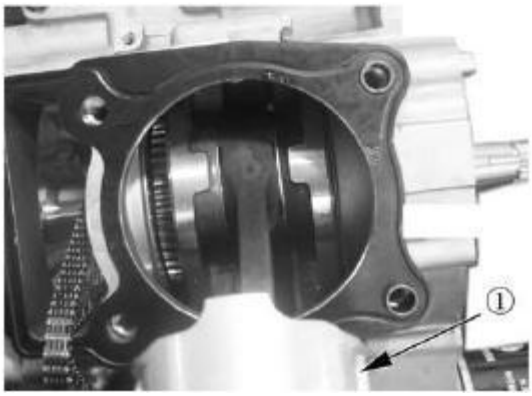


Apply a light coat of moly oil to the piston pin;

Install piston pin into holes of piston and conrod small end.

Note: When installing the piston, the “IN” mark on piston top is located to the intake side.

Place a clean rag beneath piston and install piston pin circlip ①

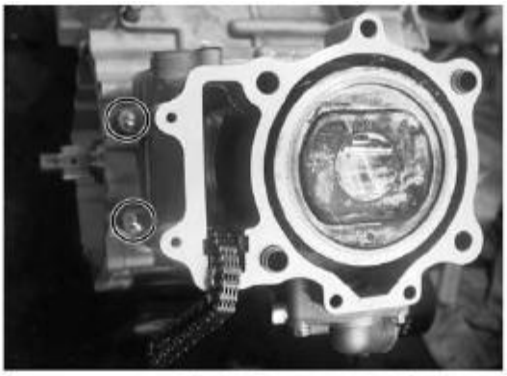


Note: while rotating crankshaft, pull the cam chain upward, or the chain will be caught between sprocket and crankcase.

Install the dowel pins and the new cylinder gasket;

Note: Use a new cylinder gasket to prevent oil leakage

Cylinder



Apply engine oil to piston skirt and cylinder wall;

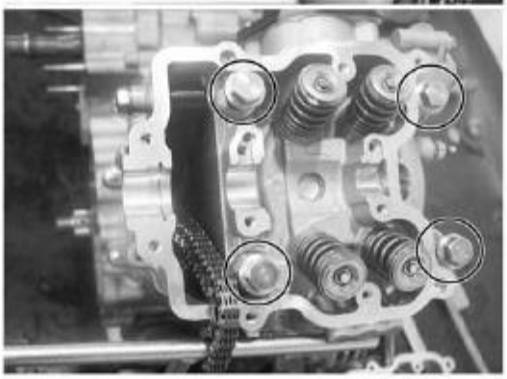
Hold each piston ring with proper position, insert piston into the cylinder;

Tighten the cylinder base bolts temporarily;

Note: When installing the cylinder and cylinder head, pull the cam chain upward, or the chain will be caught between sprocket and crankcase.

Install chain guide①;

Fit the dowel pin and new cylinder cover gasket;



Note: Use a new cylinder cover gasket to prevent oil leakage

Cylinder Head

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

Cylinder head bolt tightening torque: Initial: 25 N·m Final: 40 N·m

Tighten the cylinder head nuts to the specified torque;

Cylinder head nuts tightening torque:
M6: 10 N·m
M8: Initial 10 N·m
Final 25 N·m

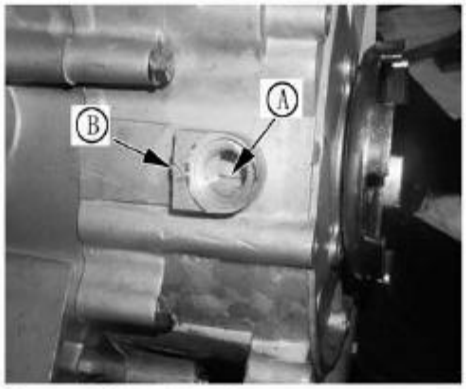
Tighten the cylinder top nuts and cylinder base to the specified torque;

Tightening torque: 10 N·m

Install chain tensioner;

Camshaft

Align mark “A” on magneto rotor with mark “B” on crankcase;

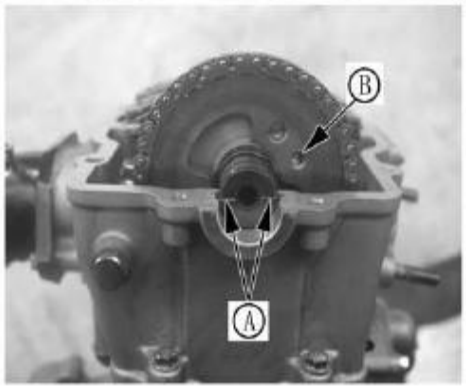


Note: while rotating crankshaft, pull the cam chain upward, or the chain will be caught between sprocket and crankcase.

Align the mark “A” on the camshaft so that they are parallel with the mating surface of the cylinder head.

Note: Do not rotate the magneto rotor while doing this. when the sprocket is not positioned correctly, turn the sprocket;

Engage the chain on the sprocket with the locating pin “B” as illustrated on the right;



Recheck if the position of mark “A” and “C” is correct. If not, reassemble until it is correct.

Install crankshaft C-ring ①

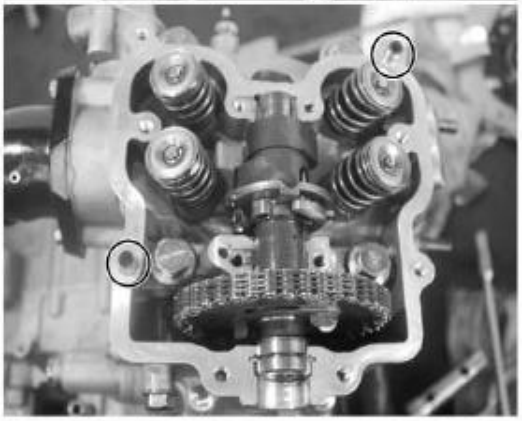
Install lock washer so that it covers the locating pin;

Apply thread locker to the bolts before installing, and tighten them to the specified torque;

Sprocket bolt tightening torque: 15 N·m

Bend up the lock washer to lock the bolts.

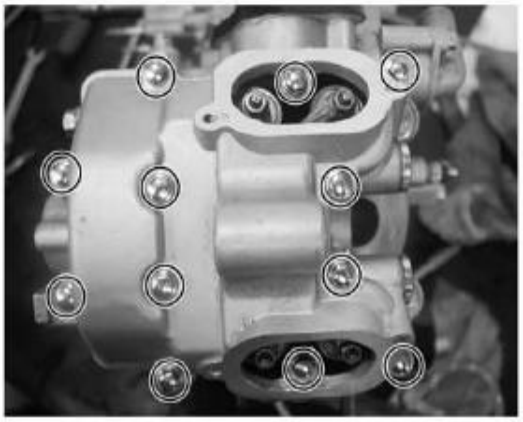
Cylinder Head Cover



Clean the mating surface of cylinder head and cylinder head cover;

Install dowel pin to the cylinder head

Apply sealant to the mating surface of the cylinder head cover;

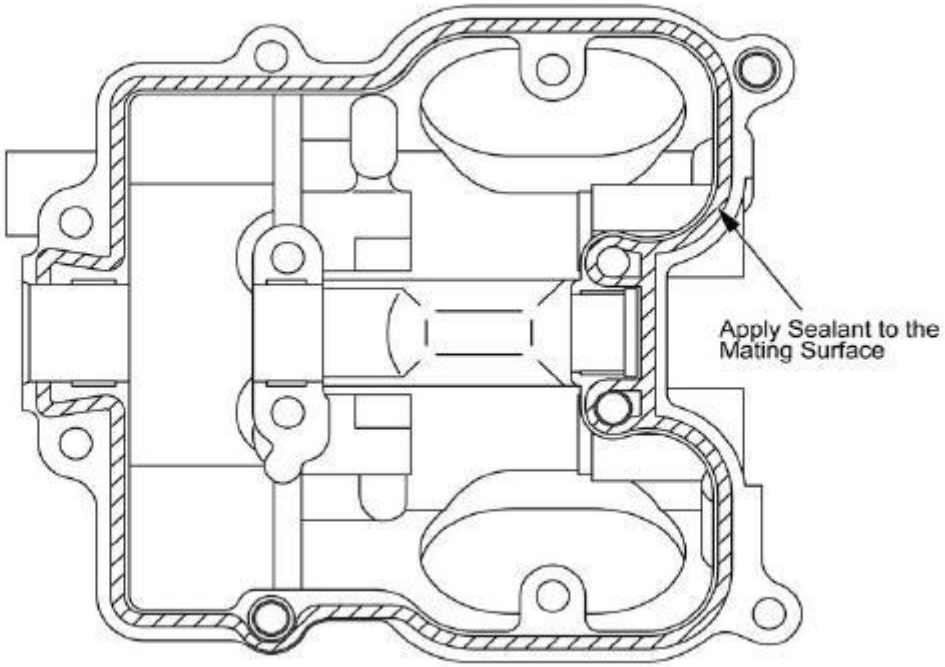


Install cylinder head cover bolts, tighten diagonally to the specified torque.

Cylinder head cover bolt tightening torque: 10 N·m

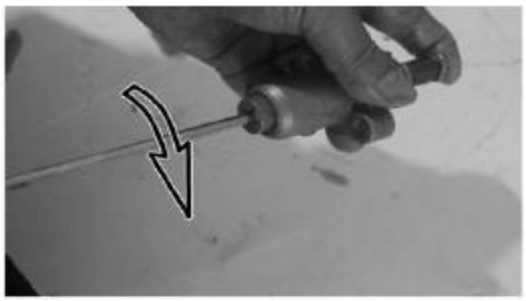
Note: When tightening the cylinder head cover bolts, the piston must be at top dead center on the compression stroke.

Gasket Sealant Applying Place



Chain Tensioner

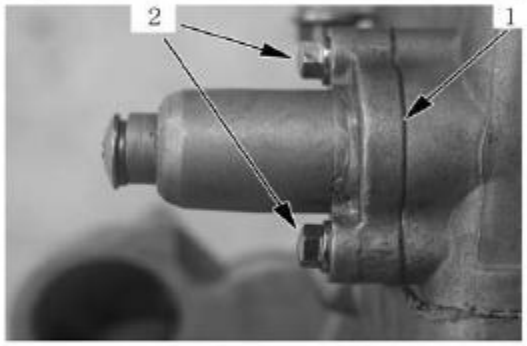
Insert (--) screwdriver into slotted end of chain tension adjuster, turn it clockwise to lock the tensioner spring;



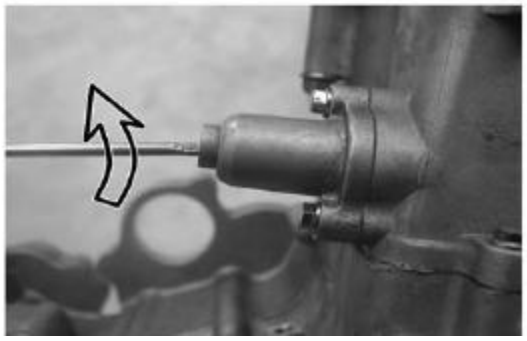
Install the chain tensioner and the new washer (1);

Install the bolt (2), tighten it to the specified torque;

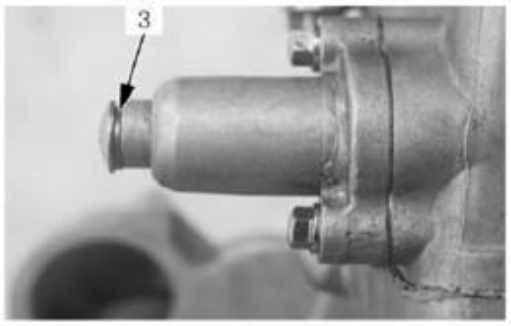
Chain tensioner bolt tightening torque: 10 N·m



After chain tensioner is installed, turn the (--) screwdriver counter clockwise. The tensioner rod will be advanced under spring force and push tensioner against chain.



Install the new gasket (3);



Install chain tensioner screw, tighten it to the Specified Torque

Chain tensioner screw tightening torque: 8 N·m

Valve Adjuster Cover

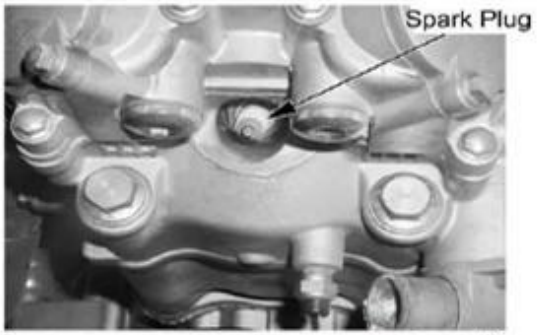
Use new rubber gasket and apply grease;

Install Valve Inspection Cap

Install valve inspection cap bolt;

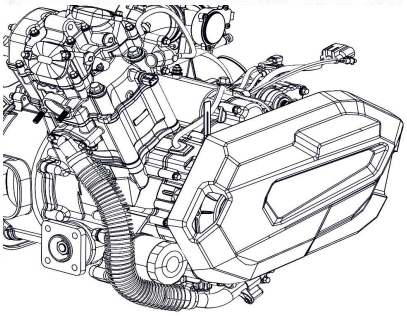
Spark Plug

Install spark plug with special tool and tighten to the specified torque;



Note: To avoid damage to the cylinder head thread, screw in the spark plug with hand first, then tighten it to the specified torque with spark plug wrench.

Spark plug tightening torque: 18N•m
Tool: Spark Plug Wrench

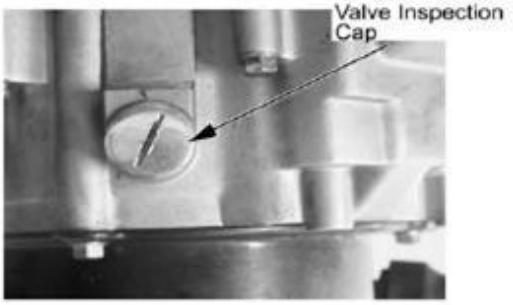


Engine Periphery

Left Side Cover

Install left side cover

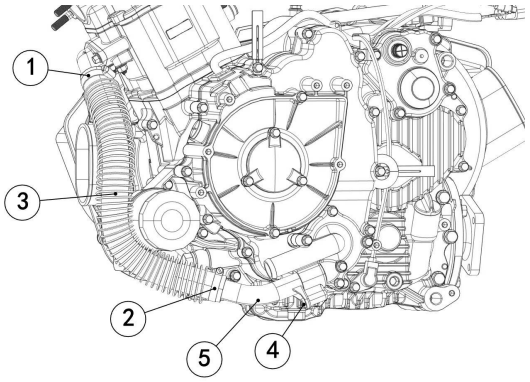
Install the bolts



Valve Inspection Cap

Install valve inspection cap

Water Pipe and Hose



Install water hose (5)

Install bolt (4)

Install water hose (3)

Install clamp (1) and (2)

3.5 Cooling and Lubrication System

3.5.1 Engine Coolant

The coolant used in cooling system is a 100% ethylene glycol antifreeze.

Warning !
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 stains, flush with plenty of water and consult the doctor immediately.
Keep coolant away from reach of children.

3.5.2 Inspection of Cooling Circuit

Remove radiator cap① and connect tester ② to filler.

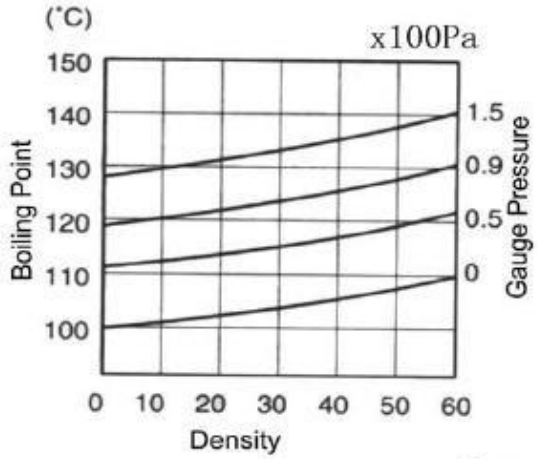
Warning!
Do not open the radiator cap when the engine is still hot.

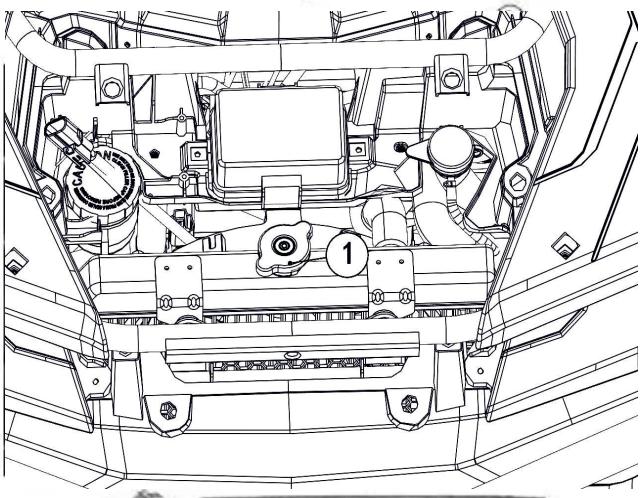
Give a pressure of 120 kPa and check if the cooling system can hold this pressure for 10 seconds.

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

Warning!
When removing the radiator cap tester, put a rag on the filler to prevent splash of coolant.

Warning!
Do not allow a pressure to exceed the radiator cap release pressure.





3.5.3 Inspection and Cleaning of Radiator and Water Hoses

Radiator Cap

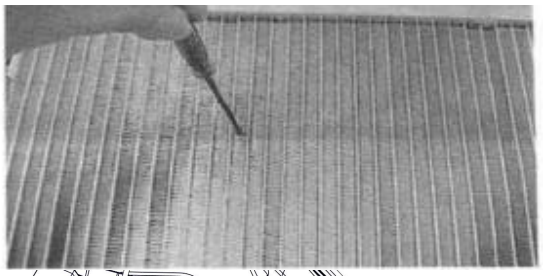
Remove radiator cap①

Install radiator cap to cap tester②

Slowly increase pressure to 110-140 kPa and check if the cap can hold the pressure for at least 10 seconds.

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

Radiator Cap Valve Opening Pressure:
Standard: 110-140 kPa
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;

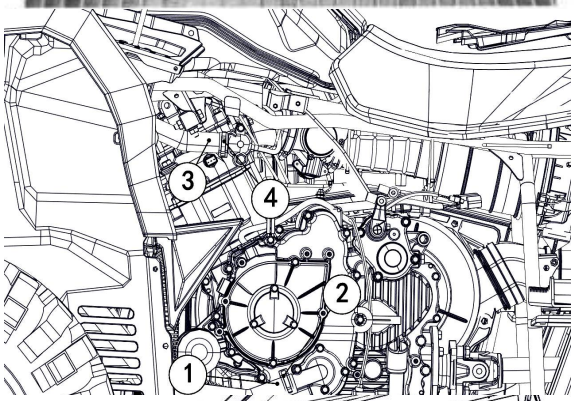
Radiator Hose Inspection

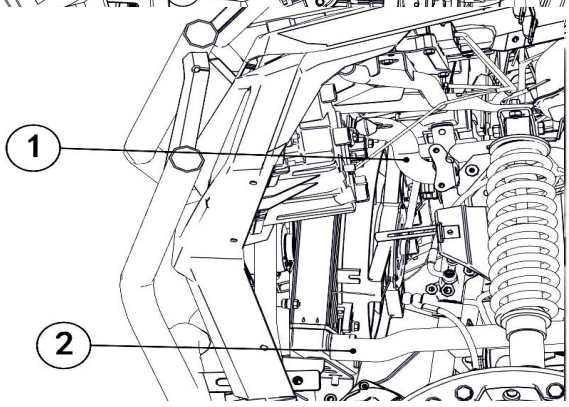
Check radiator hoses for leakage or damage.

Leakage or Damage: → Replace

Check tightening of clamps. Replace the clamps if necessary;

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

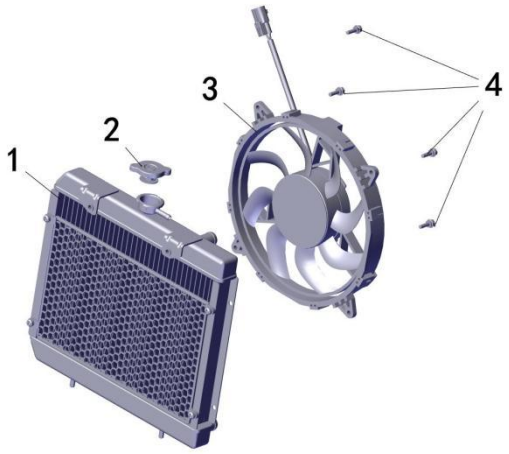




3.5.4 Inspection of Fan Motor

Remove fan motor from radiator

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



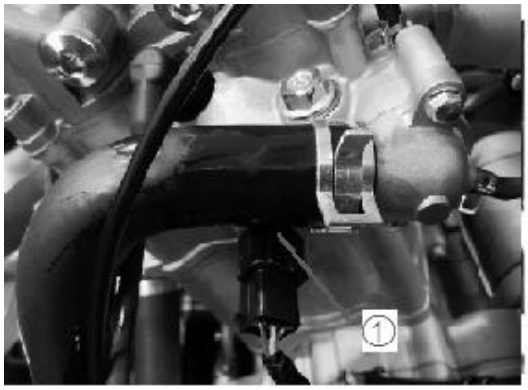
Turn the vanes and check if they can turn smoothly;

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 shall indicate the ampere not more than 5A.
If the motor does not run or the ampere exceeds the limit, replace the motor.

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

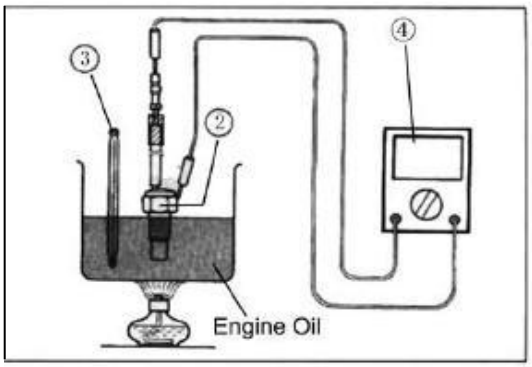
Fan Motor Bolt Tightening Torque: 10N•m

3.5.5 Inspection of Water Temperature Sensor



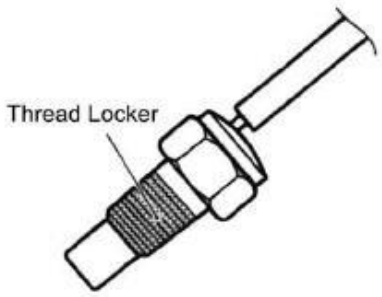
Place a rag under water temperature sensor① and remove it from cylinder head.

Check the resistance of water temperature sensor as illustrated on the right. Connect the temperature sensor② to the circuit tester, place it in a vessel with engine oil. Place the vessel above a stove. Heat the oil to raise the temperature slowly and take the reading from thermometer ③ and ohmmeter ④ .



Water Temperature and Resistance

Temperature(℃)	Resistance(kΩ)
-20	13.71~16.49
20	2.2128~2.6391
80	0.303~0.326
110	0.1383~0.1451



Installation: Apply a little thread locker and install it to the cylinder head by tightening to the specified torque.
Water Temperature Sensor
Tightening Torque: 10N•m

Note:
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.

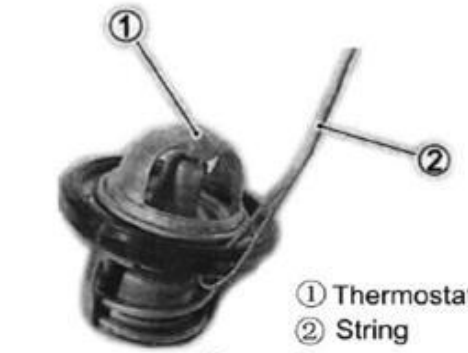
3.5.6 Inspection of Thermostat

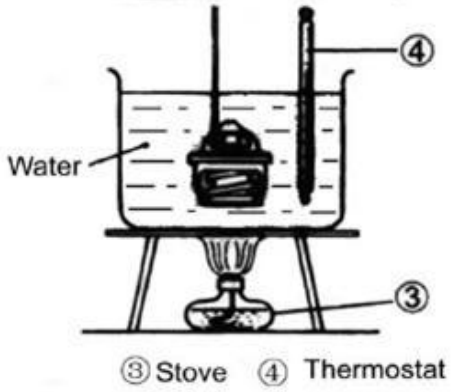
Remove thermostat case

Remove thermostat

Check thermostat pellet for cracks
Test the thermostat in the following steps:

Pass a string between thermostat flange as illustrated on the right;
Immerse the thermostat in a beaker with water. Make sure that 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.

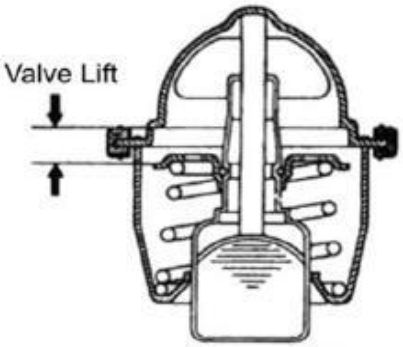




Thermostat Valve Opening Temperature: 68-74℃

Keep heating the water to raise the water temperature.

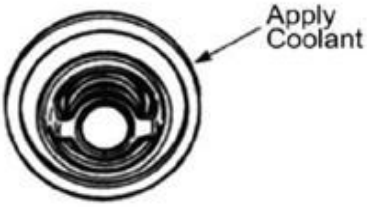
Just when the water temperature reaches the specified value, the thermostat valve should have been lifted by 3.5-4.5mm



Installation:
Reverse the removal procedure for installation.

Apply coolant to the rubber seal of thermostat.

Install thermostat case. Tighten to the specified torque:



Tightening Torque: 10N•m

3.5.7 Water Pump

3.5.7.1 Removal and Disassembly

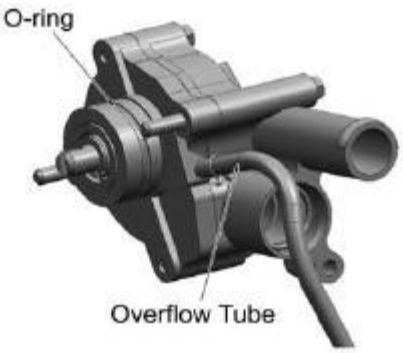
Drain coolant

Note: Before draining coolant, check water pump for oil or coolant leakage. In case of oil leakage, check the water pump oil seal, O-ring. In case of coolant leakage, check the water seal.

Remove clamps and water hoses

Release bolts and remove water pump

Remove O-ring



Note: Do not reuse the O-ring.

Remove the overflow tube

Release water pump cover screws, water pump cover and gasket

Remove E-ring and impeller

Remove seal ring ①and rubber seal②

Remove mechanical seal with special tool

Note: The mechanical seal does not need to be removed if there is no abnormal condition.

Note: Do not reuse a removed mechanical seal

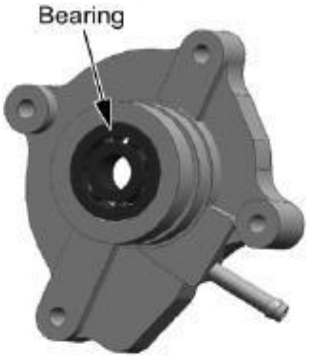
Put a rag on the water pump body

Remove oil seal.

Note: The oil seal does not need to be removed if there is no abnormal condition

Note: Do not reuse a removed oil seal

Remove bearing with special tool.



Note: The bearing does not need to be removed if there is no abnormal noise.

Note: Do not reuse a removed bearing.

3.5.7.2 Inspection of Water Pump

Bearing

Check the play of bearing by hand while it is still in the water pump body;
Turn inner race of bearing to check for abnormal noise and smooth rotation;
Replace the bearing if there is abnormal condition;

Mechanical Seal

Check mechanical seal for damage, pay special attention to the seal face;
In case of leakage or damage, replace the mechanical seal. If necessary, also replace the seal ring.

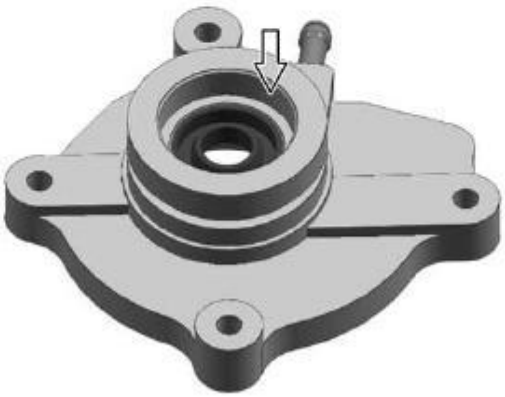
Oil Seal

Check oil seal for damage. Pay special attention to the oil seal lip;

In case of damage or leakage, replace the oil seal;

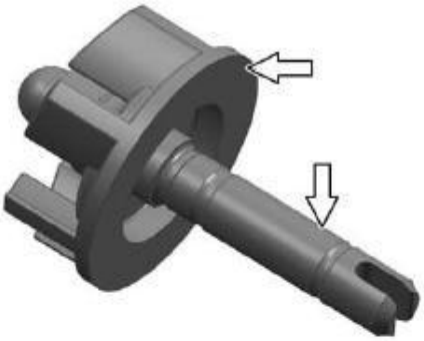
Water Pump Body

Check the mating mace of water pump body with bearing and mechanical seal.
Damage: →Replace



Impeller

Check the impeller and shaft for damage.
Damage: →Replace



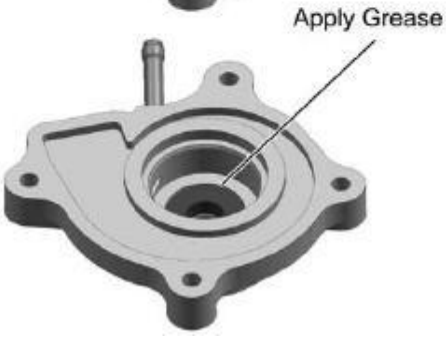
3.5.7.3 Assembly and Installation of Water Pump

Install oil seal with special tool;

Tool: Oil Seal Installer

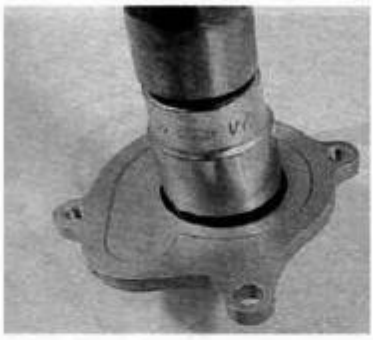
Note: The stamped mark on the oil seal faces outside

Apply a little grease to the oil seal lip.



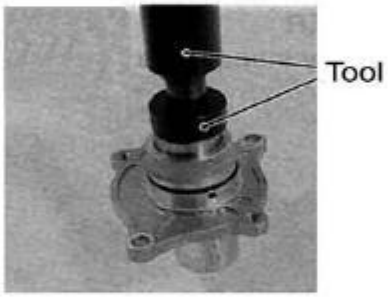
Install mechanical seal with a suitable socket wrench

Note: Apply sealant to side “A” of mechanical seal



Install bearing with special tool

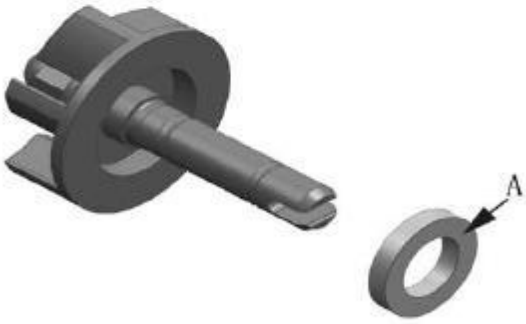
Tool: Bearing Installer



Note: The stamped mark on the bearing faces outside.

Install seal ring to impeller

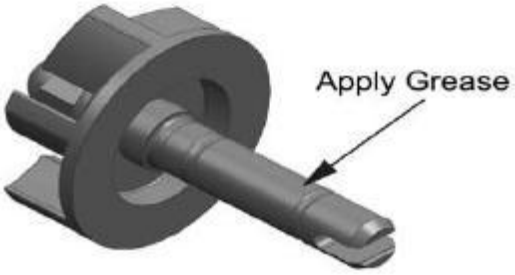
Clean off the oil and grease from mechanical seal and install it into the impeller.



Note: “A” side of mechanical seal faces impeller

Apply grease to impeller shaft

Install impeller shaft to water pump body.



Install E-ring to water pump shaft;

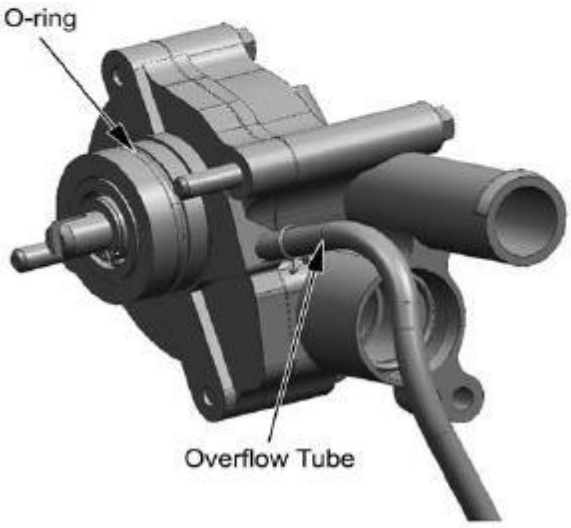
Install new gasket to water pump body;

Install water pump cover and tighten the bolts and bleed bolt.

Water Pump Cover Bolts Tightening Torque: 6N•m

Check impeller for smooth turning.

Install the new O-ring

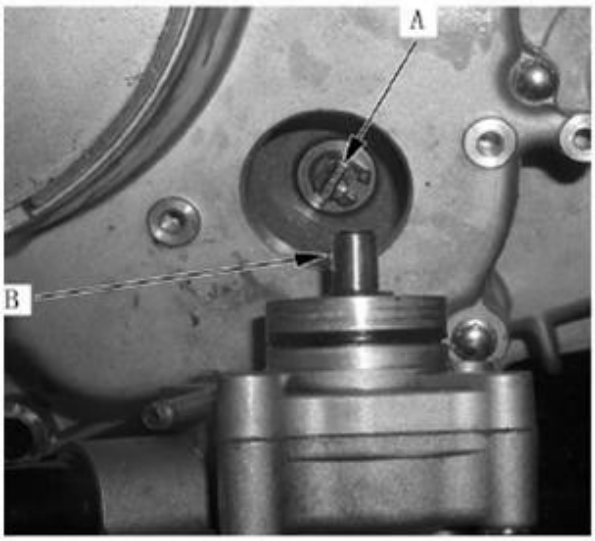


Note:
Use the new O-ring to prevent oil leakage;
Apply grease to O-ring

Install water pump and tighten the bolts to the specified torque;

Water pump bolts tightening torque: 10N•m

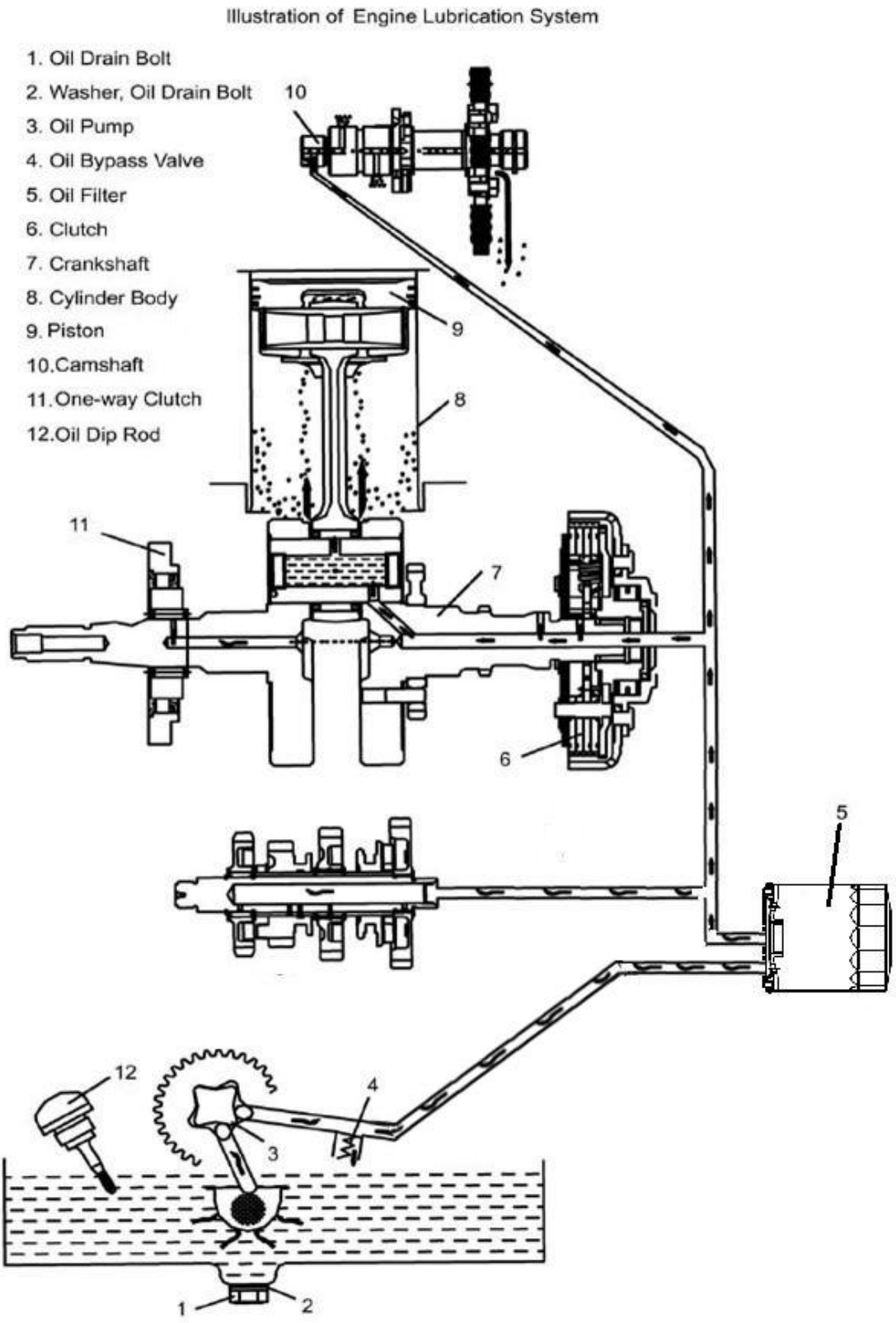
Note: Set the water pump shaft slot end “B” to oil pump shaft flat side “A”.



Connect water hoses

Add coolant

3.5.7.4 Lubrication System Illustration



3.6 TROUBLESHOOTING

GENERAL INFORMATION

TIP_____
The following glide for troubleshooting does not overall the possible causes of trouble. It should be helpful, however, as a guide to basic trouble-shooting. Refer to the relative procedure in this manual for checks, adjustments, and replace-ment of parts.

STARTING FAILURES

Engine
1. Cylinder and cylinder head
- Loose spark plug
- Loose cylinder head or cylinder
- Damaged cylinder head gasket
- Damaged cylinder gasket
- Worn a damaged cylinder
- Incorrect valve clearance
- Improperly sealed valve
- Incorrect valve-to-valve-seat contact
- Incorrect valve timing
- Faulty valve spring
- Seized valve

2. Piston and piston ring(s)
- Improperly installed piston ring
- Damaged, worn a fatigued piston ring
- Seized piston ring
- Seized or damaged piston

3. Air filter
- Improperly installed air filter
- Clogged air filter element

4. Crankcase and crankshaft
- Improperly assembled crankcase
- Seized crankshaft

Fuel system
1. Fuel tank
- Empty fuel tank
- Clogged fuel tank breather hose joint
- Clogged fuel tank breather hose joint hose
- Deteriorated or contaminated fuel

2. Fuel pump
- Faulty fuel pump
- Faulty fuel injection system relay
- Clogged or damaged fuel hose

3. Throttle body
- Deteriorated or contaminated fuel
- Sucked-in air

Electrical system
1. Battery
- Discharged battery
- Faulty battery

2 Fuse(s)
- Blown, damaged a incorrect fuse
- Improperly installed fuse

a Sparkplug
- Incorrect spark plug gap
- Incorrect spark plug heat range
- Fouled spark plug
- Worn a damaged electrode
- Worn a damaged insulator
- Faulty spark plug cap

4. Ignition coil
- Cracked a broken ignition coil body
- Broken a shorted primary or secondary coils
- Faulty spark plug lead

5 Ignition system
•Faulty ECU
- Faulty crankshaft position sensor
- Broken generator rotor woodruff key

6 Switches and wiring
- Faulty main switch
- Broken a shorted wiring
- Faulty gear position switch
- Improperly grounded circuit
- Loose connections
- Faulty brake light switch

7. Starting system
- Faulty starter motor
- Faulty starter relay
- Faulty starter clutch

INCORRECT ENGINE IDLING SPEED

Engine
1. Cylinder and cylinder head
- Incorrect valve clearance
- Damaged valve train components

2 Air filter
- Clogged air filter element

Fuel system
1. Throttle body
- Damaged a loose throttle body joint
- Improper throttle cable free play
- Flooded throttle body
- Faulty air induction system

Electrical system
1. Battery
- Discharged battery

• Faulty battery
2. Sparkplug
• Incorrect spark plug gap
• Incorrect spark plug heat range
• Fouled spark plug
• Worn or damaged electrode
• Worn or damaged insulator
• Faulty spark plug cap
3. Ignition coil
• Broken or shorted primary or secondary coils
• Faulty spark plug lead
• Cracked or broken ignition coil
4. Ignition system
• Faulty ECU
• Faulty crankshaft position sensor
• Broken generator rotor woodruff key

POOR MEDIUM-AND-HIGH-SPEED PERFORMANCE

Refer to ‘STARTING FAILURES" on Previous page.

Engine

1. Air filter
• Clogged air filter element

Fuel system

1. Fuel pump
• Faulty fuel pump

FAULTY DRIVE TRAIN

The following conditions may indicate damaged shaft drive components:

Symptoms	Possible Causes
1. A pronounced hesitation or “jerky” movement during acceleration, deceleration, or sustained speed. (This must not be confused with engine surging or transmission characteristics.) 2. A ‘Tolling amble" noticeable at low speed; a high-pitched whine; a “clink” from a shaft dive component or area. 3. A locked-up condition of the shaft dive mechanism, no power transmitted from the engine to the front and/or rear wheels.	A. Bearing damage. B. Improper gear backlash. C. Gear tooth damage. D Broken drive shaft. E. Broken gear teeth. F. Seizure due to lack of lubrication. G. Small foreign objects lodged between the moving parts.

TIP

Areas A, B, and C above may be extremely difficult to diagnose. The symptoms are quite subtle and difficult to distinguish from normal vehicle operating noise. If there is reason to believe these components are damaged, remove the components and check them.

FAULTY GEAR SHIFTING

Shifting is difficult

Refer to “FAULTY CLUTCH" on next page.
EJSDCDICDI

SHIFT LEVER DOES NOT MOVE

Shift drum and shift forks

- Foreign object in a shift drum groove
- Seized shift fork
- Bent shift fork guide bar

Transmission

- Seized transmission gear
- Foreign object between transmission gears
- Improperly assembled transmission

JUMPS OUT OF GEAR

Shift forks

•Worn shift fork

Shift drum

- Incorrect axial play
- Worn shift drum groove

Transmission

- Worn gear dog

FAULTY CLUTCH

Engine operates but vehicle will not move
1. V-belt
• Bent, damaged or worn V-belt
• Slipping V-belt
2. Primary pulley cam and primary pulley slider
• Damaged or worn primary pulley cam
• Damaged or worn primary pulley slider
3. Clutch spring(s)
• Damaged clutch spring
4. Transmission gear(s)
• Damaged transmission gear

Clutch slips
1. Clutch spring(s)
• Damaged, loose or worn clutch spring
2. Clutch shoe(s)
• Damaged or worn clutch shoe
3. Primary sliding sheave
• Seized primary sliding sheave

Poor starting performance
1. V-belt
•V-belt sips
• Oil or grease on the V-belt
2. Primary sliding sheave
• Faulty operation
• Worn pin groove
• Worn pin
3 Clutch shoe
• Bent, damaged or worn clutch shoe

Poor speed performance
1. V-belt
• Oil or grease on the V-belt
2. Primary pulley weights)
• Faulty operation
• Worn primary pulley weight
3. Primary fixed sheave
• Worn primary fixed sheave
4. Primary sliding sheave
• Worn primary slicing sheave
5 Secondary fixed sheave
• Worn secondary fixed sheave
6. Secondary sliding sheave
• Worn secondary sliding sheave

OVERHEATING

Engine
1. Clogged coolant passages
2 Cylinder head and piston
•Heavy carbon buildup
3.Engine oil
•Incorrect oil level
•Incorrect oil viscosity
•Inferior oil quality

Cooling system
1. Coolant
• Low coolant level
2 Radiator
•Damaged or leaking radiator
•Faulty radiator cap
•Bent or damaged radiator fin
3 Water pump
•Damaged or faulty water pump
4.Thermostat
•Thermostat stays closed
5 Oil cooler
•Clogged or damaged oil cooler
6 Hose(s) and pipe(s)
•Damaged hose
•Improperly connected hose
•Damaged pipe
•Improperly connected pipe

Fuel system
1. Throttle body
•Faulty throttle body
• Damaged or loose throttle body joint
2 Air filter
•Clogged *air* filter element

Chassis
1. Brake(s)
•Dragging brake

Electrical system
1. Sparkplug
•Incorrect spark plug gap
•Incorrect spark plug heat range
2 Ignition system
•Faulty ECU
3 Radiator fan
•Faulty fen motor
•Disconnected circuit breaker terminal
•Faulty coolant temperature sensor

OVERCOOUNG

Cooling system
1. Thermostat
- Thermostat stays open

POOR BRAKING PERFORMANCE
- Worn brake pad
- Worn brake disc
- Air in hydraulic brake system
- Leaking brake fluid
- Faulty brake caliper kit
- Faulty brake caliper seal
- Loose union bolt
- Damaged brake hose
- Oil or grease on the brake disc
- Oil or grease on the brake pad
- Incorrect brake fluid level

FAULTY SHOCK ABSORBER ASSEMBLY

Leaking oil
- Bent damaged or rusty damper rod
- Cracked or damaged shock absorber
- Damaged oil seal lip

Malfunction
- Fatigued or damaged shock absorber spring
- Bent or damaged damper rod

UNSTABLE HANDING
1. Steering wheel
- Bent or improperly installed steering wheel

2. Steering components
- Incorrect toe-in
- Bent steering shaft
- Improperly installed steering shaft
- Damaged bearing or bearing race
- Bent tie-rods
- Deformed steering knuckles

3. Shock absorber assemblies)
- Faulty shock absorber spring
- Leaking oil or gas

4. Tire(s)
- Uneven tire pressures (left and right)
- Incorrect tire pressure
- Uneven tire wear

5 Wheel(s)
- Incorrect wheel balance
- Damaged wheel bearing
- Bent or loose wheel axle
- Excessive wheel runout

6. Frame
- Bent frame
- Damaged frame

FAULTY LIGHTING OR SIGNAUNG SYSTEM

Headlight does not come on
- wrong headlight bulb
- Too many electrical accessories
- Hard charging
- Incorrect connection
- Improperly grounded circuit
- Poor contacts (main or light switch)
- Bunt-out headlight bulb

Headlight bulb bunt out
- Wrong headlight bulb
- Faulty battery
- Faulty rectifier/regulator
- Improperly grounded circuit
- Faulty main switch
- Faulty light switch
- Headlight bulb life expired

Tail/brake light does not come on
- Wrong tail/brake light bulb
- Too many electrical accessories
- Incorrect connection
- Bunt-out tail/brake light bulb

Tail/brake light bulb burnt out
- Wrong tail/brake light bulb
- Faulty battery
- Faulty brake light switch
- Tail/brake light bulb life expired
- Faulty rectifier/regulator
- Improperly grounded circuit

NOTES

CHAPTER 4 CHASSIS

⚠ WARNING

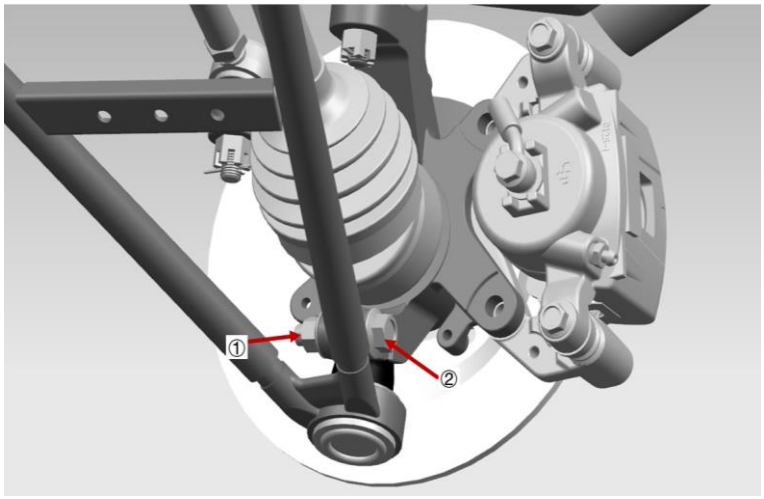
The parts of different types/ variants/ versions maybe un-interchangeable, even some parts have almost same appearance. Always refer to Parts Manual of each ATV model for spare parts information and service.

4.1 FRONT A-ARM REPLACEMENT

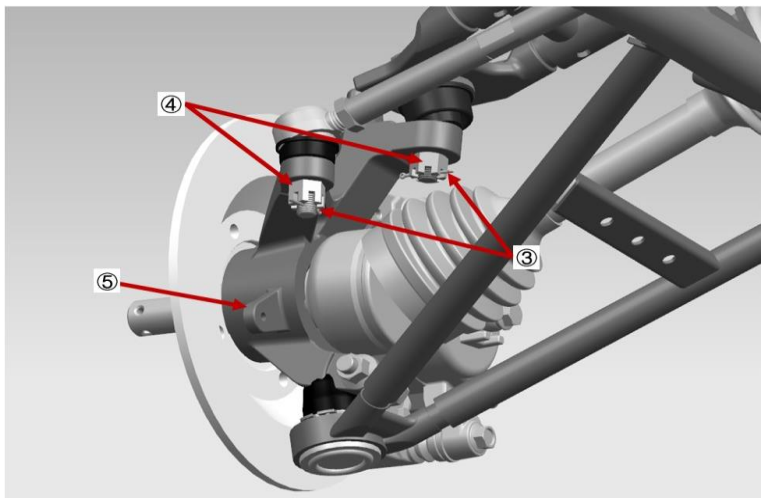
Front Suspension

Removal

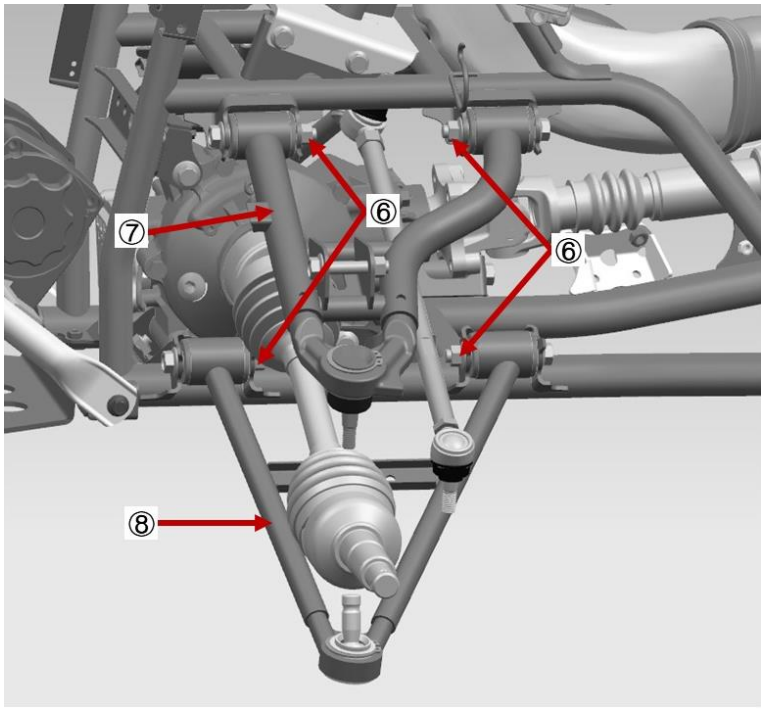
Remove nut ①.
Remove bolt ②.



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.

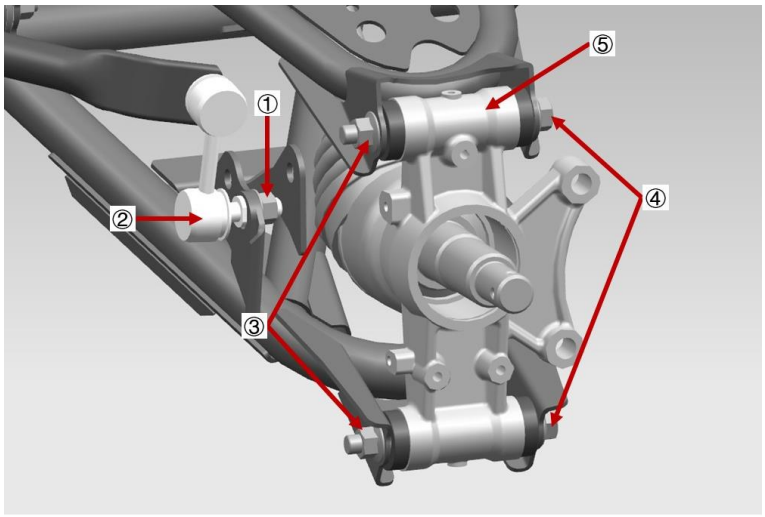
Inspect if swing arm movement is smooth or not.
Add grease from nozzle if there is stuck or blocking feeling.

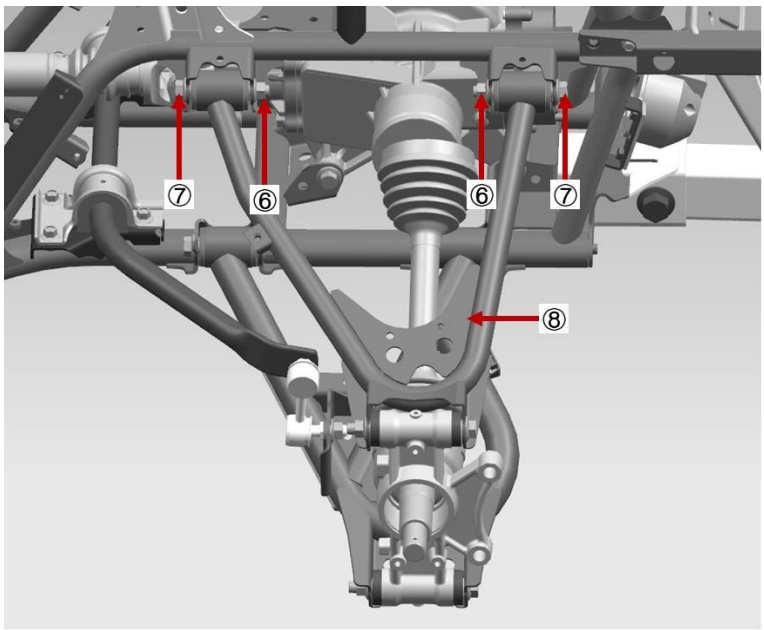
Inspect steering knuckle for dirt or rust.
Replace if any defect is found.

Installation
Reverse the removal procedures for installation.

4.2 REAR A-ARM REPLACEMENT

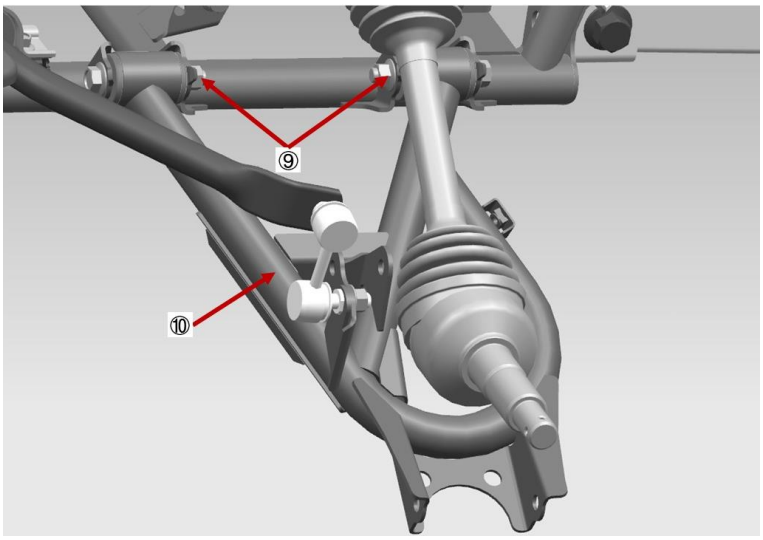
Rear Suspension
Rear Swing Arm
Removal
Remove nut ①.
Loosen sway bar ②.
Remove nuts ③.
Remove bolts ④.
Remove steering knuckle ⑤.





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.

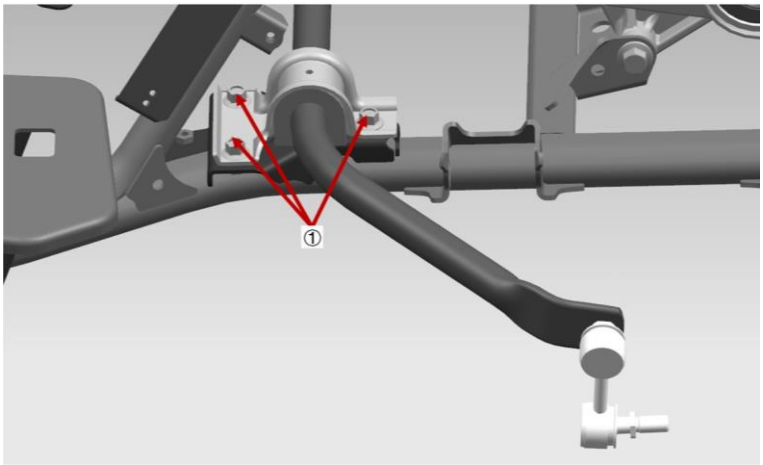
Inspect if swing arm movement is smooth or not.
Add grease from nozzle if there is stuck or blocking feeling (details refer to maintenance schedule).

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

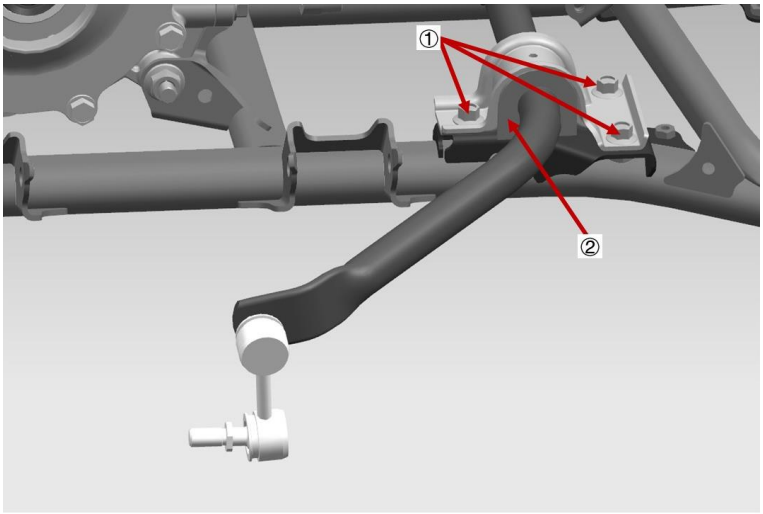
Installation
Reverse the removal procedures for installation.

4.3 REAR STABILIZER BAR REMOVAL/INSTALLATION

Sway Bar
Removal
Remove bolts ①.



Remove bolts ①.
Remove sway bar ②.

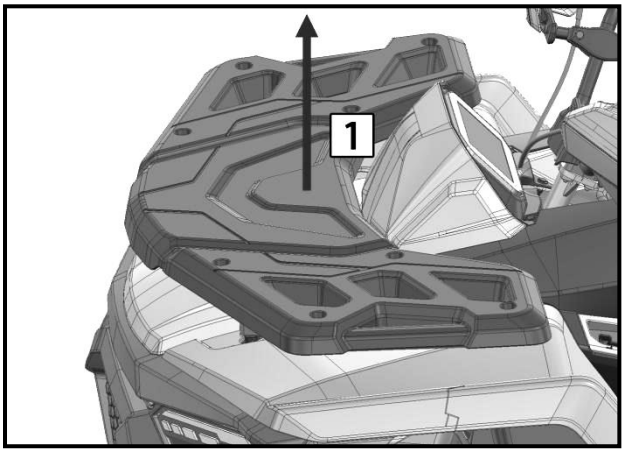


Installation
Reverse the removal procedures for installation.

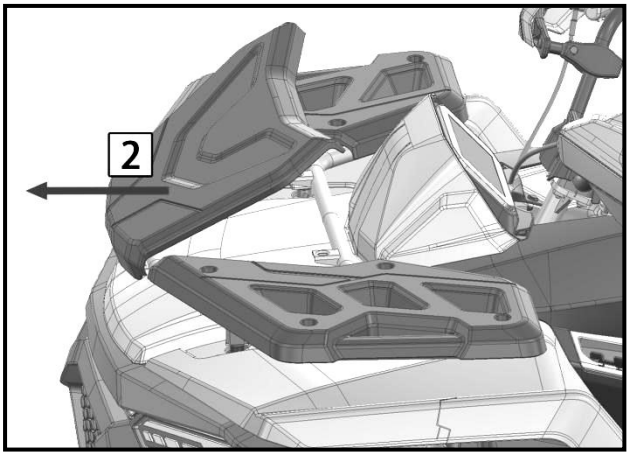
4.4 FRONT SERVICE COVER

Removal

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



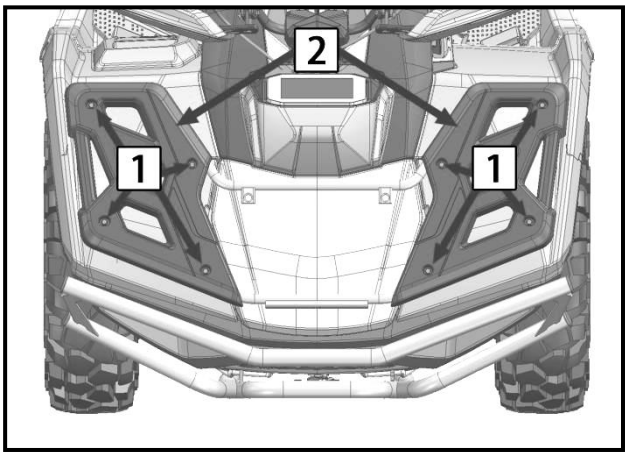
2. Pull out front middle rack cover along the arrow direction 2 .



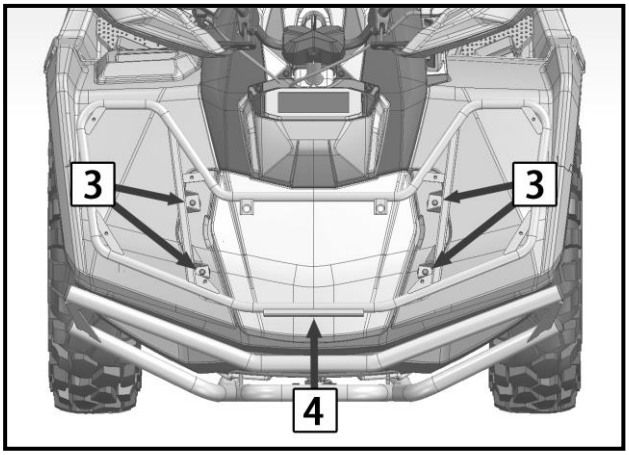
4.5 RACK COVER PLATE

4.5.1 FRONT RACK

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



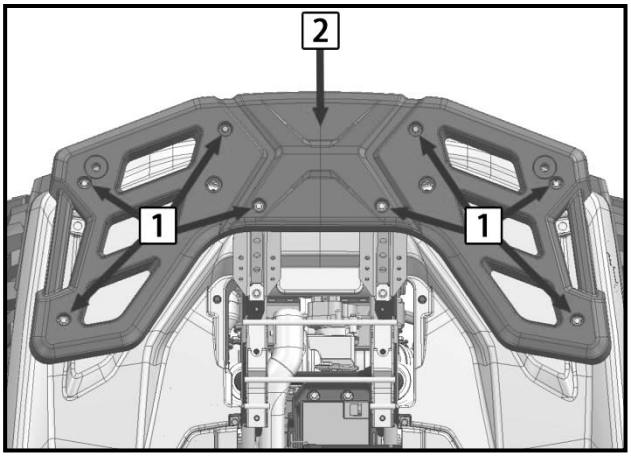
3. Remove bolts 3.
4. Remove front rack 4.



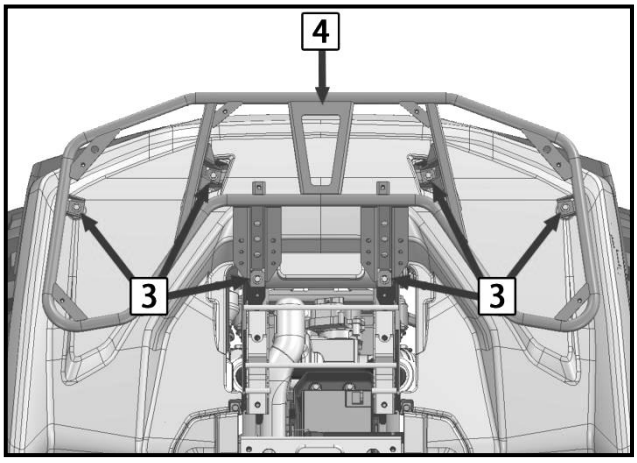
4.5.2 REAR RACK

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.

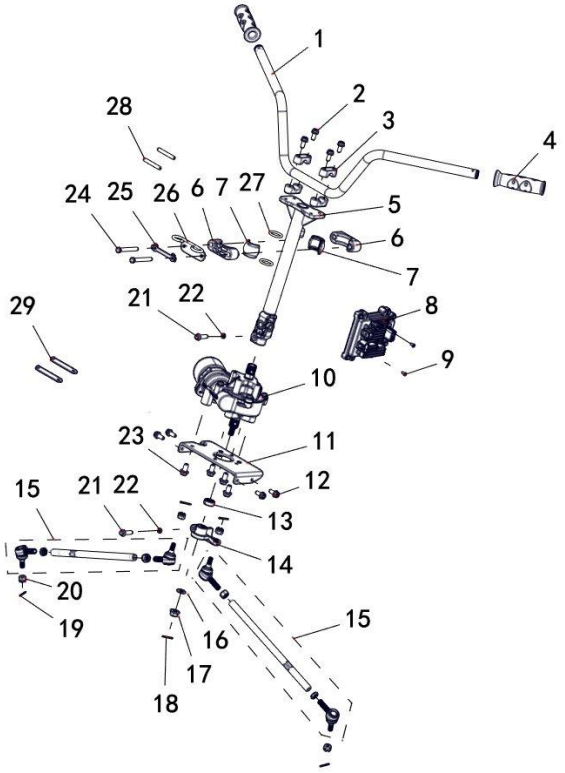
7. With the hinge pins removed, remove the box from the frame. Two people maybe needed to remove the bed from the frame.

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(option)；	9.Bolt M6x30
10.EPS Driver(option)；	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.

4.7 EPS(OPTION)

EPS (electric power steering) system controls the motor based on the speed and the torque of the steering wheel, providing corresponding assistance to help the driver complete the steering. The system consists of a steering shaft assembly and a controller (ECU). Because the system adopts the speed induction type, it can provide obvious help when the car speed is low, and reduce the fatigue strength of the driver.

NOTE: After installation, make sure of smooth steering and same steering angle for both sides.

EPS Operation System

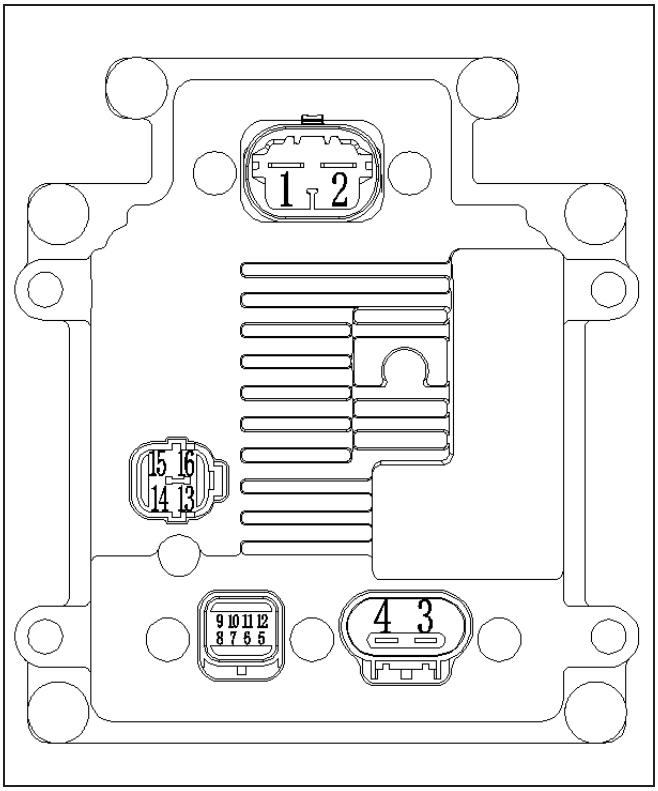
If the vehicle is equipped with the EPS system:

1. Turn on power switch, EPS indicator light in the meter will be lighted.
2. Start engine, if the EPS System without fault , EPS indicator light goes off and EPS starts working.

NOTE: There is no part in EPS system that allows users to disassemble for repair. If malfunction occurs and it isn't due to wires connection, please contact local distributor for operation.

EPS Pin Function:

1.Motor positive
2.Motor positive
3.Power positive
4.Power negative
5.-
6.Engine RPM signal
7.Ignition signal
8.-
9.-
10.-
11.Fault signal output
12.Vehicle Speed signal
13.Sensor positive pole 5V -
14.Sensor main torque
15.Sensor secondary torque
16.Sensor positive pole 5V +



When malfunction occurs, the EPS indicator light will flicker. Do not turn off the power, please observe the flicker frequency and record flicker regular pattern in one period. Then scan Malfunction failure code table to get and diagnose which malfunction it is.

Failure codes come from the EPS indicator light flicker frequency. Every failure code is made of Double-digit, which showed by long-bright times and short-bright times. The long-bright times is tens digit and the short-bright times is units digit. The long-bright time is 2 seconds. The short-bright time is 1 second, and interval is 1 second. Repeat the process after indicator light is off for 3 seconds.

Code	Wave form	Diagnosis	Solution
21		Main sensor disconnection	Check sensor wiring
22		Main sensor output abnormal (Voltage too high or too low)	
23		Vice-sensor disconnection	
24		Vice sensor output abnormal (Voltage too high or too low)	
25		Difference of main torque and Vice torque too big	
32		Motor power-assistance abnormal	Check and fix motor wiring contact status. If still not work, replace the EPS.
33		Controller current over limit	Replace EPS
37		Busbar current abnormal	Replace EPS
43		Motor voltage fault	Replace EPS

No.	Failure Phenomenon	Probable Reason	Troubleshooting
1	Steering without assistance	1.Connectors of wire is bad contact 2.The fuse blew out 3.The controller, motor or sensor is damaged	1.Check whether wire connectors are fully inserted 2.Replace the fuse(40A) 3.Contact with suppliers and replace it
2	Power don't weighs the same for left and right	1.Controller, motor or sensor is damaged	1.Contact with suppliers and replace it
3	When system is on, the steering wheel swings on both sides	1.Motor is mounted backwards 2.Controller or sensor is damaged	1. Exchange the position of (thick line) red line and black line at the motor terminal 2.Contact with suppliers and replace it
4	Steering becomes heavy	1.Battery power loss 2.Motor damage (power reduction) 3.Air pressure of the tires (front) is insufficient.	1. Charge 2. Contact with suppliers and replace it 3. Inflate tires
5	System has noise	1.Motor damage 2.Gap of lower steering shaft assembly or mechanical steering assembly is too large 3. Installation of lower steering shaft assembly or mechanical steering assembly is not stable.	1. Replace 2. Replace 3. Check whether the installation screw is tight, reinforcement

NOTES

CHAPTER 5 FINAL DRIVE

⚠ WARNING

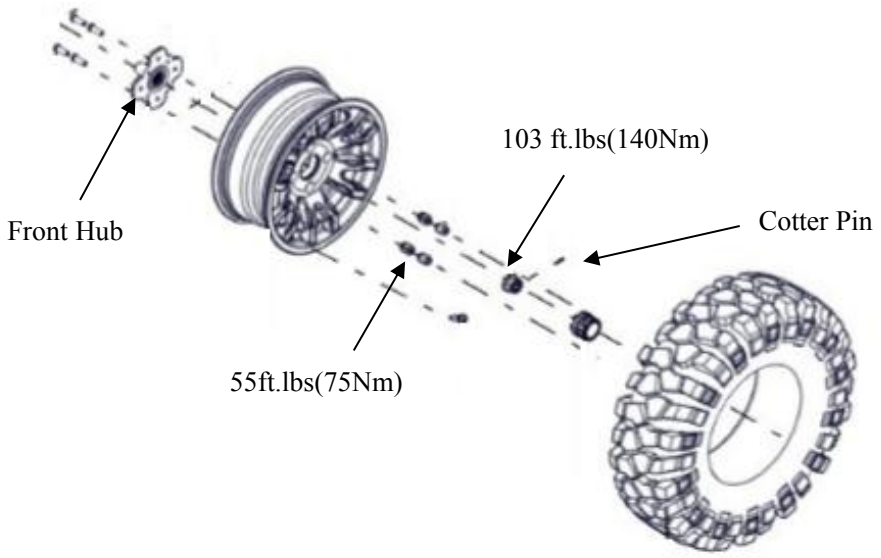
The parts of different types/ variants/ versions maybe un-interchangeable, even some parts have almost same appearance. Always refer to Parts Manual of each CUV model for spare parts information and service.

5.1 WHEEL, HUB, AND SPINDLE TORQUE TABLE

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

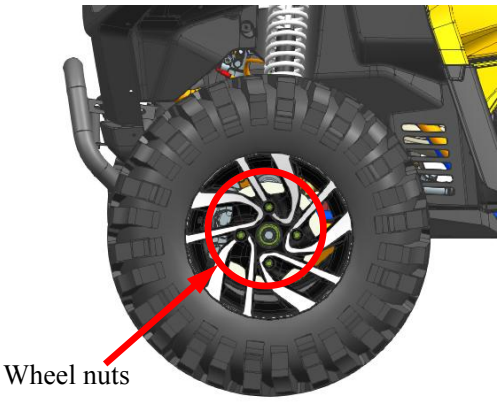
Refer to exploded views and text for torque values of other fasteners.
CAUTION: Locking nuts, and bolts with pre-applied locking agent should be replaced if removed. The self- locking properties of the nut or bolt are reduced or destroyed during removal.

5.2 FRONT HUB EXPLODED VIEW



5.3 FRONT HUB REMOVAL/INSPECTION

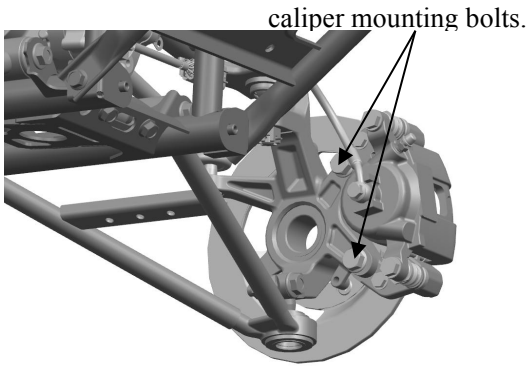
1. Position the vehicle on a level ground. Elevate the front part of the vehicle with tools. Remove wheel nuts then remove front wheel.



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.**

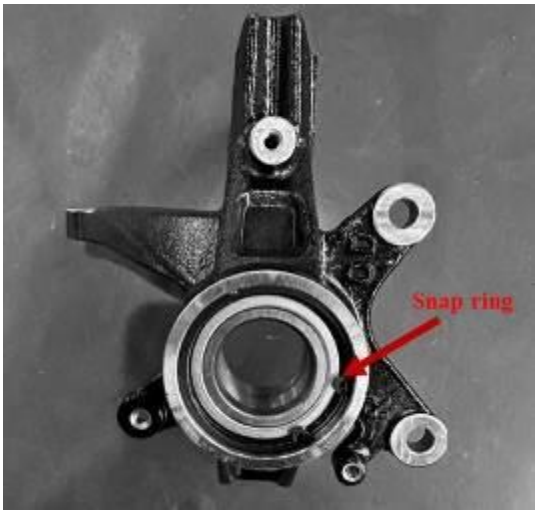
5.4 FRONT HUB INSTALLATION

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.



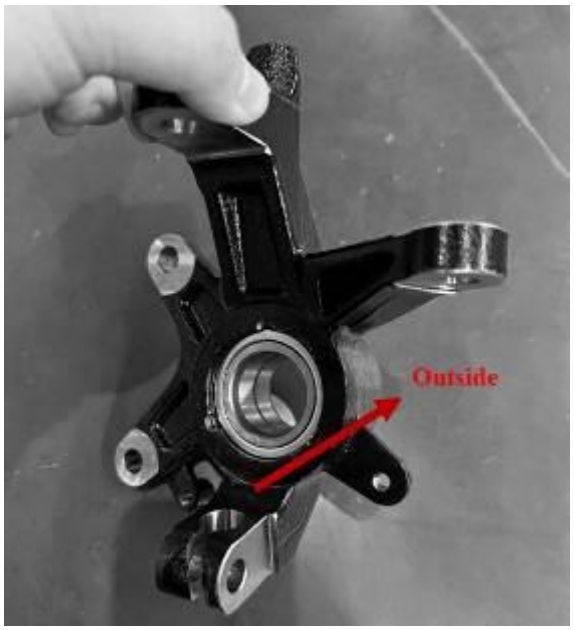
2. From the back side, tap on the outer bearing race with a drift punch in the reliefs as shown.
3. Drive bearing out evenly by tapping on outer race only. Once bearing is at bottom of casting, support casting on outer edges so bearing can be removed.

4. Inspect bearing.

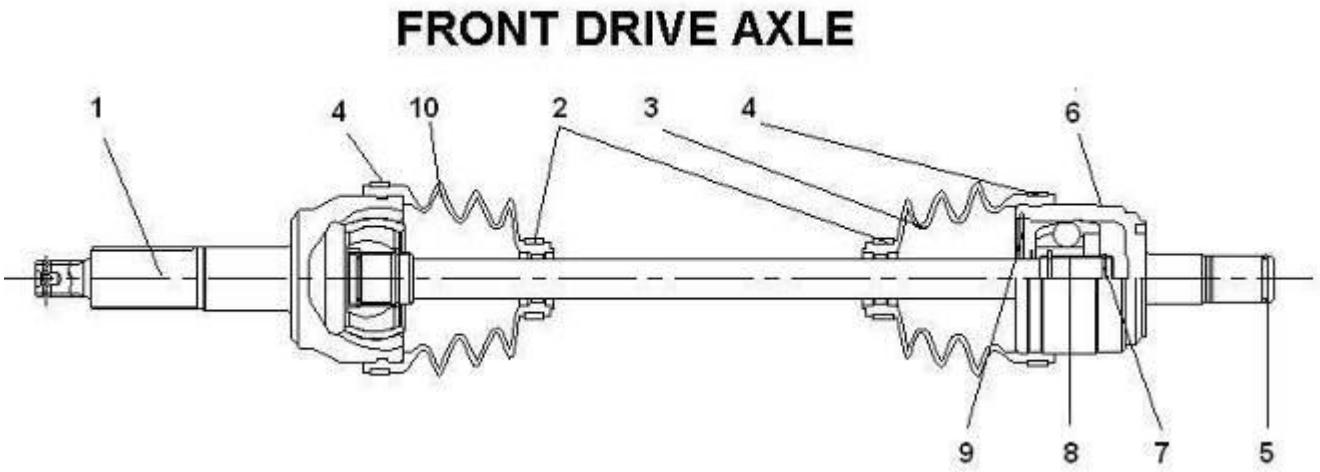
NOTE: Due to extremely close tolerances and minimal wear, the bearings must be inspected visually,

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.

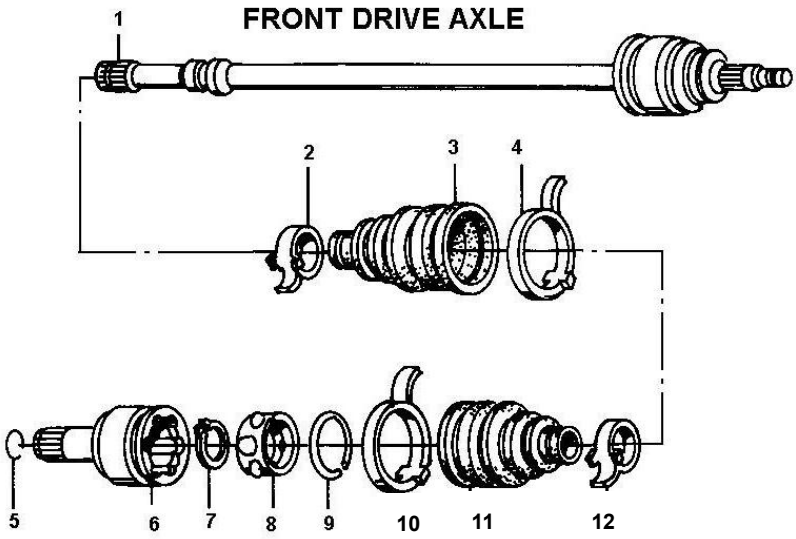


5.6 FRONT DRIVE AXLE REMOVAL/INSPECTION



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”.

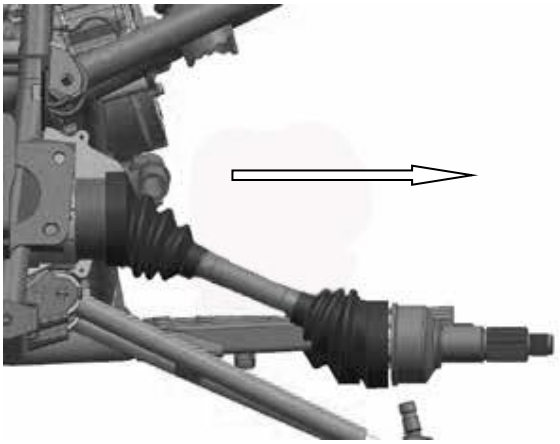


11. Inboard boot.
12. Boot Band “D”.

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

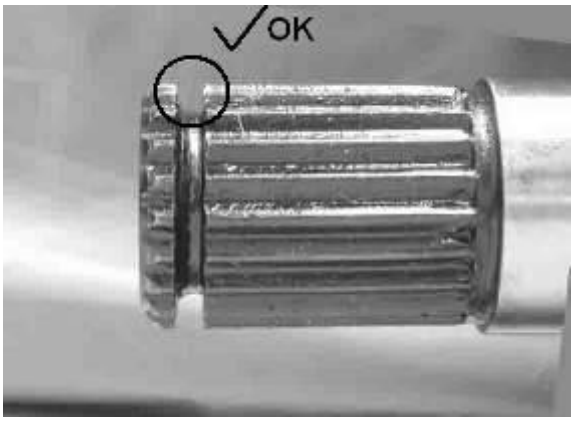
INNER CV JOINT DISASSEMBLY

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

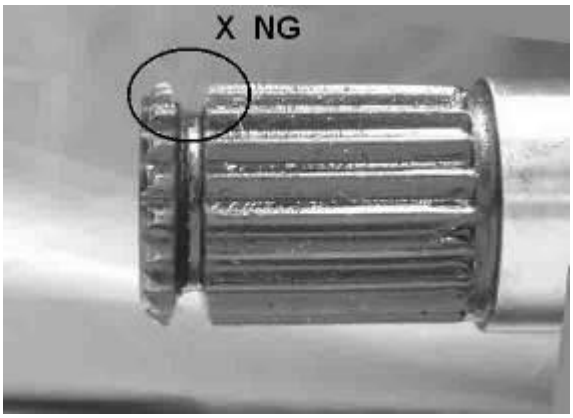
1. Open the clamps on both boot band ”A” and ”B” on the inner CV joint, then remove boot band ”B”. Discard the boot band, it cannot be reused.
2. Carefully slide the boot (A) onto the drive axle and off the inboard joint.
3. Wipe out all of the molybdenum disulfide grease within the inboard joint cavity.
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

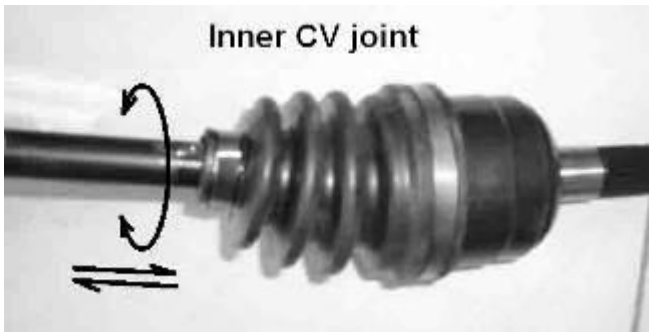
1. Clean the bearing assembly in solvent and thoroughly dry.
2. Inspect the steel balls, bearing case and the bearing race for wear or damage.
3. Check for wear or damage to the inner splines of the bearing race.
4. If necessary, disassembly the bearing assembly for further inspection. Carefully remove 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.

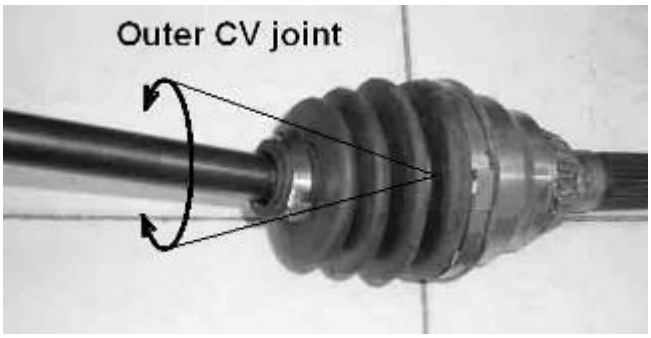


6. Clean the inner CV joint in solvent and thoroughly dry.
7. Inspect the interior of the inboard joint where the steel balls ride. Check for wear or damage and replace the joint if necessary.
8. Inspect the snap ring groove on the inboard joint for wear or damage.
9. Inspect the splines on the inner 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

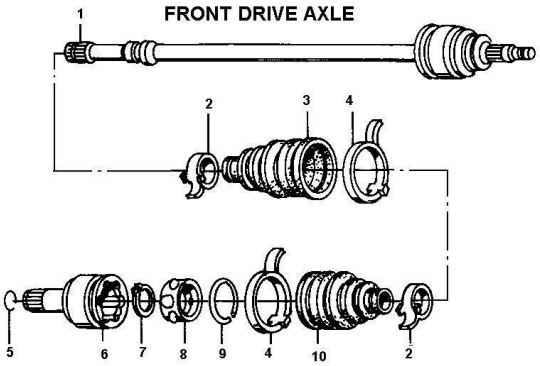




NOTE: Inner CV joint must be replaced with the bearing as an assembly.

5.9 FRONT DRIVE AXLE ASSEMBLY

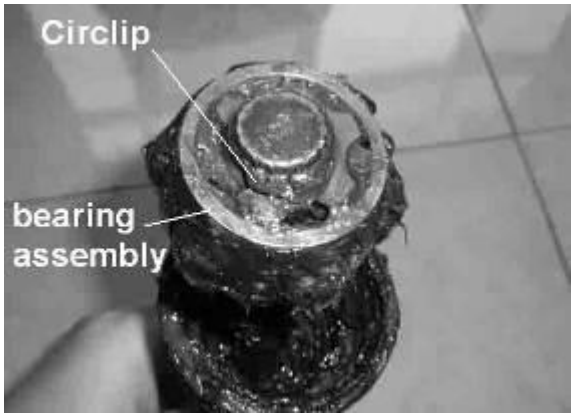
1. The rubber boots are not identical and must be installed on the correct joint. The boots are marked as follows:
   a. Inner CV joint boot : “inner”,
   b. Outer CV joint boot: “outer”.
2. If the outboard boot was removed, install a new boot onto the drive axle at this time.

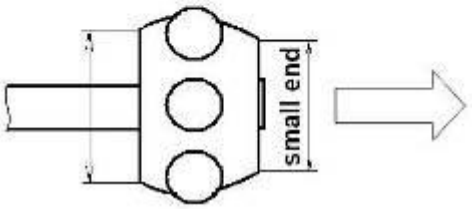


NOTE: Position the new boot bands with their tabs facing toward the rear of the vehicle.

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



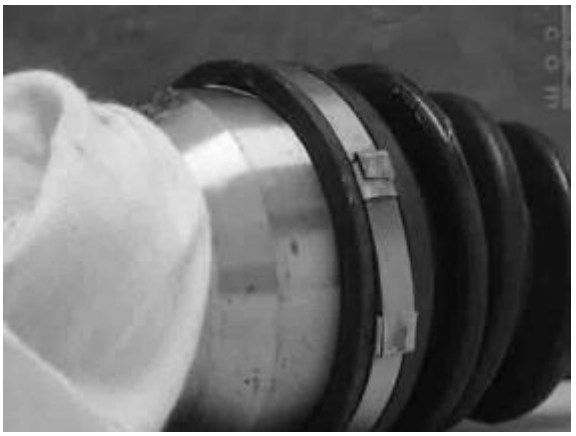


facing toward the rear of the vehicle .

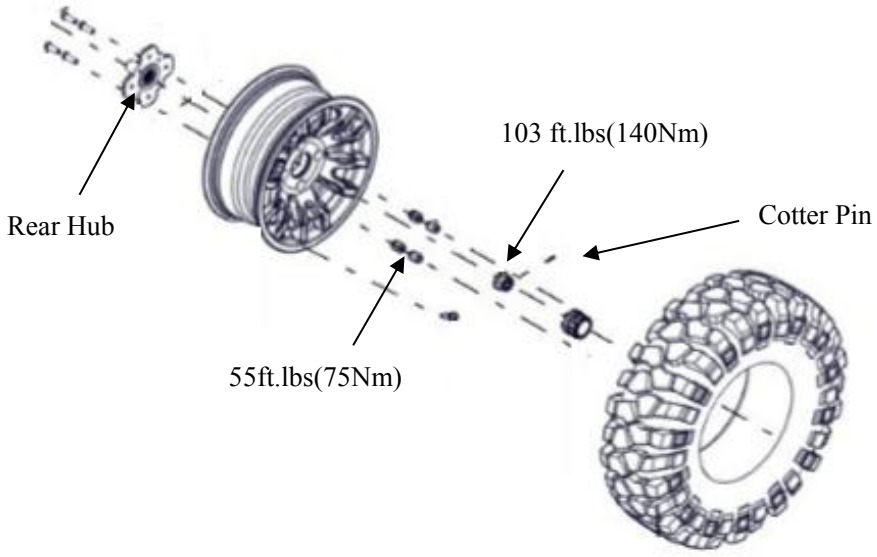
14. Move the small boot band onto the boot. Bend down the tab on the boot band and secure the tab with the locking clips and tap them with a plastic hammer. Make sure they are locked in place.
15. Install the large boot bands onto each boot.

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.

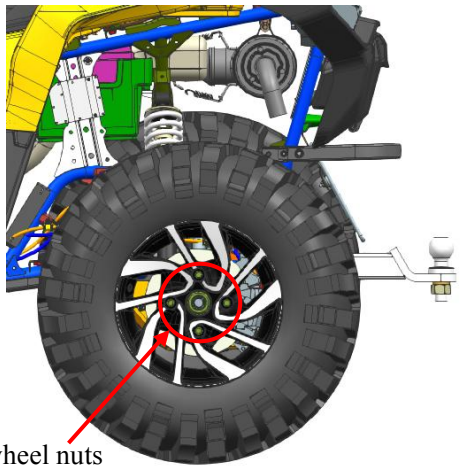


5.10 REAR HUB EXPLODED VIEW



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.

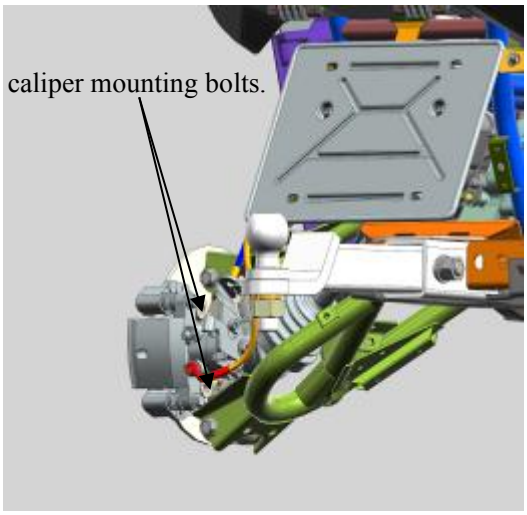


CAUTION: Serious injury may result if machine tips or falls. Be sure machine is secure before beginning this service procedure. Wear eye protection when removing bearings and seals.

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.

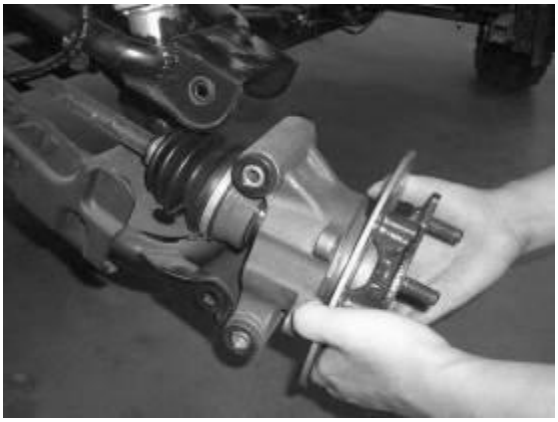
3. **Remove front hub nut and cotter pin.**
4. **Remove front hub assembly.**
5. **Inspect rear hub for cracks or damage. Replace if any defect is found.**



5.12 REAR HUB AND KNUCKLE INSTALLATION

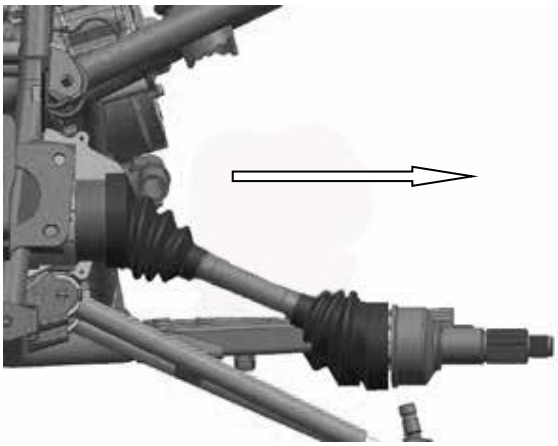
1. Reverse the removal procedures for installation.
2. Install hub nut and tighten to 103 ft.lbs (140Nm).
3. Install brake caliper using new bolts. (Apply Loctite™ 243 to threads) Tighten bolts to 33 ft.lbs (45Nm).

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
jacked up.Do not put any limbs under the vehicle,in c
inspection.

Removal

1.Remove bolts and spring washers[1].
2.Remove nuts and bolts[2].
3.Remove front axle assy[3].→Fig1

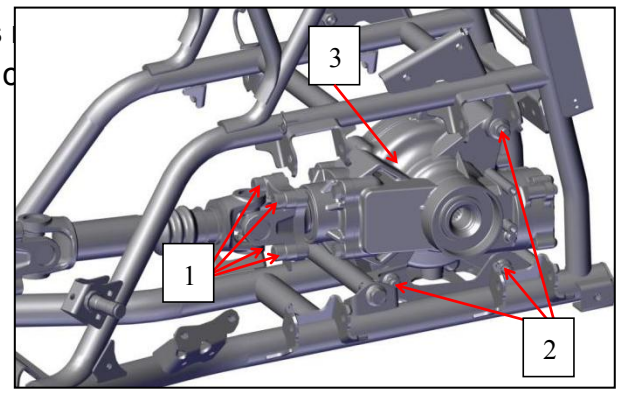
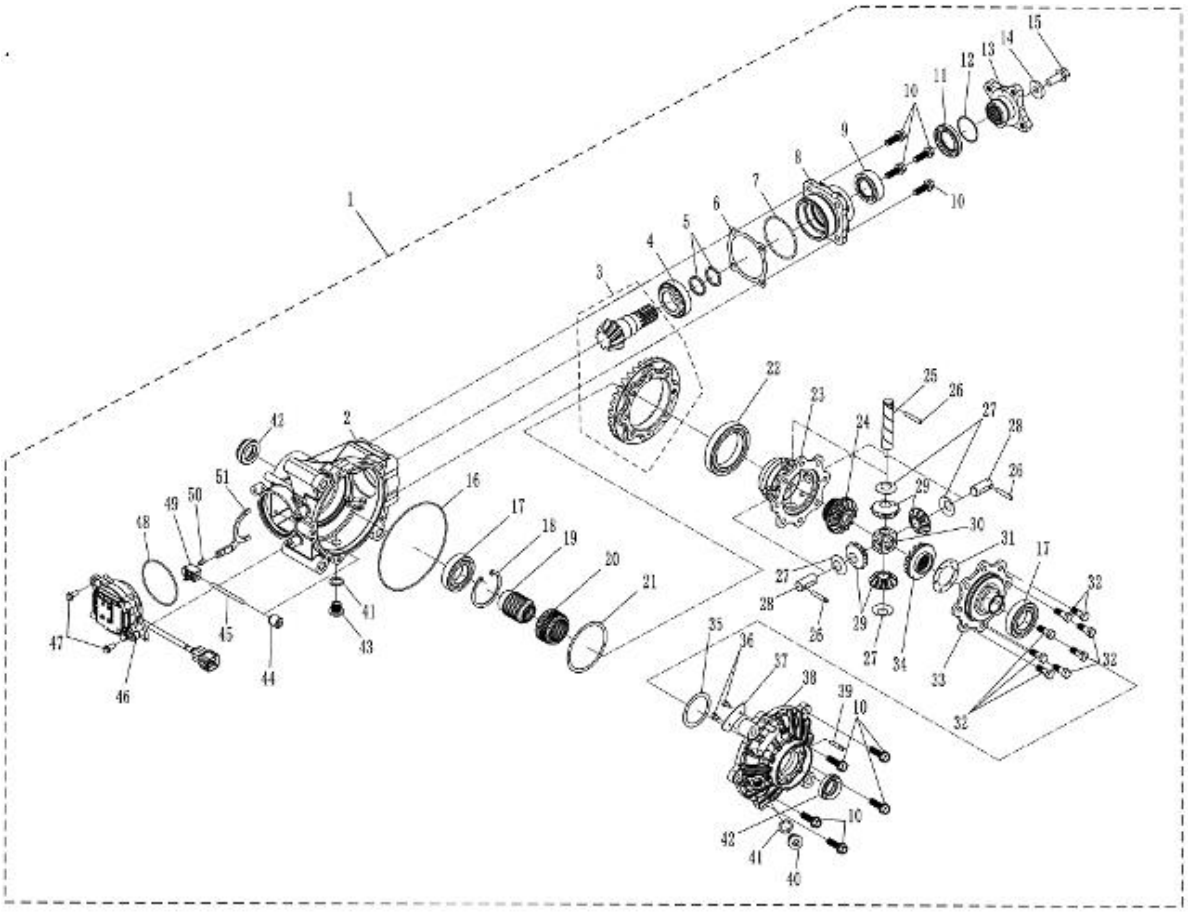


Fig 1

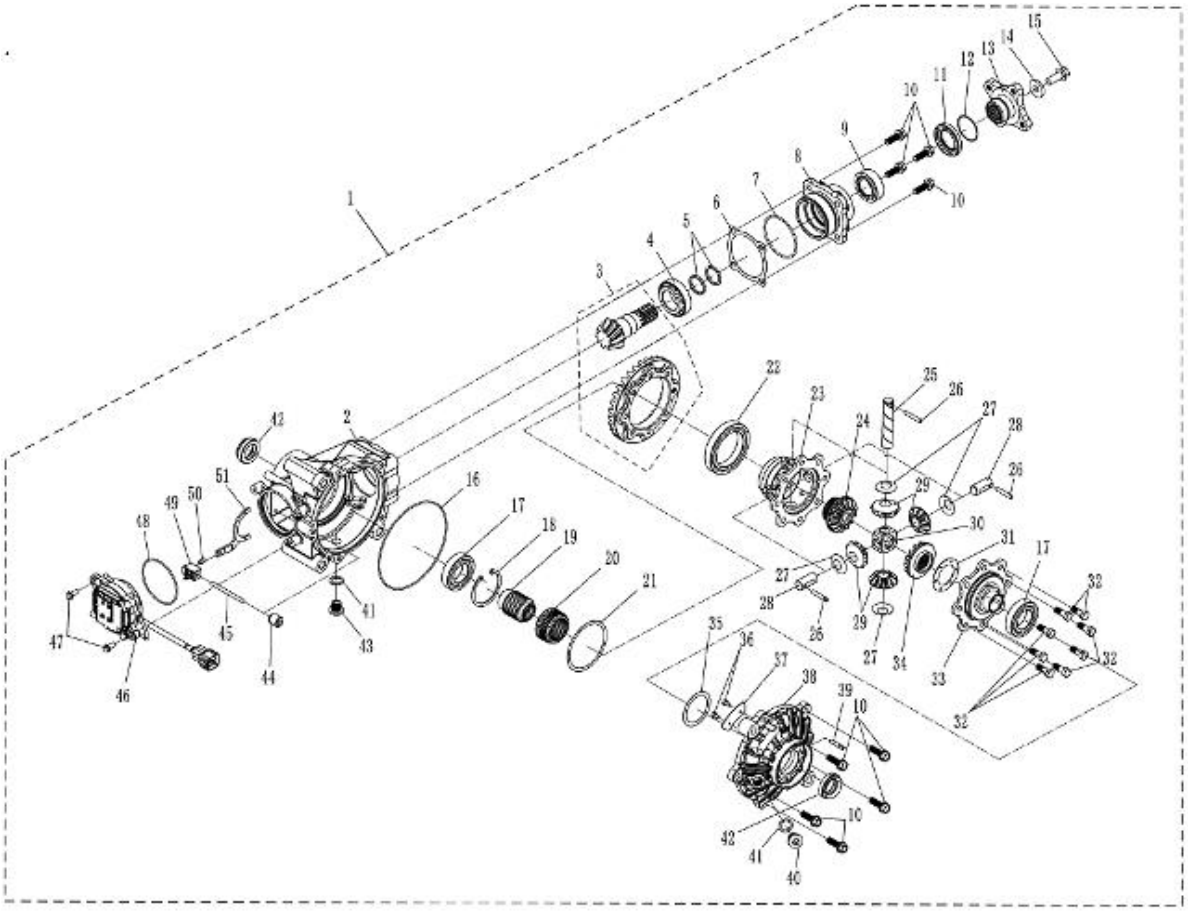
5.16 FRONT AXLE ASSY

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.

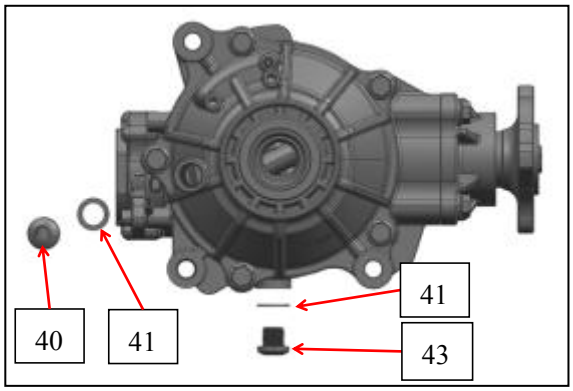


Fig 1

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

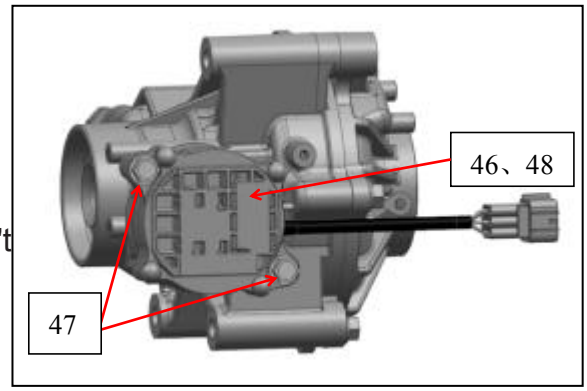


Fig 2

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

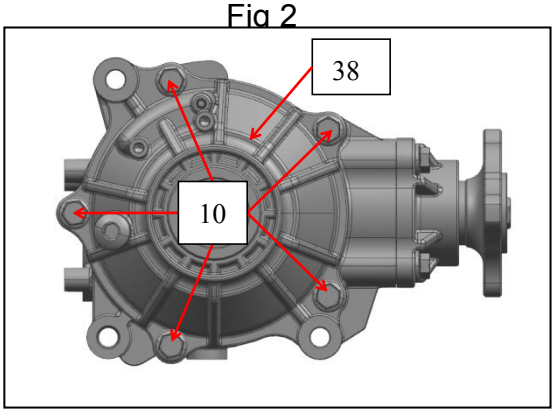


Fig 3

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

Replace the O-ring with new part.

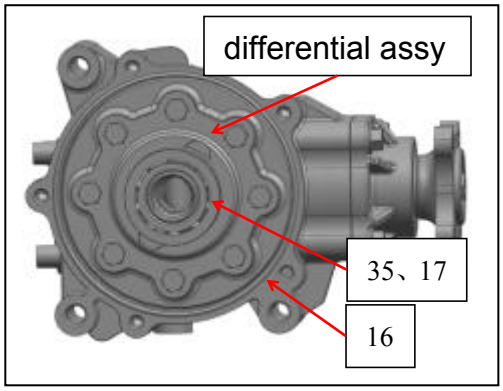


Fig 4

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

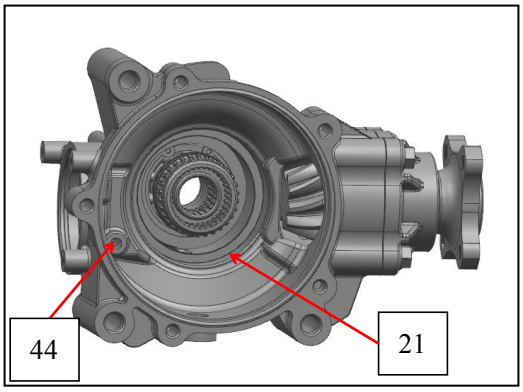


Fig 5

Remove the pin shaft㊺.
Remove the block assy㊾and pin㊿.
Remove the fork51.→Fig 6

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

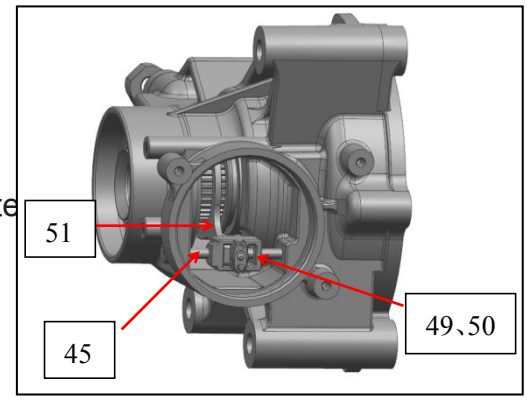


Fig 6

Remove the spline bushing⑳.→Fig 7

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

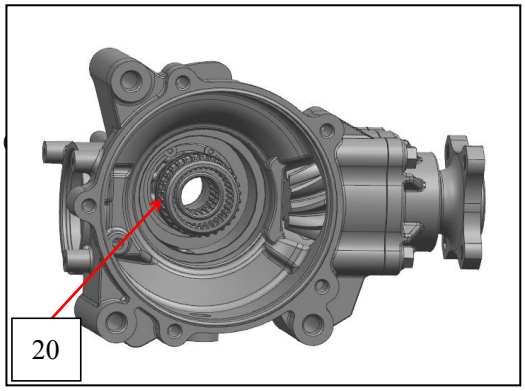


Fig 7

Remove the spline sleeve⑲.→Fig 8

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

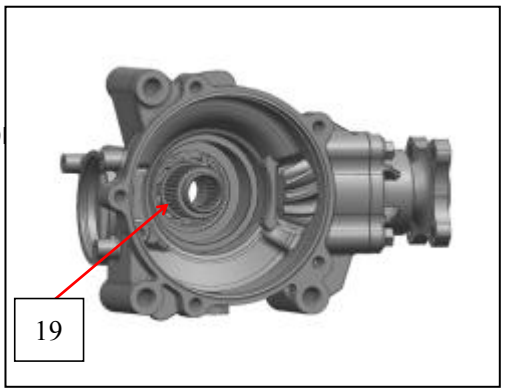


Fig 8

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

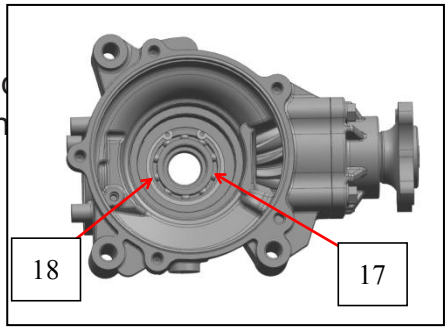


Fig 9

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.

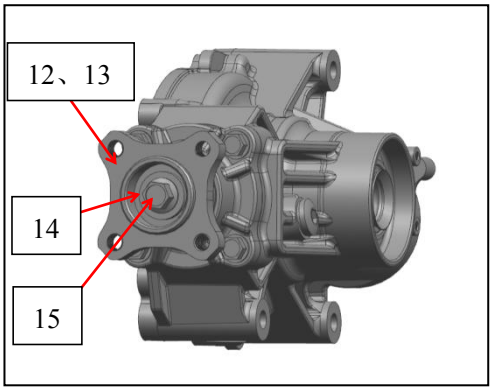


Fig 10

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

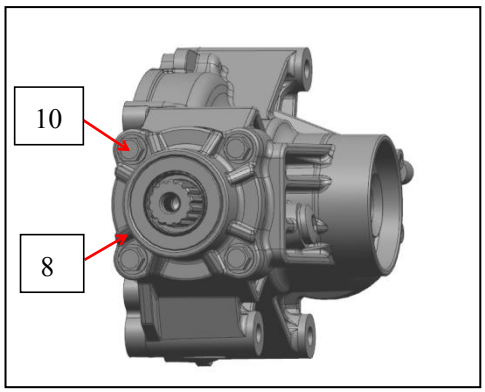


Fig 11

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.

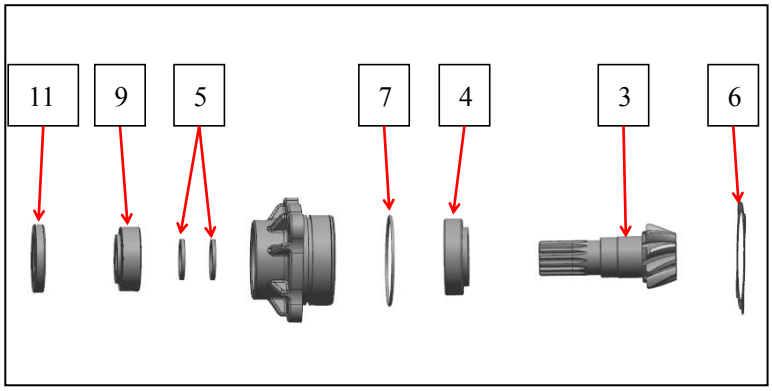


Fig 12

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.

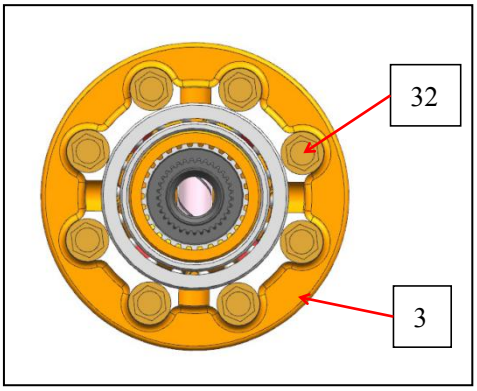


Fig 13

Remove the coupler㉝.→Fig 14

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

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 o damage.Replace it if any defect is found.

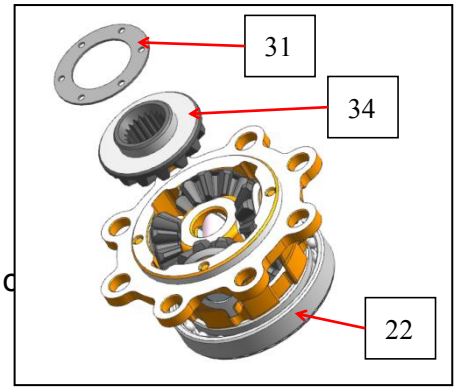


Fig 15

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

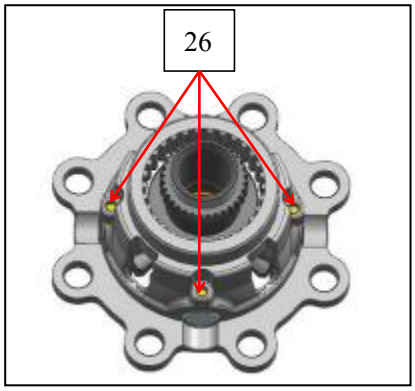


Fig 16

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

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

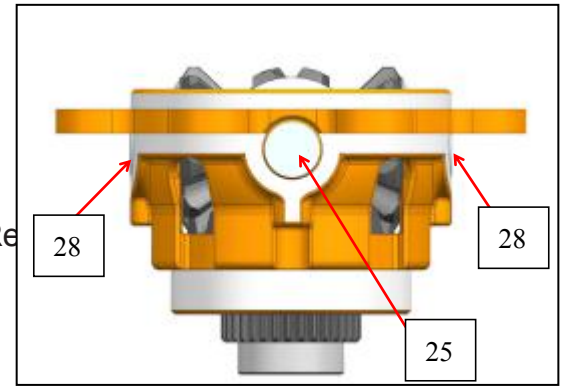


Fig 17

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

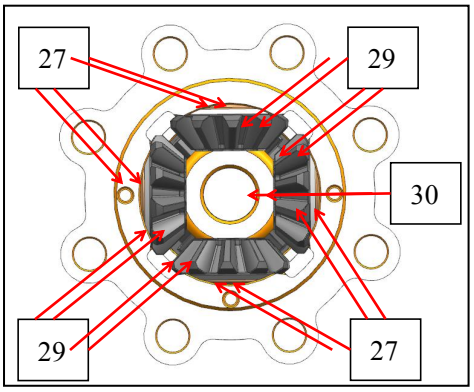


Fig 18

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.

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.

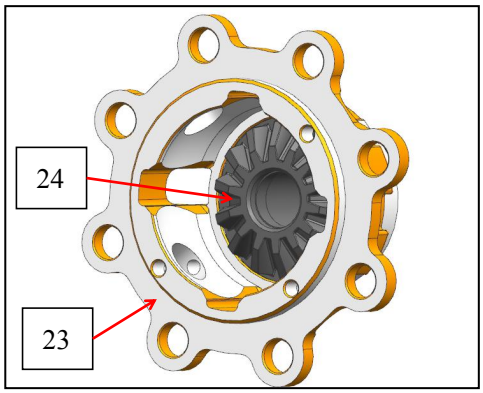


Fig 19

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

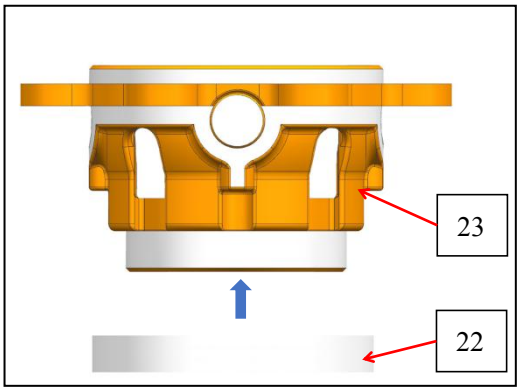


Fig 1

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

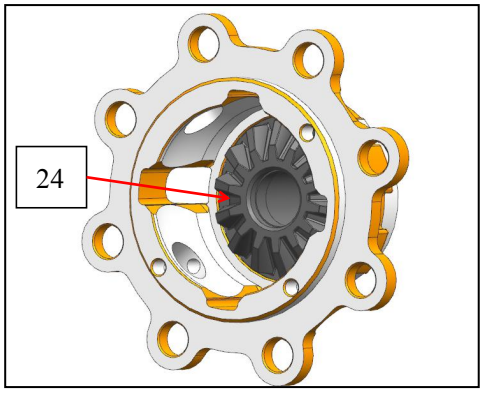


Fig 2

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

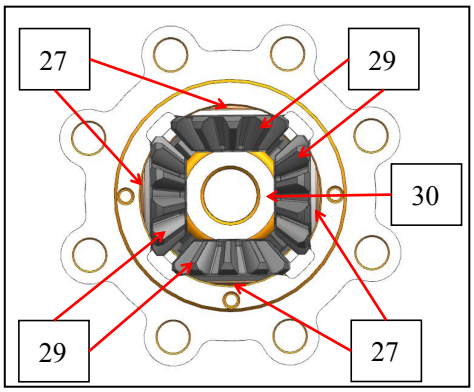


Fig 3

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

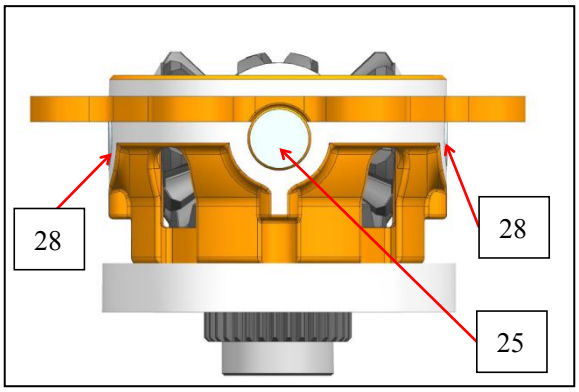


Fig 4

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

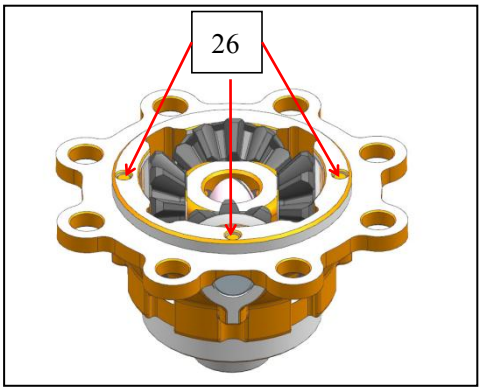
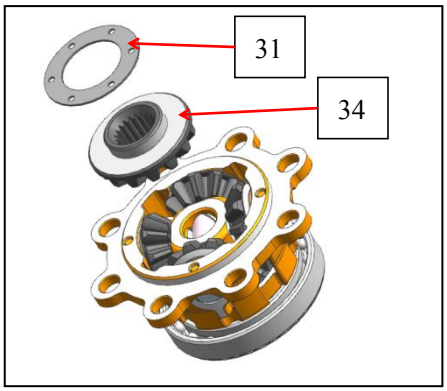


Fig 5

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



Compress the bearing⑰ onto the coupler㉝.→Fig 7

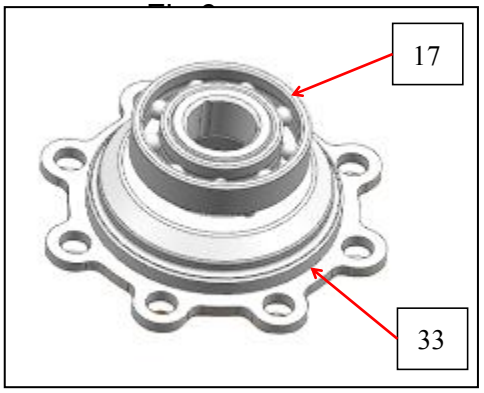


Fig 7

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.

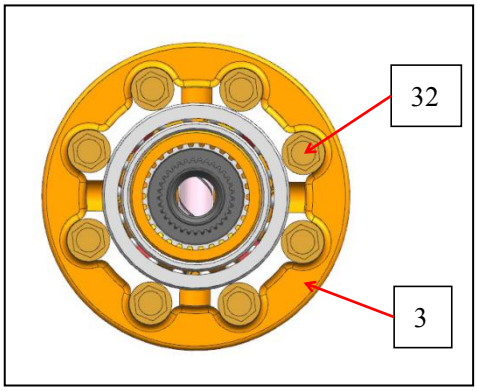


Fig 8

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.

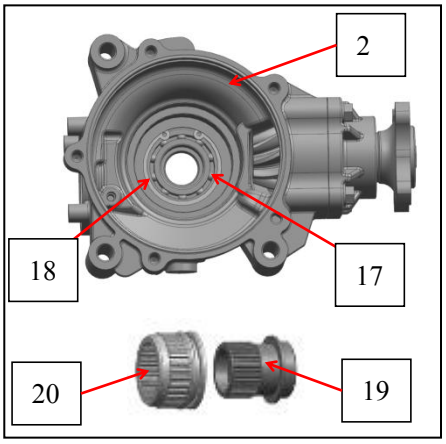


Fig 9

Assemble the fork51, the block assy49 and pin50.
Install the fork51 into the spline bushing.
Install the pin shaft45 through the front gear case,the block assy and the fork.
Install the screw and tighten the screw.→Fig 10
Screw torque: 13N•m

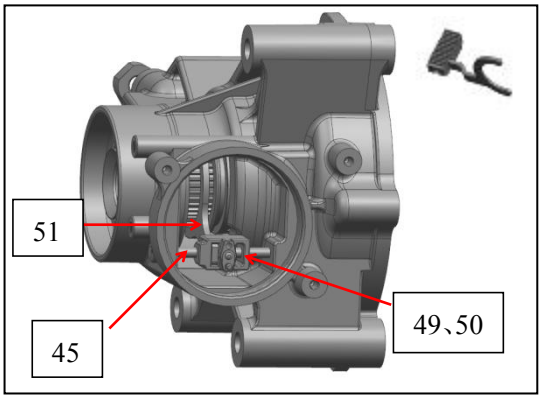


Fig 10

Install the differential assy into the front gear case.
Install the adjusting washers35 as needed.
Install a new O-ring16 on the front gear case.→Fig 11

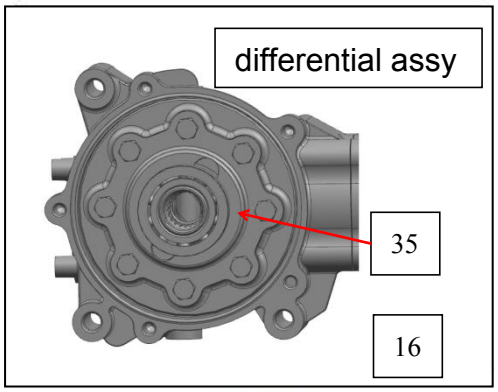


Fig 11

Assemble the front gear case and the cover38.
Install bolts10.→Fig 12
Bolt torque: 25N•m
Note:Install the bolts in criss-cross way.Pre-tighten first,the tighten the bolts.

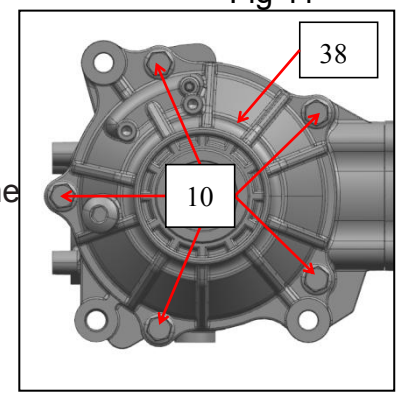


Fig 12

Compress the bearing4 on the driving bevel gear3.
Compress the bearing9 in the bearing seat8.
Install a new oil seal11 in the bearing seat.
Install the driving bevel gear assy into the front gear ca
sure the driving bevel gear engages with
the driven bevel gear well.
Install a new O-ring7 on the bearing seat.
Install the adjusting washers on the bearing seat as ne
Install two washers5 on the driving bevel gear.→Fig 1

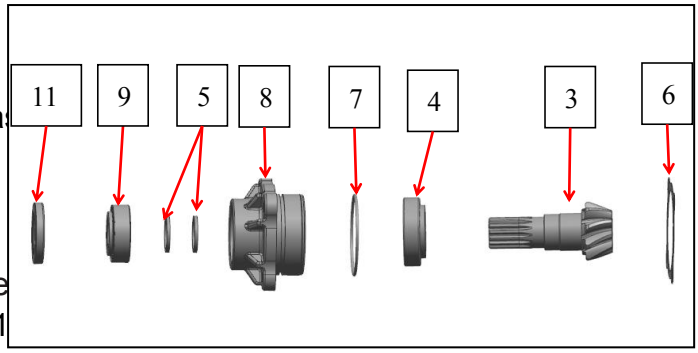


Fig 13

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.

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.

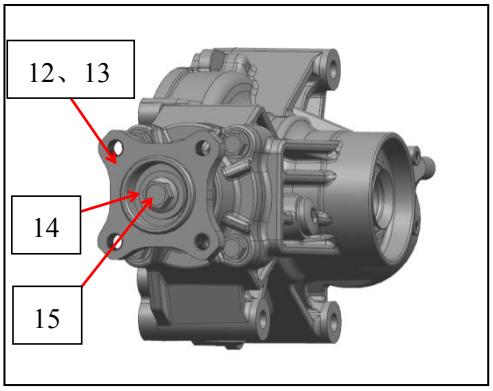


Fig 15

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

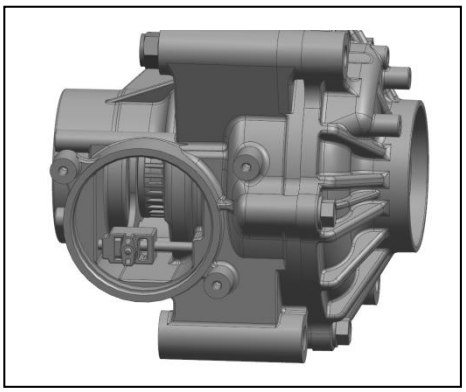


Fig 16

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

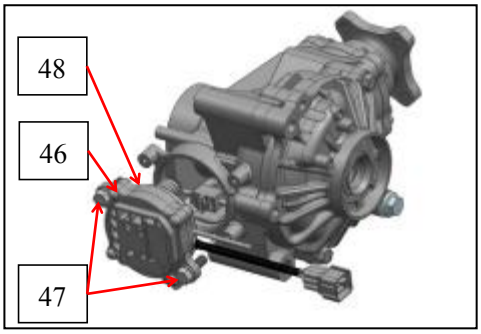


Fig 17

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

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

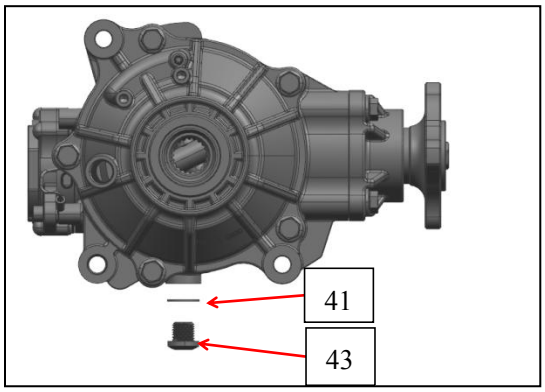


Fig 19

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

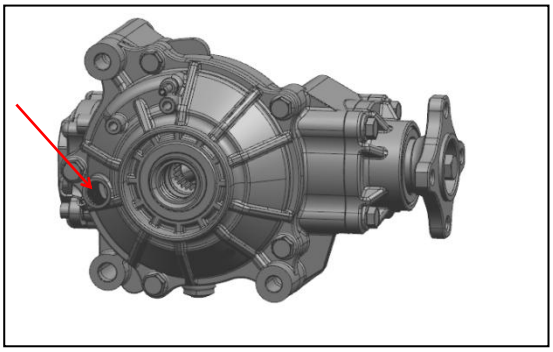


Fig 20

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

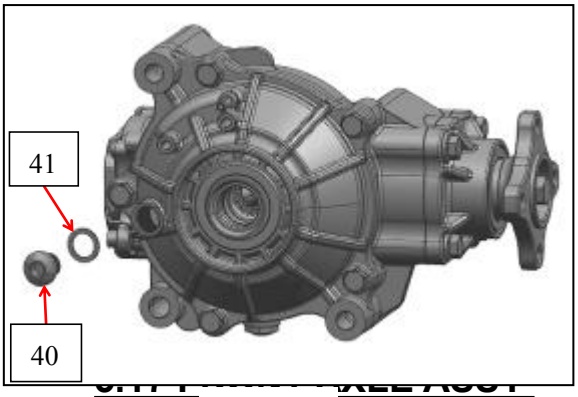


Fig 21

INSTALLATION

Install the front axle assy① onto the frame and align the mounting holes.
Install the bolts②.Pre-secure with nuts
Bolt specification:M10X1.25X110
Nut specification:M10X1.25
Bolt torque: 40N•m
Install the bolts and spring washers③.
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.

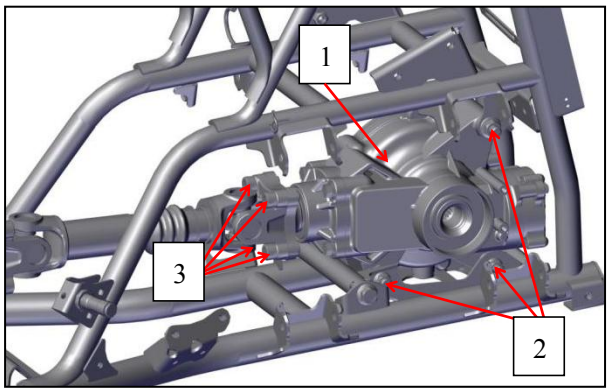
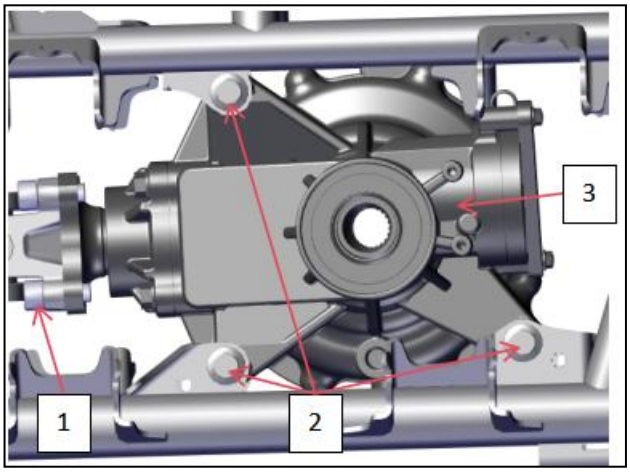


Fig 1

5.18 REAR AXLE ASSY（WITHOUT DIFFERENTIAL

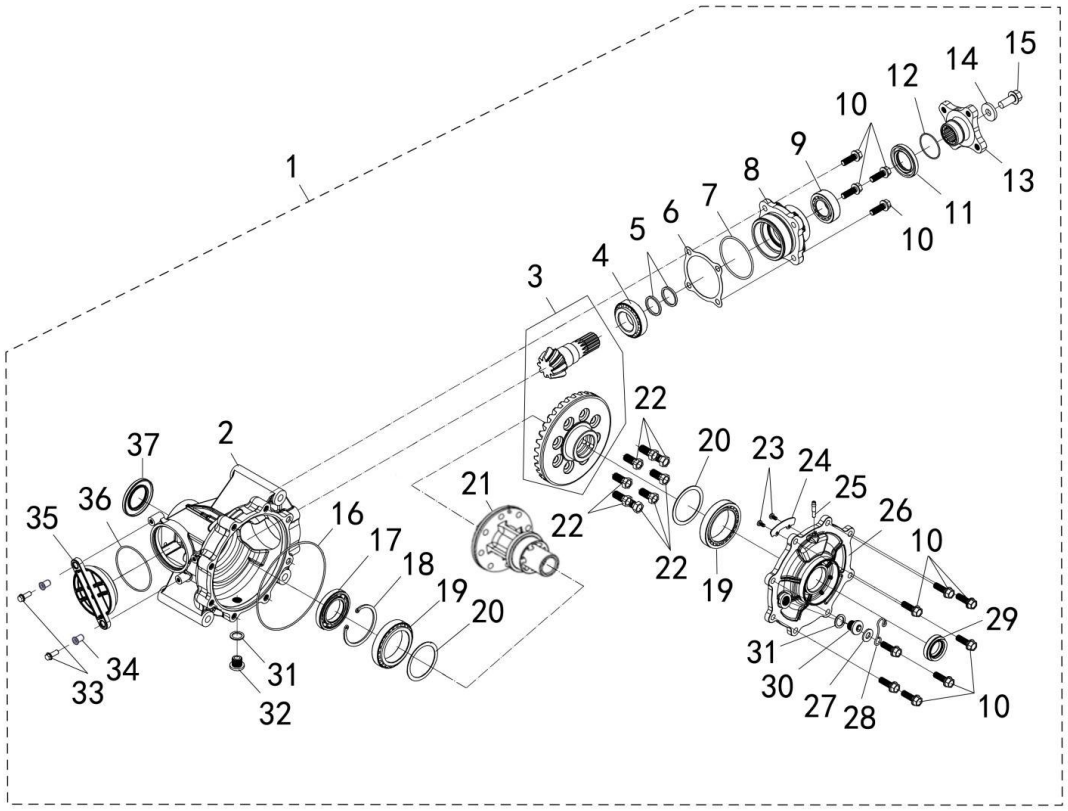
NOTE: Before inspection make sure the operation is made on a flat ground and the vehicle is jacked up. Do not put any limbs under the vehicle,in case of injury caused by sudden fall during inspection.



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

5.19 REAR AXLE ASSY（WITHOUT DIFFERENTIAL)

5.19.1 REAR AXLE ASSY（WITHOUT DIFFERENTIAL) EXPLODED VIEW



1	REAR AXLE	1	20	ADJUSTING WASHER 61X50.5	2-6
2	CASE, REAR GEAR CASE	1	21	INSTALLING SEAT	1
3	BEVEL GEAR ASSY,REAR GEAR CASE	1	22	BOLT M10X1.25X22	8
4	BEARING 32006	1	23	SCREW M4X8	2
5	ADJUSTING WASHER 32X25.4	2	24	OIL BAFFLE	1
6	ADJUSTING WASHER	1-3	25	JOINT, BREATHER PIPE	1
7	O-RING 55X2.5	1	26	COVER, REAR GEAR CASE	1
8	BEARING SEAT	1	27	WASHER 8	1
9	BEARING 33005	1	28	CLIP, REAR PARKING CABLE	1
10	BOLT M8X28	12	29	OIL SEAL 24X38X8	1
11	OIL SEAL 35X50X7	1	30	BOLT M14X1.25X12	1
12	O-SEAL RING 25X2	1	31	GASKET 14	2
13	COUPLER	1	32	OIL DRAIN BOLT M14X1.25X12, MAGNETIC	1
14	WASHER 13X27.5X4	1	33	BOLT M6X18	2
15	BOLT M12X1.25X25	1	34	BUSHING	2
16	O-SEAL RING 141X2.4	1	35	COVER	1
17	BEARING 16007	1	36	O-RING 67.5X2	1
18	CIRCLIP FOR HOLE 62	1	37	OIL SEAL 35X58X5	1
19	BEARING 32910	2			

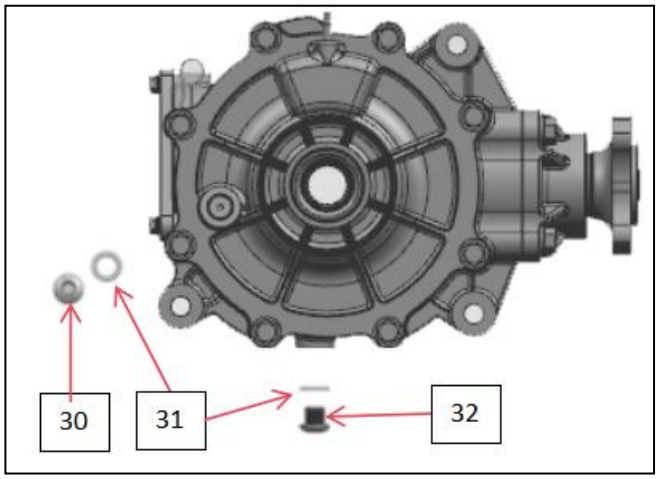
5.19.2 REAR AXLE ASSY（WITHOUT DIFFERENTIAL) DISASSEMBLY

Place a pan under the rear gear case.

Remove the bolt㉚and washer㉛.

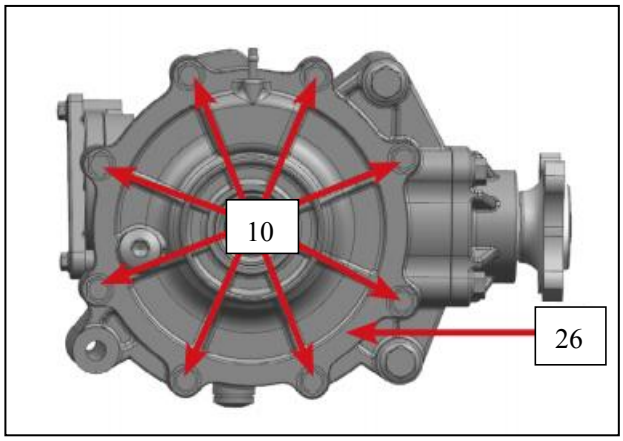
Remove the oil drain bolt㉜and washer㉛.

Drain the oil.

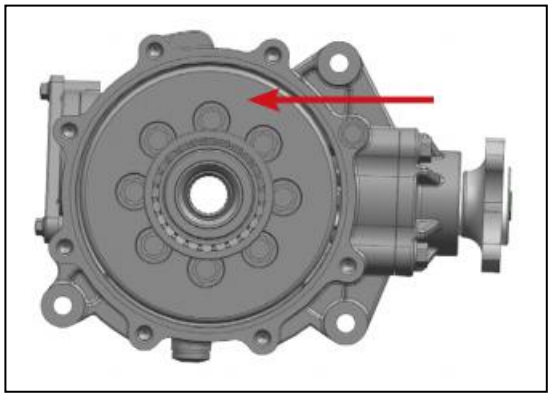


Remove the bolts⑩ .

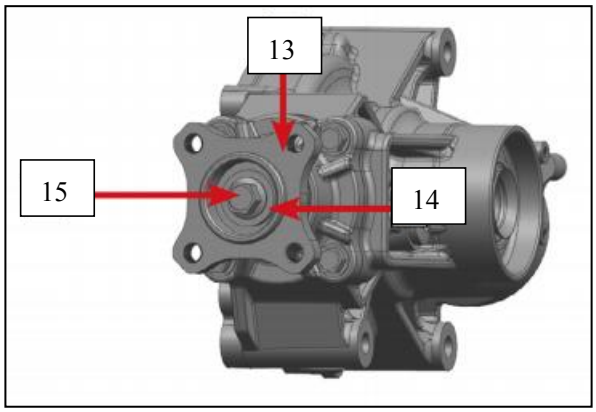
Remove the rear gear case cover㉖.



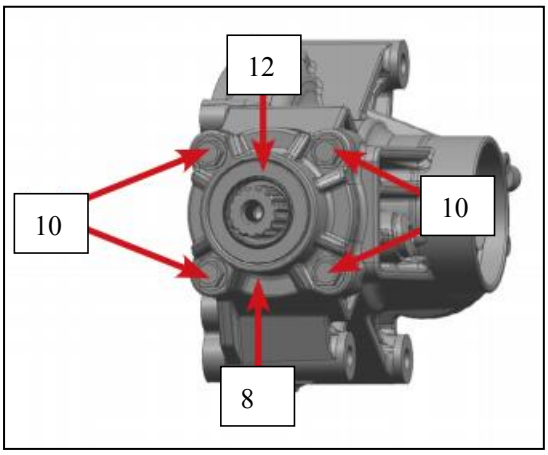
Remove the driven bevel gear assy.



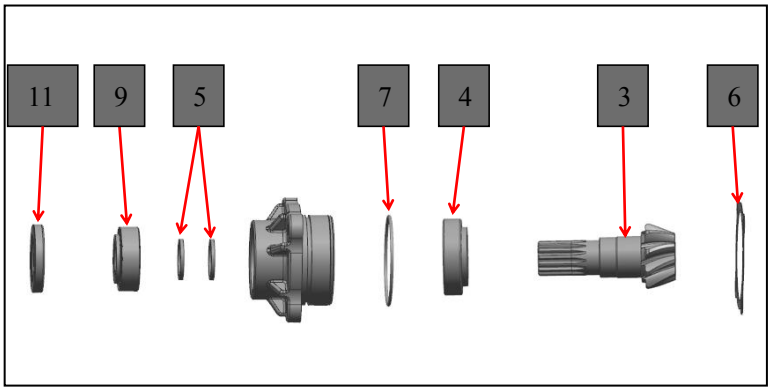
Remove the bolt⑮ and washer⑭.
Remove the coupler⑬.



Remove the bolts⑩.
Remove the O-ring⑫.
Remove the bearing seat assy⑧.



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

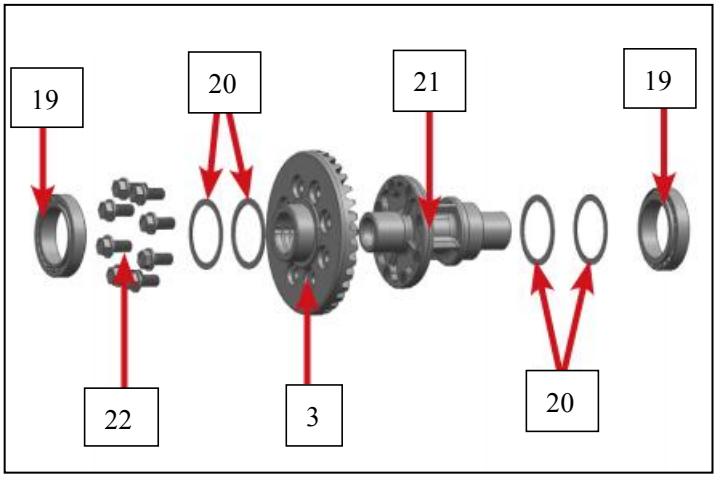


Remove the bearings⑲.

Remove the bolts㉒.

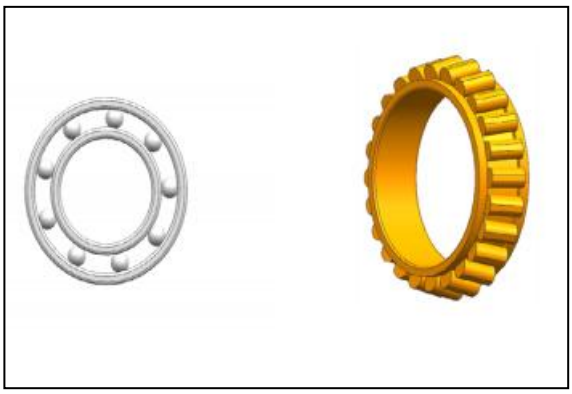
Remove the adjusting washers⑳.

Remove the installing seat㉑.

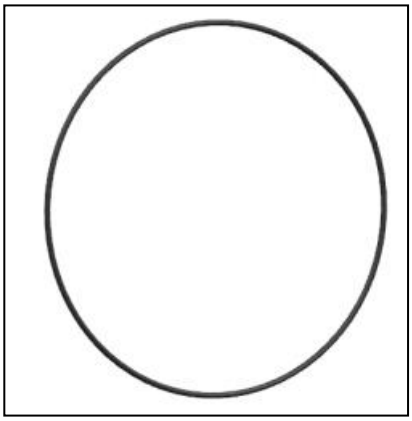


All of the oil seals that have been removed should be scrapped and replaced with new components.

Inspect the bearing clearance for proper specifications, check whether rotation is smooth, and examine whether raceways, steel balls, needle rollers, and retainers are intact. If any defects are found, replace the bearings.
When replacing bearings, use specialized tools for disassembly.

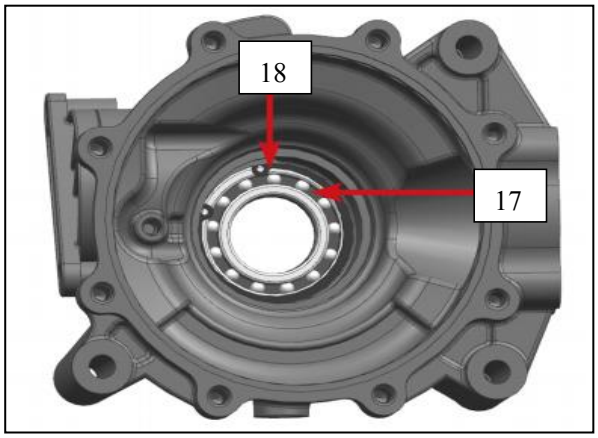


Inspect all O-ring seals for proper shape and check for cracks or damage. Replace with new components if any issues are detected.

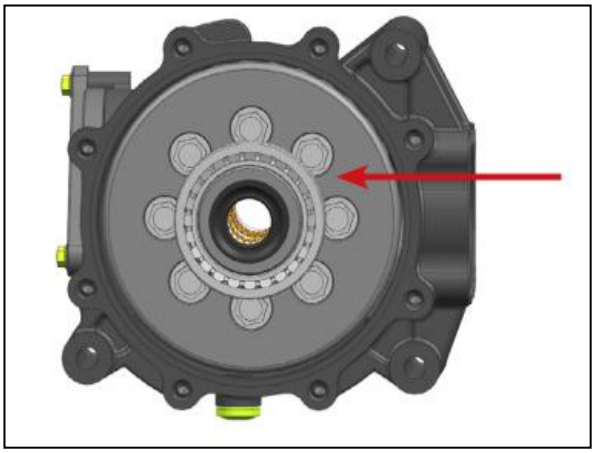


5.19.3 REAR AXLE ASSY（WITHOUT DIFFERENTIAL) ASSEMBLY

Compress the bearing⑰ into the rear gear case.
Install the circlip⑱ into the case.

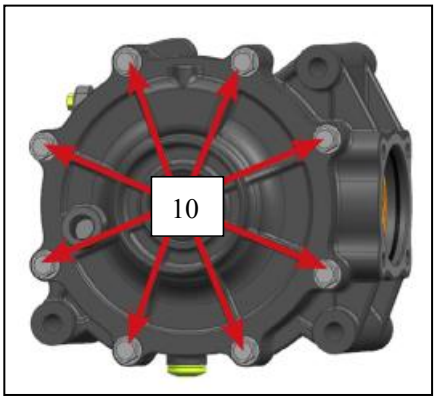


Install the driven bevel gear assy.

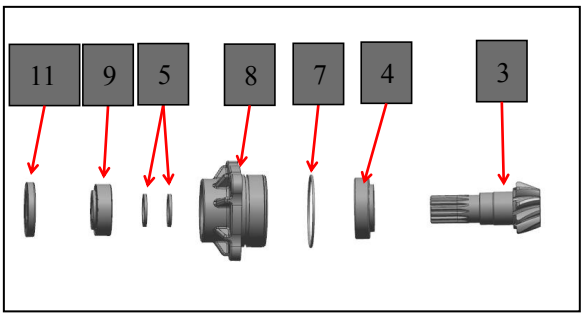


Assemble the rear gear case and the cover.

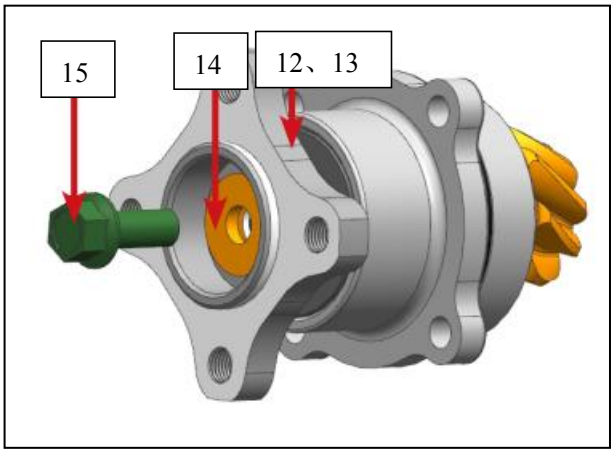
Install the bolts⑩.



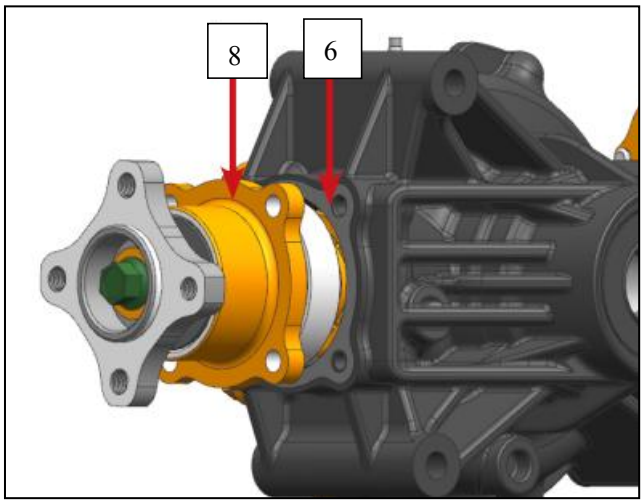
ompress the bearing④ on the driving bevel gear③.
Compress the bearing⑨ in the bearing seat⑧.
Install a new oil seal⑪ in the bearing seat.
Install the driving bevel gear assy into the rear gear case.Make sure the driving bevel gear engages with the driven bevel gear well.
Install a new O-ring⑦ on the bearing seat.
Install two washers⑤ on the driving bevel gear.



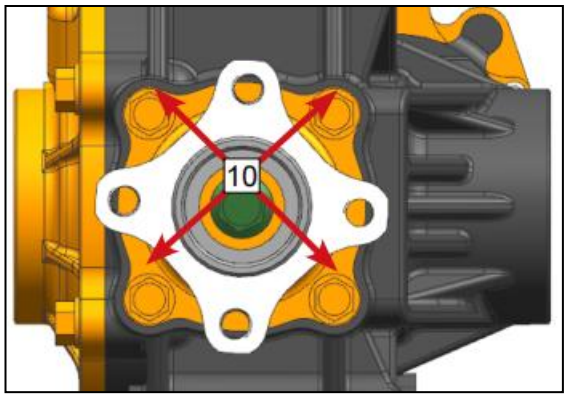
Install a new O-ring⑫ on the coupler⑬.
Install the coupler on the driving bevel gear.
Install the washer⑭ and the bolts⑮.
Bolt torque: 75N•m
Note:Pre-tighten first,then tighten the bolt.



Install the adjusting washers⑥ on the bearing seat as needed.
Install the driving bevel bearing assy.
adjusting washer t=0.20，0.30

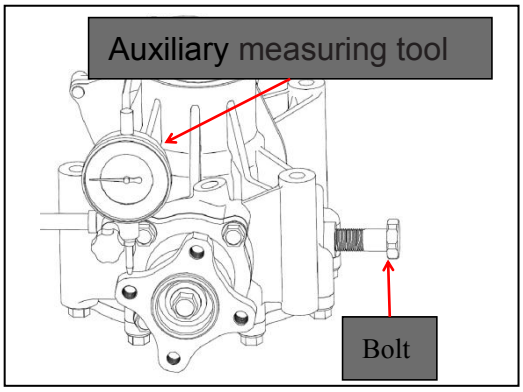


Install the bolts⑩.



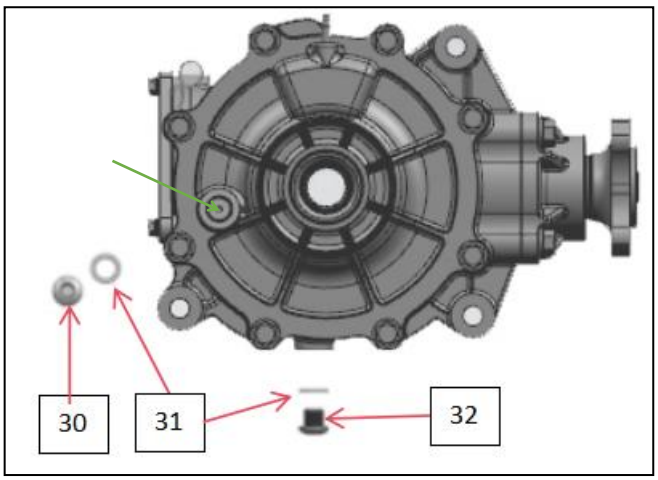
Rear Gear Case Bevel Gear Clearance Adjustment

Follow the Fig 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: 0.1~0.25.



No.	Name	Thickness
5	Adjusting washer 32X25.4	2.10 2.20 2.30 2.40 2.42 2.44 2.46 2.48 2.50 2.60 2.70 2.80 2.90 3.00
6	Adjusting washer	0.20 0.30
20	Adjusting washer 61X50.5	0.10 0.30 0.50 0.90 0.92 0.94 0.96 0.98 1.00

NOTE: If the dial indicator reading is not within the specified range, adjust the clearance of the rear axle bevel gears and repeat the aforementioned steps.



Install the washer㉛ on the oil drain bolt㉜.

Install the bolt.
Bolt torque: 25N•m
Fill the rear gear case with oil.
Oil Change Capacity: 6.7 oz (0.2L).

Install the washer㉛ on the bolt㉚.

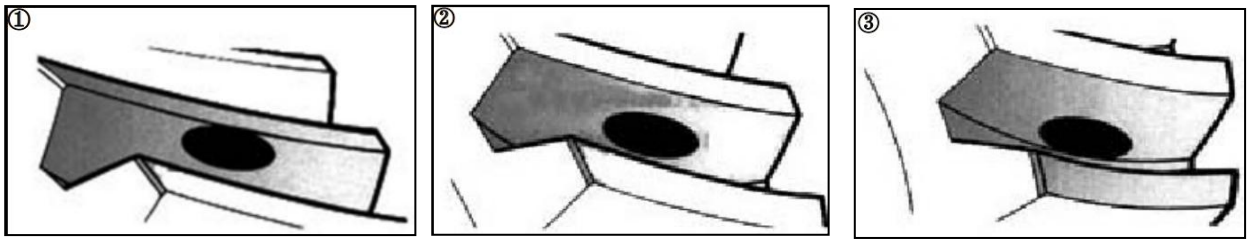
Install the bolt.
Bolt torque: 25N•m

INSPECTION OF TOOTH CONTACT PATTERN

After adjusting the backlash of the bevel gears, the tooth contact pattern must be inspected.
The inspection procedure is as follows:

1. Remove the driven bevel gear assembly from the crankcase.
2. Clean any dirt and grease from the tooth surfaces of both the drive and driven bevel gears.
3. Apply marking dye to the tooth surfaces of the driven bevel gear.
4. Reinstall the driven bevel gear.
5. Rotate the driven bevel gear several times in both forward and reverse directions.
6. Disassemble the drive and driven bevel gear assemblies, and inspect the dye transfer pattern on the drive bevel gear.

Condition ①	Contact at the top of the tooth surface	Improper
Condition ②	Contact at the center of the tooth surface	Proper
Condition ③	Contact at the root of the tooth surface	Improper



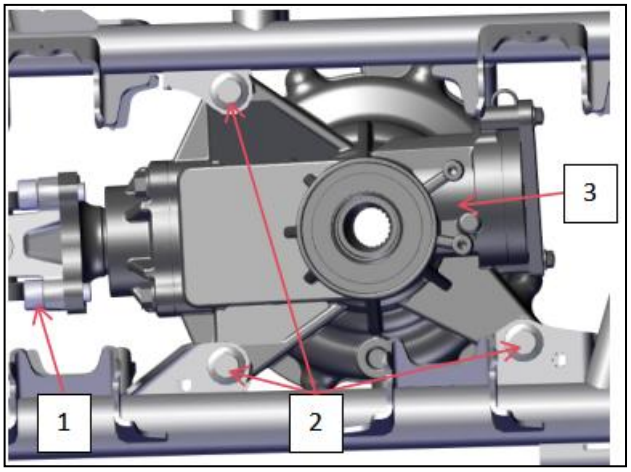
If the contact pattern is proper (Condition ②), proceed to subsequent operations.
If the contact pattern is improper (Condition ① or ③), adjust the thickness of the drive bevel gear shim and repeat the inspection until the correct pattern is achieved.
Note: After completing backlash and contact pattern adjustments, thoroughly clean the dye from the gear teeth.

Adjustment Method

Contact Pattern	Shim Thickness Adjustment
Condition ①	Reduce shim thickness
Condition ③	Increase shim thickness

Warning:
After adjusting the tooth contact pattern, recheck the backlash, as it may have changed.
If proper contact cannot be achieved after backlash adjustment, replace the drive and driven bevel gears. Ensure both tooth contact pattern and backlash meet specifications.

5.20 REAR AXLE ASSY（WITHOUT DIFFERENTIAL) INSTALLATION



Install the rear axle assy③ onto the frame and

align the mounting holes.
Install the bolts②.Pre-secure with nuts.
Bolt torque: 40N•m

Install the bolts and spring washers①.Pre-tighten

the bolts.
Spring washers specification: ϕ10
Bolt torque: 45N•m
Tighten all the bolts to their specification.
Note:Install these bolt kits with thread locker.

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

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.

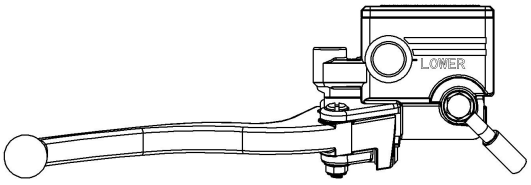
1. Clean reservoir cover thoroughly.
2. Remove cover from reservoir.

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.

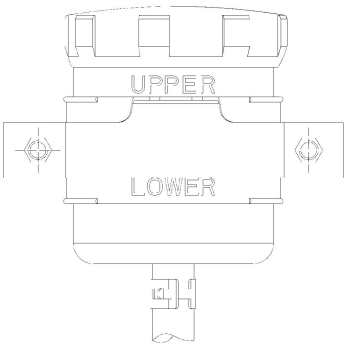
NOTE: Do not release foot pedal or hand lever before bleeder screw is tight or air may be drawn into master cylinder.



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.

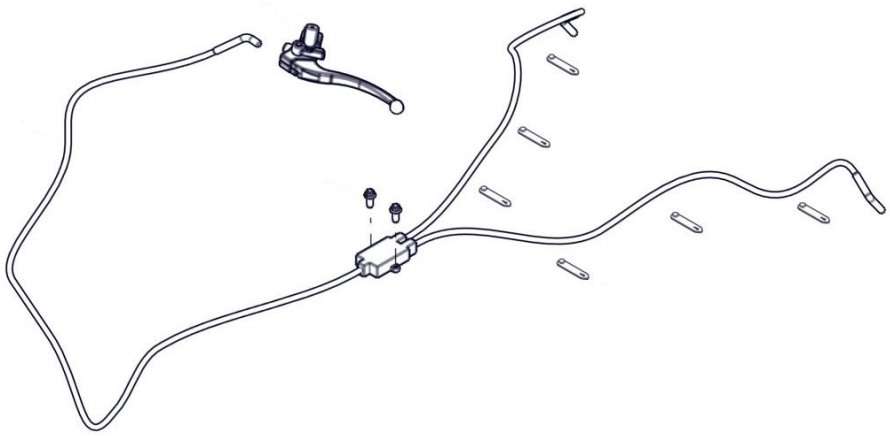
    Master Cylinder Fluid Level

    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.

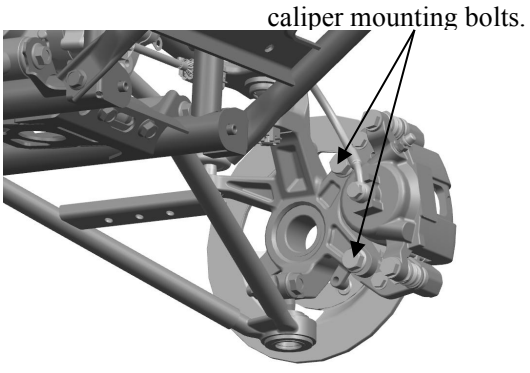
REMOVAL

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.



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.

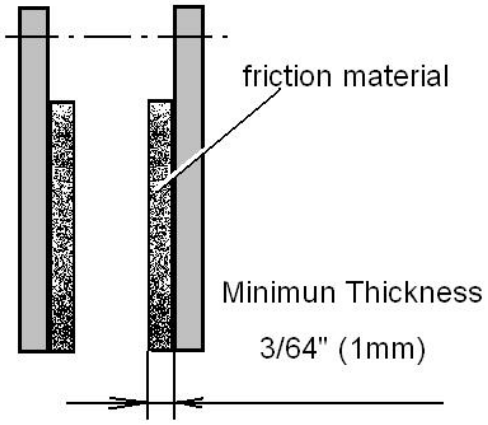
NOTE: Brake fluid will be forced through compensating port into master cylinder fluid reservoir when piston is pushed back into caliper. Remove excess fluid from reservoir as required.

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)



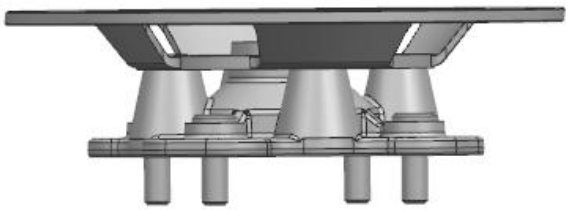
INSTALLATION

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

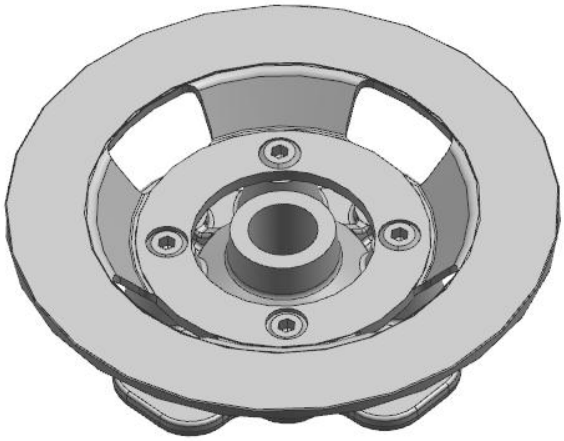
INSPECTION

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

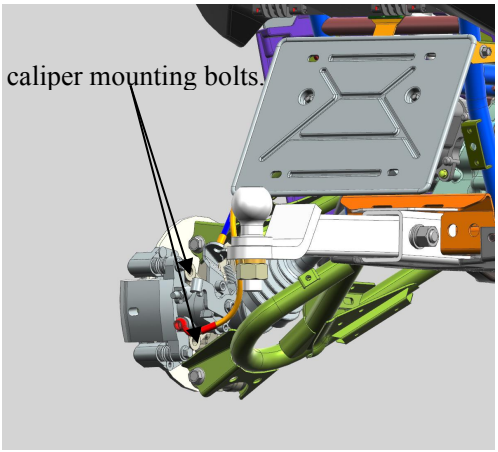
NOTE: The brake pads should be replaced as a set.

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.



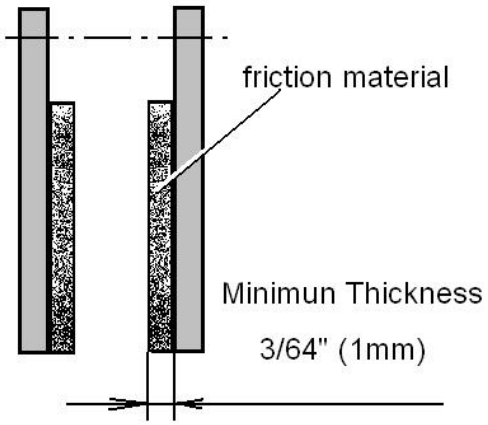
2. Remove the rear wheel.
3. Remove the two caliper bolts and lift caliper off of disc.

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

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.

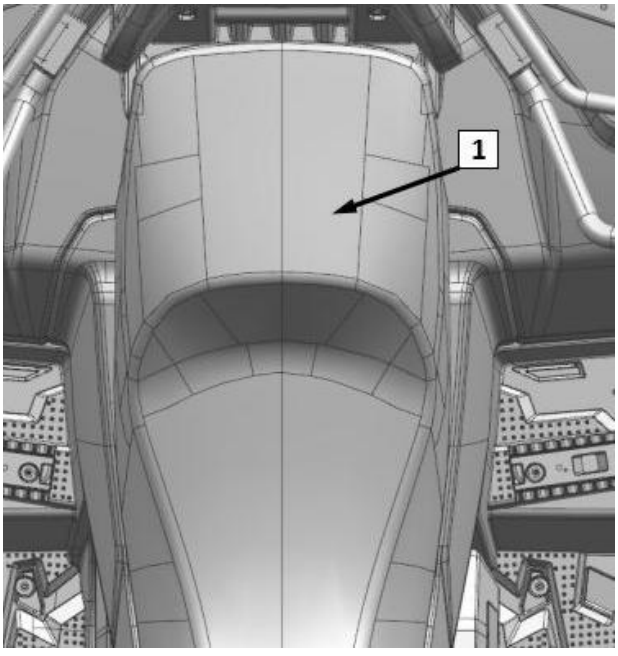
5. It is forbidden to puncture the wire to test the input/output electrical signals.

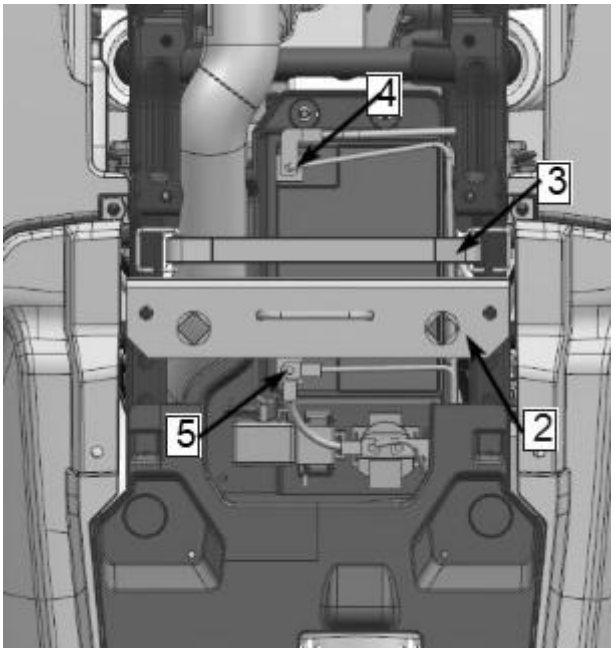
6. Establish the awareness of environmental protection and effective disposal of waste generated during maintenance.

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

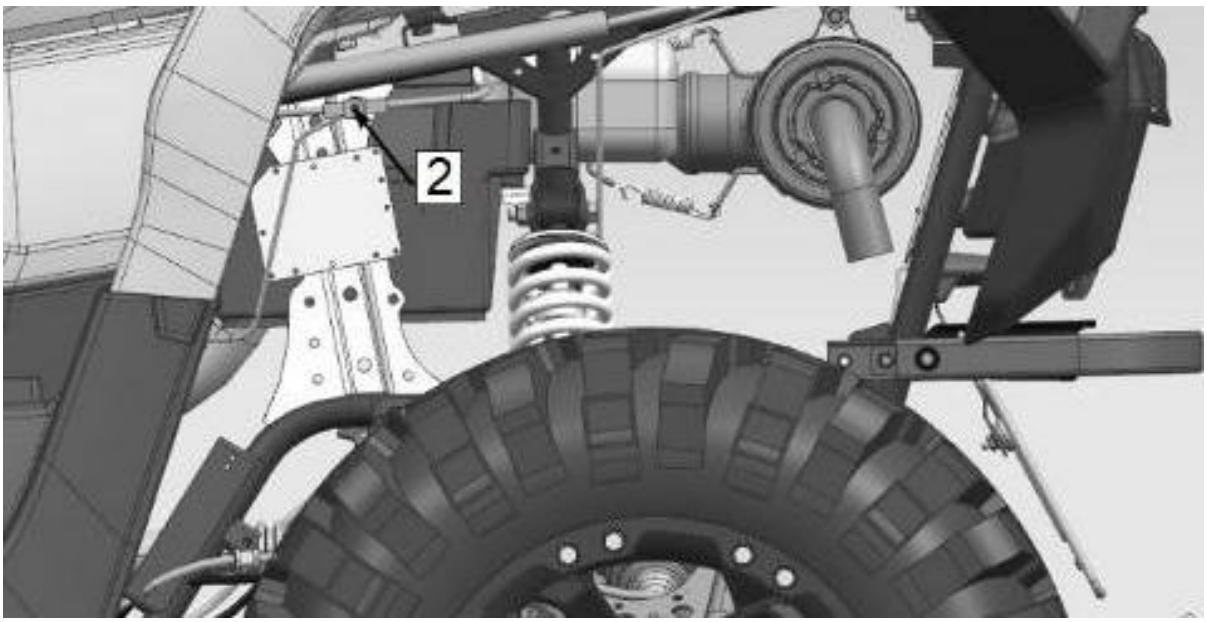
The battery has proper performance and is fully charged.
Start the vehicle and measure the voltage. Measuring point is positive pole (+), the other measuring point connects ground (-).

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.

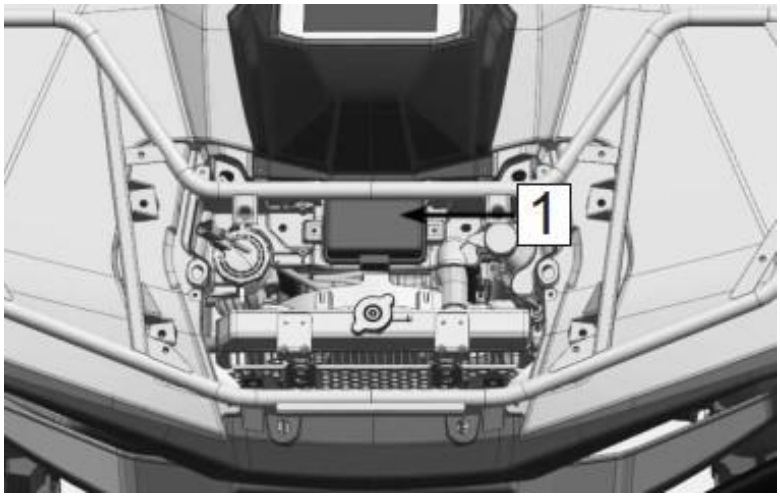
7.3 EARTH WIRE INSPECTION

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



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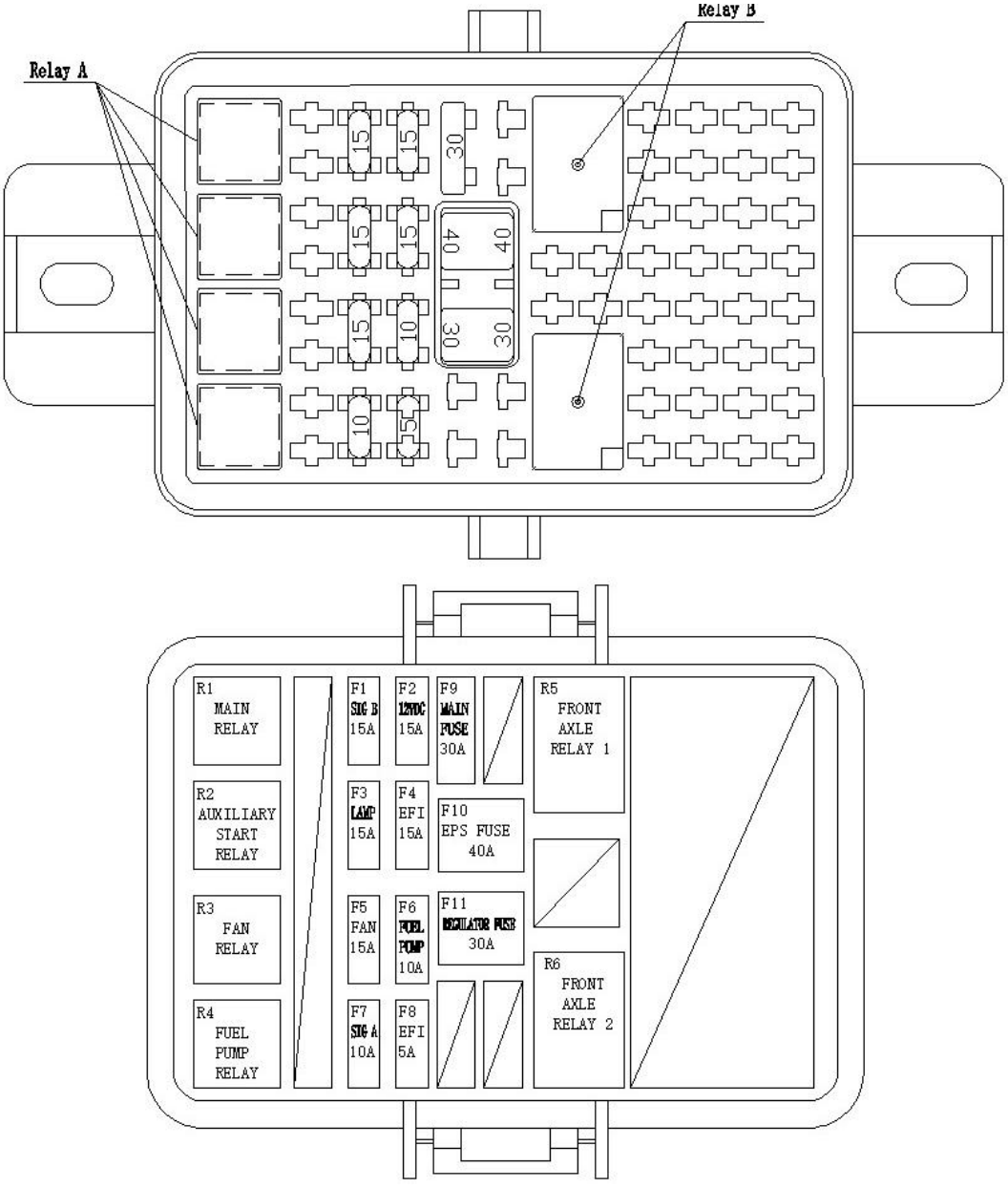


7.5 IGNITION SYSTEM

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

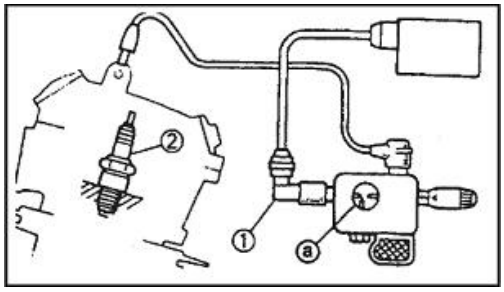
OUT OF SPECIFICATION

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

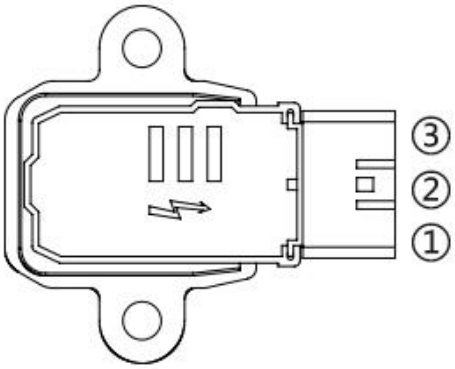
8.4-12.3KΩ(20 ℃)

⇩ CORRECT

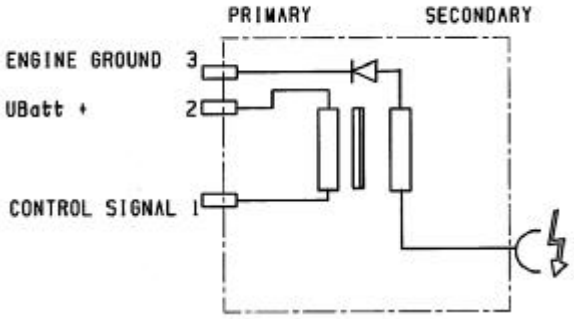
6. Ignition coil resistance

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℃)

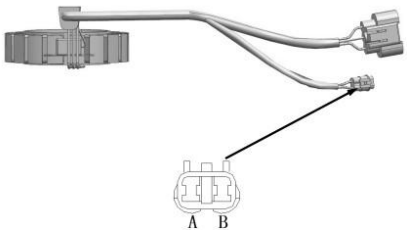
- Connect the pocket tester (Ω×10k) to the ignition coil.
- Check the secondary has the specified resistance

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:
180±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.

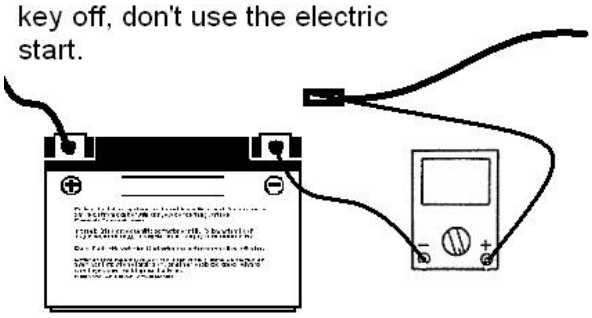
7.6 CHARGING SYSTEM

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)



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 Neutral position.

NOTE: When the drive select lever is in the neutral position or parking position, the Gear Position Indicator display “N” . If the Gear Position Indicator does not display “N” ,ask a dealer to inspect the electric circuit.
It is recommended to shift into Neutral 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

⇩ CONTINUITY

NO CONTINUITY → Replace the fuses

2. Battery
Check the battery condition.
Refer to "7.2 BATTERY "

⇩ CORRECT

INCORRECT → Clean battery terminals
Recharge or replace the battery

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

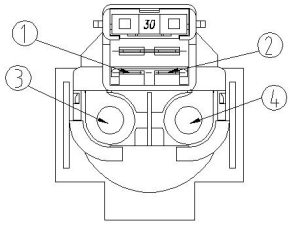
Repair or replace the starter motor

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

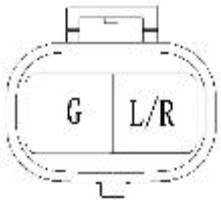
CORRECT ⇩

3 Main switch
CHECK SWITCHES
Refer to "7.13 SWITCHES"

NO CONTINUITY → Replace the main switch

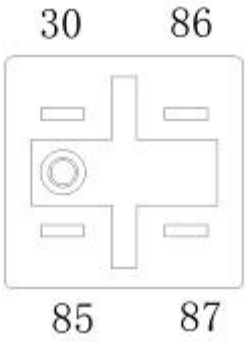
CONTINUITY ⇩

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

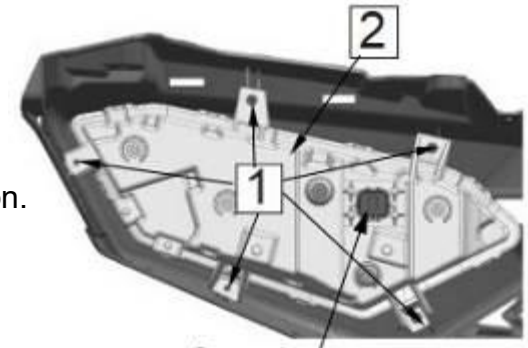
Remove five self-tapping screws 1.

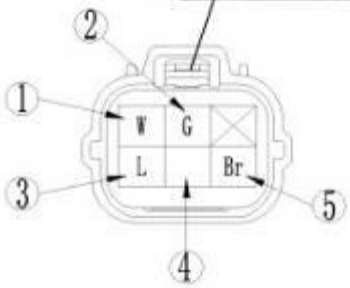
Remove headlight 2 .

Installation

Reverse the removal procedures for installation.

LH and RH headlight uses the same removal&installation procedures.





Pins and Function:

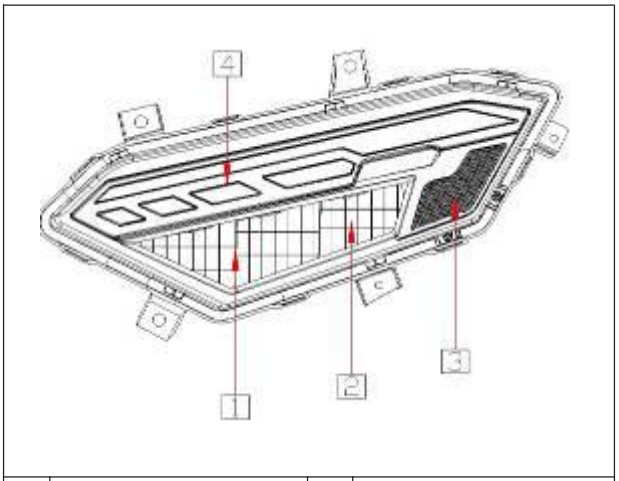
1：Low-beam light

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

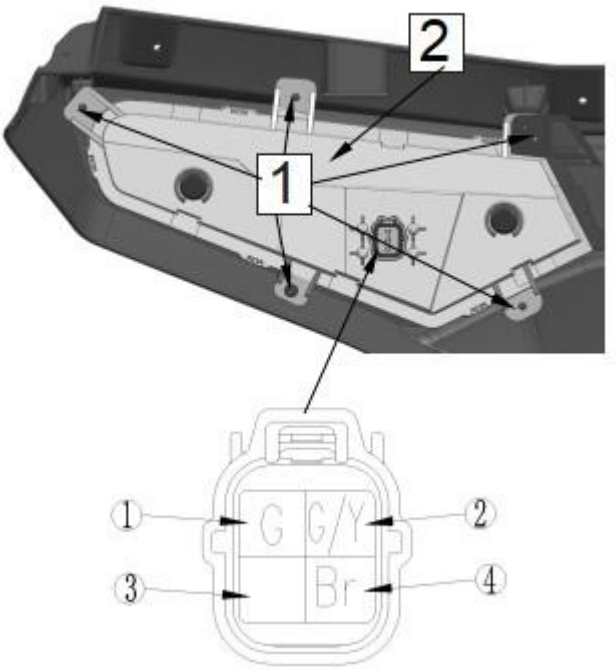
Removal

Remove self-tapping screws 1.

Remove tail light assy 2 .

Installation

Reverse the removal procedures for installation.



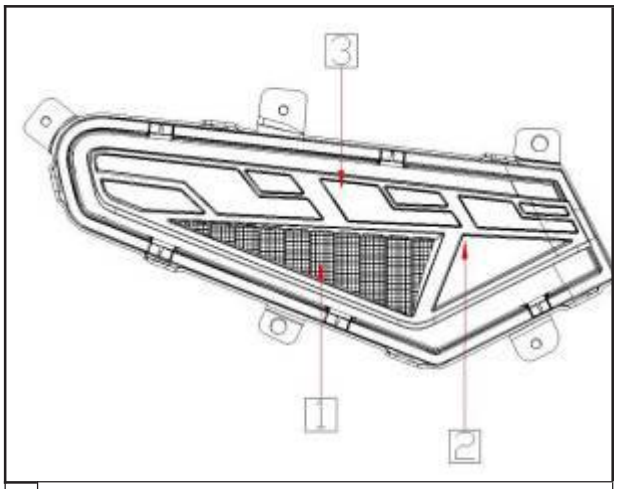
Pins and Function:

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

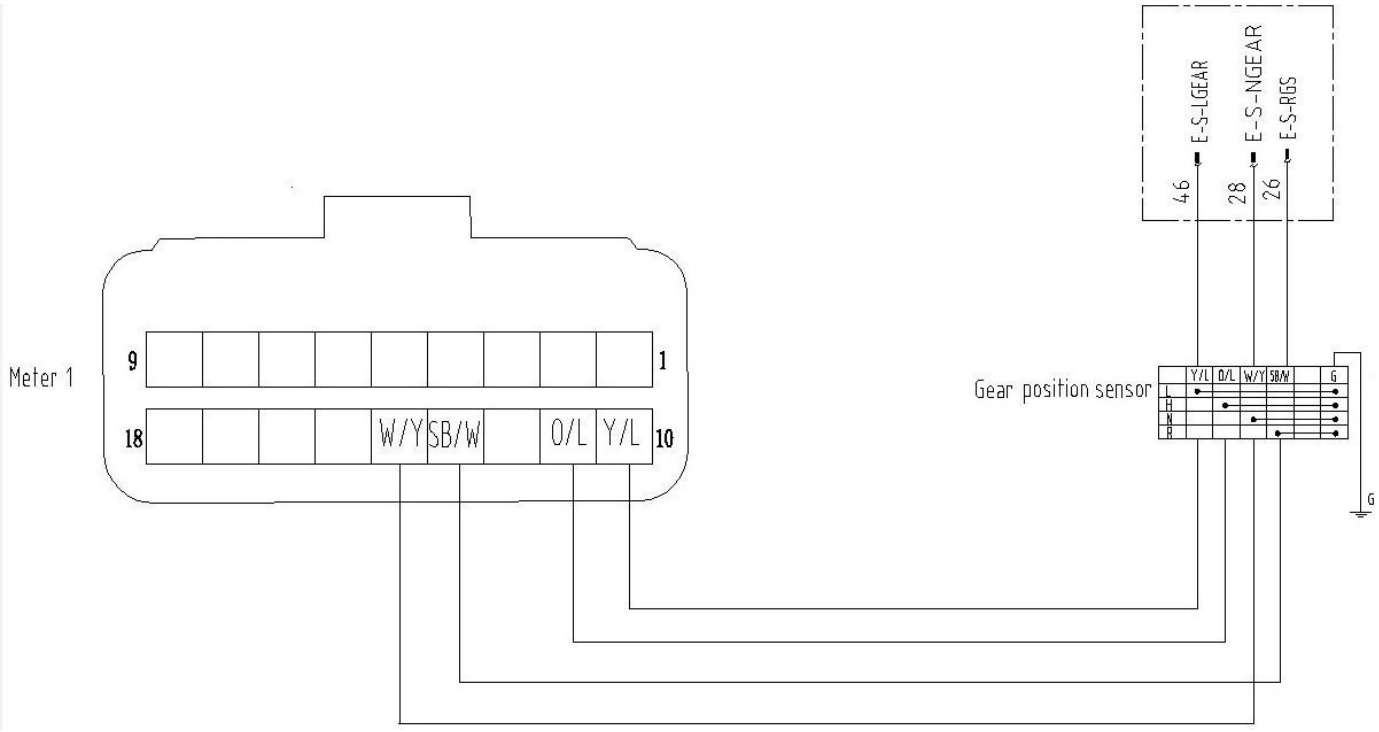
Tail light Assy

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.

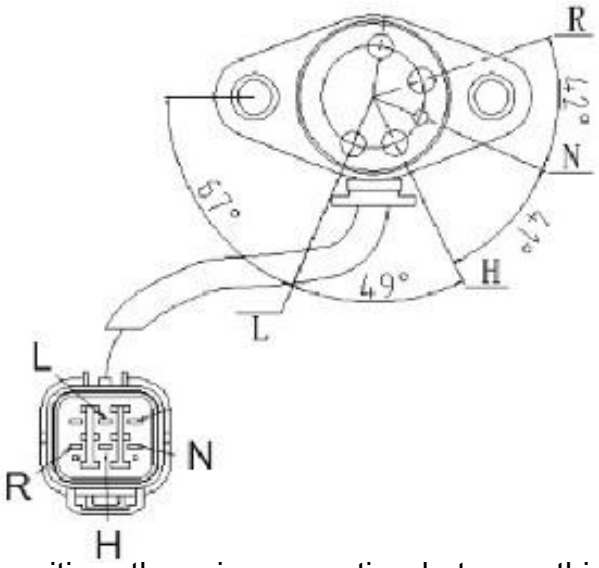
DIAGRAM



Switch table

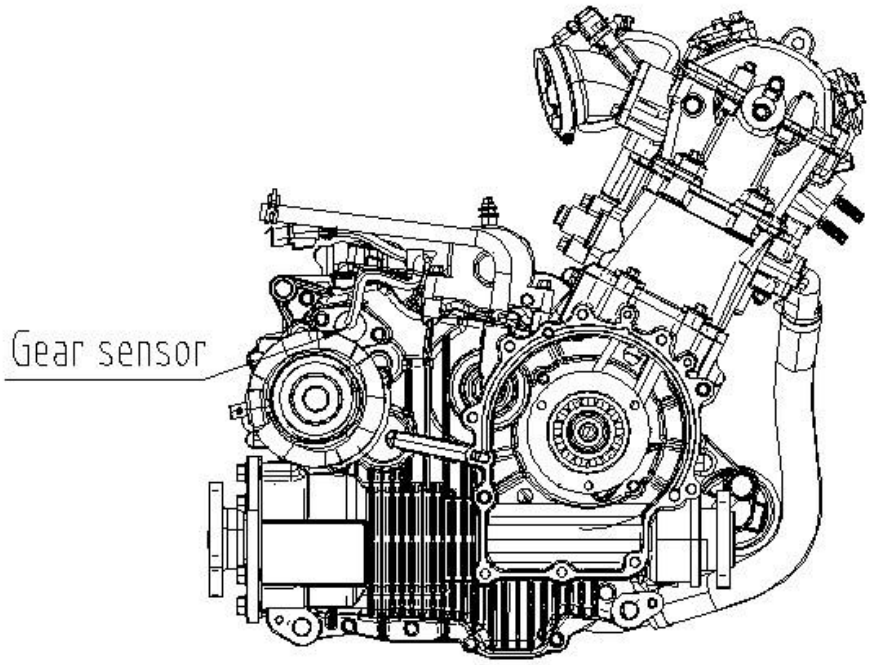
	Y/L	O/L	W/Y	SB/W		G
L	●					●
H		●				●
N			●			●
R				●		●

Pin function:
L:Low gear
H:High gear
N:Neutral gear
R:Reverse gear

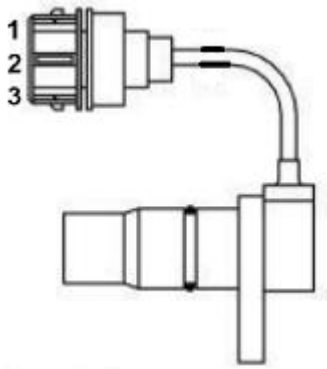


When each pin at a certain gear position, there is connection between this pin and engine. Otherwise, no connection exists.

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.



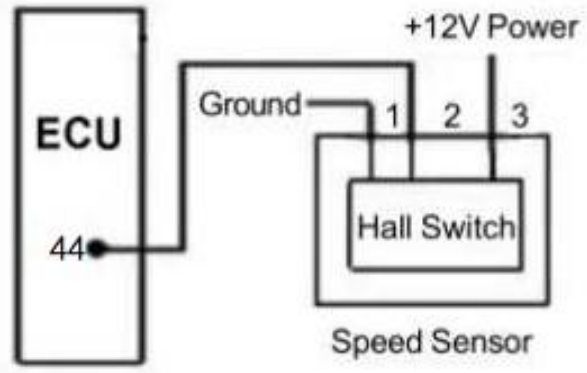
7.12 SPEEDMETER SYSTEM

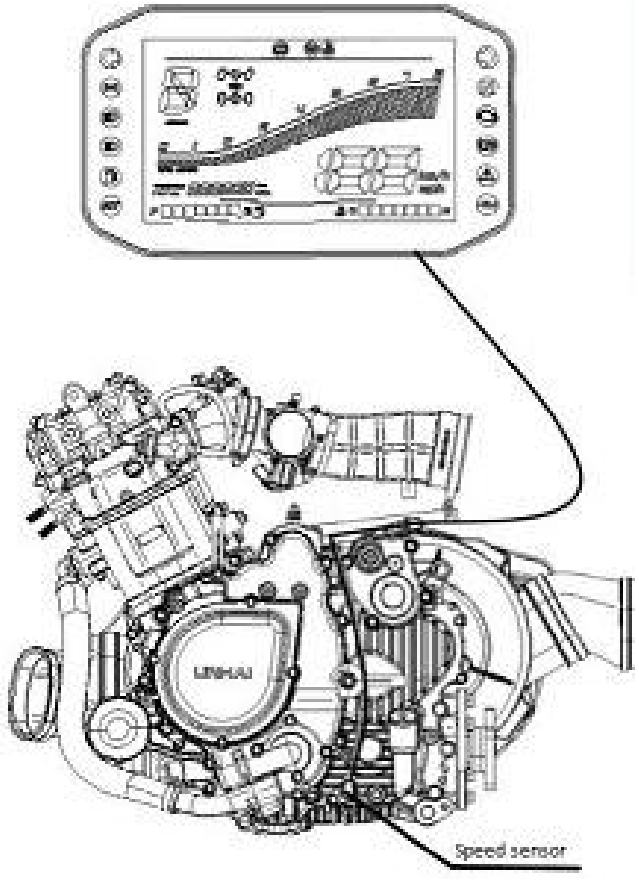


This sensor provides engine output shaft speed to ECU. Then ECU can calculate the speed according to this signal. It is a hall switch type device, which outputs square wave by the change of the magnetic field.

1. Ground
2. Output voltage signal (>80% of input voltage).
3. Power DC 12V(+)

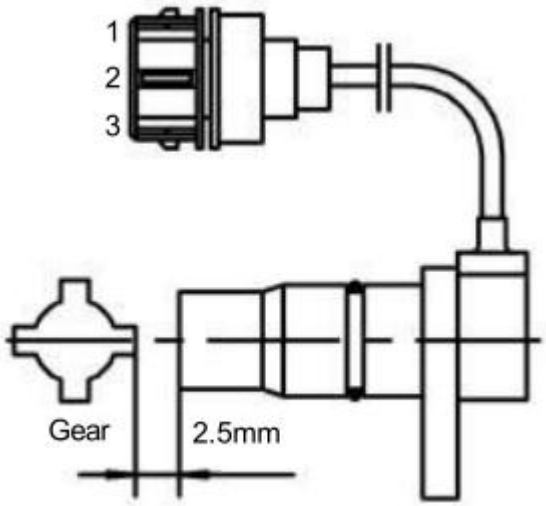
Circuit connecting with ECU.





Speed Sensor Test:

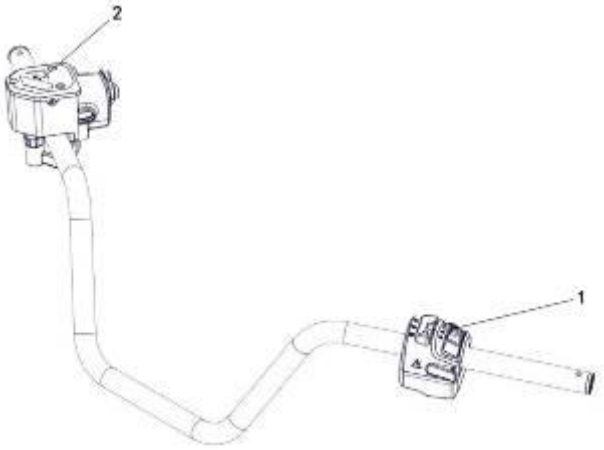
- Ground pin 1and connect pin 3 with +12V power;
- Fix a gear 2.5mm away from a speed sensor as the right figure illustrates;
- Turn multimeter to DCV range;
- Slowly turn the gear and measure the voltage between pin 2 and pin 3 to determine that if the reading varies from 0V-12V;
- If the reading doesn't 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



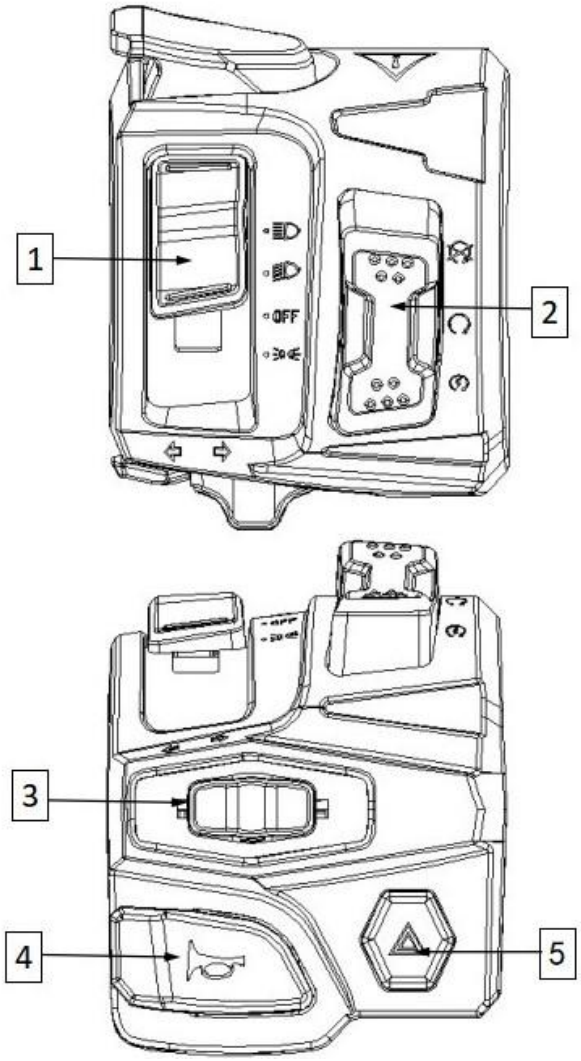
1 ： illumination switch

2 ： Start/Stop switch

3 Switch turn switch

4 ： Horn Button

5 ： Emergency alarm switch



Left hand controls

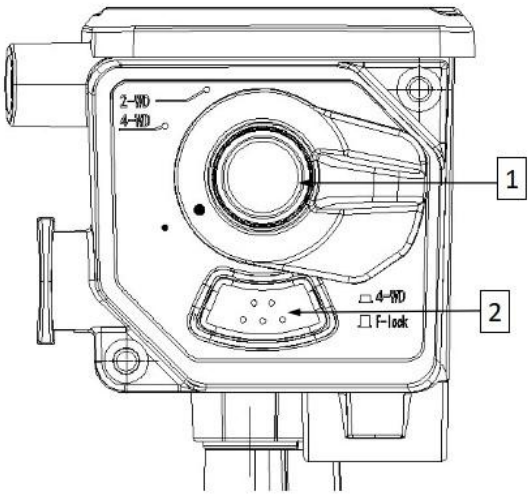
	W/L	BR	R/B	L	W	B/W	GR/R	LG	O	O/L	SB	G	P/R	B/BR	G
⚠												●	●		
🚗	●	—	—	—	—	—	—	●							
⇦									●	●					
⇨										●	●				
⚠									●	●	●				
≡D	●	●												●	●
D	●	●	—	—	●									●	●
D	●	●	—	●										●	●
OFF														●	●
↻			●	—	—	●								●	●
↻			●	—	—	●	●							●	●
✱														●	●

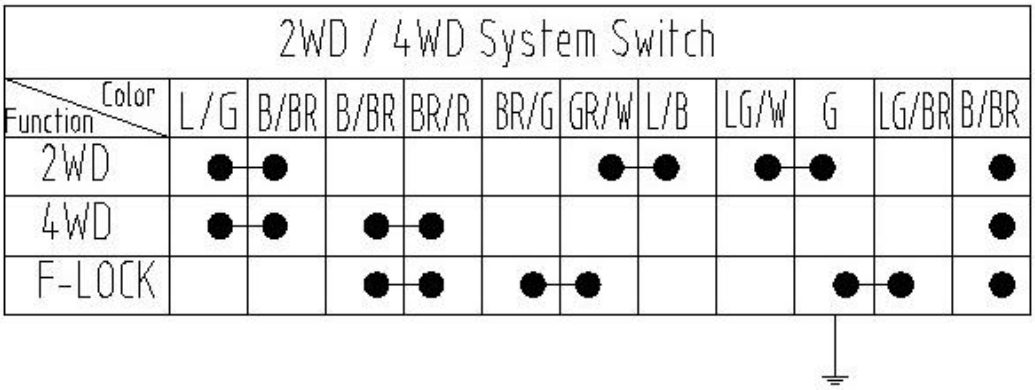
G

R

1 ： 2WD \ 4WD switch

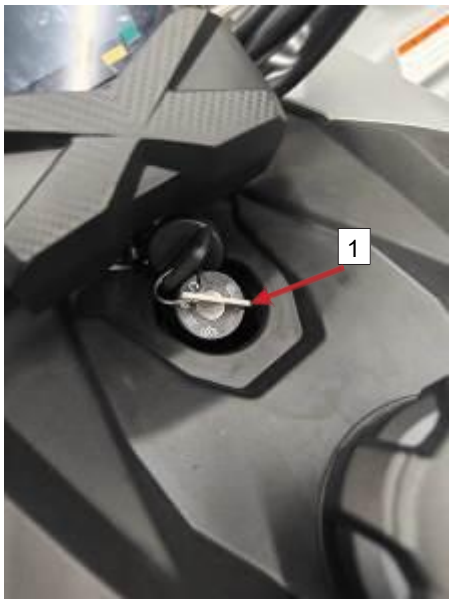
2 ： F-LOCK switch





Ignition Switch Lock Removal

Remove ignition switch lock 1 by rotating it counter-clockwise.



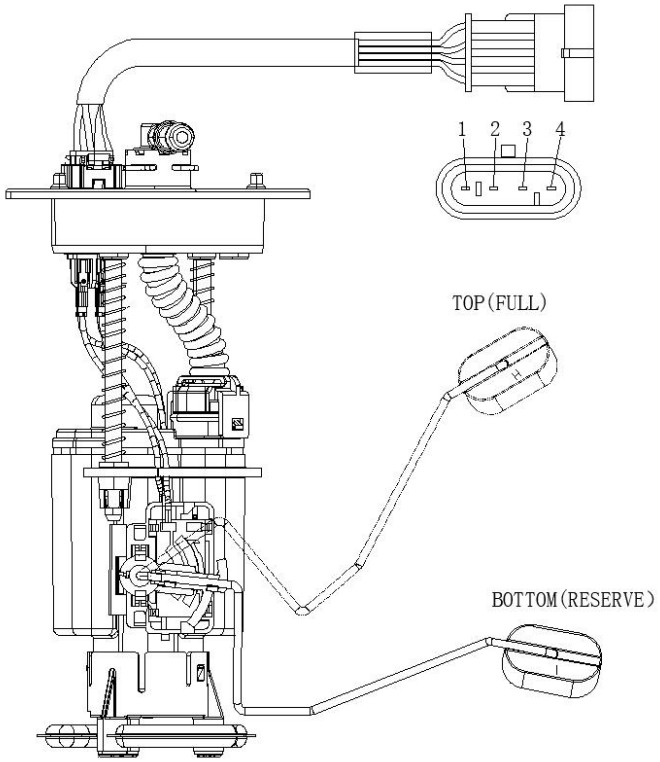
Inspection

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.

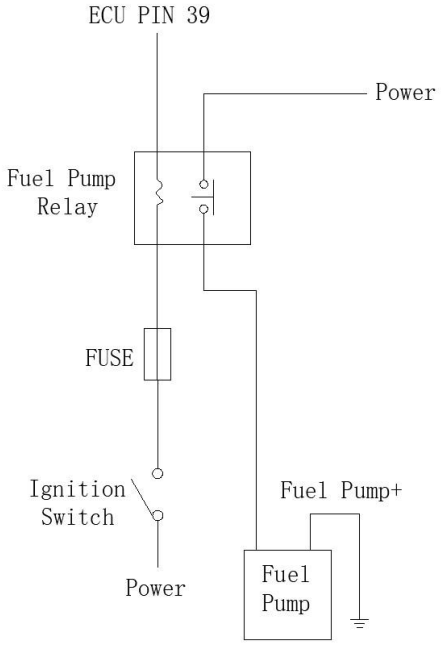


Pins and Function:

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:

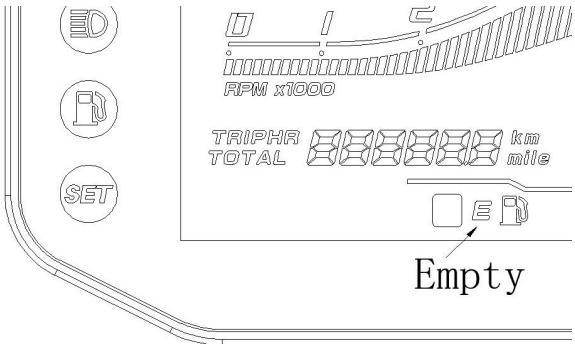
Remove fuel pump relay. Start the engine and allow it to idle until the engine stops automatically.

Parameters:

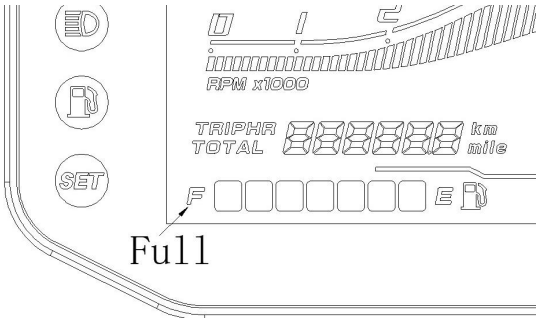
Test voltage (V)	Test pressure (MPa)	Flow (L/h)	Current (A)
12±0.1	$0.3^{0}_{-0.01}$	≥45	≤2.2

●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/”and “F-LOCK” 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
⇩ CONTINUITY
NO CONTINUITY → Replace the fuse

2. Battery
Check the battery condition.
Refer to "7.2 BATTERY "
⇩ CONTINUITY
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

4.2WD/4WD system switch

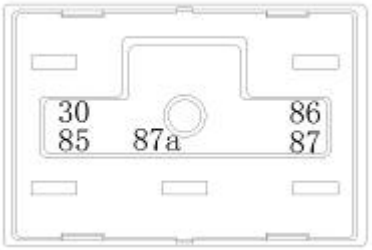
CHECK SWITCHE

Refer to "7.13 SWITCHES"

CONTINUITY

NO CONTINUITY

Replace the switch



5.Front 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"

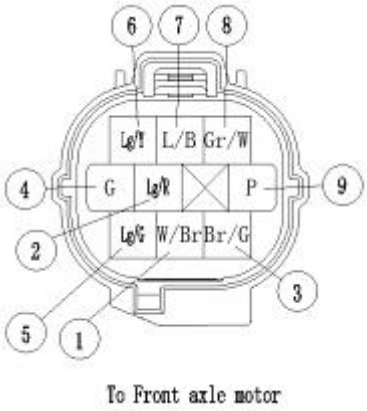
OUT OF SPECITICATION

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
- 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"

NO CONTINUITY

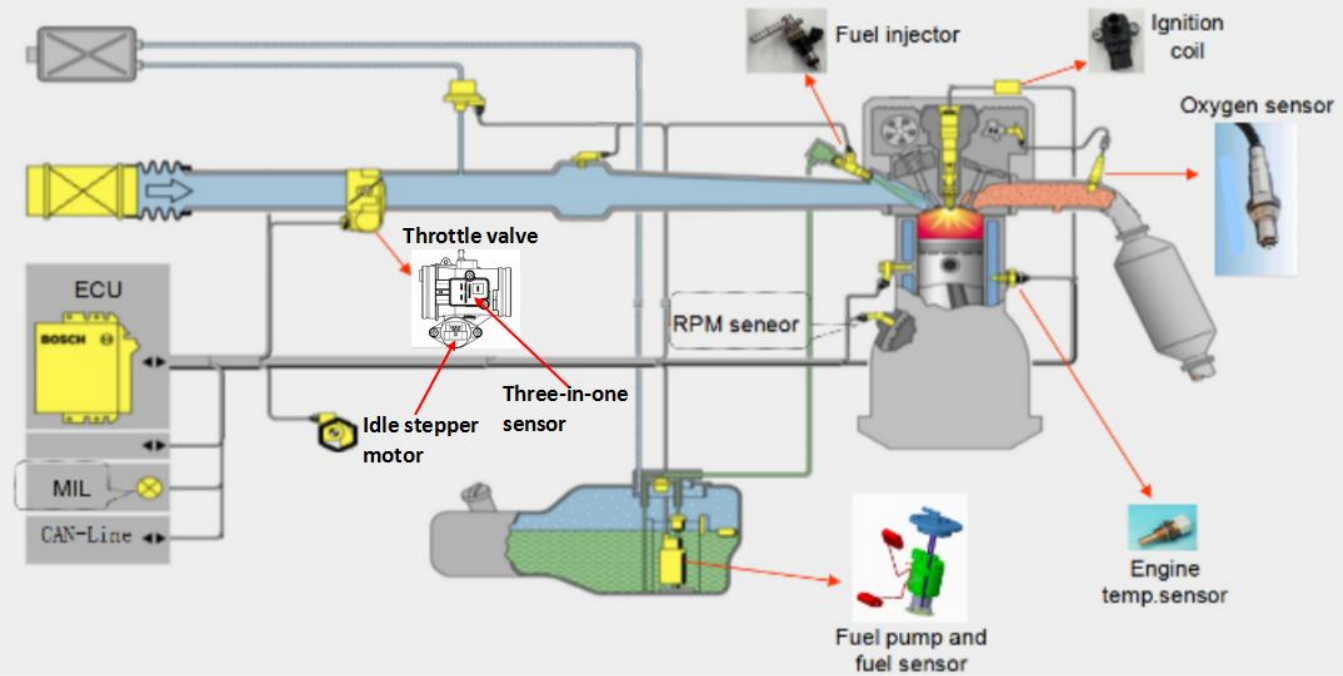
Replace the wiring

MEET SPECIFICATION

Replace the Front 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:
Three-in-one sensor(air pressure\air temperature\throttle position 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)
- **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 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.

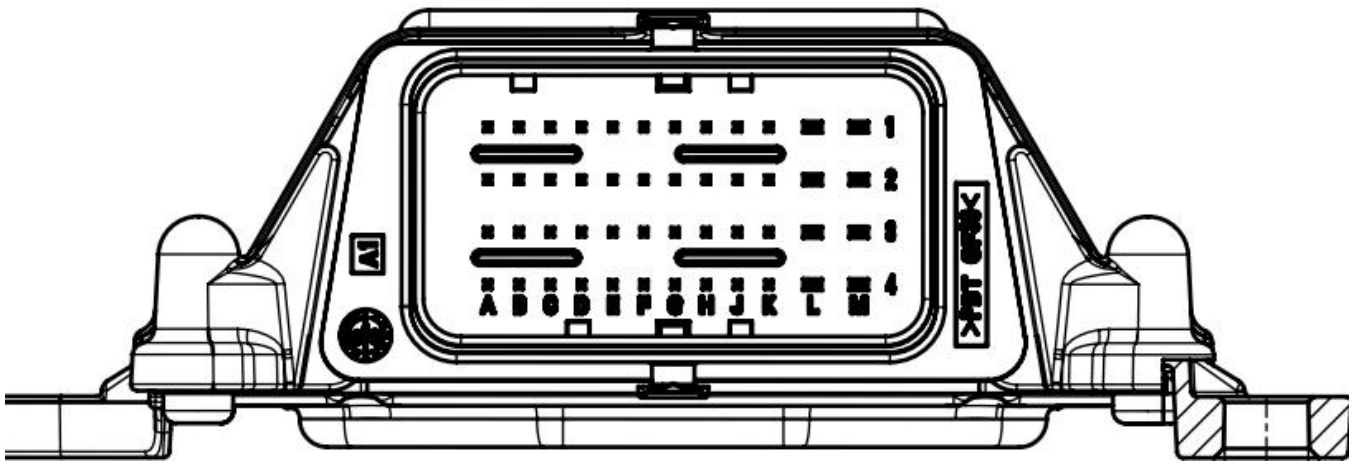
●Respect the environment and dispose of the waste left during maintenance.

7.17 STRUCTURE AND PERFORMANCE OF EFI PARTS

7.17.1 ECU

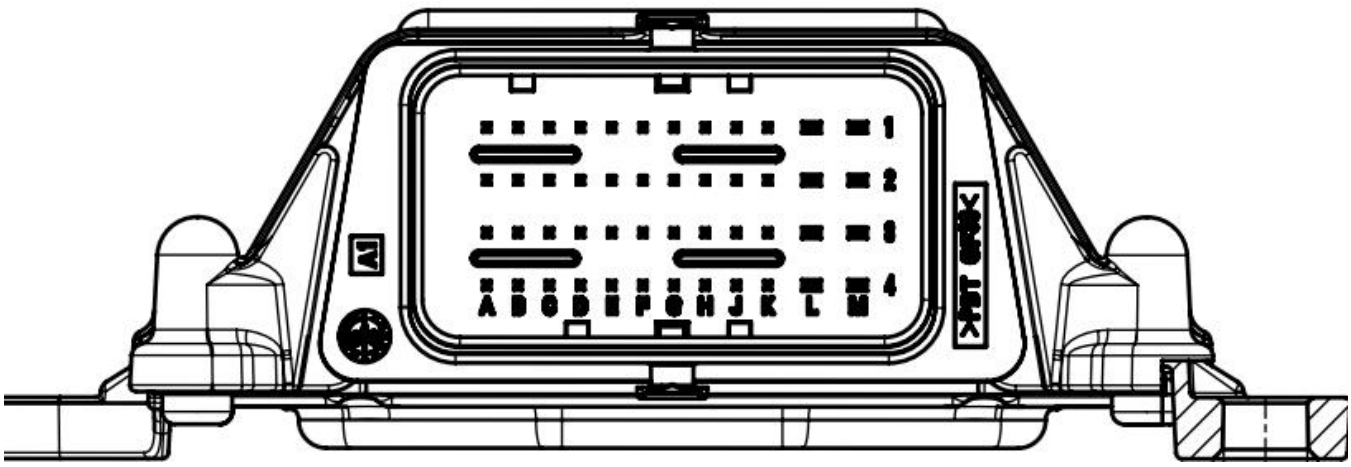
Electronic control unit , is the brain of EFI system. It analyzes and cope with the information provided by sensors, and send the conclusion in the form of instruction to actuator, then make the engine run in the optimal condition.

NOTE: It is not allowed to load on housing or cover. Gently handle it. Do not drop it on the ground.



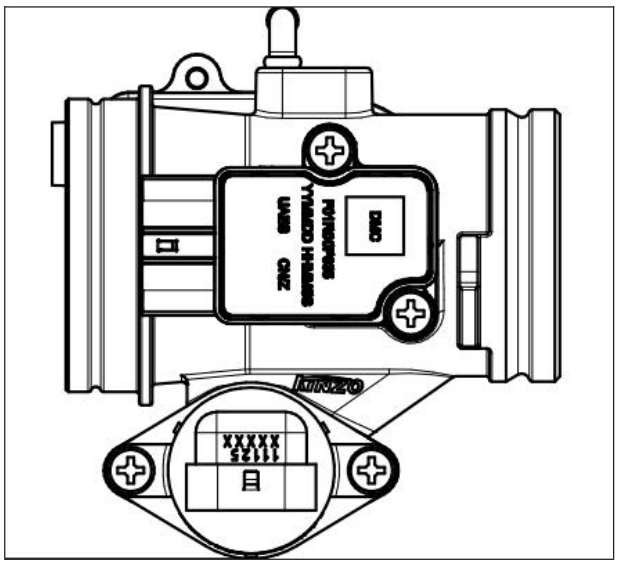
ECU pin function:

Pin	Function	Pin	Function
M1	Null	D2	Null
L1	Oxygen sensor heated 1	C2	Null
M2	Ignition 1	B2	Stepper motor phase A
L2	Null	A2	Stepper motor phase B
M3	Ignition to ground	K3	MIL
L3	Null	J3	5V output 1
M4	Null	H3	Null
L4	Interruptible battery UBR1	G3	Ignition switch KL15
K1	Intake air pressure sensor	F3	Uninterrupted battery (UBD)
J1	Senor to ground 1	E3	K_line
H1	Intake air temp. sensor	D3	Neutral gear switch
G1	TPS	C3	Overriding switch
F1	Engine temp. sensor	B3	Reverse gear switch
E1	Main relay	A3	Dump. sensor
D1	CAN Low	K4	L gear switch
C1	CAN High	J4	Engine RPM output
B1	Stepper motor phase D	H4	Speed sensor
A1	Stepper motor phase C	G4	RPM sensor B
K2	oxygen sensor signal 1	F4	RPM sensor A
J2	Null	E4	Null
H2	Null	D4	Radiator fan relay
G2	Null	C4	Fuel pump relay
F2	4WD diff-lock switch	B4	Null
E2	Null	A4	Fuel injector 1



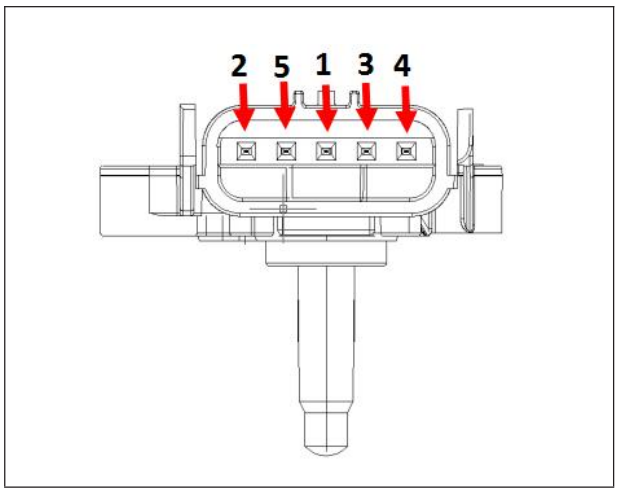
7.17.2 Throttle valve

Connect with air filter and the engine, control the on-off angle of throttle by throttle cable. Send out the angle signal through Three-in-one sensor to ECU.



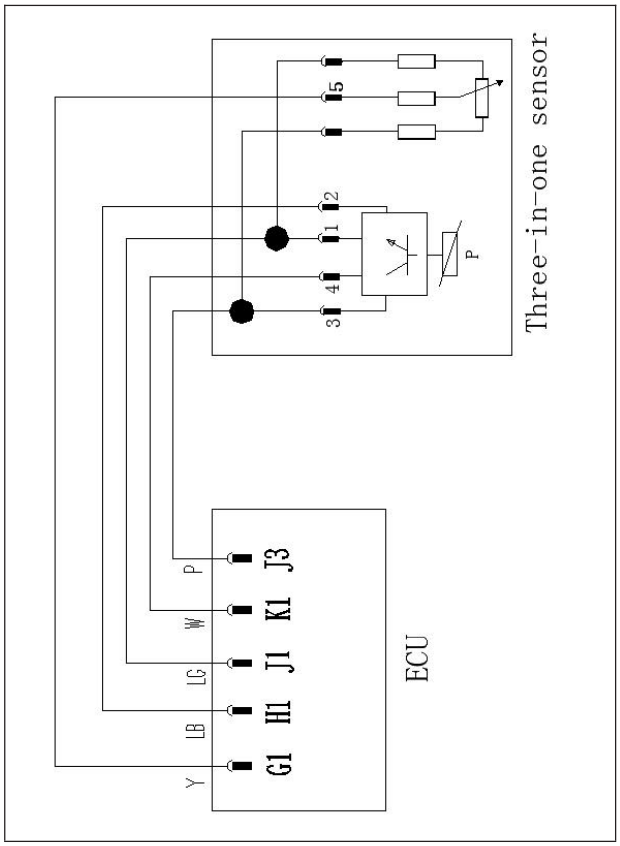
7.17.3 Three-in-one sensor

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.
Tps Sensor:This sensor monitor the throttle position.



Pin function:
1.to ground
2.Intake air temp. Signal
3.to 5V power
4.Intake air pressure signal
5.Tps signal

Circuit connecting with ECU.

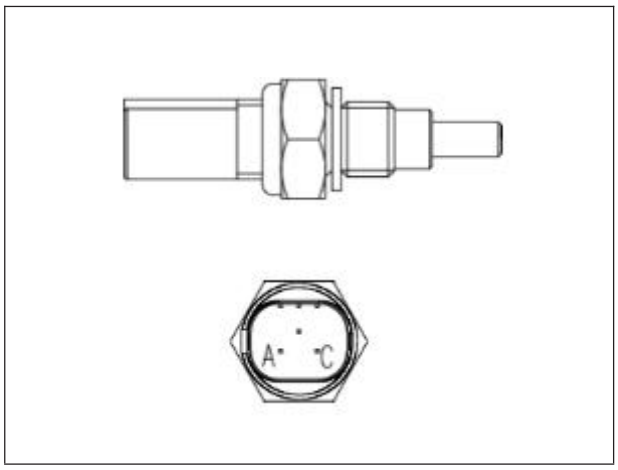


7.17.4 Coolant Temp. Sensor

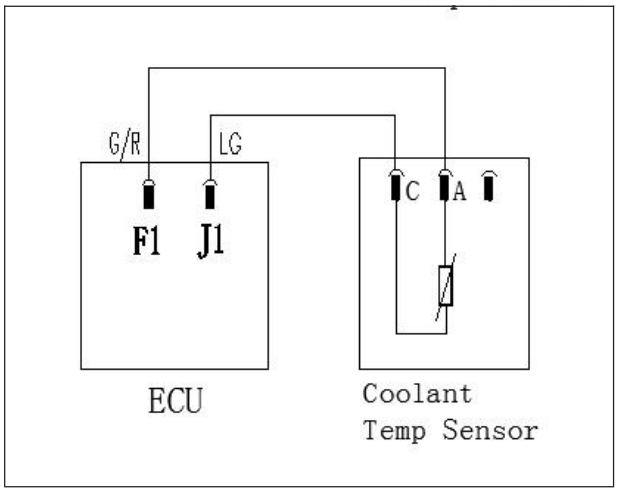
This sensor is a NTC thermo resistance. The resistance becomes lower when the air temperature becomes higher, but it is not a liner relationship.

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

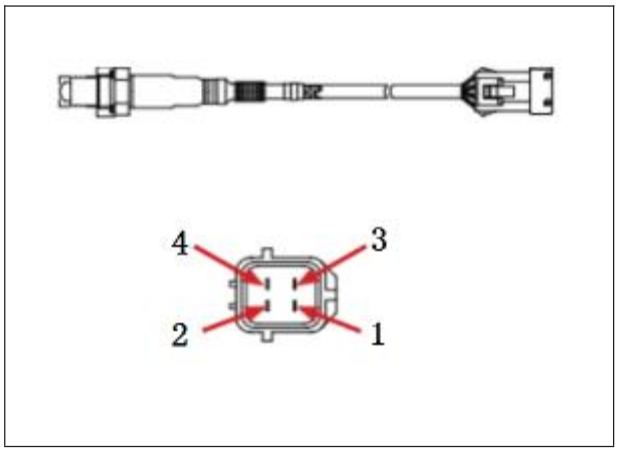
Measure resistance between pin A and C with multimeter:

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.

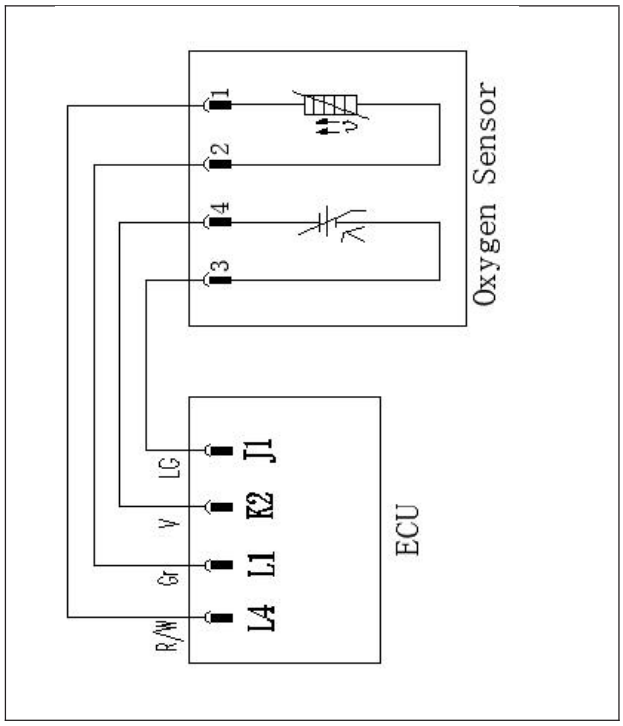
7.17.5 Oxygen Sensor

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.

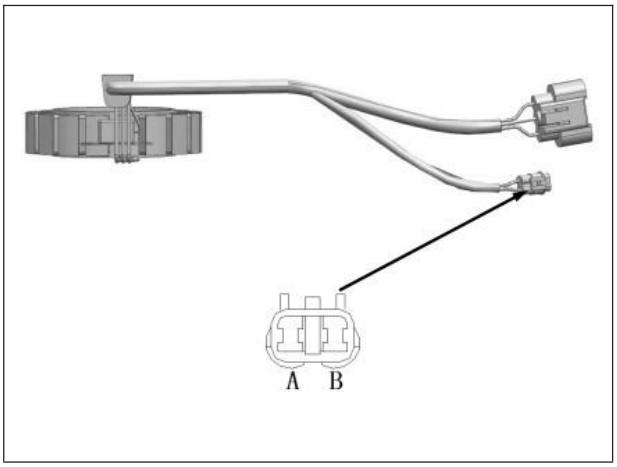


Oxygen sensor characteristic table

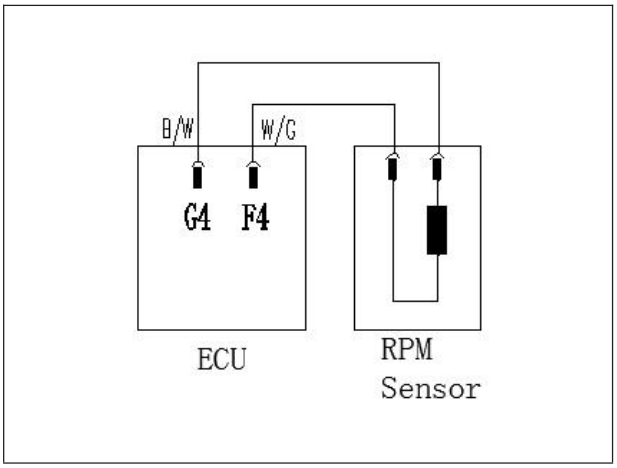
Item	Specification	
Exhaust air temp. (°C)	350	850
Voltage (mV) at λ=0.97(CO=1%)	800±55	700±70
Sensor voltage (mV) at λ=1.10	50±30	50±30
Sensor inner resistance (kΩ)	≤0.5	≤0.25
Response time (ms) (600mV to 300mV)	≤250	≤250
Response time (ms) (300mV to 600mV)	≤100	≤60

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.

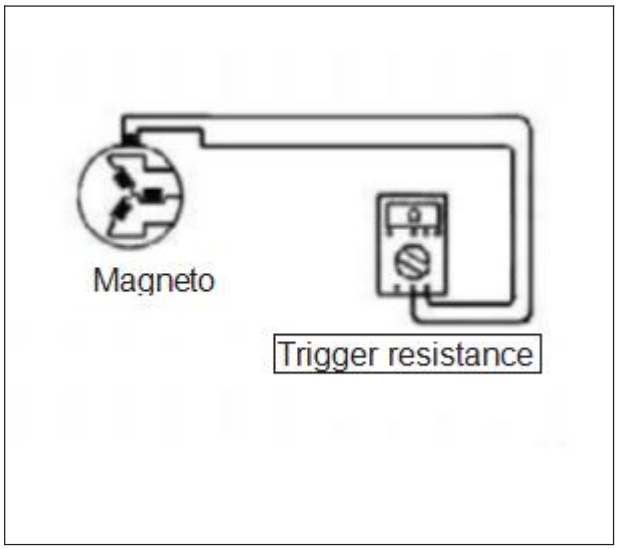


Circuit connecting with ECU.



RPM Sensor resistance Measurement

Set multimeter to 1×2kΩ .
RPM Sensor coil resistance:180±50Ω(25°C)
Replace a new one when resistance is beyond value range.

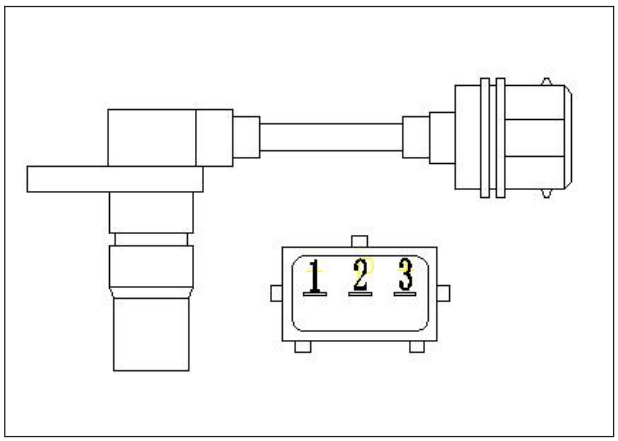


Trigger Peak Voltage Measurement

Connect multimeter and peak voltage adapter as shown as right picture
+Probe: White (B) wire
-Probe: Black (A) wire

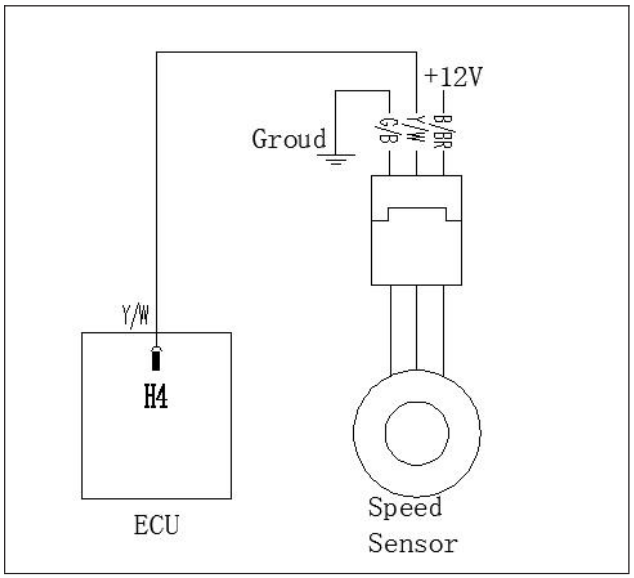
7.17.7 Speed Sensor

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.



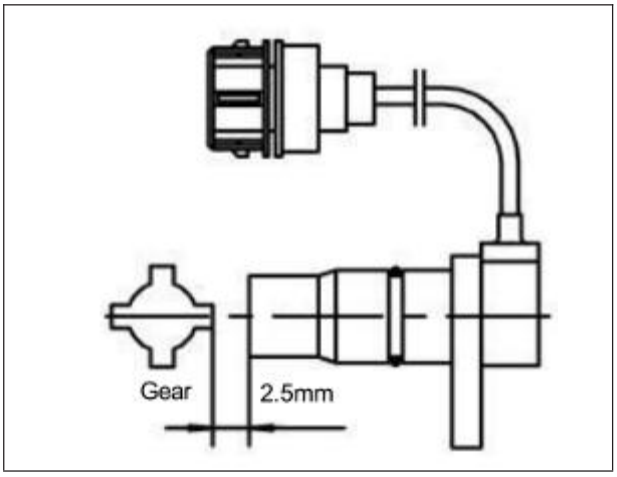
Pin function:
1.to groud
2.output voltage signal (>80% of input voltage)
3.to battery+DC12V

Circuit connecting with ECU.



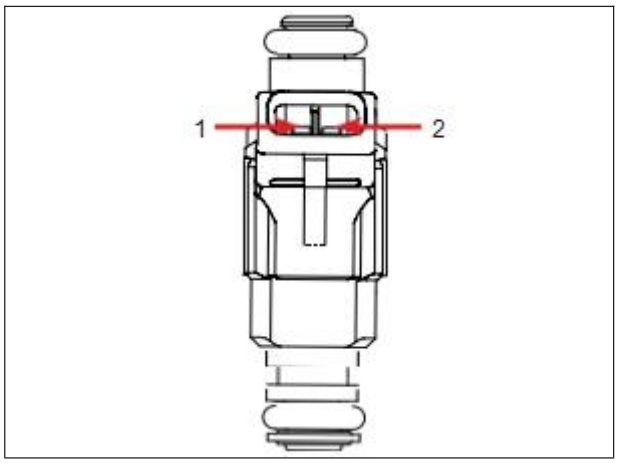
Speed Sensor Inspection

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

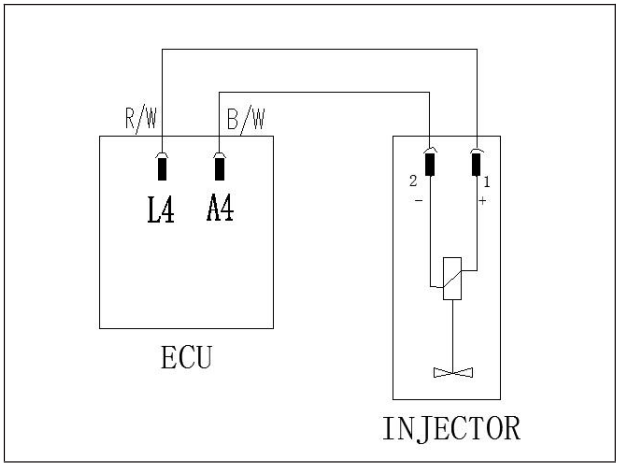
One end of fuel injector is installed on fuel injector seat, and the other attaches to the injector cap. Fuel injector is controlled by ECU to inject fuel at stated time into the engine . This injector nozzle is a 8-hole style. Don ' t turn injector after the join is installed.



Pin function:
1.to power +12V
2.to control signal

Fuel injector resistance: 12Ω(25°C)

Circuit connecting with ECU.

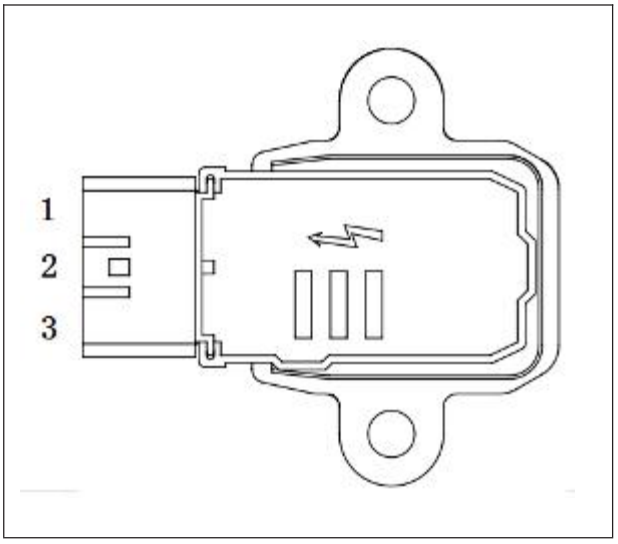


Fuel Injector Installation

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

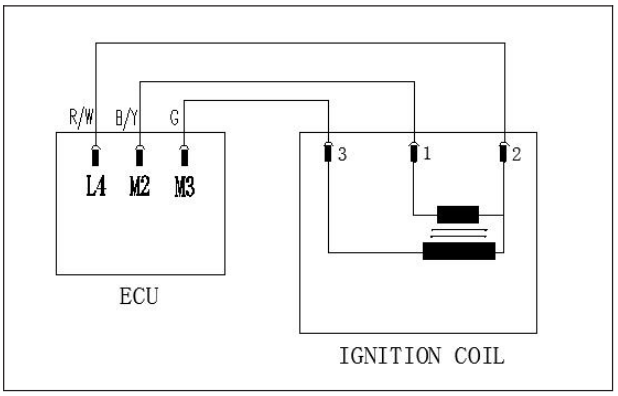
Ignition coil transforms the low voltage of primary coil to high voltage of secondary coil by sparking from spark plug and igniting the mixture of air and fuel in cylinder.



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

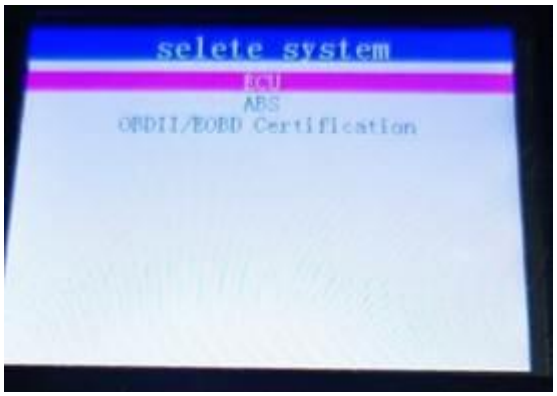
1	[⏮] Key	To return to the previous interface
2	[▲] Key	To move the cursor to upper item in the menu
3	[▼] Key	To move the cursor to down item in the menu
4	[◀] Key	To move the cursor to left item in the menu
5	[▶] Key	To move the cursor to right item in the menu
6	[↵] Key	To confirm and execute this operation

Scanner Functions

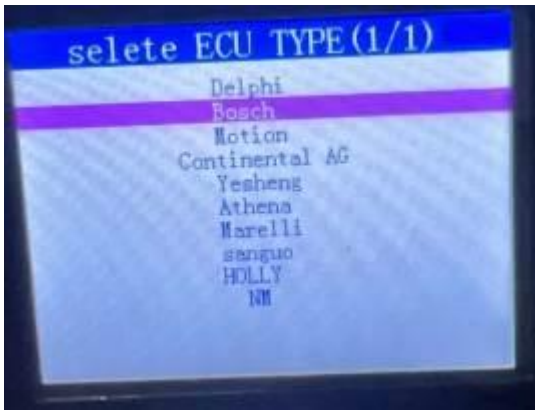
Scanner can be used to diagnose Engine Management System with functions: Read DTC, Clear DTC, Data Stream, , and Record Data.

Operations

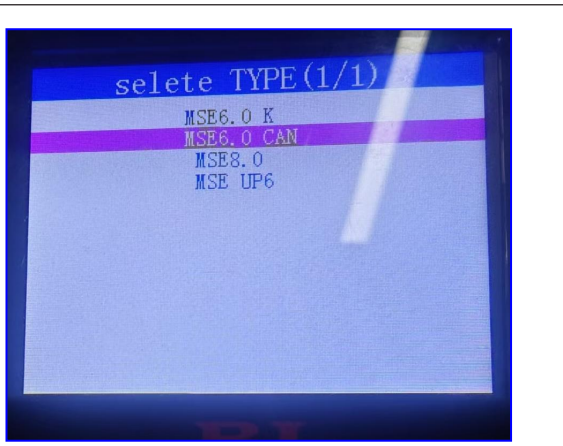
When the unit is powered up, the screen will display the interface as right.



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 6.0 CAN’ and press [↵] key, it will display information abou function list, as shown right

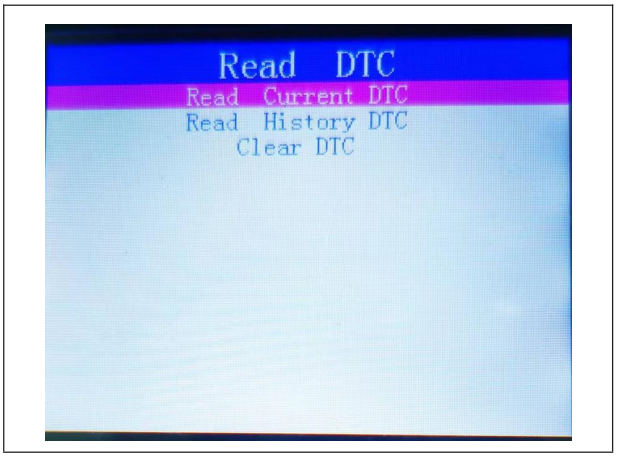
Available functions are as follows:

- Read DTC
- Clear DTC
- Data Stream
- Record Data

Press ▲ or ▼ or ◀ or ▶ key to select function you needed, as shown right

- Read DTC

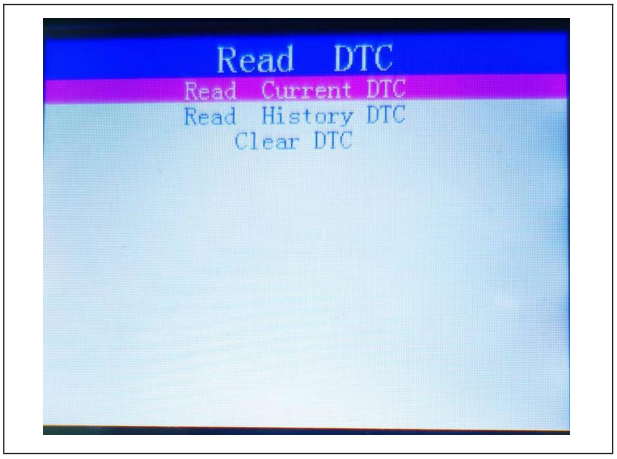
Select ‘Read DTC  ,and press [↵] , it will display function list as right.



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.

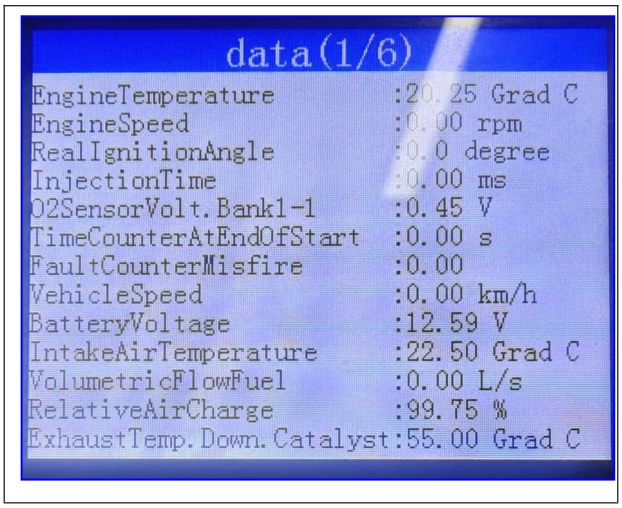


Press ▼ key to select ‘Clear DTC ’ , the screen will display "SUCCESS", as shown right. This means the fault code has been removed successfully.

● 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	P0030	O2 Sensor Heater Contr. Circ.(Bank(1)Sensor 1)open
2	P0031	O2 Sensor Heater Contr. Circ.(Bank(1)Sensor 1) Low
3	P0032	O2 Sensor Heater Contr. Circ.(Bank(1)Sensor 1) High
4	P0050	O2 Sensor Heater Contr. Circ.(Bank(2)Sensor 2)open
5	P0051	O2 Sensor Heater Contr. Circ.(Bank(2)Sensor 2) Low
6	P0052	O2 Sensor Heater Contr. Circ.(Bank(2)Sensor 2) High
7	P0038	HO2S Heater Control Circuit High Bank 1 Sensor 2
8	P0037	HO2S Heater Control Circuit Low Bank 1 Sensor 2
9	P0036	HO2S Heater Control Circuit Bank 1 Sensor 2
10	P0053	O2 Sensor Heater Resistance(Bank(1)Sensor 1)
11	P0059	O2 Sensor Heater Resistance(Bank(2)Sensor 2)
12	P0054	HO2S Heater Resistance Bank 1 Sensor 2
13	P0130	O2 Sensor Circ.,Bank1-Sensor1 Malfunction
14	P0131	O2 Sensor Circ.,Bank1-Sensor1 Low Voltage
15	P0132	O2 Sensor Circ.,Bank1-Sensor1 High Voltage
16	P0133	O2 Sensor Circ.,Bank1-Sensor1 Slow Response
17	P0134	O2 Sensor Circ.,Bank1-Sensor1 No Activity Detected
18	P0150	O2 Sensor Circ.,Bank1-Sensor2 Malfunction
19	P0151	O2 Sensor Circ.,Bank1-Sensor2 Low Voltage
20	P0152	O2 Sensor Circ.,Bank1-Sensor2 High Voltage
21	P0153	O2 Sensor Circ.,Bank1-Sensor2Slow Response
22	P0154	O2 Sensor Circ.,Bank1-Sensor2 No Activity Detected
23	P0138	O2 Sensor Circuit High Voltage Bank 1 Sensor 2
24	P0137	O2 Sensor Circuit Low Voltage Bank 1 Sensor 2
25	P0136	O2 Sensor Circuit Bank 1 Sensor 2
26	P2232	O2 Sensor Signal Circuit Shorted to Heater Circuit Bank 1 Sensor 2
27	P013A	O2 Sensor Slow Response - Rich to Lean Bank 1 Sensor 2
28	P2271	O2 Sensor Signal Biased&Stuck Rich Bank 1 Sensor 2
29	P2270	O2 Sensor Signal Biased&Stuck Lean Bank 1 Sensor 2
30	P0420	Catalyst System Efficiency Below Threshold Bank 1
31	P0122	Throttle/Pedal Pos.Sensor Circ. Low Input
32	P0123	Throttle/Pedal Pos.Sensor Circ. High Input
33	P0105	Manifold Abs.Pressure or Bar.Pressure Circuit
34	P0106	Manifold Abs.Pressure or Bar.Pressure Range/Performance
35	P0107	Manifold Abs.Pressure or Bar.Pressure Low Input
36	P0108	Manifold Abs.Pressure or Bar.Pressure High Input
37	P0111	Intake Air Temp.Circ. struck/Performance

No.	Code	Statement
38	P0112	Intake Air Temp.Circ. Low Input/range
39	P0113	Intake Air Temp.Circ. High Input
40	P0116	Engine Coolant Temp.Circ. Range/Performance
41	P0117	Engine Coolant Temp.Circ. Low Input
42	P0118	Engine Coolant Temp.Circ. High Input
43	P0119	Engine Coolant Temperature Sensor 1 Circuit Intermittent
44	P1116	Engine Coolant Temp.over Range
45	P0201	Cylinder 1- Injector Circuit open
46	P0261	Cylinder 1- Injector Circuit Low
47	P0262	Cylinder 1- Injector Circuit High
48	P0202	Cylinder 2- Injector Circuit open
49	P0264	Cylinder 2- Injector Circuit Low
50	P0265	Cylinder 2- Injector Circuit High
51	P2300	Ignition Coil “A” Primary Control Circuit low
52	P2303	Ignition Coil “B” Primary Control Circuit low
53	P0300	Random/Multiple Cylinder Misfire Detected
54	P0301	Cyl.1 Misfire Detected
55	P0302	Cyl.2 Misfire Detected
56	P0322	Eng.Speed Inp.Circ. No Signal
57	P0413	second air system valve Circuit open
58	P0414	second air system valve Circuit low
59	P0412	second air system valve Circuit high
60	P0411	Secondary Air Injection System Incorrect Flow Detected
61	P0441	Evaporative Emission System Incorrect Purge Flow
62	P0444	canister purge valve Circuit open
63	P0458	canister purge valve Circuit low
64	P0459	canister purge valve Circuit high
65	P0480	electric fan output stage A open
66	P0691	electric fan output stage A low
67	P0692	electric fan output stage A high
68	P0501	Vehicle Speed Sensor Range/Performance
69	P0506	Idle Control System RPM Lower than Expected
70	P0507	Intake Air Temp.Circ. Low Input/range
71	P0511	Intake Air Temp.Circ. High Input

No.	Code	Statement
72	P0615	Idle Control System RPM Higher than Expected
73	P0616	Stepper motor power stage
74	P0617	Starter Relay Circuit open
75	P0627	Starter Relay Circuit low
76	P0628	Starter Relay Circuit high
77	P0629	Fuel Pump “A” Control Circuit /Open
78	P0650	Fuel Pump “A” Control Circuit Low
79	P0560	Fuel Pump “A” Control Circuit High
80	P0562	Malfunction Indicator Lamp Control Circ.
81	P0563	System Voltage Malfunction
82	P1098	System Voltage Low Voltage
83	P1099	System Voltage High Voltage
84	P2177	DUMP control Circuit low
85	P2178	DUMP control Circuit high
86	P2179	System Too Lean bank1
87	P2180	System Too Rich bank1
88	P0602	System Too Lean bank2
89	P0604	System Too Rich bank2
90	P0605	Control Modul Programming Error
91	U0198	Internal Contr.Module Random Access Memory (RAM) Error
92	U0155	Internal Contr.Module ROM Test Error
93	U0073	Lost Communication With Telematic Control Module
94	U0121	Lost Communication With Instrument Panel Cluster (IPC) Control Module
95	P0508	Control Module Communication Bus Off
96	P0509	Lost Communication With Anti-Lock Brake System (ABS) Control Module
97	P0511	Idle Air Control Circuit Low
98	P0511	Idle Air Control Circuit Low High

7.21 WIRING DIAGR