



TRAILCROSS 400 DUMP BED SERVICE MANUAL



This manual is general version, the pictures in manual book are little difference compared with real part, so please check real part accordingly.

SHANDONG ODES INDUSTRY CO., LTD

Foreword

This manual contains such content as introductions on overhaul, maintenance, overhauling program, dismantling, assembling, troubleshooting and service data of Trailcross 400 Dump Bed.

This manual will help you know the vehicle beter so that you can assure your customers of fast and reliable service.

This manual hass been prepareded on the basis of the latest specifications at the time of publication.If modifications have been made sine then,differences may exist between the content of this manual and the actual vehicle.

Illustrations in this manual are used to show the basic principles of operation and work procedures.They may not represent the actual vehicle exactly in detail.

Manufacturer reserves the right of no prior notice on product improvement or modification. Repair and maintenance shall be carried out according to actual situation of vehicle.

▲ WARNING

Inexperienced mechanics or mechanics without the proper tools and equipment may not be able to properly perform the services described in this manual.

Improper repair may result in injury to the mechanic and may render the vehicle unsafe for the rider.

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1.GENERAL INFORMATION

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1.1 VEHICLE APPEARANCE**Trailcross 400 Dump Bed left-hand view**

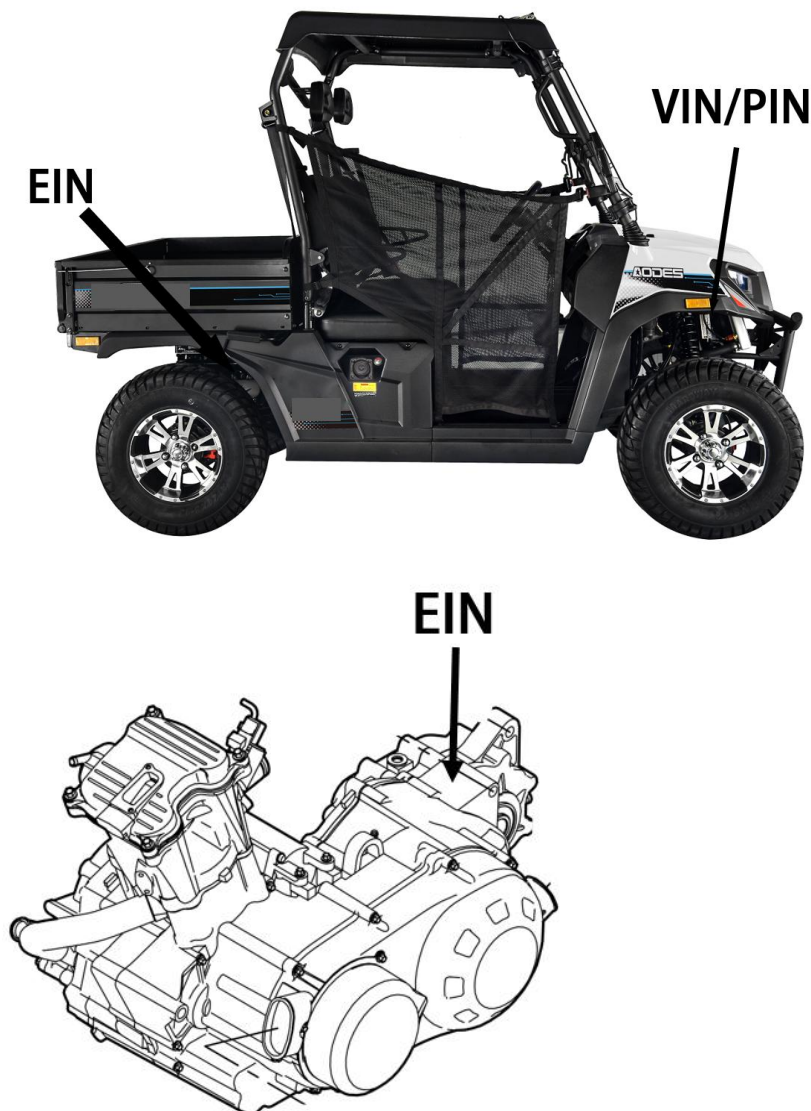
1. Front bumper	2. Front shock absorber	3. Brake fluid reservoir	4. Steering wheel
5. Driver seat	6. Driver seat belt	7. Cargo box release lever	8. Battery
9. Cargo box	10. Front windshield	11. Coolant reservoir	12. Headlights

Trailcross 400 Dump Bed right-hand view

13. Tail light	14. Muffler	15. Rear shock absorber	16. Rearview mirror
17. Inner mirror	18. Windshield	19. Fuel tank cap	20. Side net

1.2 MARKER INFORMATIVENESS

Numbers of frame (or VIN code), engine and transmission case are major information numbers of a motorcycle. When ordering components or authorizing special services, these numbers are able to assist distributors to serve you better.



TYPICAL

1. EIN (Engine Identification Number on left side/posterior portion on the crankcase)
2. VIN /PIN (Vehicle Identification Number on the right side/front on the frame)

1.3 PRECAUTIONS

1. Do not make engine under operation at a closed place or place with poor ventilation for a long time.
2. If engine stops operation, please do not touch it or silencer to avoid burning.
3. Due to high corrosiveness, battery fluid (dilute sulphuric acid)) may cause burns to skin and eyes. In case of splashing it to skin, please clean it with water and see the doctor immediately. In case of splashing it to clothes, please wash it with water immediately. Keep battery fluid far away from Children.
4. Cooling liquid is toxic. Do not drink it or splash it to skin, eyes and clothes. once splashing it to skin, please wash it with a lot of soapy water. In case of splashing it to eyes, please wash eyes immediately and see the doctor. In case of drinking cooling liquid, resulting in vomit, please see the doctor. Keep cooling liquid far away from children.
5. Wear proper working suit, boots and hat. If necessary, please wear long-sleeve working suit and gloves for operation.
6. Gasoline is highly inflammable. No smoking or firing. At the same time, fire sparks shall be avoided. Vaporized gasoline is explosive as well. Operation shall be carried out at places with good ventilation.
7. Battery may produce explosive hydrogen in charging. Please ensure charging at places with good ventilation.
8. Use legal parts, lubricating oil and lubricating grease.
9. Before overhauling, please clean soil and dust.
10. Keep accessories of each part well for correct assembly.

11. Replace dismantled gasket, O-shaped ring, piston pin retainer and cotter pin.
12. Retainer of rubber ring may be deformed after dismantling. So, please do not use loose and soft retainer.
13. Please wash and dry dismantled parts. Use lubricant on the surface of moving parts. For correct installation, please measure data well in dismantling process.
14. If do not know length of screw, please install screws one by one to ensure their corresponding depth.
15. Pre-tighten bolts and nuts and then tighten them with designated torque from the big to the small and from the inside to the outside.
16. Check whether rubber parts are aged. If necessary, replace them. Keep rubber parts far away from grease.
17. If necessary, special tools can be used.
18. Rotate inside and outside races of bearing to ensure flexibility of balls.
 - A) If axial or radial resistance is too large, please replace it. If there is concave-convex on the surface, please use oil for washing. If no effect is achieved with washing, please replace it.
 - B) If bearing cannot be clamped tightly in pressing into machine or axle, please replace bearing.
19. Please install a side dust proof bearing at correct direction. In installation of open or double-face dust proof bearing, pay attention to that marks of manufacturer shall be outward.
20. In cleaning and drying bearing, please keep bearing support still. Before installation, please carry out lubrication with oil or lubricating oil.
21. Please correct install elastic retaining ring. Assembling after opening can ensure installation of snap ring into slot.
22. After assembly, please check whether all parts are of perfect tightening and flexible movement.
23. Brake fluid and coolant may damage shell and plastic and rubber parts. In case of being splashed by them, please use water for washing.
24. In installing pipeline, please insert them to bottom of connecting pipeline. In installing pipe clamp, please install them to groove if there is. As for pipeline or pipe clamp that cannot be tightened, please replace them.
25. Do not mix soil or dust into engine and/or hydraulic braking system.
26. Before installation, please clean gasket and spacer of engine shell. Use oil stone to polish scratch of joint face evenly.
27. Do not twist or bend too much cable. Twisted or damaged cables may cause inflexible operation.
28. In assembling protective caps of parts, insert cap into groove if any.

1.4 Engine brake-in steps

Though quality material has been used for motorcycle manufacturing and all components are conforming to high quality standard, all components and parts shall subject to brake-in process before engine reaching maximum load. The reason behind this is that cooperation of components has not reached the best status after their assembling. This leads to damping force of engine and unnecessary mechanical loss. The ideal cooperation can be reached after operation for some time. In this case, mechanical loss can be minimized, reaching the best status and bringing the output power to maximum value. As a result, engine performance directly relates to initial maintenance. Regulation of running-in process is shown as follows:

-Please follow the restriction requirements for engine speed in the brake-in period below:

The first 150km	Below 5000 rpm
Till 800km	Below 5500 rpm
Till 1600km	Below 6500 rpm
Above 1600km	Below 8500 rpm

-Do not fully open the accelerator before the reading of the odometer reaching 1000km.

Attention: the speed shall not exceed 6500 rpm no matter what in brake-in period.

-During the brake-in period, the engine shall not work at the same speed with the same gear position for a long time. Try to shift gear position and speed to facility running-in of components.

-After 1000km of operation, transmission and crank cases shall be cleaned thoroughly.

1.5 TIGHTENING TORQUE

Locking devices (e.g.: locking tabs, elastic stop nuts ,self-locking fasteners ,etc.) must be installed or replaced with new ones, where specified. If the efficiency of a locking device is impaired, it must be renewed. In order to avoid a poor assembling, tighten screws, bolts or nuts in accordance with the following recommended torque value:

Grade	Torque (N·m)					
	M6	M8	M10	M12	M14	M16
4.6	4~5	10~12	20~25	36~45	55~70	90~110
5.6	5~7	12~15	25~32	45~55	70~90	110~140
6.8	7~9	17~23	33~45	58~78	93~124	145~193
8.8	9~12	22~30	45~59	78~104	124~165	193~257
10.9	13~16	30~36	65~78	110~130	180~201	280~330
12.9	16~21	38~51	75~100	131~175	209~278	326~434

Grade	Torque (lb.f.ft)					
	M6	M8	M10	M12	M14	M16
4.6	3~3.7	7.4~8.6	14.8~18.5	26.6~33.2	40.6~51.7	66.4~81.2
5.6	3.7~5.2	8.9~11.1	18.5~23.6	33.2~40.6	51.7~66.4	81.2~103.3
6.8	5.2~6.6	12.5~17	24.4~33.2	42.8~57.6	68.6~91.5	107~142.4
8.8	6.6~8.6	16.2~22.1	33.2~43.5	57.6~76.8	91.5~121.8	142.4~189.7
10.9	9.6~11.8	22.1~26.6	48~57.6	81.2~95.9	132.8~148.3	206.6~243.5
12.9	11.8~15.5	28~37.6	55.4~73.8	96.7~129.2	154.2~205.2	240.6~320.3

CAUTION: Be sure to use the proper tightening torque for the proper strength grade. Always torque screws, bolts and / or nuts in a criss-cross sequence.

	Bolt length comparison table							
Length(mm)	12	14	16	20	25	30	35	40
Length(in)	0.47	0.55	0.63	0.79	0.98	1.18	1.38	1.57
Length(mm)	45	50	55	60	65	70	75	80
Length(in)	1.77	1.97	2.17	2.36	2.56	2.76	2.95	3.15
Length(mm)	85	90	95	100	105	110	115	120
Length(in)	3.35	3.54	3.74	3.94	4.13	4.33	4.53	4.72
Length(mm)	125	130	135	140	145	150	155	160
Length(in)	4.92	5.12	5.31	5.51	5.71	5.91	6.1	6.3
Length(mm)	165	170	175	180	185	190	195	200
Length(in)	6.5	6.69	6.89	7.09	7.28	7.48	7.68	7.8

2. PERIODIC MAINTENANCE

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2.1 MAINTENANCE SCHEDULE

In order to maintain the best performance and economical performance of vehicles, suggestions on intervals for necessary regular maintenance are listed. Following maintenance is calculated in km, mile and hour based on firstly appeared data.

However, keep in mind that if the vehicle isn't used for a long period of time, the month maintenance intervals should be followed.

Items marked with an asterisk should be performed by a dealer as they require special tools and technical skills. Every 20-40 hours (More often in dusty areas)

In case of complicated road conditions, regular maintenance shall be carried for vehicles.

Case of complicated road conditions, regular maintenance shall be carried for vehicles.							
ITEM	ROUTINE	Whichever Comes first ⇒		INTAL		EVERY	
			month	3	6	6	12
			Km (mi)	800 (500)	1600 (1000)	3200 (2000)	6400 (4000)
			hours	25	50	100	200
Valves*	● Check valve clearance. ● Adjust if necessary.			O	O	O	
Cooling system	● Check coolant leakage. ● Repair if necessary. ● Replace coolant every 24 months.		O	O	O	O	
Spark plug	● Check condition. ● Adjust gap and clean. ● Replacement every 24 months		O	O	O	O	
Air filter elements	● Clean. ● Replacement every 24 months		Every 20-40 hours (More often in dusty areas)				
Crankcase breather system*	● Check breather hose for cracks or damage. ● Replace if necessary.			O	O	O	
Exhaust system*	● Check for leakage. ● Tighten if necessary. ● Replace gasket(s) if necessary.			O	O	O	
Fuel hose*	● Check fuel hose for cracks or damage.. ● Replacement fuel hose every 48 months ● Replacement fuel filter every 24 months			O	O	O	
Engine oil	● Replace (Check oil level every month) .			O	O	O	
Engine oil filter	● Replace.			O		O	
Gearbox oil	● Check oil level/oil leakage. ● Replacement every 24 months.					O	
Brake*	●Check operation/brake pad wear/fluid leakage. ●Brake fluid needs to be above the lowest position. ●Correct if necessary. Replace pads/disk if worn to the limit.		O	O	O	O	
Accelerator pedal*	●Check operation and free play.		O	O	O	O	
Wheels*	●Check balance/damage/ run out ●Repair if necessary.			O	O	O	
Wheel bearings*	●Check bearing assemblies for looseness or damage.. ●Replace if damaged.			O	O	O	
Front and rear Suspension*	●Check no deformation and looseness. ●Correct if necessary.			O		O	
Steering system*	●Check operation and no looseness.		O	O	O	O	

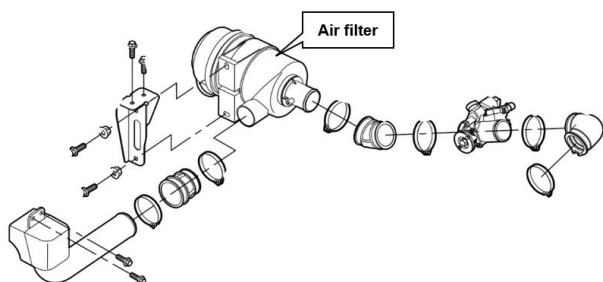
	•Repair if damage. •Check toe-in/Adjust if necessary.				
Rear knuckle pivots and suspension arms*	•Lubricate with lithium-soap-based grease.		O	O	O
Drive shaft universal joint*	•Lubricate with lithium-soap-based grease.		O	O	O
Engine mount*	•Check for cracks or damage. •Correct bolt tightness.		O	O	O
Front and rear axle boots*	•Check operation. •Replace if damage.				O
Stabilizer bushings*	•Check for cracks or damage.		O	O	O
Fittings and fasteners*	•Check all chassis fittings and fasteners. •Correct if necessary.	O	O	O	O
Battery	•End connection		O	O	O
Lamp and steering indication	•Operation	O	O	O	O

2.2 AIR CLEANER

In case of driving in dusty environment, air filter shall be cleaned regularly. It is of great possibility to accelerate wear to engine if there is not filtering element or worn filtering element is used. So, please keep air filter under good conditions all the time. If vehicle is used in dusty area, inspect more frequently than specified in MAINTENANCE SCHEDULE.

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. never remove or modify any component in the air filter housing. The engine management system is calibrated to operate specifically with these components. Otherwise, engine performance degradation or damage can occur. Check and clean the air filter element in the following manner:

Tilt cargo box, remove clamps.
Remove air filter.



1. Air filter

Cleaning

1. Inspect filter and replace if damaged.
2. Clean filter, using soft soap and water, then water rinse.
3. Gently shake off excess water and allow filter to dry at room temperature.
4. Clean the inside of air inlet with a vacuum cleaner.

Air Filter Installation

Reinstall air filter and lower cargo box.

NOTE: Maintaining a clean air filter will maximize air flow for an optimum engine components lifespan.

2.3 VALVE CLEARANCE

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

Check the intake and exhaust valve clearances at the distances indicated above and adjust the valve clearances to specification, if necessary.

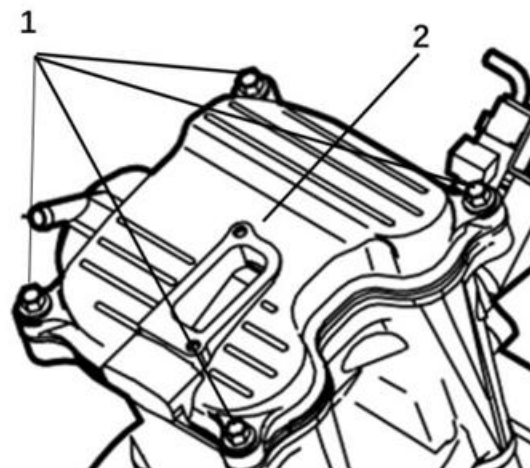
Valve clearance is to be checked when the engine is cold. The intake and exhaust valve must be checked and adjusted when the piston is at TOP DEAD CENTER(TDC) on the compression stroke.

Tilt cargo box.

Remove relevant accessories around an engine, with relevant contents referring to Chapter 5 Vehicle Dismantling.

Remove spark plug cable and spark plug.

Remove the bolts and valve cover.



TYPICAL

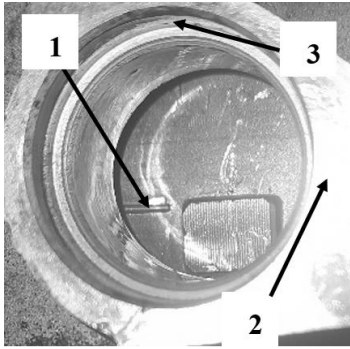
1. 4xM6 bolt

2. Valve cover

Remove the M6 bolts, the right crankcase cover and crankshaft position sensor.

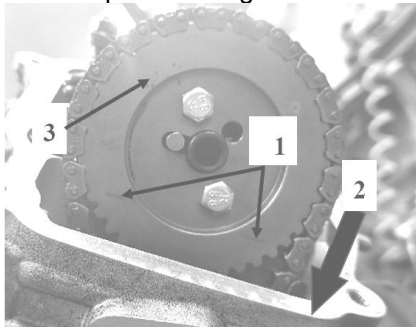
Valve clearance of cylinder

Turn the magneto bolt until mark "T" on magneto flywheel and dot mark on the crankcase cover are aligned.



1. Mark "T" on magneto flywheel
2. Dot mark on crankcase cover
3. Location of crankshaft position sensor

At TDC ignition, the printed marks on the camshaft timing gear have to be parallel to cylinder head base as per following illustration.



1. Printed marks on camshaft timing gear
2. Cylinder head base
3. Camshaft timing gear

Insert the feeler gauge between the valve stem end and adjusting screw on the rocker arm to check the clearance.

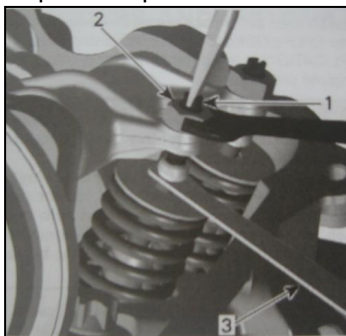
If the valve clearance is out of specification, adjust valves as follows.

Valve clearance	
Intake	0.08 to 0.12mm
Exhaust	0.08 to 0.12mm

Use mean valve of exhaust/intake to ensure a proper valve adjustment.

Hold the adjustment screw at the proper position and torque the locking nut.

Repeat the procedure for each valve.



1. Adjustment screw
2. Adjustment nut
3. Feeler gauge

Valve clearance adjuster lock nut: 7-8N.m.

Check the valve clearance again after the lock nut is tightened.

CAUTION: Securely tighten the locknut after completing adjustment.

Install the valve cover, spark plug cable and spark plug, the plug screw and gasket of right crankcase

cover and the crankshaft position sensor.

2.4 SPARK PLUG

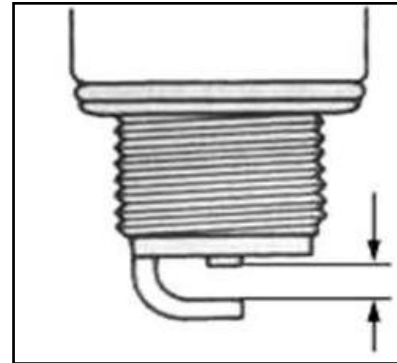
In case of serious wear or burn to electrode or burn to insulator by spark plug or damage to thread etc., please replace it with new spark plug

In case of carbon deposit, please use proper tools for cleaning.

Spark plug gap

Use feeler gauge to measure clearance of spark plug.

In case of exceeding designated range, then adjust the gap.



Spark plug gap: 0.7-0.8mm

Spark plug heat range

Check the spark plug heat range by observing the electrode color. If the electrode of the spark plug is appearing wet or dark color, replace the spark plug with a hotter type one. If it is white or appearing glazed, replace the spark plug with a colder type one.

Standard type: CR8EA

CAUTION: In order to avoid damaging cylinder cap thread, firstly use hands to tighten spark plug and then use spark plug wrench to tighten cylinder cap with designated torque.

2.5 THROTTLE CABLE PLAY

Before starting the engine, check the throttle pedal to ensure the correct operation, and ensure that the throttle pedal can be completely restored to the idle position without the external force.

Check the free play and adjust, if needed, press the throttle to ensure that the movement of the smooth and not sticky buckle back when the check throttle pedal correctly. It must run smoothly, fully spring back to the free position.

Check throttle pedal free play:

3 - 5mm(0.118-0.197inches)

In case of out of range: → adjustment

Tilt cargo box.

Loose throttle cable (bracing cable). Turn adjuster to adjust free play of throttle pedal.



From the gate line (support), turn the regulator,

regulate the solar term door handle free play.

After adjustment, tighten nut.

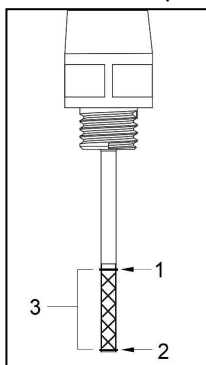
If free play after adjustment cannot reach designated requirement or there is viscosity for throttle valve, replace it with new throttle cable.

2.6 ENGINE OIL

Oil level verification

Strictly follow this procedure, otherwise wrong oil level may be indicated.

1. Ensure vehicle is on a level surface.
2. Start engine and let idle for a few minutes.
3. Stop engine. Wait a few minutes to allow oil to flow down to crankcase then check oil level.
4. Tilt cargo box and remove dipstick.
5. Fully screw in dipstick to check oil level.
6. Remove dipstick and read oil level. Oil level must be between minimum (2) and maximum (1) marks on dipstick.
7. There is a capacity of 300 ml between the two marks. Refill oil as necessary. Do not overfill.
8. Reinstall dipstick.



1.Full

2.Add

3.Operating range

Replace engine oil

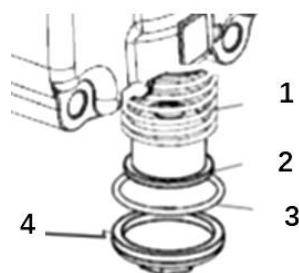
Prior to change the oil, ensure vehicle is on a level surface. Oil and oil filter must be replaced at the same time. Oil change and oil filter replacement should be done with a warm engine.

▲ WARNING

The engine oil can be very hot. Wait until engine oil is warm.

CAUTION: Dispose oil and filter as per your local environmental regulations.

1. Ensure vehicle is on a level surface.
2. Start engine and let idle for a few minutes.
3. Stop engine. Wait a few minutes to allow oil to flow down to crankcase then check oil level.
4. Tilt cargo box.
5. Remove dipstick.
6. Raise the vehicle, support it securely. Place a drain pan under the engine drain plug area.
7. Clean the drain plug area.
8. Unscrew drain plug then remove dipstick.
9. Allow oil to drain completely from crankcase.
10. Clean the magnetic drain plug from metal shavings and residue.
11. Install a new washer on drain plug. Torque drain plug to 20 N.m.
12. Remove oil filter, oil filter cover, spring and O-ring.



1. Spring

2. Oil filter

3. O-ring

4. Oil filter Cover

13. Check and clean the oil filter inlet area for dirt and other contaminations.

14. The installation is the reverse of the removal procedure. Pay attention to install a new gasket on oil filter cover.

15. Refill engine with a SAE 15W-40 classification engine oil, Oil change capacity with filter 1600mL.

16. Check the oil level with the dipstick. Refer to OIL LEVEL VERIFICATION above.

17. Run engine to ensure oil filter and drain plug areas are not leaking.

CAUTION: In order to expand service life of vehicle, please use grade SJ standard engine oil conforming to API with its viscosity indication being SAE15W-40. If viscosity of engine does not reach SAE15W-40, make corresponding selection according to drawing.

Viscosity	20W-50									
	15W-40, 15W-50									
	10W-40, 10W-50									
	10W-30									
	5W-30									
Temp.	°C	-30	-20	-10	0	10	20	30	40	
	°F	-22	-4	14	32	50	68	86	104	

2.7 Gearbox OIL

Gearbox oil level verification

1. Place the vehicle on a level surface.
2. Place shift lever on NEUTRAL position then apply parking brake.
3. Remove gearbox oil level plug to check level. The oil should be level with the bottom of the oil level hole. Refill as required until gearbox oil level flows through oil level hole.

Gearbox Oil Change

1. Place the vehicle on a level surface.
2. Clean drain plug area and oil level plug.
3. Place an oil pan under the gearbox, then remove the gearbox drain plug.

NOTE: To completely drain the gearbox, place a jack under the left side and tilt the vehicle toward the right side. When the gearbox is empty, install the drain plug and replace the vehicle on the ground. Refill gearbox, using gearbox oil refer to specification.

CAUTION: Use recommended types of oil only, when servicing. Do not mix with other types of oil. The oil should be level with the bottom of the oil level hole. Refill as required through the breathe

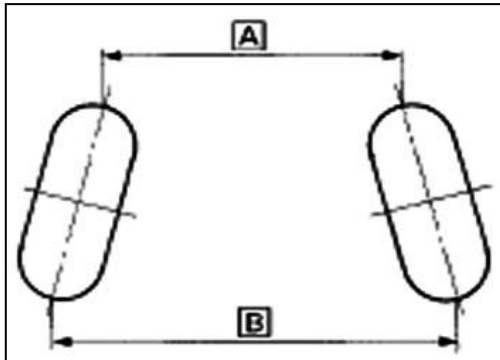
pipe, until gearbox oil level flows through oil level hole.

Reinstall oil level plug.

2.8 STEERING SYSTEM

Park vehicle at flat ground and turn handle left or right slowly to see whether it can be turned flexibly. In case of obstacles, check whether it is caused by main cable or other wiring installation. If it is not caused by above situations, please check the bottom of steering tie rod and see whether steering column bearing is damaged or not.

Park vehicle on flat ground, make sure the tire pressure for right and left tires is same and set to the proper specification, set the front wheels in the straight position, then place a load of 75kg on the seat. Measure the distance A and B of the front wheels and calculate the difference.



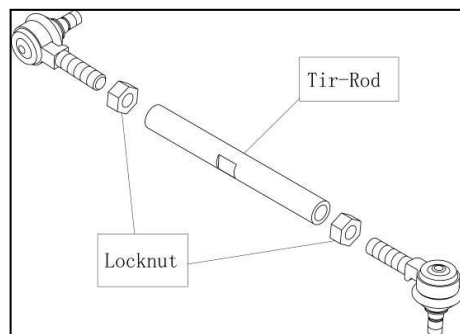
TYPICAL

A: front of front wheel

B: rear of front wheel

Toe-in: $B - A = 5\text{mm}$

Out of range of toe-in: → Adjust nut of tie rod



CAUTION: After adjusting toe-in, first rotate steering wheel from center position to the left and right, to ensure that is the same corner, then slowly run vehicle to see whether its direction can be controlled.

2.9 BRAKING SYSTEM

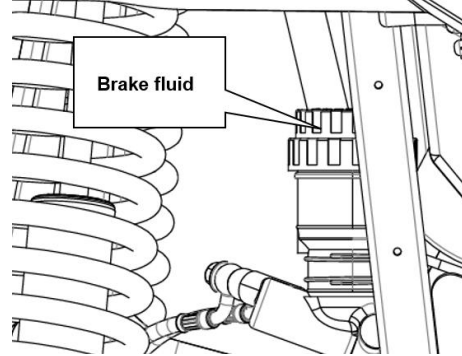
Check to see if any brake fluid is leaking out of the pipe joints or the brake fluid reservoir. Apply the brakes firmly for one minute. If there is any leakage, have the vehicle inspected by an authorized dealer. Test the brakes at slow speed after starting out to make sure they are working properly. If the brakes do not provide proper braking performance, inspect the brake system. If needed, have the vehicle inspected by an authorized dealer.

Brake fluid level

Check the brake fluid level by observing the lower limit line on the brake fluid reservoir.

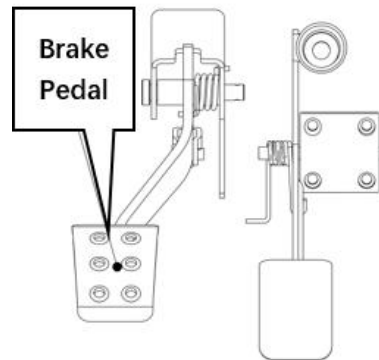
When brake fluid level is lower than lower limit,

supplement brake fluid DOT4 in time.



Brake pedal adjustment

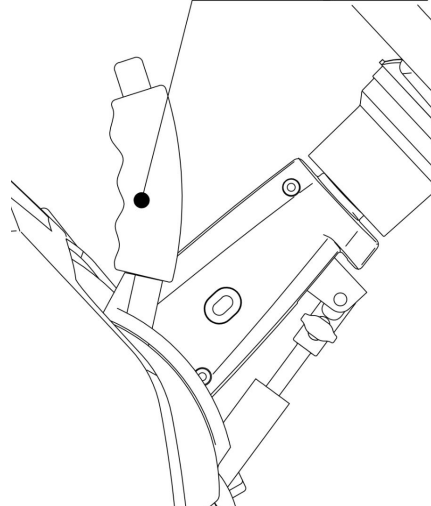
The brake pedal stroke is 30 ~ 40mm. If less than equal 30mm, it will be a hidden dangers, must adjust the brake pin connecting the brake pedal.



Parking brake adjustment

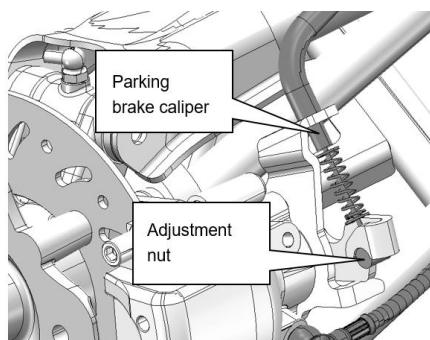
Pull the parking brake lever up to engage the parking brake. To release the unit, press button on front end of parking lever then push the parking lever to the bottom.

Parking level

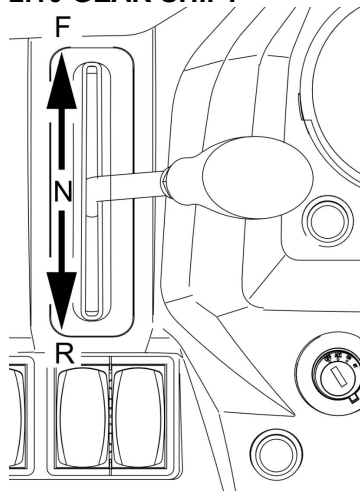


The free play is 15 ~ 20mm(0.59~0.79inches), the travel is 7 teeth.

If necessary, slacken the cable by loosening the locknut and screwing the adjuster on the brake holder. After adjusting the play, tighten the locknut. Or screwing the adjustment nut on the parking brake caliper.



2.10 GEAR SHIFT



Before operating the vehicle, check the shift lever as to change gearshift from F to R and reverse smoothly.

The shift lever should be vertical when the gear is in neutral. If not, adjust the shift cable and then tighten the nuts of the shift cable.

2.11 COOLING SYSTEM

To prevent rust formation or freezing condition, always replenish the system with the premixed coolant or with 50% antifreeze and 50% water. Do not use tap water, straight antifreeze or straight water in the system. Tap water contains minerals and impurities which build up in the system. During cold weather, straight water causes the system to freeze while straight antifreeze thickens and does not have the same efficiency. Always use ethylene glycol antifreeze containing corrosion inhibitors specifically recommended for aluminum engines.

Cooling liquid may be reduced by natural evaporation. Regularly check horizontal position of cooling liquid.

Coolant level verification

Park vehicle at flat ground and check horizontal line of cooling liquid.

Remove the front panel and view window board.

Check the level of cooling water in fluid reservoir (auxiliary radiator) is between upper and lower critical levels.

▲ WARNING

To avoid potential burns, do not remove the radiator cap or loosen the cooling drain plug if the engine is hot. Never drain or refill cooling system when engine is hot.

Coolant replacement

Park vehicle at flat ground and check horizontal line of cooling liquid.

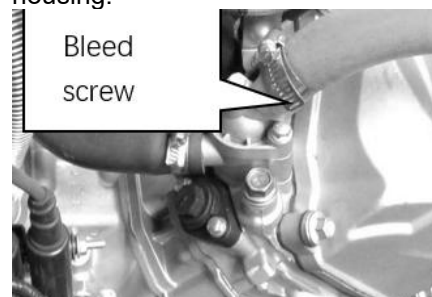
Remove the front panel and view window board.

Remove hood.

Remove auxiliary tank cover and radiator cover.

Remove water pump inlet line.

Unscrew bleed screws on top of thermostat housing.



Unscrew bleed bolt on top of radiator.

Fill up the radiator with coolant, when the coolant comes out by the thermostat housing hole, install the bleed screws with its gasket ring and torque to 10 N.m.

Refill coolant tank up to upper-level mark. Install the coolant tank cap and the radiator cap.

Run engine until radiator fan opens then stop engine.

When engine has completely cooled down, recheck coolant level in radiator and coolant tank. Top up if necessary.

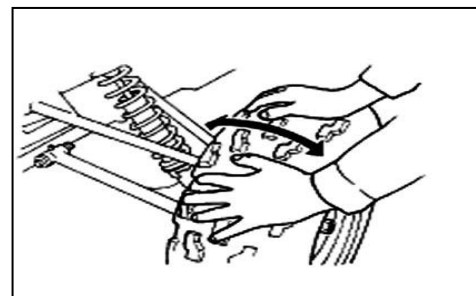
2.12 WHEELS

Lift wheels up at horizontal position and ensure no load to each wheel.

Shake wheels to left and right to see whether their connecting parts are installed tightly and check whether they can be swung.

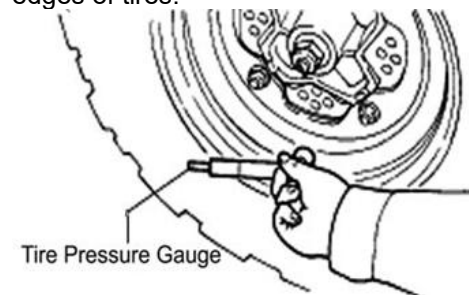
No adequate tightening: → tightening

Swing: → replace rocker arm



Tire pressure

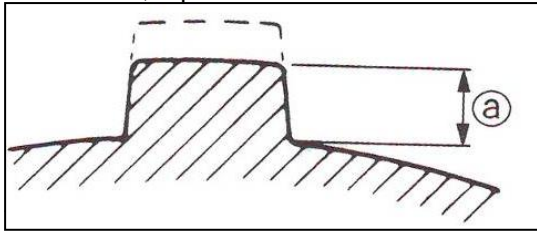
Improper tire pressure will lower comfort of operation and driving and may lead to wear to side edges of tires.



	Front wheel	Rear wheel
Rated pressure	120kPa	120kPa
Dimension of tire	24×12-8	24×12-8

Tire thread.

When the tire groove decreases to 6 mm (0.24 in) due to wear, replace the tire.

**2.13 ENGINE COMPRESSION PRESSURE**

The compression pressure reading of a cylinder is a good indicator of its internal condition. The decision to overhaul the cylinder is often based on results of a compression test.

Before measuring cylinder pressure, ensure installation and tightening of cylinder cap bolt with designated torque and reasonable clearance of valve.

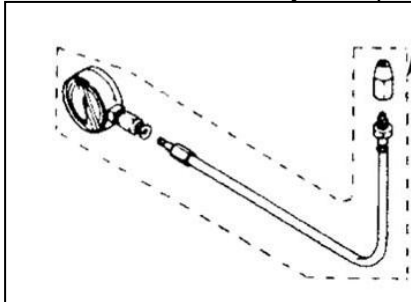
Standard cylinder pressure: 0.9~1.2Mpa

Too low cylinder pressure may cause the following:

1. Excessive wear to cylinder;
2. Wear to piston or piston ring;
3. Blockage of piston ring in groove;
4. Close valve seat;
5. Damage to cylinder lining or faults of other parts

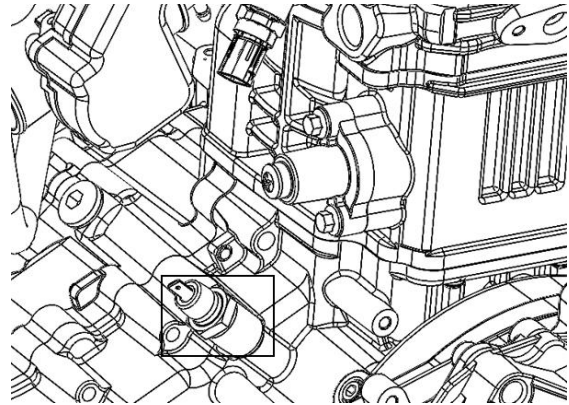
Measure engine compression pressure:

1. Warm up engine.
2. Ensure full charging of battery.
3. Tilt cargo box.
4. Dismantle spark plugs.
5. At spark plug hole, install cylinder pressure meter.
6. Press button of start for several seconds. Record indication of maximum cylinder pressure.

**2.14 ENGINE OIL PRESSURE**

Check the engine oil pressure periodically. This will give a good indication of the condition of the moving parts. The engine oil pressure test should be done with a warm engine 90°C and the recommended oil. Tilt cargo box.

Remove the oil pressure switch wire connector and switch on the left of engine.



Install oil pressure gauge and adapter hose.

Start engine on idle speed. The engine oil pressure should be within the following values.

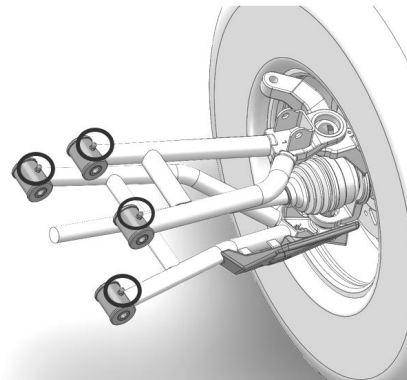
Oil pressure	1600 RPM	6000 RPM
Minimal	70 KPa	350 KPa
Nominal	180 KPa	420 KPa
Maximal	300 KPa	550 KPa

Remove oil pressure gauge and adapter hose.

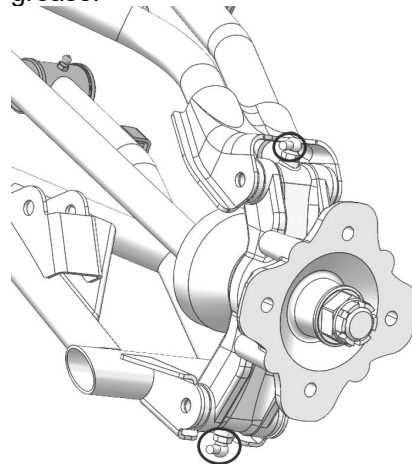
Installation oil pressure switch to 12N.m and the oil pressure switch wire connector.

2.15 SUSPENSION SYSTEM

Lubricate both suspension arms with lithium-soap based grease. There are two grease fittings on each suspension arm. Check operation and for leakage. Grease fitting location of front/rear suspension arms.



Lubricate rear knuckles with lithium-soap based grease.



3. ENGINE

ENGINE REMOVAL.....	3-2	VALVE COVER.....	3-2
TIMING CHAIN TENSIONER.....	3-2	CAMSHAFT TIMING GEAR.....	3-3
ROCKER ARM.....	3-3	CYLINDER HEAD.....	3-4
CAMSHAFT.....	3-6	VALVE AND VALVE SPRING.....	3-7
CYLINDER.....	3-9	PISTON.....	3-10
PISTON RINGS.....	3-11	TIMING CHAIN	3-12
CRANKCASE.....	3-12	GEAR.....	3-13
CRANKSHAFT.....	3-14	RIGHT CRANKCASE COVER.....	3-14
TRANSFER CASE COVER.....	3-14	TRANSFER CASE.....	3-15
MAGNETO STATOR.....	3-15	MAGNETO ROTOR.....	3-15
CLUTCH.....	3-16	OIL PUMP.....	3-16
CVT TRANSMISSION.....	3-18	ENGINE INSTALLATION.....	3-18

▲ WARNING

Torque wrench tightening specifications must strictly be adhered to.

Locking devices (e.g.: locking tabs, elastic stop nuts, self-locking fasteners, cotter pin, etc.) must be installed or replaced with new ones where specified. If the efficiency of a locking device is impaired, it must be repaired.

When diagnosing an engine problem, always perform a cylinder leak test. This will help pin-point a problem. Refer to the instructions included with your leak tester and to LEAK TEST section for procedures.

Always place the vehicle on level surface.

NOTE: For a better understanding, the many illustrations are taken with engine out of vehicle. To perform the following instructions, it is not necessary to remove engine from vehicle.

Always disconnect BLACK (-) cable from the battery, then RED (+) cable before working on the engine.

Even if the removal of many parts is not necessary to reach another part, it is recommended to remove these parts in order to check them.

When disassembling parts that are duplicated in the engine, (e.g.: valves), it is a strongly recommended to note their position (PTO/MAG side) and keep them as a "group". If you find a defective component, it would be must easier to find the cause of the failure among it group of parts (e.g.: you found a worn valve guide. A bent spring could be the cause and it will be easy to know which one among the springs is the cause to replace it if you grouped them at disassembly). Also, since used pars have matched together during the engine operation, they will keep their matched fit when you reassemble them together within their "group".

3.1 ENGINE REMOVAL

To avoid potential burns, let engine and exhaust system cool down before performing any servicing. Place vehicle on a work station that will have access to an engine-lifting hoist. Then start with initial preparation of vehicle.

Tilt the cargo box and remove seat.

Disconnect the BLACK (-) cable from battery, then the RED (+) cable.

Drain coolant from engine cooling system. Drain engine oil only if engine overhaul is necessary. To work on gearbox the removal is necessary but do not drain engine oil.

Before remove engine, drain engine oil and coolant.

-Remove CVT air inlet and exhaust pipe.

-Remove shift arm.

-Remove throttle body, water pump inlet hose, coolant outlet hose, oil inlet hose, air inlet hose, spark plug, crankcase exhaust gas hose.

Disconnect crankshaft position sensor, the speed sensor on the engine and the gear position switch, startor motor harness, disconnect the oil pressure sensor plug, engine ground harness and disconnect the engine wiring harness from the main harness.

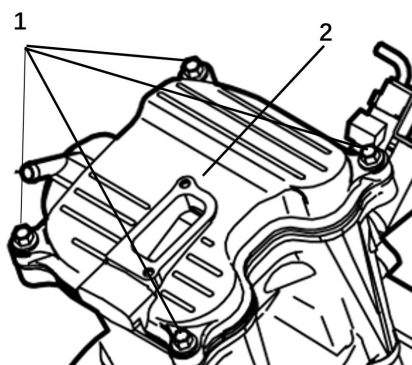
-Remove rear wheel and disconnect rear half shaft from engine.

-Remove engine mounting bolts on front mounting bracket and engine rear mounting board.

3.2 VALVE COVER

Removal

-Remove the four M6 bolts of valve cover.



1. 4xM6 Bolt
2. Valve cover

-Remove valve cover and gasket.

Inspection

Check the gasket on the valve cover if it is brittle, cracked or hard. If so, replace the gasket.

Installation

For installation, reverse the removal procedure.

Torque the bolts for valve cover in a crisscross sequence.

Bolt tightening torque for valve cover: 10-12 N.m.

3.3 TIMING CHAIN TENSIONER

NOTE: Before removal and installation, make sure that the cylinder is set to TDC ignition. Refer to CAMSHAFT.

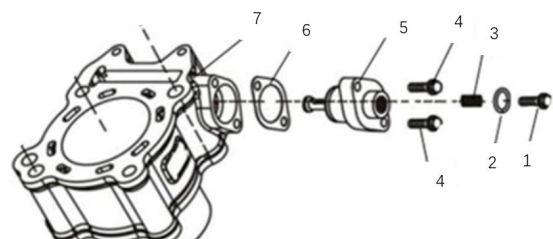
Tensioner removal

▲ WARNING

Never perform this operation immediately after the engine has been turn because the exhaust system can be very hot. Wait until exhaust system is warm or cold.

Remove:

- Lock bolt
- O-ring and spring
- Bolt
- Chain tensioner
- Gasket



1. M6 Lock bolt
2. O-ring
3. Spring
4. 2xM6 Bolt
5. Chain tensioner
6. Gasket
7. Cylinder block

Tensioner Inspection

Check the chain tensioner for cracks or other damages. Replace if necessary.

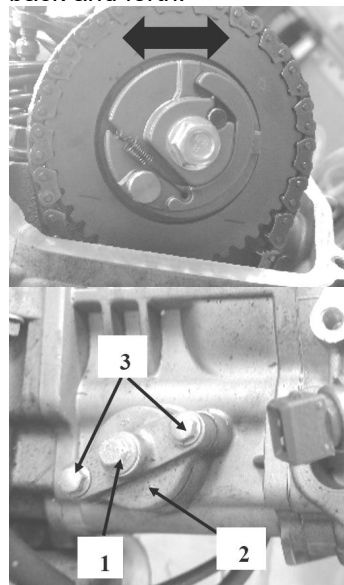
Check push rod of chain tensioner for free movement by sheet.

Check if O-ring is brittle, cracked or damaged. Replace if necessary.

Check gasket. Replace if broken or worn.

Tensioner Installation

NOTE: Before installing the chain tensioner make sure that the camshaft timing gear can be moved back and forth.



1. Locking bolt
2. Chain tensioner
3. Bolt

Turn push rod of chain tensioner clockwise to shortest position by sheet.

Install the chain tensioner with gasket to the cylinder block. Tighten the bolt for chain tensioner to 10-12N.m.

Push out the rod of chain tensioner counterclockwise by sheet, then tighten the lock bolt to 6-8N.m.

NOTE: Do not forget to place the O-ring and spring on lock bolt and gasket on the chain tensioner.

3.4 CAMSHAFT TIMING GEAR

Gear Removal

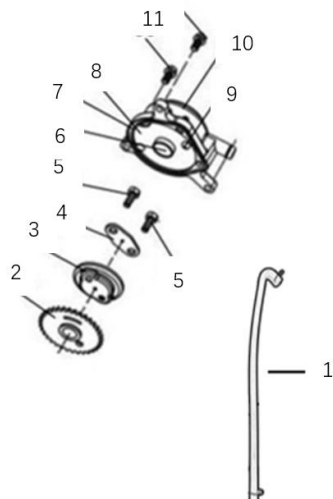
Turn crankshaft to TDC ignition of the cylinder.

Unscrew timing chain tensioner.

Remove exhaust pipe.

Unscrew three M6 bolts and remove cylinder head side cover.

Remove the M6 bolts, timing gear plate and gas cover.



1. Exhaust pipe
2. Camshaft timing gear
3. Gas cover
4. Timing gear plate
5. 2xM6 Bolt
6. Gas cover
7. Gas cover gasket
8. O-ring
9. M5 screw
10. Cylinder head side cover
11. 2xM6 Bolt

Remove camshaft timing gear.

NOTE: Secure timing chain with a retaining wire.

Gear Inspection

Check camshaft timing gear for wear or deterioration. If gear is worn or damaged, replace it as a set (camshaft timing gear and timing chain).

Check gas cover, gasket, O-ring and cylinder head side cover for crack or damage. If damaged, replace it.

Gear Installation

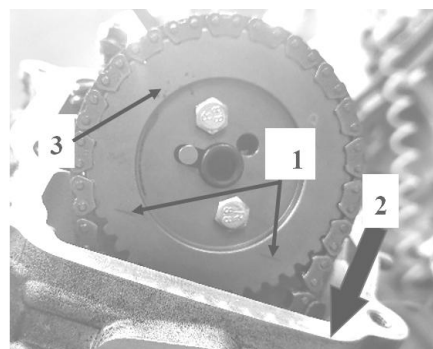
For installation, reverse the removal procedure. Pay attention to the following details.

Clean mating surface and threads of camshaft, prior to assemble camshaft timing gear.

Camshaft timing gear and crankshaft must be at TDC ignition position before installing the timing chain.

CAUTION: Crankshaft and camshaft must be locked on TDC ignition position to place camshaft timing gear and timing chain in the proper position. Install camshaft timing gear so that the timing gear tabs are located into the flat area of the camshaft.

The printed marks on the camshaft timing gear must be parallel to the cylinder head base. See the following illustration for a proper positioning.



1. Printed marks on camshaft timing gear
2. Cylinder head base
3. Camshaft timing gear

Tighten the two M6 bolts for camshaft timing gear to 10-12N.m.

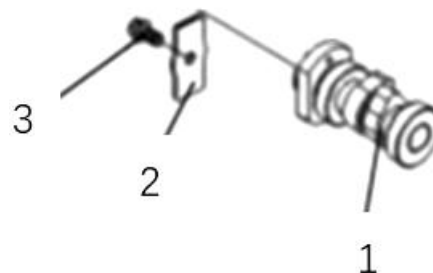
NOTE: Before installing the bolt adjust the chain tension and check again if marks on the timing gear are parallel to cylinder head base.

3.5 ROCKER ARM

Rocker Arm Removal

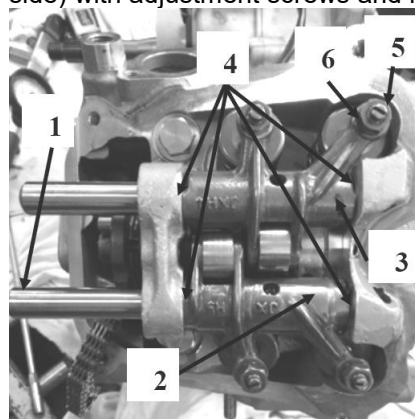
Remove:

- Valve cover
- Chain tensioner
- Camshaft timing gear
- M6 Bolt and camshaft locate plate



1. Camshaft
2. Camshaft locate plate
3. M6 Bolt

- Rocker arm shafts
- Rocker arm assembly (exhaust side and intake side) with adjustment screws and nuts.



Axial play of rocker arm and cylinder head

new 0.04 to 0.46 mm

Service limit 0.50mm

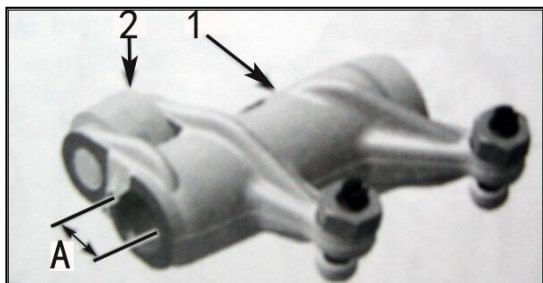
1. Rocker arm shaft
2. Rocker arm (exhaust side)
3. Rocker arm (intake side)
4. Washer
5. Adjustment screw
6. Locking nut

-Washers

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

Rocker Arm Inspection

Inspect each rocker arm for cracks and scored friction surfaces. If so, replace rocker arm assembly. Check the rocker arm rollers for free movement, wear and excessive radial play. Replace rocker arm assembly if necessary.

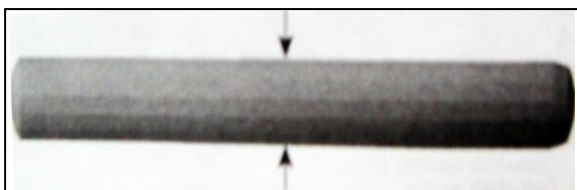


1. Rocker arm (exhaust side)

2. Roller

A- Rocker arm bore diameter

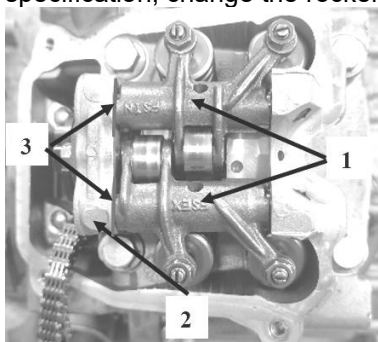
Measure rocker arm bore and shaft diameter. If radial play is out of specification, change the rocker arm assembly.



Radial play of rocker arm bore and shaft

new	0.013 to 0.046 mm
Service limit	0.046mm

Measure axial play of rocker arm and cylinder head axial play using a feeler. If axial play is out of specification, change the rocker arm assembly.

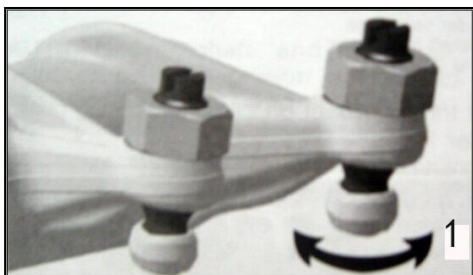


1. Rocker arm

2. Cylinder head

3. Axial play

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



1. Free movement of adjustment screw top

Check rock arm shaft for wear or damage, if so,

replace parts.

Check washer for wear or damage, if so, replace parts.

Rocker Arm Installation

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

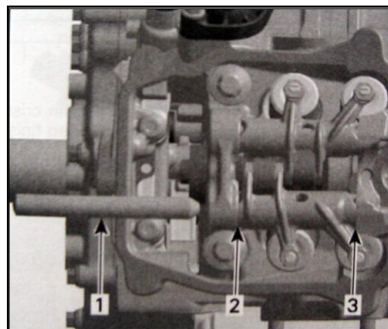
Apply engine oil on rocker arm shaft.

Install the rocker arm shafts with the cone edge facing inside and use following procedure:

-Insert a rocker arm pin through rocker arm pin bore.

-Install a washer then the proper rocker arm.

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



1. Rocker arm shaft

2. Washer (timing chain side)

3. Washer (spark plug side)

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

-Install the camshaft retaining plate.

Tighten the M6 bolt for camshaft retaining plate to 10-12N.m.

3.6 CYLINDER HEAD

Cylinder Head Removal

Drain coolant.

CAUTION: Before removing cylinder head, blow out remaining coolant by air pressure. During cylinder head removal, the remaining coolant in cylinder head could overflow into the engine and a little quantity of coolant could drop into the engine. In this case, the engine oil will be contaminated.

Disconnect:

-Spark plug wire

-Temperature sensor connector, located at cylinder head

Remove:

-spark plug

-exhaust pipe spring

-exhaust pipe nuts

-radiator intake hose

-air filter box and throttle body

-chain tensioner

-valve cover and gasket

-camshaft timing gear

-cylinder head bolts M6

-cylinder head bolts M10 retaining cylinder head and cylinder to cylinder base.

Pull up cylinder head.

Remove:

-chain guide

-cylinder head gasket and scrap it.



1. Cylinder head
2. Timing chain
3. Chain guide
4. Cylinder head gasket

Cylinder Head Inspection

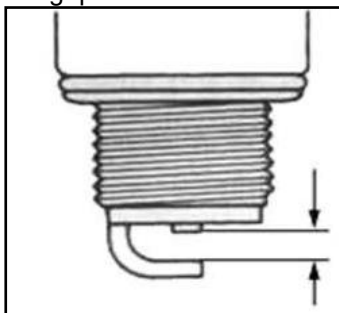
Inspect timing chain guide for wear, cracks or other damages. Replace if necessary.

Check for cracks between valve seats and spark plug hole, if so, replace cylinder head.

Check the carbon deposit for spark plug. If so, replace spark plug.

Use clearance gauge to measure clearance of spark plug.

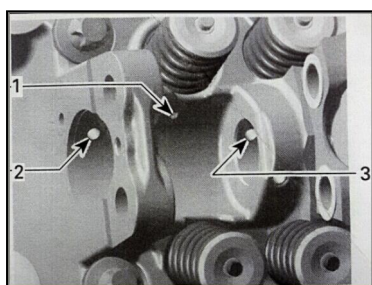
In case of exceeding designated range, then adjust the gap.



Spark plug gap: 0.7-0.8mm

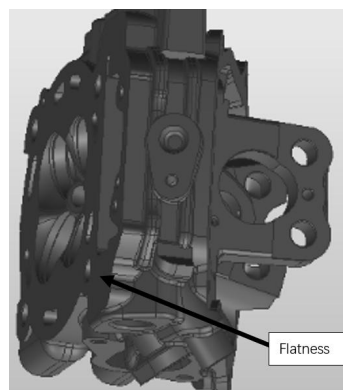
Check mating surface between cylinder and cylinder head for contamination. If so, clean both surfaces.

Clean oil support through the cylinder head from contamination.



1. Oil port to lubricate camshaft lobes intake/exhaust
2. Oil supply to camshaft bearing journal timing chain side
3. Oil supply to camshaft bearing journal spark plug side

Check cylinder head for deformation. Measure the flatness of cylinder head using knife straight edge and feeler. If flatness is out of specification, change cylinder head.



Flatness of cylinder head

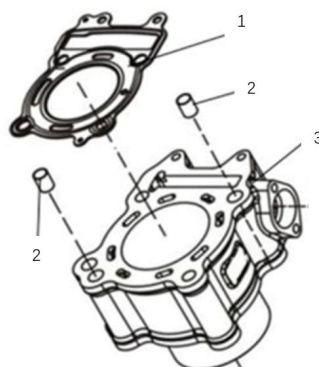
new	0 to 0.04mm
Service limit	0.04mm

Cylinder Head Installation

NOTE: The cylinder heads are not identical in design. Do not invert the cylinder heads at assembly.

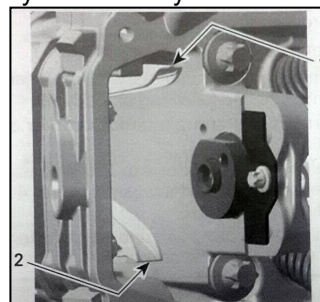
For installation, reverse the removal procedure. Pay attention to the following details.

Ensure align the cylinder head to the dowel pin on the cylinder block.



1. Gasket
2. Dowel pin
3. Cylinder block

CAUTION: Chain guide has to be fixed between cylinder and cylinder head.



1. Chain guide (fixed between cylinder and cylinder head)
2. Chain tensioner guide (mounted in crankcase)

Install a new cylinder head gasket.

NOTE: Do not forget to place the washer on cylinder head M10 bolt. First, torque cylinder head M10 bolts in crisscross sequence to 18-22N.m, then finish by tightening to 45-50N.m.

Install cylinder head M6 bolts. Tighten M6 bolts to 10-12N.m.

Check chain guide for movement.

Tighten spark plug to 20-25N.m.

3.7 CAMSHAFT



1. Camshaft of cylinder

Camshaft Timing Cylinder

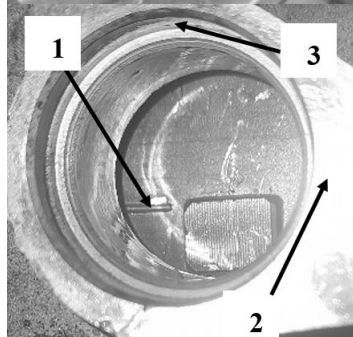
Turn crankshaft until piston is at TDC ignition as follows.

Remove:

- spark plug cable and spark plug
- valve cover
- crankshaft position sensor
- bolt and big view hole cap

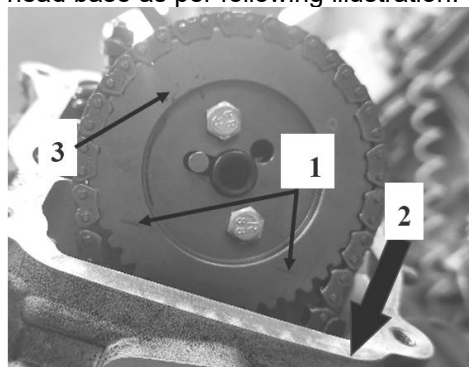
Turn the magneto bolt until mark "T" on magneto flywheel and dot mark on the left cover are aligned.

MAGNETO BOLT



1. Mark "T" on magneto flywheel
2. Dot mark on left crankcase cover
3. Location of crankshaft position sensor

NOTE: At TDC ignition, the printed marks on the camshaft timing gear have to be parallel to cylinder head base as per following illustration.



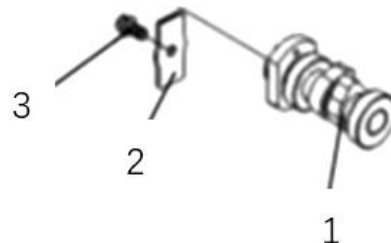
1. Printed marks on camshaft timing gear
2. Cylinder head base
3. Camshaft timing gear

CAUTION: Crankshaft cannot be locked at cylinder TDC ignition.

Camshaft Removal

Remove:

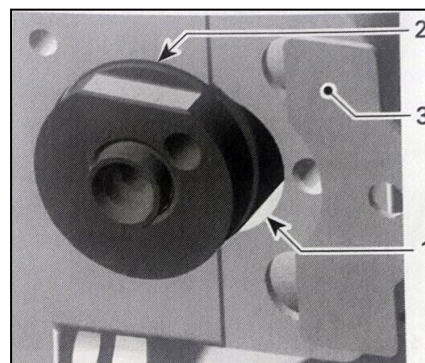
- spark plug cable and spark plug
- valve cover (see VALVE COVER above)
- chain tensioner (see CHAIN TENSIONER above)
- camshaft timing gear (see CAMSHAFT TIMING GER above)
- camshaft locate plate



1. Camshaft
2. Camshaft locate plate
3. M6 Bolt

- rocker arms (see ROCKER ARM above)
- camshaft.

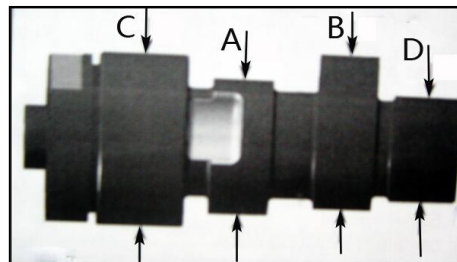
NOTE: For removal rotate camshaft so that intake/exhaust lobe shows to upper side of cylinder head.



1. Area for camshaft lobes
2. Camshaft
3. Camshaft retaining

Camshaft Inspection

Check each lobe and bearing journal of camshaft for scoring, scuffing, cracks or other signs of wear. Measure camshaft base circular runout using the indicator. If runout is out of specification, change camshaft.



- A. Camshaft lobe (exhaust valves)
- B. Camshaft lobe (intake valves)
- C. Camshaft journal timing chain side
- D. Camshaft journal spark plug side

Camshaft base circular runout	
New	0 to 0.02mm
Service limit	0.02mm

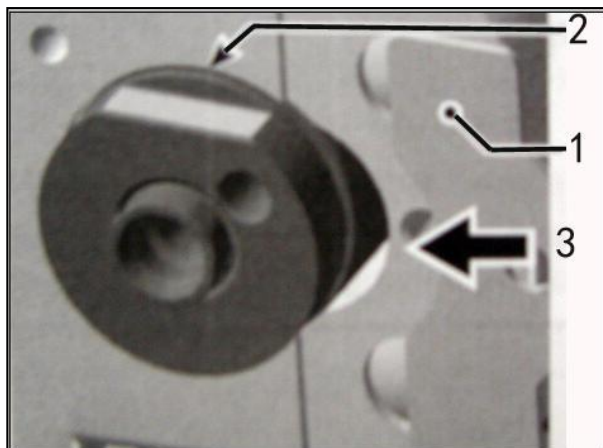
Camshaft Installation

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

CAUTION: The camshaft is not identical in design. Do not invert the camshaft during assembly. Any mix-up of the components will lead to engine damage.

Apply engine oil on the camshaft.

Place the camshaft retaining plate in the slot of the camshaft.



1. Camshaft retaining plate position
2. Slot retaining camshaft
3. Direction of movement

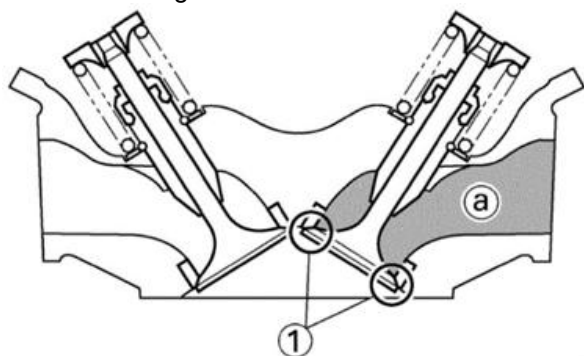
For other parts, refer to proper installation procedure.

3.8 VALVE AND VALVE SPRING

Check valve sealing

Before removing the internal parts of the cylinder head (e.g., valves, valve springs, valve seats), make sure the valves properly seal.

Check the valve face, valve seat and valve seat width for leakage at the valve seat.



a- Clean solvent

1- Valve seat

-Pour a clean solvent into the intake and exhaust ports.

- Check that the valves properly seal

NOTE: There should be no leakage at the valve seat.

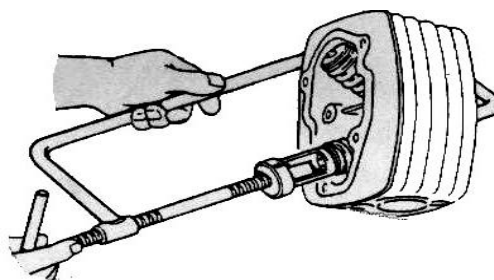
Valve and Valve Spring Removal

Remove:

-rocker arms (see ROCKER ARM above)

-cylinder head (see CYLINDER HEAD above).

Compress valve spring using valve spring compressor clamp and valve spring compressor cup.

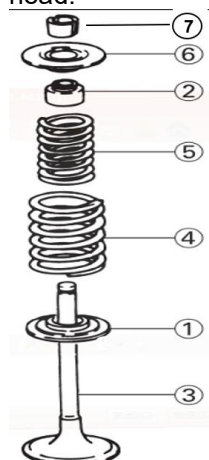


▲ WARNING

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

Remove valve cotters.

Remove upper spring seat, valve seal and valve spring, then push out valve stem from cylinder head.



1. Valve spring seat

2. Valve stems seal

3. Valve

4. Inner valve spring

5. Outer valve spring

6. Upper spring seat

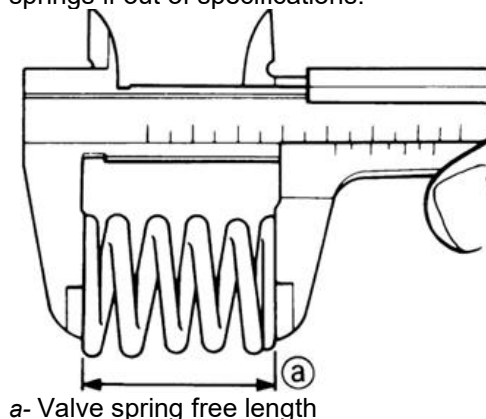
7. Valve cotter

Inspection

Valve Spring

Check valve spring for visible damages. If so, replace valve spring.

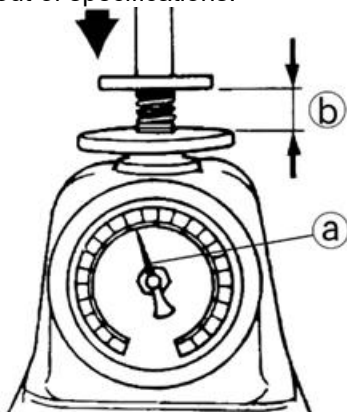
Check valve spring free length. Replace valves springs if out of specifications.



a- Valve spring free length

Inner valve spring free length	
Intake	39.2mm
Exhaust	39.2mm
Outer valve spring free length	
New	44.85mm
Service limit	44.85mm

Check compression valve spring force at installed length using tension meter. Replace valves springs if out of specifications.

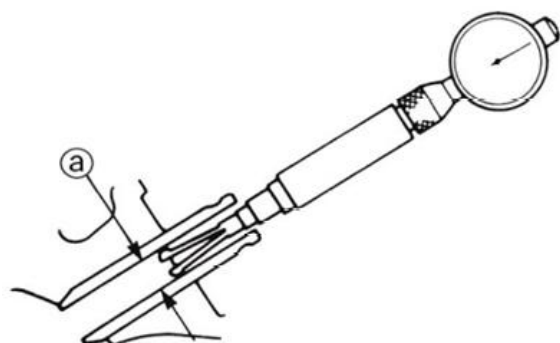


a- Compression valve spring force
b- Installed length

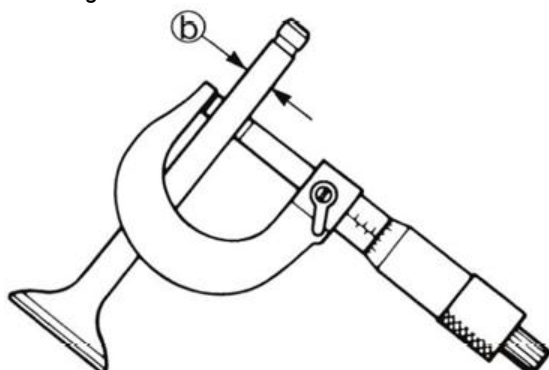
Compressed Inner spring force	
Intake	75.66~87.02 N
Exhaust	75.66~87.02N
Compressed Outer spring force	
Intake	191.4~220.2 N
Exhaust	191.4~220.2 N

Valve Stem and Valve Guide Clearance

Measure valve stem and valve guide in three places using a micrometer and a small bore gauge. Replace cylinder head if clearance is out of specification or has other damages such as wear or friction surface.



a- Valve guide inside diameter



b- Valve stem diameter

Valve stem and valve guide clearance diameter	
Intake valve	
New	0.010 to 0.035 mm
Service limit	0.060mm
Exhaust valve	
New	0.030 to 0.055 mm
Service limit	0.070mm

NOTE: Clean valve guide to remove carbon deposits before measuring valve guide inner diameter.

Valve seat width

Check valve seat for wear or pitting, and replace valve or cylinder head if there are signs of damage. Ensure to seat valve properly.

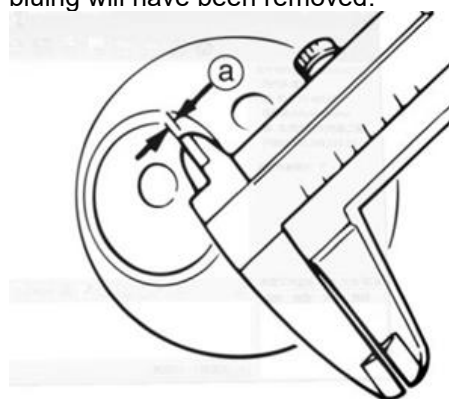
Measure valve seat width using a caliper.

- Apply Mechanic's bluing dye (Dike) onto the valve face.

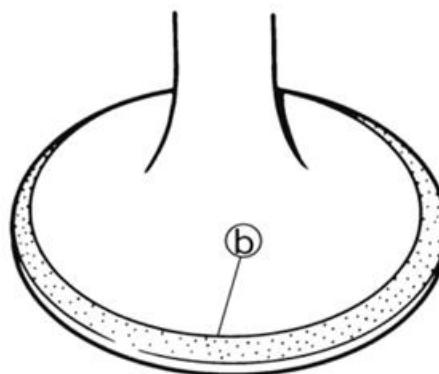
-Install the valve into the cylinder head.

-Press the valve through the valve guide and onto the valve seat to make a clear impression.

-Measure the valve seat width. Where the valve seat and valve face contacted one another, the bluing will have been removed.



a- Valve seat width



b- Mechanic's bluing dye (Dike)

Valve seat width	
Intake valve	0.85 to 1.15mm
Exhaust valve	0.85 to 1.15mm

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

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

Valve Spring and Valve Installation

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

Clean carbon deposits from valve face and valve seat.

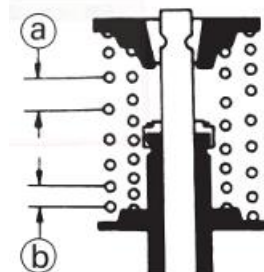
Install a NEW seal valve stem. Make sure valve

stem is installed before installing seal.

Apply engine oil on valve stem and valve stem seal before installing.

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

NOTE: Install the valve springs with the larger pitch facing up.



a- Larger pitch

b- Smaller pitch

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

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

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

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



1. Position of the spring

2. Valve cotter

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

CAUTION: An improperly locked valve spring will cause engine damage

3.9 CYLINDER BLOCK

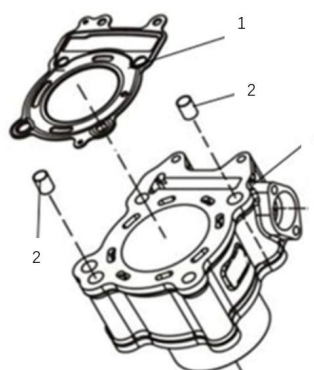
Cylinder removal

Remove:

- Chain tensioner (see CHAIN TENSIONER)
- Camshaft timing gear (see CAMSHAFT TIMING GEAR)
- Cylinder head (see CYLINDER HEAD)
- Dowel Pins, gasket and chain guide

Pull out cylinder.

Discard cylinder gaskets.



1. Gasket

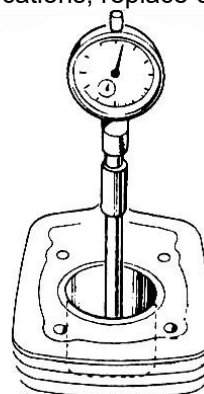
2. Dowel pin

3. Cylinder block

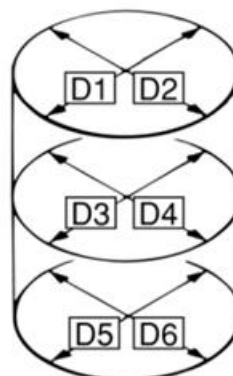
Cylinder Inspection

Check cylinder for cracks, scoring and wear, ridge on the top and bottom of the cylinder. If so, replace cylinder.

Measure cylinder bore and if it is out of specifications, replace cylinder and piston rings.



Measure cylinder bore at 3 recommended positions. See the following illustration.



CAUTION: Measure cylinder bore by taking side-to-side and front-to-back measurements of the cylinder. Then, find the maximum of the measurements D1~D6.

Cylinder bore diameter	
New	75 to 75.01mm
Service limit	75.1mm

Cylinder Installation

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

CAUTION: Always replace cylinder base gasket before installing the cylinder.

Turn magneto bolt. Crank the engine further and position piston at TDC. Then mount cylinder.

Apply engine oil on cylinder bore and also on the

band of the piston ring compressor tool.

NOTE: Put timing chain through the chain pit then put the cylinder in place.

NOTE: At installation, do not damage the piston rings.

CAUTION: Chain guide has to be fixed between cylinder and cylinder head.

NOTE: After cylinder is installed, turn crankshaft until piston of cylinder is at TDC ignition and lock crankshaft. Install cylinder head and the other parts in accordance with the proper installation procedures.

3.10 PISTON

Piston Removal

Remove:

-cylinder head (see CYLINDER HEAD above)

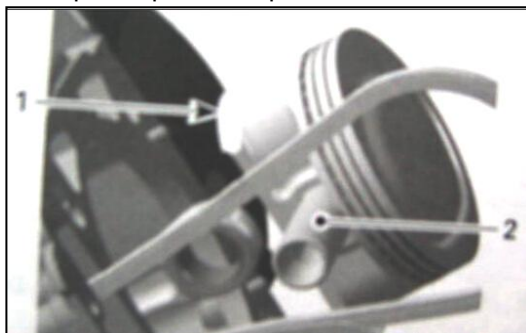
-cylinder (see CYLINDER above).

Remove two piston circlips with a snap ring plier and discard it.



NOTE: Place a clean shop towel in the crankcase to keep the piston pin clip from falling into the crankcase.

Push piston pin out of piston.



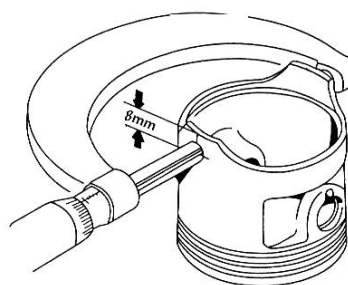
1. Piston
2. Piston Pin

Detach piston from connecting rod.

Piston and Cylinder ClearInspection

Inspect piston for scoring, cracking or other damages. Replace piston and piston rings if necessary.

Using a micrometer, measure piston at 8mm perpendicularly (90°) to piston pin. The measured dimension should be as described in the following specification. If not, replace piston.

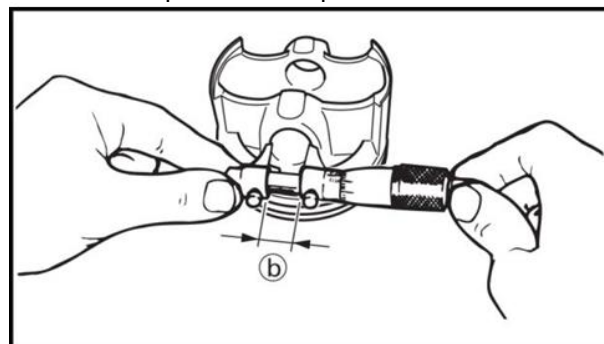


Piston diameter measurement

New	74.965 to 74.975mm
Service limit	74.95mm

Piston Pin and Piston Pin Core Clearance Inspection

Measure the piston with a pin bore diameter.



b- Piston pin diameter

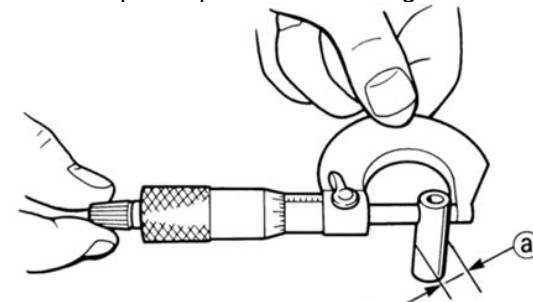
Piston pin bore diameter

New	17.002 to 17.008 mm
Service limit	17.010mm

Using synthetic abrasive woven clean piston pin from deposits.

Inspect piston pin for scoring, cracking or other damages.

Measure piston pin diameter using a micrometer.



a-Piston pin diameter

Piston pin diameter

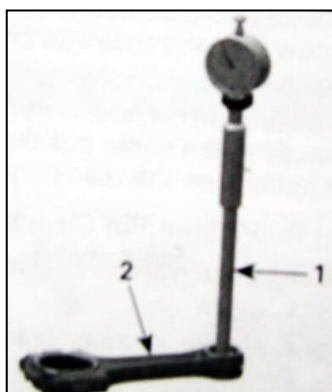
New	16.991 to 17.00 mm
Service limit	16.971mm

Replace piston pin if diameter is out of specifications.

If piston pin bore and piston pin exceed specified tolerance, replace piston and piston pin as a set.

Connecting Rod and Piston Pin Clearance Inspection

Measure inner diameter of connecting rod small end bushing with a bore gauge.



1. Bore gauge
2. Connecting rod

Connecting rod small end diameter	
New	17.01 to 17.02 mm
Service limit	17.02 mm

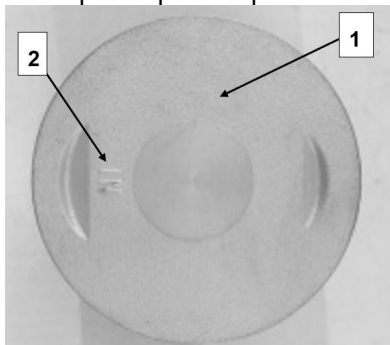
Replace connecting rod if diameter of connecting rod small end is out of specifications.

Piston Installation

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

Apply engine oil on the piston outer circle.

Insert piston pin into piston and connecting rod.



1. Piston
2. Mark "IN" on piston

CAUTION: Mark "IN" on piston points must face to intake side of engine. Place gap of piston circlip parallel with piston motion.

CAUTION: Always replace disassembled piston circlips by new ones. Place a rag on cylinder base to avoid dropping the circlip inside the engine.

3.11 PISTON RINGS

Ring Removal

Remove:

- cylinder head
- cylinder
- piston pin
- piston rings

NOTICE: Take care not to damage or break the piston rings during removal.



Ring Inspection

Inspect ring grooves on piston for scoring, cracking or other damages. Replace piston and piston rings if necessary.

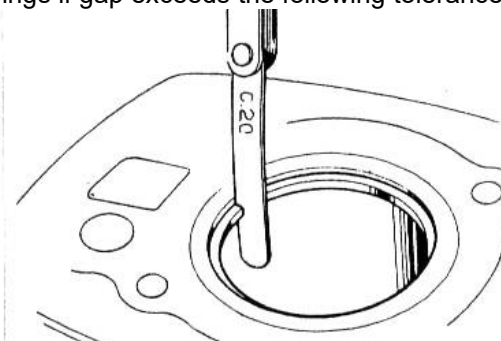
Ring end Gap

Using a feeler gauge measure each ring/piston groove clearance. If the clearance is too large, the piston and the piston rings should be replaced.

To measure the ring end gap, place the rings in the cylinder in the area of 8 to 16 mm from top of cylinder.

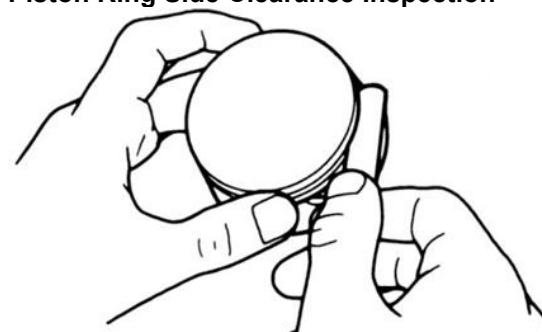
NOTE: In order to correctly place the ring in the cylinder, use piston as a pusher.

Using a feeler gauge, check ring end gap. Replace rings if gap exceeds the following tolerance.



Ring end gap	
Top ring	
New	0.25 to 0.35mm
Service limit	0.50 mm
Second ring	
New	0.25 to 0.35mm
Service limit	0.50 mm
Oil ring	
New	0.30 to 0.70 mm
Service limit	0.7mm

Piston Ring Side Clearance Inspection



Measure piston ring side clearance using a feeler gauge. Replace piston and piston rings as a set if out of specification.

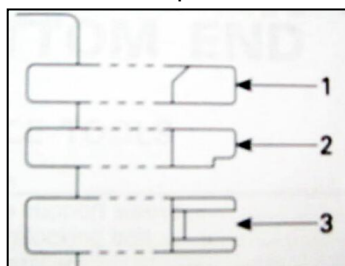
Piston ring side clearance	
Top ring	
New	0.015 to 0.050mm
Service limit	0.09 mm
Second ring	
New	0.015 to 0.045mm
Service limit	0.09 mm

Ring Installation

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

Clean carbon deposits from the piston ring grooves before ring installation.

Installation sequence



1. Upper compression ring
2. Lower compression ring
3. Oil scraper ring

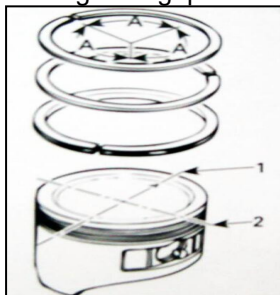
CAUTION: Ensure that top and second rings are not interchanged.

NOTE: Be sure to install the piston rings so that the "T" marks or numbers face up.

The gap of upper compression ring is faced to the intake side. The gap of lower compression ring is faced up to the exhaust side.

NOTE: Use a ring expander to prevent breakage during installation. The oil ring must be installed by hand.

Check that rings rotate smoothly after installation. Space the piston ring end gaps 120° apart and do not align the gaps with the piston pin bore.



1. DO NOT align gap with piston thrust side axis
2. DO NOT align ring with piston pin bore axis A.--120°.

3.12 TIMING CHAIN

Removal of Timing Chain

Remove:

-valve cover, chain tensioner and camshaft timing gear (refer to CYLINDER AND HEAD section)

-CVT (refer to TRANSMISSION)

- Bolt, timing chain guide and tension plate.

Carefully pull the timing chain sideward and down from the crankcase.

NOTE: Mark the operating direction of the timing chain before removal.

Timing Chain Inspection



NOTE: Check timing chain on camshaft timing gear for excessive radial play.

Check chain condition for wear and teeth condition. If chain is excessively worn or damaged, replace it as a set (camshaft timing gear and timing chain).

Timing Chain Installation

The installation is essential the reverse of the removal procedure, but pay attention to the following details.

NOTE: Ensure to perform proper valve timing. Lock crankshaft (see CRANKSHAFT) and camshaft at TDC ignition (refer to CYLINDER AND HEAD section).

Install timing chain with camshaft timing gear then, adjust chain tension (refer to CYLINDER AND HEAD section).

CAUTION: Improper valve timing will damage engine components.

3.13 CRANKCASE

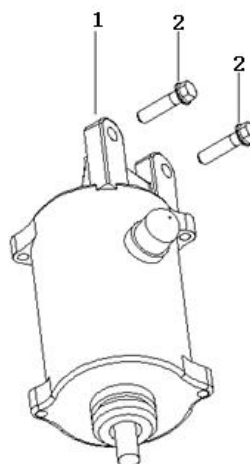
Crankcase Dismantling

Remove:

-Rear half shaft (refer to VEHICLE DISMANTLING)

-Left front cover (refer to TRANSMISSION) and gaskets

-Two M6 bolts② for starting motor ①



-Transfer case housing and cover

- Gear shift arm

-Right crankcase cover (refer to RIGHT CRANKCASE COVER)

-Magneto motor and sprag clutch

-Oil pump

-Water pump cover (refer to COOLING SYSTEM section)

-Oil filter

-Cylinder head, cylinder and piston (refer to CYLINDER AND CYLINDER HEAD section)

-timing chains and timing chain guides (refer to TIMING CHAIN).

Remove air pipe and nutral bolt.

Remove M6 bolts on the left crankcase block.

Separate the left and right crankcase block.

Inspection

Check bearing and oil seal on left crankcase block for wear or damage. Replace if necessary.

Check bearing on right crankcase block for wear or damage. Replace if necessary.

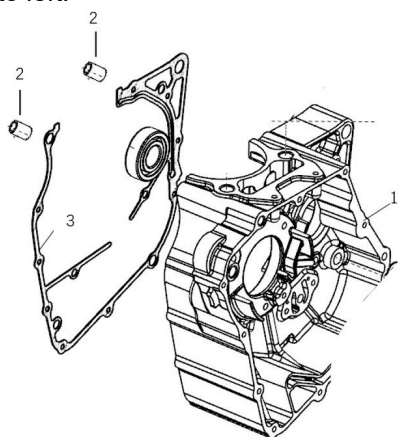
Check left and right crankcase block for wear or damage. Replace if necessary.

Installation

The installation is essential the reverse of the removal procedure, but pay attention to the following details.

Apply sealant continuous regular on contact face of left crankcase block.

Do not forget to put dowel pins and gasket to right crankcase block. Then fit the right crankcase block to left.



1. Right crankcase block

2. 2xDowel pin

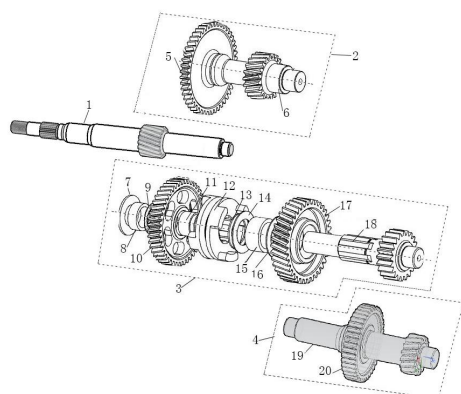
3. Gasket

Tighten M6 bolts in crisscross sequence to 10-12N.m.

3.14 GEAR**Removal**

Remove right crankcase block (refer to CRANKCASE).

Remove reverse shaft, countershaft, drive main shaft and rear out shaft from the left crankcase block.



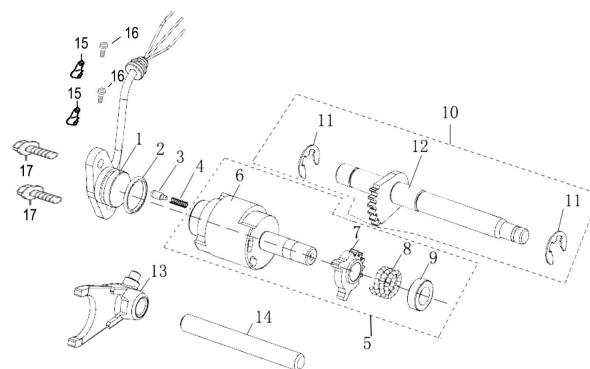
1. Drive main shaft

2. Reverse gear shift

3. Countershaft

4. Rear out shaft

Remove shift drum, gearshift arm, fork and gearshift indicator.



1. Gearshift indicator

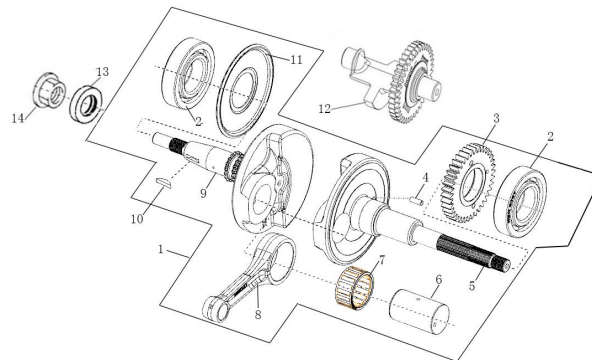
5. Shift drum

10. Gearshift arm

13. Fork

14. Fork shaft

Remove magneto nut, washer, crankshaft and balance shaft.



1. Crankshaft

12. Balance shaft

13. Washer

14. Magneto nut

Inspection

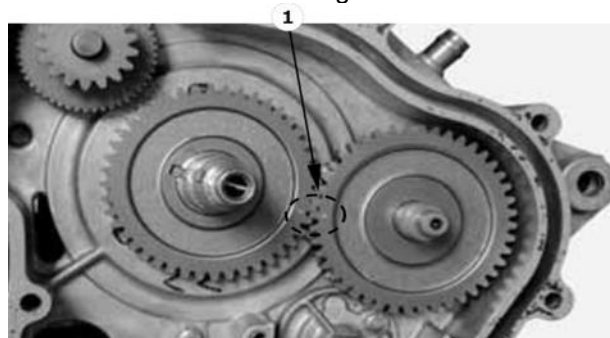
Check crankshaft, balance shaft, drive main shaft, countershaft, shift drum, bearing and crankshaft bearing for wear or damage. Replace if necessary.

Installation

The installation is essential the reverse of the removal procedure, but pay attention to the following details.

Install main/counter shaft, fork, shift drum to the left crankcase block.

NOTE: Install countershaft, fork and shift drum at the same time Check shifting smooth or not.



1. Mark

CAUTION: Apply engine oil on the crankshaft bearing and crankshaft journal. After installation, turn the crankshaft to check the marks on crankshaft and balance shaft in a line or not at TDC position.

3.15 CRANKSHAFT

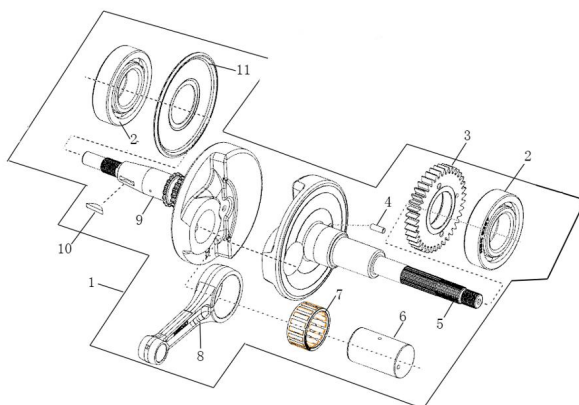
Removal

Refer to GEAR.

Inspection

Check each bearing journal of crankshaft for scoring, scuffing, cracks or other signs of wear. Check woodruff keyway and spline on the crankshaft for wear or damages.

Replace crankshaft if the gears are worn or otherwise damaged.

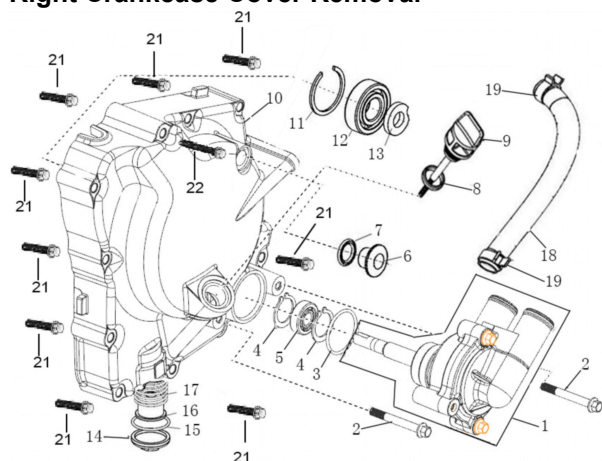


Installation

For installation of crankshaft in crankcase reverse the removal procedure.

3.16 RIGHT CRANKCASE COVER

Right Crankcase Cover Removal



Remove dipstick, O-ring and oil filter. Then drain engine oil.

Remove small view hole plug and O-ring.

Disconnect water pump intake pipe.

Unscrew two M6 bolts, then remove water pump, O-ring, circlip and bearing.

Remove 10 M6 bolts, then remove right crankcase cover from right crankcase.

Remove out O-ring, circlip and bearing from right crankcase cover.

Right Crankcase Cover Inspection and Cleaning

Check the O-ring of small view hole plug for cracks or damage. Replace if necessary.

Check O-ring, circlip, bearing and right crankcase cover for cracks or damage. Replace if necessary.

Check O-ring, spring and oil filter for cracks or damage. Replace if necessary.

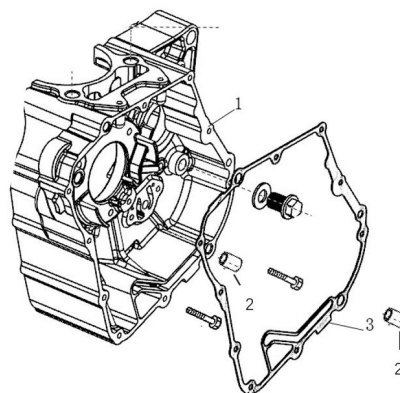
Check O-ring, circlip, bearing and water pump for cracks or damage. Replace if necessary.

Right Crankcase Cover Installation

For installation, reverse the removal procedure. However, pay attention to the following.

NOTE: At installation replace gasket for right crankcase cover.

Align the right crankcase cover to the dowel pin on the right crankcase block.



1. Right crankcase

2. Dowel pin

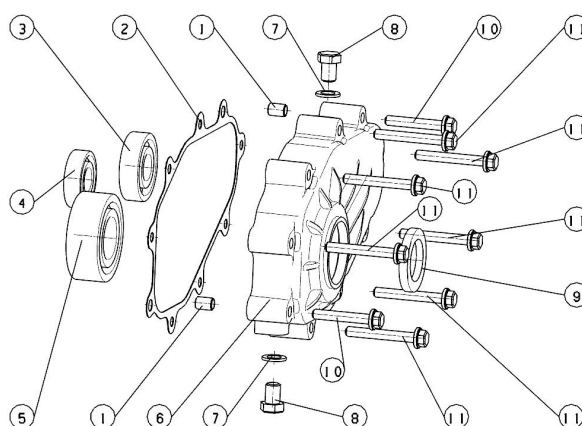
3. Gasket

Tighten M6 bolts on right crankcase cover in a crisscross sequence to 10-12N.m.

Apply lubricant on the o-ring of small view hole plug. Install water pump with water vent upward.

Tighten M6 bolts for water pump to 10-12N.m.

3.17 TRANSFER CASE COVER



1. Dowel pin

2. Gasket

3. Bearing

4. Bearing

5. Bearing

6. Transfer case cover

7. Washer

8. Drain plug

9. Oil seal

10. M8 bolt

11. M8 bolt

Make sure engine is on a level surface. Place a drain pan under the drain plug area.

Clean drain plug area and remove drain plug with its washer.

CAUTION: Pay attention not to lose washer on drain plug.

Wait a while to allow oil flow out of gearbox.

Loosen nine M8 bolts, then remove transfer case cover from transfer case.

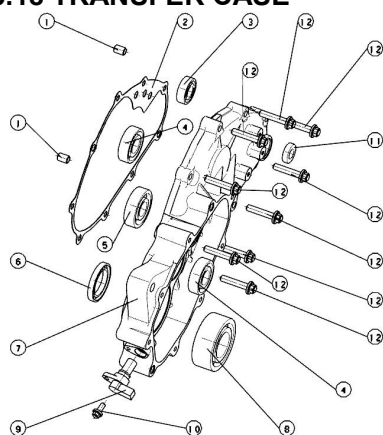
Inspection

Check the bearing and oil seal of transfer case cover for wear or damage. If damaged replace it.
Check the transfer case cover for wear or damage. If damaged replace it.

Installation

For installation, reverse the removal procedure. However, pay attention to the following.
Replace the gasket of transfer case cover.
Align the dowel pin to the transfer case.
Tighten M8 bolts of transfer case cover to 22-30N.m

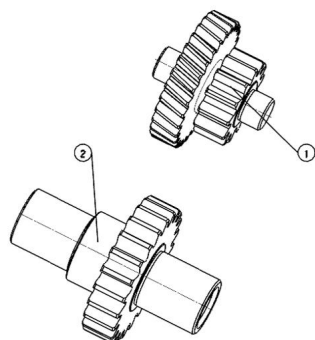
3.18 TRANSFER CASE



1. Dowel pin
2. Gasket
3. Bearing
4. Bearing
5. Bearing
6. Oil seal
7. Transfer case housing
8. Bearing
9. Speed sensor
10. M6 bolt
11. Oil seal
12. M8 bolt

Remove transfer case cover. (Refer to TRANSFER CASE COVER)

Remove transition axle and output shaft.



1. Transition axle
2. Transfer case cover output shaft

Loosen M6 bolt, then remove speed sensor from transfer case housing.

Loosen nine M8 bolts, then remove transfer case from left crankcase.

Inspection

Check the bearing and oil seal of transfer case housing for wear or damage. If damaged replace it.
Check the transfer case housing for wear or damage. If damaged replace it.

Installation

For installation, reverse the removal procedure. However, pay attention to the following.

Replace the gasket of transfer case housing.

Align the dowel pin to left crankcase.

Tighten M6 bolt of speed sensor to 10-12N.m.

Tighten M8 bolts of transfer case housing to 22-30N.m.

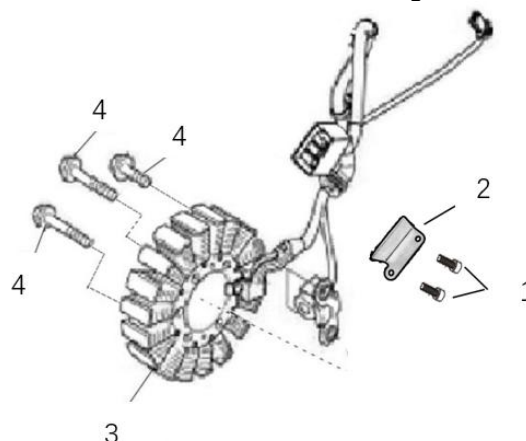
3.19 MAGNETO STATOR

Stator Removal

Remove right crankcase cover.

Remove two M5 bolts and trigger clamp.

Remove three M6 bolts, and the magneto stator.



1. 2xM5 bolt
2. Trigger clamp
3. Magneto stator
4. 3xM6 bolt

Stator Inspection

Check stator condition. If damaged replace it.

Check if stator wires are brittle, bad or otherwise damaged.

For electrical inspection, refer to CHARGING SYSTEM.

Stator Installation

For installation, reverse the removal procedure. However, pay attention to the following.

CAUTION: When installing the stator take care that the cable is in place (guide for wire).

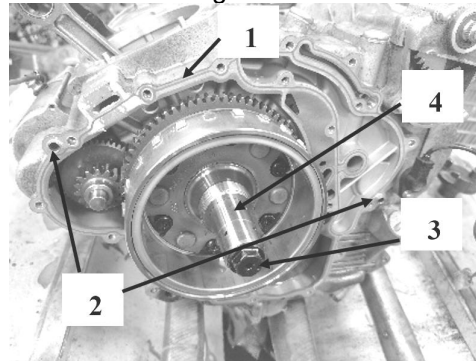
3.20 MAGNETO ROTOR

Rotor Removal

Remove right crankcase cover. Refer to RIGHT CRANKCASE COVER above.

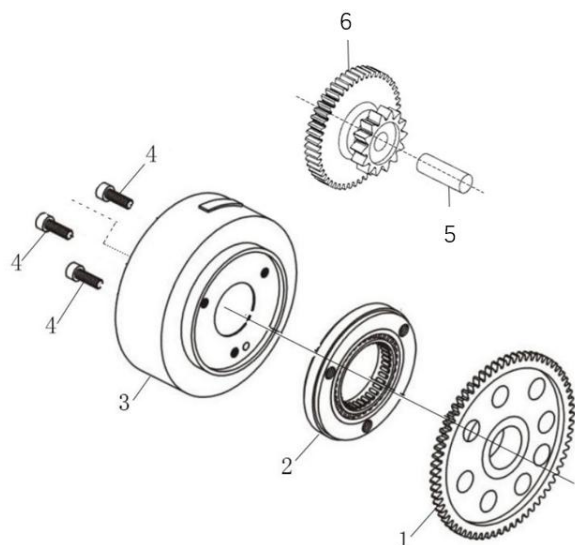
Remove gasket and dowel pins.

Remove M14 magneto bolt and washer.



1. Gasket
2. Dowel pin
3. M14 magneto nut
4. Washer

Remove magneto rotor from right crankcase.



1. Start plate gear
2. Clutch
3. Magneto rotor
4. 3xM8 Screw
5. Twin gear shaft
6. Twin gear

Remove the twin gear, twin gear shaft and start plate gear.

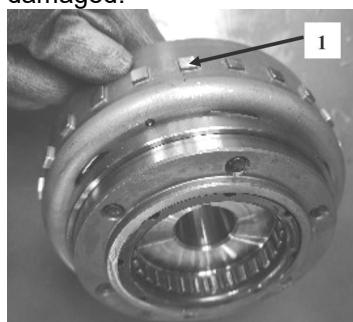
Remove three M8 screws for clutch and then remove clutch from the magneto rotor.

Rotor Inspection

Check inner side of rotor for scratches or other damage.

Check keyway on the magneto rotor for wear or damages.

Check if trigger wheel teeth are bent or otherwise damaged.



1. Rotor with trigger wheel

Check woodruff keyway on the crankshaft for wear or damages.

Check the teeth on plate gear and bearing for wear or damages. Replace parts as necessary.

Rotor Installation

For installation, reverse the removal procedure. However, pay attention to the following.

Install the start plate gear with lug boss facing outside to crankshaft.

Clean crankshaft and rotor with pulley flange cleaner.

Note: Do not drop the woodruff key from the crankshaft.

Align the woodruff keyway on the rotor to woodruff key on the crankshaft.

Apply LOCTITE 222 and thread-locker on the front

2 teeth of magneto nut. Tighten magneto nut to 50-55N.m.

Place the small gear facing outside when installing twin gear.

Apply engine oil on hole for the twin gear shaft before installing twin gear.

3.21 CLUTCH

Clutch Removal

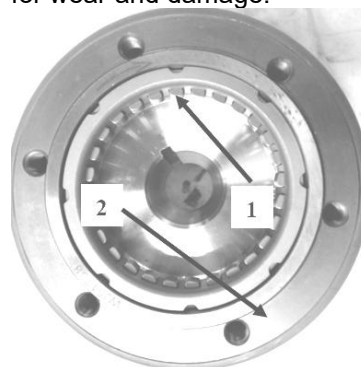
Remove right crankcase cover

Remove magneto rotor (refer to ROTOR above)

Remove three M8 screws for clutch and then remove clutch from the magneto rotor.

Clutch Inspection

Inspect sprag clutch and wedge on the sprag clutch for wear and damage.



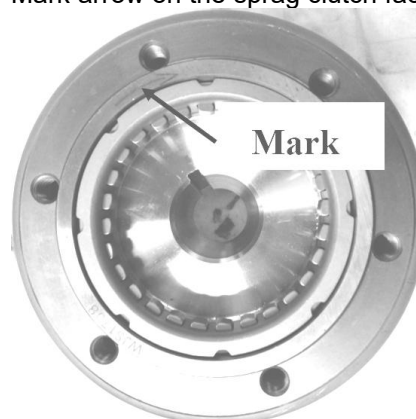
1. Wedge
2. Clutch

Clutch Installation

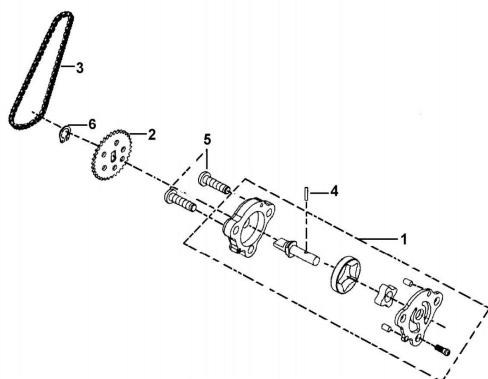
For installation, reverse the removal procedure. Pay attention to the following details.

Apply LOCTITE 263 and thread-locker on threads of sprag clutch bolt. Tighten M8 bolts for sprag clutch to 22-30N.m.

Mark arrow on the sprag clutch face outside.



3.22 OIL PUMP



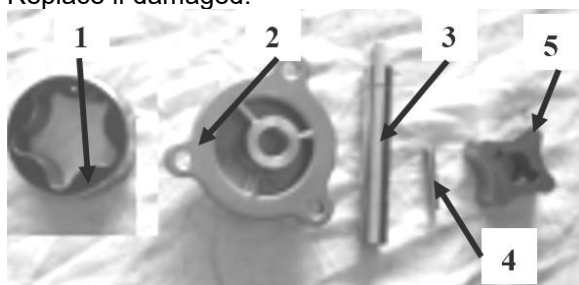
1. Oil pump
2. Oil pump gear
3. Oil pump drive chain
4. Pin
5. 2xM6 bolt
6. Circlip

Removal

Remove right crankcase cover.
Remove oil pump chain.
Remove circlip and oil pump gear.
Remove the M6 bolts and the oil pump cover.
Pull out the oil pump.

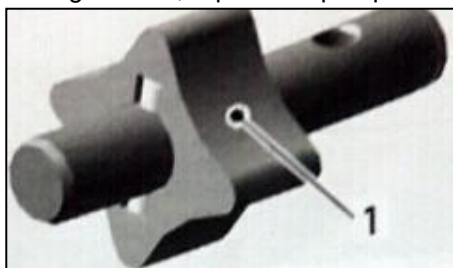
Inspection

Inspect oil pump, oil pump gear for wear or damage.
Replace if damaged.

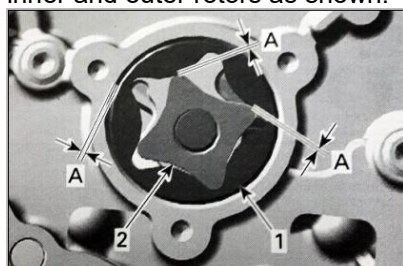


1. Outer rotor
2. Oil pump cap
3. Oil pump shaft
4. Dowel pin
5. Inner rotor

Check inner rotor for corrosion pin holes or other damages. If so, replace oil pump shaft assembly.

**1. Pitting on the teeth**

Using a feeler gauge, measure the clearance of inner and outer rotors as shown.



1. Outer rotor

2. inner rotor

A.--SERVICE LIMIT:0.25mm(0.09in)

If clearance of inner and outer rotors exceeds the tolerance, replace oil pump shaft assembly. Ensure to also check oil pump cover. If damaged, replace the complete oil pump assembly.

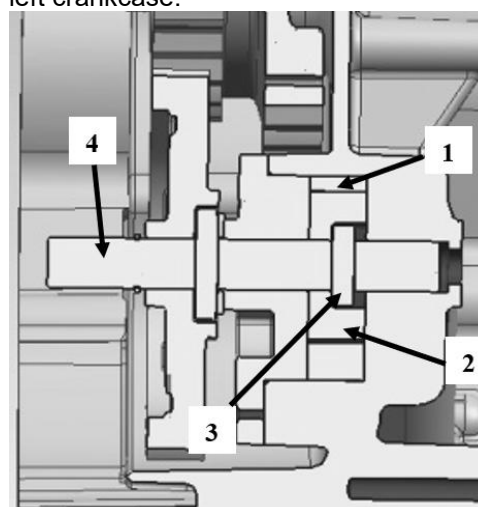
If clearance between outer rotor and its bore in crankcase exceeds the tolerance, replace the complete oil pump assembly and/ or the crankcase.

Installation

Install the outer rotor to the rotor hole of left crankcase block.

Put the inner rotor to oil pump shaft. Place dowel pin in the groove on oil pump shaft through hole on the inner rotor.

Install the inner rotor and shaft to shaft hole of the left crankcase.



1. Outer rotor
2. Inner rotor
3. Dowel pin
4. Oil pump shaft

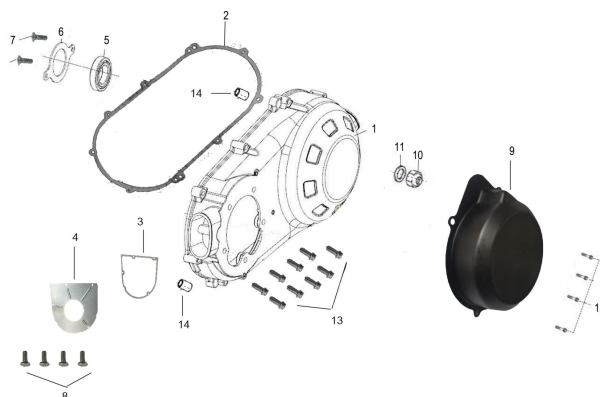
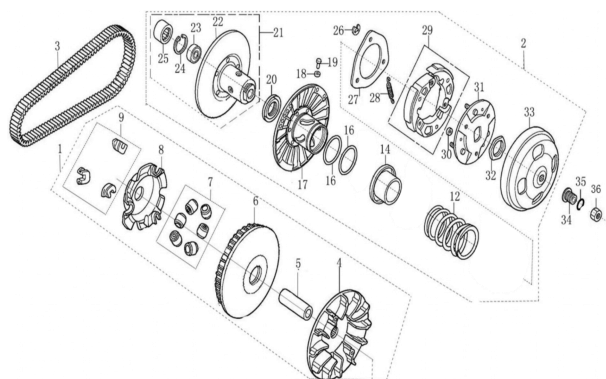
NOTE: The pin groove on the inner rotor faces up the inside.

Clean the rotor hole and apply engine oil before installation.

Put dowel pin to oil pump shaft through the hole. Install the oil pump gear, make sure the oil pump shaft in the groove of oil pump gear. Then install circlip on the oil pump shaft.

Tighten the M6 bolts for oil pump cover to 10-12N.m.

3.23 CVT TRANSMISSION



Never touch CVT while engine is running.
Never drive vehicle when pulley cover is removed.
Sub component installation and assembly tolerances require strict adherence to procedures detailed.

Never use any type of impact wrench at drive pulley removal and installation.

The clutch assembly is a precisely balanced unit.
Never replace parts with used parts from another clutch assembly

These pulleys have metric threads. Do not SAE threads puller. Always tighten puller by hand to ensure that the drive pulley has the same type of threads prior to fully tightening.

3.23.1 REMOVAL

Remove:

-4xM6 bolts and hand starter cover

-9xM6 bolts, left front cover and gasket.

Tighten M14 bolt to expand the driven pulley.

Remove collar from the drive pulley.

Remove the M12 bolt from the driven pulley.

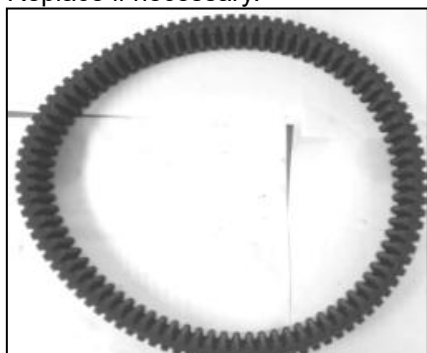
Remove the drive pulley and driven pulley from left crankcase block.

Remove the belt from pulley.

3.23.2 INSPECTION

Belt

Inspect belt for cracks, fraying or abnormal wear.
Replace if necessary.



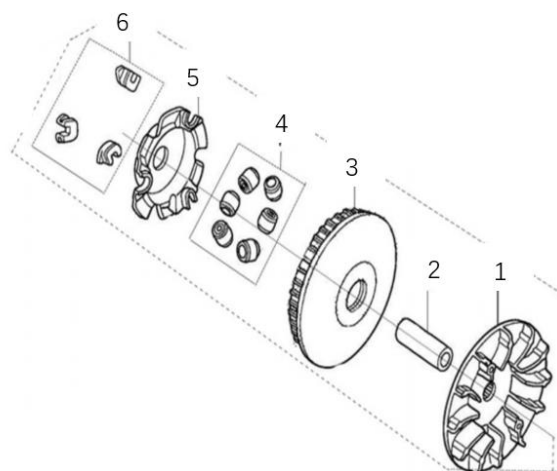
Drive Pulley

Drive pulley should be inspected annually for wear or damages.

Check drive pulley for cracks and sliding contact surface for excessive wear. Replace it if necessary.
Remove shaft sleeve, fixed plate, movable plate, backing plate, rollor and guiding block from the drive pulley.

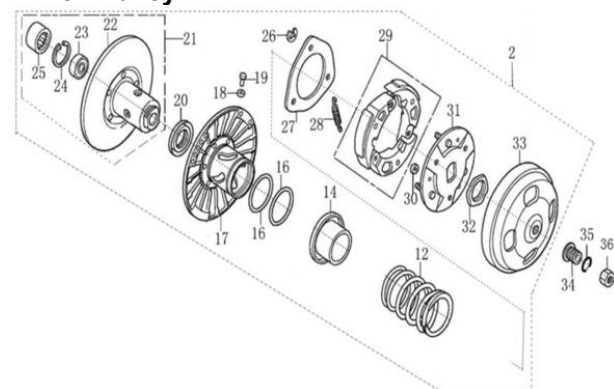
Check shaft sleeve, rollor and guiding block for

wear or damages. Replace drive pulley if necessary.



1. Fixed plate
2. Shaft sleeve
3. Movable plate
4. Rollor
5. Backing plate
6. Guiding block

Driven Pulley



The driven pulley face contacted with belt should be inspected annually for wear or damages. Replace sliding sheave if necessary.

Check bearing, spring, seal, O-ring, rubber sleeve for wear or damages. Replace if necessary.

3.23.3 INSTALLATION

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

The maximum drive belt life span is obtained when the drive belt has the proper rotation direction. Install it so that the word printed on the back of belt is pointing towards front of the vehicle, viewed from left cover.

Do not apply any lubricant on shaft and pulley.
 Clean pulley faces and shaft with dry cloth.
 Install drive pulley on crankshaft extension.
 Install driven pulley on main shaft extension.
 When the driven pulley is blocked, tighten M14 screw to 100-110N.m.
 To block the drive pulley, torque M14 bolt to 100-110N.m.
 Check the bearing of drive pulley turning smooth. If not, replace or reinstall it.
 Install dowel pin, gasket and left front cover.
 Install the center top screw in first.
 Tighten the M6 bolts in crisscross sequence to 10-12N.m.

3.24 ENGINE INSTALLATION

The engine installation is the reverse of the removal procedure. However, pay attention to the following.

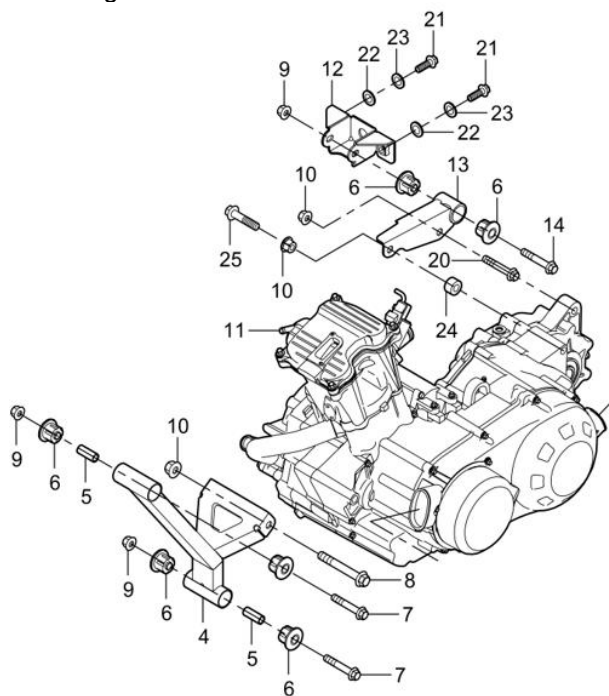
1. Prior to install engine, inspect condition of engine mounts. If necessary, replace the engine mounts, you can insert a punch in hole of engine mount bushing and push the other bushing out of the housing.

2. Make sure coolant and oil drain plugs are reinstalled and tight.

Refill engine oil and check the oil level with the dipstick.

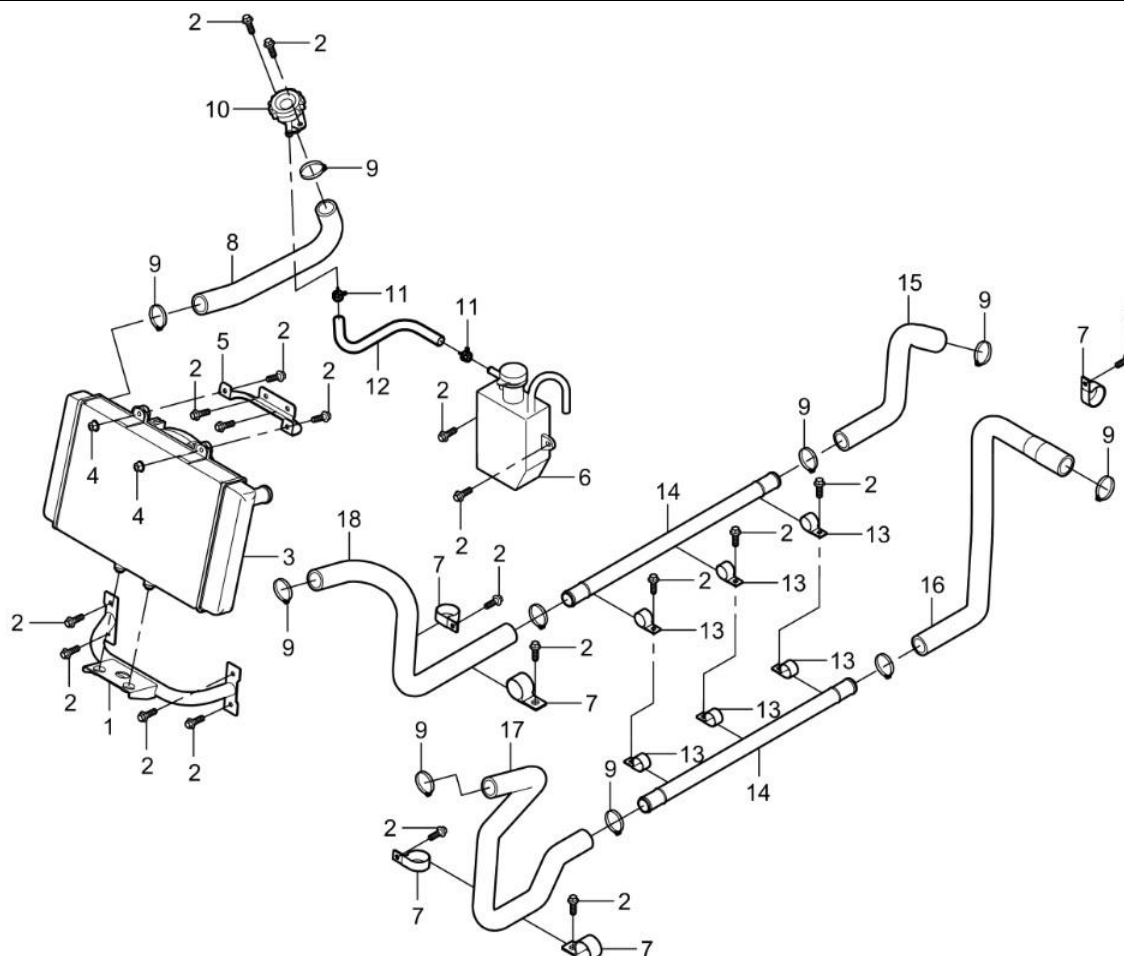
Tighten M10 bolts for engine front and rear mounting board to 65-78 N.m.

Tighten the M12 bolt for engine front and rear mounting board to 78-104 N.m.



4. COOLING SYSTEM

FAULT OVERHAULING.....	4-1	COOLING SYSTEM TEST.....	4-2
THERMOSTAT.....	4-2	RADIATOR AND CAP.....	4-2
COOLANT TANK.....	4-3	RADIATOR FAN.....	4-3
WATER PUMP.....	4-3		



Names of components:

1. Water Tank Bracket	2. M6 Bolt	3. Radiator	4. M6 Nut	5. Radiator Mounting Plate
6. Auxiliary Water Tank	7. Clamp	8. Inlet Water Pipe	9. Clamp	10. Radiator Cap
11. Spring Hose Clip	12. Auxiliary Coolant Tank Connecting Pipe	13. Clamp	14. Connecting Aluminum Tube	15. Cold Water Pipe (Rear)
16. Hot Water Pipe (Rear)	17. Hot Water Pipe (Front)	18. Cold Water Pipe (Front)		

4.1 FAULT OVERHAULING

1. If cover of radiator is open and temperature of cooling liquid is over 100°C, pressure of cooling liquid will be reduced rapidly and boiled. Vapor injection may cause danger and injuries. After drop of temperature of cooling liquid, use one cloth to cover the cover of radiator and then slowly open the cover. Cooling liquid can only be tested after complete cooling.

2. Cooling liquid is toxic. Do not drink it or splash it to skin, eyes or clothes. In case of splashing cooling liquid to your eyes, use clean water to wash your eyes completely and see the doctor. In case of splashing cooling liquid to your clothes, use soapy water to wash it rapidly. In case of drinking cooling liquid, vomit will be caused immediately. Please see the internist physician immediately. Store cooling

liquid well and keep it out of reach of children.

3. Check whether soil of fins is blocked or damaged. Correct curved fins. Use water and compressed air to clean soil. If damaged area reaches 20%, please replace radiator.

4. Pump overhauling can be carried out before dismantling engine.

5. Add cooling liquid to water tank. In addition to adding or exhausting cooling liquid, please do not open cover of radiator.

6. Do not splash cooling liquid to plastic parts. Once splashed, please use clean water for washing.

7. After dismantling cooling system, check leakagesituation of joint.

Sharp rise of water temperature

-Faults of radiator cover

-There is air in cooling system.

- Faults of water pump
- Faults of thermostat (thermostat is not open)
- Blockage of radiator tube or cooling tube
- Damage or blockage to radiator
- Incomplete cooling liquid
- Failure or faults of fan motor

No rise or slow rise of water temperature.

- Faults of thermostat (thermostat is not closed)
- Faults of line of water temperature display

Leakage of cooling liquid.

- Faults of water seal
- Aging, damage or improper sealing to O-ring.
- Aging, damage or improper sealing to gasket
- Improper installation of pipe or hose
- Aging, damage or improper sealing to pipe and/or hose

▲WARNING

Never start engine without coolant. Some engine parts such as the rotary seal on water pump shaft can be damaged.

4.2 COOLING SYSTEM TEST

▲WARNING

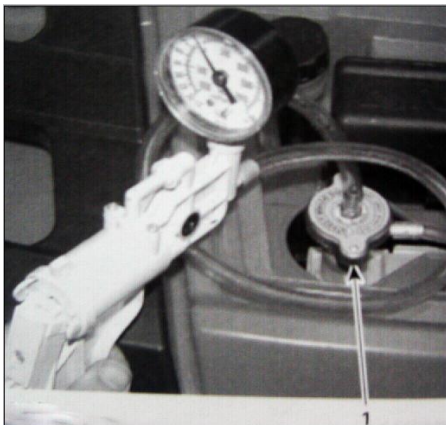
To avoid potential burns, do not remove the radiator cap or loosen the cooling drain plug if the engine is hot.

Remove the front panel and the radiator cap.

Install the test cap and a small hose pincher on overflow hose.

Using pressure/vacuum pump, pressurize system to 100 kPa.

Check all hoses, radiator and cylinder/base for coolant leaks or air bubbles.



Inspection

Check general condition of hoses and clamps tightness.

Check the leak if there is oil or coolant.

NOTE: Flowing coolant indicates a defective rotary seal. Oil indicates a defective inner oil seal. If either seal is leaking, both seals must be replaced at same time. Refer to *WATER PUMP SHAFT AND SEAL* in this section.

4.3 THERMOSTAT

The thermostat is a single action type. The thermostat is located on the top of cylinder head, on intake side.

Remove:

- thermostat housing screws and pull thermostat cover.
- thermostat with gasket out of the hole.



TYPICAL

1. O-ring
2. Thermostat cover
3. Screws

Thermostat Test

To check thermostat, put in water and heat water.

Thermostat should open when water temperature reaches 65°C(149°F).

Check if the O-ring is brittle, hard or damaged. If damaged, replace O-ring.

Thermostat Installation

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

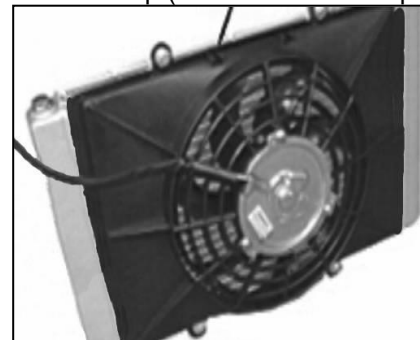
Install the thermostat cover then torque screws to 6N.m.

Check coolant level in radiator and coolant tank and top up if necessary.

Do not forget to bleed the cooling system. Refer to *COOLANT REPLACEMENT*.

4.4 RADIATOR AND CAP

Using a pressure cap tester, check the efficiency of radiator cap. If the efficiency is feeble, install a new 100 kPa cap (do not exceed this pressure).



Radiator Inspection

Check radiator fins for clogging or damage.

Remove insects, mud or other obstructions with compressed air or low-pressure water.

Radiator Removal

Drain cooling system.

Remove front bumper and front headlight cover.

Remove front panel and hood.

Remove:

- Radiator inlet and outlet hoses
- Overflow hose.
- Coolant tank support bolt.
- Remove radiator.

Radiator Installation

For installation, reverse the removal procedure.

Pay attention to the following detail.

Fill up the radiator. Refer to *COOLANT*

REPLACEMENT, in this section.

Check for any coolant leakage from radiator and hoses.

Tighten the M6 bolts for retaining radiator to 9-12N.m.

4.5 COOLANT TANK

The coolant expands as the temperature (up to 100-110°C) and pressure rise in the system. If the limiting system working pressure cap is reached 110kPa, the pressure relief valve in the pressure cap is lifted from its seat and allows coolant to flow through the overflow hose into the overflow coolant tank.

Tank Removal

Remove:

- The front bumper and front headlight cover.
- The front panel and hood.
- Coolant tank support bolt.
- Water hose and clamp.

Tank Installation

The installation is the reverse of the removal procedure.

4.6 RADIATOR FAN

Radiator Fan Removal

Remove bolts.

Separate the radiator and fan.

Radiator Fan Test

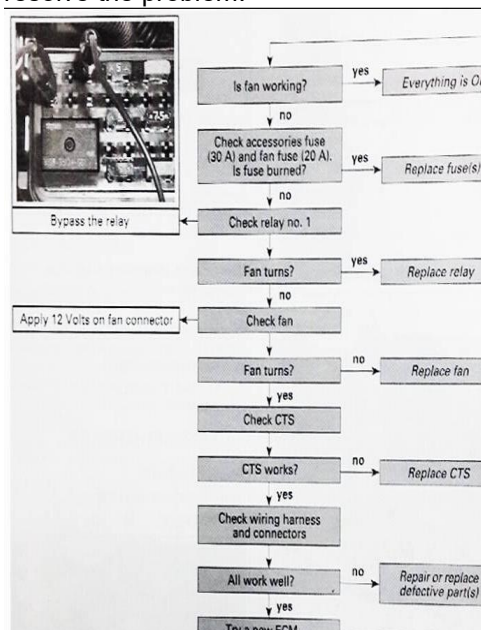
NOTE: The ECU controls the radiator fan by the input of the coolant temperature sensor (CTS). The radiator fan should turn on when coolant temperature reaches 98°C and should turn off when the coolant cools down at 95°C(203°F).

Connect the vehicle to Diagnostic Tool. Refer to ENGINE MANAGEMNT for procedure and connector location.

In ACTIVATION folder, press COOLANT FAN button.

If fan turns, check CTS, wiring harness and connectors. If all parts are good, replace the ECU.

If fan does not turn when COOLANT FAN button is pressed, use the following troubleshooting chart to resolve the problem.



Radiator Fan Installation

For the installation, reverse the removal procedure.

4.7 WATER PUMP

It is located on the right crankcase cover.

Water Pump Removal

▲ WARNING

To avoid potential burns, do not remove the radiator cap or loosen the cooling drain plug if the engine is hot.

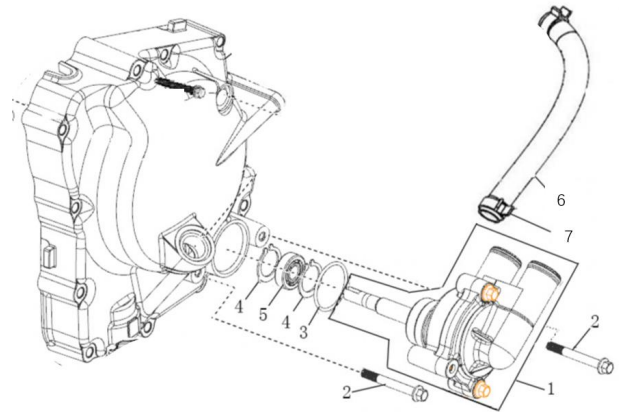
Tilt cargo box.

Drain cooling system.

Remove radiator outlet hose from water pump.

Remove water pump outlet hose from water pump.

Remove M6 bolts for water pump.



TYPICAL

1. Water pump

2. 2xM6 bolt

3. Sealing ring

4. Circlip

5. Bearing

6. Water pump outlet hose

7. Clamp

Remove water pump from right crankcase cover.

Water Pump Inspection

Check if sealing ring is brittle, hard or damage and replace as necessary.

Check water pump shaft for wear or damage.

Replace if damaged.

Check bearing and circlip for wear or damage.

Replace if damaged.

Water Pump installation

The installation is the opposite of the removal procedure.

CAUTION: To prevent leaking, take care that the sealing ring is exactly in groove when you reinstall the water pump.

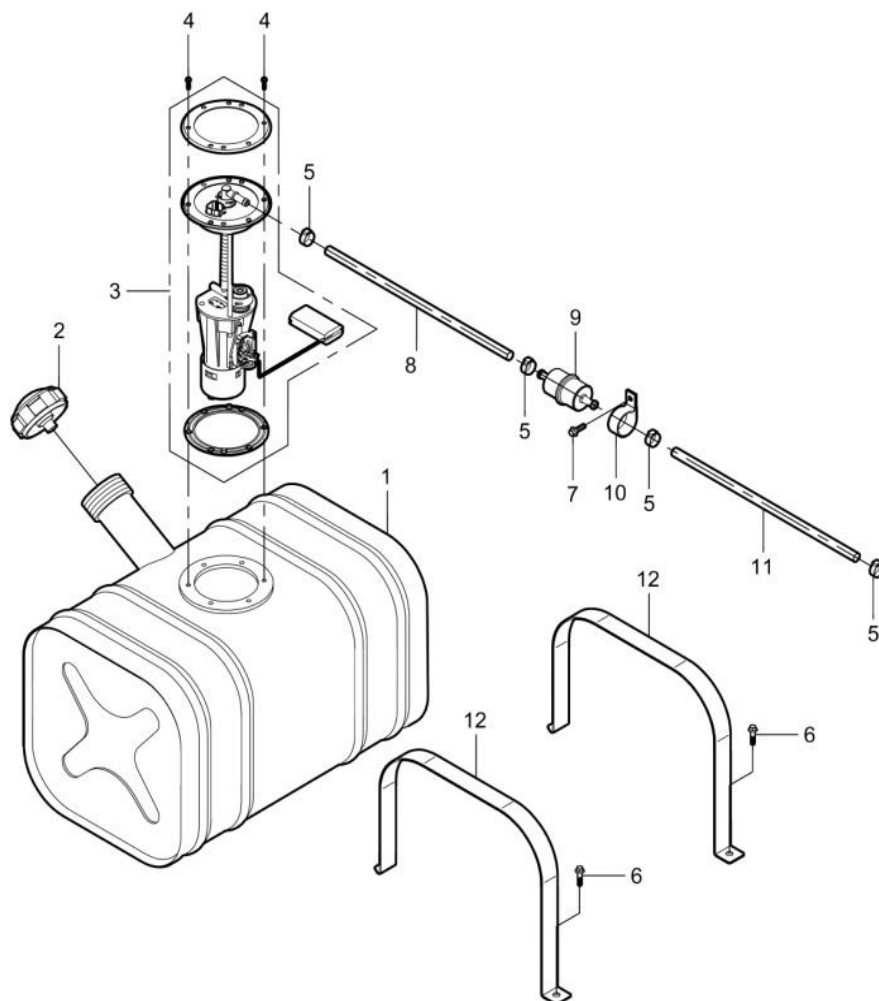
Install the shaft to the right crankcase cover. Then use circlip to retain the water pump shaft.

Tighten M6 bolts for water pump in the crisscross sequence to 10-12N.m.

5. FUEL SYSTEM

STRUCTURE.....	5-1	DISMANTLING.....	5-1
FUEL PRESSURE TEST.....	5-2	FUEL FILTER.....	5-2
FUEL PUMP.....	5-2	FUEL TANK.....	5-3

5.1 STRUCTURE



Names of components:

1. Fuel Tank	2. Tank Cap	3. Fuel Pump	4. M5 Bolt	5. Clamp
6. M8 Bolt	7. M6 Bolt	8. Fuel Hose	9. Fuel Filter	10. Hose Clamp
11. Fuel Hose	12. Fuel Tank clamp			

5.2. DISMANTLING

The fuel system of a fuel injection system holds much more a pressure than on carbureted vehicle. Prior to disconnecting a hose or to removing a component from the fuel system, follow the recommendation described here.

Fuel hoses remain under pressure at all times. Always proceed with care and use appropriate safety equipment when working on pressurized fuel system. Wear safety glasses. Proceed with care when removing/installing pressure test equipment or disconnecting fuel hose connections. Cover the fuel hose connection with an absorbent shop rag. Slowly disconnect the fuel hose to minimize spilling. Wipe off any fuel spillage in the engine compartment. Do not allow fuel to spill on hot engine parts and/or electrical connectors. Never use a hose pincher on injection system high pressure hoses. Replace any damage or deteriorated fuel hoses.

When the repair is completed, ensure that all hoses

are connected and secured.

Always perform the fuel pressure test if any component has been removed. A pressure test must be done before turning the ignition key to ON and setting the engine stop switch to RUN. The fuel pump is activated each time in these conditions.

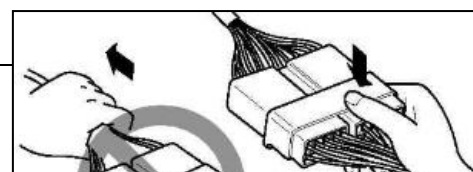
To locate a leak, pressurize the system. Check for leaking fuel or fuel odor. Spray soapy water on the hose connections and injectors. Air bubbles will show the leaking area.

Inspect the fuel hoses, fuel tank, fuel tank cap for damage, clogging and leakage of fuel. If any damages are found, replace the defective parts with the new ones.

Fuel tank combination

1. Remove seat. Disconnect wire group plug-in of fuel sensor, separating fuel sensor from wire group.

Note: Do not pull the plug directly when you pull it out. Press the plug by hand and pull it out at both ends.



▲ WARNING

Special attention should be paid to explosive gasoline.

2. Unplug the fuel hose after releasing the hose clamp, and then loose the six screws on the oil pump cap. After completing the above steps, the oil pump can be removed from the tank for repair or replacement.



Note: Clamp should not be used repeatedly; new clamp should be used upon installation.

When pulling out fuel pipe, attention should be paid to pressure inside fuel pipe, splash proof measures should be taken and vessel should be prepared to discharge fuel inside fuel pipe in advance.

3. Loose the clamp and bolt for the throttle valve, unplug the relevant connector, and remove the throttle valve from the body for maintenance.

Tightening torque of M8 bolt for throttle valve: 22-30N.m

4. Unplug the high voltage coil and remove the spark plug with a tool.

Available overhaul:

Replace and conduct daily maintenance of spark plug.

5. After removing the screw with a screwdriver, open the throttle valve cover and remove the pin of the throttle cable head from the throttle cable. Then separate the throttle cable and throttle valve.

Available overhaul:

Replace and conduct daily maintenance of throttle valve combination and accelerator cable combination.

6. Disconnect cylinder fuel nozzle, crankshaft position sensor and starting motor plug-in separately.

Remove the hose clamp and pull out the fuel hose connected to the fuel injector.

Available overhaul:

Replace and conduct daily maintenance of fuel pipe.

Fuel hose combination

Remove one screw, fuel filter support and fuel filter. The arrow on the fuel filter faces to the cylinder.

Note: Clamp should not be used repeatedly; new clamp should be used upon installation.

After completing dismantling fuel system, check fuel pipe, fuel filter and fuel pump filter element for block and crack. Replace the component with a new one, if necessary.

Installation

Conduct installation based on reversed sequence of dismantling.

▲ WARNING

To prevent fuel leakage, seal gasket, O-ring and ear clamp should be replaced upon installation. Fuel pipe should be replaced once every two years.

Do not smoke or near an open flame when performing maintenance on the fuel system.

5.3 FUEL PRESSURE TEST

The pressure test will show the available pressure at the fuel pump outlet. It validates the pressure regulator, the fuel pump and leaks in the system.

Before proceeding to the pressure test ensure the battery is fully charged. Battery voltage must be over 12 volts.

Ensure there is enough gas in fuel tank.

Remove seat.

Disconnect outlet hose.

Install fuel pressure gauge and T-fitting between disconnected hoses.

Turn ignition key ON and set engine stop switch to RUN and observe fuel pressure. Turn ignition key off then back on. Repeat the test.

Standard fuel pressure: 350kpa.

A rapid pressure drop indicates leakage is from the fuel rail, If there is not leaking then replace fuel pump.

A slow pressure drop indicates leakage either from the fuel injector or from the fuel pressure regulator. Check fuel injector and the fuel pressure regulator for leaks. If it is not leaking then replace fuel pump module.

If no leakage, start engine and observe fuel pressure. The fuel pressure should be the same as above.

If pressure is within limits, fuel pump and the fuel pressure regulator are working adequately.

Remove pressure gauge from inlet hose. Reconnect inlet hose.

5.4 FUEL FILTER

Replace fuel filter as per amintenance schedule.

Filter Removal

Remove M6 screw, clamp and pull hoses off. Detach filter from body.

Filter inspection

If fuel filter is suspected to be clogged, it may be checked as follows:

Using low compressed air, check if fuel filter is clogged. Air should flow easily through filter. In doubt, install a new filter.

Filter installation

Use arrow on filter to position it according to fuel flow.

5.5 FUEL PUMP**Fuel pump electrical test**

When turning ignition key ON, the fuel pump should run for 5 seconds to build up the fuel pressure in the system.

If the pump does not work, disconnect the connector from the fuel pump.

Install a temporary connector to the fuel pump connector. Apply 12V to this test harness.

CAUTION: Running the fuel pump a few minutes with reverse polarity can damage the pump.

If pump does not run, replace a new pump.

Other wise, check fuse and if good, probe terminals of fuel pump connector on vehicle harness or its connector, Repair or replace appropriate part.

Fuel pump removal

Remove fuel pump outlet hose and harness.

Remove fuel pump retaining screws.

Gently push pump up.

CAUTION: While pulling out the fuel pump, pay attention to fuel sensor float arm. Float arm can get stuck and bend which can reduce the fuel sensor capabilities.

Fuel pump installation

For installation, reverse the removal process but pay attention to the following.

Install a new gasket.

Pay attention to pump orientation.

Tighten retaining screws.

Install hose properly on OUT nipples and harness.

5.6 FUEL TANK

Fuel tank draining

Never perform this operation when the engine and/or the exhaust system is/are hot.

Never sue a hose pincher on injection system high pressure hoses.

Remove fuel tank cap and siphon gas in an approved fuel container.

Fuel tank removal

Remove seat.

Disconnect vent line and fuel hose from fuel tank.

Remove the fuel tank clamp.

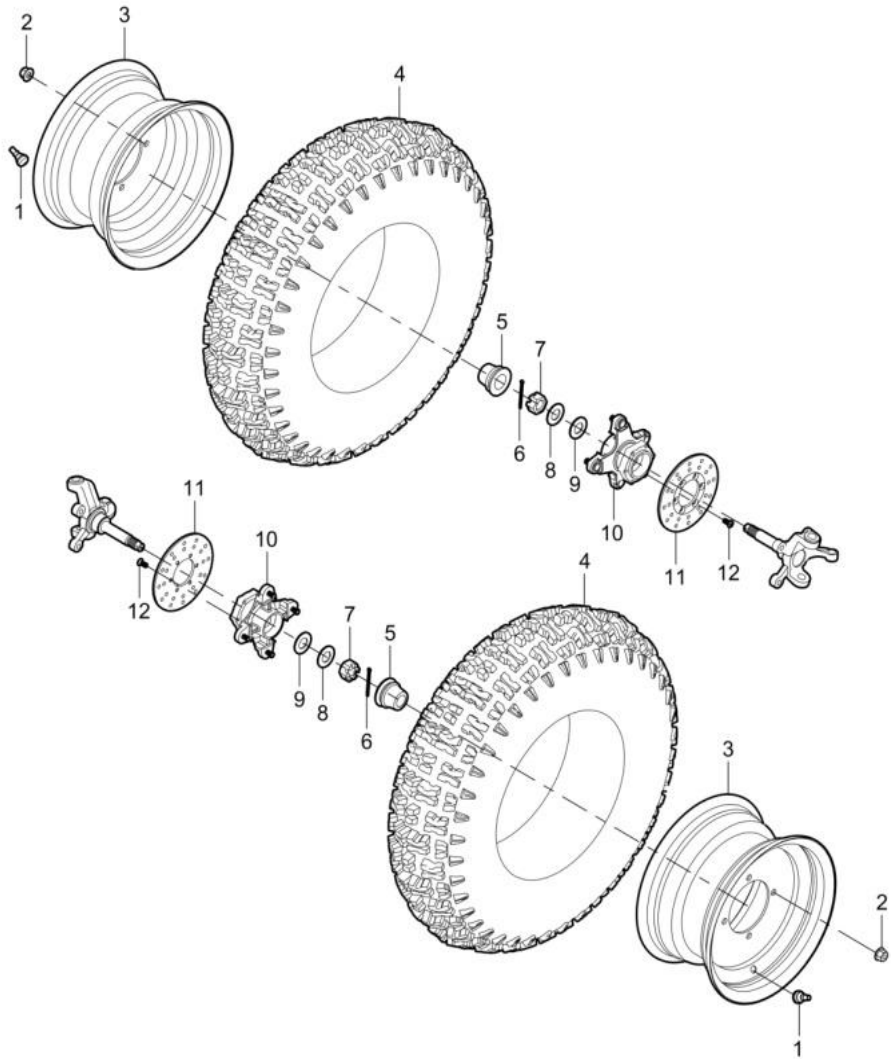
Fuel tank inspection

Inspect fuel tank for any damage or cracks which may result in fuel leaks. If so replace tank with a new one. Inspect tank and protector attachment points for damage. Inspect protector for damage.

6. DRIVE TRAIN

FRONT DRIVE.....	6-1	REAR DRIVE.....	6-2
TIRES AND WHEELS.....	6-2		

6.1 FRONT DRIVE



Names of components:

1. Air Valve	2. M10 Nut	3. Front Rim	4. Front Tire	5. Wheel Dust-Proof Cover
6. Cotter Pin	7. M16 Castle Nut	8. Washer	9. Washer	10. Front Wheel-Hub
11. Front Brake Disc	12. M6 Nut			

Front drive disc

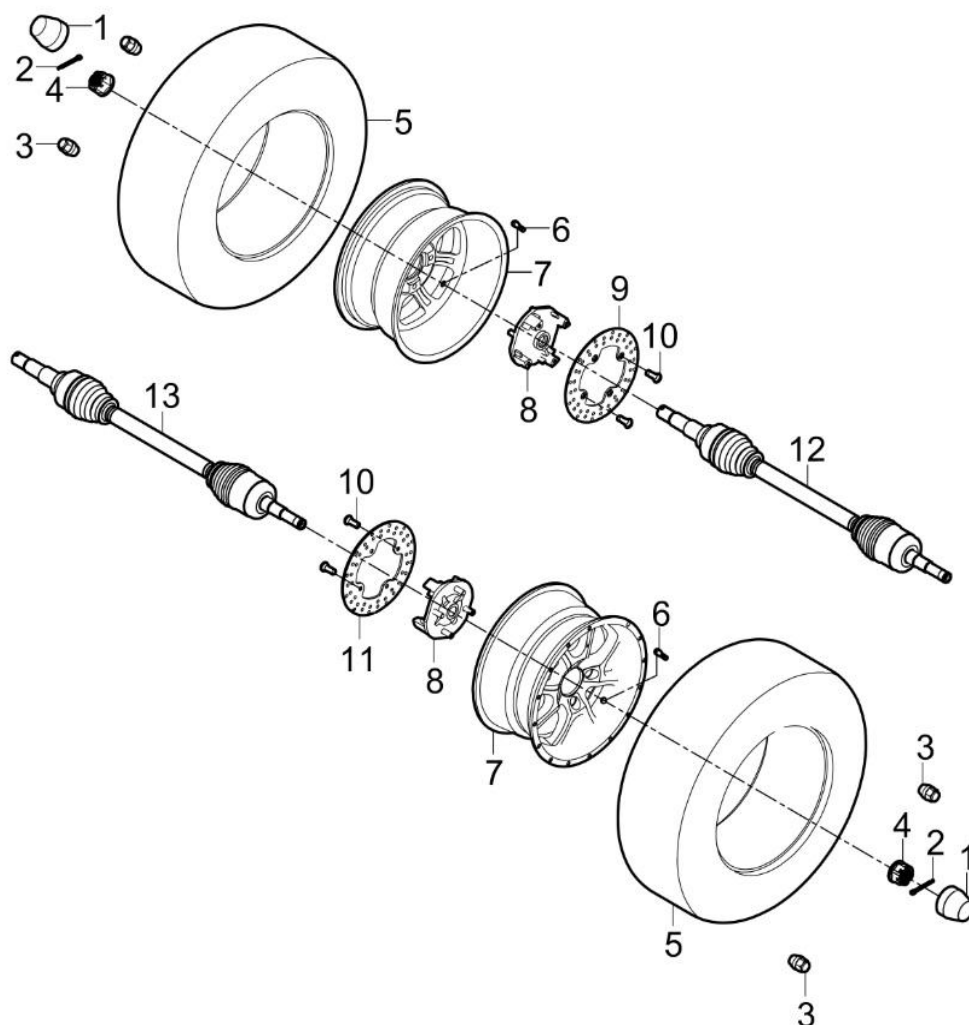
Place the vehicle at the parking rack position and lift the front of the vehicle with a jack.
Remove the nuts, cotter pins and other standard parts from the front wheel, pull the rim outward and place the rim and the front drive disc on one side.
Check whether or not the rim is broken and cracked, etc., and check whether the spline in the front drive disc is damaged. If so, please replace it.

Installation

The installation is the reverse of the removal procedure.
Ensure tighten the bolts to specified torque.

Installation location	Specific:
Mounting nut of wheel rim	M10
Nut of wheel hub	M16

6.2 REAR DRIVE



1. Wheel Dust-Proof Cover	2. Cotter Pin	3. M10 Nut	14. M24 Nut	5. Rear Tire
6. Air Valve	7. Rear Rim	8. Rear Wheel-Hub	9. Rear Brake Disc	10. M8 bolt
11. Rear Brake Disc	12. Rear Half Shaft	13. Rear Half Shaft		

Place the vehicle at the parking rack position and lift the rear of the vehicle with a jack.

Remove the nuts, cotter pins and other standard parts from the rear wheel, pull the rim outward and place the rear wheel and the rear drive disc on one side.

Check whether or not the rim is broken and cracked, etc., and check whether the spline in the rear drive disc is damaged. If so, please replace it.

Rear half shaft

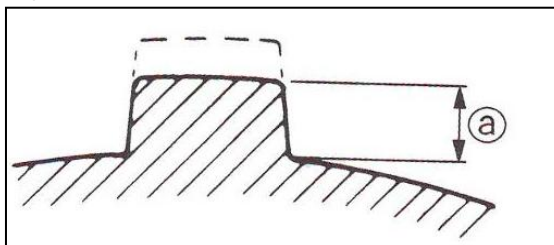
Remove the half shafts on both sides from the gearbox, and check the outer splines of the half shafts for damage, cracks, etc.

Check whether dust-proof sleeve is pulverized, cracked, etc. If any, please replace it in time. Remove clamp for dust-proof sleeve, then remove universal joint of differential side. Remove and replace the dust-proof sleeve from the differential side of drive shaft.

6.3 TIRES AND WHEELS

Tire thread

When the tire groove decreases to 6 mm (0.24 in) due to wear, replace the tire.



When the tires are replaced, never install a bias tire with a radial tire. Such a combination could create handling and/or stability problems.

Do not mix tires of different size and/or design on the same axle.

Front and rear tire pairs must be the identical model and manufacturer.

For unidirectional tread pattern, ensure that the tires are installed in the correct direction of

rotation.

The radial tires must be installed as a complete set.

In dismantling tires, use special crowbar and rim protection device.

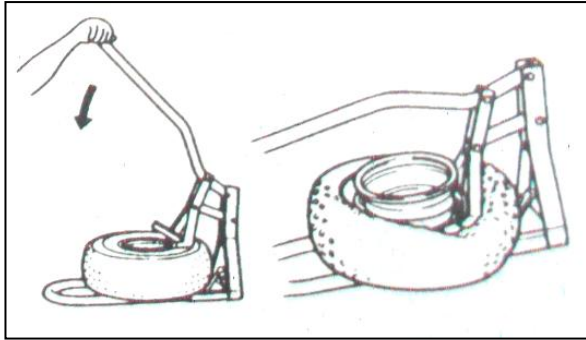
Tire replacement

Use jack to support vehicle and ensure its no dropping.

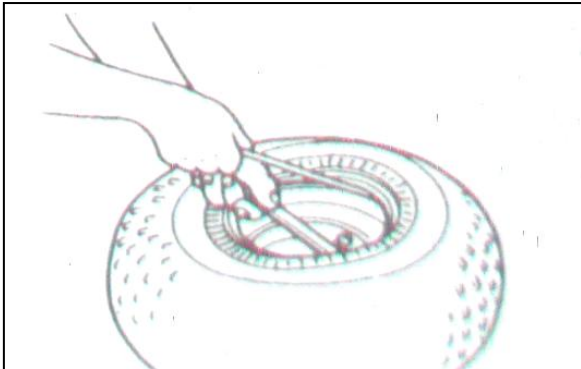
Remove the wheels.

After removing the air valve cap, release the tire pressure by depressing the valve.

Dismount the bead from the rim completely.

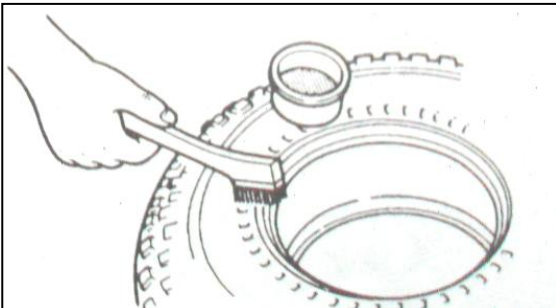


Separate the tire from the rim by using a set of tire levers and rim protectors.



CAUTION: When using the tire lever, do not scratch or hit the sealing portion of the wheel or it may cause air leakage.

Apply tire lubricant to the new tire bead and the flange of the rim. But never apply grease, oil or gasoline to the tire bead because they will deteriorate the tire.

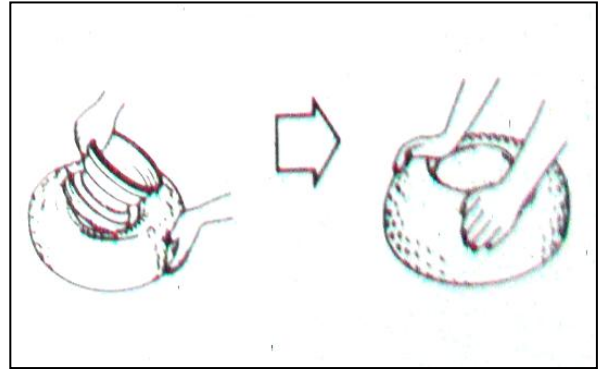


CAUTION: The standard tire fitted on this vehicle is AT24x8-12 for the front and AT24x8-12 for the rear.

The use of tires other than the standard may cause instability. It is highly recommended to use the specified tire.

Inspect the sealing portion of the rim for contamination and distortion before installing the tire on the rim.

Mount the new tire on the rim.

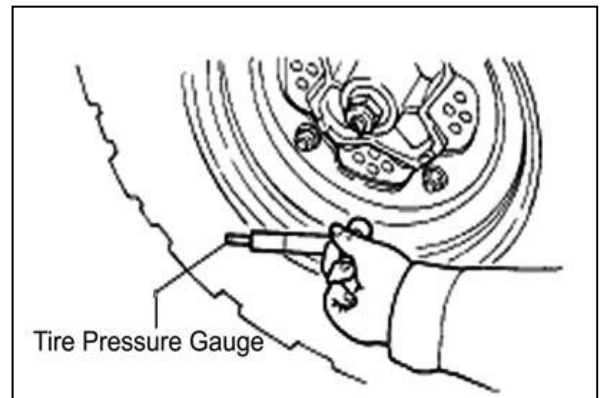


CAUTION: When installing each tire, make sure the arrow on the tire points in the direction of rotation. Also make sure the outer side of the wheel rim is facing outward.

Inflate the tire to seat the tire bead.

Check the rim line cast on the tire side walls. It must be equidistant from the wheel rim all the way around. If the distance between the rim line and the wheel rim varies this indicates that the bead is not properly seated. If this is so, deflate the tire completely, and unseat the tire bead on both sides. Then coat the bead with clean water and re-seat the tire.

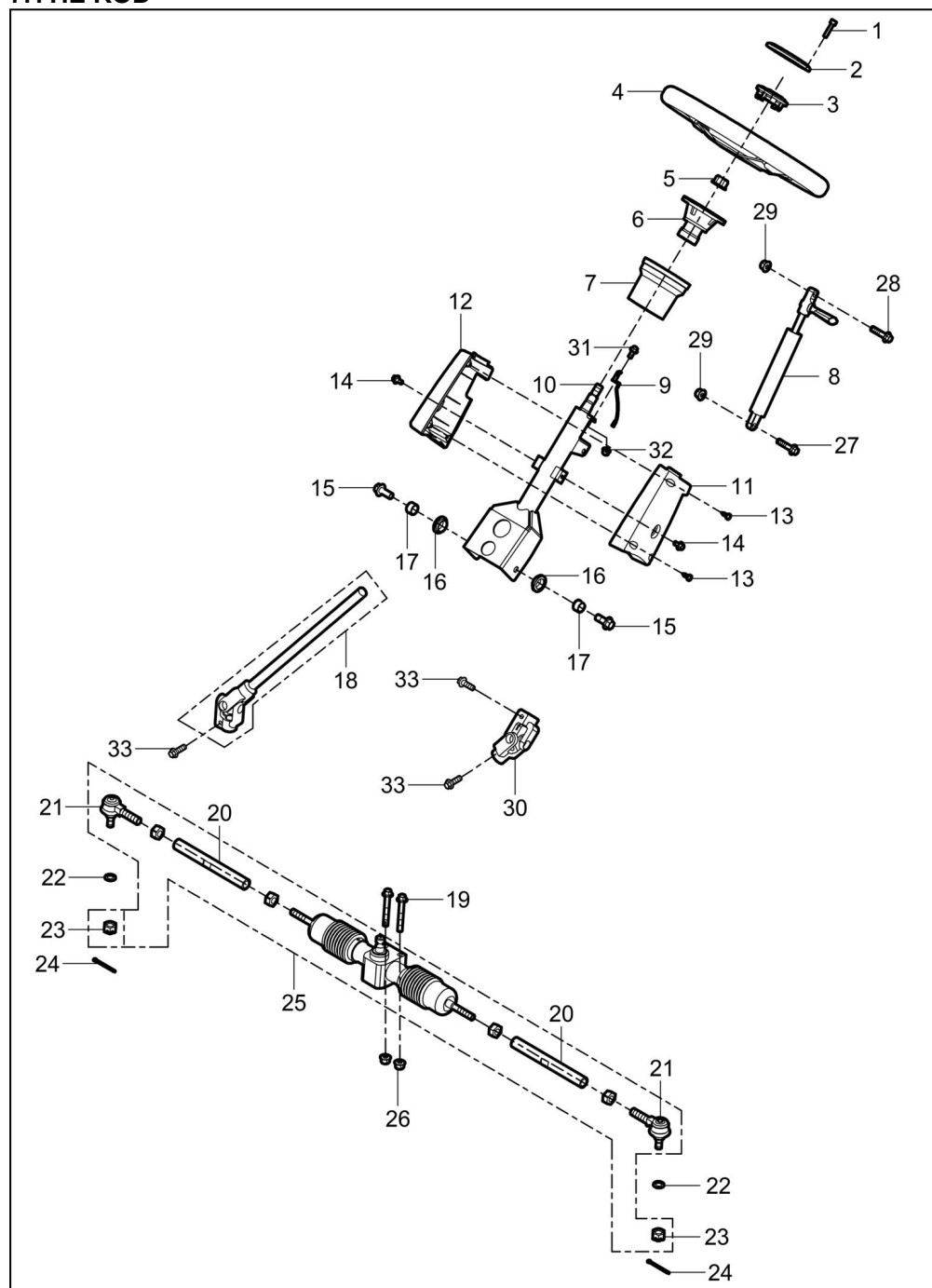
Adjust the tire pressure to specification.



7. STEERING SYSTEM

Tie rod.....	7-1	STEERING ALIGNMENT.....	7-2
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7.1 TIE ROD



1. M5 Screw	2. Steering Wheel Cover	3. Horn Switch	4. Steering Wheel
5. M12 Locking Nut	6. Steering Wheel Connected Set	7. Steering Wheel Lower Cover	8. Air Spring
9. Horn Switch Assy	10. Steering Column	11. LH Steering Column Cover	12. RH Steering Column Cover
13. ST3.5 Screw	14. M6 Screw	15. M8 Bolt	16. Steering Nylon Sleeve
17. Steering Inner Bush	18. Connecting Rod	19. M8 Bolt	20. Steering Tie Rod
21. Steering Tie Rod Ball Joint	22. Washer	23. Castle Nut M10	24. Cotter Pin
25. Redirector Assy	26. M8 Nut	27. M6 Bolt	28. M6 Bolt
29. M6 Nut	30. Universal Joint	31. M4 Screw	32. M4 Nut
33. M8 Bolt			

Removal

Remove the M8 bolt and universal joint.

Remove front wheel, wheel-hub, brake disc.

Remove castle nut, cotter pin and the knuckle.

Remove ball joint and tie rod.

Inspection

Inspect the tie rod for distortion or damage. If any damage are found, replace the tie rod with a new one.

Inspect the tie ends for smooth movement. If there are any abnormalities, replace the tie rod end with a new one.

Inspect the tie rod end boot for wear or damage. If any damage are found, replace the tie rod end with a new one.

Tie rod installation

1. For the installation, reverse the removal procedure.

2. Tighten tie rod lock nuts finger tight.

3. Install tie rod on steering knuckle.

4. Torque tie rod castle nut to 78-104N.m.

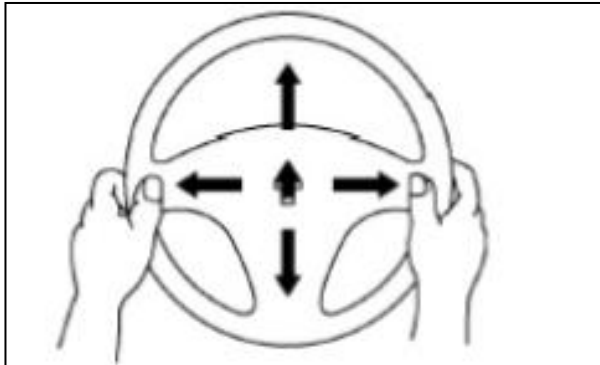
5. Install new cotter pins. Both ends of cotter pins must be folded around nut.

7.2 STEERING ALIGNMENT

Park vehicle on flat ground, make sure the tire pressure for right and left tires is same and set to the proper specification, set the front wheels in the straight position, then place a load of 75kg on the seat.

Steering wheel looseness check

Move the steering wheel as shown in the figure, check the steering column bearing wear, steering shaft reverse joint clearance, loose steering wheel and loose steering column. Replace or repair if necessary.

**Steering wheel clearance check**

At the position directly in front of the steering wheel, lightly turn the steering wheel to the left and right to adjust the clearance to within the specification. If the clearance exceeds the specified range, whether the steering shaft universal joint is worn or the steering gear clearance is too large, it should be corrected.

Steering Alignment Check

Measure the distance A and B of the front wheels and calculate the difference.

Toe-in: $B - A = 5\text{mm}$

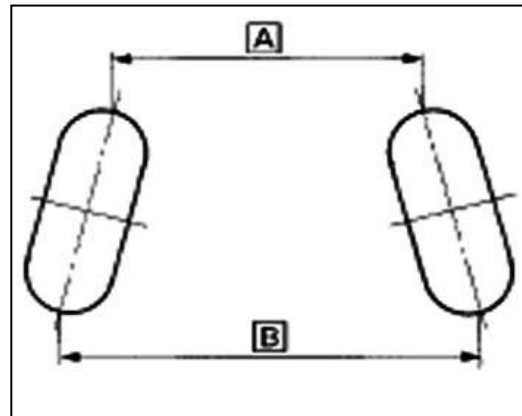
A: front of front wheel

B: rear of front wheel

Out of range of toe-in: → Adjust nut of tie rod

CAUTION: After adjusting toe-in, first rotate steering wheel from center position to the left and

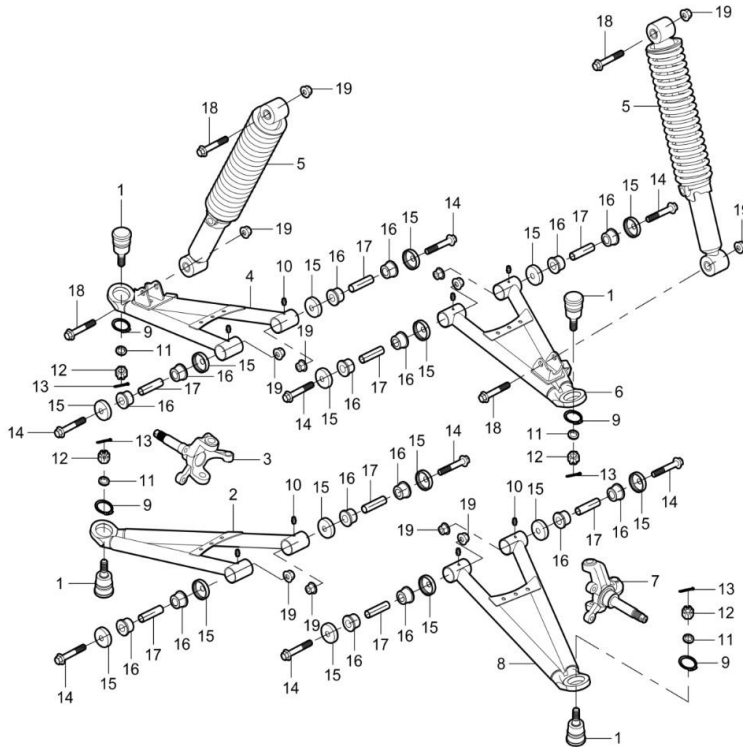
right completely, to ensure that is the same corner, then slowly run vehicle to see whether its direction can be controlled.



8. SUSPENSION SYSTEM

FRONT SUSPENSION.....	8-1	REMOVAL AND DISASSEMBLY.....	8-1
INSPECTION.....	8-1	REASSEMBLY.....	8-2
REAR SUSPENSION.....	8-3	REMOVAL AND DISASSEMBLY.....	8-3
INSPECTION.....	8-3	REASSEMBLY.....	8-4

8.1 FRONT SUSPENSION



1. Ball Joint	2.RH Lower Front Suspension Arm	3. RH Steering Knuckle	4.RH Upper Front Suspension Arm
5. Front Shock Absorber	6. LH Upper Front Suspension Arm	7. LH Steering Knuckle	8. LH Lower Front Suspension Arm
9. Snap Ring	10. Grease Zerk	11. Washer	12. M12 Castle Nut
13. Cotter Pin	14. M10 Bolt	15. Dustproof Cover	16.Arm Nylon Sleeve
17. Arm Inner Sleeve	17. M10 Bolt	18. M10 Nut	

The procedure explained below is the same for the RH and LH sides unless otherwise noted. During assembly or installation, use the torque values and service products as in the torque table.

In order to prevent collapse of vehicle, please do not dismantle left and right suspensions simultaneously.

Before overhauling front suspension system, please ensure stable support of vehicle.

8.2 REMOVAL AND DISASSEMBLY

Loosen nut of the appropriate wheel.

Install a jack stand under the frame to lift the front of vehicle off the ground until shock absorber is fully extended then.

Remove wheels, brake caliper and wheel-hub.

Remove ball joint, steering knuckle from tie rod.

Remove front shock absorber.

Remove upper and lower front suspension arm.

8.3 INSPECTION

Shock absorber

Inspect the shock absorber for oil leakage or damage, inspect the bushing for wear or damage. If any damage are found, replace the front shock absorber with a new one.

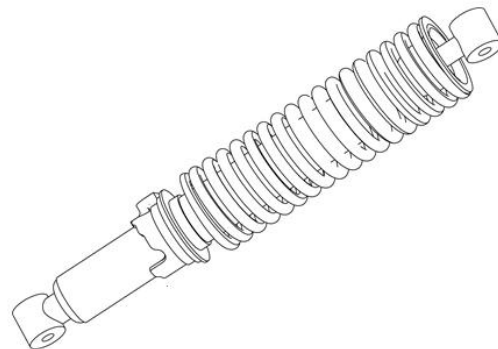
Extend and compress the piston several times over its entire stroke. Check that it moves smoothly and with uniform resistance with rod up. Any of the following conditions will denote a defective shock:

-A skip or hang up when reversing stroke at mid-travel.

-Seizing or binding conditions except at extreme end of either stroke.

-A gurgling noise after completing one full compression and extension stroke.

Replace shock if any these conditions are found.



Knuckle

Inspect the knuckle for damage. If any damages are found, replace the knuckle with a new one.



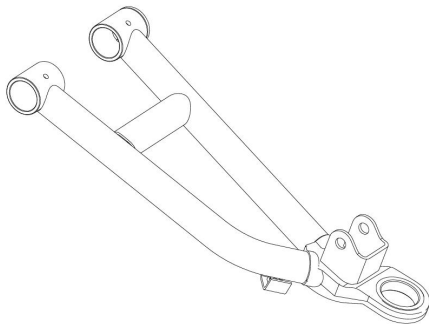
Check spline for damage or wear. If any damages or wear are found, replace a new one.

Lower Suspension Arm

Inspect the suspension arm and for damage or distortion. If any damages or distortion are found, replace the suspension arm with a new one.

Move suspension arm from side to side. There should be no noticeable loose. Replace bushing if necessary.

Move suspension arm up and down. There should be no noticeable loose. Replace bushing if necessary.



Upper Suspension Arm

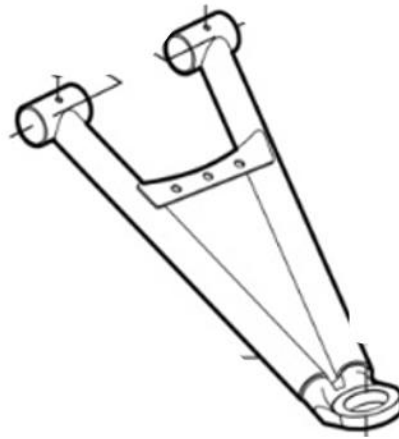
Inspect the suspension arm and for damage or distortion. If any damages or distortion are found, replace the suspension arm with a new one.

Move suspension arm from side to side. There should be no noticeable loose. Replace bushing if necessary.

Move suspension arm up and down. There should be no noticeable loose. Replace bushing if necessary.

Check ball joint for damage, pitting, looseness and roughness. If so, replace it.

Check ball joint bellows for cracks. Change if necessary.

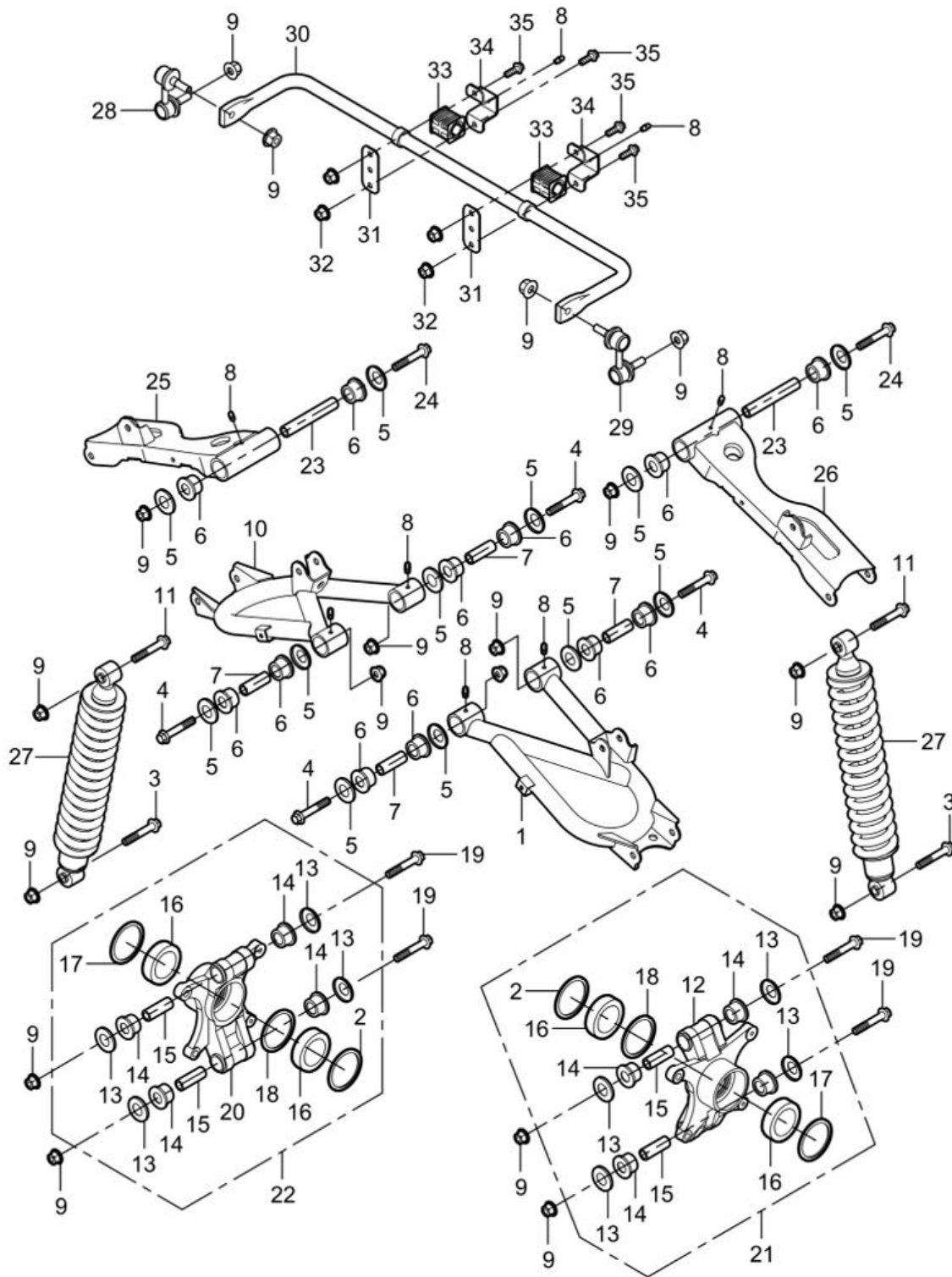


8.4 REASSEMBLY

Reassemble and remount the front suspension in the reverse order of removal and disassembly. Pay attention to the following points.

1. Install the washers and tighten the knuckle nuts to the specified torque.
2. Replace the removed cotter pins with new cotter pins.

8.5 REAR SUSPENSION



1. LH Lower Rear Suspension Arm	2. Oil Seal	3. M10 Bolt	4. M10 Bolt	5. Arm Nylon Sleeve Cover
6. Arm Nylon Sleeve	7. Arm Inner Sleeve	8. Grease Zerk	9. M10 Nut	10. RH Lower Rear Suspension Arm
11. M10 Bolt	12 LH Knuckle	13. Oil Seal for Knuckle	14. Knuckle Fixation Sleeve	15. Knuckle Bushing
16. Bearing	17. Oil Seal	18. Knuckle Bushing	19. M10 Bolt	20. RH Knuckle
21. LH Knuckle Assy	22. RH Knuckle Assy	23. Arm Inner Sleeve	24. M10 Bolt	25. RH Upper Rear Suspension Arm
26. LH Upper Rear Suspension Arm	27. Rear Shock Absorber	28. RH Stabilizer Bar	29. LH Stabilizer Bar	30. Stabilizer Bar
31. Stabilizer Bar Support Plate	32. M8 Nut	33. Sway Bar Cusion	34. Stabilizer Bar Clamp	35. M8 Bolt

During assembly or installation, use the torque values and service products as in the torque table.

8.6 REMOVAL AND DISASSEMBLY

Loosen wheel nut of the appropriate.

Install a jack stand under the frame to lift the rear of vehicle off the ground until the shock absorber is fully extended.

Remove wheels, brake caliper and hub.

Remove ball joint, steering knuckle from tie rod.

Remove rear shock absorber.

Remove rear stabilizer bar.

Remove upper and lower rear suspension arm.

8.7 INSPECTION

Shock absorber

Inspect the shock absorber for oil leakage or damage, inspect the bushing for wear or damage. If any damage are found, replace the rear shock absorber with a new one.

Extend and compress the piston several times over its entire stroke. Check that it moves smoothly and with uniform resistance with rod up. Any of the following conditions will denote a defective shock:

-A skip or hang up when reversing stroke at mid-travel.

-Seizing or binding conditions except at extreme end of either stroke.

-A gurgling noise after completing one full compression and extension stroke.

Replace shock if any these conditions are found.

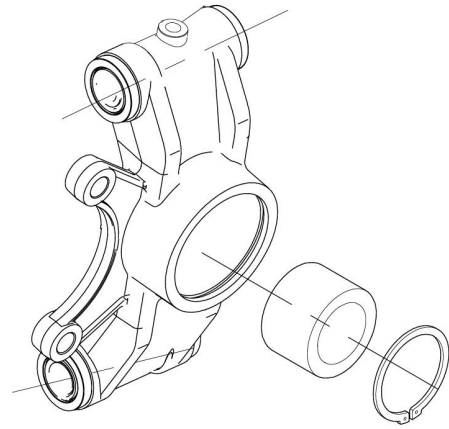


Knuckle

Inspect the knuckle for damage. If any damages are found, replace the knuckle with a new one.

Check bearing and seal for damage or wear. If any damages or wear are found, replace a new one.

Rotate the inner race by hand to inspect for abnormal noise and smooth rotation.

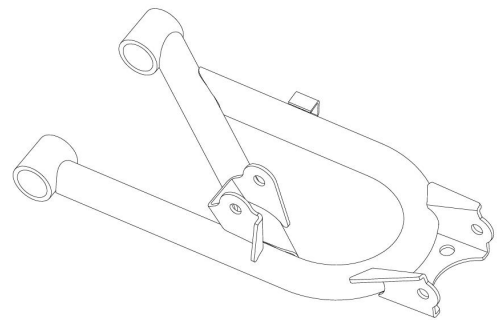


Lower Suspension Arm

Inspect the suspension arm and for damage or distortion. If any damages or distortion are found, replace the suspension arm with a new one.

Move suspension arm from side to side. There should be no noticeable loose. Replace bushing if necessary.

Move suspension arm up and down. There should be no noticeable loose. Replace bushing if necessary.



Upper Suspension Arm

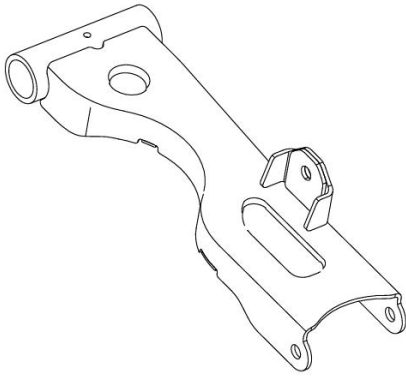
Inspect the suspension arm and for damage or distortion. If any damages or distortion are found, replace the suspension arm with a new one.

Move suspension arm from side to side. There should be no noticeable loose. Replace bushing if necessary.

Move suspension arm up and down. There should be no noticeable loose. Replace bushing if necessary.

Check ball joint for damage, pitting, looseness and roughness. If so, replace it.

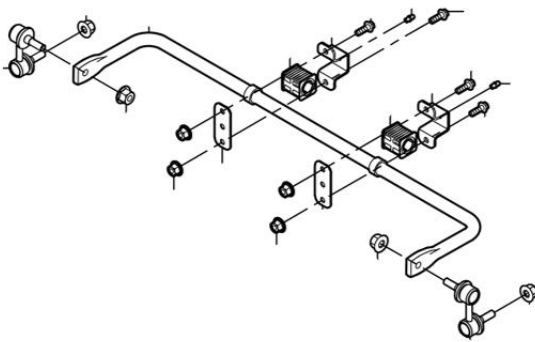
Check ball joint bellows for cracks. Change if necessary.



Stabilizer bar

Remove the stabilizer bar from the frame and the rear swing arm. Check whether the damping rubber sleeve of the stabilizer is powdered or cracked. If so, please replace it with a new rubber sleeve.

Check the transverse stabilizer ball head for damage, pitting, looseness, etc., and check the ball bellows for cracks, damage, powdering, etc. If so, please replace it with a new one.



8.8 REASSEMBLY

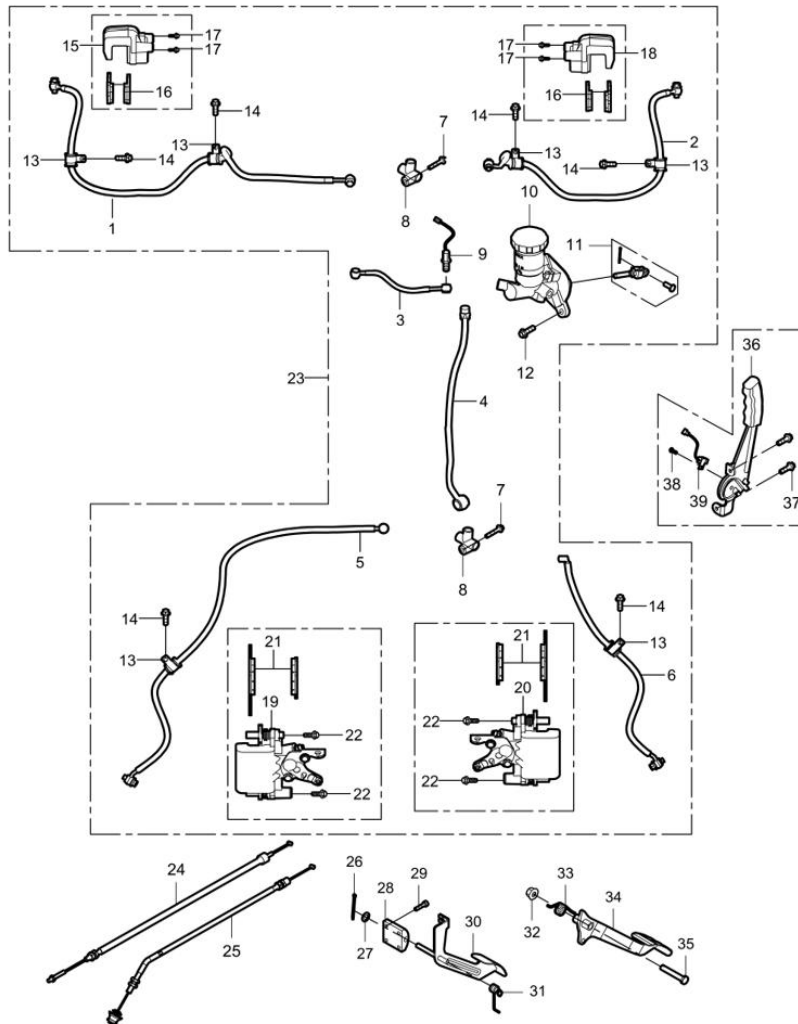
Reassemble and remount the front suspension in the reverse order of removal and disassembly. Pay attention to the following points.

1. Install the washers and tighten the knuckle nuts to the specified torque.
2. Replace the removed cotter pins with new cotter pins.

9. BRAKES SYSTEM

STRUCTURE.....	9-1	BRAKE FLUID REPLACMENT.....	9-2
BRAKE PADS REPLACMENT.....	9-2	BRAKE DISC.....	9-2
BRAKE CALIPER.....	9-3	BRAKE LIGHT SWITCH.....	9-3
BRAKE HOSE.....	9-4	FOOT BRAKE PEDAL.....	9-4
HANDBRAKE.....	9-4		

9.1 STRUCTURE



1. RH Front brake Hose	2. LH Front brake Hose	3. Front Master Brake Hose	4. Rear Foot Brake Master Cylinder Hose	5. Rear RH Brake Cylinder Hose Assembly
6. Rear LH Brake Cylinder Hose Assembly	7. M6 Bolt	8. Tee-Junction	9. Brake Switch	10. Brake Pump
11. Brake Rod	12. M8 Bolt	13. Clamp for brake hose	14. M6 Bolt	15. RH Front brake caliper
16. Front Brake Pad	17. M8 Bolt	18. LH Front brake caliper	19. RH Rear Brake Master Cylinder Assembly	20. LH Rear Brake Master Cylinder Assembly
21. Rear Brake Pad	22. M10 Bolt	23. Brake Assembly	24. Brake Cable	25. Throttle Cable
26. Cotter Pin	27. Washer	28. Throttle Pedal Mounting Base	29. M6 Screw	30. Throttle Pedal
31. Return Spring	32. M8 Nut	33. Return Spring	34. M8 Nut	35. M8 Bolt
36. Parking Brake	37. M8 Bolt	38. M4 Bolt	39. Parking Brake Switch	

This brake system is filled with an ethylene glycol-based DOT4 brake fluid. Do not use or mix different types of fluid, such as silicone-based or petroleum-based brake fluids.

Do not use any brake fluid taken from old, used or unsealed containers. Never reuse brake fluid left over from the last servicing or which has been stored for a long periods of time.

When storing brake fluid, seal the container completely and keep it away from children.

When replenishing brake fluid, take care not to get dust into fluid.

When washing brake components, use new brake fluid. Never use cleaning solvent.

A contaminated brake disc or brake pad reduces braking performance. Discard contaminated pads and clean the brake disc with high quality brake cleaner or neutral detergent.

Brake fluid may cause damage to surfaces of plastic and rubber parts. Keep it far away from these parts.

9.2 BRAKE FLUID REPLACEMENT

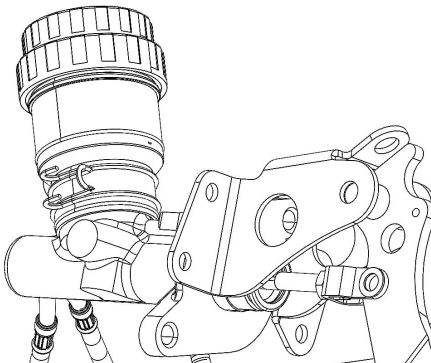
Place the vehicle on a level surface.

Remove front panel.

Remove the brake pump cap and diaphragm.

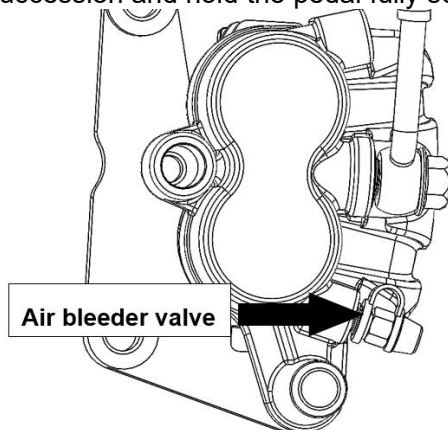
Suck up the old brake fluid as much as possible.

Fill the reservoir with new brake fluid.



Remove the dust cap of air bleeder valve. Connect a clear hose to the air bleeder valve and insert the other end of the hose into a receptacle. Loosen the air bleeder valve and pump the brake pedal until the old brake fluid is completely out of the brake system.

Close the air bleeder valve and squeeze and release the brake pedal several times in rapid succession and hold the pedal fully squeezed.



Loosen the air bleeder valve for about quarter of a turn so that the brake fluid runs into the receptacle, this will remove the tension of the brake pedal. Then close the bleeder valve, pump and squeeze the pedal and open the valve. Repeat this process until the fluid flowing into the receptacle contains no air bubbles.

Tighten the air bleeder valve to 6N.m.

Disconnect the clear hose and install the dust cap of air bleeder valve.

Fill the reservoir with new brake fluid to the upper edge of the inspection window.

Install the brake pump reservoir cap and diaphragm.

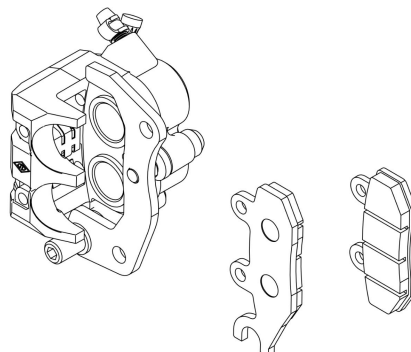
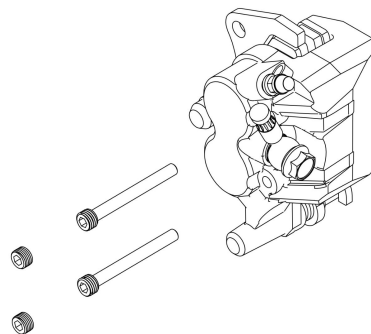
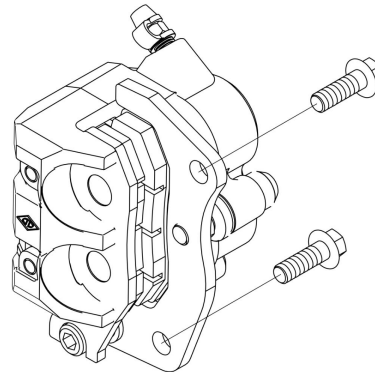
CAUTION: While bleeding the brake system, replenish the brake fluid in the reservoir as necessary. Make sure that there is always some fluid visible in the reservoir.

9.3 BRAKE PADS REPLACEMENT

Remove the wheel.

Remove the brake caliper mounting bolt and brake pads mounting pins.

Remove the brake pads.



Make sure that pad spring is in position. Install

the new brake pads.

Install pad pins by pushing in the pads against pad spring to align pad slots in the pads and caliper body. Tighten the brake pad mounting pins to 18N.m.

Tighten the brake pad mounting pins to 80N.m.

CAUTION: Do not operate the brake pedal during or after brake pad removal. Replace the brake pads as a set, otherwise braking performance will be adversely affected. After replacing the brake pads, pump the brake pedal a few times to check for proper brake operation and then check the brake fluid level.

9.4 BRAKE DISC

Removal and disassembly

Remove the wheel.

Remove the caliper and wheel-hub.

Remove the brake disc.

Inspection

Inspect the brake disc for cracks or damage and measure the thickness using the micrometer. If any damage are found or the thickness is less than the service limit, replace the brake disc with a new one.

Minimum thickness of front brake disc: 3.0mm.

Minimum thickness of rear brake disc: 2.5mm

Measure the warpage using the dial gauge. If the warpage exceeds the service limit, replace the brake disc with a new one.

Maximum warpage of brake disc:0.3mm.

Reassembly and remounting

Reassemble and remount the brake disc in the reverse order of removal and disassembly. Pay attention to the following points:

- Install the disc to the wheel hub with the punching letters on the disc showed up.

- Make sure that the disc is clean and free of any greasy matter.

- Apply THREAD LOCK to the brake disc bolts and tighten them to 26N.m.

9.5 BRAKE CALIPER

Removal

Loosen wheel nuts.

Lift vehicle and support it securely.

Remove appropriate wheel.

Remove the caliper bolts then the caliper. If the caliper is not being remove from the vehicle as during brake pad replacement, simply hang the caliper with a piece of wire to take the weight off the brake hose.

If the caliper is being removed for replacement, drain brake system before removing the banjo fitting and its sealing ring. Remove the caliper from the vehicle.

Catch spilled fluid with a rag. Attach the brake hose in a position to prevent the fluid from flowing out.

Disassembly

Remove brake pads.

Remove slide caliper support and pad spring.

Place rag over piston.

Place caliper body with piston down and apply small squirts of air pressure to the fluid inlet to remove piston.

Remove piston seal.

Clean piston grooves, caliper cylinder and piston with clean brake fluid.

Clean slide pins with brake cleaner and a rag.

Inspection

If boots are deteriorated or hard, replace with new ones.

Check caliper cylinder for scratches, rust or other damages. If so, replace caliper.

Check piston for scratches, rust or other damages. If so, replace caliper.

Assembly

Coat piston seal with clean brake fluid and install it into piston grooves in caliper.

Coat piston with clean brake fluid and install into cylinder with the closing toward caliper body.

Apply dielectric grease into sliding bores and install slide pins.

Install pad spring, caliper bracket and pads.

Installation

For installation,reverse the removal procedure, pay attention to the following details:

- Use new sealing washers when installing banjo fitting retaining brake hose to caliper.

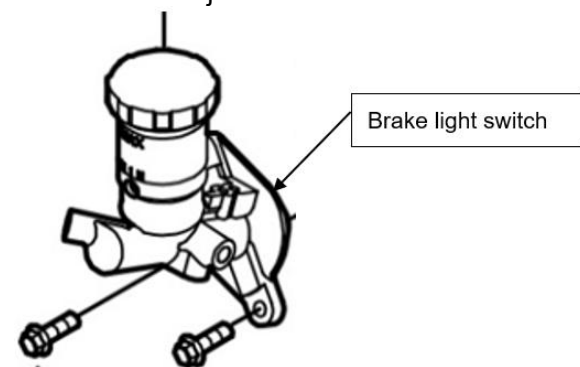
- Install caliper in its original position.

- Bleed the brake system

- Check for leaks and make sure the brakes operate normally before driving.

9.6 BRAKE LIGHT SWITCH

The brake light switch is located on brake pump. It can not be adjusted.



Inspection

First ensure brake light is good.

Check switch for dirt or corrosion. Make sure it is operating properly.

Depress brake pedal and check for brake light to turn on. Repeat with the brake pedal.

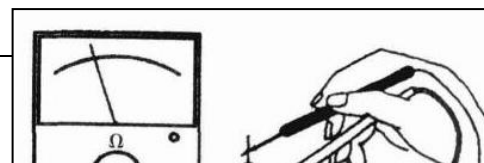
Test

Disconnect switch connectors.

Check switch operation as follows.

SWITCH POSITION	PIN		RESISTANCE
Firmly pushed	1	2	0.2Ωmax
Released			Infinite

If switch is defective, replace with a new one. If switch tests good, check wiring harness.



Remove

Disconnect switch connectors.

Drain brake system.

Unscrew brake light switch from master cylinder.

Catch spilled fluid with a rag.

Installation

For installation, reverse the removal procedure.

Bleed the brake system.

Check for leaks and make sure the brakes operate normally before driving.

9.7 BRAKE HOSE**Inspection**

Brake hose should be inspected frequently for leaks and damages.

Check if the hoses are crushed or damaged. Any deformation can restrict the proper flow of fluid and cause braking problems.

Check hoses for cracking scrapes. This damage can cause hose failure under pressure.

When hoses are removed or disconnected, cleanliness must be observed. Clean all joints and connections before disassembly. New hoses should be cleaned with brake fluid before installation to remove any contamination.

Replace any defective parts.

Removal

Before removing any hoses, drain brake system.

Remove M8 bolts to remove front slave pump hose.

Remove front driveshaft shield, seat bottom guard plate, then remove M6 bolt and master pump hose.

Remove M6 bolts and rear tee-junction. Then remove rear brake hose from brake caliper.

Thoroughly clean the area around the joints that will be disconnected.

Place a pan under the joint that will be disconnected.

Disconnect any retaining clips or brackets holding the hose and remove the defective parts.

Installation

Install the new hose.

Make sure the piece will not rub against any other part.

When there is a banjo fitting securing the hose to the caliper or to the master cylinder, always replace the sealing washers with new ones.

Install any retaining clips or brackets.

Refill and bleed the brake system.

Check for leaks and make sure the brakes operate normally before driving.

9.8 FOOT BRAKE PEDAL**Dismantling**

Remove the pin and pin shaft, then separate the brake pedal and brake rod of master cylinder.

Loosen M8 bolts, remove the foot brake support plate.

Loosen M8 bolt and nut, remove foot brake pedal and return spring from support plate.

Inspection

The brake pedal stroke is 30 ~ 40mm. If less than equal 30mm, it will be a hidden danger, must adjust the brake pin connecting the brake pedal.

Tightening torque of M8 bolts: 22 ~ 30N.m.

9.9 HAND BRAKE**Dismantling**

Remove dash board. Loosen M4 bolt then remove handbrake switch.

Loosen M8 bolts and then remove the handbrake from frame.

Loosen M8 bolt and nut, then remove the U-shaped and brake cable.

Remove front driveshaft shield, seat bottom guard plate and RH rear wheel. Then loosen nut and remove handbrake cable.

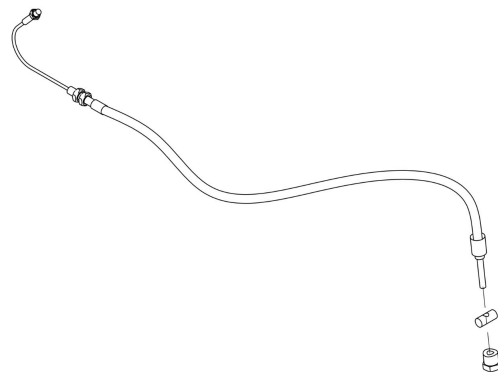
Inspection**Grip Brake**

Check whether the handbrake assembly is worn or damaged. If any defect is found, please replace it in time.

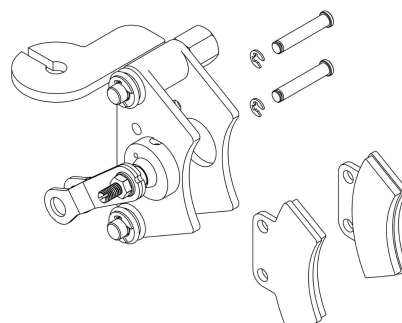
Brake cable

Check whether the handbrake cable is worn or damaged.

If any defect is found, please replace it in time.

**Mechanical brake**

Check whether the mechanical parking brake is worn or damaged. If any defect is found, please replace it in time.



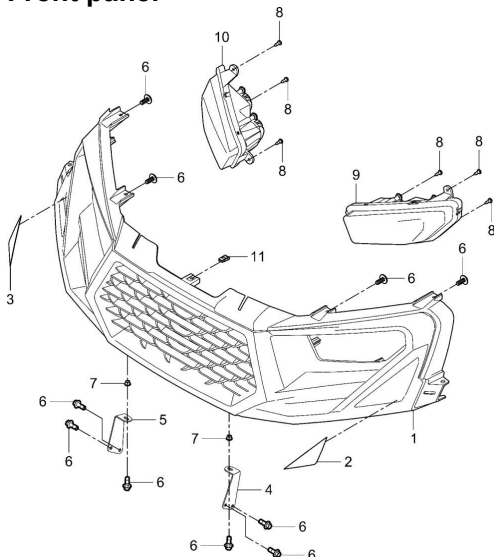
Tightening torque of M10 bolts: 22-30N.m.

10. CHASSIS

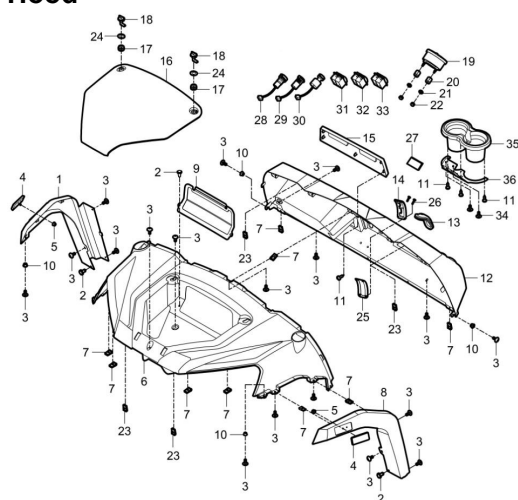
EXTERNAL COMPONENTS.....	10-1	AIR INLET AND EXHAUST SYSTEM.....	10-3
EXHAUST SYSTEM.....	10-4	GEARSHIFT LEVER	10-5
CARGO BOX.....	10-6	SEAT.....	10-8
FRONT WINDSHIELD.....	10-9	DOOR.....	10-10
ROOF AND ROLL BAR.....	10-11		

10.1 EXTERNAL COMPONENTS

Front panel



Hood

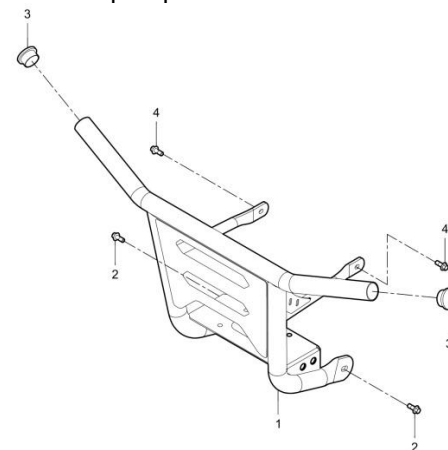


Turn rotation switch and remove hood.
 Remove push pin and view window board.
 Loosen push pin and M6 screws, then remove front mud guard board.
 Loosen M6 screws and plate nut, then remove hood.
 Loosen M6 screws and nuts, then remove headlight cover.
 Loosen ST4.2 screws and nuts, then remove headlight.
 Loose M8 and M10 bolts and then the front bump from frame.
 Loose ST3.5 screws and M6 screws, then remove cup holder and bracket.
 Remove steering wheel, hand brake, gear shift.
 Loosen M6 screws, nuts and plate nuts and then remove dashboard.
 Tightening torque of M6 bolts: 9-12N.m.
 Tightening torque of M8 bolts: 22-30N.m.
 Tightening torque of M10 bolts: 65-78N.m.

Available overhaul: Replace front bumper and headlight.

Front bumper

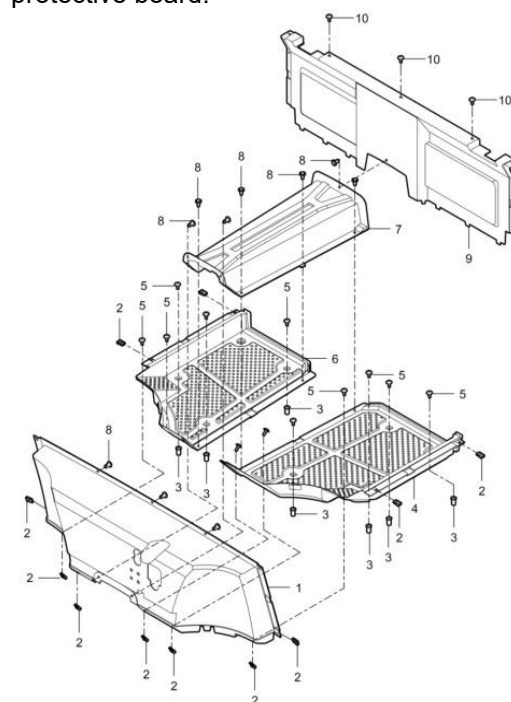
Loose two M8 and M10 bolts and nuts, then remove the rear bumper from frame.



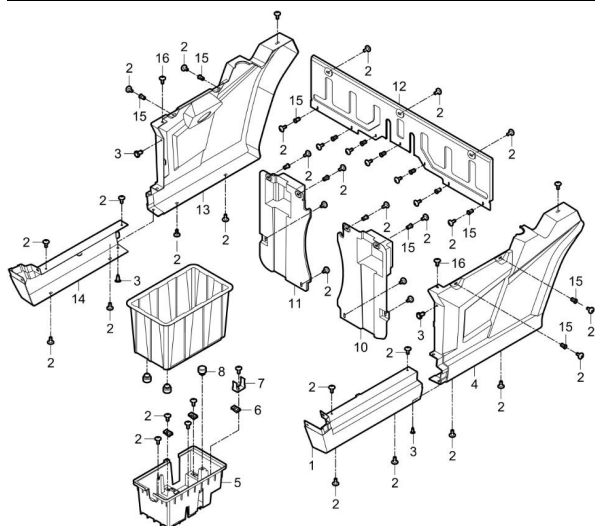
Tightening torque of M8 bolts: 22-30N.m.
 Tightening torque of M10 bolts: 65-78N.m.
 Available overhaul: Replace rear bumper.

Foot pedal and front driveshaft shield

Remove push pin and front driveshaft shield.
 Remove plate nuts, rivet nuts and M6 screws and then remove foot pedal.
 Remove plate nuts and push pin, then remove front mud guard board.
 Remove seat and M6 screws and then remove rear protective board.



Side Panel



Tilt cargo box.

Remove seat and seat back.

Loosen M6 screws and rivet nuts, then remove rear mud guard board.

Loosen M6 screws and push pin, then remove side board.

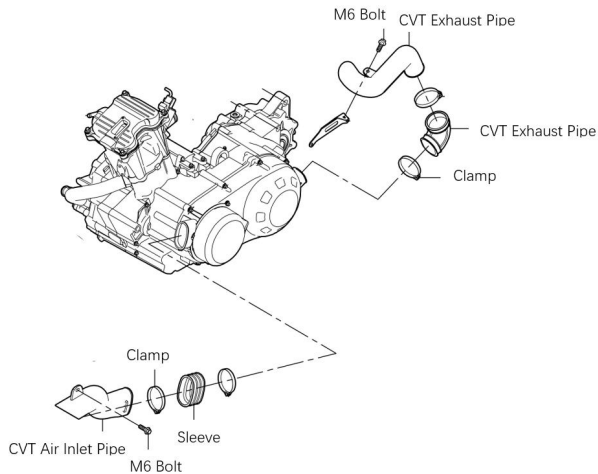
Loosen M6 screws and rivet nuts, then remove seat protective board.

Remove battery. Remove M6 screws and plate nuts, then remove battery box.

Tightening torque of M6 bolts: 9-12N.m.

10.2 AIR INTAKE AND EXHAUST SYSTEM

Structure



Dismantling

CVT Air intake pipe combination

Tilt cargo box and remove seat.

Loosen the clamp and then remove CVT air inlet pipe and sleeve.

After loosening, maintenance and replacement of relevant parts can be carried out.

Available overhaul: replace CVT intake pipe combination.

CVT Air exhaust pipe combination

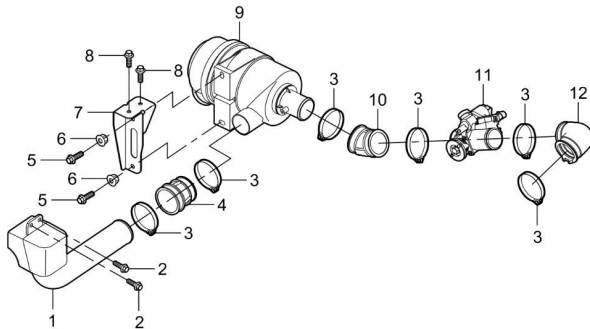
Loosen the clamp and M6 bolt, then remove CVT air exhaust pipe.

Then the relevant components of air exhaust pipe combination can be maintained.

Available overhaul: replace CVT air exhaust pipe.

Tightening torque of M6 bolts: 9-12N.m.

Air filter combination



Tilt cargo box and remove seat.

Loosen the clamp and M6 bolts, then remove air filter intake pipe and sleeve.

Remove the fuel tank gas pipe.

Loosen the clamps, M6 bolts and nuts, then remove air filter from air filter bracket.

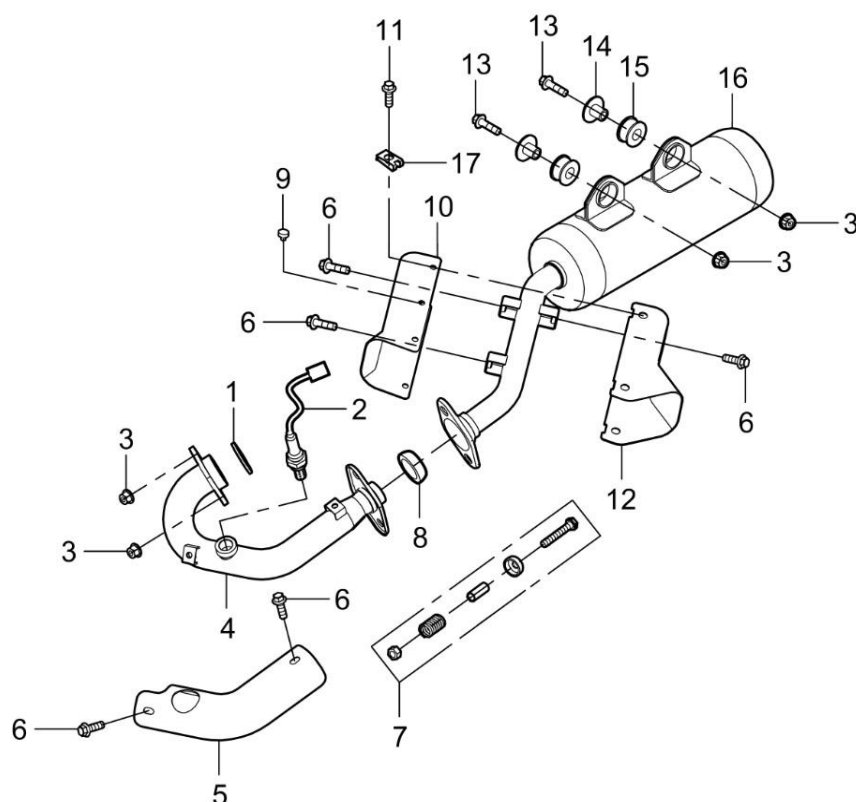
Loosen the clamps, then remove throttle valve and sleeve.

Available overhaul:

Replace and conduct daily maintenance of air filter combination.

Tightening torque of M6 bolts for air filter: 9-12N.m.

10.3 EXHAUST SYSTEM



1. Exhaust Gasket	2. Oxygen Sensor	3. M8 Nut	4. Exhaust Pipe
5. Exhaust Pipe Heat Shield	6. M6 Bolt	7. M10 Bolt	8. Graphite Seal Sleeve
9. Cushion	10. Exhaust Pipe Heat Shield	11. M6 Bolt	12. Exhaust Pipe Heat Shield
13. M8 Bolt	14. Muffler Hang Neck Bushing	15. Muffler Hang Rubber Sleeve	16. Muffler
17. Clip			

▲ WARNING

Be careful not to operate when the engine is running or the silencer is at high temperature.

Dismantling

1. Tilt cargo box and remove seat.
2. Remove M6 bolts and exhaust pipe heat shield.
3. Remove the oxygen sensor from the exhaust pipe.
4. Remove the two M8 nuts between the front exhaust pipe and the engine.
5. Remove M10 bolts between the front and rear exhaust pipe. Remove front exhaust pipe.
6. Loosen M6 bolts and remove exhaust pipe heat shield.
7. Loosen M8 bolts and nuts, then remove the muffler from the frame.

Inspection

1. Check the leaks in exhaust pipe and the cracks in heat insulating shield.
 2. Check whether the rubber parts in silencer are cracked or weathered, etc.
 3. Clean the sundries and inspect any damage in the fire retardant net.
- If there is any problem, please replace it with a new one.

▲ WARNING

After dismantling muffler, seal gasket of exhaust pipe should not be used repeatedly; new component should be used upon installation.

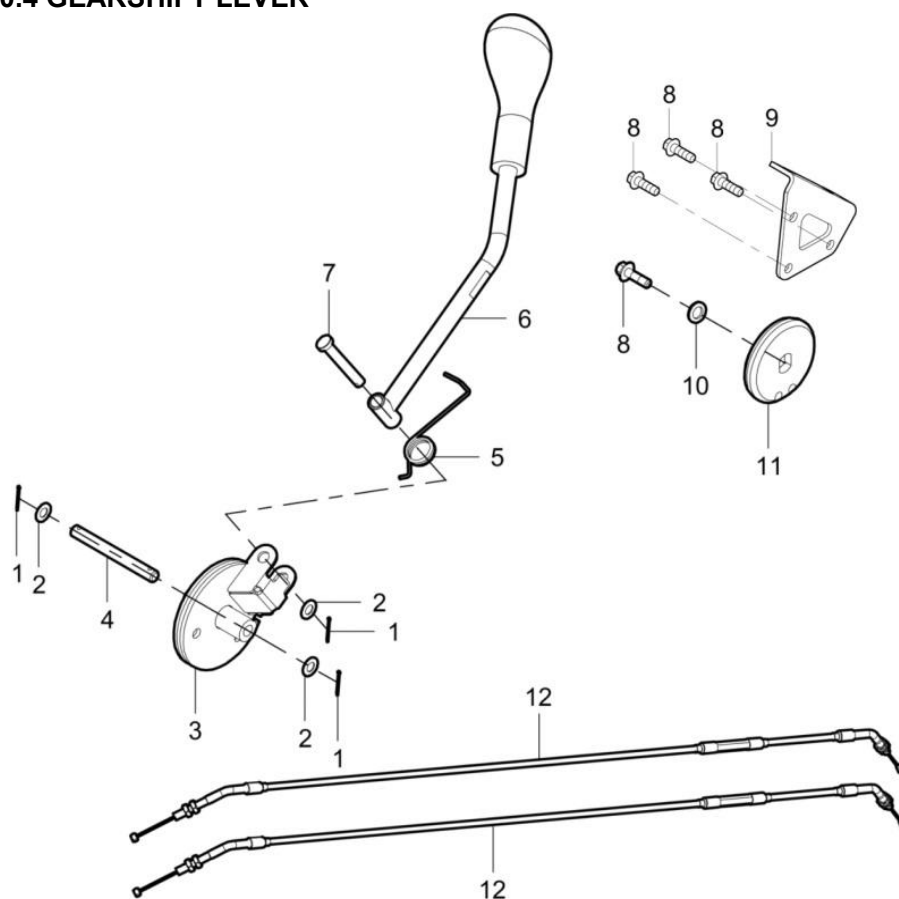
To prevent exhaust pipe leakage, high polymer sealant should be applied to cylinder exhaust pipe port and surface of exhaust pipe seal gasket upon muffler assembly installation.

Tightening torque of M6 bolts: 9~12N.m.

Tightening torque of M8 bolts: 22~30N.m.

Tightening torque of M10 bolts: 65~78N.m.

10.4 GEARSHIFT LEVER



1. Cotter Pin	2. Washer	3. Shift Fixed Bracket	4. Shift Pin Shaft
5. Return Spring	6. Shift Lever	7. Shift Lever Support Pivot Pin	8. M6 Bolt
9. Gear Shifting Bracket	10. Washer	11. Engine Gear Shift Arm	12. Gearshift Cable

Dismantling

Tilt cargo box.

Loosen M6 bolts and remove gear shifting bracket.

Loosen M6 bolts and washer, then remove gearshift cable and gearshift arm from engine.

Remove cotter pin, washer, pivot pin and return spring, then remove shift lever.

Remove cotter pin, washer and pin shaft, then remove shift fixed bracket.

Inspection

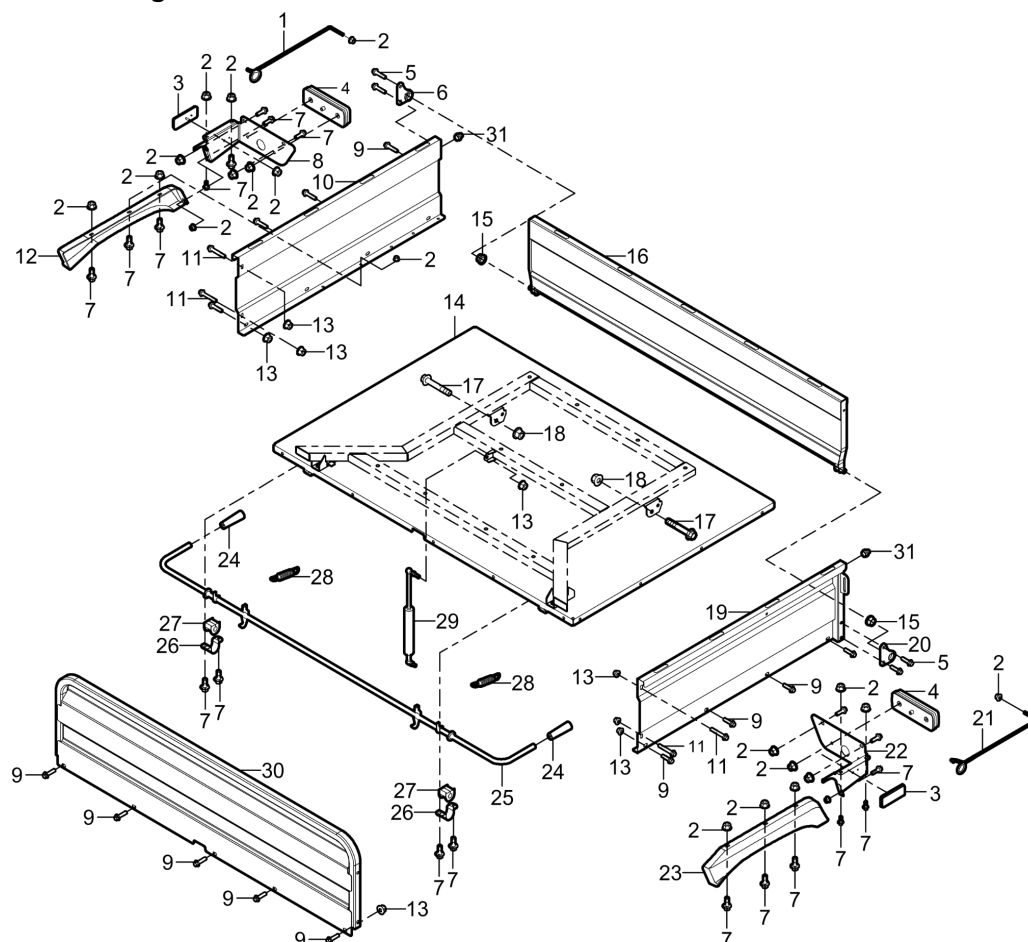
Check whether return spring, gearshift cable, and shift lever are cracked or damaged. Available overhaul:

Replace gear shift lever combination.

Tightening torque of M6 screw: 9-12N.m.

10.5 CARGO BOX

Dismantling



1. RH Hook	2. M5 Nut	3. Reflector	4. Taillight	5. M8 Bolt
6. RH Pin Installation Plate	7. M6 Bolt	8. RH Taillight Mounting Plate	9. M8 Bolt	10. RH Protective Plate Assy
11. M8 Bolt	12. RH Rear Fender	13. M8 Nut	14. Bottom Plate Ass	15. Nylon Sleeve
16. Rear Protective Plate Assy	17. M10 Bolt	18. M10 Nut	19. LH Protective Plate Assy	20. LH Pin Installation Plate
21. LH Hook	22. LH Taillight Mounting Plate	23. LH Rear Fender	24. Handrail Rubber Sleeve	25. Dump Bed Handrail
26. Handrail Fixing Buckle	27. Handrail Fixing Sleeve	28. Spring	29. Air Springs	30. Front Protective Assy
31. Rubber Shock Absorber				

Loosen M6 bolts and M5 nuts, then remove rear fender.

Loosen M6 bolts and M5 nuts, then remove taillight and taillight mounting plate from dump bed.

Loosen M5 nuts, remove hooks.

Loosen M8 bolts, remove nylon sleeve, pin installation plate and rear protective plate assy.

Loosen M8 bolts and nuts, remove front protective plate assy.

Loosen M8 bolts and nuts, remove LH/RH protective plate assy.

Loosen M8 nuts, remove air spring.

Remove spring, handrail fixing buckle and fixing sleeve, then remove dump bed.

Loosen M10 bolts and nuts, remove bottom plate assy.

Inspection

Check for the following conditions, if damaged, please replace it with a new one in time.

1. Whether the door panels of the cargo box are damaged.

2. Whether there is any obvious damage or breakage on the skin of the cargo box.

▲ WARNING

Be careful not to operate when the engine is running or the silencer is at high temperature.

Check whether the nylon sleeve is worn seriously. If there is cracked, please replace it in time

Check whether the cargo body handle spring is deformed after stretching. If it is deformed, please replace it

in time.

Check the cargo body handle limit rubber and replace it in time if cracked.

Check whether the rubber mount at the bottom of seat is cracked, if there is cracked need to replace it in time.

Cargo body air spring inspection

1. Whether the piston is moving smoothly during stretching and compressing, has balanced resistance, and its pull rod upward.

2. A suddenly fracture in stretching or compressing.

3. Unable to stretch or have noise after compression.

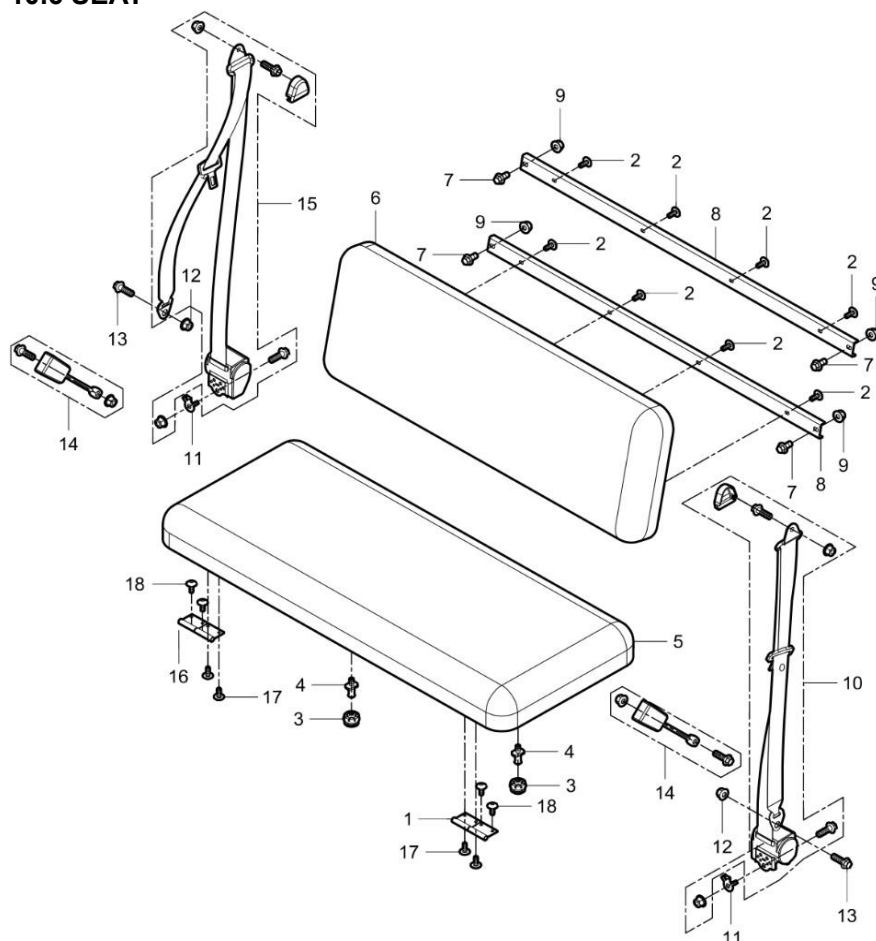
If there is any problem, please replace it with a new one.

Tightening torque of M6 bolts: 9~12N.m.

Tightening torque of M8 bolts: 22~30N.m.

Tightening torque of M10 bolts:65~78N.m.

10.6 SEAT



1. LH Seat Hinge	2. M6 Screw	3. Seat Rubber Washer	4. Seat Fixing Pin
5. Seat	6. Seat Back	7. M8 Bolt	8. Seat Back Bracket
9. M8 Nut	10. Seat Belt	11. Seat Belt Limit	12. M10 Nut
13. M10 Bolt	14. Seat Safety Fixing Buckle	15. Seat Belt	16. RH Seat Hinge
17. M6 Screw	18. M6 Screw		

Dismantling

Loosen M6 screws, M8 bolts and nuts, then remove seat back from seat back bracket.

Loosen M10 bolts and nuts, then remove seat belt from roll bar.

Loosen M10 bolts and nuts, then remove seat safety fixing buckle.

Tilt the seat, loosen M6 screw, then remove seat hinge and seat.

Inspection

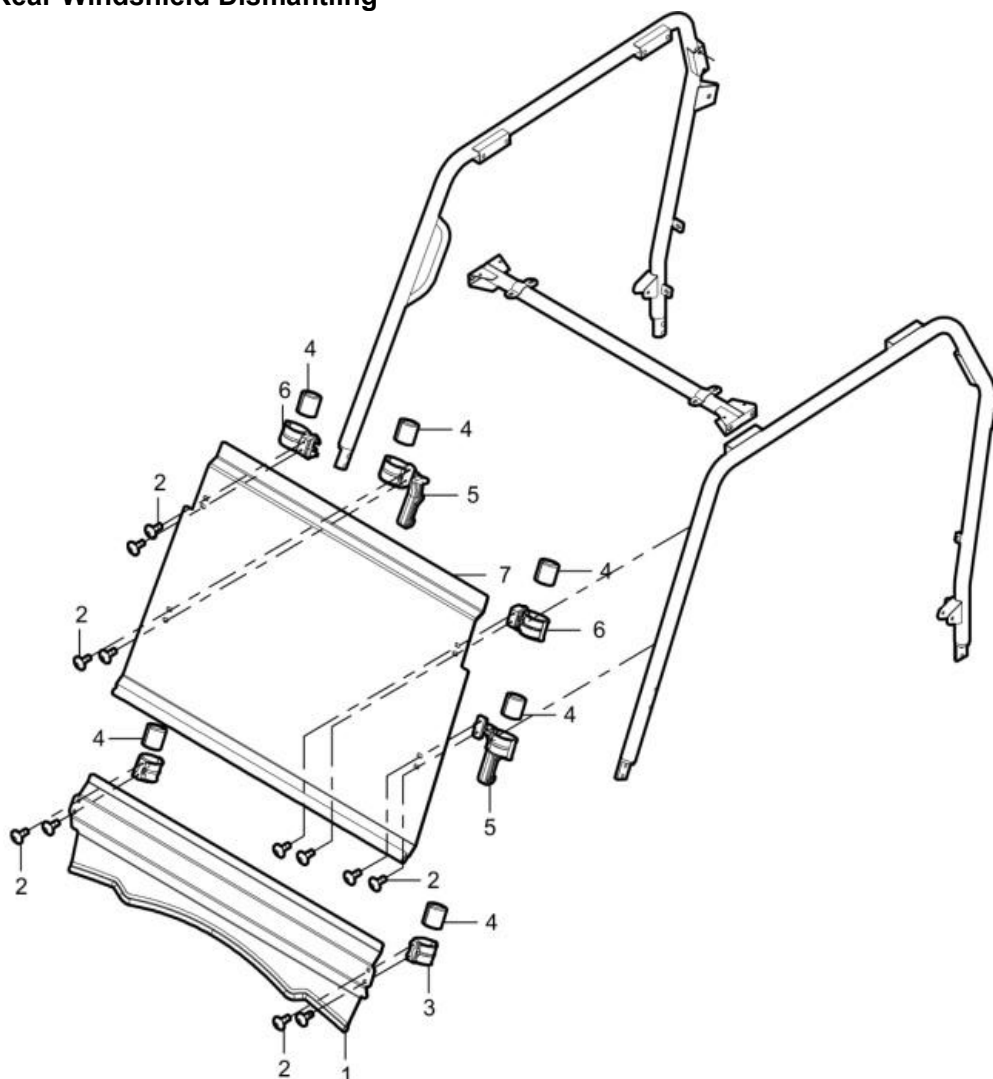
Long-term exposure of the seat to sunlight can cause some wear on its components.

1. Check whether seat rubber washer are cracked or severely worn, etc. If they are replaced, please

2. Check the seat leather for cracks, damage, etc., please replace it in time.

3. Check whether the safety belt can return to the retractor after stretching, if can not, please replace it with a new one in time.

10.7 Front Windshield Rear Windshield Dismantling



1. Bottom Windshield	2. M6 Screw	3. Bottom Windshield Fixing Buckle	4. Windshield Fixing Buckle Rubber
5. Middle Windshield Fixing Buckle	6. Top Windshield Fixing Buckle	7. Upper Windshield	

Loosen eight M6 screws, then remove windshield fixing buckle and upper windshield.

Loosen four M6 screws, then remove windshield fixing buckle and bottom windshield.

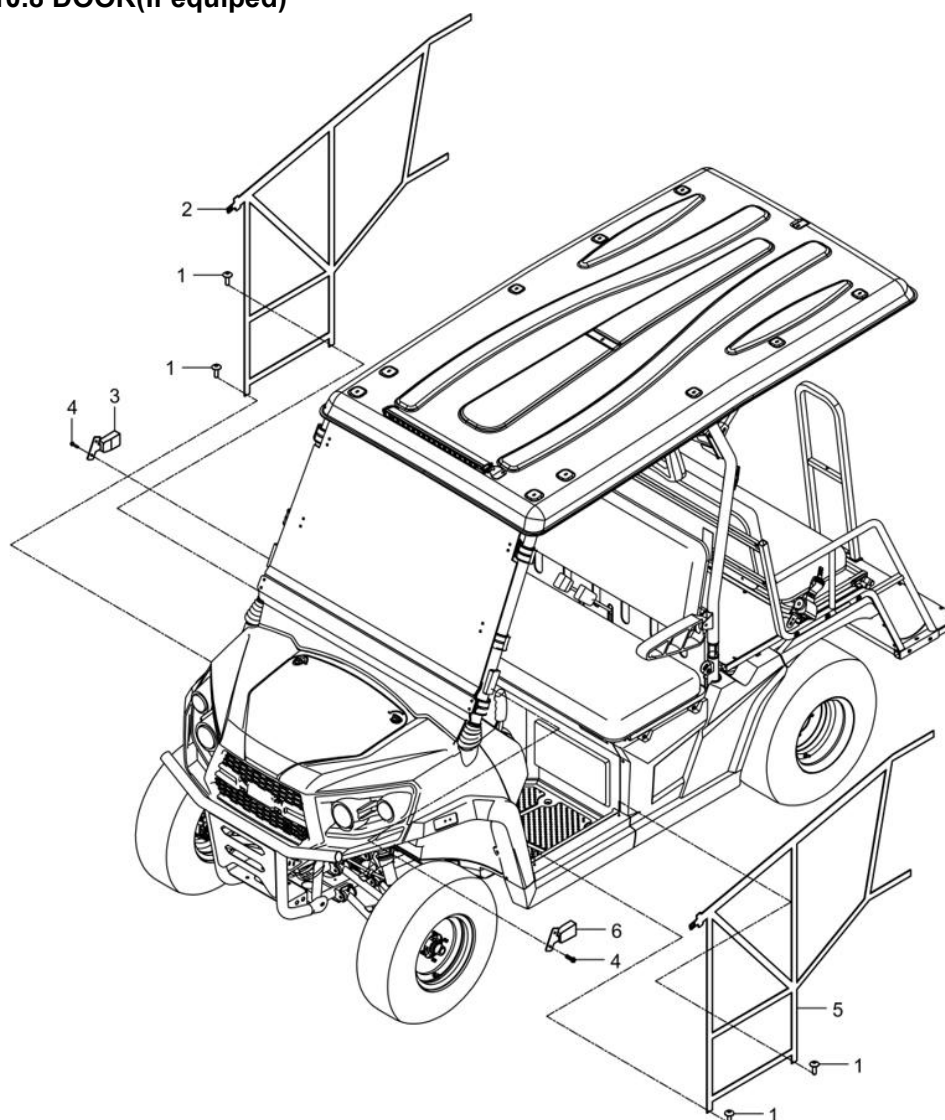
After prolonged use, the debris flying in the air will cause some damage to the windshield. If the following conditions occur, please replace it immediately.

1. Unclear windshield affects driving.

2. The windshield fixing buckle is worn and cracked.

Tightening torque of M6 screws: 9~12N.m.

10.8 DOOR(If equipped)



1. M6 Screw	2. RH Side Net	3. RH Side Net Latch	4. M6 Bolt
5. LH Side Net	6. LH Side Net Latch		

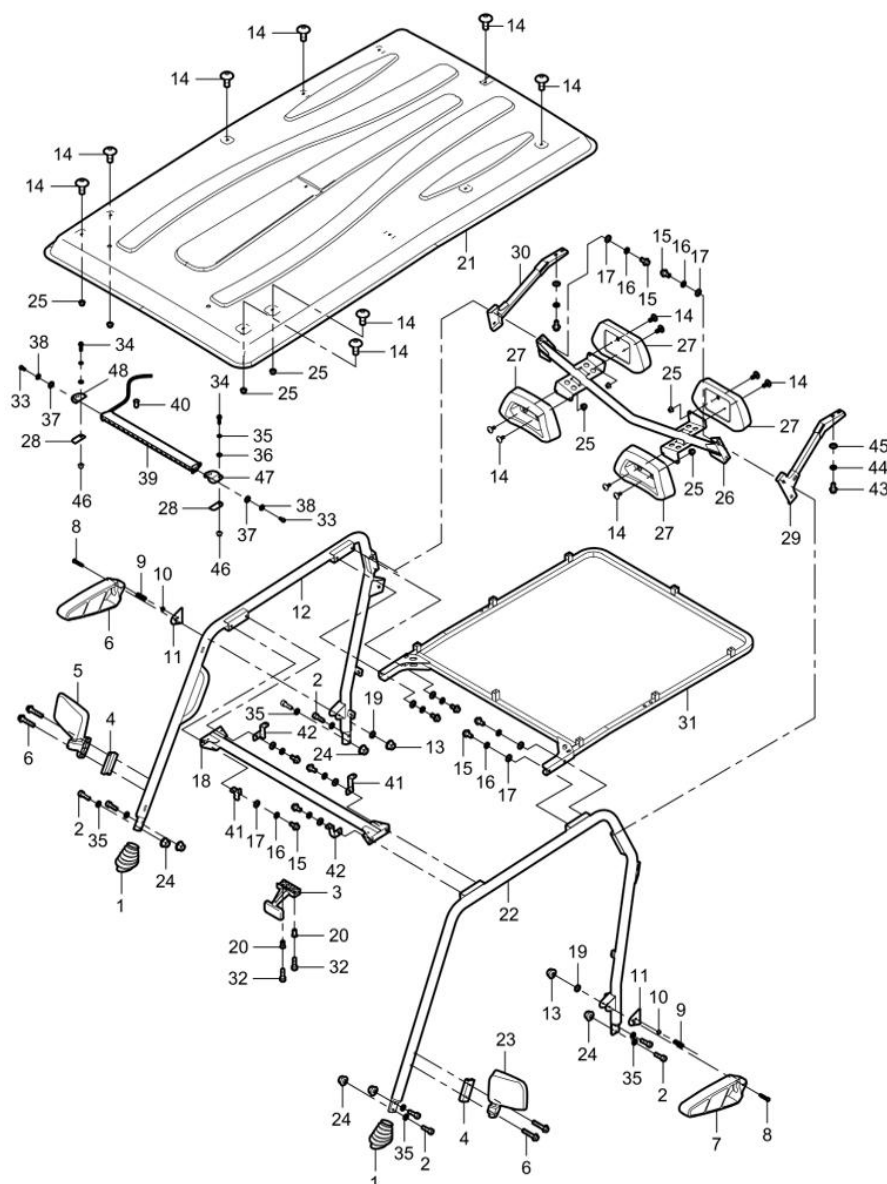
Dismantling

1. Loosen M6 bolt and then remove side net loatch.
2. Loose M6 screw, then remove the side net.

Inspection

Check for latch and side net, if damaged, please replace it with a new one in time
 Tightening torque of M6 bolts:9~12N.m.

10.9 ROOF and ROLL BAR



1. Roll Bar Rubber Sleeve	2. M8 Screw	3. Inner Mirror	4. Mirror Seat	5. Rear View Mirror	6. M6 Bolt
7.Seat Handrail	8. Handrail Pin Shaft	9. Handrail Spring	10. Steel Ball	11. Handrail Mounting Board	12. RH Roll Bar
13. M6 Nut	14. M6 Screw	15. M10 Bolt	16. Washer	17. Washer	18. Front Connecting Bar
19. Washer	20.Rivet Nut M6	21.Roof	22. RH Roll Bar	23. Rear View Mirror	24. M8 Nut
25. M6 Nut	26. Headrest Bracket	27.Seat Headrest	28. Rubber	29. LH Roof Bracket Support	30. RH Roof Bracket Support
31. Roof Bracket	32. M6 Bolt	33. M5 Screw	34. M8 Bolt	35. Washer	36. Washer
37. Washer	38. Washer	39. Top Led Bar	40. Water-Proof Mounting Block	41. LH Bar Mounting Bracket	42. RH Bar Mounting Bracket
43. M8 Bolt	44. Washer	45. Washer	46. M8 Nut	47. LH Mounting Bracket	48. RH Mounting Bracket

Dismantling

Remove seat and front panel.

Loosen M6 rivet nuts and bolts, then remove inner mirror form front connecting bar.

Loosen M8 bolts, nuts and washer, then remove top led bar and mounting bracket from roof.

Loosen M6 nuts and bolts, then remove seat rest form headrest bracket.

Loosen M6 nut, and then remove pin shaft, spring, steel ball, seat handrail mounting board from roll bar.

Loosen M6 bolt, then remove rear view mirror and mirror seat from roll bar.

Loosen M6 screws, then remove foof from roof bracket.

Loosen M10 screws and washer, then remove headrest bracket from roll bar.

Loosen M10 screws and washer, then remove connecting bar from roll bar.

Loosen M8 bolts and nuts, then remove roll bar from frame.

Inseption

Check headrest, roof and leg bar cracks, damage, etc., please replace it in time.

Check inner mirror, rear view mirror, hand rail and roll bar for cracks, damage, etc., please replace it in time.

Tightening torque of M6 bolts: 9~12N.m.

Tightening torque of M8 bolts: 22~30N.m.

Tightening torque of M10 bolts:65~78N.m.

11. ELECTRICAL SYSTEM

CHARGING SYSTEM.....	11-1	EFI SYSTEM.....	11-7
IGNITION SYSTEM.....	11-8	LIGHT SYSTEM.....	11-9
FUSE.....	11-9		

Overhauling information

Warning

Bulb will be very hot after turning on headlamp. Please do not touch it immediately after its off. In operation, bulb needs to be cooled.

In warning inspection of water temperature, fire or high temperature liquid may be needed, keep it far away from inflammables and do not to be burnt.

The temperature will be very high in turning of headlamp. For replacement, grease dirt will be splashed to glass in case of operation with bare hands or wearing dirty gloves. As a result, hot spots and glass deformation may be caused with damage to bulb as well.

Pay attention to the following in replacing bulb:

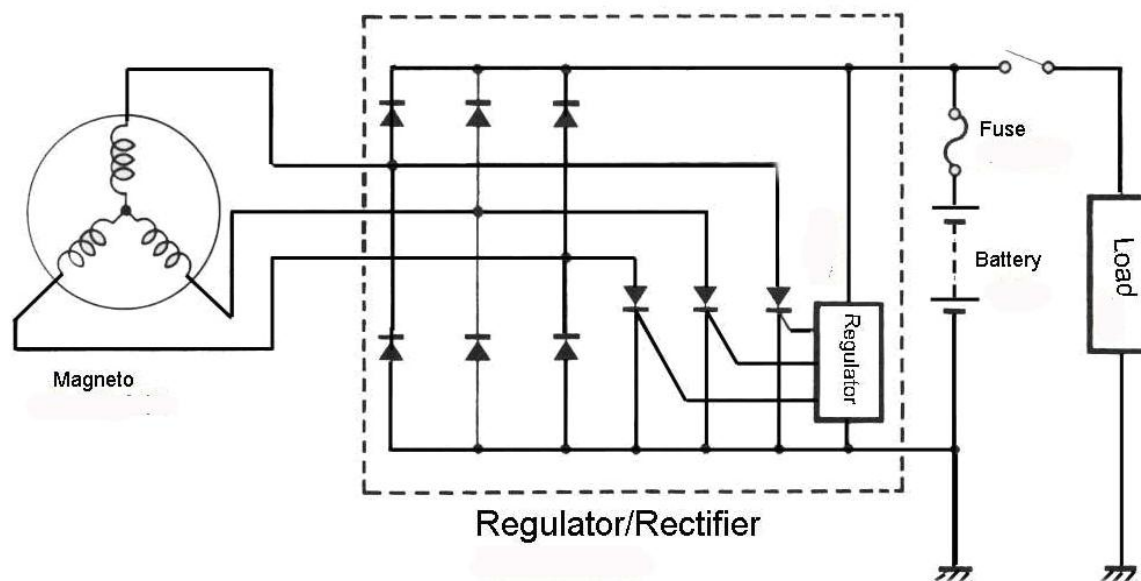
- Do not replace bulb when it is on. Turn off ignition switch and replace it after cooling bulb.
- In order to avoid splashing grease to glass, wear clean gloves in replacing bulb.
- Use cloth with alcohol or banana water to clean glass to prevent any grease sticking to glass.

Check battery to confirm whether it is normal.

Regularly check switch and do not dismantle it from vehicle in inspection.

Cables and wires of each part need to be arranged reasonably(refer to chapter1). For dismantling and installation of tail lamp and rear steering lamp, please refer to chapter 4.

11.1 CHARGING SYSTEM



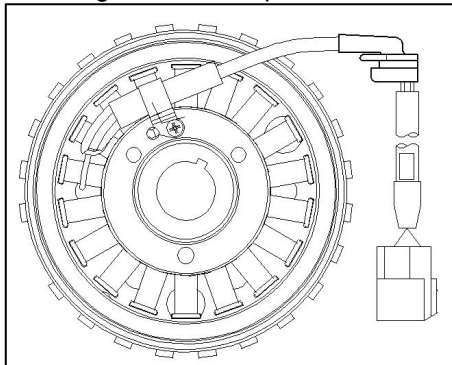
GENERAL SYSTEM DESCRIPTION

The purpose of the charging system is to keep the battery at a full state of charge and to provide the electrical system with the required electrical power for normal vehicle operation.

Magneto

The magneto is the primary source of electrical energy. It transforms magnetic field into electric current (AC).

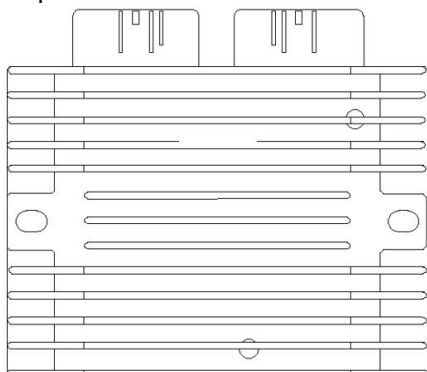
The magneto has a 3 phases series stator.



Voltage Regulator/Rectifier

The rectifier receives AC current from the magneto and transforms it into direct current (DC).

The voltage regulator, included in the same unit, limits voltage to prevent any damage to electrical components.



Battery

The battery supplies DC power to the electric starter for cranking the engine. During engine starting, it also supplies DC power to the entire electrical system.

At low engine RPM operation and high current load conditions, it supplements the magneto output and helps to maintain a steady system voltage.

INSPECTION

Charging System Output

First ensure that battery is in good condition prior to performing the following tests.

Testing the Output Voltage with multimeter.

1. Start engine with the less consumption as possible (no lights, no accessories).
2. Increase engine RPM as specified in the following table and read voltage in the multimeter.

Output Voltage Test	
Engine Speed	Voltage (DC)
4000 RPM	14.5 ± 0.5V

If voltage is above specification, replace voltage regulator/rectifier.

If voltage is below specification, check stator output

and wiring harness prior to concluding that voltage regulator/rectifier is defective.

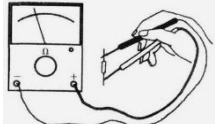
Check Stator

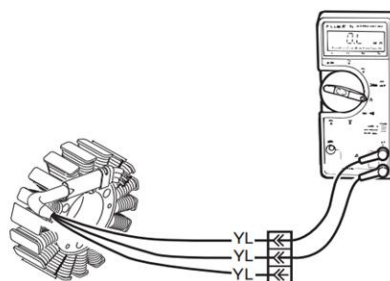
Stator Connector Access

The stator is directly connected to the voltage regulator/rectifier.

Testing the Stator Continuity

1. Disconnect the stator connector from the voltage regulator/rectifier.
2. Check resistance between YELLOW wires.

Required Tool	
UNIT MULTIMETER	115
	
TERMINAL	RESISTANCE @ 20°C (68°F)
1 and 2	0.15 - 0.30 Ω
1 and 3	
2 and 3	

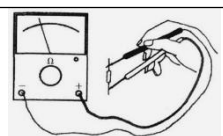


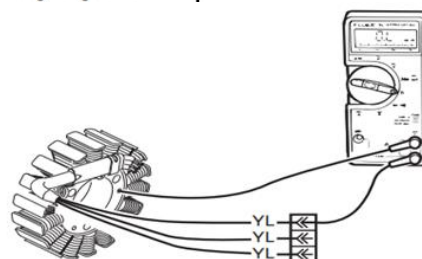
3. If any reading is out of specification, replace stator.

4. Re-plug connectors properly.

Testing the Stator Static Insulation

1. Disconnect the stator connector from the voltage regulator/rectifier.
2. Connect multimeter between any YELLOW wire (on stator connector) and engine ground.

Required Tool	
UNIT MULTIMETER	115
	
TEST PROBES	RESISTANCE @ 20°C (68°F)
Any YELLOW wire and engine ground	Infinite (open circuit)



3. If there is a resistance or continuity, the stator coils and/or the wiring is shorted to ground and needs to be repaired or replaced.

4. Re-plug connectors properly.

Check Battery

1. Connect a battery load tester.
2. Ensure proper test conditions.

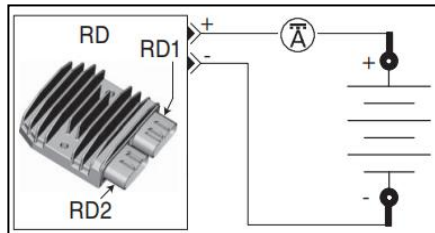
TEST CONDITIONS	
Initial battery voltage±	Above 12.5 Vdc
Engine	OFF
Load	3 times the amp-hour (AH) rating

SPECIFICATION	
Battery	Above 9.6 Vdc

If battery voltage drops below specification during test, replace battery and perform a CHARGING SYSTEM LOAD TEST.

Charging System Load Test

1. Connect a battery load tester.
2. Start vehicle and read voltage on tester.



SPECIFICATION	
Voltage	12.5 - 15 Vdc

If voltage is above specification, replace regulator and continue CHARGING SYSTEM LOAD TEST.

3. Connect an ammeter around RD1-1 wire.



DC CURRENT TEST WITH INDUCTIVE AMMETER

1. Output connector of voltage regulator
 2. Ammeter clamped over RED wire
 4. Ensure proper test conditions.
 5. Read amperage on ammeter.
- 45±5Amps

TEST CONDITIONS	
Battery voltage at idle±	Above 12.6 Vdc
Engine	Increase to 4000 RPM
Load	As required to decrease battery voltage to 12 Vdc
Time	15 seconds
± Required for accurate testing	

NOTE: With a fully charged battery and no electrical loads, specification is less than 10A.

If amperage or voltage is not within specification, verify magneto and wires. Replace:

–Voltage regulator if magneto test is within specifications.

–Magneto if magneto test is not within specifications.

VOLTAGE REGULATOR (RD)

Testing the Voltage Regulator Continuity

Due to internal circuitry, there is no static test

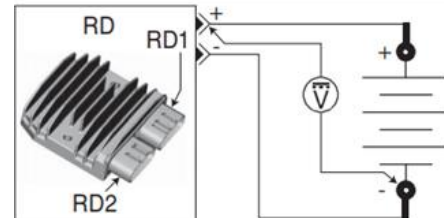
available.

Voltage Regulator Wire Identification

FUNCTION	PIN	COLOR
12Vdc output	RD1-1	RD
12Vdc ground	RD1-3	BK
12Vac input	RD2-1	BK
12Vac input	RD2-2	BK
12Vac input	RD2-3	BK

Testing the Voltage Regulator Power

1. Check voltage at RD1-1.



TEST CONDITIONS	
RD1-1	Hot at all times

BACKPROBE	PROBE	SPECIFICATION
RD1-1	BAT2 (-)	Battery voltage

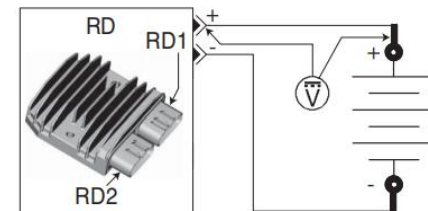
2. Connect a battery load tester.

3. Start vehicle.

4. Ensure proper test conditions.

TEST CONDITIONS	
Battery voltage at idle±	Above 12.6 Vdc
Engine	Increase to 4000 RPM
Load	As required to decrease battery voltage to 12 Vdc
Time	15 seconds
± Required for accurate testing	

5. Measure voltage drop.

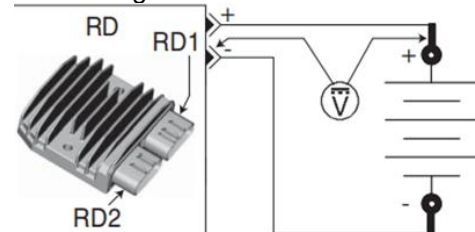


BACKPROBE	PROBE	SPECIFICATION
RD1-1	BAT1 (+)	Under 0.2 Vdc

If voltage drop is above specification, locate and repair damaged connector/wire.

Testing the Voltage Regulator Ground

1. Check ground at RD1-3.



TEST CONDITIONS	
RD1-3	Permanent ground

BACKPROBE	PROBE	SPECIFICATION
RD1-3	BAT1 (+)	Battery voltage

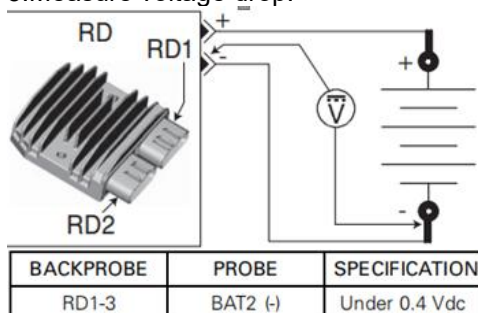
2. Connect a battery load tester.

3. Start vehicle.

4. Ensure proper test conditions.

TEST CONDITIONS	
Battery voltage at idle±	Above 12.6 Vdc
Engine	Increase to 4000 RPM
Load	As required to decrease battery voltage to 12 Vdc
Time	15 seconds

5.Measure voltage drop.



If voltage drop is above specification, locate and repair damaged connector/wire.

BATTERY

Refer to battery manufacturer's instructions for proper filling, activation and routine charging procedures.

Battery Access

The battery is located under the seat.

Removing the Battery:

- Remove the seat.
- Loosen M6 bolts and remove battery strap.
- Disconnect BLACK (-) cable first, then the RED (+) cable.

NOTICE: Always respect this order for removal; disconnect BLACK (-) cable first.

- Remove battery.

Cleaning the Battery

Clean the battery rack, cables and battery posts using a solution of baking soda and water.

Remove corrosion (if so) from battery cable terminals and battery posts using a firm wire brush. Rinse with clear water and dry well.

Inspecting the Battery

Visually inspect battery casing for cracks or any other damages. If casing is damaged, replace battery and thoroughly clean battery support with a water and baking soda solution.

Inspect condition of battery posts, battery support, holding strap and strap attachment points and wire terminal lugs.

Battery Storage

It is not necessary to remove the battery during vehicle storage but it is recommended for long term storage.

If the battery is left in the vehicle during storage or used infrequently, disconnect the BLACK (-) negative battery cable to eliminate battery current drain from the electrical equipment.

Recharge the battery once a month with an approved battery charger as per manufacturer's recommendations.

Clean battery, battery support and connections as required.

For other recommendations during storage, refer to battery manufacturer instructions.

▲ WARNING

Ensure battery is stored in a safe place, out of

reach for children.

Activating a New Battery

Refer to the instructions provided with the battery.

Charging a Battery**▲ WARNING**

Always wear safety glasses and charge in a ventilated area. Never charge or boost a battery while it is installed on vehicle. Do not open the sealed cap during charging. Do not place battery near open flame.

NOTICE: If battery becomes hot, stop charging and allow it to cool before continuing.

NOTE: If battery pressure increases due to overcharging, the valve opens to release excess pressure, preventing battery damage.

An automatic charger is a fast and convenient way for error-proof charging.

Always follow the battery manufacturer's charging instructions.

When using a constant current charger, charge battery according to the chart below.

Battery Voltage Below 12.8 V and Above 11.5V.

STANDARD CHARGING (RECOMMENDED)	
APPROXIMATE TIME	CHARGE
4 - 9 HOURS	2 A
QUICK CHARGING	
APPROXIMATE TIME	CHARGE
50 MINUTES	10 A

Installing the Battery

NOTICE: Always connect RED (+) cable first then BLACK (-) cable.

STARTING SYSTEM**GENERAL****System Description**

The starting system is composed of an electric starter supplied in current by the battery through a solenoid.

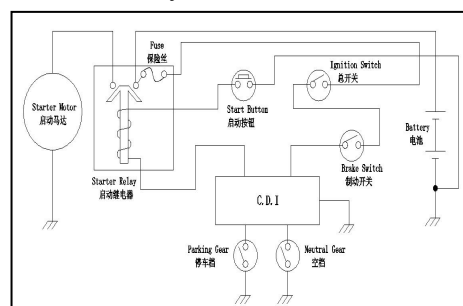
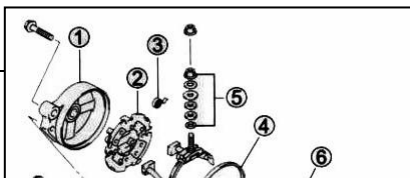
The starter solenoid receives a 12volt input from the ignition switch and the ground signal is provided by the Gear controller.

–Transmission in Park or Neutral position and/or brake pedal held.

–Ignition switch turns to the start position and hold until the engine starts.

PROCEDURES**STARTER SOLENOID****Starter Relay Access**

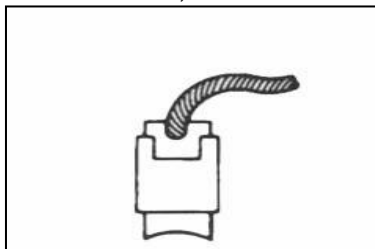
The starter solenoid is located beside the fuse box and the battery, under the diver seat.

**Starter Motor**

1	Bracket
2	Brush holder
3	Brush spring
4	O-Ring
5	Washer
6	Motor housing
7	Washer
8	Armature coil
9	Washer supporting tools
10	Inner bracket
11	O-Ring

Brush

-Check the brush on the brush holder whether it is worn abnormal, cracked or not smooth.



Worn, cracked, or not smooth: → Replace

Rectifier

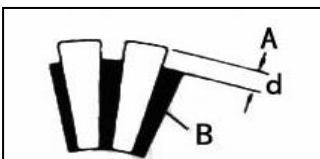
-Check the rectifier whether it is discolored, abnormal wear or concave.

Abnormal wear or damage: → Replace

-If the rectifier is discolored, grind it with sanding paper, then wipe it with a clean fabric.

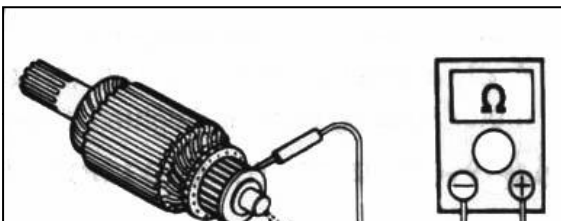
-If there is concave, scrape off insulator **B**, so that the distance with **A** is **d**.

$d \geq 1.5\text{mm}$

**Armature coil**

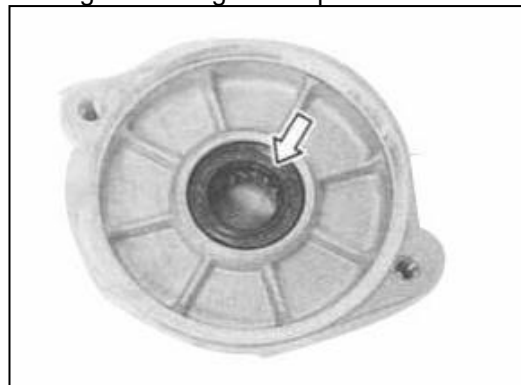
-Test the connection between each wire and the armature coil with the multimeter.

-If they are not connected, replace the armature shaft.

**Oil seal**

-Check the oil seal lip for damage or leak.

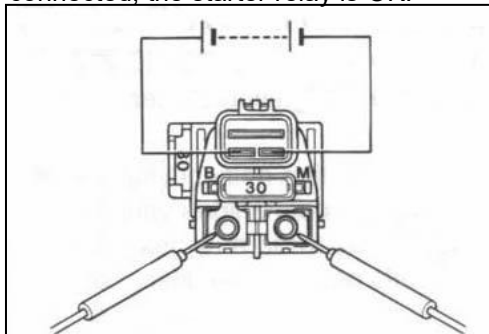
Damage or leakage: → Replace the starter motor.

**Starter relay**

-Inter-terminal voltage is 12V. Test the direct connection of positive and negative poles with the multimeter.

-If the starter relay clicks and connected, the starter relay is OK.

-When there is no voltage of 12V, they are not connected, the starter relay is OK.

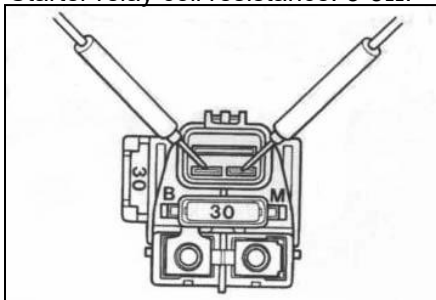


Note: Do not apply battery voltage on the starter relay for more than 2 seconds. This will result in overheating or damaging the relay coil.

-Measure the coil resistance with the multimeter. If the resistance exceeds the specified value, replace the starter relay.

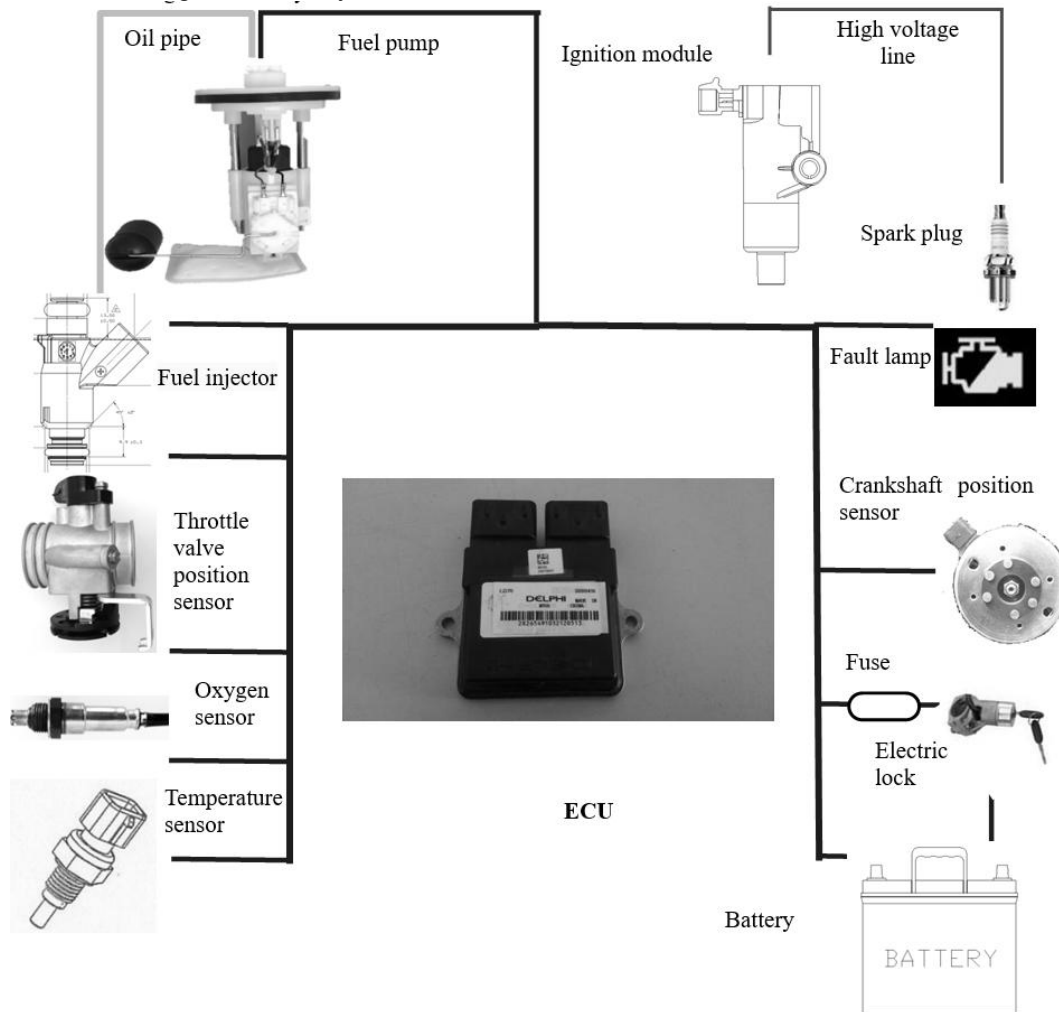
The multimeter is set to $1 \times 10\Omega$.

Starter relay coil resistance: 3-5 Ω .



6.2 EFI SYSTEM

Schematic diagram of EFI system



The function of EFI system includes two parts: fuel injection management and ignition management, which are realized by the following institutions.

(1). ECU: it is responsible for the receiving of sensor signal, the formulation of control strategy, and the issue of control signal.

(2). Oil supply device: it is composed of oil pump, tubing and injector. The pump pressurizes the fuel to 350 KPa. The injector is installed on the engine inlet to control the injection timing and fuel injection amount.

(3). Ignition device: it is composed of ignition module, high voltage wire and spark plug. The ignition module has a DC capacitor igniter and a high voltage ignition coil, which can raise the voltage of the battery from 12V to more than 15000V, which also can be transported to the spark plug by high-voltage wire to generate spark discharge.

(4). Sensors: including: a. The oxygen sensor, which mounted on an exhaust pipe to detect oxygen concentration in exhaust gases, can realize the closed-loop regulation of the mixture concentration, and when the closed-loop adjustment, the output of 0-0.9V alternating signal can be achieved;

b. cylinder temperature sensor, which is installed on the engine cylinder head to detect the engine body temperature, will affect the starting thickening amount;

c. Crankshaft position sensor, which is integrated on magneto to provide crankshaft angle signal, is the time reference for fuel injection and ignition control;

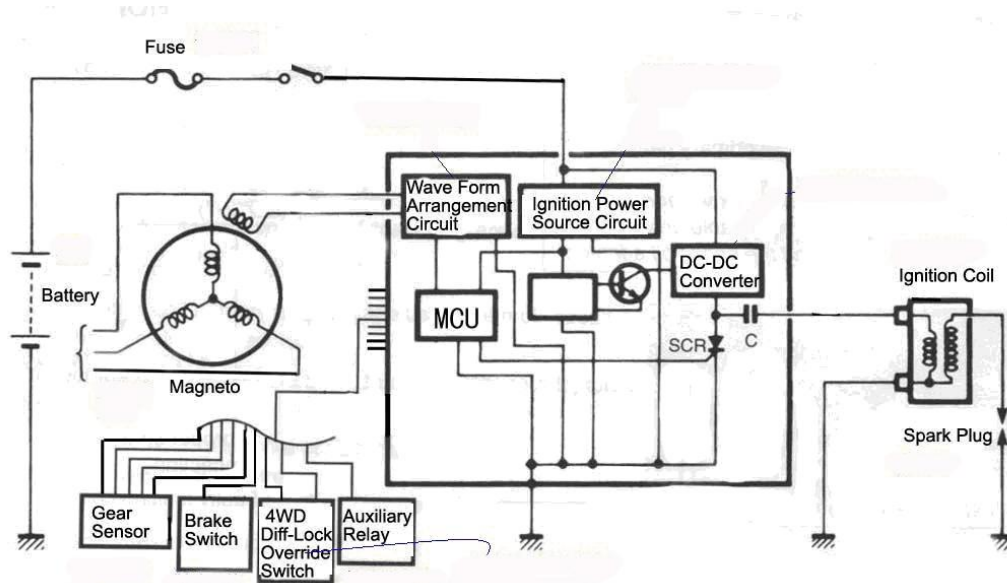
d. The throttle position sensor is mounted on the throttle body to measure the rotation angle of the throttle valve.

(5). Other: including: a. throttle body, which controls air intake through throttle pull wire;

b. Fault alarm lamp, which is installed on the dashboard for fault alarm;

c. Battery, fuse for power supply to EFI system.

6.3 IGNITION SYSTEM



Ignition coil

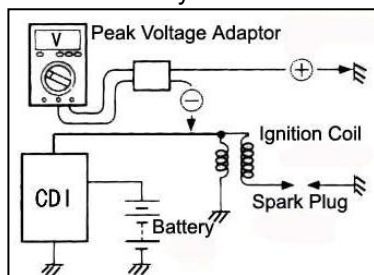
Primary peak voltage of ignition coil

-Remove the spark plug cap as shown in the following figure. Install the new spark plug to the cap. The cylinder is connected to grounding.

-Connect the multimeter and the peak voltage adapter as follows:

+Probe: BK wire or grounding wire

-Probe: Br / yellow wire



NOTE: Make sure the battery voltage $\geq 12V$. The ignition coil wires are connected. When using multimeter and the peak voltage adapter, please refer to the user manual.

-Move the gear to the neutral position, turn on the ignition device.

-Press the start button and crank the engine for a few seconds. Then measure the primary peak voltage of the ignition coil;

-Repeat the steps above for several times. Measure the maximal value of the primary peak voltage.

Set the multimeter at the AC voltage position.

Primary peak voltage of ignition coil: $\geq 150V$

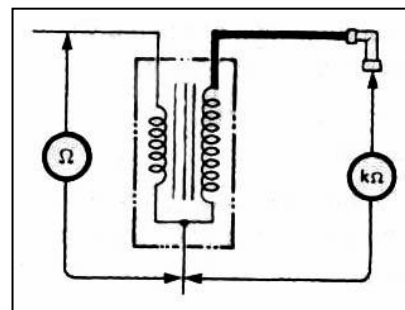
NOTE: Do not touch the test probes or spark plug, in case of electric shock.

-If the voltage is lower than the standard value, check the ignition coil and coupling coil.

Resistance of ignition coil

-Disconnect the ignition coil wires and spark plug cap. Remove the ignition coil;

-Measure the resistance of the primary and secondary windings of the ignition coil with the multimeter. If the resistance of two coils is close to the specified value, the ignition coil is in good condition.



Resistance of ignition coil

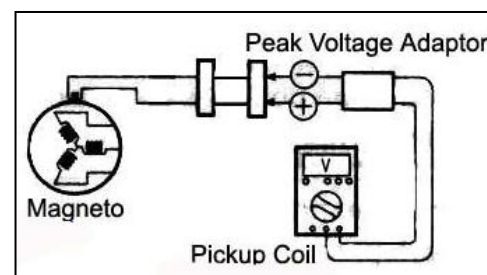
Primary winding: $0.58 \pm 0.058 \Omega$ (terminal - ground)

Secondary coil: $7.1 \pm 0.71 \Omega$ (terminal - spark plug cap)

Peak voltage of coupling coil

-Check the peak voltage of the coupling coil with following steps.

-As shown in following figure, connect the multimeter with the peak voltage adapter.



+Probe: Green/white wire

-Probe: BL/Y wire

-Move the gear to the neutral position, turn on the ignition device.

-Press the start button and crank the engine for a few seconds, and then measure the primary peak voltage of the coupling coil;

-Repeat the steps above for several times. Measure the maximal value of the primary peak voltage.

Put the multi meter at AC voltage step.

Peak voltage of coupling coil: $\geq 4V$

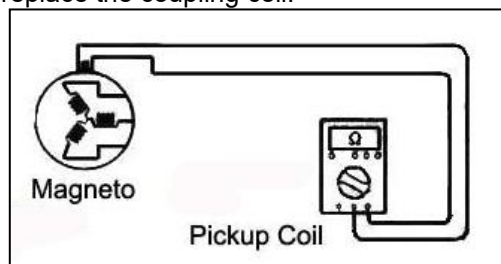
-If the voltage is lower than the standard value, replace coupling coil.

Resistance of coupling coil

The multi meter is put at $1 \times 100 \Omega$ step.

Resistance of coupling coil: $135 \pm 5 \Omega$

-If the resistance is not within the specified value, replace the coupling coil.



Inspecting an Electrical Connection

When replacing an electric or electronic component, always check electrical connections. Make sure they are tight, make good contact, and are corrosion-free. Dirty, loose or corroded contacts are poor conductors and are often the source of a system or component malfunction.

Pay particular attention to ensure that pins are not bent or pushed out of their connectors.

Ensure all wire terminals are properly crimped on wires, and connector housing are properly fastened.

11.4 Light system

Headlight

Remove headlight cover.

Loosen M6 screws, nuts and spring, then remove headlight.

Loosen ST4.2 screws, then remove front position light.

Tail light

Remove cargo box rear door.

Loosen M5 bolts, then remove tail light.

Led Light Bar

Loose M8 bolts and nuts, then remove led light bar.

11.5 Fuses

Removal

Tilt cargo box.

Remove M6 bolts and nuts, then remove fuse box.

Tightening torque of M6 bolt for fuse box: 9-12N.m.

Fuse Inspection

Check fuse condition and replace it if necessary.

To remove fuse from holder, pull fuse out. Check if filament is melted.

▲ WARNING

Do not use a higher rated fuse.

▲ WARNING

If fuse has burnt out, source of malfunction should be determined and corrected before restarting. See an authorized ATV dealer for servicing.

12. TROUBLESHOOTING

ELECTRICAL SYSTEM.....	12-1	COOLING SYSTEM.....	12-1
MAGNETO SYSTEM.....	12-1	LUBRICATION.....	12-2
CYLINDER AND HEAD.....	12-3	CRANKSHAFT.....	12-3
GEARBOX.....	12-3	COUPLING UNIT.....	12-4
CVT.....	12-4	ENGINE GENERAL.....	12-5

12.1 ELECTRICAL SYSTEM

Symptom: NO SPARK OR POOR SPARK

1. Refer to ignition system.

Symptom: STARTER DOES NOT TURN

1. Refer to starting system.

Symptom: STARTER TURNS BUT DOES NOT CRANK THE ENGINE

1. Refer to starting system.
2. Check gear condition on electric starter.
Worn and/or damaged starter gear. Replace electric starter and/or starter drive.
3. Check condition of starter pinion gear.
Worn and/or damaged starter pinion and/or ring gear. Replace starter drive and/or drive pulley fixed sheave.
4. Check splines on starter drive.
Poor movement of pinion gear on splines. Clean and/or replace starter drive.

Symptom: STARTER TURNS BUT STARTER DRIVE DOES NOT MESH WITH RING GEAR

1. Refer to starting system.

Symptom: STARTER KEEPS RUNNING

1. Refer to starting system.

12.2 COOLING SYSTEM

Symptom: HIGH ENGINE OPERATING TEMPERATURE

1. Check coolant level.
Coolant level lower than recommended. Refill (refer to cooling system).
2. Check for air bubbles in cooling system.
Air in cooling system. Refill and bleed cooling system (refer to cooling system).
3. Check temperature sensor for electrical/mechanical failure.
Temperature sensor defective. Replace.
4. Check thermostat.
Thermostat defective (does not open when engine gets hot). Replace (refer to cooling system).
5. Check leak indicator hole (in crankcase MAG side-water pump housing area) if coolant leaks.
Coolant leaking from indicator hole means a damaged water pump rotary seal. Replace rotary seal (refer to cooling system).
6. Check condition of hoses and hose clamps fixation.
Hoses are brittle and/or hard. Replace.
Hose clamps are loose. Retighten clamps.
7. Check condition of impeller located on the water pump shaft.
Impeller wirings broken and/or impeller threads are damaged. Replace (refer to cooling system).
8. Check gasket on water pump housing.
Gasket on water pump housing leaks. Retighten screws and/or replace gasket.
9. Check cylinder head and/or cylinder base gasket.
Worn out gasket(s) is (are) causing coolant leakage. Replace.
10. Check coolant drain screw on water pump housing MAG side.
Copper ring on drain screw leaks. Retighten screw and/or replace copper ring.
11. Check intermediate gear(s) behind of PTO cover.
Worn out and/or broken gear(s) is/are causing less coolant supply. Replace worn out and/or broken gear(s) (refer to bottom end).
12. Check if water pump shaft is seized.
Water pump shaft does not turn. Replace defective part(s).
13. Check cooling fan and connection.
Fan motor faulty. Replace.
Wire harness is brittle or hard (no connection). Replace.
14. Check radiator fan switch and fuse.
Faulty fan switch and/or faulty fuse. Replace defective part(s).
15. Check radiator condition for leakage.
Radiator cracked or deformed. Replace radiator.
16. Check mud/dust in radiator fins.
Radiator fin obstructed, hard air cooling. Clean radiator fins.

12.3 MAGNETO SYSTEM

Symptom: BATTERY NOT CHARGING OR CHARGING VOLTAGE INADQUATE

1. Check battery
Battery shows less power. Reload battery.
2. Check magneto for damage and/or electrical failure.

Radial position of rotor wrong due to broken woodruff key. Replace woodruff key.

Coating on stator winding is damaged. Replace stator.

Resistance value is out of specification (refer to technical specifications). Replace magneto.

Connector on magneto is damaged and/or has electrical failure. Repair and clean contacts of connector.

3. Check voltage regulator/rectifier.

Refer to charging system.

4. Check wiring harness for cracks or other damages.

Harness shows electrical failure and/or other damages. Replace/repair wiring harness.

12.4 LUBRICATION

Symptom: LOW OR NO OIL PRESSURE/HIGH OIL CONSUMPTION

1. Check oil level and search for leakage on crankcase and/or sealing parts.

Crankcase is leaking due to damage. Rebuild engine with new crankcase and gasket parts. Use recommended oil (refer to technical specifications).

Crankcase is leaking due to loosen screws. Retighten screws with recommended torque

Sealing rings, O-rings and/or gaskets are brittle, hard or damaged. Replace damaged parts.

Piston rings worn out (blue colored engine exhaust emission). Replace piston rings (refer to cylinder and head).

Piston rings are broken (low compression). Replace piston rings (refer to cylinder and head).

Valve stem seal damaged and/or sealing lip is hard and/or brittle. Replace all valve stem seals.

2. Check oil filter for contamination.

Oil filter clogged. Replace oil and oil filter at the same time. Use recommended oil (refer to technical specifications).

3. Check oil drain plug on engine bottom.

Plug is loose and/or gasket ring is missing. Retighten the plug and/or place gasket ring.

4. Check leak indicator hole if oil leaks (in crankcase MAG side-water pump housing area).

Oil leaking from leak indicator hole means a damaged oil seal on water pump shaft. Replace oil seal (refer to cooling system).

5. Check oil orifice(s) on the oil pump suction side.

Oil orifice(s) is (are) clogged. Clean from contamination. Replace oil and oil filter if necessary (refer to maintenance or lubrication system).

6. Check oil pump function.

Oil pump rotor is out of wear limit. Replace oil pump (refer to lubrication system).

Oil pump seized due to oil leakage and/or air inclusion. Replace oil pump (refer to lubrication system).

Gears driving oil pump are broken or otherwise damaged. Replace gears.

Incorrect oil being used. Use recommended oil (refer to technical specifications).

7. Check oil pressure regulator valve (spring) function.

Valve spring damaged (valve always open). Replace spring.

Valve piston is worn or broken. Replace valve piston (refer to lubrication system).

Valve piston stays open due to contamination. Clean or repair valve piston.

8. Check plain bearings in crankcase for heavy wear.

Plain bearings out of specification (increased clearance). Replace plain bearings (refer to bottom end).

9. Check engine oil strainer in crankcase.

Oil strainer is clogged due to contamination. Clean or replace strainer and diagnose causes. Replace possible damaged parts (refer to bottom end).

Symptom: OIL CONTAMINATION (white appearance)

1. Check leak indicator hole (in crankcase MAG side-water pump housing area) if water and oil leaks.

Leakage of oil/water mixture from indicator bore means damaged water pump seal ring and rotary seal. Replace sealing ring, rotary seal and change oil, oil filter and/or coolant (refer to lubrication system, cooling system and bottom end).

2. Check cylinder head and/or cylinder base gasket.

Gasket damaged or leaking. Retighten cylinder head with recommended torque and/or replace gasket.

3. Check tightening torque of cylinder head screws.

Screws not properly tightened. Retighten screws to recommended torque and replace oil.

4. Check oil for particles (may indicate possible engine internal damages).

Oil contamination due to metal or plastic particles. Replace possibly damaged part(s) including oil and oil filter. Use recommended oil (refer to technical specifications).

12.5 CYLINDER AND HEADSymptom: UNUSUAL ENGINE NOISE AND/OR VIBRATION

1. Check noise coming from cylinder head area.
 - Improper valve clearance adjustment. Readjust valve clearance and/or replace defective part(s).
 - Faulty chain tensioner. Replace spring and/or mechanism.
 - Chain guide worn out. Replace chain guide.
 - Stretched chain and/or worn out sprockets. Replace chain and sprockets.
 - Sprocket screws got loose. Retighten screws with recommended torque.
 - Rocker arm(s) is (are) worn out (valve adjustment). Readjust valve clearance and/or replace rocker arm(s).
 - Incorrect camshaft timing adjustment. Replace damaged components and readjust camshaft timing (refer to cylinder and head).

Symptom: OIL CONTAMINATION ON CYLINDER AND/OR HEAD

1. Check screws for torque.
 - Loose screws. Retighten screws with recommended torque.
 - Gaskets are brittle, hard, worn out or otherwise damaged. Replace damaged gaskets, O-rings.

12.6 CRANKSHAFTSymptom: UNUSUAL ENGINE NOISE AND/OR VIBRATION

1. Check noise coming from crankshaft area.
 - Crankshaft plain bearings are damaged. Replace crankshaft plain bearings.
 - Connecting rod plain bearings are damaged. Replace connecting rod plain bearings.
 - Magneto rotor got loose. Replace damaged components and retighten rotor retaining screw with recommended torque (refer to MAGNETO SYSTEM).

12.7 GEARBOXSymptom: UNUSUAL GEARBOX NOISE AND/OR VIBRATION

1. Check oil level in gearbox.
 - Oil leakage from gearbox. Replace damaged gasket(s) and/or oil seal(s), torque screws and refill with oil up to specified level (refer to TECHNICAL SPECIFICATIONS and GEARBOX)
2. Check bearings in the gearbox for free movement.
 - Bearing(s) do(es) not move freely. Replace bearing(s)
3. Check for knocking noise.
 - Tooth of gears are damaged and/or worn. Replace respective gears.

Symptom: GEAR INDICATION FAILS.

1. Check contact screws on gear housing center.
 - Check contact screw outside for contamination and wetness. Clean contact screw and screw for wiring harness.
 - Contact(s) is (are) corroded and/or contact screw for wiring harness got loose. Clean contact surface and retighten contact screw(s) with recommended torque.
 - Wiring harness has broken cables. Replace wiring harness.
 - Shifting indicator switch(es) pin(s) is (are) worn and/or damaged. Replace shifting indicator switch(es).

Symptom: GEAR(S) IS (ARE) HARD TO SHIFT

1. Check shift shaft splines and/or shift forks for wear and/or damages.
 - Shift shaft is worn out and/or shows damaged splines. Replace shift shaft.
 - Shift drum track(s) and/or splines is (are) worn out or damaged. Replace shift drum and damaged part(s).
 - Shift fork(s) is (are) worn out and/or engagement pins are damaged. Replace shift fork(s).
 - Shift fork(s) is (are) worn out and/or fork(s) is (are) damaged. Replace shift fork(s).
 - Shift gear(s) is (are) worn out. Replace shift gear(s).
 - Shifting indicator switch(es) pin(s) is (are) worn out (no rounding on top of pin). Replace shifting indicator switch(es).
2. Check engine idle speed.
 - Check throttle cable and throttle adjustment.
 - Check bypass idle valve and connectors.
3. Check CVT one way clutch on drive pulley.
 - CVT one way clutch was not lubricated correctly. Lubricate CVT one way clutch (refer to CONTINUOUSLY VARIABLE TRANSMISSION (CVT)).
 - CVT one way clutch is worn out or damaged. Replace defective part(s) (refer to CONTINUOUSLY VARIABLE TRANSMISSION (CVT)).
 - Check if friction washer at one way clutch is worn. Replace friction washer (refer to CONTINUOUSLY VARIABLE TRANSMISSION (CVT)).
4. Check transmission lever and connecting rod.
 - Ball joint and/or ball joint nut is (are) loose. Retighten or replace the ball joint.
5. Check spring on shift shaft in gearbox.
 - Broken spring. Replace the spring (refer to GEARBOX).
6. Check for any mud intrusions.
 - CVT parts dirty. Clean all CVT parts.

12.8 COUPLING UNITSymptom: 4 WHEEL DRIVE INDICATION FAILS

1. Check contact screw on gear housing right side for damage and/or wear.
Shifting indicator switch pin is worn and/or damaged. Replace shifting indicator switch.
Contact is corroded and/or contact screw for wiring harness got loose. Clean contact surface and retighten contact screw with recommended torque.
Wiring harness has broken cable. Replace wiring harness.

Symptom: 4 WHEEL DRIVE DOES NOT ENGAGE OR DISENGAGE

1. Check actuator and/or actuator shifting fork for wear and/or damages.
Check if selector works properly. If so, check actuator.
If selector is out of specifications, check wires, connectors and/or replace selector.
Actuator shifting fork is worn out and/or damaged. Replace shifting fork of actuator.
Check function of actuator. Replace if actuator is not turning, refer to GEARBOX.
2. Check shifting sleeve splines and/or shifting fork for wear and/or damages.
Check sleeve shows damaged splines. Replace shifting sleeve (refer to GEARBOX).
Shifting fork is worn out and/or engagement pin is damaged. Replace shifting fork.

12.9 CVTSymptom: UNUSUAL ACCELERATION BEHAVIOR

1. Check drive belt condition.
Belt is too narrow (drive belt engagement is higher in drive pulley). Replace belt if width is less than specified.
2. Check lever condition on drive pulley sliding sheave and/or roller(s) on governor cup.
Lever(s) on drive pulley sliding sheave is (are) worn and/or damaged. Replace all levers at the same time (lever kit).
Roller(s) is (are) worn and/or damaged. Replace governor cup assembly.
3. Check drive/driven pulley sliding sheave for free axial movement.
Sliding sheave is stuck. Replace damaged part(s).
4. Check condition of drive/driven pulley spring.
Drive pulley spring tension is too smooth and/or damaged. Replace spring.
Driven pulley spring tension is too stiff. Replace spring.
5. Check if cam of driven pulley is worn.
Replace if out of specifications.
6. Check condition of fixed and sliding sheaves (drive and driven pulley).
Check surface of fixed and sliding sheaves (drive and driven pulley) for grooves or other damages.
7. Check valve adjustment.
Intake and/or exhaust valves are not adjusted correctly. Adjust valves.
8. Check engine condition.
Low engine compression.
9. Check ignition condition.
Faulty spark plug. Install new spark plug(s).
10. Check differentials operation.
Vehicle on Neutral is hard to move. Repair or replace defective part(s).

Symptom: ENGINE MAXIMUM RPM IS TOO HIGH AND VEHICLE TOP SPEED IS NOT REACHED.

1. Check drive/driven pulley area for contamination and/or water intrusion.
CVT area is contaminated with water, dirt or oil. Clean CVT system and replace damaged part(s).
2. Check drive/driven pulley spring tension.
Drive pulley spring tension is too stiff. Replace spring.
Driven pulley spring tension is too smooth and/or damaged. Replace spring.

Symptom: DRIVE PULLEY NOISE IN IDLE SPEED

1. Check slider shoes (drive pulley).
Worn slider shoes (increased clearance between governor cup and drive pulley sliding sheave). Replace all slider shoes at the same time (slider shoes kit).
2. Check driven pulley sliding mechanism (between driven pulley outer and inner sheave).
Mechanism is stuck and/or damaged. Replace driven pulley assembly.
3. Check roller(s) and/or levers for wear (located on sliding sheave of drive pulley).
Roller(s) on governor cup is (are) worn out and/or damaged. Replace governor cup assembly.
Lever(s) on drive pulley sliding sheave is (are) worn out and/or damaged. Replace all levers at the same time (lever kit).
4. Check drive pulley screw for torque.
Loose screw. Retighten screw with recommended torque.
5. Check one-way clutch condition on drive pulley sliding sheave.
Bearing(s) do(es) not move freely. Replace damaged part(s) and lubricate inside of one-way clutch.
Spring sleeve(s) inside one-way clutch is (are) worn out. Replace both sleeves and springs and lubricate inside of one-way clutch.
Spring(s) inside one-way clutch is (are) worn out. Replace both pins and springs and lubricate inside of one-way clutch.

Symptom: DRIVE PULLEY NOISE WHEN ACCELERATING/DECELERATING

1. Check if belt runs in dry condition.
Drive pulley area is wet/contaminated due to water/dirt intrusion. Clean driven pulley

- area and/or drain water out of CVT cover.
- 2. Check drive/driven pulley screw for torque.
Loose screw on drive pulley. Retighten screw with recommended torque.
- 3. Check cam and driven pulley fixed sheave for wear.
Cam and/or drive pulley fixed sheave out of wear limit and/or damaged. Replace damaged part(s).
- 4. Check torque gear fixed in driven pulley sliding sheave for wear.
Torque gear out of wear limit and/or damaged. Replace torque gear).
- 5. Check for foreign particles in CVT area (stones, dirt, etc.).
Small particles damaged belt and/or pulley surface(s). clean system and replace damaged parts.

Symptom: VIBRATIONS ORIGINATING FROM DRIVE PULLEY

- 1. Check tightening torque of drive pulley screw.
Moving sliding sheave. Retighten screw.
- 2. Check fixed sheave bushings.
Excessive gap between bushings and fixed sheave shaft, thus restraining sliding sheave movements. Replace fixed sheave assembly.
- 3. Check if slider shoes are present and/or placed in correct position.
Slider shoe(s) is (are) missing and/or damaged. Replace all slider shoes at the same time (slider shoes kit).

Symptom: VIBRATIONS ORIGINATING FROM DRIVEN PULLEY

- 1. Check fixed and sliding sheave bushings on driven pulley.
Excessive gap between bushings and CVT shaft, thus restraining sliding sheave movements. Replace fixed and/or sliding sheave of driven pulley, polish CVT shaft area with fine emery cloth and wipe clean with a cloth.

Symptom: PULLEYS DO NOT DOWN/UP SHIFT PROPERLY.

- 1. Check drive pulley bushings (cleanliness, wear, etc.)
Check items 1 and 2 of UNUSUAL ACCELERATION BEHAVIOR.
Bushings stick to fixed sheave pulley shaft. Clean or replace.
Spring seat sticks to sliding sheave pulley bushing. Clean system and/or replace sliding sheave pulley.
One-way clutch does not operate properly. Clean system and/or replace damaged part(s).
- 2. Check driven pulley spring tension.
Driven pulley spring tension is too weak or broken. Replace.
Driven pulley cam is worn or damaged. Replace.

Symptom: BELT GLAZED EXCESSIVELY OR HAVING BAKED APPEARANCE

- 1. Check if CVT air intake and/or outlet is clogged.
CVT area heats up due to contamination. Clean air intake and/or outlet from contamination.
Fans located on drive pulley is worn or damaged. Replace.
- 2. Check if pulley sheaves are clean.
Oil on pulley surfaces. Clean pulley sheaves and replace belt.
Water intrusion in CVT area. Find root cause and repair. Drain water and replace belt.

Symptom: BELT WORN EXCESSIVELY IN TOP WIDTH.

- 1. Check drive belt width.
Considerable wear. Replace belt if narrower than specified (refer to CONTINUOUSLY VARIABLE TRANSMISSION (CVT) OR TECHNICAL SPECIFICATIONS).
- 2. Check driver belt identification number.
Wrong type of belt. Replace belt with an appropriate drive belt.
- 3. Check for localized belt wear caused by belt slippage.
Localized wear. Replace belt.

Symptom: BELT DISINTEGRATION.

- 1. Check drive belt lifetime is exceeded.
Clean CVT system and rebuild with a new drive belt.
- 2. Check drive belt identification number.
Excessive belt speed. Using unspecified type of belt. Replace belt with proper type of belt.
- 3. Check if pulley sheaves are clean.
Oil on pulley surfaces. Clean pulley surfaces with fine emery cloth and wipe clean using pulley flange cleaner and a cloth.
Drive/driven pulley sheaves are damaged through stones inside CVT area. Clean pulley surfaces with fine emery cloth, wipe clean with a cloth or replace drive/driven pulley sheaves and belt.

Symptom: BACK BETWEEN COGS

- 1. Check drive belt condition.
Considerable use, belt wearing out. Replace.
Brittle belt condition through aging. Replace belt.

12.10 ENGINE GENERAL

Symptom: ENGINE CRANKS BUT FAIL TO START

- 1. Check if spark plug connectors fit on spark plugs (refer to IGNITION SYSTEM).
- 2. Check spark plugs.
Define spark plugs (no spark) or wrong spark plug gap. Readjust gap and clean spark

- plugs or replace.
3. Check for fuel on spark plugs.
Flooded engine (spark plugs wet when removed). Activate engine drowned mode and crank engine with rags over the spark plug holes.
4. Check battery voltage.
Battery is discharged and starter works not properly. Charge battery.
5. Check fuel level in fuel tank and fuel pressure. Ensure fuel pump was not disabled.
Low or no fuel pressure. Replace defective part(s).
6. Check fuel injectors.
Plugged or faulty injector(s). Replace defective part(s).
7. Check idle bypass valve.
Stuck or defective.
8. Check encoder wheel.
Bent tooth. Refer to MAGNETO SYSTEM.
9. Check engine compression.
Insufficient engine compression. Replace defective part(s).
10. Check fault codes in DIAGNOSTIC TOOL system.
Check if actuator(s) is/are defective. Replace defective part(s) (refer to COMPONENT INSPECTION AND ADJUSTMENT).

Symptom: ENGINE DOES NOT START

1. Electrical problem.
Determine if the electrical system works correctly (fuse(s), battery, wiring harness, etc.). Refer to IGNITION SYSTEM.
2. Problem with fuel system (carburetor, fuel pump, hoses, etc.).
Clean, inspect, repair or replace defective parts.
3. Check engine compression.
Insufficient engine compression. Replace defective parts.
Valve seat worn and/or damaged. Repair by performing valve guide procedure (refer to CYLINDER AND HEAD). Readjust valve clearance.
4. Internal engine problem.
Overhaul engine to find defective parts. Refer to the appropriate section in ENGINE.

Symptom: ENGINE HARD TO START

1. Check idle bypass valve.
Stuck or defective. Refer to ENGINE MANAGEMENT.
2. Check closed throttle and idle actuator with DIAGNOSTIC TOOL
Wrong TPS zero setting/idle bypass valve reset. Refer to ENGINE MANAGEMENT.
3. Check engine compression.
Wrong adjustment (likely too tight). Refer to ENGINE MANAGEMENT.
4. Check engine compression.
Insufficient engine compression. Replace defective part(s) refer to LEAK TEST.
5. Verify spark plug condition.
Defective, improperly set, worn out, fouled. Identify source of problem and correct. Replace.
6. Check fuel level in fuel tank and fuel pressure.
Low or no fuel pressure. Replace defective part(s) refer to FUEL TANK AND FUEL PUMP.
7. Check CAPS (camshaft position sensor).
Defective sensor/wiring. Refer to ENGINE MANAGEMENT.

Symptom: ENGINE SUDDENLY TURNS OFF

1. Perform engine leak test.
Damaged head gasket and/or seal and/or leaking inlet/exhaust valve(s). replace and/or repair defective parts.
2. Check spark plugs condition and/or gap.
Fouled spark plugs or wrong spark plug gap. Readjust gap and clean spark plugs or replace.
3. Piston seizure.
Spark plugs heat range is too hot. Install spark plugs with appropriate heat range (refer to TECHNICAL SPECIFICATIONS).
Compression ratio is too high. Install genuine parts.
Poor oil quality. Use recommended oil.
Leaks at air intake manifold (engine gets too lean). Retighten screws or replace air intake manifold gasket.
Snow/water intrusion through intake system into combustion chamber. Clean intake system and replace defective part(s).
4. Melted and/or perforated piston dome; melted section at ring end gap.
Spark plugs heat range is too hot. Install recommended spark plugs (refer to TECHNICAL SPECIFICATIONS).
Coolant less than recommended level (engine gets too hot). Repair cooling circuit and/or refill with recommended liquid.
Poor quality and/or wrong fuel. Clean from contamination and use appropriate fuel (refer to TECHNICAL SPECIFICATIONS).
5. Piston color is dark due to seizure on intake and exhaust side.
Cooling system leaks and lowers coolant level. Tighten clamps or replace defective parts. Add antifreeze in cooling system until appropriate level reached. Replace

6. Cracked or broken piston.
Cracked or broken piston due to excessive piston/cylinder clearance or engine overheating. Replace piston. Check piston/cylinder clearance (refer to CYLINDER AND HEAD).
7. Check piston rings and cylinder surface for grooves.
Poor oil quality. Use recommended oil.
Contamination through engine intake. Replace defective part(s) and use new air filter.
8. Check crankshaft, rocker arms movement.
Oil pump failure due to lack of oil. Repair and replace defective parts and use new recommended oil.
Oil contamination due to clogged oil filter/oil strainer. Replace oil and oil filter at the same time, replace defective part(s).
9. Check valve springs exhaust/intake.
Broken valve spring damages the cylinder head, valve(s), rocker arm(s), piston, piston rings and connecting rod. Replace defective part(s).
10. Check if fuel supply is sufficient.
Low fuel level.
Clogged fuel filter or fuel injector filter.
Fuel hose is contaminated and/or bent. Clean and/or replace defective part(s).

Symptom: ENGINE BACKFIRES

1. Check spark plugs.
Carbon accumulation caused by defective spark plugs. Replace spark plugs.
2. Check leakage on intake manifold.
Air leak on intake system. Retighten screws and/or replace intake manifold gasket.
3. Check exhaust air leaking.
Exhaust gasket is leaking. Retighten screws and/or replace exhaust gasket.
4. Check intake valve(s) for leaking.
Intake valve(s) is (are) leaking. Repair or replace valve(s).
5. Check if fuel supply is sufficient.
Fuel hose is contaminated and/or bent (engine gets lean). Clean and/or replace defective part(s).
6. Check engine ground.
Poor engine ground. Clean.

Symptom: ENGINE DOES NOT OFFER MAXIMUM POWER AND/OR DOES NOT REACH MAXIMUM OPERATING RPM

1. Check spark plugs condition and/or gap.
Fouled spark plugs or wrong spark plug gap. Readjust gap and clean spark plugs or replace.
2. Check spark plugs type.
Improper spark plugs heat range. Install recommended spark plugs (refer to TECHNICAL SPECIFICATIONS).
3. Perform engine leak test.
Damaged head gasket and/or seal and/or leaking intake/exhaust valve(s). replace and/or repair defective parts.
4. Check for water in fuel (wrong fuel).
There is water in fuel or wrong fuel. Drain fuel system, search for leakage and refill it with appropriate fuel.
5. Check engine compression.
Worn piston(s) and/or piston ring(s). Replace defective part(s).
6. Check fuel pressure.
Low fuel pressure. Perform fuel pressure test (refer to FUEL SYSTEM).
7. Check air intake system.
Air filter is clogged due to contamination. Replace air filter.
8. Check if EMS (engine management system) is in limp home mode. Check fault codes in DIAGNOSTIC TOOL system.
Check if electrical actuator(s) is/are defective. Replace defective part(s).
9. Check drive belt.
Worn. Replace belt if its width is less than specified.

Symptom: HIGH ENGINE OPERATING TEMPERATURE

1. Check if cooling system shows any failure (see COOLING SYSTEM).
System is leaking. Repair and/or replace damaged part(s).
2. Check function of lubrication system (see LUBRICATION SYSTEM).
Lubrication is not working properly. Repair and/or replace damaged part(s).
3. Check condition and heat range of spark plugs.
Melted spark plug tip or inadequate heat range. Replace.
4. Check air leakage on engine intake.
Leakage causes overheating. Replace/repair damaged part(s).
5. Check air inlet and outlet of the CVT cover.
Air circulation is clogged (overheating). Clean air circulation from contamination.
Drive belt worn and/or damaged. Replace belt with an appropriate drive belt (refer to TECHNICAL SPECIFICATIONS).

13.SPECIFICATIONS

Item		Parameter
Overall length		2645mm
Overall width		1340mm
Overall height		1825mm
Wheelbase		1840mm
Ground clearance		190mm
Engine		
Type		175MN, single-cylinder, 4-stroke, water cooling,
Number of valves		4(mechanical adjustment)
Cylinder diameter		75mm
Piston stroke		65mm
Compression ratio		10.8:1
Displacement		287.2cm ³
Maximum power		21kw/8500rpm
Maximum torque		26.5N.m/5500rpm
Idle speed		1600±100rpm
Lubrication	Type	Wet tank lubrication, oil filters can be changed
	Oil pressure	0.18-0.3MPa at 1600rpm
	Type of oil	SAE 15W-40
	Oil quantity	1600ml
	Replacement of capacity	1300ml
Fuel	Type	Unleaded gasoline only 91# or higher
	Fuel pressure	350 KPa
	Fuel tank capacity	24L
Valve clearance	Intake	0.08 to 0.12mm
	Exhaust	0.08 to 0.12mm
Spark plug	Type/manufacturer	CR8EA
	Gap	0.7 to 0.8 mm
Transmission type		Two speed one down
Transmission operation		Manual
Gearbox type		Dual range with forward and reverse
Gearbox oil		1300ml(SAE 85W140)

Gear ratio	F	4.93
	R	9.74
Capacity of cooling liquid	Type	Ethyl glycol/water mix (-35°C)
	Maximum load	1700ml
	Capacity of water tank	500ml
Cooling liquid temperature thermostat	Valve opening	65°C
	Fan opening	88°C
Tire		
Type		Tubeless
Pressure	Front	120 kPa (17.4 psi)
	Rear	120 kPa (17.4 psi)
Size Front		AT24×12-8
Size Rear		AT24×12-8
Brake		
System		Front and rear unified
Type Front		Dual disc brake
Type Rear		Dual disc brake
Operation		Foot and hand praking brake
Suspension and shock absorber		
Front suspension		Double A-arm wishbone
Rear suspension		Double A-arm wishbone
Front shock absorber		Coil spring/Oil damper
Rear shock absorber		Coil spring/Oil damper
Chassis		
Frame type		Steel tube frame

Caster angle			5.0 °
Electrical			
Ignition system			EFI
Battery		Type	Maintenance Free
		Voltage	12V
		capacity	9AH
Fuses	F1	EFI system and Indicator	20A
	F2	Light Power	30A
	F3	Ignition Switch	15A
	F4	Regulator	15A
	F5	Backup power supply	20A
	F6	Backup fuse	20A
	F7	Backup fuse	10A
Relays	RY1	Main Relay	-
	RY2	Headlight Relay	
	RY3	EFI Relay	-
	RY4	Fan Relay	
	RY5	Fuel Pump Relay	
	RY6	Top Light Relay	



Wire diagram