

UTV170-10

Maintenance Manual

Shandong Odes Industry Co.,Ltd

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Foreword

This manual contains such content as introductions on overhaul, maintenance, overhauling program, dismantling, assembling, troubleshooting and service data of UTV170-10

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

This manual has been prepared on the basis of the latest specifications at the time of publication. If modifications have been made since 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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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.

TECHNICAL SPECIFICATIONS

Item		Parameter
Dimensions		
Overall length		2895mm
Overall width		1290mm
Overall height		1870mm
Seat height		780mm
Wheelbase		1840mm
Ground clearance		181mm
Engine		
Type		Single cylinder, 4 stroke, forced air cooling
Number of valves		1(mechanical adjustment)
Cylinder diameter		61 mm
Piston stroke		57.8 mm
Compression ratio		9.5: 1
Displacement		170cc
Maximum power		7.2Kw/7500rpm
Maximum torque		11.4N.m/4000 rpm
Idle speed		1500±100rpm
Lubrication	Type	Pressure spray
	Oil pressure	0.08-0.26MPa at 3000rpm
	Type of oil	SAE 15W-40
	Oil quantity	1000mL
	Replacement of capacity	830-860mL
Fuel	Type	Unleaded gasoline only 93# or higher
	Fuel pressure	250 kpa
	Fuel tank capacity	23L
Valve clearance	Intake	0.06 to 0.08mm
	Exhaust	0.06 to 0.08mm
Diameter of valve rod(IN)	New	4.975 to 4.99mm
	Service limit	4.95mm
Diameter of valve rod(EX)	New	4.955 to 4.97mm
	Service limit	4.93mm
Valve seat contact width(IN)	New	2.15 to 2.45mm
	Service limit	2.5mm
Valve seat contact width(EX)	New	2.25 to 2.55mm
	Service limit	2.6mm
Valve guide diameter	New	5.000 to 5.012mm
	Service limit	5.040mm
Free length of valve spring	New	32mm
	Service limit	30.5mm
Piston measurement	Size "A"	φ 60. 96mm— φ 60. 97mm

1.GENERAL INFORMATION

	Size “B”	N. A
Cylinder measurement	Size “A”	ϕ 61mm— ϕ 61.01mm
	Size “B”	N. A
Clearance of cylinder - piston	New	0.03mm—0.05mm
	Service limit	0.090mm
Piston ring type	1st	1
	2nd	1
	3rd	2
Piston ring end gap	New 1st	0.10mm—0.25mm
	New 2nd	0.20mm—0.35mm
	New 3rd	0.15mm—0.6mm
	All service limit	1st 0.4 mm; 2nd0.6 mm; 3rd0.8 mm
Piston/ring groove clearance	New 1st	0.03–0.07 mm
	New 2nd	0.02–0.06 mm
	New 3rd	0.02–0.06 mm
	All service limit	1st0.15 ; 2nd0.13; 3rd0.2
Intake cam height	New	5.53mm—5.56mm
	Service limit	5.51
Exhaust take cam height	New	5.42mm—5.48mm
	Service limit	5.4
Crankshaft radial clearance	Service limit	0.06mm
Crankshaft deflection	Service limit	0.15mm
Crankshaft pin diameter	New	30 to 29.994mm
	Service limit	29.98mm
Connecting rod big end diameter	Service limit	37.026mm
Connecting rod big end radial clearance	Service limit	0.04mm
Connecting rod big end axial clearance	New	0.1 to 0.3mm
	Service limit	0.55mm
Connecting rod small end diameter	New	15.016 to 16.027mm
	Service limit	15.04mm
Piston pin diameter	New	15 to 14.992mm
	Service limit	14.985mm
Spark plug	Type/manufacturer	NGK C7HSA
	Gap	0.6 to 0.7mm
Transmission type		CVT(Continuously Variable Transmission)
Drive belt width	Service limit	16.5mm
Gearbox type		Mechanical two - stage gear reduction
Gearbox oil	Capacity	700mL(GL-4-90)
Gear ratio	H	6.51
	R	24.241
Magneto generator output		180W@5000rpm
Tire		
Type		Tubeless

1.GENERAL INFORMATION

Pressure	82 to 97KPa	
Size Front	AT 24×8-12 (Rim 12×6)	
Size Rear	AT 24×8-12 (Rim 12×6)	
Brakes		
System	Front and rear unified	
Type Front	Pincer disc brake	
Type Rear	Pincer disc brake	
New disk thickness	3.7mm(Front) 4mm(Rear)	
Minimum disk thickness	3.2mm(Front) 3.5mm(Rear)	
Maximum disk warpage	0.3mm	
Operation	Foot operation	
Suspension and shock absorber		
Front suspension	Double A swing arm	
Rear suspension	towed	
Front shock absorber	Coil spring / oil damper	
Front shock absorber travel	80mm	
Rear shock absorber	Coil spring / oil damper	
Rear shock absorber travel	60mm	
Electrical		
Ignition system	EFI-DELPHI	
Battery	Type	Maintenance Free
	Voltage	12V
	capacity	9AH
Fuses	Electric spray and indicator light	20A
	The light	20A
	The ignition power supply	10A
	Voltage regulator	20A
	Standby power	20A
Head lamp	12V	
Tail light	12V	
Indicator light	12V	
Turn light	12V	

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 (lbf.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

As for important tightening torques , please refer to following standards.

Installation location	Specifications (mm)	Torque N.m(lbf.ft)
Fastening bolt of engine	M10	70(51.6)
Fastening nut of suspension arm	M10	70(51.6)
Bolt of rear shock absorber	M10	80(59)
Bolt of front shock absorber	M10	80(59)
Fastening nut of wheel rim	M10	80(59)
Nut of wheel hub	M18	250(184.5)
Bolt of rear brake/stop pump (calipers)	M10	80(59)
Rear Brake / Brake disc bolts	M8	26(19.2)
Bolt of front brake/stop pump (calipers)	M8	26(19.2)
Front Brake / Brake disc bolts	M6	15(11)
Lock nut of steering rod	M8	40(29.5)
Bolt of exhaust pipe	M6	15(11)
Spark plug	M10	20(14.8)
Adjusting nut of valve clearance	M6	12(8.9)
Main pulley bolt	M12	100(73.8)
Driven pulley bolt	M10	60(44.3)
Magneto flywheel bolt	M16	150(110.7)
Magneto stator bolt	M6	12.5(9.2)
One way bolt	M8	30(22.1)
Engine oil drain plug	M10	20(14.8)
Gearbox oil drain plug	M12	20(14.8)
Decompression valve plug	M22	20(14.8)
Cylinder head bolt	M6	15(11)
Connecting rod bolt	M8	50(36.9)
Timing chain wheel bolt	M8	30(22.1)

2. PERIODIC MAINTENANCE

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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.

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

ITEM	ROUTINE	Whichever Comes first ⇔	INTIAL			EVERY		
			month	1	3	6	6	12
			Km (mi)	320 (200)	1,200 (750)	2,400 (1,500)	2,400 (1,500)	4,800 (3,000)
hours	20	75	150	150	300			
Valves*	<ul style="list-style-type: none"> ● Check vale clearance. ● Adjust if necessary. 		○		○	○	○	
Cooling system	<ul style="list-style-type: none"> ● Check coolant leakage. ● Repair if necessary. ● Replace coolant every 24 months. 		○	○	○	○	○	
Spark plug	<ul style="list-style-type: none"> ● Check condition. ● Adjust gap and clean. ● Replacement every 24 months 		○	○	○	○	○	
Air filter elements	<ul style="list-style-type: none"> ● Clean. ● Replacement every 24 months 		Every 20-40 hours (More often in wet or dusty areas.)					
Crankcase breather system*	<ul style="list-style-type: none"> ● Check breather hose for cracks or damage. ● Replace if necessary. 				○	○	○	
Exhaust system*	<ul style="list-style-type: none"> ● Check for leakage. ● Tighten if necessary. ● Replace gasket(s) if necessary. 				○	○	○	
Fuel line*	<ul style="list-style-type: none"> ● Check fuel hose for cracks or damage.. ● Replacement fuel hose every 48 months ● Replacement fuel filter every 24 months 				○	○	○	
Engine oil	<ul style="list-style-type: none"> ● Replace (Check oil level every month) . 		○		○	○	○	
Engine oil filter	<ul style="list-style-type: none"> ● Replace. 		○		○		○	
Differential and gearbox oil	<ul style="list-style-type: none"> ● Check oil level/oil leakage. ● Replacement every 24 months. 		○				○	
ITEM	ROUTINE	Whichever Comes first ⇔	INTIAL			EVERY		
			month	1	3	6	6	12
			Km (mi)	320 (200)	1,200 (750)	2,400 (1,500)	2,400 (1,500)	4,800 (3,000)
hours	20	75	150	150	300			
Brake*	<ul style="list-style-type: none"> ●Check operation/brake pad wear/fluid 		○	○	○	○	○	

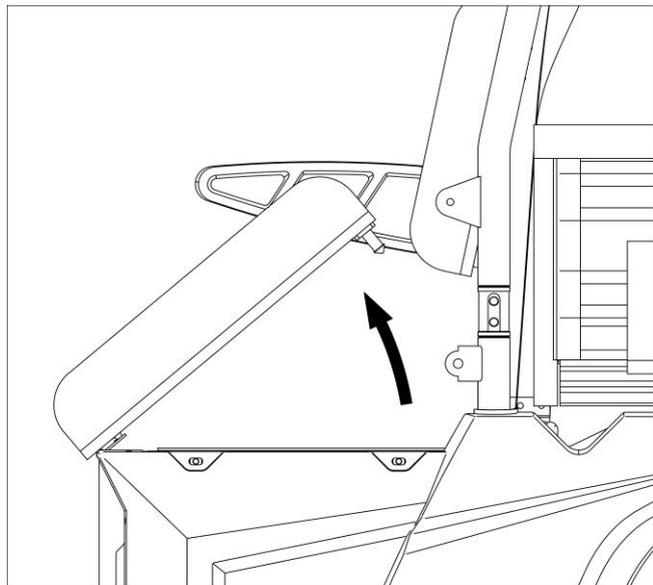
	leakage. ●Brake fluid needs to be above the lowest position. ●Correct if necessary. Replace pads/disk if worn to the limit.					
Accelerator pedal*	●Check operation and free play.	O	O	O	O	O
Wheels*	●Check balance/damage/ run out ●Repair if necessary.	O		O	O	O
Wheel bearings*	●Check bearing assemblies for looseness or damage.. ●Replace if damaged.	O		O	O	O
Front and rear Suspension*	●Check operation and for leakage. ●Correct if necessary.			O		O
Steering system*	●Check operation and for looseness/Replace if damage. ●Check toe-in/Adjust if necessary.	O	O	O	O	O
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				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	O
Battery	●End connection	O		O	O	O
Lamp and steering indication	●Operation	O	O	O	O	O

AIR CLEANER

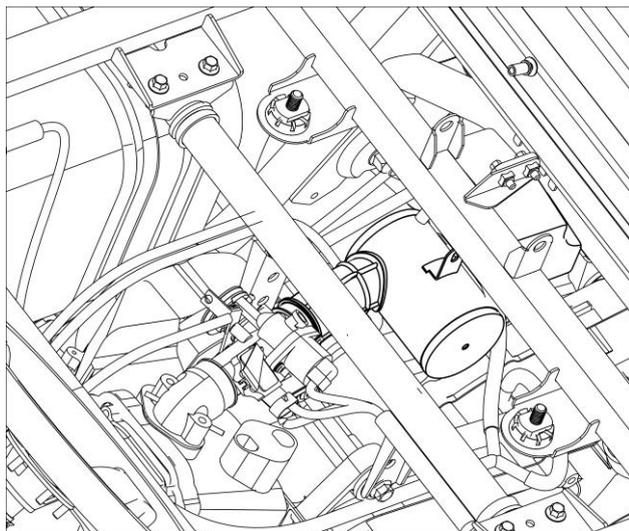
In case of driving in dusty environment, air filter shall be cleaned regularly. It is of great possibility to accelerate wear to engine if there is not filtering element or worn filtering element is used. So, please keep air filter under good conditions all the time. If vehicle is used in dusty area, 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 cleaner element in the following manner:

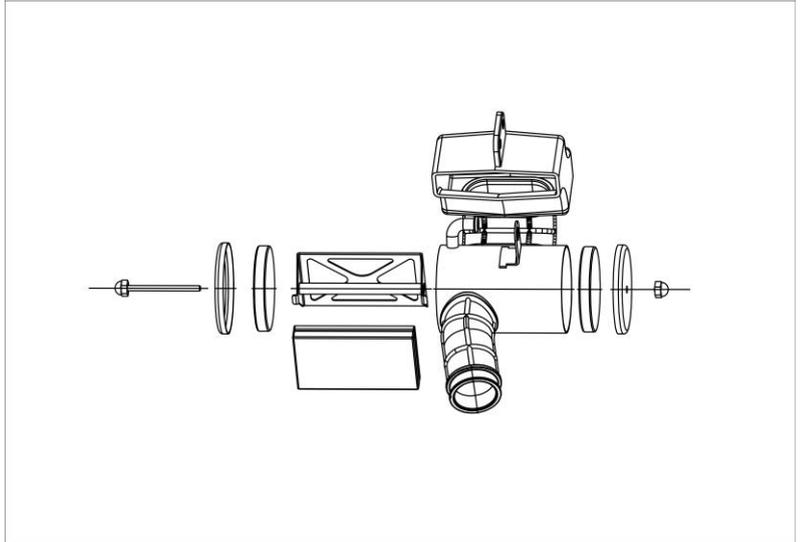
Open the tiltable seat



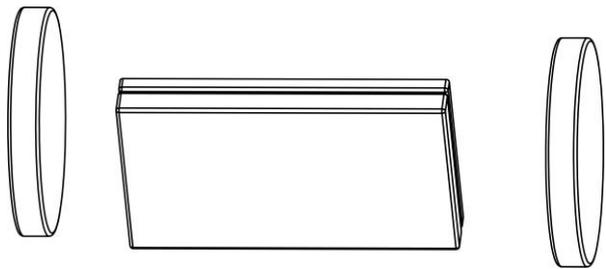
Remove the nuts at both ends of the empty filter



Remove bolt and filter element



Blow low pressure compressed air on filter element to clean it.



Properly reinstall removed parts in the reverse order of their removal. pay attention to the seal gasket of air filter housing is not skew.

CAUTION

- 1.If liquid /deposits are found, squeeze and dry the foam filter. Replace filter element if damaged.
- 2.Do not start engine if liquid or deposit are found. If there is oil in the air filter housing, check engine oil level. Oil level may be too high.
- 3.Inspect the air cleaner element for tears, a torn element must be replaced.

THROTTLE CABLE PLAY

Before starting the engine, check the gas pedal to be sure it is operating correctly. Make sure the gas pedal fully returns to the idle position as soon as it is released.

Check the free play and adjust if needed. Press the throttle to make sure it moves smoothly without sticking and snaps back automatically when it is released. Check to see that the gas pedal operates correctly. It must operate smoothly and fully spring back to the idle position when released. Have a dealer repair if necessary for proper operation.

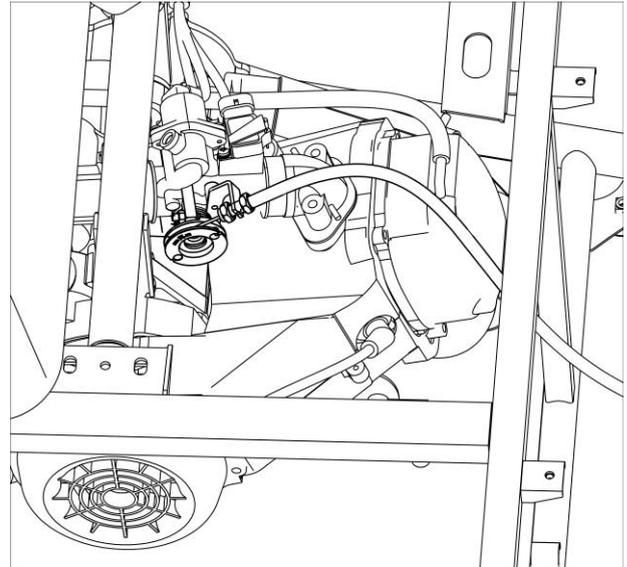
Check throttle pedal free play: 3 - 5mm

In case of out of range: → adjustment

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

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.

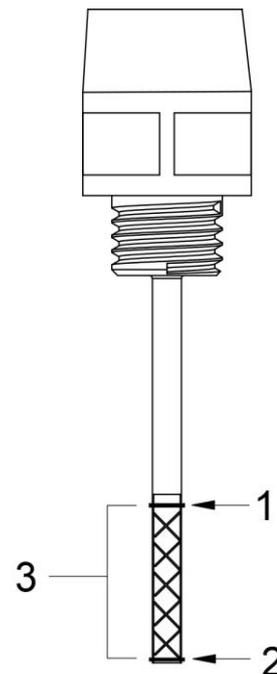


ENGINE OIL

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. Remove dipstick and wipe clean stem.
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.



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. Remove dipstick.
5. Raise the vehicle, support it securely. Place a drain pan under the engine drain plug area.
6. Clean the drain plug area.
7. Unscrew drain plug then remove dipstick.

- 1) Drain plug

8. Allow oil to drain completely from crankcase.
9. Clean the magnetic drain plug from metal shavings and residue.
10. Install a new gasket ring on drain plug. Torque drain plug to 20 N.m.

11. Remove oil filter screws, oil filter cover and oil filter.

- 1) Oil filter nut
- 2) Gasket ring
- 3) Spring
- 4) Oil filter

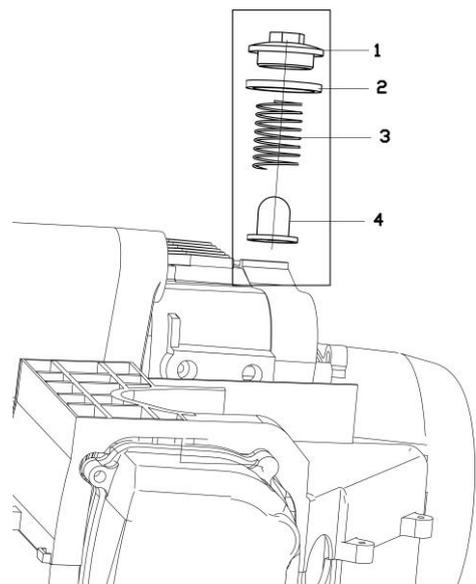
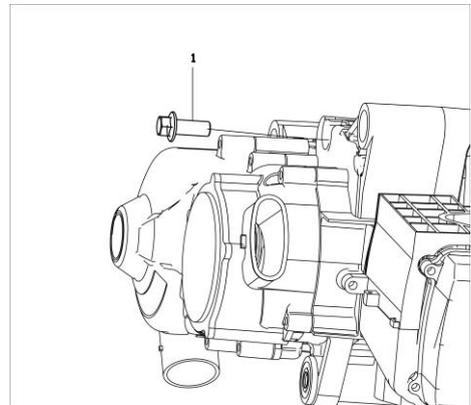
12. Check and clean the oil filter inlet area for dirt and other contaminations.

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

14. Refill engine with a SAE 10W-40 API SJ classification engine oil, Oil change capacity with filter 1850mL.

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

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



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.

BRAKING SYSTEM

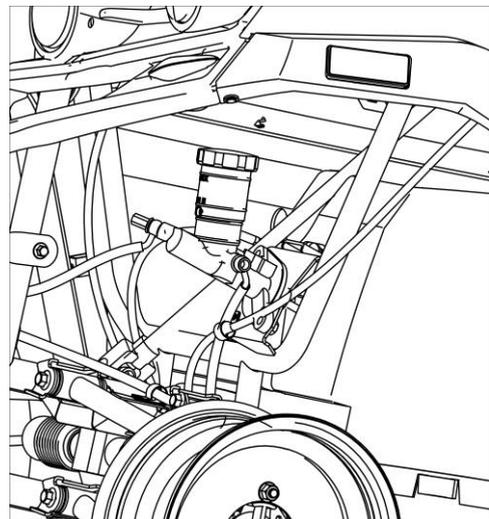
Check to see if any brake fluid is leaking out of the pipe joints or the brake fluid reservoir. Apply the brakes firmly for one minute. If there is any leakage, have the vehicle inspected by an authorized dealer.

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.

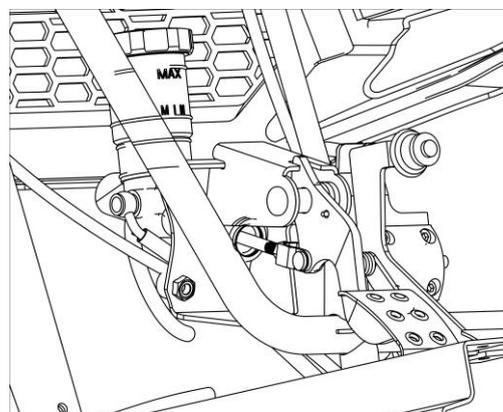
Brake fluid level

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

When the brake fluid level is below the lower edge of sightglass, replenish with brake fluid DOT4.

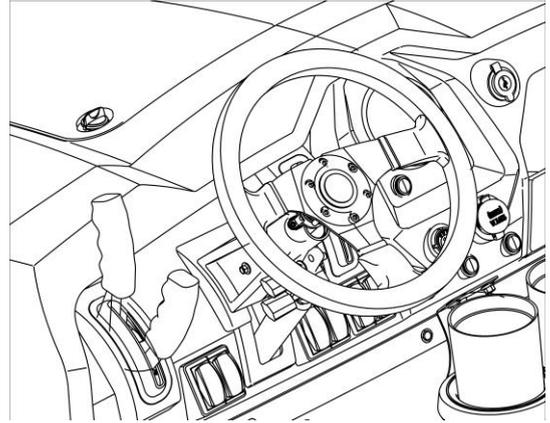
**Brake pedal adjustment**

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.



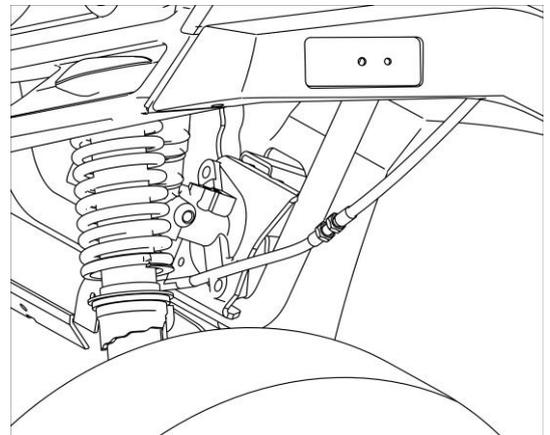
Parking brake adjustment

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



The free play is 15~20mm, the travel is 7 teeth.

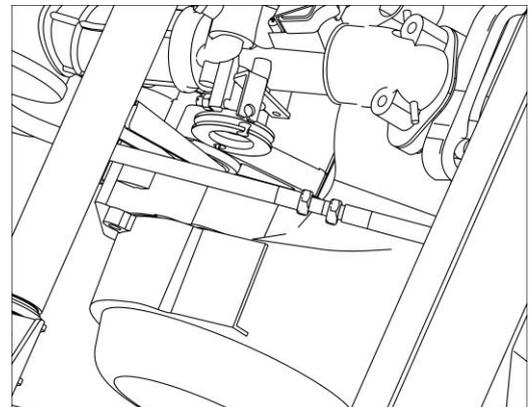
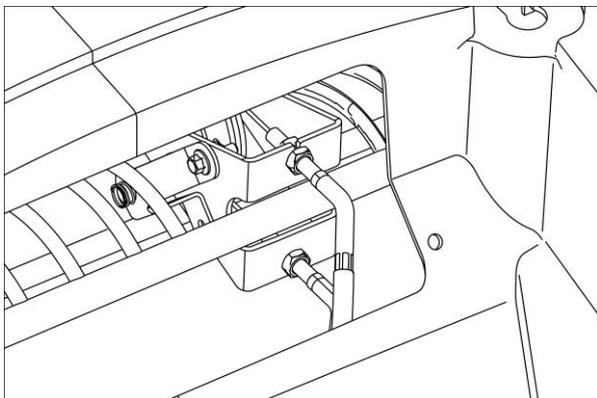
If necessary, slacken the cable by loosening the locknut and screwing the adjuster on the brake holder. After adjusting the play, tighten the locknut. Or screwing the adjustment nut on the parking brake caliper



GEAR SHIFT

Check the shift lever as to change gearshift from N to R and reverse smoothly. Also the meter display is correct.

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.



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

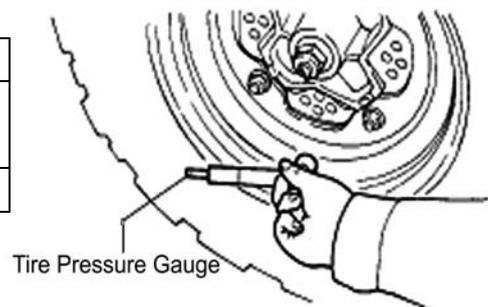
Swing: → replace rocker arm



Tire pressure

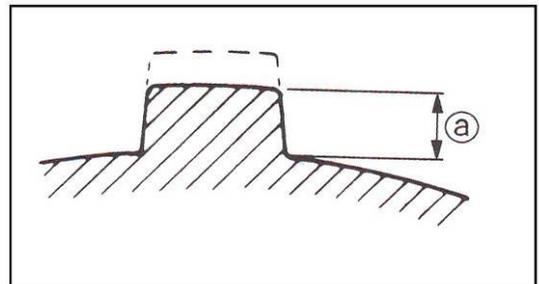
Improper tire pressure will lower comfort of operation and driving and may lead to wear to side edges of tires.

	Front wheel	Rear wheel
Rated pressure	62kPa(0.62kgf/cm ²)	62kPa(0.62kgf/cm ²)
Dimension of tire	26×9-14	26×11-14



Tire thread.

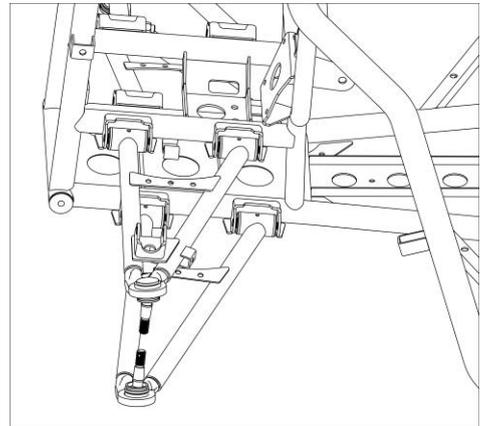
When the tire groove decreases to 6 mm (0.24 in) due to wear, replace the tire.



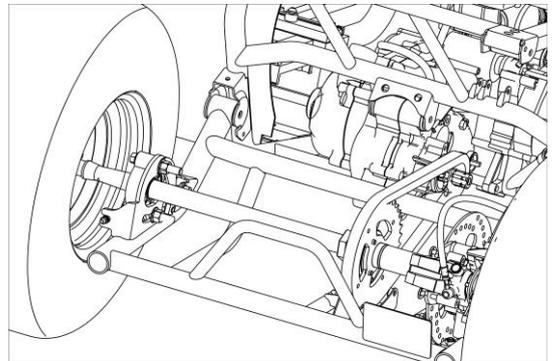
SUSPENSION SYSTEM

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 suspension arms.



Lubricate the chain with lubricating oil.



CHAIN MAINTENANCE

The new chain is too long or extended after use, it is difficult to adjust, the chain link can be removed according to the situation, but it must be an even number. The link should pass through the back of the chain, and the opening of the locking piece should be in the opposite direction of rotation.

After the sprocket wears seriously, the new sprocket and new chain should be replaced at the same time to ensure good meshing. It is not possible to replace new chains or sprockets alone. Otherwise, it will cause poor meshing and accelerate the wear of the new chain or new sprocket.

The old chain can not be mixed with some new chains, otherwise it will easily cause impact in the transmission and break the chain.

The chain should be filled with lubricant in time. Lubricating oil must enter the matching gap between the roller and the inner sleeve to improve working conditions and reduce wear.

When the vehicle is stored for a long time, the chain should be removed and cleaned with kerosene or diesel, then coated with engine oil or butter and stored in a dry place to prevent corrosion.

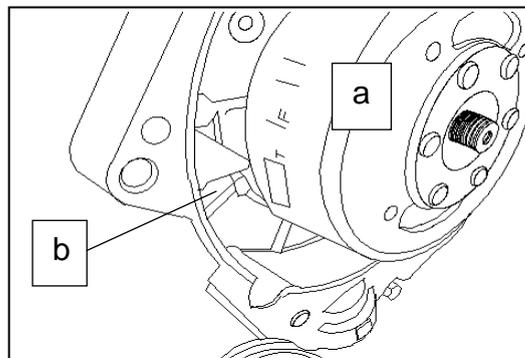
3. ENGINE

REMOVING THE CYLINDER HEAD 3-1	CHECKING THE CYLINDER HEAD 3-2
CHECK THE TIMING CHAIN TENSIONER 3-2	INSTALLING THE CYLINDER HEAD 3-3
REMOVE THE ROCK ARMS AND CAMSHAFT 3-4	CHECK THE CAMSHAFT 3-4
CHECKING THE ROCKETER ARMS AND ROCKER ARM SHAFTS 3-4	REMOVING THE VALVES 3-4
REMOVING THE PISTON 3-5	CHECKING THE TIMING CHAIN GUIDE 3-5
CHECKING THE CYLINDER AND PISTON 3-5	CHECKING THE PISTON RINGS 3-5
INSTALLING THE PISTON AND CYLINDER .. 3-5	REMOVING THE CDI MAGNETO ROTOR 3-6
INSTALLING THE CDI MAGNETO ROTOR 3-7	CHECKING THE OIL PUMP 3-7
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INSTALLING THE SHIFT FORK AND SHIFT DRUM3-12	INSTALLING THE SHIFT LEVER3-12

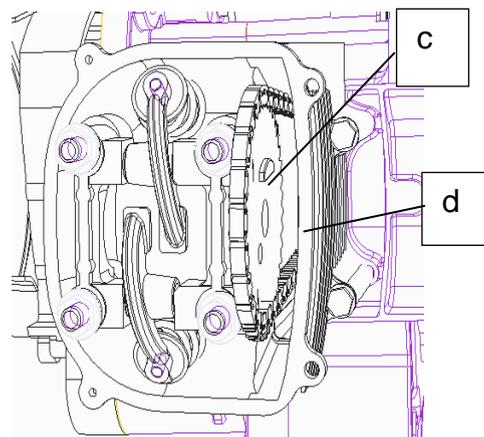
REMOVING THE CYLINDER HEAD

1.Align:

“T”make “a” on the CDI magneto rotor (with the stationary pointer “b” on the CDI magneto rotor)

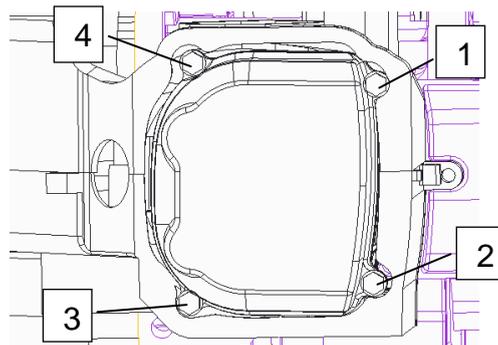


When the piston is at TDC on the Compression stroke, align the punch make “c” on the camshaft sprocket with the mark “d” on the cylinder head.



2.Remove:

Remove the bolts of the cylinder head head“1-4”

**3.Loosen:**

Timing chain tensioner cap bolt.

4.Remove :

Timing chain tensioner (along with the gasket)
Camshaft sprocket
Timing chain

TIP

To prevent the timing chain from falling into the crankcase, fasten it with a wire.

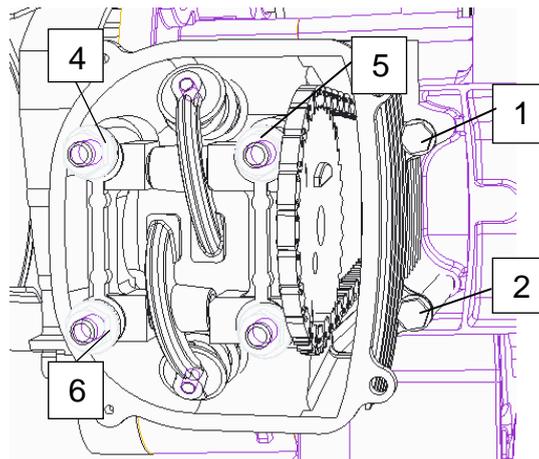
5.Remove:

Cylinder head

TIP

Loosen the bolts and nut in the proper sequence as show.

Loosen each bolt and nut 1/2of a turn at a time.After bolt No.1and nut No.3-6 are fully loosened, remove them.

**CHECKING THE CYLINDER HEAD****1.Eliminate:**

Combustion chamber carbon deposits
(with a rounder scraper)

TIP

Do not use a sharp instrument to avoid damaging or scratching.

Spark plug bore threads

Valve seats

2.Check:

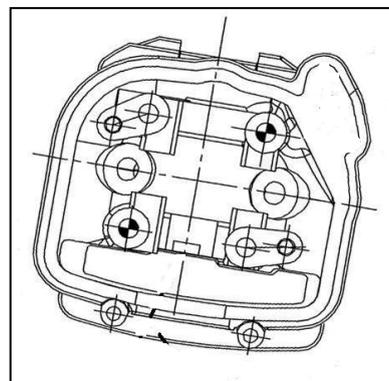
Cylinder head

Damage/scratches→Replace.

3.Measure:

Cylinder head warpage.

Out of specification→resurface the cylinder head.

**CHECK THE TIMING CHAIN TENSIONER****1.Check:**

Timing chain tensioner

Cracks/damage→Replace.

2.Check:

One-way cam operation

Rough movement→Replace the timing.

3.Check:

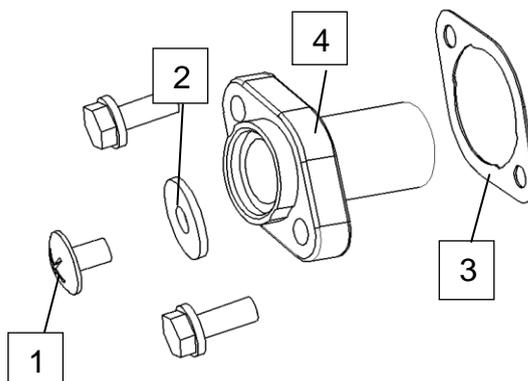
·Timing chain tensioner cap bolt“1”

·O-ring“2”

·Timing chain tensioner gasket“3”

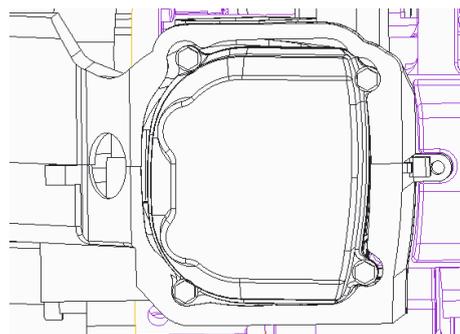
·Timing chain tensioner rod“4”

Damage/wear→Replace the defective part (s)



INSTALLING THE CYLINDER HEAD

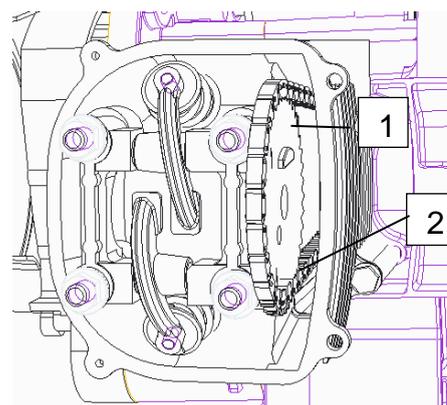
- 1.Install:
 - Dowel pins
 - Cylinder head O-ring
- 2.Install:
 - Cylinder head
- 3.Install:
 - Cylinder head top cover“1”
 - Washers
 - Cylinder head nuts
 - Cylinder head bolts
 - Cylinder bolts
- 4.Tighten:
 - Cylinder bolt
 - Cylinder head bolts
 - Cylinder head nuts



TIP

Tighten the cylinder head bolt, nuts and cylinder bolts in the proper tightening sequence as show and torque them in two stages.

- 5.Install:
 - Camshaft sprocket “1”
 - Timing chain“2”



NOTICE

Do not turn the crankshaft when installing the camshaft sprocket to avoid damage or improper valve timing.

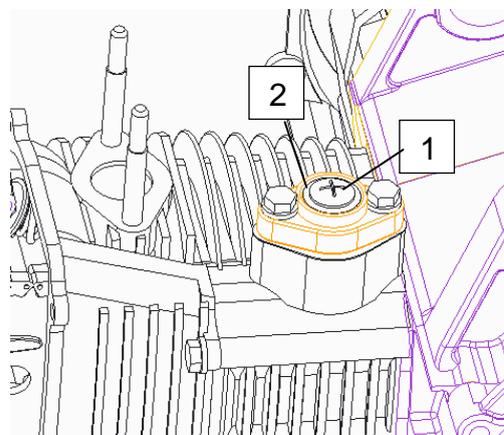
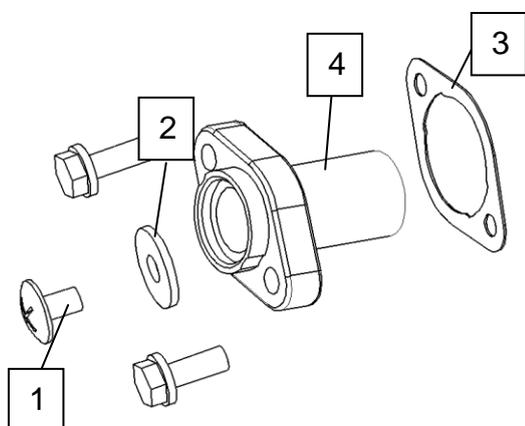
- 6.Install:
 - Timing chain tensioner gasket“3”
 - Timing chain tensioner“2”

Timing chain tensioner bolt 6-10N.m

TIP

To push in the timing chain tensioner rod, release the lock by pushing in the one-way cam“6”

- 7.Install:
 - Timing chain tensioner cap bolt“1”
 - O-ring“4”



REMOVE THE ROCK ARMS AND CAMSHAFT

1.Loosen:

- Locknuts“1”
- Valve clearance adjusting screws“2”

2.Remove:

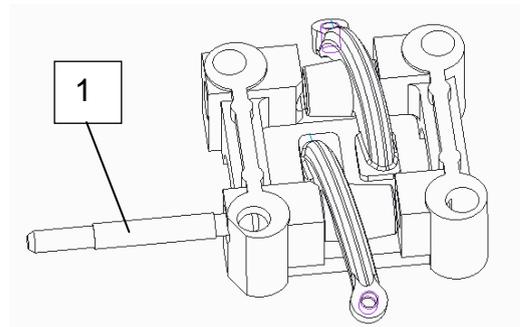
- Intake rocker arm shaft
- Intake rocker arm
- Exhaust rocker arm shaft
- Exhaust rocker arm

3.Remove:

- Camshaft

TIP

Screw an 5mm bolt “1”into the threaded of the rocker arm shaft, and then pull out the shaft.



CHECK THE CAMSHAFT

1.Check:

- Camshaft lobes

Blue discoloration/pitting/scratches→Replace the camshaft.

2.Measure:

Camshaft lobe dimensions “a”and“b”

Out of specification→Replace the camshaft.

CHECKING THE ROCKETER ARMS AND ROCKER ARM SHAFTS

The following procedure applies to all of the rocker arms and rocker arm shafts.

REMOVING THE VALVES

The following procedure applies to all of the valves and related components

TIP

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

1.Check

- Valve sealing

Leakage at the vane seat →Check the valve face, valve seat contact width.

2.Remove:

- Valve cotteners

TIP

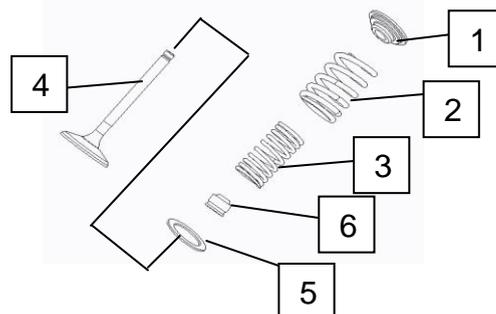
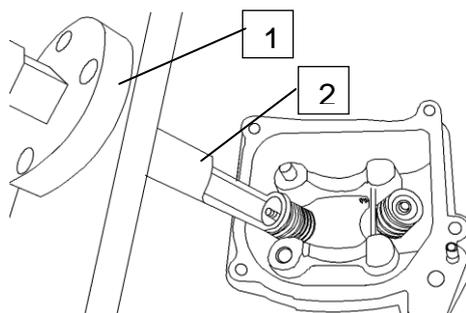
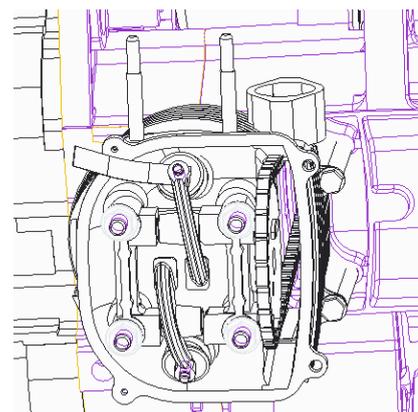
Remove the valve cotteners by compressing the valve spring with the valve spring compressor“1”and the valve spring compressor attachment“2”

3.Remove:

- Valve spring retainer“1”
- Outer valve spring“2”
- Inner valve spring“3”
- Valve“4”
- Valve spring seat“5”
- Valve stem seal“6”

TIP

Identify the position of each part very carefully so that it can be reinstalled in its original place.



REMOVING THE PISTON

- 1.Remove:
- Piston pin clips“1”
 - Piston pin“2”
 - Piston“3”

NOTICE

Do not use a hammer to drive the piston pin out.

TIP

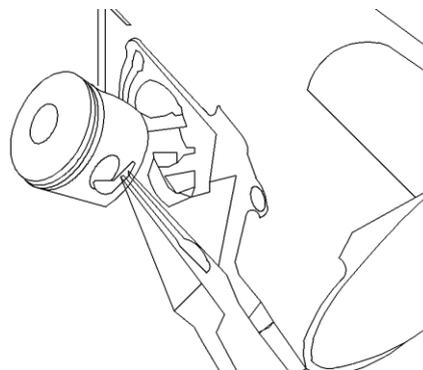
Before removing the piston pin clips, cover the crankcase opening with a clear rag to prevent the piston pin clips from falling into the crankcase.

- 2.Remove:

- Top ring
- 2nd ring
- Oil ring

TIP

When removing a piston ring, open the end gap with your fingers and lift the other side of the ring over the piston crown.



CHECKING THE TIMING CHAIN GUIDE

- 1.Check

Timing chain guide (exhaust side)

Damage/wear→Replace.

CHECKING THE CYLINDER AND PISTON

- 1.Check:

- Piston wall
- Cylinder wall

Vertical scratches→Replace the cylinder, and replace the piston and piston rings as a set.

- 2.Measure:

Piston-to-cylinder clearance

CHECKING THE PISTON RINGS

- 1.Measure:

Piston ring side clearance

Out of specification→Replace the piston and piston rings as a set.

TIP

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

- 2.Install:

- Piston ring
- (into the cylinder)

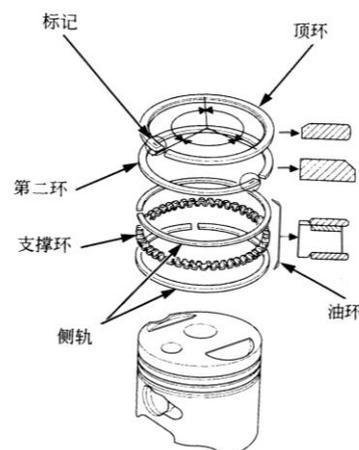
INSTALLING THE PISTON AND CYLINDER

- 1.Install:

- Lower oil ring rail“1”
- Oil ring expander“2”
- Upper oil ring rail“3”
- 2nd ring “4”
- Top ring

TIP

Be sure to install the piston rings so that the manufacture marks or numbers face up.



2.Install:

- Piston“1”
- Piston pin“2”
- Piston pin clips“3”

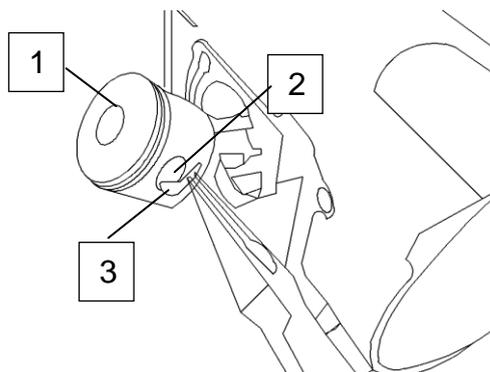
TIP

Apply engine oil to the pin

Make sure the mark“a”on the pistons towards the intake side of the cylinder.

Before installing the piston pin clips, cover the crankcase opening with a clean rag to prevent the clips from falling into the crankcase.

When installing a piston pin clip, make sure that the clip ends “b”are positioned away from the cutout“c”in the piston as show in the illustration.



3.Install:

- Cylinder gasket
- Dowel pins

4.Lubricate:

- Piston
- Piston rings
- Cylinder (with the recommended lubricant)

5.Offset:

- Piston ring end gaps

6.Install:

- Dowel pins
- Cylinder gasket
- Cylinder“1”

TIP

While holding the piston“2”with one hand, install the cylinder other hand.

Pass the timing chain and timing chain guide (intake side) through the timing chain cavity.

REMOVING THE CDI MAGNETO ROTOR

1.Remove:

- CDI magneto rotor cover

TIP

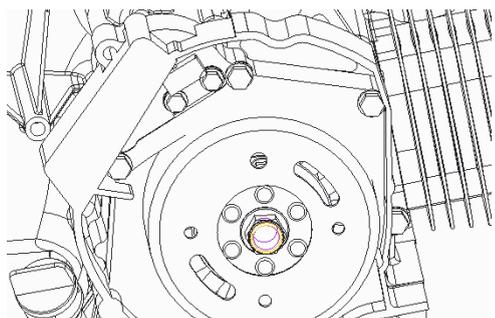
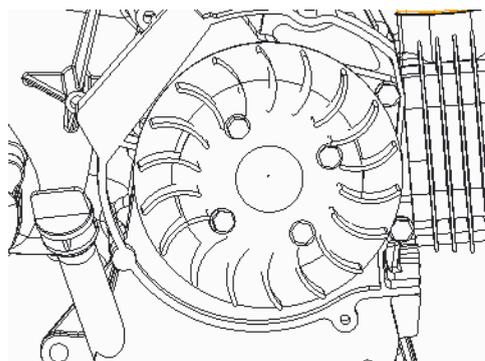
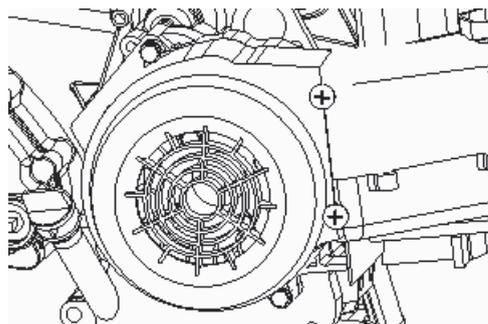
Loosen each bolt 1/4 of a turn at a time, in stages and in a crisscross pattern.After all of the bolts are fully loosened, remove them.

2.Remove:

- CDI magneto rotor nut“1”
- Washer

TIP

Hold the CDI magneto rotor “2”with the rotor holding tool“3”while loosening the CDI magneto rotor nut.



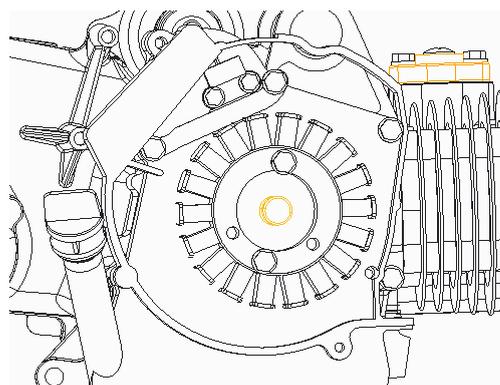
- 3.Remove:
 ·CDI magneto rotor“1”
 ·Woodruff key

NOTICE

To protect the end of the crankshaft, place an appropriate sized socket between the flywheel puller set center bolt and the crankshaft.

TIP

Use the flywheel puller“2”.
Make sure the flywheel puller is centered over the CDI magneto rotor.

**INSTALLING THE CDI MAGNETO ROTOR**

- 1.Installer:
 ·Woodruff key
 ·CDI magneto rotor
 ·Washer
 ·CDI magneto rotor nut

TIP

Clean the tapered portion of the crankshaft and the CDI magneto rotor hub.
When installing the CDI magneto rotor,make sure the woodruff key is properly seated in the keyway of the crankshaft.
Lubricate the threads of the crankshaft with engine oil.
After installing the CDI magneto rotor, check that the CDI magneto rotor rotates smoothly.If not, rein stall the woodruff key and CDI magneto rotor.

- 2.Tighten:
 ·CDI magneto rotor nut“1”
 ·Pickup coil bolt
 ·Stator coil bolt

TIP

While holding the CDI magneto rotorwith the rotor holding tool, tighten the CDI magneto rotor nut

- 3.Apply:
 Sealant (onto the pickup coil/ stator coil assembly lead grommet“1”)

- 4.Install:
 CDI magneto rotor cover

- 5.Tighten:
 CDI magneto rotor cover bolt

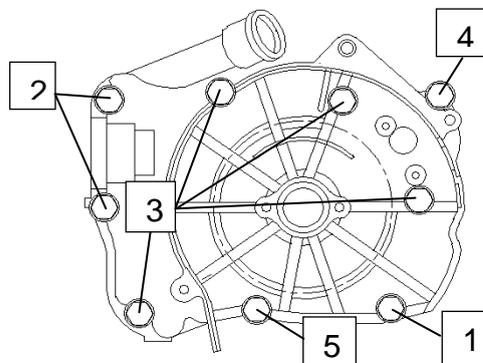
TIP

Tighten the CDI magneto cover bolts in stages and in a crisscross pattern.

CHECKING THE OIL PUMP

1. 1. Check:
 Remove fastening bolt of the right case cover.
 M6×100mm bolt: “1”
 M6×110mm bolt: “2”
 M6×95mm bolt: “3”
 M6×35mm bolt: “4”
 M6×28mm bolt: “5”
 Remove the electrical starter idle wheel and the idle wheel shaft. Remove bolt and partition .
 Remove the locking nut (turn leftwards) and the electrical clutch.

- Remove the electrical starter idle wheel and the idle wheel shaft. Remove bolt and partition .
- Remove the locking nut (turn leftwards) and the electrical clutch.
- Remove the fastening nut of gear of engine oil pump and gear of engine oil pump.



ASSEMBLING THE OIL PUMP

1.Lubricate:

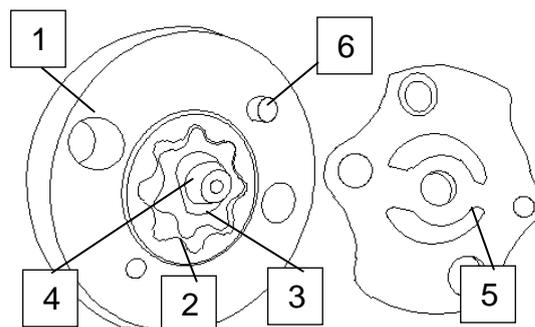
- Oil pump inner rotor
- Oil pump outer rotor
- Oil pump shaft

2.Install:

- Oil pump housing“1”
- Oil pump outer rotor“2”
- Oil pump inner rotor“3”
- Oil pump shaft“4”
- Oil pump housing cover“5”

3.Install:

- Pin“6”
- Oil pump driven gear
- Washer
- Circlip



TIP

When installing the oil pump driven gear, align the pin in the oil pump shaft with groove in the oil pump driven gear.

4.Check

- Oil pump operation

INSTALLING THE OIL PUMP

1.Install:

- Oil pump assembly
- Oil pump screw 10N.m

NOTICE

After tightening the screws, make sure the oil pump turns smoothly.

CHECK THE STARTER WHEEL

1.Check

- Bearing
- Damage/wear→Replace

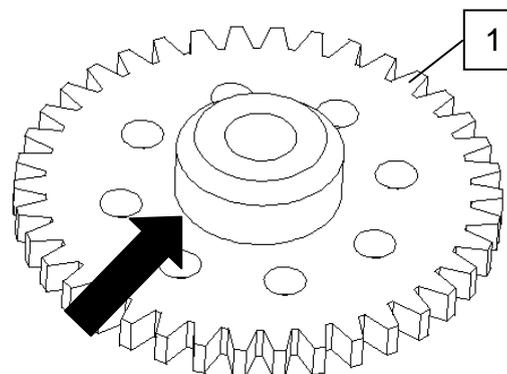
2.Check:

- Starter clutch idle gear
- Starter wheel “1”

Burrs/chips/roughness/wear→Replace the defective part (s)

3.Check:

- Starter wheel's contacting surfaces
- Damage/patting/wear→Replace the starter wheel.

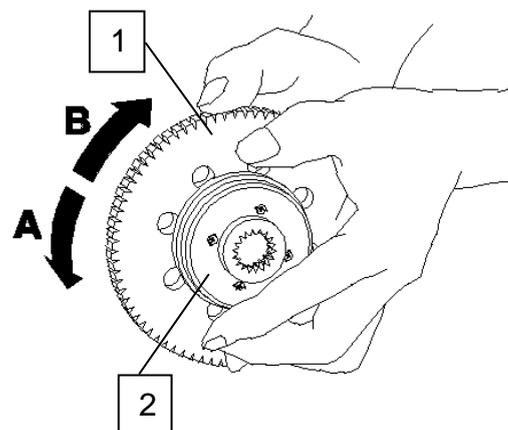


CHECKING THE STARTER CLUTCH

1.Check:

Starter clutch operation

- a.Install the starter wheel“1”onto the starter clutch“2”
- b.When turning the starter wheel counter clock wise“A”, the starter clutch and the starter clutch wheel should engage, otherwise the starter clutch is faulty and must be replace.
- c.When turning the starter wheel clockwise“B”, it should turn freely otherwise the starter clutch is faulty and must be replaced.



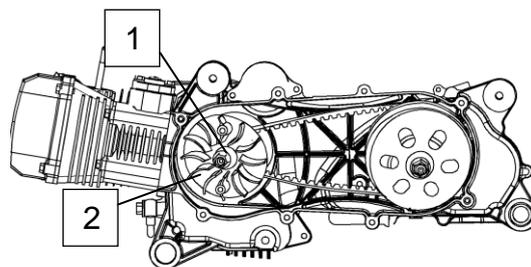
REMOVING THE PRIMARY SHEAVE

1.Remove:

- Primary fixed sheave nut“1”
- Washer
- Primary fixed sheave“2”
- CDI magneto rotor cover

TIP

While holding the CDI magneto rotor“3”with the rotor holding tool, loosen the primary fixed sheave nut“1”



REMOVING THE SECONDARY SHAEAVE

1.Remove:

- Clutch housing nut“1”
- Clutch housing“2”

TIP

While holding the clutch housing with rotor holding tool, loosen the clutch housing nut.

2.Loosen

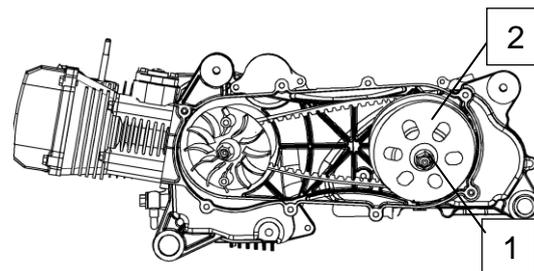
- Secondary sheave nut“1”

NOTICE

Do not remove the secondary sheave nut at this stage.

TIP

While holding the secondary sheave with the rotor holding tool, loosen the secondary sheave nut one full with the socket wrench



SEPARATING THE CRANKCASE

1.Remove:

- Crankcase bolts

TIP

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

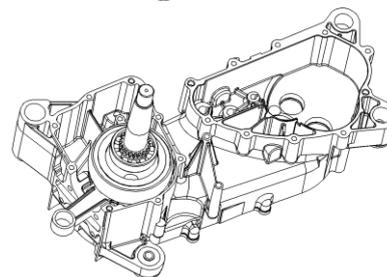
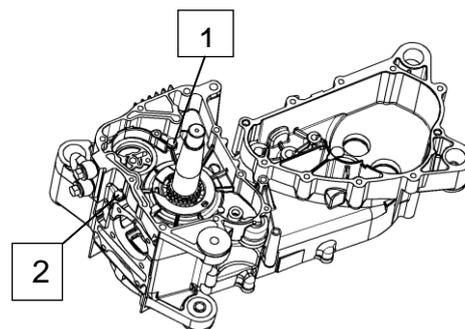
- M6×50mm bolts“1-2”

2.Remove:

- Crankcase

NOTICE

Tap on the one side of the crankcase with a soft-face hammer. Tap only on reinforced portion of the crankcase, not on the crankcase mating surfaces.Work slowly and carefully and make sure the crankcase halves separate evenly.



CHECKING THE CRANKCASE

- 1.Thoroughly wash the crankcase halves in a mild solvent.
2. Thoroughly clean all the gasket surfaces and crankcase mating surfaces.
- 3.Check:
 - Crankcase
 - Cranks /damage→Replace.
 - Oil delivery passages
 - Obstruction→Blow out with compressed air.

CHECKING THE TIMING CHAIN AND TIMING CHAIN GUIDE

1.Check:

- Timing chain

Damage/stiffness→Replace the timing chain and camshaft sprocket as a set.

2.Check:

·Timing chain guide (intake side)
 Damage/wear→Replace

CHECKING THE CRANKSHAFT

1.Measure:

·Crankshaft runout
 Out of specification→Replace the crankshaft assembly.

TIP

Turn the crankshaft slowly.

Runout limit: 0.04mm

2.Measure

·Crankshaft width
 Out of specification→Replace the crankshaft

3.Check

·Crankshaft sprocket
 Damage/wear→Replace the crankshaft.

4.Check:

·Crankshaft journal
 Scratches/wear→Replace the crankshaft.
 ·Crankshaft journal oil passage
 Obstruction→Blow out with compressed air.

CHECK THE BEARINGS

1.Check:

·Bearings
 Clean and lubricate the bearings, then rotate the inner race with your finger.
 Rough movement→Replace

ASSEMBLING CRANKCASE

1.Install:

·Timing chain guide (intake side)
 Timing chain guide bolt : 12N.m

2.Cut:

Gasket“1”

TIP

Cut the gasket as show in the illustration to remove the gasket portion that covers the crankcase opening“a”.

3.Thoroughly clean all the gasket mating surfaces and crankcase mating surfaces

4.Apply:

·Sealant
 (onto the crankcase mating surfaces)

TIP

Do not allow any sealant to come into contact with the oil gallery.

5.Install

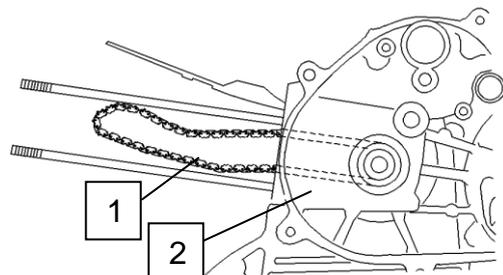
·Crankcase gasket
 (onto the crankcase mating surfaces)

6.Install

·Dowel pin
 ·Timing chain“1”
 ·Crankshaft
 ·Crankcase (right)
 (onto the crankcase (left) “2”)

NOTICE

To prevent the timing chain from becoming caught in the crankcase when turning the crankshaft, pull the timing chain using a wire.



TIP

After installing the left crankcase, make sure that the timing chain is securely meshed with the crankshaft sprocket.

7.Tighten:

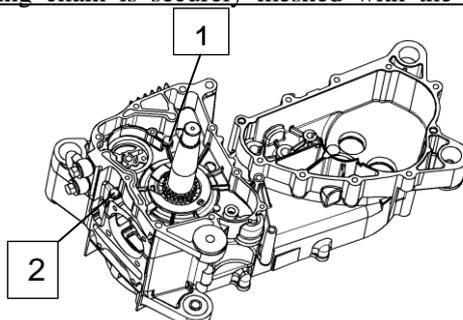
Crankcase bolts

TIP

Thoroughly wipe off any sealant that protrudes from between the left crankcase and the right crankcase.

Tighten the crankcase bolts in stages and in a crisscross pattern.

·M6×50mm bolts“1-2”

**REMOVING THE TRANSMISSION**

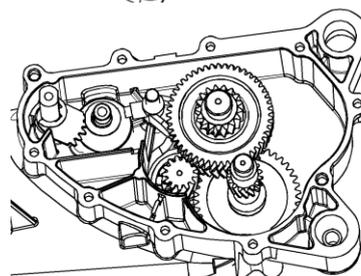
1.Remove:

·Shaft fork guide bar“1”

·Shift drum“2”

·Shift fork“3”

·Transmission“4”

**CHECKING THE SHIFT FORK**

The follow procedure applies to all the shift forks.

1.Check

·Shift fork cam follower“1”

·Shift fork pawl“2”

Bends/damage/scoring/wear→Replace the shift fork.

2.Check

Shift fork guide bar

Roll the shift fork guide bar on a flat surface.

Bends →Replace .

△ WARING

Do not attempt to straighten a bent shift fork guide bar.

3.Check:

Shift fork movement

(along the shift fork guide bar)

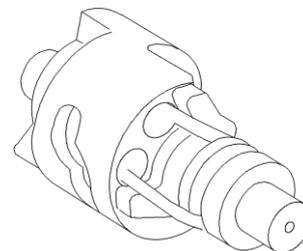
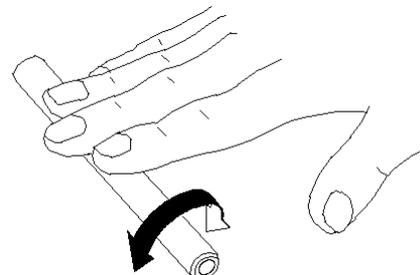
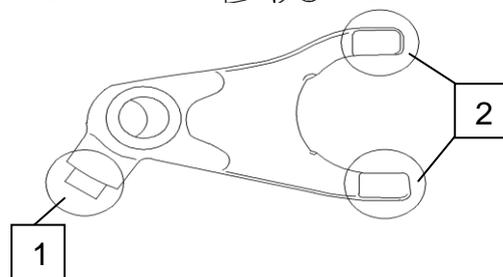
Rough movement→Replace the shift forks and shaft fork guide bar as a set.

CHECKING THE SHIFT DRUM

4.Check:

Shift drum groove

Damage/scratches/wear→Replace the shift drum assembly.

**CHECKING THE TRANSMISSION**

1.Check:

Transmission gears

Blue discoloration/pitting/wear→Replace the defective gear (s) .

Transmission gear

2.Check:

Transmission gear engagement

(each pinion gear to its respective wheel gear)

Incorrect→Reassemble the transmission axle assemblies.

3.Check:

Transmission gear movement

Rough movement→Replace the defective part (s)

ASSEMBLING THE MAIN AXLE

- 1.Install:
 Primary driven gear
 ·Washer“1”
 ·Circlip“2”

TIP

Be sure the circlip sharp-edge corner “a” is positioned opposite side to the washer and gear.

- 2.Install:
 Clutch dog

TIP

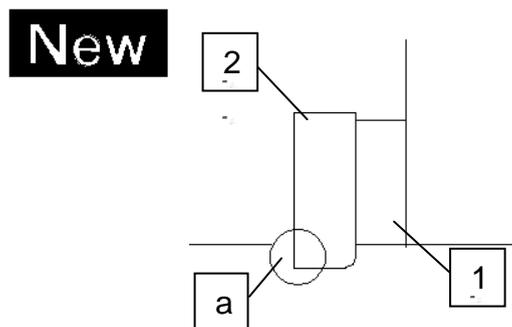
Install the clutch dog“1”so that the recessed portion“a”of the clutch dog faces the recesses“b”in the primary driven gear“2”.

- 3.Install:
 Reverse wheel gear
 ·Washer
 ·Collar“1”

TIP

Face the cutouts “a”in the collar inward.

Press the collar into the main axle/1st pinion gear“2”, as show in the illustration.



INSTALLING THE SHIFT FORK AND SHIFT DRUM

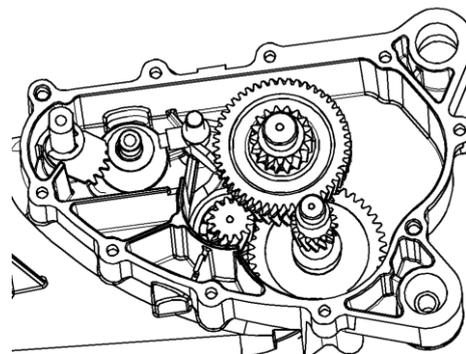
- 1.Install:
 ·Transmission“1”
 ·Shift fork“2”
 ·Shift drum“3”
 ·Shift fork guide bar“4”

- 2.Check:
 Shift cam operation
 Rough movement→Repair

TIP

Apply engine oil to each gear, shift, and bearing thoroughly.

Check the transmission and shift fork for smooth operation by turning the shift cam with your hand.



INSTALLING THE SHIFT LEVER

- 1.Install:
 ·Shift shaft“1”

TIP

Position the center tooth“a”on the cam portion of the shift shaft “1”between the teeth identified with punch marks“b”on the shift drum“2”.

- 2.Install:
 ·Transmission case gasket.
 ·Transmission case cover
 ·Transmission case cover bolt

TIP

Tighten the transmission case cover bolts in stages and in a crisscross pattern.

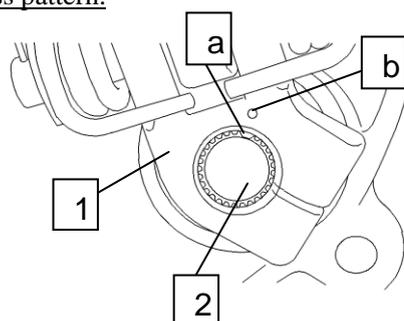
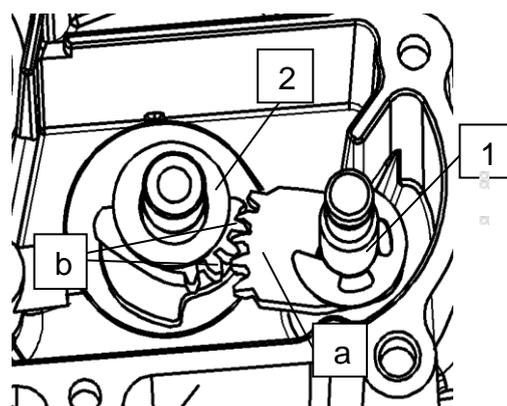
3.Install:

Shift lever guide

- 4.Install:
 Shift lever holder “1”
 Shift lever shaft
 Shift lever spring
 Shift lever
 Washer
 Cotter pin

TIP

Align the punch mark“a”on the shift lever holder “1”with the cutout“b”in the shift shaft“2”

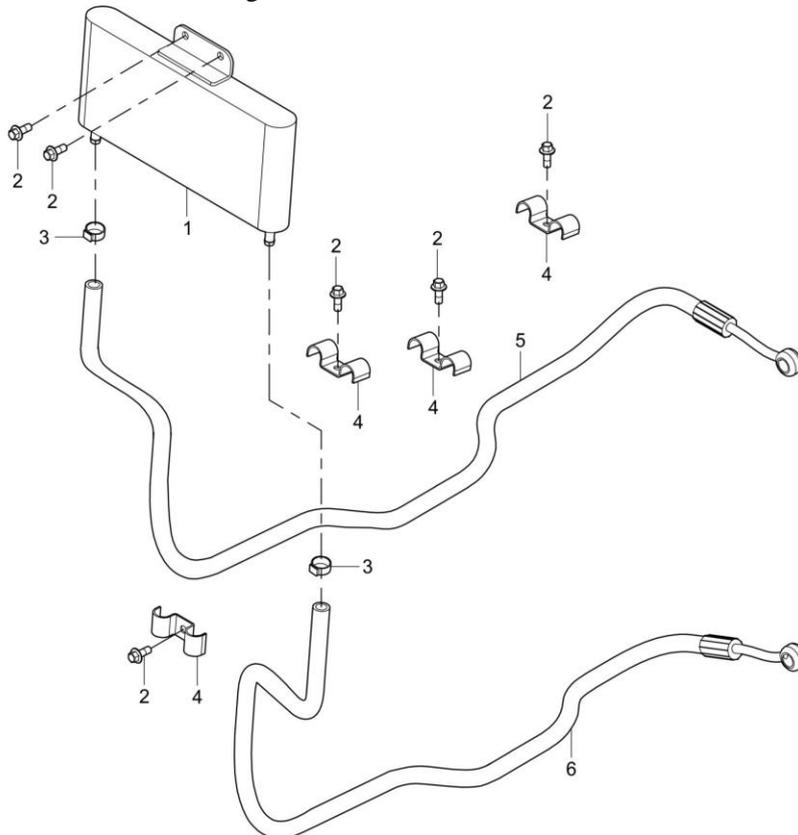


4. COOLING SYSTEM

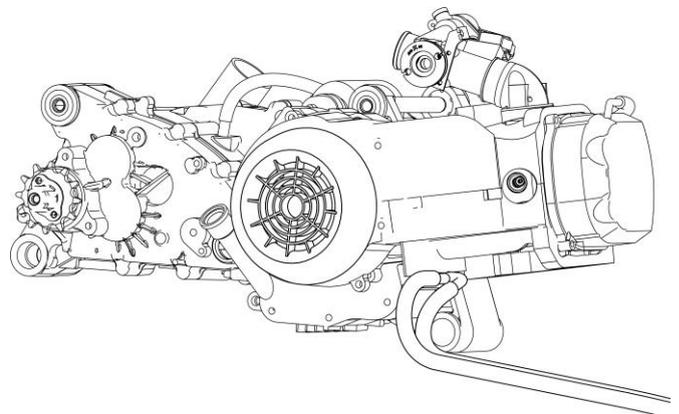
FAULT OVERHAULING	4-1
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FAULT OVERHAULING

1. 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.
2. After dismantling cooling system, check leakage situation of joint.
3. Check the oil pipe for oil leakage.If so,please repiace it.
4. Check whether the oil in the engine is sufficient.

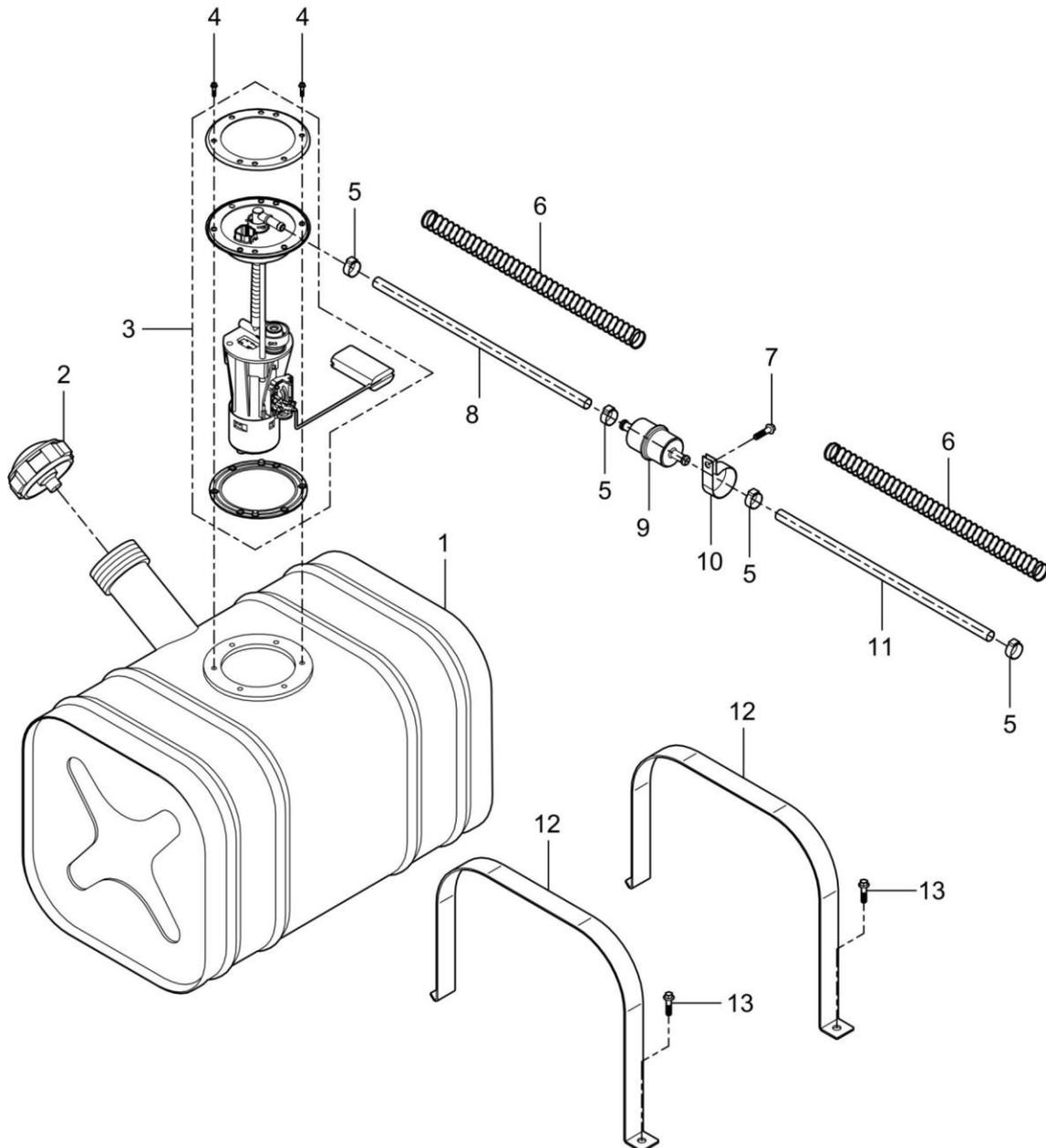


5. Check whether the oil pipe is well connected with the engine, and replace the gasket or oil pipe in case of oil leakage.



5. FUEL SYSTEM

FUEL PRESSURE TEST	5-2	FUEL FILTER	5-2
FUEL PUMP	5-3	FUEL TANK	5-3



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 lines 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 line connections. Cover the fuel line connection with an absorbent shop rag. Slowly disconnect the fuel hose to minimize spilling. Wipe off any fuel spillage in the

on injection system high pressure hoses. Replace any damage or deteriorated fuel lines.

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 all hose connections and injectors. Air bubbles will show the leaking area.

Inspect the fuel lines, 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 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.

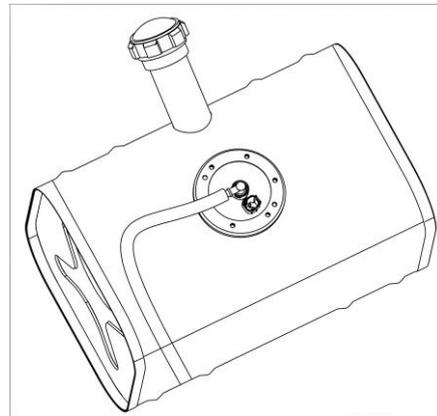
Before proceeding to the pressure test ensure the battery is fully charged. Battery voltage must be over 12 volts. Ensure there is enough gas in fuel tank.

Remove left 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.

FUEL FILTER

Replace fuel filter as per amintenance schedule.

Filter Removal

Remove oetiker clamps and pull hoses off. Detach filter from body.

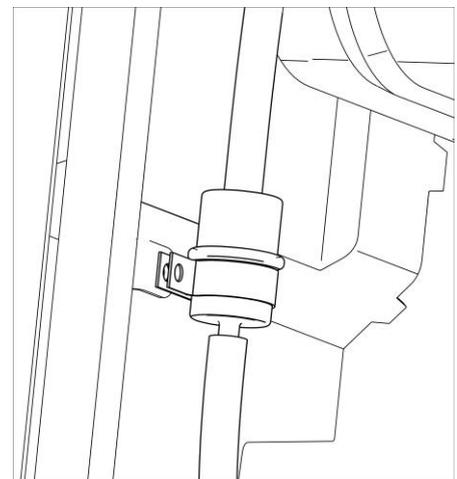
Filter inspection

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.



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 as per illustrated sequence.

Install hose properly on OUT nipples and harness.

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

Disconnect vent line from body.

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 WHEEL HUB 6-1	REAR WHEEL HUB 6-1
REAR DRIVE SHAFT 6-2	TIRES AND WHEELS 6-3

FRONT WHEEL HUB

Removal

Raise the front of vehicle, support it securely on jack stands and remove front wheel.

Remove cotter pin, castellated nut and belleville washer.

Remove the caliper from knuckle.

Pull the wheel hub to remove it.

Inspection

Check wheel hub for cracks or other damages.

Check inner splines and wheel rim bolts for wear or other damages.

If any damage is detected on wheel hub, replace it with a new one.

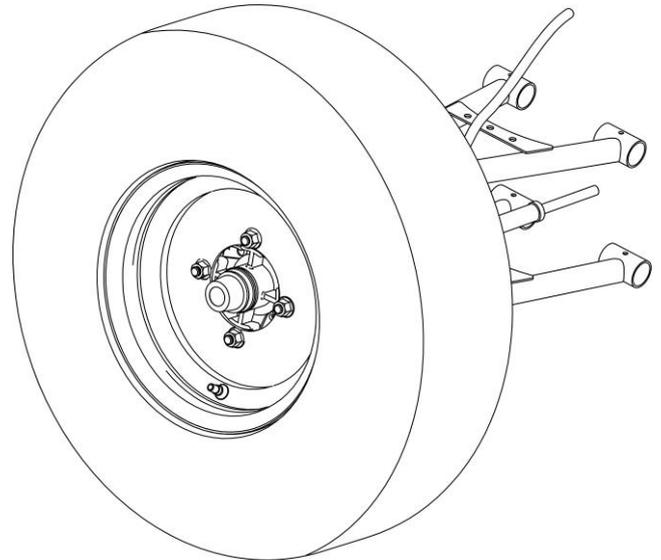
Installation

The installation is the reverse of removal procedure. Install belleville washer so that the inside diameter protrudes outward and contacts the nut.

Tighten the castellated nut on the drive shaft end to 300N.m and further tighten until one of its grooves is aligned with a cotter pin hole. Install a new cotter pin and the wheel cap.

Raise front of vehicle, support it securely on jack stands and remove front wheels.

Remove upper differential bolts, differential support bolts and lower differential bolts



REAR WHEEL HUB

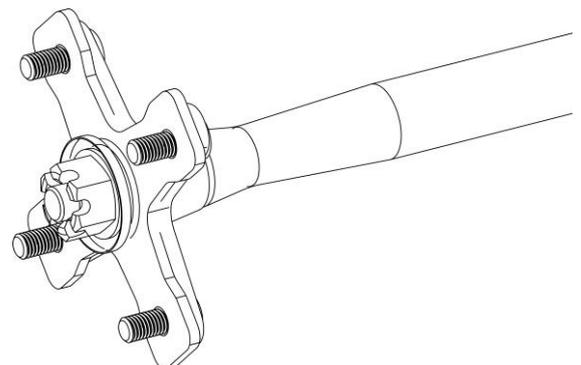
Removal

Raise the rear of vehicle, support it securely on jack stands and remove rear wheel.

Remove cotter pin, castellated nut and belleville washer.

Remove the caliper from knuckle.

Pull the wheel hub to remove it.



Inspection

Check wheel hub for cracks or other damages.

Check inner splines and wheel rim bolts for wear or other damages.

If any damage is detected on wheel hub, replace it with a new one.

REAR DRIVE SHAFT**Removal**

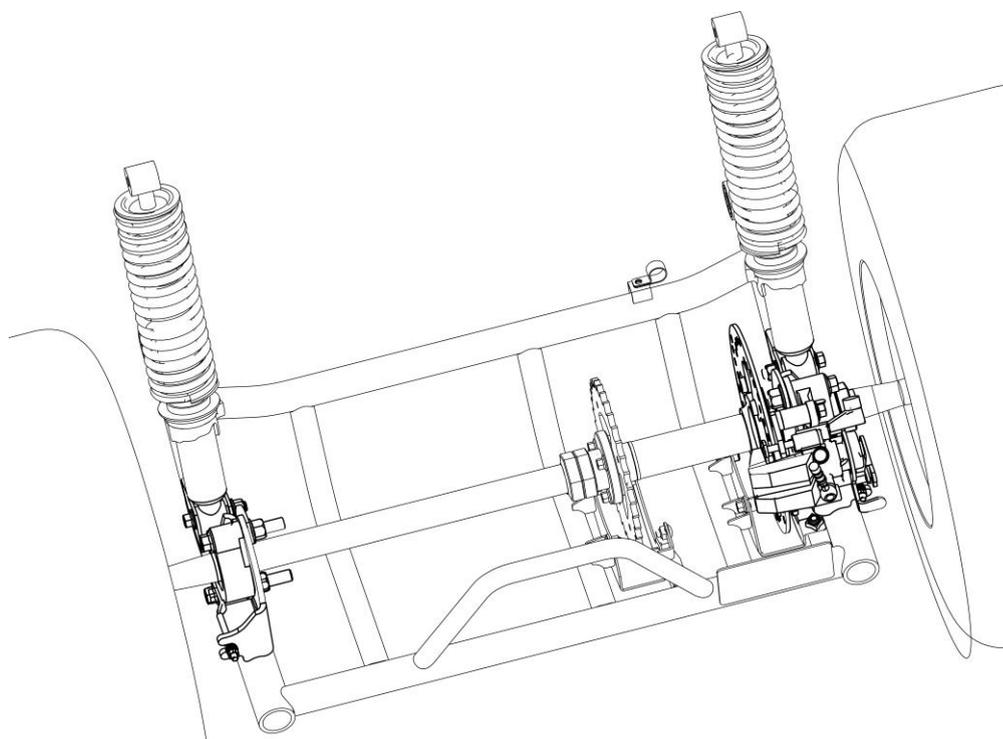
Remove the appropriate wheel hub.

Remove the bolts holding the drive shaft bearings in place

Lift the drive shaft out of the support

Check splines for excessive wear. Replace if necessary.

If the splines on plunging joint are worn, a check of differential inner splines should be done.



TIRES AND WHEELS

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

Dot mix tires of different size and/or de-sign 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.

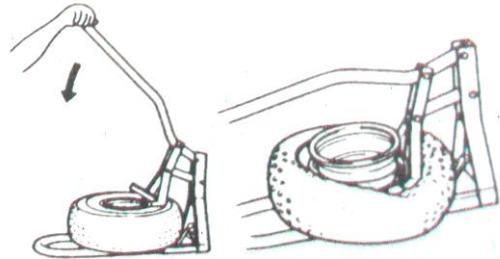
Tire replacement

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.

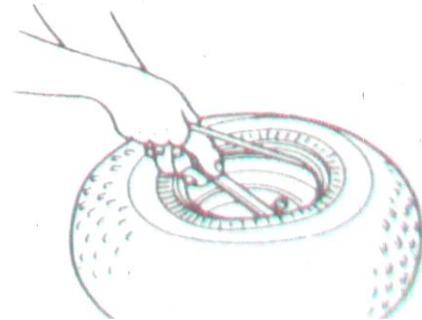
Dismount the bead from the rim completely.



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.



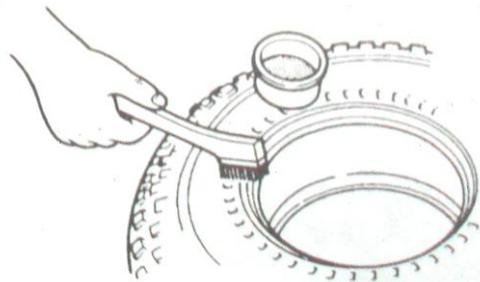
Apply tire lubricant to the new tire bead and the flange of the rim. But never apply grease, oil or gasoline to the tire bead because they will deteriorate the tire.

CAUTION

The standard tire fitted on this vehicle is AT26×9-14 for the front and AT26×11-14 for the rear.

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

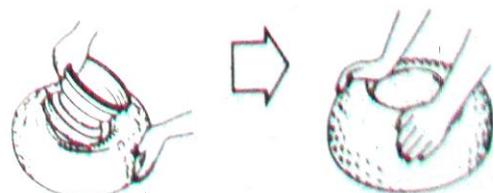
Inspect the sealing portion of the rim for contamination and distortion before installing the



Mount the new tire on the rim.

CAUTION

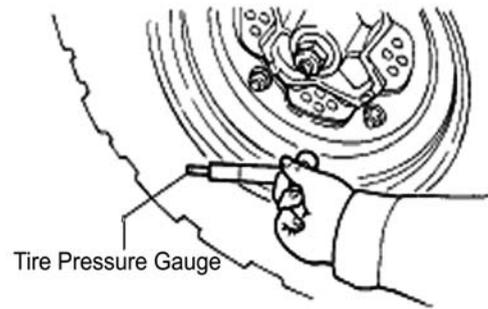
When installing each tire, make sure the arrow on the tire points in the direction of rotation. Also make sure the outer side of the wheel rim is facing outward.



Inflate the tire to seat the tire bead.

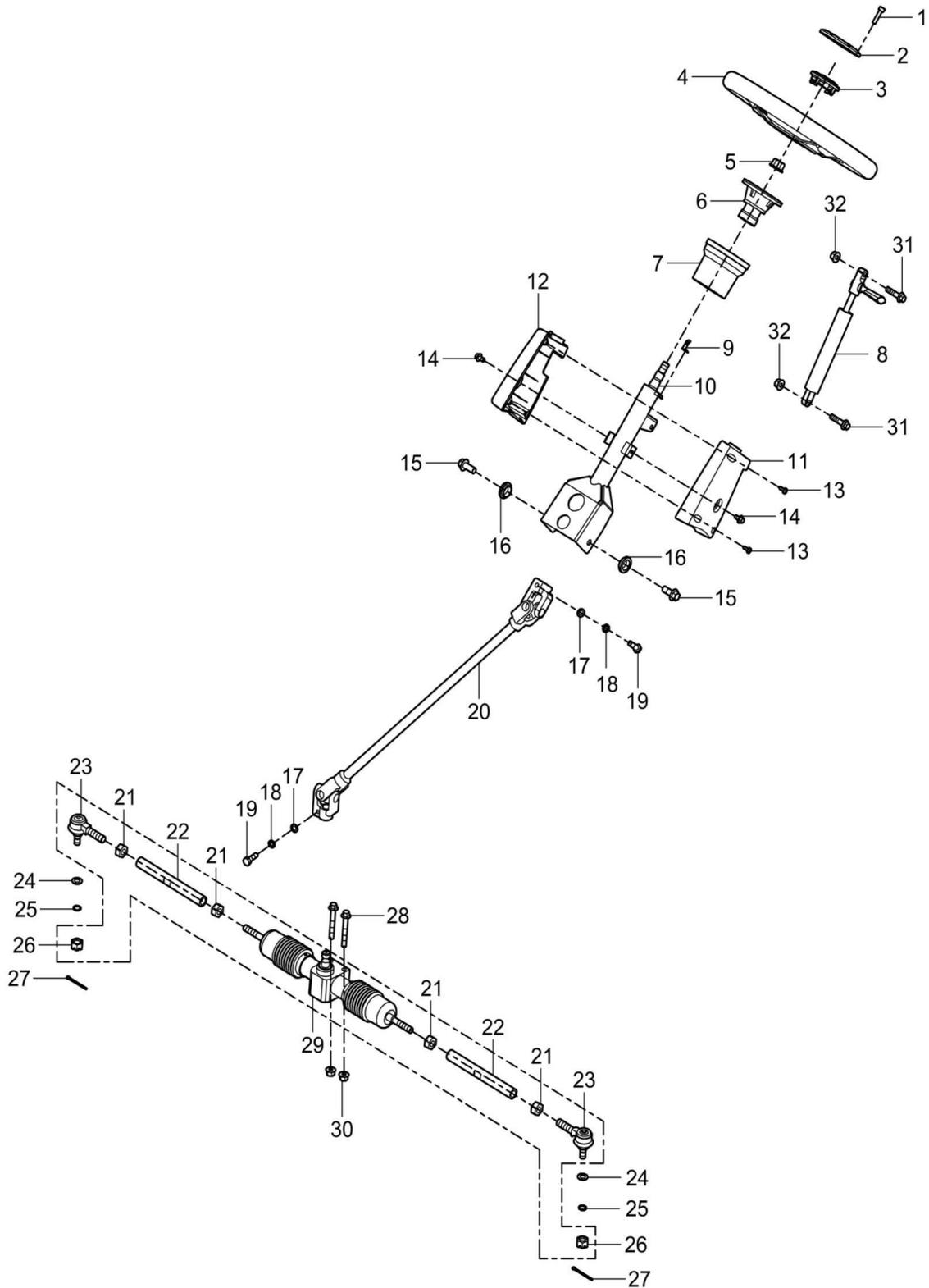
Check the rim line cast on the tire side walls. It must be equidistant from the wheel rim all the way around. If the distance between the rim line and the wheel rim varies this indicates that the bead is not properly seated. If this is so, deflate the tire completely, and unseat the tire bead on both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

Adjust the tire pressure to specification



7. STEERING SYSTEM

STEERING ALIGNMENT 7-2



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 retaining nut to 60N.m.
5. Install new cotter pins. Both ends of cotter pins must be folded around nut.

STEERING ALIGNMENT

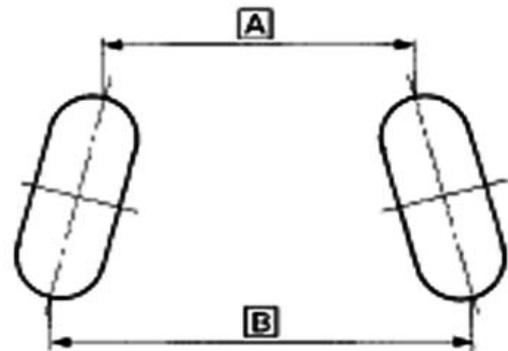
Park vehicle on flat ground, make sure the tire pressure for right and left tires is same and set to the proper specification, set the front wheels in the straight position, then place a load of 75kg on the seat.

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

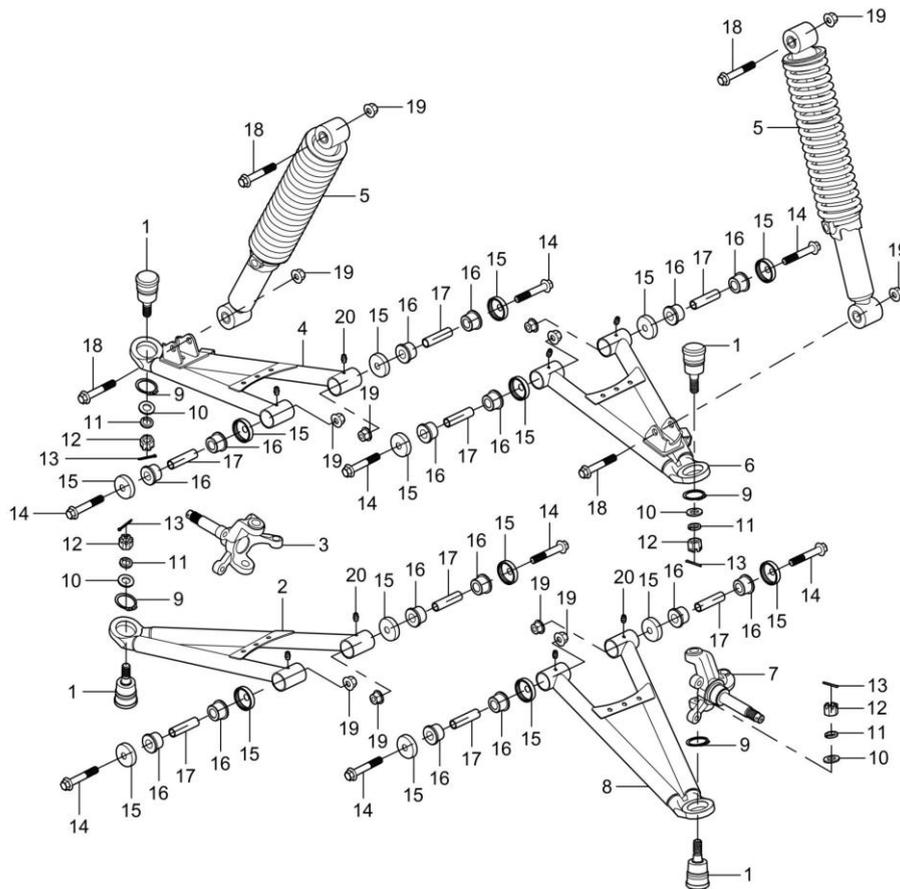
CAUTION

After adjusting toe-in, first rotate steering wheel from center position to the left and right completely, to ensure that it 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		

FRONT SUSPENSION



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

REMOVAL AND DISASSEMBLY

Loosen wheel nut of the appropriate.

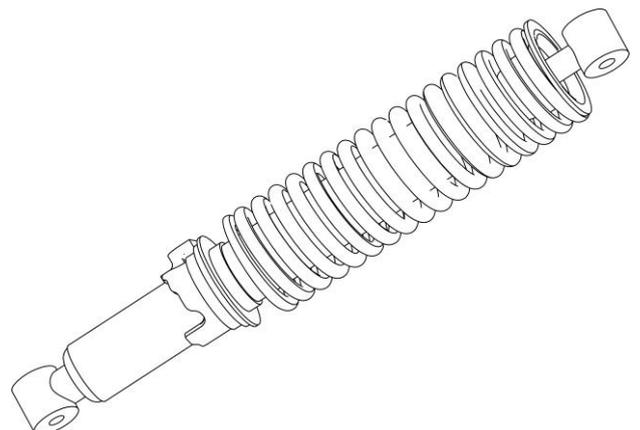
Install a jack stand under the frame to lift the front of vehicle off the ground until shock absorber is fully extended then.

Remove wheels, brake caliper and hub
remove steering knuckle from ball cage tie rod

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.



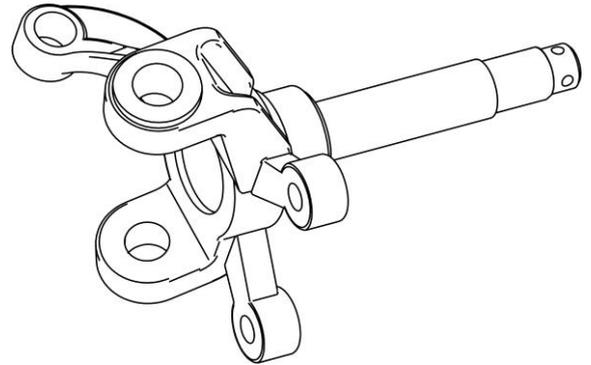
Extend and compress the piston several times over its entire stroke. Check that it moves smoothly and with uniform resistance with rod up. Any of the following conditions will denote a defective shock:

- 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

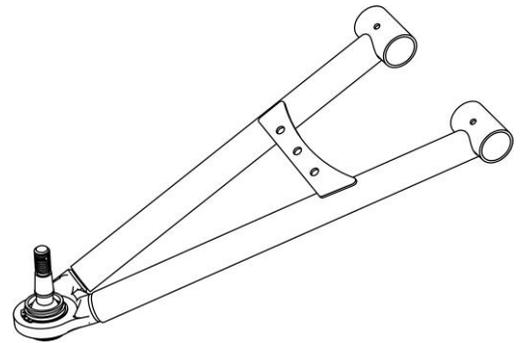
Inspect the knuckle for damage. If any damages are found, replace the knuckle with a new one.



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.

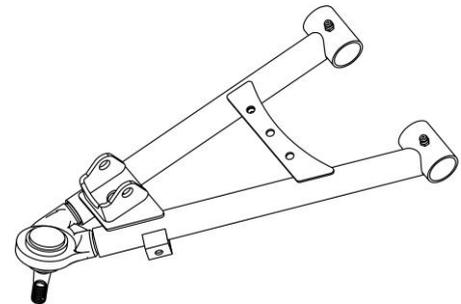
Move suspension arm from side to side. There should be no noticeable loose. Replace bushing if necessary. Move suspension arm up and down. There should be no noticeable loose. Replace bushing if necessary.



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.



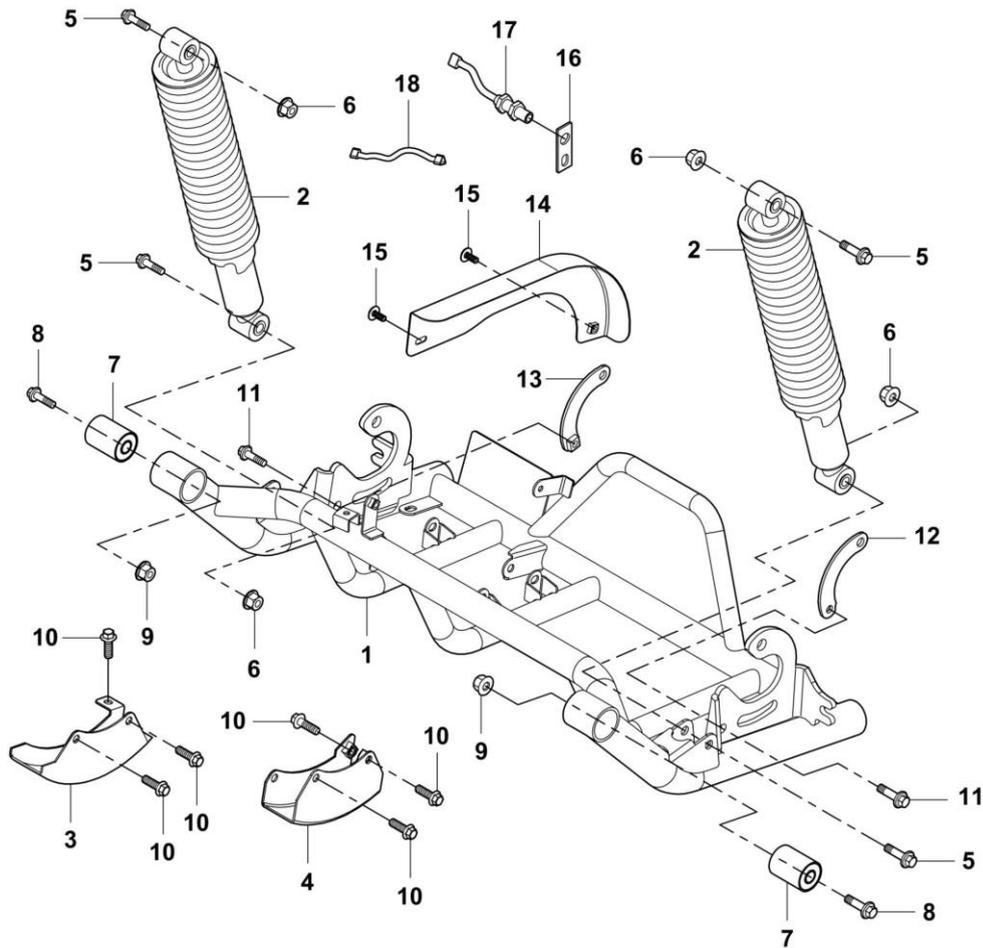
Check ball joint for damage, pitting, looseness and roughness. If so, replace it.

Check ball joint bellows for cracks. Change if necessary.

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.

REAR SUSPENSION

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

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 steering knuckle from ball cage tie rod

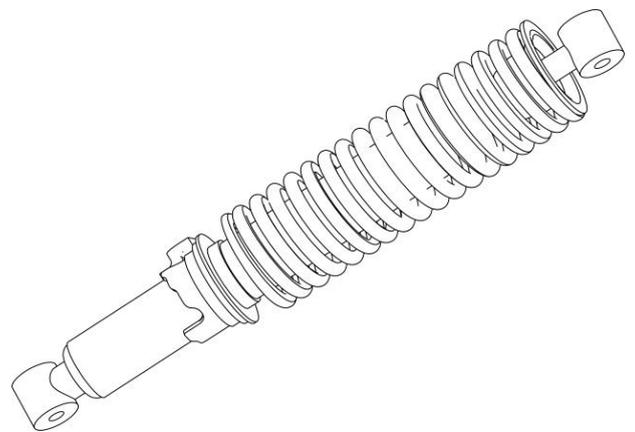
INSPECTION**Shock absorber**

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:

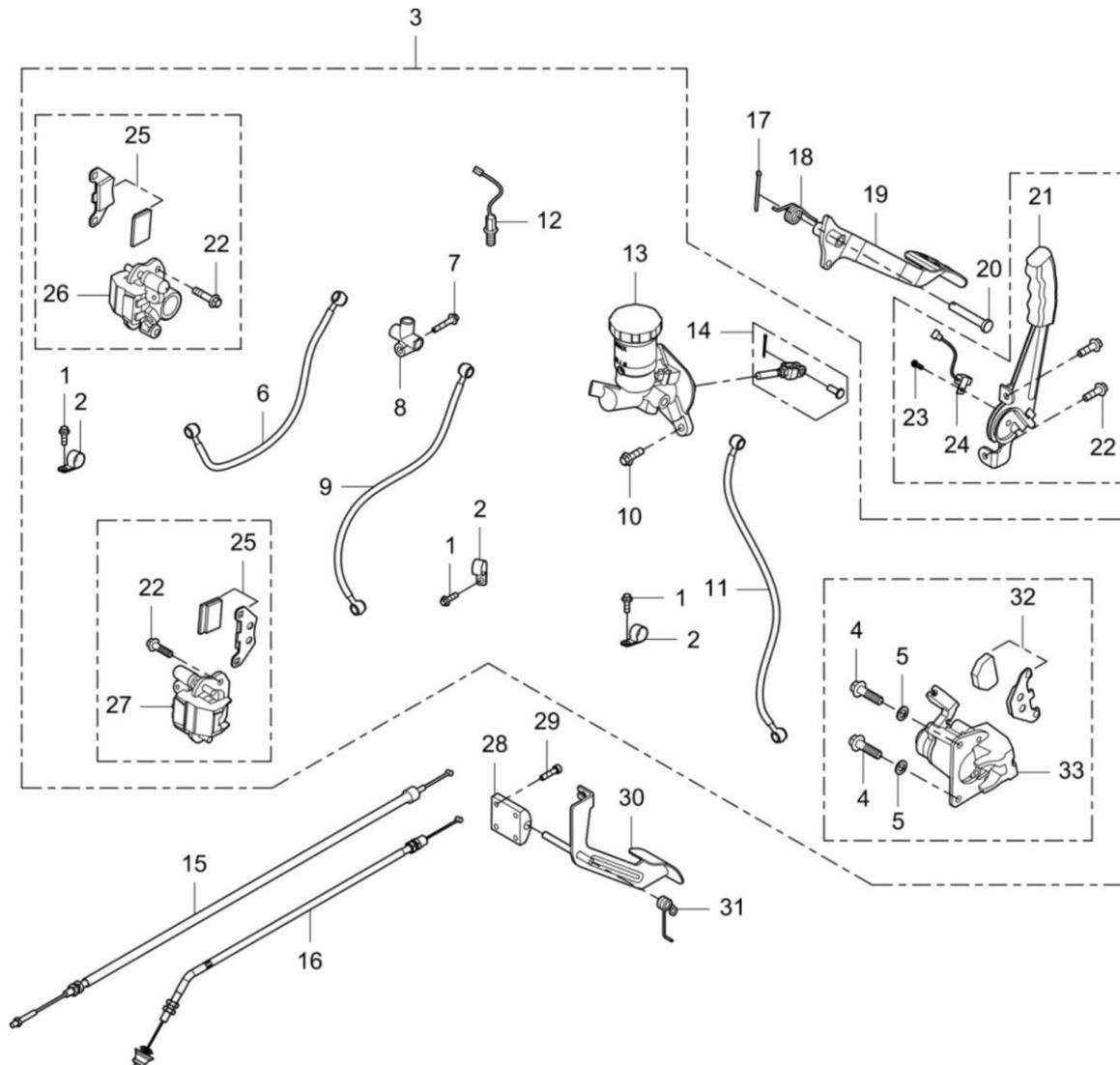
- A skip or hang up when reversing stroke at mid-travel.
- Seizing or binding conditions except at extreme end of either stroke.
- A gurgling noise after completing one full compression and extension stroke.

Replace shock if any these conditions are found



9. BRAKES SYSTEM

BRAKE FLUID REPLACEMENT	9-2	BRAKE PADS REPLACEMENT	9-3
BRAKE DISC	9-3	BRAKE CALIPER	9-4
BRAKE LIGHT SWITCH	9-4	BRAKE HOSE	9-5



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.

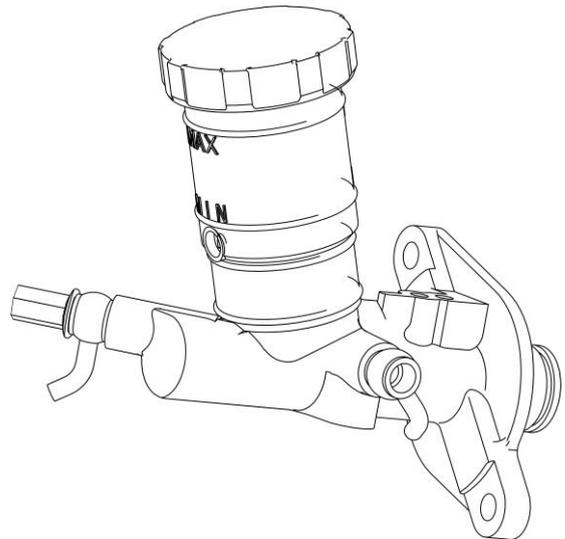
BRAKE FLUID REPLACEMENT

Place the vehicle on a level surface.

Remove the master cylinder reservoir 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.

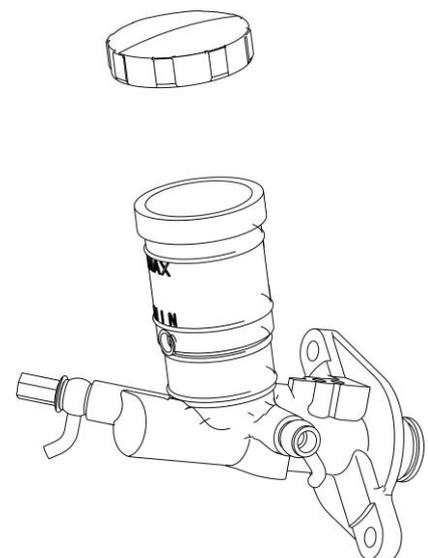
Disconnect the clear hose and install the dust cap of air bleeder valve.

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

Install the master cylinder reservoir cap and diaphragm.

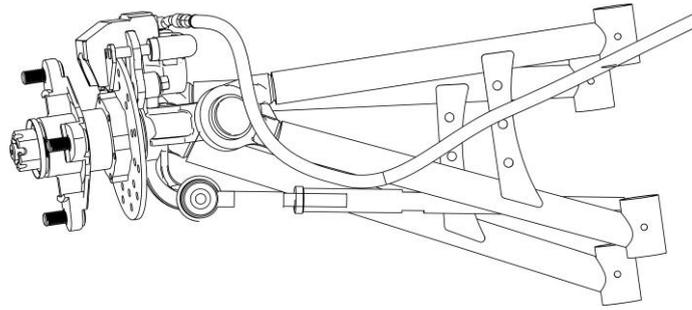
CAUTION

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.



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.

BRAKE DISC

Removal and disassembly

Remove the wheel.

Remove the caliper and 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: 3.5mm.

Minimum thickness of rear brake disc: 3.0mm

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.

BRAKE CALIPER**Removal**

- Loosen wheel nuts.
- Raise vehicle and support it securely.
- Remove appropriate wheel.
- Remove the caliper bolts then the caliper. If the caliper is not being removed 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.

BRAKE LIGHT SWITCH

The brake light switch is located on the brake master cylinder. 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	0.2 Ω max
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.

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 all necessary parts to reach the hoses.

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.

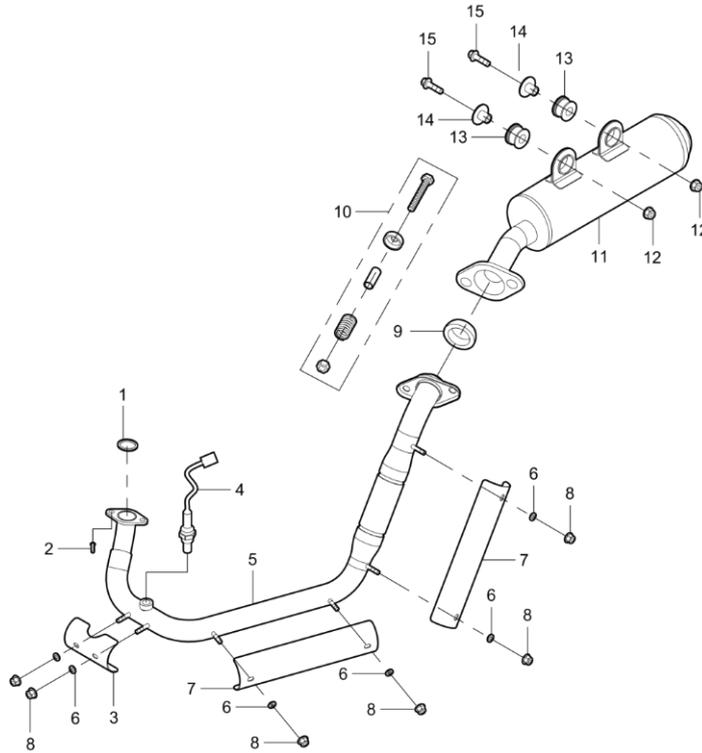
Refill and bleed the brake system.

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

10. CHASSIS

EXHAUST SYSTEM10-1	SILENCER INSPECTION10-1
REAR SEAT10-2	CAR ROOF10-3
HANDRAIL10-3	SEAT10-4
CAR FRAME10-5	

EXHAUST SYSTEM

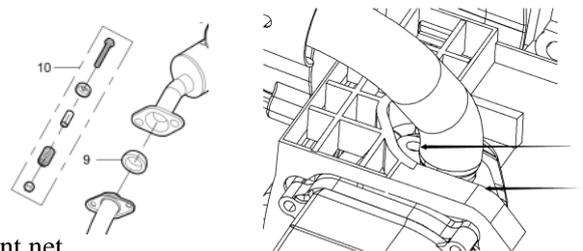


WARNING

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

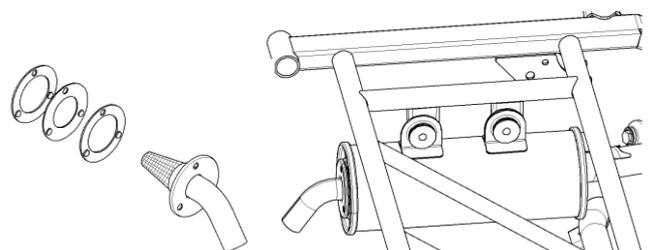
Disassemble /install procedures

- 1、 Disassemble vent pipe and silencer 2- connection bolt。
- 2、 Disassemble exhaust pipe and engine 2- joint nut。
- 3、 Disassemble the oxygen sensor from the exhaust pipe and take out the exhaust pipe.
- 4、 Disassemble silencer from the car frame
- 5、 Disassemble the tailpipe of silencer, take out the fire retardant net.



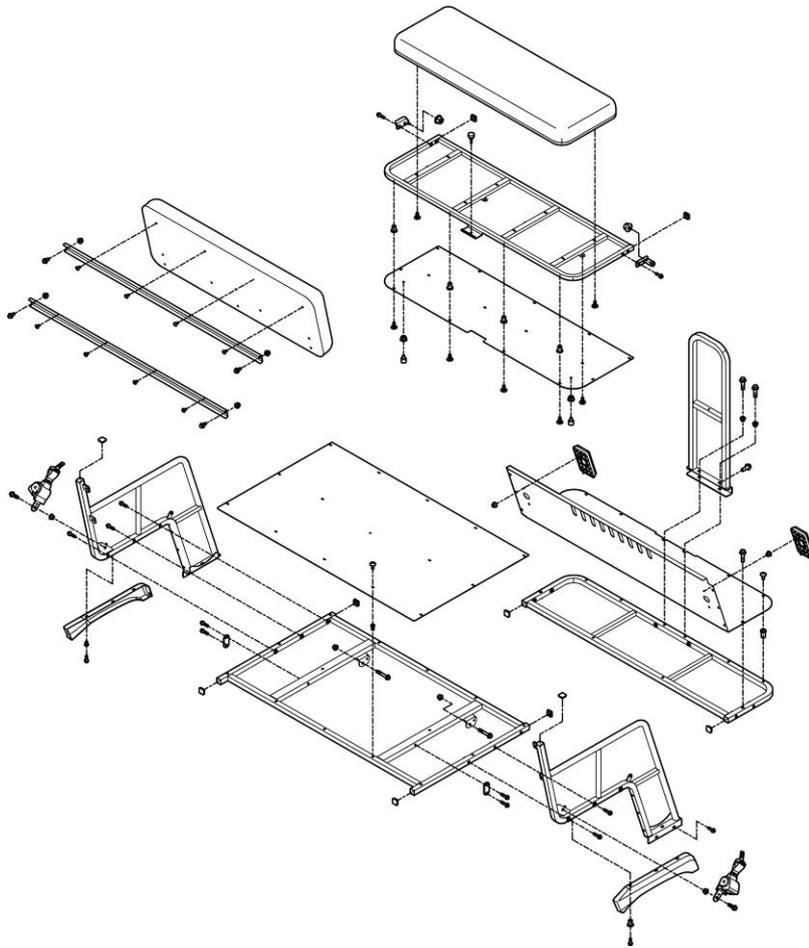
SILENCER INSPECTION

- 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.

REAR SEAT



WARNING

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

Disassemble /install procedures

- 1、 Keep the vehicle on a level surface..
- 2、 Remove the connecting bolts between the rear seat and the frame.

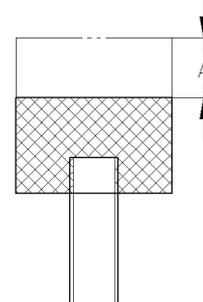
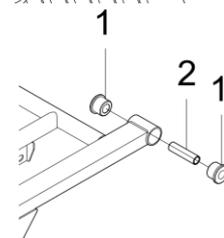
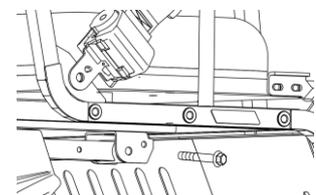
Disassemble the cargo box handle spring, cargo box gas spring, cargo box support sleeve, etc.

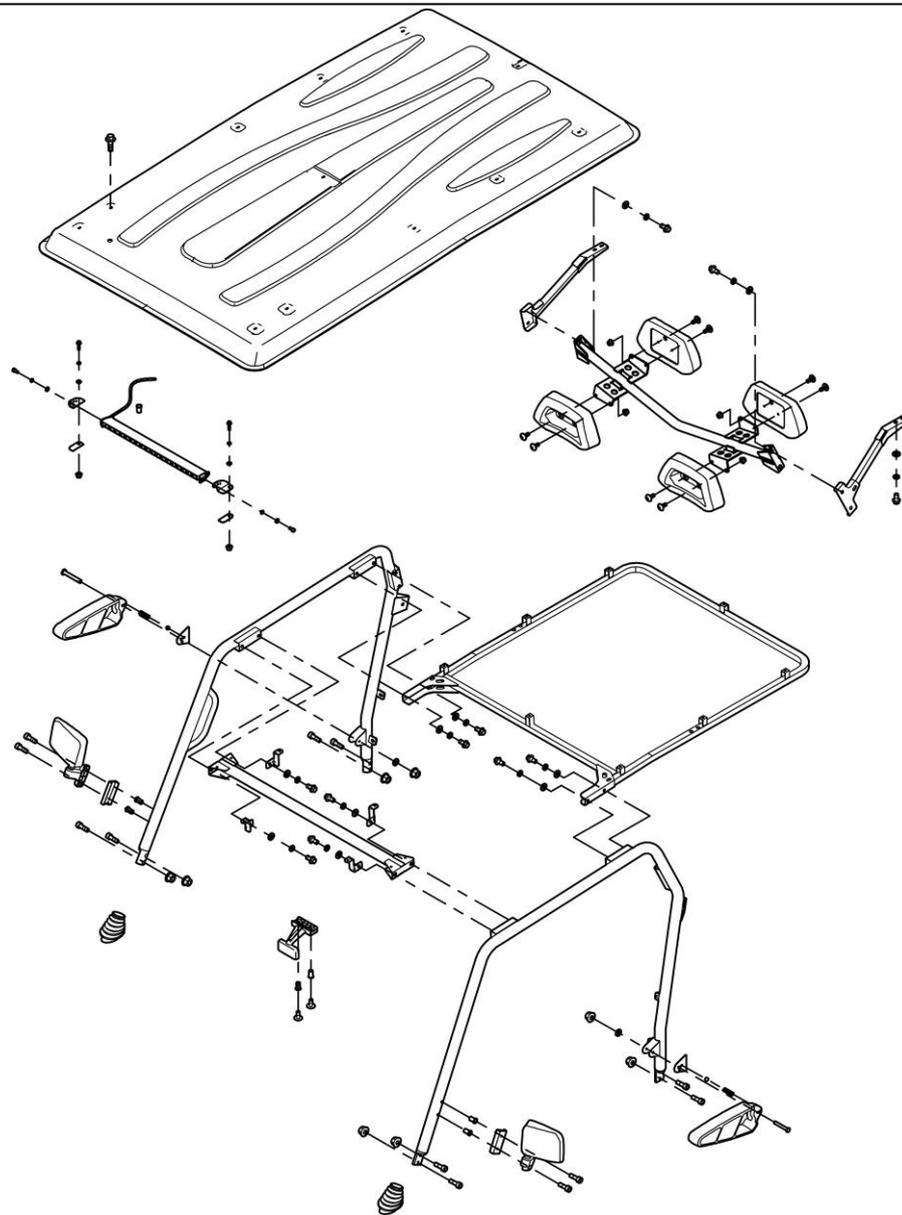
- (1) Nylon sleeve
- (2) Cargo support sleeve

Check whether the nylon sleeve is badly worn, and replace it in time if it cracks

When the rear seat is used for a long time, it will be damaged, such as cracked leather and broken rubber.

1. Check whether the leather of the seat cushion and backrest is damaged. If there is any, please replace it with a new seat cushion or backrest. .
2. When the thickness of the rear seat rubber pad is reduced by 6 mm (0.24 inches) due to wear, replace the rear seat rubber pad.



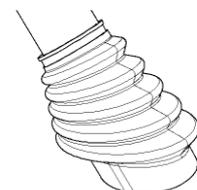
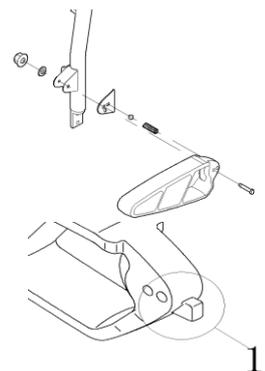
CAR ROOF**HANDRAIL**

The limit spring and steel ball in handrail will be caused certain wear and tear if the car drove on the rough road for a long time, so the handrails should be inspected regularly in the following manner.

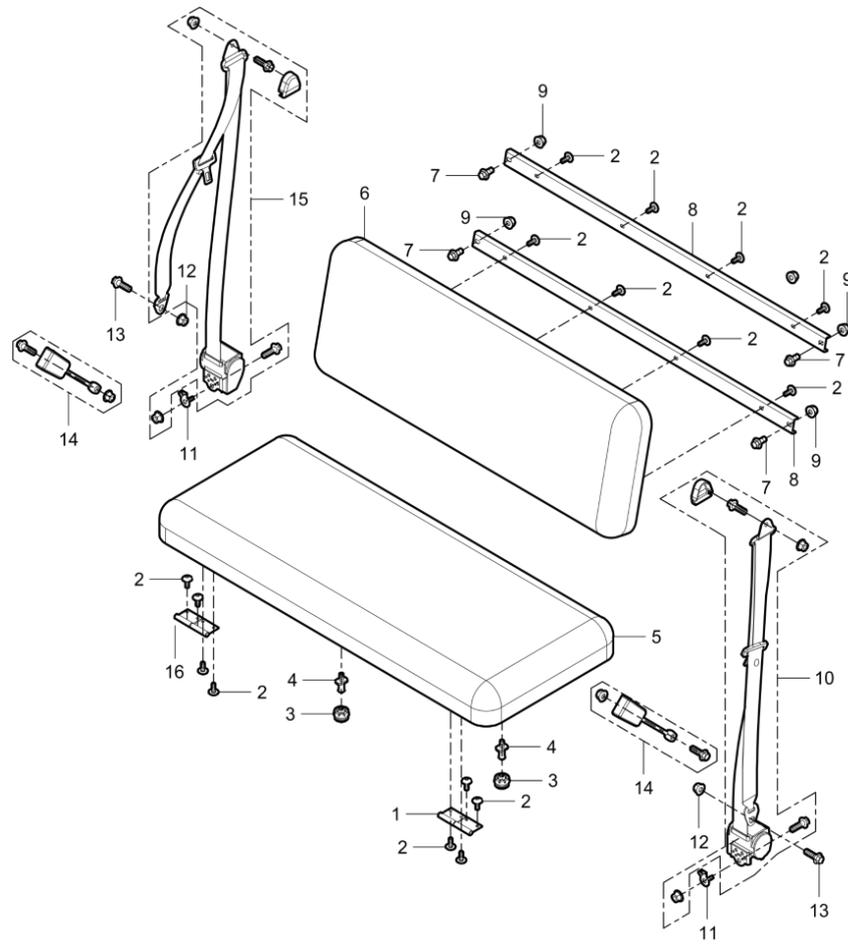
Disassemble /install procedures

- 1、 Keep the vehicle in a horizontal plane.
 - 2、 Disassemble the connecting bolts between the handrail and car roof .
 - 3、 Inspect the wear consumption of steel ball , if there are pits on the surface of steel ball and the use is affected.
 - 4、 Check whether the limit end of the handrail is seriously worn, such as the lack of material, smoothed flat.
 - 5、 Check whether the compression movement of the limit spring is in uniform motion, and the stretch movement cannot be completed due to resilience blocked.
- In case of the above situation, to replace the new one in time.

Check whether there is cracking, aging on the leather cover of car roof pipe. if so, please replace it with a new one in time.



SEAT



The seat will be wear and tear if in the sun for a long time and open it too often .

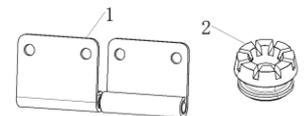
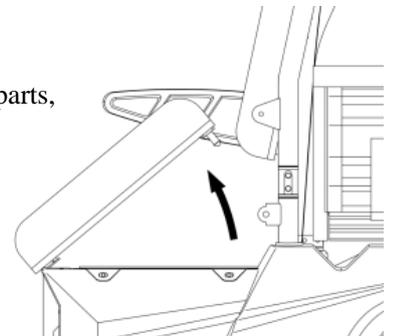
1、 Open the seat and check whether have cracks and serious wear for the following parts, if so, please replace it with a new one in time

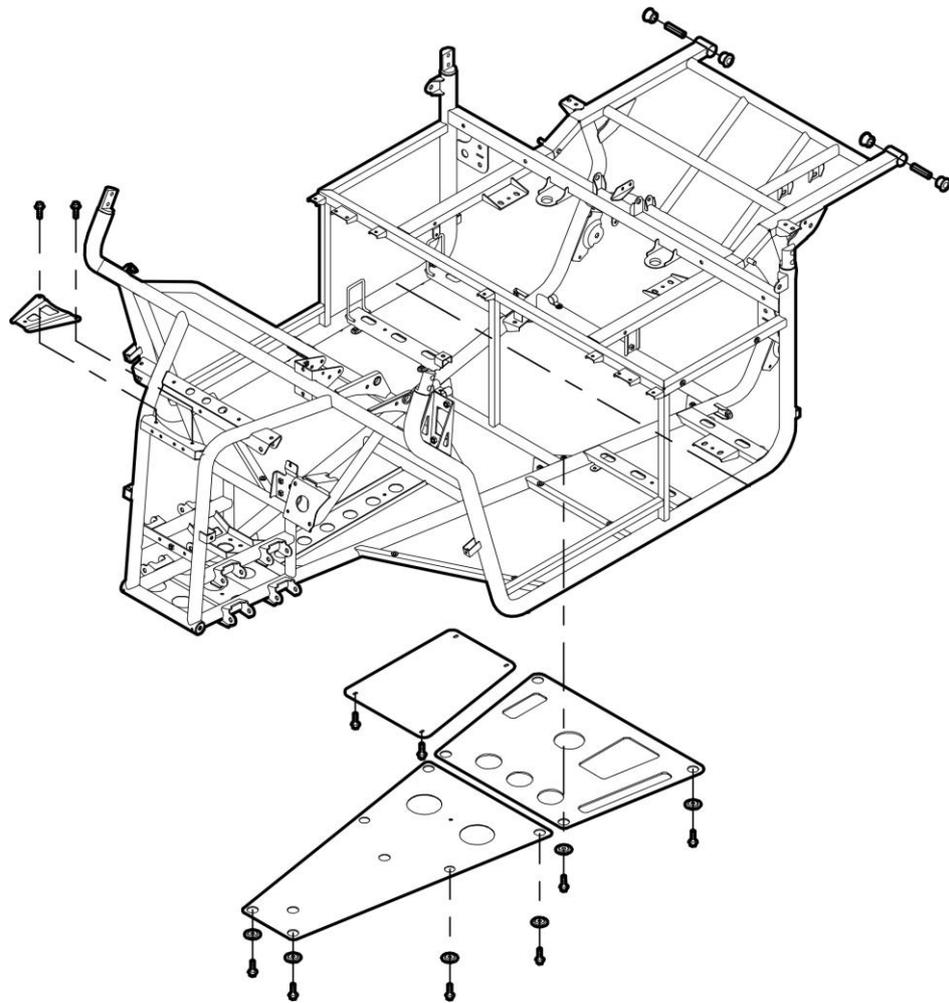
(1) Seat hinges

(2) Seat rubber pads

2. Check whether have cracks and breakage for the seat and backrest leather, if so, please replace it with a new one 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.



CAR FRAME**WARNING**

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

Car frame chassis base

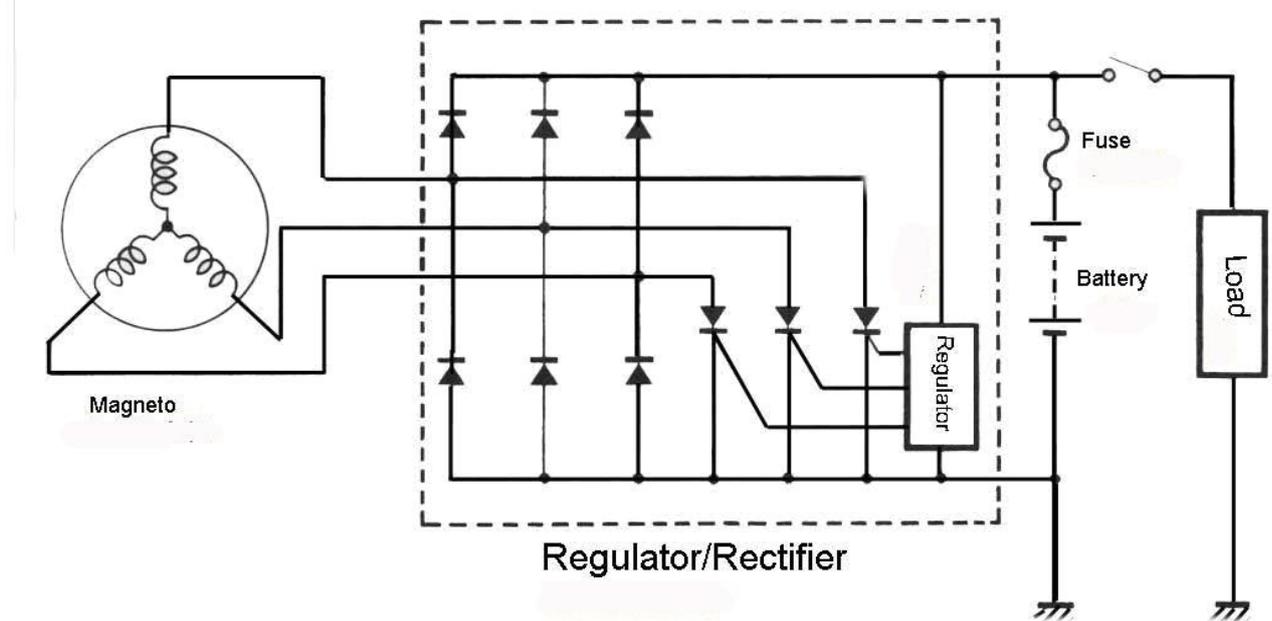
The chassis base will be damaged by the sundry objects on the ground if the car drove on the rough road for a long time

- 1、 Keep the vehicle in a horizontal plane.
- 2、 Use a jack under the car frame to keep it off the ground.
- 3、 check whether the car frame chassis base is broken or damaged, if so, please replace it with a new one in time.

11. ELECTRICAL SYSTEM

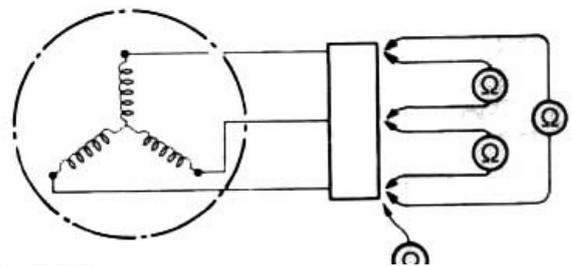
CHARGING SYSTEM11-1	RESISTANCE OF GENERATOR COIL11-1
NO- LOAD PERFORMANCE OF THE GENERATOR11-1	REGULATOR/RECTIFIER11-2
STARTING SYSTEM11-2	STARTER MOTOR11-2
BRUSH BRUSH11-3	RECTIFIER11-3
ARMATURE COIL11-3	OIL SEAL11-3
STARTER RELAY11-3	AUXILIARY STARTER RELAY11-4
EFL SYSTEM11-4	IGNITION SYSTEM11-5
IGNITION COIL11-5	INDICATOR LIGHT11-7
BATTERY11-7	RELAY AND FUSE11-9
LAMPS (LED)11-9	SWITCHES11-10

CHARGING SYSTEM



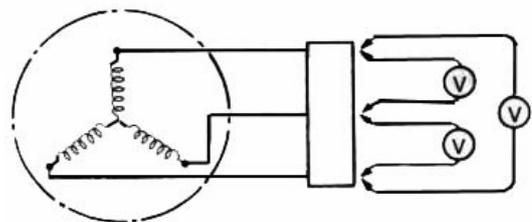
RESISTANCE OF GENERATOR COIL

Measure the resistance between three wires;
 If the resistance is not within the specified value, replace the stator coil.
 Check the generator core whether it is insulated.
 Install multimeter $1 \times 10\Omega$.
Resistance of generator coil: 0.9-1.5 Ω (color: white)
Insulation resistance $\infty\Omega$ (white - grounding wire)



NO- LOAD PERFORMANCE OF THE GENERATOR

Start the engine with the speed at 5000r/min.
 Measure AC voltage three wires inside the generator with the multimeter.
 If the voltage drops below a specified value, replace the generator.



Put the multi meter at AC step.

No- load performance of the generator:

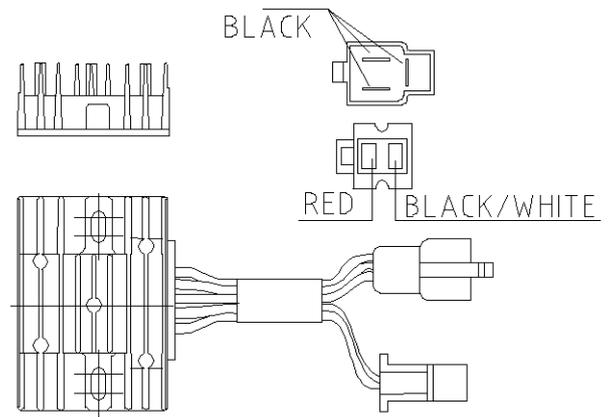
> **100V (AC) at 5000r/min**

REGULATOR/RECTIFIER

Measure the resistance between terminals with multimeter.
If the resistance is not within the range of specified values,
replace the regulator / rectifier.

NOTE:

If the probe is not connected and the multi meter
reading is lower than 1.4V, replace the multi meter
battery.

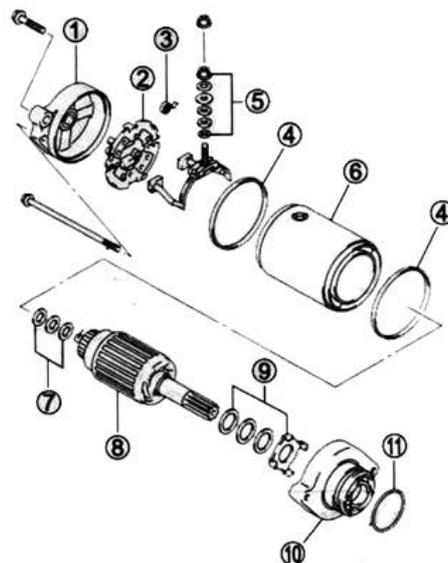


		Red ⊕					
		Black	Black	Black	B/W	Red	ground
B/W ⊕	Black	∞	∞	∞	∞	∞	∞
	Black	∞	∞	∞	∞	∞	∞
	Black	∞	∞	∞	∞	∞	∞
	B/W	∞	∞	∞	∞	∞	∞
	Red	∞	∞	∞	∞	∞	∞
	ground	∞	∞	∞	∞	∞	∞

STARTING SYSTEM

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 BRUSH

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

Worn, cracked, or not smooth: → Replace



RECTIFIER

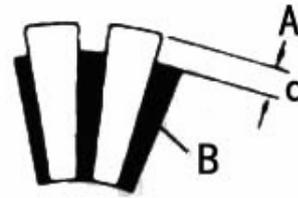
Check the rectifier whether it is discolored, abnormal wear or concave.

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.

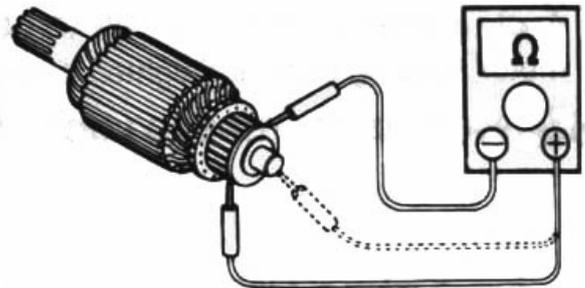
$$d \geq 1.5\text{mm}$$



ARMATURE COIL

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

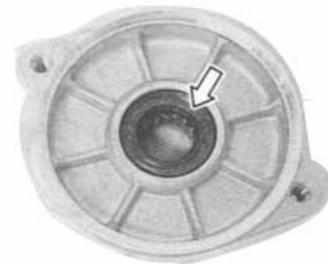
If they are not connected, replace the armature shaft.



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.

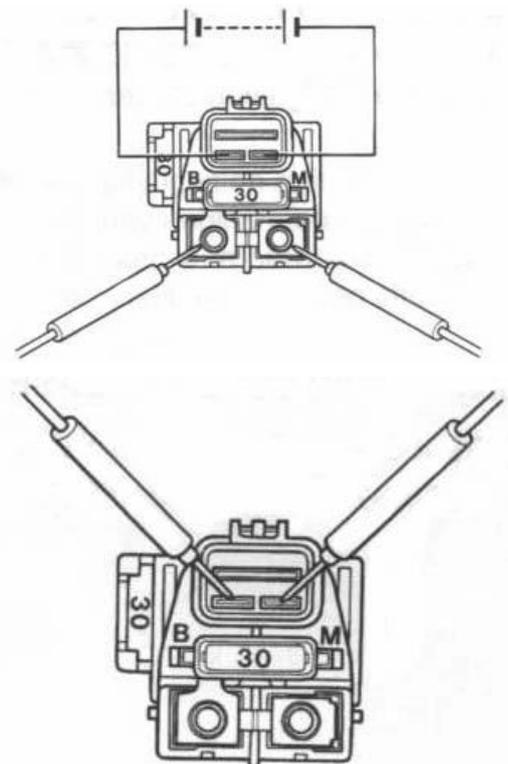
Note: Do not apply battery voltage on the starter relay for more than 2 seconds. This will result in overheating or damaging the relay coil.

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: 3-5Ω



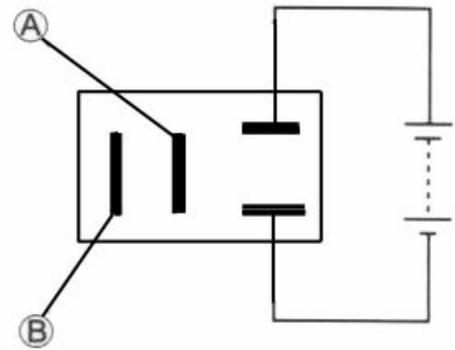
AUXILIARY STARTER RELAY

Apply 12V voltage between the positive and negative terminals of the starter relay. Test the connection between A and B with the multimeter.

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

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

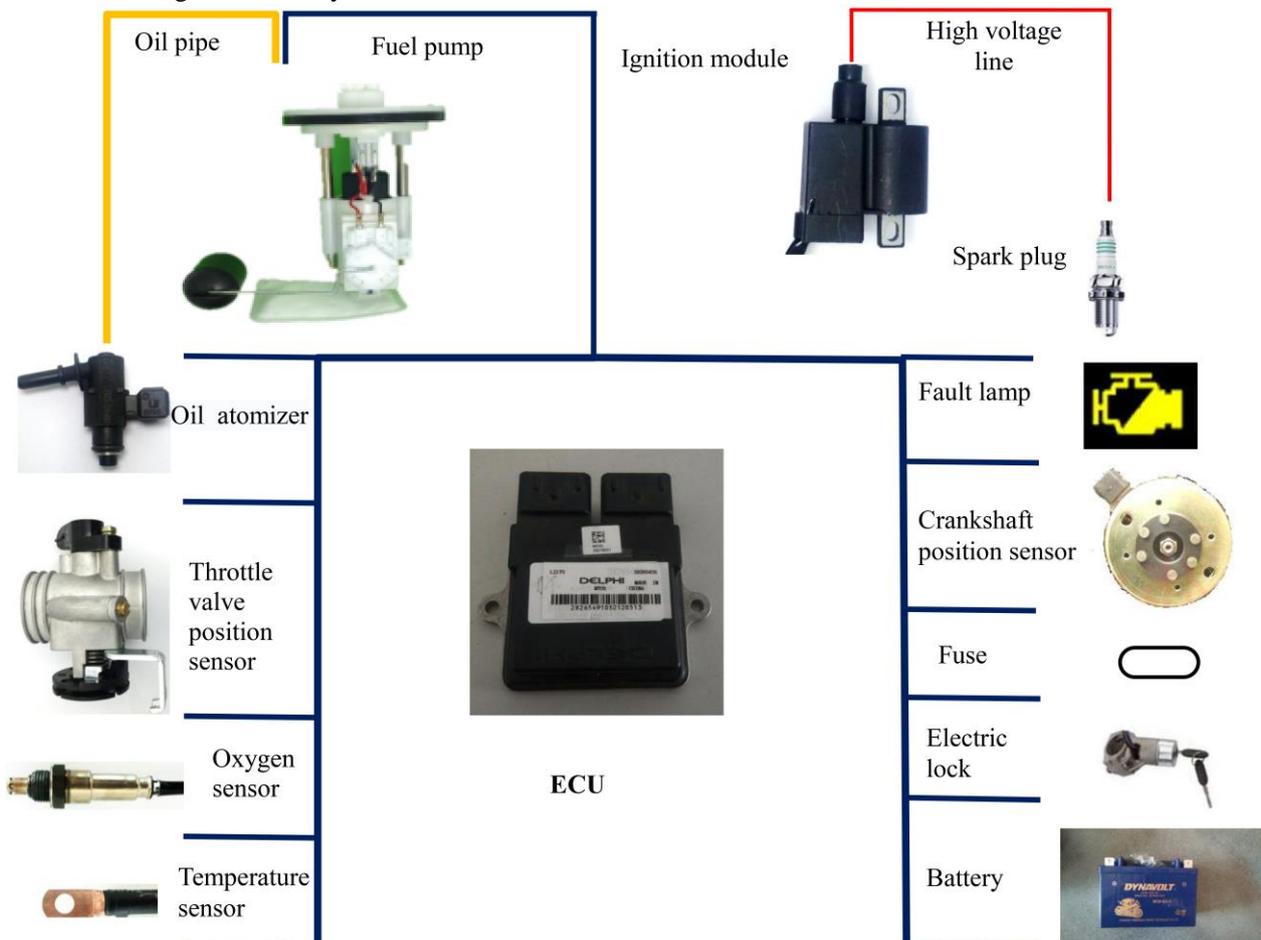
The multimeter is set to $1 \times 10\Omega$.



Auxiliary starter relay coil resistance: 3.5-4Ω

EFL 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.

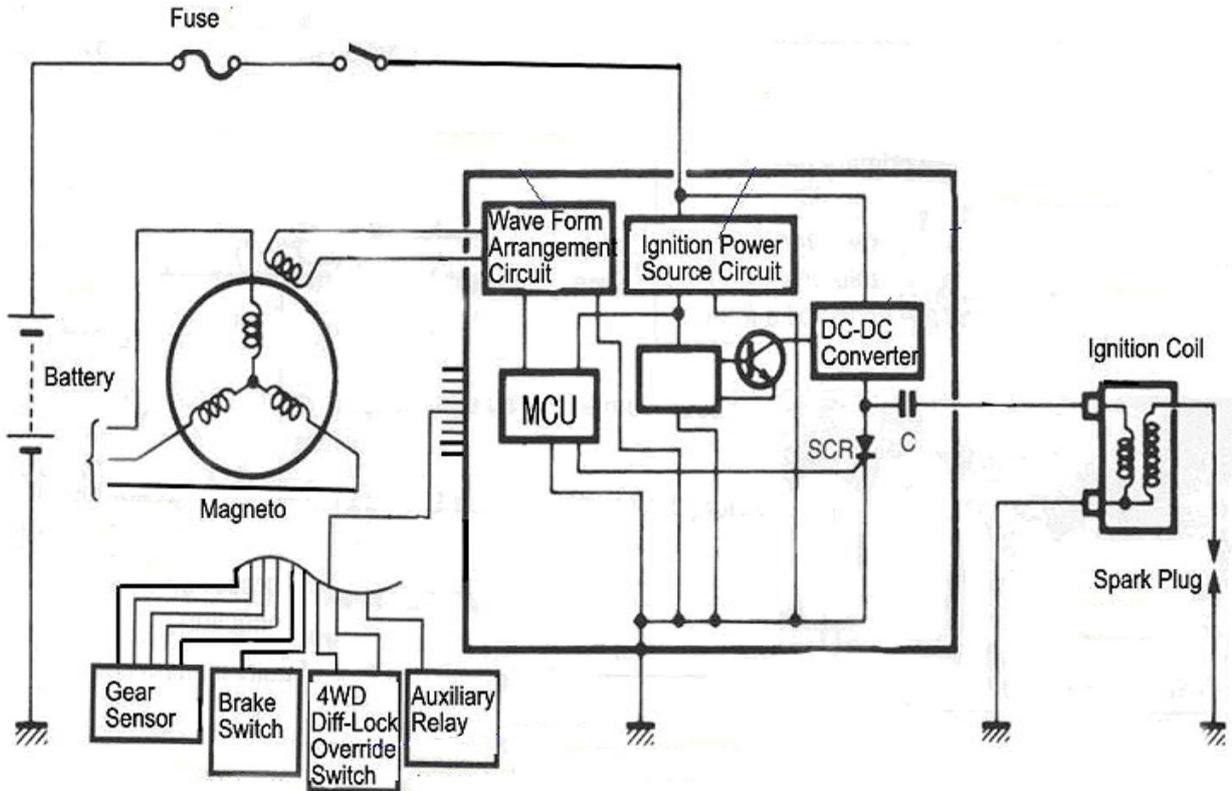
- (1). **ECU:** it is responsible for the receiving of sensor signal, the formulation of control strategy, and the issue of control signal.
- (2). **Oil supply device:** it is composed of oil pump, tubing and injector. The pump pressurizes the fuel to 250 KPA. The injector is installed on the engine 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, door lock, fuse for power supply to EFI system.

IGNITION SYSTEM



IGNITION COIL

Primary peak voltage of ignition coil

Remove the spark plug cap as shown in the right figure. Install the new spark plug to the cap. The cylinder is connected to grounding.

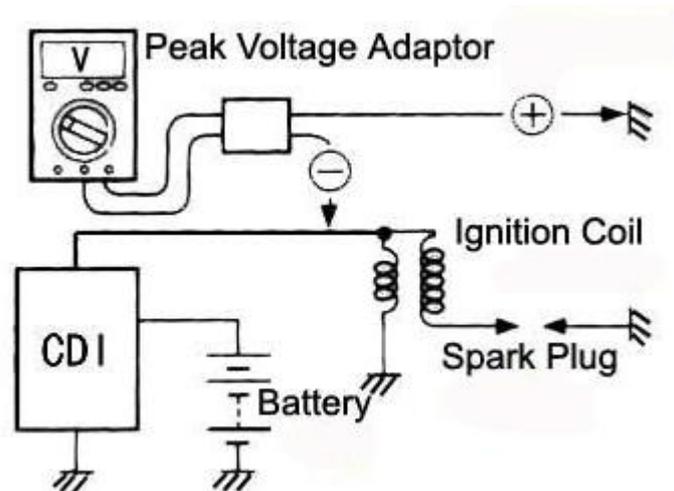
Connect the multimeter and the peak voltage adapter as follows:

+Probe: Green wire or grounding wire

-Probe: Green / yellow wire

NOTE:

Make sure the battery voltage $\geq 12V$. The ignition coil wires are connected.
When using multi meter 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 multi meter 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;

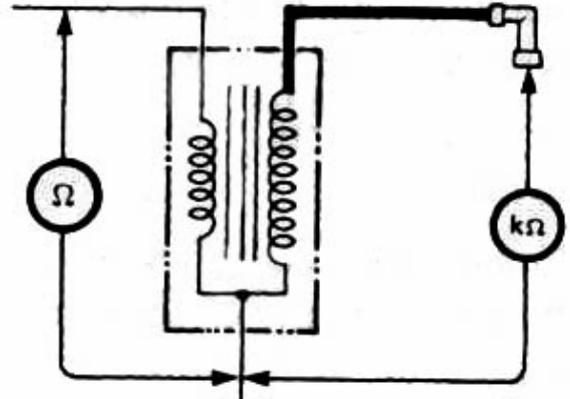
Measure the resistance of the primary and secondary windings of the ignition coil with the multimeter.

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 ± 0.71 (terminal - spark plug cap)



Peak voltage of coupling coil

Z Check the peak voltage of the coupling coil with following steps.

Z As shown in right figure, connect the multi meter with the peak voltage adapter.

+Probe: Green wire

-Probe: BL/Y wire

Z Move the gear to the neutral position, turn on the ignition device.

Z Press the start button and crank the engine for a few seconds, and then measure the primary peak voltage of the coupling coil;

Z 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: $\geq 4V$

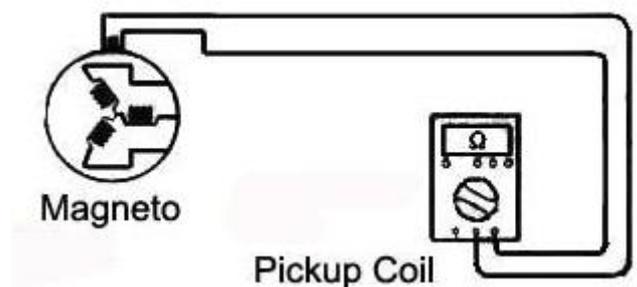
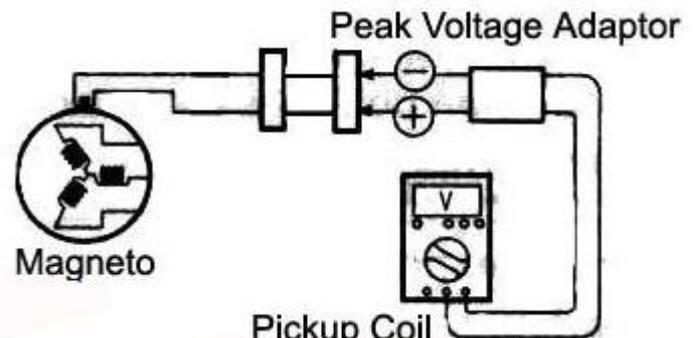
Z If the voltage is lower than the standard value, replace coupling coil.

Resistance of coupling coil

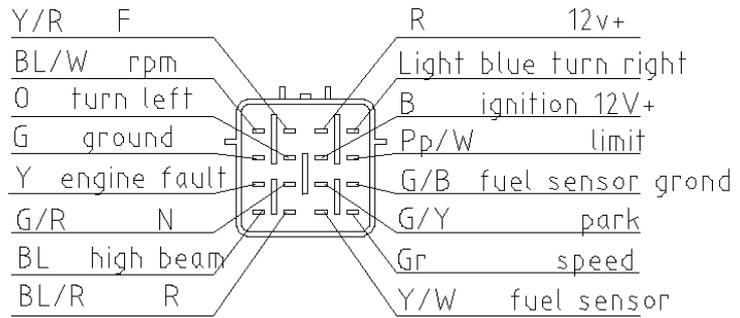
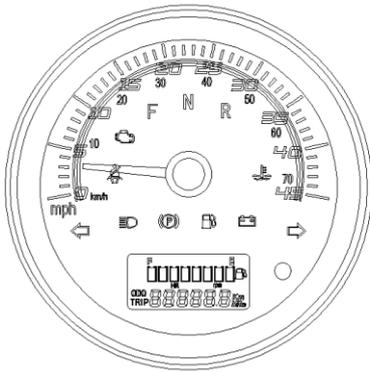
The multi meter is put at $1 \times 100 \Omega$ step.

Resistance of coupling coil: $135 \pm 5 \Omega$

Z If the resistance is not within the specified value, replace the coupling coil.



INDICATOR LIGHT



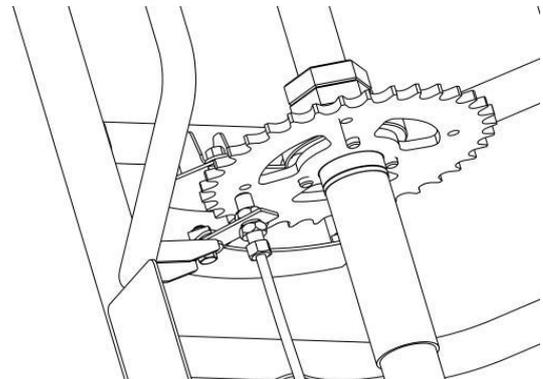
The above picture is the indicator light function and interface definition of the instrument.

Check the indicator lights with the following steps

Each signal indicator has different signals, the following table is the signal information. According to the corresponding information in the table, check with the multi meter.

indicator	signal	indicator	signal
F	ground	←	12V+
N	ground	→	12V+
R	ground	⚡	12V+
	ground		12V+
	ground		resistive analog
RPM	12V square wave signal	speed	resistive analog

NOET:
 If the speedometer is not normal, first check whether the magnet of the speed sensor is in good condition, the polarity is correct, and confirm the gap between the probe and the magnet.
 The S pole of the magnet faces the probe, and the gap between the probe and the magnet is 2-3 mm.



BATTERY

When the battery is not in use for more than one month, remove the positive and negative electrodes and charge the battery every 2-3 months. Before the first time use or when the battery voltage is below 12.75V, please charge the battery.

Characteristics

Capacity 25°C (77°F)	10 hours rate (0.9 A to 10.5V)	9.0 Ah
	5 hours rate (1.8 A to 10.2V)	7.7 Ah
	1C (9.0 A to 9.6V)	4.1 Ah
	3C (27.0 A to 9.6V)	3.2 Ah
Cranking Amperes (by Midtronic Tester)		255 A
Cold Cranking Amperes (-18°C SAE Standard)		120 A
Cold Cranking Amperes (-18°C EN Standard)		120 A
Internal Resistance (at 1KHz)		Approx. 12mΩ
Operating Temperature Range	Charge	0°C (32°F) to 40°C (104°F)
	Discharge	-30°C (-22°F) to 50°C (122°F)
	Storage	-15°C (5°F) to 40°C (104°F)
Life Expectancy (Cycle Use)	60% depth of discharge 250 cycles	
	30% depth of discharge 400 cycles	
Charge Retention (self-discharge life) at 20°C (68°F)	1 month	92%
	3 month	90%
	6 month	80%
Warranty	1 year	
Case Material	ABS	



Specifications

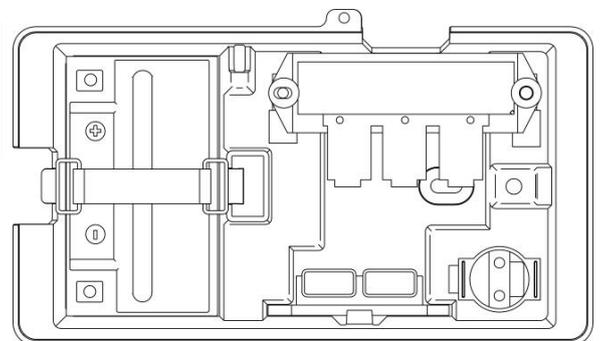
Model NO.	MGS12-9-BS-C	
Upgrade From	YTX9-BS	
Nominal Voltage	12V	
Rated Capacity (10 hours rate)	9 Ah	
Dimensions	Length	150 mm (5.91 inches)
	Width	86 mm (3.39 inches)
	Height	105 mm (4.13 inches)
	Total Height	105 mm (4.13 inches)
Approx. Weight	2.89 kg (6.37 Lbs)	
Charge Current (A)	0.9 A (14.4V constant voltage charge)	

When the battery is not in use for more than one month, remove the positive and negative electrodes and charge the battery every 2-3 months. Before the first time use or when the battery voltage is below 12.75V, please charge the battery.

NOTE:

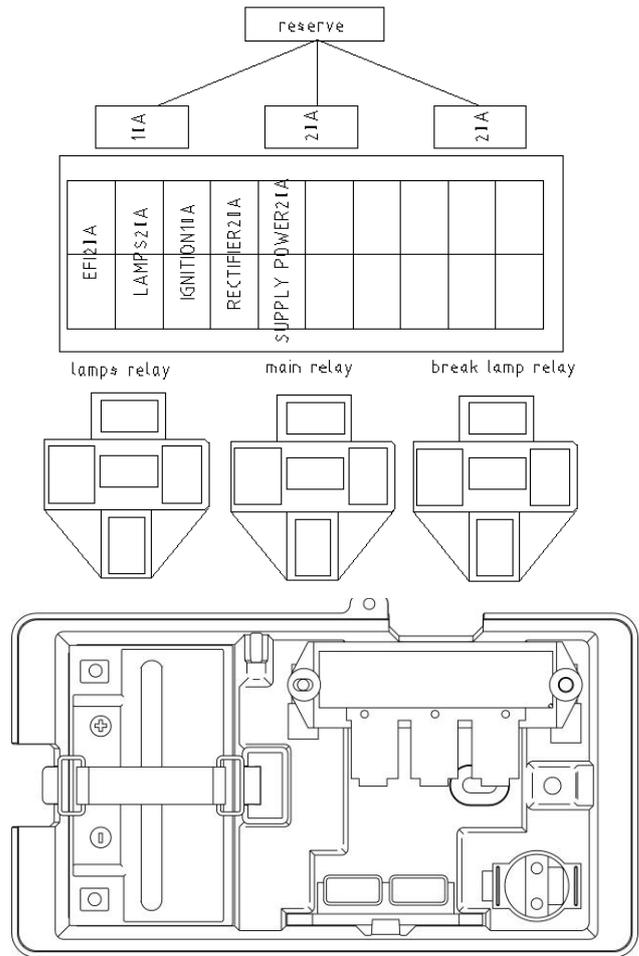
Remove the negative pole first and then the positive pole. Install the positive pole first in assembly process.

Open the seat, remove the suitcase, and remove the belt, and then remove the negative and positive.



RELAY AND FUSE

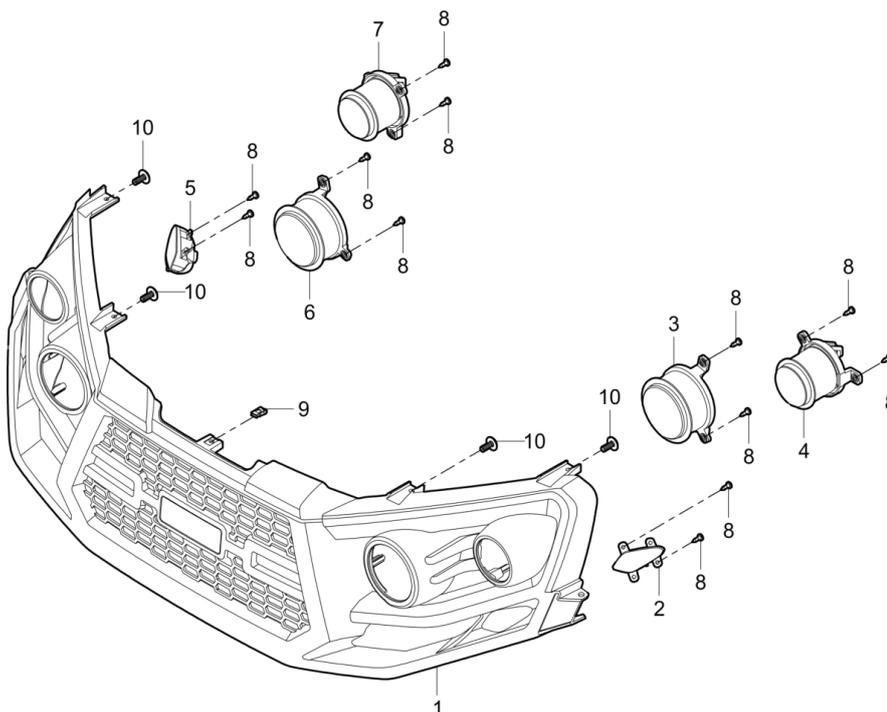
Functional definition of relays and fuses.
 Check fuse first whatever any system doesn't work.
 AND three spare fuses for reserve.



Open the seat, remove the suitcase,
 remove the cover of fuses box.
 Check the fuse and relay.

NOTE:
 Please refer to electrical schematic for specific function of fuse and relay.

LAMPS (LED)
 Turning light and headlight



Unplug the connector and remove the self-tapping nail with screwdriver. Each lamp is fixed with 3 self-tapping nails. And the self-tapping nail specification is ST3.5×12.

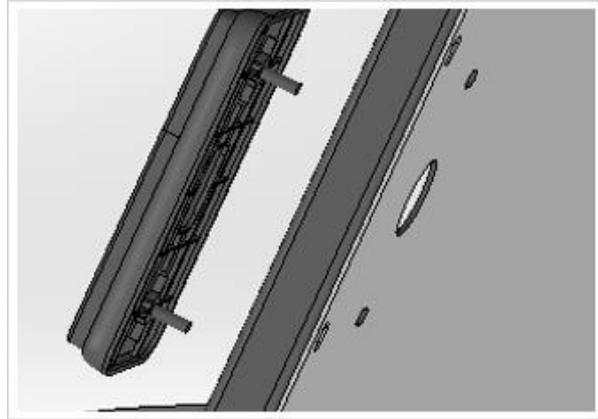
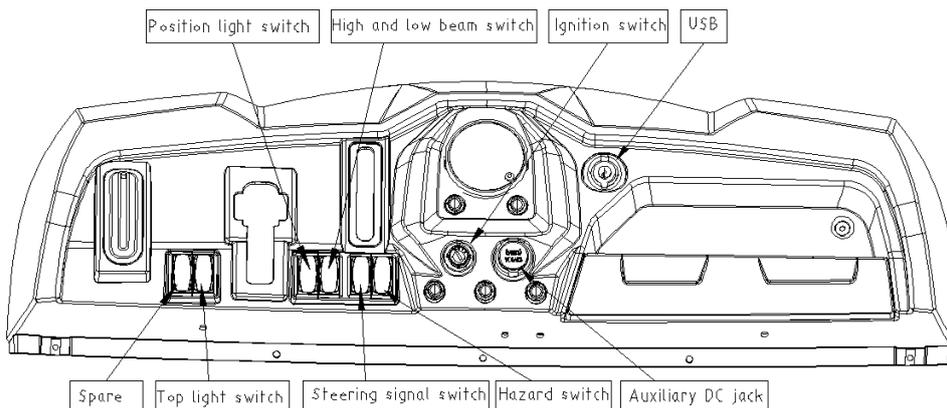
NOTE:

Pay attention to distinguish between left and right when reinstalling.

Combined rear taillights

Includes position lights, brake lights, turn lights.

Unplug the connector and remove two nuts.

**SWITCHES**

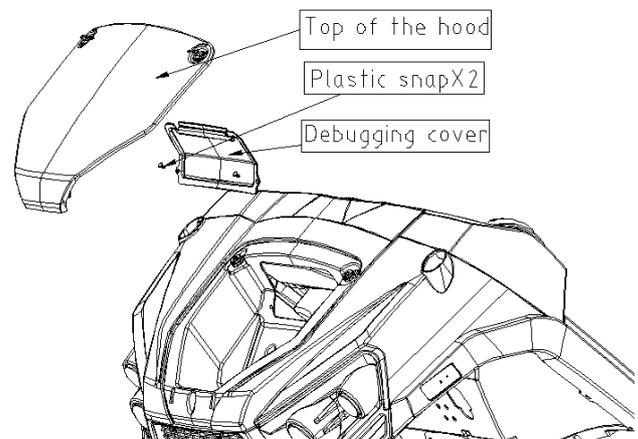
The rocker switch is embedded in the dashboard.

Remove the rocker switch from the dashboard first, Unplug the connector then.

Ignition switch, USB, and auxiliary DC Jack are fixed on dashboard with nuts.

Firstly, remove the top of the hood, remove the both plastic snaps, and then remove the debugging cover.

Remove the self-contained nut and Unplug the connector.

**NOTE:**

The nut of the ignition switch is fixed outside the dashboard, USB and auxiliary DC jack nuts are fixed inside the dashboard.

All functions are controlled by ignition switch except auxiliary DC jack. USB output voltage 5V, refer to electrical schematic for switches with the multi meter, the multi meter is set to DC12V.

12. TROUBLESHOOTING

ELECTRICAL SYSTEM12-1	COOLING SYSTEM12-1
MAGNETO SYSTEM12-1	LUBRICATION12-2
CYLINDER AND HEAD12-3	CRANKSHAFT12-3
GEARBOX12-3	CVT12-4
ENGINE GENERAL12-6	

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.

COOLING SYSTEM

Symptom: HIGH ENGINE OPERATING TEMPERATURE

1. Check engine oil adequacy.
 - Oil below recommended (refer to cooling system).
2. Check temperature sensor for electrical/mechanical failure.
 - Temperature sensor defective. Replace.
3. Check thermostat.
 - Thermostat defective (does not open when engine gets hot). Replace (refer to cooling system).
5. If the oil leaks, check whether the pipe is broken and whether the seal ring at the joint is intact. If it is damaged, replace it with a new one.
6. Check condition of hoses and hose clamps fixation.
 - Hoses are brittle and/or hard. Replace.
 - Hose clamps are loose. Retighten clamps.
7. Check the condition of engine suction impeller
8. Check the radiator for leaks.
 - Cracking or distortion of radiators. Replace the radiator.

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.

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 loose 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 pressure switch function.
 - Oil pressure switch damaged. Replace oil pressure switch.
6. 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).
7. 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).
8. 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.
9. Check plain bearings in crankcase for heavy wear.
 - plain bearings out of specification (increased clearance). Replace plain bearings (refer to bottom end).
10. 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).

CYLINDER AND HEAD

Symptom: 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 or the V-ring on breather.

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).

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.

CVT

Symptom: 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.
1. 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).
2. Check drive pulley screw for torque.
 - Loose screw. Retighten screw with recommended torque.
3. 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.

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 B.U.D.S. system.
 - Check if electrical 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. Replace defective part(s).
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 B.U.D.S.
 - 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 s reached. Replace damaged parts.
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 line 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 line 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 B.U.D.S. 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).