

CFORCE

400/400 TOURING

500/500 TOURING

450/450L/520/520L

CF400AU-3S/CF400AZ-3S/CF400AU-3L/CF400AZ-3L/CF500AU-9S/CF500AZ-9S
CF500AU-9L/CF500AZ-9L/CF400AU-3S/CF400AU-3L/CF500AU-9S/CF500AU-9L
CF400ATR-3S/CF400ATR-3L/CF500ATR-9S/CF500ATR-9L

Service Manual

Edition NO. : 20231128

**Edition item: CF400AU-3S/3L CF400AZ-3S/3L CF400ATR-3S/3L CF500AU-9S/9L
CF500AZ-9S/9L CF500ATR-9S/9L (9DQV-WX-01-2)SM-20231128**

FOREWORD INDEX

This manual introduces CF400AU-3S/3L CF400AZ-3S/3L CF400ATR-3S/3L CF500AU-9S/9L CF500AZ-9S/9L CF500ATR-9S/9L maintenance information, removal & installation procedure, inspection & adjustment methods, trouble shooting and technical specifications in detail. There are illustrations to guide your operations.

Please read this manual carefully and maintain the vehicle according to the standard operation method, which can effectively prolong parts service life, improve the engine performance and the reliability of the vehicle.

Part 1: Chapter 1, 2 and 3 introduce safety information, general information and maintenance information.

Part 2: Chapter 4 to 12 introduce parts removal, inspection, repair and installation procedures of each system, and points for attention as well;

Appendix: Special tool, start circuit diagram, EFI schematic diagram and electrical schematic diagram.

CFMOTO reserves right to make improvements and modifications to the products without prior notice. Overhaul and maintenance should be done according to actual condition of vehicle.

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This manual is applicable to the following vehicle:

**CF400AU-3S/3L CF400AZ-3S/3L
CF400ATR-3S/3L CF500AU-9S/9L
CF500AZ-9S/9L CF500ATR-9S/9L**

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1.1 Service Manual

Before maintenance, please read this service manual carefully. This manual introduces maintenance information, removal & installation procedures, checking & adjustment methods, troubleshooting and technical specifications with detailed diagram to guide maintenance technicians. It will help improve the efficiency of vehicle repair and maintenance.

1.2 Safety Tips

Follow the safety tips in this service manual.


Safety tips is highlighted in text.

NOTE: There are labels or warning labels on the visible places of vehicle. Do not remove any label, or people may not be able to identify the danger, which could result in injury.

1.3 Hazardous Level and Symbol

DANGER/WARNING/CAUTION

Please read below explanations carefully. It explains the meaning of “DANGER/WARNING/CAUTION”:

 **DANGER: The Danger alert and icon indicates a potential hazard that may cause serious injuries or death.**

 **WARNING: The Warning alert and icon indicates a potential hazard that may cause light or medium injury.**

 **CAUTION: The Caution alert and icon indicates a potential hazard that requires you to pay attention.**

NOTE: Prompts that make the process simpler or clearer.

DANGER, WARNING AND CAUTION instructions can not include all the risks during use or maintenance of the vehicle. Therefore, besides the notices on the vehicle, technicians should have basic mechanical and safety knowledge, or ask a senior mechanic for help.

1.4 Operation Notice

For some procedures, special tools are needed. These tools can be purchased according to its part number.

During installation, some parts (like seal parts, o-rings, cotter pins and etc.) can not be reused and have to be replaced with a new one. Follow the instructions when apply thread locker to screws.

For those parts that will be reused after removal, clean them up and inspect for damages or cracks. Replace it if damaged.

Ensure vehicle safety after repair or maintenance.

1.5 General Precaution

1.5.1 Avoid Carbon Monoxide Poisoning

⚠ DANGER: Exhausted gas is poisonous. Do not run the engine in a closed or bad ventilated area for a long time.

1.5.2 Avoid Corrosion Injury by Electrolyte

⚠ WARNING:

1. Battery electrolyte (dilute sulfuric acid) is highly caustic and can result in burns. If you spill electrolyte on skin, flush with water and seek for medical attention immediately.
2. If you spill electrolyte on clothes, flush with water to avoid burns.
3. Keep battery and electrolyte out of reach of children.

1.5.3 Avoid Injury

⚠ WARNING: Wear suitable work clothes, cap, boots, glasses, dust-proof mask, and gloves if necessary.

1.5.4 Avoid Scald

⚠ WARNING: Engine and muffler temperatures are still high when the engine is just stopped for a very short time. Avoid getting burned. Do not touch the engine before it completely cools down.

1.5.5 Avoid Toxic Coolant

⚠ WARNING:

1. Coolant is poisonous. Do not drink or spill it on skin, eyes or clothes. If you spill coolant on skin, wash with soap and water. If you spill coolant on eyes, flush with water and seek prompt medical attention.
2. If coolant is swallowed, induce vomiting and ask a doctor for medical care.
3. Keep coolant out of reach of children, and keep it away from pets.

1.5.6 Avoid Explode and Fire

DANGER:

1. Gasoline is highly flammable. Keep gasoline away from sparks. Vaporized gasoline is also explosive. Fuel and operate vehicle in a well ventilated area.
2. The battery produces flammable and explosive hydrogen when it is charged. It has the potential danger of explosion if there is a fire or sparks. Charge the battery in a well-ventilated area.

1.5.7 Operational Safety

WARNING:

1. Be careful not to get pinched by the turning parts, like wheels, axles, and clutch.
2. When more than two persons are working on the vehicle, remind each other of operational safety.

1.6 Cautions for Removal and Installation

CAUTION:

1. Use genuine CFMOTO parts, lubricants and service products.
2. Store the removed components separately in order for correct installation.
3. Clean mud, dust before servicing.
4. Replace removed washers, O-rings, piston pin retainers, cotter pins with new ones.
5. Elastic retainers might get distorted after disassembly. Do not use loosened retainers.
6. Clean and blow off the detergent after removal. Apply lubricants on the surface of moving parts.
7. If you do not know the length of screws, install the screws one by one and make sure they are screwed with the same depth.
8. Pre-tighten the bolts, nuts and screws, then torque them to specified specification. The basic sequence is: from big to small, from inside to outside and criss-cross.
9. Replace aged rubber parts when assembling. Do not splash gasoline, grease onto the surface, as this could cause damage.
10. Apply or inject recommended lubricant into the specified lubrication points.
11. Use the correct special tools for removal and installation.
12. When a ball bearing is removed by pressing steel balls, it can not be reused.
 - Replace bearings if the axial or radial free play is too big.
 - If the running surface feels uneven, clean with oil and check again. Replace it if the cleaning does not work.
 - When pressing the bearing into the machine or onto the shaft, if the bearing can not be securely seated, replace it.
13. Install one-side dust-proof bearings in the right direction. When assembling open type or double-side dust-proof bearings, install with the manufacturer's mark outward.
14. Install the elastic circlips properly. Turn the circlip after assembling to make sure it has been installed into the slot.

⚠ CAUTION:

15. After assembling, check that all the tightened parts are properly tightened and can move smoothly.
16. Brake fluid and coolant may damage painting, plastic and rubber parts. Flush with water if splashed on these parts.
17. Install oil seals with the side of manufacturer's mark outward.
 - Do not fold or scratch the oil seal lip.
 - Apply grease to the oil seal lip before assembling.
18. When installing pipes, insert the pipe until it bottoms in the end of the joint. Fit the pipe clip, if any, into the groove. Replace the pipes or hoses that cannot be tightened.
19. Do not allow mud or dust into the engine and/or the hydraulic brake system.
20. Clean the gaskets and washers off the engine casing before assembling. Remove the scratches on the joint faces by polishing evenly with a polish stone.
21. Do not twist or bend the cables too much. Distorted or damaged cables may cause poor operation or even damaged components.
22. When assembling the parts with protection caps, insert the caps to the grooves.

1.7 Engine Break-in

There are many movable components inside the engine, such as the piston, piston rings, cylinder, crankshaft, gears and etc. During initial use period, proper run-in for every critical component is necessary. Break-in can help engine components match to each other and adjust working conditions. A new engine with careful treatment will have better efficient performance and a longer service life.

Recommended break-in period: First **320km**

Operation guide:

0~110km: Do not operate continuously at more than 50% throttle position. Cool down the engine for 5~10 minutes after every hour of operation. Avoid sudden acceleration. Vary the throttle position slowly and smoothly.

110km~320km: Avoid long-time running at more than 75% throttle position. Do not open throttle completely during this period.

⚠ CAUTION:

1. Maintain and repair with regular procedures during break-in period.
2. After break-in, check and maintain the engine before normal use.

1.8 Warranty

Maintenance procedures specified in the schedule are only allowed to be carried out in CFMOTO authorized service stations. Otherwise, warranty and warranty rights will be effected. Refer to the Warranty manual for detailed information.

1.9 Fuel, Engine Oil and Coolant

Fuel: Octane US: 92# or higher unleaded gasoline EU: E10 or 95(ROn)

Engine oil: SAE10W-40, SG or higher level in API. If SAE10W-40 engine oil is not available, follow the chart below to choose one oil according to the environment temperature.

Coolant: Antifreeze with appropriate anti-corrosion and rust-proof properties. Therefore, the engine coolant contains antifreeze. Frozen temperature is lower than environment temperature (typically -5 °C or lower).

Oil Viscosity	Temperature (°C)							
	-30	-20	-10	0	10	20	30	40
15W-40								
10W-40								
5W-40								
F°	-22	-4	14	32	50	68	86	104
C°	-30	-20	-10	0	10	20	30	40

⚠ CAUTION: Improper handling with fuel can cause pollution. Fuel is not allowed to enter into groundwater, soil or pipe system.

NOTE: CFMOTO recommends to use - 35°C senior antifreeze, anti-corrosion and high boiling coolant.

Please only use spare parts and accessories approved or recommended by CFMOTO. Any loss caused by using other produces, CFMOTO shall not be responsible. For latest information about vehicle use, please visit CFMOTO official website: <http://www.cfmoto.com>

1.10 Caption

Pictures in this service manual include optional tools. Parts that may have been removed or not shown in the picture for better display and illustration. Not all instructions need to be removed, please note the text.

All the numbers in the corner of the picture in this service manual are only used for CFMOTO internal use.

02 General Information

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2.1 Unit conversion tables and symbols used in this manual

Unit Conversion Table

Item	Unit conversion
Pressure	1kgf/cm ² =98.0665kPa;
	1psi=6.895kPa=0.06895bar
	1mmHg=133.322Pa=0.133322kPa
Torque	1kgf·m=9.80665N·m
	1N·m= 8.85(lbf·in)
	1N·m= 0.73756 21(lbf·ft)
Volume	1mL=1cm ³ =1cc
	1L=1000cm ³
Force	1kgf=9.80665N
Length	1in=25.4mm

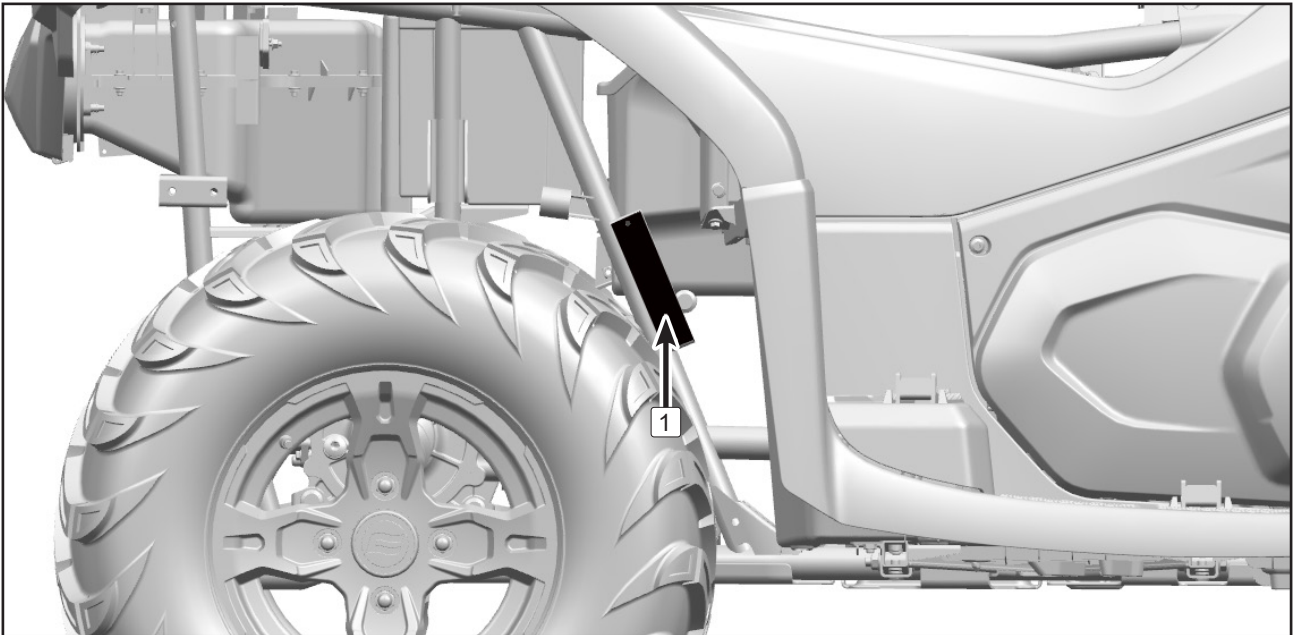
Symbols

V	Voltage
A	Electric current
Ω	Resistance
VAC	Alternating current voltage
Vdc	Direct current voltage

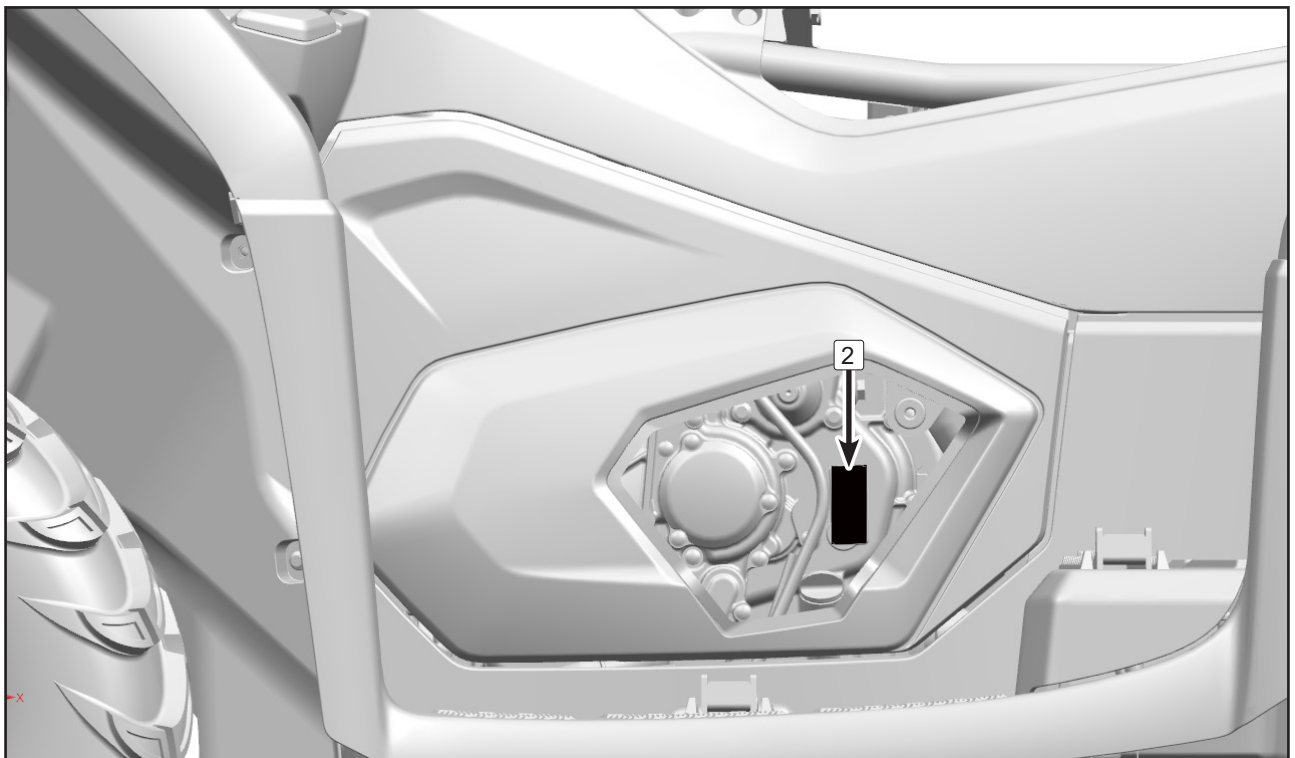
2.2 Identification Number Locations

Model: CFORCE 400/450 CFORCE 500/520

1. Vehicle identification number (VIN):
2. Engine identification number (EIN):



1 | VIN Location



2 | EIN Location

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2.3 Main Specifications

2.3.1 Vehicle

North America:

Vehicle	Specification			
Model	CF400AU-3S	CF500AU-9S	CF400AU-3L	CF500AU-9L
Size: (mm) length×width×height	2046x1125x1150		2386x1125x1150	
Size: (in.) length×width×height	80x44x45		80x44x47	
Wheelbase	49.6 in. (1260 mm)		57 in. (1460 mm)	
Min. ground clearance	9.8 in. (250 mm)		9.8 in. (250 mm)	
Basic Weight:	732 lb. (332 kg)	782 lb. (355 kg)	763 lb. (346 kg)	805 lb. (365 kg)
Passengers	2 person (includes driver)			
Maximum load	496 lb. (225 kg)		672 lb. (305 kg)	
Recommended Towing Capacities:	110 lb. (50 kg)			
Towing Hitch Weight Trailer and Cargo Weight	1349 lb. (612 kg)			
Frame type	Steel tube			

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Vehicle	Specification			
Model	CF400AU-3S	CF500AU-9S	CF400AU-3L	CF500AU-9L
Size: (mm) length×width×height	2115x1100x1190		2386x1125x1205	
Size: (in.) length×width×height	82x43x47		91x43x47	
Wheelbase	49.8 in. (1265 mm)		57.7 in. (1465 mm)	
Min. ground clearance	9.8 in. (250 mm)		9.8 in. (250 mm)	
Dry weight	787 lb. (357kg)		815.7 lb. (370 kg)	
Passengers	2 person(includes driver)			
Maximum load	573.2 lb. (260 kg)		573.2 lb (260 kg)	
Recommended Towing Capacities:	55 lb. (25 kg)			
Towing Hitch Weight Trailer and Cargo Weight	330 lb. (150 kg)			
Frame type	Steel tube			

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Vehicle	Specification			
Model	CF400ATR-3S	CF500ATR-9S	CF400ATR-3L	CF500ATR-9L
Size: (mm) length×width×height	2187x1157x1372		2387x1157x1400	
Size: (in.) length×width×height	86x46x54		94x46x45	
Wheelbase	49.8 in. (1265 mm)		57.7 in. (1465 mm)	
Min. ground clearance	9.8 in. (250 mm)		9.8 in. (250 mm)	
Dry weight	787 lb. (357kg)		815.7 lb. (370 kg)	
Passengers	2 person(includes driver)			
Maximum load	573.2 lb (260 kg)		573.2 lb (260 kg)	
Recommended Towing Capacities:	55 lb. (25 kg)			
Towing Hitch Weight Trailer and Cargo Weight	1349 lb (612 kg)			
Frame type	Steel tube			

2.3.2 Engine Specification

Engine		Specification
Model		191Q
Type		single cylinder liquid-cooled 4-stroke, SOHC, 4 valves
Bore×Stroke		91 x 61.5mm
Displacement		400cc
Compression ratio		10.3:1
Min. no-load stabilized speed (idling)		1500±150rpm
Output style		Front and rear shaft
Engine output rotating direction		Clockwise (rear view)
Electrical system	Ignition method	ECU Coil
	Spark plug	DCPR8E(NGK)
	Magneto	VAC 3-phase
	Starting method	Electric start
EFI system	ECU	Bosch
	Injectors	Bosch
Lubrication system	Lubrication method	Pressure + splash
	Oil pump	Rotor motor
	Filter style	Full flow cartridge filter
	Engine oil	SAE15W – 40/SJ higher API
Cooling system	Cooling type	Closed-circuit coolant radiator
	Coolant	-35°C Anti-freeze mix
Throttle	Valve diameter	40mm
Air Filter		Paper cartridge filter

Engine		Specification
Model		191R
Type		single cylinder liquid-cooled 4-stroke, SOHC, 4 valves
Bore×Stroke		91 x 76.2mm
Displacement		495cc
Compression ratio		10.3:1
Min. no-load stabilized speed (idling)		1500 ± 150rpm
Output style		Front and rear shaft
Engine output rotating direction		Clockwise (rear view)
Electrical system	Ignition method	ECU Coil
	Spark plug	DCPR8E(NGK)
	Magneto	VAC 3-phase
	Starting method	Electric start
EFI system	ECU	Bosch
	Injectors	Bosch
Lubrication system	Lubrication method	Pressure + splash
	Oil pump	Rotor motor
	Filter style	Full flow cartridge filter
	Engine oil	SAE10W-40/SJ higher API
Cooling system	Cooling type	Closed-circuit coolant radiator
	Coolant	-35°C Anti-freeze mix
Throttle	Valve diameter	40mm
Air Filter		Paper cartridge filter

02 General Information

Engine		Specification		
Transmission	Type	CVT+Gearshift Transmission		
	Gears	2 forward, 1 reverse, 1 parking		
	Shift/Order	Manual/L-H-N-R-P		
	Clutch type	Dry CVT		
	CVT ratio range	0.67~3.02		
	Gear ratios	Final	1.333	
		Secondary	1.952	
		L:2.533; H:1.350; R: 2.071		
Axle ratios	Total ratio: L:6.595 ;H:3.514 ; R:5.392			
	Front axle	33/9		
	Rear axle	33/9		

Fuel System	Specification
Fuel type	North America: 87# or higher unleaded gasoline; 168: E5/95 or higher unleaded gasoline;
Fuel tank capacity	18L
Reserve fuel indicator	Indicator flashes when the fuel is about 2L
Fuel pump	35L per hour, 0.3MPa±0.01MPa
Fuel filter	30-micron, inline type

Steering	Specification
Min. turning radius	short: 2800 mm long: 3250mm
Turn angle	Inside 31°
	Outside 23°

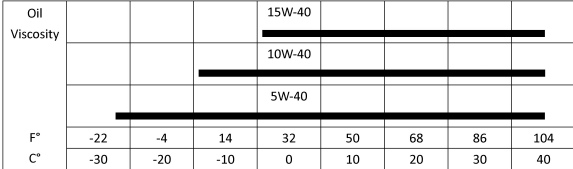
Brakes	Specification
Front	Hydraulic Disc
Rear	Hydraulic Disc
Parking	Electrical Park Brake/Hydraulic parking

Suspension	Specification
Type	Front: independent/double A arm travel: 185mm
	Rear: independent/double A arm travel: 220mm
Shock absorber	front: Hydraulic damping/Oil rear: Hydraulic damping/Oil
Standard spring pre-load setting	third gear

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Wheel/Tire	Specification
Front tire	25×8.0-12
Rear tire	25×10.0-12
Wheel bolt pattern	M10×1.25-6g
Wheel nut pattern	M10×1.25-7H

2.4 Specifications for Service

Lubrication		
Item		Standard
Engine oil capacity	Replace oil and oil filter	2900mL(crankcase)
	Total capacity	3000mL(crankcase)
Recommended engine oil	 <p>The chart shows the recommended oil grades for different ambient temperatures. The x-axis represents temperature in both Fahrenheit (F°) and Celsius (C°). The y-axis represents Oil Viscosity with grades 15W-40, 10W-40, and 5W-40. 15W-40 is recommended for temperatures above 50°F (10°C). 10W-40 is recommended for temperatures between 32°F (0°C) and 50°F (10°C). 5W-40 is recommended for temperatures below 32°F (0°C).</p>	<p>SAE: Use of any oil other than those recommended may cause serious engine damage. CFMOTO recommends the use of 10W-40 for 4-stroke engines. Changing engine oil viscosity to 5W-40 due to extreme cold environments or 15W-40 due to hot environments is acceptable. Reference the chart below for ambient temperature and viscosity choice.</p> <p>API level: SJ or higher.</p>
Oil pressure	Engine RPM 1500r/min, oil temperature 90°C, oil pressure should be between 200kPa~400kPa, Typical is 240kPa.	
	Engine RPM 8000r/min, oil temperature 90°C, oil pressure should be between 600kPa~700kPa, Typical is 600kPa.	
Front gearcase oil	Total capacity	230 mL
	Recommended oil	SAE80W-90 GL-5
Rear gearcase oil	Total capacity	200 mL
	Recommended oil	SAE80W-90 GL-5

02 General Information

Cooling System			
Item		Standard	
Thermostat	Open temperature	65°C±2°C	
	Full open temperature	85°C	
	Full open clearance	85°C, ≥5mm	
Radiator cap opening pressure		110 kPa±15 kPa(1.1kgf/cm ²)	
Coolant temperature sensor temperature vs resistance	Coolant temperature (°C)	Resistance B terminal-Earth (Ω)	Resistance A-C terminals (kΩ)
	-20	—	13.71~16.94
	25	—	1.825~2.155
	50	176~280	—
	80	63.4~81.4	0.303~0.326
	110	24.6~30.6	0.138~0.145
Coolant capacity	System	2.2L	
	Reservoir	0.2 L(upper line)	
Coolant type		-35°Canti-freezing, anti-corrosive and high boiling point	
Mix ratio		50: 50(50% coolant / 50% distilled water)	

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Wheel (Front and Rear)			
Item		Standard	Service limit
Wheel jump	Axial	1.0mm	2.0mm
	Radial	1.0mm	2.0mm
Tire	Groove depth	--	3.0mm
	Front tire pressure	45kPa (0.45kgf/cm ²)	--
	Rear tire pressure	45kPa (0.45kgf/cm ²)	--

Brakes		
Item	Standard	Service limit
Brake Fluid	DOT 4	--
Brake disc thickness - Front	5.0mm	4.0mm
Brake disc wear value - Front	4.0mm	
Brake pedal free play	10mm~20mm	—
Brake disc thickness - Rear	5.0mm	4.0mm
Brake disc wear value - Rear	4.0mm	

Battery / Charging				
Item		Standard		
Battery	Type	DYNAVOLT: GHD30HL-BS		
	Capacity	12V 30Ah		
	Voltage	Fully charged	14.4V	
		Discharged	≤ 11.8V	
	Recharging current/time	Standard	2.7A / 5h~10h	
Quick		12A / 1h		
A/C magneto	Magneto Type	Magneto 3-phase A/C generator		
	Output	3-phase A/C		
	Resistance of coils (20°C)	0.2Ω~0.3Ω		
	Max. output power	600W,5000r/min		
	Charging voltage	13.5V~15.0V, 5000r/min		
	Regulator type	3-phase supply / 12Vdc power output		

02 General Information

Ignition / EFI / Electrical		
Item		Standard
Ignition controller		Bosch ECU
Spark plug	Type	Resistance control
	Model	DCPR8E(NGK)
	Spark clearance	0.8mm~0.9mm
	Spark specification	>8mm, 1kPa
Ignition coil resistance	Primary	0.74Ω~0.78Ω
	Secondary	10.1kΩ~11.1 kΩ
Peak voltage	Ignition primary	≥1.5V, 200r/min
	Pulse starter	≥25kV
Start relay coil resistance		3Ω~5Ω
Start auxiliary coil resistance		90Ω~100Ω
Peak voltage of trigger coil	≥1.5V, 200r/min	
Resistance of trigger coil	900Ω~1000Ω	

Fuses / Lights		
Item		Standard
Fuses	Main	30A
	Secondary	10A×2 15A×4 40A×1(EPS)
Lights	Headlight	LED×2(High-beam) LED×2(Low-beam) LED×4(turn light)
	Brake light	LED
	Indicators	LED
	Rear license light	H2 W5W bulb

CVT / Transmission				
Item	Standard - mm		Limit	Remark
Drive belt width	35.9		33.5	
Clearance between shifting fork and groove	0.15~0.35		0.45	
Shifting fork moving thickness	5.8~5.9		5.7	
H/L sliding fork groove width	6.05~6.15		6.25	
Output main gear sliding groove width	6.05~6.15		6.25	
Shifting drum groove width	8.02~8.12			
Shifting fork pin diameter	7.90~7.95		7.83	
Shifting gear hole diameter	25~25.021		25.025	
Reverse dual gear hole diameter	25~25.021		25.025	
Shifting main shaft diameter	φ30	29.980~29.993	29.970	
	φ17	16.983~16.994	16.978	
Driven shaft diameter	φ15	14.983~14.994	14.978	
	φ17	16.983~16.994	16.978	
	φ20	19.980~19.993	19.974	
Drive bevel gear shaft diameter	φ17	16.983~16.994	16.978	
	φ25	24.980~24.993	24.974	
Reverse dual gear shaft diameter	φ20	19.980~19.993		

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Valve / Camshaft / Rocker Arm / Cylinder Head				
Item	Standard - mm		Limit	Remark
Valve diameter	IN	φ33	—	
	EX	φ29	—	
Valve thickness	IN & EX	1	0.5	
Valve clearance (Cold engine)	IN	0.08~0.12	—	
	EX	0.12~0.18	—	
Valve guide diameter	IN & EX	5.000~5.012	5.045	
Valve stem outer diameter	IN	4.965~4.980	4.93	
	EX	4.955~4.970	4.93	
Valve guide and stem clearance	IN	0.020~0.047	—	
	EX	0.030~0.057	—	
Valve stem roundness (run out)	IN & EX	0.005	0.06	
Valve stem end run out	IN & EX	0.02	0.05	
Valve length	IN	90.1		
	EX	88.7		
Valve bevel side run out	IN & EX	0.03	0.05	
Valve sealing line width	IN	1.2±0.1	1.7	
	EX	1.3±0.1	1.8	
Valve spring free length	IN & EX	40	38.2	
Valve spring force	IN & EX	Press to 33mm: 200.5N~235.5N Press to 23mm: 531N~587N	—	
Cam lobe height	IN	32.971~33.011	32.871	
	EX	32.985~33.025	32.865	
Camshaft journal diameter	φ35	34.959~34.975	34.95	
	φ22	21.959~21.980	21.95	
Camshaft bearing diameter	φ35	35.007~35.025	35.04	
	φ22	22.012~22.025	22.04	
Camshaft bearing fit clearance	φ35	0.032~0.066	0.09	
	φ22	0.032~0.066	0.09	
Camshaft axial clearance	0.12~0.28		—	
Camshaft round-out			0.10	
Rocker arm inner hole diameter	IN & EX	12.000~12.018	12.03	
Rocker arm shaft diameter	IN & EX	11.973~11.984	11.96	
Rocker arm shaft fit clearance	IN & EX	0.016~0.045	0.07	
Rocker arm shaft axial clearance	IN & EX	0.06~0.34	—	
Cylinder head flatness		0.03	0.05	
Cylinder head cover joint flatness		0.08	0.10	
Cylinder head flatness		0.03	0.05	

02 General Information

Cylinder / Piston / Piston Ring / Connecting Rod				
Item	Standard - mm		Limit	Remark
Cylinder compression pressure	1000kPa		—	
Piston and cylinder clearance	0.04~0.06		0.10	
Piston diameter	90.94~90.96		90.85	Above 8mm from piston bottom
Cylinder hole clearance	90.99~91.01		—	
Cylinder upside and bottom flatness	0.03		0.05	
Piston ring closing clearance	1st	0.25~0.40	1.5	
	2nd	0.35~0.45	1.5	
	Oil	0.2~0.7	1.5	
Piston ring / groove clearance	1st	0.02~0.06	0.15	
	2nd	0.02~0.06	0.15	
	Oil	0.03~0.15	0.25	
Piston ring thickness	1st	1.17~1.19	—	
	2nd	1.47~1.49	—	
	Oil	2.37~2.47	—	
piston ring groove width	1st	1.21~1.23	—	
	2nd	1.51~1.53	—	
	Oil	2.50~2.52	—	
Piston pin hole inner diameter	22.004~22.010			
Piston pin diameter	21.995~22.000		21.980	
Connecting rod small end inner diameter	22.01~22.02		22.06	
Piston pin hole/piston pin clearance	0.004~0.015		0.08	
Connecting rod small end hole/piston pin clearance	0.010~0.025		0.08	
Connecting rod big end side clearance	0.30~0.48		0.7	191Q
Connecting rod big end side clearance	0.10~0.45		0.7	191R
crankshaft run out	—		0.055	
Connecting rod journal diameter	43.934~43.946		43.915	191Q
Connecting rod big end bearing diameter	43.970~44.000		44.03	191Q
Connecting rod big end radial clearance	0.028~0.049		0.09	191Q
Crankshaft main journal diameter	41.960~41.970		41.935	
Crankcase main bearing hole diameter	41.980~42.020		42.10	
Crankshaft main journal radial clearance	0.02~0.05		0.08	
Crankshaft axial clearance	0.05~0.45		0.6	

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Oil Pump		
Oil pump rotor	Clearance between inner and outer rotor	0.07mm~0.15mm
	Clearance between outer rotor and bore	0.03mm~0.10mm
	Rotor end clearance	0.023mm~ 0.055mm

02 General Information

2.4.1 Fastener Torque Tables

Fasteners excluded in below table should also be torqued to specification.

NOTE: Threads and contact area should be coated with oil.

No.	Item	Type	Qty	Torque(N•m)
1	engine front/rear bolt	M12×1.25×180	2	60~70
2	engine front bracket bolt	M12×1.25×170	1	60~70
3	engine front bracket bolt	M10×20	4	40~50
4	front/rear suspension swing arm bolt	M10×1.25×70	16	40~50
5	front/rear shock absorbers bolt	M10×1.25×50	8	40~50
6	rear wheel shaft bracket bolt	M10×1.25×100	4	40~50
7	rim bracket nut	901A-07.00.02	16	70~80
8	rim shaft nut	M24×2	4	220-250
9	front gear case bolt	M10×1.25×110	2	50-60
10	rear gear case bolt	M10×1.25×110	2	60-70
11	steering rod ball pin nut	9010-100002	4	40~50
12	handlebar gland bolt	70.1 M8×70	4	25-30
13	front brake caliper bolt	M10×20	4	40-50
14	front brake disc bolt	A000-080001	8	30~40
15	rear brake caliper bolt	M10×30	2	40~50
16	rear brake disc bolt	A000-080001	4	30~40
17	muffler body bolt	M10×1.25×70	1	40~50
18	muffler body bolt	M8×65	1	30~40
19	exhaust pipe collar nut	8010-020001	2	25~35
20	front lower knuckle bolt	M10×1.25×35	2	40~50
21	towing bracket bolt	M10×1.25×70	2	40~50
22	cable pulley bolt	M10×1.25×20	2	40~50
23	fuel pump bolt	M5×14	6	5~8
24	oxygen sensor	0HU0-176000	1	40~60
25	rim nut	9010-070002-A000	16	70~80
26	EPS steering universal joint	9CR6-102003	1	35~45
27	EPS swing arm lock nut	9CR6-102003	1	35~45
28	handlebar aluminum cover bolts	M8×60	4	30~40

2.4.2 Torque Table - Engine Components

Item	Qty	Type (mm)	Torque (N·m)	Remark
drain bolt M12×1.5	1	M12×1.5	25	
bolt M14×1.5×12(LH)	2	M14×1.5	28	
oil rail press plate bolt(LH)	4	M6×12	8	Apply thread locker
primary filter bolt	3	M6×20	8	Apply thread locker
oil pressure switch	1	M10×1	20	
bolt R21/8(CVT oil rail)	1	R21/8	20	Apply thread locker
CVT windshield bolt	3	M6×12	10	
CVT cover bolt	8	M6	7	
Pressure limiting valve plug(LH crankcase cover)	1	M20×1.5	20	
Wire clamp bolt(LH crankcase cover)	1	M6×10	10	Apply thread locker
Oil seal clamp bolt(LH crankcase cover)	3	M6×8	10	Apply thread locker
valve clearance adjusting nut	8	M6	12	
timing sprocket bolt	2	M6×10	15	Apply thread locker
Starting pressure relief bolt	1	M8×32	30	Apply thread locker
cylinder bolt	4	M10	20、60	
cylinder bolt	2	M6×132/120	10	
spark plug assy	1	M12×1.25	20	
water temp. sensor	1	M12×1.5	20	
stud M8×42(exhaust port)	2	M8×42	25	Apply thread locker
nut M8(exhaust port)	2	M8	13	
plug screw M12×1.5	1	M12×1.5	20	
tapping screw ST4.8×13(thermostat cap)	1	ST4.8×13	5	
bolt M6×45(thermostat cap)	2	M6×45	6	
fuel injector seat bolt	2	M8×25	20	
cylinder head cover bolt	4	M6	7	
Thread pin of tensioning plate	1	M8	20	Apply thread locker
magneto rotor bolt	3	M6×30	10	Apply thread locker

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overriding clutch bolt	6	M8×20	25	Apply thread locker
bolt M10×1.25×40(magneto rotor)	1	M10×1.25	55	Apply thread locker
drive pulley bolt(CVT drive pulley)	1	M12×1.5-LH	60	Left-hand thread
gearshift main shaft nut(CVT driven pulley)	1	M20×1.5	150	
drive pulley nut	1	M22×1.5-LH	180	Left-hand thread
drive bevel gear lock nut	1	M22×1	145	
drive bevel gear housing bolt	4	M8×28	30	
Drive bevel gear bearing plate screws	4	M8×25	15	
driven bevel gear bearing stop nut	1	M65×1.5	110	Apply thread locker
driven bevel gear housing bolt	4	M8×28	25	
front output shaft bearing circlip (levorotation)	1	M55×1.5	80	Apply thread locker、 Left-hand thread
front/rear output disc bolt M10×1.25×20	2	M10×1.25	55	
shift drum set bolt T25	1	M5×8	6	
gear setting bolt	1	M14×1.5	18	
oil pumo cover bolt	3	M5×16	7	Apply thread locker
oil guard bolt	2	M6×12	8	Apply thread locker

Fastening torque of common standard parts shall be executed according to the following table

Item	Torque (N·m)	Item	Torque (N·m)
5mm bolt、 nut	5	5mm bolt	4
6mm bolt、 nut	10	6mm bolt	9
8mm bolt、 nut	20~30	6mmSH flange bolt	10
10mm bolt、 nut	30~40	6mm flange bolt、 nut	12
12mm bolt、 nut	40~50	8mm flange bolt、 nut	20~30
		10mm flange bolt、 nut	30~40

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lubricating grease、 sealant

apply area	remarks	type
steering bearing throttle cable joint throttle pedal moving part brake pedal moving part swing arm moving part steering column inner circumference seat lock moving part gearshift moving part		Multi-purpose lithium grease

Controller cable、 bearing、 moving parts lubrication

apply area	remarks	type
Steering shaft spherical bushing rear wheel shaft bracket front and rear shock absorbers joint bearing throttle handle shaft and cable connector LH+RH brake handle shaft brake cable connector rear brake pedal moving part	lubrication	ball bearing grease SY1514-82

02 General Information

Engine maintenance

Engine maintenance supplies include oil, gear oil, grease, coolant, flat sealant, thread locker, cylinder holding glue, etc.

item	type	apply area	remarks
engine oil	4-stroke motorcycle: SAE10W-40 API SJ or higher	Rotating part in cylinder, sliding part in crankcase, rotating part in CVT box, sliding part, rotating part in cylinder head, sliding part. See schematic diagram of lubrication system.	capacity 2900mL(change engine oil filter) 3000mL(engine overhaul)
Molybdenum containing lubricating oil		Piston pin, valve stem section, valve oil seal, camshaft	
grease	3 MoS ₂ lithium-based grease	Sealing surface of oil seal lip, O ring and other rubber sealing materials, bearing with seal	
coolant	-35°C Advanced anti-freezing, anti-corrosion, high boiling point coolant	cooling system、 water seal installation	Capacity is determined according to radiator water pipe system
Gasket sealant adhesive(flat sealant)		the surface of rubber sealing sleeve on stator external cable and LH crankcase cover, the commissure of crankcase and cylinder surface, water seal and water pump shaft, surface of water pump shaft and washer.	
thread locker		partial thread	

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2.4.3 Engine Service Tools

Measuring Tools

No.	Tool name	Specification	Usage	Remark
1	Vernier caliper	0~150mm	Measure the length and thickness	
2	Micrometer	0~25mm	Measure rocker arm shaft, valve rod, camshaft's diameter.	
3	Micrometer	25mm~50mm	Measure the max-range of cam	
4	Micrometer	75mm~100mm	Measure the piston size	
5	Cylinder inner dial gauge		Measure the cylinder diameter run out	
6	Inner dial caliper	10mm~34mm	Measure rocker arm inner diameter, cylinder pin hole, connecting rod small hole.	
7	Dial gauge	1/100	Measure the running out	
8	Flatness gauge		Measure the flatness	
9	Clearance gauge		Measure the flatness and adjust the valve clearance.	
10	Plastic clearance gauge		Measure fitness clearance	
11	Force gauge		Measure the spring force	
12	RPM gauge		Measure the engine speed	
13	Cylinder pressure gauge and connector		Measure cylinder pressure	
14	Oil pressure gauge		Measure oil pressure	
15	Air pressure gauge		Measure radiator cap open pressure	
16	Ohm meter		Measure the resistance	
17	Ampere meter		Measure the current	
18	Thermo gauge		Measure the temperature	
19	Timing flasher		Test the ignition timing	
20	Torque wrench	In sets	Measure the tighten torque	

Usual and Auxiliary Tools

21	Alcohol lighter		Heating up	
22	Magneto gauge stand		Install dial gauge	
23	Flat plate		Supplement the measuring	
24	V-block		Measure the running out data	
25	Caliper		Install valve locking block	
26	Retainer caliper		Install and remove the caliper	
27	Caliper		Install and remove the retainer	
28	Impact screw driver		Remove the screw	
29	Screwdriver(-)			
30	Screwdriver(+)			

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3.1.1 Maintenance before operation	03-2
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3.1.3 Periodic Maintenance Schedule	03-5

3.1 Maintenance Schedule

The following icon keys are used to note special circumstances:

- ▶ = Severe Use Item. Reduce interval by 50% on vehicles subjected to severe use.
- = Have an authorized dealer perform repairs that involve this component or system.
- = Emissions related components. Have an authorized dealer perform repairs that involve this component or system.

3.1.1 Maintenance before operation

Perform these inspections before operating the vehicle:

Item	Maintenance before operation			Remarks
	Hour	Calendar	Miles (km)	
■ Steering system	--	Pre-Ride	--	Visually inspect, test, or check components. Make adjustments and/or schedule repairs when required.
■ Throttle return	--	Pre-Ride	--	
Front suspension and axles	--	Pre-Ride	--	
Rear suspension and axles	--	Pre-Ride	--	
Tires	--	Pre-Ride	--	
Brake fluid level	--	Pre-Ride	--	
Brake lever / foot brake function	--	Pre-Ride	--	
Brake system function	--	Pre-Ride	--	
Wheels / fasteners	--	Pre-Ride	--	
Engine oil level	--	Pre-Ride	--	

Item		Maintenance before operation			Remarks
		Hour	Calendar	Miles (km)	
▶	Air filter / Air box and connections	--	Pre-Ride	--	Visually inspect. Replace filter when dirty.
▶	Air box sediment tube	--	Pre-Ride	--	Inspect. If deposits are visible, clean intake tubes, air box, and replace air filter.
▶	CVT sediment tube	--	Pre-Ride	--	Inspect. If deposits are visible, drain / clean the CVT or have it serviced by a dealer.
▶	Headlight aim / General lighting and turn indicators (if equipped)	--	Pre-Ride	--	Inspect. Adjust or replace lights when necessary.
▶	Radiator	--	Pre-Ride	--	Inspect for mud or debris blocking air flow. Clean surfaces when necessary.

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3.1.2 Break-In Maintenance Checklist

Perform these maintenance items when the 20-hour vehicle break-in is completed:

Item		Break-in Maintenance (Perform at the interval that arrives first)			Remarks
		Hour	Calendar	Miles (km)	
	General lubrication	20h	--	200 (320)	Lubricate all grease points, pivots, cables, etc.
	Engine oil / oil filter / oil strainer	20h	--	200 (320)	Change oil and filter. Clean oil strainer.
▶	Engine air filter	20h	--	200 (320)	Inspect; replace if dirty; do not clean.
■	Engine valve clearance	20h	--	200 (320)	Check and adjust as necessary.
	Front / Rear gear case oil	20h	--	200 (320)	Check level. Inspect for leaks.
	Coolant	20h	--	200 (320)	Check level. Inspect for leaks.
	Engine hoses, gaskets and seals	20h	--	200 (320)	Inspect for leaks.
▶	Brake pads	20h	--	200 (320)	Inspect pad thickness.
	Battery	20h	--	200 (320)	Check terminals, clean, test battery condition if required.
■	Idle condition	20h	--	200 (320)	Inspect for proper rpm. See dealer for service if out of spec or erratic.
■	Steering / Wheel Alignment	20h	--	200 (320)	Inspect steering system. See dealer for service if wheel alignment is required.
▶	Foot brake / Hand brake	20h	--	200 (320)	Inspect function. Adjust as necessary.
■	Gear cases, CV shafts, Prop shafts	20h	--	200 (320)	Inspect for leaks.

3.1.3 Periodic Maintenance Schedule

Perform maintenance at the interval that arrives first after the 20-hour break-in period:

Item	Periodic Maintenance Intervals (Perform at the interval that arrives first)			Remarks
	Hour	Calendar	Miles (km)	
▶ Brake pads	10h	Monthly	100 (160)	Inspect pad thickness.
Battery	20h	-	200 (320)	Check terminals. Clean and test battery condition as necessary.
Engine hoses, gaskets and seals	20h	-	200 (320)	Inspect for leaks.
▶ Air filter	50h	--	500 (800)	Always inspect before riding. Inspect frequently if subjected to severe use. Replace if dirty. Do not clean.
▶ CVT air intake filter screen / filter	50h	--	500 (800)	Clean filter screen or filter, replace with new one if necessary.
▶ General lubrication	50h	3M	500 (800)	Lubricate all grease points, pivots, cables, etc.
▶ Front gear case oil	100h	12M	1000 (1600)	Inspect level. Change yearly if hours or distance interval is not met.
▶ Rear gear case oil	100h	12M	1000 (1600)	Inspect level. Change yearly if hours or distance interval is not met.
▶ Engine oil / oil filter / oil strainer	100h	12M	1000 (1600)	Inspect for color change. Change if dirty and clean strainer. Change yearly if hours or distance interval is not met.
Cooling system	50h	6M	500 (800)	Test coolant strength. Pressure test system yearly.
▶ Radiator	50h	6M	500 (800)	Inspect; clean external surfaces. Clean more frequently if subjected to severe use.
■ Steering system	50h	6M	500 (800)	Inspect. Lubricate.
▶ Front suspension	50h	6M	500 (800)	Lubricate. Check fasteners.
▶ Rear suspension	50h	6M	500 (800)	Lubricate. Check fasteners.
▶ Gear shift	50h	1M	500 (800)	Inspect, lubricate, adjust as necessary.
▶ ■ Throttle body / throttle cable	50h	6M	500 (800)	Inspect. Clean carbon deposits. Inspect cable and lubricate frequently if subjected to severe use.

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Item		Periodic Maintenance Intervals (Perform at the interval that arrives first)			Remarks
		Hour	Calendar	Miles (km)	
▶■	CVT drive belt	100h	12M	1000 (1600)	Inspect. Replace as necessary. See dealer for service.
■	CVT drive and driven pulleys	100h	12M	1000 (1600)	Clean and Inspect pulleys. Replace worn parts. See dealer for service.
	Fuel filter and hoses	100h	24M	2000 (3200)	Inspect routing and condition. Replace filter and high-pressure hoses every 4 years.
	Cooling hoses	100h	--	1000 (1600)	Inspect routing and condition.
▶	Valve clearance	100h	--	2000 (3200)	Inspect and adjust as necessary. See dealer for service.
●	Fuel system	100h	12M	500 (800)	Inspect fuel tank, cap, fuel pump and fuel pump relay.
	Spark plug	100h	24M	2000 (3200)	Inspect; Replace if worn or fouled.
■	Engine mounts	100h	12M	1500 (2400)	Inspect condition.
	Exhaust pipe and spark arrestor	100h	12M	500 (800)	Inspect. Clean spark arrestor.
▶	Wiring, fuses, relays, connectors, and cables	100h	12M	1000 (1600)	Inspect wire routing for wear, security. Apply dielectric grease as necessary to connectors subjected to water, mud, etc.
▶■	Wheel bearings	100h	12M	1500 (2400)	Inspect for noise or looseness. Replace as necessary.
▶	Safety Belts	100h	12M	2000 (3200)	Visually inspect belts and test latches. Clean latch mechanism more often if used in severe conditions.
	Coolant	200h	24M	4000 (6400)	Change coolant every 2 years if hours or distance interval is not met.
▶	Brake fluid	200h	24M	1000 (1600)	Inspect fluid for color change. Change fluid every two years.

03 Maintenance

Item		Periodic Maintenance Intervals (Perform at the interval that arrives first)			Remarks
		Hour	Calendar	Miles (km)	
	Idle condition	--	12M	--	Inspect for proper rpm. See dealer for service if out of spec or erratic.
■	Steering / Wheel Alignment	--	12M	--	Inspect steering system. See dealer for service whenever steering parts or wheel alignment are required.
▶	Foot brake height	-	12M	-	Inspect. Replace brake pads or adjust height as required.

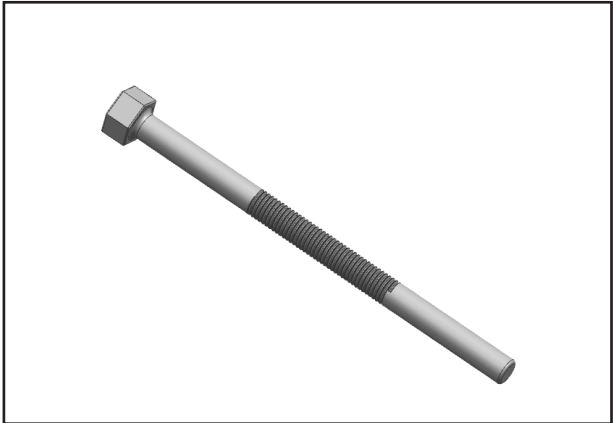
4.1 CVT Special Tool	04-2
4.2 CVT Removal	04-4
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4.4.2 Drive Pulley, Driven Pulley and Drive Belt Installation.....	04-13
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4.1 CVT Special Tool

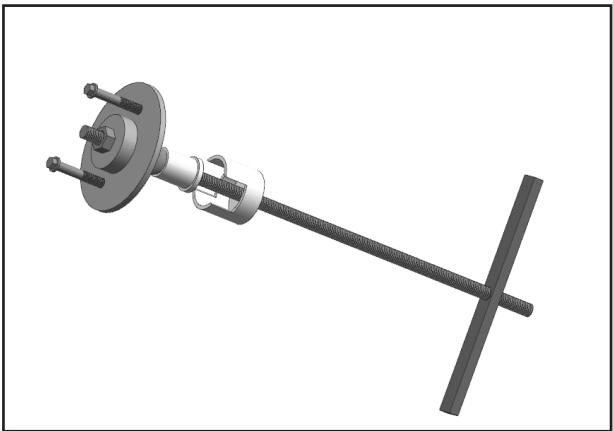
Drive Pulley Removal Tool

0JY0-050000-922-002A



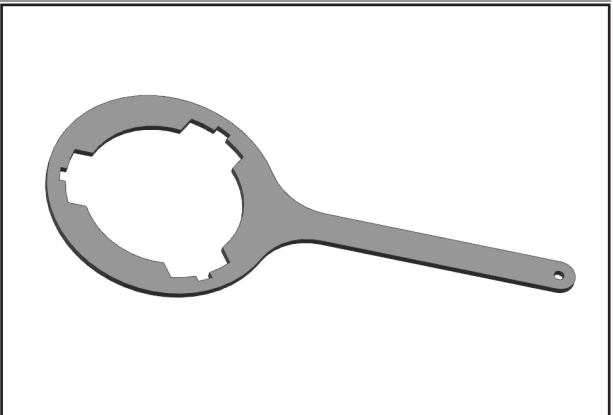
Driven Pulley Disassembly Tool (to disassemble driven pulley)

0800-052000-922-002



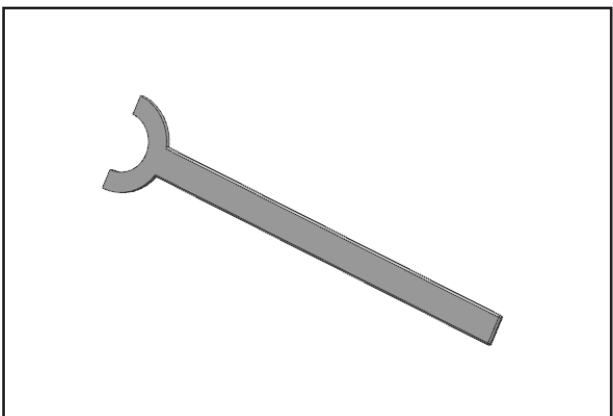
Drive Pulley Holding Wrench

0JY0-050000-922-001



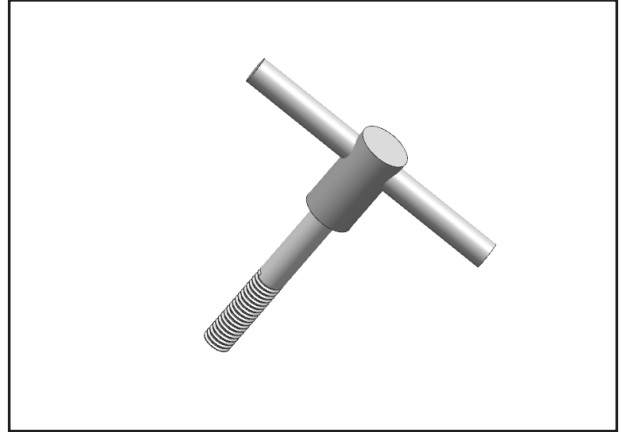
Driven Pulley Holding Wrench

0JY0-052000-922-001



Driven Pulley Fixed Sheave and Sliding Sheave Separating Tool

0800-052000-922-003



4.2 CVT Removal

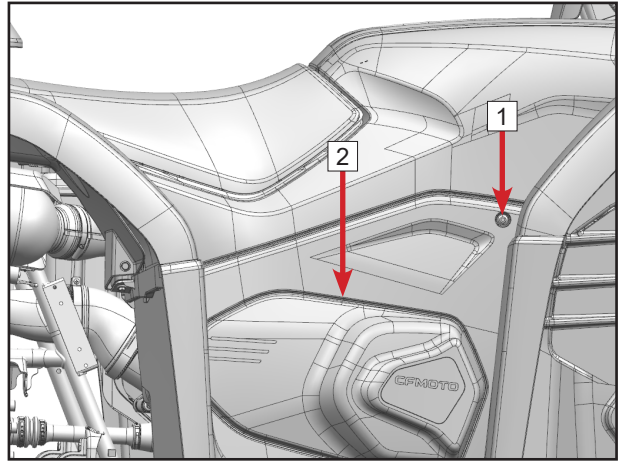
4.2.1 Preliminary Work

Remove bolts [1].

Remove CVT side panel [2].

NOTE: Pull out upper part first. Keep lower part still and rotate the cover.

Pull up whole assembly.

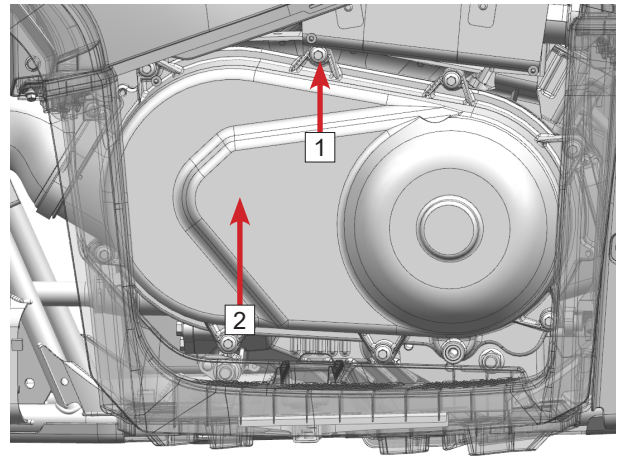


4.2.2 CVT Cover

Remove eight bolt kits [1].

Remove CVT cover [2].

Remove seal ring from CVT case.



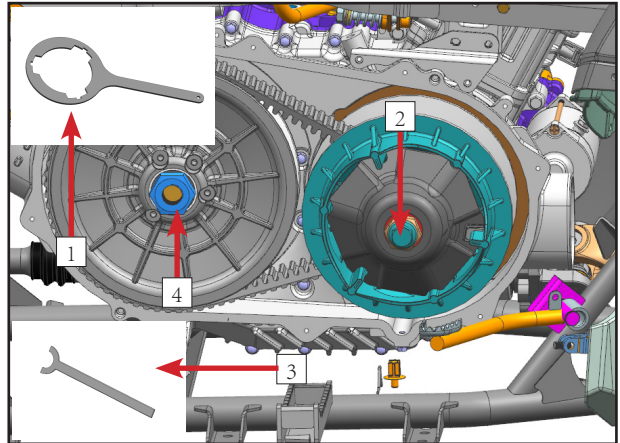
4.2.3 CVT Drive Pulley, Driven Pulley and Drive Belt

Use special tool: drive pulley holding wrench [1] to fix drive pulley.

Remove drive pulley bolt [2] (left-hand thread).

Use special tool: Driven Pulley Holding Wrench [3] to fix driven pulley.

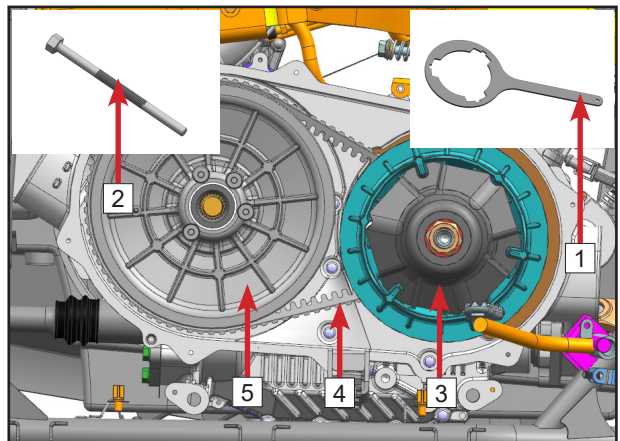
Remove driven pulley nut [4].



Use special tool: Drive Pulley Holding Wrench [1] to fix drive pulley.

Use special tool: Drive Pulley Removal Tool [2] to remove drive pulley (left-hand thread).

Remove drive pulley [3], driven pulley [5] and drive belt [4] together.



4.3 CVT Parts Inspection

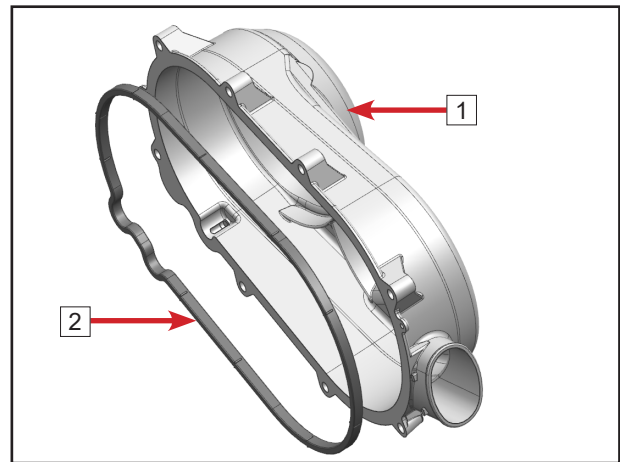
4.3.1 CVT Cover Assy

Inspection

Inspect CVT cover [1] for cracks or damage. Replace if it does.

Inspect CVT cover seal ring [2] for aging, damage or other defects. Replace if it does.

Inspect front heat insulator [3], rear insulator [4] for damage. Replace heat insulator with the CVT cover [1] together if damaged.

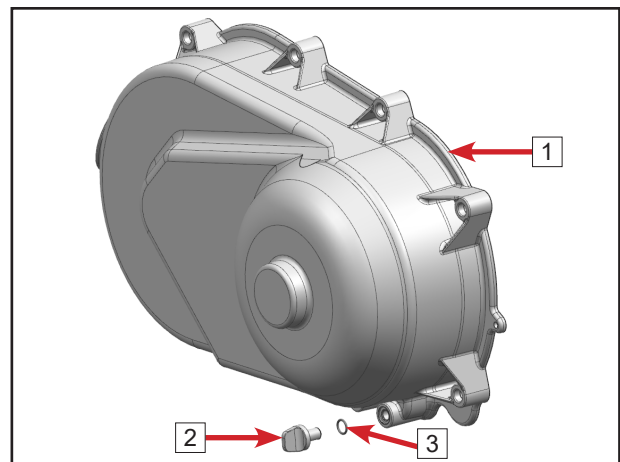


Disassembly

Remove drain bolt [2] and O-ring [3] from CVT cover [1].

Inspect O-ring [2] for aging, damage or other defects. Replace if it does.

Inspect drain bolt [2] for damage. Replace if damaged.



Assembly

Assemble in the reverse order of Disassembly.

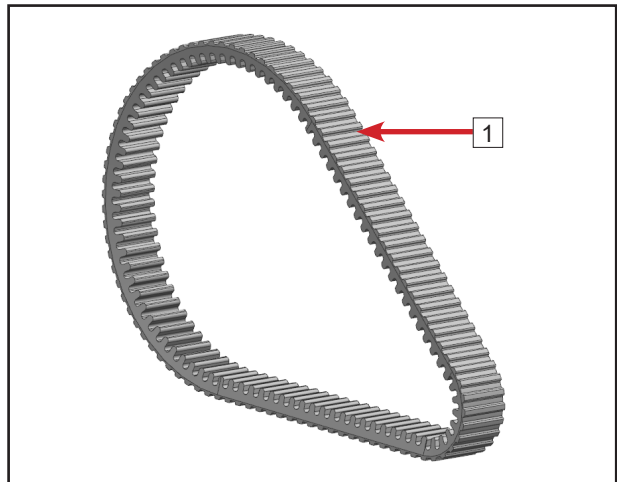
4.3.2 Drive Belt

Inspect drive belt for oil contamination or damage. Inspect belt contact surface for cracks or damage.

Measure belt width using a vernier caliper. Replace with a new belt if damaged or beyond service limit.

Drive belt service limit: 33.5 mm

NOTE: Clean the belt and pulleys thoroughly if oil and grease adheres to belt surface.



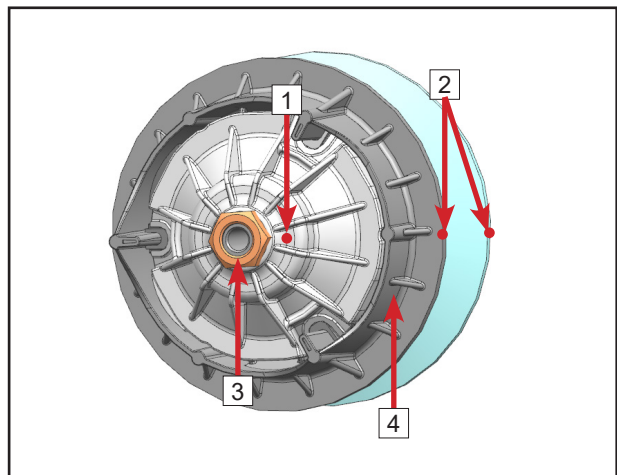
4.3.3 Drive Pulley

Disassembly

Before disassembling the drive pulley, mark the ramp plate **1** and the drive pulley sheaves **2** for reassembly.

Remove the drive pulley nut **3** (left-hand thread).

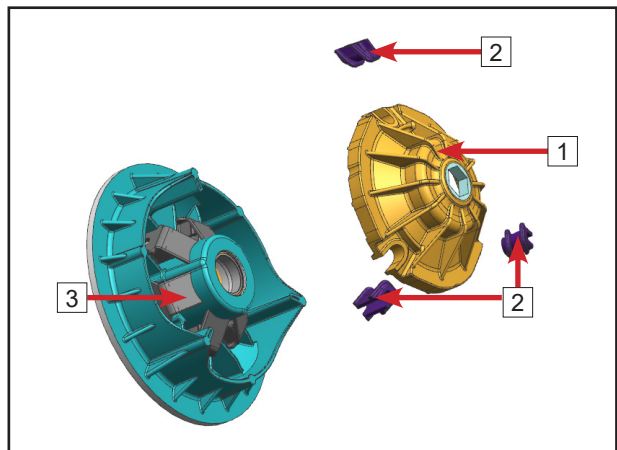
Remove drive pulley moving sheave assembly **4**.



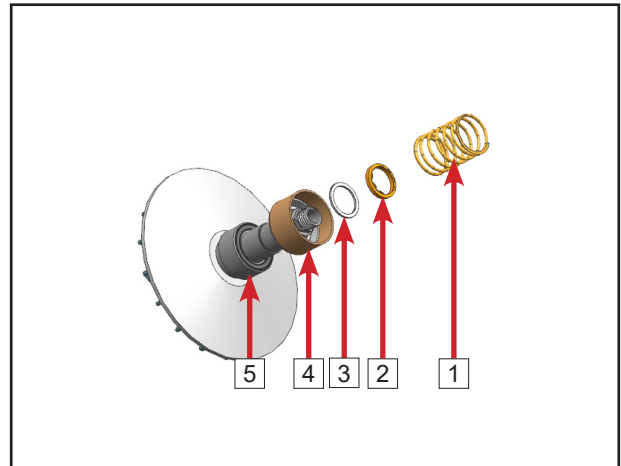
Remove ramp plate **1**.

Remove ramp sliders **2**.

Remove weight sliders **3**.



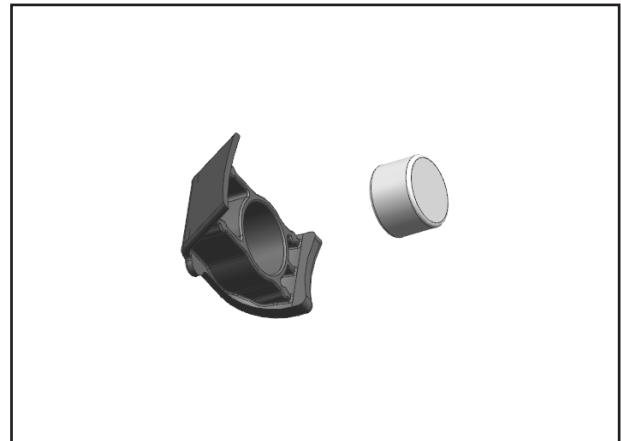
- Remove drive pulley spring [1].
- Remove nylon washer [2].
- Remove steel washer [3].
- Remove spring seat [4].
- Remove overriding clutch assembly [5]



Inspection

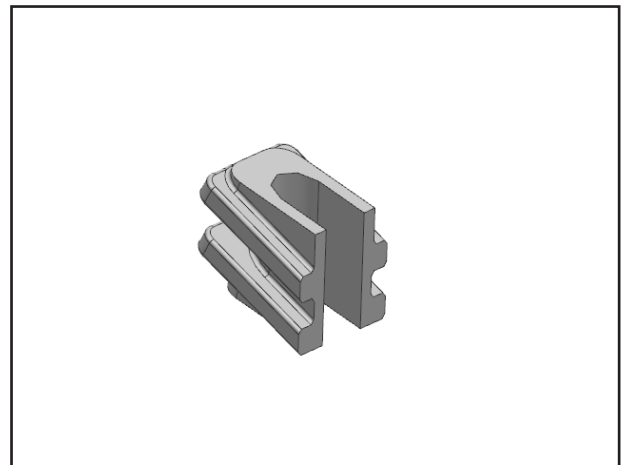
Inspect every weight slider and sliding surface for damage or wear. Replace all sliders if any defect or excessive wear is found.

NOTE: Weight sliders must be replaced as a whole set.



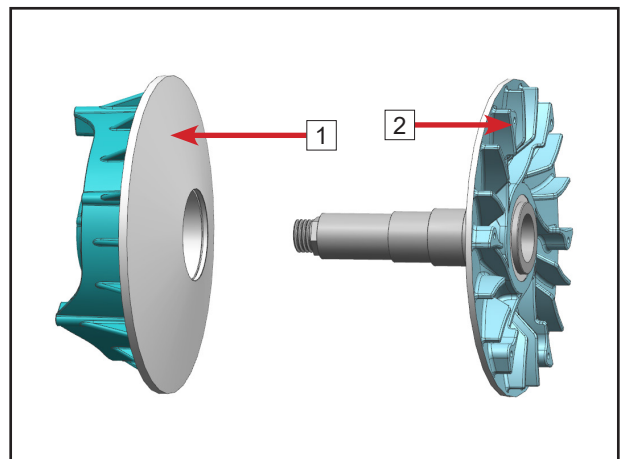
Inspect the ramp sliders for wear or damage. Replace all sliders if any defect or excessive wear is found.

NOTE: Ramp sliders must be replaced as a whole set.



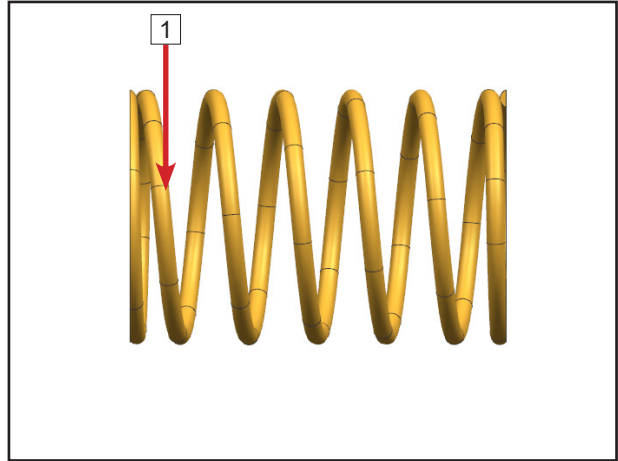
Drive Pulley Stationary Sheave and Moving Sheave

Inspect drive pulley stationary sheave [2] and moving sheave [1] surfaces for wear, grooves or damage. Replace if necessary.



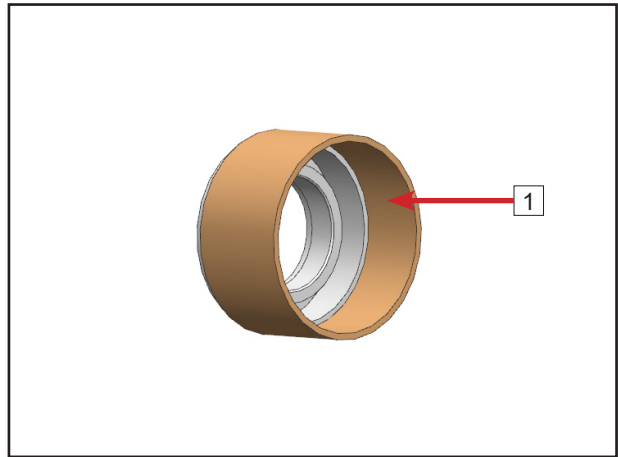
Drive Pulley Spring Inspection

Inspect the drive pulley spring **1** for deformation or cracks.



Spring Seat

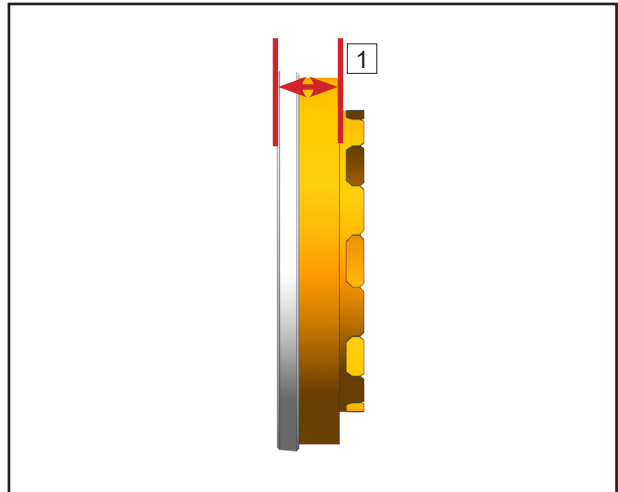
Inspect the spring seat **1** for damage. Replace it if necessary.



Steel Washer and Nylon Washer

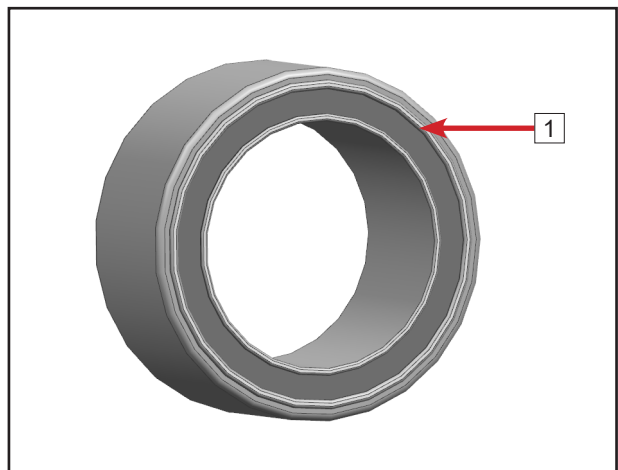
Measure thickness of the adjusting washers with a vernier caliper. Replace the washers if beyond service limit.

Adjusting washer thickness: 5mm~6mm



Overriding Clutch Assembly

Inspect overriding clutch assembly **1** for smooth rotation. Replace if locked or rotation is not smooth..



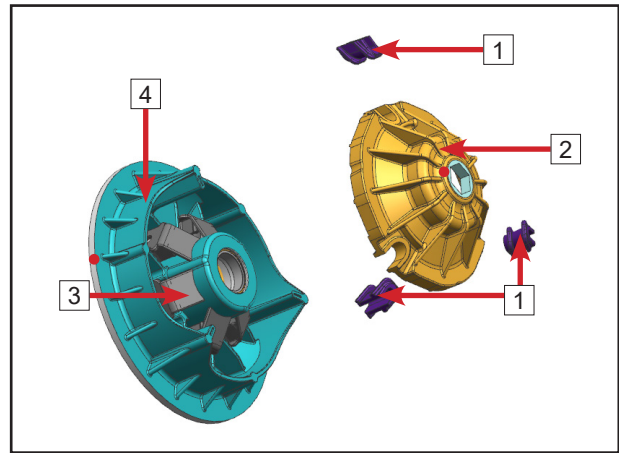
Assembly

Install sliders **1** on ramp plate **2**.

Install weight sliders **3** into drive pulley moving sheave **4**.

Install ramp plate **2** onto the drive pulley moving sheave **4**.

NOTE: Align the marks made on the ramp plate and drive pulley moving sheave. Make sure the marks are on the same line.



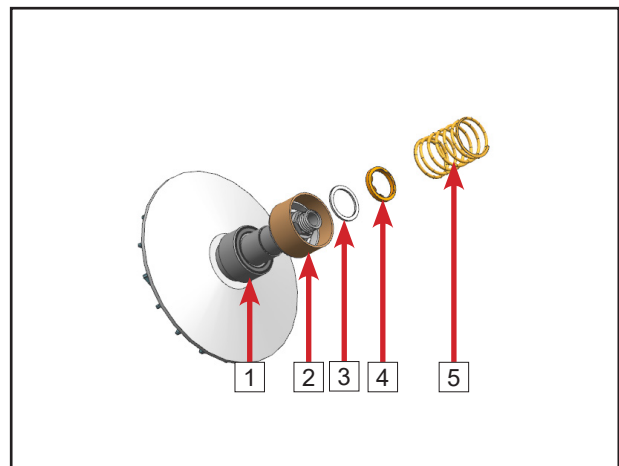
Install overriding clutch **1**.

Install spring seat **2**.

Install steel washer **3**.

Install nylon washer **4**.

Install drive pulley spring **5**.



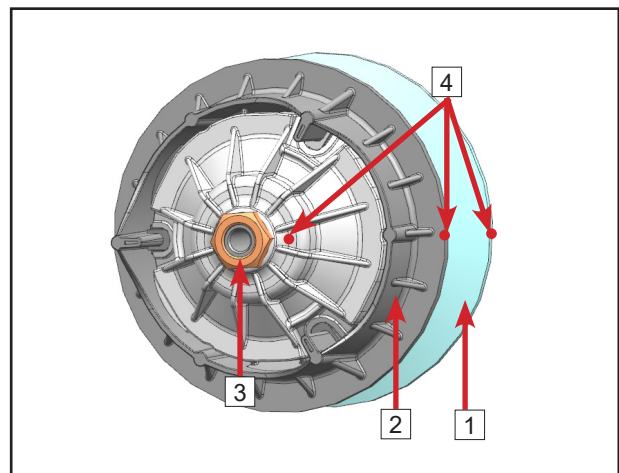
Place the drive pulley stationary sheave **1** on a work bench.

Install the moving sheave assembly **2** onto the stationary sheave **1**.

Press down the drive pulley ramp plate **2**, then install drive pulley nut **3** (left-hand thread) and tighten to **180~216N·m**.

NOTE: Make sure the alignment marks **4 of the ramp plate, moving sheave and stationary sheave are on the same line.**

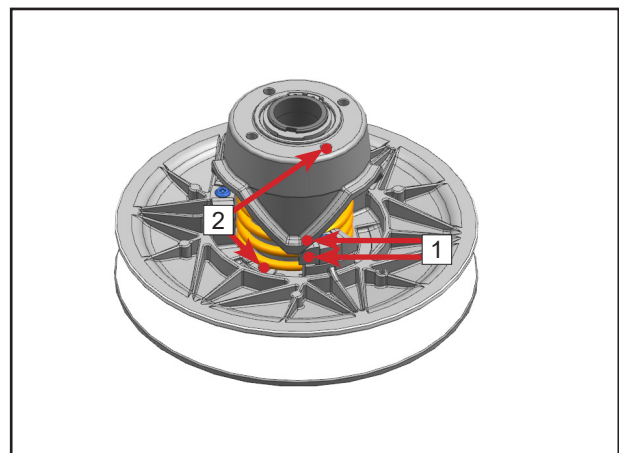
NOTE: When compressing drive pulley moving plate **2, align the inner hex hole to the drive pulley stationary sheave mounting hex.**



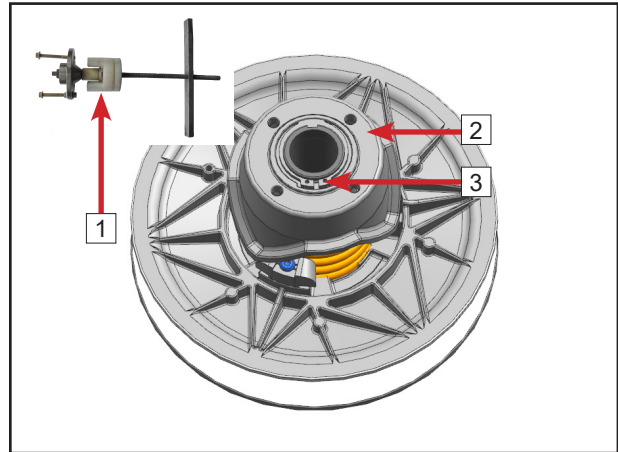
4.3.4 Driven Pulley

Disassembly

NOTE: Before disassembling driven pulley, mark the spring seat mounting holes and cam plate/ramp slider alignment for reassembly.

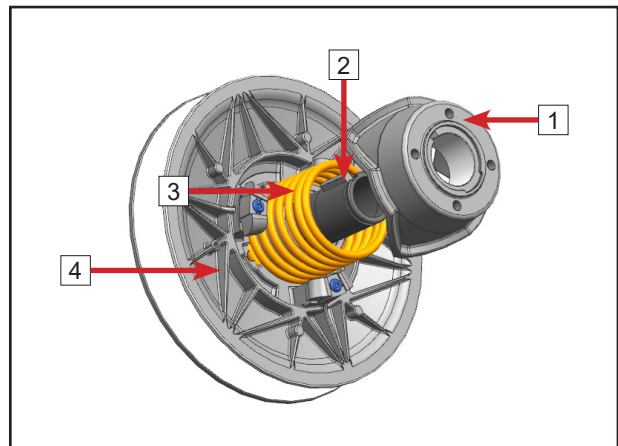


Use special tool: Driven Pulley Disassembly Tool **1** to compress the cam plate **2**.
Remove circlip **3** with pliers.
Loosen Driven Pulley Disassembly Tool **1** slowly.



Remove cam plate **1**.
Remove shaft key **2**.
Remove driven pulley spring **3**.
Remove driven pulley fixed sheave **4**.

NOTE: Before disassembling driven pulley, mark the spring seat mounting holes and cam plate/ramp slider alignment for reassembly.

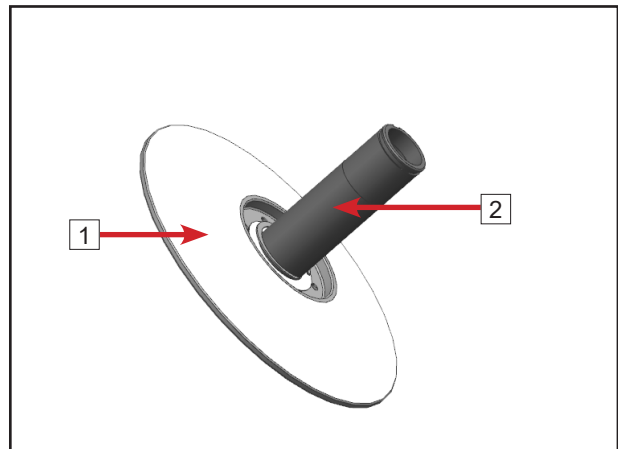


Inspection Driven Pulley Fixed Sheave

Inspect driven pulley fixed sheave surface **1** for wear, damage or other defects. Replace as necessary.
Inspect shaft sleeve **2** for wear or other defects. Replace if necessary.

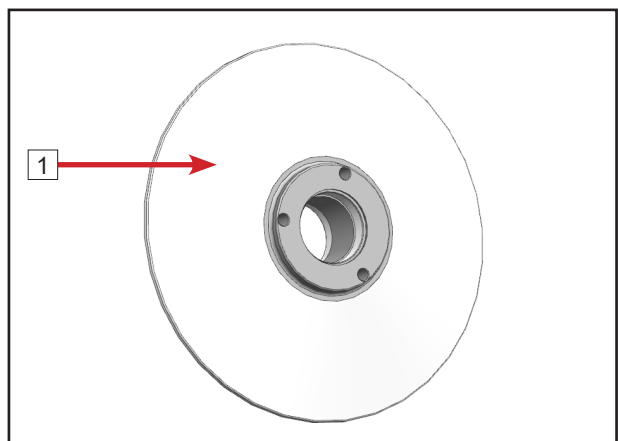
NOTE: Clean before inspection.

NOTE: Driven pulley sheaves are precisely matched. Only replace as a set.



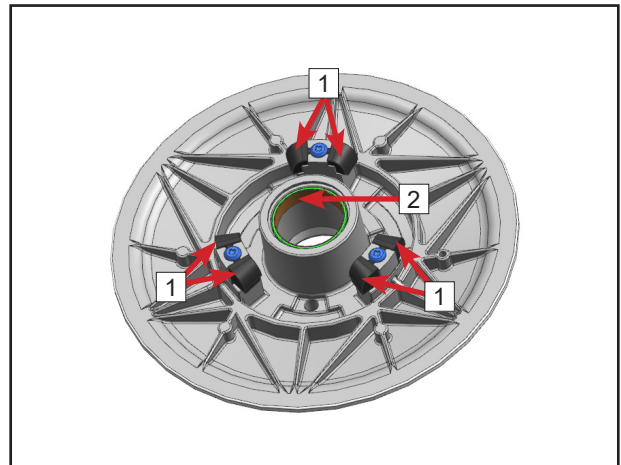
Driven Pulley Sliding Sheave

Inspect surface **1** for wear, damage or other defects. Replace if necessary.

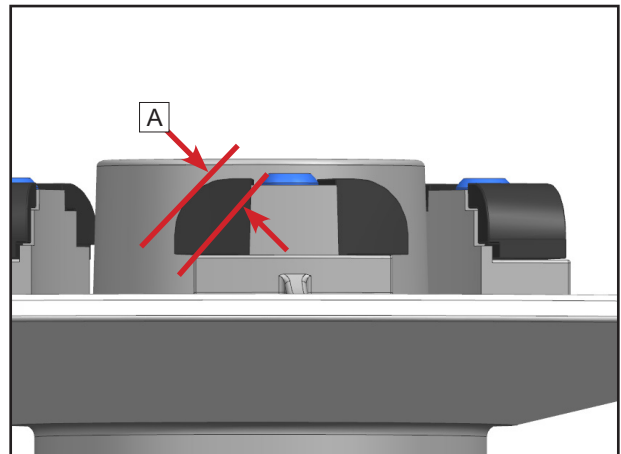


Inspect driven pulley sliders for wear or other defects. Replace if beyond value **A**.
 Inspect sliding sleeve bushing **2** for wear or damage. Replace if severely worn.

NOTE: Clean before inspection.

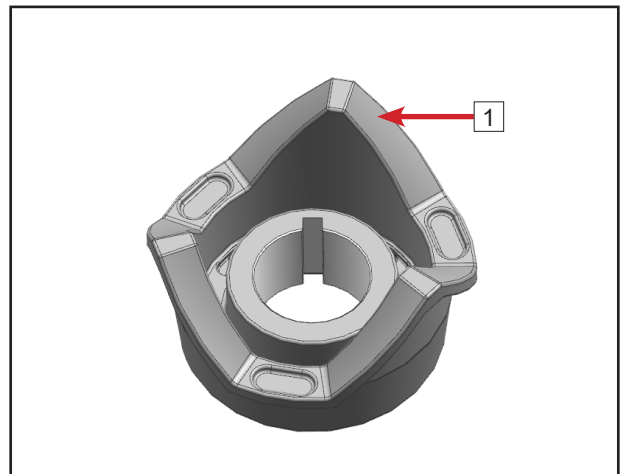


Slider wear limit: $A \geq 1.5\text{mm}$



Cam Plate Inspection

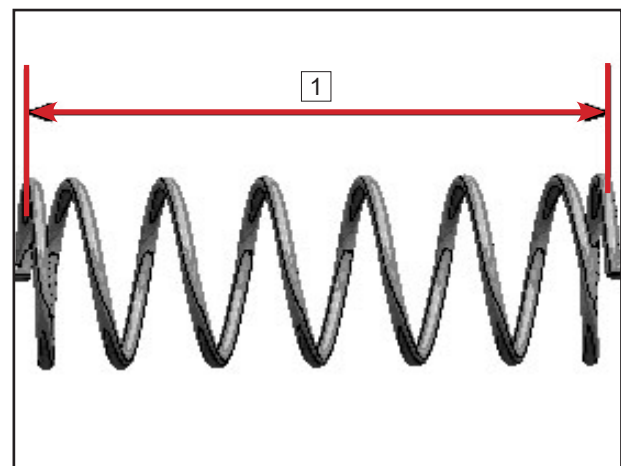
Inspect cam plate contact surfaces **1** for wear or other defects. Replace if necessary.



Spring Inspection

Inspect spring free length. Replace with new spring if less than service limit.

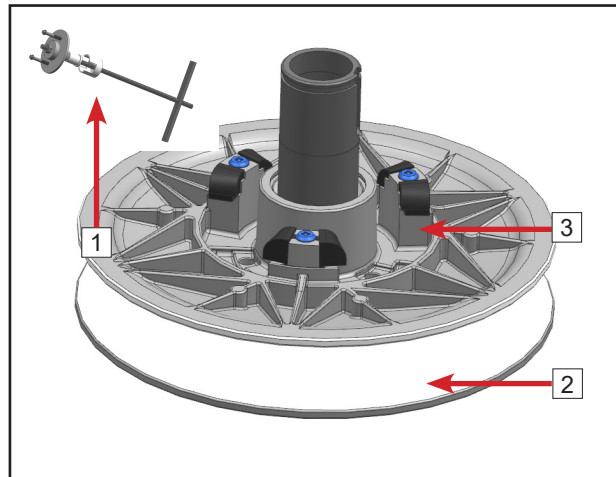
Driven spring free length **1 service limit: 214mm**



Assembly

Install sliding sheave **3** onto fixed sheave **2**.

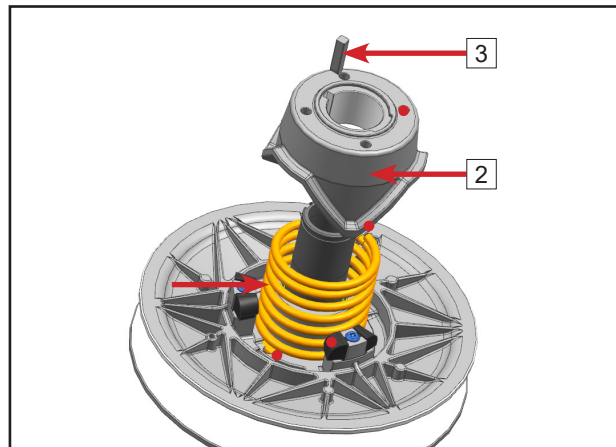
Use special tool: Driven Pulley Disassembly Tool. Place the assembly onto the special tool.



Install driven pulley spring **1** and seat each end into the sliding sheave and cam plate holes according to the marks made during disassembly.

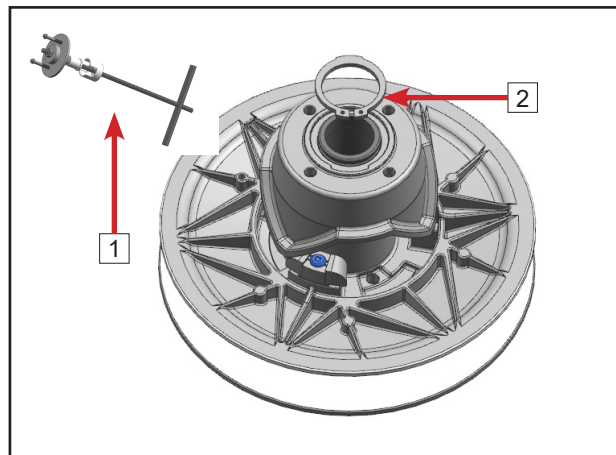
Install and align cam plate **2** according to the marks during removal. The marks on sliders should be aligned with those on cam plate.

Install shaft key **3**.



Use special tool: Driven Pulley Disassembly Tool **1** to compress cam plate and driven pulley spring onto the stationary shaft.

When compressed into position, install circlip **2**. Verify it is fully seated after installation, then loosen special tool.



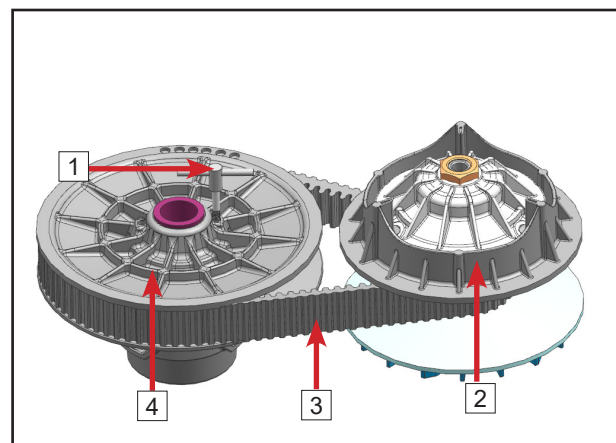
4.4 CVT Installation

4.4.1 Drive Pulley, Driven Pulley and Drive Belt Assembly

Use special tool: Driven Pulley Sheave Separating Tool **1** to separate the sheaves.

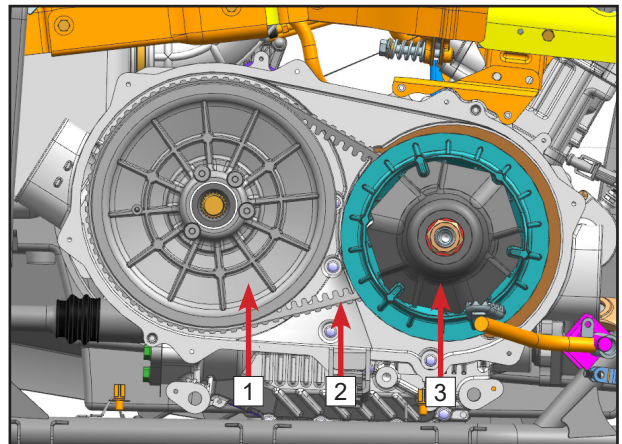
Put drive belt **3** around the drive pulley **2** and driven pulley **4**.

NOTE: Clean the belt thoroughly if oil stain and grease adheres to belt surface.



4.4.2 Drive Pulley, Driven Pulley and Drive Belt Installation

Install the driven pulley assembly **1**, drive belt **2**, and drive pulley assembly **3** together on the engine.



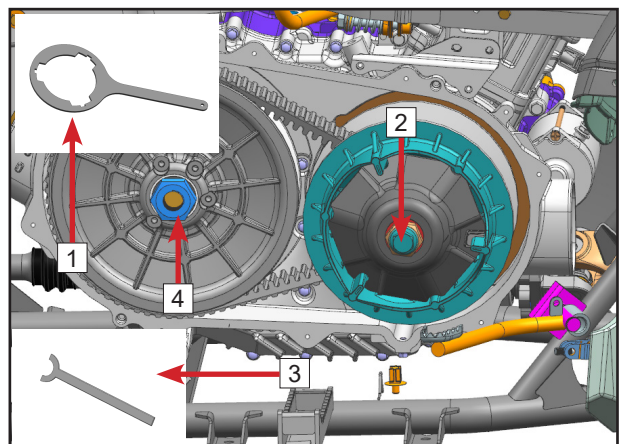
Use special tool: Drive Pulley Holding Wrench **1** to fix drive pulley. Install drive pulley bolt **2** (left-hand thread) and torque to specification.

Drive pulley bolt torque: 60N m

Use special tool: Driven Pulley Holding Wrench **3** to fix driven pulley.

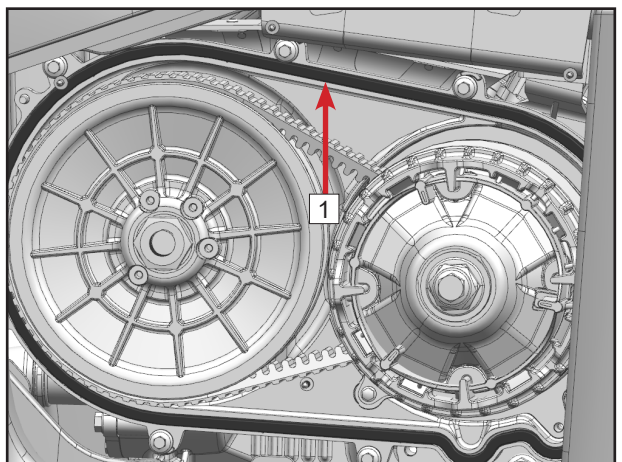
Install driven pulley nut **4** with thread locker and torque to specification.

Driven pulley nut torque: 150~180N m

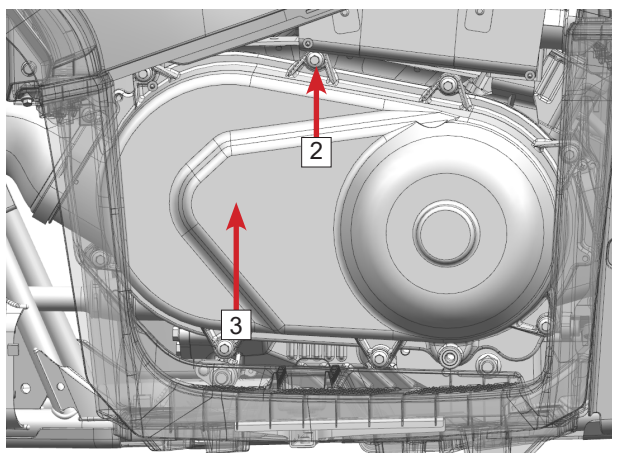


4.4.3 CVT Cover Installation

Put seal ring **1** on CVT case.



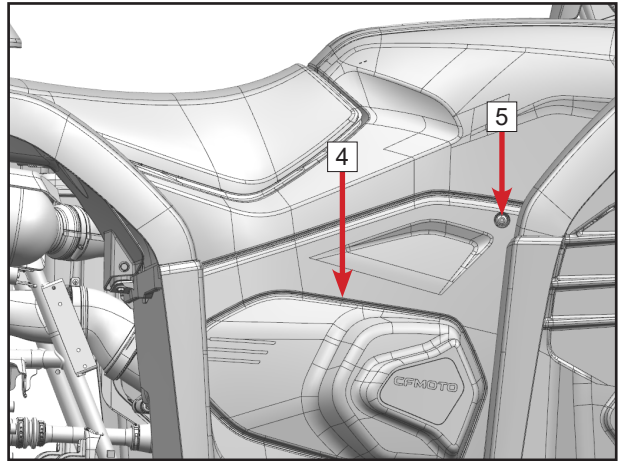
Install CVT cover **3** onto the housing.
Install CVT cover bolts **2**.



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Install CVT side panel **4**.

Install bolt **5**.



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CFMOTO

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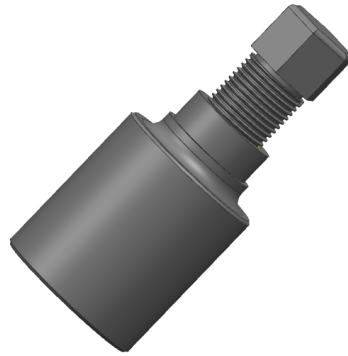
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5.1 Special Tools for Engine

(The following special tools are for dealers' reference and purchase).

Magneto Rotor Removal Tool

0800-031000-922-001A



050301

Front Output Shaft Oil Seal Installer

0800-060000-923-001



050302

Valve Stem Seal Ring Installer

152MI-022500-923-001



050303

Front Output Shaft Bearing Retainer Tool

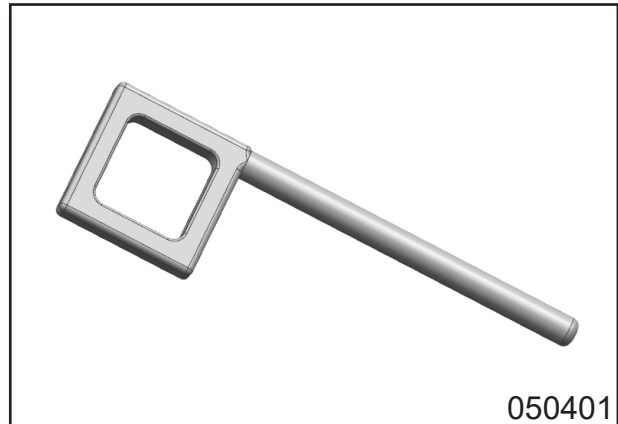
0180-060008-922-001



050304

Rear Output Coupler Holding Wrench

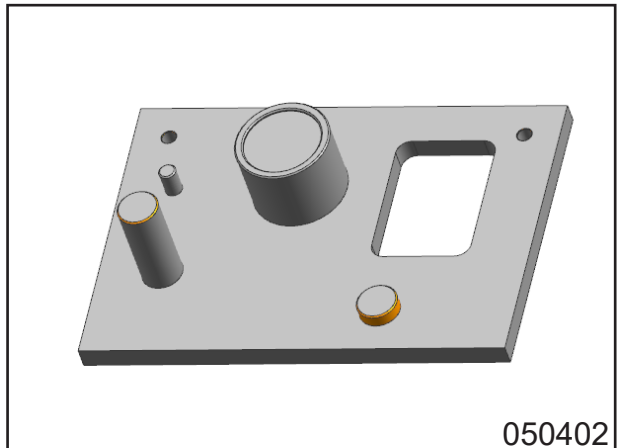
0180-060006-922-001



050401

MAG Crankcase Supporting Block

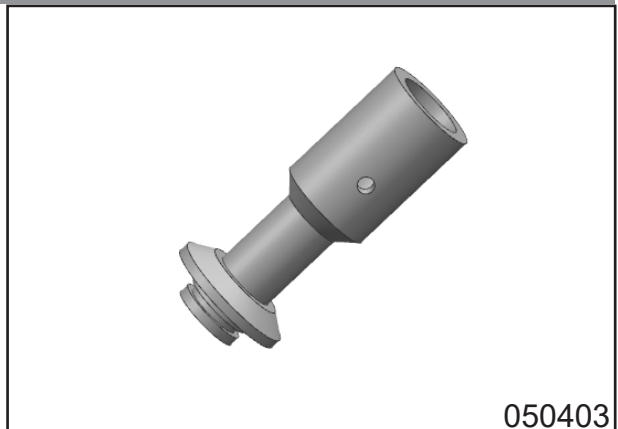
0800-012101-921-001



050402

MAG Crankcase 60/28 Bearing Installer

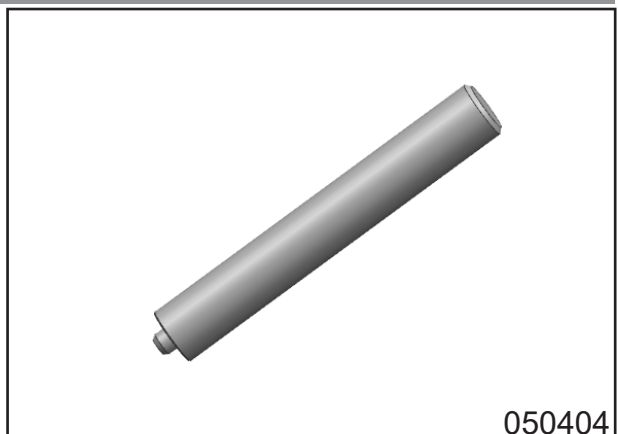
0180-01400-921-002



050403

Water Pump 6000 Bearing Installer

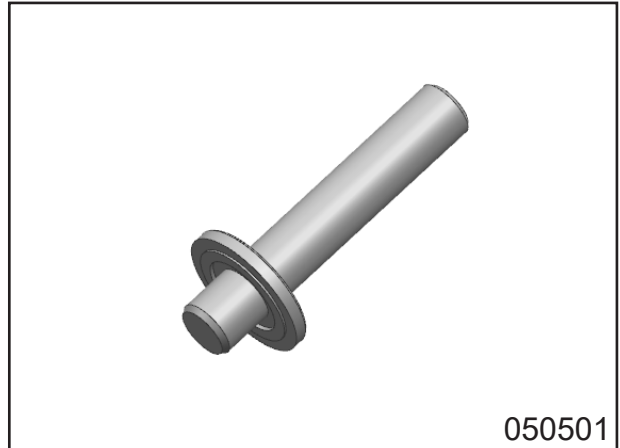
1P72MM-081001-923-001



050404

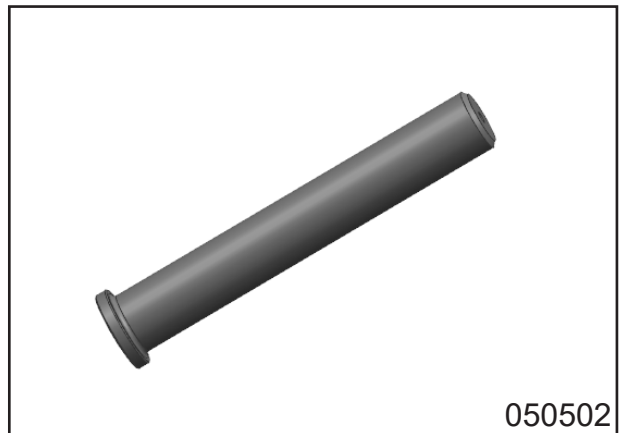
30*45*7 Oil Seal Installer

0180-014008-923-001



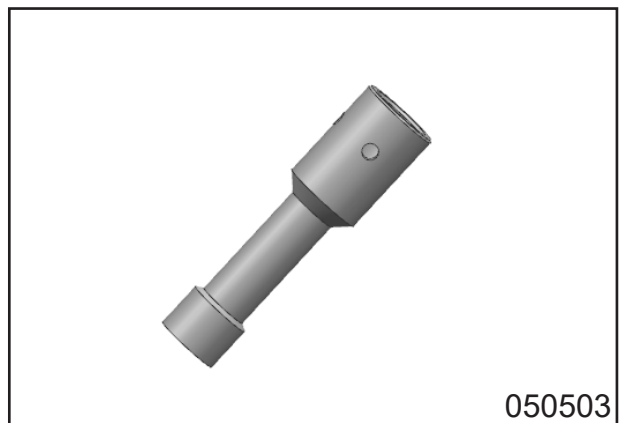
Water Pump Oil Seal Installer

172MM-080005-923-001



Water Seal Installer

152MI-081004-921-001



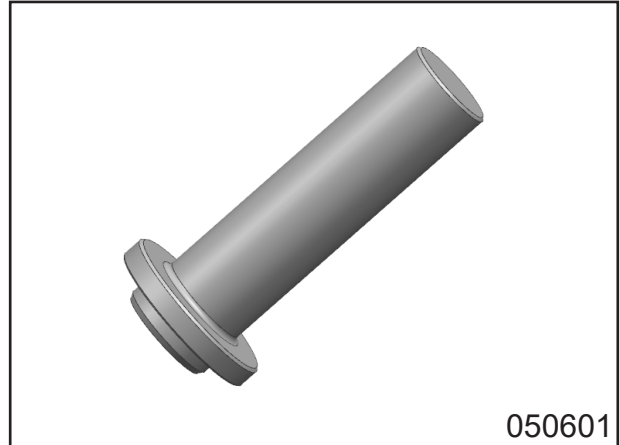
Drive Bevel Gear Holding Tool

0JYA-062100-922-009



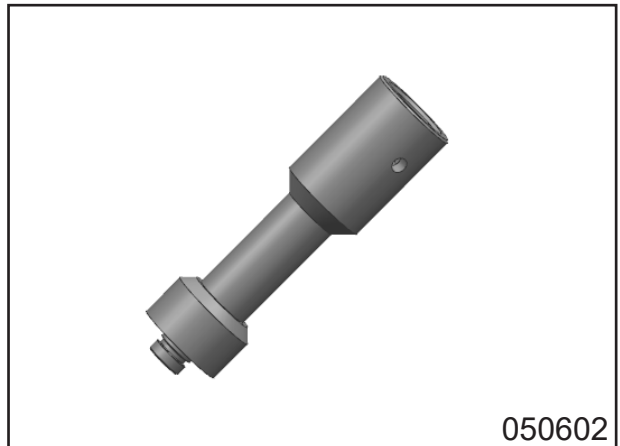
Driven Bevel Gear Oil Seal Installer

0800-062204-923-001



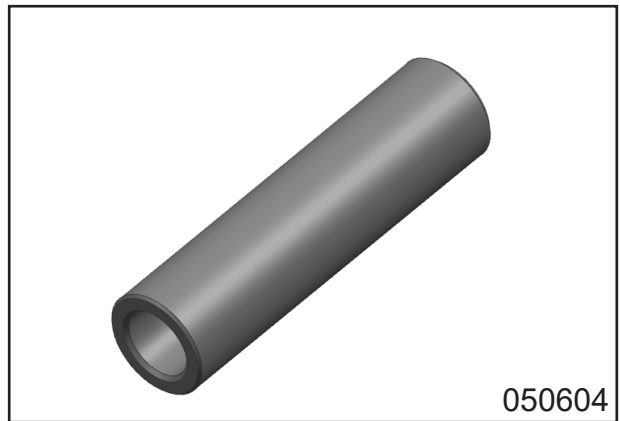
LH Crankcase 6203 Bearing Installer

0800-062204-923-001



Front Output Shaft 6205 Bearing Installer

CF188-062301-921-001



MAG Crankcase Main Shaft 6202 Bearing Installer

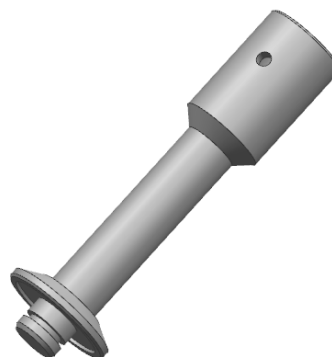
CF188-011100-921-003



050701

MAG Crankcase Main Shaft 63/22 Bearing Installer

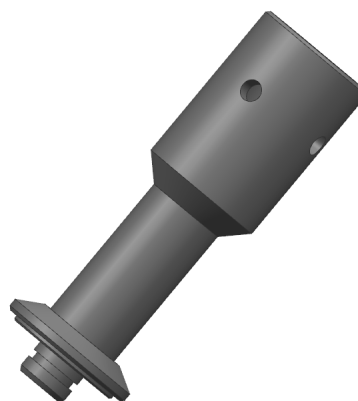
CF188-012100-921-003



050702

MAG Crankcase Main Shaft 6203 Bearing Installer

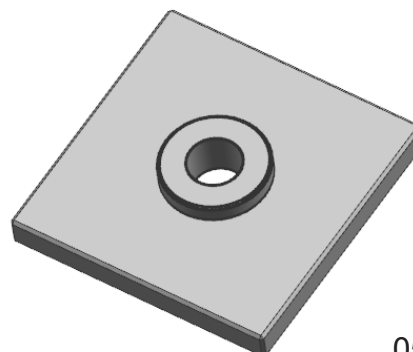
CF188-011100-921-004



050703

Driven Bevel Gear Bearing Supporting Block

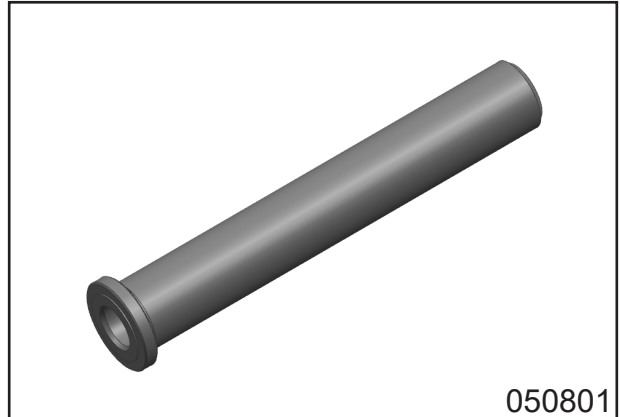
0800-062200-921-002



050704

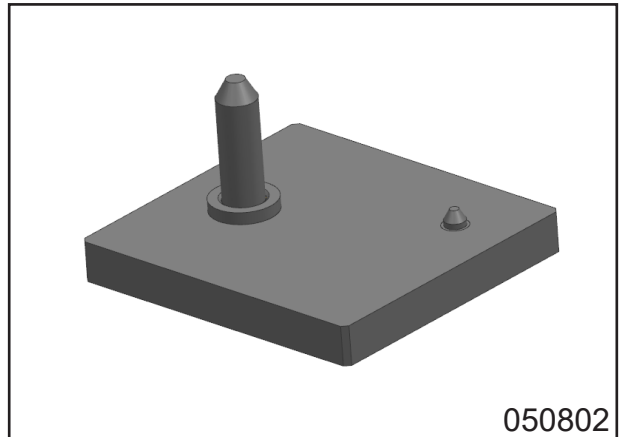
SD15×25×5 Oil Seal Installer

CF188-065002-923-001



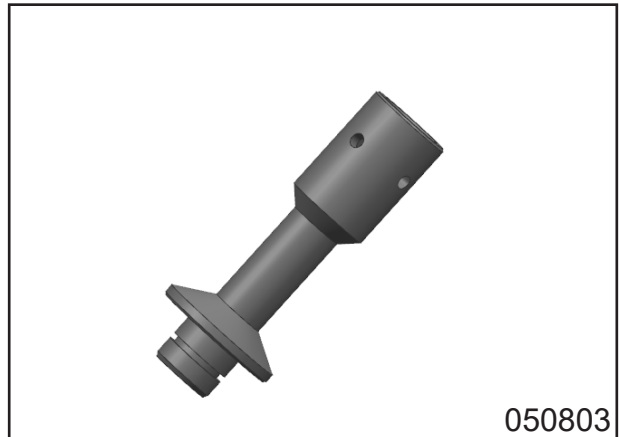
Oil Seal Cushion Block

CF188-065002-923-002



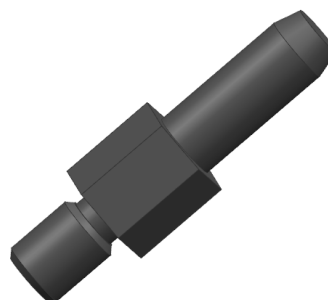
PTO Crankcase 3206A Bearing Installer

0180-012100-921-004



Oil Hose Joint

0800-000000-871-001



050901

Crankshaft Plain Bearing Protecting Sleeve

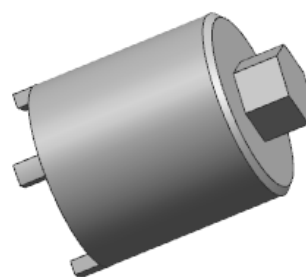
0GQ0-000000-922-001



050902

Driven Bevel Gear Bearing Limit Nut Tool

0800-062206-922-001



050903

Driven Bevel Gear 6207C3 Bearing Installer

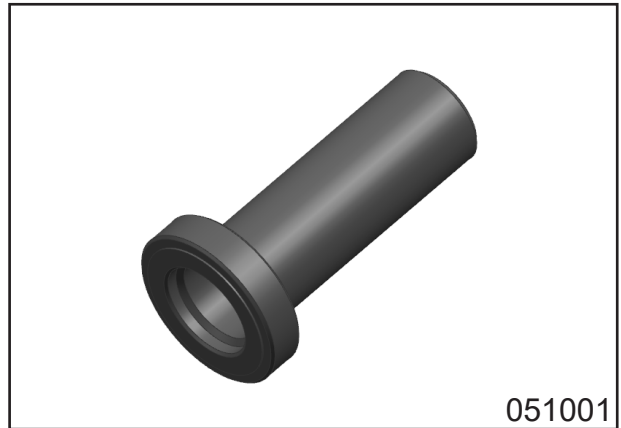
CF188-062201-921-003



050904

32*55*10 Oil Seal Installer

0JY0-013103-923-001



051001

Magneto Rotor Holding Wrench

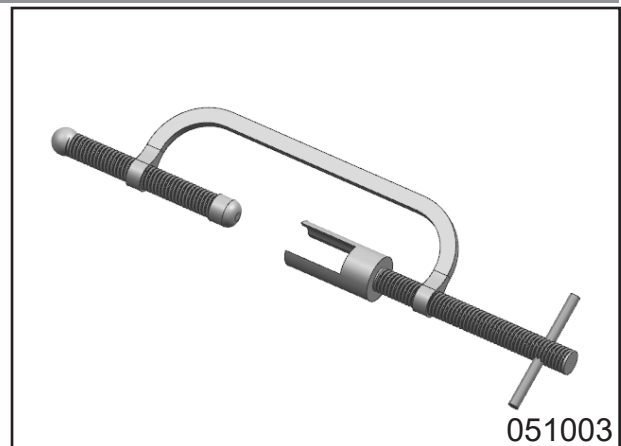
0800-031000-922-002



051002

Valve Spring Compressing Clamp

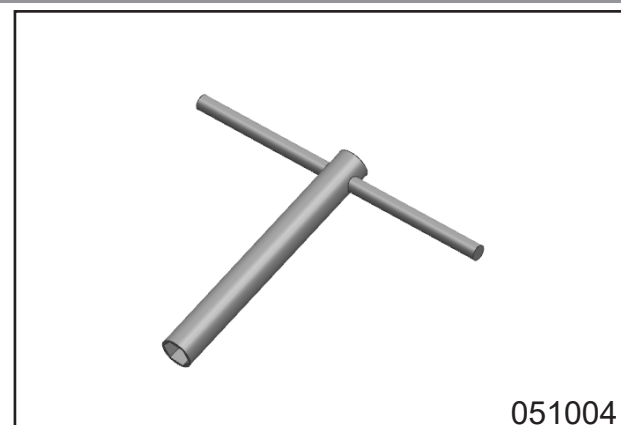
CF188-022006-922-001



051003

Spark Plug Wrench

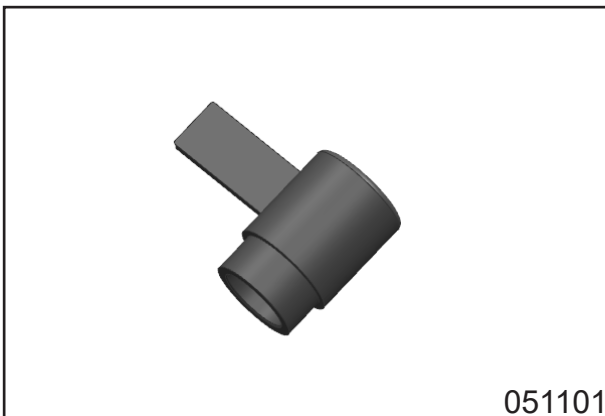
0800-022800-922-001



051004

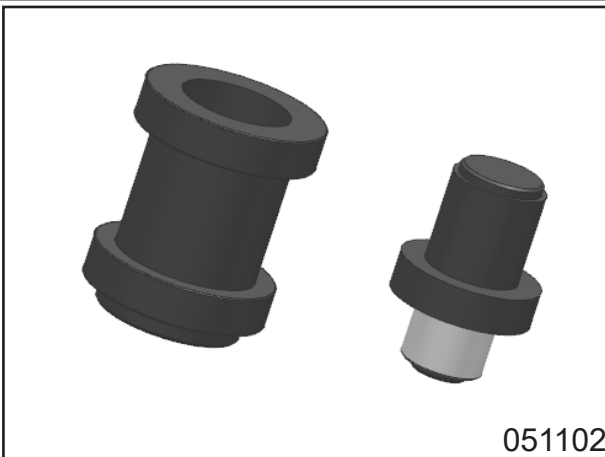
Bevel Gear Side Clearance Measuring Tool

0JWA-062000-860-001



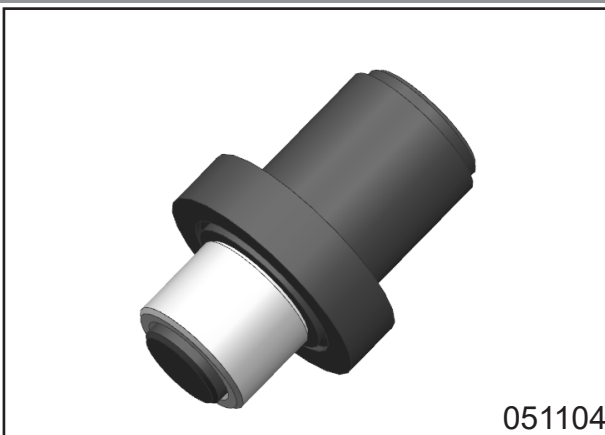
CVT Case Plain Bearing Removal Tool

0JY0-013101-922-001



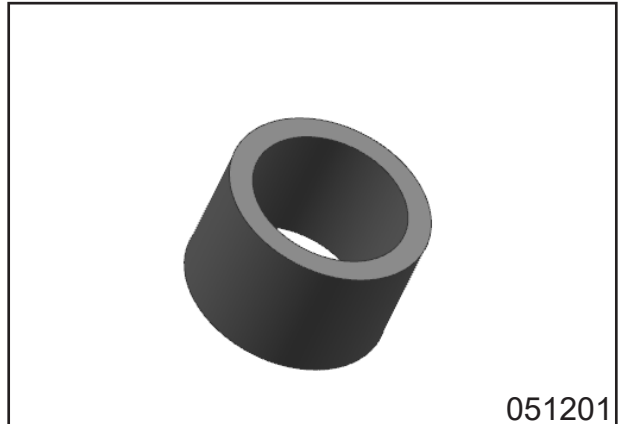
Bearing Removal Tool

0800-011102-922-001



MAG Crankcase Plain Bearing Supporting Tool

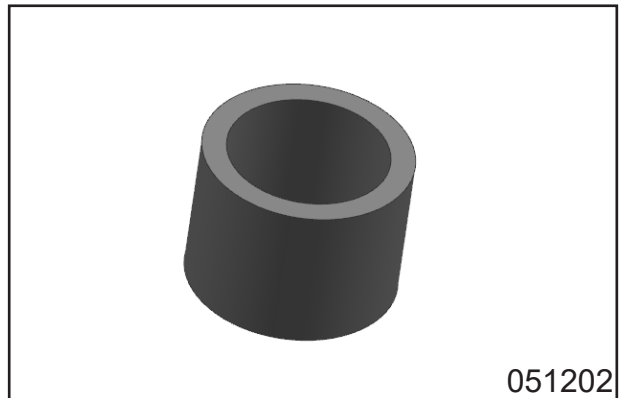
0GR0-011101-922-001



051201

PTO Crankcase Plain Bearing Supporting Tool

0GR0-012101-922-001



051202

Crankcase Bearing Removal Tool

It is recommended to use a set of suitable removal tools as picture shows.



051203

5.2 Engine Removal

Preliminary Work

Remove seats.

Remove fuel tank guard.

Remove CVT side cover.

Remove oil filler cap and engine MAG cover.

Remove LH&RH footrests.

Remove fuel tank.

Remove air filter.

Remove muffler.

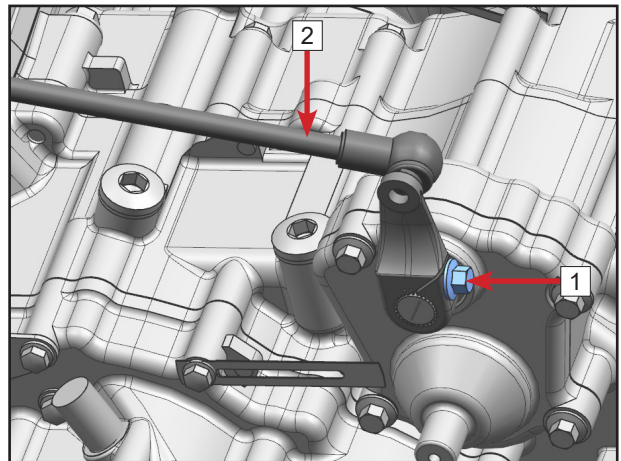
Remove throttle cable.

Unplug connectors of electrical parts on engine (such as crankshaft position sensor, gear sensor, oil pressure sensor, etc.)

5.2.1 Shift Lever Removal

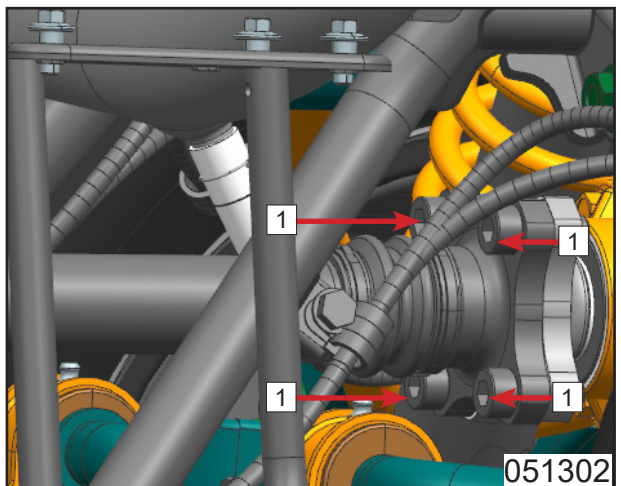
Remove bolt **1**.

Remove shift lever **2** from engine.

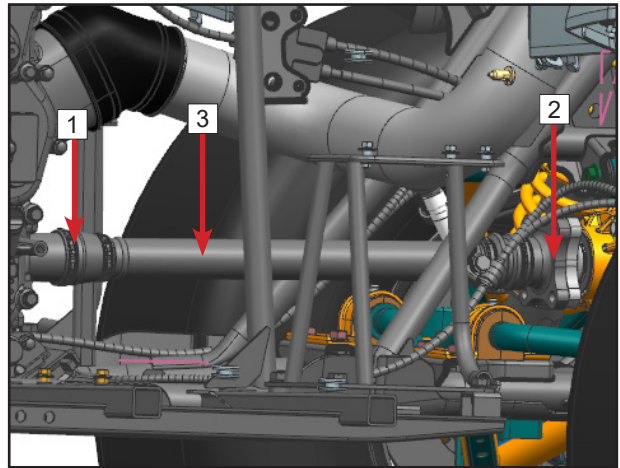


5.2.2 Drive Shaft Removal

Remove bolt **1**.

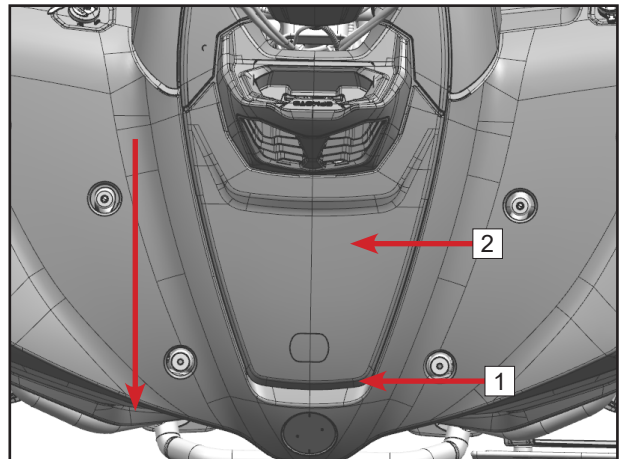


Loosen clamp **1**.
Separate connecting flange **2** between
rear drive shaft and rear gear case.
Remove rear drive shaft **3**.

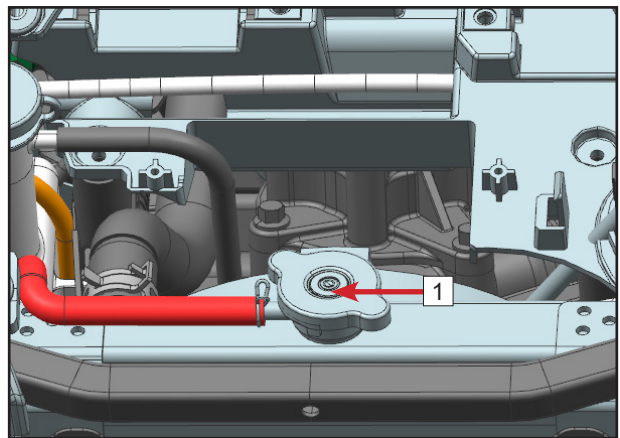


5.2.3 Coolant Drain

Release clasp **1** behind front service
plate.
Remove front service plate **2**.

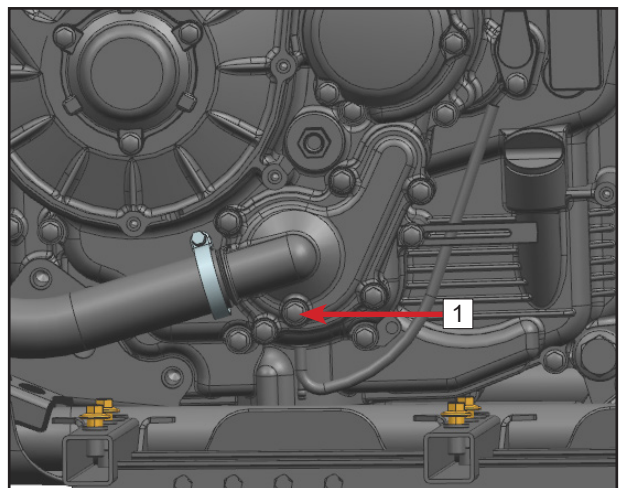


Open radiator cap **1**.



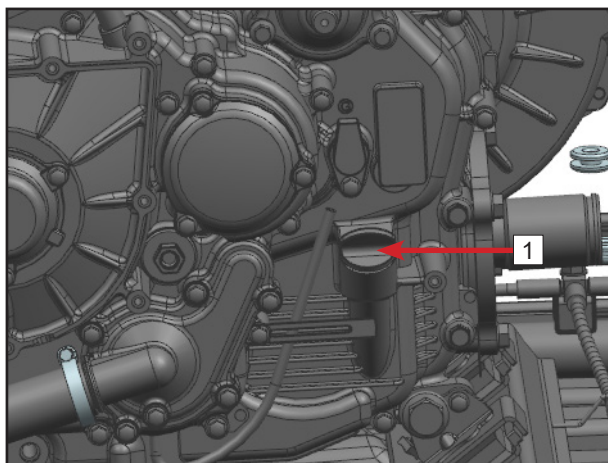
Place a container under water pump to
store drained coolant.
Remove drain bolt **1** and washer to drain
coolant.

NOTE: Use larger container as far as
possible. The coolant will be ejected for
a long distance once the drain bolt is
removed.



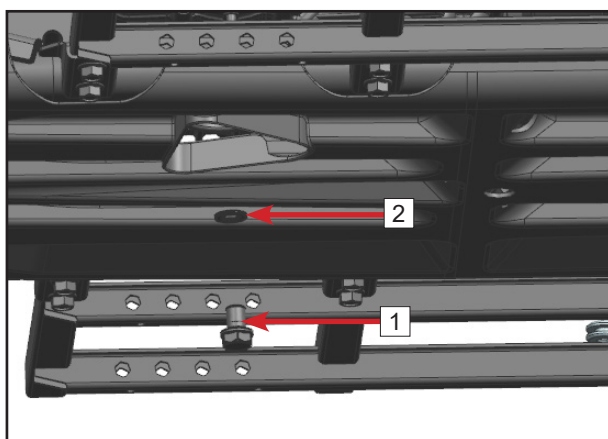
5.2.4 Engine Oil Drain

Remove oil dipstick **1**.



Place a container under engine to store drained engine oil.

Remove drain bolt **1** and washer **2**.

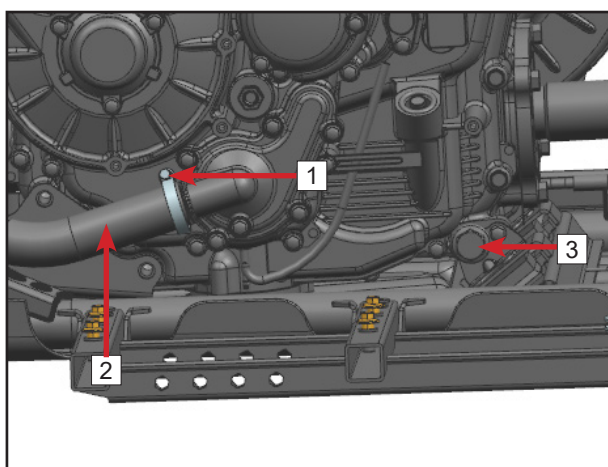


5.2.5 Engine

Loosen clamp **1**.

Pull out engine water inlet pipe **2** and put aside.

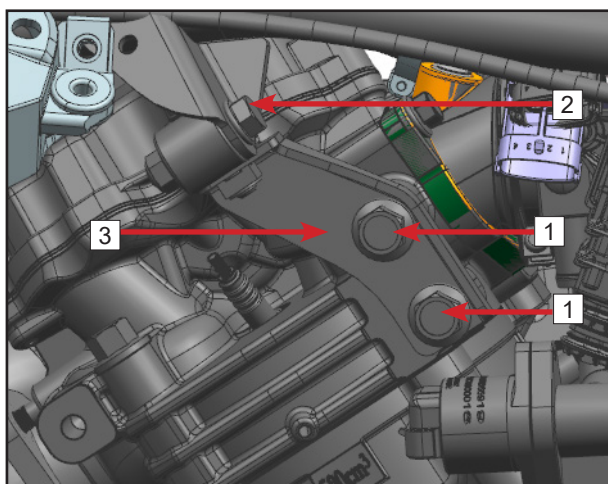
Remove bolt **3**.



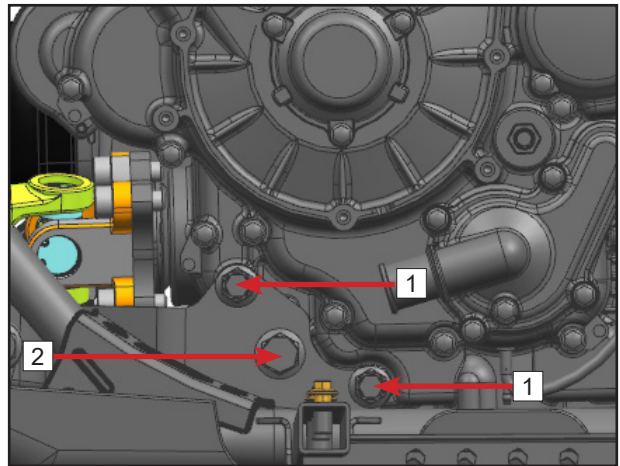
Remove bolts **1**.

Remove bolt **2**.

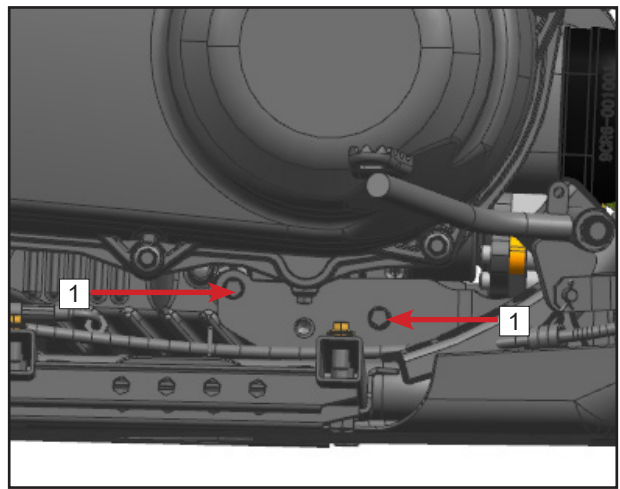
Remove connecting bracket **3** on engine.



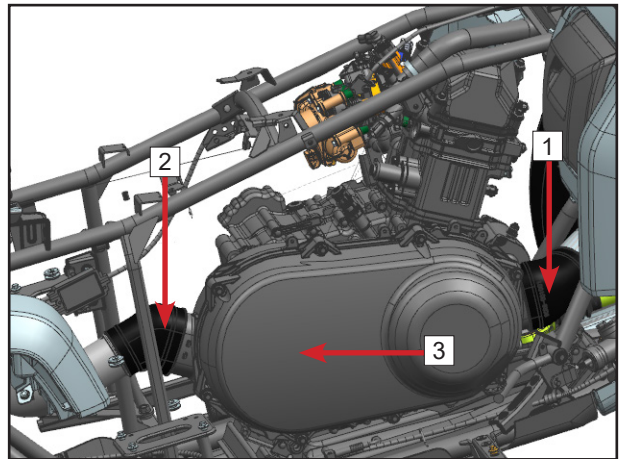
Remove bolts **1**.
Remove bolt **2** (use a wrench to lock the nut behind the bolt during removal).



Remove bolts **1**.



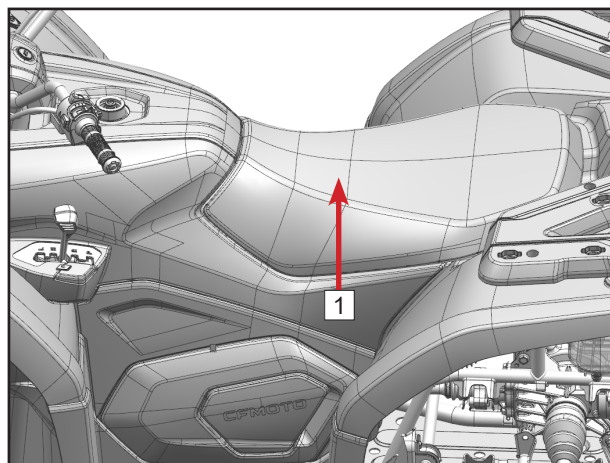
Remove CVT air intake pipe **1**.
Remove CVT air exhaust pipe **2**.
Wrap the engine until it is loosened.
Remove the engine .
Put the engine on service bench.



5.3 Air Intake&Exhaust System

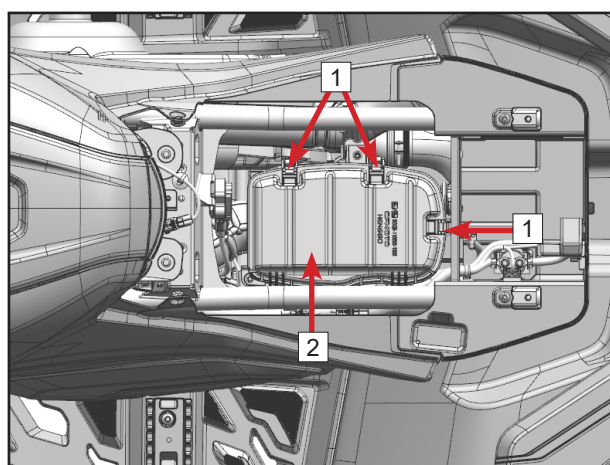
5.3.1 Air Filter Removal

Remove seats **1**.



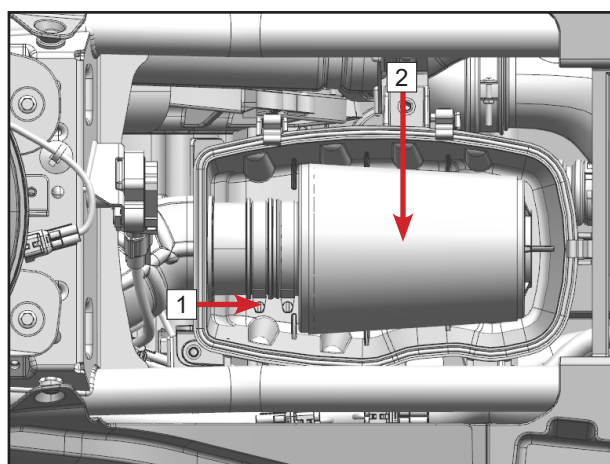
Loosen clasps **1**.

Remove air filter cover **2**.

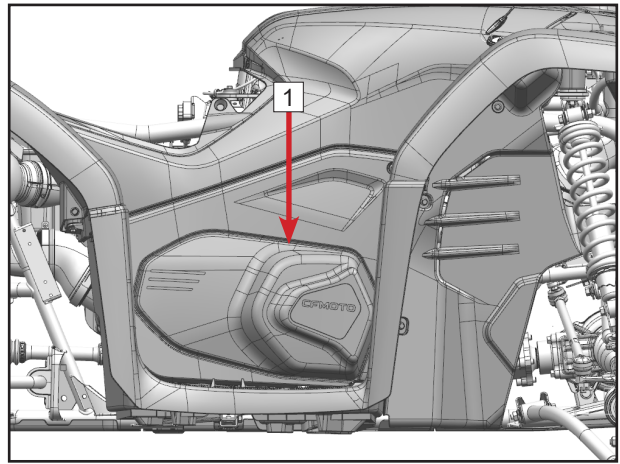


Loosen clamp **1**.

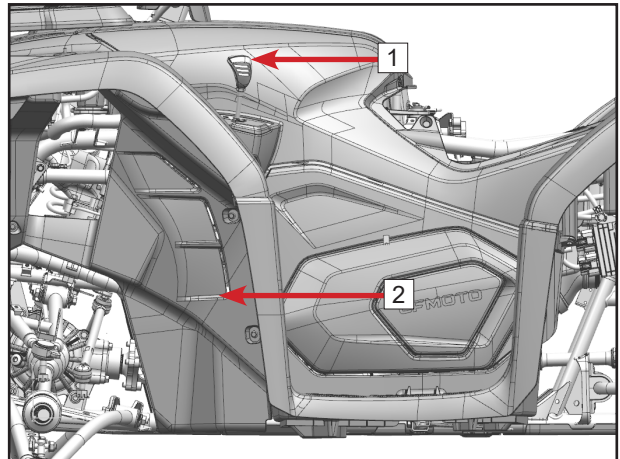
Remove filter element **2**.



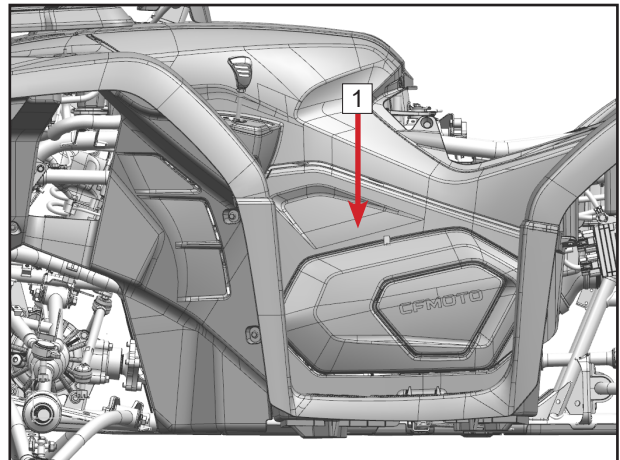
Remove CVT side cover **1** (details refer to Body Covering Parts chapter).



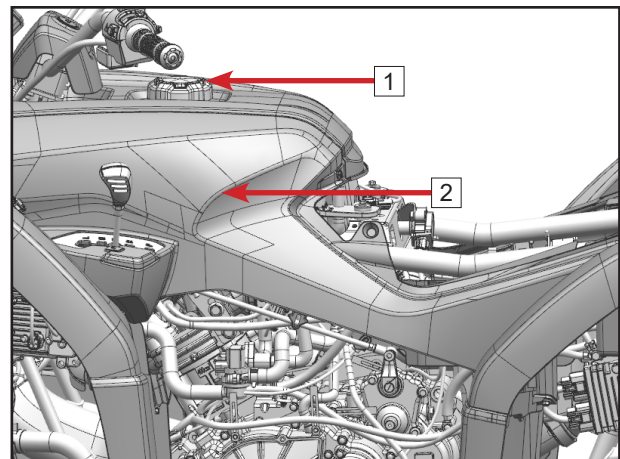
Remove shift lever ball **1**.
Remove front inner fender **2** (details refer to Body Covering Parts chapter).



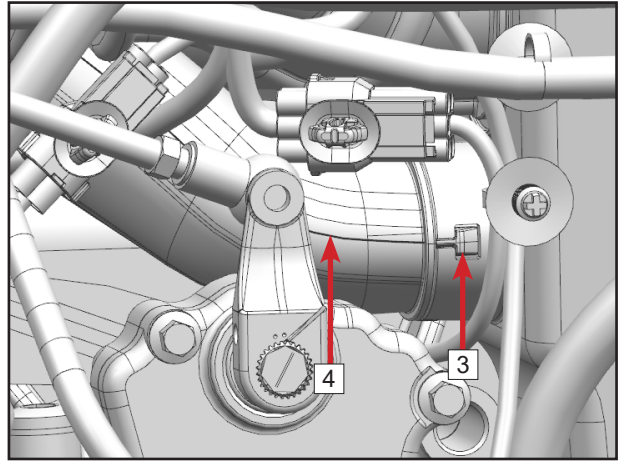
Remove engine MAG cover **1** (details refer to Body Covering Parts chapter).



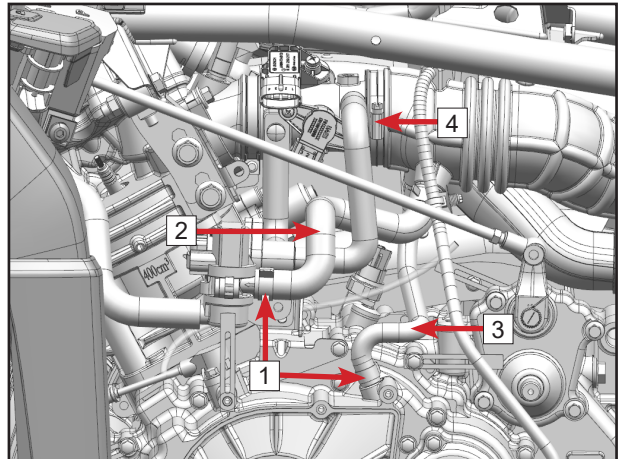
Remove fuel tank cap **1**.
Remove fuel tank upper plastic plates assembly **2** (details refer to Body Covering Parts chapter).



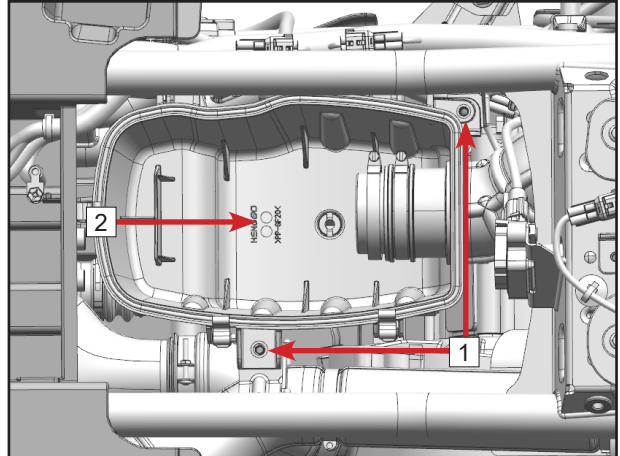
Loosen quick release kit **3**.
Loosen air intake pipe **4**.



Loosen clamp **1**.
Loosen AIS valve air intake pipe **2**.
Loosen crankcase breather pipe **3**.
Loosen clamp **4**.



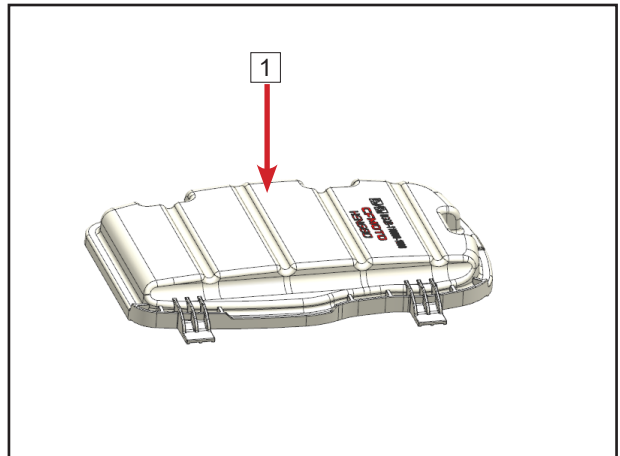
Remove bolts **1**.
Remove air filter housing **2**.
There will be some oil remaining on housing. Clean the housing after removal.



5.3.2 Air Filter Parts Inspection

5.3.2.1 Air Filter Upper Housing

Inspect air filter upper housing **1** for damage. Replace if necessary.
Inspect air filter seal ring for hardening, cracks or damage. Replace if any defect is found.



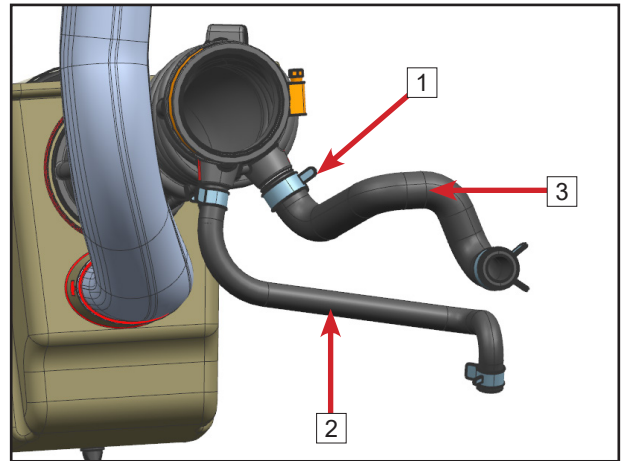
5.3.2.2 Air Filter Lower Housing Assembly

Disassembly

Loosen clamp **1**.

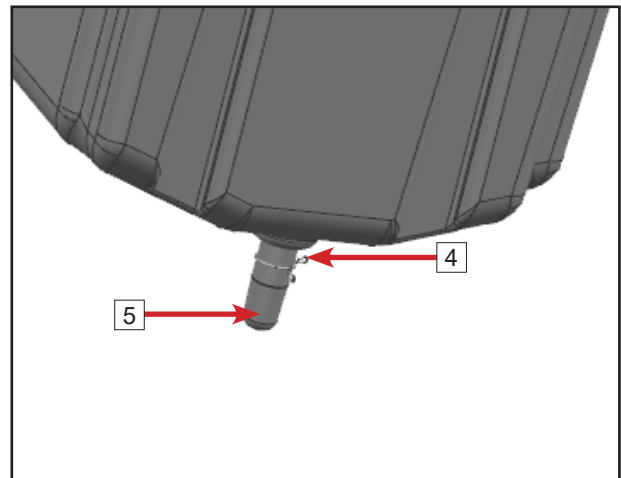
Unplug crankcase breather pipe **2**.

Remove AIS valve breather hose **3**.



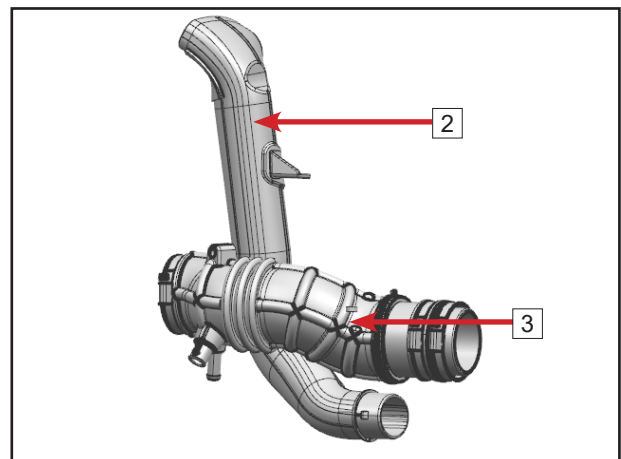
Loosen clamp **4**.

Remove oil storage hose **5**.



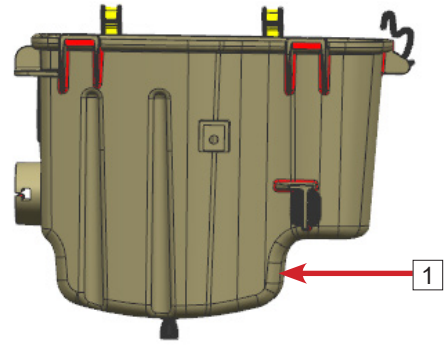
Inspection

Inspect air intake pipe **2** and air exhaust pipe **3** for breaks or damage. Replace if any defect is found.



CFMOTO

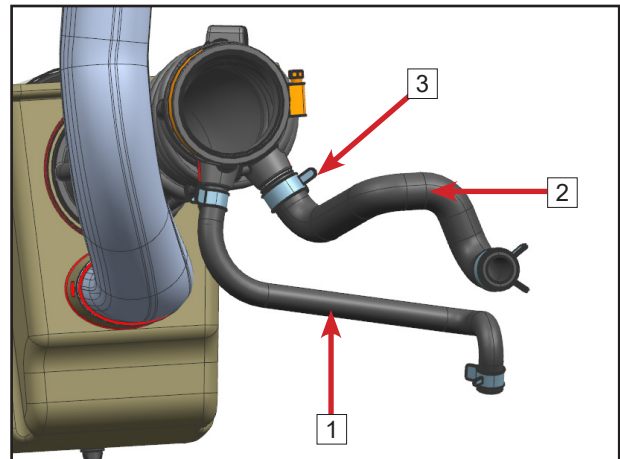
Inspect air filter lower housing **1** for breaks or damage. Replace if necessary.



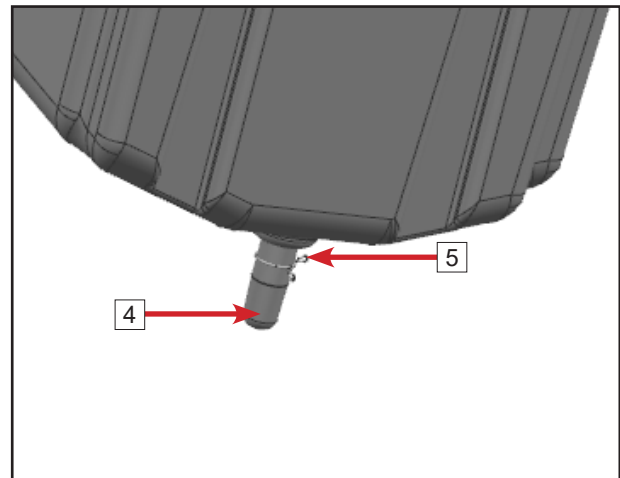
Assembly

Wipe every part with dust-free paper before assembly. Impurity or dirt is not allowed to exist in air filter.

Install crankcase breather pipe **1**;
Install AIS valve breather hose **2**.
Tighten clamp **3**.



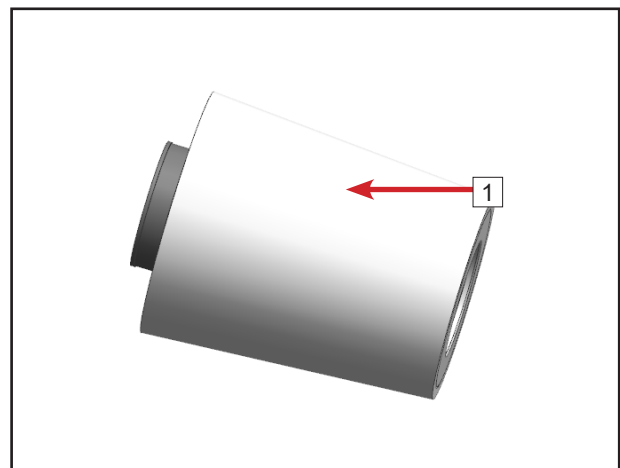
Install oil storage hose **4**.
Tighten clamp **5**.



5.3.2.3 Air Filter Element

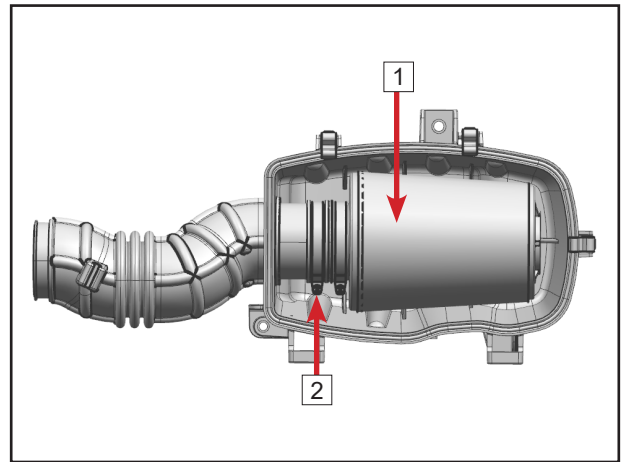
Air filter element **1** can not be washed. Please replace with new parts (refer to Maintenance Schedule).

NOTE: Make sure air filter element is clean during usage. If the vehicle is used in severe condition, increase the frequency of inspection, clean and maintenance.

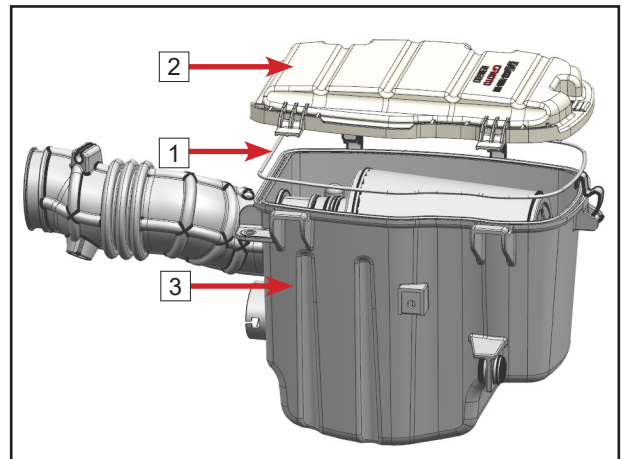


5.3.3 Air Filter Installation

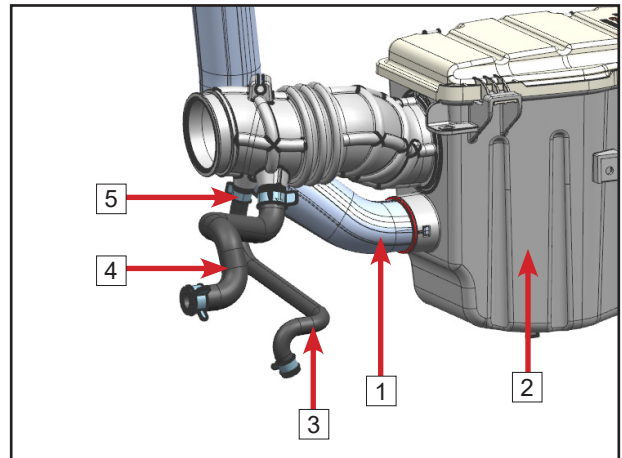
Install air filter element **1** (into the groove).
Tighten clamp **2**.



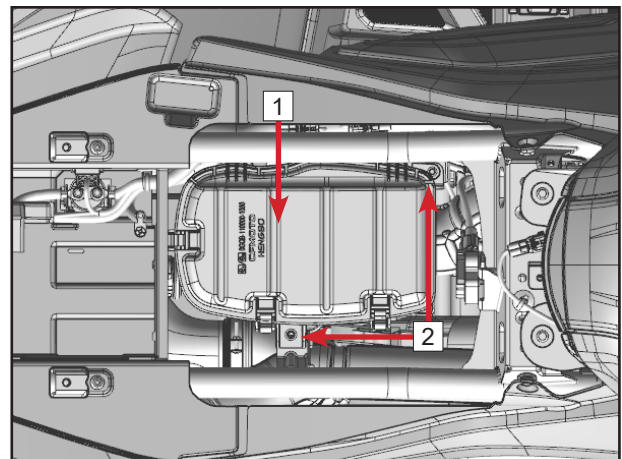
Install seal ring **1** on air filter upper housing **2**.
Install air filter upper housing **2** on lower housing **3**.



Insert air intake pipe **1** into lower housing **2**.
Install crankcase breather pipe **3**.
Install AIS valve breather hose **4**.
Tighten clamp **5**.

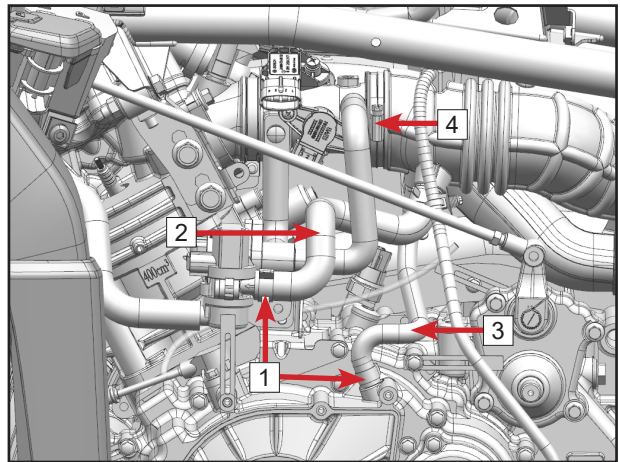


Install air filter assembly **1**.
Install bolts **2**.

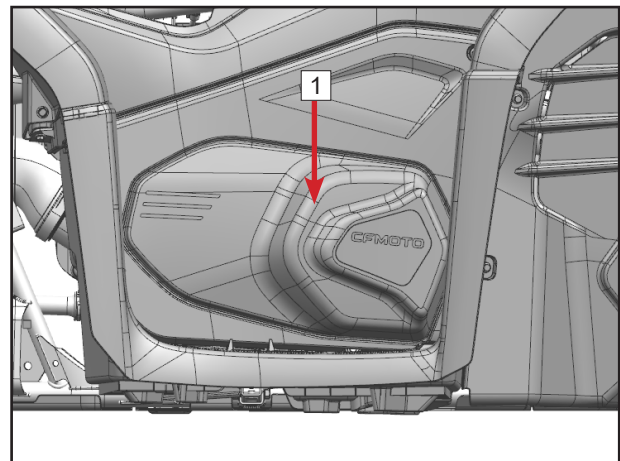


CFMOTO

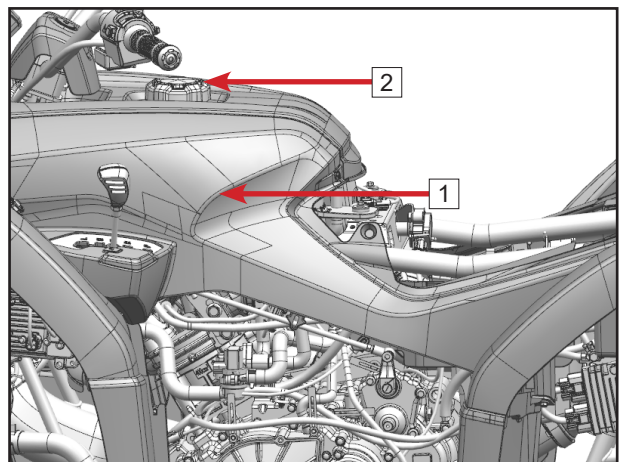
- Install AIS valve air intake pipe [2].
- Install crankcase breather pipe [3].
- Tighten clamp [1].
- Tighten clamp [4].



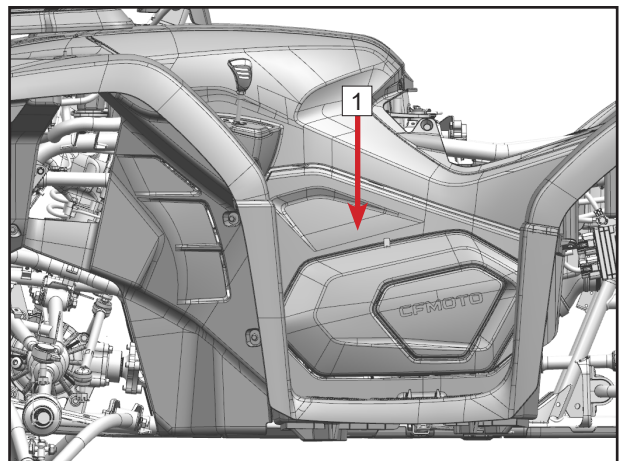
- Install CVT side cover [1] (details refer to Body Covering Parts chapter).



- Install fuel tank upper plastic plates assembly [1].
- Install fuel tank cap [2] (details refer to Body Covering Parts chapter).

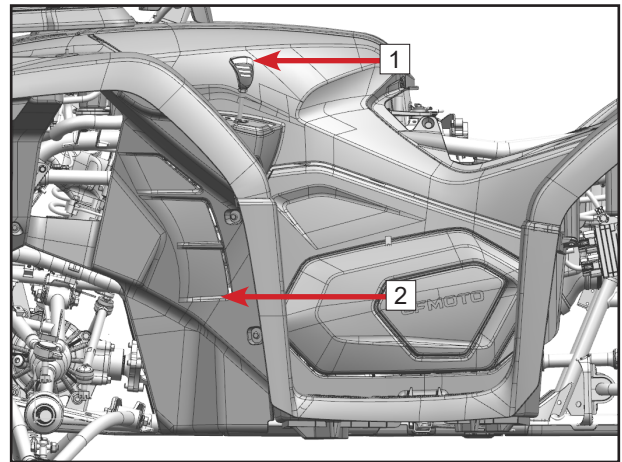


- Install engine MAG cover [1].

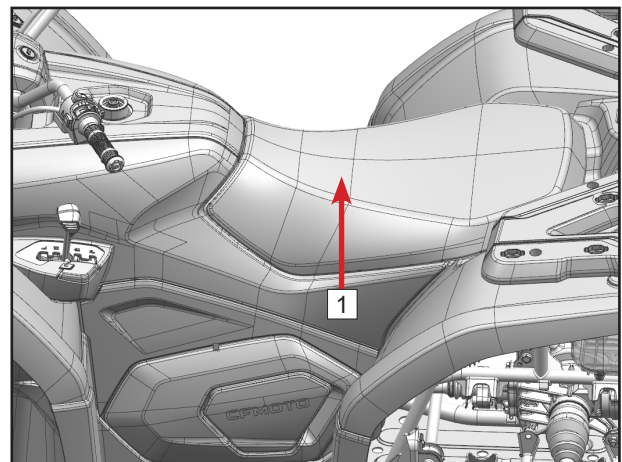


Install shift lever ball **1**.

Install front LH inner fender **2** (details refer to Body Covering Parts chapter).



Install seat **1** (details refer to Body Covering Parts chapter).

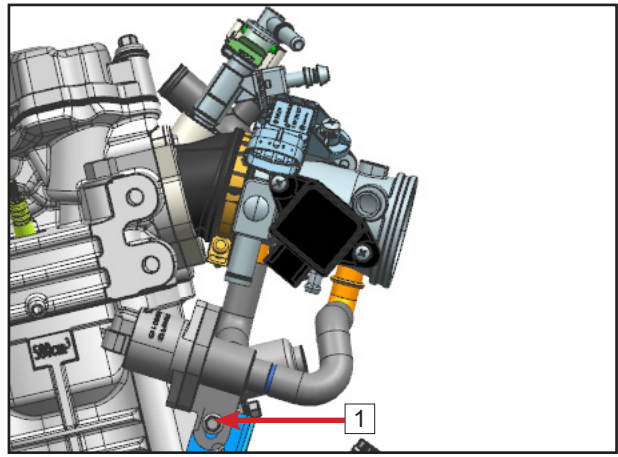


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5.3.4 Engine Air Intake Pipe

5.3.4.1 Removal

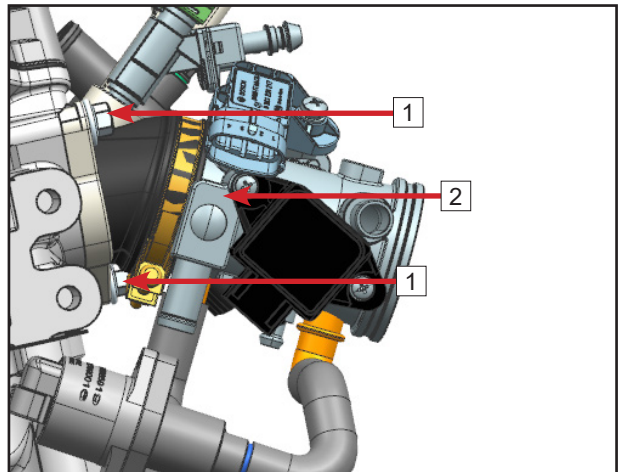
Remove bolt **1**.



Remove bolts **1**.

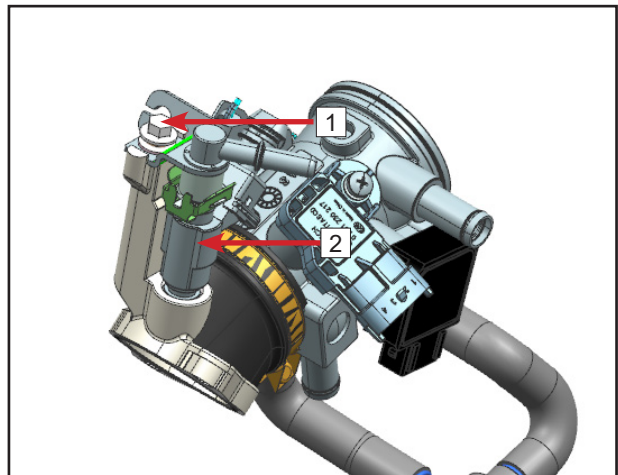
Remove engine air intake pipe assembly **2**.

2.



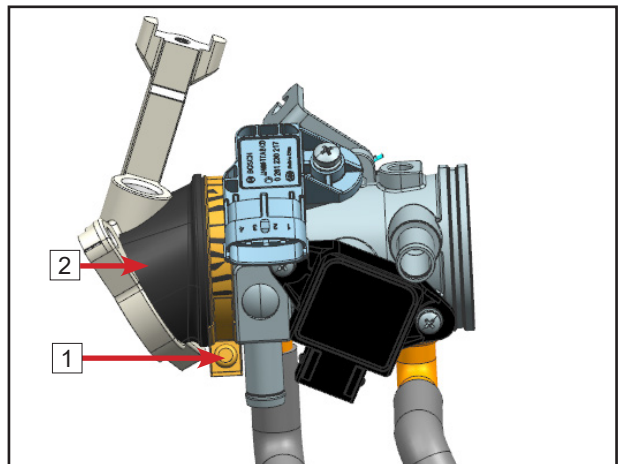
Remove bolt **1**.

Remove fuel injector assembly **2**.

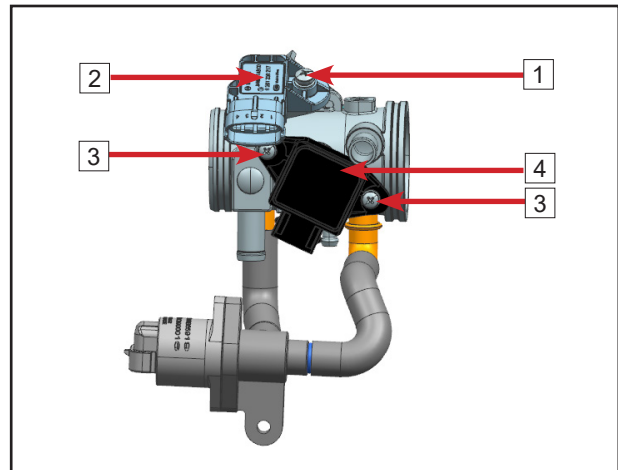


Loosen clamp **1**.

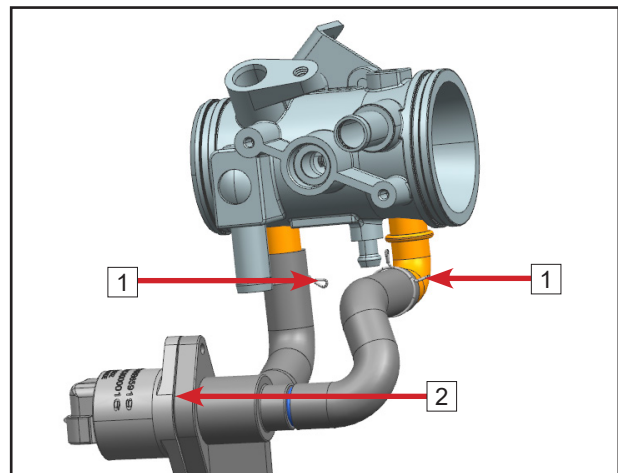
Remove air intake pipe **2**.



- Remove screw **1**.
- Remove T-MAP **2**.
- Remove screws **3**.
- Remove TPS **4**.



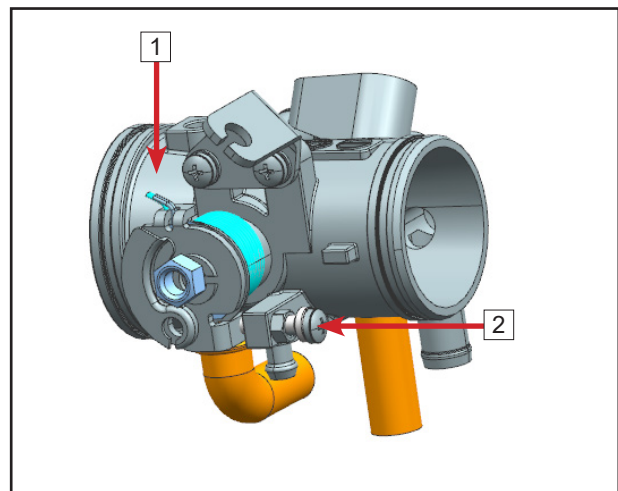
- Remove clamp **1**.
- Remove idling stepper motor **2**.



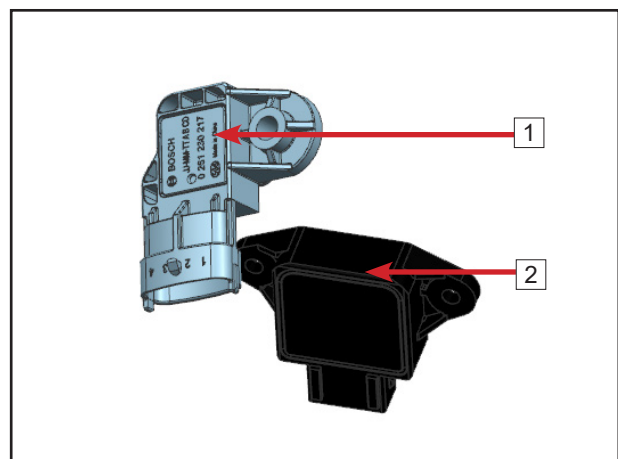
5.3.4.2 Parts Inspection Throttle Valve Body

- Clean throttle valve body **1**.
- Inspect throttle valve body **1** for damage.
- Replace if necessary.

NOTE: Adjusting screw **2** can adjust idling speed. It is not recommended to make adjustment under normal circumstances.



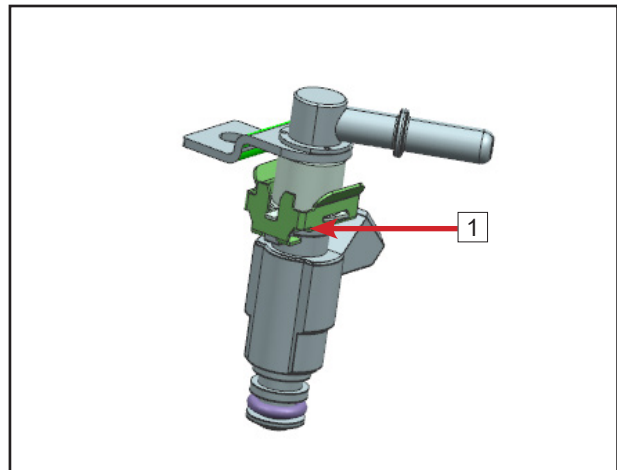
- Inspect T-MAP **1** and TPS **2** for damage.
- Replace if necessary.
- Electrical parts inspection and maintenance refer to Electrical System chapter.



Fuel Injector

Inspect fuel injector **1**. Oil, grease or other impurities are not allowed to exist. No defect like scratches, cracks or rust. Replace if any defect is found.

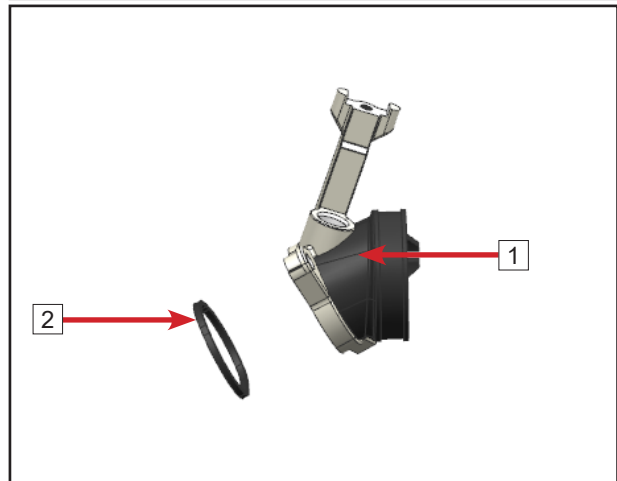
If the fault is judged to be caused by fuel injector but can not be detected, replace with a new one to make test. Replace the fuel injector if the fault is fixed.



Air Intake Pipe

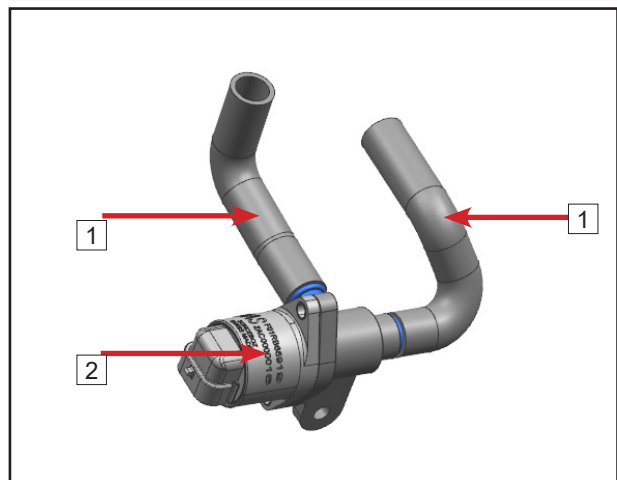
Inspect air intake pipe **1** for cracks or damage. Replace if necessary.

Inspect seal ring **2** for hardening, cracks or damage. Replace if any defect is found.



Idling Stepper Motor

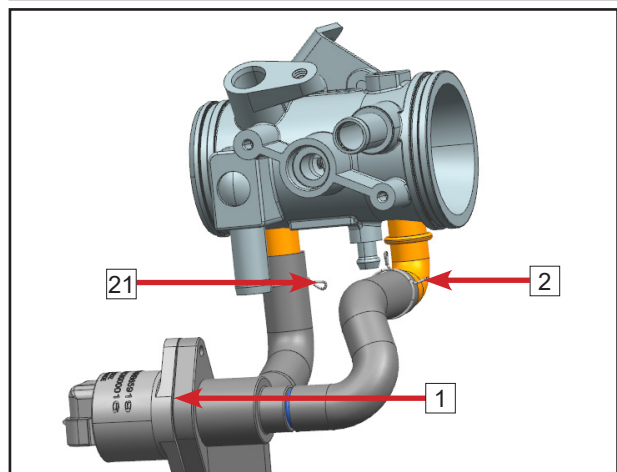
Inspect rubber hose **1** and idling stepper motor **2** for damage. Replace if necessary. Electrical parts inspection and maintenance refer to Electrical System chapter.



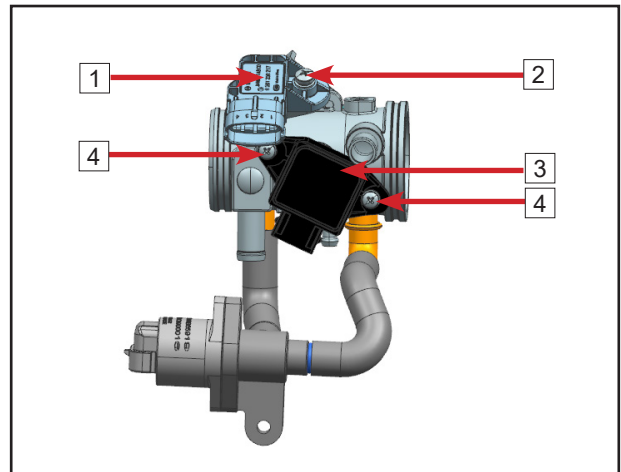
5.3.4.3 Installation

Install idling stepper motor **1**.

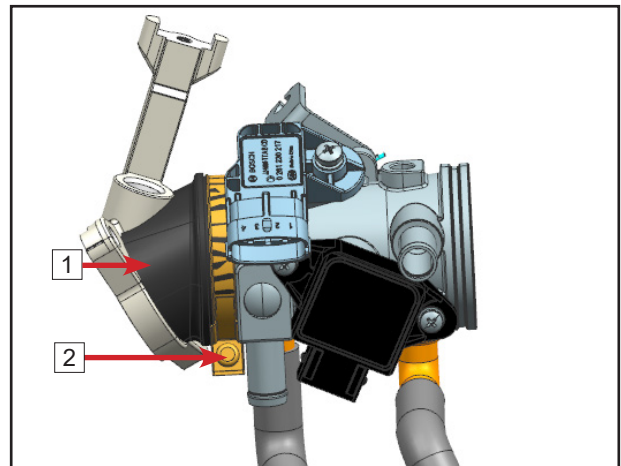
Clip clamp **2** in place.



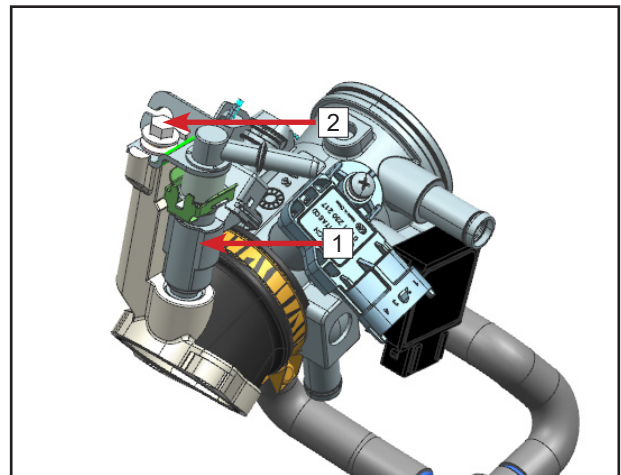
- Install T-MAP 1.
- Install screw 2.
- Install TPS 3.
- Install screws 4.



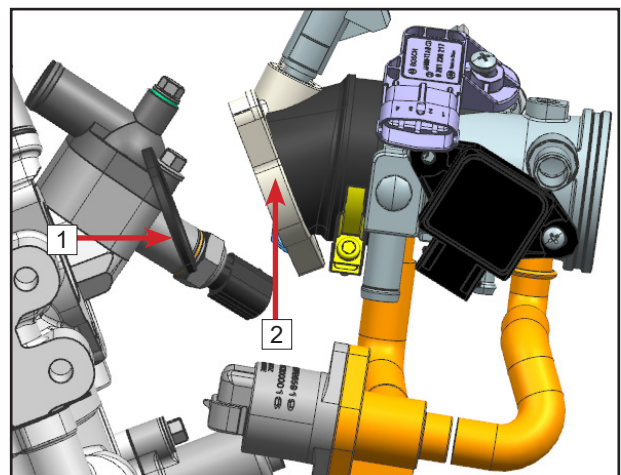
- Install air intake pipe 1.
- Tighten clamp 2.



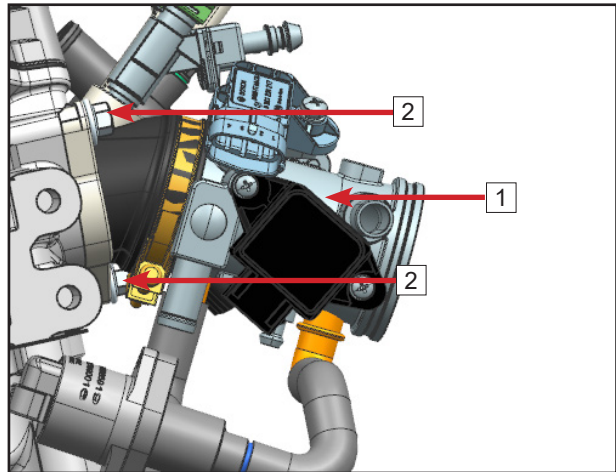
- Install fuel injector 1.
- Install bolt 2.



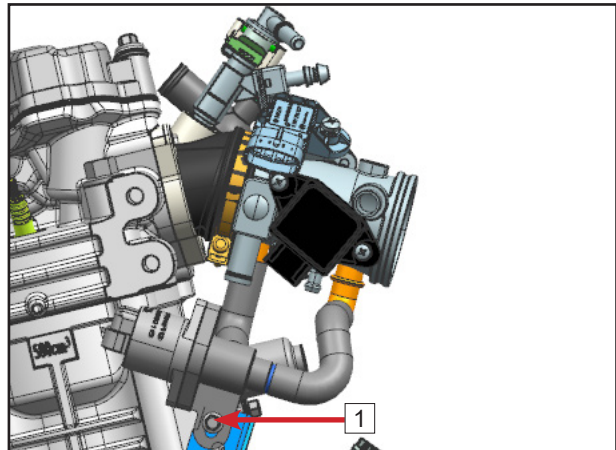
- Apply grease on seal ring 1.
- Install seal ring 1 on air intake pipe 2.



Install air intake pipe **1**.
Install bolts **2**.

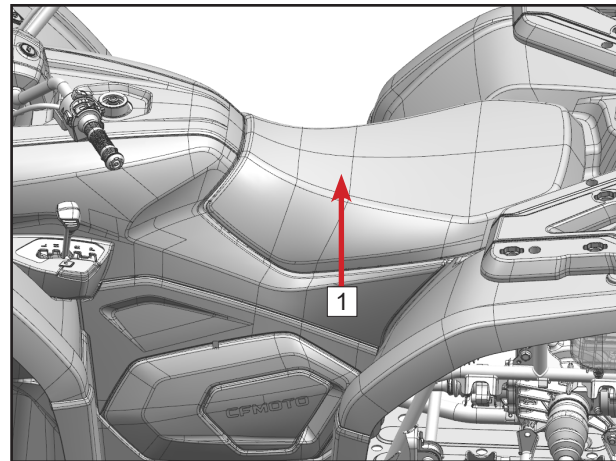


Install bolt **1**.

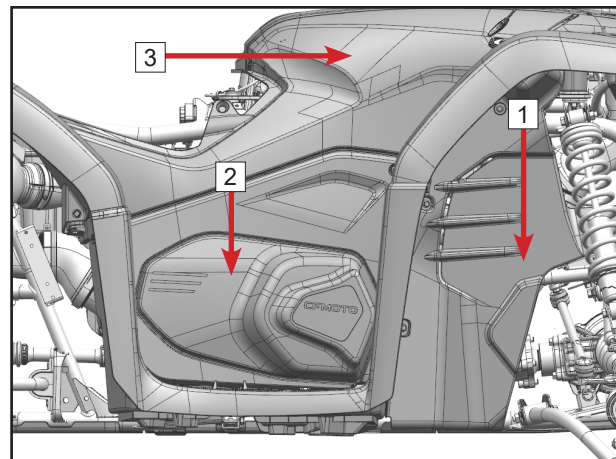


5.3.5 Air Exhaust System 5.3.5.1 Removal

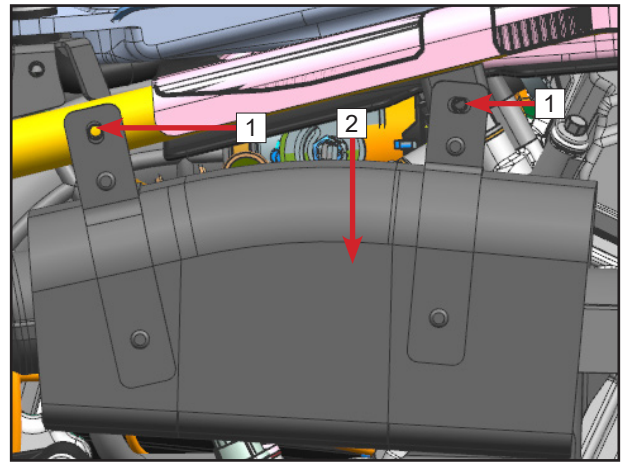
Remove seat **1**.



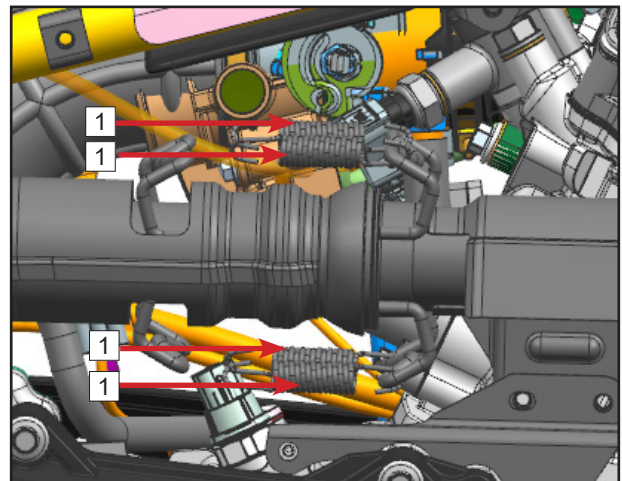
Remove front RH inner fender **1**.
Remove CVT guard **2**.
Remove fuel tank guard assembly **3**
(details refer to Body Covering Parts chapter).



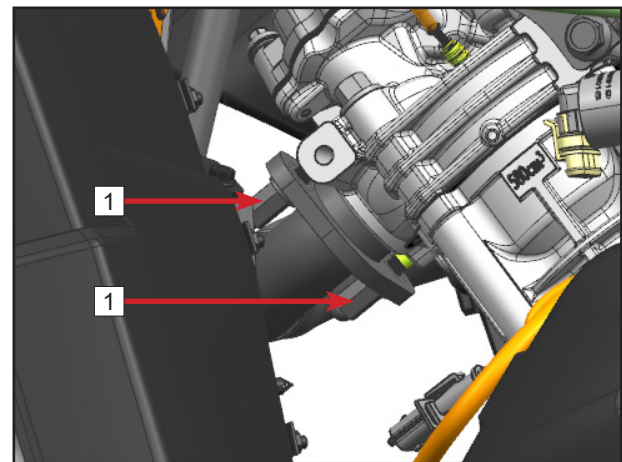
Remove bolts [1].
Remove heat insulator assembly [2].



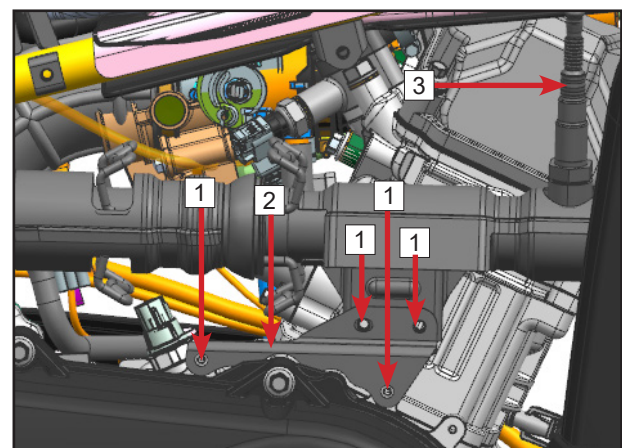
Remove springs [1].



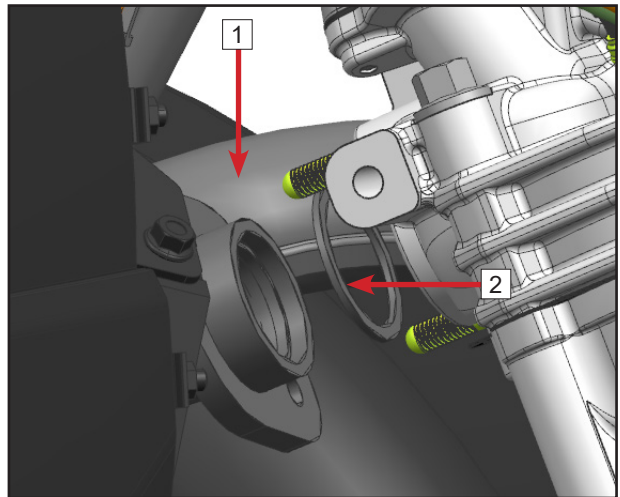
Remove cylinder head nuts [1].



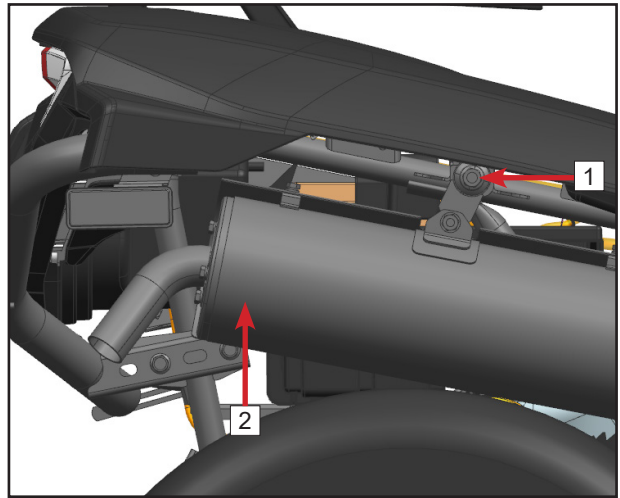
Remove bolts [1].
Remove exhaust pipe reinforcement plate [2].
Unplug oxygen sensor [3].



Remove exhaust pipe 1.
Remove steel washer 2.



Remove bolt 1.
Remove muffler assembly 2 (from vehicle back side).



5.3.5.2 Inspection

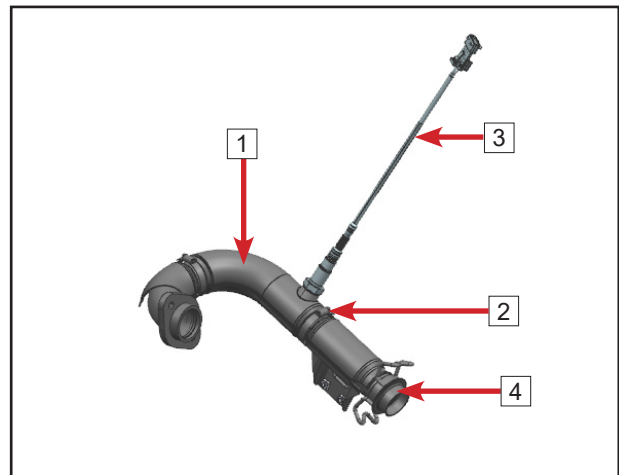
Exhaust Pipe Assembly

Inspect exhaust pipe assembly **1** for break, deformation or leakage. Replace if any defect is found.

Inspect A-type clamp **2** for damage. Replace if necessary. The specification of A-type clamp is 25-51.

Inspect small graphite ring **4** for damage or leakage. Replace if necessary.

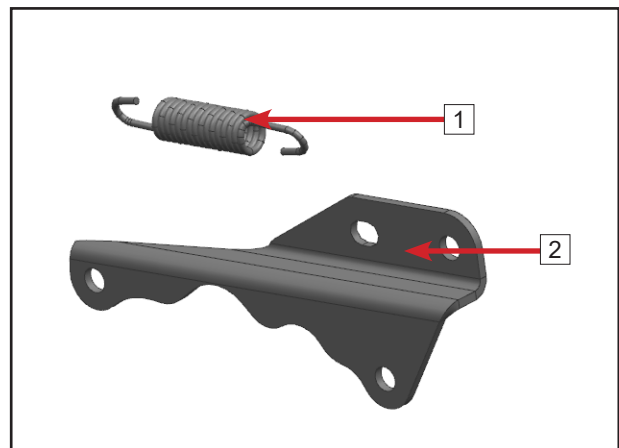
Replace oxygen sensor **3** if broken.



Muffler Spring and Exhaust Pipe Locking Plate

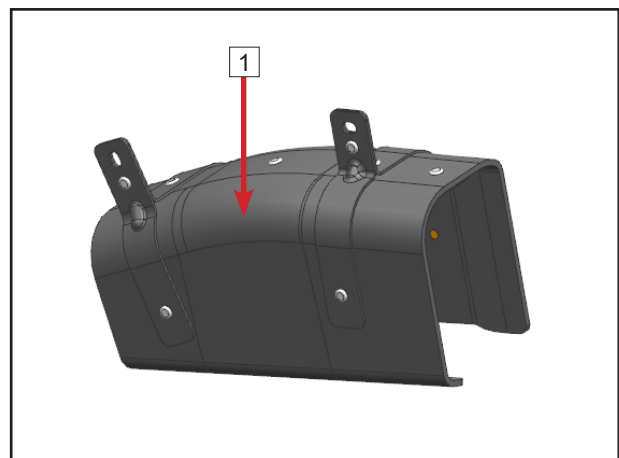
Inspect muffler spring **1** for deformation or damage. Replace if necessary.

Inspect exhaust pipe locking plate **2** for deformation or damage. Replace if necessary.



Heat Insulator Assembly

Inspect spring for damage or deformation. Replace if necessary.

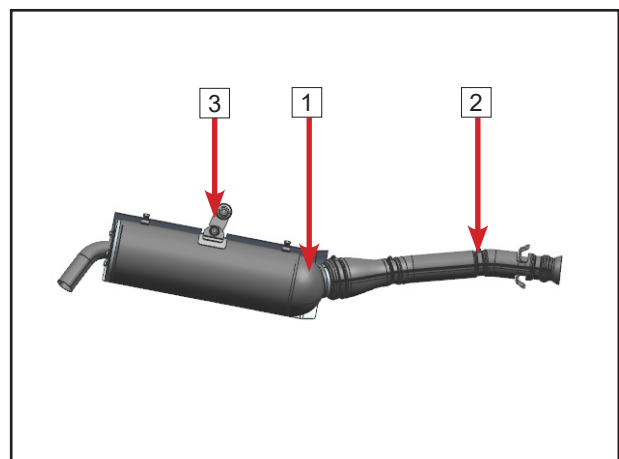


Muffler Assembly

Inspect muffler assembly **1** for break, deformation or leakage. Replace if any defect is found.

Inspect A-type clamp **2** for damage. Replace if necessary. The specification of A-type clamp is 25-51.

Inspect muffler hanging bracket **4** for damage or leakage. Replace if necessary.



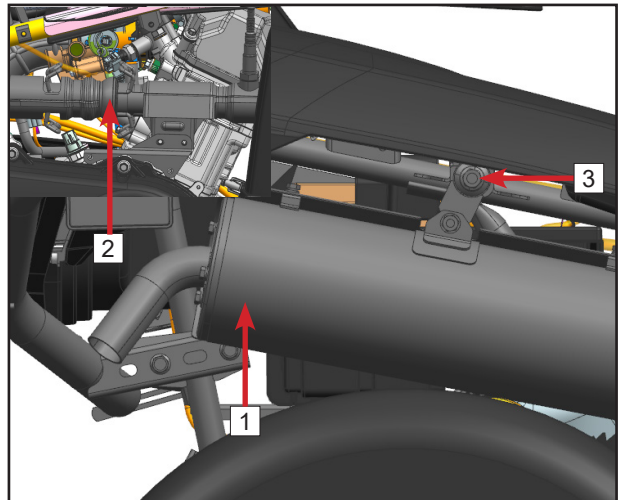
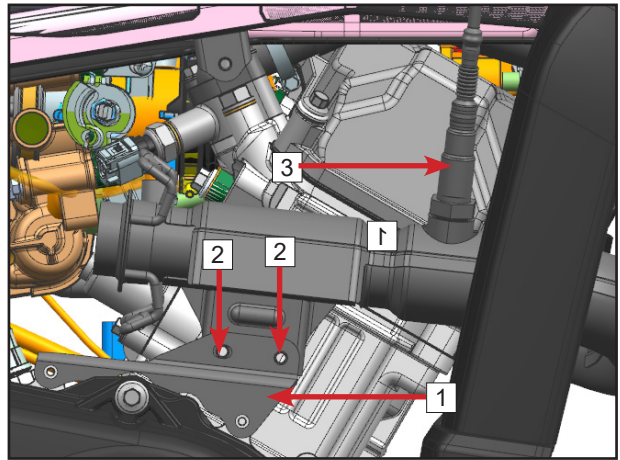
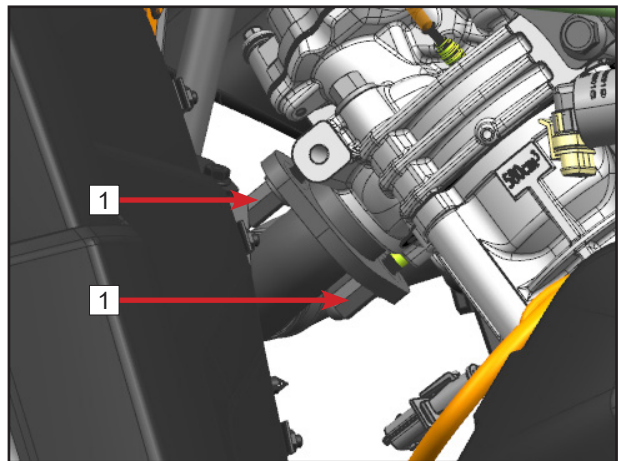
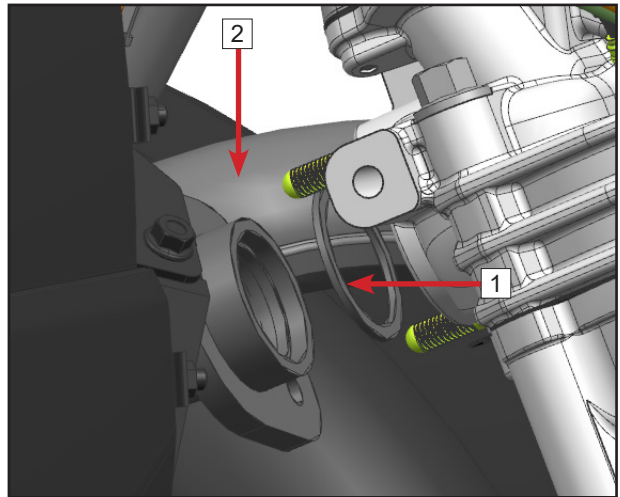
5.3.5.3 Installation

Install steel washer **1**.
Install exhaust pipe assembly **2** (do not miss the steel washer).

Install cylinder nuts **1** (not fully tightened).

Install exhaust pipe reinforcement plate **1**.
Install M6×16 bolts **2**.
Plug in oxygen sensor connector **3**.

Insert the muffler body assembly **1** from vehicle back side. Align with exhaust pipe as **2** shows.
Install M10×70 bolt **3**.
Tighten torque: 50N·m

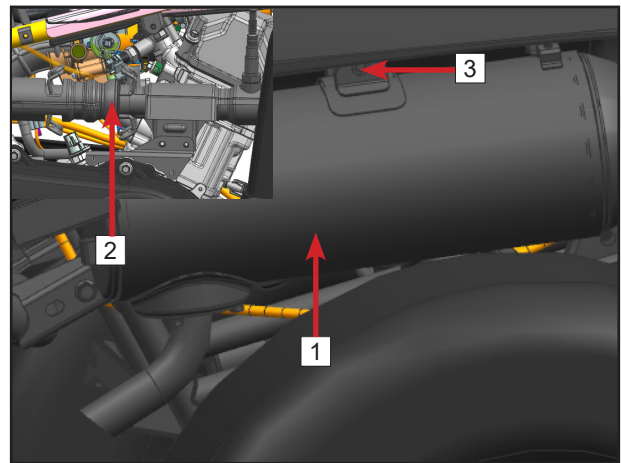


(EU V muffler body assembly 1)

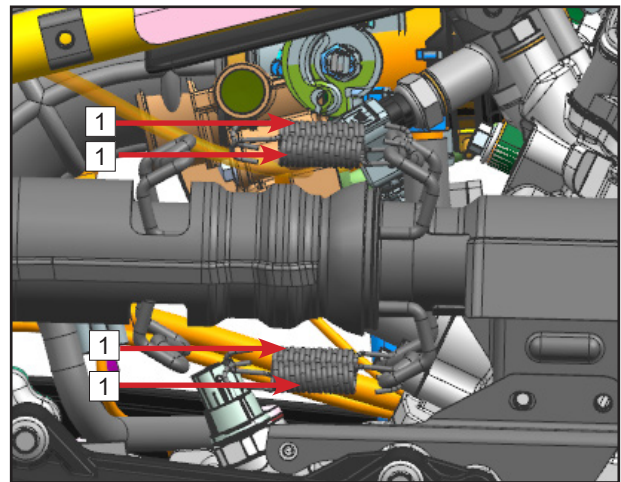
Insert the muffler body assembly 1 from vehicle back side. Align with exhaust pipe as 2 shows.

Install M10×70 bolt 3 with 243 thread locker.

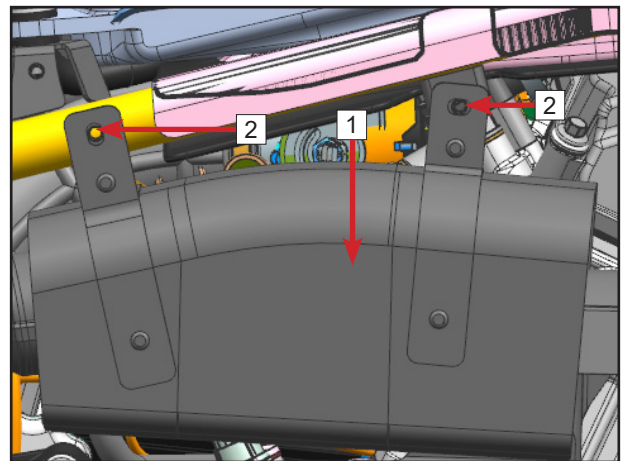
Tighten torque: 50N·m



Install springs 1. (It's difficult to install. Use a hook to help installation.)

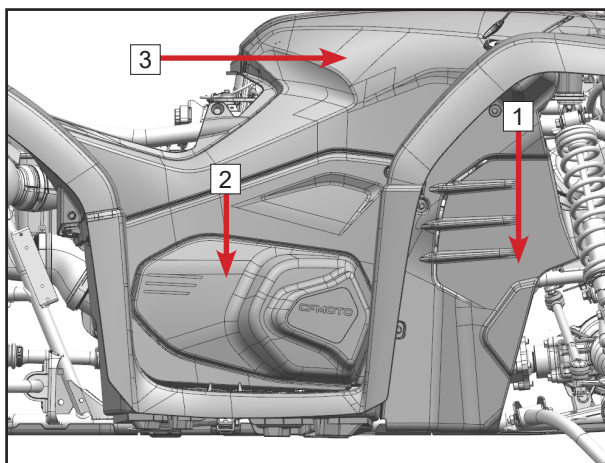


Install heat insulator assembly 1.
Install bolts 2.

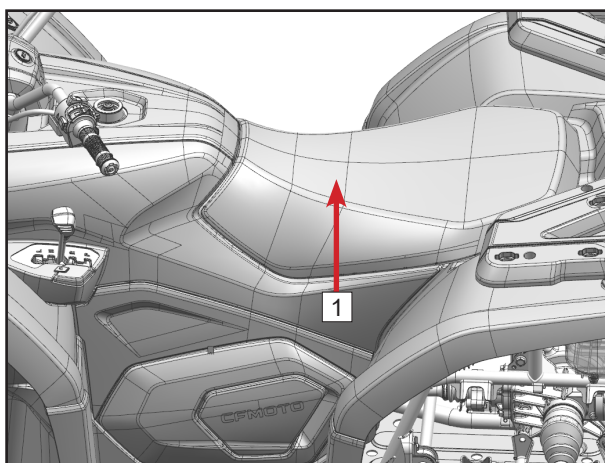


CFMOTO

Install front RH inner fender **1**.
Install CVT guard **2**.
Install fuel tank guard assembly **3** (details refer to Body Covering Parts chapter).



Install seat **1**.



5.4 Engine Disassembly

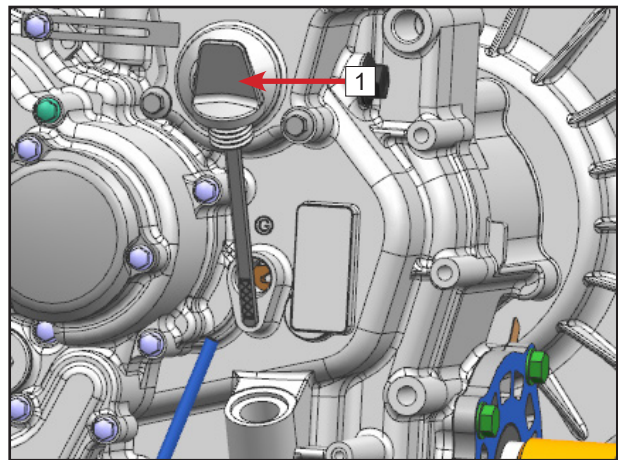
Put engine on work bench and fixate it, in case the engine falls down to cause injury and damage.

CVT refers to 04 CVT chapter.

5.4.1 Engine Oil Drain

If oil is already drained when engine is removed from vehicle, skip this procedure.

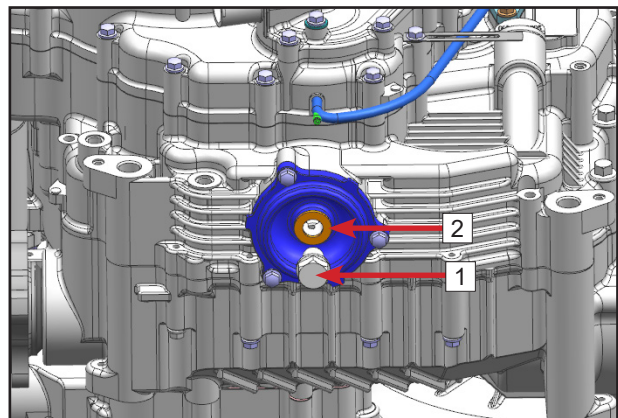
Remove oil dipstick **1**.



Place a container under engine to store drained engine oil.

Remove M12×1.5 drain bolt **1**.

Remove washer **2**.

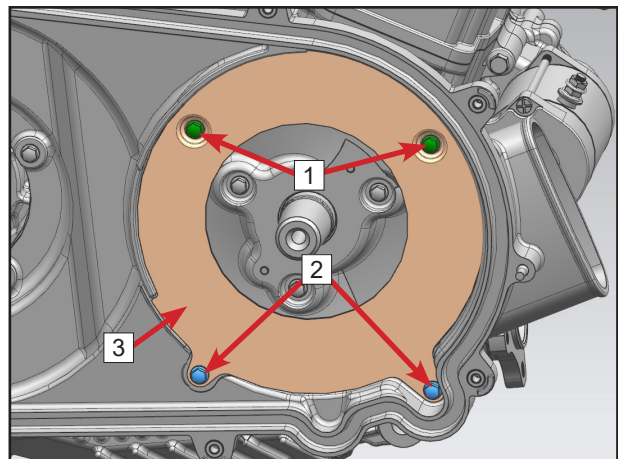


5.4.2 CVT Case ASSy

Remove M6 bolts **1**.

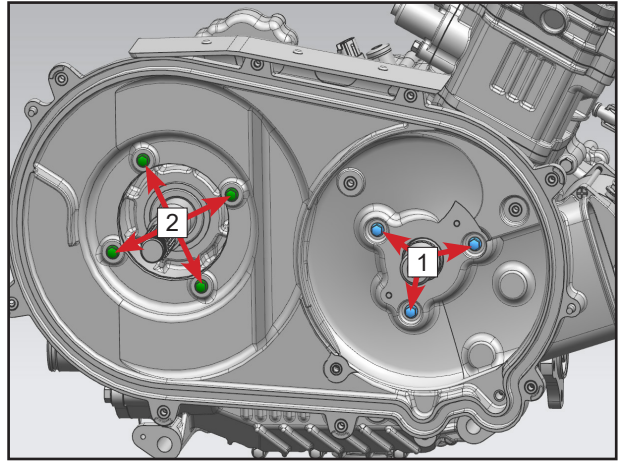
Remove M6 bolts **2**.

Remove CVT wind board **3**.

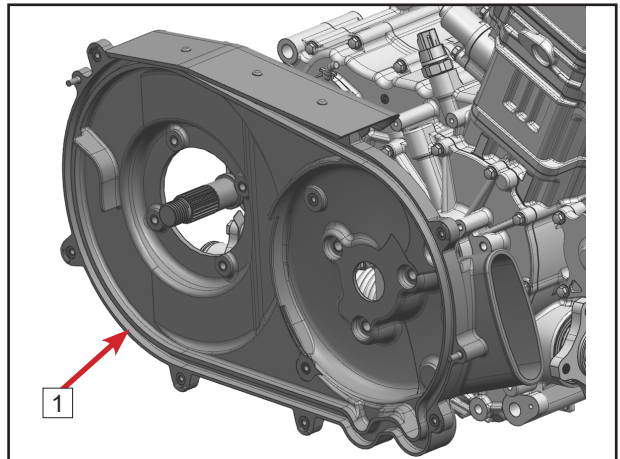


Remove M6 bolts **1**.

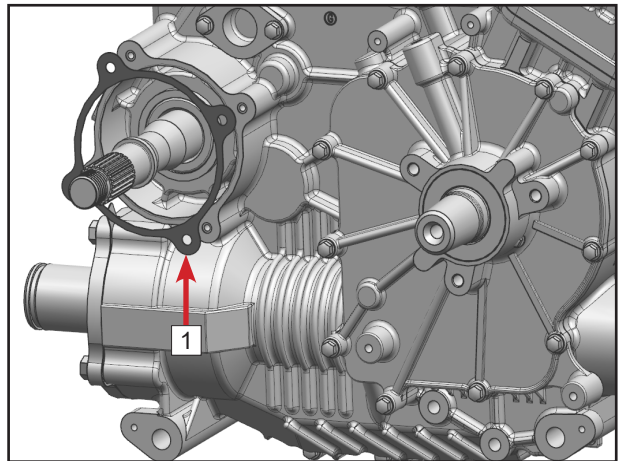
Remove M6 bolts **2**.



Remove CVT case assy **1**.

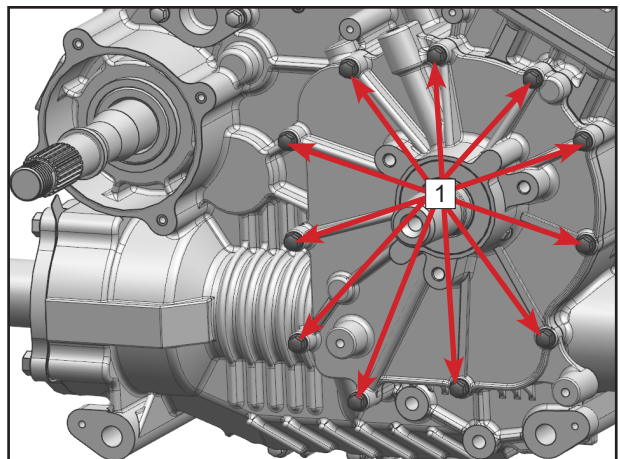


Remove seal gasket **1**.

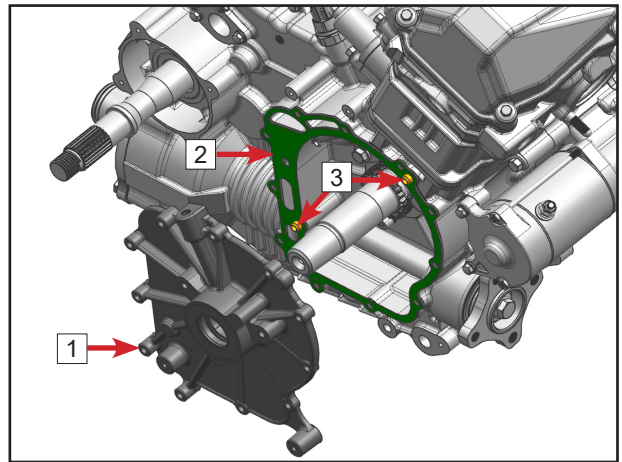


5.4.3 PTO Crankcase Cover Assy

Remove M6 bolts **1**.



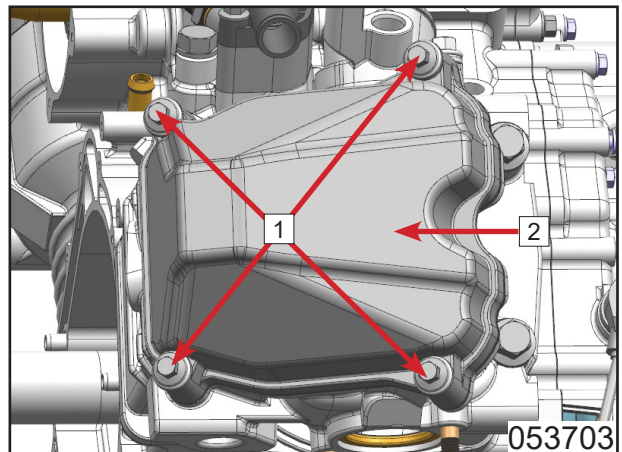
- Remove PTO crankcase cover assy [1].
- Remove seal gasket [2].
- Remove dowel pins [3].



5.4.4 Cylinder Head Cover Removal

- Loosen cylinder head cover bolt kits [1].
- Remove cylinder head cover [2].

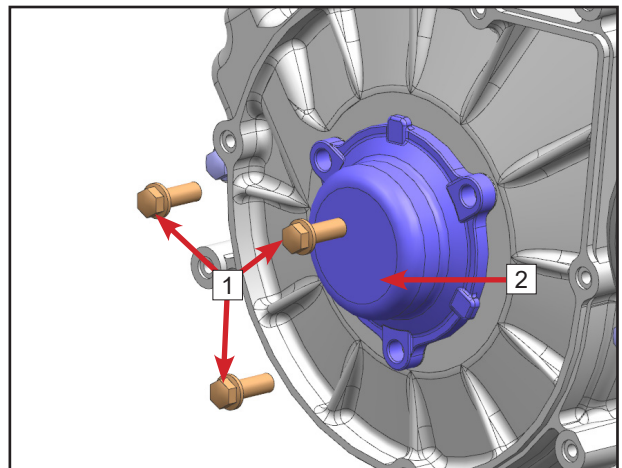
NOTE: Remove seal ring along with the cylinder head cover.



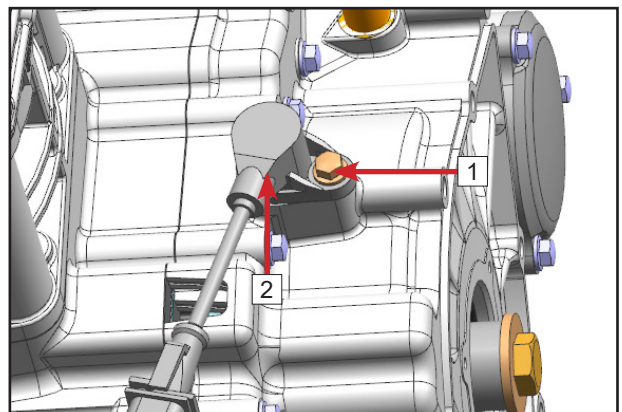
5.4.5 TDC Adjustment

- Remove M6 bolts [1].
- Remove magneto end cap [2].

NOTE: Use a screw driver to wrap the edge of the magneto end cap [2] slightly until it gets loose. Then remove the magneto end cap.

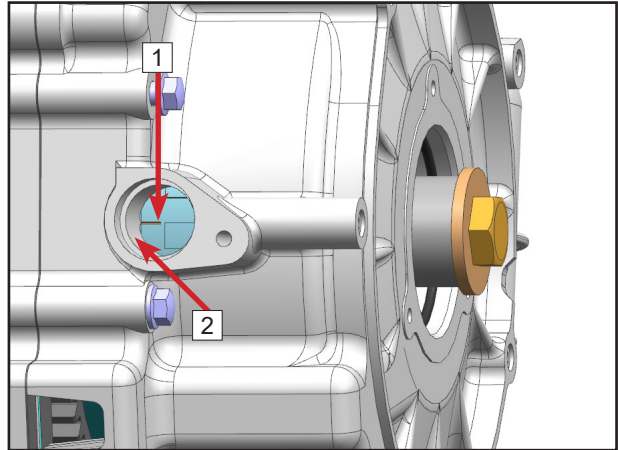


- Remove M6 bolt [1].
- Remove RPM sensor [2].

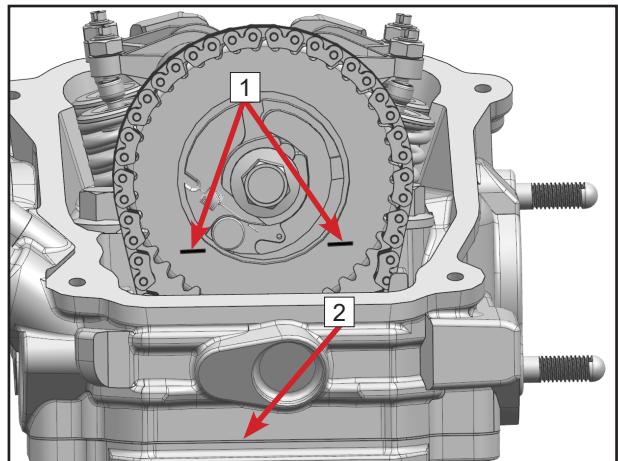


Turn crankshaft until piston is at TDC ignition.

When piston is at TDC ignition, the mark **1** on magneto rotor is at the center of the hole **2**.



At TDC ignition, the printed marks **1** on the timing sprocket have to be parallel to cylinder head base **2**.



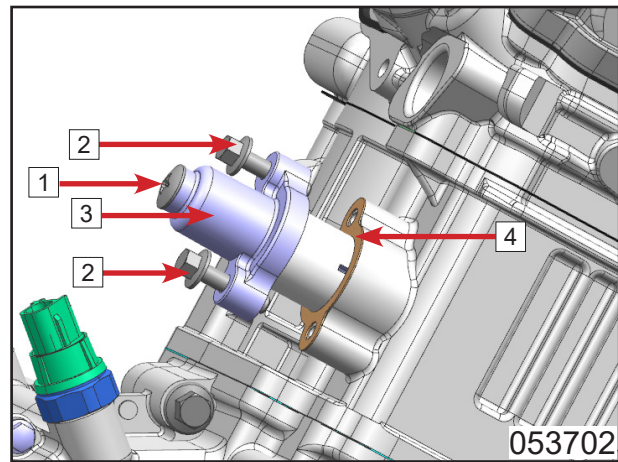
5.4.6 Tensioner

Loosen screw **1**.

Remove M6 bolts **2**.

Remove tensioner **3**.

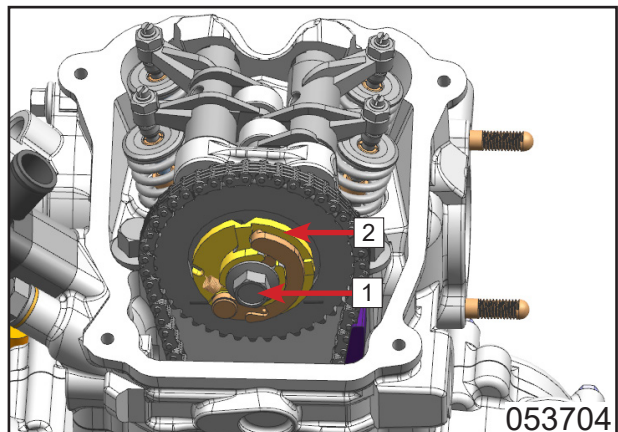
Remove tensioner gasket **4**.



5.4.7 Cylinder Head

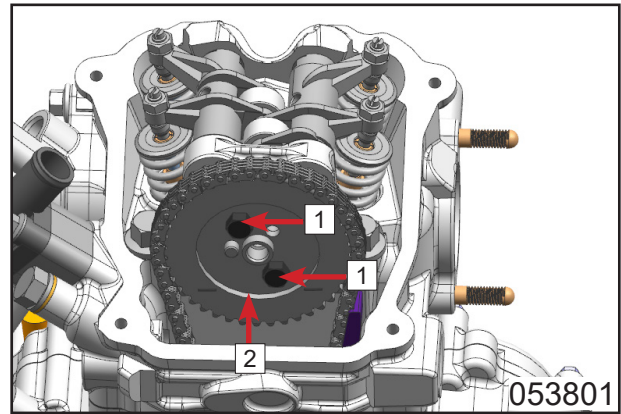
Remove M8×32 bolt **1**.

Remove start decompression assembly **2**.

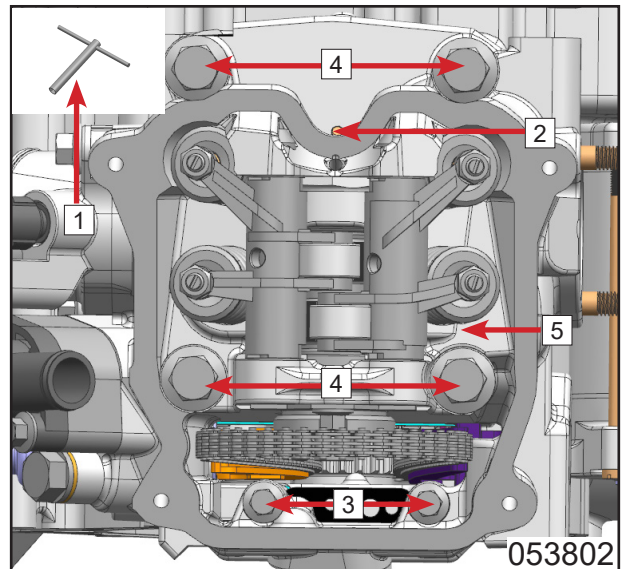


Remove M6 bolts [1].
Remove timing sprocket [2].

NOTE: Hook timing chain after removing sprocket, in case the chain falls inside the engine.

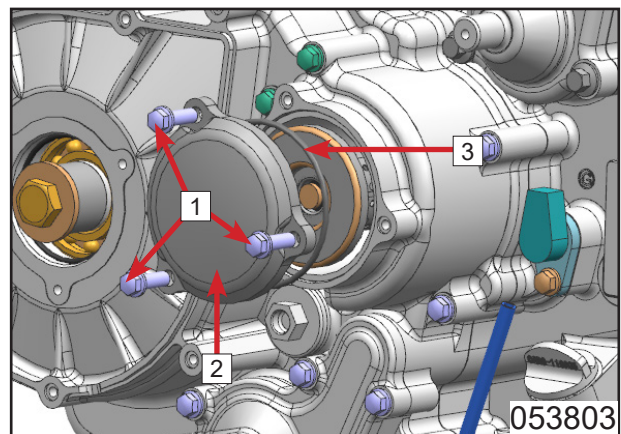


Use special tool: Spark Plug Wrench [1] to remove spark plug [2].
Remove M6 bolts [3].
Remove M10 bolts [4].
Remove cylinder head [5].

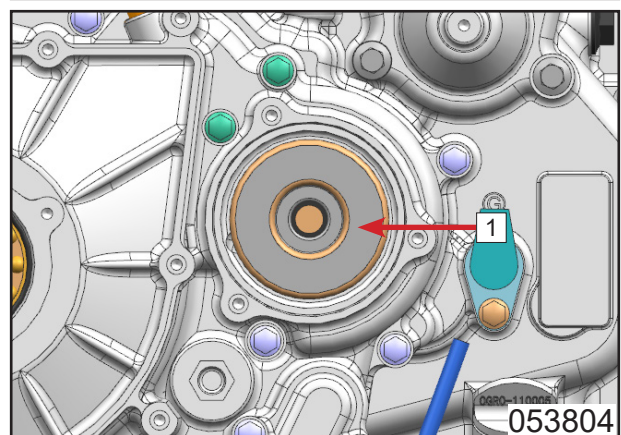


5.4.8 Oil Filter

Remove M6 bolts [1].
Remove oil filter cover [2].
Remove 63×2.5 o-ring [3]. (When removing oil filter cover, o-ring may remain on the cover).

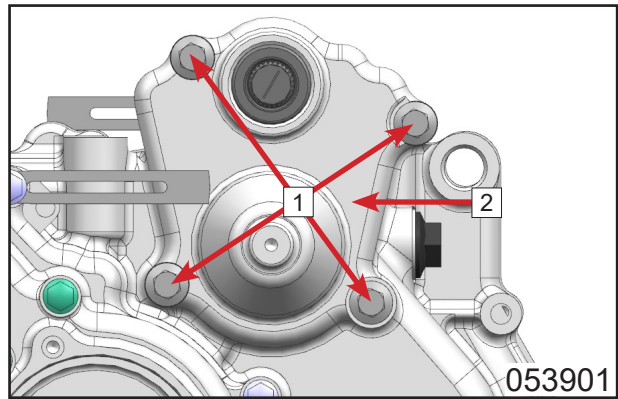


Remove oil filter element [1].

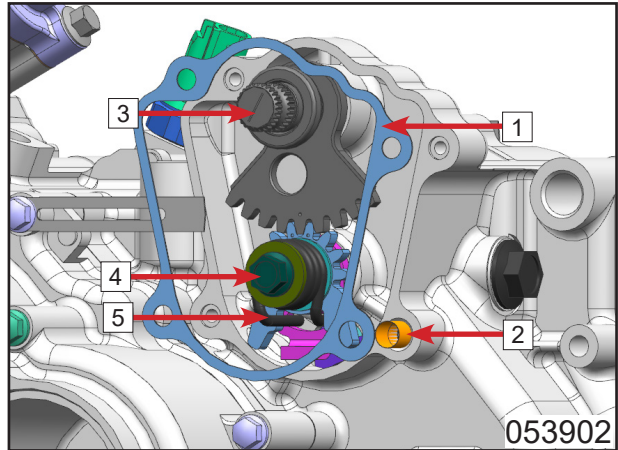


5.4.9 Gearshift Assembly

Remove M6 bolts **1**.
Remove gearshift cover **2**.

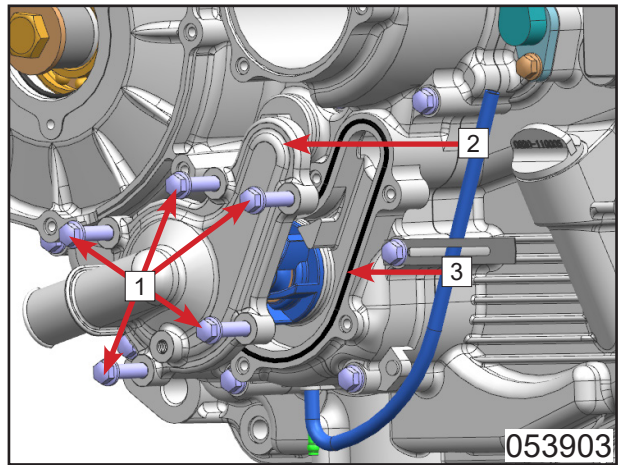


Remove seal gasket **1**.
Remove dowel pin **2**.
Remove gearshift drive sector gear **3**.
Remove bolt **4** with washer.
Remove gearshift driven sector gear **5**.

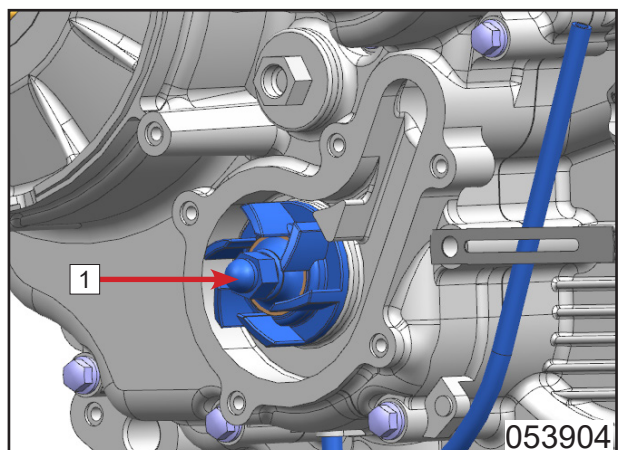


5.4.10 Water Pump

Remove M6 bolts **1**.
Remove water pump cover **2**.
Remove water pump seal ring **3**.

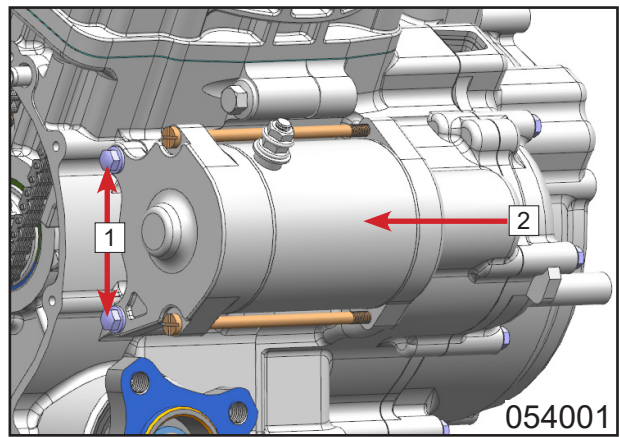


Remove bolt **1** (left-hand thread).
Remove water pump impeller.



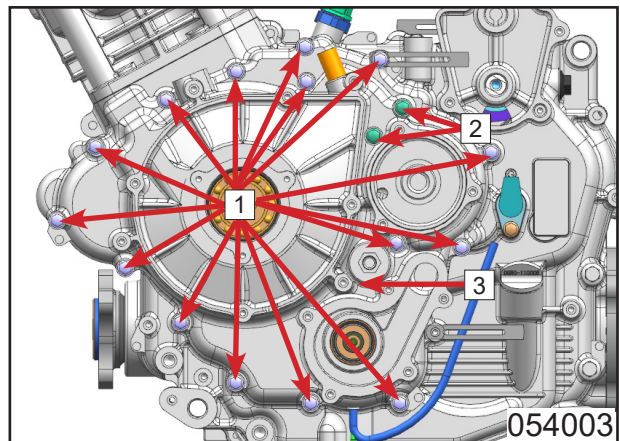
5.4.11 Starter Motor

- Remove M6 bolts **1**.
- Remove starter motor **2**.

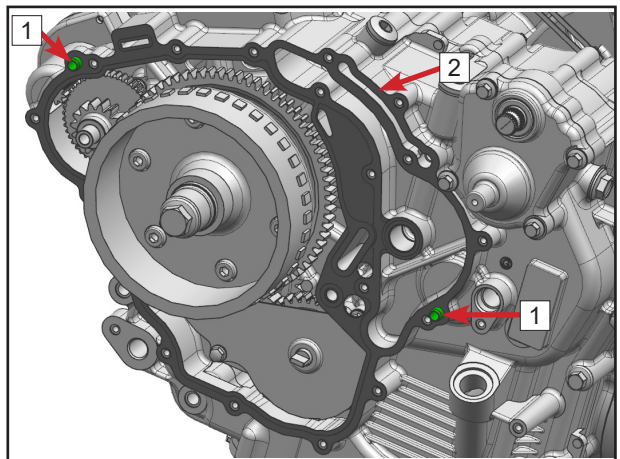


5.4.12 MAG Crankcase Cover (191Q)

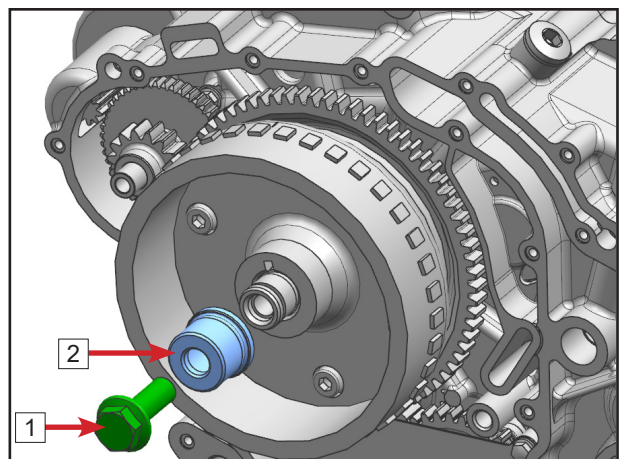
- Remove M6 bolts **1**.
- Remove M6 bolts **2**.
- Remove MAG crankcase cover **3**.



- Remove dowel pins **1**.
- Remove seal gasket **2**.

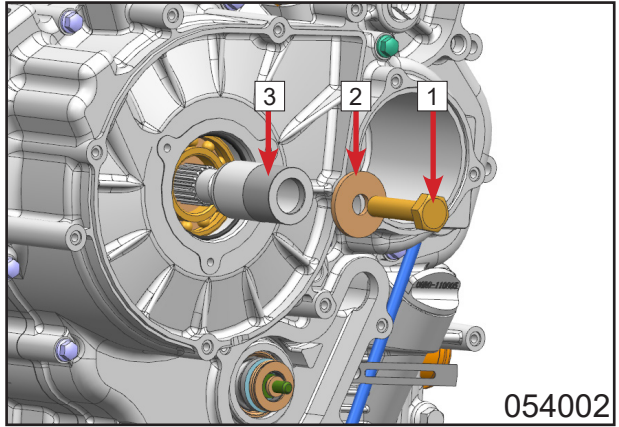


- Remove bolt **1**.
- Remove Locking sleeve **2**.

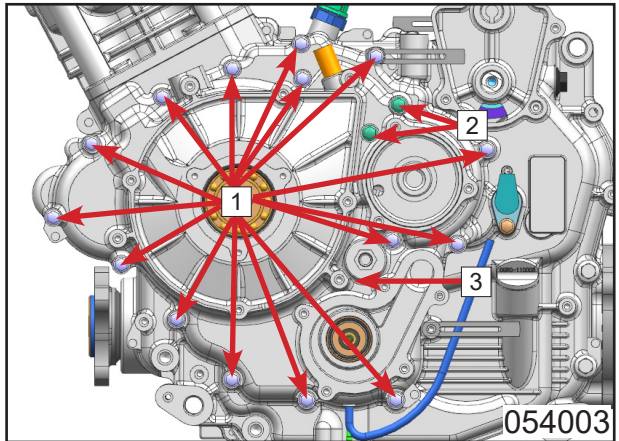


5.4.13 MAG Crankcase Cover (191R)

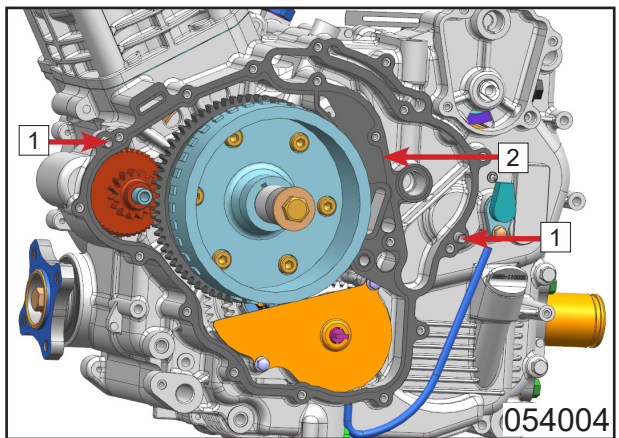
- Remove bolt **1**.
- Remove washer **2**.
- Remove shaft bushing **3**.



- Remove M6 bolts **1**.
- Remove M6 bolts **2**.
- Remove MAG crankcase cover **3**.

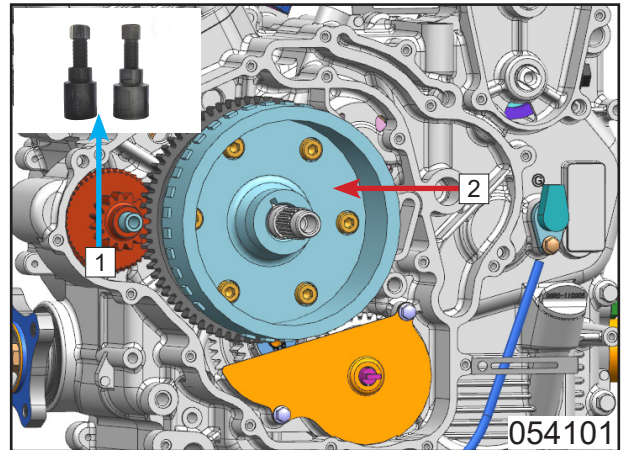


- Remove dowel pins **1**.
- Remove seal gasket **2**.

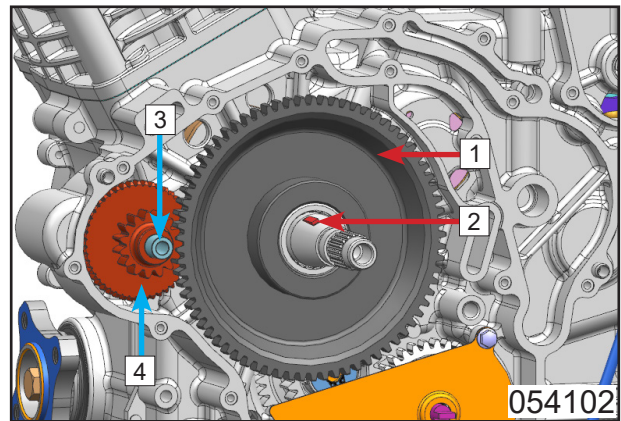


5.4.14 Magneto Rotor

Use special tool: Magneto Rotor Removal Tool **1** to remove magneto rotor **2**.

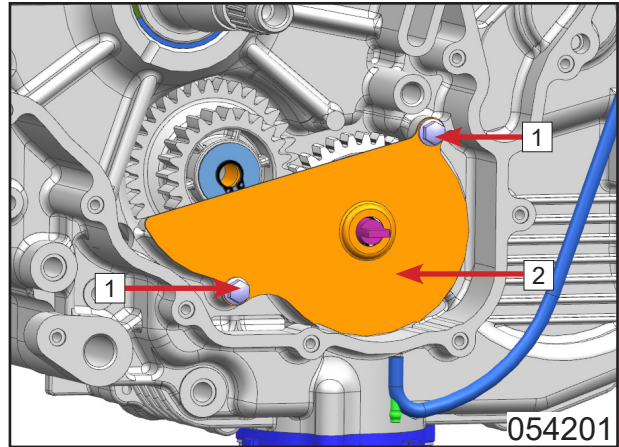


- Remove driven gear assembly **1**.
- Remove woodruff key **2**.
- Remove dual gear shaft **3**.
- Remove starter dual gear **4**.

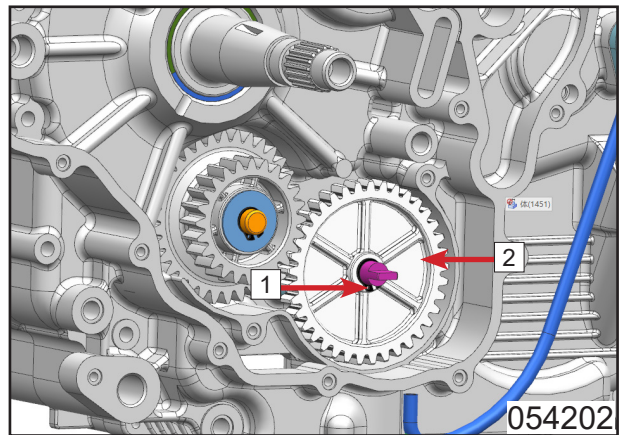


5.4.15 Oil Pump

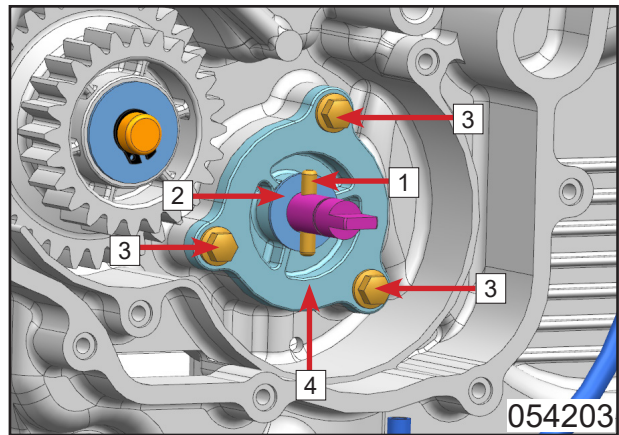
- Remove M6 bolts **1**.
- Remove oil guard **2**.



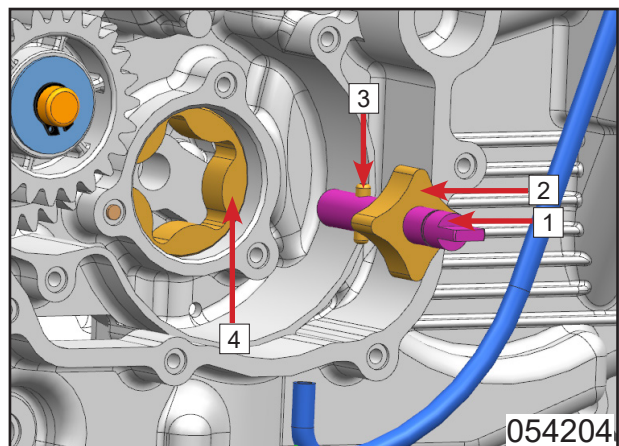
- Remove circlip **1** with pliers.
- Remove oil pump drive gear **2**.



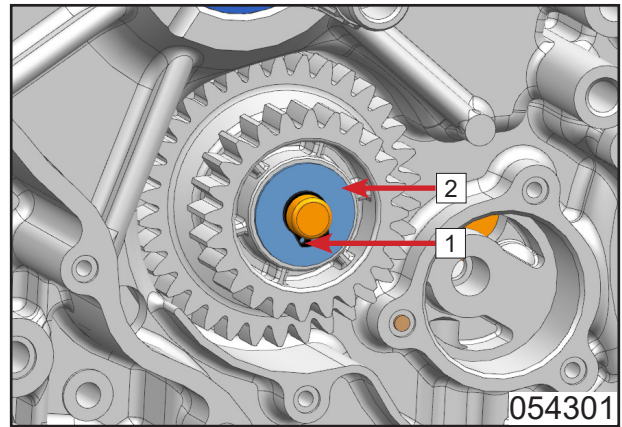
- Remove roller needle **1**.
- Remove washer **2**.
- Remove M6 bolts **3**.
- Remove oil pump cover **4**.



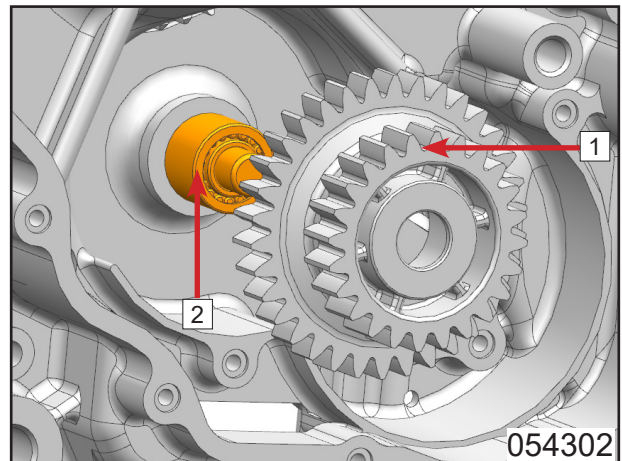
- Pull out oil pump shaft **1**.
- Remove oil pump inner rotor **2** from oil pump shaft side.
- Remove roller needle **3**.
- Remove oil pump outer rotor **4**.



Remove circlip **1** with pliers.
Remove washer **2**.

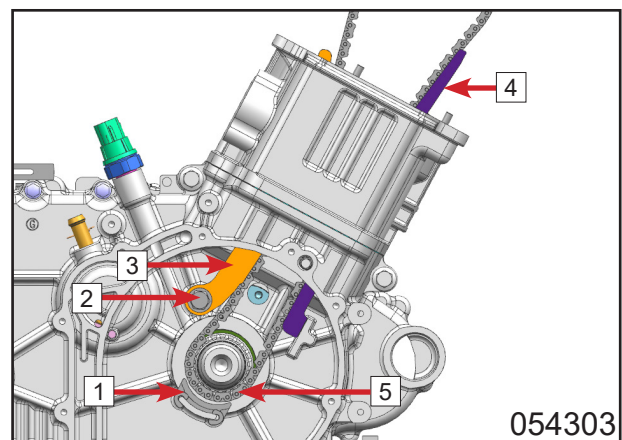


Remove oil pump dual gear **1**.
Remove needle bearing **2**.



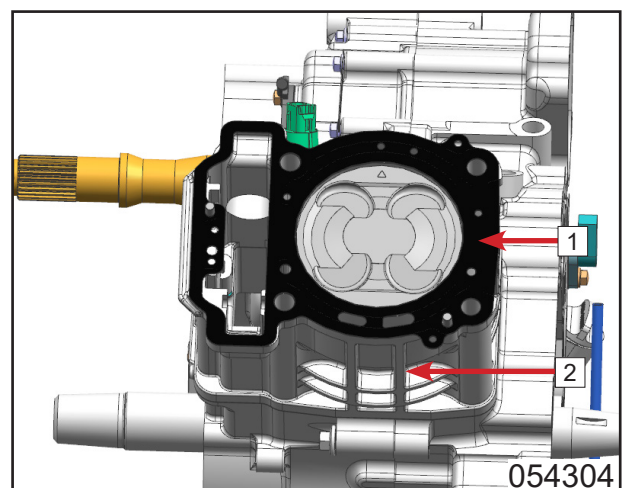
5.4.16 Timing Chain

Remove chain guard **1**.
Remove thread pin shaft **2**.
Remove tensioner plate **3**.
Remove chain guide **4**.
Remove timing chain **5**.

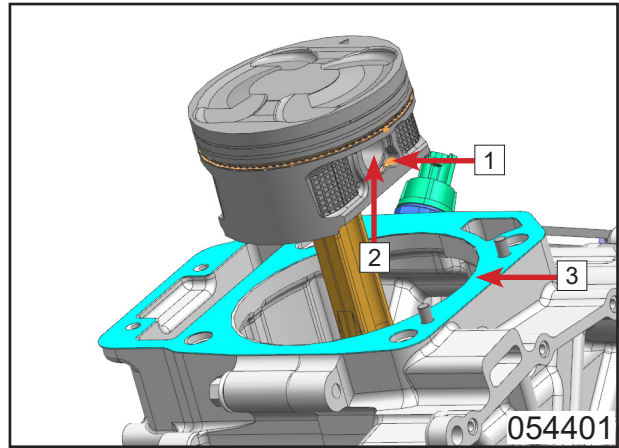


5.4.17 Cylinder Body

Remove cylinder body gasket **1**.
Remove cylinder body **2**.

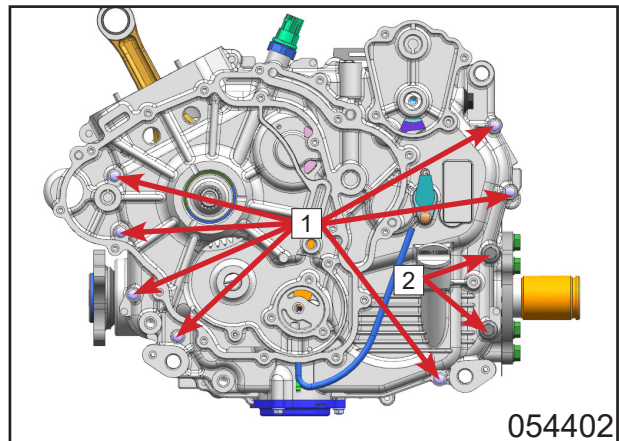


Remove piston pin circlip **1**.
Remove piston pin **2** from circlip removed side.
Remove cylinder gasket **3**.

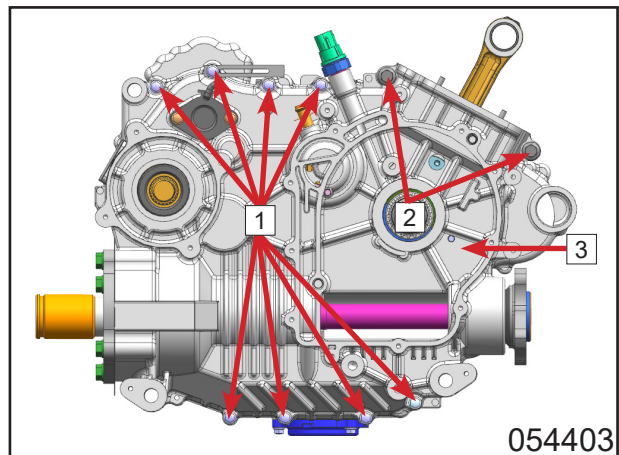


5.4.18 Crankcase Body

Remove M6 bolts **1**.
Remove M8 bolts **2**.

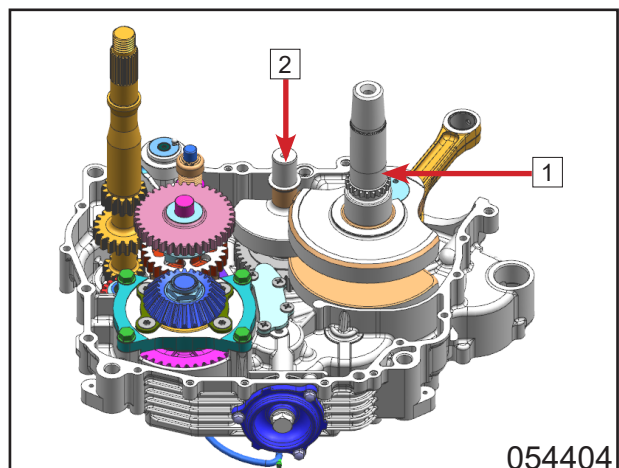


Remove M6 bolts **1**.
Remove M8 bolts **2**.
Remove PTO crankcase **3**.



5.4.19 Crankshaft Assembly and Balance Shaft

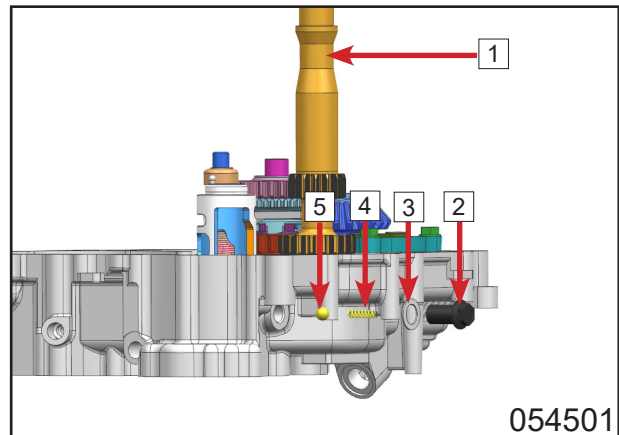
Remove the crankshaft connecting rod **1** along with balance shaft **2**.



5.4.20 Drive Bevel Gear Assembly, Counter Shaft Assembly, Shift Fork and Shift Drum

Remove drive main shaft **1**.

Remove shifter detent assembly M14 bolt **2**, washer **3** and limit spring **4** and steel ball **5**.

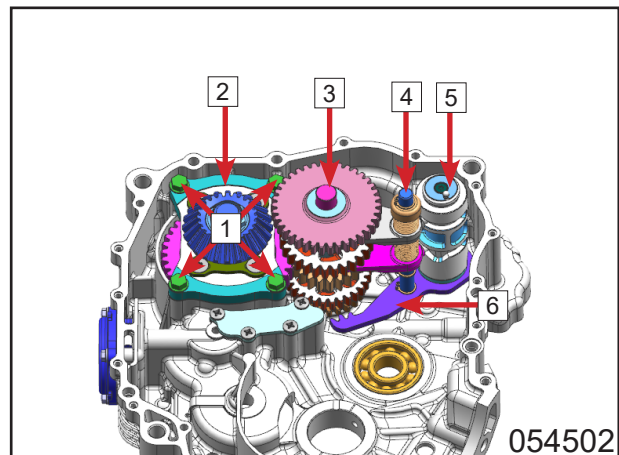


Remove M8 bolts **1**.

Remove drive bevel gear assy **2**.

Remove counter shaft assy **3**, shift fork assy **4** and shift drum **5** together as a group.

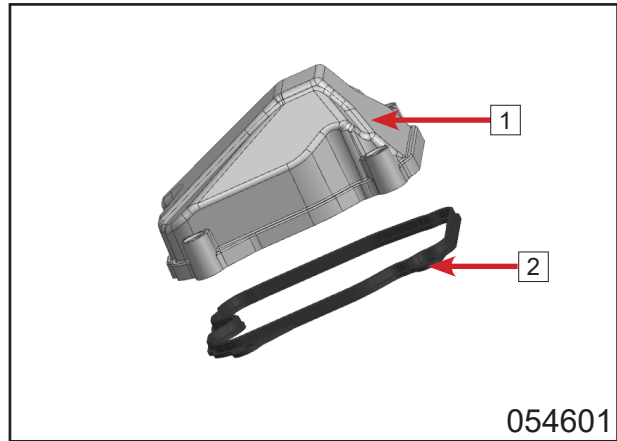
Remove parking swing arm **6**.



5.5 Engine Parts Inspection

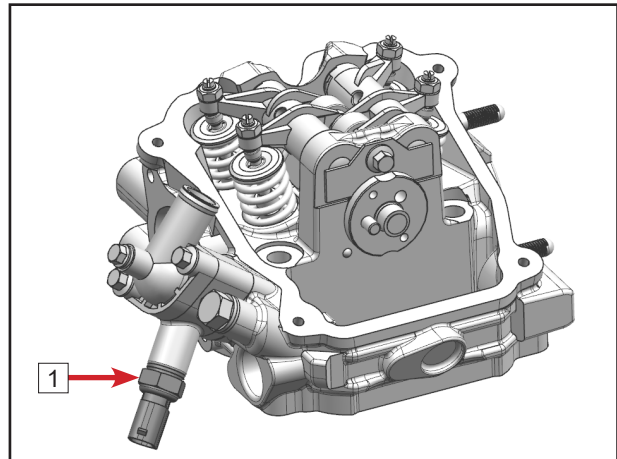
5.5.1 Cylinder Head Cover

Inspect cylinder head cover **1** seal ring **2** for cracks, hardening or aging. Replace if any defect is found.

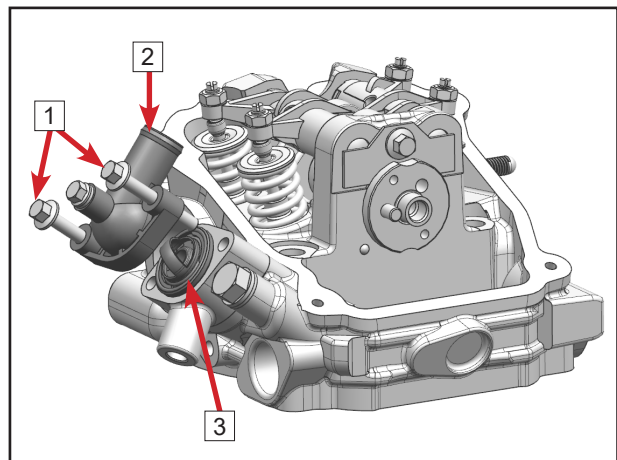


5.5.2 Cylinder Head Disassembly

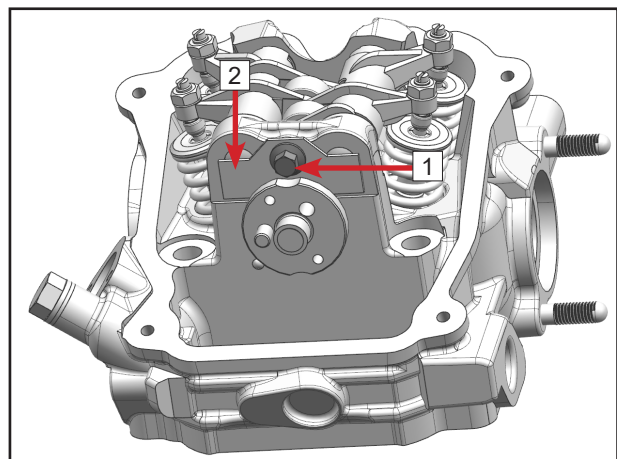
Remove coolant temperature sensor **1**.



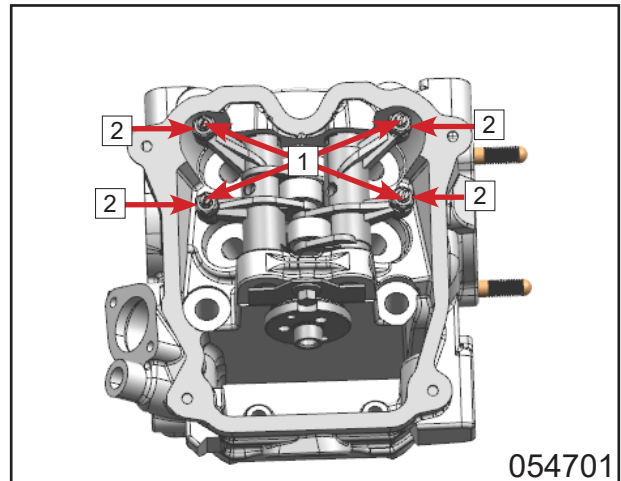
Remove M6 bolts **1**.
Remove thermostat cap **2**.
Remove thermostat **3**.



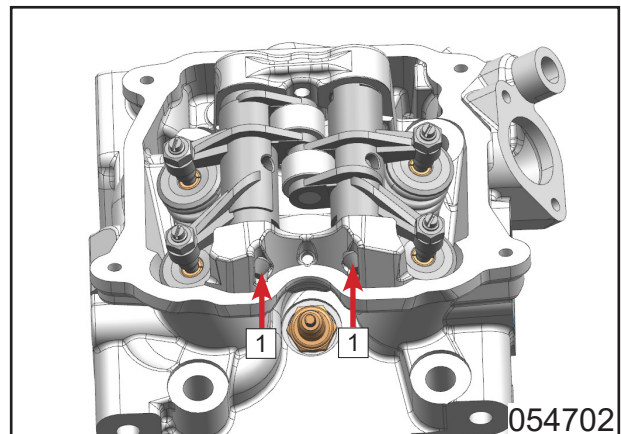
Remove M6 bolt **1**.
Remove camshaft position plate **2**.



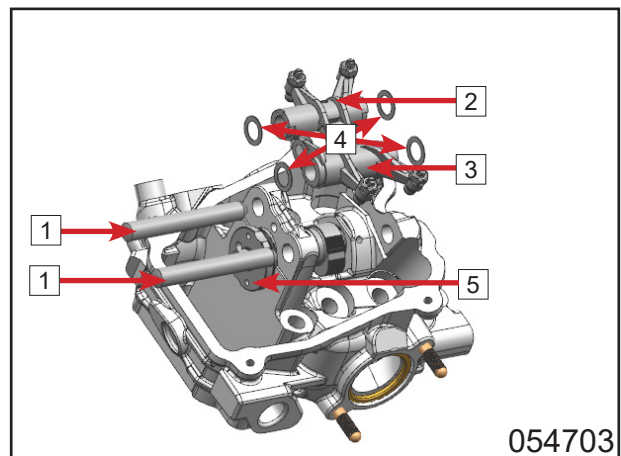
Loosen valve clearance adjusting nuts **2**.
Use slotted screwdriver to loosen valve clearance adjusting screws **1**.



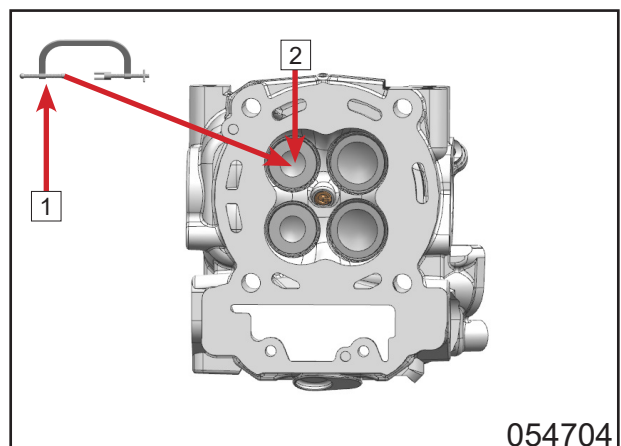
Push out rocker arms from position **1**.



Remove rocker arm shafts **1**.
Remove air intake rocker arm **2**.
Remove air exhaust rocker arm **3**.
Remove washers **4**.
Rotate camshaft **5** to appropriate position to remove.



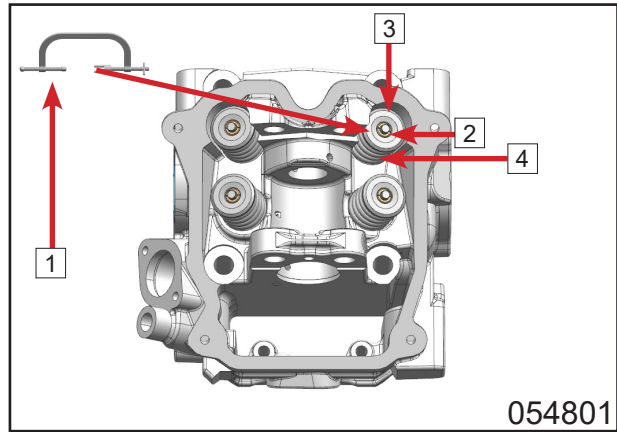
Put special tool: Valve Spring Compressing Clamp **1** in the center of the valve **2**.



Put the Valve Compressing Clamp **1** at the valve spring upper seat **3**. Tighten the clamp to compress the valve spring.

Remove valve lock clip **2** with tweezers. Loosen Valve Spring Compressing Clamp **1**.

Remove valve spring upper seat **3**. Remove valve spring **4**.

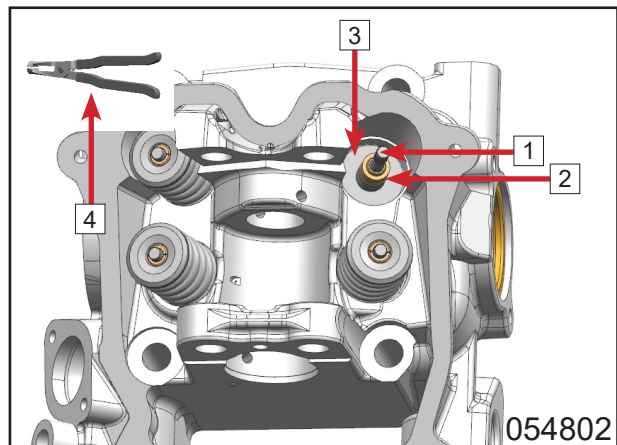


Pull out the exhaust valve **1** from the other side.

Remove valve stem seal ring **2** and discard it.

Remove valve spring seat **3**.

Intake valve removal applies the same procedures.



Inspection Cylinder Head

-Clean the carbon deposit in combustor and on junction surface **1**.

-Use knife-edge ruler and filler gauge to inspect the junction area **1** between cylinder head and body for deformation and damage. Measure at different positions. Replace with a new cylinder head if beyond service limit. Replace with a new cylinder head if damaged.

Cylinder head deformation limit: 0.05mm

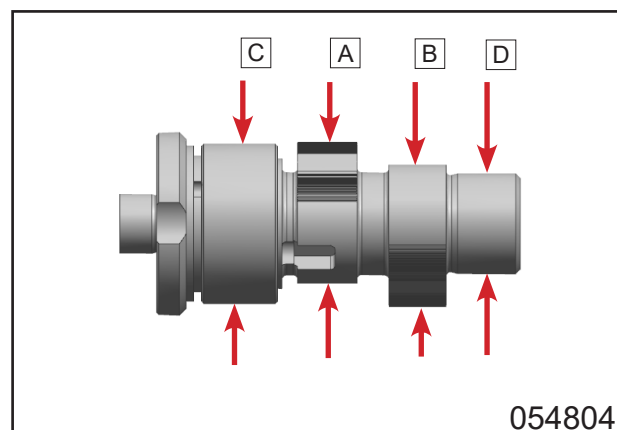
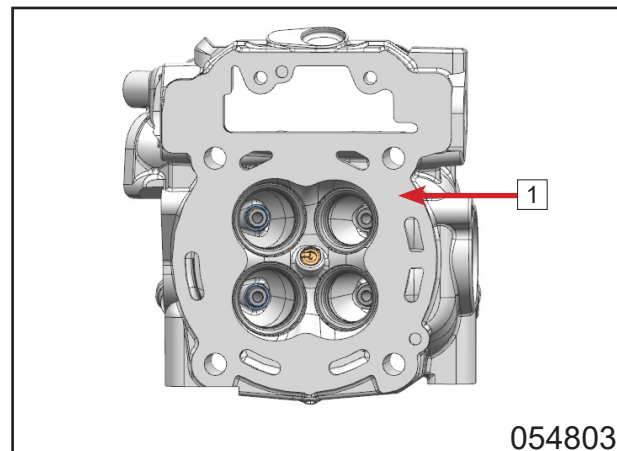
Tool: knife-edge ruler, filler gauge

Camshaft Inspection

Inspect camshaft every cam and journal for scratches, wear, cracks or other damage.

Measure camshaft journal diameter and cam height with micrometer.

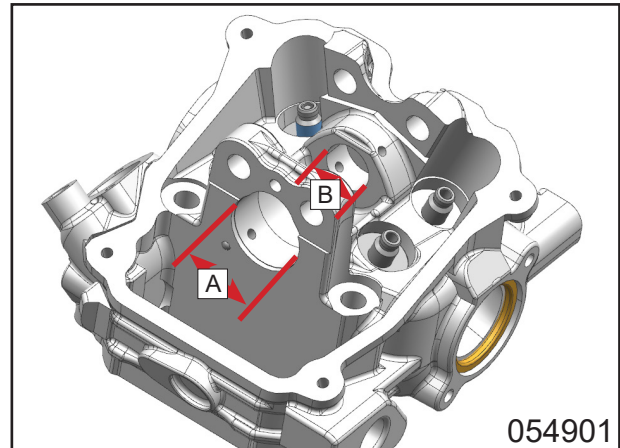
Camshaft	
Cam (air exhaust) A	
New	32.985mm~33.025 mm
Service limit	32.865 mm
Cam (air intake) B	
New	32.971mm~33.011mm
Service limit	32.871 mm



Camshaft journal (timing chain side) C	
New	34.959mm~34.975 mm
Service limit	34.950 mm
Camshaft journal (spark plug side) D	
New	21.959mm~21.980 mm
Service limit	21.950 mm

Measure the clearance between camshaft and cylinder head on both sides.

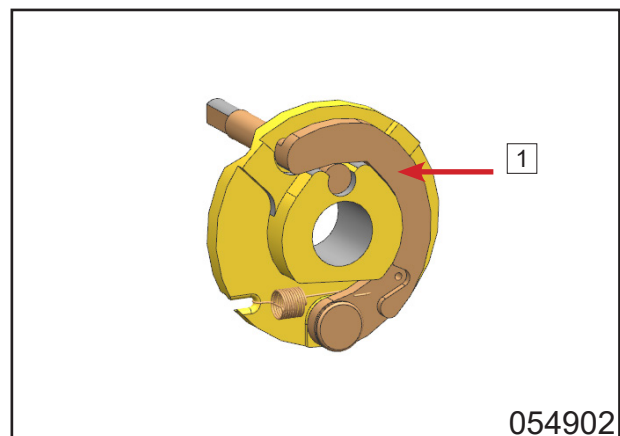
Camshaft bearing hole diameter (timing chain side) A	
New	35.007mm~35.025 mm
Service limit	35.040 mm
Camshaft bearing hole diameter (spark plug side) B	
New	22.012mm~22.025 mm
Service limit	22.040 mm



Start Decompression Assembly

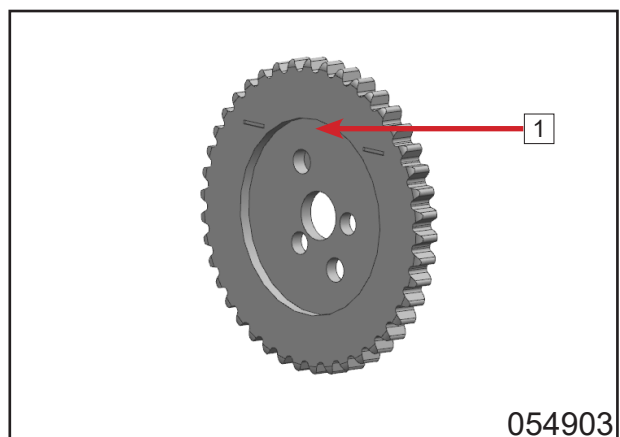
Inspect start decompression assembly for cracks or damage. Replace if any defect is found.

Turn rocker arm 1 to check if the rocker arm and cam can rotate freely and return.



Timing Sprocket Inspection

Inspect camshaft timing sprocket for wear or damage. Replace the whole set (camshaft timing sprocket and timing chain) if worn or damaged.

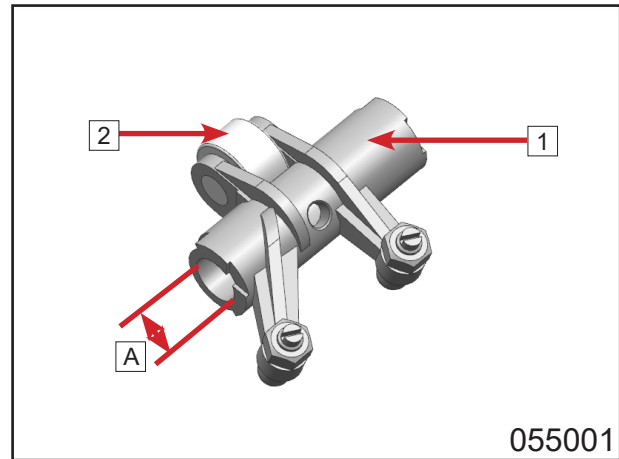


Rocker Arm Inspection

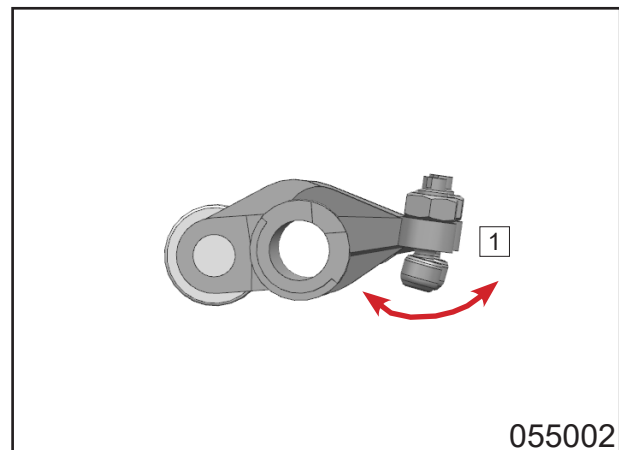
Inspect every rocker arm [1] for cracks or scratches. Replace if any defect is found. Inspect rocker arm idler wheel [2] for smooth rotation, damage or large radial run-out. Replace if necessary. Measure rocker arm inner diameter [A]. Replace if beyond service limit.

Rocker arm inner diameter	
New	12.000mm~12.018mm (0.4724in~0.4731in)
Service limit	12.030mm (0.4736in)

Inspect adjusting screw for free movement, cracks and large run-out. Inspect washers, seal rings and dowel pins for damage. Replace if damaged.



055001

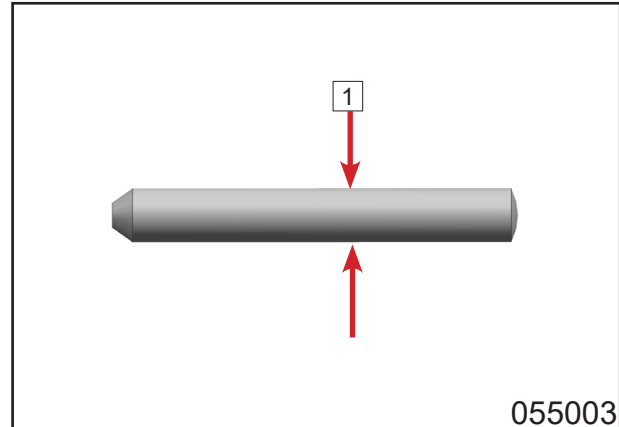


055002

Rocker Arm Shaft

- Inspect every rocker arm shaft [1] for wear and scratches. Replace if it does.
- Measure rocker arm shaft diameter [1].

Rocker arm shaft diameter [1]	
New	11.973mm~11.984mm
Service limit	11.960mm



055003

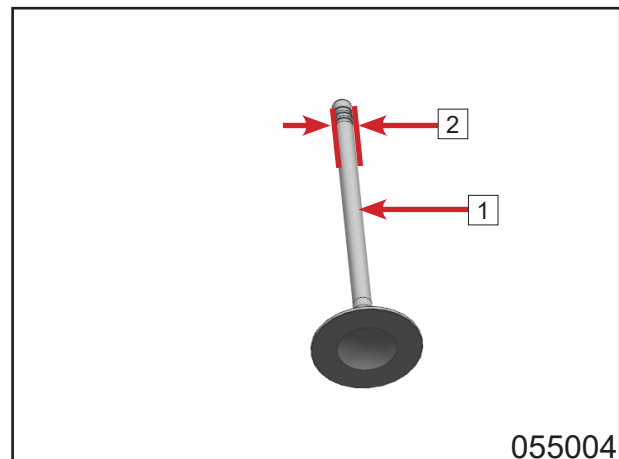
Valve Stem Seal Ring

NOTE: Replace with new valve stem seal rings during installation. The removed seal rings are sorted for waste disposal.

Valve Inspection

Inspect valve stem [1] for abnormal wear or bending. Replace if it does.

Valve stem roundness (diameter difference) [2] (intake valve and exhaust valve)	
New	0.005 mm
Service limit	0.06 mm



055004

Valve stem diameter ²	
Exhaust valve	
New	4.955mm~4.970 mm
Service limit	4.930 mm
Intake valve	
New	4.965mm~4.980 mm
Service limit	4.930 mm

Valve Guide

Inspect valve guide inner diameter ¹. Replace along with cylinder head if beyond service limit or worn.

Valve guide inner diameter ¹ (intake valve and exhaust valve)	
New	5.000mm~5.012mm
Service limit	5.045 mm

NOTE: Clean valve guide deposit before measurement.

Valve Bevel and Valve Seat

Inspect valve bevel ² and valve seat ¹ for being burnt or sunk. Replace valves or cylinder head if necessary.

Apply some grinding agent on valve bevel. Grind valve with grinding tool (refer to the following valve guide section).

NOTE: Make sure valve seats are qualified. Apply some identification agent to inspect valve contacting area condition.

Grind the valve until the sealing between valve and seat is qualified.

NOTE: The remained grinding agent has to be cleaned.

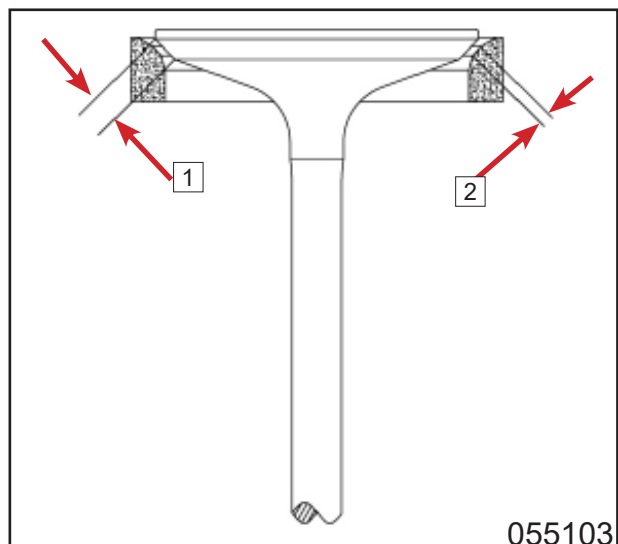
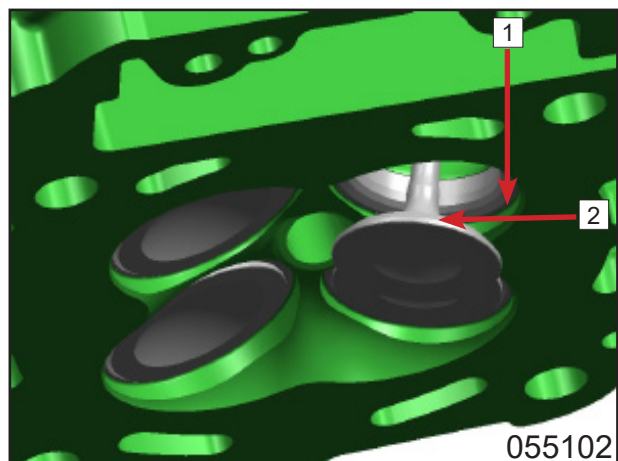
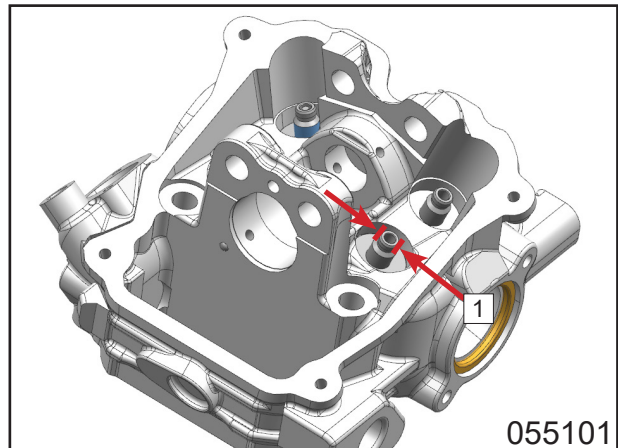
Measure valve bevel width ¹ and contacting width ².

NOTE: The contacting area should be at the center of valve seat.

Measure spring seat width.

Spring seat contacting width	
Exhaust valve	
New	1.20 mm~1.40 mm
Service limit	1.80 mm
Intake valve	
New	1.10 mm~1.30 mm
Service limit	1.70 mm

If the valve seat contacting width is beyond service limit or has dark spots, replace cylinder head.



Valve Spring

Inspect valve spring for visible damage.
Replace if it does.

Inspect valve spring free length 1.

Valve spring free length 1	
New	40mm
Service limit	38.2mm

Replace valve spring if beyond service limit.

Measure spring gradient. Replace if beyond standard.

Spring gradient standard: 2°

Use spring scales 1 or other device to measure the spring force when the spring 2 is compressed to certain length. Replace if the force is beyond standard.

Valve spring force standard (intake and exhaust): 200.5 N~235.5 N when compressed to 33 mm

Valve spring force standard (intake and exhaust): 531 N~587 N when compressed to 23 mm

Thermostat and Coolant Temperature Sensor

Remove thermostat and inspect the valve 1 at room temperature.

Replace with a new thermostat if the valve opens.

Coolant temperature sensor inspection and maintenance refers to Electrical chapter. Replace with new parts if damaged.

For valve open temperature inspection, hang thermostat A into the container full of water. Heat the water slowly.

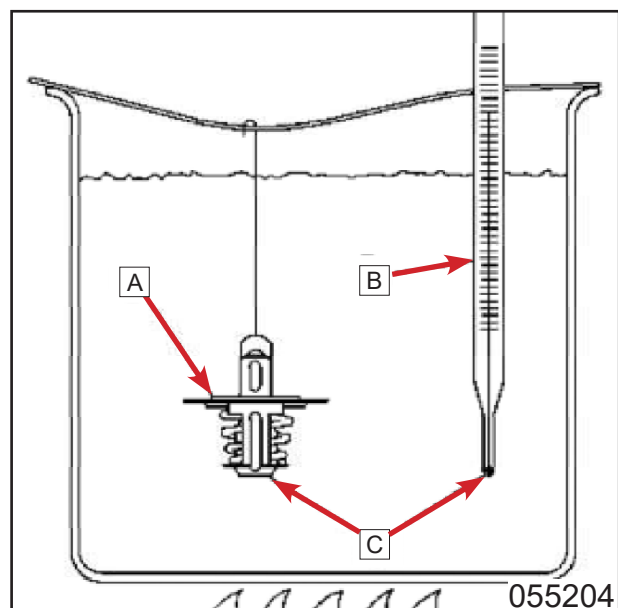
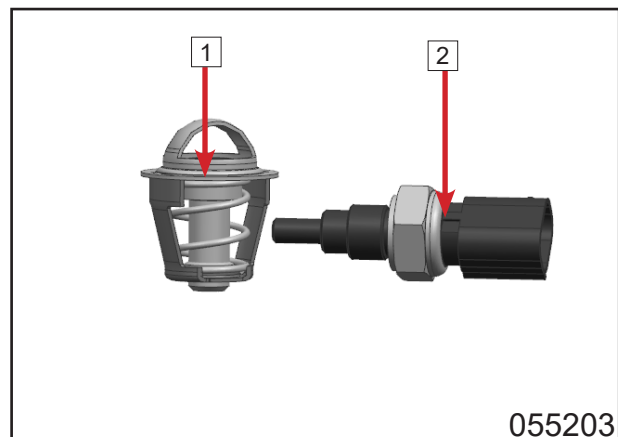
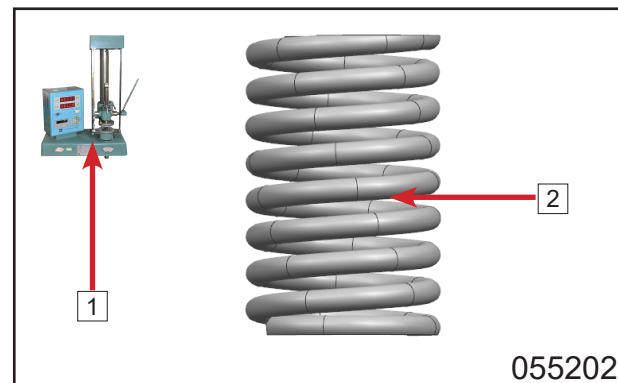
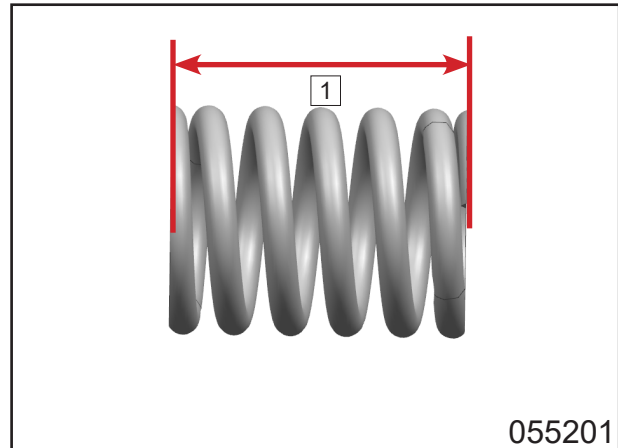
The thermostat should be fully immersed without touching container wall and bottom. Hang a thermometer B at the same level without touching wall and bottom either. Then the thermal position C is the same.

Replace with a new thermostat if beyond standard.

Thermostat valve open temperature:

Open temperature: 63°C~67°C

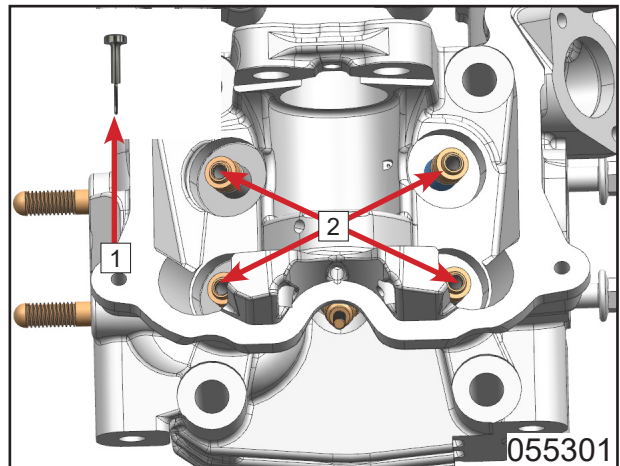
Fully open temperature: 85°C, lift range≥5.0



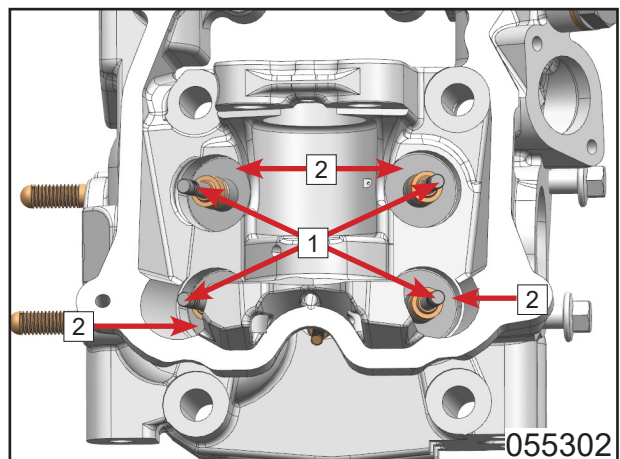
Cylinder Head Assembly

Clean every part and wipe with dust-free paper before assembly.

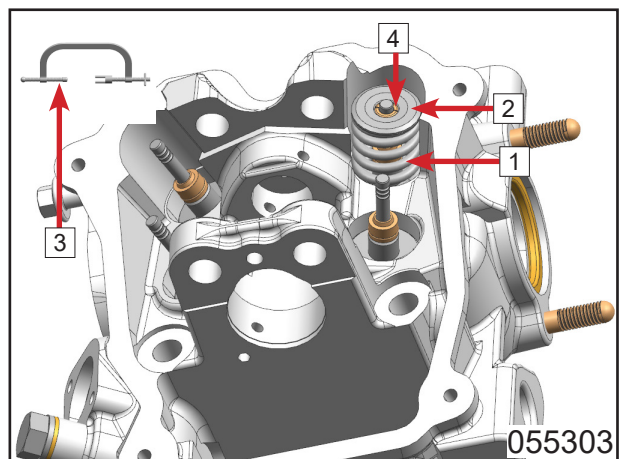
Use special tool: Valve Stem Seal Ring Installer **1** with some grease to put the new seal rings **2** on valve guides.



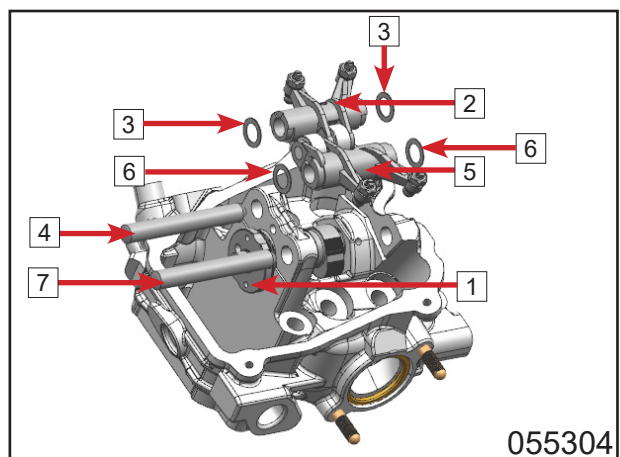
Install valve stems **1**.
Install valve spring seats **2**.



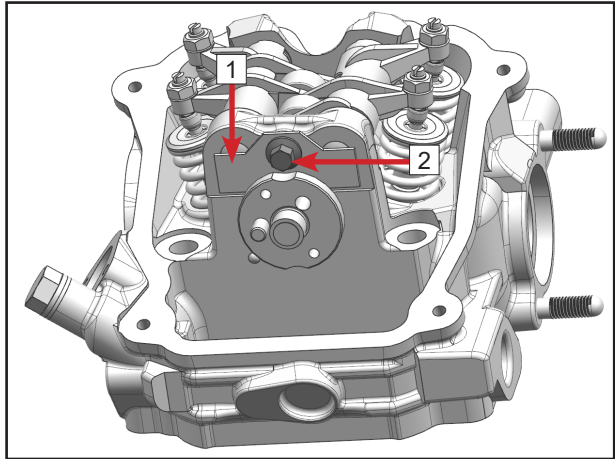
Install valve spring **1**.
Put valve spring upper seat **2** in place.
Use special tool: Valve Spring Compressing Clamp **3** to compress spring. Put two valve lock clips **4** into the groove of valve stem with tweezers. Loosen the tool.



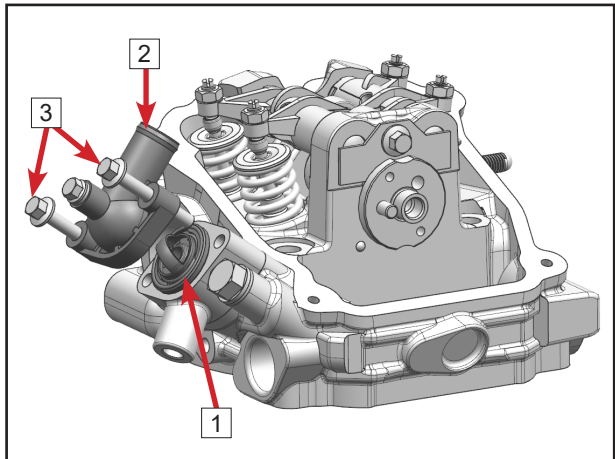
Apply some engine oil on every camshaft **1** journal.
Rotate camshaft **1** to proper position to install camshaft.
Install air intake rocker arm assembly **2**.
Install washers **3**.
Install rocker arm shaft **4**.
Install air exhaust rocker arm assembly **5**.
Install washers **6**.
Install rocker arm shaft



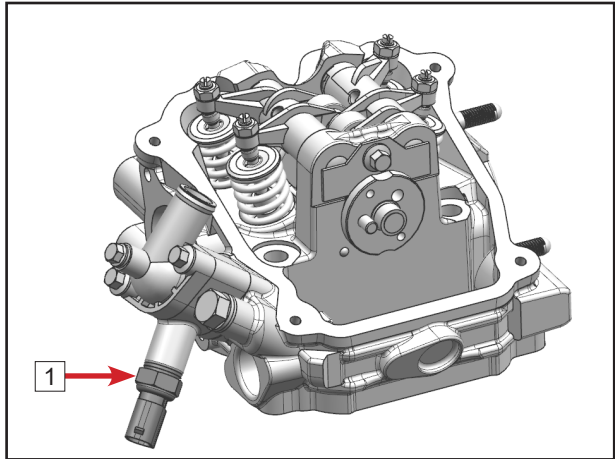
Install camshaft limit plate **2**.
Install M6×12 bolt **3** with 243 thread locker.
Tighten torque: 10N·m



Install thermostat **1**.
Install thermostat cap **2**.
Install M6×45 bolts **3**.
Tighten torque: 7N·m



Install coolant temperature sensor **1**.



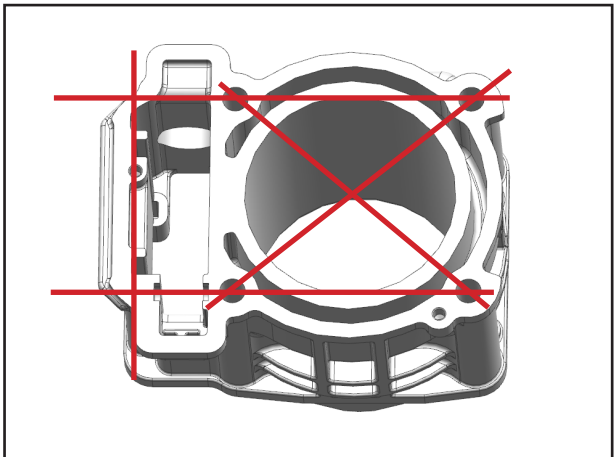
5.5.3 Cylinder Body

Cylinder Body Deformation

Inspect cylinder sealing surface flatness with knife-edge ruler and filler gauge at 7 positions as picture shows. Record each value. Replace cylinder if beyond service limit.

Cylinder sealing surface flatness service limit: 0.05 mm

Tool: knife-edge ruler, filler gauge



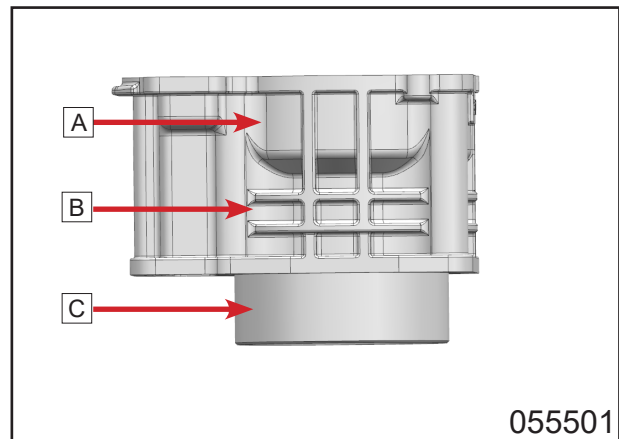
Cylinder Taper

Measure cylinder body inner diameter. Replace cylinder body and piston rings if it is beyond service limit.

Measure cylinder inner diameter at 3 recommended positions.

Cylinder body inner diameter standard: 90.99mm~91.01mm

Tool: Cylinder bore gauge



5.5.4 Timing Chain Tensioner

Remove screw [1].

Remove o-ring [2].

Inspect tensioner for damage and abnormal work. Replace if necessary.

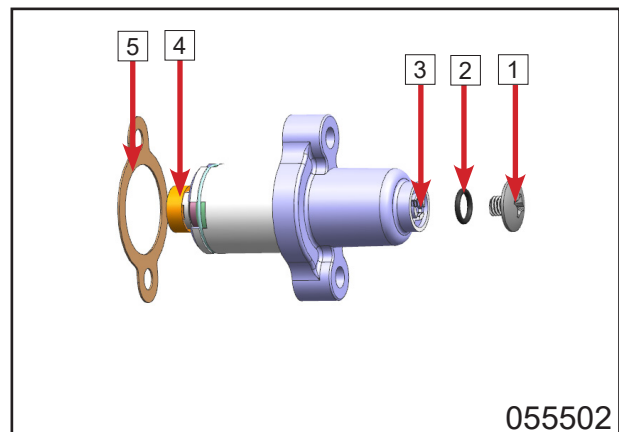
Inspection method:

1. Rotate adjusting screw clockwise with screw driver through hole [3]. And compress the tensioner arm [4] to the end with hand.

2. Loosen screw driver and tensioner arm [4] slowly. Make sure it returns gently. Replace if not.

Inspect tensioner arm [4] for abnormal function or scratches. Replace if it does.

Replace with new gasket [5] during installation.



5.5.5 Piston

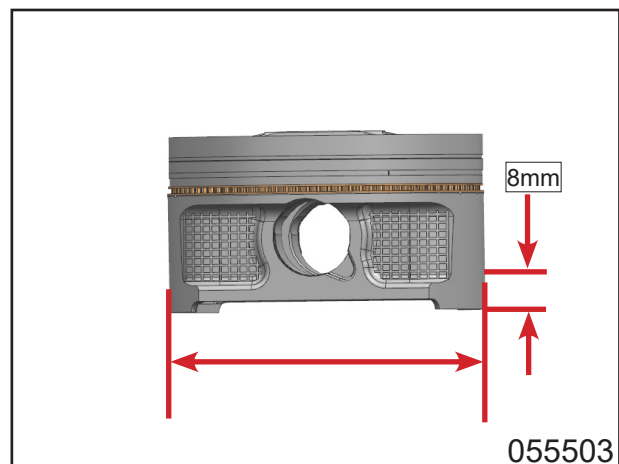
Piston Diameter

Inspect piston for scratches, cracks or other damage. Replace if necessary.

Measure piston at 8mm (0.315in) vertically (90°) to piston pin with a micrometer.

The measuring value should be within service limit. Replace if not.

Piston size	
New	90.950mm~90.970 mm
Service limit	90.85 mm



Piston Ring to Groove Clearance

Use a feeler gauge to measure each ring/piston groove clearance. Replace piston and piston rings if beyond service limit.

First ring: 0.15mm

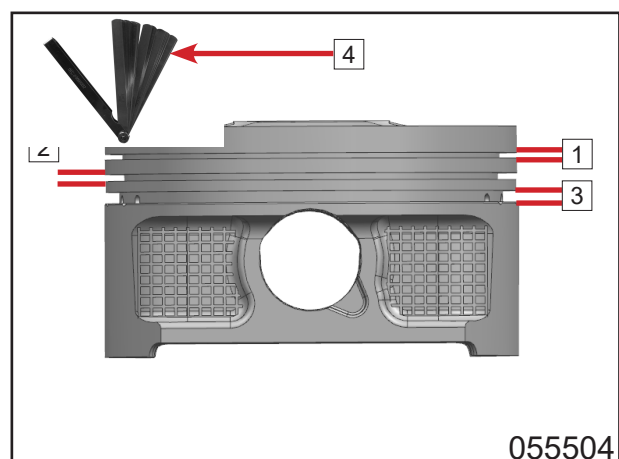
Second ring: 0.15mm

Piston Groove Width Standard

First ring: 1.21mm~1.23mm

Second ring: 1.51mm~1.53mm

Oil ring: 2.50mm~2.52mm

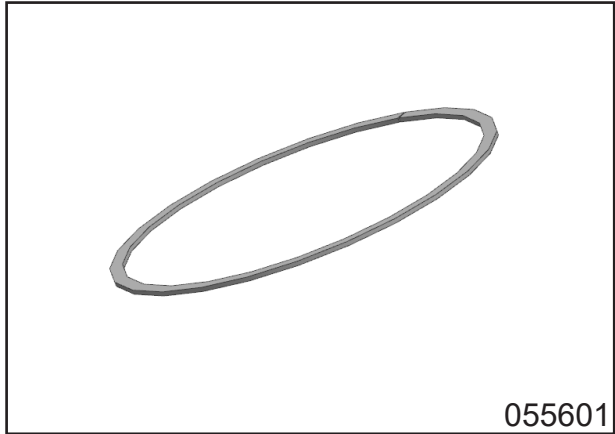


Piston Ring Thickness Standard

First ring: 1.21mm~1.23mm

Second ring: 1.47mm~1.49mm

Tool: Filler gauge, micrometer(0~25mm)



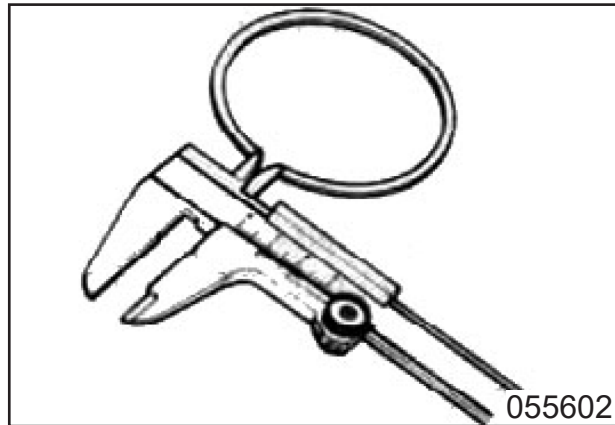
Piston Ring Free Gap and End Gap

Measure each piston ring free gap with vernier caliper before installation. After installation, measure the piston ring end gap. Replace piston rings if gap value is beyond service limit.

Piston ring free gap service limit:

First ring: 8.9mm

Second ring: 9.5mm

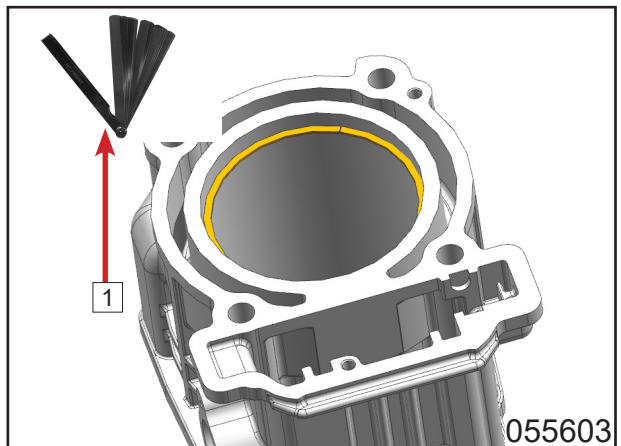


Piston ring end gap service limit:

First ring: 1.5mm

Second ring: 1.5mm

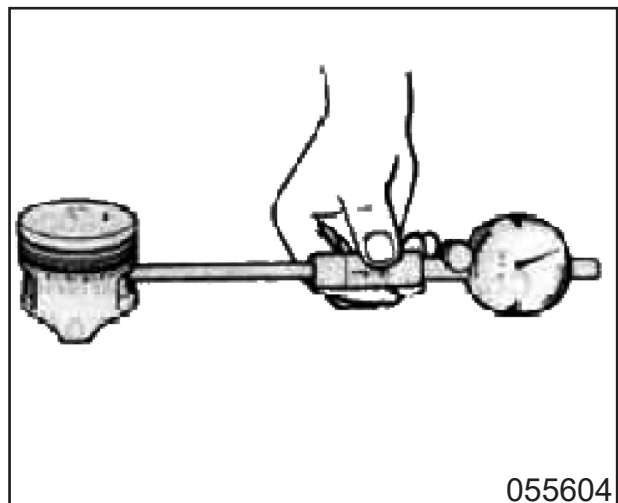
Tool: vernier caliper, filler gauge 1



Piston Pin and Pin Hole

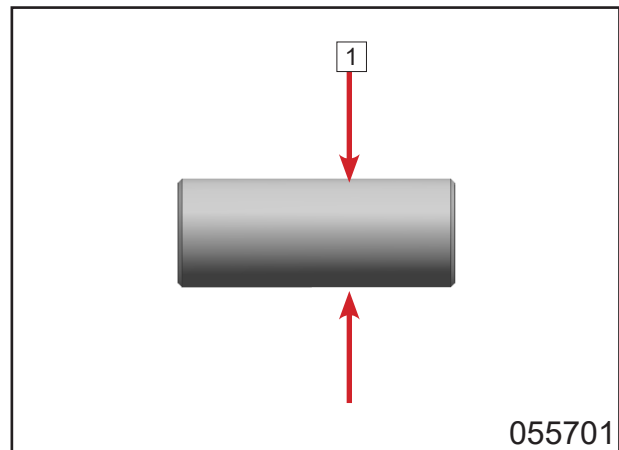
Measure piston pin hole inner diameter with dial bore gauge and outer diameter with micrometer. Replace piston and piston pin together if beyond service limit.

Piston pin hole service limit: 22.030 mm



Measure piston pin outer diameter [1] with micrometer at three measuring points.
Outer diameter service limit: 21.980 mm

Tool: Dial bore gauge (18mm~35mm),
micrometer (0~25mm)



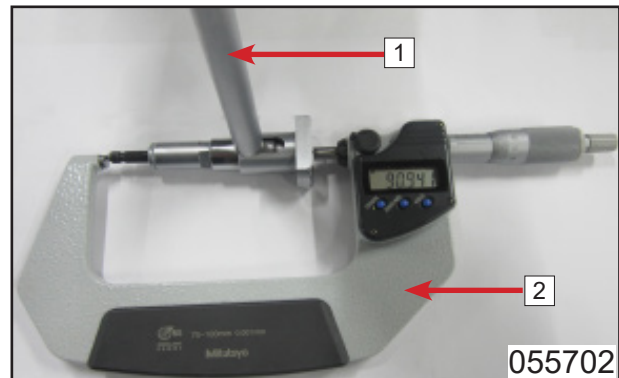
Piston/Cylinder Clearance

Adjust and lock micrometer [2] to the piston dimension.

With the micrometer set to the dimension, adjust a cylinder bore gauge [1] to the micrometer dimension and set the indicator to 0(zero).

Position the dial bore gauge above cylinder base, measure perpendicularly (90°) to piston pin axis.

Read the measurement on the cylinder bore gauge. The result is the exact piston/cylinder wall clearance.



Piston/cylinder body clearance	
New	0.040mm~0.060 mm
Service limit	0.100 mm(0.0040 in)

NOTE: Make sure the piston is not worn. Replace with a new piston to measure the clearance again if beyond service limit.

NOTE: Make sure the cylinder bore gauge indicator is set exactly at the same position as with the micrometer. Otherwise, the reading will be false.

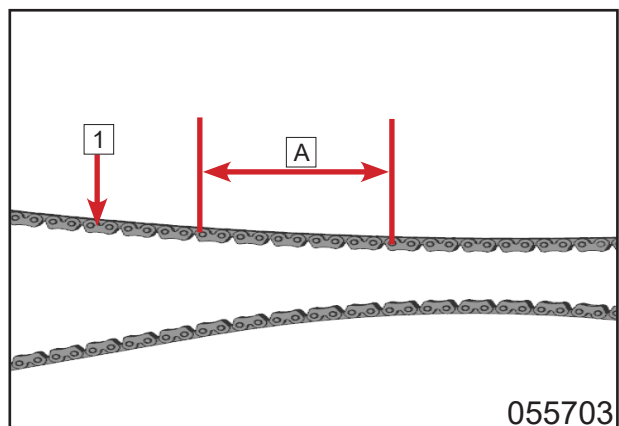
5.5.6 Timing Chain

Inspect timing chain [1] radial clearance on timing sprocket.

Inspect chain contacting area for severe wear. Replace the whole set (timing sprocket and timing chain) if severely worn.

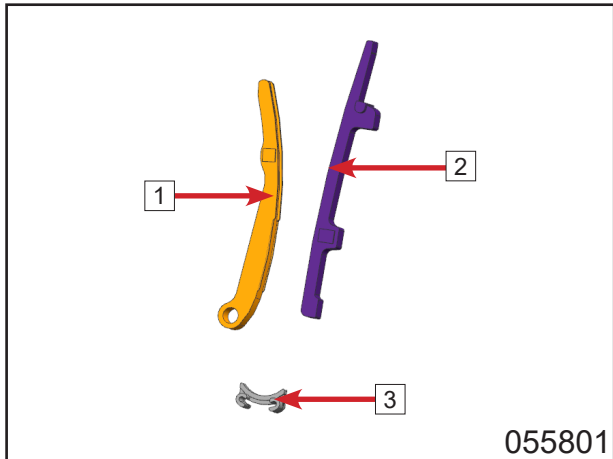
Distance [A] range between Pin1 to Pin11 on chain: 63.5mm~64.1mm

Replace if beyond distance range.



5.5.7 Tension Plate, Chain Guide and Chain Guard

Inspect tension plate **1** for damage, aging or other defects. Replace if necessary.
Inspect chain guide **2** for damage, aging or other defects. Replace if necessary.
Inspect chain guard **3** for damage, aging or other defects. Replace if necessary.

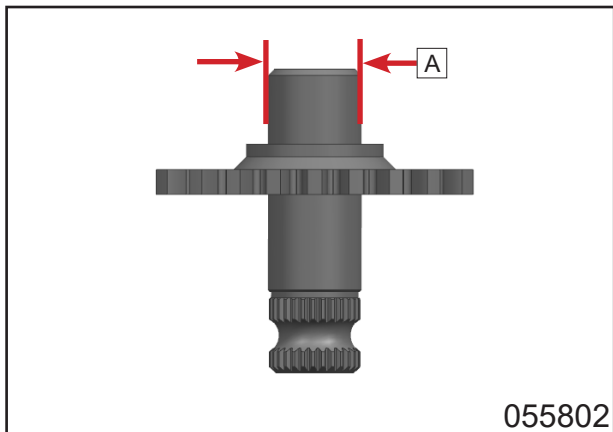


5.5.8 Shift Gear Assembly

Drive Sector Gear

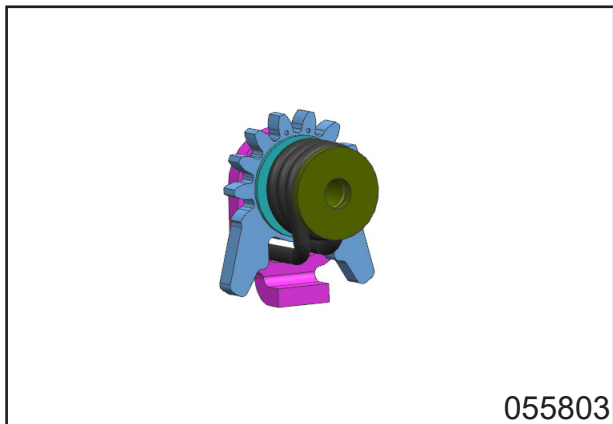
Inspect drive sector gear for cracks or other damage. Replace if necessary.
Measure gear shaft diameter **A** with vernier caliper. Replace if beyond service limit.

Diameter service limit: 14.950 mm



Driven Sector Gear

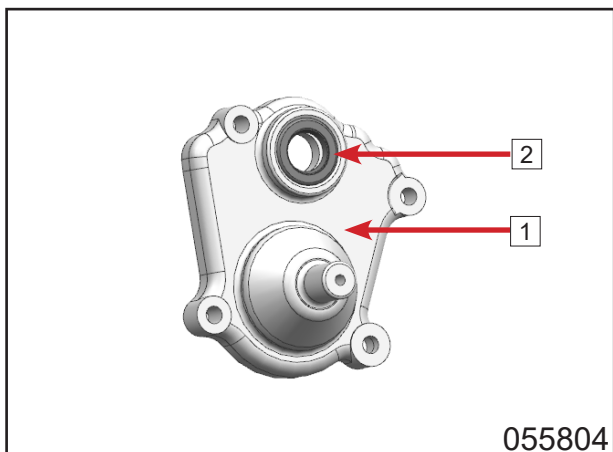
Inspect driven sector gear for defects. Replace if necessary.



5.5.9 Gearshift Cover

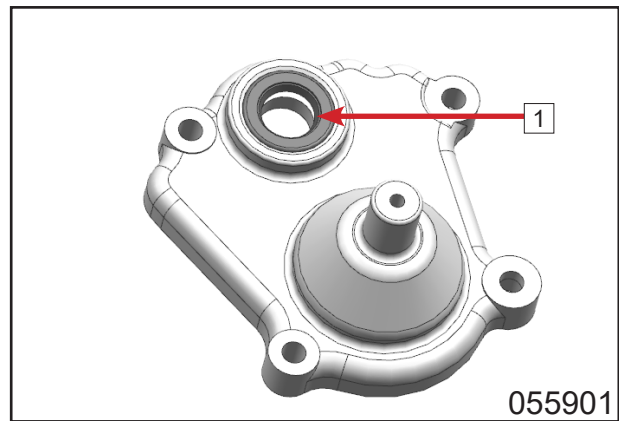
Inspect gearshift cover **2** for cracks, damage or other defects. Repair or place with a new one if necessary.

Inspect oil seal **3** for damage or oil leaking. Replace if any defect is found.



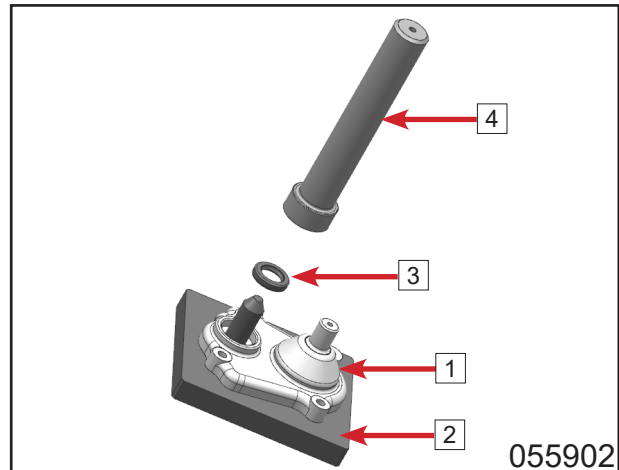
Oil Removal

Use appropriate tool to remove oil seal [1].



Oil Seal Installation

Put gearshift cover [1] on special tool: Oil Seal Cushion Block [2].
Use special tool: SD15×25×5 Oil Seal Installer [4] to install oil seal [3].

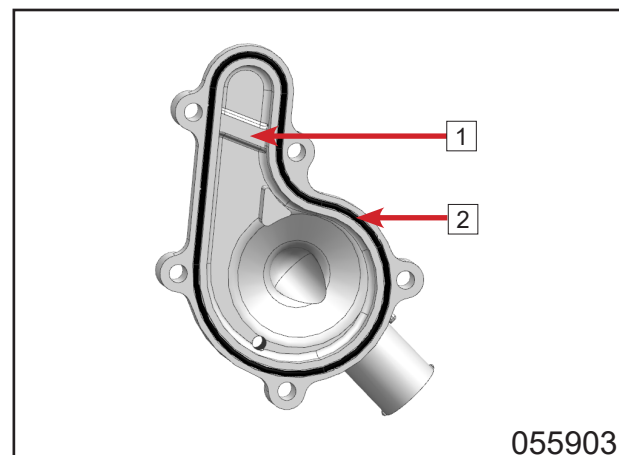


5.5.10 Water Pump Assembly

Water Pump Cover

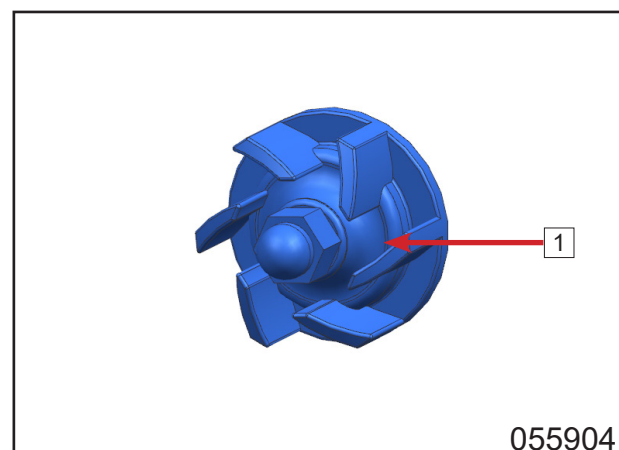
Inspect water pump cover [1] for cracks, damage or other defects. Replace if necessary.

Inspect water pump seal ring [2] for hardening, break or other damage. Replace if necessary.



Water Pump Impeller

Inspect water pump impeller [1] for damage. Replace if necessary.



CFMOTO

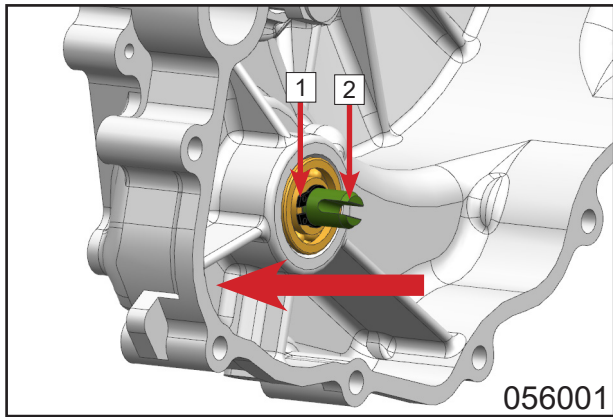
Water Pump Gear, Shaft, Oil Seal and Water Pump Gear, Shaft, Oil Seal and Bearing

Disassembly

Remove circlip **1** with pliers.

Remove water pump shaft **2** along the arrow direction.

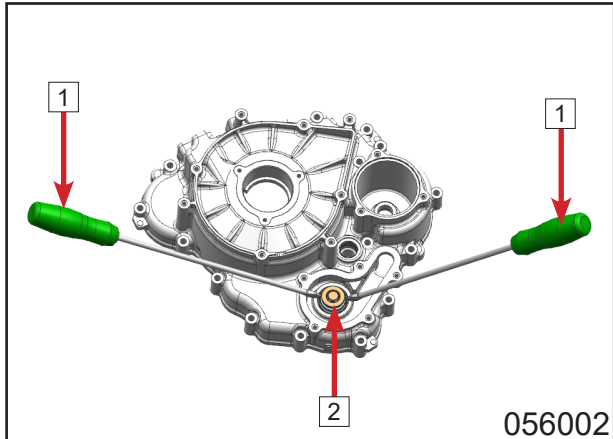
NOTE: The removed circlip is sorted for waste disposal. Replace with a new one during installation.



Wrap off water seal stable ring **2** with two screw drivers **1**.

NOTE: If there is no defect on water seal stable ring, it is not necessary to remove it.

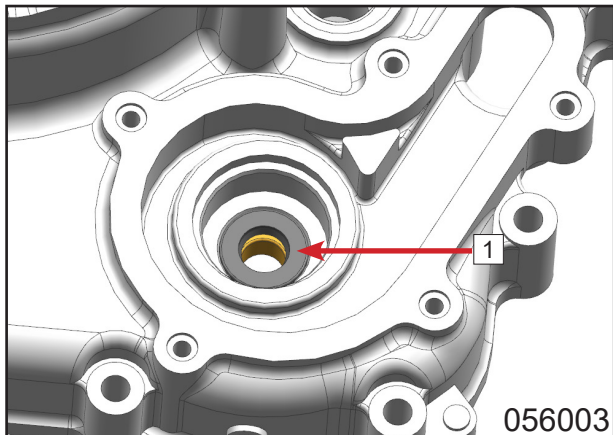
⚠ WARNING: The removed water seal is sorted for waste disposal. Replace with a new one during installation.



Remove oil seal **1** with a screw driver.

NOTE: If there is no defect on oil seal, it is not necessary to remove it.

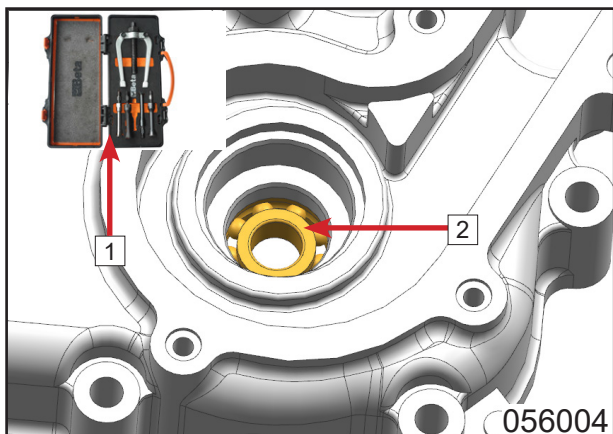
⚠ WARNING: The removed oil seal is sorted for waste disposal. Replace with a new one during installation.



Use special tool: Bearing Remover **1** to remove bearing **2**.

NOTE: If there is no defect on bearing, it is not necessary to remove it.

⚠ WARNING: The removed bearing is sorted for waste disposal. Replace with a new one during installation.



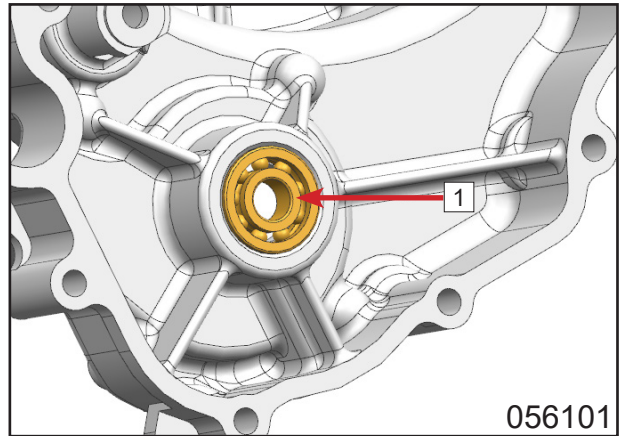
Inspection

Bearing

When bearing 1 is on water pump, inspect the bearing clearance.

Rotate bearing to inspect bearing for smooth and stable rotation and noise condition.

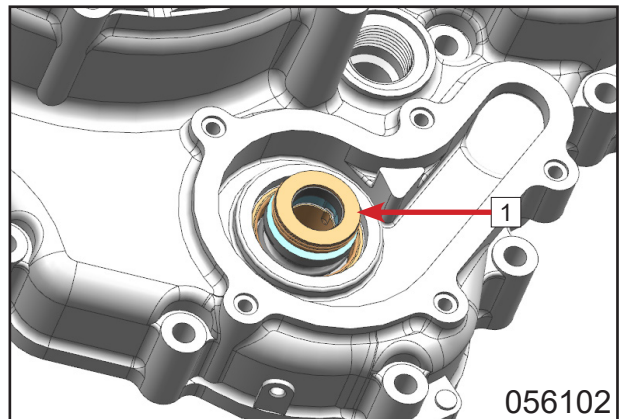
Replace with a new bearing if any defect occurs.



Water Seal Assembly

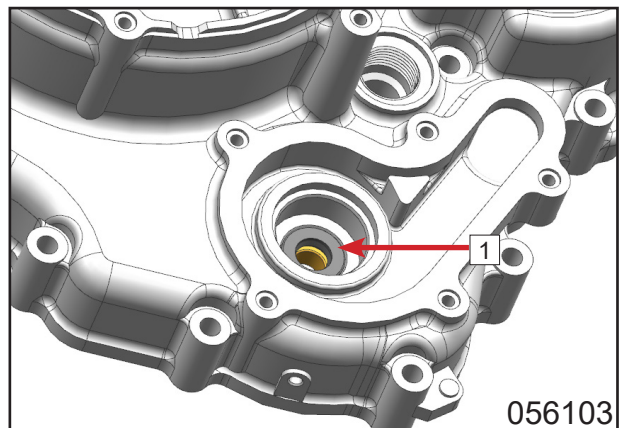
Inspect water seal assembly 1 for damage, leaking and sealing condition.

Replace if necessary.



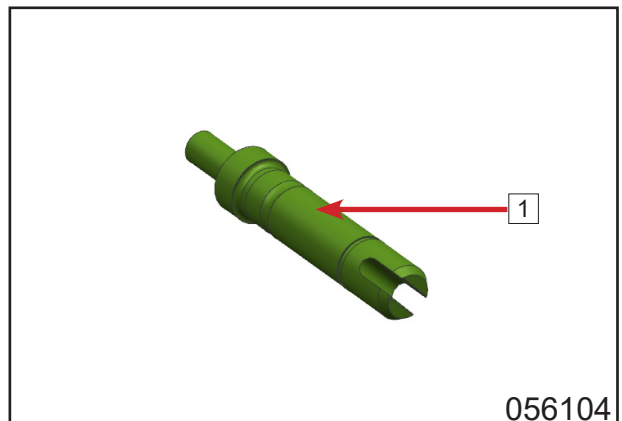
Oil Seal

Inspect oil seal 1, especially oil seal lip for damage. Replace if necessary.



Water Pump Shaft

Inspect water pump shaft. Replace if damaged.



CFMOTO

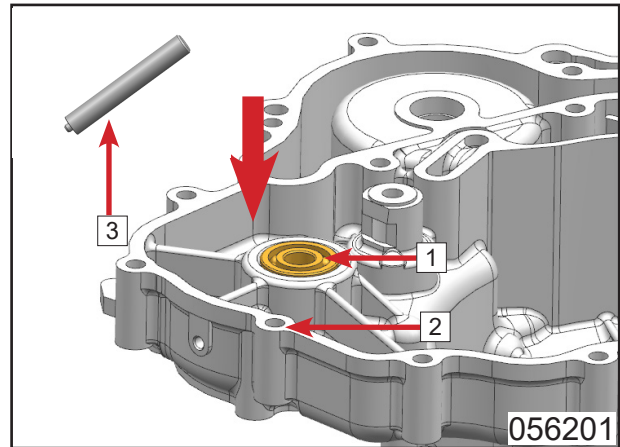
Assembly

Clean every part and wipe with dust-free paper before assembly.

Bearing

Apply some grease on water pump bearing hole 1 of MAG crankcase cover. Use special tool: Water Pump 6000 Bearing Installer 3 to install bearing on MAG crankcase cover 2.

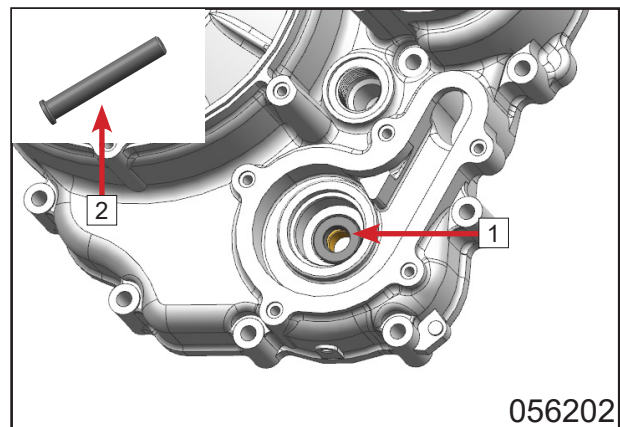
NOTE: Mark side of bearing should face outside.



Oil Seal

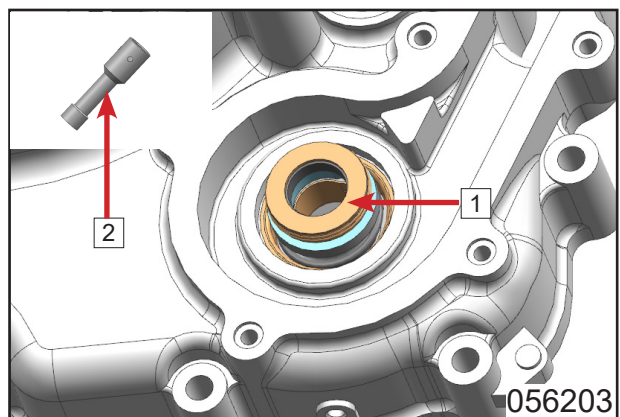
Apply 648 sealant on oil seal 1 outer surface and then compress it into MAG crankcase cover bearing hole with Water Pump Oil Seal Installer 2.

NOTE: Mark side of oil seal should face outside.



Water Seal Stable Ring

Apply KB598 sealant on water seal stable ring 1 outer surface and then compress it into MAG crankcase cover bearing hole with Water Seal Installer 2.

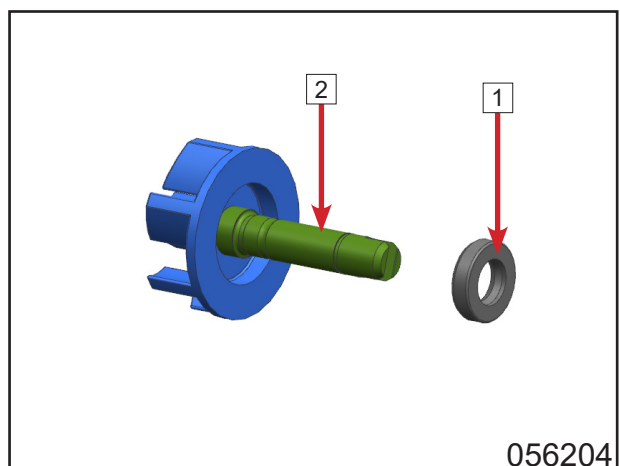


Water Seal Moving Ring and Water Pump Shaft

Wipe off grease and oil on water seal moving ring. Assemble it on water pump impeller.

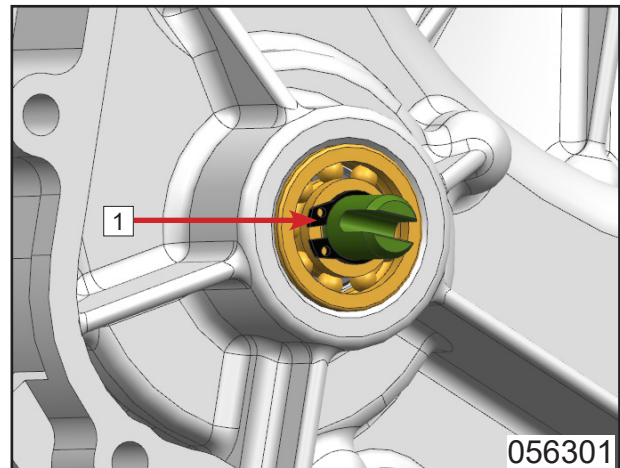
NOTE: "A" side of water seal moving ring should face towards water pump impeller.

Wipe water seal moving ring and stable ring surfaces with ethyl alcohol. Apply some grease on water pump shaft. Install water pump impeller assembly on MAG crankcase cover.



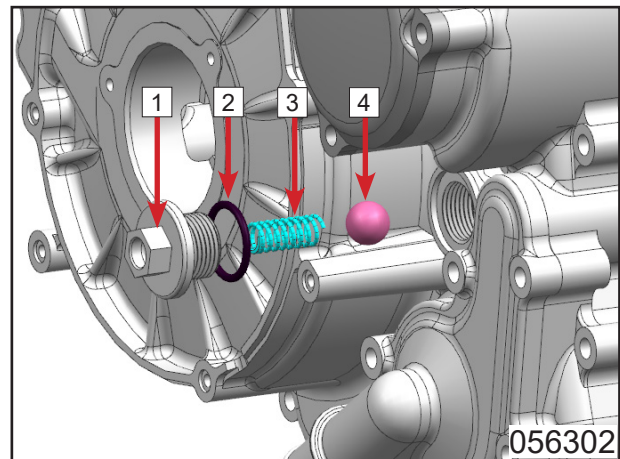
Install circlip **1** with pliers.

NOTE: The removed circlip is sorted for waste disposal. Replace with a new one during installation. The rounded side of the circlip **1** should face the bearing.



5.5.11 Relief Valve Disassembly

- Remove relief valve magneto end cap **1**.
- Remove o-seal ring **2**.
- Remove relief valve spring **3**.
- Remove steel ball **4**.



Inspection

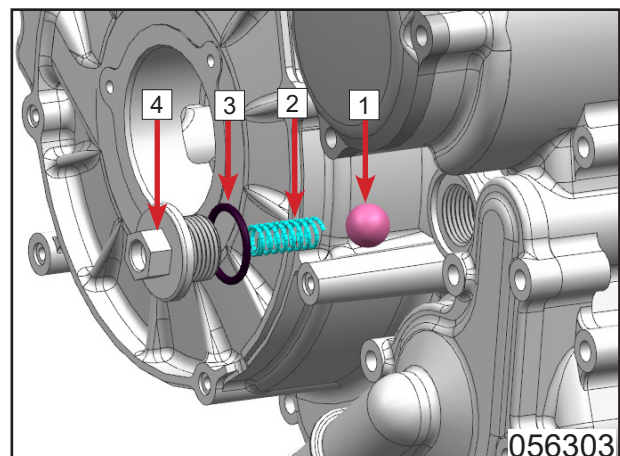
- Inspect steel ball, o-seal ring, relief valve magneto end cap for damage. Replace if damaged.
- Inspect relief valve spring free length. Replace if beyond service limit.

Spring free length	
New	24.1mm
Service limit	23mm

Assembly

Clean every part and wipe with dust-free paper before assembly.

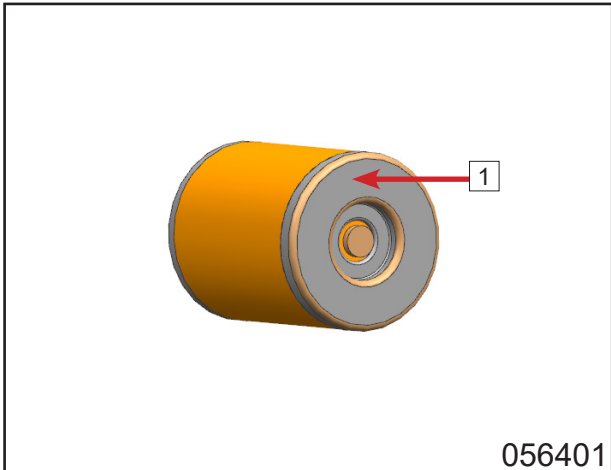
- Install steel ball **1**.
 - Install relief valve spring **2**.
 - Put o-seal ring **3** on magneto end cap **4**.
 - Install relief valve magneto end cap **4**.
- Tighten torque: 20N·m



5.5.12 Oil Filter Element

Replace with a new oil filter element **1**.

NOTE: Replace with a new oil filter element **1 after removal.**



5.5.13 Overriding Clutch

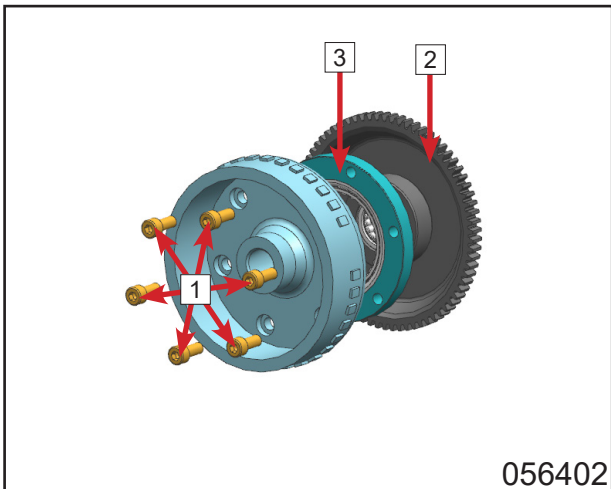
Disassembly

Remove driven gear **2**.

Remove M8 inner hex bolts **1**.

Remove overriding clutch **3**.

NOTE: If there is no defect on overriding clutch, it is not necessary to remove it.

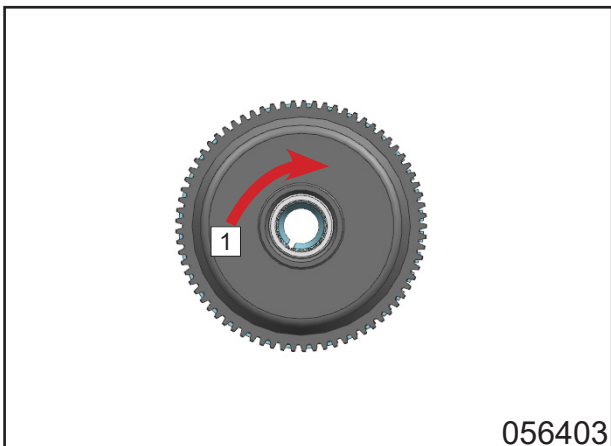


Inspection

Inspect overriding clutch function. Rotate driven gear in overriding clutch.

Inspect overriding clutch and clutch housing for wear or other damage.

NOTE: The clock-wise rotation of overriding clutch must be locked. Replace the clutch, housing and gears together if damaged.



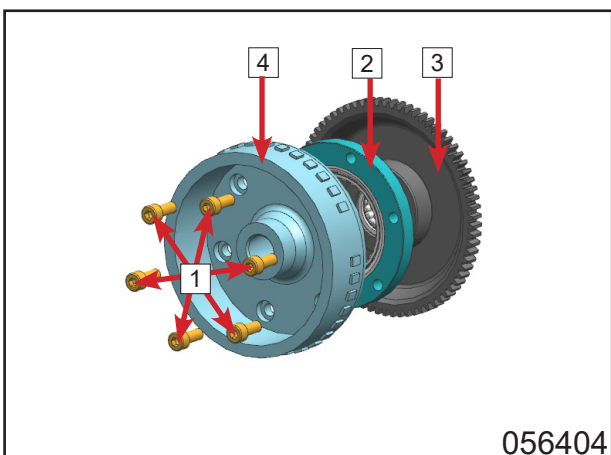
Assembly

Clean every part and wipe with dust-free paper before assembly.

Install overriding clutch **2** on magneto rotor **4**. Install bolts **1** (with 243 thread locker) and tighten them in criss-cross way.

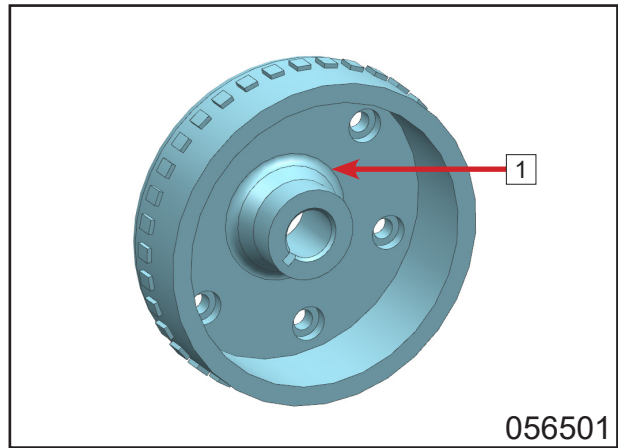
Tighten torque: 26 ± 2 N·m

Install driven gear **3**.



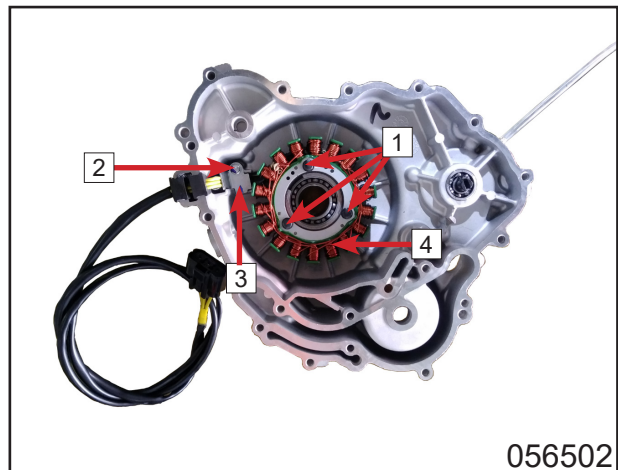
5.5.14 Magneto Rotor

Inspect rotor **1** inside for scratches or other damage;
 Inspect rotor **1** key grooves for wear or other damage;
 Inspect rotor **1** outer trigger teeth for slant or other damage;
 Inspect woodruff key and key grooves on crankshaft for wear or other damage;
 Replace if any defect above is found.



5.5.15 Magneto Stator Disassembly

Remove M6 bolts **1**.
 Remove M6 bolts **2**.
 Remove press plate **3**.
 Remove magneto stator **4**.



Inspection

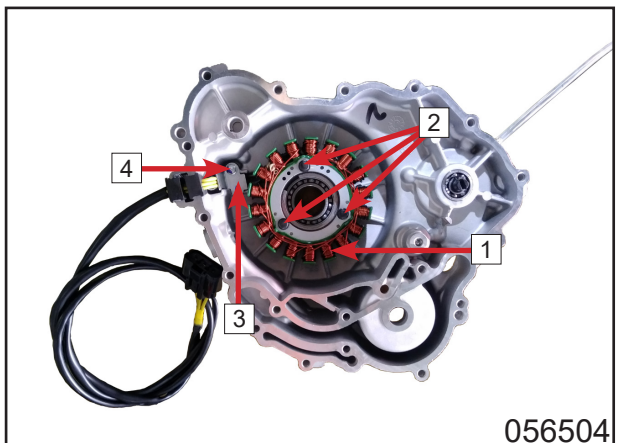
Inspect magneto stator **1**.
 Inspect stator **1** condition. Replace if damaged.
 Inspect metal coil for aging, break or other damage. Replace if any defect is found.



Assembly

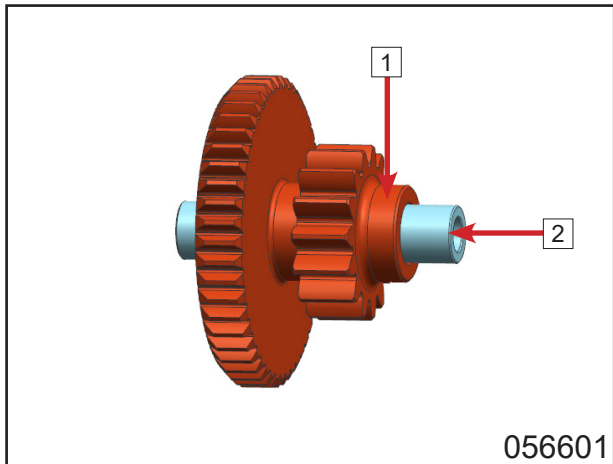
Clean every part and wipe with dust-free paper before assembly.

Install magneto stator **1**.
 Install M6×30 bolts **2** with thread locker.
 Tighten torque: 15~17N·m
 Settle wires and install press plate **3**.
 Install M6×10 bolts **4** with thread locker.
 Tighten torque: 10~12N·m



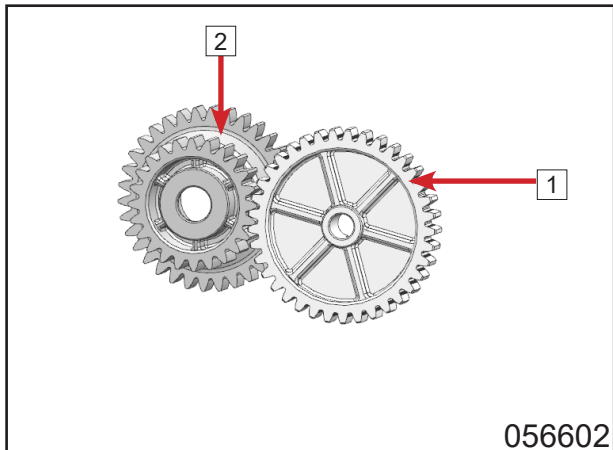
5.5.16 Starter Dual Gear

Inspect starter dual gear **1** for wear or damage. Replace if necessary.
 Inspect starter dual shaft **2** for wear or damage. Replace if necessary.



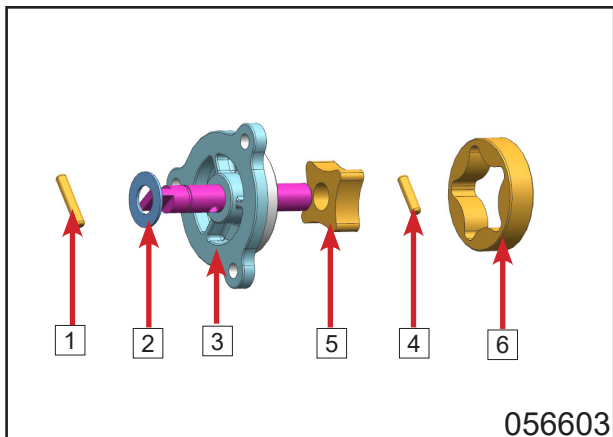
5.5.17 Oil Pump Drive Gear and Oil Pump Dual Gear

Inspect oil pump drive gear **1** teeth and surface for cracks or damage. Replace if any defect is found.
 Inspect oil pump dual gear **2** teeth and surface for cracks or damage. Replace if any defect is found.



5.5.18 Oil Pump Assembly

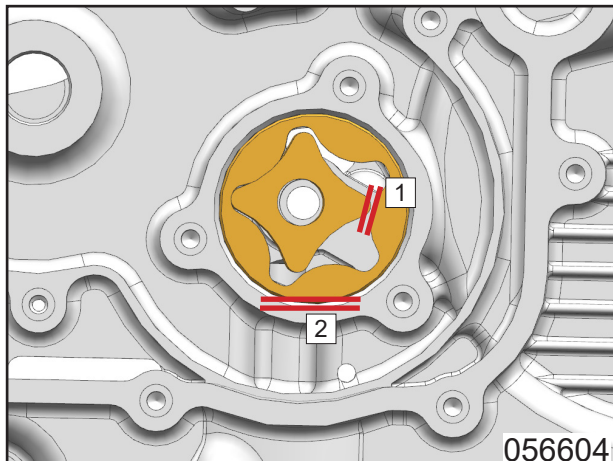
Inspect P4×21.8 roller needle **1**, washer **2**, oil pump cover **3**, P4×15.8 roller needle **4**, oil pump inner rotor **5** oil pump outer rotor **6**. Replace if any defect is found.



Measure bottom clearance **1** (between inner and outer rotor) and side clearance **2** (between outer rotor and crankcase). Replace oil pump if beyond service limit.

Bottom clearance **1**:
 Standard: 0.07mm~0.15mm
 Service limit: 0.2mm

Side clearance **2**:
 Standard: 0.03mm~0.10mm
 Service limit: 0.12mm



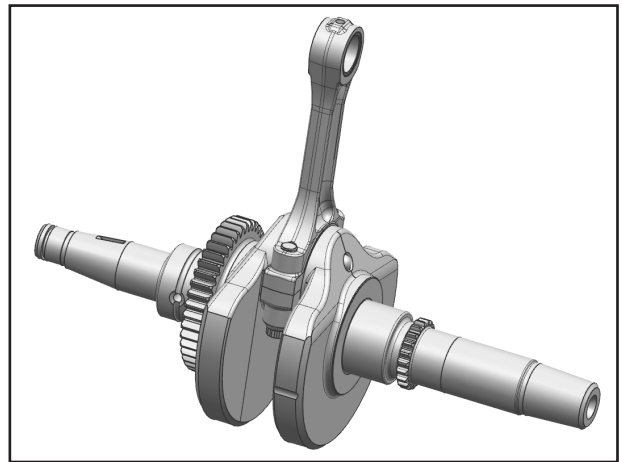
5.5.19 Crankshaft And Connecting Rod Inspection (191Q)

Crankshaft Inspection

Inspect each crankshaft journal for scratches, cracks or other damage. Replace if any defect is found.

NOTE: Replace if crankshaft sprocket or other parts damaged.

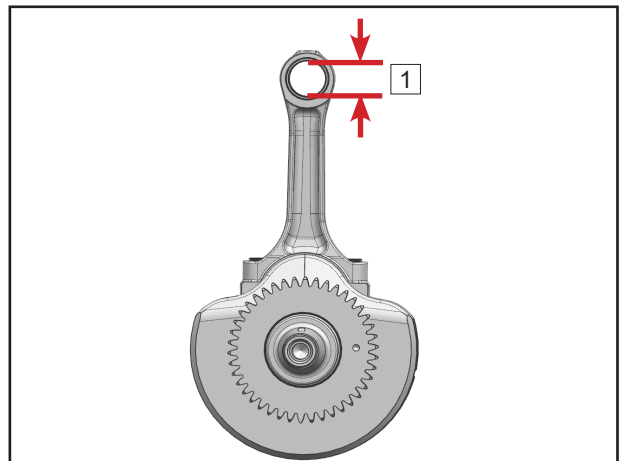
⚠ WARNING: Replace with new parts if the dimension is beyond service limit. Otherwise, it will damage the engine.



Connecting Rod Small End Inner Diameter

Measure connecting rod small end inner diameter [1] with percentile scale. Replace if beyond service limit.

Connecting rod small end inner diameter [1] service limit: 22.060mm
Tool: Percentile scale (18mm~35mm)



Crankshaft Axial Clearance

NOTE: Measure crankshaft axial clearance before disassemble MAG and PTO crankcase.

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

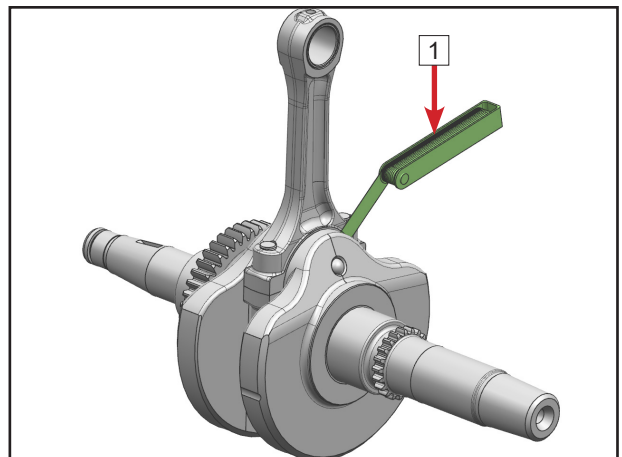
Crankshaft axial play	
New	0.050~0.45
Service limit	0.6mm

Replace with new crankcase or crankshaft if beyond service limit.

Connecting Rod Big End Axial Clearance

Use a filler gauge [1] to measure the clearance between connecting rod big end and crankshaft. Replace if beyond service limit.

Connecting Rod Big End Axial Clearance	
New	0.30~0.48
Service limit	0.7mm

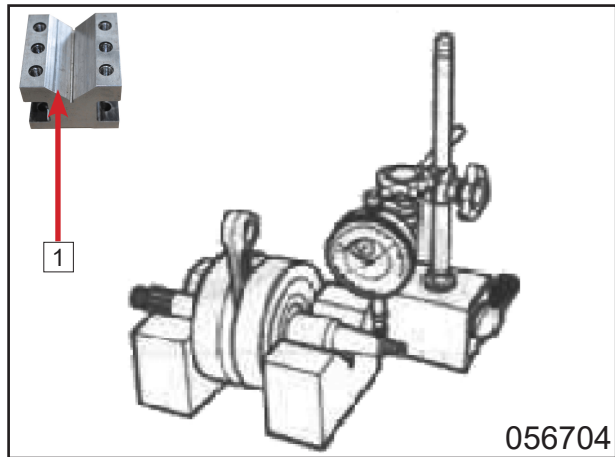


CFMOTO

Crankshaft Run-out

Put crankshaft connecting rod on V-block **1**. Rotate crankshaft slowly to measure crankshaft run-out with a dial indicator as shown in the image.

Crankshaft run-out service limit: 0.055mm
 Tool: Dial indicator, magnetic stand, V-block

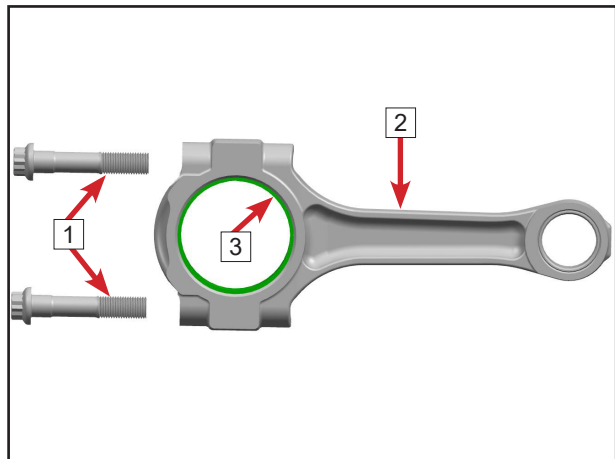


Connecting Rod Big End Radial Play

Remove connecting rod from crankshaft.

NOTE: Make sure the same marking of connecting rod to assemble together.

CAUTION: It is better to use new plain bearing **3 when removing connecting rod screws **1** and reinstalling connecting rod **2**.**

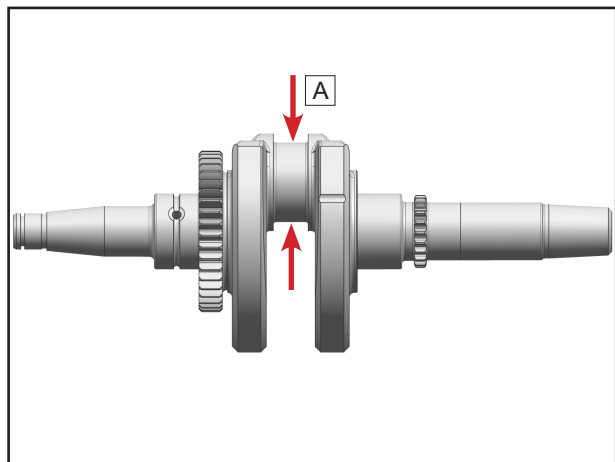


Measure the diameter **A** of crankpin and compare to inside diameter **B** of connecting rod big end.

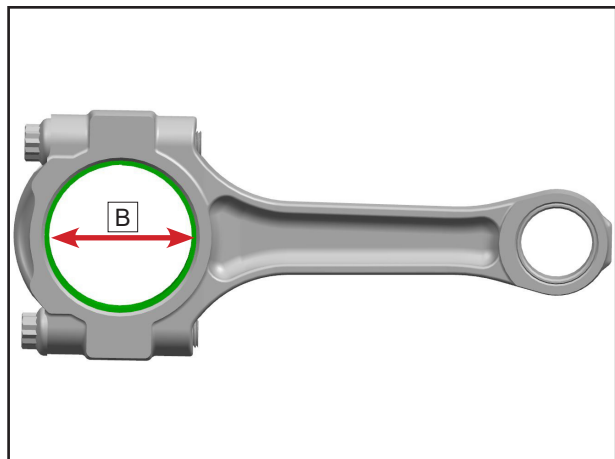
Assemble the bearing back as original condition.

Install screws of connecting rod, use below-mentioned methods and torque to tighten.

Measure inside diameter of connecting rod big end.



Diameter A of Crankpin	
New	43.934mm ~ 43.946mm (1.7297in ~ 1.7302 in)
Service limit	43.915mm(1.7289 in)
Connecting rod big end inner diameter B	
Service limit	44.03mm(1.7335 in)
Connecting rod big end radial clearance	
Service limit	0.09mm(0.0035 in)



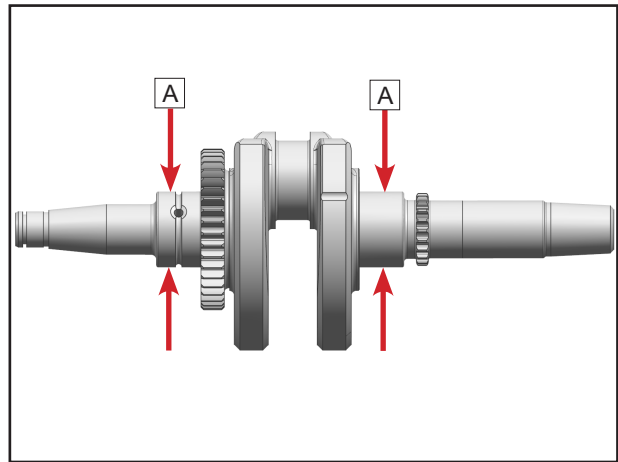
Crankshaft joint clearance

Main joint clearance

Measure the main joint diameter [A] and compare with the plain bearing inner diameter (see crankcase).

Crankshaft main joint diameter [A]	
New	41.960mm ~ 41.970mm (1.652in ~ 1.6524 in)
Service limit	41.935 mm(1.651 in)

Crankshaft main joint radial clearance	
Service limit	0.09mm(0.0035in)

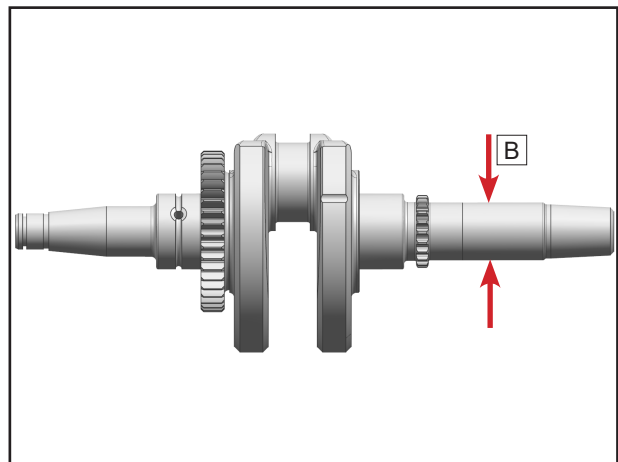


CVT case joint clearance

Measure the CVT joint diameter [B] on crankshaft.

Compare with the CVT case plain bearing inner diameter (see CVT case).

CVT joint diameter [B] on crankshaft	
New	31.960mm ~ 31.970mm (1.2583in ~ 1.2587 in)
Service limit	31.940 mm(1.2575 in)



Crankshaft / Connecting Rod Assemble

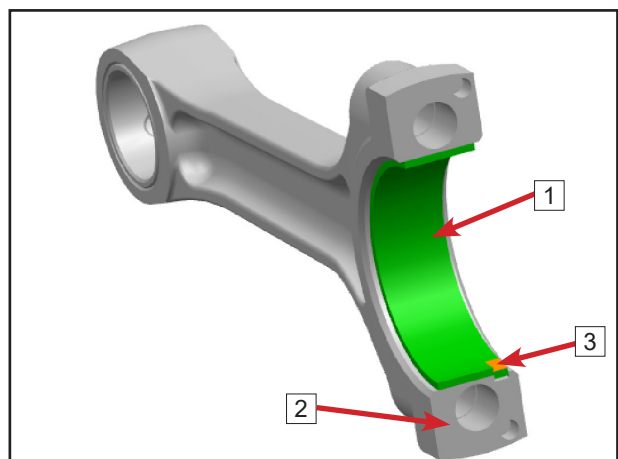
Follow the table below to assemble crankshaft, connecting rod and connecting rod plain bearing.

Inside Diameter of Connecting Rod Big End	Crankpin	Bearing of Connecting Rod
I	A	Black
II		Yellow
I	B	Red
II		Black

Crankshaft assembly procedure is the reverse of disassembly procedure. However, the following details should be noted.

When inside diameter of connecting rod big end is more than service limit, replace and use new connecting rod bearing.

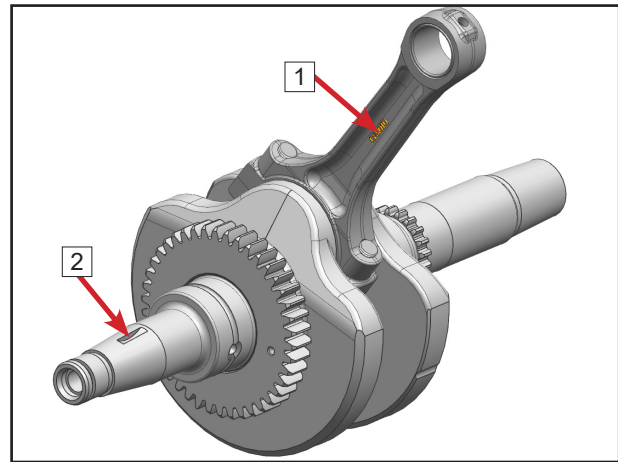
After installing bearing into big end of connecting rod, use compressed air to clean connecting rod split surface.



1. Plain Bearing of Connecting Rod Big End
2. Split Surface of the Connecting Rod
3. Nose of Plain Bearing in Line with Connecting Rod Groove

CFMOTO

NOTE: Oil inner surface of connecting rod plain bearing and crankpin surface before installation. The side with "CFMOTO" mark of connecting rod is facing to the key groove of crankshaft.



- 1. "CFMOTO" Mark
- 2. Key Groove

Screw of connecting rod should be tightened by following methods.

- Firstly torque to 10N.m (7.5lbf.ft).
DO NOT apply threadlocker.
- Then, torque to 20N.m (15 lbf.ft).
- Finally torque to 50N.m (35.25 lbf.ft).

⚠ WARNING: Improper installation will cause screw looseness and engine damage.

NOTE: Bearing of connecting rod big end and piston pin rotation cannot be changed.

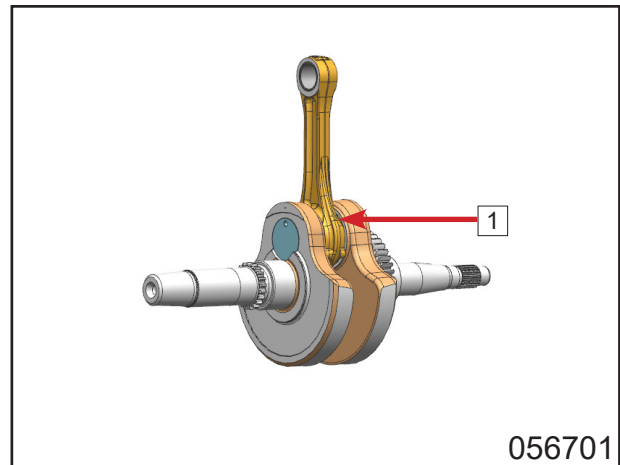
5.5.20 Crankshaft And Connecting Rod Inspection (191R)

Crankshaft Inspection

Inspect each crankshaft journal for scratches, cracks or other damage. Replace if any defect is found.

NOTE: Replace if crankshaft sprocket or other parts damaged. Connecting rod assembly 1 can't be disassembled. Replace the whole set if damaged.

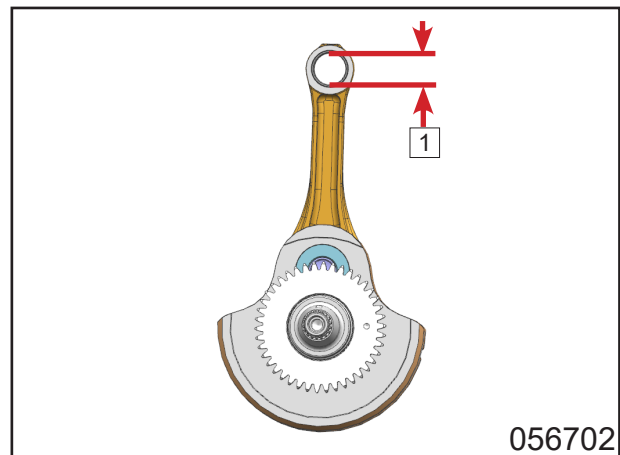
⚠WARNING: Replace with new parts if the dimension is beyond service limit. Otherwise, it will damage the engine.



Connecting Rod Small End Inner Diameter

Measure connecting rod small end inner diameter 1 with percentile scale. Replace if beyond service limit.

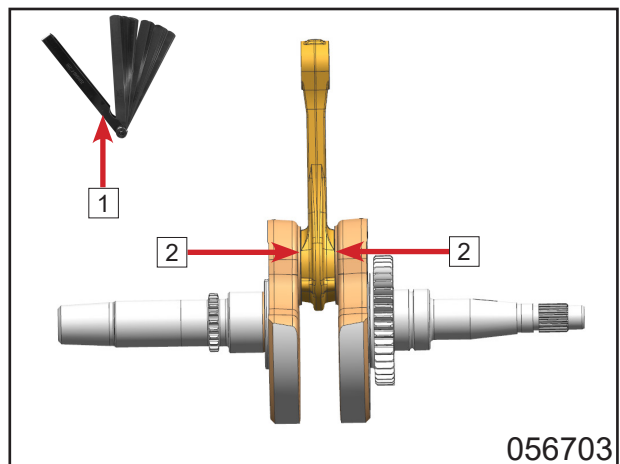
Connecting rod small end inner diameter 1 service limit: 22.060mm
Tool: Percentile scale (18mm~35mm)



Connecting Rod Big End Axial Clearance

Use a filler gauge 1 to measure the clearance 2 between connecting rod big end and crankshaft. Replace if beyond service limit.

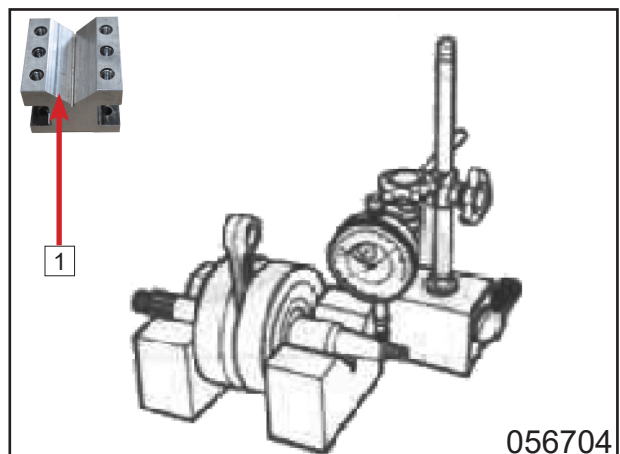
Connecting Rod Big End Axial Clearance	
New	0.100~0.450
Service limit	0.7mm



Crankshaft Run-out

Put crankshaft connecting rod on V-block 1. Rotate crankshaft slowly to measure crankshaft run-out with a dial indicator as shown in the image.

Crankshaft run-out service limit: 0.055mm
Tool: Dial indicator, magnetic stand, V-block



CFMOTO

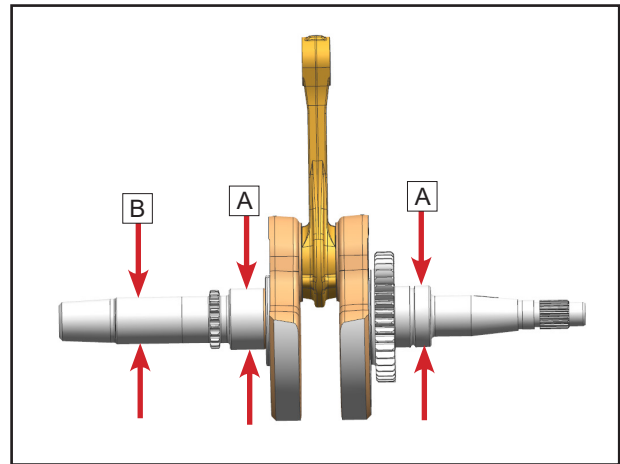
Crankshaft joint clearance

Main joint clearance

Measure the main joint diameter [A] and compare with the plain bearing inner diameter (see crankcase).

Crankshaft main joint diameter [A]	
New	41.960mm ~ 41.970mm (1.652in ~ 1.6524 in)
Service limit	41.935 mm(1.651 in)

Crankshaft main joint radial clearance	
Service limit	0.09mm(0.0035in)



CVT case joint clearance

Measure the CVT joint diameter [B] on crankshaft.

Compare with the CVT case plain bearing inner diameter (see CVT case).

CVT joint diameter [B] on crankshaft	
New	31.960mm ~ 31.970mm (1.2583in ~ 1.2587 in)
Service limit	31.940 mm(1.2575 in)

Crankshaft Axial Clearance

NOTE: Measure crankshaft axial clearance before disassemble MAG and PTO crankcase.

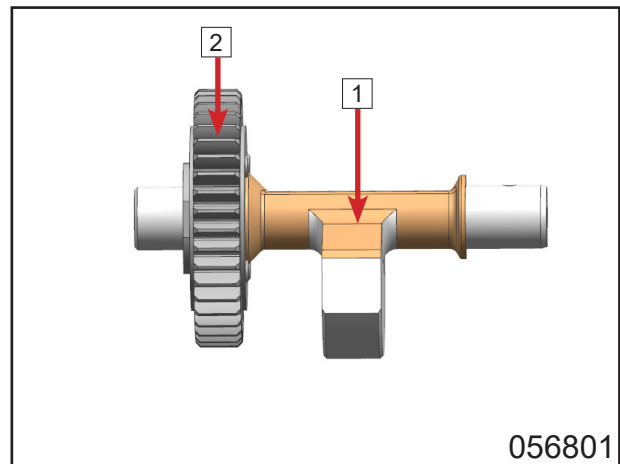
Use dial gauge to measure crankshaft axial play at MAG side.

Crankshaft axial play	
New	0.050~0.450
Service limit	0.6mm

Replace with new crankcase or crankshaft if beyond service limit.

5.5.21 Balance Shaft

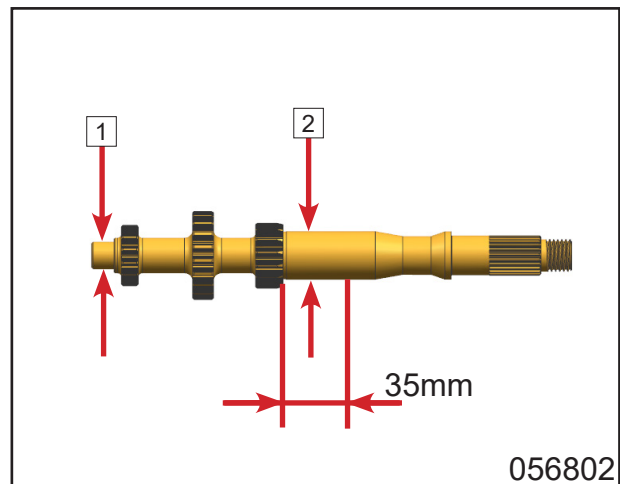
Inspect balance shaft **1** and balance shaft gear **2** for damage. Replace if damaged. Inspect balance shaft gear **2** for scratches, cracks or other damage. Replace if any defect is found.



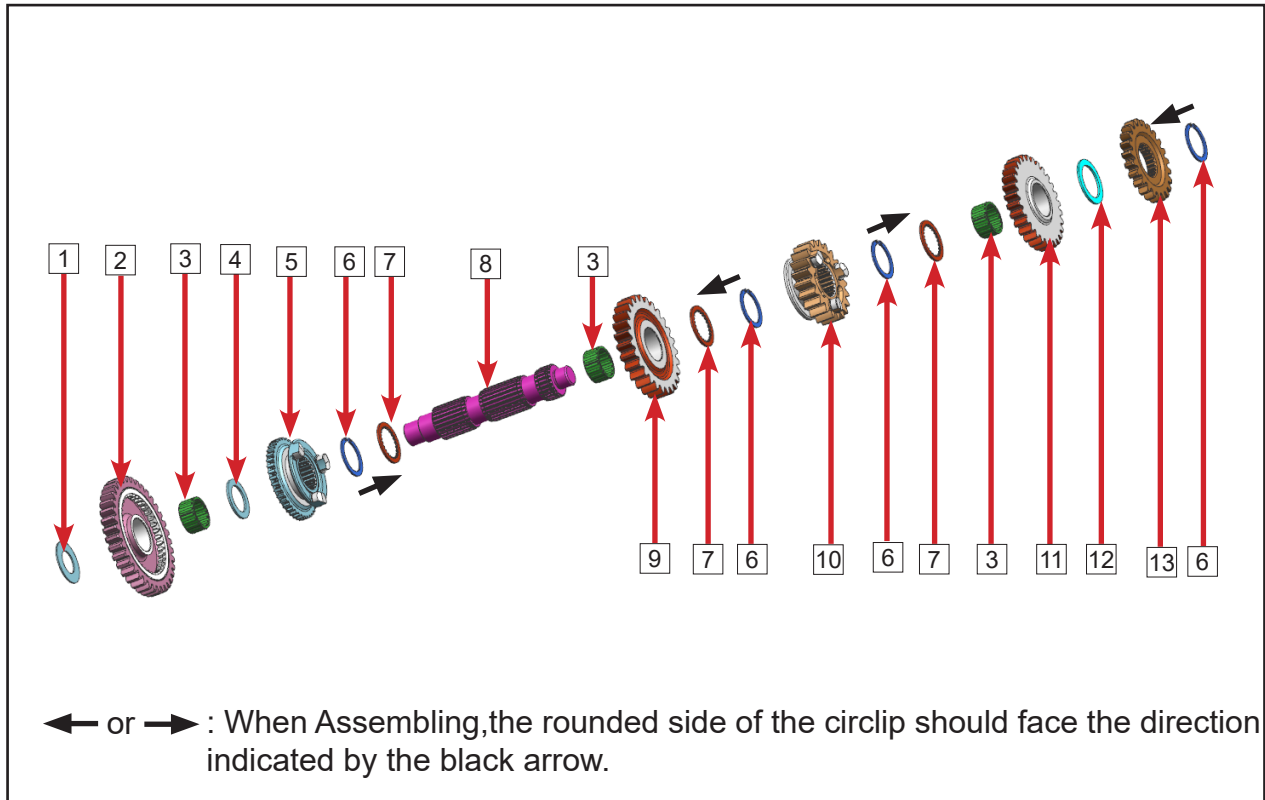
5.5.22 Main Shaft

Inspect shift main shaft for damage. Replace if damaged. Inspect shifting main shaft teeth for dark spots, damage or severe wear. Replace if necessary. Measure journal diameter on both sides. Replace if beyond service limit.

Shift main shaft journal diameter	
Service limit	
MAG side 1	16.978mm
CVT side 2	29.970mm



5.5.23 Counter Shaft Assembly



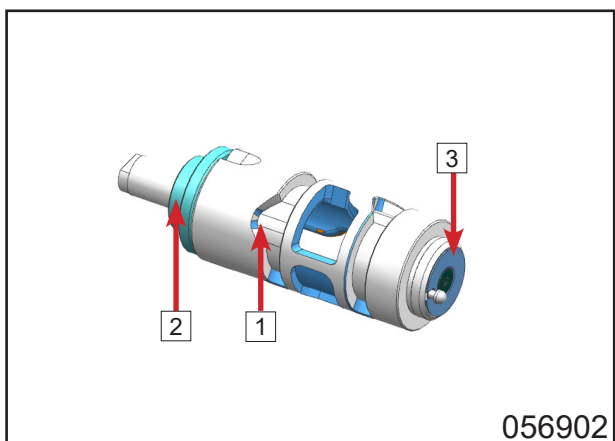
1	Washer 17.5X32X1	6	Circlip 25	11	Reverse gear
2	Driven Low gear	7	Spline washer	12	Washer 25×34×1.5
3	Needle bearing 20×25×12	8	Drive counter shaft	13	Parking gear
4	Washer 20.5×30×1.5	9	High gear		
5	Sliding sleeve, High/Low gear	10	Output drive gear		

Inspect every gear teeth for dark spots, damage or severe wear. Inspect bearing and sleeve for wear and damage. Replace if any defect is found.

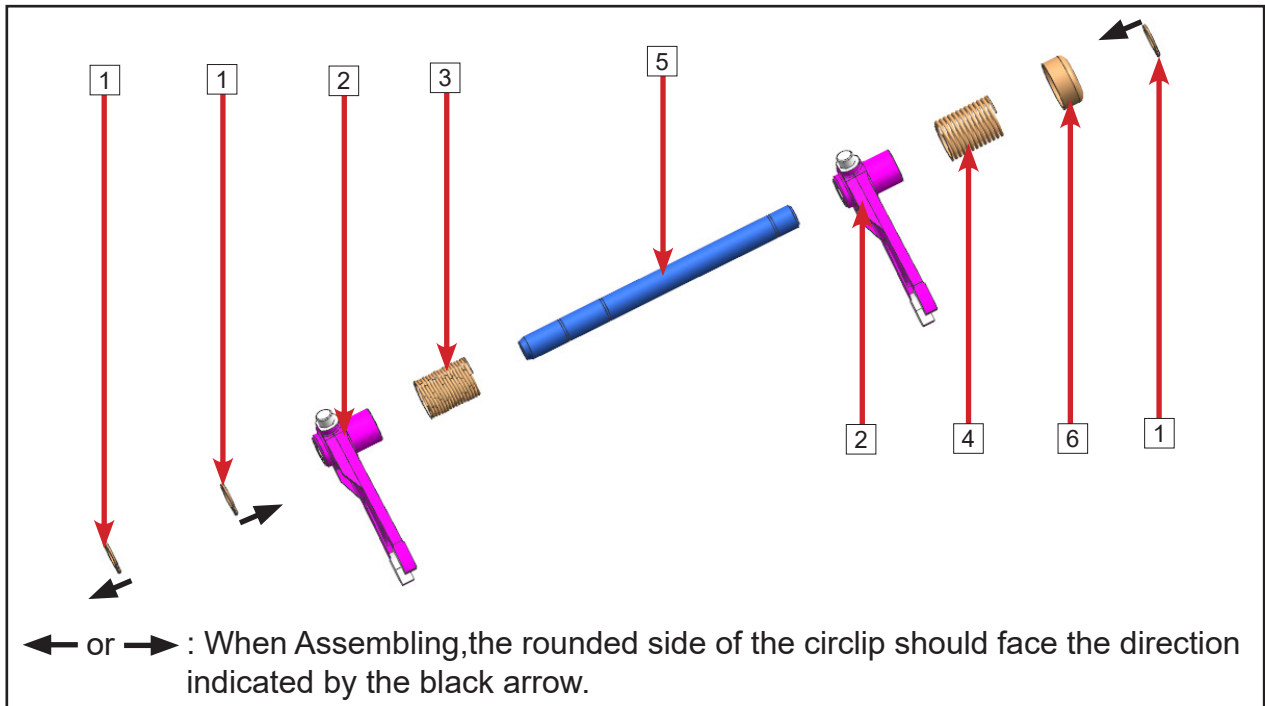
NOTE: The removed circlip is sorted for waste disposal. Replace with a new one during installation. If there is no defect on counter shaft assembly, it is not necessary to disassemble.

5.5.24 Shift Drum

Inspect shift drum **1** grooves for damage or severe wear. Replace if necessary. Inspect parking cam **2** on shift drum for damage or severe wear. Replace if necessary. Inspect thrust washer **3** for damage. Replace if necessary.



5.5.25 Shift Fork Assembly



1	Circlip 12	3	Fork spring, thin	5	Shaft, shift fork
2	Shift fork	4	Fork spring, thick	6	Spring seat

Shift Fork

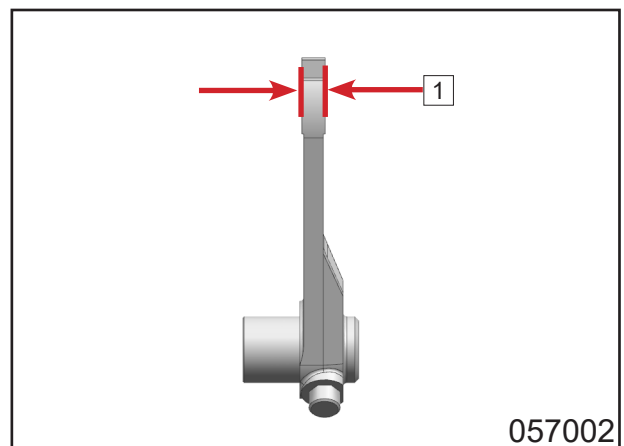
Inspect shift forks for severe wear or damage.

Inspect shift fork claw for bending.

Measure shift fork claw thickness.

Replace if beyond service limit.

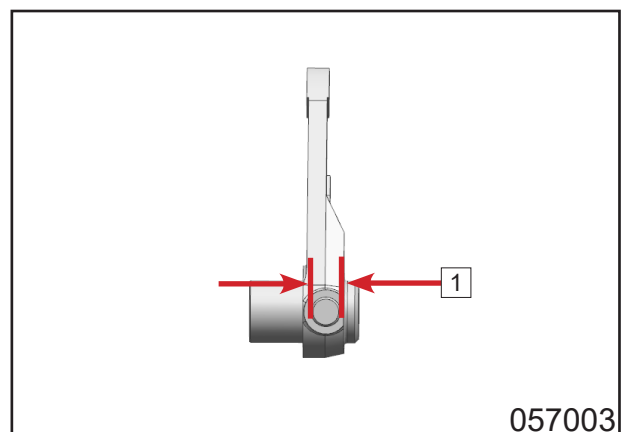
Shifting fork claw thickness (LH&RH)	
New	5.8mm~5.9mm
Service limit	5.7mm



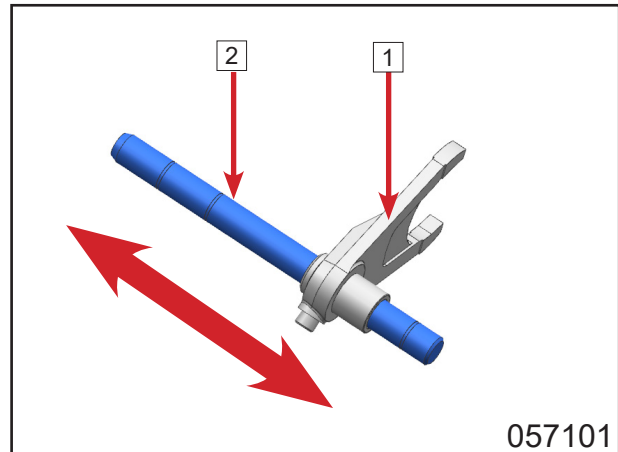
Measure shift fork pin diameter.

Replace if beyond service limit.

Shifting fork pin thickness (LH&RH)	
New	7.9mm~7.95mm
	(0.311in~0.313in)
Service limit	7.8mm(0.307n)



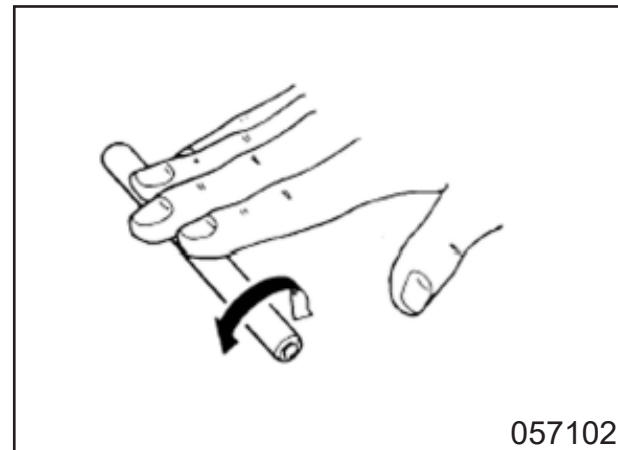
Put shift fork **1** onto the shift fork shaft **2**, then move the shaft as illustrated. Check if shift fork slides smoothly. Replace if necessary.



Shift Fork Shaft

Place shift fork shaft on a level surface and roll it. Replace if any defect is found.

⚠ WARNING: Do not try to correct the bend shift fork shaft.

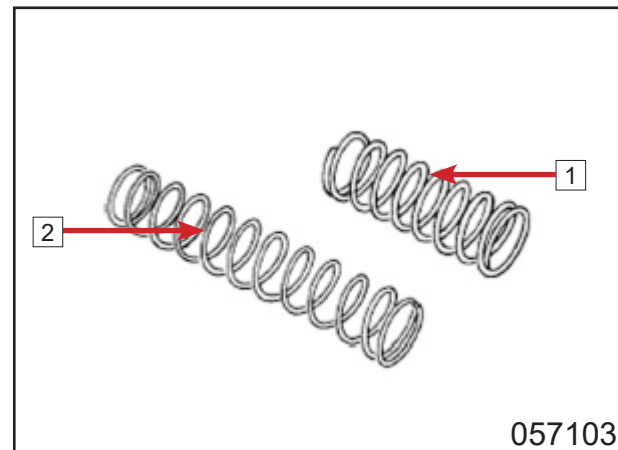


Shift Fork Spring

Inspect shift fork spring for break, crack or damage. Replace if any defect is found.

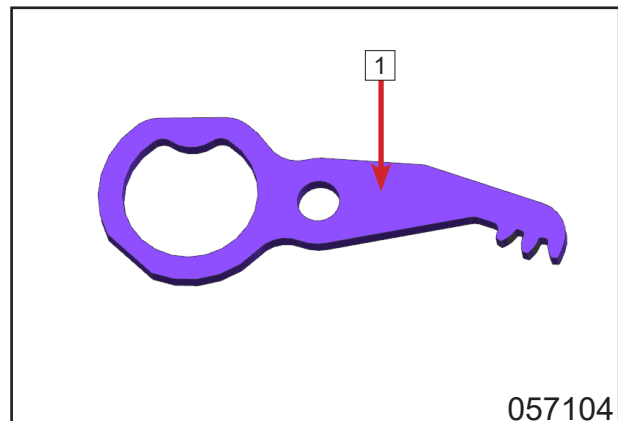
Measure shift fork spring free length. Replace if beyond standard.

1	Thin fork spring (free length: 114mm)
2	Thick fork spring (82mm)



5.5.26 Parking Swing Arm

Inspect parking swing arm **1** for cracks or damage. Replace if necessary.



5.5.27 Reverse Intermediate Gear

Disassembly

Remove circlip **1**.

Remove washer **2**.

Remove reverse intermediate gear **3**.

Remove needle bearing **4**.

Remove washer **2**.

NOTE: If reverse intermediate gear and needle bearing can rotate freely, the clearance is qualified, it is not necessary to disassemble.

Inspection

Reverse Intermediate Gear

Inspect reverse intermediate gear for damage. Measure gear inner diameter. Replace if beyond service limit.

Reverse intermediate gear inner diameter	
New	25mm~25.021mm
Service limit	25.025mm

Reverse Intermediate Gear Shaft

Inspect reverse intermediate gear shaft for damage. Measure shaft outer diameter. Replace if beyond service limit.

Reverse intermediate gear shaft outer diameter 1	
New	19.98mm~19.993mm
Service limit	19.97mm

NOTE: If reverse intermediate gear and needle bearing can rotate freely, the clearance is qualified, it is not necessary to disassemble.

Assembly

Clean every part and wipe with dust-free paper before assembly.

Apply engine oil on gear shaft hole.

Install washer **1**.

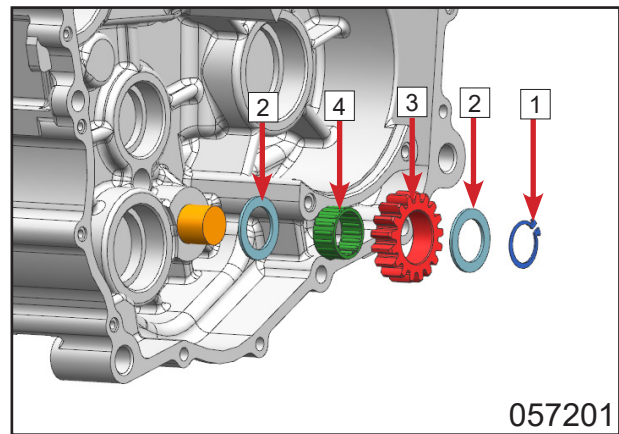
Install needle bearing **2**.

Install reverse intermediate gear **3**.

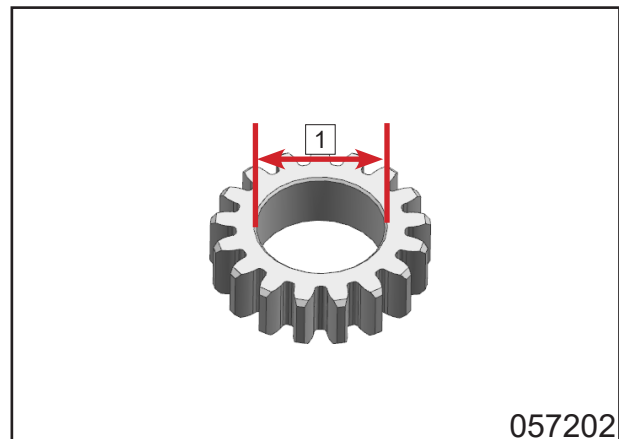
Install washer **1**.

Install circlip **4**.

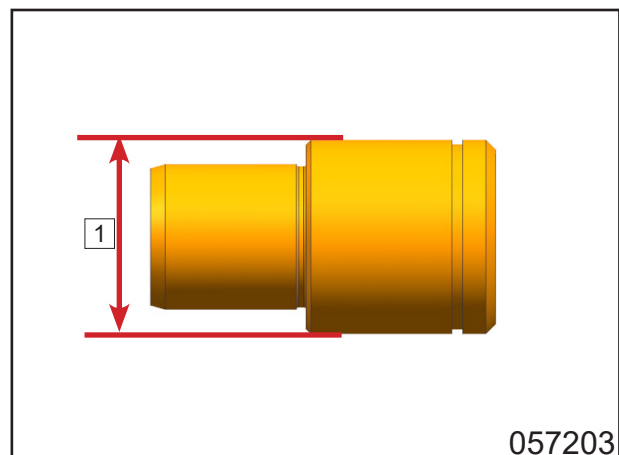
NOTE: The removed circlip is sorted for waste disposal. Replace with a new one during installation. The rounded side of the circlip **4** should face the washer **1**.



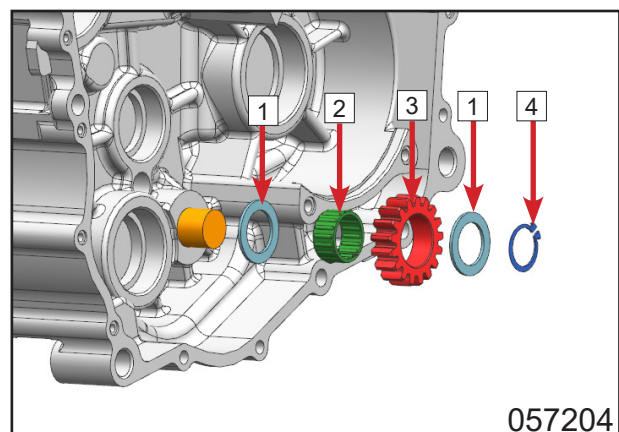
057201



057202



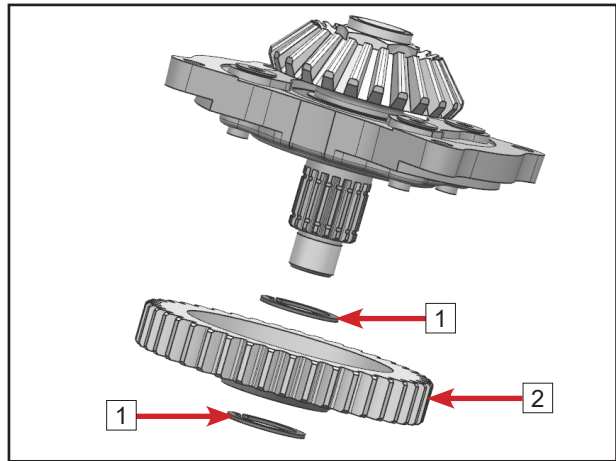
057203



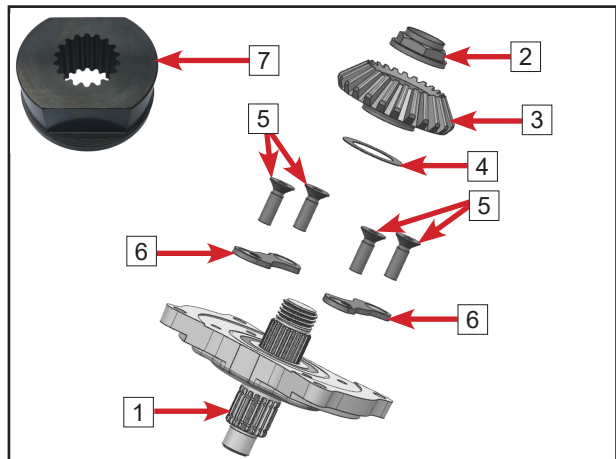
057204

5.5.28 Drive Bevel Gear Assy Disassembly

- Remove circlip [1].
- Remove output driven gear [2].
- Remove circlip [1].

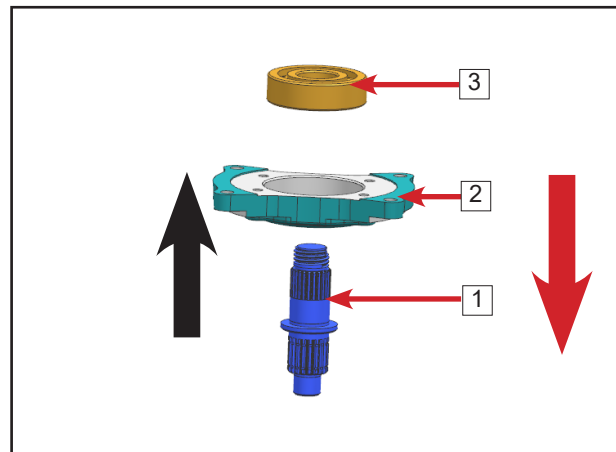


- Fix Bevel Gear Holding Tool [7] on bench vice;
- Fix drive bevel gear shaft [1] on Bevel Gear Holding Tool [7];
- Remove bevel gear lock nut [2].
- Remove drive bevel gear [3].
- Remove adjusting washer [4].
- Remove screws [5].
- Remove bearing limit plate [6].



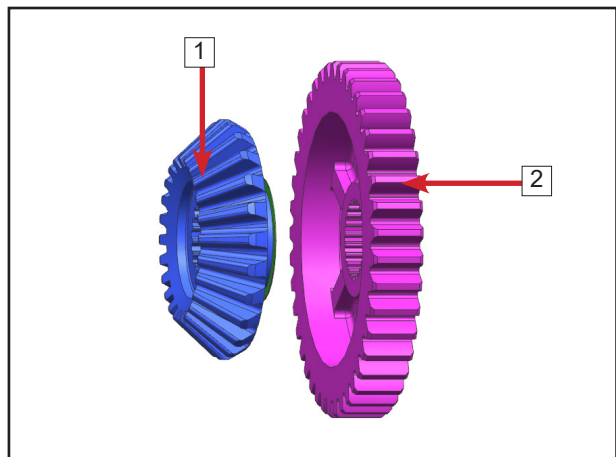
- Support drive bevel gear bearing seat [2] properly.
- Compress out drive bevel gear shaft [1] along red arrow direction.
- Compress out bearing [3] along black arrow direction.

NOTE: Inspect bearing, drive bevel gear shaft and bearing seat before disassembly. It is not necessary to disassemble if not damaged.



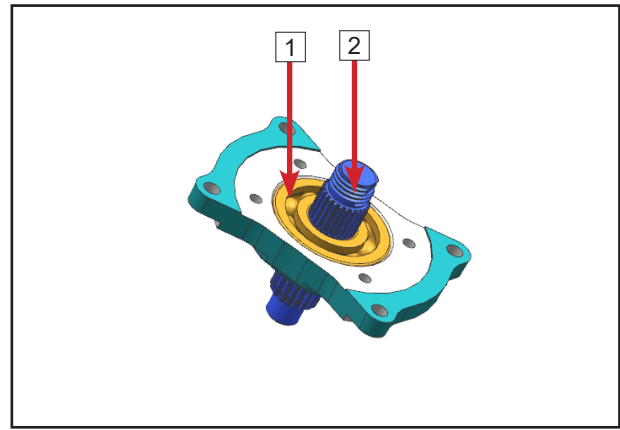
Inspection

Inspect drive bevel gear [1] and output driven gear [2] teeth for rust, scratches, wear or damage. Replace if any defect is found.



Inspect if bearing [1] turns freely and smoothly. Replace if any defect is found.
 Inspect drive bevel gear shaft [2] for rust, scratches, wear or damage. Replace if any defect is found.
 Inspect drive bevel gear shaft [2] for bending. Replace if any defect is found.

NOTE: Adjust the adjusting washers if MAG crankcase, drive bevel gear or bearing seat is replaced.



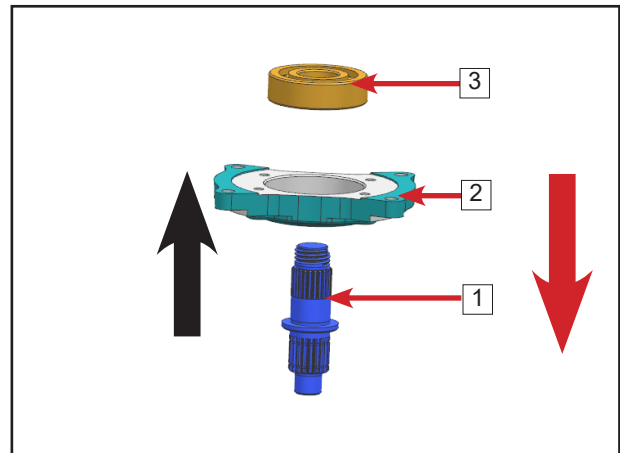
Assembly

Clean every part before assembly.

Apply engine oil on outer ring of the bearing [3].

Install bearing [3] on drive bevel gear bearing seat [2] along red direction.

Install drive bevel gear shaft [1] into bearing [3] along black direction.



Install bearing limit plate [2].

Install M8×25 screws [3] with 243 thread locker.
 Tighten torque: 20N·m

Fix Bevel Gear Holding Tool [7] on bench vice;

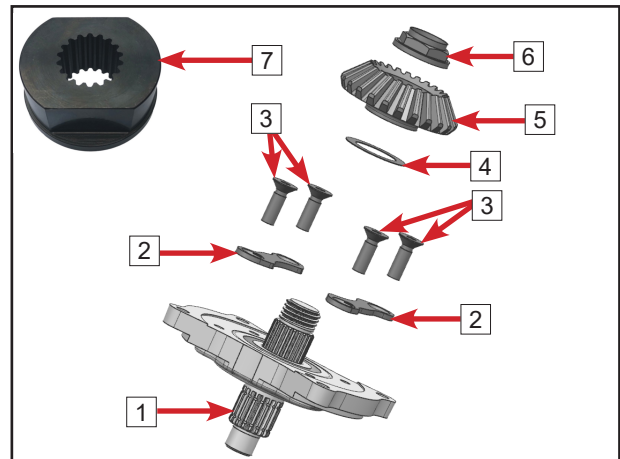
Fix drive bevel gear shaft [1] on Bevel Gear Holding Tool [7];

Install adjusting washer [4].

Install drive bevel gear [5].

Install bevel gear lock nut [6].

Tighten torque: 145N·m

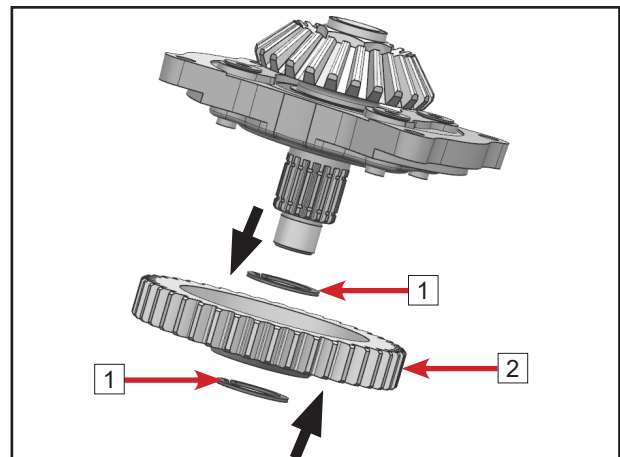


Install circlip [1].

Install output driven gear [2].

Install circlip [1].

NOTE: The removed circlip is sorted for waste disposal. Replace with a new one during installation. The rounded side of the circlip [1] should face the direction indicated by the black arrow.



5.5.29 Front Output Shaft

Disassembly

Use special tool: Rear Output Coupler Holding Tool [9] to fix coupler [3].

Remove M10 bolt [1].

Remove washer [2].

Remove coupler [3].

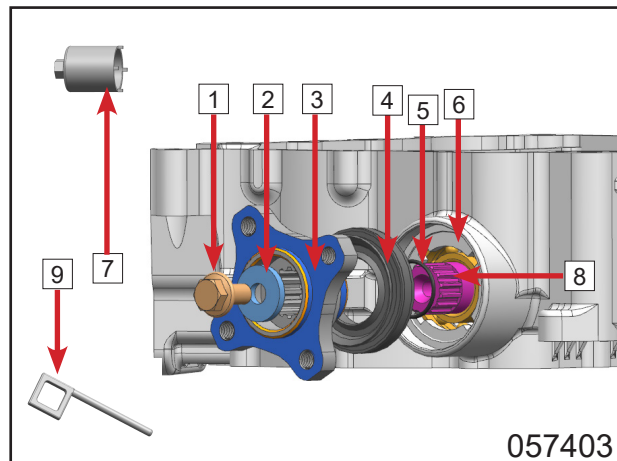
Remove oil seal [4].

Remove o-seal ring [5].

Use special tool: Front Output Shaft Bearing Retainer Tool [7] to remove bearing retainer [6] (left-hand thread).

Remove front output shaft [8].

NOTE: The removed oil seal is sorted for waste disposal. Replace with a new one during installation.

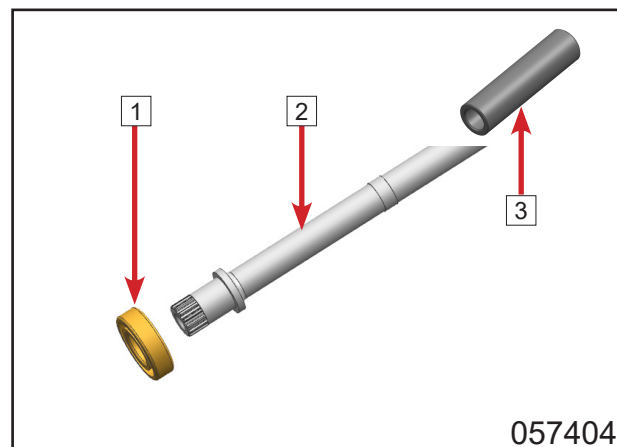


Inspection

Inspect bearing [1] for smooth rotation and abnormal wear. If yes, remove bearing [1] from front output shaft [2] and replace with a new one. During installation, apply some 648 sealant on front output shaft [2] installing surface first. Then put 6205 bearing on front output shaft. Use special tool: Front Output Shaft 6205 Bearing Installer [3] to install the bearing in place.

Inspect front output shaft for bending or damage. Replace if necessary.

NOTE: Do not break front output shaft during bearing removal and installation.



Assembly

Install front output shaft [1].

Use special tool: Front Output Shaft Bearing Retainer Tool [3] to install bearing retainer [2] with 243 thread locker (left-hand thread).

Tighten torque: 80 N·m

Apply 648 sealant on o-seal ring [4]. Use special tool: Front Output Oil Seal Installer [9] to install oil seal [5].

Install o-seal ring [6].

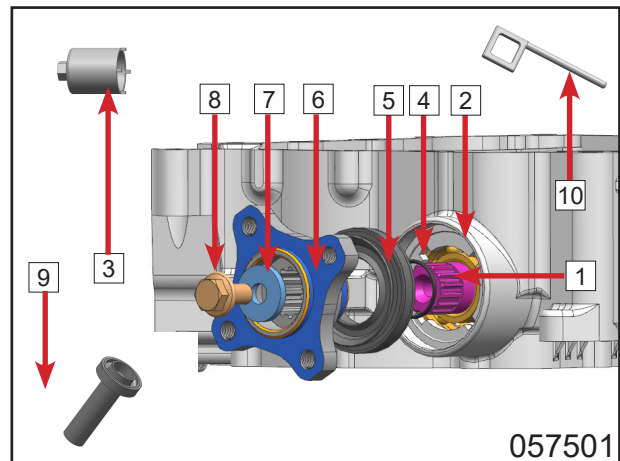
Put 10x27.5X4 washer [7] on bolt [8].

Use special tool: Rear Output Coupler Holding Wrench [10] to fix coupler [6].

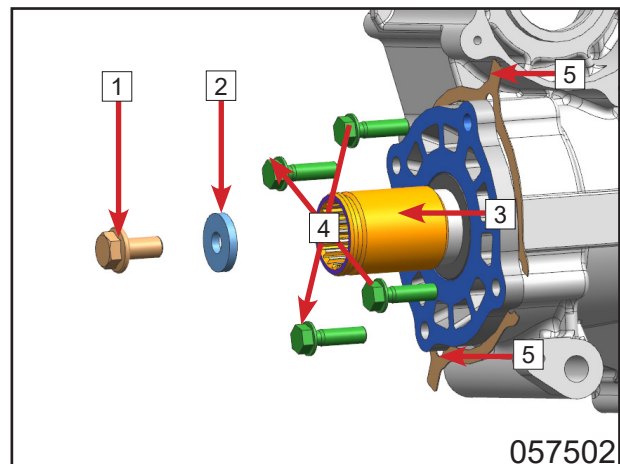
Install M10X1.25X30 bolt [8] with 243 thread locker.

Tighten torque: 55N·m

NOTE: The removed oil seal is sorted for waste disposal. Replace with a new one during installation.



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057502

5.5.30 Driven Bevel Gear

Disassembly

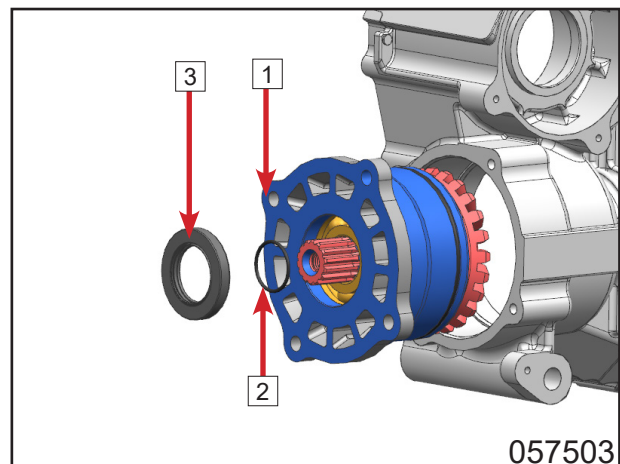
Remove M10 bolt [1].

Remove washer [2].

Remove rear output coupler [3].

Remove M8 bolts [4].

Remove driven bevel gear adjusting washers [5].



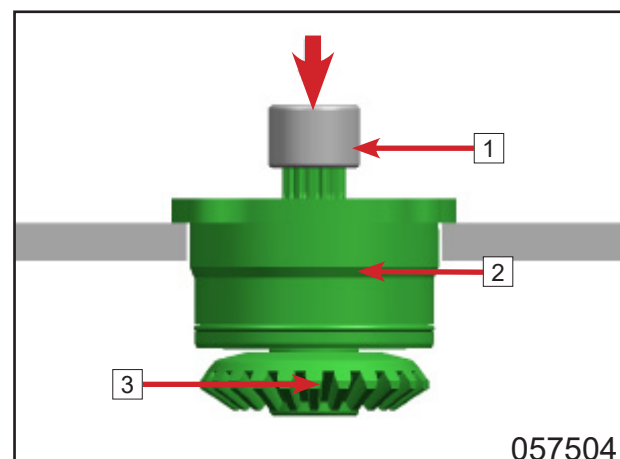
057503

Remove driven bevel gear [1].

Remove o-seal ring [2].

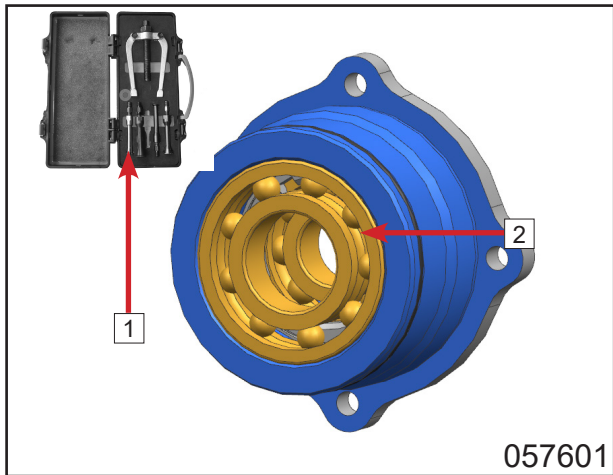
Remove oil seal [3].

Protect drive bevel gear end with protective tool [1]. Fix driven bevel gear bearing seat [2] and compress out driven bevel gear [3].

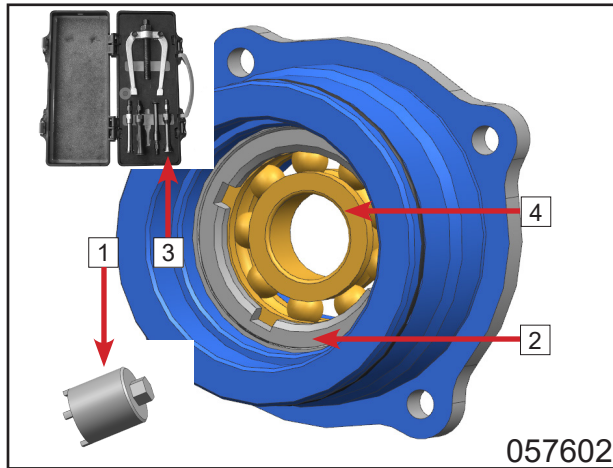


057504

Use Bearing Remover [1] to remove bearing [2].

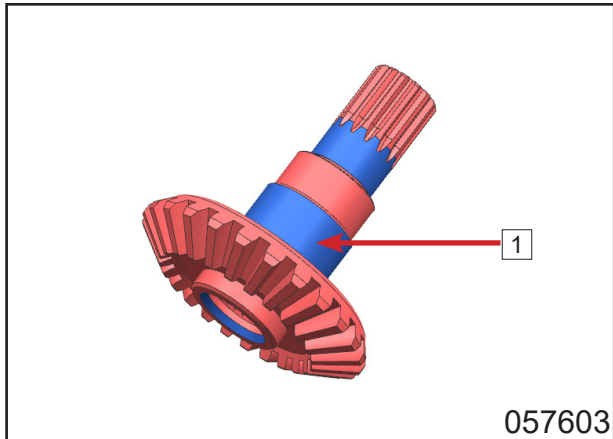


Use special tool: Bearing Retainer Locking Tool [1] to remove bearing retainer [2].
Use Bearing Remover [3] to remove bearing [4].

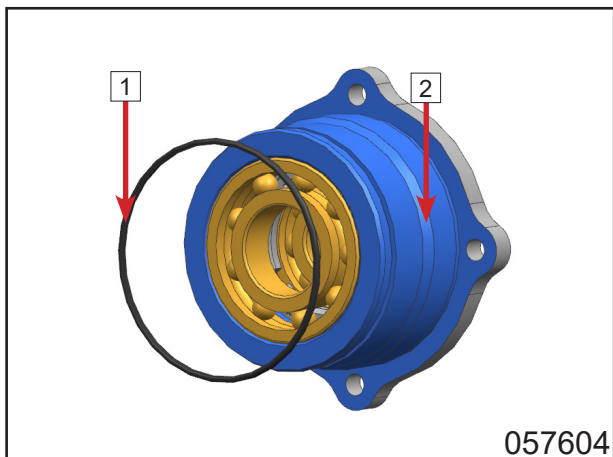


Inspection

Inspect drive bevel gear [1] for scratches, wear or other damage. Replace the whole set if necessary.



Inspect o-seal ring [1] for cracks, aging or other damage. Replace if necessary.
Inspect driven bevel gear bearing seat assembly [2] for damage. Replace if necessary.
Inspect driven bevel gear bearing. Replace if stuck or damaged.

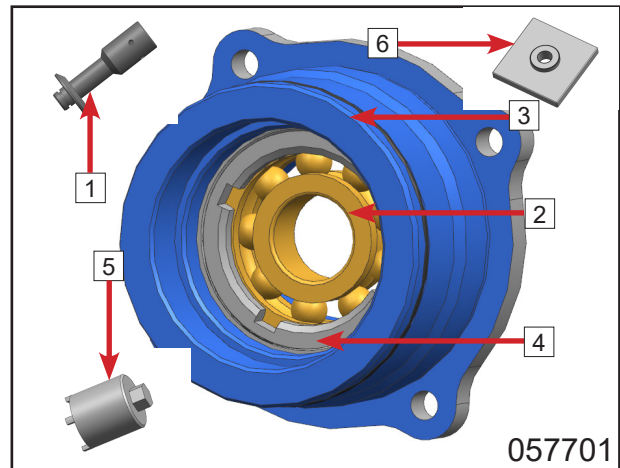


Assembly

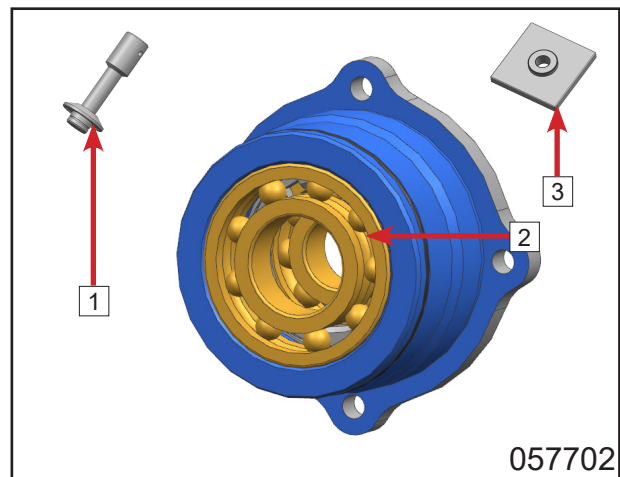
Apply engine oil on driven bevel gear bearing seat and bearing. Put driven bevel gear bearing seat [3] on Driven Bevel Gear Supporting Block [6]. Use Drive Bevel Gear 6305 Bearing Installer [1] to install bearing [2] on driven bevel gear bearing seat [3].

Install bearing limit nut [4] and tighten with Bearing Retainer Holding Tool [5] with 243 thread locker.

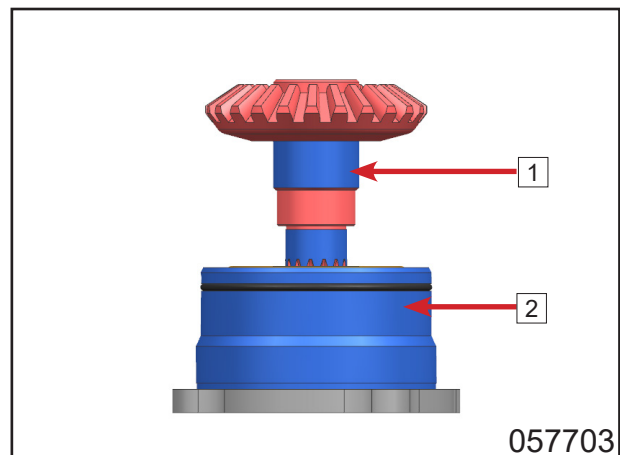
Tighten torque: 110N·m



Put driven bevel gear bearing seat [2] on Driven Bevel Gear Supporting Block [3]. Use Drive Bevel Gear Bearing Installer [1] to install bearing [2] on driven bevel gear bearing seat (mark side of bearing face outside).

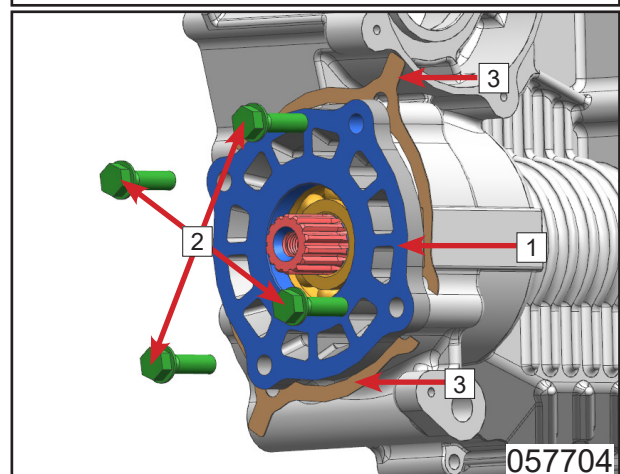


Apply engine oil on driven bevel gear [1]. Compress driven bevel gear on bearing seat [2]. (Drive bevel gear and driven bevel gear should be replaced together.)

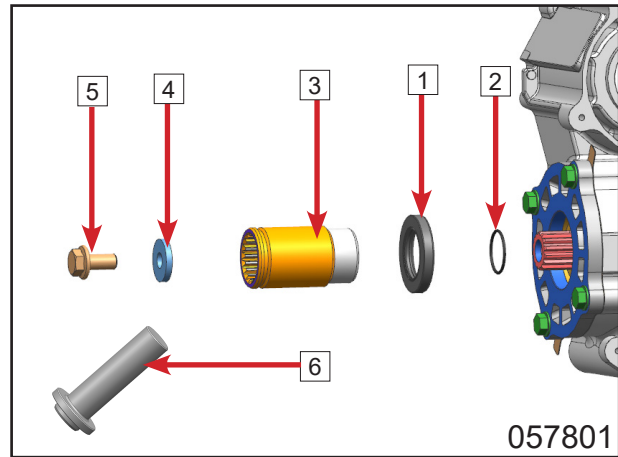


Install driven bevel gear [1]. Install M8×28 bolts [2] with 243 thread locker without being tightened. Install adjusting washers [3]. Tighten M8×28 bolts [2] in criss-cross way. Tighten torque: 25N·m

NOTE: The amount of the adjusting washers depends on clearance between drive and driven bevel gear. Details refers to Engine Assembly section.



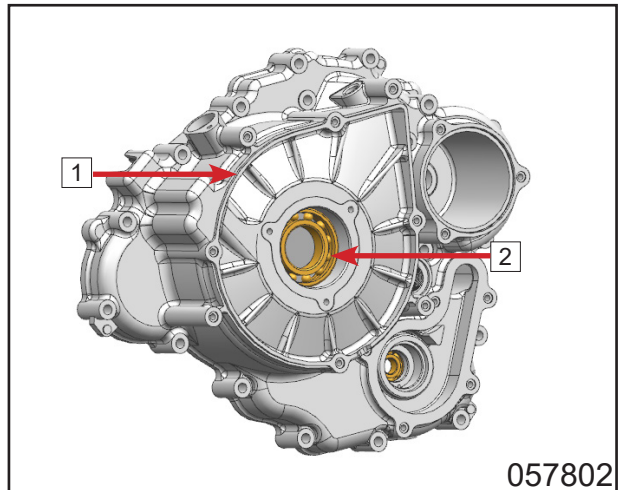
Use special tool: Driven Bevel Gear Oil Seal Installer [6] to install oil seal [1].
 Install o-seal ring [2].
 Install rear output sleeve [3].
 Put washer [4] on bolt [5].
 Install M10×30 bolt [5] with thread locker
 Tighten torque: 55N·m



057801

5.5.31 MAG Crankcase Cover Inspection

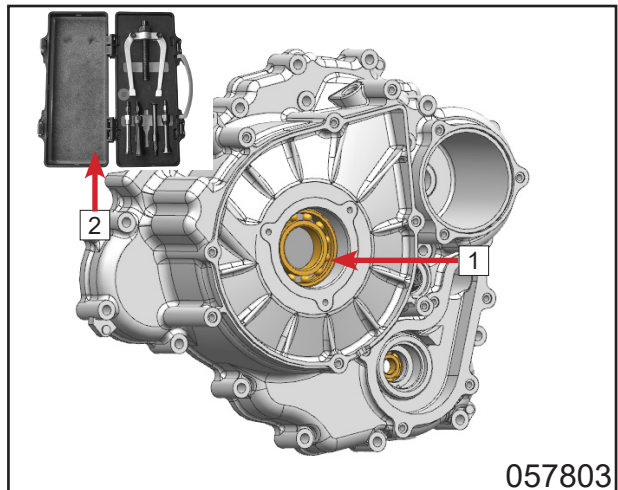
Inspect MAG crankcase cover [1] for cracks or damage. Replace the whole set if any defect is found.
 Inspect bearing for free rotation or damage. Replace if any defect is found.



057802

Bearing Removal

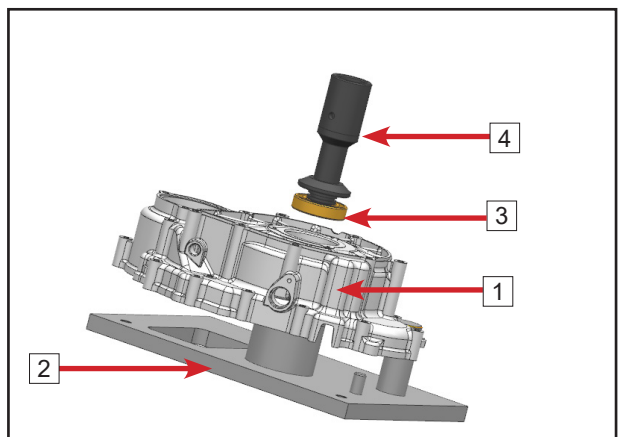
Use Bearing Remover [2] to remove bearing [1].



057803

Bearing Installation

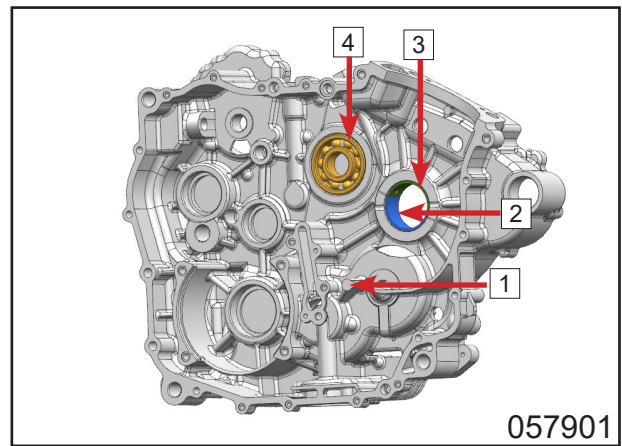
Put MAG crankcase cover on MAG Crankcase Supporting Block [2].
 Apply engine oil on bearing and MAG crankcase cover bearing hole. Install 60/28 bearing [3] into MAG crankcase cover with special tool: MAG Crankcase 60/28 Bearing Installer [4].
 After installation, rotate bearing to check if it rotates freely. Reinstall if the rotation isn't smooth.



5.5.32 MAG Crankcase

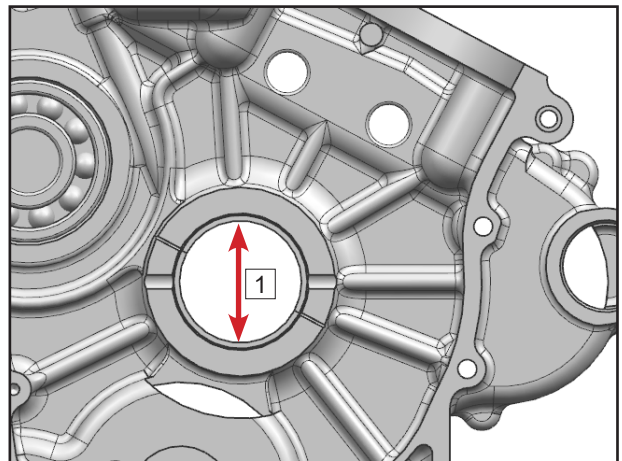
Inspect MAG crankcase **1** for cracks or damage. Replace if any defect is found. Inspect plain bearing I **2** and plain bearing II **3** for severe wear or damage. Replace if any defect is found.

Inspect bearing **4** for free rotation or damage. Replace if any defect is found.



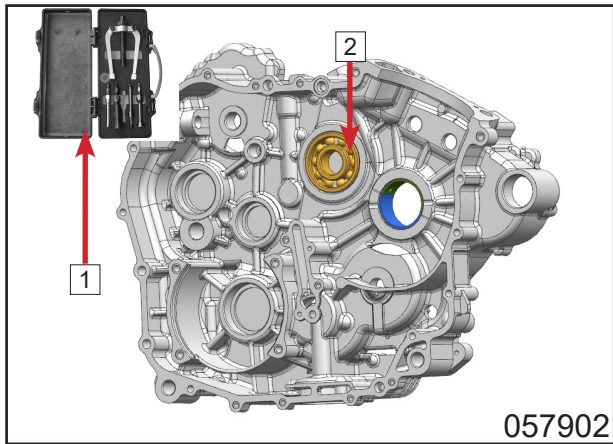
Measure plain bearing inner diameter **1** and compare to MAG side journal diameter of crankshaft (refer to Crankshaft). Replace if the measurements are out of specification.

Plain bearing inner diameter 1 (MAG)	
Service limit	42.100mm(1.6575in)



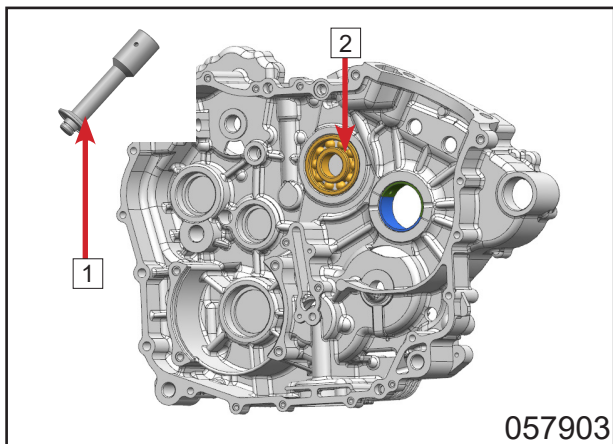
Plain Bearing/Bearing Replacement Bearing Removal

Use Bearing Remover **1** to remove bearing **2**.



Bearing Installation

Install bearing **2** into MAG crankcase with special tool: MAG Crankcase Main Shaft 63/22 Bearing Installer **4**. (Apply engine oil on junction area before installation.)

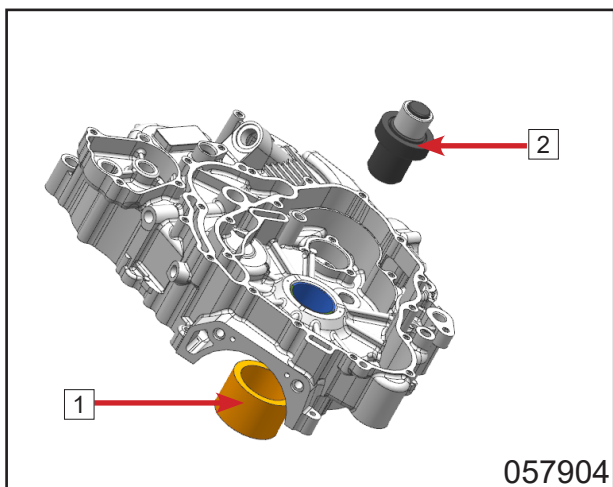


Plain Bearing Removal

Put special tool: MAG Crankcase Plain Bearing Supporting Tool **1** under MAG crankcase to support it as picture shows.

Use special tool: Bearing Removal Tool **2** to compress out plain bearing.

NOTE: Compress the bearing vertically. Otherwise, it may damage the crankcase.



Plain Bearing Installation

Plain bearing match table:

Bearing hole	Plain bearing thickness	Match
A $\varnothing 46 \sim \varnothing 46.008$	A Red 2.014~2.019	A→A(Red)
B $>\varnothing 46.008 \sim \varnothing 46.016$	B Blue $>2.019 \sim 2.024$	B→B(Blue)

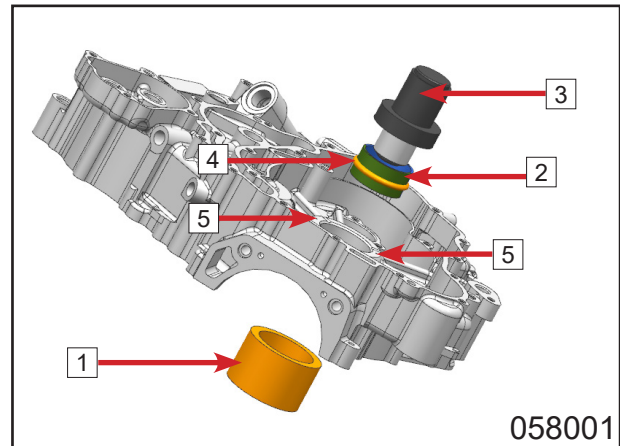
According to the match table, choose appropriate plain bearings during installation.

Put special tool: MAG Crankcase Plain Bearing Supporting Tool **1** under MAG crankcase to support it as picture shows.

Put plain bearing **2** on Bearing Removal Tool **3** and put a $\varnothing 42 \times 1 \sim 1.5$ o-seal ring **4** to encircle the plain bearing.

Align the commisure of plain bearings with two marks **5** on crankcase. Make sure the oil trail hole is correct. After confirmation, compress plain bearings into crankcase.

After installation, inspect if plain bearings are loose or sliding. Replace the whole crankcase if yes. Inspect oil trail hole if it is blocked. Reinstall plain bearings if blocked.



5.5.33 Oil Strainer and Oil Trail Cover Plate

Oil Trail Cover

Disassembly

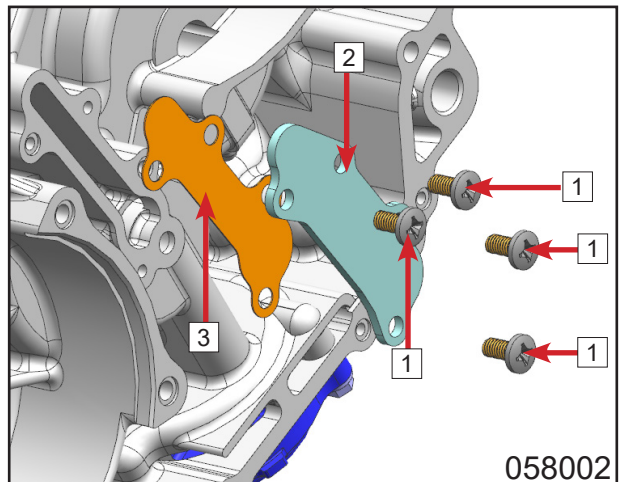
Remove M6×12 screws **1**.

Remove oil trail cover plate **2**.

Remove gasket **3**.

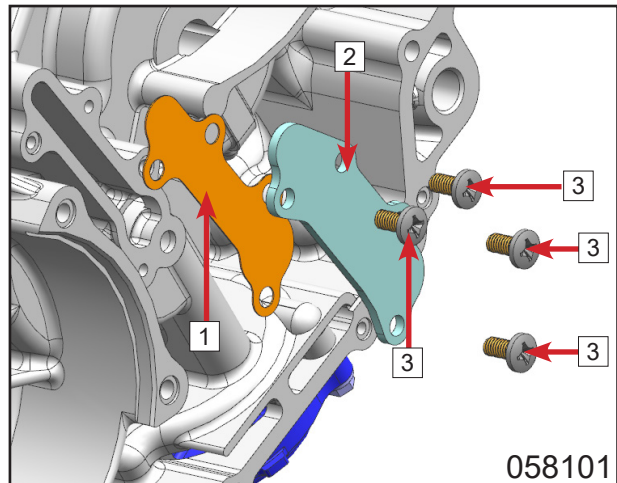
Inspection

Inspect oil trail cover plate for damage. Replace if necessary. Clean oil trail and cover plate. Wipe with dust-free paper.



Assembly

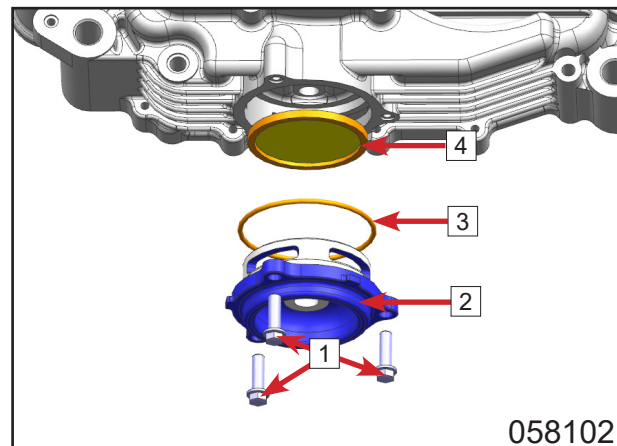
Replace with new gasket **1**.
Apply 243 thread locker on screws **3**.
Combine gasket **1** and oil trial cover plate **2** together. Pre-tighten screws **3** first, then tighten them in criss-cross way.
Tighten torque: 10N·m



Oil Strainer

Disassembly

Remove bolts **1**.
Remove strainer cover **2**.
Remove o-seal ring **3**.
Remove oil strainer **4**.



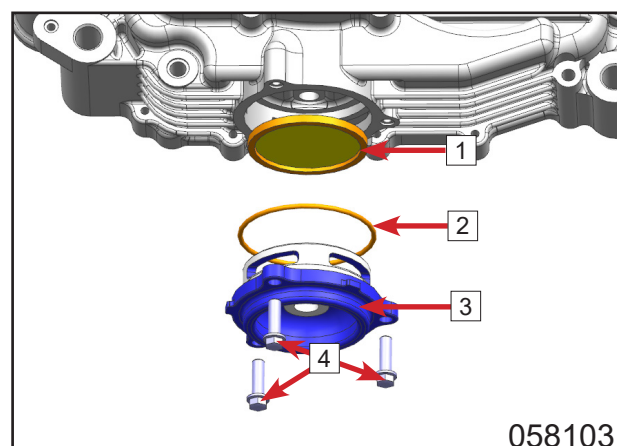
Inspection

Clean oil strainer with detergent and dry with compressed air.
Inspect every part for damage. Replace if necessary.
Inspect o-seal ring for deformation, aging or damage. Replace if any defect is found.

NOTE: Pay attention to protect eyes during cleaning. In case the chemicals in detergent gets into eyes and causes injury.

Assembly

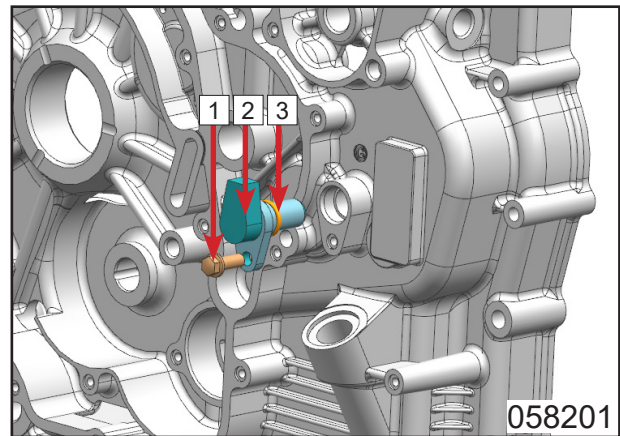
Install oil strainer **1**.
Put o-seal ring **2** on oil strainer cover **3**.
Install oil strainer cover **3**.
Install M6×20 bolts **4** (pre-tighten first and then tighten in criss-cross way).
Tighten torque: 10N·m



5.5.34 Speed Sensor

Removal

- Remove bolt [1].
- Remove speed sensor [2].
- Remove o-seal ring [3].

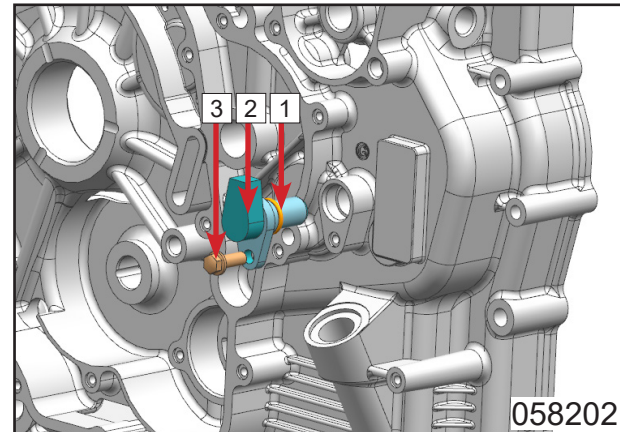


Inspection

Speed sensor inspection refers to Electrical chapter. Replace if damaged.
Inspect o-seal ring for deformation, aging or damage. Replace if any defect is found.

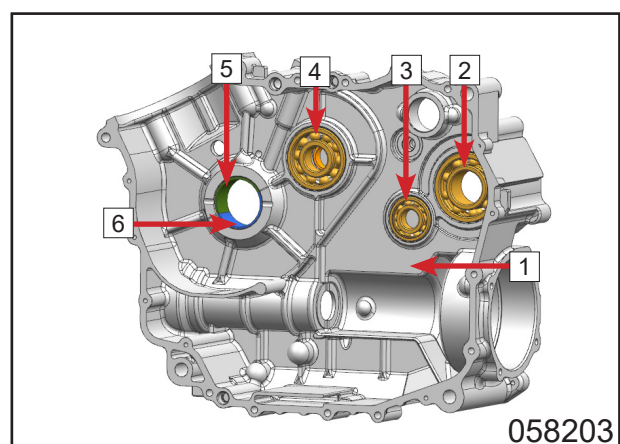
Installation

- Put o-seal ring [1] on speed sensor [2].
- Apply engine oil.
- Install speed sensor [2].
- Install M6×16 bolt [3].



5.5.35 PTO Crankcase

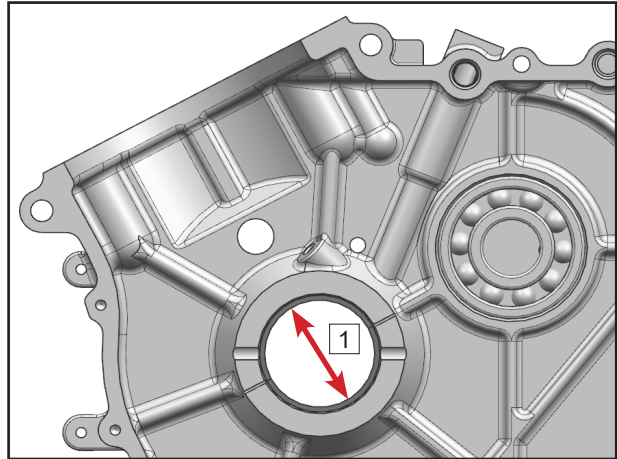
Inspect PTO crankcase [1] for cracks or damage. Replace if any defect is found.
Inspect plain bearing I [6] and plain bearing II [5] for severe wear or damage. Replace if any defect is found.
Inspect bearing [2], [3] and [4] for free rotation or damage. Replace if any defect is found.



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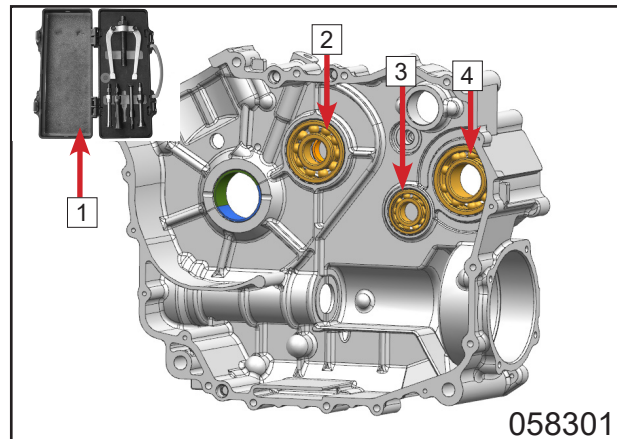
Measure plain bearing inner diameter **1** and compare to CVT side journal diameter of crankshaft(refer to Crankshaft). Replace if the measurements are out of specification.

Plain bearing inner diameter 1 (CVT)	
Service limit	42.100mm(1.6575in)



Bearing/Plain Bearing Replacement Bearing Removal

Use suitable bearing remover **1** to remove bearing **2**, bearing **3** and bearing **4**.



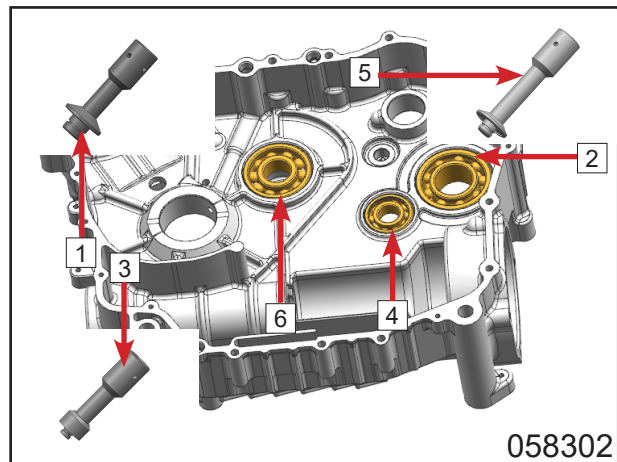
Bearing Installation

Use PTO Crankcase 3206A Bearing Installer **1** to compress bearing **2**.

Use 6203 Bearing Installer **3** to compress bearing **4**.

Use Gearshift Main Shaft 63/22 Bearing Installer **5** to compress bearing **6**.

NOTE: Apply engine oil on bearing hole and bearing before compression. Inspect bearings for smooth rotation after installation. Reinstall the bearing if stuck or blocked.

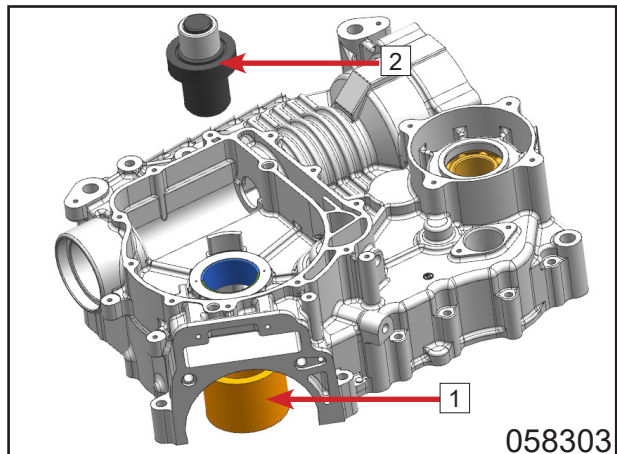


Plain Bearing Removal

Put special tool: PTO Crankcase Plain Bearing Supporting Tool **1** under PTO crankcase to support it as picture shows.

Use special tool: Bearing Removal Tool **2** to compress out plain bearing.

NOTE: Compress the bearing vertically. Otherwise, it may damage the crankcase.



Plain Bearing Installation

Plain bearing match table:

Bearing hole	Plain bearing thickness	Match
A $\phi 46 \sim \phi 46.008$	A Red 2.014~2.019	A→A(Red)
B $>\phi 46.008 \sim \phi 46.016$	B Blue $>2.019 \sim 2.024$	B→B(Blue)

According to the match table, choose appropriate plain bearings during installation.

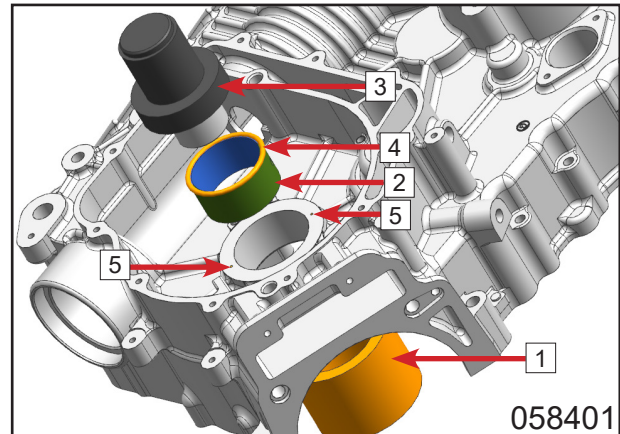
Put special tool: PTO Crankcase Plain Bearing Supporting Tool **1** under PTO crankcase to support it as picture shows.

Put plain bearing **2** on Bearing Removal Tool **3** and put a $\phi 42 \times 1 \sim 1.5$ o-seal ring **4** to encircle the plain bearing.

Align the commissure of plain bearings with two marks **5** on crankcase. Make sure the oil trail hole is correct. After confirmation, compress plain bearings into crankcase.

After installation, inspect if plain bearings are loose or sliding. Replace the whole crankcase if yes. Inspect oil trail hole if it is blocked. Reinstall plain bearings if blocked.

NOTE: Compress the bearing vertically. Otherwise, it may damage the crankcase.



5.5.36 Gear Sensor and Oil Pressure Switch

Removal

Remove bolts **1**.

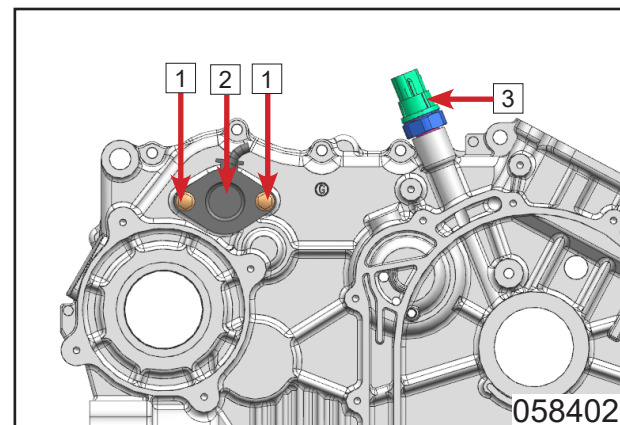
Remove gear sensor **2**.

Remove oil pressure switch **3**.

Inspection

Gear sensor inspection refers to Electrical chapter. Replace if damaged.

Oil pressure switch inspection refers to Electrical chapter. Replace if damaged.



Installation

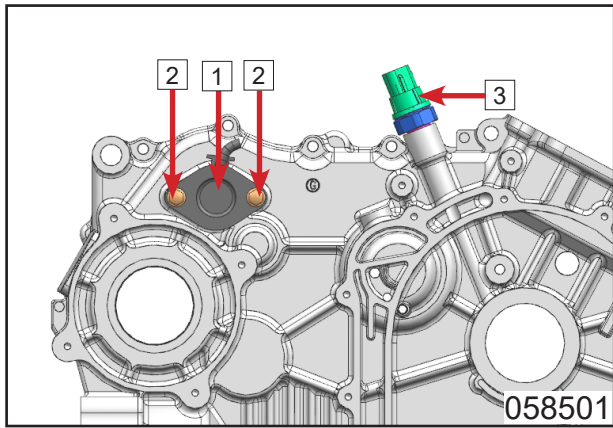
Apply engine oil in gear sensor mounting hole.

Install gear sensor **1**.

Install M6×16 bolts **2**.

Install oil pressure switch **3**.

Tighten torque: 20N·m



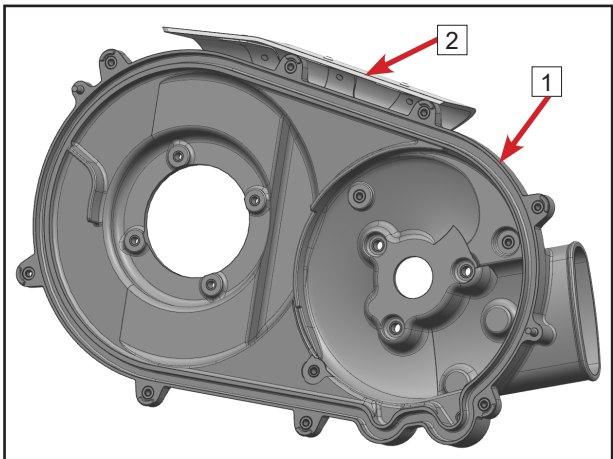
5.5.37 CVT Case Assy

Clean CVT case **1**.

Inspect CVT case **1** for cracks or damage.

Replace if necessary.

Inspect CVT insulation board **2** for cracks or damage. Replace if necessary.



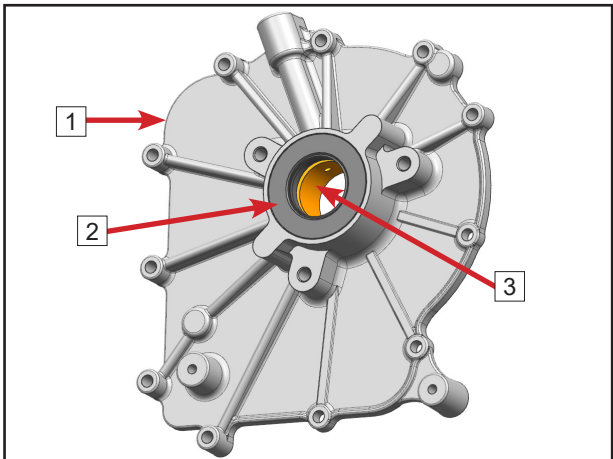
5.5.38 PTO Crankcase Cover Assy

Clean PTO crankcase cover **1**.

Inspect PTO crankcase cover **1** for cracks or damage. Replace if necessary.

Inspect oil seal **2** for cracks or damage. Replace if necessary.

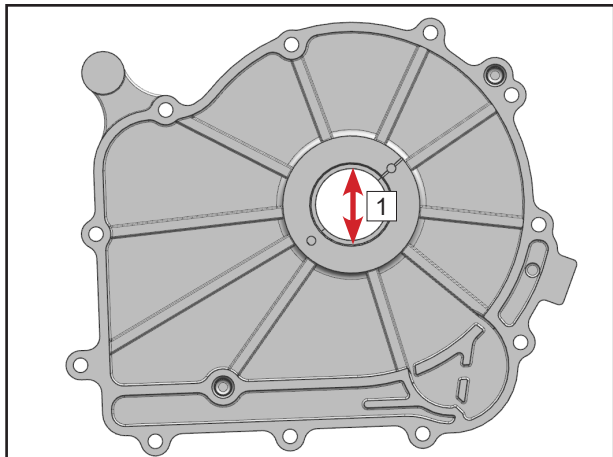
Inspect plain bearings **3** for severe wear or damage. Replace if severely worn or damaged.



Measure the inner diameter **1** of the slide bearing and compare with the CVT joint diameter (See crankshaft).

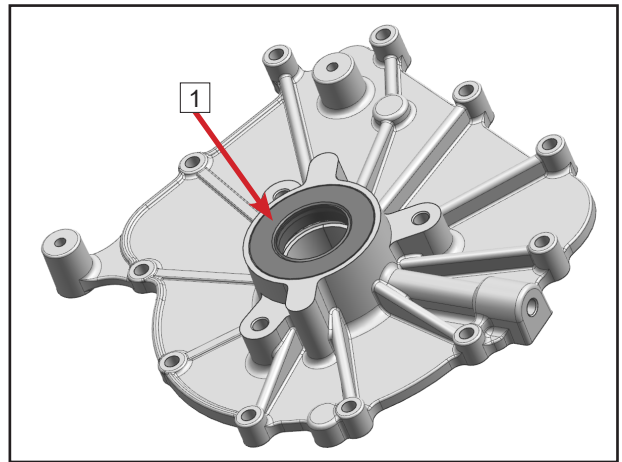
If out of service limit, replace the parts.

Slide bearing inner diameter 1	
Service limit	32.100mm(1.2638in)



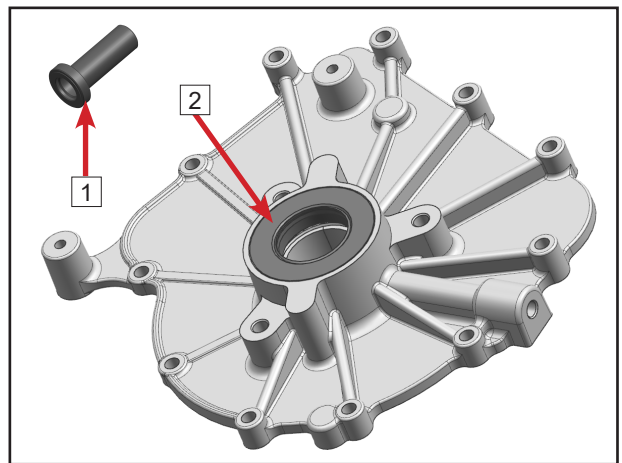
Oil Seal Removal

Remove oil seal **1** with a proper tool.
Do not damage PTO crankcase cover during removal. The removed oil seal is sorted for waste disposal. If there is no defect on oil seal, it is not necessary to remove it.



Oil Seal Installation

Use special tool: 32×55×10 Oil Seal Installer **1** to compress oil seal **2** into PTO crankcase cover .



Plain Bearing Removal

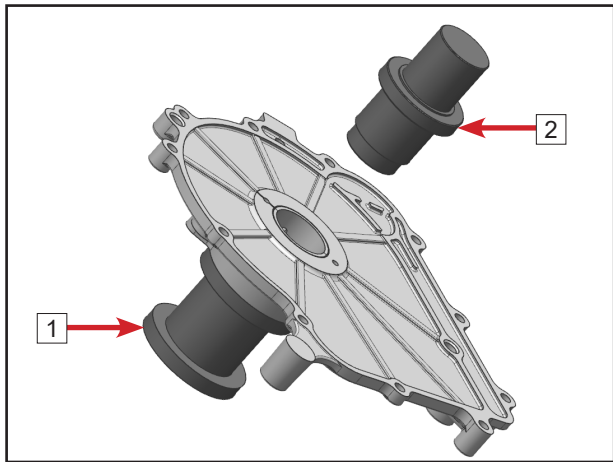
Plain Bearing Removal

Remove oil seal before plain bearing removal.

Put CVT Case Plain Bearing Supporting Tool **1** under PTO crankcase cover to support it as picture shows.

Use Bearing Removal Tool **2** to compress out plain bearing.

NOTE: Compress the bearing vertically. Otherwise, it may damage the PTO crankcase cover.



Plain Bearing Installation

Plain bearing match table:

Bearing hole	Plain bearing thickness	Match
A $\varnothing 36 \sim \varnothing 36.008$	A Red 2.014~2.019	A→A(Red)
B $>\varnothing 36.008 \sim \varnothing 36.016$	B Blue $>2.019 \sim 2.024$	B→B(Blue)

According to the match table, choose appropriate plain bearings during installation.

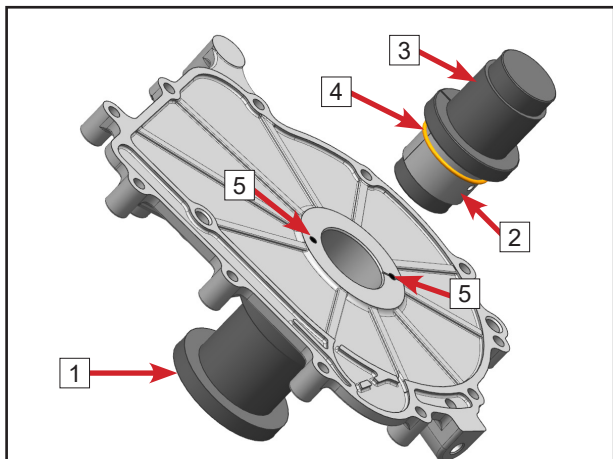
Put special tool: CVT Case Plain Bearing Supporting Tool **1** under PTO crankcase cover to support it as picture shows.

Put plain bearing **2** on Bearing Removal Tool **3** and put a $\varnothing 35 \times 1 \sim 1.5$ o-seal ring **4** to encircle the plain bearing.

Align the commissure of plain bearings with two marks **5** on PTO crankcase cover. Make sure the oil trail hole is correct. After confirmation, compress plain bearings into cover.

After installation, inspect if plain bearings are loose or sliding. Replace the whole PTO crankcase cover if yes. Inspect oil trail hole if it is blocked. Reinstall plain bearings if blocked.

NOTE: Compress the bearing vertically. Otherwise, it may damage the PTO crankcase cover.



After installing plain bearings, install oil seal.

5.6 Engine Assembly

NOTE: Inspect every part before installation. Make sure the installation is correct without missing any part. Clean every part with gasoline before installation (do not wash rubber parts with gasoline). No debris is allowed to exist on part.

NOTE: The removed gasket is sorted for waste disposal. Replace with new ones during installation. The remaining gasket on crankcase or parts has to be cleaned.

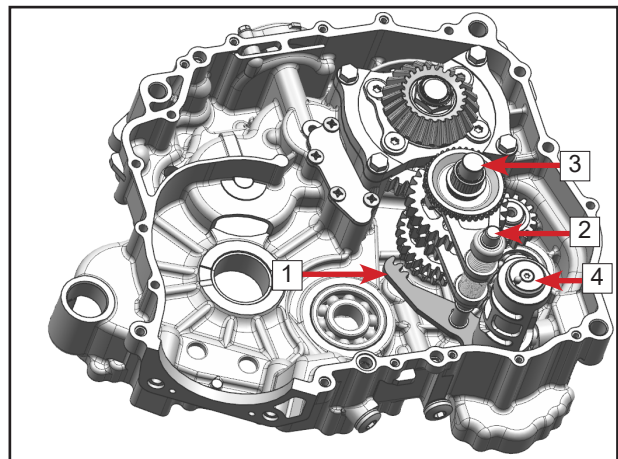
⚠ WARNING: The removed retainer is sorted for waste disposal. Replace with new ones during installation. The open end of the retainer cannot be too much widened. Check retainers in place after installation.

NOTE: The removed oil seal is sorted for waste disposal. Replace with a new one during installation.

5.6.1 Shifting Mechanism

Place parking swing arm **1** in place in crankcase.

Engage shift fork assy **2** with counter shaft assy **3** and shift drum **1**, then fit them in place in left crankcase together.



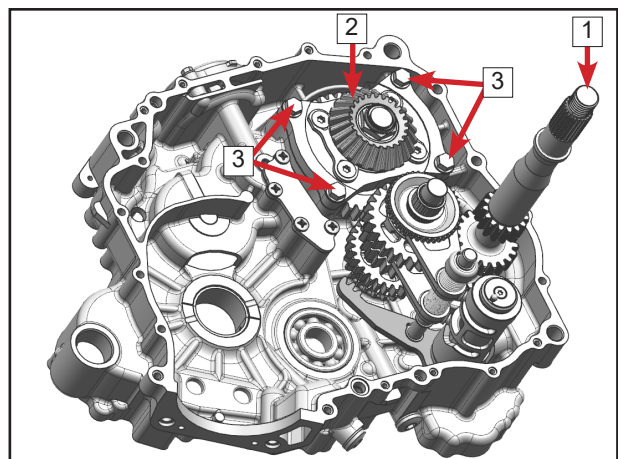
Using an appropriate tool, shift to low range.

Install gearshift main shaft **1**.

Install drive bevel gear assy **2**.

Install M8×28 bolts **3**.

Tighten torque: 30N·m

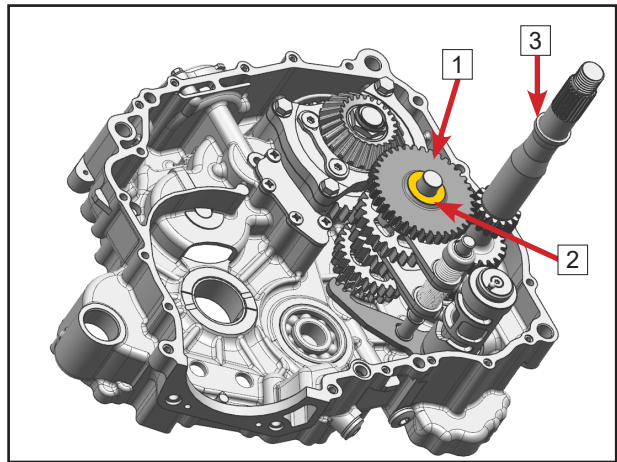


Install driven low gear **1**.

Install washer **2**.

Turn main shaft **3**, check if gears rotate freely and smoothly.

NOTE: When installing rotational parts, equally oil shaft necks.



5.6.1.1 Shim Adjustment Procedure

When crankcase and/or drive bevel gear and/or driven bevel gear and/or bearing carrier are replaced, the shim must be adjusted.

⚠ WARNING: Both gear backlash and tooth contact should be in specification.

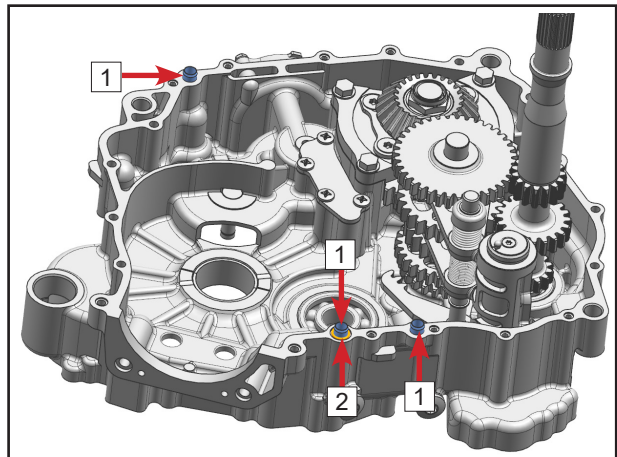
Drive and Driven bevel Gear Backlash Adjustment

Clean the MAG and PTO crankcase sealing surfaces thoroughly and dry with compressed air.

NOTE: Make sure the sealing surface is clean.

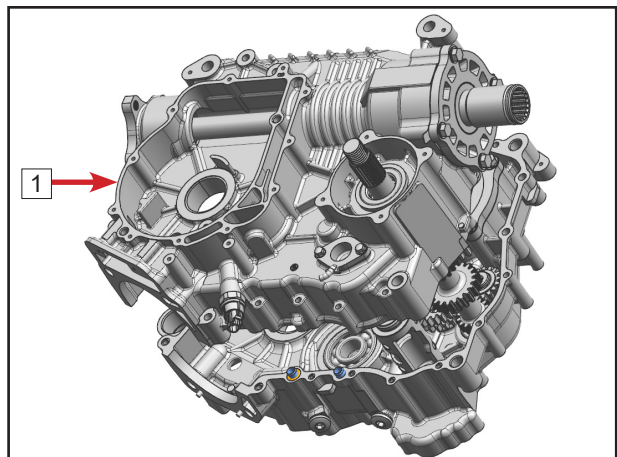
Install dowel pins **1**.

Install o-ring **2**.



Install PTO crankcase **1** onto MAG crankcase.

NOTE: Do not apply crankcase sealant for the gear backlash procedure.



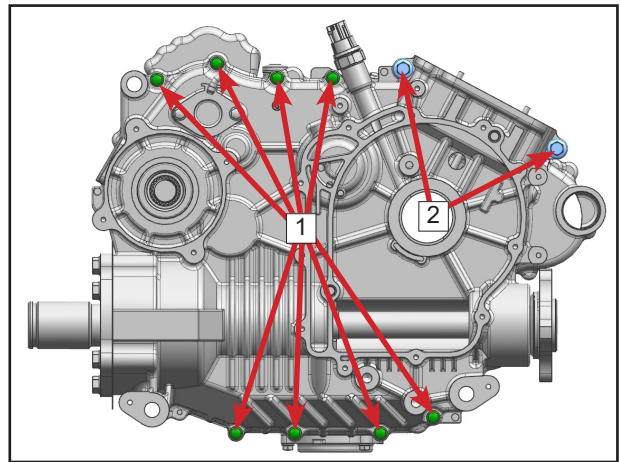
Install PTO side M6 bolts **1**.

Tighten Torque: 10N·m

Install PTO side M8 bolts **2**.

Tighten Torque: 25N·m

NOTE: Pre-tighten the bolts in a crossing method. After pre-tightening, use a torque wrench to tighten a second time in crossing method.



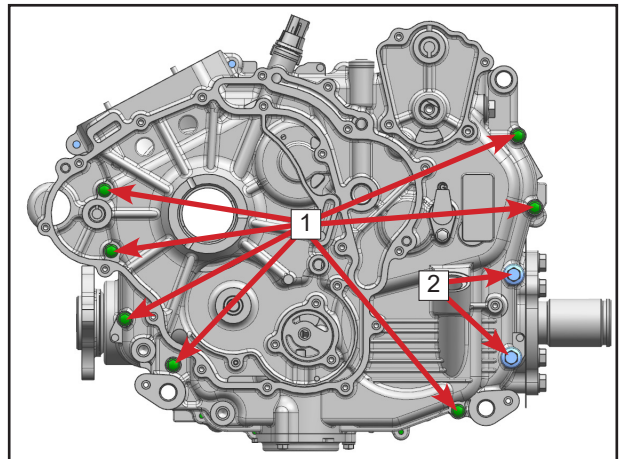
Install MAG side M6 bolts **1**.

Tighten Torque: 10N·m

Install MAG side M8 bolts **2**.

Tighten Torque: 25N·m

NOTE: Pre-tighten the bolts in a crossing method. After pre-tightening, use a torque wrench to tighten a second time in crossing method.

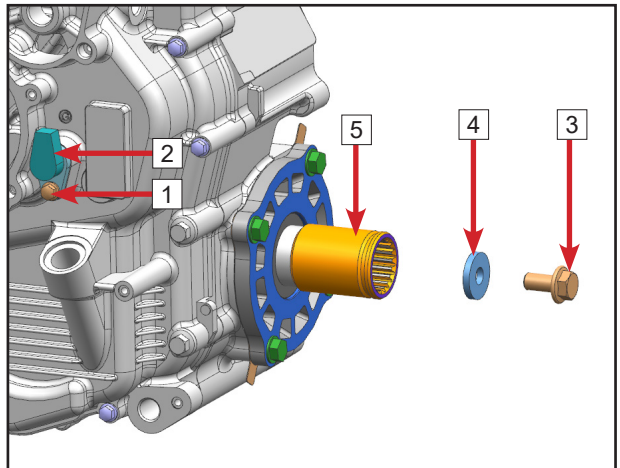


Remove bolt **1**.

Remove speed sensor **2**.

Remove bolt **3** and washer **4**.

Remove output shaft coupler **5**.



Install special tool: Bevel Gear Side Clearance Measuring Tool **1** on the output shaft.

Install washer **2**.

Install M10 bolt **3**.

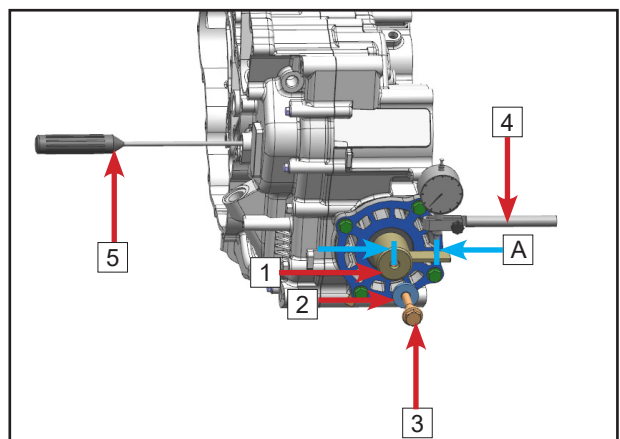
Tighten Torque: 55N·m

Install dial gauge **4** as picture shows.

Insert screw driver **5** through the speed sensor hole and apply pressure to fix drive bevel gear from movement.

Set the dial gauge needle to zero at the 'A' distance required on the measuring tool:

A=45mm



CFMOTO

Rock the tool mounted on the output shaft and measure the backlash.

NOTE: Measure at four points perpendicular to each other.

If the measured backlash is beyond the standard, adjust the washer thickness until the clearance is qualified.

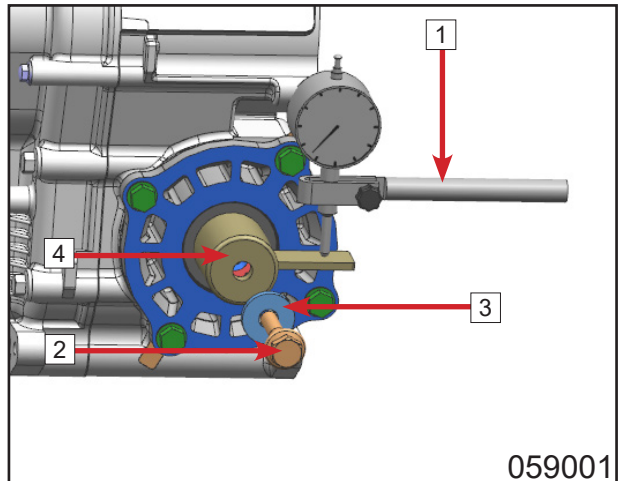
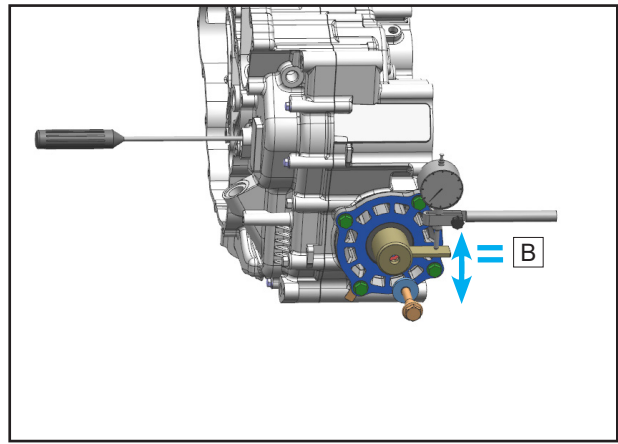
Driven Bevel Gear Backlash

Standard: 0.1mm~0.2mm

Adjusting Method

Backlash - B	Method
<0.1mm	Increase thickness
0.1mm~0.2mm	OK
>0.2mm	Decrease thickness

After adjustment, remove dial gauge [1].
Remove bolt [2] and washer [3].
Remove Bevel Gear Side Clearance Measuring Tool [4].



Tooth Contact

After backlash adjustment is carried out, the tooth contact must be checked. Pay attention to the following procedures.

Remove driven bevel gear from crankcase;
Clean and degrease drive bevel gear and driven bevel gear teeth;

Apply a coating of machinist's layout dye or paste to several teeth of the driven bevel gear;

Install driven bevel gear;

Rotate the driven bevel gear several turns in both directions;

Remove drive bevel gear and driven bevel gear, then inspect the coated teeth of the drive bevel gear.

The tooth contact pattern should be as shown below;

Pattern 1	Contact at tooth top	Incorrect
Pattern 2	Contact at tooth middle	Correct
Pattern 3	Contact at tooth root	Incorrect

If gear tooth contact is found to be correct (pattern 2), continue the next step.

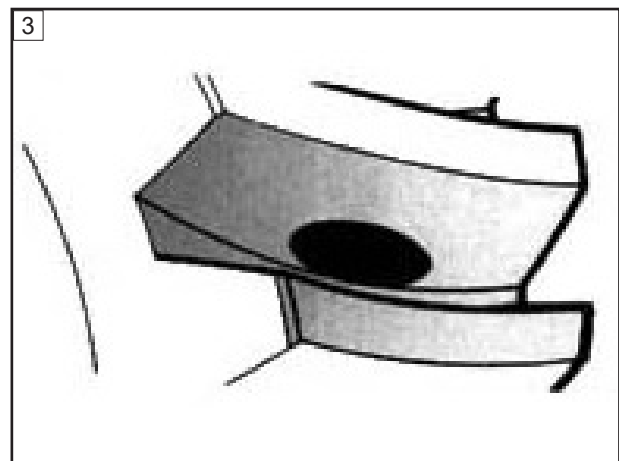
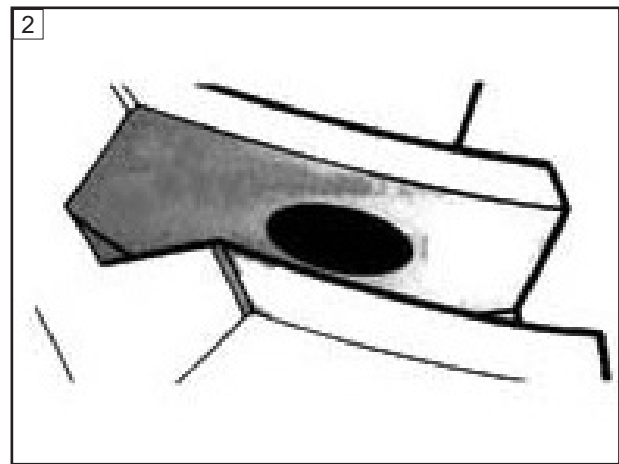
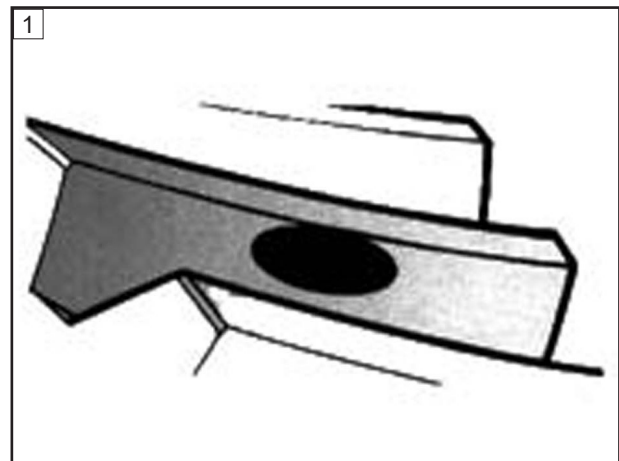
If gear tooth contact is found to be incorrect (pattern 1 and pattern 3), the shim thickness of the drive bevel gear must be changed and the tooth contact re-checked until correct.

NOTE: Clean the dye coated on the gear teeth after the tooth contact adjustment is finished.

Adjusting Method

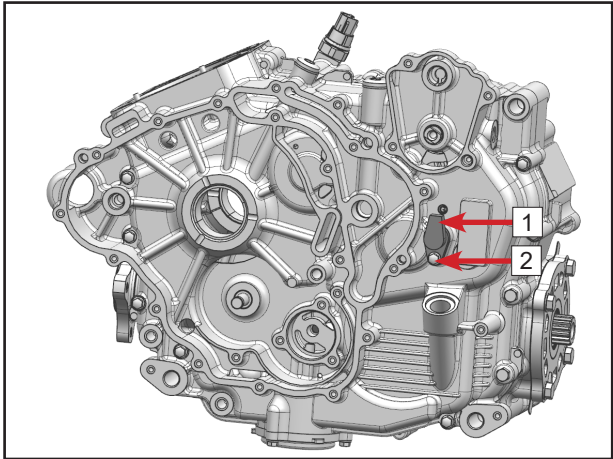
Tooth Contact	Shim Adjustment
Pattern 1	Reduce shim thickness
Pattern 3	Increase shim thickness

⚠ WARNING: Make sure to check the backlash after the tooth contact has been adjusted, since it may have changed. Adjust the tooth contact and backlash until they are both within specification. If the correct tooth contact cannot be maintained when adjusting the backlash, replace the drive bevel gear and driven bevel gear.



After adjustment, continue the next step.

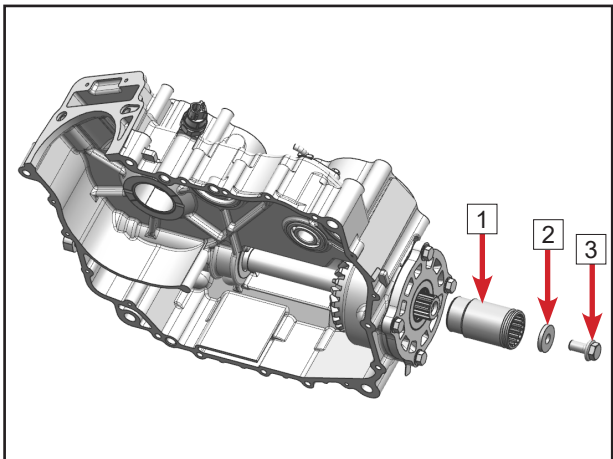
Install speed sensor **1**.
Remove bolt **2**.



Separate the MAG and PTO crankcases;
Remove drive bevel gear assy from MAG crankcase;
Remove driven bevel gear assy from PTO crankcase;
Clean the dye coated on the bevel gear teeth;
Install drive bevel gear assy onto MAG crankcase (refer to 5.6.1 section);
Install driven bevel gear assy onto PTO crankcase (refer to 5.5.30 section);

Install output shaft coupler **1**.
Put washer **2** on bolt **3**.
Install M10×30 bolt **3**.
Tighten torque: 55N·m

Then proceed to section 5.6.2 of engine reassembly.

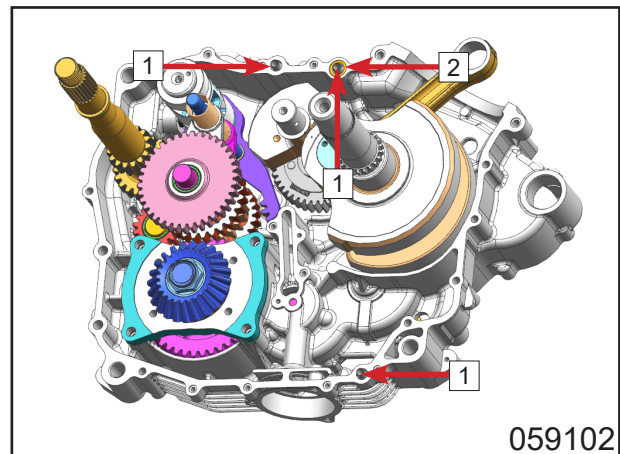
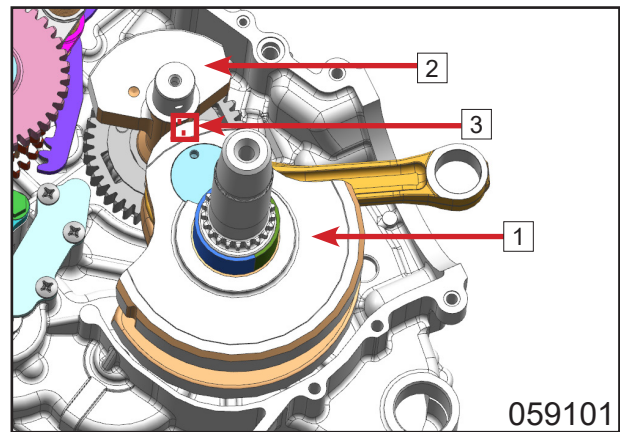


5.6.2 Crankshaft Connecting Rod and Balance Shaft

Apply engine oil on MAG crankcase plain bearings, crankshaft and balance shaft.
Install crankshaft assembly **1** and balance shaft assembly **2** together into the holes on MAG crankcase. Align the marks **3** on balance shaft and crankshaft (as picture shows).

NOTE: Make sure the marks on balance shaft and crankshaft are aligned after installation. Do not damage gear teeth and plain bearings during installation.

Install dowel pins **1**.
Install o-seal ring **2**.



5.6.3 Crankcase Assembly

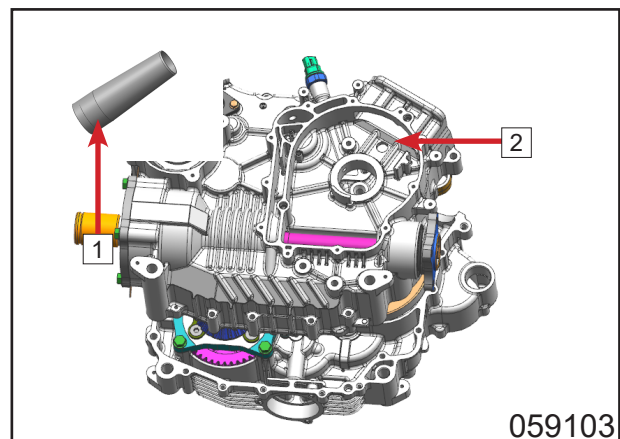
Clean the MAG and PTO crankcase sealing surfaces thoroughly and dry with compressed air.

Put special tool: Crankshaft Plain Bearing Protecting Sleeve **1** on crankshaft.

Apply KB598 sealant on MAG crankcase junction surface evenly.

Install PTO crankcase **2**.

NOTE: Make sure the shift drum is at Low Gear position during installation. Readjust shift drum position if not. Wipe the overflow sealant after assembly. Make sure the surface is clean.



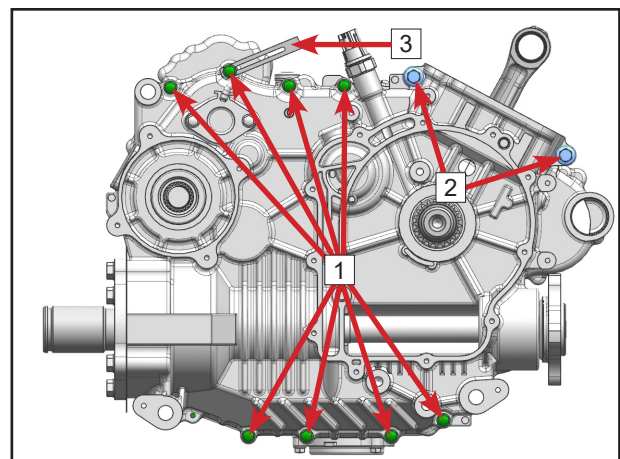
Install PTO side M6 bolts **1**. (one of them requires a wire retainer **3**)

Tighten Torque: 10N·m

Install PTO side M8 bolts **2**.

Tighten Torque: 25N·m

NOTE: Pre-tighten the bolts in a crossing method. After pre-tightening, use a torque wrench to tighten a second time in crossing method.



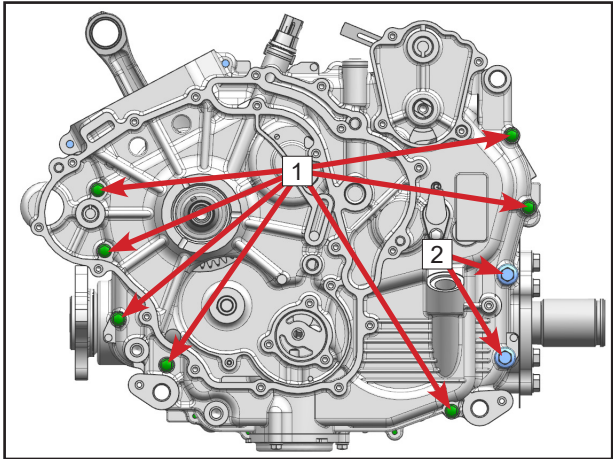
Install MAG side M6 bolts **1**.

Tighten Torque: 10N·m

Install MAG side M8 bolts **2**.

Tighten Torque: 25N·m

NOTE: Pre-tighten the bolts in a crossing method. After pre-tightening, use a torque wrench to tighten a second time in crossing method.



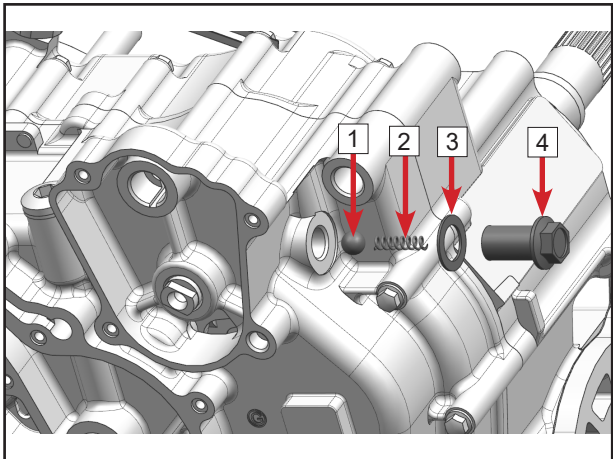
Install detent ball **1**.

Place washer **3** on detent bolt **4**.

Insert detent spring **2** into the detent bolt **4**.

Install detent bolt **4**.

Tighten Torque: 28N·m

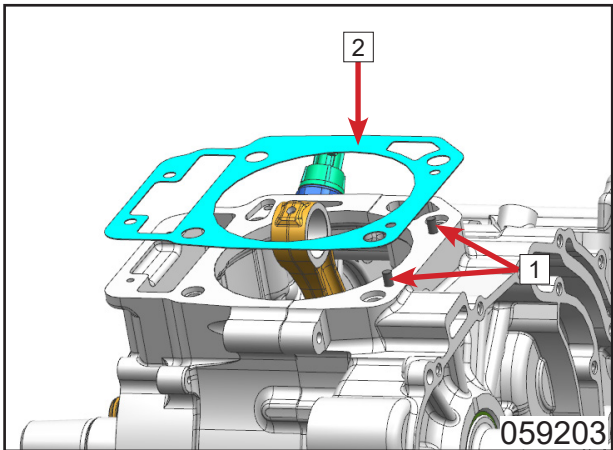


5.6.4 Piston

Install dowel pins **1**.

Apply KB598 sealant on the crankcase parting lines evenly.

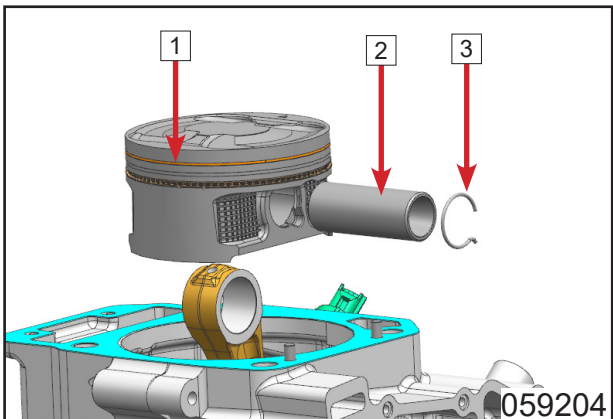
Install the cylinder base gasket **2**.



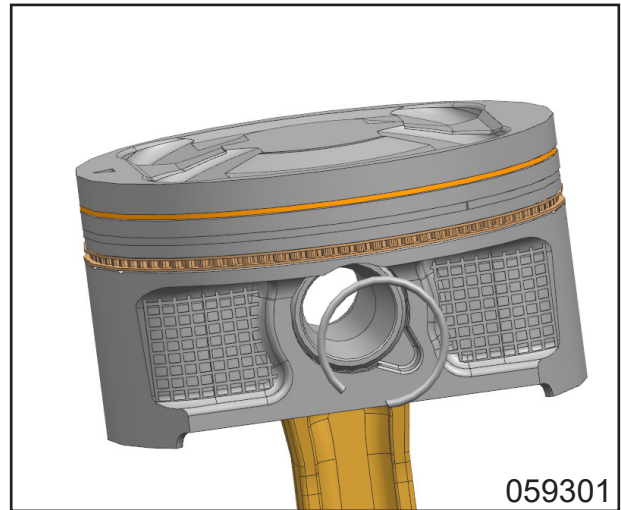
Align the piston **1** pin hole on the connecting rod small end.

Apply engine oil on the piston pin **2** and insert into the piston pin hole and connecting rod small end hole.

Install piston pin circlip **3**.



NOTE: The circlip should be into the groove. Use pliers to turn circlip. The gap of circlip and groove should be staggered as picture shows.



5.6.5 Cylinder Body

Adjust piston ring and oil ring position as picture shows before installing cylinder body.

Gap angle between A and B: 180°

Gap angle between B and D: 180°

Gap angle between C and D: 120°

Gap angle between E and D: 120°

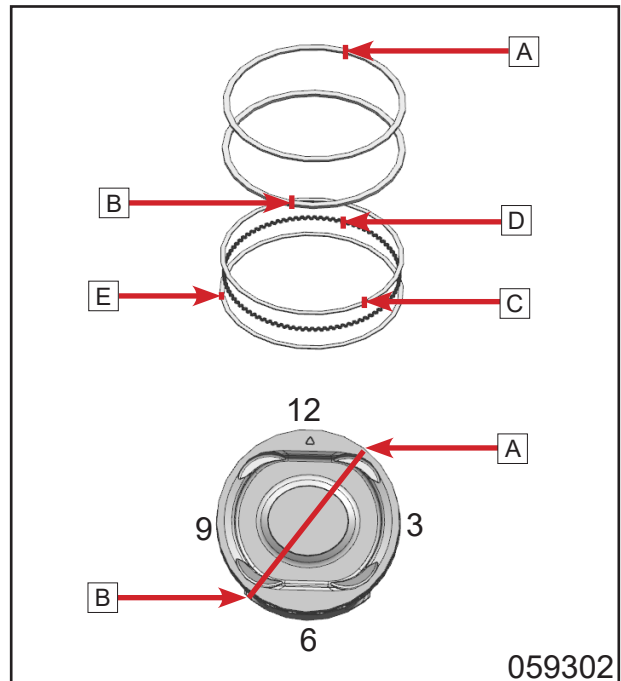
A: Pison first ring gap

B: Pison second ring gap

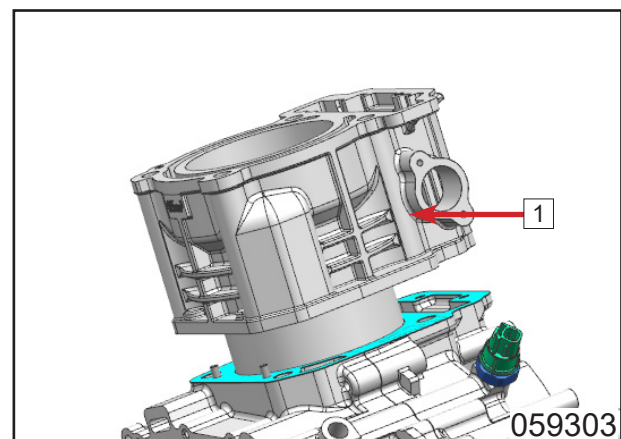
C: Oil control ring gap

D: Oil ring expander gap

E: Oil control ring gap



Apply engine oil inside cylinder body. Install cylinder body 1 with piston assembly inside. Install it in place. Wipe exceed engine oil on piston.



5.6.6 Shift Sector Gear

Apply engine oil on MAG crankcase.
 Install shift driven sector gear **1**.
 Put washer **2** on bolt **3**.
 Install M6×35 bolt **3**.
 Tighten torque: 10~12N·m
 Install shift drive sector gear **4**.

NOTE: Make sure marks on drive and driven sector gears are aligned. Shift gears to check whether they are installed in place. When shift drum is at Neutral Gear, the mark on drive sector gear should be in the center of two mark points on driven sector gear.

NOTE: Test the shift feeling with wrench. If there is stuck feeling (even a little) when shifting gear, loosen and tighten driven sector gear M6X35 bolt to make sure it is easy and smooth to shift gear.

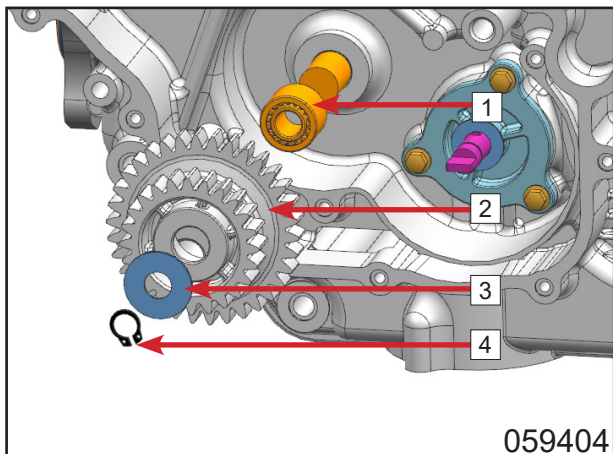
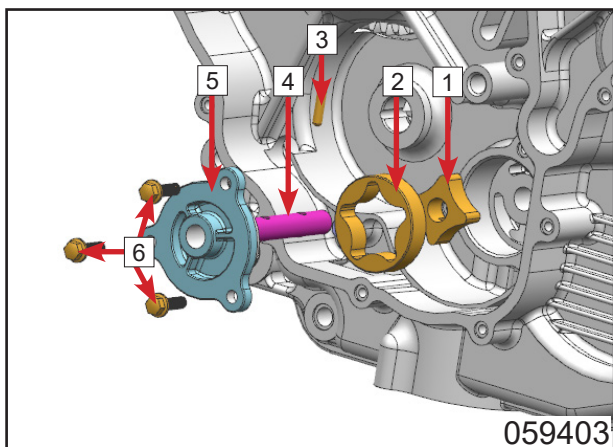
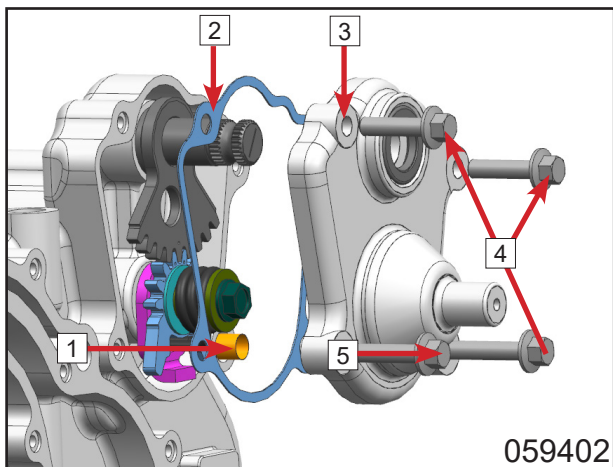
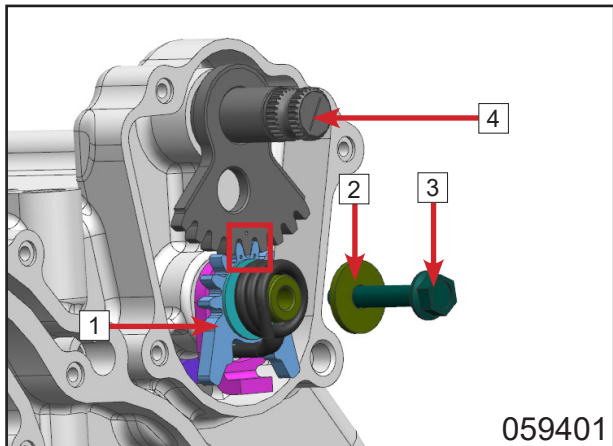
Install dowel pin **1**.
 Install gasket **2**.
 Install gearshift cover **3**.
 Install M6×25 bolts **4** and tighten to 10~12N·m.
 Install M6×32 bolts **5** and tighten to 10~12N·m.

NOTE: Insert all the bolts into holes during installation. If exposed heights are same, it means the bolts are in the correct place.

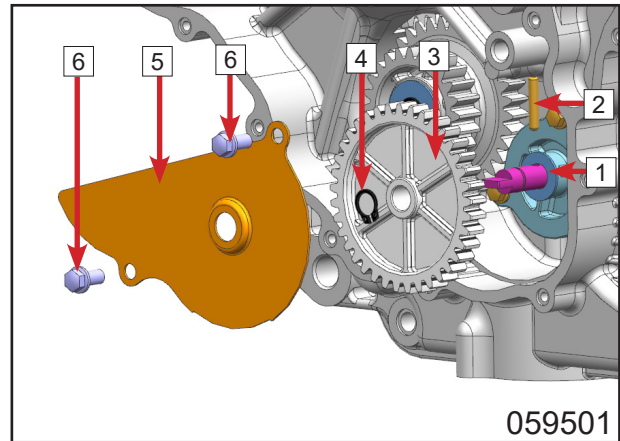
5.6.7 Oil Pump

Install oil pump inner rotor **1** on oil pump shaft **4**.
 Put roller needle **3** through hole on oil pump shaft **4** and clip it into the groove on oil pump inner rotor **1**.
 Apply engine oil on oil pump outer rotor **2** and junction area on crankcase. Put outer rotor **2** on oil pump shaft **4**. Install them together on crankcase.
 Install oil pump cover **5**.
 Install M5×16 bolts **6** with 243 thread locker.
 Tighten torque: 6~9N·m

Install needle bearing **1**.
 Install oil pump dual gear **2**.
 Install washer **3**.
 Install circlip **4**.

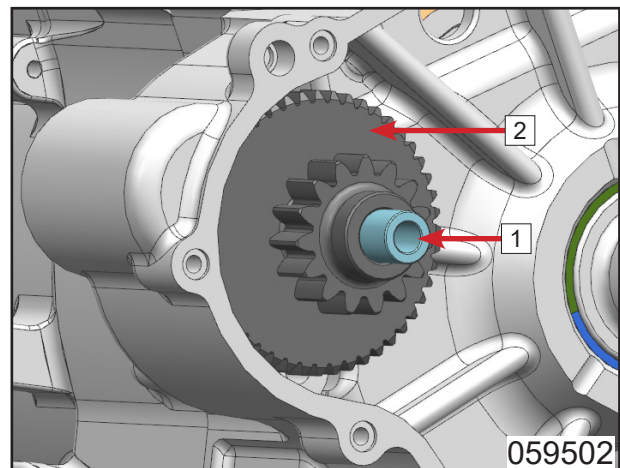


- Install washer [1].
 - Install roller needle [2].
 - Install oil pump gear [3]. (The roller needle should clip into the groove on oil pump gear.)
 - Install circlip [4].
 - Install oil guard [5].
 - Install M6×12 bolt [6].
- Tighten torque: 10~12N·m



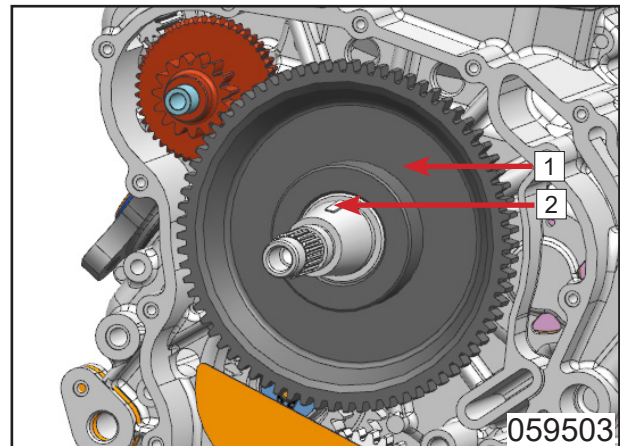
5.6.8 Starter Dual Gear

- Apply engine oil on starter dual gear and mounting hole.
- Install starter dual gear shaft [1].
- Install starter dual gear [2].



5.6.9 Magneto Stator (191Q)

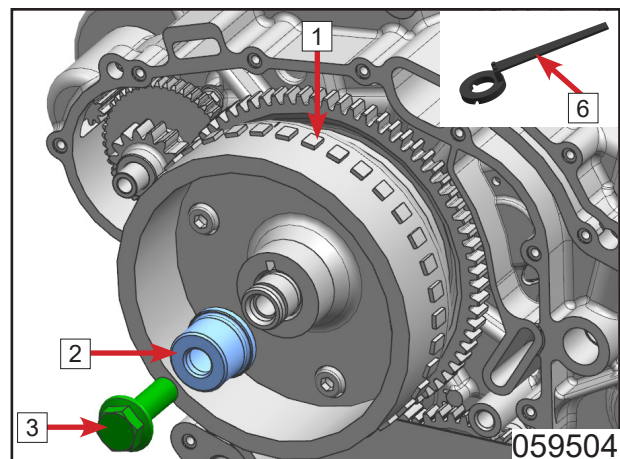
- Apply engine oil on crankshaft and driven gear hole.
- Install driven gear [1].
- Install woodruff key [2].



- Apply engine oil on crankshaft and magneto rotor hole.
- Install magneto rotor [1].

NOTE: Align woodruff key with the groove on magneto rotor during installation.

- Use Magneto Stator Holding Wrench [6] to fix magneto rotor [1].
 - Install locking sleeve [2].
 - Install M12 bolt [3] with thread locker.
- Tighten torque: 60N·m

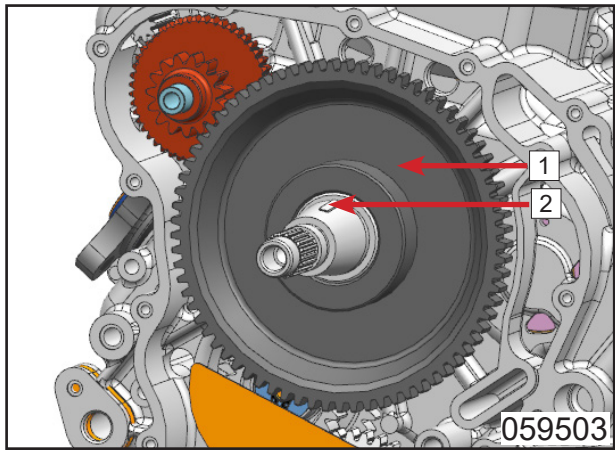


5.6.10 Magneto Stator (191R)

Apply engine oil on crankshaft and driven gear hole.

Install driven gear **1**.

Install woodruff key **2**.



Apply engine oil on crankshaft and magneto rotor hole.

Install magneto rotor **1**.

NOTE: Align woodruff key with the groove on magneto rotor during installation.

Use Magneto Stator Holding Wrench **6** to fix magneto rotor **1**.

Install shaft bushing **2**.

Install washer **3**.

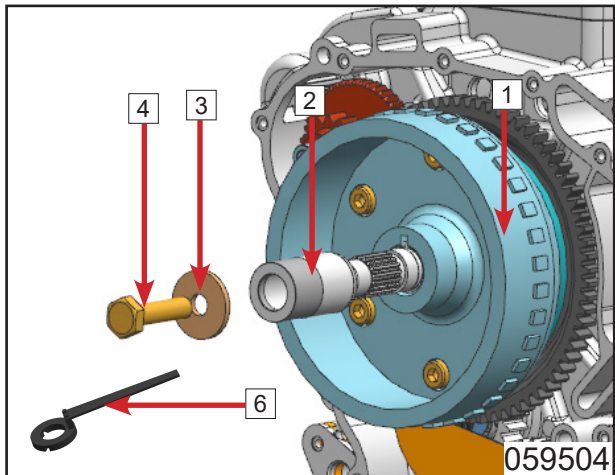
Install M10×40 bolt **4**.

Tighten torque: 60N·m

Tighten first and then remove bolt **4**.

Remove washer **3**.

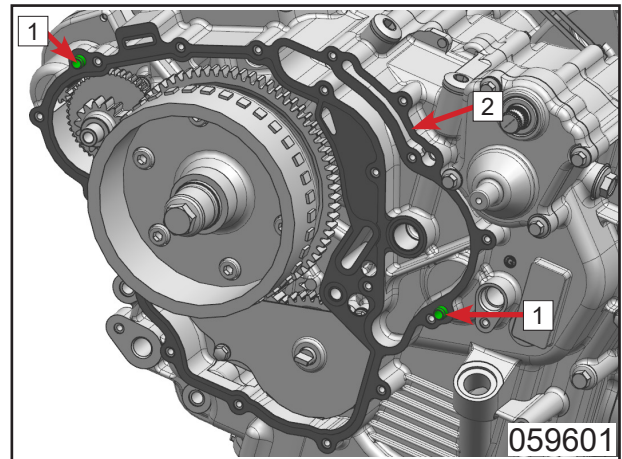
Remove shaft bushing **2**.



5.6.11 MAG Crankcase Cover (191Q)

Install dowel pins **1**.

Install seal gasket **2**.

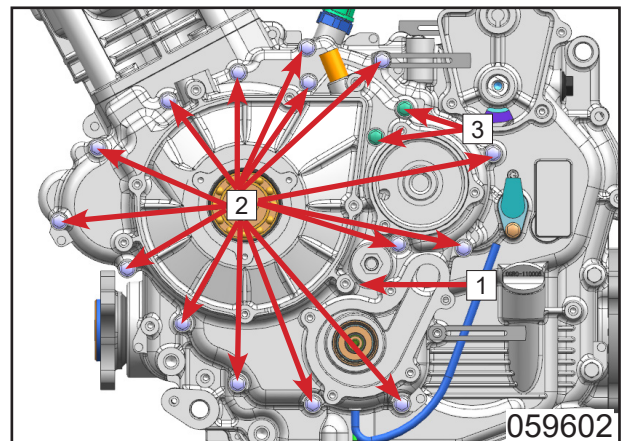


Install MAG crankcase cover **1**.

Install M6 bolts **2** and tighten to 10~12N·m.

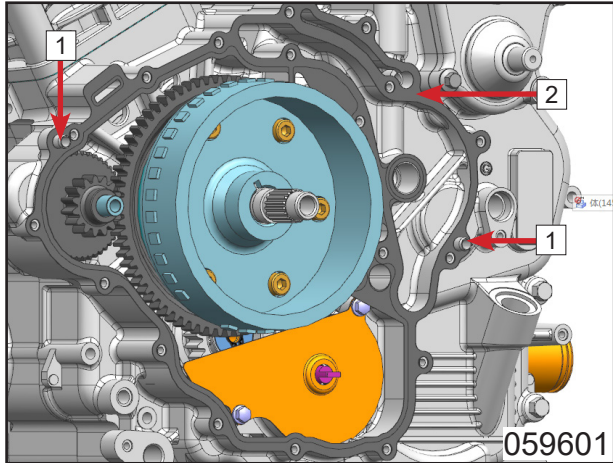
Install M6 bolts **3** and tighten to 10~12N·m.

NOTE: Insert all the bolts into holes during installation. If exposed heights are same, it means the bolts are in the correct place.



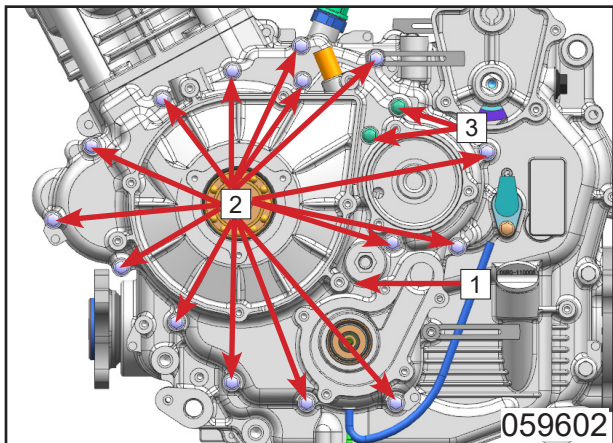
5.6.12 MAG Crankcase Cover (191R)

Install dowel pins **1**.
Install seal gasket **2**.

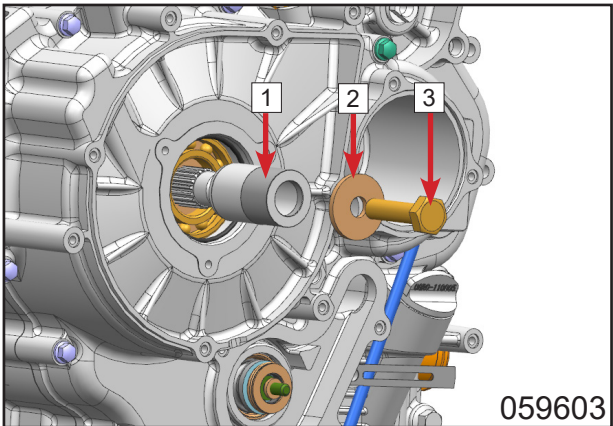


Install MAG crankcase cover **1**.
Install M6 bolts **2** and tighten to 10~12N·m.
Install M6 bolts **3** and tighten to 10~12N·m.

NOTE: Insert all the bolts into holes during installation. If exposed heights are same, it means the bolts are in the correct place.

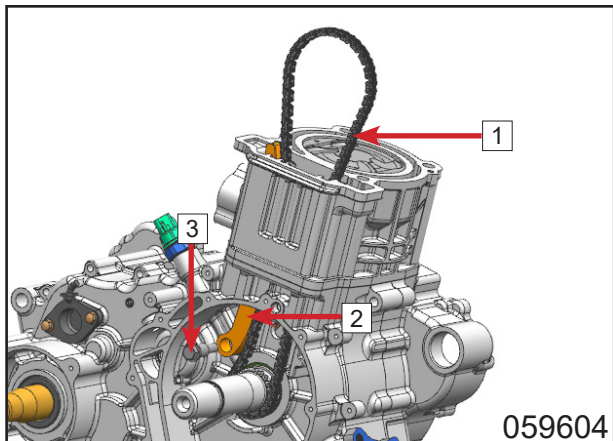


Install shaft bushing **1**.
Put washer **2** on bolt **3**.
Install M10×40 bolt **3** with thread locker.
Tighten torque: 60N·m



5.6.13 Timing Chain

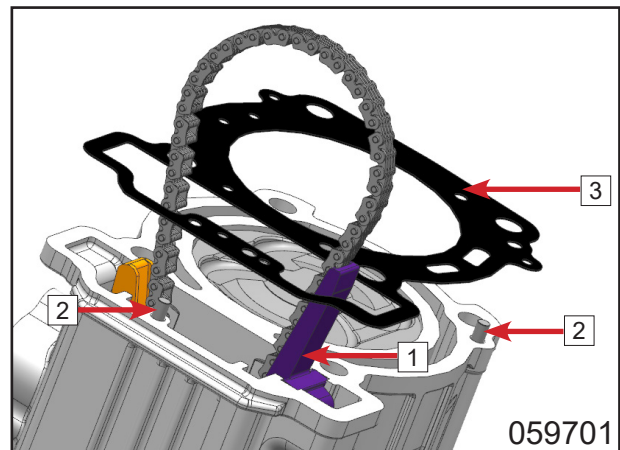
Hook timing chain **1** in case it falls into engine body during installation.
Install tensioner plate **2**.
Install thread pin shaft **3** with 243 thread locker.
Tighten torque: 18~22N·m



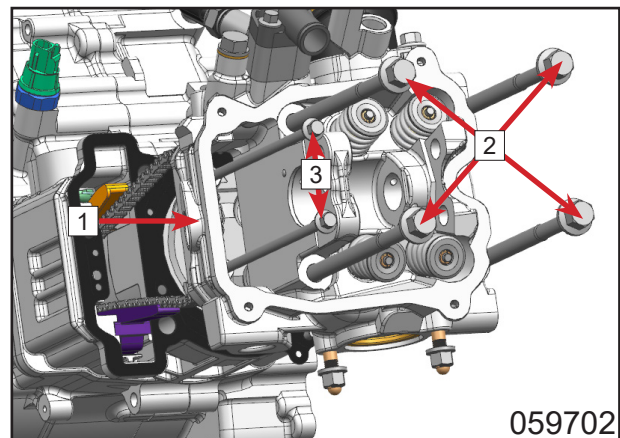
5.6.14 Cylinder Head

Install chain guide **1**.
 Install roller needle **2**.
 Install cylinder head gasket **3** (with roller needle going through).

NOTE: Roller needle shall go through cylinder head gasket. Hook the timing chain during installation, in case it falls into engine body.



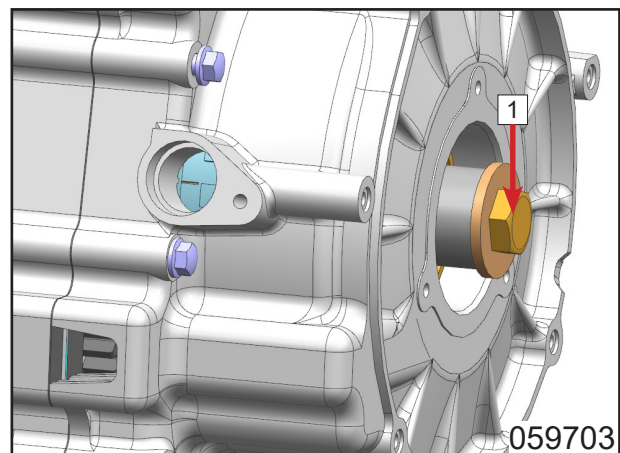
Install cylinder head **1**.
 Install M10 bolts **2**. Pre-tighten to 20N·m in criss-cross way, then tighten to 60N·m in criss-cross way.
 Install M6×132 bolts **3** and tighten to 10~12N·m.



5.6.15 TDC Adjustment

Rotate bolt **1** with sleeve.
 Watch the mark through viewing hole. Rotate the sleeve until the mark is at the center of the hole. Such position is the TDC.

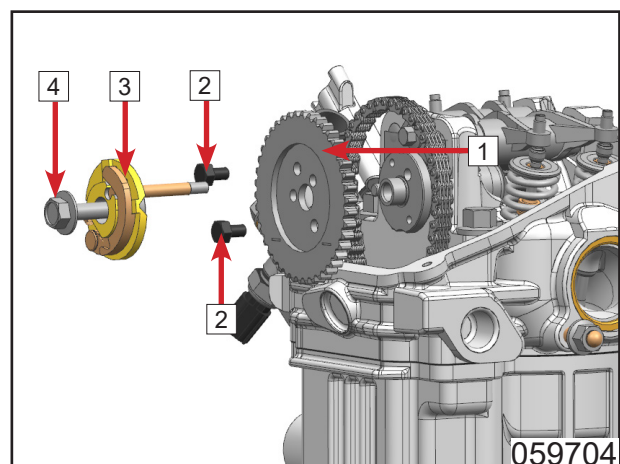
NOTE: Hook the timing chain during installation, in case it falls into engine body.



5.6.16 Timing Sprocket

Put timing sprocket **1** on timing chain.
 Install them on camshaft.
 Install M6×10 bolts **2** with 243 thread locker and tighten to 10~12N·m.
 Install start decompression assembly **3**.
 Install M8×32 bolts **4** with 243 thread locker and tighten to 28~36N·m.

NOTE: Hook the timing chain during installation, in case it falls into engine body.



NOTE: The mark lines 1 on sprocket should parallel with cylinder head surface 2 as picture shows.

If not parallel, readjust timing sprocket and camshaft position.

5.6.17 Valve Clearance Adjustment

Fix nut 1 with wrench.

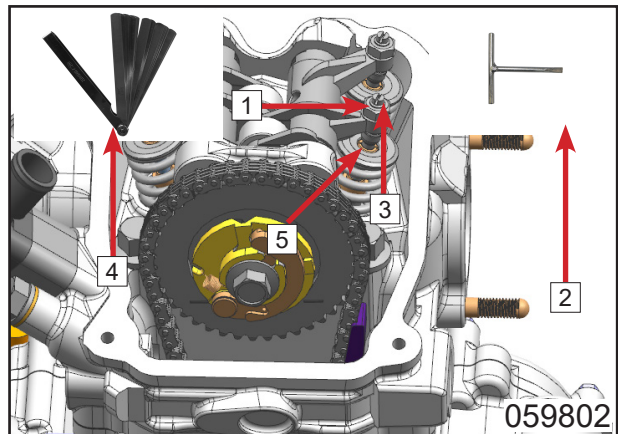
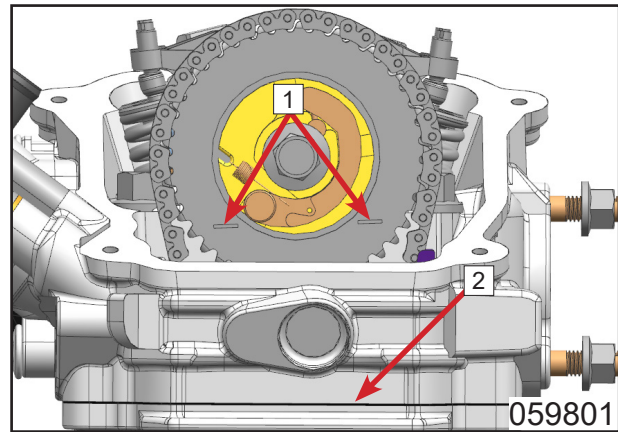
Use special tool: Valve Clearance Adjusting Wrench 2 to loosen adjusting screw 3.

Insert filler gauge 4 of appropriate thickness between rocker arm and valve spring lock clip 5.

The filler gauge 4 can be moved without much force. Then tighten adjusting nut 1. Inspect again to make sure the clearance is qualified.

NOTE: The cylinder must be at TDC position before clearance adjustment.

Valve clearance	
Intake valve	0.06mm~0.14mm
Exhaust valve	0.11mm~0.19mm



5.6.18 Timing Chain Tensioner

Remove M6 screw 1.

Remove o-seal ring 2.

Put gasket 3 on tensioner 4.

Install tensioner 4 on cylinder body.

Insert screw driver into screw mounting hole 3. Rotate it to adjust push-pull arm to the appropriate length. Do not loosen screw driver.

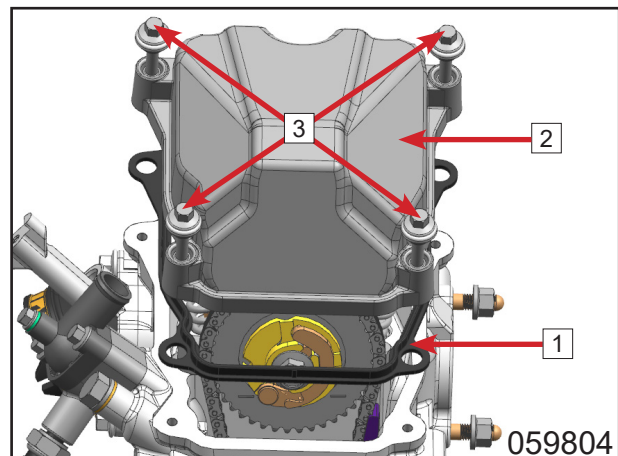
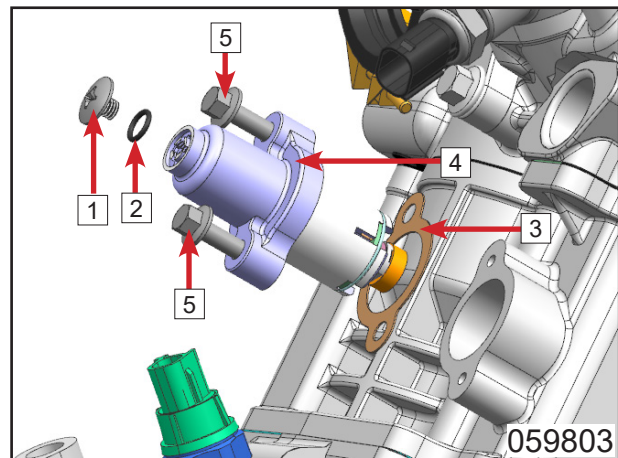
Install M6×25 bolts 5 and tighten to 10~12N·m.

Remove screw driver.

Install o-seal ring 2.

Install M6 screw 1.

NOTE: Check TDC position again. Readjust if the cylinder isn't at TDC position.

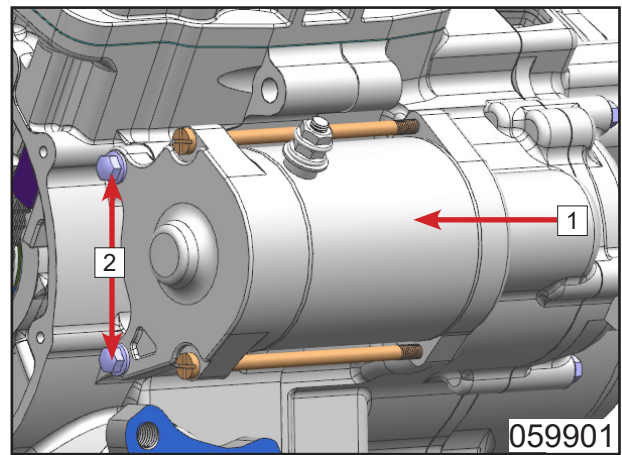


5.6.20 Starter Motor

Apply engine oil on starter motor o-seal ring and gear.

Install starter motor **1**.

Install M6×25 bolts **2** and tighten to 10~12N·m.



5.6.21 Oil Filter

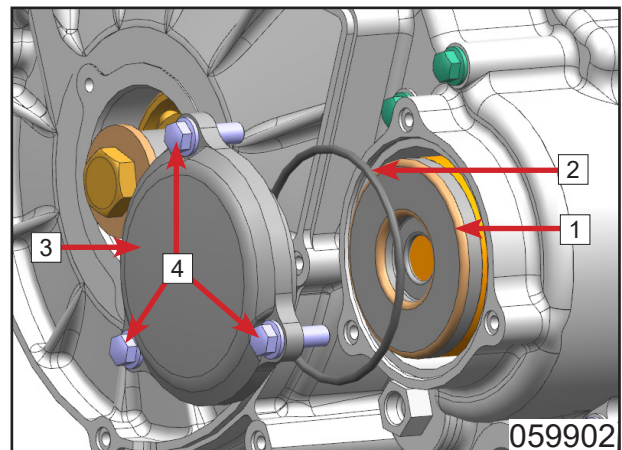
Soak filter element into engine oil before installation.

Install oil filter element **1**.

Put o-seal ring **2** on oil filter cover **3**.

Install oil filter cover **3**.

Install M6×18 bolts **4** and tighten to 10~12N·m.

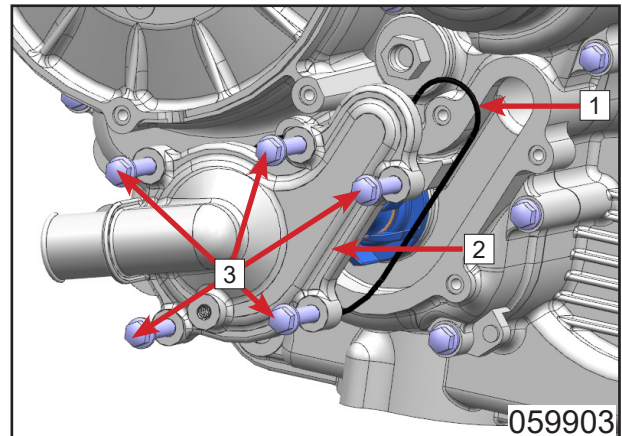


5.6.22 Water Pump Cover

Install seal ring **1** into the groove on water pump cover.

Install water pump cover **2**.

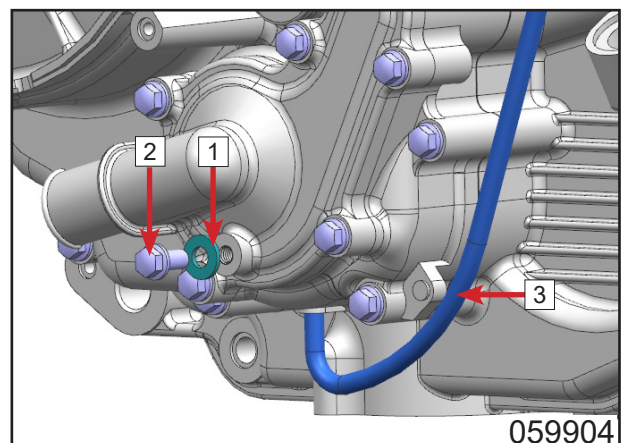
Install M6×22 bolts **3** and tighten to 10~12N·m.



Put washer **1** on drain bolt **2**.

Install M6 drain bolt **2**.

Install overflow hose **3**.

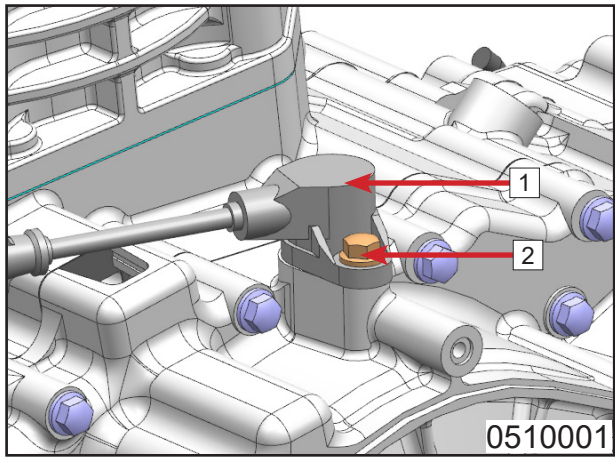


5.6.23 Magneto End Cap and Crankshaft Position Sensor

Put o-seal ring on crankshaft position sensor (apply engine oil on junction surface and mounting hole).

Install crankshaft position sensor 1.

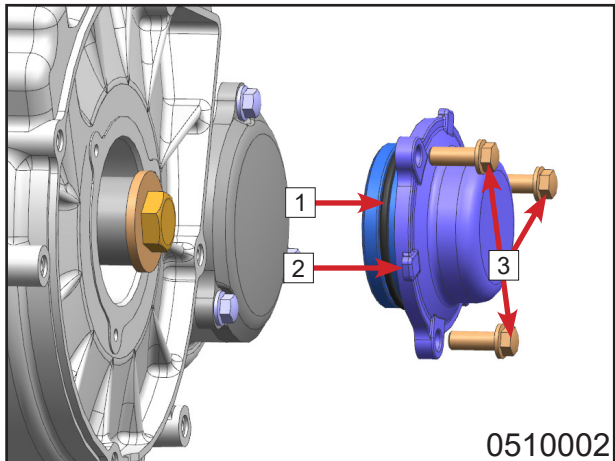
Install M6×16 bolt 2 and tighten to 10~12N·m.



Check if there is an o-seal ring 1 on magneto end cap. Install one if not.

Install magneto end cap 2.

Install M6×16 bolts 3 and tighten to 10~12N·m.



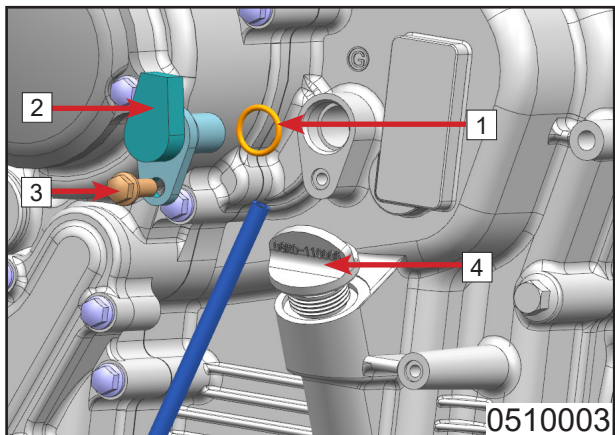
5.6.24 Oil Dipstick, Drain Bolt and Speed Sensor

Put o-seal ring 2 on speed sensor.

Install speed sensor 2.

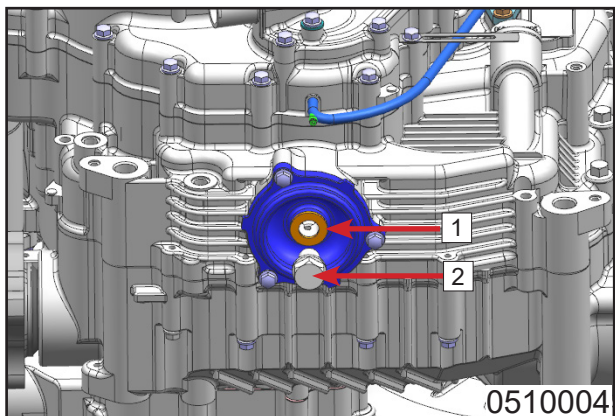
Install M6 bolt 3.

Install oil dipstick 4.



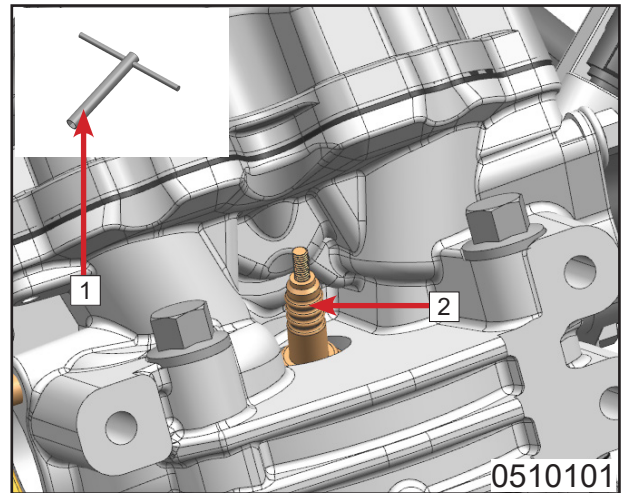
Put washer 1 on drain bolt 2.

Install M12×1.5 drain bolt 2 and tighten to 23~27N·m.



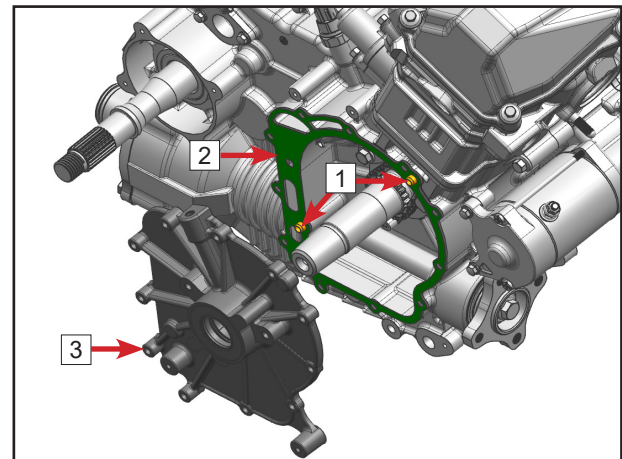
5.6.25 Spark Plug

Use special tool: Spark Plug Wrench **1** to install spark plug **2**.



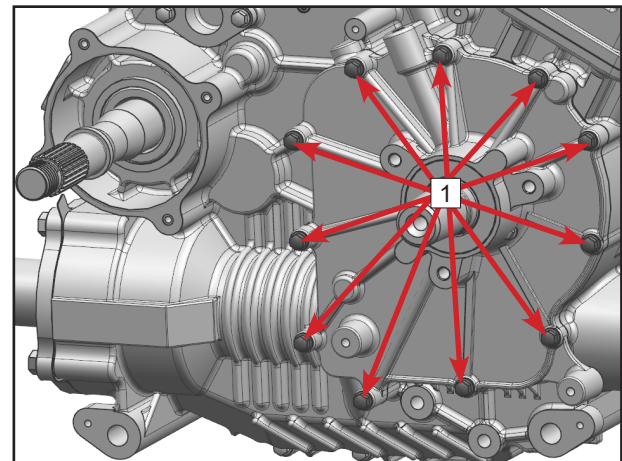
5.6.26 PTO Crankcase Cover Assy

Install dowel pins **1**.
Install seal gasket **2**.
Install PTO Crankcase Cover Assy **3**.



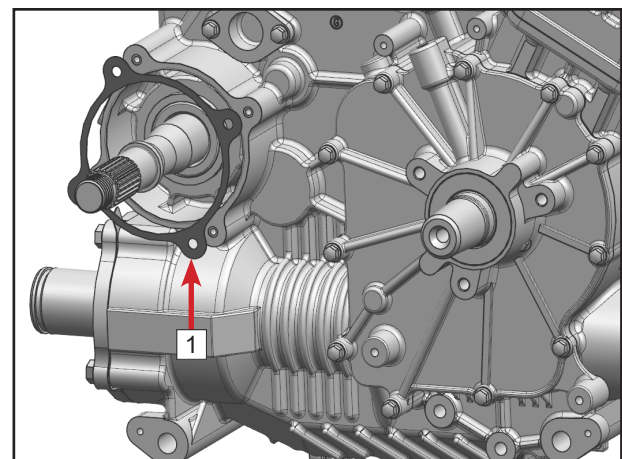
Install M6 bolts **1** and tighten to 10~12N·m.

NOTE: Insert all the bolts into holes during installation. If exposed heights are same, it means the bolts are in the correct place.

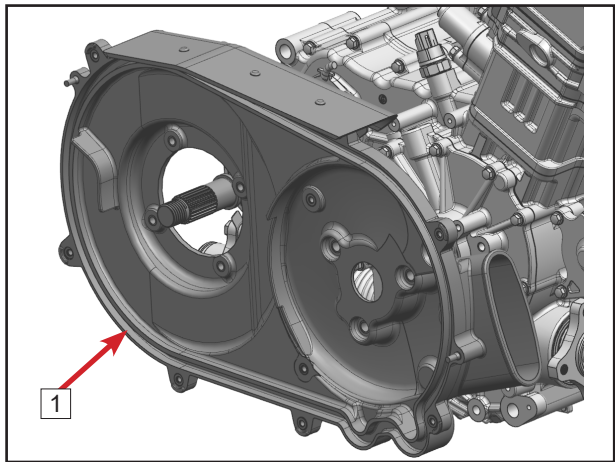


5.6.27 CVT Case Assy

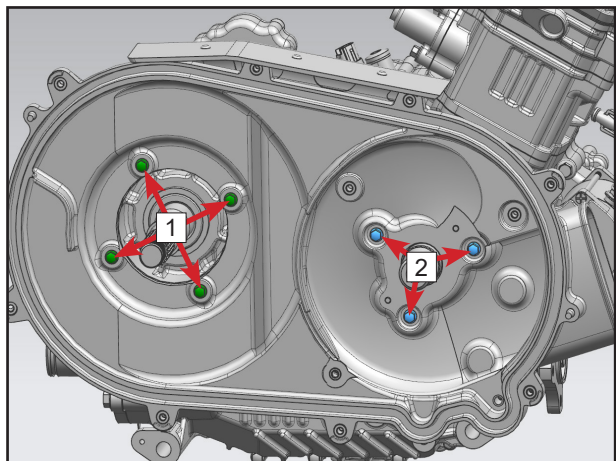
Install seal gasket **1**.



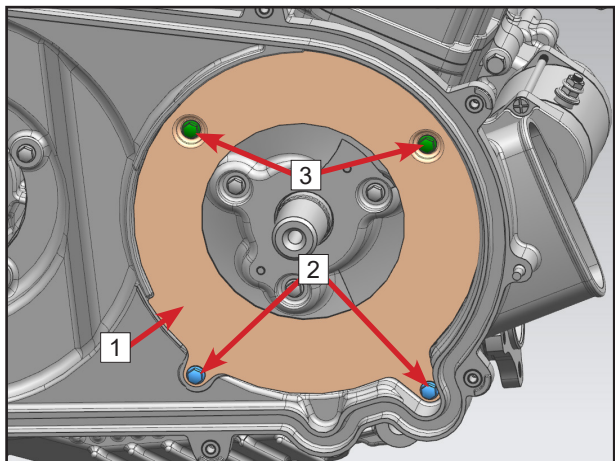
Install CVT case Assy **1**.



Apply 243 thread locker to the M6 bolts **1**.
Install M6 bolts **1** and tighten to 10~12N·m.
Install M6 bolts **2** and tighten to 10~12N·m.



Install CVT wind board **1**.
Install M6 bolts **2** and tighten to 10~12N·m.
Install M6 bolts **3** and tighten to 10~12N·m.



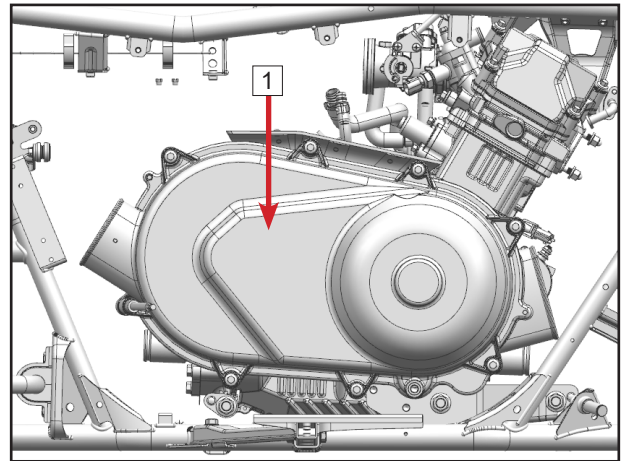
CVT system detail refers to 04 CVT System chapter.

After engine assembly, rotate crankshaft to inspect if there is stuck or noise. Diagnose the fault reason and re-assemble the engine if necessary.

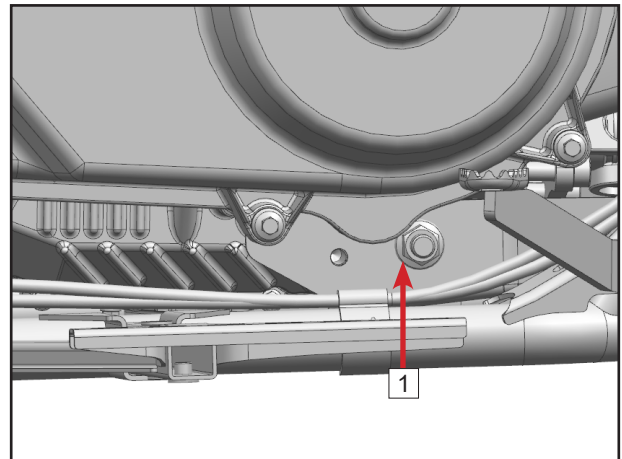
5.7 Engine Installation

Hang engine **1** and install it onto vehicle.

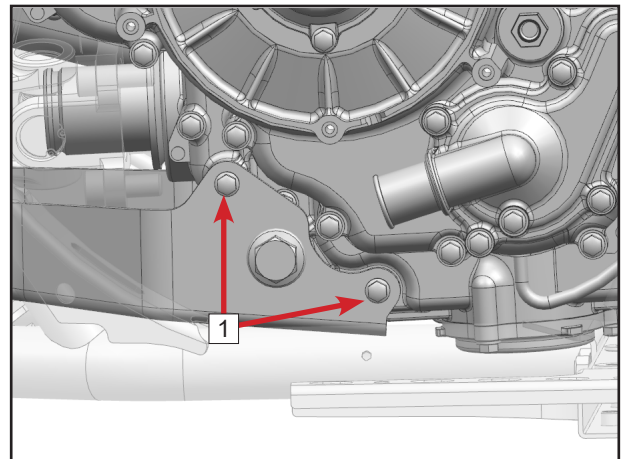
⚠ CAUTION: Pay attention during operation, in case the engine falls down to cause injury and accident.



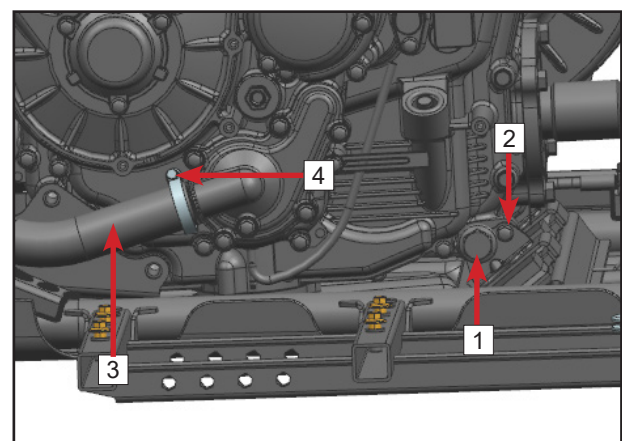
Lift engine to install bolts **1**.



Lift engine to install bolts **1**.
Install bolt **2** (use a wrench to fix the nut behind the bolt).

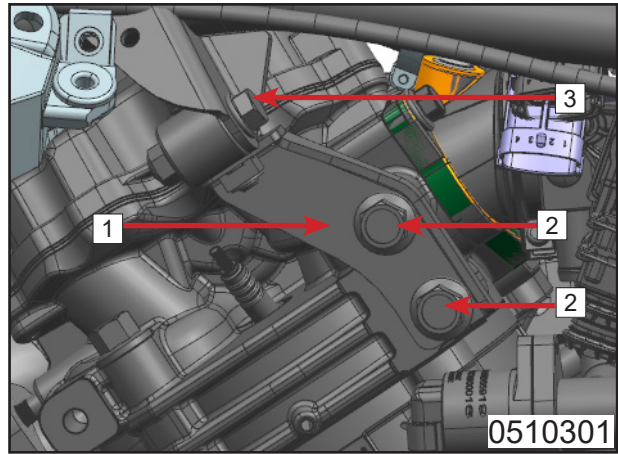


Lift engine to install bolts **1**.
Install water pipe **2**.
Tighten clamp **3**.

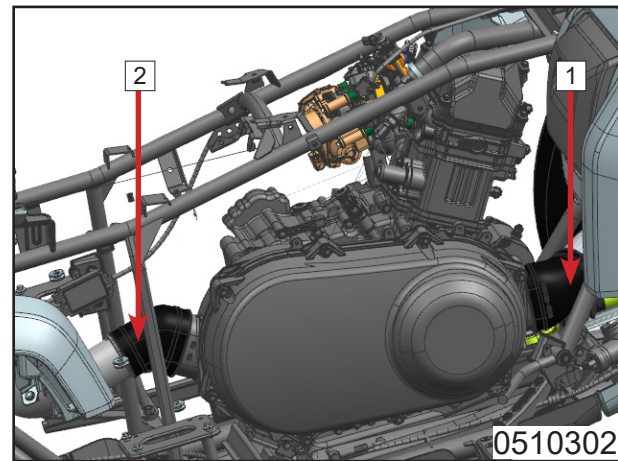


CFMOTO

Install engine upper bracket **1**.
Install bolt **2**.
Install bolts **3**.

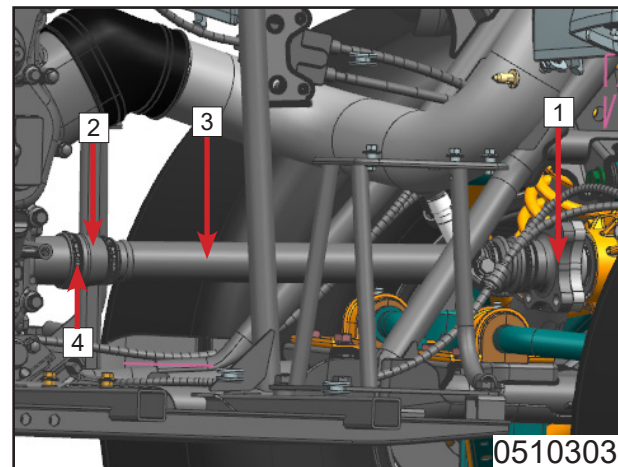


Install CVT air inlet pipe **1**.
Install CVT air outlet pipe **2**.

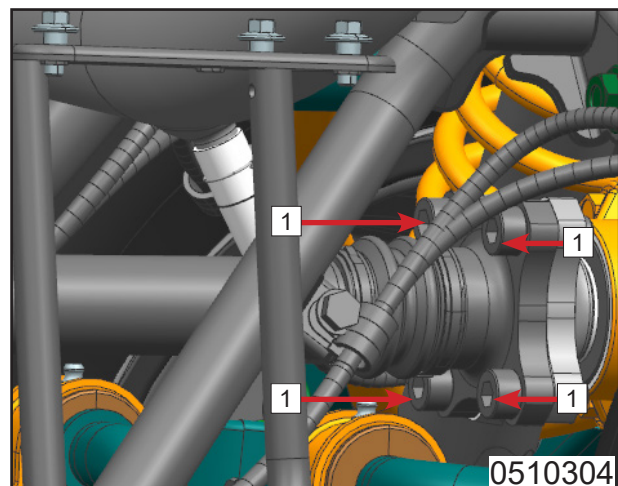


Separate rear drive shaft flange **1** and rear gear case flange. Align drive shaft **2** and engine output shaft sleeve.
Install rear drive shaft **3** and align rear drive shaft flange with rear gear case flange.
Tighten clamp **4**.

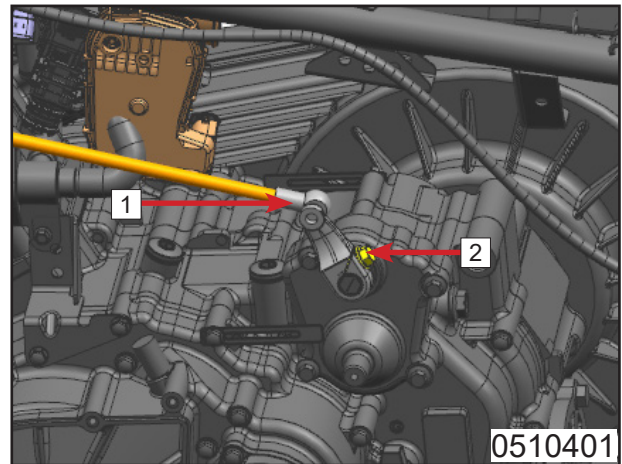
NOTE: Apply grease into drive shaft sleeve **2 during installation.**



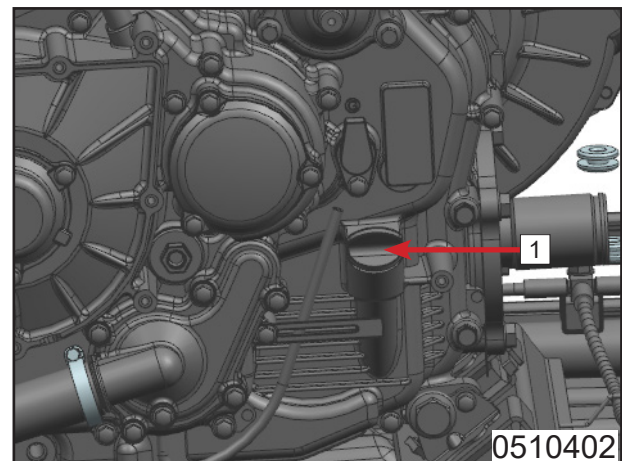
Install bolt **1**.



Install gearshift lever **1**.
Install bolt **2**.
(Details refer to Gearshift section.)

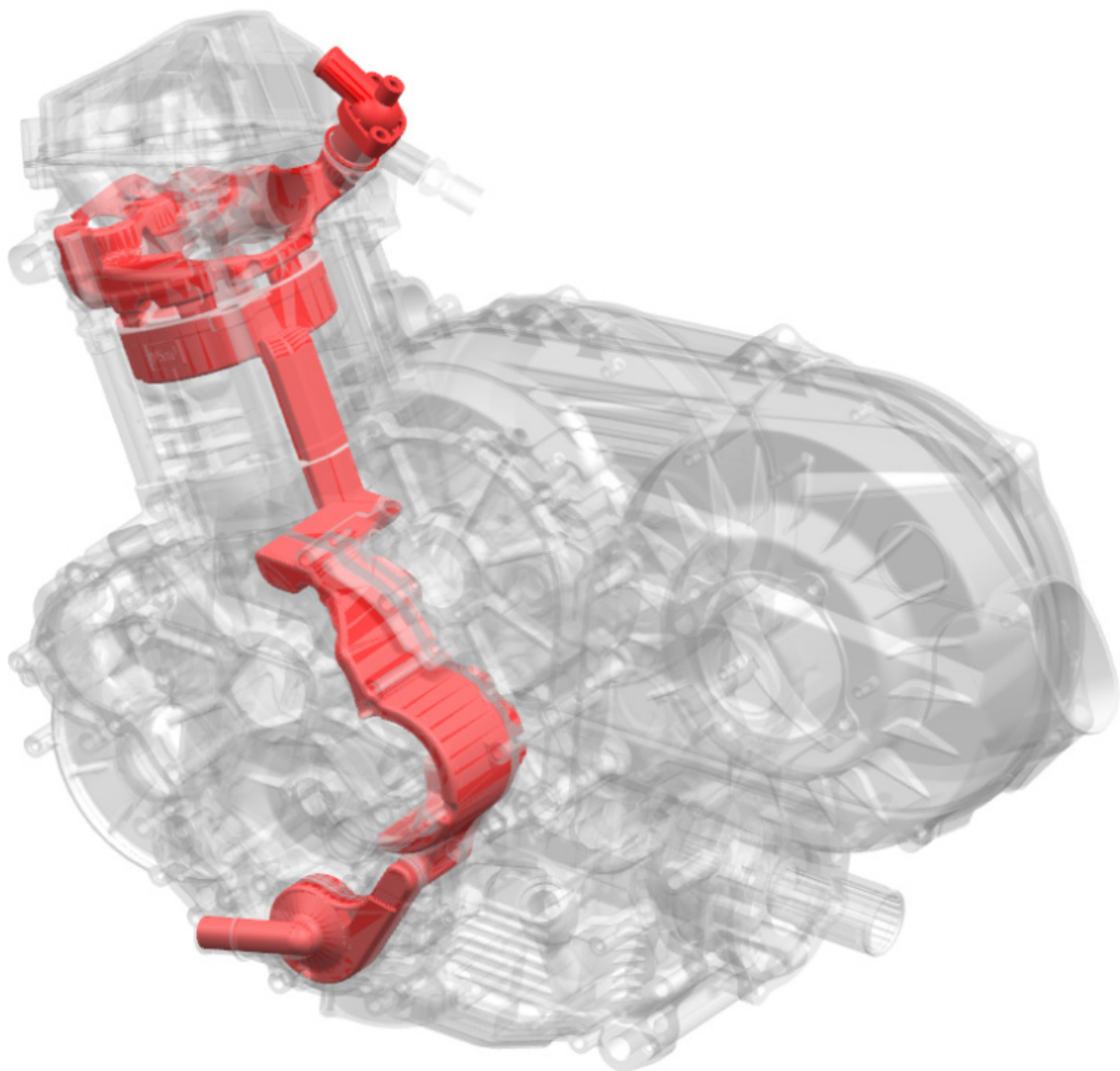


Place the vehicle on level ground.
Remove oil dipstick **1**.
Add engine oil (details refer to Lubrication System section).
Add coolant (details refer to Cooling System section).
Install air filter (details refer to Air Filter section).
Plug in electrical parts connectors.
Install muffler (details refer to Muffler section).
Install fuel tank (details refer to Fuel Tank section).
Install body covering parts (details refer to Body Covering Parts section).
Install seats (details refer to Seat section).



5.8 Cooling System

5.8.1 Cooling System View



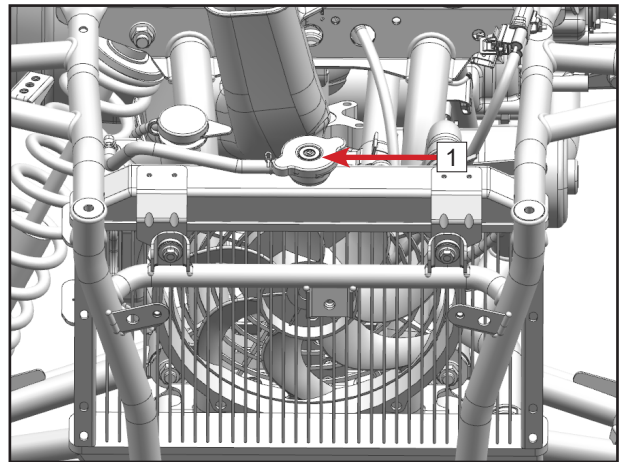
0510901

5.8.2 Coolant Replacement Coolant Drain

Wait until engine cools down.

Open radiator cap **1**.

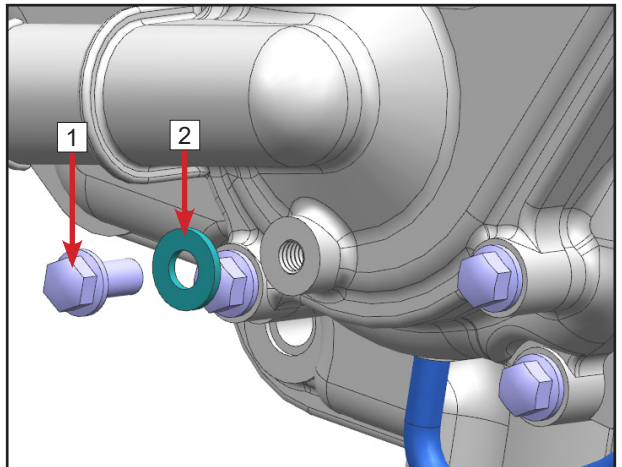
⚠ CAUTION: Never open radiator cap before engine cools down, in case of being burnt by high temperature vapor.



Place a pan under engine water pump to store the drained coolant.

Remove coolant drain bolt **1**.

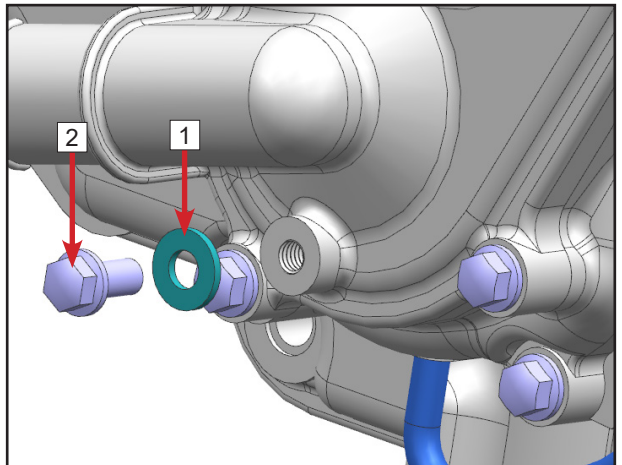
Remove washer **2** and drain coolant.



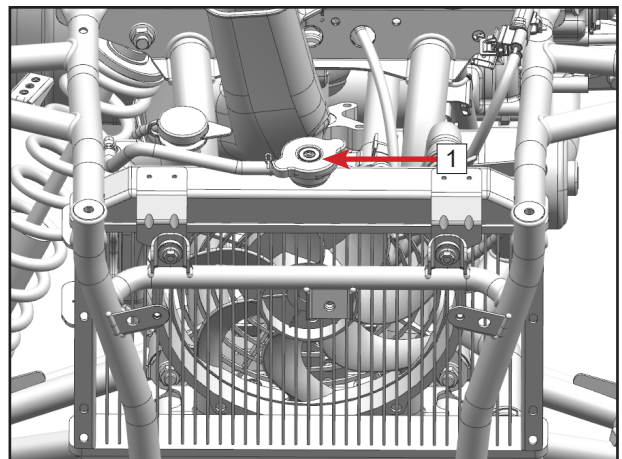
Coolant Filling

Put washer **1** on bolt **2**.

Install bolt **2**.



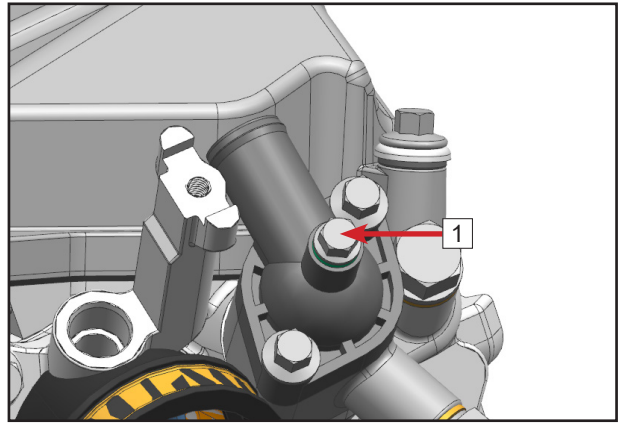
Remove radiator cap **1**



Remove relief screw **1** with washer on cylinder head.

Add coolant to radiator until exceed coolant from outlet hole doesn't contain bubble.

Install relief screw **1** with seal washer and tighten it to 5 N·m.



After full filling, install radiator cap. Add coolant in coolant reservoir until the level is between LOWER and UPPER line. Install reservoir cap. Start and run the engine until the thermostat opens. Then stop the engine. When the engine cools down, inspect the coolant level in radiator and reservoir. Make sure the coolant level in reservoir is between LOWER and UPPER marker line.

5.8.3 Thermostat and Water Pump

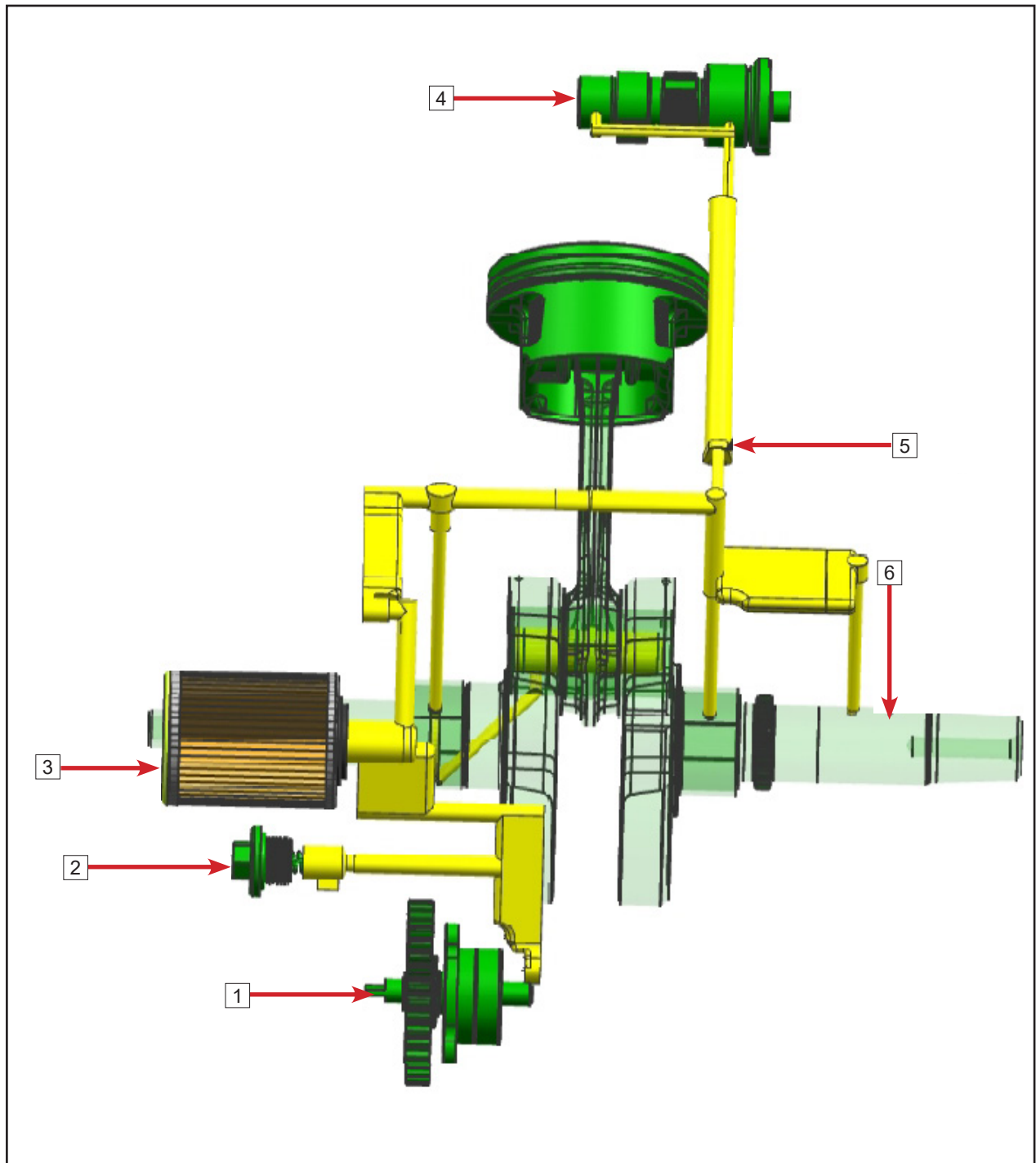
Disassembly and assembly details refer to Engine Disassembly and Assembly section.

Inspection detail refers to Engine Inspection section.

Radiator, fan, water pipe, reservoir tank and coolant details refer to 11 Cooling System chapter.

5.9 Lubrication System

5.9.1 Lubrication System View



1	Oil pump	2	Relief valve	3	Oil filter
4	Camshaft	5	Oil trail	6	Crankshaft connecting rod assembly.

5.9.2 Engine Oil Capacity Inspection

Ensure vehicle is on a level surface.

Start the engine and allow it to idle for a few minutes.

Stop the engine and wait for a few minutes to allow oil flow down to crankcase. Inspect the oil level.

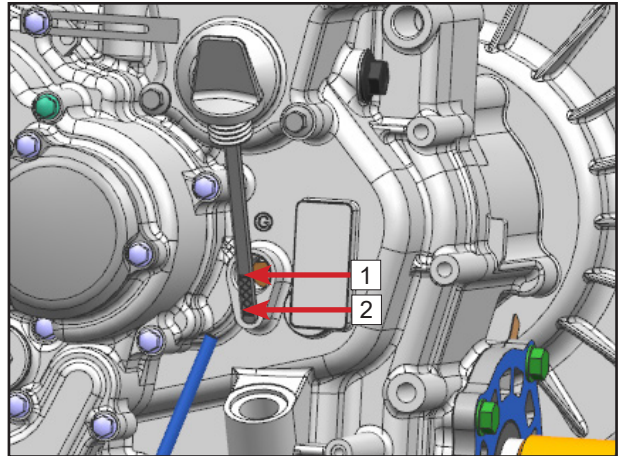
Remove dipstick and wipe away the remaining oil. Insert the dipstick into the hole. Make dipstick threads contact the hole surface without tightening it.

Remove dipstick and read oil level, which should be between “upper” **1** and “lower” **2** marks.

Add or drain engine oil until the level is in between.

Install oil dipstick.

NOTE: Strictly follow the procedures above. Otherwise, wrong oil level may be indicated.



5.9.3 Engine Oil Replacement

Ensure vehicle is on a level surface before operation.

Replace engine oil and filter element at the same time when the engine is warm.

NOTE: The engine oil can be very hot. Wait until engine temperature is appropriate.

Place a pan under the engine oil drain bolt to store the drained oil.

Clean the drain bolt area.

Remove drain bolt **2** with washer **3**.

Remove oil dipstick **1**.

Wait for several minutes to drain the oil completely from crankcase.

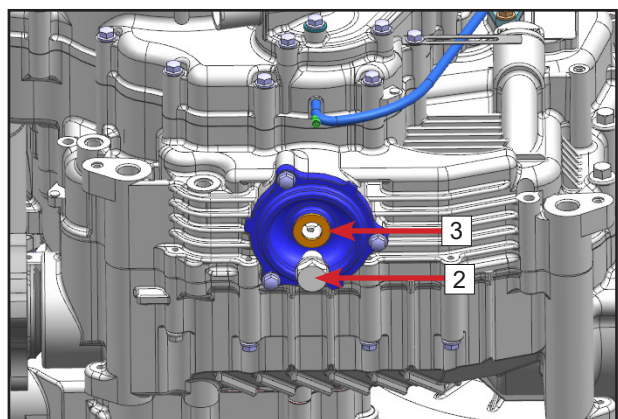
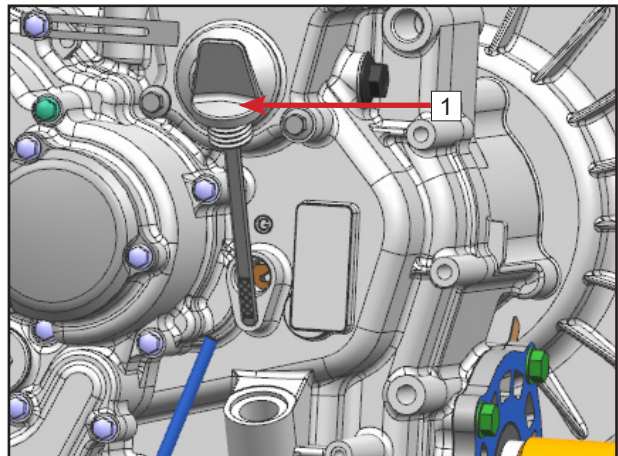
NOTE: Oil condition reflects engine condition. Check if drained engine oil contains engine shavings and residue. Presence of debris indicates a failure inside the engine. Check the engine to fix the problem.

Clean debris and dirt on drain bolt **2**.

Replace with a new washer **3** if damaged.

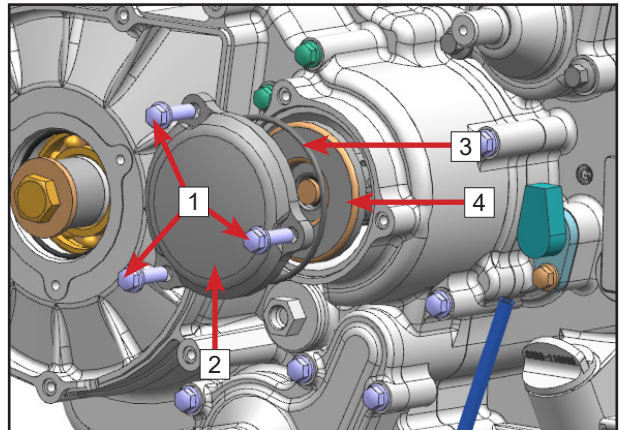
Install and tighten the drain bolt.

Drain bolt tighten torque: 20N·m



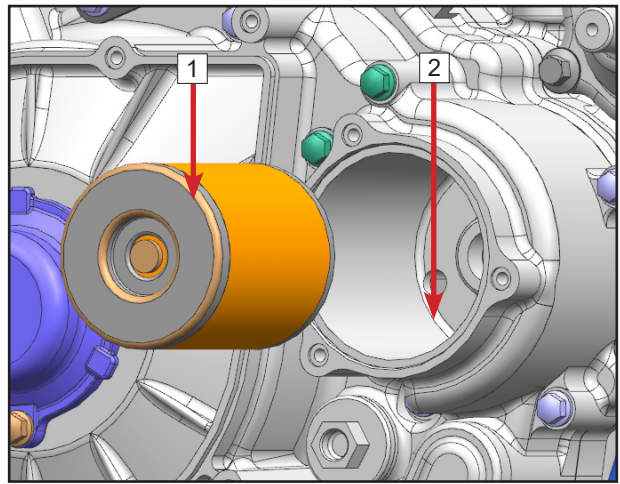
5.9.4 Oil Filter Element Replacement Disassembly

- Remove bolts **1**.
- Remove oil filter cover **2**.
- Remove o-seal ring **3**.
- Remove oil filter element **4**.



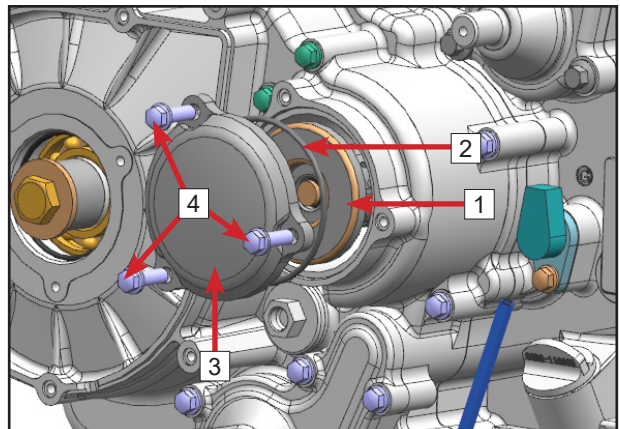
Replacement

- Clean element area **2** on MAG crankcase.
- Replace with new filter element **1**.



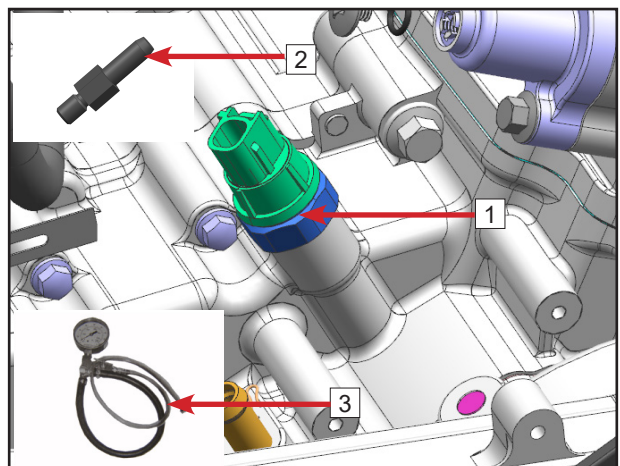
Assembly

- Install new oil filter element **1**.
- Put o-seal ring **2** on oil filter cover **3**.
- Install oil filter cover **3**.
- Install bolts **4**.



5.9.5 Engine Oil Pressure Inspection

- Inspect engine oil pressure when the engine temperature is 90°C.
- Remove engine oil pressure switch **1**.
- Install special tool: Oil Hose Joint **2** and pressure gauge **3**.
- The engine oil pressure (90°C) should be within the following values:



Oil pressure	1300r/min	6000r/min
Min.	100kPa	500kPa
Regular	200kPa	580kPa
Max.	400kPa	700kPa

If the engine oil pressure beyond specifications, check parts described in Trouble Shooting section.

Remove engine oil pressure gauge and oil hose joint after measurement.

Install the engine oil pressure switch.

NOTE: Use special tools to install and remove oil pressure gauge and oil hose joint.

5.9.6 Relief Valve, Oil Pump and Oil Strainer

Disassembly and assembly details refer to Engine Disassembly and Assembly section.

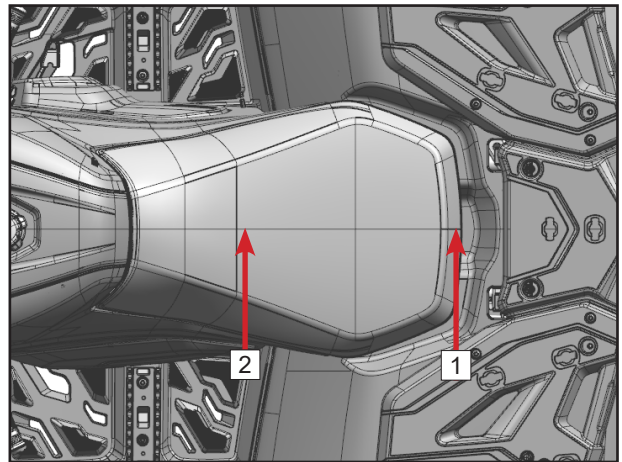
Inspection detail refers to Engine Inspection section.

5.10 Fuel System

5.10.1 Fuel Tank Removal

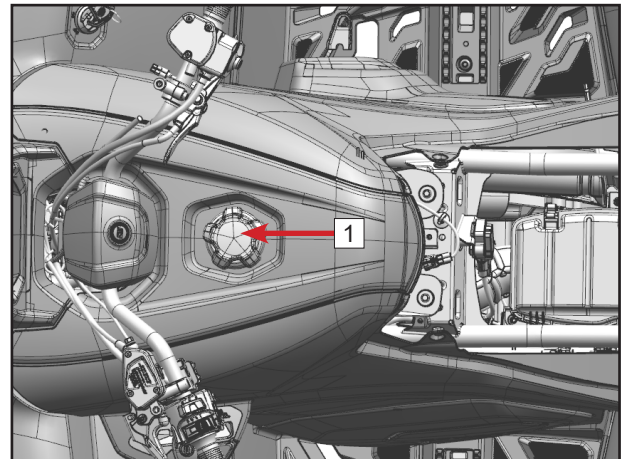
Release seat clasp **1**.

Remove seat **2**.



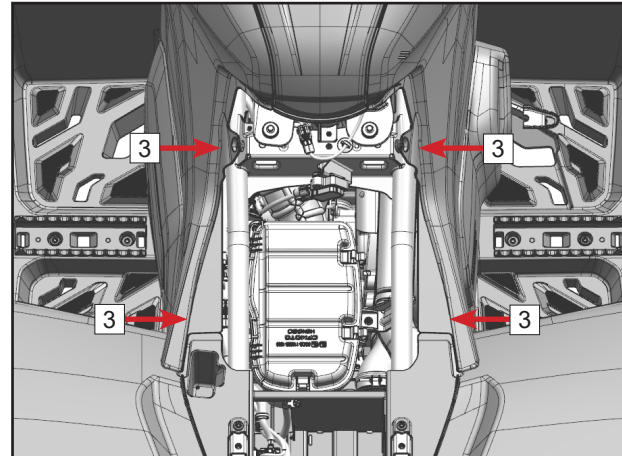
Open fuel tank cap **1**.

Cover the fuel filler with a clean cloth to prevent debris from falling into the fuel tank.



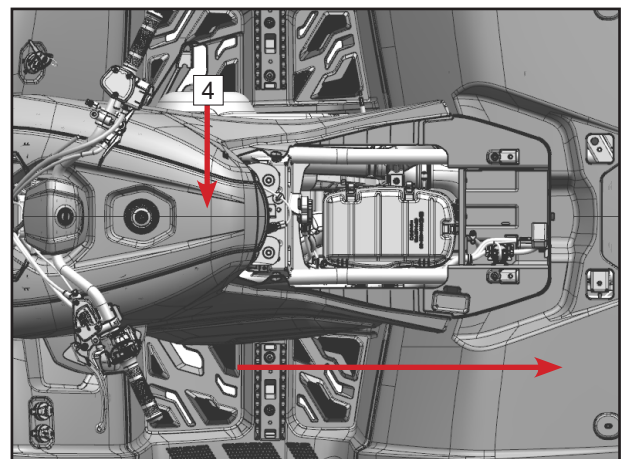
Pull out four quick release joints **3**.

NOTE: Pull up to disengage lower tabs during removal.



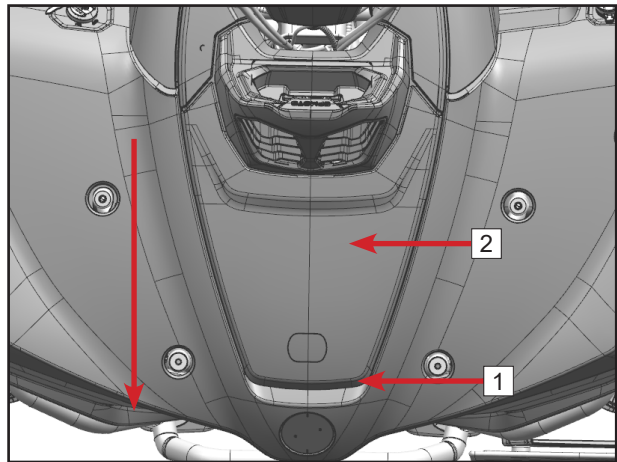
Remove fuel tank guard **4**.

NOTE: Fuel tank guard assembly is a quick release assembly. If unfamiliar with the vehicle, do not pull the quick release joints too hard to avoid breakage or bending.

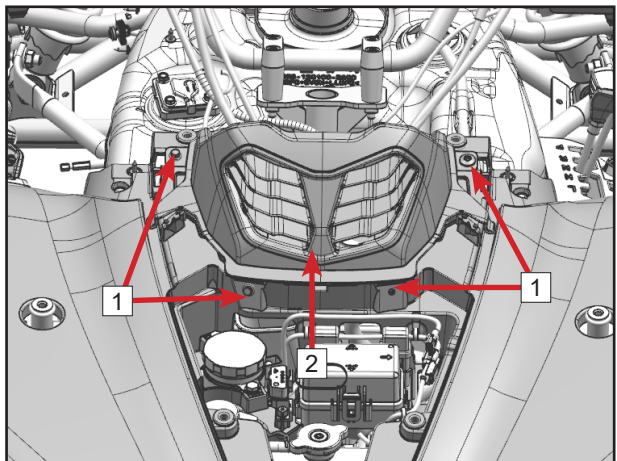


CFMOTO

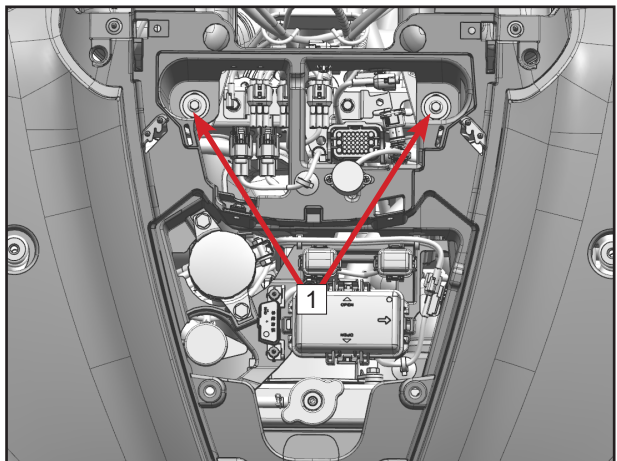
Release clasp **1** behind front service plate.
Remove front service plate **2**.



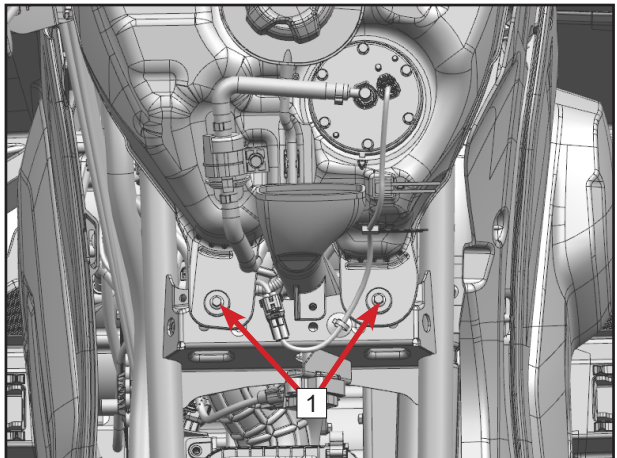
Remove bolts **1**.
Loosen dashboard guard **2**.
Unplug dashboard connectors to remove dashboard guard **2**.



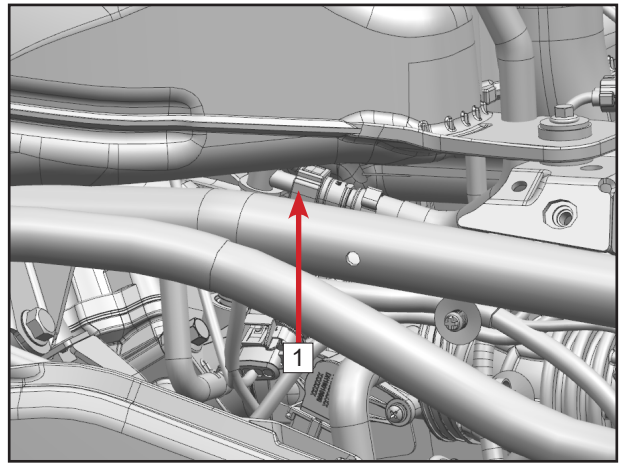
Remove bolts **1**.



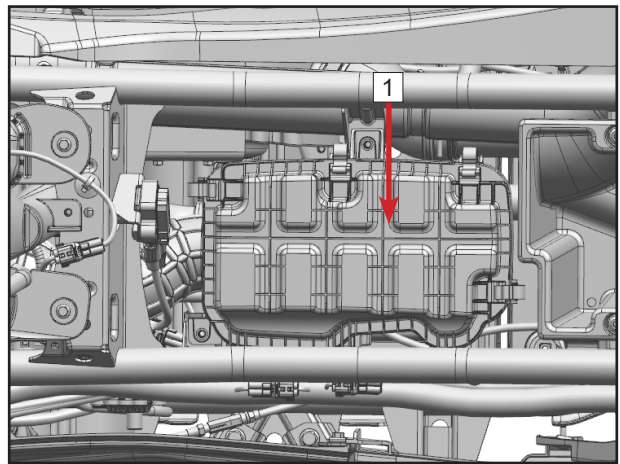
Remove bolts **1**.



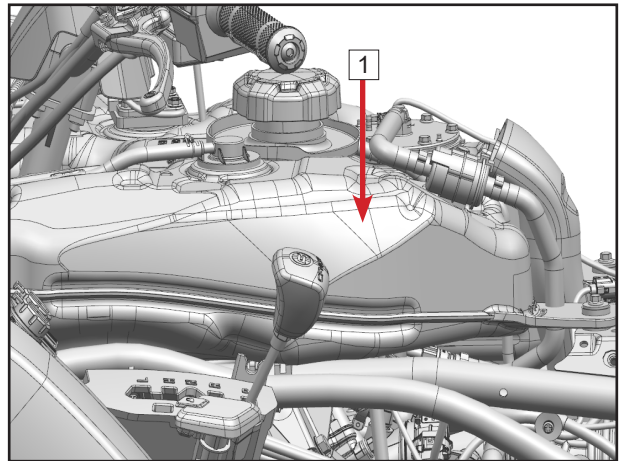
Lift fuel tank to unplug quick joint **1** on injector high-pressure oil hose.
Unplug fuel level sensor connector.
Unplug fuel pump connector.



Remove air filter assembly **1** (details refer to Air Filter Removal in this chapter).



Remove fuel tank **1**.



5.10.2 Inspection

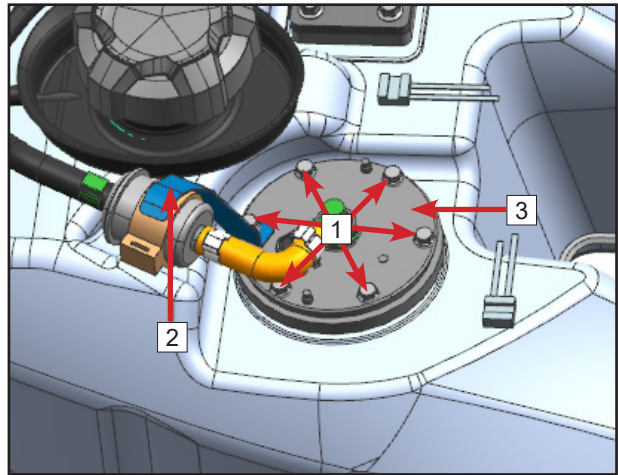
Fuel Pump Assembly

Removal

Remove bolts [1].

Remove fuel filter pressing plate [2].

Remove fuel pump assembly [3].



Inspection

Fuel Pump Pressure Inspection

Inspect fuel pump for damage. Replace if damaged.

Ensure that the battery voltage doesn't drop below 12V.

NOTE: A small amount of remaining fuel may come out of the hose when removing fuel pump.

One side of the hose of pressure gauge connects fuel outlet port, the other side connects fuel drum.

Connect the battery. Measure fuel pressure value when it is stabilized and then disconnect the battery.

NOTE: Dwell time is one minute and fuel pressure is more than 2.5bar.

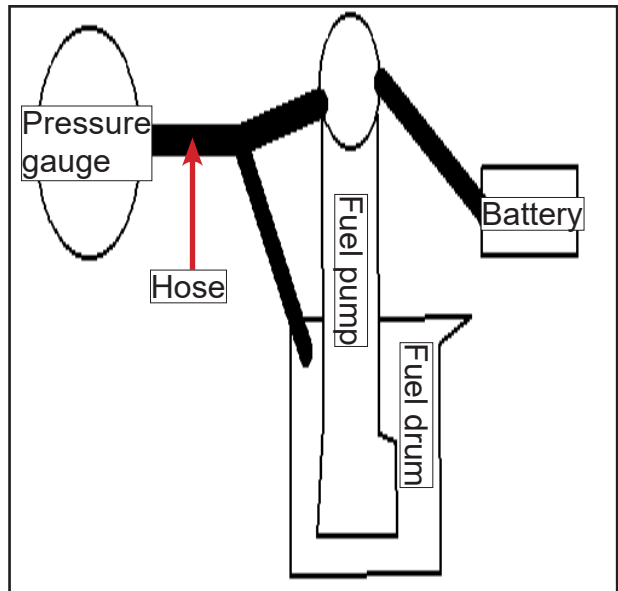
Voltage 12V	3.0bar±0.3bar
Voltage 13V	3.3bar±0.3bar

Replace a new fuel pump if the pressure is beyond the specification.

Remove pressure gauge and battery.

Properly dispose the fuel in the drum in case of pollution.

Use high-pressure air to clean joint of hose.

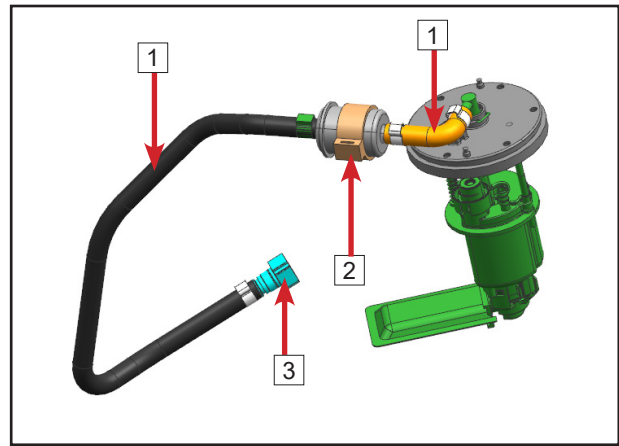


Inspect high pressure fuel hose for break, damage, crack or hardening. Replace if any defect is found.

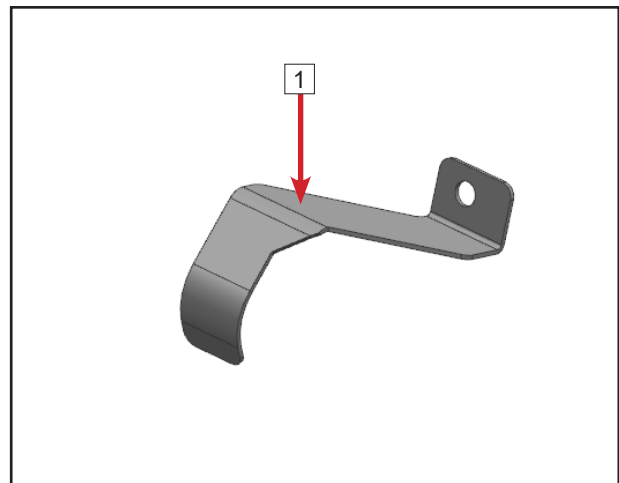
Inspect EFI fuel filter **2** for damage. Replace if necessary.

Fuel filter belongs to maintenance parts. Replace it periodically according to the maintenance schedule.

Inspect quick joint **3** for damage, looseness or efficacy loss. Replace if any defect is found.

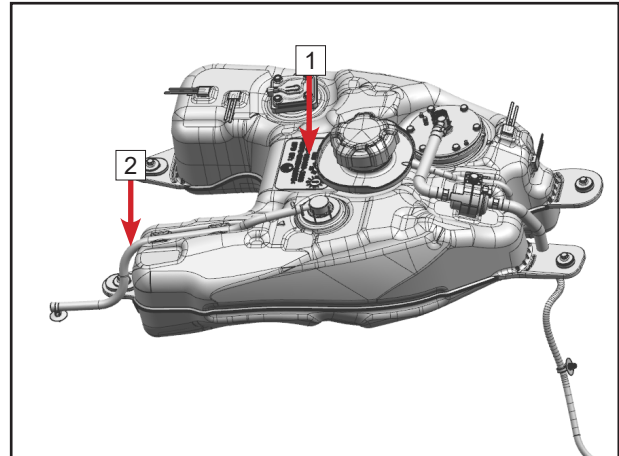


Inspect fuel filter pressing plate **1** for damage. Replace if necessary.



Inspect fuel tank **1** for damage or leakage. Replace if any defect is found.

Inspect fuel hose **2** for break, damage, crack or hardening. Replace if any defect is found.

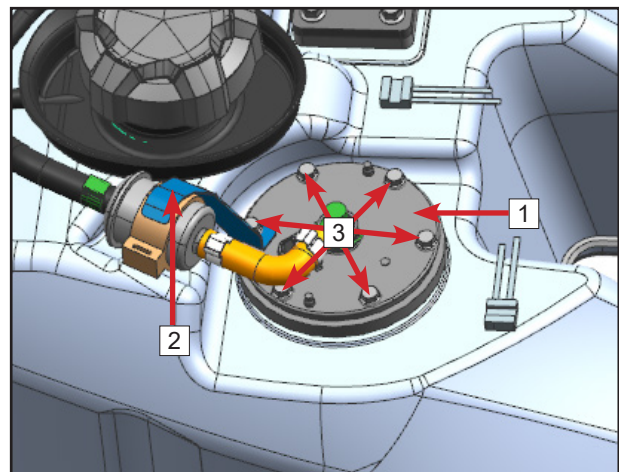


5.10.3 Installation

Install fuel pump **1**.

Install fuel filter pressing plate **2**.

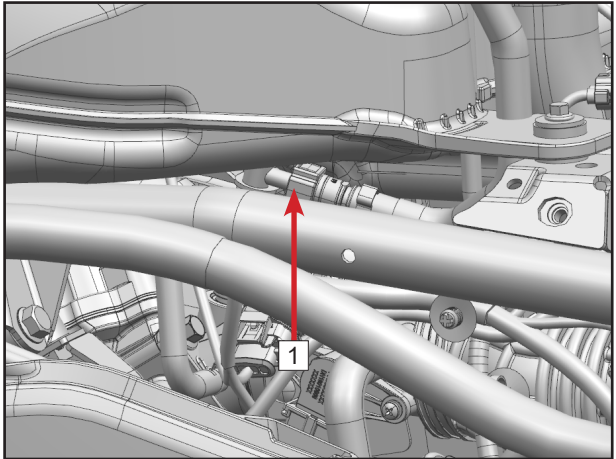
Install bolts **3**.



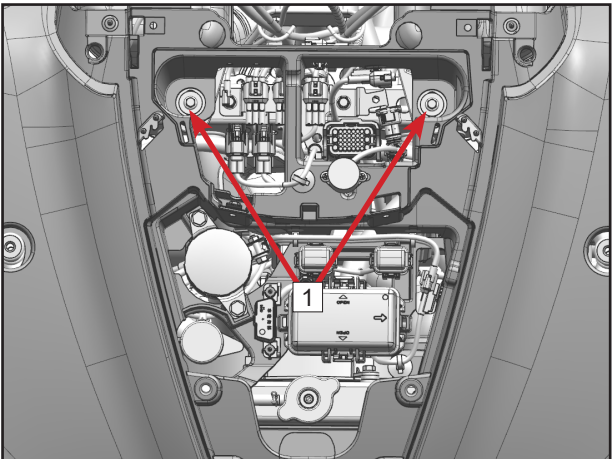
CFMOTO

Put fuel tank on mounting area and plug in high-pressure oil hose quick joint **1**.
Plug in fuel level sensor connector.
Plug in fuel pump connector.

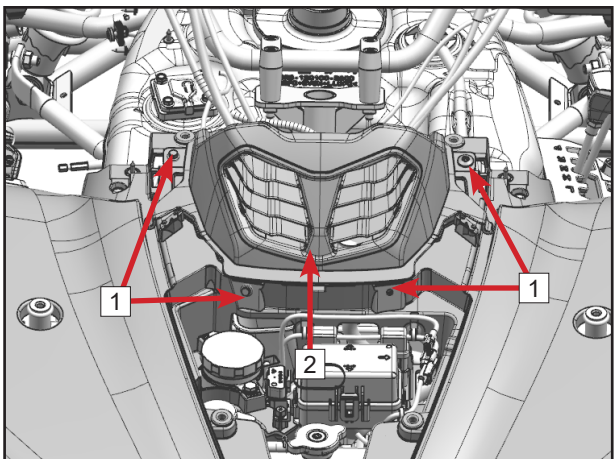
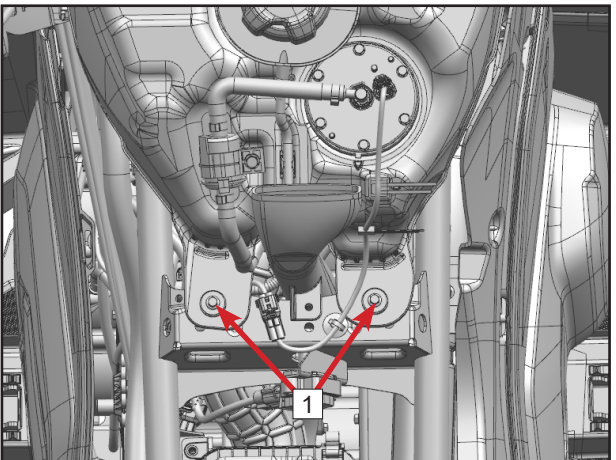
Install bolts **1**.



Install bolts **1**.



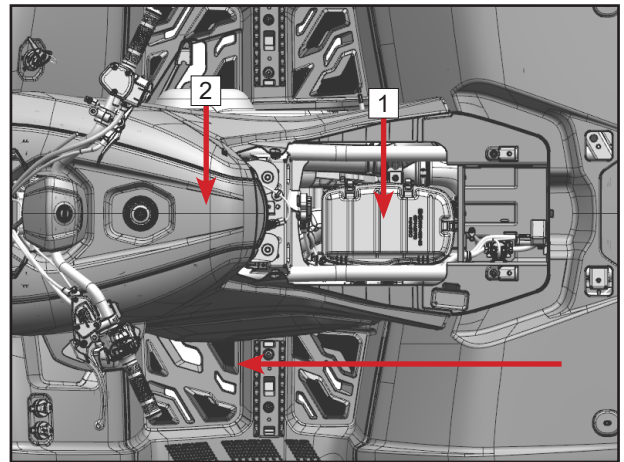
Install bolts **1**.
Install dashboard gaurd **2**.



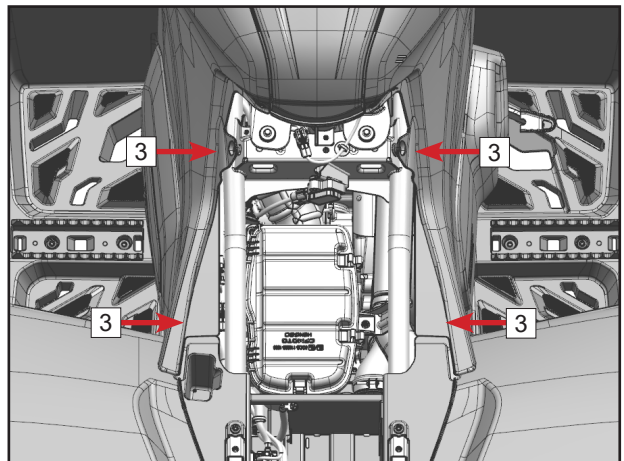
Install air filter **1**.

Install fuel tank guard assembly **2**.

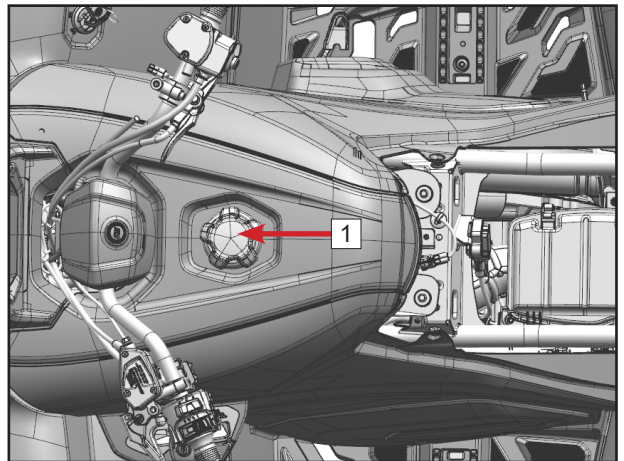
NOTE: Fuel tank guard assembly is a quick release assembly. If unfamiliar with the vehicle, do not pull the quick release joints too hard to avoid breakage or bending.



Install four quick release joints **3**.

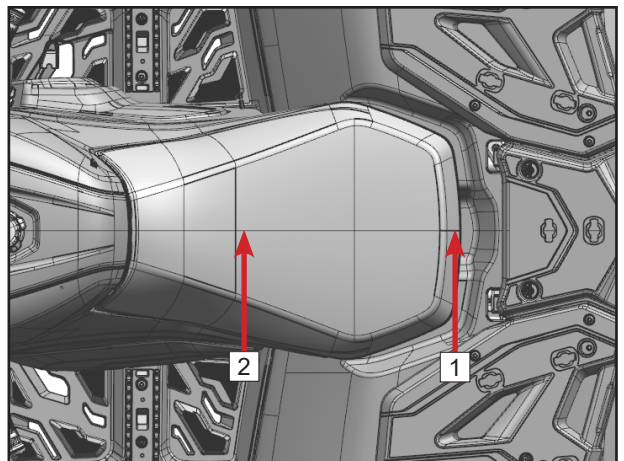


Install fuel tank cap **1**.



Install seat **2**.

Tighten seat lock **1**.



06 Vehicle and Body Covering Parts

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6.1 Maintenance Information

Pre-caution:

1. When replacing parts that are pasted or riveted with the warning labels of regulations, the corresponding signs shall be correctly and completely filled in as they are.
2. This chapter mainly introduces the body covering parts removal and installation procedures.
3. This chapter also includes rack, seat, backrest removal and installation instructions.
4. Follow the drawings to arrange the cables, pipes and wirings to the correct position.

Tighten Torque

M8 bolt	20(2.0)	Torque N·m(kgf·m)
M6 bolt	10(1.0)	Torque N·m(kgf·m)
M5 bolt	5(0.5)	Torque N·m(kgf·m)
Screw	4(0.4)	Torque N·m(kgf·m)

Pre-work

Position vehicle on level ground.

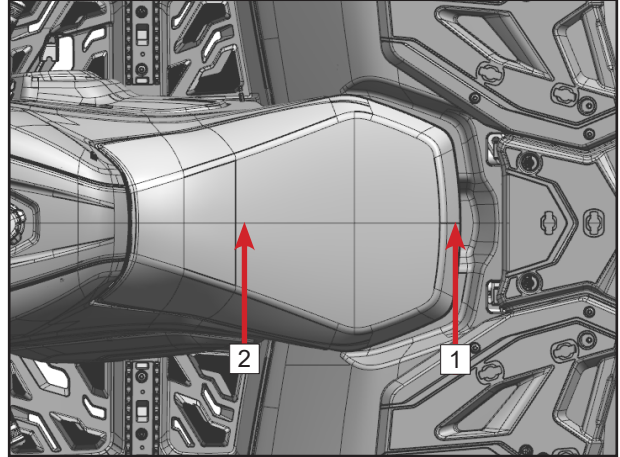
Turn off vehicle power supply.

6.2 Seat

Removal

Loosen seat lock 1.

Remove seat 2.

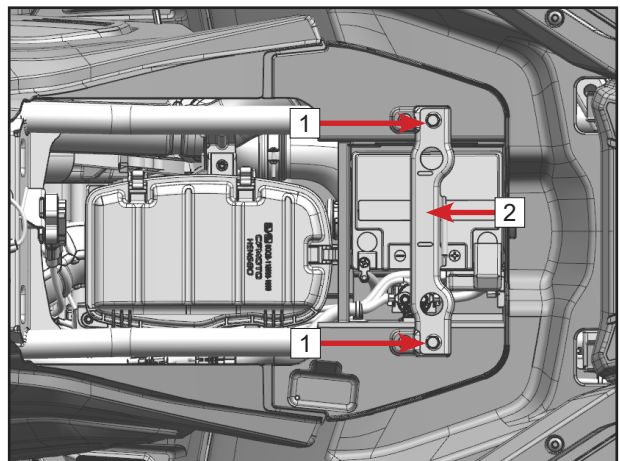


6.3 Battery

Removal

Remove bolts 1.

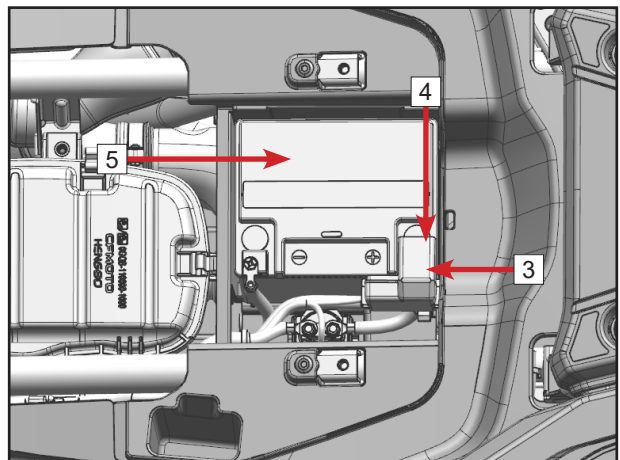
Remove seat bracket 2.



Remove bolt 3 and disconnect battery negative.

Remove electrode cover 4.

Remove bolt 5 and battery.

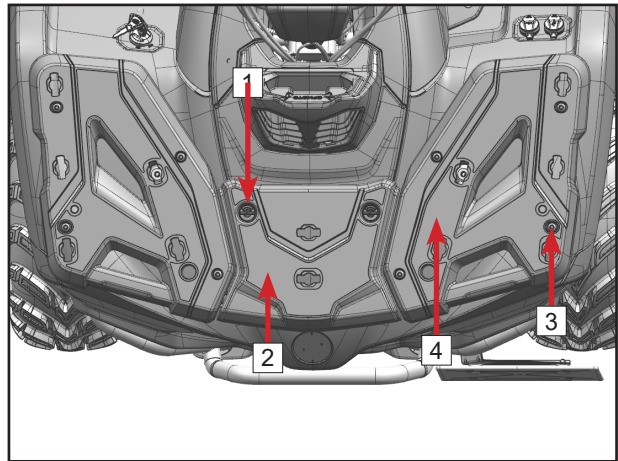


6.4 Rack

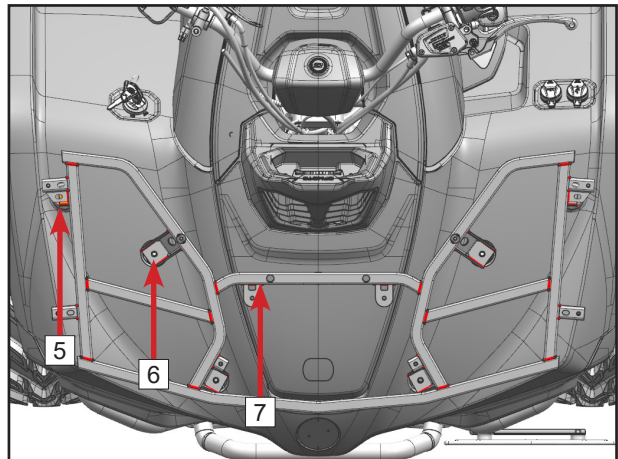
6.4.1 Front Rack

Removal

- Remove two hand twist bolts **1**.
- Remove front service cover **2**.
- Remove eight bolts **3**.
- Remove front rack **4**.



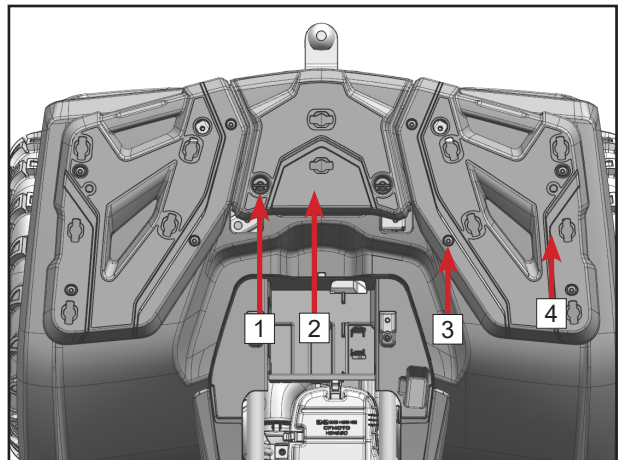
- Remove two bolts and washers **5**.
- Remove four bolts **6**.
- Remove front rack cover **7**.



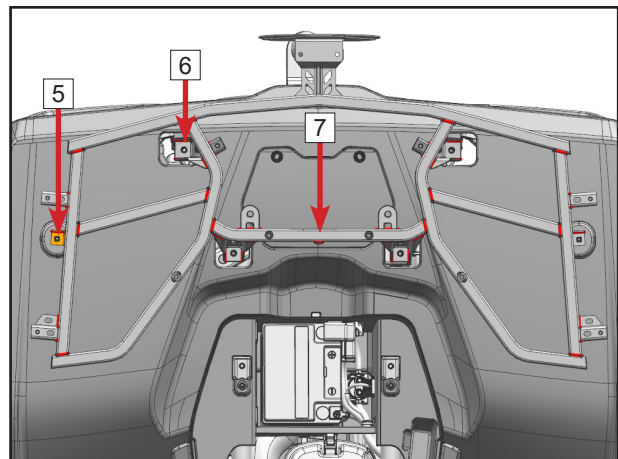
6.4.2 Rear Rack

Removal

- Remove two hand twist bolts **1**.
- Remove rear service cover **2**.
- Remove eight bolts **3**.
- Remove rear rack **4**.



- Remove two bolts and washers **5**.
- Remove four bolts **6**.
- Remove rear rack cover **7**.

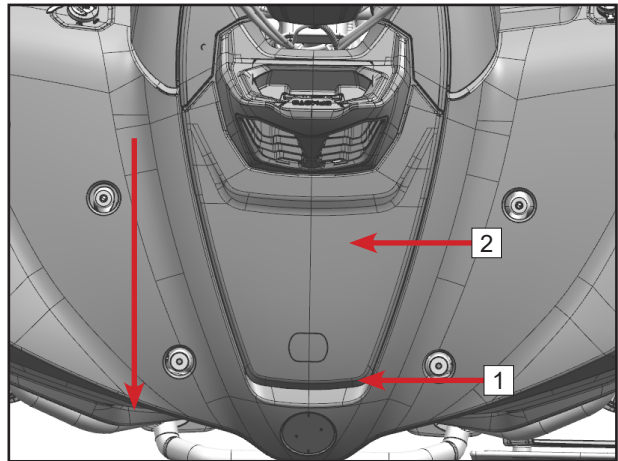


6.5 Front Service Cover

Removal

Pull out front service cover clasp **1** in the direction of arrow.

Remove front service cover **2**.



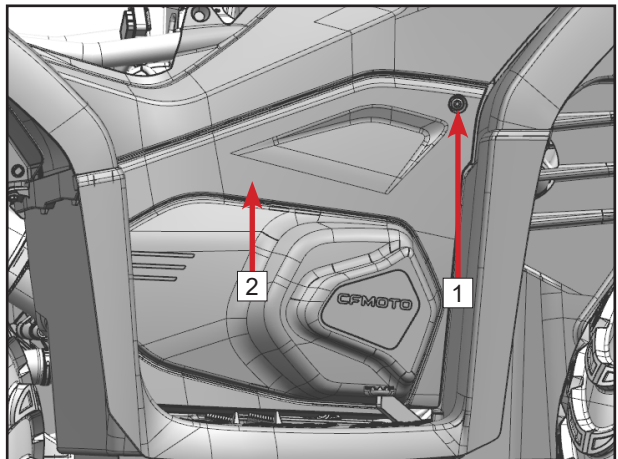
6.6 CVT Side Cover

Removal

Remove bolt **1**.

Remove CVT side cover **2**.

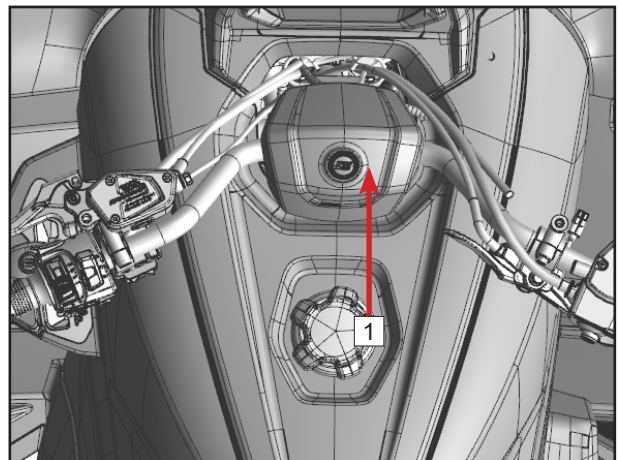
NOTE: Pull out upper part first and keep lower part still. Then take out the cover.



6.7 Handlebar Guard

Removal

Remove handlebar guard **1**.

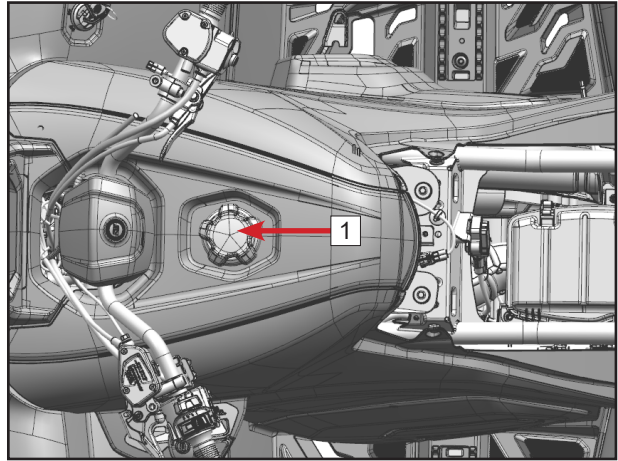


6.8 Fuel Tank Guard

Removal

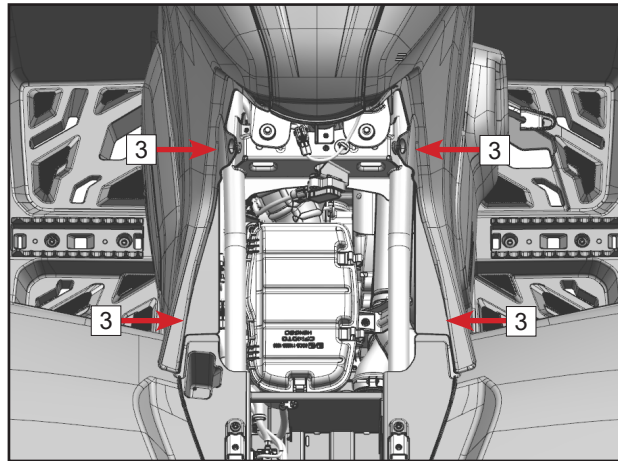
Open fuel tank cap **1**.

Cover the fuel filler with a clean cloth to prevent debris from falling into the fuel tank.



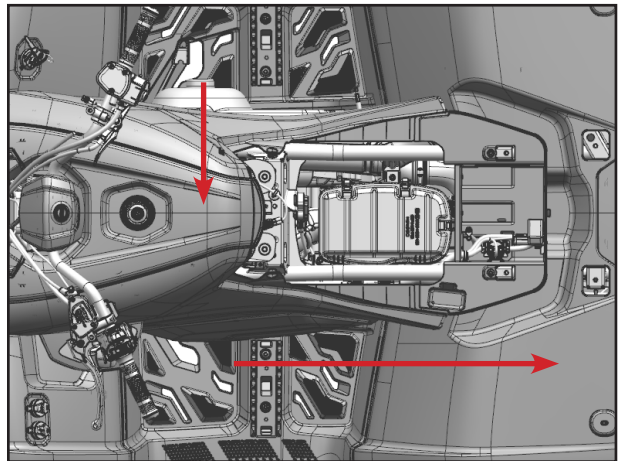
Pull out four quick release joints **3**.

NOTE: Pull up to disengage lower tabs during removal.



Remove fuel tank guard **4**.

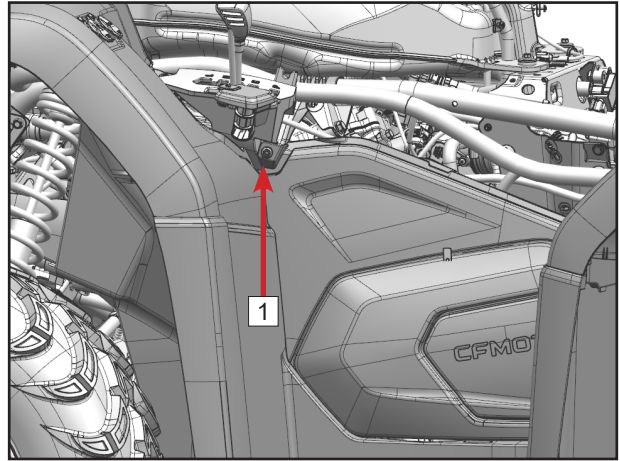
NOTE: Fuel tank guard assembly is a quick release assembly. If unfamiliar with the vehicle, do not pull the quick release joints too hard to avoid breakage or bending.



6.9 Engine LH Cover

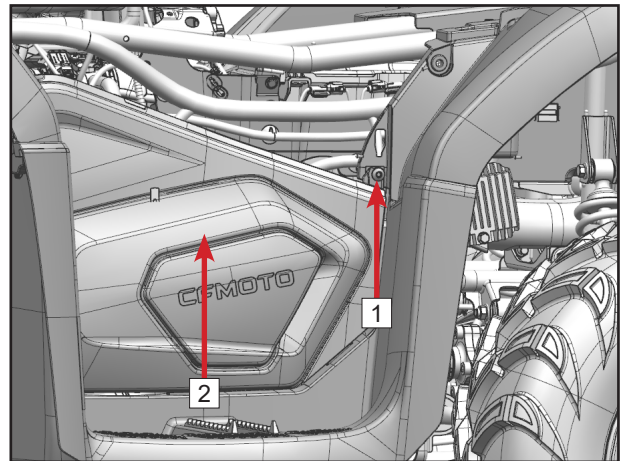
Removal

Remove bolt 1.



Remove bolt 1.

Remove engine LH cover 2.



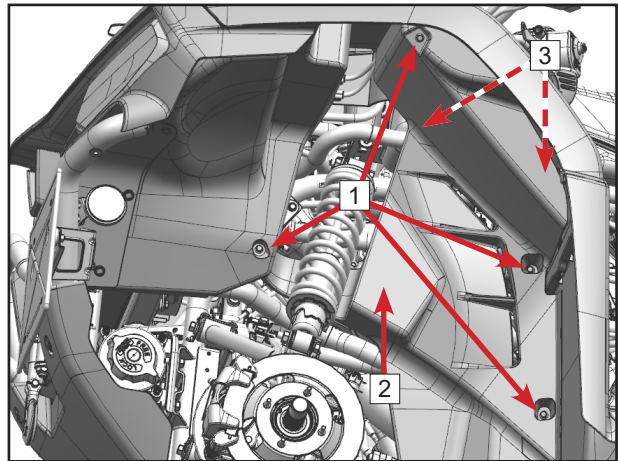
6.10 Fenders

6.10.1 LH Front Fender

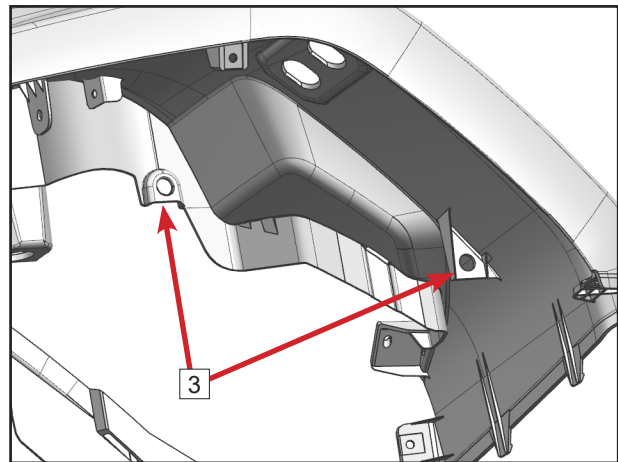
Removal

Remove bolts **1**.

Remove LH front fender **2**.



NOTE: There are quick release joints **3** beside LH front fender. Pull out fender from left side of vehicle during removal.

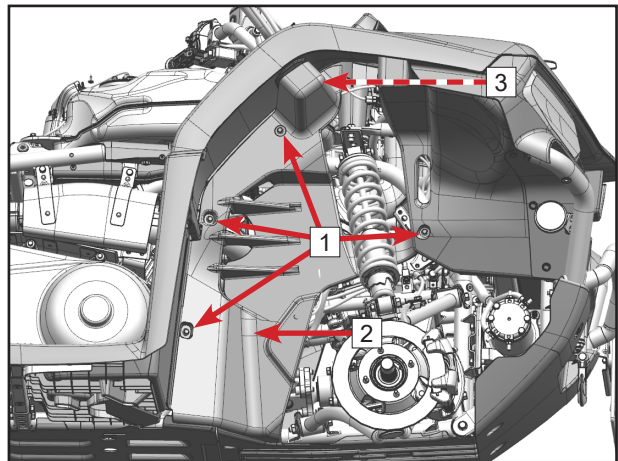


6.10.2 RH Front Fender

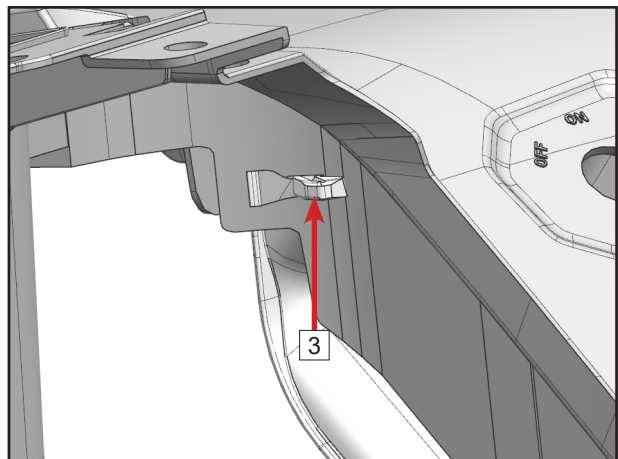
Removal

Remove bolts **1**.

Remove RH front fender **2**.



NOTE: There is a hook **3** beside RH front fender. Move fender towards vehicle running direction to release the hook during fender removal.



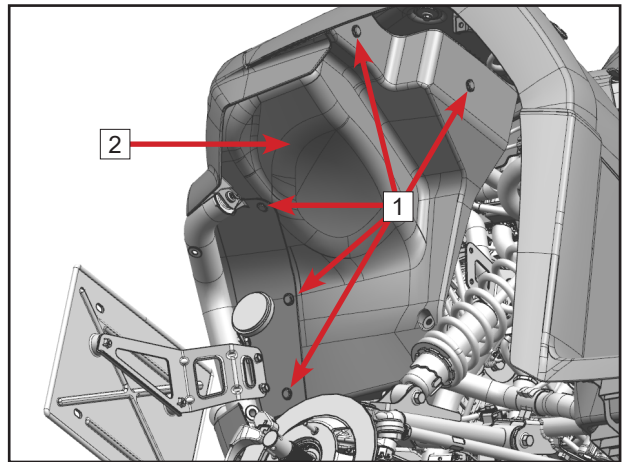
6.11 Headlight Guards

6.11.1 LH Headlight Guard

Removal

Remove expansion screws **1**.

Remove LH headlight guard **2**.

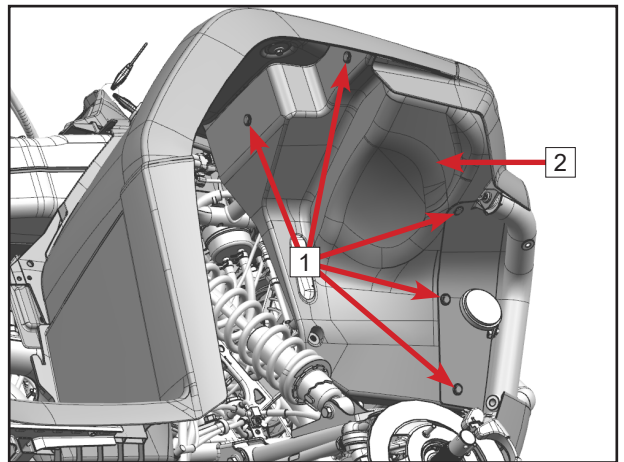


6.11.2 RH Headlight Guard

Removal

Remove expansion screws **1**.

Remove RH headlight guard **2**.



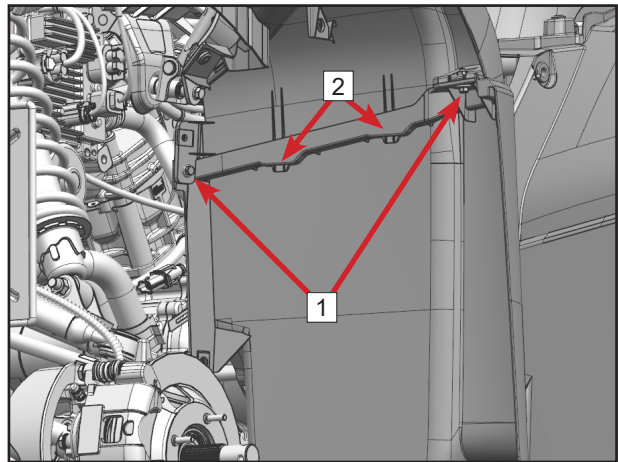
6.12 Foot Boards

6.12.1 LH Foot Board

Removal

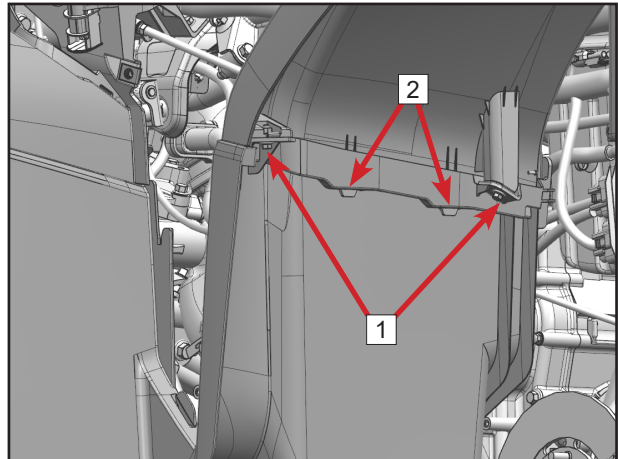
Remove bolts **1**.

Loosen quick release joints **2**.



Remove bolts **1**.

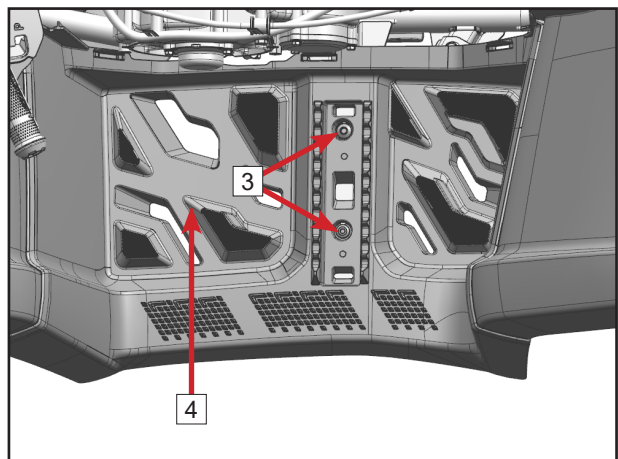
Loosen quick release joints **2**.



Short Model

Remove bolts **3**.

Remove LH foot board **4**.

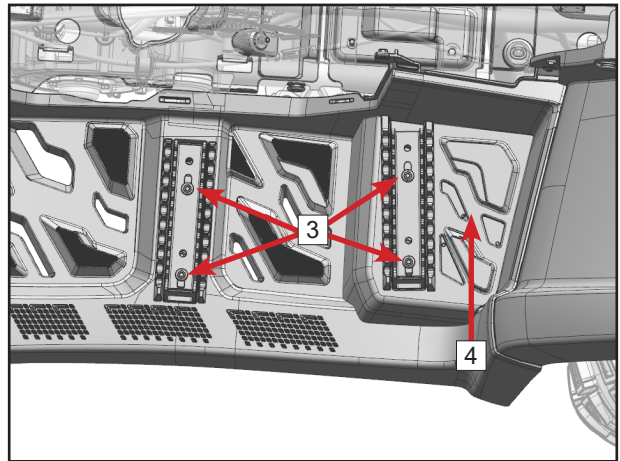


06 Vehicle and Body Covering Parts

Long Model

Remove bolts [3].

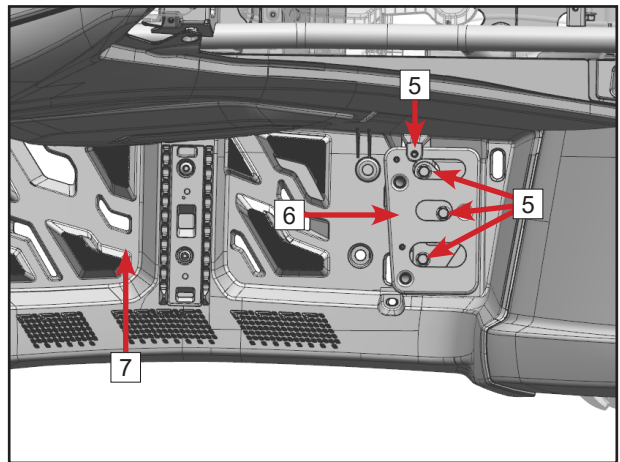
Remove LH footrest pad [4].



Remove bolts [5].

Remove LH footrest pad bracket [6].

Remove LH foot board [7].

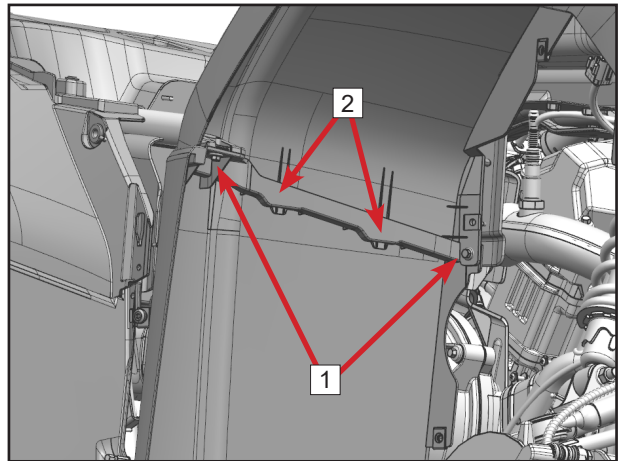


6.12.2 RH Foot Board

Removal

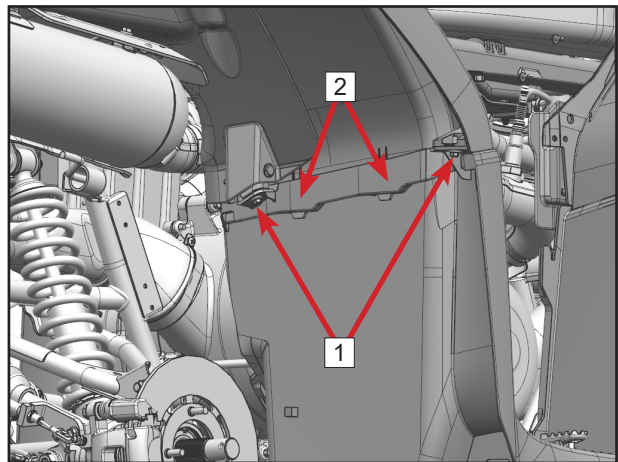
Remove bolts **1**.

Loosen quick release joints **2**.



Remove bolts **1**.

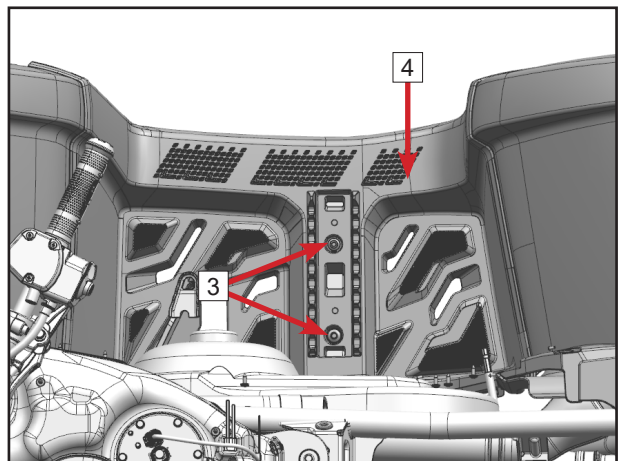
Loosen quick release joints **2**.



Short Model

Remove bolts **3**.

Remove RH foot board **4**.

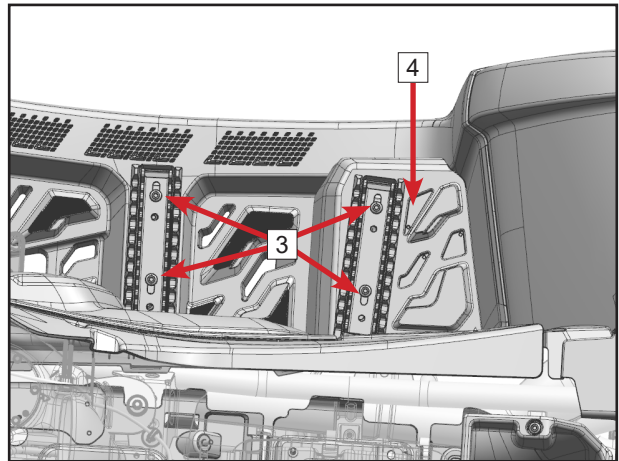


06 Vehicle and Body Covering Parts

Long Model

Remove bolts [3].

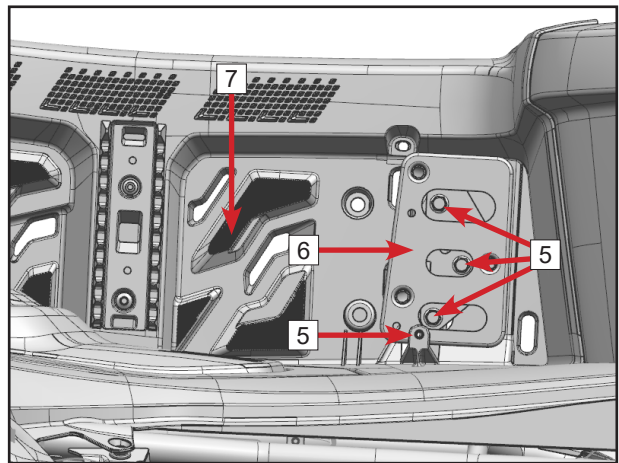
Remove RH footrest pad [4].



Remove bolts [5].

Remove RH footrest pad bracket [6].

Remove RH foot board [7].



6.13 Front Fender

Pre-work

Unplug all connectors on front top cover.

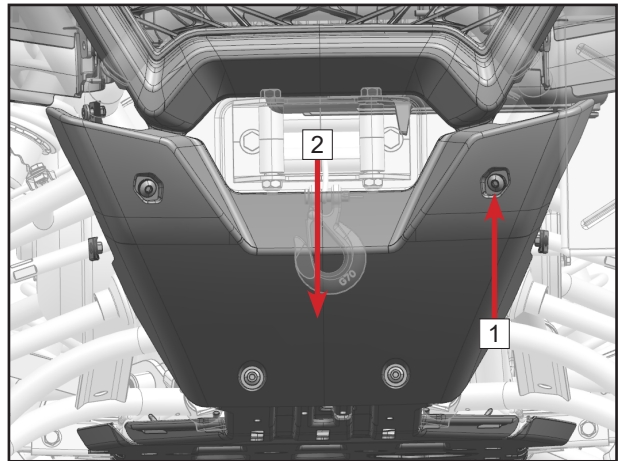
Remove brake fluid reservoir bolts.

6.13.1 Front Lower Plate

Removal

Remove four bolts **1**.

Remove front lower plate **2**.

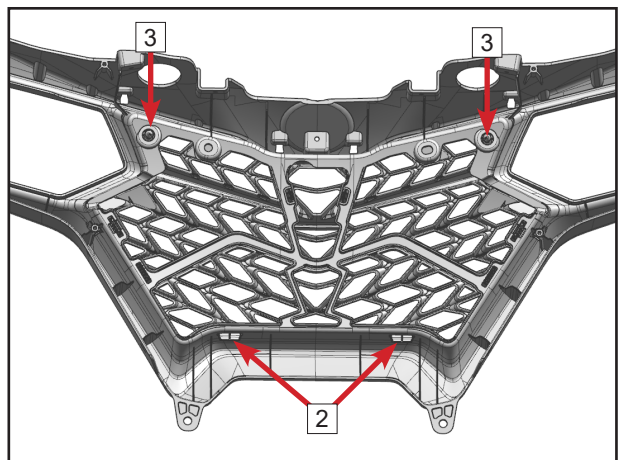
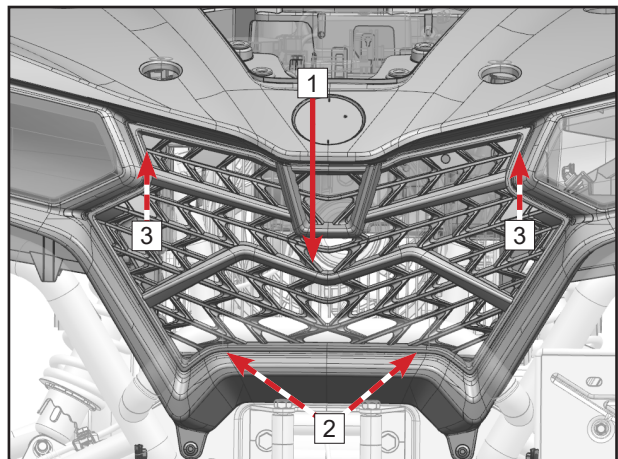


6.13.2 Headlight Panel Grid

Removal

Remove headlight panel grid **1**.

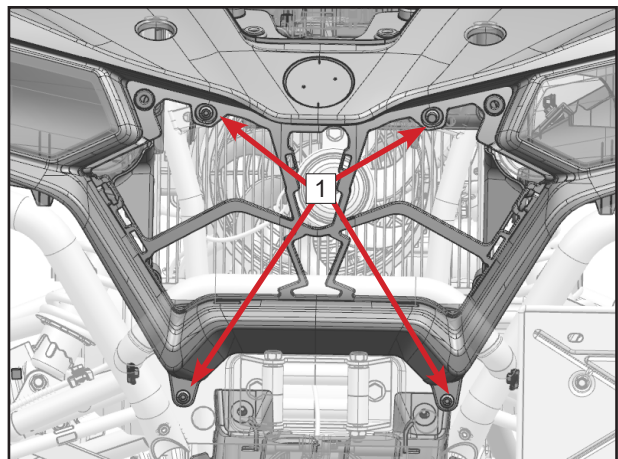
NOTE: There are quick release joints **2** and rivets **3** beside panel grid.



6.13.3 Headlight Panel

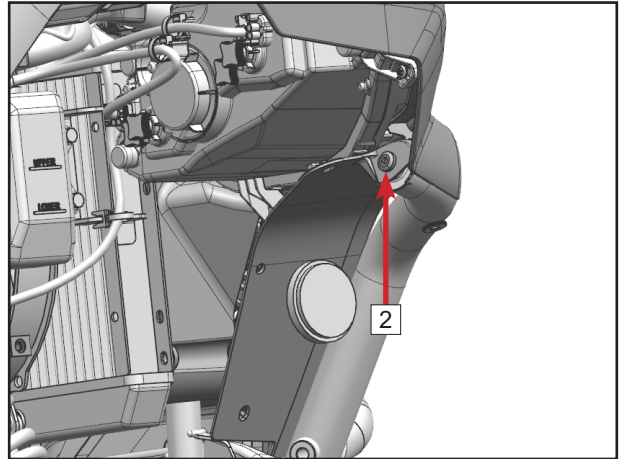
Removal

Remove four bolts **1**.

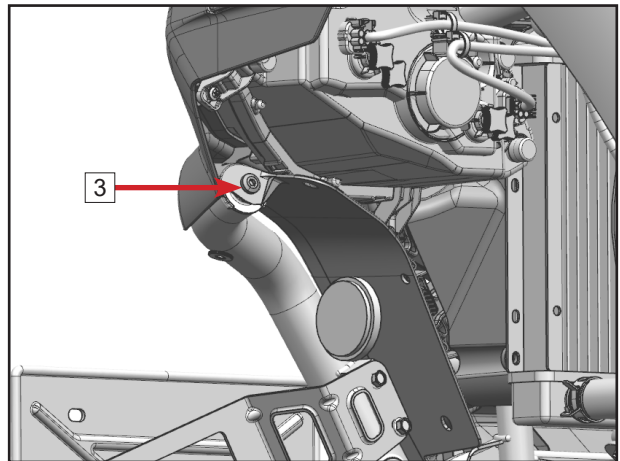


06 Vehicle and Body Covering Parts

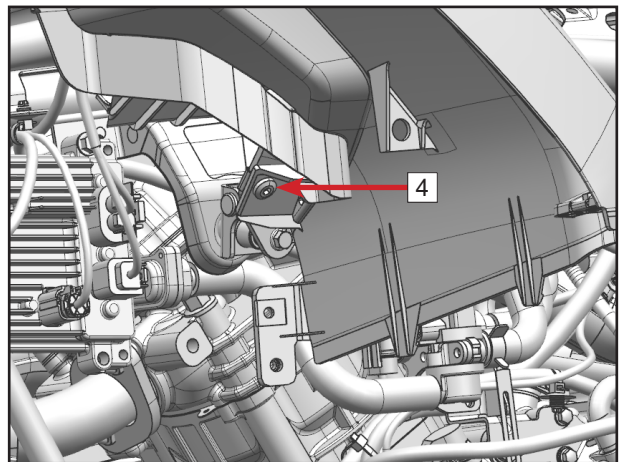
Remove bolt 2.



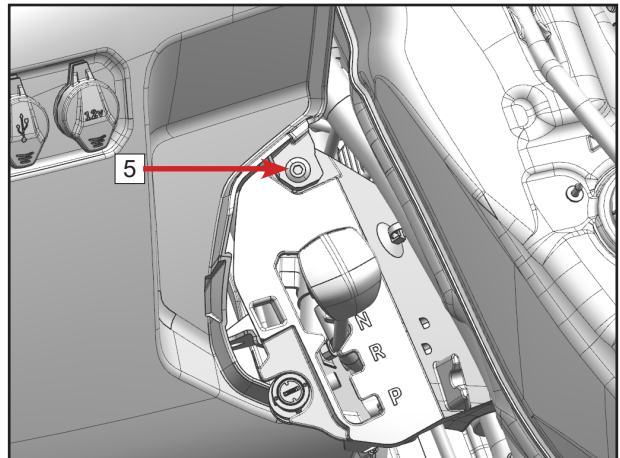
Remove bolt 3.



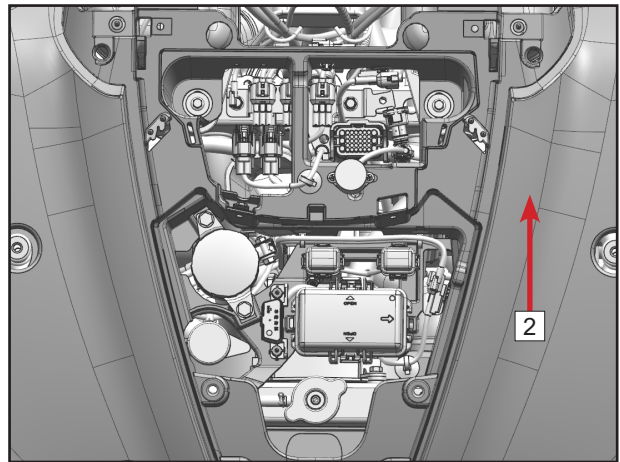
Remove bolt 4 on junction of gearshift guard and front fender.



Remove bolt 5 on junction of gearshift guard and front fender.



Remove front fender [6].



6.14 Rear Fender

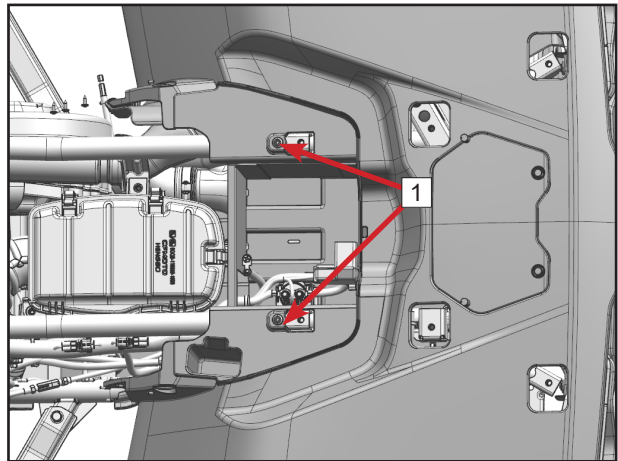
Pre-work

Unplug tail light connector.

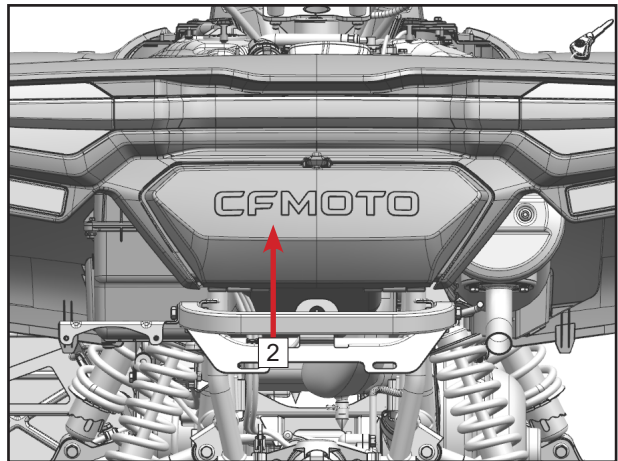
Unplug main cable and plastic parts clasp.

Removal

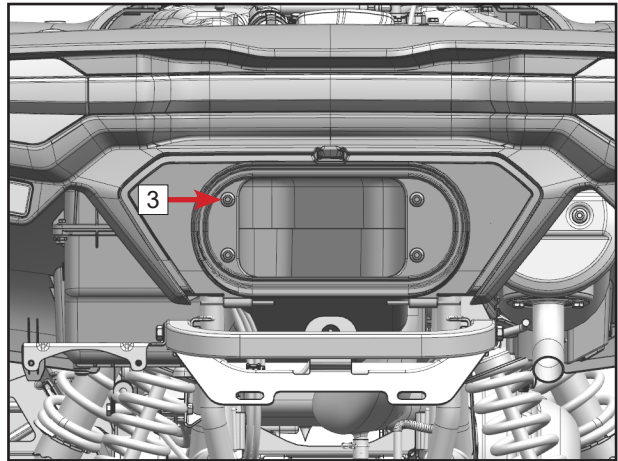
Remove bolts **1**.



Open storage box **2**.



Remove four bolts **3** inside storage box.



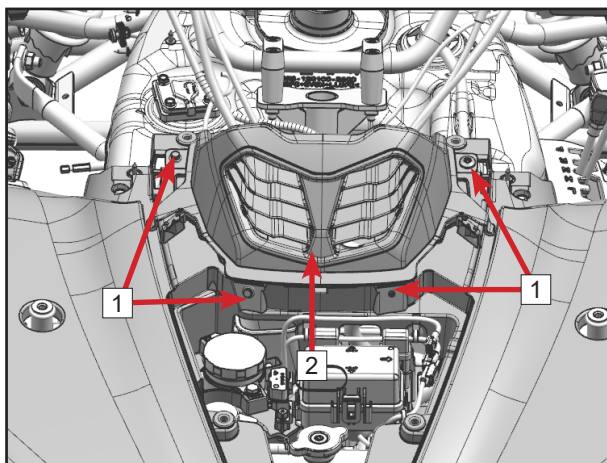
6.15 Dashboard Guard

Removal

Remove bolts **1**.

Loosen dashboard guard **2**.

Unplug dashboard connectors to remove dashboard guard **2**.



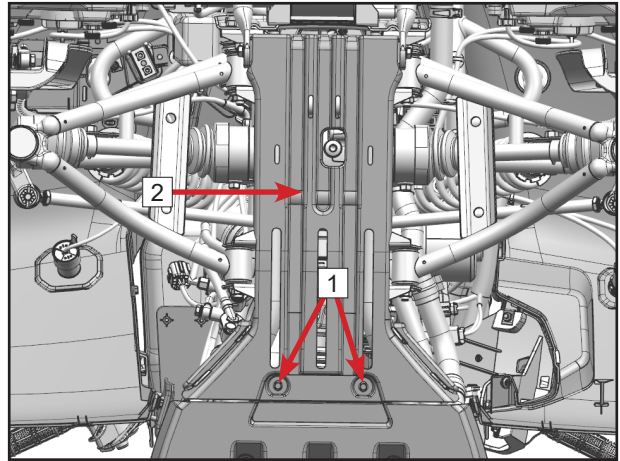
6.16 Vehicle Skid Plate

6.16.1 Engine Front Panel Removal

Removal

Remove two bolts [1].

Remove engine front panel [2].

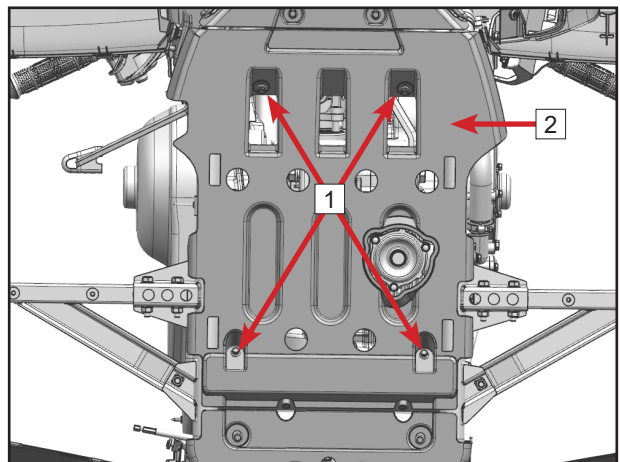


6.16.2 Engine Middle Panel Removal

Removal

Remove four bolts [1].

Remove engine middle panel [2].

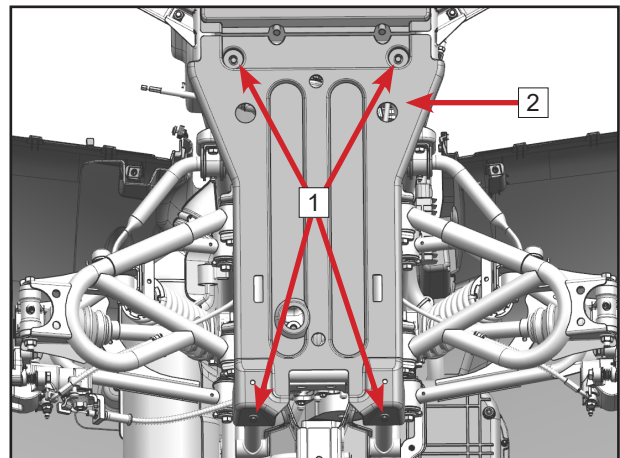


6.16.3 Engine Rear Panel Removal

Removal

Remove four bolts [1].

Remove engine rear panel [2].



7.1 Gear Cases	07-2
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7.1 Gear Cases

7.1.1 Maintenance Information

Lubrication Schedule				
Item	Specification	Capacity	Interval	
Front gear case	SAE80W-90 GL-5	0.23L	Break-in	Periodic
Rear gear case		0.20L	200miles (320km)	3000miles (4800km)

7.1.2 Inspection and Maintenance

If trouble below is found, there may be something wrong with front or rear gear case. Please maintain the vehicle.

Trouble	Reason
1. Vehicle running unstable during acceleration, deceleration or normal running.	A. Bearing damaged
2. Front or rear gear case noise.	B. Gear clearance too large or too small
3. Engine power cannot be transmitted to wheels.	C. Gear severe wear
	D. Gear teeth loose
	E. Drive shaft damaged
	F. Less or more lubricant
	G. Foreigns in gear cases

NOTE: It is hard to find out the reason 1, 2 and 3. Analyze the trouble to exclude engine fault. Then disassemble the gear case for inspection.

Inspection and Analysis

1. Do not miss any strange noise:
 - a. If the vehicle has noise during acceleration and deceleration. It may be the wheel bearing damaged.
 - b. If the vehicle keeps making noise during acceleration and deceleration. It may be the improper gear clearance.

⚠ CAUTION: Improper gear clearance may cause the gear wear or gear teeth broken.

- c. If the vehicle comes out noise at low speed, which may not be detected at high speed, maybe the gear teeth is broken.

⚠ WARNING: If any fault above is found during when running the vehicle, stop the bike to check and solve the trouble. Otherwise, it may cause accident.

2. Inspect the lubrication. Check lubrication consumption is at normal range or not. And check the metal content in lubricating oil.
3. Inspect the lubricating oil leakage.
 - a. Inspect the oil dirt around front and rear case gear.
 - b. Inspect the oil dirt on the floor.
 - c. Inspect the oil splash dirt.

Determine if it is the seal leaking or case leaking. Replace the damaged parts.

7.2 CV Drive Shaft

Removal

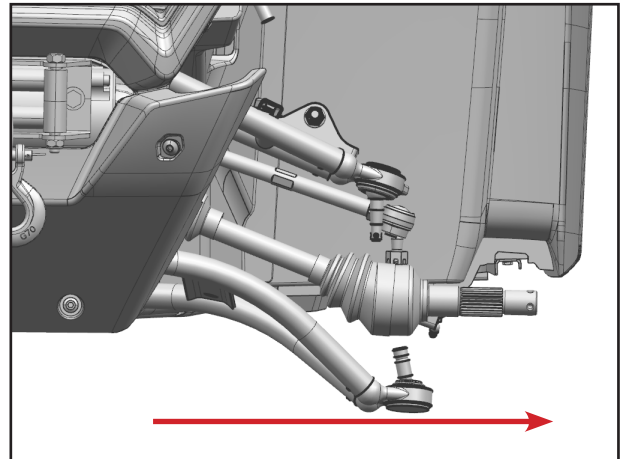
Remove wheels.

Remove shock absorbers.

Remove LH and RH steering knuckles (refer to chapter 09).

Pull out CV drive shaft in the horizontal direction.

Other CV drive shafts follow the same removal procedures.



7.3 CV Drive Shaft Inspection and Maintenance

7.3.1 CV Drive Shaft Inspection

1. Both sides of CV drive shafts should rotate freely. Disassemble to inspect or replace with new parts if any defect, like being stuck, discrete rotation or noise, is found.

2. Inspect the clearance between fixed end dust boot universal shaft and middle spline. Replace with new parts if the clearance is larger than $1^{\circ}30'$.

3. Inspect dust boots on both sides for damage or leakage. Replace if necessary.

4. Inspect shaft spline and limit circlip for abnormal wear or damage. Replace if any defect is found.

After inspection, if there is problems with the shaft while no defect is found, please refer to step 5. If the shaft is in good condition, it is not necessary to do step 5 inspection.

5. Inspect shaft cage retainer, planet sleeve, steel balls, steel ball track and middle shaft spline. Replace if any defect is found.

6. Inspect shaft other parts for damage. Replace if necessary.

7.3.1.1 Shaft Cage Dust Boot

Removal

Remove clamps [1].

Pull dust boots [2] towards middle shaft [3].

Remove circlip [4].

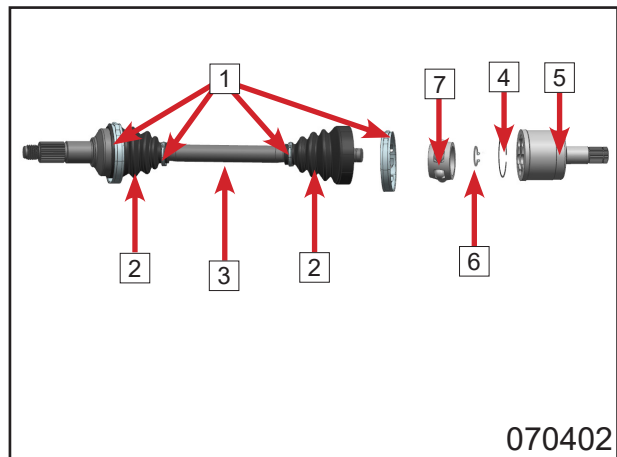
Remove housing [5].

Remove circlip [6].

Remove universal shaft assy [7].

Remove dust boots [2].

Replace with new dust boots during installation.



Installation

Reverse the removal procedures for installation.

NOTE:

Front gear case: Inject MoS2 lithium grease on universal joint during drive shaft installation.

Fill 28g±5g grease in fixed end cage universal joint, 32g±5g grease in fixed end seal enclosure, 65g±10g grease in axial movement cage universal joint.

Rear gear case: Inject polyurea grease on universal joint during drive shaft installation.

Fill 30g±5g grease in fixed end cage universal joint, 30g±5g grease in fixed end seal enclosure, 95g±10g grease in axial movement cage universal joint.

7.4 Front Gear Case

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

Pre-work

Remove tires.

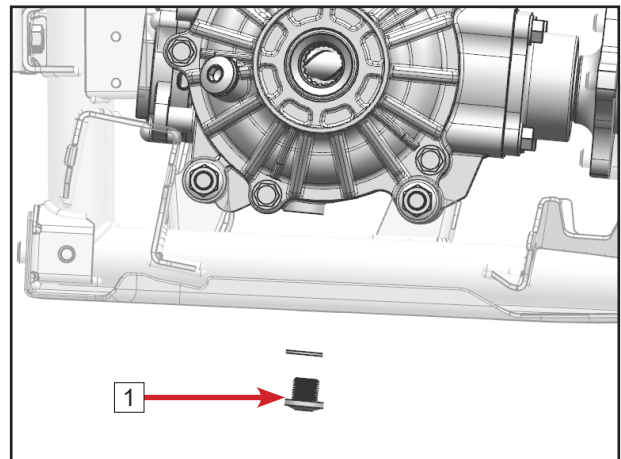
Remove shock absorbers.

Remove steering knuckles.

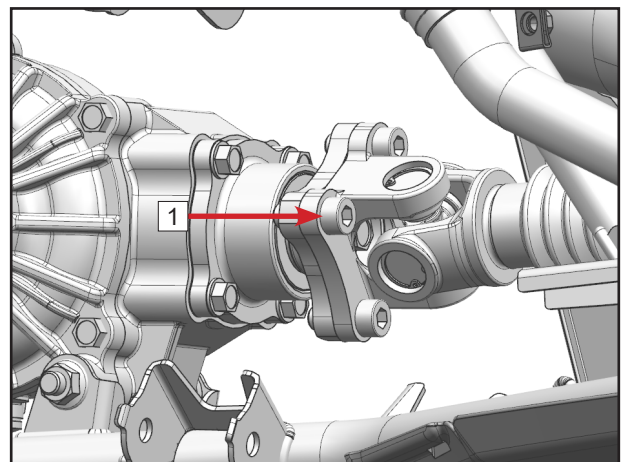
7.4.1 Front Gear Case Removal

Place a container under front gear case.

Remove drain bolt **1** and washer.

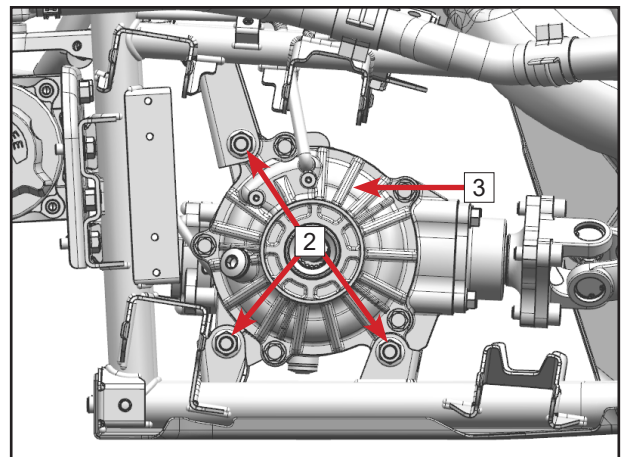


Remove four bolts **1**.



Remove bolts and nuts **2**.

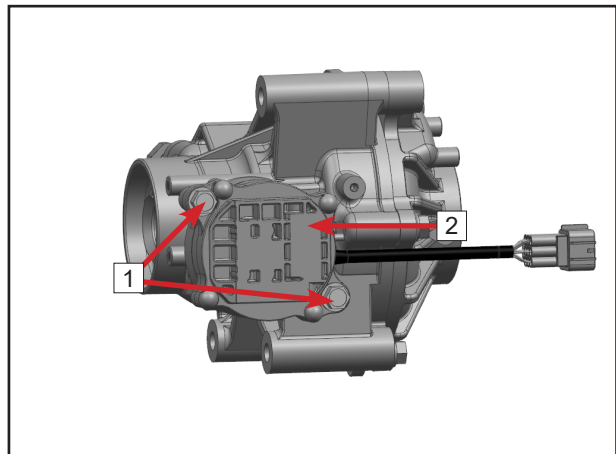
Remove front gear case **3**.



7.4.2 Front Gear Case Disassembly Front Gear Case Motor

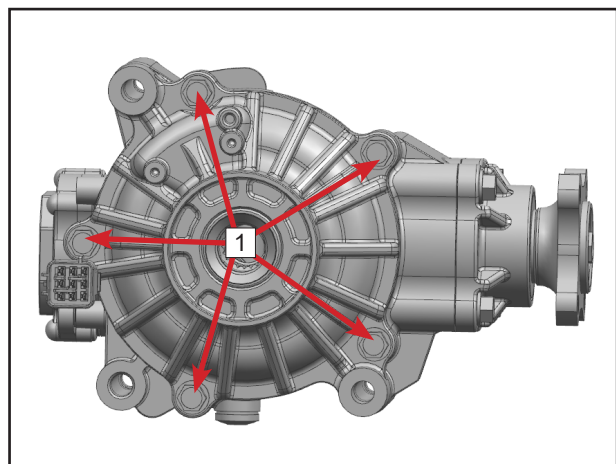
Remove two bolts **1**.

Remove front gear case motor **2**.



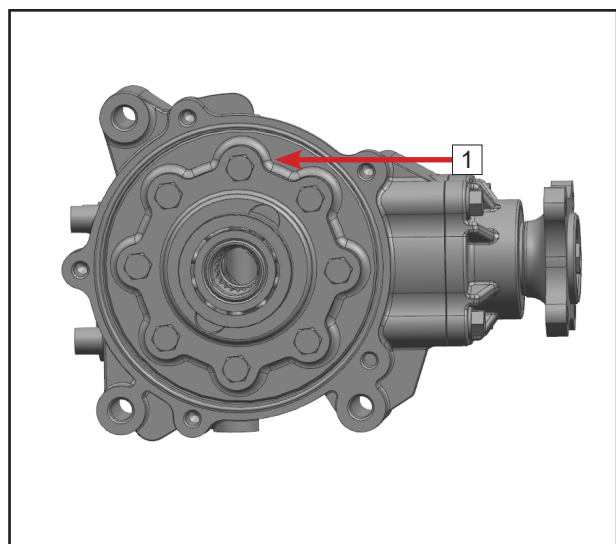
Front Gear Case Cover

Remove five bolts **1**.

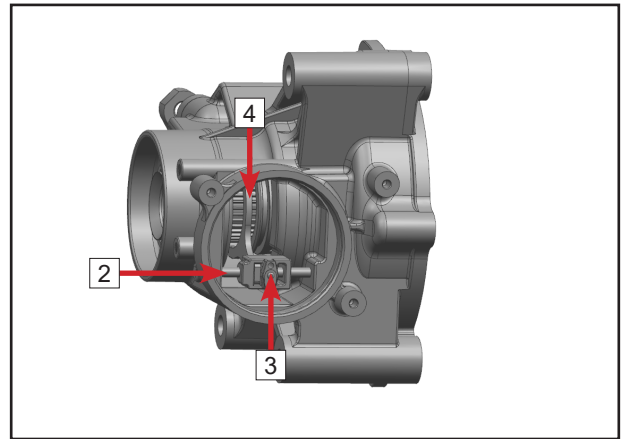


Fork Assembly

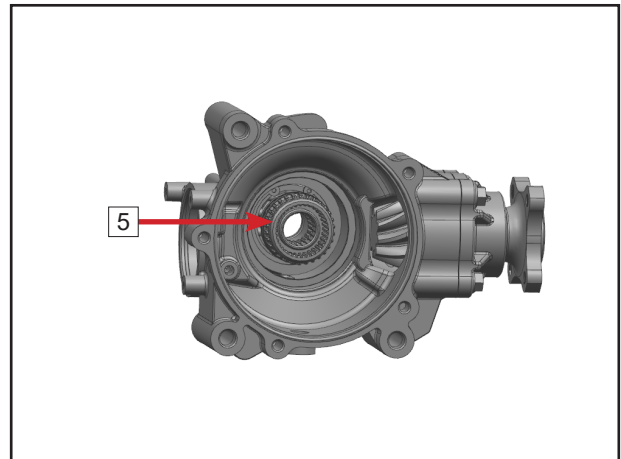
Remove differential assembly **1**.



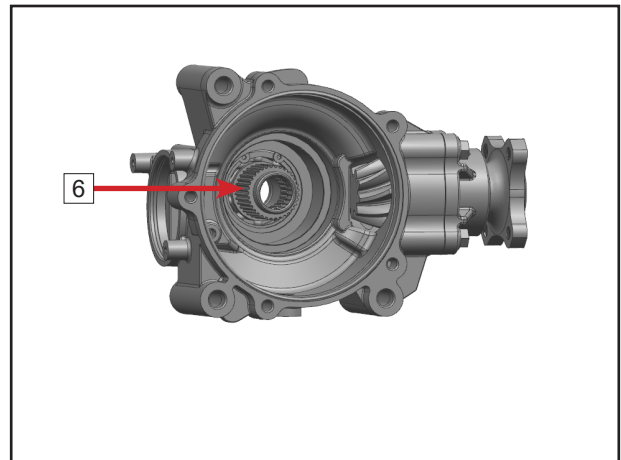
- Remove pin shaft **2**.
- Remove block assembly **3**.
- Remove fork assembly **4**.



- Remove spline dial **5**.



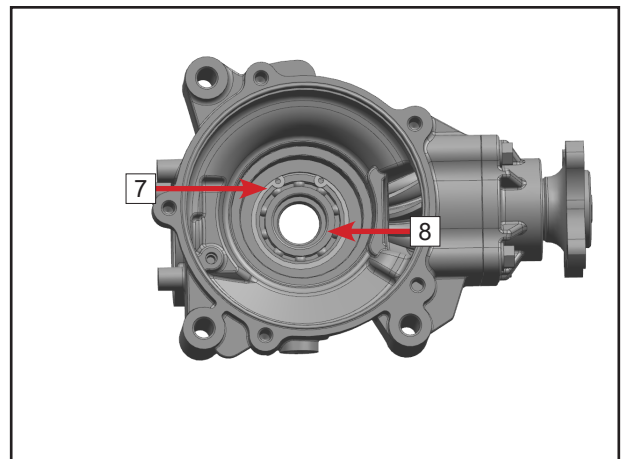
- Remove spline bushing **6**.



- Remove circlip **7**.
- Remove bearing **8**.

Installation

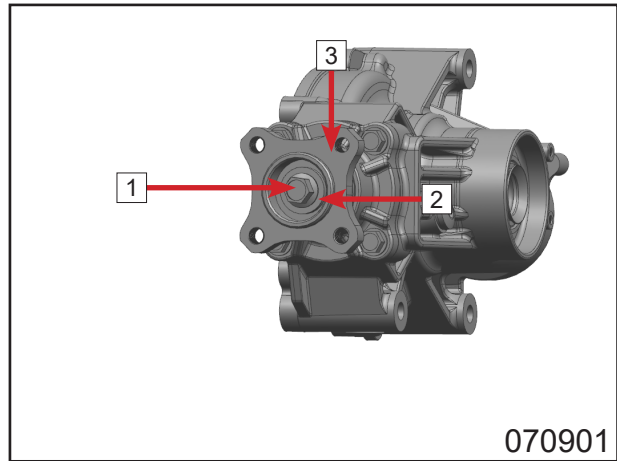
Reverse the removal procedures for installation.



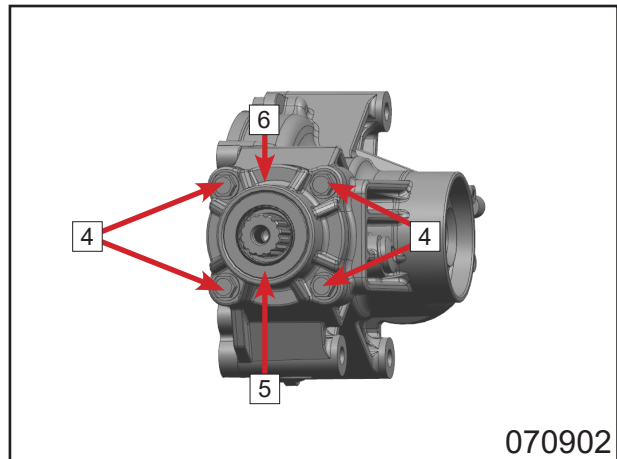
7.4.3 Front Gear Case Input Shaft Assembly

Removal

- Remove bolt [1].
- Remove washer [2].
- Remove coupler [3].

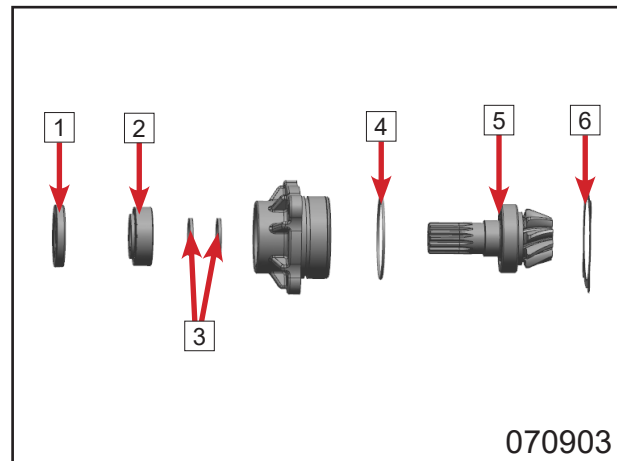


- Remove four bolts [4].
- Remove oil seal [5].
- Remove bearing seat assembly [6].

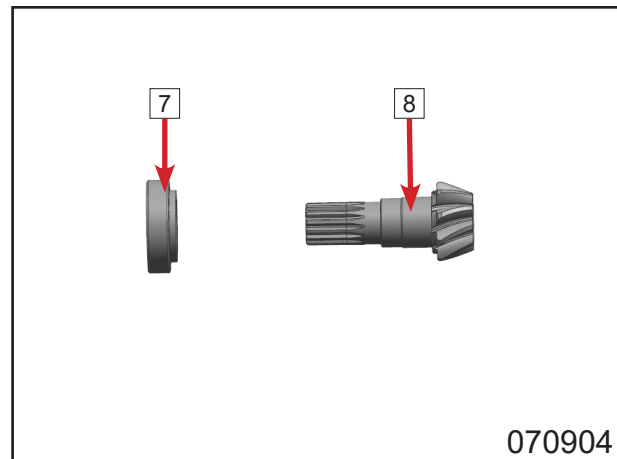


Disassembly

- Remove oil seal [1].
- Remove washer [6].
- Remove bearing [2].
- Remove adjusting washers [3].
- Remove input shaft assembly [5].
- Remove seal ring [4].



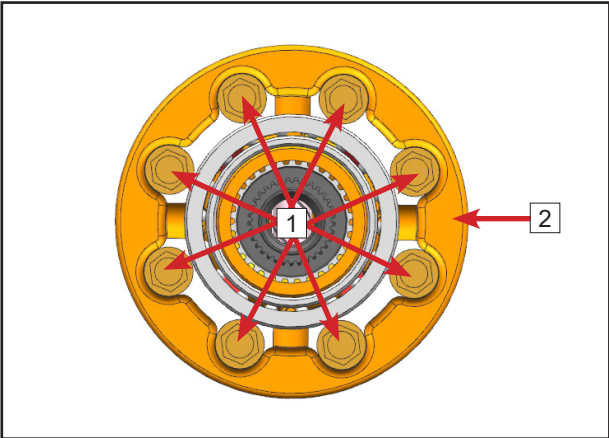
- Remove bearing [7].
- Remove drive bevel gear [8].



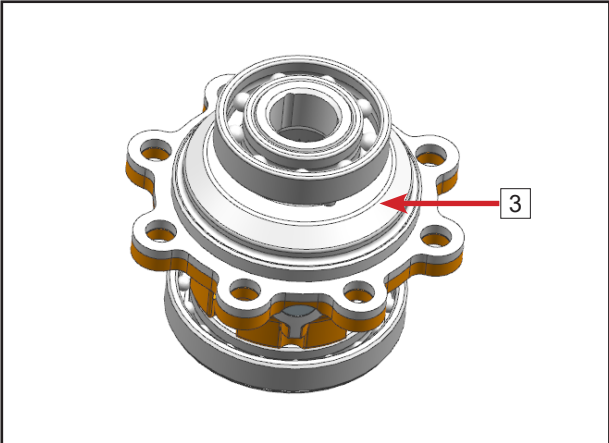
7.4.4 Differential Assembly

Disassembly

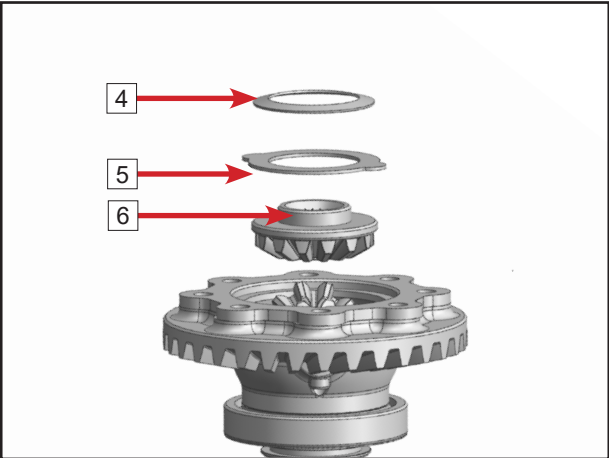
Remove bolt kits [1].
Remove front gear case driven bevel gear [2].



Remove mounting plate [3].

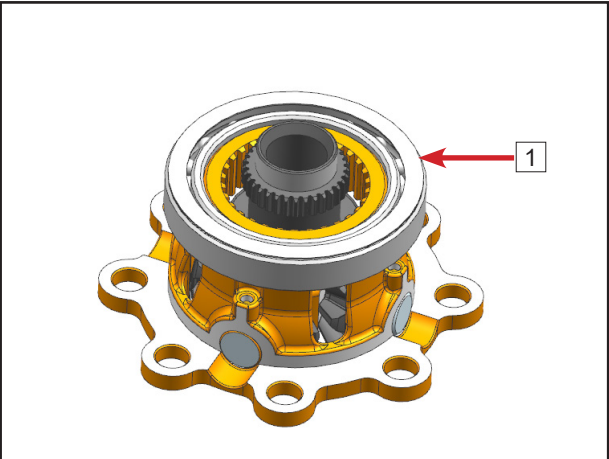


Remove gear washer [4].
Remove friction pad [5].
Remove RH shaft gear [6].

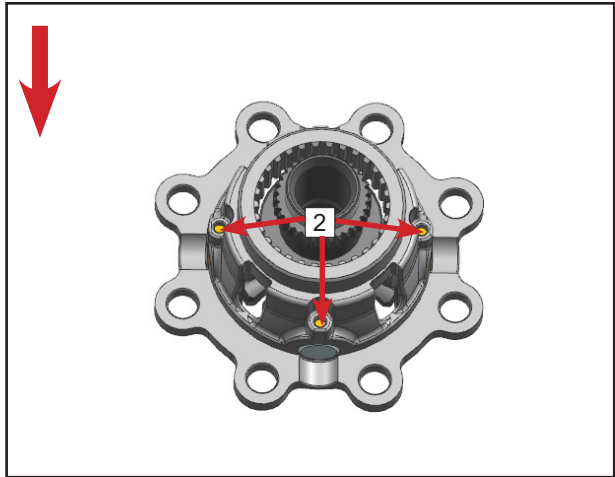


Planet Gear Removal

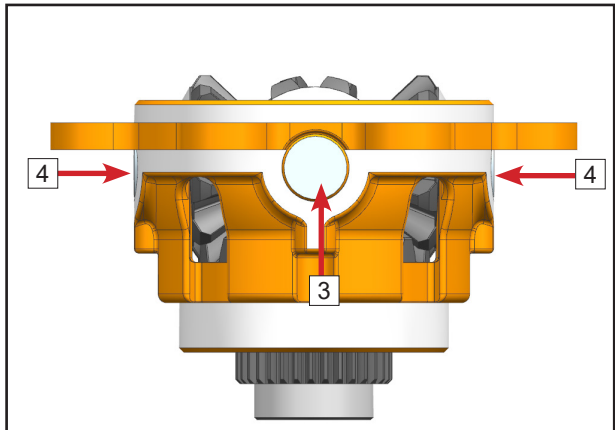
Remove bearing [1].



Remove pins **2** with proper dowel along the arrow direction.

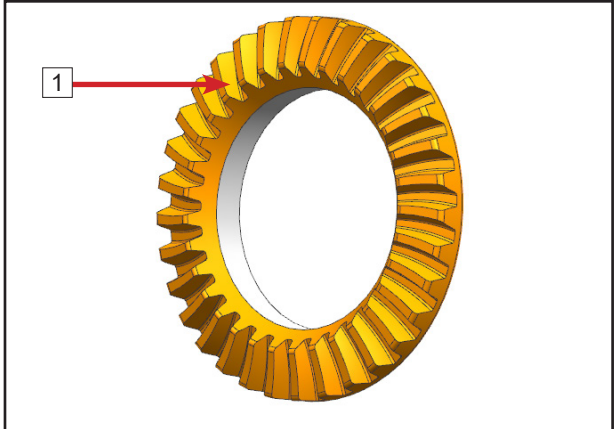


Remove planet gear shaft **3**.
Remove short planet gear shaft **4**.



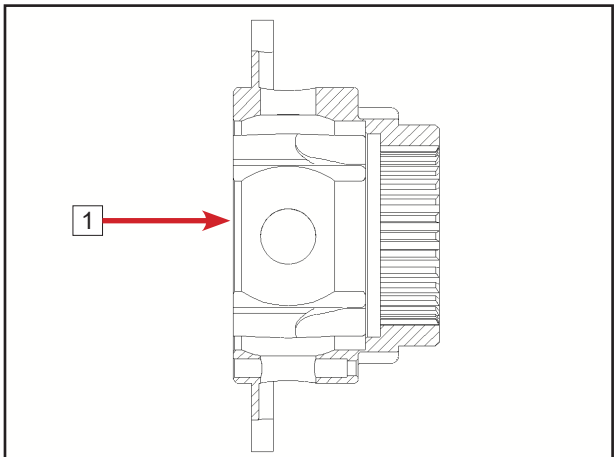
7.4.5 Front Gear Case Inspection Front Gear Case Driven Bevel Gear Inspection

Inspect front gear case driven bevel gear **1** for wear, crack or damage. Replace if any defect is found.



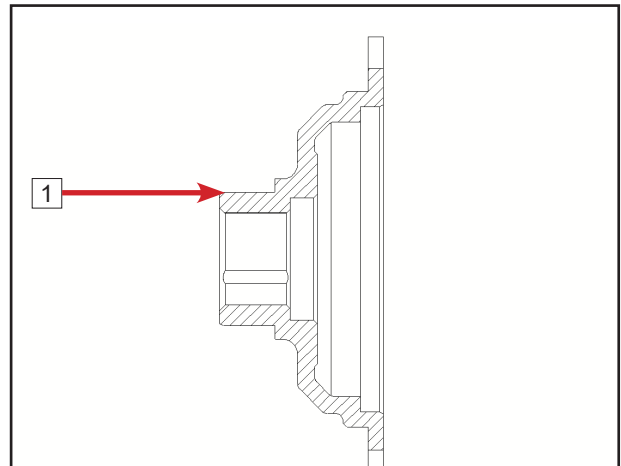
Differential Housing Inspection

Inspect differential housing **1** for cracks or damage. Replace if it does.



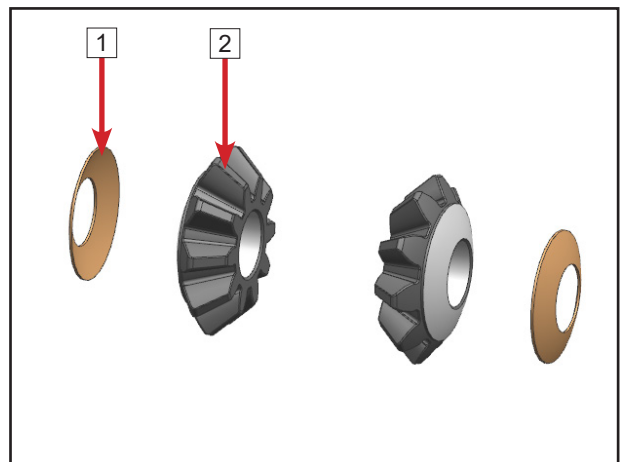
Mounting Plate Inspection

Inspect mounting plate **1** for cracks or damage. Replace if it does.



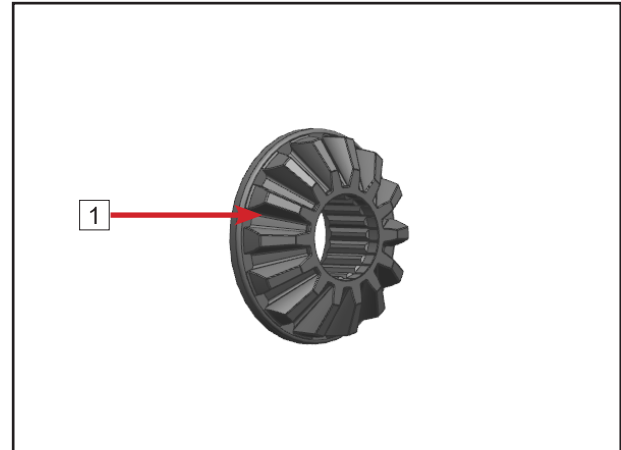
Planet Gear Inspection

Inspect girding plate **1** and planet gear **2** for cracks, damage or teeth worn. Replace if any defect is found.



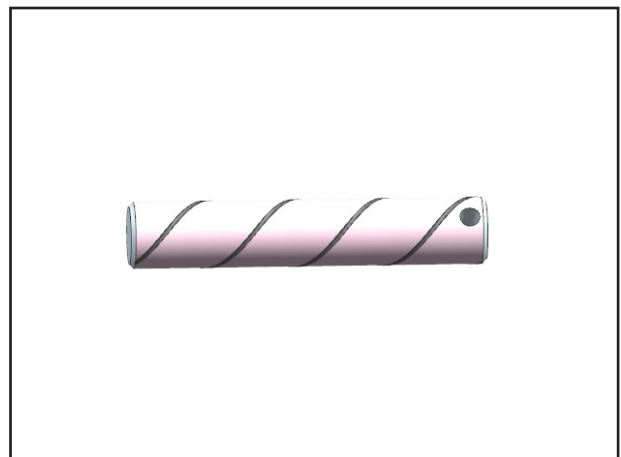
Middle Gear Inspection

Inspect middle gear **1** for cracks, damage or teeth worn. Replace if any defect is found.



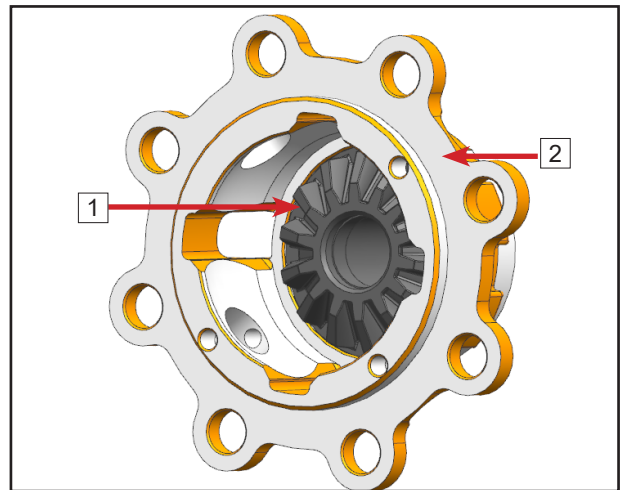
Cross Bushing and Planet Gear Shaft Inspection

Inspect cross bushing **1** for damage or abnormal wear. Replace if any defect is found.

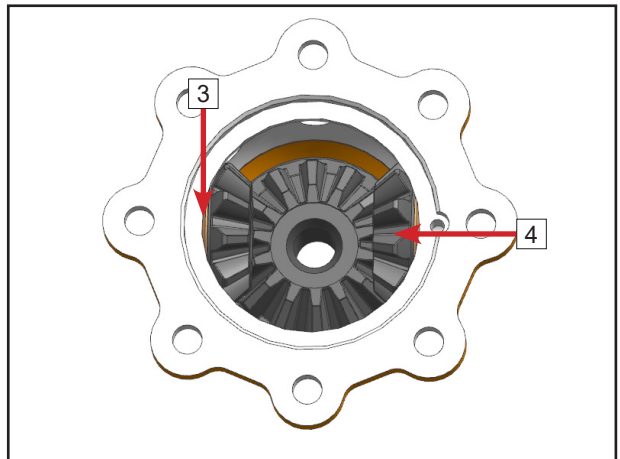


Assembly

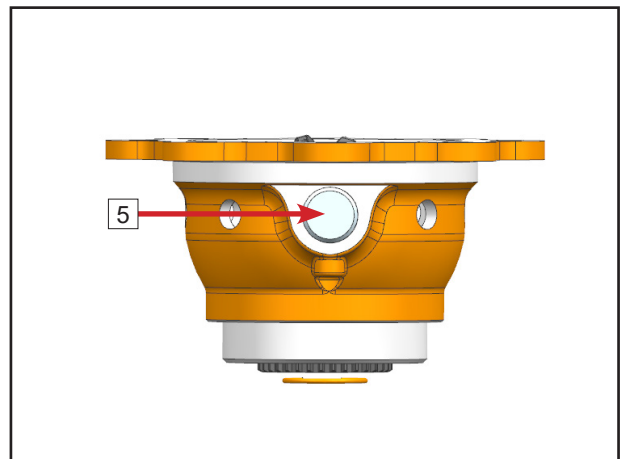
Install differential drive gear **1** on differential housing **2**.



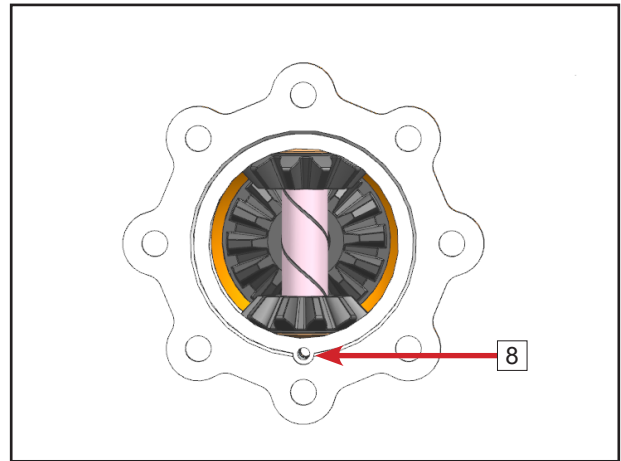
Install girding plate **3** and planet gear **4**.



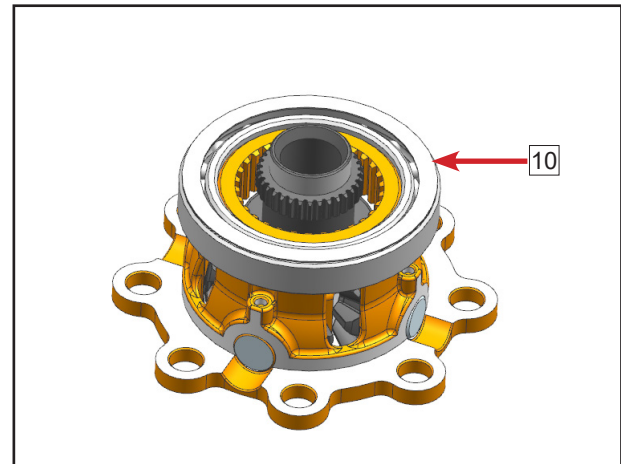
Install planet gear shaft **5**.



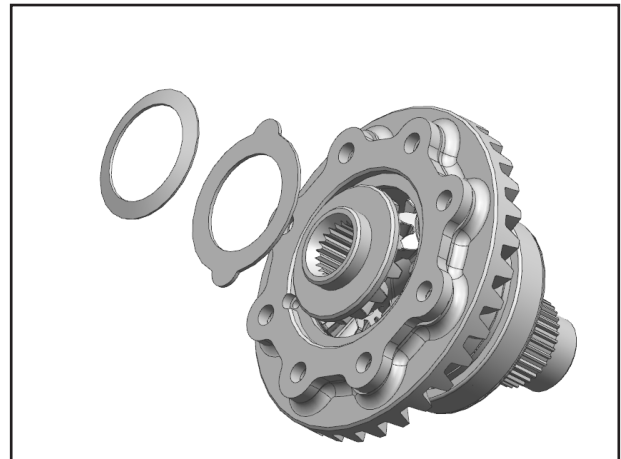
Install pins **8**. The ends are parallel with the surface.



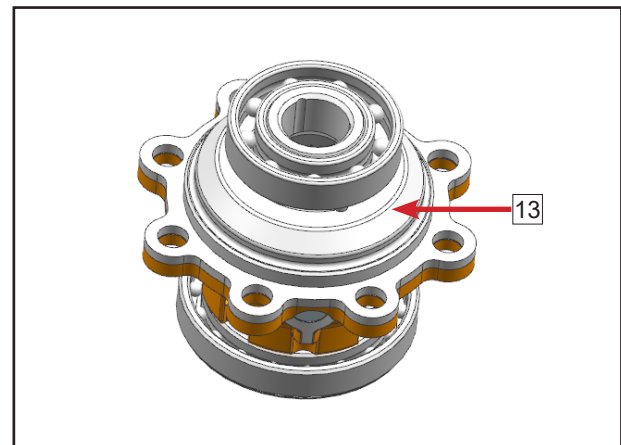
Compress bearing **10** on differential housing.



Install RH shaft gear **11**.
Install friction pad **12**.
Install gear washer **4**.



Install coupler **13**.



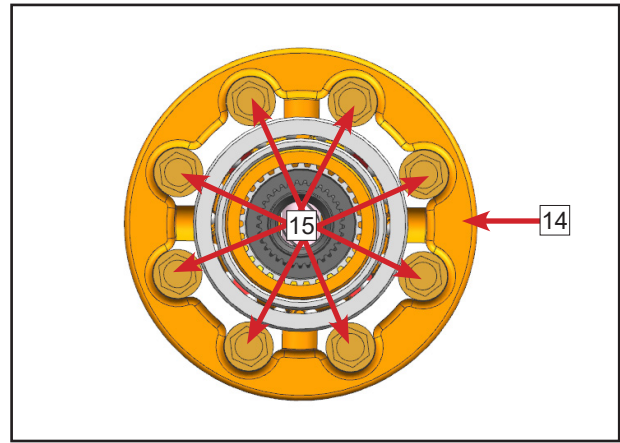
Install front gear case bevel gear **14** on mounting plate.

Install bolt kits **15** with thread locker.

Bolt specification: M10×1.25×22

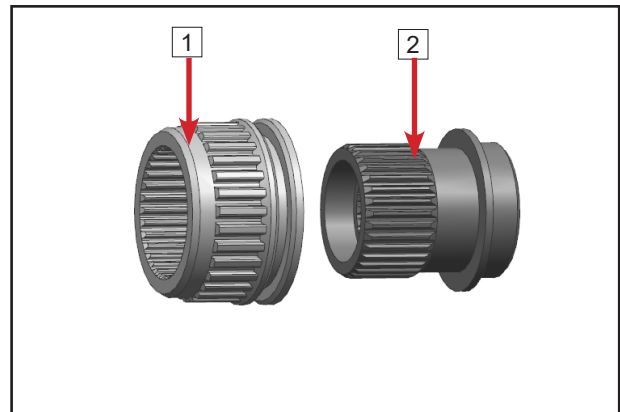
Bolt torque: 60N•m

NOTE: Install the bolts in criss-cross way. Pre-tighten first, then tighten the bolts.



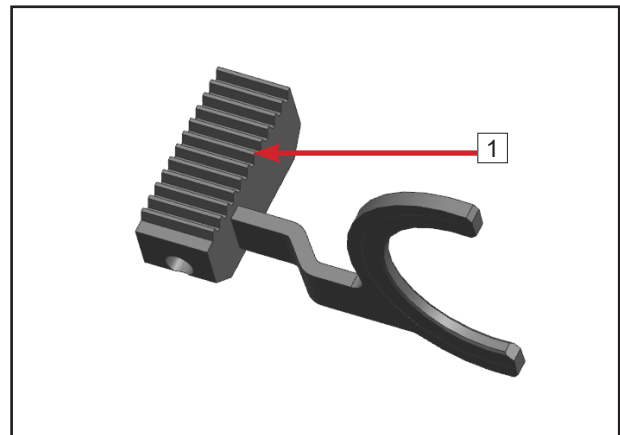
Spline Bushing Assembly Inspection

Inspect spline bushing **1** and bushing **2** for break, damage, severe wear or teeth deletion. Replace if any defect is found.



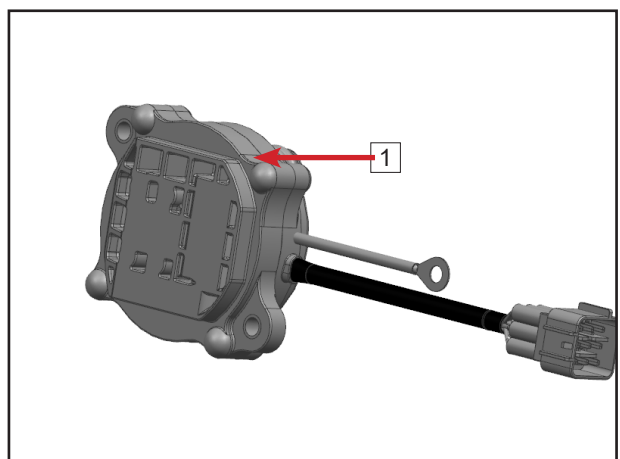
Rack Assy Inspection

Inspect rack assy **1** for break, damage, severe wear or teeth deletion. Replace if any defect is found.



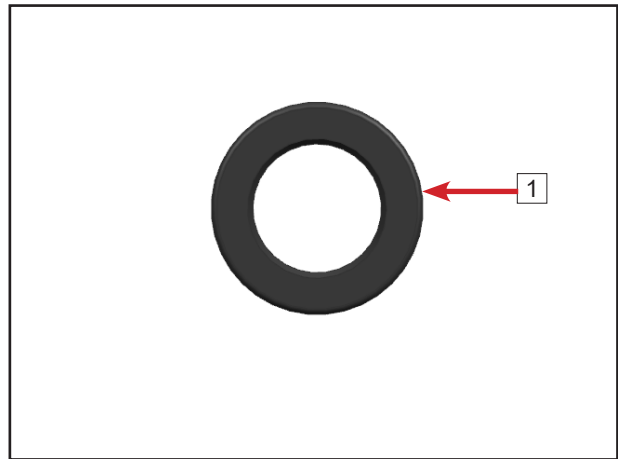
Front Gear Case Motor Inspection

Remove front gear case motor **1**. Connect with power and turn on motor switch to check if it works. Replace with new parts if it doesn't.



Oil Seal Inspection

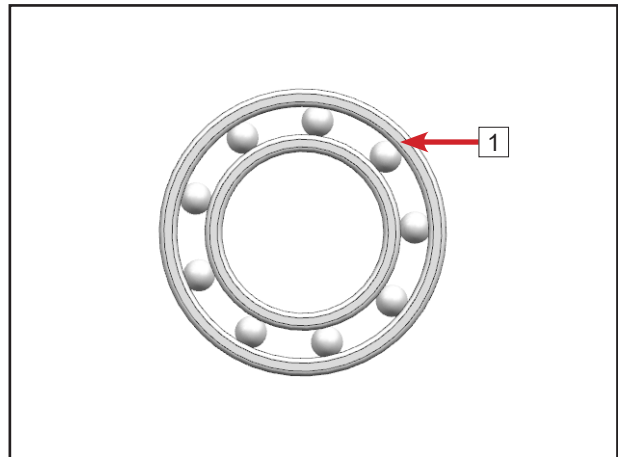
Remove all oil seals **1**. The removed oil seals are sorted as waste. Replace with new parts.



Bearing Inspection

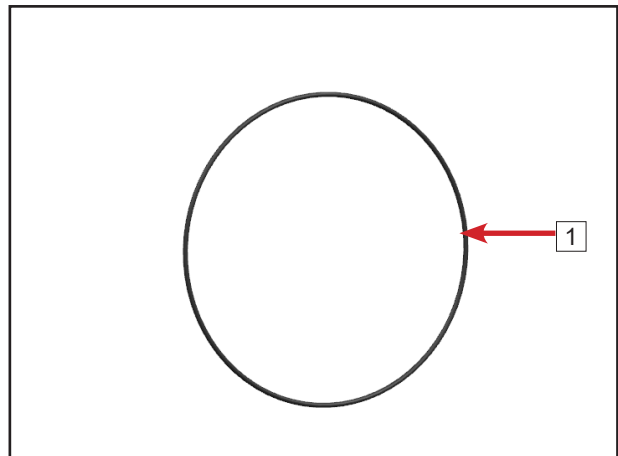
Inspect if every bearing **1** clearance is appropriate, rotation is smooth, raceway, steel balls, needle roller and retainer are in good condition. Replace if any defect is found.

Use special tool: bearing puller to remove bearing during replacement.



O-seal Ring Inspection

Inspect every o-seal ring **1** if deformed, broken or damaged. Replace with new parts if any defect is found.



7.4.6 Front Gear Case Assembly Assembly

Reverse the disassembly procedures for assembly.

⚠ WARNING: Before installation, clean the gear case, gears and washers with kerosene or gasoline. The o-ring can't be cleaned by kerosene or gasoline. After cleaning, wipe with air-laid paper to make sure every part is clean before assembly.

Front Gear Case Bevel Gear Clearance Adjustment

Follow the drawing on the right to adjusting gear side clearance: Install auxiliary measuring tool and tighten the bolt (M14X1.25X60). Set the dial gauge. Make sure the gauge testing point is 21mm to the center. Turn the measuring tool to read the data.

Dial gauge data standard: 0.1~0.25

Adjusting washer thickness	0.1	0.3	0.5	0.9	0.92	0.94	0.96	0.98	1.00
----------------------------	-----	-----	-----	-----	------	------	------	------	------

NOTE: Measure until the adjustment is done. If the data is beyond the standard, repeat above procedures to make adjustments.

Tooth Contact

After backlash adjustment is carried out, the tooth contact must be checked. Pay attention to the following procedures:

Remove ring gear from crankcase.

Clean and degrease drive pinion gear and ring gear teeth.

Apply a coating of machinist's layout dye or paste to several teeth of the driven gear.

Install ring gear.

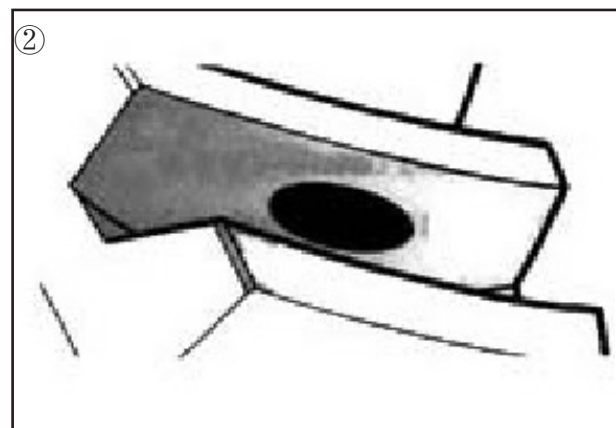
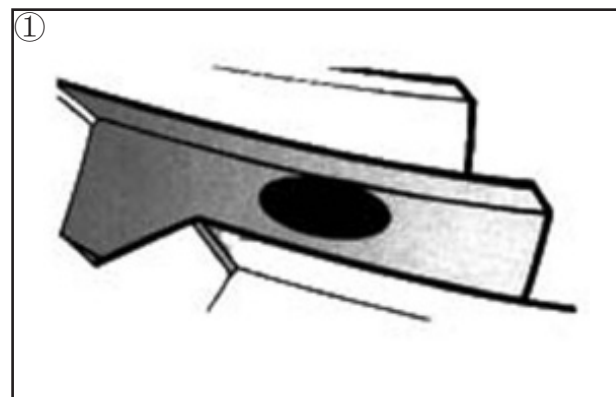
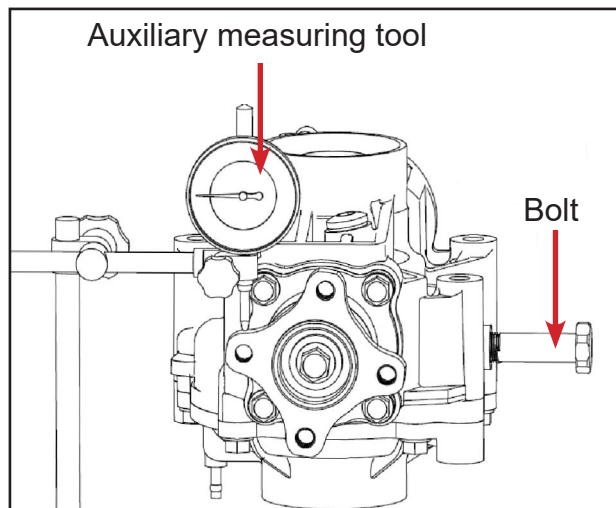
Rotate the ring gear several turns in both directions. Remove drive pinion gear and ring gear, then inspect the coated teeth of the drive pinion gear. The teeth contact pattern should be as shown below.

Pattern 1	Contact at tooth top	Incorrect
Pattern 2	Contact at tooth middle	Correct
Pattern 3	Contact at tooth root	Incorrect

If gear tooth contact is found to be correct (pattern 2), continue the next step.

If gear tooth contact is found to be incorrect (pattern 1 and 3), the shim thickness between the drive pinion gear and ring gear must be changed and the tooth contact re-checked until correct.

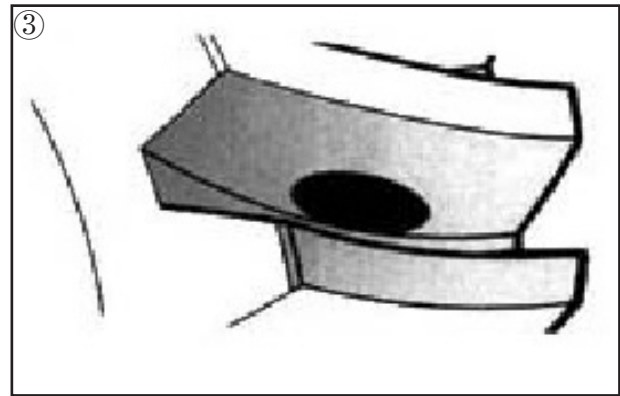
NOTE: Clean the dye coated on the gear teeth after the tooth contact adjustment is finished.



Adjustment Steps

Tooth contact	Shim adjustment
Tooth contact pattern 1	Reduce shim thickness
Tooth contact pattern 3	Increase shim thickness

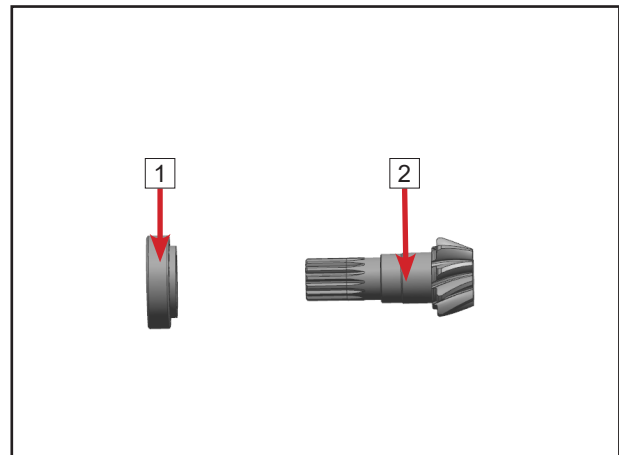
⚠ WARNING: Make sure to check the backlash after the tooth contact has been adjusted, since it may have changed. Adjust the tooth contact and backlash until they are both within specification. If the correct tooth contact cannot be maintained when adjusting the backlash, replace the drive gear and ring gear.



Front Gear Case Drive Bevel Gear Assembly

Installation

Install bearing **1** on drive bevel gear **2**.



Install input shaft assembly **3** on bearing seat **4**.

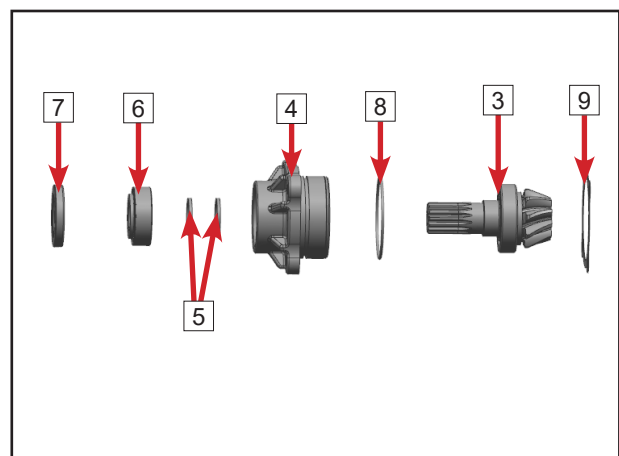
Install adjusting washers **5**.

Install bearing **6**.

Install oil seal **7**.

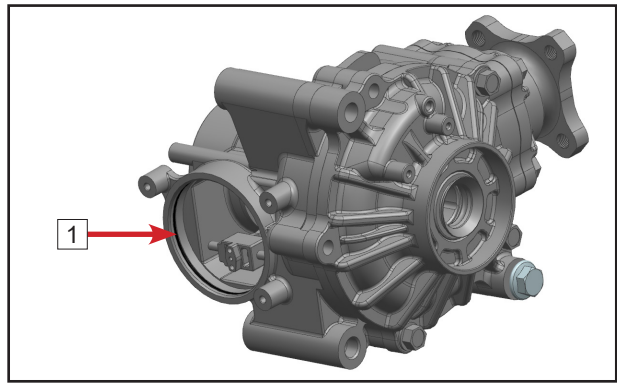
Install seal ring **8**.

Install washer **9**.

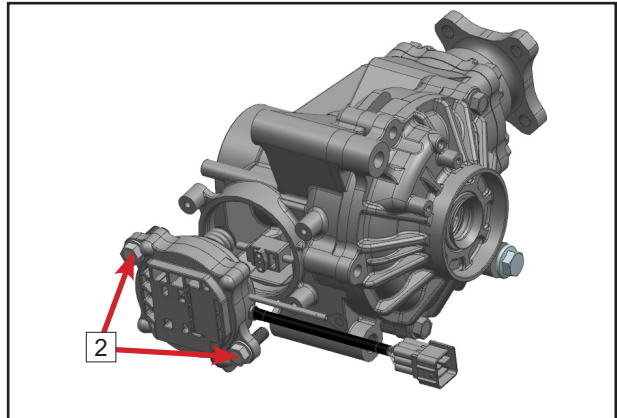


Front Gear Case Motor Installation

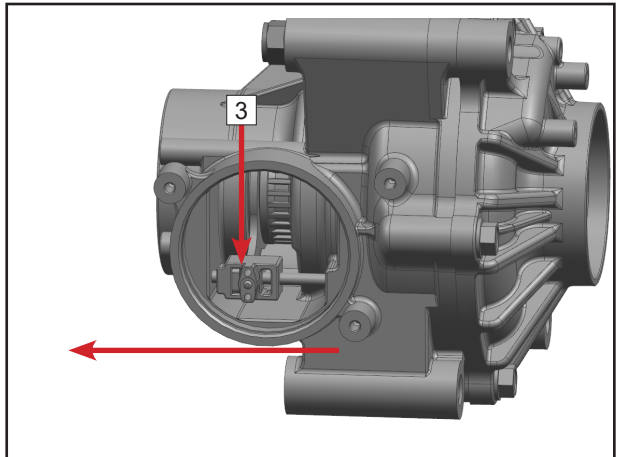
Install o-seal ring **1**.



Install bolts **2**.



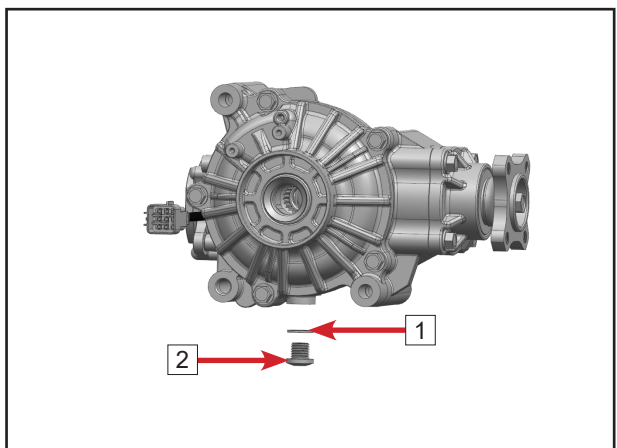
NOTE: Before motor installation, set the motor to 2WD mode with special device or vehicle control circuit. Move the block assembly **3** along the arrow direction to 2WD position.



Drain Bolt Installation

Put washer **1** on drain bolt **2**.

Install drain bolt **2**.



7.5 Rear Gear Case (Differential)

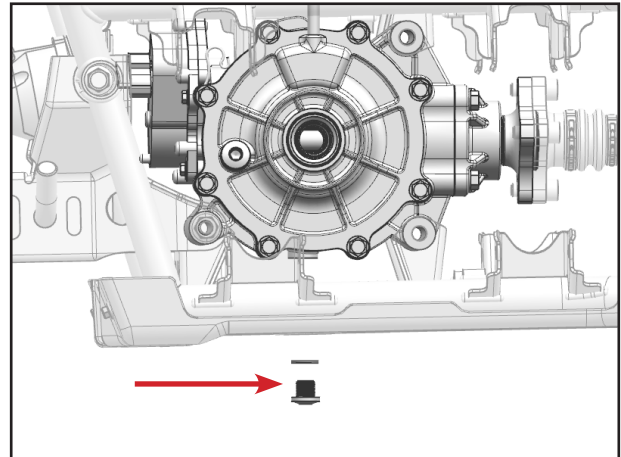
⚠ DANGER: Before inspection, make sure the operation is made on flat ground and the vehicle is jacked up. Do not put any limbs under the vehicle, in case of injury caused by sudden fall during inspection.

Pre-work

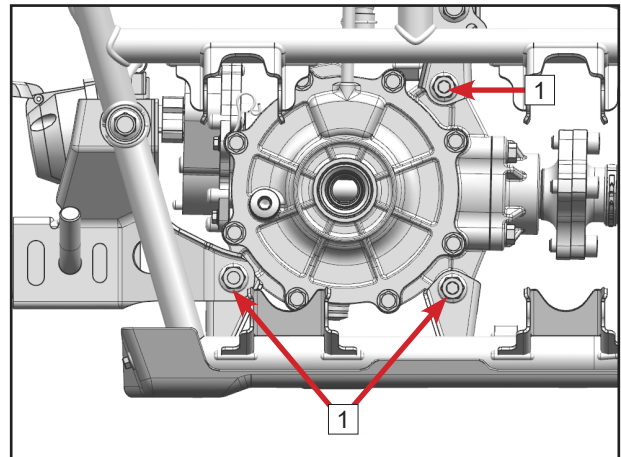
Remove tires.
Remove shock absorbers.
Remove steering knuckles.

7.5.1 Rear Gear Case Removal

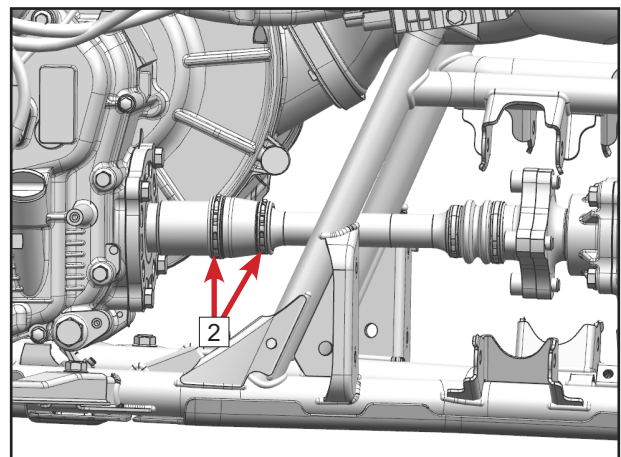
Place a container under front gear case.
Remove drain bolt **1** and washer.



Remove three bolts **1**.

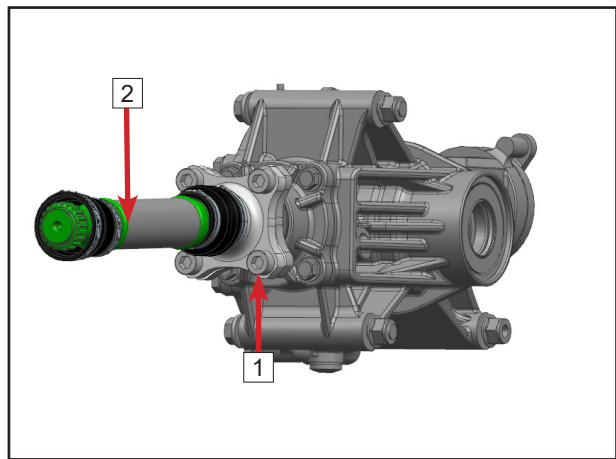


Loosen big clamp **2**.
Remove rear gear case and rear drive shaft assembly.



Remove four bolts **1**.

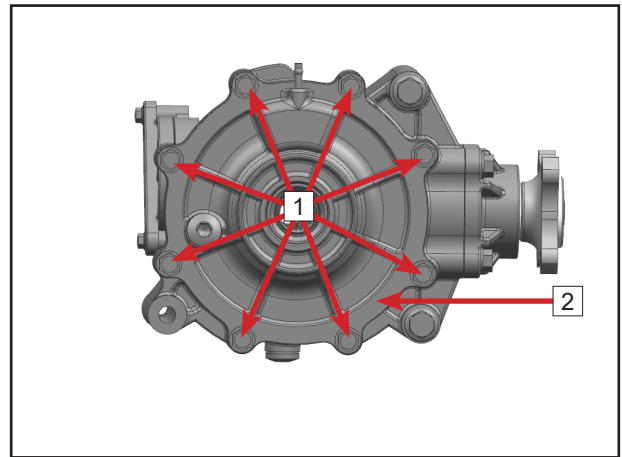
Remove rear drive shaft **2**.



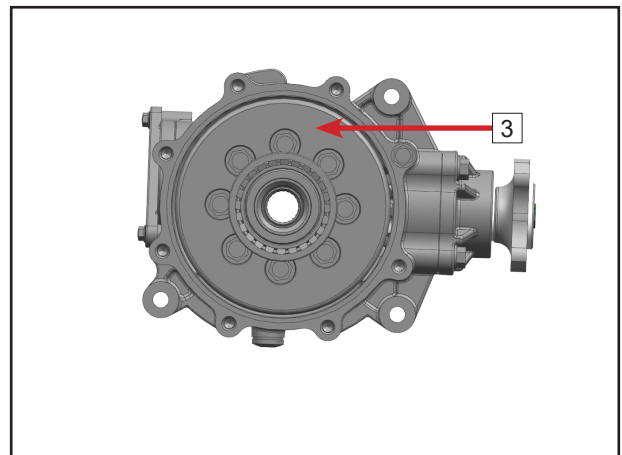
7.5.2 Rear Gear Case Disassembly

Remove bolts **1**.

Remove rear gear case cover **2**.



Remove differential assembly **3**.

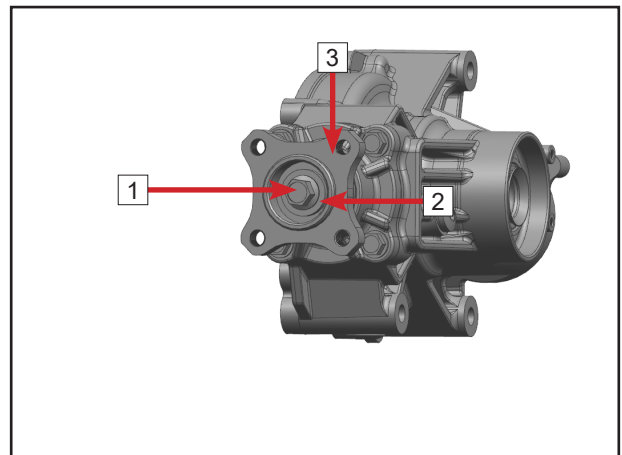


7.5.3 Rear Gear Case Input Shaft Removal

Remove bolt **1**.

Remove washer **2**.

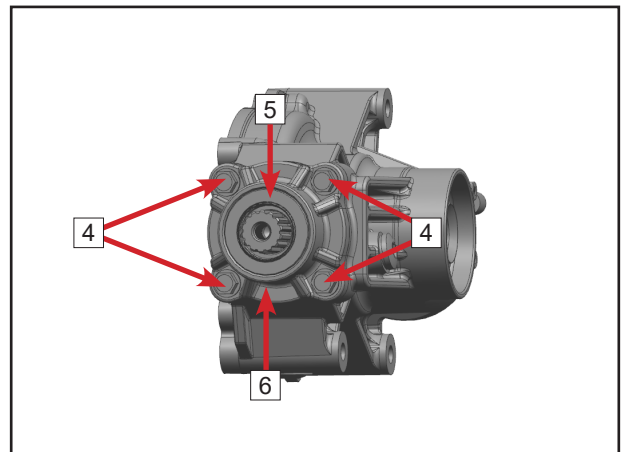
Remove coupler **3**.



Remove four bolts **4**.

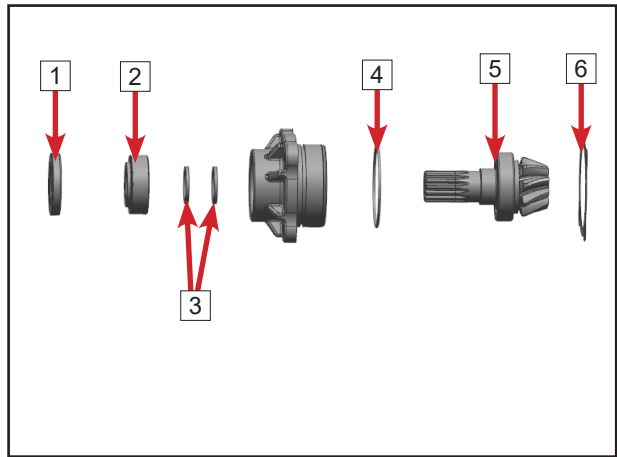
Remove oil seal **5**.

Remove bearing seat **6**.

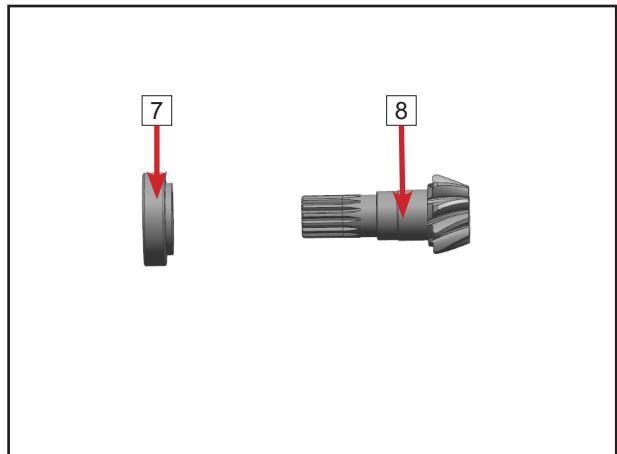


Disassembly

- Remove oil seal [1].
- Remove washer [6].
- Remove bearing [2].
- Remove adjusting washers [3].
- Remove input shaft [5].
- Remove seal ring [4].



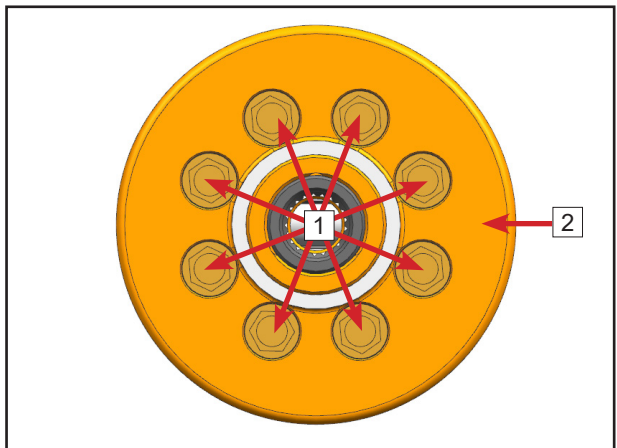
- Remove bearing [7].
- Remove drive bevel gear [8].



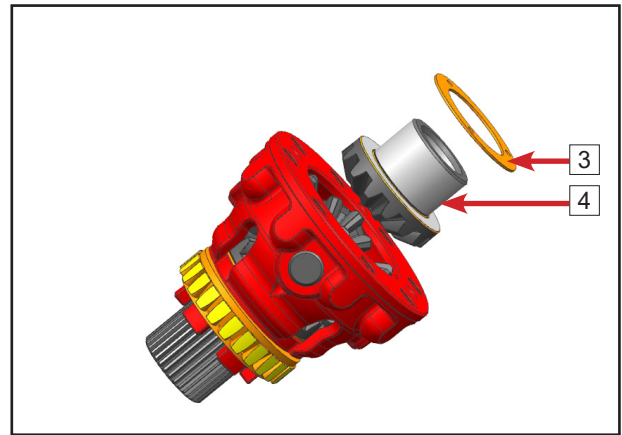
7.5.4 Differential Assembly

Disassembly

- Remove bolt kits [1].
- Remove driven bevel gear [2].

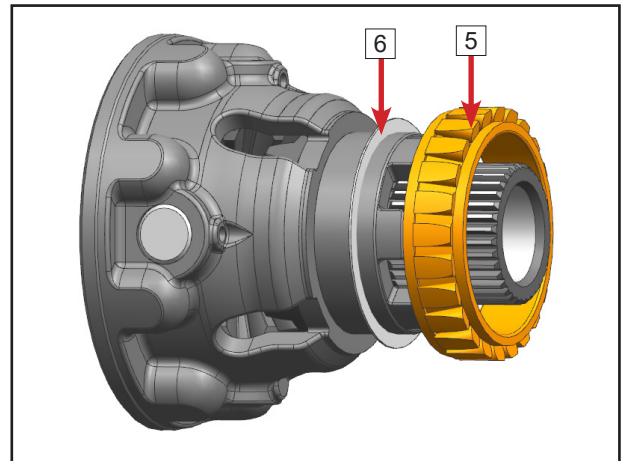


Remove shaft gear washer **3**.
Remove RH shaft gear **4**.



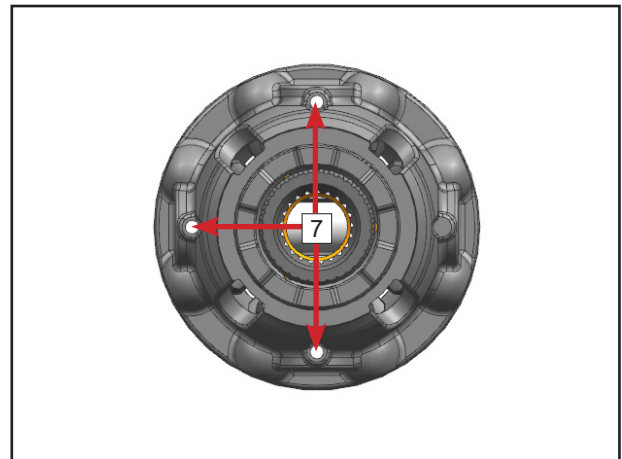
Remove roller bearing **5**.
Remove 61×50.5 adjusting washer **6**.

NOTE: Adjust the rear gear case bevel gear teeth clearance by adding or decreasing the washers.

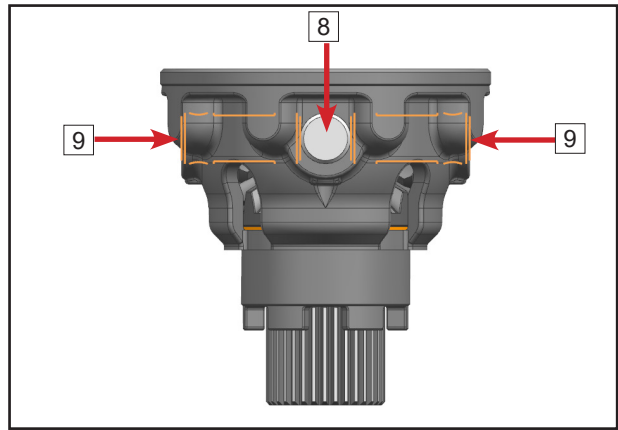


Remove pins **7**.

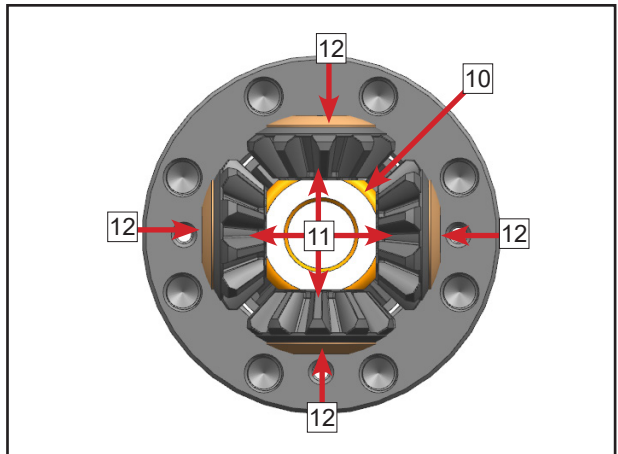
NOTE: Support differential assembly with a proper tool before removing pins **7.**



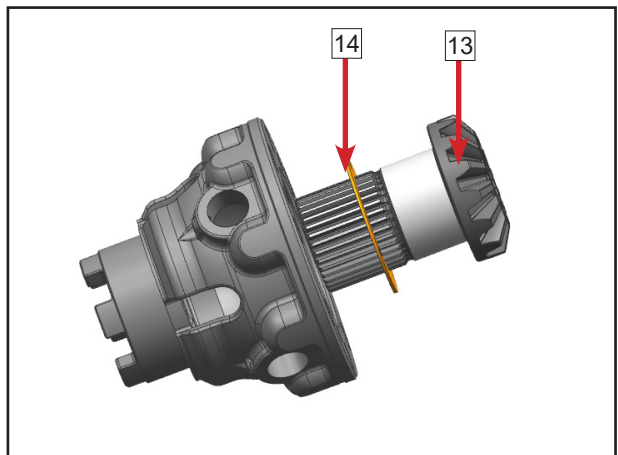
Remove planet gear shaft **8**.
Remove short planet gear shafts **9**.



Remove cross bushing **10**.
Remove planet gears **11**.
Remove wearing rings **12**.

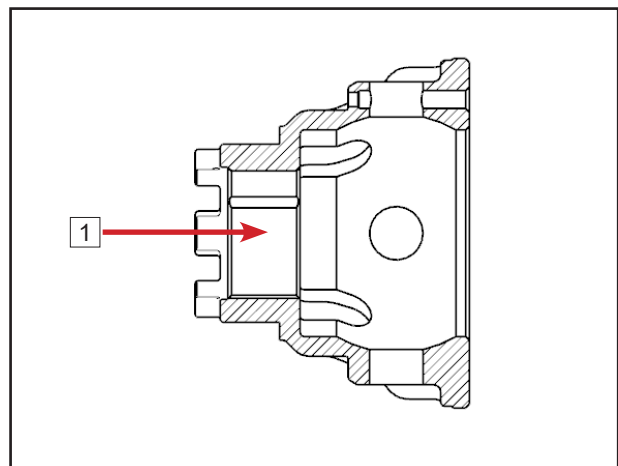


Remove LH shaft gear **13**.
Remove shaft gear washer **14**.

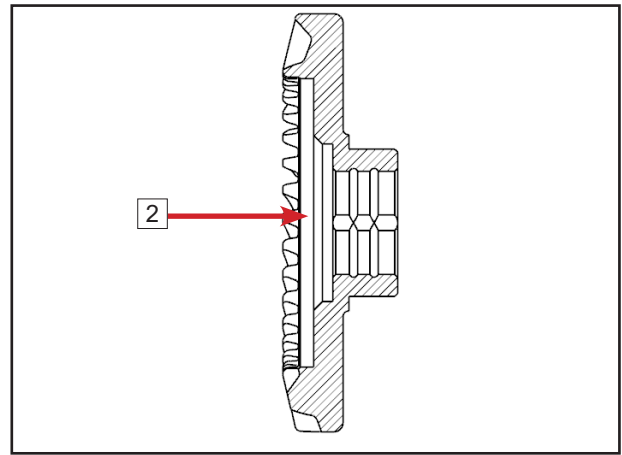


7.5.5 Rear Gear Case Inspection Differential Housing

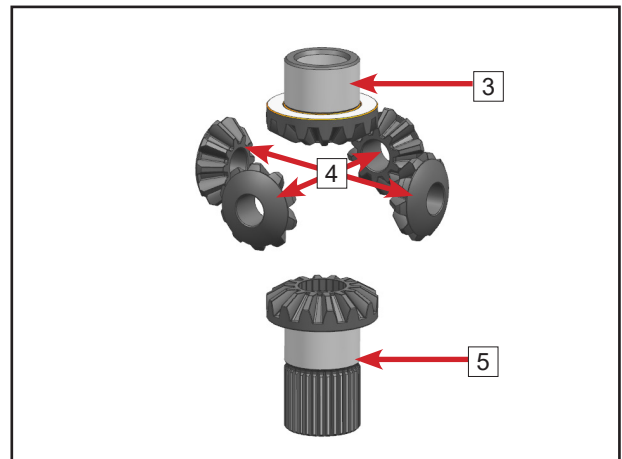
Inspect differential housing **1** for cracks or damage. Replace if any defect is found.



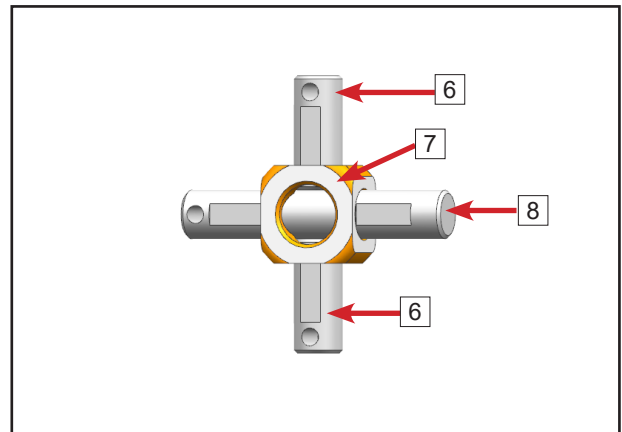
Inspect rear gear case driven bevel gear **2** for cracks or damage. Replace if any defect is found.



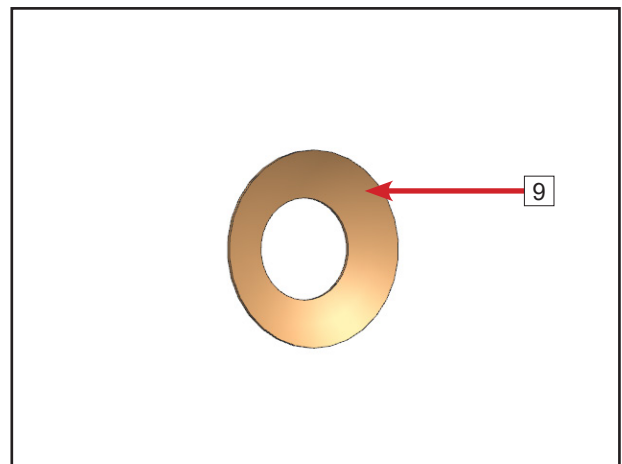
Inspect RH shaft gear **3**, planet gear **4**, LH shaft gear **5** for break, damage or teeth wear. Replace if any defect is found.



Inspect differential middle gear shaft **8**, short planet gear shaft **6** for abnormal wear, damage or deformation. Replace if any defect is found.
Inspect cross bushing **7** for damage or abnormal wear. Replace if any defect is found.

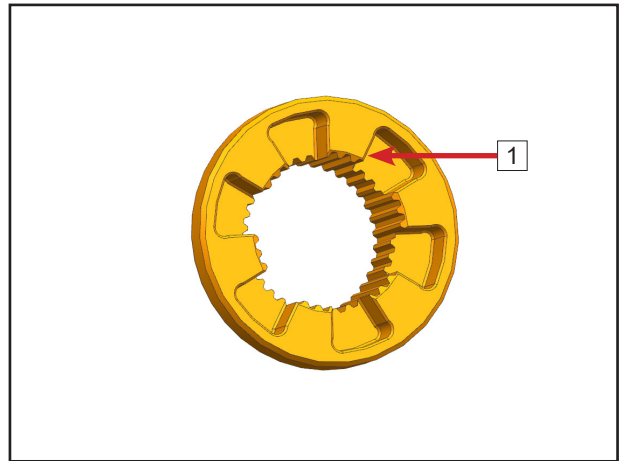


Inspect wearing washer **9** for damage or abnormal wear. Replace if any defect is found.



Rectangular Sleeve Inspection

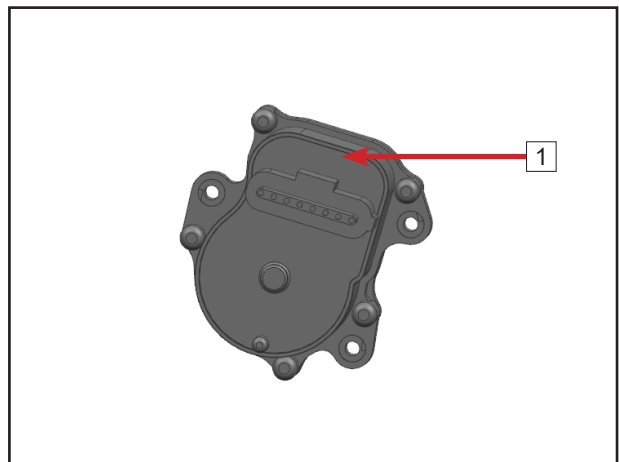
Inspect rectangular sleeve **1** for break, damage or teeth wear. Replace if any defect is found.



Rear Gear Case Motor Inspection

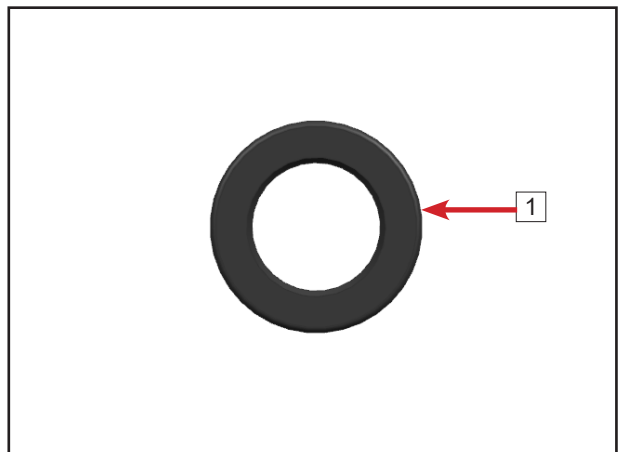
Remove rear gear case motor **1**. Connect with power and turn it on to check if the motor works. Replace with new parts if it doesn't.

Inspect rear gear case motor **1** output gear for damage or teeth wear. Replace if any defect is found.



Oil Seal Inspection

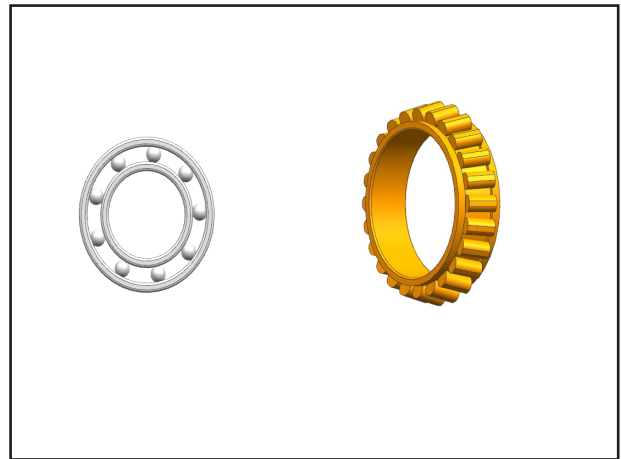
All oil seals **1** are removed and sorted as waste. Replace with new ones during installation.



Bearing Inspection

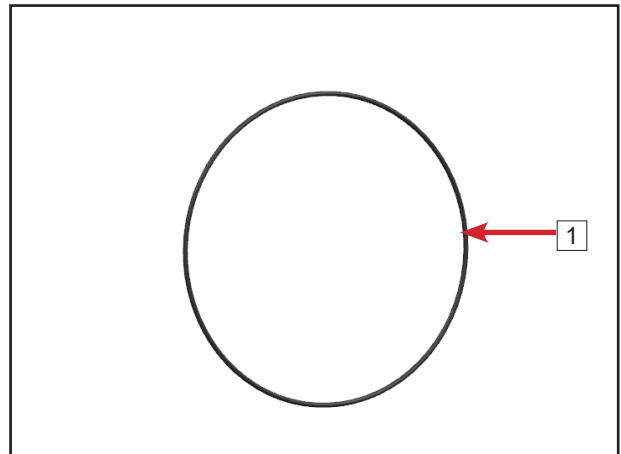
Inspect if every bearing clearance is appropriate, rotation is smooth, raceway, steel balls, needle roller and retainer are in good condition. Replace if any defect is found.

Use special tool to remove bearing during bearing replacement.



O-seal Ring Inspection

Inspect every o-seal ring 1 if deformed, broken or damaged. Replace with new parts if any defect is found.

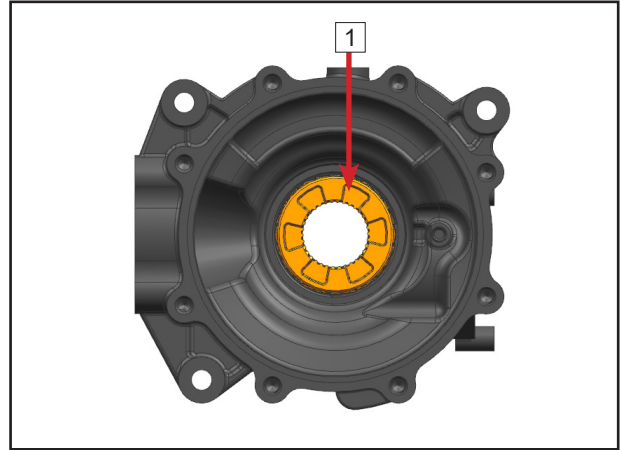


7.5.6 Rear Gear Case Assembly

⚠ WARNING: Before installation, clean the gear case, gears and washers with kerosene or gasoline. The o-ring can't be cleaned by kerosene or gasoline. After cleaning, wipe with air-laid paper to make sure every part is clean before assembly.

Rack Assembly Installation

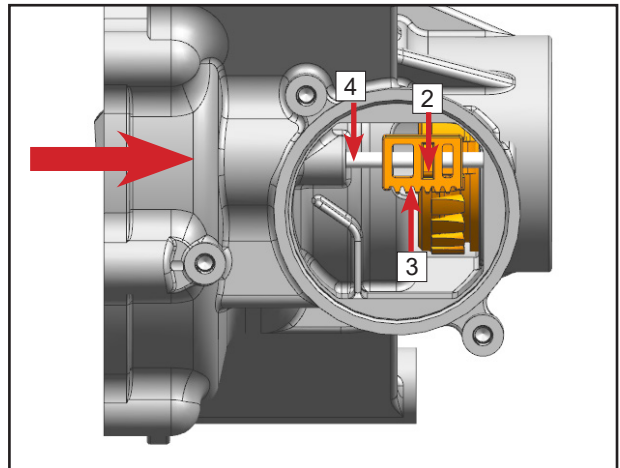
Install rectangular sleeve **1**.



Install fork **2** on rectangular sleeve.

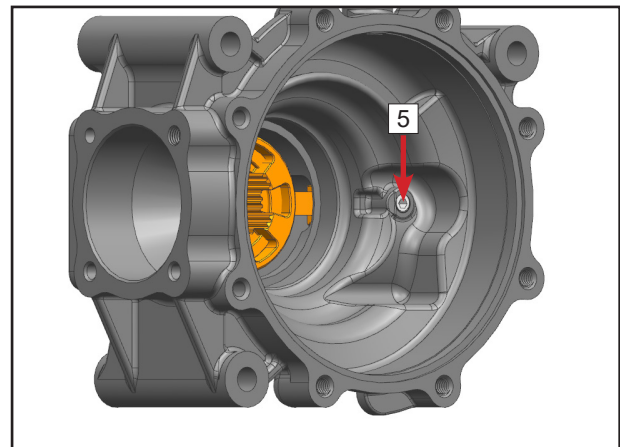
Install rack **3**.

Install pin shaft **4** along the arrow direction.



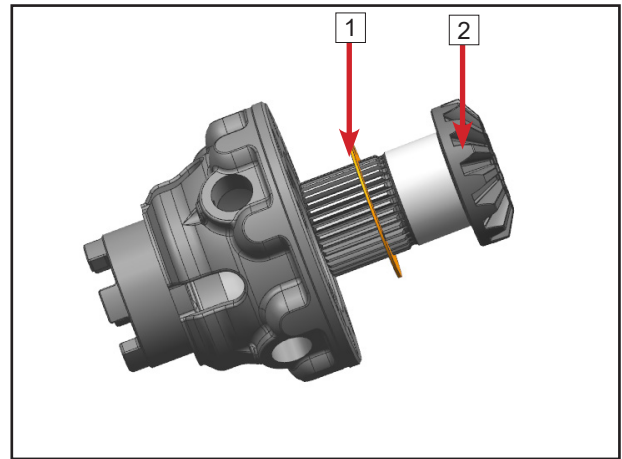
NOTE: During installation, align the rack with the mounting hole on gear case. Insert pin shaft **4** and make it go through rack and fork.

Install screw **5** and tighten it to 13N•m.

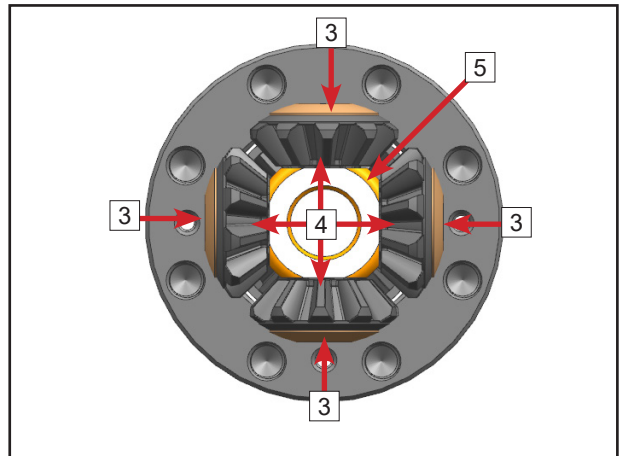


Differential Assembly

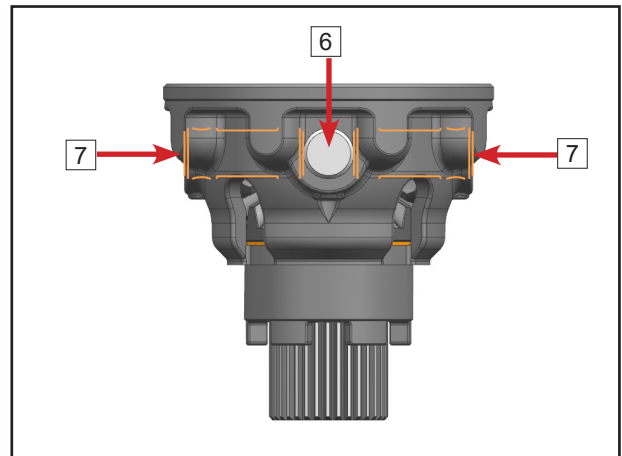
Install shaft washer **1** on LH shaft gear **2**.
Install LH shaft gear **2** on differential housing.



Install wearing rings **3**.
Install differential middle gears **4**.
Install cross bushing **5**.

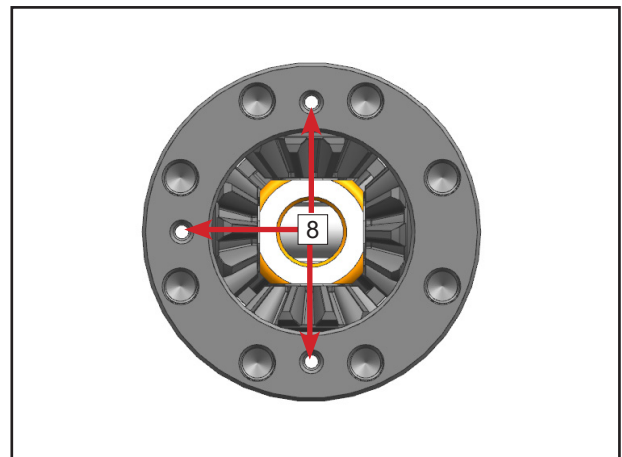


Install planet gear shaft **6**.
Install short planet gear shafts **7**.

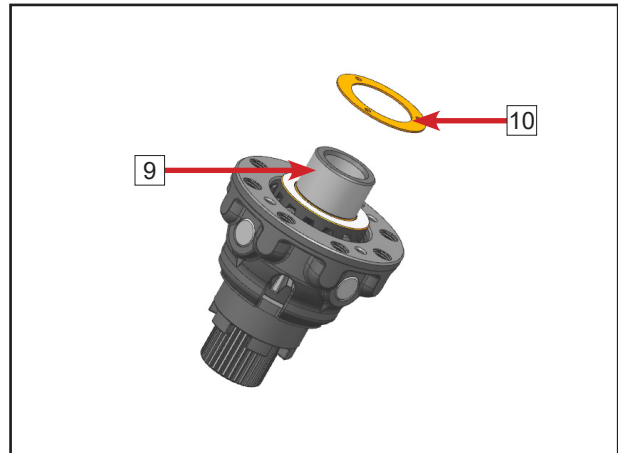


Install pins **8**.

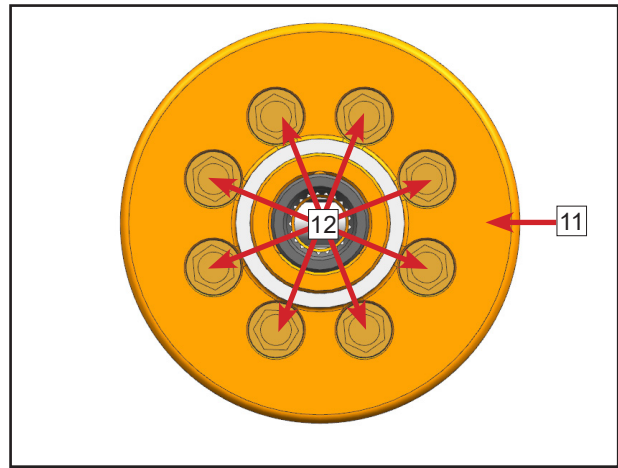
NOTE: Make sure the pins are well inserted into the hole during installation.



Install RH shaft gear [9].
Install shaft gear washer [10].



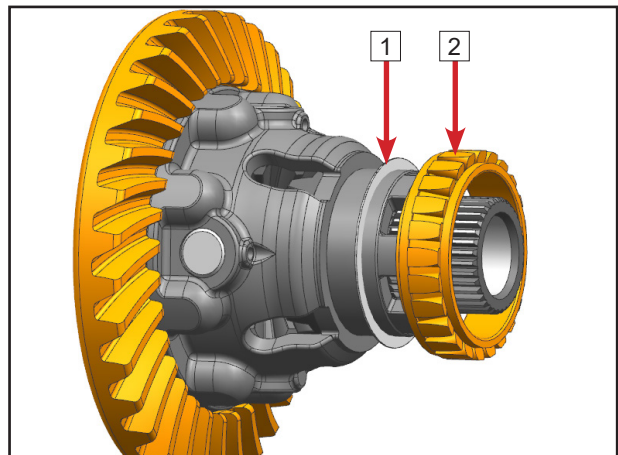
Install rear gear case driven bevel gear [11].
Install bolts [12].
Bolt specification: M10×1.25×22
Torque: 60N•m



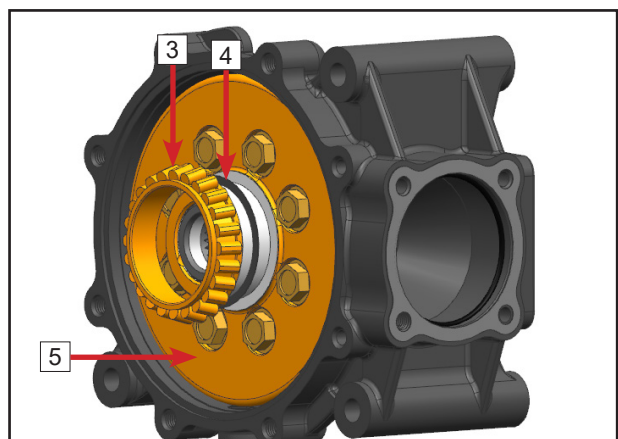
Differential Installation

Install adjusting washer 61×50.5 [1].
Install bearing [2].

NOTE: Adjust the rear gear case bevel gear teeth clearance by adding or decreasing the washers.



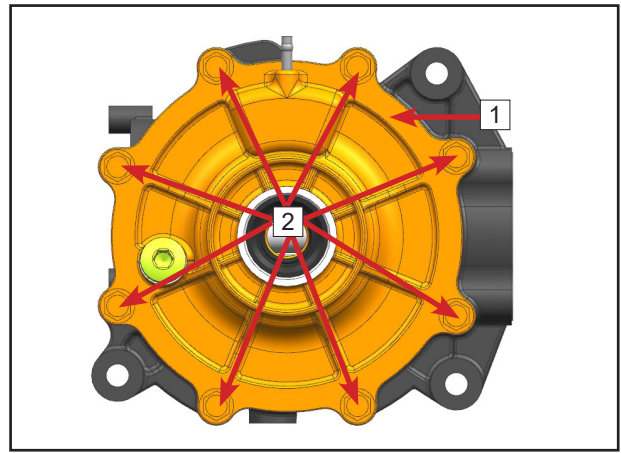
Install differential assembly [3].
Install adjusting washer [4].
Install bearing [5].



Rear Gear Case Cover Installation

Install rear gear case cover **1**.

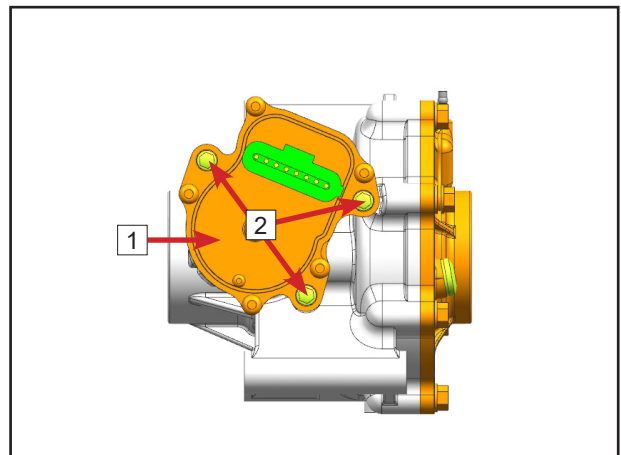
Install bolts **2**.



Rear Gear Case Motor Installation

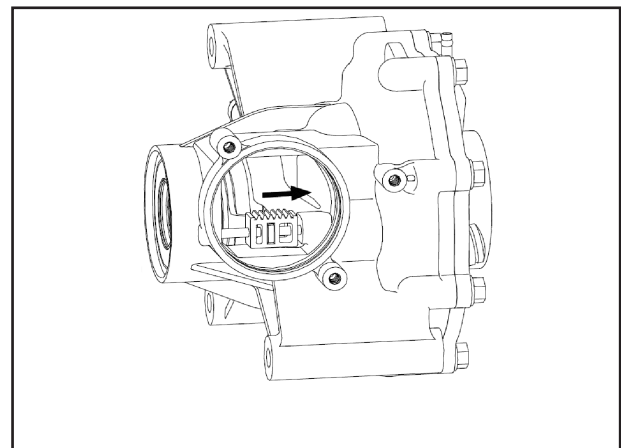
Install motor assembly **1**.

Install screws **2** and tighten to 8N•m.

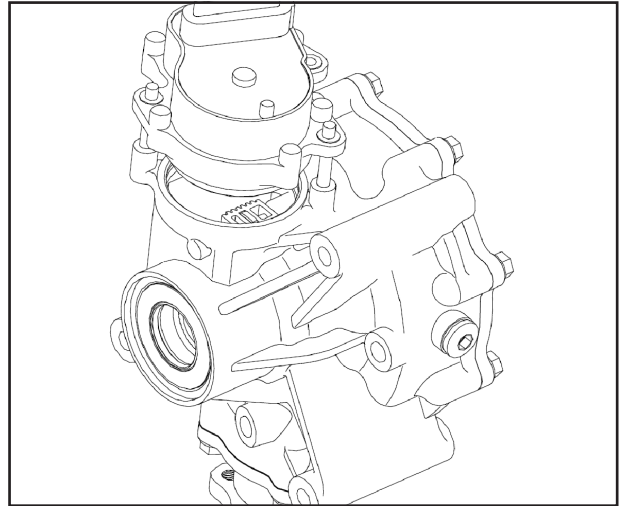


NOTE: Before motor installation, set the motor to 4WD mode with special device or vehicle control circuit.

NOTE: During installation, rack assembly and spline bushing should be closed like what picture shows.



NOTE: When assembling motor and rear gear case, operate as picture shows with screws fixed.

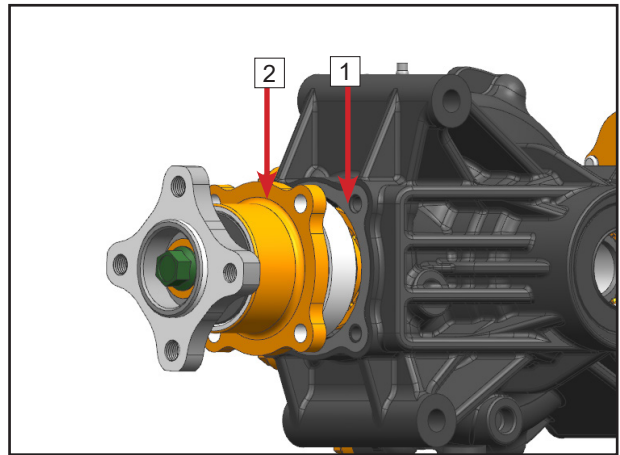


Rear Gear Case Drive Bevel Gear Installation

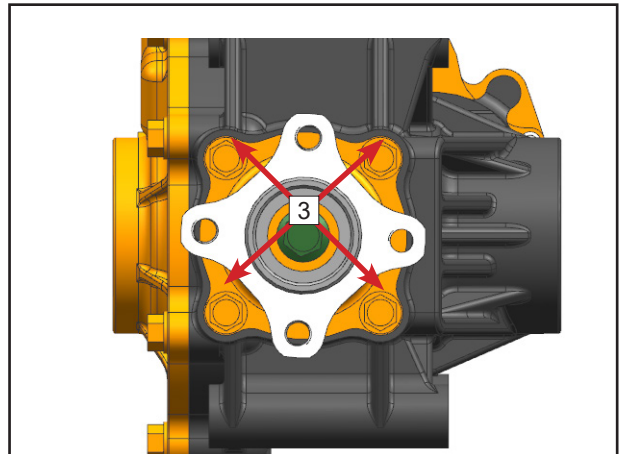
Install adjusting washer **1**.

Install drive bevel gear assy **2**.

Adjusting washer thickness	0.2	0.3
----------------------------	-----	-----

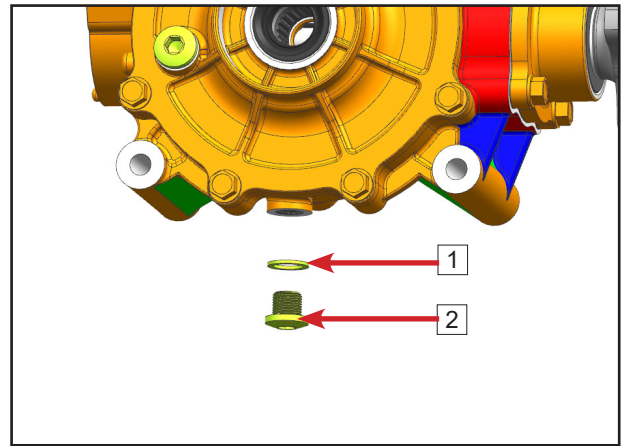


Install bolts **3**.



Oil Drain Bolt Installation

Put washer [1] on oil drain bolt [2].
Install oil drain bolt [2].



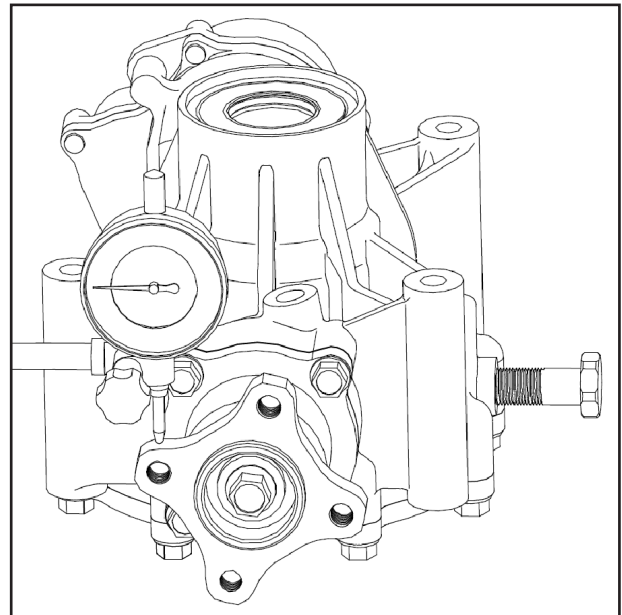
Rear Gear Case Bevel Gear Clearance Adjustment

Follow the drawing on the right to adjusting gear side clearance: Install auxiliary measuring tool and tighten the bolt (M14X1.25X60). Set the dial gauge. Make sure the gauge testing point is 21mm to the center. Turn the measuring tool to read the data.

Dial gauge data standard: 0.1~0.25

Adjusting washer thickness	0.1	0.3	0.5	0.9	0.92	0.94	0.96	0.98	1.00
----------------------------	-----	-----	-----	-----	------	------	------	------	------

NOTE: Measure until the adjustment is done. If the data is beyond the standard, repeat above procedures to make adjustments.



Tooth Contact

After backlash adjustment is carried out, the tooth contact must be checked. Pay attention to the following procedures:

Remove ring gear from crankcase.

Clean and degrease drive pinion gear and ring gear teeth.

Apply a coating of machinist's layout dye or paste to several teeth of the driven gear.

Install ring gear.

Rotate the ring gear several turns in both directions. Remove drive pinion gear and ring gear, then inspect the coated teeth of the drive pinion gear. The teeth contact pattern should be as shown below.

Pattern 1	Contact at tooth top	Incorrect
Pattern 2	Contact at tooth middle	Correct
Pattern 3	Contact at tooth root	Incorrect

If gear tooth contact is found to be correct (pattern 2), continue the next step.

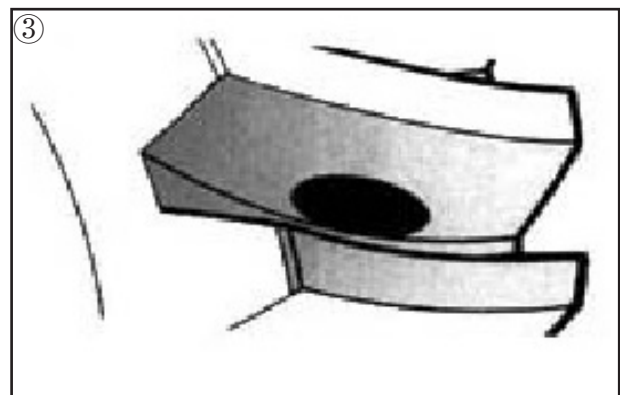
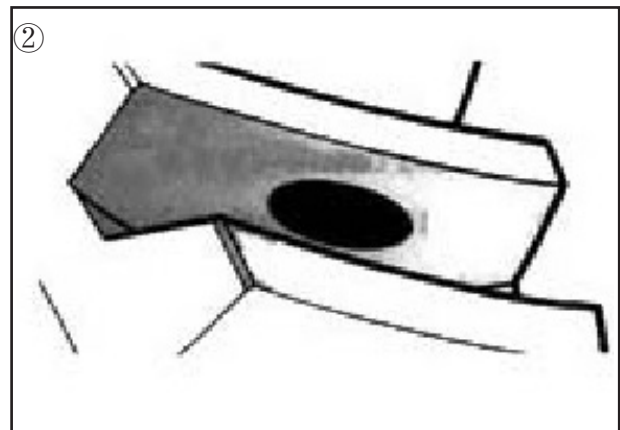
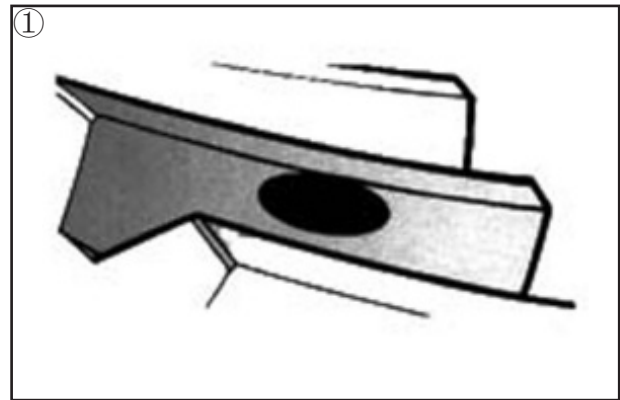
If gear tooth contact is found to be incorrect (pattern 1 and 3), the shim thickness between the drive pinion gear and ring gear must be changed and the tooth contact re-checked until correct.

NOTE: Clean the dye coated on the gear teeth after the tooth contact adjustment is finished.

Adjustment Steps

Tooth contact	Shim adjustment
Tooth contact pattern 1	Reduce shim thickness
Tooth contact pattern 3	Increase shim thickness

⚠ WARNING: Make sure to check the backlash after the tooth contact has been adjusted, since it may have changed. Adjust the tooth contact and backlash until they are both within specification. If the correct tooth contact cannot be maintained when adjusting the backlash, replace the drive gear and ring gear.



7.5.7 Rear Gear Case Installation

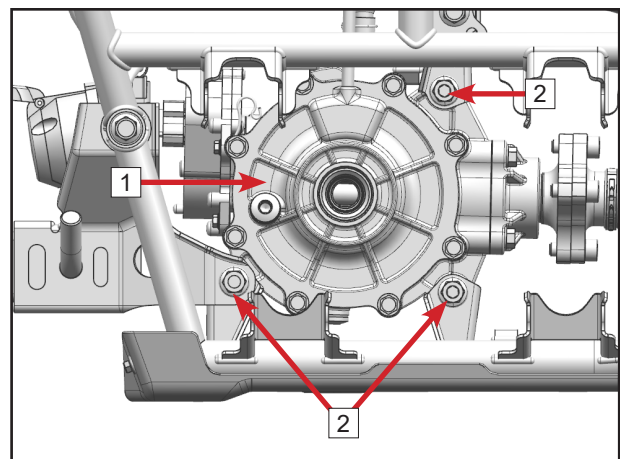
Install rear gear case **1**.

Install bolts **2**.

Bolt specification: GB5789 M10×1.25

Torque: 60N•m~70N•m

NOTE: There is a nut behind the bolt. Use a wrench to lock its position during installation.



7.6 Rear Gear Case(Non-differential)

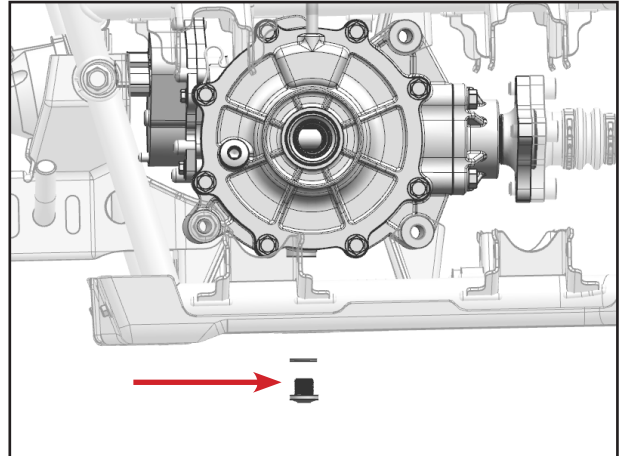
⚠ DANGER: Before inspection, make sure the operation is made on flat ground and the vehicle is jacked up. Do not put any limbs under the vehicle, in case of injury caused by sudden fall during inspection.

Pre-work

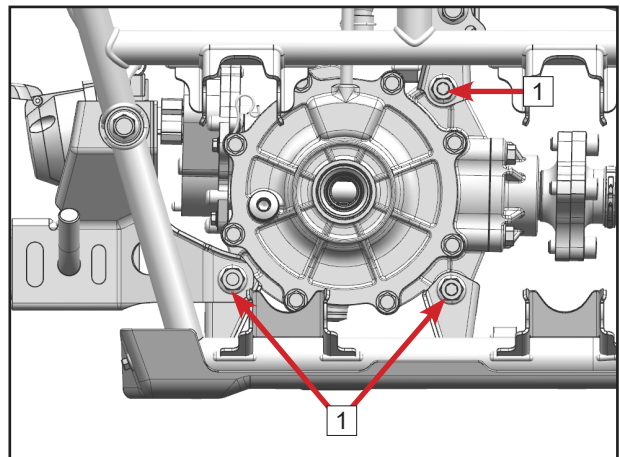
Remove tires.
Remove shock absorbers.
Remove steering knuckles.

7.6.1 Rear Gear Case Removal

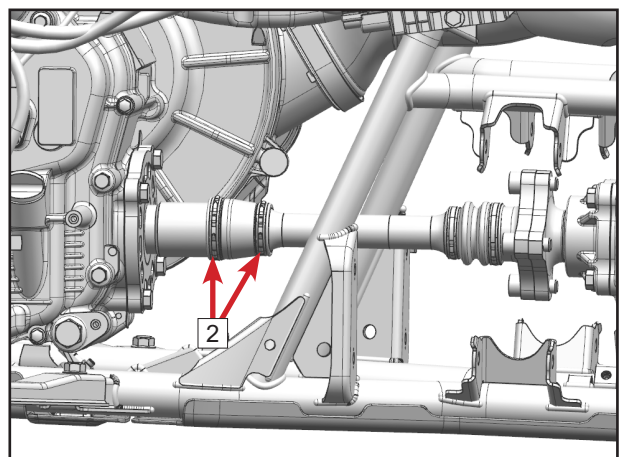
Place a container under front gear case.
Remove drain bolt **1** and washer.



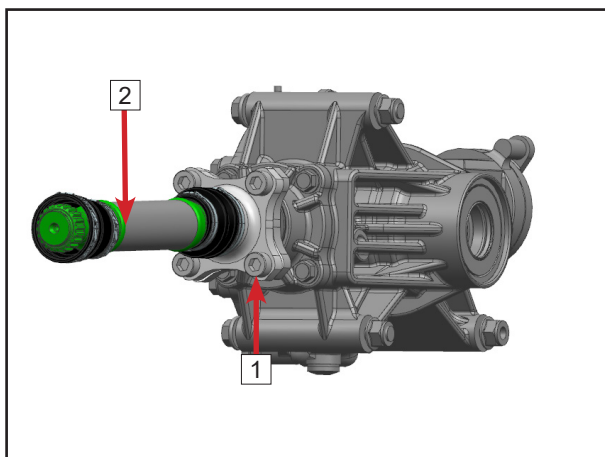
Remove three bolts **1**.



Loosen big clamp **2**.
Remove rear gear case and rear drive shaft assembly.

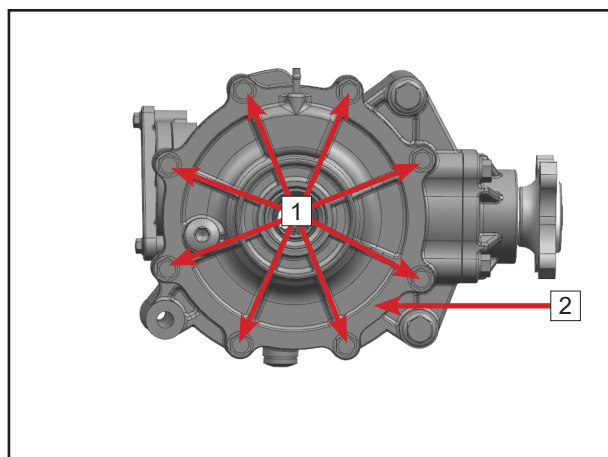


Remove four bolts [1].
Remove rear drive shaft [2].

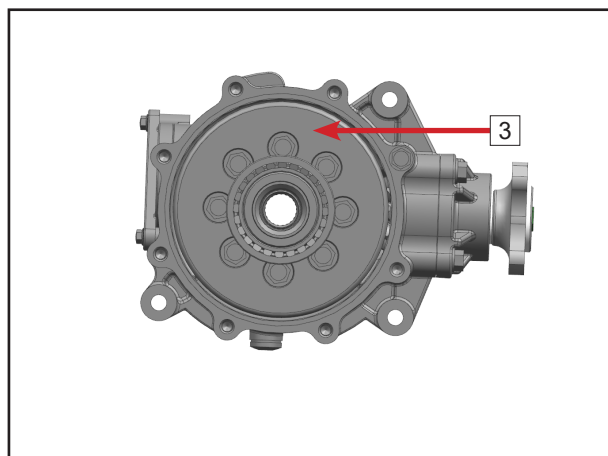


7.6.2 Rear Gear Case Disassembly

Remove bolts [1].
Remove rear gear case cover [2].



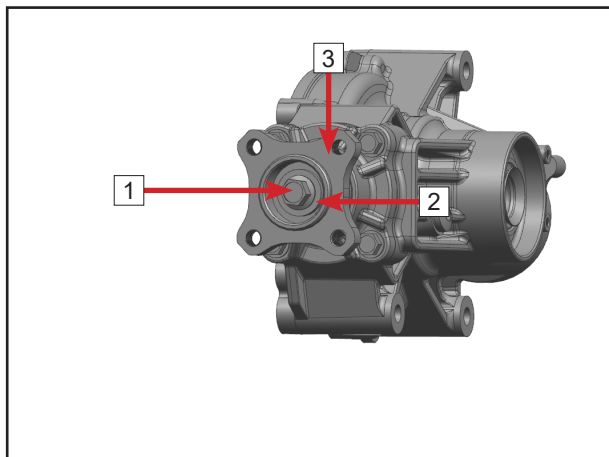
Remove differential assembly [3].



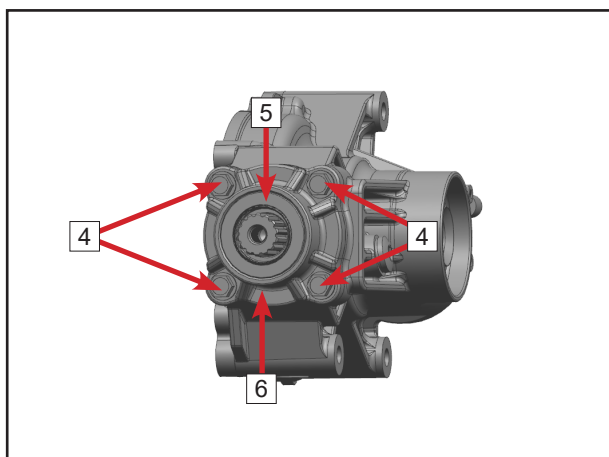
7.6.3 Rear Gear Case Input Shaft Assembly

Removal

- Remove bolt **1**.
- Remove washer **2**.
- Remove coupler **3**.

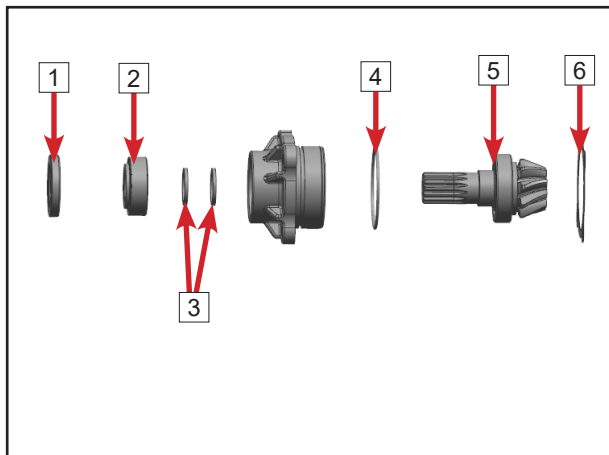


- Remove four bolts **4**.
- Remove oil seal **5**.
- Remove bearing seat **6**.**

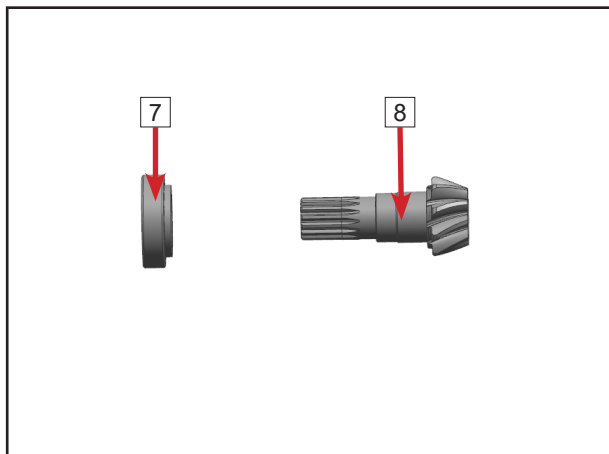


Disassembly

- Remove oil seal **1**.
- Remove washer **6**.
- Remove bearing **2**.
- Remove adjusting washers **3**.
- Remove input shaft **5**.
- Remove seal ring **4**.



- Remove bearing **7**.
- Remove drive bevel gear **8**.



7.6.4 Driven Bevel Gear Assembly

Remove bearing [1].

Remove eight bolts [2].

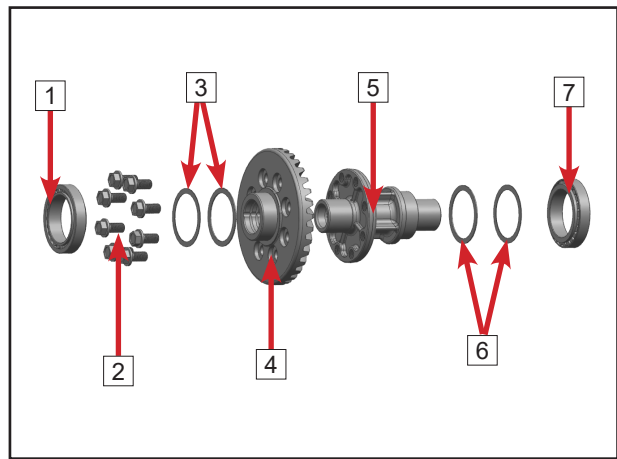
Remove washers [3].

Remove rear gear case driven bevel gear [4].

Remove bearing [7].

Remove washers [6].

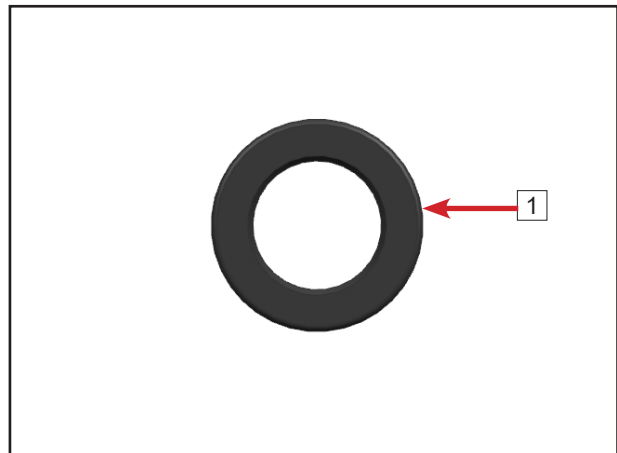
Remove mounting seat [5].



7.6.5 Rear Gear Case Inspection

Oil Seal Inspection

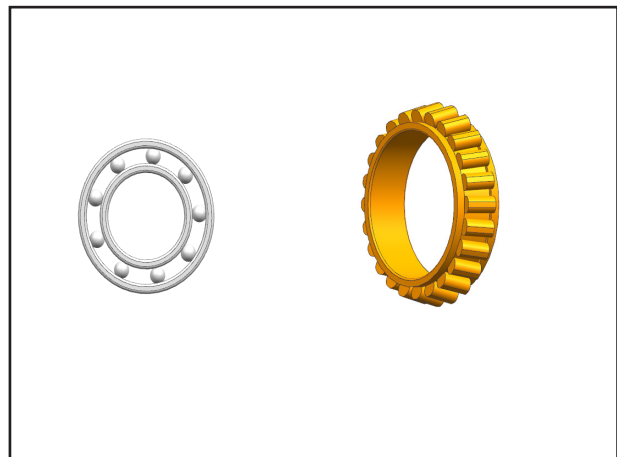
All oil seals [1] are removed and sorted as waste. Replace with new ones during installation.



Bearing Inspection

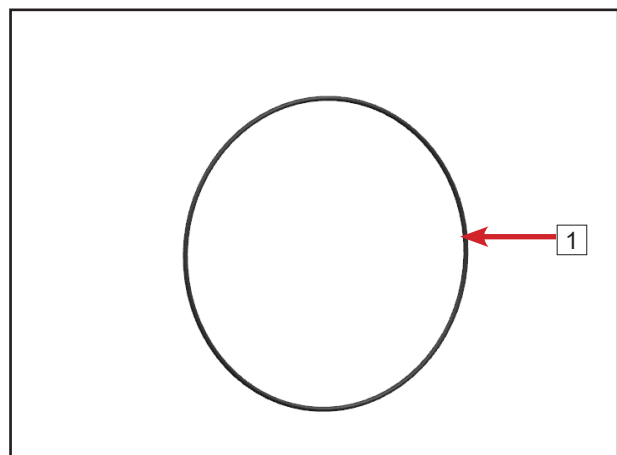
Inspect if every bearing clearance is appropriate, rotation is smooth, raceway, steel balls, needle roller and retainer are in good condition. Replace if any defect is found.

Use special tool to remove bearing during bearing replacement.



O-seal Ring Inspection

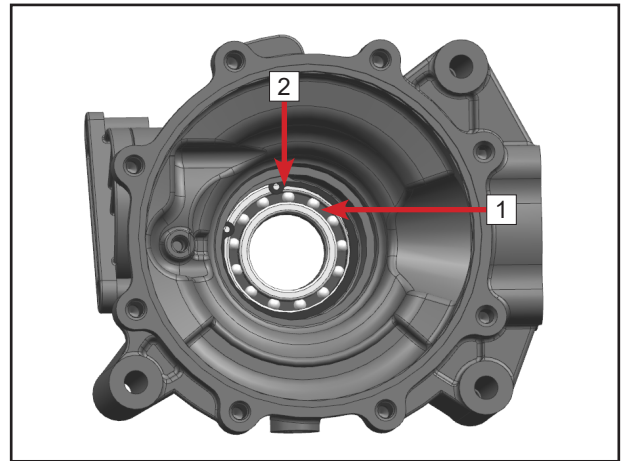
Inspect every o-seal ring [1] if deformed, broken or damaged. Replace with new parts if any defect is found.



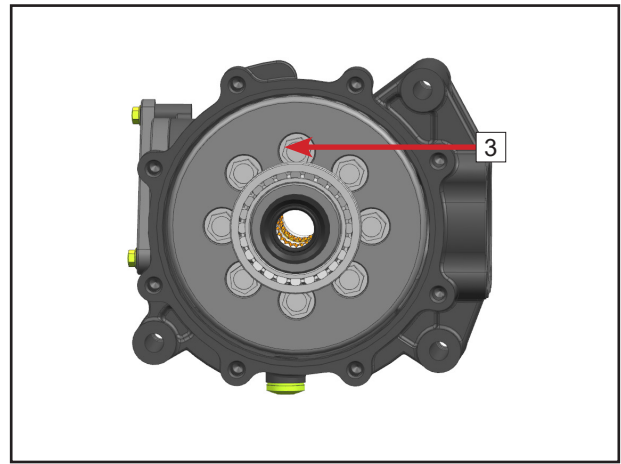
7.6.6 Rear Gear Case Assembly

Install bearing **1**.

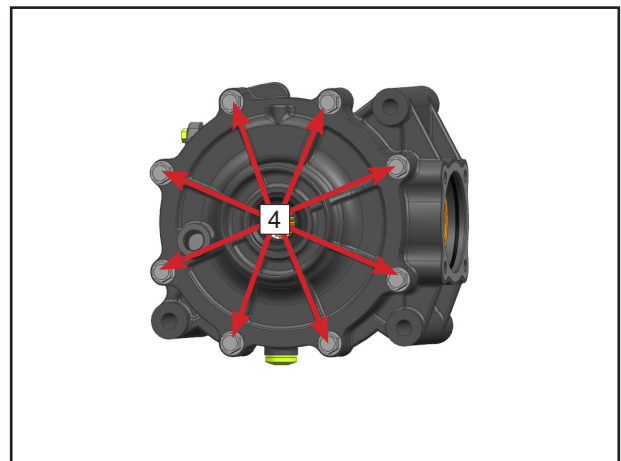
Install circlip **2**.



Install driven bevel gear assembly **3**.

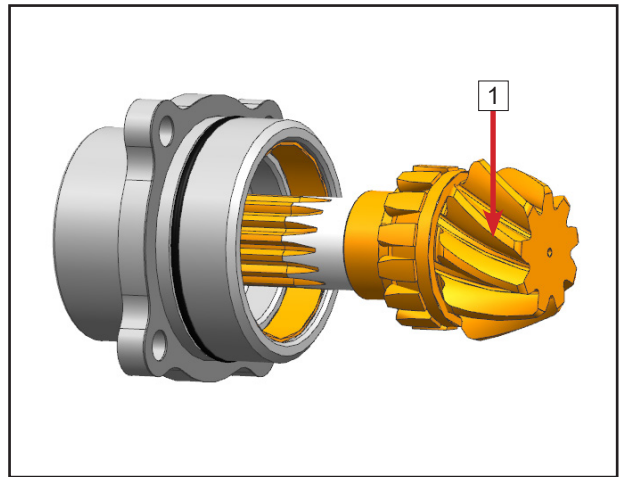


Install rear gear case cover **4**.



Rear Gear Case Drive Bevel Gear Installation

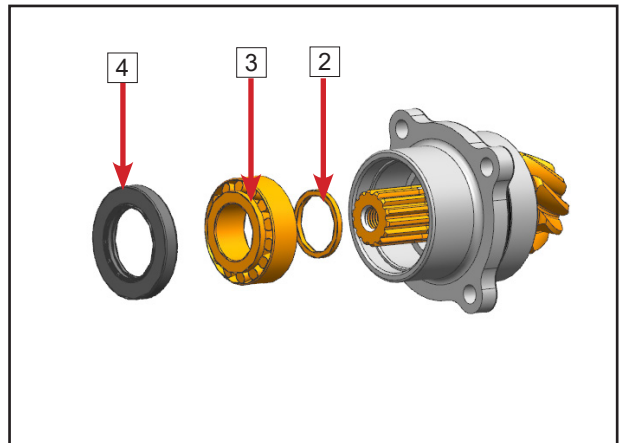
Install drive bevel gear **1**.



Install retainer **2**.

Install roller bearing **3**.

Install a new oil seal **4**.



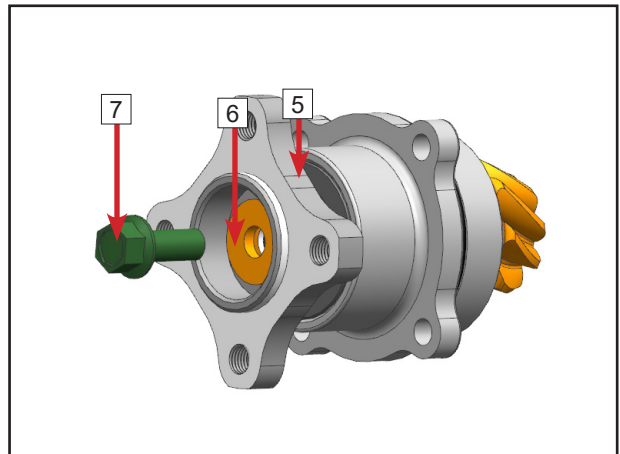
Install coupler **5**.

Put washer **6** on bolt **7**.

Install bolt **7**.

Bolt specification: M10×1.25×20

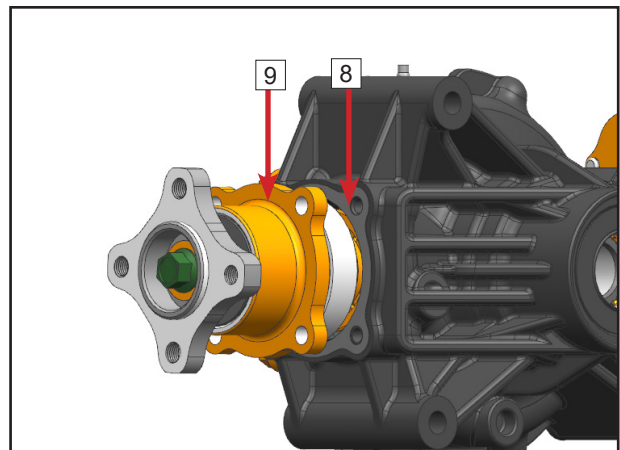
Torque: 75N·m



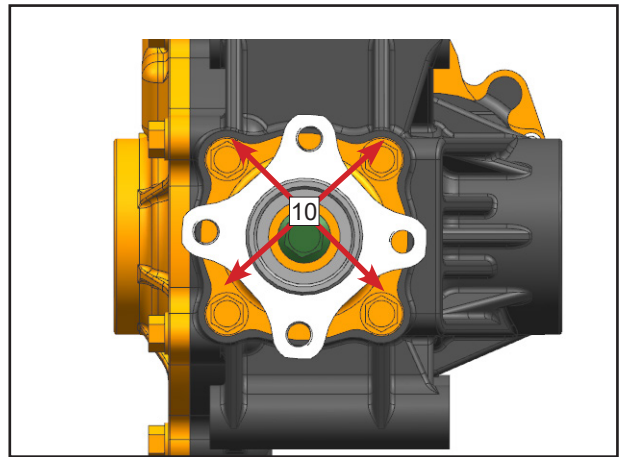
Install adjusting washer **8**.

Install drive bevel gear assembly **9**.

Adjusting washer thickness	0.2	0.3
----------------------------	-----	-----



Install bolts 10.



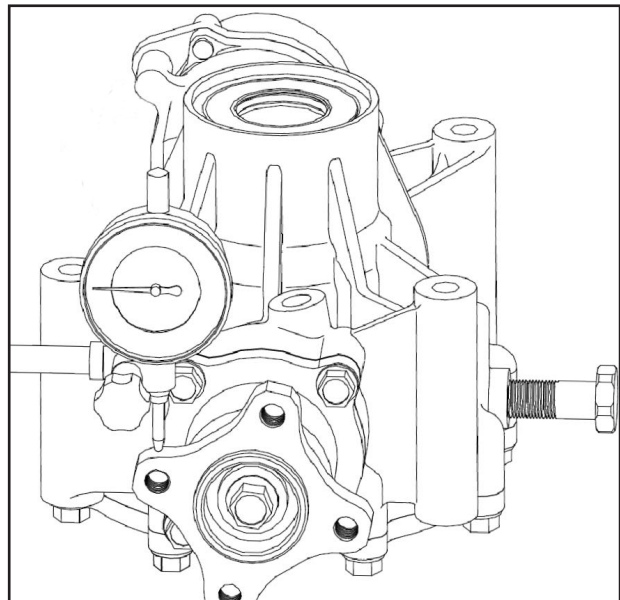
Rear Gear Case Bevel Gear Clearance Adjustment

Follow the drawing on the right to adjusting gear side clearance: Install auxiliary measuring tool and tighten the bolt (M14X1.25X60). Set the dial gauge. Make sure the gauge testing point is 21mm to the center. Turn the measuring tool to read the data.

Dial gauge data standard: 0.1~0.25

Adjusting washer thickness	0.1	0.3	0.5	0.9	0.92	0.94	0.96	0.98	1.00
----------------------------	-----	-----	-----	-----	------	------	------	------	------

NOTE: Measure until the adjustment is done. If the data is beyond the standard, repeat above procedures to make adjustments.



Tooth Contact

After backlash adjustment is carried out, the tooth contact must be checked. Pay attention to the following procedures:

Remove ring gear from crankcase.

Clean and degrease drive pinion gear and ring gear teeth.

Apply a coating of machinist's layout dye or paste to several teeth of the driven gear.

Install ring gear.

Rotate the ring gear several turns in both directions. Remove drive pinion gear and ring gear, then inspect the coated teeth of the drive pinion gear. The teeth contact pattern should be as shown below.

Pattern 1	Contact at tooth top	Incorrect
Pattern 2	Contact at tooth middle	Correct
Pattern 3	Contact at tooth root	Incorrect

If gear tooth contact is found to be correct (pattern 2), continue the next step.

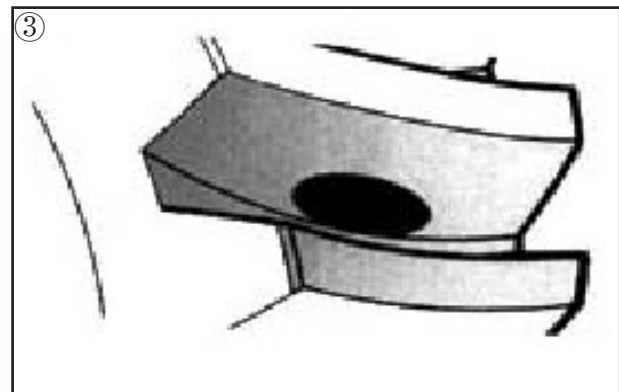
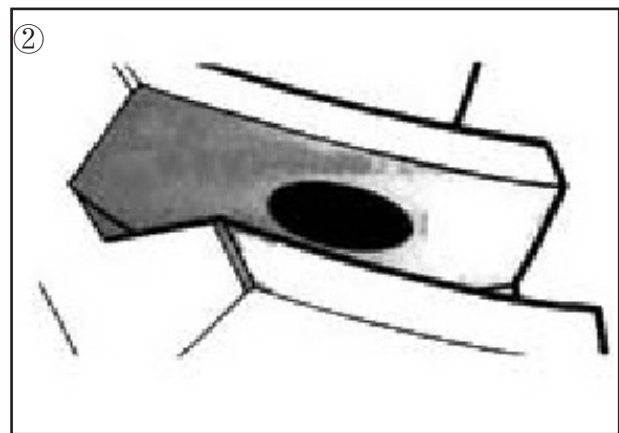
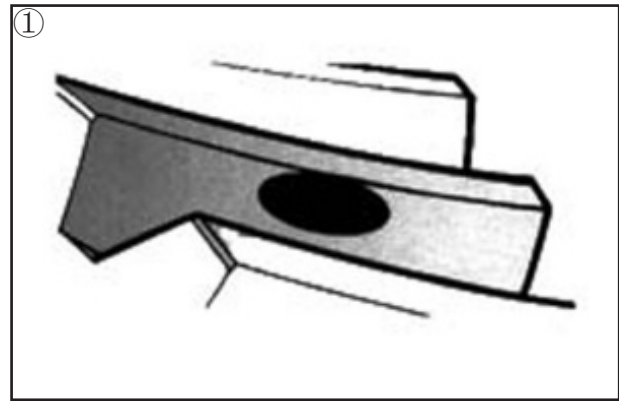
If gear tooth contact is found to be incorrect (pattern 1 and 3), the shim thickness between the drive pinion gear and ring gear must be changed and the tooth contact re-checked until correct.

NOTE: Clean the dye coated on the gear teeth after the tooth contact adjustment is finished.

Adjustment Steps

Tooth contact	Shim adjustment
Tooth contact pattern 1	Reduce shim thickness
Tooth contact pattern 3	Increase shim thickness

⚠ WARNING: Make sure to check the backlash after the tooth contact has been adjusted, since it may have changed. Adjust the tooth contact and backlash until they are both within specification. If the correct tooth contact cannot be maintained when adjusting the backlash, replace the drive gear and ring gear.

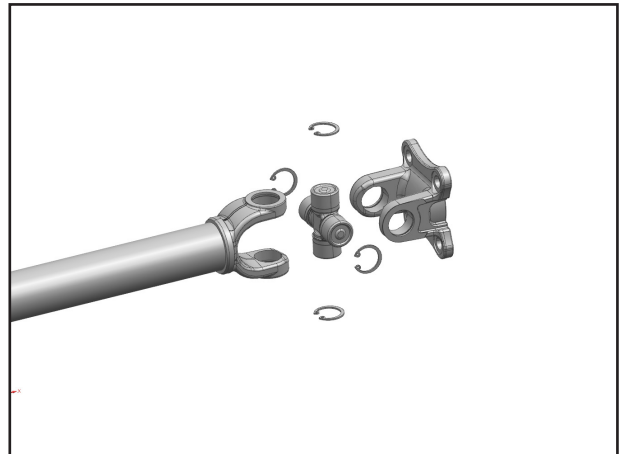


7.7 Drive Shaft

Front Drive Shaft Inspection

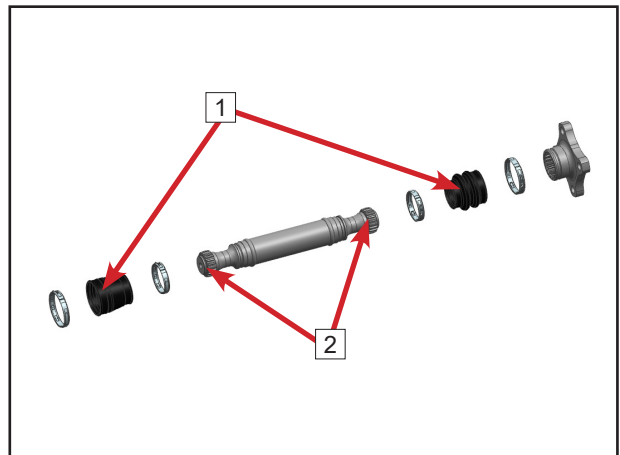
NOTE: If any defect is found, like the clearance is too large, universal shaft is severely worn or blocked, disassemble and replace the defective parts. If not, it is not necessary to disassemble.

1. Inspect front drive shaft universal shafts on both sides. Replace if necessary.
2. Inspect front drive shaft middle spline. Replace if necessary.



Rear Drive Shaft Inspection

1. Inspect rear drive shaft dust boots [1] on both sides. Replace if necessary.
2. Inspect shaft spline [2] for abnormal wear or damage. Replace if any defect is found.



8.1 Brake Assembly	08-2
8.1.1 Brake Removal	08-2
8.1.2 Brake Inspection	08-4
8.2 Brake Fluid	08-5
8.3 Parking Brake	08-7
8.3.1 Mechanical Parking Brake.....	08-7
8.3.2 Hydraulic Parking Brake.....	08-9

8.1 Brake Assembly

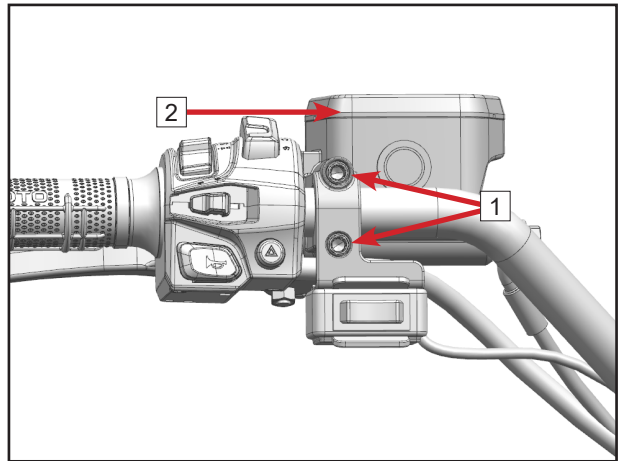
Pre-work

Remove tires.

8.1.1 Brake Removal

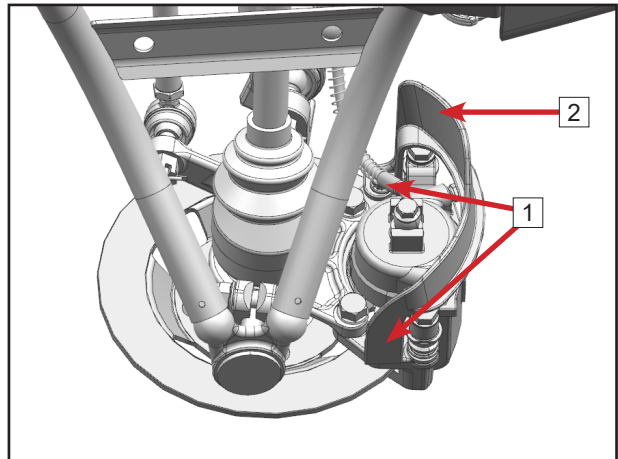
Remove bolts **1**.

Remove LH front brake lever **2**.



Remove bolts **1**.

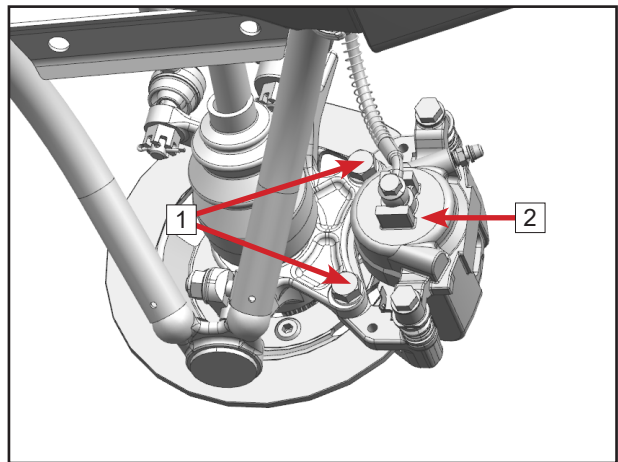
Remove caliper guard **2**.



Remove bolts.

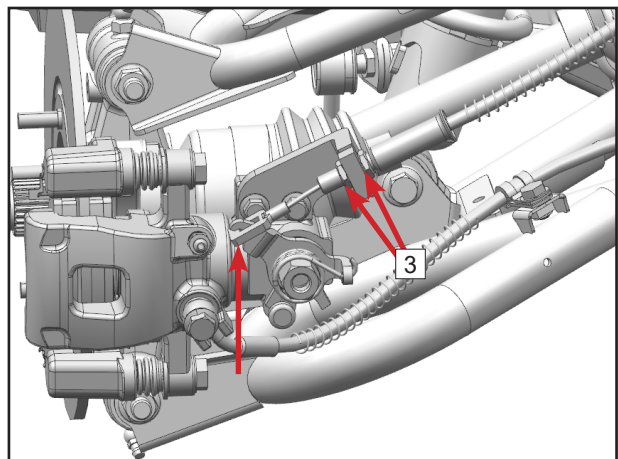
Remove front LH brake caliper **2**.

Front RH brake caliper follows same removal procedures.



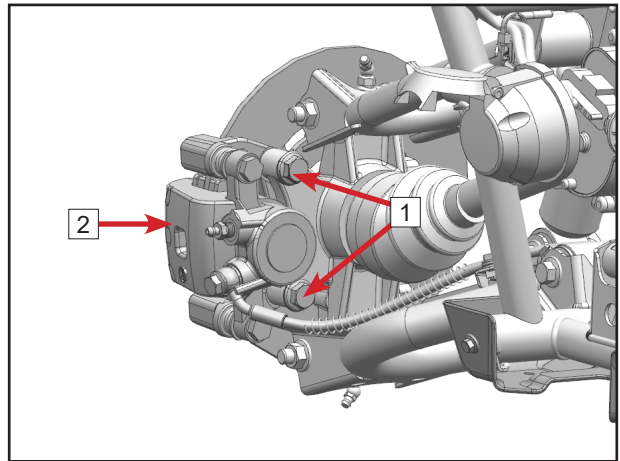
Loosen nut **1**.

Remove brake caliper joint **2**.

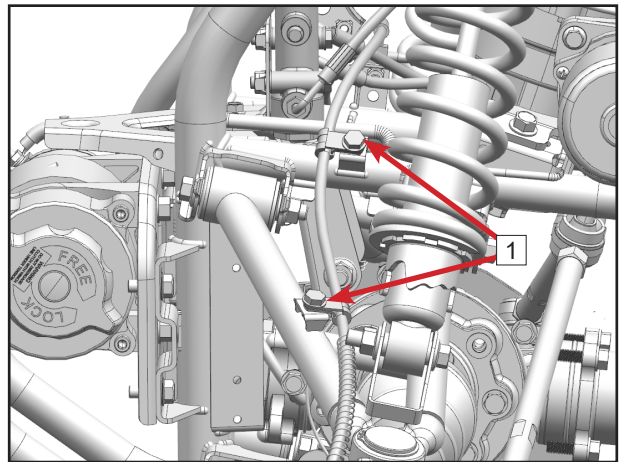


08 Brake System

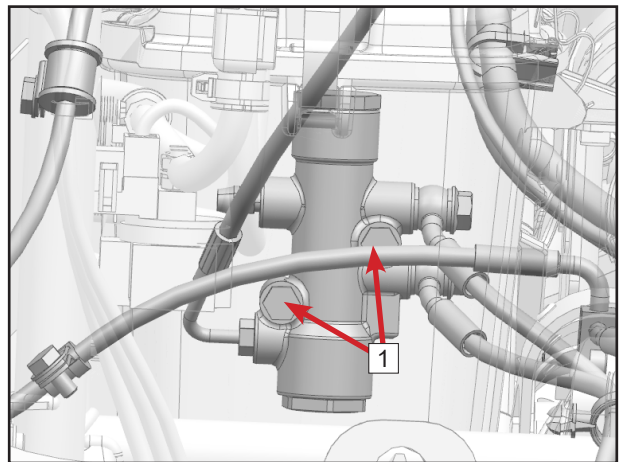
Remove two bolts **1**.
Remove rear LH brake caliper **2**.
Rear RH brake caliper follows same removal procedures.



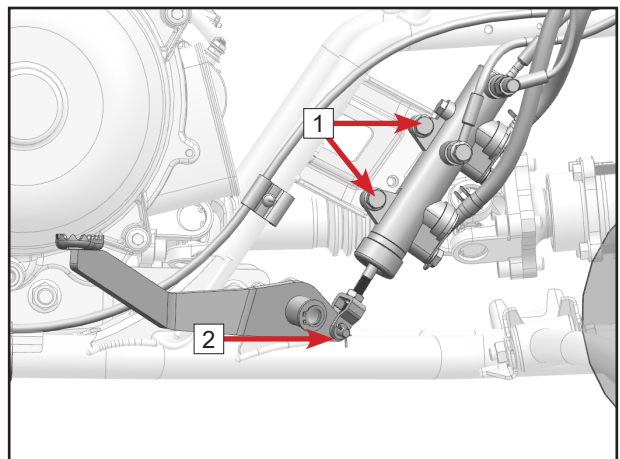
Remove bolts **1**.



Remove bolts **1**.



Remove bolts **1**.
Remove pin shaft **2**.



8.1.2 Brake Inspection

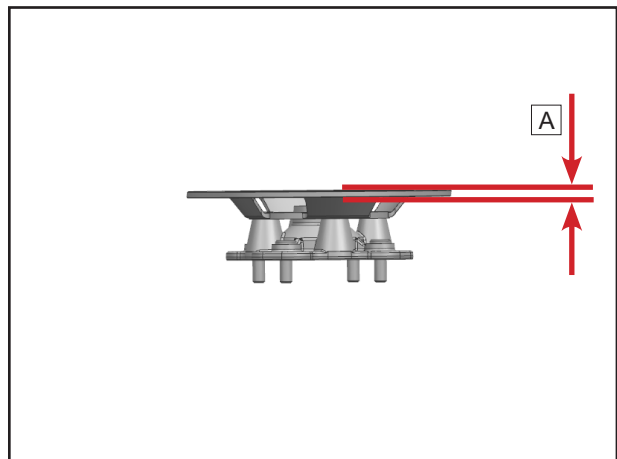
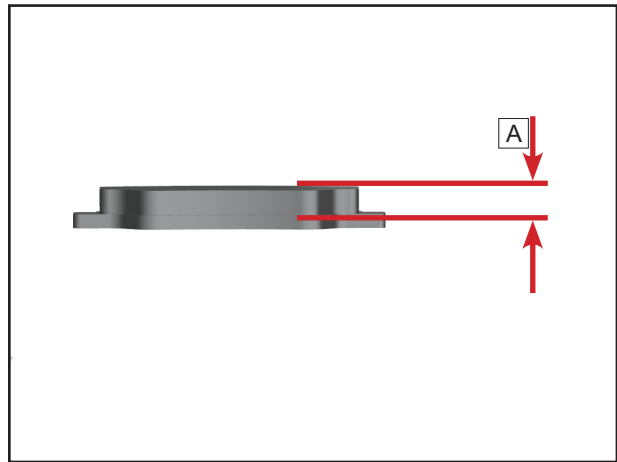
Inspect the brake friction pad thickness.
Brake pad minimum thickness $A \geq 2$ mm.
Replace if less than minimum thickness.
Inspect brake pad for damage or cracks.
Replace if any defect is found.

⚠ WARNING: Brake pad damage will reduce braking effect, which can cause accidents. If the brake pad is too thin, steel bracket will rub the brake disc, which will severely reduce the braking effect and damage the brake disc. Inspect brake pad periodically.

NOTE: Replace brake pads in pair.

Inspect brake caliper for damage or crack.
Replace if any defect is found.

Inspect brake disc sliding surface for wear or damage. Replace if necessary.
Replace brake disc if the thickness A is less than 4.0 mm.



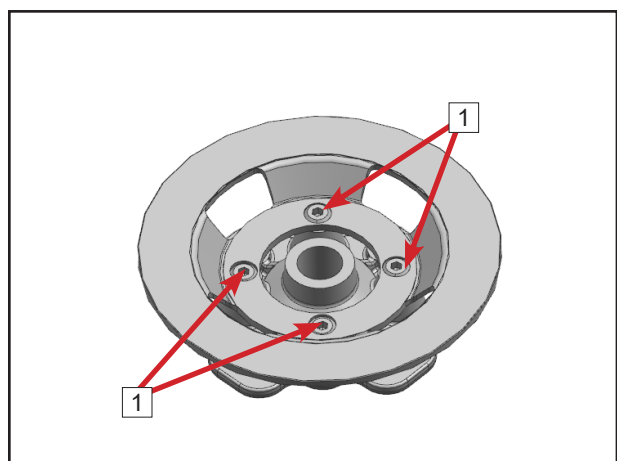
Replacement

Remove four M8 front brake disc inner hex bolts 4 .

Replace brake disc.

Install M8 front brake disc inner hex bolts.

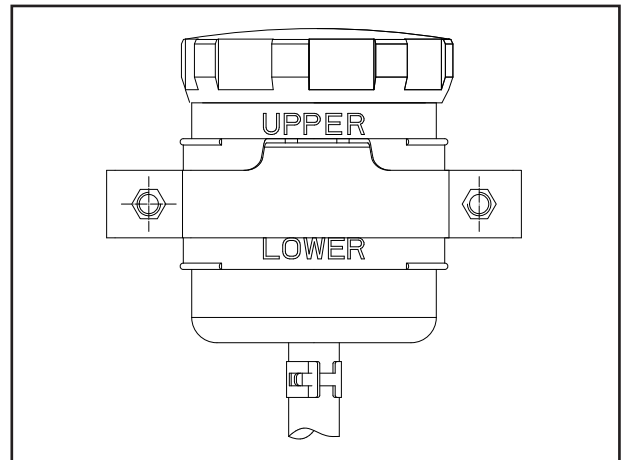
Front brake disc bolt tighten torque: 25N·m~30N·m



8.2 Brake Fluid Removal

⚠ CAUTION: Brake fluid has strong water absorption feature. If water enters into brake fluid, it will cause the boiling point depression and brake failure. Thus, the brake fluid storage should be sealed and away from the humid environment.
The brake fluid can not be used if polluted.

NOTE: Brake fluid will reduce the braking effect after using for a long time. Replace the brake fluid according to maintenance schedule.



Inspect brake effect after operation to make sure the brake function works and brake pedal free play is qualified.
Repeat above procedures if the brake effect is bad.

Installation

Reverse the removal procedures for installation.

Inspection

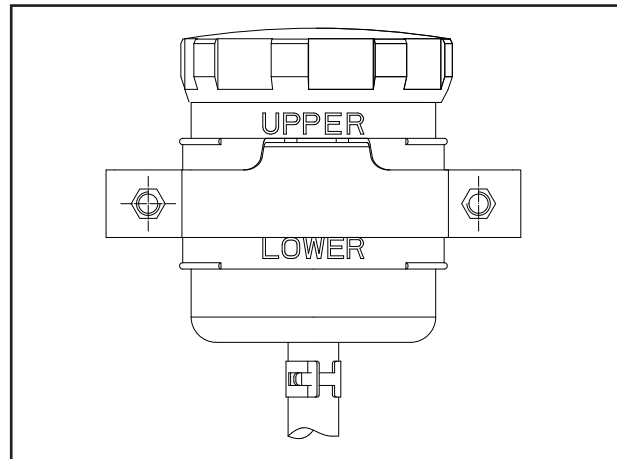
Brake fluid level should be between upper line and lower line.

Add brake fluid if the level is below or near the lower line.

Reduce brake fluid if the level is above or near the upper line.

NOTE:

1. Do not mix dirt and water with brake fluid when adding.
2. Use CFMOTO recommended brake fluid in case of chemical changes.
3. Contact with brake fluid may irritate the skin.
4. Do not let the brake fluid contact with the painted parts, because the brake fluid will corrode the paint.
5. Flash with water if brake fluid spills.
6. Do not open the brake fluid reservoir cap for a long time.



Please use CFMOTO recommended brake fluid for replacement.

Brake fluid type: DOT4

If equipped with exhaust device, follow the user manual to operate.

If not, exhaust brake system according to the following procedures:

Remove anti-dust cap:

Connect a hose with brake caliper bleed screw with the other side into a clean container. Make sure the hose is fastened on exhaust port **1**.

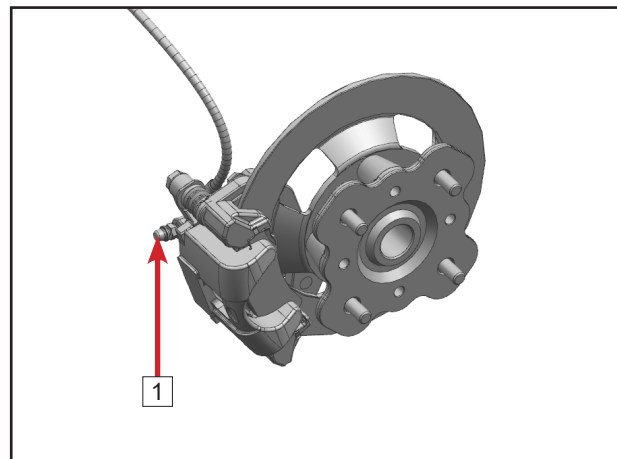
Ask assistant to repeatedly press brake pedal/pinch brake and handle.

Finally slowly press brake pedal/pinch brake handle and maintain.

Loosen bleed screw, tighten it immediately and make brake pedal return.

NOTE: Make sure the fluid level is more than a half and under upper line in brake fluid reservoir during exhausting.

NOTE: Do not release brake pedal before tightening bleed screw. Otherwise, there will be air inside master cylinder.



Tighten the bleed screw and keep the fluid level according to requirement after system deflation or fluid replacement.

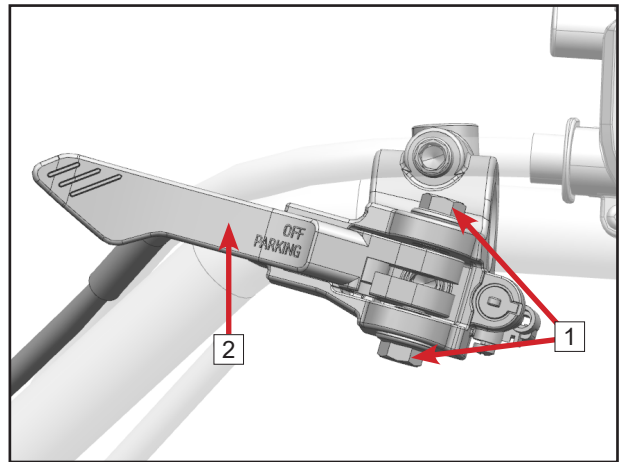
8.3 Parking Brake

8.3.1 Mechanical Parking Brake

Removal

Remove bolts **1**.

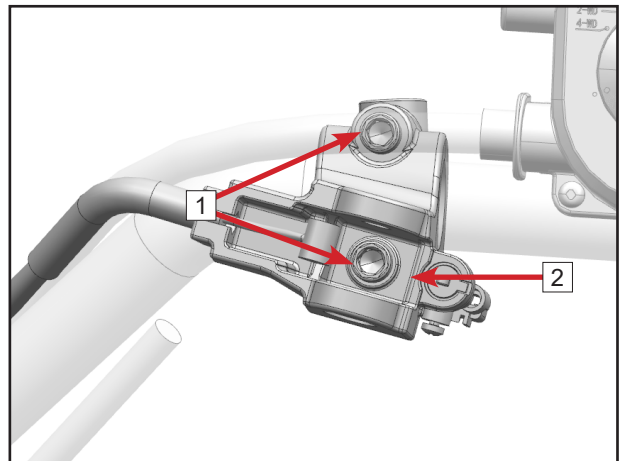
Remove Lh front brake lever **2**.



Remove bolts **1**.

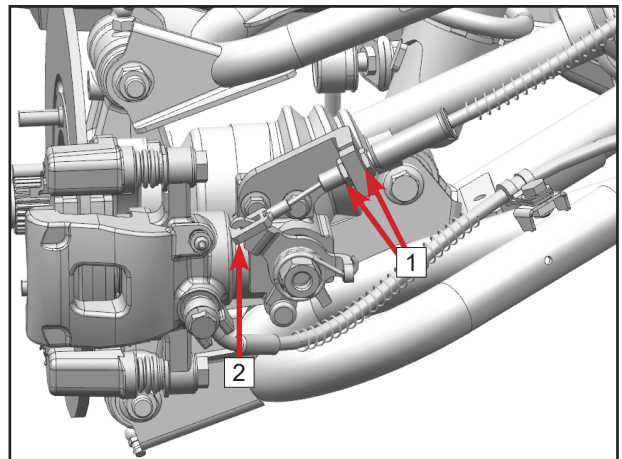
Loosen mechanical parking brake handle **2**.

2.



Loosen nuts **1**.

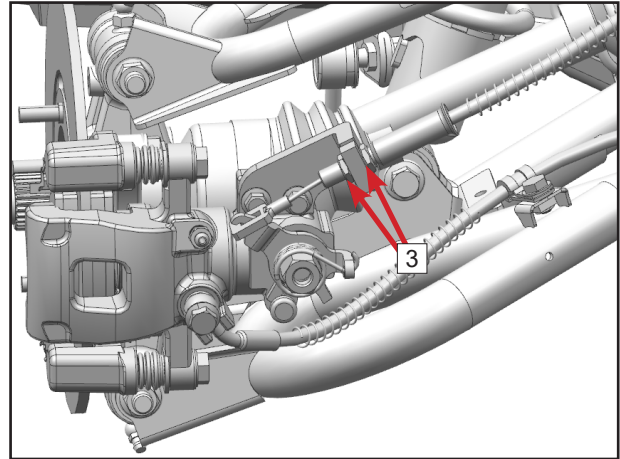
Remove parking cable joint **2**.



Inspection

Parking Brake Performance

Vehicle is parked on 12° slope when fully loaded. If vehicle slides, tighten brake cable and adjust it to an appropriate position. At this time, place vehicle on a level road and release handbrake, it should be able to be pushed with no load. If vehicle is dragging, loosen hand brake and repeat above steps to adjust until it is properly set.



Parking Brake Cable Adjustment

After working for a long time, parking brake cable is stretched, which needs to be adjusted.

Loosen two nuts 1 and adjust cable to an appropriate position.

Tighen two nuts 1.

Installation

Reverse the removal procedures for installation.

8.3.2 Hydraulic Parking Brake

Removal

Remove washer **1**.

Remove hydraulic parking brake lever rack **2**.

Remove bolt **3**.

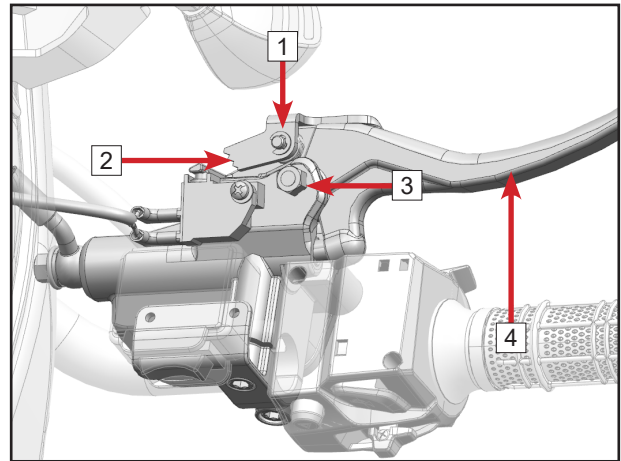
Remove hydraulic parking brake lever **4**.

Inspection

Inspect hydraulic parking brake lever and rack for cracks or damage. Replace if any defect is found. Otherwise, it will cause parking failure.

Installation

Reverse the removal procedures for installation.



9.1 Tire	09-2
9.1.1 Wheel Toe-in	09-4
9.2 Shock Absorbers	09-5
9.2.1 Front Shock Absorber	09-5
9.2.2 Rear Shock Absorber	09-6
9.3 Front Suspension	09-7
9.4 Rear Suspension	09-9
9.4.1 Sway Bar	09-10

9.1 Tire

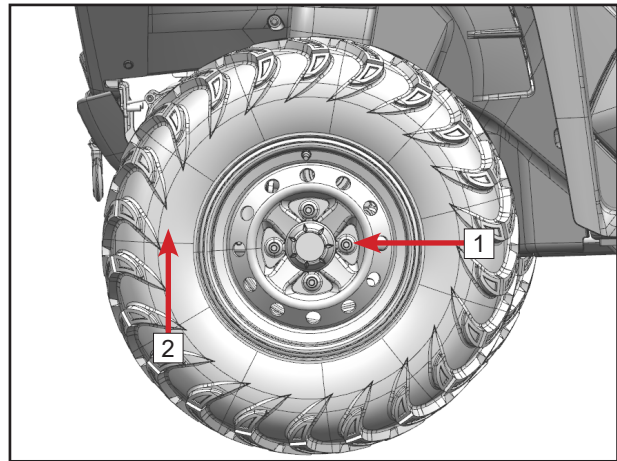
Removal

Remove four RIM nuts **1**.

Remove tire **2**.

Inspection

⚠ Danger: Please operate on a level ground and make sure the vehicle is fixed firmly. Do not stay under the tires in case vehicle falls during maintenance and causes accidents.



Put tire into water if there is air leaking. If yes, it means that tire leaks and replace with new tire in time.

Inspect front and rear tires for cuts inserted foreign objects or other damage. Replace with new tires if any defect is found.

If stones or other foreign objects are in the tread pattern, use tools to remove them.

⚠ DANGER: Tire burst will cause vehicle run out of control, which finally causes accidents. In order to ensure safety, please replace the damaged or worn tires immediately.

⚠ WARNING: Using tires and rims that are not approved or recommended by CFMOTO will affect the performance and safety of the vehicle. Please use CFMOTO approved or recommended tires and rims.

⚠ WARNING: New tires have poor grip will cause accidents. Please do break-in according to the prescribed mileage. The new tire tread is coated with release glue, so it does not have the ability to completely grip. The first 200km must be modeled in a moderate manner at different angles, so that the entire tread is rubbed against the ground.

⚠ DANGER: Tire pattern used on front and rear wheels should be consistent. If tire is aged and cracked, replace with new tire immediately.

Tire status 1

25x8.0-12

25x10.0-12

Tire status 2

24x8-12

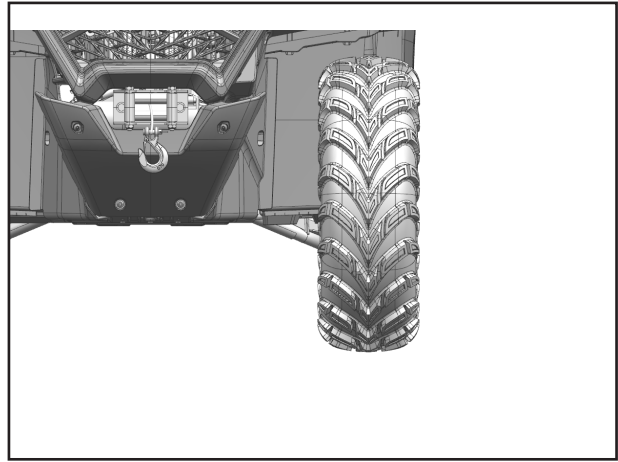
24x10-12

Maintenance Standard:

Item		Standard Value	Service Limit
Front wheel	Rim jump	Longitude	/
		Transverse	/
	Front tire	Remaining groove	/
		Pressure(US)	Factory recommended: 45kPa(0.46kgf/cm ²) 6.5PSI
			0.5mm
			0.5mm
			3.0mm

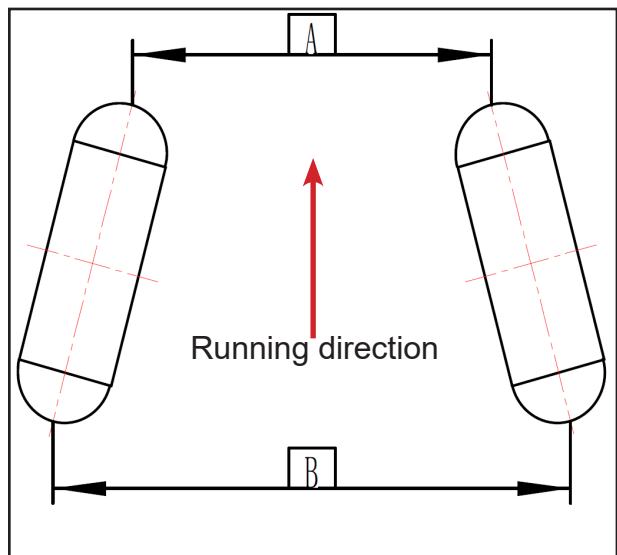
Item		Standard Value	Service Limit
Rear wheel	Rim jump	Longitude	/
		Transverse	/
	Rear tire	Remaining groove	/
		Pressure(US)	Factory recommended: 45kPa(0.46kgf/cm ²) 6.5PSI
			0.5mm
			0.5mm
			3.0mm

Position the vehicle on a level ground.
Elevate the appropriate side of the vehicle by placing a suitable stand or other tools under the footrest frame. Shake the wheel to check for free play or looseness. If any free play or looseness is found, inspect A-arms, axle, rim bolts and nuts and tighten them if necessary. If free play or looseness still remains, inspect bearing, A-arm bushings and ball joint pin and replace if needed.



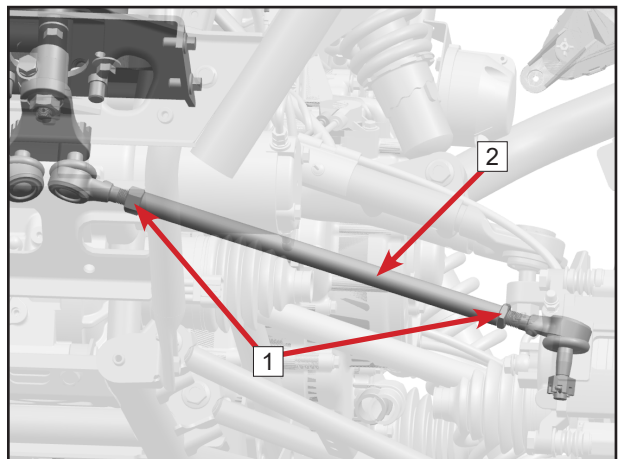
9.1.1 Wheel Toe-in

Position the vehicle on a level ground to measure the front wheel toe-in.
Comparing to vehicle running direction, the front is A, back is B.
Toe-in: $B \sim A = 5\text{mm} \sim 10\text{mm}$



If the measurement is out of specification, adjust the lock nut **2** of steering rod **1**.

Drive the vehicle slowly after the adjustment is completed. Ensure that steering wheel works properly.



9.2 Shock Absorbers

Pre-work

Remove tires.

9.2.1 Front Shock Absorber

Removal

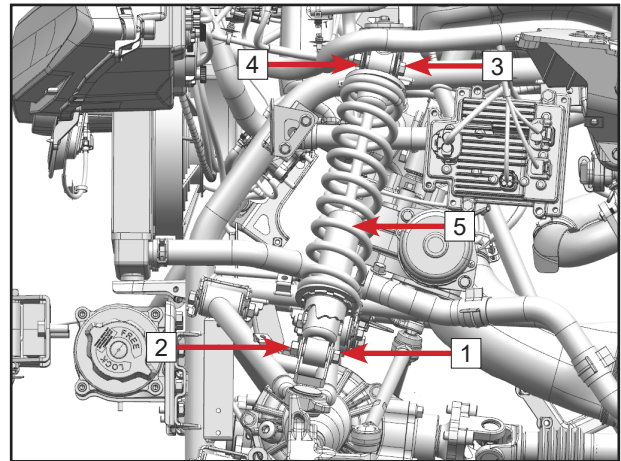
Remove nut **1**.

Remove bolt **2**.

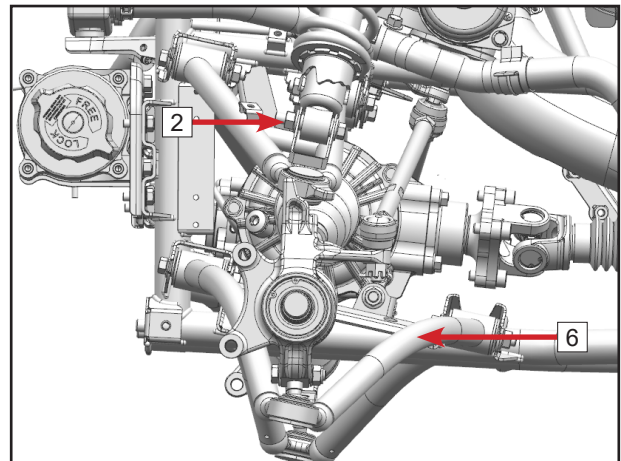
Remove nut **3**.

Remove bolt **4**.

Remove shock absorber **5**.



⚠ WARNING: Hold swing arm assembly **6** when removing bolt **2** to prevent it from falling down to cause injury or absorber damage.



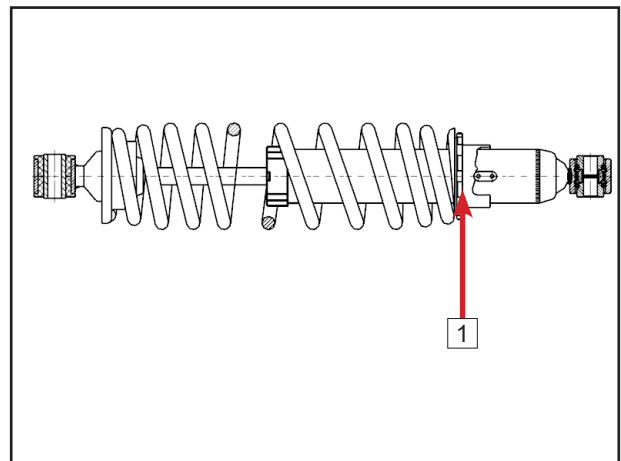
Inspection

Inspect shock absorber appearance for cracks or damage. Replace if any defect is found.

Clean dirt on shock absorbers.

Shock Absorber Adjustment

Use absorber wrench to rotate adjusting ring **1** on shock absorber.



Adjust shock absorber according to load.

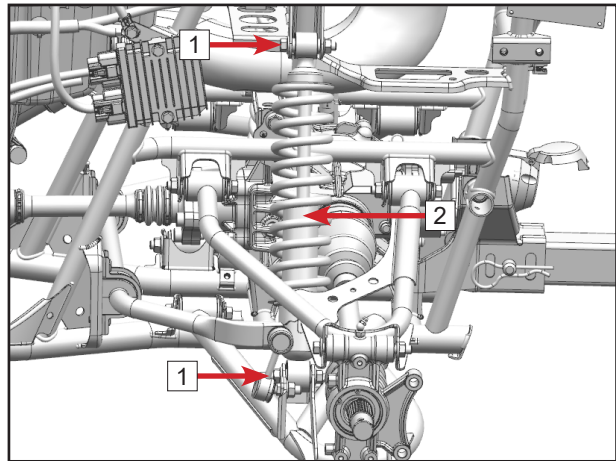
Counterclockwise: to make harder

Clockwise: to make softer

NOTE: Ensured left shock absorber and right shock absorber are symmetrical after adjustment.

9.2.2 Rear Shock Absorber Removal

Remove bolts and nuts **1**.
Remove rear shock absorber **2**.



Inspection

Inspect shock absorber appearance for cracks or damage. Replace if any defect is found.

Clean dirt on shock absorbers.

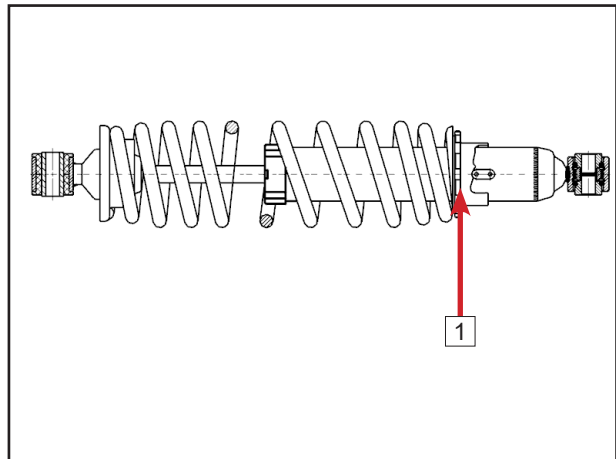
Shock Absorber Adjustment

Use absorber wrench to rotate adjusting ring **1** on shock absorber.

Adjust shock absorber according to load.

Counterclockwise: to make harder

Clockwise: to make softer



NOTE: Ensured left shock absorber and right shock absorber are symmetrical after adjustment.

9.3 Front Suspension

Pre-work

Remove tires.

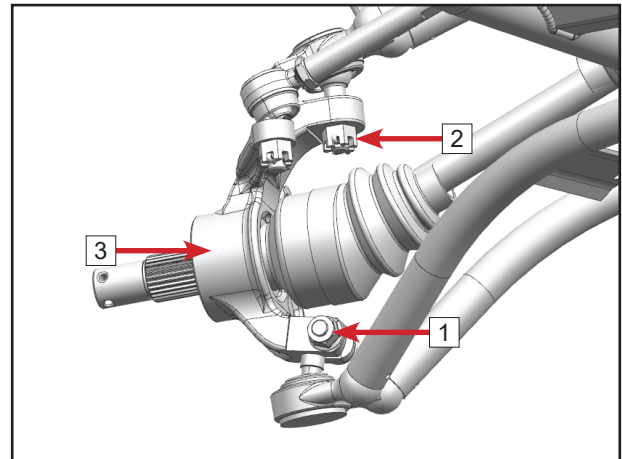
Remove brake calipers.

Removal

Remove bolt and nut [1].

Remove two cotter pins and slotted nuts [2].

Remove steering knuckle [3].

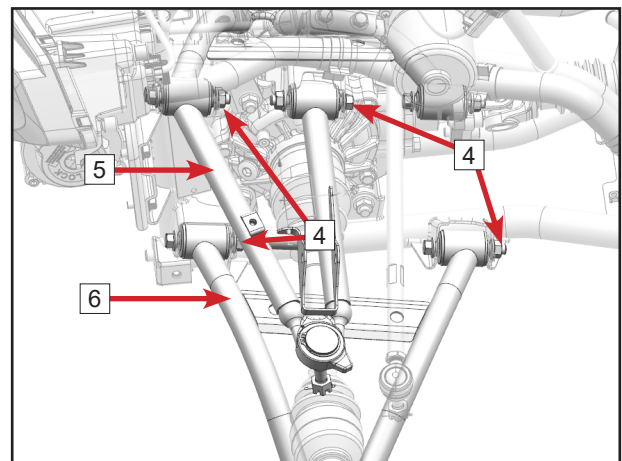


Remove bolts and nuts [4].

Remove upper swing arm [5].

Remove lower swing arm [6].

Swing arms on other side follow same removal procedures.



Inspection

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

Inspect swing arm for smooth movement.

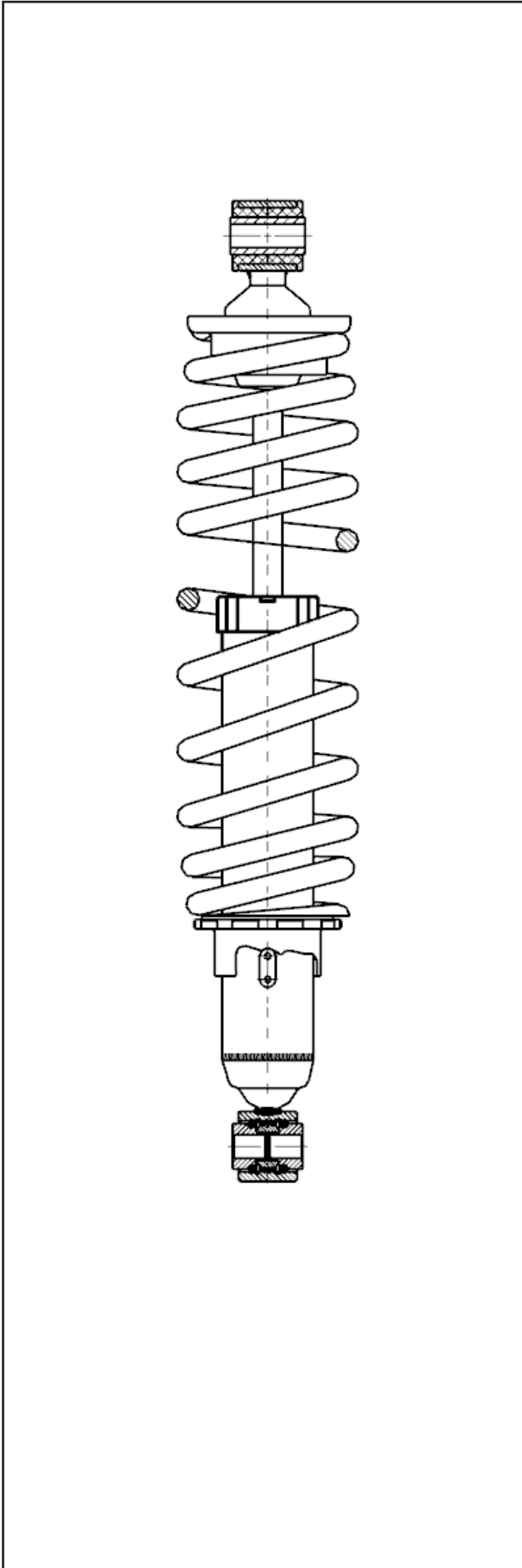
Add grease to oil nozzle if stuck or blocked (refer to Maintenance Schedule).

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

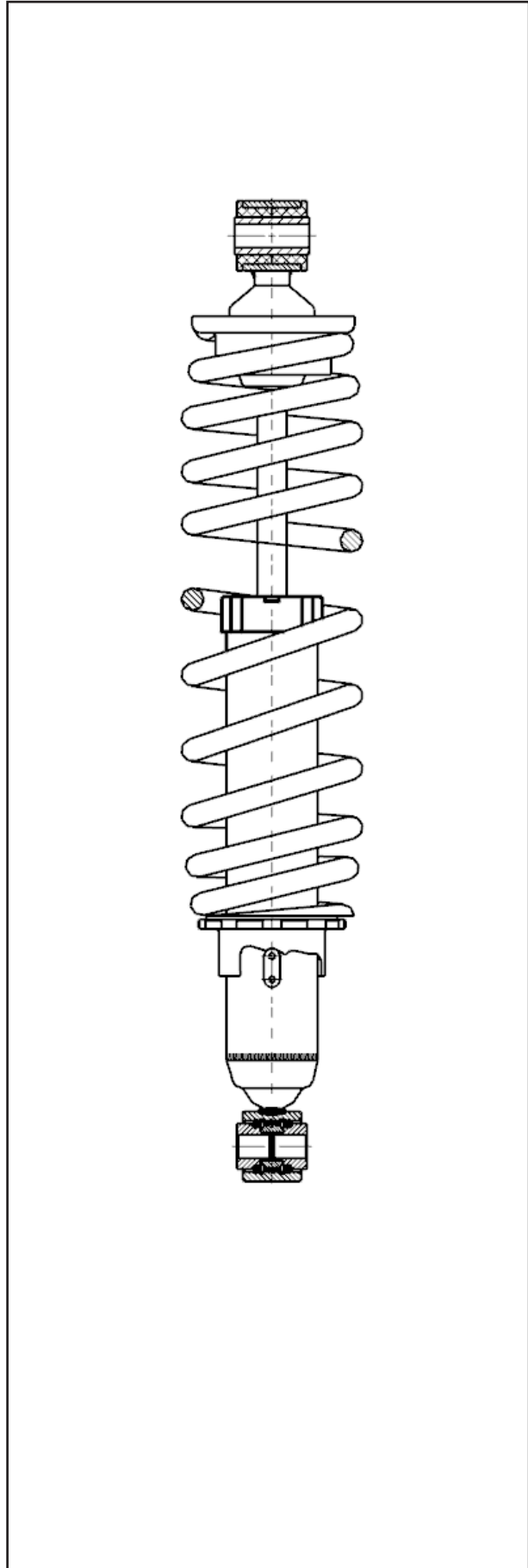
Installation

Reverse the removal procedures for installation.

Front Shock Absorber



Front Shock Absorber



9.4 Rear Suspension

Pre-work

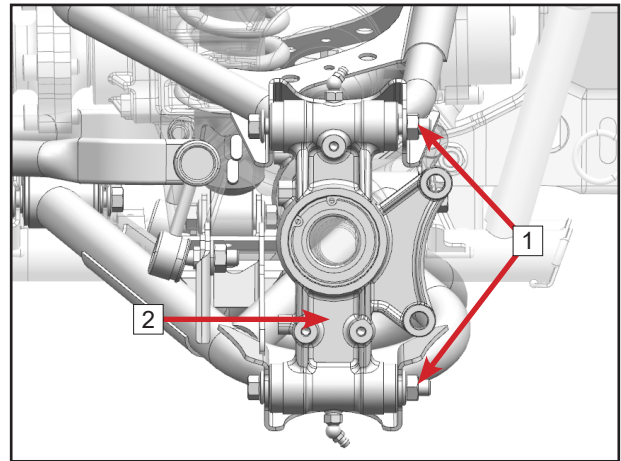
Remove tires.

Remove brake calipers.

Removal

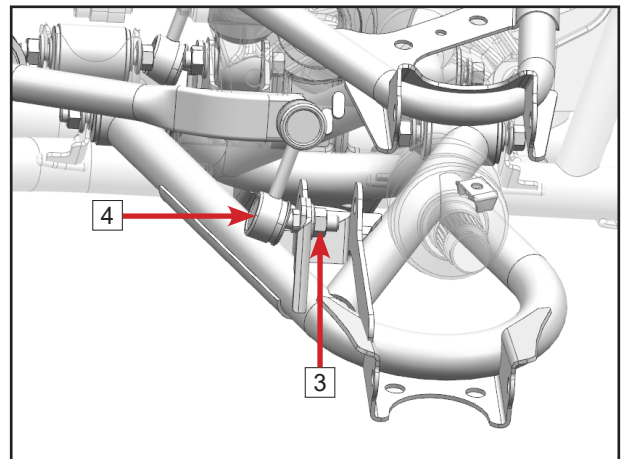
Remove bolt and nut **1**.

Remove steering knuckle **2**.



Remove nut **3**.

Loosen sway bar ball pin **4**.

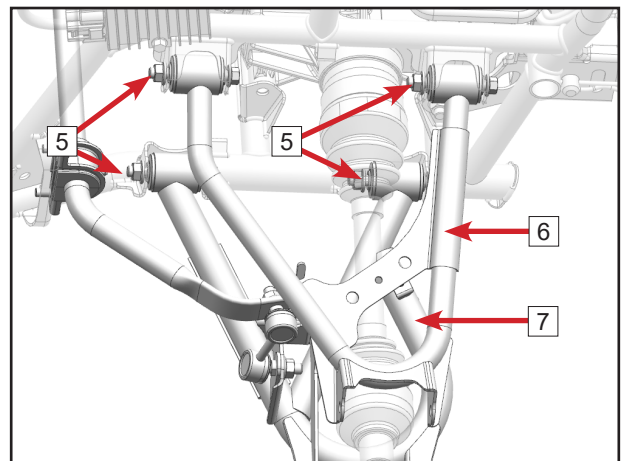


Remove bolts and nuts **5**.

Remove upper swing arm **6**.

Remove lower swing arm **7**.

Swing arms on other side follow same removal procedures.



Inspection

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

Inspect swing arm for smooth movement.

Add grease to oil nozzle if stuck or blocked (refer to Maintenance Schedule).

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

Installation

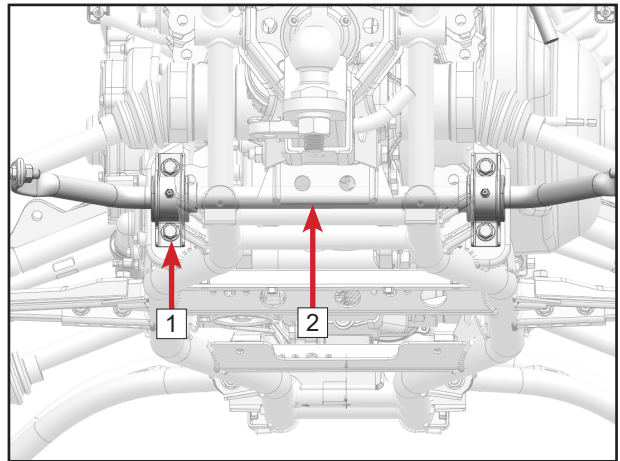
Reverse the removal procedures for installation.

9.4.1 Sway Bar

Removal

Remove four nuts **1**.

Remove sway bar assembly **2**.

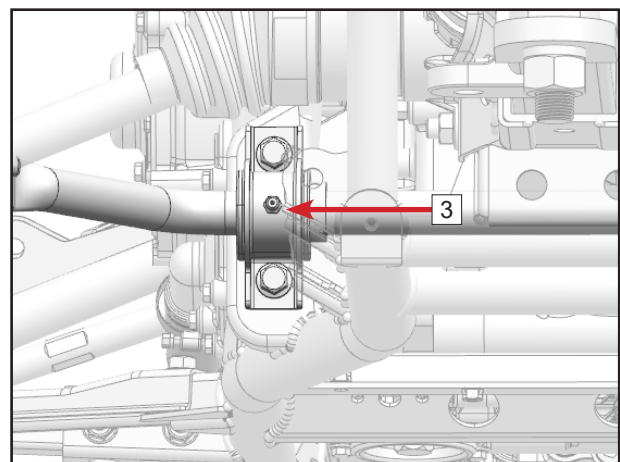


Inspection

Inspect sway bar oil nozzle **3** for leaking.

Installation

Reverse the removal procedures for installation.

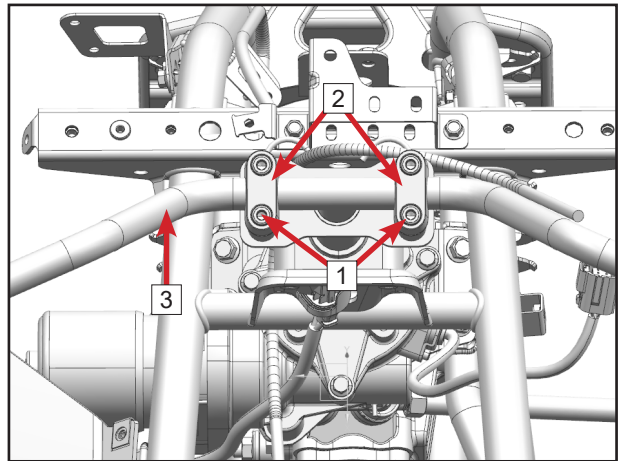


- 10.1 Handlebar 10-2**
- 10.2 Steering System 10-2**
 - 10.2.1 Steering Feature (Non-EPS) 10-2**
 - 10.2.2 Steering Feature (EPS) 10-4**
- 10.3 EPS 10-6**

10.1 Handlebar

Removal

- Remove bolts [1].
- Remove handlebar press cover [2].
- Remove handlebar [3].



10.2 Steering System

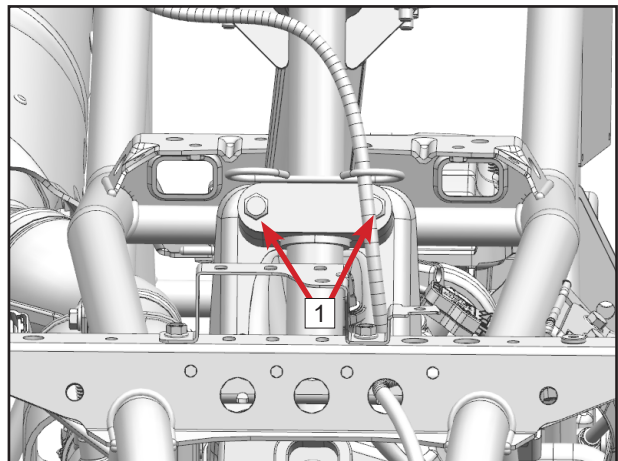
Pre-work

- Remove vehicle front body covering parts.
- Remove tires.
- Remove suspension.

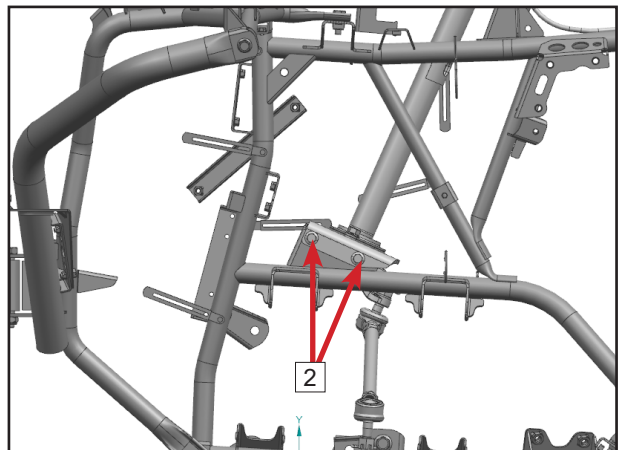
10.2.1 Steering Feature (Non-EPS)

Removal

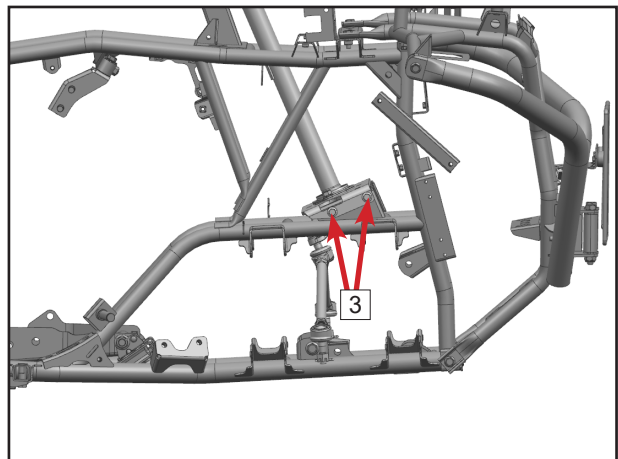
- Remove bolts [1].



- Remove bolts [2].

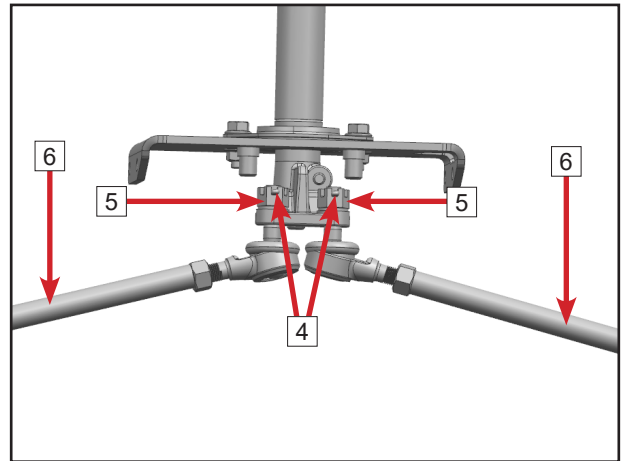


- Remove bolts [3].

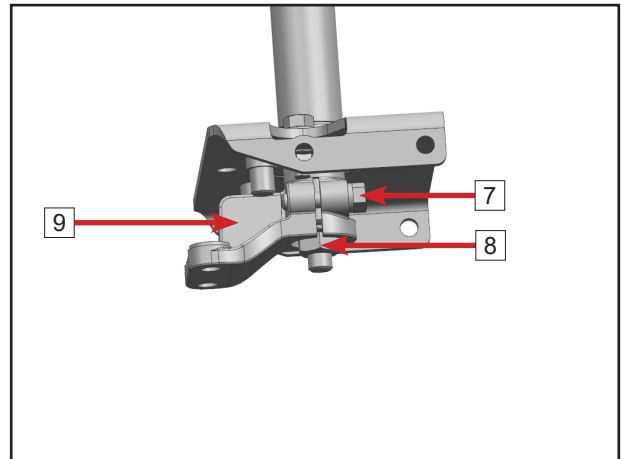


10 Steering System

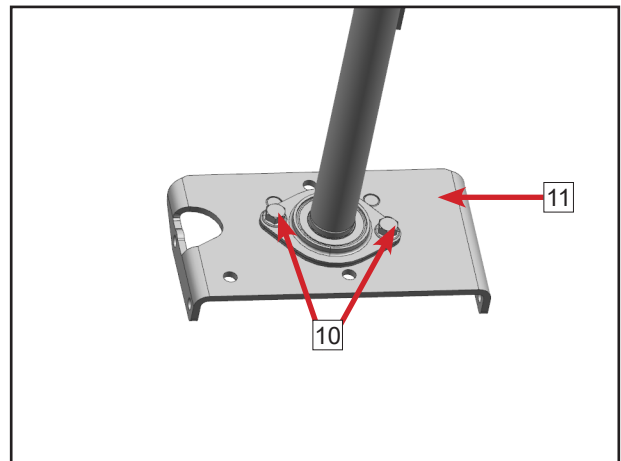
- Remove plug pins [4].
- Remove slotted nuts and washers [5].
- Remove steering lever [6].



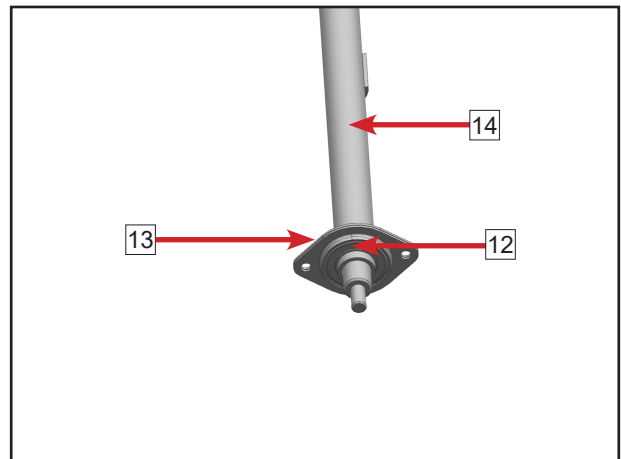
- Remove bolt [7].
- Remove nut [8].
- Remove steering arm [9].



- Remove bolts [10].
- Remove steering shaft plate [11].



- Remove shaft sleeve [12].
- Remove steering bearing [13].
- Remove steering shaft assembly [14].



10.2.2 Steering Feature (EPS)

When vehicle is equipped with EPS system, follow the procedures below to make operation.

Pre-work

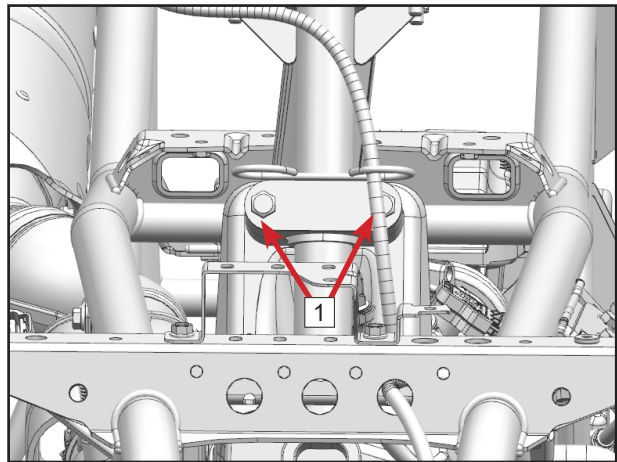
Remove vehicle front body covering parts.

Remove tires.

Remove suspension.

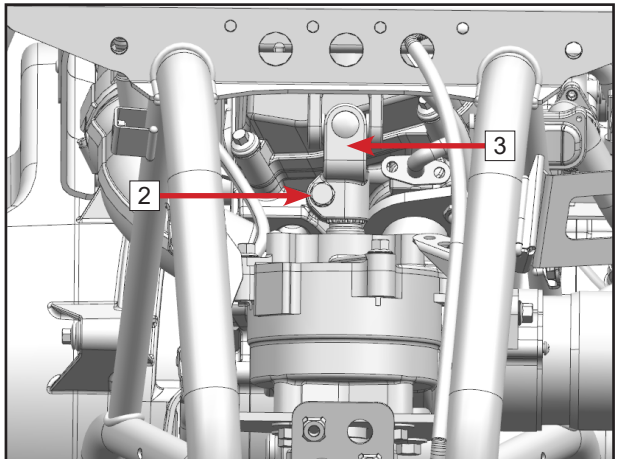
Removal

Remove bolts **1**.

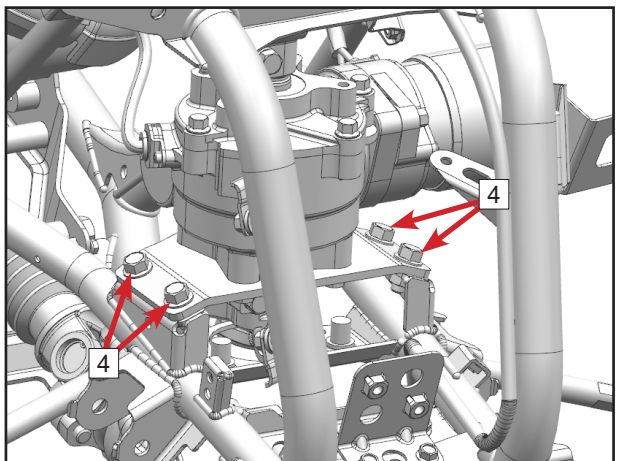


Remove bolt and washer **2**.

Remove EPS steering gear **3**.

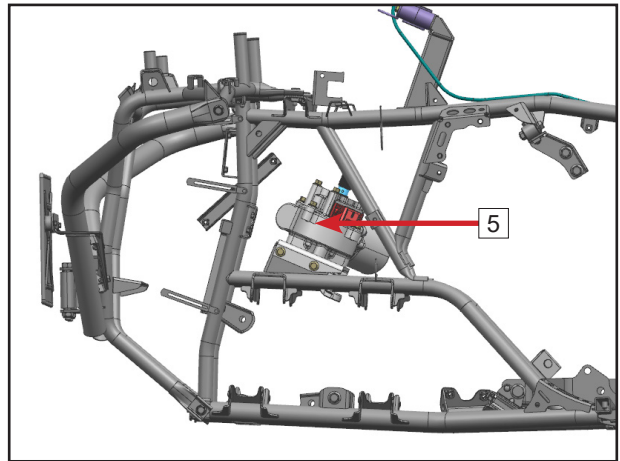


Remove bolts **4**.

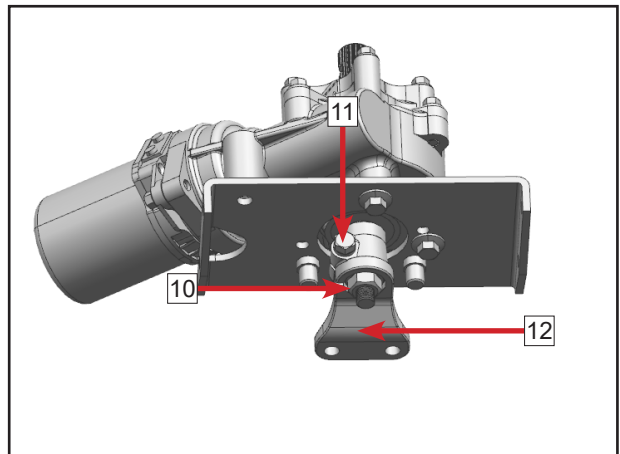


10 Steering System

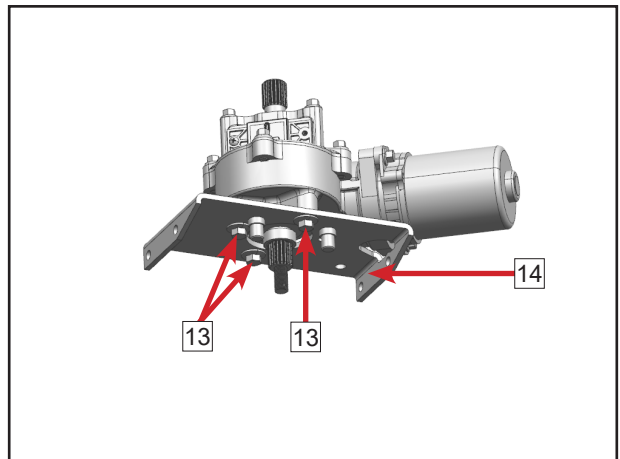
Remove EPS assembly **5**



Remove nut and washer **10**.
Remove bolt and washer **11**.
Remove steering arm **12**.



Remove bolts **13**.
Remove steering shaft plate **14**.

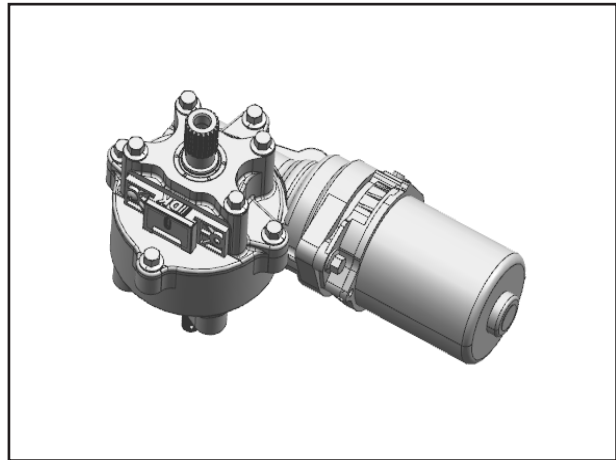


10.3 EPS

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

EPS fuse location refers to 12 Chapter.

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



Item	Specification
Operating voltage range	DC 10.6V~16V
Quiescent current	500mA Max
Maximum power supply current	25A
Maximum motor current	45A
Operating temperature range	-40°C~+85°C
Storage temperature range	-40°C~+125°C

Motor type:	Brush DC motor
Rated power	380W
Rated voltage	DC12V
Rated current	40A
Rated torque	4N·m

EPS Operation System

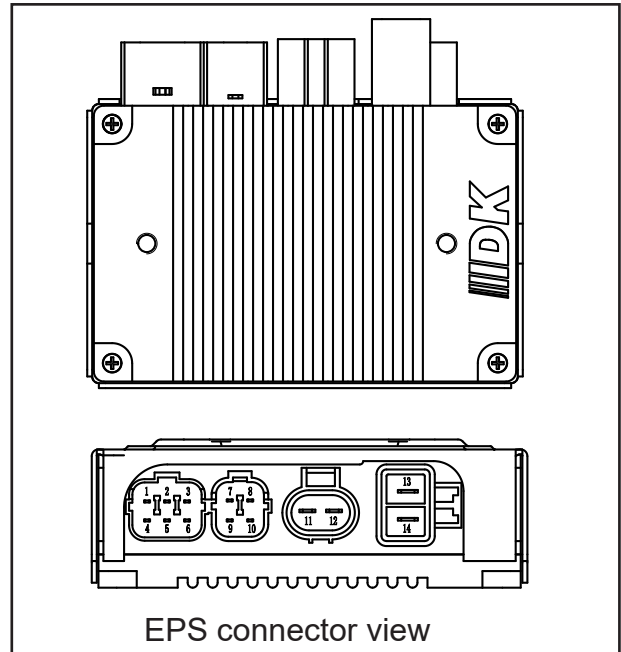
If the vehicle is equipped with the EPS system:

1. Turn on power switch, EPS indicator light will be lighted.
2. Start engine, EPS indicator light goes off and EPS starts working.

⚠ WARNING: There is no part in EPS system that allows users to disassemble for repair.

EPS Pin Function:


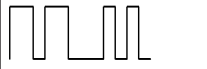
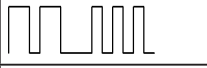
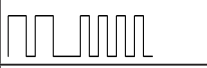
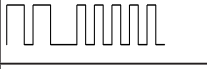
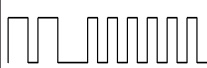

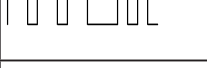



1. Ground wire
2. Engine RPM signal
3. Ignition signal
4. Speed signal
5. Fault signal output
6. K line
7. Sensor positive pole +(5V)
8. Ground wire
9. Sensor secondary moment
10. Sensor main moment
11. Power positive pole
12. Power negative pole
13. Motor positive pole
14. Motor negative pole



10.3.1 EPS failure code table

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

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

Code	Wave form	Diagnosis	Solution
21		Main sensor disconnection	Check sensor wiring
22		Main sensor output abnormal (Voltage too high or too low)	
23		Vice-sensor disconnection	
24		Vice-sensor output abnormal (Voltage too high or too low)	
25		Difference of main torque and Vice torque too big	Replace EPS
26		Main torque sensor phase compensation deviation over limit	
32		Motor power-assistance abnormal	Check and fix motor wiring contact status. If still not work, replace the EPS.
33		Controller current over limit	Replace EPS
34		Motor unilateral no power-assistance	
35		Current sensor null offset too big	
36		Motor wire break	Check the motor wire

10.3.2 EPS system failure analysis and emergency response

No.	Failure Phenomenon	Probable Reason	Troubleshooting
1	Steering without assistance	<ol style="list-style-type: none"> 1. Connectors of wire is bad contact 2. The fuse blew out 3. Relay damage 4. The controller, motor or sensor is damaged 	<ol style="list-style-type: none"> 1. Check whether wire connectors are fully inserted 2. Replace the fuse(30A) 3. Replace the relay 4. Contact with suppliers and replace it
2	Power don't weighs the same for left and right	<ol style="list-style-type: none"> 1. The median output voltage have deviation 2. Controller, motor or sensor is damaged 	<ol style="list-style-type: none"> 1. Unplug motor connectors,loosen the sensor adjustment screw,adjust the sensor position to keep the voltage in $1.65V \pm 0.05V$ 2. Contact with suppliers and replace it
3	When system is on, the steering wheel swings on both sides	<ol style="list-style-type: none"> 1. Motor is mounted backwards 2. Controller or sensor is damaged 	<ol style="list-style-type: none"> 1. Exchange the position of (thick line) red line and black line at the motor terminal 2. Contact with suppliers and replace it
4	Steering becomes heavy	<ol style="list-style-type: none"> 1. Battery power loss 2. Motor damage (power reduction) 3. Air pressure of the tires (front) is insufficient. 	<ol style="list-style-type: none"> 1. Charge 2. Contact with suppliers and replace it 3. Inflate tires
5	System has noise	<ol style="list-style-type: none"> 1. Motor damage 2. Gap of lower steering shaft assembly or mechanical steering assembly is too large 3. Installation of lower steering shaft assembly or mechanical steering assembly is not stable. 	<ol style="list-style-type: none"> 1. Replace 2. Replace 3. Check whether the installation screw is tight, reinforcement

10.4 Gear Shift Assy

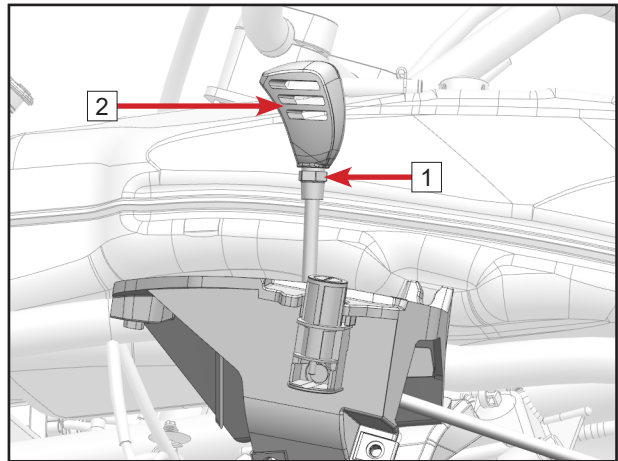
Pre-work

Remove vehicle (front/middle) parts

Removal

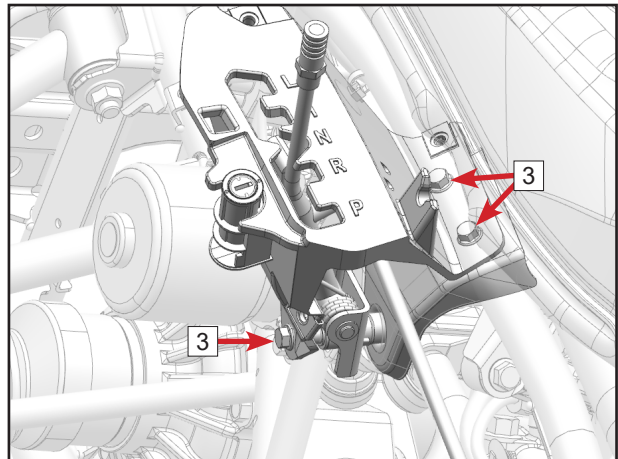
Turn the nut counterclockwise 1

Remove the gearshift head assembly 2



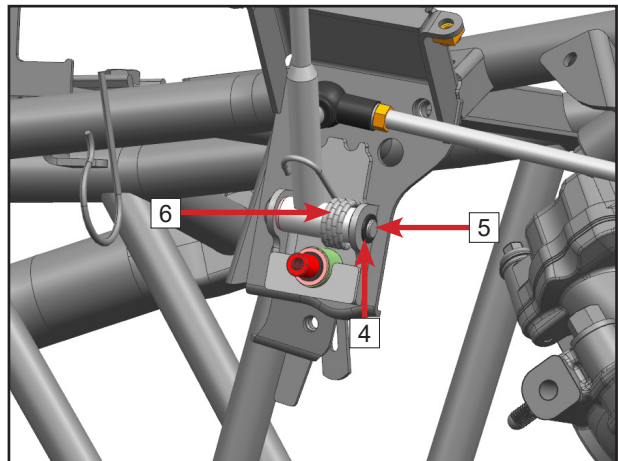
Remove bolts 3

Remove gear shift deco cover 3



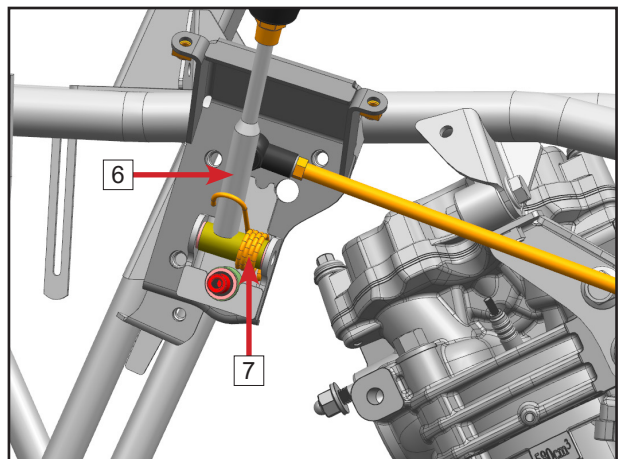
Remove circlip 4

Remove gear shift pin shaft 5

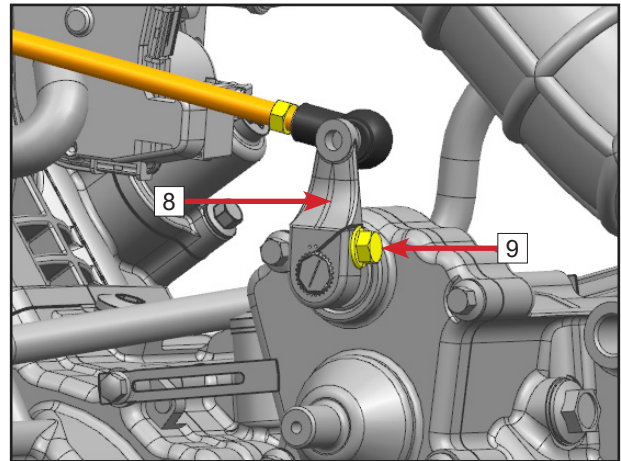


Remove gear shift shaft 6

Remove spring 7



Loosen bolt **8**.
Remove gear shift assy **9**.

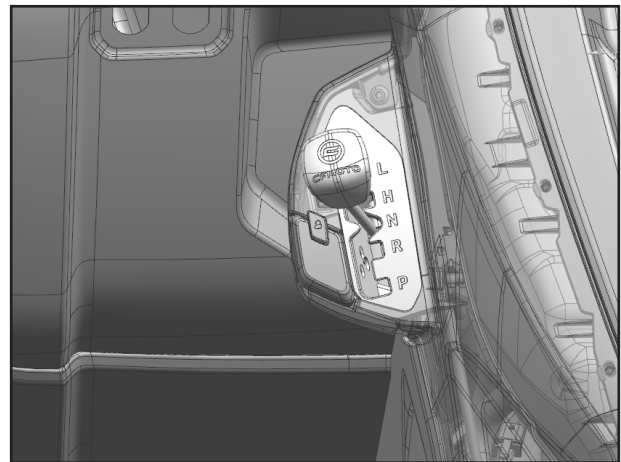


Inspection

Inspect if the gear shift lever works smoothly or not.
Follow the procedures below to make adjustment if necessary.

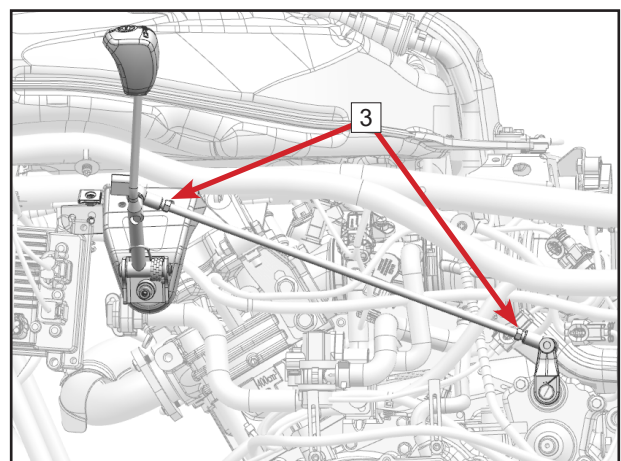
Adjustment

Adjust gear shift shaft.
Shift it into N gear.



Loosen two nuts **3**. Adjust the lever position repeatedly until the shift shaft is at N gear position.
Tighten two nuts **3**.
Shift into R, P, H and L gear and follow the same adjusting methods to make sure the shift lever is at good position.

After adjustment, start the engine, shift gears to make sure the shift lever is adjusted at place.



Installation

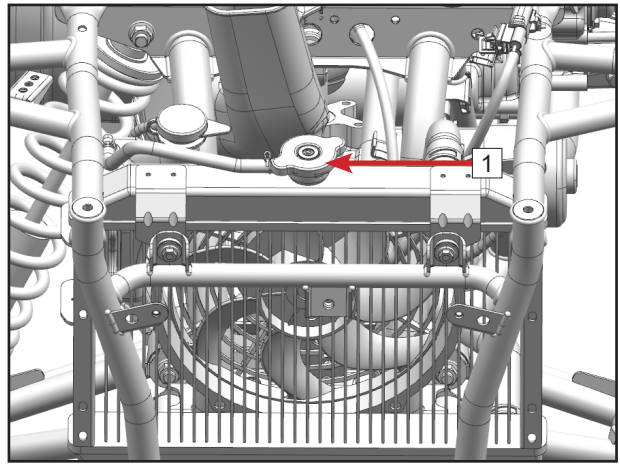
Reverse the removal procedures for installation.

- 11.1 Cooling System..... 11-2**
- 11.2 Radiator Assembly 11-3**
 - 11.2.1 Radiator Deco Guard11-3
 - 11.2.2 Reservoir Tank.....11-4
 - 11.2.3 Fan Motor11-4
 - 11.2.4 Radiator.....11-4
- 11.3 Radiator Fan Inspection..... 11-6**
- 11.4 Cooling System Sealing..... 11-8**
- 11.5 Coolant 11-9**

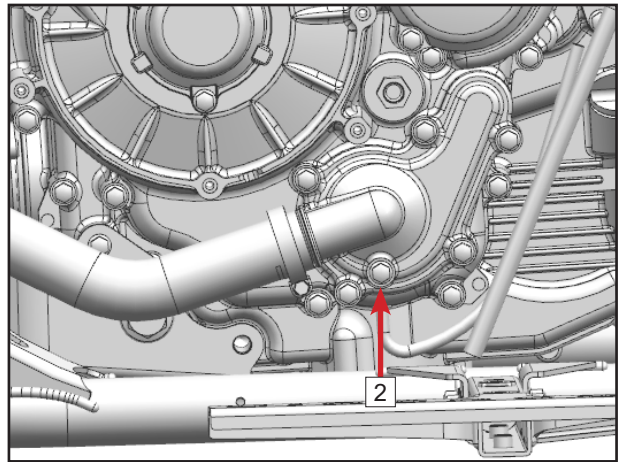
11.1 Cooling System

Removal

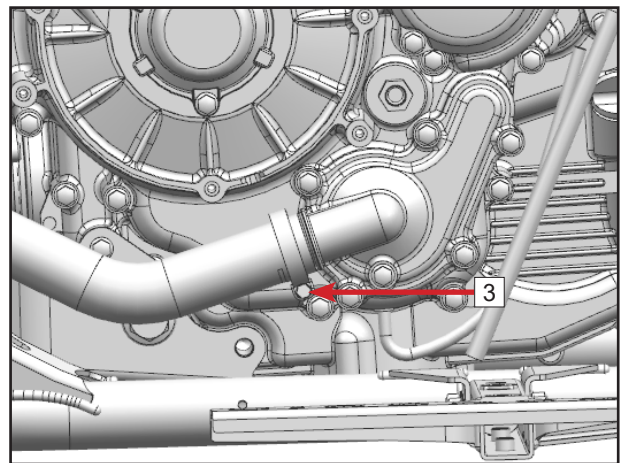
Open radiator cap **1**.



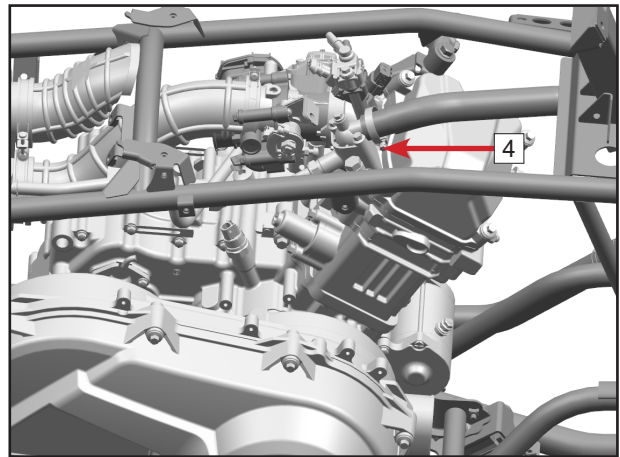
Place a container under the engine water pump.
Remove drain bolt **2**.
Drain coolant.



Loosen clamp **3**.



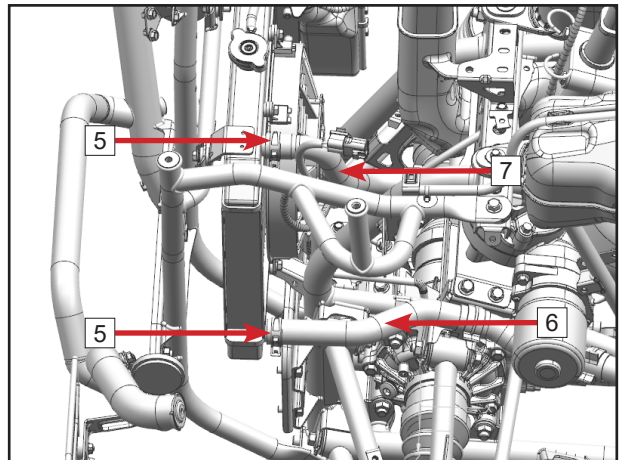
Loosen clamp **4**.



Loosen steel clamps **5**.
Remove water inlet pipe **6**.
Remove water outlet pipe **7**.

Installation

Reverse the removal procedures for installation.



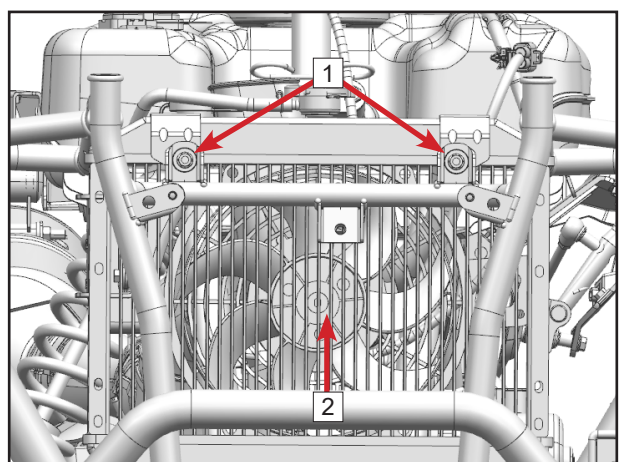
11.2 Radiator Assembly

11.2.1 Radiator Deco Guard Removal

Remove two bolts **1**.
Remove radiator deco guard **2**.

Installation

Reverse the removal procedures for installation.



11.2.2 Reservoir Tank

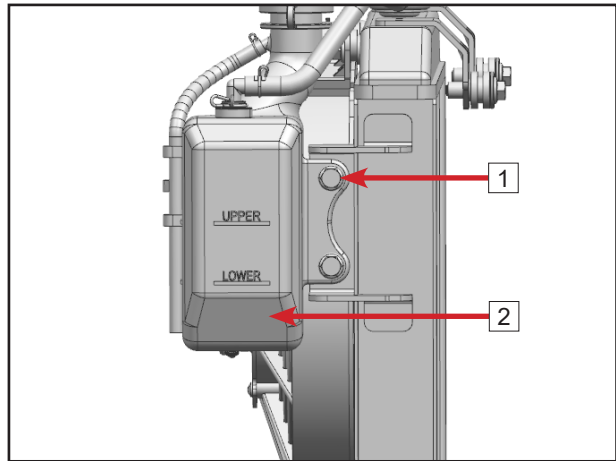
Removal

Remove two bolts [1].

Remove reservoir tank [2].

Installation

Reverse the removal procedures for installation.



11.2.3 Fan Motor

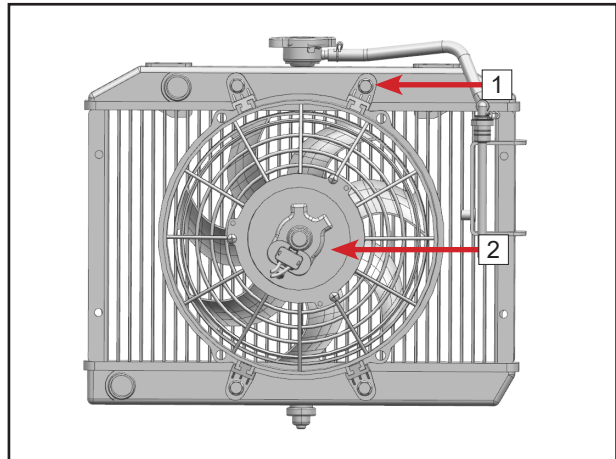
Removal

Remove four bolts [1].

Remove fan motor [2].

Installation

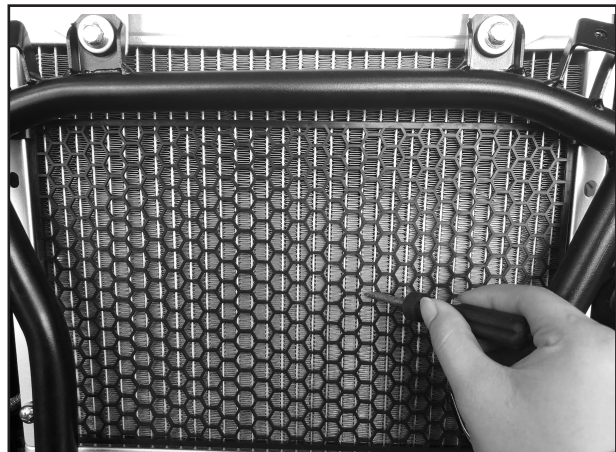
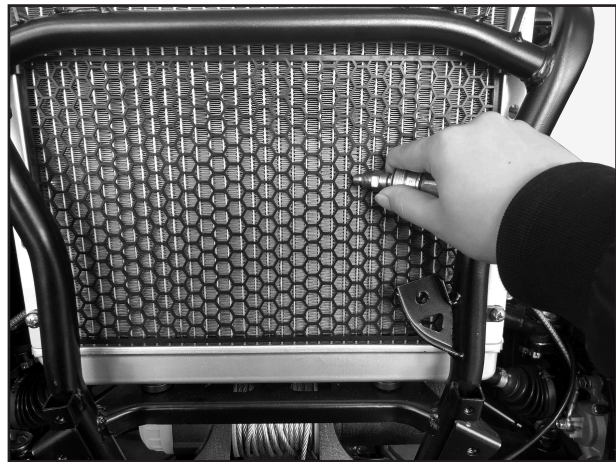
Reverse the removal procedures for installation.



11.2.4 Radiator

Inspect the radiator fin to see jammed or damaged. Use compressed air or low pressure water to clean the muds or other dirt.

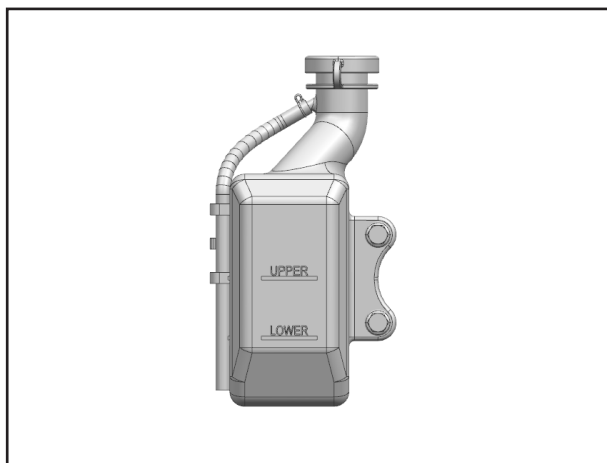
⚠ CAUTION: It is not recommended to use high pressure water to clean radiator fin. If so, the radiator fin may be damaged, which affects the cooling function.



Use screw driver to fix radiator fin.

Reservoir Tank

Inspect reservoir tank for cracks or damage. Replace if any defect is found. Inspect reservoir tank hose for cracks or damage. Replace if any defect is found.



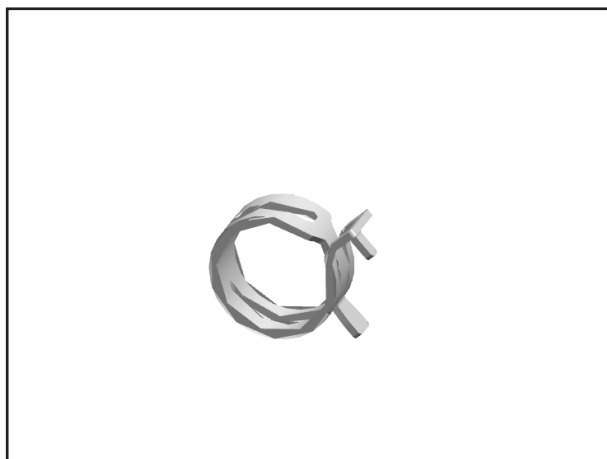
Water Pipe Clamp

Inspect water pipe clamp for wear, deformation or cracks. Replace if any defect is found.



Clamp

Inspect clamp for wear, deformation or cracks. Replace if any defect is found.

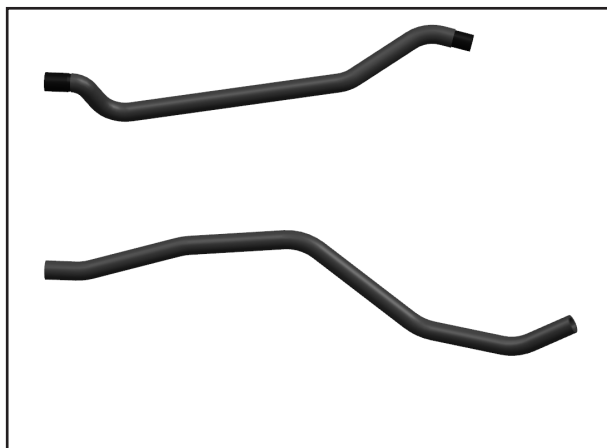


Water Inlet and Outlet Pipe

Inspect radiator pipe for damage or cracks. Rubber hoses become aged because of being heated or long-time use. Pipes may break during heating process. Inspect pipes for cracks or damage by pinching it. Replace if any defect is found.

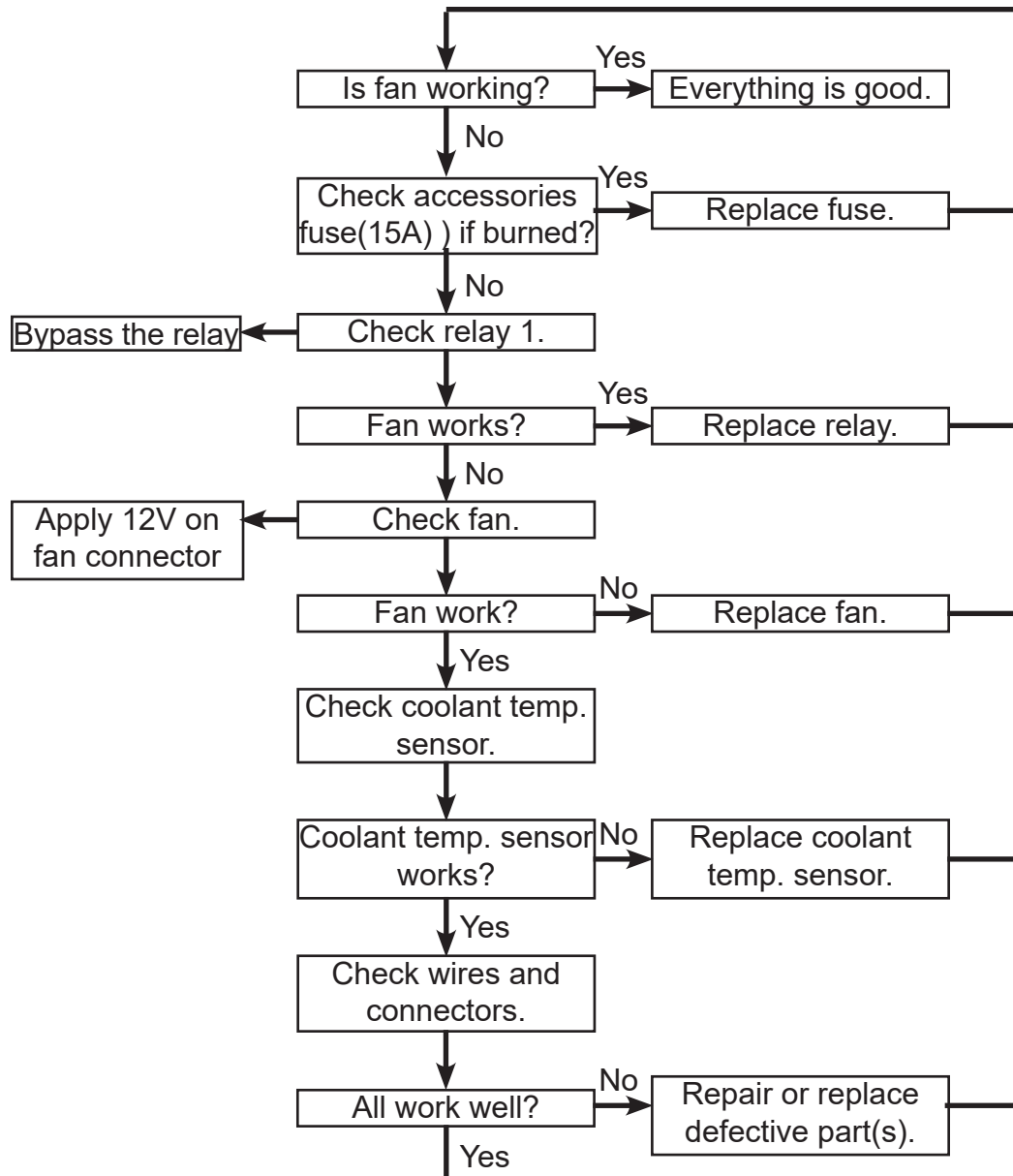
Inspect cooling system pipe clamps for tightness. Tighten or replace with new parts if loosen.

Inspect water pump, pipes and jointing areas for leaking. Replace if necessary.



11.3 Radiator Fan Inspection

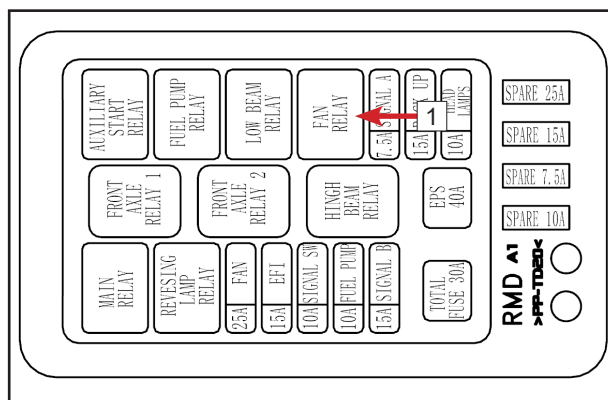
Use the following troubleshooting chart to solve the problem.



Radiator Fan Relay

Relay 1 Installation

NOTE: Relay can be inverted by 180° to ensure installation and working. Ensure to align tabs of relay with terminals of fuse holder when installation.

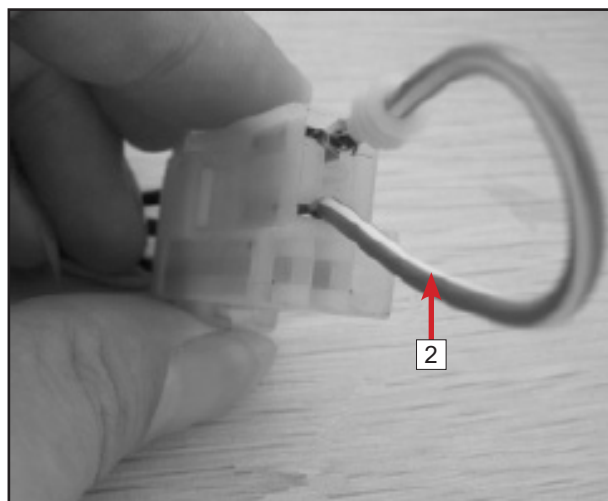


Relay Function Inspection

The easiest way to check the relay is to remove it and bypass it with a jumper 2.

If the radiator fan is activated, replace the relay.

See illustration on the right to find where to bypass the relay.



Relay Continuity Test

Remove relay.

Use multimeter and select the Ω position.

Probe relay as follows:

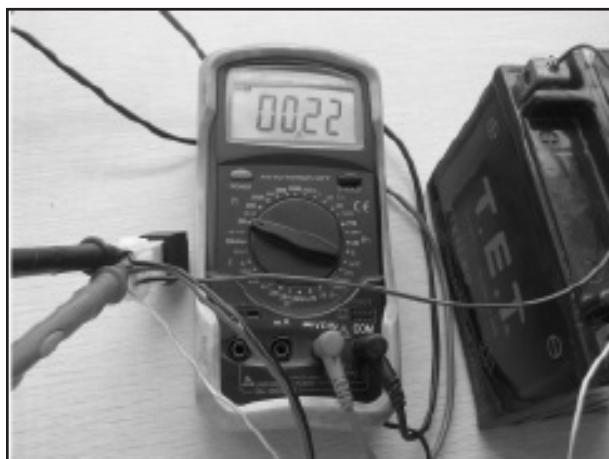
Terminals	Resistance
30	87
	Open circuit (OL)



Connect battery as picture shows:

Terminals	Resistance
30	87
	Open circuit (OL)

If relay fails during test, replace it.



11.4 Cooling System Sealing

Inspection

Install tester [2] on reservoir tank connector [1].

⚠ CAUTION: Never open radiator cap before engine cools down, in case of being burnt by high temperature vapor.

Blow 0.15Mpa dry compressed air for 30s. If the pressure decreases in 30s, it means there is leakage in cooling system. Inspect the whole system and replace the faulty parts.

NOTE: Cover a cloth on radiator cap when removing the tester, in case coolant spills out.

Coolant Replacement

After the coolant has been used for some time, the cooling system will accumulate rust, scale and lime in the jacket and radiator. Clean the cooling system when accumulations are found. If not, coolant passage can become clogged, which decreases cooling system cooling efficacy. Drain cooling system.

Fill the system with water mixed with flushing compounds

NOTE: Never use the flushing compounds which may damage aluminum engine and radiator. Please follow the instruction provided by manufacturer of clean product.

Warm up the engine and run it at normal operating temperature for about ten minutes.

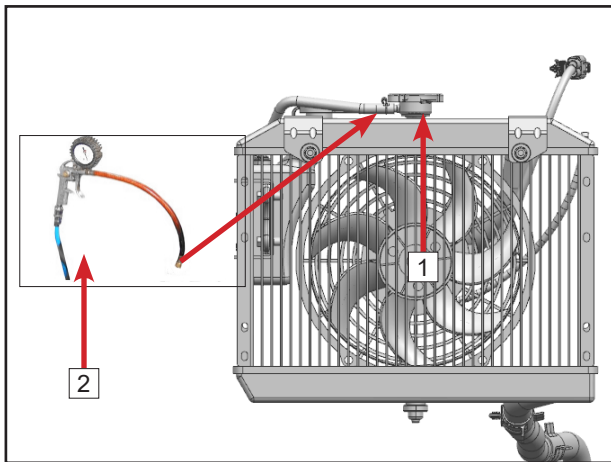
Shut down the engine and drain the cooling system.

Fill the system with clean water.

Warm up the engine and empty the system.

Repeat above steps again.

Fill the system with permanent coolant and drain the air from the system (details refer to maintenance section).



11.5 Coolant

Open radiator cap. Add coolant until there is no bubble inside the exceeded coolant from outlet port.

Loosen air relief bolt **1** on engine (just several threads) until coolant overflows from the hole on exhaust bypass. Tighten the air relief bolt.

After full filling the coolant, install radiator cap. Make sure the coolant lever inside the reservoir tank is between UPPER line and LOWER line. Install reservoir cap. Start the engine until thermostat works. Shut down engine.

Wait until engine cools down, check the coolant level inside radiator and reservoir tank. Add coolant if necessary.

If the level is below the LOWER line, add coolant until the level reaches UPPER line. If the level is above UPPER line, drain the redundant coolant.

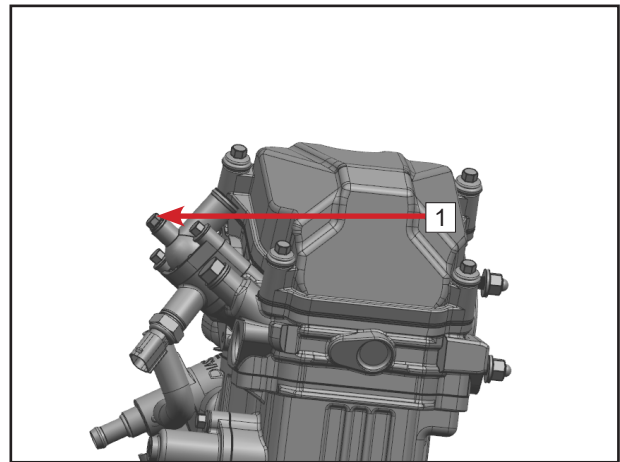
Recommended Coolant:

Coolant normal concentration of CFMOTO:
Anti-freezing agent: 50%
Water: 50%

(The freezing resistance temperature of coolant is different with different mixing ratio. Please adjust the mixing ratio according to the minimum temperature in the area where the vehicle is used.)

NOTE: Never open the radiator cap until the engine cools down to avoid burns caused by liquid coolant.

NOTE: Do not use pure antifreeze or water in cooling system. Pure water contains minerals and tends to produce contaminants in cooling system during usage. In cold season, pure water can cause system damage or thicken the coolant, which decreases cooling efficacy. For aluminum engines, it is strongly recommended to adhere to ethylene glycol coolant containing preservatives.



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12.1 Diagnosis Tool

Tool: PDA

Function:

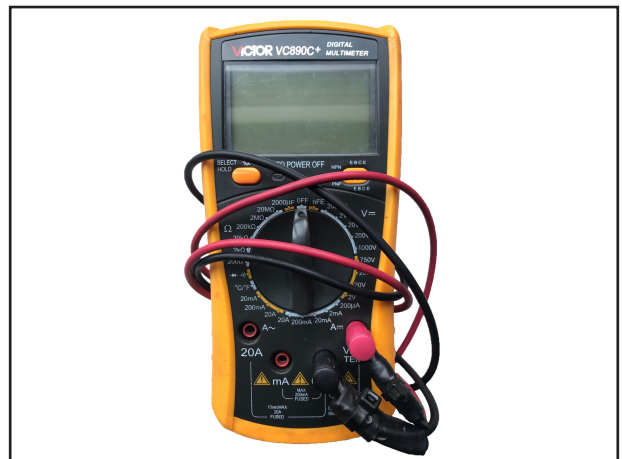
Read/clear EFI system trouble codes, observe data stream.



Tool: Digital Multimeter

Function:

Measure voltage, current and resistance and other parameters in EFI system.



12.2 Signal and Illumination System

12.2.1 Battery

⚠️ WARNING:

1. Battery acid and gas will produce serious corrosion, avoid contacting with battery acid and gas.
2. Keep batteries out of reach of children.
3. When battery acid contacts skin, wash with plenty of water. If battery acid enters the eye, flush with water for at least 15 minutes and seek for medical help.

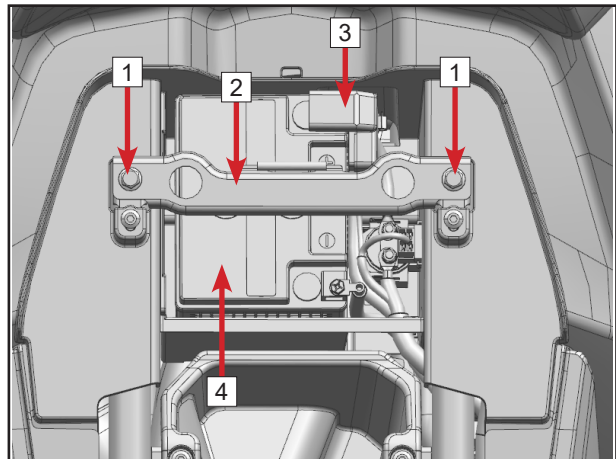
⚠️ CAUTION:

1. Please wear protective clothing and goggles. Keep the battery away from sparks and open fire. Only charge the battery in a well-ventilated room.
2. Do not mis-connect the positive and negative pole of battery. Remove the negative wire first if disassembling battery, in case it damages electrical elements. The system of this vehicle uses negative earth mode.
3. Battery wires are not allowed to be removed while the engine is working.
4. Battery positive/negative wires and electrical control units have to be removed before welding on the vehicle.
5. It is forbidden to puncture the wire to test the input/output electrical signals.
6. Establish the awareness of environmental protection and effective disposal of waste generated during maintenance.

Shut down all electrical devices and engine during removal.

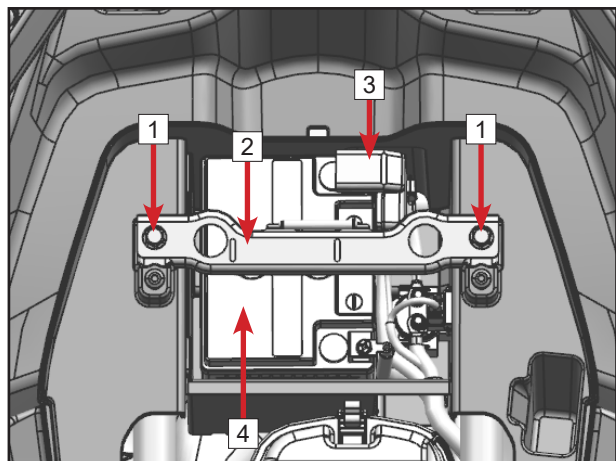
Removal (Long Model)

1. Remove bolts [1].
2. Remove rear seat bracket [2].
3. Remove lock bolt and battery negative cable.
4. Remove protection cover [3].
5. Remove lock bolt and battery positive cable.
6. Remove battery [4].



Removal (Short Model)

1. Remove bolts [1].
2. Remove rear seat bracket [2].
3. Remove lock bolt and battery negative cable.
4. Remove protection cover [3].
5. Remove lock bolt and battery positive cable.
6. Remove battery [4].



Battery Charging

⚠ CAUTION:

1. Even if the battery is not used, it also loses power every day.
2. Charging condition and charging mode are very important for the service life of the battery. Using high charging current will have a negative impact on the service life.
3. If the charging current, charging voltage and charging time are exceeded, the battery will be damaged.
4. If the battery becomes empty due to repeated start of the vehicle, it needs to be charged immediately.
5. When the battery is stored in the discharge condition for a long time, deep discharge and sulfuric acid salination will occur, which damages the battery.
6. The battery does not need to be maintained, which means the acid level does not need to be checked.

Charging

Shut down all electrical devices and engine.

Remove battery.

Connect charger and battery.

After charging, remove the charger from the battery.

NOTE: If the vehicle is not used, recharge the battery every three months.

12.2.2 Charging Voltage Inspection

The battery has proper performance and is fully charged.

Start the vehicle and measure the voltage.

Measuring point is positive pole (+), the other measuring point connects ground (-).

Charging Voltage	
5,000rpm	13.5V~15.0V

If less than specification:

Inspect the connectors between engine and regulator.

Inspect the connectors between regulator and cables.

Inspect engine electronic winding.

If more than specification:

Replace regulator.

Installation

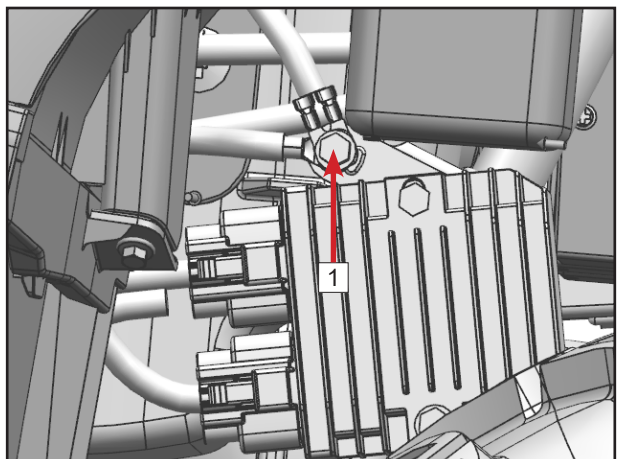
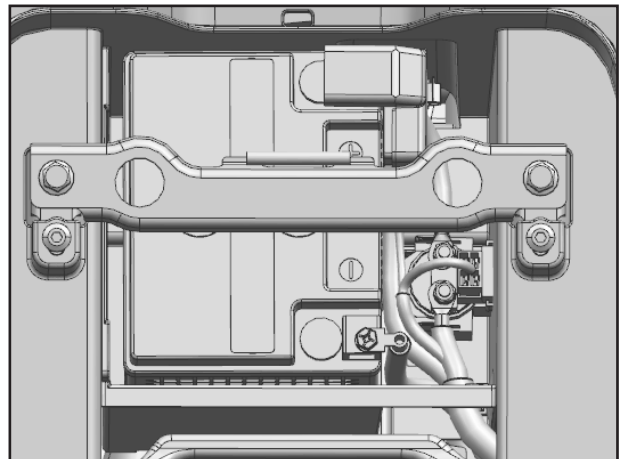
Reverse the removal procedures for installation.

12.3 Earth Wire Inspection

Shut down all electrical devices and engine.

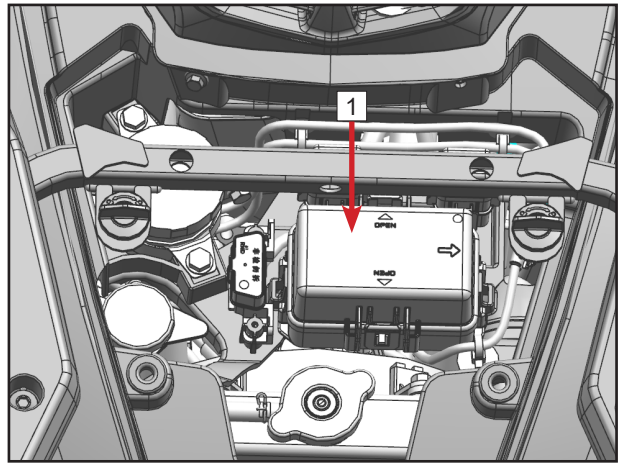
Inspect earth wire for normal function.

Inspect bolt 1 for looseness.



12.4 Fuse box

Fuse box 1 locates under front service cover.



12.5 Light Maintenance Information

Pre-cautions

⚠ CAUTION:
 Headlight is a high watt light. The temperature is very high when it is on. Make operation until the light totally cools down.
 Temperature alarm switch inspection uses fire source and high temperature liquid. Do not place combustible material nearby and pay attention not to get burnt.
 The headlight temperature will be very high when it is on. If use bare hands or with dirty gloves to touch the bulb. It may be covered with oil dirt, which leads to heat point, bulb deformation and damage.
 Be careful when replacing the bulb. Do not replace the bulb when the light is on. Turn off the ignition and wait for the bulb totally cools down. Wear clean gloves on during replacement to avoid dirty oil on glass. Use clean cloth with alcohol or lacquer thinner to clean the oil on bulb.
 Check the battery performance if use the battery for inspection.

Maintenance standard

Item Standard		Standard
Fuse	Main	30A
	Secondary	7.5A×1 10A×3 15A×3 25×1 40A×1
Light and bulb	Headlight	Halogen -HS1 35W×2/LED
	Tail light assembly	LED
	Signal indicator	LED

12.6 Illumination Inspection

Turn ON ignition switch.

Turn on the headlight switch.

Inspect the headlight is on or not.

1. ON: Normal

2.OFF:

- (1) Main cable open or shortcut
- (2) Fuse burnt
- (3) Switch damaged
- (4) Relay damaged or bad contact

When vehicle is equipped with halogen lights:

NOTE: The power of halogen bulb is large, and the temperature is very high when the light is turned on. If touch it with bare hands after turning it, you will be burned. Be sure to wait for the light to cool down before operation. Clean gloves must be worn when replacing bulbs. When oil adheres to the glass surface, it may cause the bulb to break, so it must be cleaned.

When vehicle is equipped with LED lights:

NOTE: The LED light is combined by diodes, so it cannot be replaced individually. Replace the entire light assembly if damaged.

12.7 Lights Removal and Installation

Headlight Assembly

Removal

Headlight assembly removal refers to 06 chapter.

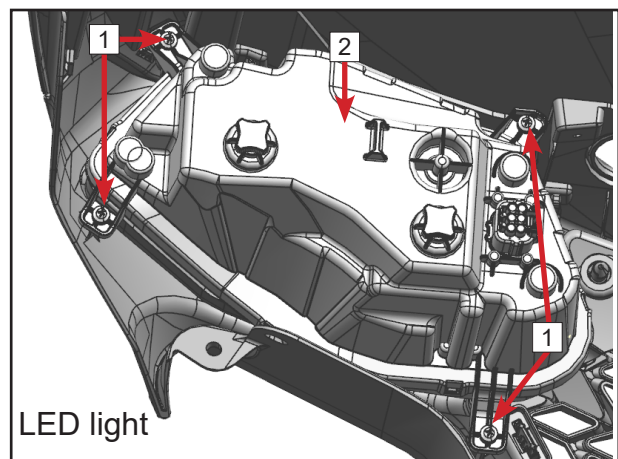
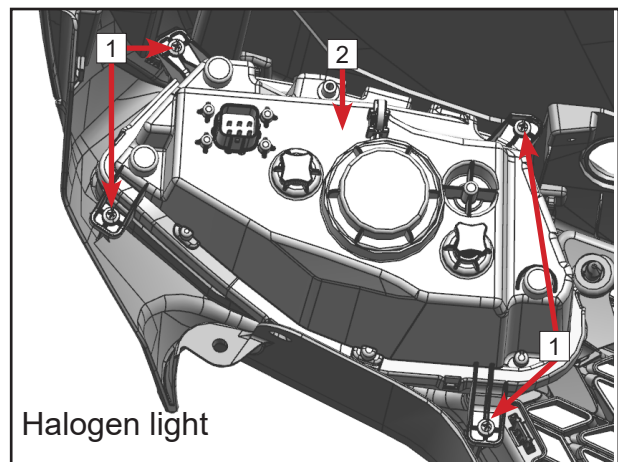
Remove four self-tapping screws **1**.

Remove headlight **2**.

Installation

Reverse the removal procedures for installation.

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



Tail Light Assembly

Removal

Remove RH tail light first.

Remove self-tapping screws **1**.

Remove heat insulator **2**.

Following removal procedures are same for RH tail light and LH tail light.

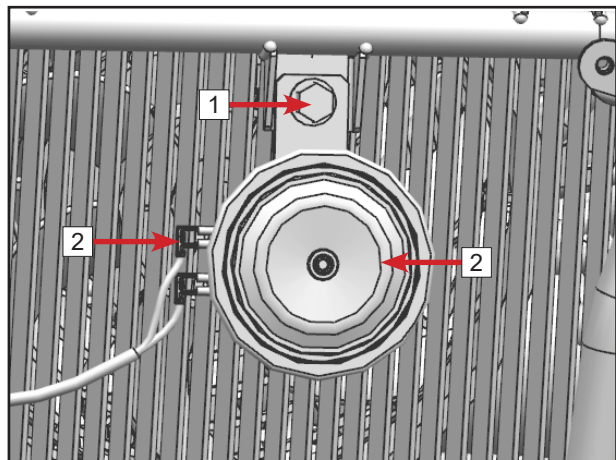
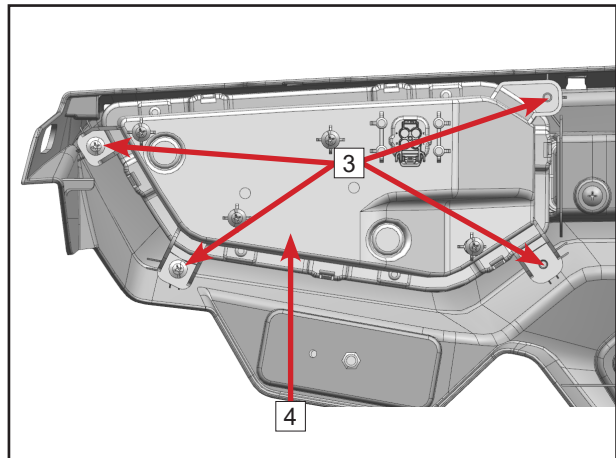
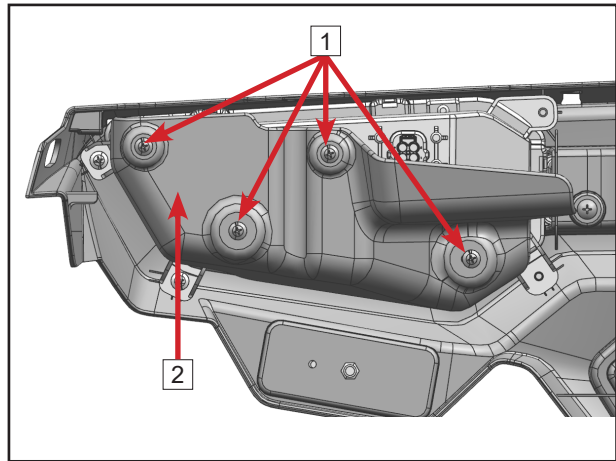
Remove self-tapping screws **3**.

Remove tail light **4**.

Installation

Install tail light **4** and self-tapping screws **3**.

RH tail light also needs to install self-tapping screws **1** and heat insulator **2**.



1	Horn	2	Wire connector	3	Bolt
---	------	---	----------------	---	------

12.8 Horn

Inspection

Remove horn.

Connect horn with 12V battery to inspect horn for normal performance.

Replace if any defect is found.

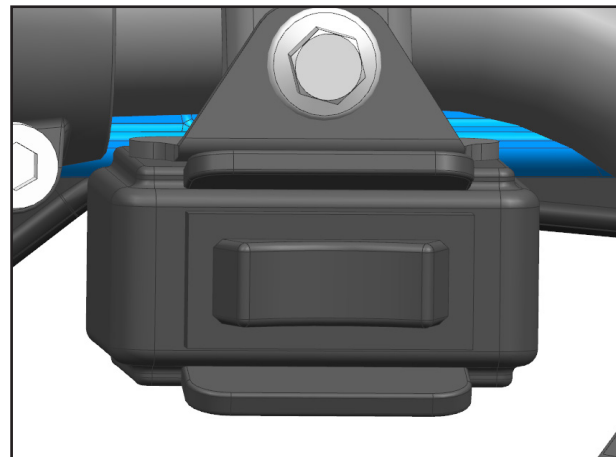
If the horn sound quality isn't good, turn the adjusting screw to achieve the best sound quality.

12.9 Winch Control Switch

Unplug winch control lever and winch control seat connectors.

Inspect switch performance.

Color Function	Br	L	Y G
IN		● — ●	
OUT	● — ●		



12.10 Alarm

Alarm is positioned under the dashboard, besides the wiring harness.

Removal

Remove dash cover(see chapter 2).

Remove alarm plug.

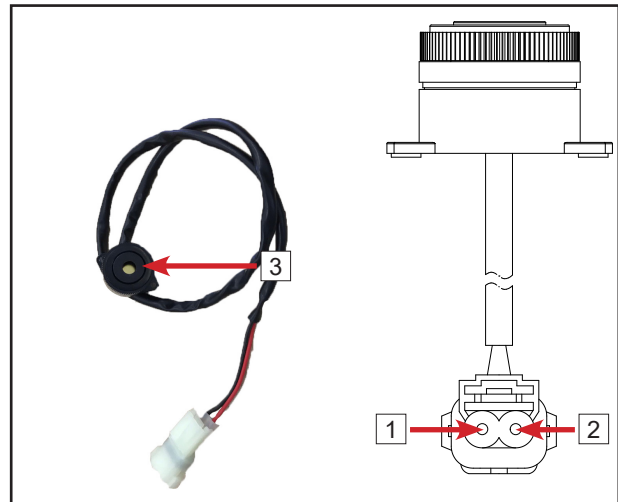
Remove zip tie and alarm [3].

Inspection

Connect the alarm with a battery (12v).

Confirm the alarm work.

Replace with new alarm if any failure.



1	Connect with power source +12V	2	Ground	3	Alarm
---	--------------------------------	---	--------	---	-------

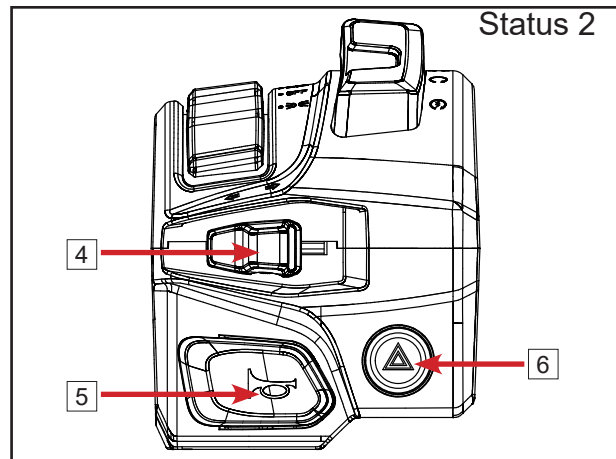
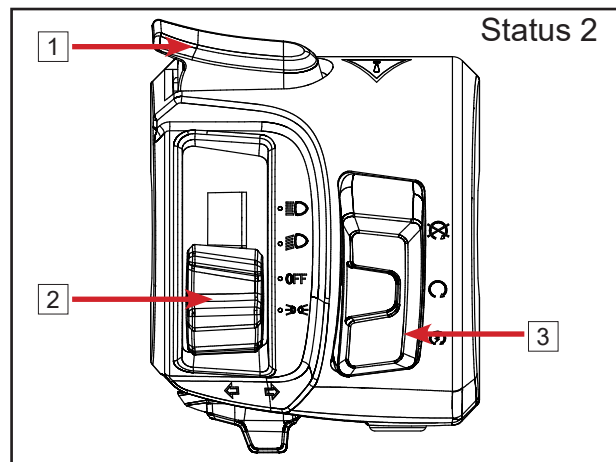
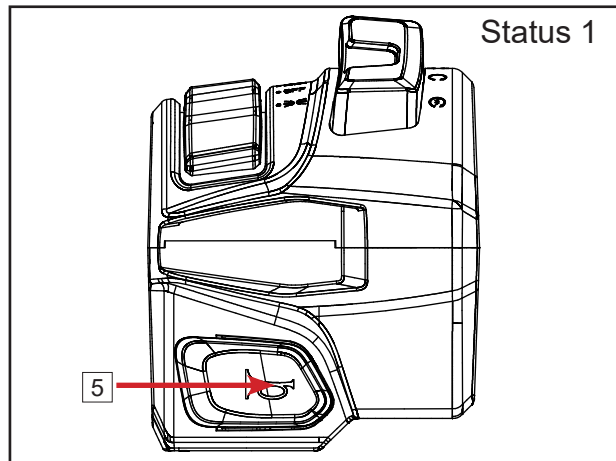
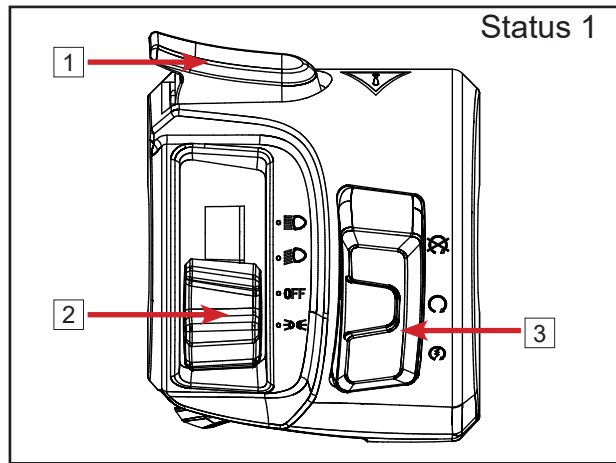
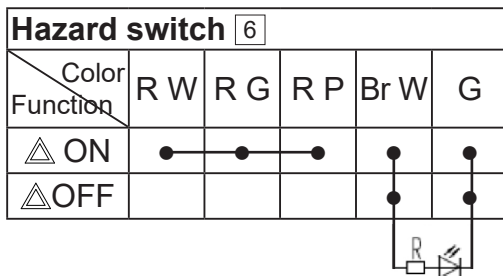
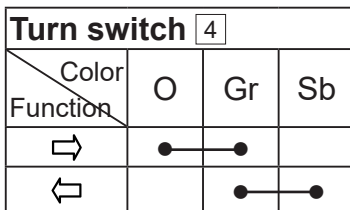
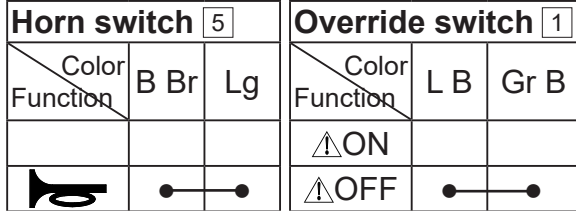
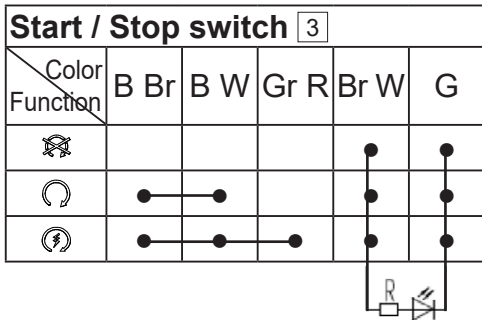
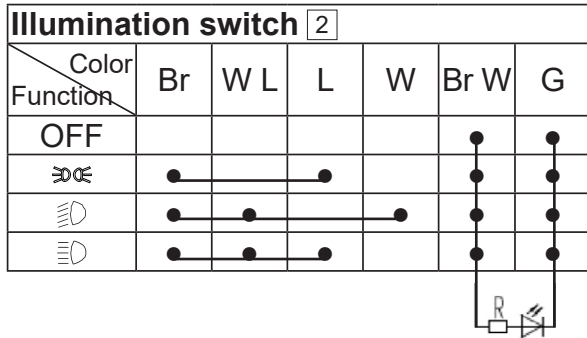
Alarm	
Performace	Statement
One short ring	RPM≥1000RPM, engine oil signal ground (<1.2V)
Two short rings	Water temp. ≥115°C
Long ringing (1)	No parking alarm (long ringing for 12s every 5 mins)
Long ringing (2)	OPC works(OPC flashes and alarms)

EU 167 model: See below warning function menu

Signal source	OPC						
	ON			OFF			
Ignition	ON			OFF			
RPM (r/min)	≤1800			>1800	/	/	/
Parking signal	Ground	Disconnect		Ground/Disconnect	Disconnect	Disconnect	Ground
Seat switch signal	Ground/Disconnect	Ground	Disconnect	Ground/Disconnect	Disconnect	Ground	Ground/Disconnect
Seat alarm	OPC	OPC	OPC	OPC	OPC	OPC	OPC
	OPC doesn't work	OPC doesn't work	OPC flashes and alarms	OPC doesn't work	OPC flashes and alarms. Dashboard shuts down after 5 mins	Long ringing for 12s every 5 mins. Dashboard shuts down after 30 mins	OPC doesn't work. Dashboard shuts down after 5 mins

12.11 Switches

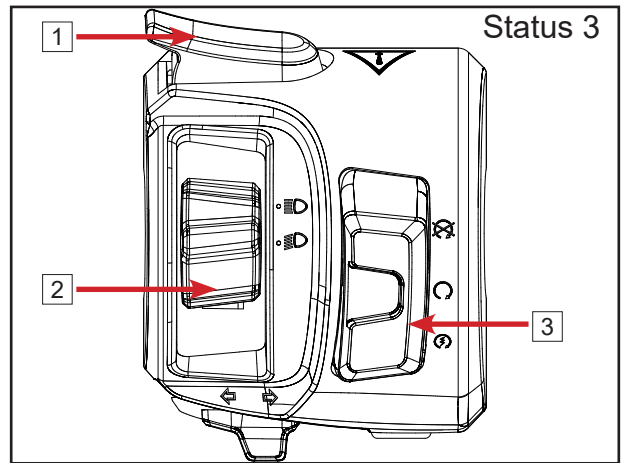
Unplug connectors between switches and main cable. Inspect switch performance.



12 Electrical System

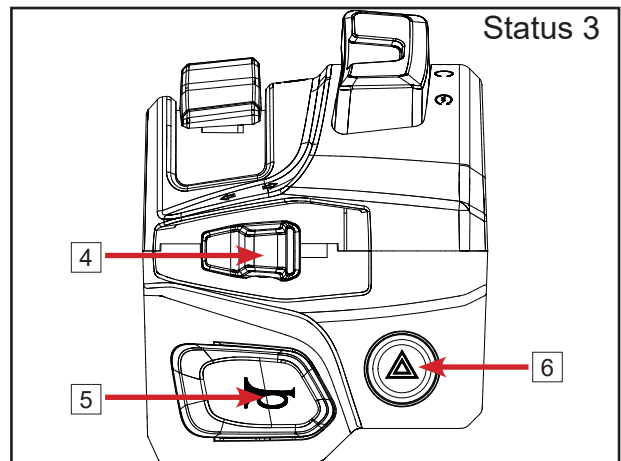
Illumination switch 2

Color Function	Br	W L	L	W	Br W	G
	●	●		●	●	●
	●	●	●		●	●



Start / Stop switch 3

Color Function	B Br	B W	Gr R	Br W	G
				●	●
	●	●		●	●
	●	●	●	●	●



Horn switch 5

Color Function	B Br	Lg
	●	●

Override switch 1

Color Function	L B	Gr B
ON		
OFF	●	●

Turn switch 4

Color Function	O	Gr	Sb
	●	●	
		●	●

Hazard switch 6

Color Function	R W	R G	R P	Br W	G
ON	●	●	●	●	●
OFF				●	●

CFMOTO

Ignition Switch Lock

Removal

Remove upper dashboard panel refer to 06 chapter.

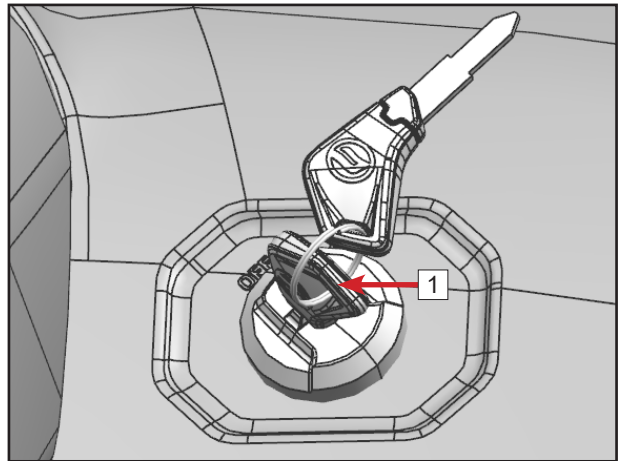
Remove ignition switch lock 1 by rotating it counter-clockwise.

Inspection

Follow the tables below to inspect ignition switch lock performance.

●-● means the connection is normal.

Color Function	R	B
↻	●-●	
⊗		



Installation

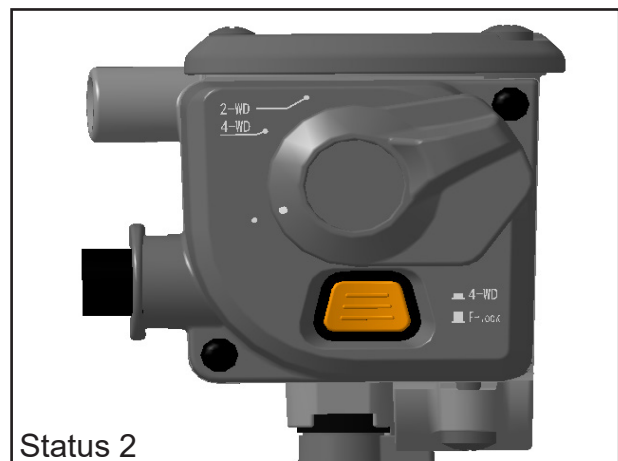
Rotate ignition switch lock 1 clockwise for installation.

2/4WD, 4WD diff-lock transfer switch (rear gear case) EU

Color Function	B L	L O	Br O	G Br	Gr O	W Gr
▣ R-WD	●-●		●-●			
▣ R-LOCK			●-●		●-●	



Status 1



Status 2

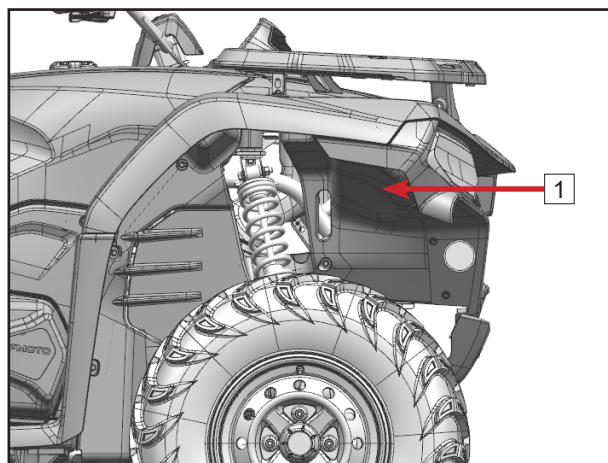
2/4WD, 4WD diff-lock transfer switch (front gear case)

Color Function	L B	L G	Br R	Br G	Gr	Gr W	Lg Br	G	Lg W
2-WD	●-●	●-●				●-●		●-●	
4-WD	●-●	●-●	●-●						
▣ F-LOCK			●-●	●-●	●-●		●-●		

12.12 T-BOX

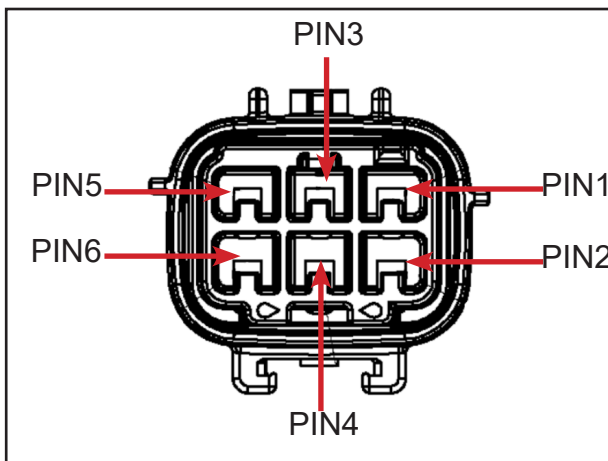
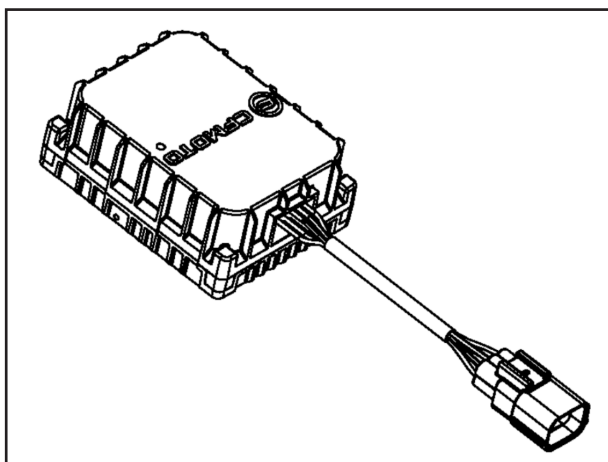
The vehicle is equipped with a T-BOX 1.

Indicator on or off	Corresponding device state	Remarks
Slow flash	PIN1	200mS on, 1800mS off
Slow flash	PIN2	1800mS on, 200mS off
Quick flash	PIN3	125mS on, 125mS off
Long light off		



Connector definition:

No.	PIN definition
PIN1	VBAT
PIN2	KL 15
PIN3	CAN H
PIN4	CAN L
PIN5	K_line
PIN6	GND



Troubleshooting:

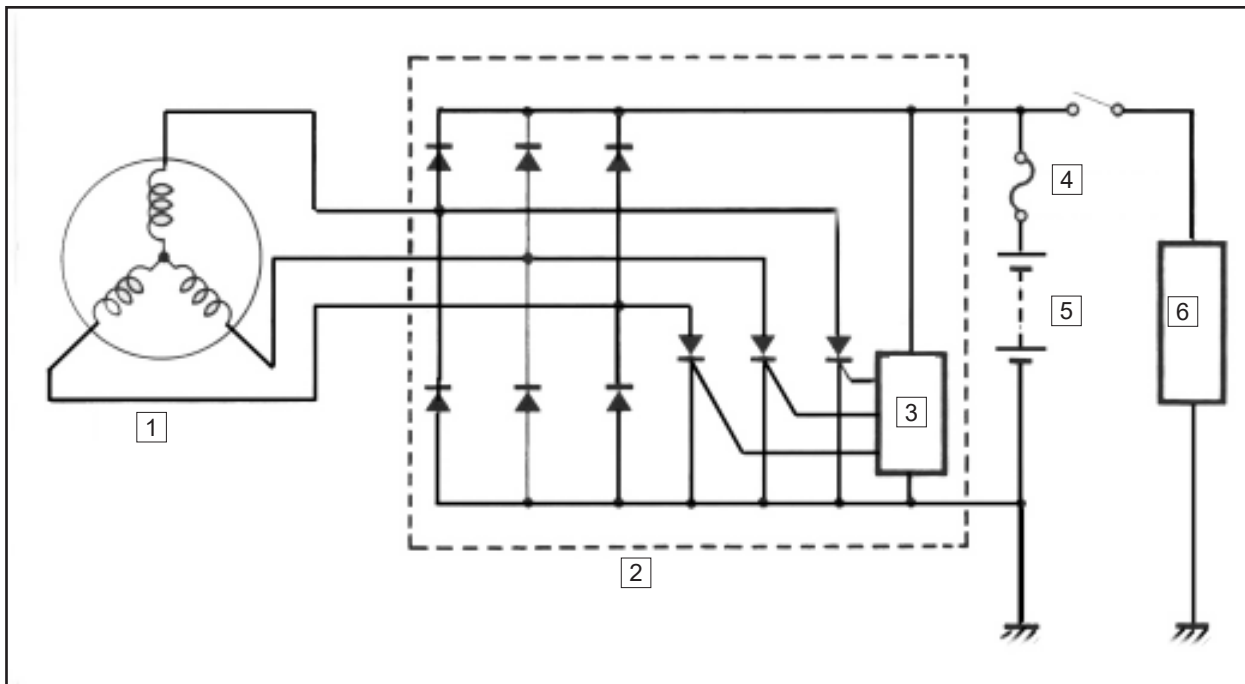
Fault	Possible causes	Solution
Terminal not online	Vehicle battery voltage is low.	Charge or change the battery
	Power cable fuse has blown.	Change the fuse
	The parameter is set wrong.	Ask the manufacturer to reset
	SIM card is out of service for the unpaid bill, or SIM card or does not support GPRS function.	Re-confirm that the SIM card is functioning properly
	The signal is weak because the 4G antenna is not connected properly.	Check the installation of the 4G antenna
	Terminal fault	Return to factory for service
Fail to locate	The vehicles are in underground garages, tunnels and other areas where GPS signal is weak.	Move to the open field
	Metal objects blocking around GPS antenna	Adjust the installation location of GPS antenna
	Antenna fault	Reinstall the GPS antenna
Incomplete CAN bus data	Cable bad contact	Re-plug the cable terminal or change it
	Terminal fault	Return to factory for service

T-BOX hardware fault codes

DTC display code	Fault attribute	Conditions for fault	Troubleshooting conditions	Possible fault causes	Maintenance suggestions
U011716	Sensor fault	Voltage < 9V, t > 30s	9.5V < Voltage < 18V, t > 500ms	Battery voltage too low	Change the battery or charge the starting battery
B111717	Voltage fault	Voltage>16V, t>100ms	Voltage back to normal 1 minute	Power supply interference/ Harness damage	Check the power cable or change the battery
B111716	Voltage fault	Voltage < 9V, t > 30s	Voltage back to normal 1 minute	Power supply interference/ Harness damage	Check the power cable or change the battery or charge the starting battery
U012187	Network fault	Message 0x12B not received within 100ms	Receive message 0x12B normally	Loose contact/ Harness interference	Check ABS and the circuit
U018087	Network fault	Message 0x210 not received within 1000ms	Receive message 0x210 normally	Loose contact/ Harness interference	Check ABS and the circuit
U014087	Network fault	Message 0x150 not received within 500ms	Receive message 0x150 normally	Loose contact/ Harness interference	Check ECU and the circuit
U015587	Network fault	Message 0x151 not received within 500ms	Receive message 0x151 normally	Loose contact/ Harness interference	Check the dashboard and the circuit
U007388	Network fault	CAN bus off detected (Controller enters Buss Off 8 times in a row.)	CAN bus off not detected	CAN bus short circuit	Check the bus connection
B1A4087	Hardware	KL30 is disconnected for over 1s when KL15 is powered on.	KL30 is connected for over 1s when KL15 is powered on.	Harness damage, intentional damage	Check the circuit

12.13 Charging System

12.13.1 Charging System Diagram



1	Magneto	3	Stable voltage	5	Battery
2	Regulator	4	Fuse	6	Load

Magneto Coil Resistance

Measure resistance between 3-phase magneto stator coil.

If the resistance is out of specification, replace with a new stator.

Check for the insulation between stator coil and core.

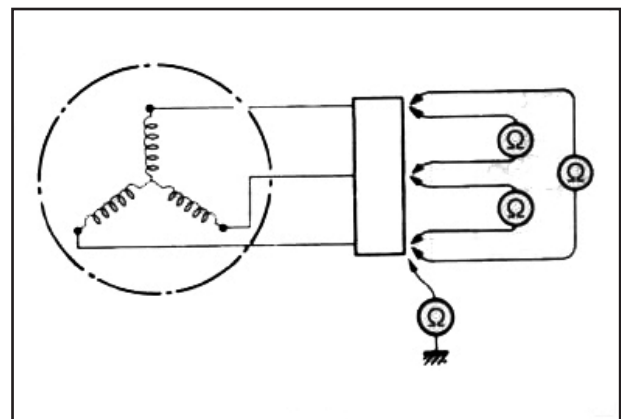
Turn multimeter to $1 \times 10\Omega$

MAG Coil Resistance:

$0.5\Omega \sim 1.5\Omega$ (Yellow-Yellow)

Resistance between Stator Coil and Core:

$\infty\Omega$ (Yellow-Ground)



Resistance measurement

MAG Non-loaded Performance

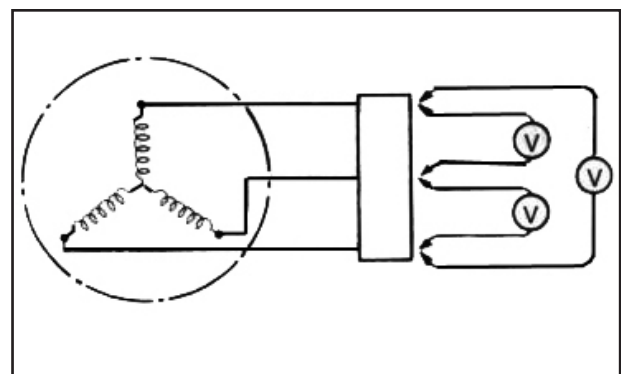
Start the engine and allow it run at 5000r/min. Use multimeter to measure the voltage between 3 output lines.

If the reading is below specification, replace with a new magneto.

Turn Multimeter to V(AC).

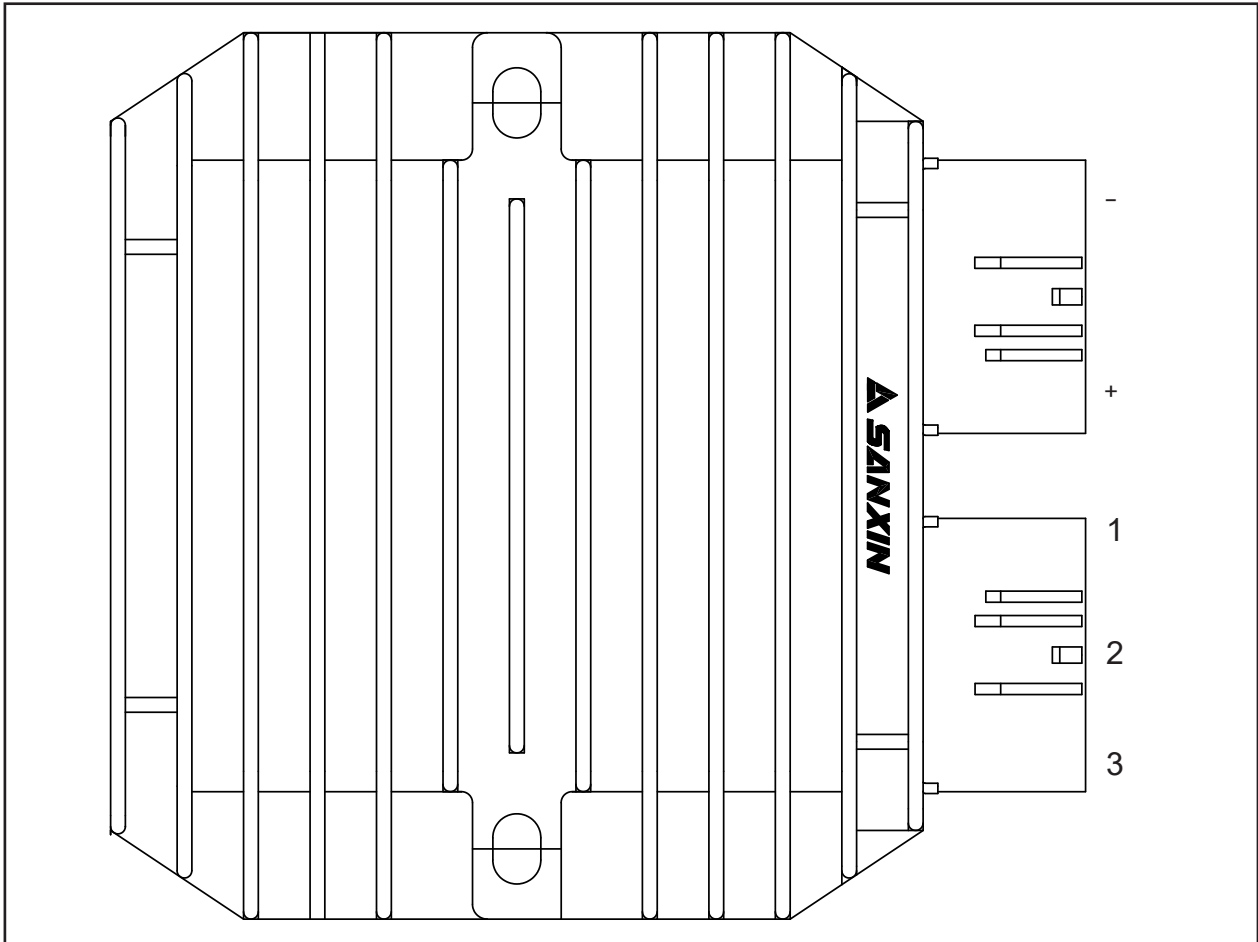
Voltage between Output Lines When MAG Non-loaded:

$>75V(AC)$ at 5000r/min



Voltage measurement

Regulator



Use multimeter to measure resistance between connectors. Replace the regulator If any data is beyond standard.

After engine works and battery is full charged, if the voltage between positive and negative terminal exceeds 15V or is lower 12V, replace with a new regulator.

		(+)				
		1	2	3	(-)	(+)
(-)	1		∞	∞	100~800	∞
	2	∞		∞	100~800	∞
	3	∞	∞		100~800	∞
	(-)	∞	∞	∞		∞
	(+)	100~800	100~800	100~800	100~800	

12.13.2 Starter Relay

Put DC12V between positive and negative terminal. Use multimeter to check connection between 2 contacts.

If multimeter clicks, there is connection.

If DC12V is removed, no connection between contacts.

If both above 2 items are proved, it indicates the replay is good. Turn multimeter to DIODE.

⚠ CAUTION: The voltage loaded between terminals can not exceed 2 minutes. Otherwise, starter relay may overheat or burn.

Use multimeter to measure the start relay coil resistance.

If the resistance is out of standard, replace with a new one.

Turn multimeter to $1 \times 10 \Omega$

Start auxiliary relay resistance: $3 \Omega \sim 5 \Omega$

12.13.3 Start Auxiliary Relay and Fuel Pump Relay

Put 12V between auxiliary starter relay positive and negative terminal. Use multimeter to check the continuity between A and B.

Turn multimeter to DIODE.

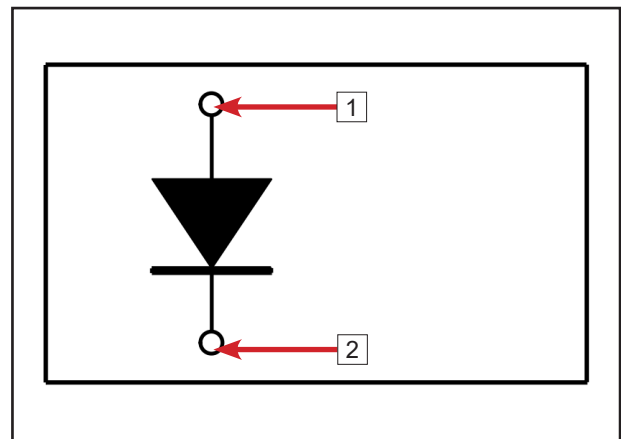
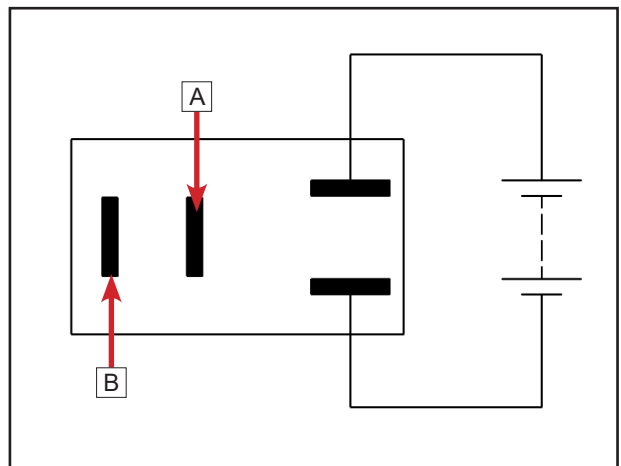
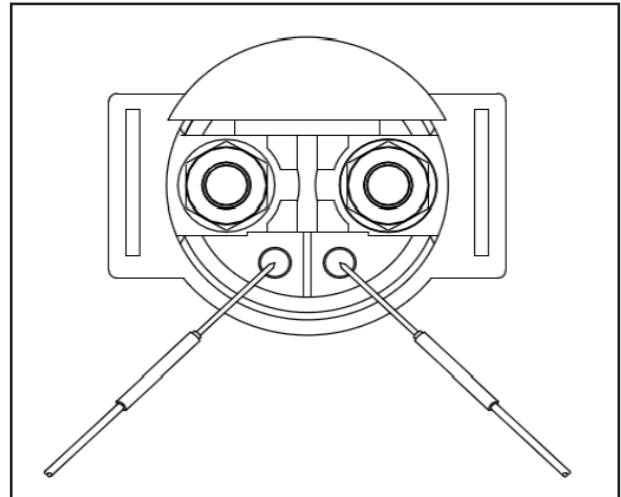
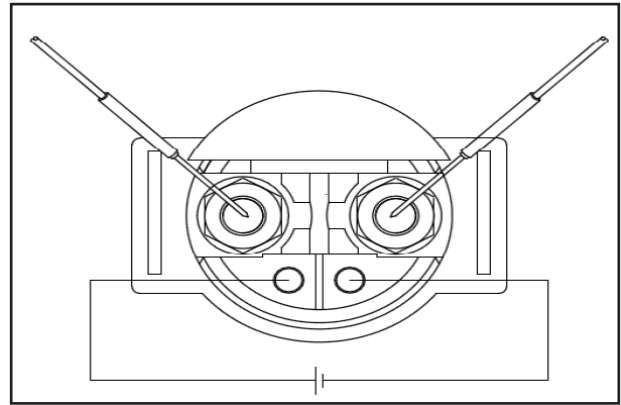
If multimeter clicks, it indicates there is connection between A and B.

If 12V is removed, no connection remains between contacts.

If both above 2 items are proved, it indicates the replay is good.

Turn multimeter to $1 \times 100 \Omega$ to measure the relay resistance.

Auxiliary starter relay resistance: $90 \Omega \sim 100 \Omega$



1	Ground	2	Battery positive pole
---	--------	---	-----------------------

12.13.4 Engine Starting Note

Properly route according to starting schematic diagram.

Before start engine, check if all parts are installed correctly. EFI parts connection refers to EFI section.

Check air intake system.

Check fuel system to ensure there is no block or leaks. Clean if blocked to make sure the fuel tail is OK. Reconnect the leaking area to make sure there is no leaking.

Measure fuel pressure with fuel pressure gauge.

Pressure in fuel pump outlet: $330\pm 5\text{kPa}$

Shift gear in Neutral.

Check EFI with PDA for fault. Eliminate the trouble according to DTC (Diagnostic Trouble Code).

Turn on ignition switch and press start switch for 3~5s.

After engine starts, warm up until idle speed is stable and check it.

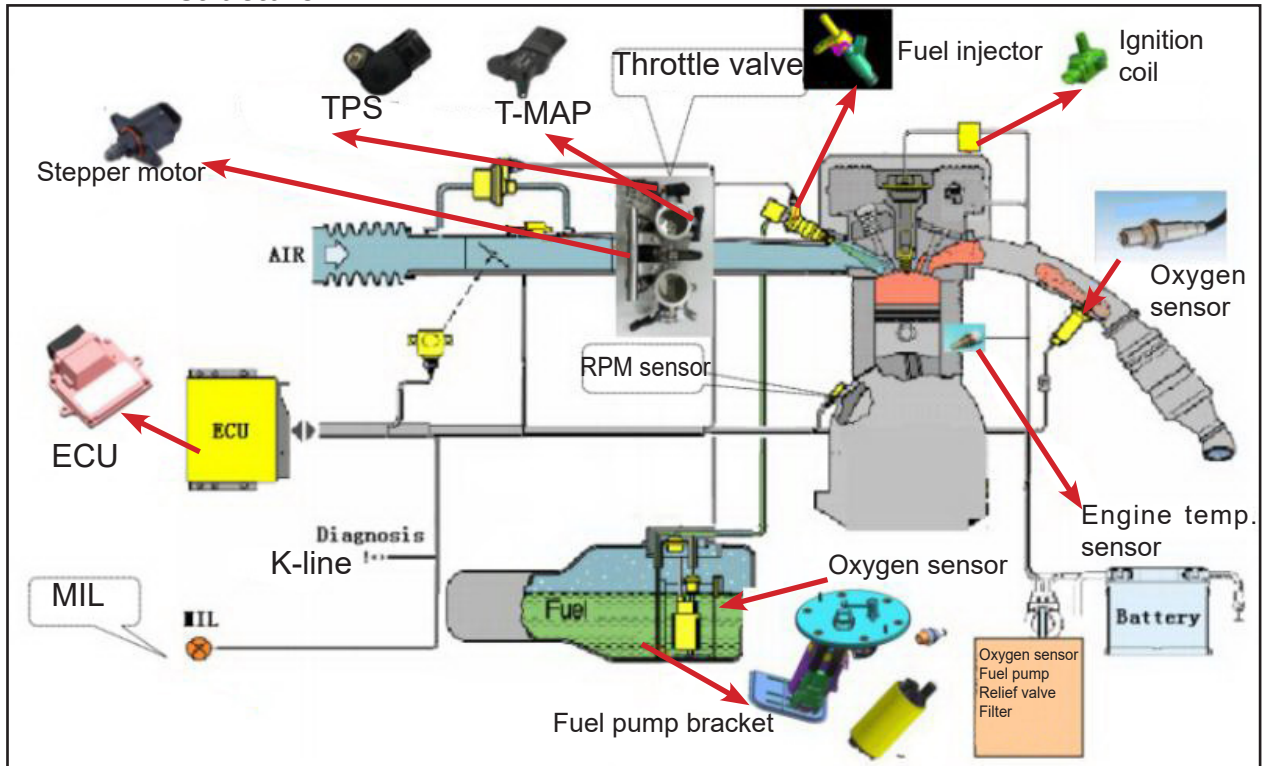
Idle Speed: $1500\text{r/min}\pm 150\text{r/min}$



Fuel gauge

12.14 EFI system

12.14.1 EFI structure



12.13.5 Sensors

A sensor is a device that measures a physical quantity and converts it into a signal which can be read by an observer or by an instrument. Sensors in EFI system include:

Air pressure sensor (air density and pressure information)

Air temp. sensor (air density and temperature information)

TPS (load, load range, speed information)

Trigger (crankshaft information)

Coolant temp. sensor (engine temp.)

Speedometer sensor (output shaft RPM information)

Phase sensor (gear information)

Oxygen sensor (air factor= $\lambda > 1$ or < 1)

12.13.6 ECU

Electronic Control Unit, the brain of EFI system, which determines the amount of fuel injection, ignition TDC and other parameters a engine needs to keep running by calculating and analyzing values provided by sensors.

12.13.7 Actuators

Actuators execute the EFI instruction. Main actuators include:

• **Fuel Pump** (Provide high-press fuel)

• **Fuel Injector** (Inject the fuel to make it spray better)

• **Ignition Coil** (Provide high ignition energy to spark plug)

• **Throttle Valve** (Provide engine with intake air)

12.14.2 EFI System Maintenance Notice

- Always use genuine CFMOTO parts for maintenance. Otherwise it can not assure a normal performance to EFI system.
- During the maintenance procedure, never try to break down the EFI components.
- In the course of maintenance, EFI parts must be handled carefully.
- Ignition switch must be shut off before connecting or disconnecting connectors. Otherwise, it may cause the EFI parts damage.
- When removing fuel pump from fuel tank, do not energize the fuel pump. Otherwise, a spark can cause a fire.
- Fuel pump is not allowed to operate in a dry environment or under water. Otherwise, its life would be shortened. Besides, reverse connections between positive and negative terminal of fuel pump is not permitted.
- The fuel pressure in EFI fuel supply system is very high (about 330kPa), accordingly, all fuel lines are high pressure resisting. Even if the engine is not running, the fuel pressure is high. Therefore, do not disassemble the fuel line unless it's necessary.

When the fuel line needs to be repaired, release the fuel pressure as follow shows:

Remove fuel pump relay, start the engine and allow it to idle until the engine stalls automatically.

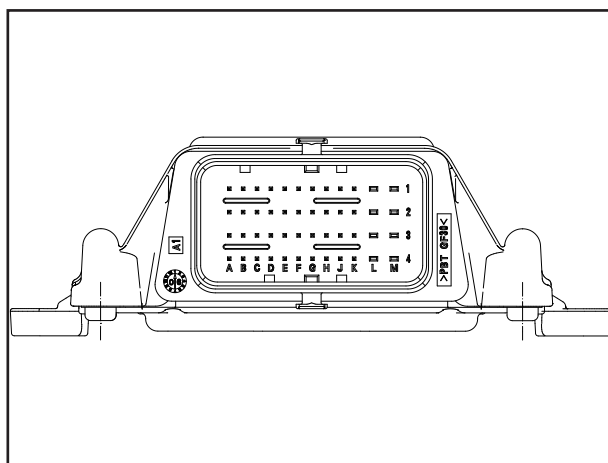
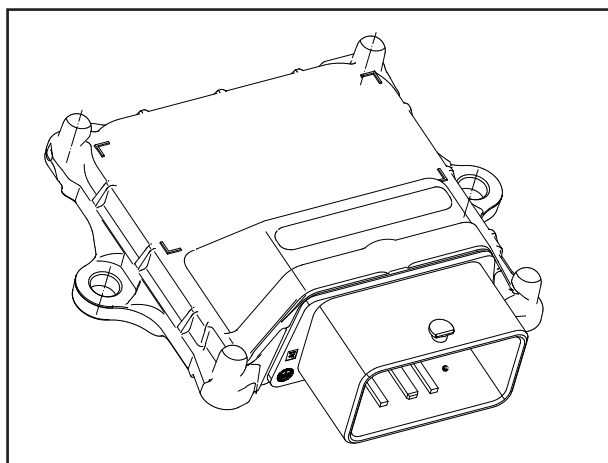
Fuel line removal and fuel filter replacement should be practiced by a professional person in a well-ventilated place.

- If possible, don't do the spark test. If spark test is done unavoidably, try to complete the test as soon as possible. Besides, don't open the throttle, otherwise, a large quantity of unburnt fuel would enter muffler, causing the catalytic converter damage.
- Idle speed is controlled by ECU, so it's unadjustable. The throttle limiter screw has been adjusted by manufacturer before sale. Therefore, it's not recommended to adjust it by the user.
- Don't reverse the battery cable connections. This may damage electrical components.
- Never remove the battery cables When the engine is running.
- Always remove cables and electrical control units which are connected with battery terminals.
- Never test the component input and output electric signal by piercing the cable plastic jacket.
- Respect the environment and dispose of the waste left during maintenance.

12.15 Structure and Performance of EFI Parts

12.15.1 ECU

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



ECU pin function (without canister solenoid valve (MSE 6.0)):

Pin	Function	Pin	Function
1(M1)	Null	25(D2)	Brake switch
2(L1)	Oxygen sensor heated 1	26(C2)	Starter relay
3(M2)	Ignition 1	27(B2)	Stepper motor phase A
4(L2)	Null	28(A2)	Stepper motor phase B
5(M3)	Ignition to ground	29(K3)	MIL
6(L3)	Null	30(J3)	5V output 12
7(M4)	Null	31(H3)	Null
8(L4)	Interruptible battery UBR1	32(G3)	Ignition switch KL 15
9(K1)	Intake air pressure sensor 1(DS)	33(F3)	Uninterrupted battery (UBD)
10(J1)	Senor to ground 1	34(E3)	K_line
11(H1)	Intake air temp. sensor(TANS)	35(D3)	Neutral gear switch
12(G1)	TPS (DKG)	36(C3)	Null
13(F1)	Engine temp. sensor (TMDT)	37(B3)	Reverse gear switch
14(E1)	Main relay	38(A3)	Null
15(D1)	CAN1 I/F 1 Low	39(K4)	Null
16(C1)	CAN1 I/F 1 High	40(J4)	Engine RPM output
17(B1)	Stepper motor phase D	41(H4)	Speed sensor
18(A1)	Stepper motor phase C	42(G4)	RPM sensor B(DGB)
19(K2)	Oxygen sensor signal 1	43(F4)	RPM sensor A(DGA)
20(J2)	Null	44(E4)	Headlight relay
21(H2)	P gear switch	45(D4)	Radiator fan relay
22(G2)	Null	46(C4)	Fuel pump relay
23(F2)	4WD diff-lock switch	47(B4)	Null
24(E2)	Override switch	48(A4)	Fuel injector 1

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ECU pin function (with canister solenoid valve (MSE 6.0)):

Pin	Function	Pin	Function
1(M1)	Null	25(D2)	Brake switch
2(L1)	Oxygen sensor heated 1	26(C2)	Starter relay
3(M2)	Ignition 1	27(B2)	Stepper motor phase A
4(L2)	AIS solenoid valve	28(A2)	Stepper motor phase B
5(M3)	Ignition to ground	29(K3)	MIL
6(L3)	Canister fuel vapor control	30(J3)	5V output 12
7(M4)	Null	31(H3)	Null
8(L4)	Interruptible battery UBR1	32(G3)	Ignition switch KL15
9(K1)	Intake air pressure sensor 1(DS)	33(F3)	Uninterrupted battery (UBD)
10(J1)	Senor to ground 1	34(E3)	K_line
11(H1)	Intake air temp. sensor(TANS)	35(D3)	Neutral gear switch
12(G1)	TPS (DKG)	36(C3)	First cylinder ignition diagnosis
13(F1)	Engine temp. sensor (TMDT)	37(B3)	Reverse gear switch
14(E1)	Main relay	38(A3)	P gear switch
15(D1)	CAN1 I/F 1 Low	39(K4)	Seat belt switch
16(C1)	CAN1 I/F 1 High	40(J4)	Engine RPM output
17(B1)	Stepper motor phase D	41(H4)	Speed sensor
18(A1)	Stepper motor phase C	42(G4)	RPM sensor B(DGB)
19(K2)	Upper stream oxygen sensor signal 1	43(F4)	RPM sensor A(DGA)
20(J2)	Null	44(E4)	Headlight relay
21(H2)	Null	45(D4)	Radiator fan relay
22(G2)	Null	46(C4)	Fuel pump relay
23(F2)	4WD diff-lock switch	47(B4)	Null
24(E2)	Override switch	48(A4)	Fuel injector 1

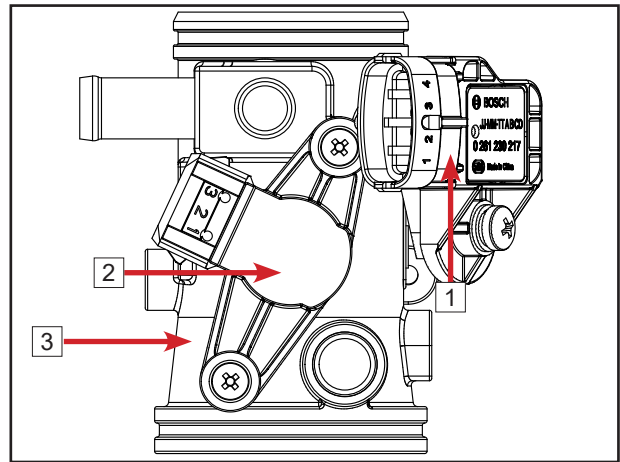
ECU pin function (MSE 8.0)

Pin	Function	Pin	Function
1(A)	Lambda sensor 1 heater	18(T)	Start relay
2(B)	Stepper driver A	19(U)	Fan relay
3(C)	Vehicle speed input	20(V)	Lambda sensor upstream 1
4(D)	Continous supply voltage	21(W)	Throttle position sensor
5(E)	Engine speed Sensor A	22(X)	Null
6(F)	Engine speed Sensor B	23(Y)	Carbon tank control valve
7(G)	Power ground 1	24(Z)	Stepper driver C
8(H)	Intake air pressure sensor	25(A1)	Stepper driver B
9(J)	Engine speed output	26(B1)	Ignition switch
10(K)	Power ground 2	27(C1)	Sensor ground
11(L)	Ignition coil 1	28(D1)	Pump relay
12(M)	Injector 1	29(E1)	Main relay
13(N)	Stepper driver D	30(F1)	Null
14(P)	Null	31(G1)	Speed up switch
15(Q)	Regulated sensor supply 1	32(H1)	Engine collant temp.sensor
16(R)	CAN1 L	33(J1)	Intake air temperature sensor
17(S)	CAN1 G		

12.15.2 Throttle Valve Body

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

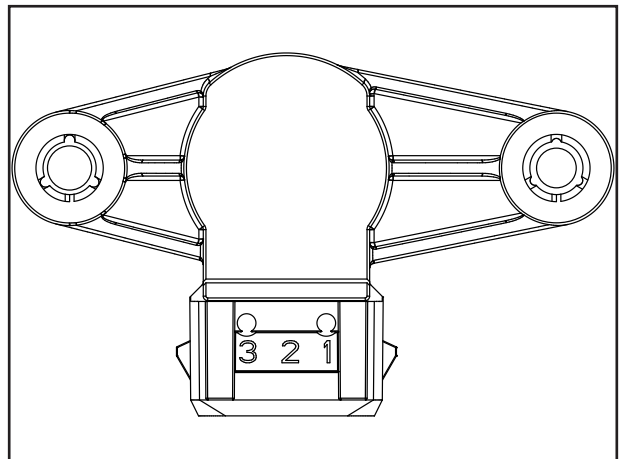
1	T-MAP	3	Throttle valve
2	TPS		



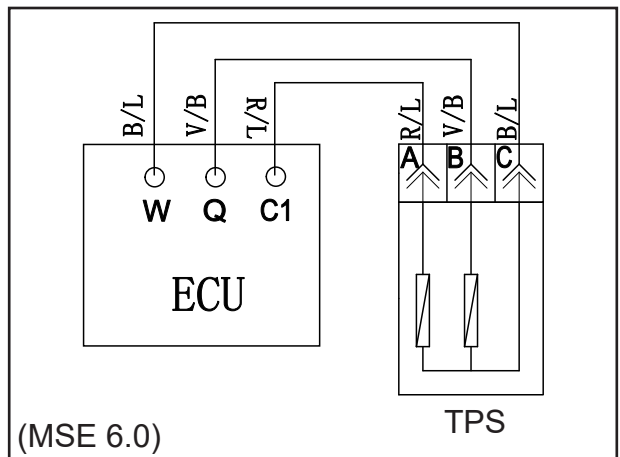
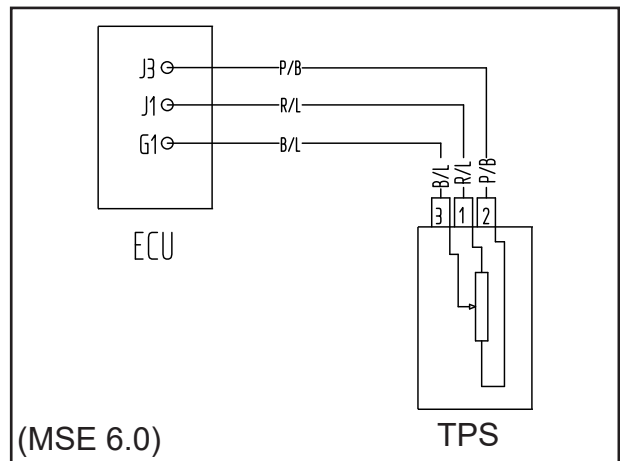
TPS

Pin function:

- 1 to ground.
- 2 to 5V power.
- 3 to output voltage signal.



Circuit connecting with ECU.



12.15.3 T-MAP

Intake air pressure sensor: this sensor monitor intake air pressure, which provides the engine load signal to ECU.

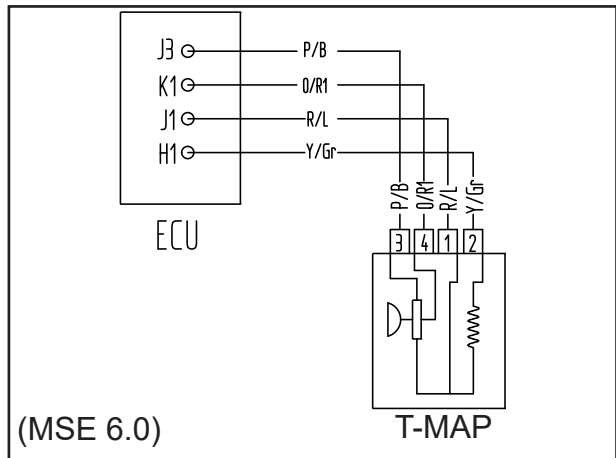
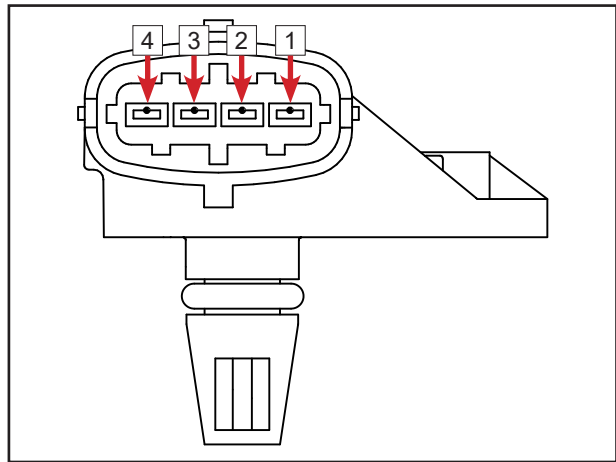
Intake air temp. sensor: This sensor is an NTC thermo resistance. The resistance is getting higher with coolant temperature, but not in linear relationship.

Air pressure sensor and temp. sensor are sealed together.

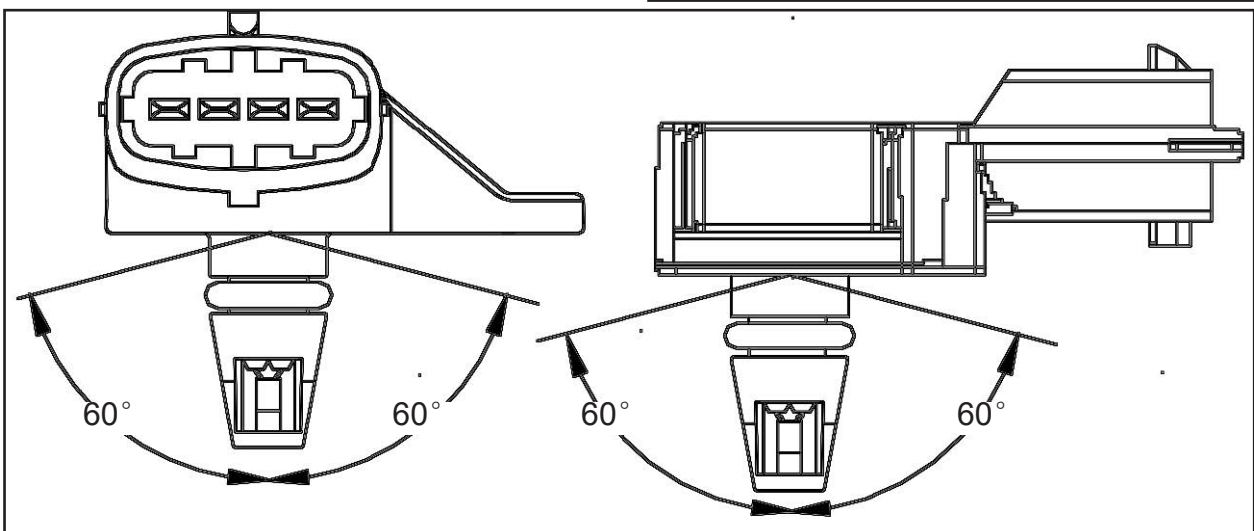
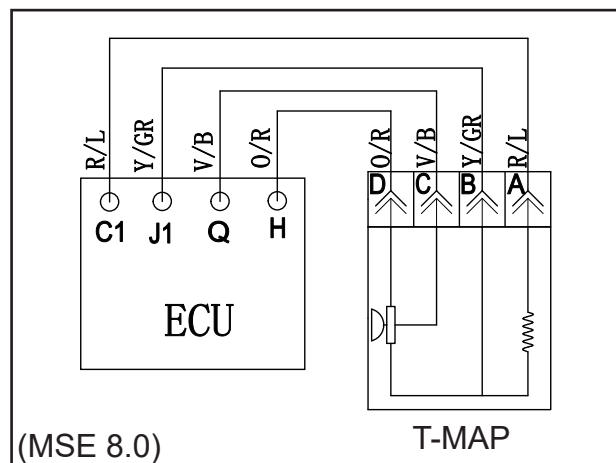
Pin function:

- 1 to ground.
- 2: Intake air temp. signal.
- 3 to 5V power.
- 4: Intake air pressure signal.

Circuit connecting with ECU.

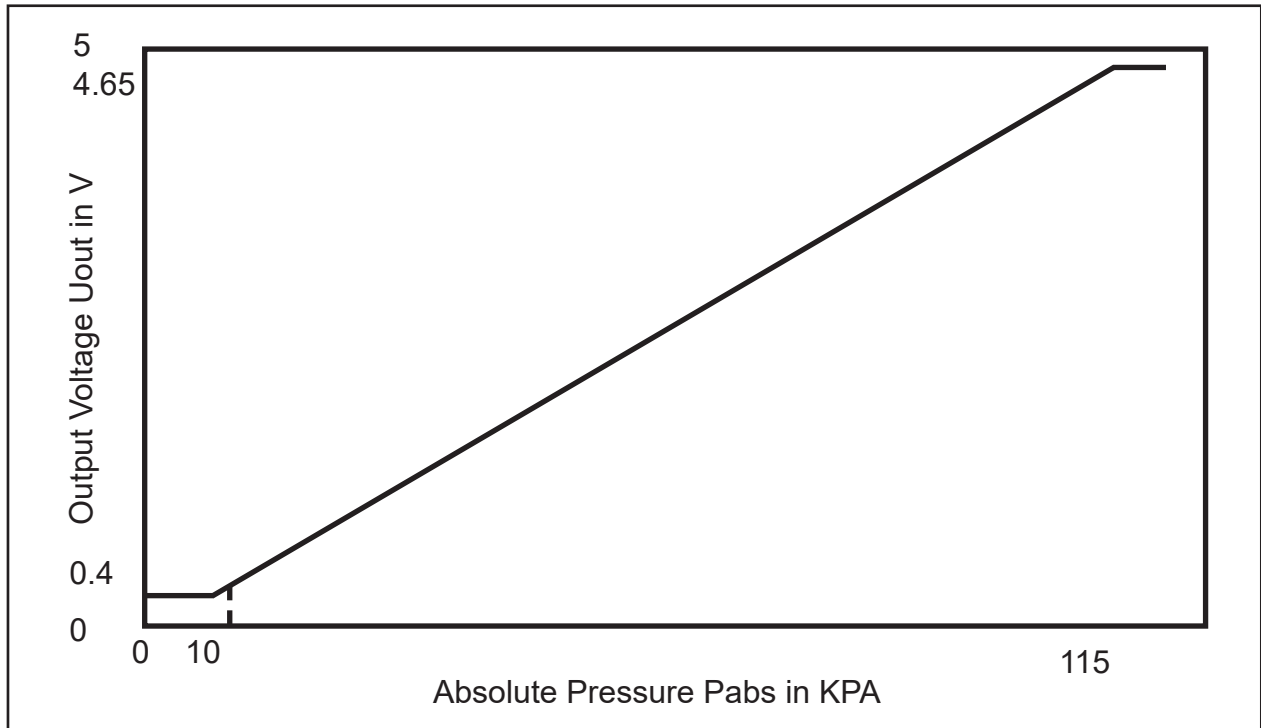


The picture below shows the allowable mounting range, which ensures that condensation does not form inside the sensor, as the condensation damages pressure sensitive elements within the sensor.

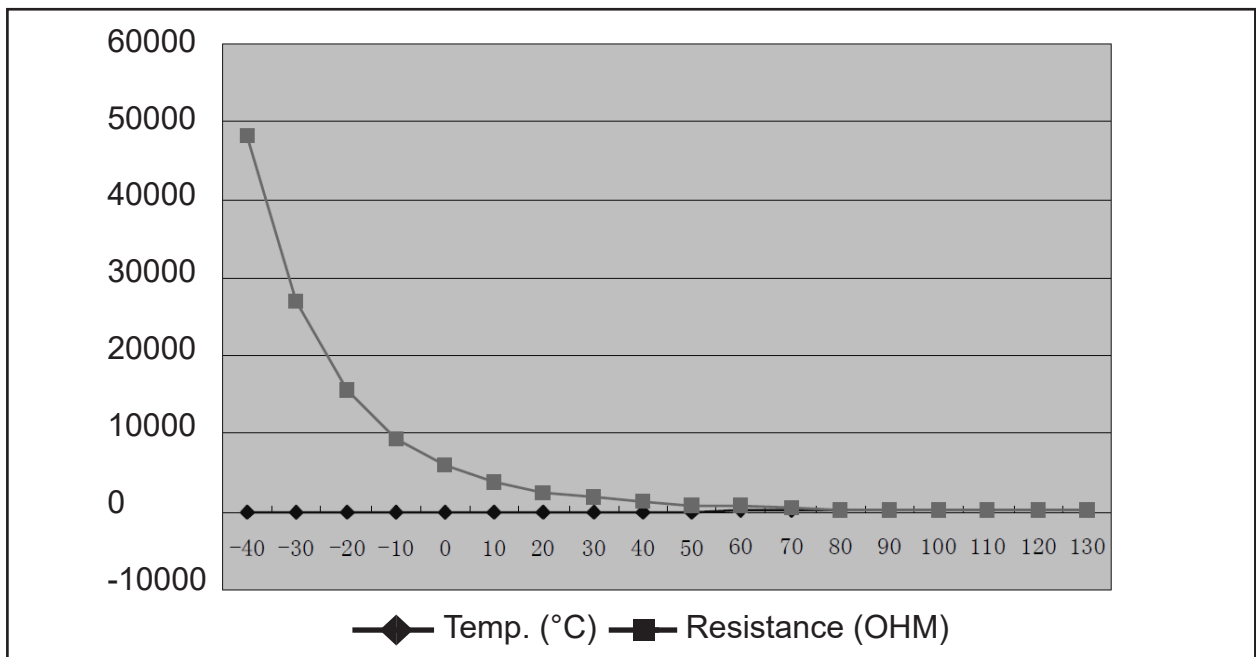


12 Electrical System

The relationship between output voltage and pressure.
Pressure range: 10~115kPa



The relationship between sensor temperature and resistance.



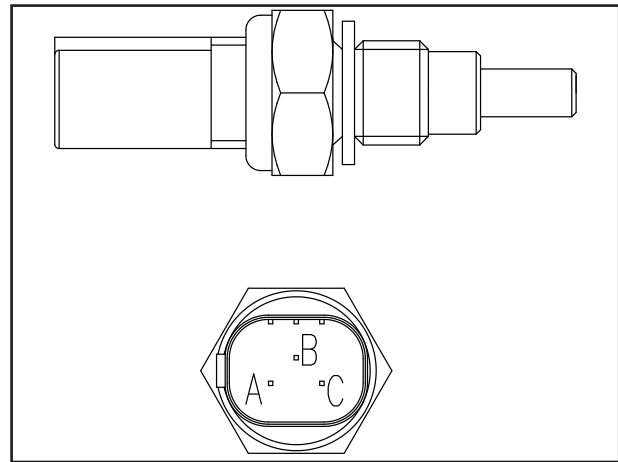
12.15.4 Water Temp. Sensor

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

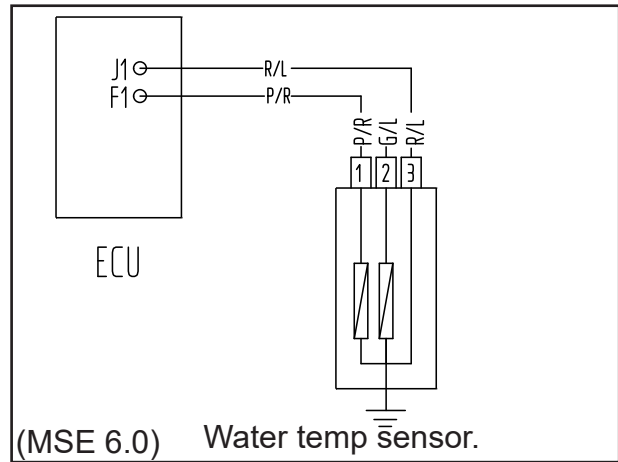
One group of parameters is sent to ECU to monitor engine temperature condition, One group is sent to dashboard to monitor coolant temperature condition.

A and C are one group which provides coolant temperature signal to the ECU.

Through ECU, B sends the coolant temperature signal to dashboard.



Circuit connecting with ECU.

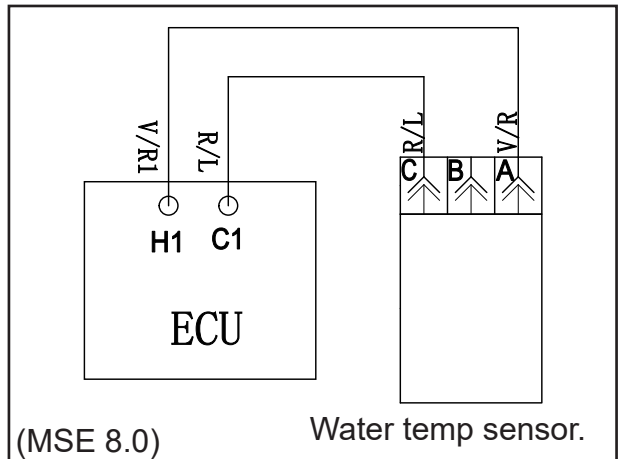


Water Temp. Sensor Inspection

Measure resistance between pin A and C with multimeter:

ECU resistance (A-C)	
Temp. °C	Resistance(Ω)
-20±0.1	13.71~16.49
25±0.1	1.825~2.155
80±0.1	0.303~0.326
110±0.1	0.1383~0.1451

If the resistance is beyond standard, the sensor is damaged. Replace with new one.

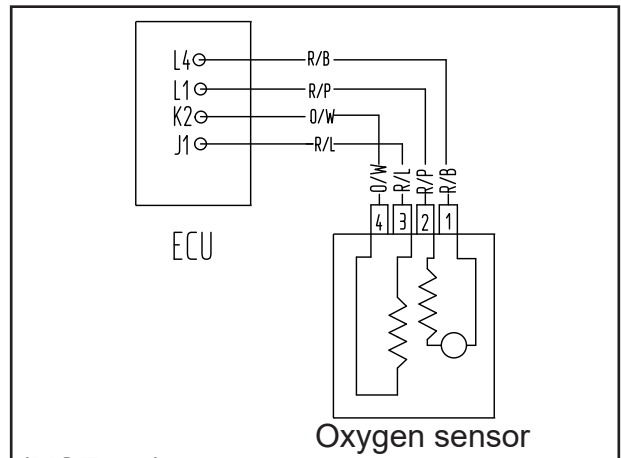
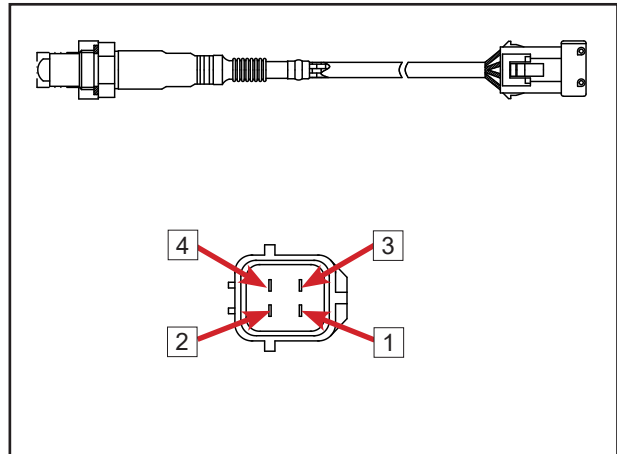


12.15.5 Oxygen Sensor

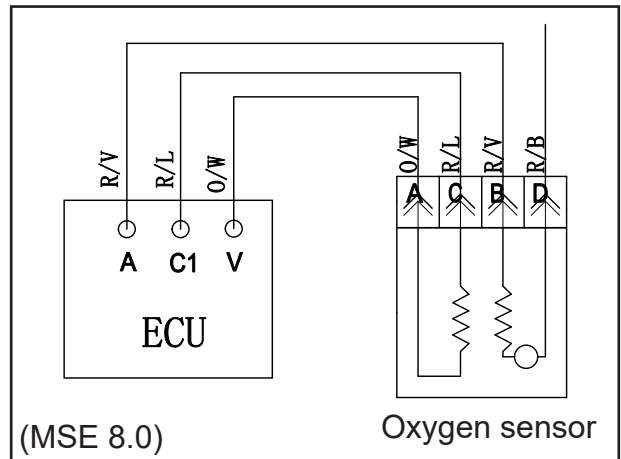
This sensor is used in closed-loop feedback controlled fuel injection to improve the air-to-fuel ratio accuracy and control the emission. It's located in the exhaust stream to measure the amount of oxygen in exhaust and send the signal to ECU, which can revise the fuel injector output, so as to reduce the amounts of unburnt fuel and make catalytic converter convert HC, CO and NOX of Nitrogen efficiently.

Pin Function:

- 1 to heated power +.
- 2 to heated power -.
- 3: output signal voltage -.
- 4: output signal voltage +.



(MSE 6.0)



(MSE 8.0)

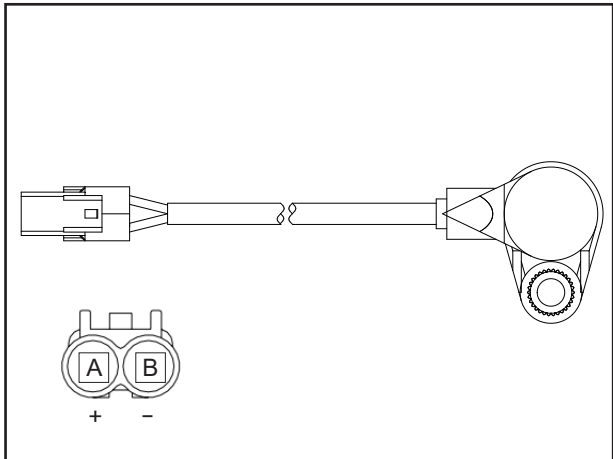
Oxygen sensor characteristic table

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

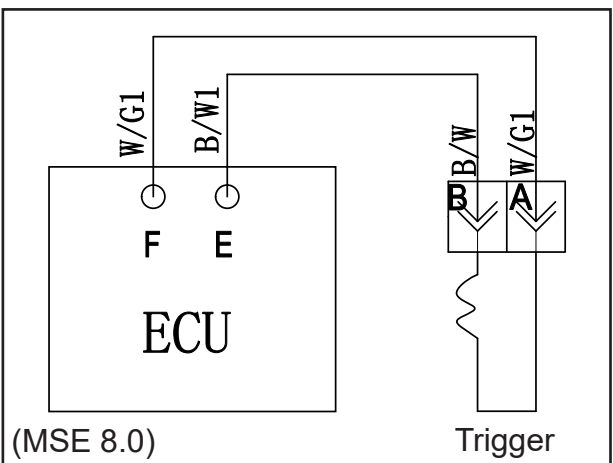
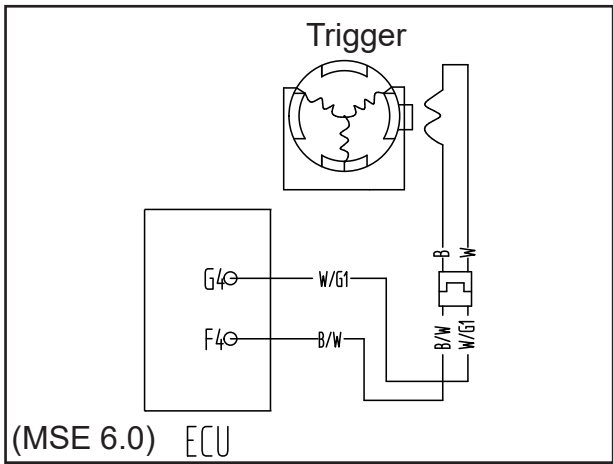
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12.15.6 Trigger (RPM Sensor)

The trigger transfers signal of engine speed to ECU and by which ECU to confirm engine speed ignition angle and injecting phase.



Circuit connecting with ECU.



Trigger Resistance Measurement

Set multimeter to $1 \times 2k\Omega$.

Trigger coil resistance: $950 \pm 50\Omega(20^\circ\text{C})$

Replace a new one when resistance is beyond value range.

Trigger Peak Voltage Measurement

Connect multimeter and peak voltage adapter as shown as right picture

+Probe: Green (B) wire

-Probe: Blue (A) wire

NOTE: Refer to owner's manual when using peak value voltage adapter.

Set multimeter to ACV.

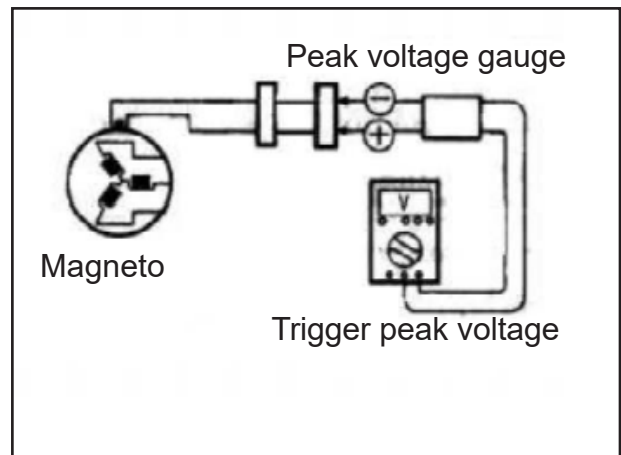
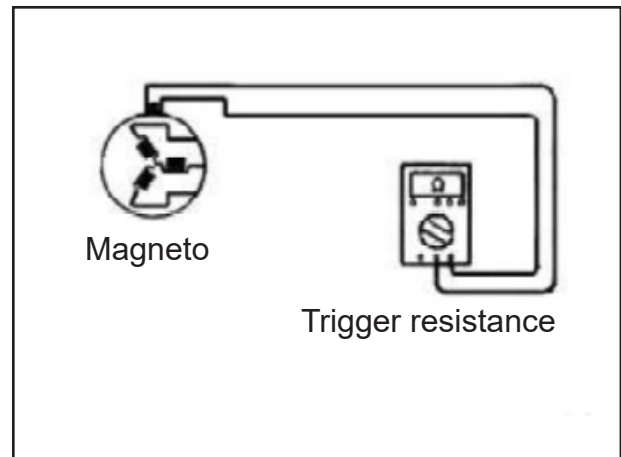
Set engine to Neutral gear, turn ON ignition switch.

Press starter button and keep engine running for seconds, then measure trigger coil peak value voltage.

Repeat a few times and record the highest value.

Trigger coil peak value voltage: $\geq 3\text{V}$ (200r/min)

Replace a new one when peak value voltage is beyond above value range.

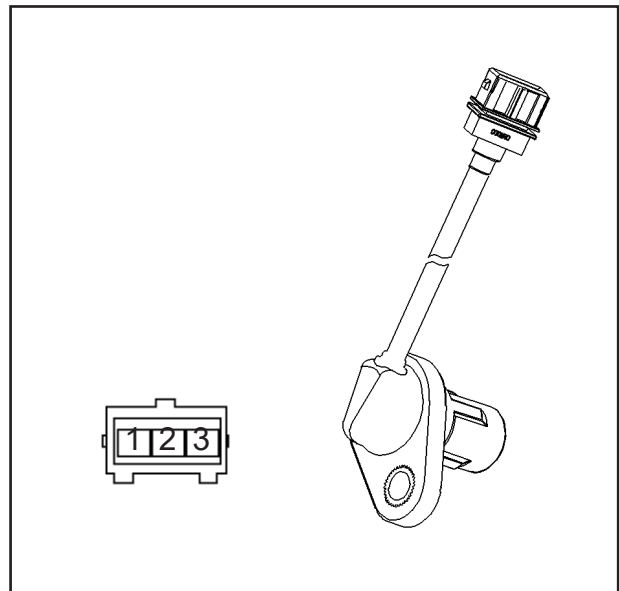


12.15.7 Speed Sensor

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

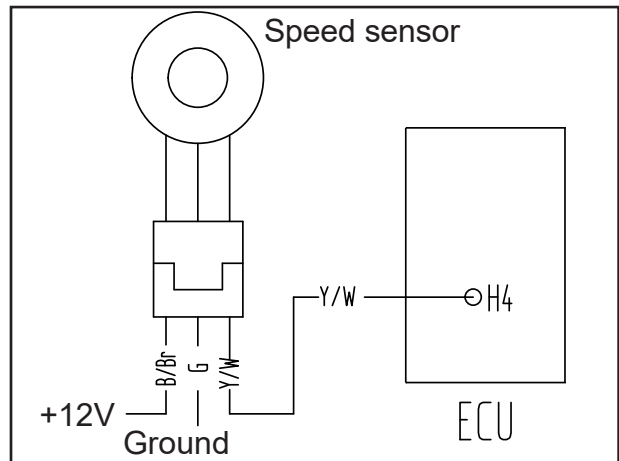
Pin Function:

- 1 to ground.
- 2: output voltage signal (>80% of input voltage).
- 3: battery+DC12V.



Speed sensor

Circuit connecting with ECU.



Speed Sensor Inspection

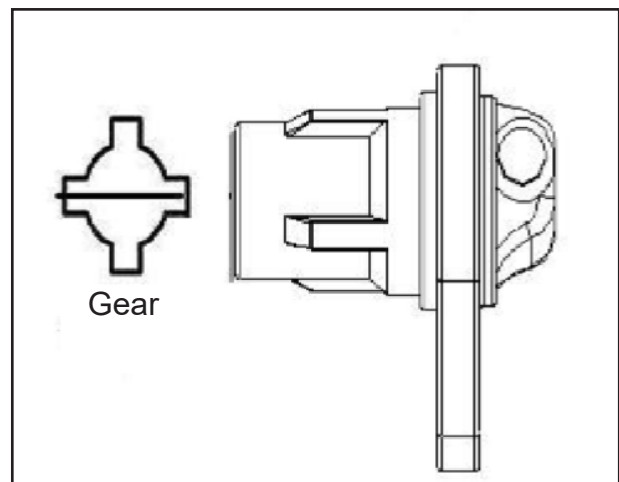
Ground pin 1. Connect pin 3 with +12V power.

Fix the gear **5mm** away from the speed sensor as the picture shows.

Turn multimeter to DCV.

Slowly rotate the gear and measure the voltage between pin 2 and pin 3 to determine that if the reading varies from 0V~12V

If the reading doesn't vary, it indicates the sensor is defective and needs to be replaced.



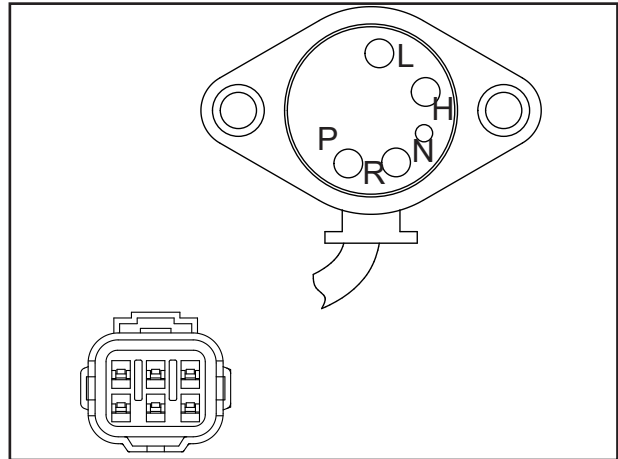
12.15.8 Gear Position Sensor

This sensor is used to provide the gear position signal for meter display.

Pin function:

- L(Low gear)
- H(High gear)
- N(Neutral gear)
- R (Reverse gear)
- P(Parking gear)

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



Gear sensor

WARNING when driving in reverse

- When driving in reverse, gear sensor sends the reverse signal to ECU and dashboard. ECU will limit the vehicle speed in response to the reverse signal.

12.15.9 Fuel Pump

This fuel pump assembly includes fuel pump, plastic support, preliminary filter, fine filter and pressure regulator. It supplies fuel for engine under a certain pressure and flow.

Pins and Function:

1 to ground.
2 to fuel pump relay output.

Parameters:

Pressure regulator opening pressure : $0.3 \pm 0.01 \text{MPa}$

Pressure regulator opening pressure : $0.33 \pm 0.01 \text{MPa (EU V)}$

Flow: Higher than 35L/h

- This fuel pump is located in fuel tank;
- Don't operate the fuel pump in dry condition to prevent damage.
- Always handle the fuel pump gently. Never drop the fuel pump.
- The battery supplies power to the fuel pump through fuel pump relay. The relay circuit is connected only when vehicle starts and engine is running.

Fuel Pressure Measurement

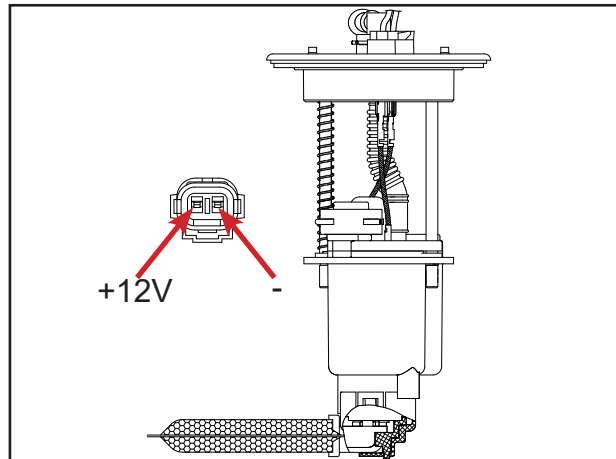
Connect the fuel pressure gauge with fuel outlet and tighten the joint with a clamp to prevent fuel leaks.

Route according to the circuit.

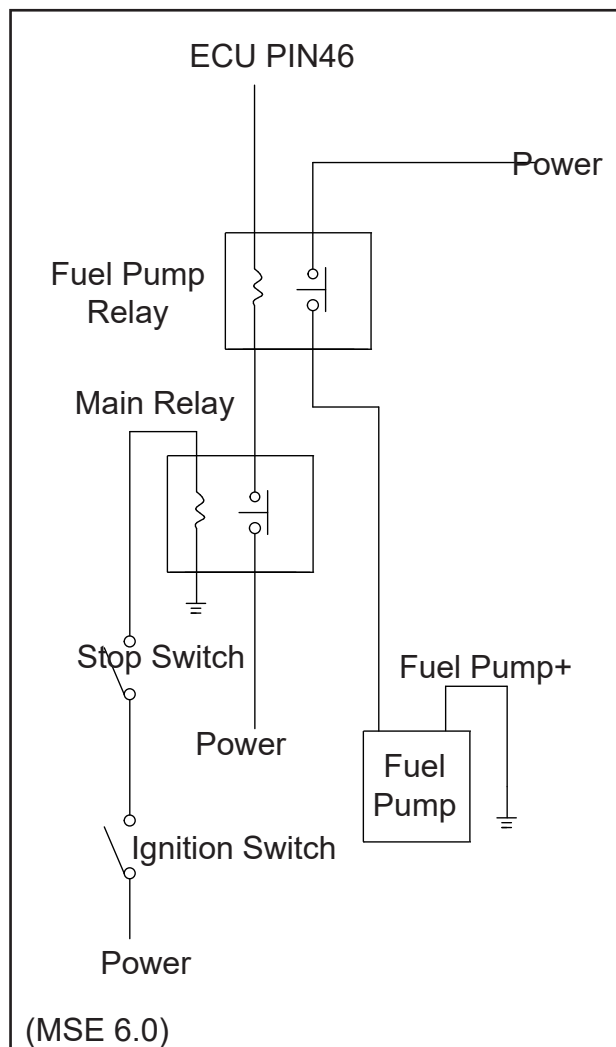
Turn ON both ignition switch and stop switch. At this moment, fuel pump will operate for 5 seconds. After the fuel pump stops running, fuel pressure should reach to standard value. Otherwise, replace the fuel pump assy. After the engine stops, fuel pressure should be kept 0.25MPa for more than 5 minutes. Otherwise, replace the fuel pump assy.

Pressure Relief in Fuel System:

In EFI model, pressure in fuel system is very high, as well as in fuel hoses. Even though the engine is not started, pressure in fuel system remains high. Therefore, it's not recommended to remove fuel hoses before pressure relief.



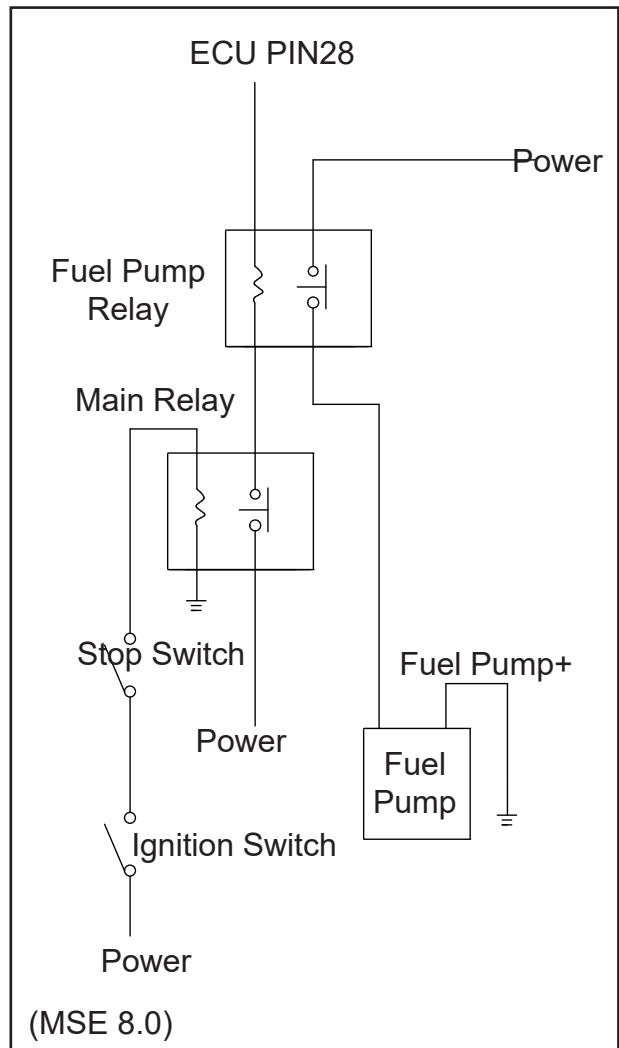
Fuel pump



12 Electrical System

Follow the procedure below to perform pressure relief:

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



12.15.10 Fuel Injector

One end of fuel injector is installed on fuel injector seat, and the other attaches to the injector cap. Fuel injector is controlled by ECU to inject fuel at stated time into the engine. This injector nozzle is a 4-hole style. Don't turn injector after the join is installed.

Pin function:

Connector with mark "+": to main relay output terminal.

Connector without mark: to ECU pin 48.

Fuel injector resistance: $12\Omega \pm 0.6\Omega (20^{\circ}\text{C} \pm 2^{\circ}\text{C})$

Circuit connecting with ECU.

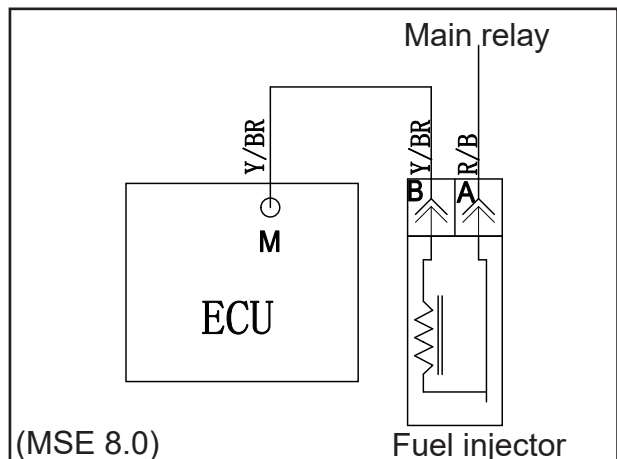
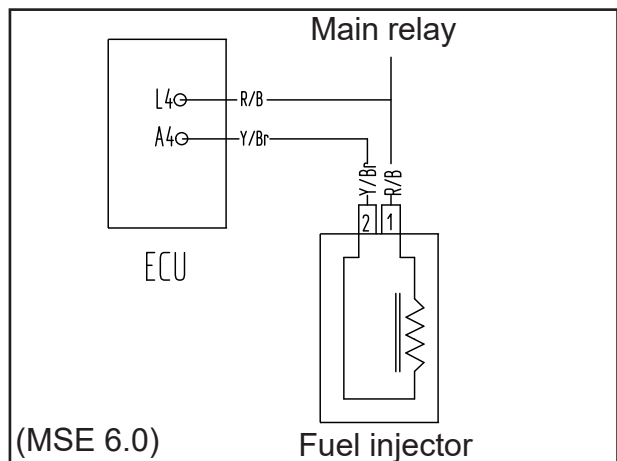
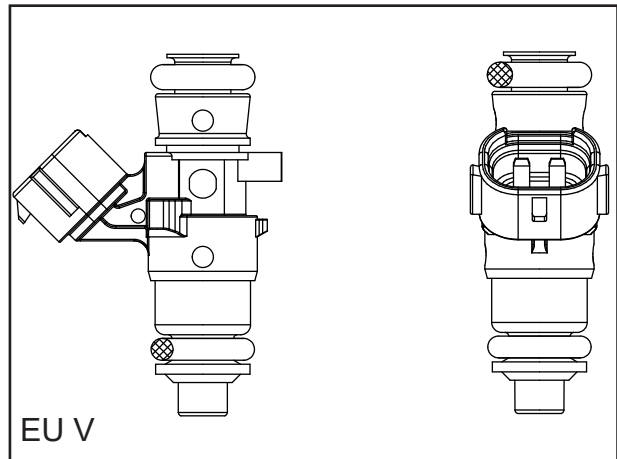
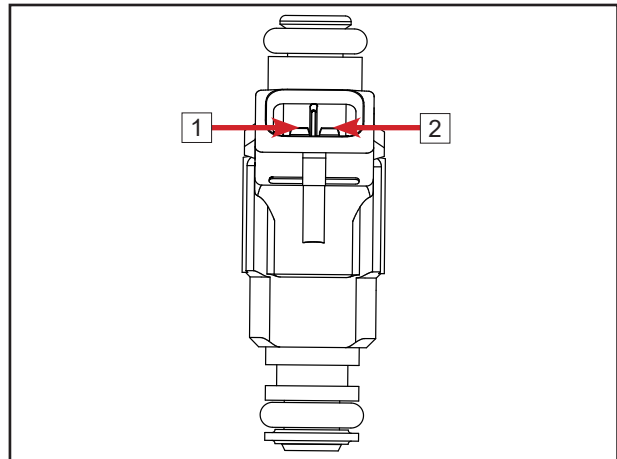
Fuel Injector Installation

Install fuel injector manually. Never knock fuel injector with a hammer.

Replace o-rings during fuel injector removal and installation.

Perform pressure relief before fuel injector removal if necessary.

Inspect the fuel injector for sealing after installation to ensure there is no leaking.

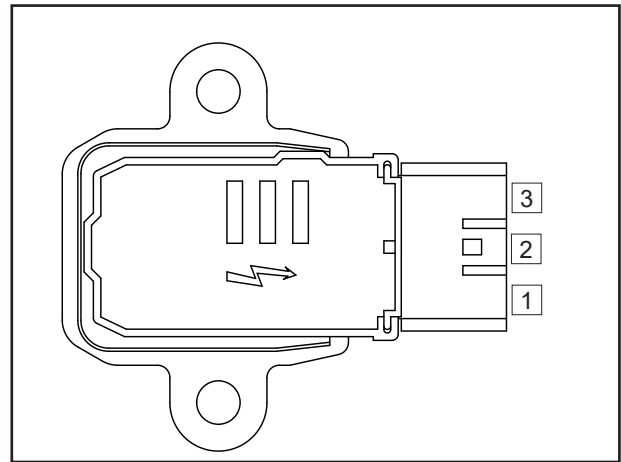


12.15.11 Ignition Coil

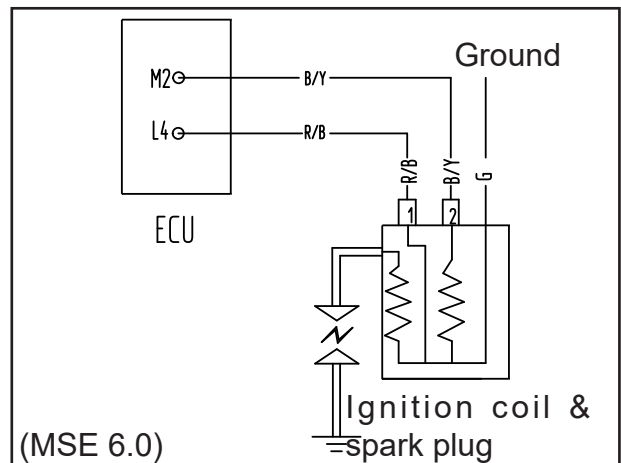
Ignition coil transforms the low voltage of primary coil to high voltage of secondary coil by sparking from spark plug and igniting the mixture of air and fuel in cylinder

Pin function:

- 1 to control signal.
- 2 to power +12V.
- 3 to ground.



Circuit connecting with ECU.



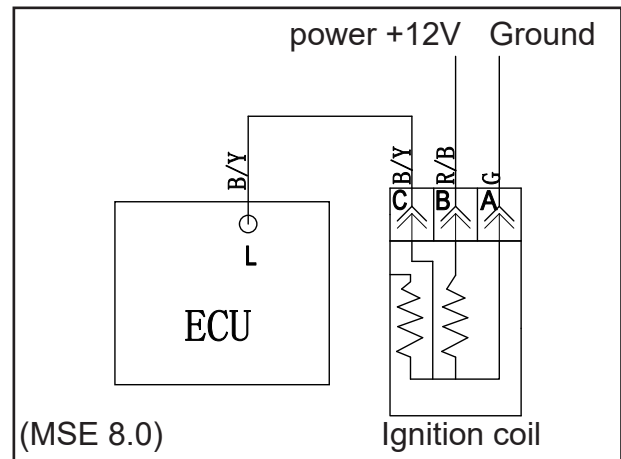
Secondary Ignition Voltage Measurement

Connect with engine according to EFI wiring diagram.

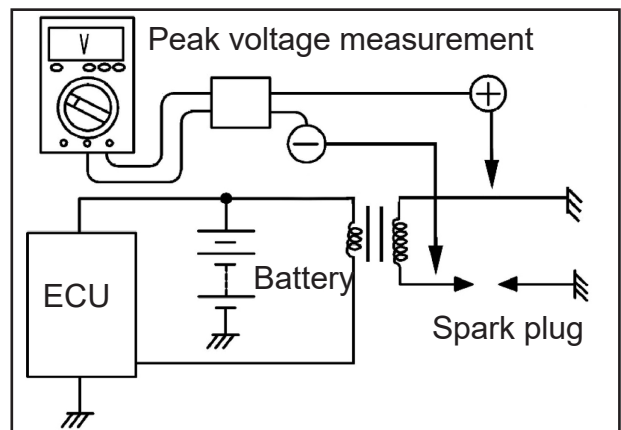
Connect the peak voltage tester according to the right diagram.

Start the engine.

Secondary ignition voltage should be >15000V.

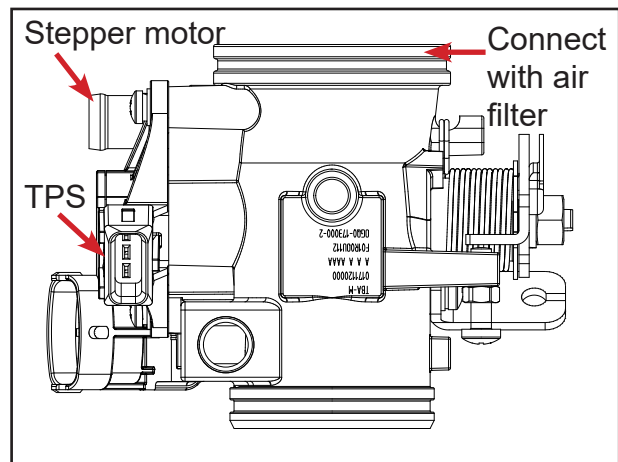
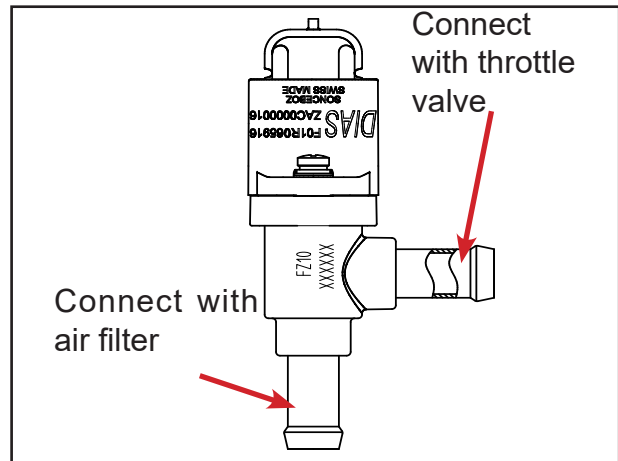


Ignition coil parameter chart table:

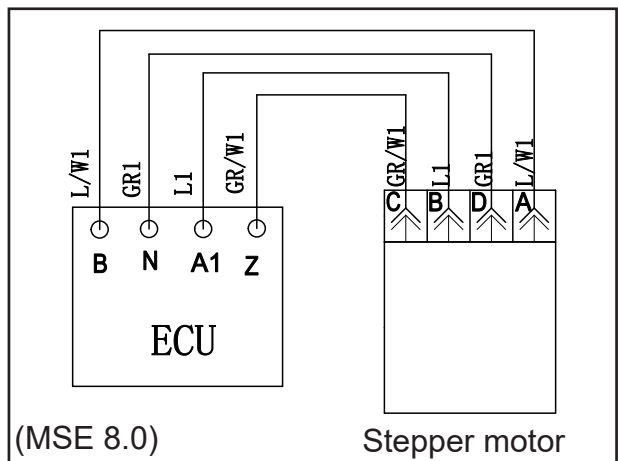
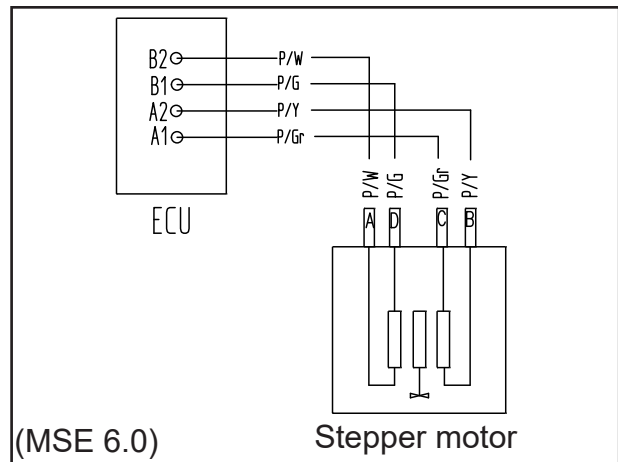


12.15.12 Stepper Motor

It is used to control the air flow of bypass. The ECU calculates the engine load and controls the stepper motor through electrical pulse duration and frequency (as known as duty ratio). Stepper motor allows different air flows pass through under different pressure difference. Install the stepper motor according to certain method. Otherwise, it may lead to incorrect idle speed. Idle valve closes if there is no electrical pulse.



Circuit connecting with ECU.



12.16 EFI Self-diagnosis

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

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

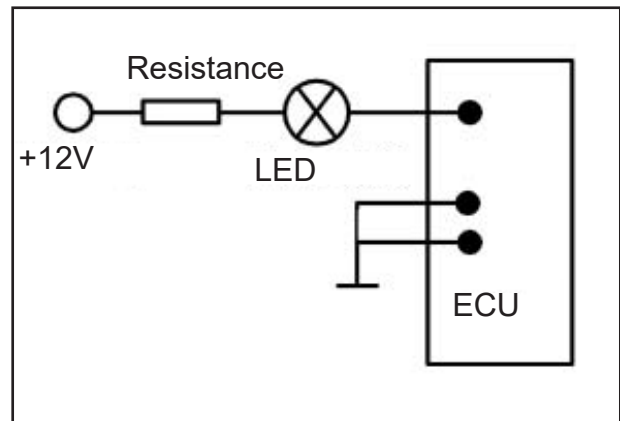
When servicing, using PDA and MIL, the defective parts can be promptly found to improve the service efficiency and quality.

EFI system is mainly diagnosed by MIL and PDA.

12.16.1 Malfunction Indicating Lamp (MIL)

It indicates different fault codes through the flashes in different frequency.

The right picture is the MIL connection circuit. The current in pin 29 to ECU should be less than 0.5 A. (EU168)



MIL Flash Principle:

If the ECU detects MIL is in flash code mode, MIL indicator flashes to show trouble code.

MIL in code-flashing mode without fault in memory:

From ECU forming, MIL is lightened for 4 seconds. After 1 second interval, MIL indicator flashes every 0.5s. It means there is no fault. MIL indicator goes off until engine starts and find RPM.

MIL in code-flashing mode with fault in memory:

From ECU forming, MIL is lightened for 4 seconds. After 1 second interval, MIL light flashes to display fault code. If all faults in memory are shown, MIL goes off and quites flash code mode.

K-line should connect to ground in code-flashing mode.

Read the trouble information by flashing code:

Turn on ignition switch with K-line to ground for more than 2.5 seconds. If the ECU memory has trouble code, MIL indicator will display the code by flashing. Take P0203 as an example, its flashing method is: flashing 10 times-off-flashing twice-Off-flashing 10 times-Off-flashing three times.

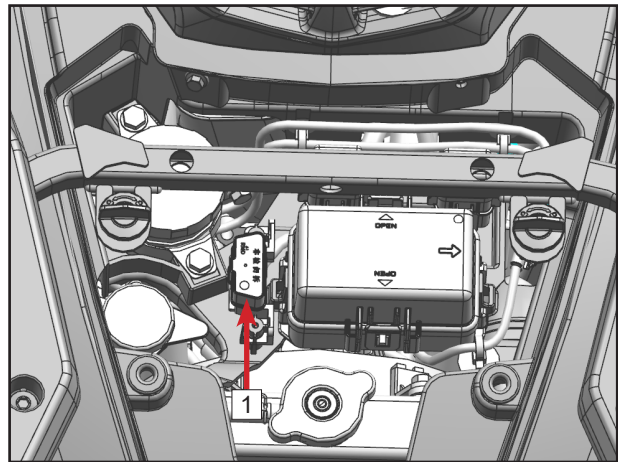
12.16.2 Diagnosis Tool and Connector

OBd diagnosis connector **1** is located under front service cover.

There are 16 pins on diagnosis tool, which connects to OBd diagnosis connector.

The picture refers to operation panel of PDA. When it comes to detailed keys operation and function, refer to PDA manual.

NOTE: Unplug k-line during diagnosis.



Key function:

LH Key: Page up

UP Key: Scroll Up

RH Key: Page Down

Down Key: Scroll Down

OK Key: Entrance

EXIT Key: Exit



PDA Function:

1. Version Information Display

PDA can display engine, ECU hardware and software information.

2. Fault Display

PDA monitors IAP sensor, IAT sensor, coolant temperature sensor, TPS, O2S, O2S heater circuit, air-to-fuel ratio revision, fuel injector, fuel pump relay, CPS, speed signal, idle speed, idle air control valve, system voltage, ECU, FI indicator and displays the fault code.

3. Engine Data stream Display

PDA can display battery voltage, RPM, desired idle speed, vehicle speed, coolant temperature, coolant temperature sensor signal voltage, inlet air temperature, IAT sensor signal voltage, inlet air pressure, inlet air flow, IACV target position, TPS signal voltage, throttle body position, throttle body relative position, canister duty, charging time, FI pulse width, park advance angle, O2S voltage, engine relative load, canister load, IACV position, atmospheric pressure, altitude multiplier, engine operation time.

4. EFI Status Display

Starter switch, main relay, fuel pump relay, idle speed, idle speed, full load status, deceleration activation, acceleration activation, FI close loop activation, lambda control activation, canister control valve activation, MIL status.

5. Actuator Test Function

MIL, fuel pump, IACV, canister control valve, ignition, fuel injection.

1	UP Key	4	EXIT Key	7	Power switch
2	LH Key	5	OK Key		
3	RH Key	6	Down Key		

12.17 Fault Diagnosis

12.17.1 Engine Body

Trouble	Reason	Solution
<p>Engine cannot start</p>	<p>Inspect the electrical system</p> <ul style="list-style-type: none"> ● Fuse melted ● Battery low ● Cable problem <p>Inspect the spark plug</p> <ul style="list-style-type: none"> ● Ignition coil bad connection ● High voltage bad connection ● RPM sensor trouble ● Magneto trouble ● Spark plug clearance not fit ● Spark plug dirty ● Spark plug too wet <p>Inspect fuel supply system</p> <ul style="list-style-type: none"> ● Canister ● Fuel pump leaking or bad effect ● Fuel line leaking ● Fuel low ● Injector jammed <p>4. Inspect cylinder pressure</p> <ul style="list-style-type: none"> ● Cylinder wearing ● Piston ring wearing ● Gasket leaking ● Valve conducting pipe wearing ● Valve seat bad sealing ● Valve wearing ● Spark plug loose ● Starting RPM low ● Valve TDC wrong ● Valve clearance not fit <p>5. Idle by pass valve jammed</p> <p>6. Not in N gear</p> <p>7. Trouble code</p>	<p>Inspect or replace</p> <p>Inspect or charge</p> <p>Inspect or replace</p> <p>Inspect or replace</p> <p>Inspect or replace</p> <p>Inspect or replace</p> <p>Inspect or replace</p> <p>Adjust or replace</p> <p>Clean or replace</p> <p>Dry or replace</p> <p>Repair and replace</p> <p>Inspect or replace</p> <p>Inspect the fuel tank</p> <p>Replace</p> <p>Replace</p> <p>Replace</p> <p>Replace</p> <p>Replace</p> <p>Repair or replace</p> <p>Replace</p> <p>Tighten</p> <p>Inspect or replace</p> <p>Adjust</p> <p>Adjust</p> <p>Clean or replace</p> <p>Shift to N gear</p> <p>Inspect</p>
<p>Engine hard to start</p>	<p>1. Idle valve bad</p> <p>2. TPS not in 0</p> <p>3. Adjust the throttle cable</p> <p>4. Engine pressure low</p> <p>5. Inspect the spark plug</p> <ul style="list-style-type: none"> ● Spark plug bad ● Spark plug setting bad ● Spark plug damage ● Spark plug dirty <p>6. Fuel low or pressure low</p> <p>7. CAPS or cable bad</p>	<p>See engine</p> <p>See engine</p> <p>Inspect the reason</p> <p>Replace the parts</p>

Trouble	Reason	Solution
Engine overheat	<ol style="list-style-type: none"> 1. Coolant level low 2. Cooling system got bubble 3. Water temp sensor problem 4. Thermostat problem(Not open in high heat) 5. Inspect the leaking hole to see leaking 6. Inspect the pipe and clamp <ul style="list-style-type: none"> ● Pipe cracked or getting old ● Clamp getting loose 7. Water pump impeller broken 8. Water pump gasket leaking 9. Cylinder head gasket leaking 10. Water pump cover drain bolt gasket leaking. 11. Water pump gear wearing cause coolant not enough. 12. Water pump shaft jammed 	<p>Fill</p> <p>Drain and refill</p> <p>Replace</p> <p>Replace</p> <p>Replace the water seal</p> <p>Replace</p> <p>Tighten</p> <p>Replace</p> <p>Tighten or replace</p> <p>Replace</p> <p>Tighten or replace</p> <p>Replace</p> <p>Replace the bad parts</p>
Lubrication	<p>Oil wasting high/Oil pressure low or no oil pressure</p> <ol style="list-style-type: none"> 1. Inspect the engine oil level to see the crankcase and oil seal leaking. <ul style="list-style-type: none"> ● Crankcase damage leaking ● Crankcase bolt loose ● Sealing ring/O-ring/Gasket cracked, old or damaged ● Piston ring damaged(Blue smoke) ● Piston ring damaged(Pressure low) ● Valve oil seal damaged. Lip crack ed or old. 2. Oil filter jammed 3. Inspect the oil drain bolt <ul style="list-style-type: none"> ● Case bottom bevel bolt loose ● Oil drain bolt loose or without washer 4. Oil leaking 5. Oil strainer jammed 6. Inspect the oil pump <ul style="list-style-type: none"> ● Oil pump rotor wearing ● Wasted oil or air inlet cause the oil pump jammed. ● Oil pump gear damaged. ● Use wrong oil 	<p>Replace and reassemble</p> <p>Tighten</p> <p>Replace</p> <p>Replace</p> <p>Replace</p> <p>Replace the oil seal</p> <p>Replace the filter and oil</p> <p>Tighten</p> <p>Tighten or install washer</p> <p>Replace the oil seal</p> <p>Clean and replace</p> <p>Replace</p> <p>Replace</p> <p>Replace</p> <p>Use recommend oil</p>
	<p>Oil getting white</p> <ol style="list-style-type: none"> 1. Leaking indicator shows the oil mixed with water 2. Cylinder gasket damaged or leaking. 3. Cylinder head bolt loose. 4. Oil has dust inside 	<p>Replace oil seal and water seal.</p> <p>Tighten or replace</p> <p>Tighten and replace the oil</p> <p>Replace damaged parts(Including filter and oil)</p>

12 Electrical System

Trouble		Reason	Solution
CVT	Abnormal accelerate	1. Belt getting narrow 2. Inspect the main sliding wheel • Rolling ball wearing • Main roller track wearing 3. Drive/Driven pulley axial sliding not smooth 4. Driven pulley spring too strong 5. Driven pulley clutch shoe/Surface wearing 6. Drive/Driven pulley groove damaged. 7. Connect the PDA to find trouble 8. Valve clearance not fit 9. Pressure low 10. Spark plug bad ignition	Replace Replace Replace Clean or replace Replace Replace Adjust Replace
	Top speed low	Inspect“Bad accelerate”1~3 CVT got dirty. Drive pulley jammed Driven pulley spring bad or damaged	Clean and replace Clean and replace Replace
	Shifting not smooth	1. Inspect the Shifting mechanism • Inspect“Bad accelerate”1~2 2. Inspect the driven pulley • Driven pulley spring bad or damaged • Clutch shoe or surface got damaged	Replace Replace
	Belt burnt	1. Inspect the CVT cooling pipe • CVT room too hot • Main stable wheel impeller jammed 2. Inspect the wheel groove surface • Groove got dirty • CVT case got water in.	Clean Clean Clean and replace the belt Clean and replace the belt
	Drive belt trouble	Wearing too much Belt specification wrong Belt got wearing Belt cracked and reach the life period Groove got oil dirty Drive or driven pulley got damaged by stone Belt getting old	Replace Replace Replace Clean and replace the belt Clean Clean or replace Replace

Trouble		Reason	Solution
Engine noise or shocked	Cylinder head noise	<ol style="list-style-type: none"> 1. Valve clearance not fit 2. Tensioner bad 3. Chain conductor wearing 4. Chain getting longer or sprocket wearing 5. Sprocket bolt loose 6. Valve rocker arm or camshaft wearing. 7. Camshaft TDC wrong. 	Adjust or replace Replace Replace Replace Tighten Adjust or replace Adjust or replace
	Crankshaft noise	<ol style="list-style-type: none"> 1. Main bearing damaged 2. Connecting rod bearing damaged 3. Magneto bolt getting loosed 4. Left crankcase cover bearing damaged 	Replace Replace Tighten or replace Replace
	Case noise	<ol style="list-style-type: none"> 1. Oil leaking 2. Gear teeth damaged 	Replace,tighten and fill Replace
	CVT idle noise	<ol style="list-style-type: none"> 1. Driven pulley sliding shaft sleeve jammed or wearing. 2. Inspect the drive slide wheel 3. Roller ball wearing 4. Drive slide wheel track wearing 5. Drive slide wheel track wearing 6. Nylon part damaged 7. Axial sliding jammed 8. Drive wheel nut loose 	Replace the driven pulley Replace at same time Replace Replace Replace at same time Clean or replaced Tighten
	CVT noise	<ol style="list-style-type: none"> 1. Inspect "Idle noise" 1~3 2. Drive pulley wet and dirt 3. Drive/Driven pulley nut loose 4. Driven pulley slide shoe surface damaged 5. Belt or wheel damaged by other trash. 	Clean or drain Tighten Replace Clean or replace
	CVT Drive pulley shock	<ol style="list-style-type: none"> 1. Drive pulley nut loose 2. Drive slide wheel sleeve clearance large. 3. Roller ball lost or wearing 4. Washer not in position 	Tight Replace Replace at same time Reassemble or replace
	CVT driven pulley shock	Driven bearing sleeve clearance too large	Replace

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12.18 Fault Code Table (MSE 6.0)

No.	Fault Path	Pcode	Description	Class	Active MIL	EUV
1	CDCHSVE	P003000	O2 Sensor Heater Contr. Circ.(Bank(1) Sensor 1)open	4	✓	
2		P003100	O2 Sensor Heater Contr. Circ.(Bank(1) Sensor 1) Low	4	✓	
3		P003200	O2 Sensor Heater Contr. Circ.(Bank(1) Sensor 1) High	4	✓	
4	CDCHSVE2	P005000	O2 Sensor Heater Contr. Circ.(Bank(2) Sensor 2)open	4	✓	
5		P005100	O2 Sensor Heater Contr. Circ.(Bank(2) Sensor 2) Low	4	✓	
6		P005200	O2 Sensor Heater Contr. Circ.(Bank(2) Sensor 2) High	4	✓	
7	CDCHSV	P005300	O2 Sensor Heater Resistance(Bank(1) Sensor 1)	3	✓	✓
8	CDCHSV2	P005900	O2 Sensor Heater Resistance(Bank(2) Sensor 2)	3	✓	✓
9	CDCLSV	P013000	O2 Sensor Circ.,Bank1-Sensor1 Malfunction	4	✓	
10		P013100	O2 Sensor Circ.,Bank1-Sensor1 Low Voltage	4	✓	
11		P013200	O2 Sensor Circ.,Bank1-Sensor1 High Voltage	4	✓	
12	CDCLATP1	P013300	O2 Sensor Circ.,Bank1-Sensor1 Slow Response	3	✓	✓
13	CDCLSV	P013400	O2 Sensor Circ.,Bank1-Sensor1 No Activity Detected	4	✓	
14	CDCLSV2	P015000	O2 Sensor Circ.,Bank1-Sensor2 Malfunction	4	✓	
15		P015100	O2 Sensor Circ.,Bank1-Sensor2 Low Voltage	4	✓	
16		P015200	O2 Sensor Circ.,Bank1-Sensor2 High Voltage	4	✓	
17	CDCLATP2	P015300	O2 Sensor Circ.,Bank1-Sensor2Slow Response	3	✓	✓
18	CDCLSV2	P015400	O2 Sensor Circ.,Bank1-Sensor2 No Activity Detected	4	✓	
19	CDCDK	P012200	Throttle/Pedal Pos.Sensor Circ. Low Input	3	✓	
20		P012300	Throttle/Pedal Pos.Sensor Circ. High Input	3	✓	

CFMOTO

21	CDCLM	P010500	Manifold Abs.Pressure or Bar. Pressure Circuit	3	✓	✓
22		P010600	Manifold Abs.Pressure or Bar. Pressure Range/Performance	3	✓	✓
23		P010700	Manifold Abs.Pressure or Bar. Pressure Low Input	3	✓	
24		P010800	Manifold Abs.Pressure or Bar. Pressure High Input	3	✓	
25	CDCTA	P011100	Intake Air Temp.Circ. struck/ Performance	3	✓	✓
26		P011200	Intake Air Temp.Circ. Low Input/range	3	✓	
27		P011300	Intake Air Temp.Circ. High Input	3	✓	
28	CDCTM	P011600	Engine Coolant Temp.Circ. Range/ Performance	3	✓	
29		P011700	Engine Coolant Temp.Circ. Low Input	3	✓	
30		P011800	Engine Coolant Temp.Circ. High Input	3	✓	
30		P011900	Engine Coolant Temperature Sensor 1 Circuit Intermittent	3	✓	✓
31	CDCTMLIMIT	P11600	Engine Coolant Temp.over Range	30	✓	
32	CDCEV1	P020100	Cylinder 1- Injector Circuit open	4	✓	
33		P026100	Cylinder 1- Injector Circuit Low	4	✓	
34		P026200	Cylinder 1- Injector Circuit High	4	✓	
35	CDCEV2	P020200	Cylinder 2- Injector Circuit open	4	✓	
36		P026400	Cylinder 2- Injector Circuit Low	4	✓	
37		P026500	Cylinder 2- Injector Circuit High	4	✓	
38	CDCIG	P230000	Ignition Coil "A" Primary Control Circuit low	4	✓	
39	CDCIG2	P230300	Ignition Coil "B" Primary Control Circuit low	4	✓	
40	CDCMD_xx	P030000	Random/Multiple Cylinder Misfire Detected	2	✓ or Blink	✓
41		P030100	Cyl.1 Misfire Detected	2	✓ or Blink	✓
42		P030200	Cyl.2 Misfire Detected	2	✓ or Blink	✓
43	CDCN	P032200	Eng.Speed Inp.Circ. No Signal	4	✓	
44	CDCSSAL	P041300	second air system valve Circuit open	3	✓	
45		P041400	second air system valve Circuit low	3	✓	
46		P041200	second air system valve Circuit high	3	✓	
47		P041100	Secondary Air Injection System Incorrect Flow Detected	3	✓	✓
	CDCTES	P044100	Evaporative Emission System Incorrect Purge Flow	3	✓	✓
48	CDCTEVE	P044400	canister purge valve Circuit open	3	✓	
49		P045800	canister purge valve Circuit low	3	✓	
50		P045900	canister purge valve Circuit high	3	✓	
51	CDCLUEA	P048000	electric fan output stage A open	3	✓	
52		P069100	electric fan output stage A low	3	✓	
53		P069200	electric fan output stage A high	3	✓	

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54	CDCVFZ	P050100	Vehicle Speed Sensor Range/Performance	3	✓	
55	CDCLLR	P050600	Idle Control System RPM Lower than Expected	5	×	✓
56		P050700	Idle Control System RPM Higher than Expected	5	×	✓
57	CDCISA	P051100	Stepper motor power stage	3	✓	
58	CDCOT1	P061500	Starter Relay Circuit open	4	✓	NG
59		P061600	Starter Relay Circuit low	4	✓	NG
60		P061700	Starter Relay Circuit high	4	✓	NG
61	CDCKPE	P062700	Fuel Pump “A” Control Circuit / Open	4	✓	
62		P062800	Fuel Pump “A” Control Circuit Low	4	✓	
63		P062900	Fuel Pump “A” Control Circuit High	4	✓	
64	CDCMILE	P065000	Malfunction Indicator Lamp Control Circ.	5	×	
65	CDCUB	P056000	System Voltage Malfunction	5	×	
66		P056200	System Voltage Low Voltage	5	×	
67		P056300	System Voltage High Voltage	5	×	
68	CDCDUMP	P109800	DUMP control Circuit low	4	✓	
69		P109900	DUMP control Circuit high	4	✓	
70	CDCFRAU	P217700	System Too Lean bank1	11	✓	✓
71		P217800	System Too Rich bank1	11	✓	✓
72		P217900	System Too Lean bank2	11	✓	✓
73		P218000	System Too Rich bank2	11	✓	✓
74	CDCDUMMY	P060200	Control Modul Programming Error	5	×	
75		P060400	Internal Contr.Module Random Access Memory (RAM) Error	5	×	
76		P060500	Internal Contr.Module ROM Test Error	5	×	
77	CDCTOX	U019800	Lost Communication With Telematic Control Module	5	×	
78	CDCDASH	U015500	Lost Communication With Instrument Panel Cluster (IPC) Control Module	5	×	
79	CDCCIF	U007300	Control Module Communication Bus Off	5	×	
80	CDCABS	U012100	Lost Communication With Anti-Lock Brake System (ABS) Control Module	5	×	
81	CDCISA	P050800	Idle Air Control Circuit Low	4	✓	
82		P050900	Idle Air Control Circuit Low High	4	✓	
83		P051100	Idle Air Control Circuit	4	✓	

12.19 Fault Code Table (MSE 8.0)

DFES_DTCO.	DTC naming
P0262	Cylinder Injector Circuit High
P0261	Cylinder Injector Circuit Low
P0201	Cylinder Injector Circuit/Open
P0629	Fuel Pump Control Circuit High
P0628	Fuel Pump Control Circuit Low
P0627	Fuel Pump Control Circuit/Open
P0511	Idle Air Control Circuit
P0509	Idle Air Control System Circuit High
P0508	Idle Air Control System Circuit Low
P2300	Ignition Coil A Primary Control Circuit Low
P0650	Malfunction Indicator Lamp (MIL) Control Circuit
P0108	Manifold Absolute Pressure/Barometric Pressure Circuit High
P0107	Manifold Absolute Pressure/Barometric Pressure Circuit Low
P0105	Manifold Absolute Pressure/Barometric Pressure Circuit
P0106	Manifold Absolute Pressure/Barometric Pressure Circuit Range/Performance
P0000	Crankshaft signal improperly faulty
P0322	Ignition/Distributor Engine Speed Input Circuit No Signal
P0507	Idle Air Control System RPM Higher Than Expected
P0506	Idle Air Control System RPM Lower Than Expected
P0113	Intake Air Temperature Sensor 1 Circuit High
P0112	Intake Air Temperature Sensor 1 Circuit Low
P0111	Intake Air Temperature Sensor 1 Circuit Range/Performance
P0114	Intake Air Temperature Sensor 1 Circuit Intermittent
P0118	Engine Coolant Temperature Sensor 1 Circuit High
P0117	Engine Coolant Temperature Sensor 1 Circuit Low
P0116	Engine Coolant Temperature Sensor 1 Circuit Range/Performance
P0116	Insufficient Coolant Temperature for Stable Operation
P0126	
P0563	System Voltage High
P0562	System Voltage Low
P0560	System Voltage
P0501	Vehicle Speed Sensor A Range/Performance
P0123	Throttle/Pedal Position Sensor/Switch A Circuit High
P0122	Throttle/Pedal Position Sensor/Switch A Circuit Low
P2177	System Too Lean Off Idle
P2178	System Too Rich Off Idle
P2187	System Too Lean at Idle
P2188	System Too Rich at Idle
P0053	HO2S Heater Resistance
P0032	HO2S Heater Control Circuit High
P0031	HO2S Heater Control Circuit Low
P0030	HO2S Heater Control Circuit
P0133	O2 Sensor Circuit Slow Response
P0132	O2 Sensor Circuit High Voltage

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P0131	O2 Sensor Circuit Low Voltage
P0130	O2 Sensor Circuit
P0134	O2 Sensor Circuit No Activity Detected
P0301	Cylinder 1 Misfire Detected
P0692	Fan 1 Control Circuit High
P0691	Fan 1 Control Circuit Low
P0480	Fan 1 Control Circuit
P0459	Evaporative Emission System Purge Control Valve Circuit High
P0458	Evaporative Emission System Purge Control Valve Circuit Low
P0444	Evaporative Emission System Purge Control Valve Circuit Open
P0412	Secondary Air Injection System Switching Valve A Circuit
P0414	Secondary Air Injection System Switching Valve A Circuit Shorted
P0413	Secondary Air Injection System Switching Valve A Circuit Open
P1099	Rollover sensor Circuit High
P1098	Rollover sensor Circuit Low
P1508	Side stand switch voltage too high error
P1507	Side stand switch voltage too low error

12.19.1 T-BOX Fault Code Table

No.	1	2	3	4	5	6
Code	B111716	B111717	U007388	U010587	U015586	B1A4087
DTC byte (Hex)1	0x911716	0x911717	0xC07388	0xC10587	0xC15586	0x9A4087
DTC definition	Supply voltage too low	Supply voltage too high	Power Train CAN Bus Off	Lost connection with DASH	Record DASH(0x120) AliveCounter or CheckSUM incorrect	KL15 powered, KL30 open
Fault attribute	Voltage Faults	Voltage Faults	Network Faults	Network Faults	Network Faults	Hardware
Mature condition	Voltage < 9V, t > 500ms	Voltage >18V, t > 500ms	Bus-Off detected 8 busoff	The message DASH (0x120, 0x151, 0x153 or 0x154) is missed in 10 times cycle.	10 frames in a row AliveCounter or CheckSUM incorrect	When KL15 is powered, KL30 open more than 30s
System action	Record DTC	Record DTC	Record DTC	Record DTC	Record DTC	Record DTC
Demature condition	9.5V < Voltage < 18V, t > 500ms	9.5V < Voltage < 18V, t > 500ms	One of the messages was successfully transmitted	ECU received DASH (0x120, 0x151, 0x153 or 0x154) message	5 frames in a row AliveCounter and CheckSUM correct	KL15 powered, KL30 connects more than 1s
Possible fault causes	Battery voltage too low	Battery voltage too High	CAN Circuit Short ,open	1. CAN bus error 3. DASH error	1. The network connected failed 2. DASH error	Harness damaged
Corrective action	Check power	Check power	CAN Circuit Short ,open	1.Check the network connection. 3.Check DASH	1. Check the network connection. 2.Check DASH	

12.19.2 DASH Fault Code Table

No.	Code	DTC byte (Hex)1	DTC definition	Fault attribute	Mature condition	System action	Demature condition
1	B111716	0x911716	Supply voltage too low	Voltage Faults	Voltage < 9V, t > 30s	Record DTC	9.5V < Voltage < 18V, t > 500ms
2	B111717	0x911717	Supply voltage too high	Voltage Faults	Voltage >18V, t > 500ms	Record DTC	9.5V < Voltage < 18V, t > 500ms
3	U007388	0xC07388	Dashboard CAN Bus Off	Network Faults	Detect CAN bus off (8 times in a row)	Record DTC	CAN bus off not detected
4	B112000	0x912000	Left button failure	Signal Faults	Sustained grounding over 30s	Record DTC	Sustain over 30s
5	B113000	0x913000	Right button failure	Signal Faults	Sustained grounding over 30s	Record DTC	Sustain over 30s
6	U019887	0xC19887	T-BOX communication node lost	Network Faults	No message received, 0x212 ≥ 500ms	Record DTC	Receive message, 0x212 normal
7	B110013	0x910013	Fuel level sensor circuit open	Signal Faults	Detect fuel inlet resistance ≥1000Ω and lasting 30s	Record DTC	Detect fuel inlet resistance <1000Ω and lasting 15s
8	B110014	0x910014	Fuel level sensor circuit short	Signal Faults	Detect fuel inlet resistance ≤2Ω and lasting 30s	Record DTC	Detect fuel inlet resistance >2 and lasting 15s

12.19.3 Diagnosis by Trouble Code

Instruction:

1. Make sure the trouble is stable at the moment. Or, it may cause wrong diagnosis.
2. The AVO meter mentioned below is digital AVO meter. Do not use analog style meter to test the electrical parts.
3. When diagnosing the vehicle with anti-theft system, if the “Next Step” is “Replace ECU”, program the ECU after replacement.
4. If the trouble code shows the some electrical voltage low. It means short to the ground or open to the ground. If the voltage high. That means may short to power. If trouble code shows some wiring trouble. Means open or different troubles in wirings.

Diagnosis help:

1. If the trouble code cannot clean up, this trouble is stable
If it happens occasionally. Please check the connector if loose.
2. Do not ignore the vehicle maintenance information. Cylinder pressure mechanical timing effect.
3. Replace ECU for testing
If the trouble code can be cleaned. That means the trouble part is located in ECU. If the code still cannot be cleaned. Replace into the original ECU and test again.

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Fault code: P003000/P013000 Oxygen Sensor Heating Control Circuit Malfunction

Note: Fault may be caused by 1) Circuit between oxygen sensor pin 2 and ECU pin open. 2) Circuit between oxygen sensor pin 1 and main relay open. 3) Circuit between oxygen sensor pin 1 and pin 2 open.	Maintenance note: Inspect items below 1) Measure resistance between ECU pin and oxygen sensor pin 2. 2) Measure resistance between oxygen sensor pin 1 and main relay. 3) Measure resistance between oxygen sensor pin 1 and pin 2.
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Fault code: P003100/ P013100 Oxygen Sensor Heating Circuit Low Voltage

Note: Fault may be caused by 1) ECU pin short to ground.	Maintenance note: Inspect items below 1) Measure ECU pin to ground resistance.
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Fault code: P003200/ P013200 Oxygen Sensor Heating Circuit High Voltage

Note: Fault may be caused by 1) Circuit between oxygen sensor pin 2 and ECU pin short. 2) Short circuit between ECU pin circuit and other circuits.	Maintenance note: Inspect items below 1) Measure ECU voltage. 2) Measure resistance between ECU pin and oxygen sensor pin 1.
---	--

Fault code: P005300 / P005900 Oxygen Sensor Heating Resistance Incorrect

Fault explain: ECU determines heat output correction by measuring oxygen sensor heating resistance. In some cases, oxygen sensor may be influenced by deposits, especially during cold start.

Note: Fault may be caused by 1) Oxygen sensor heating function failure. Replace oxygen sensor.	Maintenance note: Inspect items below 1) Measure resistance between oxygen sensor pin C and pin D.
--	---

Fault code: P015200 Oxygen Sensor Circuit High Voltage

Note: Fault may be caused by 1) Circuit between ECU pin A and oxygen sensor pin B open. 2) Circuit between oxygen sensor pin A and pin B open.	Maintenance note: Inspect items below 1) Replace oxygen sensor. 2) Replace ECU. 3) Inspect circuit.
--	--

Fault code: P010700 Intake Air Pressure Sensor Short to Ground

Note: Fault may be caused by 1) ECU detects sensor signal circuit short to ground.	Maintenance note: Inspect items below 1) Measure ECU pin to ground resistance.
---	---

Fault code: P010800 Intake Air Pressure Sensor Short to Power

Note: Fault may be caused by 1) ECU detects sensor signal circuit short to power.	
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Fault code: P011200 Intake Air Temp. Sensor Circuit Low Voltage

Note: Fault may be caused by 1) Sensor signal circuit of ECU pin short to ground.	Maintenance note: Inspect items below 1) Measure sensor signal circuit of ECU pin to ground resistance.
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Fault code: P011300 Intake Air Temp. Sensor Circuit High Voltage

Note: Fault may be caused by 1) Sensor signal circuit of ECU pin short to power.	Maintenance note: Inspect items below 1) Measure sensor signal circuit of ECU pin voltage.
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Fault code: P011600 Coolant Temp. Sensor Incorrect Display

Note: Fault may be caused by 1) Coolant temp. sensor is damaged. Replace coolant temp. sensor.	
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Fault code: P020100/P026100/P0262 00 Fuel Injector Circuit Malfunction

Note: Fault may be caused by 1) Fuel injector circuit open. 2) Bad connection between fuel injector connector and ECU pin. 3) Bad connection between fuel injector connector and main relay. 4) ECU pin to ground circuit open. 5) Circuit to ECU short circuit.	Maintenance note: Inspect items below 1) Measure fuel injector resistance. 2) Inspect connectors connection. 3) Measure ECU pin to ground resistance. 4) Measure ECU pin circuit voltage.
---	---

Fault code: P011700 Coolant Temp. Sensor Circuit Low Voltage

Note: Fault may be caused by 1) Sensor signal circuit of ECU pin short to ground.	Maintenance note: Inspect items below 1) Measure sensor signal circuit of ECU pin to ground resistance.
--	--

Fault code: P011800 Coolant Temp. Sensor Circuit High Voltage

Note: Fault may be caused by 1) Sensor signal circuit of ECU pin short to power.	Maintenance note: Inspect items below 1) Measure sensor signal circuit of ECU pin voltage.
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Fault code: P032200 RPM Sensor Signal Malfunction

Fault explain: ECU monitors sensor signals and other signals when the engine starts. The rationality of the signal is judged by the system to be Sensor Signal Loss.

Note: Fault may be caused by 1) Circuit between RPM sensor to ECU pin open. 2) Circuit between RPM sensor to ECU short. 3) Sensor coil open.	Maintenance note: Inspect items below 1) Measure resistance between sensor to ECU. 2) Measure sensor resistance. 3) Measure sensor peak voltage.
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Fault code: P069200/P069100/P048000 Fan Relay Circuit High or Low Voltage or Open Circuit

Note: Fault may be caused by 1) Circuit of ECU pin short to ground. 2) Fan relay open circuit.	Maintenance note: Inspect items below 1) Measure resistance between fan relay and ECU.
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Fault code: P012200 TPS 1 Signal Circuit Low Voltage

Note: Fault may be caused by 1) ECU pin short to ground.	Maintenance note: Inspect items below 1) Measure ECU pin to ground resistance.
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Fault code: P012300 TPS 1 Signal Circuit High Voltage

Note: Fault may be caused by 1) ECU pin short to power.	Maintenance note: Inspect items below 1) Measure ECU pin voltage.
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Fault code: P056000 Battery Voltage Signal Abnormal

Fault code: P056200 Battery Low Voltage

Fault code: P056300 Battery High Voltage

Note: Fault may be caused by 1) Magneto damage or battery leaking. 2) Magneto stator coil open circuit. 3) Magneto regulator damage.	Maintenance note: Inspect items below 1) Inspect magneto function (measure voltage after start).
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Fault code: P065000 MIL Circuit Malfunction

Note: Fault may be caused by 1) MIL to ECU circuit open/short to ground/short to power. 2) Circuit between MIL and main relay open. 3) MIL burnt.	Maintenance note: Inspect items below 1) Measure MIL to ECU resistance or circuit voltage.
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12.19.4 Diagnosis by Engine Trouble

Before trouble diagnosis by engine problems, initial checking should be done as follows.

1. Confirm if trouble light is ok;
2. Confirm there's no trouble code record by PDA checking.
3. Confirm there's really trouble existing complained by end-users.

Then check the following points.

1. Check fuel hoses if any fuel leakage;
2. Check vacuum pipes if any broken, twist or improper connection;
3. Check intake manifold if any blocked, air leakage or damaged;
4. Check high-tension cable if any damaged, aging; or ignition order is correct.
5. Check wiring close to ground if it's clean and firm;
6. Check connector of all sensors and actuator if any loose or improper connection.
7. Important note: In case there are some problems as above-mentioned, then removal work should be done firstly, then go to next diagnosis.

Diagnosis helps:

1. Confirm engine without any trouble record.;
2. Confirm there's really trouble existing;
3. During checking, do not neglect vehicle periodic maintenance, cylinder pressure, valve TDC, fuel supply and so on;
4. Replace ECU to test.

In case trouble disappears, then it's a problem of ECU. If trouble still exists, then assemble original ECU and check other points.

Frequent troubles list:

- When starting engine, it cannot rotate or rotate slowly.
- When starting engine, starter motor can rotate but cannot start engine.
- Difficult to start warm or hot engine
- Difficult to start cold engine
- RPM is ok, but difficult to start engine.
- Starting is ok, but idle speed is unstable at any time.
- Starting is ok, but idle speed is unstable during engine warm-up period.
- Starting is ok, but idle speed is unstable after engine warm-up.
- Starting is ok, idle speed is unstable or engine stop when switch on some lights or other electric components.
- Starting is ok, but too high idle speed.
- RPM cannot go up or engine stop when acceleration.
- Slow acceleration.
- Insufficient power and bad performance when acceleration.

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(1) When starting engine, it can't rotate or rotate slowly.

Possible defective parts: 1. Battery, 2. Starter motor, 3. Wirings harness or ignition switch, 4. Engine mechanism part.

General diagnosis procedures

Item	Procedures	Results	Next
1	Use multi-meter to check battery voltage if voltage is between 8V~12V or not when engine starts.	YES	Next Step
		NO	Replace battery
2	Keep ignition switch "on", use multi-meter to check if voltage of starting motor anode is over 8V.	YES	Next Step
		NO	Repair switches or change harness
3	Remove starting motor and check its working status, especially whether there was broken circuit or jammed by bad lubrication.	YES	Repair or replace starting motor
		NO	Next Step
4	If error only occur in Winter, check if starter motor resistance is too big caused by improper oil used.	YES	Change to proper lubricant
		NO	Next Step
5	Check if mechanical resistance is too big inside engine.	YES	Check resistance inside engine
		NO	Repeat above procedures

(2) When starting engine, it can rotate but cannot start.

Possible defective parts: 1. No fuel in fuel tank, 2. Fuel pump, 3. Pick up, 4. Ignition coil, 5. Mechanical parts of engine

General diagnosis procedures:

Item	Procedures	Results	Next
1	Connect fuel pressure gauge, turn on ignition switch or start engine, check if fuel pressure is around 330kpa.	YES	Next Step
		NO	Repair fuel supply system
2	Connect PDA, check if there's signal of RPM data after starting engine.	YES	Next Step
		NO	Check and repair RPM sensor circuit
3	Disconnect high-tension cable, connect spark plug and set its electrode 5mm to engine body, then start engine to check if blue and white spark appears.	YES	Next Step
		NO	Check and repair ignition system

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Item	Procedures	Results	Next
4	Test cylinder pressure and check if pressure is enough	YES	Eliminate engine mechanical failures
		NO	Next step
5	Use PDA to test, turn on ignition switch, check if power supply of ECU pin 8, pin 14 and pin 32 are normal. Check if pin 42 and pin 43 works normally.	YES	Use PDA to check
		NO	Repair related circuit

(3) Difficult to start hot engine.

General failure part: 1. Water in fuel tank, 2. Fuel pump, 3. Coolant temp. sensor, 4. Ignition coil.

General diagnosis procedures:

Item	Procedures	Results	Next
1	Connect fuel pump gauge, start engine, check if pressure is around 330kpa.	YES	Next Step
		NO	Repair fuel supply system
2	Disconnect high-tension cable, connect spark plug and set its electrode 5mm to engine body, then start engine to check if blue and white spark appears.	YES	Next Step
		NO	Repair ignition system
3	Disconnect coolant temp. sensor connector and start engine to check if engine can start (or use one 300ohm resistance to replace coolant temp. sensor).	YES	Repair wiring or replace sensor
		NO	Next step
4	Check whether the failure happens right after filling fuel oil.	YES	Change fuel
		NO	Next Step
5	Use PDA to test, turn on ignition switch, check if power supply of ECU pin 8, pin 14 and pin 32 are normal. Check if pin 42 and pin 43 works normally.	YES	Use PDA to check
		NO	Repair related circuit

(4) Difficult to start cold engine.

General failure part: 1. Water in fuel tank, 2. Fuel pump, 3. Engine coolant temp. sensor, 4. Fuel injector, 5. Ignition coil, 6. Throttle body and by-pass, 7. Mechanical parts of engine

General diagnosis procedures:

Item	Procedures	Results	Next
1	Connect fuel pump gauge ,start engine, check if pressure is around 330kpa.	YES	Next Step
		NO	Replace battery
2	Disconnect high-tension cable, connect spark plug and set its electrode 5mm to engine body, then start engine to check if blue and white spark appears.	YES	Next Step
		NO	Repair switches or change harness
3	Disconnect coolant temp. sensor connector and start engine to check if engine can start (or use one 2500ohm resistance to replace coolant temp. sensor).	YES	Next Step
		NO	Repair switches or change harness
4	Slightly draw throttle cable and check if engine could start easily.	YES	Repair or replace starting motor
		NO	Next Step
5	Disassemble injector and use special tool to check if there is leakage or block.	YES	Change to proper lubricant
		NO	Next Step
6	Check whether the failure happens right after filling fuel.	YES	Check resistance inside engine
		NO	Repeat above procedures
7	Check if cylinder pressure is insufficient.	YES	Eliminate engine mechanic failures
		NO	Next step
8	Use PDA to test, turn on ignition switch, check if power supply of ECU pin 8, pin 14 and pin 32 are normal. Check if pin 42 and pin 43 works normally.	YES	Use PDA to check
		NO	Check circuit

(5) Difficult to start in any conditions.

General failure part: 1, Water in fuel tank, 2. Fuel pump, 3. Coolant temp. sensor, 4. Fuel injector, 5. Ignition coil, 6. Throttle body and by-pass, 7. Air intake pipe, 8. Ignition TDC, 9. Spark plug, 10. Mechanical part of engine.

General diagnosis procedures:

Item	Procedures	Results	Next
1	Check if air filter is blocked or air intake pipe leaks	YES	Repair air intake system
		NO	Next step

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Item	Procedures	Results	Next
2	Connect fuel pump gauge ,start engine, check if pressure is around 330kpa.	YES	Next Step
		NO	Repair fuel Supply system
3	Disconnect high-tension cable, connect spark plug and set its electrode 5mm to engine body, then start engine to check if blue and white spark appears.	YES	Next Step
		NO	Repair ignition System
4	Check if spark plug is suitable for requirement (including its type and clearance).	YES	Next Step
		NO	Adjust or replace
5	Disconnect coolant temp. sensor connector and start engine to check if engine can start.	YES	Repair circuit or replace sensor
		NO	Next Step
6	Slightly draw throttle cable and check if engine could start easily.	YES	Clean throttle body and bypass
		NO	Next Step
7	Disassemble injector and use special tool to check if there is leakage or blocked.	YES	Replace injector
		NO	Next step
8	Check whether the failure happens right after filling fuel.	YES	Change fuel
		NO	Next step
9	Check if cylinder pressure is insufficient.	YES	Eliminate mechanical failures
		NO	Next step
10	Check if ignition TDC complies with standard regulation.	YES	Next step
		NO	Adjust ignition TDC
11	Use PDA to test, turn on ignition switch, check if power supply of ECU pin 8, pin 14 and pin 32 are normal. Check if pin 42 and pin 43 works normally.	YES	Use PDA to check
		NO	Repair related circuit

(6) Normal starting, but unstable idle speed.

General failure part: 1. Water in fuel tank, 2. Fuel pump, 3. Coolant temp. sensor, 4. Fuel injector, 5. Ignition coil, 6. Throttle body and by-pass, 7. Air intake pipe, 8. Ignition TDC, 9. Spark plug, 10. Mechanical part of engine.

General diagnosis procedures:

Item	Procedures	Results	Next
1	Check if air filter is blocked or air intake pipe leaks	YES	Repair air intake system
		NO	Next step

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Item	Procedures	Results	Next
2	Check if air control valve is blocked.	YES	Clean or replace
		NO	Next Step
3	Check if spark plug is suitable for requirement (including its type and clearance).	YES	Next Step
		NO	Adjust or replace
4	Check if there is carbon deposit inside throttle body and air control valve.	YES	Clean
		NO	Next Step
5	Disassemble injector and use special tool to check if there is leakage or blocked or wrong fuel flow.	YES	Replace
		NO	Next Step
6	Check whether the failure happens right after filling fuel.	YES	Change fuel
		NO	Next Step
7	Check if cylinder pressure is insufficient.	YES	Eliminate mechanical failures
		NO	Next step
8	Check if ignition TDC complies with standard regulation.	YES	Next step
		NO	Repair ignition TDC
9	Use PDA to test, turn on ignition switch, check if power supply of ECU pin 8, pin 14 and pin 32 are normal. Check if pin 42 and pin 43 works normally.	YES	Use PDA to check
		NO	Repair related circuit

(7) Normal start, but unstable idle speed during engine warming.

General failure part: 1. Water in fuel tank, 2. Engine coolant temperature sensor, 3. Spark plug, 4. Throttle body and by-pass, 5. Air intake pipe, 6. Air control valve, 7. Mechanical part of engine

General diagnosis procedures:

Item	Procedures	Results	Next
1	Check if air filter is blocked or air intake pipe leaks.	YES	Repair air intake system
		NO	Next step
2	Check if spark plug is suitable for requirement (including its type and clearance).	YES	Next Step
		NO	Adjust or replace
3	Check if there is carbon deposit inside throttle body and air control valve.	YES	Clean
		NO	Next Step
4	Disconnect coolant temp. sensor connector and start engine to check idle speed is stable or not.	YES	Repair circuit or replace sensor
		NO	Next Step
5	Disassemble injector and use special tool to check if there is leakage or blocked or wrong fuel flow.	YES	Replace
		NO	Next Step

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Item	Procedures	Results	Next
6	Check whether the failure happens right after filling fuel.	YES	Change fuel
		NO	Next Step
7	Check if cylinder pressure is insufficient.	YES	Eliminate mechanical failures
		NO	Next Step
8	Use PDA to test, turn on ignition switch, check if power supply of ECU pin 8, pin 14 and pin 32 are normal. Check if pin 42 and pin 43 works normally.	YES	Use PDA to check
		NO	Repair related circuit

(8) Normal starting, but unstable idle speed after engine warming.

General failure part: 1. Water in fuel tank, 2. Engine coolant temperature sensor, 3. Spark plug, 4. Throttle body and by-pass, 5. Air intake pipe, 6. Air control valve, 7. Mechanical part of engine

General diagnosis procedures:

Item	Procedures	Results	Next
1	Check if air filter is blocked or air intake pipe leaks.	YES	Repair air intake system
		NO	Next step
2	Check if spark plug is suitable for requirement (including its type and clearance).	YES	Next Step
		NO	Adjust or replace
3	Check if there is carbon deposit inside throttle body and air control valve	YES	Clean
		NO	Next Step
4	Disconnect coolant temp. sensor connector and start engine to check idle speed is stable or not.	YES	Repair circuit or replace sensor
		NO	Next Step
5	Disassemble injector and use special tool to check if there is leakage or blocked or wrong fuel flow.	YES	Replace
		NO	Next Step
6	Check whether the failure happens right after filling fuel	YES	Change fuel
		NO	Next step
7	Check if cylinder pressure is insufficient.	YES	Eliminate mechanical failures
		NO	Next step
8	Use PDA to test, turn on ignition switch, check if power supply of ECU pin 8, pin 14 and pin 32 are normal. Check if pin 42 and pin 43 works normally.	Use PDA to check	Use PDA to check
		Repair related circuit	Repair related circuit
9	Turn off switch lock for 3 seconds and restart and start	YES	
		NO	Repair related circuit

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(9) Normal start, but unstable idle speed or engine stops when it is electronic loaded (e.g. headlight is on).

General failure part: 1. Air control valve, 2. Fuel injector

General diagnosis procedures:

Item	Procedures	Results	Next
1	Disassemble air control valve and check if there is carbon deposit inside throttle body, idle adjustment and by-pass	YES	Clean related parts
		NO	Next step
2	Check if output power increases when lighting, by using PDA to test if ignition advance angl, fuel spray and air intake volume is normal	YES	To steep 4
		NO	Next step
		NO	Repair air intake System
3	Disassemble injector and use special tool to check if there is leakage or blocked or wrong fuel flow	YES	Replace injector
		NO	Next Step
4	Use PDA to test, turn on ignition switch, check if power supply of ECU pin 8, pin 14 and pin 32 are normal. Check if pin 42 and pin 43 works normally.	YES	Use PDA to check
		NO	Repair related circuit

(10) Normal start, but idle speed is too high

General failure part: 1. Throttle body and by-pass, 2. Fuel injector seat, 3. Air control valve, 4. Coolant temp. sensor, 5. Ignition TDC

General diagnosis procedures:

Item	Procedures	Results	Next
1	Check if throttle cable is jammed or too tight.	YES	Adjust
		NO	Next step
2	Check if there's leakage between air intake pip and injector seat.	YES	Repair air intake system
		NO	Next step
3	Remove air control valve and check if there s carbon deposit inside throttle body, air control valve and by-pass.	YES	Clean related Parts
		NO	Next Step
4	Remove coolant temp. sensor connector, start engine to check if idle speed is too high.	YES	Repair circuit or replace sensor
		NO	Next Step
5	Check if ignition TDC complies with standard regulation.	YES	Next Step
		NO	Repair ignition TDC
6	Turn ignition switch off for 3 seconds,and then turn it on. Start engine.	YES	
		NO	Check the wires accordingly

12 Electrical System

Item	Procedures	Results	Next
7	Use PDA to test, turn on ignition switch, check if power supply of ECU pin 8, pin 14 and pin 32 are normal. Check if pin 42 and pin 43 works normally.	YES	Use PDA to check
		NO	Repair related circuit

(11) RPM cannot increase or engine stops when accelerating.

General failure part: 1. Water in fuel tank, 2. TPS, 3. Spark plug, 4. Throttle body and by-pass, 5. Air intake pipe, 6. Air control valve, 7. Fuel injector, 8. Ignition TDC, 9. Exhaust pipe

General diagnosis procedures:

Item	Procedures	Results	Next
1	Check if air filter is blocked.	YES	Repair air intake system
		NO	Next step
2	Connect fuel pressure gauge, start engine to check if pressure is around 330kpa at idle.	YES	Next Step
		NO	Repair fuel supply system
3	Check if spark plug is suitable for requirement (including its type and clearance).	YES	Next Step
		NO	Adjust or replace
4	Remove air control valve and check if there is carbon deposit inside throttle body, air control valve and by-pass.	YES	Clean related parts
		NO	Next Step
5	Check if TPS and its circuit is normal.	YES	Next Step
		NO	Repair circuit or replace TPS
6	Disassemble injector and use special tool to check if there is leakage or blocked.	YES	Replace
		NO	Next step
7	Check whether the failure happens right after filling fuel.	YES	Change fuel
		NO	Next step
8	Check if ignition TDC and TDC order comply with standard regulation.	YES	Next step
		NO	Adjust ignition TDC
9	Check if exhaust gas exhale smoothly.	YES	Next step
		NO	Repair or replace exhaust pipe
10	Use PDA to test, turn on ignition switch, check if power supply of ECU pin 8, pin 14 and pin 32 are normal. Check if pin 42 and pin 43 works normally.	YES	Use PDA to check
		NO	Repair related circuit

CFMOTO

(12) Low acceleration.

General failure part: 1. Water in fuel tank, 2. TPS, 3. Spark plug, 4. Throttle body and by-pass, 5. Air intake pipe, 6. Air control valve, 7. Fuel injector, 8. Ignition TDC, 9. Exhaust pipe

General diagnosis procedures:

Item	Procedures	Results	Next
1	Check if air filter is blocked.	YES	Repair air intake system
		NO	Next step
2	Connect fuel pressure gauge, start engine to check if pressure is around 330kpa at idle.	YES	Next Step
		NO	Repair fuel supply system
3	Check if spark plug is suitable for requirement (including its type and clearance).	YES	Next Step
		NO	Adjust or replace
4	Remove air control valve and check if there is carbon deposit inside throttle body, air control valve and by-pass.	YES	Clean related parts
		NO	Next Step
5	Check if TPS and its circuit is normal.	YES	Next Step
		NO	Repair circuit or replace TPS
6	Disassemble injector and use special tool to check if there is leakage or blocked.	YES	Replace
		NO	Next step
7	Check whether the failure happens right after filling fuel.	YES	Change fuel
		NO	Next step
8	Check if ignition TDC and TDC order comply with standard regulation.	YES	Next step
		NO	Adjust ignition TDC
9	Check if exhaust gas exhale smoothly.	YES	Next step
		NO	Repair or replace exhaust pipe
10	Use PDA to test, turn on ignition switch, check if power supply of ECU pin 8, pin 14 and pin 32 are normal. Check if pin 42 and pin 43 works normally.	YES	Use PDA to check
		NO	Repair related circuit

(13) Difficult to accelerate and bad performance.

General failure part: 1. Water in fuel tank, 2. TPS, 3. Spark plug, 4. Ignition coil, 5. Throttle body and by-pass, 6. Air intake pipe, 7. Air control valve, 8. Injector, 9. Ignition TDC, 10. Exhaust pipe

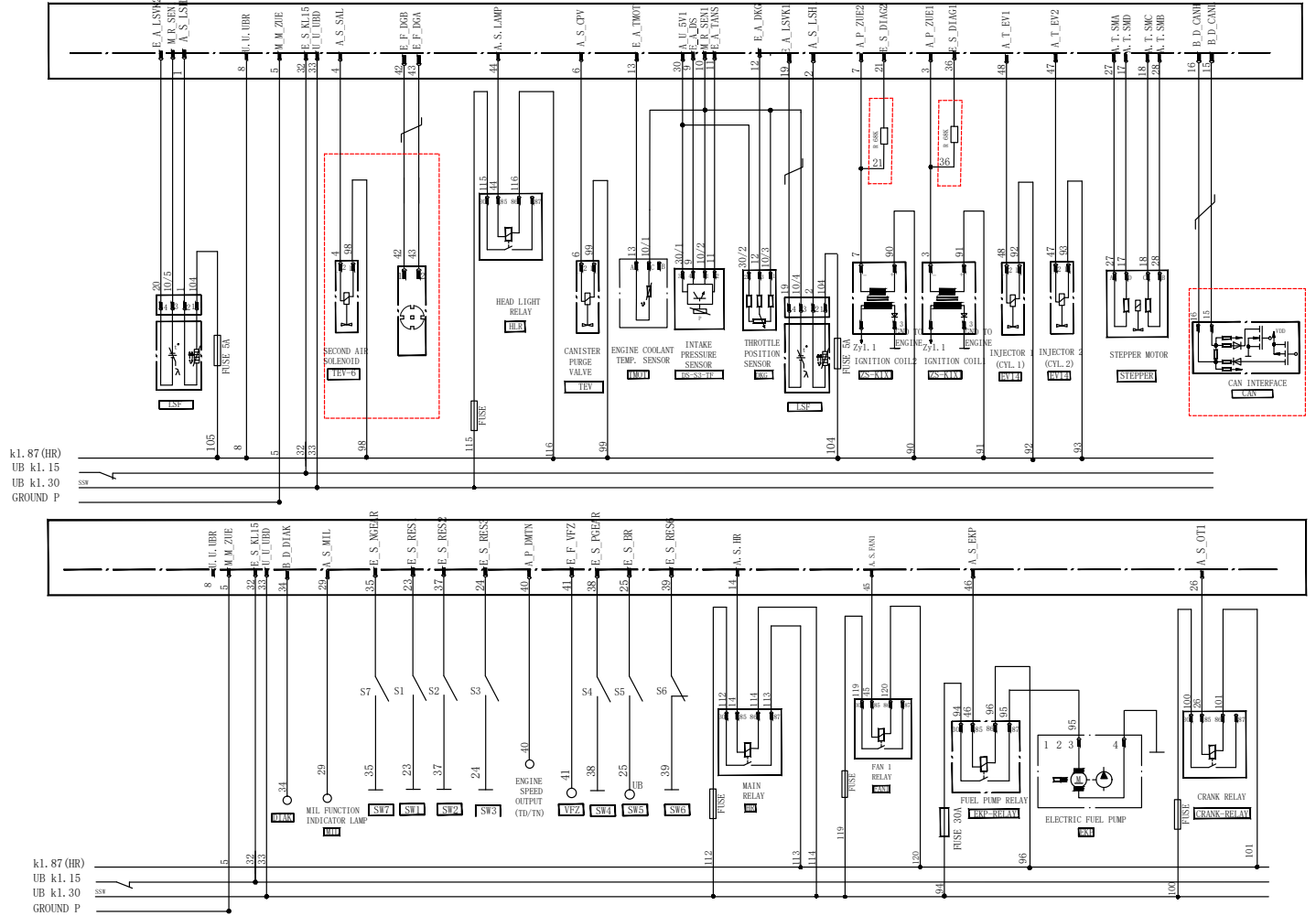
General diagnosis procedures:

12 Electrical System

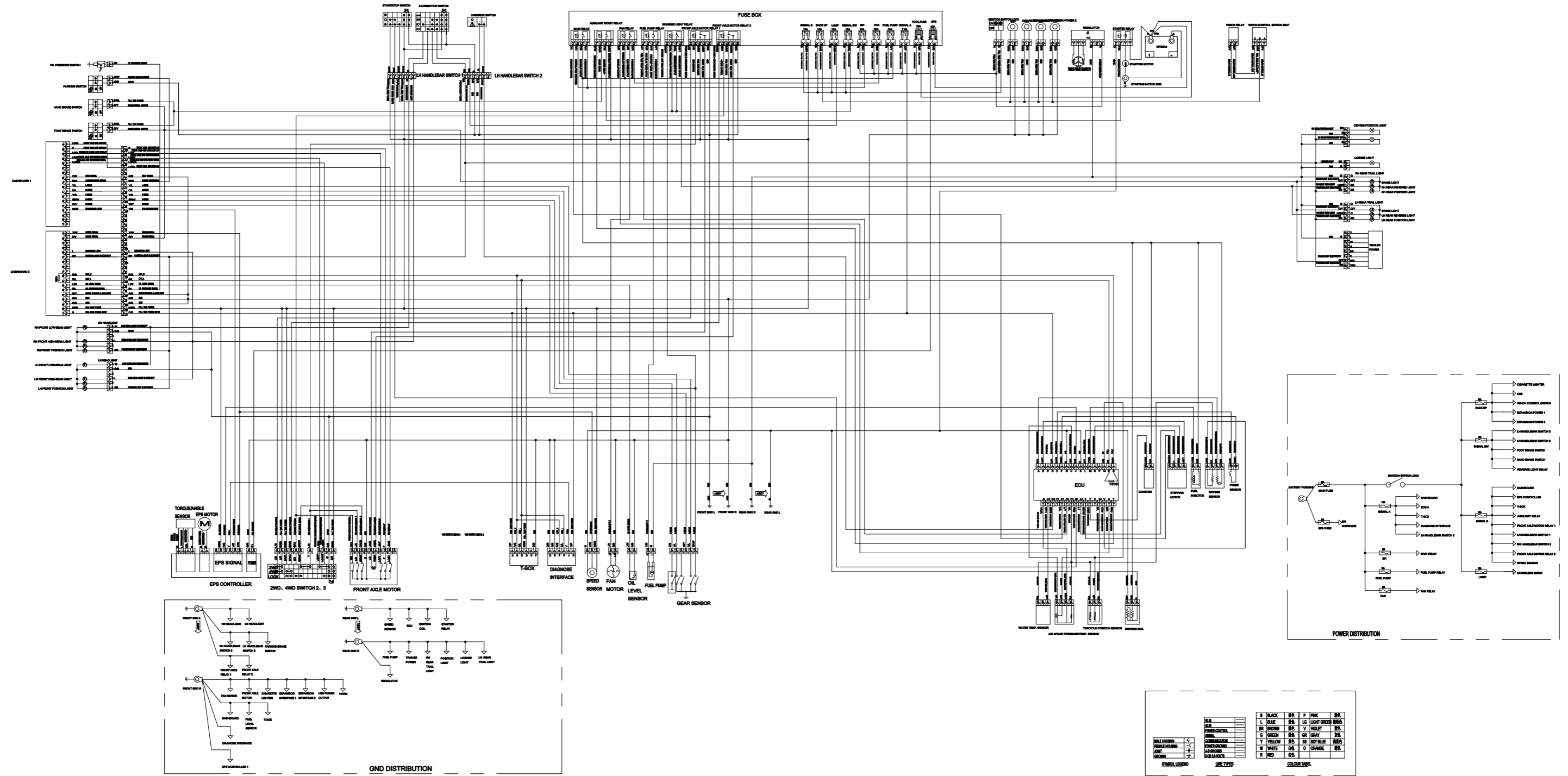
Item	Procedures	Results	Next
1	Check if clutch sliding, low tire pressure, bad brake or wrong tire size.	YES	Repair
		NO	Next step
2	Check if air filter is blocked.	YES	Repair air intake system
		NO	Next step
3	Connect fuel pressure gauge, start engine to check if pressure is around 330kpa at idle.	YES	Next Step
		NO	Repair fuel supply system
4	Disconnect high-tension cable, connect spark plug and set its electrode 5mm to engine body, then start engine to check if spark is strong enough.	YES	Next step
		NO	Repair ignition system
5	Check if spark plug is suitable for requirement (including its type and clearance).	YES	Next Step
		NO	Adjust or replace
6	Remove air control valve and check if there is carbon deposit inside throttle body, air control valve and by-pass.	YES	Clean related Part
		NO	Next step
7	Check if TPS and its circuit is normal.	YES	Next step
		NO	Repair circuit or Replace sensor
8	Disassemble injector and use special tool to check if there is leakage or blocked.	YES	Replace
		NO	Next step
9	Check whether the failure happens right after filling fuel.	YES	Change fuel
		NO	Next step
10	Check if ignition TDC complies with standard regulation.	YES	Next step
		NO	Repair ignition TDC
11	Check if exhaust gas exhale smoothly.	YES	Next step
		NO	Repair or replace
12	Use PDA to test, turn on ignition switch, check if power supply of ECU pin 8, pin 14 and pin 32 are normal. Check if pin 42 and pin 43 works normally.	YES	Use PDA to check
		NO	Repair related circuit

Appendix A

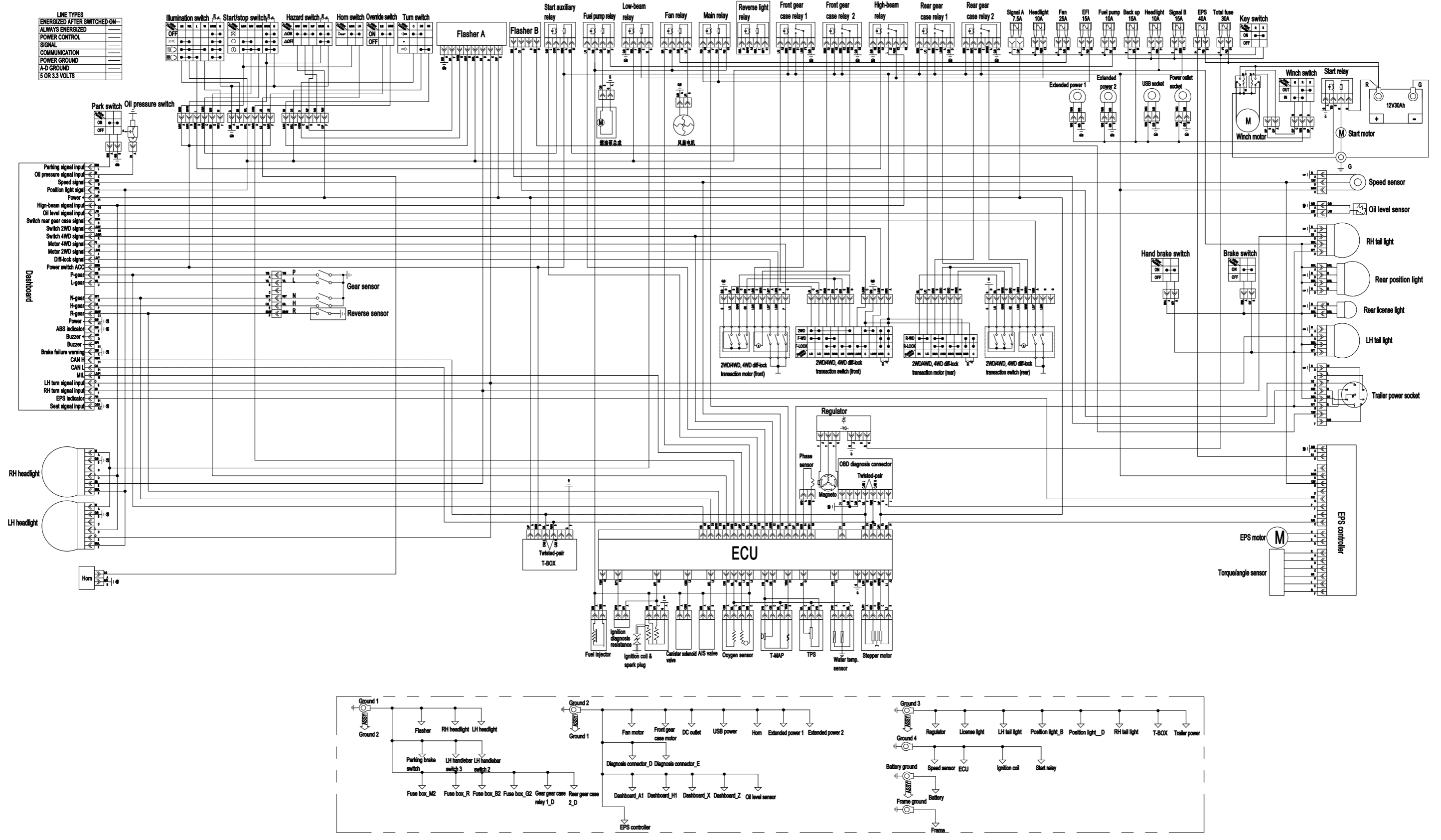
PIN-NO.	SIGNAL	FUNCTION
1 (M1)	A-S_LSH2	LAMBDA SENSOR HEATING
2 (L1)	A-S_LSH1	LAMBDA SENSOR HEATING
3 (M2)	A-P_ZUF1	IGNITION COIL 1
4 (G4)	A-S_SAL	SECOND AIR SOLENOID
5 (M3)	M-M_ZUE	IGNITION GROUND
6 (L3)	A-S_CPV	CANISTER PURGE VALVE
7 (M4)	A-P_ZUE2	IGNITION COIL 2
8 (L4)	U-U_UBK	SWITCHED BATTERY VOLTAGE
9 (L1)	E-A_DS	INTAKE AIR PRESSURE SENSOR
10 (L1)	M-R_SEN1	SENSOR GROUND 1
11 (H1)	E-A_TANS	INTAKE AIR TEMPERATURE SENSOR
12 (G1)	E-A_DRG	THROTTLE POSITION SENSOR
13 (F1)	E-A_TMO1	ENGINE COOLANT TEMP. SENSOR
14 (E1)	A-S_BR	WAIN RELAY
15 (D1)	B-D_CAN1	CAN 1 L
16 (C1)	B-D_CANH	CAN 1 H
17 (B1)	A-T_SMD	STEPPER MOTOR PHASE D
18 (A1)	A-T_SMC	STEPPER MOTOR PHASE C
19 (K2)	E-A_LSVK1	LAMBDA SENSOR UPSTREAM 1
20 (J2)	E-A_LSVK2	LAMBDA SENSOR UPSTREAM 2
21 (B2)	E-A_DIAG2	IGNITION DIAGNOSIS FOR COIL 2
22 (G2)	E-S_RES1	4WD LOCKED SWITCH
24 (E2)	E-S_RES3	SPEED UP SWITCH
25 (D2)	E-S_BR	BRAKE SWITCH
28 (C2)	A-S_OT1	CRANK RELAY
27 (B2)	A-T_SMA	STEPPER MOTOR PHASE A
28 (A2)	A-T_SMB	STEPPER MOTOR PHASE B
29 (K3)	A-S_MIL	MIL FUNCTION INDICATOR LIGHT
30 (H3)	A-U_SV1	REGULATED SENSOR SUPPLY 1
31 (G3)	E-S_KL15	IGNITION SWITCH
33 (F3)	U-U_UBD	CONTINUOUS SUPPLY VOLTAGE
34 (E3)	B-P-DIAX	DIAGNOSIS K-LINE
35 (D3)	E-S_NGEAR	NH/L GEAR SWITCH
36 (C3)	E-A-DIAG1	IGNITION DIAGNOSIS FOR COIL 1
37 (B3)	E-S_RES2	REVERSE GEAR SENSOR
38 (A3)	E-S_PGEAR	P. GEAR SWITCH
39 (G4)	E-S_REL1	SAFE RELAY SWITCH
40 (L4)	A-P_DMTN	ENGINE SPEED OUTPUT (TD/TN)
41 (H4)	E-F_VFZ	VEHICLE SPEED SIGNAL
42 (G4)	E-P_DGB	ENGINE SPEED SENSOR B
43 (F4)	E-F_DGA	ENGINE SPEED SENSOR A
44 (E4)	A-S_LAMP	HEAD LIGHT RELAY
45 (D4)	A-S_FAN1	FAN RELAY
46 (C4)	A-S_EXP	FUEL PUMP RELAY
47 (B4)	A-T_EV2	INJECTOR 2 (CYL. 2)
48 (A4)	A-T_EV1	INJECTOR 1 (CYL. 1)



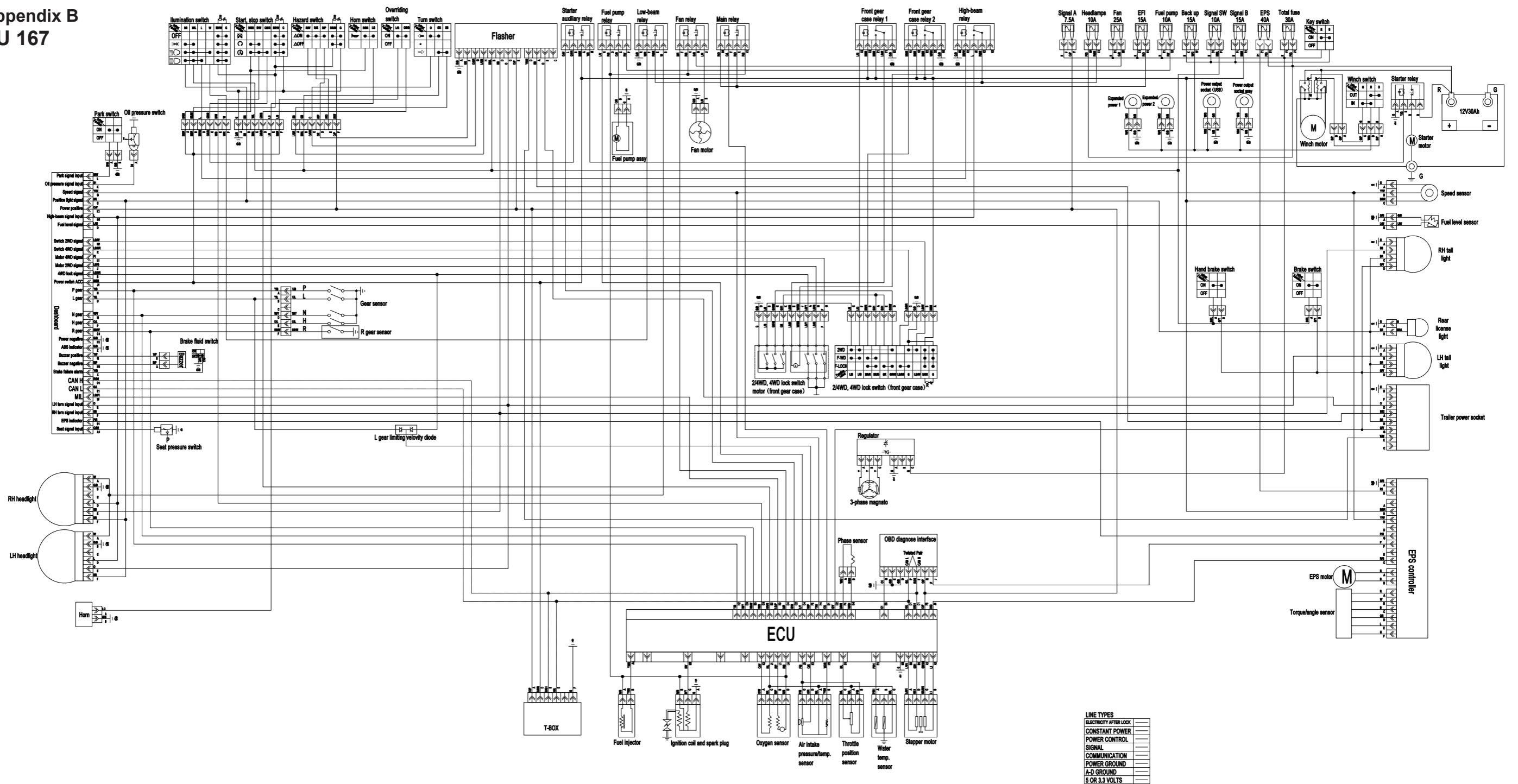
Appendix B North America and international status (advanced configuration)



Appendix B EU 168

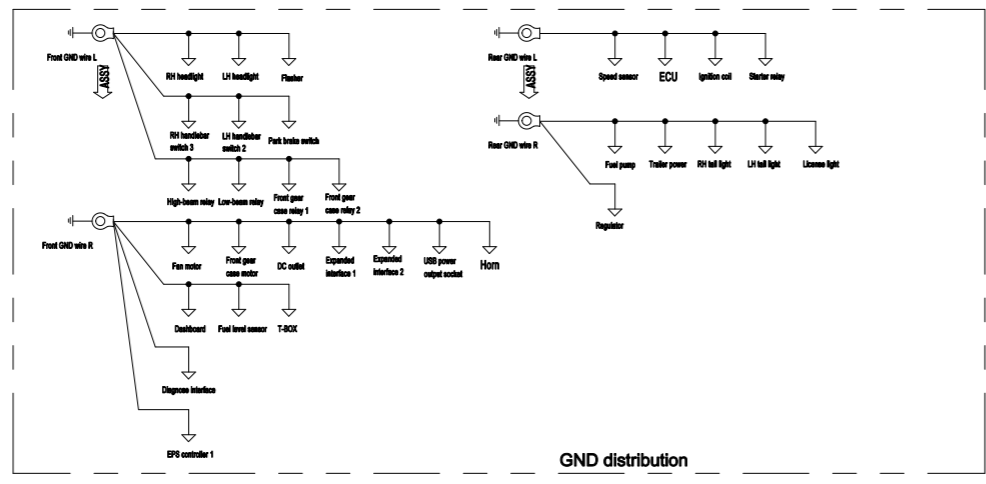


Appendix B EU 167

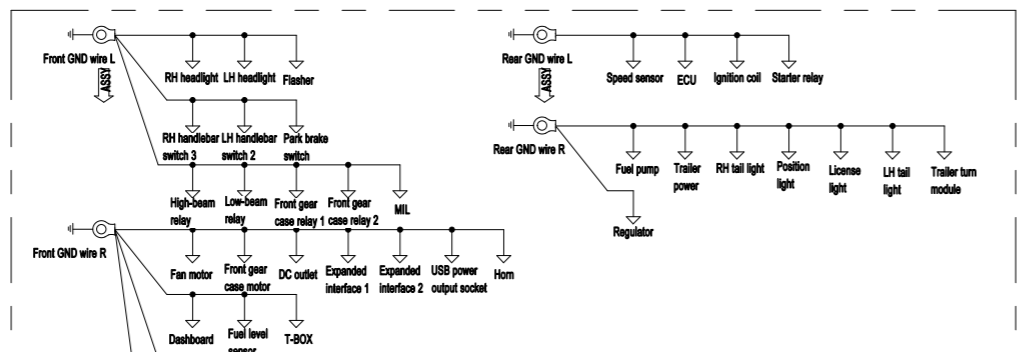
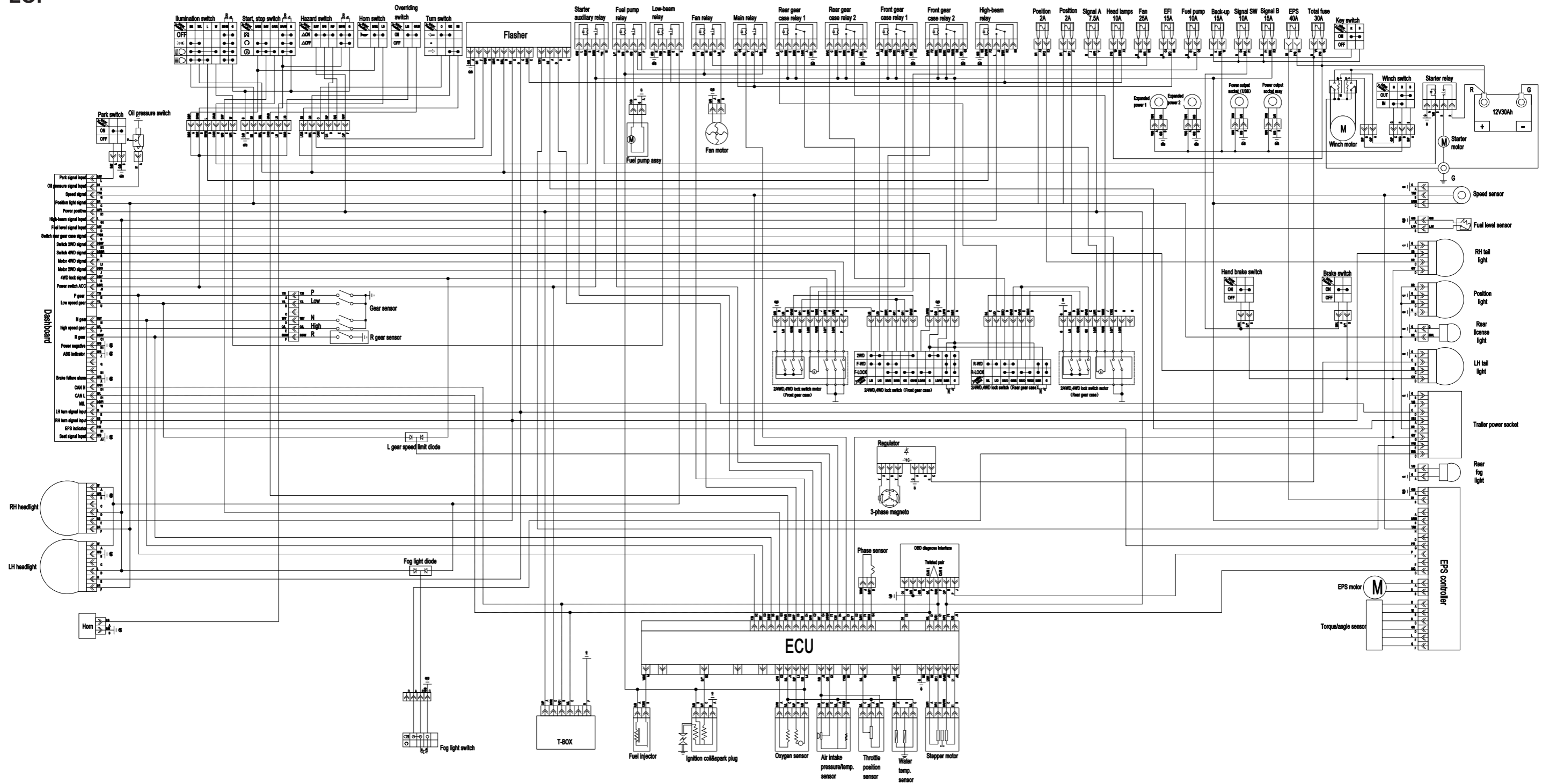


LINE TYPES

—	ELECTRICITY AFTER LOCK
—	CONSTANT POWER
—	POWER CONTROL
—	SIGNAL
—	COMMUNICATION
—	POWER GROUND
—	A-D GROUND
—	5 OR 3.3 VOLTS



Appendix B LOF



LINE TYPES

电源线
信号线
POWER CONTROL
SIGNAL
COMMUNICATION
POWER GROUND
A-D GROUND