SEGWAY®

SERVICE MANUAL

ATV SERIES PRODUCTS

SNARLER

20220728 V3

版本信息

日期	修订前版本	修订后版本	修订内容	修改章节	修订日期	完成状态
20220526	V2	V3	1、CVT部件新增一种CVTech状态	第3-6章整个章节	20220528	是
			2、CVT进排气进行修改	第7-2页		
20220706	V2	V3	ECU/节气门更换后进行自学习	第14-23页	20220706	是
20220725	V2	V3	添加或更换制动液后油盖复位操作	第2-9页	20220726	是
20220725	V2	V3	制动片磨损极限由1mm改为1.5mm	第2-8页	20220726	是
20220804	V2	V3	长兴CVT主动轮螺母扭力值更改由100N·m 改为150~170N·m	第3-6-5、3-6-16页	20220804	是

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SUMMARY

This manual provides information on ATV diagnosis, maintenance procedures, adjustments, and specifications for use by maintenance technicians. All materials, illustrations and product descriptions contained in this manual are in accordance with the status at the time of publication to ensure the efficient safety of vehicles

Continuous research and development, may lead to parts of the manual account do not tally with the vehicle actual situation, so the state of the vehicle body shall prevail, when in doubt it is suggested that you contact the Segway Powersports dealership, for the latest status of this manual or information relating to the product part number or special tools.

No part of this manual may be copied or stored in any form without the permission of Segway Technologies LTD. The above declaration applies to all texts, ICONS and forms.

1. This manual is provided by Segway Technology Co., Ltd. and is prepared for qualified professional and technical personnel. Attempts to repair and maintain the vehicle without proper training and without proper tools and equipment may injure the maintainer or others and may damage or disable the vehicle in normal operation.

2. Correct vehicle repair and maintenance is very important for the personal safety of maintenance personnel and the safe and reliable operation of motor vehicles. If a part needs to be replaced, please use the same part or the part designated by Segway.

3. The maintenance procedures recommended in this manual are effective methods of repair and maintenance, some of which require the use of specialized tools.

Therefore, if replacement parts, repair procedures or tools are to be used that are not approved or recommended by Segway, it must first be confirmed that there is no risk to personal safety or safe operation of the vehicle.

SEGWAY®

SEGWAY TECHNOLOGY CO., LTD.

Web: SegwayPowersports.us

APPLICABLE MODELS:

SGW570A1、SGW570A2、SGW570A3、SGW570A4、SGW570A5、SGW570A6

REVISION INDEX

REV	RELEASE DATE	CHANGES
V01	20210709	◆ Updated the Main Harness diagram ◆ Updated the Dashboard to new version ◆ Added brushed EPS topic ◆ Added differential Rear Axle topic

TERMINOLOGY

A	ampere(s)	lb	pounds(s)
ABDC	after bottom dead center	m	meter(s)
AC	alternating current	mm	Millimeter(s)
ATDC	after top dead center	min	minute(s)
BBDC	before bottom dead center	N	newton(s)
BDC	bottom dead center	Nm	Newton meters
BTDC	before top dead center	Pa	pascal(s)
C	degree(s) Celcius	HP(PS)	horsepower
CVT	centrifugal variable Transmission	psi	pound(s) per square inch
DC	direct current	r	revolution
F	farad(s)	rpm	revolution(s) per minute
F	degree(s) Fahrenheit	TDC	top dead center
ft	foot, feet	TIR	total indicator reading
g	gram(s)	V	volt(s)
kg/cm²	Kilograms per square centimeter	W	watt(s)
h	hour(s)	Ω	ohm(s)
L	liter(s)		

NOTES BEFORE MAINTENANCE

This manual includes a variety of "warnings", "attention", "tips", etc., which must be carefully followed in order to reduce the risk of injury during repair or maintenance. Improper repair or maintenance will damage the vehicle or bring safety hazards to the vehicle.

⚠ WARNING

WARNING indicates a potential hazard that may result in severe injury or death to the operator, bystander or person(s) inspecting or servicing the vehicle.

⚠ CAUTION

CAUTION indicates a potential hazard that may result in personal injury or damage to the vehicle.

TIPS

TIPS provide maintenance information to give the corresponding reminder, express and explanation.

IMPORTANT

IMPORTANT provides key reminders during disassembly, assembly, and inspection of components.

GENERAL INFORMATION

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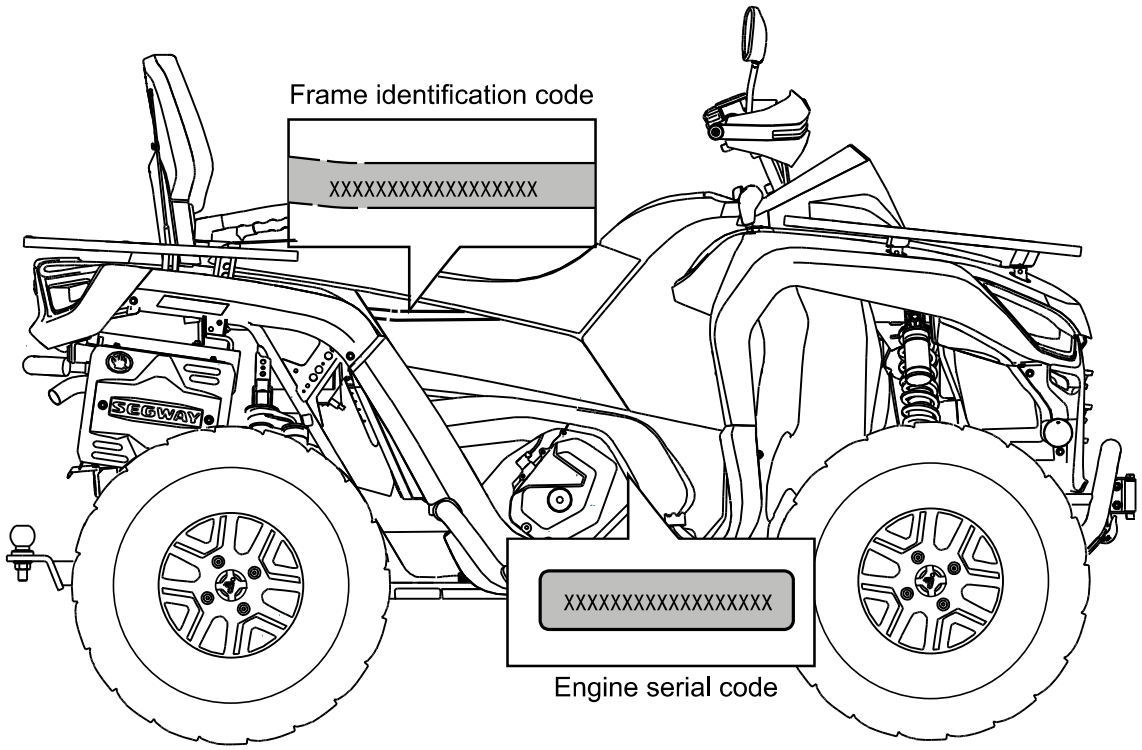
GENERAL INFORMATION

Vehicle identification number/engine serial code

Vehicle identification number

The frame identification number is located on the frame cross under the seat cushion pipe under the seat cushion.

Reference the vehicle identification number (VIN) when corresponding about the Segway Powersports vehicle.



VEHICLE IDENTIFICATION CODE COMPOSITION					
A0SAAPX1?XXXXXXXX 1 234567 8 9 10					
No.	Serial Number Meaning	Digits	No.	Serial Number Meaning	Digits
1	OEM CODE	3	6	inspection	1
2	MODEL	1	7	DATE	1
3	ENGINE CODE	1	8	Serial number	1
4	displacement	1	9	Factor number	1
5	POWER	1	10	Production number	6

Technical parameters of vehicle

No.	Item	Model	
		SGW570F-A1 A2 A3 SNARLER AT6 S	SGW570F-A4 A5 A6 SNARLER AT6 L
Vehicle			
1	Length	87 in（2200mm）	92.52 in（2350mm）
2	Width	50.39 in（1280mm）	50.39 in（1280mm）
3	Height	51.97 in (1320mm)	56.3 in（1430mm）
4	Wheel base	51.18 in (1300mm)	57.09 in（1450mm）
5	Ground clearance	10.6 in（270mm）	10.6 in（270mm）
6	Turning diameter	275.59 in（7000mm）	314.96 in（8000mm）
7	Curb weight（no oil and gasoline）	860lb(390kg)	877lb(398kg)
8	Front rack load	88.18 lb(40kg)	
9	Rear rack load	132.28 lb(60kg)	
10	Recommended Traction quality Pulled load quality）	661.39 lb (300kg)	771.62 lb(350kg)
Engine			
11	Engine model	199MS	
12	Engine type	Four stroke、Single cylinder、 Water cooled、vertical、 Double overhead camshaft	
13	Cylinder diameter × stroke	99×73.6	
14	Engine displacement	567cc	
15	Compression ratio 10.6:1	10.6:1	
16	maximum power	32.5kw / 7000 rpm	
17	maximum torque	48N·m / 5500 rpm	
18	Idle speed	1400±140r/min	
19	Starting way	Electric starting	
20	Lubrication way	Pressure spray	
21	Engine oil type	10W/40-SJ	
22	Engine oil capacity （oil filter replacement）	2.53 qt (2.4L)	
23	Engine oil capacity （Without change the filter）	2.32 qt (2.2L)	

24	Front Differential gear oil type	SAE 75W/90/GL-5 or SAE 80W/90/GL-5
25	Front Differential oil the volume	9.5oz (280ml)
26	Rear Differential gear oil type	SAE 75W/90/GL-5 or SAE 80W/90/GL-5
27	Change the volume	8.1oz (240ml)
28	Air filter	Paper filter
29	Fuel tank type	Barrier type plastic fuel tank
30	Fuel tank capacity	6.1gal (23L)
31	Reserve fuel capacity	1.9gal (4.5L)
32	Throttle type	D42/D44
33	Spark plug type	CPR7EA / B7RTC
34	Spark plug gap	0.6~0.8mm
35	Transmission	CVT continuously variable speed
36	Shift sequence	L-H-N-R-P
37	Transmission gear ratio	0.648~2.976
38	Low	5.34
39	High	3.08
40	Reverse	4.40
Tire		
41	Tire type	All-Terrain
42	Front tire specification	25×8-12/AT26×8-12/26×8-14
43	Rear tire specification	25×10-12/AT26×10-12/26×10-14
44	Front tire pressure	7.0psi (48.3kPa)
45	Rear tire pressure	7.0psi (48.3kPa)
Brake System		
46	Brake type	Divide the cell to show the vehicle column that the brake system represents.
47	Auxillary brake	Right foot operation
48	Front braking mode	Right-hand operation
49	Brake fluid type	DOT4
Suspension System		
50	Front suspension	Front double A rocker arm
51	Rear suspension	Rear double A rocker arm
52	Front shock absorber	Spring + oil resistance Spring + air resistance

53	Rear shock absorber	Spring + oil resistance Spring + air resistance	
54	Front wheel travel	7.28in (185mm)	
55	Rear wheel travel	8.27in (210mm)	
Electrical System			
56	Ignition mode	Electric (ECU）	
57	Charge	450W / 5500 rpm	
58	Battery	12V 32Ah	
Light(2 status)			
59	Headlight	LED 13.2W	H4 55W/60W
60	Front turn light	LED 2.64W	4.8W
61	Day light	LED 28.8W	4.2W
62	Front position light	LED 12W	0.5W
63	Rear turn light	LED 2.64W	10W
64	Parking light	LED 3.96W	21W
65	Rear tail light	LED 0.61W	10W/5W
66	License plate light	5W	

Unit conversion table

Torque		
Unit	coefficient	Convert to
N·m	× 0.1020	kg·m
N·m	×0.7376	ft·lbs
N·m	×8.851	in·lbs
kg·m	×9.807	N·m
kg·m	×7.233	ft·lbs
kg·m	×86.80	in·lbs
in·lbs	×0.833	ft·lbs
in·lbs	×0.116	kg·m
Pressure		
kPa	× 0.01020	kg/cm²
kPa	× 0.1450	psi
kPa	× 0.7501	cmHg
kg/cm²	× 98.07	kPa
kg/cm²	× 14.22	psi
cm Hg	× 1.333	kPa
Power		
N	× 0.1020	kg
N	× 0.2248	lb
kg	× 9.807	N
kg	× 2.205	lb
Volume		
L	× 0.2642	gal (US)
L	× 0.2200	gal (imp)
L	× 1.057	qt (US)
L	× 0.8799	qt (imp)
L	× 2.113	pint (US)
L	× 1.816	pint (imp)
mL	0.03381	oz (US)
mL	0.02816	oz (imp)
mL	0.06102	cu in
Speed		
km/h	× 0.6214	mph
Power		
kW	× 1.360	PS
kW	× 1.341	HP
PS	× 0.7355	kW
PS	× 0.9863	HP
Temperature		
°C to °F : °C x 9/5 + 32 = °F		
°F to °C : °F - 32 x 5/9 = °C		

Torque

The following tables list the tightening torque for the major fasteners, and the parts requiring use of a non-permanent locking agent or liquid gasket.

Letters used in the “Remarks” column mean:

L: Apply a non-permanent locking agent.

MO: Apply molybdenum disulfide oil solution (mixture of the engine oil and molybdenum disulfide grease in a weight ratio 10:1).

EO: Apply engine oil.

SS: Apply silicone sealant

Lh: Left-hand Threads

R: Replacement Parts

S: Follow the specific tightening sequence.

Engine standard fastener torque					
NO.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Hexagon socket head screw M6×16	8~12	0.8~1.2	69~103.6 in·lb	
2	Screw M8×25	22~28	2.2~2.8	16.2~20.7	
3	Screw M8×25	29~35	2.9~3.5	21.4~25.8	
4	Bolt M10×1.25×25	75~85	7.5~8.5	55.3~62.7	
5	Bolt M12×1.25×30	112~128	11.2~12.8	82.6~94.4	
Engine special fastener torque					
1	CVT Driving wheel bolt M12×1.25×142	112~128	11.2~12.8	82.6~94.4	
2	CVT Drive wheel bolt M10×1.25×80	75~85	7.5~8.5	55.3~62.7	
3	Cylinder bolt M11×1.25×150	70~80	7.0~8.0	51.6~59	
4	Shift positioning bolt	23~27	2.3~2.7	17~20	
5	Parking positioning bolt	23~27	2.3~2.7	17~20	
6	plug M14	16~18	1.6~1.8	11.8~13.3	
7	Hexagon socket head stepped bolt	10~14	1.0~1.4	7.4~10.3	
8	bolt M8×30	18~22	1.8~2.2	13.3~16.2	
9	Connecting water pipe joint	23~27	2.3~2.7	17~20	
10	Oil filter connector	35~45	3.5~4.5	25.8~33.2	
11	Piston injection hole plug	3.7~4.3	0.37~0.43	32~37.1 in·lb	
12	Flow hole φ1	1.9~2.5	0.19~0.25	16.4~21.6 in·lb	
13	Oil regulating valve assembly	20~24	2.0~2.4	14.8~17.7	
14	Vent stud M8×43	20~24	2.0~2.4	14.8~17.7	
15	bolt M6×40	12~16	1.2~1.6	8.6~11.8	

16	nut M18×1.5	145~155	14.5~15.5	107~114.3	
17	nut M22×1	175~185	17.5~18.5	129~136.4	
18	nut M55×1.5×6-LH	120	12	88.4	
19	nut M65×1.5×8-LH	137	13.7	100.9	
20	bolt M6×12	16~20	1.6~2.0	11.8~14.8	
21	bolt M6×21	13~17	1.3~1.7	9.6~12.5	
22	bolt M6×12	8~12	0.8~1.2	69~103.6 in·lb	
23	bolt M6×16	8~12	0.8~1.2	69~103.6 in·lb	
24	bolt M6×20	8~12	0.8~1.2	69~103.6 in·lb	
25	bolt M6×25	8~12	0.8~1.2	69~103.6 in·lb	
26	bolt M6×30	8~12	0.8~1.2	69~103.6 in·lb	
27	bolt M6×30	8~12	0.8~1.2	69~103.6 in·lb	
28	bolt M6×35	8~12	0.8~1.2	69~103.6 in·lb	
29	bolt M6×40	8~12	0.8~1.2	69~103.6 in·lb	
30	bolt M6×55	8~12	0.8~1.2	69~103.6 in·lb	
31	bolt M6×60	8~12	0.8~1.2	69~103.6 in·lb	
32	bolt M6×60	8~12	0.8~1.2	69~103.6 in·lb	
33	bolt M6×65	8~12	0.8~1.2	69~103.6 in·lb	
34	bolt M6×90	8~12	0.8~1.2	69~103.6 in·lb	
35	bolt M8×30	30~34	3.0~3.4	22.1~25.1	
36	bolt M8×35	30~34	3.0~3.4	22.1~25.1	
37	bolt M8×40	30~34	3.0~3.4	22.1~25.1	
38	bolt M8×70	28~32	2.8~3.2	20.7~23.6	
39	bolt M6×20	8~12	0.8~1.2	69~103.6 in·lb	
40	bolt M6×28	8~12	0.8~1.2	69~103.6 in·lb	
41	spark	10~15	1.0~1.5	7.4~11.1	

Standard fastener torque of the whole vehicle					
NO.	Fastener	Torque			Remark
		N·m	kgf·m	ft·lb	
1	bolt M6	8~12	0.8~1.2	69~103.6 in·lb	
2	bolt M8	30 ～ 40	3.0~4.0	22.1~29.5	
3	bolt M10	40 ～ 50	4.0~5.0	29.5~36.9	
4	bolt M12	50 ～ 60	5.0~6.0	36.9~44.3	
Torque of special fasteners for vehicle					
1	Nut M12×1.25	70～80	7.0~8.0	51.6~59	
2	Nut M24×2	200～250	20~25	147.5~221.3	
3	Bolt	30～37	3.0~3.7	22.1~27.3	
4	Bolt M10×1.25×20	40 ～ 50	4.0~5.0	29.5~36.9	
5	Bolt M10×1.25×40	40 ～ 50	4.0~5.0	29.5~36.9	
6	Bolt M12×1.25×65	50 ～ 60	5.0~6.0	36.9~44.3	
7	Bolt M8×16	35 ～ 45	3.5~4.5	25.8~33.2	
8	Bolt M10×1.25×20	40 ～ 50	4.0~8.0	29.5~36.9	
9	Bolt M10×1.25×120	40 ～ 50	4.0~5.0	29.5~36.9	
10	Intermediate shaft support mounting bolt M12×1.25×25	50 ～ 60	5.0~6.0	36.9~44.3	
11	Drive shaft mounting bolts GB5789 M8×35	35 ～ 45	3.5~4.5	25.8~33.2	
12	Front suspension bolt M10×1.25×45	40 ～ 50	4.0~5.0	29.5~36.9	
13	Front suspension bolt M10×1.25×90	40 ～ 50	4.0~5.0	29.5~36.9	
14	Front suspension bolt M10×1.25×140	40 ～ 50	4.0~5.0	29.5~36.9	
15	Stabilizer bar ball pin GB/T 6183.2 M10×1.25	40 ～ 50	4.0~5.0	29.5~36.9	
16	Rear suspension bolt GB5789 M12×1.25	50 ～ 60	5.0~6.0	36.9~44.3	
17	Direction machine mounting bolt M12×1.25×25	50 ～ 60	5.0~6.0	36.9~44.3	
18	Direction machine mounting bolt M12×1.25×125	50 ～ 60	5.0~6.0	36.9~44.3	
19	Direction machine mounting nut M14×1.5	100 ～ 120	10~12	73.8~88.5	
20	Brake clamp body mounting bolt M10×1.25×25	40 ～ 50	4.0~5.0	29.5~36.9	

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Maintenance Periodic Table

A good maintenance is vital for safety and driving. Regular maintenance is especially important. Please follow this table to make regular maintenance for your vehicle.

⚠ WARNING

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

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

Perform all services at whichever maintenance interval is reached first. Record maintenance and service in the Maintenance Log.

	ITEM	MAINTENANCE INTERVAL (WHICHEVER COMES FIRST)			REMARKS
		HOURS	CALENDAR	MILES（KM）	
	Steering		Pre-Ride		Visually inspect, test, or check components. Make adjustments and/ or schedule repairs when required
	Front suspension		Pre-Ride		
	Rear suspension		Pre-Ride		
	Tires/ Wheels/ fasteners		Pre-Ride		
	Brake fluid level		Pre-Ride		
	Brake system		Pre-Ride		
	Accelerator		Pre-Ride		
	Engine oil level		Pre-Ride		
►	Air filter, pre-filter		Daily		Inspect; clean often; replace as needed
	Coolant		Daily		Check level
	Power steering unit (if equipped)		Daily		Inspect daily; clean often
	Headlight/taillight/ worklight		Daily		Check operation; apply dielectric grease if replacing lamps
►	Air filter, main element		Weekly		Inspect; replace as needed

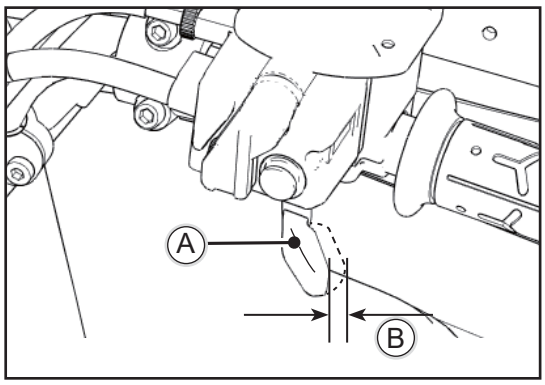
MAINTENANCE

ITEM		MAINTENANCE INTERVAL (WHICHEVER COMES FIRST)			REMARKS
		HOURS	CALENDAR	MILES（KM）	
► D	Brake pad wear	10 H	Monthly	100 (160)	Inspect periodically
	Battery	20 H	Monthly	200 (320)	Check terminals; clean; test
	Fuel System	20 H	Monthly		Inspect; cycle key to pressurize fuel pump; check lines and fittings for leaks and abrasion
►	Engine oil change	25 H	1 M	200 (320)	Break-in oil and filter change
►	Front gearcase oil	25 H	1 M	200 (320)	Break-in oil level check
►	Rear gearcase oil	25 H	1 M	200 (320)	Break-in oil level check
►	General lubrication	50 H	3 M	500 (800)	Lubricate all fittings, pivots, cables, etc.
	Throttle Body Intake Duct	50 H	6 M		Inspect duct for proper sealing/air leaks
	Drive belt	50 H	6 M	500 (800)	Inspect; adjust; replace as needed
	Cooling system	50 H	6 M	1000(1600)	Inspect coolant strength seasonally; pressure test system yearly
►	Engine oil change	100 H	6 M	1000(1600)	Change the oil and filter
►	Oil lines and fasteners	100 H	6 M	1000(1600)	Inspect for leaks and loose fittings
►	Front gearcase oil	100 H	12 M	1000(1600)	Change fluid;
►	Rear gearcase oil	100 H	12 M	1000(1600)	Change fluid
D	Fuel system/filter	100 H	12 M	1000(1600)	Cycle key to pressurize fuel pump; check for leaks at fill cap, fuel lines/rail and fuel pump; replace lines every two years

ITEM		MAINTENANCE INTERVAL (WHICHEVER COMES FIRST)			REMARKS
		HOURS	CALENDAR	MILES（KM）	
►	Radiator (if applicable)	100 H	12 M	1000 (1600)	Inspect; clean external surfaces
►	Co ng hoses (if applicable)	100 H	12 M	1000 (1600)	Inspect for leaks
►	Engine mounts	100 H	12 M	1000 (1600)	Inspect
	Exhaust muffler/ pipe / Joints	100 H	12 M	1000 (1600)	Inspect; clean; replace worn parts
D	Spark plug	100 H	12 M	1000(1600)	Inspect; replace as needed
D	Clutches (drive and driven)	100 H	12 M	1000 (1600)	Inspect; clean; replace worn parts
D	Front wheel bearings	100 H	12 M	1000 (1600)	Inspect; replace as needed
D	Brake fluid	200 H	24 M	2000(3200)	Change every two years
	Spark arrester	300 H	36 M	3000(4800)	Clean out
►	Coolant		60 M		Replace coolant
D	Valve clearance	500 H		5000（8000）	Inspect; adjust
	Idle speed				Adjust as needed
D	Toe adjustment				Inspect periodically; adjust when parts are replaced
	Headlight aim				Adjust as needed

Check and adjust free play of throttle cable

Throttle Lever Free Play Inspection



◆ Check that the throttle lever 【A】 moves smoothly from full open to close, and the throttle closes quickly and completely in all steering positions by the return spring.

If the throttle lever does not return properly, check the throttle cable routing, lever free play, and possible cable damage. Then lubricate the throttle cable.

◆ Run the engine at the idle speed, and turn the handlebar all the way to the right and left to ensure that the idle speed does not change.

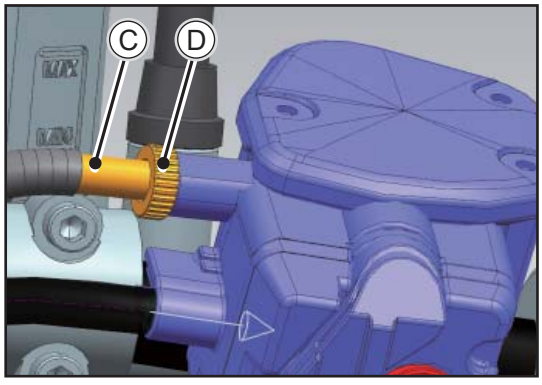
If the idle speed increases, check the throttle lever free play and the cable routing.

◆ Stop the engine and check the throttle lever free play【B】.

If the free play is not within the specified range, adjust the cable.

Throttle Lever Free Play

Standard: 2 ～ 3mm (0.08 ～ 0.12in.)

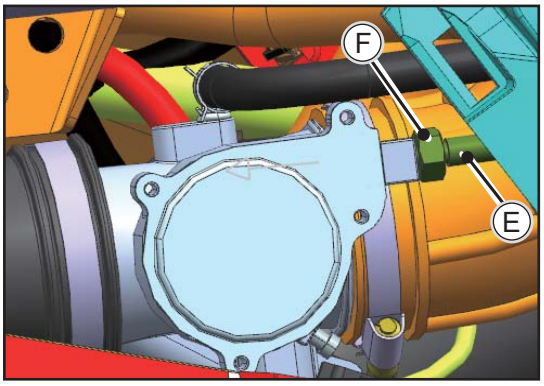


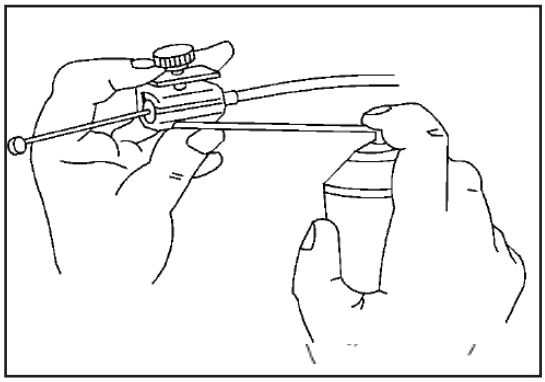
◆ Slide the rubber cover off the adjuster at the throttle case.

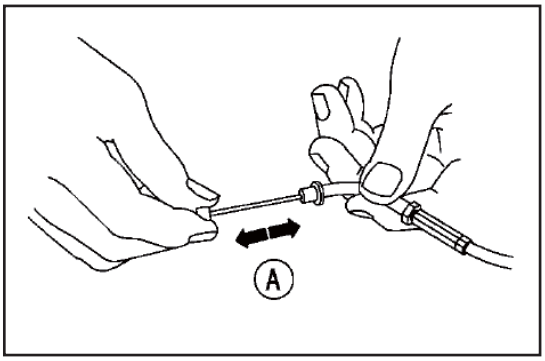
◆ Loosen the locknut 【D】 and turn the throttle cable upper adjuster 【C】 until the cable has proper amount of play.

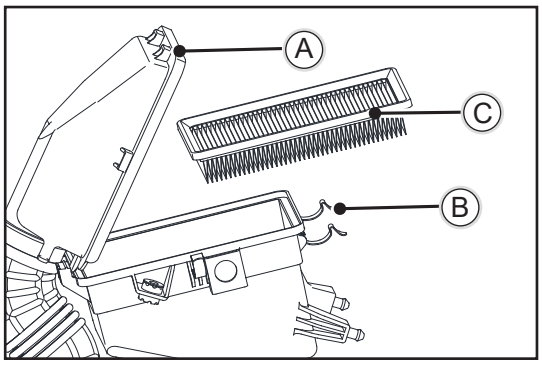
◆ Tighten the locknut and reinstall the rubber cover.

◆ If upper adjuster 【C】 cannot be used to adjust proper free play of throttle, take out plastic part and use throttle cable adjuster 【E】under the air damper for adjustment until it is properly adjusted and then lock nut 【F】.









⚠ WARNING

It may lead to unsafe driving conditions if throttle valve is not properly assembled and operated.

- ◆ Check throttle lever free play.
- ◆ Cover back oiler dust cap and fasten.

- ◆ Before assembly, lubricate throttle cable.

If it is not properly adjusted, it will cause misoperation cabling or cable damage which will cause unsafe driving conditions.

Replace of air filter

Remove the air box cover

The air filter element of this vehicle is paper air filter element. The air filter needs to be cleaned or replaced after being used for a period of time. See the periodic maintenance table (See vehicle body part) for details. First, remove the filter element for inspection. If the filter element is seriously soaked with oil or ash, do not clean it. Instead, replace it with a new filter element. If there is no oil or heavy ash, you can put the intake side down, knock on the ground, and shake off most of the dust.

It is better if you have an air pump, you can blow from the filter element side (cannot blow from the air intake side) until the dust is blown off.

【A】Air filter cover

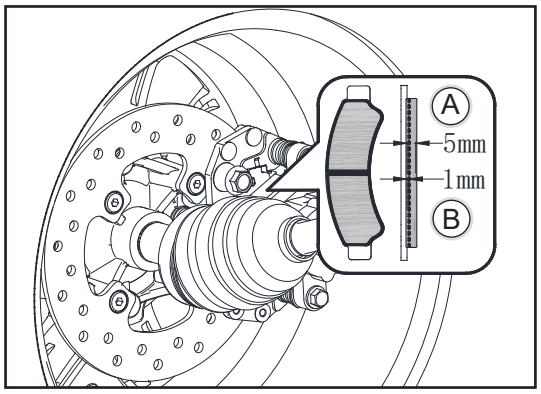
【B】Air box cover clamp

【C】The filter element

The air filter cover is located in front of the seat; Disassembly steps（See vehicle body part）

- ◆ Press and move the air box cover clamp.
- ◆ Pull up the front air filter cover;
- ◆ Take out the old air filter.
- ◆ Clean the filter;
- ◆ Install a new filter if necessary.
- ◆ Make sure the air filter is securely anchored.

Brake system



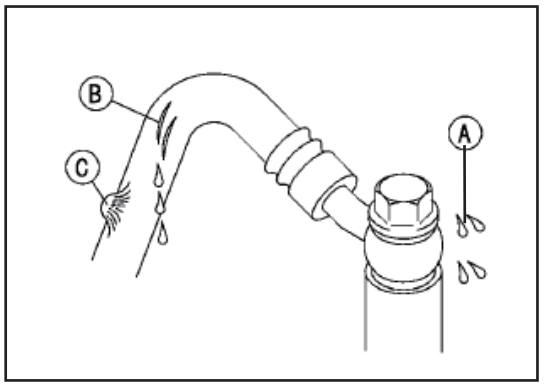
Wearing inspection of front brake disc

Brake components thickness	Standard thickness	5.0mm (0. 19 inch)
	Minimum thickness	1.5mm (0.06 inch)

【A】Normal thickness

【B】Limit thickness

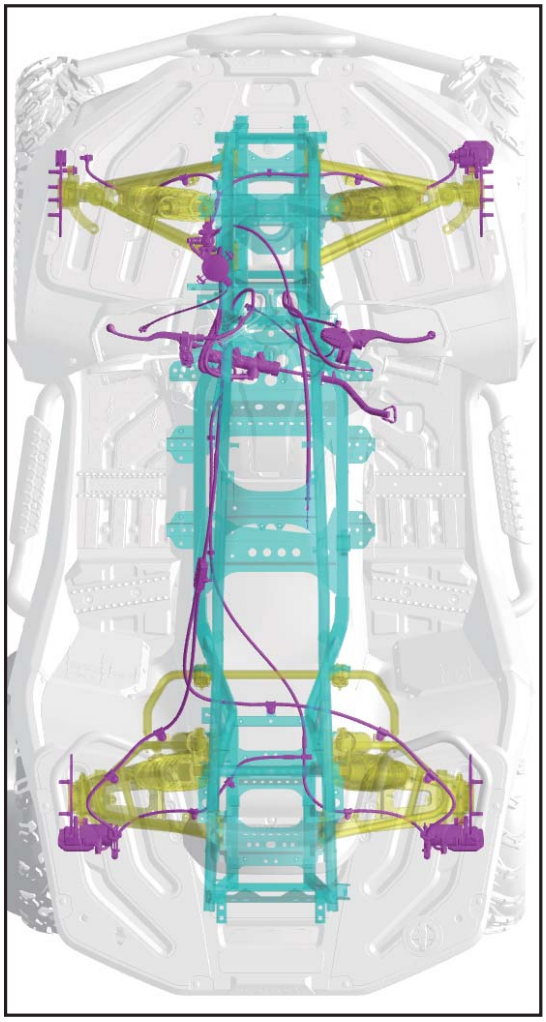
- ◆ Check each brake disc thickness regularly
- ◆ If any side of brake disc thickness is smaller than 1mm, replace two brake discs as a group together.



Inspection of front brake hose and connection

- ◆ Check brake hose and accessories if any aging, crack and leakage
- ◆ If pipe is not properly maintained, brake hose will lead to fluids leakage【A】 or hose crack due to high pressure.
- ◆ If any crack【B】or swelling is found【C】, replate the hose.
- ◆ Tighten all loosen fittings.

Replace brake hose



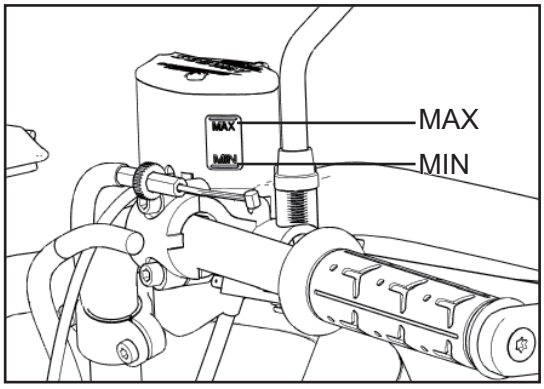
- Discharge brake fluid from brake hose for replacement.
- Remove oiling bolt of both ends of brake hose and take out the hose.
- Clean overfilled brake fluid immediately

⚠ WARNING

Brake fluid may quickly destroy painting surface. Any overfilled fluids should be cleaned immediately

- Use new flat washer on each end of hose connector.
- assemble new brake hose in position and fasten oiling bolt.

Torque of brake hose oiling bolt
25N·m（2.5kgf·m，18.4ft·lb）



Check fluid level of front brake oil cup

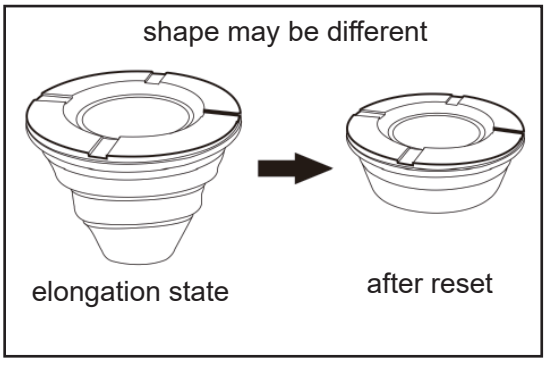
Put hand brake main pump accumulator horizontally and check liquid level in the oil cup.

- 【MAX】—highest fluid level of brake oil cup
- 【MIN】—lowest fluid level of brake oil cup.

If liquid level is lower than 【MIN】, check and refill brake fluid.

- Procedures to refill brake fluid in the brake hose
- Remove front brake oil cup cover and refill same brake fluid in the brake cup to 【MAX】 level and then fasten its screws.

Torque of oil cap cover screw
1.5N·m（0.15kgf·m，13.3in·lb）

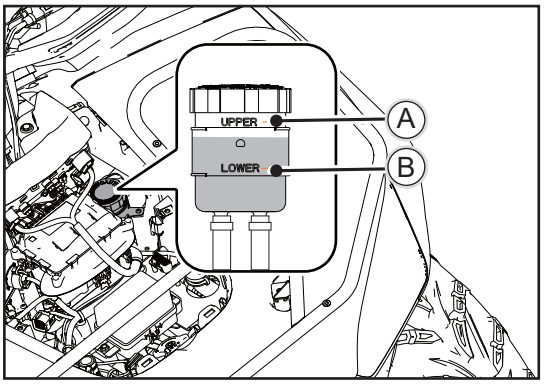


⚠ CAUTION

After replenishing or replacing the brake fluid, check whether the oil gasket under the oil cup cover is in an extended state. If the oil gasket is in an extended state, the oil gasket needs to be reset at this time (as shown in the figure). If the oil cup gasket is not reset, when the oil cup cover is tightened, the brake fluid will overflow the oil cup.

Check rear brake oil cup liquid level

The rear brake oil cup is located between LF upper fender and front shock.



- Park vehicle in even ground and check liquid level of oil cup.

【A】—UPPER— highest liquid level of brake oil cup

【B】—LOWER— lowest liquid level of brake oil cup.

If fluid is lower than this level, you should refill same brake fluid and fasten the cap.

If the oil gasket is stretched, the oil gasket must be reset.

⚠ WARNING

Refill DOT4 brake fluid as per requirement.

Replace brake fluid

Pump out brake fluid from brake system

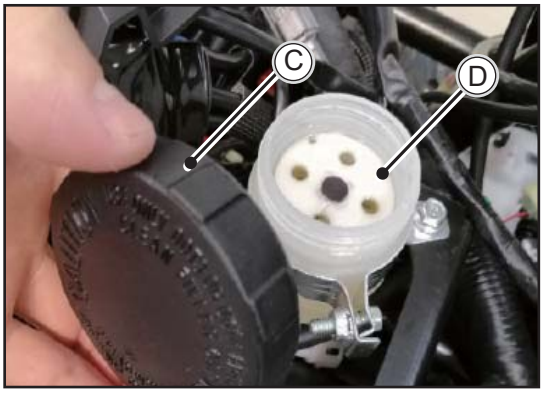
【A】oil cup cover of hand brake upper pump assy

【B】oil cup of hand brake upper pump assy

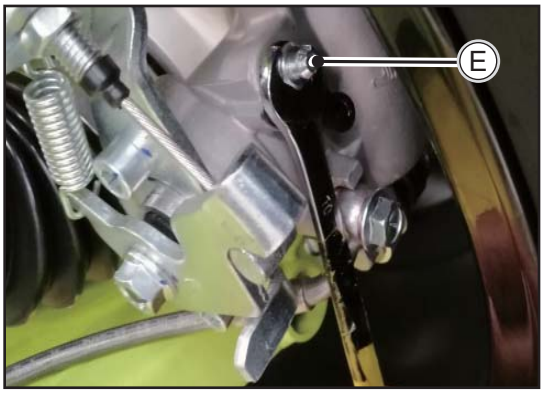
【C】oil cup cover of rear brake

【D】oil cup of rear brake

【E】bleeder valve



- disassemble oil cup cover 【A】 of hand brake upper pump assy
- disassemble oil cup rear brake oil cup 【C】
- Turn on front (rear), left (right) air nozzle in the brakes and distribution valves 【E】successively
- Connect transparent plastic hose of vacuum tank with front and rear brakes and air nozzles of distributions valves respectively. The other end of vacuum tank is connected with air source to pump out all brake fluids in the brake system until all fluids in the hand brake main cylinder oil cup and rear brake oil cup are pumped out. Then, close air valve of vacuum tank to cut the air source.



⚠ WARNING

Brake fluid is corrosive. When turning on air nozzle and discharge fluids, pay attention not to drop any fluid on the plastic parts or other appearance parts.

Refill brake fluid

- Refill new brake fluids in the hand brake oil cup
- Refill new brake fluids in the rear brake oil cup

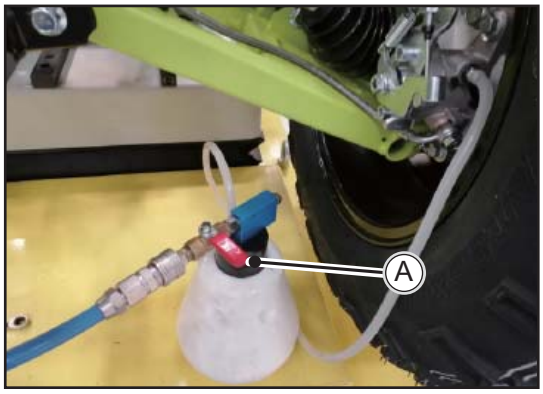
⚠ CAUTION

When refilling brake fluid in the oil cup, please do not refill DOT4 fluid over MAX level.If the oil gasket is stretched, the oil gasket must be reset.

Please refill brake fluid as below procedures

【A】Vacuum tank air valve hand shank

1. Vacuumize rear right brake hose and refill



- disassemble rear right brake air nozzle dust cover
- Unscrew rear right brake air nozzle
- Connect the other end of vacuum tank to air source and connect hose to air nozzle.
- Rotate air valve hand shank and open vacuum tank air valve to vacuumize rear right brake hose and observe rear brake oil cup and hand brake main pump oil cup liquid level situation. Refill only when fluid level is lower than MIN.
- In the vacuum process of rear right brake hose, refill oil cup twice at least each time and screw up air nozzle clockwise and then rotate vacuum tank air valve to close it.

Torque of air outlet
12N·m（1.2kgf·m，8.8ft·lb）

2. Vacuumize and refill rear left brake hose

- Refer to the procedures of vacuumizing rear right brake hose to vacuumize and refill rear left brake hose.

3. Vacuumize and refill front left brake hose

- Disassemble front left brake air nozzle dust cap
- Loosen front left brake air nozzle
- Connect one end of vacuum tank to air source and put its hose to air nozzle.
- Counter clockwise rotate air valve hand shank and open vacuum tank air valve to vacuumize front left brake hose. Meanwhile, observe rear brake oil cup and hand brake main pump cup fluid level and refill in time. Refill only when fluid is lower than MIN level.
- In the vacuum process of front left brake hose, refill oil cup twice at least each time and screw up air nozzle clockwise and then rotate vacuum tank air valve to close it.

4. Vacuumize and refill front right brake hose

Refer to the procedures of vacuumizing front left brake hose to vacuumize and refill front right brake hose.

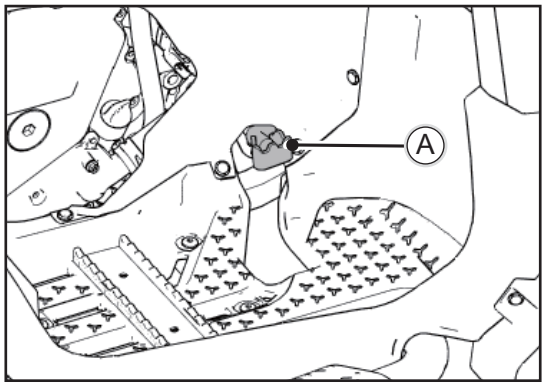
5. Vacuumize and refill front brake hose

- Open distribution valve dust cap and counter clockwise open air inlet bolts of distribution valve..
- Connect one end of vacuum tank to air source and the other end hose to air outlet.
- Counter clockwise rotate air valve hand shank to open vacuum tank. Vacuumize pipelines of front left and front right brakes respectively. Meanwhile, check liquid level of rear brake cup and hand brake main pump oil cup and refill in time. Refill only when level is lower than MIN.
- In the vacuum process of all pipelines, refill oil cup twice at least each time and screw up air nozzle clockwise and then rotate vacuum tank air valve to close it.

Torque of Air Outlet
7.9N·m（0.8kgf·m，94.8in·lb）

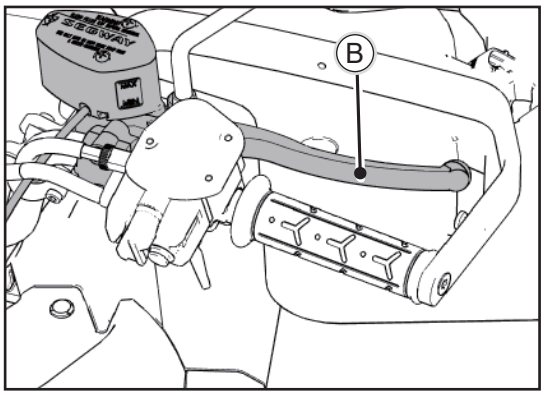
TIPS

Check liquid level in the brake oil cup regularly and refill.



⚠ WARNING

Step on brake pedal【A】and hand grasp front brake shank【B】respectively. If you have soft or “sponge” feeling, in this process, it means there is air in the brake system. Please repeat above procedures to vacuumize (discharge air) the pipeline until you have no such feeling.

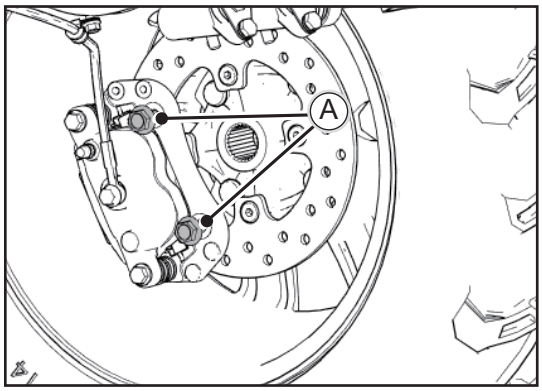


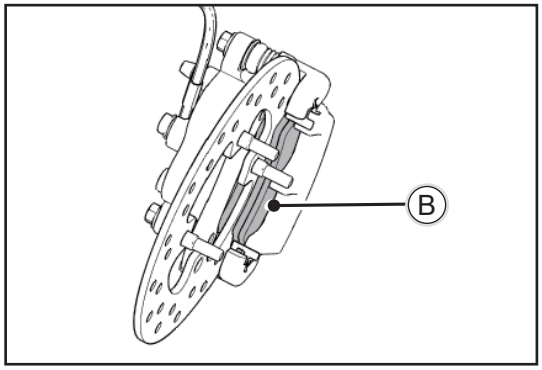
Discharge air in the brake system

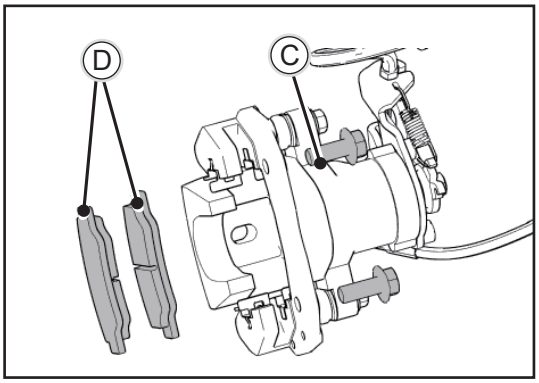
Discharge air in the pipeline when you replace or reassemble brake parts

- Remove hand brake upper pump assy oil cup or rear brake oil cup cap and refill brake fluid over the MIN level.
- Slowly grasp hand brake shank or step on brake pedal to the bottom several times. Loosen air outlet of brake in the replaced pipeline. If any brake fluid

flows out, immediately screw up air outlet bolts. Repeat above procedures until no bubble in the oil cup and no soft or “sponge” feeling.







Replace of front brake disc

【A】bolts of front brake

【B】front brake disc

disassemble front brake bolts and front brake caliper and replace same grade brake discs.

Torque of front brake bolts
（40～50）N·m（4.0~5.0kgf·m，29.5~36.9ft·lb）

Replace of rear brake disc

【C】Rear brake bolts

【D】Rear brake disc

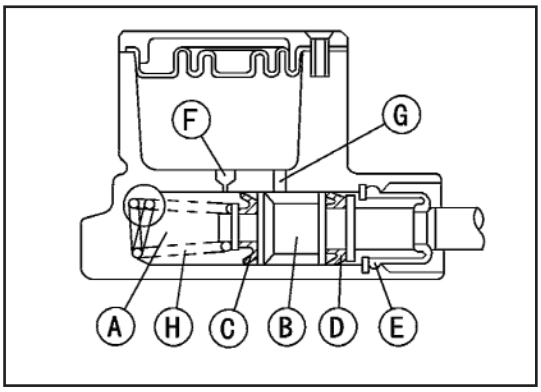
- ◆ Disassemble rear brake caliper
- ◆ Replace same grade rear brake disc

Torque of rear brake bolt
（40～50）N·m（4.0~5.0kgf·m，29.5~36.9ft·lb）

⚠ WARNING

When you replace brake discs, you need to replace inside and outside discs together.

Check Cylinder



【A】Hans brake cylinder

【B】Piston

【C】Seal ring

【D】Seal ring

【E】Dust cover

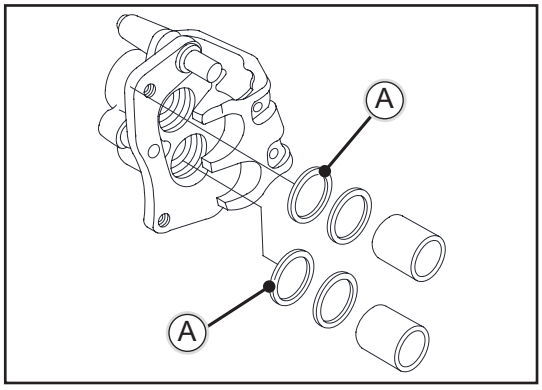
【F】Compensating hole

【G】Oiling hose

【H】Piston reset spring

- Disassemble hand brake pump
- Check if any scratch, rust or hard spots, inside and outside surfaces of hand brake cylinder 【A】and piston 【B】. If any damage of hand brake cylinder or piston, please replace them.
- Check first seal ring 【C】 and second seal ring 【D】. If any wearing, damage, deformation （rot） or swelling, replace piston components to refresh seal ring. If any fluid leakage is found in the push rod, the seal ring in the piston need to be replaced.
- Check dust cover 【E】 if any damage. If yes, replace it.
- Check compensating hole 【F】 and oiling hole 【G】 if any block. If oiling hole 【G】 is blocked, brake disc will be dragged in the brake pad to make it clamped too tightly. If so, clean the blocking stuff.
- Check piston reset spring 【H】if any damage. If yes, replace it.

Replace brake assy oil seal



【A】Oil seal.

The oil seal【A】around piston should be kept right gap. If seal is not ideal, seal will be worn more and resistance will be increased in the piston so that brake and brake fluid temperature will be increased accordingly.

- Disassemble brake caliper. Please replace piston seal if meeting any of below situations.

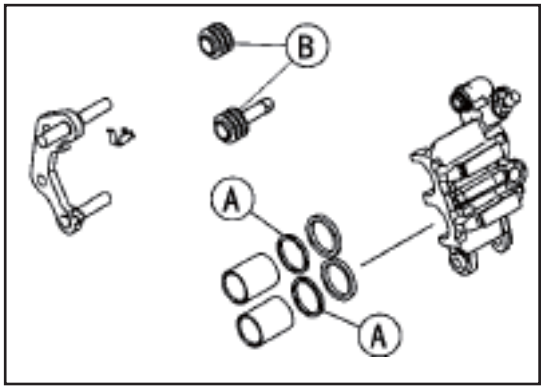
（a）Leakage of brake fluid around oil seal

（b）Brake too hot;

（c）Big wearing difference between inside and outside cushion.

（d）Seal sticks on the piston. If piston seal pad is changed, dust sea cushion should be replaced, too. Besides, the seal cushion should be replaced at intervals.

Replace dust seal and dust sleeve in the brake assy piston

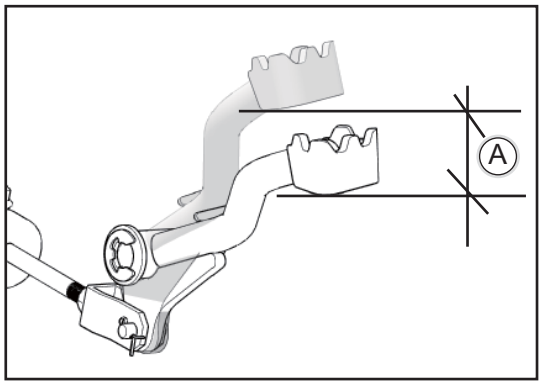


【A】Dust sea

【B】Dust sleeve

- Disassemble brake caliper (pls refer to “brake” chapter）
- Check dust seal【A】and dust sleeve【B】if any crack, wearing, swelling or other damage. If any damage, please replace them.

Check free play of rear brake pedal



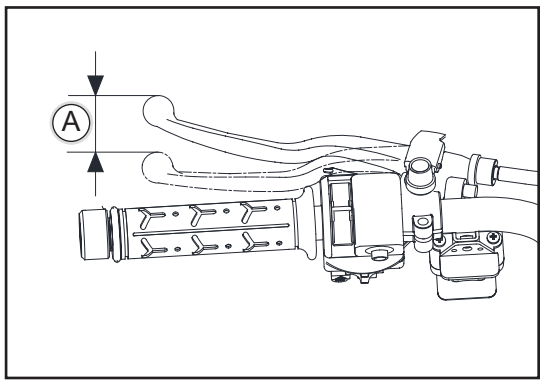
【A】Free play of brake pedal

- Check free play【A】of brake pedal
- Slightly step on brake pedal till you step to the bottom. If rear brake pedal free play is bigger, adjust it. Please refer to “brake” chapter.

Standard of free play of rear brake pdeal

2-3 mm (0.08-0.12inch)

Check rear parking handle free play



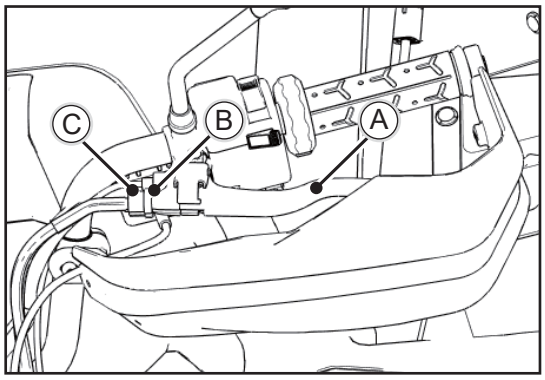
【A】Parking handle work play

- Check parking handle work play 【A】.
- Grasp parking handle until the parking brake is engaged If parking handle free play is bigger, please adjust it.

Standard of parking handle free play

10-20mm (0.4-0.8inch)

Adjustment of free play of parking handle



【A】Brake handle

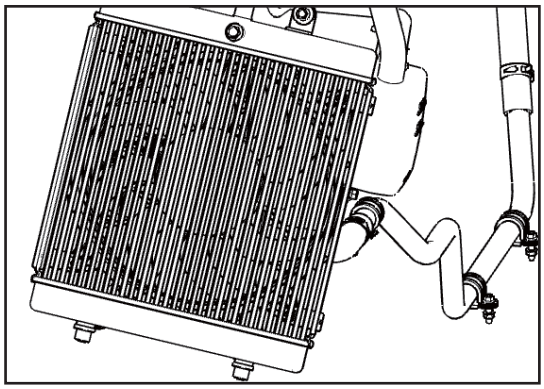
【B】lock nut

【C】Brake rod adjuster

- Loosen locknut 【B】 and rotate adjuster 【C】to do as you can.
- Fasten locknut 【B】.
- Rotate end part of brake rod adjuster 【C】. Adjust parking wire handle till it is within parking handle free play specification.

Cooling System

Radiator Cleaning



⚠ CAUTION

Clean the radiator screen and the radiator in accordance with the Periodic Maintenance Chart.

In dusty areas, they should be cleaned more frequently than the recommended interval. After riding through muddy terrains, the radiator screen and the radiator should be cleaned immediately.

⚠ CAUTION

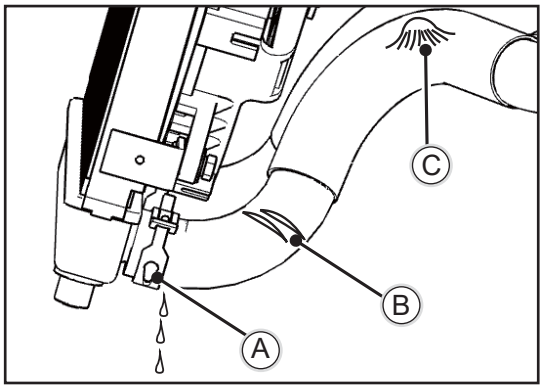
When cleaning the radiator with steam cleaner, be careful of the following to prevent radiator damage.

Keep the steam gun away more than 0.5 m (20 in.) from the radiator core【A】.

Hold the steam gun perpendicular to the core surface.

Run the steam gun following the core fin direction.

Radiator Hose and Connection Inspection



The high pressure inside the radiator hose can cause coolant to leak【A】 or the hose to burst if the line is not properly maintained. Visually inspect the hoses for signs of deterioration. Squeeze the hoses. A hose should not be hard and brittle, nor should it be soft or swollen.

Replace the hose if any fraying, cracks 【B】 or bulges 【C】 are noticed.

IMPORTANT

Check that the hoses are securely connected and clamps are tightened correctly.

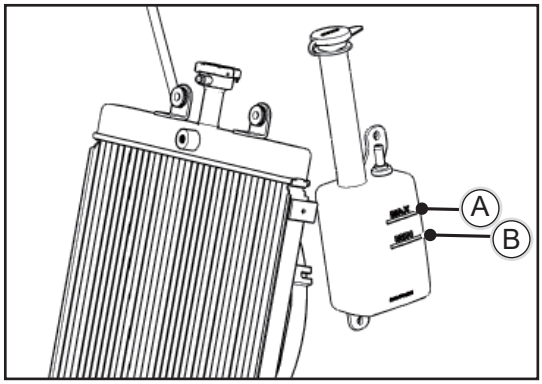
Adding cooling liquid

⚠ WARNING

To avoid scald, do not replace cooling liquid when engine is hot.

Coolant on tires will make them slippery and can cause an accident and injury. Immediately wash away any coolant that spills on the frame, engine, or wheels.

Since coolant is harmful to the human body, do not use for drinking.



- ◆ Remove front rack（see body part）
- ◆ Remove front maintenance cover

【A】Max level

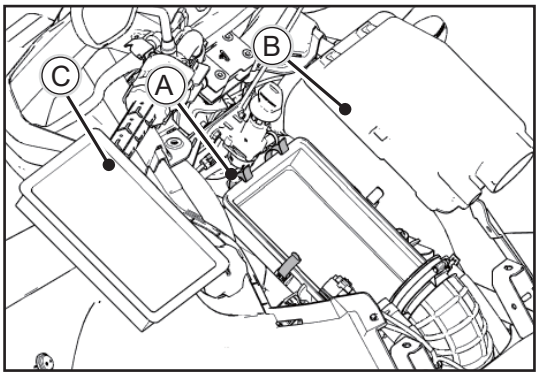
【B】Min level

- ◆ Add cooling liquid when liquid level lower 【B】
- ◆ Do not add cooling liquid over【A】
- ◆ Fill the reserve tank up to the full level line with coolant, and install the reserve tank cap.

Model of cooling liquid

Anti-freezing, anti-boiling and anti-rust -35℃ ***Green***

Cleaning or replacing air filter



【A】 metal buckle

【B】Air filter cover combination

【C】filter element, disassemble plastic parts before replacing it (see body part chapter)

- ◆ move metal buckle 【A】 outside
- ◆ remove air filter cover combination【B】
- ◆ Take out filter element 【C】 for cleaning and or replacing

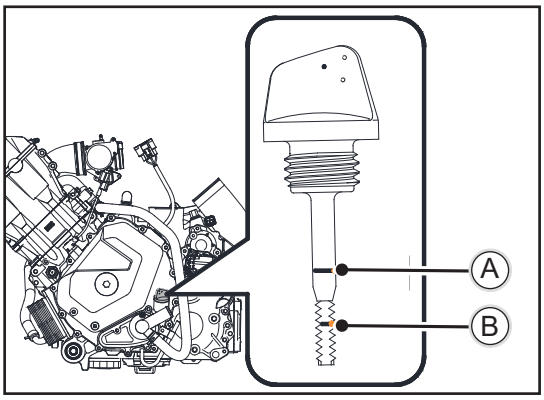
The air filter element of this vehicle is paper air filter element. First, remove the filter element for inspection. If the filter element is seriously soaked with oil or ash, do not clean it. Instead, replace it with a new filter element. If there is no oil or heavy ash, you can put the intake side down, knock on the ground, and shake off most of the dust.

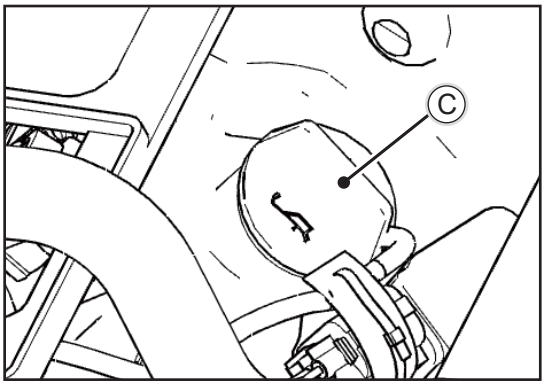
It is better if you have an air pump, you can blow from the filter element side (cannot blow from the air intake side) until the dust is blown off.

Engine Oil Level Check

⚠ CAUTION

Running the engine with an improper oil level can cause serious engine damage.





- Park the vehicle on a level ground. Wait at least 5 minutes to allow the oil to flow back to the bottom of the engine.
- Put a piece of cotton cloth under the end of the oil dipstick, and then pull out the oil dipstick.
- Wipe the oil dipstick clean.
- Reinsert completely;
- Put a piece of cotton cloth under the end of the oil dipstick, then pull out the oil dipstick and check the oil level.

Check the oil level as shown in the figure below:

The oil level is between the Upper engraved line【A】and the Lower engraved line 【B】. It is the proper oil level. Below the lower scale means the oil is too little, and the upper scale means the oil is too full, too little or Too full is not suitable.

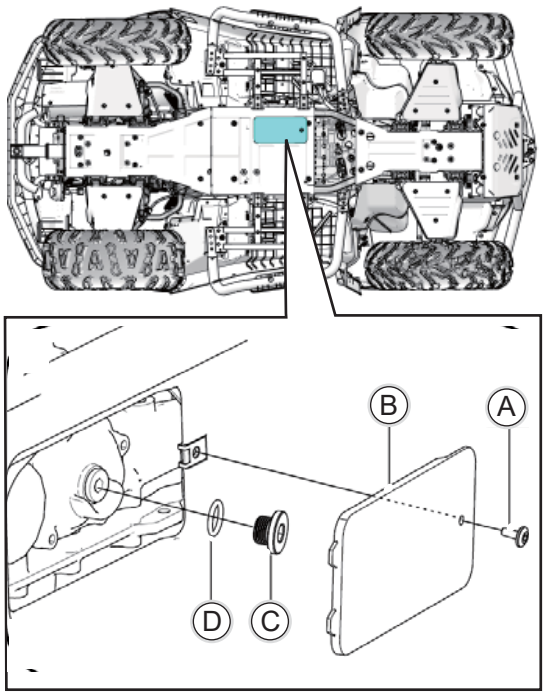
【A】Upper engraved line

【B】Lower engraved line

【C】Oil filler cap

- After cleaning the oil dipstick, fully insert it again.
- If the oil level is near or below the lower level mark, remove the seat (see body part) . Remove the oil fill cap【C】from the front right crankcase cover and add the specified oil into the fill cap hole, up to the upper level mark on the dipstick.
- Reinstall the oil fill cap and dipstick.
- Install the tank cover assembly.
- Install the seat.

Changing engine oil & filter



⚠ CAUTION

Do not change the oil when the engine and oil are hot. Allow engine and oil to cool before changing oil.

【A】Screw

【B】Filter inspection cover

【C】Oil drain plug

【D】O-ring

- Put the vehicle on the flat level surface.
- Start the engine, let it warm up at idle for 2 to 3 minutes.
- Turn off the engine.
- Remove the fixing screws of the filter inspection cover and open the filter inspection cover.
- Remove the oil drain plug【C】and O-ring, till the waste engine oil to drain out completely.

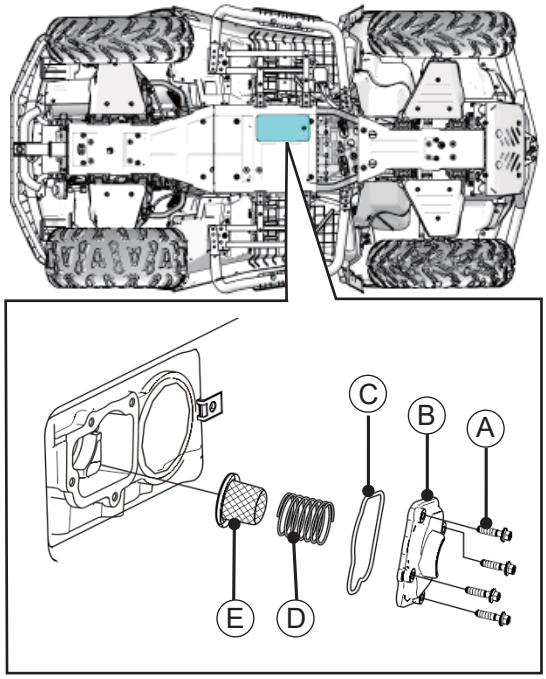
⚠ CAUTION

The hot oil may burn the skin, Do not let the oil contact skin.

- Change a new sealing washer onto the drain plug and reinstall the drain plug back【C】.

Torque specifications:

Oil drain plug*: *(16~20)N.m



Oli strainer clean

The oil filter of this engine is a two-stage filter. The oil filter screen filters the oil at the first stage. Clean the oil according to the time required, do not use poor quality oil.

【A】 Bolt M6*25*8

【B】 Strainer cover

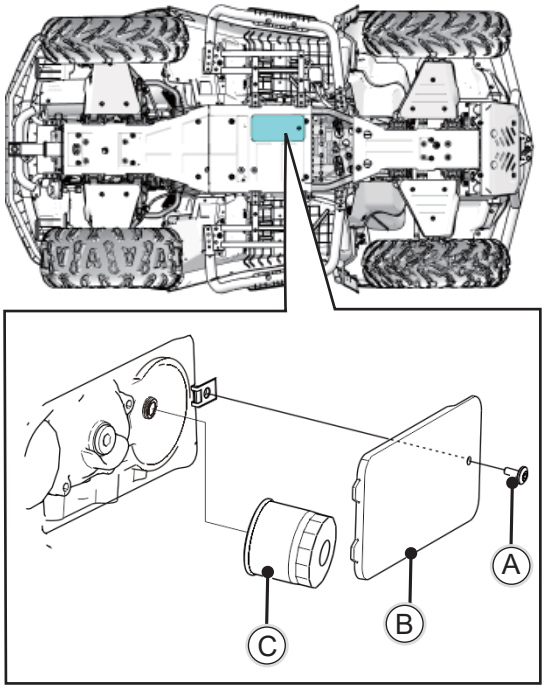
【C】 O-rings seal

【D】 Strainer spring

【E】 Oil strainer

The oil filter can be checked after the oil is discharged. If cleaning is needed, please take the following steps:

- Remove 4 bolts with tools;
- Remove the strainer cover, O-ring seal and strainer spring in turn;
- Take out the oil filter for cleaning;
- The installation step is opposite to the removal step



Oil filter change

This procedure requires mechanical skill and professional tools such as a torque wrench as well as a means for disposing of the drained fluid. If you do not have the skills or the tools, see your dealer.

Check the fluid recommendation table for capacities and plug torques. Always change the oil filter at the same time when changing the oil.

【A】Screw

【B】Oil filter inspection cover

【C】Oil filter

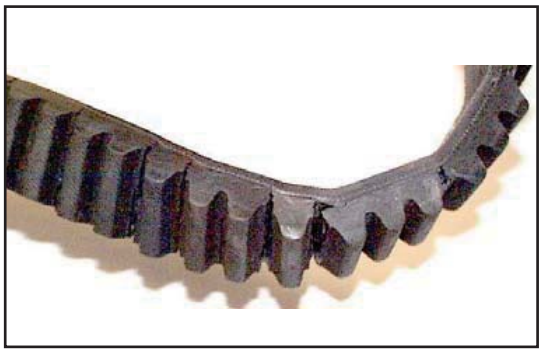
- Remove the fixing screws of the filter inspection cover and open the filter inspection cover，you can see the black cover, the oil filter is located here, put the towel under the oil filter
- Change a new O shape ring onto a new oil filter, inspect and make sure the O shape ring is in good condition.
- Remove the oil filter to be replaced by the tool counterclockwise;

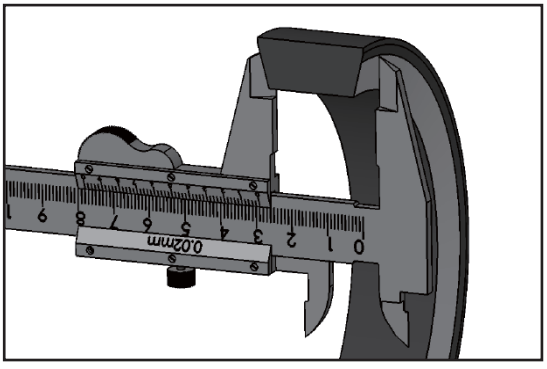
Rotate clockwise to install the new filter until the filter gasket touches the sealing surface. Tighten the can.

Drive Belt Inspection

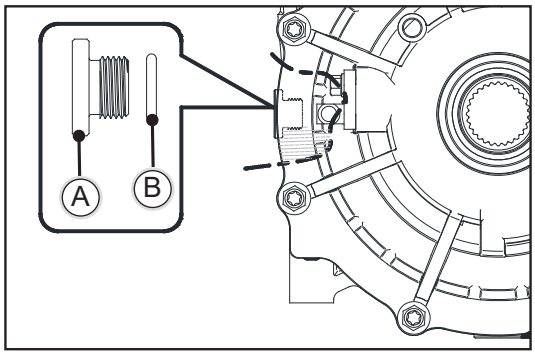
⚠ WARNING

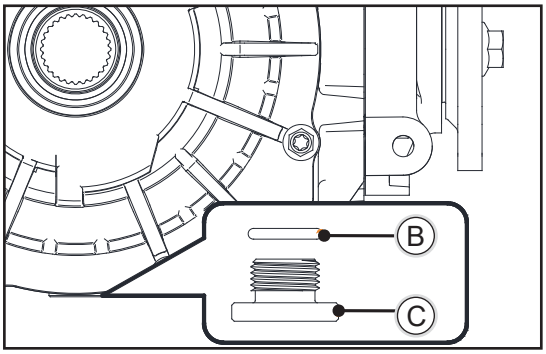
The drive belt must be inspected in order to avoid any risk of personal injury and/or material damage.





- The drive belt must be replaced if cracks are seen when turning it inside out.
- The drive belt must be replaced when the width at the cord level is approximately 2 mm less than it is on a new belt (refer to owner's manual).
- Make sure to take the measurement at the cord level of the belt.





Front/Rear Axle Gear Oil

【A】Filling plug

【B】O-ring

【C】Drain plug

- Put the vehicle on the flat level surface
- Place an oil drain pan under the drain plug【C】
- Remove the drain plug【C】and O-ring【B】

***Torque to specification*:**

Drain Plug: 16~20N.m

- After the oil has completely drained, reinstall the drain plug【C】and a new O-ring【B】.
- The oil discharged is harmful to the environment. Properly dispose of the oil properly□
- Remove the Filling plug 【A】and O-ring【B】, Add the recommended liquid as needed to make the liquid level reach the bottom of the filling hole thread.
- Reinstall the O-ring and filling plug

***Torque to specification*:**

Filling Plug:16~20N.m

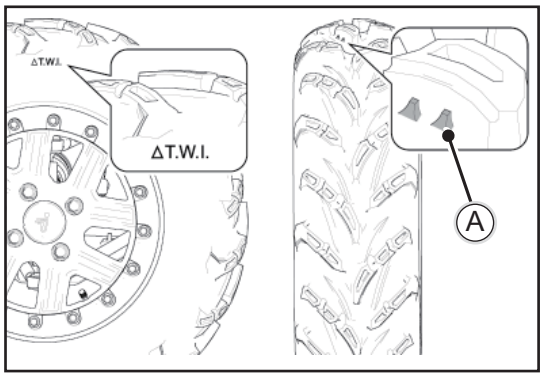
- Check for the leak.

⚠ CAUTION

Dispose of used fluid properly.

Wheels/Tires

Tire Inspection



【A】Type wear mark

Examine the tire for damage and wear.

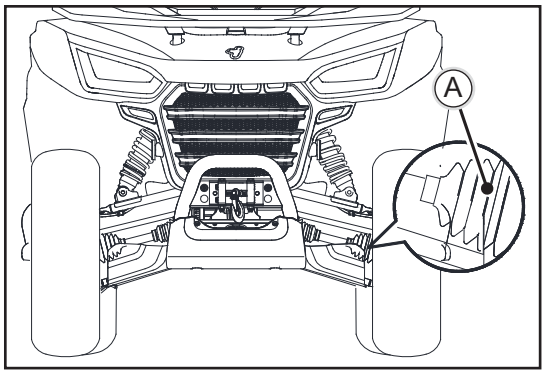
If the tire is cut or cracked, replace it.

- Observe the tire shoulder to find the tire wear limit alarm mark "T.W.I", follow the triangle sign to see the past, found that the tire tread has the corresponding convex, when the pattern block convex surface wear to the convex position, you should change the tire, otherwise due to insufficient strength, the tire will burst midway
- internal damage requiring tire replacement.
- Remove any foreign objects from the tread. After removal,
- check for leaks with a soap and water solution.

Standard Tire

Front: 25×8-12/ AT26×8-12/26×8-14

Rear: 25×10-12/ AT26×10-12/26×10-14



Propeller Shaft Joint Boot Inspection

- Visually inspect the rear propeller shaft joint boot 【A】 in accordance with the Periodic Maintenance Chart or if the shaft is noisy during operation.
- If the joint boot is torn, worn, or deteriorated, replace the joint boot and check the propeller shaft (see Drive System chapter).

ENGINE LUBRICATION SYSTEM

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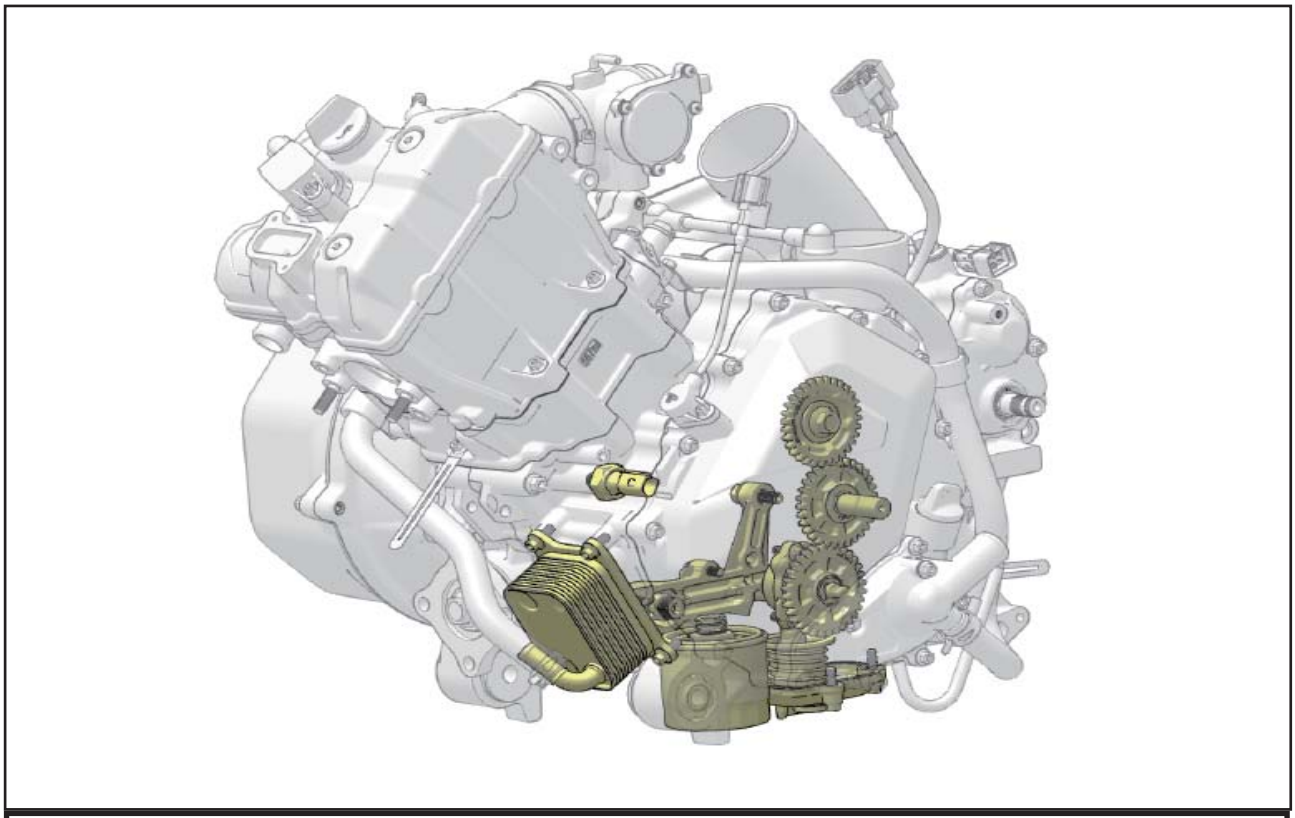
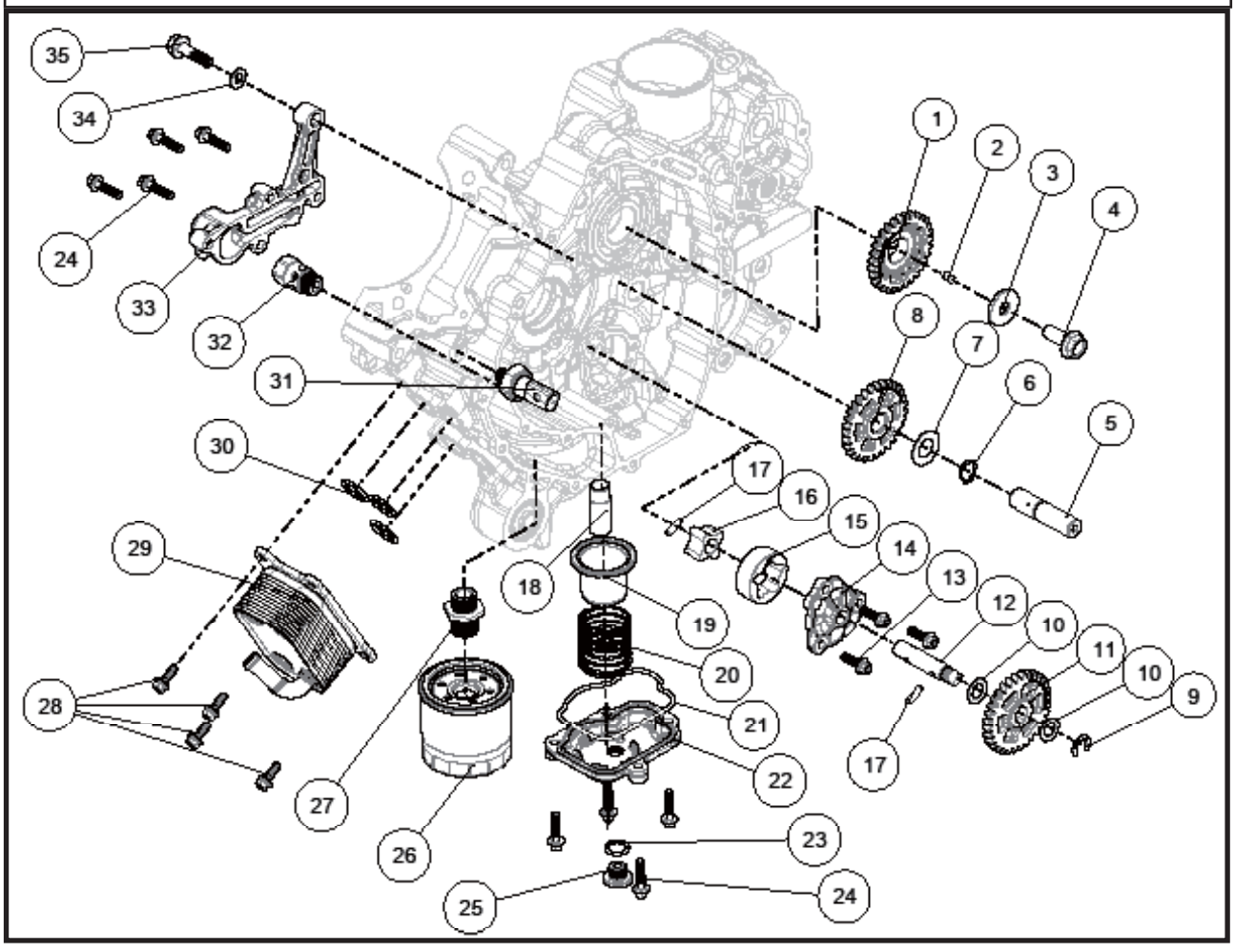
ENGINE LUBRICATION SYSTEM

Exploded view





No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Oil Pump Drive Gear				
2	Flat Key				
3	Spacer 10×30×3				
4	Bolt M10×1.25×25	80	8	58	
5	Oil Pump Idler Gear Shaft				
6	Circlip 15				
7	Spacer 15×28×1				
8	Oil Pump Idler Gear				
9	E-Ring 9				
10	Spacer12×20×1				
11	Oil Pump Driven Gear				
12	Oil Pump Shaft				
13	Bolt M6×20	10	1	7	
14	Oil Pump Cover				
15	Outer Gerotor				
16	Inner Gerotor				
17	Needle Roller 4×15.8				
18	Oil Pickup Pipe				
19	Strainer Filter				
20	Strainer Filter Spring				
21	O-Ring 82×3.1				
22	Strainer Filter Cover				
23	O-Ring 13.8×2.5				
24	Bolt M6×25	10	1	7	
25	Engine Drain Plug M14	18	1.8	13	
26	Oil Filter	18	1.8	13	R
27	Oil Filter Adapter	40	4	28	L
28	Bolt M6×16	10	1	7	
29	Oil Cooler				
30	O-Ring 19×2.5				
31	Oil Pressure Sensor	15	1.5	11	SS
32	Oil Pressure Valve Unit	22	2.2	16	L
33	Oil Pressure Valve Unit Cover				
34	Gasket 8				
35	Banjo Bolt M8×30	20	2.0	14	

G: Apply grease for oil seal and O-ring.
L: Apply a non-permanent locking agent.
O: Apply engine oil.
SS: Apply silicone sealant.
R: Replacement Parts.

ENGINE LUBRICATION SYSTEM

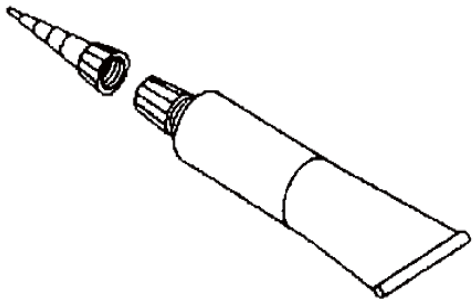
Technical Parameter

Item	Standard
Engine Oil:	
Grade	API SH or SJ
Viscosity	SAE 10W-40
Capacity	2.0 L (1.80 US qt) (when filter is not removed) 2.2 L (2.01 US qt) (when filter is removed) 2.4 L (2.33 US qt) (when engine is completely dry)
Oil Pressure Measurement: Oil Pressure @ 4500 r/min(rpm), oil temp. 110℃(230℉).	500 kPa (5.1 kgf/cm^2, 72.6 psi)

Special tools and sealants

Oil Pressure Gauge, 10 kgf/cm^2 :
E01GZ0030001

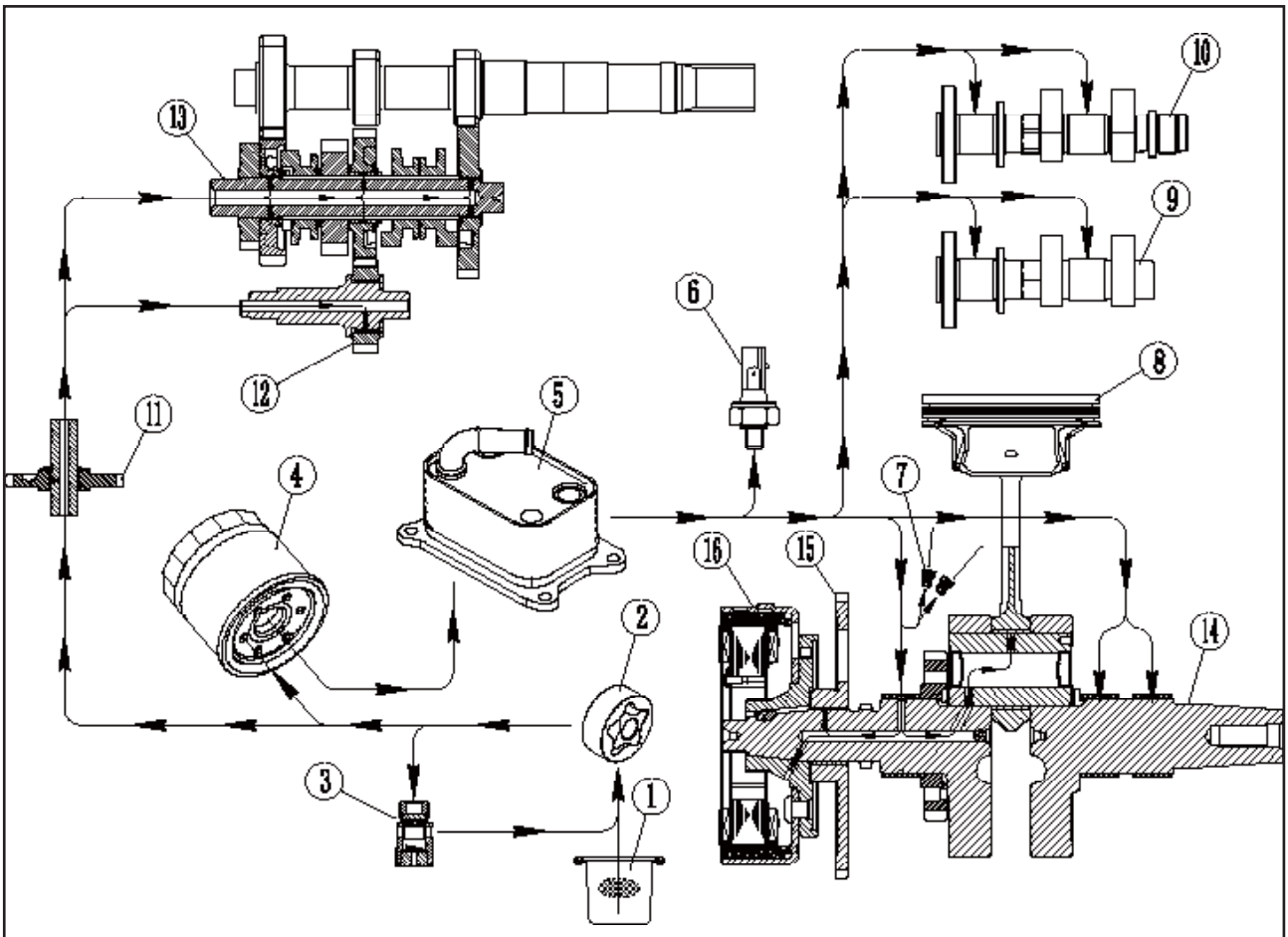
Silicone Sealant:



Oil Pressure Test Hose, M10×1:
E01GZ0040001

ENGINE LUBRICATION SYSTEM

Engine Oil Flow Chart



1	Strainer Filter	7	Oil Nozzles	13	Transmission Countershaft Assembly
2	Oil Pump	8	Piston	14	Crankshaft
3	Oil Pressure Valve Unit	9	Camshaft-IN	15	Starter One-Way Gear
4	Oil Filter	10	Camshaft-EX	16	Alternator Stator and Rotor
5	Oil Cooler	11	Oil Pump Idler Gear		
6	Oil Pressure Sensor	12	R Idler Gear		

Engine Oil and Oil Filter

⚠ WARNING

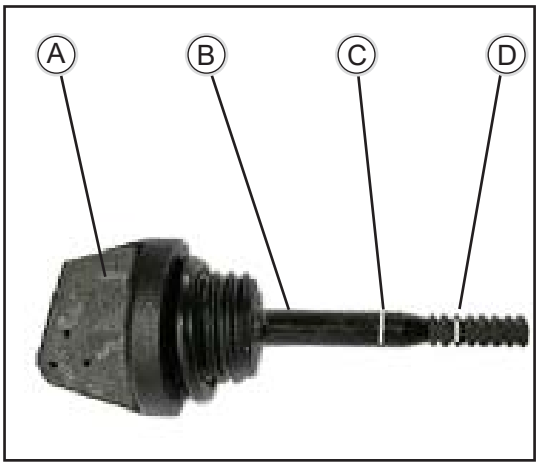
Vehicle operation with insufficient,deteriorated,or contaminated engine oil will cause accelerated wear and may result in engine or transmission seizure, accident,and injury.

Oil Level Inspection

- Park the vehicle so that it is level, both side-to-side and front-to-rear.
- If the oil has just been changed,start the engine, and run it for several minutes to fill the oil filter.

CAUTION

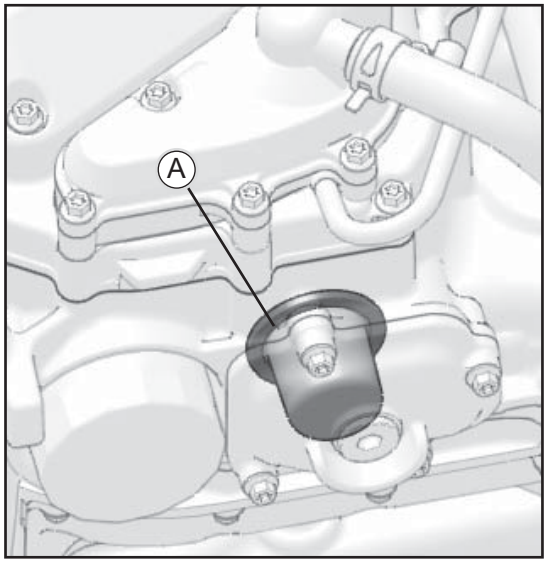
Allow the engine to idle for several minutes so that oil may reach all parts of the engine. Running a "dry" engine may cause severe damage.

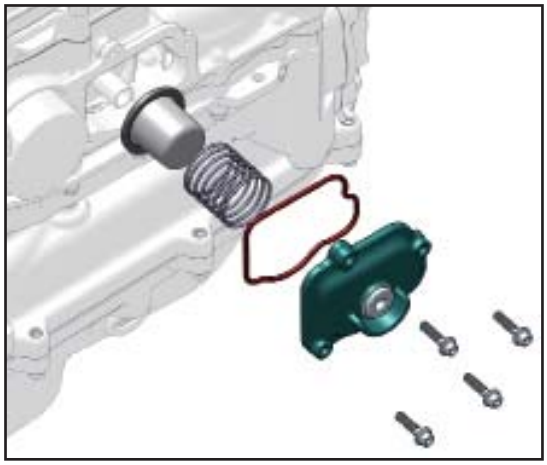


- Stop the engine and wait several minutes for all the oil to drain back to the sump.
- Unscrew the oil filler cap【A】 wipe its dipstick【B】 dry, and tighten it into the filler opening.
- Unscrew the oil filler cap and check the oil level. The oil level should be between the upper (H) level line 【C】and lower (L) level line【D】.

If the level is too high, suck the excess oil out the filler hole with a syringe or other suitable device.

If the level is too low, add oil through the filler hole.Use the same type and make of oil that is already in the engine.





Engine Oil Change

- Refer to the Engine Lubrication System in the Periodic Maintenance chapter.

Oil Filter Change

- Refer to the Engine Lubrication System in the Periodic Maintenance chapter to fill the oil filter.

Coarse Filter Removal

- Remove the Coarse Filter Cover.
- The Coarse Filter【A】out of the crankcase.

Coarse Filter Cleaning

- Clean the Coarse Filter【A】thoroughly whenever it is removed for any reason.
- Clean the Coarse Filter with an appropriate solvent and remove any particles stuck to it.

⚠ *WARNING*

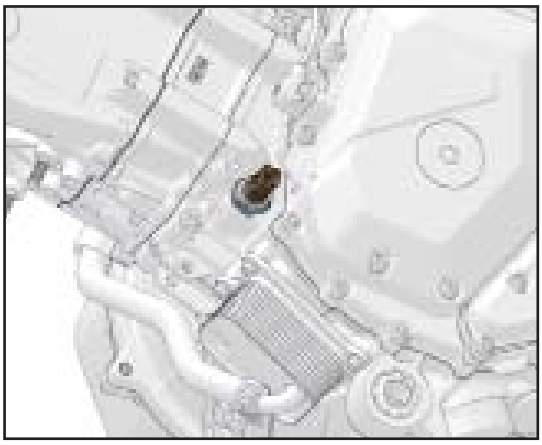
Clean the Coarse Filter in a well-ventilated area, and take care that there is no spark or flame anywhere near the working area. Because of the danger of highly flammable liquids, do not use gasoline or low flash-point solvents.

TIPS

- While cleaning the Coarse Filter,check for any metal particles that might indicate internal engine damage.
- Check the Coarse Filter carefully for any damage, holes, broken wires,or gasket pulling off.

If the Coarse Filter is damaged, replace it.

Oil Pressure



Oil Pressure Measurement

NOTE

Measure the oil pressure after the engine is warmed up.

- Remove the oil pressure switch, and attach the oil pressure gauge【A】and adapter【B】.

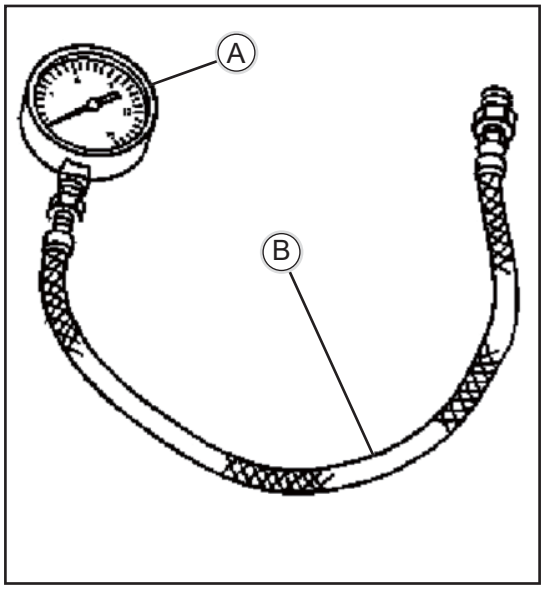
Special Tools-

Oil Pressure Gauge,10 kgf/cm^2: E01GZ0030001

Oil Pressure Gauge Adapter: E01GZ0031001

Oil Pressure

Standard: 500 kPa (5.1 kgf/cm^2, 72.6psi)@4500r/min (rpm),110°C (230°F) of oil temp.



If the oil pressure is much lower than the standard, inspect the relief valve, oil pump, and/or crankshaft bearing insert wear.

If the oil pressure is much higher than the standard, inspect the oil filter, oil screen, and other areas of the lubrication system for clogging.

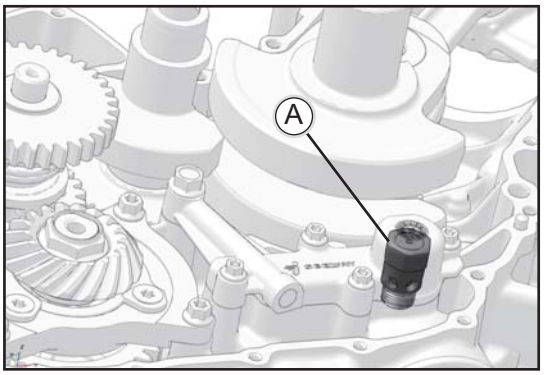
- Stop the engine.
- Remove the oil pressure gauge and adapter.

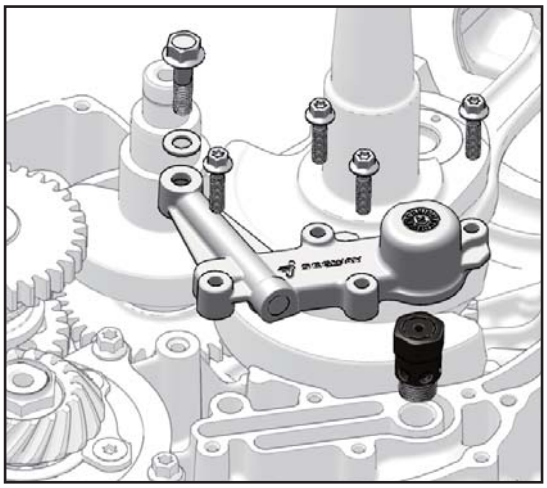
⚠ WARNING

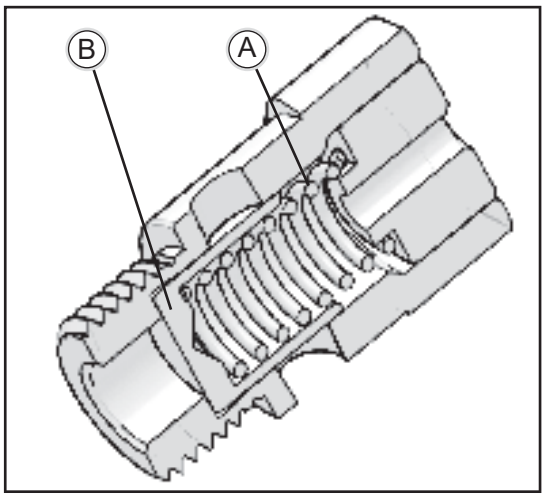
Take care against burns from hot engine oil that will drain through the oil passage when the gauge adapter is removed.

- Apply silicone sealant to the oil pressure switch, and tighten it.
- Sealant - Silicone Sealant
- Torque

Oil Pressure Switch
15 N·m (1.5 kgf·m, 11 ft·lb)







Oil Pressure Valve Removal

- Split the crankcase (see Crankshaft / Transmission chapter).
- Remove the oil pressure relief valve Cover.
- Remove the oil pressure relief valve【A】.

Oil Pressure Valve Installation

- See crankcase assembly (See Crankshaft / Transmission chapter).
- Apply a non-permanent locking agent to the threads of oil pressure relief valve, and tighten it.

Torque-

Oil Pressure ReliefValve
15N·m(1.5kgf·m,11ft·lb)

Oil Pressure Valve Inspection

- Remove the relief valve.
- Push the inner valve to make sure that the valve【A】moves smoothly and that it returns to its original position by the force of the spring【B】.

NOTE

The Oil Pressure Valve cannot be disassembled and it must be inspected in the assembled state.

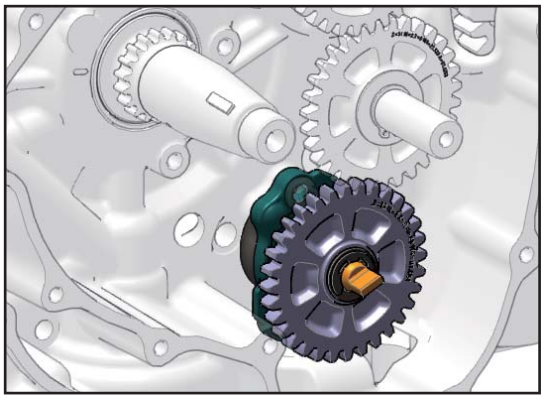
If the valve movement is not smooth, wash the relief valve with high flash-point solvent, and use compressed air to remove any foreign particles from it.

⚠ WARNING

Clean the oil pressure relief valve in a well -ventilated area, and take care that there is no spark or flame anywhere near the working area.Because of the danger of highly flammable liquids, do not use gasoline or low-flash point solvents.

If the valve does not move smoothly even after washing it, replace the relief valve. The oil pressure relief valve is precision made with no allowance for replacement of individual parts.

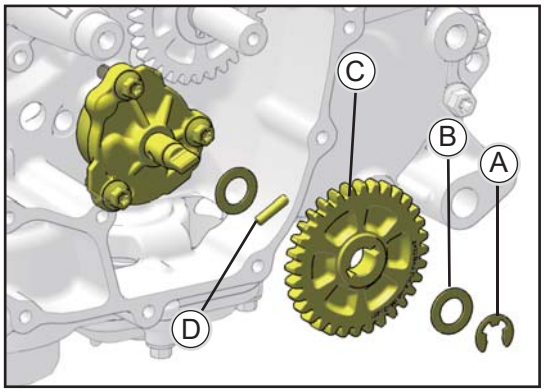
Oil Pump



Oil Pump Removal

◆ Remove:

Alternator Rotor and Starter Clutch Gear(see Electrical System chapter).



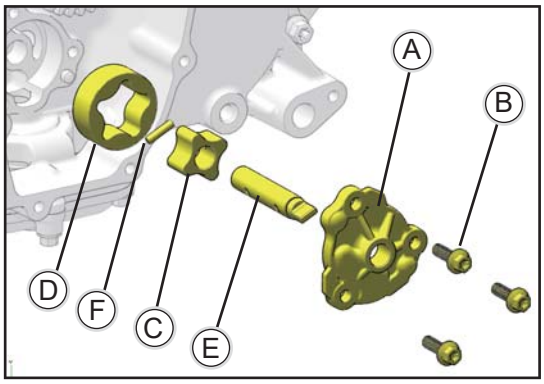
◆ Remove:

【A】E-Ring 9

【B】Flat Washer 12×20×1

【C】Driven Gear,Oil Pump

【D】Needle Roller 4×15.8



◆ Remove:

【B】Oil Pump Bolts

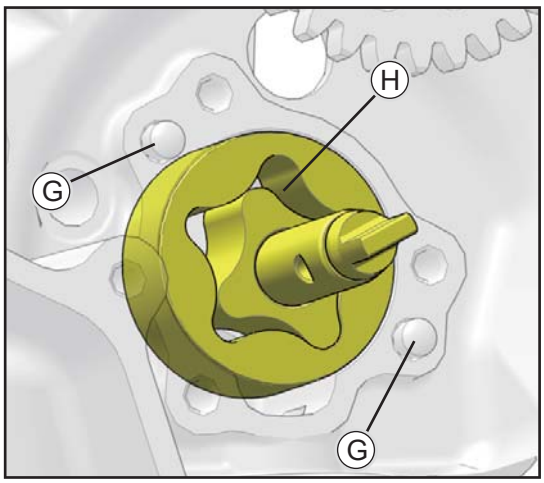
【A】Oil Pump Cover

【E】Shaft,Oil Pump

【F】Needle Roller 4×15.8

【C】Inner Rotor

【D】Outer Rotor



Oil Pump Installation

Apply engine oil:

◆ Oil Pump Shaft

◆ Inner and Outer Rotors

Install:

◆ Outer Rotor【D】

◆ Shaft,Oil Pump 【E】

◆ Needle Roller 4×15.8【F】

◆ Inner Rotor 【C】

◆ Check to see that the dowel pins 【G】 are in place

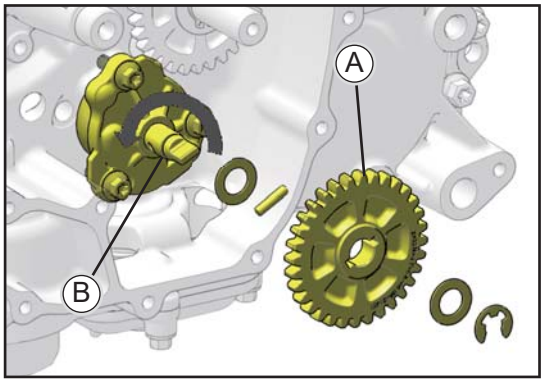
◆ Apply engine oil to the oil pump hole 【H】

◆ Oil Pump Cover【A】

◆ Tighten:

Oil Pump Bolts
10 N·m (1kgf·m, 7ft·lb)

Oil Pump Gear



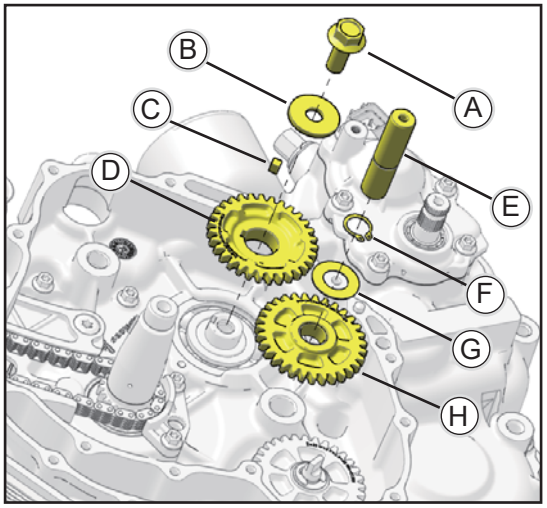
- Check the flexibility of the Oil Pump Shaft rotation
- Install the Oil Pump Driven Gear【A】 with the Oil Pump[B].

Oil Pump Gear Removal

- Remove:

Oil Pump Idler Gear Shaft【E】
Washer 15×28×1【G】
Oil Pump Idler Gear【H】
Hexagon Flange Boltm 10×1.25×25【A】
Flat Washer10×30×3【B】
Drive Gear【D】
Flat Key【C】

Oil Pump Gear Installation



- Apply engine oil:

Oil Pump Idler Gear
Oil Pump Idler Gear Shaft

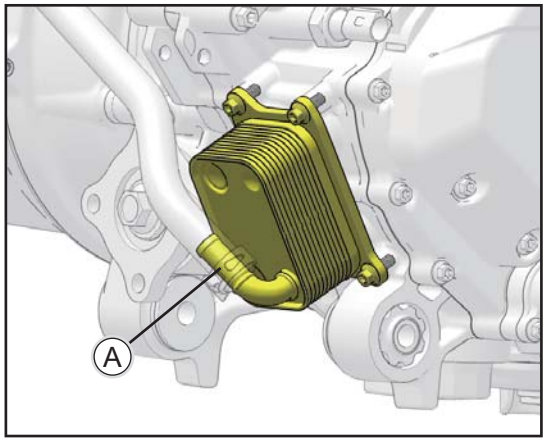
- Install:

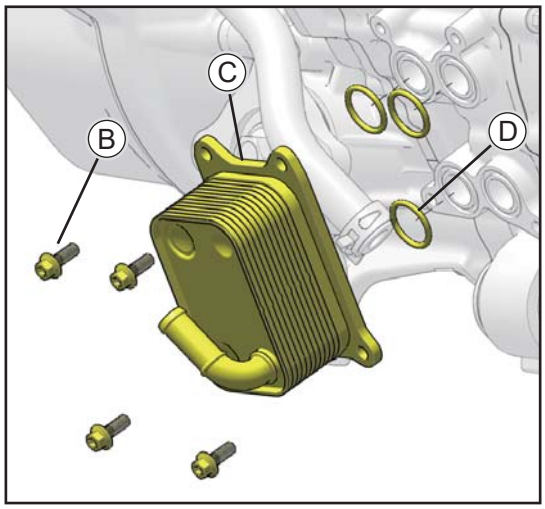
Drive Gear【D】
Flat Key【C】
Flat Washer10×30×3【B】
Hexagon Flange Bolt M10×1.25×25【A】

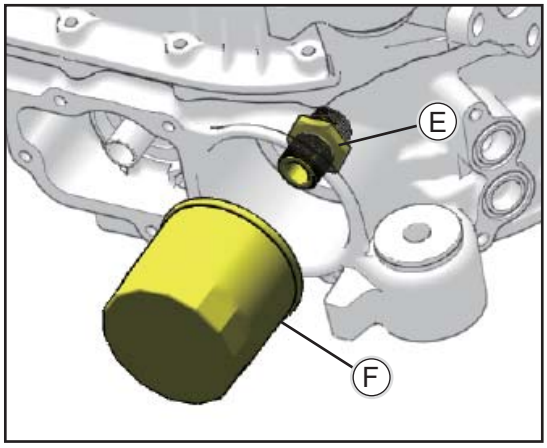
- Tighten:

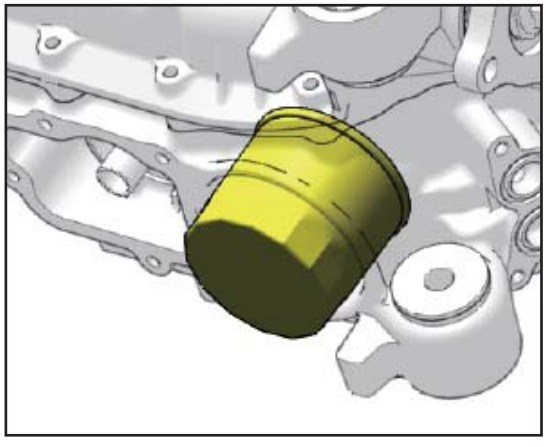
Bolt【A】
80N·m(8kgf·m, 58ft·lb)

Oil Pump Idler Gear【H】
Washer 15×28×1【G】
Oil Pump Idler Gear Shaft【E】









Oil Cooler

Oil Cooler Removal

◆ Remove:

Drain the engine coolant and oil

Spring band hose clamps【A】

Screw M6×16【B】

Cooler【C】

O-Ring 19×2.5【D】

Oil Cooler Installation

◆ Install:

1. Replace the O-ring 【D】 with new ones
2. Cooler 【C】
3. Screw M6×16【B】

Torque

Oil Pump Bolts 【B】
10 N·m (1kgf·m, 7ft·lb)

4. Spring band hose clamps【A】
5. Fill the engine coolant and oil

Oil Filter Removal

◆ Remove:

Oil Filter【F】

Oil Filter Installation

◆ Install:

Oil Filter【F】

◆ Tighten:

Torque

Oil Filter Adapter【E】
40 N•m (4kgf•m, 28 ft•lb)

Oil Filter【F】
18 N•m (1.8 kgf•m, 13 ft•lb)

CRANKSHAFT / TRANSMISSION

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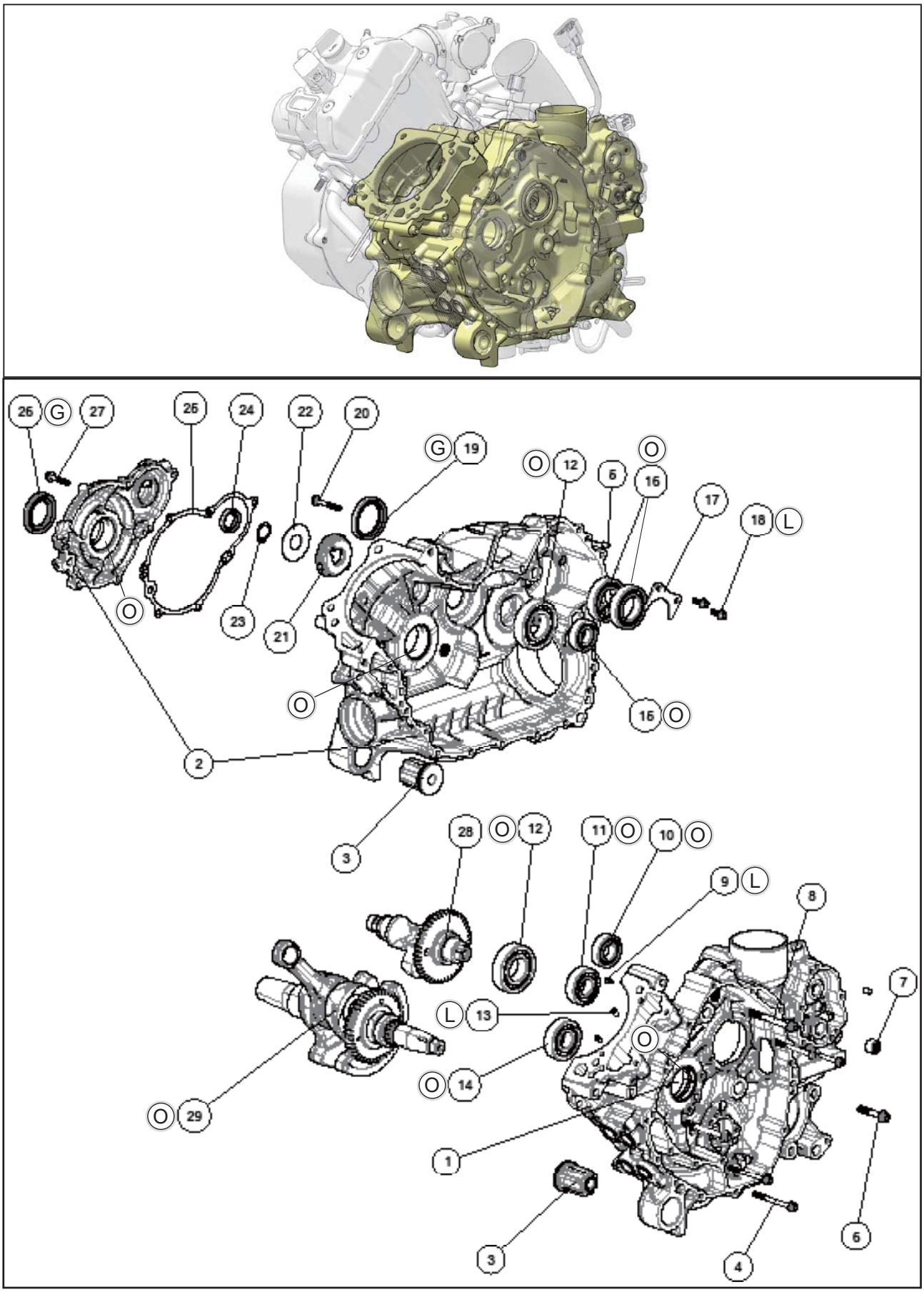
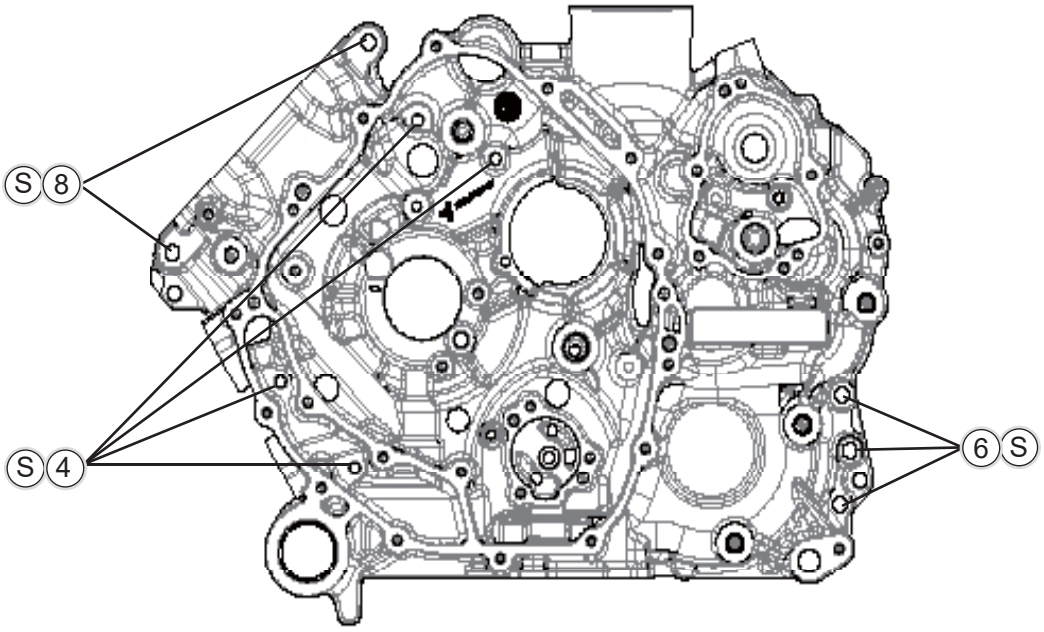
CRANKSHAFT / TRANSMISSION

Exploded view



(Left)



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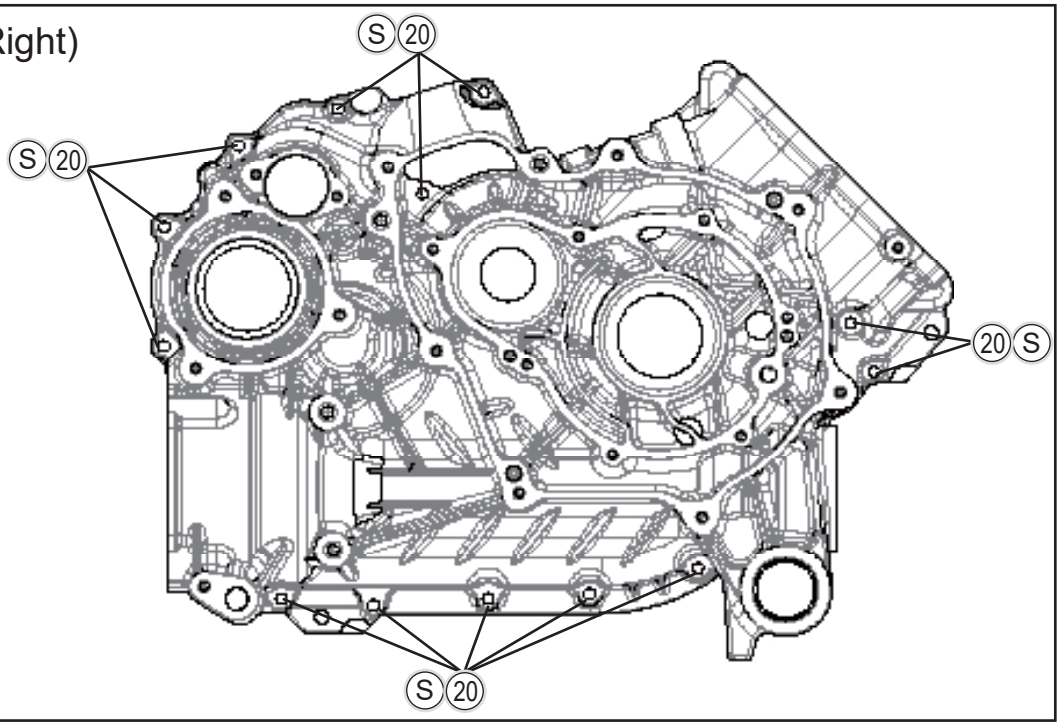
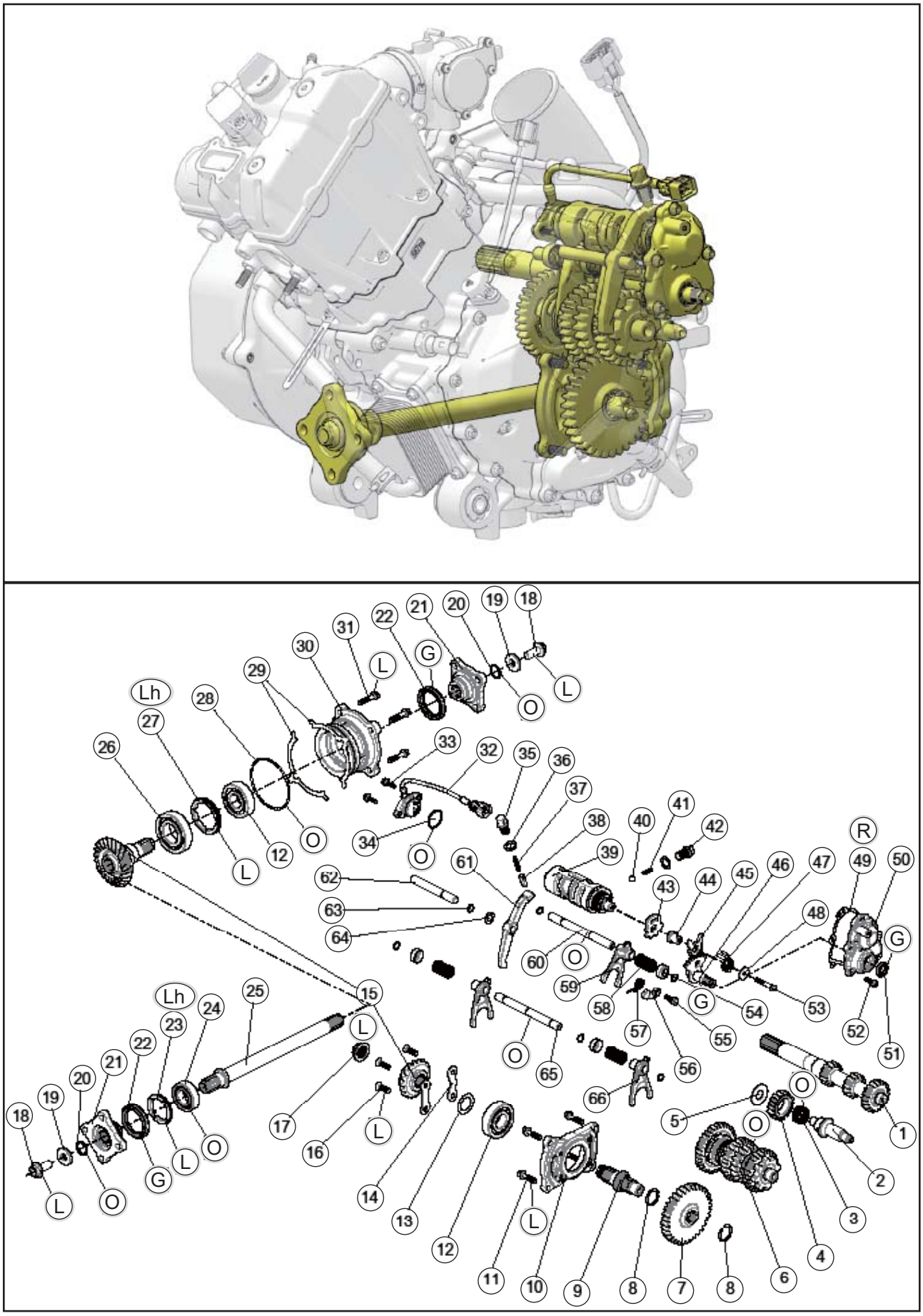


CRANKSHAFT / TRANSMISSION

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Left Crankcase Assembly				SS,O
2	Right Crankcase & Right Cover Combination				SS,O
3	Isolator				
4	Bolt M6×65	9.8	1.0	87 in•lb	S
5	Dowel Pin 6×10				
6	Bolt M8×40	26	2.7	20	S
7	Needle Roller Bearing HK121612				
8	Bolt M8×70	26	2.7	20	S
9	Flow Orifice Φ1	2.5	0.25	21 in•lb	L
10	Bearing 6004				O
11	Bearing 6204Z				O
12	Bearing 6206				O
13	Piston Injection Hole Plug	4	0.4	35 in•lb	L
14	Bearing 6304				O
15	Bearing 6203				O
16	Bearing 6006				O
17	Plate,Bearing Retainer				
18	Bolt M6×16	9.8	1.0	87 in•lb	L
19	Oil Seal 42×55×8				G
20	Bolt M6×40	9.8	1.0	87 in•lb	S
21	Centrifugal Oil-Air Separator				
22	Respirator Cover				
23	Circlip 20				
24	Oil Seal 20×30×7				G
25	Right Crankcase Cover Gasket				
26	Oil Seal 35×52×7				G
27	Bolt M6×30	9.8	1.0	87 in•lb	S
28	Balance Shaft Assembly				
29	Crankshaft Connecting Rod Parts				O

G: Apply grease for oil seal and O-ring.
L: Apply a non-permanent locking agent.
O: Apply engine oil.
SS: Apply silicone sealant.
R: Replacement Parts.
S:Follow the specific tightening sequence.


Lh
R
G
L
O

CRANKSHAFT / TRANSMISSION

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Transmission Main Shaft				
2	Idle Shaft				
3	Needle Roller Bearing K252913				O
4	R Idle Gear				
5	Spacer 17×38×2				
6	Transmission Countershaft Assembly				O
7	Reduction Driven Gear				
8	Circlip 25×1.2				
9	Drive Bevel Gear Shaft				
10	Drive Bevel Gear Housing				
11	Bolt M8×30	26	2.7	20	L
12	Bearing 6305				
13	Drive Bevel Gear Shims				
14	Bearing Husing Plate				
15	Drive&Driven Bevel Gear Kit				
16	Screw M8×25	26	2.7	20	L
17	Nut M22×1	180	18.4	133	L
18	Bolt M12×1.25×30	120	12	89	L
19	Spacer 12.5×32×5				
20	O-Ring 20×2.65				O
21	Transmission Shaft Flange				
22	Oil Seal 44×60×7				G
23	Nut M55×1.5×6-LH	120	12	89	L,Lh
24	Bearing 6205				
25	Transmission Shaft				
26	Bearing 6207				O
27	Nut M65×1.5×8-LH	137	14	106	L,Lh
28	O-Ring 88×2.8				O
29	Driven Bevel Gear Shims				
30	Driven Bevel Gear Housing				
31	Bolt M8×35	26	2.7	20	L
32	Gear Sensor				
33	Bolt M6×20	9.8	1.0	87in•lb	
34	O-Ring 29.6×2.4				O
35	Parking Brake Spring Plug	25	2.5	18	
36	Gasket 14×21×1.5				
37	Parking Brake Arm Spring				
38	Parking Brake Pin				
39	Shift Drum				
40	Ball 3/8				
41	Neutral Position Spring				
42	Neutral Position Spring Plug	25	2.5	18	
43	Positioning Star				
44	Sector Gear Spacer				
45	Sector Gear				
46	Shift Shaft				
47	Sector Gear Torsion Spring				
48	Spacer 6.2×22×2				

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
49	Shiftshaft Cover Gasket				R
50	Shiftshaft Cover				
51	Oil Seal 15×25×5				G
52	Bolt M6×20	9.8	1.0	87 in•lb	
53	Bolt M6×40	14	1.4	10	L
54	Shift Fork Spring Seat				
55	Shoulder Bolt	14	1.4	10	L
56	Detent Pawl				
57	Detent Pawl Torsion Spring				
58	Shift Fork				
59	Shift Fork L				
60	Shift Rail L				O
61	Parking Brake Arm				
62	Parking Brake Arm Shaft				
63	Circlip 12				R
64	Spacer 12×20×1				
65	Shift Rail H/R				O
66	Shift Fork H/R				

G: Apply grease for oil seal and O-ring.

L: Apply a non-permanent locking agent.

O: Apply engine oil.

R: Replacement Parts.

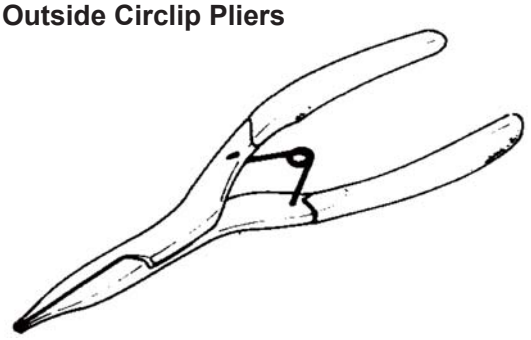
Technical Parameter

Item	Standard	Service Limit
Crankshaft,Connecting Rods:		
Connecting rod bend	– – –	TIR 0.2/100 mm
Connecting rod twist	– – –	TIR 0.2/100 mm
Connecting rod big end side clearance	0.13 ~ 0.48 mm	0.7 mm
Connecting rod big end bearing, insert / Crankpin clearance:	0.028 ~ 0.052 mm	0.09mm
Crankpin diameter:	39.992 ~ 40.000 mm	39.97 mm
Connecting rod big end inside diameter:	44.000 ~ 44.016	– – –
Connecting rod big end bearing insert thickness:		
White	1.987 ~ 1.990 mm	– – –
Blue	1.984 ~ 1.987 mm	– – –
Crankshaft runout:	TIR 0.04 mm or less	TIR 0.10 mm
Crankshaft main journal diameter: Φ41 Side	40.995 ~ 41.005 mm	40.97 mm
Crankshaft main bearing bore diameter: Φ41 Side	41.040 ~ 41.050 mm	41.08 mm

Item	Standard	Service Limit
Transmission:		
Shift fork ear thickness:	5.8 ~ 5.9 mm	5.7 mm
Shifter groove width:	6.0 ~ 6.1 mm	6.2 mm

Special tools and sealants

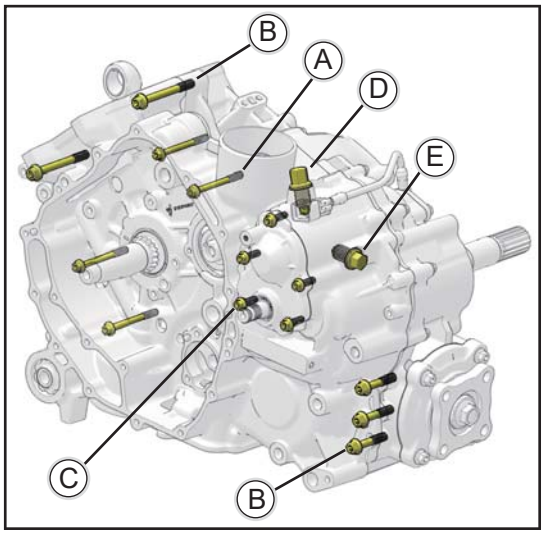
Outside Circlip Pliers

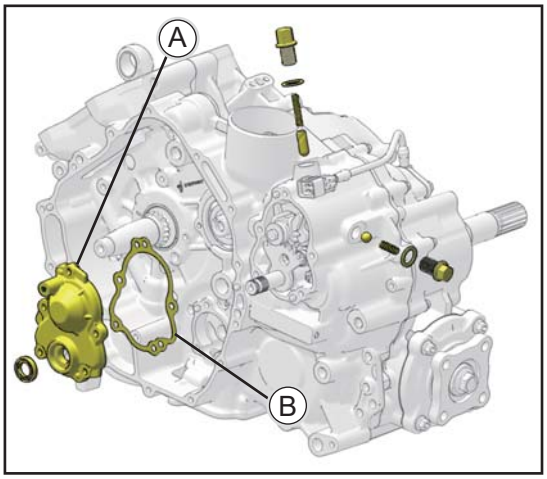


Bearing Driver Set

Sealant: 5699

Crankcase





Crankcase Disassembly

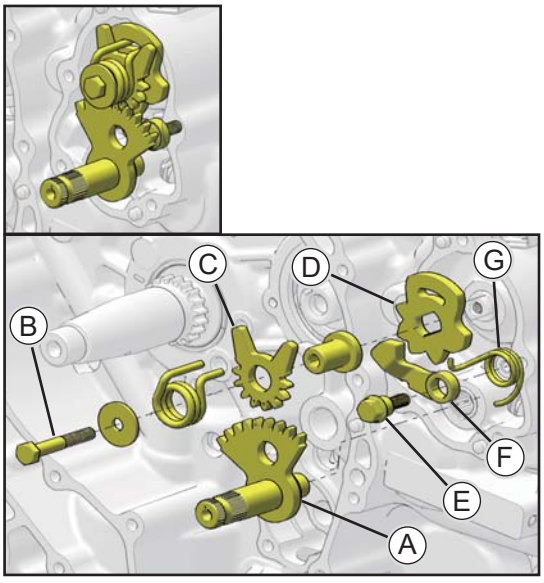
◆ Remove:

1. Engine (see Engine Removal/Installation chapter)
2. Starter Motor (see Electrical System chapter)
3. Oil Filter (see Engine Lubrication System chapter)
4. Cylinder Blocks and Pistons (see Engine Top End chapter)
5. Camshaft and Chain (see Engine Top End chapter)
6. Left Crankcase Bolts (M6) 【A】
7. Left Crankcase Bolts (M8)【B】
8. Shiftshaft Cover Bolts (M6)【C】
9. Parking Brake Spring Plug【D】, Gasket, Spring, and Parking
10. Brake Pin.
11. Shift Spring Plug【E】,Gasket, Spring, and Steel Ball.

◆ Remove:

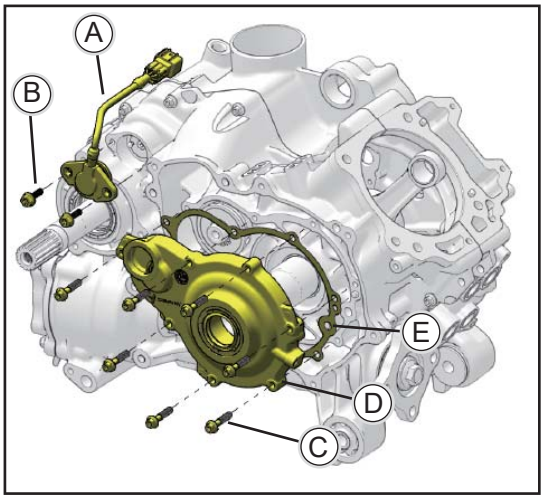
Shiftshaft Cover【A】

Gasket,Shiftshaft Cover【B】



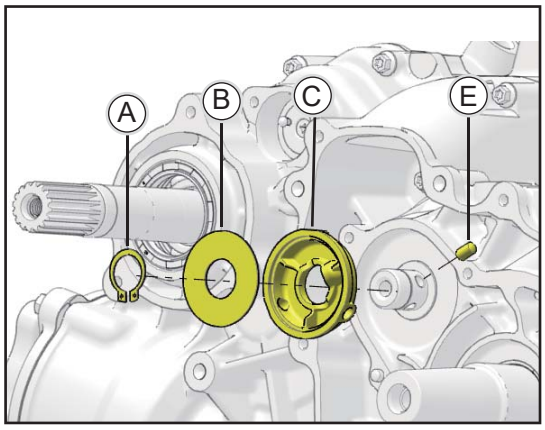
◆ Remove:

1. Shiftshaft【A】
2. Hexagon Bolt M6×40【B】, Spacer , Spring , Shift Driven Gear【C】, Bushing , Positioning Star【D】
3. Shoulder Blots 【E】, Detent Pawl【F】, Spring 【G】.



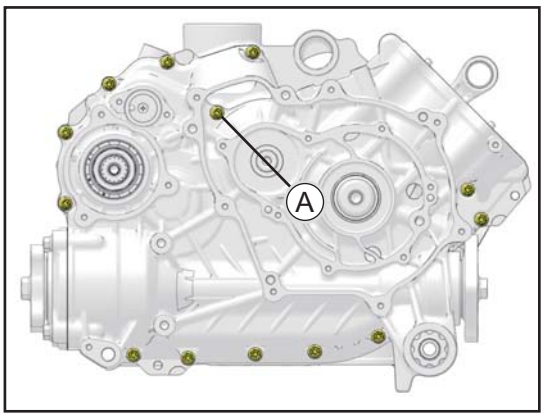
◆ Remove:

1. Sensor Bolts (M6×20)【B】.
2. Gear Sensor【A】.
3. Right Crankcase Cover Bolts (M6×30)【C】.
4. Right Crankcase Cover【D】
5. Right Crankcase Cover Gasket【E】.



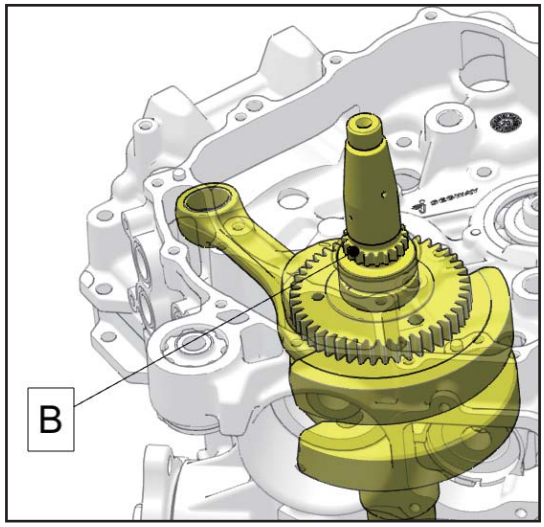
◆ Remove:

1. Circlip 25×1.2【A】
2. Washer【B】
3. Gentrifugal oil-air Separator【C】
4. Dowel Pin 6×10【E】



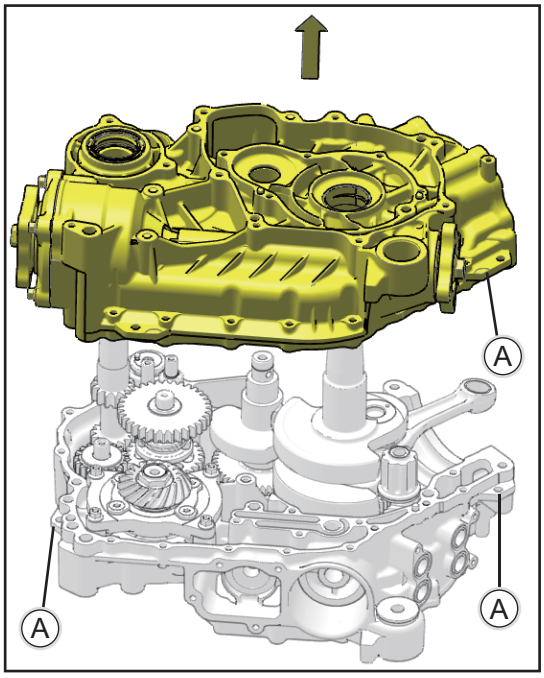
◆ Remove:

Left Crankcase Bolts M6 (13)【A】



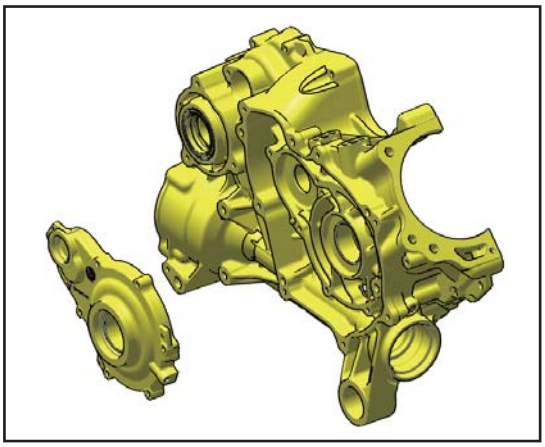
◆ Remove:

1. Wrap the teeth on the sprockets【B】by taping for protecting the bushing in the crankcase.



2. Using the pry points【A】, split the crankcase halves.
3. Lift off the right crankcase half.

Crankcase Assembly



CAUTION

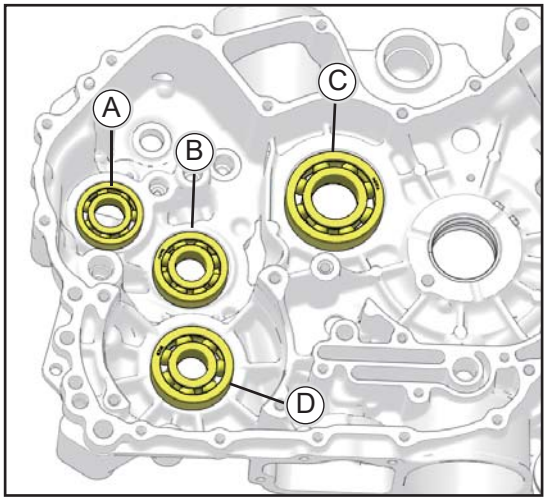
The right crankcase and right crankcase cover are machined at the factory in the assembled state, so the right crankcase and right crankcase cover must be replaced as a set.

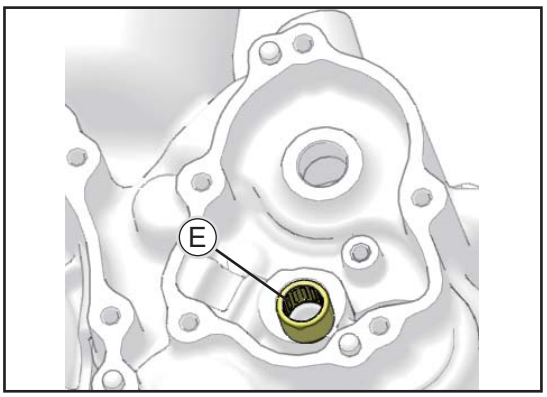
NOTE

- Be certain that all parts are cleaned thoroughly before assembly.
- Blow through all oil passages with compressed air to clear any blockage in the crankcase halves and crankshaft.

⚠ WARNING

Clean the engine parts in a well-ventilated area, and take care that there are no sparks or flame anywhere near the working area; this includes any appliance with a pilot light. Do not use gasoline or low flash-point solvents to clean parts. A fire or explosion could result.





- Apply a small amount of engine oil to the transmission gears, bearings and shift fork.
- Be sure the mating surfaces of the crankcase halves are clean and dry.
- Press and insert the new ball bearings until they are bottomed.

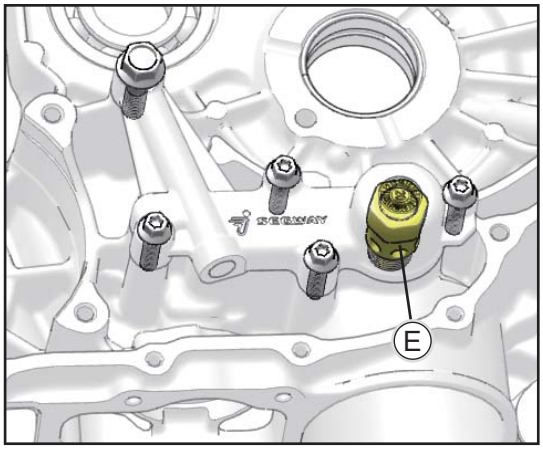
Special Tool - Bearing Driver Set:

【A】Ball Bearing : 6004
【B】Ball Bearing : 6204Z
【C】Ball Bearing : 6206
【D】Ball Bearing : 6304

- Press and insert the new needle bearings so that the bearing surfaces are flush with the end of the hole.

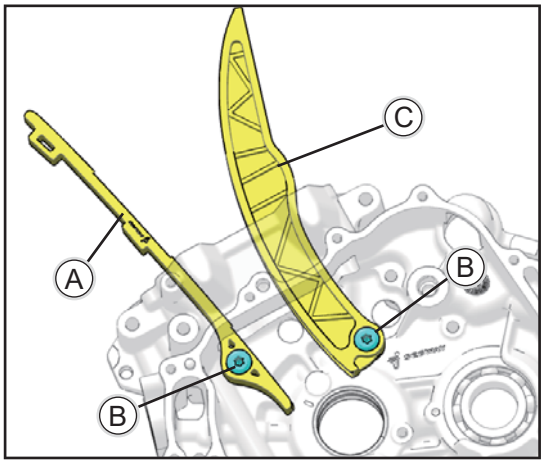
  【E】Needle Bearing : HK121612

- Apply engine oil to the bearings.



◆ Install:

Oil Pressure Relief Valve【E】(see Engine Lubrication System chapter)



◆ Install:

Chain Guide【A】

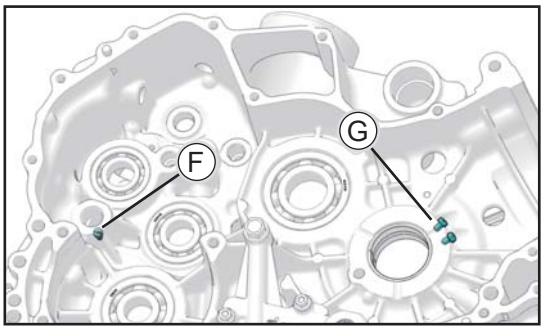
Chain Tensioner【C】

◆ Tighten:

Torque

Chain Guide Bolts【B】
12 N·m (1.2 kgf·m, 8.7 ft·lb)

Apply a non-permanent locking agent to the Bolts【B】.



◆ Install:

Piston Injection Hole Plug【G】

Flow Orifice ϕ1 【F】

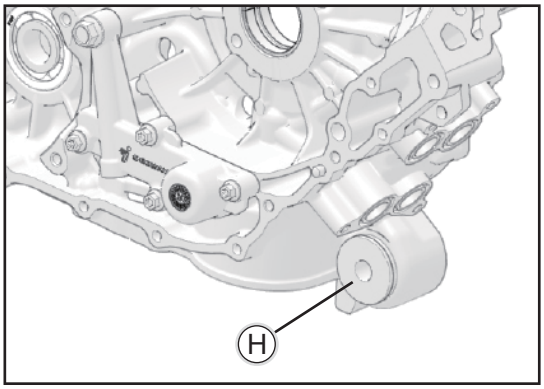
◆ Tighten:

Torque

Piston Injection Hole Plug【G】
4 N·m

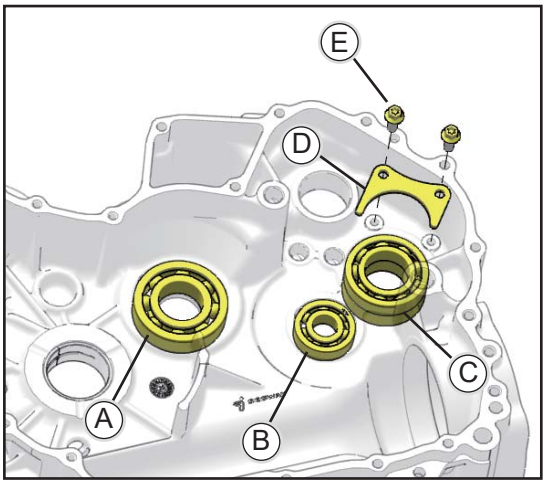
Flow Orifice ϕ1 【F】
2.2 N·m

◆ Apply a non-permanent locking agent to the【F】and【G】.



◆ Install:

Press and insert Cushion Bushing【H】until they are bottomed.



◆ Press and insert the new ball bearings until they are bottomed.

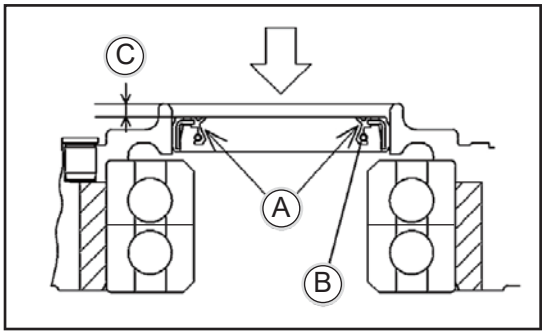
Special Tool - Bearing Driver Set:

【A】Ball Bearing : 6206
【B】Ball Bearing : 6203
【C】Ball Bearing : 6006 × 2

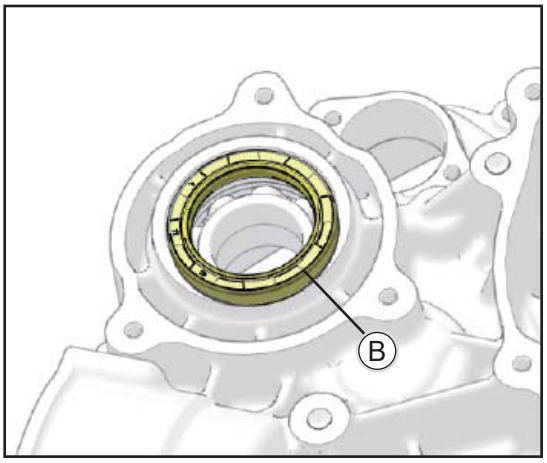
◆ Apply engine oil to the bearings.
◆ Install the position plates【D】.
◆ Apply a non-permanent locking agent to the position plate mounting screws【E】.
◆ Tighten:

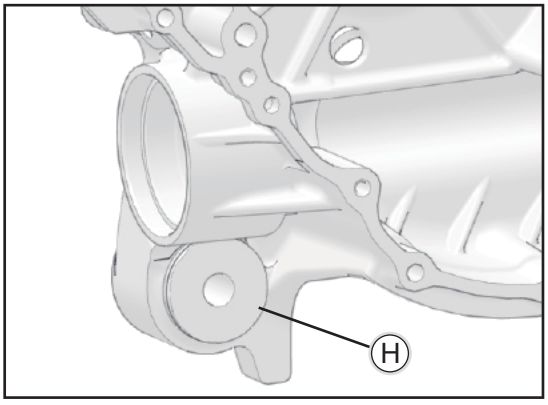
Torque -

Position Plate Mounting Screws
9.8 N·m (1 kgf·m, 87 in·lb)

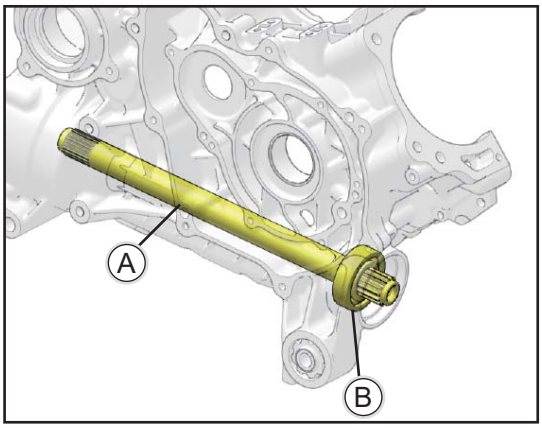


◆ Grease the lip【A】of the oil seal 42×55×8【B】and press the seal 0.5 mm【C】inwards from the end of the boss.





◆ Press and insert Cushion Bushing【H】until they are bottomed.



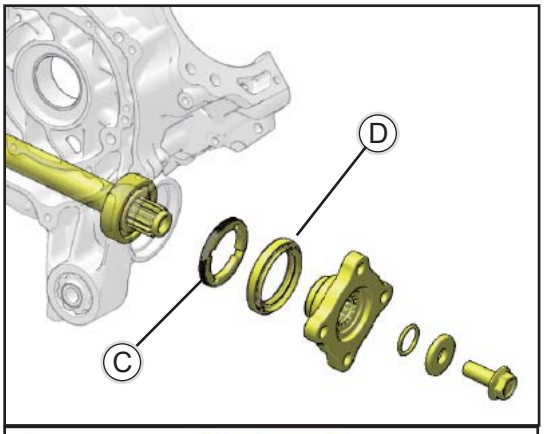
◆ Install:

Transmission Shaft【A】and new Bearing 6205【B】.

◆ Press and insert the bearings until they are bottomed.

Special Tool - Bearing Driver Set:

【B】 Ball Bearing : 6205



◆ Install:

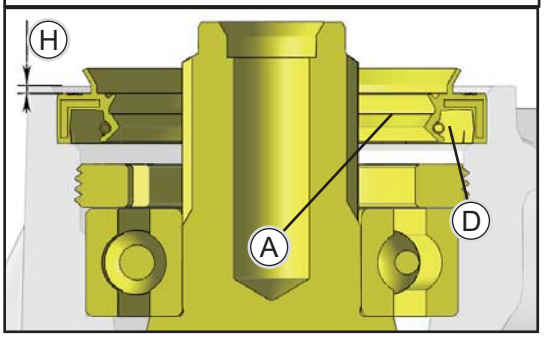
【C】Nut M55×1.5×6-LH

◆ Tighten:

Torque

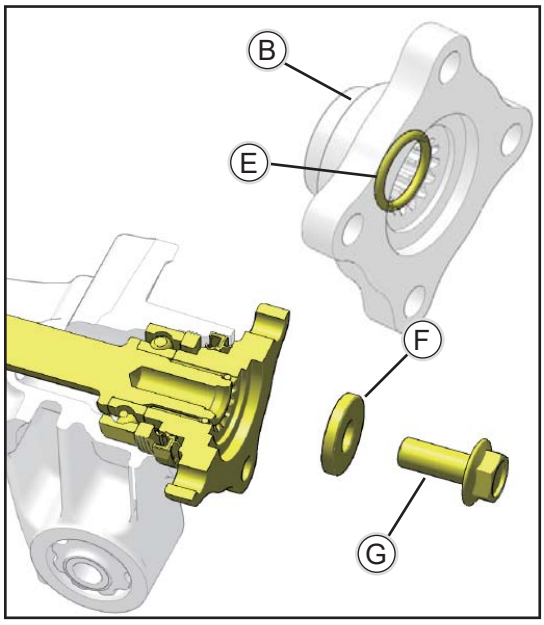
Nut【C】
120 N·m (12 kgf·m, 89 ft·lb)

◆ Apply a non-permanent locking agent to the Nut【C】



◆ Install:

Grease the lip【A】of the oil seal 44×60×7【D】and press the seal 1.0 mm【H】inwards from the end of the boss.



◆ Install:

insert the O-Ring 20×2.65【E】to the Transmission Shaft Flange【B】.

◆ Apply engine oil to the O-Ring【E】

Washer 12.5×32×5【F】

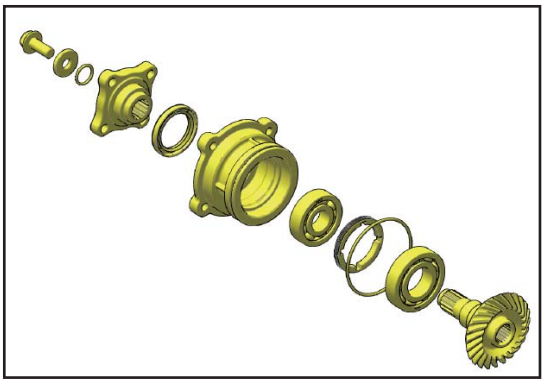
Bolt M12×1.25×30【G】

◆ Tighten:

Torque

Bolt M12【G】
120 N·m (12 kgf·m, 89 ft·lb)

◆ Apply a non-permanent locking agent to the Bolt【G】.

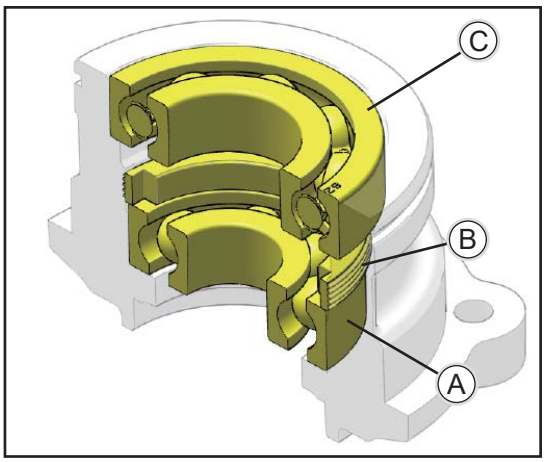


◆ Press and insert the bearings until they are bottomed.

Special Tool - Bearing Driver Set

【A】Ball Bearing : 6305

【C】Ball Bearing : 6207



◆ Install:

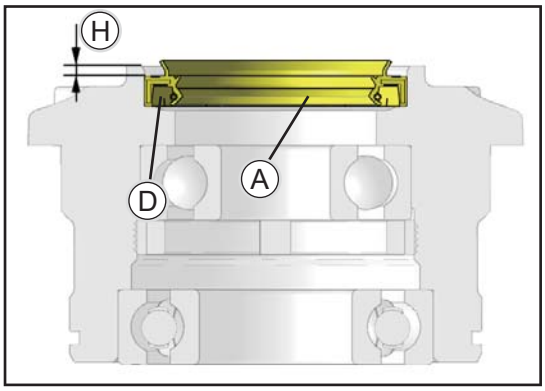
Nut M65×1.5×8-LH【B】(Left-hand Threads)

◆ Tighten:

Torque

Nut【B】
137 N·m (14 kgf·m, 106 ft·lb)

◆ Apply a non-permanent locking agent to the Nut【B】



◆ Install:

Grease the lip【A】of the oil seal 44×60×7【D】and press the oil seal 2.2 mm【H】inwards from the end of the boss.

◆ Install:

insert the O-Ring 20×2.65【N】to the Transmission Shaft Flange【M】.

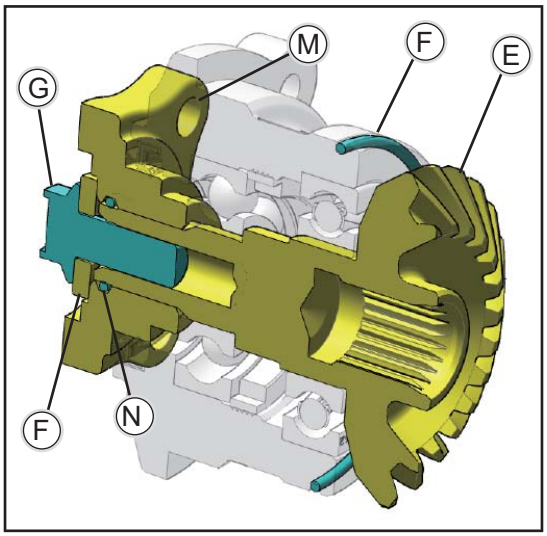
◆ Apply engine oil to the O-Ring【N】

◆ Install:

Driven Bevel Gear【E】

Washer 12.5×32×5【F】

Bolt M12×1.25×30【G】



◆ Tighten:

Torque

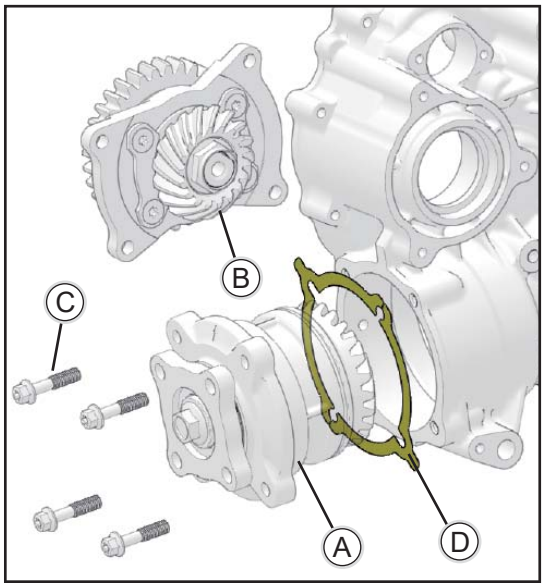
Bolt M12【G】
120 N·m (12 kgf·m, 89 ft·lb)

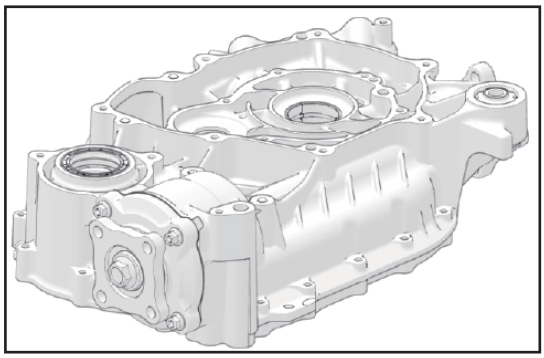
◆ Apply a non-permanent locking agent to the Bolt【G】.

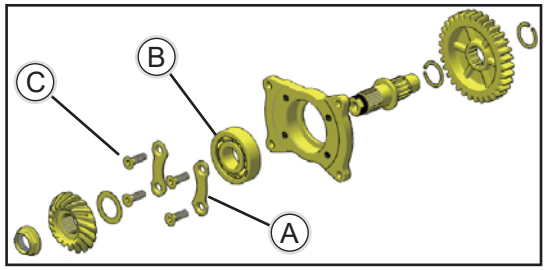
◆ Install:

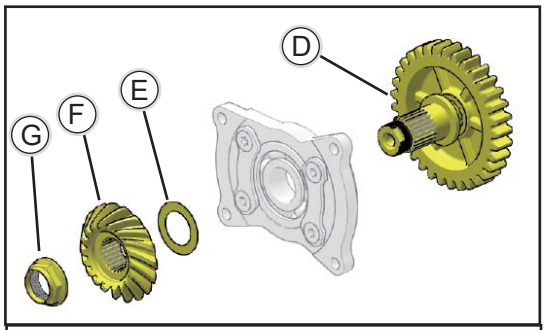
【J】O-Ring 88×2.8

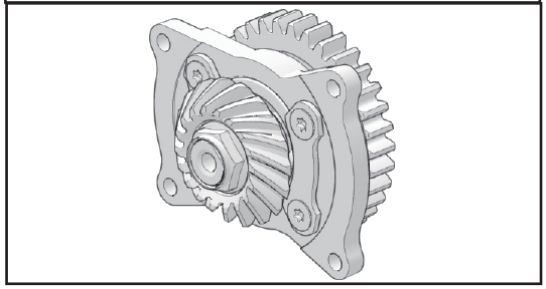
◆ Apply engine oil to the O-Ring【J】











CAUTION

The Driving Bevel Gear【B】and Driven Bevel Gear【A】are machined at the factory in the assembled state, so the Driving Bevel Gear and Driven Bevel Gear must be replaced as a set.

◆ Install:

1. Driven Bevel Gear Assembly【A】
2. Shim,Driven Bevel Gear【D】
3. Bolts M8×35【C】

◆ Tighten:

Torque

Bolts 【C】
26 N·m (2.7 kgf·m, 20 ft·lb)

◆ Apply a non-permanent locking agent to the Bolts【C】

TIPS

Driven bevel gear backlash

Standard:0.15 ~ 0.25 mm

◆ Press and insert the bearings until they are bottomed.

Special Tool - Bearing Driver Set

【B】 Ball Bearing : 6305

◆ Install:

Bearing Frame Plate【A】
Screw M8×25【C】

◆ Tighten:

Torque

Screw M8×25【C】
26 N·m (2.7 kgf·m, 20 ft·lb)

◆ Apply a non-permanent locking agent to the Screw【C】

◆ Install:

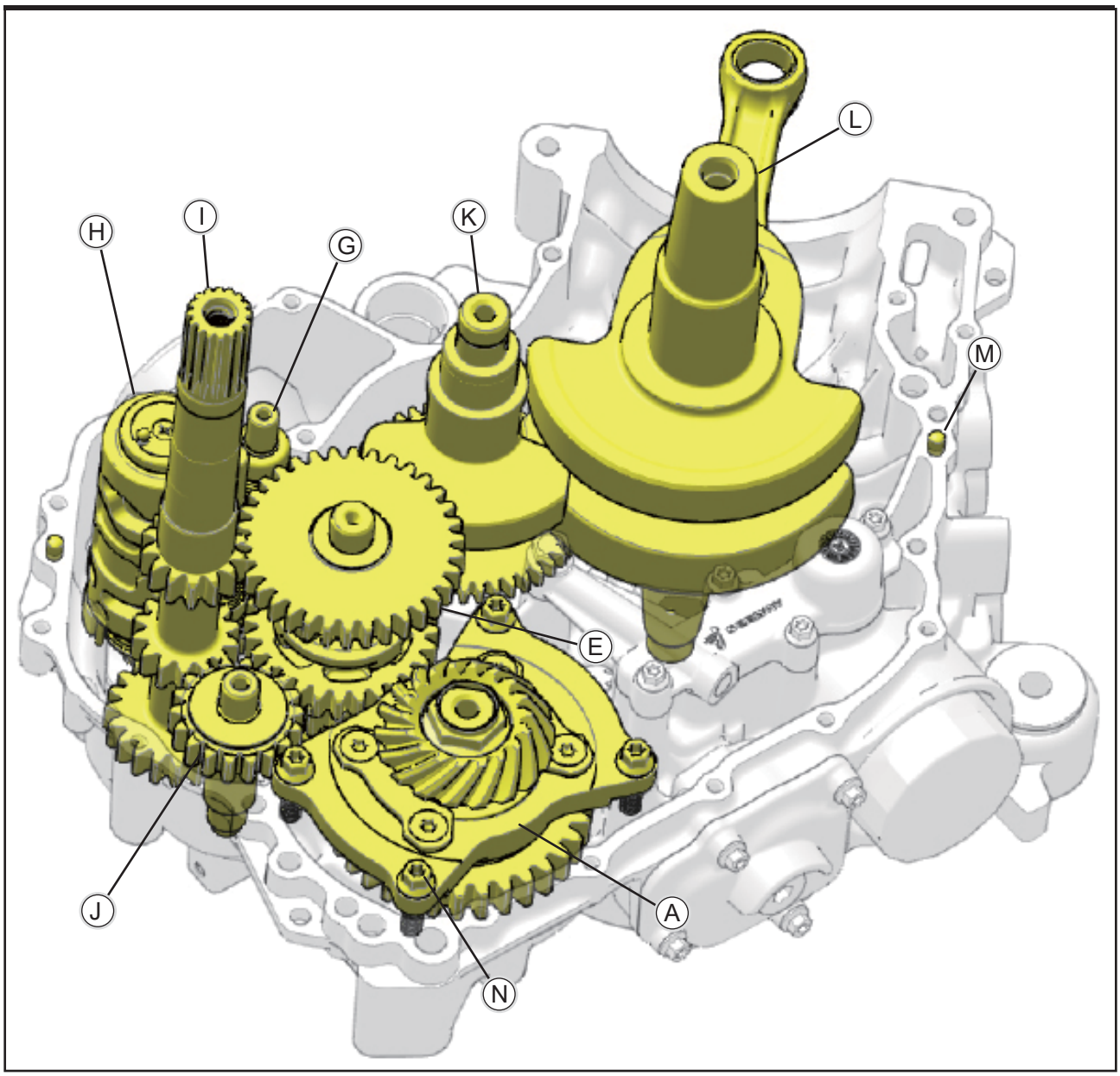
1. Drive Bevel Gear Shaft,Reduction Driven Gear,Circlip Combination【D】
2. Drive Bevel Gear Shim【E】
3. Drive Bevel Gear【F】
4. Nut M22×1【G】

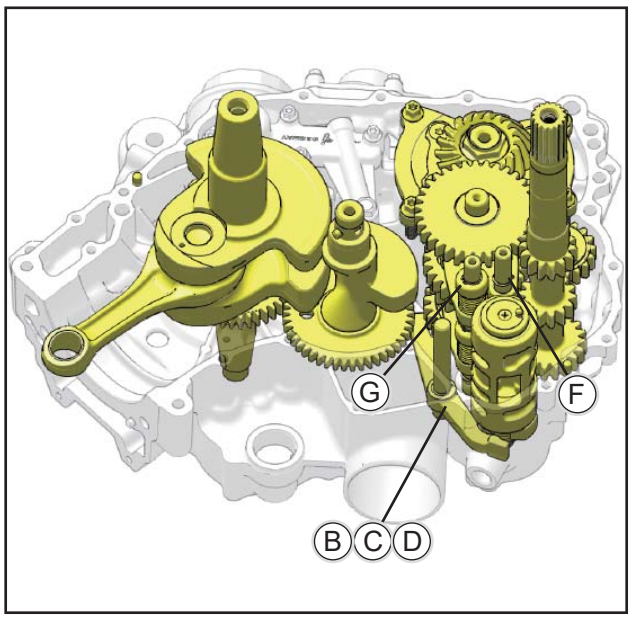
◆ Tighten:

Torque

Nut M22×1【G】
180 N·m (18.4 kgf·m, 133 ft·lb)

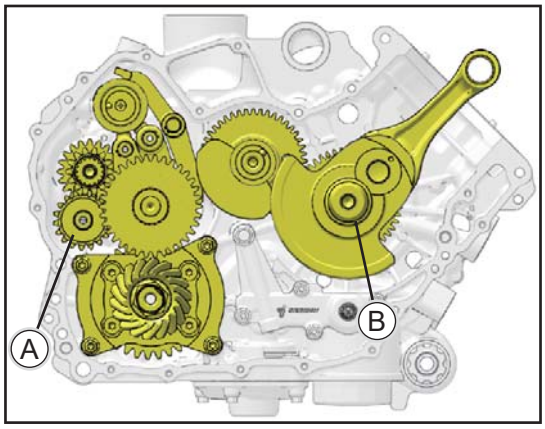
◆ Apply a non-permanent locking agent to the Nut【G】



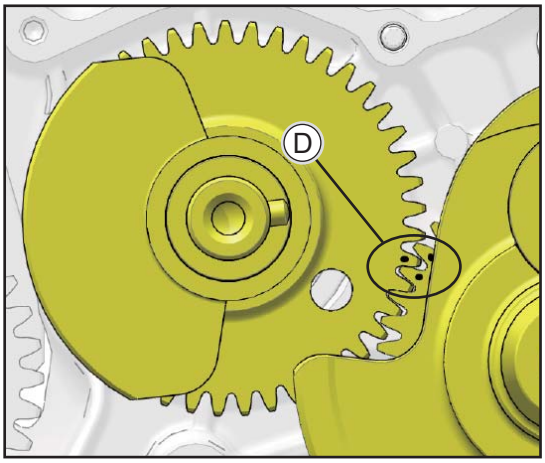


◆ Be sure the following parts are in place in the left crankcase half.

1. Drive Bevel Gear shaft Assembly【A】
2. Parking Brake Arm【B】, Snap Ring 12【C】, Parking Brake Shaft【D】
3. Countershaft Assembly【E】, Shift Rail L【F】 ,Shift Rail H/R【G】,Shift Drum【H】
4. Transmission Main Shaft【I】
5. R Idle Gear【J】
6. Balance Shaft【K】
7. Crankshaft【L】
8. Dowel Pins【M】
9. Bolt M8×30【N】

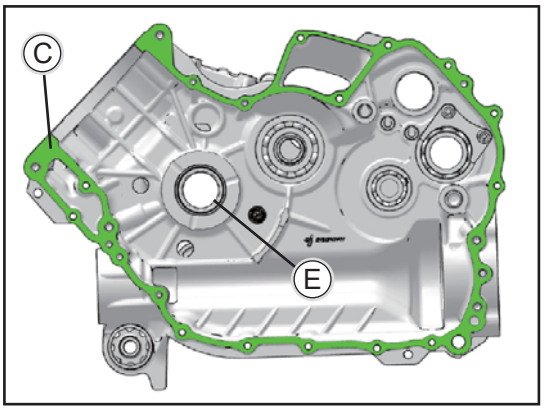


◆ Apply engine oil to the Needle Roller Bearing【A】,Crankshaft Rod【B】,Crankshaft Case oil passages ,Main bearing bore【E】.



CAUTION

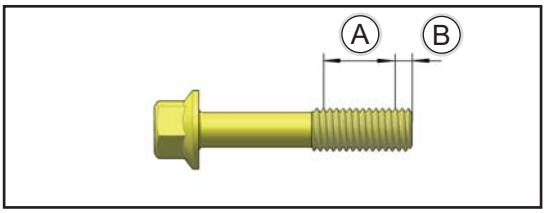
The Crankshaft and Balance Shaft Gear mark points【D】must be aligned.

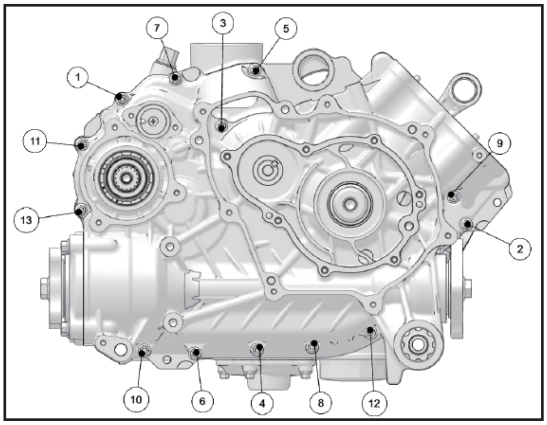


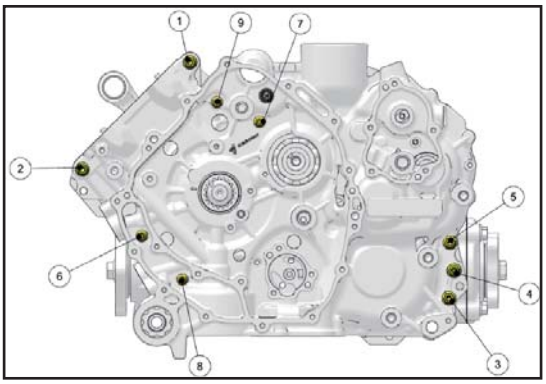
◆ Apply liquid gasket【C】to mating surface of the right crankcase half.

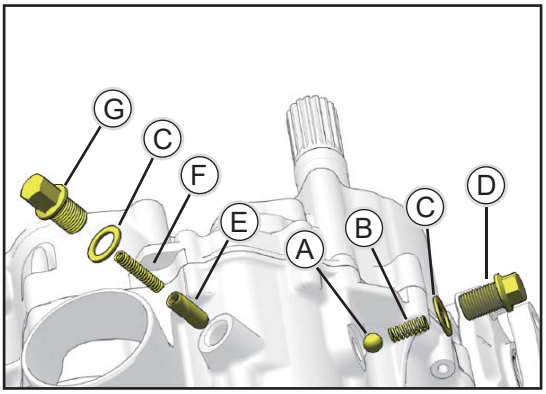
Sealant:5699

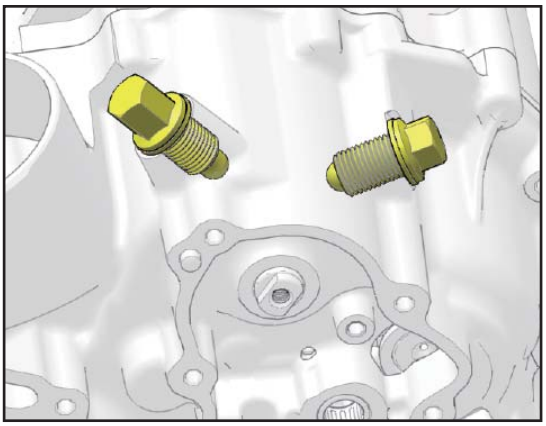
Apply after, must be assembled with in 5 min.











◆ Apply a non-permanent locking agent to the area 【A】(12 mm, 0.47 in.) except for the tip【B】(2 ~ 3 mm, 0.08 ~ 0.12 in.).
Right Crankcase Bolt M6×40【13】

◆ Tighten the right crankcase bolts (M6) following the tightening sequence【1 ~ 13】

Torque

Crankcase Bolts (M6)
9.8 N·m (1.0 kgf·m, 87 in·lb)

[1 ~ 13] L = 40 mm

Left Crankcase : Bolt M8×70【2】
Bolt M8×40【3】
Bolt M6×65【4】

◆ Tighten left crankcase bolts following the tightening sequence【1 ~ 5】(M8),【6 ~ 9】(M6)

Torque

Bolts (M6)	Bolts (M8)
9.8 N·m (1.0 kgf·m, 87 in·lb)	20 N·m (2.0 kgf·m, 14 ft·lb)

【1 ~ 2】L = 70 mm
【3 ~ 5】L = 40 mm
【6 ~ 9】L = 65 mm

◆ Apply grease to the steel ball【A】,Parking Brake Pin【E】 and spring【B】【F】.

◆ Install:
Steel Ball【A】
Spring【B】
washer【C】
Shift Spring Plug【D】

◆ Install:
Parking Brake Pin【E】
Parking Brake Arm Spring【F】
Washer【C】
Parking Brake Spring Plug【G】

◆ Tighten:

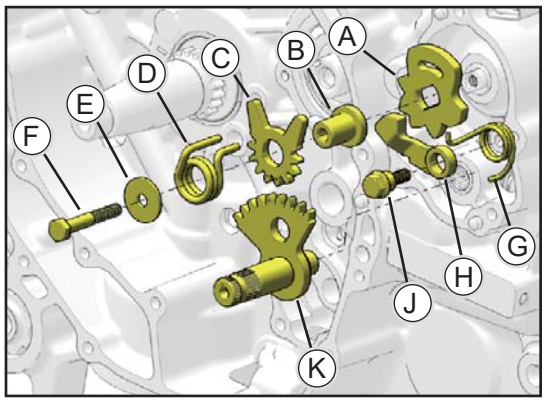
Torque

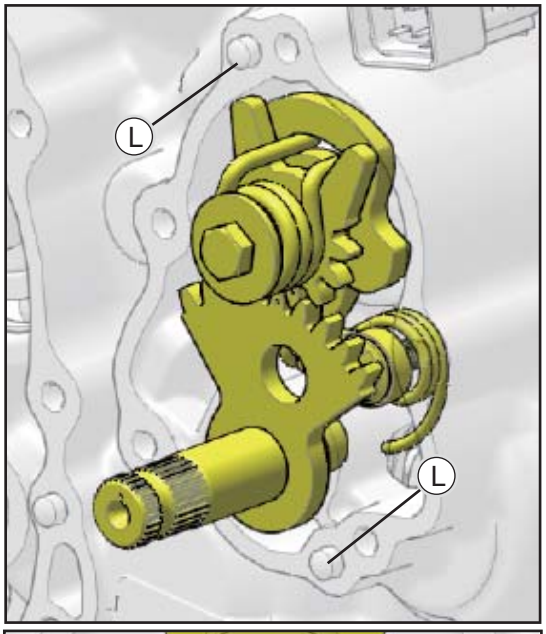
Shift Shaft Positioning Bolt
25 N·m (2.5 kgf·m, 18ft·lb)

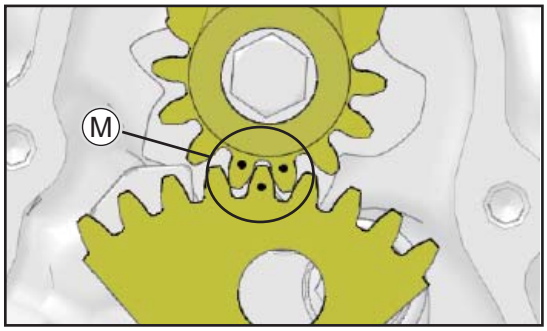
◆ Check:

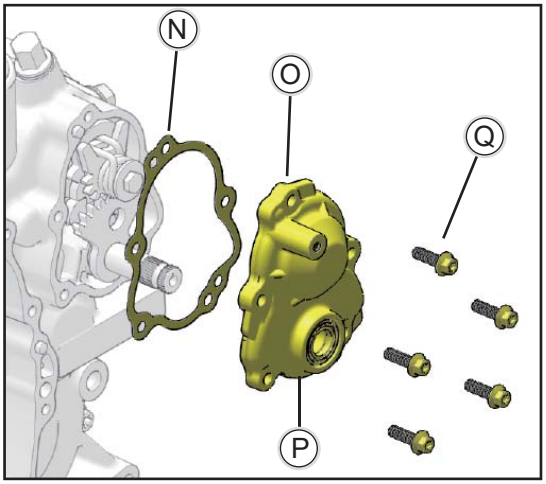
Crankshaft and driven shaft turn freely.

If any of the shafts do not turn freely, split the crankcase to locate the problem.









◆ Install:
【G】Shift Positioning Plate Spring
【H】Detent Pawl
【J】Shoulder Blot
【A】Positioning Star
【B】Spacer
【C】Shift Driven Gear
【D】Torsion Spring
【E】Washer 6.2×22×2
【F】Hexagon Bolt M6×40
【K】Fan Gear
【L】 Dowel Pin 6×10

◆ Tighten:

Torque

Hexagon Bolt M6×40【F】	Shoulder Bolt【J】
14 N·m (1.4 kgf·m, 10 ft·lb)	14 N·m (1.4 kgf·m, 10 ft·lb)

◆ Apply a non-permanent locking agent to the Bolts 【F】 and【J】.

CAUTION

The Fan Gear and Shift Driven Gear mark points【M】must be aligned.

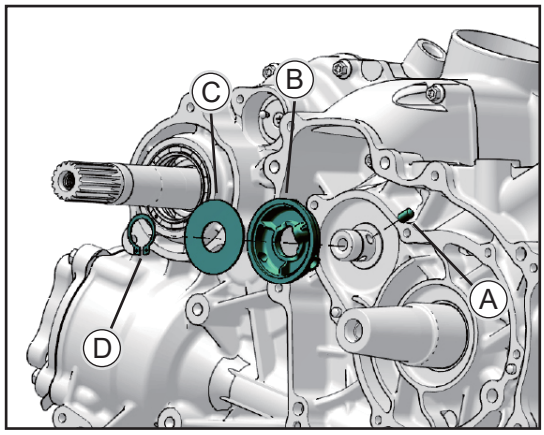
◆ Install:
【N】Shiftshaft Cover Gasket
【O】Shiftshaft Cover
【P】Oil Seal 15×25×5
【Q】Bolts M6×20

◆ Tighten:

Torque

Shiftshaft Cover Bolts【Q】
9.8 N·m (1 kgf·m, 87 in·lb)

◆ Apply a non-permanent locking agent to the Bolts 【Q】



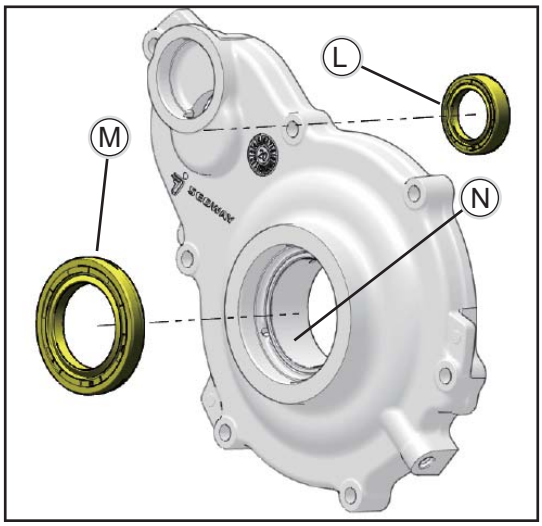
◆ Install:

【A】Dowel Pin 6×10

【B】Centrifugal Oil-air Separator

【C】Washer

【D】Snap Ring 25×1.2



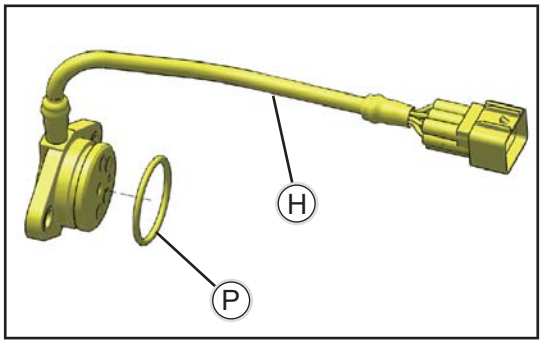
◆ Install:

Oil Seal 20×30×7【L】

Oil Seal 35×52×7【M】

◆ Apply engine oil to the Main bearing bore【N】

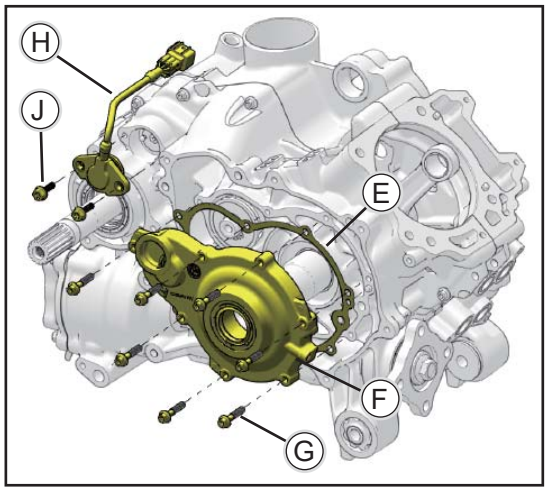
◆ Apply grease the lip of the oil seal【L】and【M】



◆ Install:

Put the O-Ring 29.6×2.4【P】into the Gear Sensor groove【H】

◆ Apply engine oil to the O-Ring 29.6×2.4【P】



◆ Install:

Right Crankcase Cover Gasket【E】

Right Crankcase Cover Combination【F】

Bolts M6×30【G】

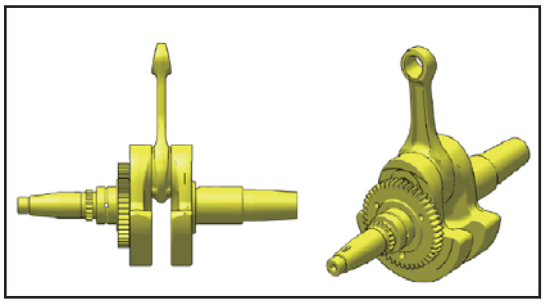
Gear Sensor【H】

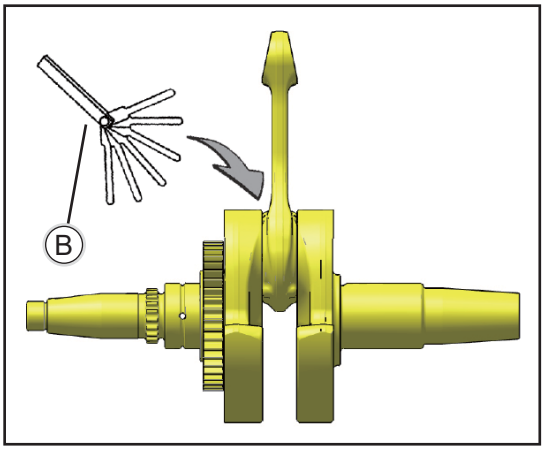
Bolts M6×20【J】

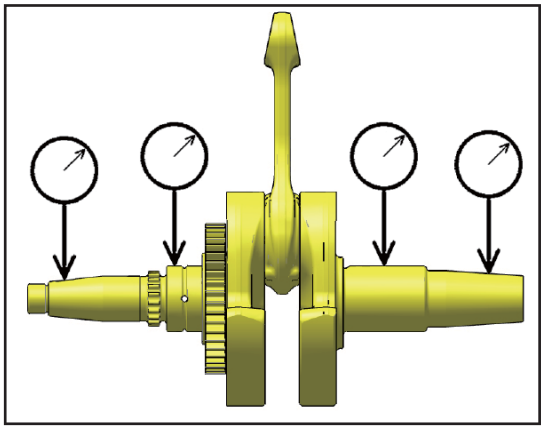
◆ Tighten:

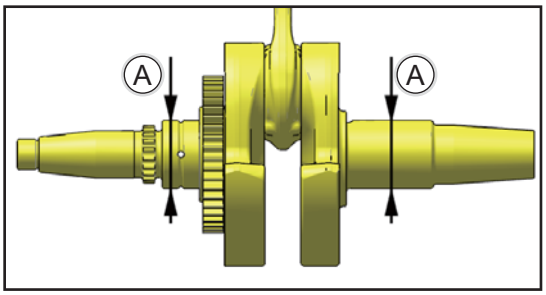
Torque

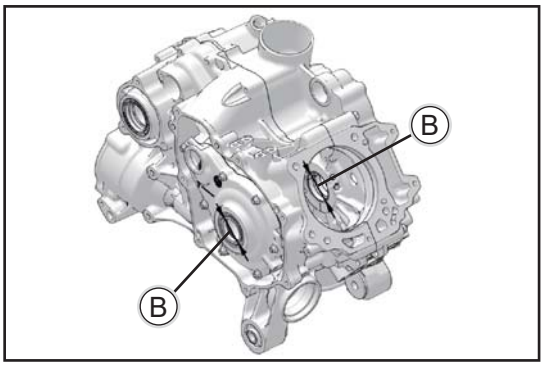
Bolts M6×30【G】/ Bolts M6×20【J】
9.8 N·m (1 kgf·m, 87 in·lb)











Crankshaft

CAUTION

The Crankshaft and Connecting Rod are Assembled at the factory , so the Crankshaft must be replaced as a set.

Connecting Rod Big End Side Clearance

- Measure the side clearance of the connecting rod big end.
- Insert a thickness gauge【B】between the big end and either crank determine clearance.

Connecting Rod Big End Side Clearance

Standard: 0.13 ~ 0.48 mm

Service Limit: 0.7 mm

If the clearance exceeds the service limit, replace the Crankshaft.

Crankshaft Runout

- Measure the crankshaft runout.

If the measurement exceeds the service limit, replace the Crankshaft.

Standard: TIR 0.04 mm (0.0016 in.) or less

Service Limit: TIR 0.10 mm (0.0039 in.)

Crankshaft Main Bearing/Journal Wear

- Measure the diameter【A】of the crankshaft main journal.

Crankshaft Main Journal Diameter

Standard: 40.995 ~ 41.005 mm

Service Limit: 40.97 mm

If any journal has worn past the service limit, replace the crankshaft with a new one.

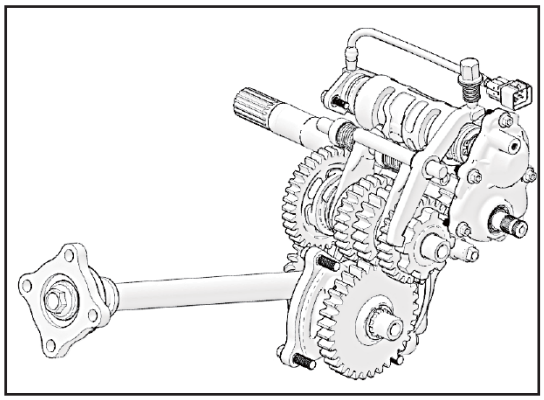
- Measure the main bearing bore diameter【B】in the crankcase halves.

Crankcase Main Bearing Bore Diameter

Standard: 41.040 ~ 41.050 mm

Service Limit: 41.08 mm

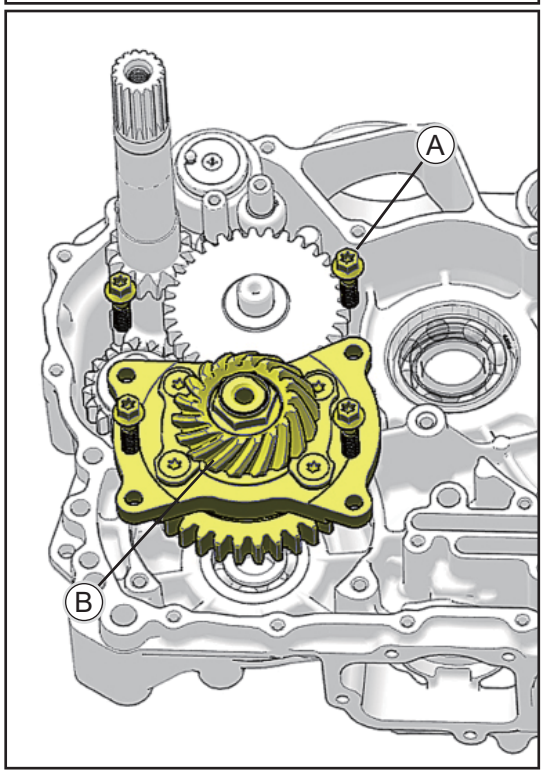
If there is any signs of seizure, damage, or excessive wear, replace the crankcase halves as a set.



Transmission

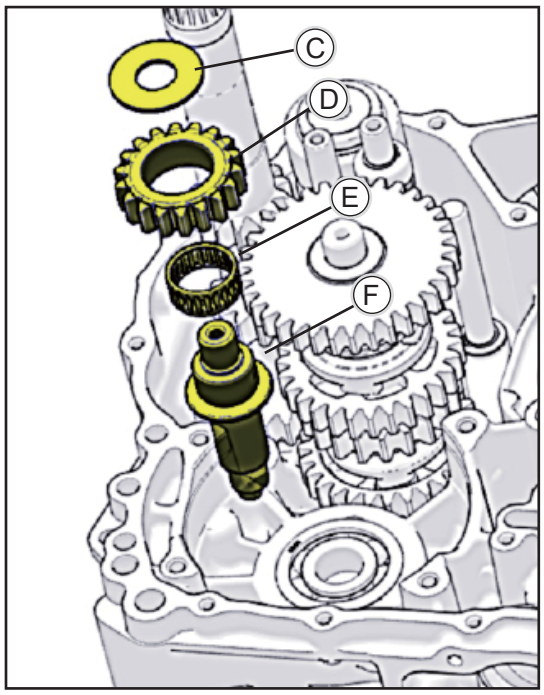
Transmission Removal

- Remove the shift lever (see Shift Lever Removal).
- Remove the Shiftshaft (see Crankcase Disassembly).
- Split the crankcase (see Crankcase Disassembly).



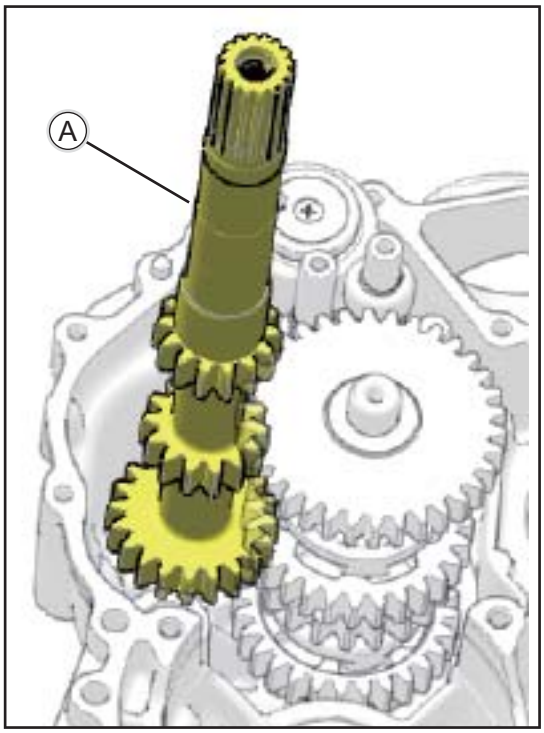
- Remove:

Drive Bevel Gear Component Bolts【A】
Drive Bevel Gear Component【B】



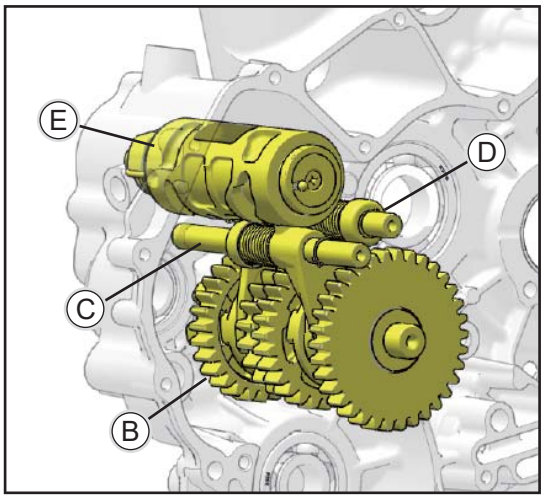
- Remove:

Spacer【C】
Reverse Idle Gear【D】
Needle Bearing【E】
Reverse Idle Shaft【F】



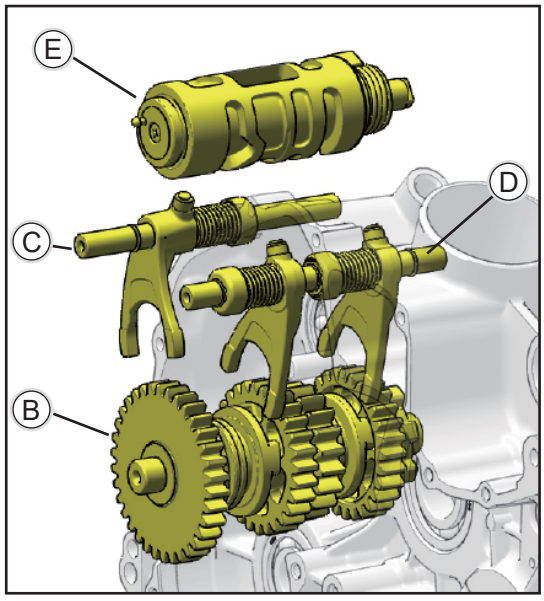
◆ Remove:

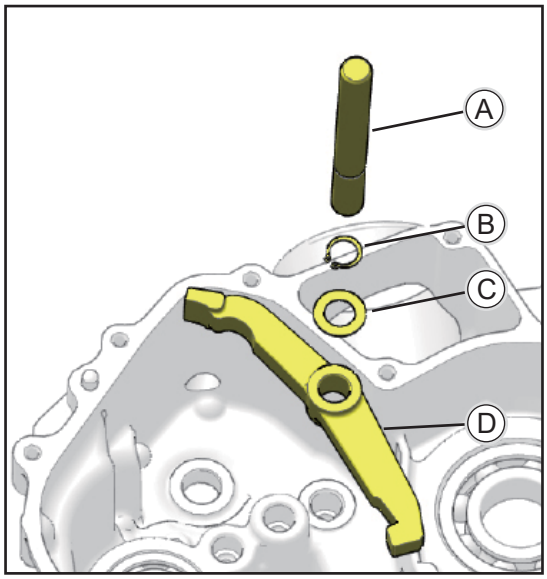
Main Shaft【A】



◆ Remove:

Countershaft Assembly【B】, Shift Rail L【C】,Shift Rail H/R【D】,Shift Drum【E】Component.



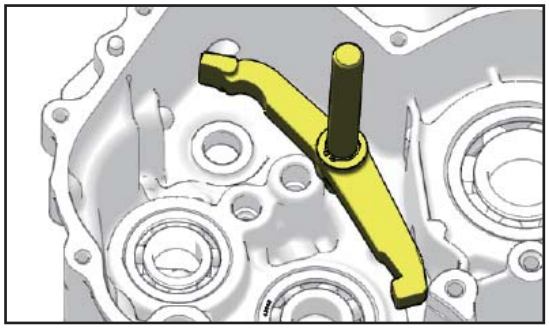


◆ Remove:

Parking Brake Arm Shaft【A】and Snap Ring 12 【B】

Spacer12×20×1【C】

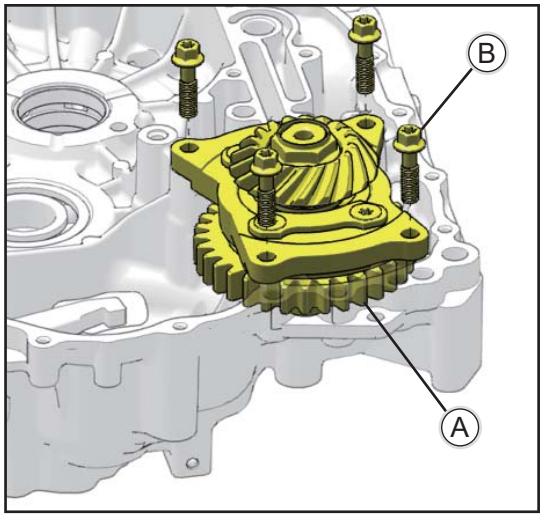
Parking Brake Arm【D】



Transmission Installation

◆ Install:

Insert the Parking Brake Arm Assembly in the crankcase until it is bottomed

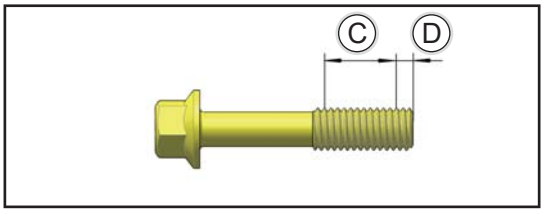


◆ Install:

Drive Bevel Gear Assembly【A】

Bolts M8×30【B】

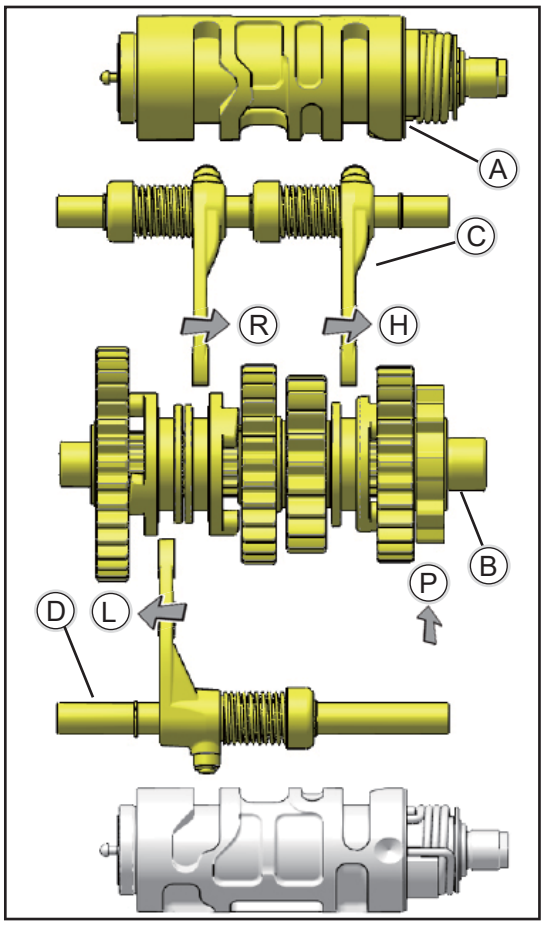
◆ Apply a non-permanent locking agent to the area 【C】(12 mm, 0.47 in.) except for the tip【D】 (2 ~ 3 mm, 0.08 ~ 0.12 in.)



◆ Tighten:

Torque

Bolts M8×30【B】
26 N·m (2.7 kgf·m, 20 ft·lb)



◆ Install:

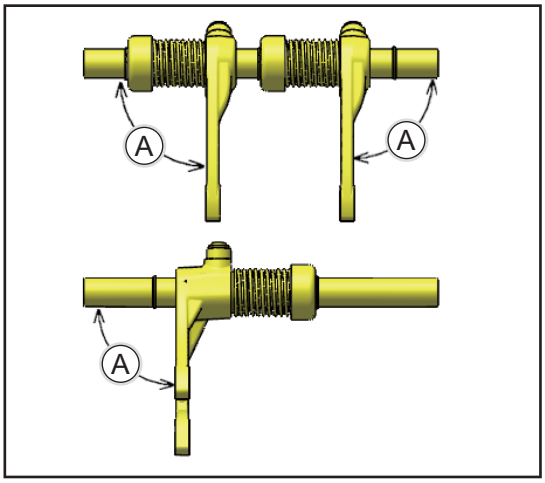
Shift Rail Fork Assembly H/R【C】

Shift Rail Fork Assembly L 【D】

Shift Drum【A】

Countershaft Assembly【B】

Insert the Shift Forks into the groove of the Countershaft Assembly

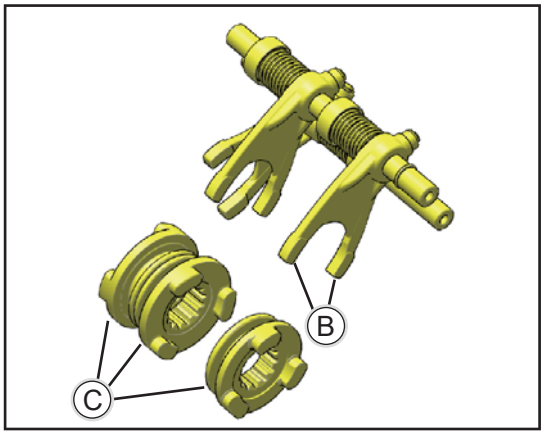


Shift Fork Bending

◆ Visually inspect the shift fork.

If the fork is bent, replace the shift rod with a new one. A bent fork could cause difficulty in shifting, or allow the transmission to jump out of gear when under power.

【A】90°



Shift Fork/Gear and Shifter Groove Wear

◆ Measure the thickness of the shift fork ears【B】, and measure the width【C】of the gear groove and shifter.

If the thickness of a shift fork ear is less than the servicelimit, the shift rod must be replaced.

Shift Fork Ear Thickness

Standard: 5.8 ~ 5.9 mm

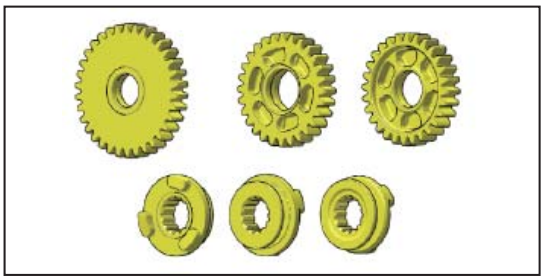
Service Limit: 5.7 mm

If the groove is worn over the service limit, the shifter must be replaced

Shifter Groove Width

Standard: 6.0 ~ 6.1 mm

Service Limit: 6.2 mm



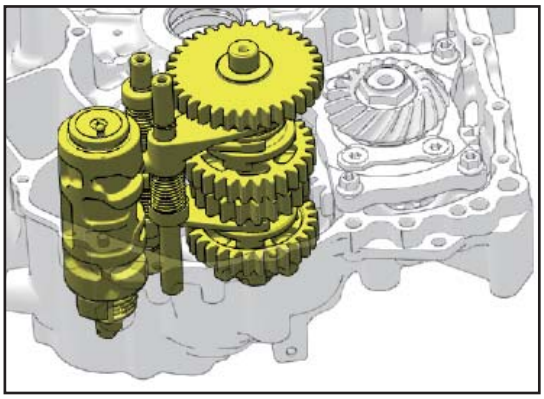
Transmission and Shift Mechanism Inspection

◆ Visually inspect:

Gears

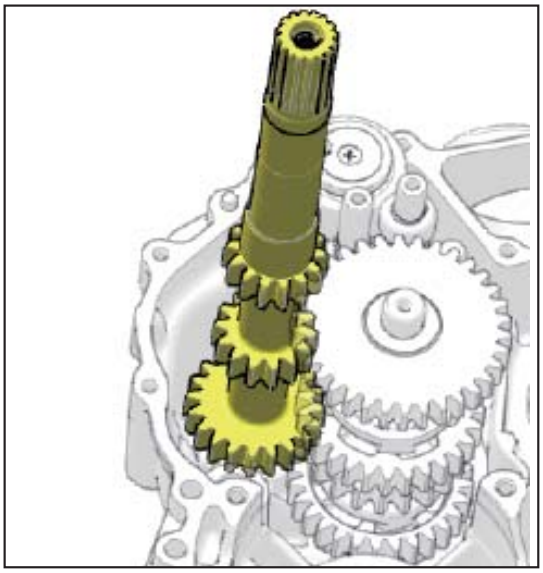
Dogs of Gear and Shifter

If they are damaged or worn excessively, replace them

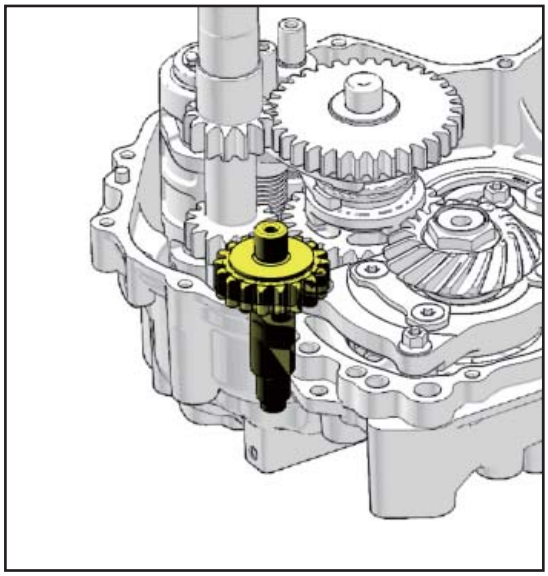


◆ Install:

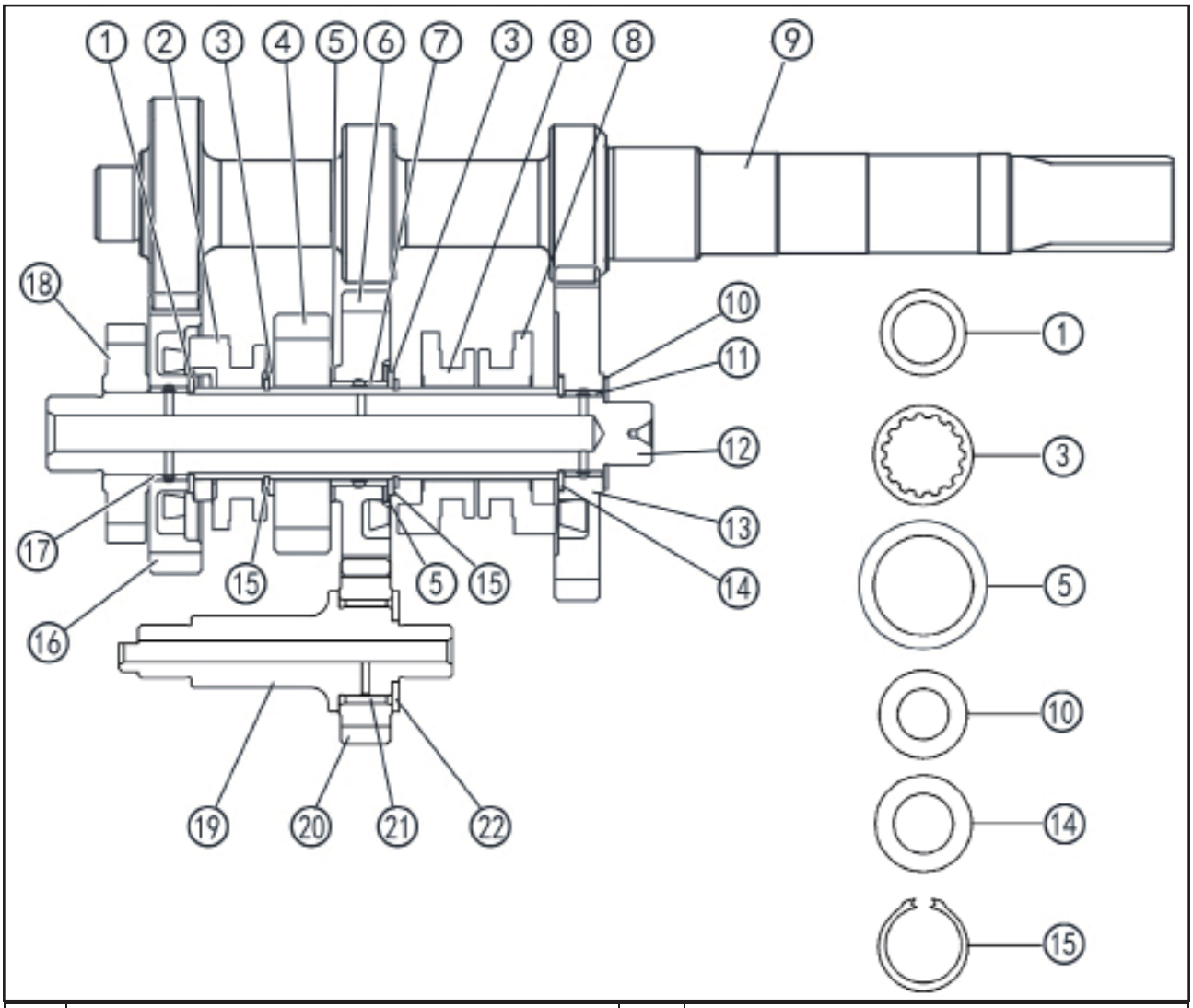
1. Install the Countershaft Assembly, Shift Rail L, Shift Rail H/R and Shift Camshaft to C.



2. Transmission Main Shaft



3. R Idle Gear Shaft Assembly



1	Spacer 22×32×1.5	12	Countershaft
2	Shifter, H	13	Gear L
3	Washer 33×1.5	14	Spacer 20×30×1.5
4	Reduction drive gear	15	Circlip 25×1.2
5	Spacer 28×36.5×1	16	Gear H
6	Gear R	17	Bushing H
7	Bushing R	18	Gear P
8	Shifter, R/L	19	Reverse Idle Shaft
9	Main Shaft	20	R Idle Gear
10	Spacer 17×30×1	21	Needle Roller Bearing K252913
11	Bushing L	22	Spacer 17×38×2

Ball Bearing, Needle Bearing, and Oil Seal

Ball and Needle Bearing Replacement

CAUTION

Do not remove the ball or needle bearings unless it is necessary. Removal may damage them.

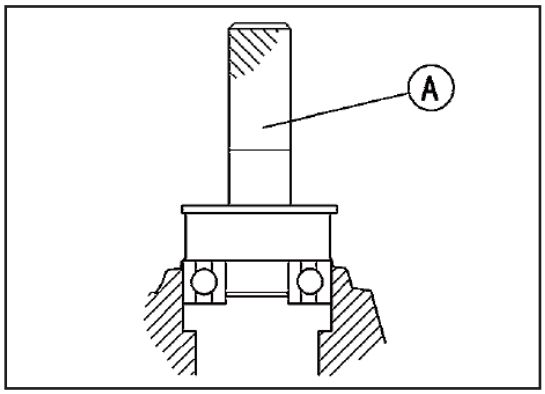
◆ Using a press or puller, remove the ball bearing and/or three needle bearings.

NOTE

In the absence of the above mentioned tools, satisfactory results may be obtained by heating the case to approximately 93°C (200°F) max., and tapping the bearing in or out.

CAUTION

Do not heat the case with a torch. This will warp the case. Soak the case in oil and heat the oil.

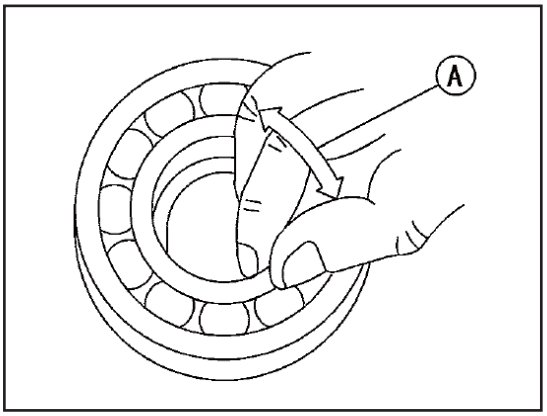


Using a press and the bearing driver set【A】, install the new ball bearing until it stops at the bottom of its housing.
Special Tool - Bearing Driver Set:

Ball and Needle Bearing Wear

CAUTION

Do not remove the bearings for inspection. Removal may damage them.



◆ Check the ball bearings.

Since the ball bearings are made to extremely close tolerances, the wear must be judged by feel rather than measurement. Clean each bearing in a high flash-point solvent, dry it (do not spin the bearing while it is dry), and oil it with engine oil.
Spin【A】the bearing by hand to check its condition.
If the bearing is noisy, does not spin smoothly, or has any rough spots, replace it.

◆ Check the needle bearings.

The rollers in a needle bearing normally wear very little, and wear is difficult to measure. Instead of measuring, inspect the bearing for abrasion, color change, or other damage.Spin【A】the bearing by hand to check its condition.

If there is any doubt as to the condition of a needle bearing, replace it.

Oil Seal Inspection

◆ Inspect the oil seals.

Replace it if the lips are misshapen, discolored (indicating that the rubber has deteriorated), hardened or otherwise damaged.

ENGINE-ELECTRICAL SYSTEM

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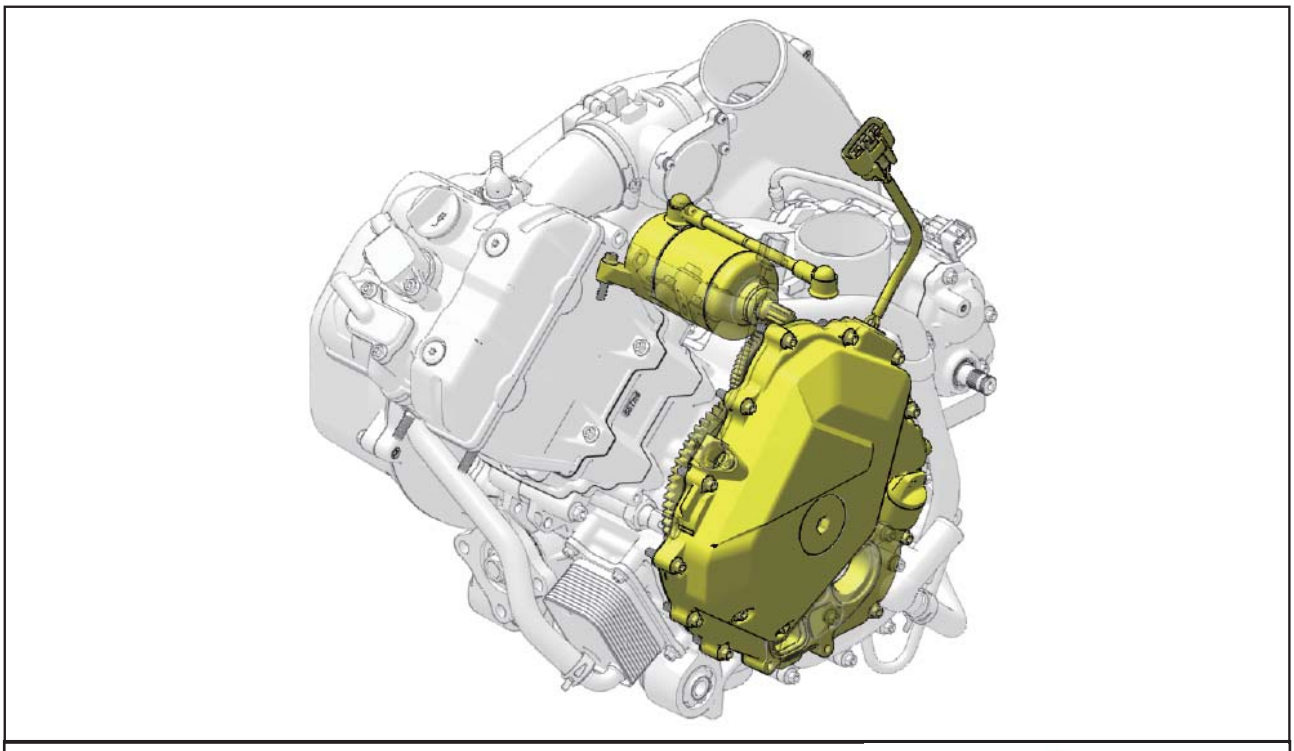
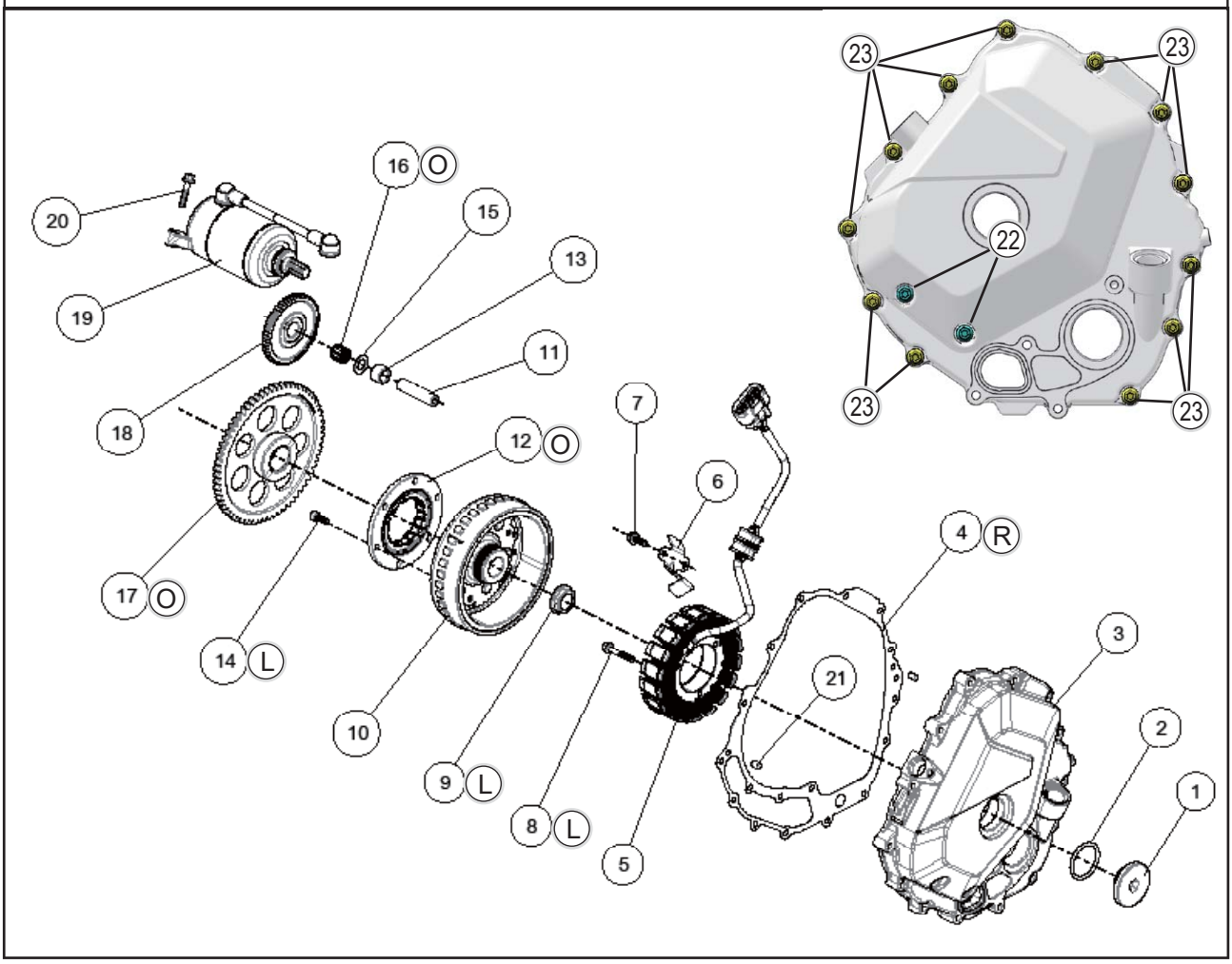
Exploded view





No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Stator Cover Plug	18	1.8	13.3	
2	O-Ring 35×3.5				
3	Left Crankcase Cover				
4	Left Crankcase Cover Gasket				R
5	Alternator Stator				
6	Plate				
7	Bolt M6×16	9.8	1.0	87 in•lb	
8	Bolt M6×35	13	1.3	113 in•lb	L
9	Nut M18×1.5	180	18.4	133	L
10	Alternator Rotor				
11	Double Gear Shaft				
12	One-Way Clutch				O
13	Spacer 12×18×12				
14	Bolt M6×16	20	2	14.5	L
15	Spacer 12×20×1				
16	Needle Roller Bearing K121616				O
17	Starting Driven Gear Assembly				O
18	Double Gear Assembly				
19	Starter Motor Assembly				
20	Bolt M6×30	9.8	1.0	87 in•lb	
21	Dowel Pin 6×10				
22	Bolt M6×55	9.8	1.0	87 in•lb	
23	Bolt M6×30	9.8	1.0	87 in•lb	

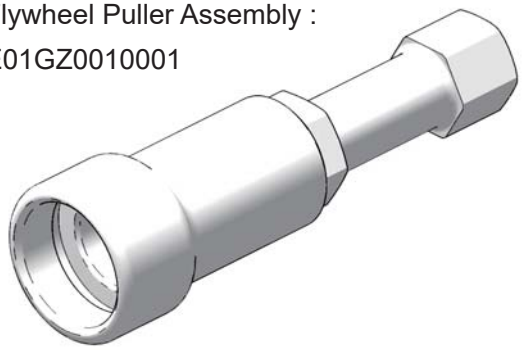
G: Apply grease for oil seal and O-ring.
L: Apply a non-permanent locking agent.
O: Apply engine oil.
R: Replacement Parts.

Technical Parameter

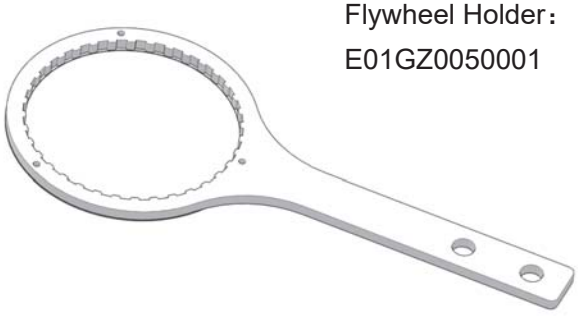
Item	Standard	Service Limit
Charging System:		
Alternator type	Three-phase AC	– – –
Charging voltage	14 ~ 15V	– – –
(Regulator/rectifier output voltage)		
Alternator output voltage:	36 ~ 54V 3000r/min(rpm)	– – –
Stator coil resistance:	0.33 ~ 0.49 Ω	– – –

Special tools

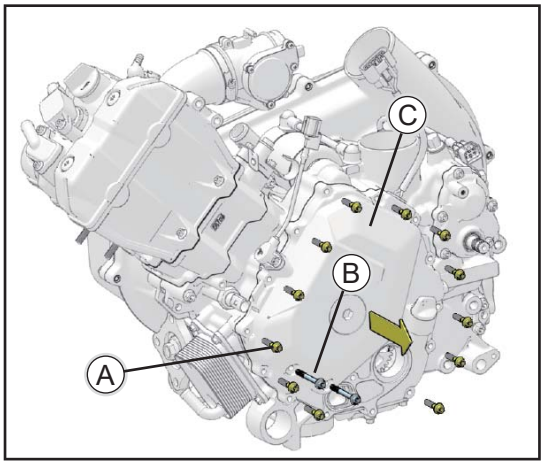
Flywheel Puller Assembly :
E01GZ0010001



Flywheel Holder：
E01GZ0050001



Charging System

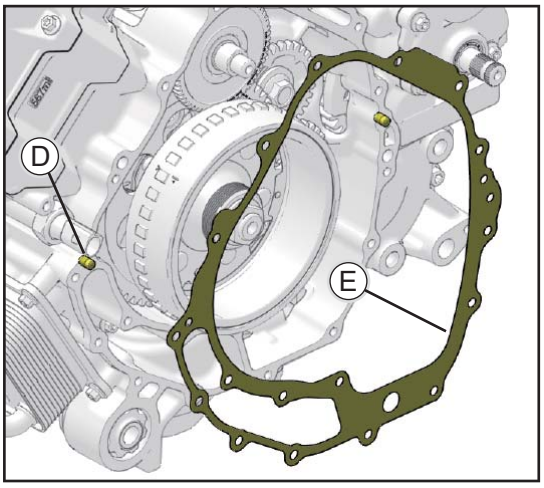


Alternator Cover Removal

- ◆ Place an coolant pan under the engine left side.
- ◆ Drain the coolant (see Cooling System chapter).
- ◆ Place an oil pan under the engine left side.
- ◆ Remove Water Pump (see Cooling System chapter).
- ◆ Remove:

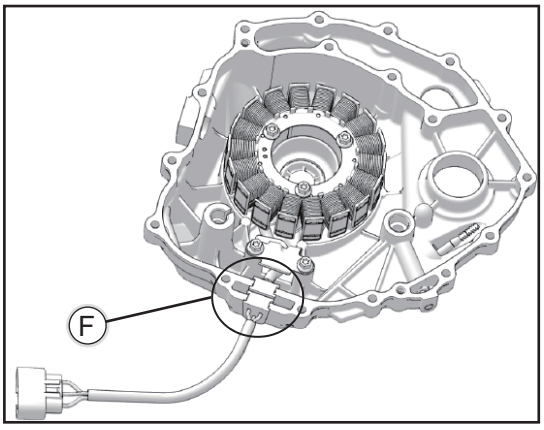
Alternator and Crankshaft Sensor Lead Connectors (disconnect)

【A】Bolts M6×30 (12)
【B】Bolts M6×55 (2)
【C】Alternator Cover

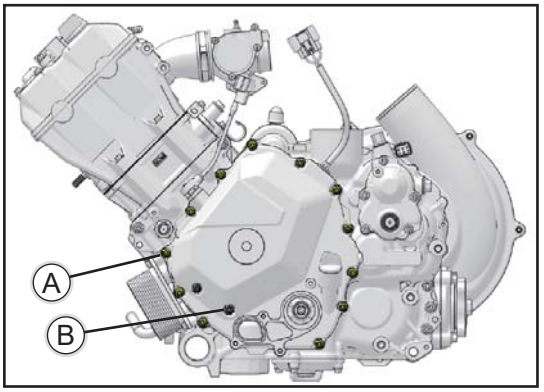


Alternator Cover Installation

- ◆ Be sure all of the old gasket has been removed from the alternator cover and the left crankcase sealing surfaces.
- ◆ Check that the Dowel Pins【D】are in place, and fit a new gasket【E】on the crankcase.



- ◆ Fit the grommets【C】into the notch in the cover.

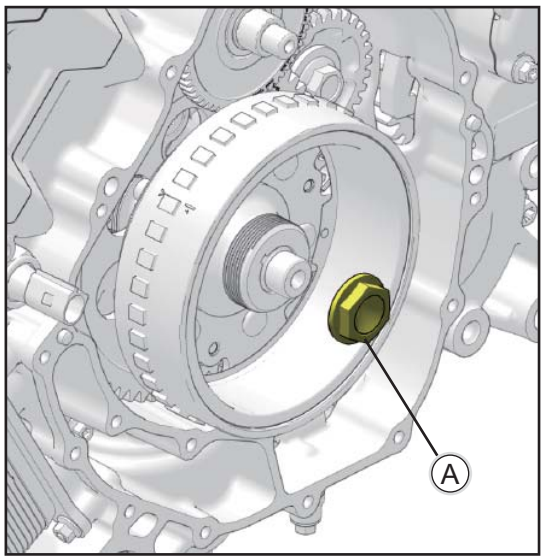


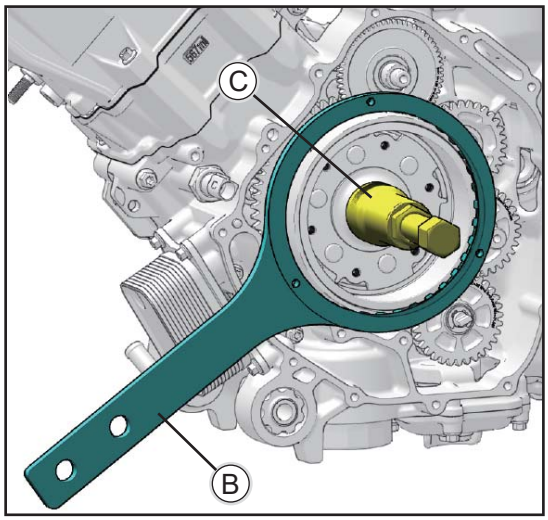
- ◆ Install the Alternator Cover bolts【A】and【B】
- ◆ Tighten

Torque

Alternator Cover Bolts
9.8 N·m (1.0kgf·m, 87 in·lb)

- ◆ Install Water Pump (see Cooling System chapter).





Alternator Rotor Removal

◆ Remove:

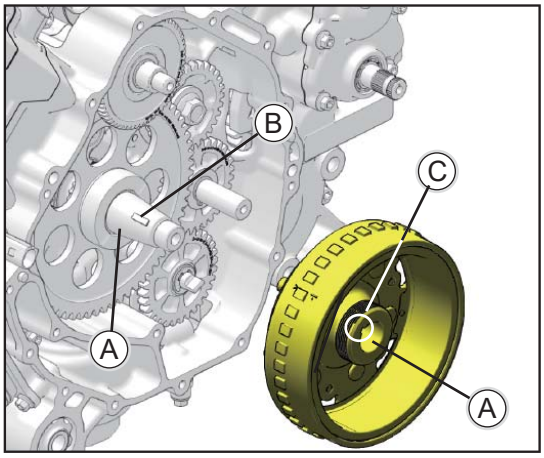
1. Alternator Cover (see Alternator Cover Removal)
2. Alternator rotor Nut M18×1.5【A】
3. Thread the flywheel puller【B】onto the alternator rotor.

Special Tool - Flywheel Puller: E01GZ0010001
Flywheel Holder: E01GZ0050001

◆ Holding the Flywheel Holder【B】, turn the rotor puller【C】until the alternator rotor is forced off the end of the crankshaft.

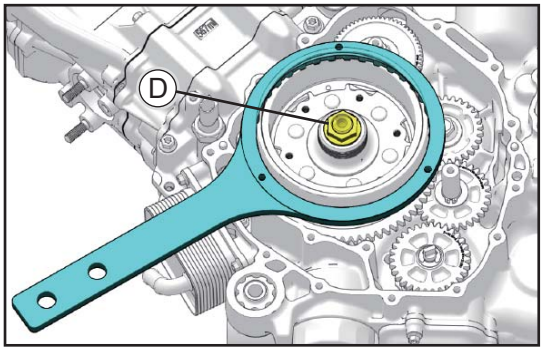
CAUTION

If the rotor is difficult to remove, turn the puller while tapping the end of the puller. Do not strike the alternator rotor. Striking the rotor can cause the magnets to lose magnetism.



Alternator Rotor Installation

- Clean【A】the inside of the rotor and the end of the crankshaft.
- Fit the rotor onto the crankshaft so that woodruff key [B] fits in the groove【C】in the hub of the rotor.
- Install the alternator rotor【B】while turning the starter clutch gear【C】.



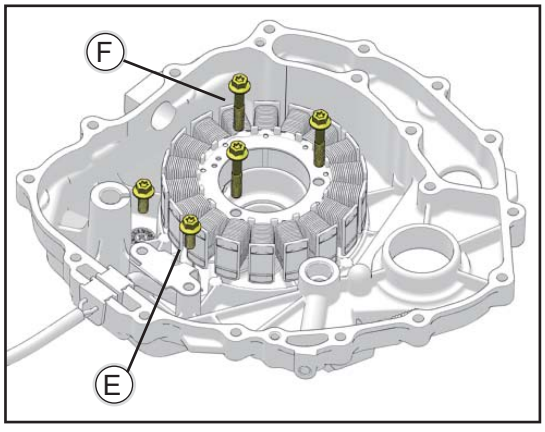
- Nut M18×1.5【D】
- Tighten:

Torque

Nut【C】
180 N•m (18.4 kgf•m, 133 ft•lb)

- Apply a non-permanent locking agent to the Nut【C】.

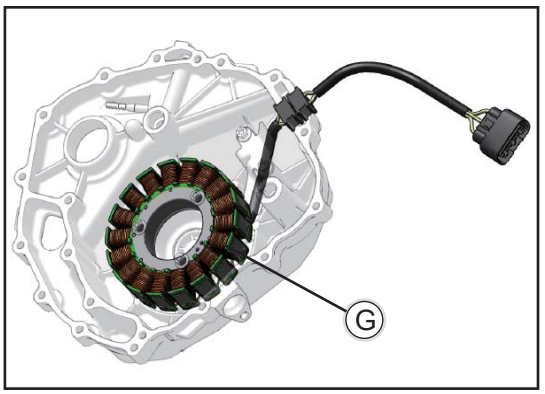
Special Tool - Flywheel Holder：E01GZ0050001



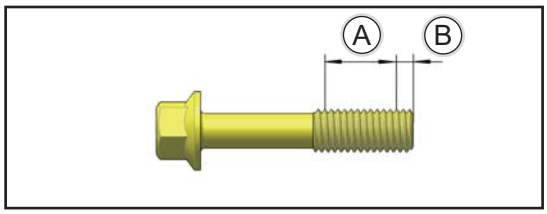
Alternator Stator Removal

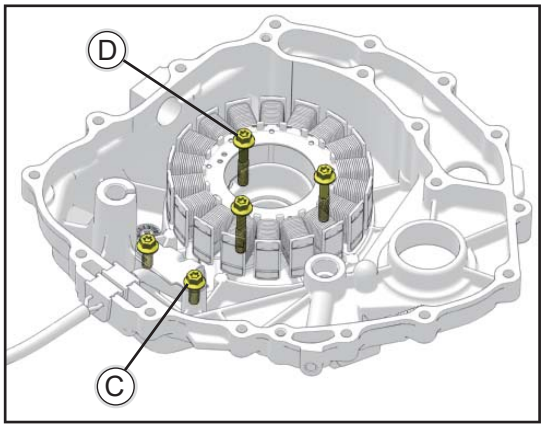
- Remove：

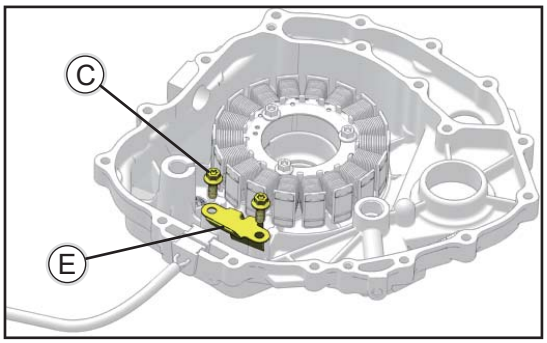
Left Crankcase Cover (see Left Crankcase Cover Removal)
Bolts M6×16 (2)【E】
Bolts M6×35 (3)【F】

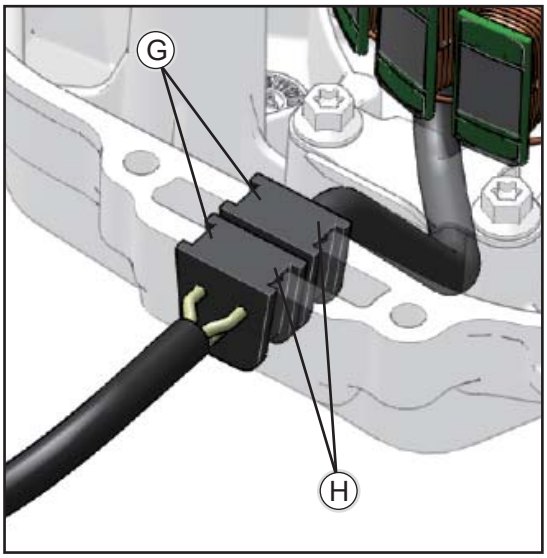


Alternator Stator【G】









Alternator Stator Installation

- Apply a non-permanent locking agent to the area 【A】 (12 mm, 0.47 in.) except for the tip【B】(2 ~ 3 mm, 0.08 ~ 0.12 in.)
- Tighten:

Torque

Bolts M6×35
13 N•m (1.3 kgf•m, 113 in•lb)

Bolts M6×16
9.8 N•m (1.0 kgf•m, 87in•lb)

- Install:

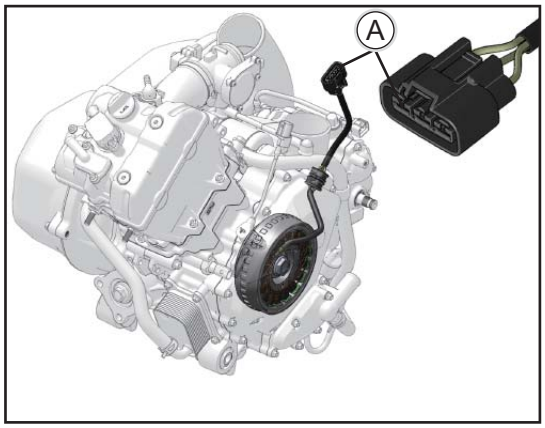
Crankshaft Sensor (see Crankshaft Sensor Installation)

- Fit the lead grommets【G】into the notch on the Left Crankcase Cover.
- Fit the Plate 【E】

- Apply liquid gasket【H】to mating surface of the lead grommets.

Sealant:5699

Apply after, must be assembled with in 5 min.



Alternator Inspection

There are three types of alternator failures: short, open, or loss in rotor magnetism. A short or open in one of the coil wires will result in either a low output, or no output at all. A loss in rotor magnetism, which may be caused by dropping or hitting the alternator, by leaving it near an electromagnetic field, or just by aging, will result in low output.

- To check the alternator output voltage, perform the following procedures.
- Disconnect the alternator connector【A】.
- Connect a hand tester as shown in the table.
- Start the engine.
- Run it at the rpm given in the table.
- Note the voltage readings (total 3 measurements).

Alternator Output Voltage

Tester Range	Connections		Reading @3000rpm
	Tester (+) to	Tester (–) to	
250V AC	One yellow lead	Another yellow lead	36~54 V

If the output voltage is within the values in the table, the alternator is operating correctly, and the regulator/rectifier is damaged. A much lower reading indicates that the alternator is defective.

- Check the stator coil resistance as follows:
- Stop the engine.
- Disconnect the alternator connector.
- Connect a hand tester as shown in the table.
- Note the readings (total 3 measurement).

Stator Coil Resistance

Tester Range	Connections		Reading
	Tester (+) to	Tester (–) to	
×1Ω	One yellow lead	Another yellow lead	0.33~0.49 Ω

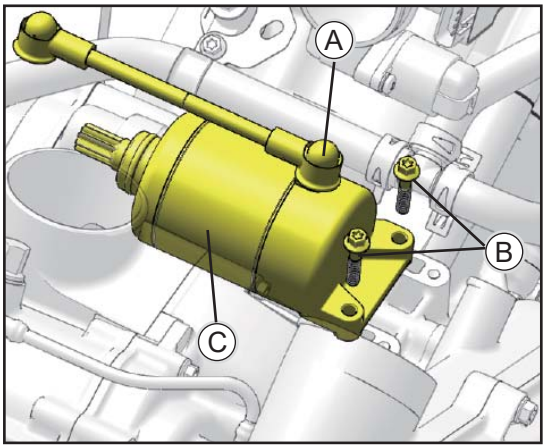
If there is more resistance than shown in the table, or no reading (infinity) for any two leads, the stator has an open and must be replaced. Much less resistance means the stator is shorted and must be replaced.

- Using the highest resistance range of the hand tester, measure the resistance between each of the black leads and chassis ground.
- Any reading less than infinity (∞) indicates a short, necessitating stator replacement.

If the stator coils have normal resistance, but the voltage check shows the alternator to be defective; then the rotor magnetism has probably weakened, and the rotor must be replaced.

Special Tool - Hand Tester :

Electric Starter System

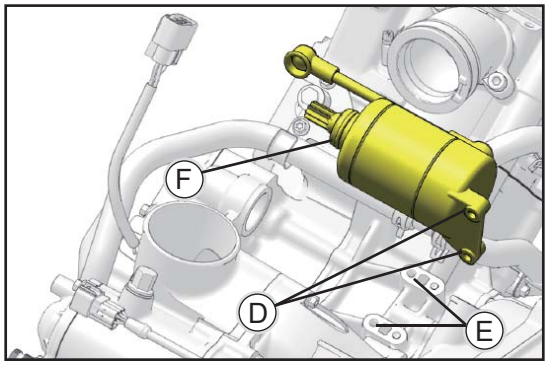


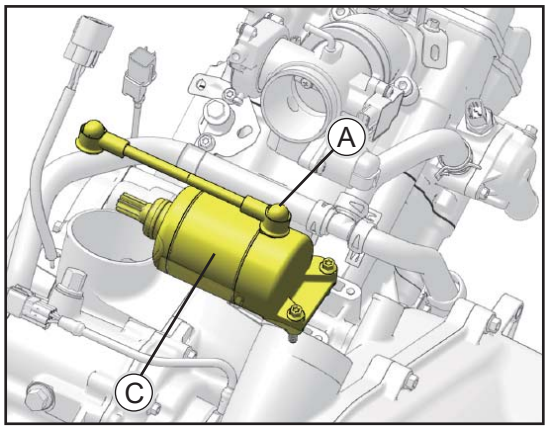
Starter Motor Removal

◆ Remove
Starter Motor Cable【A】
Starter Motor Mounting Bolts【B】
Starter Motor【C】

CAUTION

Do not tap the end of the starter motor shaft or the motor may be damaged.





Starter Motor Installation

◆ When installing the starter motor, clean the starter motor lugs【D】 and crankcase【E】where the starter motor is grounded.

★ If the O-ring【F】shows wear or damage, or if it is hardened, replace it with a new one.

◆ Apply a small amount of engine oil to the O-ring.

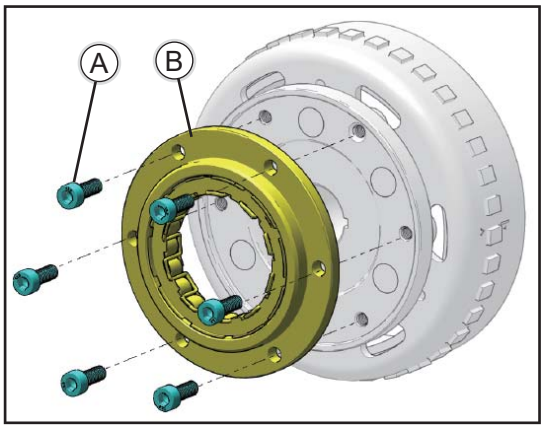
◆ Install:
Starter Motor【C】
Starter Motor Cable【A】

◆ Tighten:

Torque

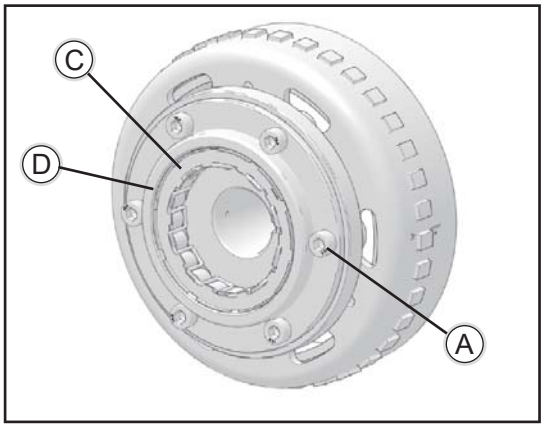
StarterMotorMounting Bolts
9.8N•m(1.0 kgf•m, 87 in•lb)

Starter Motor Terminal Nut
4.9 N•m (0.50 kgf•m, 43 in•lb)



One-Way Clutch Removal

- Remove the Alternator Rotor (see Alternator Rotor Removal).
- Hold the rotor with the Flywheel Holder and take out the One-Way Clutch Bolts [A].
- Take out the One-Way Clutch [B].



One-Way Clutch Installation

- Install the One-Way Clutch so that the flange【C】fits on the recess【D】of the race.
- Apply a non-permanent locking agent:
  One-Way Clutch Bolts【A】
- Tighten:

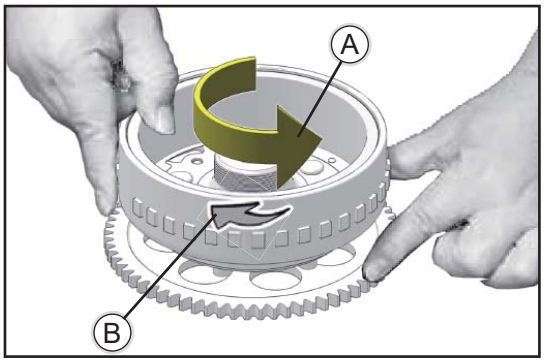
Torque

Starter Motor Clutch Bolts
20 N•m (2 kgf•m, 14.5 ft•lb)

One-Way Clutch Inspection

- Remove:

Alternator Rotor (see Alternator Rotor Removal)



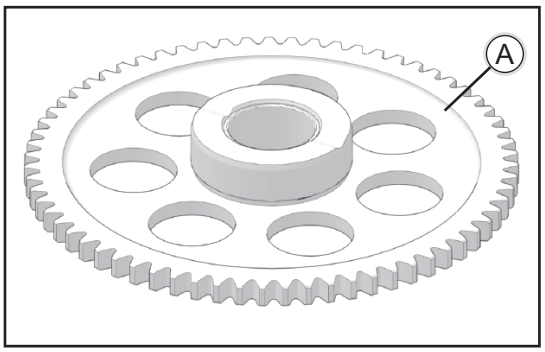
- Fit the Starter One-Way Gear into the One-Way Clutch.

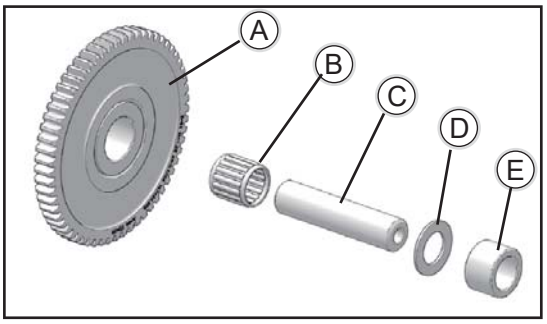
If the alternator rotor turns counterclockwise【A】freely from the Starter One-Way Gear, but not clockwise【B】, the clutch is operating correctly.

If the clutch does not operate correctly, or if it makes noise, disassemble it and examine each part visually. Replace any worn or damaged parts.

NOTE

Examine the Starter One-Way Gear【A】. Replace it if it is worn or damaged.



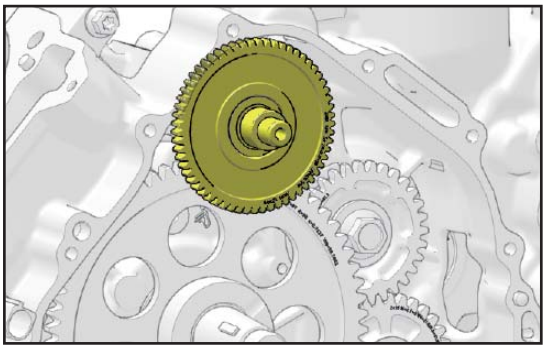


Starter Gear Removal

◆ Remove

1. Alternator Rotor (see Alternator Rotor Removal)
2. Spacer【E】
3. Washer【D】
4. Double Gear Shaft【C】
5. Needle Roller Bearing【B】
6. Remove the Starter Gear Assembly【A】

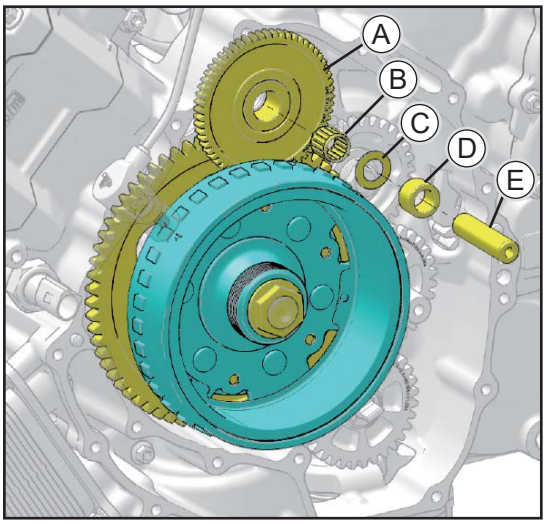
Visually inspect the Starter Gear



If the gear does not operate correctly, or if it makes noise, disassemble it and examine each part visually. Replace any worn or damaged parts.

Starter Gear Installation

◆ Install



1. Starter Gear Assembly【A】
2. Install the Needle Roller Bearing【B】, Apply engine oil to the Needle Roller Bearing
3. Combine the Spacer【C】, Spacer【D】and Double Gear Shaft【E】install them to mounting hole of the Crankcase.

ENGINE-COOLING SYSTEM

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Coolant Temperature Sensor Installation.....3-4-13

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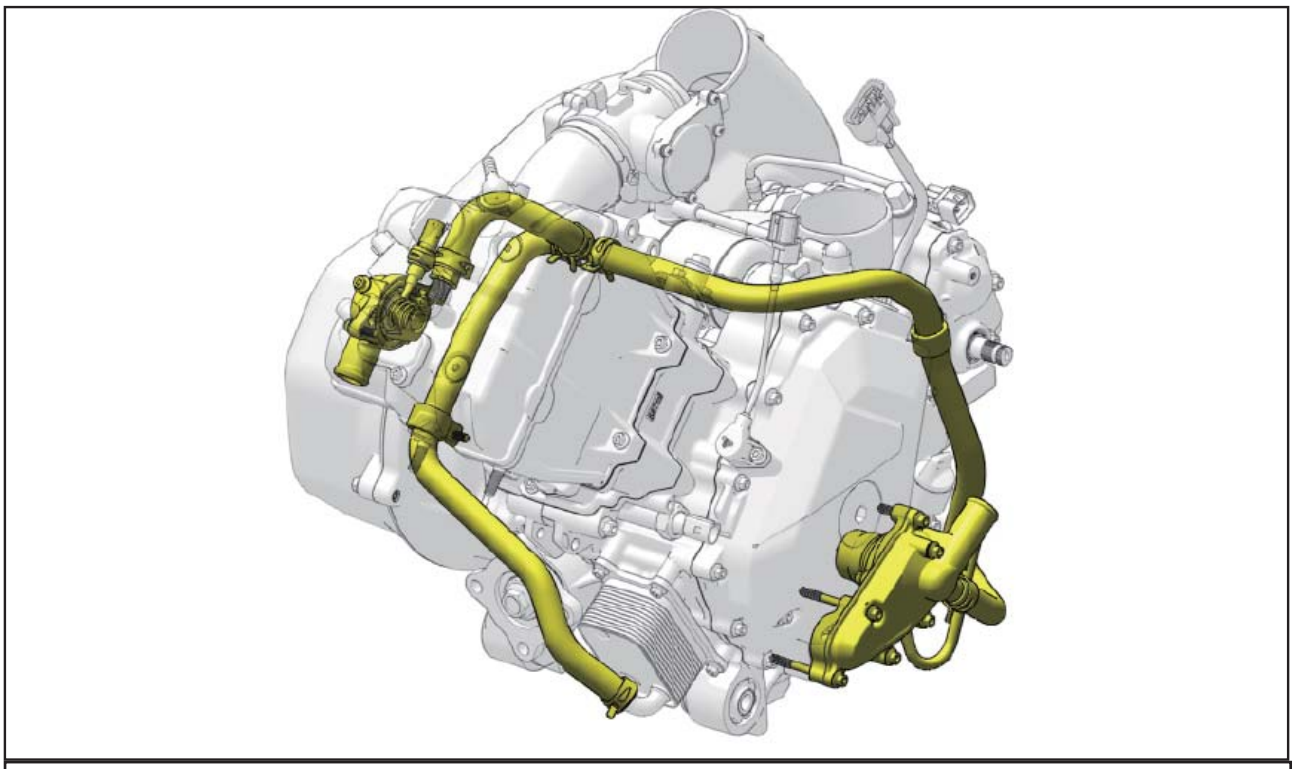
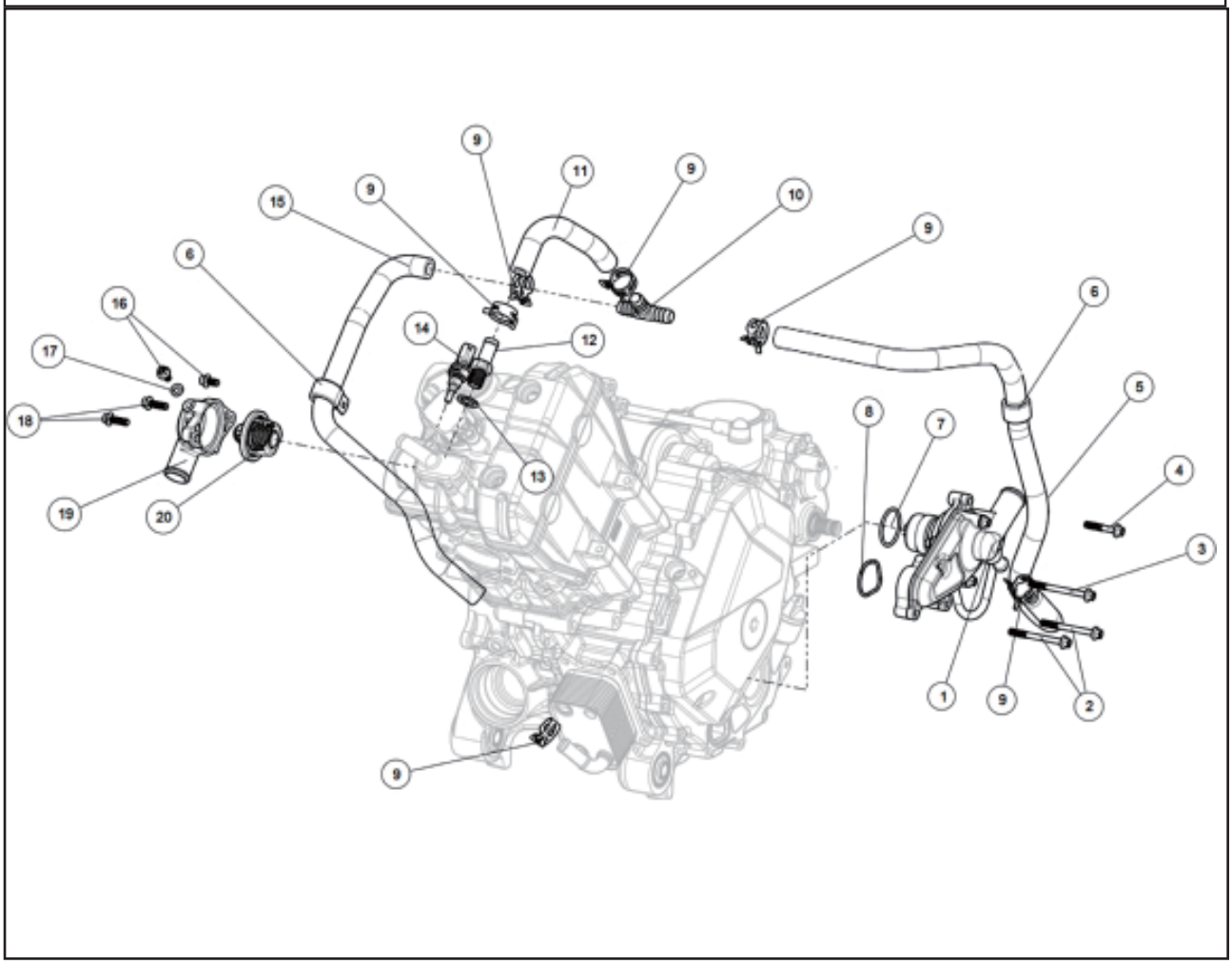
ENGINE-COOLING SYSTEM

Exploded view





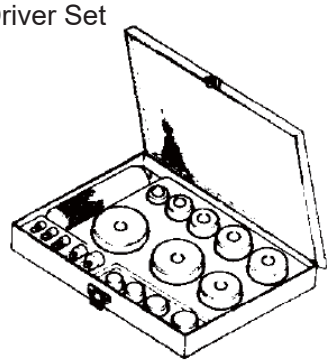
No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Water Pump Assembly				
2	Bolt M6×60	9.8	1.0	87 in•lb	
3	Bolt M6×65	9.8	1.0	87 in•lb	
4	Bolt M6×35	9.8	1.0	87 in•lb	
5	Hose,11×20×671				
6	Clamp,Hose				
7	O-Ring 33×2.62				
8	Water Pump Gasket				
9	Clamp,Springband				
10	Connector,Tee				
11	Hose,12×20×147				
12	Adapter,Water Pipe				
13	Aluminum Washer 14×21×1.5				
14	Water Temperature Sensor				
15	Hose,12×20×455				
16	Bolt M6×12	9.8	1.0	87 in•lb	
17	Washer 6				
18	Bolt M6×20	9.8	1.0	87 in•lb	
19	Thermostat Cover				
20	Thermostat,82℃ (180℉)				

Technical Parameter

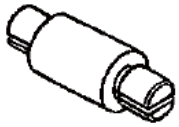
Item	Standard	Service Limit
Coolant provided when shipping:		
Type	Permanent type of antifreeze (soft water and ethylene glycol plus corrosion and rust inhibitor chemicals for aluminum engines and radiators)	– – –
Color	Green	– – –
Mixed ratio	Soft water 50%, coolant 50%	– – –
Freezing point	–35˚C (–31˚F)	– – –
Total amount	3.0 L (3.17 US qt) (reserve tank full level including radiator and engine)	– – –
Radiator cap:		
Relief pressure	93 ~ 123 kPa (0.95 ~ 1.25 kgf/cm², 14 ~ 18 psi)	– – –
Thermostat:		
Valve opening temperature	69.5 ~ 72.5˚C (157 ~ 162˚F)	– – –
Valve full opening lift	8 mm or more @ 82˚C (180˚F)	– – –

Special tools

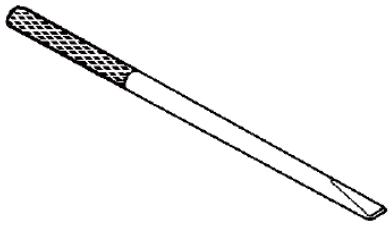
Bearing Driver Set



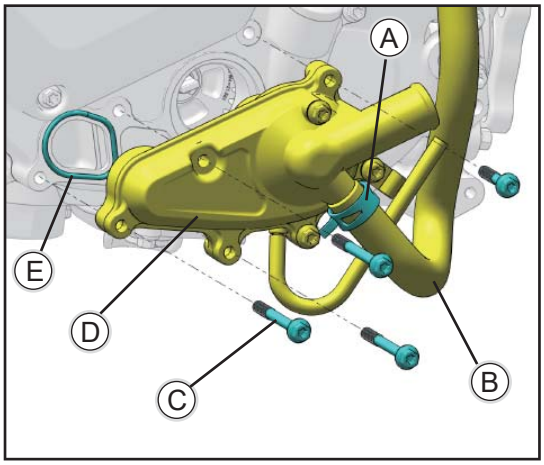
Bearing Remover Head



Bearing Remover Shaft



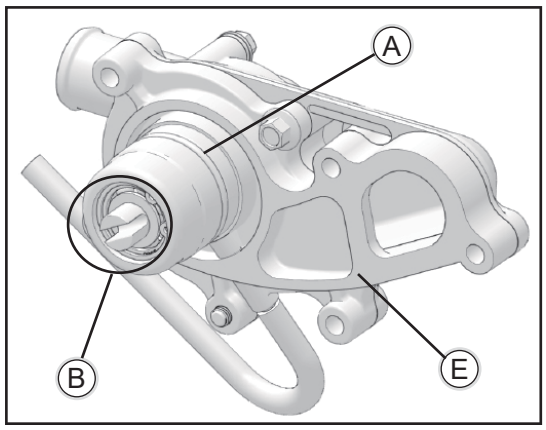
Water Pump



Water Pump Removal

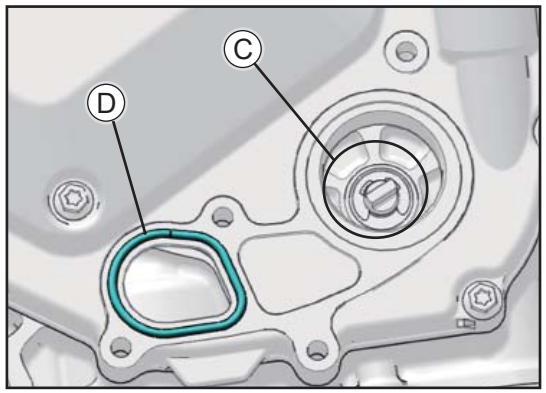
- ◆ Drain the engine coolant and oil
- ◆ Remove:

Clamp【A】
Cooling Hoses【B】
Water Pump Bolts【C】
Water Pump【D】
Water Pump Gasket【E】

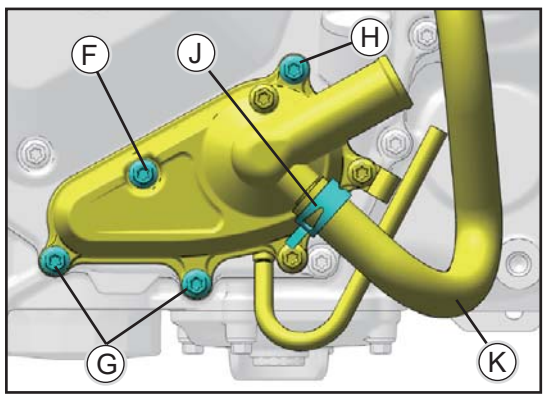


Water Pump Installation

- ◆ Apply engine oil to the Oil Pump O-ring【A】
- ◆ Install the Water Pump Gasket【D】to the sealing groove of the alternator cover
- ◆ Turn the notch【B】of the water pump shaft to align the convex square【C】side of the oil pump shaft



- ◆ Install the Water Pump【E】to the mounting hole of the alternator cover



- ◆ Install the Water Pump Bolts:

M6×65 (1)【F】
M6×60 (2)【G】
M6×35 (1)【H】

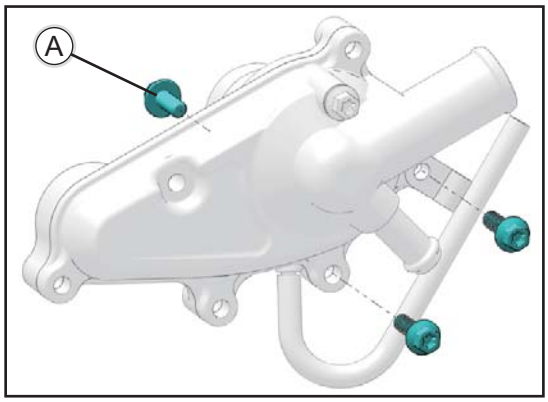
- ◆ Tighten

Torque

Bolts M6
9.8 N•m (1.0kgf•m, 87 in•lb)

- ◆ Install Cooling Hoses【K】
- ◆ Install Clamp【J】

Water Pump Cover Removal

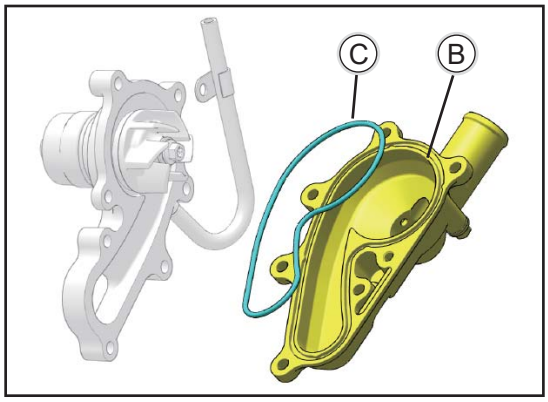


◆ Remove:

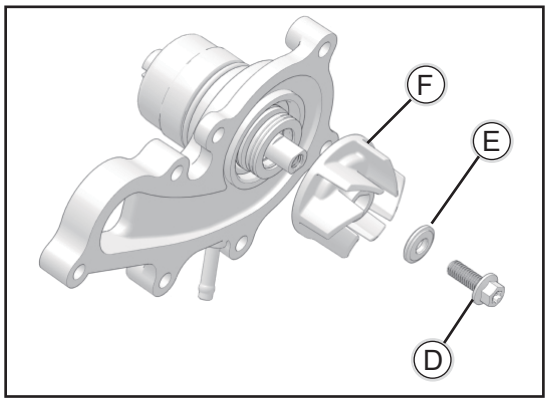
Water Pump Cover Bolts【A】

Water Pump Cover【B】

Water Pump Cover Seal【C】



Impeller Removal

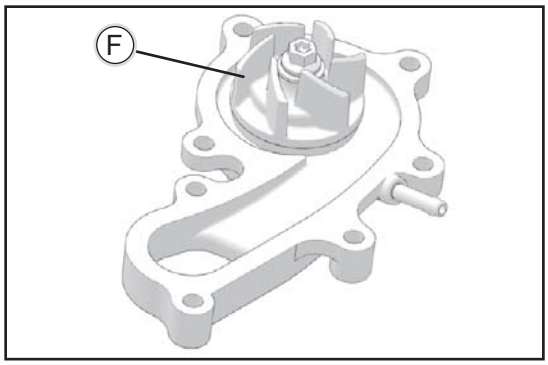


◆ Loosen the water pump impeller Bolt【D】counter-clockwise.

◆ Remove the Gasket【E】

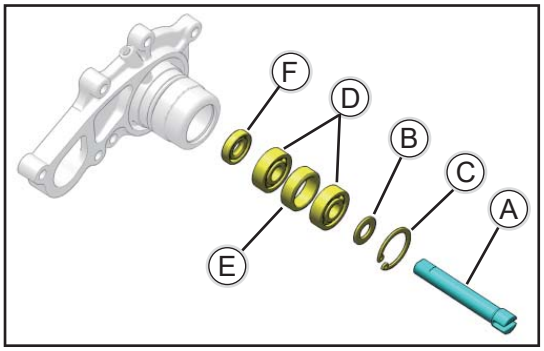
◆ Remove the impeller【F】

Water Pump Impeller Inspection



◆ Visually inspect the impeller【F】.

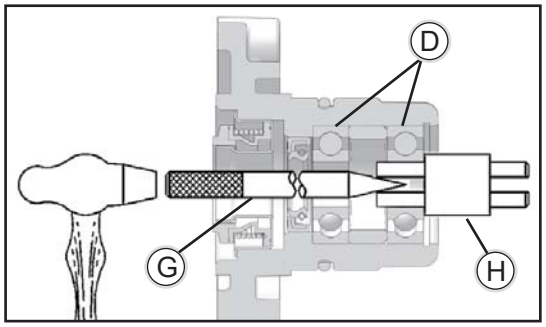
If the surface is corroded or the blades are damaged, replace the impeller.



Water Pump Shaft Removal:

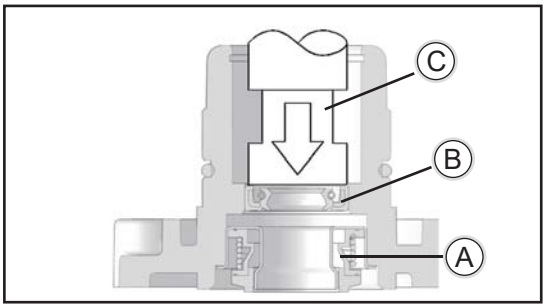
◆ Remove:

Water Pump Shaft【A】
Washer【B】
Circlip【C】
Bearing【D】
Spacer【E】
Bearing【D】
Oil Seal【F】



◆ Take the bearing【D】out of the Water Pump Body, using the bearing remover.

Special Tools - Bearing Remover Shaft【G】
Bearing Remover Head【H】



Mechanical Seal Replacement:

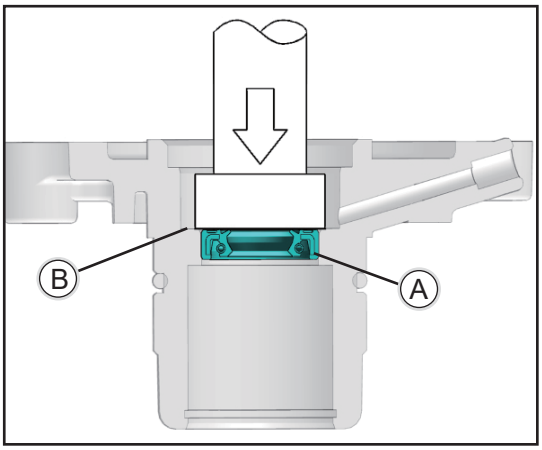
Press out the mechanical seal【A】and oil seal【B】from the inside of the Water Pump Body with the bearing driver set【C】.

Special Tool - Bearing Driver Set

CAUTION

If either the mechanical seal, oil seal, or the ball bearing is removed,make sure to replace all of them simultaneously with a new one.

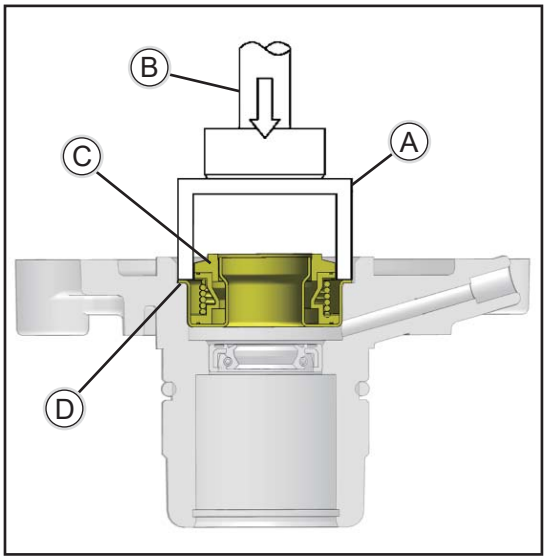
Be careful not to block the inspection hole with the oil seal. If the inspection hole is blocked, the coolant may pass through the oil seal and flow into the crankcase.



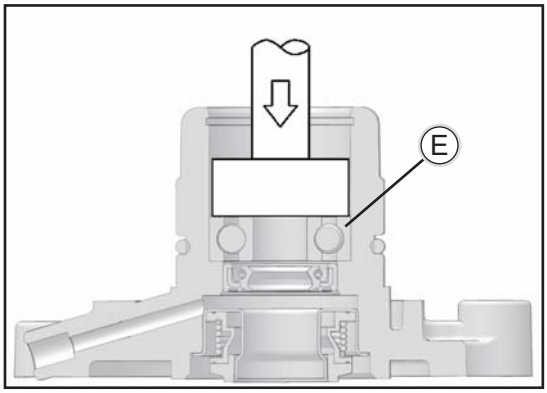
◆ Apply heat-resistance grease on the oil seal lip.

◆ From outside the Water Pump Body, press and insert the oil seal【A】flush【B】in the direction as shown.

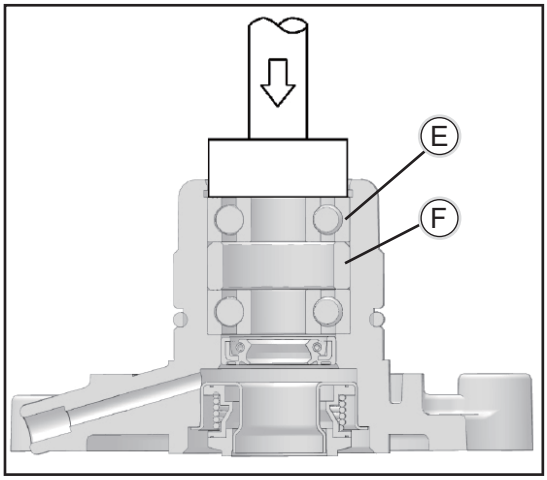
Special Tool - Bearing Driver Set



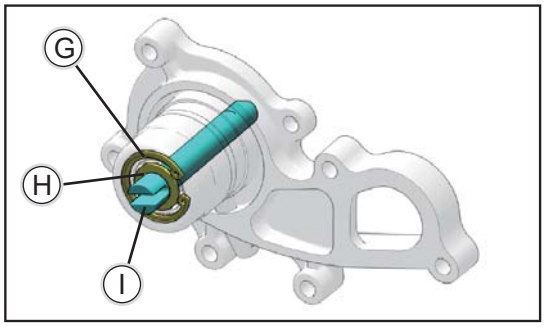
◆ Using a suitable socket【A】 and the bearing driver 【B】, press and insert a new mechanical seal【C】 until its flange stops at the step【D】of the hole.
Special Tool - Bearing Driver Set



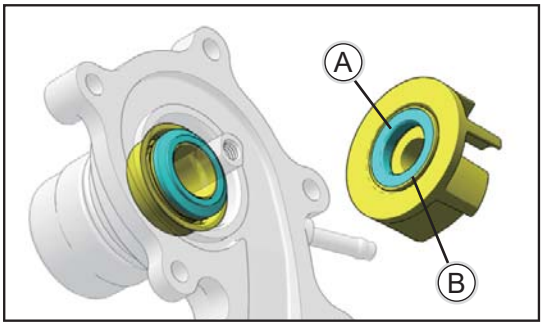
◆ From inside the Water Pump Body, press and insert the ball bearing【E】until it is bottomed.
Special Tool - Bearing Driver Set



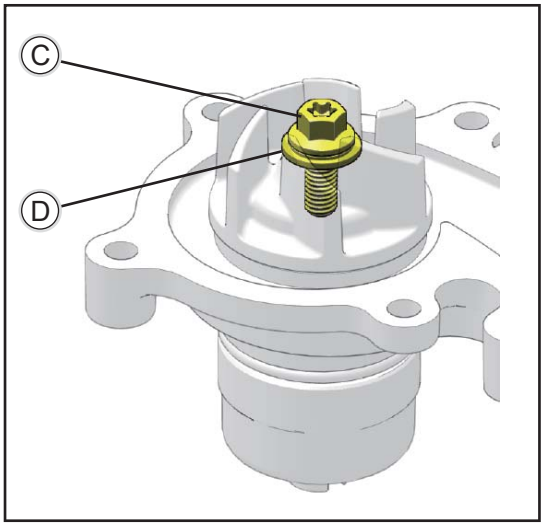
◆ Install the Spacer【F】
◆ From inside the Water Pump Body, press and insert the ball bearing【E】until it is bottomed.



◆ Install the Circlip【G】
◆ Install the Washer【H】
◆ Install the Water Pump Shaft【I】

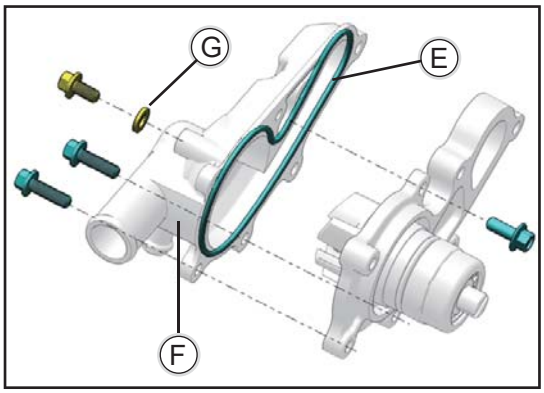


- Clean the sliding surface of a new mechanical seal with a high flash-point solvent, and apply a little coolant to the sliding surface to give the mechanical seal initial lubrication.
- Apply coolant to the surfaces of the rubber seal and sealing seat【A】, and press the rubber seal【B】 and sealing seat into the impeller by hand until the seat bottoms out.
- install the Gasket【C】
- Tighten the water pump impeller by turning the bolt 【D】clockwise.



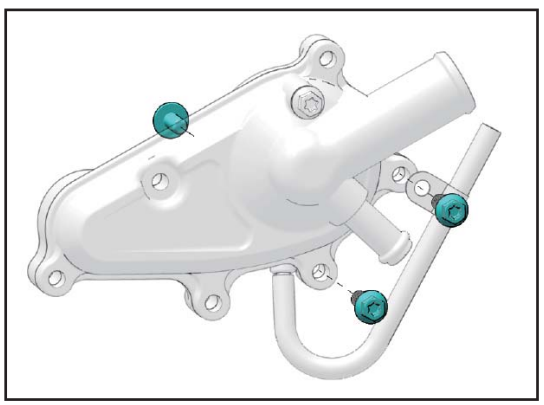
Torque

Water PumpImpeller
9.8 N•m (1.0kgf•m, 87 in•lb)



Water Pump Cover Installation

- Install the new water pump cover Gasket【E】to the sealing groove of the water pump cover【F】
- water pump cover Bolts and Gasket【G】

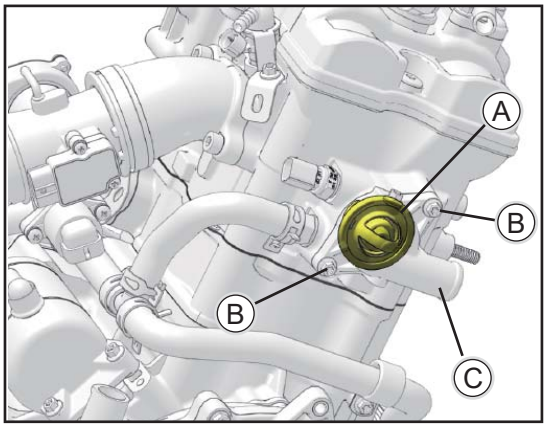


- Tighten

Torque

Water Pump Cover Bolts
9.8 N•m (1.0kgf•m, 87 in•lb)

Thermostat



Thermostat Removal

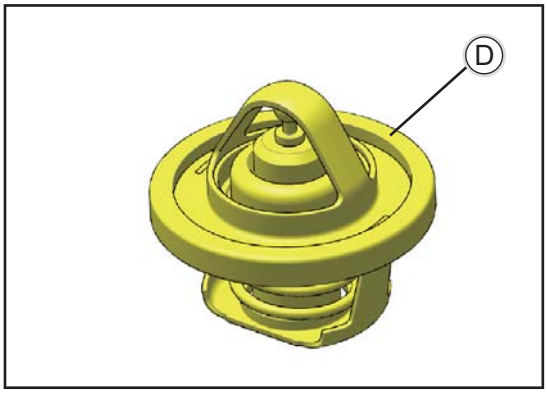
◆ Drain the coolant (see Cooling System in Periodic Maintenance chapter).

◆ Remove:

Thermostat Housing Cover Bolts【B】

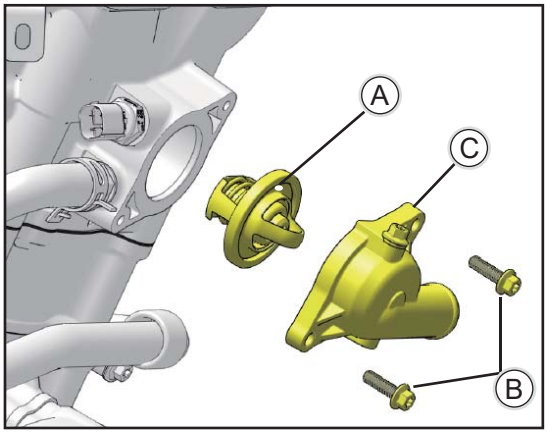
Thermostat Housing Cover【C】

Thermostat【A】



Thermostat Installation

◆ Be sure to install the O-ring【D】on the Thermostat



◆ Install:

Thermostat【A】

Thermostat Housing Cover【C】

Thermostat Housing Cover Bolts【B】

◆ Tighten:

Torque

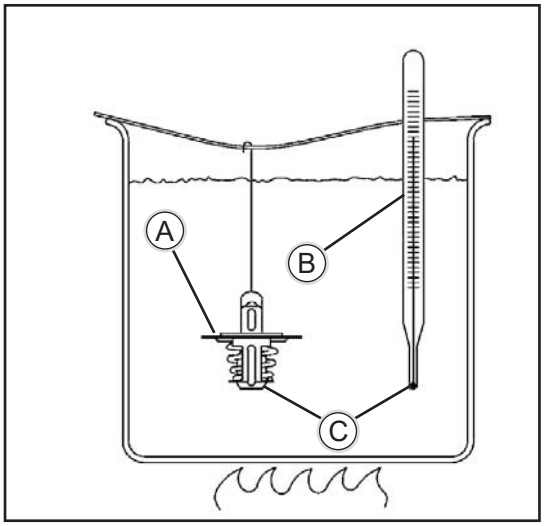
Water Pump Cover Bolts
9.8 N•m (1.0kgf•m, 87 in•lb)

◆ Add coolant (see Cooling System in Periodic Maintenance chapter).

Thermostat Inspection

◆ Remove the thermostat, and inspect the thermostat valve【A】at room temperature.

If the valve is open, replace the valve with a new one.



◆ To check valve opening temperature, suspend the thermostat【A】and an accurate thermometer【B】in a container of water with the heat-sensitive portions【C】in almost the same depth.

NOTE

Take care against burns from hot engine oil that will drain through the oil passage when the gauge adapter is removed.

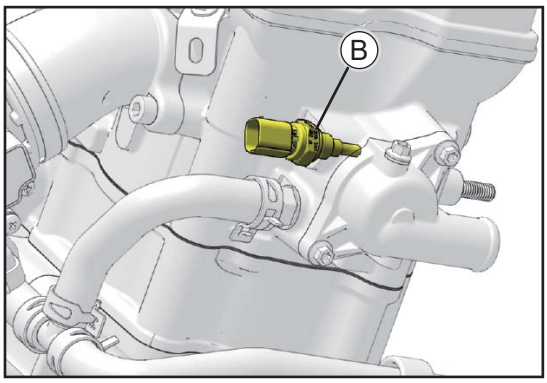
◆ Gradually raise the temperature of the water while stirring the water gently for even temperature.

If the measurement is out of the range, replace the thermostat.

Thermostat Valve Opening Temperature

69.5 ～ ***72.5*** ℃ ***(157*** ～ ***162*** ℉***)***

Coolant Temperature Sensor



Coolant Temperature Sensor Removal

CAUTION

The coolant temperature sensor should never be allowed to fall on a hard surface. Such a shock to the part can damage it.

- Drain the coolant (see Cooling System in Periodic Maintenance chapter).
- Disconnect the Sensor lead.
- Remove the Sensor【B】.

Coolant Temperature Sensor Installation

- Apply silicone sealant to the threads of the Sensor and tighten it
- Tighten:

Torque

Coolant Temperature Sensor
12 N•m (1.2kgf•m, 107 in•lb)

- Fill the coolant (see Cooling System in Periodic Maintenance chapter).

Coolant Temperature Sensor Inspection

- Refer to the Electrical System chapter.

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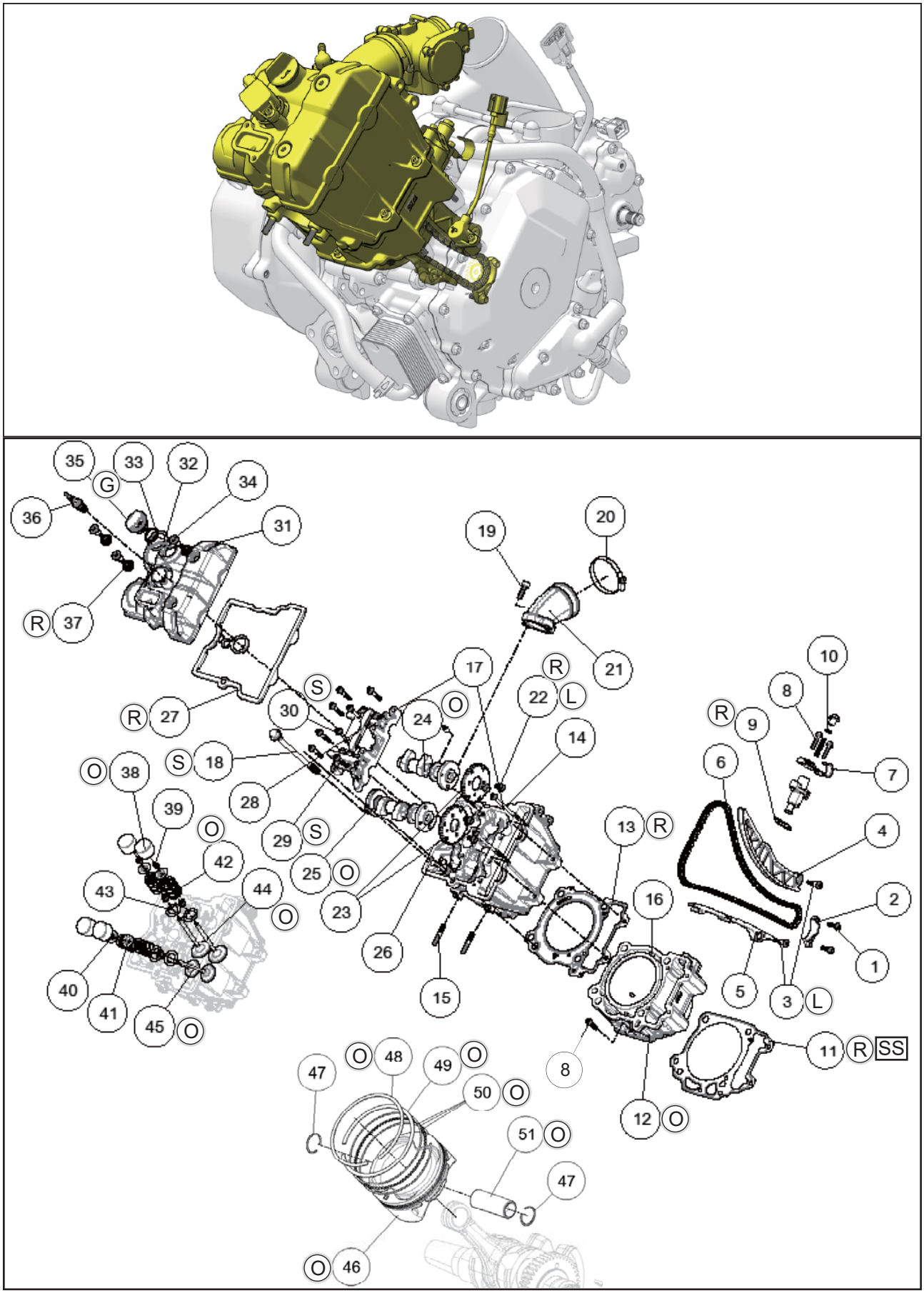
Exploded view



ENGINE TOP END

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Bolt M6×20	9.8	1.0	87 in•lb	
2	Chain Guard				
3	Shoulder Bolt				L
4	Chain Tensioner	9.8	1.0	87 in•lb	
5	Chain Guide Plate				
6	Timing Chain				
7	Pipe/Line Fixing Plate				
8	Bolt M6×25	9.8	1.0	87 in•lb	
9	Tensioner Gasket				R
10	Tensioner				
11	Base Gasket				R / SS
12	Cylinder				O
13	Cylinder Head Gasket				R
14	Bolt M6×90	9.8	1.0	87 in•lb	
15	Stud M8×43	20	2.0	14	
16	Dowel Pin 6×10				
17	Cylinder Head & Camshaft Carrier Combination				
18	Cylinder Head Bolt	75	7.7	54	S
19	Bolt M8×25	20	2.0	14	
20	Clamp 50 ~ 70				
21	Air Intake Pipe				
22	Bolt M6×12	9.8	1.0	87 in•lb	L / R
23	Timing Driven Sprocket				
24	Intake Camshaft Assembly				O
25	Exhaust Camshaft Assembly				O
26	Dowel Pin 10×14				
27	Valve Cover Seal				R
28	Fixed Cam Chain Guid				
29	Bolt M6×35	9.8	1.0	87 in•lb	S
30	Bolt M6×65	9.8	1.0	87 in•lb	S
31	Valve Cover				
32	Oil Fill Cap Seal				G
33	O-Ring 22×3				G
34	Shoulder Bolt	9.8	1.0	87 in•lb	
35	Oil Fill Cap				
36	Spark Plug	11	1.1	97 in•lb	
37	Isolator				R
38	Valve Bucket				O
39	Split Keeper				
40	Valve Retainer				
41	Valve Spring				
42	Valve Stem Seal				O
43	Valve Seat				
44	Intake Valve				O
45	Exhaust Valve				O
46	Piston				O
47	Piston Pin Retaining Ring				O
48	Top Ring				O

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
49	Second Conpression Ring				O
50	Oil Ring Combination				O
51	Piston Pin				O

G: Apply grease for oil seal and O-ring.

L: Apply a non-permanent locking agent.

O: Apply engine oil.

SS: Apply silicone sealant.

S: Follow the specific tightening sequence.

R: Replacement Part.

Technical Parameter

Item	Standard	Service Limit
Cylinder Head:		
Cylinder compression(usable range)		
Electric starter	450 ~700 kPa (4.7 ~ 7.2 kgf/cm²,65 ~ 102 psi) @ 300 r/min (rpm)	– – –
Cylinder head warp	– – –	0.05 mm (0.002 in.)
Cylinder Head Height	120.5 ± 0.03 mm (4.7441" ± 0.0012")	– – –
Valve Seat Contacting Width - Exhaust	1.5 ~ 1.6 mm (0.0591" ~ 0.0630")	1.9 mm (0.0748")
Valve Seat Contacting Width - Intake	1.0 ~ 1.1 mm (0.0394" ~ 0.0433")	1.4 mm (0.0551")
Valve Seat Angles	30.0° ± 1.5° / 45.0° ± 0.5° / 60.0° ± 1.5°	– – –
Valve Guide Inner Diameter	5.500 ~ 5.512 mm (0.2165" ~ 0.2170")	– – –
Valve Spring:		
Valve Spring Free Length	42.5 mm (1.6732")	41.4 mm (1.6299")
Valve:		
Valve clearance (Cold):		
Exhaust	0.20 ~ 0.30 mm (0.0079" ~ 0.0117")	– – –
Intake	0.10 ~ 0.20 mm (0.0039" ~ 0.0079")	– – –
Valve head thickness:		
Exhaust	0.9 mm (0.0354")	0.5 mm (0.020")
Intake	0.7 mm (0.0276")	0.3 mm (0.012")
Valve stem bend	– – –	TIR 0.05 mm (0.020")
Valve stem diameter:		
Exhaust	5.455 ~ 5.470 mm (0.2147" ~ 0.2153")	
Intake	5.475 ~ 5.490 mm (0.2155" ~ 0.2161")	
Valve Stem Oil Clearance:		
Exhaust	0.030 ~ 0.060 mm (0.0011" ~ 0.0023")	
Intake	0.010 ~ 0.040 mm (0.0003" ~ 0.0015")	
Valve Stem Overall Length:		
Exhaust	96.10 mm (3.7835")	
Intake	95.50 mm (3.7598")	
Valve/valve guide clearance (wobble method):		
Exhaust	0.09 ~ 0.17 mm (0.0035" ~ 0.0067")	0.34 mm (0.0133")
Intake	0.03 ~ 0.11 mm (0.0012" ~ 0.0043")	0.25 mm (0.0110")
Piston:		
Piston O.D. :		
I	98.931 ~ 98.941 mm (3.8949" ~ 3.8953")	98.81 mm (3.8902")
II	98.939 ~ 98.949 mm (3.8952" ~ 3.8956")	98.82 mm (3.8906")
Piston Pin Bore I.D.	22.004 ~ 22.010 mm (0.8663" ~ 0.8665")	22.05(0.7087")

Item	Standard	Service Limit
Piston Pin:		
Piston Pin O.D.	21.995 ~ 22.000 mm (0.8659" ~ 0.8661")	21.975(0.8652")
Piston Ring:		
Installed Gap:		
Top Ring	0.20 ~ 0.35 mm (0.0079" ~ 0.0138")	0.5 mm (0.0197")
Second Ring	0.35 ~ 0.55 mm (0.0138" ~ 0.0217")	0.7 mm (0.0276")
Oil Control Rails	0.20 ~ 0.70 mm (0.0079" ~ 0.0276")	0.9 mm (0.0354")
Ring/Groove Clearance:		
Top Ring	0.020 ~ 0.060 mm (0.0007" ~ 0.0023")	0.12 mm (0.0047")
Second Ring	0.020 ~ 0.060 mm (0.0007" ~ 0.0023")	0.12 mm (0.0047")
Piston ring groove width:		
Top Ring	1.22 ~ 1.25 mm (0.0480" ~ 0.0492")	1.32 mm (0.0520")
Second Ring	1.22 ~ 1.25 mm (0.0480" ~ 0.0492")	1.32 mm (0.0520")
Piston ring thickness:		
Top Ring	1.17 ~ 1.19 mm (0.0461" ~ 0.0469")	1.10 mm (0.0433")
Second Ring	1.17 ~ 1.19 mm (0.0461" ~ 0.0469")	1.10 mm (0.0433")
Camshafts:		
Cam Lobe height:		
Exhaust	40.08 ± 0.04 mm (1.5780" ± 0.0015")	39.99 mm (1.5744")
Intake	40.36 ± 0.04 mm (1.5890" ± 0.0015")	40.27 mm (1.5854")
Camshaft journal diameter - All:	22.954 ~ 22.975 mm (0.9036" ~ 0.9045")	22.944 mm (0.9033")
Camshaft Journal Bore diameter - All:	23.000 ~ 23.021 mm (0.9055" ~ 0.9063")	23.044 mm (0.9072")
Camshaft Oil Clearance:	0.025 ~ 0.067 mm (0.0009" ~ 0.0026")	0.1 mm (0.0039")
Camshaft End Play:	0.10 ~ 0.25 mm (0.0039" ~ 0.0098")	0.4 mm (0.0157")
Camshaft runout:	TIR 0.02 mm (0.0008") or less	TIR 0.1 mm (0.0039")
Automatic Compression Release:		
operating engine speed:	450 ± 50 rpm	– – –
Connecting Rod:		
Connecting Rod Small End I.D.	22.010 ~ 22.023 mm (0.8665" ~ 0.8670")	22.06 mm (0.8685")
Main Journal O.D.	40.995 ~ 41.005 mm (1.6140" ~ 1.6144")	40.97 mm (1.6129")
Crankshaft Runout Limit	– – –	Less than 0.025 mm (0.001")
Balance Shaft:		
Bearing Journal O.D.	29.980 ~ 29.993 mm (1.1803" ~ 1.1808")	29.92 mm (1.1780")

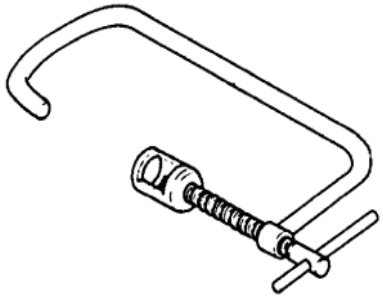
ENGINE TOP END

Item	Standard	Service Limit
Cylinder:		
Cylinder - Surface Warp Limit	0.05 mm (0.002")	– – –
Cylinder Bore - Standard:		
I	98.992 ~ 99.000 mm (3.8973" ~ 3.8976")	99.08 mm (3.9008")
II	99.000 ~ 99.008 mm (3.8976" ~ 3.8980")	99.09 mm (3.9012")
Cylinder Out of Round Limit	0.025 mm (0.001")	– – –
Cylinder Taper Limit	0.025 mm (0.001")	– – –
Cylinder/Piston Clearance	0.051 ~ 0.069 mm (0.0020" ~ 0.0027")	– – –

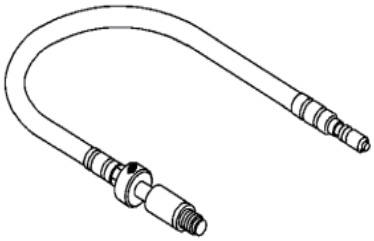
Special tools

Compression Gauge

Valve Spring Compressor Assembly



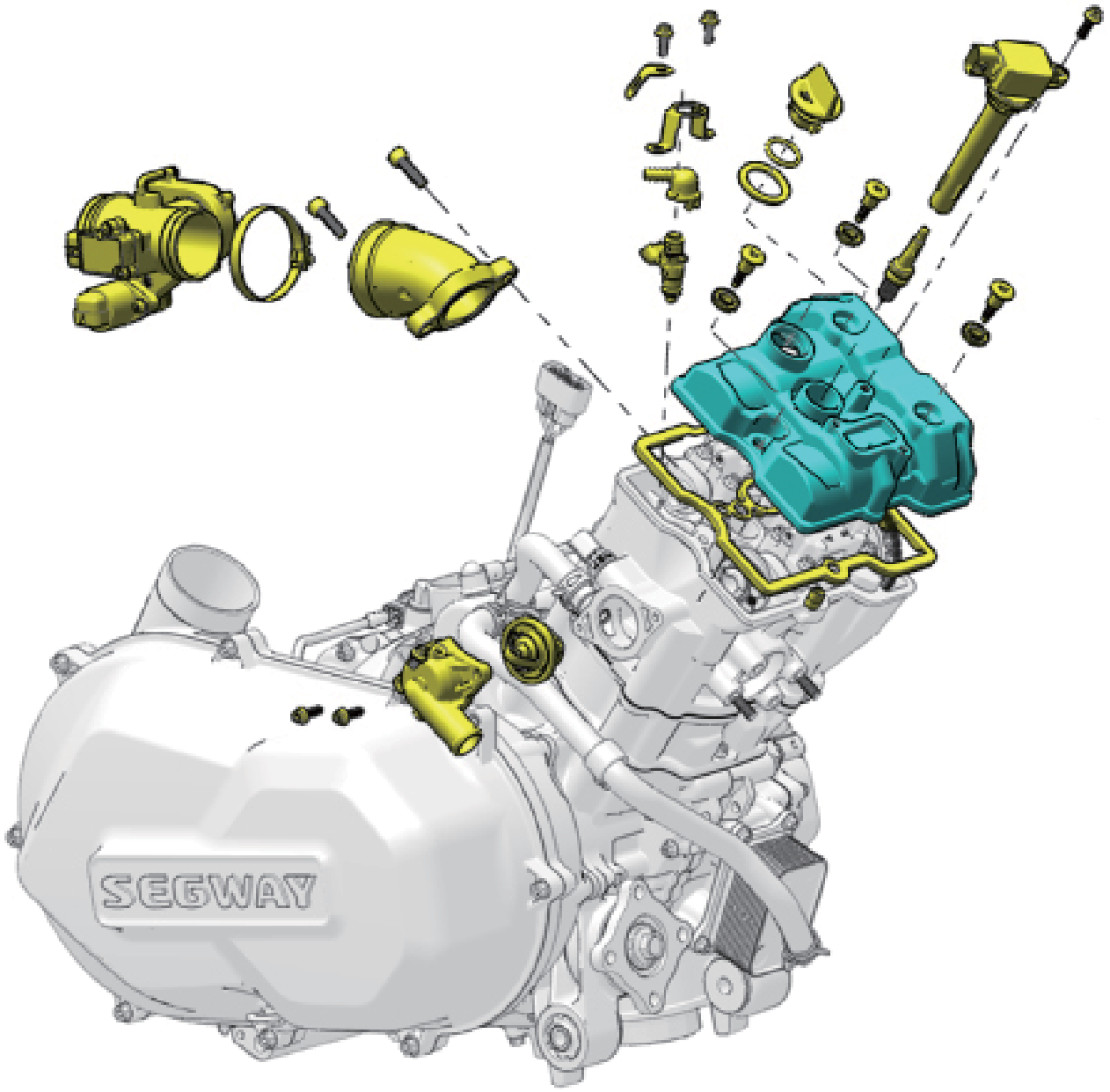
Compression Gauge Adapter, M10×1.0



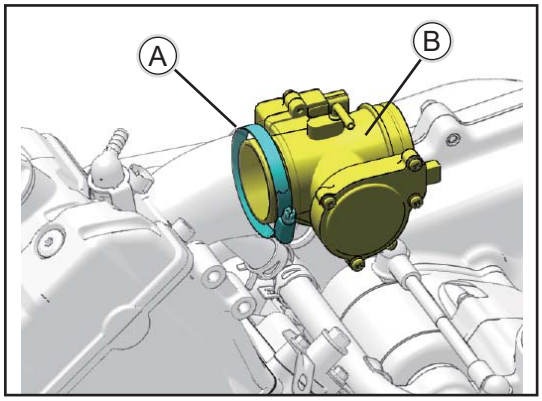
Valve Spring Compressor Adapter

ENGINE TOP END

Spark Plug / Valve Cover / Throttle Body / Camshaft



Throttle Body

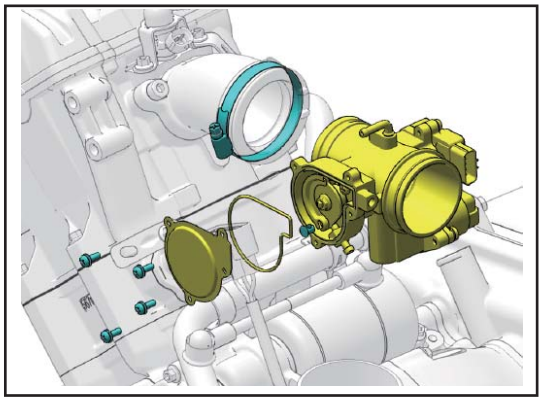


Throttle Body Removal

◆ Remove

Clamp 50 ~ 70【A】

Throttle Body【B】

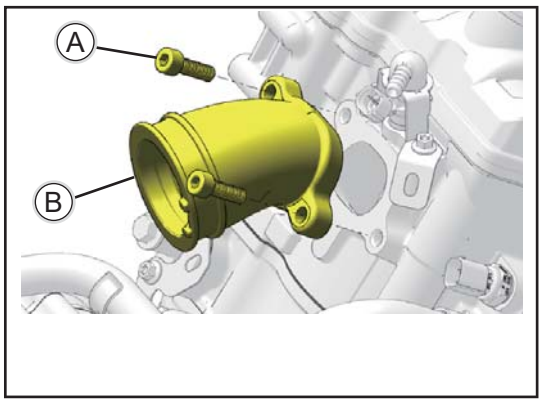


Throttle Body Installation

◆ Install

Throttle Body

Clamp 50 ~ 70

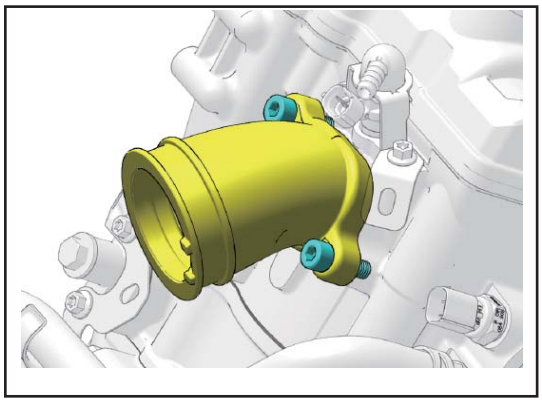


Air Intake Pipe Removal:

◆ Remove:

Bolts M8×25【A】

Air Intake Pipe Removal【B】



Air Intake Pipe Installation:

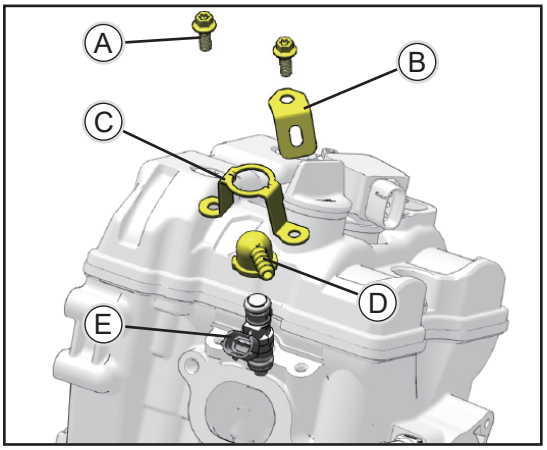
◆ Install

◆ Tighten

Torque

Air intake Pipe Bolts
23 N•m (2.3kgf•m, 204 in•lb)

Fuel Injector / Thermostat



Fuel Injector Removal

◆ Disconnect the Fuel Injector Lead.

◆ Remove:

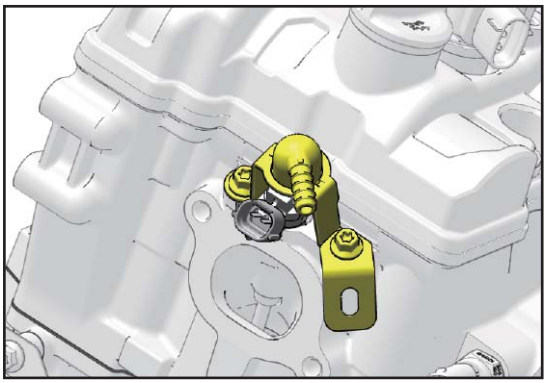
Fuel Injector Bolts【A】

Fixed Plate【B】

Fuel Injector Press Plate【C】

Fuel Injector Adapter【D】

Fuel Injector【E】



Fuel Injector Installation

Fuel Injector【E】

Fuel Injector Adapter【D】

Fuel Injector Press Plate【C】

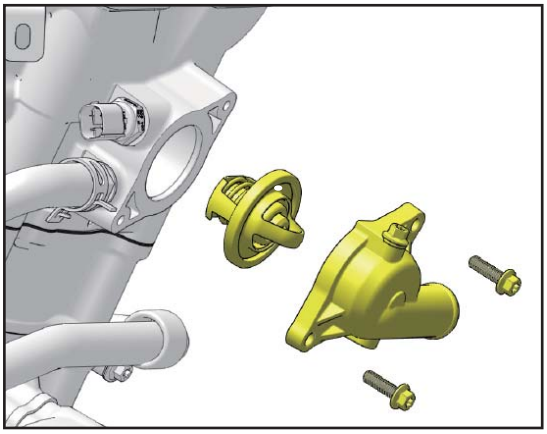
Fixed Plate【B】

Fuel Injector Bolts【A】

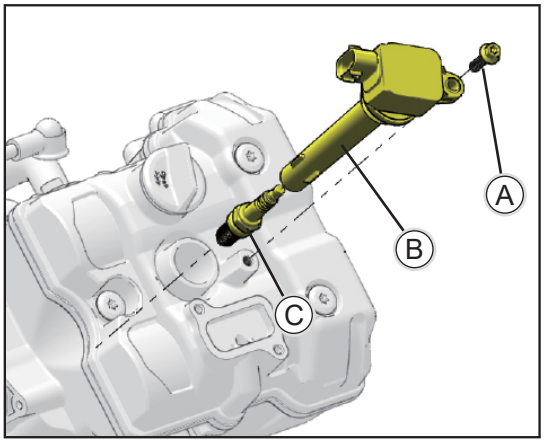
◆ Tighten

Torque

Fuel Injector Bolts
9.8 N•m (1.0kgf•m, 87 in•lb)



◆ Thermostat Removal and Install(See Cooling System)



Ignition Coil / Spark Plug

Spark Plug Removal

- ◆ Disconnect the Ignition Coil Lead.
- ◆ Remove:

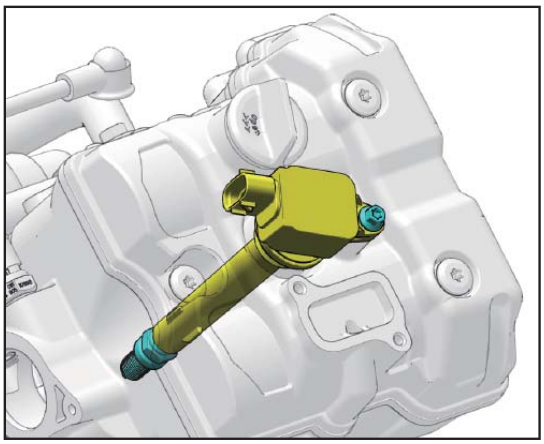
Bolt M6×20【A】
Ignition Coil【B】
Spark Plug【C】

CAUTION

The Spark Plug should never be allowed to fall on a hard surface. Such a shock to the part can damage it.

NOTE

Remove the spark plug. Stuff spark plug holes with shop towels to prevent anything from falling into the combustion chamber.



Spark Plug Installation

- ◆ Apply anti-seize compound to spark plug threads.
- ◆ Install

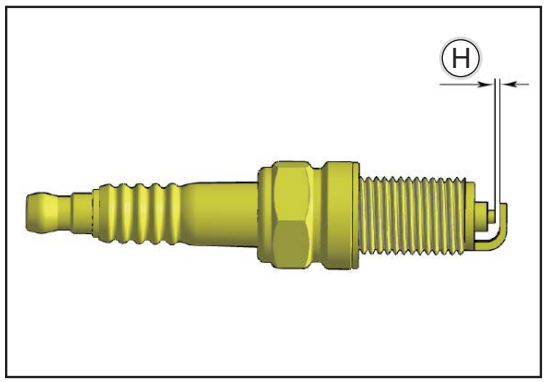
Spark Plug
Ignition Coil
Bolt M6×20

- ◆ Tighten

Torque

Bolt M6×20
10 N•m (1.0kgf•m, 87in•lb)

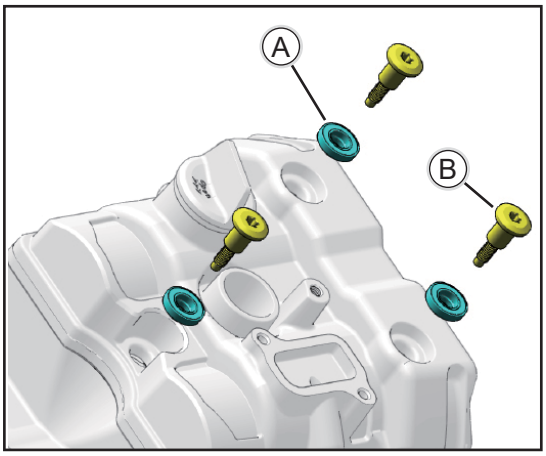
Spark Plug
11 N•m (1.1kgf•m, 97in•lb)



Spark Plug Inspection :

Spark Plug electrode gap :【H】=0.6 ~ 0.8

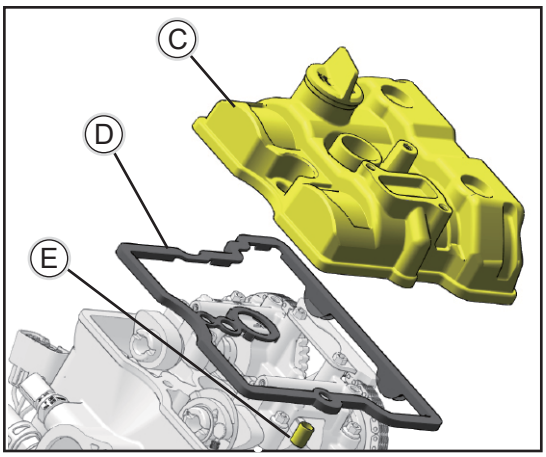
Valve Cover



Valve Cover Removal

◆ Remove:

Shoulder Bolts [B] (using a T40 driver)
Isolators【A】
Valve Cover【C】
Valve Cover Seal【D】
Dowel Pin 10×14【E】



Valve Cover Installation:

◆ Replace isolators【B】and valve cover seal【C】if oil leaks are evident.

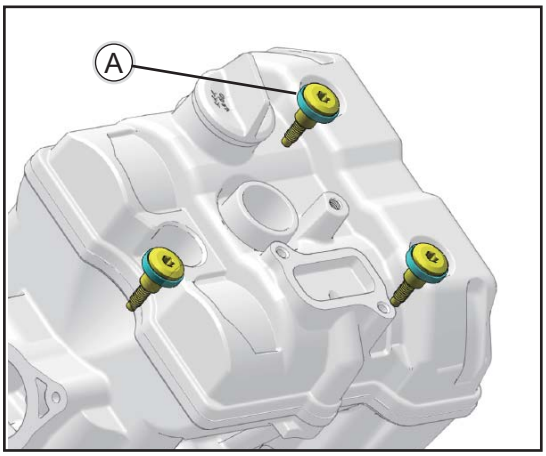
◆ Prepare valve cover sealing surfaces by cleaning thoroughly to remove all residue.

◆ Install

Dowel Pin 10×14【E】
Valve Cover Seal【D】
Valve Cover【C】
isolators【A】
Shoulder Bolts【B】(using a T40 driver)

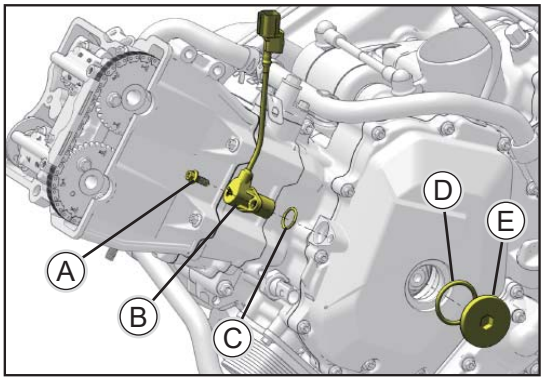
◆ Tighten

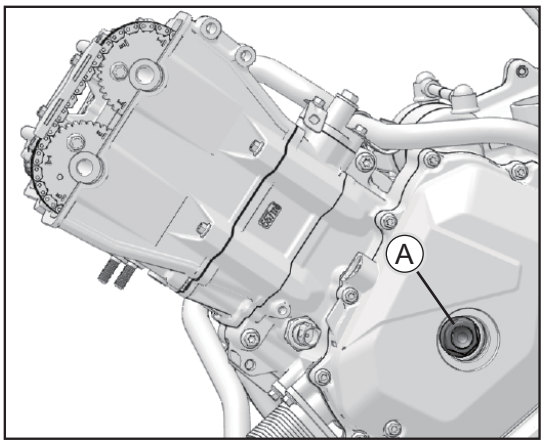
Torque

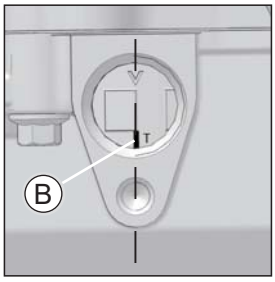


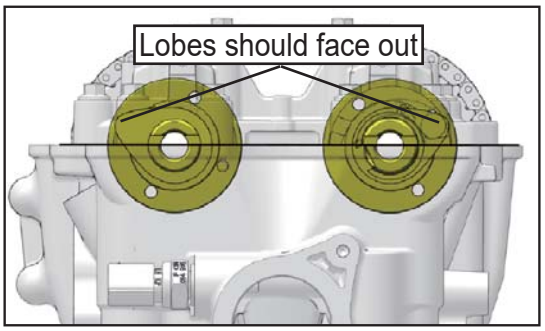
Shoulder Bolts
9.8 N•m (1.0kgf•m, 87in•lb)

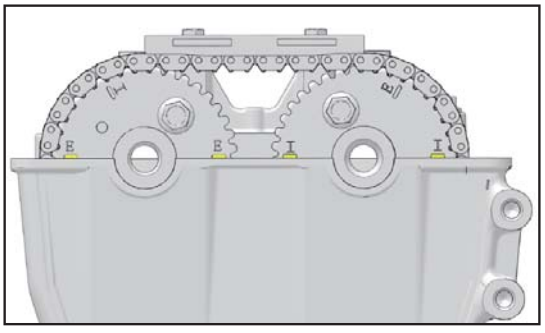
Crank Position Sensor











Crank Position Sensor Removal

- Disconnect the Crank Position Sensor Lead.
- Remove:
  Bolt M6×16【A】
  Crank Position Sensor【B】
  O-Ring 17×2【C】
- Remove:
  Stator Cover Plug【E】
  O-Ring 35×3.5【D】

- Using a wrench on the alternator Nut【A】,Rotate counterclockwise the crankshaft until the flywheel TDC mark【B】is aligned or centered in the Crankshaft Position Sensor (CPS) mounting hole to relieve most of the valve spring pressure. The camshaft lobes should face out and the slots on the end of the camshafts should line up.

CAUTION

Be sure to position the crankshaft at TDC of the end of the compression stroke when removing or installing the camshaft carrier. The camshaft could bend the valves.

Camshaft Chain Tensioner

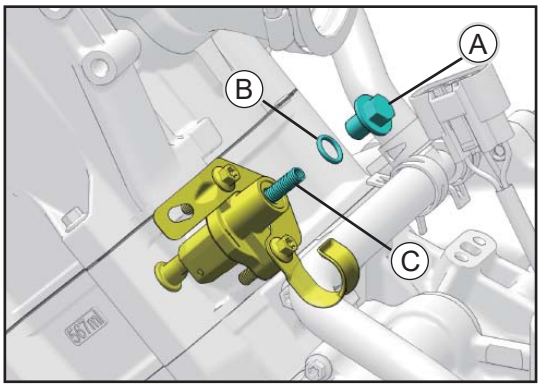
Camshaft Chain Tensioner Removal

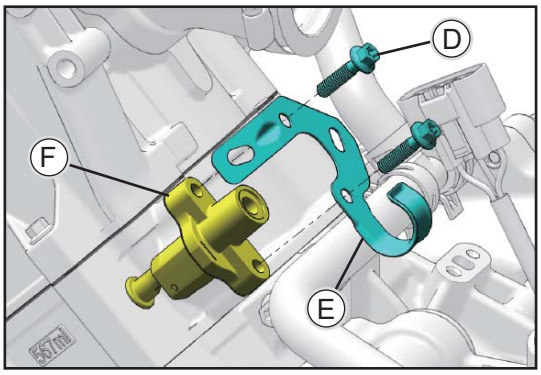
CAUTION

This is a non-return type cam chain tensioner. The push rod does not return to its original position once it moves out to take up cam chain slack. Observe all the rules listed below:

When removing the tensioner, do not take out the mounting bolts only partway. Retightening the mounting bolts from this position could damage the tensioner and the camshaft chain. Once the bolts are loosened, the tensioner must be removed and reset as described in "Camshaft Chain Tensioner Installation".

Do not turn over the crankshaft while the tensioner is removed. This could upset the cam chain timing, and damage the valves.





◆ Remove:

Tensioner Cap Bolt【A】and O-Ring【B】

Spring【C】

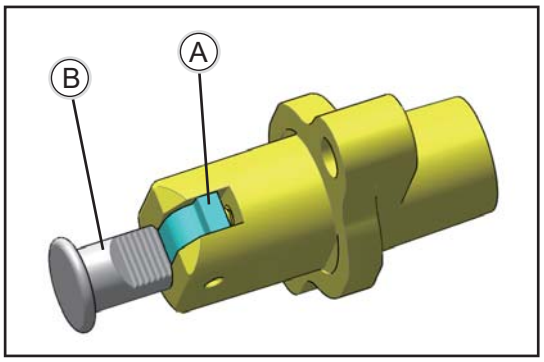
Tensioner Mounting Bolts【D】

Pipe/line Fixing Plate【E】

Camshaft Chain Tensioner【F】

Camshaft Chain Tensioner Installation

◆ Push the stopper【A】to release the ratchet and push the push rod【B】into the tensioner body.



◆ Install

Replace the New Tensioner Gasket【A】

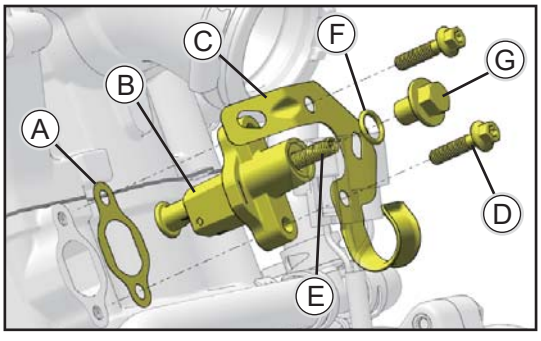
Tensioner【B】

Pipe/line Fixing Plate【C】and Mounting Bolts【D】

Spring【E】,O-Ring【F】and Tensioner Cap Bolt 【G】

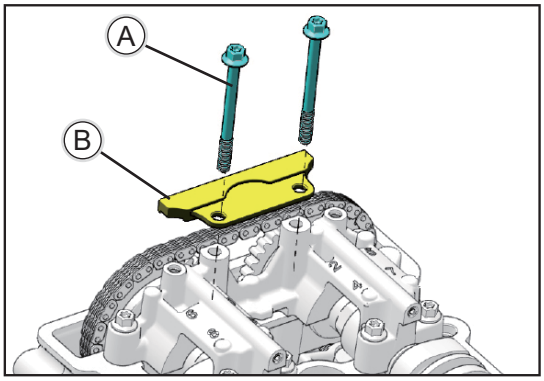
◆ Tighten:

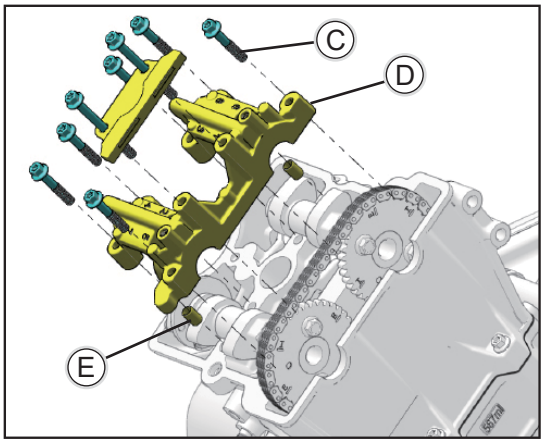
Torque

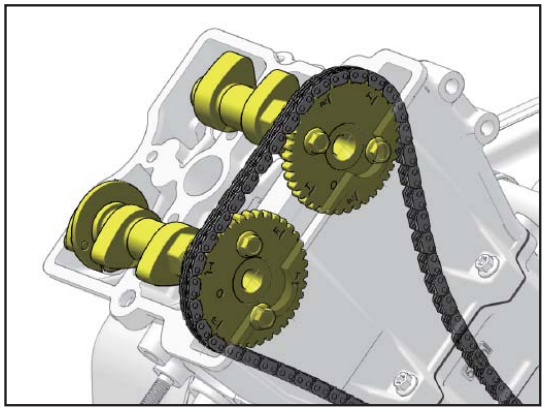


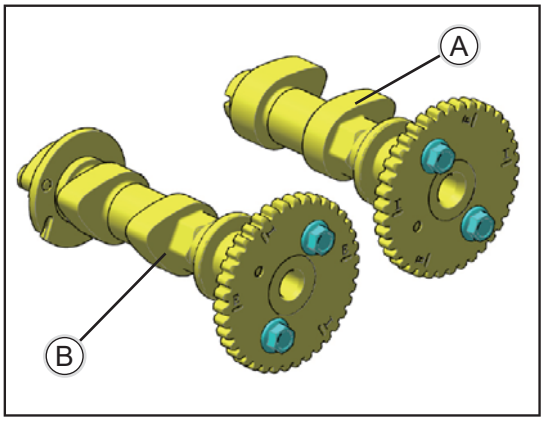
Chain Tensioner Mounting Bolts
9.8 N•m (1.0 kgf•m, 87 in•lb)

Chain Tensioner Cap Bolt
12 N•m(1.2 kgf•m,8.8 ft•lb)









Camshaft Carrier / Camshaft

Camshaft Carrier Removal

◆ Remove the bolts M6×65【A】retaining the fixed cam chain guide【B】and remove the assembly from the engine.

◆ Remove

Bolts M6×35【C】

Camshaft Carrier【D】

Dowel Pin 8×14【E】

NOTE

Evenly loosen the bolts retaining camshaft carrier carefully lift the camshaft carrier off the camshafts.

◆ Lift the chain off the camshafts to allow each Camshaft to be removed.

NOTE

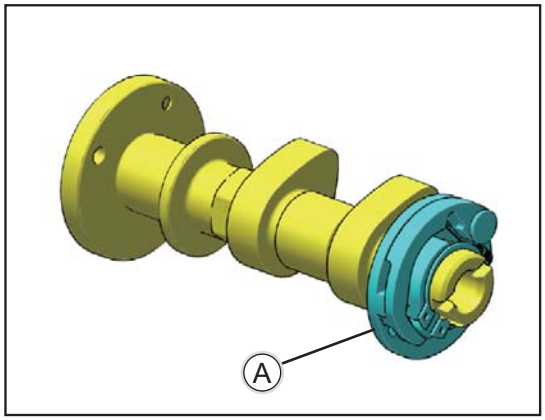
Carefully remove camshafts from the cylinder head

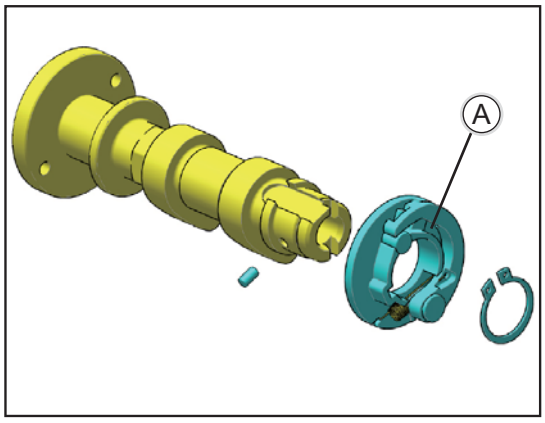
◆ Use a hook or similar tool to hold the timing chain up to prevent the chain from falling into the engine.

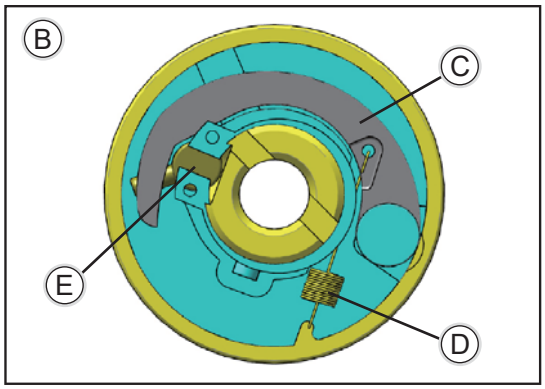
NOTE

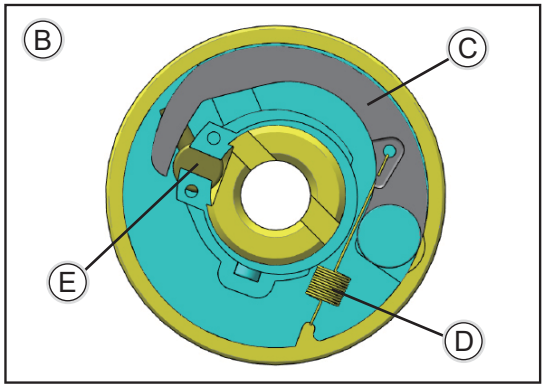
The crankcase has a built-in lower guide to prevent the chain from falling off the crankshaft.

◆ Mark the intake【A】and exhaust【B】camshafts to ensure proper assembly.









Camshaft Inspection

Automatic Compression Release

The Automatic Compression Release momentarily opens the exhaust valves on the compression stroke at very low speeds. This allows some of the compression pressure to escape, making it easy to turn over the engine during starting.

Due to the simplicity of the mechanism, no periodic maintenance is needed. There are only two symptoms of problems with the Automatic Compression Release mechanism【A】: compression is not released during starting, and compression is released during running.

(1) If compression is not released during starting, the Weight Block are not returning to their rest position.

- ◆ Remove the camshaft (see Camshaft Removal).
- ◆ Remove the Automatic Compression Release unit.
- ◆ Visually inspect the spring.

If damaged, deformed, or missing, replace the spring.

- ◆ Remove the spring and move the Weight Block back and forth.

If the Weight Block do not move smoothly, replace the Automatic Compression Release unit. Also inspect the exhaust camshaft for any damage, and replace the exhaust camshaft if necessary.

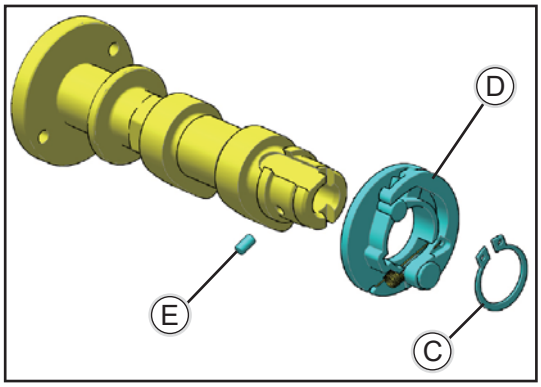
【B】Rest Position (compression is released)
【C】Weight Block
【D】Spring
【E】Compression Release Pin

(2) If compression is released while the engine is running, the Weight Block are not swinging out.

- ◆ Remove the spring and move the Weight Block back and forth.

(3) If the Weight Block do not move easily from the retracted position, replace the Automatic Compression Release unit. Also inspect the exhaust camshaft for any damage, and replace the exhaust camshaft if necessary.

【B】Running Position (compression is not released)
【C】Weight Block
【D】Spring
【E】Compression Release Pin



Automatic Compression Release Removal

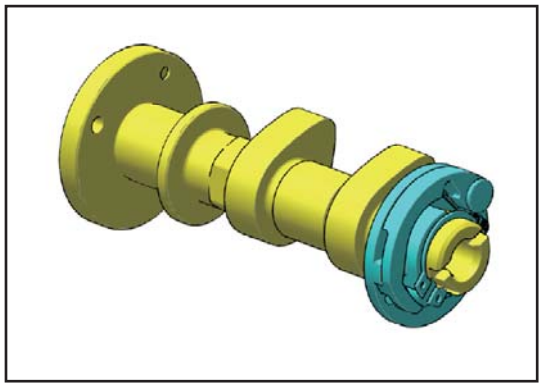
◆ Remove:

Camshaft (see Camshaft Removal)

Circlip【C】

Automatic Compression Release Unit【D】

Dowel Pin【E】



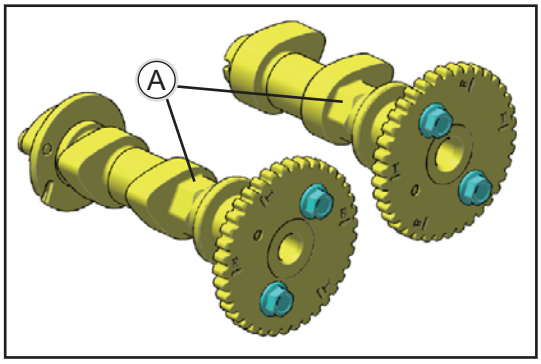
Automatic Compression Release Installation

◆ Install:

Dowel Pin【E】

Automatic Compression Release Unit【D】

Circlip【C】



Camshaft Sprocket Installation

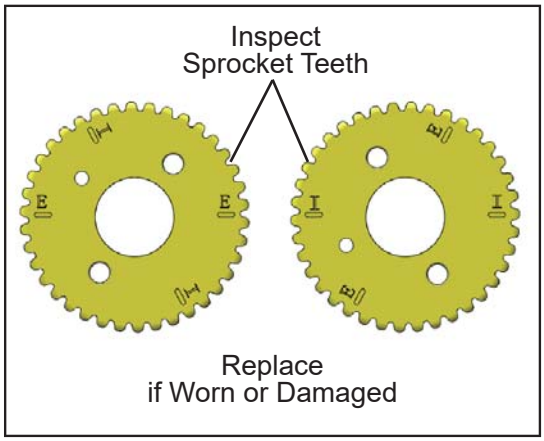
◆ Install the sprockets on the intake and exhaust camshafts.

◆ Fix the hexagonal surface【A】of the Camshaft with tools, and tighten the sprocket bolts.

◆ Apply a non-permanent locking agent to the bolts.

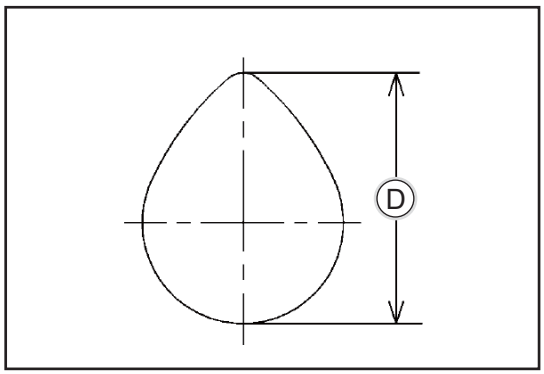
Torque

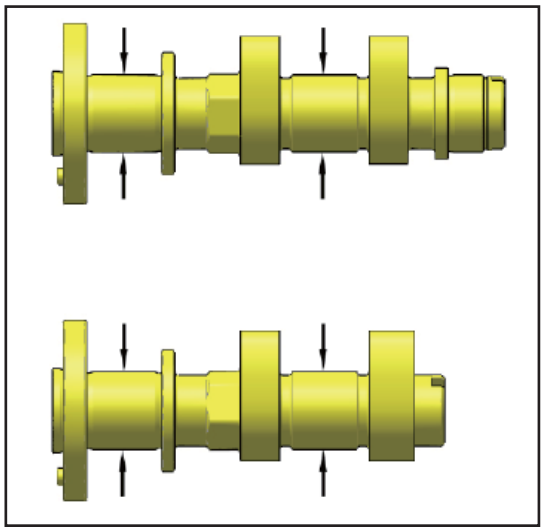
Sprocket bolts
19 N•m (1.9 kgf•m, 14 ft•lb)

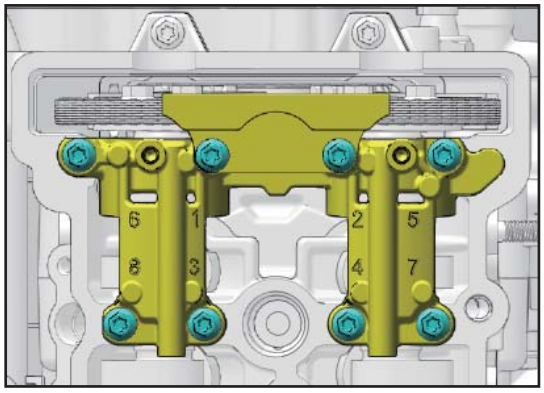


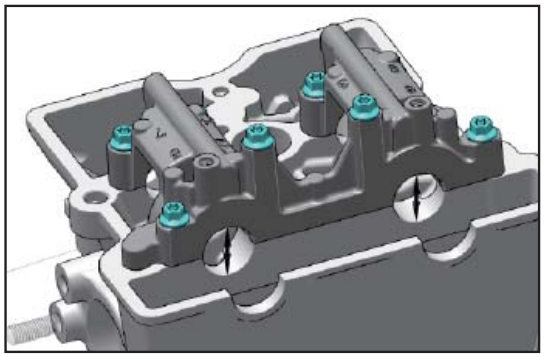
Camshaft Sprocket Inspection

◆ Inspect cam sprocket teeth for wear or damage. Replace timing chain and sprockets if worn or damaged.









Camshaft / Camshaft Bore Inspection

Cam Wear

- Visually inspect each cam lobe for wear or damage.
- Measure the height【D】of the cam with a micrometer.

If the cams are worn past the service limit, replace the camshaft.

Camshaft Lobe Height:

	Standard	Service Limit
Exhaust	40.08 ± 0.04 mm (1.5780" ± 0.0015")	39.99 mm (1.5744")
Inlet	40.36 ± 0.04 mm (1.5890" ± 0.0015")	40.27 mm (1.5854")

- Visually inspect each camshaft journal for scoring, wear or damage.
- Measure the diameter of the camshaft journals using a micrometer. Compare to specification.
- Replace camshafts if damaged or if any part is worn past the service limit.

Standard	Service Limit
22.954 ~ 22.975 mm(0.9036" ~ 0.9045")	22.944 mm (0.9033")

- Temporarily install the camshaft carriers to measure the camshaft bore. Torque bolts in sequence to specification. Replace cylinder head if worn.

Torque

Camshaft Carrier Bolts
10 N•m (1.0 kgf•m, 89 in•lb)

- Replace cylinder head if camshaft journal bores are damaged or if worn past the service limit.

Standard	Service Limit
23.000 ~ 23.021 mm(0.9055" ~ 0.9063")	23.044 mm (0.9072")

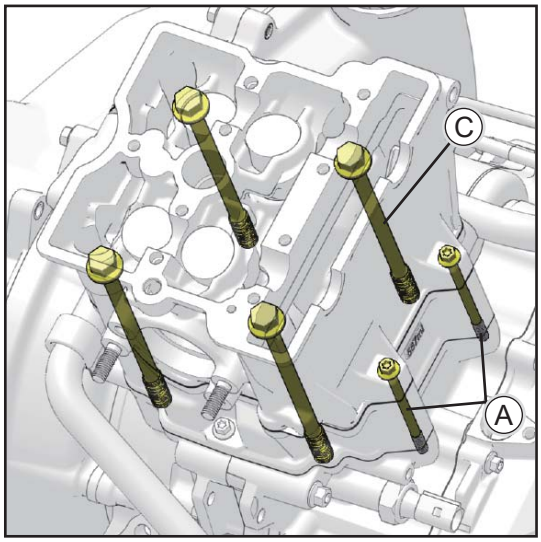
- Calculate oil clearance by subtracting camshaft journal O.D.s from camshaft carrier bore I.D.s. Compare to specification.

Standard	Service Limit
0.025~ 0.067 mm (0.0009" ~ 0.0026")	0.10 mm (0.0039")

CAUTION

The cylinder head and Camshaft Carrier are machined as a set, and must be replaced as a set.

Cylinder Head

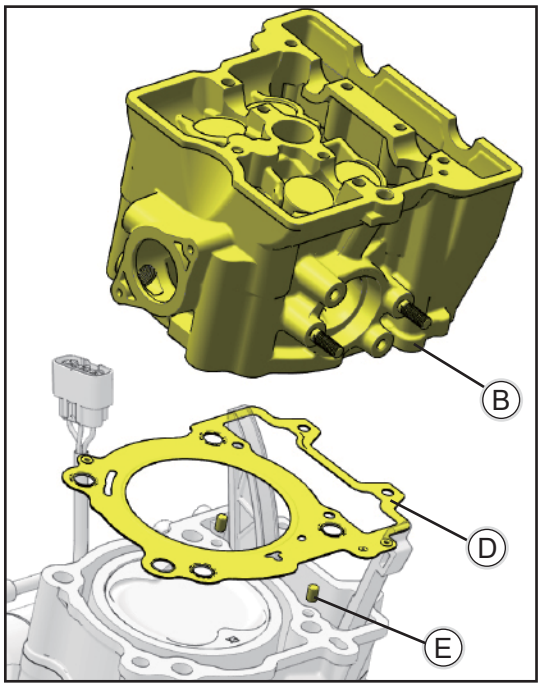


Cylinder Head Removal

NOTE

The cylinder head can be serviced with the engine installed in the chassis.

- Remove the (2) outer M6 bolts【A】that retain the cylinder head【B】to the cylinder.
- Loosen the (4) cylinder head bolts【C】evenly 1/8 turn at a time until all are loose.
- Remove and discard the cylinder head bolts【C】.
- Tap cylinder head lightly with a soft faced hammer until loose.
- Tap only in reinforced areas or on thick parts of the cylinder head casting.
- Remove the cylinder head【B】and head gasket【D】.

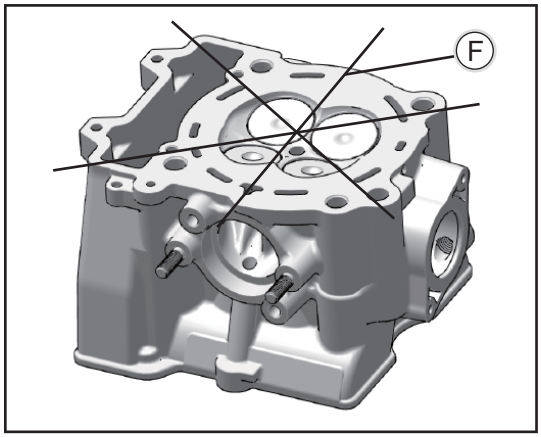


Cylinder Head Inspection

- Thoroughly clean cylinder head surface to remove all traces of gasket material and carbon.

CAUTION

Use care not to damage gasket sealing surface. All gasket surfaces must be clean, dry and free of any oil or grease upon assembly. Clean sealing surfaces with rubbing alcohol or electrical contact cleaner. Do not touch sealing surfaces of the new head gasket.

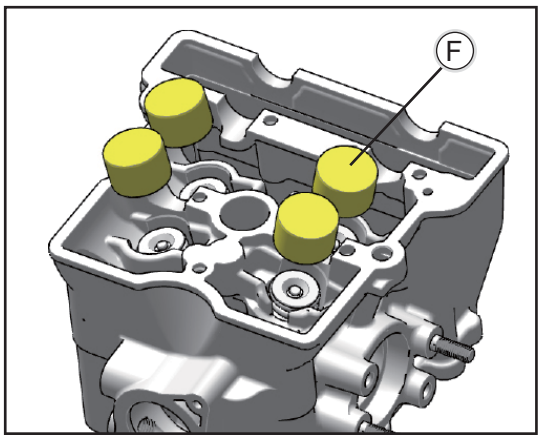


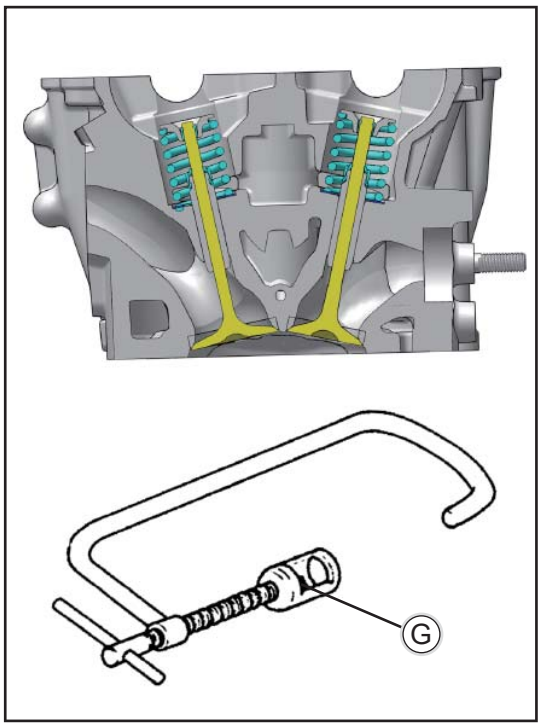
Cylinder Head Warp

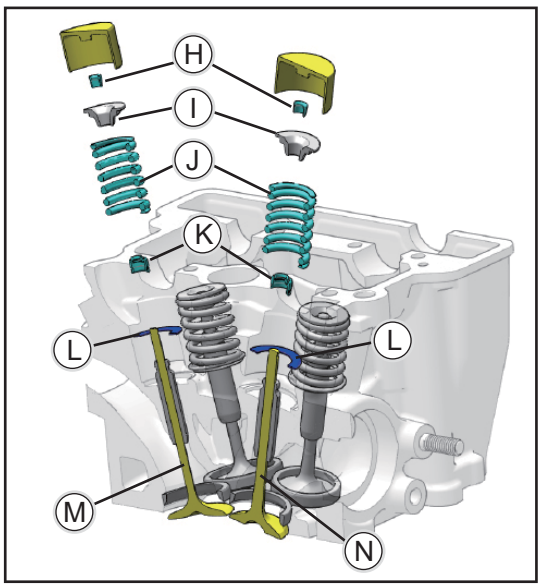
- Clean the cylinder head.
- Lay a straightedge across the lower surface of the cylinder head.
- Use a thickness gauge to measure the space between the straightedge【F】and the head at several locations.

Cylinder Head Warp Limit : 0.05 mm (0.002")

If the cylinder head is warped more than the service limit, replace it.







Cylinder Head Disassembly

⚠ WARNING

Wear eye protection during cylinder head disassembly and reassembly or when working with the valve springs.

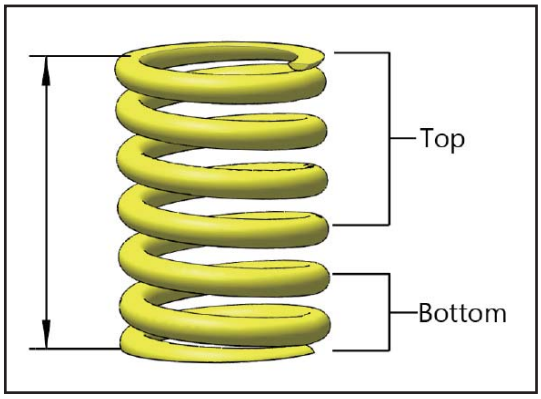
IMPORTANT: Keep mated parts together and in order with respect to their location in the cylinder head for assembly purposes. It is important to install cylinder head components back in the same location. Mark each component or place them in an organized rack as you remove them.

- Remove the valve bucket【F】from the cylinder head.
- Compress the valve spring by hand using valve spring compressor adapter【G】.
- Push down on spring and remove split keepers【H】
- Slowly release valve spring pressure and remove the compressor adapter.
- Remove the valve retainer【I】, valve spring 【J】, valve stem seal【K】and valve spring seat【L】. Discard the valve seal.

NOTE

Replace valve seals whenever cylinder head is disassembled. Hardened, cracked or worn seals will cause excessive oil consumption.

- Lift up the cylinder head and push the valve [M] out, keeping it in order for reassembly in the same valve guide.
- Repeat the previous steps to remove the remaining valves.
- Clean the combustion chamber and head gasket surface.



◆ Measure the free length of each valve spring with a Vernier caliper and compare to specification.

◆ Valve Spring Free Length: Standard: 1.726" (43.85 mm)Service Limit: 1.683" (42.75 mm)

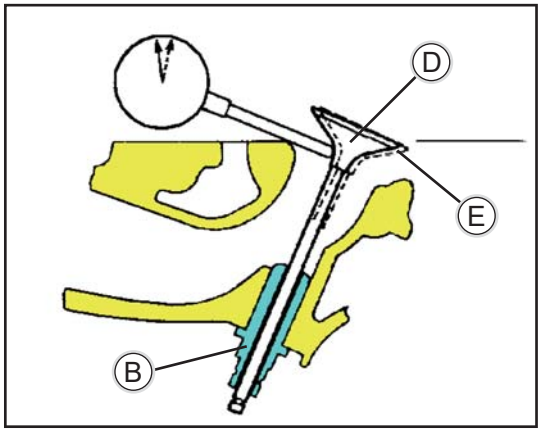
Standard	Service Limit
42.5 mm (1.6732")	41.4mm (1.6299")

Valve Guide / Valve Inspection

◆ Valve-to-Guide Clearance Measurement:

If a small bore gauge is not available, inspect the valve guide wear by measuring the valve to valve guide clearance with the wobble method as indicated below.

◆ Insert a new valve 【A】 into the guide【B】and set a dial gauge against the stem perpendicular to it as close as possible to the cylinder head mating surface.



◆ Move【C】the stem back and forth to measure valve/valve guide clearance.

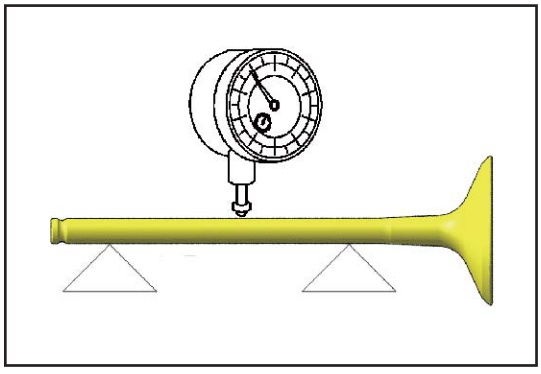
◆ Repeat the measurement in a direction at a right angle to the first.

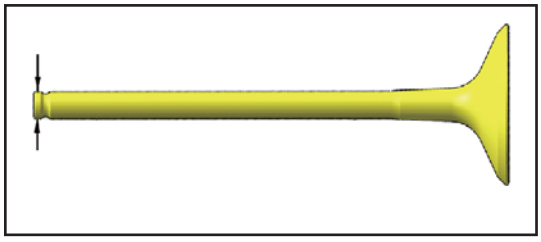
If the reading exceeds the service limit, replace the Cylinder head & Camshaft Carrier Combination.

NOTE

The reading is not actual valve/valve guide clearance because the measuring point is above the guide.

Valve/Valve Guide Clearance (Wobble Method)		
	Standard	Service Limit
Exhaust:	0.09 ~ 0.17 mm (0.0035" ~ 0.0067")	0.34 mm 0.0133"
Inlet:	0.03 ~ 0.11 mm (0.0012" ~ 0.0043")	0.28 mm 0.0110"

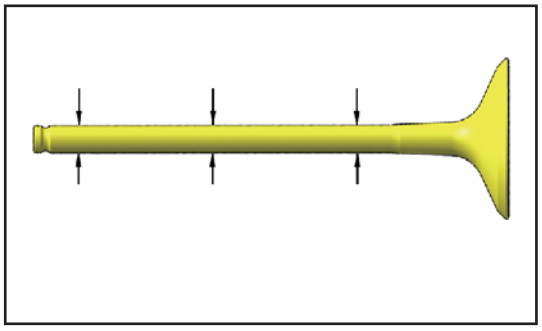




◆ Check valve face for runout, pitting, and burnt spots. To check for bent valve stems, mount valve in a drill or use “V” blocks and a dial indicator.

◆ Check the end of the valve stem for flaring, pitting, wear or damage.

◆ Inspect split keeper groove for wear or flaring in the keeper seat area.

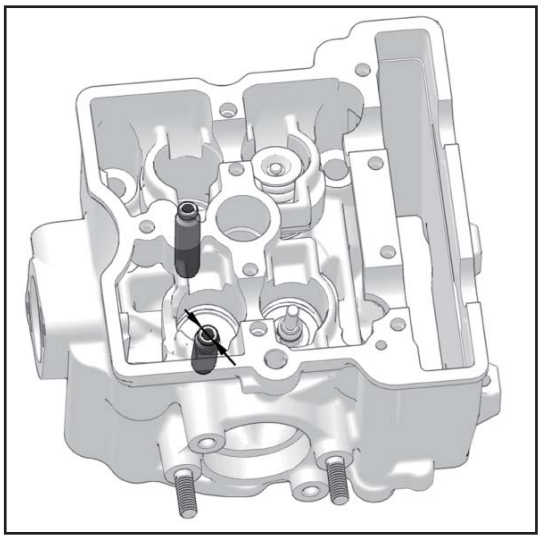


NOTE

The valves can be re-faced or end ground, if necessary. They must be replaced if extensively worn, burnt, bent or damaged.

◆ Measure diameter of valve stem with a micrometer in three places, then rotate 90° and measure again (take six measurements total). Compare to specifications.

Valve Stem Diameter:		
	Standard	Service Limit
Exhaust:	5.455 ~ 5.470 mm (0.2147" ~ 0.2153")	————
Inlet:	5.475 ~ 5.490 mm (0.2155" ~ 0.2161")	————



◆ Measure diameter of valve stem with a micrometer in three places, then rotate 90° and measure again (take six measurements total). Compare to specifications.

Valve Guide I.D.:
5.500 - 5.515 mm(0.2165" ~ 0.2171")

◆ Be sure to measure each guide and valve combination individually.

NOTE

The valve guides cannot be replaced.

Combustion Chamber Cleaning

⚠ WARNING

Wear eye protection during combustion chamber cleaning.

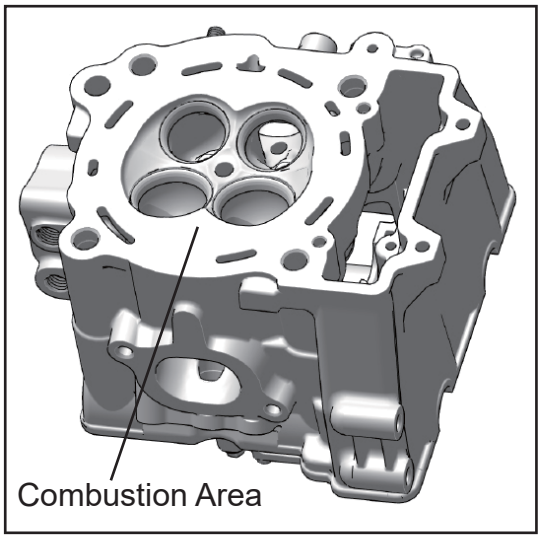
◆ Clean all accumulated carbon deposits from combustion chambers and valve seat area.

NOTE

Carbon Clean Fuel Treatment can be used to help remove carbon deposits.

CAUTION

Do not use a metal scraper, a coarse wire brush or abrasive cleaners to clean the cylinder head. Damage may result.



Valve Seat Reconditioning

◆ Valve seat reconditioning should be performed by a technician proficient in cylinder head reconditioning techniques. Reconditioning techniques vary, so follow the instructions provided by the valve reconditioning equipment manufacturer. Do not grind seats more than necessary to provide proper seat surface, width, and contact point on valve face.

⚠ *WARNING*

Wear eye protection or a face shield during cylinder head disassembly and reassembly.

Valve Seat Inspection:

◆ Remove the valve (see Valve Removal).

◆ Check the valve seating surface【A】between the valve【B】and valve seat【C】.

Coat the valve seat with machinist's dye.

Push the valve into the guide.

Rotate the valve against the seat with a lapping tool.

Pull the valve out, and check the seating pattern on the valve head. It must be the correct width and even all the way around.

◆ Measure the outside diameter【D】of the seating pattern on the valve seat.

If the outside diameter of the valve seating pattern is too large or too small, repair the seat (see Valve Seat Repair).

Valve Seating Surface Outside Diameter:	
Exhaust:	31.8 ~ 31.9 mm (1.2520" ~ 1.2559")
Inlet:	36.8 ~ 36.9 mm (1.4488" ~ 1.4528")

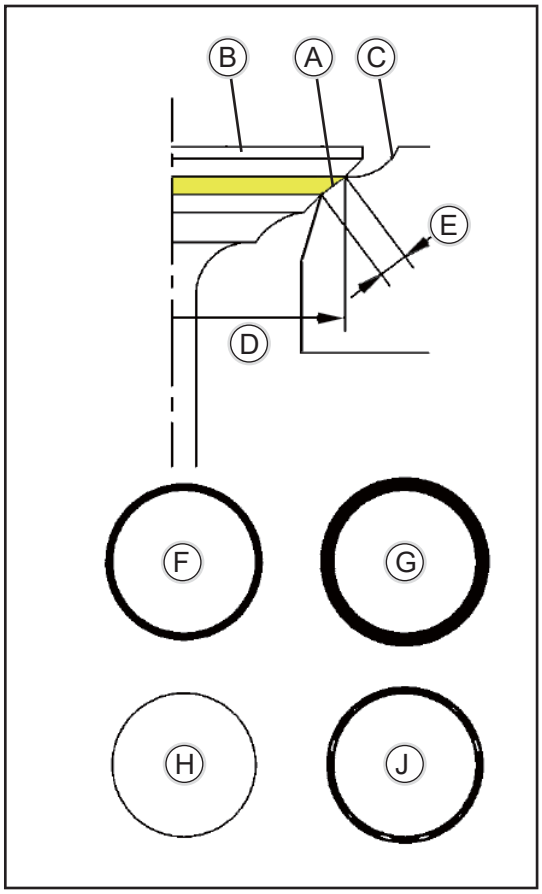
NOTE

The valve stem and guide must be in good condition, or this check will not be valid.

If the valve seating pattern is not correct, repair the seat (see Valve Seat Repair).

◆ Measure the seat width【E】of the portion where there is no build-up carbon (white portion) of the valve seat with vernier calipers.

If the width is too wide, too narrow or uneven, repair the seat (see Valve Seat Repair).



[F] Good
[G] Too Wide
[H] Too Narrow
[J] Uneven

Valve Seating Surface Width	
Exhaust:	1.5 ~ 1.6mm (0.0591" ~ 0.0630")
Inlet:	1.0 ~ 1.1mm (0.0394" ~ 0.0433")

Valve Seat Repair (Valve Lapping)

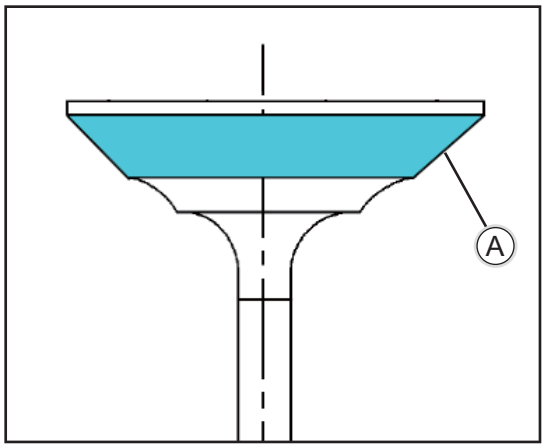
- Install pilot into valve guide.
- Apply cutting oil to valve seat and cutter.
- Place 46° cutter on the pilot and make a light cut.
- Inspect the cut area of the seat:

If the contact area is less than 75% of the circumference of the seat, rotate the pilot 180° and make another light cut.

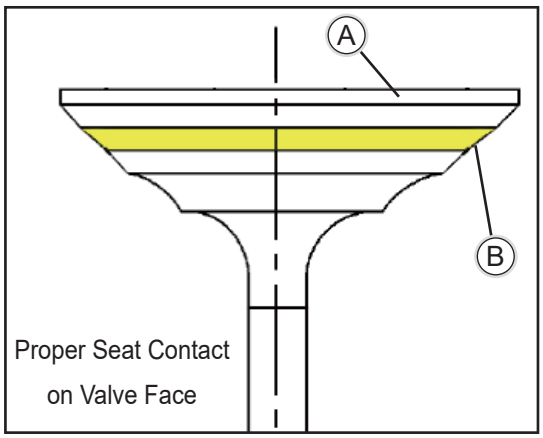
If the cutter now contacts the uncut portion of the seat, check the pilot. Look for burrs, nicks, or runout. If the pilot is bent it must be replaced.

If the contact area of the cutter is in the same place, the valve guide is distorted from improper installation.

If the contact area of the initial cut is greater than 75%, continue to cut the seat until all pits are removed and a new seat surface is evident.



- To check contact area of the seat on the valve face, apply a thin coating of Prussian Blue™ paste to the valve seat. If using an interference angle (46°) apply black permanent marker to the entire valve face 【A】.
- Insert valve into guide and tap valve lightly into place a few times.
- Remove valve and check where the Prussian Blue™ indicates seat contact on the valve face. The valve seat should contact the middle of the valve face or slightly above, and must be the proper width.



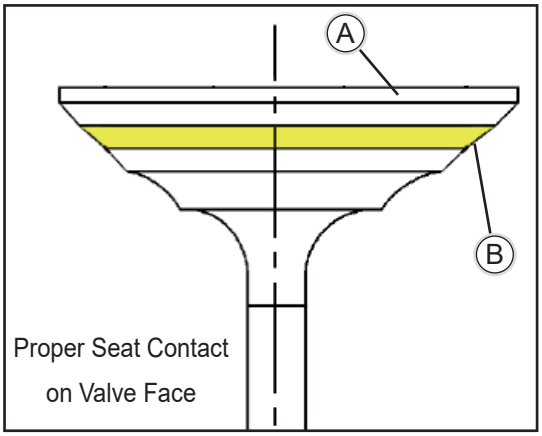
Proper Seat Contact on Valve Face

If the indicated seat contact is at the top edge of the valve face and contacts the margin area【B】it is too high on the valve face. Use the 30° cutter to lower the valve seat.

If too low, use the 60° cutter to raise the seat. When contact area is centered on the valve face, measure seat width.

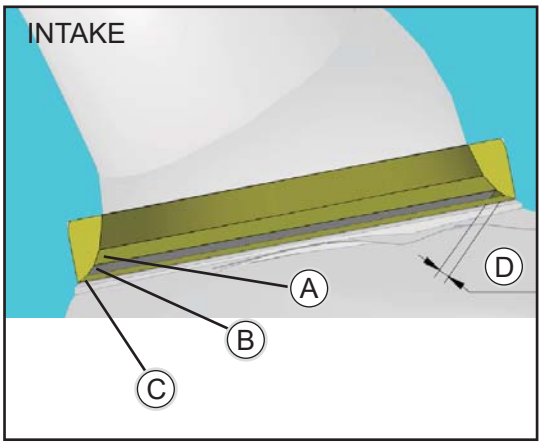
If the seat is too wide or uneven, use both top and bottom cutters to narrow the seat.

If the seat is too narrow, widen using the 45° cutter and re-check contact point on the valve face and seat width after each cut.

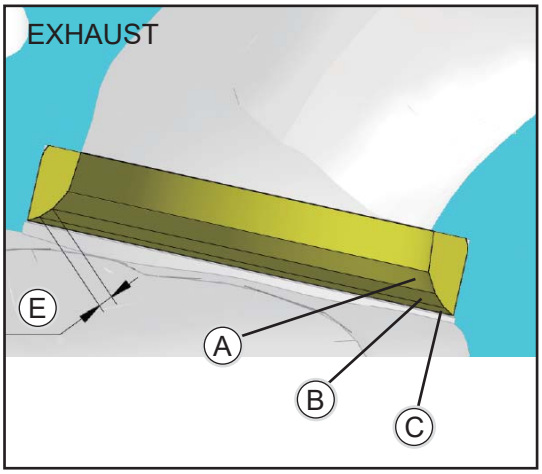


NOTE

When using an interference angle, the seat contact point on the valve will be very narrow, and is a normal condition. Look for an even and continuous contact point all the way around the valve face【A】.



【A】30°
【B】45°
【C】60°
【D】1.0 ~ 1.1mm (0.0394" ~ 0.0433")
Service Limit: 1.4mm (0.055")



【A】 30°
【B】 45°
【C】 60°
【E】1.5 ~ 1.6mm (0.0591" ~ 0.0630")
Service Limit: 1.9mm (0.075")

- Clean all filings from the area with hot soapy water. Rinse and dry with compressed air.
- Lubricate valve guides with clean engine oil and apply oil or water based lapping compound to the face of the valve.

NOTE

Lapping is not required if an interference angle reconditioning method is used.

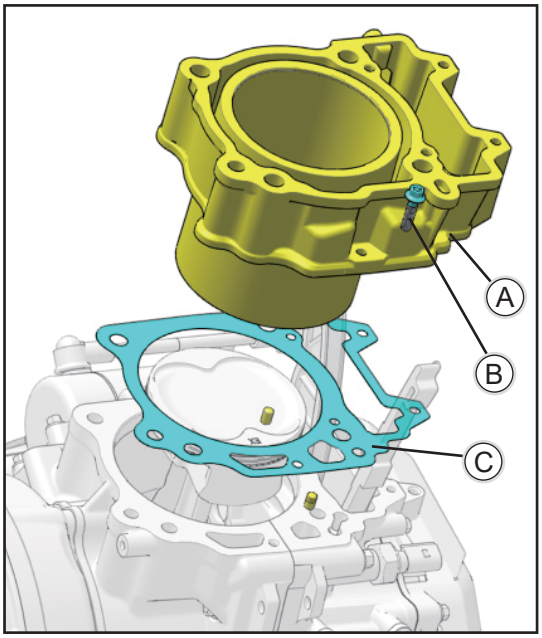
- Insert the valve into its respective guide and lap using a lapping tool or a section of fuel line connected to the valve stem.

- Rotate the valve rapidly back and forth until the cut sounds smooth. Lift the valve slightly off of the seat, rotate 1/4 turn, and repeat the lapping process. Do this four to five times until the valve is fully seated, and the seating surface is smooth, Then repeat process for the other valve(s).
- Thoroughly clean cylinder head and valves.

CAUTION

Do not grind the seat too much. Overgrinding will reduce valve clearance by sinking the valve into the head. If the valve sinks too far into the head, it will be impossible to adjust the clearance, and the cylinder head must be replaced.

Cylinder and Piston



Cylinder Removal

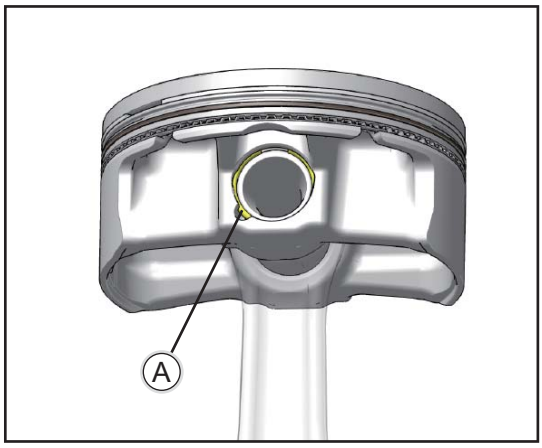
◆ Remove:

Cylinder Head (see Cylinder Head Removal)

Cylinder Bolt【A】

Cylinder【B】

Cylinder Base Gasket【C】



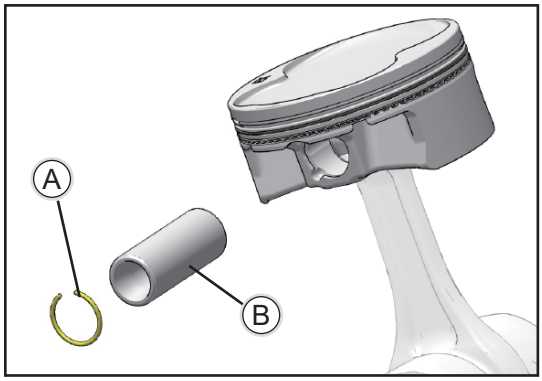
Piston Removal

◆ Remove the cylinder block (see Cylinder Removal).

◆ Place a piece of clean cloth under the piston and remove the piston pin snap rings【A】from the outside of the piston.

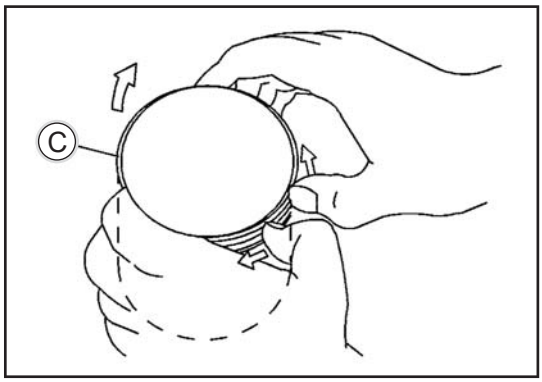
CAUTION

Do not reuse snap rings, as removal weakens and deforms them. They could fall out and score the cylinder wall.



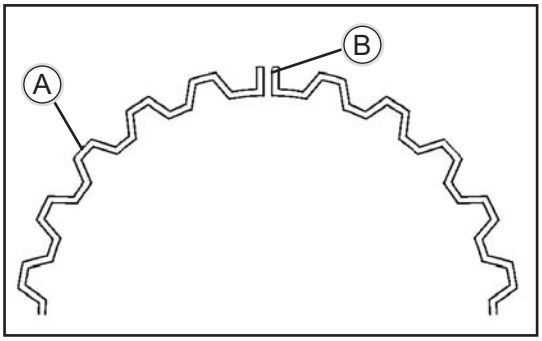
◆ Remove the piston pin【B】

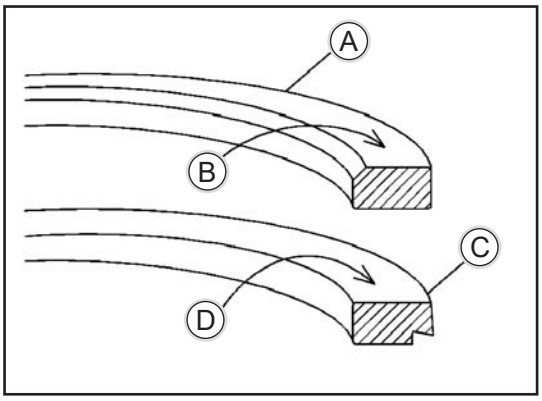
◆ Remove the piston

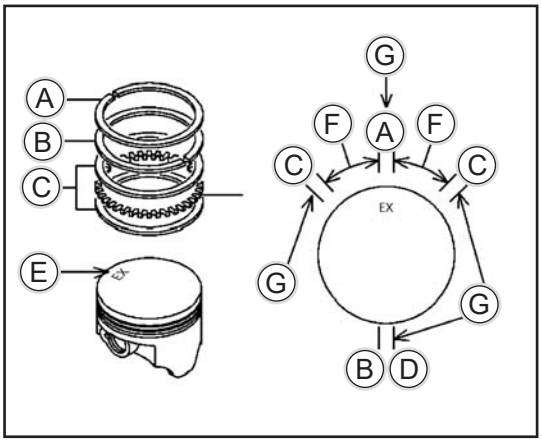


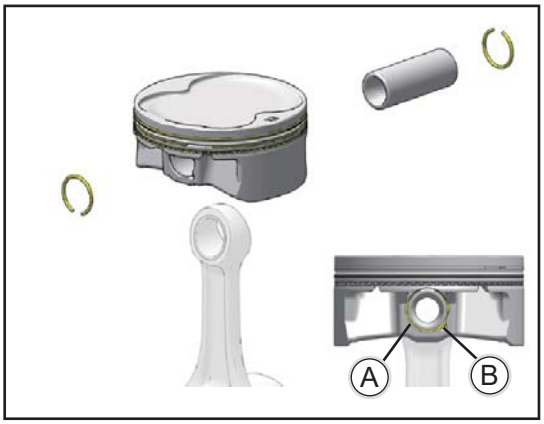
◆ Carefully spread the ring opening with your thumbs and then push up on the opposite side of the ring【C】 to remove it.

◆ Remove the 3-piece oil ring with your thumbs in the same manner.









Cylinder, Piston Installation

NOTE

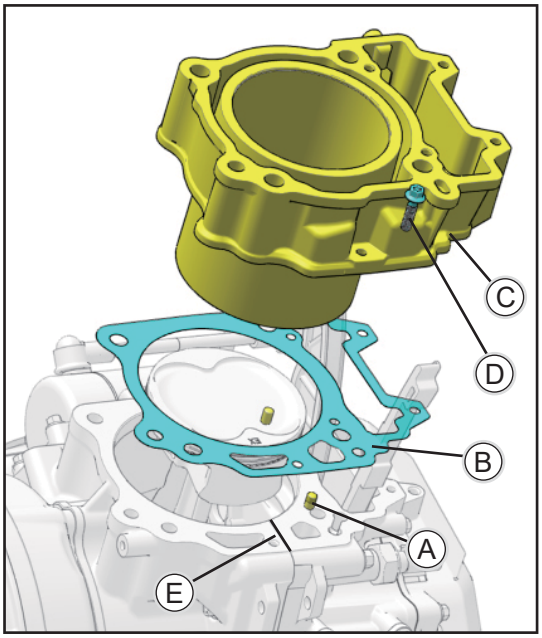
If a new piston or cylinder is used, check piston to cylinder clearance (see Piston/Cylinder Clearance), and use new piston rings.

The oil ring rails have no “top” or “bottom”.

- ◆ Install the oil ring expander【A】in the bottom piston ring groove so the ends【B】butt together.
- ◆ Install the oil ring steel rails, one above the expander and one below it.
  - ○ Spread the rail with your thumbs, but only enough to fit the rail over the piston.
  - ○ Release the rail into the bottom piston ring groove.
- ◆ Do not mix up the top ring and second ring.
- ◆ Install the top ring【A】so that the “A1” mark【B】faces up.
- ◆ Install the second ring【C】so that the “A2” mark【D】faces up.

- ◆ The piston ring openings must be positioned as shown in the figure. The openings of the oil ring steel rails must be about 30° ~ 40°【F】of angle from the opening of the top ring.

  Top Ring【A】
  Second Ring【B】
  Oil Ring Steel Rails【C】
  Oil Ring Expander【D】
  Note the piston orientation mark (EX) located on top of the piston. (EX) should point toward the exhaust side.
  Opening Positions【G】
- ◆ Fit a new piston pin snap ring into the side of the piston so that the ring opening【A】does not coincide with the slit【B】of the piston pin hole.
  - ○ When installing the piston pin snap ring, compress it only enough to install it and no more.
- ◆ Apply engine oil to the cylinder bore and, piston skirt.



◆ Install:

Dowel Pins【A】

New Cylinder Base Gasket【B】

Cylinder【C】

Bolt【D】

◆ Tighten:

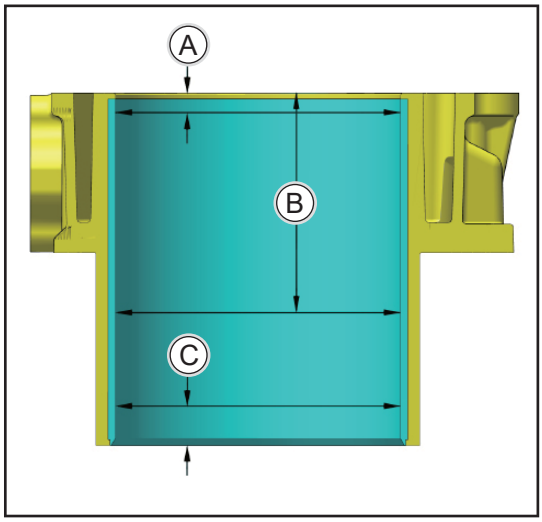
Torque

Bolt【D】
9.8 N·m (1.0 kgf·m, 87 in·lb)

CAUTION

Base gasket and surfaces must be DRY and oil free. Use care upon assembly to keep oil away.

◆ Apply liquid gasket【E】to meeting surface of the crankcase.



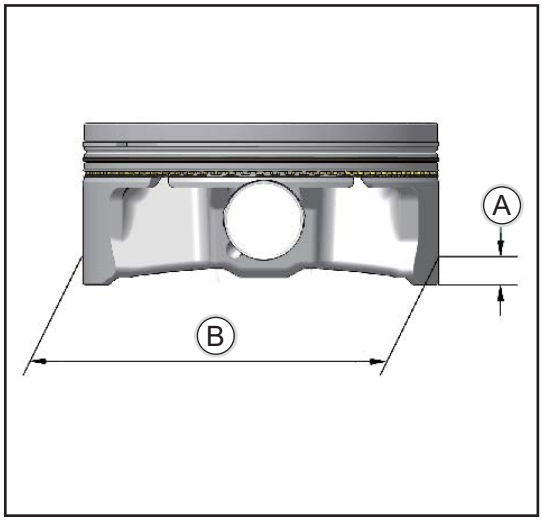
Cylinder Wear

◆ Since there is a difference in cylinder wear in different directions, take a side-to-side and a front-to-back measurement at each of the three locations (total of six measurements) shown in the figure.

If any of the cylinder inside diameter measurements exceeds the service limit, replace the cylinder.

10 mm (0.4 in.)【A】
60 mm (2.4 in.)【B】
20 mm (0.8 in.)【C】

Cylinder inside Diameter:		
Standard:	Ⅰ	98.992 ~ 99.000 mm (3.8973" ~ 3.8976")
	Ⅱ	99.000 ~ 99.008 mm (3.8976" ~ 3.8980")
Service Limit:	Ⅰ	99.08 mm (3.9008")
	Ⅱ	99.09 mm (3.9012")



Piston Wear

◆ Measure the outside diameter【A】of each piston 5mm (0.20 in.) 【B】up from the bottom of the piston at a right angle to the direction of the piston pin.

If the measurement is under service limit, replace the piston.

Piston Diameter:		
Standard:	Ⅰ	98.931 ~ 98.941 mm (3.8949" ~ 3.8953")
	Ⅱ	98.939 ~ 98.949 mm (3.8952" ~ 3.8956")
Service Limit:	Ⅰ	98.81 mm (3.8902")
	Ⅱ	98.82 mm (3.8906")

Piston/Cylinder Clearance

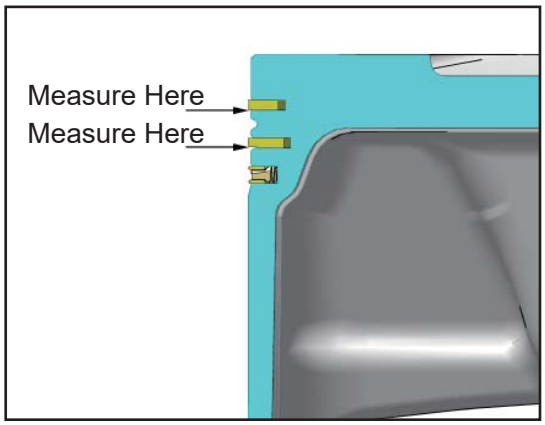
- Subtract the piston diameter from the cylinder inside diameter to get the piston/cylinder clearance.

Piston/Cylinder Clearance

Standard: 0.051 ~ 0.069 mm (0.0020" ~ 0.0027".)

Piston Ring, Piston Ring Groove Wear

- Check for uneven groove wear by inspecting the ring seating.
- The rings should fit perfectly parallel to groove surfaces. If not, replace the piston and all the piston rings.
- With the piston rings in their grooves, make several measurements with a thickness gauge to determine piston ring/groove clearance.



Piston Ring to Groove Clearance:	
Top Ring:	0.020 ~ 0.060 mm (0.0007" ~ 0.0023")
Second Ring:	0.020 ~ 0.060 mm (0.0007" ~ 0.0023")
Service Limit:	0.12 mm (0.0047")

If the piston ring groove clearance is greater than the service limit, measure the ring thickness and groove width as follows to decide whether to replace the rings, the piston or both.

Piston Ring Groove Width

- Measure the piston ring groove width.
  - Use a vernier caliper at several points around the piston.

Piston Ring Groove Width		
	Standard	Service Limit
Top: Second:	1.22 ~ 1.25 mm (0.0480" ~ 0.0492")	1.32mm (0.0520")

If the width of any of the two grooves is wider than the service limit at any point, replace the piston.

Piston Ring Thickness

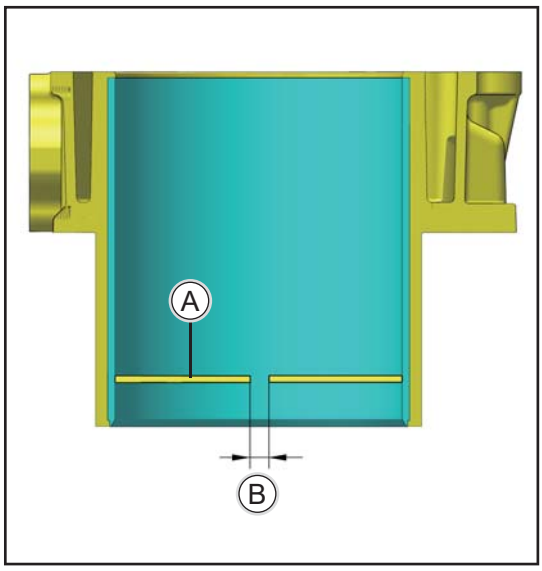
- Measure the piston ring thickness.
  - Use a micrometer to measure at several points around the ring.

Piston Ring Thickness		
	Standard	Service Limit
Top: Second:	1.17 ~ 1.19 mm (0.0461" ~ 0.0469")	1.10mm (0.0433")

If any of the measurements is less than the service limit on either of the rings, replace all the rings.

CAUTION

When using new rings in a used piston, check for uneven groove wear. The rings should fit perfectly parallel to the groove sides. If not, replace the piston.



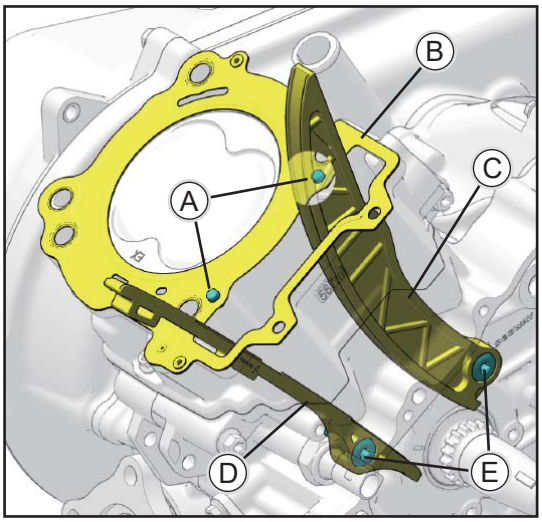
Piston Ring End Gap

- Place the piston ring【A】inside the cylinder, using the piston to locate the ring squarely in place. Set it close to the bottom of the cylinder, where cylinder wear is low.
- Measure the gap [B] between the ends of the ring with a thickness gauge.

Piston Ring End Gap		
	Standard	Service Limit
Top:	0.20 ~ 0.35 mm (0.0079" ~ 0.0138")	0.5mm (0.0197")
Second:	0.35 ~ 0.55 mm (0.0138" ~ 0.0217")	0.7mm (0.0276")
Oil:	0.20 ~ 0.70 mm (0.0079" ~ 0.0276")	0.9mm (0.0354")

If the end gap of either ring is greater than the service limit, replace all the rings.

Cylinder Head Installation



Cylinder Head Installation

◆ Install:

Dowel Pins【A】

New Cylinder Head Gasket【B】

Camshaft Chain Guide【C】

Camshaft Chain Guide【D】

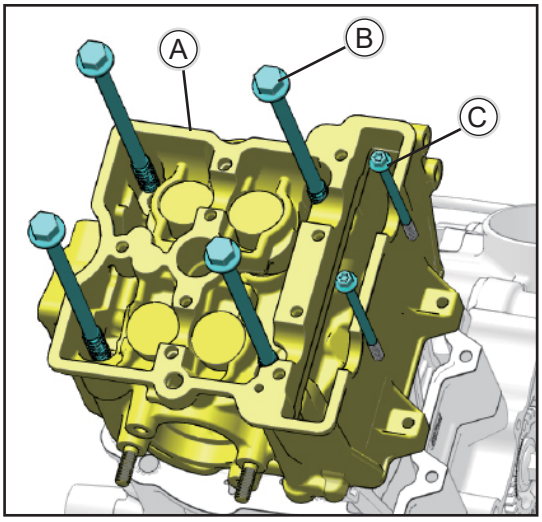
Shoulder Bolts【E】(using a T40 driver)

◆ Tighten:

Torque

Shoulder Bolts
9.8 N·m (1.0 kgf·m, 87 in·lb)

◆ Apply a non-permanent locking agent to the bolts【E】.

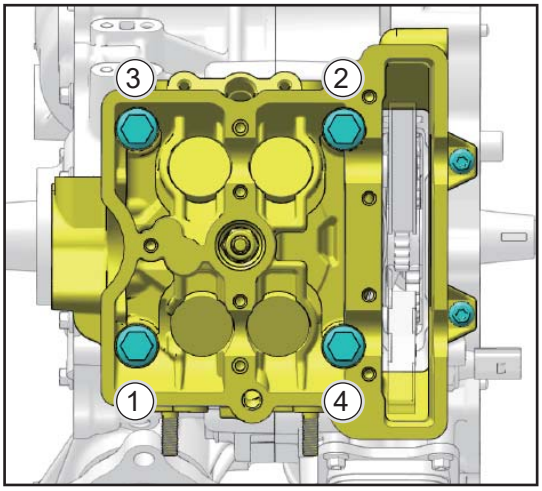


◆ Install:

Cylinder Head Assembly【A】

Cylinder Head Bolts M11×1.25×150【B】

Bolts M6×90【C】



◆ Tighten the cylinder head bolts (M11)【B】 following the tightening sequence as shown.

First Torque

Cylinder Head Bolts (M11)【B】
25 N•m (2.5 kgf•m, 18 ft•lb)

Final Torque

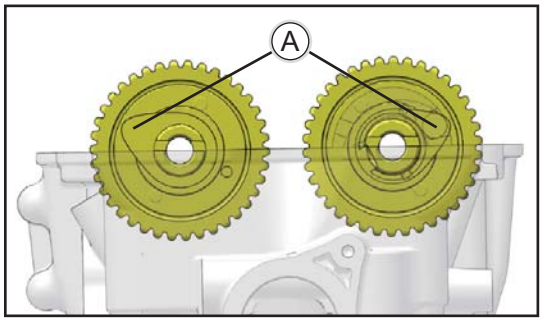
Cylinder Head Bolts (M11)【B】
75 N•m (7.7 kgf•m, 54 ft•lb)

Tighten the Bolts M6×90【C】.

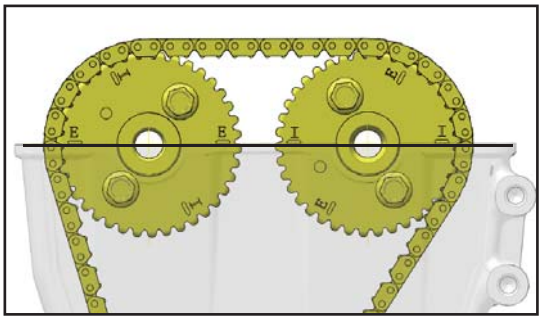
Torque

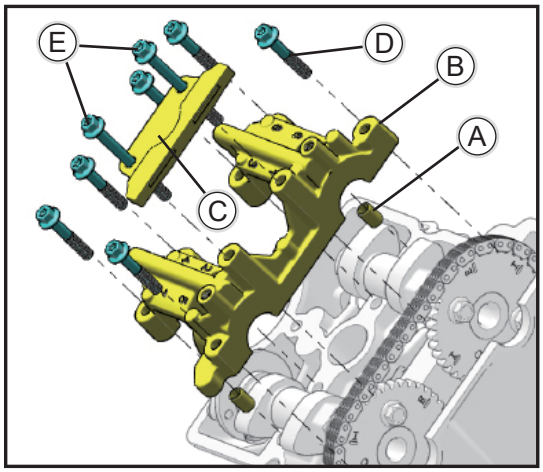
Bolts M6×90【C】
9.8 N•m (1.0kgf•m, 87in•lb)

Timing View For Camshafts



Timing View For Sprockets





Camshaft Installation / Timing

CAUTION

If any valve train components were replaced, refer to Valve Clearance Adjustmentpage procedure.

Camshaft Installation / Timing

- Rotate the engine until the flywheel Top Dead Center (TDC) mark is aligned or centered in the Crankshaft Position Sensor (CPS) mounting hole.
- Reference the intake and exhaust markings made during disassembly. If installing new camshafts or if camshafts were not marked, you can reference the part number stamped on the end of the shafts and compare to the electronic parts catalog.
- Lubricate all camshaft lobes and bearing journal surfaces with engine oil prior to installation.
- Carefully install the camshafts into the cylinder head. The camshaft lobes【A】should face out as shown.

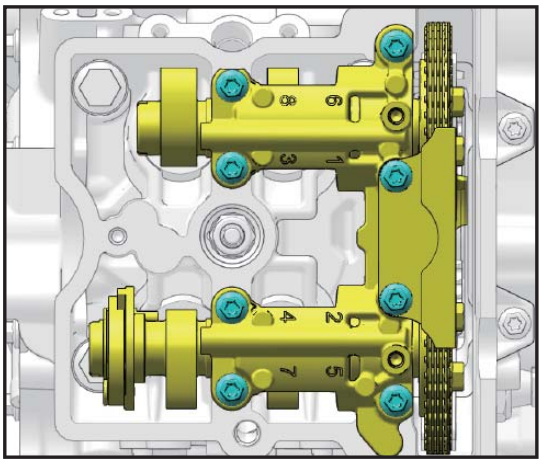
CAUTION

Intake cam sprocket should have “I” marks aligned with gasket surface and the exhaust cam sprocket should have “E” marks aligned with gasket surface. Install the exhaust cam sprocket first (opposite the camchain tensioner) to ensure proper cam timing.

- Install:

Dowel Pins【A】
Camshaft Carrier【B】
Fixed Cam Chain Guide【C】
Bolts M6×35【D】
Bolts M6×65【E】

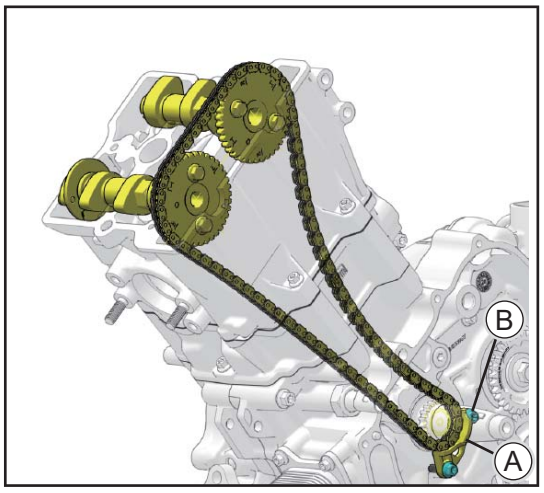
Carefully install the camshaft carrier onto the camshafts. Carrier openings should face each other when installed properly.



◆ Tighten the camshaft carrier bolts (M6)【D】and 【E】following the tightening sequence as shown.

Torque

Bolts M6
9.8 N•m (1.0kgf•m, 87in•lb)



◆ Install

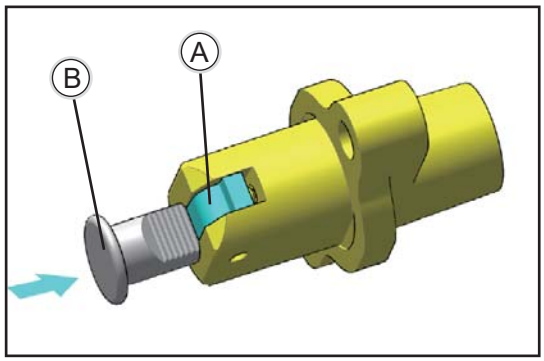
Chain Guard【A】

Bolts M6×20【B】

◆ Tighten:

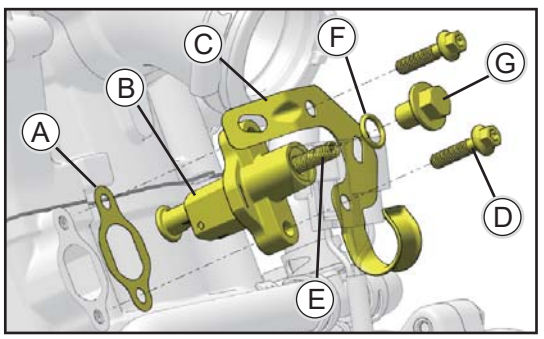
Torque

Bolts M6×20【B】
9.8 N•m (1.0kgf•m, 87in•lb)



Camshaft Chain Tensioner Installation

◆ Push the stopper【A】to release the ratchet and push the push rod【B】into the tensioner body.



◆ Install

Replace the New Tensioner Gasket【A】

Tensioner【B】

Pipe/line Fixing Plate【C】and Mounting Bolts【D】

Spring【E】,O-Ring【F】and Tensioner Cap Bolt 【G】

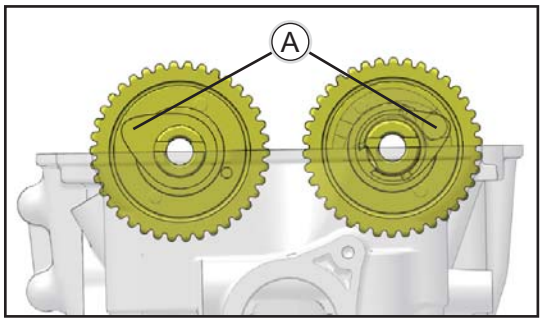
◆ Tighten:

Torque

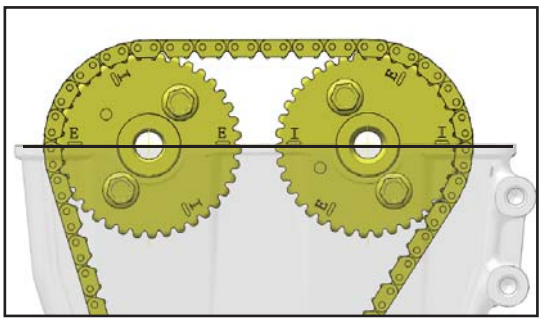
Chain Tensioner Mounting Bolts
9.8 N•m (1.0kgf•m, 87in•lb)

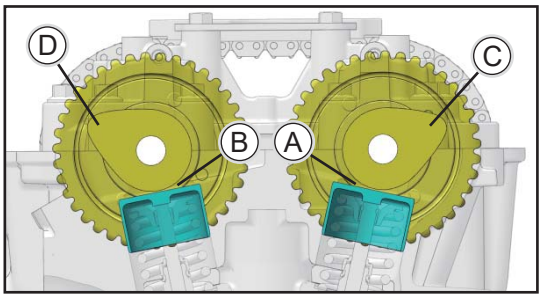
Chain Tensioner Cap Bolt
12 N•m(1.2 kgf•m,8.8 ft•lb)

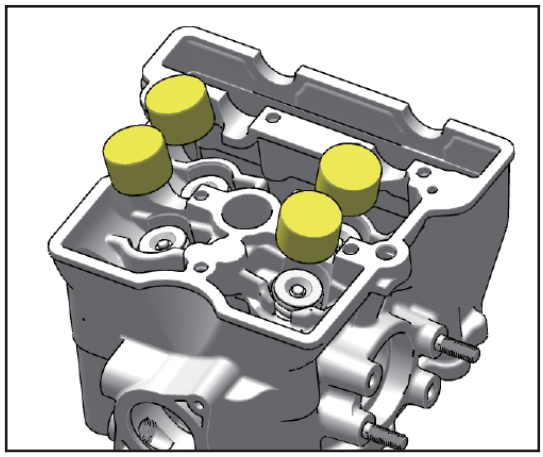
Timing View For Camshafts



Timing View For Sprockets







Valve Clearance Adjustment

IMPORTANT: Always inspect valve clearance prior to camshaft installation or final engine assembly.

- Camshaft installation (See the Camshaft Installation / Timing)
- Camshaft Carrier installation (See the Camshaft Installation / Timing)
- Rotate the camshaft until the cam lobes【C】and【D】above the valves you are inspecting are facing up.
- Measure the valve clearance【A】and【B】using a thickness (feeler) gauge. Record the measurement if clearance is out of specification.
- Repeat the above steps until all four valves have been inspected.

Measurement Valve Clearance (cold)	
Exhaust:	0.2 ~ 0.3mm (0.0080" ~ 0.0120")
Inlet:	0.1 ~ 0.2mm (0.0040" ~ 0.0080")

If any of the valve clearance measurements are out of specification, remove the camshaft carriers and camshafts and proceed with this procedure.

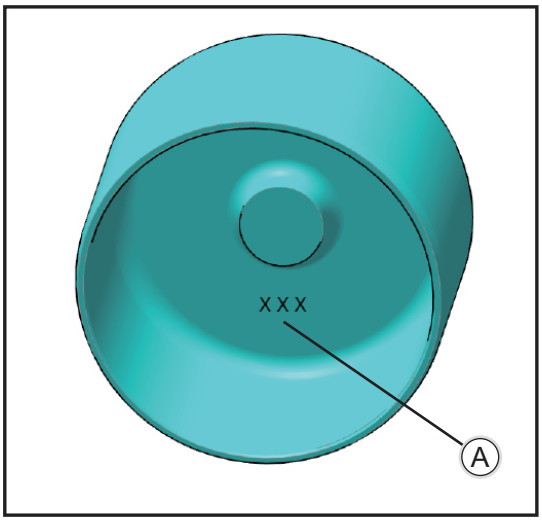
CAUTION

If all valve clearance measurements are within specification, remove the camshaft carriers and proceed to Camshaft Installation

- Remove the valve tappet from a valve that was out of specification.

CAUTION

Keep mated parts together and in order with respect to their location in the cylinder head for assembly purposes. Mark each component or place them in an organized rack as you remove them.



- Record the 3 digit number on the bottom of the tappet【A】.
- Reference the valve clearance measurement recorded for that valve, along with the 3 digit tappet number.
- Refer to the appropriate tappet selection matrix (Intake or Exhaust) on the following pages and select the proper tappet.
- Install the proper tappet.
- Repeat the above steps until all necessary valves have been adjusted.
- Reinstall the camshafts and camshaft carriers and tighten the bolts evenly to specification.
- Tighten:

Torque

Bolts (M6)
9.8 N•m (1.0kgf•m, 87in•lb)

- Measure and confirm that valve clearance is now within specification for each valve.

If valve clearance is not within specification, repeat this procedure.

If all valve clearance measurements are now within specification, remove the camshaft carriers and proceed to Camshaft Installation / Timing.

Valve Lash - Tappet Selection

IMPORTANT

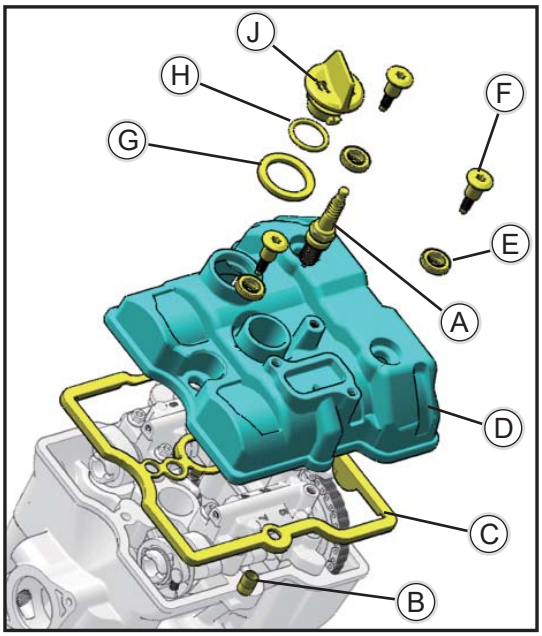
The Valve Lash Specification and Measured Valve lash must be calculated in millimeters (mm), A 480 tappet means the thickness of the tappet is 4.80 mm.

◆ The proper valve tappet may be obtained by completing these steps:

1. Subtract the actual valve lash on the engine from the valve lash specification (i.e. 0.27 mm – 0.20 mm) = 0.07 mm.
2. Divide the 3 digit tappet number by 100 (i.e. 520 / 100) = 5.2 mm.
3. Add the results of step 1 and step 2 (i.e. 0.07 mm + 5.2 mm) = 5.27 mm.
4. Multiply that answer by 100 to obtain the correct new tappet (i.e. 5.27 mm × 100 = 527).
5. Refer to the table below to find the closest available tappet size to the result from step 4 (i. e. 527 should be rounded to 528 since there is a 528 tappet).

Available Tappets

Part Number	F01A20007-	001	002	003	004	005	006	007	008	009	010
3 digit number		480	482	484	486	488	490	492	494	496	498
Part Number	F01A20007-	011	012	013	014	015	016	017	018	019	020
3 digit number		500	502	504	506	508	510	512	514	516	518
Part Number	F01A20007-	021	022	023	024	025	026	027	028	029	030
3 digit number		520	522	524	526	528	530	532	534	536	538
Part Number	F01A20007-	031	032	033	034	035	036	037	038	039	040
3 digit number		540	542	544	546	548	550	552	554	556	558
Part Number	F01A20007-	041	042	043	044	045	046	047	048	049	050
3 digit number		560	562	564	566	568	570	572	574	576	578



Valve Cover Installation

Valve Cover Installation

◆ Install:
Spark Plug【A】
Dowel Pin 10×14【B】
Valve Cover Seal【C】
Valve Cover【D】
New Isolators【E】
Shoulder Bolts【F】 (using a T40 driver)
Oil Fill Cap Seal【G】
O-Ring 22×3【H】
Oil Fill Cap【J】

◆ Tighten:

Torque

Shoulder Bolts [F]
9.8 N•m (1.0kgf•m, 87in•lb)

Spark Plug [A]
11 N•m (1.1 kgf•m, 97 in•lb)

Cylinder Compression Measurement

NOTE

Use the battery which is fully charged

◆ Warm up the engine thoroughly, and stop the engine.
◆ Remove the spark plug (see Electrical System chapter).
◆ Attach the compression gauge and adapter firmly into the spark plug hole.
◆ Special Tools - Compression Gauge，
Compression Gauge Adapter,M10×1.0
◆ Hold the throttle wide open and crank the engine with the electric starter several times.
○ When the gauge stops rising, stop cranking and read the gauge.

Cylinder Compression (Usable Range)	
Electric Starter:	450 ~ 700 kPa (4.7~7.2 kgf/cm², 65~102 psi) @ 300r/min (rpm)

Cylinder Compression

◆ The following table should be consulted if the obtainable compression reading is not within the usable range.

Problem	Diagnosis	Remedy (Action)
Cylinder compression is higher than usable range	Carbon accumulation on piston, cylinder head, and in combustion chamber possibly due to damaged valve stem oil seal and/ or damaged piston oil rings (This may be indicated by white exhaust smoke).	Remove the carbon deposits and replace damaged parts if necessary.
	Incorrect cylinder head gasket thickness.	Replace the gasket with a standard part.
	Damaged or missing compression release cam spring	Replace the spring.
	Compression release weights do not move smoothly.	Replace the compression release unit.
Cylinder compression is lower than usable range	Gas leakage around cylinder head	Replace damaged gasket and check cylinder head warp.
	Bad condition of valve seating	Repair if necessary.
	Incorrect valve clearance.	Adjust the valve clearance.
	Incorrect piston/cylinder clearance Piston seizure.	Replace the piston and/or cylinder
		Inspect the cylinder and liner and replace/repair the cylinder and/or piston as necessary.
	Bad condition of piston ring and/or piston ring grooves	Replace the piston and/or the piston rings.
	Compression release weights do not move smoothly	Replace the compression release unit

CVT SYSTEM

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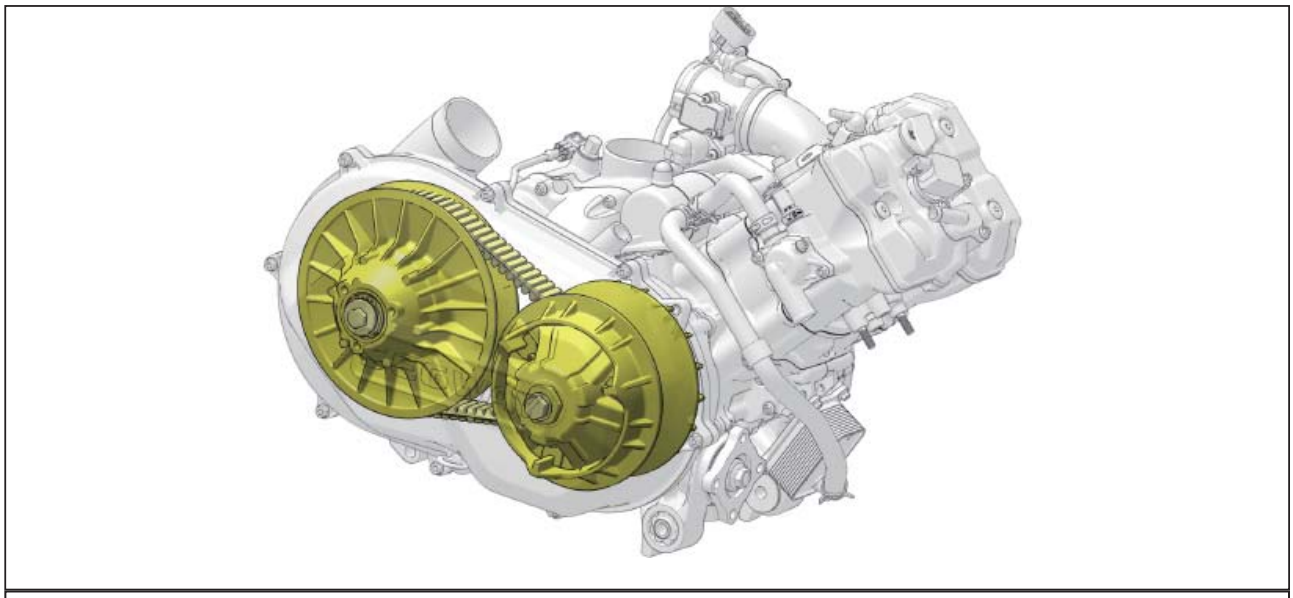
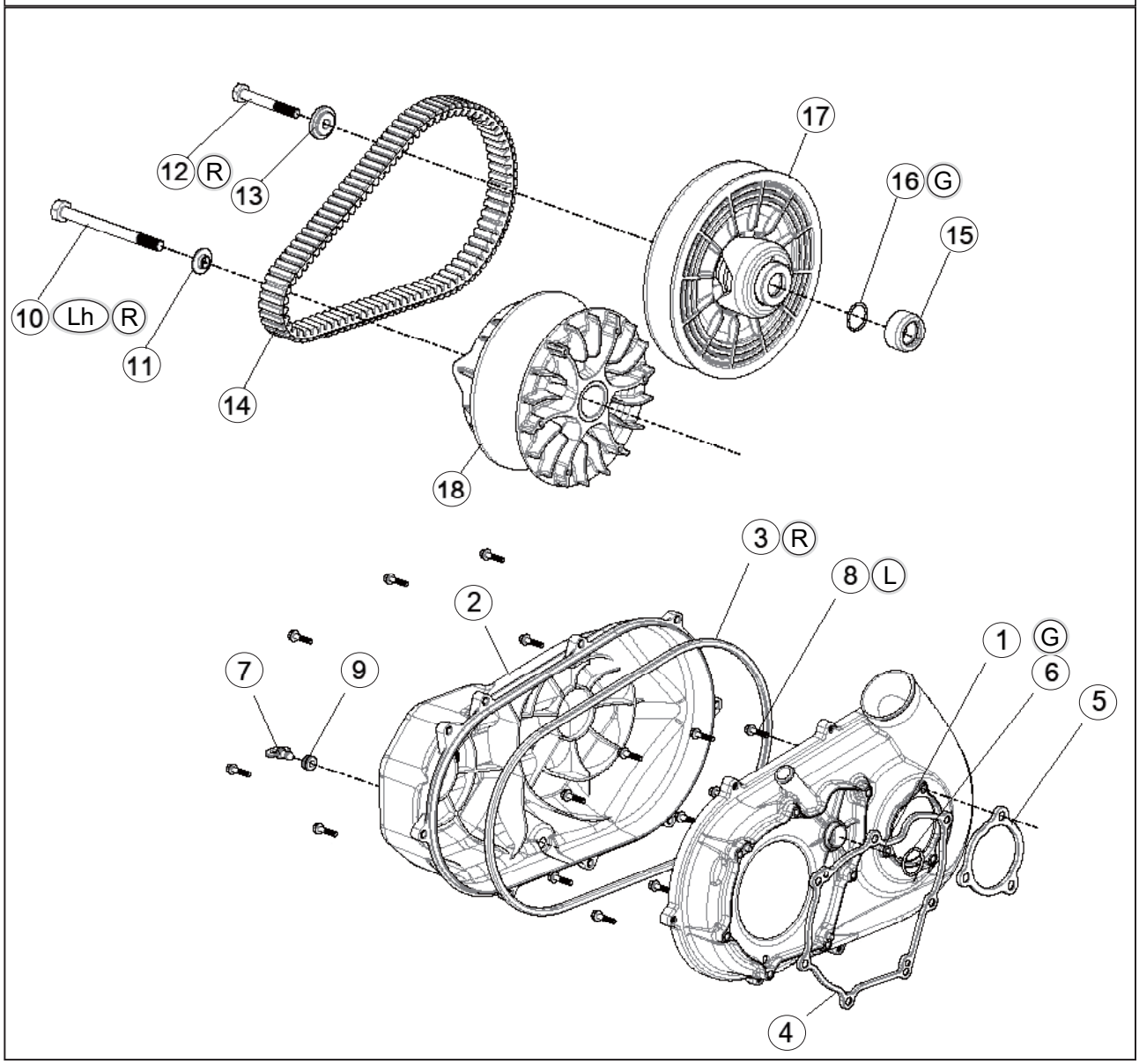
CVT SYSTEM

Exploded view





No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	CVT Inner Cover				
2	CVT Outer Cover				
3	CVT Cover Seal				R
4	CVT Inner Cover Seal Ⅰ				
5	CVT Inner Cover Seal Ⅱ				
6	O-Ring 30×3				G
7	CVT Cover Plug Seal				
8	Bolt M6×28	9.8	1.0	87 in•lb	L
9	CVT Cover Plug				
10	Bolt M12×1.25×142	120	12.2	88	R,Lh
11	Spacer 12×28×6				
12	Bolt M10×1.25×80	80	8.2	59	R
13	Spacer 10.5×36×8				
14	Drive Belt				
15	Driven Pulley Spacer				
16	O-Ring 26.1×2.4				G
17	CVT Driven Pulley Assembly				
18	CVT Drive Pulley Assembly				

G:Apply grease for oil seal and O-ring.

L:Apply a non-permanent locking agent.

Lh:Left-hand Threads

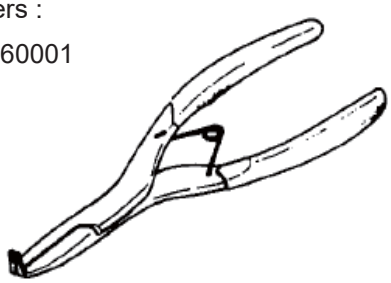
R:Replacement Part.

Technical Parameter

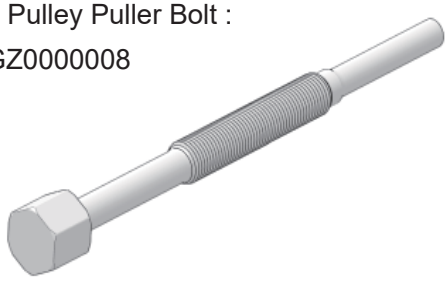
Item	Standard	**Service Limit**
Drive Belt:		
Belt deflection	22 ~ 27 mm (0.87 ~ 1.06")	– – –
Belt height (Parallel portion)	3.0 ~ 3.5 mm (0.118" ~ 0.138")	0.65 mm(0.026")
Drive Pulley:		
Bushing(10) inside diameter	55.005 ~ 55.095 mm (2.166" ~ 2.169")	55.15 mm (2.171")
Bushing(11) inside diameter	32.003 ~ 32.073 mm (1.260" ~ 1.263")	32.11 mm (1.264")
Shoe side clearance	0.15 ~ 0.30mm (0.0059" ~ 0.0118")	– – –
Spring free length	81.5mm (3.2")	– – –
Driven Pulley:		
Sheave bushing(22) inside diameter	35.003 ~ 35.073 mm (1.378" ~ 1.381")	35.11 mm (1.382")
Spring free length	139 mm (5.472")	– – –

Special tools

Circlip Pliers :
E01GZ0060001

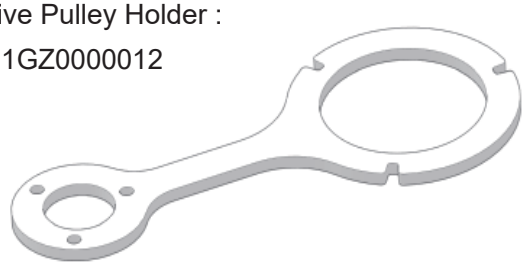


Drive Pulley Puller Bolt :
E01GZ0000008

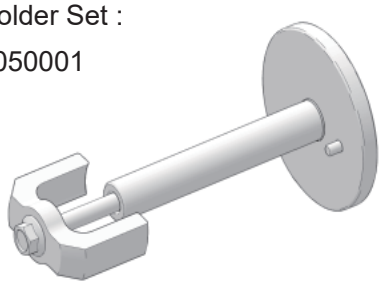


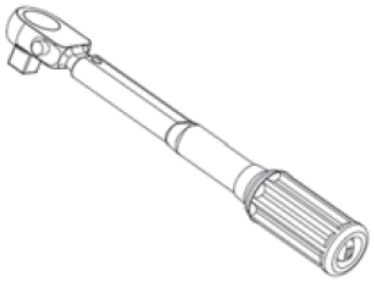
Belt Separate Bolt :
E01GZ0000013

Drive Pulley Holder :
E01GZ0000012

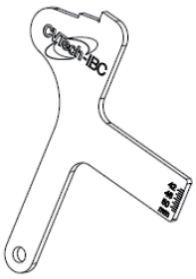


Spring Holder Set :
E01GZ0050001

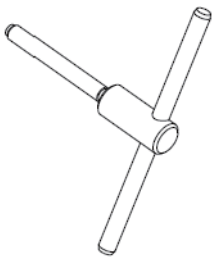




Alignement Tool

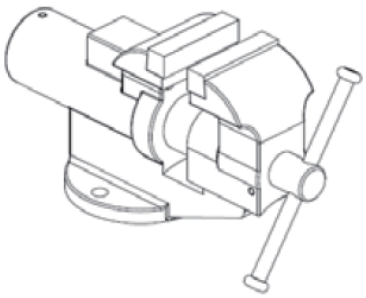


Flange Spreader

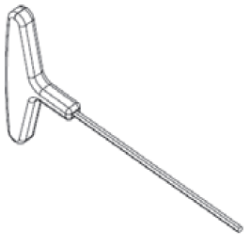


Assembly-Disassembly Tool

Vise



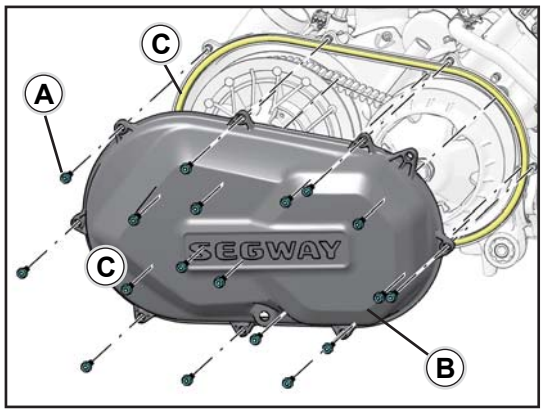
3mm hex. key



CVT Cover

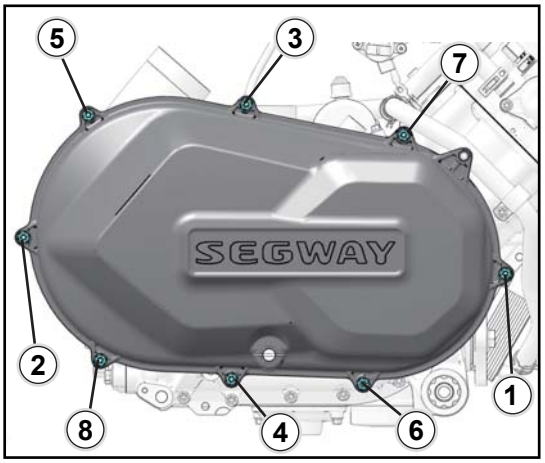
⚠ WARNING

Excessive imbalance or operating rpm could cause CVT pulley failure resulting in severe injury or death. The pulleys of the CVT are precision balanced components designed to operate within certain rpm limits. Disassembly/assembly and servicing procedures of the pulley assemblies must be followed closely. Modifications to the engine or pulleys that increase rpm may cause failure.



CVT Cover Removal

- Turn the ignition switch OFF.
- Remove
  CVT Outer Cover Bolts【A】
  CVT Outer Cover【B】

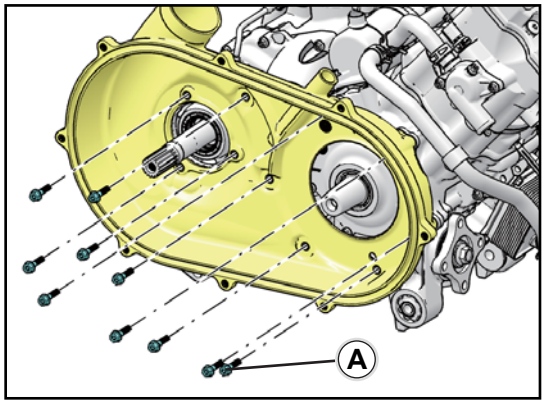


CVT Cover Installation

- Fit the CVT Cover seal【C】into the seal groove of CVT Inner cover
- Tighten the cover bolts following the tightening sequence as shown.

Torque

Converter Cover Bolts
9.8 N•m (1.0kgf•m, 87 in•lb)

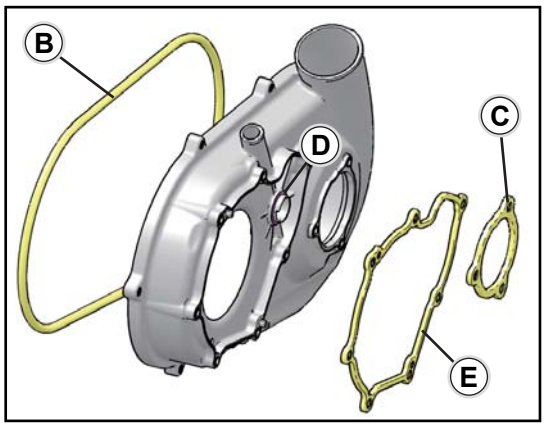


CVT Inner Cover Removal

- Remove the Drive Pulley and Driven Pulley (See Drive Pulley Removal)
- Remove:

  Bolts M8×28【A】

  Remove CVT Inner Cover assembly



CVT Inner Cover Disassembly:

- Remove:

  CVT Cover Seal【B】

  CVT Inner Cover Seal Ⅰ【E】

  CVT Inner Cover Seal Ⅱ【C】

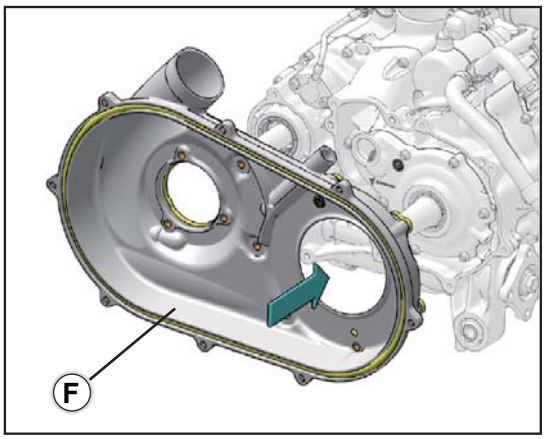
  O-Ring 30×3【D】

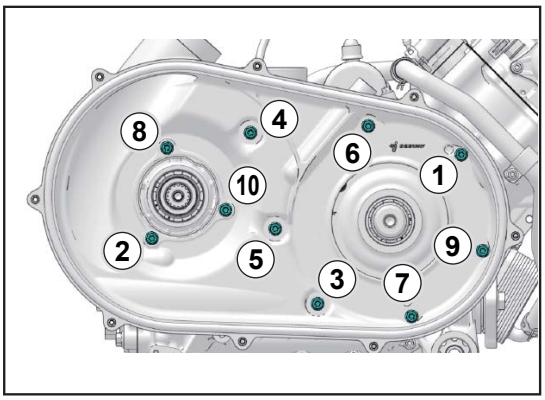
CVT Inner Cover Installation:

Replace CVT Cover Seal【B】,CVT Inner Cover Seal Ⅰ【E】and CVT Inner Cover Seal Ⅱ【C】if water leaks are evident.

- Prepare CVT Inner Cover sealing surfaces by cleaning thoroughly to remove all residue.
- Install:

  CVT Inner Cover Assembly【F】



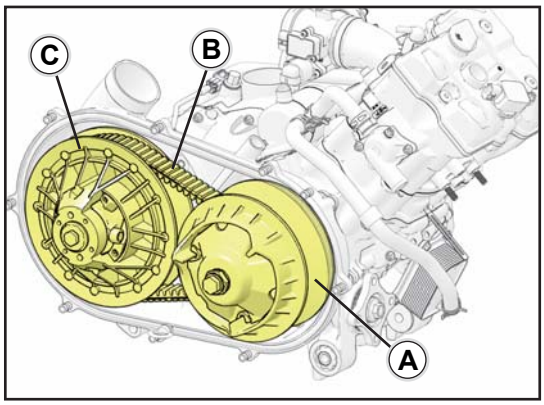


- Tighten the cover bolts following the tightening sequence as shown.

Torque

Converter Cover Bolts
9.8 N•m (1.0kgf•m, 87 in•lb)

Drive Belt



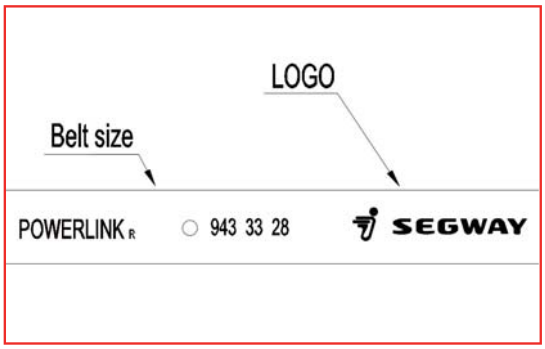
Drive Belt Removal

◆ Remove the drive pulley【A】(see Drive Pulley Removal).

NOTE

Before removing the drive belt, observe the direction of the informations【A】(Such as manufacturers name and arrow marks) printed on the belt so that it may be reinstalled on the pulleys as originally.

◆ Lift the drive belt【B】off the driven pulley【C】.



Drive Belt Installation

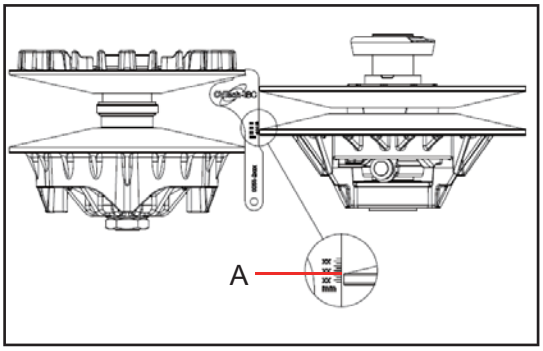
NOTE

Be sure the printed information faces the same direction so the belt rotates in the same direction as originally installed. When installing a new belt, install it so the printed information【A】can be read from beside the vehicle.

◆ Installation is basically the reverse of removal.
◆ Loop the belt【B】over the driven pulley【C】.
◆ Install the drive pulley (see Drive Pulley Installation).
◆ Put the transmission in neutral, and rotate the driven pulley to allow the belt to return to the top【A】of the sheaves, before measuring belt deflection.

Drive Belt Inspection

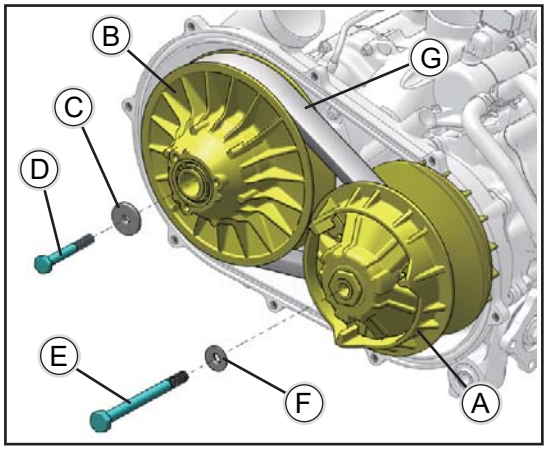
◆ Refer to the CVT System in the Periodic Maintenance chapter.

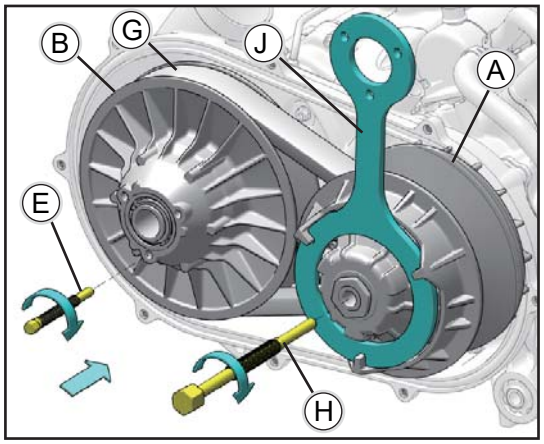


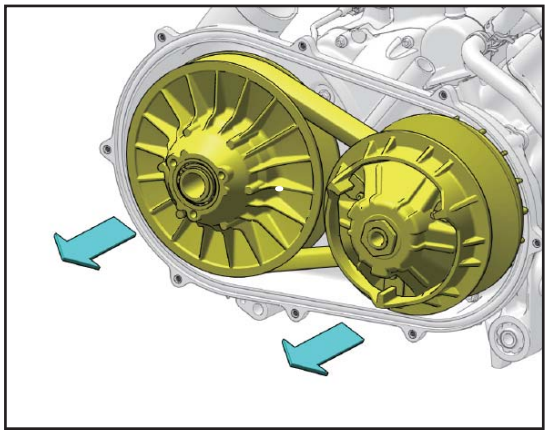
Pulleys Geometrical Specifications

Alignment between pulleys

◆ After completing the installation, check the alignment between the pulleys with the alignment tool. Make sure to obtain dimension A and the proper alignment tool part number (refer to owner's manual for both).
◆ If dimension A is out of tolerance, you can add or remove shims from the gearbox shaft to help reach it.







Drive Pulley and Driven Pulley

Drive Pulley and Driven Pulley Removal

Remove:

Torque CVT Cover (see Torque Converter Cover Removal)

Loosen the drive pulley bolt【E】(left-hand threads)

NOTE

The drive pulley bolt has left-hand threads. Turn the wrench clockwise for loosening.

Loosen the driven pulley bolt【D】(right-hand threads)

Remove:

Drive Pulley Bolt M12×1.25×142-LH【E】

Spacer 12×28×6【F】

Driven Pulley Bolt M10×1.25×80【D】

Spacer 10.5×36×8【C】

Remove the drive pulley【A】from the crankshaft by screwing the drive pulley puller bolt【H】clockwise, while holding the drive pulley with the drive pulley holder【J】.

Screwing the Driven Pulley Separate Bolt【E】to separate the Belt【G】from Driven Pulley【B】.

Special Tool -

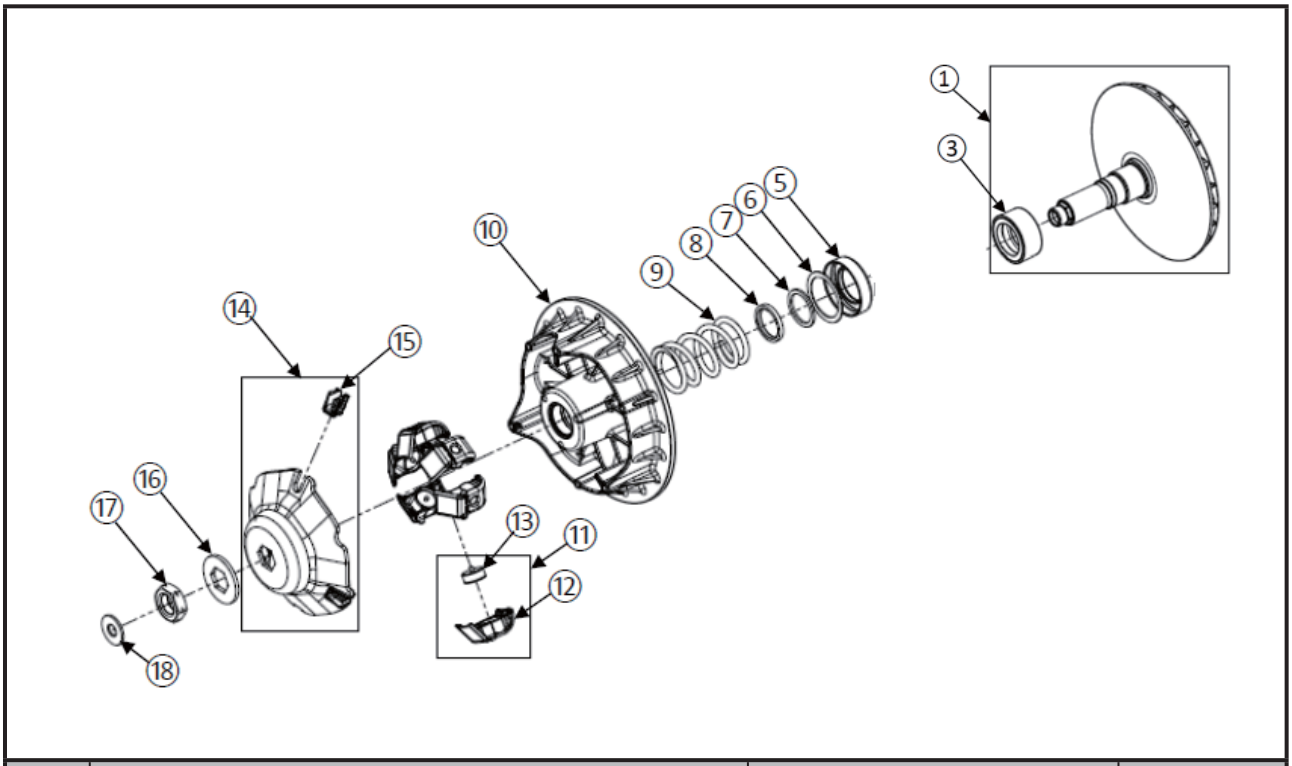
Drive Pulley Puller Bolt: E01GZ0000008

Belt Separate Bolt: E01GZ0000013

Drive Pulley Holder: E01GZ0000012

Remove the drive pulley, driven pulley and Drive Belt together.

CVT Drive Pulley Assembly Exploded view



No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Fixed sheave	9 N.m	0.9		
3	Freewheel or idle bearing				
5	Spring seat				
6	Shim (if applicable)				
7	Shim				
8	Stroke limiter				
9	Spring				
10	Sliding sheave				
11	Centrifugal mass				
12	Block				
13	Mass				
14	Cap				
15	Cap shoe				
16	Washer (If applicable)				
17	Nut	180 N.m	18		
18	Washer (If applicable)				

G: Apply grease for oil seal and O-ring.

L: Apply a non-permanent locking agent.

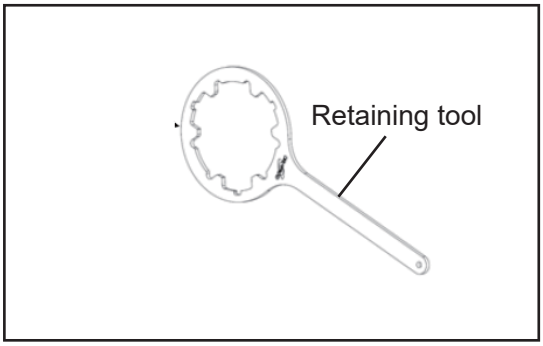
Lh: Left-hand Threads

M: Apply molybdenum disulfide grease

R: Replacement Part.

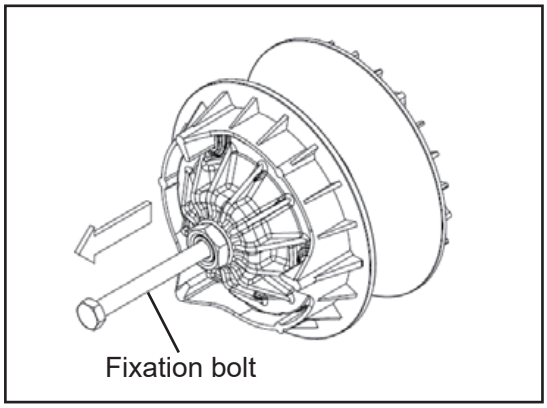
CVT Drive Pulley Assembly Removal

Pulley Removal From The Vehicle



Removing the drive pulley:

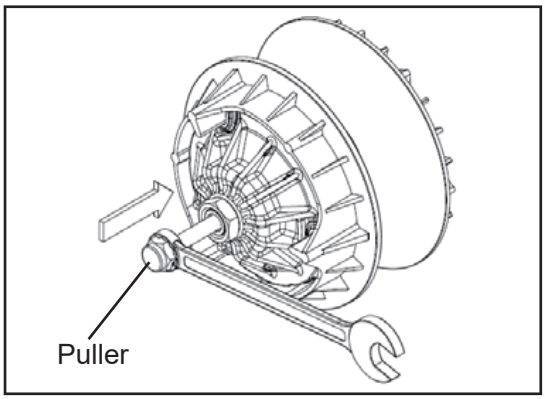
- Remove the fixation bolt from the drive pulley (you will need to use the retaining tool to prevent the pulley from rotating).



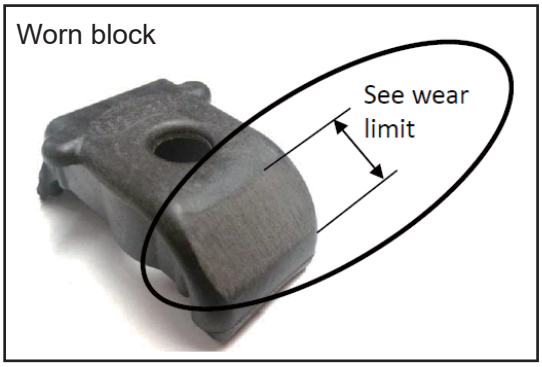
- Screw the puller in the drive pulley shaft and use a breaker bar; torque the puller until the pulley comes off.

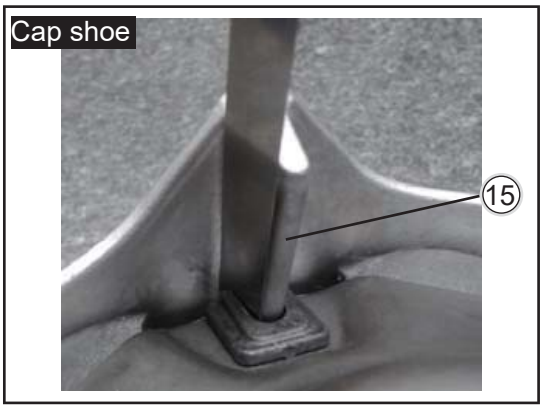
NOTE

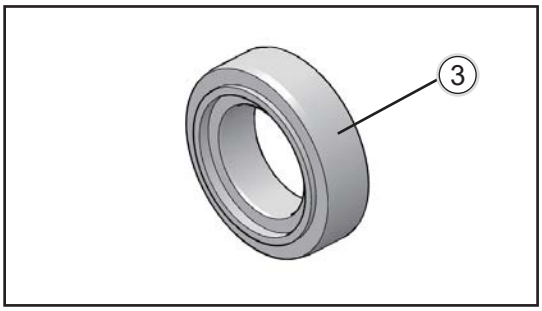
Hint: apply grease on the tip and on the threads of the puller

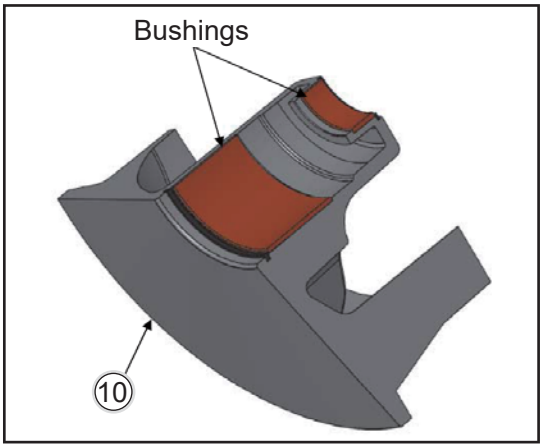


- If the pulley does not comes off, please refer to the CVTech document #0046 - 5239 for complementary information on how to remove the drive pulley.









Drive Pulley Disassembly

Recommended inspection and replacement

1. Check for wear marks on the blocks ⑫ .

1.1. Change the blocks ⑫ when the wear marks shown in figure 14 exceed the wear limit. Admissible wear limit of the block is less than 14mm.

Always change all 6 centrifugal blocks ⑫ at the same time.

2. Check for wear of the cap shoe ⑮ .

2.1. Change cap shoes ⑮ when a 1mm feeler gauge enters between the cap shoe ⑮ and sliding sheave ⑩ tower or if the pulley makes too much noise at idle.

Always change all 3 cap shoes ⑮ at the same time.

3. Check the Freewheel or idle bearing ③.

3.1. Change when an irregular rotation is detected by hand or a creaky noise is heard when rotating the freewheel ③.

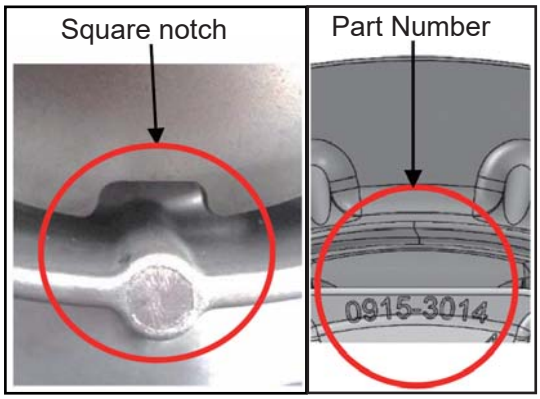
Measure the spring ⑨ forces at the distances indicated on the CVTech website.

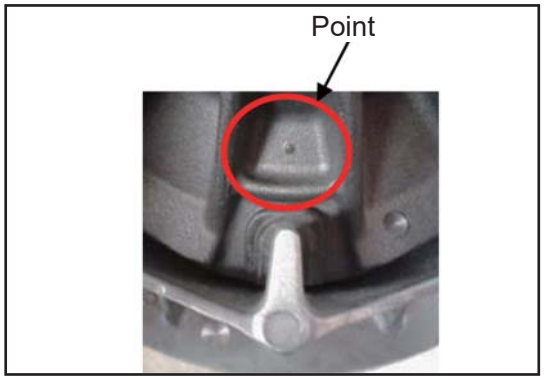
NOTE

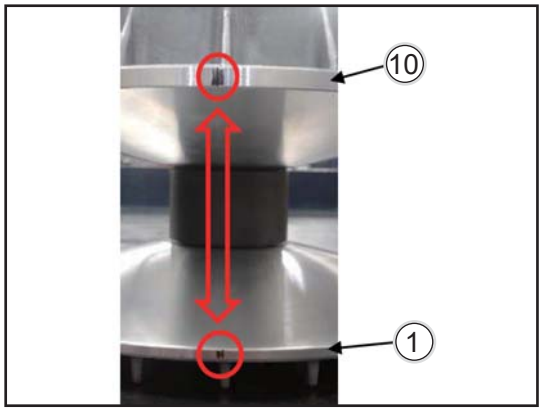
To maintain the performance of the pulley, make sure the sliding sheave ⑩ bushings are cleaned with a microfiber towel or dry cloth.

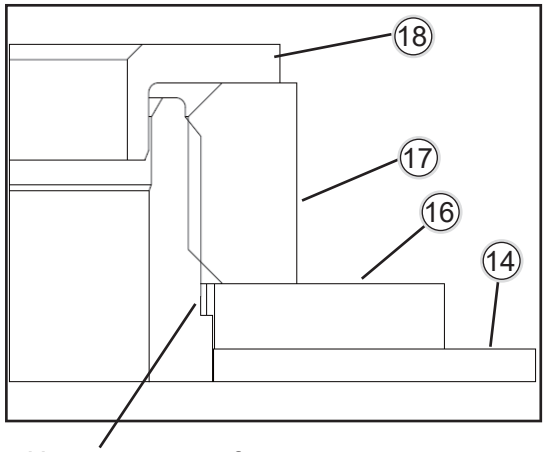
⚠ CAUTION

Do not use acetone to clean the bushings.









Hexagon top surface
on the pulley shaft

Drive Pulley Re-Assembly

Alignment of fixed sheave ①, sliding sheave ⑩ and cap ⑭.

◆ Align the 2 notches on the sheaves ① and ⑩ and also the square shape notch or point or part number on the cap ⑭ (depending on cap model) together to make sure the pulley is balanced.

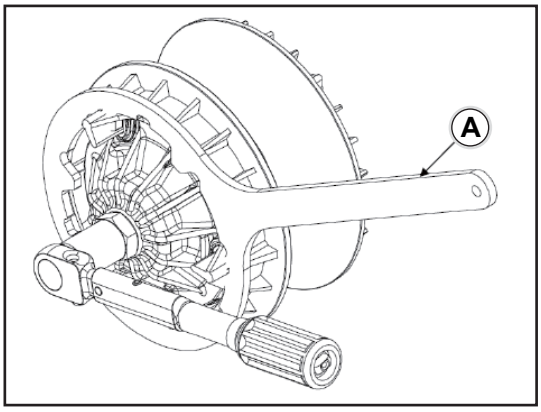
screw M4×8
6 N•m (0.6kgf•m, 53in•lb)

Tightening the Pulley

◆ Use a torque wrench and a 30 mm or 32mm socket (depending on the version of pulley) to tighten the pulley nut ⑰ (see owner's manual for the proper value).

NOTE

◆ Make sure the alignment of the hexagon shape of the cap ⑭ and washer ⑯ are fully engaged on the shaft hexagon shape before applying torque to the nut ⑰.



Pulley Tightening

- Once the pulley is properly installed, use a torque wrench to tighten the fixation bolt.
- To tighten the drive pulley, use the retaining tool 【A】 to lock the rotation.

⚠ WARNING

Do not forget to remove the tools from the drive pulley.

NOTE

Before you start the engine:

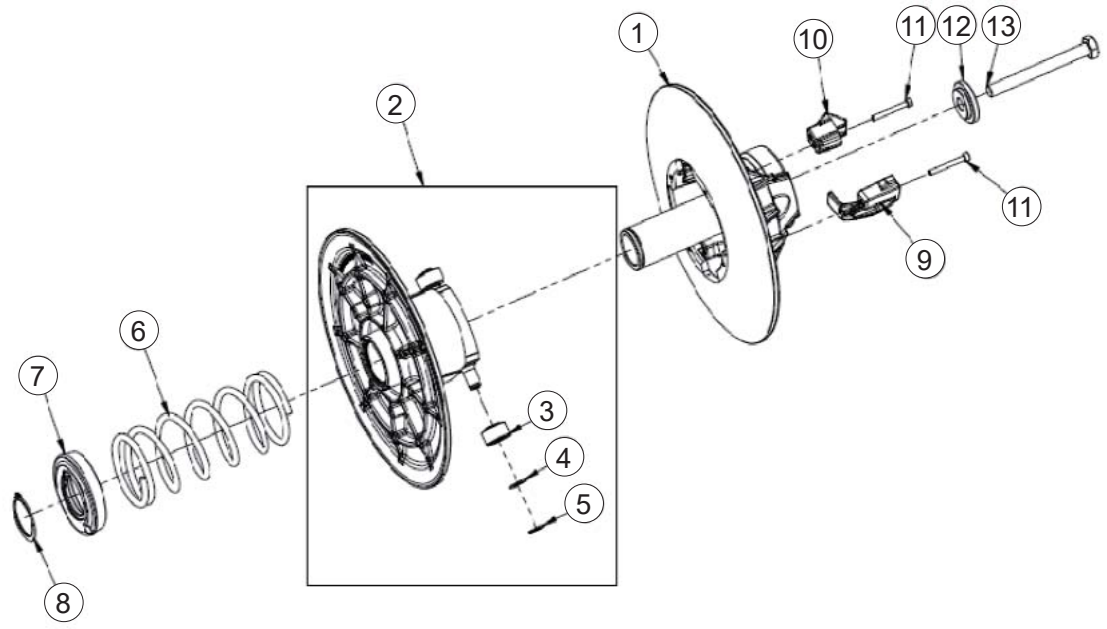
- Make sure all the components are clean without any trace of oil, dust and contaminants.
- Do not use any lubricants.

NOTE

For optimal tightening force

- Repeat this tightening procedure after traveling a few kilometers with the vehicle.

CVT Driven Pulley Assembly Exploded view



No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Fixed Sheave				
2	Sliding Sheave				
3	Roller				
4	Washer				
5	External Retaining Ring				
6	Spring				
7	Spring Seat				
8	External Retaining Ring				
9	Forward Ramp				
10	Helix				
11	Screw	3.5	0.35	31in•lb	
12	Washer (If Applicable)				
13	Screw (If Applicable)	75~85	7.5~8.5	55.3~62.7	

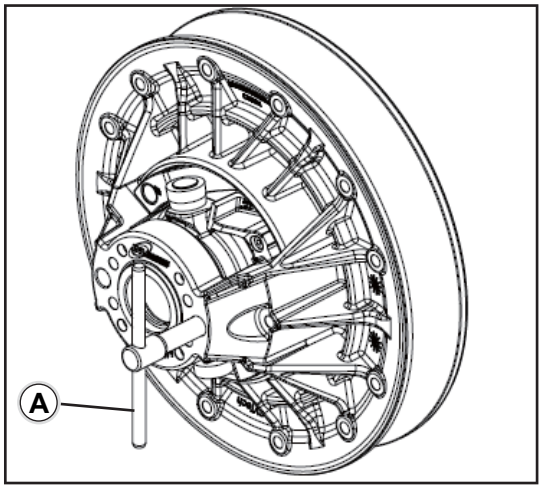
G:Apply grease for oil seal and O-ring.

L:Apply a non-permanent locking agent.

Lh:Left-hand Threads

M:Apply molybdenum disulfide grease

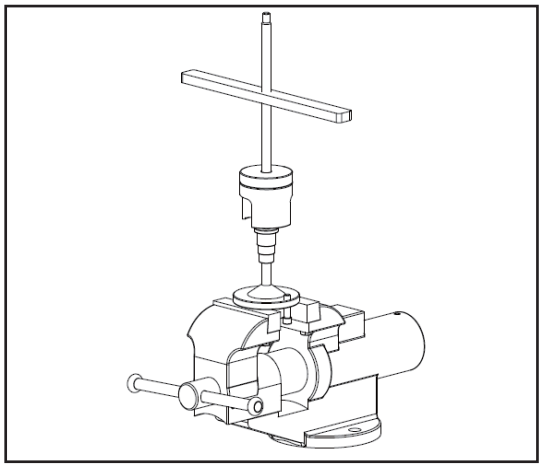
R:Replacement Part.



Pulley Disassembly

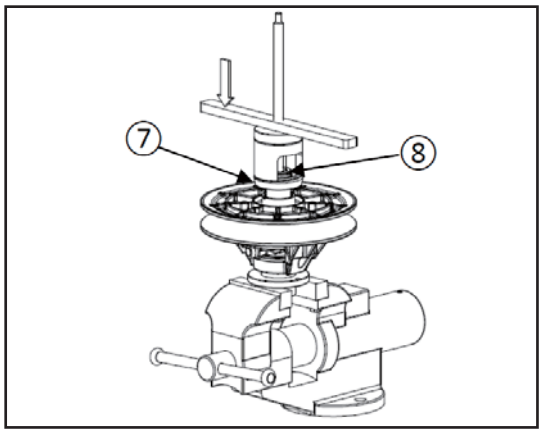
Removing the driven pulley

- If the drive belt is installed, screw the flange spreader 【A】 in the one of threaded holes, to remove the drive belt.
- Lock the pulley rotation by engaging in gear and apply the vehicle brakes.
- Remove the bolt or nut from the driven pulley.



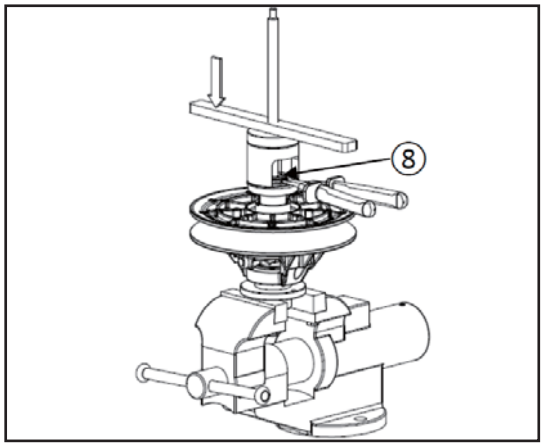
Spring disassembly

◆ Using a vise, mount the disassembly tool as shown .

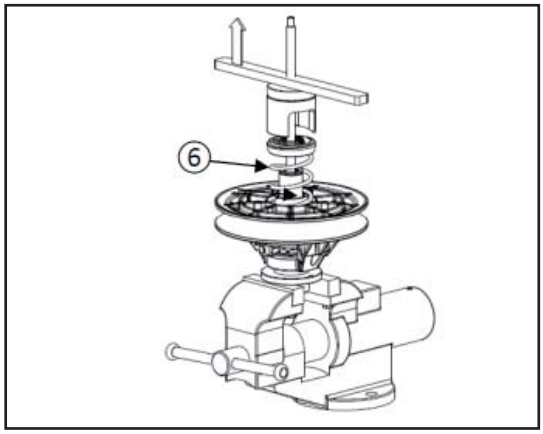


◆ Install the pulley on the disassembly tool as shown .

◆ By screwing the bar on the threaded rod, press down the spring seat ⑦ (3 to 4 mm max.) in order to free up the external retaining ring ⑧.



◆ Remove the external retaining ring ⑧ using the snap ring pliers.



◆ Slowly unscrew the bar on the threaded rod to release the spring ⑥ tension.

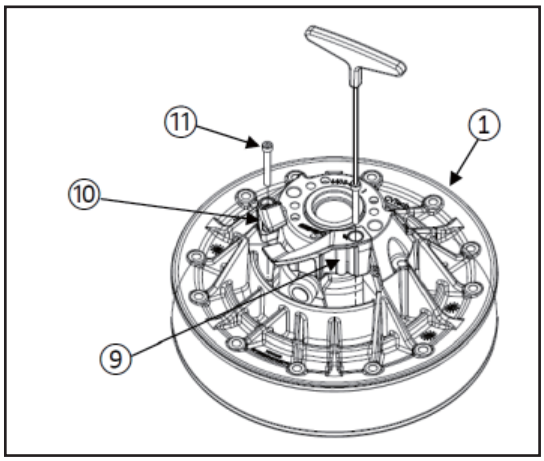
⚠ WARNING

Use the disassembly tool to disassemble the spring seat ⑦. The pulley is spring loaded with significant amount of force; the use of the disassembly tool will keep the pulley compressed.

⚠ WARNING

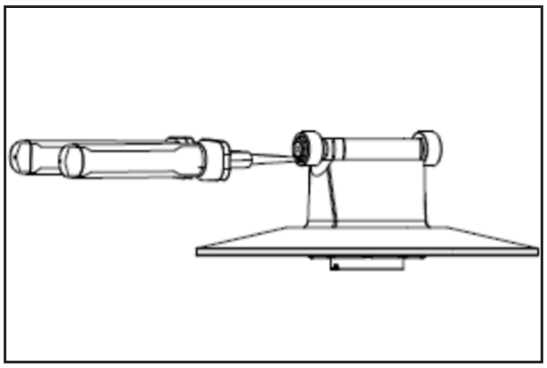
Slowly lift the spring seat ⑦ to free it from the shaft by unscrewing the disassembly tool once the external retaining ring ⑧ is removed.

Forward ramps ⑨ and helix ⑩ disassembly

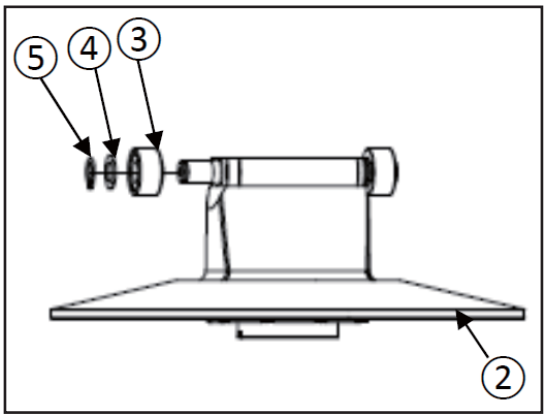


- Using the 3mm hexagonal key, remove the 4 retaining screws of the 2 forward ramps ⑨ and the 2 helix ⑩ from the fixed sheave ①.
- Remove the 2 forward ramps ⑨ and the 2 helix ⑩.
- Disassemble the 2 sheaves ① and ②.

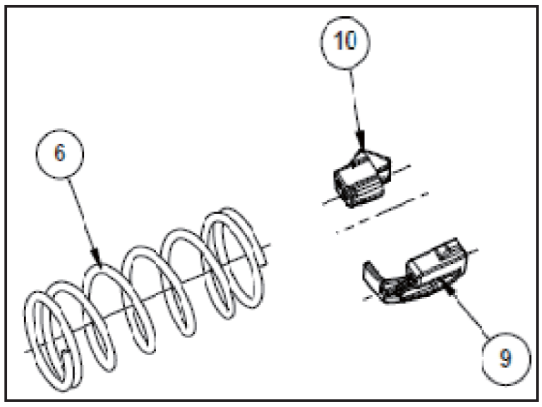
Rollers ③ disassembly



- Remove the external retaining ring from the sliding sheave ② .



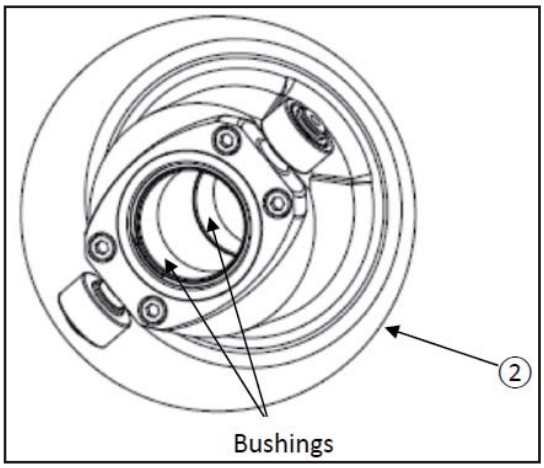
- Remove the 2 washers ④ and the 2 rollers ③ from the sliding sheave ② .



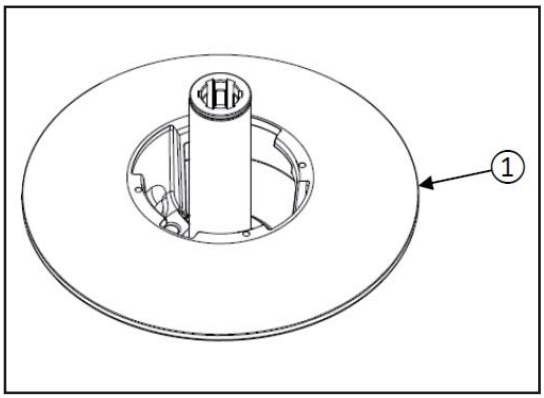
Sliding Flange Maintenance

Recommended inspection

- Check for wear marks on the forward ramps ⑨ and helix ⑩.
- Check for wear marks on the spring ⑥.
- Perform a visual inspection of the components.
- Check the wear of the sliding sheave ② bushings (visual inspection only). If there is excessive wear, you must replace the whole sheave assembly ②.



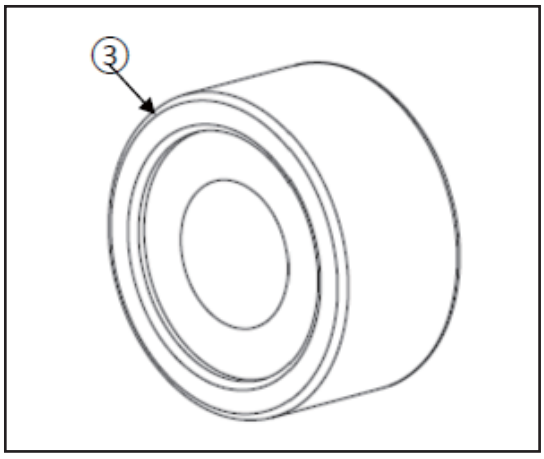
- The bushings cannot be removed from the sliding sheave ② .

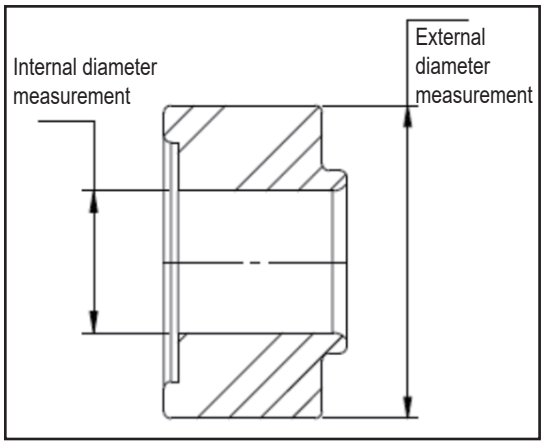


- The shaft cannot be disassembled from the fixed sheave ① .
- To maintain the performance of the pulley, make sure the sliding sheave ② bushings are cleaned with a microfiber towel or dry cloth.

⚠ CAUTION

Do not use acetone to clean the bushings.





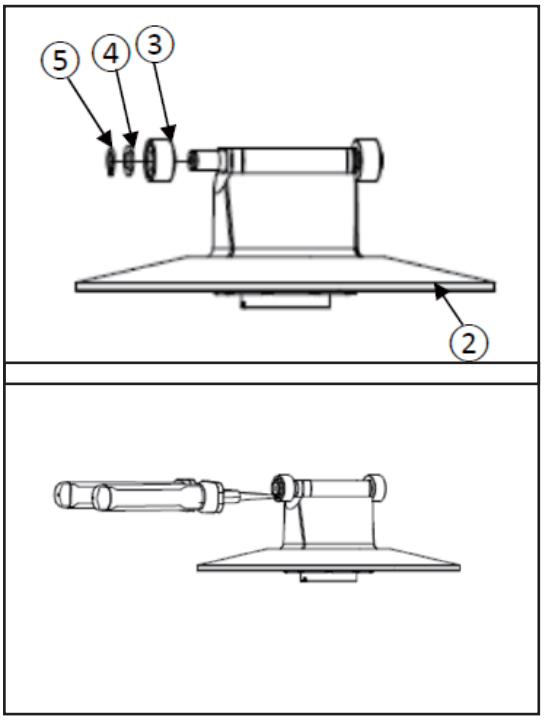
Sliding flange maintenance

Check for wear on the outside surface of the rollers ③

- ◆ No flat spot on the outside surface
- ◆ The external diameter must by bigger than 21 mm

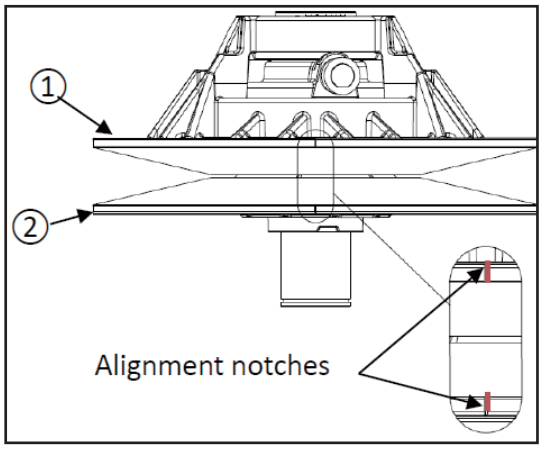
Check for wear on the inside surface of the rollers ③

- ◆ The internal diameter must be smaller than 10.5 mm

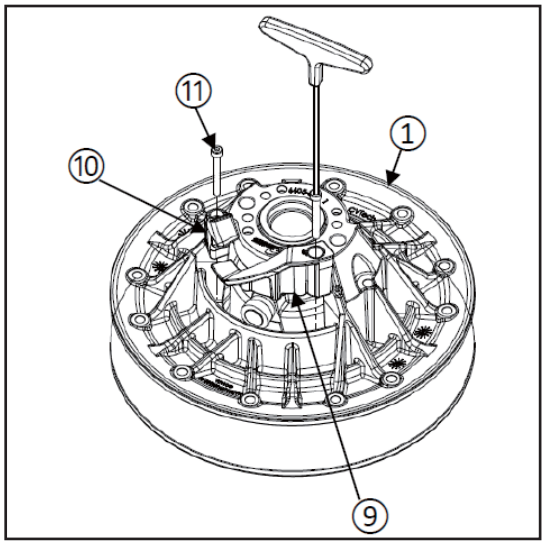


Rollers ③ re - assembly

- Insert the 2 rollers ③, the 2 washers ④ and the 2 external retaining rings ⑤ on the roller pins of the sliding sheave ② . Foward ramps ⑨ and helix ⑩ re - assembly

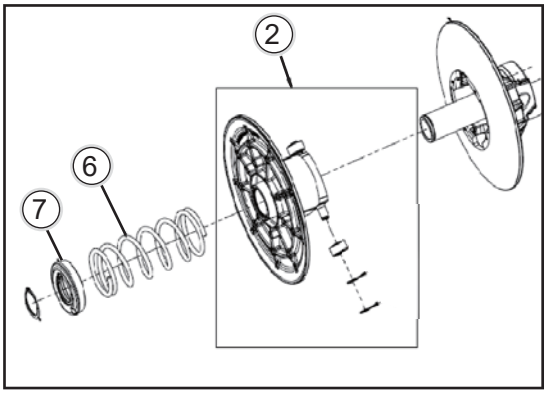


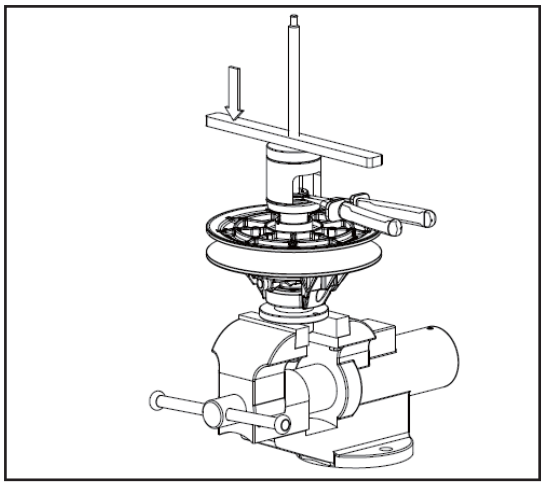
- Insert the sliding sheave ② on the fixed sheave ① and make sure that the alignment notches are aligned .

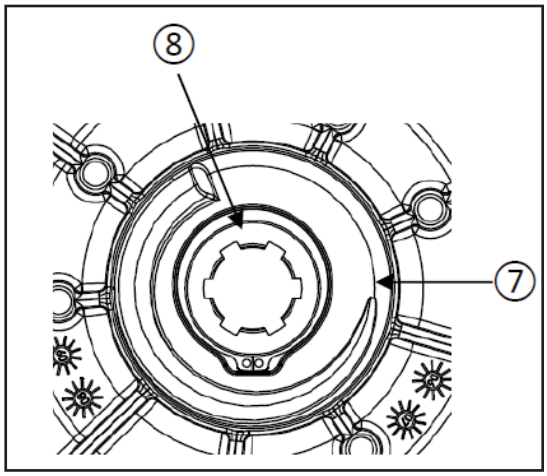


- Insert the 2 forward ramps ⑨ and the 2 helix ⑩ in the fixed sheave ①.
- Torque the 4 screws .

Screw
3.5 Nm (0.35 kgf•m,31in•lb)







Pulley re - assembly

- Install the pulley on the disassembly tool as shown .
- Insert the spring ⑥ in the sliding sheave ②.
- Put the spring seat ⑦ on the spring ⑥ and turn it clockwise until it comes to a stop in rotation; maintain the spring ⑥ by hand during the operation.
- Put the external retaining ring ⑧ on the spring seat ⑦.
- Make sure that the external retaining ring ⑧ is in the notch made for that purpose .
- With the compression tool, lower the spring ⑥ and spring seat ⑦ until they clear the retaining ring groove in the shaft.
- Install the external retaining ring ⑧.

⚠ WARNING

Slowly lift the spring seat ⑦ to free it from the shaft by unscrewing the disassembly tool.

⚠ WARNING

The use of the disassembly tool is required in order to assemble the sliding sheave ②.

CVT SYSTEM

Exploded View 3-6-2

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CVT Outer Cover Removal 3-6-8

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CVT Inner Cover Installation 3-6-9

Drive Belt 3-6-10

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Drive Belt Installation 3-6-10

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Drive Pulley and Driven Pulley 3-6-11

Drive Pulley and Driven Pulley Removal 3-6-11

Drive Pulley Disassembly 3-6-12

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Driven Pulley Disassembly 3-6-17

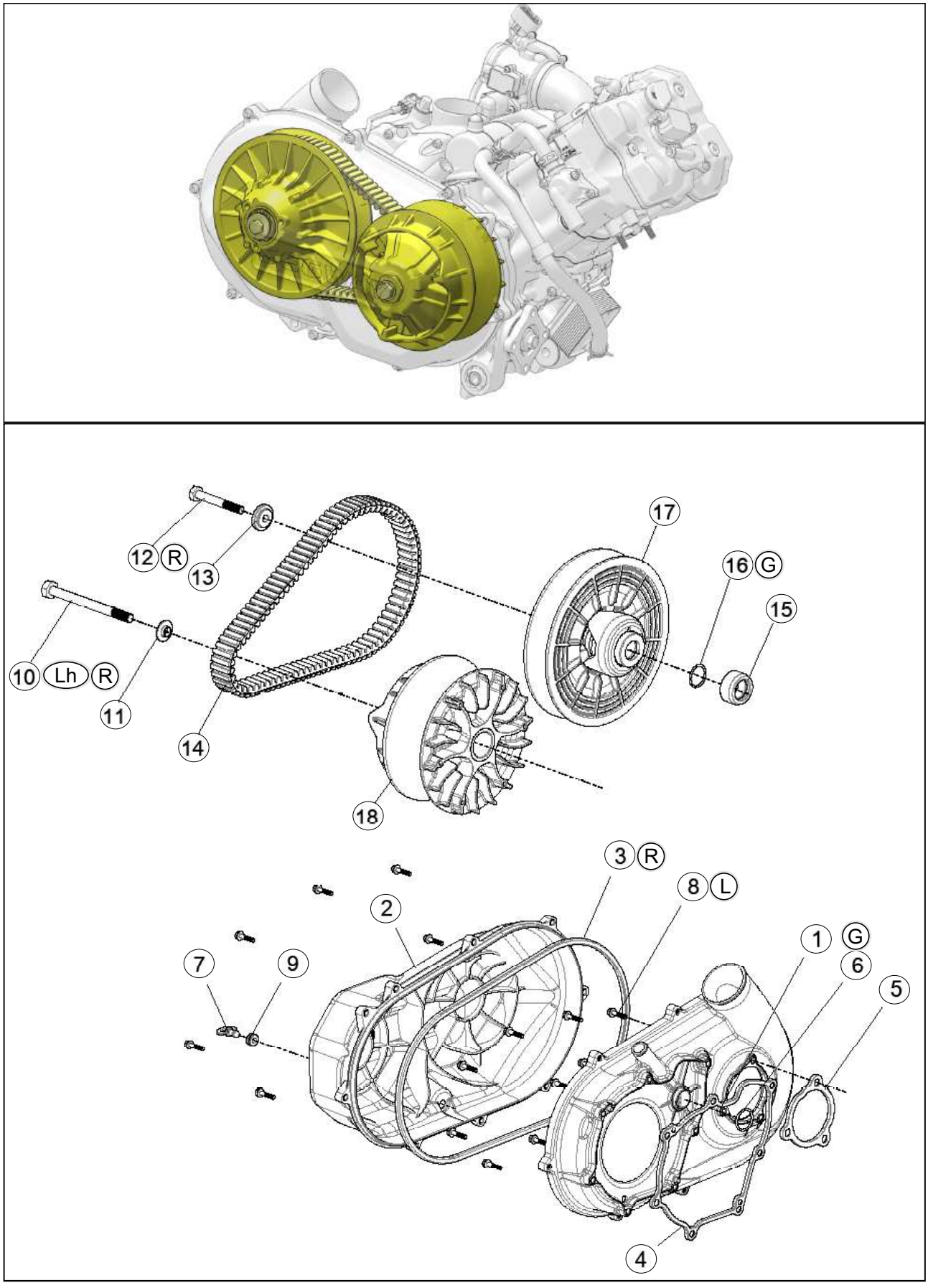
Driven Pulley Inspection 3-6-18

Driven Pulley Assembly 3-6-19

Drive Pulley and Driven Pulley Installation 3-6-21

CVT SYSTEM

Exploded view



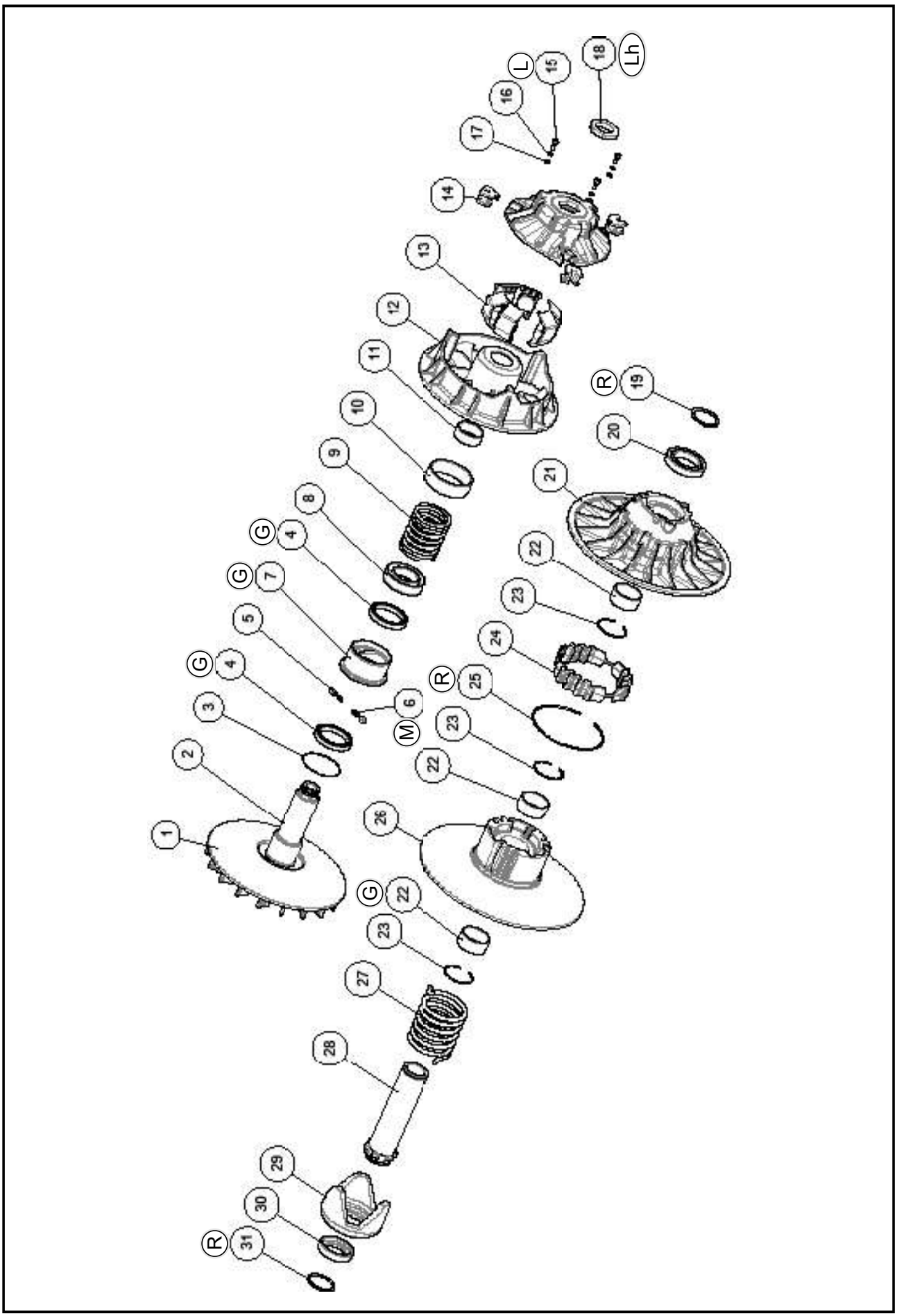
No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	CVT Inner Cover				
2	CVT Outer Cover				
3	CVT Cover Seal				R
4	CVT Inner Cover Seal Ⅰ				
5	CVT Inner Cover Seal Ⅱ				
6	O-Ring 30×3				G
7	CVT Cover Plug Seal				
8	Bolt M6×28	9.8	1.0	87 in•lb	L
9	CVT Cover Plug				
10	Bolt M12×1.25×142	120	12.2	88	R,Lh
11	Spacer 12×28×6				
12	Bolt M10×1.25×80	80	8.2	59	R
13	Spacer 10.5×36×8				
14	Drive Belt				
15	Driven Pulley Spacer				
16	O-Ring 26.1×2.4				G
17	CVT Driven Pulley Assembly				
18	CVT Drive Pulley Assembly				

G:Apply grease for oil seal and O-ring.

L:Apply a non-permanent locking agent.

Lh:Left-hand Threads

R:Replacement Part.


1
2
3
4
G
5
6
M
7
G
8
4
G
9
10
11
12
13
14
15
L
16
17
18
Lh
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R
20
21
22
23
24
25
R
23
22
26
22
G
23
27
28
29
30
31
R

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Drive Fixed Sheave				
2	Drive Fixed Shaft				
3	Circlip 52				
4	Bearing 61808-2RS				G
5	Cam Pin				
6	Cam Spring				M
7	One-Way Bearing Housing				G
8	Spring Seat				
9	Drive Pulley Spring				
10	Bushing 60×55×20				
11	Bushing 36×32×15				
12	Drive Movable Sheave				
13	Counterweight Shoes				
14	Thrust Plate Shoes				
15	Screw M4×8	6	0.61	53	L
16	Spring Washer				
17	Spacer				
18	Nut	150~170	15.3~17.3	110~125	Lh
19	Circlip 35				
20	Bearing 61907-2RS				R
21	Driven Fixed Sheave				
22	Bushing 35×39×18				G
23	Circlip 39				
24	Guide Ring				
25	Circlip 99				R
26	Driven Movable Sheave				
27	Driven Pulley Spring				
28	Driven Fixed Shaft				
29	Driven Pulley Guide Seat				
30	Spacer				
31	Circlip 35				R

G:Apply grease for oil seal and O-ring.

L:Apply a non-permanent locking agent.

Lh:Left-hand Threads

M:Apply molybdenum disulfide grease

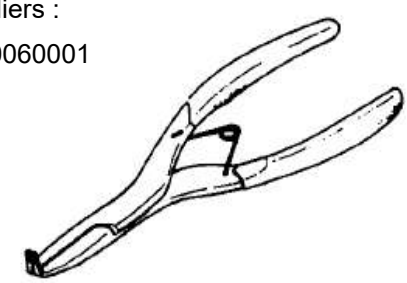
R:Replacement Part.

Technical Parameter

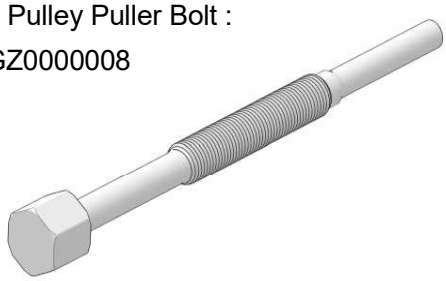
Item	Standard	Service Limit
Drive Belt:		
Belt deflection	22 ~ 27 mm (0.87 ~ 1.06")	– – –
Belt height (Parallel portion)	3.0 ~ 3.5 mm (0.118" ~ 0.138")	0.65 mm(0.026")
Drive Pulley:		
Bushing(10) inside diameter	55.005 ~ 55.095 mm (2.166" ~ 2.169")	55.15 mm (2.171")
Bushing(11) inside diameter	32.003 ~ 32.073 mm (1.260" ~ 1.263")	32.11 mm (1.264")
Shoe side clearance	0.15 ~ 0.30mm (0.0059" ~ 0.0118")	– – –
Spring free length	81.5mm (3.2")	– – –
Driven Pulley:		
Sheave bushing(22) inside diameter	35.003 ~ 35.073 mm (1.378" ~ 1.381")	35.11 mm (1.382")
Spring free length	139 mm (5.472")	– – –

Special tools

Circlip Pliers :
E01GZ0060001



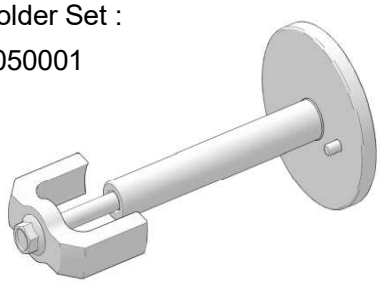
Drive Pulley Puller Bolt :
E01GZ0000008



Belt Separate Bolt :
E01GZ0000013

Drive Pulley Holder :
E01GZ0000012

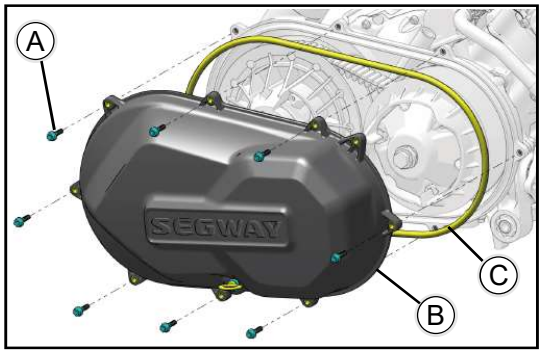
Spring Holder Set :
E01GZ0050001



CVT Cover

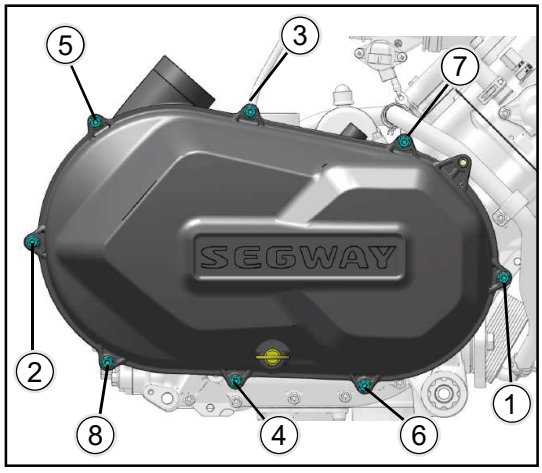
⚠ WARNING

Excessive imbalance or operating rpm could cause CVT pulley failure resulting in severe injury or death. The pulleys of the CVT are precision balanced components designed to operate within certain rpm limits. Disassembly/assembly and servicing procedures of the pulley assemblies must be followed closely. Modifications to the engine or pulleys that increase rpm may cause failure.



CVT Cover Removal

- Turn the ignition switch OFF.
- Remove
  CVT Outer Cover Bolts【A】
  CVT Outer Cover【B】

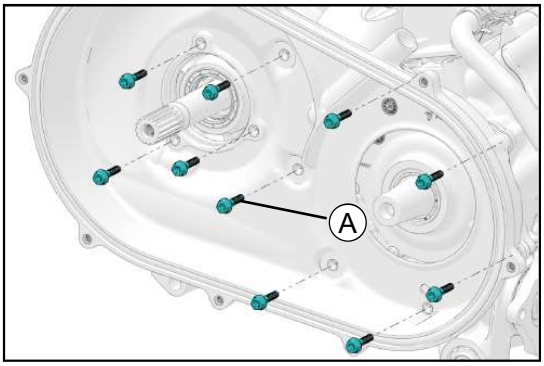


CVT Cover Installation

- Fit the CVT Cover seal【C】into the seal groove of CVT Inner cover
- Tighten the cover bolts following the tightening sequence as shown.

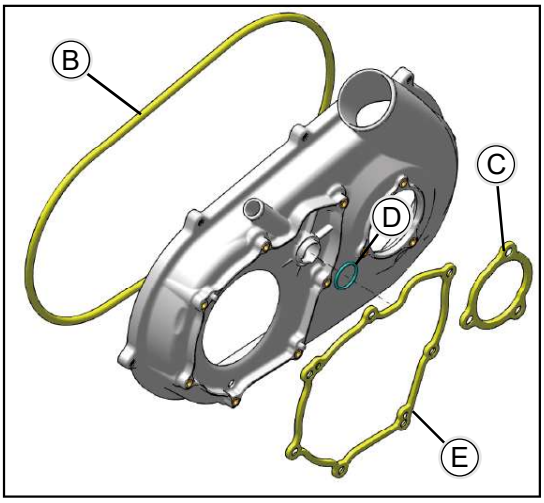
Torque

Converter Cover Bolts
9.8 N•m (1.0kgf•m, 87 in•lb)



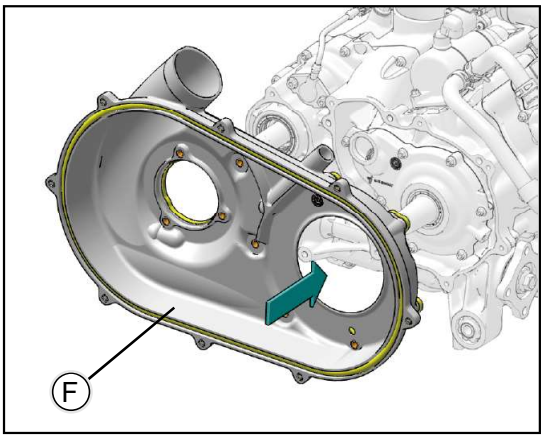
CVT Inner Cover Removal

- Remove the Drive Pulley and Driven Pulley (See Drive Pulley Removal)
- Remove:
  Bolts M8×28【A】
  Remove CVT Inner Cover assembly



CVT Inner Cover Disassembly:

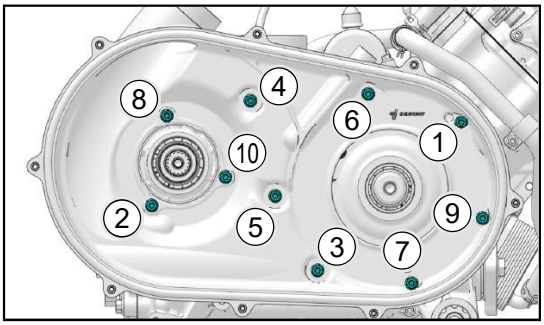
- Remove:
  CVT Cover Seal【B】
  CVT Inner Cover Seal Ⅰ【E】
  CVT Inner Cover Seal Ⅱ【C】
  O-Ring 30×3【D】



CVT Inner Cover Installation:

Replace CVT Cover Seal【B】,CVT Inner Cover Seal Ⅰ【E】and CVT Inner Cover Seal Ⅱ【C】if water leaks are evident.

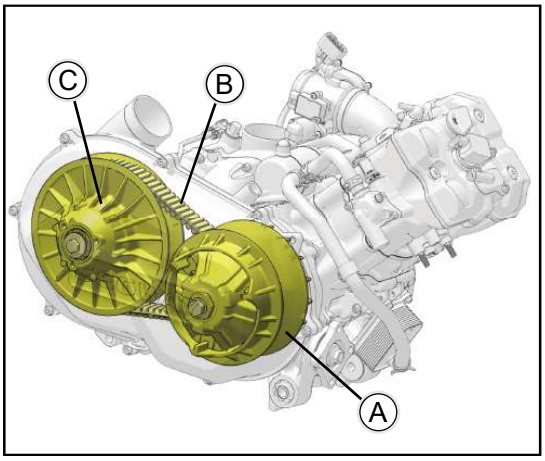
- Prepare CVT Inner Cover sealing surfaces by cleaning thoroughly to remove all residue.
- Install:
  CVT Inner Cover Assembly【F】

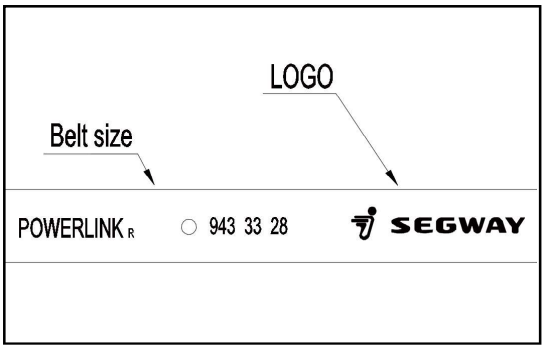


- Tighten the cover bolts following the tightening sequence as shown.

Torque

Converter Cover Bolts
9.8 N•m (1.0kgf•m, 87 in•lb)





Drive Belt

Drive Belt Removal

◆ Remove the drive pulley【A】(see Drive Pulley Removal).

NOTE

Before removing the drive belt, observe the direction of the informations【A】(Such as manufacturers name and arrow marks) printed on the belt so that it may be reinstalled on the pulleys as originally.

◆ Lift the drive belt【B】off the driven pulley【C】.

Drive Belt Installation

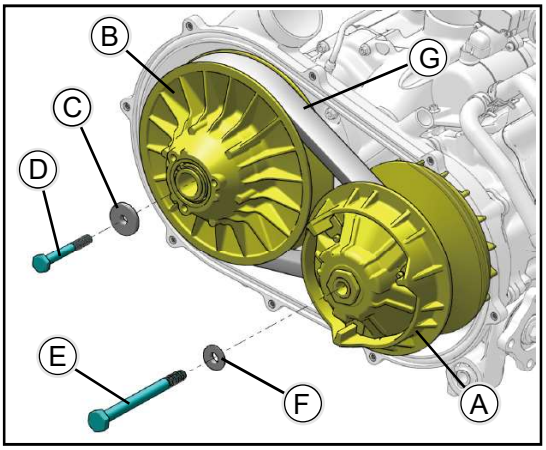
NOTE

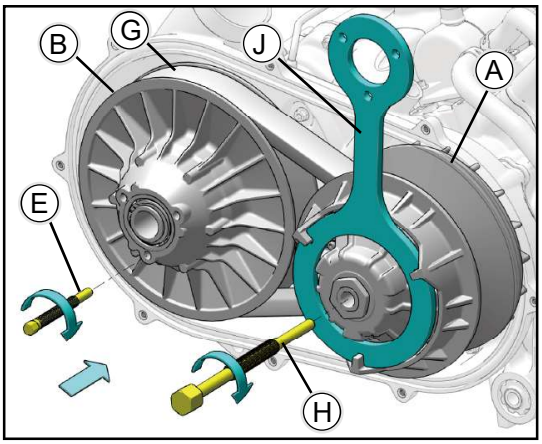
Be sure the printed information faces the same direction so the belt rotates in the same direction as originally installed. When installing a new belt, install it so the printed information【A】can be read from beside the vehicle.

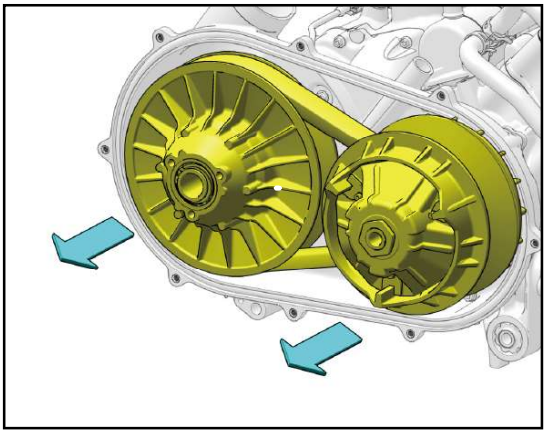
◆ Installation is basically the reverse of removal.
◆ Loop the belt【B】over the driven pulley【C】.
◆ Install the drive pulley (see Drive Pulley Installation).
◆ Put the transmission in neutral, and rotate the driven pulley to allow the belt to return to the top【A】of the sheaves, before measuring belt deflection.

Drive Belt Inspection

◆ Refer to the CVT System in the Periodic Maintenance chapter.







Drive Pulley and Driven Pulley

Drive Pulley and Driven Pulley Removal

◆ Remove:

Torque CVT Cover (see Torque Converter Cover Removal)

◆ Loosen the drive pulley bolt【E】(left-hand threads)

NOTE

The drive pulley bolt has left-hand threads. Turn the wrench clockwise for loosening.

◆ Loosen the driven pulley bolt【D】(right-hand threads)

◆ Remove:

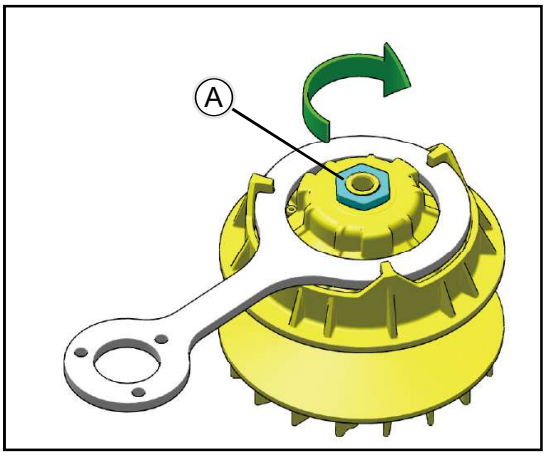
Drive Pulley Bolt M12×1.25×142-LH【E】
Spacer 12×28×6【F】
Driven Pulley Bolt M10×1.25×80【D】
Spacer 10.5×36×8【C】

◆ Remove the drive pulley【A】from the crankshaft by screwing the drive pulley puller bolt【H】clockwise, while holding the drive pulley with the drive pulley holder【J】.

◆ Screwing the Driven Pulley Separate Bolt【E】to separate the Belt【G】from Driven Pulley【B】.

Special Tool -
Drive Pulley Puller Bolt: E01GZ0000008
Belt Separate Bolt: E01GZ0000013
Drive Pulley Holder: E01GZ0000012

◆ Remove the drive pulley, driven pulley and Drive Belt together.



Drive Pulley Disassembly

◆ Turn clockwise from the drive pulley assembly to loosen the Nut【A】.

Special Tool -

Drive Pulley Holder: E01GZ0000012

◆ Remove:

Nut 【A】

Thrust Plate Assembly【B】

Counterweight Shoes【C】

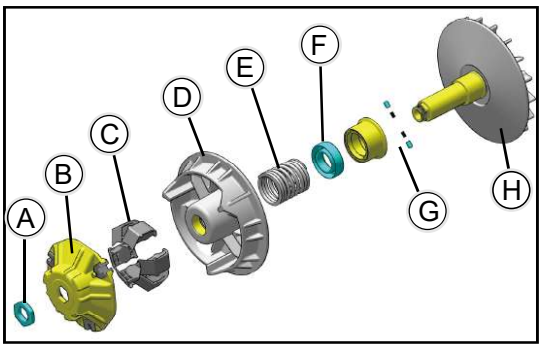
Drive Movable Sheave【D】

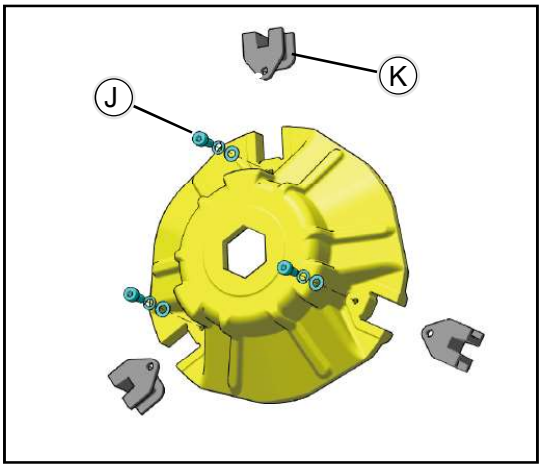
Drive Pulley Spring【E】

Spring Seat【F】

One-Way Bearing Assembly【G】

Dirve Fixed Sheave Assembly【H】

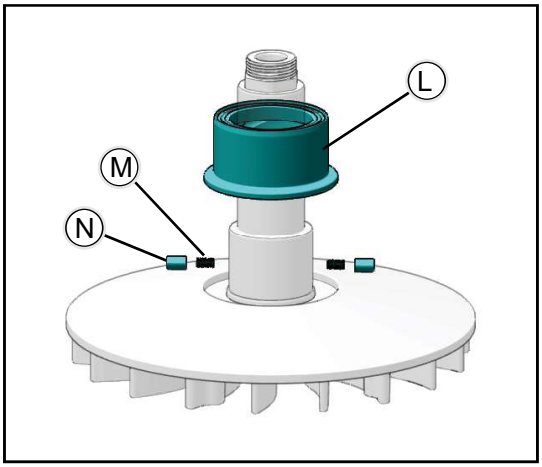




◆ Thrust Plate disassembly

Screw M4×8【J】

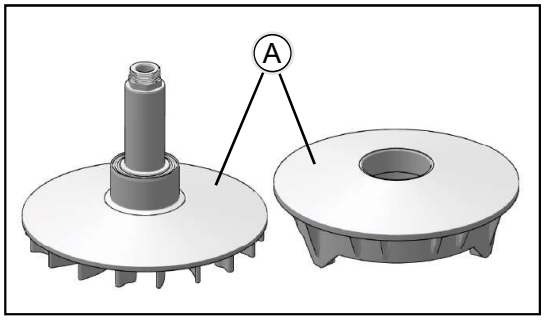
Thrust Plate Shoes【K】

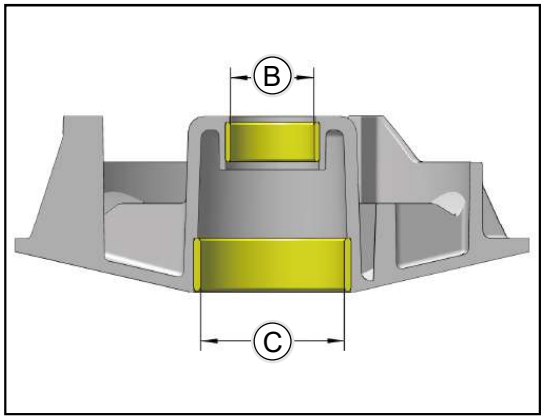


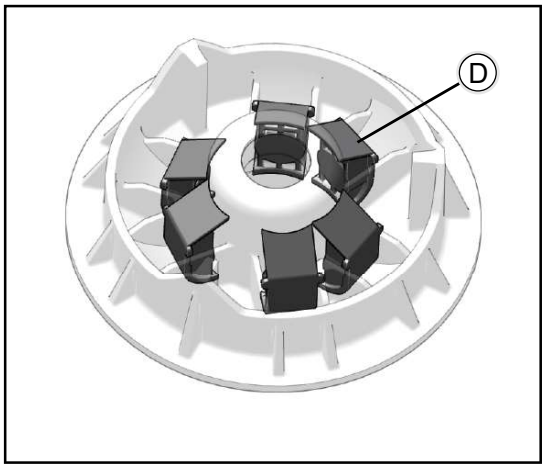
◆ One-Way Bearing disassembly

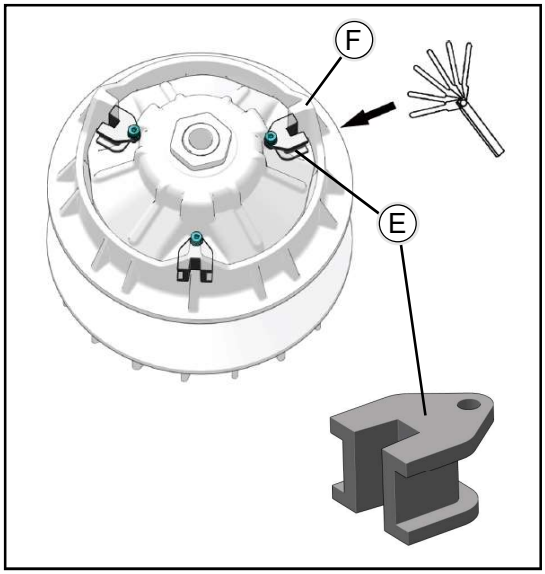
Turn clockwise from the Dirve Fixed Sheave Assembly to remove the One-Way Bearing【L】

Remove the Cam Pin【M】and Cam Spring【N】together carefully to prevent the them from springing off.









Drive Pulley Inspection

◆ If the sheave surfaces【A】appear damaged, replace the sheaves.

◆ Measure the inside diameter【B】and【C】of the Bushings.

◆ If the Drive Move Pulley Bushing is damaged or worn, replace the Drive Move Pulley.

Bushing 60×55×20 inside Diameter:【C】	
Standard:	55.005 ~ 55.095 mm (2.166" ~ 1.169")
Service Limit:	55.15 mm (2.171")

Bushing 36×32×15 inside Diameter:【B】	
Standard:	32.003 ~ 32.073 mm (1.260" ~ 1.263")
Service Limit:	32.11 mm (1.264")

◆ Check the Surface wear of the Counterweight Shoes.

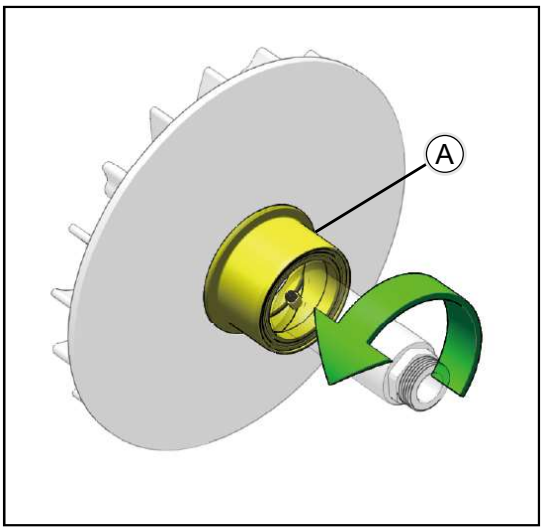
◆ If the Counterweight Shoes【D】are damaged, replace them.

◆ Check the Shoes side clearance

◆ Measure the resulting clearance between the Thrust Plate Shoes【B】and the post【C】on the movable sheave at all three positions as shown.

If any of the measurements are greater than the maximum, replace all shoes with standard shoes.

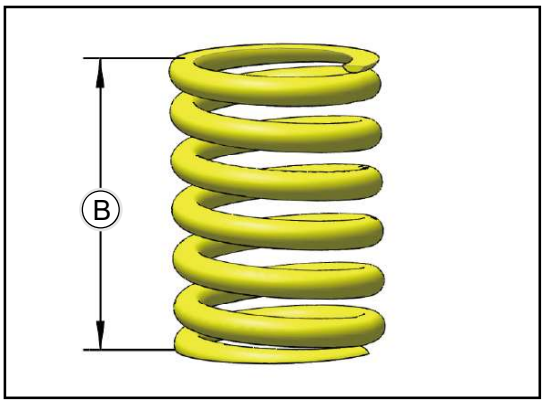
Shoes side clearance:	
Standard:	0.15~ 0.30 mm (0.0059" ~ 0.0118")



◆ One-Way Bearing Inspection:

◆ If the One-Way Bearing Assembly【A】turns counterclockwise【A】freely from the Dirve Fixed Sheave, but not clockwise【B】, the One-Way Bearing is operating correctly.

◆ If the One-Way Bearing does not operate correctly, or if it makes noise, disassemble it and examine each part visually. Replace any worn or damaged parts.

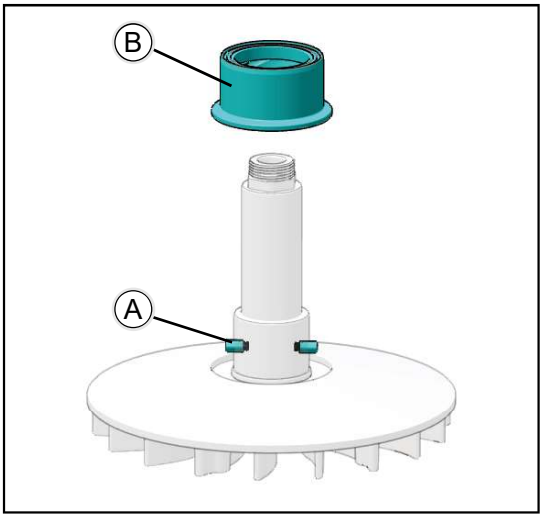


◆ Check the Spring Free Length:

If the spring is worn or damaged, replace the spring.

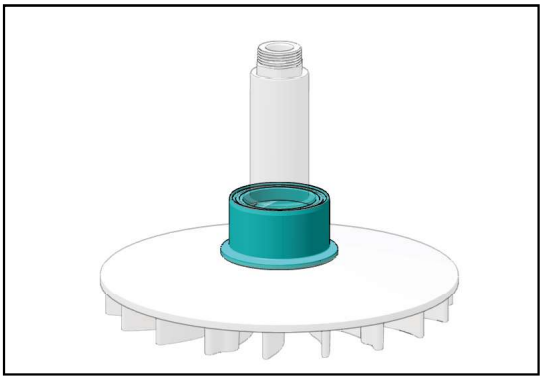
Spring Free Length : 【B】	
Standard:	81.5 mm (3.200")

Drive Pulley Assembly

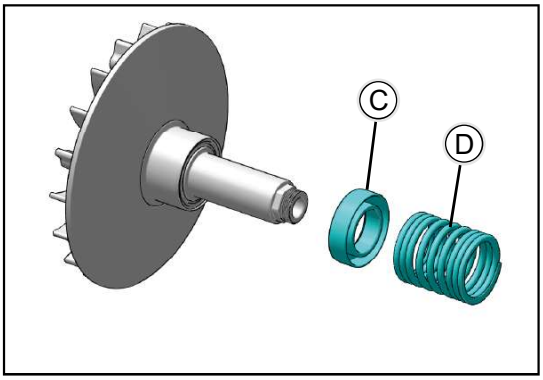


- ◆ Clean off any grease or dirt on the movable and fixed sheaves, and dry them with a clean cloth.
- ◆ Install the One-Way Bearing.

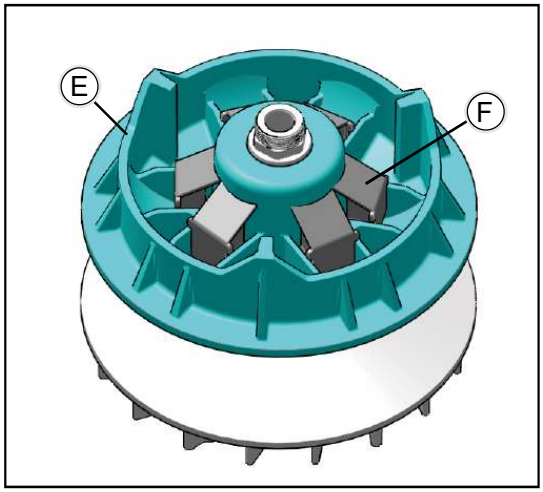
1. Install the Cam Pin【A】and Cam Spring【N】together into the mounting hole of Drive Fixed Shaft.
2. Turn down along the axis and counterclockwise to the end.



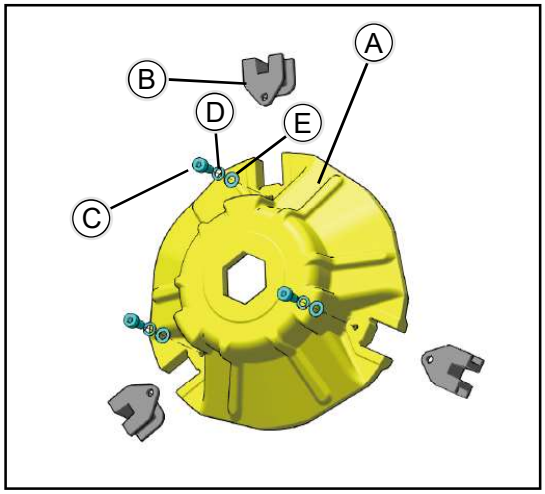
3. Check the One-Way Bearing (See One-Way Bearing Inspection)



4. Install the Spring Seat【C】and Drive Pulley Spring【D】.



5. Install the Movable Sheave【E】and Counterweight Shoes【F】.



6. Thrust Plate assembly:

Install all three Thrust Plate Shoes【B】to the gap of the Thrust Plate【A】.

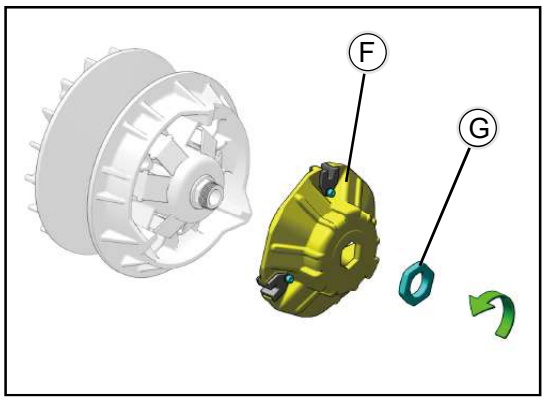
Install Screws M4×8【C】,Spring Washer【D】and Spacer【E】

◆ Tighten:

Torque

Screws M4×8
6 N•m (0.6kgf•m, 53in•lb)

Apply a non-permanent locking agent to the Screws【C】.

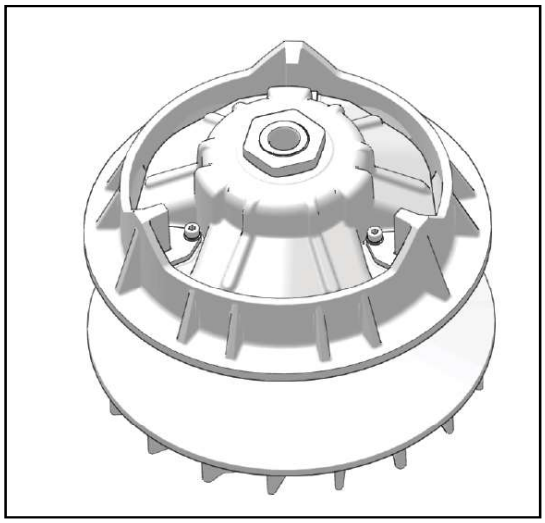


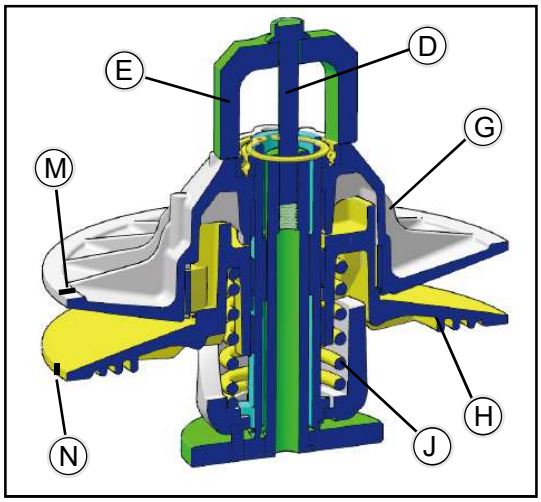
7. Install the Thrust Plate assembly【F】and Nut【G】(left-hand threads).

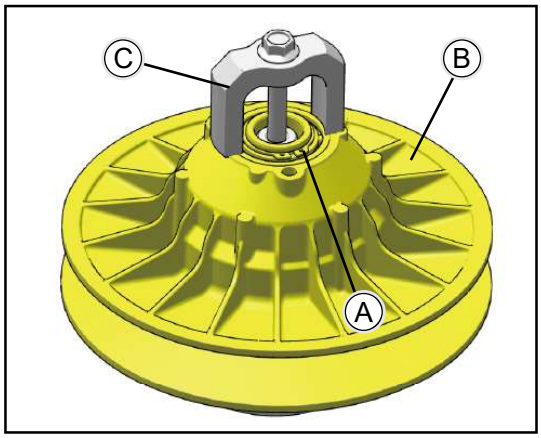
◆ Tighten:

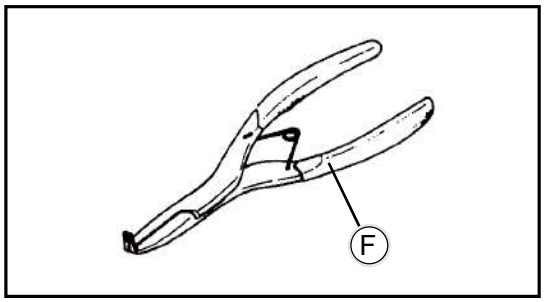
Torque

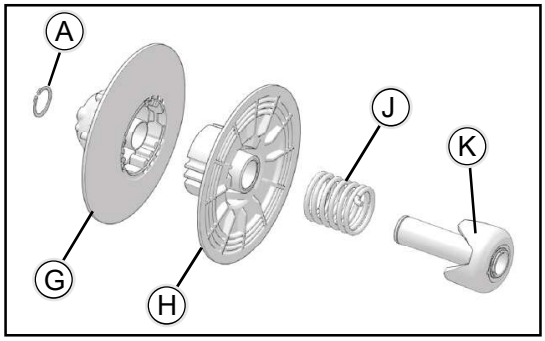
Nut
150~170 N•m (15.3~17.3 kgf•m, 110~125 ft•lb)











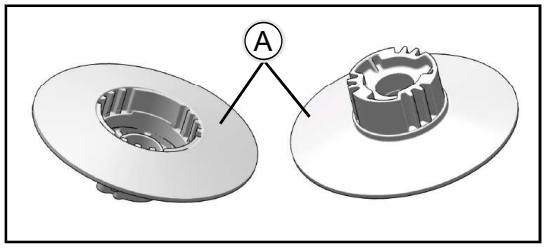
Driven Pulley Disassembly

- Hold the spring holder set【C】in the Driven Pulley Disassembly【B】.
- Put the CVT Driven Pulley Assembly【B】on the guide bar of the spring holder set.
- Screw the Bolt【D】of the spring holder set into the holder.
- Hold the spring holder set【C】in the Driven Pulley Disassembly【B】.
- Tighten the Bolt【D】, and compress the spring with the spring holder【E】of the spring holder set.

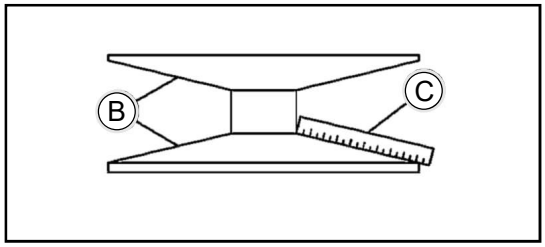
  Special Tool -

  Spring Holder Set : E01GZ0050001
- Remove the circlip【A】with circlip pliers【F】.
- Remove the Bolt【D】 and spring holder【E】.
- Make match–marks【M】and【N】on the Movable Pulley【H】and Fixed Pulley【G】so that it can be installed later in the same position.
- Remove Fixed Sheave【G】from the Movable Sheave【H】.
- Remove the Driven Pulley Spring【J】.
- Remove the Driven Pulley Guide Seat【K】.

Driven Pulley Inspection



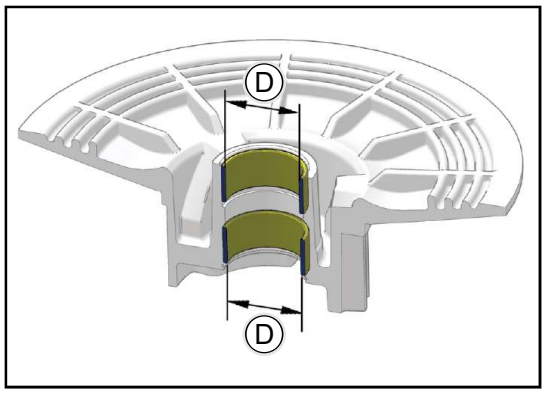
If the sheave surfaces【A】appear damaged, replace the sheaves.



◆ Replace the sheave with uneven wear on the belt contacting surfaces.

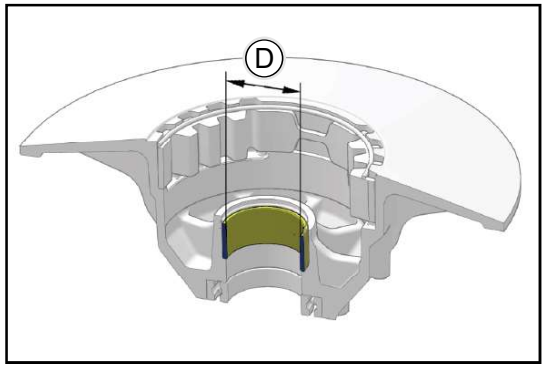
Sheave Surface【B】

Straight Edge【C】



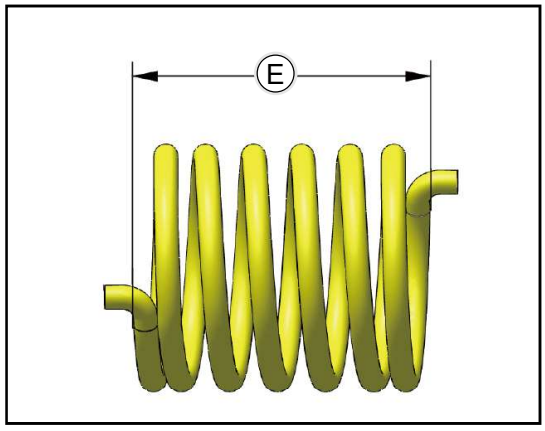
If the sheave bushings【D】are damaged or worn, replace the movable sheave or fixed sheave.

Bushing 35×39×18 inside Diameter:【D】	
Standard:	35.003 ~ 35.073 mm (1.378" ~ 1.381")
Service Limit:	35.11 mm (1.382")



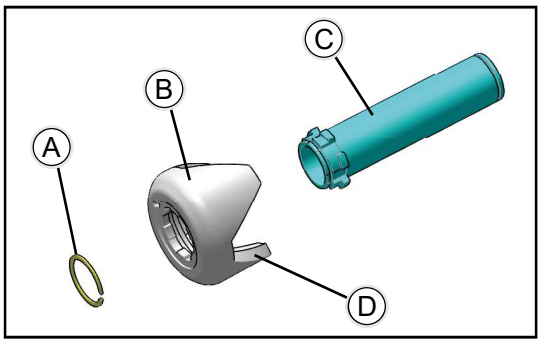
◆ Check the Spring Free Length:

If the spring is damaged or worn, replace the spring.



Spring Free Length :【E】	
Standard:	139 mm (5.472")

If the spring coils are distorted, replace the spring.



◆ Check the guide Surfaces【D】of the Driven Pulley Guide Seat【B】

◆ If any of the guide Surfaces appear damaged, replace the Driven Pulley Guide Seat.

Circlip【A】

Dirven Pulley Guide Seat【B】

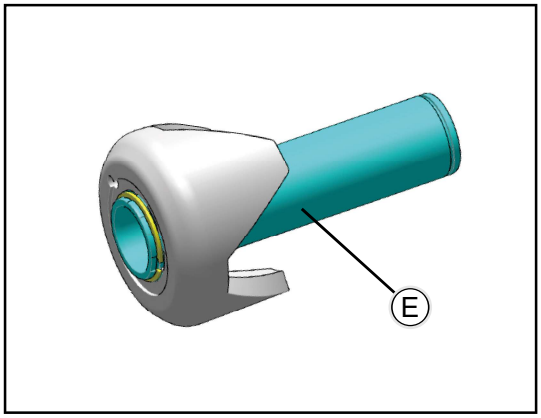
Dirven Fixed Shaft【C】

Driven Pulley Assembly

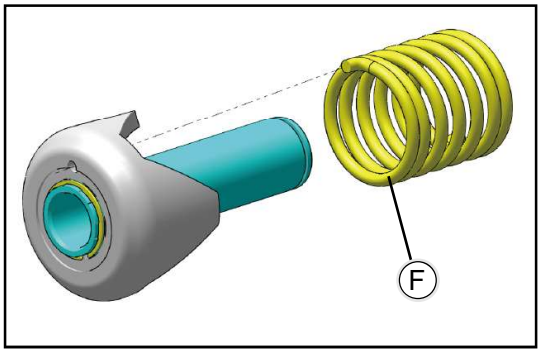
◆ Clean off any grease or dirt on the movable and fixed sheaves, and dry them with a clean cloth.

◆ Install :

1. Assemble the Dirven Pulley Guide Seat Assembly【E】.

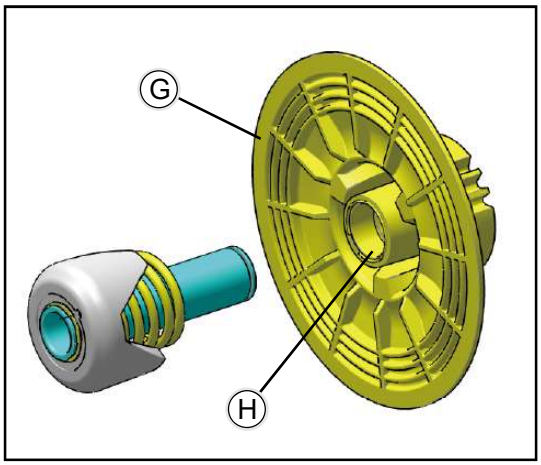


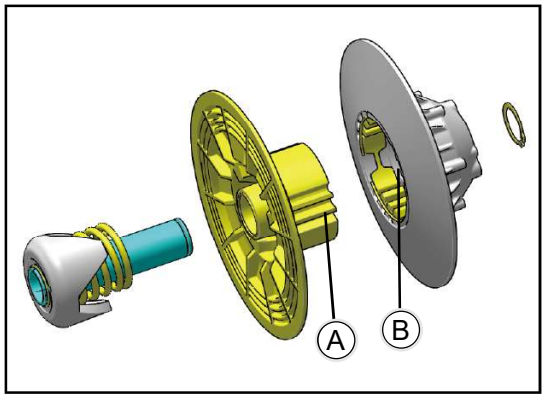
2. Install the Spring【F】.



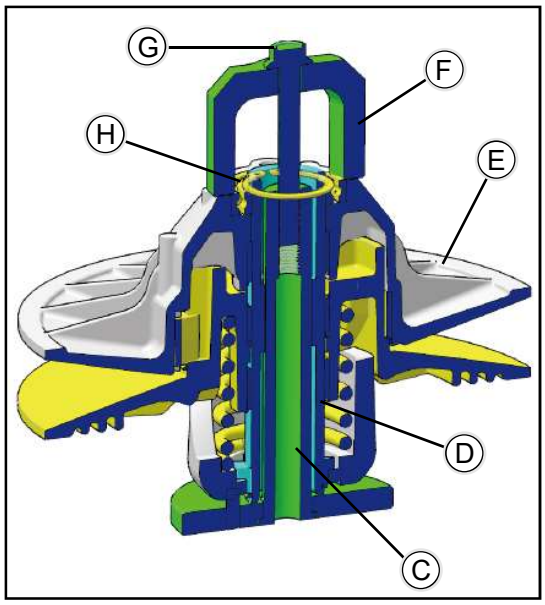
3. Install the Movable Sheave Assembly【G】.

Apply molybdenum disulfide grease to the inner surfaces【H】of the bushings.

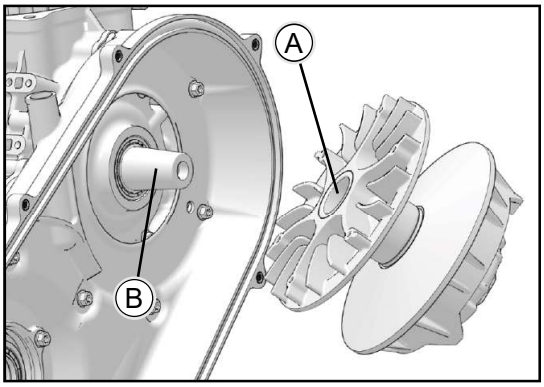


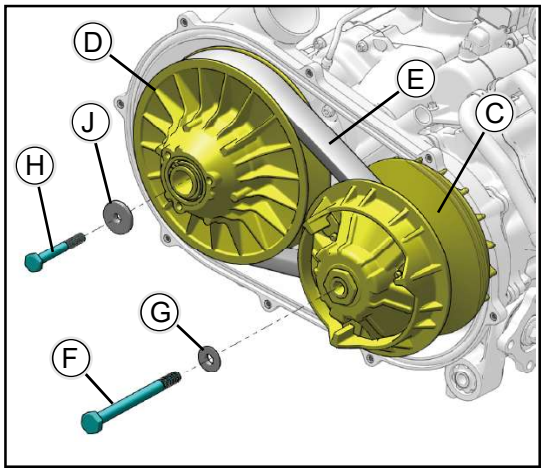


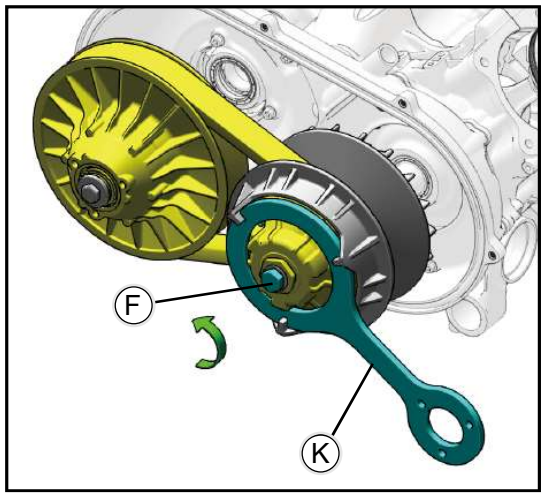
4. Align the match–marks on the sheaves, made when disassembled, and the openings【A】and grooves【B】will be matched easily.

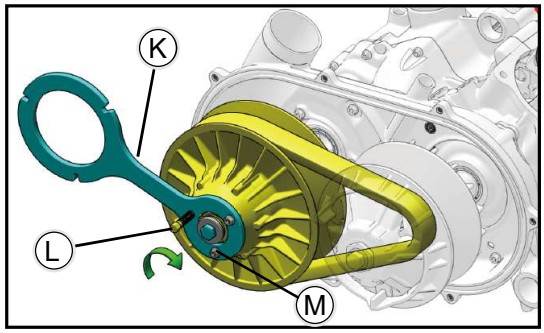


5. Install the guide bar of the spring holder set【C】into the Dirven Pulley Guide Seat Assembly【D】.
   Special Tool -
   Spring Holder Set : E01GZ0050001
6. Put the Driven Pulley【E】onto the Dirven Fixed Shaft【D】of the Dirven Pulley Guide Seat Assembly
7. Tighten the Bolt【G】, and compress the spring with the spring holder【F】.
8. Install the circlip【H】with the circlip pliers.
   Special Tool - Circlip Pliers : E01GZ0060001
9. Remove the driven pulley from the spring holder set.
10. Clean the surface of the sheaves with an oil-less cleaning fluid.









Drive Pulley and Driven Pulley Installation

◆ Clean the following portions with an oil-less cleaning fluid such as trichloroethylene or acetone.

Fixed Sheave Tapered Portion【A】

Crankshaft Tapered Portion【B】

⚠ WARNING

These cleaning fluids are usually highly flammable and harmful if breathed for prolonged periods. Be sure to heed the fluid manufacturer's warnings.

◆ Combine the CVT Drive Pulley Assembly【C】, CVT Driven Pulley Assembly【D】and Belt【E】and install them to taper【B】of the Crankshaft and spline of the Transmission Main Shaft.

◆ Install

Spacer 12×28×6【G】

CVT Drive Pulley Bolt M12×1.25×142【F】

Spacer 10.5×36×8【J】

CVT Driven Pulley Bolt M10×1.25×80【H】

◆ Tighten the CVT Pulley Bolt to the specified torque.

Torque

Drive Pulley Bolt
120 N•m (12.2 kgf•m, 88 ft•lb)

Drive Pulley Bolt
80 N•m (8.2 kgf•m, 59 ft•lb)

Special Tool -

Drive Pulley Holder【K】: E01GZ0000012

Belt Separate Bolt【L】: E01GZ0000013

◆ Remove the Drive Pulley Holder【K】, Belt Separate Bolt【L】and Bolt M8【M】.

◆ Install the CVT Outer Cover (See CVT Cover Installation)

FRONT AND REAR DIFFERENTIAL

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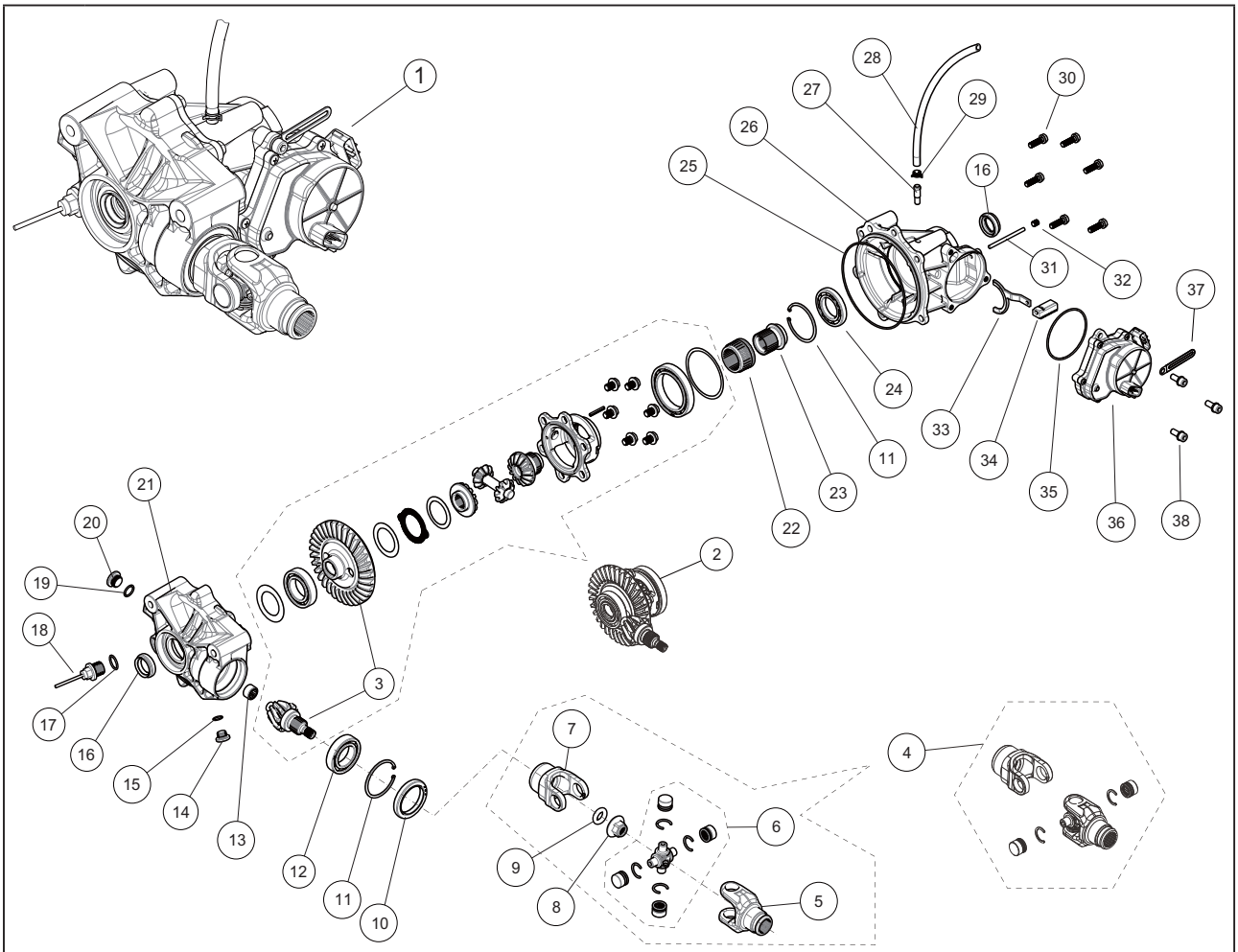
Exploded view of Front Differential



No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	FRONT DIFFERENTIAL ASSEMBLY				
2	FRONT DIFFERENTIAL DIFFERENTIAL COMBINATION				
3	DRIVE & DRIVEN BEVEL GEAR KIT				
4	UNIVERSAL JOINT COMBINATION				
5	CONNECTION FORK B				
6	UNIVERSAL JOINT				
7	CONNECTION FORK A				
8	LOCKED NUT M14×1.5	180	18.3	133	L
9	O-RING 14×6.8				G
10	OIL SEAL 48×65×9				G
11	CIRCLIP 62				
12	BEARING 6007				
13	NEEDLE BEARING HK152112				
14	PLUG M14	18	1.83	13	
15	O-RING 13×1.5				G
16	OIL SEAL 24×38×8				G
17	O-RING 19.4×2.3				G
18	VEHICLE SPEED SENSOR	18	1.83	13	
19	O-RING 16.4×2.5				G

FRONT AND REAR DIFFERENTIAL

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
20	PLUG M18×1.5	18	1.83	13	
21	FRONT Differential GEAR BOX CASE				
22	SLIDING SLEEVE				
23	DIVIDE DEVICE CONNECTION				
24	BEARING 16007				
25	O-RING 140×2.65				G
26	FRONT Differential GEAR BOX COVER				
27	AIR TAP				
28	PIPE 600				
29	SPRING BAND HOSE CLAMPS				
30	BOLT M8×28	25	2.55	21	L
31	CYLINDRICAL PIN 5×75				
32	PLUG M8×10				
33	FORK				
34	RACK				
35	O-RING 72.7×2.4				G
36	TRANSFER CASE ASSEMBLY				
37	CLAMP(12×75)				
38	BOLT M8×20	25	2.55	21	L

O: Apply gear oil.

G: Apply grease for oil seal and O-ring.

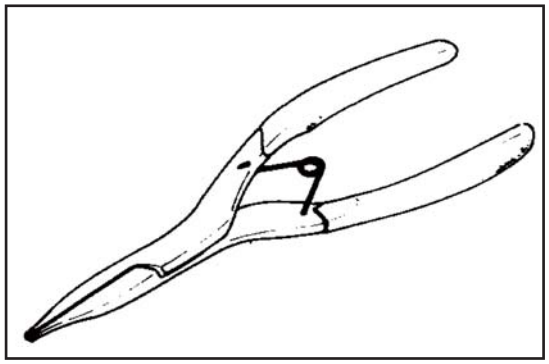
L: Apply a non-permanent locking agent.

Specifications

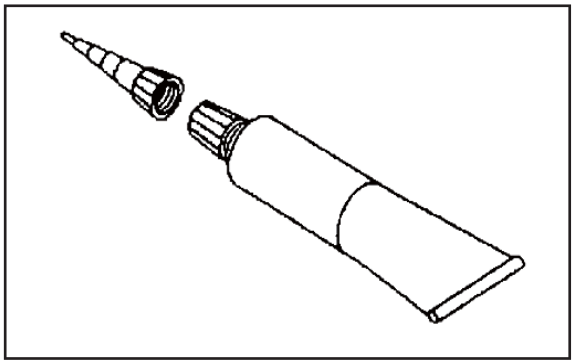
Item	Standard	Service Limit
Front gear box:		
Type	SAE 80W/90 GL-5	
Refueling position	Side of the box(PLUG M18)	
Oil drain position	Bottom of the box(PLUG M14)	
Capacity	300 mL (0.32 US qt) (When there is no oil stains after internal cleaning) 280 mL (0.3 US qt) (Only when changing gear oil)	
Bevel gear backlash	0.15~0.25 mm(0.06~0.10 in.)	
Rear gear box :		
Type	SAE 75W/90 orSAE 80W/90	
Refueling position	Side of the box(SCREW PLUG M14)	
Oil drain position	Bottom of the box(SCREW PLUG M14)	
Capacity	260 mL (0.27 US qt) (When there is no oil stains after internal cleaning) 220 mL (0.23 US qt) (Only when changing gear oil)	
Bevel gear backlash	0.15~0.25 mm(0.06~0.10 in.)	

Special Tools

Inside Circlip Plisers:



Silicone Sealant:



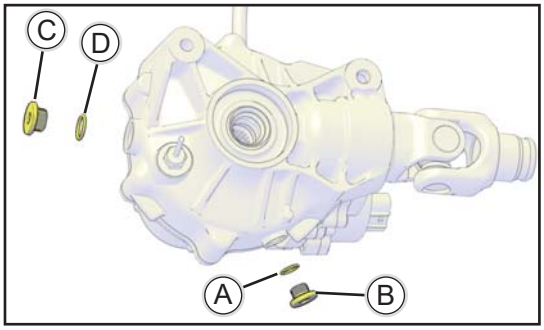
Round nut M75×1.5×6-LH sleeve

T-sleeve 10mm

Front Differential gear oil replacement

⚠ WARNING

Vehicle operation with insufficient,deteriorated,or contaminated engine oil will cause accelerated wear and may result in Gearbox Damage, accident,and injury.



Drain Front Differential Gear Oil

【A】O-RING 13×1.5

【B】Plug M14

【C】Plug M18

【D】O-RING 16.4×2.5

Tool: 8mm Allen wrench

◆ Rotate【B】 counterclockwise and twist out, let the waste oil flow out for 10 minutes, then put【A】on the threaded end of【B】, tighten it clockwise, and wipe clean the spilled gear oil. Please treat the waste gear oil in an environmentally friendly manner. Please take care of the environment.

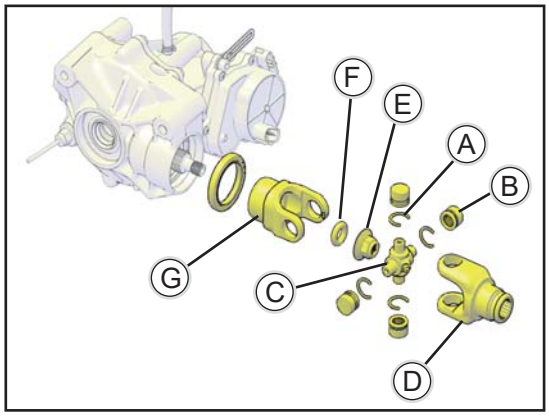
Plug M14 torque
18N·m(1.8kgf·m,13.3ft·lb)

Add new gear oil

Tool: 8mm Allen wrench

◆ Screw out【C】counterclockwise, add a new amount of gear oil, and then put【D】on the threaded end of【C】.Tighten it clockwise and manner to wipe clean the gear oil spilled around.

⚠ CAUTION



Front Differential Disassembly:

Universal Joint Removal:

- Remove
  - 【A】Circlip 12
  - 【B】 Needle Roller Bearing
  - 【C】Univerasl Joint
  - 【D】Connection Fork B
  - 【E】Locked Nut M14×1.5
  - 【F】O-Ring 14×6.8
  - 【G】Connection Fork A

universal joint Inspection：

- Check that the universal joint works smoothly without rattling or sticking.

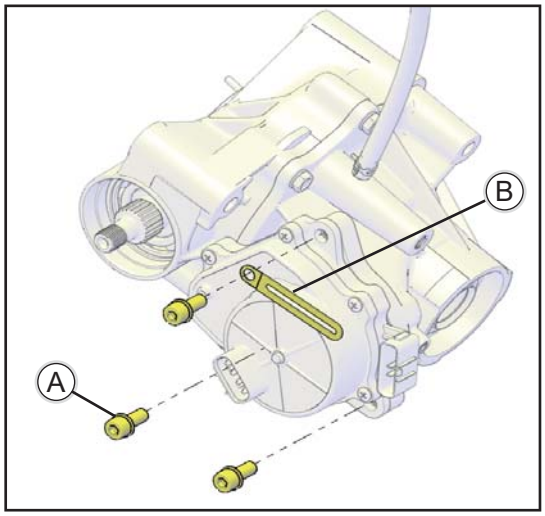
If it does rattle or stick, the universal joint is damaged. Replace the universal joint with a new one.

- Visually inspect the splines on the connection fork B 【D】.

If they are badly worn, chipped, or loose, replace the connection fork B【D】.

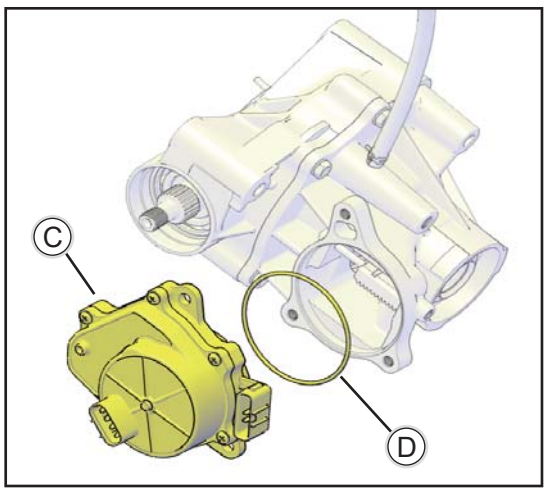
- Also, inspect the splines on the rear end of the transmission shaft.

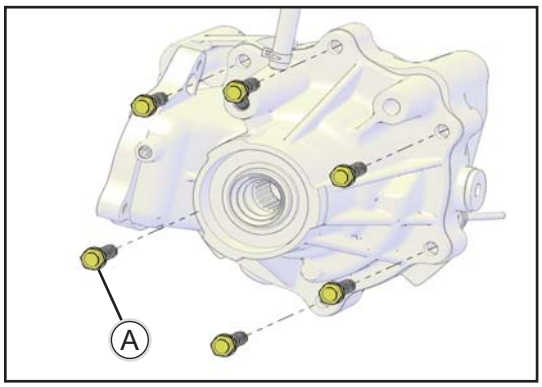
If splines are badly worn, chipped, or loose, replace the transmission shaft.



Transfer Case Assembly Removal:

- Before removing the four-wheel drive transfer, you must reset it to the two-wheel drive state.
- Remove:
  - 【A】Bolts M8×20
  - 【B】Clamp 12×75
  - 【C】Four-wheel drive transfer
  - 【D】 O-Ring 72.7×2.4

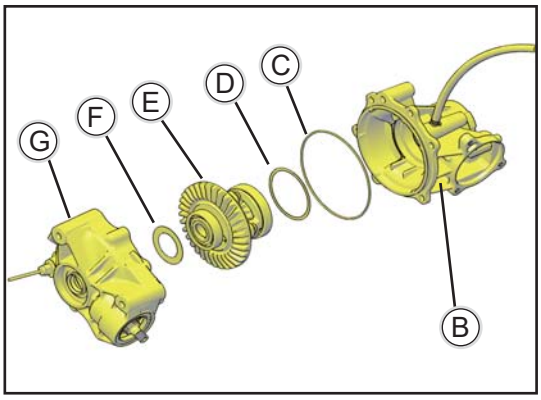




Front Differential Disassembly

◆ Remove

【A】Bolt M8×28



◆ Remove

【B】Front Differential Gear Box Cover

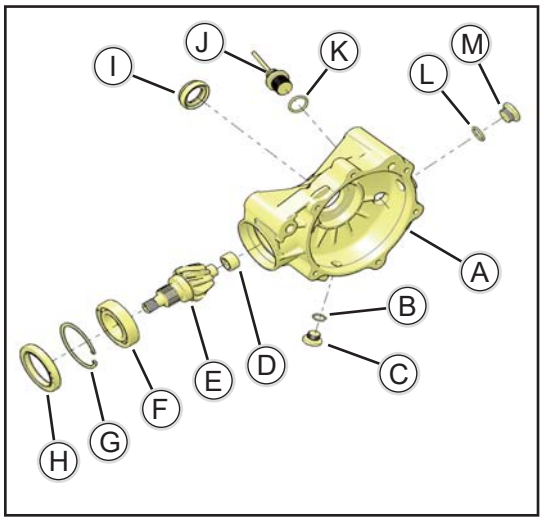
【C】O-Ring 104×2.65

【D】SHIMS

【E】Differential Gear Assy

【F】SHIMS

【G】Front Differential Gear Box Cover



Front Differential Gear Box Case Disassembly

◆ Remove

【A】Front Differential Gear Box Case

【B】Plug M14,【C】O-Ring 13×1.5

【D】Needle Bearing HK152112

【E】Drive Bevel Gear

【F】Bearing 6007

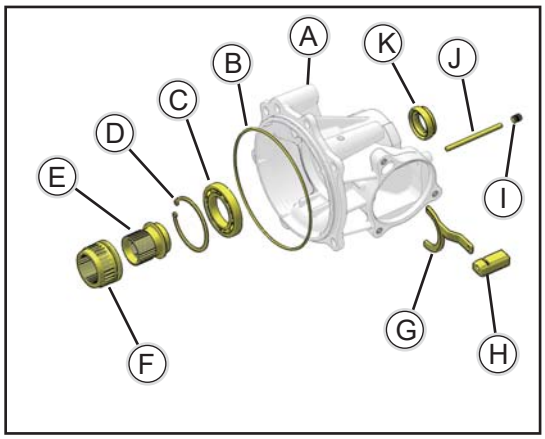
【G】Circlip 62

【H】Oil Seal 48×65×9

【I】Oil Seal 24×38×8

【J】Vehicle Speed Sensor,【K】O-Ring 19.4×2.4

【L】 O-Ring 16.4×2.5,【M】Plug M18×1.5



Front Differential Gear Box Cover Disassembly

◆ Remove

【A】Front Differential Gear Box Cover

【B】O-Ring 104×2.65

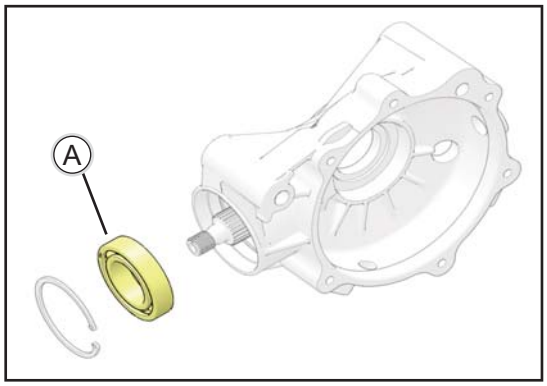
【C】Bearing 16007,【D】Circlip 62

【E】Divide Device Connection,【F】Sliding Sleeve

【G】Fork,【H】Rack

【H】 Plug M8×10,【J】Cylindrical Pin 5×75

【K】 Oil Seal 24×38×8



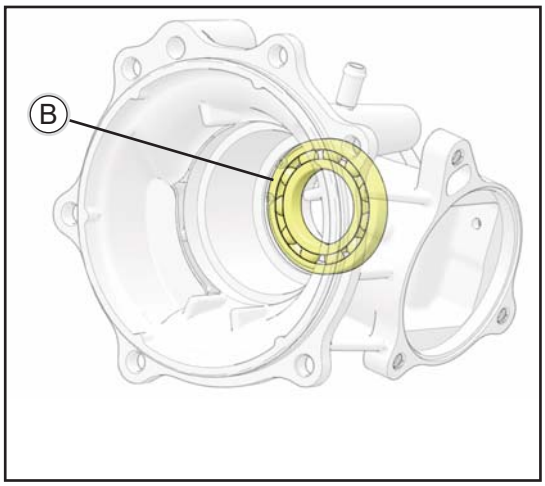
Bearing and Oil Seal

Ball or Needle Bearing Inspection

Since the bearings are made to extremely close tolerances,the clearance cannot normally be measured.

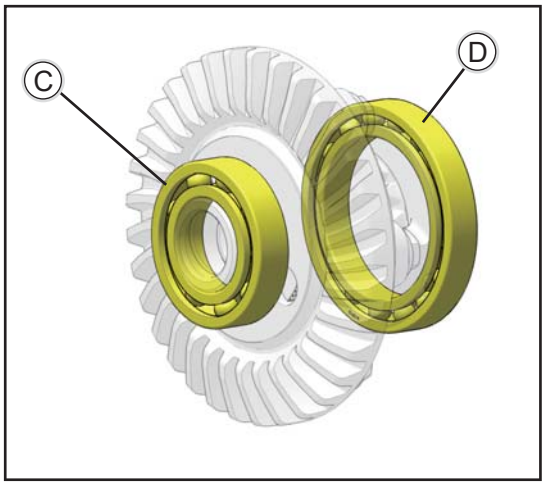
⚠ CAUTION

Do not remove bearing【C】【D】for inspection. Removal may damage it.



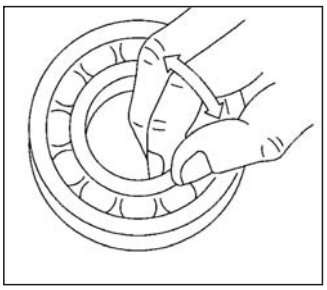
Check the ball bearing.

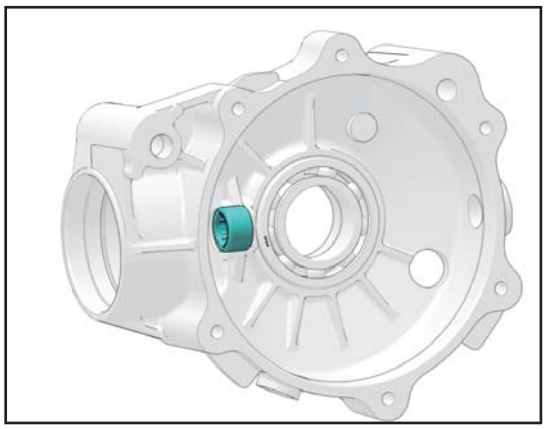
◆ Since the ball bearing is made to extremely close tolerances, the wear must be judged by feel rather than measurement.



◆ Spin the bearing by hand to check its condition.

If the bearing is noisy, does not spin smoothly, or has any rough spots, it must be replaced.

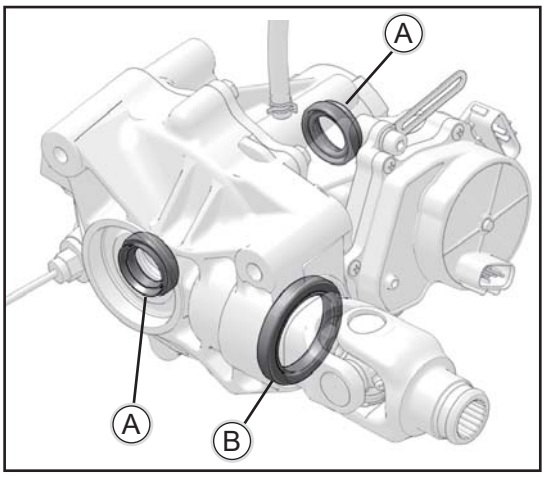




◆ Check the needle bearing【A】in the front Differential gear- box case.

The rollers in the needle bearing normally wear very little, and wear is difficult to measure. Instead of measuring, inspect the bearing for abrasion, color change, or other damage.

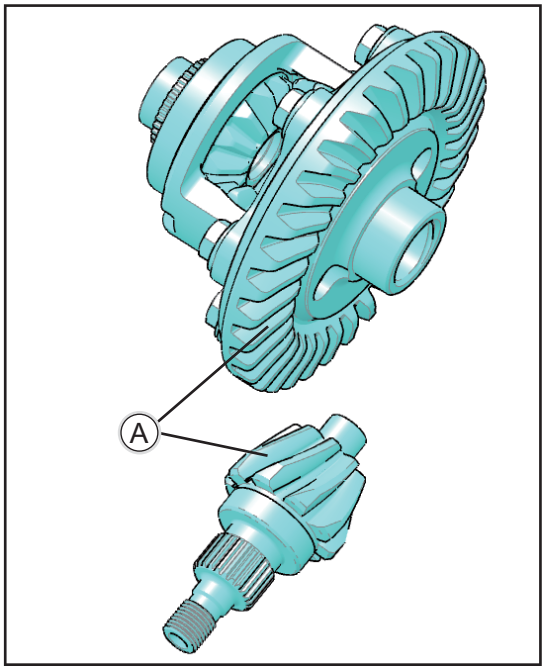
If the bearing is damaged, replace the front Differential gearbox case.



Oil Seal Inspection

◆ **Inspect the oil seals【A】【B】**

Replace any if the lips are misshapen, discolored (indicating that the rubber has deteriorated), hardened, or been otherwise damaged.



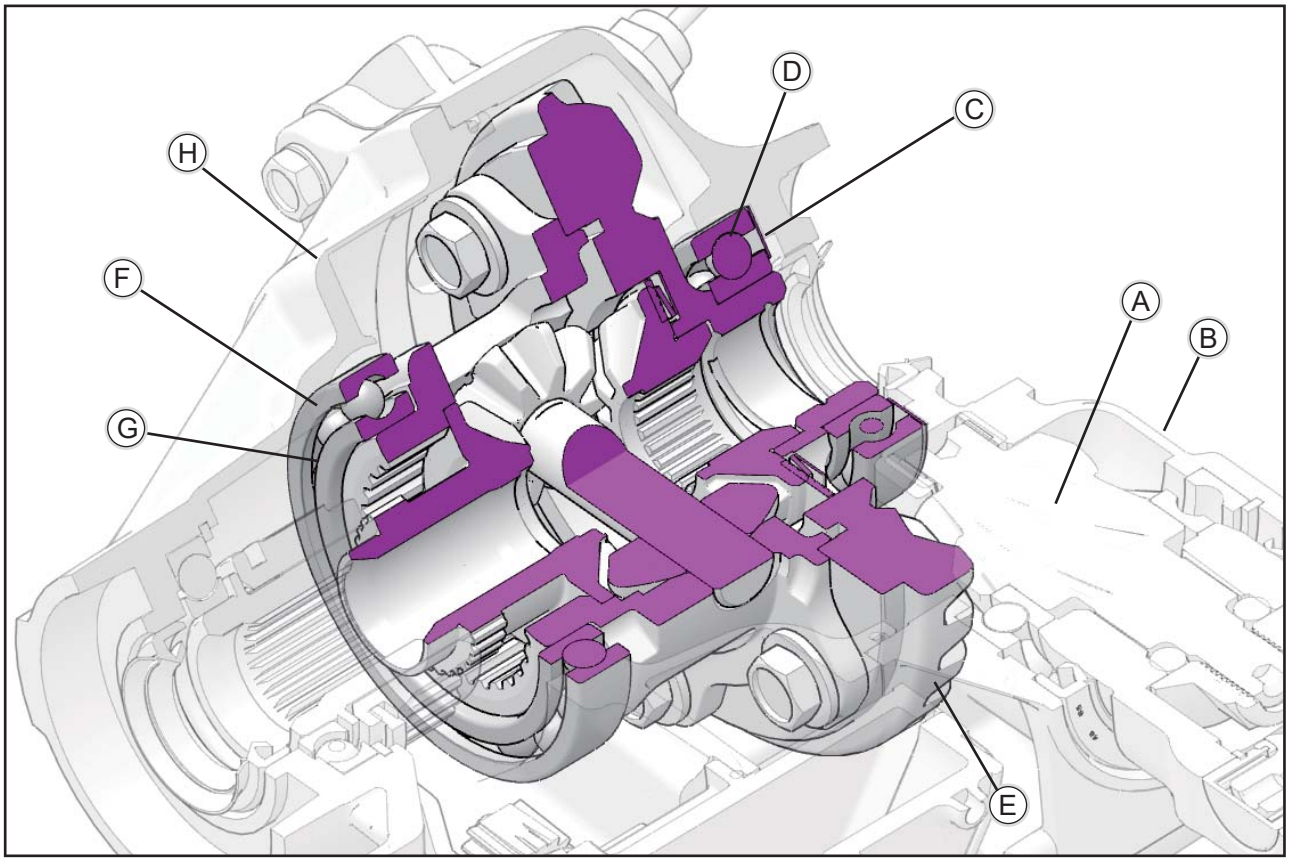
Bevel Gear

Bevel Gear Inspection

◆ Visually check the bevel gears【A】for scoring, chipping, or other damage.

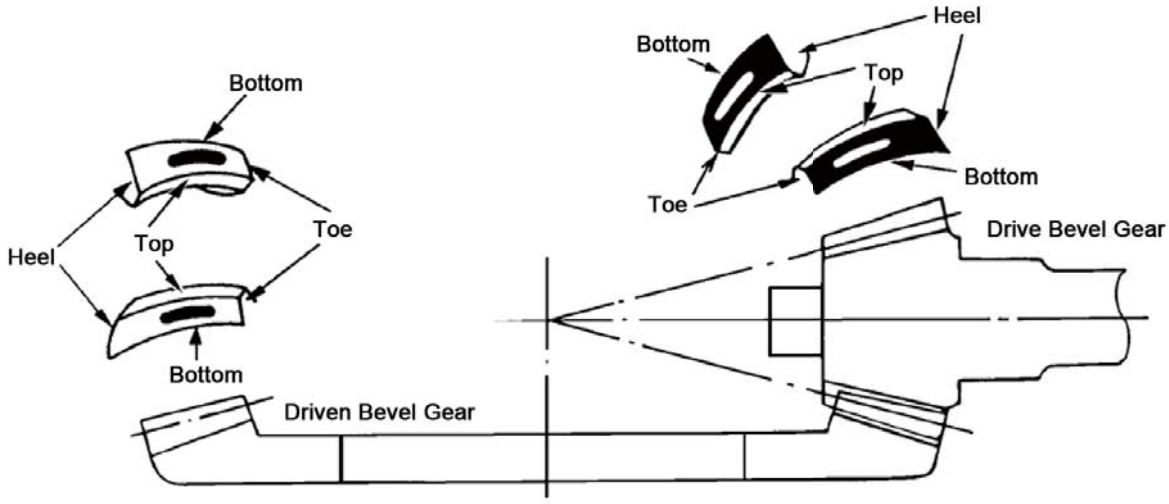
Replace the bevel gears as a set if either gear is damaged.

Bevel Gear (Backlash-related Parts)



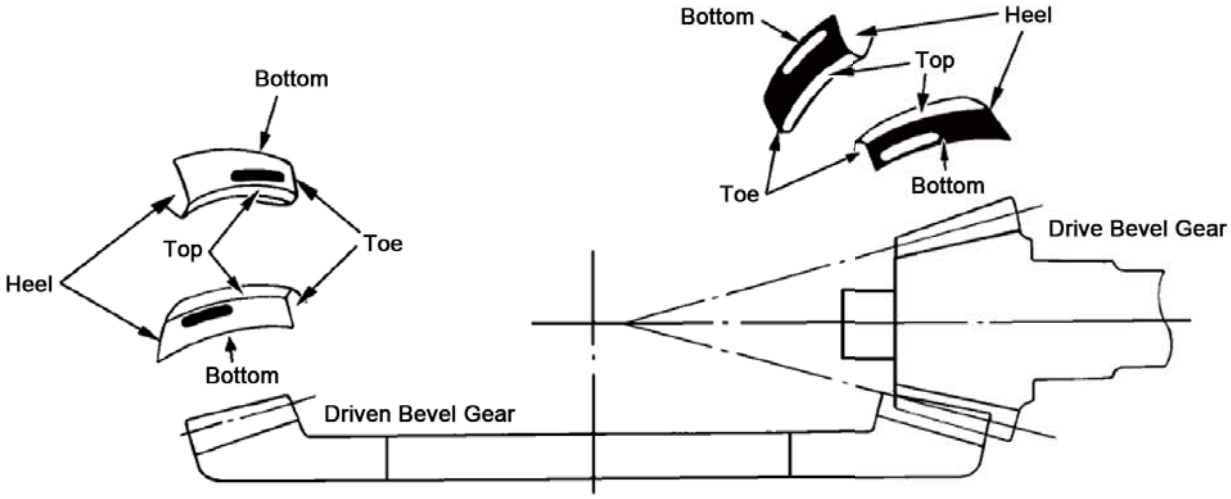
【A】. Drive Bevel Gear
【B】. Front Differential Gear Box Case
【C】.Shim(s) 61.5×50×t, (t=0.1,0.15,0.2,0.5)
【D】. Ball Bearing
【E】. Differential Gear Assy
【F】. Shim(s) 83×71×T, (T=0.1,0.15,0.2,0.5)
【G】. Ball Bearing
【H】. Front Differential Gear Box Cover

Correct Tooth Contact Pattern: No adjustment is required

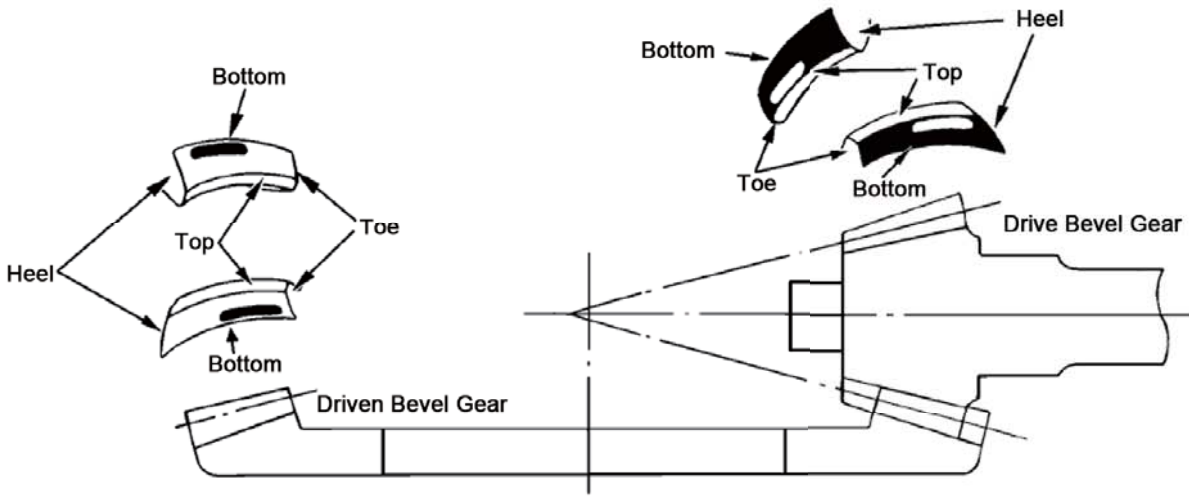


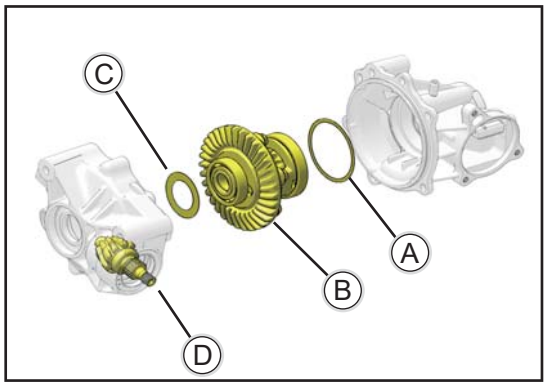
Incorrect Tooth Contact Patterns

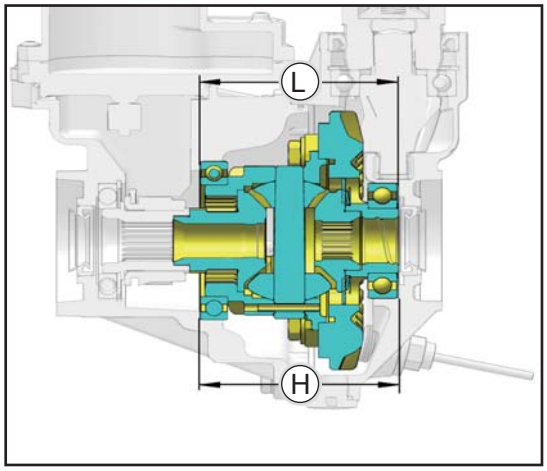
Example 1 : increase the thickness of the shim(s) by 0.1mm(0.004") to correct the pattern shown below.
Repeat in 0.1mm(0.004") steps if necessary.



Example 2 : Decrease the thickness of the shim(s) by 0.1mm(0.004") to correct the pattern shown below.
Repeat in 0.1mm(0.004") steps if necessary.







Bevel Gear Adjustment

- The backlash and tooth contact pattern of the bevel gears must be correct to prevent the gears from making noise and being damaged.
- After replacing any of the backlash-related parts, be sure to check and adjust the backlash and tooth contact of the bevel gears. First, adjust backlash, and then tooth contact by replacing shims 【A】 【C】.

  【A】Shim(s) 83×71×T, (T=0.1,0.15,0.2,0.5)

  【C】Shim(s) 61.5×50×t, (t=0.1,0.15,0.2,0.5)

  【B】Differential Gear Assy

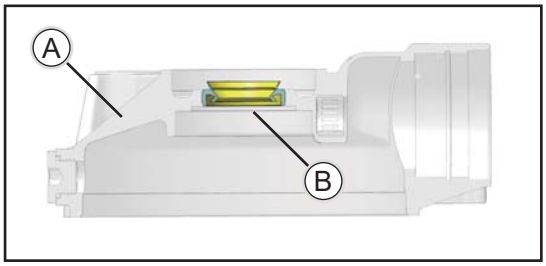
  【D】Drive bevel gear

  【H】Assembly end face size of Differential Gear Assy = 96mm

  【L】Width of Differential Gear Assy = 【A】+ 【B】+【C】=96mm
- The amount of backlash is influenced by the driven bevel gear position more than by the drive bevel gear position.
- Tooth contact locations is influenced by the drive bevel gear position more than by the driven bevel gear position.

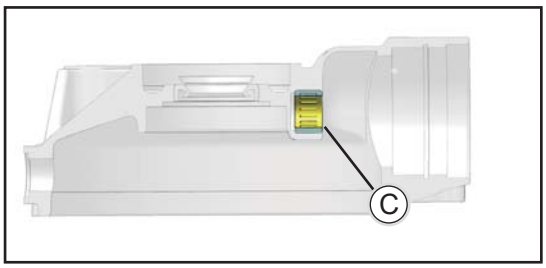
Front Differential Installation

Front Differential Gear Box Case Assembly

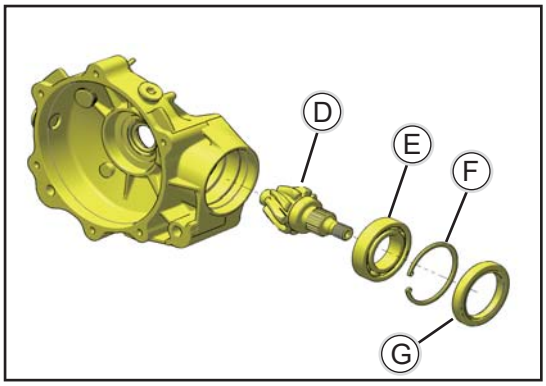


◆ Install:

Grease the lip of the Oil Seal【B】and press the Seal 0.5mm inwards from the end of the boss.



◆ Press and insert the new needle bearing until it is bottomed



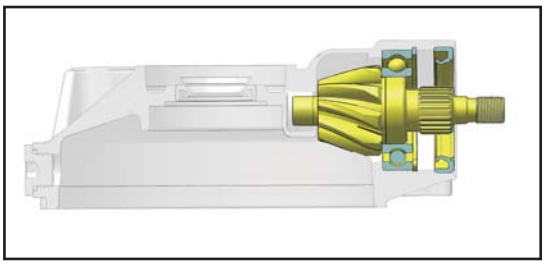
◆ Install:

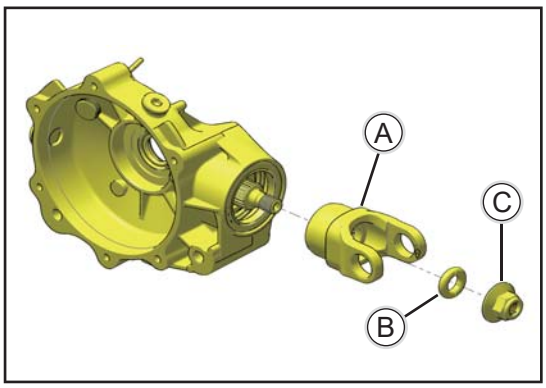
【D】Drive Bevel Gear

【E】Ball Bearing 6007

【F】Circlip 62

◆ Grease the lip of the Oil Seal 48×65×9【G】and press the Seal 0.5mm inwards from the end of the boss.





◆ Install:

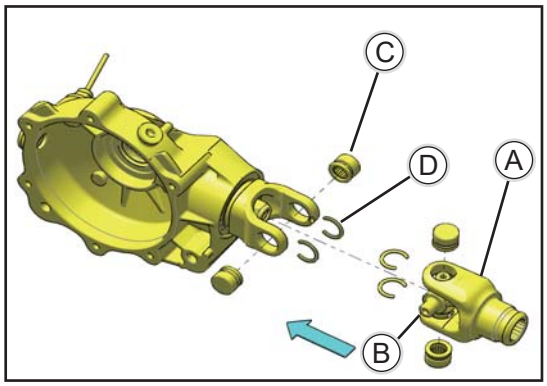
【A】Connection Fork A

【B】O-Ring 14×6.8

【C】Locked Nut M14×1.5

Applay a non-permanent locking agent to the Nut M14×1.5【C】

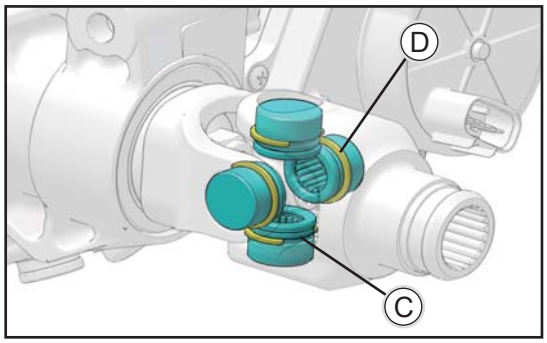
Locked Nut M14 [C] torque
180N·m(18.3kgf·m,133ft·lb)



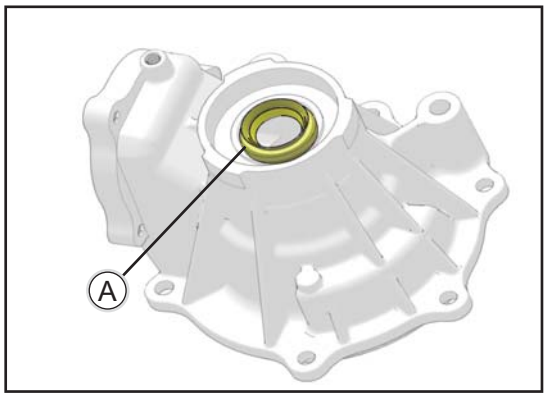
◆ Install Universal Joint Combination:

Install the【B】cross universal joint knot assembly into the 【A】fork B.

Press and insert the【C】needle bearing until it is bottomed.



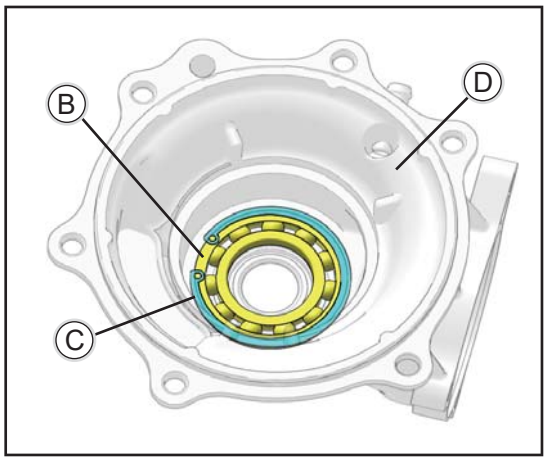
Install the【D】Circlip into the mounting groove of the【C】needle bearing.



Front Differential Gear Box Cover Assembly

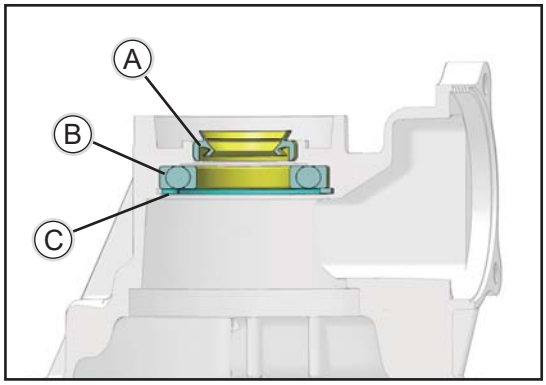
◆ Install:

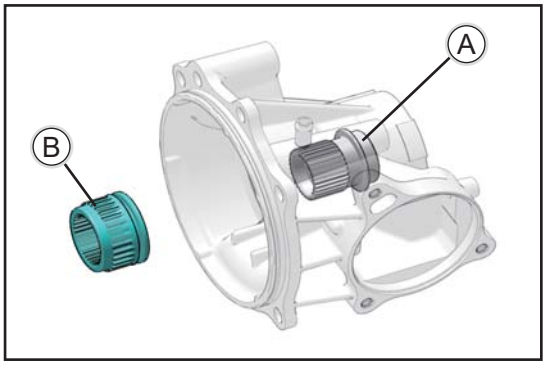
Grease the lip of the Oil Seal【A】and press the Seal 0.5mm inwards from the end of the boss.



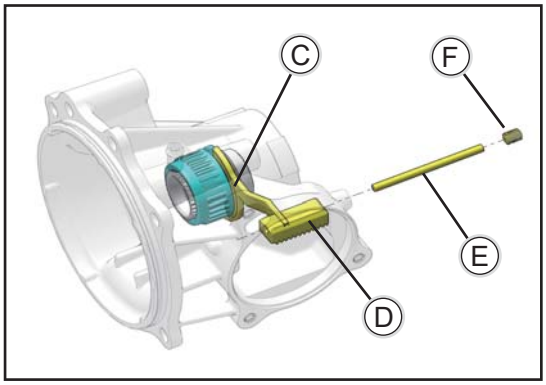
◆ Press and insert the【B】Bearing 16007 until it is bottomed

◆ Install the【C】Circlip into the mounting groove of the【D】Front Differential gear box cover.

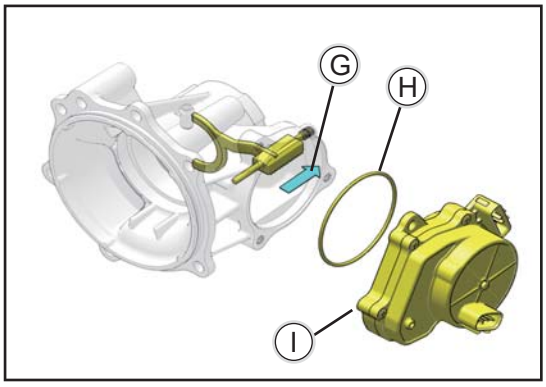




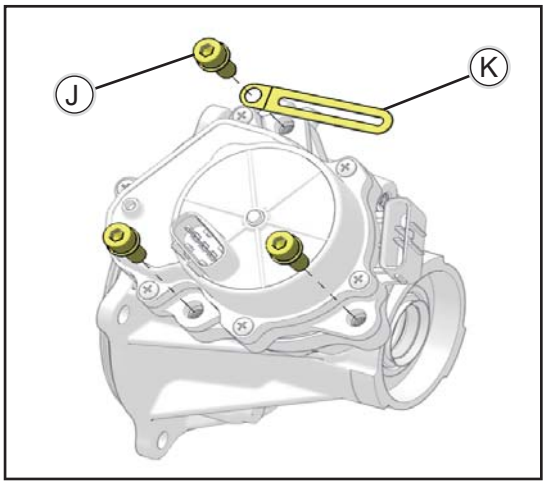
◆ Install:
【A】Divide Device Connection
【B】Sliding Sleeve



◆ Install:
【C】Fork
【D】Rack
【E】Cylindrical Pin 5×75
【F】Plug M8×10



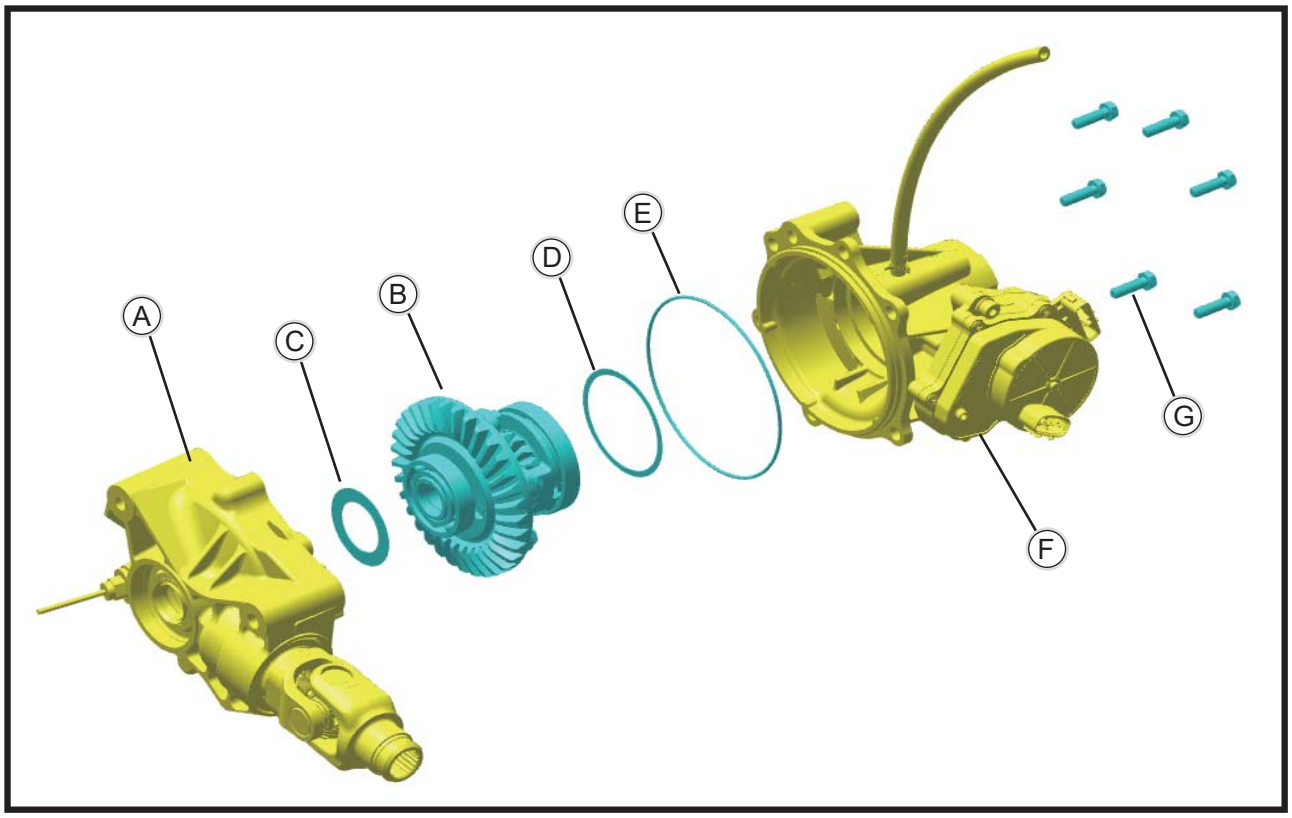
◆ Move the Rack to the bottom in the indicated direction【G】.
◆ Install:
【H】O-Ring 72.7×2.4
【I】Transfer Case Assembly



◆ Install:
【J】Bolt M8×20
【K】Clamp (12×75)

Bolt M8×20 [J] torque
25N·m(2.55kgf·m,21ft·lb)

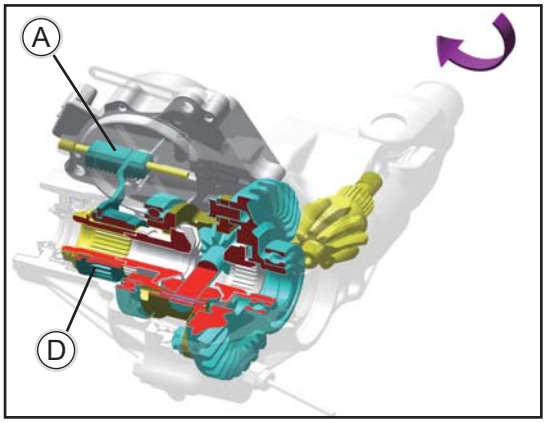
Front Differential Gear Box

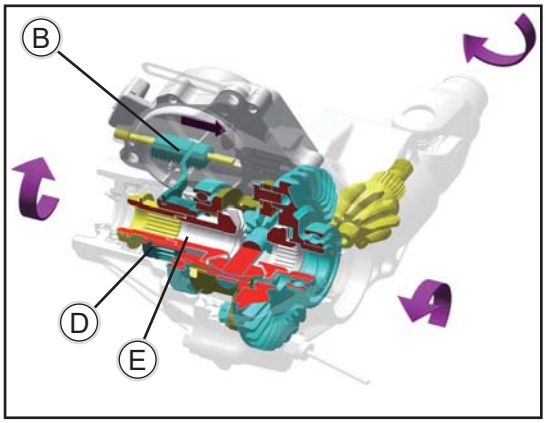


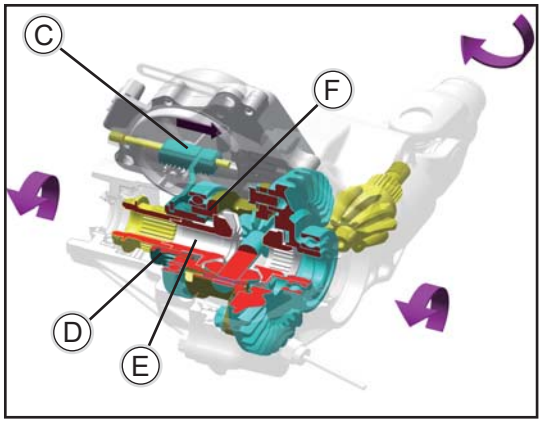
【A】Front Differential Gear Box Case Assembly
【B】Differential Gear Assy
【C】Shim(s) 61.5×50×t, (t=0.1,0.15,0.2,0.5)
【D】Shim(s) 83×71×T, (T=0.1,0.15,0.2,0.5)
【E】O-Ring 140×2.65
【F】Front Differential Gear Box Cover Assembly
【G】Bolts M8×28

- Install the【B】Differential Gear Assy and Shim(s)【C】【D】into the【A】Front Differential Gear Box Case Assembly.
- Install the【E】O-Ring 140×2.65 into the mounting groove of the【F】Front Differential Gear Box Cover Assembly.
- Install the【G】 Bolts M8×28,Apply a non-permanent locking agent to the bolts.

Bolt M8×28 【G】 torque
25N·m(2.55kgf·m,21ft·lb)







Front Differential Function Inspection

	function	YELLOW switch	RED switch
A		4WD	2WD
B		4WD	4WD
C		LOCK	4WD

【A】2WD Position

Switch control transfer case is in the 2WD position,

Sliding Spline Sleeve【D】is in rest position,no parts engaged.there is no power output to the front wheel at this time.

【B】 4WD Position

Switch control transfer case is in the 4WD position,

Sliding Spline Sleeve【D】move to 4WD position and engages with the spline of the differential gear【E】. At this time, the power output to the front wheels with differential function.

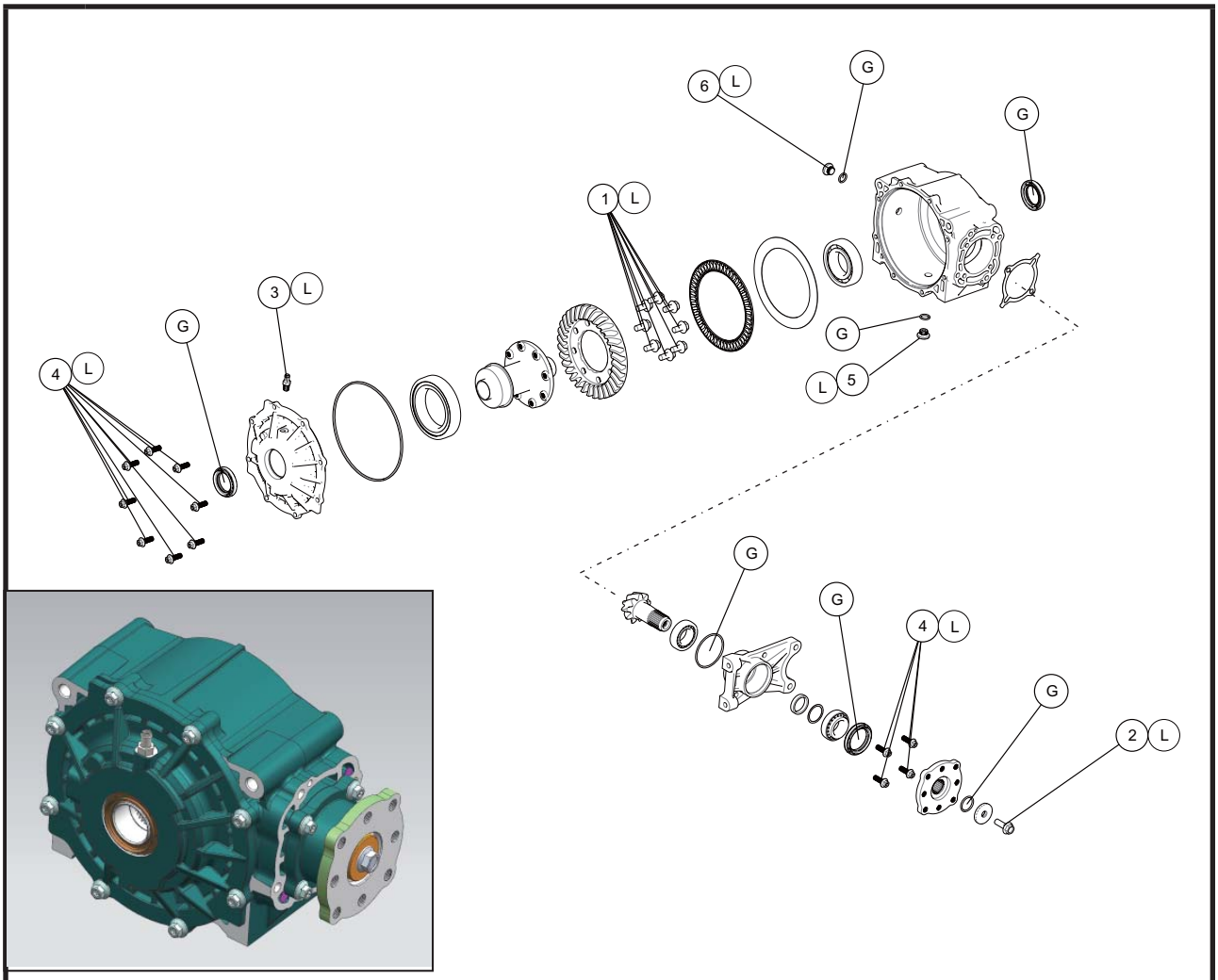
【C】LOCK Position

Switch control transfer case is in the LOCK position,

Sliding Spline Sleeve【D】move to LOCK position and meshes with the spline of both the differential gear【E】and differential hous【F】.At this time, the power output to the front wheels without differential function(LOCK differential function).

FRONT AND REAR DIFFERENTIAL

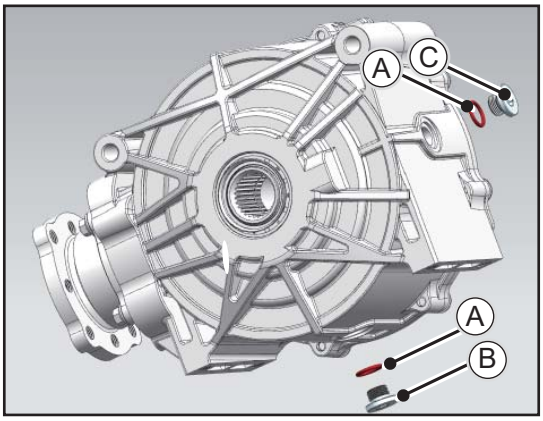
Exploded view of Rear Differential（locked）



No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Hexagon flange boltsM10×1.0×20	70	6.8	51.6	L
2	Hexagon flange boltsM10×1.0×30	70	6.8	51.6	L
3	Breathing joint	12	1.2	103.6 in·lb	L
4	Hexagon flange boltsM8×25	24	2.4	17.7	L
5	Screw plug assembly M14	18	1.8	13.3	
6	Screw plug M14	18	1.8	13	

G: Apply grease for oil seal and O-ring.
L: Apply a non-permanent locking agent.
O: Apply engine oil(SAE 75W 90 GL-5 grade、AGL 80W 90 GL-5 grade).
SS: Apply silicone sealant.
R: Replacement Parts.

Rear Differential gear oil replacement



⚠ WARNING

Vehicle operation with insufficient,deteriorated,or contaminated engine oil will cause accelerated wear and may result in Differential Damage, accident,and injury.

【A】O-Ring
【B】Screw plug assembly M14
【C】Screw plug M14

Drain gear oil

Tool: 8mm Allen wrench

- Rotate B counterclockwise, and let it stand for 10 minutes
- Set A on the threaded end of B, tighten it clockwise, and wipe off the gear oil spilled around it.
- Please dispose of waste gear oil in an environmentally friendly way, please take care of the environment

Add gear oil

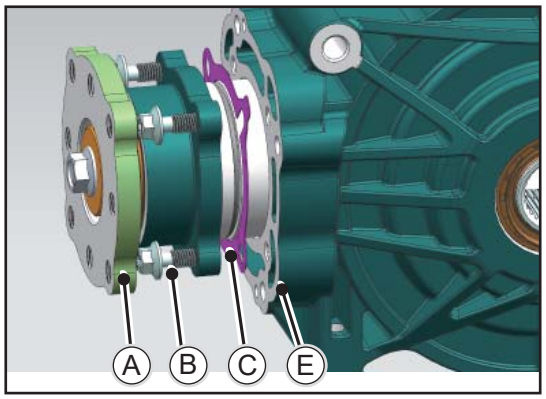
Tool: 8mm Allen key

- Unscrew 【C】 counterclockwise, add new gear oil
- Set 【A】 on the threaded end of 【C】, tighten it in time, and wipe off the gear oil spilled around it

⚠ CAUTION

Pay attention to the damage of the O-ring during installation. If it is damaged, the Differential will leak gear oil, which will accelerate the internal wear of the Differential and eventually damage the Differential. Please replace the damaged O-ring in time.

Gear clearance adjustment



⚠ WARNING

If the gear gap is not adjusted well, it will aggravate the wear of gear parts, resulting in abnormal gear transmission noise, gear surface pitting, reduced transmission efficiency, and shortened overall life.

【A】Driving bevel gear assembly
【B】Hexagon flange bolts M8×25
【C】Active bevel adjustment washer
【E】Rear Differential housing

Disassembly

Tools: open-end wrench 10mm

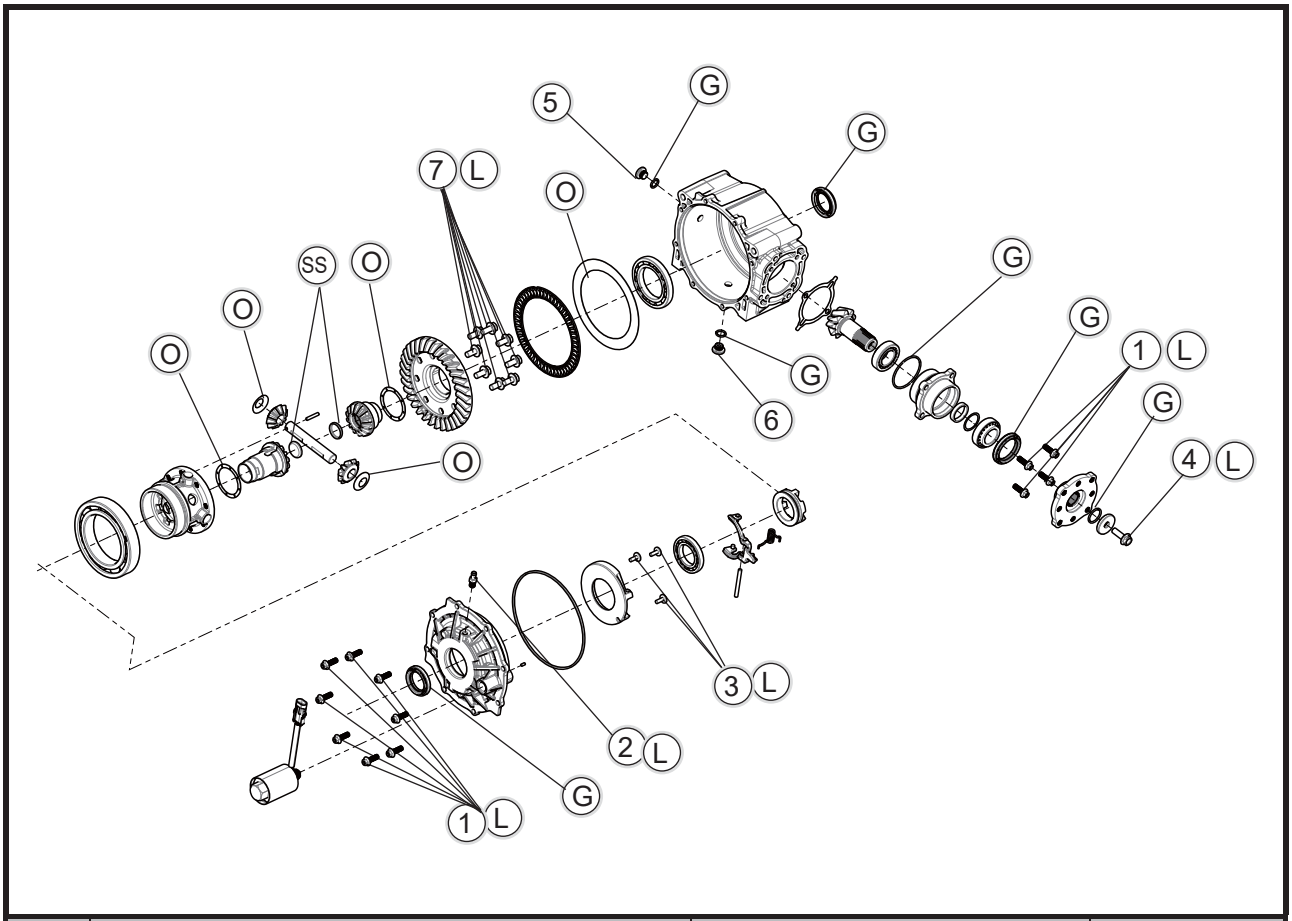
- Use an open-end wrench to remove 【B】 from 【E】 by turning counterclockwise
- Push out 【A】 as a whole by 10cm-15cm, and take out 【C】

Installation

Tools: open-end wrench 10mm

- Take 【C】 corresponding thickness according to the gear clearance value, put 【C】 between 【E】 and 【B】, push in 【A】
- Use an open-end wrench to turn it clockwise to tighten it, reconfirm the gear gap, and wipe clean the gear oil spilled around it.

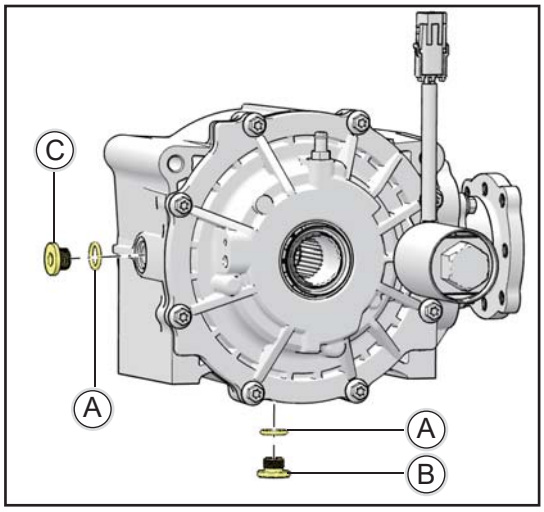
Exploded view of Rear Differential（locking and unlocking）



No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Hexagon flange bolts M8×25	24	2.4	17	L
2	Breathing connector	12	1.2	9	L
3	Large Pan Head Hexagon Bolt M6×16	12	1.2	9	L
4	Hexagon flange bolts M10×1.25×30	70	6.8	49	L
5	Screw plug M14	18	1.8	13	
6	Screw plug assembly M14	18	1.8	13	
7	Hexagon flange bolts M10×1.0×20	70	6.8	49	L

G: Apply grease for oil seal and O-ring.
L: Apply a non-permanent locking agent.
O: Apply engine oil(SAE 75W/90/GL-5、AGL 80W/90/GL-5 级).
SS: Apply silicone sealant.
R: Replacement Parts.

Rear Differential gear oil replacement



⚠ WARNING

Vehicle operation with insufficient,deteriorated,or contaminated engine oil will cause accelerated wear and may result in Gearbox Damage, accident,and injury.

【A】O-Ring
【B】Screw plug assembly M14
【C】Screw plug M14

Drain gear oil

- Rotate 【B】 counterclockwise and unscrew it, and let it stand for 10 minutes to let the waste oil flow out.
- Put 【A】 on the threaded end of 【B】, tighten it in clockwise, and clean the gear oil spilled around.
- Please dispose of waste gear oil in an environmentally friendly way, please take care of the environment

Tool: 8mm Allen key

Add gear oil

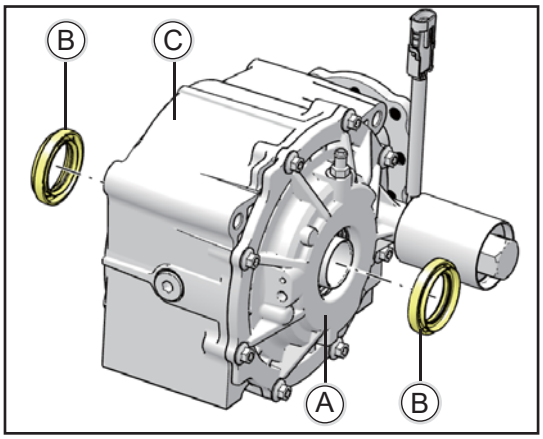
- Unscrew 【C】 counterclockwise, add new gear oil
- Set 【A】 on the threaded end of 【C】, tighten it in clockwise, and wipe off the gear oil spilled around it.

Tool: 8mm Allen key

Screw plug M14 tightening torque
18N·m(1.8kgf·m,13.3ft·lb)

⚠ CAUTION

Pay attention to the damage of the O-ring seal during installation. If it is damaged, it will cause the gearbox to leak gear oil, which will accelerate the internal wear of the gearbox and eventually cause damage to the gearbox. Please replace the damaged O-ring seal in time.



Inspection of parts wear

Oil seal 37×55×7

When 【A】has gear oil leakage or oil stains, please check 【B】 oil seal 37×55×7 and replace it in time.

⚠ WARNING

If it is not replaced in time, it will cause abnormal wear of other parts, and the overall temperature of the gearbox will increase, which will shorten its service life.

【A】Rear Differential end cover
【B】Oil seal 37×55×7
【C】Rear Differential housing

Disassemble

- Tool: Flat-blade screwdriver
- Destroy 【B】 from 【A】, remove and replace them

Assemble

- Tool: special tooling for oil seal
- Use oil seal tooling to replace two old B with new B, and clean up the oil stains after replacement

⚠ WARNING

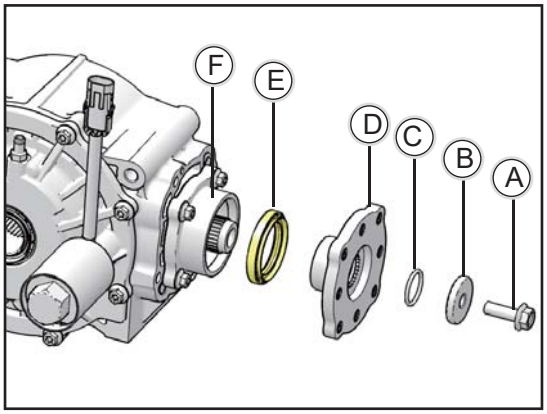
If the gear oil leaks after the replacement, please make up the gear oil, and check whether the oil seal and sealing ring on B are damaged, if any, please replace it

Oil seal 44×60×7

When F has gear oil leakage or oil stains, please check D in time and replace it in time

⚠ WARNING

If it is not replaced in time, it will cause abnormal wear of other parts, and the overall temperature of the gearbox will increase, which will shorten its service life.



【A】Hexagon flange bolts M10×1.25×30
【B】Flat Washers 10.5×39×6
【C】O-ring 25×2.65
【D】Drive shaft connection flange
【E】Oil seal 44×60×7
【F】Active gear bearing seat

Disassemble

◆ Tear down

Tools: special tooling for oil seal, sleeve 15

Assemble

◆ Replace the old E with a new E with oil seal tooling, and clean up the oil stains after the replacement is completed

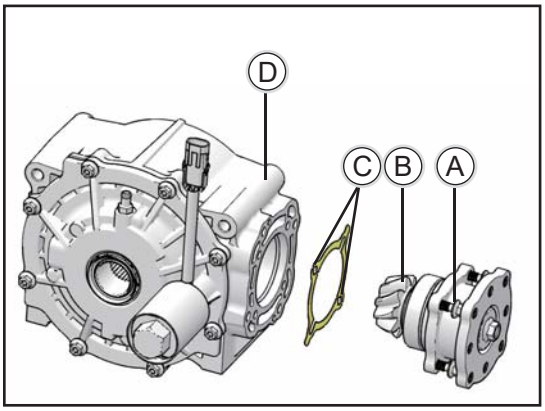
Tools: special tooling for oil seal, sleeve 15

Hexagon flange bolts M10X1.25X30
70N·m(6.8kgf·m,49ft·lb)

⚠ WARNING

Pay attention to the damage of the O-ring seal during installation. If it is damaged, it will cause the gearbox to leak gear oil, which will accelerate the internal wear of the gearbox and eventually cause damage to the gearbox. Please replace the damaged O-ring seal in time. After replacement, please make up the gear oil and check whether the oil seals and sealing rings are damaged. If so, replace them.

Tooth gap adjustment



⚠ WARNING

If the gear gap is not adjusted properly, it will aggravate the wear of gear parts, resulting in abnormal gear transmission noise, tooth surface pitting, reduced transmission efficiency, and shortened overall life.

【A】Hexagon flange bolts M8×25
【B】Active gear bearing seat
【C】Clearance adjustment pad
【D】Rear Differential housing

Disassemble

◆ Take four 【A】 from 【B】, and then take out 【B】 for a certain distance, then take out 【C】 on both sides

Tool: Sleeve 10

Assemble

◆ Take the corresponding thickness of 【C】 according to the gear clearance value, insert it between 【B】 and 【D】, then install 【B】, turn 【A】 clockwise to tighten it, reconfirm the gear clearance, and wipe clean the gear oil spilled around. Hexagon flange bolt M8×25.

Tool: Sleeve 10

Tightening torque of hexagon flange bolt M8X25
24N·m(2.4kgf·m,17ft·lb)

⚠ CAUTION

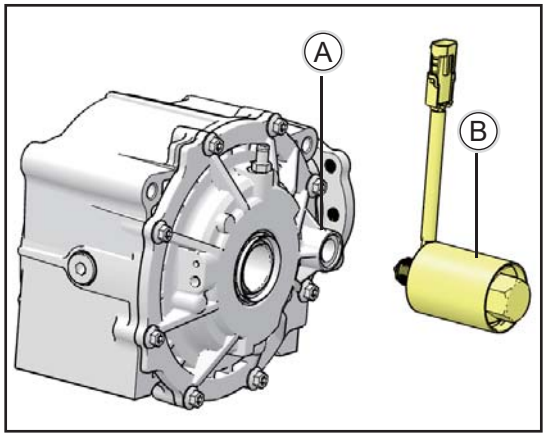
After replacement, please make up the gear oil, and check whether the oil seals and sealing rings are damaged, if any, please replace them

Solenoid valve assembly inspection and replacement

If the vehicle is running normally without 4WD, and the solenoid valve assembly is energized and still not working, check 【B】 and replace it in time.

⚠ WARNING

If it is not replaced in time, the 2WD and 4WD will not work normally



【A】Rear Differential end cover
【B】Solenoid valve assembly

Disassemble

◆ Screw out 【B】 with a sleeve counterclockwise
Tool: Sleeve 29

Assemble

◆ Rotate the new 【B】 clockwise into 【A】 by the sleeve, and wipe clean the gear oil spilled around it.
Tool: Sleeve 29

Tightening torque of solenoid valve assembly
35N·m(3.57kgf·m,25.8ft·lb)

⚠ CAUTION

After replacement, please make up the gear oil, and check whether the oil seals and sealing rings are damaged, if any, please replace them.

FUEL SYSTEM

Exploded view of Fuel System.....5-2

Fuel Tank.....5-4

Disassembly.....5-4

Assembly.....5-4

Fuel Pump.....5-5

Disassembly.....5-5

Inspection.....5-5

Assembly.....5-5

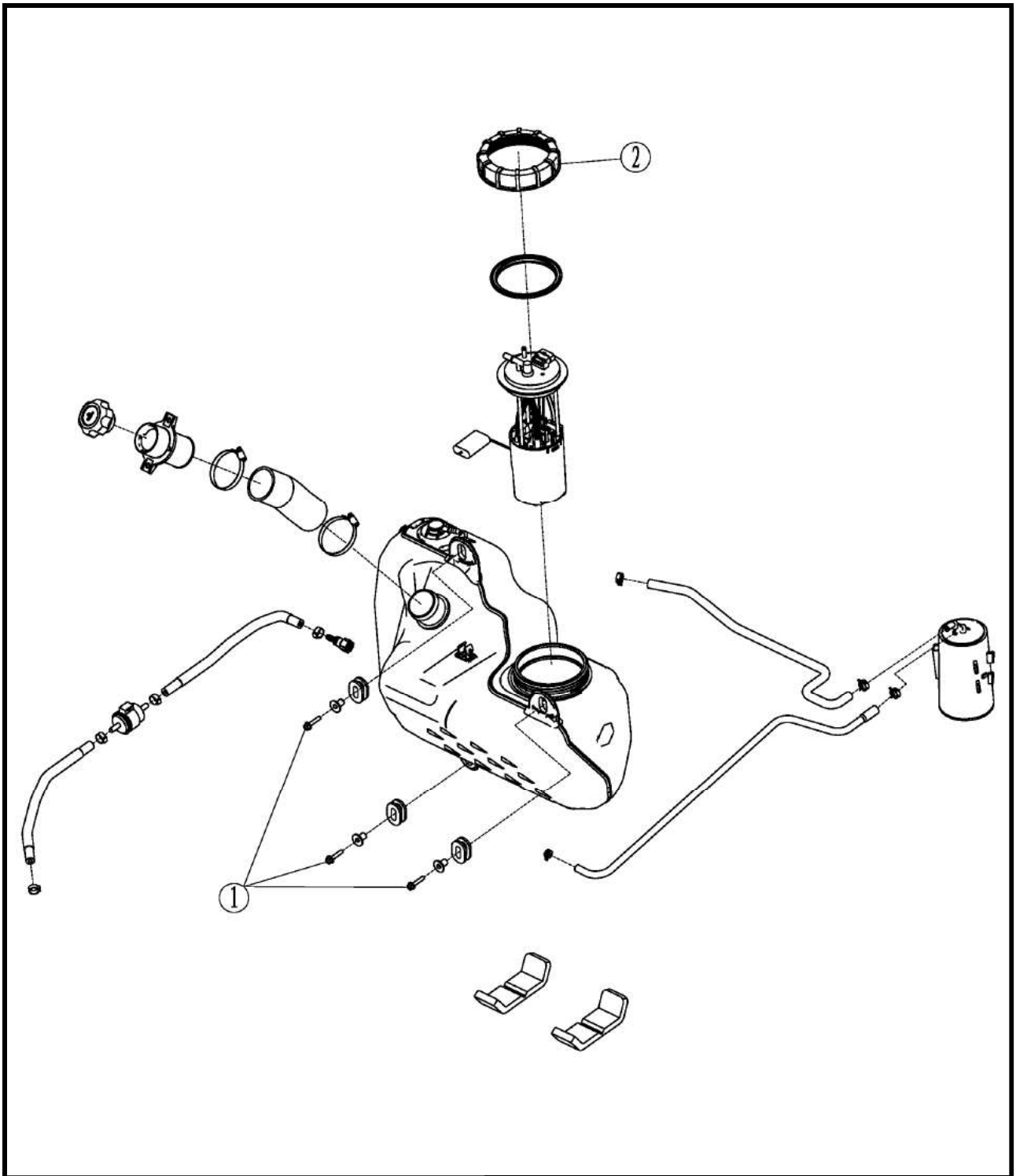
Fuel Filter.....5-6

Disassembly.....5-6

Assembly.....5-6

FUEL SYSTEM

Exploded view of Fuel System

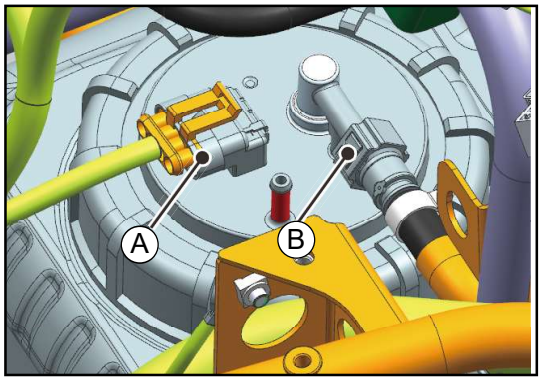


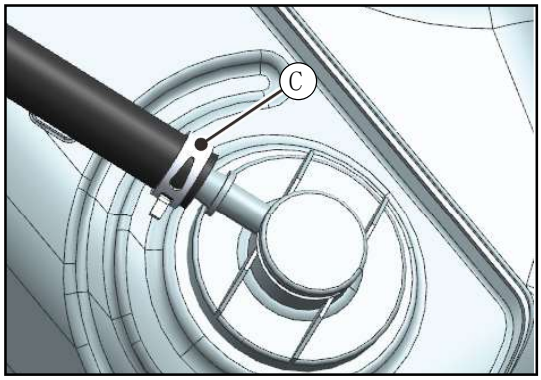
No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Bolt M6×30	8~12	0.8~1.2	69~103.6 in·lb	
2	Install screw cap on oil pump	75	7. 5	55	

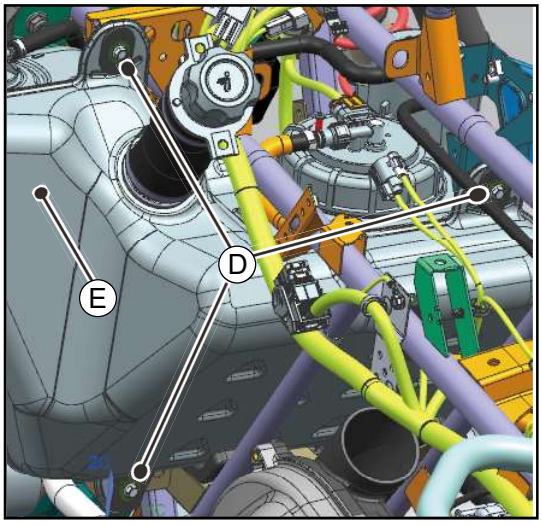
Fuel tank

⚠ WARNING

- Whenever the gasoline line is removed, the battery must be disconnected to prevent accidental starting of the fuel pump.
- Fuel leakage may occur whenever any repair or inspection is carried out on the fuel system, and welding, smoking, open fires, etc., shall not be allowed in the area.







Disassembly

【A】Fuel pump cable plug
【B】High pressure tubing plug
【C】Carbon canister adsorption tube
【D】Bolt M6×30
【E】Fuel tank

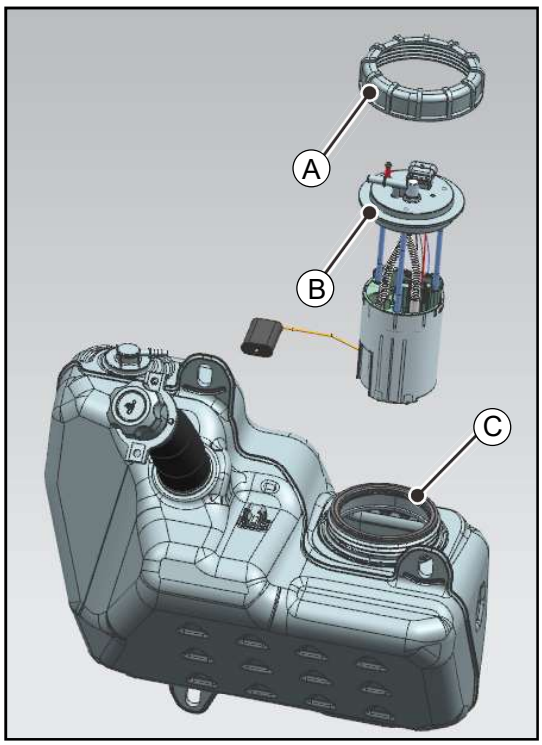
- Remove the body plastic and the seats（See car body for details）;
- Remove the air filter;
- Disconnect the battery cable;
- Disconnect the fuel pump cable plug【A】and the high pressure oil pipe plug【B】;
- Remove the carbon canister adsorption tube【C】
- Remove the retaining bolts【D】 and fuel tank【E】;

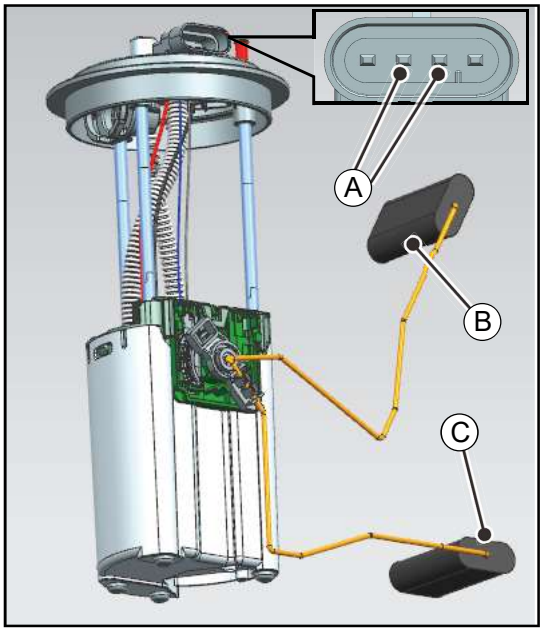
⚠ CAUTION

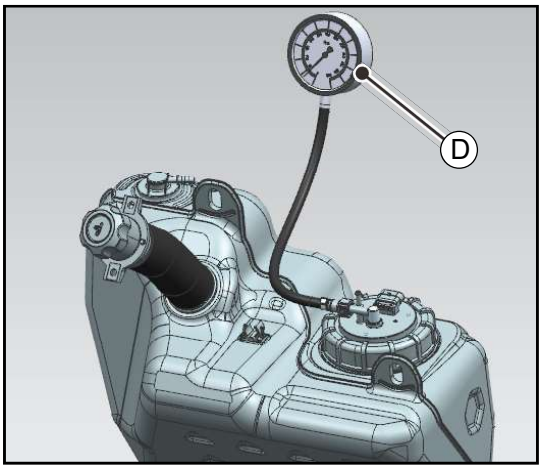
Fuel leak may occur during the removal of any component of the fuel system. Wipe the residual fuel with a cloth.

Assembly

During assembly, please assemble in reverse order according to disassembly sequence; When assembling the high pressure tubing plug, please make sure the assembly is correct and reliable.







Fuel Pump

⚠ WARNING

Fuel leakage may occur whenever any repair or inspection is carried out on the fuel system, and welding, smoking, open fires, etc., shall not be allowed in the area.

Disassembly

【A】Install screw cap on fuel pump

【B】Fuel pump

【C】Seal ring

- ◆ Remove the fuel pump install screw cap counterclockwise【A】;
- ◆ Mark the orientation of the fuel pump on the tank and remove the fuel pump【B】;
- ◆ Keep the seal ring【C】well to prevent loss;

⚠ CAUTION

After removing the fuel pump, please protect the fuel tank opening effectively to avoid debris falling into the fuel tank, thus damaging the fuel pump.

Inspection

【A】cable plug

【B】Position 1

【C】Position 2

【D】Pressure gauge

- ◆ Move the float lever to check if it is free to move. Float components should be free to return to lower positions.If not, replace the fuel pump.
- ◆ Test the fuel position sensor by connecting the multimeter to the two middle pins of the cable plug 【A】. Shown on the multimeter in full fuel position 1 to 160 + 5 Ω, displayed on the empty fuel position 2 to 40 + 5 Ω.
- ◆ The fuel pump outlet pressure was measured through the pressure gauge 【D】, and the measured pressure value was 330±20Kpa in the electrified state.

⚠ CAUTION

- If the resistance reading is unstable, clean the resistance scraper with alcohol and retest. If it is still incorrect, replace the fuel pump.
- If the fuel pump supply pressure test does not meet the required value, then replace the pump.

Assembly

- Confirm that the sealing ring is installed on the fuel tank.
- Confirm the orientation of the fuel pump with the cable plug connector facing the left-side of the fuel tank as shown in the illustration.
- Tighten the screw cap of the fuel pump clockwise

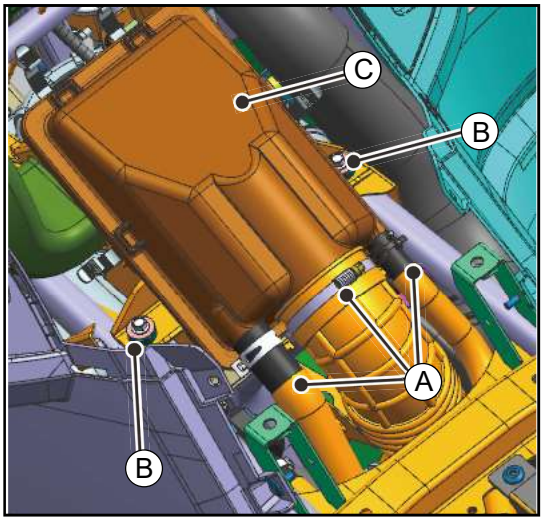
Fuel pump Assembly screw cap
75N · m

If the fuel pump is not installed correctly, there maybe interference with the fuel level float.

Fuel Filter

⚠ WARNING

- Whenever the gasoline line is removed, the battery must be disconnected to prevent accidental starting of the fuel pump.
- Fuel leakage may occur whenever any repair or inspection is carried out on the fuel system, and welding, smoking, open fires, etc., shall not be allowed in the area.



Disassembly

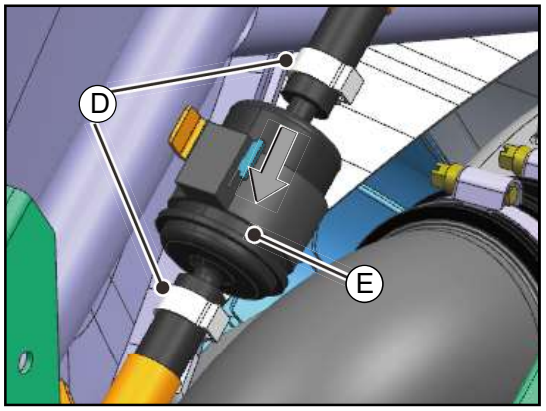
The fuel filter is under the air filter box

【A】Air filter connection pipe

【B】BoltM6×30

【C】air filter box

- Remove seat and fuel tank hood (see body part for details)
- Remove 3 air filter box connectors【A】;
- Remove 2 bolts 【B】 and pull out the air filter box 【C】 from front to back;
- Remove the clamp【D】 with appropriate tools and take out the fuel filter 【E】;



⚠ CAUTION

Fuel leak may occur during the removal of any component of the fuel system. Wipe the residual fuel with a cloth.

Assembly

【D】Single ear stepless clamp 16.5

【E】Fuel filter

- Make sure the arrow is pointing towards the fuel pump (see left) when assembling the fuel filter.
- Replace the new clamp【D】and clamp it with professional tools;
- Assemble the parts in reverse order according to disassembly sequence;

COOLING SYSTEM

Exploded view of Cooling System..... 6-2

Coolant Flow..... 6-3

Technical Parameter..... 6-5

Special Tool..... 6-7

Coolant..... 6-7

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Coolant level check..... 6-7

Pressure test..... 6-8

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Radiator Inspection 6-11

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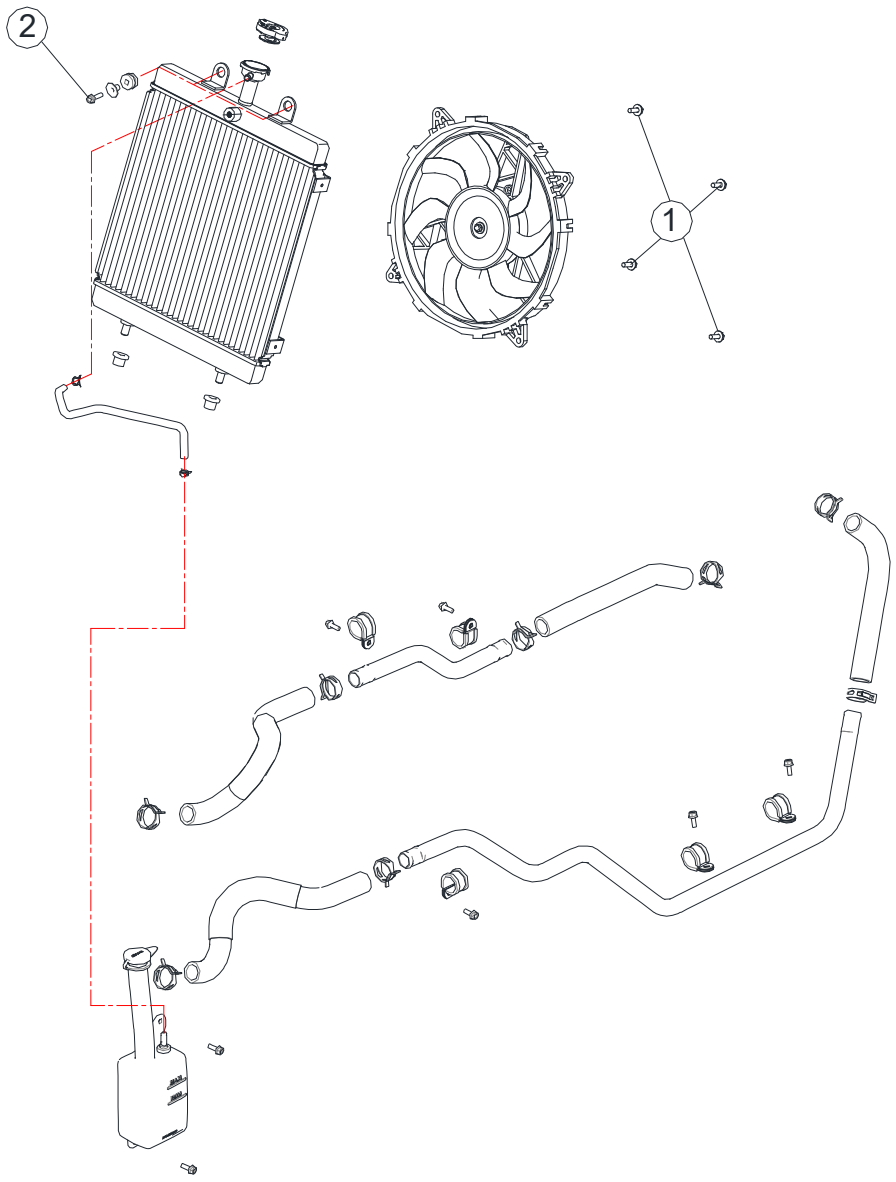
COOLING SYSTEM

Exploded view of Cooling System



No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Radiator fan assembly bolt M6	8~12	0.8~1.2	69~103.6 in·lb	
2	Radiator mounting bolt M6×25	8~12	0.8~1.2	69~103.6 in·lb	

Coolant Flow

Select permanent antifreeze as the coolant to prevent rust and corrosion of the cooling system. When the engine starts, the water pump rotates and the coolant circulates.

The thermostat is a wax particle type, which opens or closes with the change of the coolant temperature. The thermostat continuously changes its valve opening to keep the coolant temperature at an appropriate level. When the coolant temperature is lower than ***79*** ～ ***82***℃（***174.2*** ～ ***179.6***℉）, the thermostat is closed. Therefore, the flow of coolant through the exhaust hole is restricted, which makes the engine warm up faster. When the coolant temperature exceeds ***79 ~ 82***℃ ***(174.2 ~ 1179.6***℉***)***, the thermostat will open and the coolant will flow. When the coolant temperature reaches 88℃ (190.4 ℉), the radiator fan switch is turned on and the radiator fan works. When there is not enough airflow (for example, at low speeds). The radiator fan sucks in air through the radiator core. This increases the cooling effect of the radiator. When the temperature is lower than ***83*** ℃ ***(181.4*** ℉***)***, the fan switch is turned off and the radiator fan stops working.

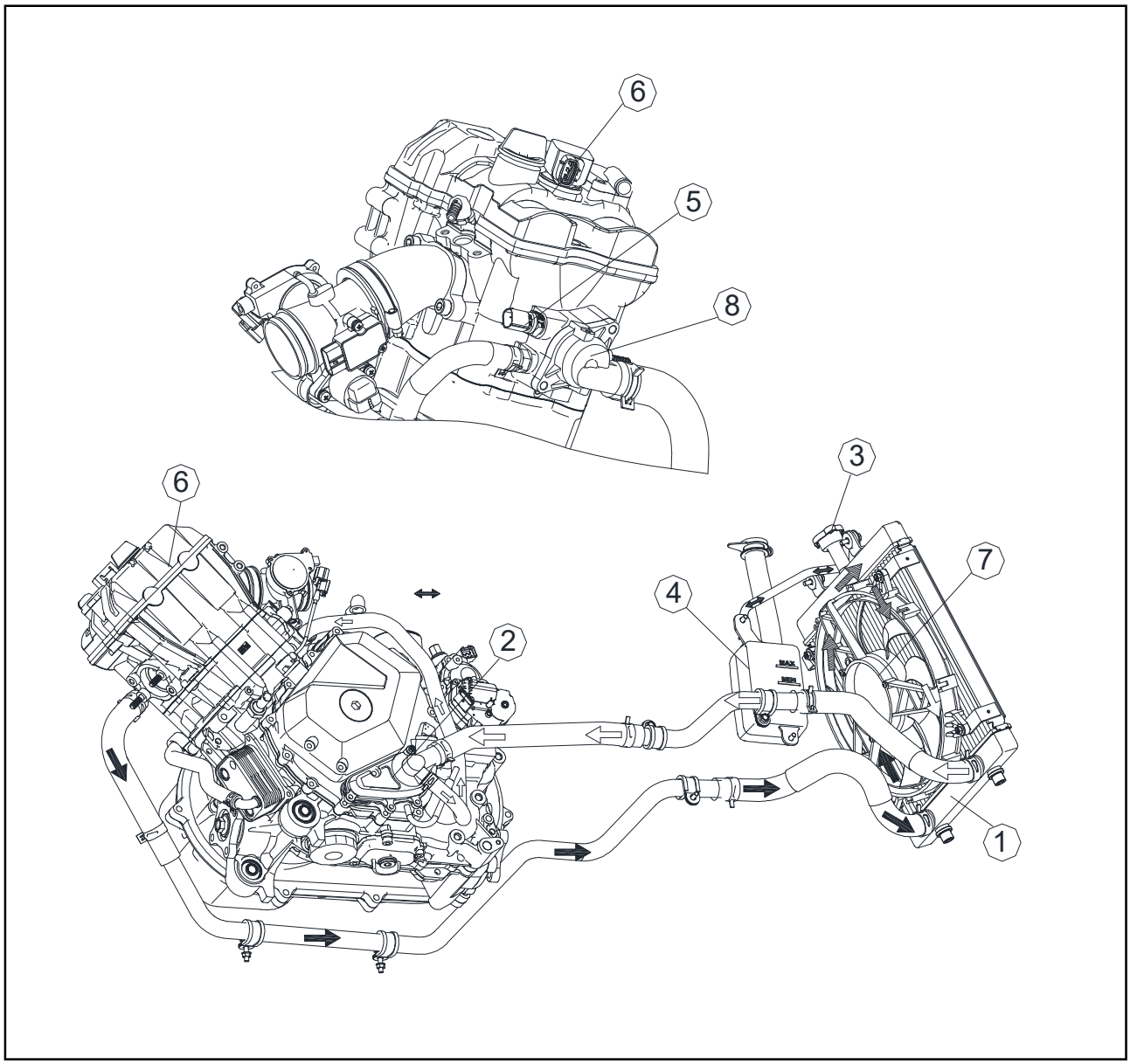
In this way, the system controls the engine temperature within the narrow range of engine operation. Even if the engine load changes, the engine has the highest working efficiency.

The system is pressurized through the radiator cap to suppress boiling and the resulting bubbles that may cause the engine to overheat. When the engine warms up, the coolant in the radiator and water circuit expands. The excess coolant flows into the water storage tank through the radiator cover and hoses. Conversely, when the engine cools, the coolant in the radiator and water circuit shrinks, and the stored coolant flows from the storage tank back to the radiator.

The radiator cover has two valves. One is a pressure valve, which maintains the pressure in the system when the engine is running. When the pressure exceeds ***93 ~ 123kPa (0.95 ~ 1.25 kgf/c***㎡***, 14 ~ 18psi)***, the pressure valve opens and releases the pressure to the water storage tank. Once the pressure overflows, the valve is closed and the pressure is maintained at ***93 ~ 123kPa (0.95 ~ 1.25kgf/c***㎡***, 14 ~ 18psi)***. After the engine has cooled down, another small valve (vacuum valve) on the cover opens. When the coolant cools, the coolant shrinks, creating a vacuum in the system. The vacuum valve opens and allows the coolant to enter the radiator from the storage tank.

COOLING SYSTEM

Coolant Flow



1.Radiator
2.Water Pump
3.Radiator cover
4.Water storage tank
5.Switch of radiator fan
6.Cylinder，Cylinder head
7.Radiator fan
8.Thermostat

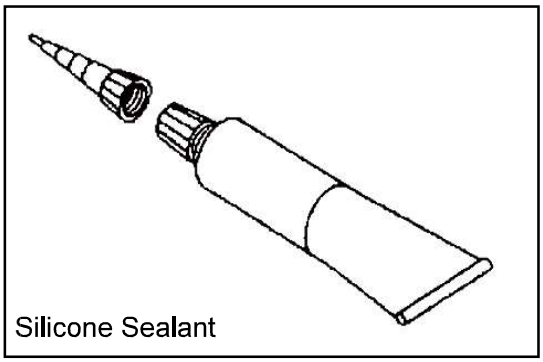
Black arrow: hot coolant

White arrow: cold water

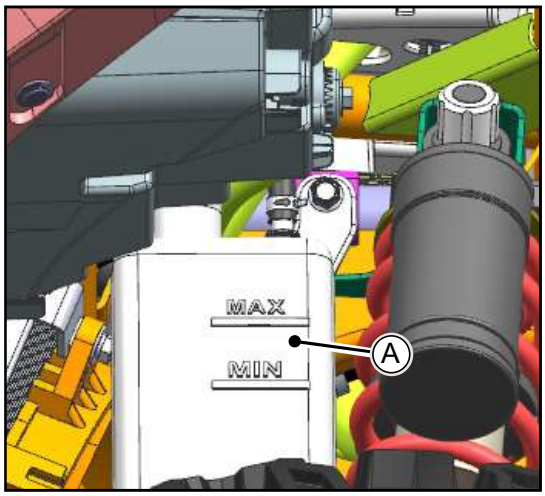
Technical Parameter

Item	Standard	Service Limit
Coolant provided during transportation：		
Type	Permanent antifreeze (soft water and glycol for aluminum engines and radiators plus corrosion inhibitors and rust inhibitor chemicals)	– – –
Color	Green	– – –
Mixing ratio	Soft water 50%, cooling water 50%	
Total	3.4 L（3.6US qt）(Full level of the water storage tank, including radiator and engine)	– – –
Radiator cover		
Pressure relief	93～123 kPa（0.95～1.25 kgf /cm^2，14～18psi）	– – –
Thermostat		
Valve opening temperature	79～82^{0}C（174.2～179.6^{0}F）	– – –
Valve fully open lift	8～12mm or over 85°C（185°F）	– – –
Coolant filter/valve		
Cooling valve closing temperature（For reference）	83°C（181.4^{0}F）or over 24.5kPa（0.25kgf/cm^2，3.6 psi）	– – –

Special tools and sealants



Silicone Sealant



Coolant

Coolant deterioration inspection

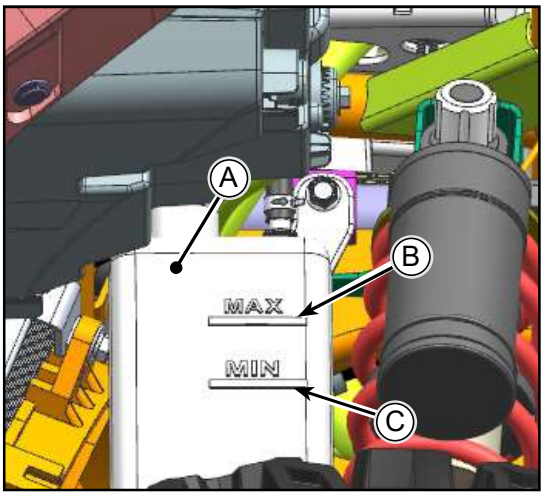
【A】Water storage tank

Visually inspect the coolant in the water storage tank 【A】. If whitish cotton-like fluff is observed, the aluminum parts in the cooling system are corroded. If the coolant is brown, the iron or steel parts are rusty. In either case, flush the cooling system. If the coolant emits a strange smell, check the cooling system for leaks.

Coolant level check

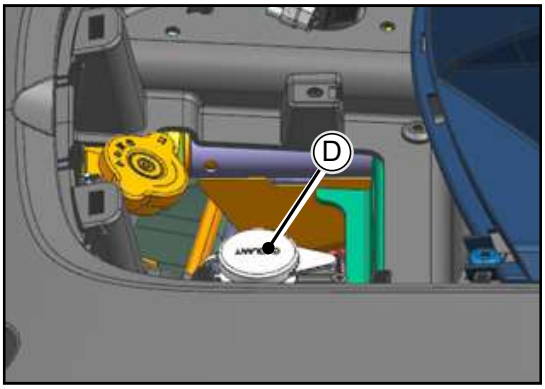
⚠ CAUTION

Check the liquid level when the engine is cold (room temperature or ambient temperature)



【A】Water storage tank
【B】Max mark
【C】Min mark
【D】Water storage tank cover

- Check the coolant level in the water storage tank (keep the water tank vertical) If the coolant level is lower than the MIN mark 【C】, remove the front inspection cover (see the vehicle body chapter for details)
- Open the water storage tank cover 【D】, and then add coolant to the MAX mark 【B】.



⚠ WARNING

When refilling, add the specified mixture of coolant and soft water. Adding water alone will dilute the coolant and reduce its corrosion resistance. The diluted coolant will adhere to aluminum engine parts. In an emergency, soft water can be added, but the diluted coolant must be restored to the correct mixing ratio within a few days. If coolant must be added frequently, or the water storage tank is completely dry, there may be a leak in the cooling system. Please check the system for leaks.

Pressure test

- Remove the front access cover and the radiator cover, and install the cooling system pressure tester on the radiator filler pipe.

⚠ CAUTION

Wet the sealing surface of the cover with water or coolant to prevent pressure leakage.

Slowly pressurize until the pressure rises to 123kPa (1.25kgf/cm^2, 18psi).

⚠ WARNING

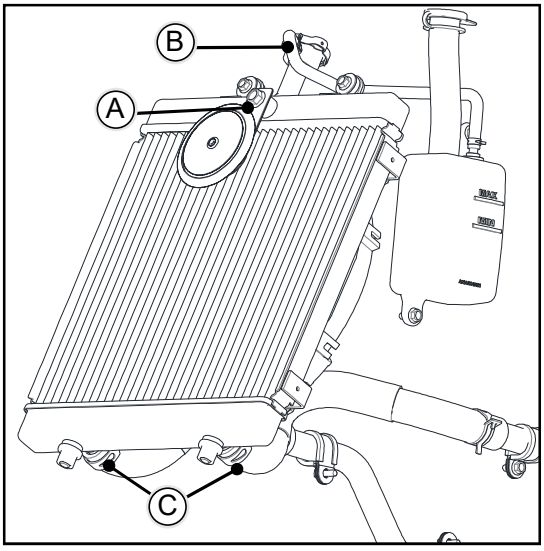
During the pressure test, do not exceed the design pressure of the system. The maximum pressure is 123kPa（1.25kgf/cm^2，18psi）.

- Observe the pressure gauge for at least 6 seconds.
- If the pressure remains stable, the system is normal. If the pressure drops quickly, check for leaks.

Radiator removal

WARNING

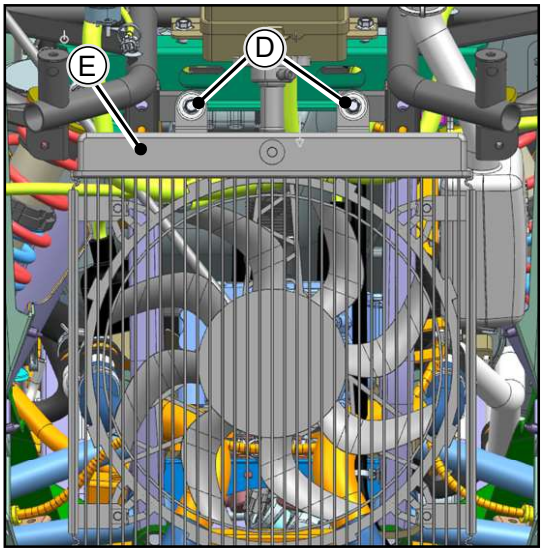
- The start and stop of the radiator fan are controlled by the vehicle ECU. When the water temperature of the engine cylinder head reaches 88°C, the fan automatically starts; until the water temperature of the cylinder head drops below 83°C, the radiator fan automatically stops. Do not touch the radiator fan when it is rotating, as this may cause injury.
- When disassembling the radiator, it must be done in a low temperature vehicle and in a flameout state.



Disassembly

【A】Horn mounting bolt
【B】Radiator overflow pipe clamp
【C】Hose clamp for front section of radiator
【D】Radiator mounting bolt M6×25
【E】Radiator

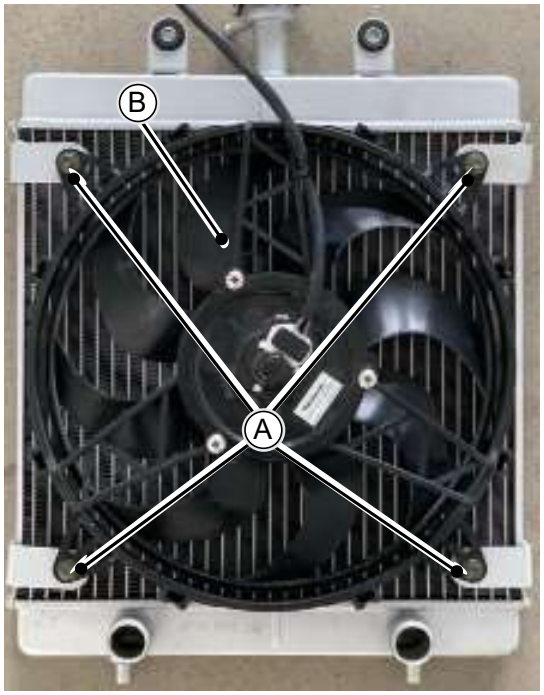
- Remove the front plastic part of the vehicle(See the vehicle body section for details)
- Remove the speaker mounting bolt 【A】, and remove the speaker
- Use tools to remove the radiator overflow pipe clamp, pull out the overflow pipe radiator front hose clamp, and remove the left and right 2 radiator front hose
- Remove the 2 radiator mounting bolts
- Remove the radiator



WARNING

Do not touch the radiator core. This may damage the heat sink, resulting in reduced cooling efficiency

Radiator fan removal



【A】Radiator fan assembly bolt
【B】Fan assembly
【C】Radiator fan mounting nut
【D】Radiator fan

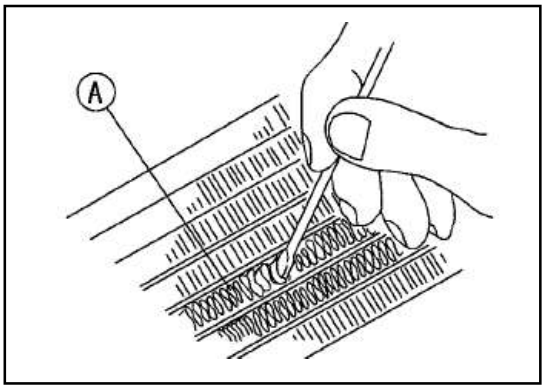
- ◆ Remove the radiator first (see radiator removal)
- ◆ Remove the radiator fan assembly bolts【A】
- ◆ Remove the fan assembly【B】

- ◆ Remove the radiator fan mounting nut【C】
- ◆ Remove the radiator fan【D】

Radiator fan installation

- ◆ Radiator fan
- ◆ Radiator fan assembly
- ◆ Tighten

Radiator fan assembly bolt torque
8N.m（0.8kgf·m，103.6 in·lb）

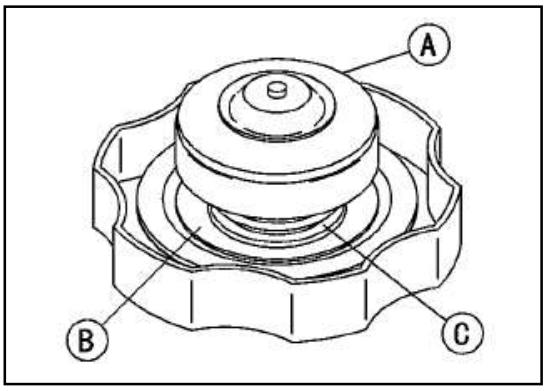


Radiator Inspection

- Check the radiator core.
- If there are obstructions to air flow, remove the radiator and remove obstructions.
- If the corrugated fins【A】are deformed, carefully straighten them.
- If the air passages of the radiator core are blocked more than 20% by unremovable obstructions or irreparably deformed fins, replace the radiator with a new one.

Radiator Cleaning

- Refer to the Cooling System in the Periodic Maintenance chapter.



Radiator Cap Inspection

- Check the condition of the top and bottom valve seals of the radiator cap.

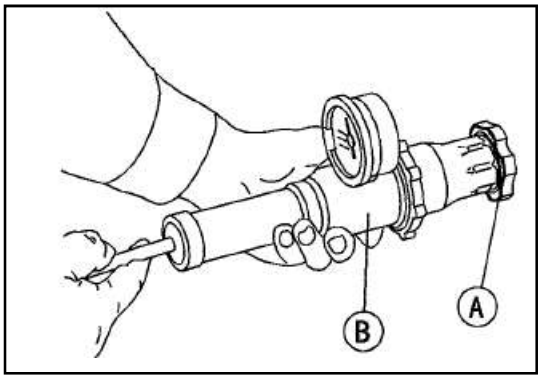
If any one of them shows visible damage, replace the cap.

【A】Bottom Valve Seal
【B】Top Valve Seal
【C】Valve Spring

- Install the cap 【A】 on a cooling system pressure tester【B】.

⚠ CAUTION

Wet the cap sealing surfaces with water or coolant to prevent pressure leakage.



- Watching the pressure gauge, slowly pump the pressure tester to build up the pressure. The relief valve opens,indicated by the gauge hand flicks downward.
- The relief valve must open within the relief pressure range in the table below and the gauge hand must remain within the specified range at least 6 second.

Radiator Cap Relief Pressure

Standard: 93 ～ 123 kPa（0.95 ～ 1.25 kgf /cm^2, 14 ～ 18psi）

If the cap cannot hold the specified pressure, or if it holds too much pressure, replace it with a new one.

INTAKE / EXHAUST SYSTEM

Exploded view of Intake system……7- 2

Disassemble Air Filter……7- 3

Exploded view of Exhaust System……7- 4

Muffler and exhaust pipe……7- 5

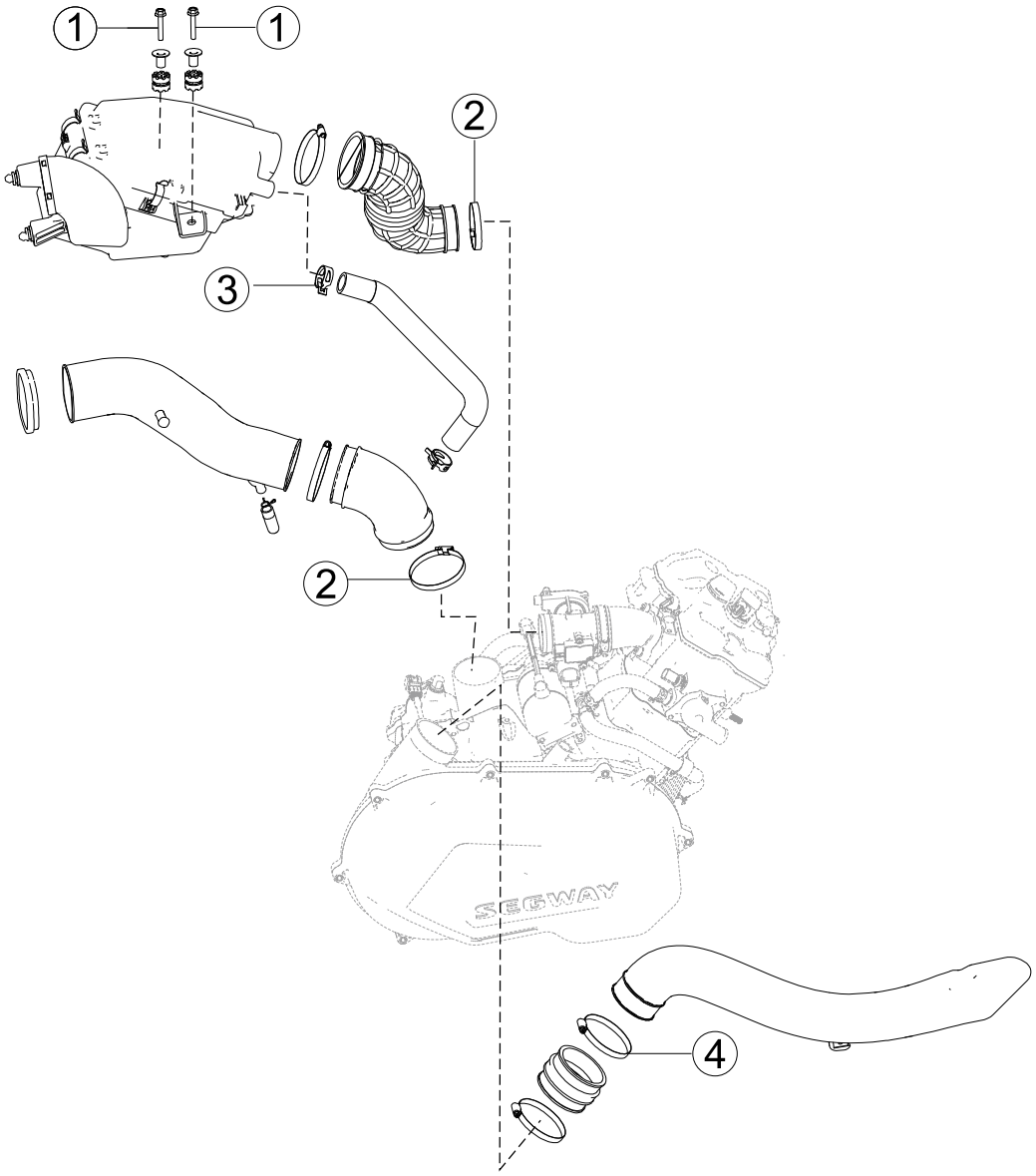
Muffler disassembly…… 7- 5

Exhaust pipe disassembly…… 7- 6

Inspection…… 7- 6

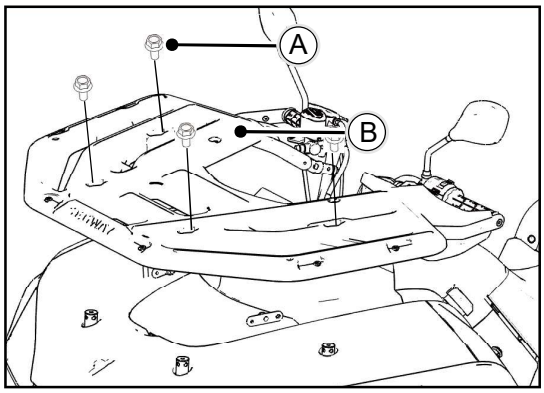
Assembly…… 7- 6

Exploded view of Intake System



No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Installment bolts for air filter M8×16	35 ～ 45	3.5~4.5	25.8~33.2	
2	Type A worm drive hose hoop 80	——	——	——	
3	Steel belt flexible hose clamp 30	——	——	——	
4	Type A worm drive hose hoop 70	——	——	——	

Disassemble Air Filter

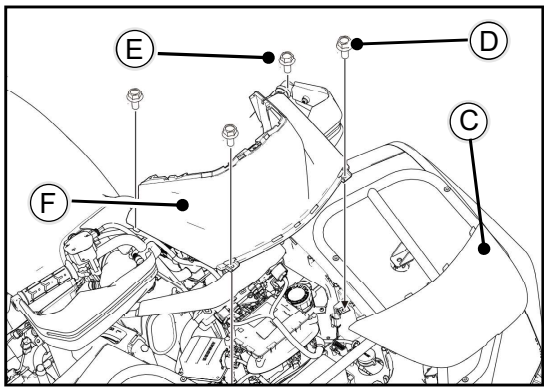


Place the vehicle body in a horizontal position first

【A】bolt

【B】Front rack assembly

- ◆ Remove the bolts
- ◆ Remove the front rack assembly as a whole from the body



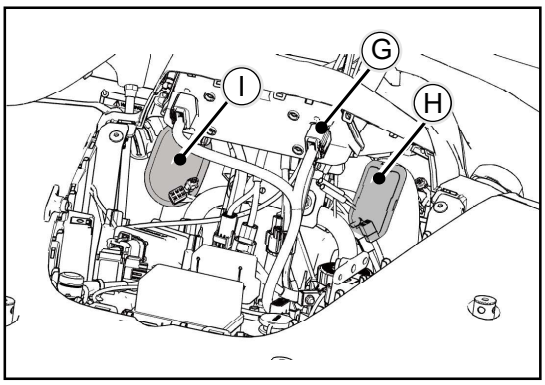
【C】maintenance cover

【D】bolt

【E】bolt

【F】Instrument cover assembly

- ◆ remove maintenance cover 【C】
- ◆ take down bolt【D】and【F】;
- ◆ Remove the instrument cover assembly【F】;



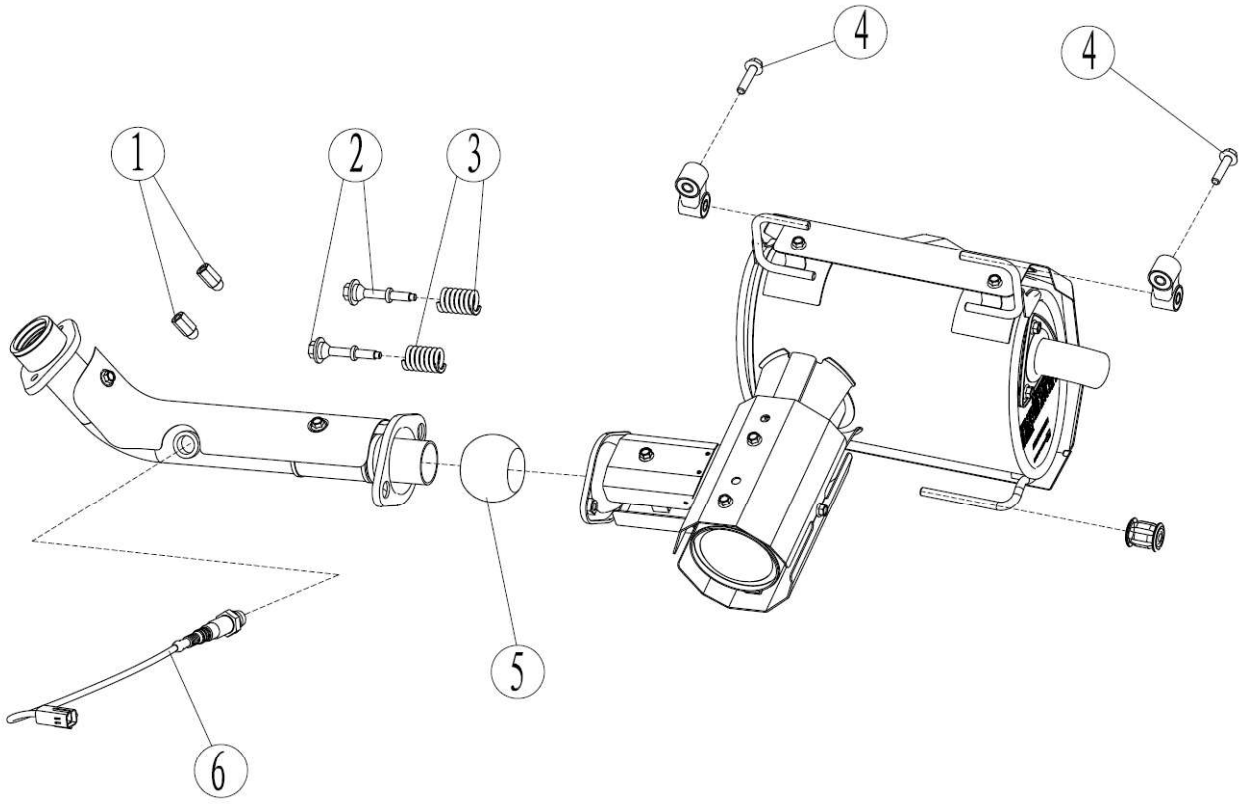
【G】Instrument connector

【H】Air filter air inlet screen

【I】CVT intake strainer

- ◆ Unplug the instrument connector【G】
- ◆ Remove the CVT intake strainer 【I】 Air inlet screen for air filter【H】;

Exploded view of Exhaust System

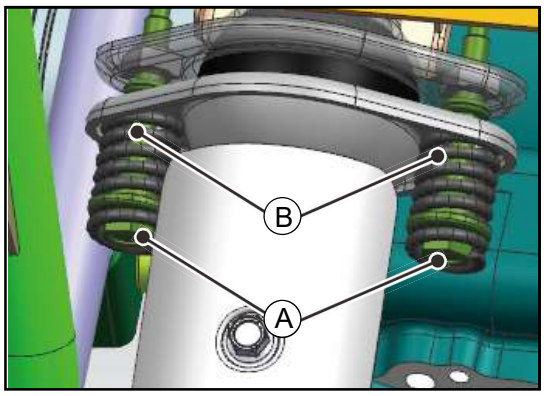


No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Nut	30 ～ 40	3.0~4.0	22.1~29.5	
2	Exhaust pipe connection bolt	30 ～ 40	3.0~4.0	22.1~29.5	
3	Spring	— —	— —	— —	
4	Fixed bolt M8×35	30 ～ 40	3.0~4.0	22.1~29.5	
5	Seal cartridge	— —	— —	— —	
6	Oxygen sensor	40 ～ 60	4.0~6.0	29.5~44.3	

Muffler and Exhaust pipe

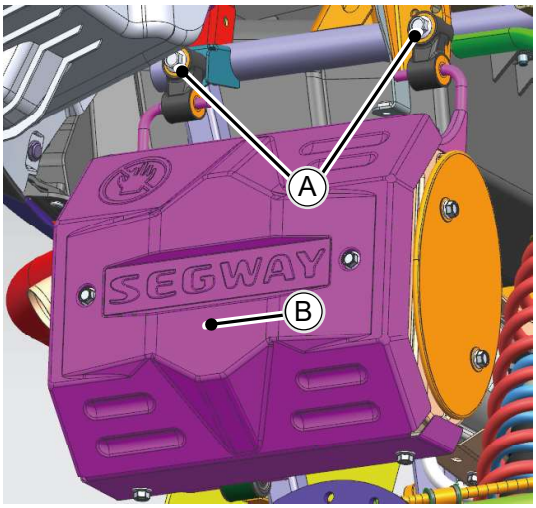
⚠ WARNING

Do not perform maintenance immediately after use as the exhaust components become very hot and can cause serious burns and injury.

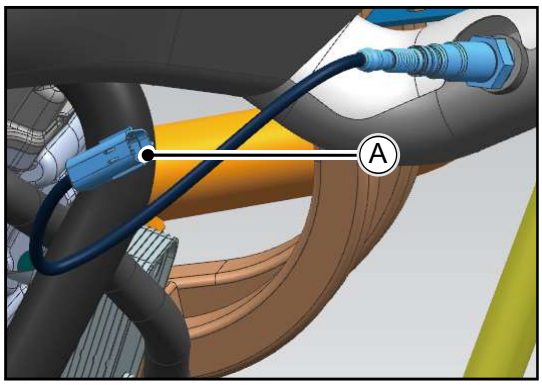


Muffler disassembly

- Remove the exhaust pipe connection bolts【A】and spring【B】;

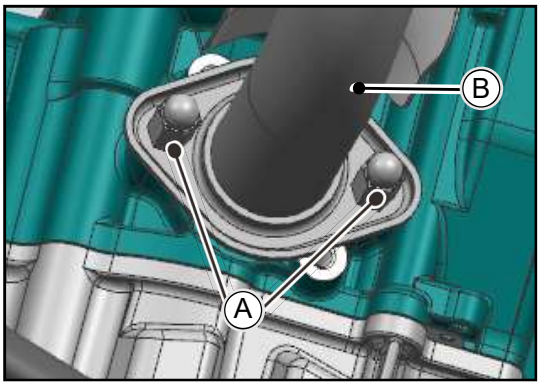


- Remove the fixed screw【A】
- Remove the muffler【B】



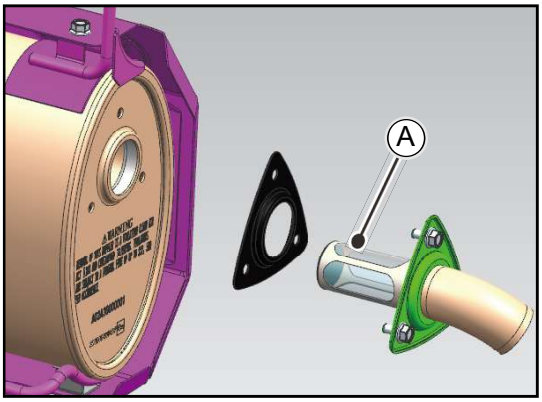
- Disconnect oxygen sensor cable plug【A】;

Exhaust pipe disassembly



- Remove exhaust pipe retaining nut【A】
- Removal of exhaust pipe【B】

Inspection



- Inspect the muffler from the outside for cracks, holes or breakages, which will affect the performance and emission of the engine. Replace any damaged parts.
- By shaking the muffler back and forth, check whether there are looseness, abnormal sound, debris and other abnormalities inside the muffler;;
- Check the connection between exhaust pipe and engine cylinder head for leakage. If so, tighten the nut or replace the gasket;
- Check whether there is leakage at the connection between the exhaust pipe and the muffler. If so, tighten the bolt or replace the muffler spring and sealing sleeve.;
- Check the filter screen of spark eliminator【A】 for carbon deposits, clean with appropriate brush if any, and replace the filter screen or gasket if any is damaged.

Assembly

- Assemble in the reverse order as disassembly sequence

INTAKE / EXHAUST SYSTEM

Exploded view of Intake system……7- 2

Disassemble Air Filter……7- 3

Exploded view of Exhaust System……7- 4

Muffler and exhaust pipe……7- 5

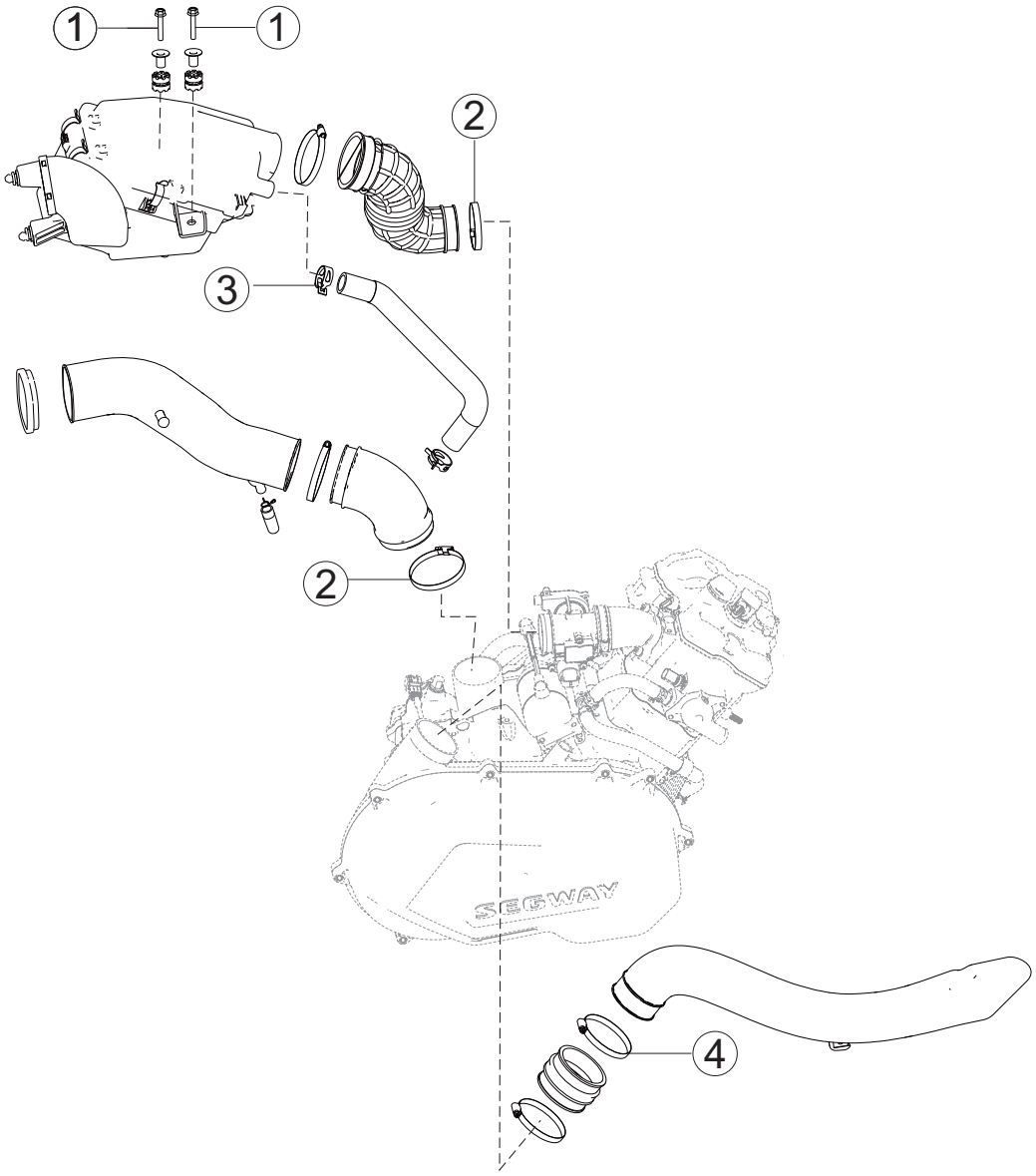
Muffler disassembly…… 7- 5

Exhaust pipe disassembly…… 7- 6

Inspection…… 7- 6

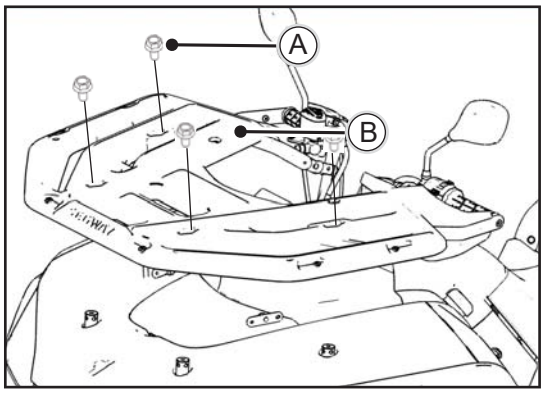
Assembly…… 7- 6

Exploded view of Intake System



No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Installment bolts for air filter M8×16	35 ～ 45	3.5~4.5	25.8~33.2	
2	Type A worm drive hose hoop 80	——	——	——	
3	Steel belt flexible hose clamp 30	——	——	——	
4	Type A worm drive hose hoop 70	——	——	——	

Disassemble Air Filter

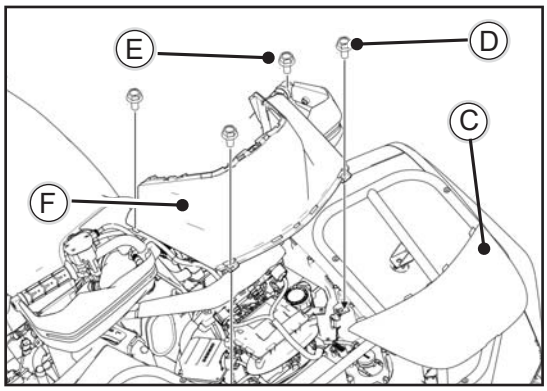


Place the vehicle body in a horizontal position first

【A】bolt

【B】Front rack assembly

- ◆ Remove the bolts
- ◆ Remove the front rack assembly as a whole from the body



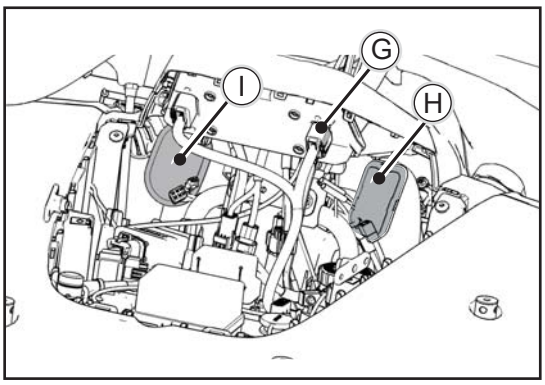
【C】maintenance cover

【D】bolt

【E】bolt

【F】Instrument cover assembly

- ◆ remove maintenance cover 【C】
- ◆ take down bolt【D】and【F】;
- ◆ Remove the instrument cover assembly【F】;



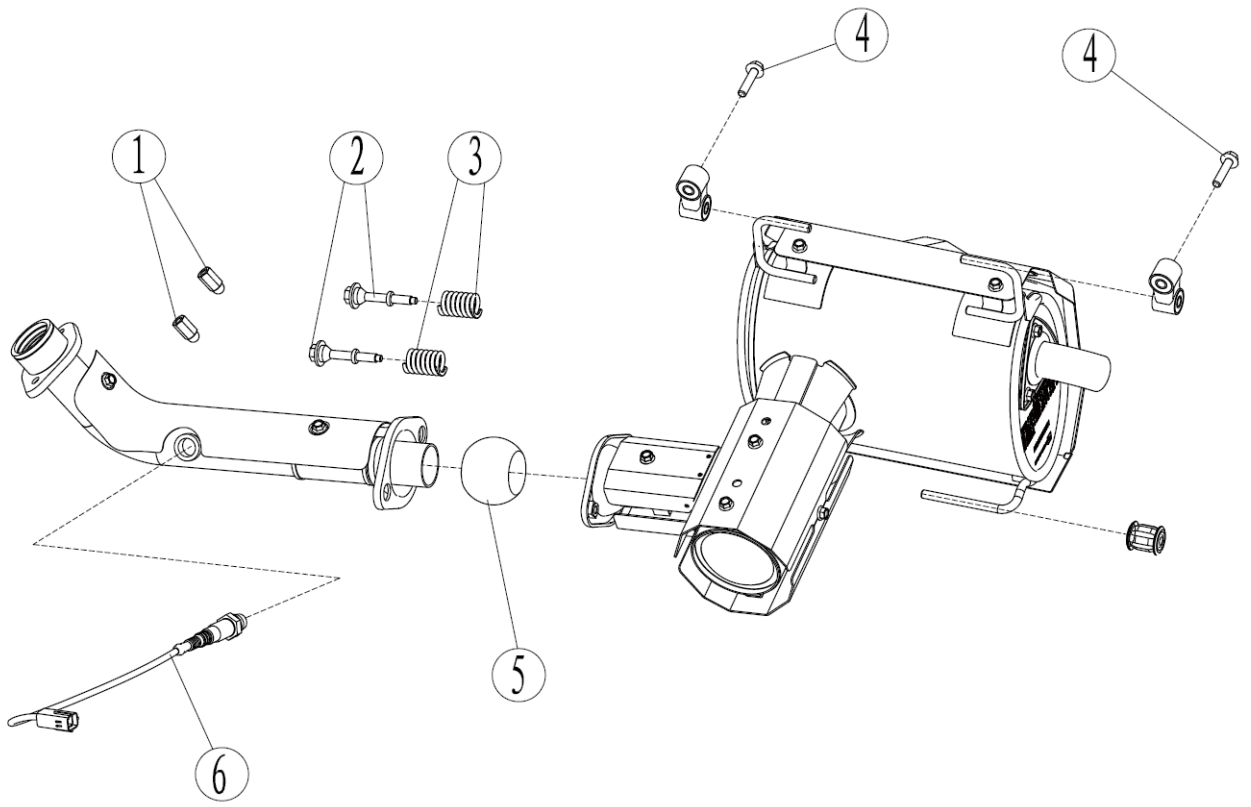
【G】Instrument connector

【H】Air filter air inlet screen

【I】CVT intake strainer

- ◆ Unplug the instrument connector【G】
- ◆ Remove the CVT intake strainer 【I】 Air inlet screen for air filter【H】;

Exploded view of Exhaust System

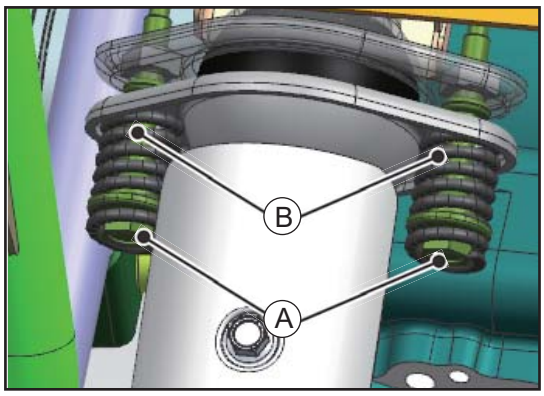


No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Nut	30 ～ 40	3.0~4.0	22.1~29.5	
2	Exhaust pipe connection bolt	30 ～ 40	3.0~4.0	22.1~29.5	
3	Spring	— —	— —	— —	
4	Fixed bolt M8×35	30 ～ 40	3.0~4.0	22.1~29.5	
5	Seal cartridge	— —	— —	— —	
6	Oxygen sensor	40 ～ 60	4.0~6.0	29.5~44.3	

Muffler and Exhaust pipe

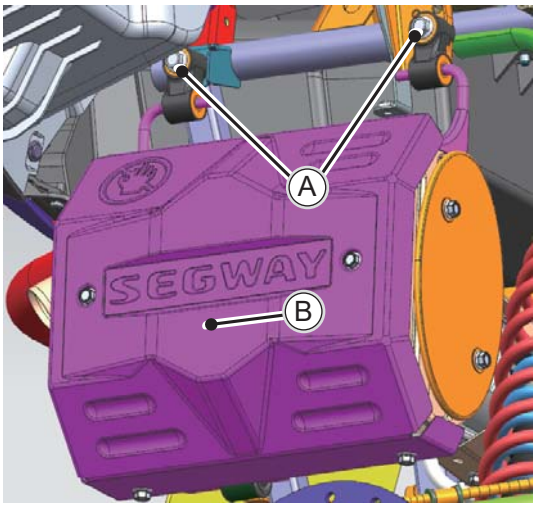
⚠ WARNING

Do not perform maintenance immediately after use as the exhaust components become very hot and can cause serious burns and injury.

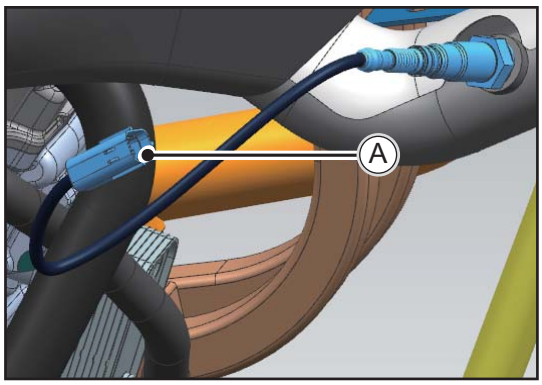


Muffler disassembly

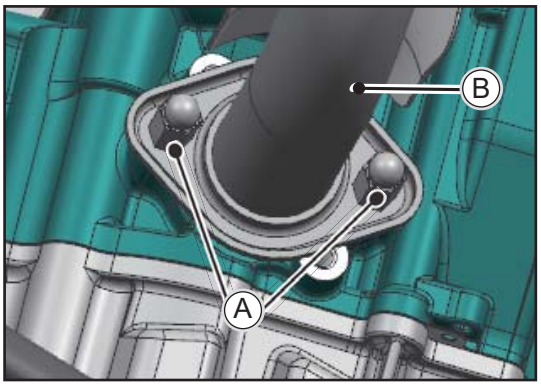
- Remove the exhaust pipe connection bolts【A】and spring【B】;



- Remove the fixed screw【A】
- Remove the muffler【B】



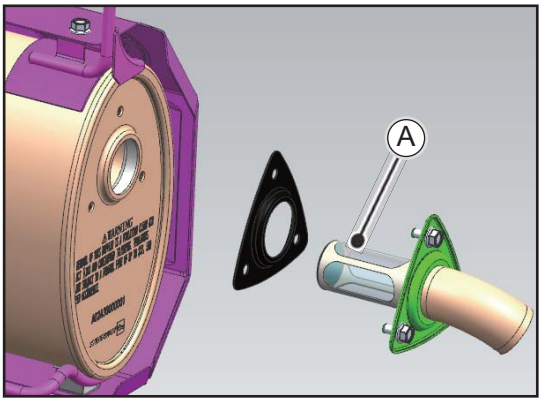
- Disconnect oxygen sensor cable plug【A】;



Exhaust pipe disassembly

- Remove exhaust pipe retaining nut【A】
- Removal of exhaust pipe【B】

Inspection



- Inspect the muffler from the outside for cracks, holes or breakages, which will affect the performance and emission of the engine. Replace any damaged parts.
- By shaking the muffler back and forth, check whether there are looseness, abnormal sound, debris and other abnormalities inside the muffler;;
- Check the connection between exhaust pipe and engine cylinder head for leakage. If so, tighten the nut or replace the gasket;
- Check whether there is leakage at the connection between the exhaust pipe and the muffler. If so, tighten the bolt or replace the muffler spring and sealing sleeve.;
- Check the filter screen of spark eliminator【A】 for carbon deposits, clean with appropriate brush if any, and replace the filter screen or gasket if any is damaged.

Assembly

- Assemble in the reverse order as disassembly sequence

DRIVE SYSTEM

Exploded View of Drive System……..8-2

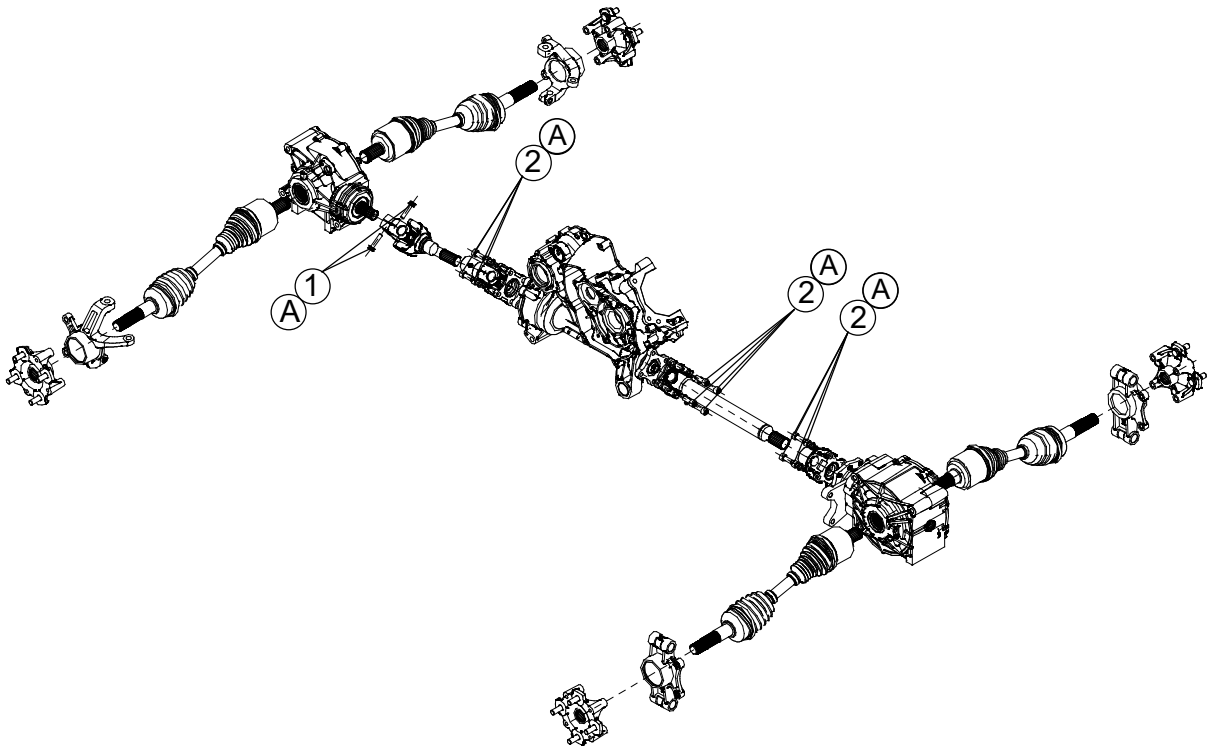
Drive Axle Disassembly……8-3

Front& Rear Drive Axle Disassembly……8-4

Front& Rear Drive Axle Assembly……8-5

DRIVE SYSTEM

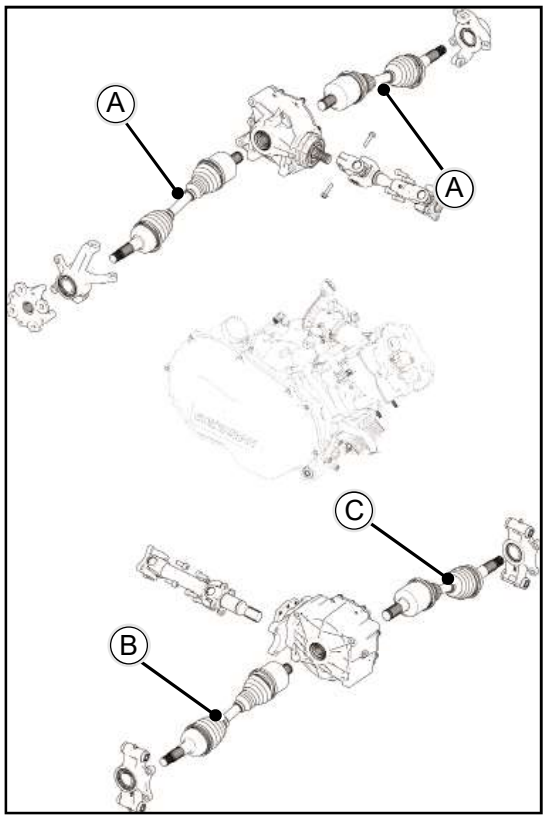
Exploded view of Drive System



No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Hexagon Flange Bolts M8×35	35 ～ 45	3.5~4.5	25.8~33.2	
2	Hexagon Socket Head Screw M10×1.25×25				

A：Apply Impermanent Locking Agent.

Drive Axle Disassembly

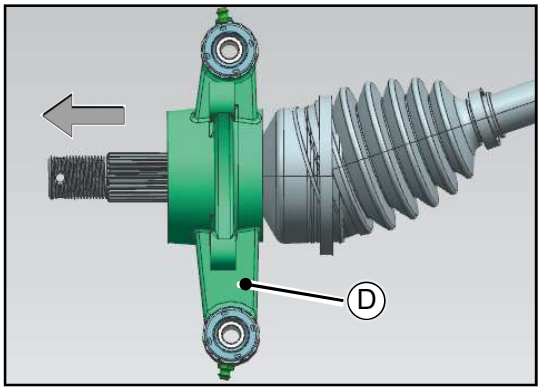


⚠ WARNING

- Do not remove the dust boot when the drive axle is removed, it is full of grease.
- Please do not pull out the drive axle when disassemble it, which may damage the intermediate axle clip and cause the ball cage to fall out.

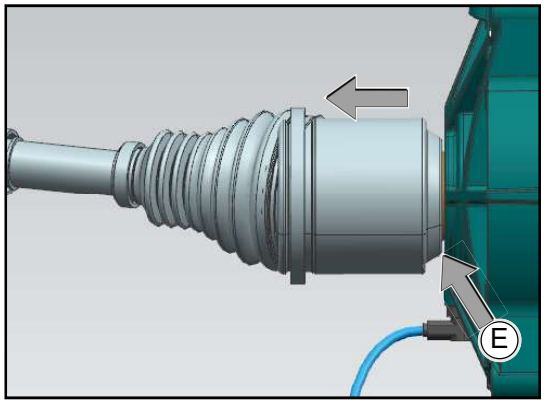
【A】Front constant speed drive axle assembly
【B】RL constant speed drive axle assembly
【C】RR constant speed drive axle assembly
Remove the drive axle from the fixed end of the drive axle (wheel end)

- Remove the wheel and suspension components before the axle assembly(see the wheels & tires and suspension chapters for more details)

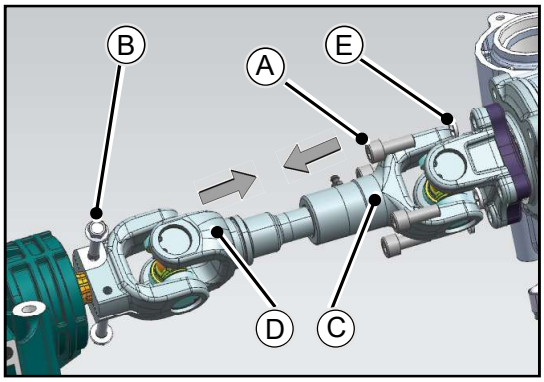


【D】Axle Support

- Pull out the axle support from the drive axle in the direction indicated by the arrow in the left picture.



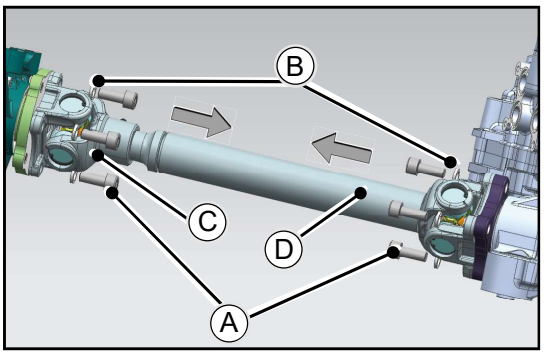
- Pull out the drive axle from the axle in the direction indicated by the arrow in the left picture.
- If it is difficult to pull out the axle, use tools to pry at the point 【E】 until it is loose enough to be pulled out.



Front Drive Axle Disassembly

【A】Hexagon socket head screw M10×1.25×25
【B】Hexagon flange bolts M8×35
【C】Rear part of front drive axle
【D】Front part of front drive axle
【E】10mm diameter spring washer (4 pcs）

- Loosen the screws A (4 psc）
- Loosen the screws B (2 pcs）
- Take 【C】 the rear part of the front drive axle in the direction of the arrow until it is taken out.
- Take 【D】the fear part of the front drive axle in the direction of the arrow until it is taken out.

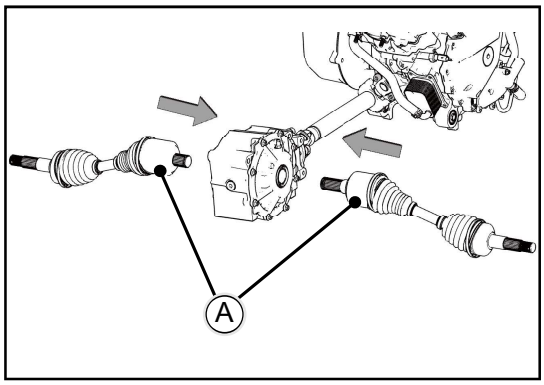


Rear Drive Axle Disassembly

【A】Hexagon socket head screw (8 pcs）M10×1.25×25
【B】10mm diameter spring washer (8 pcs）
【C】Rear part of rear drive axle
【D】Front part of rear drive axle

- Loosen the 8 screws 【A】before removing the rear drive axle.
- Pull out 【C】 and 【D】 at both ends of the drive axle in the direction of the arrow until they are removed out.

Front& Rear Drive Axle Assembly



【A】Front L& R drive axles

The front and rear drive axles are installed by pushing them into the axle hole in the direction of the arrow shown in the picture until they reach the bottom, and then install the upper and lower arms and wheel support and the wheel parts.

The installation of the front and rear drive axle assembly is the reverse of the removal steps.

FRONT & REAR SUSPENSION

Exploded view of Front Suspension..... 9-2

Exploded view of Rear Suspension..... 9-4

Technical parameter..... 9-6

Special Tools..... 9-7

Shock Absorber..... 9-8

Absorber inspection.....9-8

Normal hydraulic damping absorber preloading adjustment.....9-8

Air damping absorber preloading adjustment.....9-8

Measure free length of spring.....9-9

Absorber damping adjustment.....9-9

Compressure damping adjustment.....9-9

Rebound damping adjustment.....9-10

Absorber disassembly.....9-10

Rear shock absorber scrapped.....9-11

Suspension..... 9-12

Rocker arm disassembly..... 9-12

Rocker arm assembly..... 9-13

Rocker arm maintenance 9-14

Wheel hub bearing replacement..... 9-15

Rear wheel axle steady disassembly..... 9-15

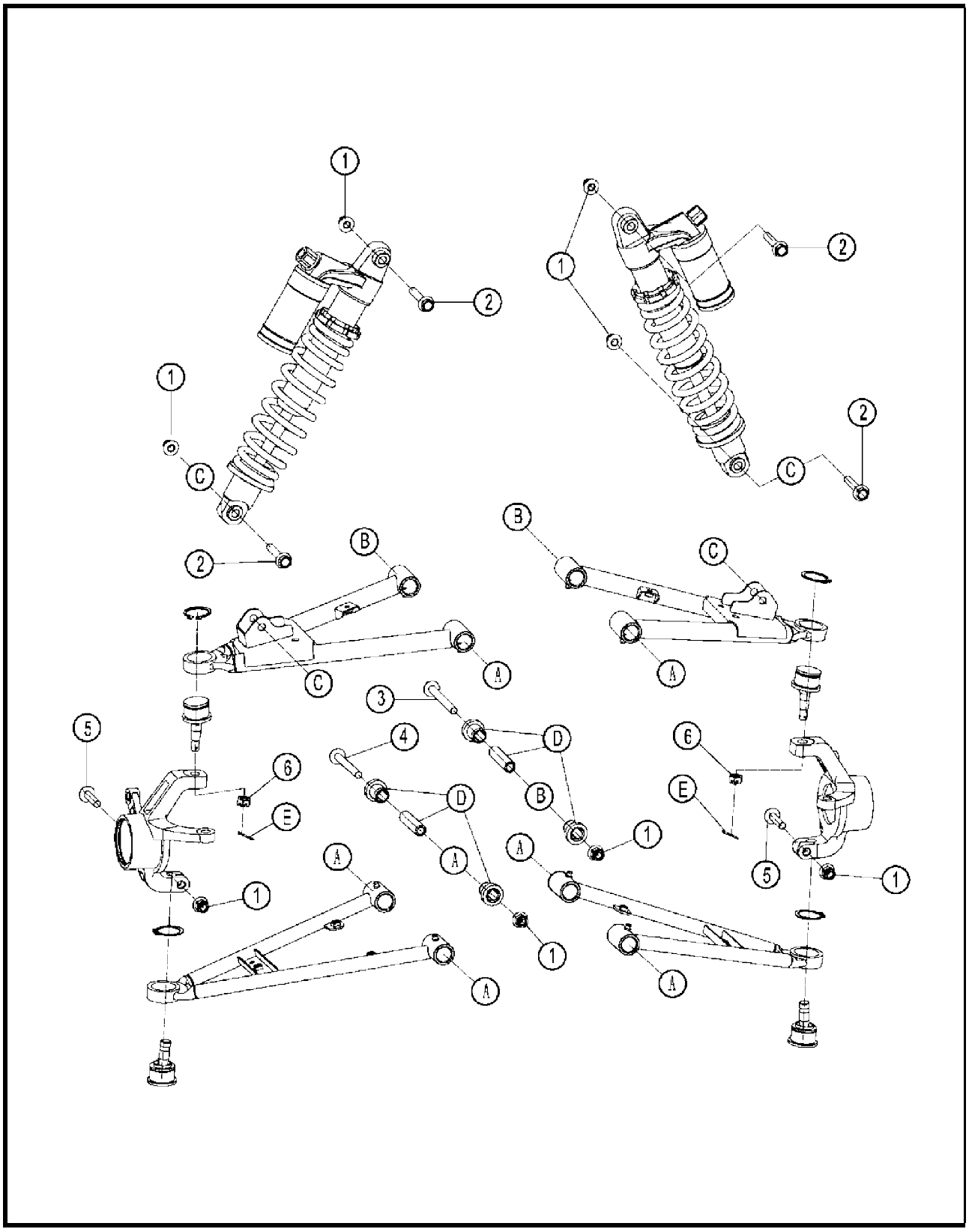
Rear balance bar..... 9-16

Rear stabilizer bar decomposition..... 9-16

Rear stabilizer bar maintenance..... 9-16

FRONT & REAR SUSPENSION

Exploded view of Front suspension



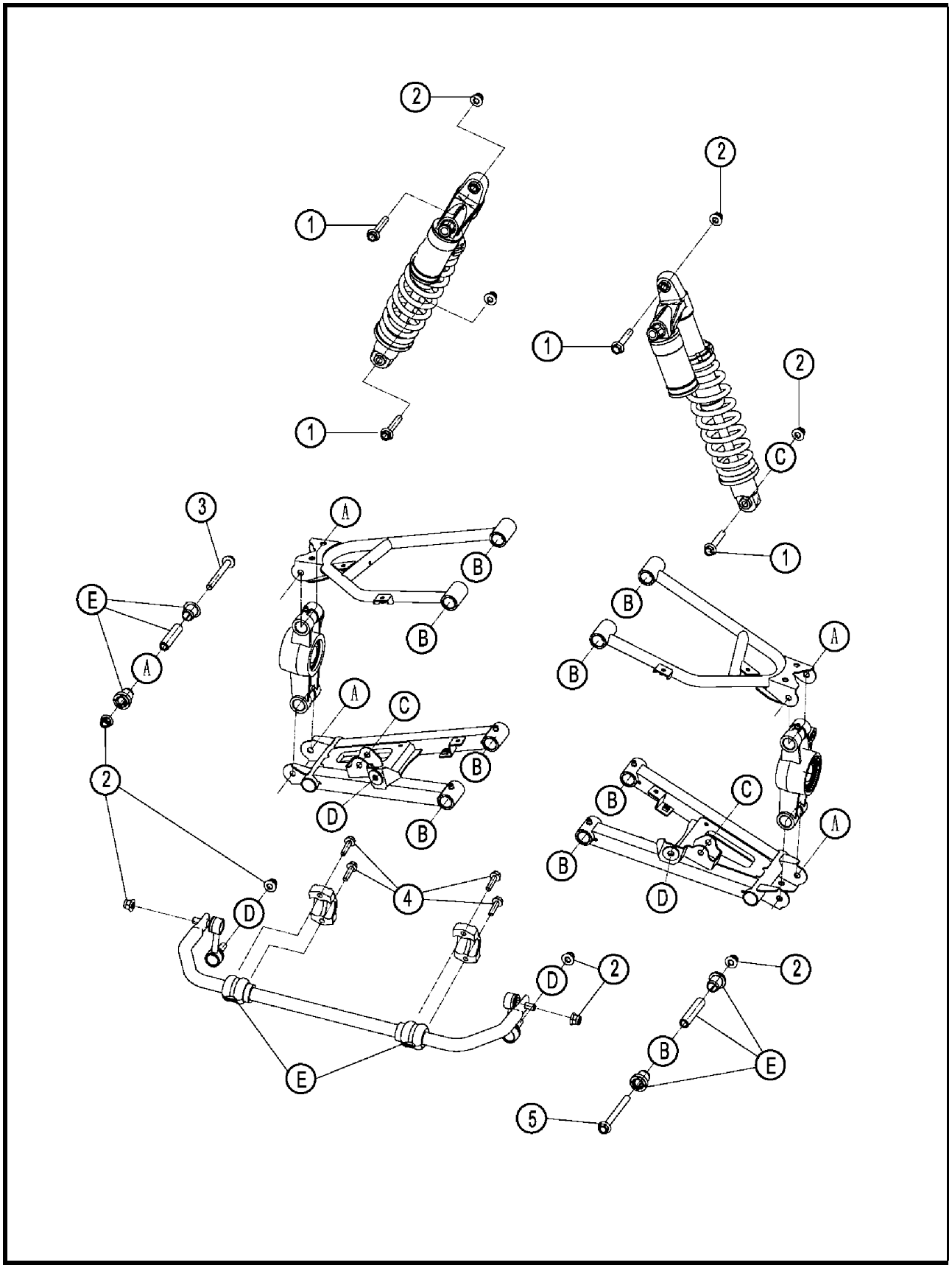
No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Hexagon flange lock nuts M10×1.25	40 ～ 50	4.0~5.0	29.5~36.9	
2	Absorber mounting bolt M10×1.25×55	40 ～ 50	4.0~5.0	29.5~36.9	
3	Front rocker arm mounting bolt M10×1.25×90	40 ～ 50	4.0~5.0	29.5~36.9	
4	Rocker arm mounting bolt M10×1.25×85	40 ～ 50	4.0~5.0	29.5~36.9	
5	Steering knuckle lower mounting bolt M10×1.25×40	40 ～ 50	4.0~5.0	29.5~36.9	
6	Slotting nut M10×1.25	40 ～ 50	4.0~5.0	29.5~36.9	

D：Fill grease through the grease cup nozzle（1000 miles or 12 months or 100 hours)

E：Parts replacement

FRONT & REAR SUSPENSION

Exploded view of Rear suspension



No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Absorber mounting bolt M10×1.25×55	40 ～ 50	4.0~5.0	29.5~36.9	
2	Hexagon flange lock nuts M10×1.25	40 ～ 50	4.0~5.0	29.5~36.9	
3	Rear wheel axle steady mounting bolt M10×1.25×100	40 ～ 50	4.0~5.0	29.5~36.9	
4	Rear balance bar mounting boltM8×1.25×30	20 ～ 25	2.0~2.5	14.7~18.4	
5	Rocker arm mounting bolt M10×1.25×85	40 ～ 50	4.0~5.0	29.5~36.9	

E：Fill grease through the grease cup nozzle（1000 miles or 12 months or 100 hours）

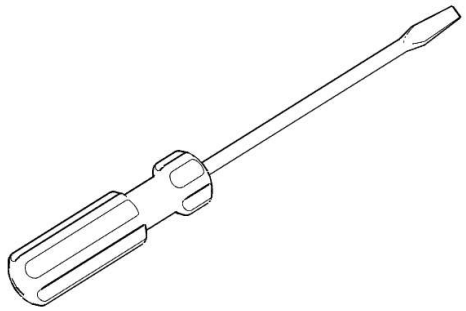
FRONT & REAR SUSPENSION

Technical parameter

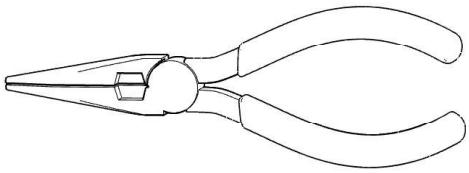
Item	Setting	Available range
Front absorber: (Optional) • Preloading setting position of normal hydraulic damping absorber spring • Preloading setting position of air damping absorber（From the bottom of the upper mount to the position of the adjusting nut)	**Gear 3**	**Gear 1 ～ Gear 5**
	45mm(1.78in.)	**35 ～ 55mm** **(1.38 ～ 2.17in.)**
Rear absorber：(Optional) • Preloading setting position of normal hydraulic damping absorber spring • Preloading setting position of air damping absorber（From the bottom of the upper mount to the position of the adjusting nut）	**3 Gear**	**Gear 1 ～ Gear 5**
	53mm(2.09in.)	**48 ～ 63mm**
Air pressure damping • Compression damping adjustment（Adjust from clockwise） • Reset damping adjustment（Adjust from clockwise） • Air pressure	**Gear 1**	**Gear 1 ～ Gear 8**
	Gear 9	**Gear 1 ～ Gear 14**
	1Mpa	

Dedicated Tools

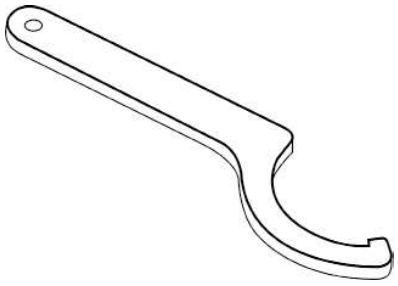
Slotted screwdriver



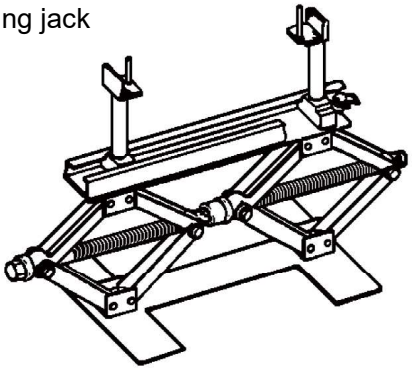
Needle nose pliers



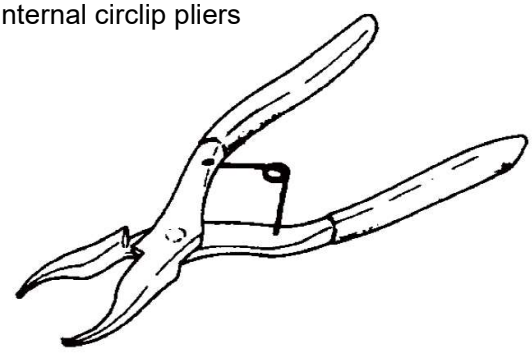
Hook wrench



Lifting jack

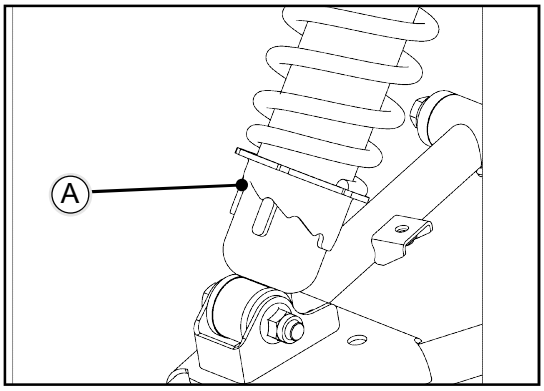


Internal circlip pliers



Bearing drive kit

Shock absorber



Absorber inspection

Because the front shock absorber is a sealed unit, it cannot be disassembled, only external inspection is required. If one unit is damaged, replace two shock absorbers together as a set. If only one unit is replaced, when the two shock absorbers are out of balance, it may cause the vehicle to become unstable at high speeds or deteriorate the overall comfort.

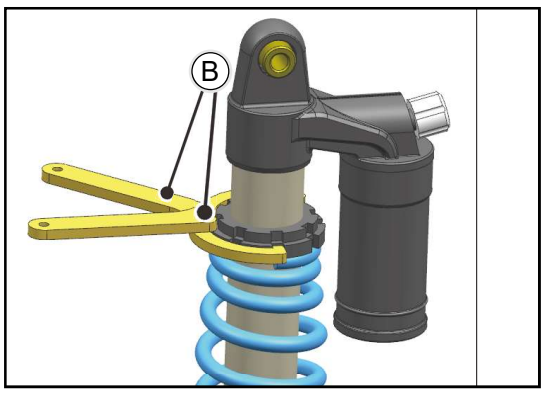
Normal hydraulic damping absorber preloading adjustment

【A】The spring adjustment sleeve of the hydraulic shock absorber【A】There are 5 adjustment positions, the spring can be adjusted according to different terrain and loading conditions, if you feel too soft and too hard, it can be adjusted by the spring table adjustment.

Spring adjustment table

Gear	Spring	Environment	Load	Terrain	Speed
1	Soft	Soft	Light	Flat	Low
2(STD)		↑	↑	↑	↑
3					
4	↓	↓	↓	↓	↓
5	Hard	Hard	Heavy	Bumpy	High

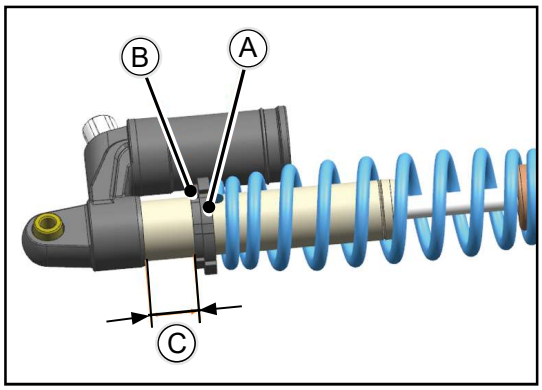
◆ Turn the adjustment sleeve on the shock absorber to the required gear position with a tool.



Air damping absorber preload adjustment

【B】Hook wrench

◆ The spring adjustment nut of shock is on the upper end of spring, and use the tool【B】to loosen the lock nut. Then turn the adjustment nut to loosen.



Measure free length of spring

【A】Adjustment nut

【B】Lock nut

【C】Spring preload position

◆ Screw the adjustment nut【A】to the required position，and then tighten the lock nut【B】, adjust nut position【C】.

Spring preload position【C】set up

***Standard*:**

Front absorber: 45mm(1.78in.)

Limit for the use: 35mm(1.38in.) ～ 55mm(2.17in.)

Rear absorber: 53mm(2.09in.)

Limit for the use: 48mm(1.89in.) ～ 63mm(2.48in.)

Spring lock nut torque requirement
30 N·m（3.0kgf·m，22.1ft·lb）

If the spring action feels too soft or too hard, set it to:

Position	Spring	Environment	Load	Terrain	Speed
↑	Soft	Soft	Light	Flat	Low
	↑	↑	↑	↑	↑
STD					
	↓	↓	↓	↓	↓
↓	Hard	Hard	Heavy	Bumpy	High

Absorber damping adjustment

In order to adapt to various riding conditions, the damping of the shock can be adjusted to replace the shock absorber or spring. The damping force can also be easily adjusted without changing the oil viscosity.

Compression damping adjustment

◆ Turn the upper compression damping regulator by hand【A】, Increase the damping in clockwise direction and decrease it in counter clockwise direction.

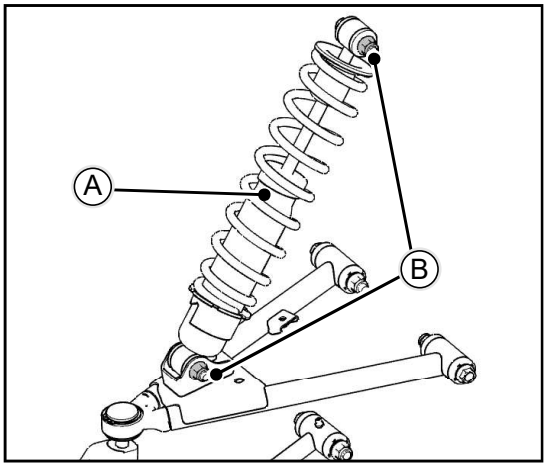
There are 8 gears in the compression damping regulator, which is set to the gear 1 from the factory.

Rebound damping adjustment

Turn the damping regulator at the bottom with a slotted screwdriver, Increase the damping in clockwise direction(H) and decrease it in counter clockwise direction (S).

There are 14 gears in the compression damping regulator, which is set to the gear 9 from the factory.

Tool：slotted screwdriver



Absorber disassembly

【A】Front absorber

【B】When installing the bolts

support the vehicle with a jack or support frame to make the wheels do not touch the ground.

◆ Remove the upper and lower mounting bolts and nuts of the shock absorber with tools【B】

◆ Take out the front shock absorber【A】

Front absorber disassembly

◆ Install the upper end of the front shock absorber into the frame mounting base, and install the bolts and nuts.

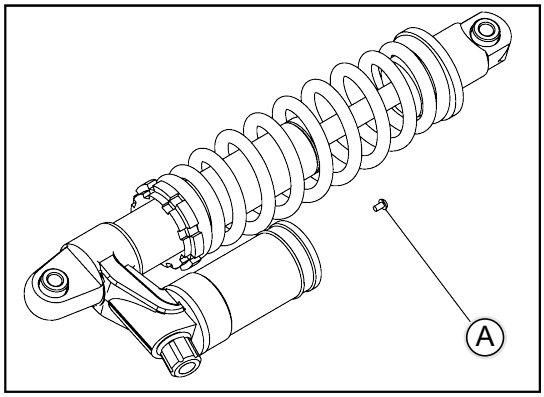
◆ mounting base, and install the bolts and nuts

Install the lower end of the front shock absorber into the front rocker arm mounting base, and install the bolts and nuts

◆ arm mounting base, and install the bolts and nuts, Use tools to fasten the upper and lower mounting bolts and nuts.

Shock absorber retaining nut torque requirement
45 N·m（4.4kgf·m，32ft·lb）

Rear absorber scrapped



⚠ WARNING

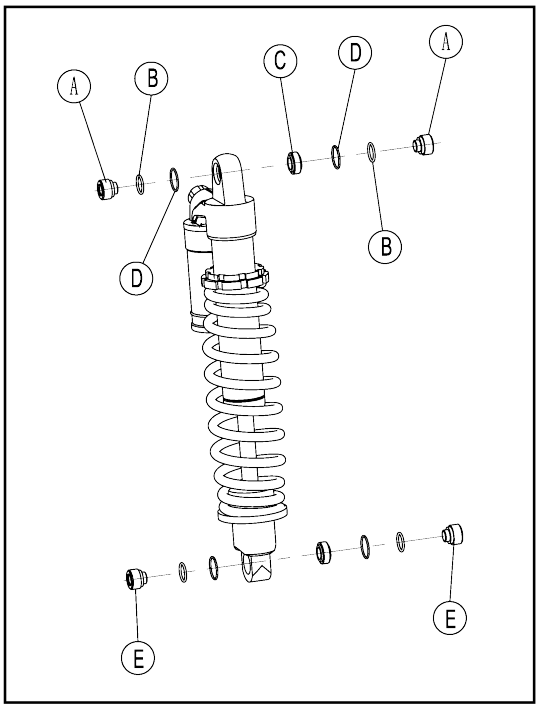
As the oil container of the shock absorber contains nitrogen, do not incinerate the gas that has not been released in the container, otherwise it may explode.

【A】Valve cover

- Remove the absorber(Refer to absorber removal)
- Remove the valve cover【A】and release nitrogen
- Remove the valve

⚠ WARNING

As high pressure gas is dangerous, do not point the valve to your face or body.

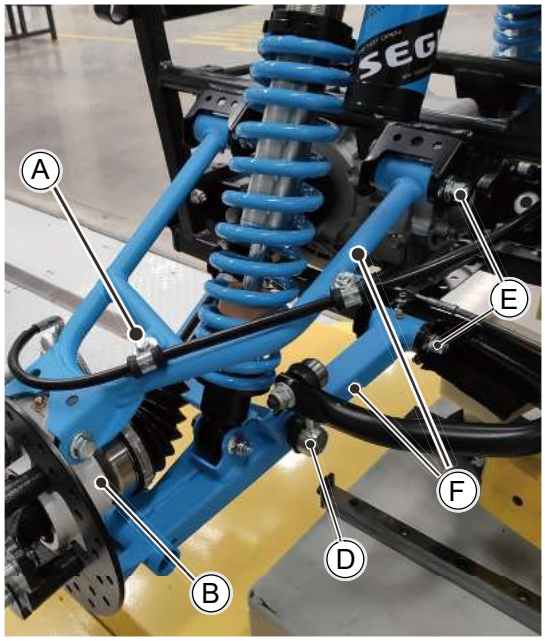


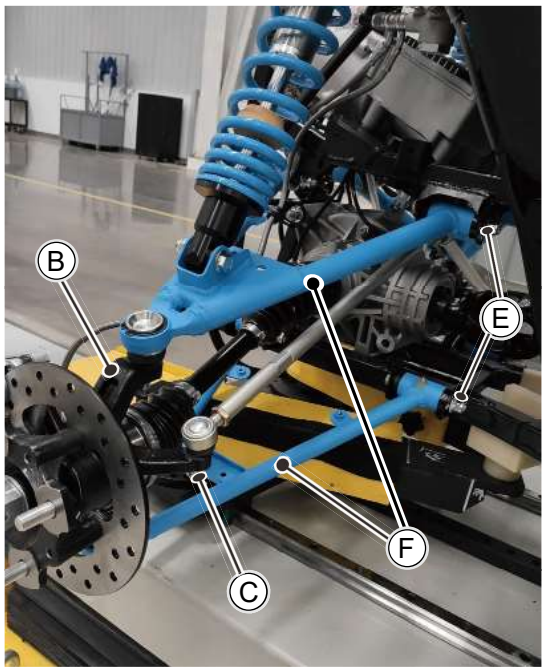
Inspection of adjustable air pressure absorber

- Check the upper and lower mounting blocks
- If the spacer ring, plain bearing assembly and oil seal are damaged, replace them

【A】Upper spacer ring
【B】O ring
【C】Spherical plain bearing assembly
【D】Retaining ring
【E】Lower spacer ring

Suspension



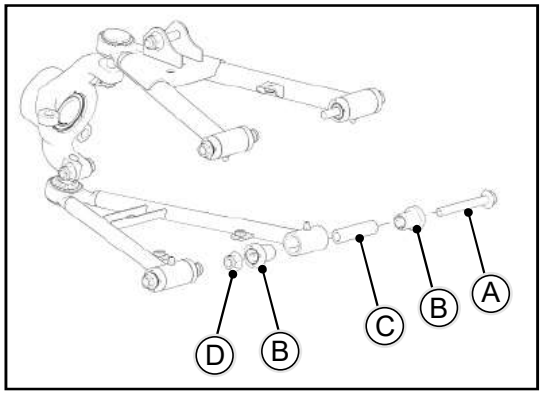


Rocker arm removal

【A】Hose fixing bolt
【B】Steering knuckle / axle support assembly
【C】Steering rod nut
【D】Ball pin connecting rod bolt
【E】Rocker arm mounting bolt
【F】Rocker arm assembly

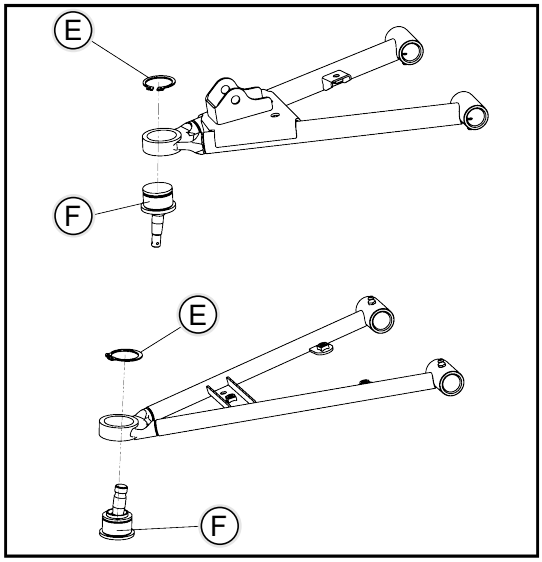
- Remove the brake caliper mounting bolts and remove the caliper body
- Remove the brake hose retaining bolts【A】
- Remove the steering knuckle / axle support assembly【B】
- Remove the steering rod nut【C】
- Remove the ball pin connecting rod bolt【D】
- Remove the rocker arm mounting bolt fasteners【E】
- Remove the rocker arm assembly【F】

Rocker arm disassembly



【A】Rocker arm assembly mounting bolts
【B】Rocker arm buffer sleeve
【C】Rocker liner
【D】Nut
【E】Elastic ring for shaft
【F】Upper and lower kingpin assembly

- ◆ Rocker arm buffer sleeve
- ◆ Rocker liner
- ◆ Circlip



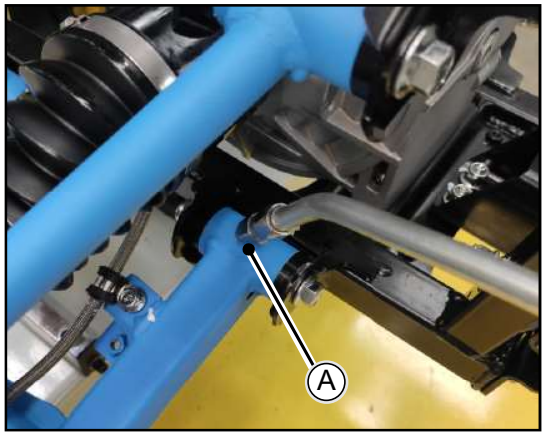
- ◆ Press out the upper kingpin assembly
- ◆ Press out the lower kingpin assembly

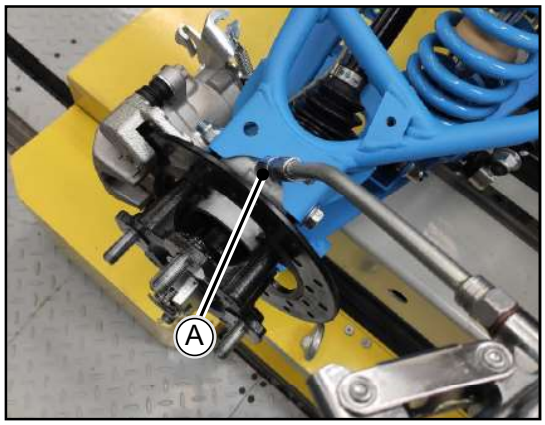
Rocker arm assembly

- ◆ Tighten

Rocker arm assembly mounting bolt / steering rod end nut torque requirement
45 N·m（4.4kgf·m，32ft·lb）

Stabilizer bar assembly mounting bolts torque requirement
25N·m（2.5kgf·m，18 ft·lb）





Rocker arm maintenance

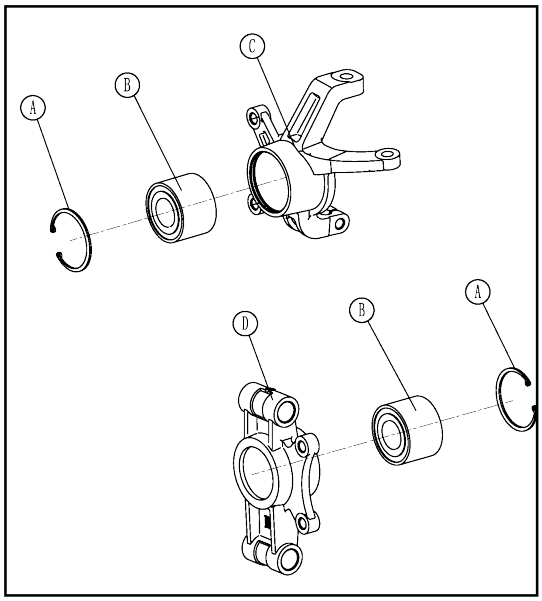
【A】Straight type grease cup

- Fill grease into the straight type cup with grease gun
- When it is found that the grease in the suspension rocker arm shaft sleeve ,axle support and axle sleeve is reducing, or after the vehicle runs every 1000km, grease the straight type oil cup in the suspension system(Including upper and lower rocker arm, rear axle support and rear stabilizer bar) with an grease gun.

Dedicated tool：Grease gun.

⚠ WARNING

When there is no proper lubrication for the suspension joints, it needs to be filled with grease and maintained regularly to avoid excessive wear of shaft sleeve.



Hub bearing replacement

If the hub bearing in the knuckle assembly and rear axle support assembly is damaged, it needs to be replaced.

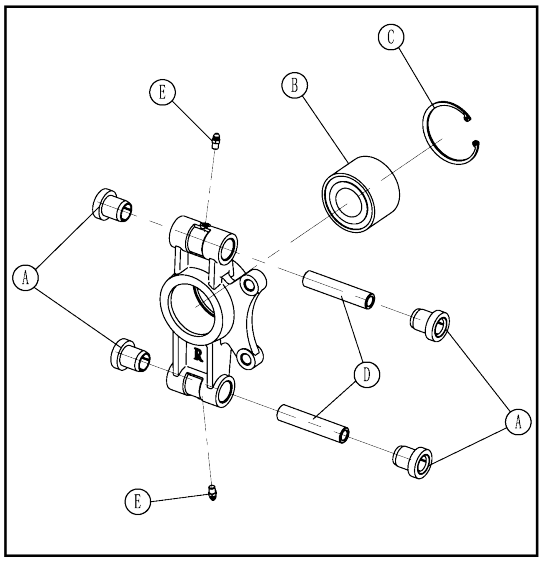
【A】Take out the split ring with the circlip pliers

【B】Press out hub bearing

【C】Front knuckle

【D】Rear axle mount

Dedicated tool：Circlip plier, Bearing drive kit



Disassembly of rear axle support assembly

【A】Buffer sleeve

【B】Hub bearing

【C】Split ring

【D】Axle support liner

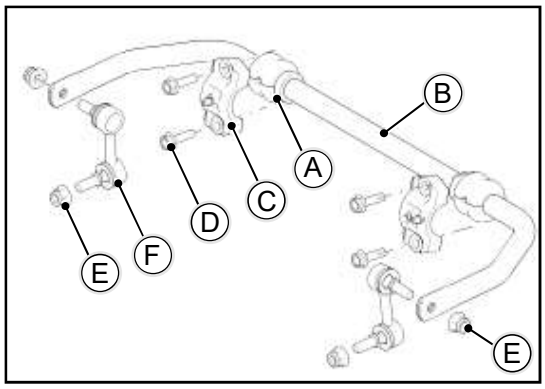
【E】Straight type grease cup (grease fitting)

Dedicated tool：Circlip plier, Bearing drive kit

⚠ CAUTION

Check the buffer sleeve【A】, If the inner hole is seriously worn, it needs to be replaced, and the grease should be refilled after assembly.

Rear stabilizer bar

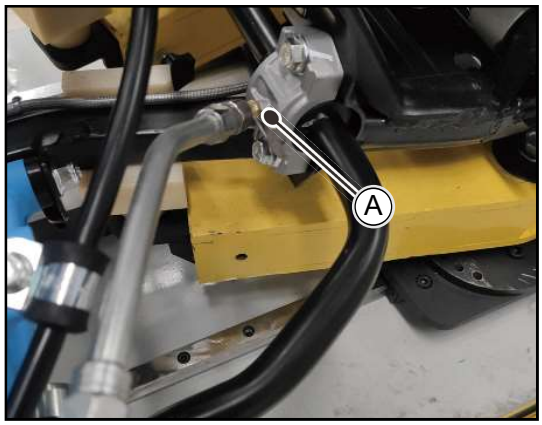


Rear stabilizer bar disassembly

【A】Stabilizer bar buffer sleeve
【B】Rear stabilizer bar
【C】Stabilizer bar mounting
【D】Mounting bracket fixing bolt
【E】Connecting rod assembly mounting nut
【F】Connecting rod assembly

Fixing bolt of mounting base torque requirement
25N·m（2.5kgf·m，18 ft·lb）

Connecting rod assembly mounting nut torque requirement
45 N·m（4.5 kgf·m，33 ft·lb）



Rear stabilizer bar maintenance

【A】Straight type oil cup

When the vehicle runs 1000km, it is necessary to add proper amount of grease into the buffer sleeve of stabilizer bar by the straight type oil cup【A】.

Special tool：Circlip plier, Bearing drive kit

WHEELS AND TIRES

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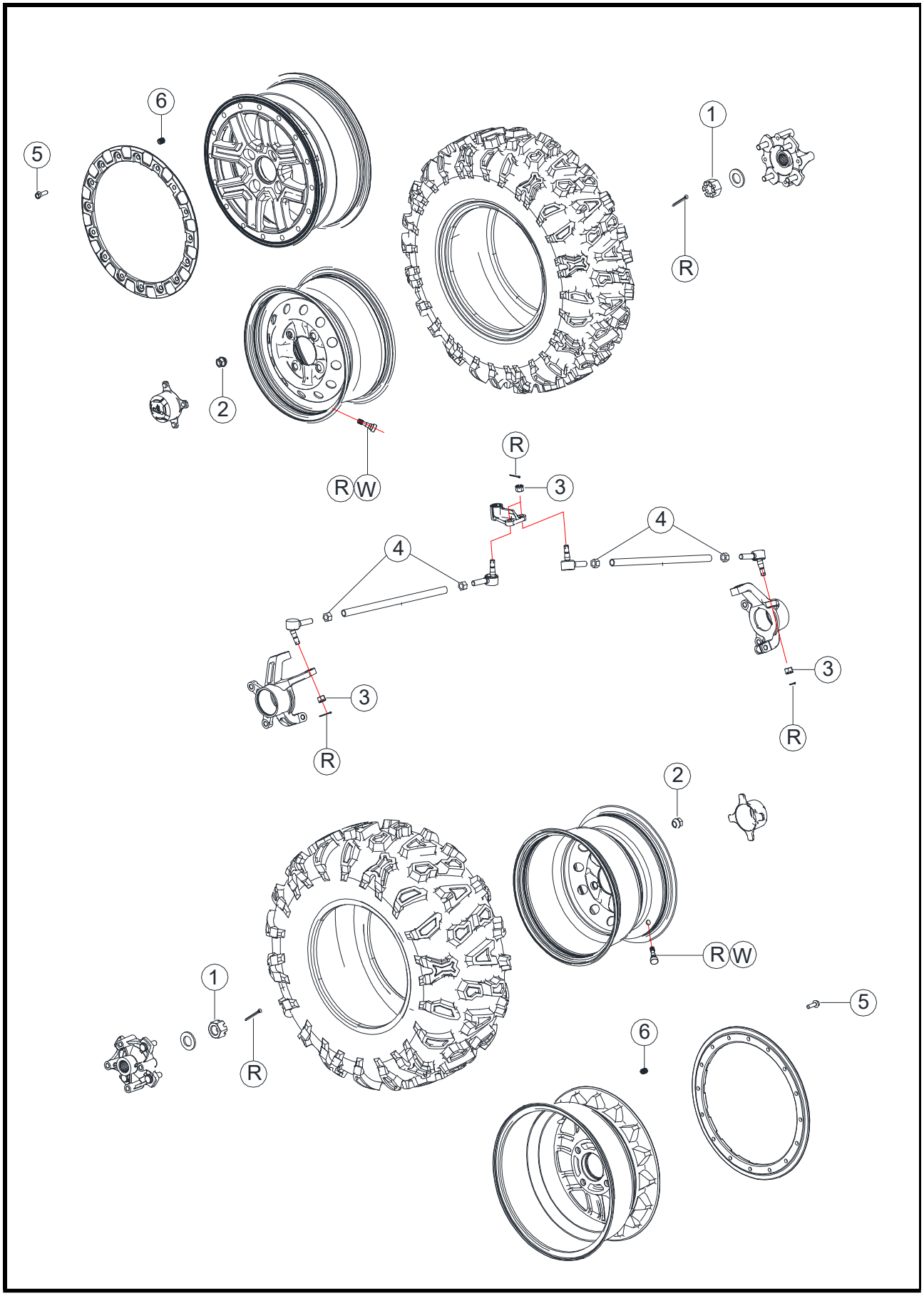
WHEELS AND TIRES

Exploded view of Wheels and Tires



No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Shaft nut M24	250	25	221.	
2	Wheel nut M12	70 ～ 80	7.0~8.0	51.6~59	
3	Cross tie rod end nut M10	50 ～ 60	5.0~6.0	36.9~44.3	
4	Cross tie rod adjustment lock nut M12	50 ～ 60	5.0~6.0	36.9~44.3	
5	Anti-slip mounting bolt M8	35 ～ 45	3.5~4.5	25.8~33.2	
6	Detachable spiral shell M12	50 ～ 60	5.0~6.0	36.9~44.3	

W: Water or soapy water

R: Replace parts

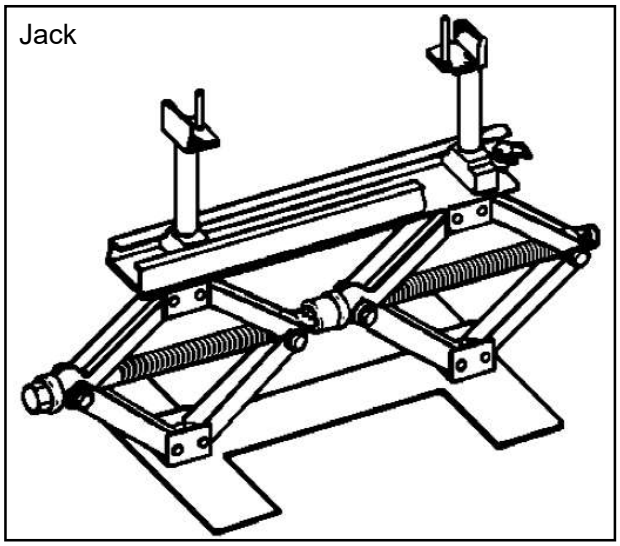
WHEELS AND TIRES

Technical parameters

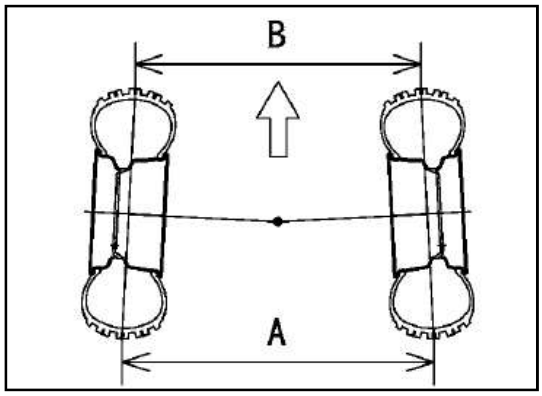
Item	Standard	Use Limit
Wheel positioning: Front wheel and front bundle:	10±10mm（0.39±0.39inch）	– – –
Tires: Standard tire: **front** **rear**	 25×8-12/AT26×8-12/26×8-14 Tubeless Nylon 25×10-12/AT26×10-12/26×10-14Tubeless Nylon	 – – – – – –
Tire pressure (in cold state) : **front** **rear** Maximum tire pressure (In cold state)	 48.3kPa (0.49 kgf/cm², 7.0 psi) 48.3kPa (0.49 kgf/cm², 7.0 psi) 250 kPa (2.5 kgf/cm², 36 psi)	 – – – – – – – – –
Tread height of tire: **front** **rear**	 – – – – – –	 3mm（0.12inch） 3mm（0.12inch）

Special Tools

Jack



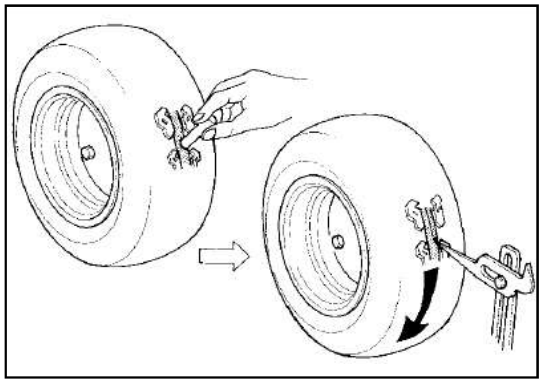
Wheel alignment



Front beam inspection

- The front beam is the distance between the front wheels at axle height and the rear. The difference in distance is called the anterior beam value. When there is A front beam, viewed from the top of the car, the distance A (rear) is greater than B (front), as shown in the figure.
- The function of the front beam is to prevent the front wheel from running off at any time and reduce the sliding friction between the tire and the ground. If the front beam is not correct, the front wheels will rub against the ground, causing tread damage or abnormal wear.

The caster and camber angles of the kingpin are built-in and di bit reqyure adjustment.



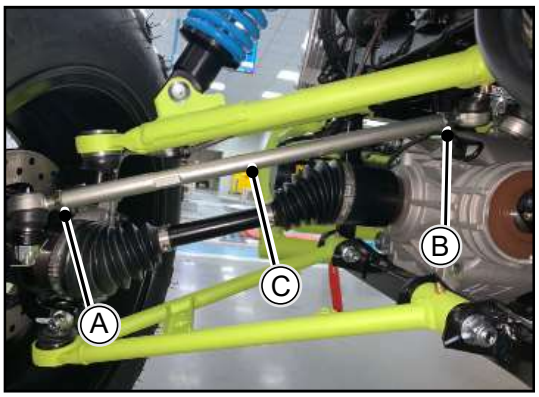
A（rear）– B（front）=toe value

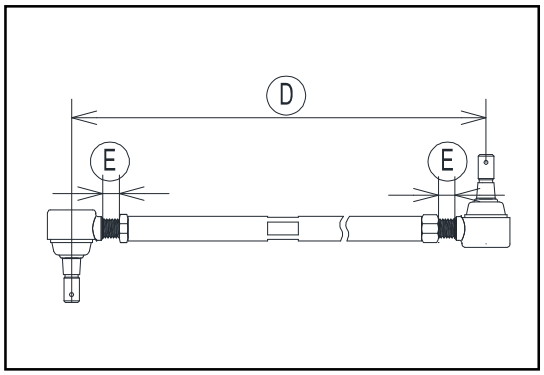
（The distances A and B are measured at the height of the axle when the vehicle is parked on a flat surface.）

- Apply thick chalk or paint line near the center of the front tire.
- When turning a wheel, make a small mark near the center of the chalk coating with a needle marker.

- Place the front wheel on the ground and fix the handlebars.
- At axle height, measure the distance between front tire front and rear marking or paint line.
- The front beam is obtained by subtracting the measured value at the rear from the measured value at the front. If the forebeam is not within the specified range, continue the forebeam adjustment procedure.

***Standard*：*10±10mm*（*0.39±0.39inch*）**





Front Beam adjustment

【A】Locknut

【B】Locknut

【C】Pull rod

◆ Loosen the lock nut【A】【B】and turn the adjustment lever [C] on both sides for the same number of turns to achieve the designated toe.

TIPS

◆ Loosen the lock nut【A】【B】and turn the adjustment lever【C】on both sides for the same number of turns to achieve the designated toe.

◆ If the front beam reaches the specified value, the length【D】of each tie rod shall be ***416 ~ 419mm(16.4 ~ 16.5 inches).***

⚠ WARNING

Adjust the length of the horizontal pull rod so that the visible thread length【E】at both ends of the horizontal pull rod is even. Uneven thread length will cause damage to the end of the horizontal pull rod

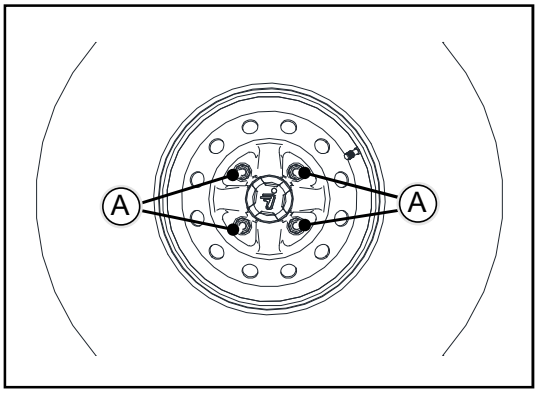
Check the front beam

◆ Tighten：

Lock nut torque of Tie Rod
50 ～ 60 N.m（5.0~6.0kgf·m，36.9~44.3ft·lb）

◆ Test drive

Wheel（Rim）



Wheel Disassembly

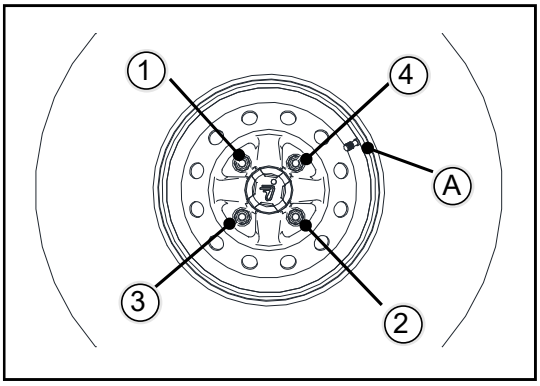
【A】Wheel nut

- Loosen the wheel nut【A】
- Support the vehicle with a bracket or jack to lift the wheels off the ground.

Special tool: Jack.

Tear down:

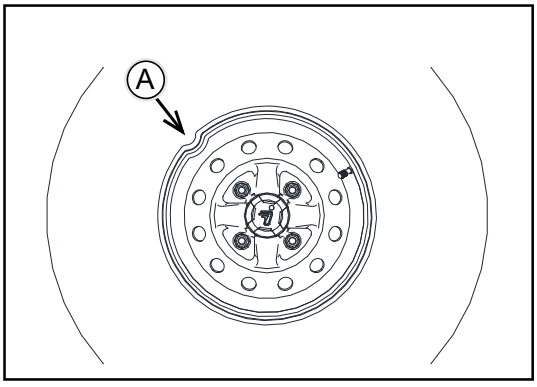
- Wheel nut
- wheel



Wheel Assembly

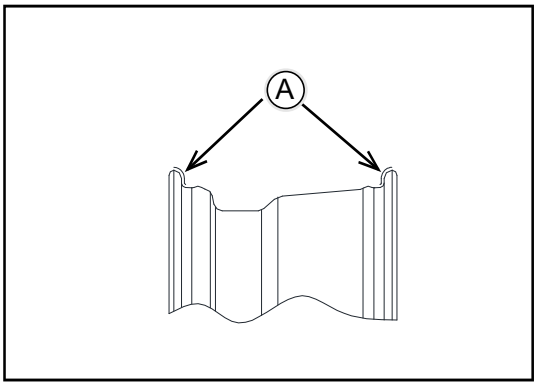
- Position the wheels so that the air valve 【A】faces the outside of the vehicle
- Tighten the wheel nuts in a cross way

Tightening bolt torque
70 ～ 80N.m（5.0~6.0kgf·m，51.6~59ft·lb）



Wheel check

- Check whether there are depressions on both sides of the rim 【A】. If there are depressions, please replace them.



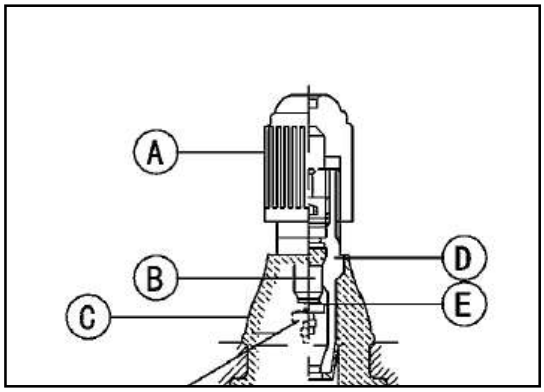
- Remove the tire and check the air sealing surface 【A】 of the rim for scratches or scratches. If necessary, use a fine emery cloth to polish the air sealing surface.

The replacement of the wheel

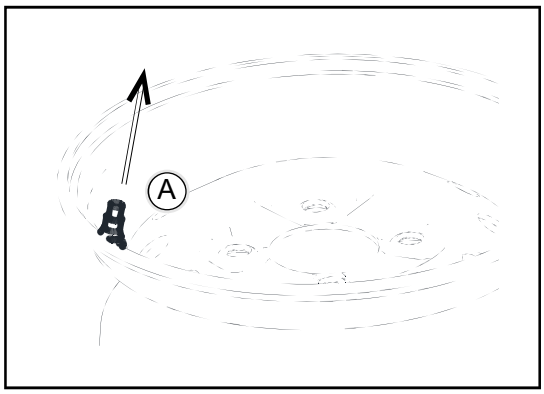
- Shake the wheel with both hands for excessive or abnormal movement, check whether the hub bearing is loose or damaged, if necessary, please replace the hub bearing.
- Remove the wheel (see Wheel removal).
- Remove tire from rim (see Tire removal).
- Remove the valve mouth assembly and throw away.

⚠ CAUTION

Replace the air valve every time you change the tire. Do not reuse the air valve.



【A】 Plastic cover
【B】 Spool
【C】 Stem seal
【D】 Stem
【E】 Seat



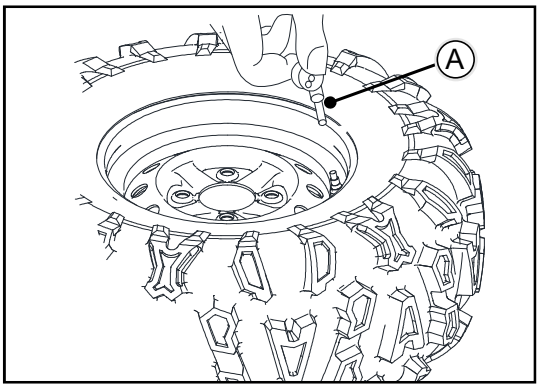
- Install new air valve on new rim.
- Remove bonnet, moisten stem with soap solution, and pull stem 【A】from inside out through rim until it gets stuck in place.

⚠ CAUTION

Do not use oil or petroleum distillate to moisten the stem as it degrades rubber.

- Install the tire on the new rim (see Tire installation).
- Wheel mounting (please refer to wheel mounting)

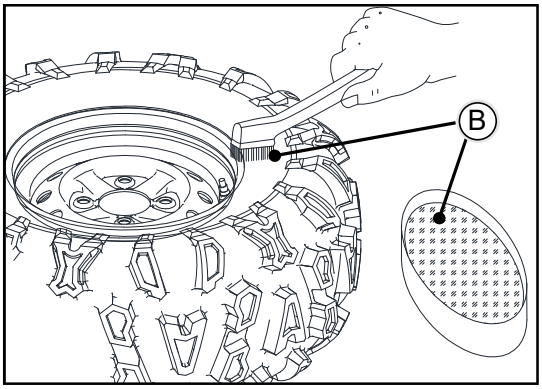
Tire



Tire Disassembly

- Remove the Tire
- Loosen the valve to deflate the tire.

Use the appropriate spool tool 【A】



- Lubricate the tires and rims on both sides of the wheel with soap solution or water 【B】.This helps the tires slide off the rim flange.

⚠ CAUTION

Do not lubricate rim and tire rims with oil or petroleum fractions as they can spoil the tire.

- Remove the tire from the rim using a suitable commercial tire changer.

TIPS

Tires cannot be removed manually because they fit tightly to the rim.

Tire Assembly

- Check rim (refer to wheel check).
- Replace the new air valve.

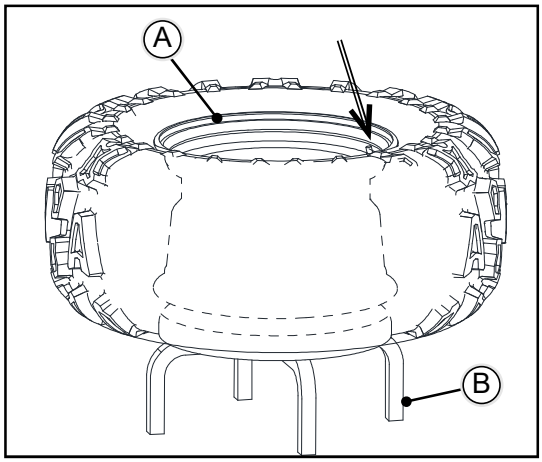
⚠ WARNING

Whenever you change a tire, change the air valve.Do not reuse the air valve.

- Whenever you change a tire, change the air valve. Do not reuse the air valve.
- Lubricate the tire rim and tire rim with soap solution or water.

⚠ CAUTION

Do not use lubricants other than aqueous soap and water.



- Support the rim【A】on a suitable bracket【B】to prevent the tire from slipping off.
- Inflate the tire until the rim is fixed to the tire rim.

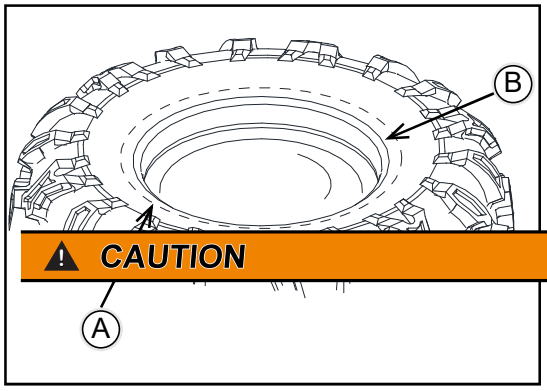
Maximum air pressure of tire (fixed on wheel when cold)

front and rear: 50 kPa (2.5 KGF /cm, 36 psi)

WARNING

Do not inflate the tire above the maximum tire pressure. Overinflated air can cause a tire to explode, potentially causing injury and death.

- Check whether the rim lines【A】on both sides of the tire are parallel to the rim flange【B】.
- If the rim lines are not parallel to the rim flange, bleed the tire, moisten the sealing surface again, and inflate it again.
- Check whether there is air leak after the tire is in place correctly.
- Apply soap solution around the tire tire rim, and then check for air bubbles.
- Bleed the tire to the specified pressure.。



TIPS

CAUTION

Tire pressure (in cold state)

Front: 48.3 kPa (0.49 KGF /cm2, 7.0 psi)

Rear: 48.3 kPa (0.49 KGF /cm2, 7.0 psi)

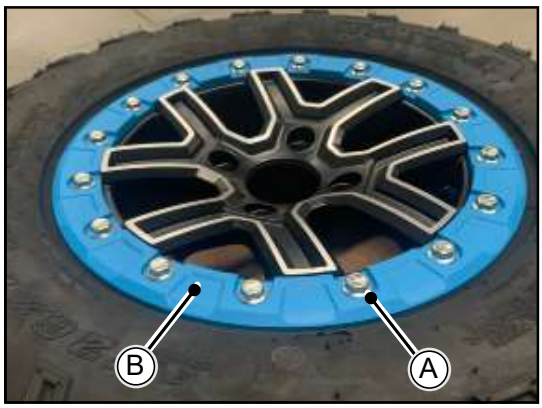
- Wheel mounting (see Wheel mounting).
- Wipe the soap and water solution from the tire and dry the tire before operation.

WARNING

Do not operate the vehicle while soap and water are still around the wheel rim, it can cause tyre separation and can lead to dangerous conditions.

- Tire Inspection
- Refer to the "Wheels/Tires" section of the Regular Maintenance section.

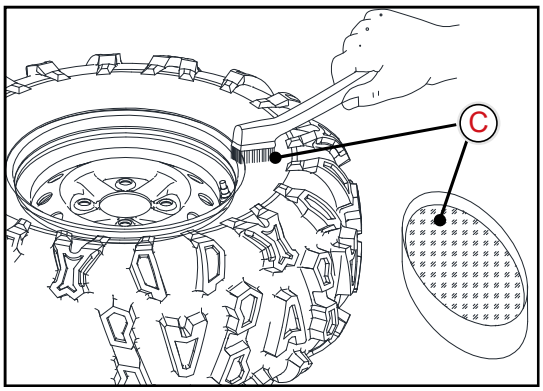
Tire Disassembly (for anti-drop rims)）



【A】detachable ring fastening bolts

【B】detachable coil

- Take off the wheel.
- Remove all detachable ring fastening bolts 【A】.
- Remove the detachable coil 【B】.



- Lubricate tires and rims on both sides of the wheel with soap solution or water 【C】.This helps the tires slide off the rim flange.

⚠ CAUTION

Do not lubricate rim and tire rims with oil or petroleum ingredients as they can spoil the tire.

- Remove the tire from the rim using a suitable commercial tire changer.

TIPS

Tires cannot be removed manually because they fit tightly to the rim.

Tire Assembly

- Check rim (refer to wheel check)
- Replace the valve mouth with a new one.

⚠ WARNING

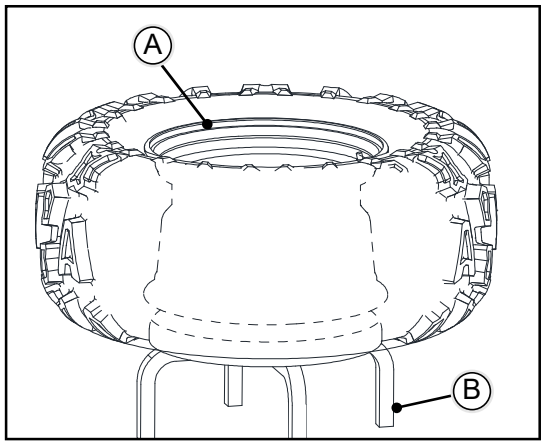
Whenever you change a tire, change the valve port. Do not reuse valve mouth.

- Check the tire for wear and damage (refer to tire inspection).
- Lubricate the tire rim and tire rim with soap solution or water.

⚠ CAUTION

Do not use lubricants other than aqueous soap and water.

Tyre mounting (for anti-drop rims)



【A】Rim

【B】Bracket

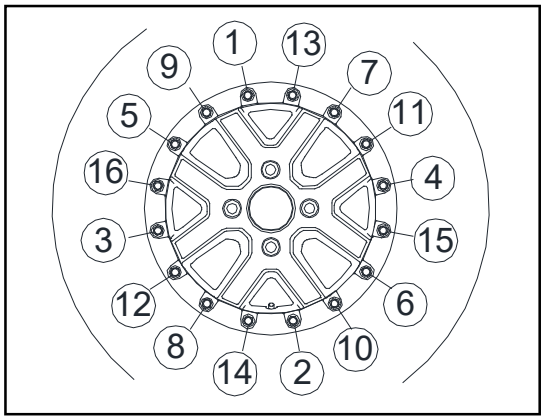
- Support the rim 【A】 on A suitable bracket【B】to prevent the tire from slipping off.
- Tighten the detachable ring fastening bolts in a cross way.

Torque of anti-drop ring screw
20N.m（2.0kgf·m，14.8ft·lb）

- Inflate the tire until the rim is fixed to the tire rim.

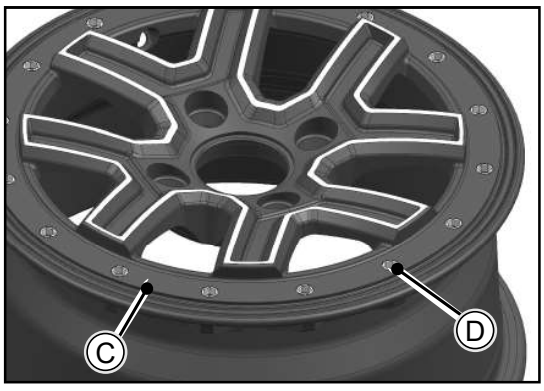
Maximum tire inflation pressure (can be fixed to rim when cold)

Front and rear: 250 kPa (2.5 KGF /cm2, 36 psi)



⚠ WARNING

Do not inflate the tire above the maximum tire pressure. Overinflated air can cause a tire to explode, potentially causing injury and death.



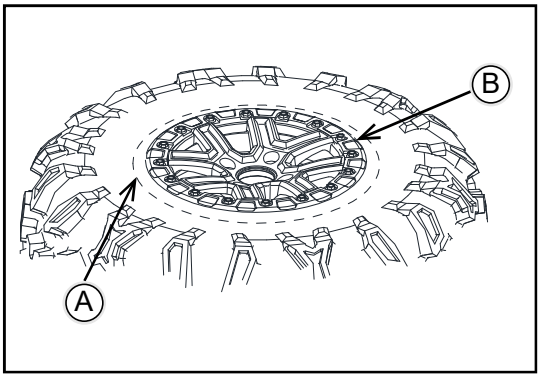
【C】Rim

【D】Screw sleeve

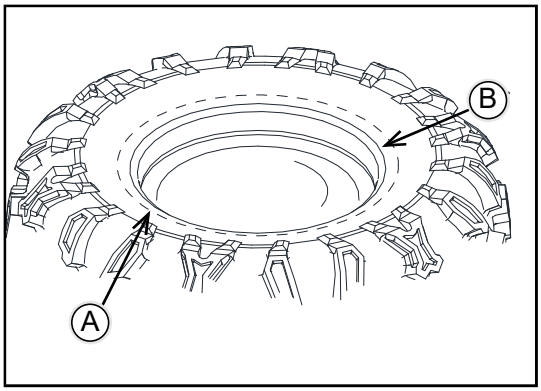
- If the anti-drop ring screw sleeve 【D】is damaged, please replace the anti-drop ring screw sleeve

screw sleeve torque
22~25N.m（5.0~6.0kgf·m，16.2~18.4ft·lb）

- If necessary, replace rim 【C】and screw sleeve 【D】 as a whole.



- Check whether the rim lines 【A】 on both sides of the tire are parallel to the anti-slip rim/rim flange 【B】 and the surrounding relative clearance is uniform.
- If the rim line and the rims/rim flange are not parallel or the relative gap around the tire is uneven, bleed the tire, re-lubricate the sealing surface, and then re-inflate the tire.
- Check whether there is air leak after the tire is in place correctly.
- Apply soap solution to the tire rim, and check whether there is air bubble.
- Bleed the tire to the specified pressure.
- Check the tire pressure with the barometer.



TIPS

Segway offers tire pressure gauges and user kits.。

Tire pressure (in cold state)

***Front*：*48.3 kPa*（*0.49 kgf /cm²*，*7.0 psi*）**

***Rear*：*48.3 kPa*（*0.49 kgf /cm²*，*7.0 psi*）**

- Wheel mounting (see Wheel mounting).
- Wipe the soap and water solution from the tire and dry the tire before operation.

⚠ WARNING

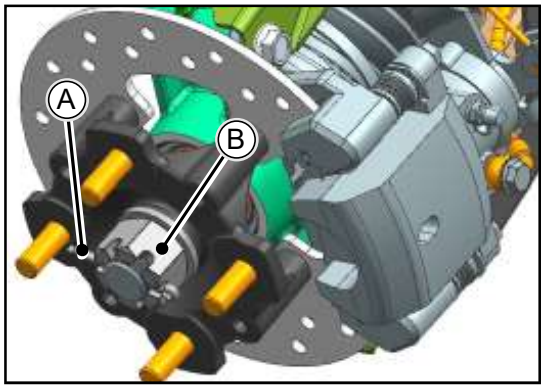
Do not operate the vehicle with soap and water around the wheel rim.

It can cause tyre separation and can lead to dangerous conditions.

Tire check

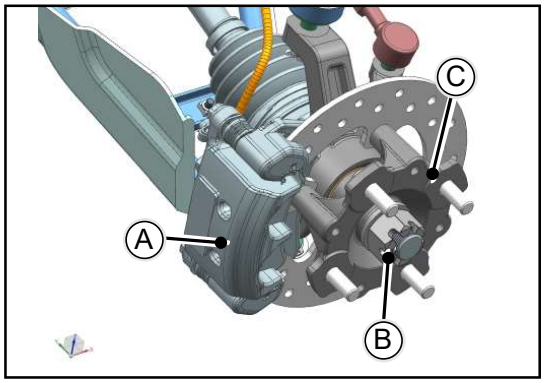
- Refer to the "Wheels/Tires" section of the Regular Maintenance section.

Wheel hub



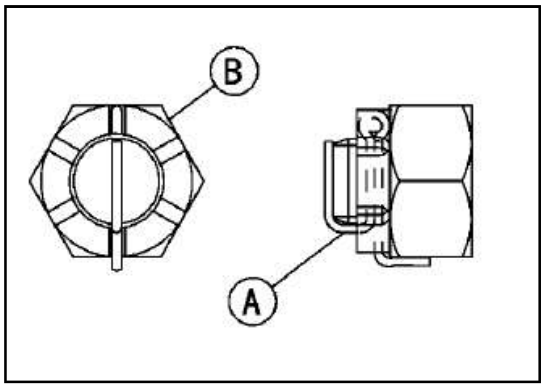
Take the wheels apart

- Remove the wheel (see Wheel removal).
- Remove cotter pin 【A】
- Loosen half shaft nut 【B】



- Unscrew the mounting bolts, remove the calipers 【A】, and do not let the calipers hang freely.
- Remove the axle nut 【B】and then pull down the hub assembly【C】 and brake disc.
- Separate the brake disc from the hub.

Wheel hub assembly



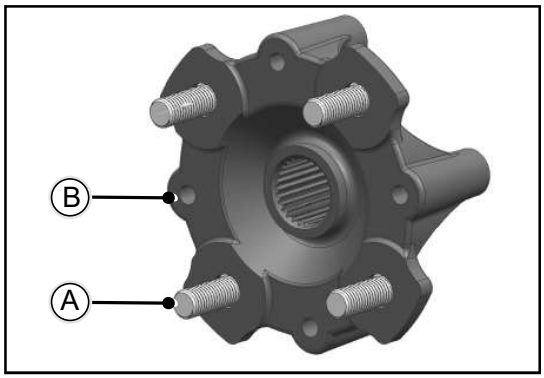
- Installing a brake disc (see "Braking" chapter)

Tighten axle nut torque
250 N.m（25 kgf·m，184 ft·lb）

- Insert the new cotter 【A】 and bend it to the nut 【B】.

⚠ CAUTION

- When inserting the cotter, if the slotted nut does not align with the open pin hole in the half shaft, tighten the nut clockwise until the next hole is aligned.
- Loosen once and tighten again as the slot passes through the nearest hole.



Wheel hub disassembly/assembly

- No need to press out hub bolts【A】.
- If any hub bolts are damaged, please replace hub mounting seat 【B】 and bolt 【A】 totally.

BRAKE SYSTEM

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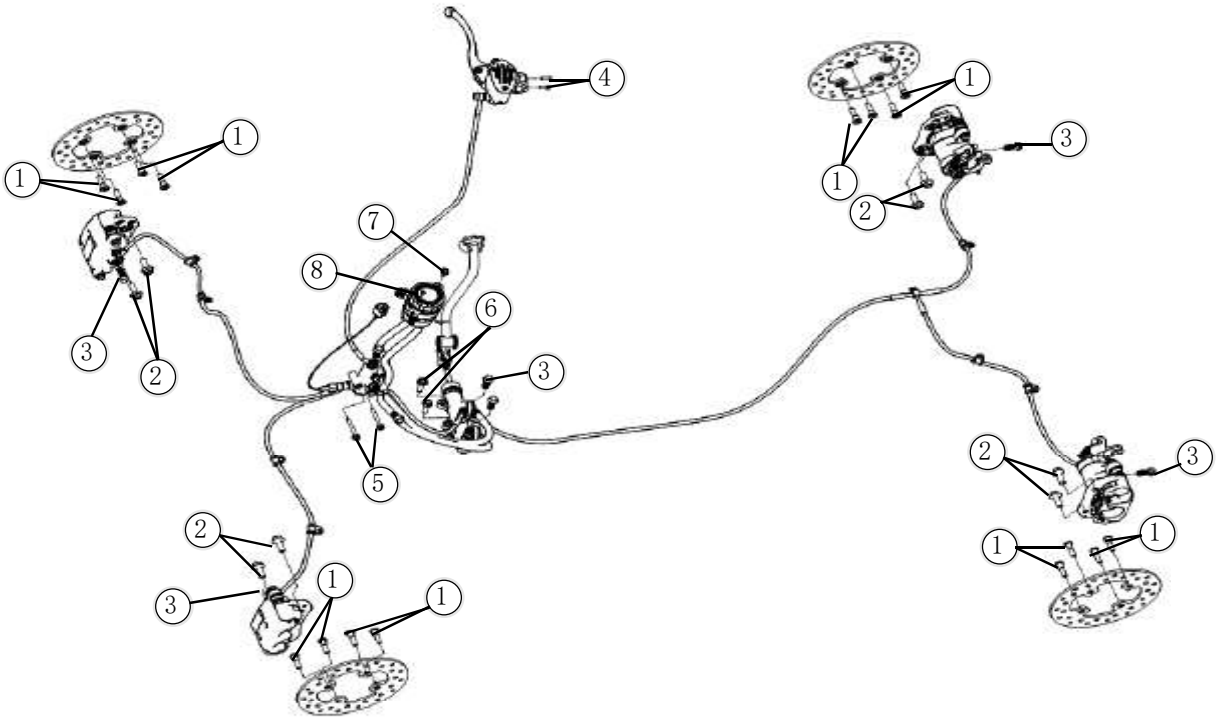
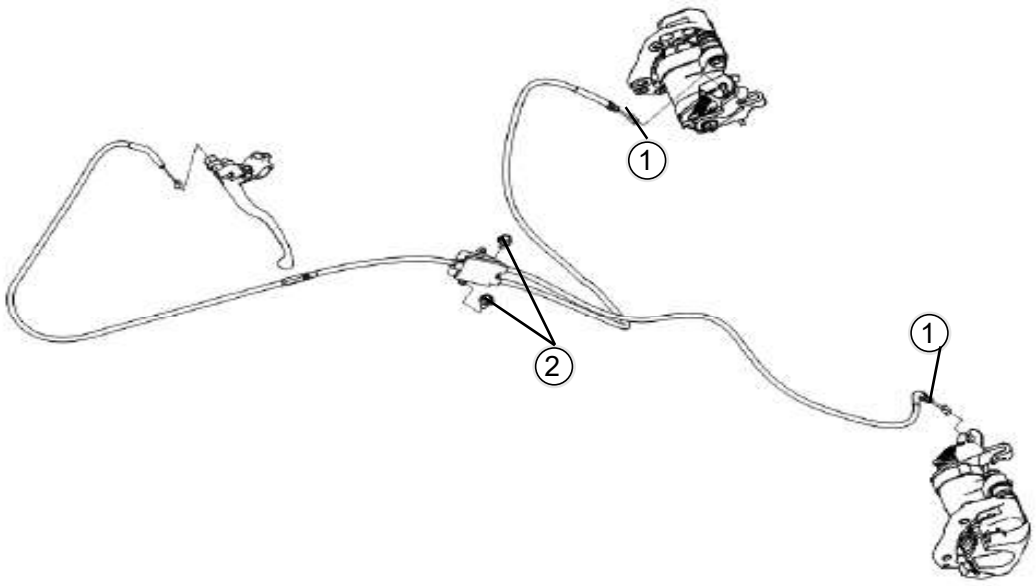
Exploded view of Brake System



No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Disc Mounting Bolts	37	3.8	27in·lb	
2	Brake Caliper Fastening Bolts	45	4.5	33in·lb	
3	Brake Hose Banjo Bolts	25	2.5	18in·lb	
4	Master Cylinder Clamp Bolts	8.8	0.90	78in·lb	
5	Distribution Valve Fastening Bolts	15	0.15	11in·lb	
6	Foot Brake Main Pump Bolts	45	4.5	33in·lb	
7	Oil Cup Bolts	8.8	0.90	78in·lb	
8	Oil Cup Screw	8	0.8	5.9in·lb	

1. **Brake Disc Bolt, Brake Main Pump Bolt, Brake Fastening Bolt need to be inspected and tightened regularly;**
2. **The brake sliding bar dust cover and the pump handle shaft of the handle brake need to be coated with silicone grease to ensure flexible movement。**

Exploded view of Parking Brake



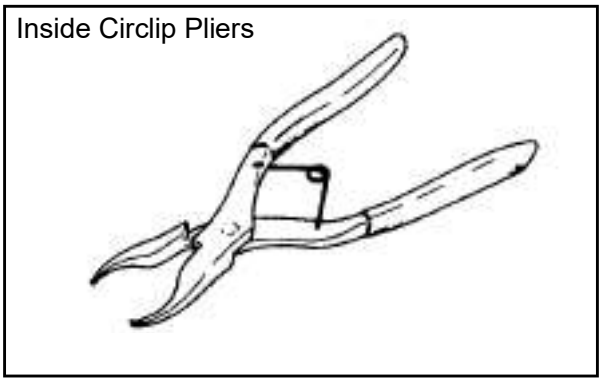
No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Parking Brake Lever Screw	8. 8	0.9	78in.lb	
2	Junction Box Fastening Bolt	8.8	0.9	78in.lb	

Specifications

Item	Standard	Service Limit
Brake Fluid: Type	 DOT 4	 – – –
Front Disc Brake: Pad lining thickness Disc thickness Disc runout	 4.0 mm (0.16 in.) 4.8~5.2mm (0.19～ 0.205 in.) TIR 0.08 mm (0.003 in.) or less	 1 mm (0.04 in.) 4 mm (0.16 in.) TIR 0.1 mm (0.004 in.)
Rear Brake Lever, Pedal and Cables: Rear brake pedal position Working stroke of rear parking handle Working stroke of rear brake pedal	 35 ~ 40 mm (1.38 ～ 1.57 in.) 10~20 mm (0.4～ 0.8 in.) 25~30 mm (1.0～1.2in.)	 – – – – – – – – –

Special tool

Inside Circlip Pliers



Brake Fluid

⚠ WARNING

When working with the disc brake, observe the precautions listed below.

1. **Never reuse old brake fluid.**
2. **Do not use fluid from a container that has been left unsealed or that has been open for a long time.**
3. **Do not mix two types and brands of fluid for use in the brake. This lowers the brake fluid boiling point and could cause the brake to be ineffective. It may also cause the rubber brake parts to deteriorate.**
4. **Don't leave the reservoir cap off for any length of time to avoid moisture contamination of the fluid.**
5. **Don't change the fluid in the rain or when a strong wind is blowing.**
6. **Except for the disc pads and disc, use only disc brake fluid, isopropyl alcohol, or ethyl alcohol for cleaning brake parts. Do not use any other fluid for cleaning of these parts. Gasoline, engine oil, or any other petroleum distillate will cause deterioration of the rubber parts. Oil spilled on any part will be difficult to wash off completely and will eventually deteriorate the rubber used in the disc brake.**
7. **When handling the disc pads or disc, be careful that no disc brake fluid or any oil gets on them. Clean off any fluid or oil that inadvertently gets on the pads or disc with a high flash-point solvent. Do not use one which will leave an oily residue. Replace the pads with new ones if they cannot be cleaned satisfactorily.**
8. **Brake fluid quickly ruins painted surfaces; any spilled fluid should be completely washed away immediately.**
9. **If any of the brake line fittings or the bleed valve is opened at any time, the AIR MUST BE BLED FROM THE BRAKE LINE.**

Brake Fluid Recommendation

Use extra heavy-duty brake fluid only from a container marked **DOT4.**

Recommended Disc Brake Fluid

Type : **DOT 4**

Brake Fluid Level Inspection

- Refer to the Brakes in the Periodic Maintenance chapter.

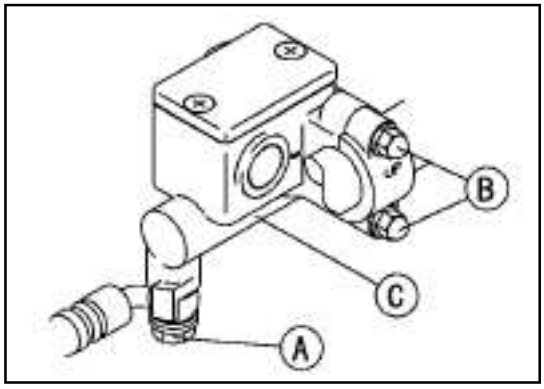
Brake Fluid Change

- Refer to the Brakes in the Periodic Maintenance chapter.

Brake Line Air Bleeding

- Refer to the Brakes in the Periodic Maintenance chapter.

Handbrake



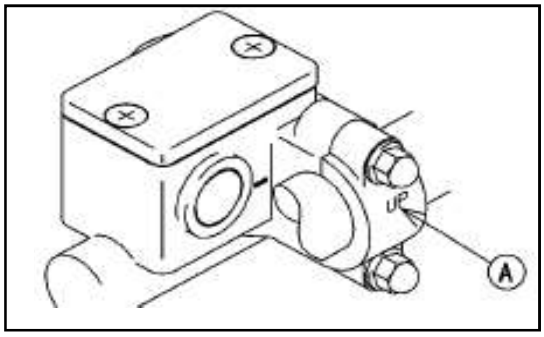
Disassembly

【A】brake hose oil line banjo bolt
【B】master cylinder tightened bolt
【C】master cylinder

⚠ WARNING

Brake fluid will damage the painted surface quickly, any spilled fluid should be completely washed off immediately.

Installation



- Installation of main cylinder holder, must have the “up” mark upward
- First properly tighten the upper clamping bolt, then tighten the lower clamping bolt, and finally reach the same gap between the upper and lower parts of the holder, then tighten the lower bolt.

Main Cylinder Clamping Bolt Torque
8.8N·m（0.9kgf·m，105.6in·lb）

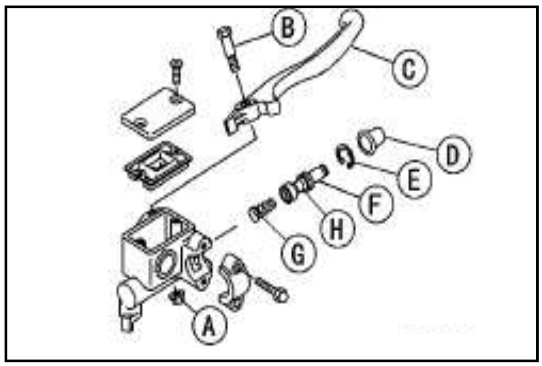
- Install new flat washers on each side of brake hose, then tighten oil bolt.

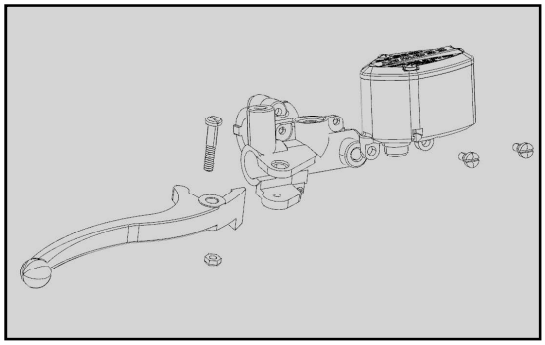
Brake Hose Oil Bolt Torque
25N·m（2.5kgf·m，18.4ft·lb）

- If the Main Cylinder is replace with a new one, the Brake Pipeline must be vacuum and exhausted, then brake fluid must be filled correctly, please refer to the brake in the section on regular maintenance.
- Check whether the braking force of the brake is good, whether there is brake drag or lock, and there is no fluid leakage

⚠ WARNING

Do not attempt to drive the vehicle until a firm brake lever can be obtained by pumping the brake lever until the pads are against each disc. The brakes will not function on the first application of the lever if this is not done.





Master Cylinder Disassembly

◆ Remove:

Master Cylinder (see Master Cylinder Removal)

【A】Brake Lever Pivot Nut

【B】Brake Lever Pivot Bolt

【C】Brake Lever

【D】Dust Cover

【E】Circlip

【F】Piston

【G】Spring

⚠ CAUTION

Do not remove the secondary cup【H】from the piston since removal will damage it.

Master Cylinder Assembly

◆ Before assembly, clean all parts including the master cylinder with brake fluid or alcohol.

⚠ CAUTION

Except for the disc pads and disc, use only disc brake fluid, isopropyl alcohol, or ethyl alcohol for cleaning brake parts. Do not use any other fluid for cleaning these parts. Gasoline, engine oil, or any other petroleum distillate will cause deterioration of the rubber parts. Oil spilled on any part will be difficult to wash off completely, and will eventually deteriorate the rubber used in the disc brake.

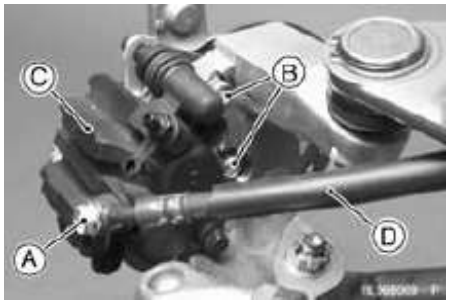
◆ Take care not to scratch the piston or the inner wall of the cylinder.

◆ Apply brake fluid to the removed parts and to the inner wall of the cylinder.

◆ Tighten:

Torque - Brake Lever Pivot Bolt	Brake Lever Pivot Bolt Locknut
5.9 N·m （0.6kgf·m，70.8in·lb）	

Master Cylinder Inspection (Visual Inspection) •Refer to the Brakes in the Periodic Maintenance chapter.



Caliper

- Remove the front wheel (see Wheels/Tires chapter).
- Loosen the banjo bolt 【A】 at the brake hose lower end, and tighten it loosely.
- Unscrew the caliper mounting bolts 【B】.
- Detach the caliper 【C】 from the disc.
- Unscrew the banjo bolt and remove the brake hose 【D】 from the caliper.

⚠ WARNING

Immediately wash away any brake fluid that spills.

⚠ CAUTION

If the caliper is to be disassembled after removal and if compressed air is not available, disassemble the caliper before the brake hose is removed (see Caliper Disassembly).

Caliper Installation

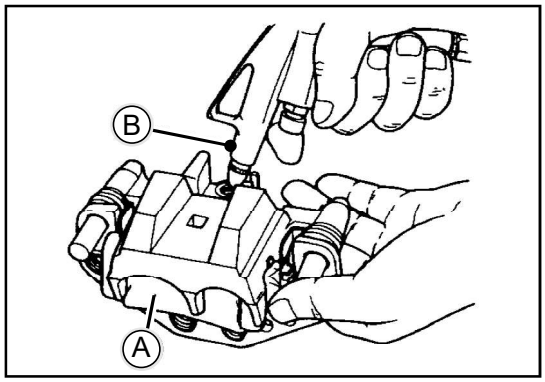
- Install the caliper and brake hose lower end.
- Replace the washers that are on each side of hose fitting with new ones.
- Tighten:

Caliper Mounting Bolts	Brake Hose Banjo Bolt
25N·m（2.5kgf·m，18.4ft·lb）	

- Check the fluid level in the brake reservoir.
- Bleed the brake line .
- Check the brake for good braking power, no brake drag,and no fluid leakage.

⚠ WARNING

Do not attempt to drive the vehicle until a firm brake lever can be obtained by pumping the brake lever until the pads are against each disc. The brakes will not function on the first application of the lever if this is not done.



Caliper Disassembly

◆ Remove:

Caliper (see Caliper Removal)

Pads (see Brake Pad Removal)

Anti-rattle Spring

◆ Using compressed air, remove the piston.

Cover the caliper opening with a clean, heavy cloth【A】.

Remove the piston by lightly applying compressed air【B】to where the brake line fits into the caliper.

⚠ WARNING

To avoid serious injury, never place your fingers or palm inside the caliper opening. If you apply compressed air into the caliper, the piston may crush your hand or fingers.

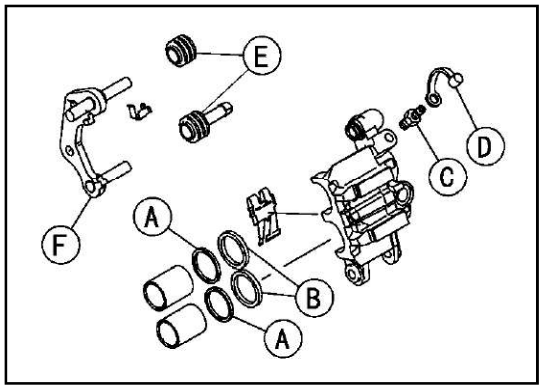
⚠ CAUTION

◆ If compressed air is not available, do as follows with the brake hose connected to the caliper.

◆ Prepare a container for brake fluid.

◆ Remove the pads and spring (see Brake Pad Removal).

◆ Pump the brake lever to remove the caliper piston.



◆ Remove:

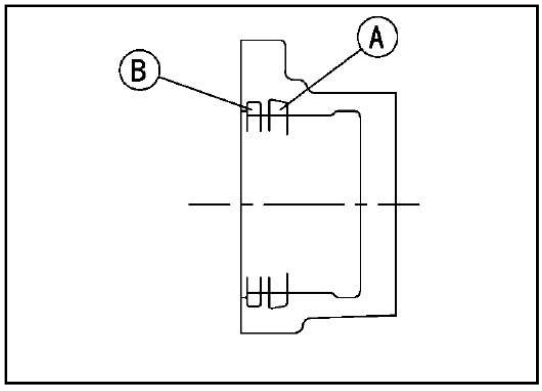
Dust Seal【A】

Fluid Seal【B】

Bleed Valve【C】and Rubber Cap【D】

Boots【E】and Caliper Holder【F】

Caliper Assembly

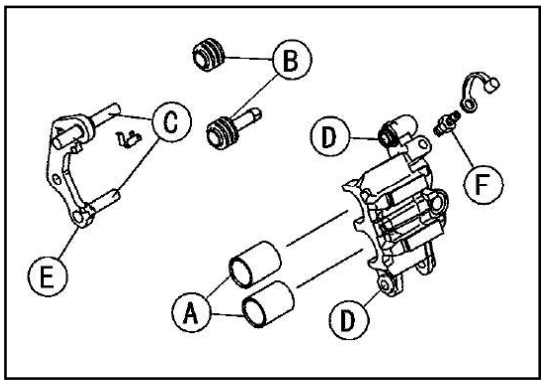


◆ Replace the fluid seal【A】with a new one.

◆ Apply brake fluid to the fluid seal, and install it into the cylinder by hand.

◆ Replace the dust seal【B】with a new one if it is damaged.

◆ Apply brake fluid to the dust seal, and install it into the cylinder by hand.



- Apply brake fluid to the outside of the pistons【A】, and push them into the cylinder by hand. Take care that neither the cylinder nor the piston skirt gets scratched.
- Replace the rubber boots【B】if they are damaged.
- Apply a thin coat of silicone grease to the caliper holder shafts【C】and holder holes【D】(Silicone grease is a special high temperature, water-resistant grease).
- Install:

Caliper Holder【E】

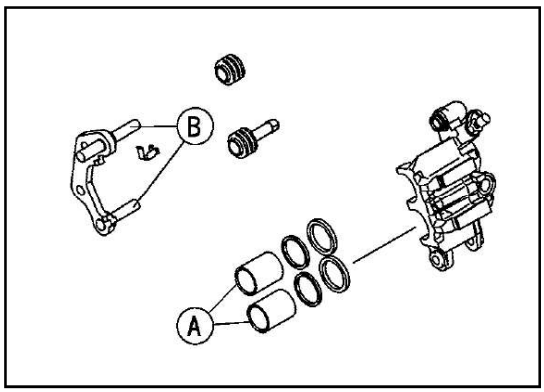
Bleed Valve【F】and Rubber Cap

Torque-Bleed Valve
7.9N·m（0.8kgf·m，94.8in·lb）

- Install the anti-rattle spring【A】in the caliper as shown.
- Install the pads (see Brake Pad Installation).

Piston and Cylinder Damage

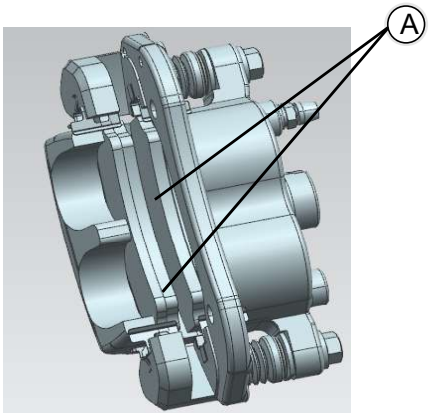
- Visually inspect the pistons【A】and cylinder surfaces.
- Replace the caliper if the cylinder and piston are badly scored or rusty.

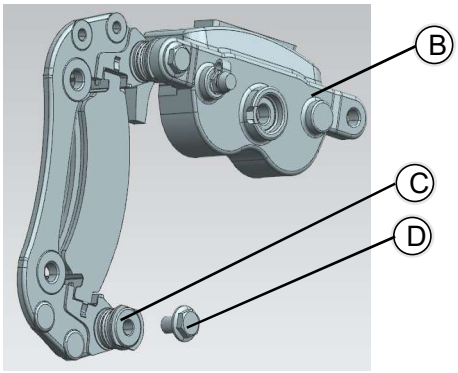


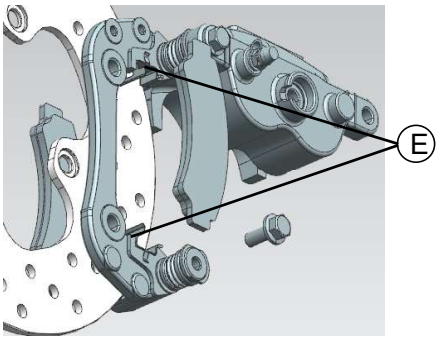
Caliper Holder Shaft Wear Inspection

The caliper body must slide smoothly on the caliper holder shafts【B】. If the body does not slide smoothly, one pad will wear more than the other, pad wear will increase, and constant drag on the disc will raise brake and brake fluid temperature.

- Check to see that the caliper holder shafts are not badly worn or stepped, and that the rubber friction boots are not damaged.
- If the rubber friction boot is damaged, replace the rubber friction boot.
- If caliper holder shaft is damaged, replace the caliper holder shaft and rubber friction boot as a unit.







Brake Pads

Brake Pad Removal

- Remove front rim assembly or rear rim assembly
- Loosen the fasten blot from the guide rod of brake assembly, during process of loosening the bolt, the required head should always be in contact with brake caliper body and limit, otherwise it will follow because C is not limited, then it is impossible to disassemble.
- Rotate the brake caliper at least 90 degrees, so that the brake pad can be easily removed from spring holder inside and outside of the brake disc.

Brake Pad Installation

- Push the caliper piston in by hand as far as it will go.
- Be sure that the anti-rattle spring is in place.
- Install:

1. Install the brake pad in the upper and lower spring holder on the inner or outer side, and fit the brake disc respectively.
2. Rotate the brake caliper down so that the mounting hole position coincides with the hole position of brake assembly guide rod, and the brake assembly guide rod must be confined to the brake caliper, and it fits with brake caliper.
3. Apply thread glue to the newly loosened fastening bolt

Torque - Fasten the fastening bolt
25N·m （2.5kgf·m，18ft·lb）

⚠ WARNING

Do not attempt to drive the vehicle until a firm brake lever can be obtained by pumping the brake lever until the pads are against each disc. The brake will not function on the first application if this is not done.

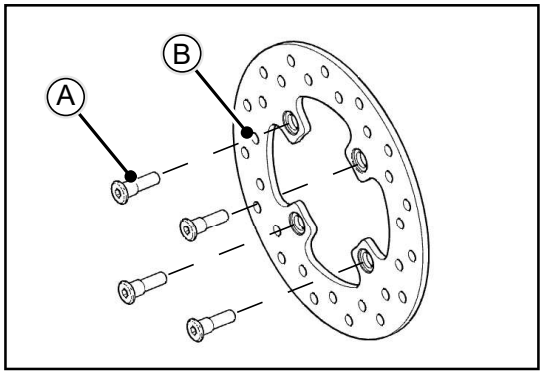
Brake Pad Wear Inspection

- Refer to the Brakes in the Periodic Maintenance chapter.

Brake Discs

Disc Cleaning

Poor braking can be caused by oil on a disc. Oil on a disc must be cleaned off with an oilless cleaning fluid such as trichloroethylene or acetone.



⚠ WARNING

These cleaning fluids are usually highly flammable and harmful if breathed for prolonged periods. Be sure to heed the fluid manufacturer's warnings.

Disc Removal

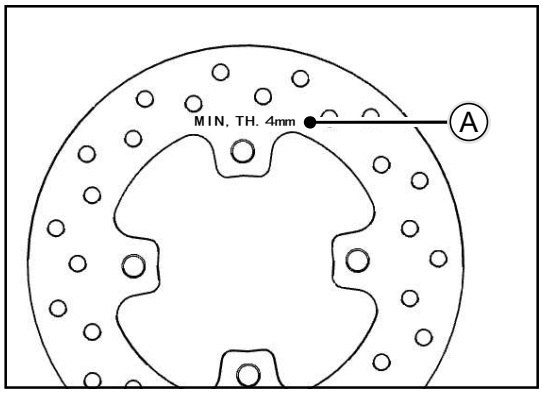
◆ Remove:

Front Hub (see Wheels/Tires chapter)

Brake Disc Mounting Bolts【A】

Brake Disc 【B】

Disc Installation



◆ The disc must be installed with the marked side 【A】facing toward the steering knuckle.

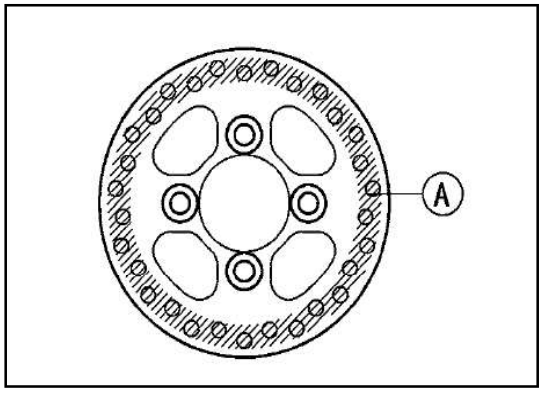
◆ Apply a non-permanent locking agent:

Disc Mounting Bolts

◆ Tighten:

Torque - Disc Mounting Bolts
37N·m （3.7kgf·m，50.2ft·lb）

◆ After installing the discs, check the disc runout. Completely clean off any grease that has gotten on either side of the disc with a high flash-point solvent. Do not use one which will leave an oily residue.



Disc Wear

◆ Measure the thickness of each disc at the point 【A】where it has worn the most.

◆ Replace the disc if it has worn past the service limit.

Disc Thickness

Standard: 4.8～5.2mm (0.19 ～ 0.205 in.)

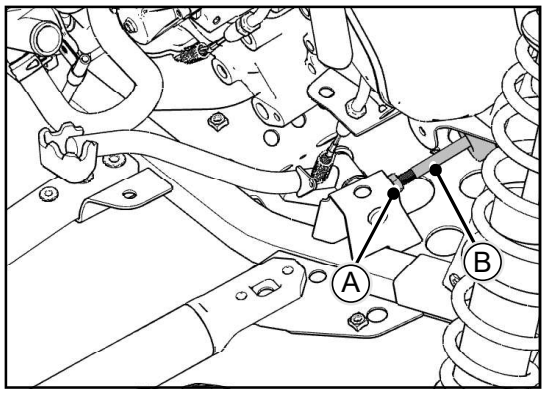
Service Limit: 4 mm (0.16 in.)

Brake Hoses

Brake Hose Inspection

- Refer to the Brakes in the Periodic Maintenance chapter.
- Brake Hose Replacement
- Refer to the Brakes in the Periodic Maintenance chapter.

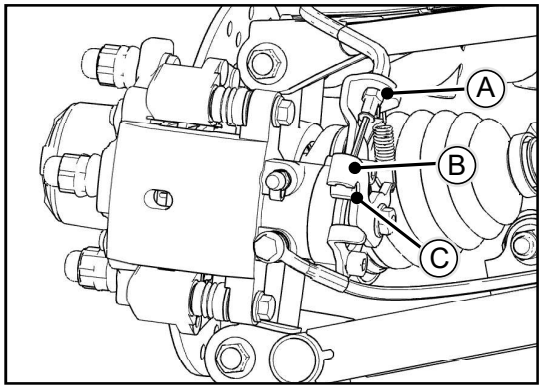
Rear Brake Pedal

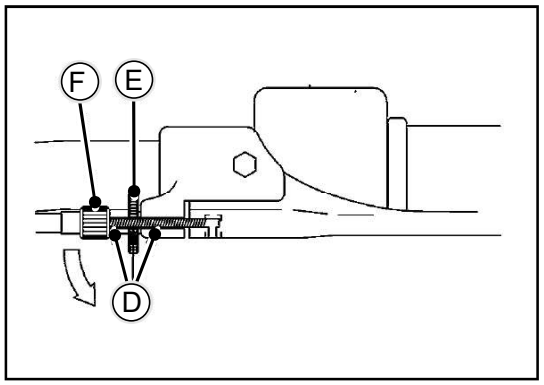


Brake Pedal Position Adjustment

- Loosen the locknut【A】, and turn the adjusting bolt【B】until the brake pedal is correctly positioned.
- Tighten the locknut.
- Check the brake pedal free play .

Rear Parking cable



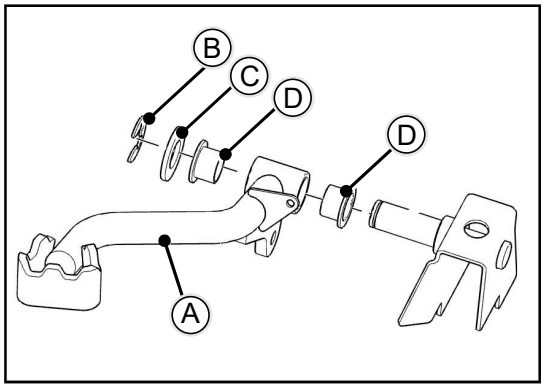


Parking cable removal

- Taking the parking cable head out of the rotating arm in the rear brake
- Disassemble 2 piece of M8 nuts
- Loosen knurled locknut on the parking handle, then screw in the adjuster.
- Align the slot in the parking handle and knurled locknut and adjuster slot.
- Taking out the parking cable from the parking handle.

Parking cable installation

The installation of parking cable can be completed in the reverse order of the above parking cable removal.



Rear brake pedal disassembly

【A】brake pedal

【B】retainer ring

【C】flat gasket

【D】brake pedal flanging bushing

- Use the pliers to remove the retainer ring 【B】
- Remove the flat gasket 【C】
- Remove the brake pedal【A】assembly
- Remove 【D】 from the brake pedal

Rear brake pedal installation

Apply grease to the end of brake pedal shaft 【A】

- Install 2 pieces of brake pedal flanging bushing 【D】into brake pedal
- Put on flat gasket【C】
- Then install the retainer ring【B】in place.

STEERING SYSTEM

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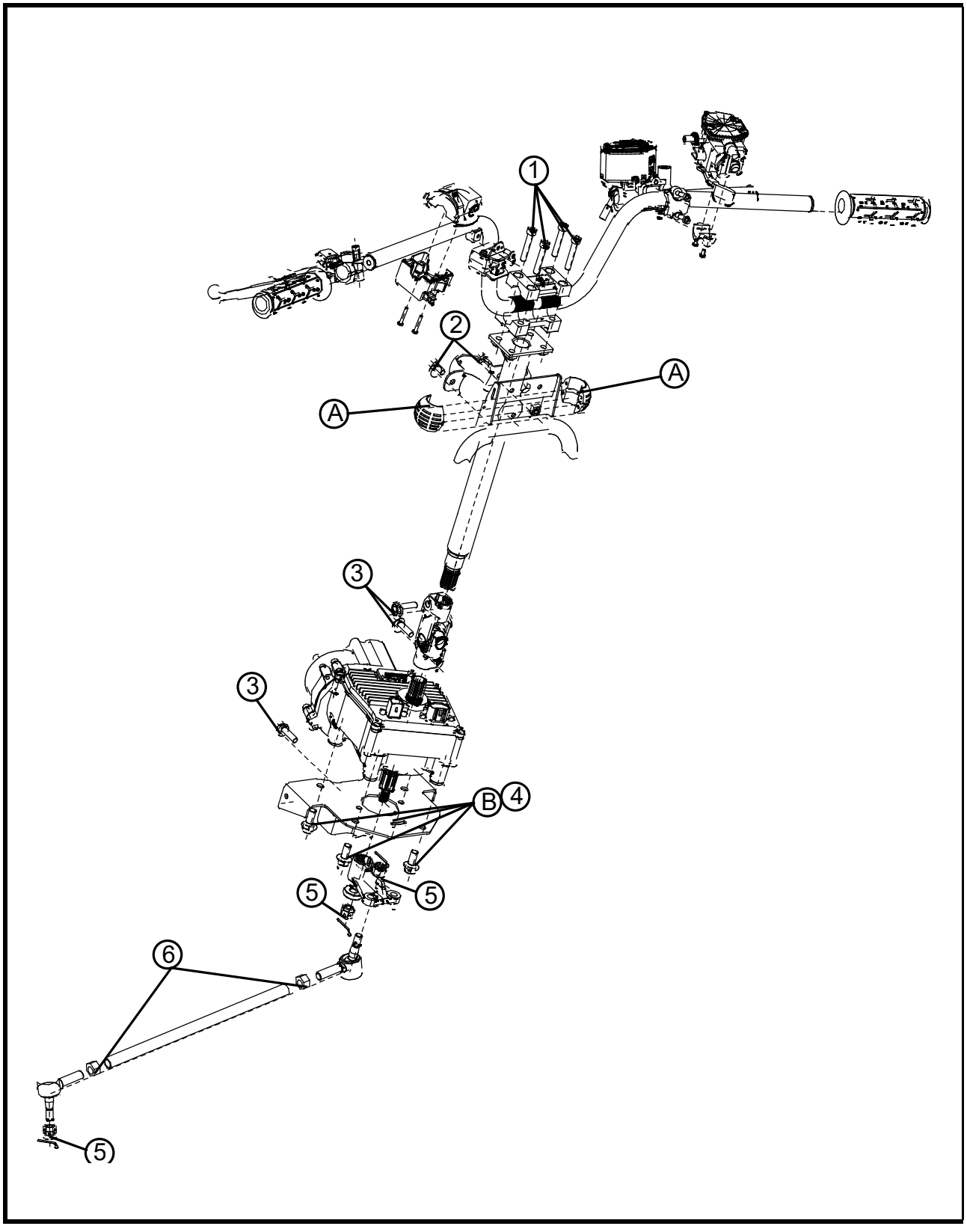
STEERING SYSTEM

Exploded View of Steering System

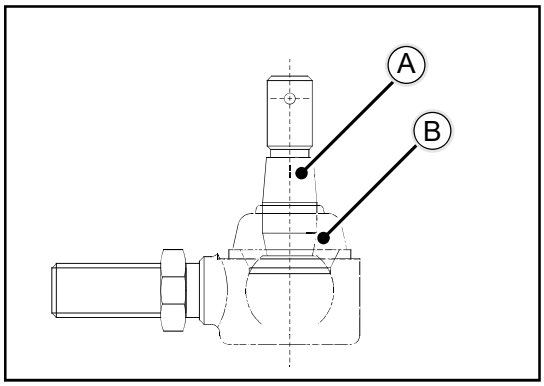


No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Hexagon Socket Head Screw M8×45	29	2.9	21.4	
2	Hexagon Flange Bolts M8×16	35	3.6	25.8	
3	Hexagon Flange Bolts M8×30	35	3.6	25.8	
4	Hexagon Flange Bolts M10×1.25×20	45	4.6	33.2	
5	Type 1 Hexagon Slotted Nut M10	45	4.6	33.2	
6	Type 1 Hexagon Nut M12×1.25	55	5.6	40.5	

A: Apply grease.

B: Apply Impermanent Locking Agent.

Steering System Technical Specification

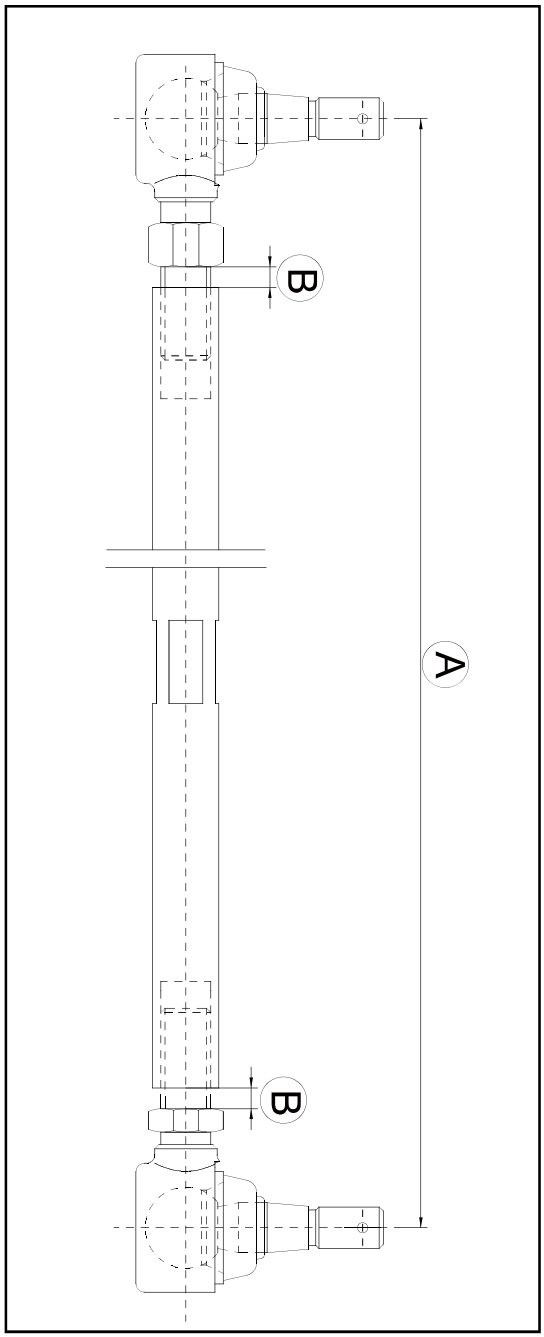


WARNING

Do not remove the dust cover, it is full of grease.

Steering rod end installation:

Make sure the sealing ring【B】 is on the rod 【A】.



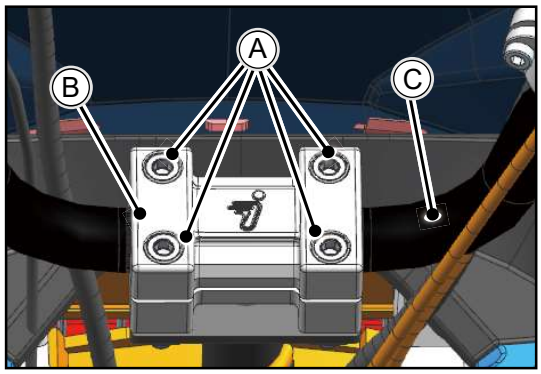
Steering rod

Rod length 【A】 418±1.5 mm

Steering rod installation:

Install the smaller taper end of the rod toward the steering knuckle and the taper hole of the steering arm. Make sure the length of the rod 【A】 is correct, and the two visible thread lengths【B】are approximately equal.

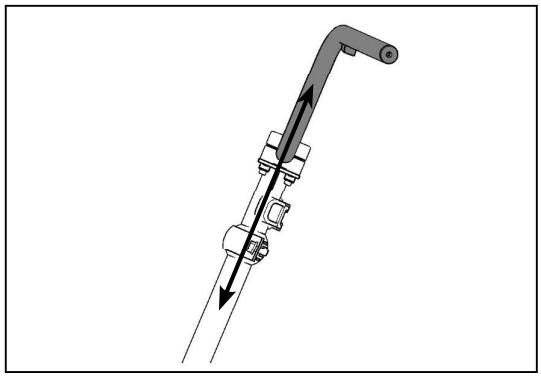
Steering System Handlebar Disassembly



【A】Lock bolt
【B】Handlebar cover
【C】Steering Handlebar

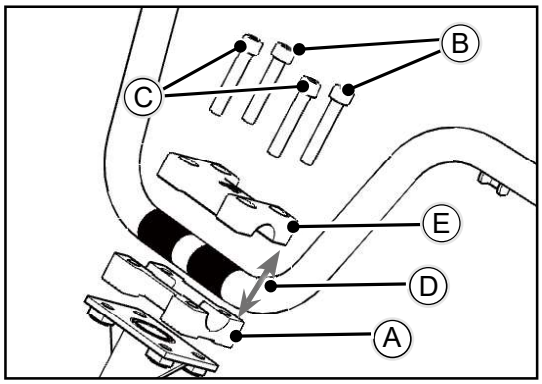
- Loose the handlebar locking bolt【A】;
- Take off the Handlebar cover【B】;
- Take off the Handlebar【C】;

Steering handlebar installation



⚠ CAUTION

Assure the handlebar matches the angle of the steering rod, keep in parallel, as shown in the left picture.



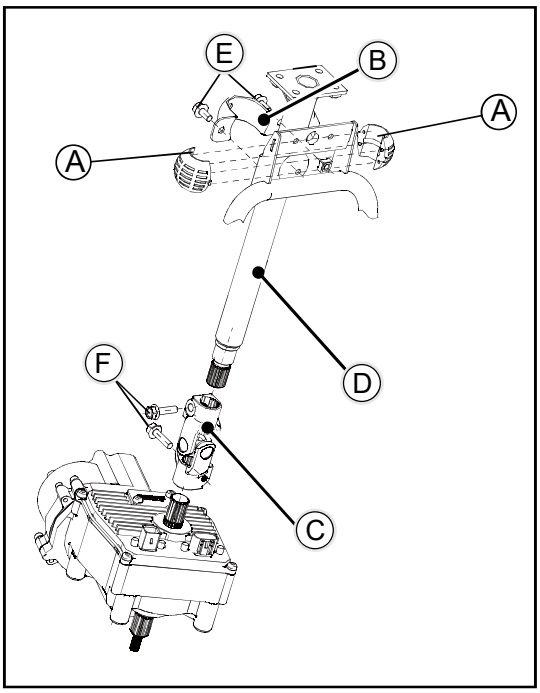
【A】Handlebar lower cover
【B】Locking bolt
【C】Locking bolt
【D】Gap
【E】Handlebar upper cover

- Place the lower handlebar bracket【A】on the steering rod with the holes aligned
- Place the handlebar in the center of the handlebar lower bracket, layer on the handlebar upper cover【E】, make sure the hole position is aligned with the lower holes;
- Tighten the front locking bolts【B】, and then tighten the rear locking bolts【C】;

Tightening Torque
29N.m（2.9kgf·m，21.4ft·lb）

⚠ CAUTION

Incorrect steps of the locking bolt may make the gap【D】between the upper and lower covers uneven.



Steering Column disassembly

First remove the screen panel plastic cover and the upper inner flap FL. For specific removal steps, see the vehicle disassembly chapter.

【A】Steering spherical block

【B】Ball block locking plate

【C】EPS joint assembly

【D】 EPS steering rod assembly

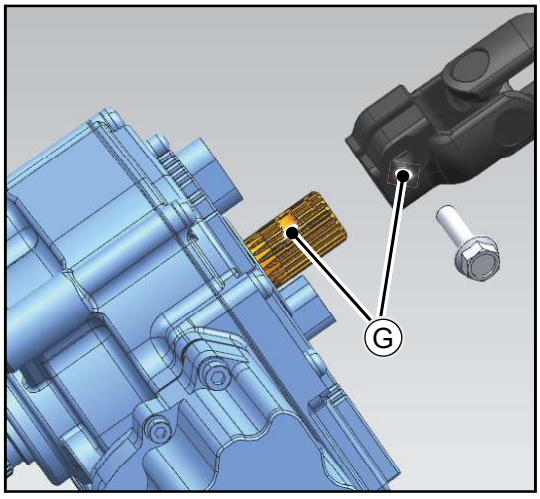
【E】Bolt M8×16

【F】Bolt M8×30

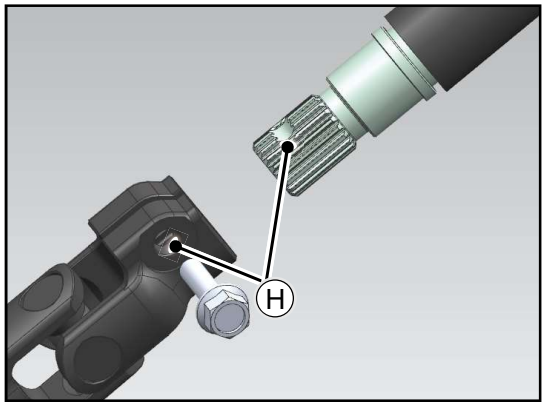
- ◆ Remove two hexagon flange bolts M8×16【E】
- ◆ Remove the ball block locking plate【B】and the ball block【A】
- ◆ Pull out the EPS steering rod assembly【D】
- ◆ Remove two hexagon flange bolts (half thread) M8×30【F】
- ◆ Pull out EPS joint assembly【C】

⚠ CAUTION

If the position of the locking bolt, shown in the left figure as 【G】& 【H】is not aligned, the bolt may be damaged and the handlebar direction will be incorrect.



Bolt M8×16/bolt M8×30 Torque
35N.m（3.6kgf·m，25.8ft·lb）



VEHICLE BODY AND FRAME

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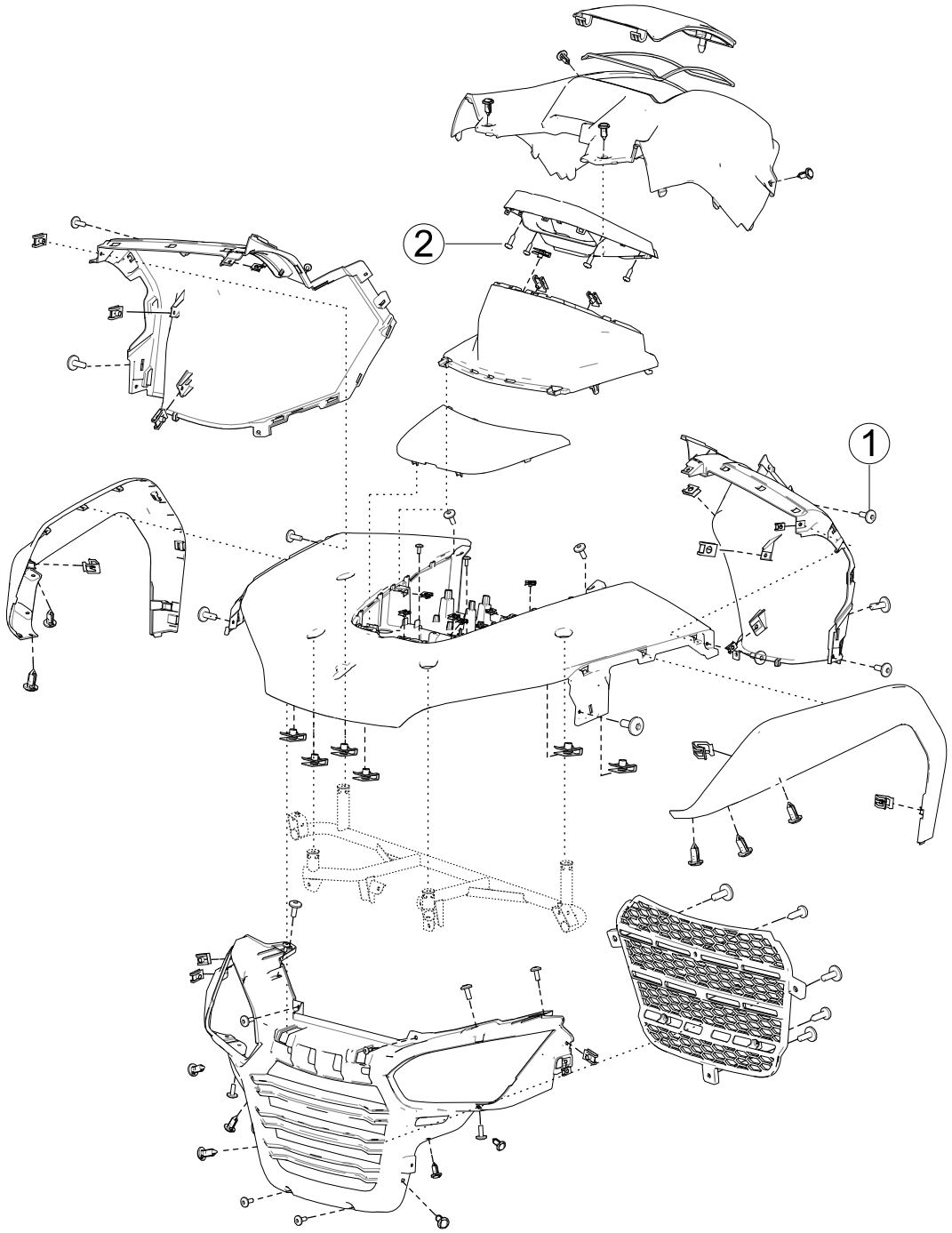
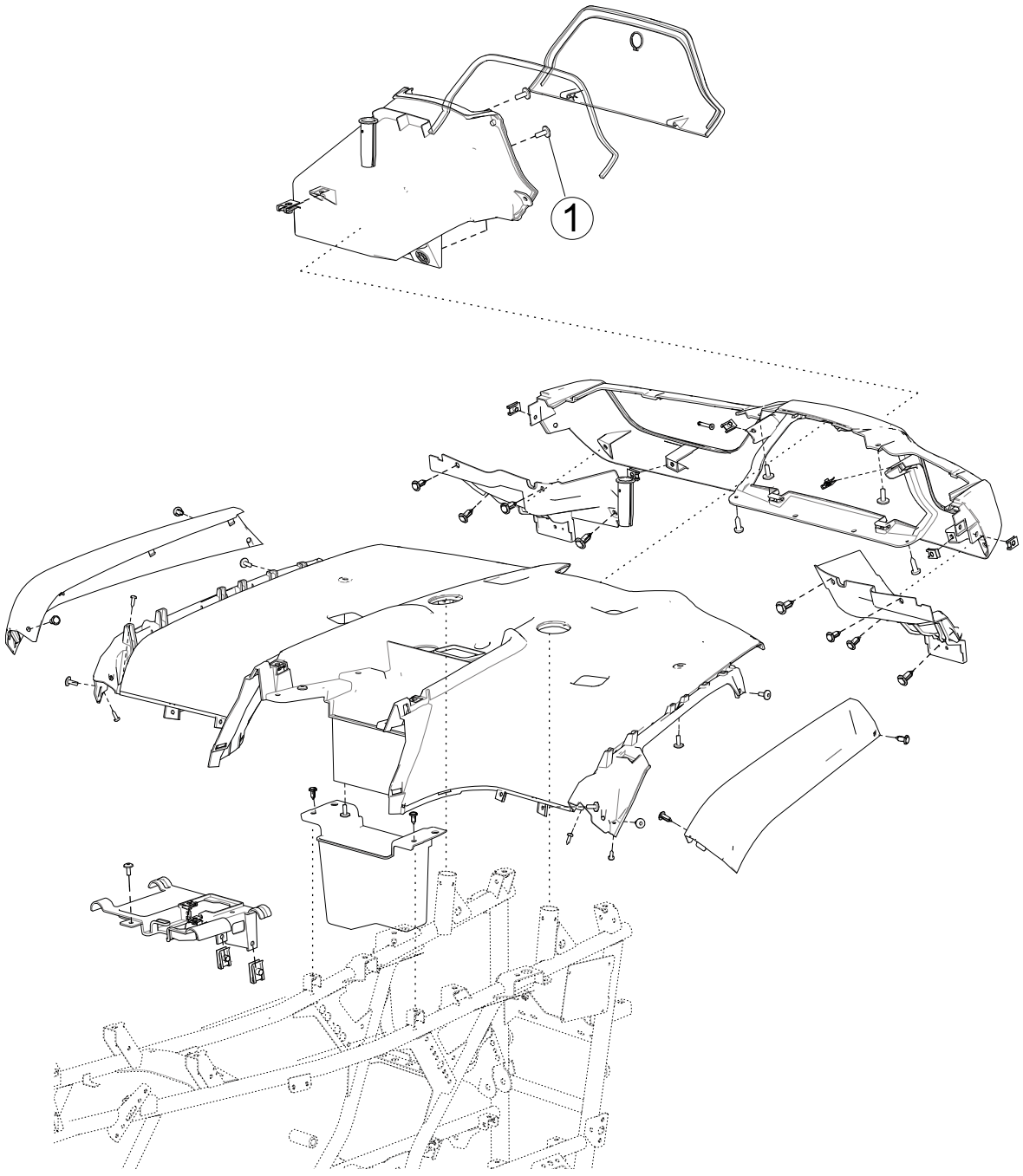
Exploded view of Body



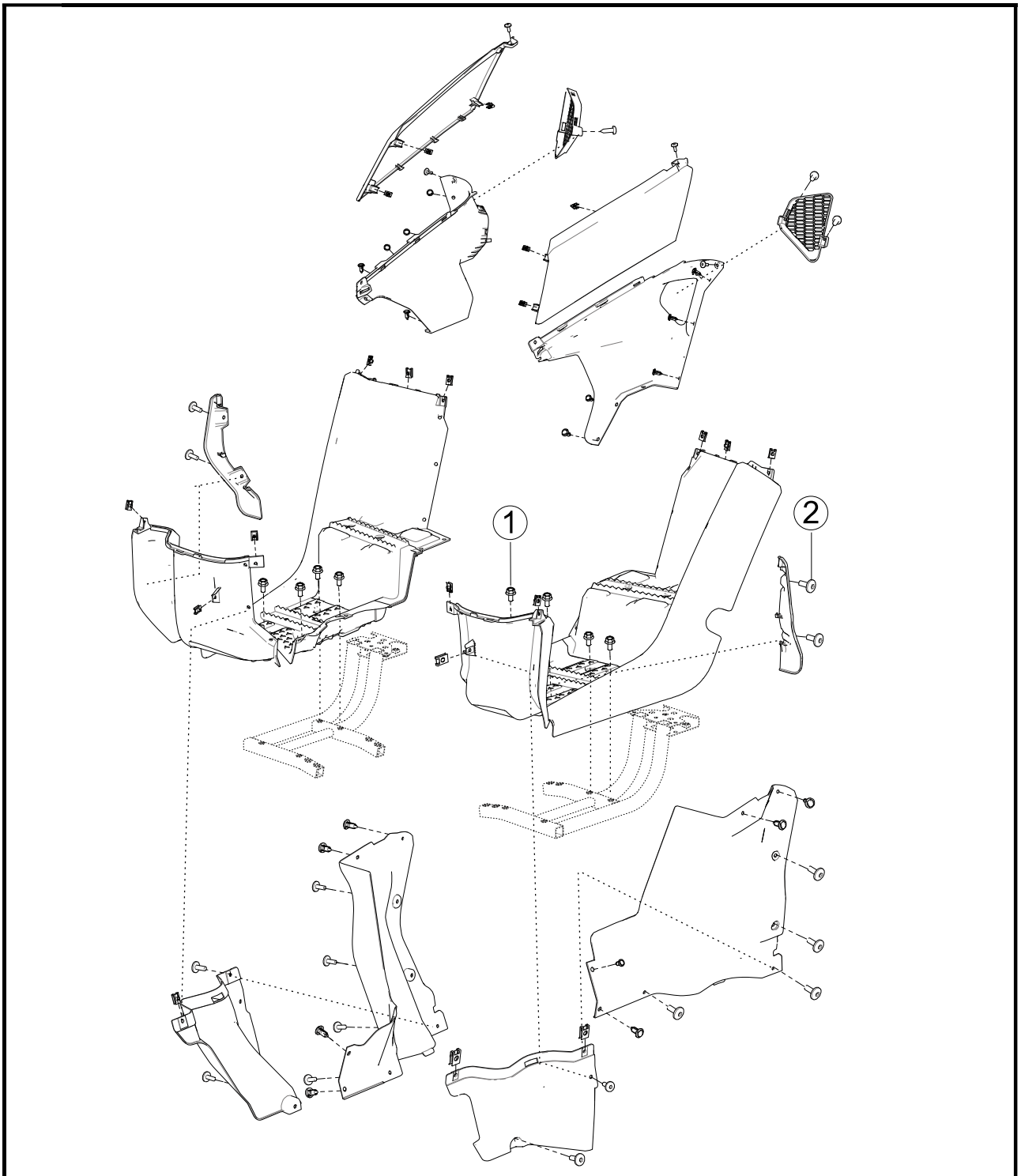
No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Hexagon Socket Large Pan Head Bolt M6×16	8~12	0.8~1.2	69~103.6 in·lb	
2	Cross Recessed Hexagon Screw ST4.8×16	8~12	0.8~1.2	69~103.6 in·lb	

Exploded view of Body

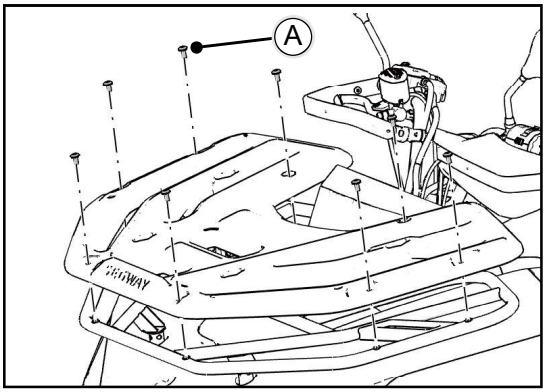


No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Hexagon Socket Large Pan Head Bolt M6×16	8~12	0.8~1.2	69~103.6 in·lb	

Exploded view of Body



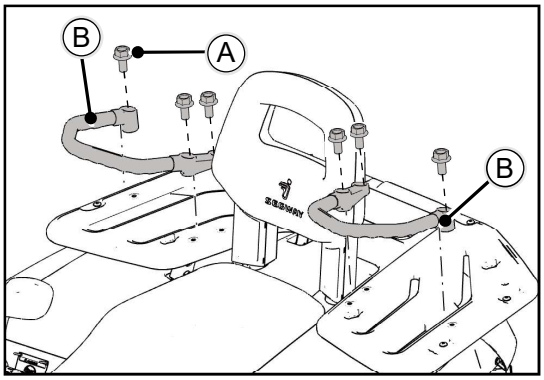
No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Hexagon Flange BoltsM6X16	8~12	0.8~1.2	69~103.6 in·lb	
2	Hexagon Socket Large Pan Head Bolt M6×16	8~12	0.8~1.2	69~103.6 in·lb	



Front Shelf Cover

Put the vehicle on flat ground first

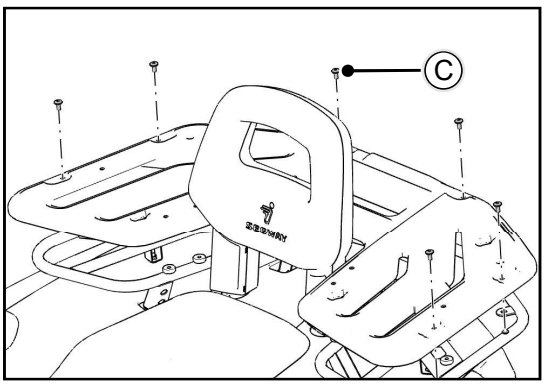
- Take out 8 pieces of front shelf cover fixing bolts 【A】;
- Remove the front shelf cover from the body;

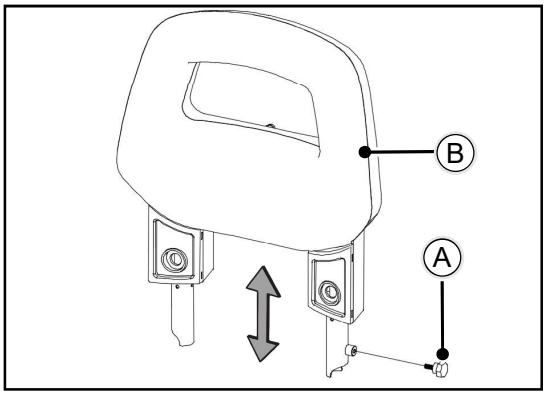


Rear Shelf Cover

Put the vehicle on flat ground first

- After removing the left and right armrest fixing bolts 【A】, remove the rear armrest 【B】;
- Take out the 8 bolts of the rear shelf cover 【C】, and remove the rear shelf cover





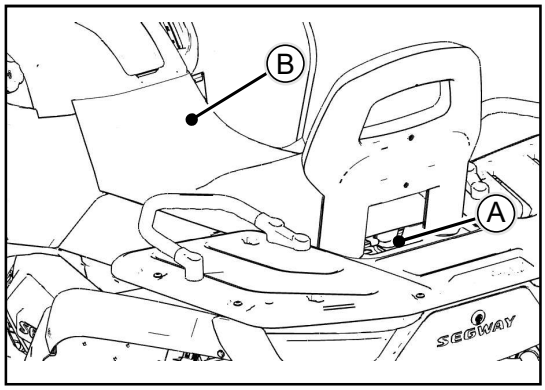
Backrest removal

- Loosen the lock nut on the left side 【A】
- Pull out the cushion 【B】

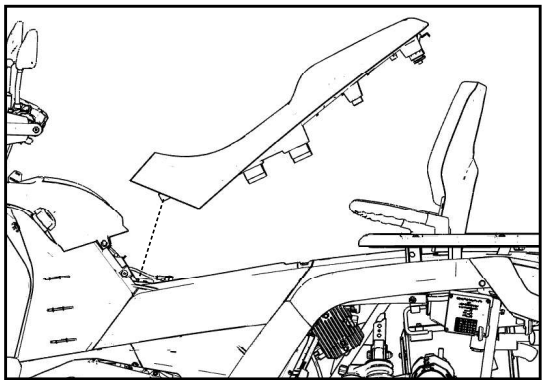
Install the Backrest

- Align the two round holes and insert it in place;
- Tighten the lock nut 【A】;

Saddle removal

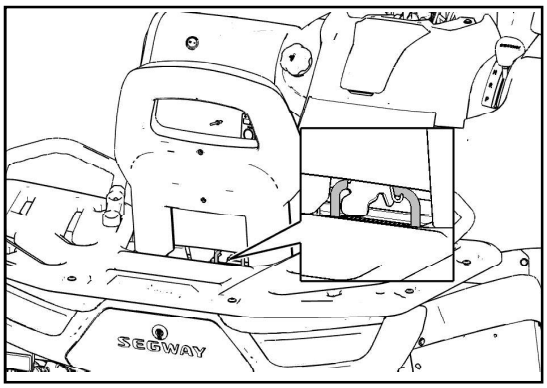


- unhook the saddle hook【A】
- pull the saddle 【B】 backward and upward.



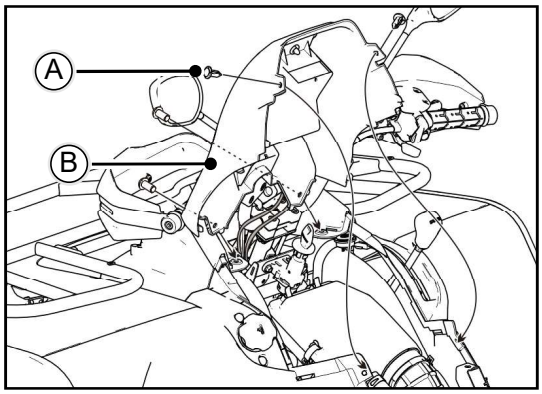
Saddle installation

- Insert the two tabs at the front end of the saddle into the two slots on the frame



- Press the saddle down and hear a click. The lock hook behind the seat hook on the frame.

Air filter cover assembly removal



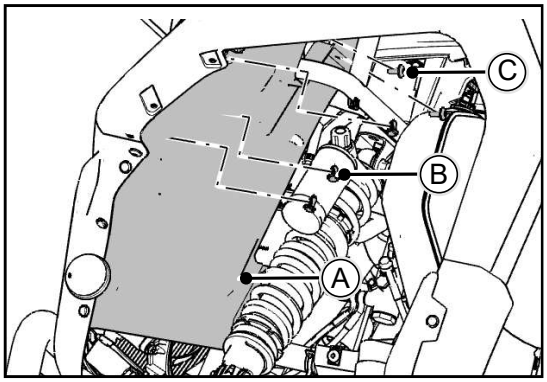
Put the vehicle on flat ground and remove the seat cushion first;

【A】Expansion screw assembly

【B】Air filter cover assembly

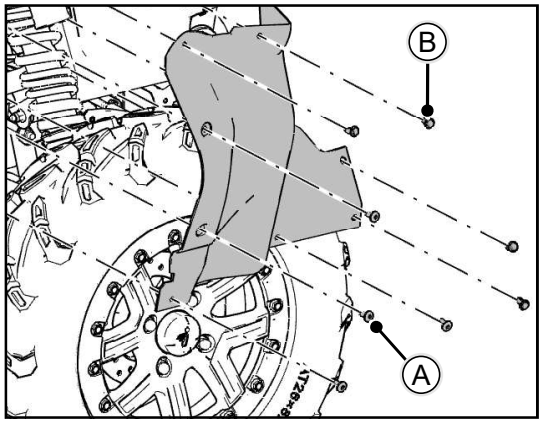
- After removing the expansion screw, remove the air filter cover. Since the USB and 12V power sockets are installed on the air filter cover, the air filter cover can be hung on the side;
- Unplug the 2 DC sockets, remove the sockets, and then remove the air filter cover

Disassembly of plastic parts of body



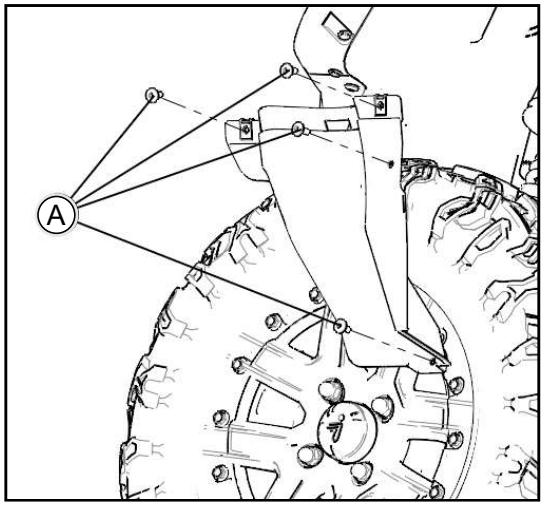
Front Lampshade

- Take out the bolt 【C】 and take out the expansion screw【B】;
- Remove the headlight cover【A】
- The removal method of the head lampshade is the same on both sides;



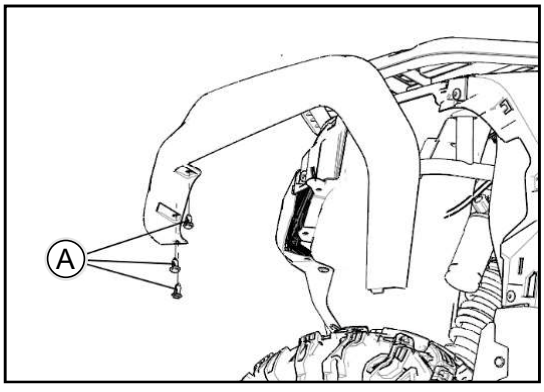
Front Upper Mudguard

- Take out the expansion screw 【A】, take out the screw【B】;
- Remove the upper front fender;
- The removal method of the upper front fender is the same on both sides;



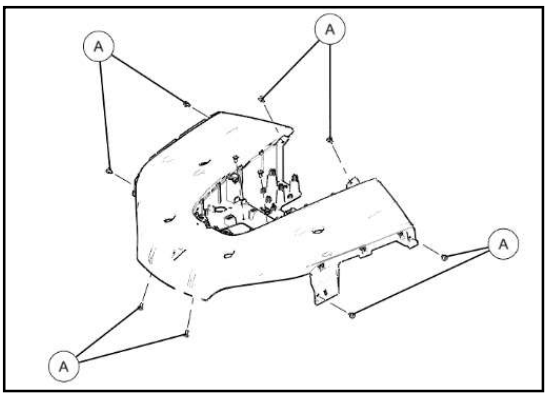
Front Lower Mudguard

- Take out the bolt【A】;
- Remove the front lower mudguard;
- The removal method of the front and lower mudguards is the same on both sides;



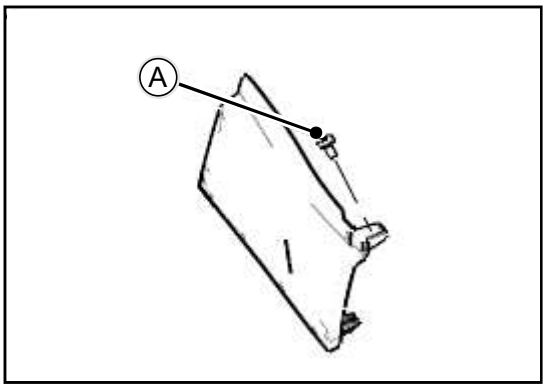
Front Strip

- Take out the expansion screw【A】;
- Remove the front strip;
- The removal method of the front side strip is the same on both sides;



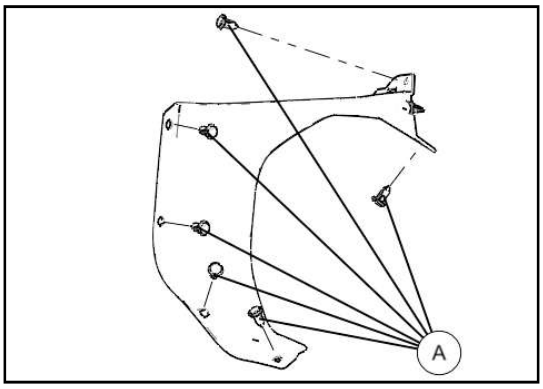
Front Panel

- Remove the front shelf cover;
- Remove the welding components of the front shelf;
- Remove the front access cover;
- Remove the left and right front side strip;
- Remove the instrument cover assembly;
- Remove the electrical components installed inside the front panel;
- Take out bolt 【A】;
- Remove the front panel;



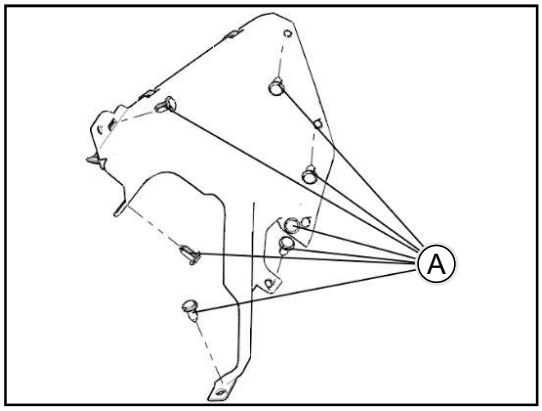
Left and Right Guards

- Remove the cushion;
- Take out bolt【A】;
- Remove the left guard plate;
- The removal method of the left and right guard plates is the same;



Left Front Guard Plate

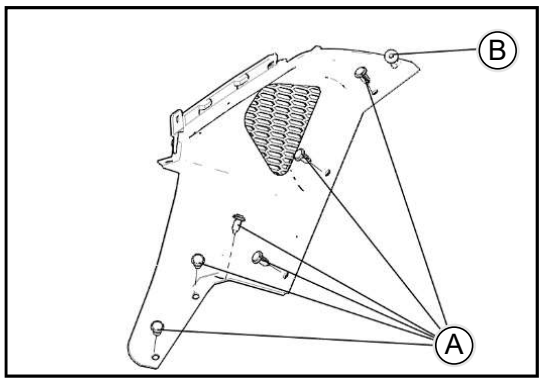
- Remove the cushion;
- Remove the left guard plate;
- Take out expansion screw 【A】;
- Remove the left front guard plate of the engine;



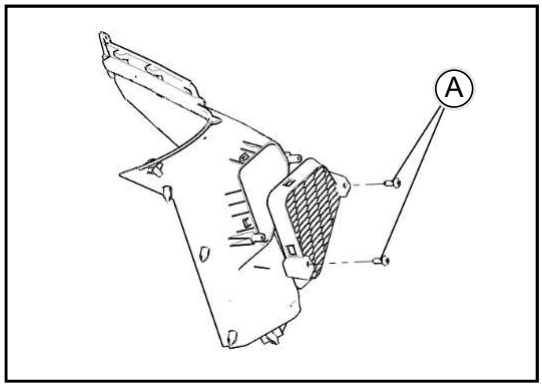
Right Front Guard Plate

- Remove the cushion;
- Remove the right guard plate;
- Take out expansion screw 【A】;
- Remove the right front guard plate of the engine;

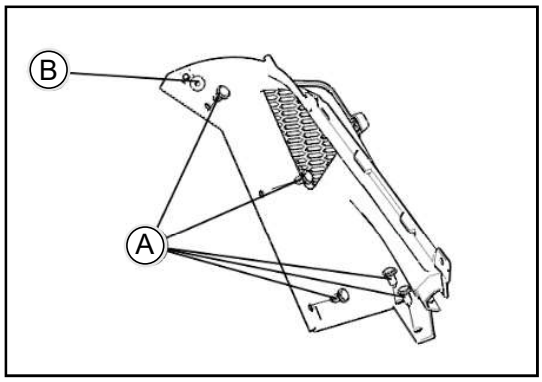
Left Rear Guard Plate and Left Rear Grille



- Remove the cushion;
- Remove the left guard plate, and remove the left front guard plate of the engine;
- Take out expansion screw 【A】, take out bolt 【B】;
- Remove the left rear guard plate and left rear grille of the engine;

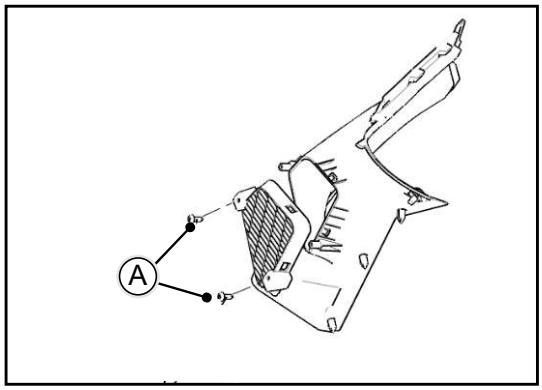


- Remove the screw【A】to take out the left rear grille;

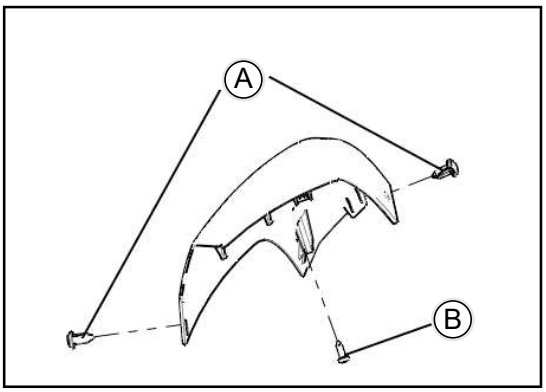


Right Rear Guard Plate and Right Rear Grille

- Remove the cushion;
- Remove the right guard plate, and remove the right front guard plate of the engine;
- Take out expansion screw 【A】, take out bolt 【B】;
- Remove the right rear guard plate and right rear grille of the engine;

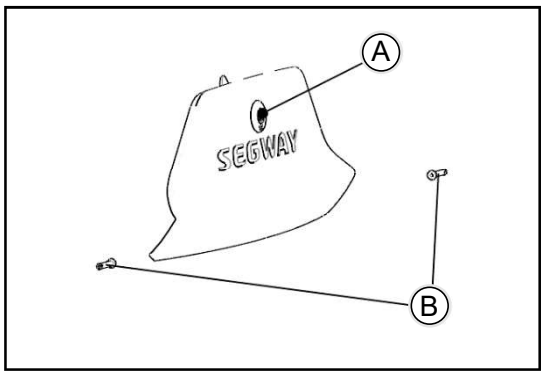


- Remove the screw【A】to take out the right rear grille;



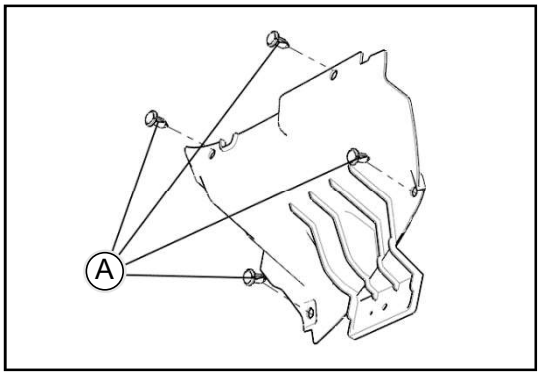
Left and Right Strips

- Take out expansion screw 【A】, take out bolt 【B】;
- Remove the left rear side strip;
- The removal method of the right rear side strip is the same as the left rear side strip;



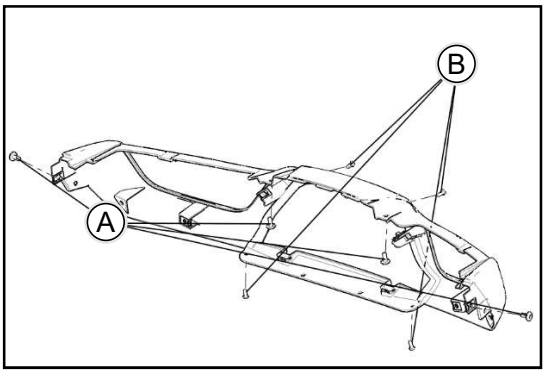
Tail Box Cover

- Use the key to open the tail box cover lock 【A】, and open the tail box cover;
- Pull out the tail box cover pin B;
- Remove the tail box cover;



Left and Right Rear Tail Lamp Cover

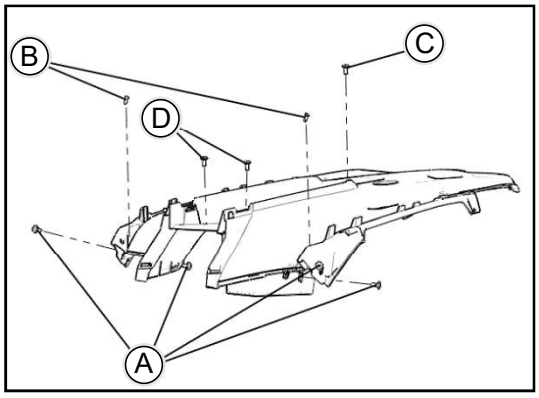
- Take out expansion screw 【A】;
- Take out the left rear tail lamp cover;
- The removal method of the right rear tail lamp cover is the same as that of the left rear tail lamp cover;



Rear Light Panel

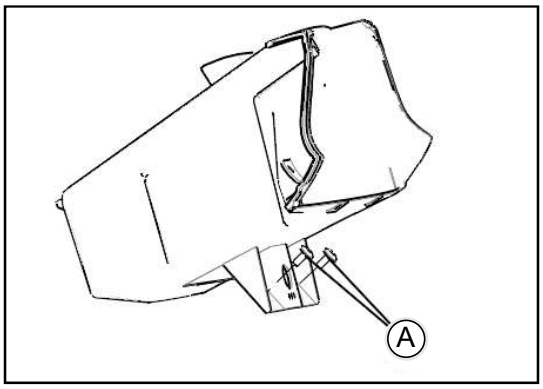
- Remove the left and right rear taillights;
- Remove bolts 【A】and 【B】;
- Remove the rear tail light panel;

Rear Fender



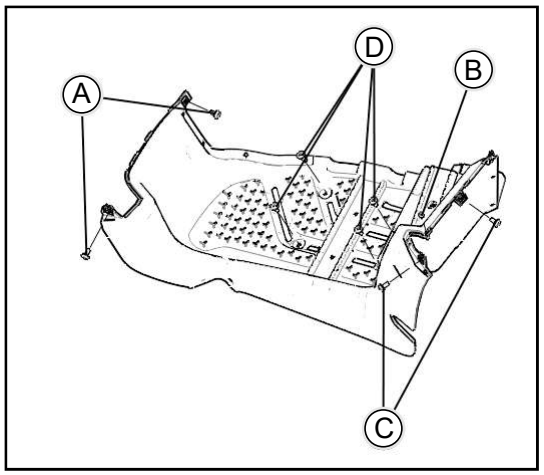
- Remove the rear shelf cover;
- Remove the welding components of the rear shelf;
- Remove the seat cushion assembly;
- Remove the backrest assembly;
- Remove the left/right rear side strip;
- Remove the rear tail light panel and the tail box cover;
- Remove related electrical components;
- Remove the bolts【A】and【B】connecting the pedals;
- Remove the bolt【C】connecting the rear box;
- Remove the bolt【D】connecting the frame;
- Remove the rear mudguard;

Rear Storage Box



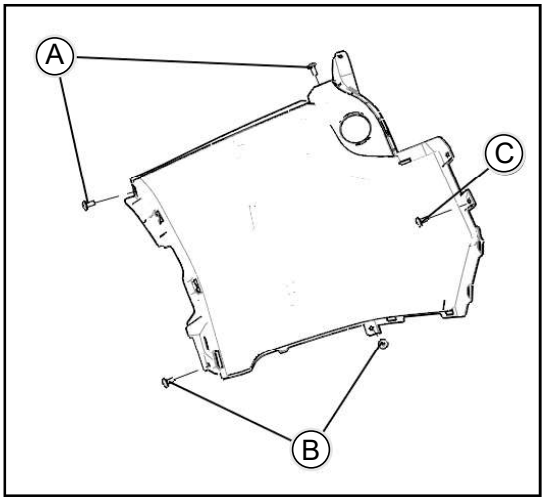
- Remove the rear shelf cover;
- Remove the welding components of the rear shelf;
- Remove the seat cushion assembly;
- Remove the backrest assembly;
- Remove the left/right rear side strip;
- Remove the rear tail light panel and the tail box cover;
- Remove related electrical components;
- Remove the rear mudguard;
- Remove the rear storage box;

Left and Right Pedals



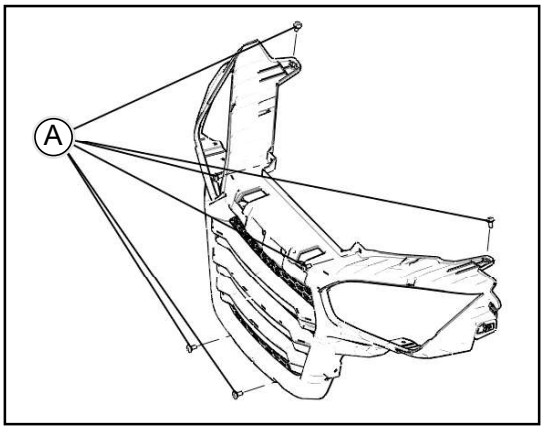
- Remove the front/rear left strips;
- Remove the front fender;
- Remove the left guard plate;
- Remove the front left/rear left guard plate of the engine;
- Remove the bolt【A】connected to the left front mudguard;
- Remove the bolts【B】and【C】connected to the rear fender;
- Remove the bolt【D】connected with the pedal bracket;
- Remove the left foot pedal;
- The removal method of the right pedal is the same as the left pedal;

Left and Right Front Mudguards

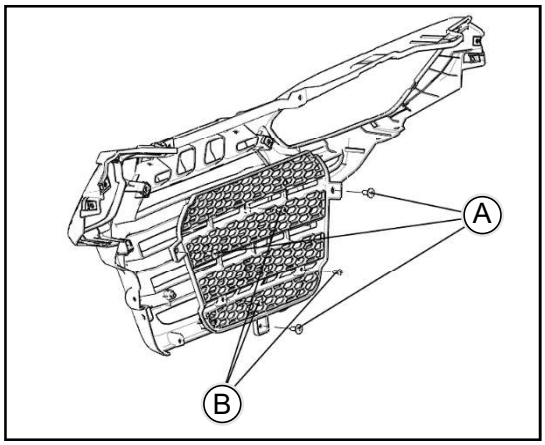


- Remove the front/rear left strips;
- Remove the front access cover;
- Remove the air filter cover;
- Remove the instrument cover assembly;
- Remove related electrical components;
- Remove the front fender;
- Remove the left guard plate;
- Remove the left front guard plate of the engine;
- Remove the bolt【A】connected to the front panel;
- Remove the bolt【B】connected with the pedal;
- Remove the bolt【C 】connected to the frame;
- Remove the fuel tank cap;
- Remove the left front mudguard;
- The removal method of the right front fender is the same as the left and left front fender, but the shift handle needs to be removed;

Headlight Mask and Front Grille

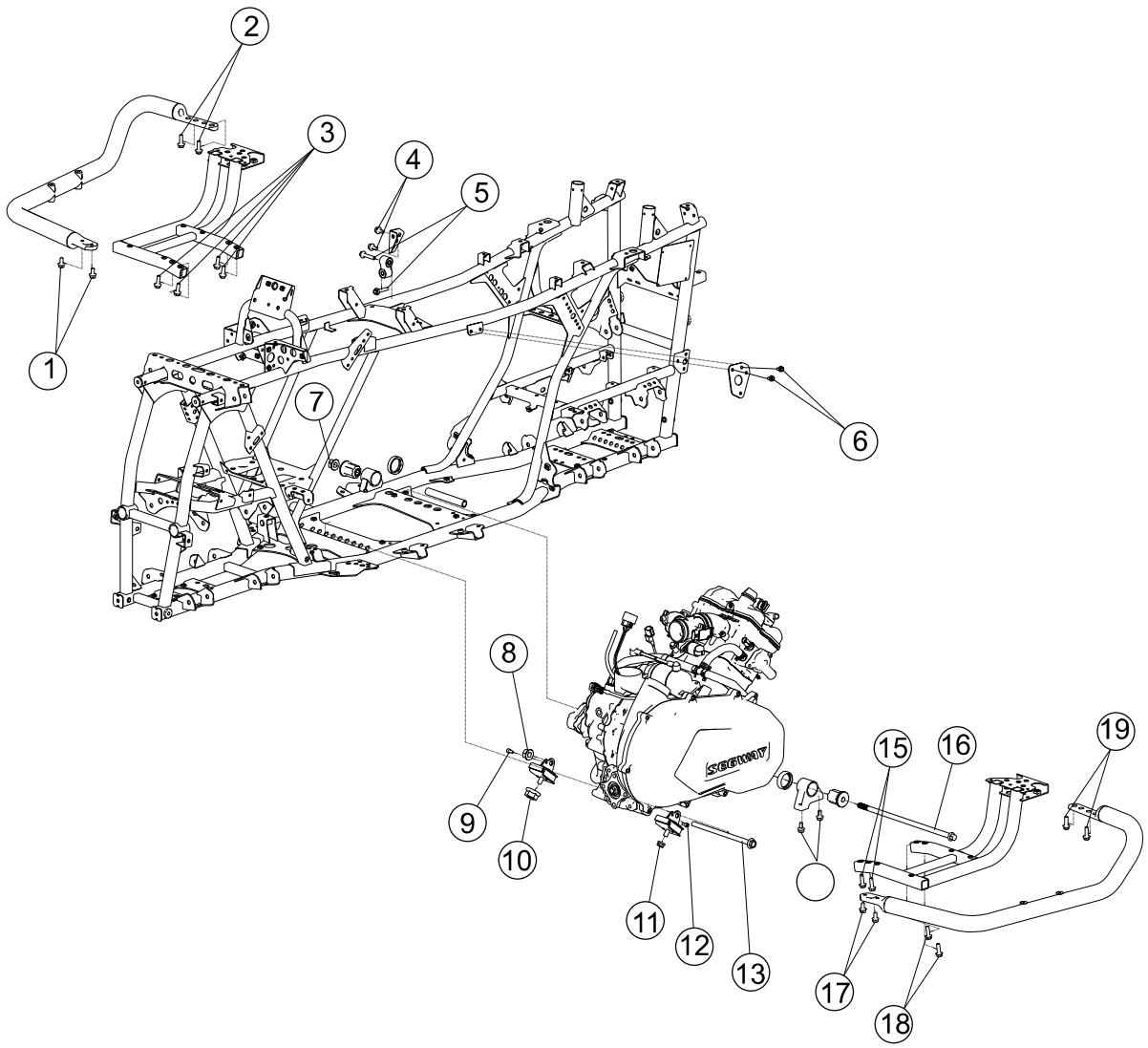


- Remove the front shelf cover;
- Remove the welding components of the front shelf;
- Remove the front access cover;
- Remove the left/right front side strip;
- Remove the front panel;
- Remove the left/right front headlight cover;
- Remove the bolt【A】connected to the frame;
- Remove the headlight cover and front grille;



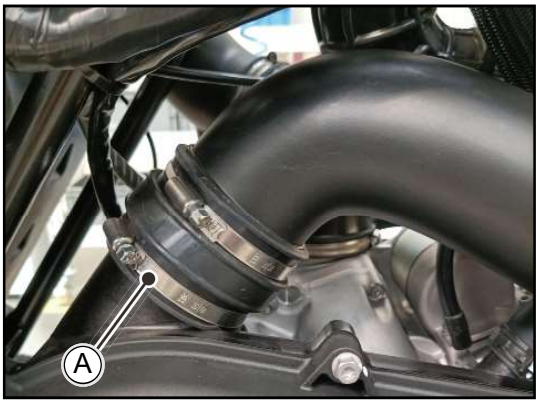
- The front grille can be removed by removing the bolts【A】and【B】connected to the headlight cover.

Exploded view of Engine assembly



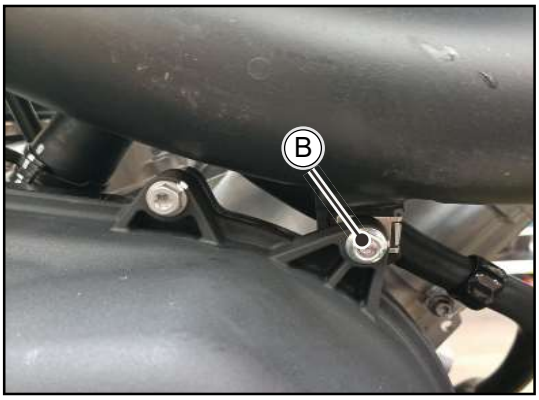
No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Right foot guard bar combination mounting bolt M8X16	30 ～ 40	3.0~4.0	22.1~29.5	
2	Right foot guard bar combination mounting bolt M8X25	30 ～ 40	3.0~4.0	22.1~29.5	
3	Right pedal bracket assembly mounting bolt M8X25	30 ～ 40	3.0~4.0	22.1~29.5	
4	Combined mounting bolts for hanging on the engine M8X16	30 ～ 40	3.0~4.0	22.1~29.5	
5	Right hanging buffer sleeve mounting bolts m8x35	30 ～ 40	3.0~4.0	22.1~29.5	

6	Trailer power bracket mounting bolts M6X12	8~12	0.8~1.2	69~103.6 in·lb	
7	Engine mounting bolts M12X1.25	50 ～ 60	5.0~6.0	36.9~44.3	
8	Engine mounting bolts M12X1.25	50 ～ 60	5.0~6.0	36.9~44.3	
9	Hexagon socket head cap screw M6×12	8~12	0.8~1.2	69~103.6 in·lb	
10	Engine buffer block mounting bolts M10X1.25	40 ～ 50	4.0~5.0	29.5~36.9	
11	Engine buffer block mounting bolts M10X1.25	40 ～ 50	4.0~5.0	29.5~36.9	
12	Hexagon socket head cap bolt M6x12	8~12	0.8~1.2	69~103.6 in·lb	
13	engine front mounting bolts M12X1.25X210	50 ～ 60	5.0~6.0	36.9~44.3	
14	Mounting bolts M8X16	30 ～ 40	3.0~4.0	22.1~29.5	
15	Left Pedal bracket assembly mounting bolt M8X25	30 ～ 40	3.0~4.0	22.1~29.5	
16	Engine mounting shaft1	50 ～ 60	5.0~6.0	36.9~44.3	
17	Left foot guard bar assembly mounting bolt M8X16	30 ～ 40	3.0~4.0	22.1~29.5	
18	Left foot guard bar assembly mounting bolt M8X25	30 ～ 40	3.0~4.0	22.1~29.5	
19	Left foot guard bar assembly mounting bolt M8X25	30 ～ 40	3.0~4.0	22.1~29.5	



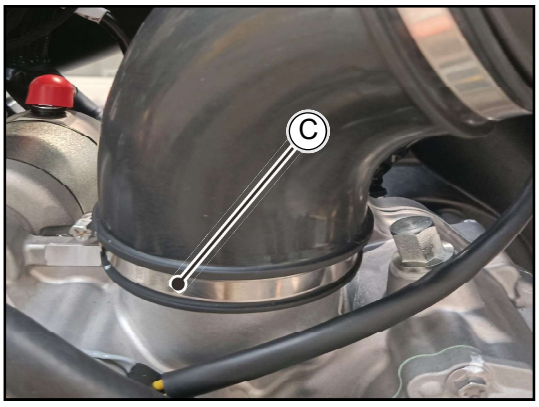
Disassembly

- Remove the middle floor; (see the body section for details)
- Remove the outer and middle plastic parts; (see the body section for details)
- Pull out the connectors or cables on the engine, and disconnect the cables from the main cables;
- Use a suitable tool to remove the CVT air inlet pipe mounting bolt【B】;
- Use a flat screwdriver to remove the hoop【A】, and remove the CVT air inlet pipe



⚠ CAUTION

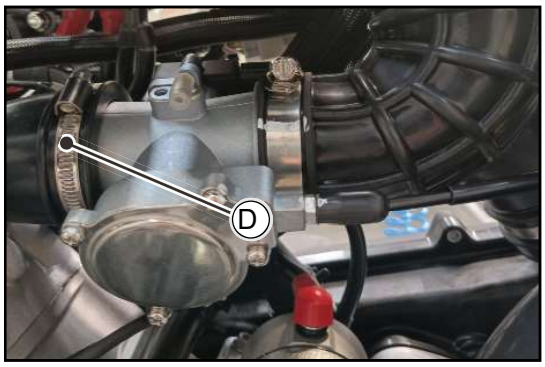
After removing the CVT air inlet pipe, please protect the CVT air inlet to Avoid debris from falling into the engine, thereby damaging the engine.



- Use a flat screwdriver to remove the hoop【C】, and remove the CVT outlet pipe;

⚠ CAUTION

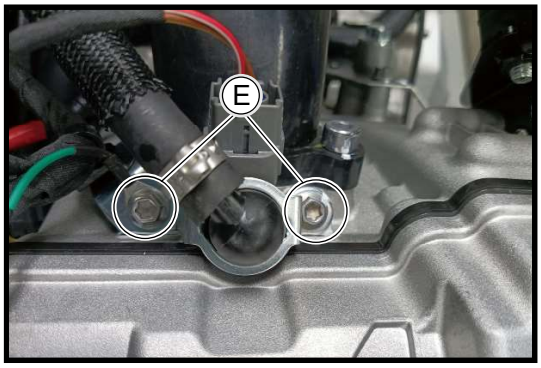
After removing the CVT air outlet pipe, please protect the CVT air outlet toAvoid dust from falling into the engine, thereby damaging the engine.



- Use a flat screwdriver to remove the bracket【D】, disconnect the throttle valve and the engineConnection of trachea;

⚠ CAUTION

After removing the throttle valve, please protect the engine inlet to avoid dust falling into the engine; After removing the throttle, please protect the throttle to avoid damage to the throttle.

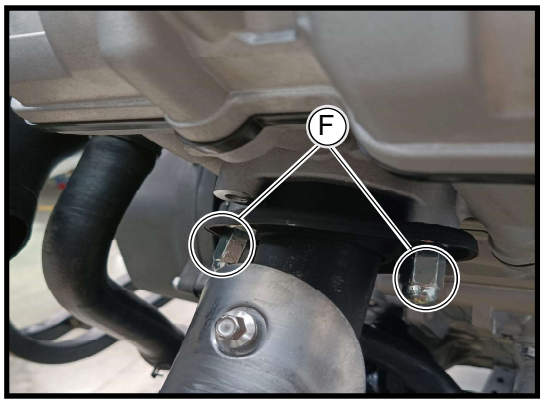


◆ Use a suitable tool to remove the fuel injector mounting bolt【E】, and remove the fuel injector

⚠ CAUTION

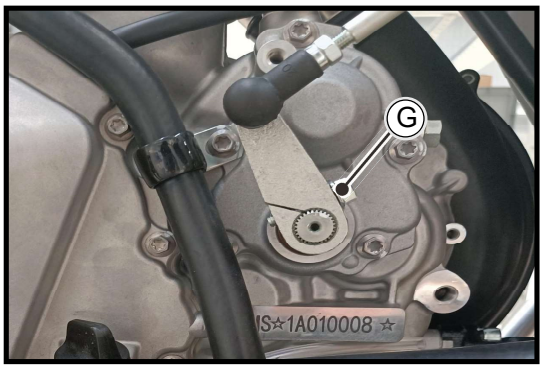
After removing the injector, please protect the injection hole of the fuel injector; After removing the fuel injector, please protect the engine fuel injector mounting hole to prevent dust falling into the engine.

Injector mounting bolt torque torque
10N·m（1.0kgf·m，7.4ft·lb）



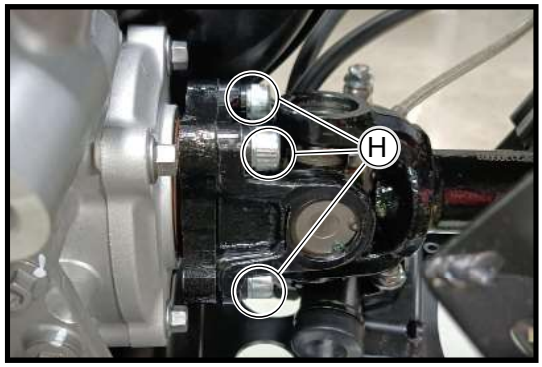
◆ Use a suitable tool to remove the exhaust muffler mounting nut【F】, and remove Exhaust muffler;

Exhaust muffler mounting nut torque
35～45N·m（3.5~4.5kgf·m，25.8~33.2ft·lb）



◆ Use a suitable tool to remove the shift rocker arm mounting bolt【G】, and remove the shift arm

Shift arm mounting bolt torque
8N·m～12N·m（3.5~4.5kgf·m，69~103.6 in·lb）



◆ Use a suitable tool to remove the 4 mounting screws of the front drive shaft and the engine 【H】, disconnect the front drive shaft from the engine;

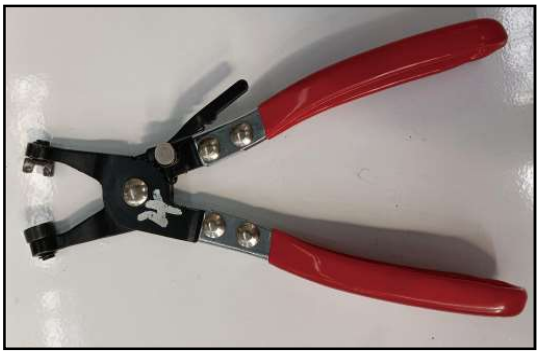
Front drive shaft mounting screw torque
45N·m（4.5kgf·m，33.2ft·lb）

When assembling, please apply appropriate amount of thread glue on the front drive shaft mounting screws

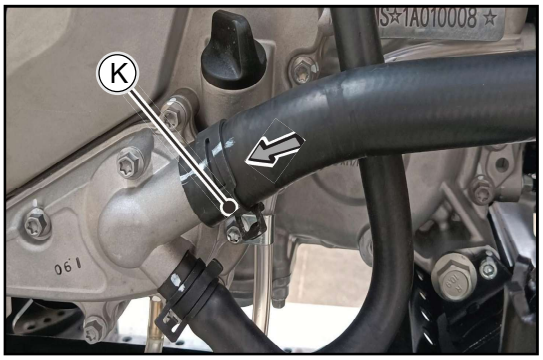
◆ Use a suitable tool to remove the 4 mounting screws of the rear drive shaft and engine【J】Disconnect the front drive shaft from the engine;

⚠ CAUTION

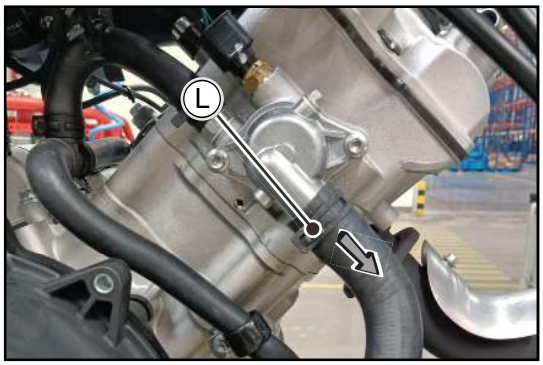
when assembling, use Thread glue to prevent the screws from loosening and falling off.

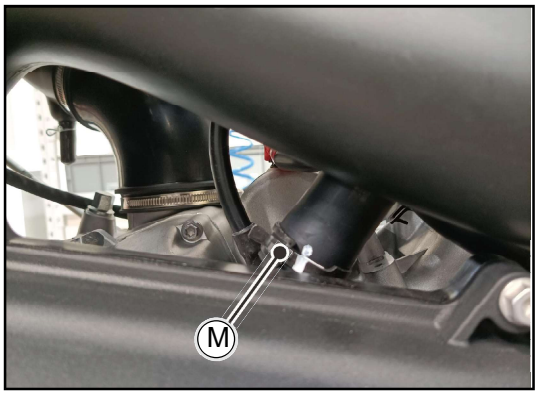


◆ Use hose clamp pliers to remove the clamp【K】to remove the radiator outlet pipe, And drain the coolant;



◆ Use water pipe clamp pliers to remove the clamp【L】to remove the water inlet pipe of the radiator, And drain the coolant;





- Use water pipe clamp pliers to remove the clamp【M】to remove the engine exhaust pipe;

⚠ CAUTION

After removing the exhaust pipe and the water inlet and outlet pipes of the radiator, please protect the connection parts

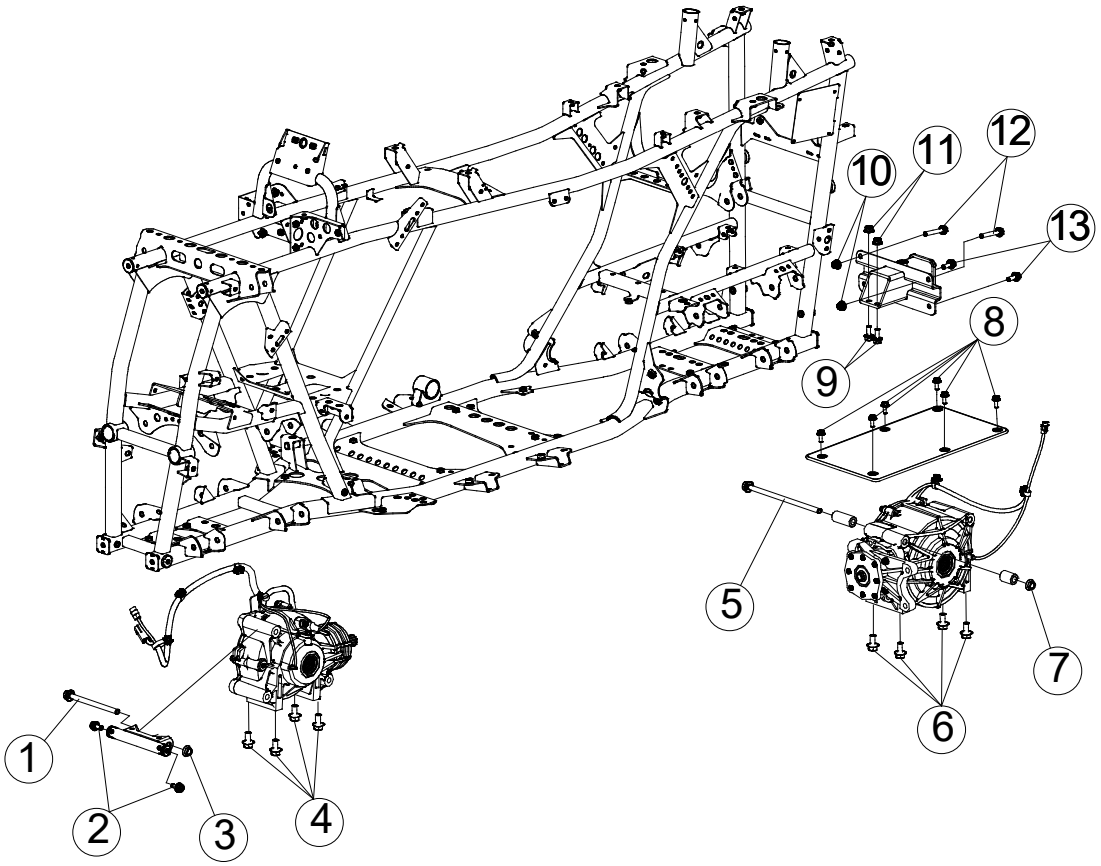
- Use a suitable tool to remove the bolt 6, Remove the parking adapter bracket assembly;
- Use a suitable tool to remove the bolts 19 and 17, and remove the left foot guard bar combination;
- Use a suitable tool to remove bolts 15 and 18, and remove left pedal bracket Components;
- Remove the bolts 1 and 2 with a suitable tool, and remove the right foot guard bar assemblyTogether
- Remove the bolt 13 with a suitable tool and remove right Foot support assembly;
- Use a suitable tool to remove the bolt 4 so that the engine hanging assembly and The engine is disconnected;
- Use a suitable tool to remove the bolt 5, remove the suspension buffer rubber sleeve and the hairMotivation hanging combination;
- Use suitable tools to remove the screw 9 and 12;
- Use a suitable tool to remove the nut pieces 8 and 7, and pull out the pieces 13 and 16;

⚠ CAUTION

When pulling out the front mounting shaft bolt of the engine and the engine mounting shaft 1, please make sure that all parts connected to the engine are disconnected to avoid damage to other parts

- Use a suitable tool to remove the bolt 14 and remove Mounting seat
- Remove nut pieces 10 and 11 with a suitable tool, and remove engine buffer block
- Use appropriate tooling to lift the engine assembly out of the left side of the vehicle, and handle with care;

Exploded view of Front and Rear Differential

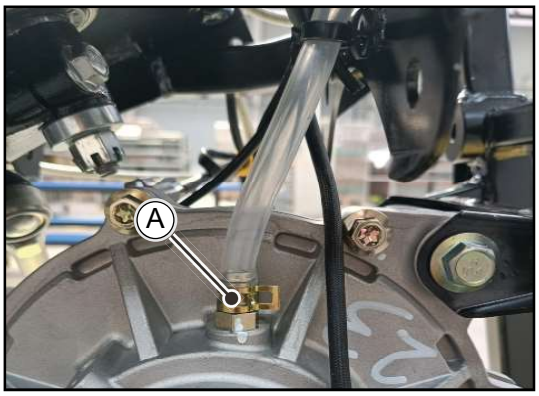


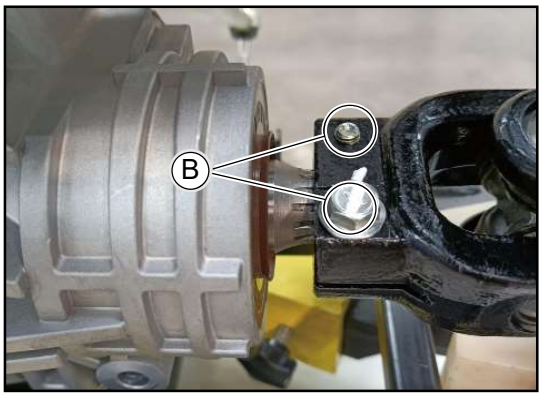
No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Mounting bolts on the front Differential M10X1.25X25	40 ～ 50	4.0~5.0	29.5~36.9	
2	Front Differential mounting bracket combination mounting bolt M8×16	8~12	0.8~1.2	69~103.6 in·lb	
3	Mounting bolts on the front Differential M10X1.25	40 ～ 50	4.0~5.0	29.5~36.9	
4	Mounting bolts on the front DifferentialM10X1.25X20	40 ～ 50	4.0~5.0	29.5~36.9	
5	Rear Differential upper mounting bolts M10X1.25X215	40 ～ 50	4.0~5.0	29.5~36.9	

6	Rear Differential under mounting bolts M10X1.25X20	40 ～ 50	4.0~5.0	29.5~36.9	
7	Rear Differential upper mounting bolts M10X1.25	40 ～ 50	4.0~5.0	29.5~36.9	
8	Rear Differential heat shield mounting bolts M6x16	8~12	0.8~1.2	69~103.6 in·lb	
9	Weld drag bracket under mounting bolts M8*20	30 ～ 40	3.0~4.0	22.1~29.5	
10	Weld drag bracket upper mounting bolts M8	30 ～ 40	3.0~4.0	22.1~29.5	
11	Weld drag bracket under mounting bolts M8	30 ～ 40	3.0~4.0	22.1~29.5	
12	Weld drag bracket upper mounting bolts M8*50	30 ～ 40	3.0~4.0	22.1~29.5	
13	Weld drag bracket rear mounting bolts M8*20	30 ～ 40	3.0~4.0	22.1~29.5	

Front Differential repair

Disassembly





- Remove the front lower right arm welding assembly and the front right upper arm welding assembly;(See Suspension section for details)
- Remove the front left lower arm welding assembly and the front left upper arm welding assembly;(See Suspension section for details)
- Remove the connection between the front constant velocity drive shaft and the front Differential assembly;
- Unplug or remove the connectors or cables from the front Differential assembly, and disconnectThe connection of the main cable;
- Use suitable tools to remove the hoop【A】, and remove the front Differential vent pipe;
- Use a suitable tool to remove the 2 bolts 【B】, and disconnect the front drive shaft Into the connection with the front Differential assembly;
- Use a suitable tool to remove the nut piece 3, remove the bolt piece 2, and pull out the screw Bolt 1, remove the front Differential mounting bracket assembly;
- Remove the bolt 4 with a suitable tool, and remove the front Differential from left to rightFront Differential assembly;

Front drive shaft mounting screw torque
35～45N·m（3.5~4.5kgf·m，25.8~33.2ft·lb）

⚠ CAUTION

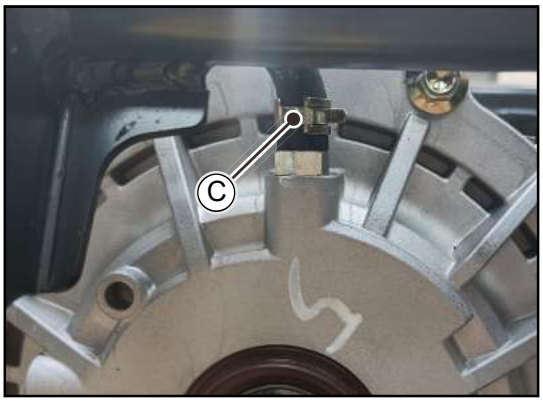
Before removing the front Differential assembly, make sure that the wiring harnesses on the front Differential assembly are completelyThe frame or main cable is disconnected;

Assembly

When assembling, please reverse the assembly in the order of disassembly; When assembling, apply proper amount of thread glue on the mounting screws of the front drive shaft;

Rear Differential repair

Disassemble



- Unplug or remove the connectors on the rear Differential assembly, and disconnect the main cables.
- Remove the connection between the brake assembly and the rear Differential assembly;
- Remove the connection between the left and right constant velocity drive shafts and the rear Differential assembly;
- Use suitable tools to remove the hoop 【C】, and remove the rear Differential vent pipe;
- Remove the bolt 8 with a suitable tool and remove rear Differential heat shield
- Use a suitable tool to remove the nut 11 and pull out the bolt 9;
- Remove the bolt 13 with a suitable tool;
- Remove the nut 10 with a suitable tool, and pull out the bolt 12;
- Remove the welding assembly of the trailer bracket;
- Use a suitable tool to remove the nut piece 7, and pull out the bolt piece 5. Removal Differential left and right bushings;
- Remove the bolt 6 with a suitable tool;
- Take out the rear Differential assembly from front to back;

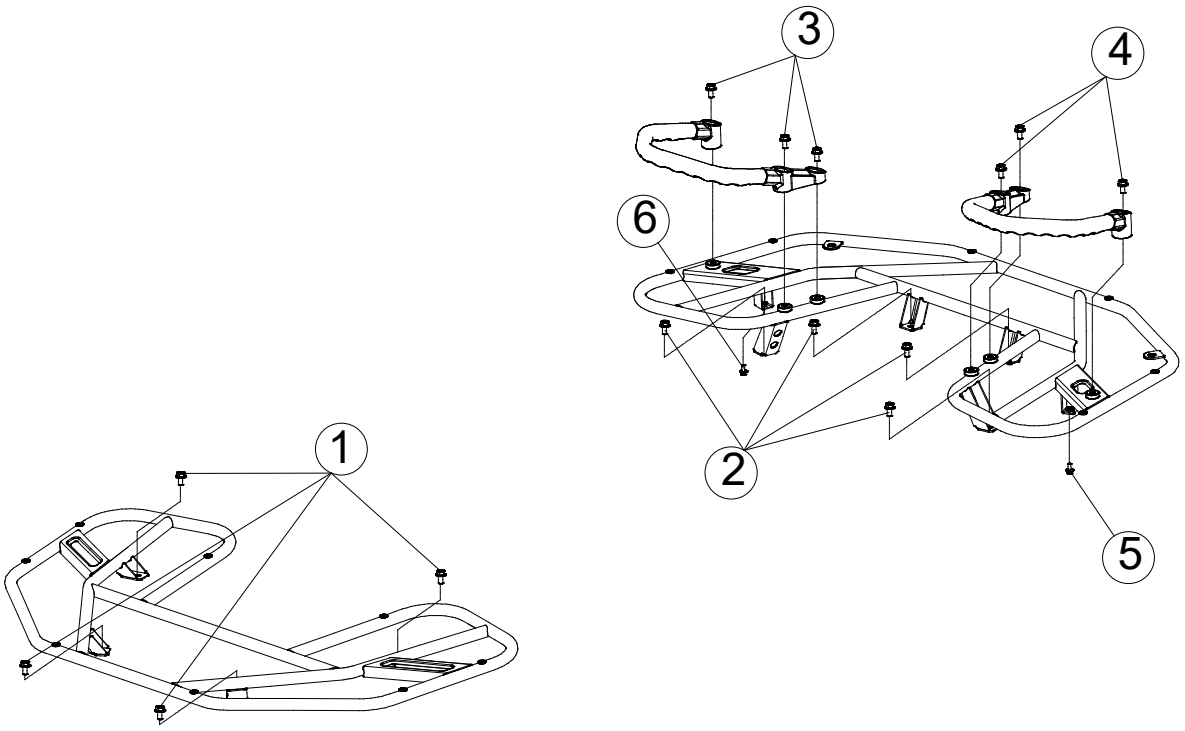
⚠ CAUTION

Before removing the rear Differential assembly, make sure that the wiring harnesses on the front Differential assembly are completely disconnected with The frame or main cable

Assembly

- When assembling, please reverse assembling in the order of disassembly;

Exploded view of Front and Rear Shelf



No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Front shelf welding assembly mounting bolt M8X16	30 ～ 40	3.0~4.0	22.1~29.5	
2	Rear shelf welding assembly mounting bolts M8X16	30 ～ 40	3.0~4.0	22.1~29.5	
3	Left armrest assembly mounting bolt M8X16	30 ～ 40	3.0~4.0	22.1~29.5	
4	Left armrest assembly mounting bolt M8X16	30 ～ 40	3.0~4.0	22.1~29.5	
5	Rear fender mounting bolt M6X16	8~12	0.8~1.2	69~103.6 in·lb	
6	Rear fender mounting bolt M6X16	8~12	0.8~1.2	69~103.6 in·lb	

Front Shelf repair

Disassembly

- Use a suitable tool to remove the bolt 1 and remove the welding assembly of the front shelf;

Assembly

- When assembling, please reverse assembling in the order of disassembly;

Rear shelf repair

Disassembly

- Remove the rear shelf cover;
- Use a suitable tool to remove the bolts 5 and 6 to make the rear plate and the frame welding components are disconnected;
- Use a suitable tool to remove the bolt 4 and remove the left armrest assembly;
- Remove the bolt 3 with a suitable tool, and remove the right armrest assembly;
- Use a suitable tool to remove the bolt 2 and remove the welding assembly of the rear shelf;

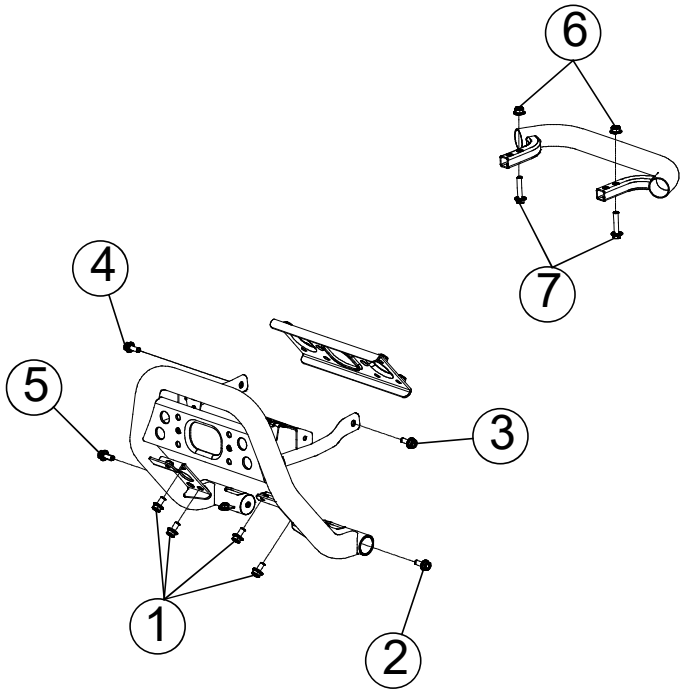
Assembly

When assembling, please reverse assembling in the order of disassembly;

⚠ CAUTION

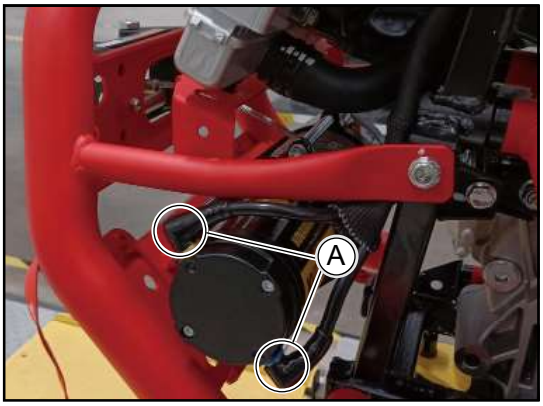
Before removing the welding components of the front and rear shelves, make sure that there is noload;

Exploded view of Bumper



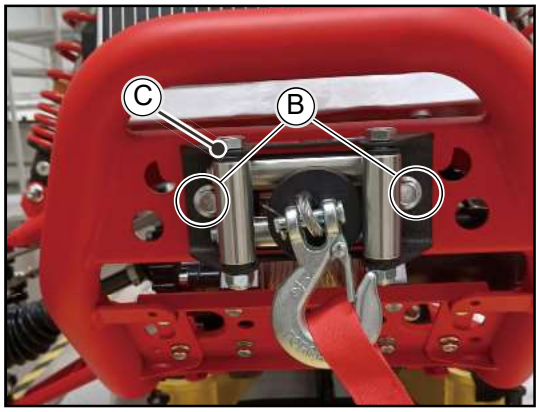
No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Combination mounting bolts for winch mounting plate M8X16	30 ～ 40	3.0~4.0	22.1~29.5	
2	Front bumper welding assembly mounting bolt M8X20	30 ～ 40	3.0~4.0	22.1~29.5	
3	Front bumper welding assembly mounting bolt M8X20	30 ～ 40	3.0~4.0	22.1~29.5	
4	Front bumper welding assembly mounting bolt M8X20	30 ～ 40	3.0~4.0	22.1~29.5	
5	Front bumper welding assembly mounting bolt M8X20	30 ～ 40	3.0~4.0	22.1~29.5	
6	Rear handle bar mounting bolt M8	30 ～ 40	3.0~4.0	22.1~29.5	
7	Rear handle bar mounting bolt M8*40	30 ～ 40	3.0~4.0	22.1~29.5	

Front Bumper repair

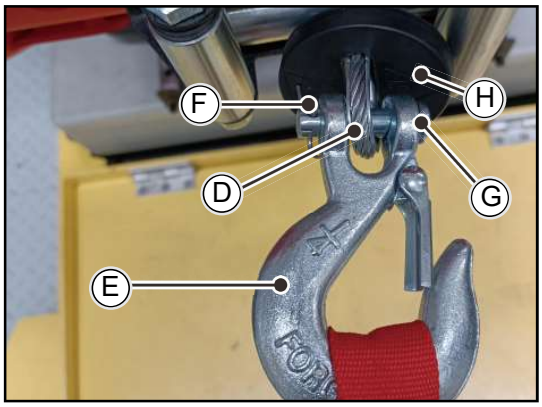


Disassembly

- Use a suitable tool to remove the mounting bolts of the front lighting cover to make the front light disconnected from the welding assembly of the front bumper;
- Use a suitable tool to remove the mounting nuts for the positive and negative connecting wires of the winch motor【A】, disconnect the positive and negative wires of the winch motor from the connection;



- Use a suitable tool to remove the 2 bolts 【B】so that the guide wheel【C】 is in line with the front The bumper welding assembly is disconnected;

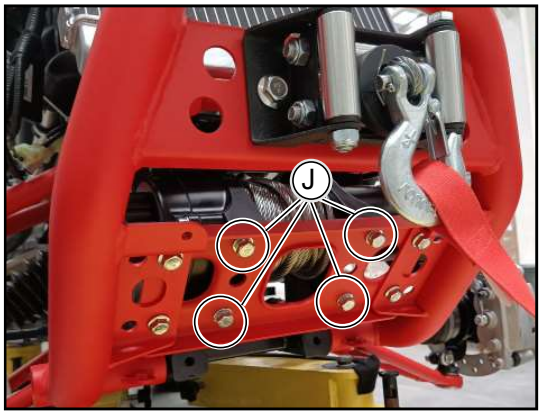


- Use a suitable tool to remove the split pin 【F】, pull out the pin shaft 【G】, and take out the hook 【E】, take out the cushion 【H】 and let the wire rope 【D】from the guide wheel【C】Go through the middle, take out the guide wheel 【C】, and then pass the wire rope 【D】 through the middle of the guide wheel mounting plate of the front bumper welding assembly to make the wireAble to move freely;

⚠ CAUTION

After removing the hook, take out the guide wheel, please install the hook on the wire rope again So as not to loose the wire rope on the winch motor and affect the use of the winch;

◆ Use suitable tools to remove the bolts 2 and 5, then remove the bolts 3 and 4, and remove the front bumper welding assembly;



⚠ CAUTION

When removing parts 3 and 4, please gently support the front bumper welding assembly with a suitable assembly, so as not to fall when the last bolt is removed and hurt yourself or others;

◆ Use a suitable tool to remove the 4 bolts 【J】 and the spring washers and flat washers, and remove the winch motor;

◆ Remove bolt 1 with a suitable tool, and remove the winch mounting plate assembly;

Assembly

◆ When assembling, please reverse assembling in the order of disassembly;

Rear armrest assembly repair

Disassembly

◆ Remove bolt 7 with a suitable tool and take out bolt 6;

◆ Pull out the rear armrest assembly backwards;

Assembly

◆ When assembling, please reverse assembling in the order of disassembly;

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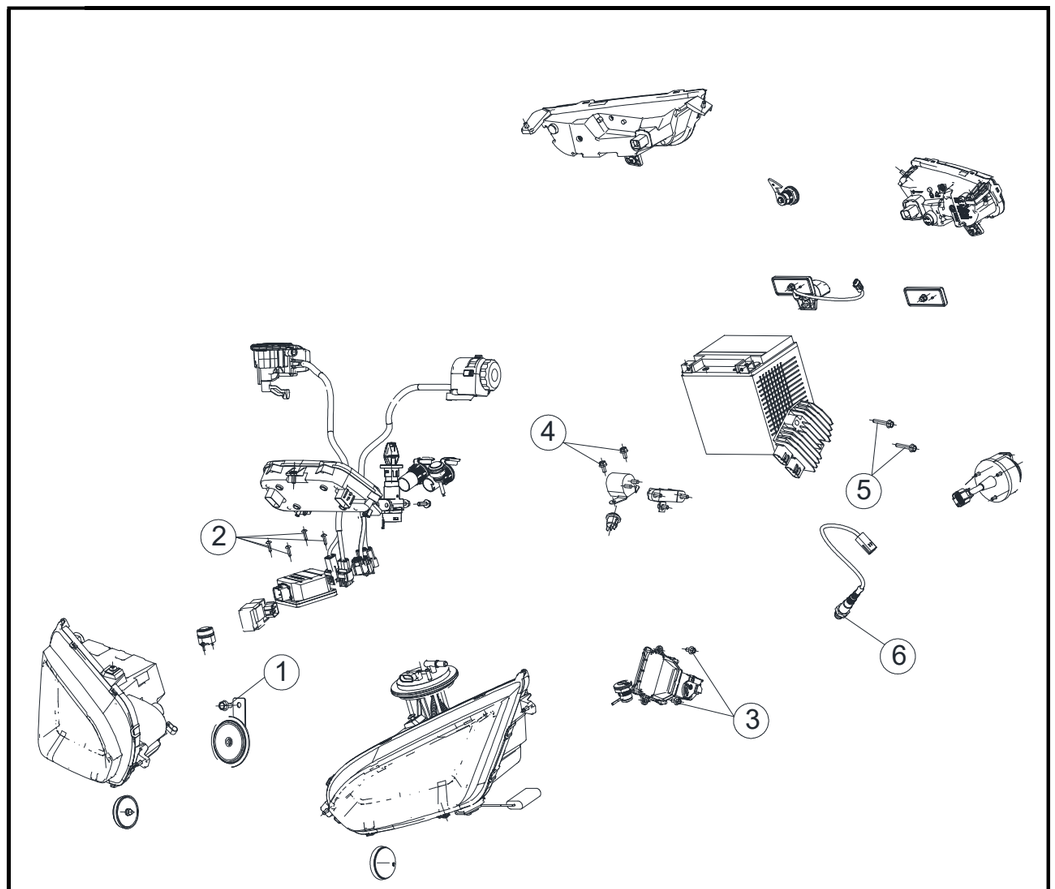
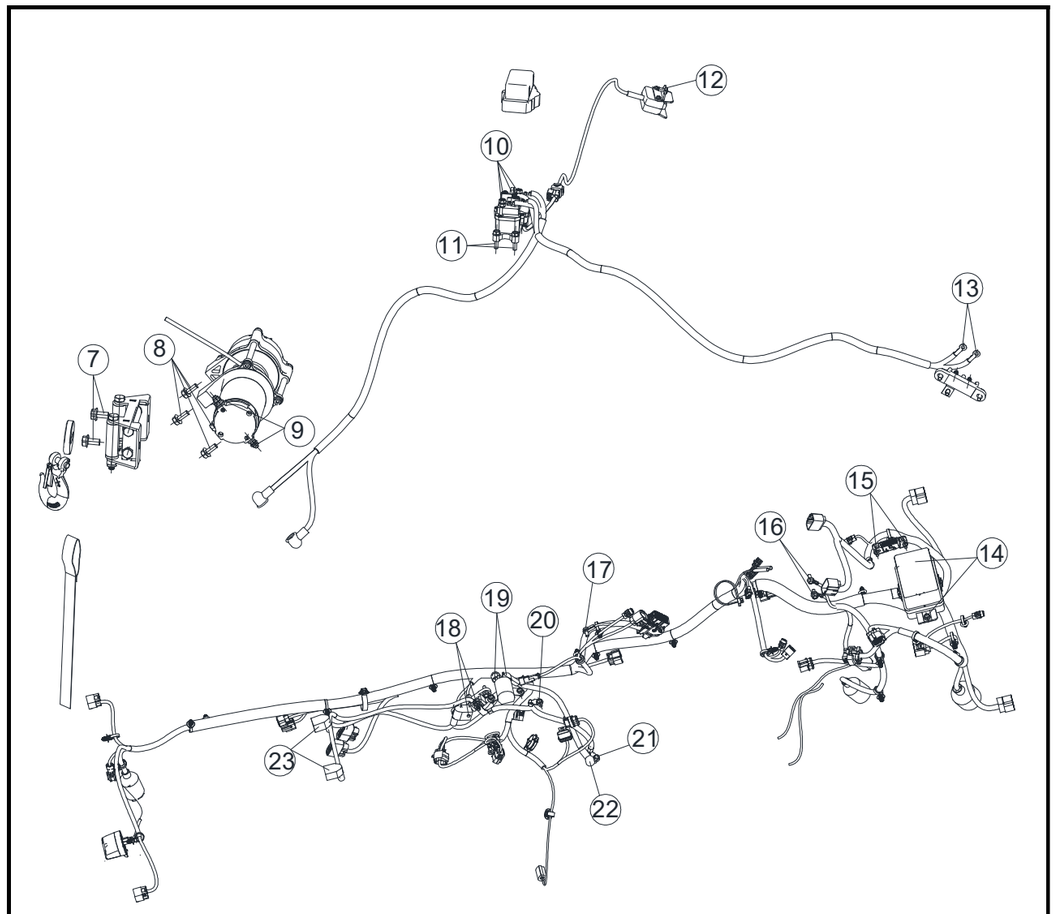
Exploded View



No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Hexagon flange bolt M8×1.5×16	8~10	0.8~1.0	70.8~88.4in·lb	
2	Cross hexagon screw st4.2×19	4~5	0.4~0.5	35.4~44.2in·lb	
3	Hexagon flange bolt M6×1.5×12	7~9	0.7~0.9	61.9~79.6in·lb	
4	Hexagon flange bolt M6×1.5×12	5~7	0.5~0.7	44.2~61.9in·lb	
5	Hexagon flange bolt M6×35	10~12	1.0~1.2	7.4~8.8	
6	Nut M22	40~60	4.0~6.0	29.5~44.2	

ELECTRICAL SYSTEM

Exploded View



No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
7	Hexagon flange bolt M10×1.5×20	75~85	7.5~8.5	55.3~62.7	
8	Hexagon flange bolt M8×1.25×20	22~28	2.2~2.8	16.2~20.7	
9	Nut M6	7~9	0.7~0.9	61.9~79.6in·lb	
10	Nut M6	7~9	0.7~0.9	61.9~79.6in·lb	
11	Hexagon flange bolt M6×1.5×25	7~9	0.7~0.9	61.9~79.6in·lb	
12	Hexagon socket pan head screw M6×12	3~5	0.3~0.5	26.5~44.2in·lb	
13	Nut M6	7~9	0.7~0.9	61.9~79.6in·lb	

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
14	Hexagon flange bolt M6×1.5×12	4~5	0.4~0.5	35.4~44.2in·lb	
15	Cross recessed hexagon boltS M5×12	3~4	0.3~0.4	26.5~35.4in·lb	
16	Hexagon flange bolt M6×1.5×12	5~7	0.5~0.7	44.2~61.9in·lb	
17	Hexagon flange bolt M6×1.5×12	8~10	0.8~1.0	70.8~88.4in·lb	
18	Nut M6	7~9	0.7~0.9	61.9~79.6in·lb	
19	Nut M6	7~9	0.7~0.9	61.9~79.6in·lb	
20	Hexagon flange bolt M6×1.5×12	5~7	0.5~0.7	44.2~61.9in·lb	
21	Hexagon flange bolt M6×1.5×12	7~9	0.7~0.9	61.9~79.6in·lb	
22	Nut M6	7~9	0.7~0.9	61.9~79.6in·lb	
23	Hexagon flange bolt M6×1.5×12	7~9	0.7~0.9	61.9~79.6in·lb	

ELECTRICAL SYSTEM

Technical parameters

Project	Standard	Use limit
Battery:		
Type	Sealed Battery	---
Capacity	12 V 32 Ah	
Charging System:		
Alternator type Charging voltage	Three-phase AC 14 ～ 15 V	
(Regulator/rectifier output voltage) Alternator		---
output voltage	36 ～ 54 V 3 000 r/min (rpm)	
Stator coil resistance	0.33 ～ 0.49	
Ignition System:		
Spark plug:		
Spark plug gap	0.6~0.8 mm	
Spark plug cap resistance	3~12kΩ	---
Ignition coil:		
Primary winding resistance	466~593mΩ	
Secondary winding resistance	8.2~10.5kΩ	
Electric Starter System:		
Starter motor:		---
Commutator diameter	28mm	
Brush length	11.5mm	
Fuel Pump:	330±20KPa	---
Fuel pump pressure		
Switch:		
Brake light switch timing of pedal travel	ON after 10 mm (0.4 in.) of pedal travel	---
Rising temperature	From OFF to ON at 88°C	
	From ON to OFF at 83.5°C	

2

Special tools

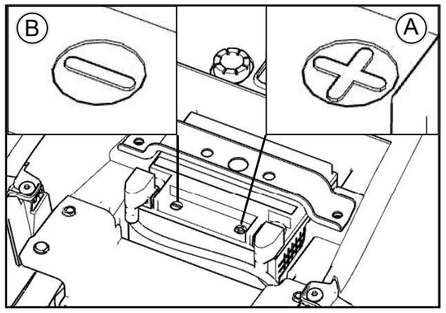
Multimeter

⚠ CAUTION

- ◆ When the multimeter is measuring voltage, the meter pen should not be inserted into the current measuring hole
- ◆ When measuring resistance, please be sure to disconnect the battery positive pole.

ELECTRICAL SYSTEM

Battery



Remove the battery

【A】positive（+）

【B】negative（-）

- Turn off ignition switch.
- Remove seat(Please read frame and body section)
- Loosen the bolts on the battery seat
- Remove the battery bracket.
- First disconnect the battery negative (-) cable, then disconnect the positive (+) cable.
- Take out the battery

Turn off ignition switch

- Place the battery in place with the battery box and retainer.
- First connect the battery positive (+) cable, then connect the negative (-) cable.
- Thin grease is applied to the terminals to prevent corrosion.
- Tighten the battery seat bolts. Match the model name of the battery. These names must be the same.

Battery model Name：GHD32HL-BS

⚠ CAUTION

This battery is a colloidal battery and does not need to add electrolyte.

Battery charging

In the case shown in the following table, to start the vehicle fully to start the engine, and it should be charged before use. However, if the battery voltage is higher than 12.6V after 10 minutes of charging, no initial charge is required.

The conditions under which an initial charge is required	charging method
At low temperatures (below 0˚C)	1.4 A x 2 _ 3 Hours
Batteries have been stored at high temperatures and in high humidity	1.4 A x 15 _ 20 Hours
The seal has been removed or cracked - flaked, torn or torn	
The battery life is more than 2 years after manufacture	

NOTE: Terminal voltage - To measure the terminal voltage of the battery, use a digital voltmeter. When measuring the terminal voltage after charging, the battery should stand still for more than 20 minutes.

Preventive measures:

1）Colloidal battery, no liquid filling is required

- Before normal use, there is no need to replenish the battery as long as it is not exhausted. It is very dangerous to pry open the sealing plug and add water. Never do that.

2）Recharge

- If the engine fails to start, the horn becomes weaker or the indicator light goes dark, it shows the battery is exhausted.
- Charge the battery for 5 to 10 hours according to the charging current as shown in the specification.
- When it is inevitable to need quick charging, please charge in strict accordance with the maximum charging current and the time conditions indicated on the battery.

⚠ WARNING

The battery is designed to withstand no abnormal damage if it is recharged as specified above. However, if charged under conditions other than those described above, the performance of the battery may degrade significantly. Do not remove the seal cover during recharging. If excess gas is generated due to overcharging, a safety valve ensures battery safety.

3）When you don't use the vehicle for months

- Before storing the vehicle, please charge it and store it before removing the negative wire.
- Fully charged once a month during storage.

4）Battery life time

- If the battery fails to start the engine after several charges, it indicates that the battery has exceeded its service life. Please replace it. (But only if the vehicle itself has no problem starting the system.)

⚠ WARNING

During charging, keep the battery away from sparks and naked fire. An explosive gas mixture that releases hydrogen and oxygen. When using a battery charger, connect the battery to the charger before turning on the charger. This process prevents the battery terminals from generating sparks that could ignite any combustible gas. Do not put the fire near the battery and do not loosen the terminal. Electrolytes contain sulfuric acid. Be careful and do not let it come into contact with your skin or eyes. If touched, rinse with plenty of water. If serious, seek medical attention immediately.

Swap places

- The sealed battery can give full play to its performance only when used in conjunction with appropriate vehicle electrical equipment.
- Therefore, the sealed battery can only be replaced on the vehicle originally equipped with the tool.
- If sealed batteries are installed on vehicles with ordinary batteries, please take care of the equipment, the life of sealed batteries will be shortened.

Charging condition check

Battery charging status can be measured to check the battery terminal voltage.

- Remove the battery (refer to the section on Removing the battery).

⚠ WARNING

First, make sure to disconnect the negative (-)

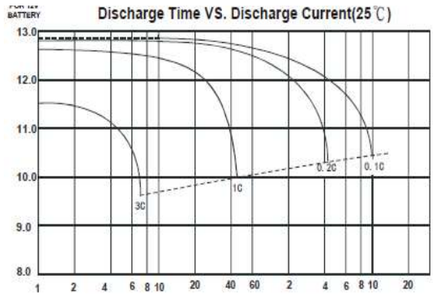
- Measure the battery terminal voltage.

⚠ CAUTION

The voltage to one decimal point is measured with a readable digital voltmeter【A】.
If the reading is below the rated value, it needs to be recharged.

Battery terminal voltage standard: 12.6V or higher

- Remove the battery (refer to the Removal of batteries section)
- Recharge the battery in the following way.



⚠ WARNING

The battery is sealed. Do not open it. Do not add water when charging.

The charging current and time are described below.

Terminal voltage: 11.5 _ Less than 12.5 V
Standard charge: 3.2 amps x 5 _ 10 hours
(see attached table)
Quick charge: 32 A x 1.0 hours

⚠ WARNING

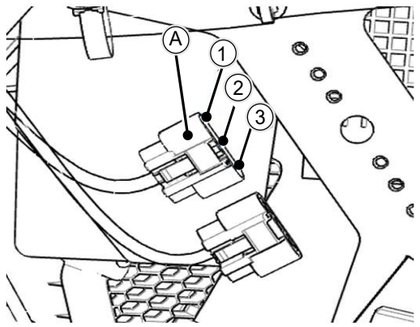
If possible, do not charge quickly. If there is an inevitable situation that requires a quick charge, pay attention to the ambient temperature.

Test against the standard voltage later.

Terminal voltage: less than 11.5V
Charging method: 3.2 A x 20 hours

Generator inspection

There are three types of alternator faults: short circuit, disconnection, or rotor magnetic loss. Short-circuiting one of the coils or disconnecting the wire will result in low output or no output at all. A loss of the magnetic field of the rotor may be caused by a drop or by placing the AC generator near the electromagnetic field, thereby hitting the magnetic field of the AC generator or simply due to aging, resulting in low output. To check the output voltage of the alternator, perform the following procedures.



- Remove rear fender (see Chapter "Frames")
- Disconnect the alternator connector 【A】(1, 2, 3 in the connector are magneto three-phase outgoing lines)
- Connect the handheld tester as shown in the following table
- Start the engine. Run it at the speed shown in the table. Note the voltage reading (three measurements in total).Ac generator output voltage

Range tester	Tester connection		Reading @3000 rpm
	(+)	(–)	
250 V AC	One Yellow wire	Another Yellow wire	36~54 V

If the output voltage is within the value in the table, the alternator is operating normally and the regulator/rectifier has been damaged. A much lower reading indicates that the AC generator is defective. Check the stator coil resistance as follows:

- Stop the engine
- Disconnect the AC generator connector

Connect the handheld tester as shown in the table below.

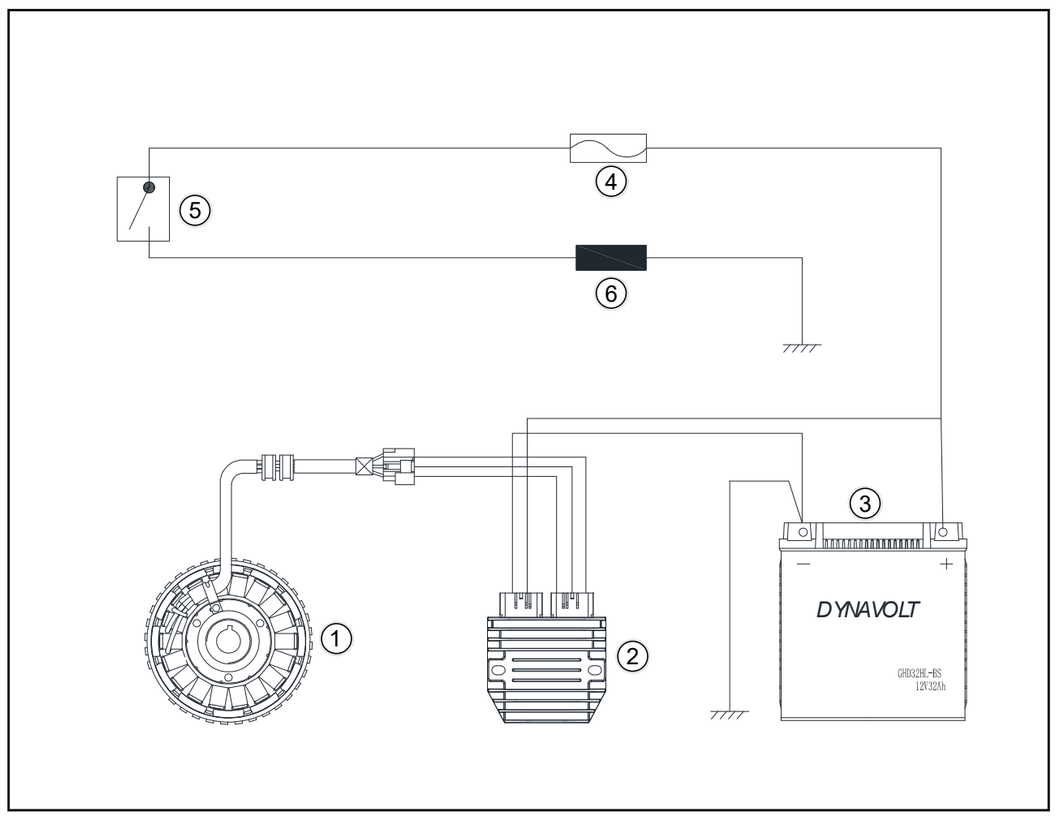
Pay attention to the readings (3 measurements in total).

Stator coil resistance

Range tester	Tester connection		Reading @3000 rpm
	(+)	(–)	
×1 Ω	One Yellow wire	Another Yellow wire	0.30 _ 0.49Ω

- One yellow wire and the other yellow wire if the resistance is greater than that shown in the table, or show nothing. Read the (infinity) of any two wires, the stator has an open circuit and must be replaced. Less resistance means that the stator is short-circuited and must be replaced.
- Using a handheld tester, measure the resistance between each yellow lead with the engine. Any reading less than infinity must be replaced.
- If the stator coil has normal resistance, but the voltage check shows that the AC generator is faulty then the rotor magnetism may have weakened and the rotor must be replaced.

Circuit diagram of charging system



1. Alternator 2. regulator/rectifier 3. Battery
4. Main Fuse 5. Ignition lock 6. Load

Voltage regulating rectifier inspection

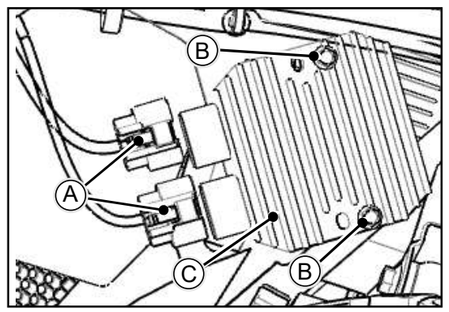
Test and Judgment Method of Charging Voltage on Whole Vehicle

Test conditions and methods	Output voltage
1. Connect the product according to the normal loading state, after the vehicle started, the speed will remain above 2000rpm; 2. Bring a fully charged battery; 3. Use a multimeter to test the voltage at the output terminal of the regulator	Output voltage:14.0-15.0V Qualified; otherwise unqualified

Remove

- ◆ Connector【A】（Disconnect）
- ◆ Bolt【B】and Voltage regulating rectifier【C】

See the table below for the determination method of the voltage regulating rectifier resistance:

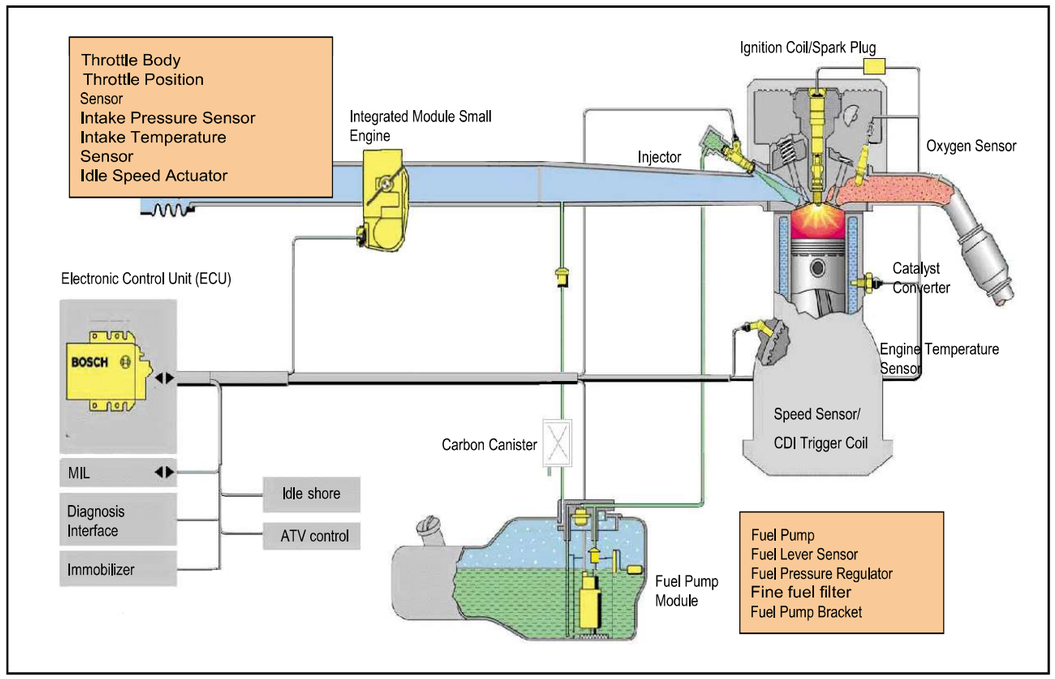


Output resistance characteristics（unit Ω）

Output resistance characteristics（unit Ω）						
	Output +	Y1	Y2	Y3	Output-	Digital multimeter (Diode gear)
Output+		∞	∞	∞	∞	Connect the red pen to output +, and the black test pen to measure the remaining terminals
Y1	0.12-0.25		∞	∞	∞	Connect the red pen to Y1, and the black test pen to measure the remaining terminals
Y2	0.12-0.25	∞		∞	∞	Connect the red pen to Y2, and the black test pen to measure the remaining terminals
Y3	0.12-0.25	∞	∞		∞	Connect the red pen to Y3, and the black test pen to measure the remaining terminals
Output-	0.5-0.7	0.4-0.6	0.4-0.6	0.4-0.6		Connect the red pen to output -, and the black test pen to measure the remaining terminals

EFI system

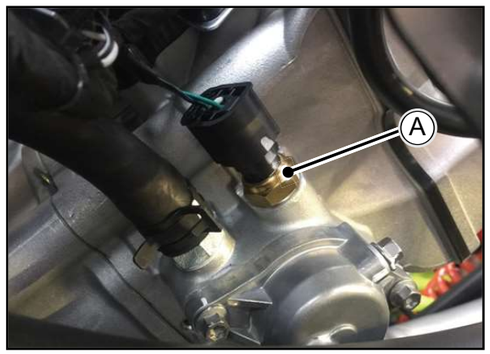
Schematic diagram of EFI system



Temperature Sensor

Function introduction

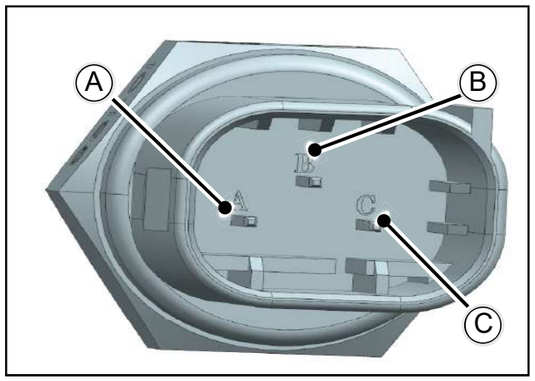
The temperature sensor function is used to monitor the temperature of the engine coolant. The sensor delivers engine temperature information to the ECU to determine engine performance and the display. The temperature sensor is generally installed on the intake side of the engine block. The cylinder temperature sensor can be seen by disassembling the left side cover and seat cushion of the whole vehicle (see 【A】 in the figure below).



Working principle

The NTC thermistor is encapsulated in the temperature sensor, and its resistance value changes with the change of the ambient temperature, so as to accurately and timely measures the small change of the external temperature. The temperature of the contact medium can be reflected by measuring its output resistance. Where, terminal【A】 and Terminal 【C】 output signals to the electric control unit ECU, and terminal 【B】 is suspended. The stitch definition is shown in the figure below.

【A】Connect the signal positive　　【B】Suspended　　【C】Connect the negative positive



Performance parameter

- ***Power: 0.25W under standard use conditions***
- ***Working temperature：-30°C～+130°C***
- ***Vibration level：≤600m/s2***
- ***Insulation resistance: DC voltage of 500V is applied between the A and C end circuits and the B end circuit, and the insulation resistance is greater than 10MΩ.***
- ***Resistance-temperature characteristics are shown in Table 1***

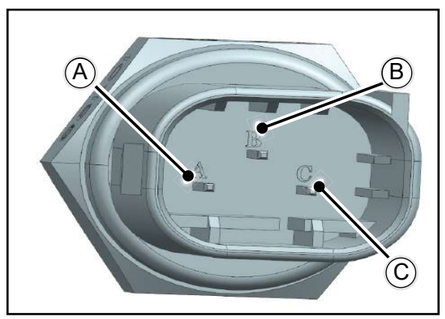
Table 1 Temperature sensor resistance-temperature characteristics

Temperature range（℃）	A and C end resistances（KΩ）
-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
	B end resistances（Ω）
50±0.2	176～280
80±0.2	63.4～81.4
110±0.2	24.6～30.6

Fault diagnosis

When the cylinder temperature is greater than its credible upper limit or less than its credible lower limit, the fault flag is set, and the common fault codes are shown in the fault summary table. Cylinder temperature sensor failure check:

- First check whether the sensor harness connector is well connected
- Unplug the connector, check whether the sensor and the wire harness end pins are bent or deformed, etc.
- Use M19mm open-end wrench to remove the sensor and check whether the sensor probe is deformed
- Check the resistance between pins【A】and【C】
- Connect the connector and check the voltage between pins【A】and【C】

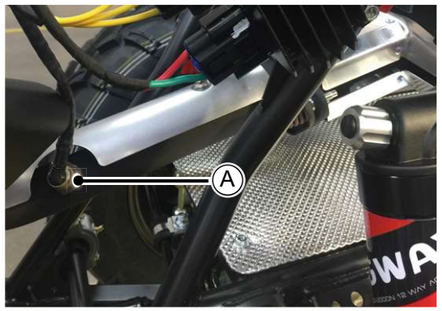


ELECTRICAL SYSTEM

Oxygen sensor

Function introduction

It is used in the feedback system of the electronic control fuel injection device to achieve closed-loop control and improve the control accuracy of the air-fuel ratio of the electronic control unit. It is installed on the exhaust pipe (see【A】in the figure below) close to the engine end. It determines whether the gasoline is completely burned by measuring the oxygen content in the exhaust gas to ensure that the three-way catalytic converter has the maximum of HC, CO and NOx in the exhaust gas.



Working principle

This is achieved by converting the difference in oxygen concentration inside and outside the sensing ceramic tube into a voltage signal output. When the temperature of the ceramic tube of the sensor reaches 350℃, the ceramic solid electrolyte has conductive properties. The oxygen molecules on both sides of the ceramic are catalyzed into oxygen ions by the platinum electrode of the sensor, and the oxygen ions can move inside the ceramic, therefore, the oxygen on both sides of the ceramic can diffuse through the ceramic itself.

It is this feature that converts the difference in oxygen concentration between the inner and outer sides of the ceramic into a potential difference, thereby forming an electrical signal output. If the mixed gas is thicker and the oxygen concentration in the exhaust gas produced by combustion is low, the oxygen ion concentration difference between the inside and outside of the ceramic tube is higher, the potential difference is higher, a large amount of oxygen ions move from the inside to the outside, and the output voltage is higher (about 800mv --1000mv); if the mixed gas is lean and the oxygen concentration in the exhaust gas produced by combustion is high, the difference in oxygen ion concentration between the inside and outside of the ceramic tube is low, the potential difference is low, the output voltage is low (about 100mv), and the signal voltage is A sudden change occurs near the theoretical equivalent air-fuel ratio (λ=1).

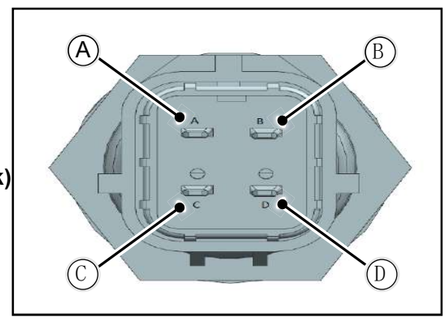
The oxygen sensor electrical connector has 4 pins:

【A】connect to the negative signal of the signal (gray)

【B】connect to the positive pole of the heating power supply (white)

【C】connect to the positive signal of the signal (black)

【D】connect to the negative pole of the heating power supply (white)



Performance parameter

Item	New oxygen		500h Durable after oxygen	
Exhaust temperature	350℃	850℃	350℃	850℃
λ = 0.97 when the sensor element voltage(mv)	840±70	710±70	840±80	710±70
λ = 1.10 when the sensor element voltage(mv)	20±50	55±30	20±50	40±40
Internal resistance of sensing element (kΩ)	≤1. 0	≤0. 1	≤1. 5	≤0. 3
Response time (ms) （600mv-300mv）	≤150	≤150	≤300	≤200
Response time（ms） （300mv-600mv）	≤150	≤150	≤300	≤200

Electrical characteristic parameter

Item		Value	Unit
Edge resistance between the new sensor heating element and the sensor connector	Ambient temperature, heating element break resistance	≥30	MΩ
	Exhaust temperature 350℃	≥30	MΩ
	Exhaust temperature 850℃	≥30	KΩ
Power supply voltage on plug	Rated voltage	12	V
	Continuous working voltage	12−14	V
	Working voltage that can maintain 1% of total life at most (exhaust temperature ≤850℃)	15	V
	Up to 75s working voltage can be maintained (exhaust temperature≤350℃)	24	V
	Test voltage	13	V
Working voltage is 13V, heating power when reaching thermal equilibrium (exhaust temperature 350℃, exhaust flow velocity is about 0.7m/s)		12	W
Working voltage is 13V, heating current when ambient temperature is -40℃ (exhaust temperature is 350℃, exhaust flow velocity is about 0.7m/s)		5	A
Fuse of heating circuit		8	A

ELECTRICAL SYSTEM

Troubleshooting

The electronic control unit ECU monitors various sensors, actuators, power amplifier circuits and detection circuits. Common fault codes are shown in the fault list.

⚠ CAUTION

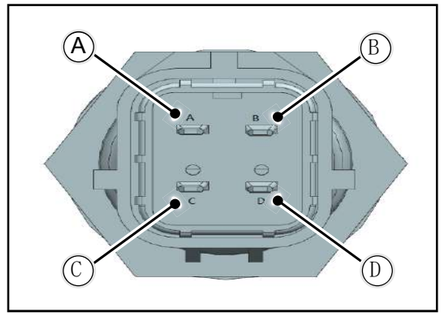
When the fault of oxygen sensor signal is checked, the engine should be run for at least 5-10min to ensure the completion of heating of oxygen sensor.

Oxygen sensor failure check:

- Check whether the oxygen sensor connector is well connected
- Unplug the connector, check whether the sensor and the wire harness end pins are bent or deformed, etc.
- Check whether the resistance between pins【B】and【D】is normal
- Check whether the voltage between pin【B】and the main relay is normal
- Connect the connector and run the engine for a period of time, check whether the voltage between pins【A】and【C】is normal.

In addition, the oxygen sensor is an indirect reflection sensor. If other sensors are faulty, the oxygen sensor will also report a fault:

- Unreliable battery voltage
- The absolute pressure signal of the intake manifold is unreliable
- The signal of the engine temperature sensor is unreliable
- Injector driver stage failure



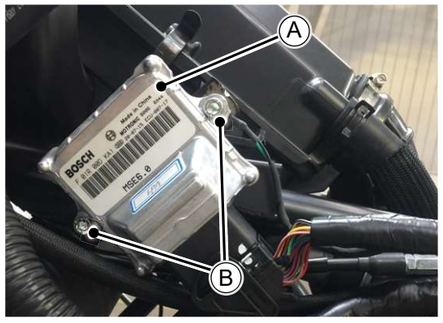
⚠ WARNING

When disassembling the oxygen sensor, be careful of the muffler and engine, and be careful of burns!

Electronic control unit（ECU）

Function introduction

ECU first collects the running data of the engine system in real time through the sensors of the engine management system, and then drives the actuator to control the engine operation according to the system calibration and the stored calibration data. The ECU is generally installed under the cover (see 【A】in the figure below) and fixed on the frame by two M6 bolts【B】(see【B】 in the figure below), with the ECU socket facing downwards.



Electrical characteristics

Working voltage:

Rated voltage: 13.5V

Full functional operating voltage range: 9 V ~ 16 V

Function limited voltage range: 6V ~ 9V, 16V ~ 18V

Ensure the diagnostic function voltage range: 8V ~ 16V

Working current:

Working current :< 1.1 A@13.5v

Static current: <1 mA@13.5v

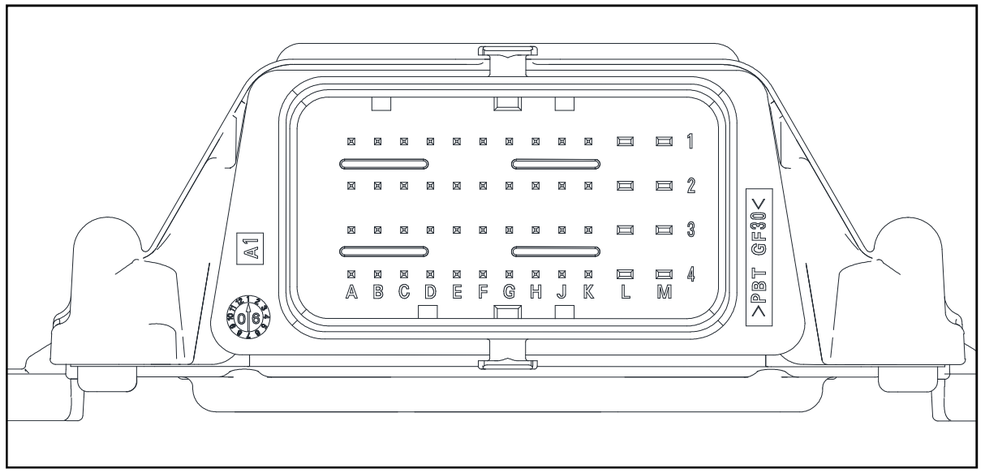
Electrical protection:

- Overvoltage protection: ECU can withstand 24V overvoltage for 60 seconds (ambient temperature is 23℃±5℃). If the system returns to normal operating voltage within 60 seconds, ECU can still ensure normal operation.
- System reverse voltage protection: If UBR (Pin8) is powered by the main relay, the ECU can withstand a reverse voltage of 14.0 V for 60 seconds (ambient temperature is 23 ℃ ± 5 ℃, other connections are correct), within 60 seconds If the system returns to normal working voltage, ECU can still guarantee normal operation.
- Output level protection: The controller drive level has diagnostic protection functions, such as short-circuit to ground, short-circuit to power supply and open circuit. But it needs to be pointed out that the ECU ignition pin does not have a short circuit protection function.

Fault diagnosis

The No. 34 pin of the ECU is connected to the K line for fault diagnosis. The K line can be used to call up the fault information record in the ECU, or manually input some instructions such as clearing the fault information record, self-learning, etc. ECU failure inspection mainly checks whether the connectors are well connected and whether the pins are bent or deformed.

ECU stitch definition



Item	Name	item	Name
1(M1)	/	25(D2)	Brake switch
2(L1)	Oxygen sensor heating	26(C2)	Auxiliary start relay control
3(M2)	Ignition coil 1	27(B2)	Idle motor A
4(L2)	Secondary air supply solenoid valve	28(A2)	Idle motor B
5(M3)	Ignition ground	29(K3)	MIL fault indicator
6(L3)	Canister solenoid valve	30(H3)	5V power output
7(M4)	/	31(H3)	/
8(L4)	Non-continuous power supply UBR1	32(G3)	Ignition switch KL5
9(K1)	Intake pressure sensor	33(F3)	Continuous power UBD
10(J1)	Sensor ground	34(E3)	K-line diagnostic K line
11(H1)	Intake air temperature sensor	35(D3)	Neutral switch
12(G1)	Throttle position sensor	36(C3)	1 cylinder ignition diagnosis
13(F1)	Engine temperature sensor	37(B3)	Reverse signal
14(E1)	Main relay	38(A3)	Afterburner switch
15(D1)	CAN communication line low	39(K4)	L gear switch
16(C1)	CAN communication line height	40(J4)	Engine speed output
17(B1)	Idle motor D	41(H4)	Vehicle speed signal output
18(A1)	Idle motor C	42(G4)	Speed sensor B end
19(K2)	Oxygen sensor signal 1	43(F4)	Speed sensor A end
20(J2)	/	44(E4)	Headlight relay
21(H2)	P gear switch	45(D4)	Cooling fan relay
22(G2)	/	46(C4)	Fuel pump relay
23(F2)	Four-wheel drive signal switch	47(B4)	/
24(E2)	/	48(A4)	Injection 1

Electronic throttle body DVE self-learning process

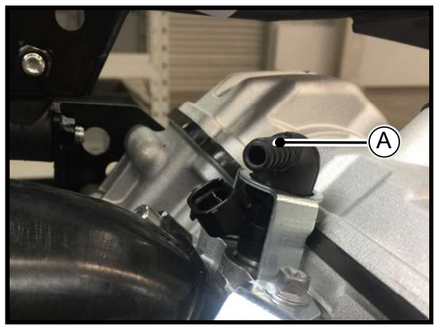
1. After replacing either ECU or electronic throttle body, it is necessary to restart the electronic throttle body self-learning;
2. For vehicles that have completed self-learning, turn the key to the ON again, after waiting for 29 seconds, the electronic throttle body self-learning will also be started again.
3.DVE self-learning must meet the following conditions at the same time
①Vehicle speed (vfzg) is 0 ②The engine speed (nmotll) is less than 250RPM
③The engine water temperature (tmot) is between 5.25℃-100.5℃
④The intake air temperature (tans) is not less than 5.25℃ ⑥Battery voltage (ub) is more than 10V
4. Self-learning operation method:
For the first DVE self-learning, just switch the ignition key to ON and wait for 10 seconds. Do not do anything else at this time.
5. Analysis of possible failures in self-learning and their causes:
If the initial self-learning cannot be completed, the following DVE fault codes may appear:

Fault codes	meaning	Fault light
P1565	DVE mechanical bottom dead center first self-learning failure	Bright SVS/EPC
P1579	Unsatisfactory environmental conditions lead to withdrawal from DVE self-study	—
P1564	The battery voltage condition is not met, which leads to exit DVE self-learning	—

(Note: The above fault codes are only for DVE fault codes recommended by UAES for OEMs. If customers have their own requirements for DVE fault codes, the fault codes may be different)
If the above faults are reported, the dveadchst variable needs to be measured by KIC to confirm what causes the DVE to fail self-learning, and the DVE self-learning can be successfully carried out only after the reasons are identified and eliminated.

dveadchst	The following conditions are not met
24	Engine speed (nmotll) is less than 250RPM
25	Vehicle speed (vfzg) is 0
26	Electronic gas pedal (wped) is 0
27	Battery voltage (ub) is greater than 10V
28	100 °C => engine water temperature (tmot)>=5 °C
30	Inlet air temperature (tans) not less than 5 °C

Fuel injector



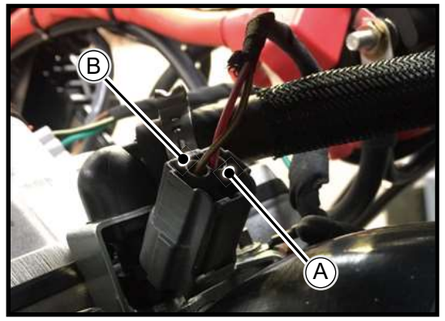
The fuel injector provides fuel to the engine and atomizes it within a specified time according to the instruction of the ECU. The fuel injector is installed on the intake pipe, and the other end is connected to the fuel pipe through the fuel injector cap (see 【A】 in the figure below).

Working principle

The ECU sends out electrical pulse signals to the injector coil to form a magnetic field force. When the magnetic field force rises enough to overcome the combined force of the return spring pressure, the gravity of the needle valve and the friction force, the needle valve begins to rise and the fuel injection process begins. The maximum lift of the needle valve does not exceed 0.1mm. When the fuel injection pulse is cut off, the pressure of the return spring causes the needle valve to close again.

Performance parameters

Project	Parameter
Static flow	207.8g/min
Dynamic flow	6.65mg/stroke
Jet angle	23°
Coil resistance	12Ω
Hydraulic leak	1.8mm3/min



Fault diagnosis

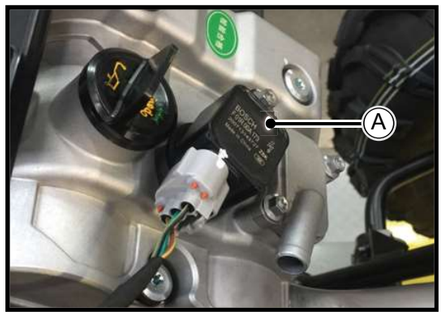
ECU only implements fault diagnosis for the fuel injector drive stage. When the fuel injector drive stage is short-circuited or overloaded to the battery voltage, short-circuited to the ground, or open circuit, the fault flag is set. At this time, close the closed-loop control of the oxygen sensor and its self-learning pre-control. The last self-learning data is valid. After the fault is removed, the fault flag is reset. Common fault codes are shown in the fault summary table

- Injector failure inspection:
- Check the connectors are well connected
- Check whether the wiring harness and injector pins are bent or deformed
- Check whether the injector cap and the oil pipe are reliably connected
- Unplug the connector and check the coil resistance between pins【A】and【B】
- Check the resistance between the pins (【A】on the left) and the main relay
- Check the resistance between the pins (【B】in the left picture) and ECU pin 48 (see ECU pin definition)

⚠ WARNING

When removing the fuel pipe, there is high-pressure fuel in the fuel pipe. Pay attention to fire safety and spray it into your eyes carefully.

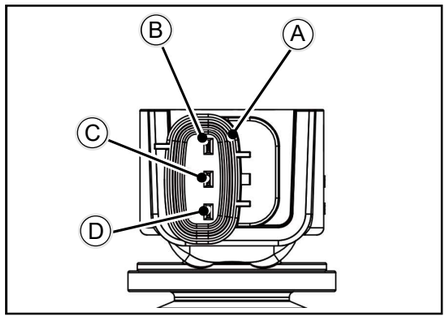
Ignition coils



The ignition coil converts the low-voltage electricity of the primary winding into the high-voltage electricity of the secondary winding, and generates sparks through the discharge of the spark plug to ignite the fuel-air mixture in the gas cylinder.

The ignition coil is installed on the engine. Remove the seat cushion to see the ignition coil installed on the engine (see【A】in the figure below).

Working principle



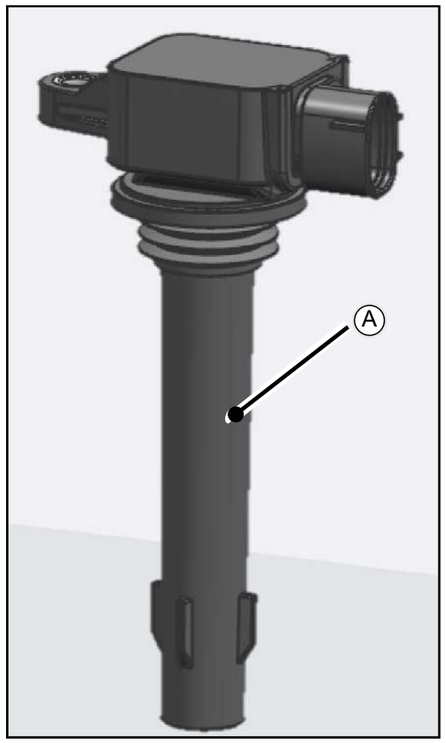
The ignition coil is composed of a primary winding, a secondary winding, an iron core, and a shell. When the battery voltage is applied to the primary winding, the primary winding is charged. Once the ECU cuts off the primary winding loop, the charging is stopped and high voltage is induced in the secondary winding. There are three pins on the low voltage side of the ignition coil:

【A】MATING CONNECTOR RECOMMEND
SUMITOMO 6189-0027

【B】PIN 1：ECU CONTROL SIGNAL;

【C】PIN 2：ENGINE GROUND;

【D】PIN 3：UBATT+



Performance parameters

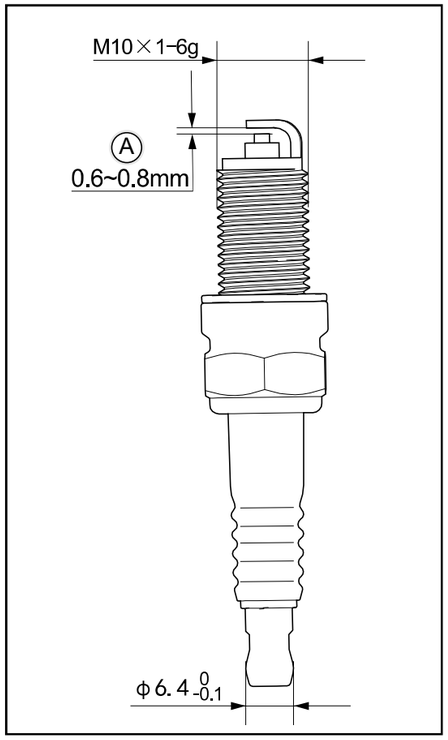
Item		Value			Unit
		Min	Rated	Max	
Calibration voltage		/	14	/	V
Operating voltage		6	14	16.5	V
Resistance（20--25℃	Primary winding	466	530	593	mΩ
	Secondary winding	8.27	9.4	10.53	kΩ
Primary current (Charging time 3.9ms)		7.4	8.0	8.6	A
Secondary voltage (Load 35pF)		34	/	/	kV
Ignition energy (Zener voltage 1000V)		40	/	/	mJ

Fault diagnosis

The ECU does not perform the fault diagnosis function for the ignition coil, so there is no ignition coil related code in the fault code list. If there is no ignition, please check whether the ignition coil connector is well connected, whether the pins are deformed, and whether the ignition coil wire and the spark plug are in good contact.

⚠ WARNING

If the spark plug wire (point【A】in the left picture) is installed incorrectly, it will cause the engine to shut down.



Spark Plug

The spark plug introduces the pulsed high voltage electricity generated by the ignition coil into the combustion chamber, and uses the electric spark generated by the electrode to ignite the mixture to complete the combustion. The spark plug sample diagram (see the figure below).

⚠ WARNING

If the spark plug gap (point【A】in the left picture) is outside the range of 0.7±0.1, it will lead to unreliable ignition or failure to ignite. Please adjust the gap or replace the spark plug in time

Remove and install spark plugs

- Remove the ignition coil
- Use the spark plug sleeve to remove the spark plug
- Take out the spark plug and check the state of the spark plug
- If there is no problem, please replace with a new spark plug

Spark plug torque
15N・m（1.5kgf·m，11.1ft·lb）

⚠ CAUTION

In the process of disassembly and installation, be careful not to hit the spark plug against any hard objects such as the engine block. If so, please replace with new spark plugs in time.

Engine speed sensor

The working principle of the speed sensor is to use the magnetoelectric effect. When the shaft rotates, the signal wheel is driven to rotate together, and the teeth on the signal wheel will cut the magnetic line of the sensor. This change in magnetic flux causes a certain frequency at both ends of the sensor coil. The output voltage is output to the electronic controller, and the output signal can represent the crankshaft speed and position (see A in the figure below).

Technical performance test

The speed sensor outputs a sinusoidal voltage signal, and the output signal (see 【B】 on the left)

Coil resistance (23 ℃) : 950-20 Ω

Coil inductance (1000HZ) : 450±15 mH

Fault diagnosis

- When the engine cannot be started,the remaining fault points have been eliminated. Use a multimeter to test whether the coil resistance of the speed sensor is the resistance required by the technical performance.
- If the resistance value is normal, please use an oscilloscope to check whether the voltage signal output by the sensor is as shown in the figure (B in the left figure)

⚠ CAUTION

When the two pins of the sensor are connected reversely, the first gear signal after the missing gear in the output voltage signal is negative, which will cause the engine to be turbulent, idling unstable or unable to start.

Oil Pressure Sensor

The oil pressure sensor detects the size of the engine oil pressure when it is working, and it is usually screwed into the oil passage of the cylinder block. Its working principle is that there is a variable resistor inside the sensor, one end outputs the signal, and the other end is connected to the grounded sliding arm. When the oil pressure increases, the oil pressure pushes the diaphragm through the lubricating oil channel interface to bend, and the diaphragm pushes the sliding arm to a low resistance position, which increases the output current in the circuit, and vice versa, reduces the output current in the circuit. (See【A】in the figure below). The sensor is a normally open contact, the working pressure is 250±10kPa, and the maximum working temperature is greater than 150°C. When the oil pressure is too low, the oil pressure indicator on the instrument is always on.

Fault diagnosis

- When there is no oil pressure indicator, it is generally because the wiring harness connector is poorly connected.
- When the wiring harness connector is well connected, the sensor itself is faulty. It is recommended to replace the sensor with a new one.

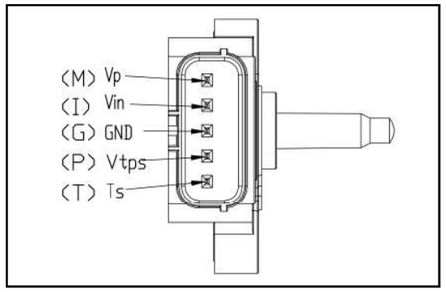
⚠ WARNING

When an oil pressure failure occurs, you must troubleshoot the failure. Forcible operation will damage the engine.

Throttle valve body assembly

The throttle valve body assembly is connected to the engine and the air filter. The user can control the opening and closing angle of the throttle valve through the throttle cable to achieve different driving intentions. The structure and size of the main passage of the throttle body are directly related to the amount of air entering the engine, and the performance of the engine at different speeds can be changed by changing the main passage. The valve body assembly includes: a mechanical throttle body assembly, a three-in-one sensor (intake pressure, intake temperature and throttle position sensor) and a stepper motor

Disassemble the entire vehicle seat cushion and left side cover to see the throttle valve body assembly(See A on the left)



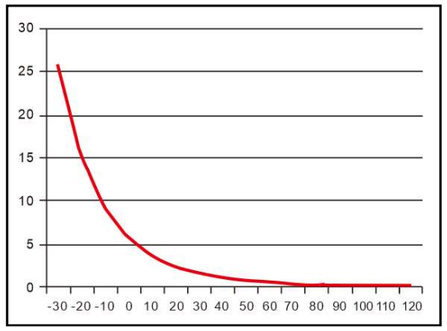
Three-in-one sensor

The three-in-one sensor includes: intake pressure, intake temperature and throttle position sensor. The pin diagram is shown on the left.

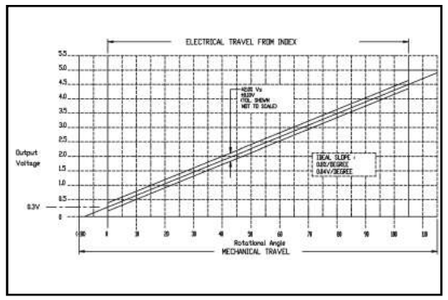
Vp: intake pressure signal; Vin: 5V power supply;
GND: sensor ground; Vtps: throttle position signal;
Ts: intake air temperature signal;

The core of the intake air temperature sensor is the thermistor that responds quickly to temperature. The intake air pressure sensor communicates with the main channel of the throttle body through the air pressure channel on the throttle body to detect the absolute pressure of the intake air. When the pressure in the main channel changes, the output voltage of the pressure chip will also change accordingly. Through the corresponding relationship between the output voltage and the absolute pressure of the main channel, the ECU can obtain the absolute pressure value of the main channel at this time. The throttle position sensor is an angle sensor with linear output, composed of two arc-shaped sliding contact resistors and two sliding contact arms. The rotating shaft of the sliding contact arm and the throttle body shaft are connected on the same axis. A voltage of 5V is applied to both ends of the sliding contact resistance. When the throttle valve rotates, the sliding contact arm rotates and moves on the sliding contact resistance at the same time, and outputs the potential of the contact as a voltage, which is actually a corner potentiometer.

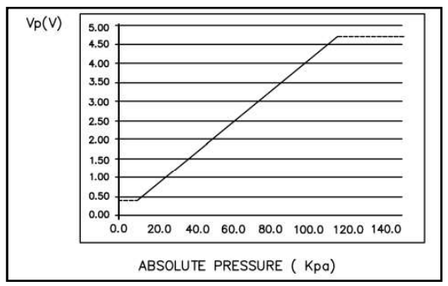
Three-in-one sensor performance characteristics



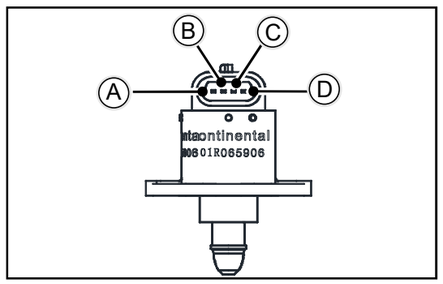
Intake temperature sensor	
R25	2kΩ±3%
B25/85	3520k±2%
Temperature-resistance characteristics	See the left picture



Throttle position sensor	
Linearity	See the left picture
Operating temperature	-30˚C --+110˚C



Intake pressure sensor	
Change sensitivity	40.5mv/kPa
Output voltage characteristic	See the left picture



Idle motor

The idle motor is composed of a plurality of steel stators and rotors arranged in a circle. Each steel stator is wound with a coil; the rotor is a permanent magnet, and the center of the permanent magnet is a nut. All stator coils are always energized. As long as the current direction of one of the coils is changed, the rotor will rotate through an angle. When each stator coil changes the direction of current in the proper sequence, a rotating magnetic field is formed, which makes the rotor made of permanent magnets rotate in a certain direction. If the order of the current direction changes is reversed, the direction of rotation of the rotor will also be reversed. The nut connected to the center of the rotor drives a screw rod. Because the screw rod is designed to be unable to rotate, it can only move in the axial direction, so it is also called a linear axis. The end of the screw rod is a plug, so the plug can be retracted or extended to increase or decrease the cross-sectional area of the bypass air inlet passage of the idle speed actuator until it is blocked. Whenever the current direction of a certain coil is changed, the rotor rotates through a fixed angle, called the step length, which is equal to 360° divided by the number of stators or coils. Correspondingly, the distance the screw rod moves in each step is also fixed. The ECU controls the number of moving steps of the idle motor by controlling the number of times the current direction of the coil is replaced, thereby adjusting the cross-sectional area of the bypass channel and the air flow through it. The idle motor is installed on the throttle valve body (see【A】on the left), and the probe of the idle motor is generally flat or down.

Idle motor pin definition:

【A】Idle motor phase A

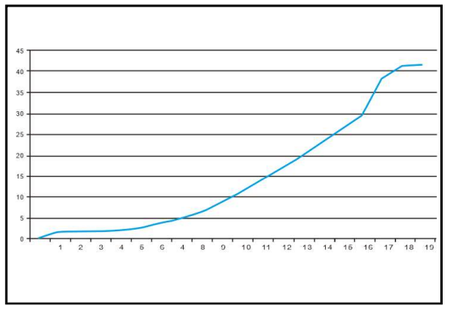
【B】Idle motor phase B

【C】Idle motor phase C

【D】Idle motor phase D

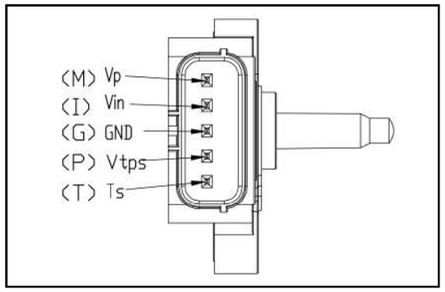
⚠ WARNING

The idle motor probe cannot be placed on top, which may cause loss of step, resulting in unstable idling or even stalling of the vehicle.



Idle motor flow characteristics

The ECU controls the number of moving steps of the stepper motor by controlling the number of times the current direction of the coil is replaced, thereby adjusting the cross-sectional area of the bypass channel and the air flow through it.The flow characteristics of stepper motors are shown on the left.

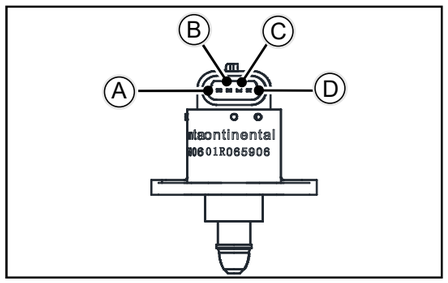


Fault diagnosis

ECU monitors various sensors, actuators, power amplifier circuits and detection circuits. Common fault codes are shown in the fault summary table:

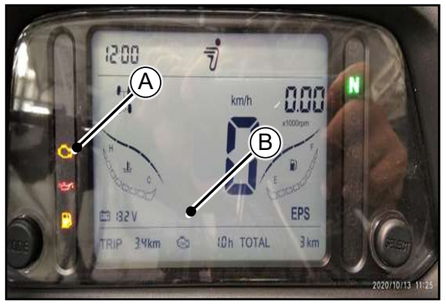
Three-in-one sensor fault inspection：

- Check that the connector is well connected
- Check whether the wiring harness and injector pins are bent or deformed
- Measure the resistance between M pin and pin G
- Measure the voltage of M pin and ECU pin
- Measure the resistance of T pin and pin G
- Measure the resistance of P pin and pin G



Idle motor fault check:

- Check that the connector is well connected
- Check whether the wiring harness and injector pins are bent or deformed
- Measure the resistance or voltage between each stepping motor drive circuit connected to the ECU and the ground



Fault code reading

There is a fault indicator (【A】in the left figure) in the instrument. When the key switch is turned on, the fault indicator is always on. When the engine is running, if the vehicle electronically controlled fuel injection system has no faults, the indicator light should go out; if there is a fault, the indicator light should always be on, indicating that the system is faulty. The indicator (【B】in the left figure) can display the relevant fault code, and the specific fault information can be queried through the fault code summary table.

Troubleshooter operation

When the engine is running, the instrument fault indicator is always on, indicating that the system is faulty. At present, use a dedicated fault diagnosis instrument (bottom left) to read the corresponding fault information. Use the OBD diagnostic interface to connect to the corresponding diagnostic interface of the vehicle, and connect the other end of the device to the computer (diagnostic software and corresponding drivers should be installed on the computer), and the key switch should be turned on. Specific steps:

- Connect the device, select "Open CAN", and press the OK button.
- Enter the main interface, you can view engine operating parameters and fault information

⚠ CAUTION

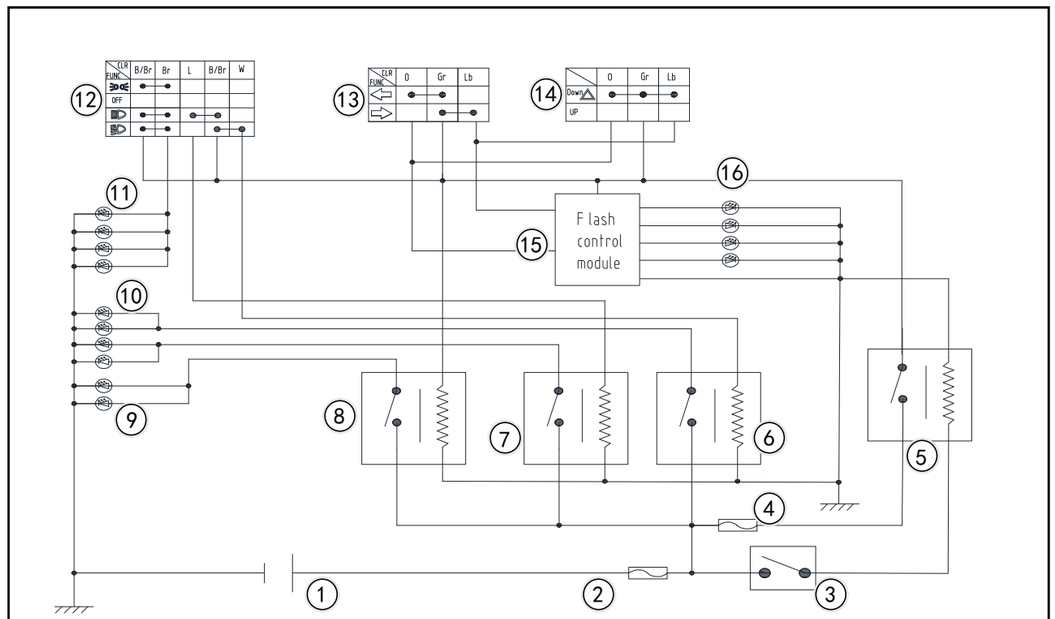
When the engine is not running, it is normal that the fault light is always on, and there is no need to deal with it

Summary of failure codes（**ECU**）

NO.	Pcode	Description（UAES）	fault indicator on
1	P0030	O2 Sensor 1 Heater Contr. Circ. High	√
2	P0031	O2 Sensor 1 Heater Contr. Circ. Low	√
3	P0032	O2 Sensor 1 Heater Contr. Circ. Open	√
4	P0107	Manifold Abs.Pressure or Bar.Pressure Low Input	√
5	P0108	Manifold Abs.Pressure or Bar.Pressure High Input	√
6	P0112	Intake Air Temp.Circ. Low Input	√
7	P0113	Intake Air Temp.Circ. High Input	√
8	P0117	Engine Coolant Temp.Circ. Low Input	√
9	P0118	Engine Coolant Temp.Circ. High Input	√
10	P0122	Throttle Pos.Sensor Circ. Low Input	√
11	P0123	Throttle Pos.Sensor Circ. High Input	√
12	P0130	O2 Sensor Circ.,Bank1-Sensor1 Malfunction	√
13	P0131	O2 Sensor Circ.,Bank1-Sensor1 low Voltage	√
14	P0132	O2 Sensor Circ.,Bank1-Sensor1 High Voltage	√
15	P0134	O2 Sensor Circ.,Bank1-Sensor1 No Activity Detected	√
16	P0201	Cylinder 1- Injector Circuit	√
17	P0261	Cylinder 1- Injector Circuit Low	√
18	P0262	Cylinder 1- Injector Circuit High	√
19	P0322	Ign./Distributor Eng.Speed Inp.Circ. No Signal	√

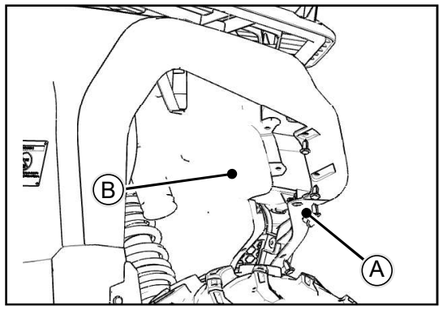
20	P0480	cooling fan control Circuit Open	√
21	P0501	Vehicle Speed Sensor “A” Range/Performance	√
22	P0508	Idle Air Control Circuit Low	√
23	P0509	Idle Air Control Circuit Low High	√
24	P0511	Idle Air Control Circuit Open	√
25	P0560	System Voltage Malfunction	√
26	P0562	System Voltage Low Voltage	√
27	P0563	System Voltage High Voltage	√
28	P0627	Fuel Pump “A” Control Circuit /Open	√
29	P0628	Fuel Pump “A” Control Circuit Low	√
30	P0629	Fuel Pump “A” Control Circuit High	√
31	P0650	Malfunction Indicator Lamp Control Circ.	√
32	P0691	cooling fan control Circuit Low	√
33	P0692	cooling fan control Circuit High	√

Lighting system circuit



1	Battery	2	Main Fuse	3	Lgnition lock	4	Fuse
5	Main relay	6	Low beam relay	7	High beam relay	8	Daytime running light relay
9	Daytime running light	10	High/Low beam	11	Position lights	12	Lights switch
13	Turn switch	14	Warning switch	15	Flash CM	16	Turn Lights

Headlamps



Rear headlight guard (see chapter "Frame")

【A】the buckle

【B】Rear headlight guard

【C】Headlight body

【D】Headlight bolt*4

【E】Light bulb guard

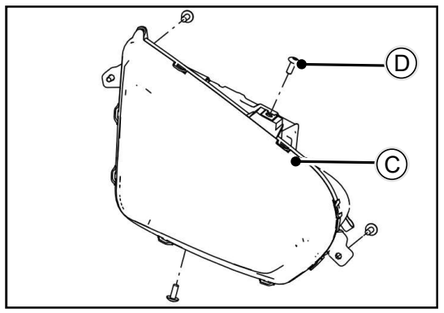
【F】Headlight bulb

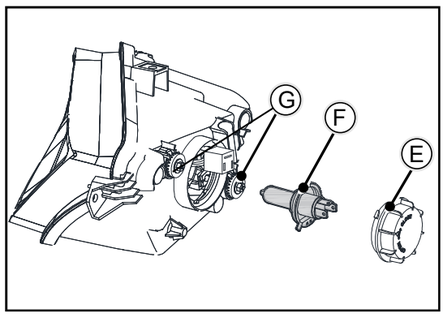
【G】high and low light adjusting bolt

Replace

⚠ CAUTION

- Lamps are divided into LED lamps and halogen lamps (please confirm according to the actual vehicle)
- The high and low lights of the LED headlights are damaged, and only the headlights can be replaced;
- If the high and low beams of the halogen headlights are damaged, replace the bulbs of the same model.
- If other light sources are damaged, only replace the headlights.





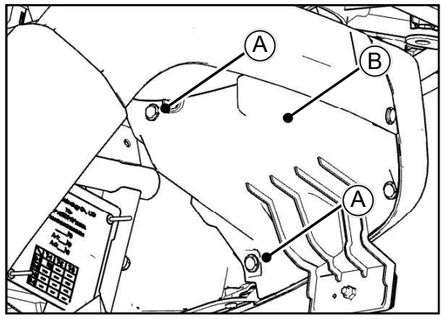
- Remove the 7 buckles on the rear guard of the headlight 【A】
- Remove the front lamp rear guard【B】
- Remove the 4 headlight bolts【D】with tools, and remove the headlight body【C】after unplugging the headlight connector

If replacing the headlight bulb, continue the following procedure:

- Rotate clockwise【E】
- Take out the headlight bulb 【F】and replace it with a new one.

  The headlight bulb number is: H4
- After the replacement, adjust the high and low beam adjustment bolts【G】to adjust the headlight beam height to a suitable position.

Tail lamp



Rear guard for taillights (see chapter "Frame")

【A】buckle

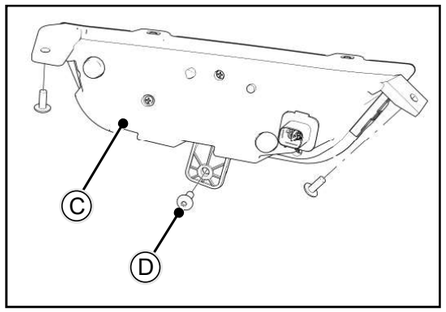
【B】Tail lamp rear shield

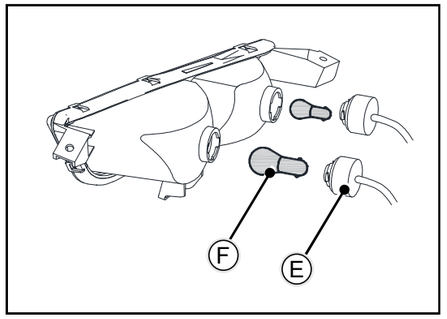
【C】Tail lamp body

【D】Tail lamp bolt*3

【E】Tail lamp holder

【F】Tail lamp bulb





Replace

⚠ CAUTION

The lamps are divided into LED lamps and halogen lamps (please confirm according to the actual vehicle)

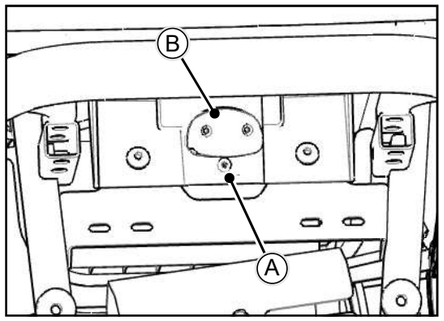
- The LED tail light source is damaged, only the tail light assembly can be replaced
- If the light source of the halogen tail lamp is damaged, the bulb of the same model can be replaced

- Remove the buckle on the rear guard of the headlight*4【A】
- Remove the taillight guard【B】
- Remove the tail lamp bolts and unplug the tail lamp connector to remove the tail lamp body【C】
- **If you replace the tail light bulb, please continue to perform the following procedures:**
- Rotate the tail lamp holder clockwise【E】]
- Remove the tail lamp holder【F】that needs to be replaced, and replace with a new bulb.

The tail lamp bulb model is: P2/ 5W

The rear turning bulb number is: RY10W

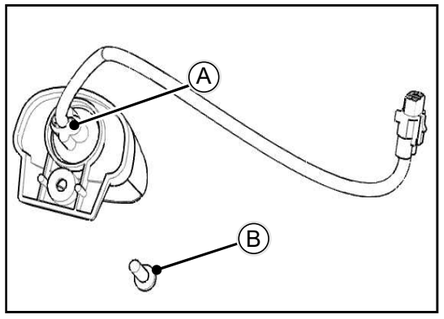
License plate lamp



【A】License plate lamp bolt *1
【B】License plate lamp
【C】Rear license plate lamp bolt *4
【D】Rear license plate lamp holder

Remove

- Remove the license plate lamp bolt 【A】
- Remove the license plate lamp【B】
- Disassembly license plate lamp



Replace

- Remove the bulb holder
- Take out the license plate lamp bulb and replace the license plate bulb type: W5W

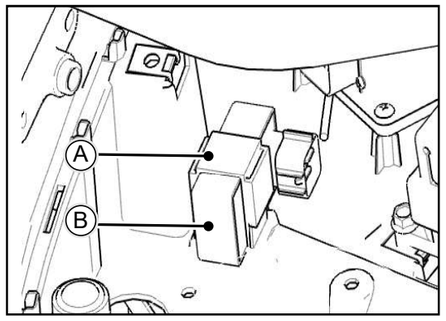
  The license plate bulb number is: W5W
- Place the license plate lamp at the installation position of the license plate lamp
- Tighten the license plate lamp bolt*1【B】

⚠ CAUTION

The lamps are divided into LED lamps and halogen lamps (please confirm according to the actual vehicle)

- The LED license plate lamp is damaged, only the license plate lamp can be replaced.
- If the light source of the halogen license plate lamp is damaged, the bulb of the same model can be replaced

Flasher



Disassembly and assembly of the front shelf and front guard (please refer to the relevant sections of the body)

【A】rubber sleeve

【B】Flasher

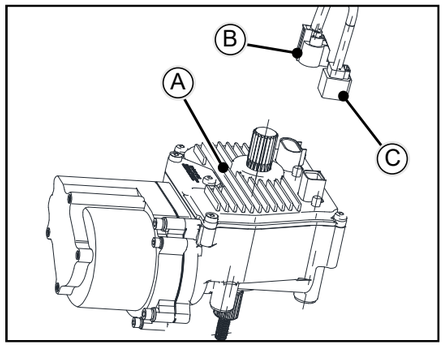
Disassembly

- Remove the installation rubber sleeve【A】from the installation bracket
- Remove the wiring harness connector
- Replace the flasher【B】

→	TEST

- If the turn signal does not flash or flashes abnormally on the whole vehicle (the normal turn signal flash frequency is 85/min)
- The lamp is out of light (one-side forward or backward turn light is damaged), and the turn signal flashes at a frequency of 120/min）

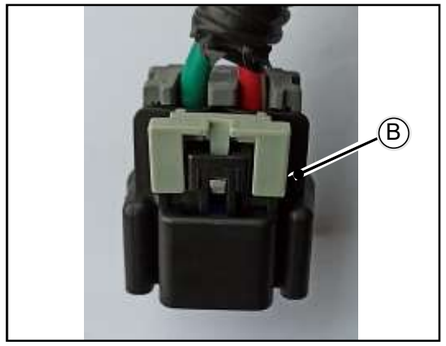
EPS-brushless



⚠ CAUTION

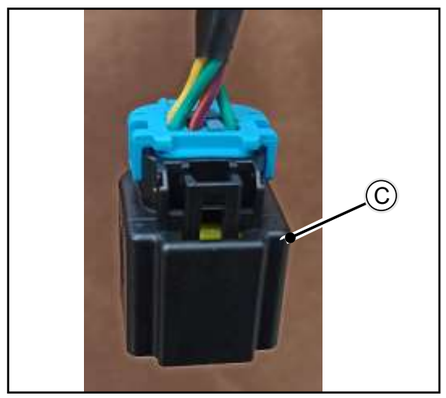
The method of disassembling the EPS assembly refers to the method of disassembling the steering assembly. Only the electrical functions of the EPS are introduced here.

Before disassembling the EPS assembly【A】, firstly remove the power connector【B】and power connector【C】



The interface of the plug【B】is defined as follows

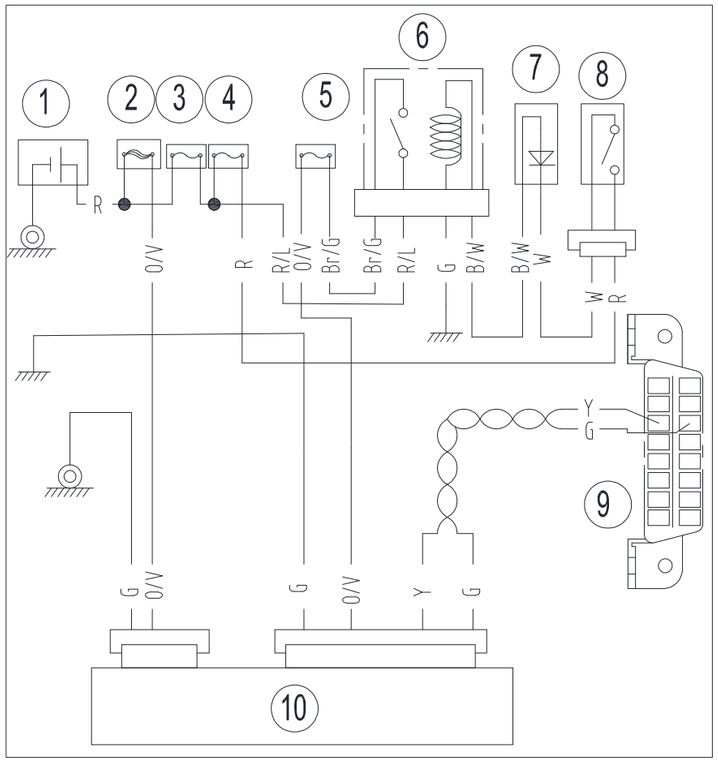
- G means green wire, wire diameter 5.0, for grounding
- RW means red white wire, wire diameter 5.0, 12V+



The interface of the plug【C】is defined as follows

- G means green wire, the wire diameter is 0.5, CANL
- Y means yellow wire, wire diameter 0.5, CANH
- OV means orange-purple wire, wire diameter 0.5, 12V+ for key power
- G means green wire, wire diameter 0.5, for grounding

EPS system wiring schematic diagram

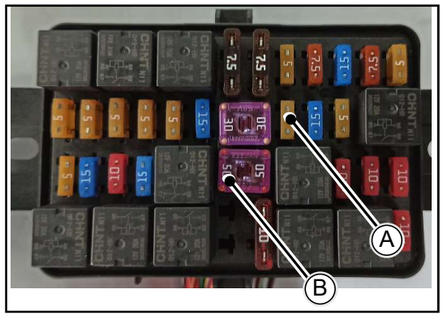


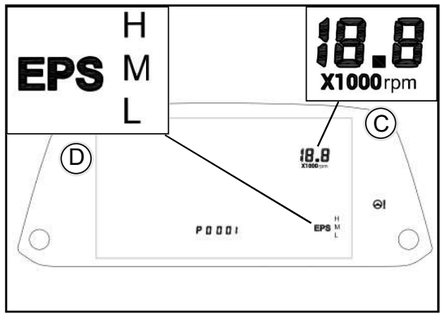
1. Battery	**2. Fuse 50A**	**3. Fuse 30A**	**4. Fuse 5A**	**5. Fuse 5A**
6. IG relay	**7. Diode**	**8. Key switch**	**9. OBD**	**10. EPS**

EPS trouble removal

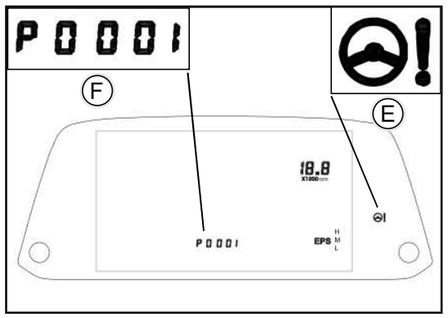
→ TROUBLE SHOOTING

If the EPS is not working, first check whether the EPS fault light on the meter is on. If the fault light is not on, check whether the 5A fuse【A】and 50A fuse【B】in the fuse box are blown, and check whether there is speed on the meter【C】display, if there is no speed display, EPS will not work, and the EPS fault light on the meter will not light up.





◆ The position of EPS gear in the meter, EPS is divided into three gears: H/M/L【D】, the default is M gear, when in four wheel drive locking mode, it will immediately switch to H gear; M gear and L gear are adjusted on the Segway Powersports APP (only vehicles with TBOX can be adjusted)



If the EPS fault light on the meter is on, it means that the EPS is malfunctioning.

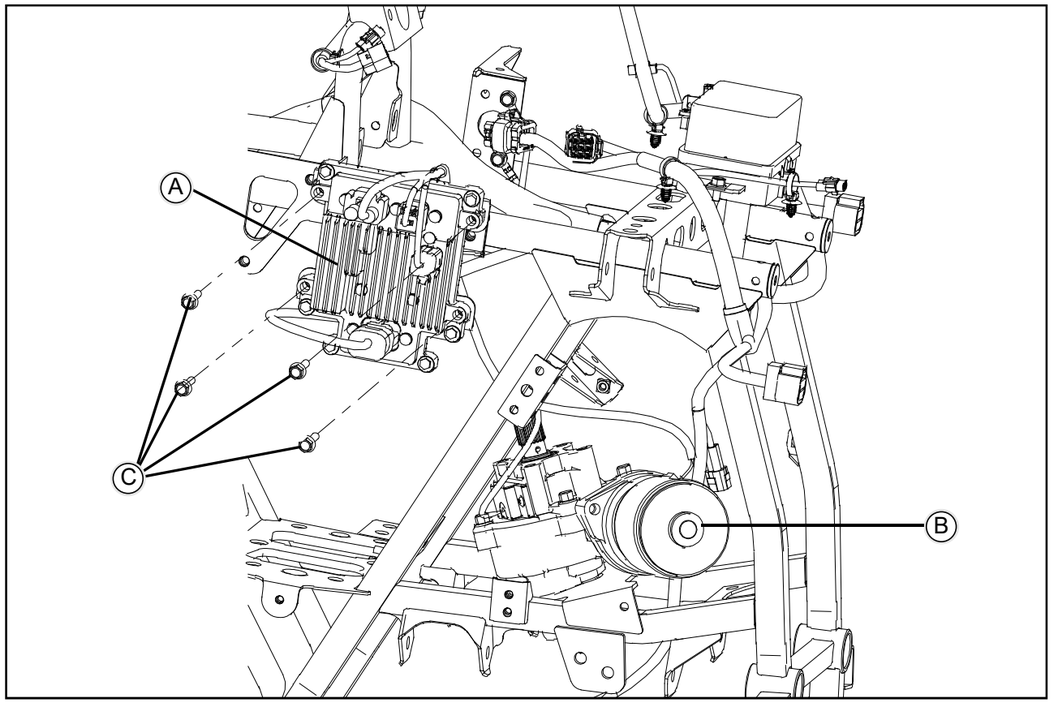
◆ EPS fault light【E】and fault code【F】in the indicator

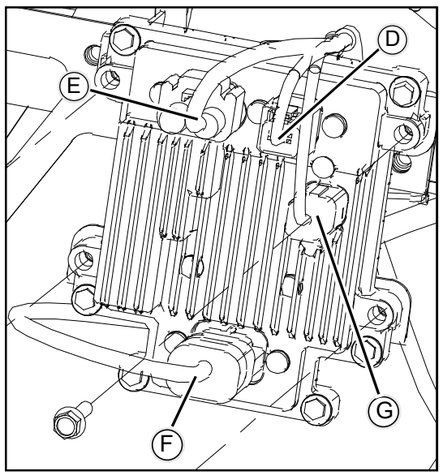
◆ The location is shown left.

EPS fault code

NO.	Fault description	Fault rank	Have EPS or not	Power on then restorability or not	Fault code	Trouble light
1	Torque midpoint not written	3	Yes	Yes	E0001	on
2	End of rotor angle is not written	1	No	No	E0002	off
3	Storage read and write failure	1	Yes	Yes	E0003	on
4	The main torque sensor is disconnected	1	No	No	E0004	on
5	The main torque sensor output is abnormal	1	No	No	E0005	on
6	The secondary torque sensor is disconnected	1	No	No	E0006	on
7	Secondary torque sensor output failure	1	No	No	E0007	on
8	The main and auxiliary torque differ too much	1	No	No	E0008	on
9	differenc of the main torque is too large before and after amplification	1	No	No	E0009	on
10	motor offer no assistant power	1	No	No	E0010	on
11	overcurrent	1	No	No	E0011	on
12	Abnormal current	1	No	No	E0012	on
13	CAN communication abnormal	2	Set the vehicle speed to 30, cancel the positive and damping	restorability after normal CAN	E0013	on
14	Rotor angle jump (abnormal output)	1	No	No	E0014	off
15	Rotor angle sensor disconnected	1	No	No	E0015	on
16	Power module failure	1	No	No	E0016	on
17	A phase current abnormal	1	No	No	E0017	on
18	C phase current abnormal	1	No	No	E0018	on
19	Steering wheel angle small teeth abnormal	2	No returnability	No	E0019	No
20	Steering wheel angle middle teeth abnormal	2	No returnability	No	E0020	off
21	Steering wheel angle jump	2	No returnability	No	E0021	off
22	The steering wheel angle value exceeds the limit	2	No returnability	No	E0022	off
23	Steering wheel angle is not centered	2	No returnability	No	E0023	off
24	Motor terminal voltage is abnormal	1	No	No	E0024	off

EPS-brush

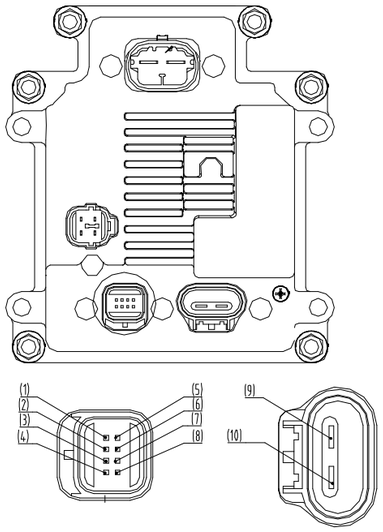


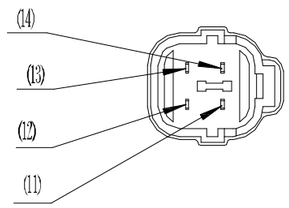


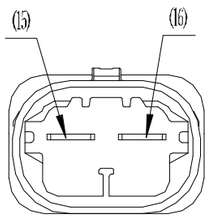
⚠ CAUTION

The method of disassembling the EPS motor 【B】 refers to the method of disassembling the steering assembly. Only the electrical functions of the EPS are introduced here.

Before disassembling the EPS controller 【A】, firstly remove the connector【D】、connector【E】、connector【F】、connector【G】







⚠ CAUTION

The EPS-brushless and EPS-brush is the optional product。

Interface definition：

pin	Function
1	CANH
2	IG
3	engin speed(from ecu pin41)
4	GND
5	CANL
6	K-line(to OBD)
7	Fault light(to OBD）
8	Vehicle speed （from vehicle speed sensor）
9	GND
10	12+
11	0V
12	The main torque signal
13	The deputy torque signal
14	5V+
15	motor+
16	motor-

⚠ CAUTION

There is no EPS gear in the meter, and EPS gear can't to adjust on the Segway Powersports APP .

ELECTRICAL SYSTEM

Display

Dashboard

The dashboard displays key information to the user.

See the next page for display functions and instructions

⚠ WARNING

Using a high-pressure water gun may damage the meter.

You should use your hands or hoses to clean the vehicle with neutral soap.

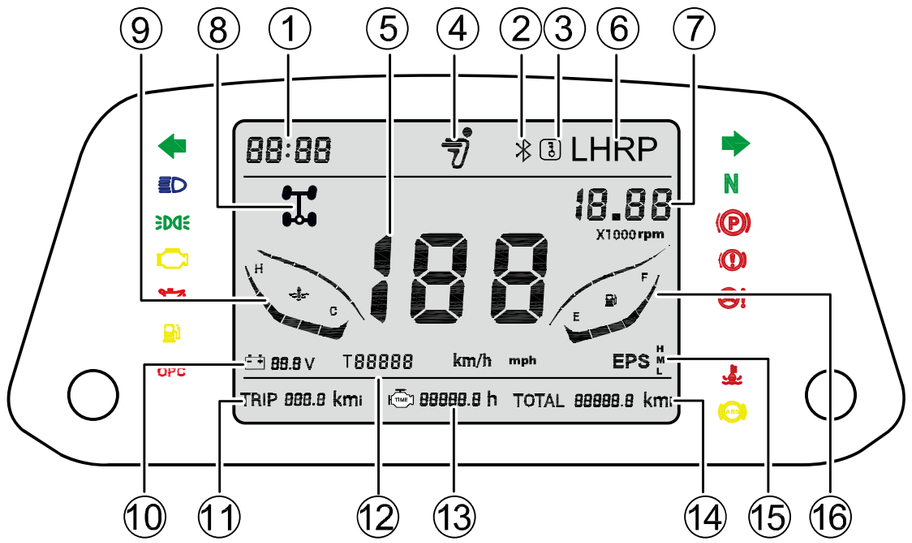
Do not use alcohol or corrosive cleaning agents, such as insect repellents, to clean the meter.

Dashboard Indicator light description

Item	Icon	Function description	Fault phenomenon	Analysis of cause and trouble shooting
Left turning		This indicator will be on when turn on the left turning light	This indicator not on when the left turning light is on	Check the fuse of left turning light, check whether PIN 29 has high level input, if yes, replace the meter, if not, check the relevant electric line
High beam		This indicator will be on when turn on the high beam	This indicator not on when high beam is on	Check whether PIN 30 has high level input, if yes, replace the meter, if not, check the relevant electric line
Position indicator		This indicator will be on when front light, tail light ,license plate light, dashboard light are on	This indicator not on when position light is on	Check whether PIN31 has high level input, if yes, replace the meter, if not, check the relevant electric line
Fault indicator		When the fault indicator light is on, it indicates that the following systems have faults: Emission control system; Engine electronic control system;	——	——
Oil pressure		This indicator will be on if the oil pressure is too low	——	——
Low Fuel		This indicator will be on if the fuel level in the tank is too low	The indicator not on when fuel level is lower than the last line	Check fuel level sensor or replace the dashboard
Off cushion alarm		This indicator will be on if the vehicle not in parking brake when driver is off cushion, meanwhile the buzzer will alarm	Off cushion and apply the parking switch, buzzer not beep light not on	Check the parking switch and the off cushion switch

Right turning light indicator		This indicator will be on when right turning light is on	This indicator not on when right turning light is on	Check the fuse of the right turning light ,check if PIN12 has high level input, if so ,replace the meter, if No. check the related wiring
'N' gear indicator		Shift lever in 'N' gear	Shift lever in 'N' gear and the indicator not on	Check if PIN11 has low level input, if so, replace the meter, if No, check the related wiring, whether the wiring harness is loose or broken
Parking indicator		The indicator will be on when the parking switch is applied	The indicator not on when the parking switch is applied	Check if PIN10 has low level input, if so, replace the meter, if No, check the related wiring, whether the wiring harness is loose or broken
Brake system alarming		• Brake fluid level too low • Brake system have fault	——	——
Electric steering system alarming		EPS have fault （optional）	——	——
"ABS" Alarm light		The following system have fault •ABS ； • Brake auxiliary system （optional）	——	Check the level of the coolant and the leakage of the coolant
Coolant high temperature indicator		This indicator show the high temperature of the engine coolant. stop the engine immediately when the indicator on	——	——

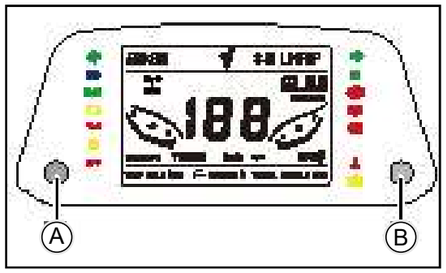
Instrument information display

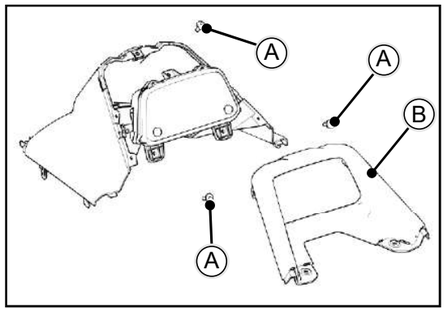


NO.	Area	function description	Fault	Toubleshouting
1	Time display	Showing current time	——	——
2	Bluetooth	When using bluetooth to power on remotely, this icon lights up	Power on remotely by Bluetooth, this icon not lights up	Check dashboard CAN-H,CAN-L wire harness, if not solve it， replace TBOX if still no replace dashboard
3	Power on remotely	When using APP to power on remotely, this icon lights up	Power on remotely by APP, this icon not lights up	Check dashboard CAN-H,CAN-L wire harness, if not solve it, replace TBOX if still not,replace dashboard
4	Company logo	This icon light up when vehicle on power	——	——
5	Vehicle speed display	Display actual vehicle speed	Display wrong speed or no display	Check PIN4 loose check vehicle speed sensor, replace meter

6	Gear display	Display the correctly gear **L** -Low speed **H** -High speed **R** -Reverse **P** -Parking	No gear display	Check gear position sensor and related electric line
7	RPM	Display actual engine speed	No engine speed display	Check CNA-H,CAN-L Wire harness, check ECU, and crankshaft position
8	Four-wheel drive full differential lock	2 x 4 patterns 4 x 4 patterns 4×4 locking mode 2 x 4 patterns(With differential) 4 x 4 patterns(With differential) 4×4 locking mode(With differential)	——	——
9	Coolant temperature indicator	Displays current coolant temperature **H** -High temperature **C** -Low temperature	No coolant temperature display	Check CNA-H,CAN-L wire harness check ECU
10	Accumulator voltage	Displays the current voltage of the vehicle battery	——	——
11	Subtotal mileage	Single trip mileage	——	——
12	Fault code display	Fault code will display when parts connected to CAN ocour when	——	——
13	Engine operation time	Display engine operation time	Display wrong engine operation time	Check if display engine operation time ,if yes, replace meter, if no ,check as the procedure of inspection engine speed

14	Total mileage	Displays the total mileage accumulated by the vehicle	——	——
15	EPS On	EPS mode was set in the APP and the preferred mode of the rider was selected: **M** -Normal mode, power normal **H** -Comfort mode, power light **L** -Motion mode, booster weight	E P S model no display	Check CNA-H, CAN-L Wire harness Check EPS Check TBOX
16	Fuel meter	Displays the current amount of fuel	No display of the fuel mass	Check CNA-H, CAN-L Wire harness Check fuel level sensor Check TBOX





Dashboard (meter)button function introduction

Short press the【A】button: backlight brightness adjustment, 5 brightness levels, from dark to bright

- Short press【B】button: switch between metric and inch
- Long press the【A】button: clear the subtotal mileage
- Clock setting: Long press the【A】and【B】button to enter at the same time, the hour digit flashes first, then short press the【B】button to adjust the flashing digit, short press the【A】button to switch to the minute digit, after setting the minute digit, short press the【A】button to save and exit
- To reset the total mileage: In the power-off state, press and hold the【A】and【B】button at the same time, then turn on the key to power on, the interface "CCC--" appears, adjust by pressing the buttons: short press the left key to shift, short press the right key to adjust the current position, Put After adjusting to 378 "CCC--" , perform customer reset. The condition of customer reset is that the mileage is within 200KM and the number of customer resets is less than 5 times.

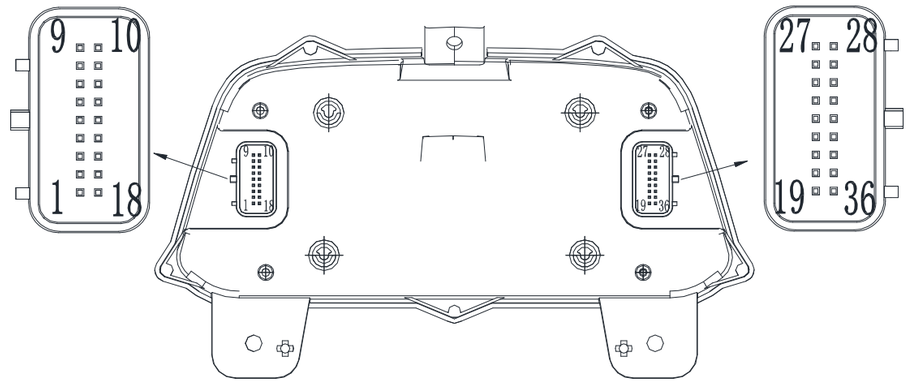
Dashboard (meter)disassembly

⚠ CAUTION

Before removing the meter, be sure to power off the vehicle.

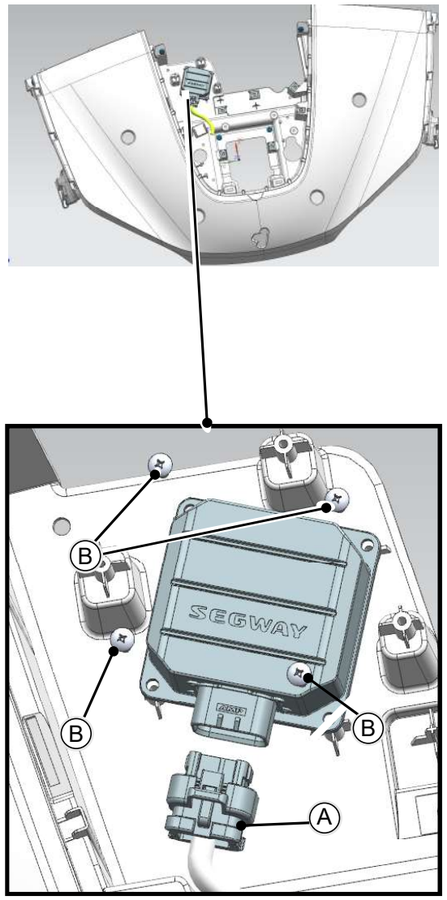
- First remove the plastic part【B】
- Remove three bolts【A】
- Pull out the connector on the back of the meter, remove the meter, and replace it with a new one

Instrument Interface Definition



pin	Description	note	pin	Description	note
1	CAN-L	——	19	Brake failure alarm	Low voltage
2	CAN-H	——	20	4WD LOCK signal	——
3	——	——	21	4wd signal	——
4	Vehicle speed	Pulse signal	22	Off cushion switch	Low voltage
5	Power ground	——	23	Oil pressure	Low voltage
6	——	——	24	R gear	Low voltage
7	——	——	25	P gear	Low voltage
8	Fuel level signal	Resistance value input	26	H gear	Low voltage
9	Grounding	Fuel level sensor grounding	27	L gear	Low voltage
10	Parking signal	Low voltage	28	2WD signal	——
11	N gear	Low voltage	29	Left turning light	High voltage
12	Right turning light	Low voltage	30	High beam	High voltage
13	ABS light（reserved）	Low voltage（reserved）	31	Position light	High voltage
14	B+	——	32	Engine fault indicator	Low voltage
15	Power ground	——	33	K Line	——
16	——	——	34	Power ground	——
17	Key power	——	35	Buzzer output	——
18	——	——	36	Rear axle differential lock	——

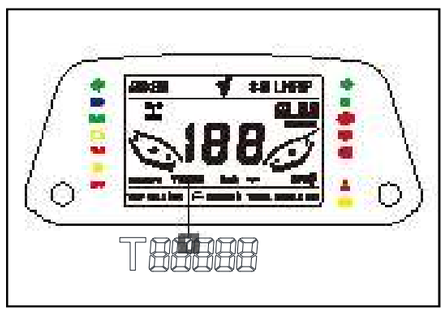
T-BOX



⚠ CAUTION

If multiple vehicles are repaired at the same time, do not exchange and install the T-BOX

- Power off the whole vehicle first and remove the front shelf assembly
- Pull out the connector【A】
- Remove the four bolts【B】

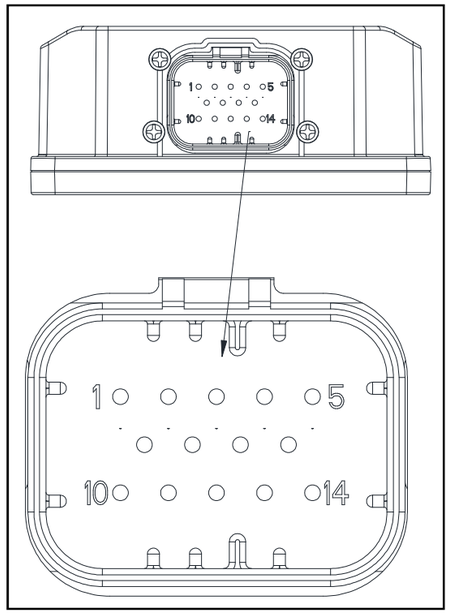


T-BOX fault code display area

T0001	GPS module failure
T0002	4G module failure
T0003	Bluetooth module failure
T0004	Sensor failure
T0005	Power CAN failure
T0006	Body CAN failure

Failure phenomenon and failure reason		
NO.	Trouble	Solution
1	Fault code T0001	Replace T-BOX
2	Fault code T0002	Replace T-BOX
3	Fault code T0003	Replace T-BOX
4	Fault code T0004	Replace T-BOX
5	Fault code T0005	Check PIN9 and PIN14 have signal
6	Fault code T0006	Check PIN4 and PIN5 have
7	APP can not power on remote	Check signal circuit replace T-BOX

T-BOX Interface Definition



Pin	Description	Note
1	GND	
2	MIgnition	Check if the mechanical key to power on or not
3	NG	——
4	CAN1+	Body CAN+
5	CAN1-	Body CAN-
6	REALY_OUT	Power on remotely relay interface
7	ACC	
8	CAN3+(Reserve)	
9	CAN2+	Engine CAN+
10	B+	Battery power
11	OIL+	
12	OIL-	
13	CAN3-(Reserve)	
14	CAN2-	Engine CAN-

FUNC \ CLR	R	B	Key can be taken out
ON	●	●	NO
OFF			YES
LOCK			YES

Switch

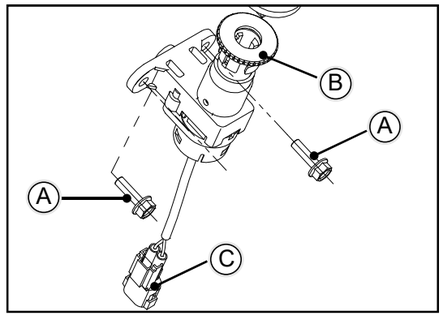
Power lock

⚠ CAUTION

When the indicator does not display after the key is turned on, check the circuit failure (see page xx), and replace the power lock after confirming that the power lock is broken

→ Check Power lock

After unplugging the connector, turn the multimeter to the conduction position. When the key is turned to the OFF position, the two wires should not be able to conduct; when the key is turned to the ON position, the two wires should be able to conduct;



When you need to replace the power lock, first remove the seat cushion and fuel tank guard （see "vehicle body and frame"）.

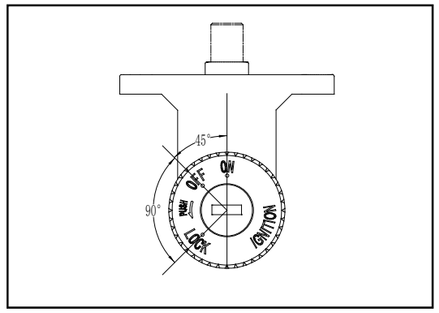
【A】M6 bolt

【B】power lock

【C】connector

◆ Remove the two M6 bolts

◆ Unplug the connector ,remove the power lock



NOTICE

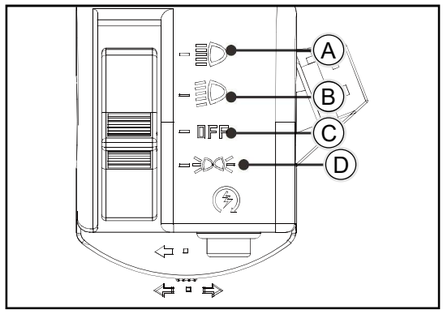
In the normal state, the ON gear is in the forward direction, turning 45 degrees counterclockwise is the OFF gear, pressing down the key while rotating 90 degrees counterclockwise is the LOCK gear

In the ON gear, the entire vehicle circuit is connected and the key cannot be removed;

In the OFF gear, the entire vehicle circuit is disconnected and the key can be removed;

In the LOCK gear, the front of the vehicle is in a locked state（see "vehicle body and frame"）and the key can be removed;

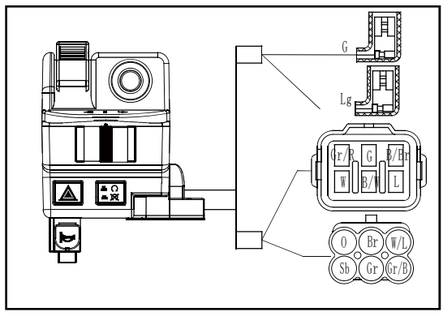
Left handlebar switch



⚠ CAUTION

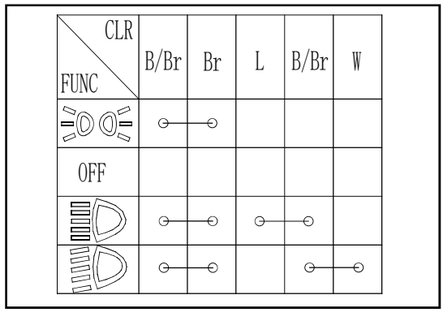
The switch is valid only when the power lock is in the ON position

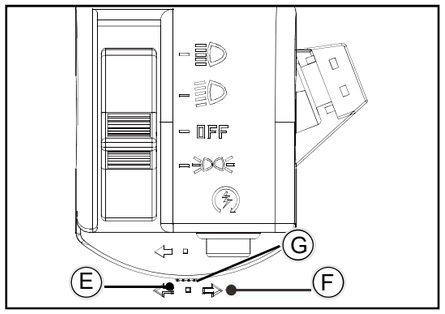
【A】Turn on high beam
【B】Turn on lower beam
【C】Turn off light
【D】Turn on position light



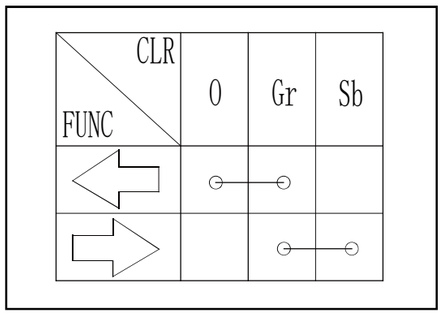
⚠ CAUTION

Since the switch is an integral part, any damage to the switch requires replacement of the entire switch



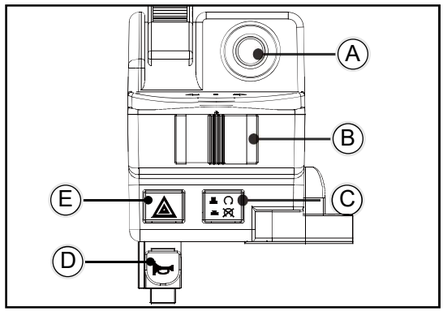


【E】Turn on left turning light
【G】Turn off the turning light
【F】Turn on the right turning light



→ Check if the turning light switch work normally

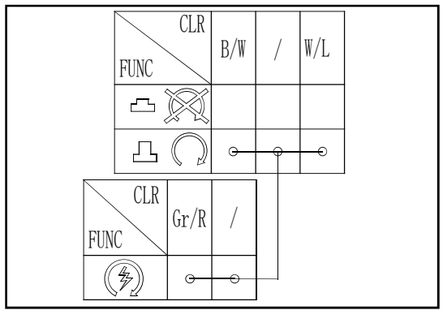
When the switch is turned to the left steering position, gray and orange can be connected, while gray and light blue cannot be connected ; when the switch is turned to the right steering position, gray and light blue can be connected, and gray and orange cannot be connected;



【A】Starting button
【B】Left and right turn signal switch
【C】Stop switch
When the engine is running, press the stop switch button to stop the engine;
when the engine is stopped, first pop up the stop switch button, and then press the starting button to start the engine;
When the function fails, check the related circuit first;
when there is no problem in the check circuit, test the internal circuit of the flameout switch;

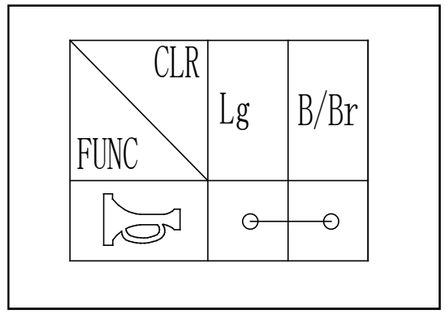
⚠ CAUTION

Press the start button to start the engine only when the flameout switch is in the unpressed state



→ Check ignition key

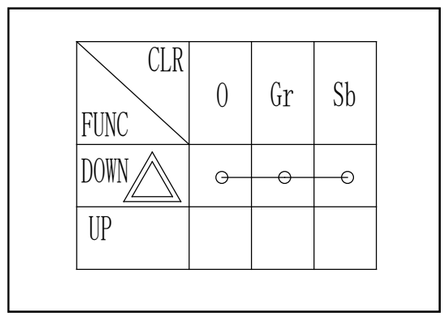
When the flameout switch bounces, black white and white blue should be able to conduct, and when the start button is pressed at this time, gray red, black white, white blue should be able to conduct; when the flameout switch is pressed, black white and white blue cannot be conducted. And when the start button is pressed at this time, the gray-red, black-and-white, white-blue cannot be conducted; And when the start button is pressed at this time, the gray-red, black-and-white, white-blue cannot be conducted;



【D】Horn switch

→ Check horn switch

When the key is in the ON position, it should make a sound when pressing the horn switch;
when the horn cannot make a sound, first check the related circuit;
when there is no problem with the circuit, test the internal circuit of the horn switch;
when pressing the horn switch, light green and black brown should be able to conduct;

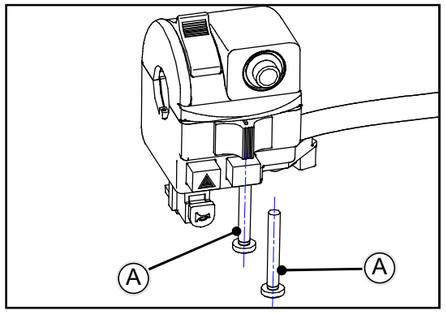


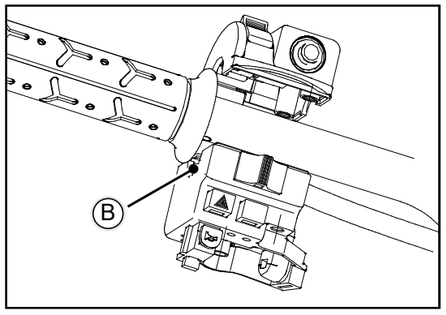
【E】Emergency switch

When the emergency switch is pressed, the four front and rear turning lights flash at the same time; when the emergency switch is pressed, if a single turning light does not light up, check the relevant fuse or the lamp itself.;

→ Check emergency switch

When the emergency switch is pressed, if the four front and rear turning lights do not flash, the internal circuit of the emergency switch can be tested;
when the emergency switch bounces, the orange, gray, and light blue should not be conductive;
when the emergency switch is pressed, orange, , gray and light blue should be able to conduct;





Disassembly and assembly of left handlebar switch

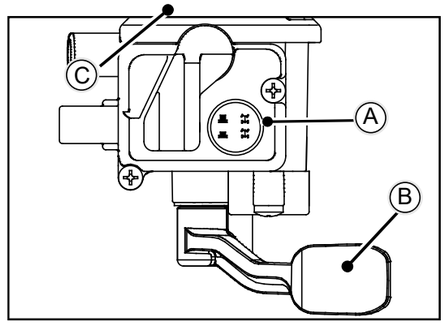
【A】Fixed bolt

- Remove the two fixing bolts with tools;
- Remove the switch from the handle;
- When installing a new switch, pay attention to snap the limit of the lower cover into the limit slot of the handle, and then tighten the two fixing bolts with a tool;

【B】Limit point

- Rotate the switch around the handle tube after installation to confirm whether it is installed in place, and it should not be able to rotate after installation.

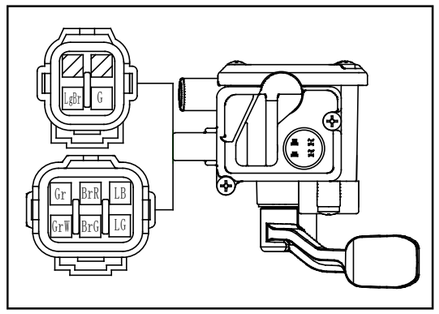
Right handlebar switch



⚠ CAUTION

The switch is valid only when the power lock is in the ON position

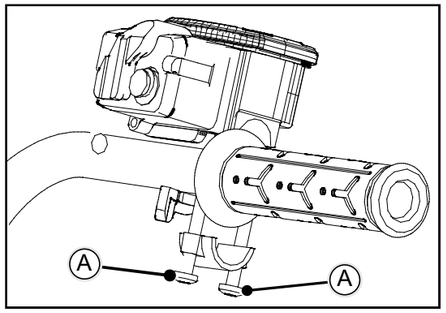
【A】2/4WD switch
【B】Accelerator
【C】Switching knob



→ Check 2/4WD switch

When the knob is shifted to the left, after pressing the 2nd 4WD switch, the switch is in 4WD State, brown-red and brown-green can be conducted.
After popping up the 2/4WD switch, the switch is in the 2WD state. the blue black and blue green can be conductive.
When the knob is shifted to the right, after the four-wheel drive lock switch is popped up, the gray and gray White, blue-black and blue-green, brown-red and brown-green, light green-brown and green can be guided respectively through.

CLR / FUNC	Gr	GrW	LB	LG	BrR	BrG	LgBr	G
			●	●				
					●	●		
	●	●			●	●	●	●
Explain	4WD Lock power		4WD signal (OFF)		4D power		4WD Lock signal (ground)	



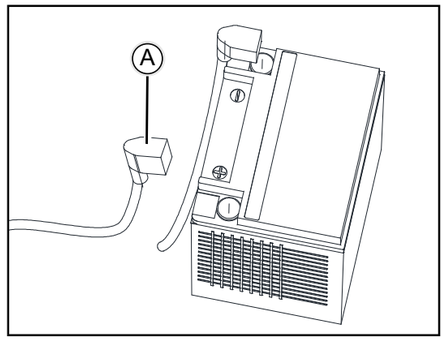
Assembly and disassembly of right handlebar switch

【A】fastening bolt

- Remove the two blots；
- Remove the switch from the handle;
- When installing a new switch, tighten the two fixing bolts with a tool;
- Rotate the switch around the handle tube after installation to confirm whether it is installed in place, and it should not be able to rotate after installation.

Winch assembly

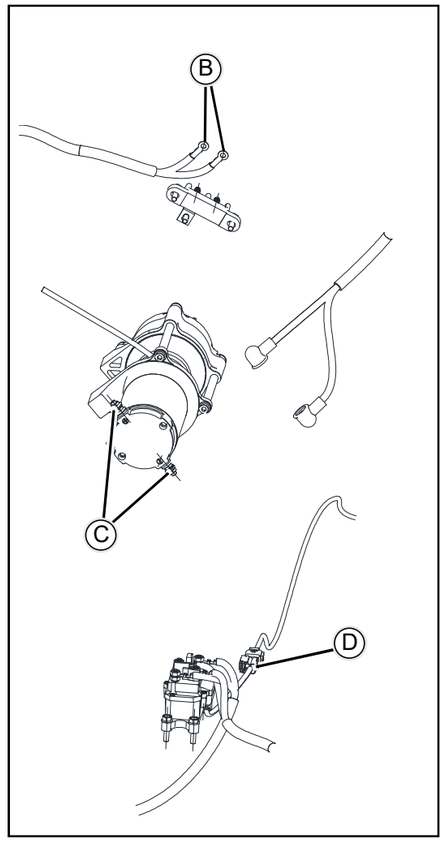
Removal



⚠ CAUTION

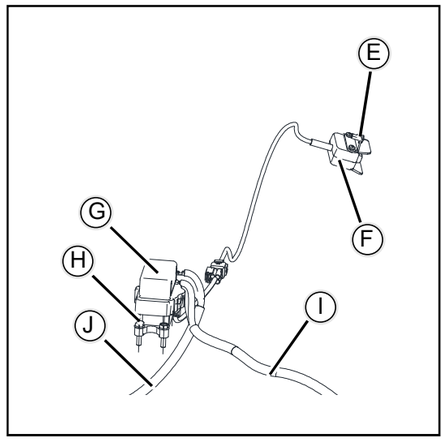
When removing the winch, first turn off the vehicle power

- Remove external related plastic parts
- First remove the battery positive electrode【A】
- Remove the power cord of the winch 【B】
- Remove the winch motor wire nut【C】
- Unplug the plug【D】
- Cut off the cable tie along the cable

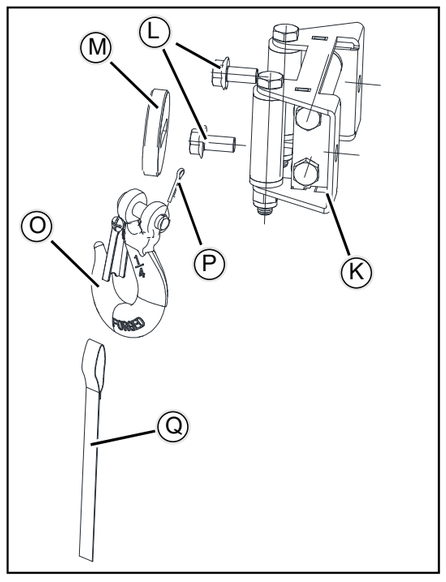


⚠ WARNING

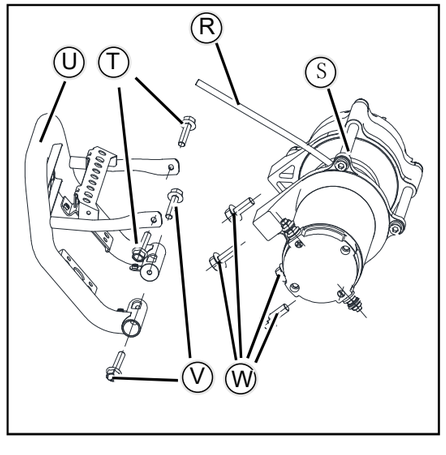
Be sure to disconnect the battery before disassembling the winch assembly to avoid short circuit



- Remove the bolt【E】, remove the winch switch【F】
- Remove the bolt【H】, then the winch power cord【I】, winch motor wire 【J】 and winch relay【G】 can be removed together



- After disassembling the bolt【P】 and the wire rope【R】, you can remove the strap【Q], hook【O】, and rubber pad【M】
- Remove the bolt【L】, and remove the guide wheel【K】

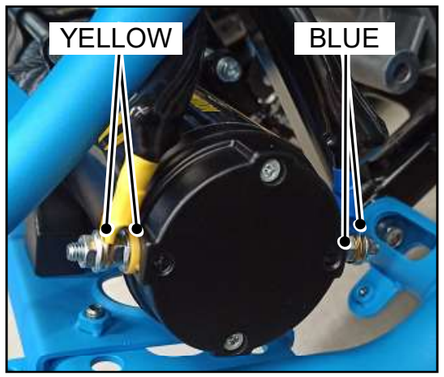


- First remove bolt【T】 and bolt【V】
- Disassemble the bolt【W】, and remove the motor【S】

⚠ CAUTION

The winch work does not exceed 1min each time, and then works after an interval of 30S

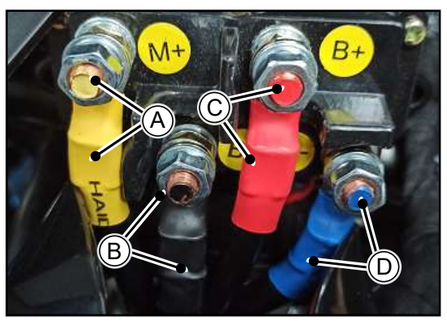
- Rated working voltage DC12V
- Maximum working tension 2500LBS or 3000LBS
- The maximum working current ≤185 A, the maximum working current lasts for 1 min, and work after an interval of 30 seconds. Continue to work in this way
- The wire rope diameter is 4.8 and the wire rope length is 14.5



The color of the insulation pad of the winch motor terminal and the heat shrinkable tube of the cable is one-to-one correspondence

【A】YELLOW

【B】BLUE



The color of the insulation pad of the winch motor terminal and the heat shrinkable tube of the cable is one-to-one correspondence

【C】YELLOW

【D】BLACK

【E】RED

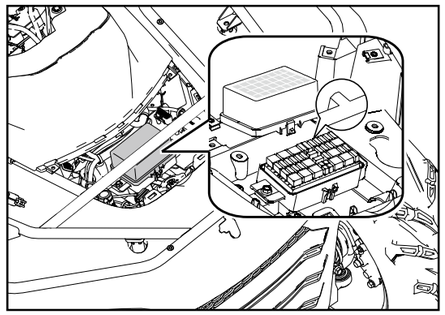
【F】BLUE

Fuse Box

All fuses in the vehicle are in the fuse box

The fuse box is located under the front instrument mask.

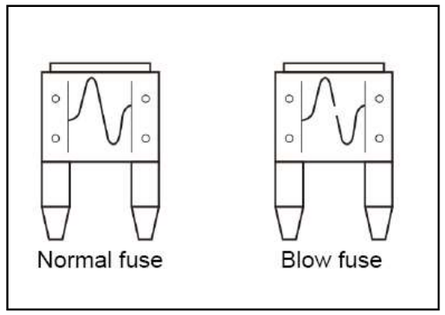
Remove front panel repair cover （See the body section）

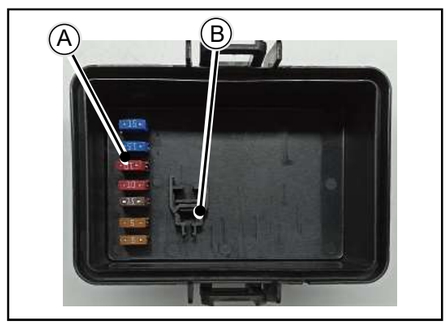


- After the front panel repair cover is removed, the fuse box located at the bottom can be seen.
- Move the clasp on the left and right sides of the fuse box cover to the outside. Loosen the clasp and open the fuse box.

⚠ CAUTION

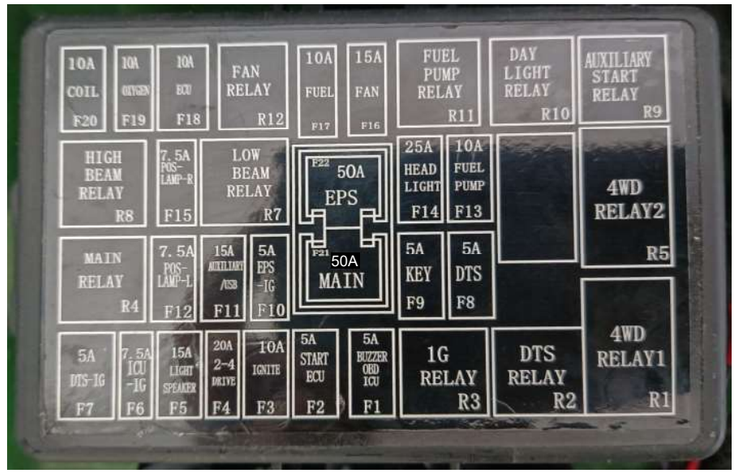
- Do not use a fuse above the rated ampere value or replace it with anything else.
- Please use the same product.Never use wires for fuses, even temporary replacements are not allowed.
- Do not modify fuses or fuse boxes.





- If a chip fuse is broken, you can replace it with a spare fuse 【A】 of the same specification in the fuse box cover. Please use a fuse clamp【B】to replace the fuse.

Fuel box label



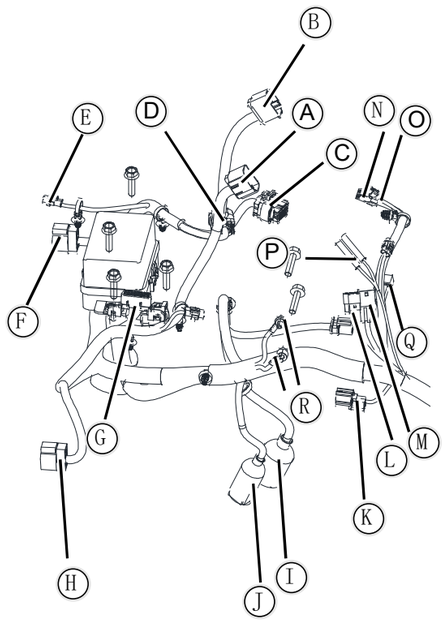
No.	Fuse/Relay	Power	No.	Fuse/Relay	Power
F1	Buzzer and OBD ICU	5A	F21	The main fuse	50A
F2	Start switch ECU	5A	F22	EPS	50A
F3	IGNTE	10A			
F4	2WD / 4WD	20A	R1	2WD/4WD relay1	12V 20A
F5	Light speaker	15A	R2	DTS relay	12V 20A
F6	ECU-IG	7.5A	R3	IG relay	12V 20A
F7	DTS-IG	5A	R4	Main relay	12V 20A
F8	Daytime running light	5A	R5	2WD/4WD relay2	12V 20A
F9	KEY	5A	R6	ECU-4WD relay	12V 20A
F10	EPS-IG	5A	R7	Lower beam relay	12V 20A
F11	12V/USB power output seat	15A	R8	High beam relay	12V 20A
F12	Pos-Lamp-L	7.5A	R9	Auxiliary starting relay	12V 20A
F13	Fuel pump	10A	R10	Day light relay	12V 20A
F14	Heat light	25A	R11	Fuel pump relay	12V 20A
F15	Pos-Lamp-R	7.5A	R12	Fan relay	12V 20A
F16	FAN	15A			
F17	Fuel injector	10A			
F18	ECU	10A			
F19	Oxygen sensor	10A			
F20	Coil	10A			

ELECTRICAL SYSTEM

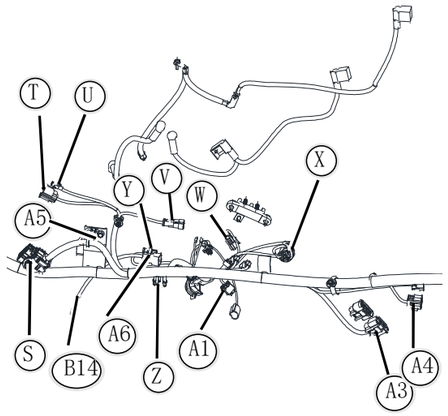
Wire Harness

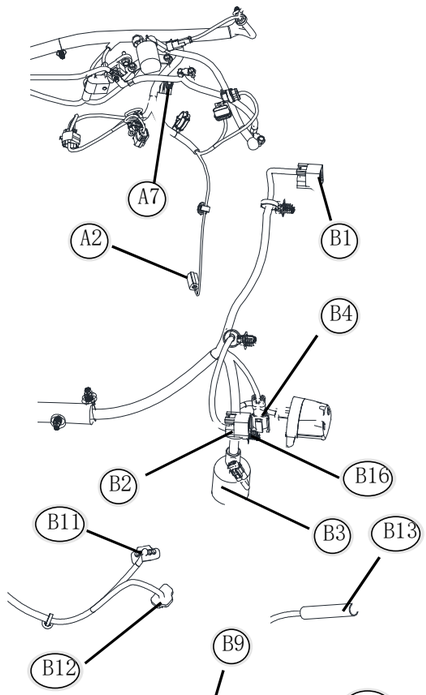
⚠ CAUTION

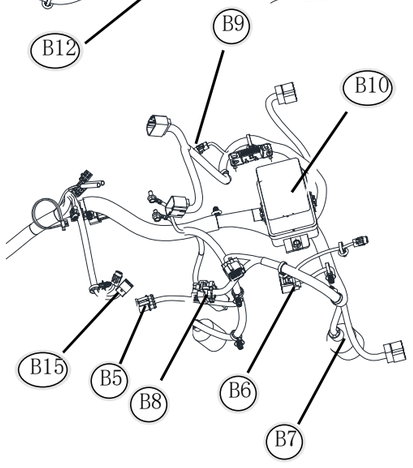
1. The positive and negative connections of the battery cannot be reversed, which will cause the wires to burn out
2. All wiring screws must be tightened according to the required torque



- 【A】-Plug for dashboard ,black
- 【B】-Plug for dashboard gray
- 【C】-TBOX plug
- 【D】-Flasher plug
- 【E】-Buzzer plug
- 【F】-Right headlight plug
- 【G】-OBD plug
- 【H】-Left headlight plug
- 【I】-EPS plug
- 【J】-EPS plug
- 【K】-Brake switch plug
- 【L】-Left handlebar plug
- 【M】-Left handlebar plug
- 【N】-Right handlebar plug
- 【O】-Auxiliary brake fluid level alarm
- 【P】-Parking switch plug
- 【Q】-Ignition key plug
- 【R】-Ground



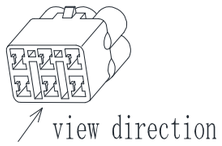




- 【S】-ECU plug
- 【T】-12V power socket plug
- 【U】-USB plug
- 【V】-Off cushion alarm plug
- 【W】-Fuel injector plug
- 【X】-Ignition coil plug
- 【Y】-Air intake pressurE
- 【Z】-idle motor
- 【A1】-Coolant temperature sensor plug
- 【A2】-Oil pressure alarm plug
- 【A3】-Rectifier plug
- 【A4】-Rear oxygen sensor
- 【A5】-Ground
- 【A6】-Gear position sensor
- 【A7】-CDI trigger
- 【B1】-Right rear taillight plug
- 【B2】-Left rear taillight plug
- 【B3】-Trailer socket plug
- 【B4】-License plate light plug
- 【B5】-Fuel pump plug
- 【B6】-Fan plug
- 【B7】-Vehicle speed sensor、electromagnet
- 【B8】-Fuel mass plug
- 【B9】-Main brake fluid level alarm
- 【B10】-Fuse box
- 【B11】-Front axle branch 1
- 【B12】-Front axle branch 2
- 【B13】-Winch switch power
- 【B14】-Rear axle differential module
- 【B15】-right handlebar switch 3
- 【B16】-rear axle differential Electromagnet

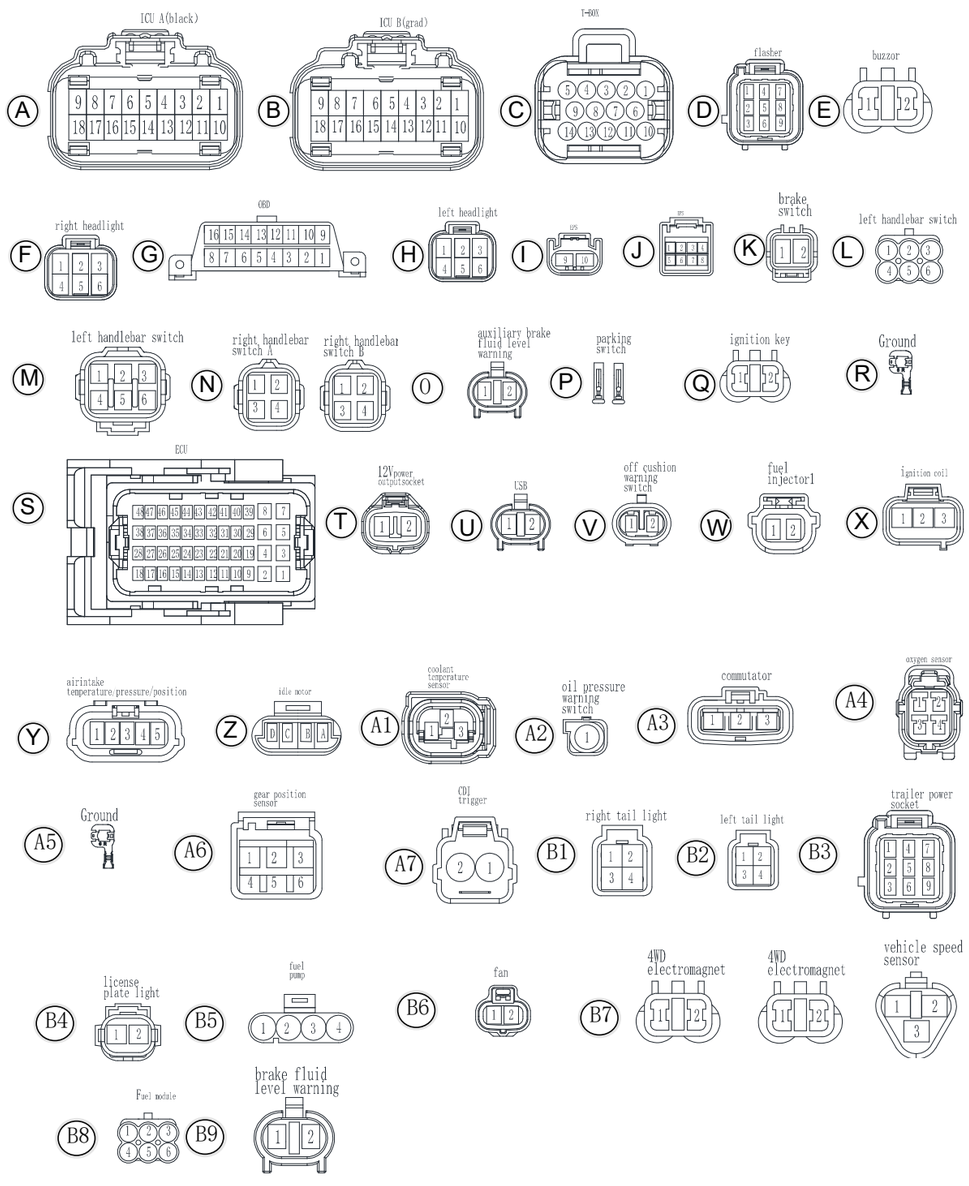
◆ See the figure below for the pin number of each plug-in

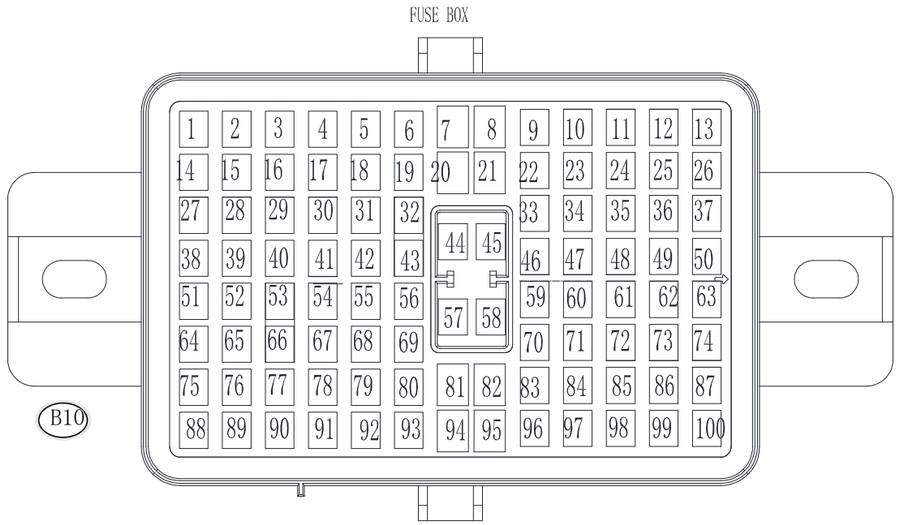
Harness plug-in view direction



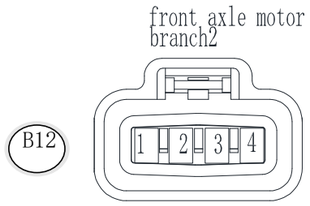
⚠ CAUTION

The pin number of the plug-in corresponds to the electrical schematic diagram



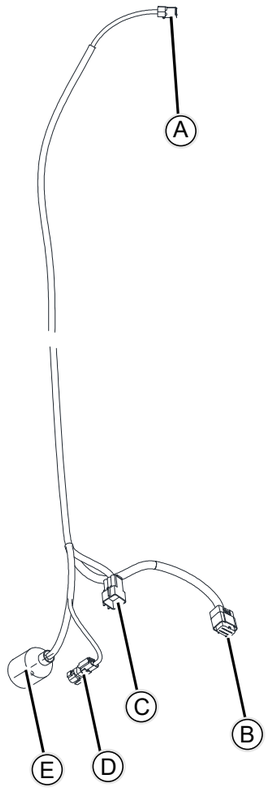

FUSE BOX
1 2 3 4 5 6 7 8 9 10 11 12 13
14 15 16 17 18 19 20 21 22 23 24 25 26
27 28 29 30 31 32 33 34 35 36 37
38 39 40 41 42 43 44 45 46 47 48 49 50
51 52 53 54 55 56 57 58 59 60 61 62 63
64 65 66 67 68 69 70 71 72 73 74
75 76 77 78 79 80 81 82 83 84 85 86 87
88 89 90 91 92 93 94 95 96 97 98 99 100
B10


front axle motor branch1
B11
1 2 3 4 5
Rear axle differential module
B14
1 4 7
2 5 8
3 6 9
right handlebar switch
B15
1 2 3
4 5 6
rear axle differential Electromagnet
B16
11 12


front axle motor branch2
B12
1 2 3 4

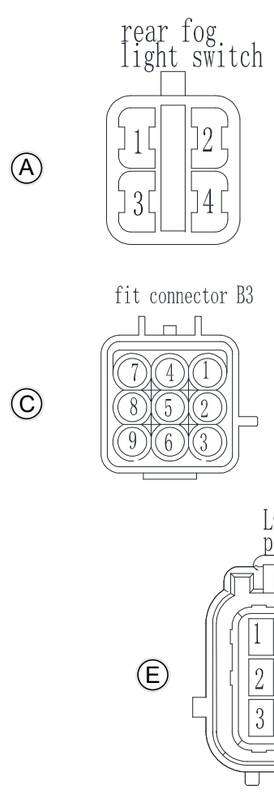
ELECTRICAL SYSTEM

Lof wire cable



- 【A】-plug(black) for rear light switch
- 【B】-plug（gray）for LOF control modul
- 【C】-plug for trailer power socket
- 【D】-plug for rear fog light
- 【E】-plug for LOF trailer power socket

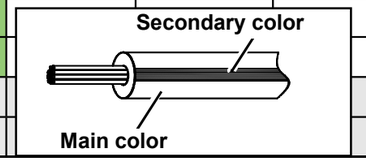
- The pin number of each plug-in is shown in the figure below



WIRING DIAGRAM

Color comparison table

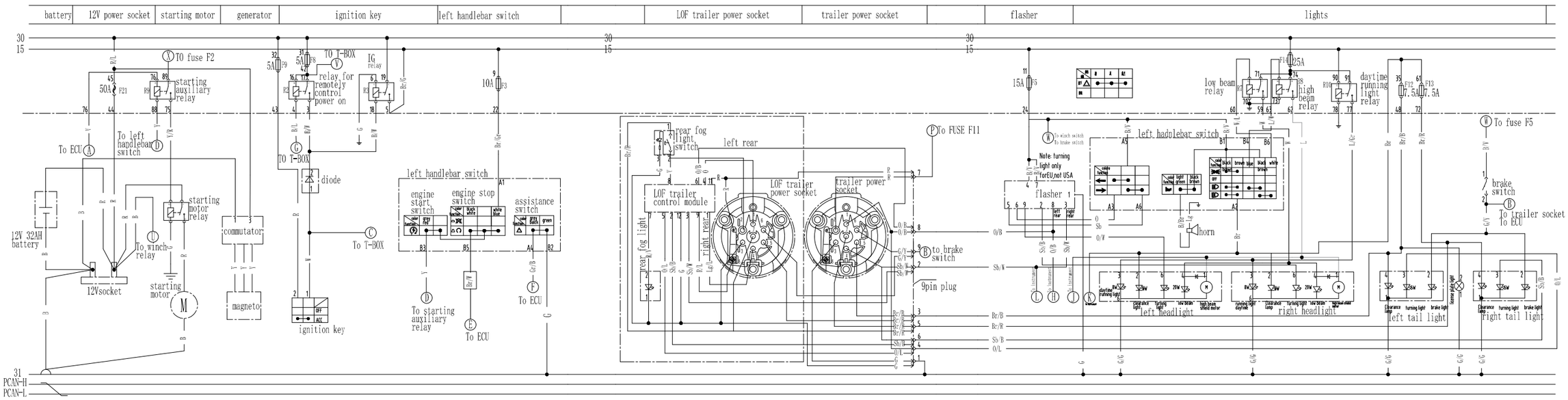
CODE	R	R/B	R/W	R/G	R/Y	R/L	R/Br	R/O	
COLOUR	Red	Red/Black	Red/White	Red/Green	Red/Yellow	Red/Blue	Red/Brown	Red/Orange	
CODE	P	B	B/R	B/W	B/Y	B/L	B/V	B/Br	
COLOUR	Pink	Black	Black/Red	Black/White	Black/Yellow	Black/Blue	Black/Violet	Black/Brown	
CODE	W	W/R	W/B	W/G	W/Y	W/L	W/V	W/Gr	W/Br
COLOUR	White	White/Red	White/Black	White/Green	White/Yellow	White/Blue	White/Violet	White/Gray	White/Brown
CODE	Gr	Gr/R	Gr/B	Gr/W	BR	Br/R	Br/B	Br/Y	
COLOUR	Gray	Gray/Red	Gray/Black	Gray/White	Brown	Brown/Red	Brown/Black	Brown/Yellow	
CODE	O	O/R	O/B	O/W	O/G	O/L	O/Gr		
COLOUR	Orange	Orange/Red	Orange/Black	Orange/White	Orange/Green	Orange/Blue	Orange/Gray		
CODE	G	G/R	G/B	G/W	G/Y	G/L	G/V	G/Br	
COLOUR	Green	Green/Red	Green/Black	Green/White	Green/Yellow	Green/Blue	Green/Violet	Green/Brown	
CODE	Y	Y/R	Y/B	Y/W	Y/G	Y/L	Y/Gr	Y/Br	
COLOUR	Yellow	Yellow/Red	Yellow/Black	Yellow/White	Yellow/Green	Yellow/Blue	Yellow/Gray	Yellow/Brown	
CODE	L	L/R	L/B	L/W	L/G	L/Y			
COLOUR	Blue	Blue/Red	Blue/Black	Blue/White	Blue/Green	Blue/Yellow			
CODE	V	V/R	V/B	V/W	V/G	V/L	V/Br	V/O	
COLOUR	Violet	Violet/Red	Violet/Black	Violet/White	Violet/Green	Violet/Blue	Violet/Brown	Violet/Orange	
CODE	Lg	Lg/R	Lg/G	Lg/Y	Lg/Br	Lg/P			
COLOUR	Light Green	Light Green/Red	Light Green/Green	Light Green/Yellow	Light Green/Brown	Light Green/Pink			
CODE	Lb	Lb/R	Lb/B	Lb/W	Lb/Gr				
COLOUR	Light Blue	Light Blue/Red	Light Blue/Black	Light Blue/White	Light Blue/Gray				

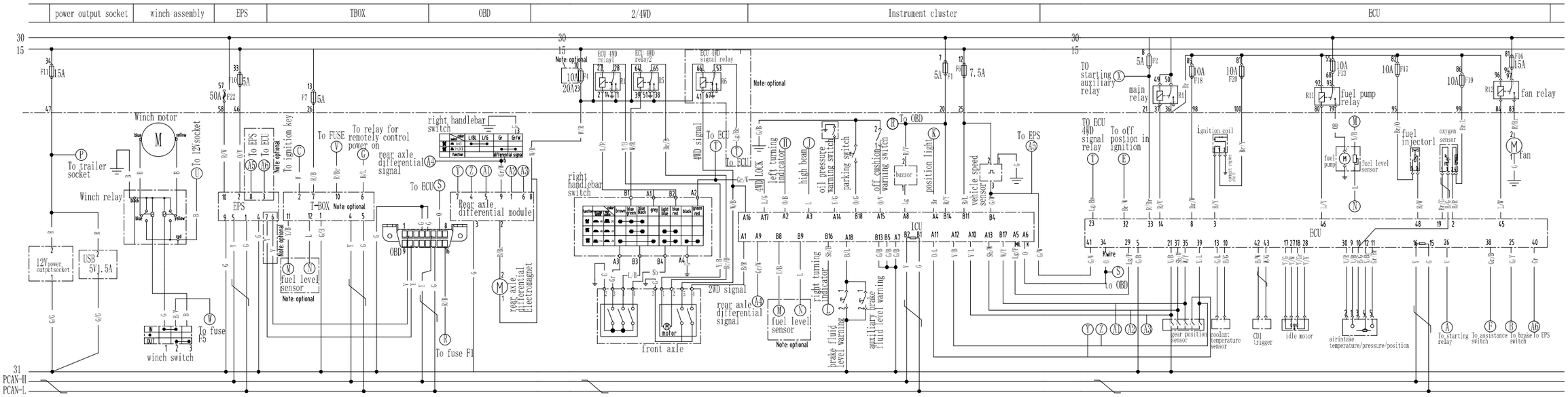


Wire color instruction:
Wire color contains main color and secondary color. For example:R/L means the main color is red and the secondary color is blue.

ELECTRICAL SYSTEM

Wiring diagram





R-red O-orange W-white B-black Y-yellow V-villet Sb-wathet blue (A)---(AG)
G-green L-blue Br-brown Gr-gray P-pink Lg-low green