

BARONESS®
Quality on Demand

GM1700

3-Unit Mid-Mount Rotary Mower Service Manual

Introduction

This manual describes about the procedures of maintenance and malfunction diagnosis etc. of this machine.

Items of description are categorized per system for representative maintenance contents.

As for repair items specified by the manufacturers in the hydraulic system, engine, etc., their respective disassembling and maintenance procedures are not described.

For operation, handling and adjustment instruction, please refer to the Owner's Operating Manual.

Be sure to also read the Owner's Operating Manual for the engine, battery, etc.

See the parts catalog for required parts.

Caution

The information described in this manual is subject to change for improvement without prior notice.
Note that the Baroness product warranty may not apply to defects caused by the use of parts from other companies.

Warning Symbols

This manual uses the following warning symbols for handling precautions that are important for your safety.



696cq5-001

Warning symbol

This symbol indicates the articles regarding “Danger,” “Warning,” or “Caution.”

Those articles describe important safety precautions and so read them carefully to understand completely before operating the machine.

Failure to adequately follow these safety precautions may cause an accident.

Danger

This symbol indicates that serious injury or death will occur if the warning is ignored.

Warning

This symbol indicates that serious injury or death may occur if the warning is ignored.

Caution

This symbol indicates that injury or damage to property may occur if the warning is ignored.

Important

This symbol indicates precautions on the mechanism of the machine.

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Safety

Failure to adequately follow these safety precautions may cause an accident resulting in injury or death.

Danger

This machine is designed to ensure safe operation and has been tested and inspected thoroughly before shipment from the factory. The machine is equipped with safety devices to prevent accidents.

However, whether the machine demonstrates its original performance level depends on the manner in which it is operated and handled, as well as the manner in which it is managed on a daily basis.

Inappropriate use or management of the machine may result in injury or death.

Observe the following safety instructions to ensure safe operation.

- Lack of awareness of the effect of ground conditions, especially slopes
- Incorrect hitching and load distribution

4. Never allow children or people unfamiliar with these instructions to use or service the machine.
Local regulations may restrict the age of the operator.
5. The owner/user can prevent and is responsible for accidents or injuries occurring to themselves, other people, or property.
6. Keep in mind that the owner, operator, and mechanic are responsible for accidents or hazards occurring to other people or their property.

Preparation

1. Evaluate the terrain to determine what accessories and attachments are needed to properly and safely perform the job.
Only use accessories and attachments approved by the manufacturer.
2. While operating, always wear substantial footwear, long trousers, hard hat, safety glasses, and ear protection.
Long hair, loose clothing, or jewelry may get tangled in moving parts.
Do not operate the equipment when barefoot or wearing open sandals.
3. Inspect the area where the equipment is to be used and remove all objects such as rocks, toys and wire which can be thrown by the machine.
4. Exercise care in the handling of fuel.

Warning

Warning-Fuel is highly flammable.
Take the following precautions.

- [1] Store fuel in containers specifically designed for this purpose.
- [2] Add fuel before starting the engine.
Never remove the cap of the fuel tank or add fuel while the engine is running or when the engine is hot.
- [3] Refuel outdoors only and do not smoke while refueling.

Safe Operating Practices

The following instructions include the ones from CEN standard EN 836: 1997, ISO standard 5395: 1990, and ANSI B71.4-2004.

Training

1. Read the Owner's operating Manual and other training material carefully. Be familiar with the controls, safety signs, and the proper use of the equipment.
2. If the operator or mechanic can not read English it is the owner's responsibility to explain this material to them.
3. All operators and mechanics should seek and obtain professional and practical instruction.

The owner is responsible for training the users.

Such instruction should emphasize.

[1] The need for care and concentration when working with ride-on machines.

[2] Control of a ride-on machine sliding on a slope will not be regained by the application of the brake.

The main reasons for loss of control are

- Insufficient wheel grip
- Being driven too fast
- Inadequate braking
- The type of machine is unsuitable for its task

- [4] If fuel is spilled, do not attempt to start the engine but move the machine away from the area of spillage and avoid creating any source of ignition until petrol vapours have dissipated.
- [5] Replace all fuel tanks and container caps securely.
- 5. Check that operator's presence controls, safety switches and shields are attached and functioning properly.
Do not operate unless they are functioning properly.
- 6. If the brake operation is faulty or the parking brake lever has noticeable play, be sure to adjust or repair them before operating the machine.
- 7. Replace faulty mufflers.
- 8. Before using, always visually inspect to see that the blades, blade bolts, and cutting assembly are not worn or damaged.
Replace worn or damaged blades and bolts in sets to preserve balance.
- 9. On multi-bladed machines, take care as rotating one blade can cause other blades to rotate.
- [4] Stay alert for humps and hollows and other hidden hazards.
- [5] Never operate across the face of the slope, unless the machine is designed for this purpose.
- [6] Never drive the machine on a slope with an angle of gradient that is greater than that specified or in a place where there is a danger of the machine slipping.
- 5. Never raise deck with the blades running.
- 6. Never operate with the discharge deflector raised, removed or altered, unless using a grass catcher.
Do not crawl under the machine while it is in operation.
- 7. Never operate with the discharge deflector raised, removed or altered, unless using a grass catcher.
- 8. Do not change the engine governor settings or overspeed the engine.
Operating the engine at excessive speed may increase the hazard of personal injury.
- 9. Do the following before leaving the operator's position.

Operation

- 1. Do not operate the engine in a confined space where dangerous carbon monoxide fumes can collect.
- 2. Only operate in good light, keeping away from holes and hidden hazards.
- 3. Before attempting to start the engine, disengage all attachments, shift into neutral, and engage the parking brake.
Only start engine from the operator's position.
Use seat belts if provided.
- 4. Remember there is no such thing as a safe slope.
Travel on grass slopes requires particular care.
To guard against overturning:
 - [1] Do not stop or start suddenly when going up or downhill.
 - [2] Engage clutch slowly, always keep machine in gear, especially when traveling downhill.
 - [3] Machine speeds should be kept low on slopes and during tight turns.
- [1] Stop on level ground.
- [2] Disengage the power take-off and lower the attachments.
- [3] Change into neutral and set the parking brake.
- [4] Stop the engine and remove the key.
- 10. Disengage the drive to attachments, stop the engine, and remove the ignition key in the following conditions.
 - [1] Before refueling.
 - [2] Before removing the grass catcher/catchers;
 - [3] Before making height adjustment unless adjustment can be made from the operator's position:
 - [4] Before cleaning blockages.
 - [5] Before checking, cleaning or working the machine.
 - [6] After striking a foreign object or if an abnormal vibration occurs.
Inspect the machine for damage and make repairs before restarting and operating the equipment.
- 11. Keep hands and feet away from the cutting units and the rotating parts.

Safety

12. Look behind and down before backing up to be sure of a clear path.
13. Do not carry passengers.
14. Never operate while people, especially children, or pets are nearby.
15. Slow down and use caution when making turns and crossing roads and sidewalks.
16. Stop the blades rotating before crossing surfaces other than grass.
17. Disengage drive to attachments when transporting or not in use.
18. When using any attachments, never direct discharge of material toward bystanders nor allow anyone near the machine while in operation.
19. Do not operate the machine under the influence of alcohol or drugs.
20. Take care when loading or unloading the machine into a trailer or a truck.
Load or unload the machine in a flat and safe place.
Before loading or unloading, set the parking brake on the truck or trailer, stop the engine, and chock the wheels.
When transporting the machine on a truck or a trailer, set the parking brake, stop the engine, and fasten the machine to the truck with a rope or other suitable restraining device that has sufficient strength.
When using a running board, select one with sufficient strength, length, and width and that will not cause the machine to slip.
21. Close the fuel valve before transporting the machine.
22. Use care when approaching blind corners, shrubs, trees, or other objects that may obscure vision.
23. Do not take your eyes off the road ahead. Do not operate the machine with no hands.
24. Reduce the throttle setting during engine run-out and, if the engine is provided with a shut-off valve, turn the fuel off at the conclusion of operation.
2. When machine is to be parked, stored, or left unattended, lower the cutting units unless a positive mechanical lock is provided.
3. To reduce the fire hazard, keep the engine, silencer/muffler, battery compartment fuel storage area, cutting units and drives free of grass, leaves, or excessive grease. Clean up oil or fuel spillage.
4. Allow the engine to cool before storing in any enclosure.
5. Only cover the machine with a sheet after hot parts have sufficiently cooled down.
6. Never store the equipment with fuel in the tank inside a building where fumes may reach an open flame or spark.
7. If the engine is provided with a shut-off valve, shut off valve while storing or transporting.
8. Do not store fuel near flames.
9. Never allow untrained personnel to service machine.
10. Allow the engine/muffler to cool before checking/maintenance.
11. Appropriately manage and correctly use the tools necessary for servicing or adjusting the machine.
12. Use jack stands to support components when required.
13. Carefully release pressure from components with stored energy.
14. Be sure to depressurize the hydraulic system before performing maintenance operations on it such as removing hydraulic equipment.
15. Check whether line connectors in the hydraulic system are properly tightened. Before applying hydraulic pressure, check the connections of the hydraulic pressure lines and the condition of the hoses.
16. When checking the hydraulic circuit for pinhole leaks or oil leakage from nozzles, do not use your hands.
Use items such as paper or corrugated cardboard to find leakage points.
Be extremely careful with high-pressure oil as it may pierce your skin, result. If fluid is injected into the skin it must be surgically removed within a few hours by a doctor familiar with this form of injury or gangrene may result.

Maintenance and storage

1. Disengage drives on level ground, lower the attachments, set parking brake, stop engine and remove key from ignition. Wait for all movement to stop before adjusting, cleaning or repairing.

17. Disconnect battery before making any repairs.
Disconnect the negative terminal first and the positive last.
Reconnect positive first and negative last.
18. Make sure that parts such as wires are not touching each other and that their covers have not come off.
19. Use care when checking the blades.
 - [1] Wrap the blades or wear gloves, and use caution when servicing them.
 - [2] Only replace blades.
 - [3] Never straighten or weld them.
20. Keep hands and feet away from moving parts.
If possible, do not make adjustments with the engine running.
21. Charge batteries in an open well ventilated area, away from spark and flames.
Unplug charger before connecting or disconnecting from battery.
Wear protective clothing and use insulated tools.
22. Keep all parts in good working condition and all hardware tightened.
Replace all worn or damaged decals.
23. Keep all nuts, bolts and screws tight to be sure the equipment is in safe working condition.
24. Check the grass catcher frequently for wear or deterioration.
25. If the fuel tank has to be drained, do this outdoors.

Safety Signs and Instruction Signs

About Safety Signs and Instruction Signs

Warning

Safety decals and instruction decals are attached to this machine.
Make sure that they are preserved in their entirety. If they are damaged, become dirty, or peel off, replace them with new ones.

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Disposal

Disposal

Waste Disposal

About the Waste disposal

Make sure that waste generated when servicing or repairing the machine is disposed of in accordance with local regulations. (e.g. waste oil, antifreeze batteries, rubber products, and wires etc.)

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Maintenance standards and maintenance

Unit conversion

Inch-millimeter conversion table

1 mm = 0.03937 in

1 in = 25.4 mm

Fractions		Decimals	mm	Fractions		Decimals	mm
	1/64	0.015625	0.397		33/64	0.515625	13.097
	1/32	0.03125	0.794		17/32	0.53125	13.494
	3/64	0.046875	1.191		35/64	0.546875	13.891
1/16		0.0625	1.588	9/16		0.5625	14.288
	5/64	0.078125	1.984		37/64	0.578125	14.684
	3/32	0.09375	2.381		19/32	0.59375	15.081
	7/64	0.109275	2.778		39/64	0.609375	15.478
1/8		0.1250	3.175	5/8		0.6250	15.875
	9/64	0.140625	3.572		41/64	0.640625	16.272
	5/32	0.15625	3.969		21/32	0.65625	16.669
	11/64	0.171875	4.366		43/64	0.671875	17.066
3/16		0.1875	4.762	11/16		0.6875	17.462
	13/64	0.203125	5.159		45/64	0.703125	17.859
	7/32	0.21875	5.556		23/32	0.71875	18.256
	15/64	0.234375	5.953		47/64	0.734375	18.653
1/4		0.2500	6.350	3/4		0.7500	19.050
	17/64	0.265625	6.747		49/64	0.765625	19.447
	9/32	0.28125	7.144		25/32	0.78125	19.844
	19/64	0.296875	7.541		51/64	0.796875	20.241
5/16		0.3125	7.938	13/16		0.8125	20.638
	21/64	0.328125	8.334		53/64	0.828125	21.034
	11/32	0.34375	8.731		27/32	0.84375	21.431
	23/64	0.359375	9.128		55/64	0.859375	21.828
3/8		0.3750	9.525	7/8		0.8750	22.225
	25/64	0.390625	9.922		57/64	0.890625	22.622
	13/32	0.40625	10.319		29/32	0.90625	23.019
	27/64	0.421875	10.716		59/64	0.921875	23.416
7/16		0.4375	11.112	15/16		0.9375	23.812
	29/64	0.453125	11.509		61/64	0.953125	24.209
	15/32	0.46875	11.906		31/32	0.96875	24.606
	31/64	0.484375	12.303		63/64	0.984375	25.003
1/2		0.5000	12.700	1		1.000	25.400

Maintenance standards and maintenance

US unit-SI unit conversion table

To Convert			Into		Multiply By
Linear Measurement	Miles	mi	Kilometers	km	1.609
	Yards	yd	Meters	m	0.9144
	Feet	ft	Meters	m	0.3048
	Feet	ft	Centimeters	cm	30.48
	Inches	in	Meters	m	0.0254
	Inches	in	Centimeters	cm	2.54
	Inches	in	Millimeters	mm	25.4
Area	Square Miles	mile ²	Square Kilometers	km ²	2.59
	Square Feet	ft ²	Square Meters	m ²	0.0929
	Square Inches	in ²	Square Centimeters	cm ²	6.452
	Acre	ac	Hectare	ha	0.4047
Volume	Cubic Yards	yd ³	Cubic Meters	m ³	0.7646
	Cubic Feet	ft ³	Cubic Meters	m ³	0.02832
	Cubic Inches	in ³	Cubic Centimeters	cm ³	16.39
Weight	Tons (Short)	sh tn	Metric Tons	ton	0.9078
	Pounds	lb	Kilograms	kg	0.4536
	Ounces (Avdp.)	oz	Grams	g	28.3495
Pressure	Pounds/Sq. In.	psi	Kilopascal	kPa	6.895
	Pounds/Sq. In.	psi	Bar	mdyn/cm ²	0.069
Work	Foot-pounds	lb-ft	Newton-Meters	N-m	1.356
	Foot-pounds	lb-ft	Kilogram-Meters	kgf-m	0.1383
	Inch-pounds	lb-in	Kilogram-Centimeters	kgf-cm	1.152144
Liquid Volume	Quarts	qt (US)	Liters	L	0.9463
	Gallons	gal (US)	Liters	L	3.785
Liquid Flow	Gallons/Minute	gal/min	Liters/Minute	L/min	3.785
Temperature	Fahrenheit	°F	Celsius	°C	1. Subtract 32 ° 2. Multiply by 5/9

Maintenance standards and maintenance

Maintenance standards

Maintenance Standards List

Main body

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Engine	Engine model	D1105-E3B		
	No load rpm	1,250 - 3,000 rpm		
	Quantity of engine oil	3.0 dm ³ (3.0 L) (0.79 gal (US)) (including filter)	API Service grade class CF or higher, SAE Viscosity grade 10W-30	
	Coolant capacity	6.0 dm ³ (6.0 L) (1.59 gal (US)) (including reserve tank)		
	Fuel tank capacity	23.0 dm ³ (23.0 L) (6.08 gal (US))	JIS No. 2 diesel fuel (Low sulfur or ultra-low sulfur diesel fuel only)	
	Hydraulic tank capacity	22.0 dm ³ (22.0 L) (5.81 gal (US))	Shell Tellus S2M46 or equivalent (ISOVG46)	
Main body (including hydraulic and electrical systems)	Parking brake switch	Pull the switch contact point by 1 - 2 mm (0.04 - 0.08 in) from the condition that it is pressed to the maximum extent	Pullback amount from the condition that the contact point of the parking brake switch is pressed to the maximum extent when the parking brake is released	
	Neutral switch	0.5 mm (0.02 in)	Clearance between the transmission shift lever and switch contact point when the transmission shift lever is neutral	
	Knife rotation lever switch	Pull the switch contact point by 1 - 2 mm (0.04 - 0.08 in) from the condition that it is pressed to the maximum extent	Pullback amount from the condition that the switch contact point is pressed to the maximum extent when the knife rotation lever is "ON"	
	Battery	80D26R		
	Tire pneumatic pressure	Front wheel 140.0 kPa (1.43 kgf/cm ²) (20.30 psi)	21 x 11.00 - 10	
		Rear wheel 140.0 kPa (1.43 kgf/cm ²) (20.30 psi)	21 x 11.00 - 10	
	Toe angle	0±5.0 mm (0±0.20 in)		
	Spring for the knife tension belt	40.0 mm (1.57 in)	Total length of the spring when the knife rotation lever is "ON"	
	Return spring for the knife tension lever	50.0 mm (1.97 in)	Total length of the spring when the knife rotation lever is "OFF"	
	Neutral cam lever spring	53.0 mm (2.09 in)	Total length of the spring when the piston pump is neutral	

* The factory default maximum engine rpm is 2,700 rpm

Maintenance standards and maintenance

Mower Units

■Contour Deck

Mower unit	Tension spring (center deck belt)	Spring extends 35.0 mm (1.38 in) from end of spring guide	Total length of spring compresses to 55.0 mm (2.17 in)
	Tension spring (left and right deck belt)	Spring extends 35.0 mm (1.38 in) from end of spring guide	Total length of spring compresses to 55.0 mm (2.17 in)
	Gearbox grease quantity	260.0 g (9.17 oz)	

Maintenance standards and maintenance

Tightening torques

Standard tightening torques

Bolts and Nuts

Important

A number of bolts are used in each part of this machine.
Be sure to re-tighten the bolts and nuts, because they may be loosened at the earlier stage of the use.

As to the bolts and nuts without any special instruction, tighten them in appropriate tightening torque with proper tool.

Too much tightening may cause the looseness or damage of the screw.

The strength of tightening is determined by types of screws, strength, the friction of thread face or base face and others.

The table below is for the galvanized or parkerized bolts.

In case that the strength of internal thread is weak, it is not applied.

Do not use rusty or sand attached "screw."

Otherwise, it may cause insufficient tightening even if you apply the specified tightening torque.

The friction of the screw face becomes higher and the tightening torque is canceled out by the friction, therefore sufficient tightening cannot be applied.

If "screw" is wet by water or oil, do not tighten it with normal tightening torque.

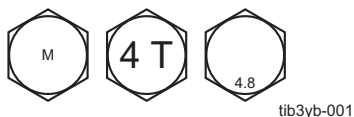
If the screw is wet, the torque coefficient will get smaller and it may result in too much tightening.

Too much tightening may cause looseness by the screw stretched or result in damage.



Do not use a bolt experienced too much burden.

Using the impact wrench requires the skill.

Do exercise as much as possible for steady tightening.

Nominal diameter	General bolt		
	Strength classification 4.8		
			
	N-m	kgf-cm	lb-in
M5	3 - 5	30.59 - 50.99	26.55 - 44.26
M6	7 - 9	71.38 - 91.77	61.96 - 79.66
M8	14 - 19	142.76 - 193.74	123.91 - 168.17
M10	29 - 38	295.71 - 387.49	256.68 - 336.34
M12	52 - 67	530.24 - 683.20	460.25 - 593.02
M14	70 - 94	713.79 - 958.52	619.57 - 831.99
M16	88 - 112	897.34 - 1142.06	778.89 - 991.31
M18	116 - 144	1,182.85 - 1,468.37	1,026.72 - 1,274.54
M20	147 - 183	1,498.96 - 1,866.05	1,301.10 - 1,619.73
M22	295	3,008.12	2,611.05
M24	370	3,772.89	3,274.87
M27	550	5,608.35	4,868.05
M30	740	7,545.78	6,549.74

Maintenance standards and maintenance

Nominal diameter	Heat-treated bolt					
	Strength classification 8.8			Strength classification 10.9		
						
	N-m	kgf-cm	lb-in	N-m	kgf-cm	lb-in
M5	5 - 7	50.99 - 71.38	44.26 - 61.96	7 - 10	71.38 - 101.97	61.96 - 88.51
M6	8 - 11	81.58 - 112.17	70.81 - 97.36	14 - 18	142.76 - 183.55	123.91 - 159.32
M8	23 - 29	234.53 - 295.71	203.57 - 256.68	28 - 38	285.52 - 387.49	247.83 - 336.34
M10	45 - 57	458.87 - 581.23	398.30 - 504.51	58 - 76	591.43 - 774.97	513.36 - 672.68
M12	67 - 85	683.20 - 866.75	593.02 - 752.34	104 - 134	1,060.49 - 1,366.40	920.50 - 1186.03
M14	106 - 134	1,080.88 - 1,366.40	938.21 - 1,186.03	140 - 188	1,427.58 - 1,917.04	1,239.14 - 1,663.99
M16	152 - 188	1,549.94 - 1,917.04	1,345.35 - 1,663.99	210 - 260	2,141.37 - 2,651.22	1,858.71 - 2,301.26
M18	200 - 240	2,039.40 - 2,447.28	1,770.20 - 2,124.24	280 - 340	2,855.16 - 3,466.98	2,478.28 - 3,009.34
M20	245 - 295	2,498.27 - 3,008.12	2,168.50 - 2,611.05	370 - 450	3,772.89 - 4,588.65	3,274.87 - 3,982.95
M22	-	-	-	530	5,404.41	4,691.03
M24	-	-	-	670	6,831.99	5,930.17
M27	-	-	-	1,000	10,197.00	8,851.00
M30	-	-	-	1,340	14,628.78	11,860.34

Note:
The same values are applied to "fine screw thread."

Maintenance standards and maintenance

Maintenance standards and maintenance

Hydraulic hose

The tightening torques for union joints and union adaptors with parallel pipe threads (G, PF) are shown in the table below.

A union joint or adaptor will not become loose or leak as long as it is tightened by the specified torque.

If fluid leaks from the sealed portion, do not attempt to tighten the union joint or adaptor forcibly.

Examine whether any foreign matter or scratches are present on the seat surface.

Tightening a union joint or adaptor forcibly could damage the connection of the joints.

When tightening a union joint or adaptor, use a torque wrench where possible and firmly tighten it by an appropriate torque.

Nominal diameter of the hose size	Nominal diameter of the parallel pipe threads (PF)	Tightening torque		
		N-m	kgf-cm	lb-in
6	1/4	24.50	250	221.28
9	3/8	49.03	500	564.91
12	1/2	58.84	600	677.89
15	3/4	117.68	1200	1,355.78
19	3/4	117.68	1200	1,355.78
25	1	137.30	1400	1,581.74
32	1-1/4	166.72	1700	1,920.69
38	1-1/2	205.94	2100	2,372.61
50	2	245.17	2500	2,824.54

Fittings with parallel threads (O-ring seal type)

The tightening torques for fittings with parallel threads (O-ring seal method) are shown in the table below.

Tightening an adjustable joint forcibly with a spanner or other such tool to secure it to a set position could damage the adjustable joint, its washers, and other parts. Be sure to tighten an adjustable joint to the torque appropriate to its size.

Nominal diameter of thread	Tightening torque		
	N-m	kgf-cm	lb-in.
1/4	34.32 - 49.03	350 - 500	309.79 - 442.55
3/8	68.65 - 78.45	700 - 800	619.57 - 708.08
1/2	98.07 - 117.68	1000 - 1200	885.10 - 1,062.12
3/4	147.10 - 176.52	1500 - 1800	1,327.65 - 1,593.18
1	245.17 - 274.59	2500 - 2800	2,212.75 - 2,478.28
1-1/4	294.20	3000	2,655.30
1-1/2	294.20	3000	2,655.30
2	392.27	4000	3,540.40

Maintenance standards and maintenance

Principal tightening torques

Tightening Torque by Model

GM1700_Main body

Tighten the following bolts and nuts at the torque specified in the table.

For thread locking adhesive, apply a middle strength thread locker (ThreeBond 1322 anaerobic adhesives).

Location		Code	Part name	Tightening torque			Thread locking adhesive
				N-m	kgf-cm	lb-in	
Front wheel	Wheel mounting base	K0138240002	24 slotted nut high P1.5	180 - 200	1,835.46 - 2,039.40	1,593.18 - 1,770.20	—
	Wheel	K0011120302	Bolt, 11T, heat-treated M12-30P1.5	67 - 85	683.20 - 833.75	593.02 - 752.34	—
Rear wheel	Wheel mounting base	K0160000492	24 special nut P1.5	180 - 200	1,835.46 - 2,039.40	1,593.18 - 1,770.20	○
	Wheel	K0011120302	Bolt, 11T, heat-treated M12-30P1.5	67 - 85	683.20 - 833.75	593.02 - 752.34	—
Engine base		K0017100252	Bolt, 8T, heat-treated, small, 10-25 P1.25	45 - 57	458.87 - 581.23	398.30 - 504.51	—
		K4040000150	Nut for attaching anti-vibration rubber	29 - 38	295.71 - 387.49	256.68 - 336.34	○
Joint mounting bracket front		K0017100252	Bolt, 8T, heat-treated, small, 10-25 P1.25	45 - 57	458.87 - 581.23	398.30 - 504.51	○
Joint mounting bracket rear		K0010100201	Bolt, heat-treated M10-20	58 - 76	591.43 - 774.97	513.36 - 672.68	○
Joint shaft housing		K0010080302	Bolt, 11T, heat-treated M8-30	14 - 19	142.76 - 193.74	123.91 - 168.17	○
Kingpin stopper		K0010120602	Bolt, 11T, heat-treated M12-60	Nut 52 - 67	530.24 - 683.20	460.25 - 593.02	—
Tie rod		K1610000020	Tie rod end right ass'y slotted nut	45	458.87	398.30	—
		K1611000020	Tie rod end left ass'y slotted nut	45	458.87	398.30	—

Maintenance standards and maintenance

Tightening Torque by Model

GM1700_Contour deck

Tighten the following bolts and nuts at the torque specified in the table.

For thread locking adhesive, apply a middle strength thread locker (ThreeBond 1322 anaerobic adhesives).

Location	Code	Part name	Tightening torque			Thread locking adhesive
			N-m	kgf-cm	lb-in	
Link fulcrum shaft	K0013100802	Bolt, 11T, heat-treated M10-80	29 - 38	295.71 - 387.49	256.68 - 336.34	—
Center knife shaft	K0017100251	Bolt, 8T, heat-treated, small, 10-25 P1.25	45 -57	458.87 - 581.23	398.30 - 504.51	○
Rotary knife shaft	K0010100251	Bolt, 11T, heat-treated M10-25	58 -76	591.43 - 774.97	513.36 - 672.68	○
Rotary knife	GM1700-2149Z1	Knife mounting bolt	130 - 150	1325.61 -1529.55	1150.63 - 1327.65	—
Deck connector	K0010100202	Bolt, 11T, heat-treated M10-20	58 - 76	591.43 - 774.97	513.36 - 672.68	—
Stopper arm	K0013080502	Bolt, 11T, heat-treated M8-50	14 - 19	142.76 - 193.74	123.91 - 168.17	—

Maintenance standards and maintenance

Jacking up the machine

About the Jacking up the machine

Warning

When replacing a tire or beginning any other maintenance or repairs, be sure to chock the wheels to prevent the machine from moving. Before jacking up the machine, park it on a hard, flat surface such as a concrete floor and remove any obstacles that could prevent you from performing the work safely.

When necessary, use an appropriate chain block, hoist, or jack.

Support the machine securely with jack stands or appropriate blocks.

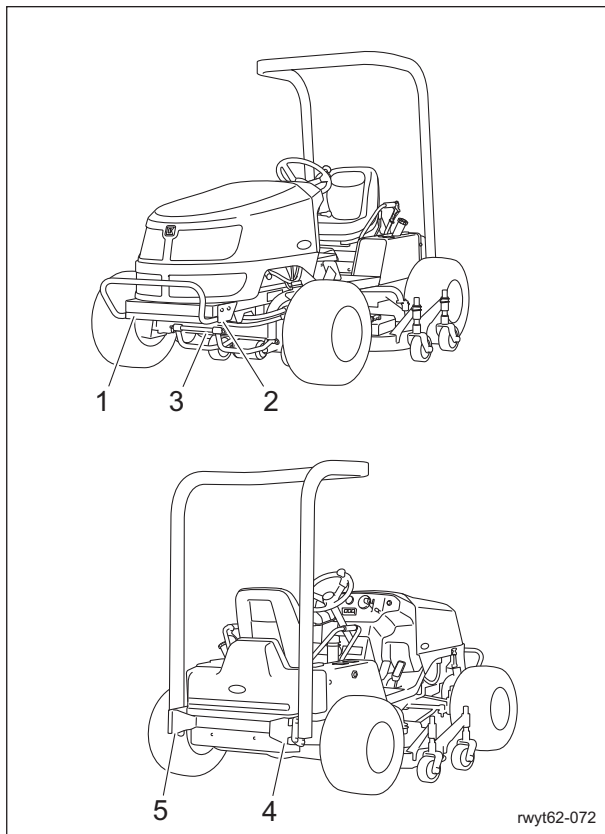
Failure to do so may cause the machine to move or fall, resulting in injury or death.

Use the jack-up points identified in this manual when jacking up the machine.

Only place a jack under the jack-up points specified.

Placing a jack at any other point could result in damage to the frame or other parts.

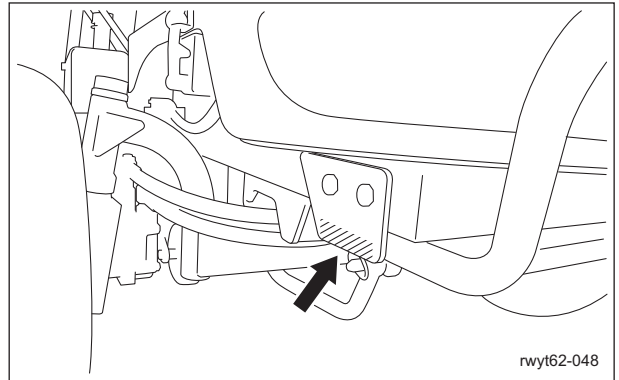
Jack-up Points



Jack-up Points_001

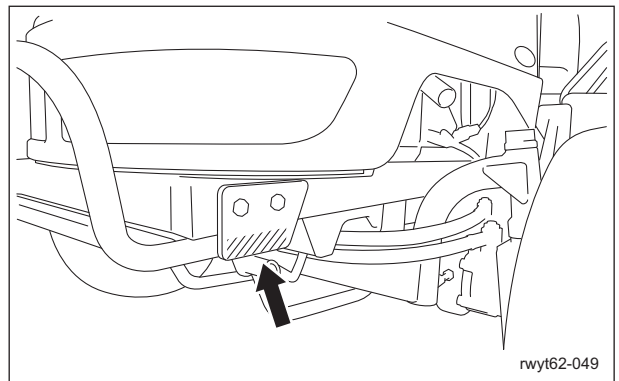
	Jack-up Points
1	Front right frame
2	Front left frame
3	Center of pivot
4	Rear right frame
5	Rear left frame

1. Front right frame



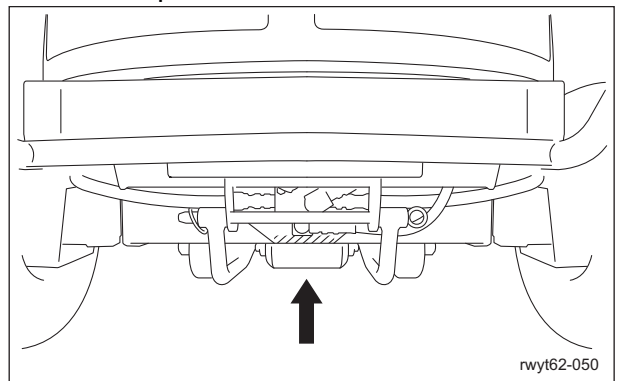
Jack-up Points_002

2. Front left frame



Jack-up Points_003

3. Center of pivot

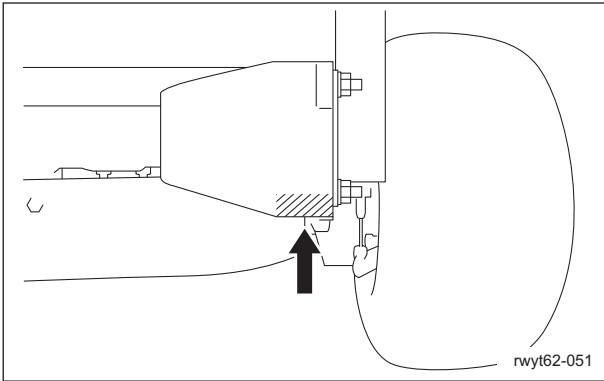


Jack-up Points_004

Maintenance standards and maintenance

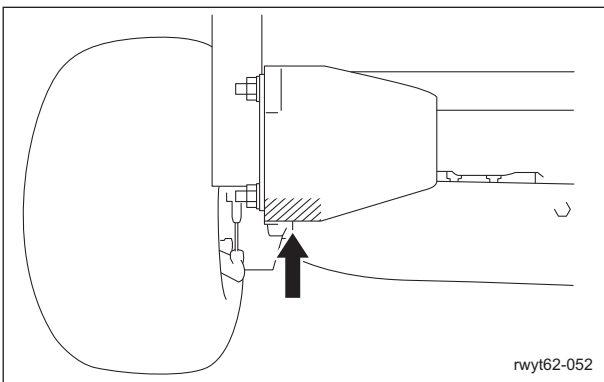
Maintenance standards and maintenance

4. Rear right frame



Jack-up Points_005

5. Rear left frame



Jack-up Points_006

Maintenance standards and maintenance

Greasing

About Greasing

Since there may be adhesion or damage due to lack of grease on moving parts, they must be greased.

Add urea-based No. 2 grease in accordance with the Maintenance Schedule.

Other locations where the specified grease or lubricant is used are indicated in "Greasing Points".

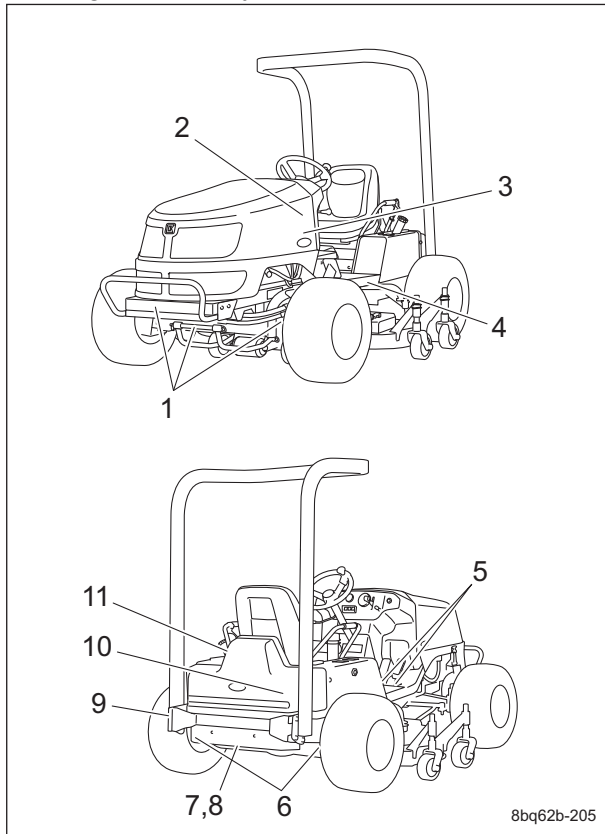
Add grease using the specified grease or lubricant.

Main body

■Greasing Points

Grease nipples are installed in the following locations.

Add grease every 50 hours of operation.



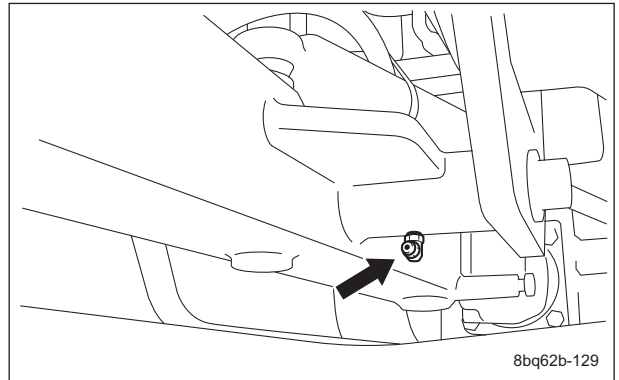
Greasing Points_001

	Location	No. of Greasing Points
1	Pivot	3
2	Knife rotation lever fulcrum	1
3	Brake pedal shaft fulcrum	1
4	Chain wheel mounting shaft fulcrum	2
5	Traveling pedal shaft fulcrum	2
6	Brake lever shaft	2
7	Joint fulcrum	2
8	Joint connector	1
9	Tension shaft fulcrum	1
10	Cam lever shaft fulcrum	1
11	Seat mounting bracket	1

1. Pivot

Jack up the machine and apply grease.

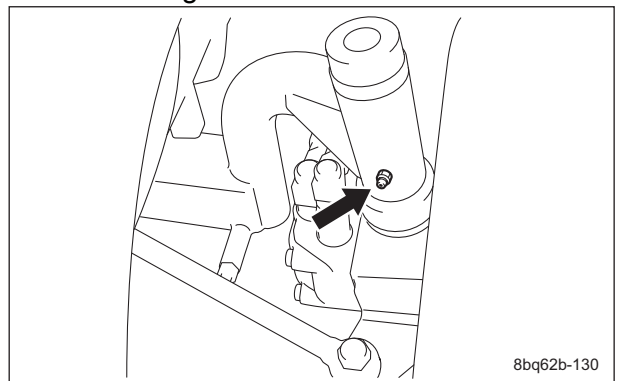
Middle between the front wheels



8bq62b-129

Greasing Points_002

Front right wheel

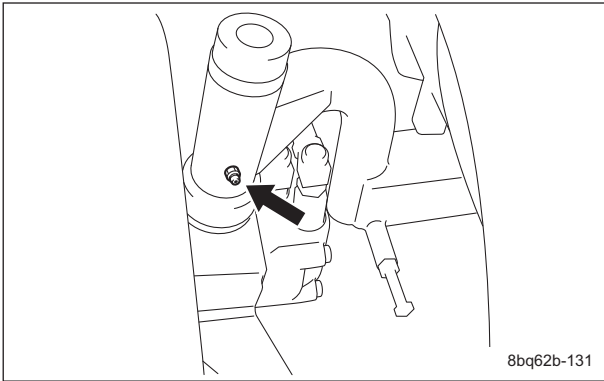


8bq62b-130

Greasing Points_003

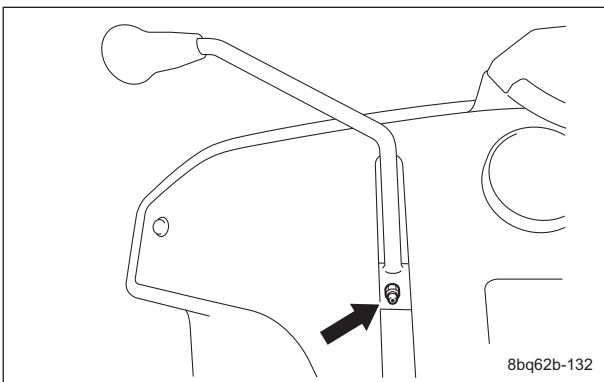
Maintenance standards and maintenance

Front left wheel



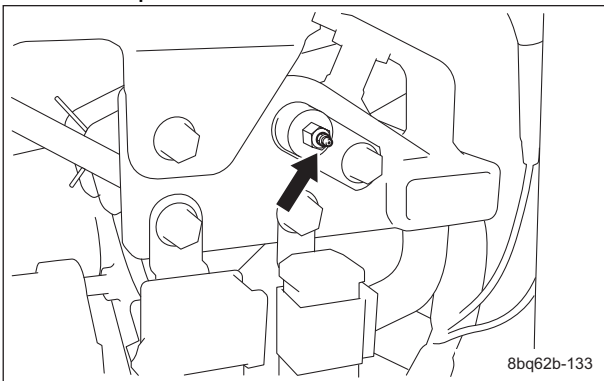
Greasing Points_004

2. Knife rotation lever fulcrum



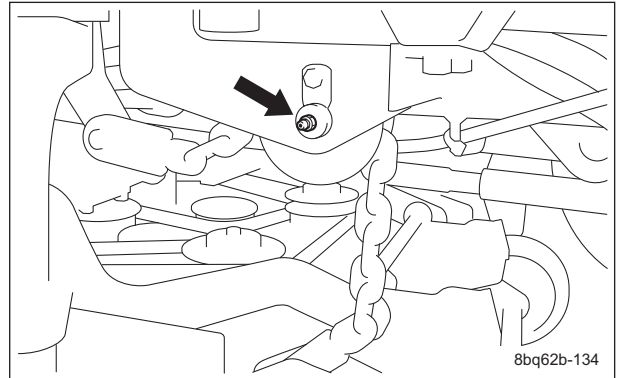
Greasing Points_005

3. Brake pedal shaft fulcrum



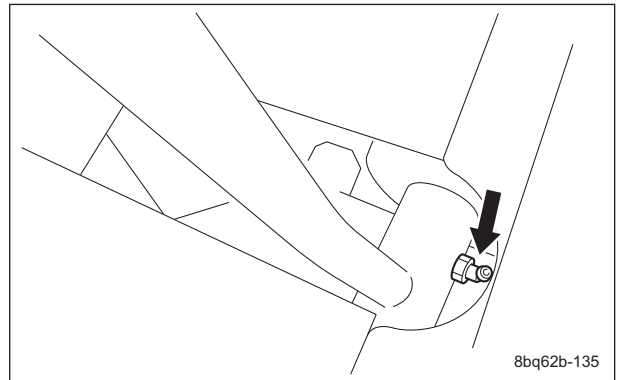
Greasing Points_006

4. Chain wheel mounting shaft fulcrum
There is one greasing point each on the left and right.



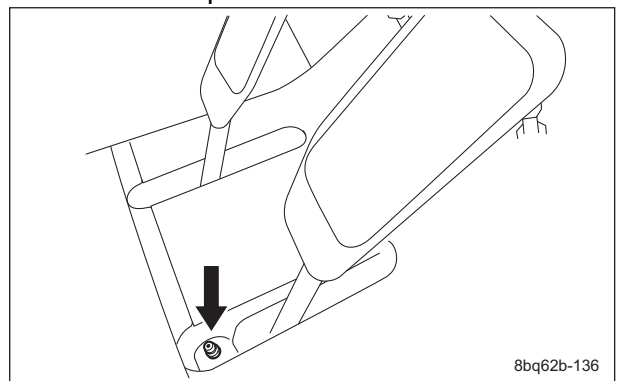
Greasing Points_007

5. Traveling pedal shaft fulcrum
Forward pedal



Greasing Points_008

Reverse pedal

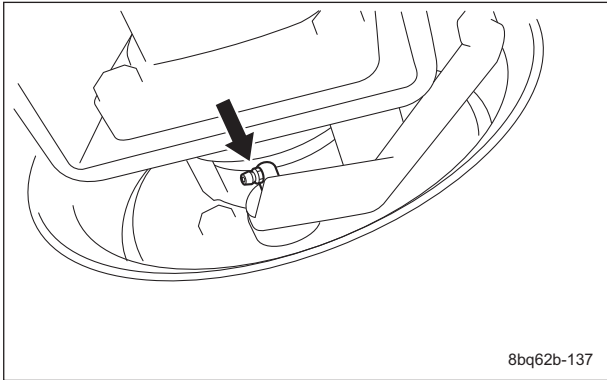


Greasing Points_009

Maintenance standards and maintenance

6. Brake lever shaft

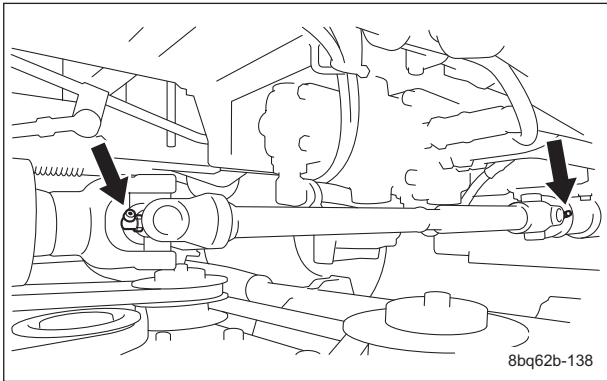
There is one greasing point each in the left and right brake areas.



Greasing Points_010

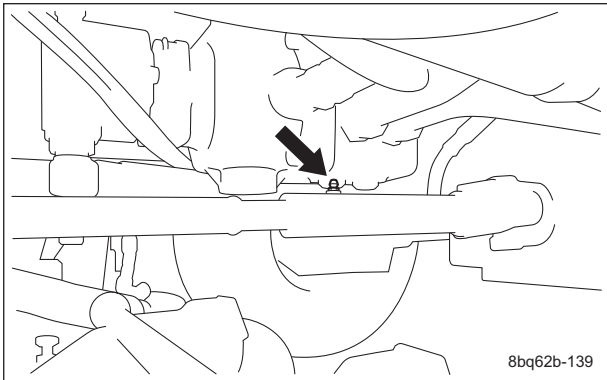
7. Joint fulcrum

There are two locations.



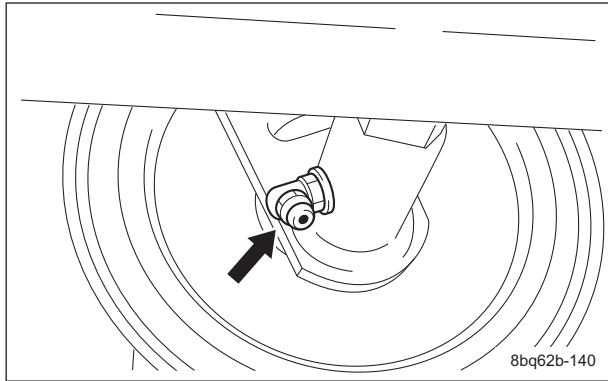
Greasing Points_011

8. Joint connector



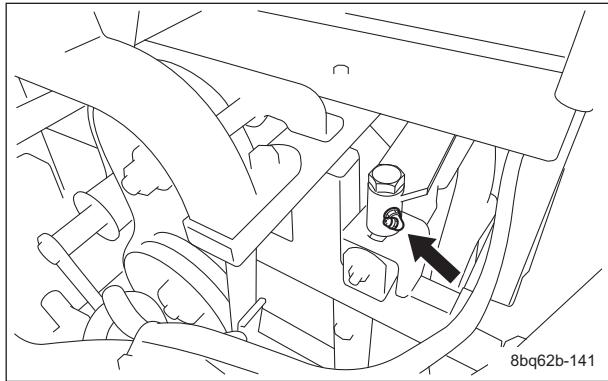
Greasing Points_012

9. Tension shaft fulcrum



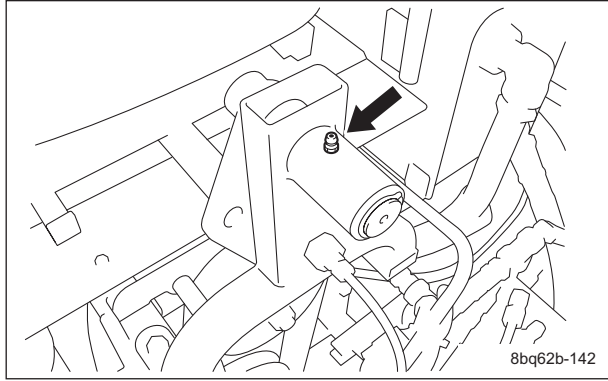
Greasing Points_013

10. Cam lever shaft fulcrum



Greasing Points_014

11. Seat mounting bracket



Greasing Points_015

Maintenance standards and maintenance

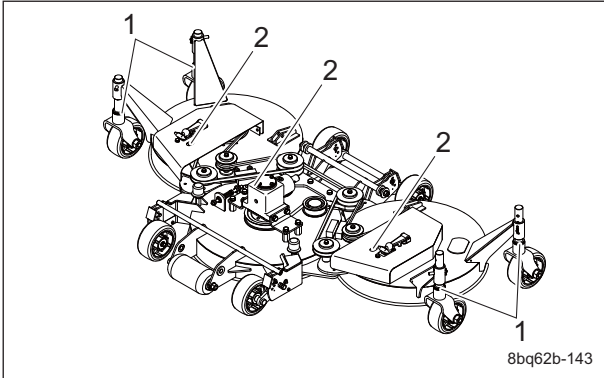
Maintenance standards and maintenance

Contour Deck

■ Greasing Points

Grease nipples are installed in the following locations.

Add grease every 50 hours of operation.

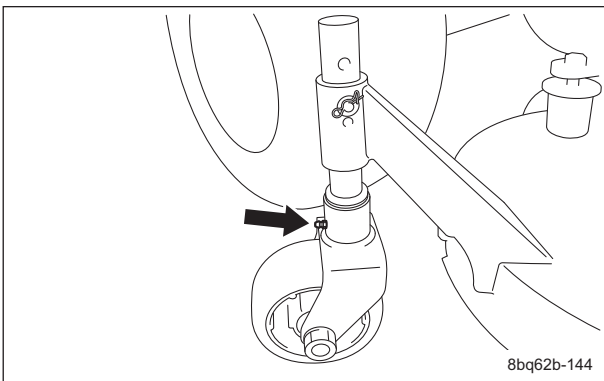


Greasing Points_001

	Location	No. of greasing points
1	Caster fulcrum	4
2	Tension lever fulcrum	3

1. Caster fulcrum

There are four locations.

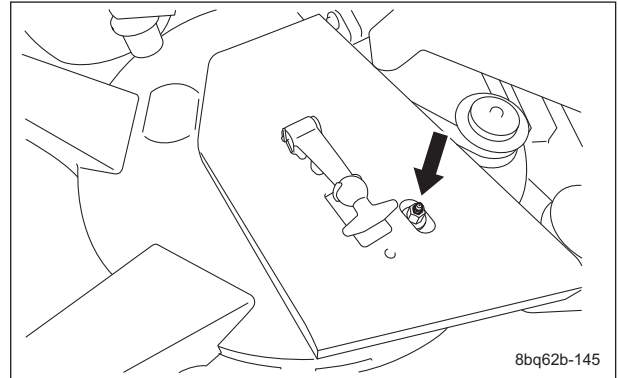


Greasing Points_002

2. Tension lever fulcrum

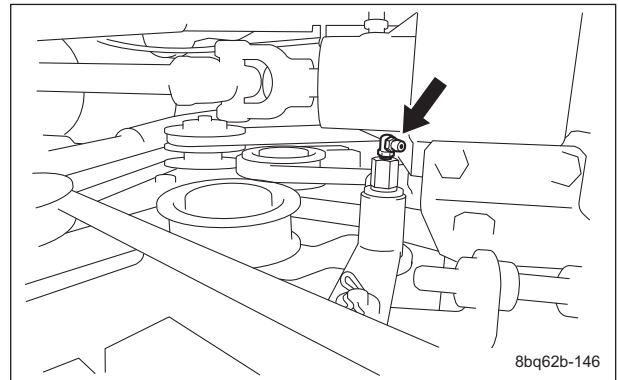
Left/right decks

There is one point each on the left and the right deck.



Greasing Points_003

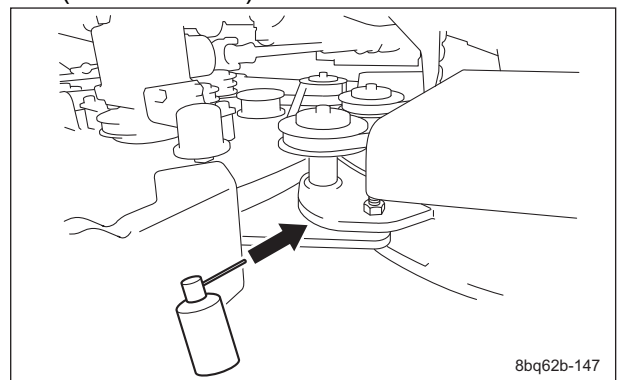
Center deck



Greasing Points_004

Note:

Apply lubricant to the deck connections (four locations).



Greasing Points_005

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Maintenance..... Page 4-2

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Specifications.....Page 4-3

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Steering Circuit..... Page 4-37

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Hydraulic system

Maintenance

Maintenance

This chapter describes primary checking and maintenance operations for the GM1700 hydraulic system.

For information on daily checks, maintenance and handling of the machine, please refer to the separate GM1700 Owner's Operating Manual and Parts Catalog.

To maintain the integrity of the hydraulic device, you must not overhaul the device for maintenance.

For those parts that must be repaired by the manufacturer, the overhaul procedure is not described in this manual. Request repairs for those parts from your dealer or Baroness.

Please note that our product warranty may be void if you overhaul the device.

Hydraulic system

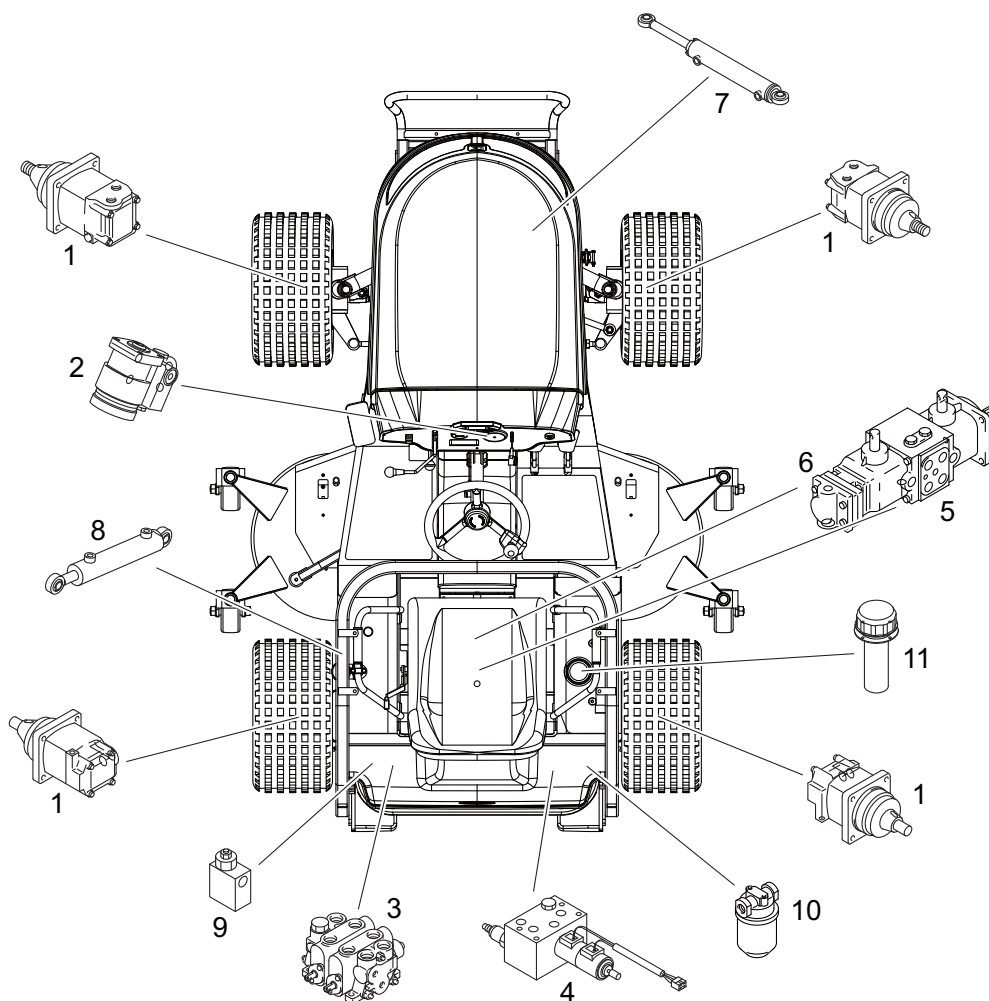
Specifications

Specifications

HST	KYB PSV2-16A		
	Piston pump	Displacement	0 - 16.4 cm ³ /rev (0 - 1.00 in ³ /rev)
		High-pressure relief set pressure	20.6 MPa (2,987.67 psi)
		Charge relief set pressure	0.6 MPa (87.02 psi)
Gear pump	Displacement	9.08 cm ³ /rev (0.55 in ³ /rev)	
Wheel motor	EATON orbit motor		
	Wheel motor 2-200BS4S	Displacement	195.0 cm ³ /rev (11.90 in ³ /rev)
Steering control unit	EATON VD5XMED-attached UAS070A08B2D		
	Orbitrol UAS070A08B2D	Displacement	51.0 cm ³ /rev (3.11 in ³ /rev)
		Relief set pressure	6.9 MPa (1,000.73 psi)
Flow divider VD5XMED	Prioritized flow rate	7.0 L/min (1.85 gal (US)/min)	
Solenoid valve (Mower unit up/down)	YOSHIZUKA HF78806-12		
	Solenoid valve	Relief set pressure	7.0 MPa (1,015.23 psi)
		Flow	19.0 L/min (5.02 gal (US)/min)
Control valve (2WD/4WD changeover)	KYB KVS-65K-2		
	Control Valve	Flow	65.0 L/min (17.17 gal (US)/min)
Relief valve (control valve)	SANYO DVR04		
	Relief valve	Relief set pressure	1.76 MPa (255.26 psi)
Hydraulic tank capacity	22.0 L (5.81 gal (US)/min)		
Hydraulic line filter	10µm cartridge type		
Hydraulic Oil	Shell Tellus S2M46 or equivalent (ISO VG46)		

Hydraulic system

Hydraulic System Layout



dwb7jb-010

Hydraulic System Layout_001

1	Wheel motor	5	Piston pump	9	Relief valve (DVR04)
2	Orbitrol	6	Gear pump (w/piston pump)	10	Cartridge filter
3	2WD/4WD changeover valve (KVS-65K-2)	7	Steering cylinder	11	Filler neck breather
4	Solenoid valve (HF78806-12)	8	Up/down cylinder		

Hydraulic system

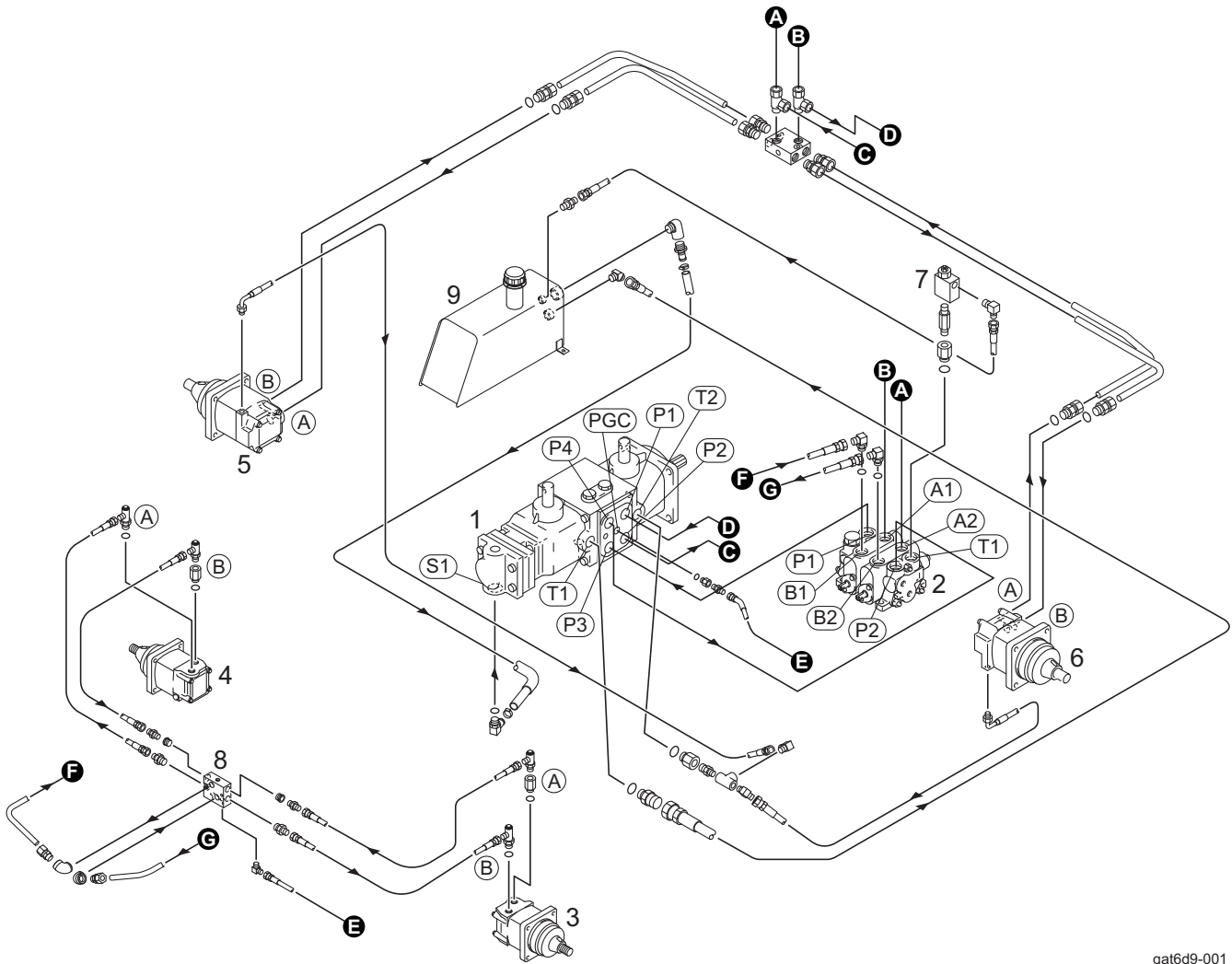
1. **Wheel motor**
This converts the fluid energy from the pump to mechanical energy (rotation motion) in order to directly drive the machine.
This is located at each wheel.
2. **Orbitrol**
This is a fully hydraulic power steering unit, switching of the internal valve depending on the rotational input from the steering wheel causes oil from the hydraulic pump to be fed to the steering cylinder.
It is located in the front part in the center cover.
3. **2WD/4WD changeover valve (KVS-65K-2)**
This channels the fluid energy from the two piston pumps to the wheel motor of the vehicle by manual changeover composed of multiple valves.
If the valve position is 4WD, the fluid energy is channeled from the front piston pump to the front wheel and from the rear piston pump to the rear wheel.
If it is 2WD, the fluid energy from the two piston pumps converges and flows into the rear wheel.
It is located in the rear left part of the main body.
4. **Solenoid valve (HF78806-12)**
This raises and lowers the mower unit by channeling the fluid energy from the gear pump to the up or down side of the up/down cylinder by changeover of the flow channel by opening and closing the electromagnetic valve.
It is located in the rear right part of the main body.
5. **Piston pump**
This converts the mechanical energy of the engine to fluid energy by using the reciprocating motion of the piston.
It is located in the center of the main body.
6. **Gear pump (w/piston pump)**
This converts the mechanical energy (rotation motion) of the engine to fluid energy by using two gears.
It is installed in the front part of the piston pump.
7. **Steering cylinder**
According to the control valve that is activated depending on the steering operation, the flow of the fluid from the hydraulic pump is changed to steer the vehicle to the left or right.
This is located between the front tires.
8. **Up/down cylinder**
This converts the fluid energy from the pump to mechanical energy (reciprocating motion) in order to raise and lower the mower unit.
It is located inside the fuel tank.
9. **Relief valve (DVR04)**
This automatically opens the valve and emits fluid if the pressure reaches the specified level and closes the valve if the pressure drops, in order to protect the equipment.
It is installed in the upper part of the 2WD/4WD changeover valve.
10. **Cartridge filter**
This removes dirt or dust in the outgoing fluid.
This fulfills an essential role since elements that could cause major problems may be circulated if there was no filter.
It is located in the rear right part of the main body.
11. **Filler neck breather**
While hydraulic mechanisms are functioning, the oil level is regularly raised and lowered. In addition, due to atmospheric pressure fluctuations as well as temperature fluctuations, air is flowing in and out of the hydraulic tank.
Therefore, the vent at the top of the hydraulic tank has an air breather so fresh air can flow in.
This is located in the oil filling port of the hydraulic tank.

Hydraulic system

Flow of Hydraulic Oil

Flow of Oil during Forward Traveling

■4WD



qat6d9-001

4WD_001

→ shows flow of oil.

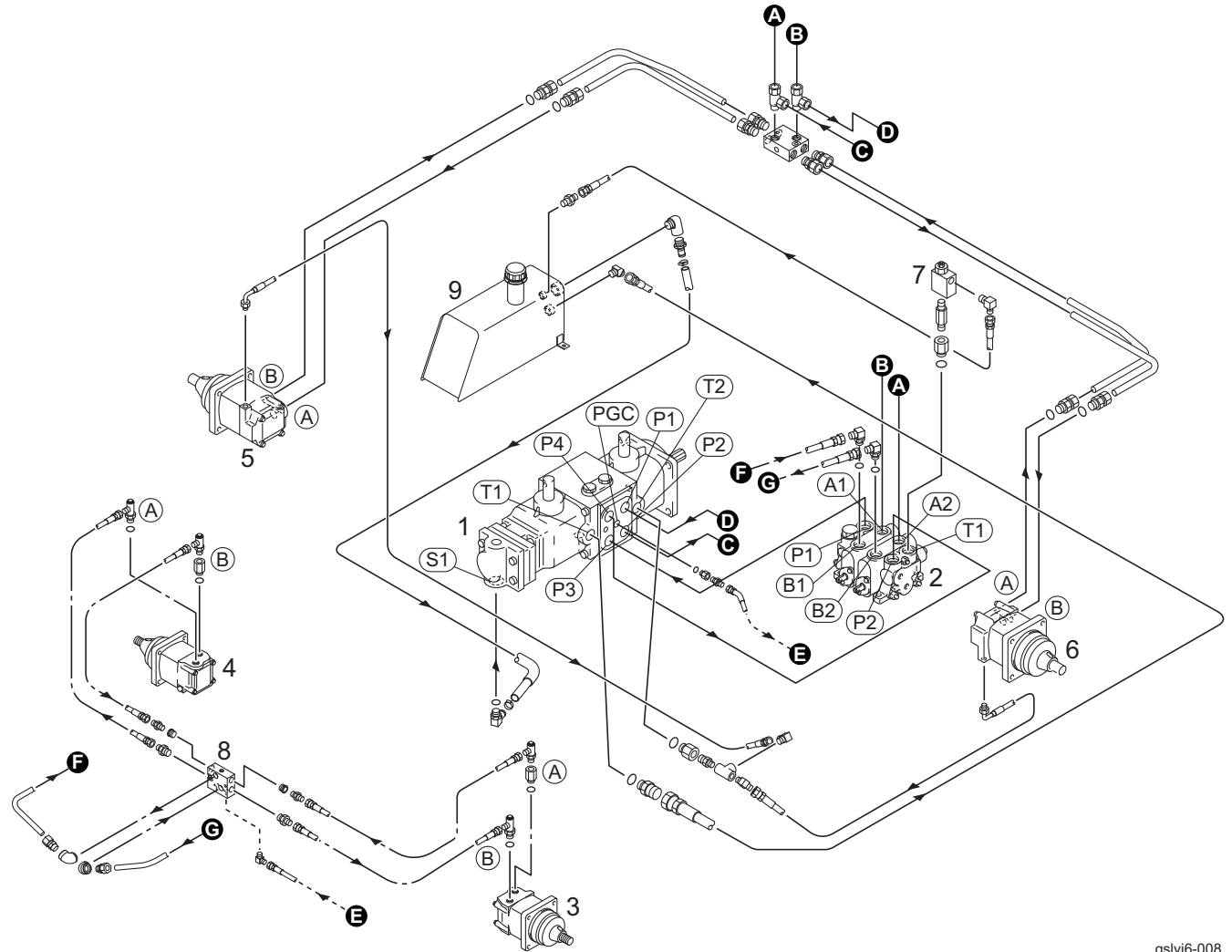
The flow of oil shows that for 4WD forward traveling.

○ shows port name inside.

1	Piston pump	5	Wheel motor (rear right)	9	Hydraulic tank
2	2WD/4WD changeover valve	6	Wheel motor (rear left)		
3	Wheel motor (front left)	7	Relief valve		
4	Wheel motor (front right)	8	Elbow w/check		

Hydraulic system

■2WD



2WD_001

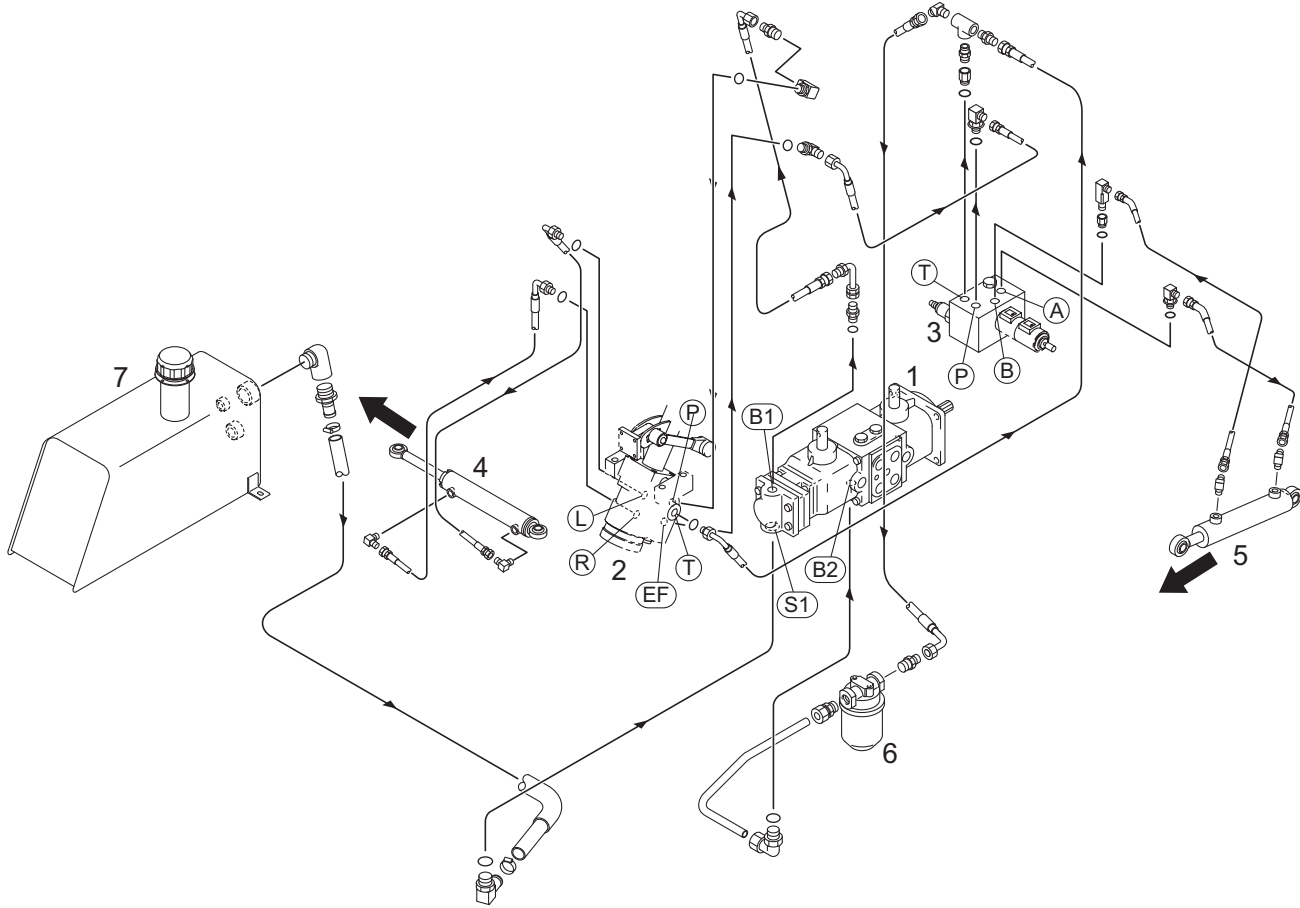
gslvj6-008

- shows flow of oil.
 - - - shows flow of supply oil of the front wheel motor.
 - - - - shows circulation of oil between the front wheel motor and 2WD/4WD changeover valve in the direction of the arrow.
- The flow of oil shows that for 2WD forward traveling.
- shows port name inside.

1	Piston pump	5	Wheel motor (rear right)	9	Hydraulic tank
2	2WD/4WD changeover valve	6	Wheel motor (rear left)		
3	Wheel motor (front left)	7	Relief valve		
4	Wheel motor (front right)	8	Elbow w/check		

Hydraulic system

Flow of Oil during Raising Mower Unit, with Power Steering Turning to Left



qwbqfy-007

Flow of Oil during Raising Mower Unit, with Power Steering Turning to Left_001

→ shows flow of oil.

The flow of oil shows that for raising the mower unit, turning the power steering to left.

○ shows port name inside.

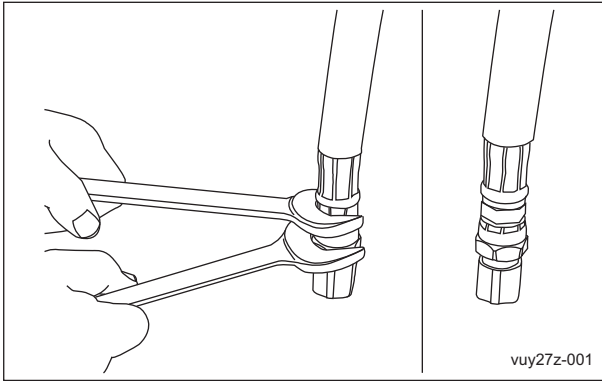
1	Piston pump	4	Steering cylinder	7	Hydraulic tank
2	Orbitrol	5	Up/down cylinder		
3	Solenoid valve	6	Cartridge filter		

General instructions

Hydraulic hose

Hydraulic hoses are subjected to excessive load when weathered, exposed to the sun or chemicals, stored in a very hot storage environment, or handled roughly during operation or maintenance work. These factors may cause damage to hoses or facilitate their deterioration. Since a hydraulic hose is more sensitive to external conditions than other components, check it frequently for damage, deterioration or the like of.

When replacing the hydraulic hose, check that the hose is straight (not twisted before fitting). When replacing the hydraulic hose, use two wrenches. First, support the hose at a designated point with the first wrench. Next, fasten the hose swing nut to the fitting with the second wrench.



Hydraulic hose_001

Warning

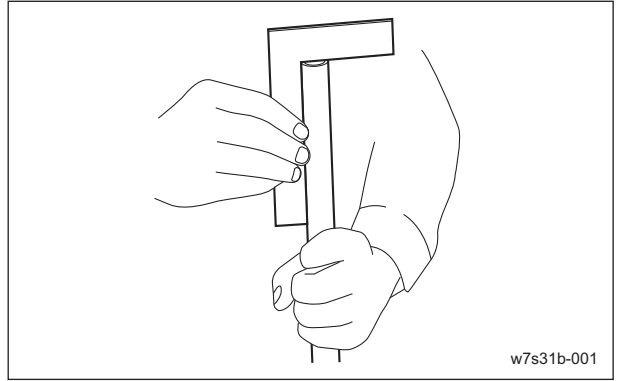
Be sure to depressurize the hydraulic system before maintaining or repairing it. Stop the engine, and lower the rake. When checking for pinhole leakage of the hydraulic circuit or oil leakage of the nozzle, search for a leakage point using something like paper or cardboard, never with your bare hands. Be careful about high-pressure oil which may pierce your skin, resulting in physical injury.

Hydraulic fitting

Bite type tube fitting

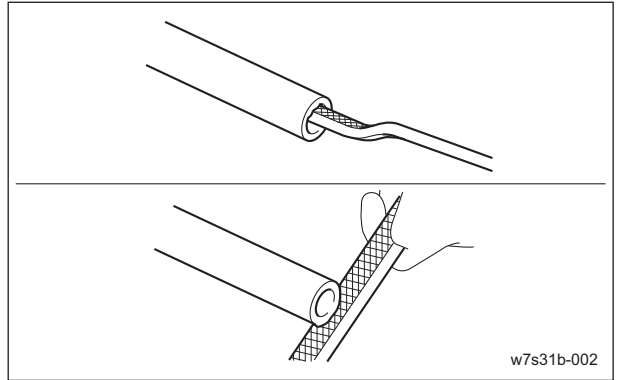
Preliminary tightening (Preset)

1. Cut the tube at the designated length at a right angle.



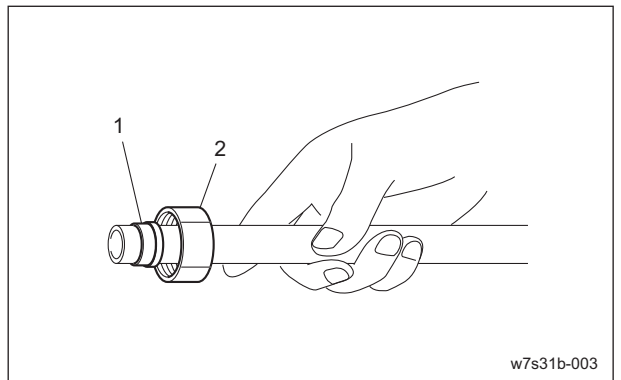
Bite type tube fitting_001

2. Remove burrs on the inside and outside of the tube with a file or the like of.



Bite type tube fitting_002

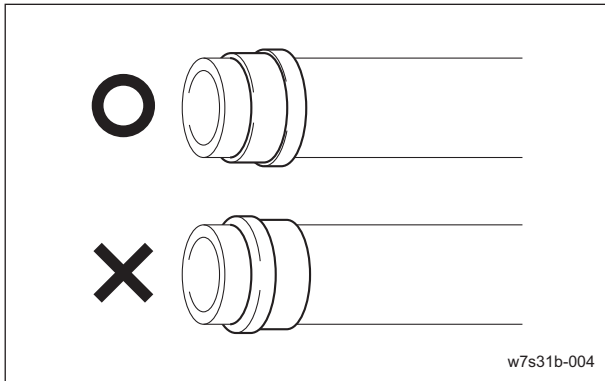
3. Insert the nut and sleeve into the tube. Note the direction of the sleeve.



Bite type tube fitting_003

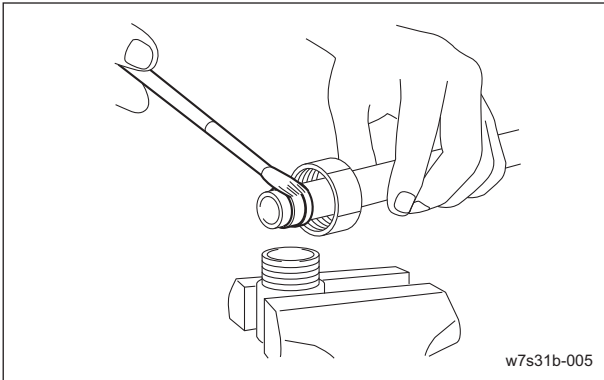
1	Sleeve
2	Nut

Hydraulic system



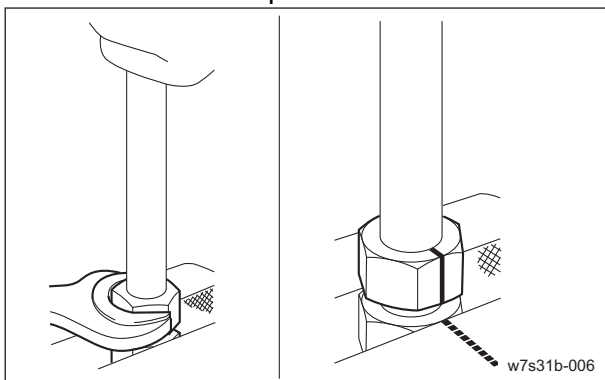
Bite type tube fitting_004

4. Fix the temporary tightening jig onto the vise and apply hydraulic oil to the threads, tapered part, and sleeve.



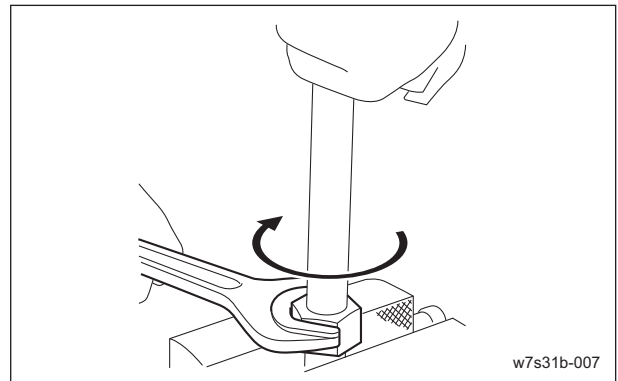
Bite type tube fitting_005

5. Put the tube end onto the hole bottom of the temporary tightening jig and tighten the nut slowly to the point where the tube can no longer be rotated by hand. This point is called the "zero point."



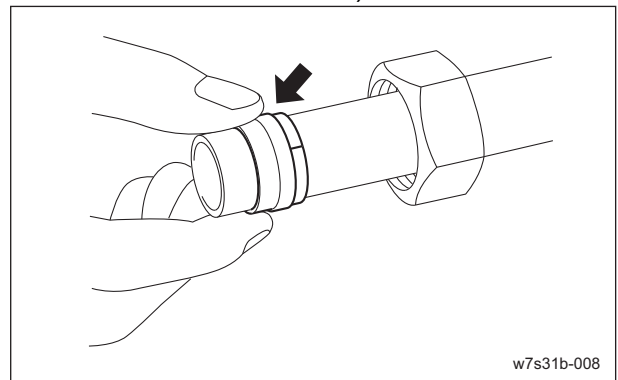
Bite type tube fitting_006

6. Matchmark the zero point and further tightening of 3/4 to one turn will cause the sleeve to bite into the tube.



Bite type tube fitting_007

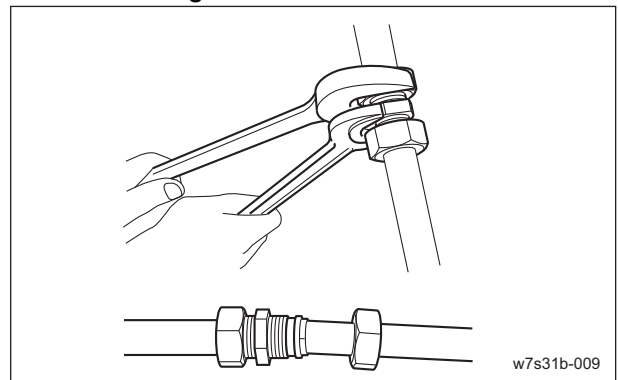
7. Fasten the nut and check that the sleeve end is a few mm apart from the tube end and the sleeve will not move in axial direction (it is allowed to move in the circumferential direction).



Bite type tube fitting_008

Final tightening (Reset)

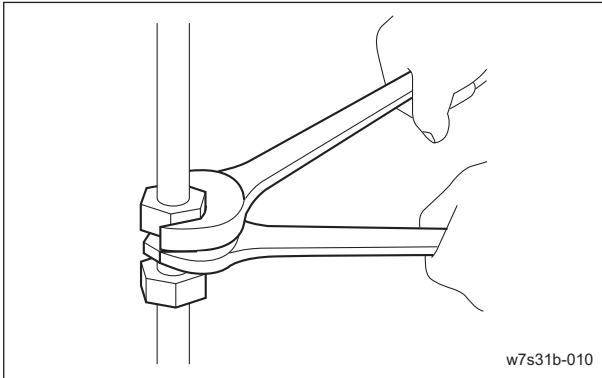
- Fit the preliminary tightened tube onto the fitting body. Tighten with a spanner to the point where some resistance is suddenly felt, then further tighten with the nut for a 1/4 turn.



Bite type tube fitting_009

Note:

For direct tightening, use the fitting body to follow procedures 1 to 5 when using a temporary tightening jig, and set the zero point. Further tighten for 1 and 1/4 turns from the zero point.

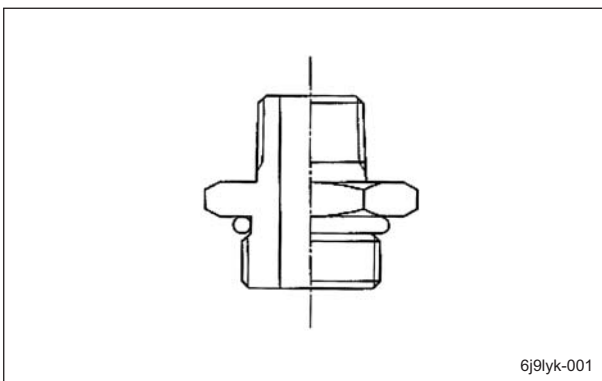


Bite type tube fitting_010

Reuse of piping

Bite type fitting can be reused if an inspection finds no flaw or other damage on the sleeve surface. Done properly, disassembly and retightening can be carried out up to five times or so.

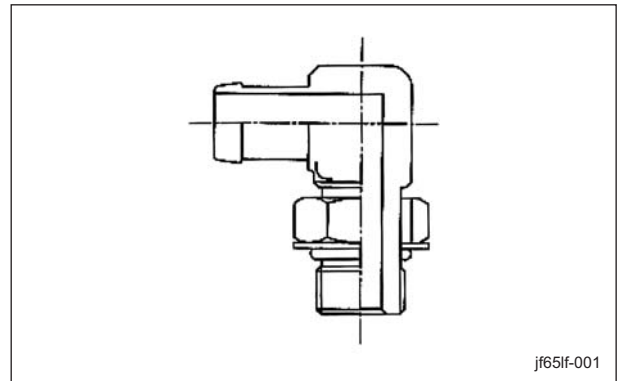
Fitting with parallel pipe threads (O-ring sealing system)



Fitting with parallel pipe threads (O-ring sealing system)_001

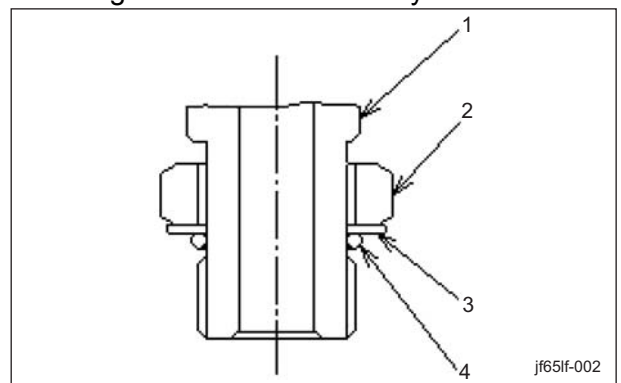
1. Check to see if the O-ring is properly fitted to the groove of the main body.
2. Check to see that the thread part, seat surface of O-ring port and O-ring are free from flaws or foreign matter.
3. Before fitting, apply hydraulic oil or grease to the O-ring.
4. For fitting, screw in by hand till the main body touches the other side lightly, then tighten securely with a tool such as a spanner.

Adjustable Elbow



Adjustable Elbow_001

1. Make sure that the positions of the nut, washer, and O-ring are correct. If they are in the correct positions, the washer is pressed into the upper end of the groove of the main body.

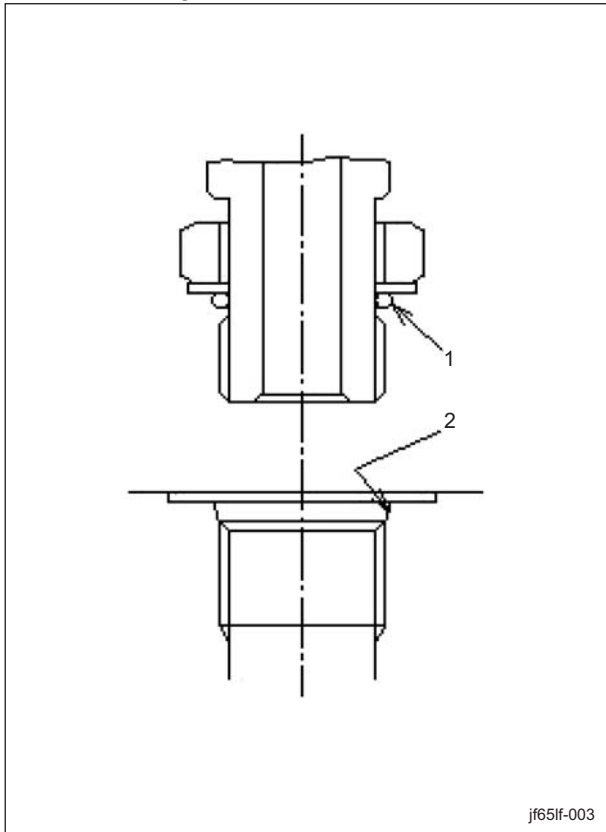


Adjustable Elbow_002

1	Main body
2	Lock nut
3	Washer
4	O-ring

Hydraulic system

2. Make sure that the thread portion, sheet surface of the O-ring port, and O-ring are not contaminated with foreign objects. Apply oil or grease to the sheet surface and O-ring before installation.



Adjustable Elbow_003

1	O-ring
2	Sheet surface

⚠ Caution

Never give the locknut more than one turns. If you give it more than one turn, the thread fit between the other side port and locknut becomes loose, which reduces the thread strength.

If the washer goes too deeply into the other side port, the washer gets deformed, which leads to oil leakage.

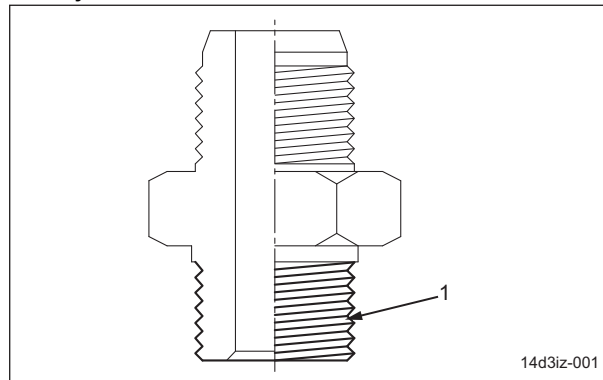
Rough installation makes the main body and nut overloaded, which leads to deformation. Be sure to observe the installation procedure.

3. To fit, screw the main body by hand till the washer face touches lightly, and turn from that position in the loosening direction to the setting position.

4. After fitting the opposite screw, tighten the lock nut while holding the main body with a spanner etc. to ensure that the setting position does not change.

Taper Pipe (PT) Thread Joint (Sealing Tape Method)

1. Make sure that the taper thread portion is not damaged or contaminated with foreign objects.



Taper Pipe (PT) Thread Joint (Sealing Tape Method)_001

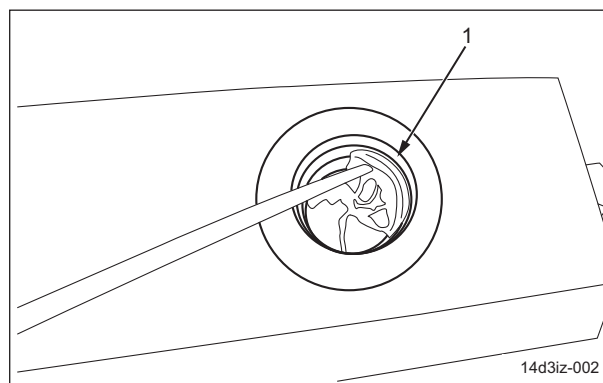
1	Taper (PT) thread portion
---	---------------------------

Important

If a used taper pipe (PT) thread joint retains the residue of old sealing tape, using it again for assembly may cause machine problems or oil leakage.

Important

If you remove a taper thread joint, remove the sealing tape residue from the joint and connecting portion, so that the tape residue will not enter the hydraulic system.

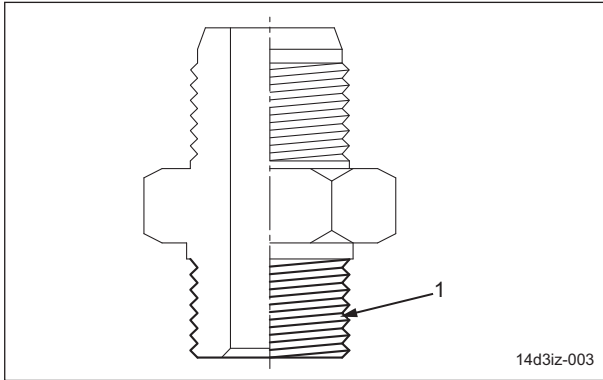


Taper Pipe (PT) Thread Joint (Sealing Tape Method)_002

1	Taper (PT) thread connecting portion
---	--------------------------------------

Hydraulic system

2. Before connecting the joint, wind sealing tape on the taper thread portion. (See "How to Use the Sealing Tape" (Page 4-13) .)



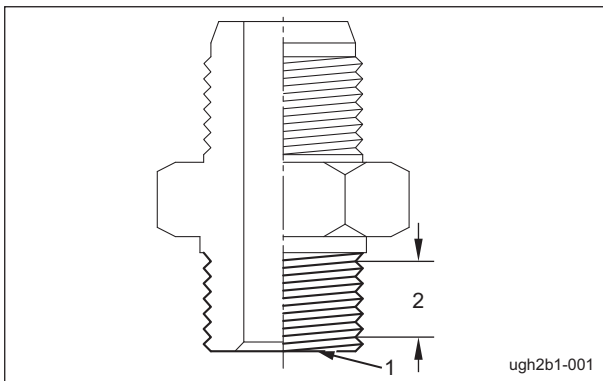
Taper Pipe (PT) Thread Joint (Sealing Tape Method)_003

1	Taper (PT) thread portion
---	---------------------------

How to Use the Sealing Tape

Important

Using the sealing tape with its end out of the edge face may cause a trouble of the machine due to its debris invading the hydraulic circuit.



How to Use the Sealing Tape_001

1	Edge face
2	Sealing area

Important

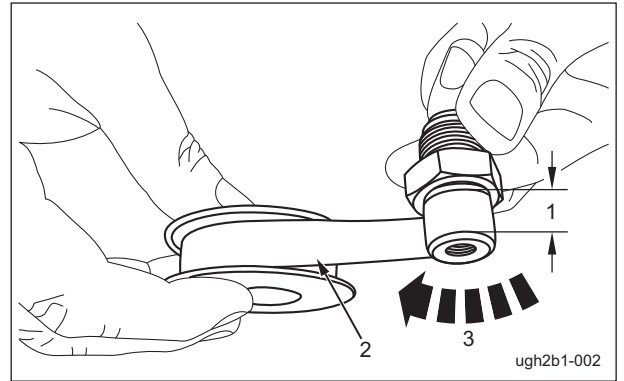
Loosening again the taper thread joint which has been tightened may reduce its sealing effect to cause leakage of oil.

Note:

Pay attention to the following precautions when you use the sealing tape.

- Slightly pull the sealing tape (as tight as you can clearly see the thread mark on the tape) while you wrap it and overlap a half of its width to the previous round.

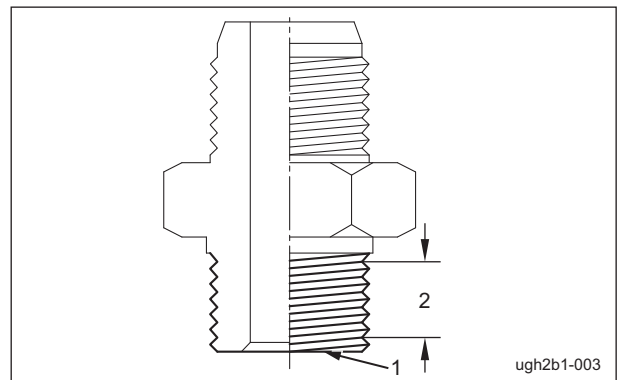
- Wrap it in clockwise direction (direction to tighten the screw). Wrapping in the opposite direction may cause the tape to be easily peeled off.



How to Use the Sealing Tape_002

1	Sealing area
2	Sealing tape
3	Clockwise direction

1. Wrap it in clockwise direction (direction to tighten the screw) about 1.5 to 2 turns from edge to root, starting from the point of 1 to 2 threads apart from the edge face of the thread.



How to Use the Sealing Tape_003

1	Edge face
2	Sealing area

Hydraulic system

Towing

Important

Going over the limit of towing may lead to the failure of hydraulic equipment.
 Also, if the machine is towed at high speed, the wheel may cease its motion.
 Stop towing in case of wheel lock.
 Resume towing at low speed after the pressure has been stabilized.

In the event of loss of mobility due to engine trouble or the like of, movement is possible through towing or hand driving.

Take the shortest route when towing or hand driving the machine.

Transport the machine on a trailer if you have to transport it a long way.

For the towing method, see the Owner's manual.

Neutral

If the machine goes forward or in reverse without pressing on the forward/reverse pedals, the neutral is not working. Adjust accordingly.

Refer to the Owner's manual for adjustment of the neutral.

Depressurization

Be sure to depressurize the hydraulic system before inspecting or repairing it.

When performing depressurization, move the machine to level surface.

Apply the parking brake, and then lower the operating machine.

Then, stop the engine and remove the key.

To depressurize the hydraulic circuit, set the traveling pedal and all the drives of the operating machine to the neutral position.

To depressurize the steering circuit, turn the steering wheel side to side.

Hydraulic circuit failure

The hydraulic traveling circuit of this equipment is made up of a closed circuit.

In the event of failure of the hydraulic equipment of the hydraulic circuit, debris and contaminant from the faulty hydraulic equipment will circulate to every part of the circuit.

Since this contaminant causes damage to other hydraulic equipment, such debris and contaminant must be removed to prevent further failure of other hydraulic equipment. In the event that failure of hydraulic equipment is found in the hydraulic circuit, remove hydraulic hoses and piping of the whole hydraulic circuit and clean them well with kerosene.

Drain all the hydraulic oil from hydraulic tank and hydraulic equipment other than the hydraulic hoses and piping and clean them well.

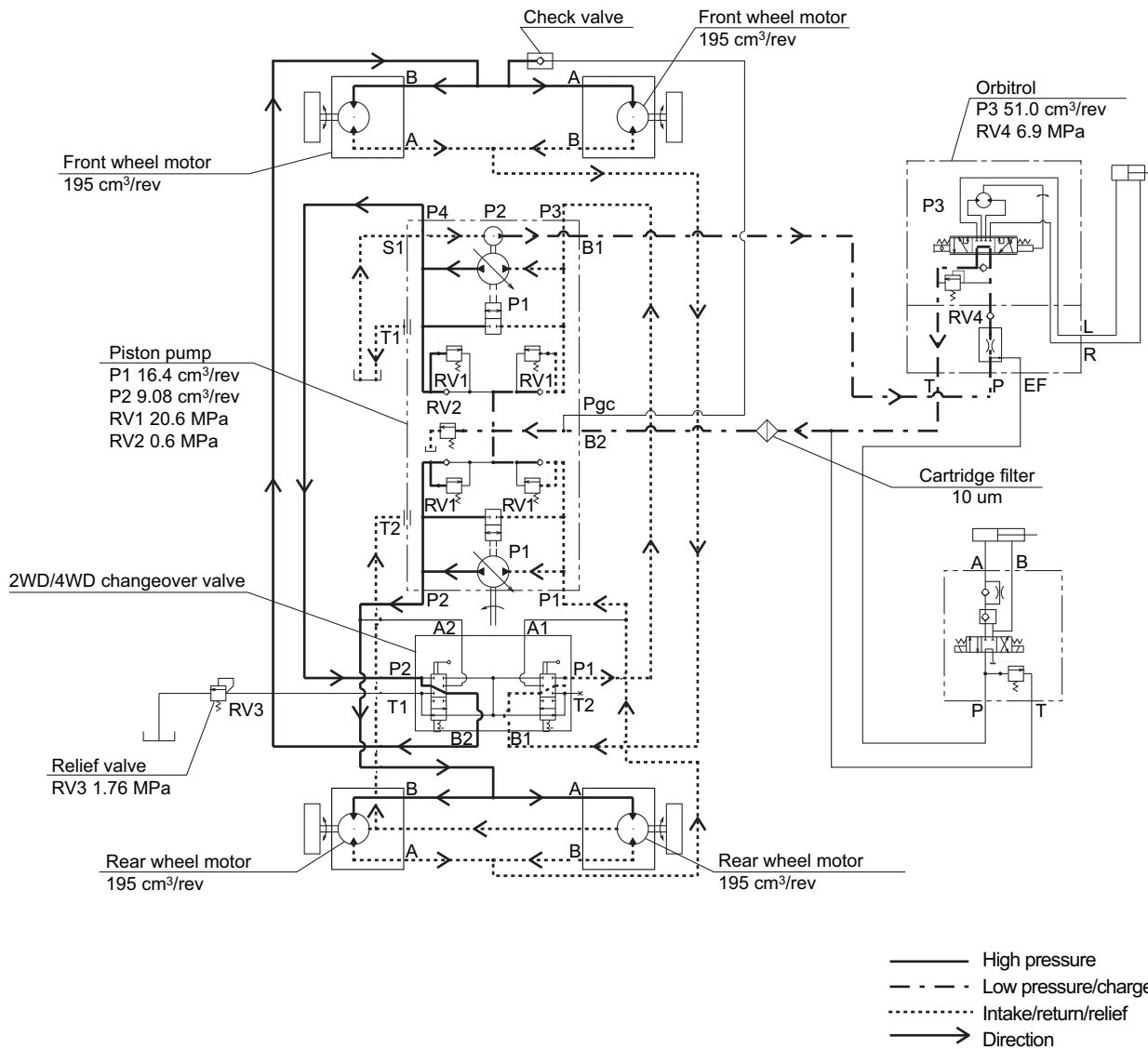
We recommend to replace the hydraulic oil, hydraulic oil filter and defective hydraulic equipment with new ones.

Hydraulic system

Hydraulic circuit flow

Traveling circuit

Forward traveling (4WD)



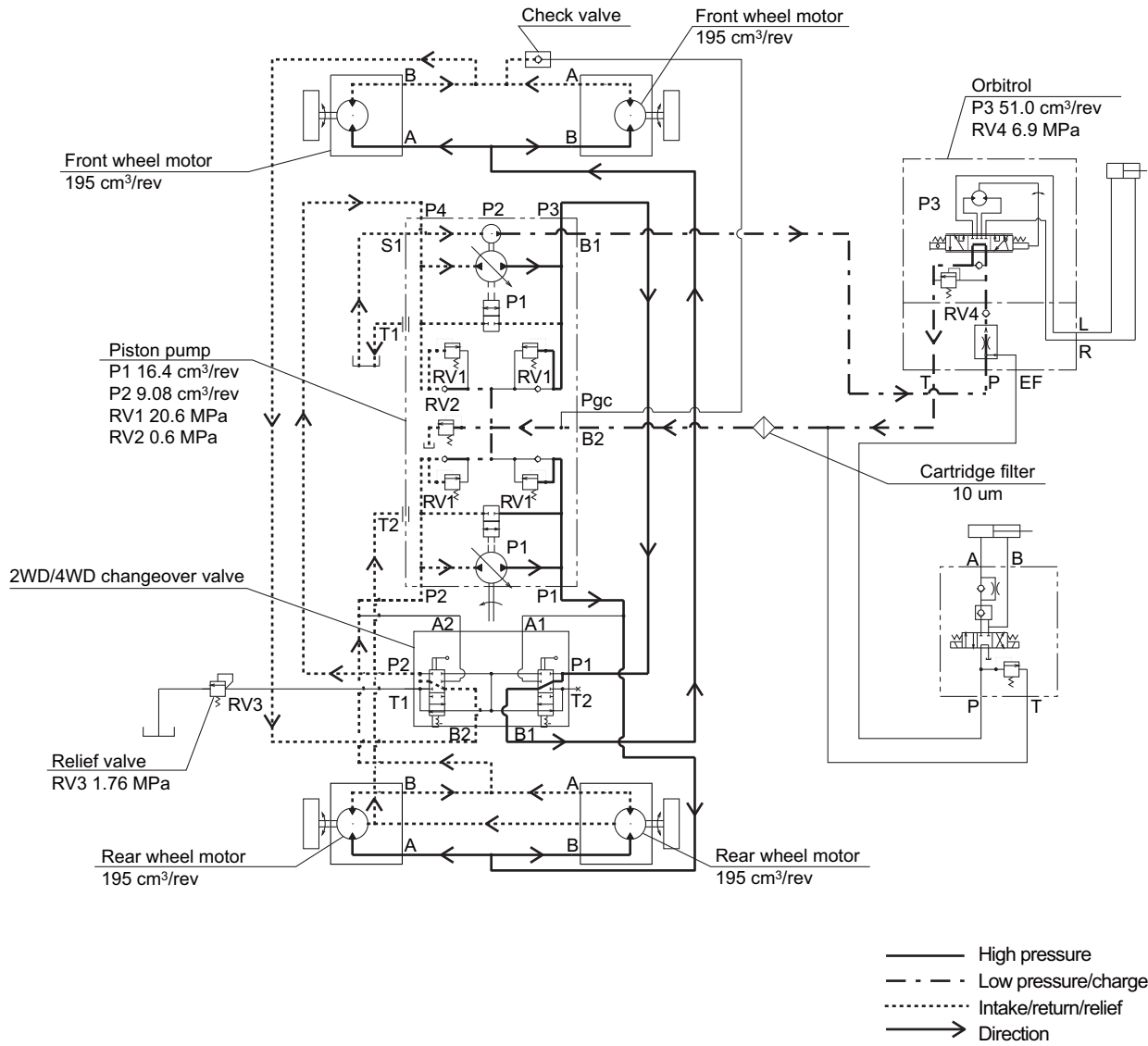
Forward traveling (4WD)_001

ms5j2m-015

Hydraulic system

Hydraulic system

Backward traveling (4WD)

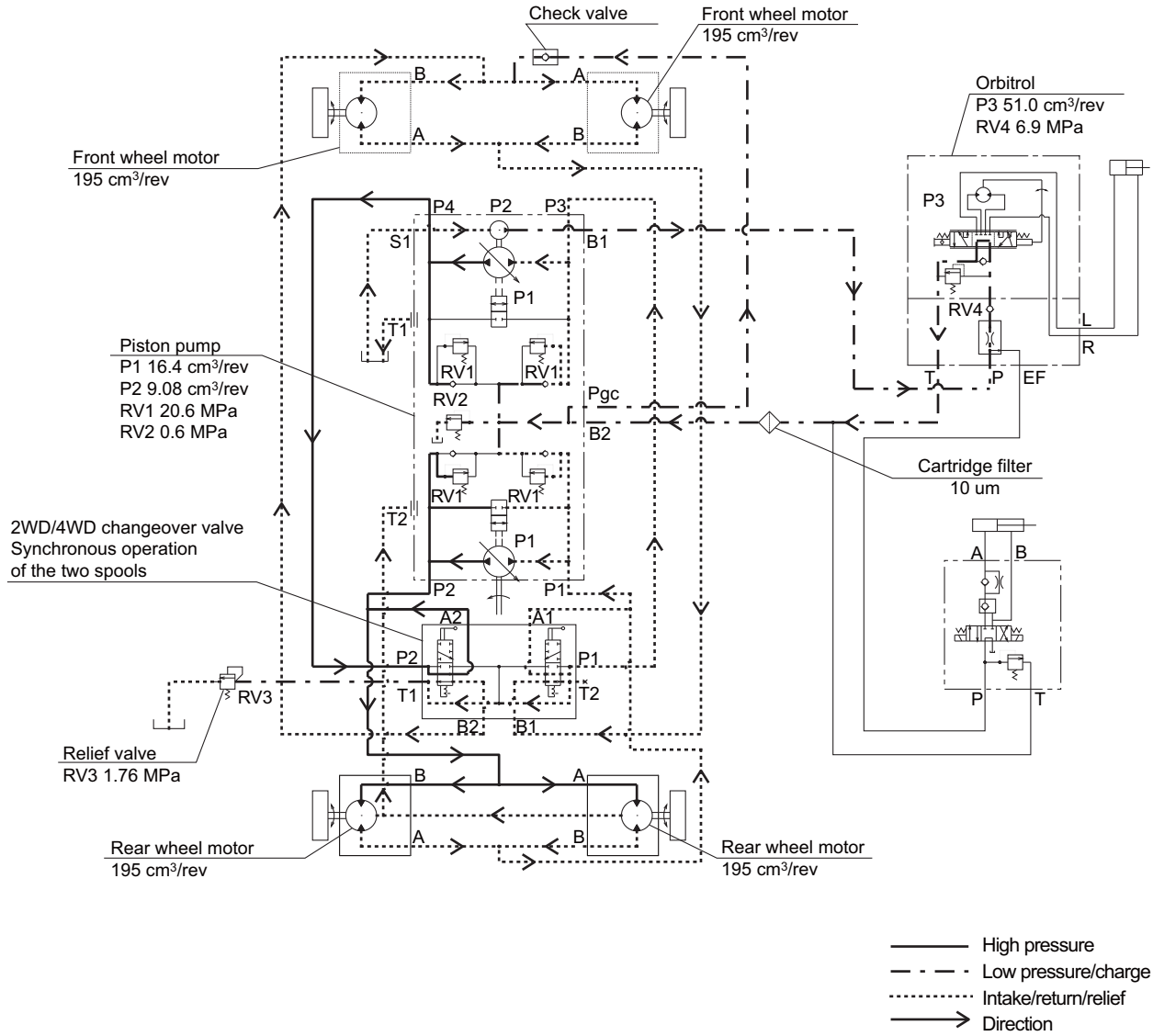


hs919t-002

Backward traveling (4WD)_001

Hydraulic system

Forward traveling (2WD)



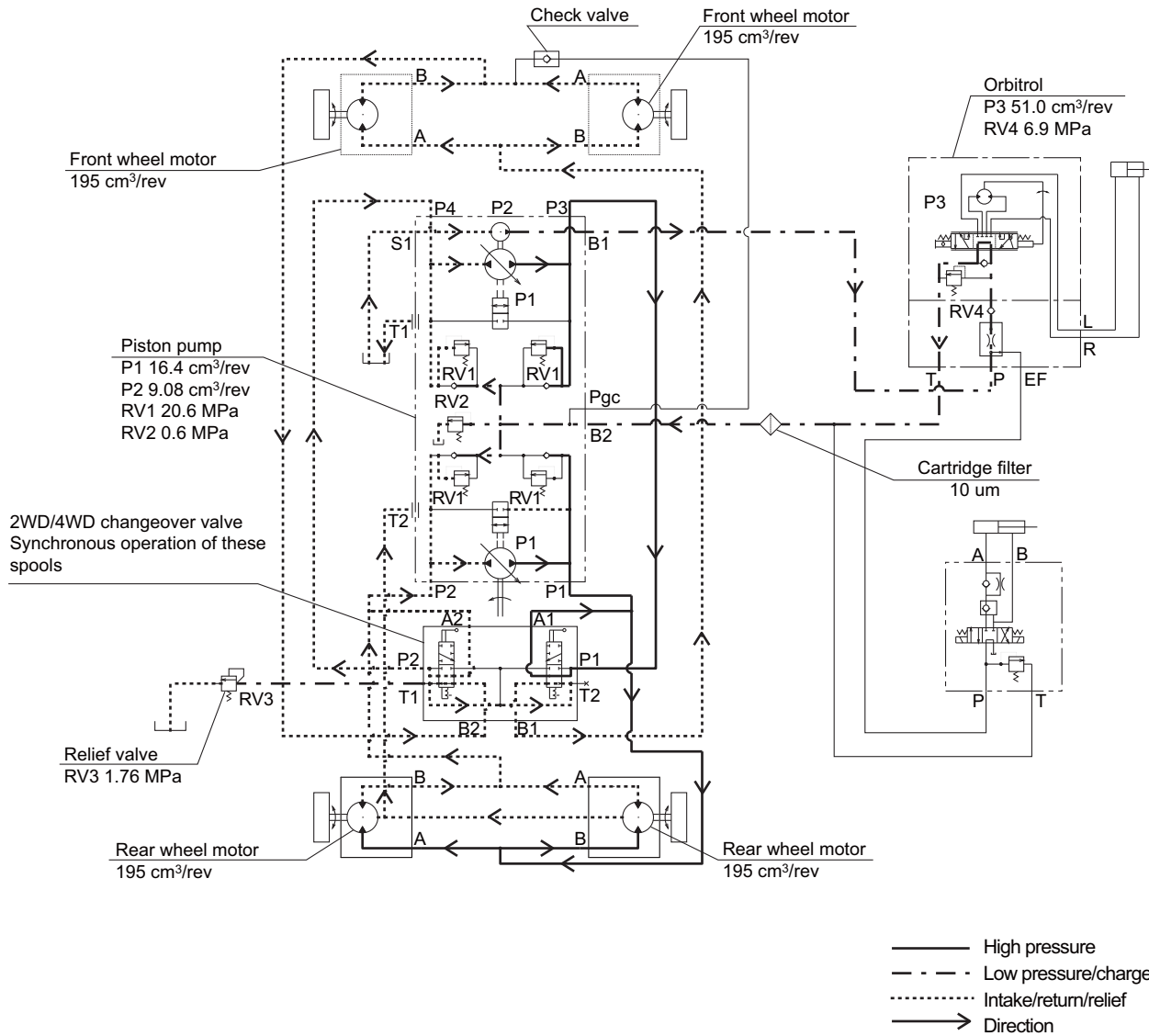
Hydraulic system

Forward traveling (2WD)_001

c983zk-002

Hydraulic system

Backward traveling (2WD)



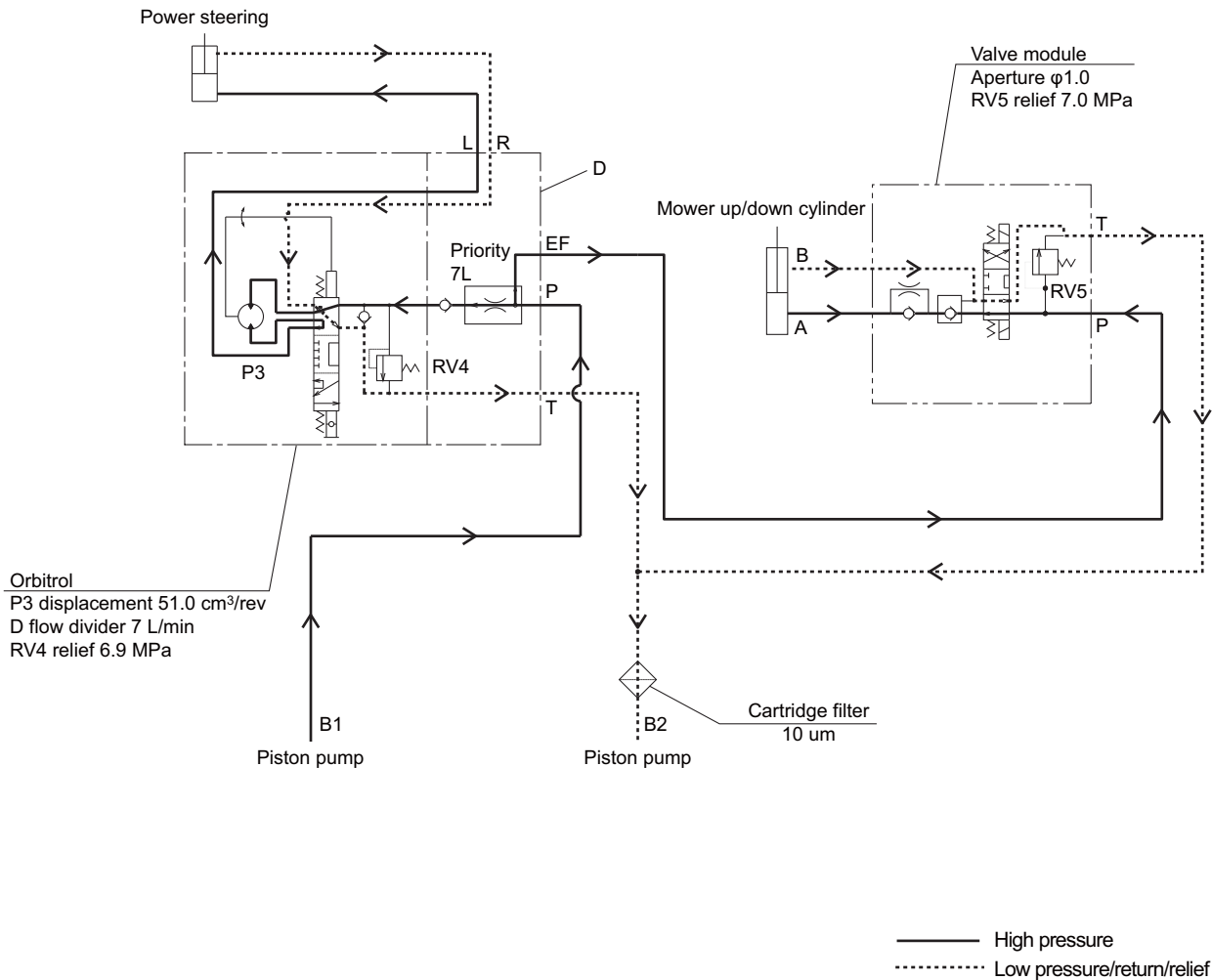
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Backward traveling (2WD)_001

Hydraulic system

Steering, Raise/lower circuit

Steering counter-clockwise turning, up/down cylinder raising



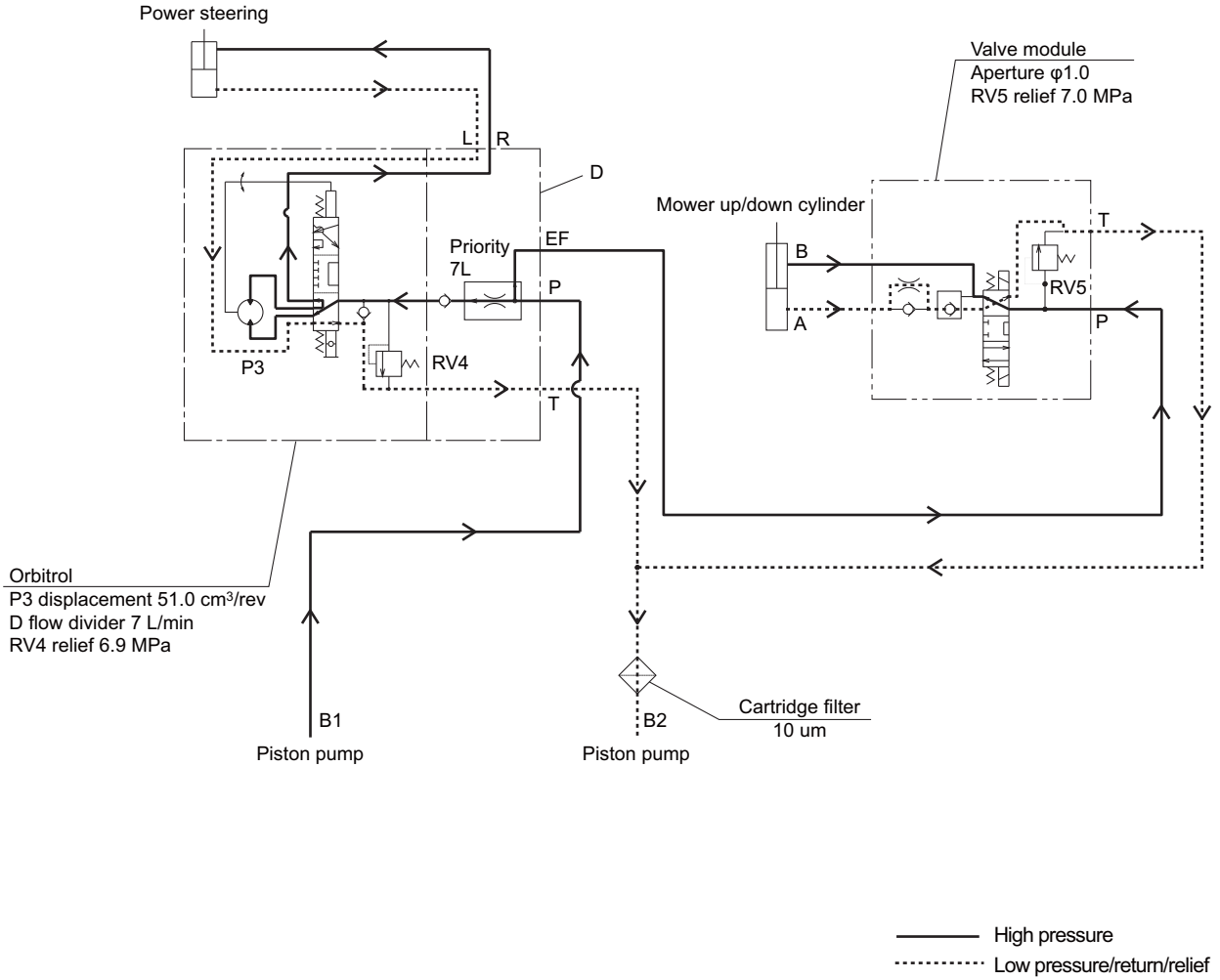
Hydraulic system

lvf5si-002

Steering counter-clockwise turning, up/down cylinder raising_001

Hydraulic system

Steering clockwise turning, up/down cylinder lowering

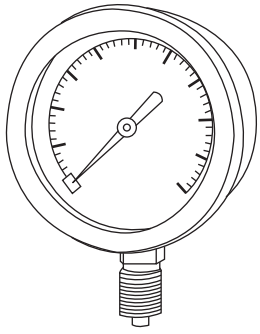
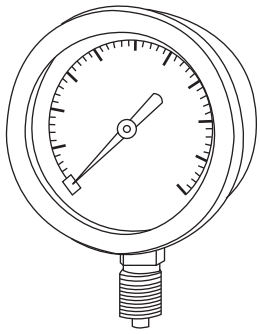
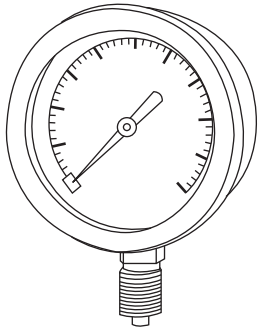


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Steering clockwise turning, up/down cylinder lowering_001

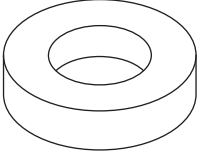
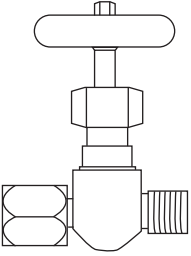
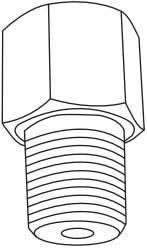
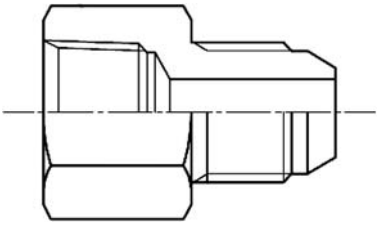
Special Tool

List of Special Tools

<p>Pressure gauge for high pressure measurements</p>  <p style="text-align: right; font-size: small;">vasdfi-004</p>	<p>K4701000010</p>	<p>Pressure: For the range of 0 - 35 MPa For the range of 0 - 5,076.40 psi For the range of 0 - 356.90 kgf/cm²</p> <p>Primarily used for measuring the pressure of high-pressure parts.</p>
<p>Pressure gauge for low pressure measurements</p>  <p style="text-align: right; font-size: small;">vasdfi-004</p>	<p>K4701000020</p>	<p>Pressure: For the range of 0 - 15 MPa For the range of 0 - 2,175.60 psi For the range of 0 - 152.96 kgf/cm²</p> <p>Primarily used for measuring the pressure of low-pressure parts.</p>
<p>Pressure gauge for extremely low pressure measurements</p>  <p style="text-align: right; font-size: small;">vasdfi-004</p>	<p>K4701000030</p>	<p>Pressure: For the range of 0 - 5 MPa For the range of 0 - 725.20 psi For the range of 0 - 50.99 kgf/cm²</p> <p>Primarily used for measuring the pressure of extremely low-pressure parts.</p>

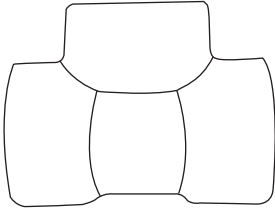
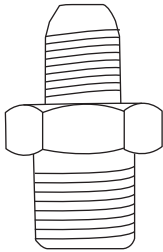
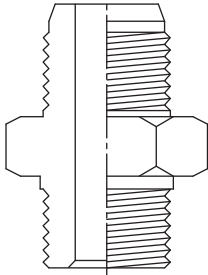
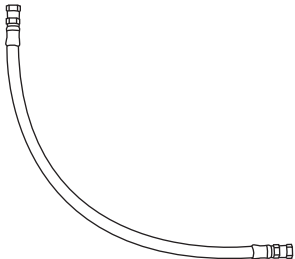
Hydraulic system

Hydraulic system

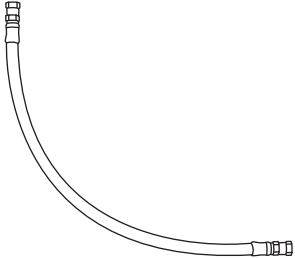
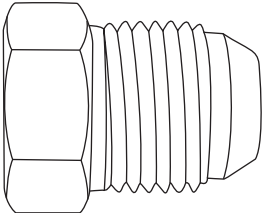
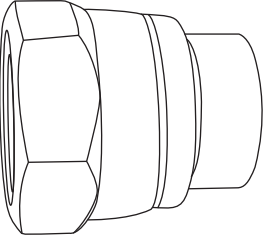
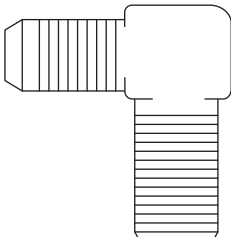
<p>Pressure gauge seal</p>  <p style="text-align: right;">vasdfi-005</p>	<p>K4701000050</p>	<p>Inserted between the pressure gauge and the pressure gauge joint.</p>
<p>Gauge valve</p>  <p style="text-align: right;">vasdfi-016</p>	<p>K4701000060</p>	<p>Used to temporarily shut off the fluid to be measured during maintenance, inspection, or repair etc. of the hydraulic equipments.</p>
<p>Pressure gauge joint</p>  <p style="text-align: right;">vasdfi-006</p>	<p>K4701000040</p>	<p>Used as a joint for pressure pipes.</p>
<p>Female connector 1015-04</p>  <p style="text-align: right;">vasdfi-007</p>	<p>K3009000290-Y</p>	<p>Used as a connector to attach the hydraulic hose to the pressure gauge.</p>

Hydraulic system

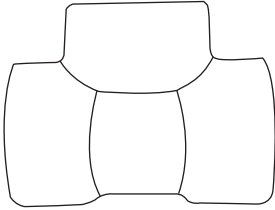
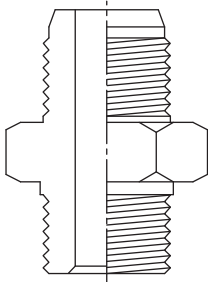
Hydraulic system

<p>Cast iron T-joint PT3/8 PF3/8</p>  <p>vasdfi-013</p>	<p>K3024000042-Y</p>	<p>Used to insert the pressure gauge between the hydraulic hoses.</p>
<p>Special adapter PF1/4 PT3/8</p>  <p>vasdfi-015</p>	<p>K3009000042-Y</p>	<p>Used as adapters for the T-joint during pressure measurements.</p>
<p>Adapter 1013-9</p>  <p>q9c6v6-008</p>	<p>K3000090002-Y</p>	<p>Two pieces are used as adapters for the T-joint during pressure measurements.</p>
<p>WP280-6 hose 1-600</p>  <p>vasdfi-008</p>	<p>K3107210600</p>	<p>Used as a hydraulic hose for high pressure to extremely low pressure measurements.</p>

Hydraulic system

<p>WP210-9 hose 1-490</p>  <p>vasdfi-008</p>	<p>K3105310490</p>	<p>Used as a hydraulic hose for high pressure to extremely low pressure measurements.</p>
<p>Screw cap (male) PF1/2</p>  <p>q9c6v6-001</p>	<p>K3008000542-Y</p>	<p>Used as a plug when the hydraulic hose is removed.</p>
<p>Screw cap (female) PF1/2</p>  <p>q9c6v6-002</p>	<p>K3008000502-Y</p>	<p>Used as a plug when the hydraulic hose is removed.</p>
<p>90° elbow 1033-6</p>  <p>q9c6v6-046</p>	<p>K3021040002-Y</p>	<p>Used as an elbow when measuring the pressure.</p>

Hydraulic system

<p>T-joint TEFPT1/4</p>  <p>vasdfi-013</p>	<p>K3021040002-Y</p>	<p>Used to insert the pressure gauge between the hydraulic hoses.</p>
<p>Adapter 1013-6</p>  <p>q9c6v6-008</p>	<p>K300006000-Y</p>	<p>Used as an adapter when installing the pressure gauge to the hydraulic measurement port.</p>

Hydraulic system

Hydraulic system

Measurement

Note

The most effective way of solving problems in the hydraulic system is to use a measuring instrument such as a pressure gauge for measurement.

Before hydraulic measurement

Important

Before concluding that the problem in the hydraulic system is caused by the hydraulic equipment, every part of the hydraulic system must be checked for issues related to oil fill, oil filter, loosening of fasteners, lack of adjustment and so on.

Note on hydraulic measurement

Warning

As mentioned in the testing procedure, the use of a pressure gauge not meeting the pressure measurement standard may result in damage to the pressure gauge or leakage of high-pressure oil. Be extremely careful with high-pressure oil as it may pierce your skin, resulting in personal accidents.

Carry out hydraulic measurement with two or more persons. One person should be in the driver's seat to operate the machine and the other person should engage in measurement and recording.

Caution

When checking the hydraulic circuit for pinhole leaks or oil leakage from nozzles, never use your hands. Use items such as paper or corrugated cardboard to find leakage points. Be extremely careful with high-pressure oil as it may pierce your skin, resulting in personal accidents.

1. Always clean the machine before hydraulic measurement. Remember that the machine must always be kept clean for hydraulic measurement. Contamination may lead to clogging or breakage of the hydraulic circuit.
2. Review the measuring method before starting measurement.
3. Before measurement, check for maladjustment, clogging or breakage.

4. Warm up the hydraulic oil before starting hydraulic measurement.

Warning

Be sure to depressurize the hydraulic system before inspecting or repairing it.

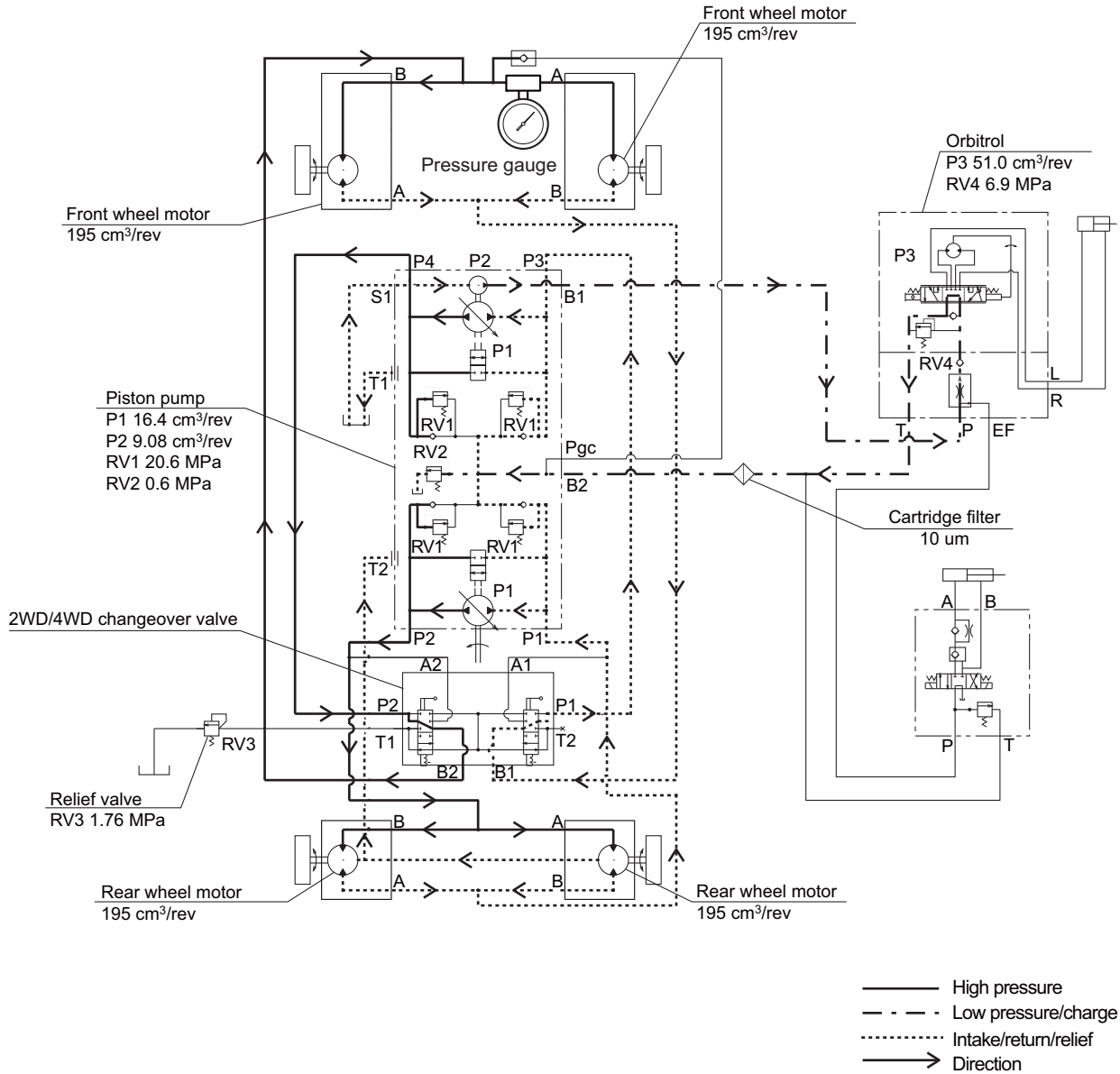
5. When hydraulic equipment is removed, cap or plug it to prevent contamination of the hydraulic system.
6. When using a measuring instrument such as a pressure gauge, connect the in/out hoses correctly. Never connect the other way round to prevent breakage of the hydraulic system and measuring instrument.
7. Screw in the hydraulic fitting by hand till it touches the other side lightly, then fasten it with a wrench.
8. Fit hoses and measuring instruments in such a way as to avoid contact with the driving part of the machine.
9. After connecting a measuring instrument, check the amount of oil in the hydraulic tank.
10. Check to see that the engine is in good condition. Carry out hydraulic measurement with the engine running at maximum speed.
11. In case there is any problem in the traveling circuit, carry out the following measurement.
 - [1] Charge relief valve pressure
 - [2] Traveling relieve valve pressure
12. In case there is any problem in the raise/lower or steering circuit, carry out the following measurement.
 - [1] Relief valve pressure

Hydraulic system

Traveling circuit

Front Wheel

■ Forward



Hydraulic system

g518is-024

Forward_001

⚠ Caution

Before starting pressure measurement, make sure that there is no people around the machine.

Important

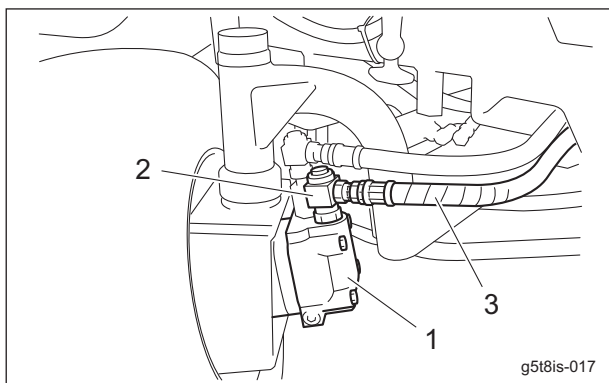
The pressure measurement of the traveling circuit must be executed in 4WD.

Hydraulic system

1. Remove the hydraulic hose from the forward swivel joint of the left wheel motor of the front wheel.

Caution

Use a pressure gauge and hydraulic hose which can withstand the pressure of 20.6 MPa (2,987.67 psi) or more .



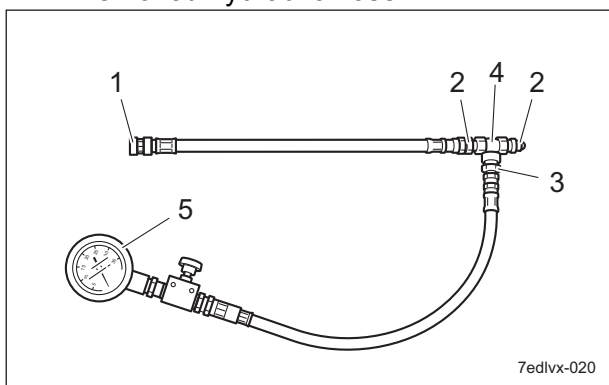
Forward_002

1	Wheel motor
2	Swivel joint
3	Hydraulic hose (forward)

2. Follow the steps below to install the pressure gauge for high pressure measurements to the main body.

[1] Tentatively install the 9 hydraulic hose onto the swivel joint with the hydraulic hose removed.

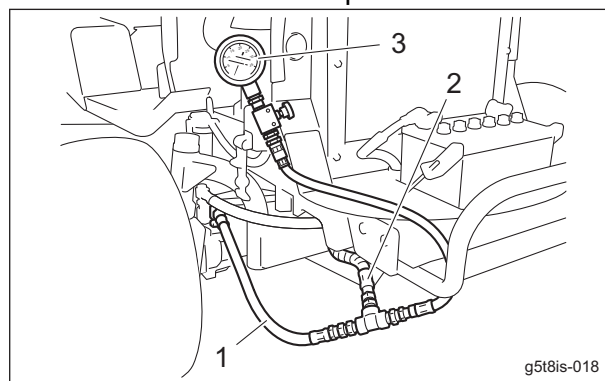
[2] Tentatively install the adapter 9 to the removed hydraulic hose.



Forward_003

1	9 hydraulic hose
2	Adapter 9
3	Adapter 6
4	T-joint
5	Pressure gauge for high pressure measurements

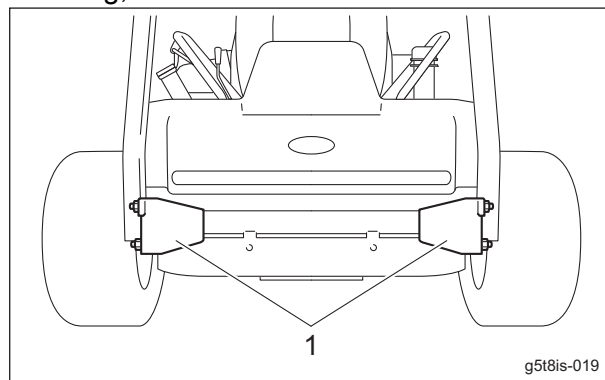
3. Tighten the hydraulic hose so that the hydraulic hose does not touch the tire even if the handle is operated.



Forward_004

1	Hydraulic hose
2	Hydraulic hose (forward)
3	Pressure gauge for high pressure measurements

4. Apply resistance on the machine using a sling, etc. to the frame of this machine.



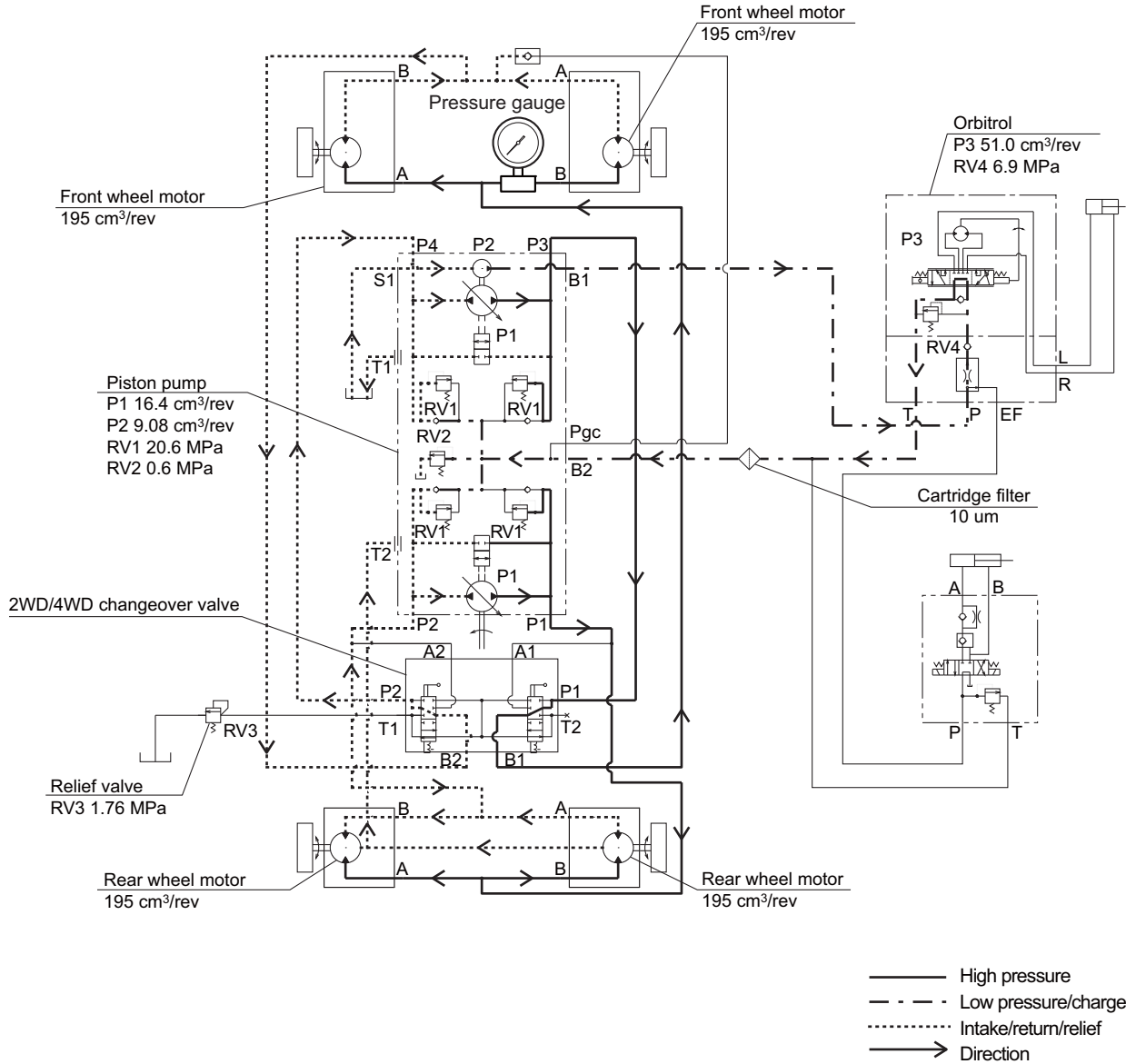
Forward_005

1	Sling installation position
---	-----------------------------

5. Make sure that the parking brake is applied.
6. Make sure that the 2WD/4WD changeover lever is set to the 4WD position.
7. Start the engine, and rev it up to the maximum rpm.
Depress the forward pedal, and it is normal if the pressure becomes 20.6 MPa (2,987.67 psi) with the tires locked without slipping.

Hydraulic system

Reverse



Hydraulic system

7edlvx-027

Reverse_001

Caution

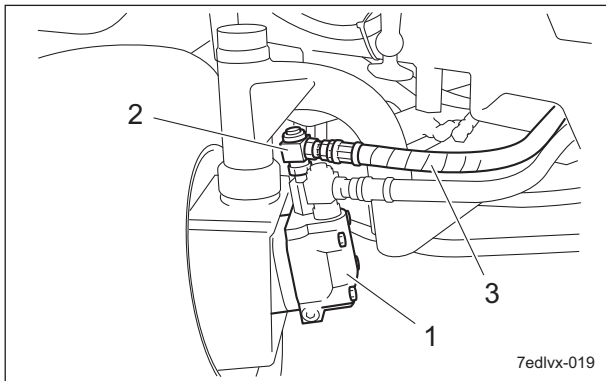
Before starting pressure measurement, make sure that there is no people around the machine.

Important

The pressure measurement of the traveling circuit must be executed in 4WD.

Hydraulic system

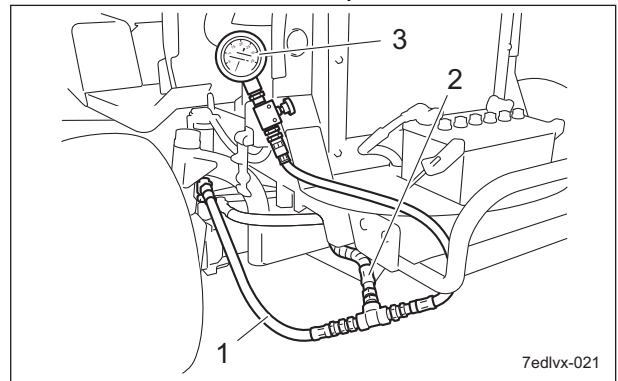
1. Remove the hydraulic hose of the reverse swivel joint of the right wheel motor of the front wheel.



Reverse_002

1	Wheel motor
2	Swivel joint
3	Hydraulic hose (reverse)

3. Tighten the hydraulic hose so that the hydraulic hose does not touch the tire even if the handle is operated.



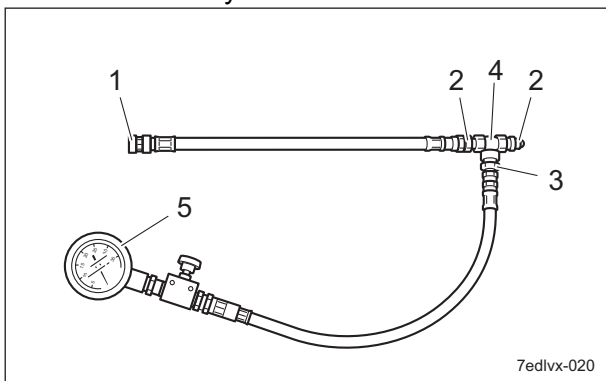
Reverse_004

1	Hydraulic hose
2	Hydraulic hose (reverse)
3	Pressure gauge for high pressure measurements

Caution

Use a pressure gauge and hydraulic hose which can withstand the pressure of 20.6 MPa (2,987.67 psi) or more .

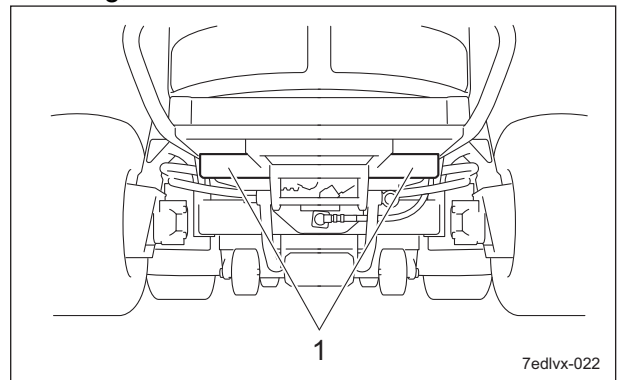
2. Follow the steps below to install the pressure gauge for high pressure measurements to the main body.
 - [1] Tentatively install the 9 hydraulic hose onto the swivel joint with the hydraulic hose removed.
 - [2] Tentatively install the adapter 9 to the removed hydraulic hose.



Reverse_003

1	9 hydraulic hose
2	Adapter 9
3	Adapter 6
4	T-joint
5	Pressure gauge for high pressure measurements

4. Apply resistance on the machine using a sling, etc. to the frame of this machine.



Reverse_005

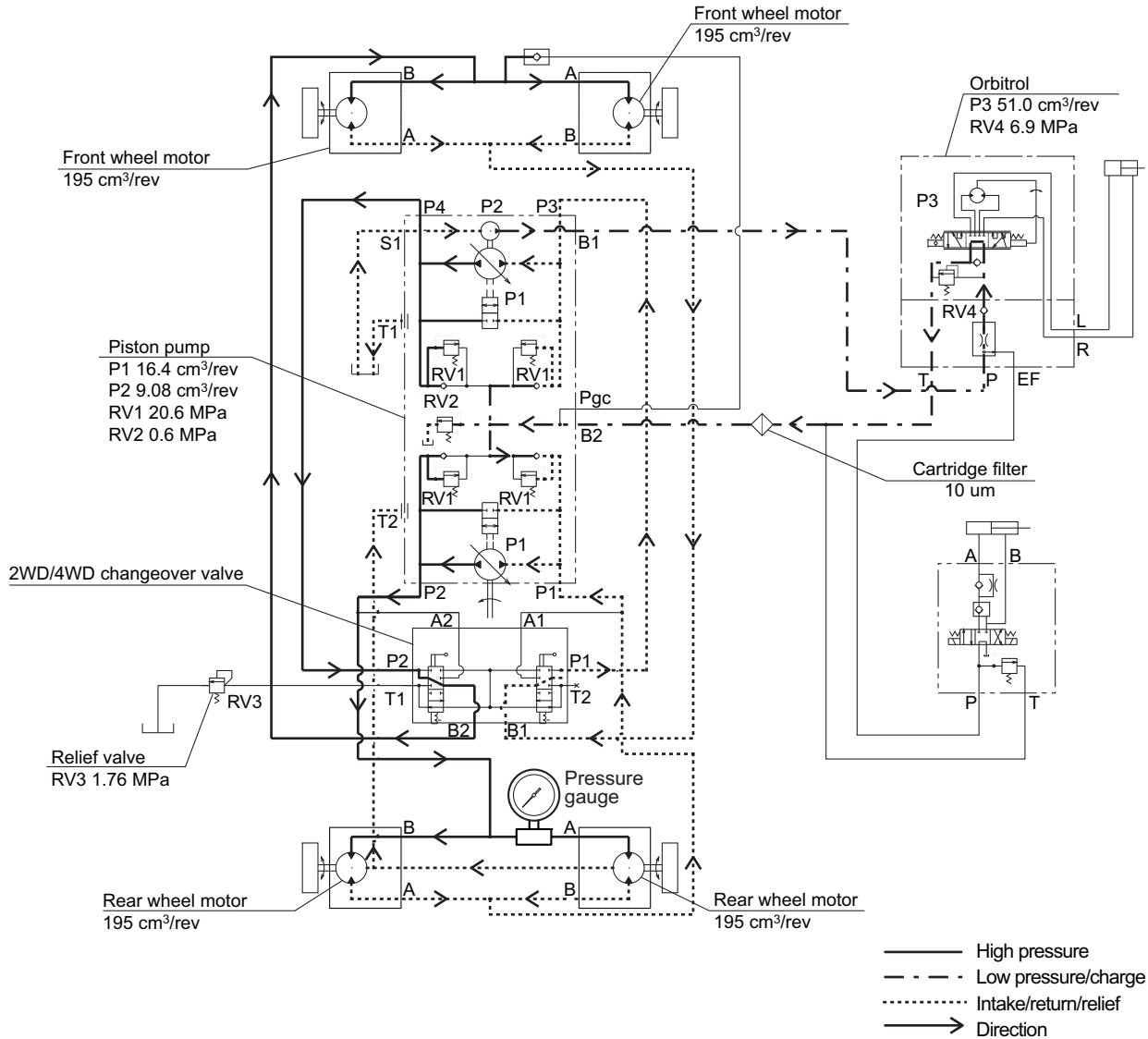
1	Sling installation position
---	-----------------------------

5. Make sure that the parking brake is applied.
6. Make sure that the 2WD/4WD changeover lever is set to the 4WD position.
7. Start the engine, and rev it up to the maximum rpm.
It is normal if the pressure becomes 20.6 MPa (2,987.67 psi) when the reverse pedal is depressed and the tires are locked without slipping.

Hydraulic system

Rear Wheel

■ Forward



Hydraulic system

g5i8is-025

Forward_001

⚠ Caution

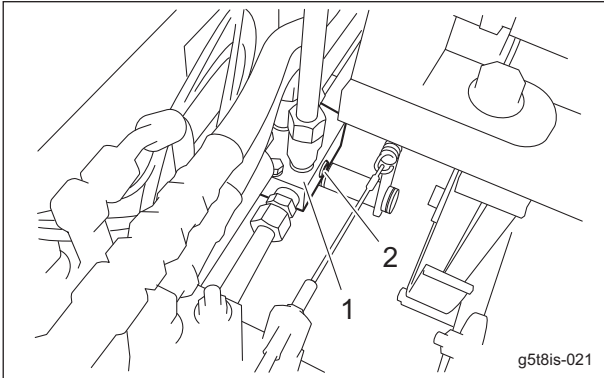
Before starting pressure measurement, make sure that there is no people around the machine.

Important

The pressure measurement of the traveling circuit must be executed in 4WD.

Hydraulic system

1. Remove the taper plug w/hexagon hole from the hydraulic fitting.



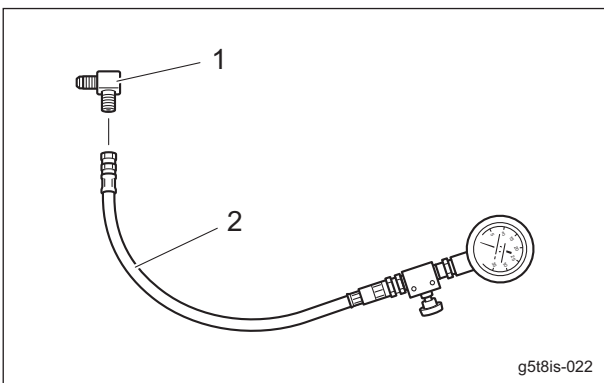
Forward_002

1	Hydraulic fitting
2	Taper plug w/hexagon hole

Caution

Use a pressure gauge and hydraulic hose which can withstand the pressure of 20.6 MPa (2,987.67 psi) or more .

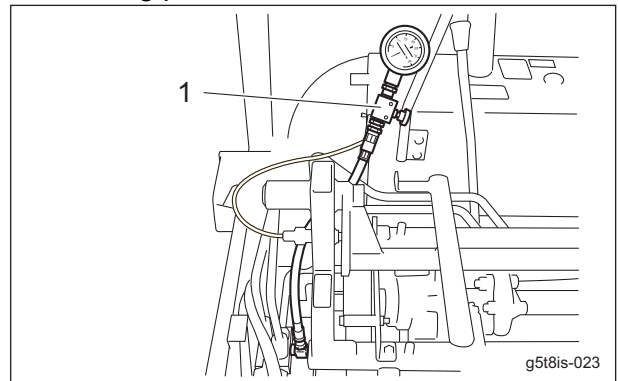
2. Follow the steps below to install the pressure gauge for high pressure measurements to the main body.
 - [1] Install the 90° elbow upward in the portion where the taper plug w/hexagon hole is removed.
 - [2] Tentatively install the pressure gauge for high pressure measurements on the 90° elbow.



Forward_003

1	90° elbow
2	Pressure gauge for high pressure measurements

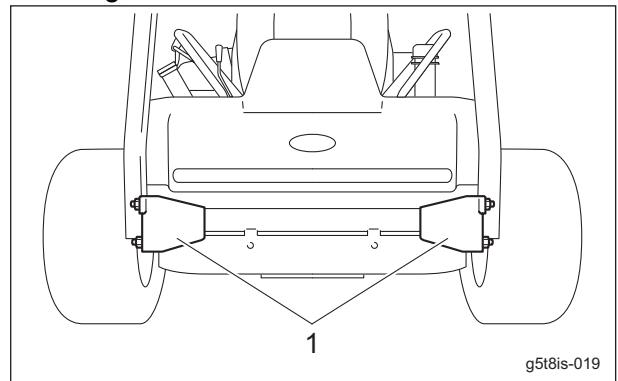
3. Tighten the hydraulic hose so that the installed hydraulic hose does not touch the moving parts.



Forward_004

1	Pressure gauge for high pressure measurements
---	---

4. Apply resistance on the machine using a sling, etc. to the frame of this machine.



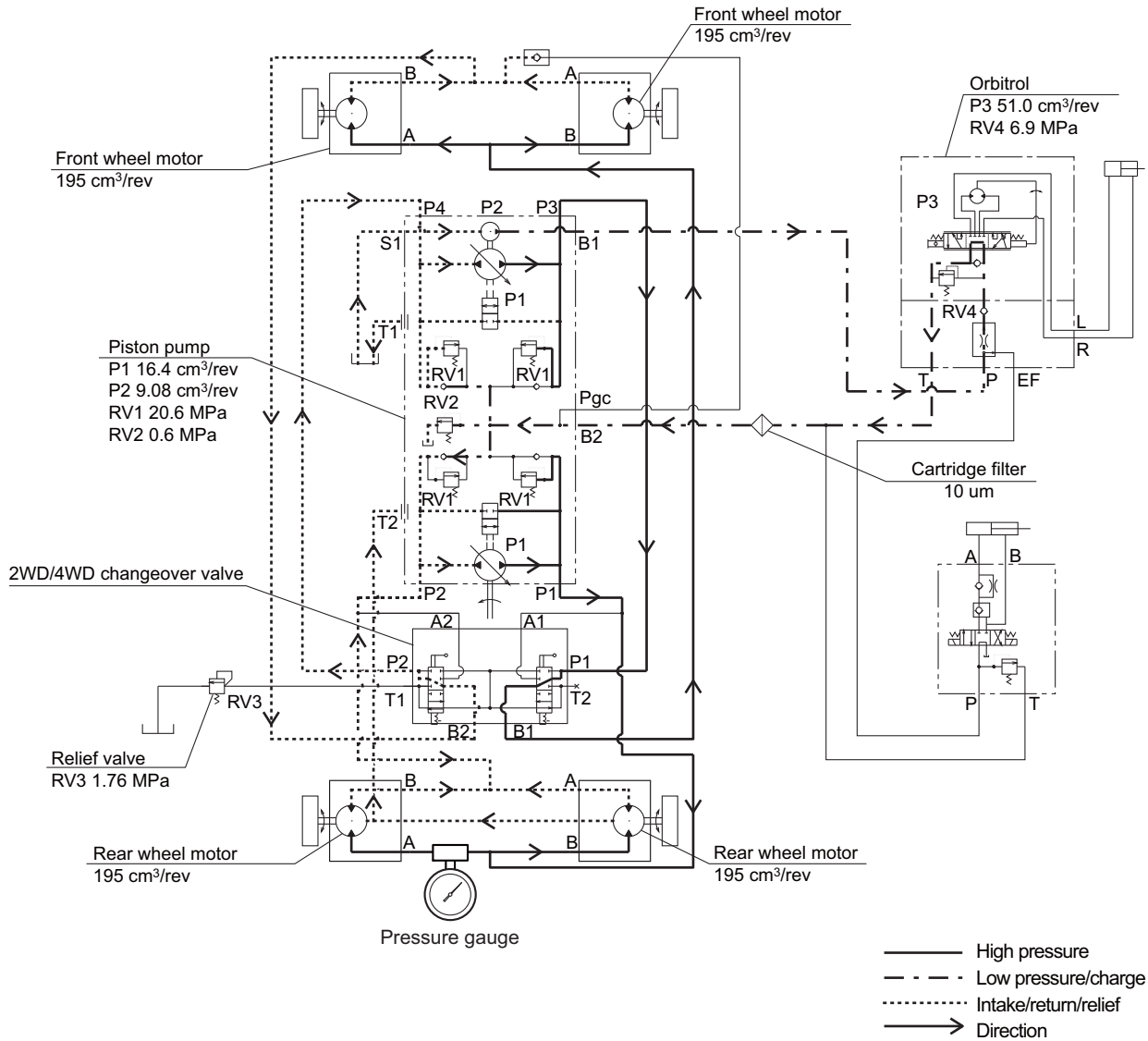
Forward_005

1	Sling installation position
---	-----------------------------

5. Make sure that the parking brake is applied.
6. Make sure that the 2WD/4WD changeover lever is set to the 4WD position.
7. Start the engine, and rev it up to the maximum rpm.
Depress the forward pedal, and it is normal if the pressure becomes 20.6 MPa (2,987.67 psi) with the tires locked without slipping.

Hydraulic system

Reverse



Hydraulic system

7edlvx-028

Reverse_001

Caution

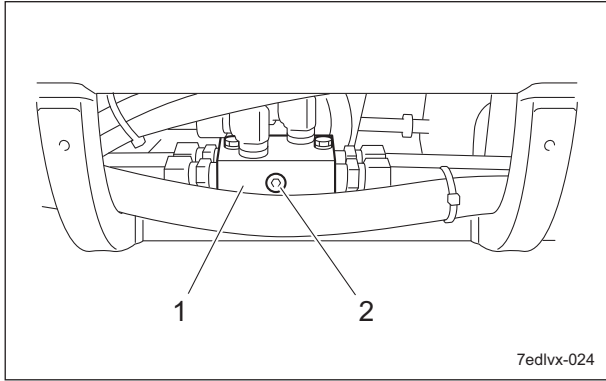
Before starting pressure measurement, make sure that there is no people around the machine

Important

The pressure measurement of the traveling circuit must be executed in 4WD.

Hydraulic system

1. Remove the taper plug w/hexagon hole from the hydraulic fitting.



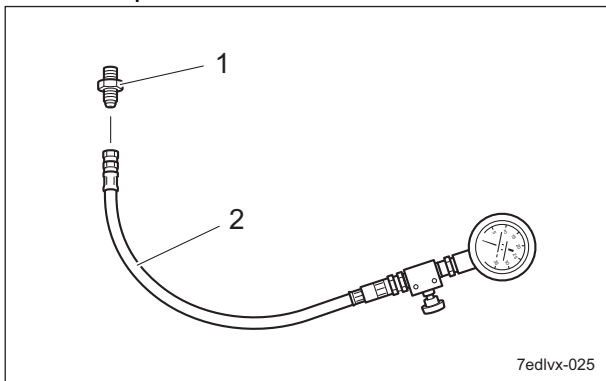
Reverse_002

1	Hydraulic fitting
2	Taper plug w/hexagon hole

Caution

Use a pressure gauge and hydraulic hose which can withstand the pressure of 20.6 MPa (2,987.67 psi) or more .

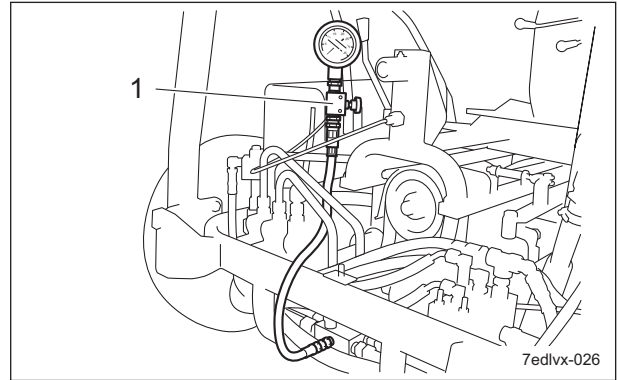
2. Follow the steps below to install the pressure gauge for high pressure measurements to the main body.
 - [1] Install the adapter in the portion where the taper plug w/hexagon hole is removed.
 - [2] Tentatively install the pressure gauge for high pressure measurements on the adapter.



Reverse_003

1	Adapter
2	Pressure gauge for high pressure measurements

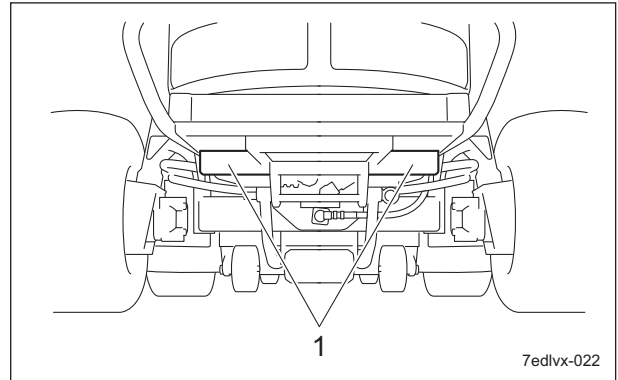
3. Tighten the hydraulic hose so that the installed hydraulic hose does not touch the moving parts.



Reverse_004

1	Pressure gauge for high pressure measurements
---	---

4. Apply resistance on the machine using a sling, etc. to the frame of this machine.



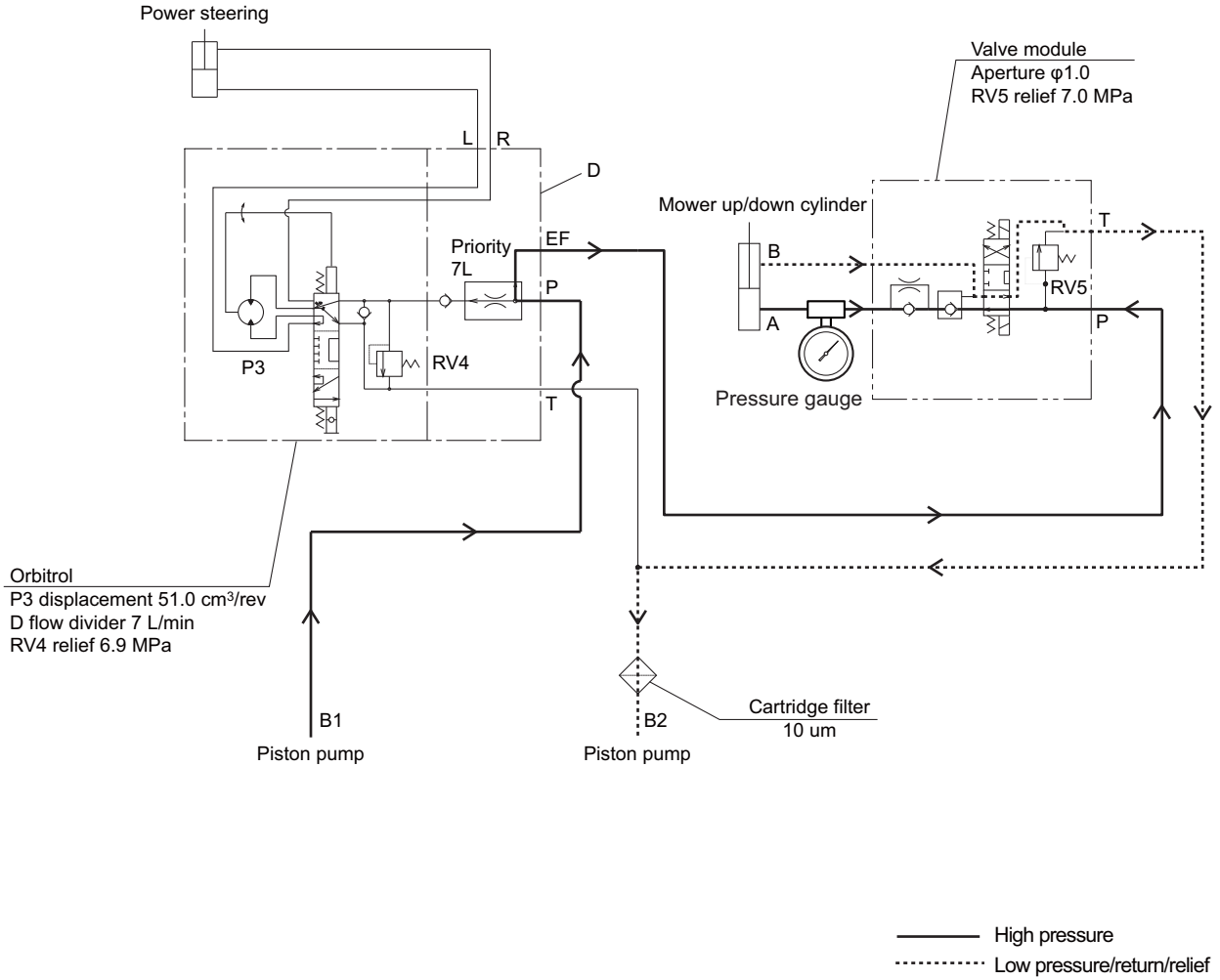
Reverse_005

1	Sling installation position
---	-----------------------------

5. Make sure that the parking brake is applied.
6. Make sure that the 2WD/4WD changeover lever is set to the 4WD position.
7. Start the engine, and rev it up to the maximum rpm.
It is normal if the pressure becomes 20.6 MPa (2,987.67 psi) when the reverse pedal is depressed and the tires are locked without slipping.

Hydraulic system

Up/Down circuit



Hydraulic system

z4kw7w-037

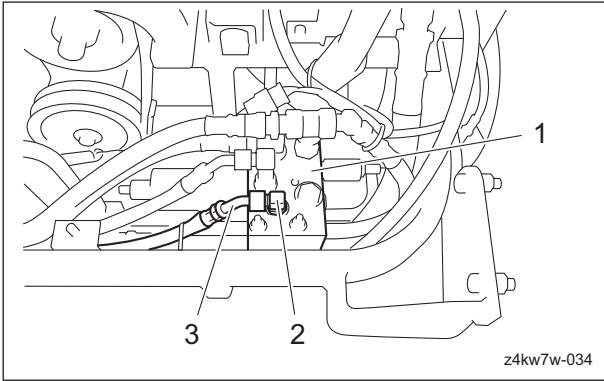
Up/Down circuit_001

Caution

Before starting pressure measurement, make sure that there is no people around the machine.

Hydraulic system

1. Lower the mower units.
2. Remove the hydraulic hose installed to the 90° elbow of the up/down port of the valve module.

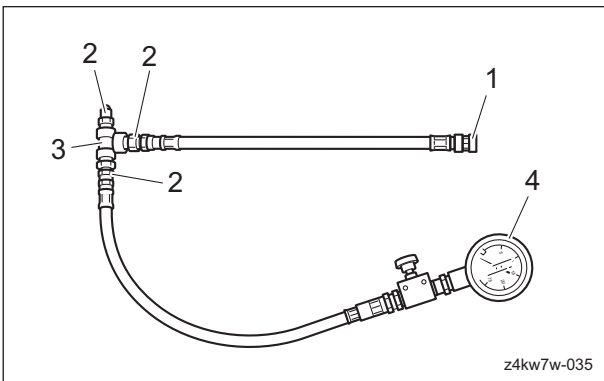


Up/Down circuit_002

1	Valve module
2	90° elbow (up/down port)
3	Hydraulic hose

3. Follow the steps below to install the pressure gauge for low pressure measurements to the main body.

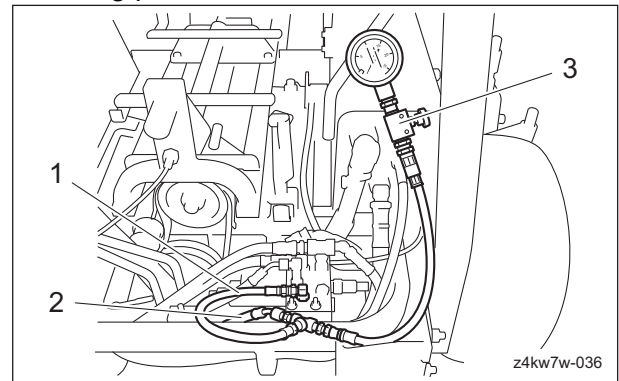
- [1] Tentatively install the 6 hydraulic hose to the 90° elbow of the up/down port.
- [2] Tentatively install the adapter 6 to the removed hose.



Up/Down circuit_003

1	6 hydraulic hose
2	Adapter 6
3	T-joint
4	Pressure gauge for low pressure measurements

4. Tighten the hydraulic hose so that the installed hydraulic hose does not touch the moving parts.

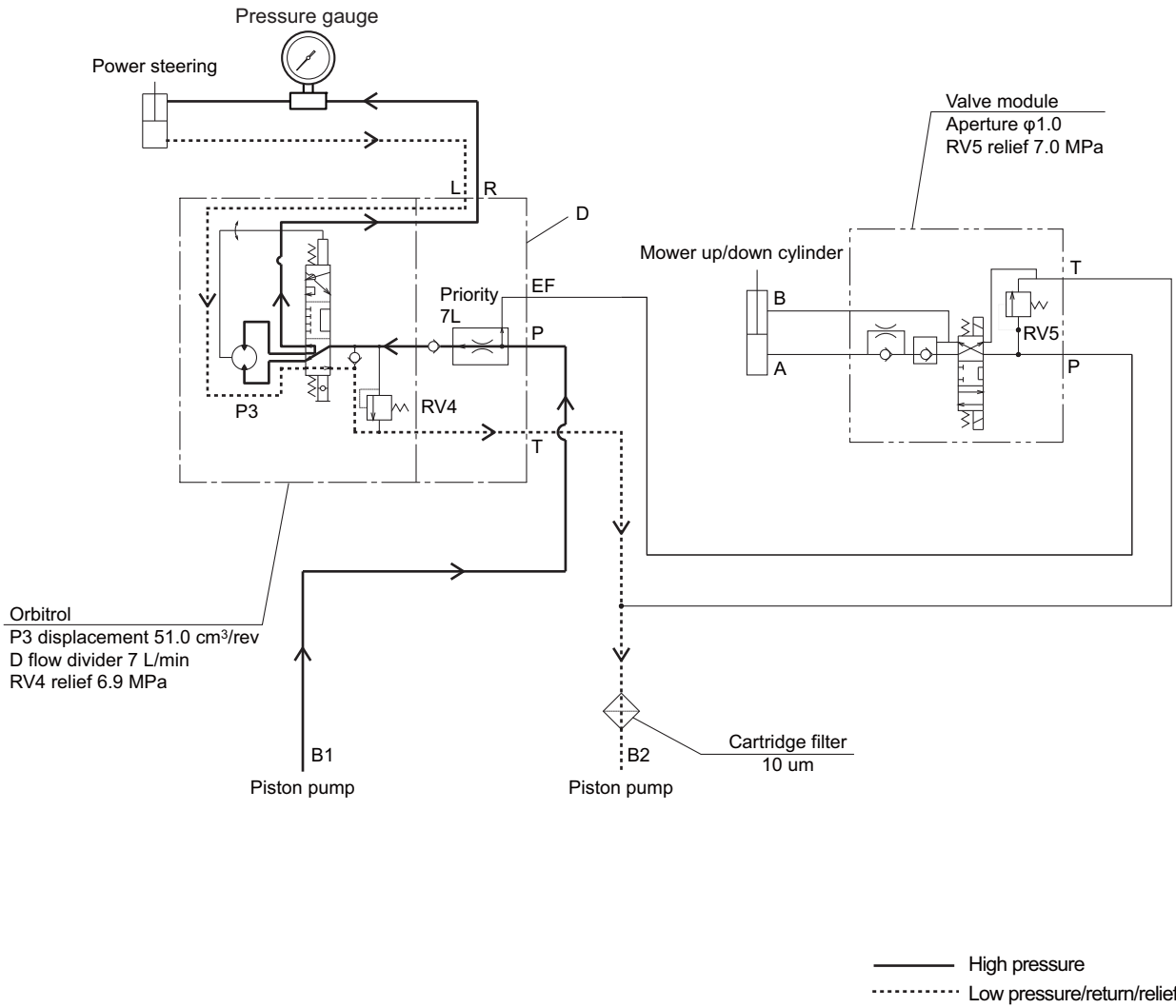


Up/Down circuit_004

1	Hydraulic hose
2	Up/Down hydraulic hose
3	Pressure gauge for low pressure measurements

5. Make sure that the parking brake is applied.
6. Start the engine, and then raise the mower units.
7. Rev the engine up to the maximum rpm.
8. The normal pressure is 7.0 MPa (1,015.23 psi) when the automatic return switch is shifted to the up position and the hydraulic cylinder is extended to the maximum extent.

Steering Circuit



Hydraulic system

9idjnn-026

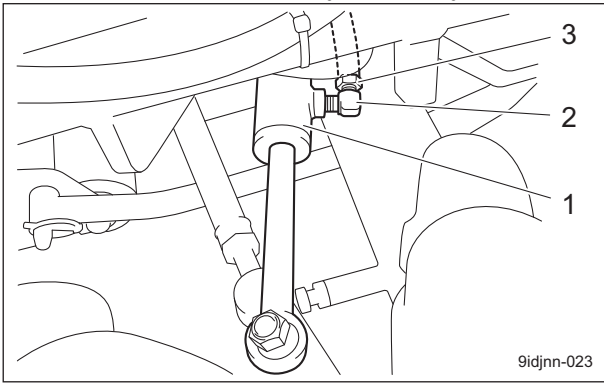
Steering Circuit_001

Caution

Before starting pressure measurement, make sure that there is no people around the machine.

Hydraulic system

1. Remove the hydraulic hose from the 90° elbow attached to the hydraulic cylinder.

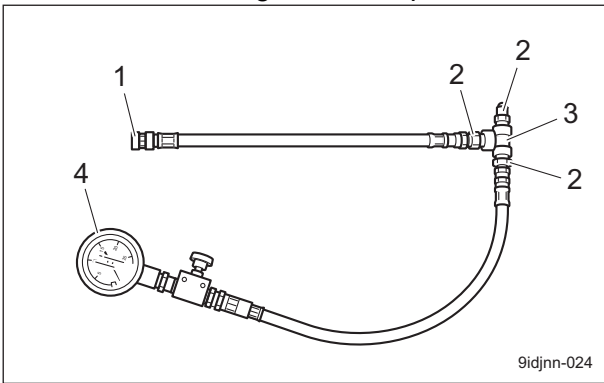


Steering Circuit_002

1	Hydraulic cylinder
2	90° elbow
3	Hydraulic hose

2. Follow the steps below to install the pressure gauge for low pressure measurements to the main body.

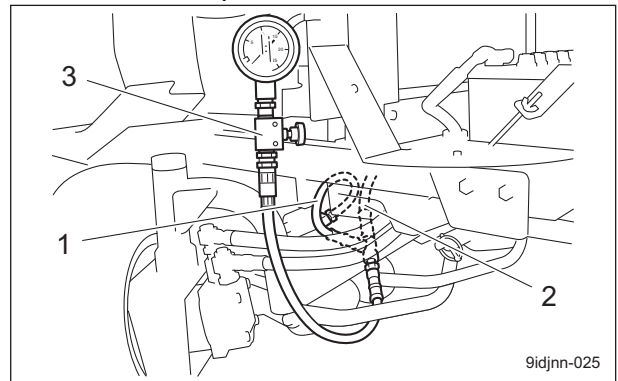
- [1] Tentatively install the 6 hydraulic hose to the 90° elbow of the hydraulic cylinder.
- [2] Tentatively install the removed hydraulic hose for steering to the adapter 6.



Steering Circuit_003

1	6 hydraulic hose
2	Adapter 6
3	T-joint
4	Pressure gauge for low pressure measurements

3. Tighten the hydraulic hose so that the hydraulic hose does not touch the tire even if the handle is operated.



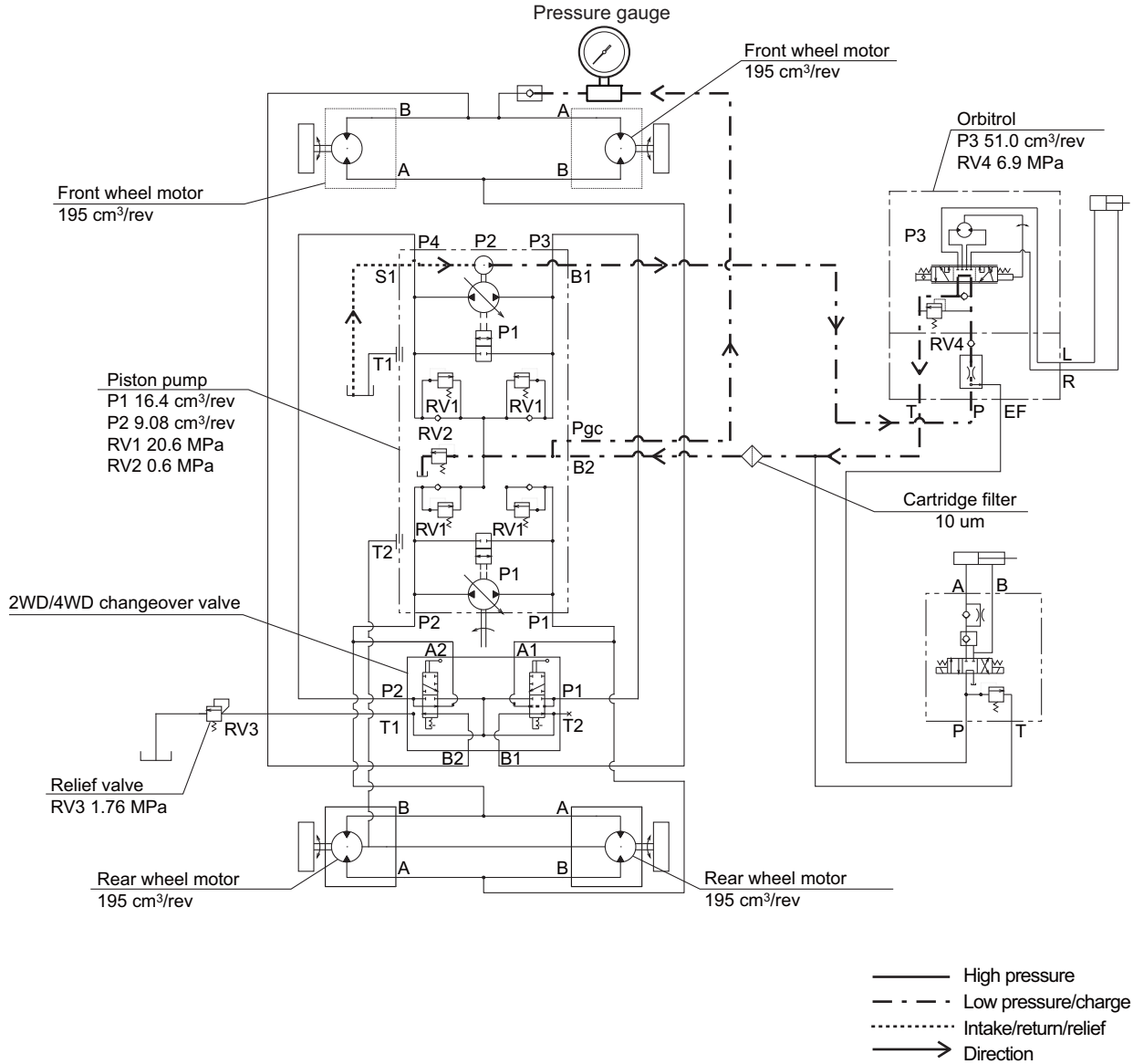
Steering Circuit_004

1	Hydraulic hose
2	Steering hydraulic hose
3	Pressure gauge for low pressure measurements

4. Make sure that the parking brake is applied.
5. Start the engine, and rev it up to the maximum rpm.
6. The normal pressure is 6.9 MPa (1,000.73 psi) when the handle is turned rightward completely.

Hydraulic system

Charge Circuit



Hydraulic system

zg85f8-031

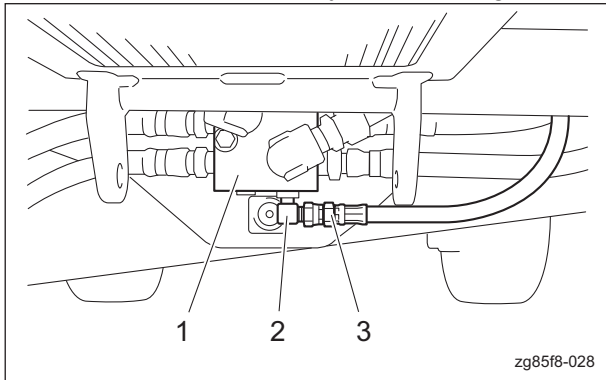
Charge Circuit_001

Caution

Before starting pressure measurement, make sure that there is no people around the machine.

Hydraulic system

1. Remove the hydraulic hose from the 90° elbow attached to the hydraulic fitting-front.



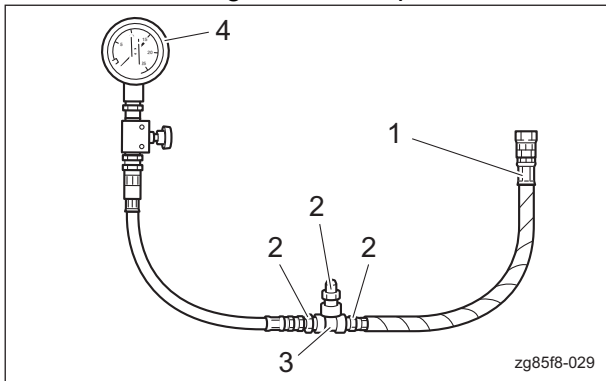
Charge Circuit_002

1	Hydraulic fitting-front
2	90° elbow
3	Hydraulic hose

2. Follow the steps below to install the pressure gauge for extremely low pressure measurements to the main body.

[1] Tentatively install the 6 hydraulic hose to the 90° elbow of the hydraulic fitting-front.

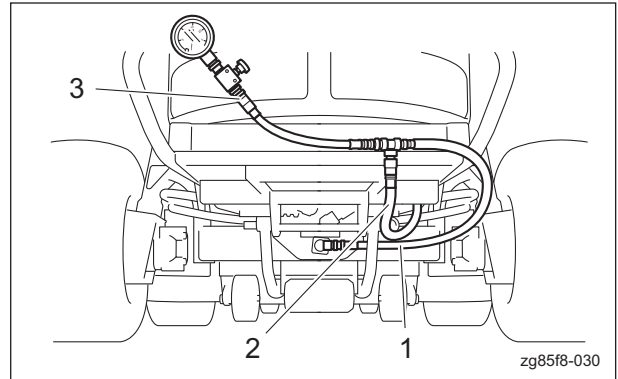
[2] Tentatively install the removed hydraulic hose for charge to the adapter 6.



Charge Circuit_003

1	6 hydraulic hose
2	Adapter 6
3	T-joint
4	Pressure gauge for extremely low pressure measurements

3. Tighten the hydraulic hoses.



Charge Circuit_004

1	Hydraulic hose
2	Charge hydraulic hose
3	Pressure gauge for extremely low pressure measurements

4. Make sure that the parking brake is applied.
5. Start the engine, and rev it up to the maximum rpm.
6. The normal pressure is 0.6 MPa (87.02 psi).

Hydraulic system

General inspection and repair

Note

Before inspection and repair

1. Move the machine to level surface.
2. Apply the parking brake, and then lower the operating machine.
3. Stop the engine, and then remove the key.
4. Clean the machine.
Be sure to clean parts such as the piping, hoses, and hydraulic fittings.
Remember that cleaning is always necessary upon inspection and repair of hydraulic systems.

Warning

Be sure to depressurize the hydraulic system before inspecting or repairing it.

5. When piping and hoses are removed, put a cap or plug in its place to prevent contamination of the hydraulic systems.
6. Attach labels or other identifications to the removed piping and hoses so that they can be correctly refitted.
7. When removing piping and hoses, pay special attention to the connection part.
If necessary, mark the piping and hoses to ensure correct fitting.

After inspection and repair

Caution

After the installation, check if there is no hydraulic oil leakage in each part.
See the list in "Tightening torques" (Page 3-6).

Note that the Baroness product warranty may not apply to defects caused by incorrect or overtightening etc.

1. Check the amount of oil in the hydraulic tank. Add as necessary.
In the event that failure or contamination is found in the hydraulic circuit, replace the hydraulic oil and filter.
2. When fitting hydraulic fittings, apply hydraulic oil onto the O-ring and seal.
3. Fit hoses and hydraulic fittings only after removing the cap and plug.

4. When fitting hoses and hydraulic fittings, follow the proper procedure for tightening.
5. After repair, check to see whether the hydraulic system functions normally and whether there are any broken parts.
6. When the hydraulic system has been repaired or replaced, operate the machine slowly, idling the engine, to allow the air to go out of the circuit.
7. Make sure that there is no oil leakage.
In the event of leakage, stop the engine, set the oil stopper, and check the amount of oil in the hydraulic tank.
Add oil if necessary.

Hydraulic hose, piping

Warning

When checking for pinhole leakage of the hydraulic circuit or oil leakage of the nozzle, search for a leakage point using something like paper or cardboard, never with your bare hands. Be careful about high-pressure oil which may pierce your skin, resulting in physical injury.

Check the piping and hose every day for oil leakage, damage to the circuit, looseness, abrasion, loosening of connecting part, weather-related deterioration and chemical-related deterioration. If necessary, repair before operating the machine.

Hydraulic Oil

Important

In the event of hydraulic circuit failure, be sure to clean the circuit.

In the event of contamination or failure of the hydraulic circuit, clean and/or replace the parts. Since the hydraulic circuit is a closed circuit, any contaminant will remain within the circuit and may lead to other failures unless cleaned.

Caution

Be careful with hot oil, which could cause burns if it contacts your skin.

1. Drive and maneuver the machine and warm up the hydraulic oil.
2. Move the machine to level surface.

Hydraulic system

3. Apply the parking brake, and then lower the operating machine.
4. Stop the engine, and then remove the key.

Warning

Be sure to depressurize the hydraulic system before inspecting or repairing it.

Important

Be sure to clean the circuit connecting part to be repaired.

5. Drain the oil from the hydraulic tank.
6. Drain the oil from the hydraulic hoses and piping while the oil is still warm.
7. Replace the hydraulic oil and filter.
8. Check the hydraulic tank and clean.
9. Fit the hydraulic hoses, piping and hydraulic fittings that have been removed.

Caution

Use only the specified hydraulic oil. Use of other hydraulic oil may lead to the failure of hydraulic circuit or the like.

10. Supply new hydraulic oil.
11. Make sure that the traveling pedal and all the drives of the operating machine are in neutral position.
12. Start and run the engine for 10 seconds to check that there is no oil leakage or else. Perform this operation twice.
13. Start the engine.
Let it run idle for at least two minutes, then run at the maximum speed for one minute.
14. Raise and lower the operating machine, and turn the steering wheel side to side.
15. Stop the engine, and check for any oil leakage.
Check the amount of hydraulic oil. Add as necessary.
16. Operate for two hours under normal operating conditions.
17. Check the condition of hydraulic oil.
If it is contaminated, repeat the procedures from 1 through 15 until the oil becomes clean.
18. If no abnormality is found, operate normally and maintain according to the maintenance schedule.

Air bleeding

Caution

When you replace or repair the motor, pump, cylinder, etc, make sure that the hydraulic system is properly connected. Make sure that air is bled to avoid malfunction.

Important

When you replace or repair hydraulic parts, be sure to replace the oil filter.

1. Move the machine to level surface.
2. Apply the parking brake, and then lower the operating machine.
3. Stop the engine, and then remove the key.
4. Make sure that the hydraulic equipments and hydraulic fittings are securely tightened.
5. When there is any malfunction of the hydraulic system or any dirt, clean the hydraulic system and the hydraulic tank, and then replace the hydraulic oil.
6. Check the amount of hydraulic oil. Add as necessary.
7. Make proper adjustment and connection, and make sure that there are neither broken parts nor oil leakage.
8. Make sure that the traveling pedal and all the drives of the operating machine are in neutral position.
9. Start and run the engine for 10 seconds to check that there is no oil leakage or else. Perform this operation twice.

Warning

Check " "Jacking up the machine" (Page 3-11) " when you jack up the machine.

10. Raise all the wheels of the machine, and then use jack stands or any proper blocks to support it firmly.
11. Make sure that the traveling pedal and all the drives of the operating machine are in neutral position.

12. Start the engine and depress the traveling pedal while it is running at low rpm. The charge pump sucks oil, air in the hydraulic system will be bled in about 30 seconds, and then the circuit will be filled with oil.
13. After the hydraulic circuit is filled with oil, operate the up/down lever and switches to operate the up/down cylinder several times. Stop the engine immediately when the cylinder does not move within 10 to 15 seconds or if there is any noise from the pump. And then check the cause. Then carry out the following inspections.
 - [1] Loose, malfunction of the filter or suction line
 - [2] Loose, malfunction of the pump coupler
 - [3] Block of the suction line
 - [4] Block of the charge relief valve
 - [5] Malfunction of the charge pump
14. Proceed to the following operation when the up/down cylinder moves within 10-15 seconds.
15. Operate the traveling pedal for forward and reverse to check if the wheels rotate in correct direction.
 - [1] When the wheels rotate in wrong direction, stop the engine and then swap the lines for the motor to correct rotation direction.
 - [2] Stop the engine when the rotation direction is correct.
16. Return the traveling pedal into the neutral position.
17. Check neutral of the traveling and make adjustment. (See the Owner's Operating Manual)
18. Lower the machine to the ground.
19. Carry out the following operations when the traveling pump or the wheel motor has been removed.
 - [1] Run for 10 minutes so as to rotate the wheels slowly.
 - [2] Then, gradually increase operation load while running for 10 minutes.
 - [3] Stop the machine, check the amount of hydraulic oil and add it as necessary. Make sure that there is no oil leakage. Check all of the connections.

- [4] Check that the traveling is in neutral position. When any adjustment is needed, raise all wheels of the machine, and then use jack stands or any proper blocks to support it firmly.

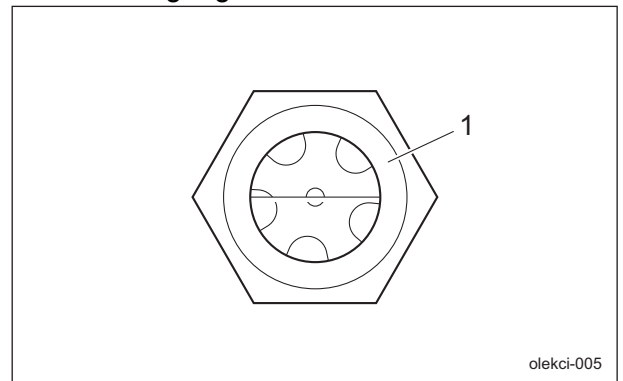
Inspection and repair of each section

Hydraulic Oil

Inspection of Hydraulic Oil

The oil gauge is on the side of the hydraulic tank.

1. Raise the mower units and maintain that position on a level surface.
2. Make sure that the oil level is at the middle of the oil gauge.



Inspection of Hydraulic Oil_001

1	Oil gauge
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3. Check underneath the machine for oil leakage.

Hydraulic system

Hydraulic Oil Supply

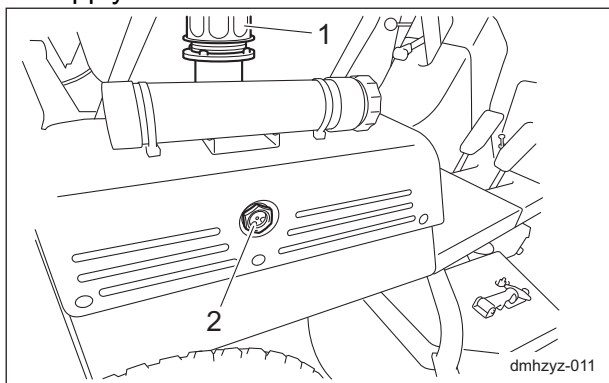
Important

Do not mix different types of oil.

Important

Use Shell Tellus S2M46 (or equivalent) as hydraulic oil.

1. If the oil level is low, open the tank cap and supply oil.



Hydraulic Oil Supply_001

1	Tank cap
2	Oil gauge

2. Securely close the tank cap.
3. Start the engine, raise and lower the mower units, and turn the steering wheel left and right.
Move forward and reverse repeatedly several times.
4. Raise the mower units and maintain that position on a level surface, and then check to see if the oil level is at the middle of the oil gauge. If necessary, supply oil.
5. Check underneath the machine for oil leakage.

Change of Hydraulic Oil

Warning

When you change the hydraulic oil, be sure to drain it into a bowl and discard it in accordance with local laws and regulations.

Caution

If the oil emulsifies or if it becomes even slightly less transparent, change the oil immediately.

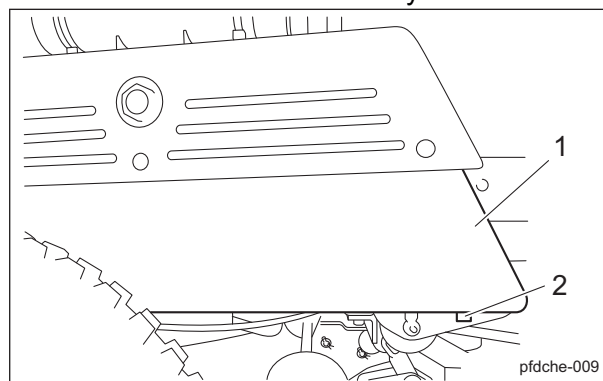
Caution

Be careful with hot oil, which could cause burns if it contacts your skin.

Important

Use Shell Tellus S2M46 (or equivalent) as hydraulic oil.

1. Follow the steps below to remove the old oil.
 - [1] Start and run the engine to warm up the oil.
 - [2] On a level surface, lower the mower units, and then stop the engine.
 - [3] Remove the drain plug of the hydraulic tank, and then drain the old oil into a container.
 - [4] Wind new sealing tape on the drain plug, and then attach it to the hydraulic tank.



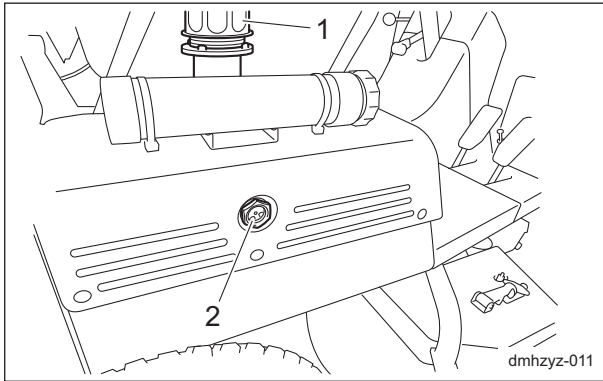
Change of Hydraulic Oil_001

1	Hydraulic tank
2	Drain plug

Hydraulic system

- Open the tank cap, and then pour new oil from the fill port until the oil level reaches the middle of the oil gauge on the hydraulic tank.

The hydraulic tank capacity is approximately 22.0 dm³ (22.0 L).



Change of Hydraulic Oil_002

1	Tank cap
2	Oil gauge

- Tighten the tank cap securely.
- Start the engine, raise and lower the mower units, and turn the steering wheel left and right. Move forward and reverse repeatedly several times.
- Raise the mower units and maintain that position on a level surface, and then check to see if the oil level is at the middle of the oil gauge. If necessary, supply oil.
- Check underneath the machine for oil leakage.

■Timing for Raplacing Hydraulic Oil

Important

Contamination of hydraulic oil may cause malfunction of the hydraulic system.

Periodically replace the hydraulic oil.

Timing for replacing	First time	After 100 hrs of operation
	Second time and later	Every 500 hrs of operation
Specified hydraulic oil	Shell Tellus S2M46 (or equivalent)	
Tank capacity	22.0 L (5.81 US gallons)	

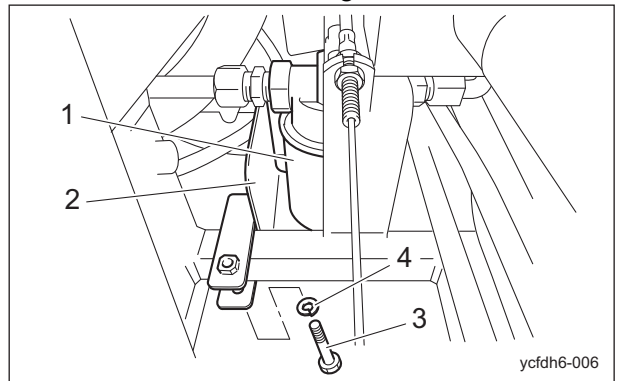
Hydraulic oil filter

Replacement of Hydraulic Oil Filter

Important

Before changing the hydraulic oil filter, be sure to drain the hydraulic oil into a container.

- Remove the filter guard mounting bolt, and then remove the filter guard.
- Remove the old cartridge filter.



Replacement of Hydraulic Oil Filter_001

1	Hydraulic oil filter
2	Filter guard
3	Bolt
4	Spring washer

- Apply clean hydraulic oil on the packing of the new cartridge filter.
- Screw in the filter by hand until the packing contacts the mounting surface. Then tighten additional 1/2 turn from that point.
- After the installation, start the engine. After the oil is warmed up, stop the engine and then check that there is no oil leakage.

■Replacing Timing of Hydraulic Oil Filter

Important

Contamination of hydraulic oil filter may cause malfunction of the hydraulic system.

Replace the hydraulic oil filter periodically.

Timing of replacing	The first time	After 100 hours of operation
	The second time or after	Every 500 hours of operation

Hydraulic system

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Electrical system

Maintenance

About Maintenance

This chapter provides descriptions of the main inspection and maintenance procedures for the GM1700 electrical system.

For daily inspections and maintenance as well as machine handling, refer to the GM1700 Operator's Manual and Parts Catalog.

Also, for details for handling of the battery, please refer to the separate Battery Instruction Manual.

Specifications

Adjusted Value

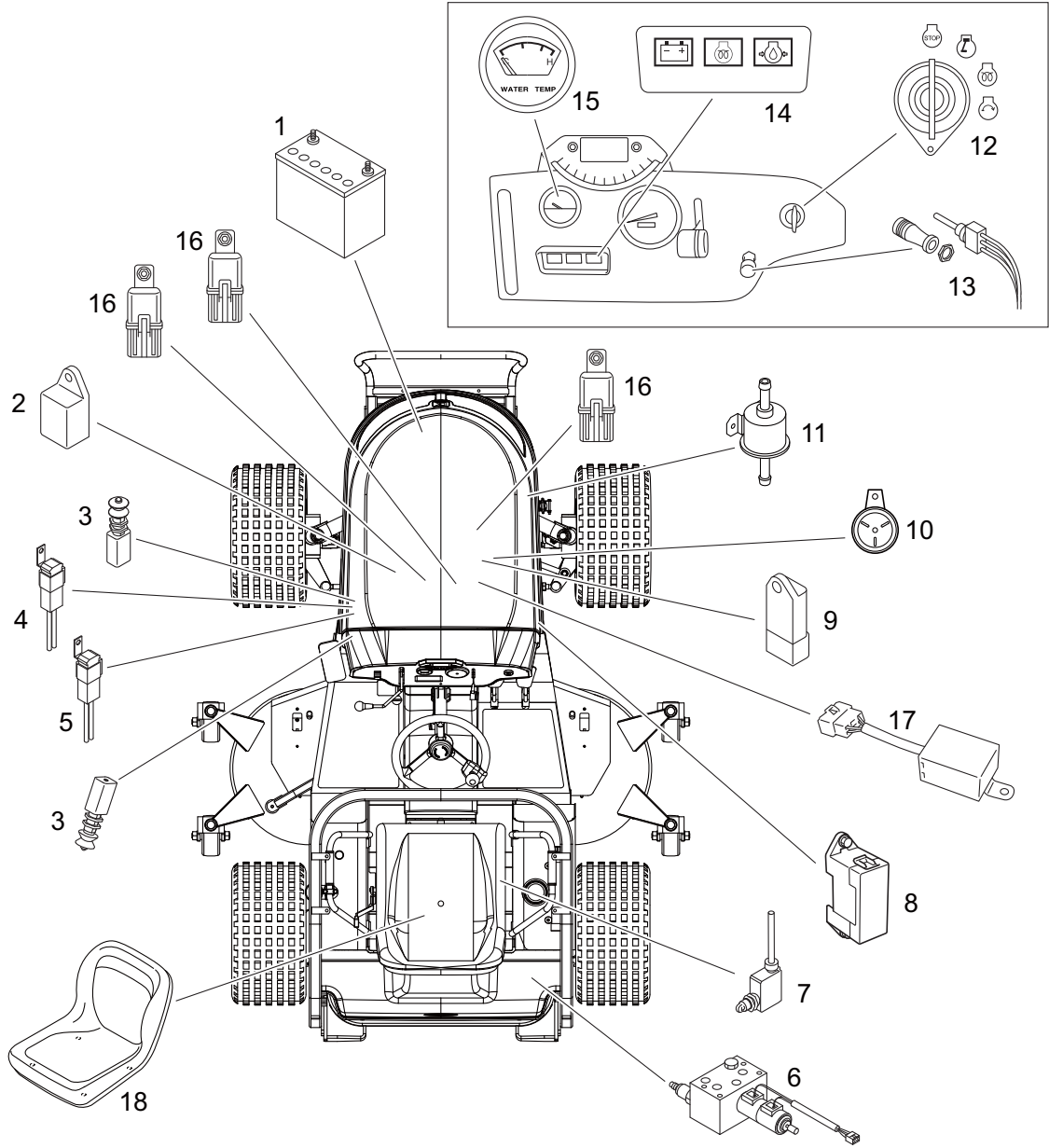
Parking brake switch	Pull the switch contact point by 1 - 2 mm (0.04 - 0.08 in) from the condition that it is pressed to the maximum extent	Pullback amount from the condition that the contact point of the parking brake switch is pressed to the maximum extent when the parking brake is released
Knife rotation lever switch	Pull the switch contact point by 1 - 2 mm (0.04 - 0.08 in) from the condition that it is pressed to the maximum extent	Pullback amount from the condition that the switch contact point is pressed to the maximum extent when the knife rotation lever is "ON"
Neutral switch	0.5 mm (0.02 in)	Clearance between the transmission shift lever and switch contact point when the transmission shift lever is neutral

Adjustment of Safety Switch

See ("Adjustment" (Page 5-7)) for method for adjustment.

Electrical system

Electrical Part Layout



Electrical system

erq4ky-010

Electrical Part Layout_001

1	Battery	7	Neutral switch	13	Automatic return switch
2	Glow lamp timer	8	Fuse Box	14	Pilot lamp
3	Safety Switches	9	Relay comp. (starter)	15	Water temperature gauge
4	Fusible link 30 A	10	Buzzer EBM-12 type	16	Power relay 411
5	Fusible link 50 A	11	Fuel supply pump	17	Delay timer
6	Solenoid valve HF78806-12	12	Starter switch	18	Seat switch

Electrical system

1. Battery

The battery supplies power to the starter at the start of the engine, as well as to all electrical parts.

It is located in the front part of the main body and in front of the radiator.

2. Glow lamp timer

This controls illumination of the thermo-start lamp inside the pilot lamp.

When the ignition key switch is set and held to "GLOW", the thermo-start lamp turns on for 5 seconds.

It is located under the hood.

3. Safety switch [NC type (push to turn off)]

The safety switch is one of the safety switches that constitute the interlock system.

It is located near the fulcrum of the parking brake lever and that of the knife rotation lever.

4. Fusible link 30 A

This functions as the fuse of the fuel solenoid of the engine.

It is located under the hood and equipped with a specialized fuse (30 A) cartridge.

5. Fusible link 50 A

This functions as the main fuse for the entire electrical circuit and as the fuse for the charge circuit.

It is located under the hood and equipped with a specialized fuse (50 A) cartridge.

6. Solenoid valve HF78806-12

This valve is linked to the auto-return switch. It switches the hydraulic path inside the manifold and controls raising/lowering the mower unit.

It is located in the rear right part of the main body.

7. Neutral switch

Linked to the neutral lever attached to the transmission shift lever of the piston pump (traveling pump), this detects the neutral position of the transmission shift lever.

This is one of the safety switches that constitute the interlock system. It is located near the neutral lever of the frame.

8. Fuse Box

Each electrical device is connected through the fuse block to the key switch.

Fuse standards are the same as those of "mini fuses for automobiles."

It is located under the hood.

9. Relay comp. (starter)

The relay comp. is one of the relays that constitute the interlock system.

The starter motor can be started only when the safety switch, seat switch, and the alternator are working properly.

It is located under the hood.

10. Buzzer (water temperature)

This buzzer is linked to the thermo switch on the water flange (to which the upper radiator hose is connected). An intermittent buzzer alarm will sound if the coolant temperature reaches 105°C (221°F).

It is located under the hood.

11. Fuel supply pump

The fuel supply pump sends the fuel that has passed through the fuel filter to the injection pump.

It is located near the front right part of the main body.

12. Starter switch

This is used to start, run or stop the engine.

It is located at the right end of the meter panel.

13. Automatic return switch

The automatic return switch is used for raising and lowering the mower unit.

When this switch is tilted down, the hydraulic cylinder is activated to lower the mower unit, and when this switch is tilted up, the hydraulic cylinder is activated to raise the mower unit.

If the switch is released, the position becomes neutral and the hydraulic cylinder stops in that position.

It is located at the right of the meter panel.

14. Pilot lamp

The pilot lamp displays the status of charge of the engine, glow, and oil pressure with illumination of the lamps.

It is located at the left of the meter panel.

15. Water temperature gauge

The water temperature gauge is connected to the water temperature sensor on the engine's cylinder head (front left). It indicates the temperature of engine coolant.

It is located at the left of the meter panel.

16. Power relay 411

Relays, which constitute the interlock system, include the fuel control relay, neutral detection relay and sitting-on detection relay.

Electrical system

Each relay controls the start and driving of the engine in combination with the status signal of each safety switch. It is located under the hood.

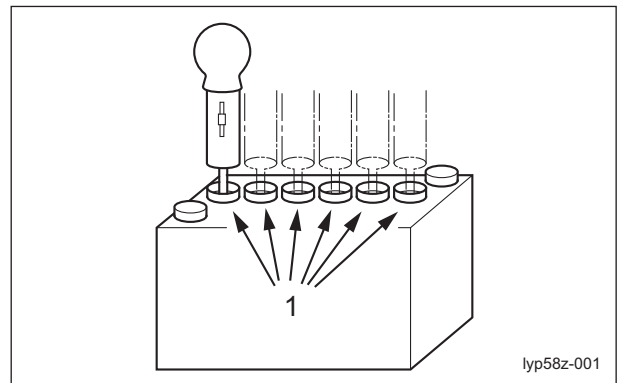
- 17. Delay timer (seat safety switch timer)
The delay timer is linked to the seat switch and, if the driver is away from the seat for 0.9 second or longer while driving this machine, this timer turns off the signal to the power relay, which controls fuel. If the signal from the delay timer is blocked, the energization to the engine stop solenoid stops and then the engine stops.
- 18. Seat switch [NO type (push to turn on)]
The seat switch is one of the safety switches that constitute the interlock system. It is located in the center of the seat cushion.

1	Specific weight converted for 20 ° C
2	Measured specific weight
3	Fluid temperature at measurement

Specific weight and remaining capacity of battery		
Specific weight (20 ° C)	Discharged electrical quantity (%)	Remaining capacity (%)
1.28	0	100
1.24	25	75
1.20	50	50
1.16	75	25
1.12	100	0

Measurement of specific weight of 12V battery

1. Check all the cells after charge.
2. Replace the battery when the specific weight is 1.225 or less, or gap of that between each cell is 0.05 or more.



Measurement of Battery Specific Weight_002

1	Cell
---	------

Special Tool

Special tools list

No use of special tools is required.

Measurement

Battery

Measurement of Battery Specific Weight

Specific weight of electrolyte tends to reduce in linear proportion with the discharged electrical quantity of the battery and so checking the specific weight of electrolyte with a hydrometer can tell the remaining capacity of the battery.

Temperature compensation is required for the specific weight measured with a hydrometer. The standard temperature for the specific weight of battery electrolyte is 20 ° C, and the specific weight increases or decreases by 0.0007 in accordance with the temperature change of 1 ° C. Thus it can be compensated by the following formula.

$$S_{20} = S_t + 0.0007(t - 20)$$

1
2
3

Measurement of Battery Specific Weight_001

Electrical system

Battery charging

Follow this procedure to fully charge the battery.

Warning

When charging the battery, do not use a current in excess of one tenth of the rated current. With regard to the maximum recommended charging current, follow the battery manufacturer's instructions.

Caution

If the battery gets extremely hot or releases a significant amount of gas during charging, unplug the battery charger at regular intervals.

1. Use a taper battery charger, which automatically reduces the charging rate during charging.
2. After charging is completed, fill the battery cells with distilled water (if the battery is in use).
3. After charging is completed, measure and record the specific gravity of each cell using a battery hydrometer. (See "Measurement of Battery Specific Weight" (Page 5-5))
4. If the measured specific gravity is 1.225 or less, or the difference between the cells is equal to or exceeds 0.05, replace the battery with a new one.

Interlock system

The interlock system is a safety system to prevent injury or accident caused by lack of attention of operator, using combined control with multiple switches and sensors.

The fuel stop solenoid is activated by the seat switch and traveling pedal neutral switch. It operates simultaneously with the parking brake switch and the knife rotation lever switch.

To start the engine,

1. An operator sits on the seat.
2. Apply the parking brake.
3. Set the knife rotation lever to the "OFF" position.
4. Take the foot off the traveling pedal (forward or reverse pedal).

To drive,

1. An operator sits on the seat.
2. Release the parking brake.
3. Hit the traveling pedal (forward or reverse pedal).

In the following case, the engine is stopped.

- The operator applies the parking brake, leaves the driver's seat, and hits the traveling pedal (forward or reverse pedal).
- The operator releases the parking brake without sitting on the driver's seat.
- The operator applies the parking brake, and turns the knife rotation lever "ON" without sitting on the driver's seat.

To operate (rotary knife rotation),

1. An operator sits on the seat.
2. The knife rotation lever is set to "ON."
 - If the operator leaves the driver's seat, the engine is stopped.

When the machine is parked or stopped,

1. Apply the parking brake.
2. Set the knife rotation lever to the "OFF" position.
3. Take the foot off the traveling pedal (forward or reverse pedal).
 - Unless the operator leaves the driver's seat, the engine is not stopped.
 - However, unless all of the above-mentioned conditions are satisfied, the interlock system is activated and the engine is stopped.

Interlock System Operation Requirements

	Seat	Parking brake	Knife rotation lever	Traveling pedal
To start the engine,	ON (Sitting)	ON (Applied)	OFF	OFF (Take the foot off)
To travel,	ON (Sitting)	OFF (Released)	-	ON (Forward or reverse)
To operate (rotary knife rotation)	ON (Sitting)	OFF (Released)	ON	-
When the machine is parked or stopped,	-	ON (Applied)	OFF	OFF (Take the foot off)

Confirming Operation of Interlock System

1. In the status of the engine start, check if the engine will stop when even one of the operation conditions on the seat, the parking brake, the knife rotation lever and the traveling pedal "neutral position of the forward/reverse pedal" is not met.

Adjustment

Neutral switch

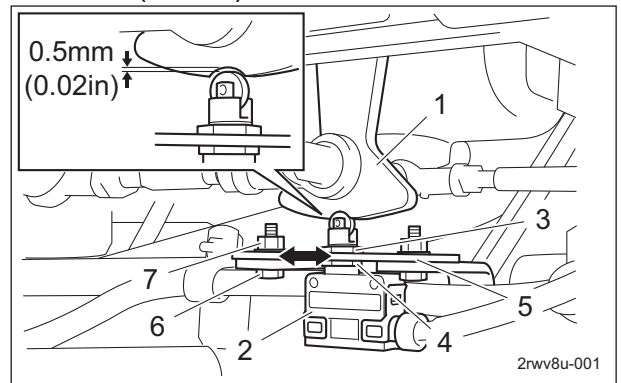
The traveling pedal is equipped with a neutral switch, one part of the interlock system. The neutral switch contact point is activated through the operation of the traveling pedal and it controls starting and stopping of the engine.

Important

Adjust the neutral switch with the piston pump set to the neutral position.

1. Loosen the bolts and nuts of the switch mounting board while the transmission shift lever-front is set to the neutral position.
2. Slide and adjust the switch mounting board so that the roller of the neutral switch will be placed in the center of the groove of the transmission shift lever-front.
3. Tighten the switch mounting board to the main body.

4. Adjust the adjustment nuts A and B so that the clearance between the roller of the neutral switch and the center of the groove of the transmission shift lever-front will be 0.5 mm (0.02 in).



Neutral switch_001

1	Transmission shift lever-front
2	Neutral switch
3	Adjusting nut A
4	Adjusting nut B
5	Switch mounting board
6	Bolt
7	Nut

5. Follow the steps below to check the operation of the neutral switch.
 - [1] Place the jacks beneath the jack-up points securely, and then lift the machine off the ground. Use stable jack stands and raise the machine until the tires lift off the ground. (See the Owner's Operating Manual)
 - [2] Sit on the driver's seat and make sure that you have depressed the brake pedal and applied the parking brake.
 - [3] Set the knife rotation lever to the "OFF" position.

Electrical system

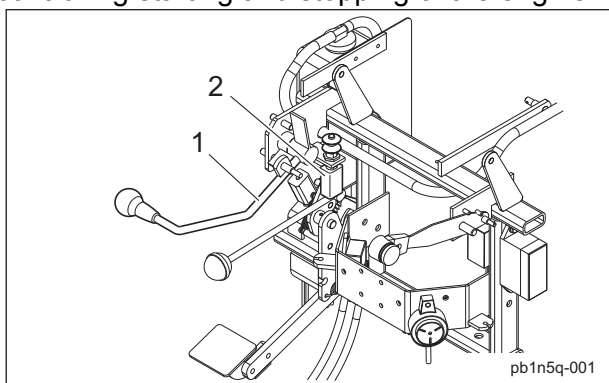
[4] Depress the traveling pedal to confirm that the engine is not started.

[5] Make sure that the engine is started when the traveling pedal is neutral.

Knife rotation lever switch

The knife rotation lever is equipped with a knife rotation lever switch, one part of the interlock system.

The switch contact point is activated through the operation of the knife rotation lever, controlling starting and stopping of the engine.



Knife Rotation Lever Switch_001

1	Knife rotation lever
2	Knife rotation lever switch

1. Follow the steps below to adjust the knife rotation lever switch.

[1] Stop the engine, and apply the parking brake.

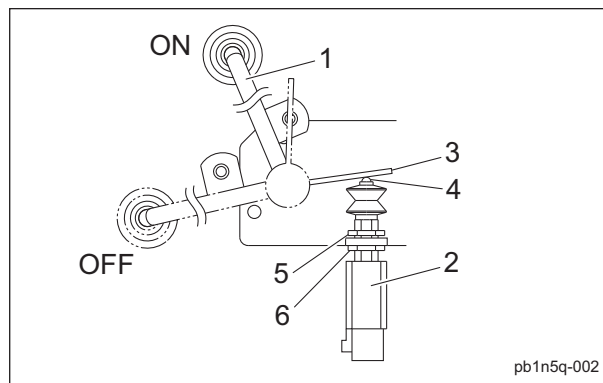
[2] Turn "ON" the knife rotation lever.

[3] Make sure that the switch contact point is pressed on the contact point housing plate.

Important

If the switch contact point is pressed more than a stroke of the switch, the switch may be damaged.

[4] Make adjustments by pulling back the switch contact point 1 - 2 mm (0.04 - 0.08 in) from the condition that it is pressed to the maximum extent, by the adjustment nuts A and B of the knife rotation lever switch while the knife rotation lever is "ON."



Knife Rotation Lever Switch_002

1	Knife rotation lever
2	Knife rotation lever switch
3	Contact point housing plate
4	Switch contact point
5	Adjusting nut A
6	Adjusting nut B

⚠ Caution

Make sure that there is no people around the machine.

2. Follow the steps below to check the operation of the knife rotation switch.

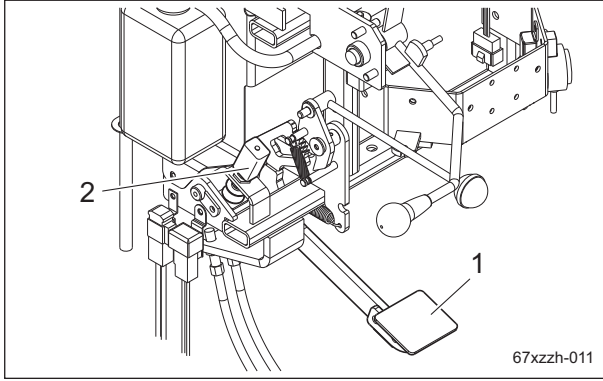
[1] Sit on the seat, and apply the parking brake.

[2] Make sure that the engine is started when the knife rotation lever is set to the "OFF."

[3] Make sure that the engine is not started when the knife rotation lever is set to the "ON."

Parking brake switch

The parking brake is equipped with a parking brake switch, one part of the interlock system. The switch contact point is activated through the operation of the brake pedal, controlling starting and stopping of the engine.



Parking Brake Switch_001

1	Brake pedal
2	Parking brake switch

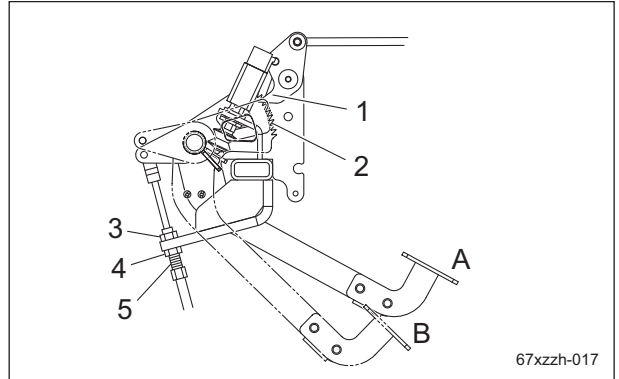
1. Follow the steps below to adjust the knife rotation lever switch.

[1] Stop the engine, and apply the parking brake.

Important

After adjusting the foot brake wire, check that the machine is firmly stopped with the parking brake at notch 3 - 4.

[2] Adjust the adjustment part of the brake wire by the adjustment nuts A and B so that the latch of the brake will be at notch 3 - 4.



Parking Brake Switch_002

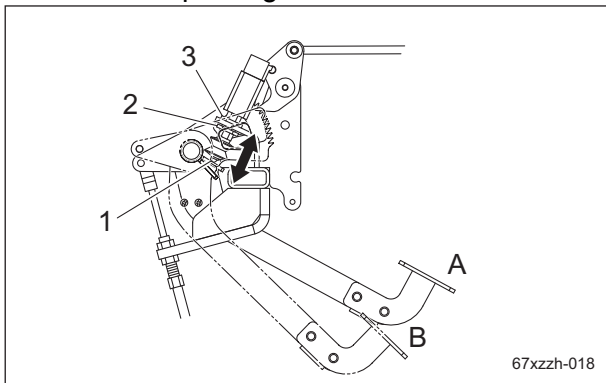
1	Parking brake stopper
2	Notch
3	Adjusting nut A
4	Adjusting nut B
5	Brake wire adjustment
A	Release the brake
B	Depress the brake

Electrical system

Important

If the switch contact point is pressed more than a stroke of the switch, the switch may be damaged.

[3] Make adjustments by pulling back the switch contact point 1 - 2 mm (0.04 - 0.078 in) from the condition that it is pressed to the maximum extent, with the adjustment nuts A and B of the parking brake switch when the parking brake is released.



Parking Brake Switch_003

1	Switch contact point
2	Adjusting nut A
3	Adjusting nut B
A	Release the brake
B	Depress the brake

[4] Release the parking brake, and then make sure that the switch contact point is pressed.

2. Follow the steps below to check the operation of the parking brake switch.

[1] While sitting on the seat with the parking brake set to at least notch 3 - 4 and the knife clutch lever set to the OFF position, check that the engine starts.

[2] Check that the engine is stopped when you release the parking brake and leave the seat.

Electrical components

About the Electrical components

Warning

When servicing electrical components, be sure to disconnect the negative battery cable.

Safety Switches

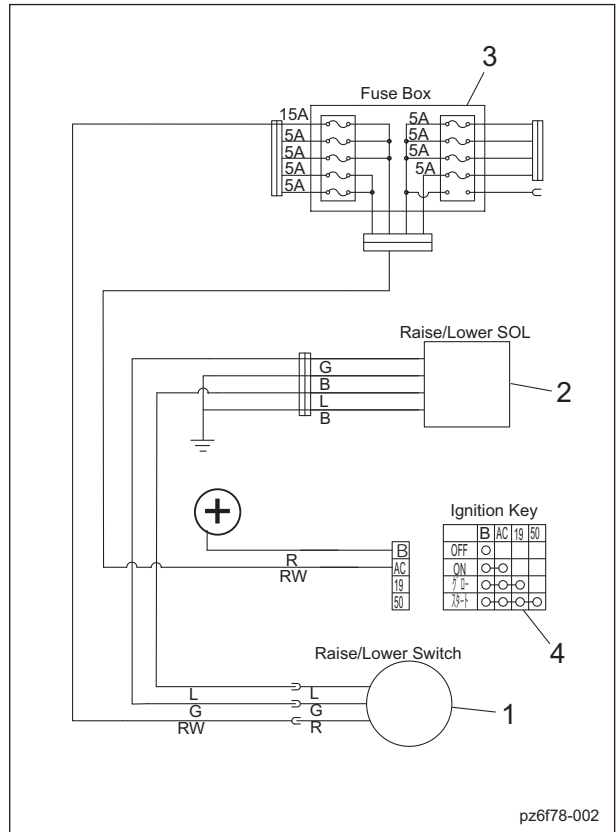
The following devices are used as safety switches to prevent injuries and accidents due to operator inattentiveness.

1. Related to engine starting and operation (See " "Interlock system" (Page 5-6) ").

- Seat switch
- Parking brake switch
- Neutral switch
- Knife rotation lever switch

Mower unit up/down circuit

Raising and lowering of the mower unit is controlled by opening and closing the solenoid valve for raising and lowering by the automatic return switch and solenoid valve.

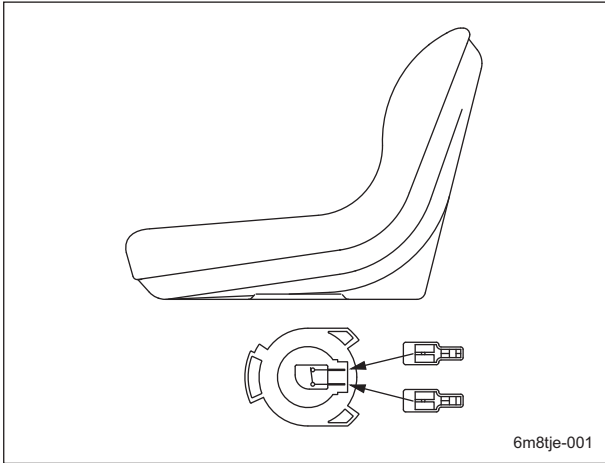


Mower unit up/down circuit_001

1	Automatic return switch
2	Solenoid valve
3	Fuse Box
4	Key switch

Seat Switch

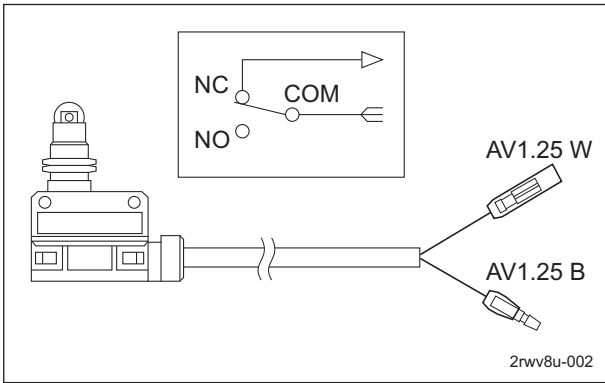
The seat switch is located right underneath the seat and is not usually conducted. It is normal if it is conducted when seated (pressed).



Seat Switch_001

Neutral switch

The neutral switch is located in the hydraulic pump neutral lever. It is normal that there is conduction when the traveling pedal is neutral (released) and there is no conduction when the traveling pedal is forward or backward (depressed).

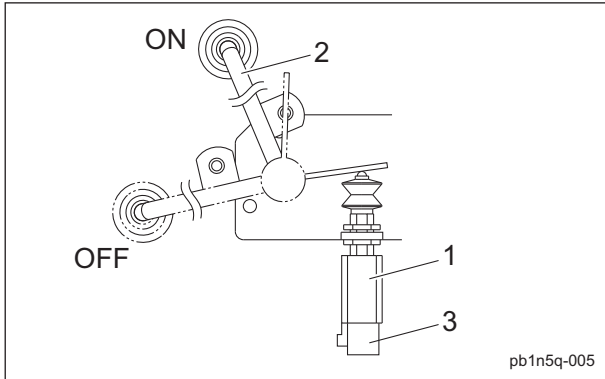


Neutral switch_001

Electrical system

Knife Rotation Lever Switch

1. The knife rotation lever switch is located in the knife rotation lever fulcrum (under the hood) and has two systems of circuits.



Knife Rotation Lever Switch_001

1	Knife rotation lever switch
2	Knife rotation lever
3	Connector

1	Connector terminal 1
2	Connector terminal 2
3	Connector terminal 3
4	Connector terminal 4

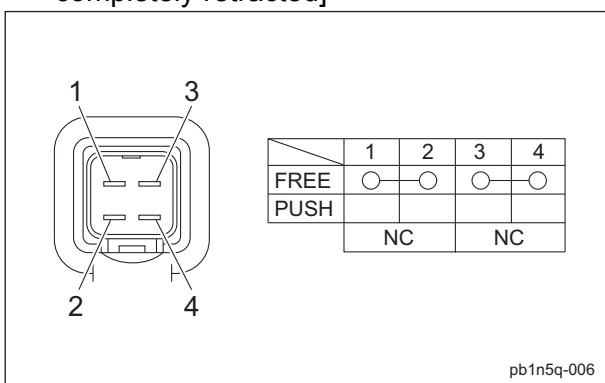
2. Disconnect the connector of the knife rotation lever switch.

[1] It is normal that there is conduction between connector terminals 1 and 2 and between connector terminals 3 and 4 of the knife rotation lever switch when the knife rotation lever is "OFF."

(Condition that switch operation part is completely extended)

[2] It is normal that there is no conduction between connector terminals 1 and 2 and between connector terminals 3 and 4 of the knife rotation lever switch when the knife rotation lever is "ON."

[Condition that switch operation part is completely retracted]

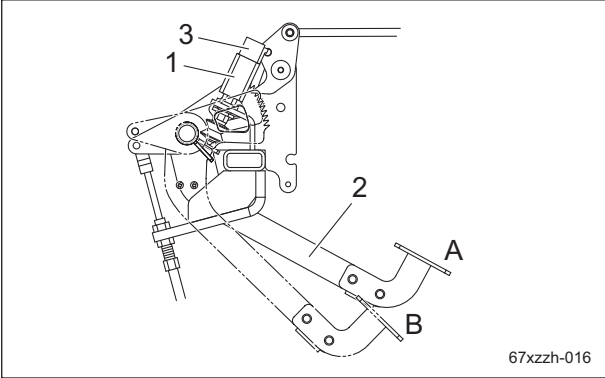


Knife Rotation Lever Switch_002

Parking brake switch

1. The parking brake switch is located in the brake pedal fulcrum (under the hood) and has two systems of circuits.

1	Connector terminal 1
2	Connector terminal 2
3	Connector terminal 3
4	Connector terminal 4



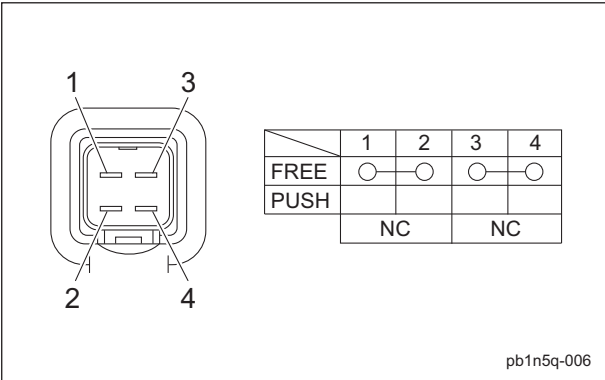
Parking Brake Switch_001

1	Parking brake switch
2	Brake pedal
3	Connector
A	Release the brake
B	Depress the brake

2. Disconnect the connector of the parking brake switch.

[1] It is normal that there is conduction between connector terminals 1 and 2 and between connector terminals 3 and 4 of the parking brake switch when the brake pedal is depressed.
(Condition that switch operation part is completely extended)

[2] It is normal that there is no conduction between connector terminals 1 and 2 and between connector terminals 3 and 4 of the parking brake switch when the brake pedal is released.
[Condition that switch operation part is completely retracted]



Parking Brake Switch_002

	1	2	3	4
FREE	○	○	○	○
PUSH	NC		NC	

Electrical system

Mower Unit Up/Down Switch

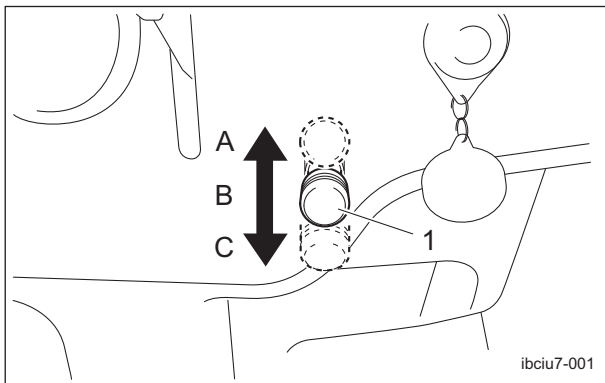
⚠ Caution

Before raising or lowering the mower units, make sure that there are no people around the machine.

The mower unit up/down lever is located in the operation panel and raises or lowers the mower units.

When the lever is shifted to the "DOWN" position, the mower units are lowered. When the lever is shifted to the "UP" position, the mower units are raised.

Release the switch to return it to the neutral position.

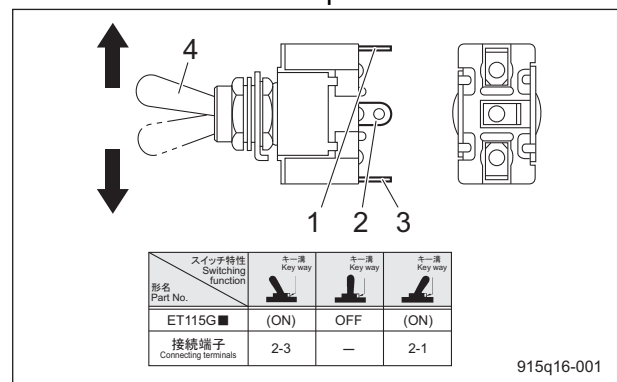


Mower Unit Up/Down Switch_001

1	Mower unit up/down switch
A	Raise
B	Neutral
C	Lower

Inspection of Auto Return Switch

1. Prepare a stand alone switch.
2. It is normal if the switch terminal 1 and 2 are conducted between them when the switch lever is pressed towards the terminal 1 side, and if they are not conducted when the lever is in neutral position.
3. It is normal if the switch terminal 2 and 3 are conducted between them when the switch lever is pressed towards the terminal 3 side, and if they are not conducted when the lever is in neutral position.



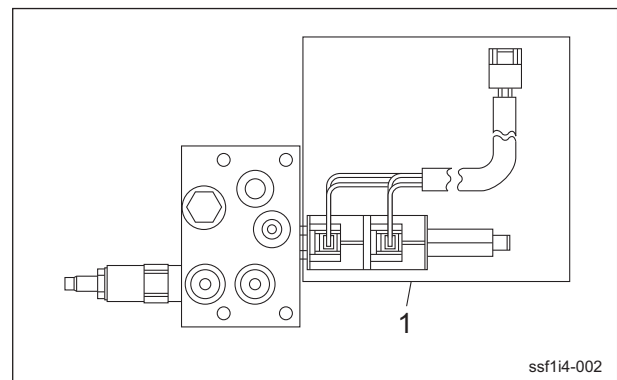
Inspection of Auto Return Switch_001

1	Terminal 1
2	Terminal 2
3	Terminal 3
4	Switch lever

Solenoid Valve

Mower unit up/down valve

The mower unit up/down valve is located in the rear right part of the main body. Depending on the operation of the solenoid valves, the hydraulic path in the mower unit up/down valve is switched to raise and lower the mower unit.



Mower unit up/down valve_001

1	Solenoid valve
---	----------------

■ Inspection of Solenoid

1. Remove the connector of the solenoid.
2. It is normal if resistance between connectors of the solenoid is about 7.2 Ω.

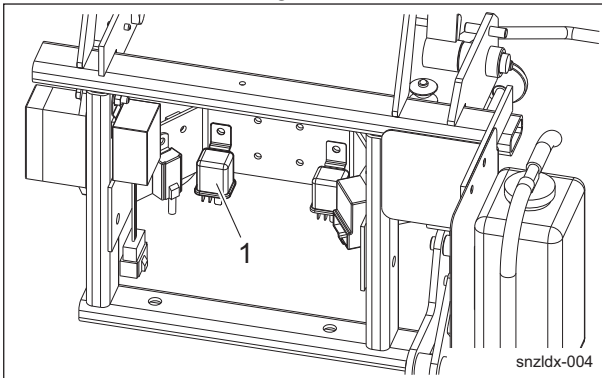
■ Solenoid Specifications

Voltage	Resistance	Holding Current
DC 12 V	7.2 Ω	1.67 A

Power Relay

Sitting-on detection relay

The sitting-on detection relay (power relay [MR5A411A1K] brown) functions as the switch to determine the operation statuses of the fuel control relay and starter relay on the basis of the status signal of the seat switch.

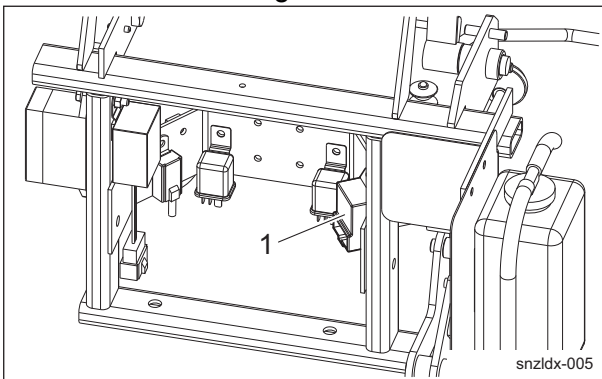


Sitting-on detection relay_001

1	Power relay [MR5A411A1K (brown)]
---	----------------------------------

Neutral detection relay

The neutral detection relay (power relay [MR5A411A1K] brown) functions as the switch to determine the operation statuses of the fuel control relay and starter relay on the basis of the status signal of the neutral switch.



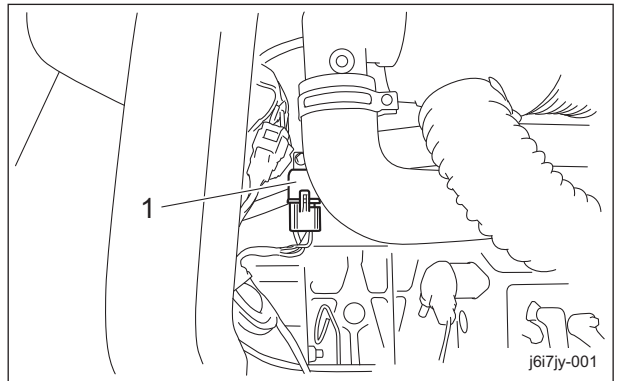
Neutral detection relay_001

1	Power relay [MR5A411A1K (brown)]
---	----------------------------------

Fuel Control Relay

The fuel control relay (power relay [MR5A411A1K] brown) controls the operation of the engine stop solenoid (= supply or stop of fuel).

The fuel control relay is controlled by the combination of the operation of the neutral detection relay and sitting-on detection relay and the status signal of the safety switch (parking brake switch, knife rotation lever switch, seat switch, and neutral switch).

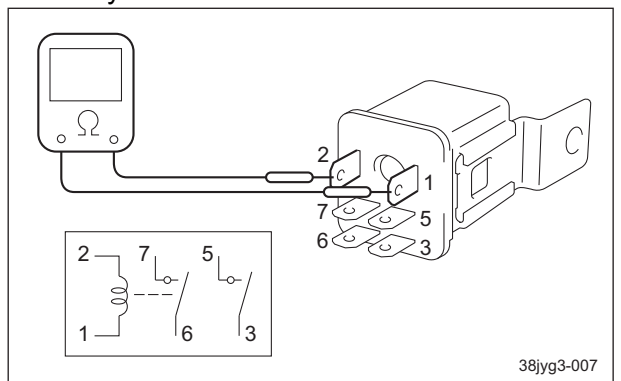


Fuel Control Relay_001

1	Power relay [MR5A411A1K (brown)]
---	----------------------------------

■ Inspection of Power Relay

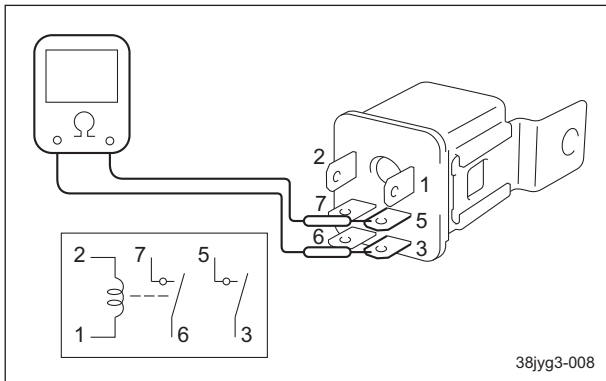
1. Remove the power relay.
2. The normal measured resistance between relay terminals 1 and 2 is about 75 Ω.



Inspection of Power Relay_001

Electrical system

3. It is normal if there is no conduction between both of relay terminal 3 and 5, 6 and 7.

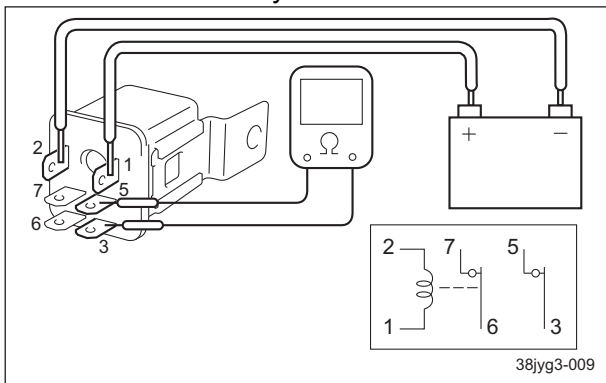


Inspection of Power Relay_002

Caution

Do not short-circuit the battery terminals.

4. It is normal if there is conduction between both of the relay terminal 3 and 5, 6 and 7 when the battery voltage is applied between the relay terminal 1 and 2.



Inspection of Power Relay_003

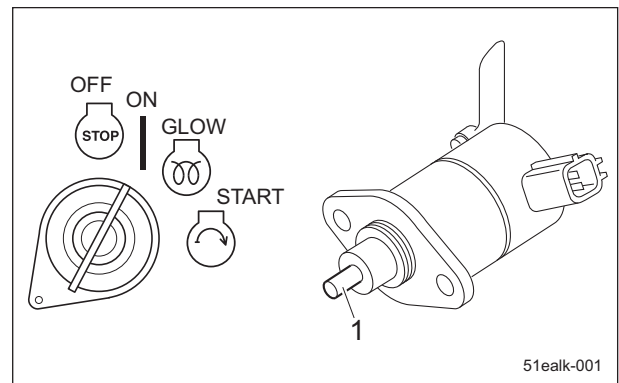
Key Position and Device Operation

ON (Run)

The diesel engine on the machine runs or stops based on the fuel supply. When the key is set to the "OFF" position, the engine stop solenoid is turned off, and fuel is shut off.

After the engine starts, while the key remains in the "ON" position, the solenoid works and fuel is supplied. (This type of solenoid is always conductive. During operation = conductive.)

Key [OFF]	Plunger [out]
Key [ON]	Plunger [in]

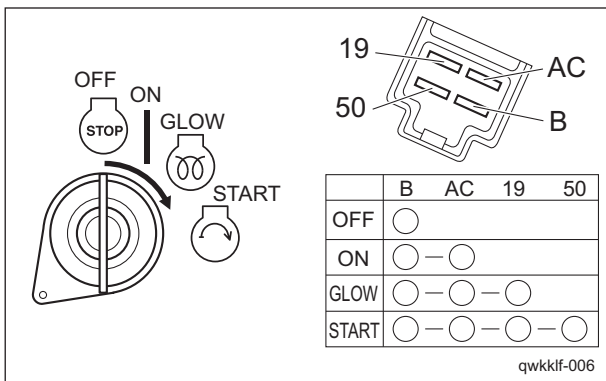


ON (Run)_001

1	Plunger
---	---------

Key Switch

Use the key switch to start or stop the engine. The conductive status of each key position is described below.



Key Switch_001

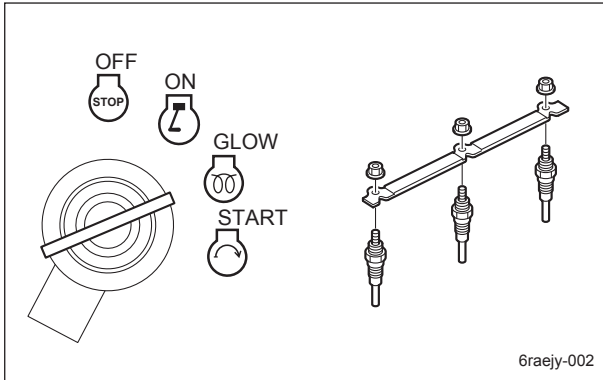
Electrical system

■Glow (thermo-start)

When the ignition key is kept in the "GLOW" position, the glow plug is generating heat and the thermo-start lamp is turned on. The lamp turns off at the specified time. However, the lamp turning off is not related to the glow plug generating heat, and the plug is kept heated as long as the key is in "GLOW" position even after the lamp is turned off.

The glow lamp will stay illuminated for five seconds.

The glow plug is located at engine head of each cylinder and is connected by the plate. The electrical circuit is grounded at the engine block.



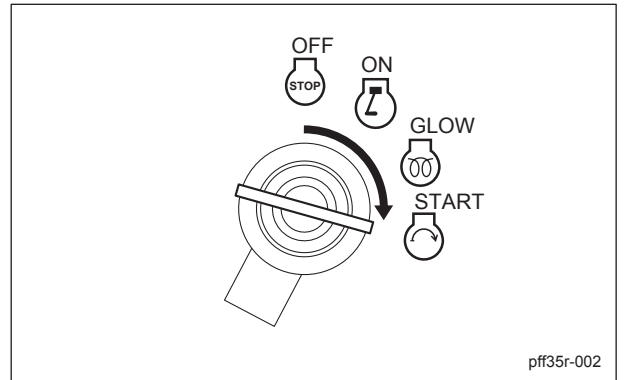
Glow (thermo-start)_001

■START

The engine starts by rotating the starter motor, when the magnet switch of the starter motor is energized with the key at "START" position.

The starter motor is connected via four safety switches.

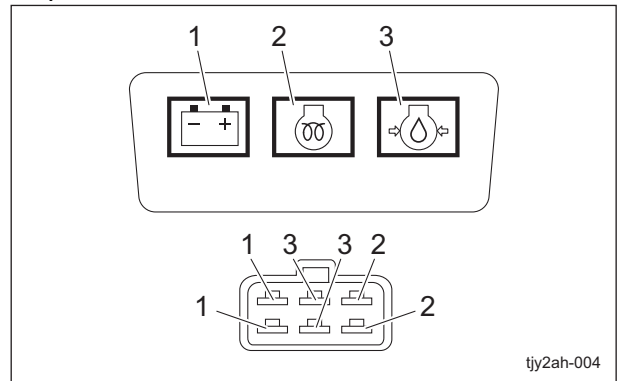
Only if the engine activation conditions of the interlock system are satisfied, the starter motor can be activated. (See "Interlock System Operation Requirements" (Page 5-7))



START_001

Pilot Lamps

Status of charge of the engine, glow, and oil pressure is displayed with illumination of the lamps.



Pilot Lamps_001

1	Charge
2	Thermo-start
3	Engine oil pressure

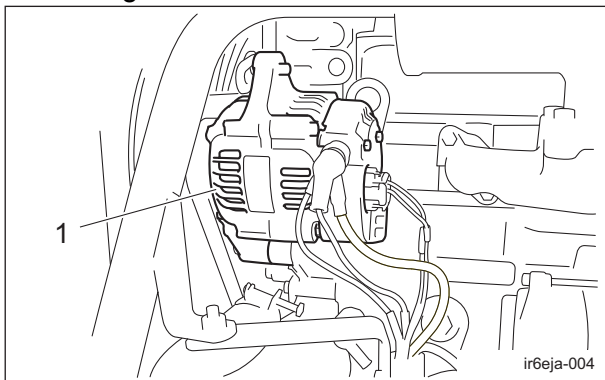
Electrical system

Charge

When the ignition key is set to the "ON" position before the engine starts, the alternator IG-terminal (yellow) is energized and the L-terminal (brown = charger lamp ground) is grounded through internal circuit of the alternator and the lamp lights up.

After normal operation, the internal circuit ground for L-terminal is disconnected and the lamp blacks out.

Grounding is connected to the engine block. If the charge lamp lights up during the engine running, a failure in charging may occur due to malfunction of the alternator drive belt or the IC regulator inside of the alternator etc.



Charge_001

1	Alternator
---	------------

Thermo-start

When the ignition key is set to the "GLOW" position, it illuminates as the glow plug generates heat.

Illumination time of the thermo-start lamp is controlled by the glow lamp timer, and the lamp is turned off after a specified amount of time passes.

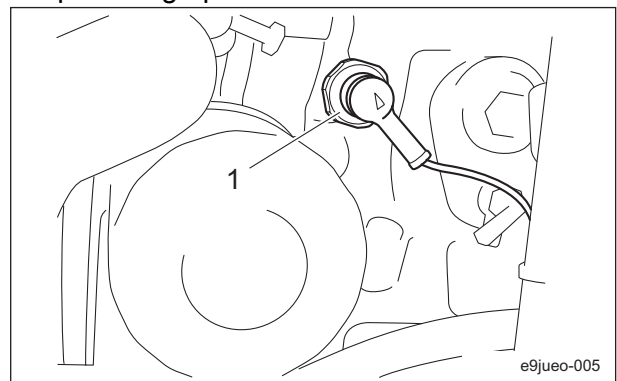
The duration of illumination indicates an approximate period of time required for warm-up, and has been fixed at five seconds.

Engine Oil Pressure

The lamp turns on when the ignition key is set to the "ON" position before the engine starts.

It turns off when the engine starts and engine oil pressure is generated properly.

It is connected to an oil pressure switch located in the engine block (beside the oil element) and lights up if the oil pressure drops during operation.

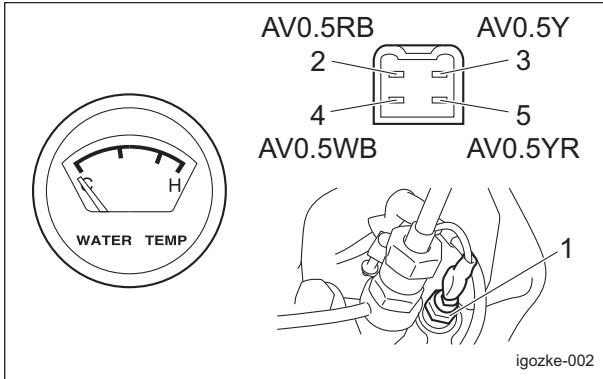


Engine Oil Pressure_001

1	Oil pressure switch
---	---------------------

Water Temperature Gauge

The water temperature gauge is connected to a water temperature sensor located on the engine cylinder head (in the left front of the machine) and displays the water temperature. The resistance value of the water temperature sensor changes according to a temperature and is converted to display the temperature.



Water Temperature Gauge_001

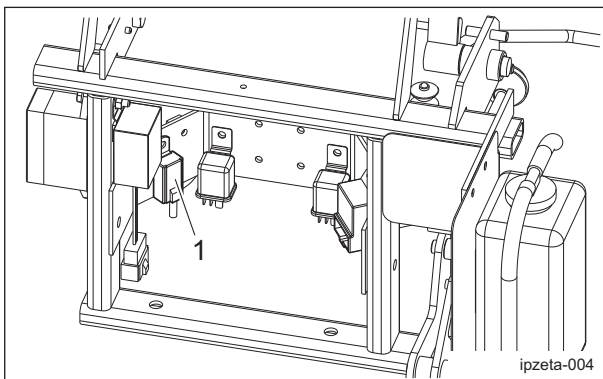
1	Water temperature sensor
2	Light + (unused)
3	IGN +
4	Ground
5	Water temperature sensor power supply

Starter Relay

The starter relay controls the operation of the starter motor (= possibility of starter motor rotation).

The starter relay is controlled by the combination of the operations of the neutral detection relay and sitting-on detection relay and the status signals of the safety switches (parking brake switch, knife rotation lever switch, seat switch, and neutral switch).

It is located under the hood.

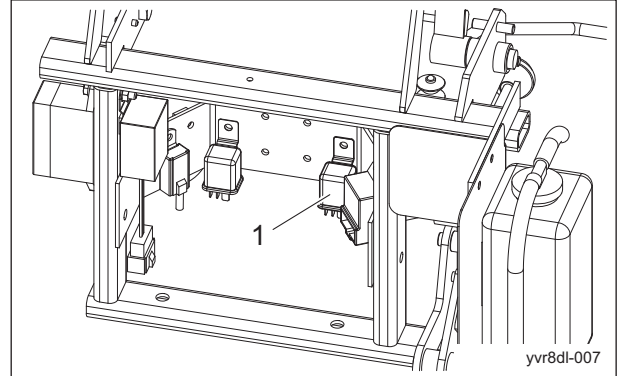


Starter Relay_001

1	Starter relay
---	---------------

Glow Lamp Timer

The glow lamp timer is located in the hood and controls illumination of the thermo-start lamp.



Glow Lamp Timer_001

1	Glow lamp timer
---	-----------------

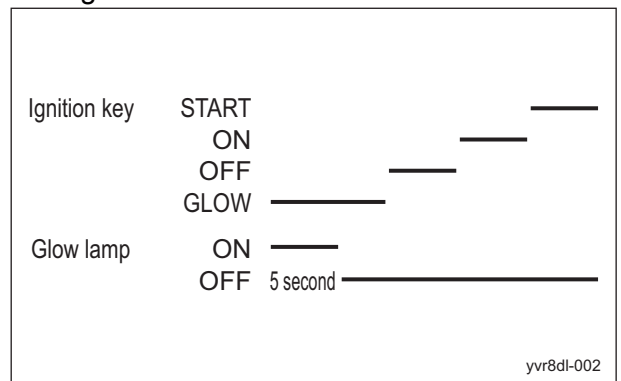
When the ignition key is set and held to the "GLOW" position, the thermo-start lamp turns on for 5 seconds.

The timer unit is activated with the "glow" and "starter start" signals from the ignition key switch.

When the glow signal is inputted, the thermo-start lamp turns on (5 seconds).

When the ignition key is set to the "START" position (starter motor start), even during the period of the thermo-start lamp turning on (before 5 seconds pass), the starter start signal is inputted and the lamp is turned off.

If the timer unit malfunctions, the lamp will not turn on; however, this will not affect engine starting.



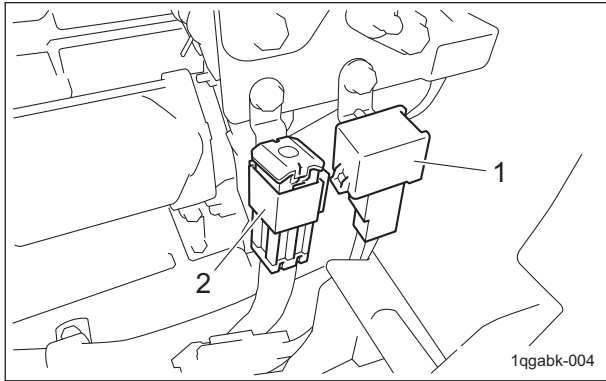
Glow Lamp Timer_002

Electrical system

Fusible Link

Fuse capacity of the fusible link is described below.

- Engine stop solenoid: 30 A
- Battery: 50 A



Fusible Link_001

1	Fusible link (engine stop solenoid)
2	Fusible link (battery)

Fuse Box

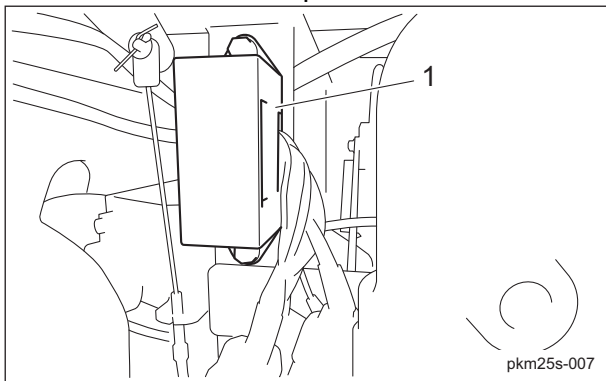
Warning

Before performing maintenance on the electrical system, be sure to disconnect the negative terminal of the battery.

Caution

If a fuse is blown, the electrical circuit may be shorted. Check to identify the cause, such as a bad terminal connection, damaged wiring or terminals, or incorrect wiring.

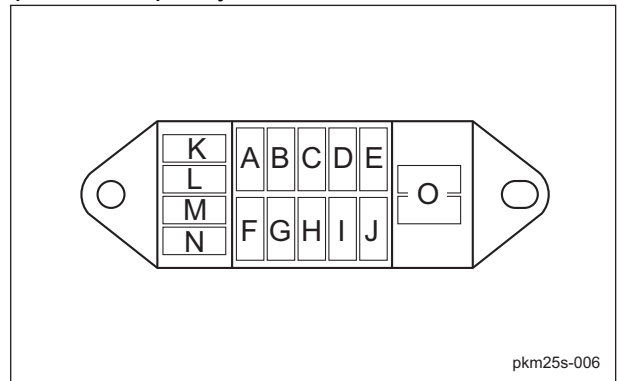
The fuse box includes spare fuses and tools.



Fuse Box_001

1	Fuse box
---	----------

The machine uses a mini fuse for automobiles. Replace an old fuse with a new fuse of the specified capacity.



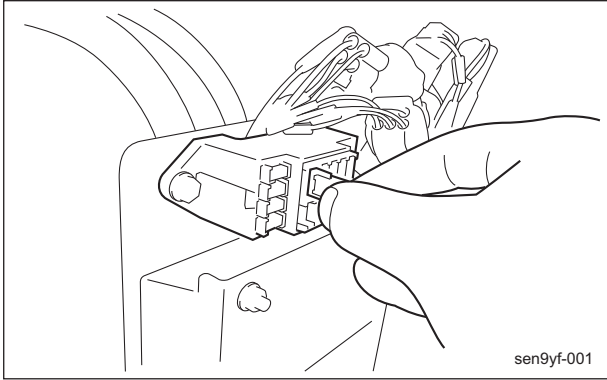
Fuse Box_002

A	5A	Timer (glow signal)
B	5A	Glow lamp
C	5A	Fuel pump
D	5A	Water temperature gauge, charge lamp, oil pressure (engine oil pressure) lamp, water temperature buzzer
E	15A	Electromagnetic valve
F	-	-
G	5A	Timer (start signal)
H	5A	Alternator
I	5A	Fuel SOL relay
J	5A	Starter relay, Delay timer, Sitting detection relay, Neutral detection relay
K	5A	Spare
L	5A	
M	15A	
N	15A	
O	Tool	

Replacement of Fuse

Important

To remove the fuse, use the tools in the tool box.



Replacement of Fuse_001

Solenoid Specifications

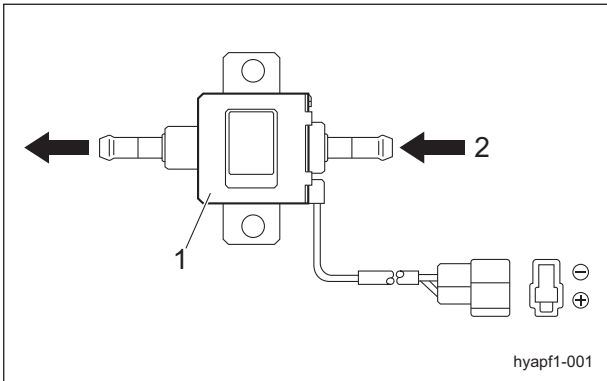
Rated Voltage	DC 12 V
Rated Current	1.5 A
Discharge Quantity	400 cc/min

Fuel Pump

The fuel pump is located at front right side in the hood and powered by DC12V and its inside is composed of a solenoid, diaphragm, check valve, etc.

When the key switch is set to the "ON" position, the solenoid is energized and the diaphragm operates.

As a result, fuel is repeatedly taken in and discharged to supply a constant amount of fuel to the injection pump, regardless of the engine speed.



Fuel Pump_001

1	Fuel pump
2	Fuel

Electrical system

Buzzers

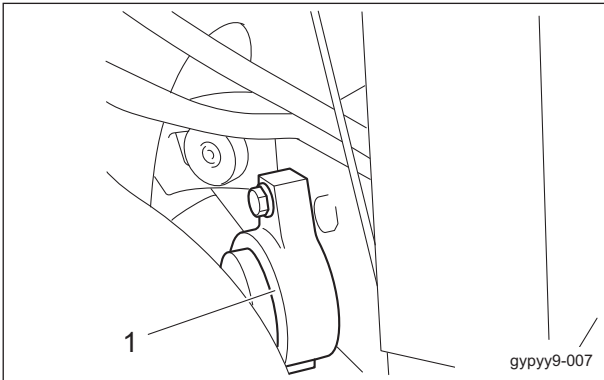
Water Temperature Buzzer

The water temperature buzzer is a warning buzzer connected to the thermo switch on the engine side.

When a specified temperature is reached, there is continuity between the thermo switch and the engine block, causing a buzzer to sound (intermittent tone).

The specified temperature is 105 degrees Celsius (221 °F).

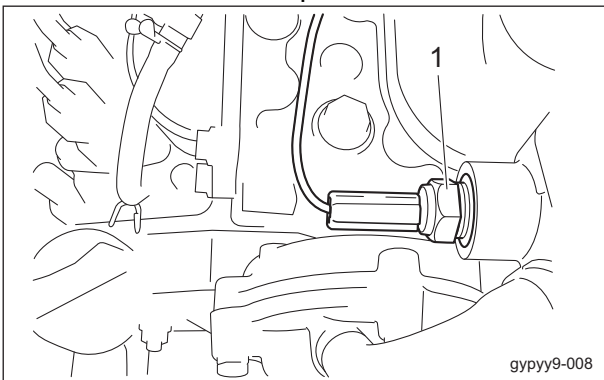
With the circuit in this machine, the engine will not stop, even if the specified temperature is exceeded.



Water Temperature Buzzer_001

1	Water Temperature Buzzer
---	--------------------------

The thermo switch is located on the flange of the connector at the top of the radiator hose.



Water Temperature Buzzer_002

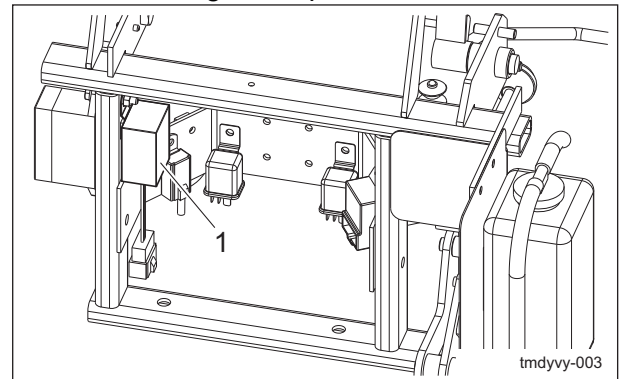
1	Thermo switch
---	---------------

Delay timer

(Seat safety switch timer)

The delay timer is located under the hood and, if the driver is away from the seat for 0.9 second or longer while driving this machine, it turns off the signal to the power relay, which controls fuel.

If the signal from the delay timer is blocked, the energization to the engine stop solenoid stops and then the engine stops.

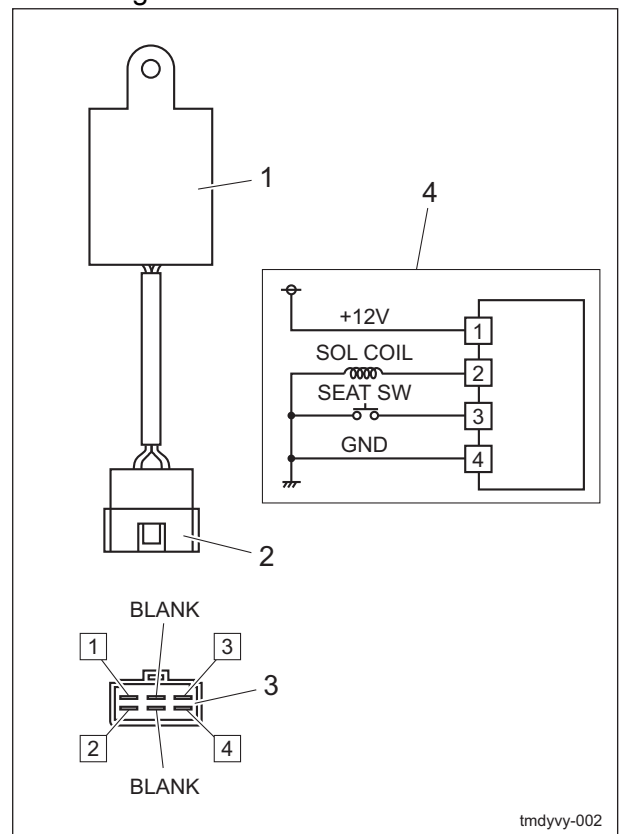


Delay Timer_001

1	Delay timer
---	-------------

Note:

Circuit diagram



Delay Timer_002

Electrical system

1	Delay timer
2	Coupler
3	Coupler position diagram
4	Wiring diagram

Inspection of Delay Timer

1. Remove the delay timer from the machine.

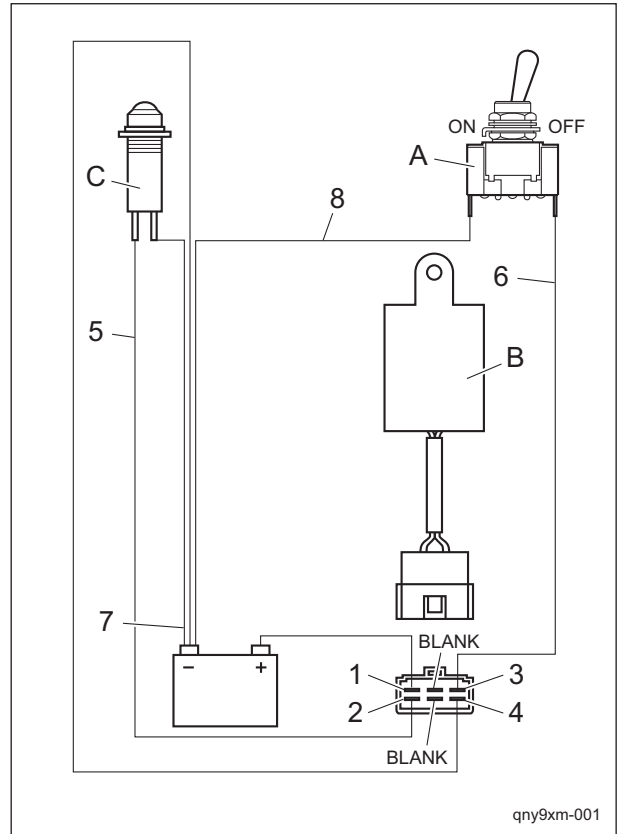
Caution

Do not short-circuit the battery terminals.

2. Follow the steps below to create a test circuit.

- [1] Connect coupler terminal 1 to the battery (+).
- [2] Connect lamp line 1 to coupler terminal 2.
- [3] Connect switch line 1 to coupler terminal 3.
- [4] Connect coupler terminal 4 to the battery (-).
- [5] Connect lamp line 2 to the battery (-).
- [6] Connect switch line 2 to the battery (-).

3. When the switch is turned "ON," the lamp turns on.
If the lamp turns off 0.9 second after the switch is turned "OFF," the delay timer is normal.



Inspection of Delay Timer_001

1	Terminal 1
2	Terminal 2
3	Terminal 3
4	Terminal 4
5	Lamp line 1
6	Switch line 1
7	Lamp line 2
8	Switch line 2
A	Switch
B	Delay timer
C	Lamp

Electrical system

General inspection and repair

Battery

Handling of the battery

For details on handling the battery, please refer to the separate Battery Instruction Manual.

For safe use of the battery, observe the following precautions:

Danger

Do not use the battery near open flames or in a poorly ventilated area. Keep the battery away from lit cigarettes and other open flames.

Do not short-circuit the battery.

If the positive and negative terminals are connected to each other by a metallic tool, the battery will short-circuit. And a short-circuit will also occur if the positive terminal contacts another metallic part (machine body etc.).

1. Keep the battery away from open flames. Hydrogen gas may be generated from the battery. Improper handling of the battery could cause a fire or explosion.

Danger

Do not throw, drop, tilt or upset the battery, or allow it to undergo physical impact. Doing so could cause the electrolyte to leak. If contact of the electrolyte with the eye, skin, or clothing occurs, immediately wash it off with plenty of water. In particular, if eye contact or ingestion occurs, immediately seek medical treatment. If the electrolyte spills over the machine etc., wipe away with a wet cloth and flush the affected area with plenty of water.

2. The electrolyte contained in the battery is sulfuric acid. Contact of the electrolyte (sulfuric acid) with the skin could cause blindness or burns. Contact of the electrolyte with the machine etc. could cause damage to the machine.

Danger

Do not allow anyone to handle the battery who does not fully understand the correct battery handling procedures and relevant dangers.

When handling the battery, wear protective glasses and rubber gloves, etc.

If the battery has an unusual odor, if the electrolyte level goes down unusually fast, or if the electrolyte leaks, do not continue to use the battery.

Failure to observe these precautions could cause a fire, explosion, etc.

Caution

If the electrolyte overflows, neutralize it with bicarbonate etc. until the bubbles disappear, and wash out with plenty of water.

Failure to do so could cause corrosion of the surrounding area or environmental pollution. If deformation of the exterior of the battery is observed, do not continue to use it.

Doing so could result in damage to the battery or electrolyte leaks.

3. Use extra care when handling the battery, and if any problems are found, replace the battery with a new one. Carry or store the battery with care so that it does not fall or become damaged.

Inspection of the battery

To ensure safe use of the battery, inspect it at least once a month.

Before inspecting the battery, be sure to stop the engine and remove the key.

⚠ Danger

Do not allow anyone to handle the battery who does not fully understand the correct battery handling procedures and relevant dangers. When handling the battery, wear protective glasses and rubber gloves, etc. The electrolyte may cause blindness or burns. Never use an open flame when inspecting the battery.

Do not connect the positive and negative battery terminals to each other using a metallic tool etc.

Doing so could cause a fire or explosion.

Always keep the electrolyte level above the LOWER (minimum level line) limit.

Failure to do so could cause the battery life to be shortened or cause explosion.

Loose connections between cable and terminal, or corroded terminals could cause a fire or explosion.

⚠ Warning

Before handling the battery such as for purposes of inspection etc, touch a metal part of the machine body with your bare hand in order to remove static electricity.

Static electricity could cause a fire.

When cleaning the battery, do not use dry cloth or tissue paper, etc.

Static electricity could cause a fire.

When adding distilled water, keep the electrolyte level below the UPPER (maximum level line) limit.

Failure to do so could cause the electrolyte to leak.

⚠ Caution

If the electrolyte overflows from the battery, wipe it with a wet cloth.

Failure to do so could cause damage to the instruments.

When cleaning the battery, do not use organic solvents such as benzene, thinner or gasoline and refrain from using cleaner, or chemical cloth.

Doing so could damage the battery case, resulting in electrolyte leaks.

Do not add anything but distilled water to the battery.

Adding anything other than distilled water could cause the battery to become extremely hot or generate toxic gases due to impurities.

Do not add sulfuric acid to the battery.

Doing so could cause the specific gravity of the electrolyte to exceed the specified value, causing the battery life to be shortened.

After adding distilled water to the battery, firmly tighten the vent plug.

When inspecting the battery, inspect the following items:

1. Visual inspection

Visually inspect the battery case for cracks, chips and deformation, and check that there are no electrolyte leaks.

If any of the above are found, investigate what has caused them and replace the battery.

2. Cleaning of the exterior

When cleaning the battery, use cloth that has been dampened with water.

Inspect the vent plug or vent hole on the side.

If the plug or hole is clogged with mud etc., wash it with water.

A clogged vent hole could cause the internal pressure to increase due to gases generated inside the battery, causing the battery to burst.

Electrical system

3. Inspection of the mounting bracket

Ensure that the battery is firmly secured by the mounting bracket.

If it is not, tighten the nuts securing the battery until it is firmly secured.

If the battery is not firmly secured by the mounting bracket, the battery could move due to vibration while the machine is moving, resulting in damage to the battery case or electrolyte leaks.

4. Inspection of the cable terminals for looseness

If a connection between a battery terminal and machine-side cable terminal is loose, tighten the nut securing the cable terminal until it is firmly secured.

Loose connections could result in an insufficiently charged battery, damaged terminals, or explosion.

Note:

If a terminal has corroded, polish it using a wire brush or fine sandpaper, and apply a small amount of anti-rust grease.

5. Inspection of the electrolyte level and addition of distilled water

Important

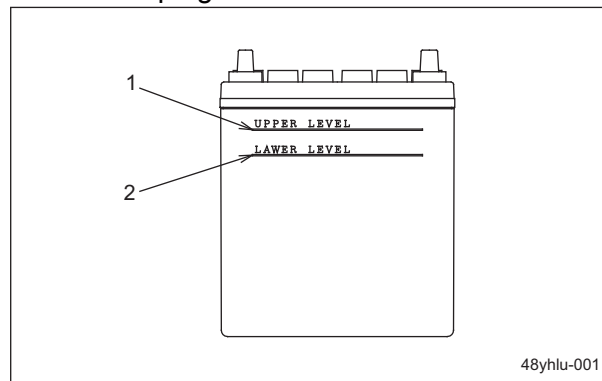
When adding distilled water, be careful not to add an excessive amount.

Check the electrolyte level by looking from the side of the battery.

If the electrolyte level has fallen to less than halfway between the "UPPER" (maximum level line) and "LOWER" (minimum level line) limits, add distilled water to the battery immediately until the "UPPER" limit is reached.

When adding distilled water, loosen and remove the vent plug and add distilled water up to the "UPPER" (maximum level line) limit.

After adding distilled water, firmly tighten the vent plug.



Inspection of the battery_001

1	Upper limit
2	Lower limit

Replacement of Battery

When replacing the battery, note the following precautions and be sure to turn off the power switch etc., stop the engine, and remove the key before replacement.

⚠ Danger

Do not replace the battery near open flames or in a poorly ventilated area. Keep the battery away from lit cigarettes and other open flames.

Failure to observe these precautions could cause a fire or explosion.

Do not short-circuit the battery.

If the positive and negative terminals are connected to each other by a metallic tool, the battery will short-circuit. And a short-circuit will also result if the positive terminal contacts another metallic part (machine body etc.).

When connecting a machine-side cable terminal to a battery terminal, ensure that the nut is firmly tightened.

A loose nut could cause a fire or explosion.

Warning

When connecting the machine-side cable terminals to the battery, ensure that they are correctly connected to the positive and negative terminals.

Secure the battery firmly with the mounting bracket.

Failure to do so could cause damage to the battery, leakage of the electrolyte, fire or explosion.

Do not modify the battery terminals.

Ensure that the vent plug or vent hole on the side of the battery is not covered by the connection cables etc.

Do not connect any electrical devices directly to the battery.

Caution

Select a battery that has the same terminal positions (the positions of the positive and negative terminals) as the old one.

Installing a battery that has different terminal positions could cause damage to the cables.

Do not use organic solvents such as benzene, thinner or gasoline and refrain from using cleaners.

Do not allow the battery to come in contact with vinyl chloride containing plasticizer etc.

When handling the battery, keep it in a horizontal position and install it on the mounting so that it is horizontal.

If the battery has terminal covers or heat shield plates attached, re-install them in their original positions after replacing the battery.

When mounting the battery on the machine, never hold the battery terminals.

Doing so could cause the terminals to deform, resulting in poor connections or electrolyte leaks from around the terminals.

Replace the battery with one that is the same size.

When replacing the battery, follow these steps:

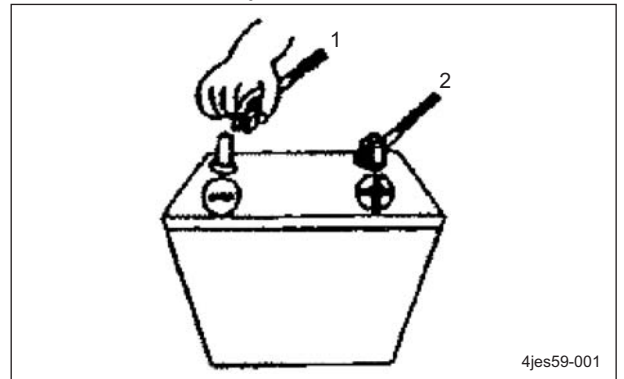
Removing the old battery

Important

Be careful when handling the used battery as it still contains electrical energy.

1. Stop the engine and remove the key.
2. Disconnect the negative cable.

3. Disconnect the positive cable.
4. Loose the mounting bracket and remove the old battery.

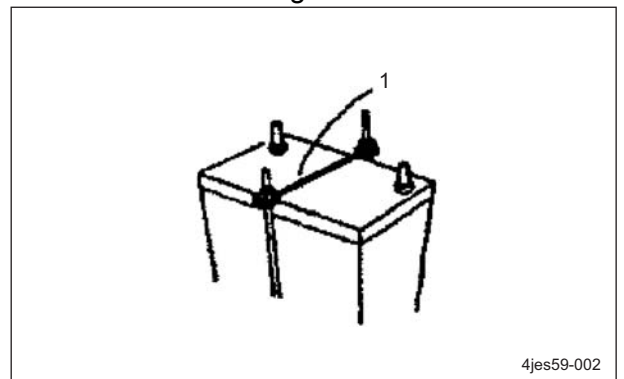


Replacement of Battery_001

1	(-) Cable
2	(+) Cable

Installing a new battery

1. Install the new battery with the correct polarities and firmly secure the battery with the mounting bracket.



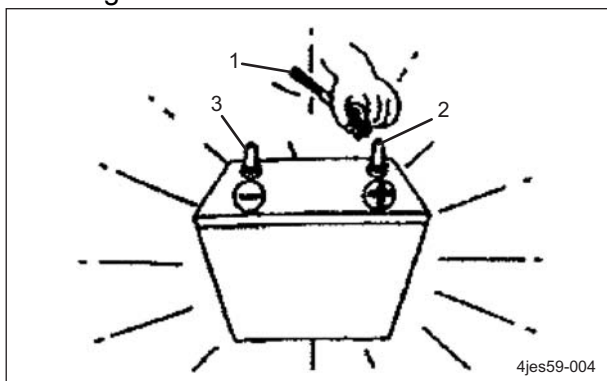
Replacement of Battery_002

1	Mounting bracket
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2. Remove the protection cap from the new battery.
3. Firmly secure the positive cable to the positive terminal.

Electrical system

4. Firmly secure the negative cable to the negative terminal.



Replacement of Battery_003

1	(+) Cable
2	(+) Terminal
3	(-) Terminal

Battery Charge

When charging the battery with the battery charger, follow the correct steps according to the handling instructions attached to the battery charger.

⚠ Danger

Do not charge the battery near open flames or in a poorly ventilated area. Keep the battery away from lit cigarettes and other open flames.

Failure to observe these precautions could cause a fire or explosion.

Do not connect the charge clip to the battery nor remove it while the power of the battery charger is ON.

Failure to observe these precautions could cause a fire or explosion.

If the battery charger has a changeover switch for voltage, set the battery voltage for charge.

If the voltage for charge is wrong, it may cause overheating or ignition of the battery charger or explosion of the battery.

⚠ Warning

Charging the battery mounted on the vehicle may cause ignition, explosion, or damage on the vehicle or equipment.

If there is no way other than to charge the battery mounted on the vehicle, remove the minus cable terminal on the vehicle side, which is connected to the battery.

When connecting to the battery charger, firmly connect the plus and minus charge clip to the plus and minus terminals of the battery, respectively.

If they are connected reversely or loosely, it may cause ignition, explosion, failure of the battery charger, or damage on the vehicle or equipment due to the polarity inversion of the battery.

Set the charging current to 1/10 or less than the rating capacity of battery. In the case of fast charging, set it to that rating capacity or less.

If the charging current is too large, it may cause ignition or explosion due to electrolyte leaks or liquid shortage.

Do not mount the battery on the vehicle and wait for 30 minutes after charging.

Failure to observe these precautions could cause a fire or explosion.

⚠ Caution

The temperature of the electrolyte must be 45 degrees C or lower. In the case of fast charging, it must be 55 degrees or lower.

If these temperature limits are exceeded, it could result in battery deformation or electrolyte leaks.

When charging the battery, remove the vent plug of the battery, if possible, to expedite the diffusion of the hydrogen gas derived from the battery.

Electrolytic solution adheres to the vent plug, so be careful so that your skin nor clothes do not touch the solution.

If the electrolyte level is lower than halfway between the solution levels, add purified water up to the UPPER LEVEL (maximum line).

If UPPER LEVEL is exceeded, it may cause electrolyte leaks.

Important

Fast charging is not suitable for charging to recover the battery left for a long time.

A high electrolyte temperature deteriorates parts such as polar plates inside the battery and shorten its lifetime.

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Adjusted Value..... Page 6-2

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Adjustment..... Page 6-4
Brake..... Page 6-4
Traveling rod.....Page 6-6
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Toe Angle..... Page 6-9

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Brake..... Page 6-10

Main body

Maintenance

About Maintenance

This chapter provides descriptions of the main inspection and maintenance procedures for the GM1700.

For daily inspections and maintenance as well as machine handling, refer to the GM1700 Operator's Manual and Parts Catalog.

Specifications

Tire Pneumatic Pressure

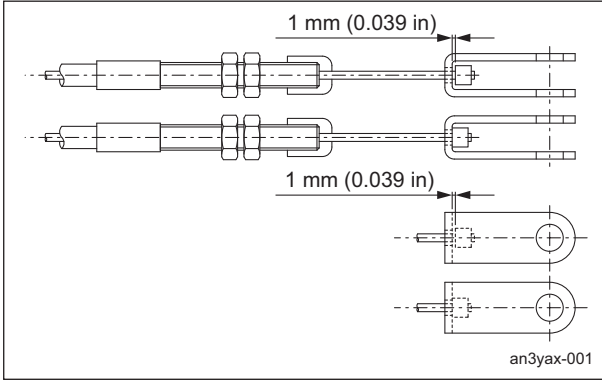
	kPa	kgf-cm ²	psi=lb-in
Front wheel	140	1.43	20.30
Rear wheel	140	1.43	20.30

Adjusted Value

		mm	in
Rod distance (between rod end centers)	Forward rod	489.0	19.25
	Reverse rod	166.0	6.54
	Neutral adjustment rod	186.0	7.32
Spring compression distance (lever adjuster)	Compression spring	53.0	2.09
Brake wire part	Pedal-side clearance	1	0.039
Toe angle		0±5	0±0.20

Adjusted Value of the Foot Brake Wire

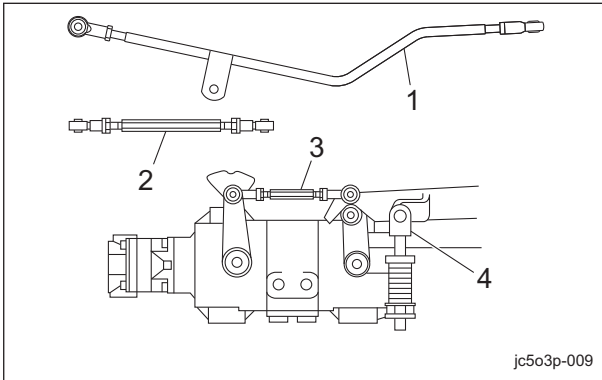
The clearance adjusted value of brake wire on the pedal side is described below.



Adjusted Value of the Foot Brake Wire_001

Adjustment Value of Traveling Rod

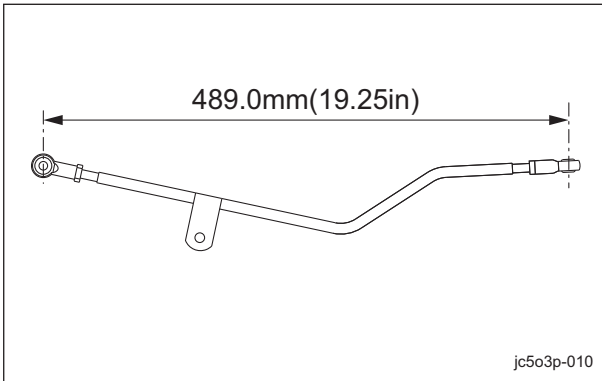
Here are the adjustment values of the traveling rod distance (between the centers of the rod ends).



Adjustment Value of Traveling Rod_001

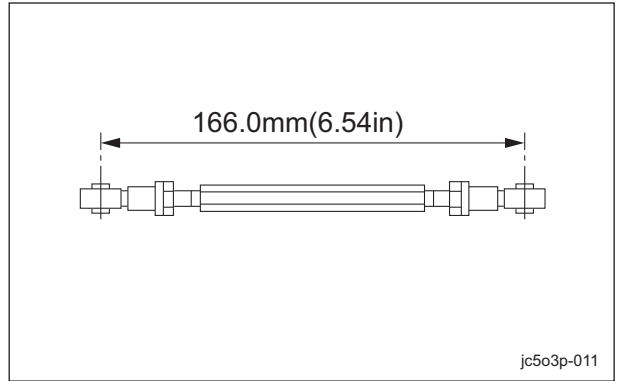
1	Forward rod
2	Reverse rod
3	Neutral adjustment rod
4	Lever adjustment bracket

1. Forward rod



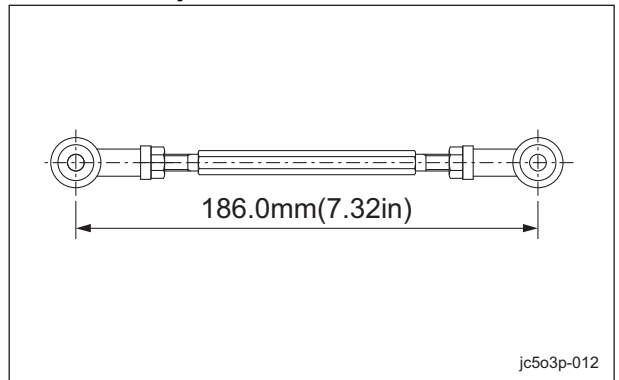
Adjustment Value of Traveling Rod_002

2. Reverse rod



Adjustment Value of Traveling Rod_003

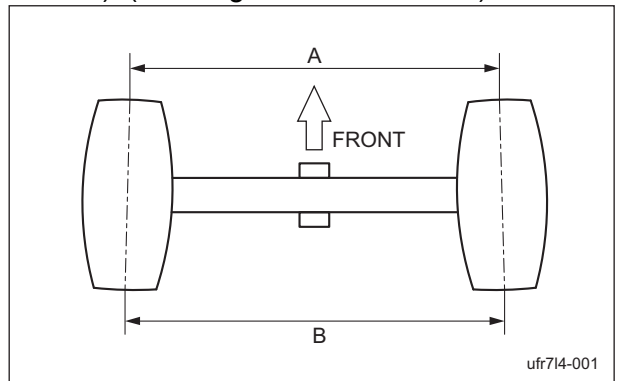
3. Neutral adjustment rod



Adjustment Value of Traveling Rod_004

Adjusted Value of the Toe Angle

The toe angle adjustment is $0 \pm 5 \text{ mm}$ ($0 \pm 0.20 \text{ in}$). (Toe angle amount = A - B)



Adjusted Value of the Toe Angle_001

Special Tool

Special tools list

No use of special tools is required.

Main body

Main body

Adjustment

Brake

Adjustment of Brake

⚠ Danger

If the brake wire is cut, the machine will be unable to stop. This would be extremely dangerous.

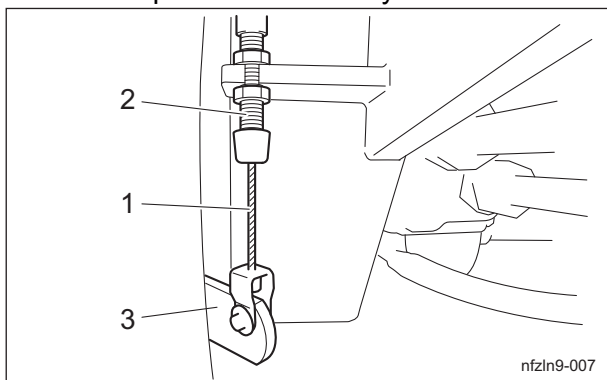
If the brake wire is cracked or damaged, replace it with a new one immediately.

If the brake is not sufficiently effective, adjust the brake wire.

Important

Adjust to reduce the play in the brake lever as much as possible so that the brake does not drag when the lever is released.

- Adjust the foot brake by tightening the brake wire adjustment bolt.
 - If there is too much play in the brake lever, the braking power is reduced and the brake pedal feel is light.
 - If there is too little play in the brake lever, the braking power is increased and the brake pedal feel is heavy.



Adjustment of Brake_001

1	Brake wire
2	Adjustment bolt
3	Brake lever

- Start the engine and drive to check the following.
 - Make sure that heat is not generated in the brake area.
 - Make sure that the left and right brakes are equally effective.

⚠ Danger

It would be extremely dangerous and may result in an unexpected accident if the left and right brakes are not equally effective.

- If the left and right brakes are not equally effective, make fine adjustments with the adjustment bolt on the brake wire.

■ Break-in of Brakes

If the brake shoes or brake pads are worn, replace them with new ones.

Immediately after replacement, drive to break in the brakes if the effectiveness of the brakes is low.

While driving, lightly operate the brakes to break in the contact areas.

Adjustment of Parking Brake

⚠ Danger

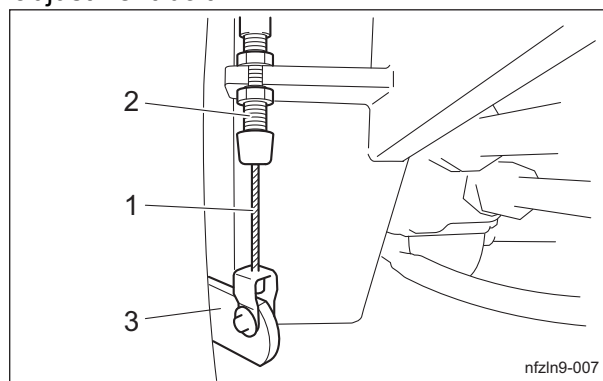
Make sure that the brake wire is not cracked or damaged.

⚠ Danger

Make sure that the brake is effective on slopes and that it is not applied any longer when you release it.

Adjust the parking brake system whenever there is any abnormality.

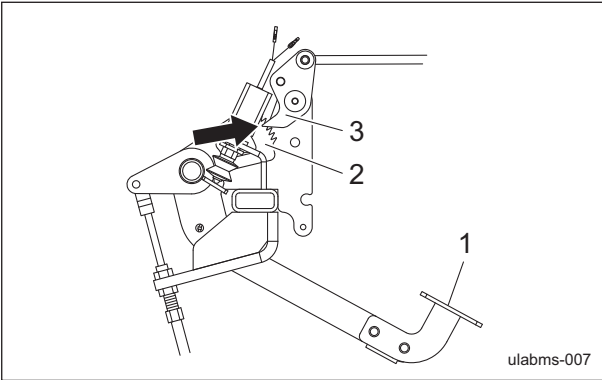
Adjust the parking brake system by the adjustment bolt.



Adjustment of Parking Brake_001

1	Brake wire
2	Adjustment bolt
3	Brake lever

1. Follow the steps below to adjust the parking brake.
 - [1] Check position of the notch of the parking brake.
 - [2] Depress the brake pedal firmly, and then pull the parking brake lever to engage the latch on the notch.
 - [3] Make adjustment with the adjustment bolt so as to locate position of the arrow at 3 to 4 notches from the bottom.



Adjustment of Parking Brake_002

1	Brake pedal
2	Notch
3	Latch

Adjustment of Knife Brake

1. Remove the rear cover.
2. Make sure that the knife rotation lever is set to the "OFF" position.

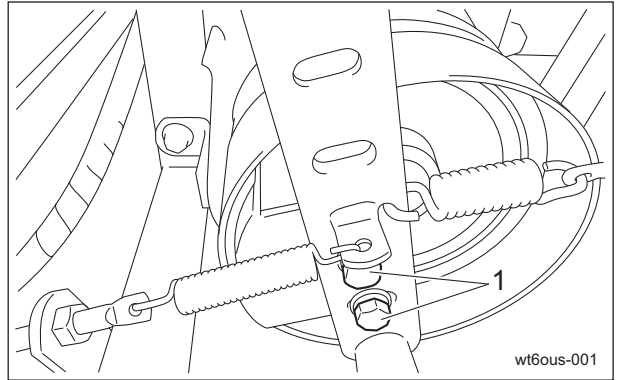
Important

Make sure that the shoe of the knife brake is not worn. If the brake shoe is worn, replace it.

Important

After adjusting the knife tension spring, adjust the knife brake.

3. Loosen the bolts mounting the brake shoe.



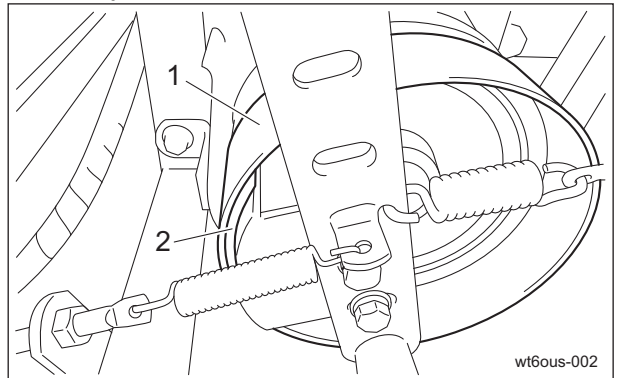
Adjustment of Knife Brake_001

1	Bolt
---	------

4. Move the brake shoe flush against the inside of the pulley drum.

Note:

Adjust the brake shoe so that knife rotation is fully stopped.



Adjustment of Knife Brake_002

1	Pulley drum
2	Brake shoe

5. Tighten the bolt mounting the brake shoe.
6. Adjust the knife tension return spring.

Main body

Main body

Traveling rod

Adjustment of Traveling Rod

The return of the pedal neutral rod compression spring may become insufficient due to the usage frequency of the traveling pedal. Inspect them and, if necessary, implement adjustment etc.

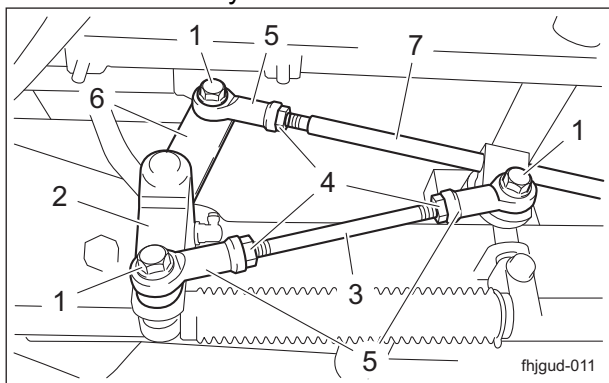
1. Follow the steps below to adjust the traveling pedal.

- [1] Loosen the lock nut at the both ends of the reverse rod.
- [2] Remove the bolt set securing the reverse pedal and reverse rod.

Important

Evenly screw in the left and right screws of the pillow ball rod end to be installed to the reverse rod.

- [3] Adjust the length of the reverse rod so that the reverse pedal connecting fitting faces directly downward.

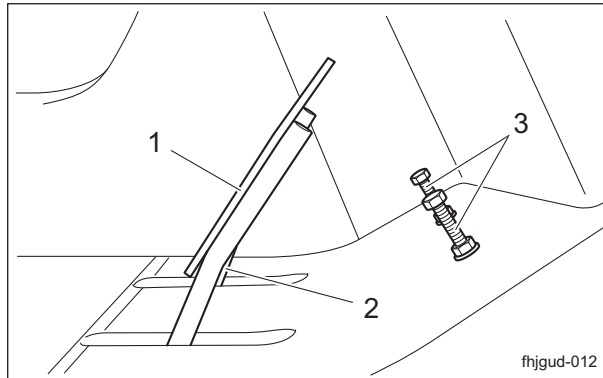


Adjustment of Traveling Rod_001

1	Bolt set (bolt, spring washer x 2, and nut)
2	Reverse pedal connecting fitting
3	Reverse rod
4	Lock nut
5	Pillow ball rod end
6	Forward pedal
7	Forward rod

2. Follow the same steps to adjust the forward pedal.

The height of the position of the forward pedal should be the same as that of the reverse pedal.



Adjustment of Traveling Rod_002

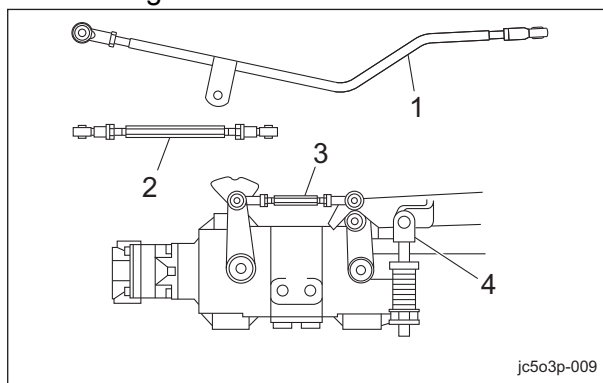
1	Forward pedal
2	Reverse pedal
3	Speed adjustment screw

Important

When tightening each rod lock nut, be careful on the position of the pillow ball rod end and confirm that the rod moves smoothly.

3. Follow the steps below to adjust the traveling rod.

- [1] The length of the neutral adjustment rod can be adjusted just by loosening the left and right lock nut.

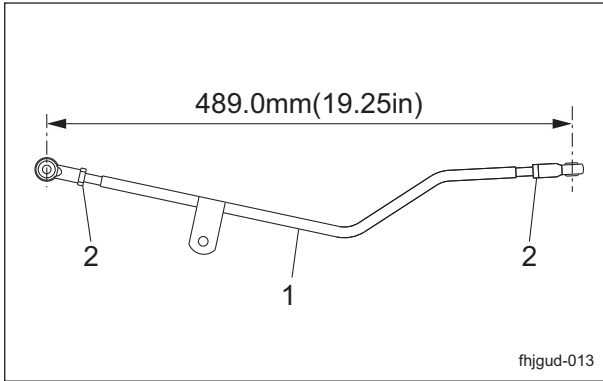


Adjustment of Traveling Rod_003

1	Forward rod
2	Reverse rod
3	Neutral adjustment rod
4	Lever adjustment bracket

Main body

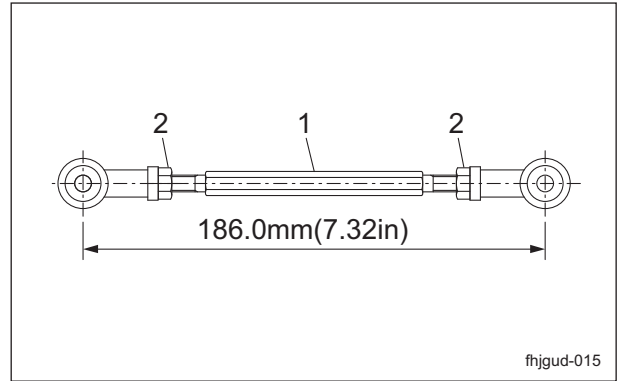
[2] Make sure that the length of the forward rod is 489.0 mm (19.25 in).
Loosen the lock nut as necessary to make adjustment.



Adjustment of Traveling Rod_004

1	Forward rod
2	Lock nut

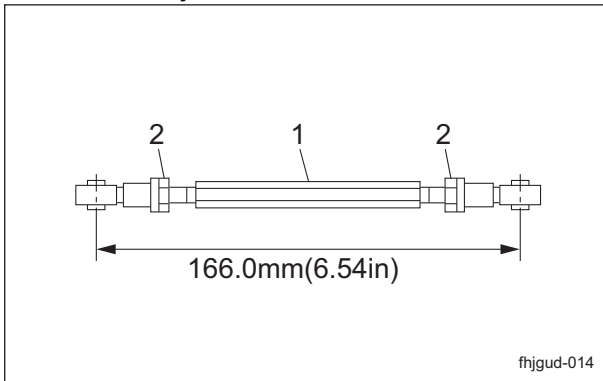
[4] Make sure that the length of the neutral adjustment rod is 186.0 mm (7.32 in).
Loosen the lock nut as necessary to make adjustment.



Adjustment of Traveling Rod_006

1	Neutral adjustment rod
2	Lock nut

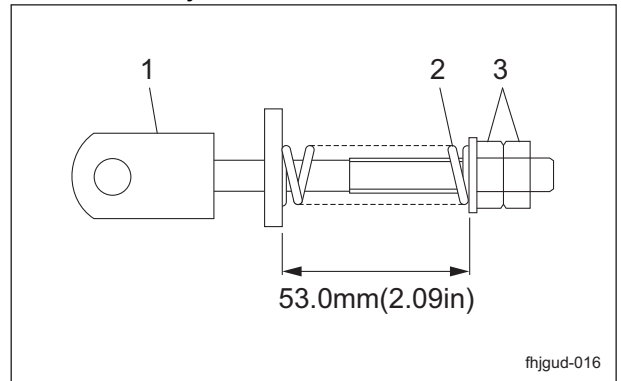
[3] Make sure that the length of the reverse rod is 166.0 mm (6.54 in).
Loosen the lock nut as necessary to make adjustment.



Adjustment of Traveling Rod_005

1	Reverse rod
2	Lock nut

[5] Make sure that the length of the spring of the lever adjuster is 53.0 mm (2.09 in).
Loosen the lock nut as necessary to make adjustment.



Adjustment of Traveling Rod_007

1	Lever adjustment bracket
2	Spring
3	Lock nut

Main body

Main body

■ Adjusting the Neutral Position of the Piston Pump

⚠ Caution

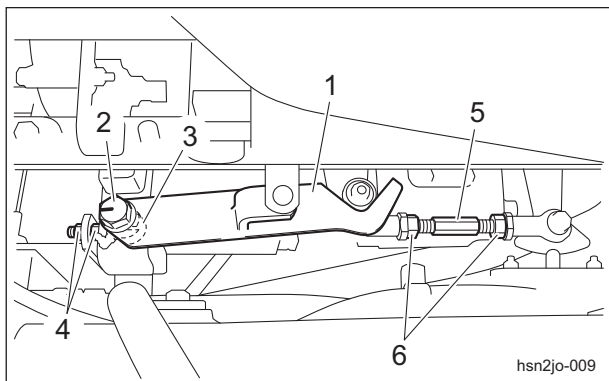
Make sure not to touch rotating tires.

If the machine moves forward or backward while the traveling pedals are released, they are not set to the neutral position. Follow the steps below to make adjustments.

1. Stop the engine.
2. Place the jacks beneath the jack-up points, and then lift the machine off the ground.
Use stable jack stands, and raise the machine until the tires lift off the ground. (See "Jack-up Points" (Page 3-11) .)
3. Remove the seatback cover on the right side.
4. Remove the underseat cover on the right side.
5. Start the engine, and rev it up to the maximum rpm.
6. Set the 2WD/4WD selector switch to the "4WD" position.
7. Adjust the neutral position for the rear wheels.

[1] If the rear tires rotate forward, loosen the cam lever shaft, and then adjust lock nuts A to move the shaft seat backward. Find the position where the rear wheels stop, and then tighten the cam lever shaft to secure it.

[2] If the rear tires rotate in reverse, loosen the cam lever shaft, and then adjust lock nuts A to move the shaft seat forward. Find the position where the rear wheels stop, and then tighten the cam lever shaft to secure it.



Adjusting the Neutral Position of the Piston Pump_001

1	Cam lever
2	Cam lever shaft
3	Shaft seat
4	Lock nut A
5	Threaded rod
6	Lock nut B

Important

Before adjusting the neutral position for the front wheels, make sure that the rear wheels have first been set to the neutral position.

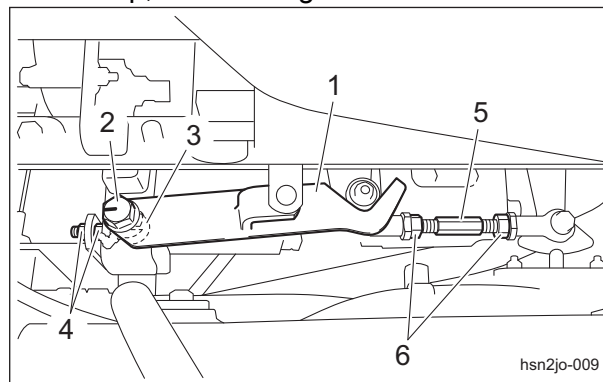
8. Adjust the neutral position for the front wheels.

[1] If the front tires rotate forward, loosen lock nuts B of the threaded rod, then turn the threaded rod to shorten the connection.

Find the position where the front wheels stop, and then tighten lock nuts B.

[2] If the front tires rotate in reverse, loosen lock nuts B of the threaded rod, then turn the threaded rod to extend the connection.

Find the position where the front wheels stop, and then tighten lock nuts B.



Adjusting the Neutral Position of the Piston Pump_002

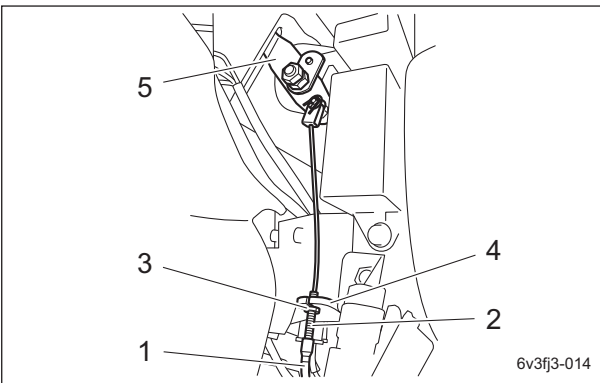
1	Cam lever
2	Cam lever shaft
3	Shaft seat
4	Lock nut A
5	Threaded rod
6	Lock nut B

Throttle wire

Adjustment of Throttle Wire

Movement of the lever may become dull due to frequent use, play of the inner wire may change and the inner wire may be stretched depending on R angle of the outer wire. Inspect them and, if necessary, implement adjustment etc.

1. Pull the adjustment bolt of the throttle lever to 10 mm (0.39 in) from the upper face of the main body stay and secure it with a lock nut.

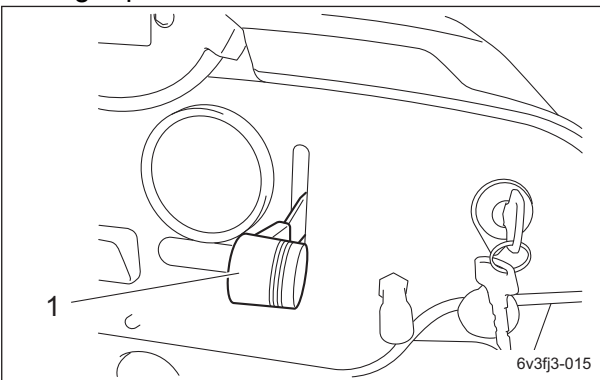


Adjustment of Throttle Wire_001

1	Throttle wire
2	Adjustment bolt
3	Lock nut
4	Main body stay
5	Throttle lever

2. Start the engine, and check that the engine rpm is 1,200 rpm when the throttle lever is "Low."

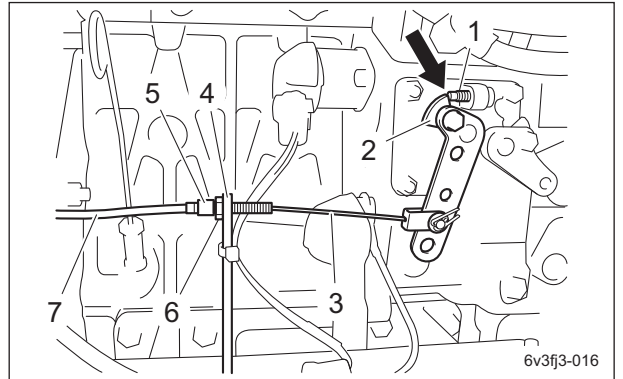
3. Lower the throttle lever until it stops in the "High" position.



Adjustment of Throttle Wire_002

1	Throttle lever
---	----------------

4. Shift the throttle lever to the maximum rpm, adjust the engine rpm to 2,800 rpm by the adjustment bolt, and secure it with the lock nut.
5. Confirm that there is a clearance (arrow) between the stopper for maximum rpm and the linkage at the maximum rpm.
6. Confirm that there is a play in the throttle wire when the throttle lever is "Low."



Adjustment of Throttle Wire_003

1	Stopper for maximum rpm
2	Linkage
3	Throttle wire (inner)
4	Main body stay
5	Adjustment bolt
6	Lock nut
7	Throttle wire (outer)

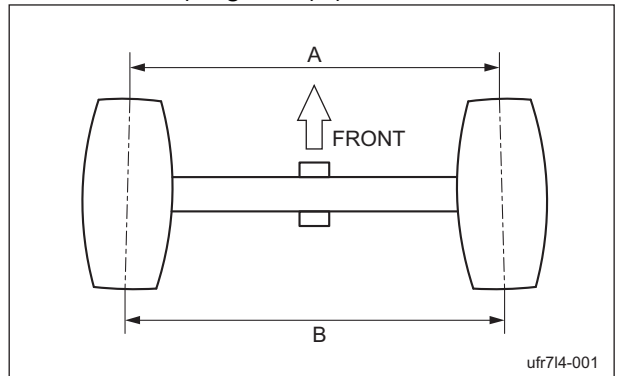
Toe Angle

Adjustment of Toe Angle

Due to damage to the tie rod and rod ends, it may become difficult to properly handle the machine. Inspect them and, if necessary, implement adjustment etc.

Inspect them and, if necessary, implement adjustment etc.

1. Adjust the pneumatic pressure of the tire to specified pressure. (See "Tire Pneumatic Pressure" (Page 6-2) .)

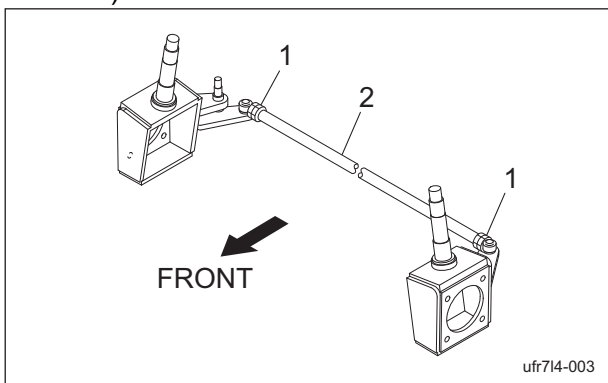


Adjustment of Toe Angle_001

Main body

Main body

2. Straighten the front wheels and then measure the front width A and the rear width B between the front wheels.
3. Loosen the left and right lock nuts, and then rotate the tie rod to make adjustment. Target adjustment value of the toe angle is 0 ± 5.0 mm (0 ± 0.20 in). (Toe angle amount = A - B)



Adjustment of Toe Angle_002

1	Lock nut
2	Tie rod

Inspection and repair of each section

Brake

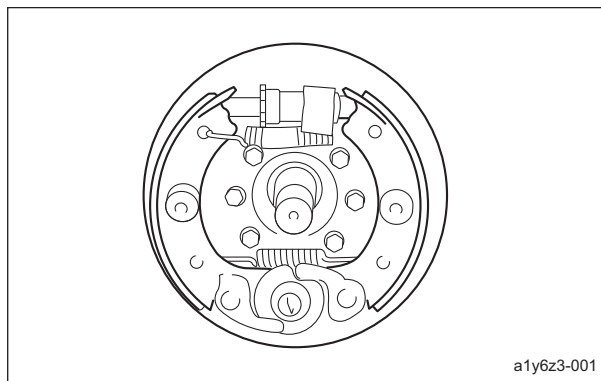
A worn brake shoe will increase the amount of brake pedal depression, and may cause the pedal to touch the floor or result in uneven braking. Inspect the brake accordingly. Adjust the brake shoe clearance to be even on both sides. A brake shoe is gradually worn down like an eraser as the brake is applied. Check the remaining shoe amount upon inspection and replace as needed.

Inspection of Brake

Adjust the clearance of the brake shoe so that the left and right sides are even. Brake shoe wears out gradually as the brake is used just like an eraser. Check the remaining amount at the inspection. Replace if it is too small.

Disassembling and Assembling the Brake

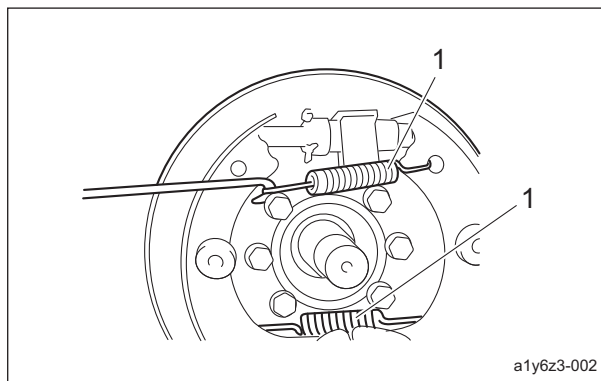
The brake shoe can be replaced while the brake is installed to the machine.



Disassembling and Assembling the Brake_001

1	Shoe
---	------

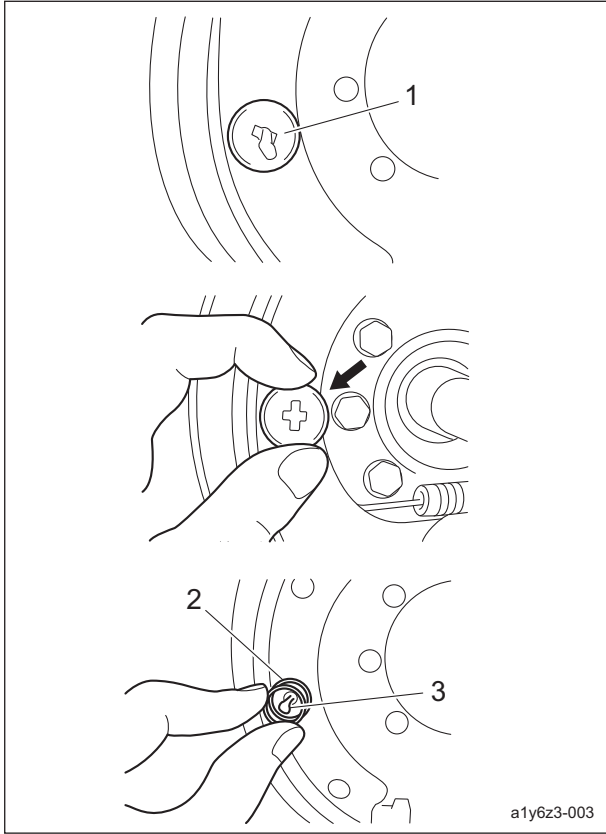
1. Remove the upper and lower springs. The sizes of the upper and lower springs are different with each other.



Disassembling and Assembling the Brake_002

1	Spring
---	--------

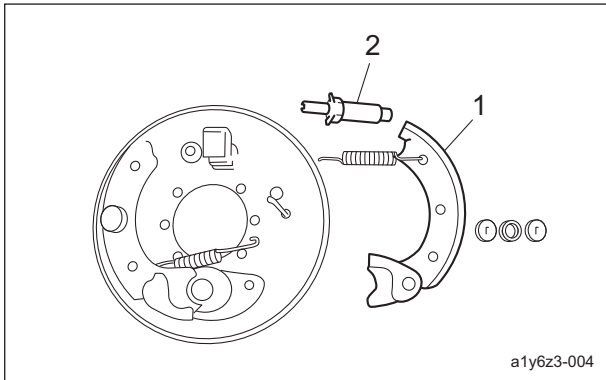
2. Turn the spring holder 90 degrees while pressing it and remove it.
3. Remove the spring and hold pin.



Disassembling and Assembling the Brake_003

1	Spring holder
2	Spring
3	Hold pin

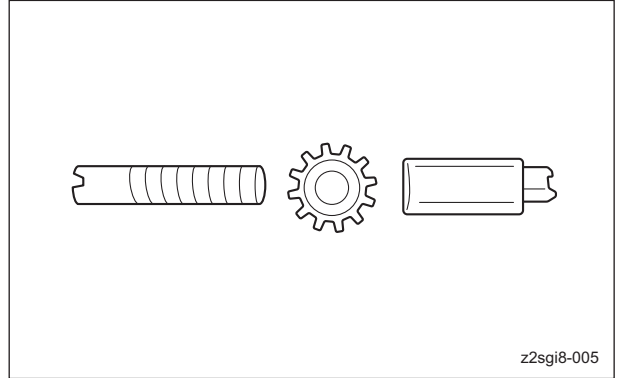
4. Remove the shoe and the adjustment screw.



Disassembling and Assembling the Brake_004

1	Shoe
2	Adjustment screw

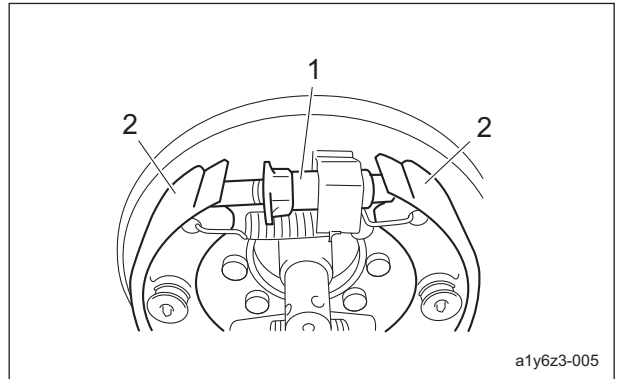
5. Apply grease to the sliding parts when assembling.
Use the grease for the brake and be sure not to apply the friction surface of the shoe. If the grease is attached to the friction surface, wash off oil with brake cleaner, etc.



z2sgi8-005

Disassembling and Assembling the Brake_005

6. Adjust the clearance of the shoe.
Turn the adjustment screw to adjust the width of the shoe.
Do not insert the key to the motor shaft and tentatively assemble the drum.



a1y6z3-005

Disassembling and Assembling the Brake_006

1	Adjustment screw
2	Shoe

Main body

Operating Machine and Mower Units

Contour Deck..... Page 7-2

Maintenance..... Page 7-2

Inspection and repair of each section... Page 7-23

Operating Machine and Mower Units

Contour Deck

Maintenance

Maintenance

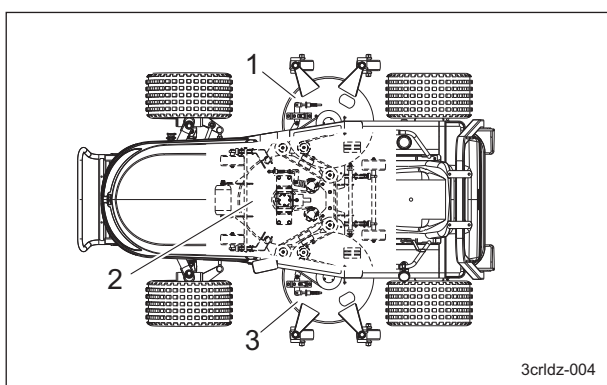
This chapter describes primary checking and maintenance operations for the GM1700 mower unit.

For information on daily checks, maintenance and handling of the machine, please refer to the separate GM1700 Owner's Operating Manual and Parts Catalogue.

For information on attaching and removing optional parts and attachments, please refer to the handling manual for the corresponding attachment.

Specifications

■Mower Unit Layout (Contour Deck)



Mower Unit Layout (Contour Deck)_001

1	Right deck
2	Center deck
3	Left deck

■Grease

Use the following type of grease on the operating machine and mower units.

Grease for other than the gearbox	Urea-based No. 2
Gearbox grease	Pyronoc CC 0

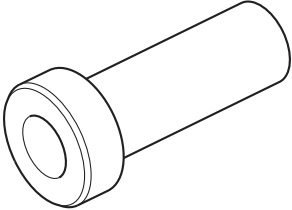
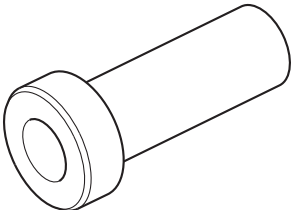
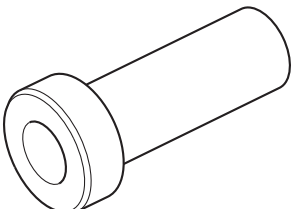
Operating Machine and Mower Units

■Adjusted Value

Spring compression distance	Tension spring (center deck belt)	Spring extends 35.0 mm (1.38 in) from end of spring guide	Total length of spring compresses to 55.0 mm (2.17 in)
	Tension spring (center deck belt)	Spring extends 35.0 mm (1.38 in) from end of spring guide	Total length of spring compresses to 55.0 mm (2.17 in)
Grease quantity	Gearbox	260.0 g (9.17 oz)	

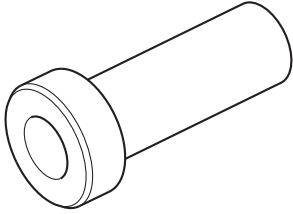
Special Tool

■List of Special Tools

<p>6303 Bearing driver</p>  <p style="text-align: right; font-size: small;">q9c6v6-009</p>	K4802000752	Used to knock-in and install the bearings with outer $\Phi 47$ and inner $\Phi 17$.
<p>6204 Bearing driver</p>  <p style="text-align: right; font-size: small;">q9c6v6-009</p>	K4802000762	Used to knock-in and install the bearings with outer $\Phi 47$ and inner $\Phi 20$.
<p>6208 Bearing driver</p>  <p style="text-align: right; font-size: small;">q9c6v6-009</p>	K4802000772	Used to knock-in and install the bearings with outer $\Phi 80$ and inner $\Phi 40$.

Operating Machine and Mower Units

6203 Bearing driver



q9c6v6-009

K4802000882

Used to knock-in and install the bearings with outer $\Phi 40$ and inner $\Phi 17$.

Operating Machine and Mower Units

Adjustment

- Adjustment of Cutting Height

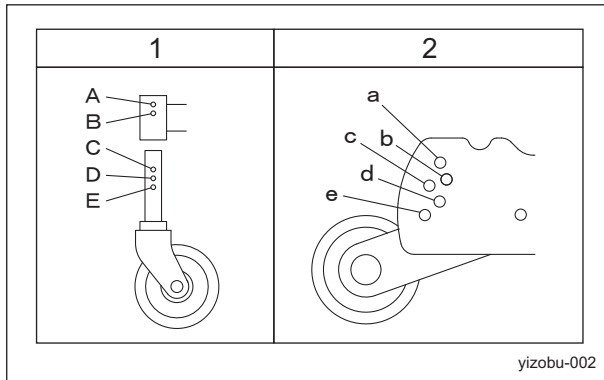
Cutting Height Table

Important

Adjust all mower units to the same cutting height.

The adjustment range for the cutting height is 35 - 95 mm (15 mm spacing, 5 levels).

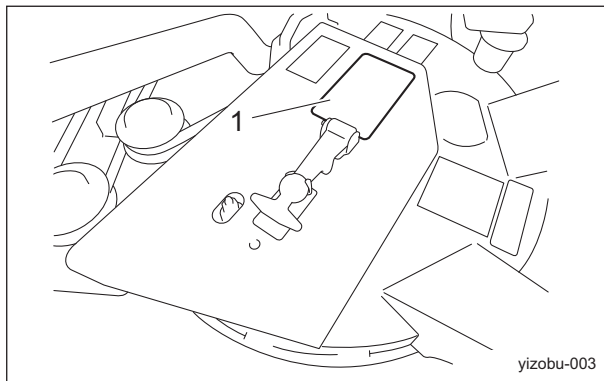
Left/Right Decks	Cutting Height (mm)	Center Deck
A-C	95	e
B-D	80	d
A-D	65	c
B-E	50	b
A-E	35	a



Cutting Height Table_001

1	Left/right decks
2	Center deck

Attach the cutting height adjustment label to the mower unit.

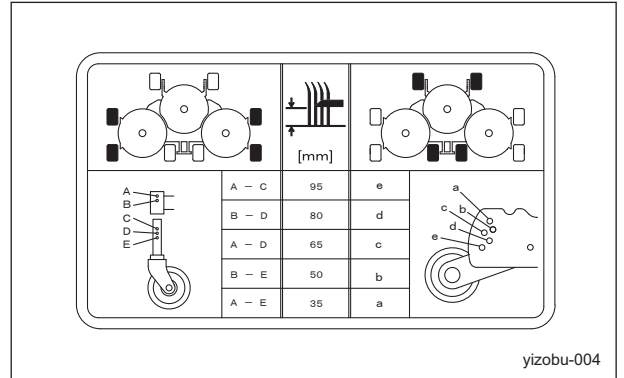


Cutting Height Table_002

1	Cutting height adjustment label
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GM1700-2161Z0

Contour deck cutting height adjustment label



Cutting Height Table_003

Adjustment of Center Deck

The cutting height of the center deck is adjusted with the cutting height gauge wheels mounted at the front and back of the deck.

There are four cutting height gauge wheels.

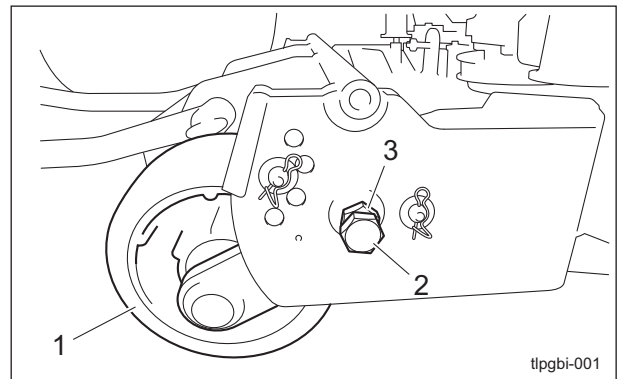
Important

The length of grass cut off at any one time must be no more than 30 mm.

Important

Do not cut off more than 1/3 of the grass height.

1. Apply the parking brake, and then raise the mower unit so that the cutting height gauge wheels do not touch the ground.
2. Stop the engine, and then remove the key.
3. Loosen the bolt and nut on the cutting height gauge wheel at the front of the deck.

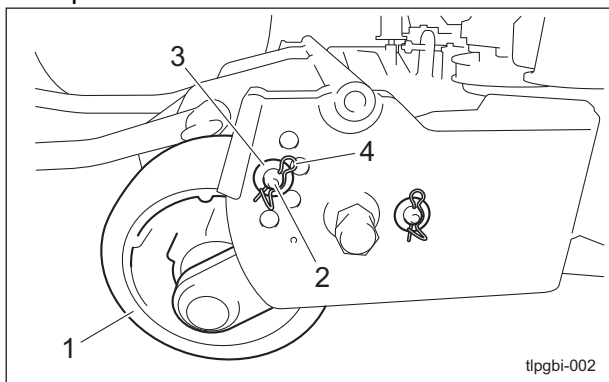


Adjustment of Center Deck_001

Operating Machine and Mower Units

1	Cutting height gauge wheel
2	Bolt
3	Nut

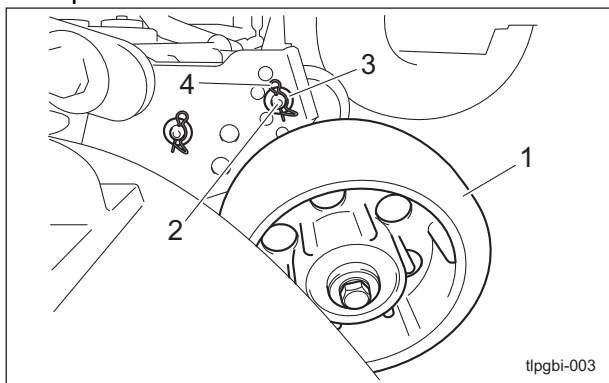
4. Remove the cotter pin and washer from the cutting height gauge wheel at the front of the deck, and then remove the pin.



Adjustment of Center Deck_002

1	Cutting height gauge wheel
2	Pin
3	Washer
4	Cotter pin

5. Refer to the Cutting Height Table, and then change the hole positions.
6. Insert the pin, and then securely install the cutting height gauge wheel with the washer and cotter pin.
7. Firmly tighten the bolt and nut to secure the wheel.
8. Remove the cotter pin and washer from the cutting height gauge wheel at the back of the deck, and then remove the pin.



Adjustment of Center Deck_003

1	Cutting height gauge wheel
2	Pin
3	Washer
4	Cotter pin

9. Refer to the Cutting Height Table, and then change the hole positions.
10. Insert the pin, and then securely install the cutting height gauge wheel with the washer and cotter pin.

Adjustment of Left and Right Decks

The cutting heights of the left and right decks are adjusted with the casters mounted at the front and back of each deck.

There are four casters.

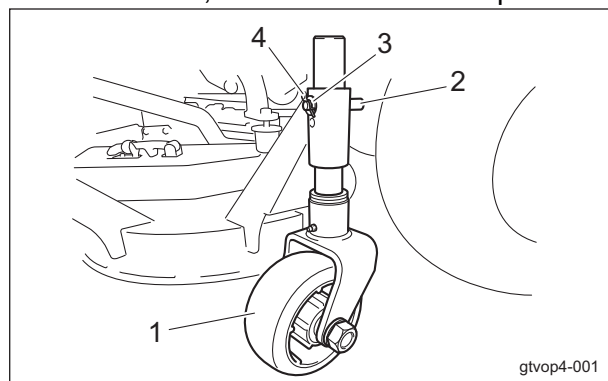
Important

The length of grass cut off at any one time must be no more than 30 mm.

Important

Do not cut off more than 1/3 of the grass height.

1. Apply the parking brake, and then raise the mower unit so that the casters do not touch the ground.
2. Stop the engine, and then remove the key.
3. Remove the cotter pin and washer from the caster, and then remove the pin.



Adjustment of Left and Right Decks_001

1	Caster
2	Pin
3	Washer
4	Cotter pin

Operating Machine and Mower Units

4. Refer to the Cutting Height Table, and then change the hole positions.
5. Insert the pin, and then securely install the caster with the washer and cotter pin.

■Adjustment of Belt Tension

⚠ Caution

Be sure to stop the engine before adjusting the belts.

Important

Make sure that the belt has the specified amount of tension.

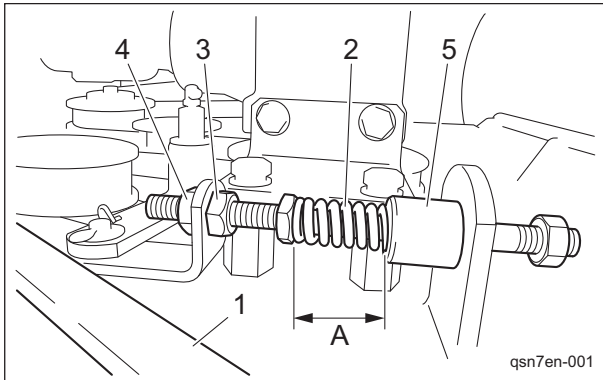
If the belt becomes slack due to frequent use, it may jump or slip. In addition, if it is overtightened, it may wear prematurely. If necessary, adjust it, and always check the belt for appropriate tension.

Center Deck Belt

⚠ Caution

Be sure to stop the engine before adjusting the belts.

1. Press the middle of the belt with your finger to check the belt tension.
2. If the belt is too slack, adjust it by tightening the nut so that the length of the tension spring extends 35.0 mm from the end of the spring guide. (Total length of spring compresses to 5.0 mm)



Center Deck Belt_001

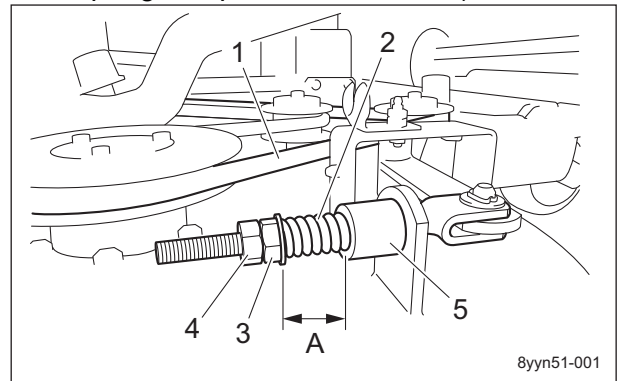
1	Belt
2	Tension spring
3	Nut
4	Lock nut
5	Spring guide
A	35.0 mm

Left and Right Deck Belts

⚠ Caution

Be sure to stop the engine before adjusting the belts.

1. Remove the belt cover.
2. Press the middle of the belt with your finger to check the belt tension.
3. If the belt is too slack, adjust it by tightening the nut so that the length of the tension spring extends 35.0 mm from the end of the spring guide. (Total length of spring compresses to 5.0 mm)



Left and Right Deck Belts_001

1	Belt
2	Tension spring
3	Nut
4	Lock nut
5	Spring guide
A	35.0 mm

4. Install the belt cover.

■Adjustment of Stoppers

The rubber stoppers may wear or deteriorate due to frequent use and may no longer perform as expected.

If necessary, adjust the stoppers.

Operating Machine and Mower Units

Swing Stoppers

The swing stoppers fulfill the role of suppressing swing when the mower unit is raised while keeping the deck horizontal by lever action.

There are two installed, one each on the left and the right.

1. Temporarily tighten the rubber stopper in the direction away from the deck.
2. Raise the mower unit.
3. Make sure that the right and left decks are equally raised.

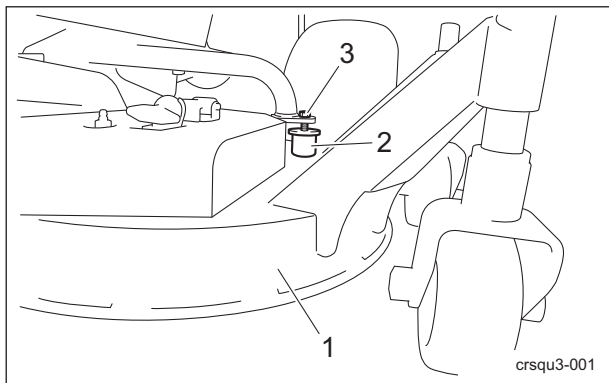
Note:

If the decks are not equally raised, adjust the installation position of the link fulcrum shafts.

Important

Adjust the rubber stoppers on the left and right decks so that they make contact equally and so that the left and right decks are level.

4. Adjust the contact for the rubber stoppers, and then lock them with the nuts.



Swing Stoppers_001

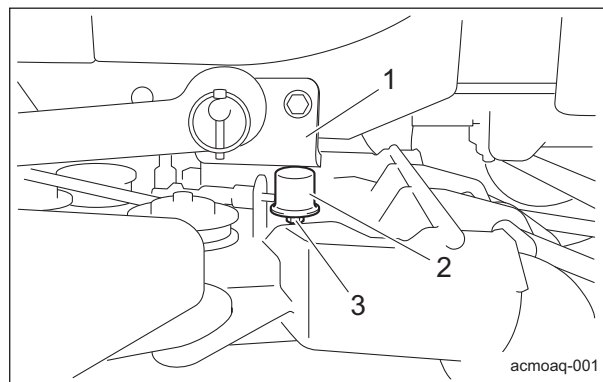
1	Mower unit
2	Rubber stopper
3	Nut

Lift Stoppers

The lift stoppers fulfill the role of preventing interference between the mower unit and the frame.

There are three installed.

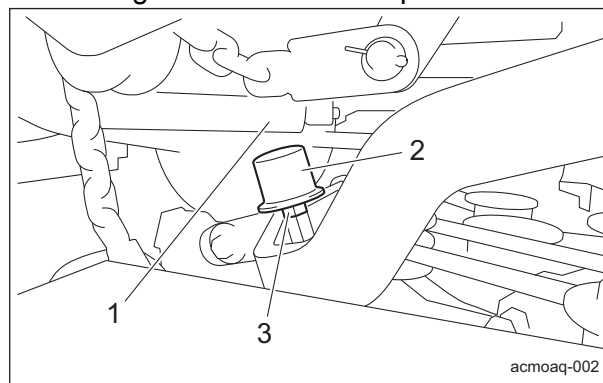
1. Raise the mower unit.
2. Make sure that all decks of the mower unit are raised horizontally.
3. Adjust the rubber stoppers so that they slightly come into contact with the frame, and then lock them with the nuts.
 - Left and right sides of front of center deck



Lift Stoppers_001

1	Frame (link fulcrum shaft)
2	Rubber stopper
3	Nut

- Right side of deck tow plate



Lift Stoppers_002

1	Frame
2	Rubber stopper
3	Nut

Operating Machine and Mower Units

Removal and installation of each section

- Mower unit

Removal of Mower Unit

Warning

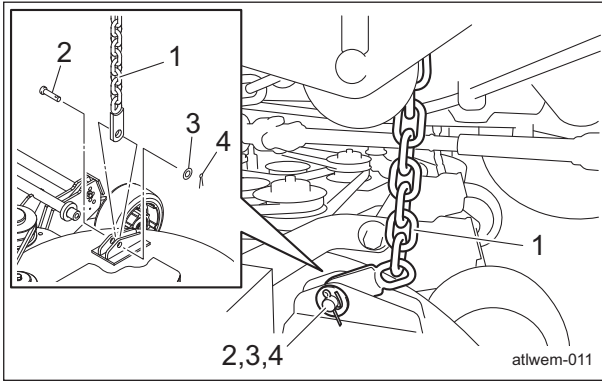
The rotary knife is an edged tool. Handle it carefully, since it could cut your hands or legs.

1. Make sure that the parking brake is applied.
2. Start the engine.
3. Lower the mower deck to the ground and stop the engine.

Caution

Be sure to stop the engine before making adjustments.

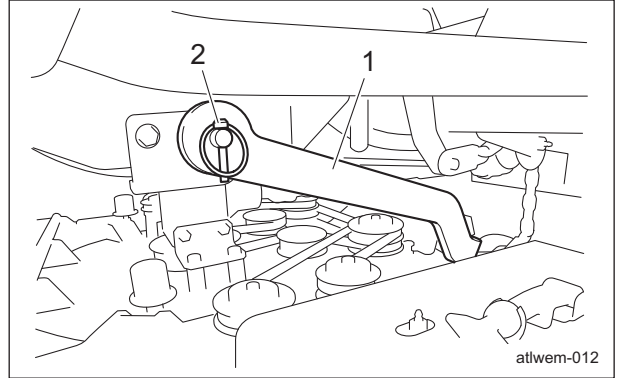
4. Remove the cotter pin and the pin and then remove the lift chain. Follow the same steps to remove them from the other side.



Removal of Mower Unit_001

1	Lift chain
2	Pin
3	Washer
4	Cotter pin

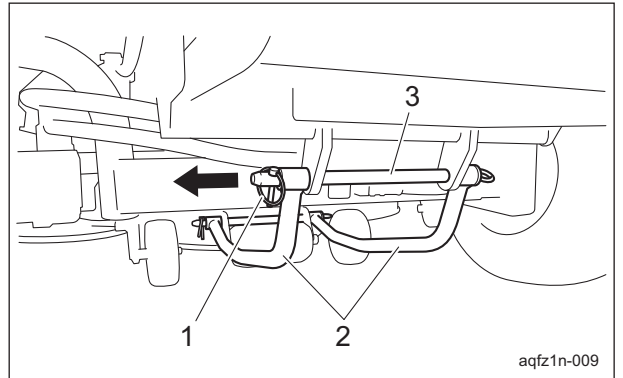
5. Remove the clip pin and then remove the deck tow plate from the main body. Follow the same steps to remove them from the other side.



Removal of Mower Unit_002

1	Deck tow plate
2	Clip pin

6. Remove the clip pin to pull out the pin in the direction of the arrow and then remove the left and right front rods.

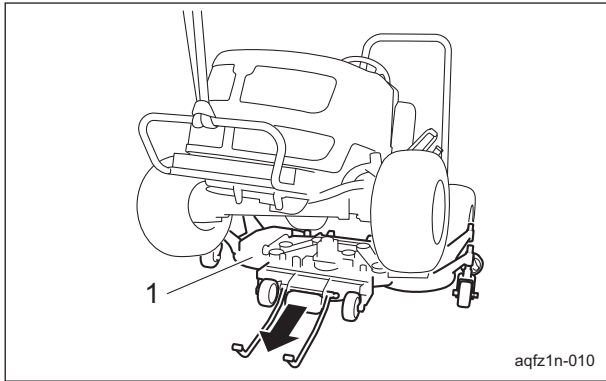


Removal of Mower Unit_003

1	Clip pin
2	Front rod
3	Pin

Operating Machine and Mower Units

7. Raise the bumper with a hoist, etc., to lift up the front wheels of the machine, and pull out the mower unit in the direction of the arrow to remove it.



Removal of Mower Unit_004

1	Mower unit
---	------------

Installation of Mower Unit

⚠ Danger

The rotary knife is an edged tool. Handle it carefully, since it could cut your hands or legs.

For installation, reverse the removing procedure.

■ Rotary Knife

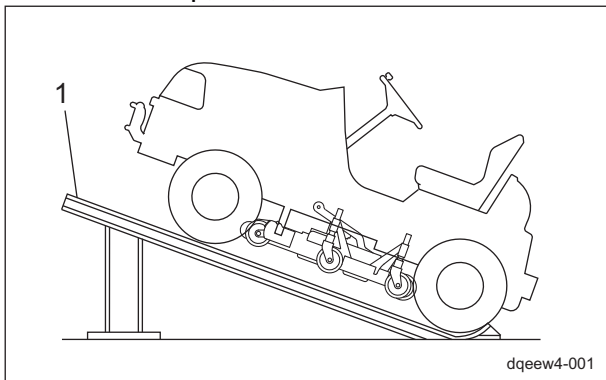
Removal of Rotary Knife

Contour Deck

⚠ Caution

When using a ramp, etc., apply the parking brake, and chock the tires.

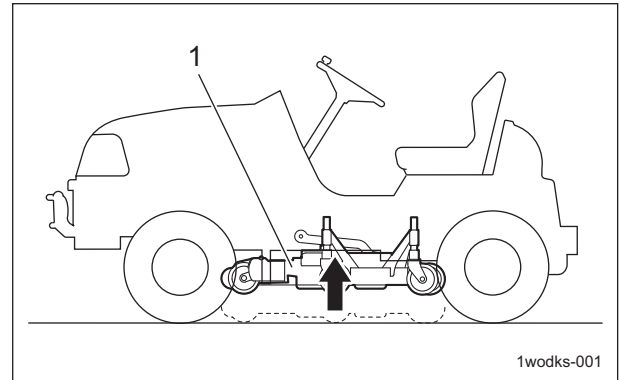
Note:
Use a ramp, etc., if it is available.



Contour Deck_001

1	Ramp
---	------

1. Start the engine, and then raise the mower units.

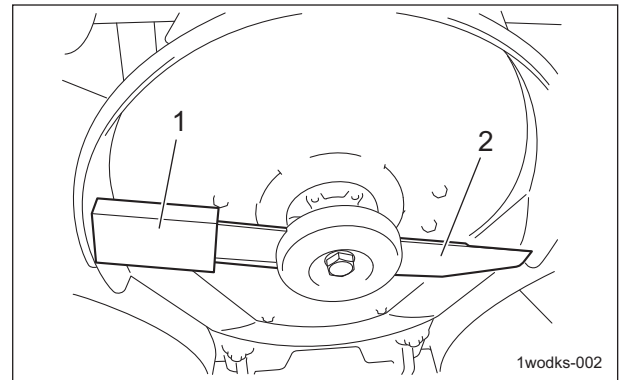


Contour Deck_002

1	Mower unit
---	------------

2. Stop the engine, and then remove the key.
3. Follow the steps below to remove the rotary knife.

[1] Use the square pipe from the included tools to secure the rotary knife so that it does not turn.



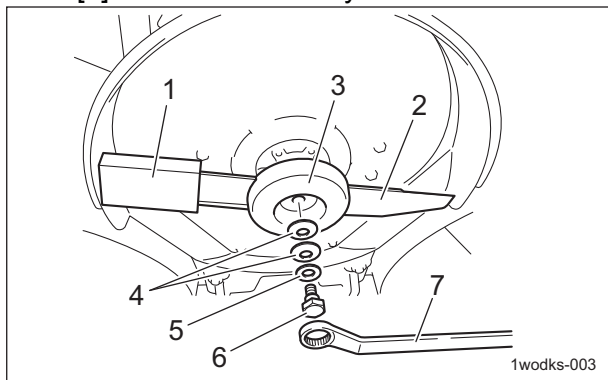
Contour Deck_003

1	Square pipe
2	Rotary knife

- [2] Slide the pipe for the offset wrench onto the offset wrench from the included tools.
- [3] Remove the bolt, washer and disc spring used to install the rotary knife.
- [4] Remove the knife guide disc.

Operating Machine and Mower Units

[5] Remove the rotary knife.

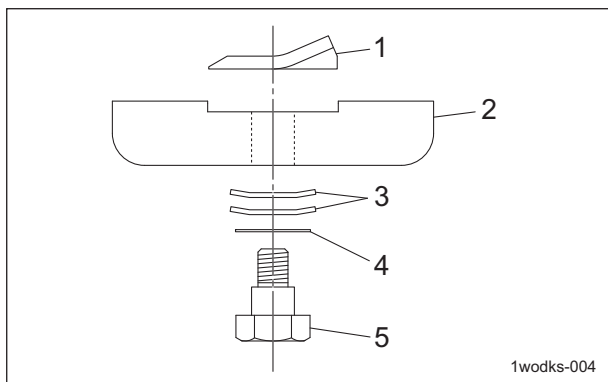


Contour Deck_004

1	Square pipe
2	Rotary knife
3	Knife guide disc
4	Disc spring
5	Washer
6	Knife mounting bolt
7	Offset wrench

Caution

The disc spring has a specific installation orientation. Do not install it facing the wrong direction.



Contour Deck_005

1	Rotary knife
2	Knife guide disc
3	Disc spring
4	Washer
5	Knife mounting bolt

Important

The tightening torque for the knife mounting bolt is 130 - 150 N-m (1,325.61 - 1,529.55 kgf-cm).

4. Install the rotary knife.
For installing the rotary knife, reverse the removing procedure.

■ Universal Joint

Removal of Universal Joint

Danger

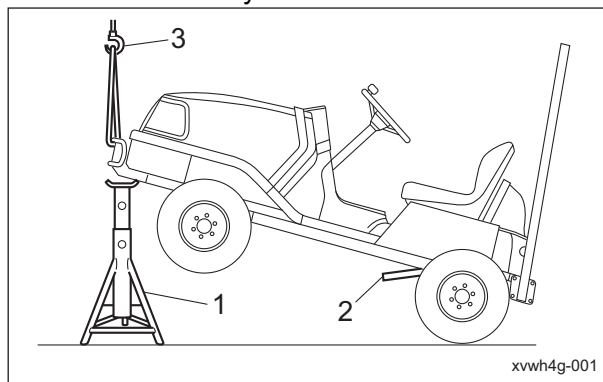
The rotary knife is an edged tool. Handle it carefully, since it could cut your hands or legs.

1. Make sure that the parking brake is applied.
2. Remove the mower unit. (See "Removal of Mower Unit" (Page 7-9) .)

Warning

When jacking up the machine, jack up the portion described in the jack-up portion. Do not jack up any other portions than the specified ones. It may damage the frame or parts.

3. Raise the vehicle with a hoist and place the jack stand in the jack point to secure the main body.



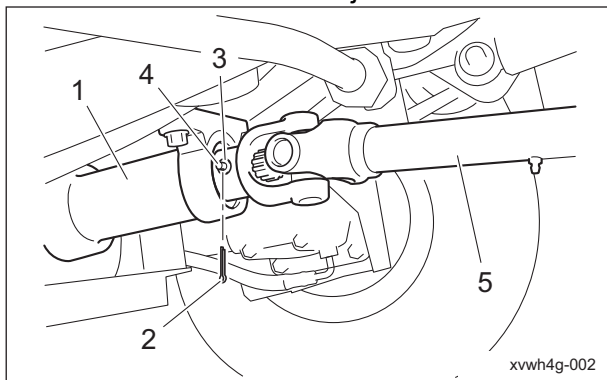
Removal of Universal Joint_001

1	Jack stands
2	Universal joint
3	Hoist

4. Remove the cotter pin and the washer from the joint shaft housing Assy and then remove the pin.

Operating Machine and Mower Units

5. Pull out the universal joint.

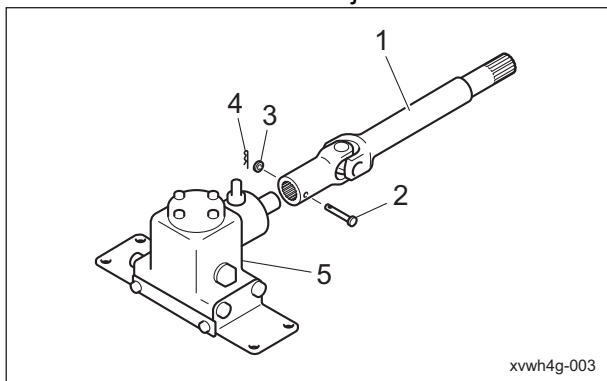


Removal of Universal Joint_002

1	Joint shaft housing Assy
2	Cotter pin
3	Washer
4	Pin
5	Universal joint

6. Remove the cotter pin and the washer from the gearbox Assy of the mower unit and then remove the pin.

7. Pull out the universal joint.



Removal of Universal Joint_003

1	Universal joint
2	Pin
3	Cotter pin
4	Washer
5	Gearbox Assy

Installation of Universal Joint

⚠ Danger

The rotary knife is an edged tool. Handle it carefully, since it could cut your hands or legs.

⚠ Warning

Use the jack-up points identified in this manual when jacking up the machine. Place a jack only under the specified jack-up points. Placing a jack at any other point could result in damage to the frame or other parts .

For installation, refer to the Operating Manual.

■ Belt

Removal of Belt

⚠ Danger

The rotary knife is an edged tool. Handle it carefully, since it could cut your hands or legs.

1. Remove the mower unit from this machine. (See "Removal of Mower Unit" (Page 7-9) .)

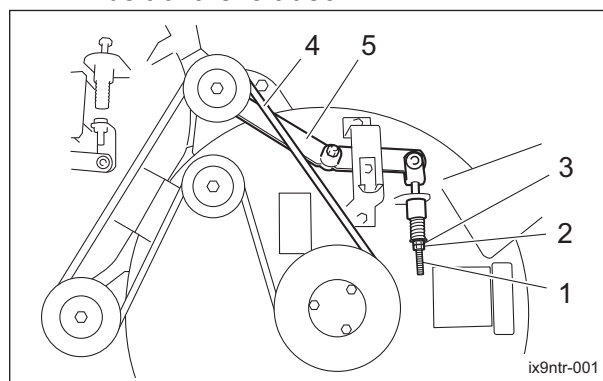
2. Follow the steps below to remove the V belt of the right deck.

[1] Loosen the lock nut of the tension rod of the right deck.

[2] Loosen the nut until the V belt is removed from the tension pulley.

[3] Remove the V belt.

[4] Follow the same steps to remove the V belt of the left deck.



Removal of Belt_001

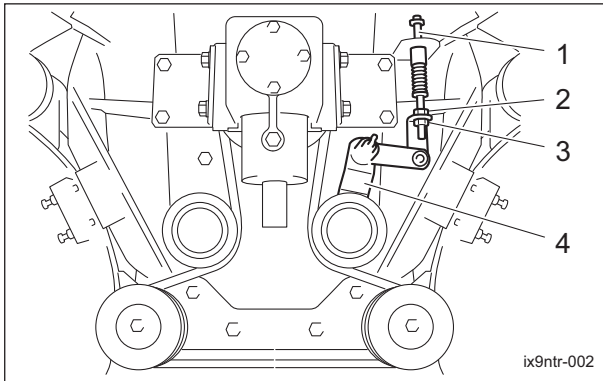
Operating Machine and Mower Units

1	Tension rod
2	Lock nut
3	Nut
4	V-belt
5	Tension pulley

3. Follow the steps below to remove the V belt of the center deck.

[1] Loosen the lock nut of the tension rod of the center deck.

[2] Loosen the nut of the tension rod to the extent of the thread.



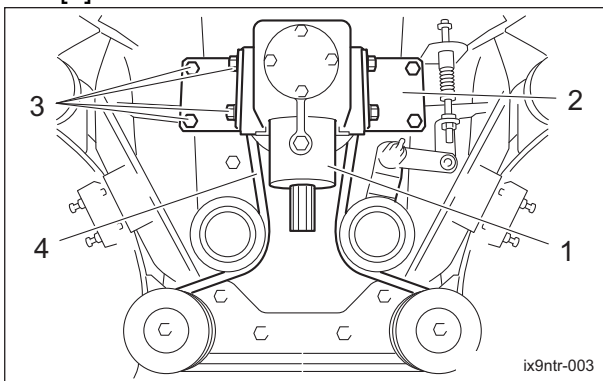
Removal of Belt_002

1	Tension rod
2	Nut
3	Lock nut
4	Tension pulley

[3] Remove the four bolts of the gearbox mounting bracket.

[4] Follow the same steps to remove them from the other side.

[5] Remove the V belt.



Removal of Belt_003

1	Gearbox Assy
2	Gear box mounting bracket
3	Bolt, spring washer, and washer
4	V-belt

Installation of Belt

⚠ Danger

The rotary knife is an edged tool. Handle it carefully, since it could cut your hands or legs.

⚠ Caution

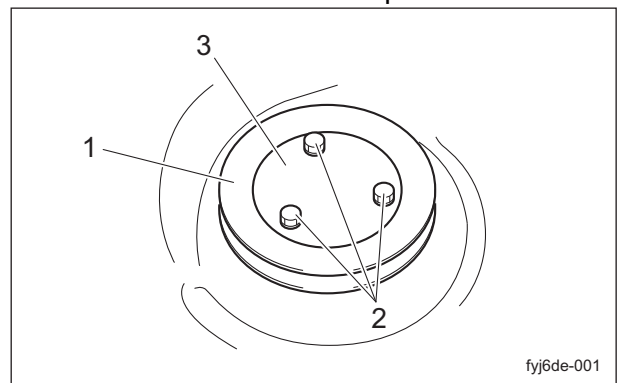
See the "Tightening torques" (Page 3-6) list. Note that the Baroness product warranty may not apply to defects caused by incorrect or overtorque tightening, etc.

For installation, reverse the removing procedure. (See "Removal of Belt" (Page 7-12) .)

■Housing

Removal of Left and Right Deck Housing

1. Remove the mower unit from this machine. (See "Removal of Mower Unit" (Page 7-9) .)
2. Remove the rotary knife. (See "Change of Rotary Knife" (Page 7-24) "Contour Deck" (Page 7-10) .)
3. Remove the belt. (See "Removal of Belt" (Page 7-12) .)
4. Remove the bolt from the rotary pulley and then remove the cap.

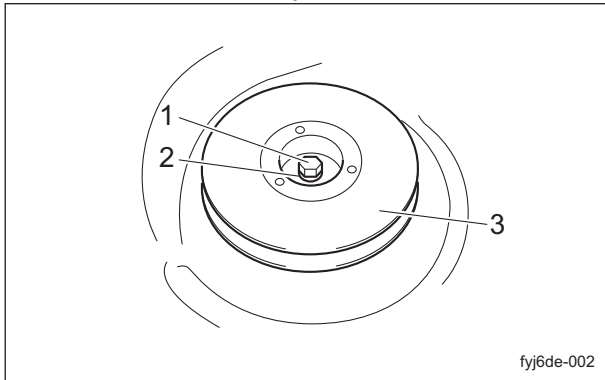


Removal of Left and Right Deck Housing_001

1	Rotary pulley
2	Bolt
3	Cap

Operating Machine and Mower Units

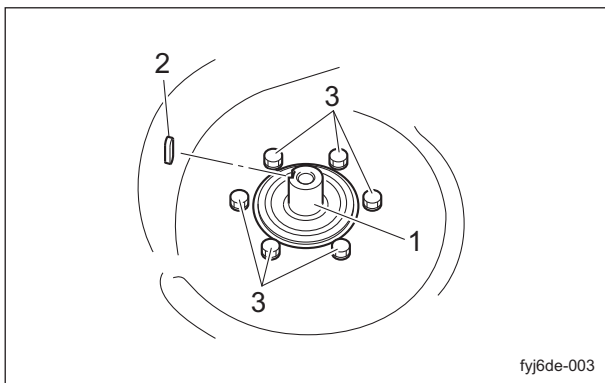
5. Remove the bolt and then remove the washer and pulley.



Removal of Left and Right Deck Housing_002

1	Bolt
2	Washer
3	Pulley

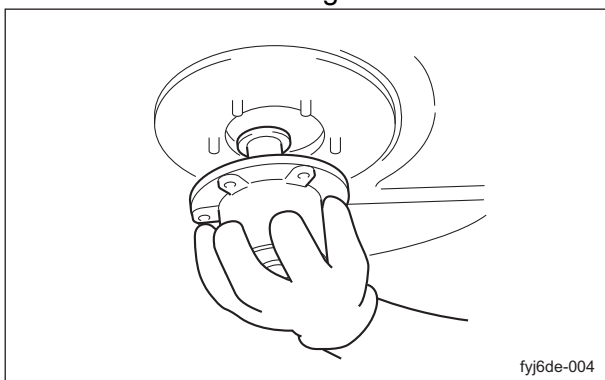
6. Remove the key from the rotary shaft.
7. Remove the six bolts.



Removal of Left and Right Deck Housing_003

1	Rotary shaft
2	Key
3	Bolt

8. Remove the housing.



Removal of Left and Right Deck Housing_004

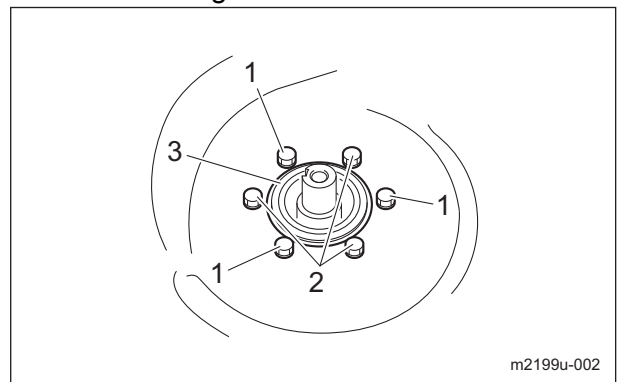
Installation of Left and Right Deck Housing

⚠ Caution

See the "Tightening torques" (Page 3-6) list.

Note that the Baroness product warranty may not apply to defects caused by incorrect or overtorque tightening, etc.

1. For installation, reverse the removing procedure.
2. Tighten bolts A and B alternately to install the housing.



Installation of Left and Right Deck Housing_001

1	Bolt A
2	Bolt B
3	Housing

Removal of Center Deck Housing

1. Remove the mower unit from the main body. (See "Removal of Mower Unit" (Page 7-9) .)
2. Remove the rotary knife. (See "Change of Rotary Knife" (Page 7-24) "Contour Deck" (Page 7-10) .)
3. Remove the belt. (See "Removal of Belt" (Page 7-12) .)
4. Raise the mower unit with a hoist and place the jack stand to secure it.

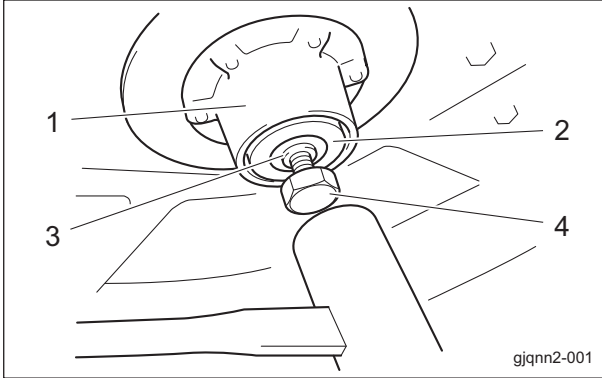
⚠ Caution

Drive in the knife mounting bolt while the mower unit is stable.

5. Install the knife mounting bolt to the center knife shaft.
6. Drive in the knife mounting bolt with a wooden hammer until it hits the knife mounting bracket.

Operating Machine and Mower Units

7. Remove the knife mounting bolt.



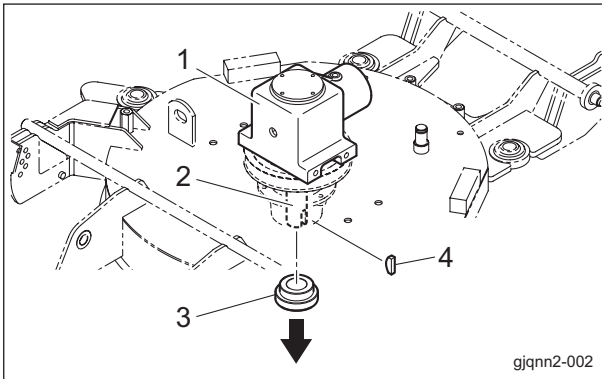
Removal of Center Deck Housing_001

1	Center housing
2	Knife mounting bracket
3	Center knife shaft
4	Knife mounting bolt

1	Gearbox Assy
2	Center knife shaft
3	Knife mounting bracket
4	Key with one round end

8. Remove the knife mounting bracket in the direction of the arrow.

9. Remove the key with one round end from the center knife shaft.

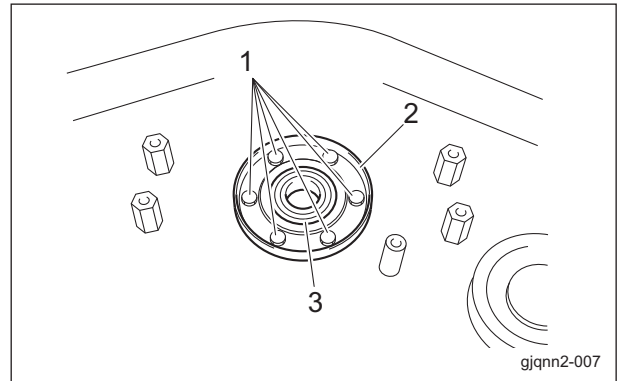


Removal of Center Deck Housing_002

1	Gearbox Assy
2	Center knife shaft
3	Knife mounting bracket
4	Key with one round end

11. Remove the bolt from the housing.

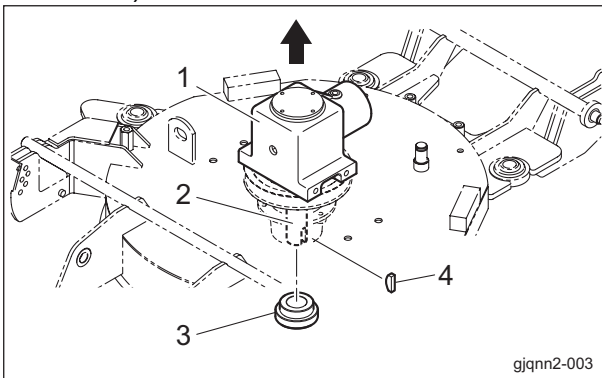
12. Remove the housing and cover from the mower unit.



Removal of Center Deck Housing_004

1	Bolt
2	Cover
3	Housing

10. Pull out the gearbox Assy (w/center knife shaft) in the direction of the arrow.



Removal of Center Deck Housing_003

Operating Machine and Mower Units

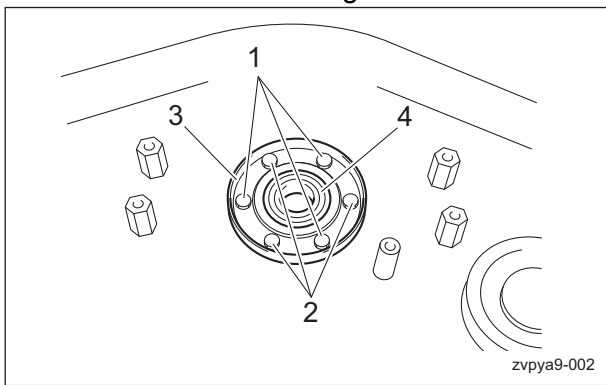
Operating Machine and Mower Units

Installation of Center Deck Housing

⚠ Caution

See the "Tightening torques" (Page 3-6) list.
 Note that the Baroness product warranty may not apply to defects caused by incorrect or overtorque tightening, etc.

1. For installation, reverse the removing procedure.
2. Tighten bolts A and B alternately to install the cover and housing.



Installation of Center Deck Housing_001

1	Bolt A
2	Bolt B
3	Cover
4	Housing

■Front Roller Assy

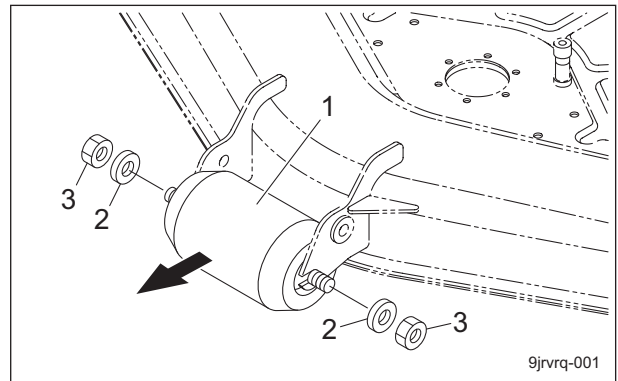
Removal of Front Roller Assy

⚠ Danger

The rotary knife is an edged tool. Handle it carefully, since it could cut your hands or legs.

1. Remove the mower unit from this machine. (See "Removal of Mower Unit" (Page 7-9) .)

2. Remove the nut and spring washer and then remove the front roller Assy in the direction of the arrow.



Removal of Front Roller Assy_001

1	Front Roller Assy
2	Spring washer
3	Nut

Installation of Front Roller Assy

⚠ Danger

The rotary knife is an edged tool. Handle it carefully, since it could cut your hands or legs.

⚠ Caution

See the "Tightening torques" (Page 3-6) list.
 Note that the Baroness product warranty may not apply to defects caused by incorrect or overtorque tightening, etc.

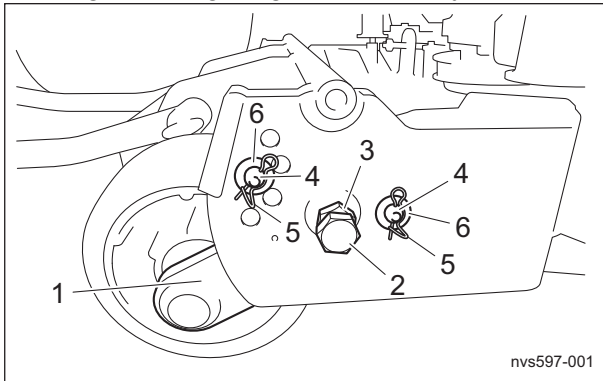
1. For installation, reverse the removing procedure.
 Note:
 Insert the front roller Assy into the groove from the front side of the mower unit, and then install it tightening the left and right nuts alternately with hitting it with a wooden hammer, etc. into the back of the groove, instead of tightening them at one time.

Operating Machine and Mower Units

■Center deck left and right wheel Assy

Removal of Center Deck Left and Right Wheel Assy

1. Apply the parking brake, and then raise the mower unit so that the cutting height wheels do not touch the ground.
2. Stop the engine, and then remove the key.
3. Loosen the lock nut and then loosen the bolt by 2 turns.
4. Remove the two snap pins with retainer.
5. Remove the flat-head pin, holding the left cutting height wheel Assy and then remove the left cutting height wheel Assy.
6. Follow the same steps to remove the right cutting height wheel Assy.



Removal of Center Deck Left and Right Wheel Assy_001

1	Left cutting height wheel Assy
2	Bolt
3	Lock nut
4	Flat-head pin
5	Cotter pin with retainer
6	Washer

Installation of Center Deck Left and Right Wheel Assy

1. Apply the parking brake, and then raise the mower unit so that the cutting height wheels do not touch the ground.

2. Stop the engine, and then remove the key.

⚠ Caution

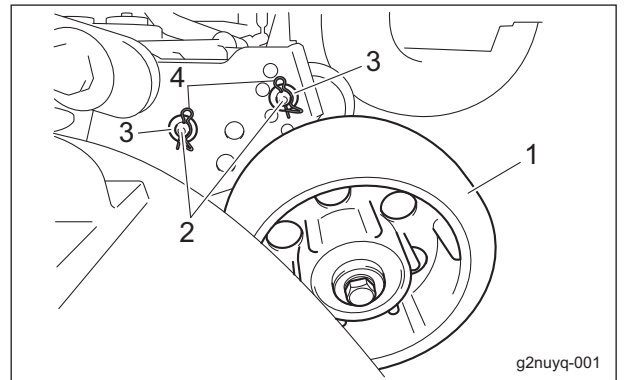
See the " "Tightening torques" (Page 3-6) " list.
 Note that the Baroness product warranty may not apply to defects caused by incorrect or overtorque tightening, etc.

3. For installation, reverse the removing procedure.

■Center deck rear wheel Assy

Removal of Center Deck Rear Wheel Assy

1. Apply the parking brake, and then raise the mower unit so that the cutting height wheels do not touch the ground.
2. Stop the engine, and then remove the key.
3. Remove the two snap pins with retainer and washers.
4. Follow the same steps to remove them from the other side.

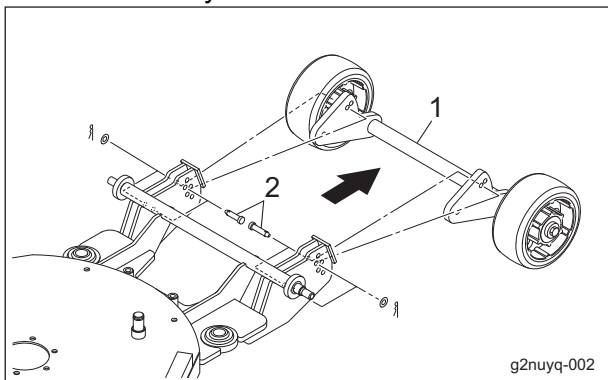


Removal of Center Deck Rear Wheel Assy_001

1	Cutting height wheel
2	Flat-head pin
3	Washer
4	Cotter pin with retainer

Operating Machine and Mower Units

- Remove the flat-head pins holding the left and right side of the rear wheel Assy by two persons and then remove the rear wheel Assy in the direction of the arrow.



Removal of Center Deck Rear Wheel Assy_002

1	Rear wheel Assy
2	Flat-head pin

Installation of Center Deck Rear Wheel Assy

- Apply the parking brake, and then raise the mower unit so that the cutting height wheels do not touch the ground.
- Stop the engine, and then remove the key.

Caution

See the " "Tightening torques" (Page 3-6) " list.
Note that the Baroness product warranty may not apply to defects caused by incorrect or overtorque tightening, etc.

- For installation, reverse the removing procedure.

■Caster

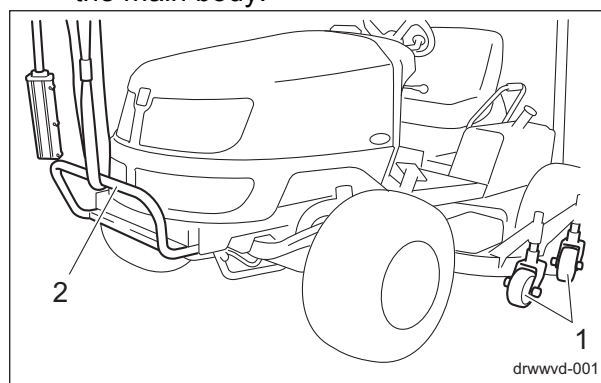
Removal of Caster Wheel

- Start the engine, raise mower units, and then turn off the engine.

Warning

When jacking up the machine, jack up the portion described in the jack-up portion. Do not jack up any other portions than the specified ones. It may damage the frame or parts.

- Raise the vehicle with a hoist and place the jack stand in the jack point to secure the main body.



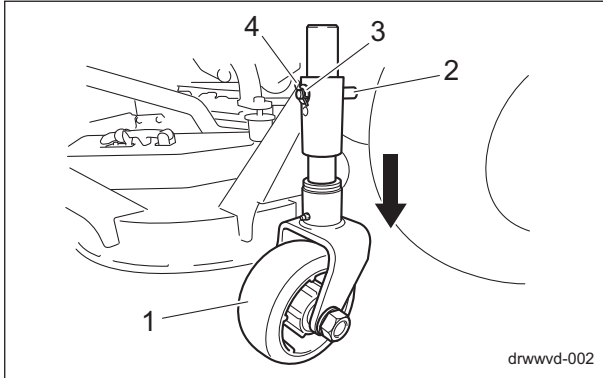
Removal of Caster Wheel_001

1	Caster wheel
2	Bumper

- [1] Follow the steps below to remove the caster wheel.

Operating Machine and Mower Units

- [2] Remove the snap pin with retainer of the caster wheel and washer and then remove the pin holding the caster wheel by one hand.
- [3] If it cannot be removed because the caster wheel is too low, raise it to the position in which it can be removed with a hoist, etc.
- [4] Follow the same steps to remove them from the other side.



Removal of Caster Wheel_002

1	Caster wheel
2	Pin
3	Washer
4	Snap pin with retainer

Installation of the caster wheel

Danger

The rotary knife is an edged tool. Handle it carefully, since it could cut your hands or legs.

- 1. For installation, reverse the removal steps.

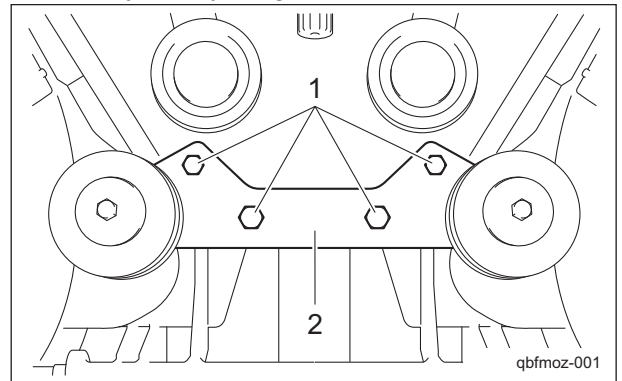
■ Relay pulley stage

Removal of Relay Pulley Stage

Danger

The rotary knife is an edged tool. Handle it carefully, since it could cut your hands or legs.

- 1. Remove the mower unit from this machine. (See "Removal of Mower Unit" (Page 7-9) .)
- 2. Remove the belt. (See "Removal of Belt" (Page 7-12) .)
- 3. Remove the bolt and then remove the relay pulley stage Comp.



Removal of Relay Pulley Stage_001

1	Bolt
2	Relay pulley stage Comp

Installation of Relay Pulley Stage

Danger

The rotary knife is an edged tool. Handle it carefully, since it could cut your hands or legs.

Caution

See the " "Tightening torques" (Page 3-6) " list. Note that the Baroness product warranty may not apply to defects caused by incorrect or overtorque tightening, etc.

For installation, reverse the removing procedure.

Operating Machine and Mower Units

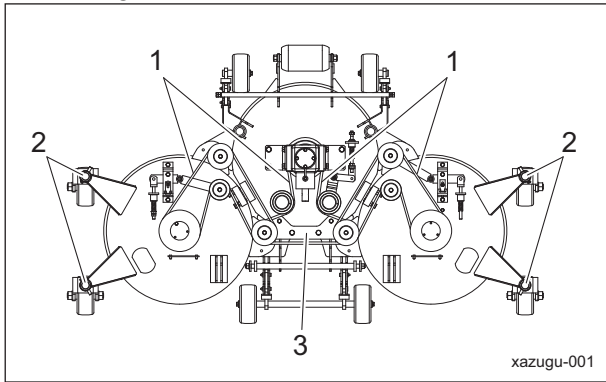
■Contour Deck

Removal of Left and Right Decks

⚠ Danger

The rotary knife is an edged tool. Handle it carefully, since it could cut your hands or legs.

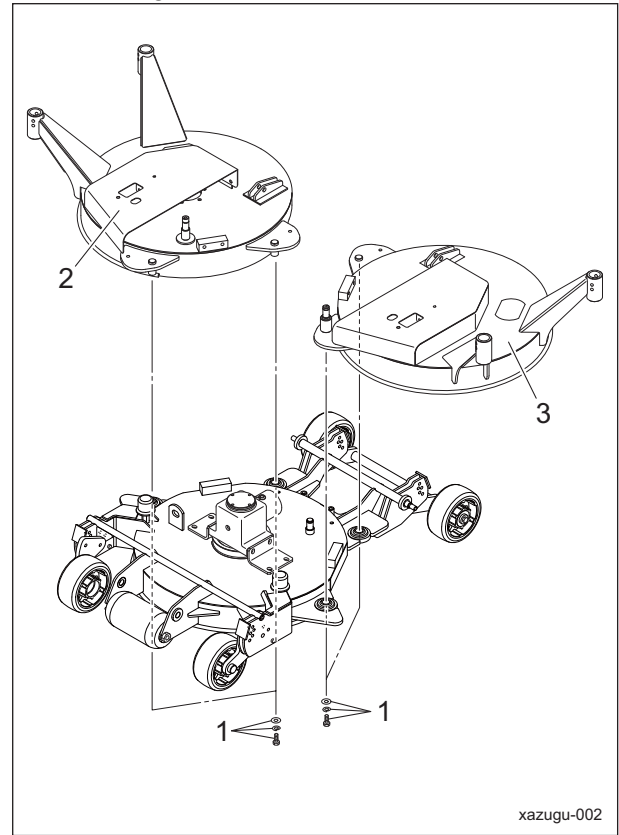
1. Remove the mower unit from this machine. (See "Removal of Mower Unit" (Page 7-9) .)
2. Remove the belt cover from the left and right decks.
3. Remove the universal joint on the gearbox side. (See "Removal of Universal Joint" (Page 7-11) .)
4. Remove the V belt. (See "Removal of Belt" (Page 7-12) .)
5. Remove the caster wheel. (See "Removal of Caster Wheel" (Page 7-18) .)
6. Remove the relay pulley stage Assy. (See "Removal of Relay Pulley Stage" (Page 7-19) .)



Removal of Left and Right Decks_001

1	V-belt
2	Caster wheel
3	Relay pulley stage Assy

7. Follow the steps below to remove the left and right decks.

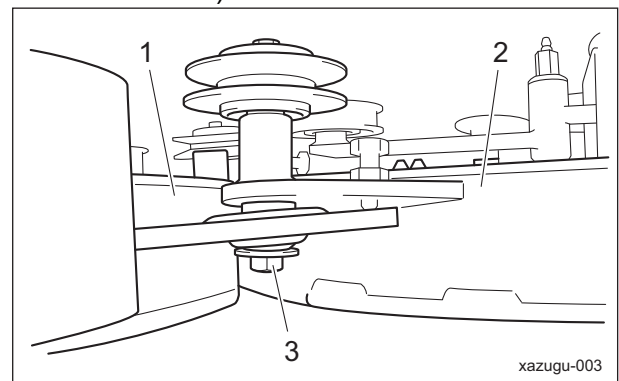


xazugu-002

Removal of Left and Right Decks_002

1	Bolt
2	Right deck
3	Left deck

- [1] Remove the front bolts securing the center deck and left deck. (Figure from the front)



xazugu-003

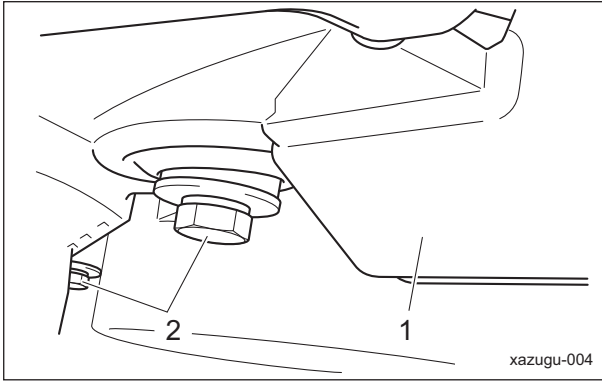
Removal of Left and Right Decks_003

1	Center deck
2	Left deck
3	Bolt

- [2] Remove the rear belt. (Figure from the back)
- [3] Raise and remove the left deck.

Operating Machine and Mower Units

[4] Follow the same steps to remove the right deck.



Removal of Left and Right Decks_004

1	Center deck
2	Bolt

8. Follow the steps below to remove the housing.

- [1] Remove the housings (left and right). (See "Removal of Left and Right Deck Housing" (Page 7-13) .)
- [2] Remove the gear box. (See "Removal of Center Deck Housing" (Page 7-14) .)
- [3] Remove the housing (center). (See "Removal of Center Deck Housing" (Page 7-14) .)
- [4] Remove the rear wheel of the center mower unit. (See "Removal of Center Deck Rear Wheel Assy" (Page 7-17) .)
- [5] Remove the left and right wheels of the center more unit. (See "Removal of Center Deck Left and Right Wheel Assy" (Page 7-17) .)
- [6] Remove the tension lever. (See "Removal of the tension lever" (Page 7-21) .)

Installation of Left and Right Decks

⚠ Danger

The rotary knife is an edged tool. Handle it carefully, since it could cut your hands or legs.

⚠ Caution

See the " "Tightening torques" (Page 3-6) " list. Note that the Baroness product warranty may not apply to defects caused by incorrect or overtorque tightening, etc.

For installation, reverse the removing procedure.

■ Tension lever

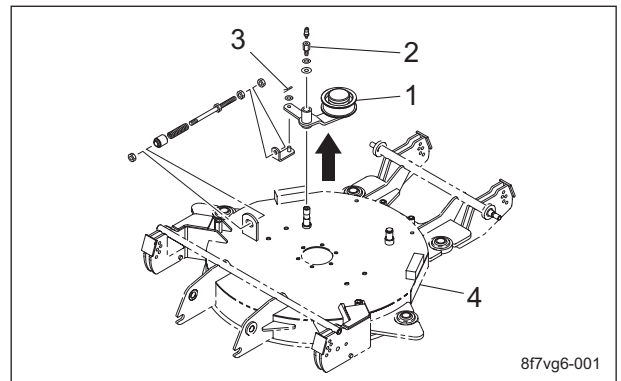
Removal of the tension lever

⚠ Danger

The rotary knife is an edged tool. Handle it carefully, since it could cut your hands or legs.

1. Follow the steps below to remove the tension lever of the center deck.

- [1] Remove the tension mounting bolt.
- [2] Remove the cotter pin.
- [3] Pull out and remove the tension lever-center in the direction of the arrow.

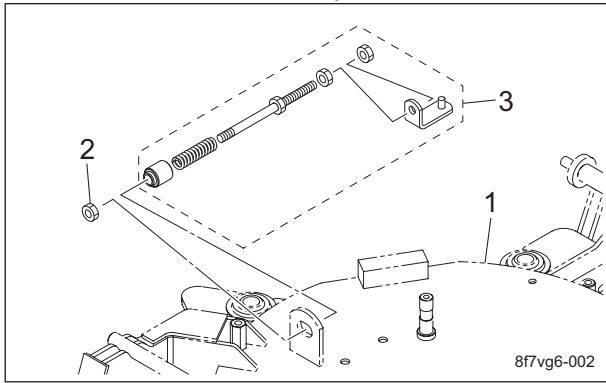


Removal of the tension lever_001

1	Tension lever-center
2	Tension mounting bolt
3	Cotter pin, washer
4	Center deck

Operating Machine and Mower Units

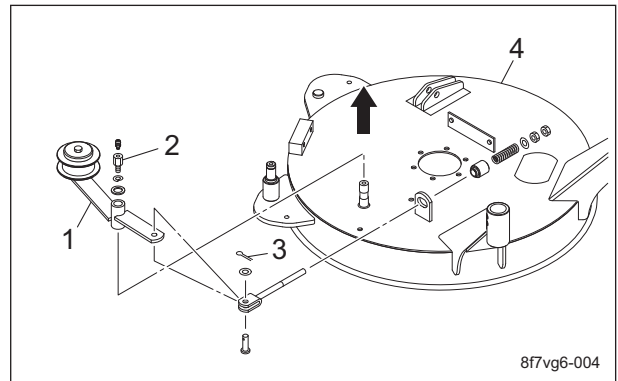
[4] Remove the U nut and then remove the screw rod Assy.



Removal of the tension lever_002

1	Center deck
2	U nut
3	Screw rod Assy

[2] Remove the cotter pin and pull out the tension lever Assy in the direction of the arrow.

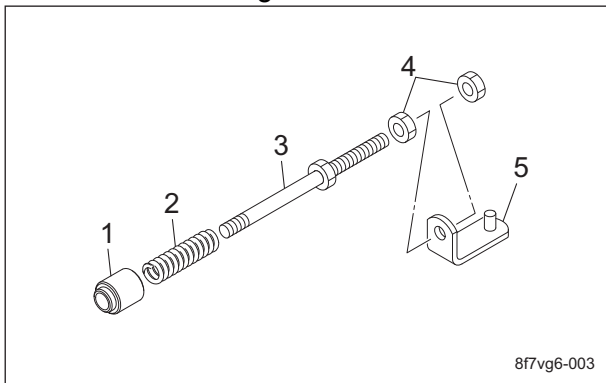


Removal of the tension lever_004

1	Tension lever Assy
2	Tension lever mounting bolt
3	Cotter pin
4	Left deck

[5] Remove the spring guide and compression spring.

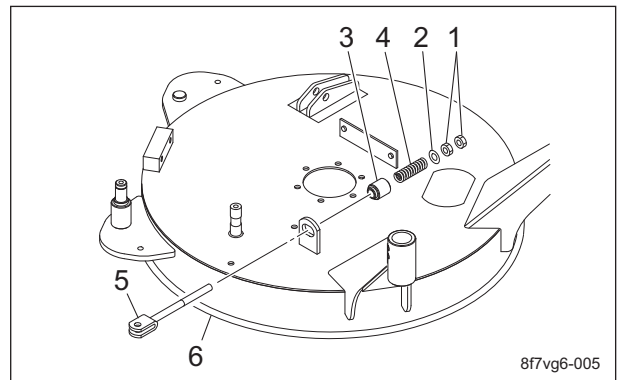
[6] Remove the nut and then remove the tension fitting from the screw rod.



Removal of the tension lever_003

1	Spring guide
2	Compression spring
3	Screw rod
4	Nut
5	Tension fitting

3. Remove two nuts and then the washers, spring guide, and compression spring, and pull out the tension rod from the center frame.



Removal of the tension lever_005

1	Nut
2	Washer
3	Spring guide
4	Compression spring
5	Tension rod
6	Center frame

Important

The tension lever and tension pulley are different between the center deck and left/right decks.

2. Left/right decks

Follow the same steps as those of the center deck to remove the tension levers of the left and right decks.

[1] Remove the tension lever mounting bolt.

Operating Machine and Mower Units

Installation of the tension lever

⚠ Caution

See the " "Tightening torques" (Page 3-6) " list.
Note that the Baroness product warranty may not apply to defects caused by incorrect or overtorque tightening, etc.

For installation, reverse the removing procedure.

Inspection and repair of each section

Rotary Knife

■ Inspection of Rotary Knife

⚠ Danger

The rotary knife is an edged tool.
Handle them carefully, since they could cut your hands or legs.

⚠ Caution

When touching edged tools, wear gloves, since they could cut your hands.

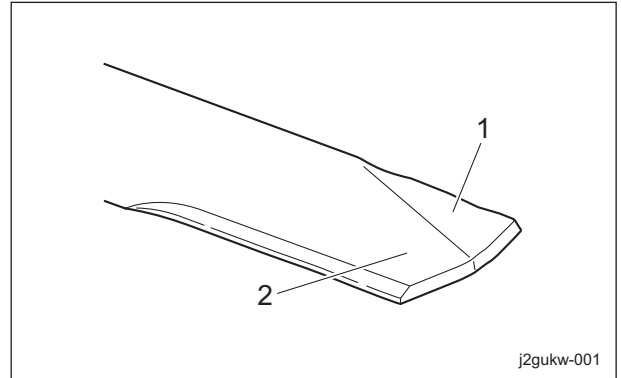
Due to frequent use, objects crushed during mowing, or damage during transportation and so forth, the rotary knife may vibrate from imbalance or become dull.
Inspect the rotary knife, and if necessary, resharpen, balance or replace it.

Important

Frequently inspect the rotary knife since it may become dull quickly if the machine is operated in an environment of dry soil or sand.

1. Make sure that the rotary knife is not bent.
2. Make sure that the rotary knife is not chipped.
3. Check to see how much the rotary knife is worn.
4. Make sure that the rotary knife is not worn asymmetrically.
5. Make sure that the mounting bolt for the rotary knife is not loose.

6. Make sure that there are no cracks or tears between the sail and flat part of the rotary knife.



Inspection of Rotary Knife_001

1	Sail
2	Flat part

Operating Machine and Mower Units

Change of Rotary Knife

⚠ Danger

The rotary knife is an edged tool. Take extra care in handling since they could cut your hands or legs.

⚠ Danger

If the rotary knife becomes worn or damaged, a crack or tear between the sail and flat part will result. Take extra care since a broken piece of the rotary knife may fly off while it is rotating.

⚠ Caution

When touching edged tools, wear gloves, since they could cut your hands.

⚠ Caution

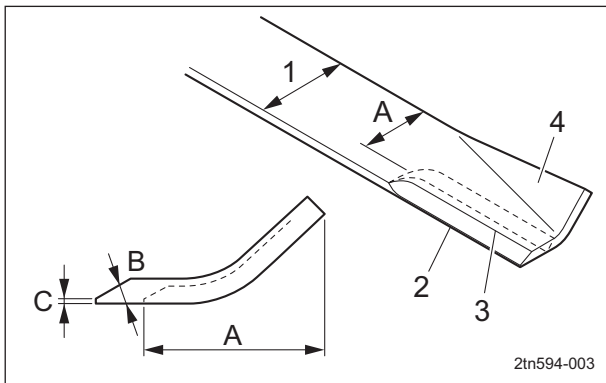
The rotary knife has a specific installation direction. Do not install it facing the wrong direction.

Important

Before installing the rotary knife, make sure that it is balanced.

If the edge of the rotary knife becomes chipped or thin, replace it with a new one. The criteria for replacing the rotary knife are described below.

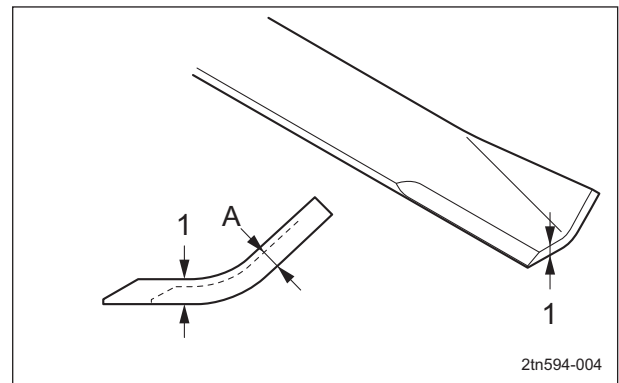
1. When the narrowest part of the rotary knife has a width of less than 2/3 of the width of a new knife



Replacement of Rotary Knife_001

1	Total width
2	Blade edge
3	Blade base
4	Sail
A	less than 2/3
B	30 - 40°
C	0.5 - 1.0 mm

2. When the thinnest part of the rotary knife has a thickness of less than 1/3 of the thickness of a new knife



2tn594-004

Replacement of Rotary Knife_002

1	Thickness
A	less than 1/3

Operating Machine and Mower Units

■Grinding of Rotary Knife

⚠ Danger

The rotary knife is an edged tool. Take extra care in handling since they could cut your hands or legs.

⚠ Danger

If the rotary knife becomes worn or damaged, a crack or tear between the sail and flat part will result. Take extra care since a broken piece of the rotary knife may fly off while it is rotating.

⚠ Warning

Using an imbalanced rotary knife may cause vibrations, resulting in damage to the machine.

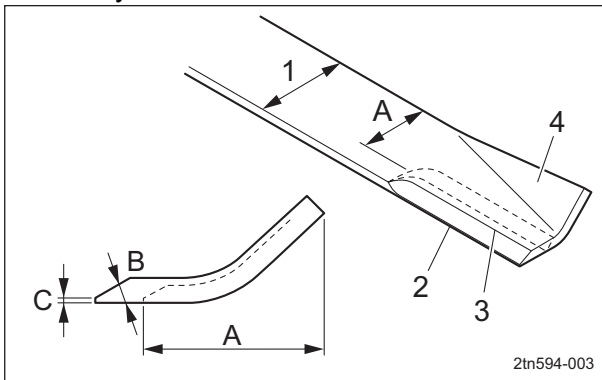
⚠ Caution

When grinding the rotary knife, be sure to wear safety glasses and gloves.

When the edge of the rotary knife becomes rounded and no longer cuts well, sharpen the worn cutting edge with a grinder or sander.

If the edge of the rotary knife becomes chipped or thin, replace it with a new one. The criteria for grinding the rotary knife is described below.

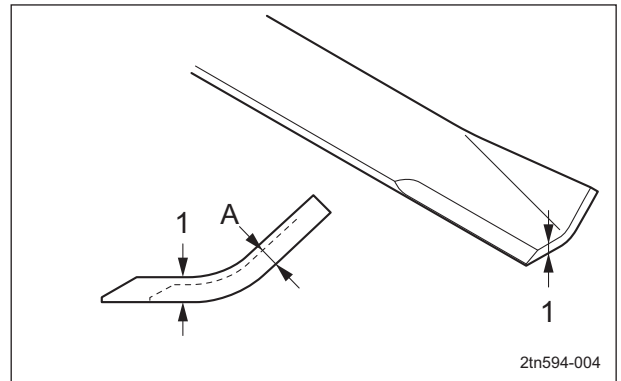
1. When, after grinding, the width of the rotary knife to the blade edge is 2/3 or more of the total width of a new knife
2. When, after grinding, the blade base of the rotary knife does not reach the sail



Grinding of Rotary Knife_001

1	Total width
2	Blade edge
3	Blade base
4	Sail
A	2/3 or more
B	30 - 40°
C	0.5 - 1.0 mm

3. When the thinnest part of the rotary knife has a thickness of 1/3 or more of the thickness of a new knife



2tn594-004

Grinding of Rotary Knife_002

1	Thickness
A	1/3 or more

Operating Machine and Mower Units

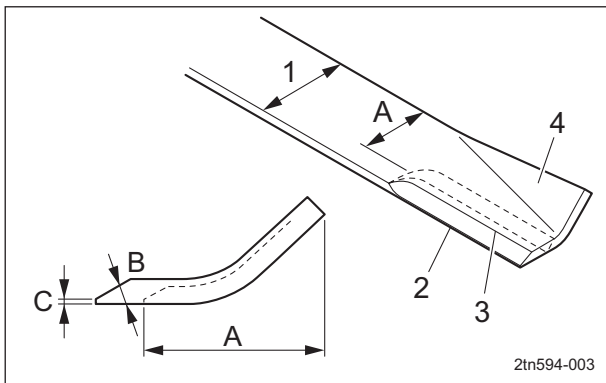
Follow the steps below to grind the rotary knife.

1. Remove the rotary knife from the machine. (See "Contour Deck" (Page 7-10) "Change of Rotary Knife" (Page 7-24) .)

Important

Grind only the top surface of the edge, and be sure to maintain the original angle. By equally grinding the left and right ends of the rotary knife, it can be sharpened without becoming imbalanced.

2. Grind the cutting edge of the rotary knife with a grinder. Grind so that the edge angle is 30 - 40 degrees, the point thickness is 0.5 - 1.0 mm, and the blade base does not reach the sail.



Grinding of Rotary Knife_003

1	Total width
2	Blade edge
3	Blade base
4	Sail
A	2/3 or more
B	30 - 40°
C	0.5 - 1.0 mm

3. Balance the rotary knife. (See "Balancing of Rotary Knife" (Page 7-26) .)
4. If it is not balanced, repeat steps 2. - 3.

■Balancing of Rotary Knife

Danger

The rotary knife is an edged tool. Take extra care in handling since they could cut your hands or legs.

Danger

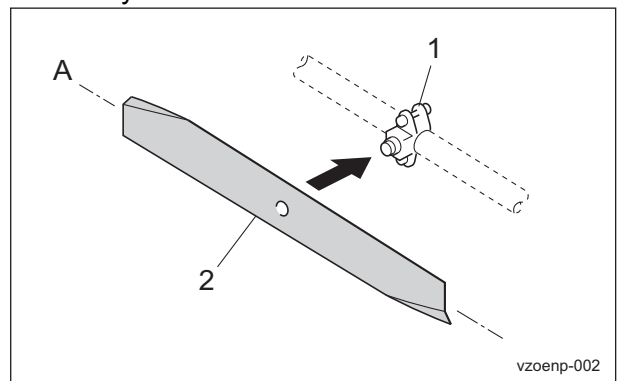
Using an imbalanced rotary knife may cause vibrations, resulting in damage to the machine.

Caution

When touching edged tools, wear gloves, since they could cut your hands.

When the rotary knife is worn asymmetrically, causing vibrations, or when it becomes dull or worn, remove the rotary knife from the machine and balance it. Follow the steps below to balance the rotary knife.

1. Remove the rotary knife from the machine. (See "Contour Deck" (Page 7-10) "Change of Rotary Knife" (Page 7-24) .)
2. Install the balancer equipment in an appropriate location.
3. Fit the hole at the center of the rotary knife onto the balancer equipment, and then balance the left and right ends so that the rotary knife is level.



Balancing of Rotary Knife_001

1	Balancer equipment
2	Rotary knife
A	Level

Operating Machine and Mower Units

Gearbox

■ Inspection of Gearbox

Wear of bearing due to frequent use and/or damage of bearing etc. caused by invasion of water may prevent smooth rotation of the vertical and horizontal shafts. Inspect and replace the parts such as the oil seal or bearing.

- Make sure that the gearbox does not have any cracks.
- Make sure that there is no wear or damage of the oil seal.
- Make sure that there is no wear or rusting of the bearing.
- Make sure that there is no play in the fit between the shaft and housing and the bearing.
- Make sure that there is no play in the fit between the vertical and horizontal shafts and the housing.
- Make sure that there is no wear or damage of the vertical and horizontal shafts.
- Make sure that there is no wear or crack of the gear.

⚠ Danger

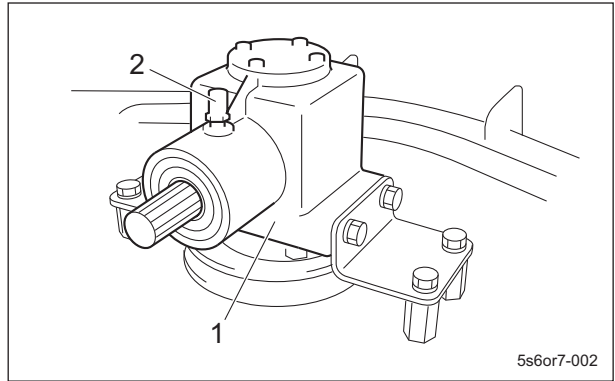
The rotary knife is an edged tool. Handle it carefully, since it could cut your hands or legs.

⚠ Caution

Wear gloves when touching edged tools to avoid cutting your hands.

1. Remove the mower unit from this machine. (See "Removal of Mower Unit" (Page 7-9) .)
2. Remove the rotary knife. (See "Change of Rotary Knife" (Page 7-24) "Contour Deck" (Page 7-10) .)
3. Remove the belt. (See "Removal of Belt" (Page 7-12) .)
4. Remove the gearbox Assy. (See "Removal of Center Deck Housing" (Page 7-14) .)

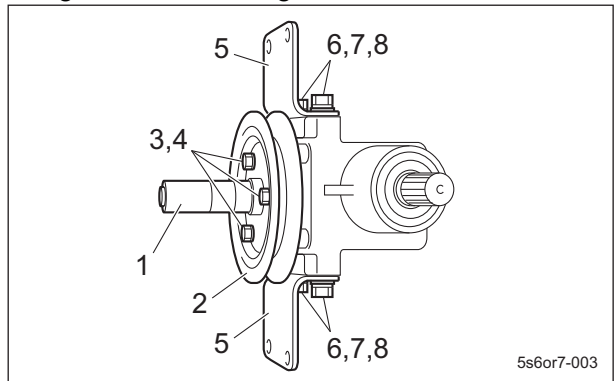
5. Remove the air breather.



Inspection of Gearbox_001

1	Gearbox Assy
2	Air breather

6. Remove three Bolts A securing the center knife shaft and driving pulley and then remove the center knife shaft and driving pulley simultaneously.
7. Remove Bolt B and then remove the gearbox mounting board.



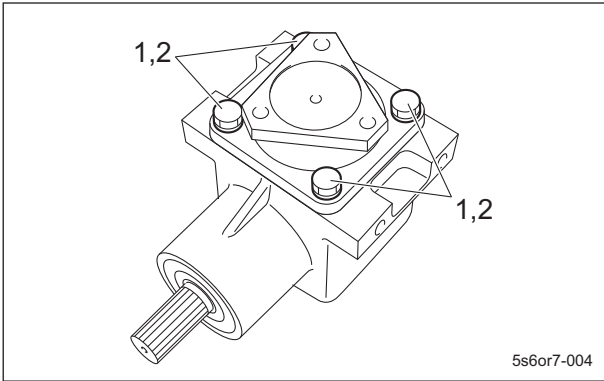
Inspection of Gearbox_002

1	Center knife shaft
2	Driving pulley
3	Bolt A
4	Spring washer
5	Gearbox mounting board
6	Bolt B
7	Spring washer
8	Washer

Operating Machine and Mower Units

Operating Machine and Mower Units

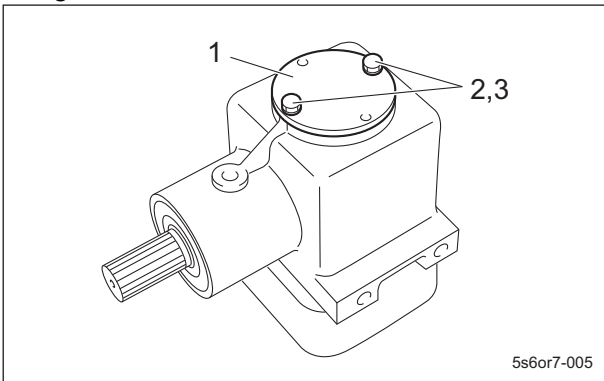
8. Remove the four bolts.



Inspection of Gearbox_003

1	Bolt
2	Spring washer

9. Remove the four bolts and spring washers, and then remove the upper gearbox lid.

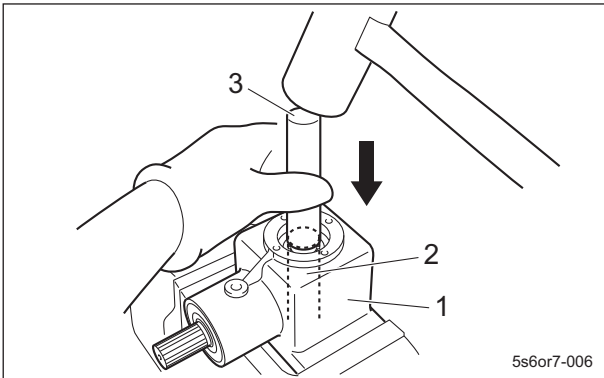


Inspection of Gearbox_004

1	Upper gearbox lid
2	Bolt
3	Spring washer

10. Secure the gear case Assy with the vise, etc.

11. Drive in the vertical shaft with a copper solid rod (which does not scratch the vertical shaft) in the direction of the arrow and remove the vertical shaft.

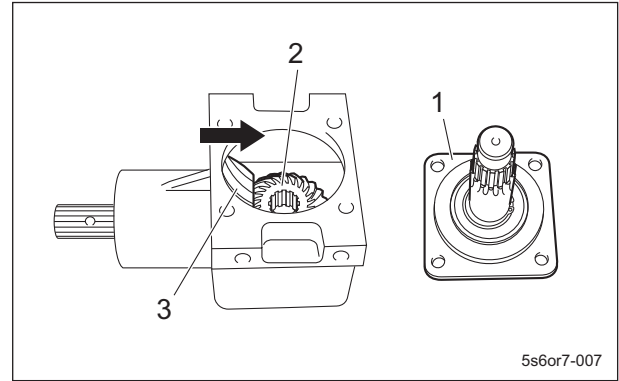


Inspection of Gearbox_005

1	Gear case Assy
2	Vertical shaft
3	Copper solid rod

12. Remove the 19-tooth bevel gear.

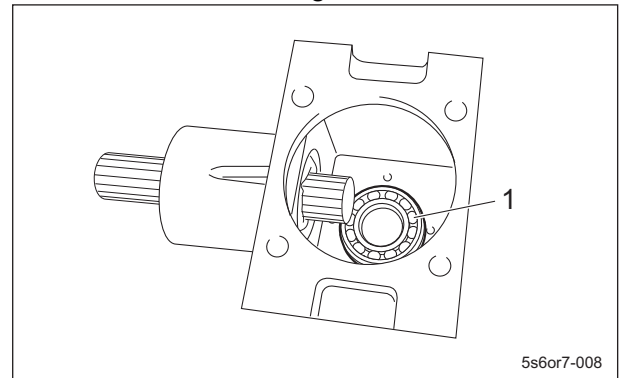
13. Remove the 24-tooth bevel gear in the direction of the arrow.



Inspection of Gearbox_006

1	Vertical shaft Assy
2	19-tooth bevel gear
3	24-tooth bevel gear

14. Remove the bearing.

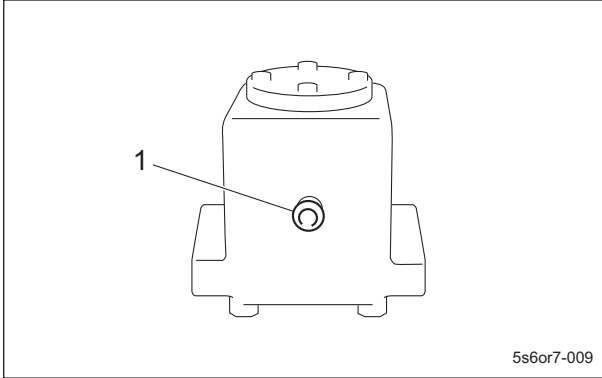


Inspection of Gearbox_007

1	Bearing
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Operating Machine and Mower Units

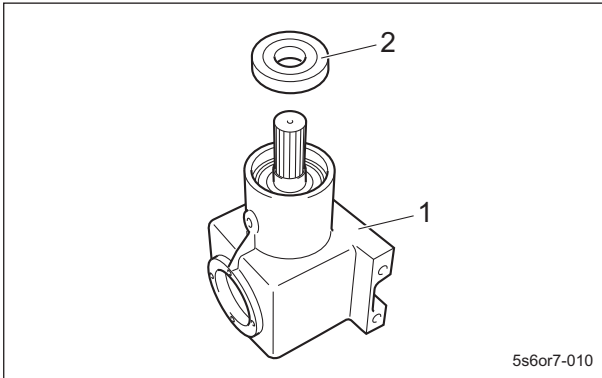
15. Remove the taper plug w/hexagon hole.



Inspection of Gearbox_008

1	Taper plug w/hexagon hole
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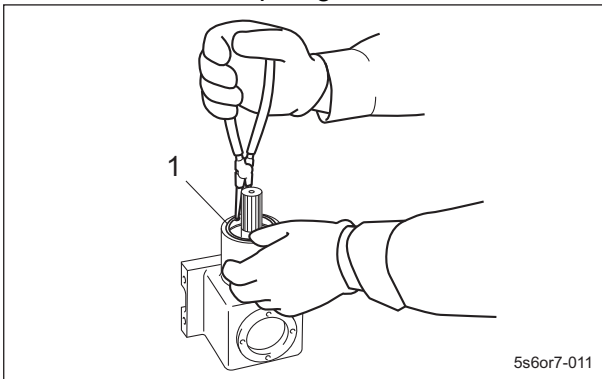
16. Remove the oil seals from the gear case.



Inspection of Gearbox_009

1	Gear case
2	Oil seal

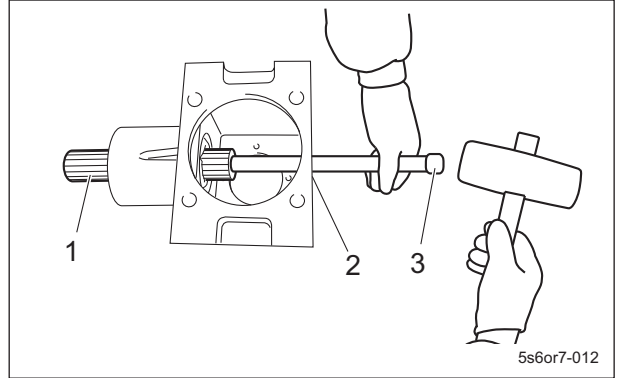
17. Remove the stop ring.



Inspection of Gearbox_010

1	Stop ring
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18. Remove the horizontal shaft w/bearing from the gear case by using a copper solid rod, with paying attentions not to scratch the spline part.



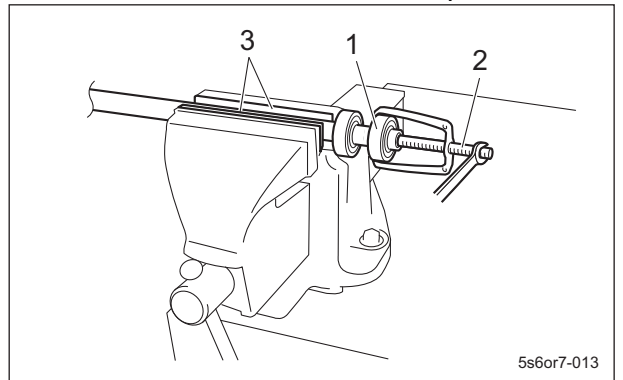
Inspection of Gearbox_011

1	Horizontal shaft w/bearing
2	Taper plug w/hexagon hole
3	Copper solid rod

19. Secure the removed horizontal shaft with a vise, etc. and then remove the bearing with a pulley puller.

Note:

When securing the horizontal shaft with a vise, etc., do not scratch the spline.



Inspection of Gearbox_012

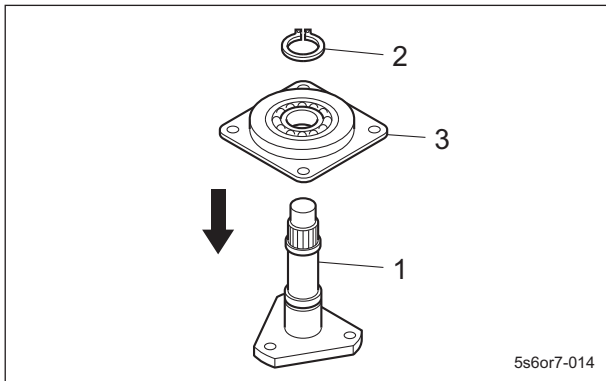
1	Horizontal shaft w/bearing
2	Pulley puller
3	Material protector

20. Remove the stop ring.

Operating Machine and Mower Units

Operating Machine and Mower Units

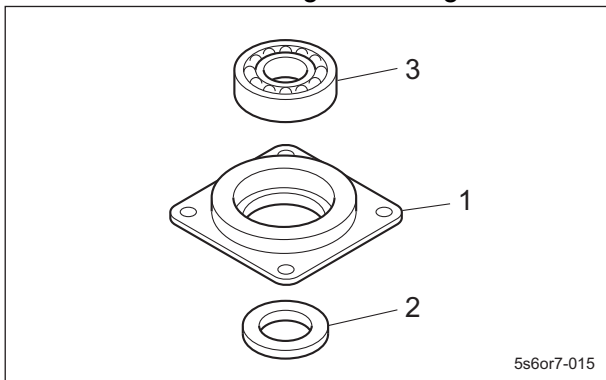
21. Remove the vertical shaft from the gearbox lid Assy in the direction of the arrow.



Inspection of Gearbox_013

1	Vertical shaft
2	Stop ring
3	Gearbox lid Assy

22. Remove the oil seals from the gearbox lid.
23. Remove the bearing from the gearbox lid.



Inspection of Gearbox_014

1	Gearbox lid
2	Oil seal
3	Bearing

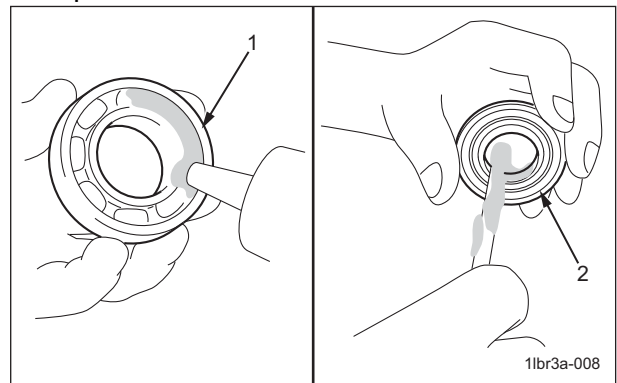
Important

When assembling, remove the old packing and wipe out all of the old liquid gasket and then attach a new packing.

Important

Be sure to replace the bearings, oil seals and O-rings with new ones.

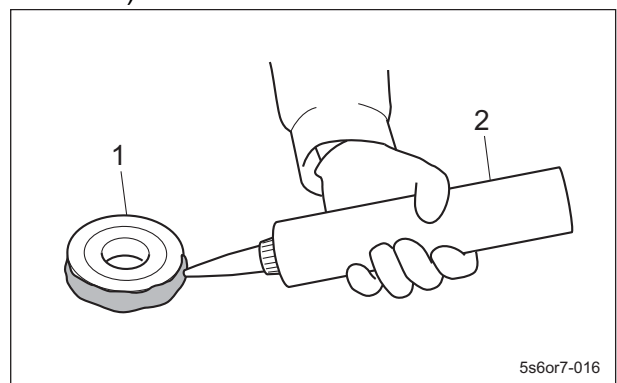
24. Have new bearings and oil seals ready with a profuse amount of grease applied. Apply a profuse amount of grease to the lip of the oil seal.



Inspection of Gearbox_015

1	Bearing
2	Oil seal

25. When driving in the oil seal, apply the liquid gasket (equivalent to ThreeBond 1104).



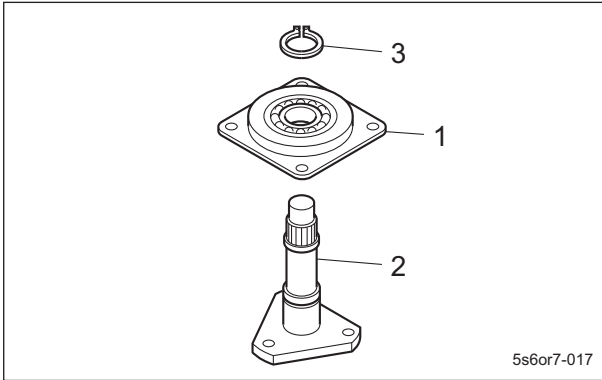
Inspection of Gearbox_016

1	Oil seal
2	Liquid gasket (ThreeBond 1104)

26. Install the oil seal and bearing onto the gear box lid by using a driver.

Operating Machine and Mower Units

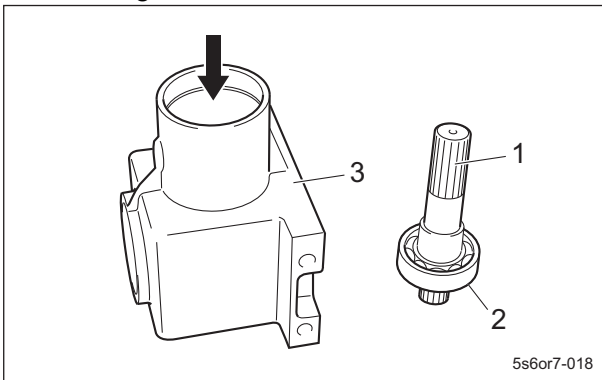
27. Install the gearbox lid Assy onto the vertical shaft by using a driver and secure it with the stop ring.



Inspection of Gearbox_017

1	Gearbox lid Assy
2	Vertical shaft
3	Stop ring

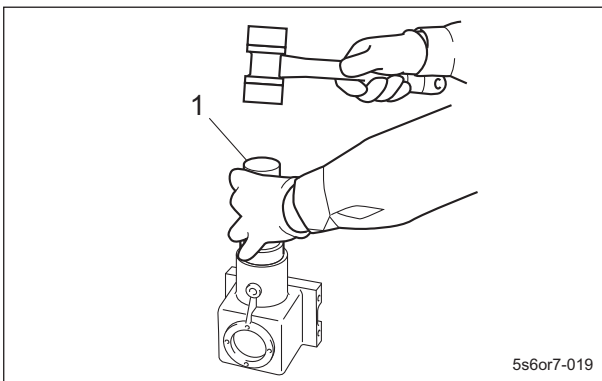
28. Install the bearing onto the shorter spline of the horizontal shaft by using a driver.
29. Insert the horizontal shaft onto the position of the arrow of the gearbox from the bearing side.



Inspection of Gearbox_018

1	Horizontal shaft
2	Bearing
3	Gear case

30. Install the horizontal shaft with a driver.

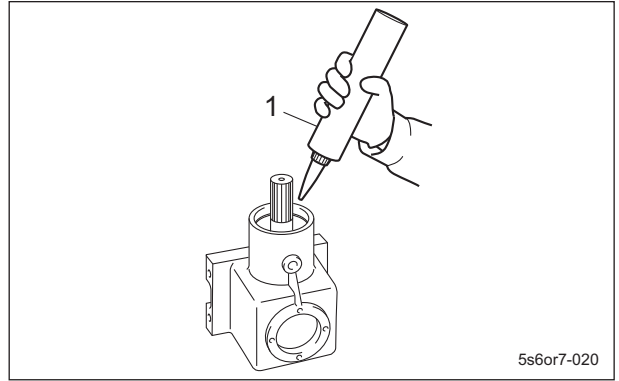


Inspection of Gearbox_019

1	Driver
---	--------

31. Apply 20 g (0.71 oz) of grease to the upper part of the bearing of the horizontal shaft.

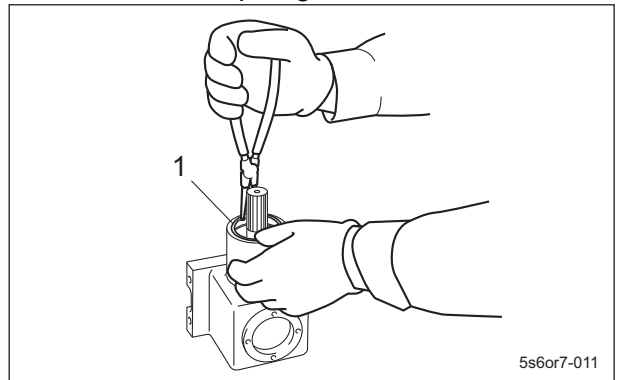
32. Apply grease to the new bearing and install it by using a driver.



Inspection of Gearbox_020

1	Grease
---	--------

33. Attach the stop ring.



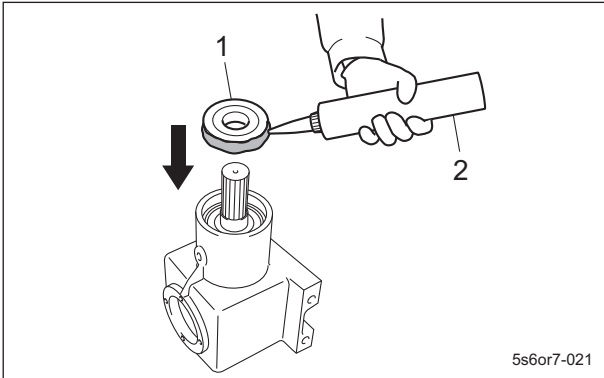
Inspection of Gearbox_021

1	Stop ring
---	-----------

Operating Machine and Mower Units

Operating Machine and Mower Units

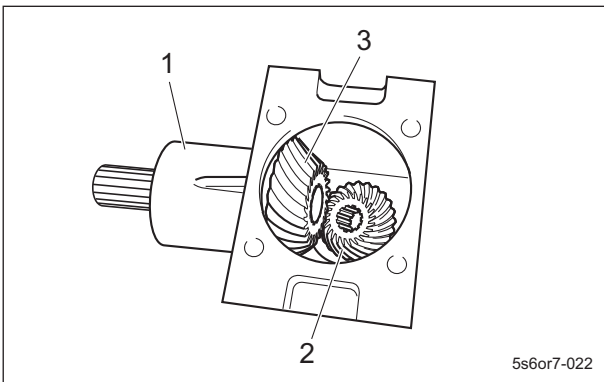
34. Apply the liquid gasket to the oil seal and install it in the direction of the arrow by using a driver.



Inspection of Gearbox_022

1	Oil seal
2	Liquid gasket

- 35. Place the gear case as shown.
- 36. Align the 19-tooth bevel gear with the center of the hole position first and then set it to the gear case.
- 37. Align the 24-tooth bevel gear with the spline of the horizontal shaft and then assemble it.

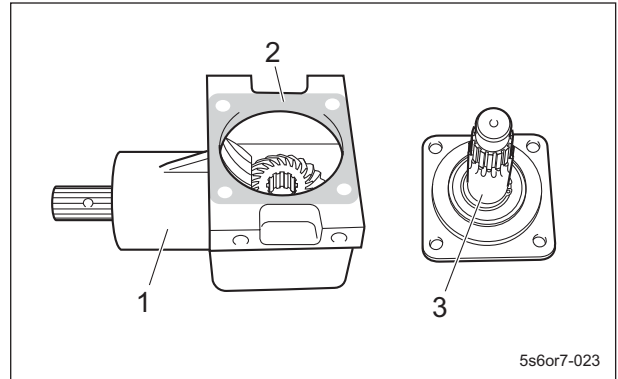


Inspection of Gearbox_023

1	Gear case
2	19-tooth bevel gear
3	24-tooth bevel gear

38. Apply the liquid gasket to the gear case lid joint part and install the packing.

39. Apply the liquid gasket to the packing.



Inspection of Gearbox_024

1	Gear case
2	Packing
3	Vertical shaft

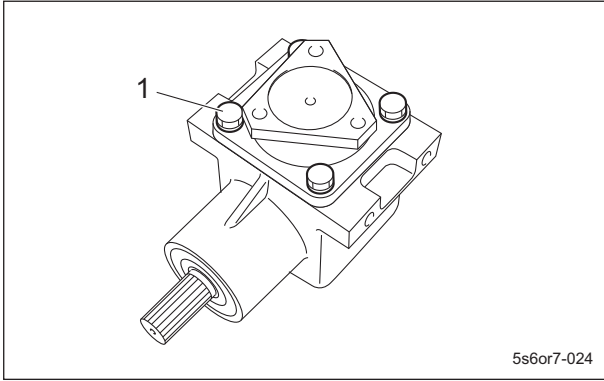
40. Align the 19-tooth bevel gear with the position of the spline of the vertical shaft and then assemble them.

Operating Machine and Mower Units

Caution

"Tightening torques" (Page 3-6) See the list. Note that the Baroness product warranty may not apply to defects caused by incorrect or overtorque tightening, etc.

41. Install four bolts and spring washers.

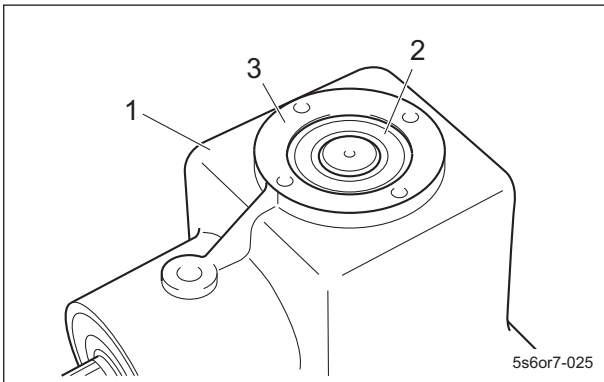


Inspection of Gearbox_025

1	Bolt
---	------

42. Drive the bearing into the upper part of the gear case.

43. Make sure that the upper face of the bearing is below the mounting face of the lid.

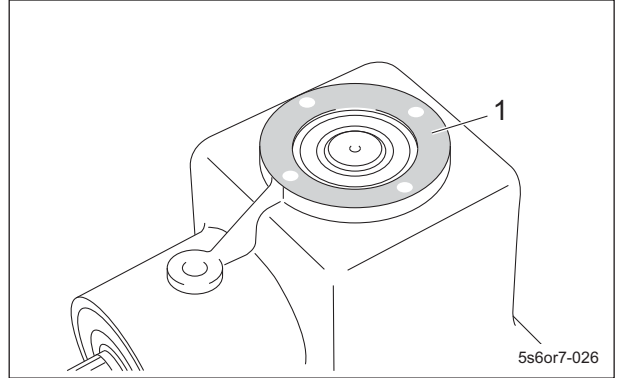


Inspection of Gearbox_026

1	Gear case
2	Bearing
3	Mounting face of the lid

44. Apply the liquid gasket to the lid joint part and install the packing.

45. Apply the liquid gasket.

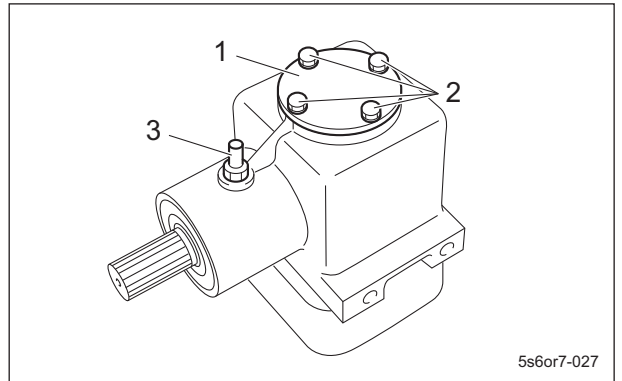


Inspection of Gearbox_027

1	Packing
---	---------

46. Install the lid and secure it with four bolts.

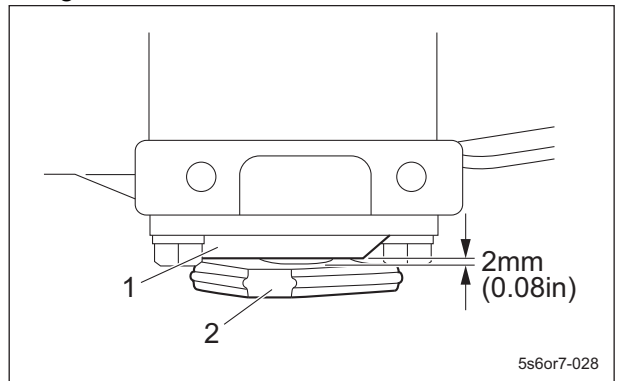
47. Install the air breather.



Inspection of Gearbox_028

1	Cap
2	Bolt and spring washer
3	Air breather

48. Make sure that there is 2 mm (0.08 in) clearance between the lower face of the gearbox lid and the vertical shaft.



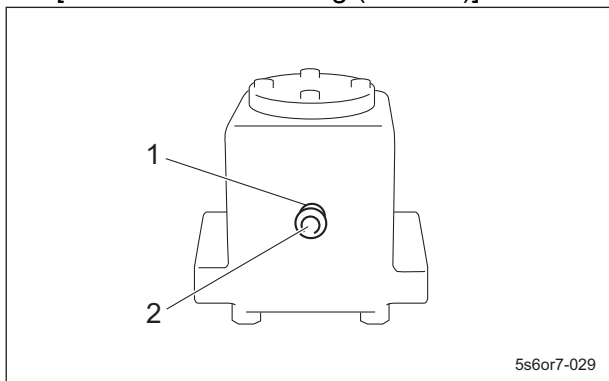
Inspection of Gearbox_029

1	Lower face of the gearbox lid
2	Vertical shaft

Operating Machine and Mower Units

Operating Machine and Mower Units

- Inject grease from the oil filling port and install the oil filling plug.
[Grease amount 240 g (8.47 oz)]



5s6or7-029

Inspection of Gearbox_030

1	Oil filling port
2	Oil filling plug

Housing

■ Inspection of Center Deck Housing

Wear of bearing due to frequent use and/or damage of bearing etc. caused by invasion of water may prevent smooth rotation of the rotary knife. Inspect and replace the parts such as the oil seal or bearing.

- Make sure that the housing does not have any cracks.
- Make sure that there is no wear or damage of the shaft.
- Make sure that there is no wear or damage of the oil seal.
- Make sure that there is no wear or rusting of the bearing.
- Make sure that there is no play in the fit of the shaft and the bearing.

⚠ Danger

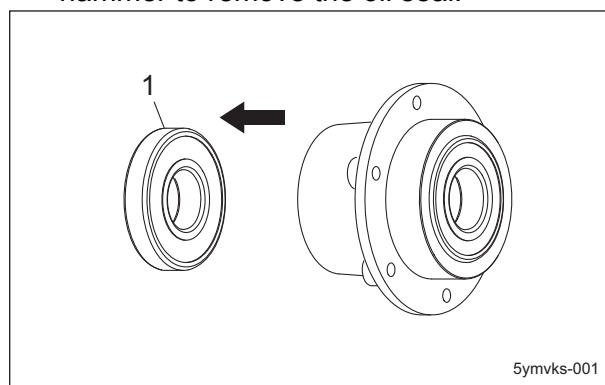
The rotary knife is an edged tool. Handle it carefully, since it could cut your hands or legs.

⚠ Caution

Wear gloves when touching edged tools to avoid cutting your hands.

- Remove the mower unit from the main body. (See "Removal of Mower Unit" (Page 7-9) .)

- Remove the rotary knife. (See "Change of Rotary Knife" (Page 7-24) "Contour Deck" (Page 7-10) .)
- Remove the belt. (See "Removal of Belt" (Page 7-12) .)
- Remove the gearbox Assy and then remove the center deck housing. (See "Removal of Center Deck Housing" (Page 7-14) .)
- Use an iron pipe and tap it with a plastic hammer to remove the oil seal.

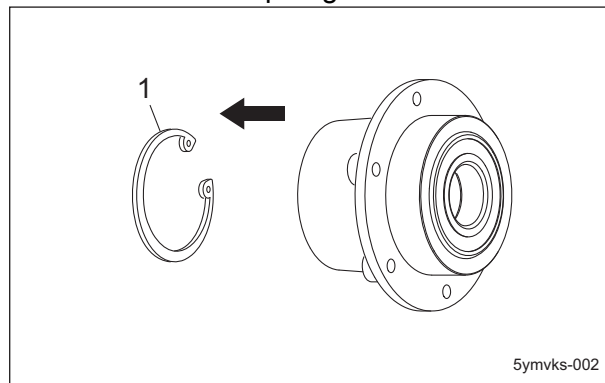


5ymvks-001

Inspection of Center Deck Housing_001

1	Oil seal
---	----------

- Remove the stop ring.



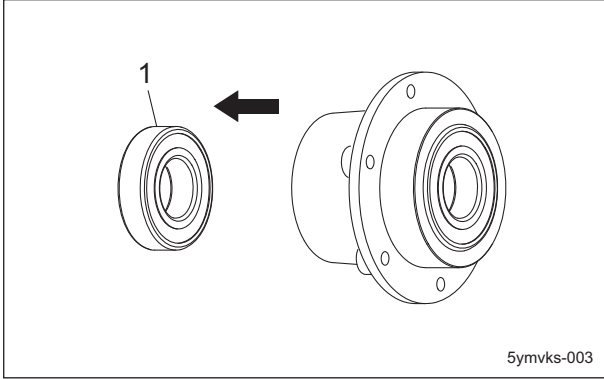
5ymvks-002

Inspection of Center Deck Housing_002

1	Stop ring
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Operating Machine and Mower Units

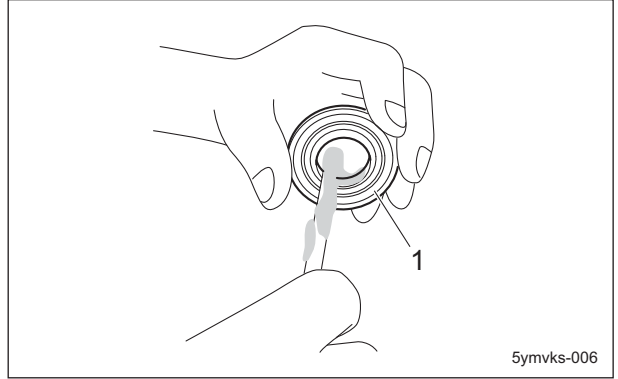
7. Use an iron pipe, etc. and tap it with a plastic hammer to remove the bearing.



Inspection of Center Deck Housing_003

1	Bearing
---	---------

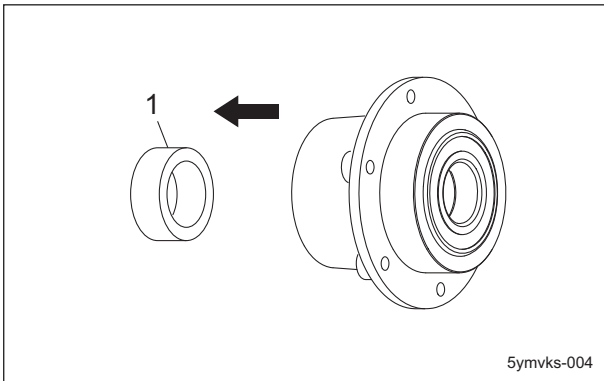
10. Apply a profuse amount of grease to the lip of the oil seal.



Inspection of Center Deck Housing_005

1	Oil seal
---	----------

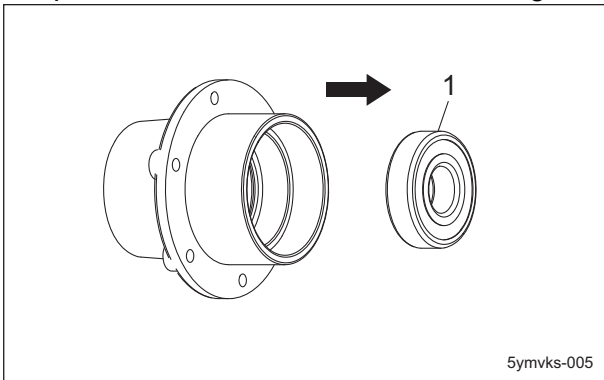
8. Remove the collar.



Inspection of Center Deck Housing_004

1	Collar
---	--------

9. Use an iron pipe, etc. and tap it with a plastic hammer to remove the bearing.



Inspection of Center Deck Housing_004

1	Bearing
---	---------

Important

Be sure to replace the bearings and oil seals with new ones.

11. For installation, reverse the removing procedure.

Note:

Use a driver to drive in the oil seal and bearing.

■ Inspection of Left and Right Deck Housings

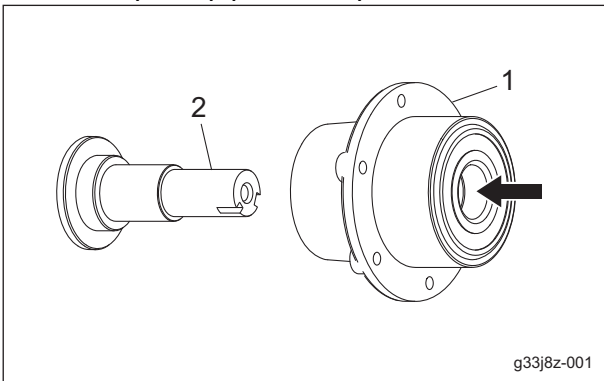
Wear of bearing due to frequent use and/or damage of bearing etc. caused by invasion of water may prevent smooth rotation of the rotary knife. Inspect and replace the parts such as the oil seal or bearing.

- Make sure that the housing does not have any chips or cracks.
- Make sure that there is no wear or damage of the shaft.
- Make sure that there is no wear or damage of the oil seal.
- Make sure that there is no wear or rusting of the bearing.
- Make sure that there is no play in the fit of the shaft and the bearing.

1. Remove the mower unit from this machine. (See "Removal of Mower Unit" (Page 7-9) .)
2. Remove the rotary knife. (See "Change of Rotary Knife" (Page 7-24) "Contour Deck" (Page 7-10) .)
3. Remove the belt. (See "Removal of Belt" (Page 7-12) .)
4. Remove the left and right deck housings. (See "Removal of Left and Right Deck Housing" (Page 7-13) .)

Operating Machine and Mower Units

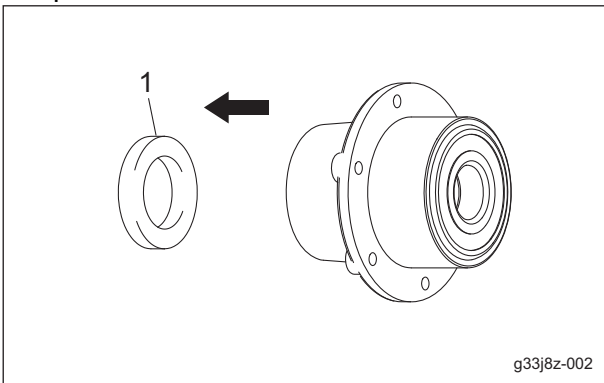
5. In order to avoid damage to the shaft when removing it, use an iron pipe, etc., and tap the pipe with a plastic hammer.



Inspection of Left and Right Deck Housings_001

1	Metal ASSY
2	Rotary knife shaft

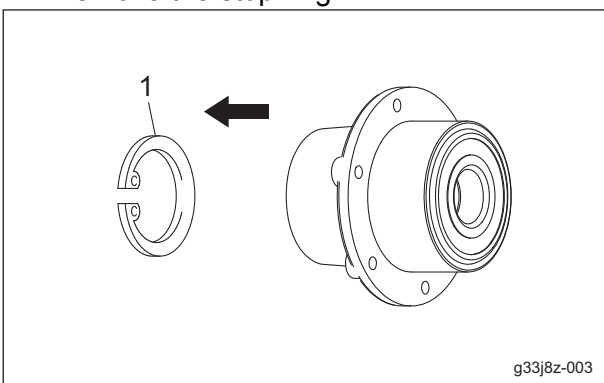
6. Use an iron pipe, etc. and tap it with a plastic hammer to remove the oil seal.



Inspection of Left and Right Deck Housings_002

1	Oil seal
---	----------

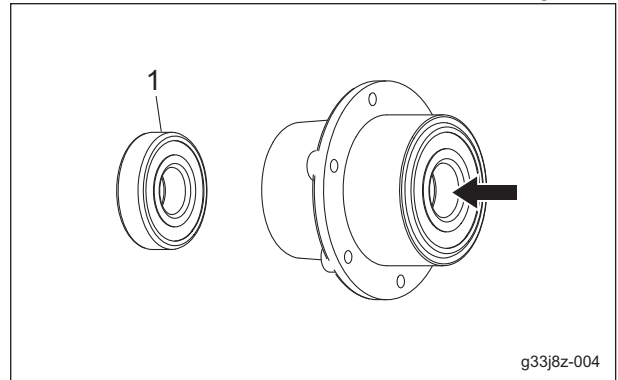
7. Remove the stop ring.



Inspection of Left and Right Deck Housings_003

1	Stop ring
---	-----------

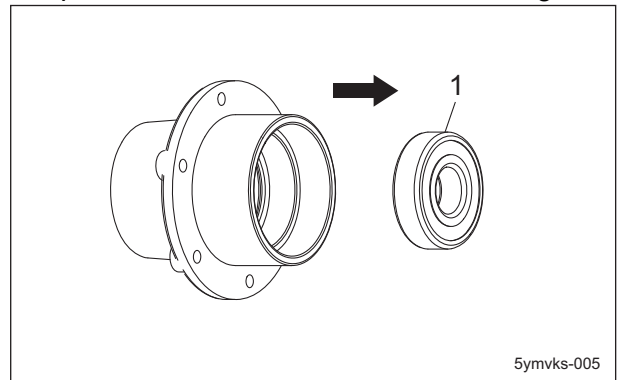
8. Use an iron pipe etc., and tap it with a plastic hammer to remove the bearing.



Inspection of Left and Right Deck Housings_004

1	Bearing
---	---------

9. Use an iron pipe etc., and tap it with a plastic hammer to remove the bearing.



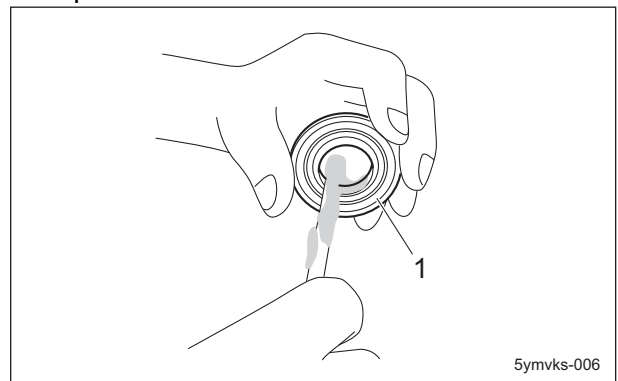
Inspection of Left and Right Deck Housings_005

1	Bearing
---	---------

Important

Be sure to replace the bearings and oil seals with new ones.

10. Apply a profuse amount of grease to the lip of the oil seal.



Inspection of Left and Right Deck Housings_006

1	Oil seal
---	----------

Operating Machine and Mower Units

- For installation, reverse the removing procedure.
 Note:
 Use a driver to drive in the oil seal and bearing.

Roller

■ Inspection of Front Roller

Wear of bearings due to frequent usage and invasion of water may damage bearings etc. and prevent smooth rotation of the roller. Inspect and replace the parts such as the bearings.

- Make sure that there is no abrasion or adhesion of the roller.
- Make sure that there is no wear of the roller shaft.
- Make sure that there is no abrasion or deformation of the collar, or washer etc. on both ends.
- Make sure that there is no wear or rust on the bearing.
- Make sure that there is no play in the fit of the roller and the bearing.

⚠ Danger

The rotary knife is an edged tool. Handle it carefully, since it could cut your hands or legs.

⚠ Caution

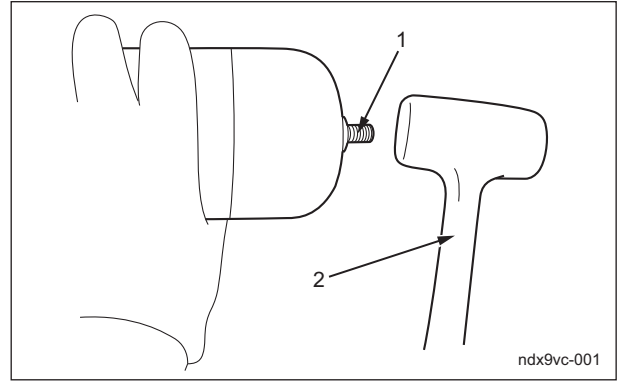
When touching edged tools, wear gloves, since they could cut your hands.

- Remove the front roller ass'y. (See "Removal of Front Roller Assy" (Page 7-16) .)

⚠ Caution

Pay attention not to damage the threads when you hit the shaft with a hammer.

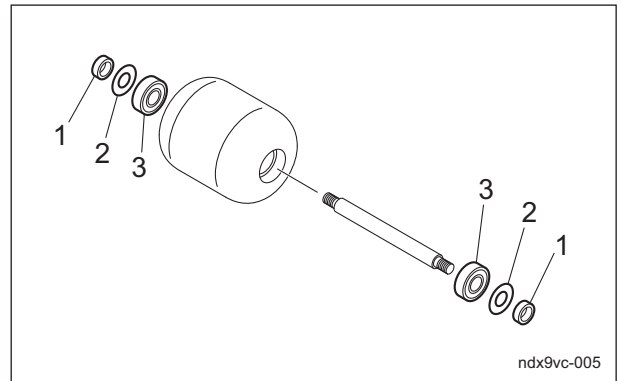
- Knock one end of the wheel shaft with a plastic hammer to push out the shaft.



Inspection of Front Roller_001

1	Wheel shaft
2	Plastic hammer

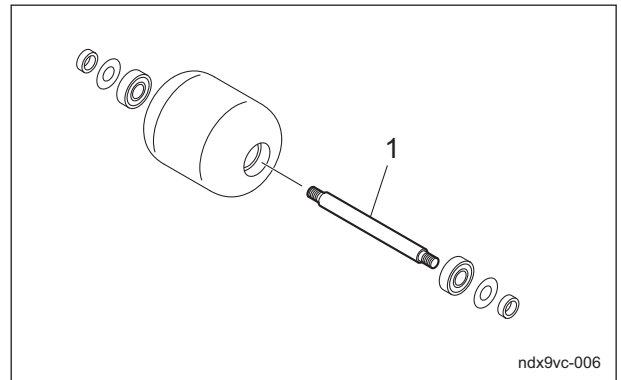
- Remove collar, washer, and bearing from one end of the shaft.



Inspection of Front Roller_002

1	Collar
2	Washer
3	Bearing

- Follow the same steps to remove them from the other side.



Inspection of Front Roller_003

1	Wheel shaft
---	-------------

Operating Machine and Mower Units

Important

Be sure to replace the bearing with new one.

Caution

See the list in "Tightening torques" (Page 3-6) .

Note that the Baroness product warranty may not apply to defects caused by incorrect or overtorque tightening, etc.

5. Install the front roller ass'y following the reversed procedure of the procedure 2 to 4.
6. Make sure that the roller rotates smoothly with no play when the roller shaft is fixed.
7. Install the front roller ass'y. (See "Installation of Front Roller Assy" (Page 7-16) .)

■ Inspection of Left and Right Wheels of Center Deck

Wear of bearing due to frequent use and/or damage of bearing etc. caused by invasion of water may prevent smooth rotation of the rubber wheel. Inspect and replace the parts such as the bearing.

- Make sure that there is no abrasion or adhesion of the rubber wheel.
- Make sure that there is no wear of the wheel shaft of the bracket.
- Make sure that the bracket is not cracked or bent.
- Make sure that there is no wear of the collar, bolt, or washer etc.
- Make sure that there is no wear or rusting of the bearing.
- Make sure that there is no play in the fit of the wheel shaft of the bracket and the bearing.

Danger

The rotary knife is an edged tool. Handle it carefully, since it could cut your hands or legs.

Caution

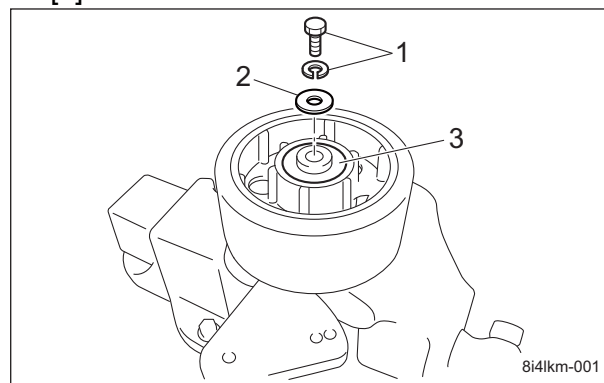
Wear gloves when touching edged tools to avoid cutting your hands.

1. Follow the steps below to remove the wheel from the bracket.

[1] Remove the bolts and spring washers from the shaft of the bracket.

[2] Remove the wheel tightening washer.

[3] Remove the washer.



Inspection of Left and Right Wheels of Center Deck_001

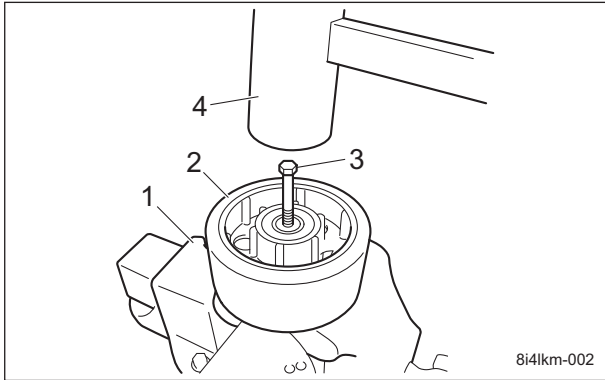
1	Bolt and spring washer
2	Wheel tightening washer
3	Washer

[4] Place the wheel on the vise to create space for the bracket to be pushed out.

[5] Screw the bolt into the shaft of the bracket by 10 mm (0.39 in).

Operating Machine and Mower Units

[6] Remove the bracket by tapping the bolt with a wooden hammer while holding the bracket by one hand.

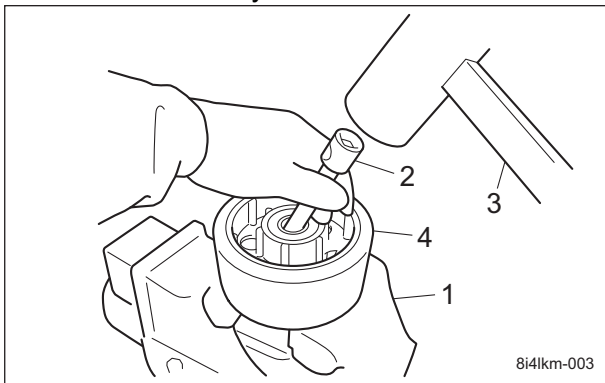


Inspection of Left and Right Wheels of Center Deck_002

1	Vise
2	Wheel Assy
3	Bolt
4	Wood hammer

2. Follow the steps below to remove the bearing from the wheel.

- [1] Place the wheel on the vise to create space for the bearing to be pushed out.
- [2] Remove the bearing by hitting it from front to back and from side to side alternately with a wooden hammer using an iron pipe.
- You can remove the collar together.
- [3] Turn the wheel upside down and remove the bearing of the other side in the same way.



Inspection of Left and Right Wheels of Center Deck_003

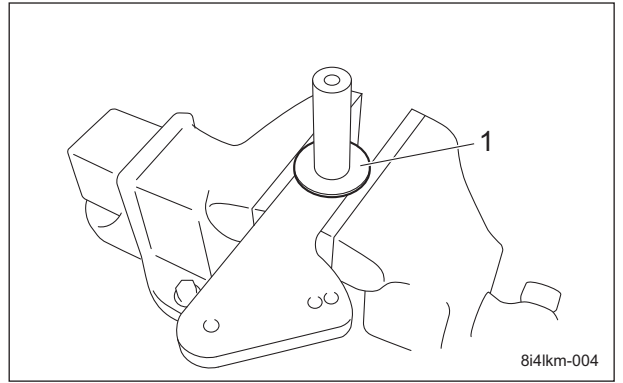
1	Vise
2	Iron pipe
3	Wood hammer
4	Wheel

Important

Be sure to replace the bearing with new one.

3. Follow the steps below to install the wheel into the bracket.

- [1] Secure the bracket firmly onto the vise.
- [2] Insert the washer into the shaft of the bracket.



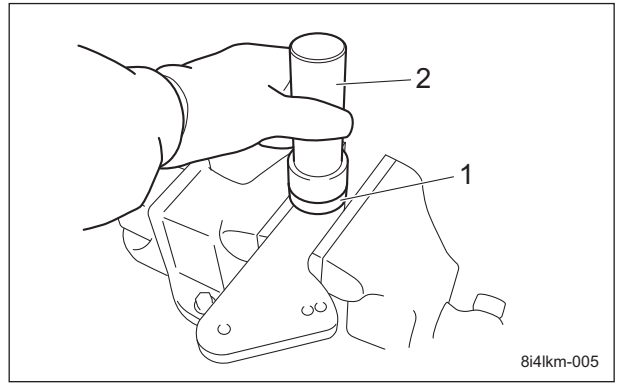
Inspection of Left and Right Wheels of Center Deck_004

1	Washer
---	--------

[3] Drive the bearing into the shaft of the bracket evenly.

Note:

Use a bearing driver to drive in the bearings and oil seals.

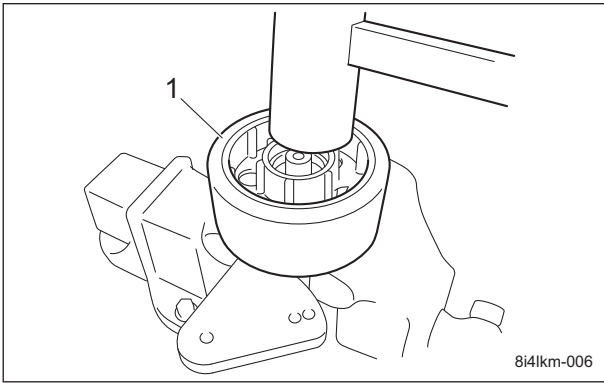


Inspection of Left and Right Wheels of Center Deck_005

1	Bearing
2	Driver

Operating Machine and Mower Units

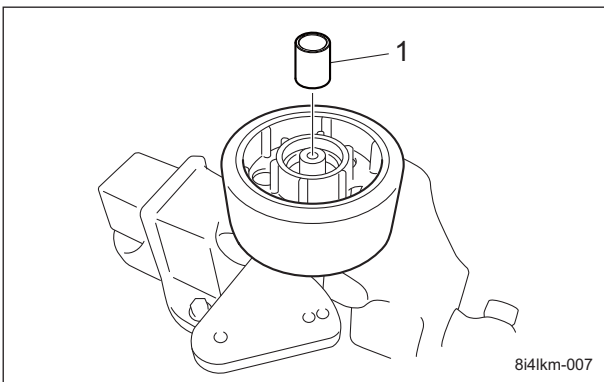
[4] Drive the wheel evenly into the bearing attached to the shaft.



Inspection of Left and Right Wheels of Center Deck_006

1	Wheel
---	-------

[5] Insert the collar into the shaft of the bracket.



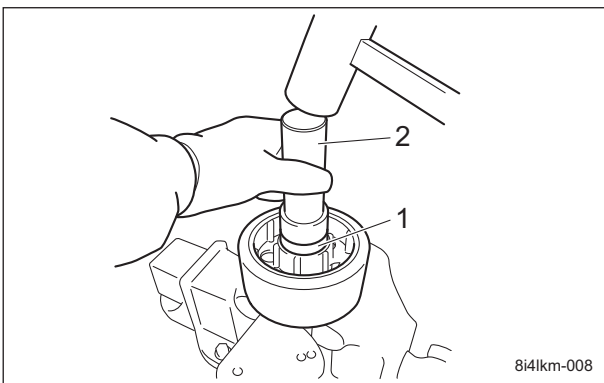
Inspection of Left and Right Wheels of Center Deck_007

1	Collar
---	--------

[6] Drive the bearing into the wheel evenly.

Note:

The bearing can be inserted deeper inside beyond the upper face of the wheel.



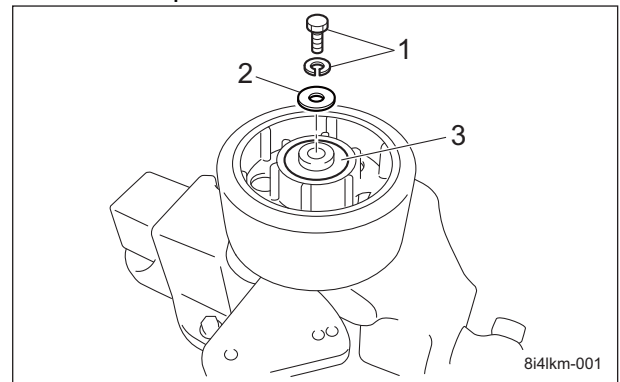
Inspection of Left and Right Wheels of Center Deck_008

1	Bearing
2	Driver

[7] Insert the washer and wheel tightening washer into the shaft of the bracket and tighten them with the bolts and spring washers.

[8] Make sure that the wheel rotates smoothly.

[9] Follow the same steps to complete the installation on the opposite side by the same procedure.



Inspection of Left and Right Wheels of Center Deck_009

1	Bolt and spring washer
2	Wheel tightening washer
3	Washer

■ Inspection of Rear Wheel of Center Deck

Wear of bearing due to frequent use and/or damage of bearing etc. caused by invasion of water may prevent smooth rotation of the rubber wheel. Inspect and replace the parts such as the bearing.

- Make sure that there is no abrasion or adhesion of the rubber wheel.
- Make sure that there is no wear of the wheel shaft of the bracket.
- Make sure that the bracket is not cracked or bent.
- Make sure that there is no wear of the collar, bolt, or washer etc.
- Make sure that there is no wear or rusting of the bearing.
- Make sure that there is no play in the fit of the wheel shaft of the bracket and the bearing.

Operating Machine and Mower Units

! Danger

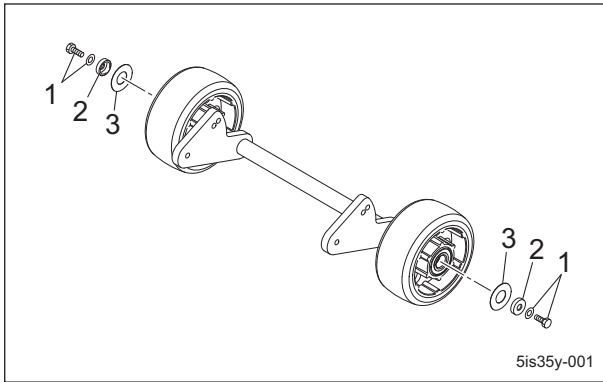
The rotary knife is an edged tool. Handle it carefully, since it could cut your hands or legs.

! Caution

Wear gloves when touching edged tools to avoid cutting your hands.

1. Follow the steps below to remove the wheel from the bracket.

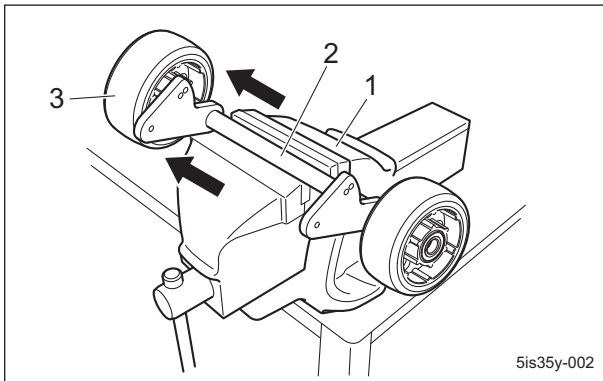
- [1] Remove the bolts and spring washers from the shaft of the bracket.
- [2] Remove the wheel tightening washer.
- [3] Remove the washer.



Inspection of Rear Wheel of Center Deck_001

1	Bolt and spring washer
2	Wheel tightening washer
3	Washer

- [4] Secure the bracket with a vise.
- [5] Remove the wheel tapping it from front to back and from side to side alternately with a wooden hammer in the direction of the arrow.

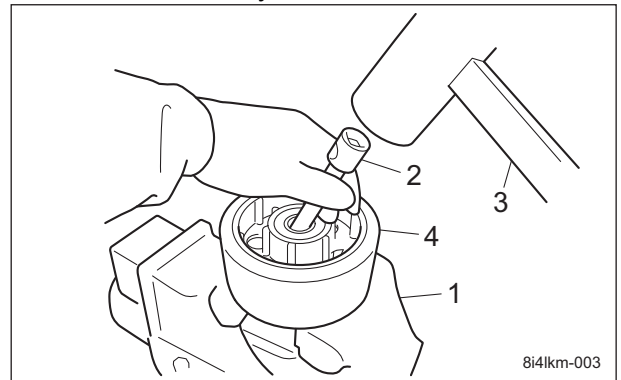


Inspection of Rear Wheel of Center Deck_002

1	Vise
2	Bracket
3	Wheel

2. Follow the steps below to remove the bearing from the wheel.

- [1] Place the wheel on the vise to create space for the bearing to be pushed out.
- [2] Remove the bearing hitting it from front to back and from side to side alternately with a wooden hammer using an iron pipe.
- [3] Turn the wheel upside down and remove the bearing of the other side in the same way.



Inspection of Rear Wheel of Center Deck_003

1	Vise
2	Iron pipe
3	Wood hammer
4	Wheel

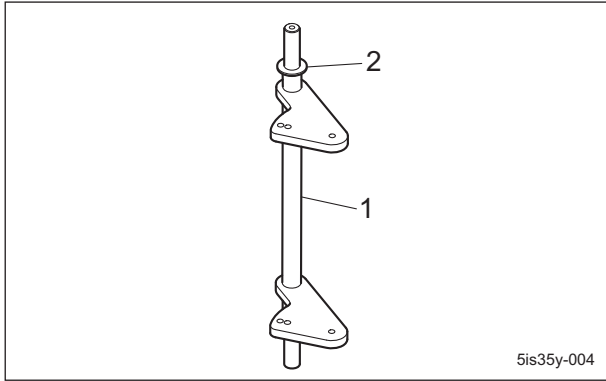
Important

Be sure to replace the bearing with new one.

Operating Machine and Mower Units

3. Follow the steps below to install the wheel into the bracket.

[1] Insert the washer into the shaft of the bracket.



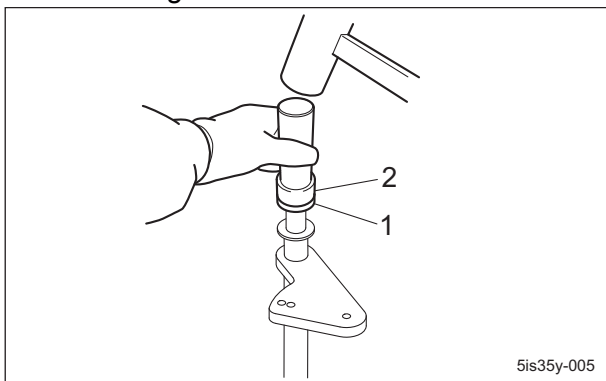
Inspection of Rear Wheel of Center Deck_004

1	Bracket
2	Washer

[2] Drive the bearing into the shaft of the bracket evenly.

Note:

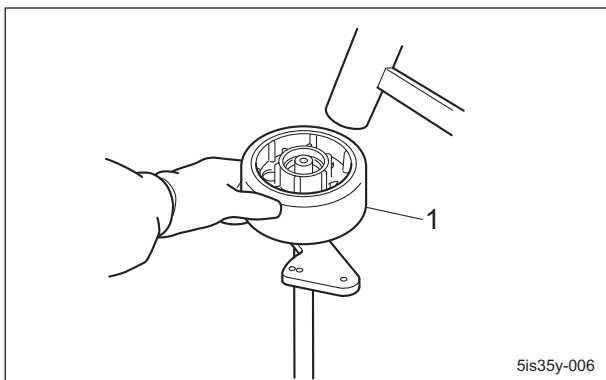
Use a bearing driver to drive in the bearings and oil seals.



Inspection of Rear Wheel of Center Deck_005

1	Bearing
2	Driver

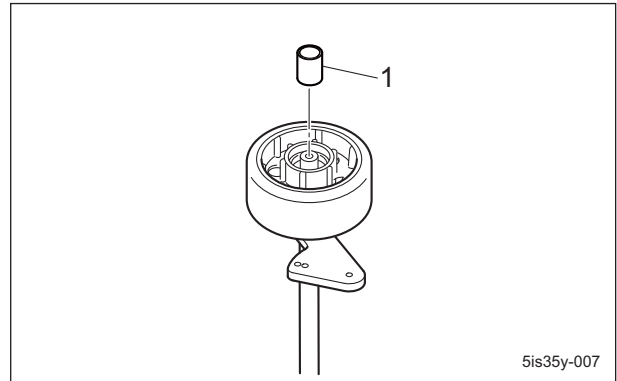
[3] Drive the wheel evenly into the bearing attached to the shaft.



Inspection of Rear Wheel of Center Deck_006

1	Rubber wheel
---	--------------

[4] Insert the collar into the shaft of the bracket.



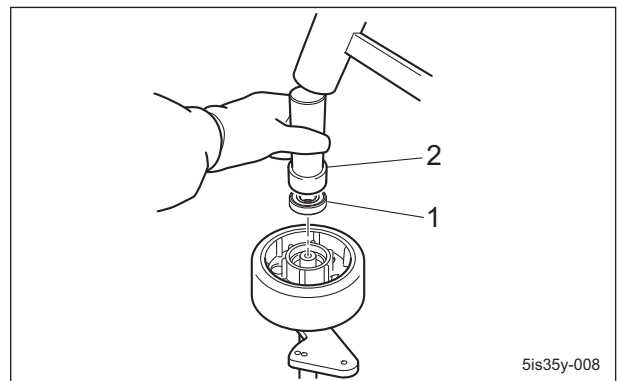
Inspection of Rear Wheel of Center Deck_007

1	Collar
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[5] Drive the bearing into the wheel evenly.

Note:

The bearing can be inserted deeper inside beyond the upper face of the wheel.



Inspection of Rear Wheel of Center Deck_008

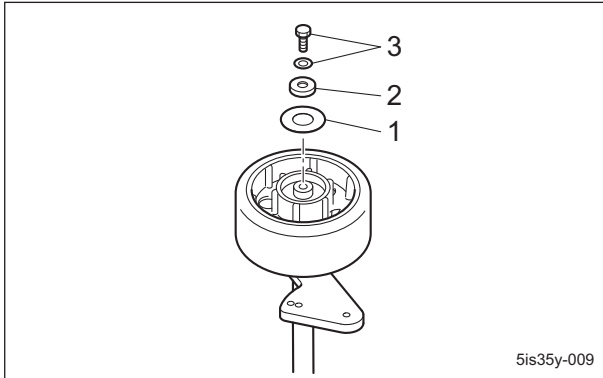
1	Bearing
2	Driver

[6] Insert the washer and wheel tightening washer into the shaft of the bracket and tighten them with the bolts and spring washers.

[7] Make sure that the wheel rotates smoothly.

Operating Machine and Mower Units

[8] Follow the same steps to complete the installation on the opposite side by the same procedure.



Inspection of Rear Wheel of Center Deck_009

1	Washer
2	Wheel tightening washer
3	Bolt and spring washer

■ Inspection of Caster Wheel

Wear of bearing due to frequent use and/or damage of bearing etc. caused by invasion of water may prevent smooth rotation of the rubber wheel. Inspect and replace the parts such as bearing.

- Make sure that there is no abrasion or adhesion of the rubber wheel.
- Make sure that there is no wear of the collar, or washer etc. on both ends.
- Make sure that there is no crack, bent, or wear on the front wheel arm, shaft, or front wheel shaft.
- Make sure that there is no wear, scratch, crack, etc. on the front wheel arm bushing.
- Make sure that there is no wear or rusting of the bearing.
- Make sure that there is no play in the fit of the front wheel shaft of the front wheel arm and the bearing.
- Make sure that there is no wear of the copper washer or iron washer of the front wheel arm shaft.

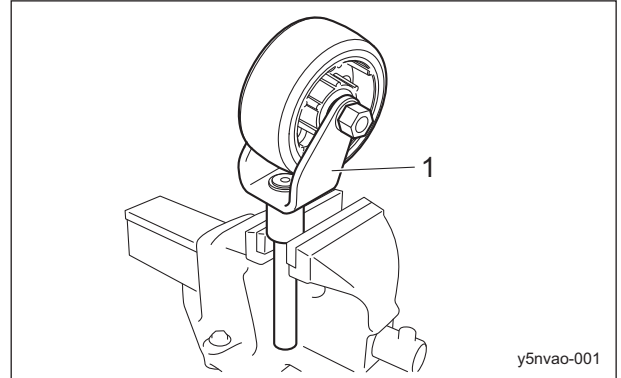
⚠ Danger

The rotary knife is an edged tool. Handle it carefully, since it could cut your hands or legs.

⚠ Caution

Wear gloves when touching edged tools to avoid cutting your hands.

1. Secure the caster wheel Assy with a vise.

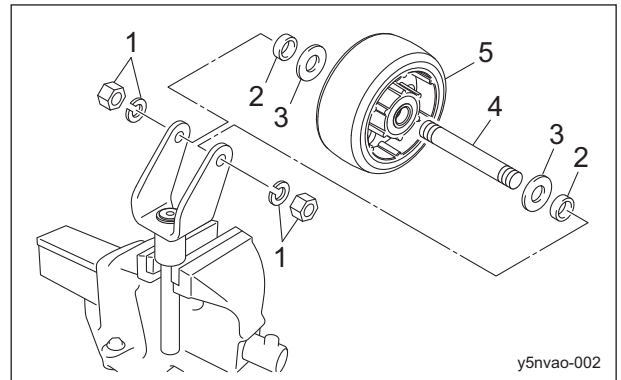


Inspection of Caster Wheel_001

1	Caster wheel Assy
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2. Follow the steps below to remove the wheel from the front wheel arm.

- [1] Remove the nuts and spring washers of both sides.
- [2] Remove the collars and washers of both sides.
- [3] Remove the front wheel shaft and then remove the wheel.



Inspection of Caster Wheel_002

1	Nut and spring washer
2	Collar
3	Washer
4	Front wheel shaft
5	Wheel

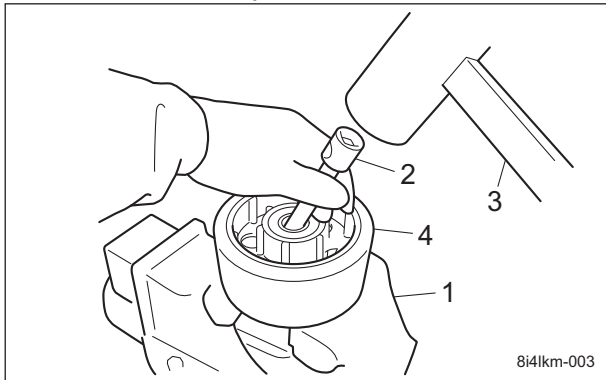
3. Follow the steps below to remove the bearing from the wheel.

- [1] Place the wheel on the vise to create space for the bearing to be pushed out.

Operating Machine and Mower Units

[2] Remove the bearing hitting it from front to back and from side to side alternately with a wooden hammer using an iron pipe.
You can remove the collar together.

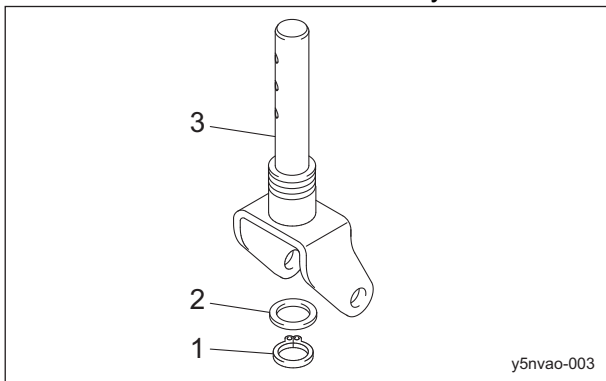
[3] Turn the wheel upside down and remove the bearing of the other side in the same way.



Inspection of Caster Wheel_003

1	Vise
2	Iron rod
3	Wood hammer
4	Wheel

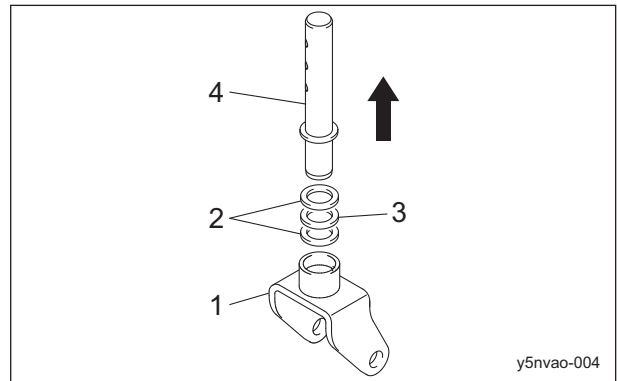
4. Remove the stop ring and copper washer from the front wheel arm Assy.



Inspection of Caster Wheel_004

1	Stop ring
2	Copper washer
3	Front wheel arm Assy

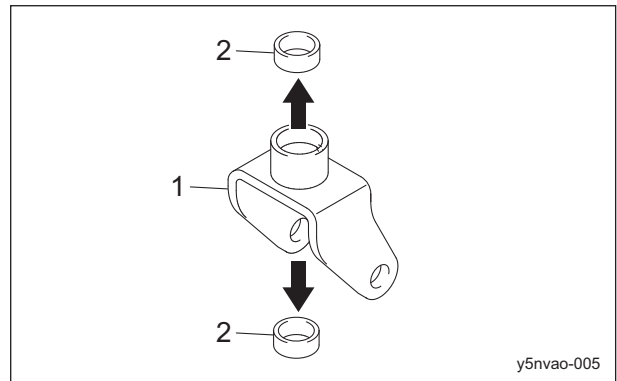
5. Pull out the shaft from the front wheel arm in the direction of the arrow and remove the iron washer.



Inspection of Caster Wheel_005

1	Front wheel arm
2	Copper washer
3	Iron washer
4	Shaft

6. Follow the steps below to remove the two bushings of the front wheel arm in the direction of the arrow.



Inspection of Caster Wheel_006

1	Front wheel arm
2	Bushing

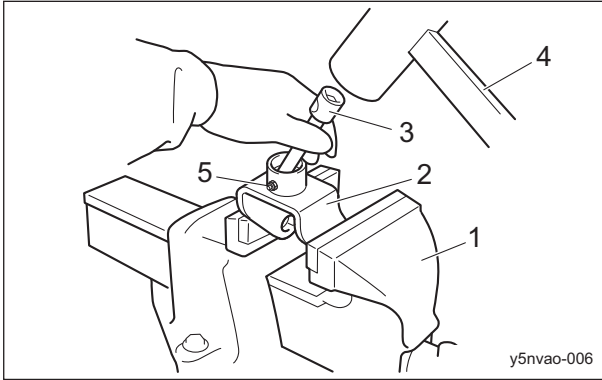
[1] Secure the front wheel arm with a vise.

[2] Remove the bushing hitting it from front to back and from side to side alternately with a wooden hammer using an iron pipe.

[3] Secure the front wheel arm upside down and remove the bush of the other side in the same way.

[4] Remove the grease nipple.

Operating Machine and Mower Units



Inspection of Caster Wheel_007

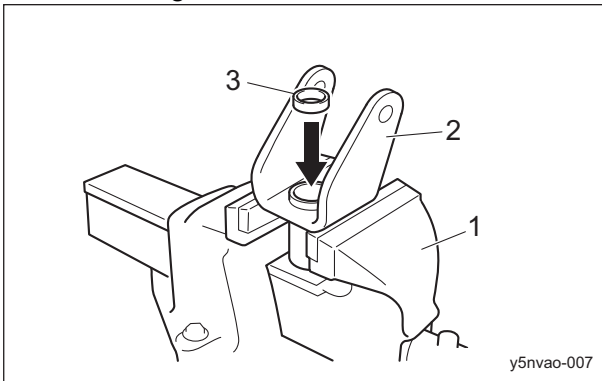
1	Vise
2	Front wheel arm
3	Iron pipe
4	Hammer
5	Grease nipple

Important

Be sure to replace the bushing and bearing with new ones.

7. Follow the steps below to install the bushing onto the front wheel arm.
 - [1] Secure the front wheel arm with a vise.
 - [2] Drive a new bushing into the front wheel arm evenly.

Note:
Use a bearing driver to drive in the bushing.



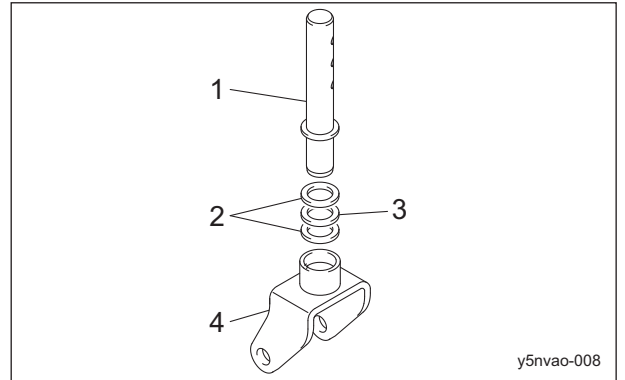
Inspection of Caster Wheel_008

1	Vise
2	Front wheel arm
3	Bushing

8. Follow the steps below to install the shaft onto the front wheel arm.

[1] Apply grease to the shaft.

- [2] Insert the copper washer and iron washer into the shaft caring for the order.
- [3] Insert the shaft set into the front wheel arm.



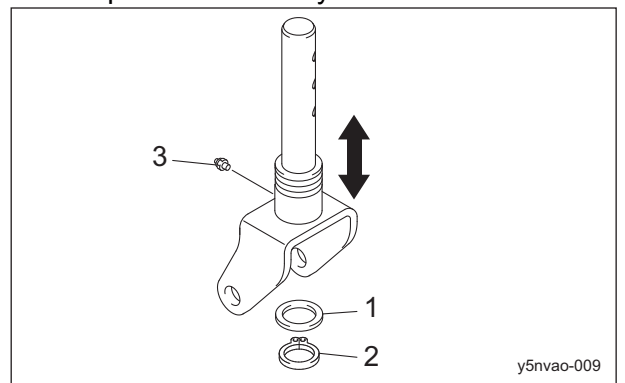
Inspection of Caster Wheel_009

1	Shaft
2	Copper washer
3	Iron washer
4	Front wheel arm

- [4] Insert the copper washer into the shaft and secure it with a stop ring.

Note:
If the shaft rattles when moved in the direction of the arrow, replace all washers with new ones.

- [5] Install the grease nipple and inject grease.
- [6] Make sure that the front wheel arm operates smoothly.



Inspection of Caster Wheel_010

1	Copper washer
2	Stop ring
3	Grease nipple

Operating Machine and Mower Units

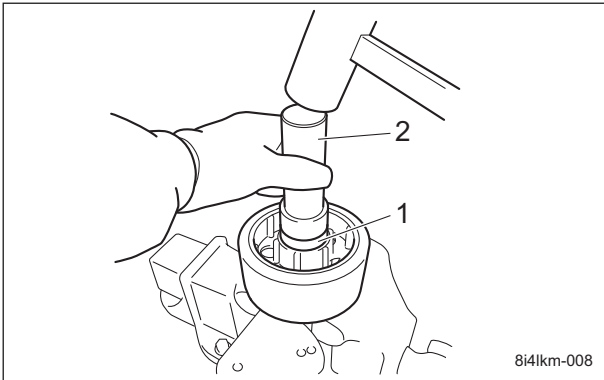
9. Follow the steps below to install the bearing onto the wheel.

[1] Drive the bearing into the wheel evenly. (It enters deeper inside beyond the upper face of the housing.)

Note:

Use a bearing driver to drive in the bearings and oil seals.

[2] Turn the wheel upside down and insert the collar



Inspection of Caster Wheel_011

1	Bearing
2	Driver

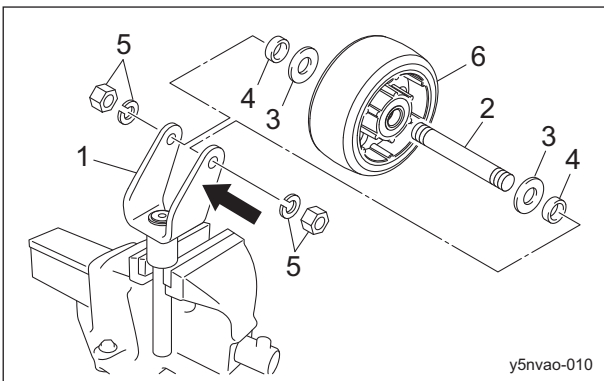
[3] Drive the bearing into the wheel evenly. (It enters deeper inside beyond the upper face of the housing.)

10. Follow the steps below to install the wheel onto the front wheel arm.

[1] Secure the front wheel arm w/shaft with a vise.

[2] Insert the front wheel shaft into the front wheel arm a little in the direction of the arrow and pass the collar, copper washer, wheel, copper washer, and collar in order to the front wheel shaft.

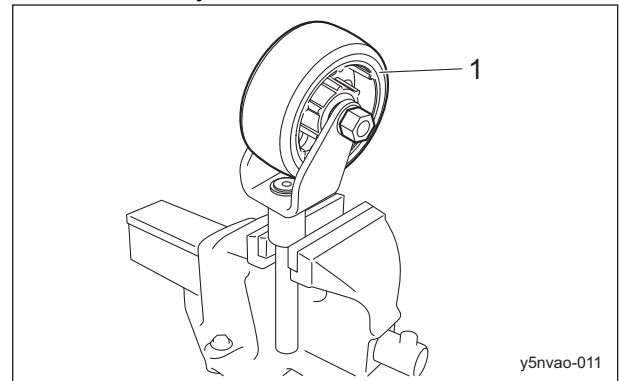
[3] Tighten the spring washers and nuts of both sides.



Inspection of Caster Wheel_012

1	Front wheel arm
2	Front wheel shaft
3	Copper washer
4	Collar
5	Wheel

[4] Make sure that the wheel rotates smoothly.



Inspection of Caster Wheel_013

1	Wheel
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Operating Machine and Mower Units

Relay pulley stage Comp

■ Inspection of Relay Pulley Stage Comp

Wear of bearing due to frequent use and/or damage of bearing etc. caused by invasion of water may prevent smooth rotation of the relay pulley. Inspect and replace the parts such as the bearing.

- Make sure that there is no wear or play of the relay pulley shaft.
- Make sure that there is no abrasion or rust of the bearing and the housing and bearing have no play.

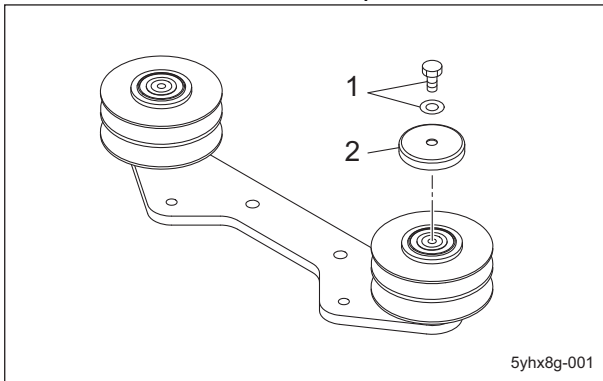
⚠ Danger

The rotary knife is an edged tool. Handle it carefully, since it could cut your hands or legs.

⚠ Caution

See the " "Tightening torques" (Page 3-6) " list.
Note that the Baroness product warranty may not apply to defects caused by incorrect tightening etc.

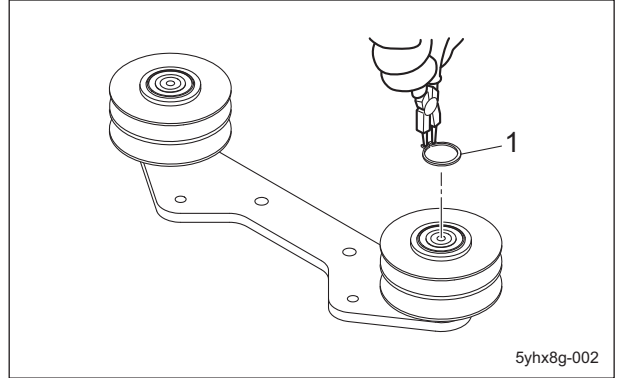
1. Remove the bolts and spring washers, and then remove the cap.



Inspection of Relay Pulley Stage Comp_001

1	Bolt and spring washer
2	Cap

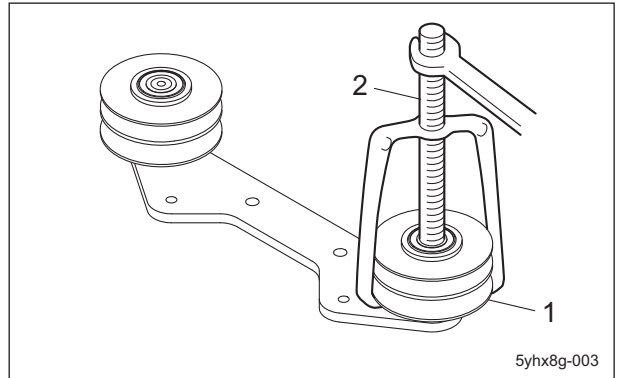
2. Remove the stop ring.



Inspection of Relay Pulley Stage Comp_002

1	Stop ring
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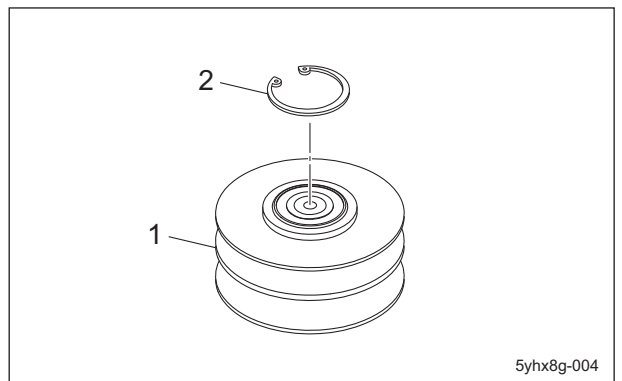
3. Remove the relay pulley with pulley puller.



Inspection of Relay Pulley Stage Comp_003

1	Relay pulley
2	Pulley puller

4. Remove the stop ring from the relay pulley.
Follow the same steps to remove them from the other side.

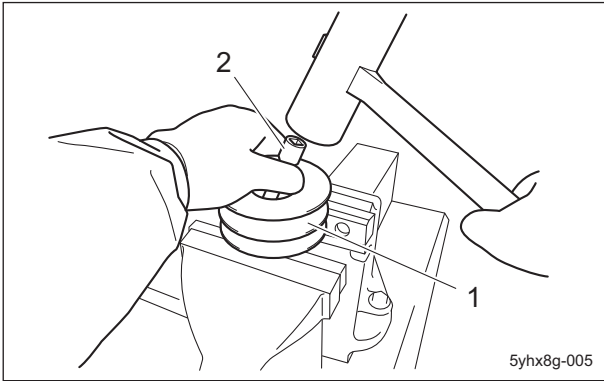


Inspection of Relay Pulley Stage Comp_004

1	Relay pulley
2	Stop ring

Operating Machine and Mower Units

5. Place the relay pulley on the vise with the side where the stop ring was installed facing downward to secure space for the bearing to come out.
6. Remove the bearing by hitting it from front to back and from side to side alternately with a wooden hammer using an iron pipe.
7. Follow the same steps to remove the bearing from the other side.



Inspection of Relay Pulley Stage Comp_005

1	Relay pulley
2	Iron pipe

8. Follow the steps below to install the bearing onto the relay pulley.

Important

Be sure to replace the bearing with new one.

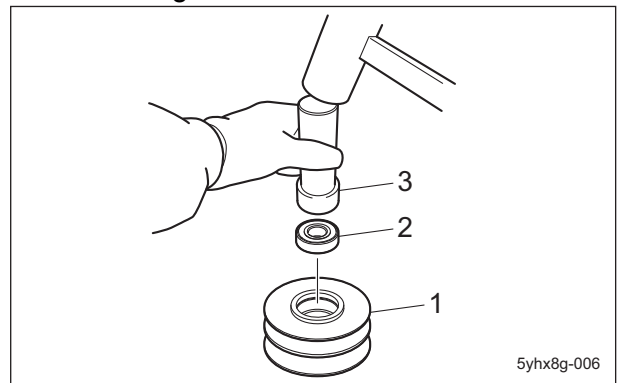
Important

The bearing is a double-sealed one. Be careful not to scratch the seal of the main body of the bearing when tapping it.

- [1] Drive the bearing into the relay pulley evenly.

Note:

Use a bearing driver to drive in the bearings and oil seals.



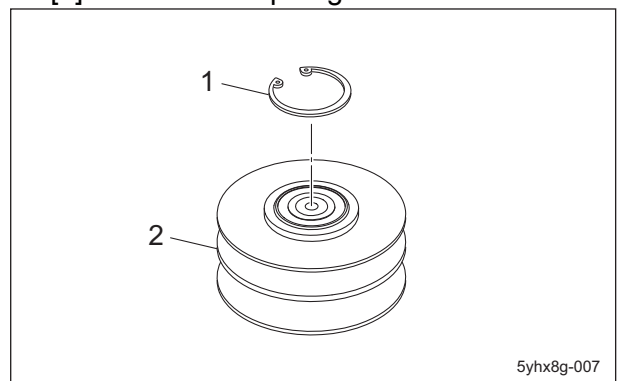
Inspection of Relay Pulley Stage Comp_006

1	Relay pulley
2	Bearing
3	Driver

- [2] Install the stop ring onto the relay pulley.

- [3] Then drive the bearing into the opposite side.

- [4] Attach the stop ring.

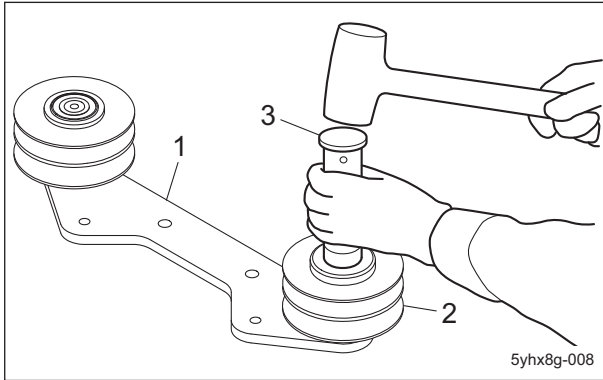


Inspection of Relay Pulley Stage Comp_007

1	Stop ring
2	Relay pulley

Operating Machine and Mower Units

9. Drive the relay pulley into the relay pulley stage with the stop ring side of the relay pulley Assy facing downward.

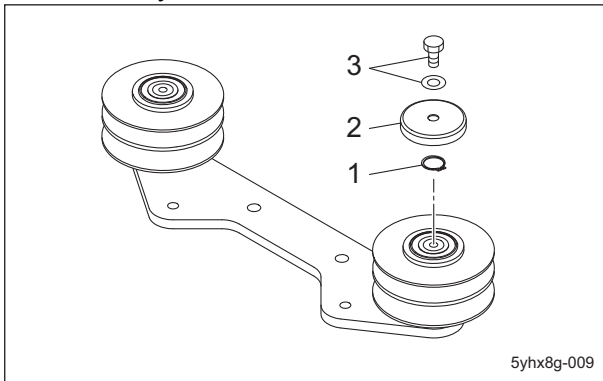


Inspection of Relay Pulley Stage Comp_008

1	Relay pulley stage
2	Relay pulley Assy
3	Driver

10. Install the stop ring and cap and tighten them with bolts and spring washers.

11. Make sure that the pulley rotates smoothly.



Inspection of Relay Pulley Stage Comp_009

1	Stop ring
2	Cap
3	Bolt and spring washer

Tension lever Assy

■ Inspection of Center Deck Tension Lever Assy

Wear of bearing due to frequent use and/or damage of bearing etc. caused by invasion of water may prevent smooth rotation of the tension pulley. Inspect and replace the parts such as the bearing.

- Make sure that there is no wear or crack of the tension pulley.
- Make sure that there is no abrasion or rust of the bearing and the shaft of the tension lever and bearing have no play.
- Make sure that the tension lever or rod is not cracked or bent.

⚠ Danger

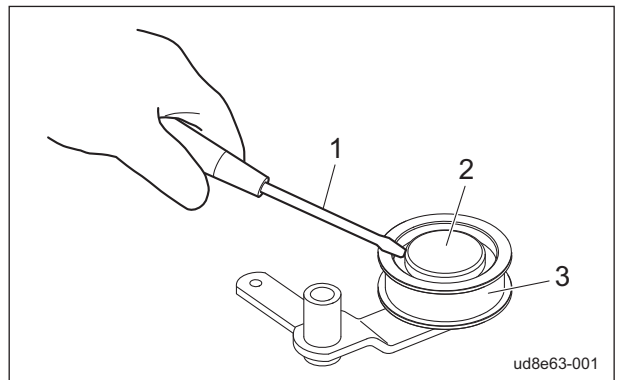
The rotary knife is an edged tool. Handle it carefully, since it could cut your hands or legs.

⚠ Caution

See the " "Tightening torques" (Page 3-6) " list. Note that the Baroness product warranty may not apply to defects caused by incorrect tightening etc.

1. Follow the steps below to remove the tension pulley.

[1] Remove the cap of the pulley with a flat-blade screwdriver.

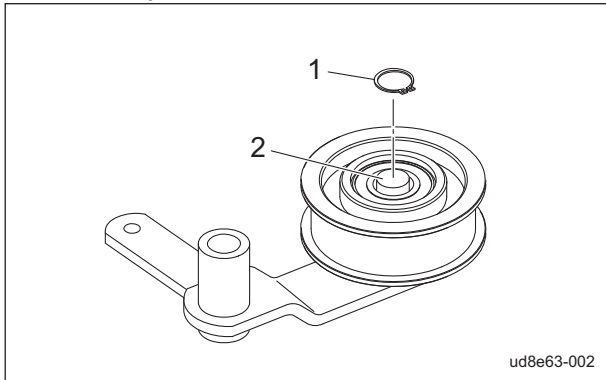


Inspection of Center Deck Tension Lever Assy_001

1	Flat-blade screwdriver
2	Cap
3	Pulley

Operating Machine and Mower Units

[2] Remove the stop ring from the tension pulley shaft.

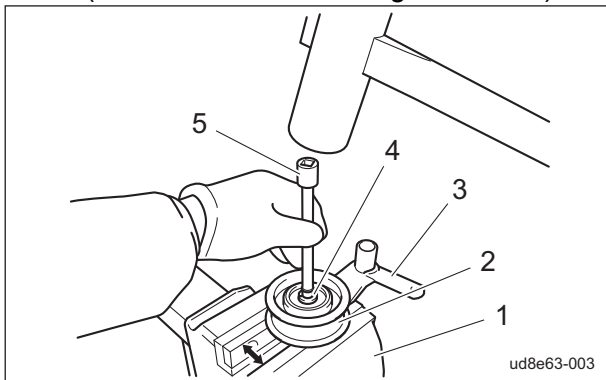


Inspection of Center Deck Tension Lever Assy__002

1	Stop ring
2	Tension pulley shaft

[3] Place the tension pulley on the vise and create space for the tension lever to be pushed out.

[4] Remove the pulley shaft tapping it with a wooden hammer using an iron pipe. (Be careful not to damage the shaft)



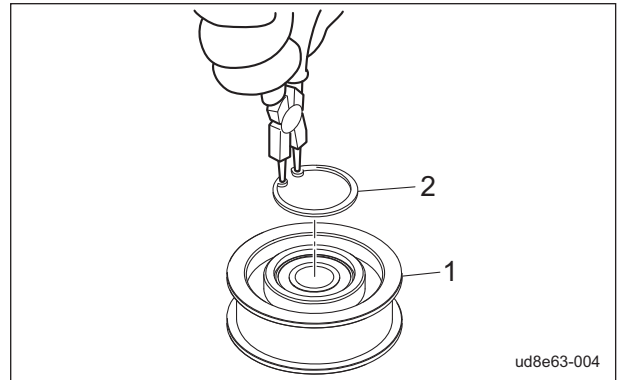
Inspection of Center Deck Tension Lever Assy__003

1	Vise
2	Pulley
3	Tension lever
4	Pulley shaft
5	Iron pipe

2. Follow the steps below to remove the bearing from the tension pulley.

[1] Remove the stop ring from the tension pulley.

[2] Remove the stop ring on the other side as well.

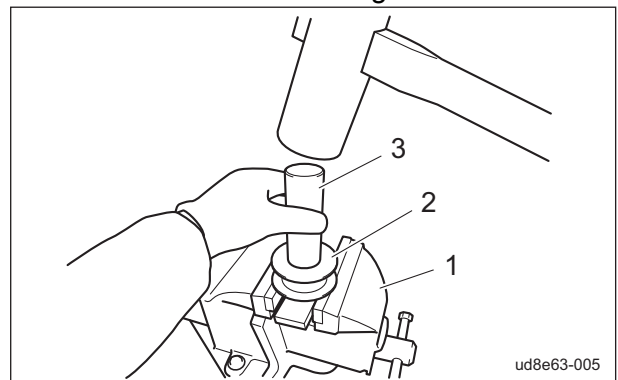


Inspection of Center Deck Tension Lever Assy__004

1	Tension pulley
2	Stop ring

[3] Place the tension pulley on the vise and create space for the bearing to be pushed out.

[4] Remove the bearing tapping it with a wooden hammer using a driver.



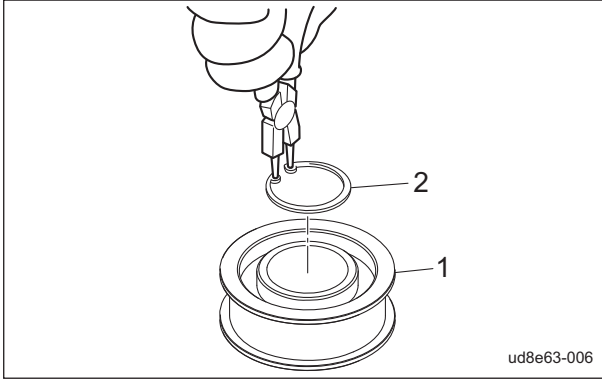
Inspection of Center Deck Tension Lever Assy__005

1	Vise
2	Tension pulley
3	Driver

Operating Machine and Mower Units

3. Follow the steps below to install the tension pulley onto the lever.

[1] Install the stop ring onto one side of the tension pulley.



Inspection of Center Deck Tension Lever Assy__006

1	Tension pulley
2	Stop ring

Important

Be sure to replace the bearing with new one.

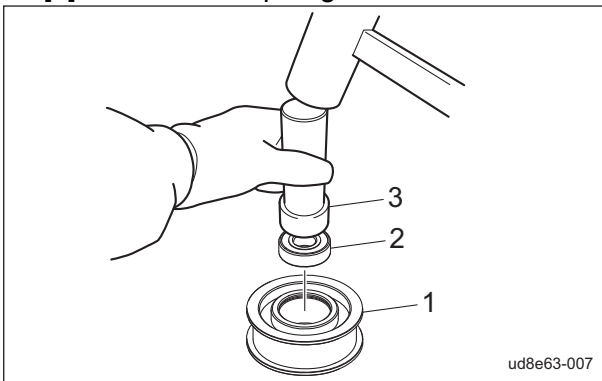
Important

The bearing is a double-sealed one. Be careful not to scratch the seal of the main body of the bearing when tapping it.

[2] Turn the tension pulley upside down and install the bearing.

Note:
Use a bearing driver to drive in the bearings and oil seals.

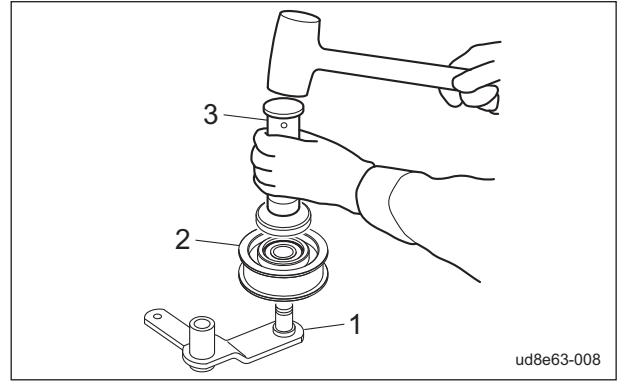
[3] Attach the stop ring.



Inspection of Center Deck Tension Lever Assy__007

1	Tension pulley
2	Bearing
3	Driver

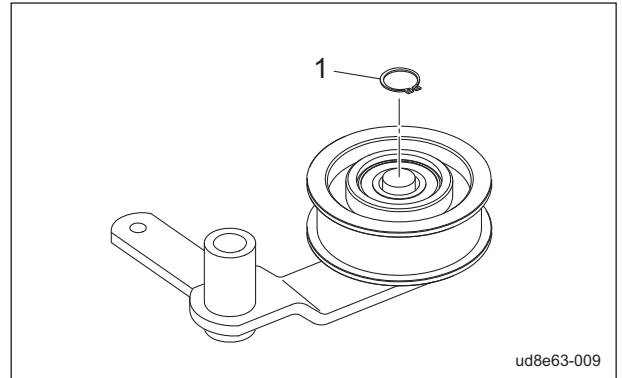
[4] Drive the tension pulley into the tension lever with the cap mounting side up.



Inspection of Center Deck Tension Lever Assy__008

1	Central tension lever
2	Tension pulley
3	Driver

[5] Attach the stop ring.

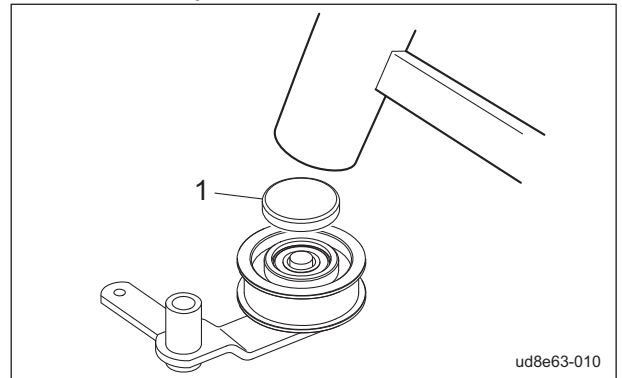


Inspection of Center Deck Tension Lever Assy__009

1	Stop ring
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[6] Install the cap to the tension pulley by tapping it lightly.

[7] Make sure that the pulley rotates smoothly.



Inspection of Center Deck Tension Lever Assy__010

1	Cap
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Operating Machine and Mower Units

■ Inspection of Left and Right Deck Tension Lever Assy

Wear of bearing due to frequent use and/or damage of bearing etc. caused by invasion of water may prevent smooth rotation of the tension pulley. Inspect and replace the parts such as bearing.

- Make sure that there is no wear or crack of the tension pulley.
- Make sure that there is no abrasion or rust of the bearing and no play between the shaft of the tension lever and bearing.
- Make sure that the tension lever or rod is not cracked or bent.

⚠ Danger

The rotary knife is an edged tool. Handle it carefully, since it could cut your hands or legs.

⚠ Caution

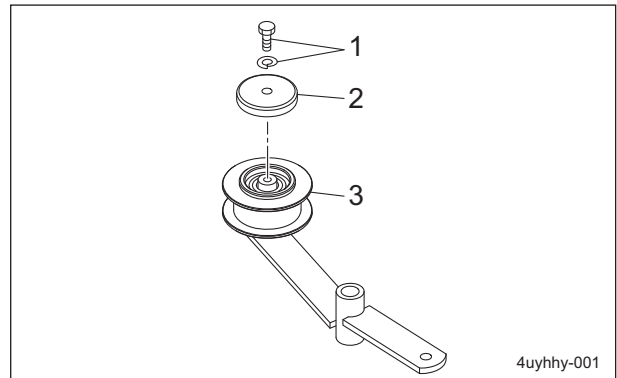
See the " "Tightening torques" (Page 3-6) " list.
Note that the Baroness product warranty may not apply to defects caused by incorrect tightening etc.

Important

The tension pulley is different between the left and right decks.
Check the installation position.

1. Follow the steps below to remove the tension pulley.

[1] Remove the cap of the pulley with a flat-blade screwdriver.

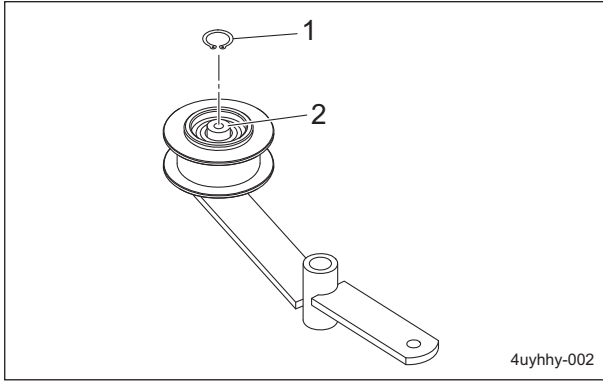


Inspection of Left and Right Deck Tension Lever Assy_001

1	Bolt and spring washer
2	Cap
3	Pulley

Operating Machine and Mower Units

[2] Remove the stop ring from the tension pulley shaft.



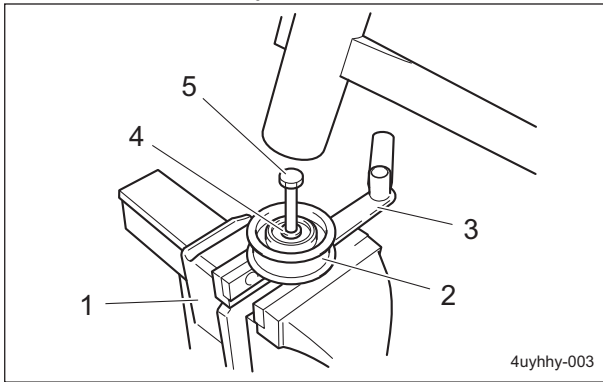
Inspection of Left and Right Deck Tension Lever Assy_002

1	Stop ring
2	Tension pulley shaft

[3] Place the tension pulley on the vise to create space for the tension lever to be pushed out.

[4] Screw the bolt into the shaft of the pulley by 10 mm (0.39 in).

[5] Remove the bracket by tapping the bolt with a wooden hammer while holding the bracket by one hand.



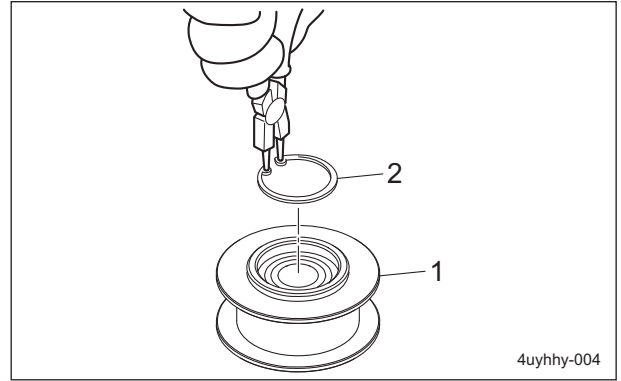
Inspection of Left and Right Deck Tension Lever Assy_003

1	Vise
2	Pulley
3	Tension lever
4	Pulley shaft
5	Bolt

2. Follow the steps below to remove the bearing from the tension pulley.

[1] Remove the stop ring from the tension pulley.

[2] Remove the stop ring on the other side as well.

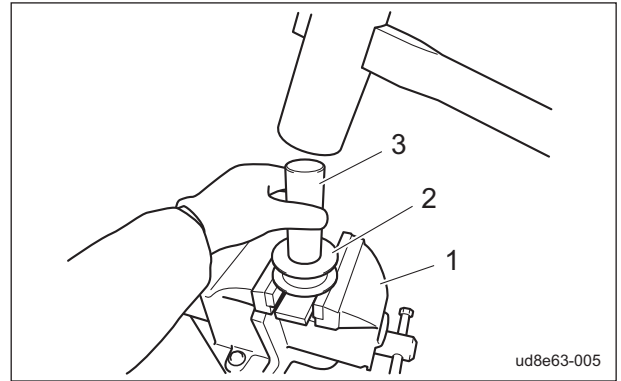


Inspection of Left and Right Deck Tension Lever Assy_004

1	Tension pulley
2	Stop ring

[3] Place the tension pulley on the vise to create space for the bearing to be pushed out.

[4] Remove the bearing tapping it with a wooden hammer using a driver.



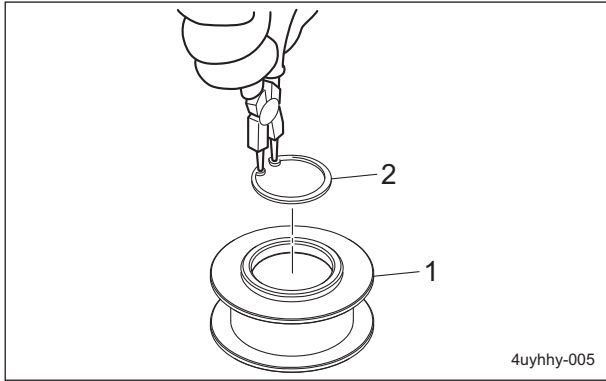
Inspection of Left and Right Deck Tension Lever Assy_005

1	Vise
2	Tension pulley
3	Driver

Operating Machine and Mower Units

3. Follow the steps below to install the tension pulley onto the lever.

[1] Install the stop ring onto one side of the tension pulley.



Inspection of Left and Right Deck Tension Lever Assy_006

1	Tension pulley
2	Stop ring

Important

Be sure to replace the bearing with new one.

Important

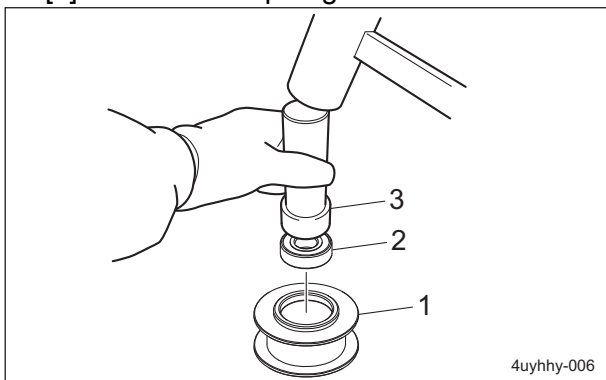
The bearing is a double-sealed one. Be careful not to scratch the seal of the main body of the bearing when tapping it.

[2] Turn the tension pulley upside down and install the bearing.

Note:

Use a bearing driver to drive in the bearings and oil seals.

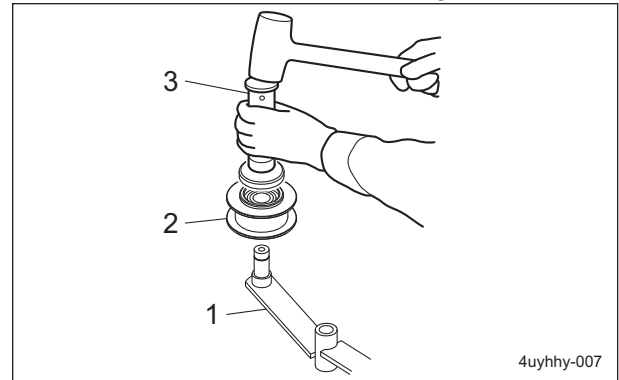
[3] Attach the stop ring.



Inspection of Left and Right Deck Tension Lever Assy_007

1	Tension pulley
2	Bearing
3	Driver

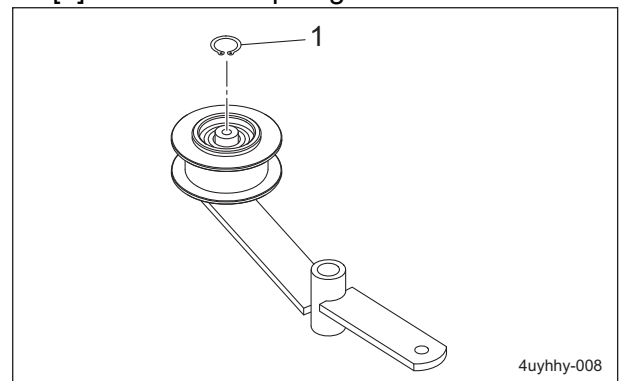
[4] Drive the tension pulley into the tension lever with the cap mounting side up.



Inspection of Left and Right Deck Tension Lever Assy_008

1	Central tension lever
2	Tension pulley
3	Driver

[5] Attach the stop ring.

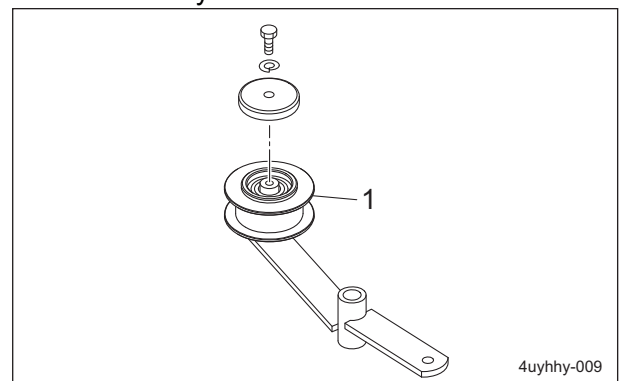


Inspection of Left and Right Deck Tension Lever Assy_009

1	Stop ring
---	-----------

[6] Install the cap with the bolt and spring washer.

[7] Make sure that the pulley rotates smoothly.



Inspection of Left and Right Deck Tension Lever Assy_010

1	Cap
---	-----

Troubleshooting

- Relating to the Engine..... Page 8-2**
- Relating to Traveling..... Page 8-5**
- Relating to Steering..... Page 8-7**
- Relating to Operating Machine and
Mower Unit..... Page 8-8**



Troubleshooting

Troubleshooting

Relating to the Engine

Problem	Cause	Reference
The engine does not start (the starter motor does not turn)	The interlock system was activated (not sitting on the seat, parking brake not applied, the knife rotation lever switch not set to the "OFF" position, or the foot not released from the traveling pedal)	Electrical System - Measurements - Interlock System
	Faulty interlock system component (seat switch, parking brake switch, neutral switch, knife rotation lever switch, seat switch relay (power relay), neutral detection relay (power relay), or delay timer)	Electrical System - Electrical Components Electrical System - Electrical Components - Power Relays
	Faulty 5A fuse	Electrical System - Electrical Components - Fuse - Fuse Box (H.J)
	Faulty 50 A fusible link	Electrical System - Electrical Components - Fusible Link
	Insufficient battery capacity or loose terminals	Electrical System - Electrical Components - General Inspections/ Repairs - Battery
	Faulty ignition key switch	Electrical System - Electrical Components - Power Relays - Ignition Key Switch
	Faulty starter relay	Electrical System - Electrical Components - Starter Relay
	Faulty starter motor	Engine Maintenance Manual
	Overheating or damage to a moving part of the engine	Engine Maintenance Manual
	Malfunction related to electrical wire	Inspect and repair or replace the wire-related part
The engine does not start (but the starter motor turns)	No fuel	Engine Handling Manual (Supply fuel and automatically air bled by setting the ignition key switch to the "ON" position.)
	Fuel pump does not operate	Electrical System - Electrical Components - Fuel Pump
	Clogged fuel filter	Engine Handling Manual
	Wrong fuel	Engine Handling Manual
	Clogged air cleaner element	This machine's Owner's Operating Manual

Troubleshooting

Problem	Cause	Reference
The engine does not start (but the starter motor turns)	Insufficient battery capacity or loose terminals	Electrical System - Electrical Components - General Inspections/ Repairs - Battery
	Faulty ignition key switch	Electrical System - Electrical Components - Power Relays - Ignition Key Switch
	Faulty stop solenoid	Engine Maintenance Manual
	No engine compression	Engine Maintenance Manual
	Faulty 5A fuse	Electrical System - Electrical Components - Fuse Box (I)
	Faulty thrust of the starter motor pinion gear	Engine Maintenance Manual
	Faulty 30 A fusible link	Electrical System - Electrical Components - Fusible Link
The engine starts, then immediately stops	The interlock system was activated (left the seat without applying the parking brake/get away from the seat depressing the traveling pedal/get away from the seat with the knife clutch set to "ON")	Electrical System - Measurements - Interlock System
	Clogged air cleaner element	This machine's Owner's Operating Manual
	Insufficient fuel	Engine Handling Manual
	Air in the fuel system	Engine Handling Manual (Supply fuel and automatically air bleed by setting the ignition key switch to the "ON" position.)
	Clogged fuel filter	Engine Handling Manual
	Fuel pump does not operate	Electrical System - Electrical Components - Fuel Pump
	Faulty engine stop solenoid	Engine Maintenance Manual
No charge	Loose battery cable	Electrical System - Electrical Components - General Inspections/ Repairs - Battery
	Corroded battery terminal	Electrical System - Electrical Components - General Inspections/ Repairs - Battery
	Insufficient battery electrolyte	Electrical System - Electrical Components -

Troubleshooting

Problem	Cause	Reference
No charge	Insufficient battery electrolyte	General Inspections/ Repairs - Battery
	Faulty battery	Electrical System - Measurement - Battery Electrical System - Electrical Components - General Inspections/ Repairs - Battery
	Insufficient fan belt tension	This machine's Owner's Operating Manual
	Disconnected coupler in charging circuit wire or faulty wire	Inspect and repair the wire
	Faulty alternator	Engine Maintenance Manual
Buzzer warning about overheating sounds	Dust-proof mesh or radiator blocked with dirt	This machine's Owner's Operating Manual
	Insufficient amount of coolant	This machine's Owner's Operating Manual
	Insufficient fan belt tension	This machine's Owner's Operating Manual
	Faulty thermostat	Engine Maintenance Manual
	Faulty water temperature switch	Engine Maintenance Manual
Charge lamp does not turn off	Loose or broken fan belt	This machine's Owner's Operating Manual
	Faulty alternator wire	Inspect and repair the wire
	Faulty alternator	Engine Maintenance Manual
Oil pressure lamp does not turn off	Insufficient amount of engine oil	This machine's Owner's Operating Manual
	Faulty engine oil switch	Engine Maintenance Manual
	Faulty engine oil pump	Engine Maintenance Manual
Thermo-start (glow) lamp does not turn on	Faulty lamp bulb	Replace the lamp bulb
	Faulty 5A fuse	Electrical System - Electrical Components - Fuse Box (B)
	Faulty ignition key switch	Electrical System - Electrical Components - Power Relays - Ignition Key Switch
	Faulty glow lamp timer	Electrical System - Electrical Components - Glow Lamp Timer

Relating to Traveling

Problem	Cause	Reference
Traveling power is poor.	Engine rpm is slow.	This machine's Owner's Operating Manual
	Engine does not run smoothly	Engine Maintenance Manual
	The parking brake is applied.	This machine's Owner's Operating Manual
	The piston pump speed change lever does not shift enough.	Main body - Adjustment - Traveling rod - Adjustment of traveling rod
	The unload valve is not completely closed.	This machine's Owner's Operating Manual
	Amount of hydraulic oil is low.	This machine's Owner's Operating Manual
	Blockage of hydraulic oil line filter	This machine's Owner's Operating Manual
	Hydraulic oil is too cool.	This machine's Owner's Operating Manual
	Dirt in the hydraulic oil (contamination, invasion of water, air)	This machine's Owner's Operating Manual
	Viscosity of the hydraulic oil is wrong.	This machine's Owner's Operating Manual
	Pressure of the piston pump is not high enough.	Replacement of the piston pump
	Malfunction of the piston pump	Replacement of the piston pump
It does not travel (in the case where the aforementioned causes do not exist).	Malfunction of linkage, etc. from the traveling pedal to the pump	Main body - Adjustment - Traveling rod - Adjustment of traveling rod
	The unload valve is open.	This machine's Owner's Operating Manual
	The piston pump speed change lever does not operate.	Main body - Adjustment - Traveling rod - Adjustment of traveling rod
	There is no charge pressure of the piston pump.	Hydraulic system - Measurement - Charge circuit
	Malfunction of the joint part between the engine and pump	Inspection, repair, or replacement of the joint part
2WD/4WD changeover does not work.	Malfunction of the 2WD/4WD changeover lever	Inspection and replacement of the lever and rod
	Malfunction of the 2WD/4WD changeover valve	Replacement of the 2WD/4WD changeover valve

Troubleshooting

Problem	Cause	Reference
It travels forward or backward even when the pedal is released.	Malfunction of neutral of the piston pump	Adjusting the Neutral Position of the Piston Pump
	Malfunction of bearing of neutral lever part	Replacement of the bearing
	Adhesion or play of the pedal/rod/lever damper part	Replacement of malfunctioning parts
Brake does not work.	The brake wire is broken (extended) or adhered.	Replacement of the brake wire
	The brake shoe is worn	Main body - Adjustment - Brake
	The brake shoe has water, dust, oil, etc. on it	Main body - Inspection of each portion, Repair - Brake - Assembly and disassembly of the brake
	Adhesion between the plate and brake lever	Repair and replacement of the brake lever

Relating to Steering

Problem	Cause	Reference
Power steering is not working (steering operation is heavy)	Engine rpm is slow	This machine's Owner's Operating Manual
	Tire pressure is low	This machine's Owner's Operating Manual
	Lack of grease on the kingpin	Maintenance standards and maintenance - Greasing
	Amount of hydraulic oil is low	This machine's Owner's Operating Manual
	Hydraulic oil is too cool	Warm up the engine on cold days
	Dirt in the hydraulic oil (contamination, invasion of water, air)	Hydraulic system - Inspection of each part, repair - Hydraulic oil
	Viscosity of the hydraulic oil is wrong	Hydraulic system - Specifications - Specification table
	Malfunction of the orbitrol	Replacement of the orbitrol
	Malfunction of the steering cylinder	Repair and replacement of the steering cylinder
	Malfunction of the gear pump	Replacement of the gear pump
Adhesion or damage of the kingpin and tie rod sliding parts	Maintenance standards and maintenance - Greasing	

Troubleshooting

Troubleshooting

Relating to Operating Machine and Mower Unit

Problem	Cause	Reference
The mower unit cannot be raised or lowered	Faulty 15 A fuse	Electrical System - Electrical Components - Fuse - Fuse Box (E)
	Malfunction of Auto Return Switch	Electrical system - Electrical components - Mower unit up/down switch
	Amount of hydraulic oil is low	This machine's Owner's Operating Manual
	Malfunction of up/down cylinder	Hydraulic system - Measurement - Up/Down circuit
	Malfunction of the valve module	Hydraulic system - Measurement - Up/Down circuit Electrical system - Electrical components - Solenoid valve - Mower unit up/down valve Replacement of the valve module
	Malfunction of the gear pump of the piston pump	Replacement of the piston pump
None of the rotary knives rotates	Stretch of the tension wire	This machine's Owner's Operating Manual
	Malfunction of the driving pulley key of this machine	Replacement of the pulley key
	Malfunction of the tension pulley of this machine	Replacement of the tension pulley
	Malfunction of the universal joint	Replacement of the universal joint
	Malfunction of the gearbox	Operating machine and mower unit - Inspection of each part, repair - Gearbox
	Malfunction of bearing and shaft of mower unit housing	Operating machine and mower unit - Inspection of each part, repair - Housing
	Malfunction of the mower unit tension pulley	Operating machine and mower unit - Inspection of each part, repair - Tension lever Assy
One or two rotary knives do not rotate	Malfunction of the V belt	Mower unit operating manual
	Slack of the V belt	Mower unit operating manual

Troubleshooting

Problem	Cause	Reference
One or two rotary knives do not rotate	Malfunction of bearing and shaft of mower unit housing	Operating machine and mower unit - Inspection of each part, repair - Housing
	Malfunction of the mower unit pulley key	Operating machine and mower unit - Removal and installation of each part - Housing - Removal of the left and right deck housings
	Malfunction of the mower unit tension pulley	Operating machine and mower unit - Inspection of each part, repair - Tension lever Assy
	Slack of the knife mounting bolt	Mower unit operating manual
Vibration occurs when the rotary knife rotates	Balancing malfunction of Rotary Knife	Mower unit operating manual
	Slack of the knife mounting bolt	Mower unit operating manual
	Slack of the V belt	Mower unit operating manual
	Malfunction of bearing and shaft of mower unit housing	Operating machine and mower unit - Inspection of each part, repair - Housing
Mowed face is not flat	Cutting height adjustments of all the mower units are not even	Mower unit operating manual
	Malfunction of bearing of cutting height wheel	Operating machine and mower unit - Inspection of each part, Repair - Roller - Contour deck - Inspection and repair of the caster wheel
	Malfunction of bearing and shaft of mower unit housing	Operating machine and mower unit - Inspection of each part, repair - Housing
	Deformation and wear of rotary knife	Operating machine and mower unit - Inspection of each part, repair - Rotary knife
	Installation failure of Rotary Knife	Operating machine and mower unit - Inspection of each part, repair - Rotary knife
	Deformation, damage, and wear of the connectors of the center deck and the left and right decks	Operating machine and mower unit - Contour deck - Maintenance - Installation and removal of each part - Contour deck

Troubleshooting

Troubleshooting

Problem	Cause	Reference
Mowed face is not flat	Adhesion, deformation, and wear of the mower unit installation part	Maintenance standards and maintenance - Greasing
Mowed face is not clean (in the case without the aforementioned causes)	Engine rpm is slow	This machine's Owner's Operating Manual
	Operation speed is fast	Mower unit operating manual
	Volume of mowing is too much	Mower unit operating manual
	Wear of rotary knife	Mower unit operating manual
	Blockage inside of mower unit	Removal of foreign objects and cleaning inside of mower unit
	Grass is wet	Reduce volume of mowing Mow when grass is dry

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 - Main body..... Page 9-2
 - Mower unit..... Page 9-3
- Maintenance Schedule..... Page 9-4**
- Hydraulic circuit diagram.....Page 9-7**
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- Consumable parts list..... Page 9-10**
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Reference

Reference

Specifications list

Main body

Main body	Total length	255.0 cm (100.39 in)		
	Total width	159.0 cm (62.60 in)		
	Total height	Roof 197.0 cm (77.56 in)		
		Handle 121.0 cm (47.64 in)		
	Wheelbase	147.0 cm (57.87 in)		
	Tread	132.0 cm (51.97 in)		
	Total weight	743.0 kg (1,638.01 lb)		
	Drive	HST4WD (2WD/4WD selectable)		
	Traveling speed	Forward	2WD: 0 - 16.0 km/h (9.94 mph) 4WD: 0 - 8.0 km/h (4.97 mph)	
		Reverse	2WD: 0 - 14.0 km/h (8.70 mph) 4WD: 0 - 7.0 km/h (4.35 mph)	
Steering wheel	Power steering (orbitrol + hydraulic cylinder)			
Brake	Rear two wheel internal expansion mechanical type			
Wheel size air pressure	Front wheel	21 x 11.00 - 10:140.0 kPa (1.43 kgf/cm ²) (20.30 psi)		
	Rear wheel	21 x 11.00 - 10:140.0 kPa (1.43 kgf/cm ²) (20.30 psi)		
Engine	Model	KubotaD1105-E3B		
	Model	Vertical 3-cylinder water-cooled 4-cycle diesel		
	Total stroke volume	1,123 cm ³ (68.52 in ³)		
	No load rpm	1,250 - 3,000 rpm		
	Rated output	17.8 kW (24.2 PS)/2,800 rpm		
	Fuel consumption rate	280 g/kW·h (206 g/PS·h) (rated output)		
	Engine oil in use	API Service grade class CF or higher, SAE Viscosity grade 10W-30		
	Battery	80D26R		
Volume	Quantity of engine oil	3.0 dm ³ (3.0 L) (0.79 gal (US))		
	Coolant capacity	6.0 dm ³ (6.0 L) (1.59 gal (US))		
	Fuel tank capacity	23.0 dm ³ (23.0 L) (6.08 gal (US))		
	Hydraulic tank capacity	22.0 dm ³ (22.0 L) (5.81 gal (US))		

Mower unit

Contour Deck

Dimensions	Total length	108.0 cm (42.52 in)
	Total width	183.0 cm (72.05 in)
	Total height	37.0 cm (14.57 in)
Weight		166.0 kg (365.96 lb)
Operating width (Cutting width)		151.0 cm (59.45 in)
Operating height (Cutting height)		3.5 - 9.5 cm (1.38 - 3.74 in)
Number of blades		3
Blade length		53.3 cm (20.98 in)

Reference

Maintenance Schedule

GM1700

Follow the maintenance schedule below.

○ . . . Inspect, adjust, supply, clean

● . . . Replace (first time)

△ . . . Replace

Maintenance item		Before work	After work	Every 8 hrs.	Every 50 hrs.	Every 100 hrs.	Every 200 hrs.	Every 250 hrs.	Every 400 hrs.	Every 500 hrs.	Every year	Every 2 years	Every 4 years	Remarks
Engine	Tightening the parts	○												
	Fuel	○												
	Air cleaner	-	-	-	-	-	-	-	-	-	-	-	-	-
	Engine oil	○		●	△									8 hrs. (first time)
	Engine oil filter	○			●	△								50 hrs. (first time)
	Ignition plug	-	-	-	-	-	-	-	-	-	-	-	-	-
	Radiator	○												
	Oil cooler	-	-	-	-	-	-	-	-	-	-	-	-	-
	Coolant	○			△									
	Fan belt	○									△			
	Battery	○										△		
	Battery fluid	○												
	Cleaning the exterior	○												
Main body	Tightening the parts	○												
	Interlock system	○												
	Emergency switch	-	-	-	-	-	-	-	-	-	-	-	-	-
	Electrical wiring										○			
	Knife	-	-	-	-	-	-	-	-	-	-	-	-	-
	Steering chain	-	-	-	-	-	-	-	-	-	-	-	-	-
	Cutting height	-	-	-	-	-	-	-	-	-	-	-	-	-
	Greasing, oiling				○									
	Tire	○												
	Rubber crawler	-	-	-	-	-	-	-	-	-	-	-	-	-
	V-belt	○									△			
	Brake	○												
	Wire	○					△							
	Cover	○												
	Oil leakage	○												
Hydraulic oil	○				●					△			100 hrs. (first time)	
Hydraulic oil filter					●					△			100 hrs. (first time)	

Reference

Maintenance item		Before work	After work	Every 8 hrs.	Every 50 hrs.	Every 100 hrs.	Every 200 hrs.	Every 250 hrs.	Every 400 hrs.	Every 500 hrs.	Every year	Every 2 years	Every 4 years	Remarks	
Main body	Hydraulic motor oil	-	-	-	-	-	-	-	-	-	-	-	-	-	
	Power unit oil	-	-	-	-	-	-	-	-	-	-	-	-	-	
	Transmission oil	○			●						△				
	Hydraulic hose (moving part)	○										△			
	Hydraulic hose (fixed part)	○											△		
	Air cleaner	○					△					△			See "Replacement of Air Cleaner".
	Electromagnetic pump filter	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Fuel strainer					○						△			
	Fuel pipe	○													
	Cleaning the exterior	○													
By model (operating machine)	Brake (knife)	○													
By model (mower unit)	Tightening the parts	○													
	Knife	○													
	Cutting height	○													
	Greasing, oiling				○										
	Tire (cutting height gauge wheel)	○													
	V-belt	○									△				
	Cover	○													
	Grease (gearbox)											△			
Cleaning the exterior	○														
By model (grass collector)	Tightening the parts	○													
	Greasing, oiling				○										
	V-belt	○									△				
	Cover	○													
	Fan	○													
	Duct	○													
	Cleaning the exterior	○													

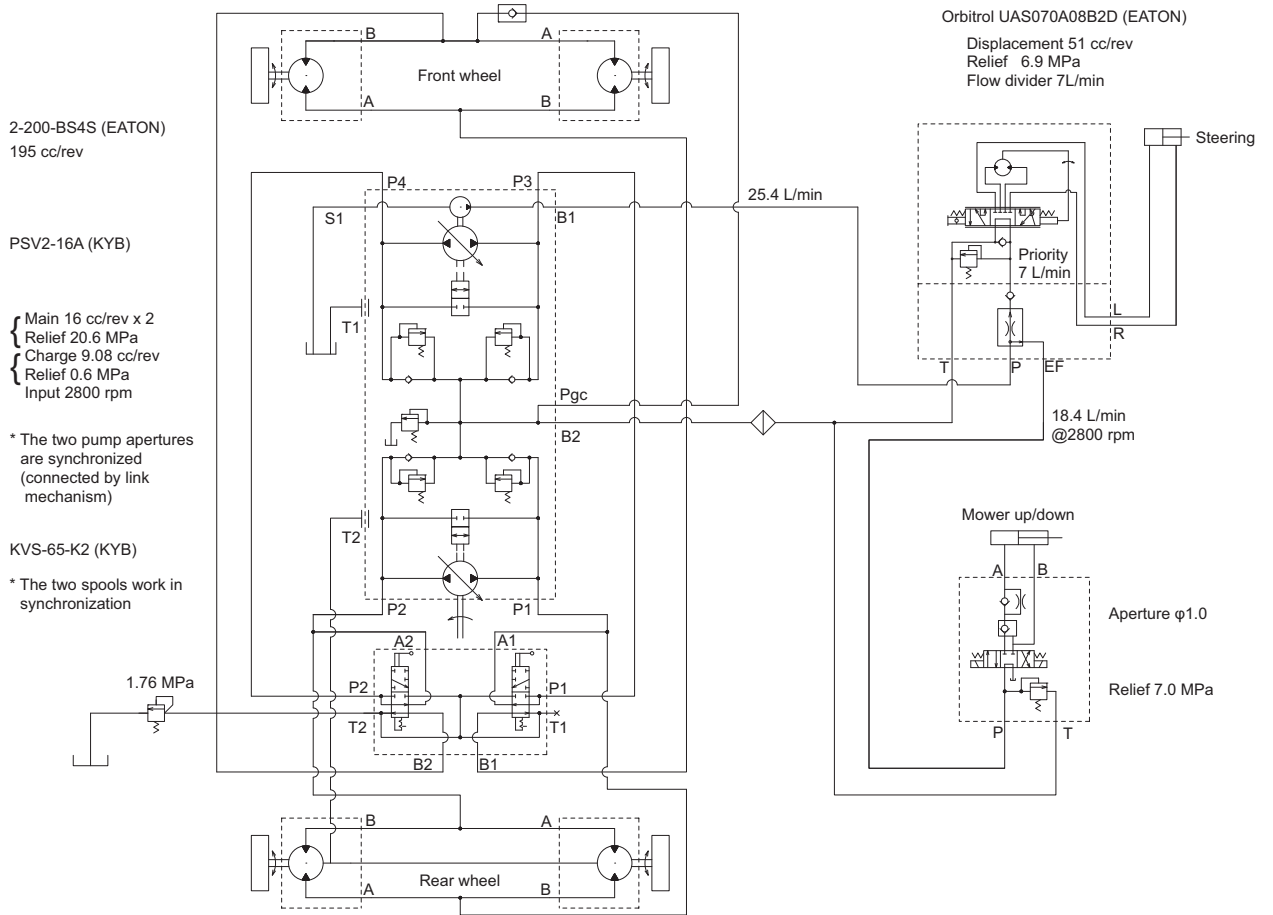
Reference

Reference

Maintenance item		Before work	After work	Every 8 hrs.	Every 50 hrs.	Every 100 hrs.	Every 200 hrs.	Every 250 hrs.	Every 400 hrs.	Every 500 hrs.	Every year	Every 2 years	Every 4 years	Remarks	
By model (high-dump sweeper)	Tightening the parts	○													
	Greasing, oiling				○										
	V-belt	○									△				
	Cover	○													
	Oil leakage	○													
	Hydraulic hose (moving part)	○										△			
	Hydraulic hose (fixed part)	○											△		
	Fan	○													
	Duct	○													
	Cleaning the exterior	○													

The values for consumables are not guaranteed.
 Replace the steering cylinder hoses every 2 years.

Hydraulic circuit diagram

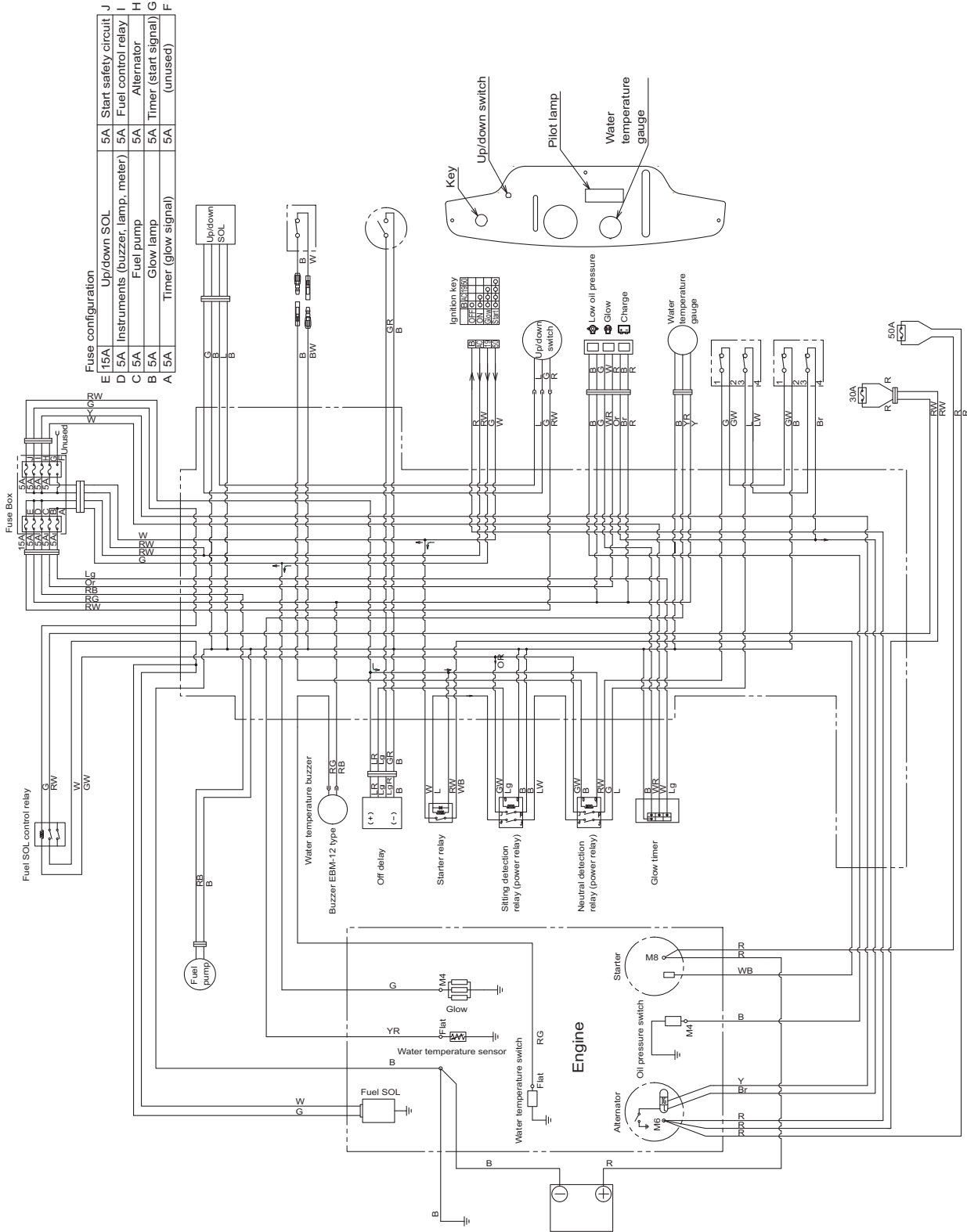


Reference

6inb7c-018

Hydraulic circuit diagram_001

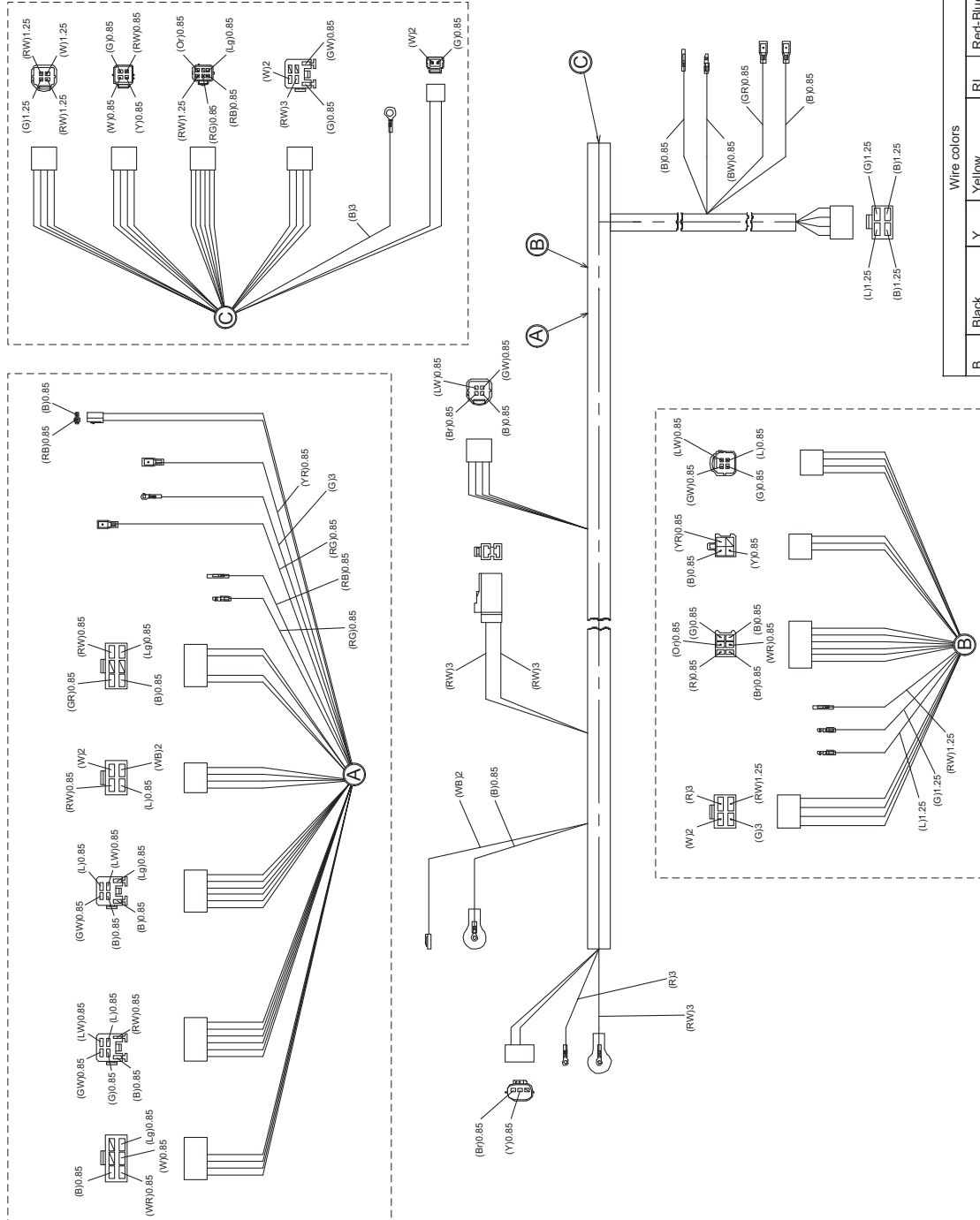
Electrical Circuit



vgmkvc-019

Electrical Circuit_001

Electric wiring diagram



Wire colors			
B	Black	Y	Yellow
Br	Brown	BW	Black-White
G	Green	GW	Green-White
L	Blue	LG	Blue-Green
Lg	Light green	LR	Blue-Red
Or	Orange	LW	Blue-White
R	Red	RB	Red-Black
W	White	RG	Red-Green
		RL	Red-Blue
		RW	Red-White
		RY	Red-Yellow
		WB	White-Black
		YB	Yellow-Black
		YG	Yellow-Green
		YR	Yellow-Red
		GR	Green-Red

Electric wiring diagram_001

kcl9bj-026

Reference

Consumable parts list

Main body

		Code	Part name	Qty.	Remarks
Engine	Fan belt	PF1G345-9701-0	V-belt (FM36)	1	
	Oil element	PF16271-3209-3	Oil element	1	
	Air cleaner element	PFT0270-1632-0	Air cleaner element	1	
	Fuel filter	PF1G313-4301-1	Fuel filter Assy	1	
	Hydraulic cartridge filter	K3412000050	Replacement filter C-SP04-10	1	
	Hydraulic oil (20 L can)		Tellus S2M46, 20 L can	1	
Main body, Oil pressure, Including electricity	Steering cylinder	YIS-35A-SK	Cylinder seal kit	1	
	Deck cylinder	YIS-35A-SK	Cylinder seal kit	1	
	Piston pump	YB070A-51005	Seal kit for pump	1	
	Orbitrol	YBA0272A	Seal kit for orbitrol	1	
	Wheel motor	Y61090S	Seal kit for orbit motor (for rear)	4	
		Y61091S	Seal kit for orbit motor (for shaft)	4	
	Valve KVS-65K-2	Y2101A-30001	Repair kit	1	
	Solenoid valve HF78806-12	YZFC08-20F-0-N-C-10	Flow control	1	
		YZSK08-2N-T	Seal set for FC08-20F	1	
		YZPC08-30-0-N	Pilot check	1	
		YZSK08-3N-TM	Seal set for PC08-30	1	
		YZRV08-20A-0-N18/M60	Relief valve	1	
		YZSK08-2N-B	Seal set for RV08-20A	1	
	Solenoid valve HF78806-12	YZSV10-47AM-0-N-00	Solenoid valve	1	
		YZSK10-4N-MMM	Seal set for SV10-47AM	1	
		YZ4305712	Coil for SV10-47AM	2	
		YZ4528180	Coil nut for SV10-47AM		
		YZ7122-2446ASSY	Connector set for SV10-47AM	1	
	Sitting-on detection power relay	K3681000070	Power relay MR5A411A1K	1	
	Neutral detection power relay	K3681000070	Power relay MR5A411A1K	1	
	Fuel SOL control power relay	K3681000070	Power relay MR5A411A1K	1	
	Starter relay	PF1K574-6022-1	Relay comp.	1	
	Glow lamp timer	PF15694-6599-2	Glow lamp timer	1	
	Fusible Link	K3631000190	Plug-in fuse 30 A	1	
		K3631000170	Plug-in fuse 50 A	1	
	Fuse Box	K3631000070	Mini-plate fuse 5 A	10	
K3631000110		Mini-plate fuse 15 A	3		
Automatic return switch	K3662000030	Automatic return switch	1		
Limit SW-SL1-A	K3671000070	Limit SW-SL1-A	1		
Safety switch V17680A	K3671000150	Safety switch V17680A	1		

Reference

		Code	Part name	Qty.	Remarks
Main body, Oil pressure, Including electricity	Key switch	PF15248-6359-2	Starter switch Assy	1	
Main body, Oil pressure, Including electricity	Brake wire, left	K1120182500	Brake wire 1825	1	
	Brake wire, right	K1120199500	Brake wire 1995	1	
	Throttle wire	K1110063000	Throttle wire 630	1	
	Tension wire	K1140231500	Tension wire 2315	1	
	Brake shoe for knife	GM1700-6104Z0	Shoe COMP	1	
	Brake shoe, front right	P741-8005-00	Brake shoe, front right	1	
	Brake shoe, rear right	P741-8007-00	Brake shoe, rear right	1	
	Brake shoe, front left	P741-8006-00	Brake shoe, front left	1	
	Brake shoe, rear left	P741-8008-00	Brake shoe, rear left	1	
	Tension belt	K2344037000	V-belt GLB37A-4	2	

Mower unit

Contour Deck

		Code	Part name	Qty.	Remarks
Operating machine	Center deck V belt	K2347056000	V-belt LB56AG-X	1	
	Left deck V belt	K2325064000	V-belt LA64-AG-6A	1	
Contour Deck	Right deck V belt	K2325064000	V-belt LA64-AG-6A	1	
	Rotary knife	K2530000120	Rotary knife 533L	3	

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