

GM2810

5-Unit Rotary Mower

Service Manual

BARONESS[®]
Quality on Demand

Serial No. 10001-

Ver.1.0

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 repair, please contact your sales dealer or Kyoeshia.

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.

Kyoeshia Co., Ltd.

Caution

The information described in this manual is subject to change for improvement without prior notice. When replacing parts, be sure to use genuine Baroness parts or parts designated by Kyoeshia. 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.

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 this 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 manual 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
 - 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.
- [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.
- [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.
 - [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.
- [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.
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.

Safety

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.
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.
2. When machine is to be parked, stored, or left unattended, lower the cutting units unless a positive mechanical lock is provided.
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.

Part numbers for decals that need to be replaced are listed in the parts catalog.
Order them from a Baroness dealer or Kyoeisha.

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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

List of Maintenance Specifications

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Engine	Engine model	Kubota V2403-CR-TE4B (Diesel Turbo)		
	No load rpm	1,450 - 2,600 rpm		
	Quantity of engine oil	9.7 dm ³ (9.7 L) (2.56 U.S. gal.) (including filter)	Be sure to use engine oil that is classified as API Service Grade CJ-4, with an SAE Viscosity that is appropriate for the operating environment (ambient temperature).	
	Coolant capacity	12.0 dm ³ (12.0 L) (3.17 U.S. gal.) (including reserve tank)		
Main body (including hydraulic and electrical systems)	Fuel tank capacity	51.0 dm ³ (51.0 L) (13.47 U.S. gal.)	Sulfur-free light oil	
	Hydraulic tank capacity	44.0 dm ³ (44.0 L) (11.62 U.S. gal.)	Shell Tellus S2M46 or equivalent (ISO VG46)	
	Parking brake switch	Slight clearance	A clearance between the switch contact point and the brake lever when the parking brake lever is at the 5th notch	
	Proximity sensor	Outer ends of mower units #4/#5 400 mm (15.75 in) from the ground	Proximity sensor detection position (#4/#5 mower arm fulcrum cams)	
		1 - 4 mm (0.04 - 0.16 in)	Distance for #4/#5 mower arm fulcrum cams	
	Assist valve	Low pressure side: 2.4 MPa (348.08 psi)		
		High pressure side: 3.0 MPa (435.10 psi)		
	Battery	105D31R		
	Tire pneumatic pressure	Front wheel: 150 kPa (21.83 lb-in ²)	29 x 14.00 - 15 6P	
		Rear wheel: 140 kPa (20.37 lb-in ²)	20 x 12.00 - 10 4P	
	Toe angle	0±5 mm (0±0.20 in)		
	Traveling pedal rod distance (between the centers of the rod ends)	923 mm (36.34 in)	Front wheel rod	
		923 mm (36.34 in)	Rear wheel rod	
214 mm (8.43 in)		Neutral adjustment rod		
Spring compression distance (forward rod part)	84 mm (3.31 in)	Compression spring on pedal side		
	84 mm (3.31 in)	Compression spring on pump side		
Spring compression length (neutral adjustment)	55 mm (2.17 in)	Compression spring		

* The factory default maximum engine rpm is 2,600 rpm.

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		
	 tib3yb-002			 tib3yb-003		
	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

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

GM2810

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	Motor housing	K0014160402	Bolt, heat-treated M16-40P1.5	152 - 188	1549.94 - 1917.04	1345.35 - 1663.99	—
	Motor	K0013140502	Bolt, heat-treated M14-50	100	1019.7	885.1	—
	Wheel mounting base	1 1/4-18UNF	Slotted nut (Hydraulic motor)	400 - 430	4078.80 - 4384.71	3540.40 - 3805.93	—
	Disc brake	K0024080401	Bolt, w/hexagon hole, M8-40	28 - 38	285.52 - 387.49	247.83 - 336.34	—
	Wheel	K0014120652	Bolt, heat-treated M12-65P1.5	67 - 85	683.20 - 833.75	593.02 - 752.34	—
Rear wheel	Wheel mounting base	K0138240002	24 slotted nut high P1.5	180 - 200	1835.46 - 2039.40	1593.18 - 1770.20	—
	Wheel	K0014120652	Bolt, heat-treated M12-65P1.5	67 - 85	683.20 - 866.75	593.02 - 752.34	—
Front axle	K0015200702	Bolt, heat-treated M20-70P1.5	370 - 450	3772.89 - 4588.65	3274.87 - 3982.95	—	
Brake ass'y	K1720000190	Bolt, heat-treated M12P1.75	150 ± 15	1529.55 ± 152.96	1327.65 ± 132.77	○	
Engine	K0012120352	Bolt, heat-treated M12-35P1.25	67 - 134	683.20 - 1366.40	593.02 - 1186.03	—	
	K0015120552	Bolt, heat-treated M12-55P1.25	67 - 134	683.20 - 1366.40	593.02 - 1186.03	—	
	K0011100502	Bolt, heat-treated M10-50P1.25	45 - 76	458.87 - 774.97	398.30 - 672.68	—	
	K0013121102	Bolt, heat-treated M12-110	67 - 134	683.20 - 1366.40	593.02 - 1186.03	○	
Flywheel adapter	K0011100302	Bolt, heat-treated M10-30P1.25	45 - 76	458.87 - 774.97	398.30 - 672.68	—	
	K0010100352	Bolt, heat-treated M10-35	45 - 76	458.87 - 774.97	398.30 - 672.68	○	
Joint	K0024100401	Bolt, w/hexagon hole, M10-40	80	815.76	708.08	—	
	K0013100352	Bolt, heat-treated M10-35	45 - 76	458.87 - 774.97	398.30 - 672.68	○	
Kingpin stopper	K0010120502	Bolt, heat-treated M12-50	52 - 67	530.24 - 683.20	460.25 - 593.02	—	
Tie rod	K1610000020	Slotted nut of tie rod end RH	45	458.87	398.30	—	

Maintenance standards and maintenance

Location	Code	Part name	Tightening torque			Thread locking adhesive
			N-m	kgf-cm	lb-in	
Tie rod	K1611000020	Slotted nut of tie rod end LH	45	458.87	398.30	—
Piston pump	K0013120502	Bolt, heat-treated M12-50	67 - 134	683.20 - 1366.40	593.02 - 1186.03	—
Tandem gear pump	K0069000251	Bolt, 3/8-16 UNC 31.8	29 - 38	295.71 - 387.49	256.68 - 336.34	—
Pedal stopper	K0013101202	Bolt, heat-treated M10-120	29 - 38	295.71 - 387.49	256.68 - 336.34	—
Diff-lock valve	K0024100151	Bolt, w/hexagon hole, M10-15	29 - 38	295.71 - 387.49	256.68 - 336.34	—
Knife and knife guide	K0010120302	Bolt, heat-treated M12-30	67 - 85	683.20 - 866.75	593.02 - 752.34	—
Shoulder bolt	GM2800-0207Z2	Shoulder bolt	67 - 134	683.20 - 1366.40	593.02 - 1186.03	—
Bumper	K0010120302	Bolt, heat-treated M12-30	67 - 134	683.20 - 1366.40	593.02 - 1186.03	—
Cover mounting bracket	K0000080202	Bolt, M8-20	9 - 14	91.77 - 142.76	61.96 - 123.91	—

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.

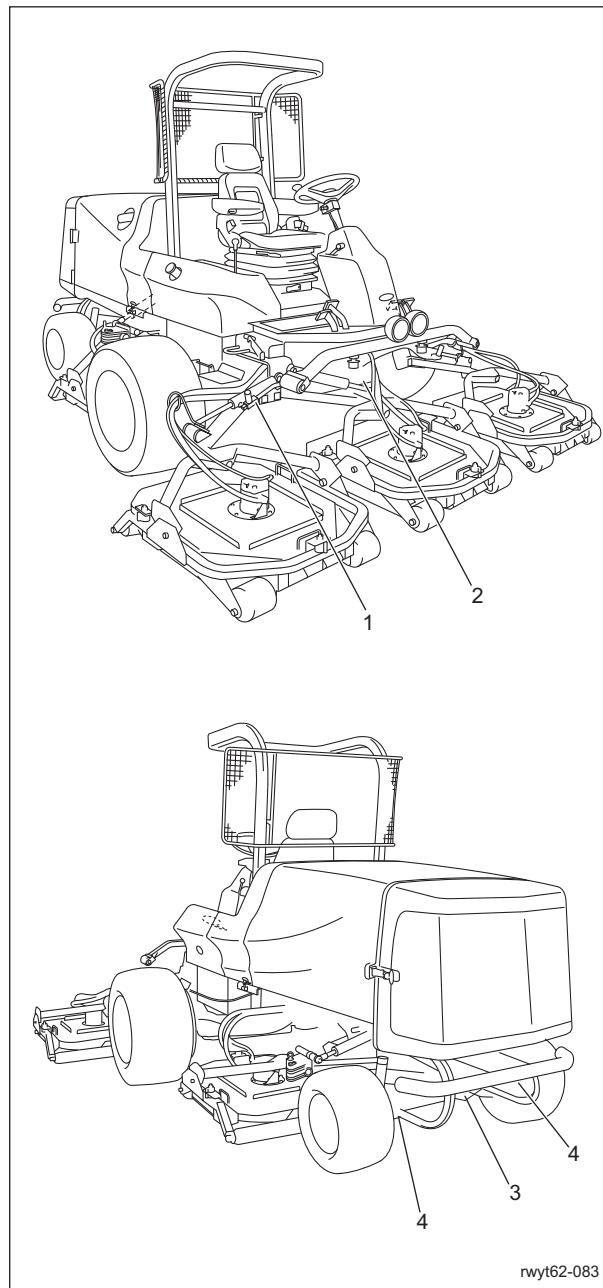
Failure to do so may cause the machine to move or fall, resulting in injury or death.

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



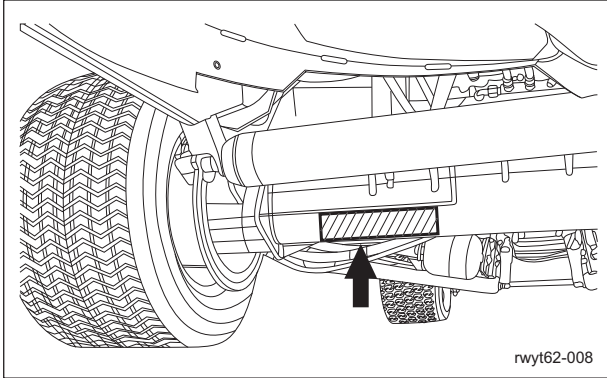
rwy162-083

Jack-up Points_001

	Jack-up points
1	Front right frame
2	Front left frame
3	Center of pivot
4	Below rear wheel motors

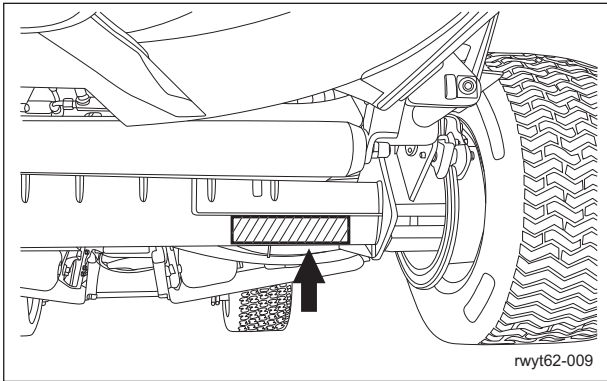
Maintenance standards and maintenance

1. Front right frame



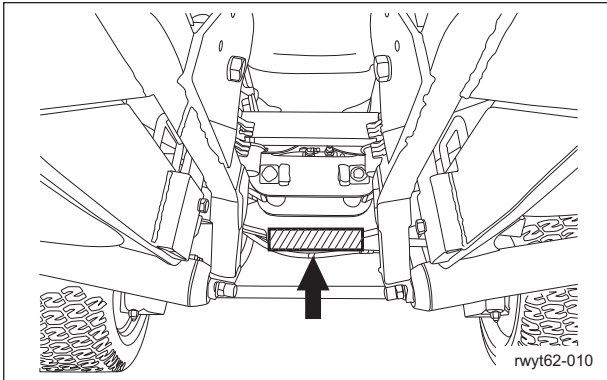
Jack-up Points_002

2. Front left frame



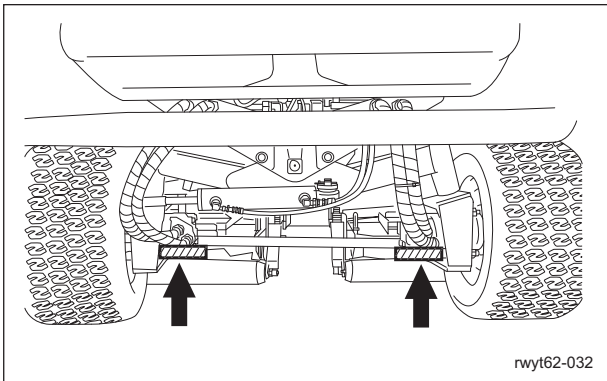
Jack-up Points_003

3. Center of pivot



Jack-up Points_004

4. Below rear wheel motors Two locations



Jack-up Points_005

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.

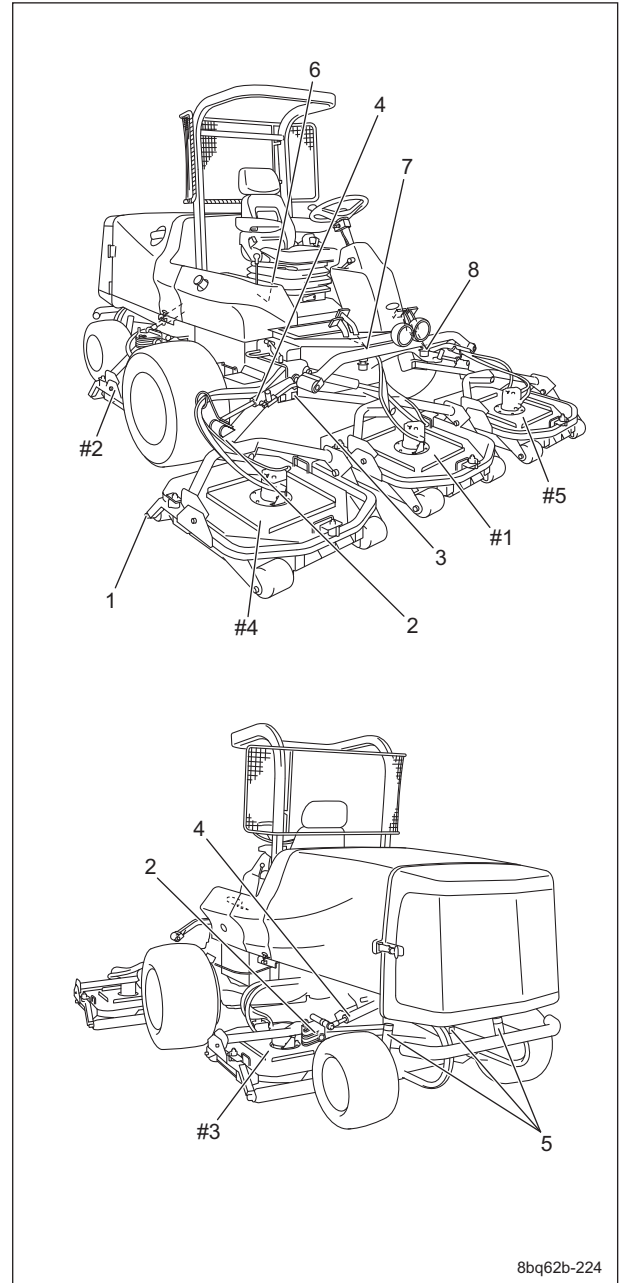
Other locations where the specified grease or lubricant is used are indicated in "Greasing Points".

Add grease using the specified grease or lubricant.

Greasing Points

Grease nipples are installed in the following locations.

Add grease every 50 hours of operation.



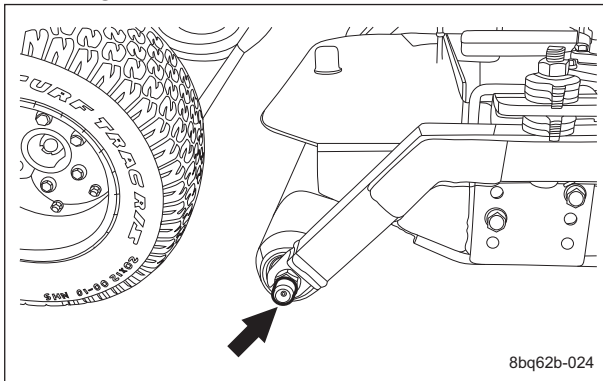
Greasing Points_001

Maintenance standards and maintenance

	Portion	No. of Greasing Points
1	Rear roller	10
2	Mower arm fulcrum	5
3	Lift arm fulcrum	5
4	Lift arm cylinder fulcrum	12
5	Pivot	3
6	Neutral position area	2
7	Traveling pedal shaft fulcrum	2
8	Foot brake	3

1. Rear roller

There is one greasing point each on the left and right of each mower unit.

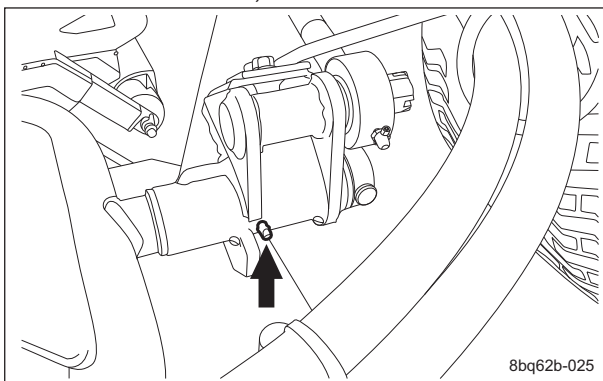


Greasing Points_002

2. Mower arm fulcrum

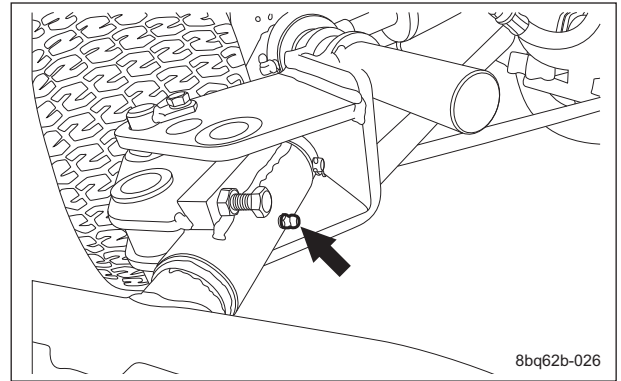
There is one greasing point on the arm connected to each mower unit.

Mower units #1, #4 and #5



Greasing Points_003

Mower units #2 and #3

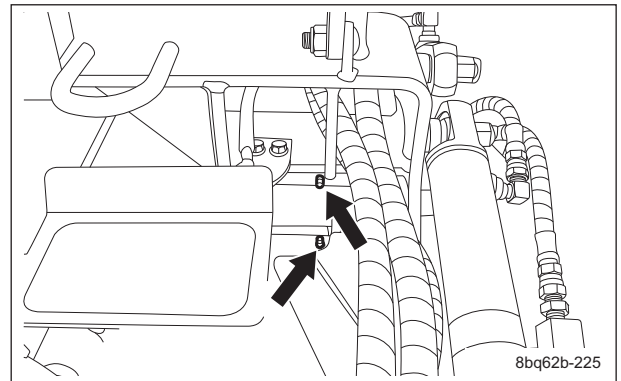


Greasing Points_004

3. Lift arm fulcrum

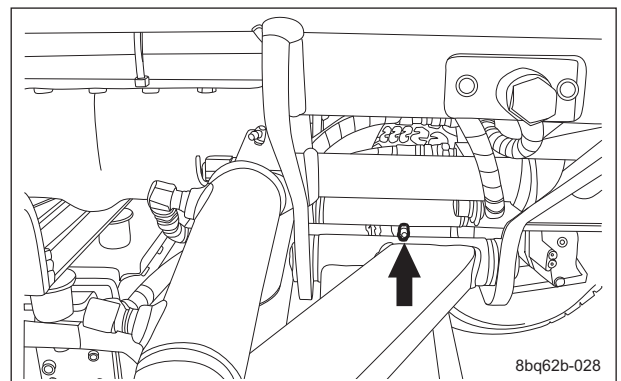
There is one greasing point on the arm connected to each mower unit. Lower the mower units before greasing the lift arm fulcrums.

Mower units #1 and #4



Greasing Points_005

Mower units #2 and #3

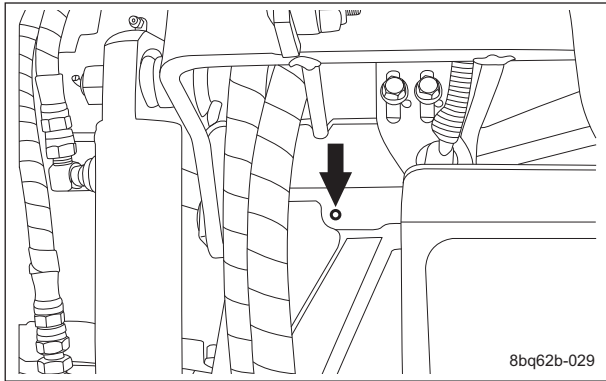


Greasing Points_006

Maintenance standards and maintenance

Maintenance standards and maintenance

Mower unit #5

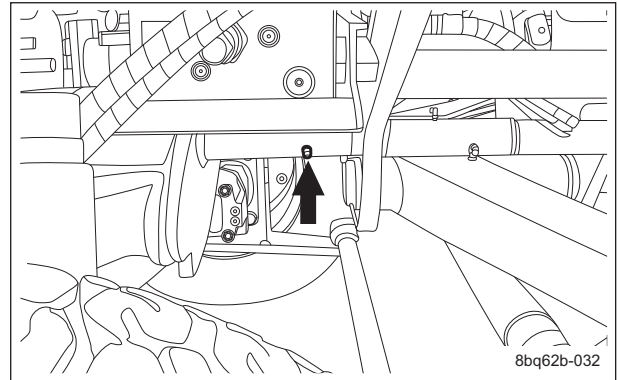


Greasing Points_007

8bq62b-029

5. Pivot

Middle between the rear wheels



Greasing Points_010

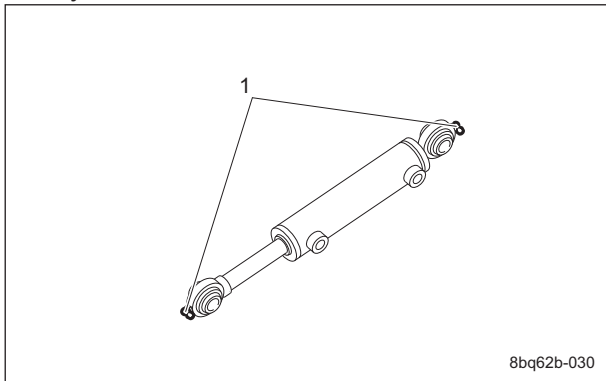
8bq62b-032

4. Lift arm cylinder fulcrum

This is on each cylinder of the arms connected to each mower unit.

Mower units #1, #4 and #5

There are two greasing points on each cylinder.



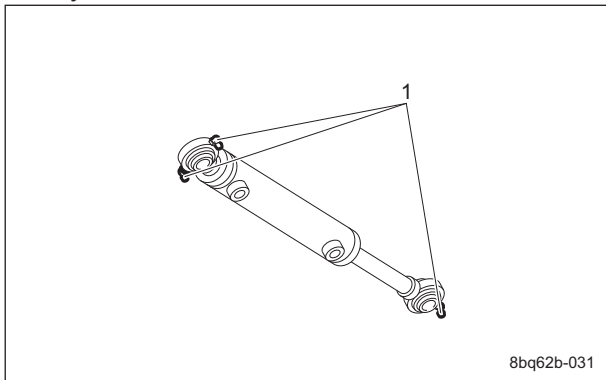
Greasing Points_008

8bq62b-030

1	Grease nipple (2 locations)
---	-----------------------------

Mower units #2 and #3

There are three greasing points on each cylinder.

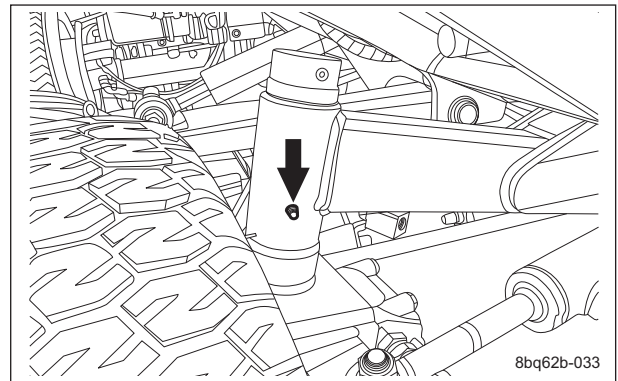


Greasing Points_009

8bq62b-031

1	Grease nipple (3 locations)
---	-----------------------------

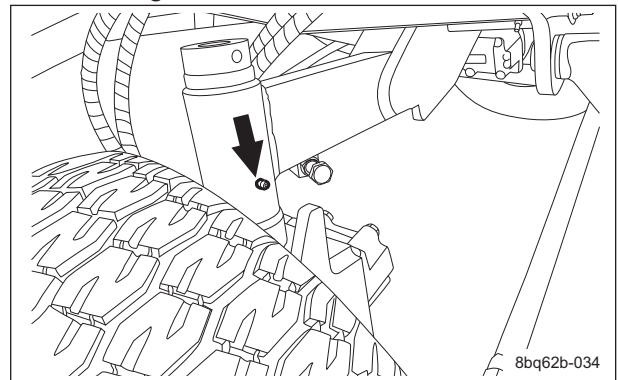
Rear left wheel



Greasing Points_011

8bq62b-033

Rear right wheel

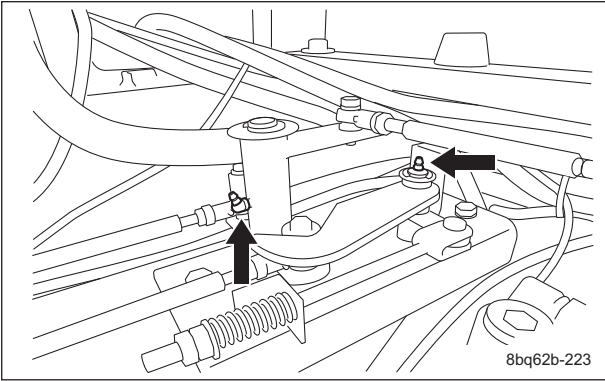


Greasing Points_012

8bq62b-034

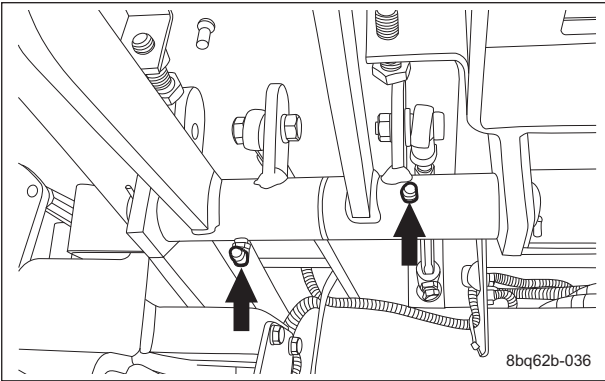
Maintenance standards and maintenance

6. Neutral position area
There are two locations.



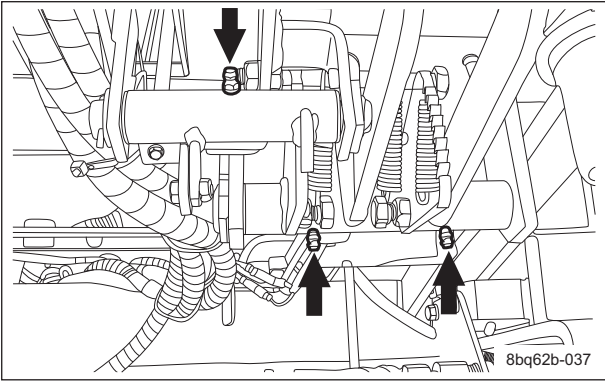
Greasing Points_013

7. Traveling pedal shaft fulcrum
There are two locations.



Greasing Points_014

8. Foot brake
There are three locations.



Greasing Points_015

Maintenance standards and maintenance

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Hydraulic system

Maintenance

About Maintenance

This chapter provides descriptions of the main inspection and maintenance operations for the GM2810 hydraulic system.

For information on daily checks, maintenance and handling of the machine, please refer to the separate GM2810 Owner's Operating Manual and Parts Catalog.

In order to maintain the integrity of the hydraulic device, it cannot be disassembled and repaired.

For those parts that must be repaired by the manufacturer, the disassembly and repair 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 disassemble or repair the device.

Specifications

Specifications

HST	EATON 72400		
	Piston pump	Displacement	0 - 49.2 cm ³ /rev (0 - 3.0 in ³ /rev)
		High-pressure relief set pressure	24.1 MPa (3,495.28 psi)
	Charge pump	Displacement	17.2 cm ³ /rev (1.05 in ³ /rev)
		Charge relief set pressure	1.7 - 2.1 MPa (246.54 - 304.55 psi)
Gear pump	EATON PBB44RK gear pump		
	Front (P1)	Displacement	16.0 cm ³ /rev (0.8 in ³ /rev)
	Rear (P2)	Displacement	16.0 cm ³ /rev (0.8 in ³ /rev)
	Engine area (P3)	Displacement	8.14 cm ³ /rev (0.50 in ³ /rev)
Wheel motor	EATON orbit motor		
	Front wheel motor	Displacement	495.0 cm ³ /rev (30.05 in ³ /rev)
	Rear wheel motor	Displacement	195.0 cm ³ /rev (11.90 in ³ /rev)
Rotary motor	CASAPPA PLM20.20		
	Gear motor	Displacement	21.14 cm ³ /rev (1.29 in ³ /rev)
Steering control unit	LC-D1-E w/EATON VP31XM070B		
	Orbitrol LC-D1-E	Displacement	96.0 cm ³ /rev (5.83 in ³ /rev)
		Relief set pressure	6.9 MPa (1,000.73 psi)
Knife rotation valve	HF78261-12		
		Relief set pressure	20.7 MPa (3,002.19 psi)
		Flow (theoretical value)	35.4 L/min (9.35 US gallons/min)
Solenoid valve	EATON V4205		
		Relief set pressure	3.1 MPa (449.60 psi)
		Flow	150.0 L/min (39.75 US gallons/min)

Hydraulic system

Control valve (Mower unit up/down)	EATON		
		Relief set pressure	15.2 MPa (2,204.51 psi)
		Flow	16.5 L/min (4.34 US gallons/min)
Hydraulic tank capacity	44.0 L (11.62 US gallons)		
Hydraulic line filter	10µm cartridge type		
Hydraulic oil	Shell Tellus S2M46 or equivalent (ISO VG46)		

Adjusted Value

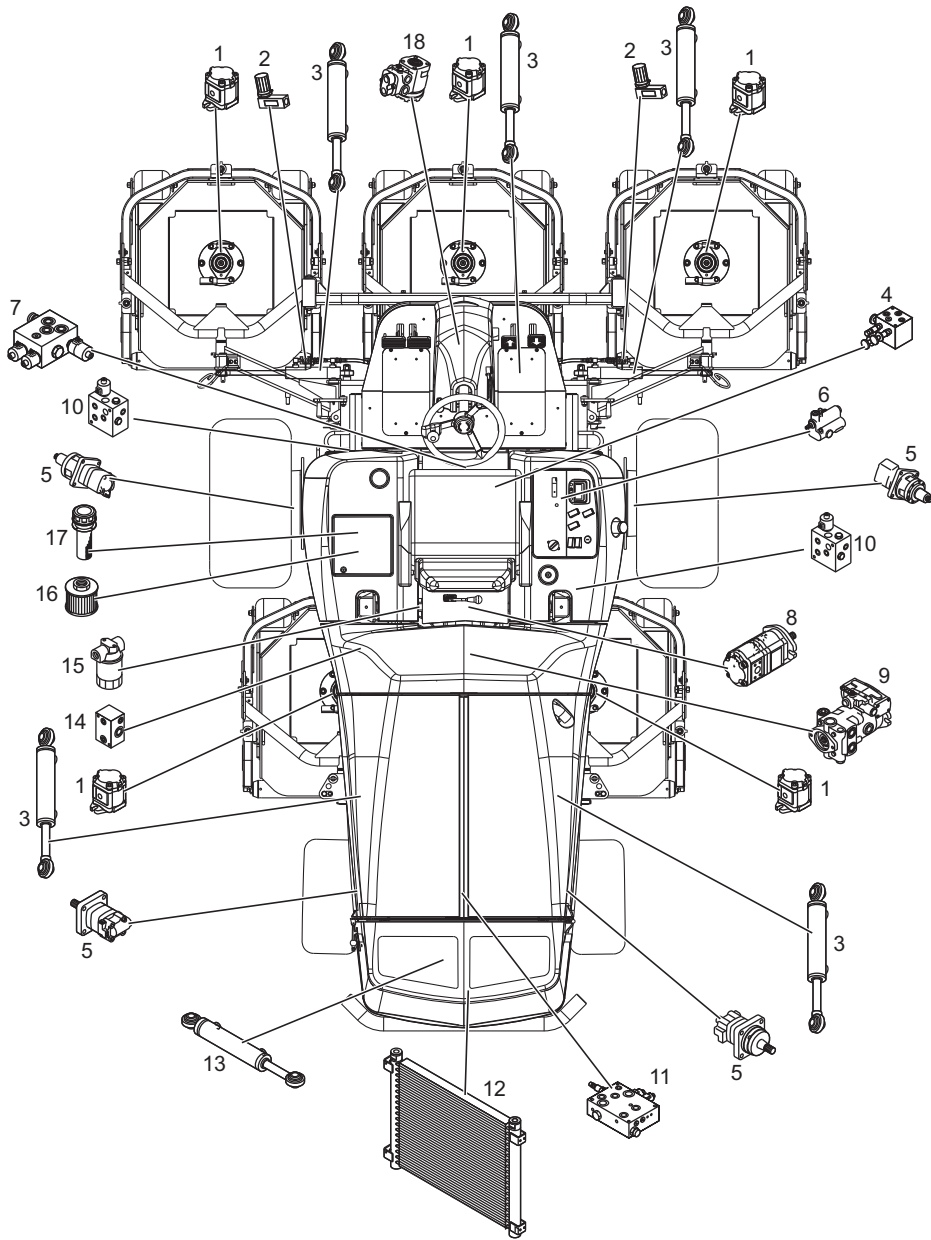
Assist valve	Low pressure side: 2.4 MPa (348.08 psi)	Under the driver's seat
	High pressure side: 3.0 MPa (435.10 psi)	

Adjustment of Assist Valve

See ("Adjustment" (Page 4-48)) for method for adjustment.

Hydraulic system

Hydraulic System Layout



Hydraulic system

dwb7jb-012

Hydraulic System Layout_001

1	Gear motor	7	Diff-lock valve	13	Steering cylinder
2	Slow return valve	8	Gear pump	14	Exhaust pressure valve
3	Up/down cylinder	9	Piston pump	15	Hydraulic oil filter
4	Assist valve	10	Rotary knife rotation valve	16	Suction filter
5	Wheel motor	11	2WD/4WD changeover valve	17	Filler neck breather
6	Control Valve	12	Oil cooler	18	Orbitrol

Hydraulic system

1. Gear motor
This is located in each unit to rotate the rotary knife. These convert the fluid energy from the pump to mechanical energy (rotation motion) by using two gears.
2. Slow return valve
These valves control the flow by changing the size of the aperture in the hydraulic circuit and control the speed of the actuator (hydraulic cylinder).
3. Up/down cylinder
This is located in each unit arm to raise and lower the unit. These convert the fluid energy from the pump to mechanical energy (reciprocating motion).
4. Assist valve
Using a relief valve to maintain a constant pressure in the up/down cylinders, this switches between two stages, depending on the travel fluid pressure.
In addition, a solenoid valve enables the fluid to bypass in order to relieve the pressure.
This is located under the seat.
5. 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.
6. Control Valve
This is located within reach at the right side of the seat and used for raising and lowering the units. This decreases the operating force by activating the internal spool valve using the fluid energy from the manual switch valve.
7. Diff-lock valve
When fluid energy is to be distributed over two or more lines, this valve divides the flow at a fixed ratio, regardless of the pressure in each line.
This is located above the front axle of the front wheel.
8. Gear pump
This converts the mechanical energy (rotation motion) of the engine to fluid energy by using two gears.
This is located in front of the main pump.
9. Piston pump
This converts the mechanical energy of the engine to fluid energy by using the reciprocating motion of the piston.
This is located at the center of the machine in front of the engine.
10. Rotary knife rotation valves
Depending on whether the solenoid valves are opened or closed, these valves operate to rotate or to stop the rotary knives.
These valves are equipped with a counterbalance valve that controls braking for the rotation of the rotary knife when it is stopped.
These are located behind and below the seat and to the right, and in front of and below the seat and to the left.
*Solenoid valve
Turning on/off electricity causes this combination of an electromagnet and a valve to stop, circulate or change the flow direction of fluid.
11. 2WD/4WD changeover valve
This valve controls the vehicle drive with multiple valves switching the passage of fluid energy from the piston pump to wheel motors at either four wheels or two wheels in parallel.
The valve is located in the upper part of the rear axle.
12. Oil cooler
This cools the high-temperature oil.
This is located behind the engine, at the tail end of the machine.
13. Steering cylinder
This is located between the rear wheels.
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.
14. Charge control valve
This valve maintains the pressure by integrating another flow in order to avoid negative pressure if the flow is insufficient when the rotary knife rotation is in a closed circuit. This is located under the center of the machine and toward the left.

15. Hydraulic oil 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.

This is located behind the left front wheel.

16. Suction filter

Installed at the suction side of the pump, this fulfills the major role of preventing the oil from being contaminated with impurities.

This is located in the hydraulic tank.

17. 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 the temperature, 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 upper area of the hydraulic tank.

18. Orbitrol

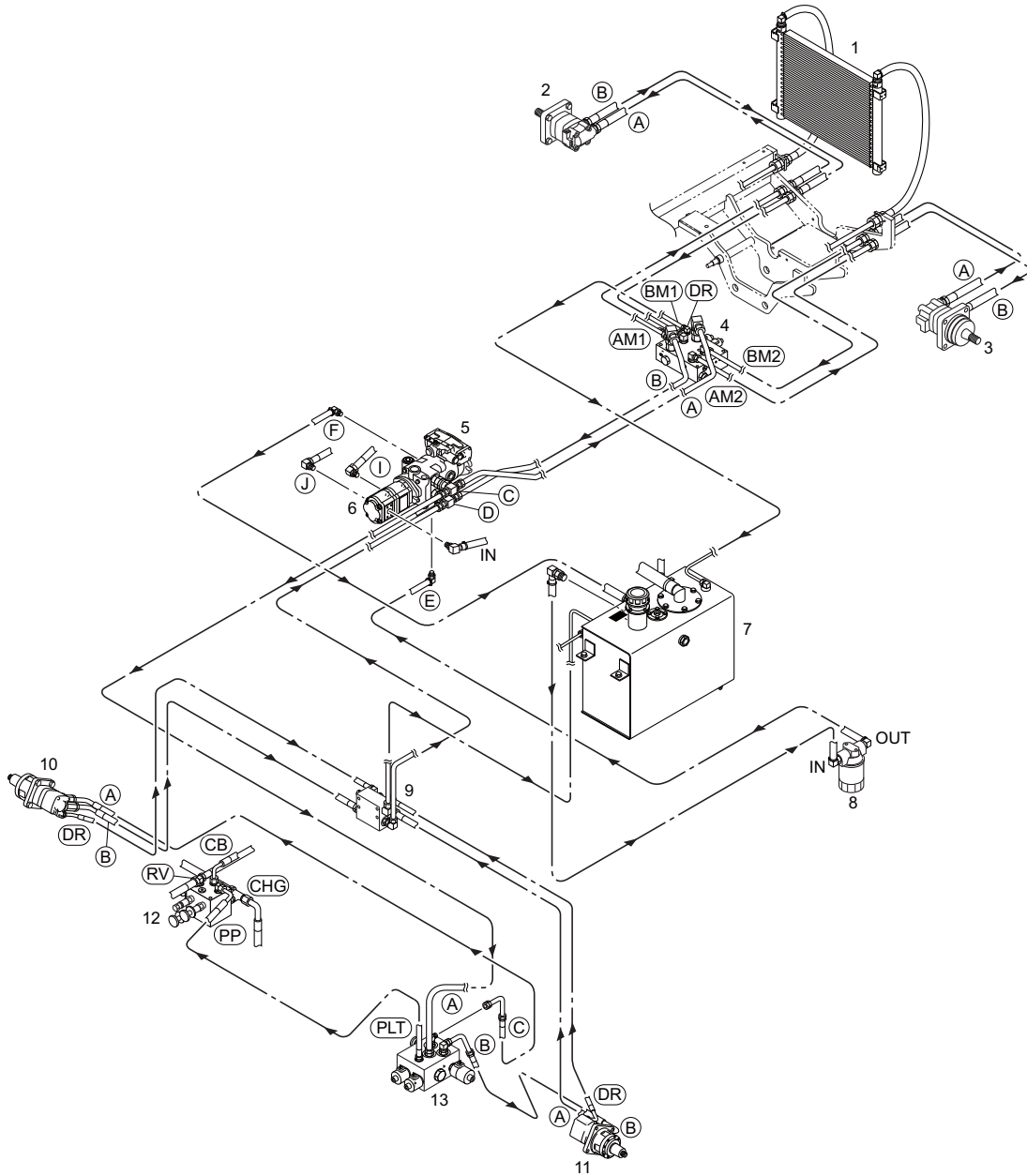
In a fully hydraulic power steering unit, switching of the internal valve depending on the rotational input from the steering wheel causes oil from the hydraulic pump to be fed to the steering cylinder.

This is located at the center, inside the front cover.

Hydraulic system

Flow of Hydraulic Oil

Flow of Oil during Forward Traveling



zy6f9z-004

Flow of Oil during Forward Traveling_001

→ shows flow of oil.

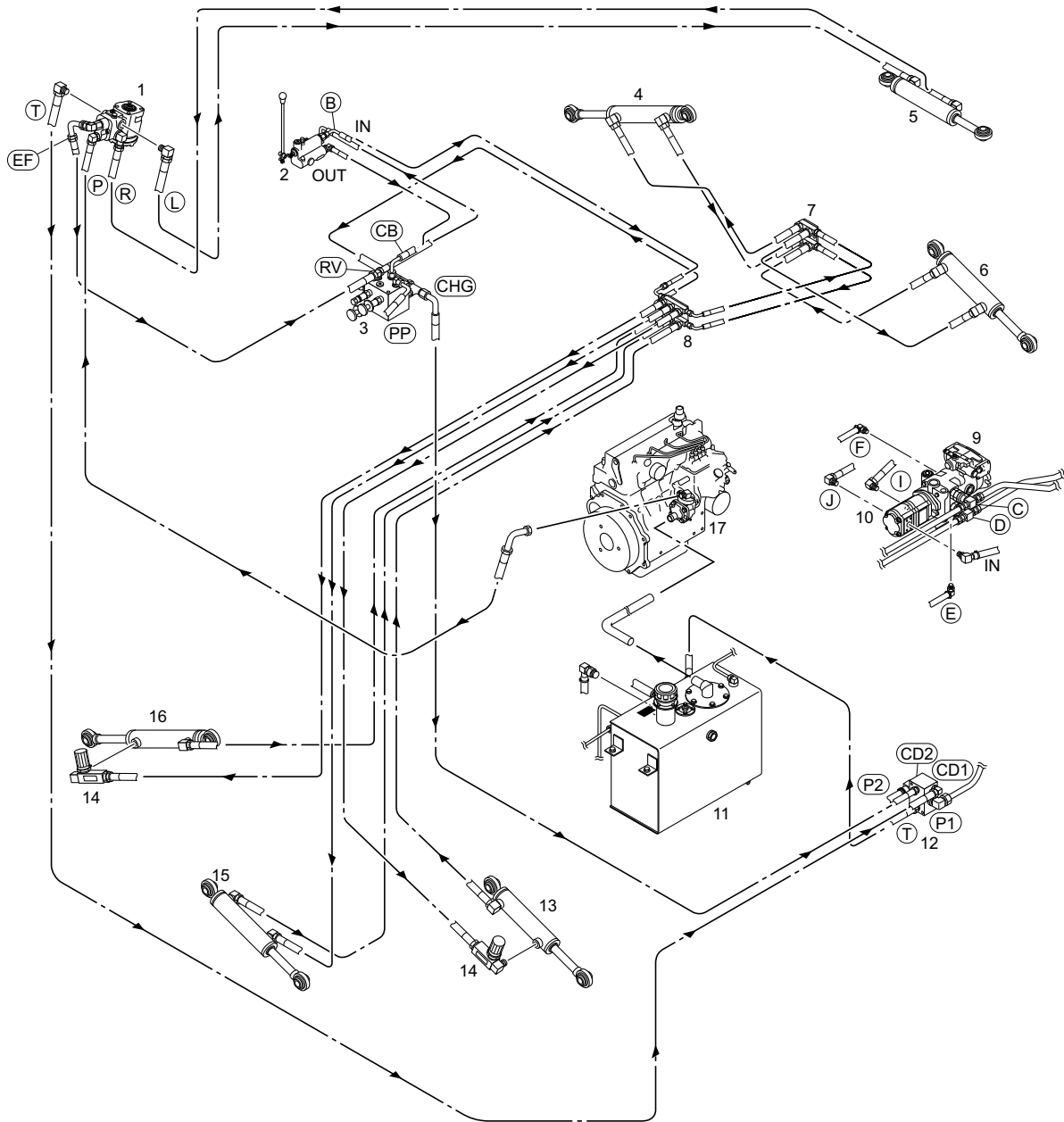
The flow of oil shows that for 4WD forward traveling.

○ shows port name.

1	Oil cooler	6	Gear pump	11	Wheel motor (front left)
2	Wheel motor (rear right)	7	Oil tank	12	Assist valve
3	Wheel motor (rear left)	8	Oil filter	13	Diff-lock valve
4	2WD/4WD changeover valve	9	Manifold (traveling)		
5	Piston pump	10	Wheel motor (front right)		

Hydraulic system

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



Hydraulic system

qwbqfy-005

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

→ shows the flow of oil.

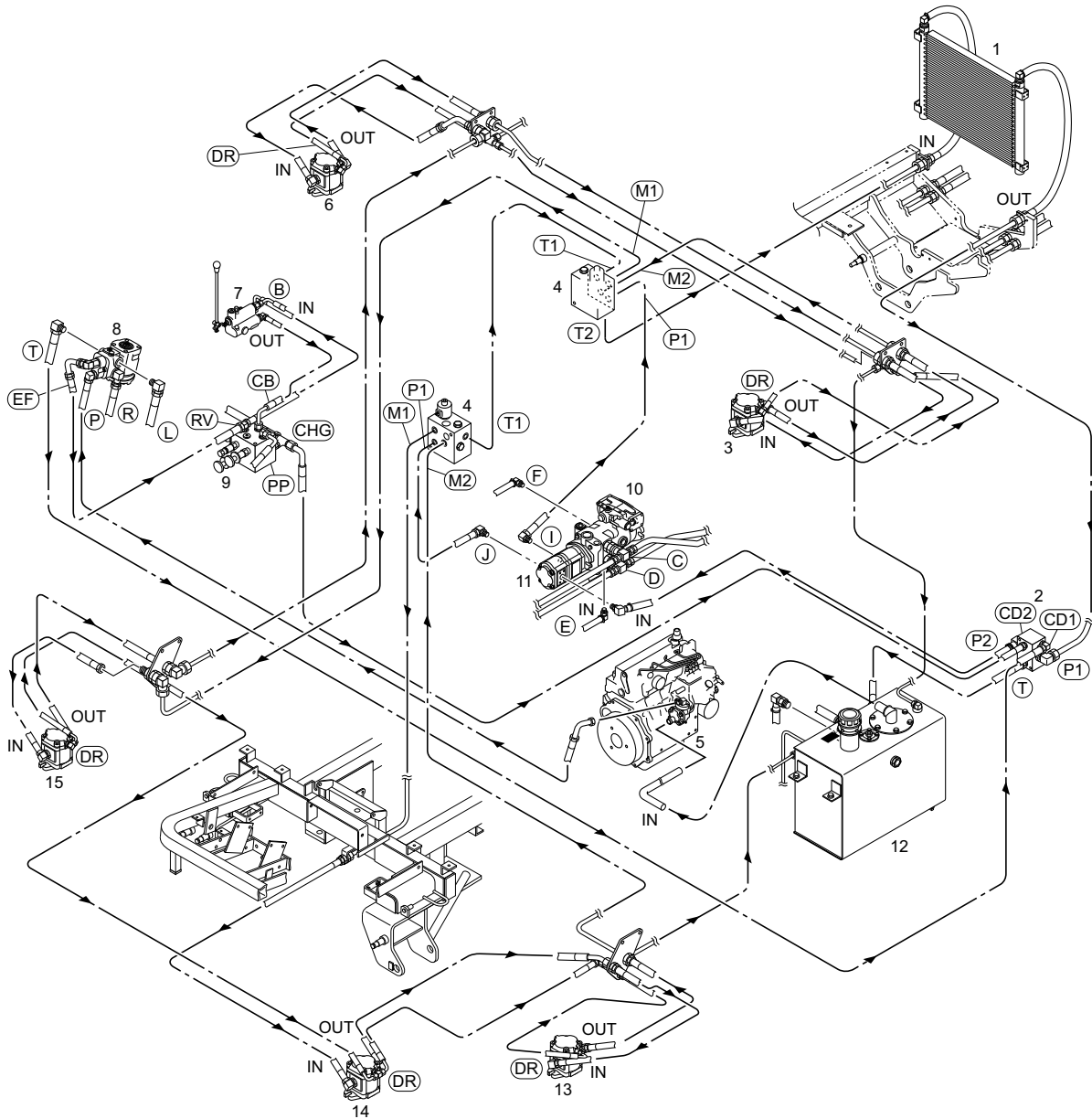
The flow of oil shows that for raising the mower unit, turning the power steering to left.

○ shows port name inside.

1	Orbitrol	7	Manifold (rear)	13	#5 cylinder
2	Control valve	8	Manifold (front)	14	Slow return valve
3	Assist valve	9	Piston pump	15	#1 cylinder
4	#2 cylinder	10	Gear pump	16	#4 cylinder
5	Steering cylinder	11	Oil tank	17	Pump (engine)
6	#3 cylinder	12	Exhaust pressure valve		

Hydraulic system

Flow of Oil during Cutting with Mower Unit



a4d9ch-006

Flow of Oil during Cutting with Mower Unit_001

→ shows the flow of oil.

The flow of oil shows that for cutting with the mower unit.

○ shows port name inside.

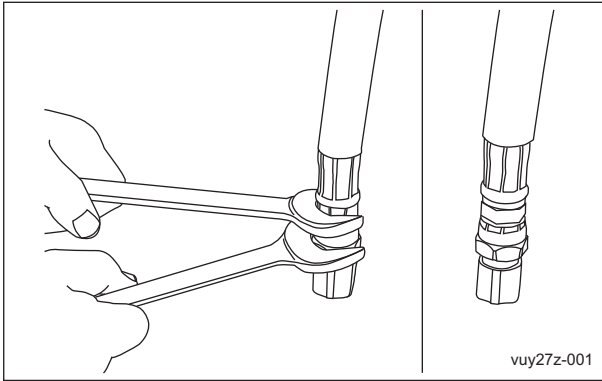
1	Oil cooler	6	#2 motor	11	Gear pump
2	Exhaust pressure valve	7	Control Valve	12	Oil tank
3	#3 motor	8	Orbitrol	13	#5 motor
4	Knife rotation valve	9	Assist valve	14	#1 motor
5	Pump (engine)	10	Piston pump	15	#4 motor

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

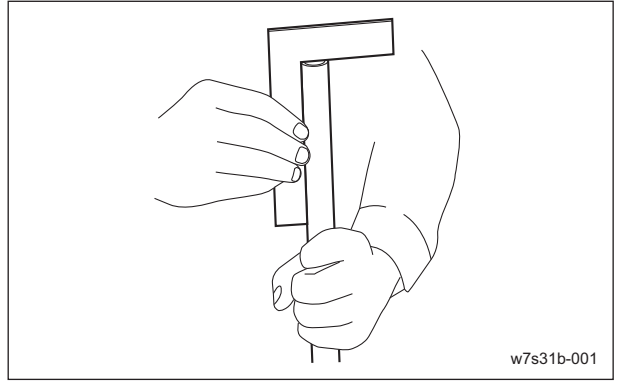
Be sure to depressurize the hydraulic system before maintaining or repairing it. Stop the engine, and lower the rake. When checking for pinhole leakage of the hydraulic circuit or oil leakage of the nozzle, search for a leakage point using something like paper or cardboard, never with your bare hands.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

Hydraulic fitting

Bite type tube fitting

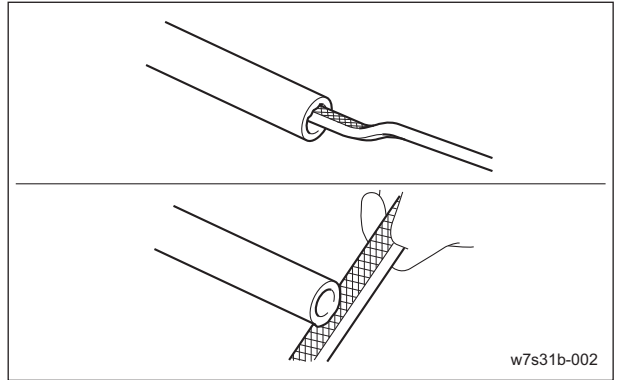
Preliminary tightening (Preset)

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



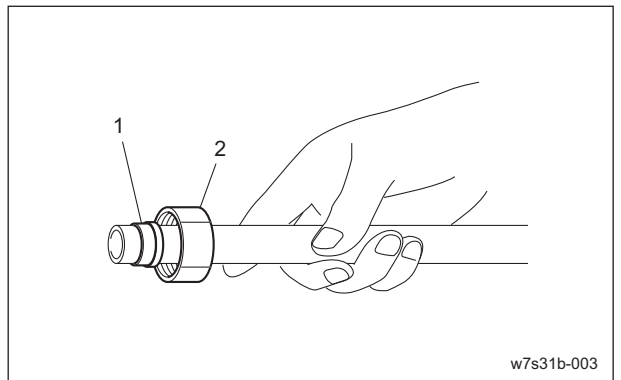
Bite type tube fitting_001

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



Bite type tube fitting_002

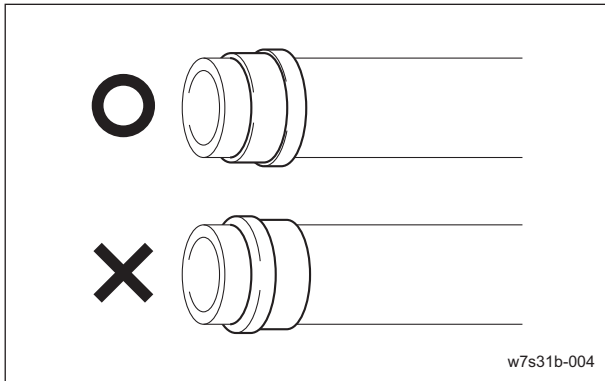
3. Insert the nut and sleeve into the tube. Note the direction of the sleeve.



Bite type tube fitting_003

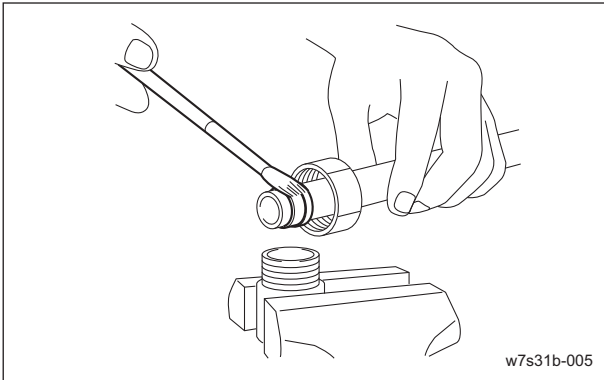
1	Sleeve
2	Nut

Hydraulic system



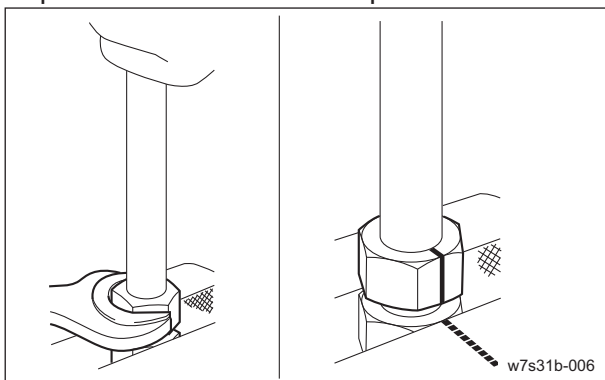
Bite type tube fitting_004

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



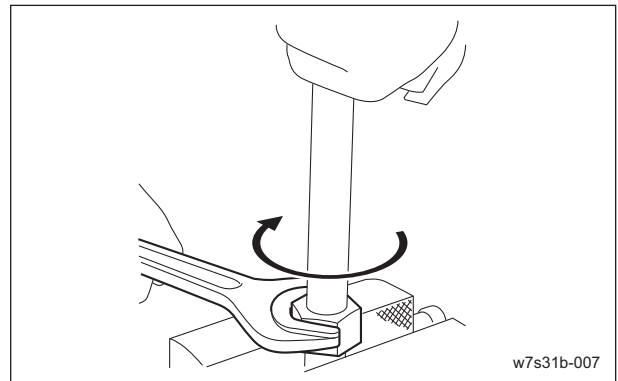
Bite type tube fitting_005

5. Put the tube end onto the hole bottom of the temporary tightening tool 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.”



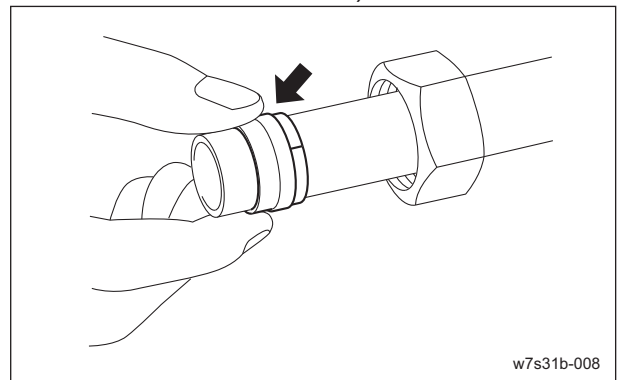
Bite type tube fitting_006

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

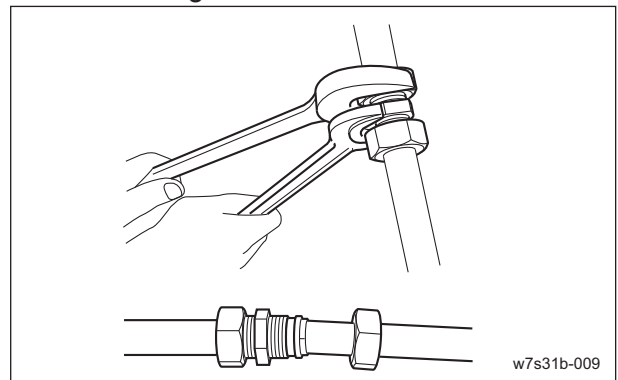
7. Fasten the nut and check that the sleeve end is a few mm apart from the tube end and the sleeve will not move in axial direction (it is allowed to move in the circumferential direction).



Bite type tube fitting_008

Final tightening (Reset)

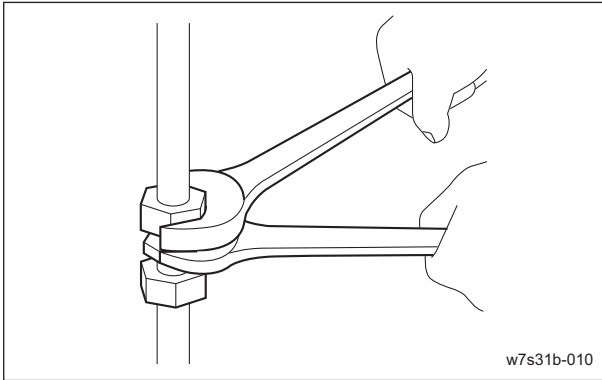
- Fit the preliminary tightened tube onto the fitting body. Tighten with a spanner to the point where some resistance is suddenly felt, then further tighten with the nut for a 1/4 turn.



Bite type tube fitting_009

Note:

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

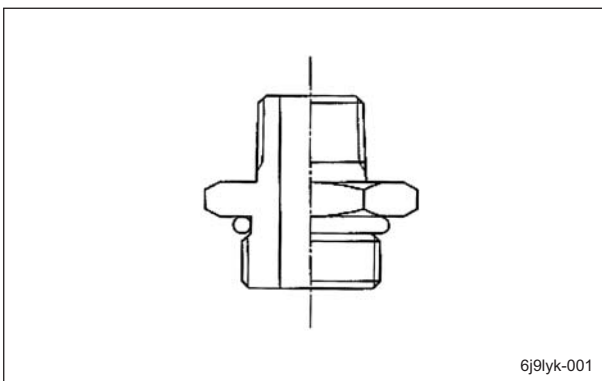


Bite type tube fitting_010

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.

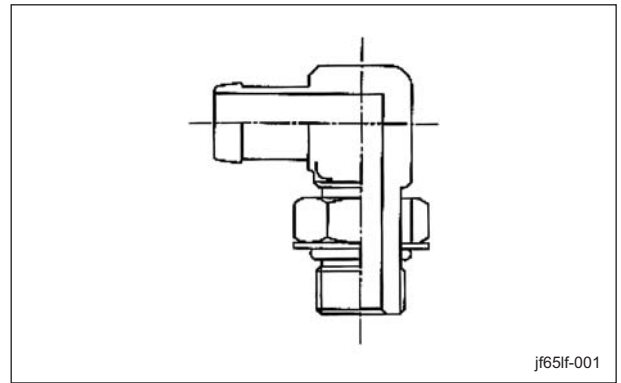
Fitting with parallel pipe threads (O-ring sealing system)



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

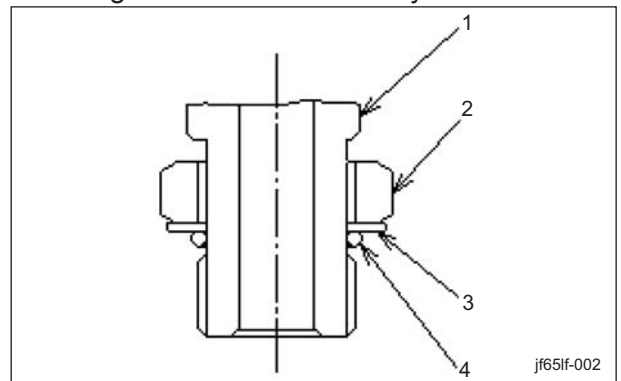
1. Check to see if the O-ring is properly fitted to the groove of the main body.
2. Check to see that the thread part, seat surface of O-ring port and O-ring are free from flaws or foreign matter.
3. Before fitting, apply hydraulic oil or grease to the O-ring.
4. For fitting, screw in by hand till the 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.

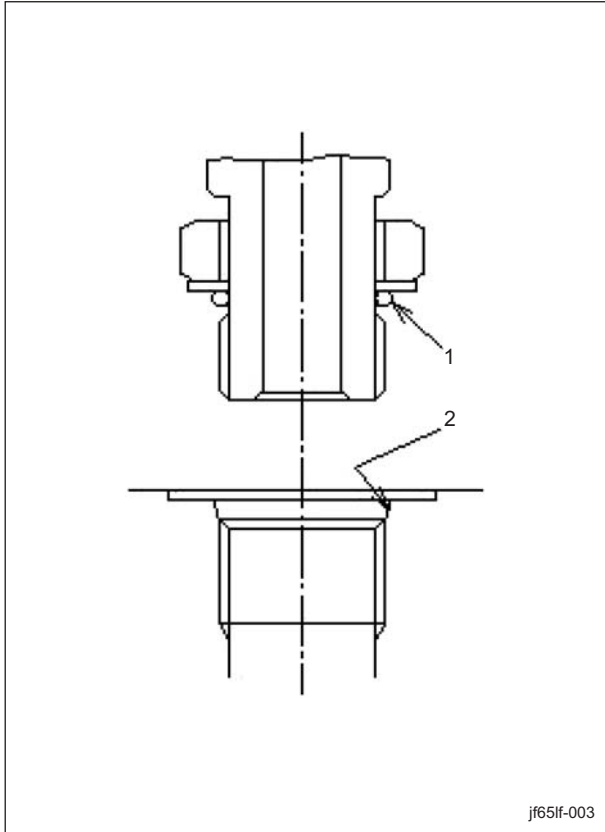


Adjustable Elbow_002

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

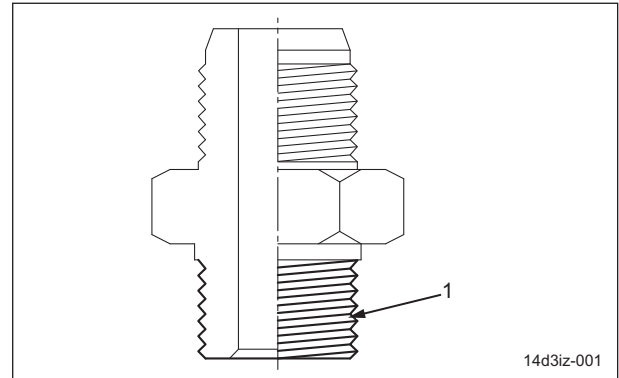
Never give the locknut more than one turns. If you give it more than one turn, the thread fit between the other side port and locknut becomes loose, which reduces the thread strength. If the washer goes too deeply into the other side port, the washer gets deformed, which leads to oil leakage. Rough installation 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

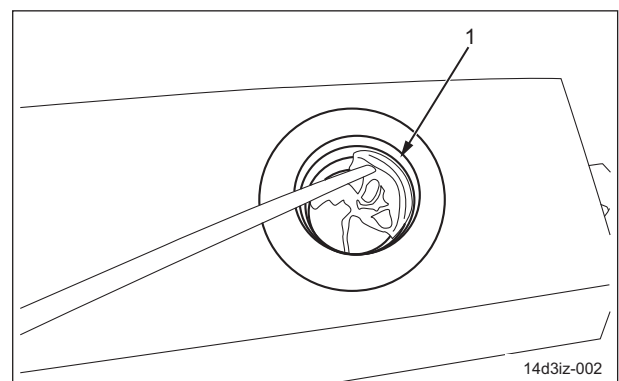
1	Taper (PT) thread portion
---	---------------------------

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.

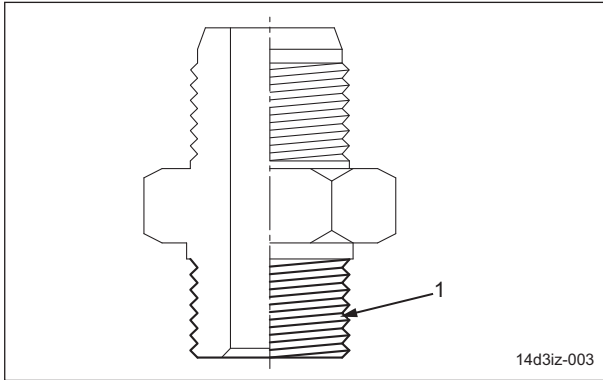


Taper Pipe (PT) Thread Joint (Sealing Tape Method)_002

1	Taper (PT) thread connecting portion
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Hydraulic system

2. Before connecting the joint, wind sealing tape on the taper thread portion. (See "How to Use the Sealing Tape" (Page 4-15) .)



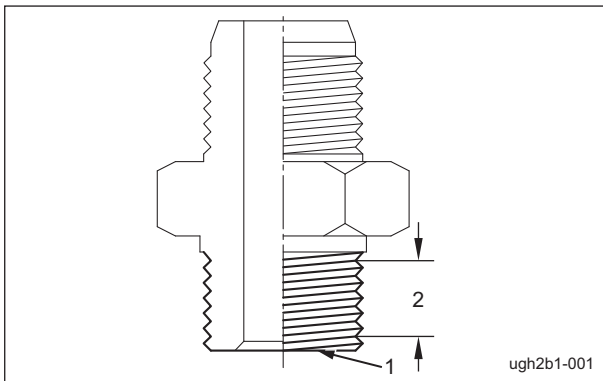
Taper Pipe (PT) Thread Joint (Sealing Tape Method)_003

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

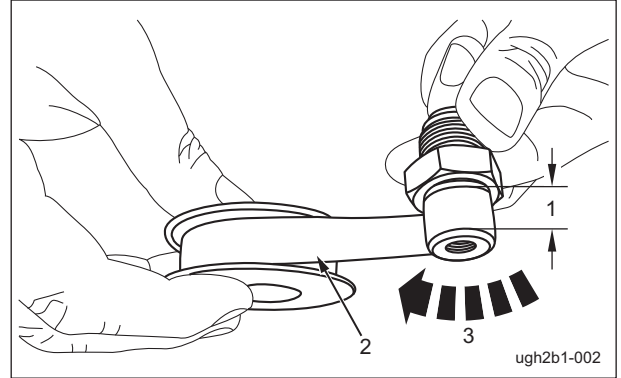
Loosening again the taper thread joint which has been tightened may reduce its sealing effect to cause leakage of oil.

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.

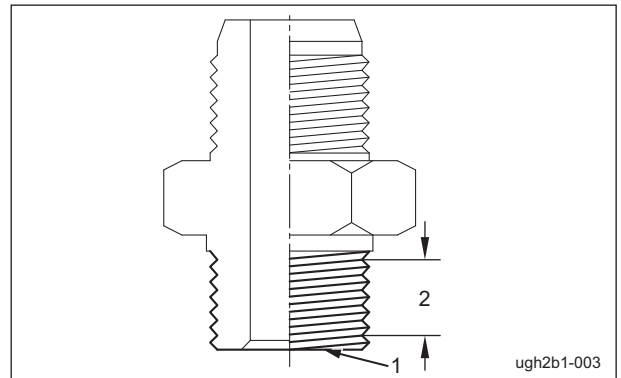
- Wrap it in clockwise direction (direction to tighten the screw). Wrapping in the opposite direction may cause the tape to be easily peeled off.



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.

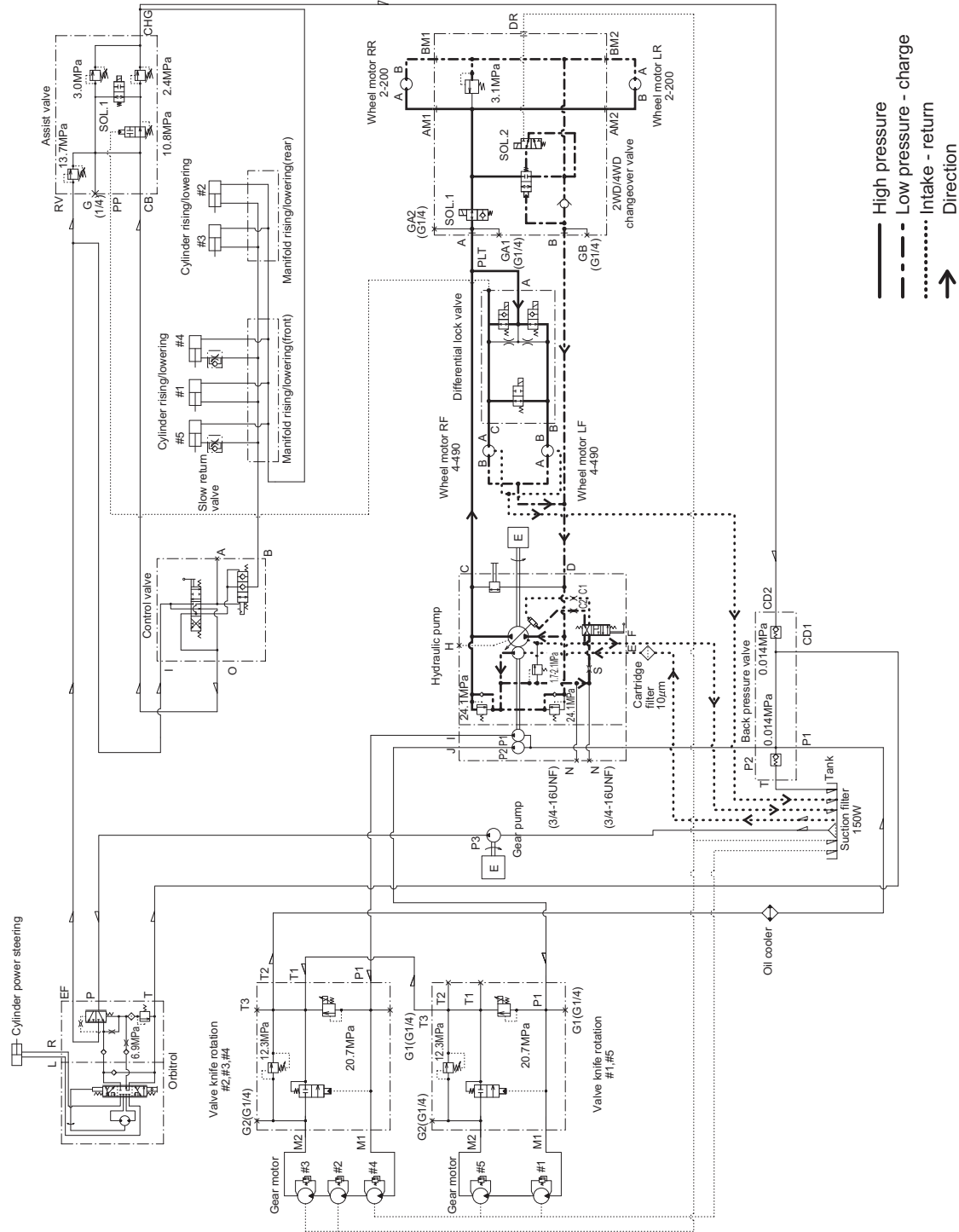
Drain all the hydraulic oil from hydraulic tank and hydraulic equipment other than the hydraulic hoses and piping and clean them well.

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

Hydraulic circuit flow

Traveling circuit

Forward traveling (4WD)

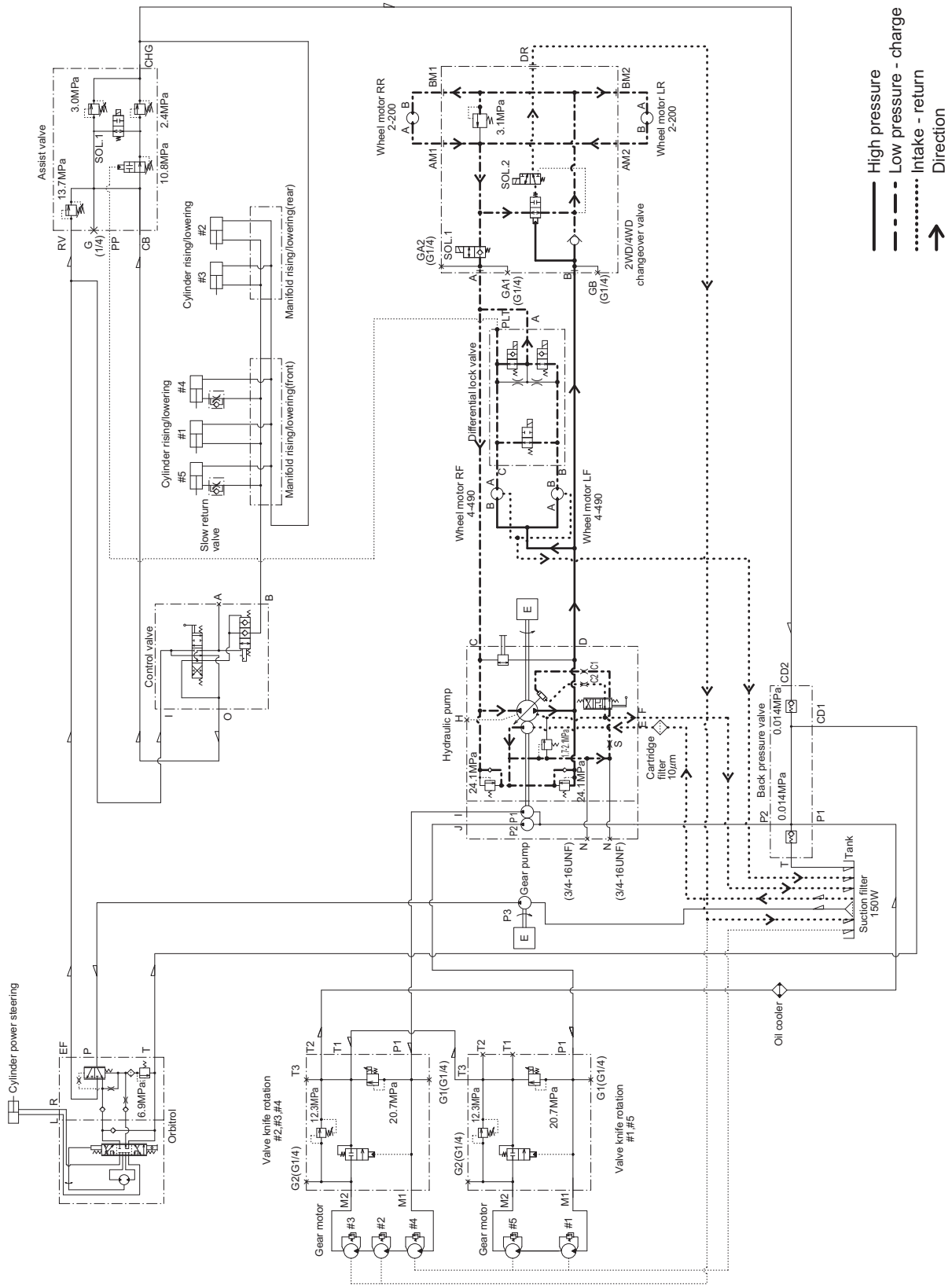


Forward traveling (4WD)_001

ms5j2m-016E

Hydraulic system

Backward traveling



— High pressure
 - - - Low pressure - charge
 Intake - return
 ↑ Direction

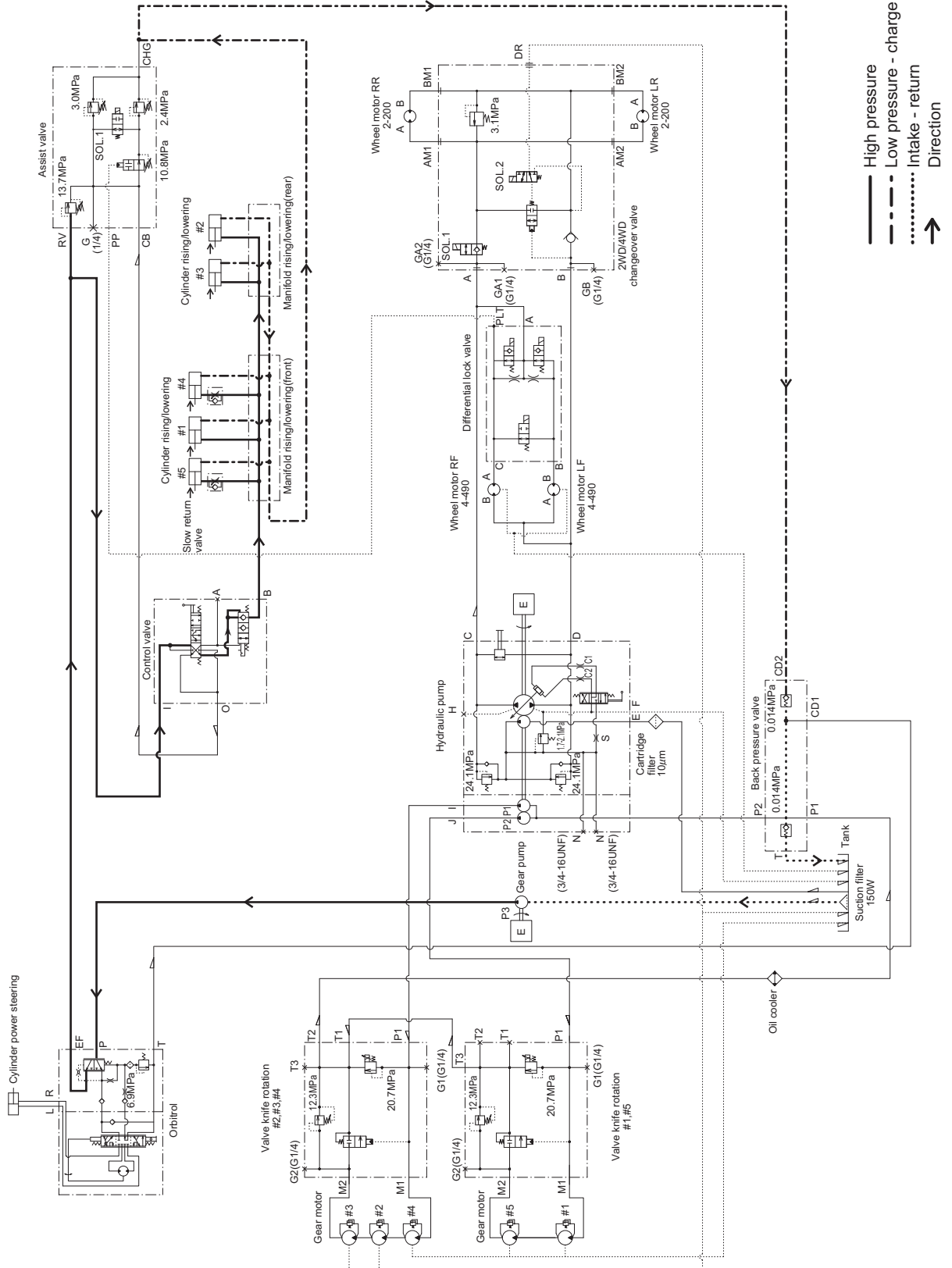
Backward traveling_001

7edlvx-033E

Hydraulic system

Raise/lower circuit

Up/down cylinder raising

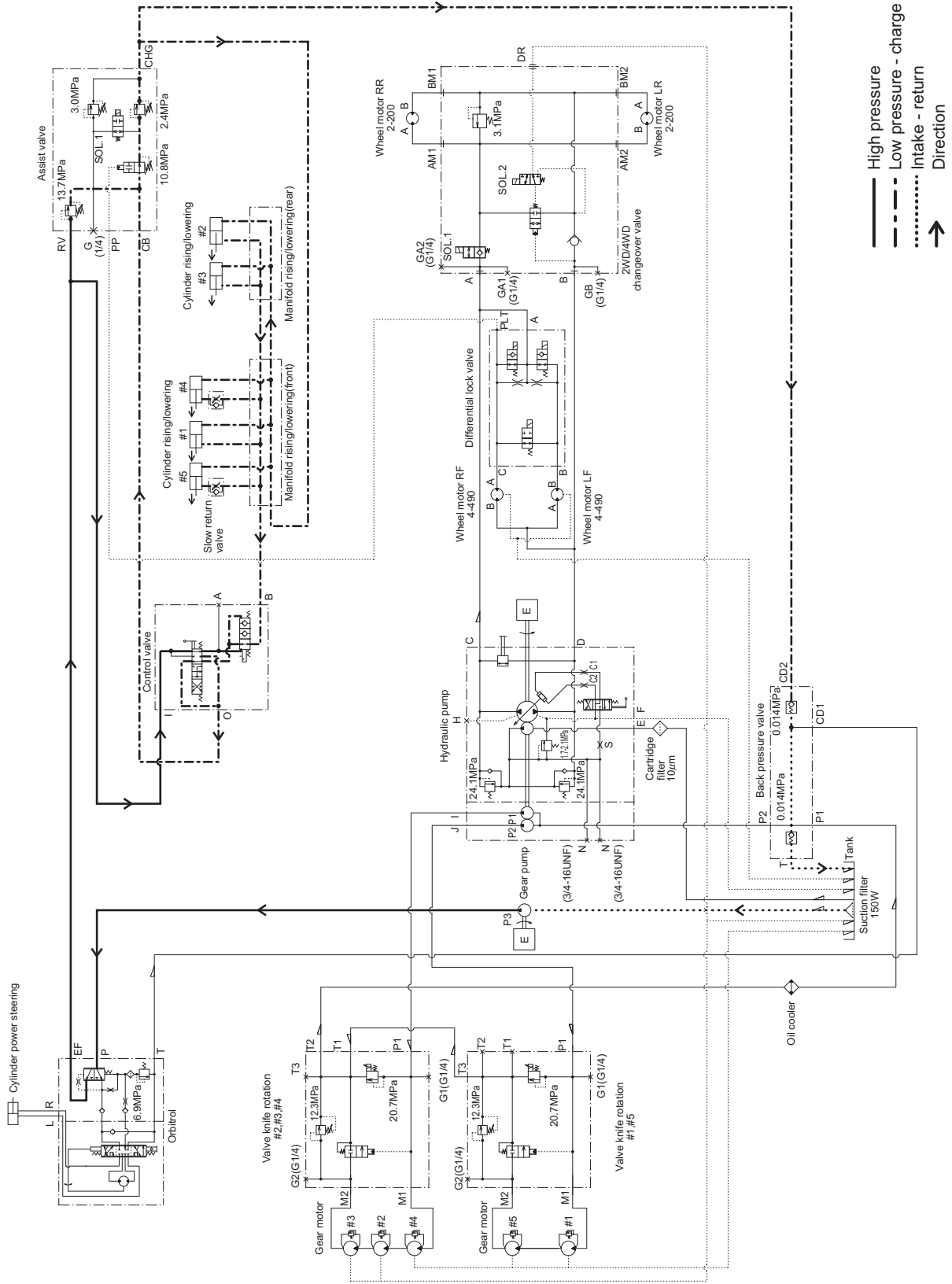


- High pressure - charge
- - - Low pressure - return
- Intake - return
- ↑ Direction

Hydraulic system

Hydraulic system

Up/down cylinder lowering (operation)



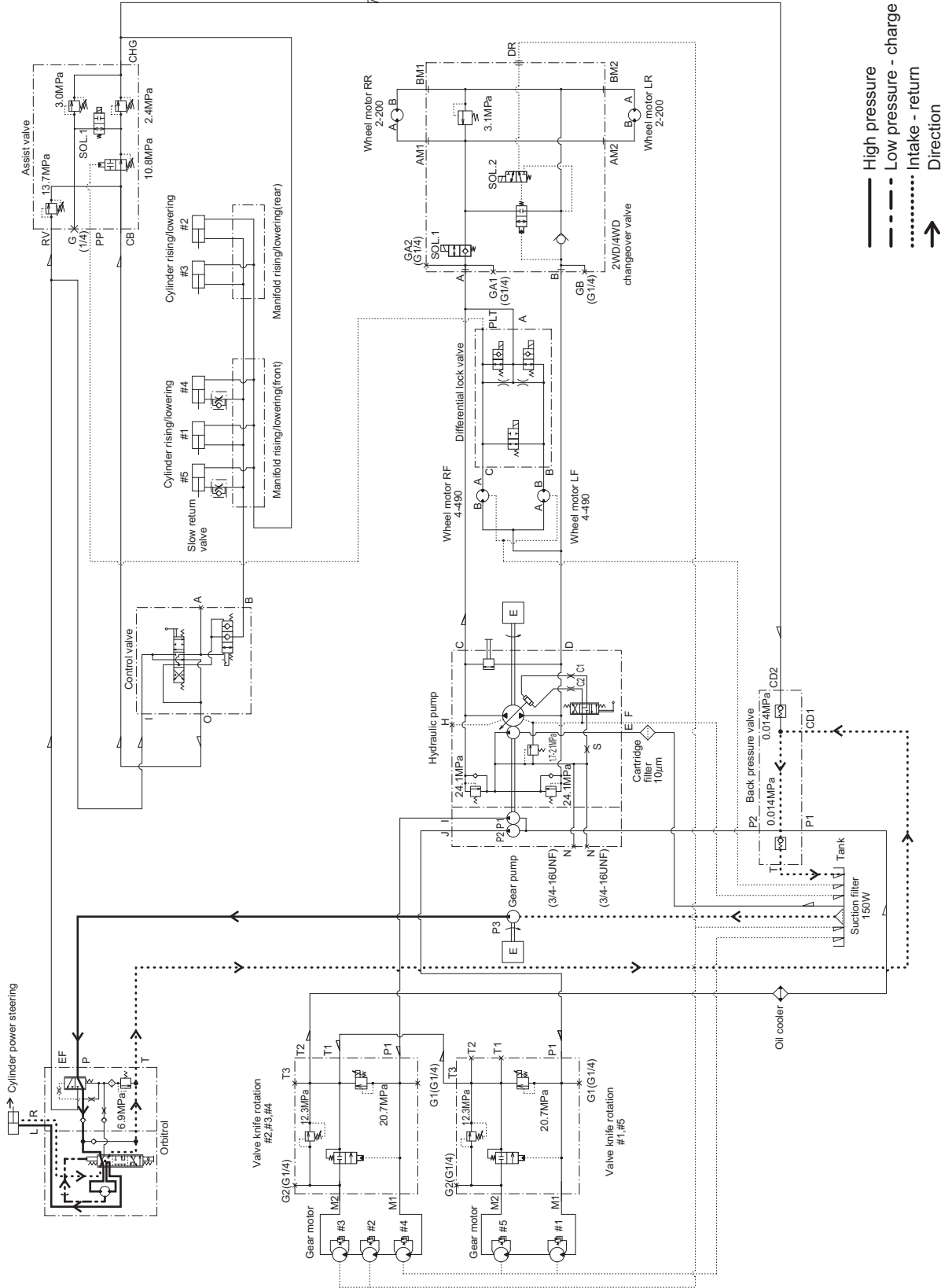
- High pressure
- - - Low pressure - charge
- Intake - return
- ↑ Direction

Up/down cylinder lowering (operation)) _001

jif9j-013E

Steering circuit

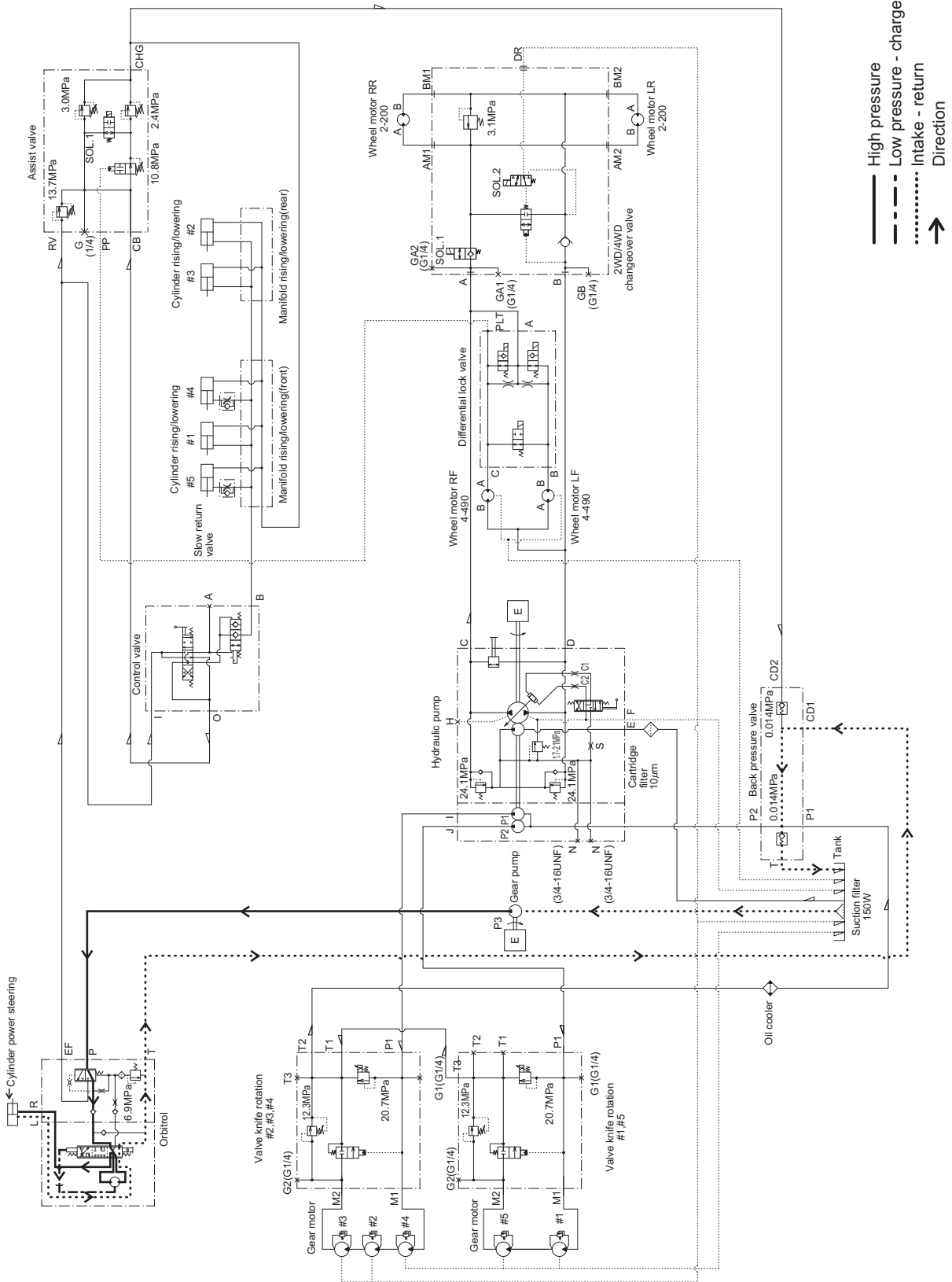
Steering cylinder counter-clockwise turning



Hydraulic system

Hydraulic system

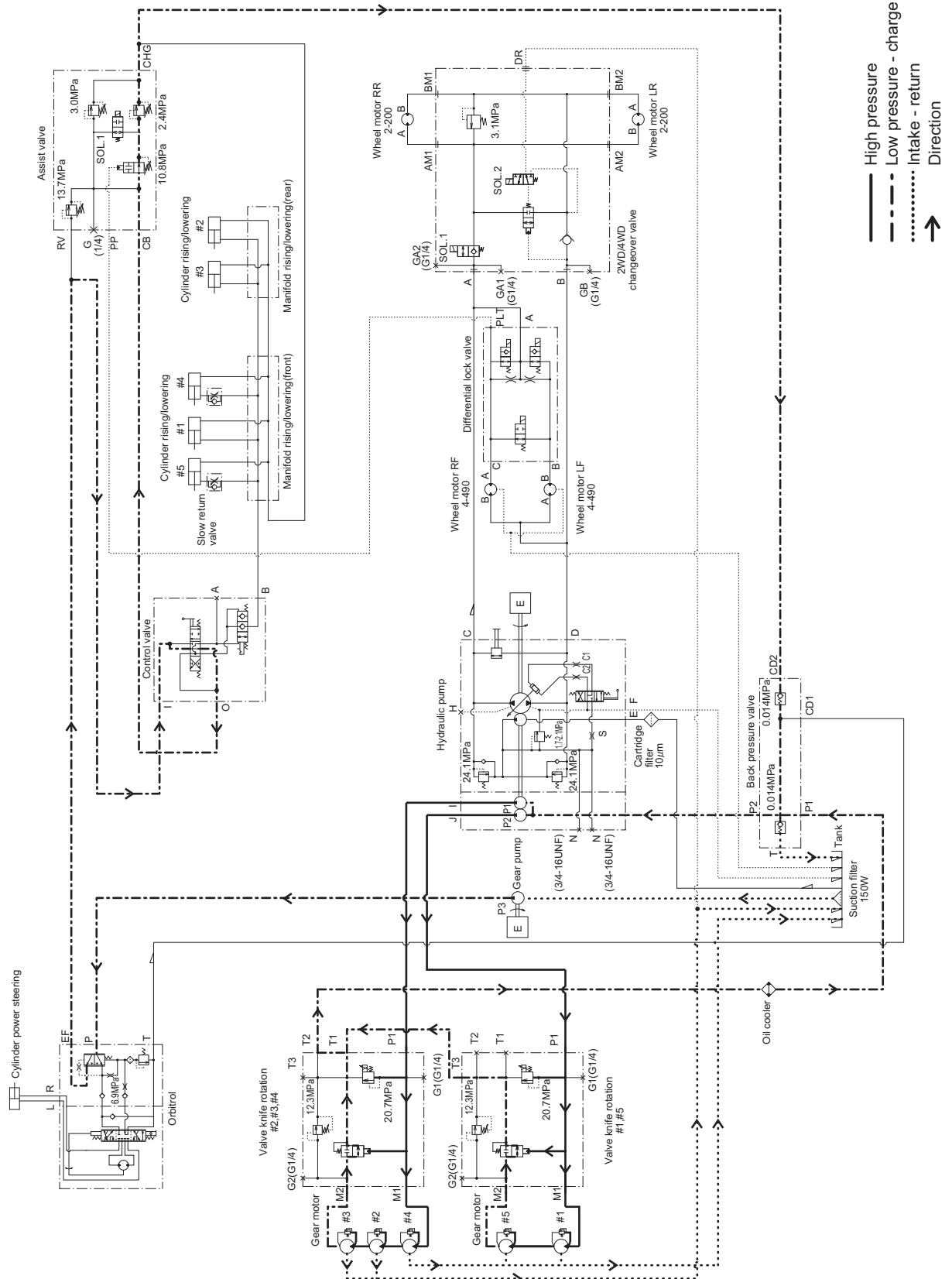
Steering cylinder clockwise turning



c3cs72-006E

Steering cylinder clockwise turning_001

Rotary Knife Rotation Circuit



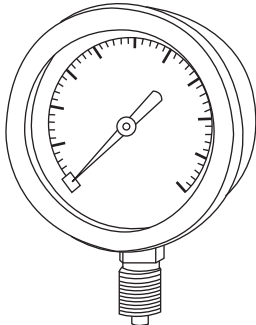
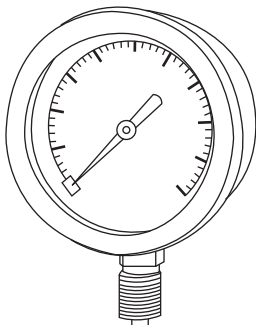
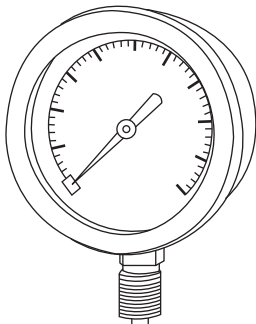
1pm741-006E

Rotary Knife Rotation Circuit_001

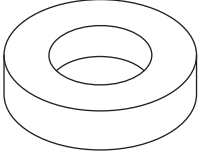
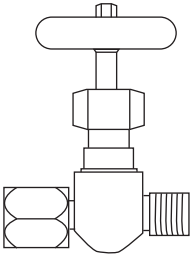
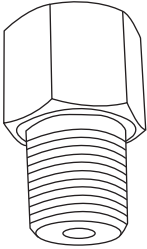
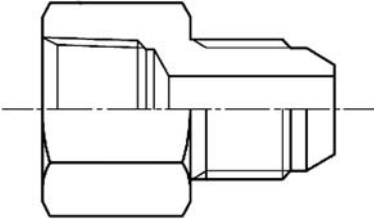
Hydraulic system

Special Tool

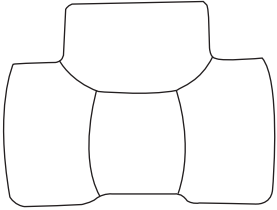
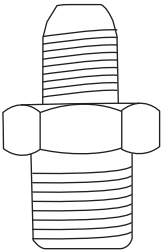
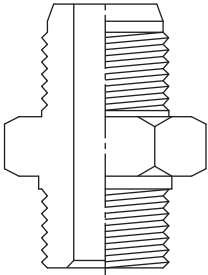
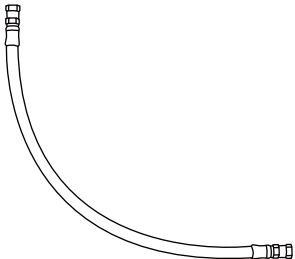
List of Special Tools

<p>Pressure gauge for high pressure measurements</p>  <p style="text-align: right;"><small>vasdfi-004</small></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;"><small>vasdfi-004</small></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;"><small>vasdfi-004</small></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

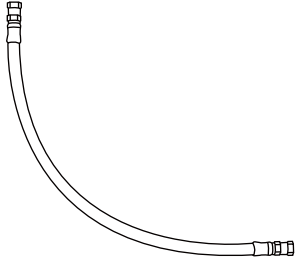
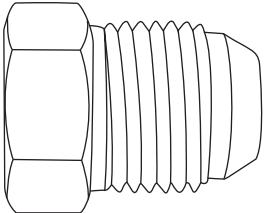
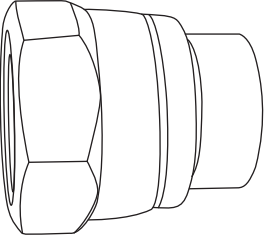
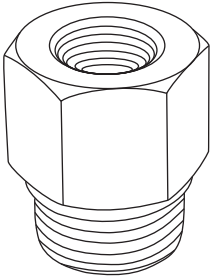
<p>Pressure gauge seal</p>  <p>vasdfi-005</p>	<p>K4701000050</p>	<p>Inserted between the pressure gauge and the pressure gauge joint.</p>
<p>Gauge valve</p>  <p>vasdfi-016</p>	<p>K4701000060</p>	<p>Used to temporarily shut off the fluid to be measured during maintenance, inspection, or repair etc. of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

Hydraulic system

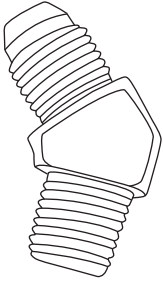
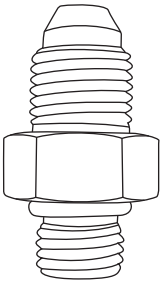
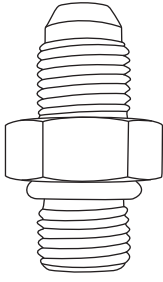
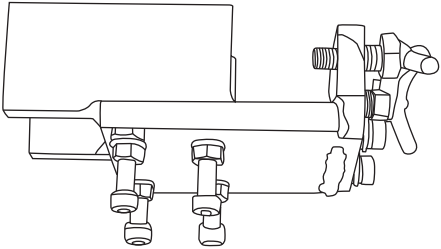
<p>T-joint TEF1/2</p>  <p>vasdfi-013</p>	<p>K3021080002-Y</p>	<p>Used to insert the pressure gauge between the hydraulic hoses.</p>
<p>Special adapter PF1/4 PT3/8</p>  <p>vasdfi-015</p>	<p>K3009000042-Y</p>	<p>Used as an adapter for the T-joint during pressure measurements.</p>
<p>Adapter 1013-12</p>  <p>q9c6v6-008</p>	<p>K3000120002-Y</p>	<p>Used as an adapter for the T-joint during pressure measurements (quantity used: two).</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

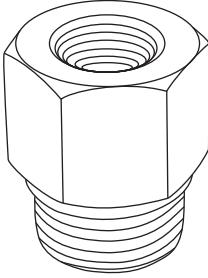
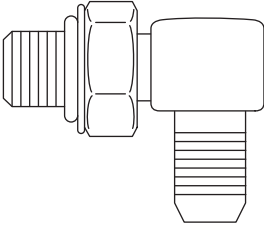
Hydraulic system

<p>WP-210-12 hose-1150</p>  <p>vasdfi-008</p>	<p>K3105411150</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>Special bushing 3/4-16UNFPT1/4</p>  <p>q9c6v6-003</p>	<p>K3029000272-Y</p>	<p>Used as a bushing when installing the pressure gauge to the pressure measuring port.</p>

Hydraulic system

<p>45 elbow 1035-6</p>  <p>q9c6v6-004</p>	<p>K3003060002-Y</p>	<p>Used as an elbow for the special bushing during pressure measurements.</p>
<p>O-ring connector (1096-6)</p>  <p>q9c6v6-005</p>	<p>K3008000342-Y</p>	<p>Used as a connector when installing the pressure gauge to the pressure measuring port.</p>
<p>O-ring connector PF1/4PF1/4</p>  <p>q9c6v6-006</p>	<p>K3008000232-Y</p>	<p>Used as a connector when installing the pressure gauge to the pressure measuring port.</p>
<p>GM2800 knife fixture</p>  <p>q9c6v6-007</p>	<p>K4802000550</p>	<p>Used to lock the rotary knife during pressure measurements.</p>

Hydraulic system

<p>Bushing BUT1/2 x 3/8</p>  <p>q9c6v6-003</p>	<p>K3020080601-Y</p>	<p>Used as a bushing for size alignment during pressure measurements.</p>
<p>90° adjustable elbow 1086-6</p>  <p>q9c6v6-048</p>	<p>K3008000442-Y</p>	<p>Used as a connector when installing the pressure gauge to the pressure measuring 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 pressure 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 pressure measurement

Warning

As mentioned in the measurement 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 pressure 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, 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, resulting in personal accidents.

1. Always clean the machine before pressure measurement. Remember that the machine must always be kept clean for pressure 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 poor adjustment, clogging or breakage.

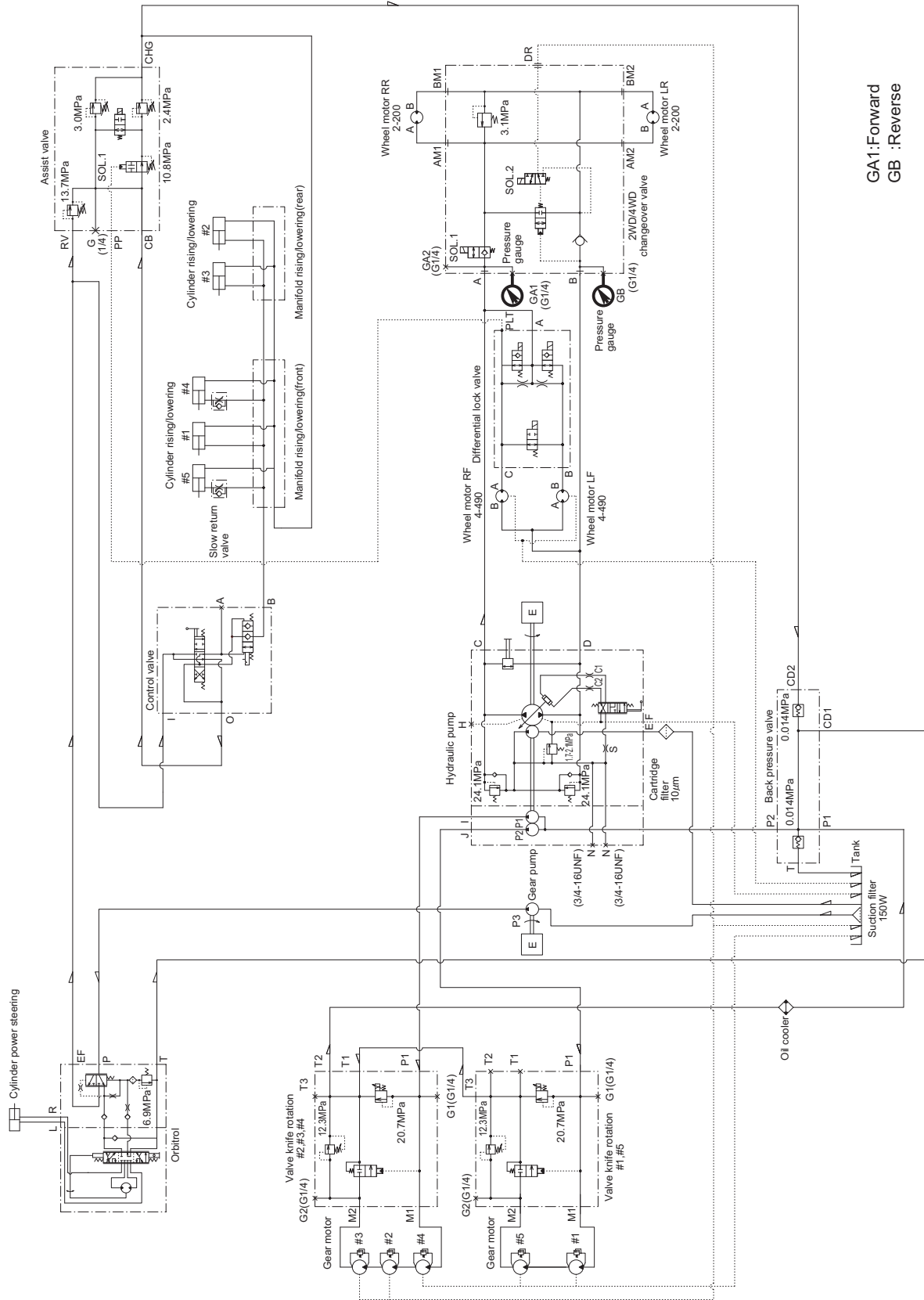
4. Warm up the hydraulic oil before starting pressure measurement.

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 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 pressure 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

Traveling circuit



GA1:Forward
 GB :Reverse

Traveling circuit_001

vt1bv-015E

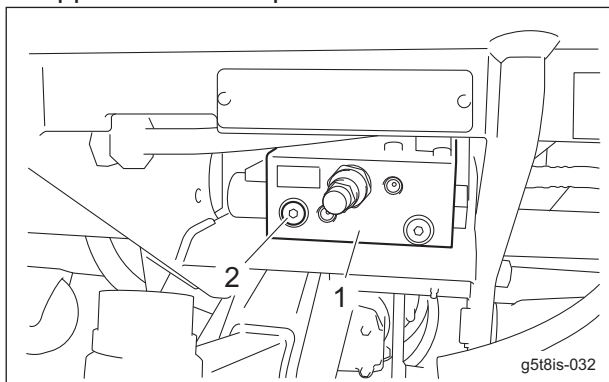
Hydraulic system

Forward

⚠ Caution

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

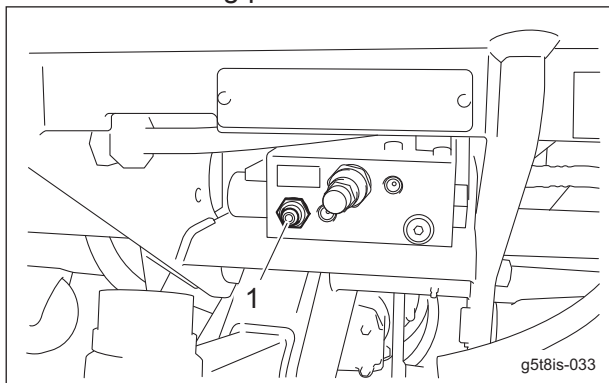
1. Remove the plug of the forward side measurement point of the 2WD/4WD changeover valve located in the center upper area of the pivot of the main unit.



Forward_001

1	2WD/4WD changeover valve
2	Plug

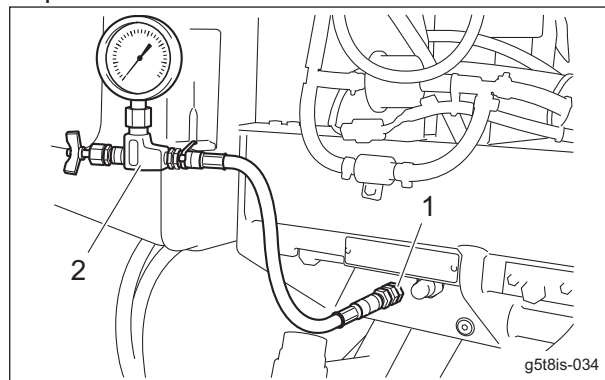
2. Attach the O-ring connector to the forward side measuring port.



Forward_002

1	O-ring connector (1096-6)
---	---------------------------

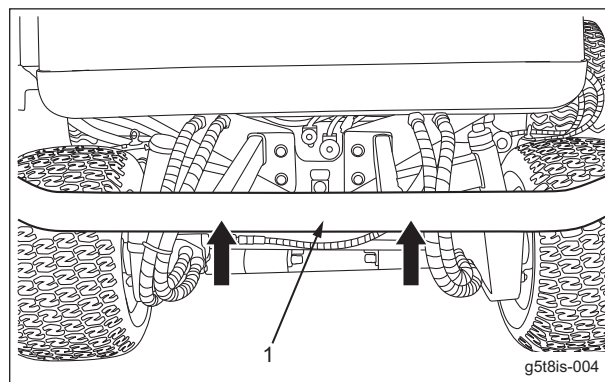
3. Attach the pressure gauge for high pressure measurements onto the O-ring connector of the forward side measuring port.



Forward_003

1	Forward side measuring port connector
2	Pressure gauge for high pressure measurements

4. Use a sling etc. on the rear bumper to apply resistance on the machine.



Forward_004

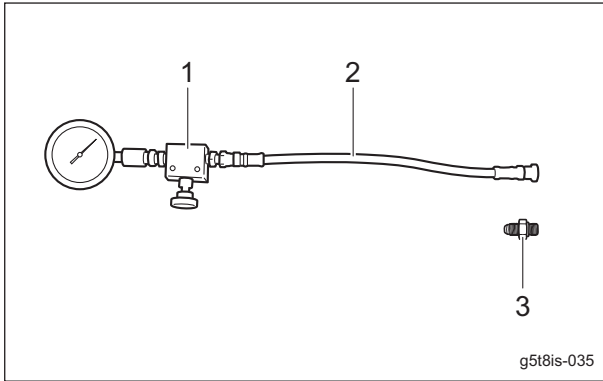
1	Bumper
---	--------

5. Make sure that the parking brake is applied, and then start the engine and rev it up to the maximum rpm.

Depress the forward pedal. It is normal if the pressure becomes 24.1 MPa (3,495.29 psi) with the tires locked without slipping.

Hydraulic system

6. Items to Prepare for Measurement
Prepare a pressure gauge for high pressure measurements, high pressure hose, and O-ring connector PF1/4PF1/4.



Forward_005

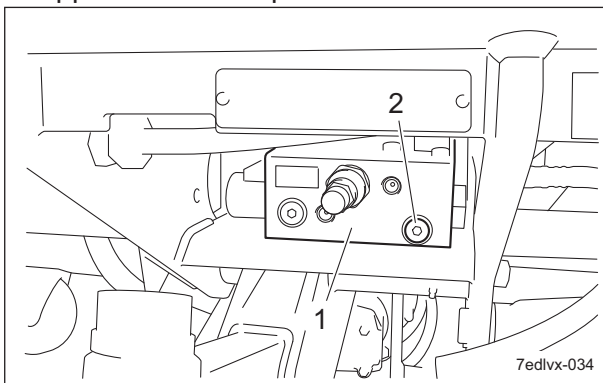
1	Pressure gauge for high pressure measurements
2	High pressure hose
3	O-ring connector PF1/4PF1/4

Reverse

⚠ Caution

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

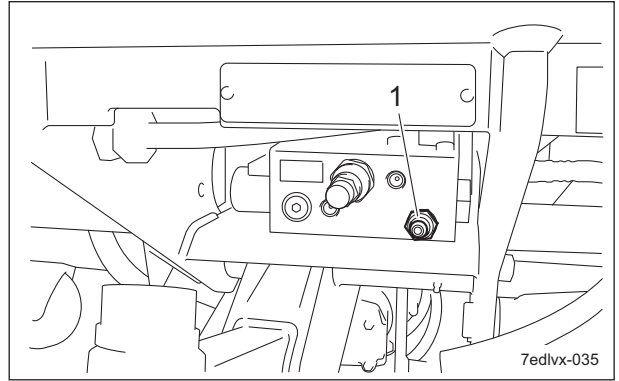
1. Remove the plug of the reverse side measurement point of the 2WD/4WD changeover valve located in the center upper area of the pivot of the main unit.



Reverse_001

1	2WD/4WD changeover valve
2	Plug

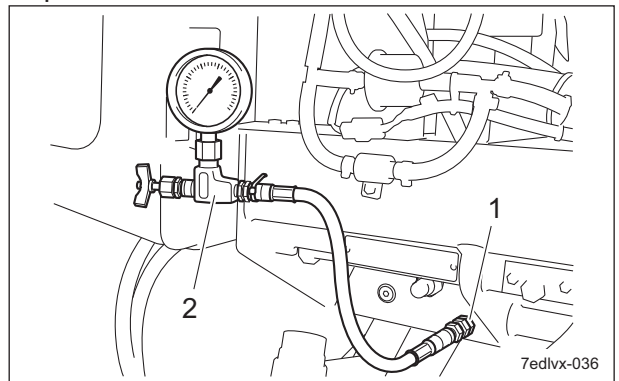
2. Attach the O-ring connector to the reverse side measuring port.



Reverse_002

1	O-ring connector (1096-6)
---	---------------------------

3. Attach the pressure gauge for high pressure measurements onto the O-ring connector of the reverse side measuring port.



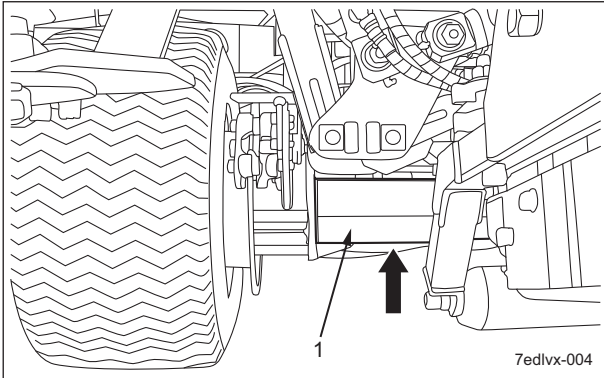
Reverse_003

1	Reverse side measuring port connector
2	Pressure gauge for high pressure measurements

Hydraulic system

4. Use a sling etc. on the front axle of the front area of the machine to apply resistance on the machine.

The pressure gauge is on the left or right of the front axle.



Reverse_004

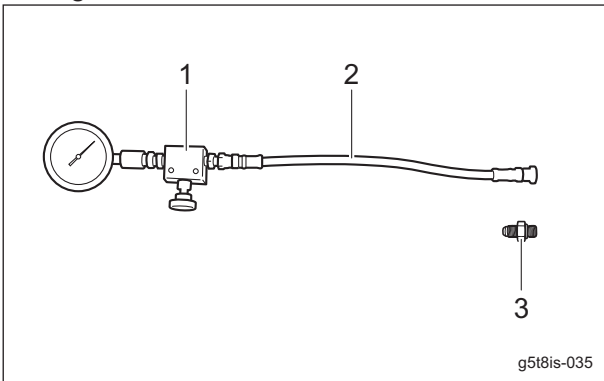
1	Front axle
---	------------

5. Make sure that the parking brake is applied, and then start the engine and rev it up to the maximum rpm.

Depress the reverse pedal. It is normal if the pressure becomes 24.1 MPa (3,495.29 psi) with the tires locked without slipping.

6. Items to Prepare for Measurement

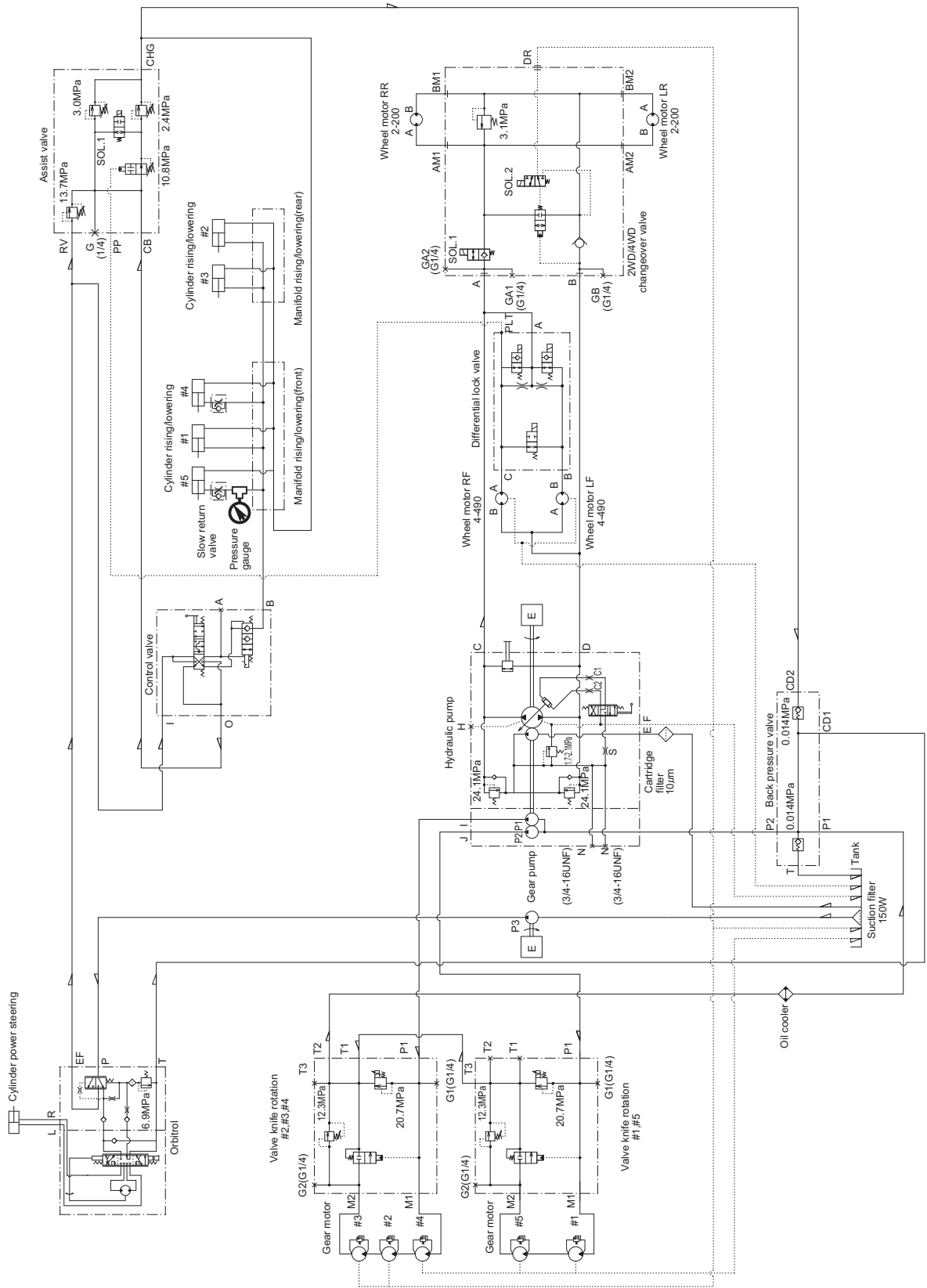
Prepare a pressure gauge for high pressure measurements, high pressure hose, and O-ring connector PF1/4PF1/4.



Reverse_005

1	Pressure gauge for high pressure measurements
2	High pressure hose
3	PF1/4PF1/4 with O-ring connector

Up/Down circuit



Up/Down circuit_001

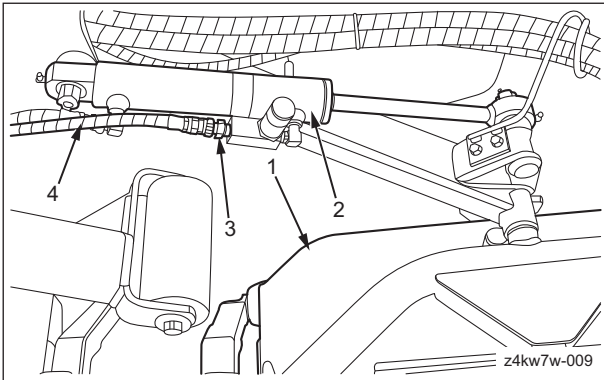
z4kw7w-042E

Hydraulic system

⚠ Caution

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

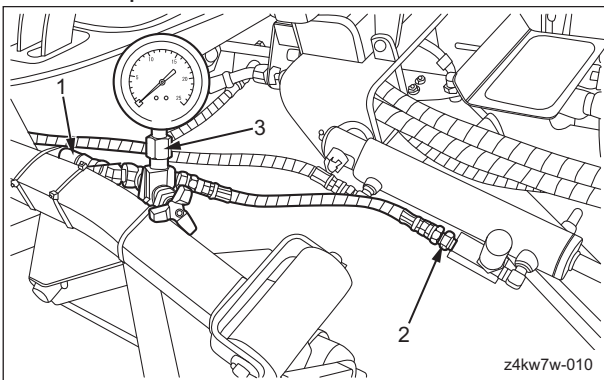
1. Lower the mower units, and then remove the hydraulic hose from the adapter attached to the hydraulic cylinder.



Up/Down circuit_002

1	Mower unit
2	Cylinder
3	Adapter
4	Hydraulic hose

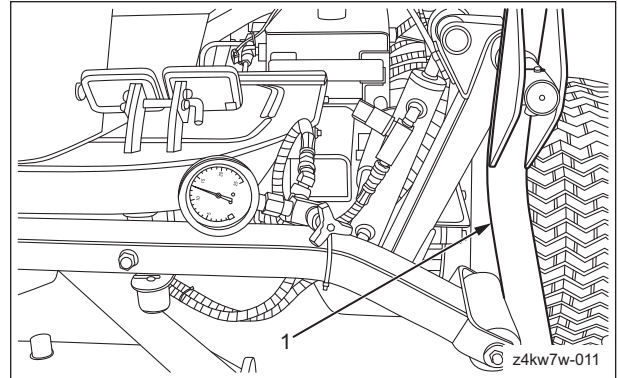
2. Install the pressure gauge for high pressure measurements between the removed hose and adapter.



Up/Down circuit_003

1	Hydraulic hose
2	Adapter
3	Pressure gauge for high pressure measurements

3. Make sure that the parking brake is applied, and then start the engine.

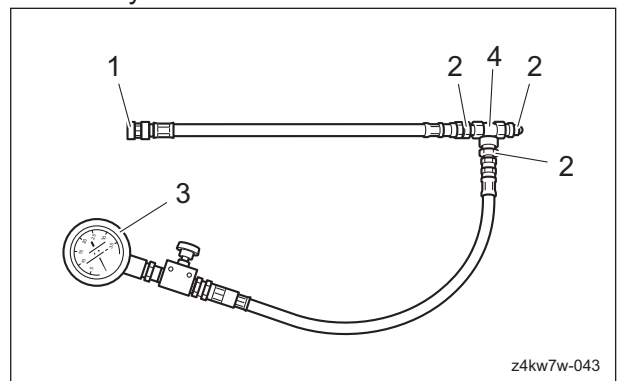


Up/Down circuit_004

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

4. Rev the engine up to the maximum rpm. The normal pressure is 13.7 MPa (1,986.95 psi) when the up/down lever is shifted to the "UP" position and the up/down cylinder is retracted to its maximum.

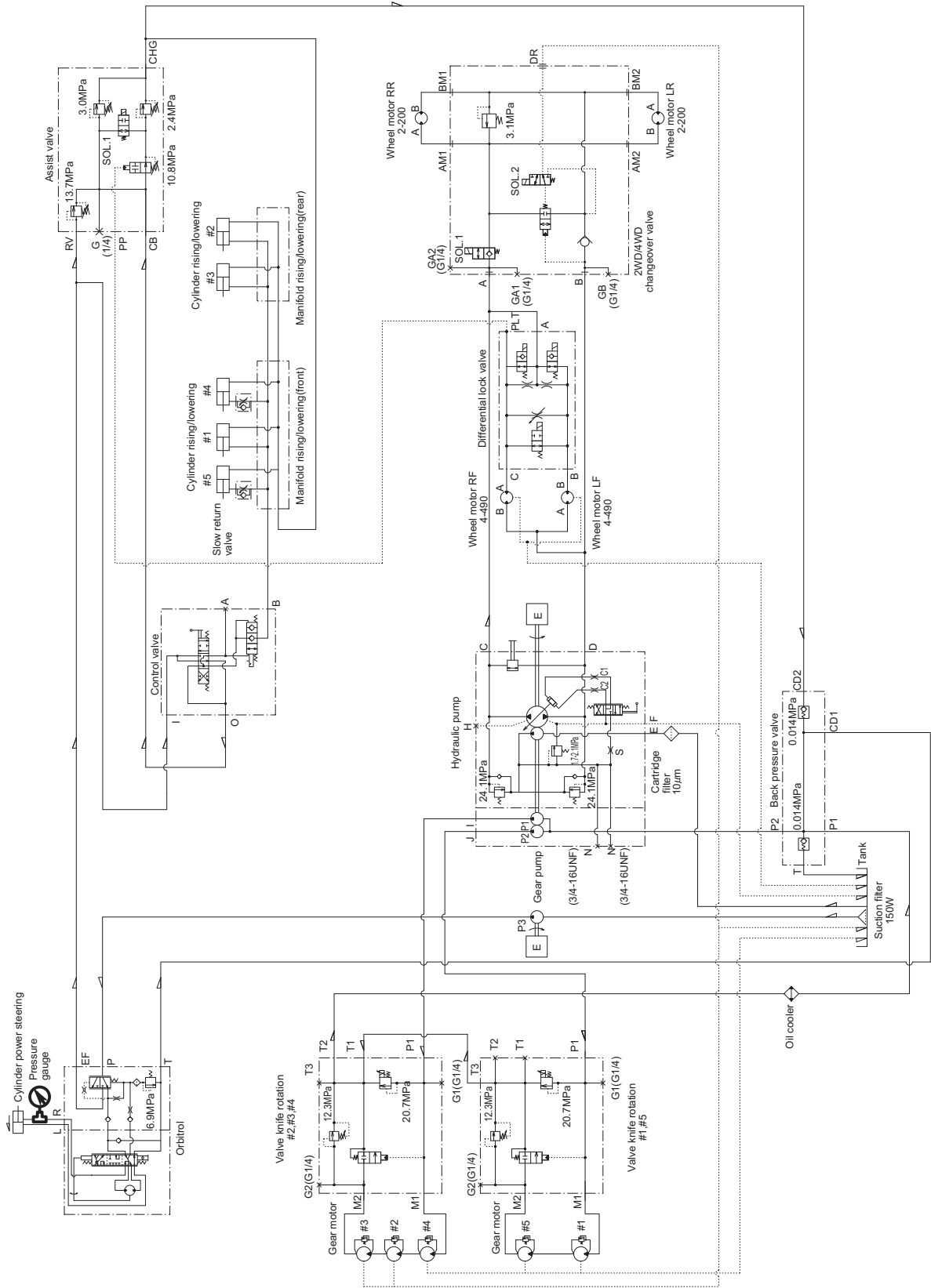
5. Items to Prepare for Measurement
Prepare a pressure gauge for high pressure measurements, T-joint TEF1/4, 6 adapter, and 6 hydraulic hose.



Up/Down circuit_005

1	6 Hydraulic hose
2	6 Adapter
3	Pressure gauge for high pressure measurements
4	T-joint TEF1/4

Steering Circuit



Steering Circuit_001

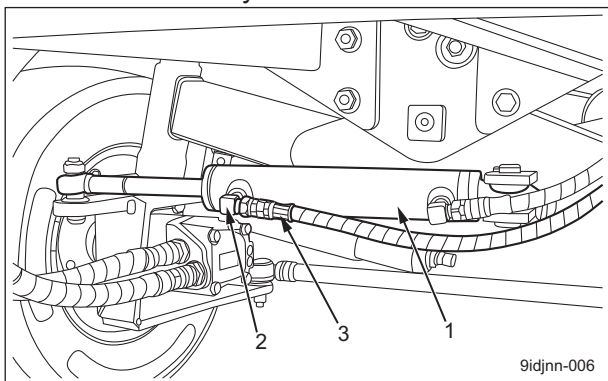
9idjnn-027E

Hydraulic system

⚠ Caution

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

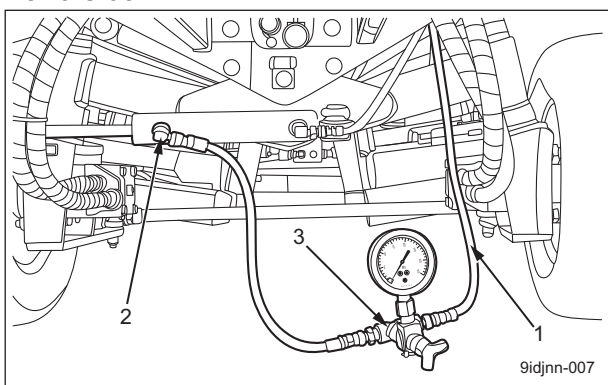
1. Remove the hydraulic hose from the elbow attached to the cylinder.



Steering Circuit_002

1	Cylinder
2	Elbow
3	Hydraulic hose

2. Install the pressure gauge for low pressure measurements between the removed hose and elbow.

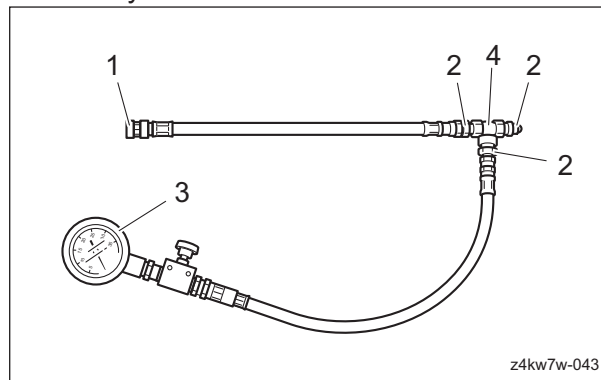


Steering Circuit_003

1	Hydraulic hose
2	Elbow
3	Pressure gauge for low pressure measurements

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

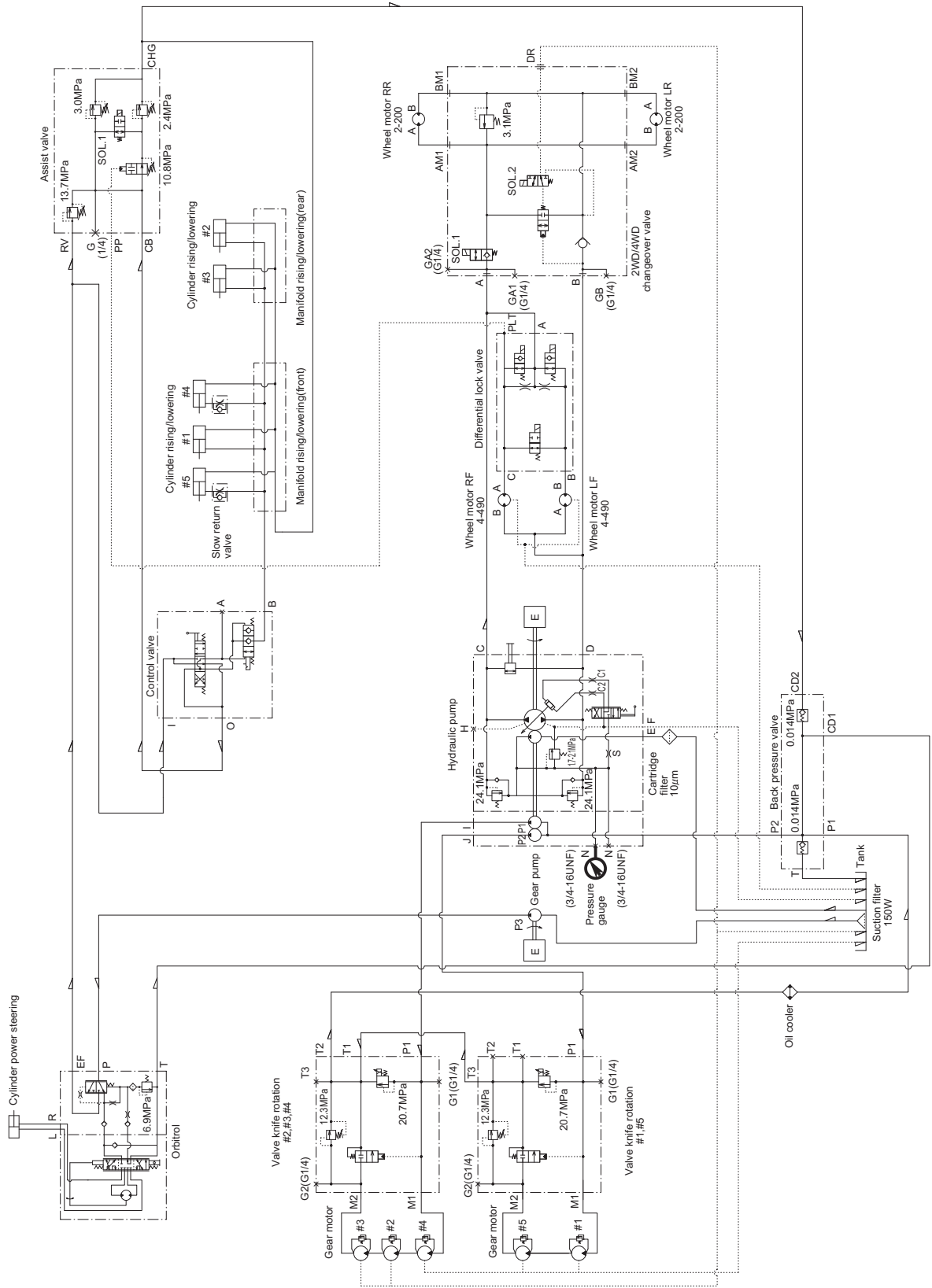
4. Items to Prepare for Measurement
Prepare a pressure gauge for low pressure measurements, T-joint TEF1/4, 6 adapter, and 6 hydraulic hose.



Steering Circuit_004

1	6 Hydraulic hose
2	6 Adapter
3	Pressure gauge for low pressure measurements
4	T-joint TEF1/4

Charge Circuit



Charge Circuit_001

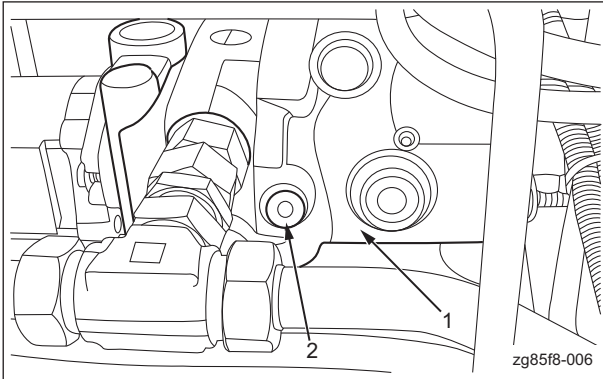
zg85f8-036E

Hydraulic system

⚠ Caution

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

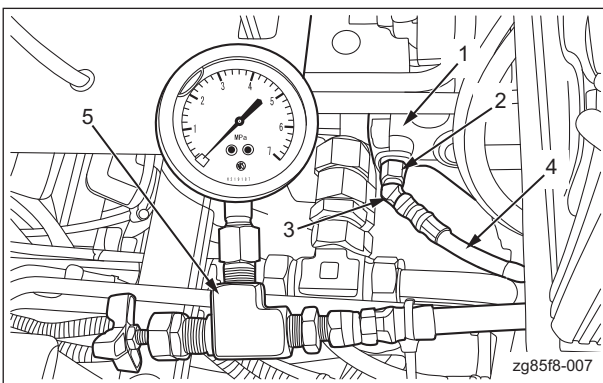
1. Remove the plug of the piston pump.



Charge Circuit_002

1	Piston pump
2	Plug

2. Attach the special bushing fitted with elbow to the piston pump, and then install the hydraulic hose and pressure gauge for extremely low pressure measurements, in order.



Charge Circuit_003

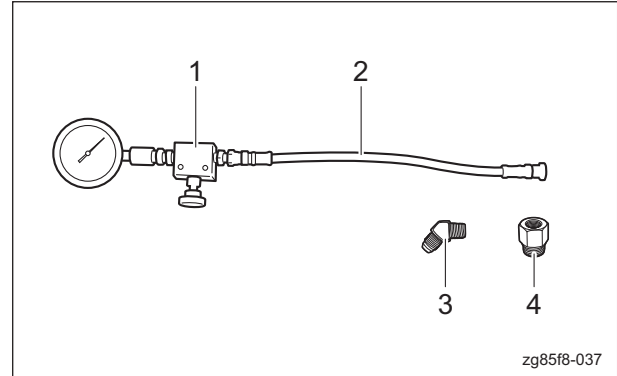
1	Piston pump
2	Special bushing (3/4-16NFPT1/4)
3	45 elbow (1035-6)
4	Hydraulic hose
5	Pressure gauge for extremely low pressure measurements

3. Make sure that the parking brake is applied, and then start the engine and rev it up to the maximum rpm.

The normal pressure is 1.7 to 2.1 MPa (246.56 - 304.57 psi).

4. Items to Prepare for Measurement

Prepare a pressure gauge for extremely low pressure measurements, 6 hydraulic hose, special bushing 3/4-16UNFPT1/4, and 45° elbow 1035-6.

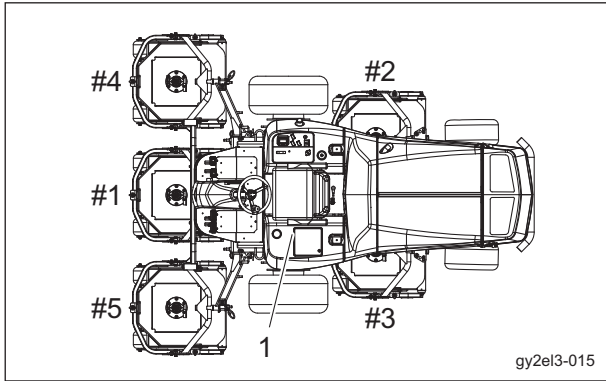


Charge Circuit_004

1	Pressure gauge for extremely low pressure measurements
2	6 Hydraulic hose
3	45° elbow 1035-6
4	Special bushing 3/4-16UNFPT1/4

Hydraulic system

Mower Units #1/#5



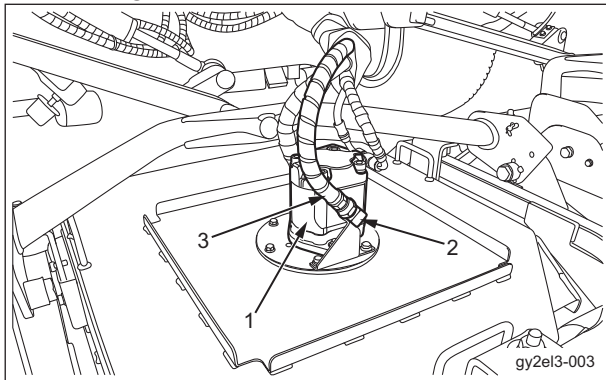
Mower Units #1/#5_001

1	Rotary Knife Rotation Valves
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Caution

Before starting pressure measurement, make sure that there are no people around the machine and that there are no objects under the mower units.

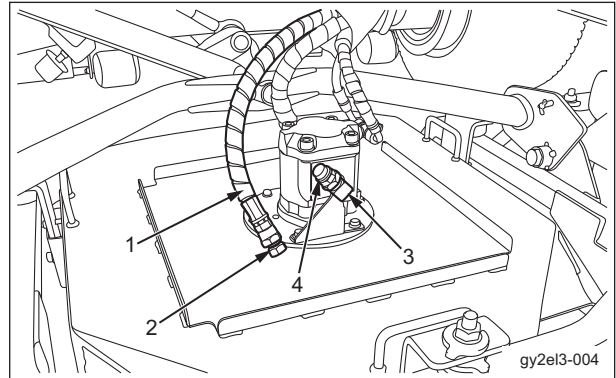
1. Move the machine onto a level surface, apply the parking brake, lower all mower units, and then stop the engine.
2. Remove the hydraulic hose from the elbow on the gear motor of mower unit #1.



Mower Units #1/#5_002

1	Gear motor
2	Elbow
3	Hydraulic hose

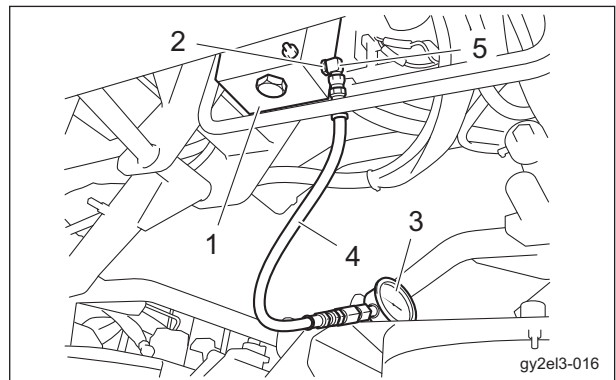
3. Install a screw cap (male) onto the removed hydraulic hose, and then install a screw cap (female) onto the elbow.



Mower Units #1/#5_003

1	Hydraulic hose
2	Male screw cap (PF1/2)
3	Elbow
4	Female screw cap (PF1/2)

4. Attach the hydraulic hose of the pressure gauge for high pressure measurements to the measuring port of the rotary knife rotation valve.



Mower Units #1/#5_004

1	Rotary knife rotation valve
2	Measuring port (G1)
3	Pressure gauge for high pressure measurements
4	Hydraulic hose
5	90° adjustable elbow 1086-6

Hydraulic system

⚠ Caution

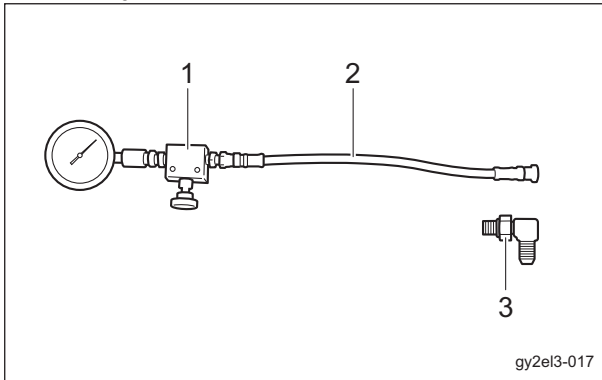
Be careful since the rotary knives of mower units #2/#3/#4 will rotate when the rotary knife rotation valve for mower units #1/#5 is being measured.

⚠ Caution

Before starting pressure measurement, make sure that there are no people around the machine and that there are no objects under the mower units.

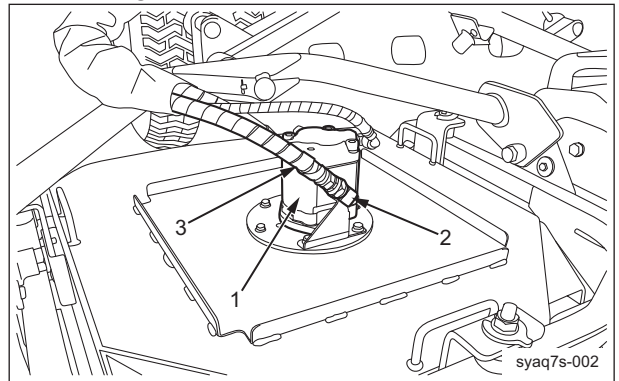
5. Make sure that the parking brake is applied, and then start the engine and rev it up to the maximum rpm.
The normal pressure is 20.7 MPa (3,002.18 psi) when the rotary knife rotation switch (ROTATION) is set to the "ON" position.
6. Items to Prepare for Measurement
Prepare a pressure gauge for high pressure measurements, high pressure hose, and 90° adjustable elbow 1086-6.

1. Move the machine onto a level surface, apply the parking brake, lower all mower units, and then stop the engine.
2. Remove the hydraulic hose from the elbow on the gear motor of mower unit #4.



Mower Units #1/#5_005

1	Pressure gauge for high pressure measurements
2	High pressure hydraulic hose
3	90° adjustable elbow

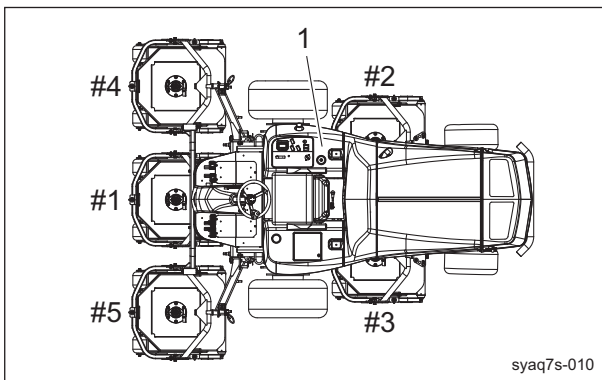


Mower Units #2/#3/#4_002

1	Gear motor
2	Elbow
3	Hydraulic hose

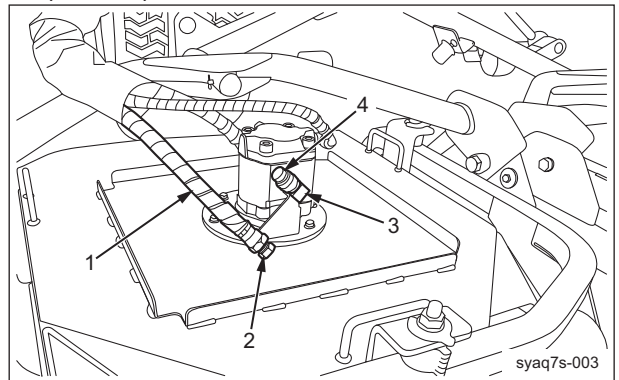
3. Install a screw cap (male) onto the removed hydraulic hose, and then install a screw cap (female) onto the elbow.

Mower Units #2/#3/#4



Mower Units #2/#3/#4_001

1	Rotary Knife Rotation Valves
---	------------------------------

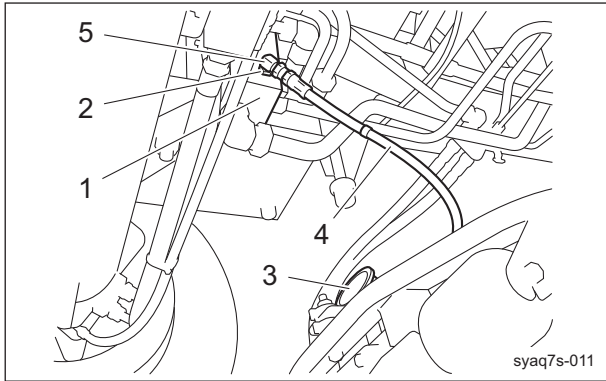


Mower Units #2/#3/#4_003

1	Hydraulic hose
2	Male screw cap (PF1/2)
3	Elbow
4	Female screw cap (PF1/2)

Hydraulic system

4. Attach the hydraulic hose of the pressure gauge for high pressure measurements to the measuring port of the rotary knife rotation valve.



Mower Units #2/#3/#4_004

1	Rotary knife rotation valve
2	Measuring port
3	Pressure gauge for high pressure measurements
4	Hydraulic hose
5	90° adjustable elbow 1086-6

1	Pressure gauge for high pressure measurements
2	High pressure hose
3	90° adjustable elbow

⚠ Caution

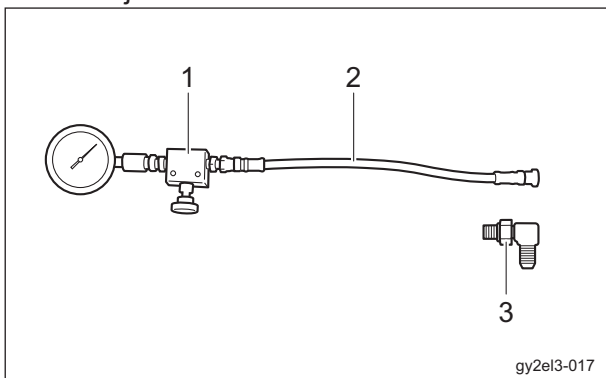
Be careful since the rotary knives of mower units #1/#5 will rotate when the rotary knife rotation valve for mower units #2/#3/#4 is being measured.

5. Make sure that the parking brake is applied, and then start the engine and rev it up to the maximum rpm.

The normal pressure is 20.7 MPa (3,002.18 psi) when the rotary knife rotation switch (ROTATION) is set to the "ON" position.

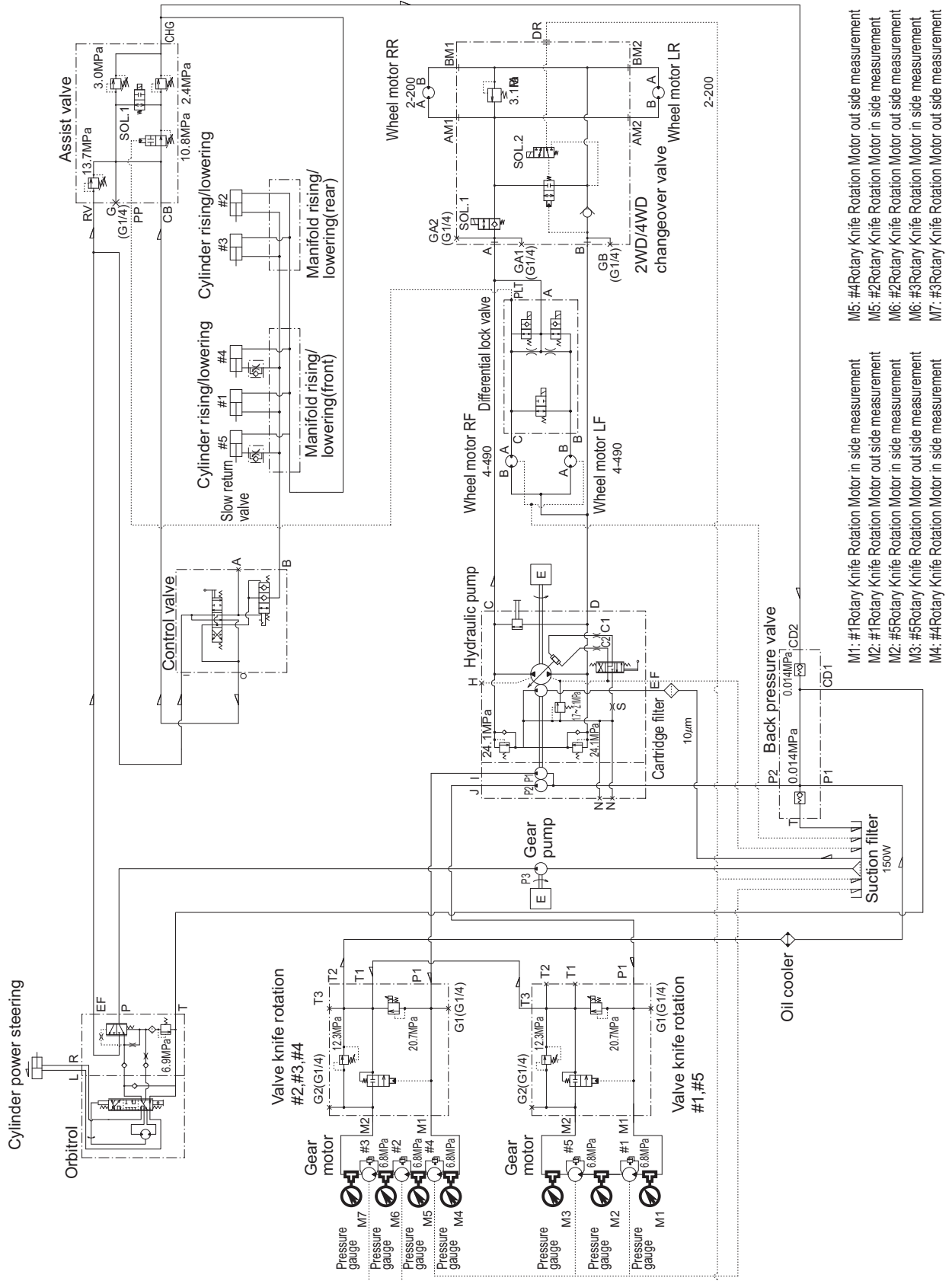
6. Items to Prepare for Measurement

Prepare a pressure gauge for high pressure measurements, high pressure hose, and 90° adjustable elbow 1086-6.



Mower Units #2/#3/#4_005

Rotary Knife Rotation Motor Circuit



- M1: #1 Rotary Knife Rotation Motor in side measurement
- M2: #1 Rotary Knife Rotation Motor out side measurement
- M2: #5 Rotary Knife Rotation Motor in side measurement
- M3: #5 Rotary Knife Rotation Motor out side measurement
- M4: #4 Rotary Knife Rotation Motor in side measurement
- M5: #4 Rotary Knife Rotation Motor out side measurement
- M5: #2 Rotary Knife Rotation Motor in side measurement
- M6: #2 Rotary Knife Rotation Motor out side measurement
- M6: #3 Rotary Knife Rotation Motor in side measurement
- M7: #3 Rotary Knife Rotation Motor out side measurement

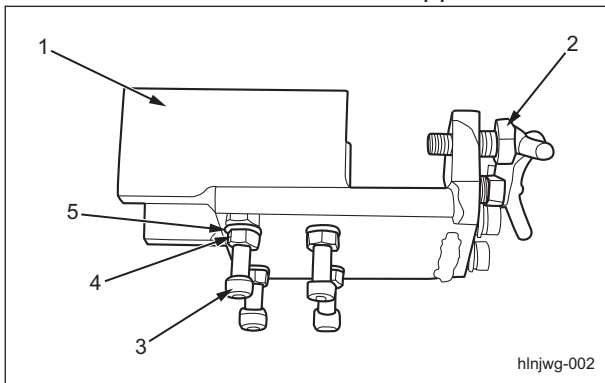
Rotary Knife Rotation Motor Circuit_001

Hydraulic system

⚠ Caution

Before starting pressure measurement, make sure that there are no people around the machine and that there are no objects under the mower units.

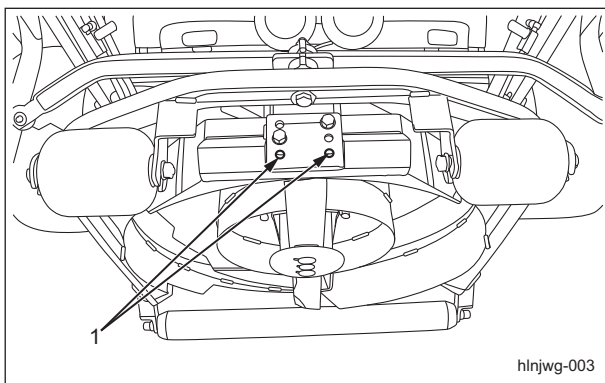
1. Move the machine onto a level surface, apply the parking brake, and then stop the engine.
2. Secure the rotary knife of the mower unit to be measured with the knife stopper.



Rotary Knife Rotation Motor Circuit_002

1	Knife stopper
2	Wing bolt
3	Bolt, w/hexagon hole
4	Nut
5	Spring washer

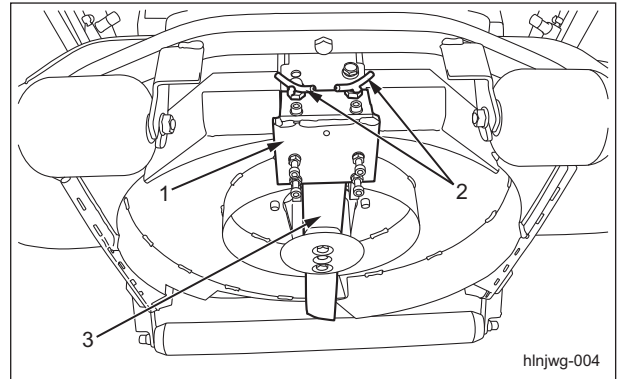
3. Install the knife stopper onto the cutting height adjusting holes at the front of #1 mower unit.



Rotary Knife Rotation Motor Circuit_003

1	Cutting height adjusting hole
---	-------------------------------

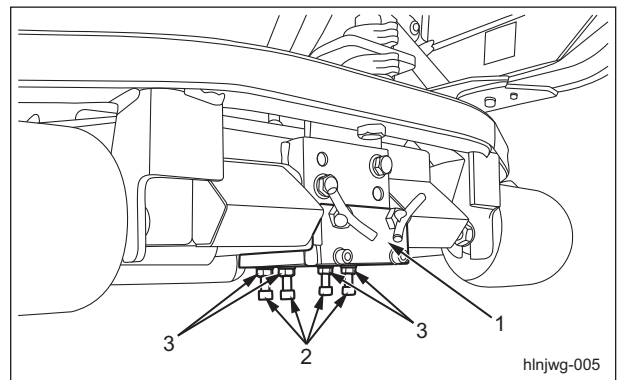
4. Loosen the wing bolts of the knife stopper, insert it onto the rotary knife, and then tighten the wing bolts in the cutting height adjusting holes.



Rotary Knife Rotation Motor Circuit_004

1	Knife stopper
2	Wing bolt
3	Rotary knife

5. Adjust the knife stopper with the four bolts w/ hexagon holes so that the stopper is level with the ground when #1 mower unit is lowered, and then secure the stopper with the nuts.

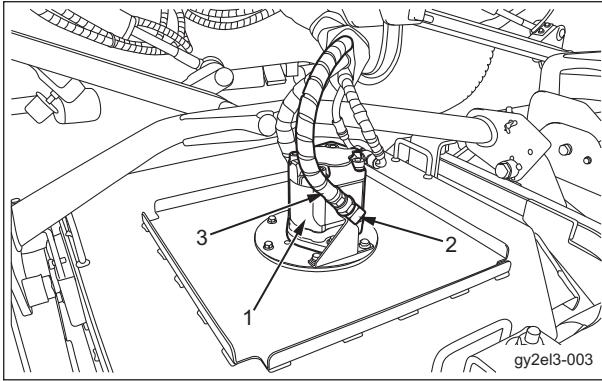


Rotary Knife Rotation Motor Circuit_005

1	Knife stopper
2	Bolt, w/hexagon hole
3	Nut

Hydraulic system

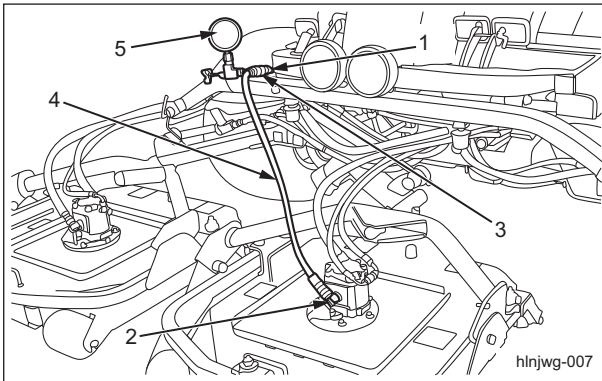
6. Remove the hydraulic hose from the elbow (IN side) on the gear motor of #1 mower unit.



Rotary Knife Rotation Motor Circuit_006

1	Gear motor
2	Elbow (IN side)
3	Hydraulic hose

7. Use a tee and hydraulic hose between the removed hose and elbow to install the pressure gauge for high pressure measurements.



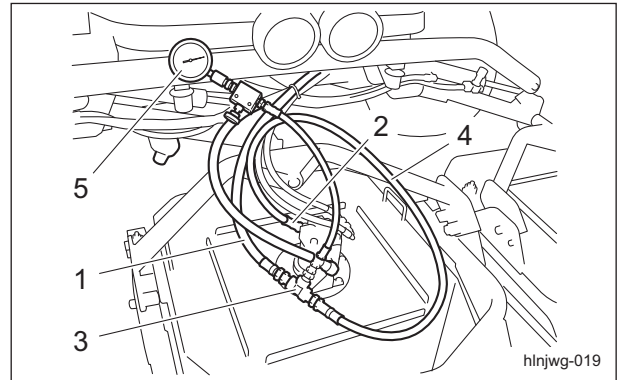
Rotary Knife Rotation Motor Circuit_007

1	Hydraulic hose (of this machine)
2	Elbow (IN side)
3	Tee
4	Hydraulic hose (for pressure measurement)
5	Pressure gauge for high pressure measurements

8. Make sure that the parking brake is applied, and then start the engine and rev it up to the maximum rpm.
Turn the rotary knife rotation switch (ROTATION) to the "ON" position, make a pressure measurement and record the reading. (IN side reading of pressure measurement)

9. Remove the pressure gauge for high pressure measurements from IN side of the gear motor of #1 mower unit and restore the original state.

Follow a similar procedure as IN side to install the pressure gauge for high pressure measurements between the hydraulic hose (OUT side) and elbow (OUT side) with a tee and hydraulic hose.



Rotary Knife Rotation Motor Circuit_008

1	Hydraulic hose (of this machine)
2	Elbow (OUT side)
3	Tee
4	Hydraulic hose (for pressure measurement)
5	Pressure gauge for high pressure measurements

10. Make sure that the parking brake is applied, and then start the engine and rev it up to the maximum rpm.
Turn the rotary knife rotation switch (ROTATION) to the "ON" position, make a pressure measurement and record the reading. (OUT side reading of pressure measurement)
11. The relief pressure of the gear motor is normal if the value obtained by subtracting OUT side reading of pressure measurement from IN side reading is as follows.
6.8 MPa (986.22 psi) for GM2810

Hydraulic system

Adjustment

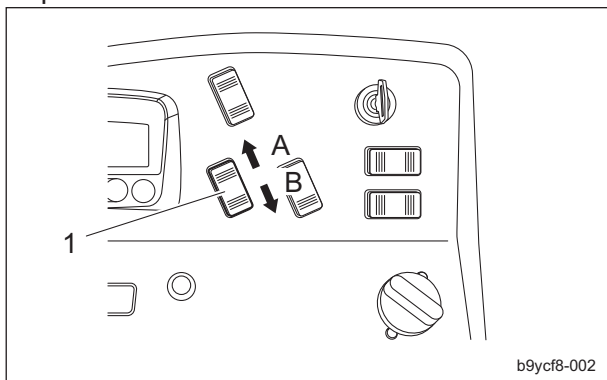
Assist Valve

Adjustment of Assist Valve

Caution

The following adjustment procedure applies to assist valves that are in their factory default state.

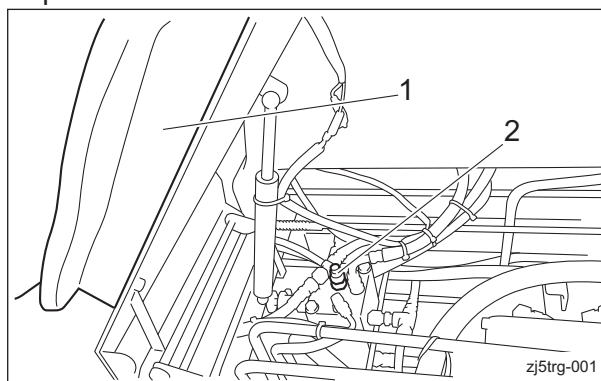
1. Before starting the adjustment, perform the following operations.
 - [1] Park the machine on a level, paved surface.
 - [2] Set the rotary knife rotation switch (ROTATION) to the "OFF" position and lower all mower units completely.
 - [3] Apply the parking brake, stop the engine, and then remove the key.
2. Set the traction assist switch to the "ON" position.



Adjustment of Assist Valve_001

1	Traction assist switch
A	ON
B	OFF

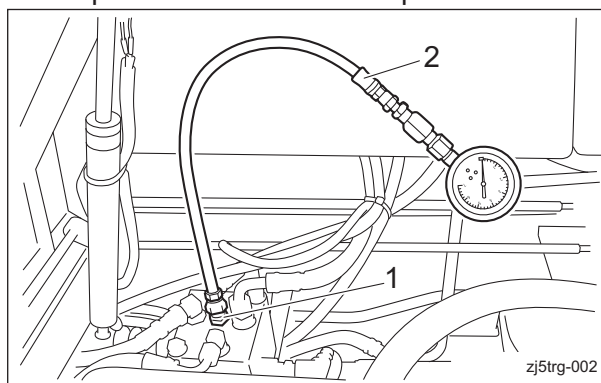
3. Lift the seat, and then remove the screw cap (female) of the pressure measurement port.



Adjustment of Assist Valve_002

1	Seat
2	Screw cap (female)

4. Install the pressure gauge for low pressure measurements onto the O-ring connector of the pressure measurement port.



Adjustment of Assist Valve_003

1	O-ring connector
2	Pressure gauge for low pressure measurements

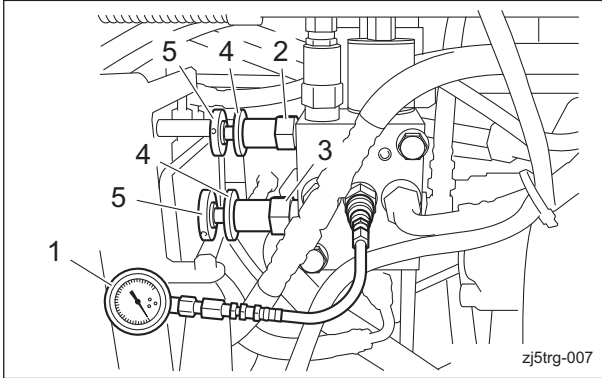
Important

Run the machine for approximately ten minutes to stabilize the hydraulic oil temperature.

5. Start the engine, and rev it up to the maximum rpm.
6. Set the rotary knife rotation switch (ROTATION) to the "OFF" position, and then apply the parking brake.

Hydraulic system

7. Loosen the lock knobs on the low-pressure valve and the high-pressure valve. Alternately turn the adjustment knobs for the low-pressure valve and the high-pressure valve clockwise, little by little, until the pressure reaches 3.1 MPa (435.10 psi).

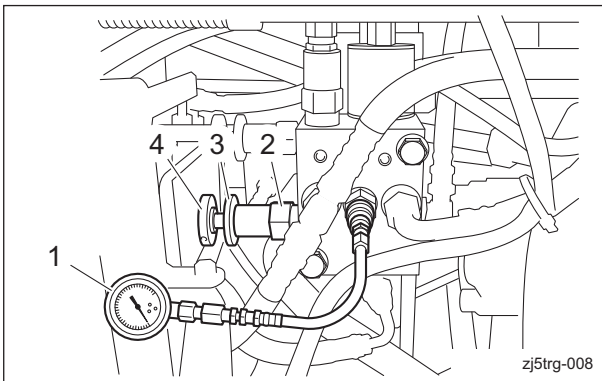


Adjustment of Assist Valve_004

1	Pressure gauge for low pressure measurements
2	Low-pressure valve
3	High-pressure valve
4	Lock knob
5	Adjustment knob

8. Follow the steps below to adjust the high-pressure valve settings.

- [1] Turn the adjustment knob for the high-pressure valve counterclockwise to set the pressure to 3.0 MPa (435.10 psi).
- [2] Tighten the lock knob for the high-pressure valve to lock the adjustment knob.

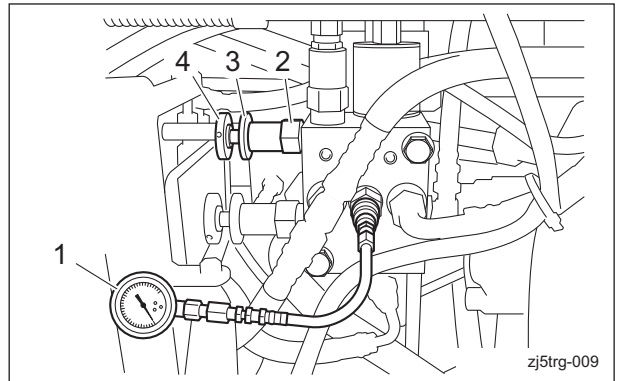


Adjustment of Assist Valve_005

1	Pressure gauge for low pressure measurements
2	High-pressure valve
3	Lock knob
4	Adjustment knob

9. Follow the steps below to adjust the low-pressure valve settings.

- [1] Make sure that the pressure gauge for low pressure measurements reads 3.0 MPa (435.10 psi).
- [2] Turn the adjustment knob for the low-pressure valve counterclockwise to set the pressure to 2.4 MPa (348.08 psi).
- [3] Tighten the lock knob for the low-pressure valve to lock the adjustment knob.



Adjustment of Assist Valve_006

1	Pressure gauge for low pressure measurements
2	Low-pressure valve
3	Lock knob
4	Adjustment knob

Important

Run the machine for approximately ten minutes to stabilize the hydraulic oil temperature.

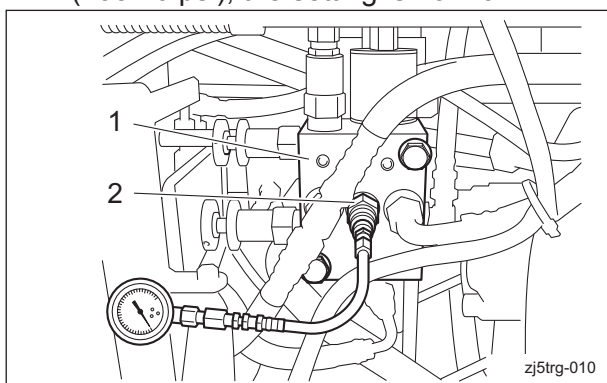
10. Before checking the settings, perform the following operations.

- [1] Start the engine, and rev it up to the maximum rpm.
- [2] Set the rotary knife rotation switch (ROTATION) to the "OFF" position and lower all mower units completely.
- [3] Apply the parking brake, stop the engine, and then remove the key.
- [4] Install the pressure gauge for low pressure measurements onto the O-ring connector of the pressure measurement port.
- [5] Start the engine, and rev it up to the maximum rpm.

Hydraulic system

11. Follow the steps below to check the settings.

- [1] If the pressure at the pressure measurement port of the assist valve is 2.4 MPa (348.08 psi), the low pressure setting is normal.
- [2] Sit on the seat, set the 2WD/4WD changeover switch (DRIVE) to the "2WD" position, and then firmly depress the brake pedal.
- [3] If slowly depressing the forward pedal switches the pressure at the pressure measurement port of the assist valve from a low pressure of 2.4 MPa (348.08 psi) to a high pressure of 3.0 MPa (435.10 psi), the setting is normal.



Adjustment of Assist Valve_007

1	Assist valve
2	Pressure measurement port

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 3-5).

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 suction filter, 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, hydraulic tank and suction filter, 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 3-10) " 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 hydraulic metal fitting of the pump
 - [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.

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Electrical system

Maintenance

About Maintenance

This chapter provides descriptions of the main inspection and maintenance operations for the GM2810 electrical system.

For information on daily checks, maintenance and handling of the machine, please refer to the separate GM2810 Owner's Operating Manual and Parts Catalog.

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

Specifications

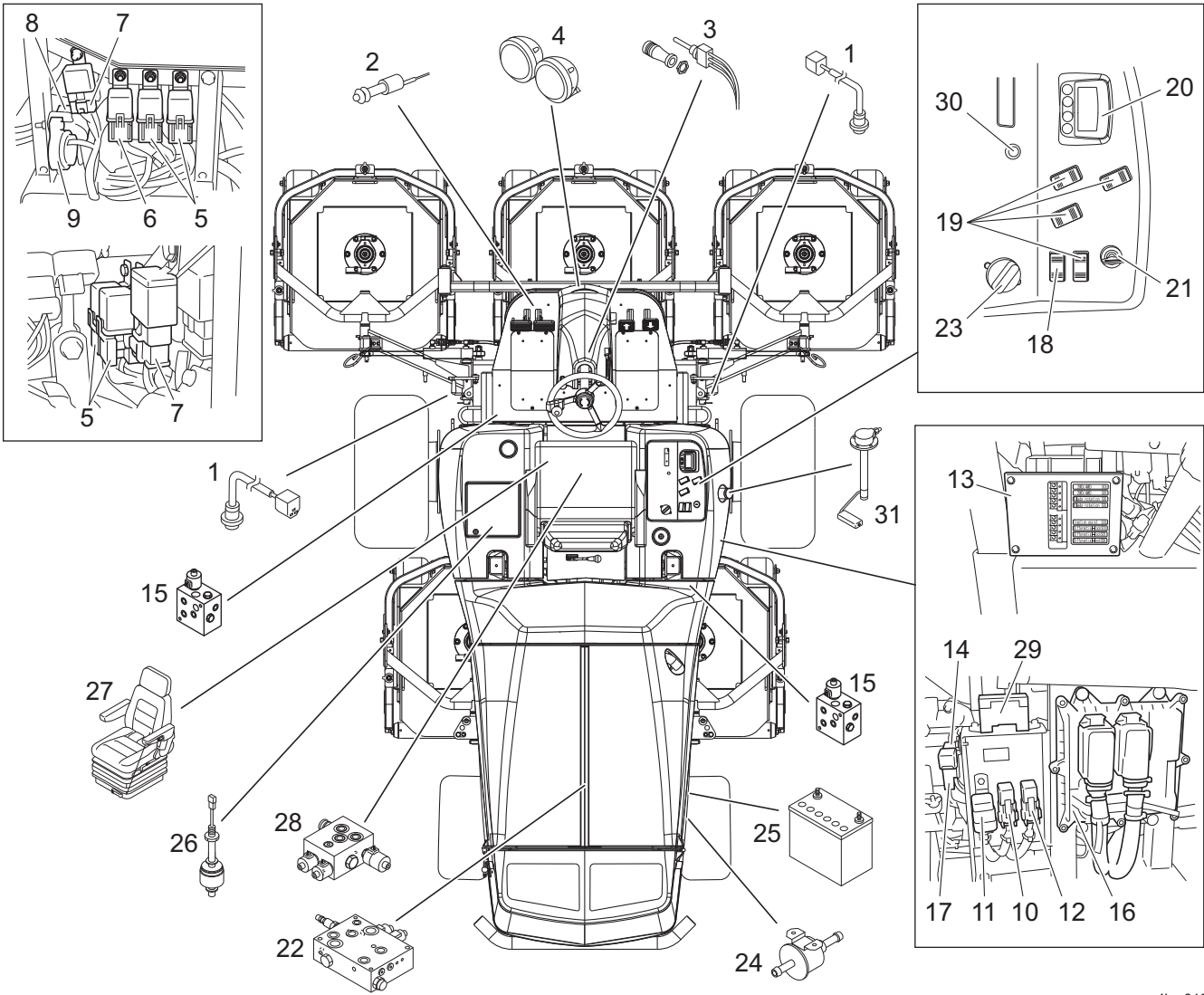
Adjusted Value

Parking brake switch	Slight clearance	Parking brake lever Clearance between the parking brake lever and the switch contact point when the brake lever at 5 notch
Proximity sensor	Outer ends of mower units #4/#5 400 mm (15.75 in) from the ground up to the outer ends of mower units #4/#5	Proximity sensor detection positions : #4/#5 mower arm fulcrum cam portions
	1 - 4 mm (0.04 - 0.16 in)	Distance between the sensors and #4/#5 mower arm fulcrum cam portions

Adjustment of Safety Switch

See ("Adjustment" (Page 5-8)) for method for adjustment.

Electrical Part Layout



erq4ky-012

Electrical Part Layout_001

1	Proximity sensor	12	Relay (main)	23	Potentiometer
2	Parking brake switch	13	Terminal relay	24	Fuel supply pump
3	Automatic return switch	14	Fusible link (30A)	25	Battery
4	Work lamp	15	Rotary knife rotation valve	26	Level switch
5	Power relay 411	16	ECU Assy	27	Seat switch
6	Power relay 602	17	Fusible link (50A)	28	Diff-lock valve
7	Power relay CA1	18	Rocker switch M	29	Mini fuse block
8	Buzzer (oil level)	19	Rocker switch	30	Toggle switch
9	Buzzer (water temperature)	20	Display	31	Fuel unit
10	Relay (starter)	21	Starter switch		
11	Relay (glow)	22	2WD/4WD changeover valve		

Electrical system

Electrical system

1. Proximity sensor
The proximity sensors are one of the safety switches that constitute the interlock system. Proximity sensors (position detection switches) are attached to the #4/#5 mower arm fulcrum. They detect the rise of the mower arms and stop the rotary knife rotation.
2. Safety switch [NC type (push to turn off)]
The parking brake switch is one of the safety switches that constitute the interlock system. It is located on the brake pedal fulcrum.
3. Automatic return switch
This switch turns the differential lock (solenoid valve HF78445-12COMP) for the left and right front wheels on or off. Tilt the switch lever up or down to turn the differential lock on. Release the switch lever to return it to the neutral position to turn the differential lock off. It is located to the right of the steering wheel.
4. Work lamps (12V 35 W)
Use the light switch on the control panel, located to the right of the seat, to turn the work lamps on or off. The lamps are located on the front part of the machine. These lamps provide auxiliary lighting. Do not travel or operate the machine at night or under poor visibility.
5. Power relay 411 (brown)
These power relays are located at the front inside of the control panel (which is located to the right of the seat). They are part of the interlock system and linked to the brake switch, neutral switch, starter switch and seat switch. They control the engine startup and operation.
6. Power relay 602 (gray)
This power relay is located at the front inside of the control panel (which is located to the right of the seat). It is a part of the interlock system and linked to the rotary knife rotation switch and the proximity sensors for mower units #4 and #5. It controls the rotary knife rotation.
7. Power relay CA1
This power relay is linked to the rotary knife rotation switch and seat switch. It controls the engine operation.
8. Buzzer (oil level)
This buzzer is linked to the level switch for the hydraulic tank. A continuous buzzer alarm will sound if the oil volume in the hydraulic tank decreases by approximately two (2) liters. The buzzer is located at the front inside of the control panel (which is located to the right of the seat).
9. Buzzer (water temperature)
When the temperature of the cooling water exceeds 120 °C the ECU Assy sends a signal and a buzzer (intermittent tone) sounds. The buzzer is located at the front inside of the control panel (which is located to the right of the seat).
10. Relay (starter)
Operating the starter switch causes the ECU Assy to send a signal and start the engine. The relay is located in front of the side cover and to the right.
11. Relay (glow)
Operating the starter switch causes the ECU Assy to send a signal and make preparations for the starting of the engine. The relay is located in front of the side cover and to the right.
12. Relay (main)
This relay is an ECU Assy dedicated relay. The relay is located in front of the side cover and to the right.
13. Terminal relay
This is located at the right of the tank cover. Each terminal relay has four circuits, and two terminal relays are used on this machine. One of the terminal relays controls operation of the differential lock and traction assist, and the other turns the rotary knives on or off and switches between 2WD and 4WD. The operating condition can be determined by checking the illumination of the LEDs.
14. Fusible link
The fusible link functions as the engine glow fuse, and as the fuse for the charge circuit. It is located at the right front, under the hood. It is equipped with a specialized fuse (50A) cartridge.

15. Rotary knife rotation valve (knife rotation solenoid)
These valves are linked to the rotary knife rotation switch and the proximity sensors. They switch the hydraulic path inside the manifold and rotate or stop the rotary knives. Rotation valves #1/#5 are located under the floor of the driver's seat, on the left. Rotation valves #2/#3/#4 are located under the floor of the driver's seat, on the right.
16. ECU Assy
The ECU Assy controls Exhaust Emission Standard Tier 4 compatible devices and the engine overall.
The assy is located at the right front under the hood.
17. Fusible link
The fusible link functions as the main fuse for the overall operation of the engine. It is located at the right front, under the hood. It is equipped with a specialized fuse (30 A) cartridge.
18. Rocker switch M
The rocker switch M is used as a switch for starting the DPF parking regeneration switch.
It is located on the control panel (which is located to the right of the seat).
19. Rocker switch
The rocker switch is used for the knife rotation switch, 2WD/4WD changeover switch, DPF automatic regeneration inhibit switch and traction assist switch.
It is located on the control panel (which is located to the right of the seat).
20. Display
The display displays all engine information. It is located on the control panel (which is located to the right of the seat).
21. Starter switch
This is used to start, run or stop the engine. It is located on the control panel (which is located to the right of the seat).
22. 2WD/4WD changeover valve (2WD/4WD solenoid)
This is linked to the 2WD/4WD changeover switch, rotary knife rotation switch and the proximity sensors. It switches the hydraulic path inside the manifold and switches between 2WD and 4WD.
It is located behind the rear wheel pivot.
23. Potentiometer
This controls the rotation of the engine. It is located on the control panel (which is located to the right of the seat).
24. Fuel supply pump
This sends the fuel that has passed through the fuel filter to the injection pump. It is located to the rear right of the engine.
25. Battery
The battery supplies power to the starter at the start of the engine, as well as to all electrical parts.
It is located to the front left of the engine.
26. Level switch
This is linked to the buzzer (oil level). The switch will be engaged and a continuous buzzer alarm will sound if the oil volume in the hydraulic tank decreases (the float descends) by approximately two (2) liters (0.53 U.S. gal.).
27. 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 seat cushion.
28. Diff-lock valve (diff-lock solenoid)
This valve is linked to the auto-return switch. It switches the hydraulic path inside the manifold and turns the diff-lock for the left and right front wheels on or off.
The diff-lock valve is located in the upper part of the front axle.
29. Mini fuse block
Each electrical device is connected through the fuse block to the ignition key switch. The machine uses a standard mini fuse for automobiles.
The fuse block is located at the right front under the hood.
30. Toggle switch
The toggle switch is used to turn the work lamp ON or OFF.
It is located on the control panel (which is located to the right of the seat).
31. Fuel unit
The fuel unit is connected to the ECU Assy. The remaining fuel volume measurement is displayed on the monitor screen based on the position of the float.
It is located on top of the fuel tank.

Electrical system

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.

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

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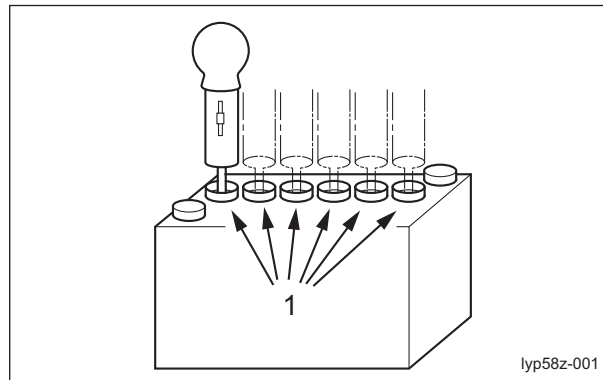
Measurement of Battery Specific Weight_001

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
---	------

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 5-6))
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 operator inattentiveness using combined control with multiple switches and sensors.

The seat switch, traveling pedal [Neutral] and parking brake switch activate the relay to stop the engine. They are linked to the knife rotation switch.

The rotary knife rotation stop solenoid is linked to relay operation by a proximity switch.

Interlock System Operation Requirements

	Operation	Seat	Parking brake	Rotary knife rotation switch	Traveling pedal
1	Start the engine	Seated	Applied	OFF	Move foot away (neutral)
2	Stop the engine	Away	Released	—	—
3	Stop the engine	Away	Applied	ON	—

- The engine will not start unless you are seated, the parking brake is applied, your foot is away from the traveling pedal, and the rotary knife rotation switch is [OFF].
- The engine will stop if you release the parking brake and leave the seat.
 Note:
 If you leave the seat while the engine is running, apply the parking brake.
- The engine will stop when the knife rotation switch is [ON] even if you apply the parking brake and leave the seat.
 Note:
 If you want to leave the seat while the engine is running, apply the parking brake and turn the knife rotation switch [OFF].

Confirming Operation of Interlock System

- 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 traveling pedal (neutral), and the rotary knife rotation switch is not met.

- With the engine started and the rotary knife rotating, shift the mower unit up/down lever to the "UP" position to raise the mower units, and then check the following.
 - When mower unit #4 is raised by 400 mm (15.75 in), check that the rotary knives for mower units #2, #3, and #4 stop rotating.
 - When mower unit #5 is raised by 400 mm (15.75 in), check that the rotary knives for mower units #1 and #5 stop rotating.

Electrical system

Adjustment

Proximity Sensor

1. Start the engine, raise mower units #1, #4, and #5 by 30 cm (11.81 in), and then turn off the engine.

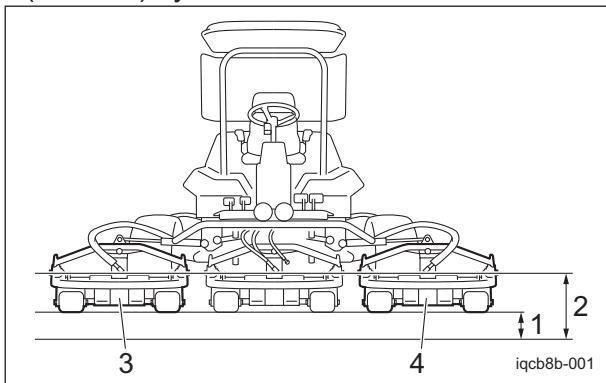
Warning

Be sure to stop the engine before adjusting the proximity sensor.

Warning

Do not crawl under the mower units.

2. Turn the key switch ON (the engine remains stopped); turn the rotary knife rotation switch ON; and then lift up mower unit #5 by 40 cm (15.75 in) by hands.



Proximity Sensor_001

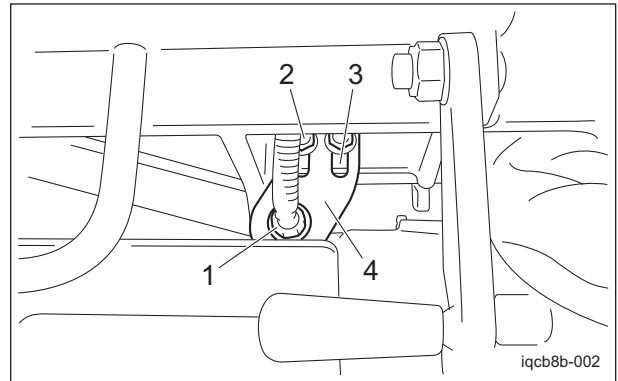
1	Setting value 30cm (11.81 in)
2	Setting value 40 cm (15.75 in)
3	Mower unit #4
4	Mower unit #5

Caution

See the list in "Tightening torques" (Page 3-5) .

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

3. Loosen two bolts, slide the switch mounting board slowly until the illuminated proximity sensor on the switch mounting bracket turns off. Then, fasten the board using the two bolts.



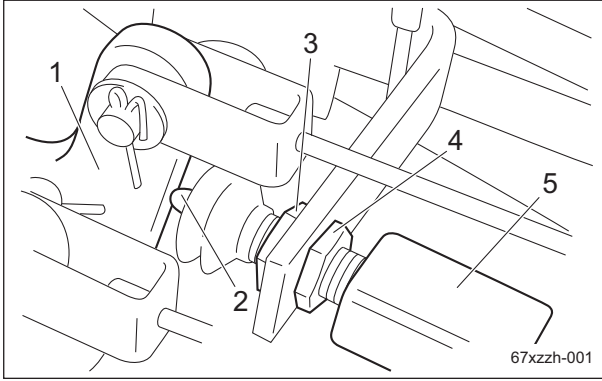
Proximity Sensor_002

1	Proximity sensor
2	Bolt
3	Long hole (for adjusting the proximity sensor)
4	Switch mounting board

4. Adjust the proximity sensor for mower unit #4 by the same procedure.

Parking Brake Switch

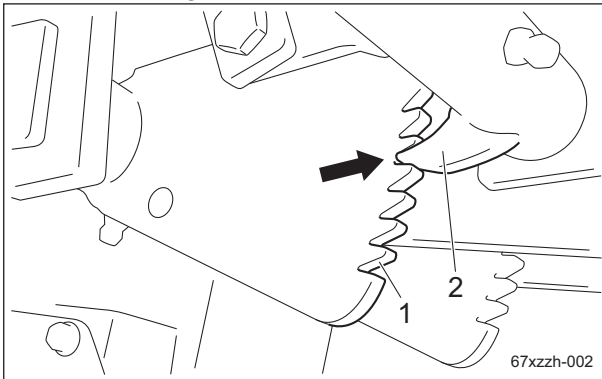
The parking brake is equipped with a parking brake switch, one part of the interlock system. The switch contact point is activated through the operation of the brake pedal, controlling starting and stopping of the engine.



Parking Brake Switch_001

1	Brake pedal
2	Switch contact point
3	Adjusting nut A
4	Adjusting nut B
5	Parking brake switch

1. Link the left and right brake pedals, and then pull up the parking brake lever to apply the parking brake. (See "RT mechanical brake manual" (Page 9-13) .)



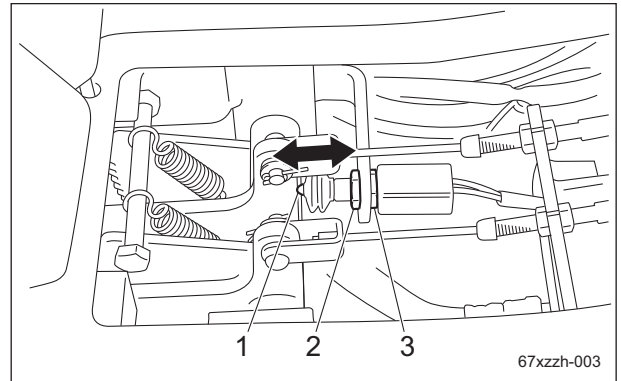
Parking Brake Switch_002

1	Notch
2	Parking brake stopper

Important

After adjusting the foot brake wire, check that the machine is firmly stopped with the parking brake at notch 5 - 6. (See "Adjusted Value of the Foot Brake Wire" (Page 6-3) .)

2. With the parking brake at notch 5, adjust adjusting nut A and adjusting nut B of the parking brake switch to create a slight clearance at the switch contact point.



Parking Brake Switch_003

1	Switch contact point
2	Adjusting nut A
3	Adjusting nut B

Important

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

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

4. 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 5 and the rotary knife switch 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. (See "Interlock System" (Page 5-7) .)

Electrical system

Electrical components

About the Electrical components

Warning

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

Safety Switches

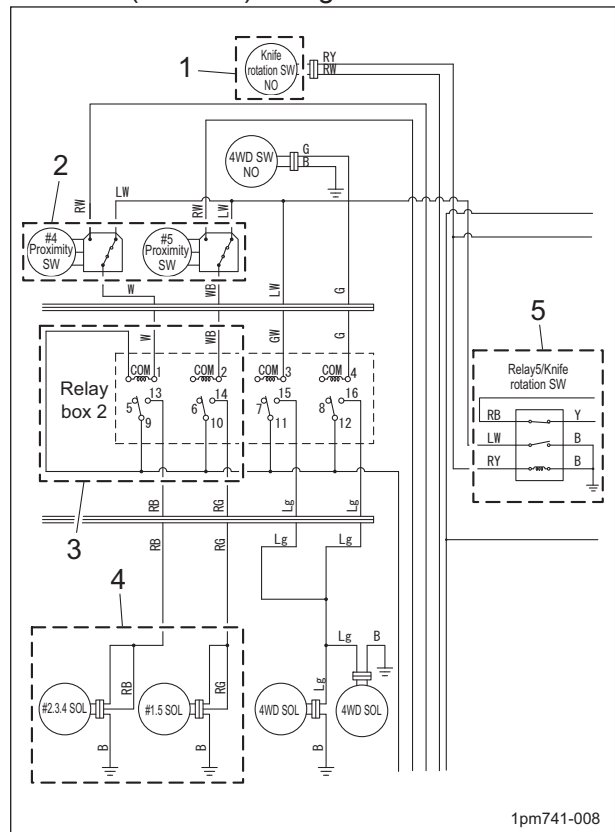
The following devices are used as safety switches to prevent injuries and accidents due to operator inattentiveness.

1. Related to engine starting and operation (See "Interlock System" (Page 5-7) ".)
 - Seat switch
 - Parking brake switch
 - Rotary knife rotation switch
 - Traveling pedal neutral switch
2. Related to rotary knife rotation
 - Proximity sensor

Rotary Knife Rotation Circuit

The rotary knife rotation is controlled by open/close of the rotary knife rotation valve by the operation switch (rocker switch), the rotary knife rotation relay, the proximity sensor, terminal relay and the solenoid valve.

The proximity sensor controls to stop rotation of the rotary knife when the outer edges of the Mower Units #4/#5 are at ground height of 400 mm (15.75 in) or higher.



1pm741-008

Rotary Knife Rotation Circuit_001

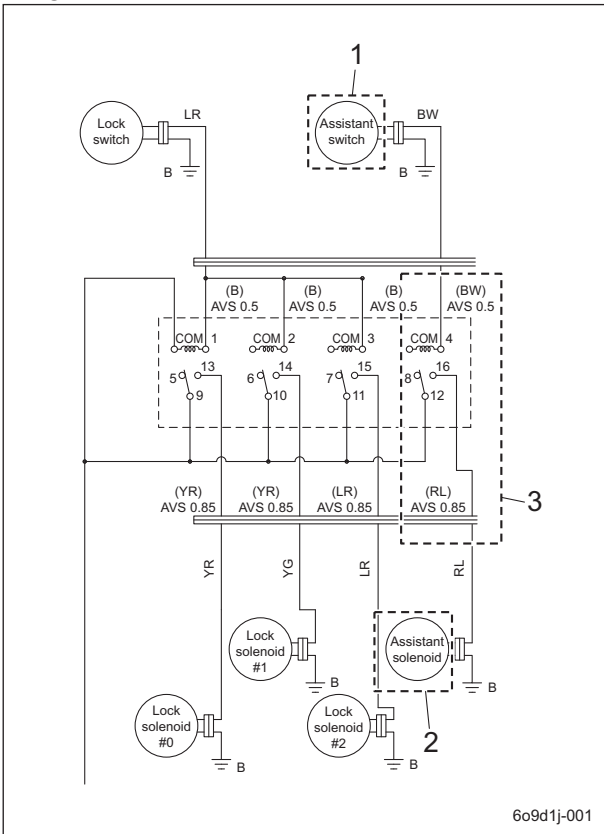
1	Operation switch (rocker switch)
2	Proximity sensor
3	Terminal relay
4	Solenoid valve
5	Rotary knife rotation relay

Electrical system

Assist Circuit

The traction assist switching operation is controlled by the assist switch (rocker switch), terminal relay, and the opening and closing of the assist valve that is controlled by the solenoid valve.

The traction assist switching provides two stages of traction assist effects.

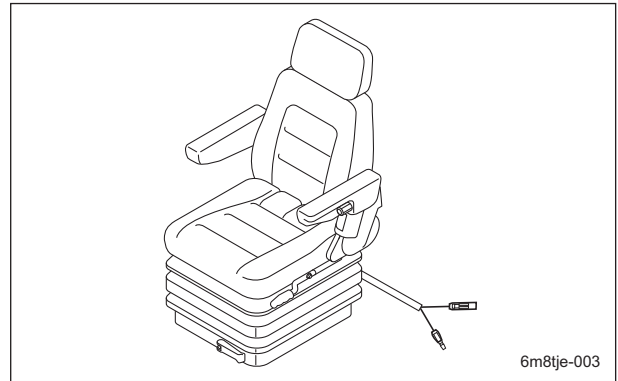


Assist Circuit_001

1	Assist switch (rocker switch)
2	Terminal relay
3	Solenoid

Seat Switch

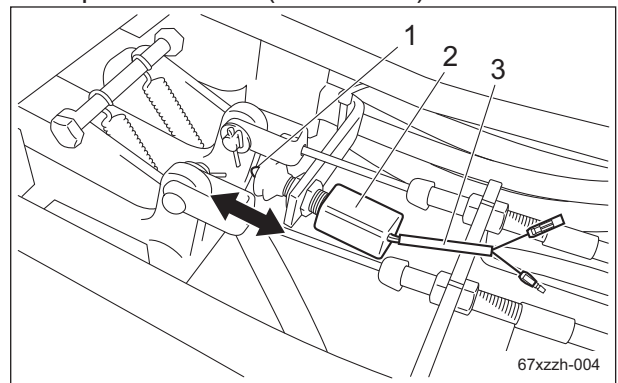
The seat switch is located right underneath the seat and is not usually conducted. It is normal if it is conducted when seated (pressed).



Seat Switch_001

Parking Brake Switch

The parking brake switch is located at the brake pedal fulcrum (under floor).



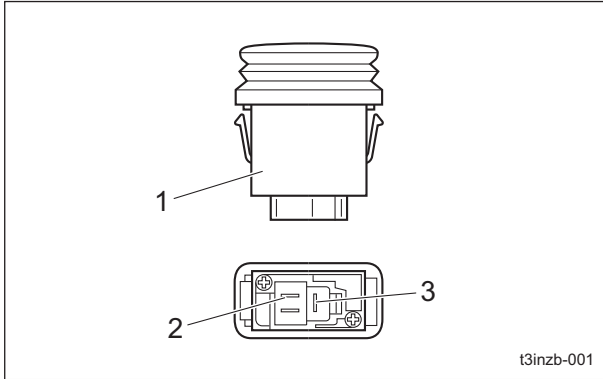
Parking Brake Switch_001

1	Switch operation part
2	Parking brake switch
3	Wiring

1. It is normal if two wires are conducted between them when the brake pedal is depressed.(Condition that switch operation part is completely extended)
2. It is normal if two wires are not conducted between them when the brake pedal is released.(Condition that switch operation part is completely retracted)

Rocker Switch

Rocker switches are located in the operation panel and are used for the rotary knife rotation switch, 4WD switch, DPF auto regeneration inhibit switch and assist switch.



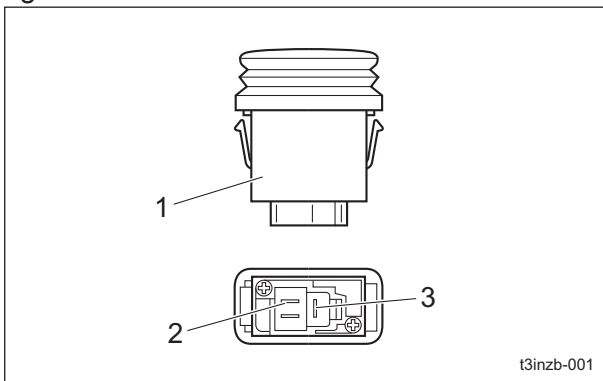
Rocker Switch_001

1	Rocker switch
2	C
3	A

Normal operation is when there is continuity between sockets A and C with the rocker switch in the "ON" position and no continuity between sockets A and C with it in the "OFF" position.

Rocker switch M

The rocker switch is located in the operation panel and is used for the DPF parking regeneration switch.



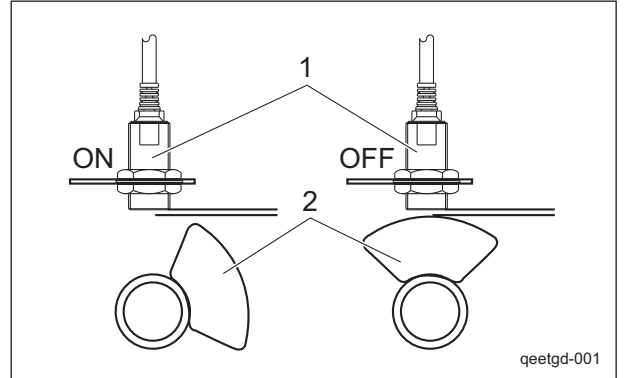
Rocker Switch_001

1	Rocker switch
2	C
3	A

Normal operation is when there is conduction between sockets A and C when the rocker switch is pressed to the operation side, and no conduction between sockets A and C when the rocker switch is released.

Proximity Sensors

Proximity sensors detect through non-contact methods that objects are nearby.

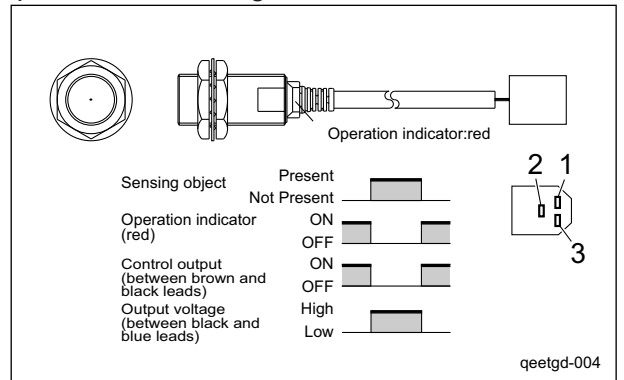


Proximity Sensor_001

1	Proximity sensors
2	Object (metal)

If an object is away from the proximity sensor, the sensor is set to the "ON" position and the operation indicator lights up in red.

If an object is near the proximity sensor, the sensor is set to the "OFF" position and the operation indicator goes off.



Proximity Sensor_002

1	Connector terminal (brown; +)
2	Connector terminal (black; output)
3	Connector terminal (blue; -)

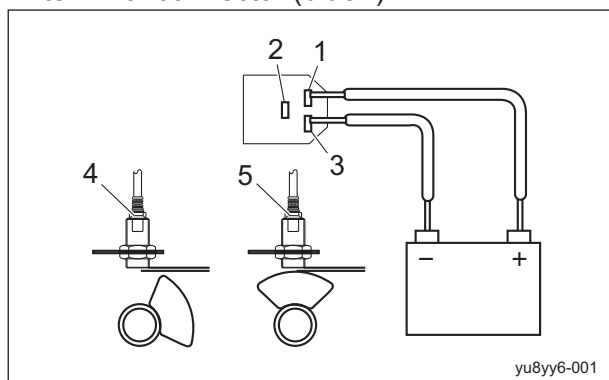
Electrical system

Inspection of Action Indicator

⚠ Caution

Make sure not to short-circuit the battery terminals.

1. Connect the battery (+) to the connector terminal (brown/+), and the battery (-) to the terminal connector (blue/-).



Inspection of Action Indicator_001

1	Connector terminal (brown/+)
2	Connector terminal (black/output)
3	Connector terminal (blue/-)
4	ON (red)
5	OFF

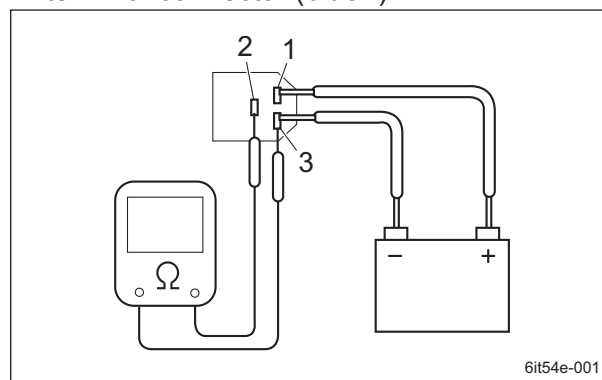
2. It is normal if the action indicator is illuminated red when the object to be detected is away from the proximity sensor, and the action indicator is turned off when the object is close to the proximity sensor.

Inspection of Control Output

⚠ Caution

Make sure not to short-circuit the battery terminals.

1. Connect the battery (+) to the connector terminal (brown/+), and the battery (-) to the terminal connector (blue/-).



Inspection of Control Output_001

1	Connector terminal (brown/+)
2	Connector terminal (black/output)
3	Connector terminal (blue/-)

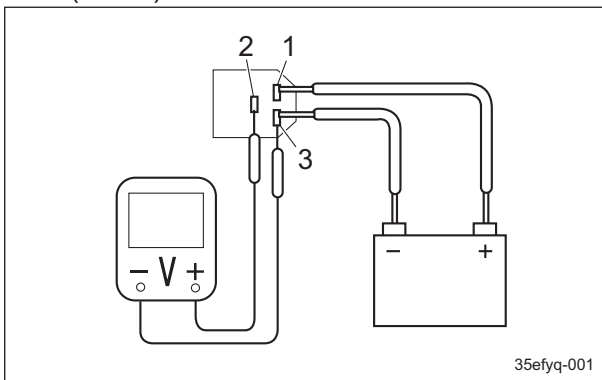
2. It is normal if there is conduction between the connector terminal 2 and 3 when the object to be detected is away from the proximity sensor, and there is no conduction between the connector terminal 2 and 3 when the object is close to the proximity sensor.

Inspection of Output Voltage

⚠ Caution

Make sure not to short-circuit the battery terminals.

1. Follow the steps below to connect the battery and voltmeter.
 - [1] Connect the battery (+) to the connector terminal (brown/+), and the battery (-) to the connector terminal (blue/-).
 - [2] Connect the voltmeter (+) to the connector terminal (black/output) and the voltmeter (-) to the connector terminal (blue/-).



35efyq-001

Inspection of Output Voltage_001

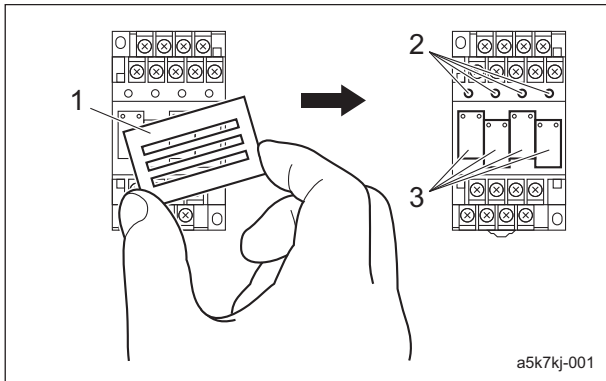
1	Connector terminal (brown/+)
2	Connector terminal (black/output)
3	Connector terminal (blue/-)

2. It is normal if the voltage between the connector terminals 2 and 3 is 0 V when the object to be detected is away from the proximity sensor, and the voltage between the connector terminals 2 and 3 is battery voltage (12 V) when the object is close to the proximity sensor.

Electrical system

Terminal Relay

Terminal relays control operation of the diff-lock, rotation of the rotary knives, 2WD/4WD selection and traction assist selection. The operating condition can be checked by the illumination of the LEDs. Two terminal relays of four circuits each are used.

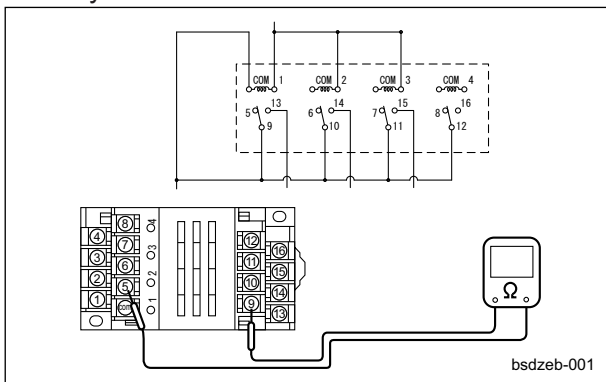


Terminal Relay_001

1	Cover
2	LED
3	Power relay

Inspection of Terminal Relay

1. Have ready a simple terminal relay.
2. It is normal that there is conduction between terminals 5 and 9 of the terminal relay.



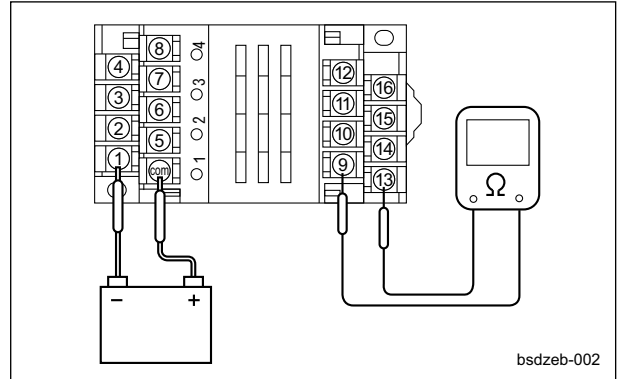
Inspection of Terminal Relay_001

3. Inspect the remaining three circuits in the same way.
 - Between 6 and 10
 - Between 7 and 11
 - Between 8 and 12

⚠ Caution

Do not short-circuit the battery terminals.

4. It is normal that there is conduction between 9 and 13 and LED1 lights up with the battery connected between COM and 1.



Inspection of Terminal Relay_002

5. Inspect the remaining three circuits in the same way.

- Between 10 and 14
- Between 11 and 15
- Between 12 and 16

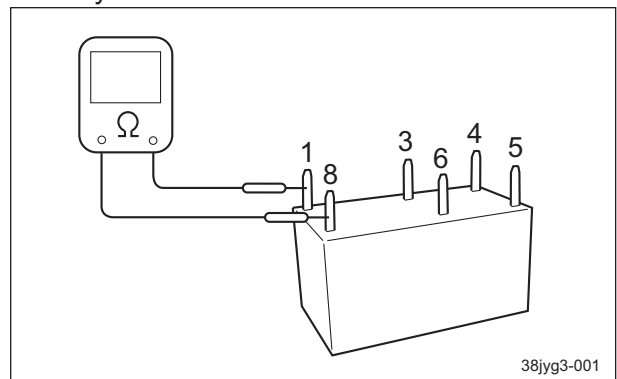
BTT (+)	BTT (-)	Tester	LED
COM	1	9 - 13	1
COM	2	10 - 14	2
COM	3	11 - 15	3
COM	4	12 - 16	4

Inspection of Power Relay

Note:

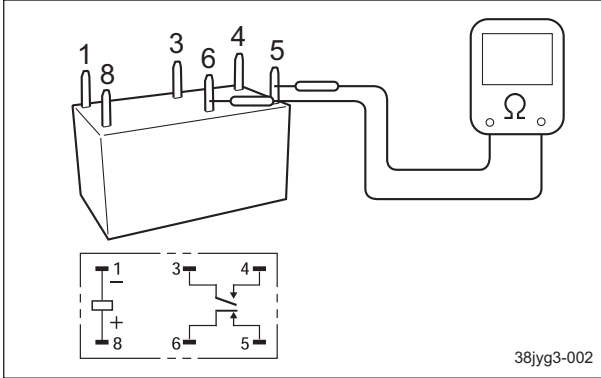
All the power relays have the same internal circuits. Accordingly the inspection method should be the same.

1. Disconnect the power relay from the terminal relay.
2. The normal measured resistance between relay terminals 1 and 8 is about 480 Ω.



Inspection of Power Relay_001

3. Normal operation is when there is conduction between relay terminals 5 and 6 and no conduction between relay terminals 3 and 4.



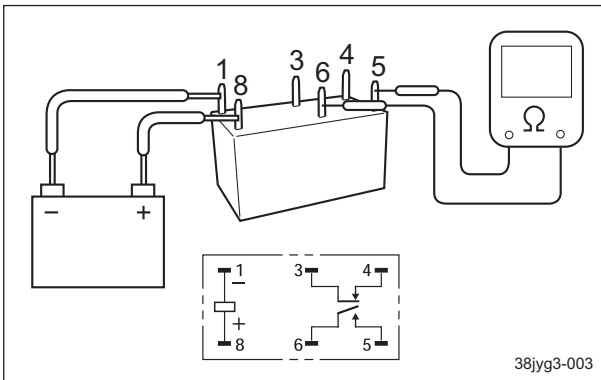
Inspection of Power Relay_002



Caution

Do not short-circuit the battery terminals.

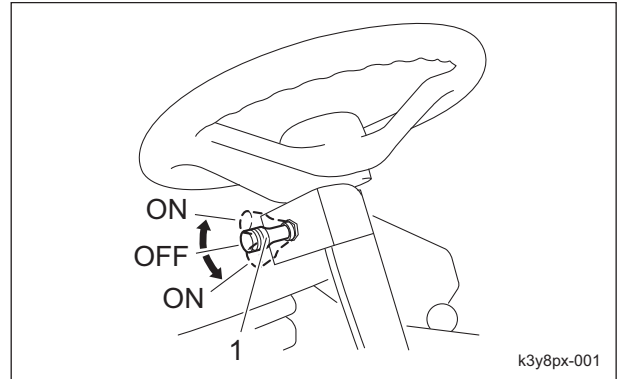
4. Normal operation is when there is no conduction between 5 and 6 and there is conduction between relay terminals 3 and 4 with the battery connected to relay terminals 1 and 8.



Inspection of Power Relay_003

Diff-Lock Switch

An auto-return switch is used, and it is located below the steering wheel on the right side. Flip the switch up or down to engage the differential lock for the front wheels. When the switch is released, it returns it to its neutral position and the differential lock is disengaged.

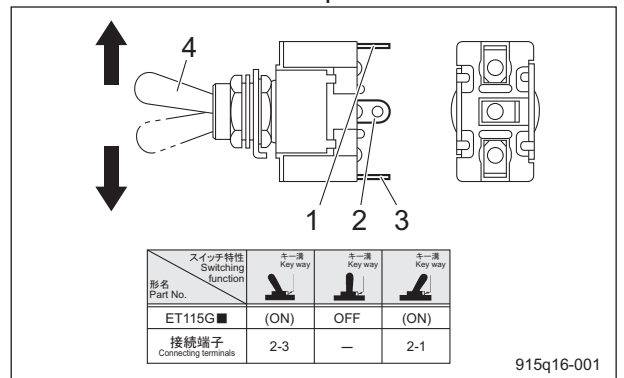


Diff-Lock Switch_001

1	Diff-lock switch
---	------------------

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

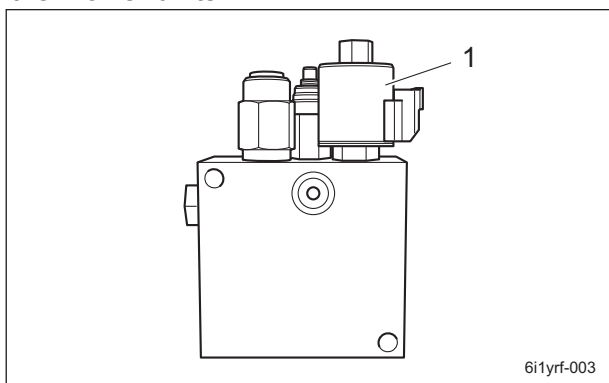
1	Terminal 1
2	Terminal 2
3	Terminal 3
4	Switch lever

Electrical system

Solenoid Valve

Rotary Knife Rotation Valves

The rotary knife rotation valves are installed in the lower right area behind the seat and in the lower area in front of the seat. Depending on the operation of the solenoid valves, the hydraulic path in the rotary knife rotation valve is switched to control the rotation and stopping of the gear motors on the mower units.



Rotary Knife Rotation 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 10.9 Ω.

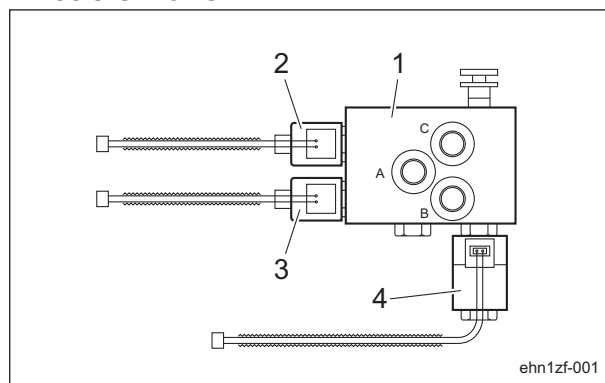
■ Solenoid Specifications

Voltage	Resistance	Holding Current
DC 12 V	10.9 Ω	1.1 A

Diff-lock Valve

The diff-lock valve is located in the upper part of the front axle.

Operation of the solenoid valves switches the hydraulic path inside the diff-lock valve and turns the diff-lock for the left and right front wheels ON or OFF.



Diff-lock Valve_001

1	Diff-lock valve
2	Solenoid #1
3	Solenoid #2
4	Solenoid #0

■ Inspection of Solenoid

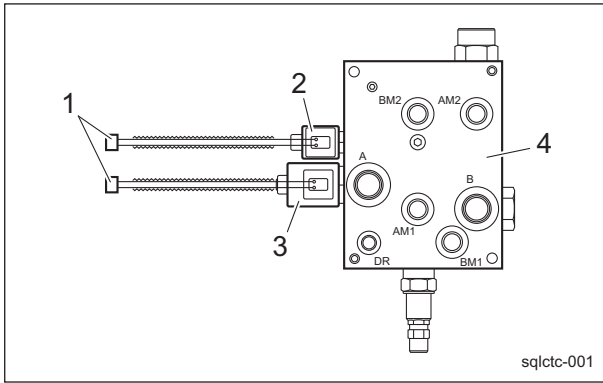
1. Disconnect the solenoid connectors.
2. Measure the resistance between the connector terminals of the solenoid. The normal operation is when the measured values are as in the table.

■ Solenoid Specifications

Solenoid Number	Voltage	Resistance	Holding Current
#0	DC12 V	4.5 Ω	2.6 A
#1 - #2	DC12 V	7.2 Ω	1.67 A

2WD/4WD Changeover Valve

The 2WD/4WD changeover valve is located below the radiator, behind the seat. It controls 2WD/4WD operation. The hydraulic circuit in the 2WD/4WD changeover valve is switched according to the activation of the solenoid valves.



2WD/4WD Changeover Valve_001

1	Housing
2	Solenoid #1
3	Solenoid #2
4	2WD/4WD changeover valve

■ Inspection of Solenoid

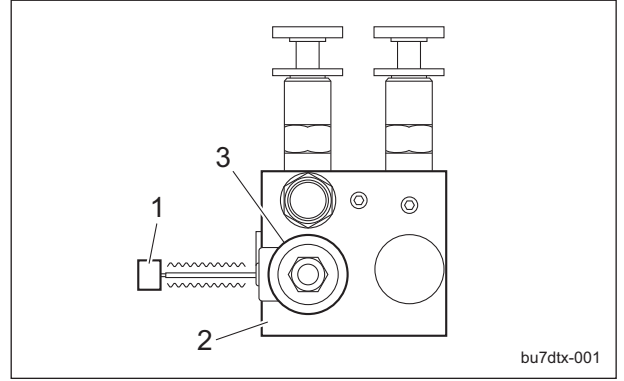
1. Disconnect the solenoid connectors.
2. Measure the resistance between the connector terminals of the solenoid. Normal operation is when the measured values are as in the table.

■ Solenoid Specifications

Solenoid Number	Voltage	Resistance	Holding Current
#1	DC 12 V	10 Ω	1.2 A
#2	DC 12 V	7.2 Ω	1.67 A

Assist Valve

The assist valve is located at right side underneath the seat. Operation of the solenoid valve switches hydraulic path inside of the assist valve to control the traction assist operation.



Assist Valve_001

1	Housing
2	Assist valve
3	Solenoid

■ Inspection of Solenoid

1. Disconnect the solenoid connectors.
2. The normal resistance between the connector terminals of the solenoid is about 7.1 Ω.

■ Solenoid Specifications

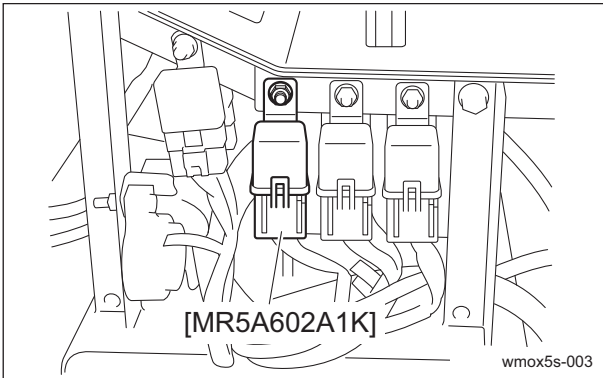
Voltage	Resistance	Holding current
DC12 V	7.1 Ω	1.7 A

Electrical system

Power Relay

Rotary Knife Rotation Relay

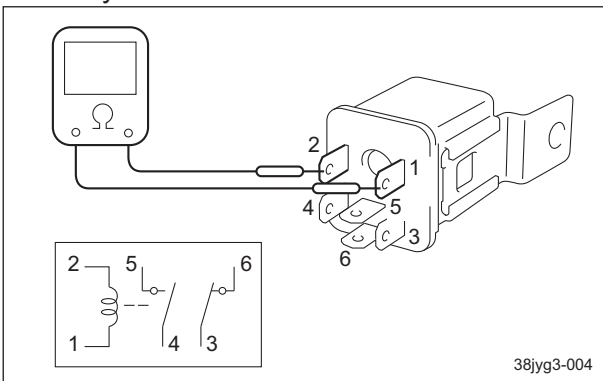
The rotary knife rotation relay controls rotation of the rotary knife with the power relay [MR5A602A1K] (grey) by operation of the rotary knife rotation switch and the proximity sensor of the Mower Units #4/#5.



Rotary Knife Rotation Relay_001

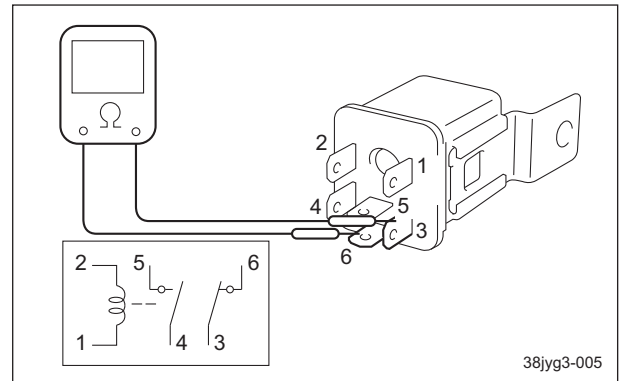
■ Inspection of Power Relay

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

3. Normal operation is when there is continuity between relay terminals 3 and 6 and no continuity between relay terminals 4 and 5.

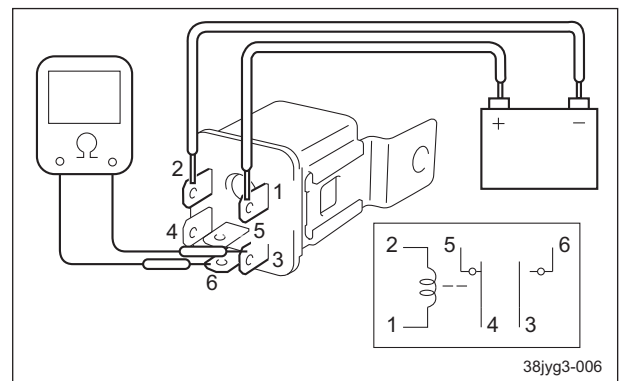


Inspection of Power Relay_002

⚠ Caution

Do not short-circuit the battery terminals.

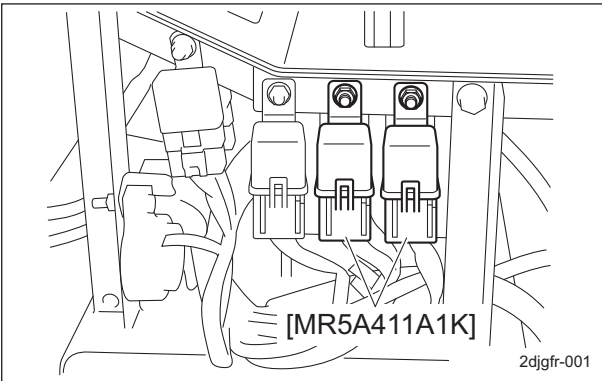
4. Normal operation is when there is no continuity between 3 and 6 and there is continuity between relay terminals 4 and 5 with the battery connected to relay terminals 1 and 2.



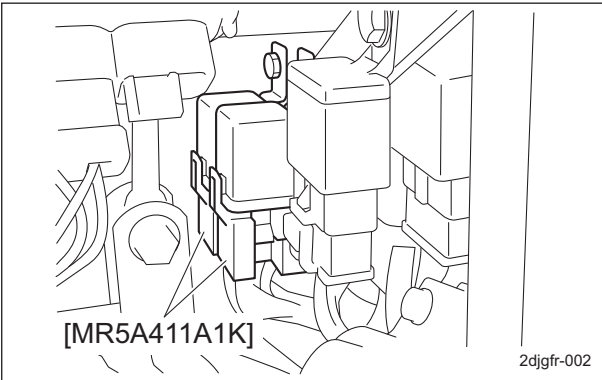
Inspection of Power Relay_003

Seat Relays, Brake Relays, Starter Relays, and Neutral Relays

The seat relays, brake relays, starter relays, and neutral relays are a part of the interlock system circuit, and control engine starting and operation using the power relay [MR5A411A1K] (brown).



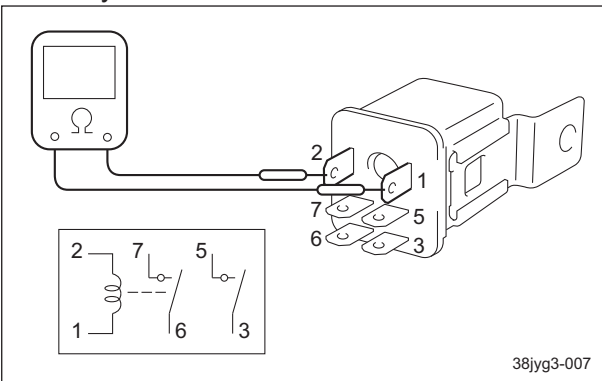
Seat Relays / Brake Relays / Starter Relays / Neutral Relays_001



Seat Relays / Brake Relays / Starter Relays / Neutral Relays_002

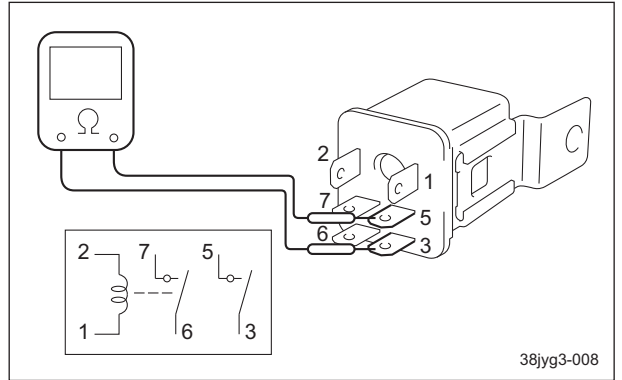
■ Inspection of Power Relay

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

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

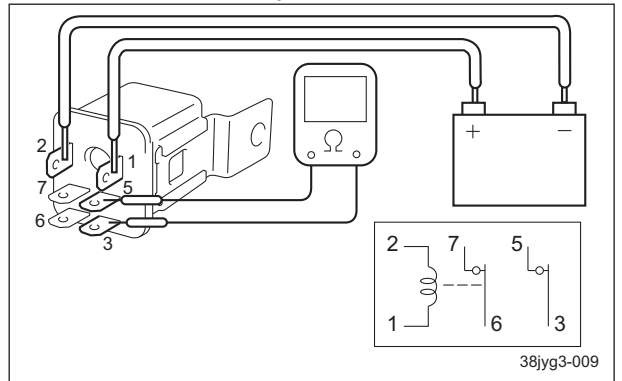


Inspection of Power Relay_002

⚠ 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.



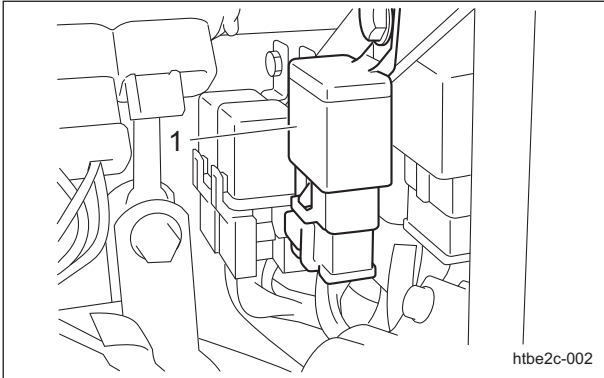
Inspection of Power Relay_003

Electrical system

Rotary Knife Rotation Detection Relay and Engine Stop Relay

1. Power Relay (Rotary Knife Rotation Detection)

The rotary knife rotation detection relay controls the operation of the engine using a power relay [CA1-DC12V-N] (black) by operation of the rotary knife rotation switch and seat switch.

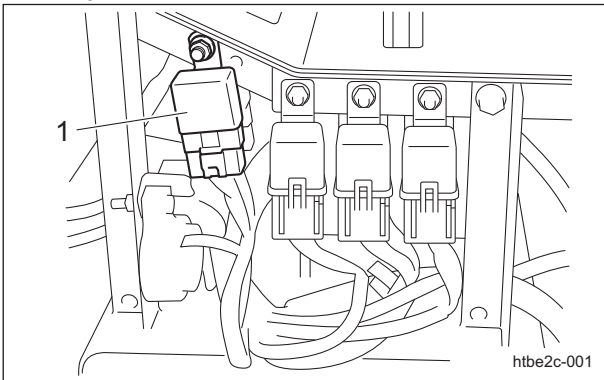


Rotary Knife Rotation Detection Relay / Engine Stop Relay_001

1	Power Relay (Rotary Knife Rotation Detection)
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2. Power Relay (Engine Stop)

The engine stop relay is a part of the interlock system circuit, and controls engine stopping and operation using the power relay [CA1-DC12V-N] (black).



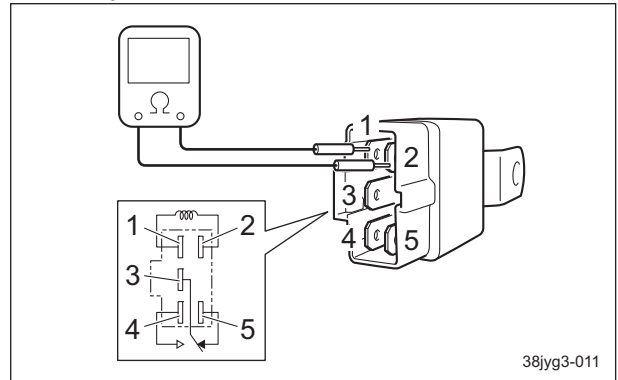
Rotary Knife Rotation Detection Relay and Engine Stop Relay_002

1	Power Relay (Engine Stop)
---	---------------------------

■ Inspection of Power Relay

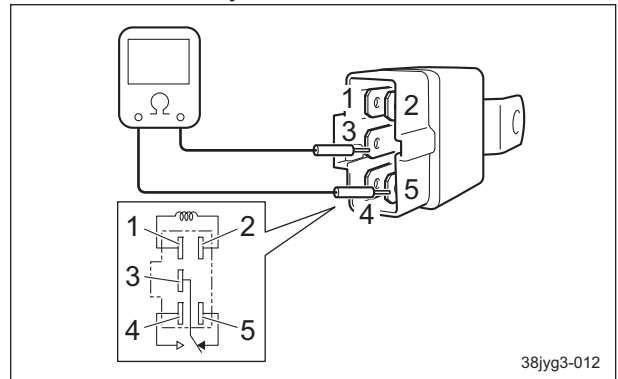
1. Remove the power relay.

2. The normal measured resistance between relay terminals 1 and 2 is about 80 Ω.



Inspection of Power Relay_001

3. It is normal that there is conduction between relay terminals 3 and 5.

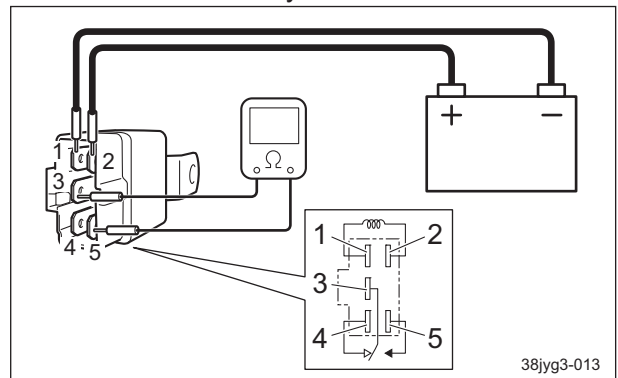


Inspection of Power Relay_002



Caution
Do not short-circuit the battery terminals.

4. Normal operation is when there is no conduction between between relay terminals 3 and 5 with the battery connected to relay terminals 1 and 2.

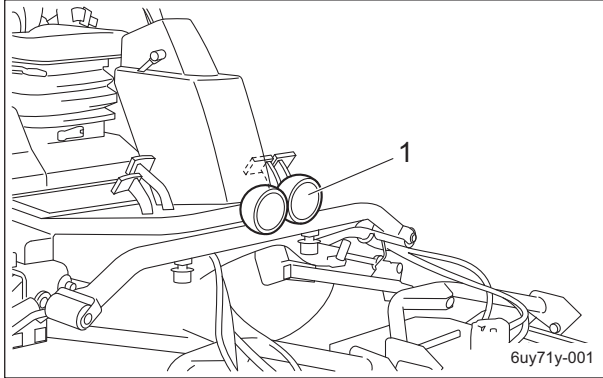


Inspection of Power Relay_003

Electrical system

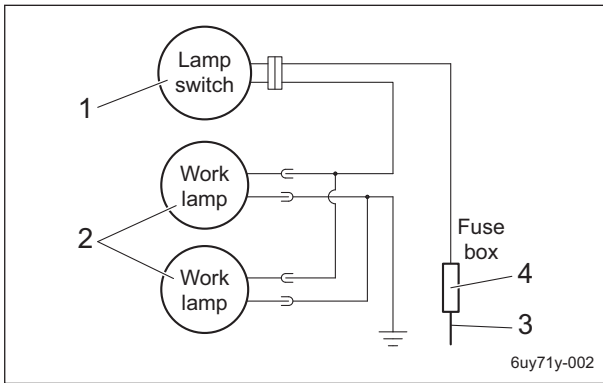
Work Lamp

The work lamp is located at the front of the main body and it lights up and off by operating the light switch (rocker switch).



Work Lamp_001

1	Work lamp
---	-----------



Work Lamp_002

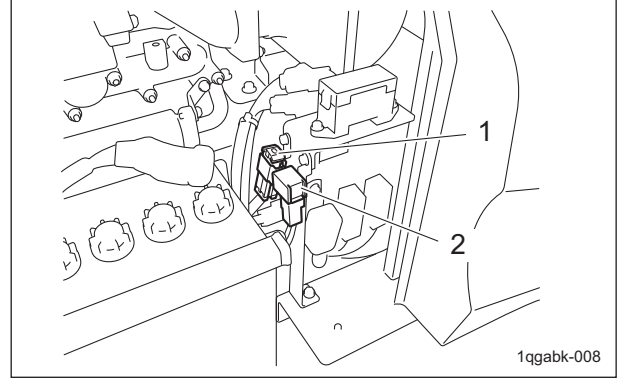
1	Light switch (rocker switch)
2	Work lamp
3	Plus power supply
4	Fuse

Valve Specifications

Type	Rating
H3	12 V 35 W

Fusible Link

Fuse capacities of the fusible links are 30 A and 50 A.

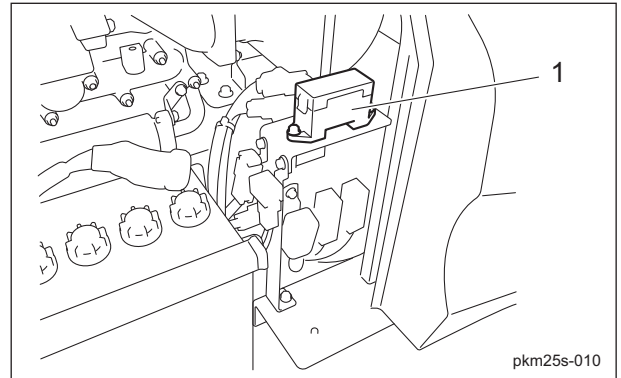


Fusible Link_001

1	Fusible link (50 A)
2	Fusible link (30 A)

Fuse box

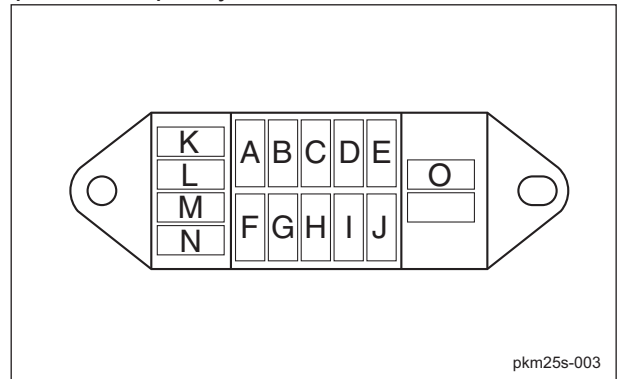
The fuse box includes spare fuses and tools.



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

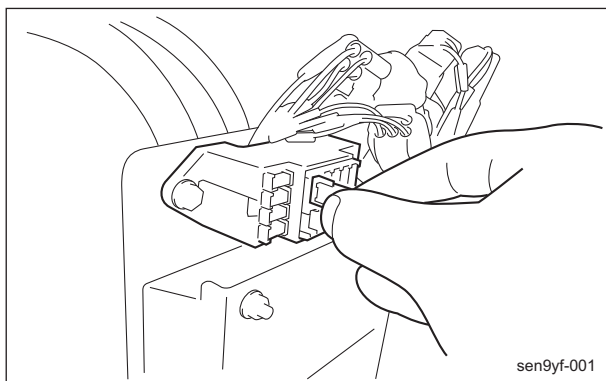
Electrical system

A	5 A	ECU_KeySwitch_ON
B	5 A	Alternator
C	5 A	Display
D	15 A	Relay box 1(differential lock switch, assist switch)
E	15 A	Relay box 2 (2WD/4WD selector switch, #4/#5 proximity switches)
F	-	-
G	5 A	ECU_KeySwitch_Start
H	5 A	ECU_ManualRegenerationSwitch/ AutoRegenerationInhibitSwitch
I	5 A	Operating oil buzzer
J	5 A	Water temperature buzzer
K	5 A	Spare
L	5 A	
M	15 A	
N	15 A	
O	Fuse removal tool	

Replacement of Fuse

Important

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



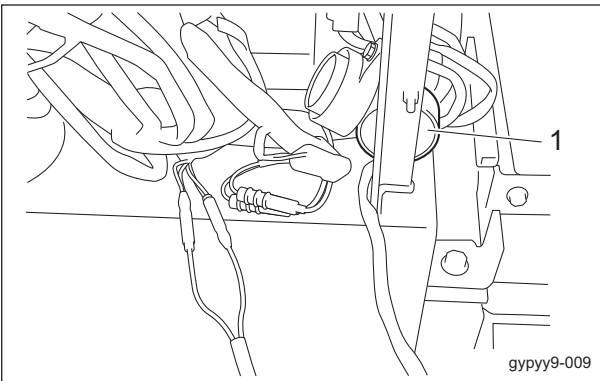
Replacement of Fuse_001

sen9yf-001

Buzzers

Water Temperature Buzzer

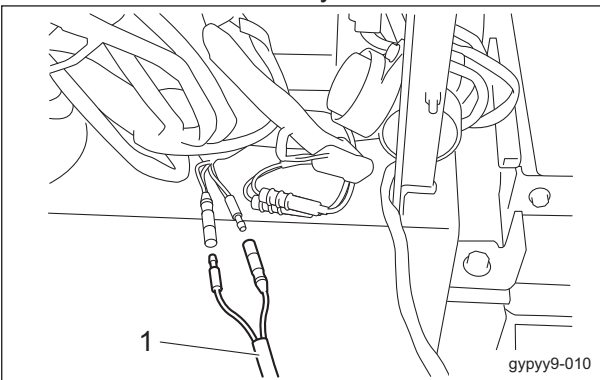
The water temperature buzzer is a warning buzzer connected to the ECU.
 When a specified temperature is reached, the ECU issues a signal, causing a buzzer to sound (intermittent tone).
 The specified temperature is 120 degrees Celsius (120 °C).
 With the circuit in this machine, the engine will not stop even if the specified temperature is exceeded.



Water Temperature Buzzer_001

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

When testing the water temperature buzzer, disconnect the buzzer from the wiring of the machine and test the buzzer as a single unit. The water temperature buzzer is normal if it emits an intermittent tone when the red wire is connected to the positive terminal and the black wire is connected to the negative terminal of a 12 V battery.

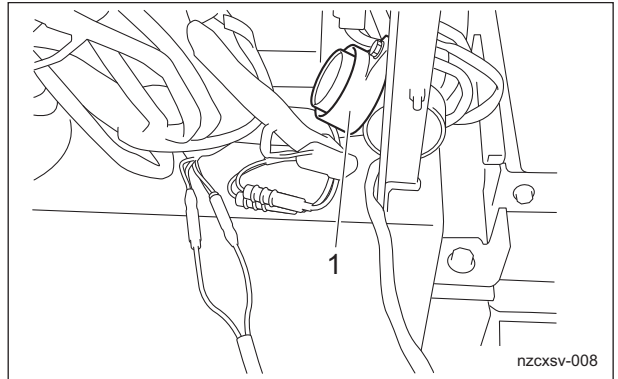


Water Temperature Buzzer_002

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

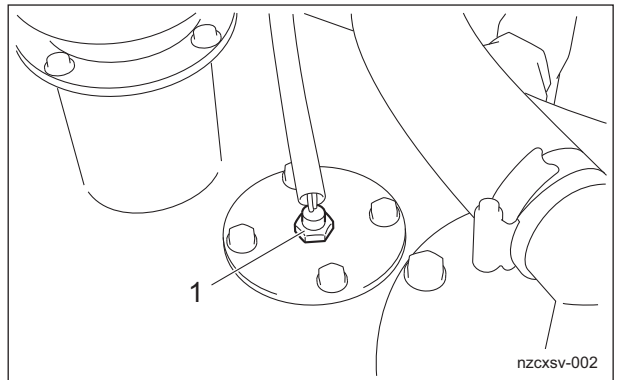
Hydraulic Oil Level Buzzer

The hydraulic oil level buzzer is a buzzer that warns about insufficient oil and is connected to the level switch on the hydraulic tank. When the hydraulic oil is less than the specified quantity, there is continuity in the level switch, causing a buzzer to sound (continuous tone).



Hydraulic Oil Level Buzzer_001

1	Hydraulic oil level buzzer
---	----------------------------



Hydraulic Oil Level Buzzer_002

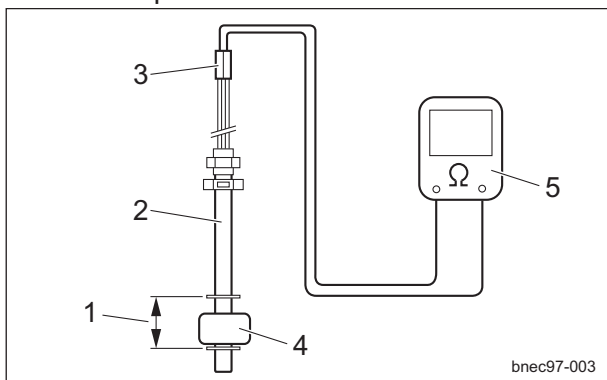
1	Level switch
---	--------------

Electrical system

Level Switch

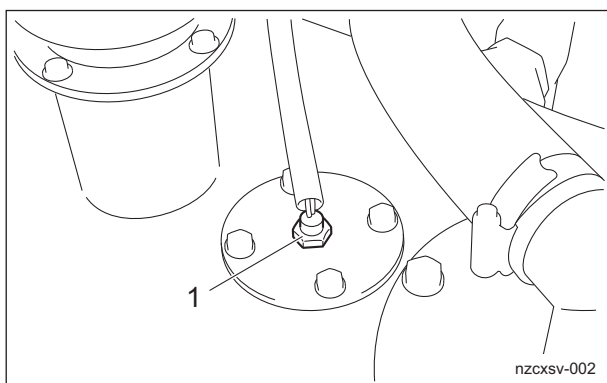
The level switch is located at the top of the hydraulic tank and switches "ON" and "OFF" according to the rise and fall of the float. (The arrow indicates the float travel distance.)

Normal operation is when there is continuity when the float is down and no continuity when the float is up.



Level Switch_001

1	Float travel distance
2	Level switch
3	Coupler
4	Float
5	Circuit tester



Level Switch_002

1	Level switch
---	--------------

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.

Electrical system

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.

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

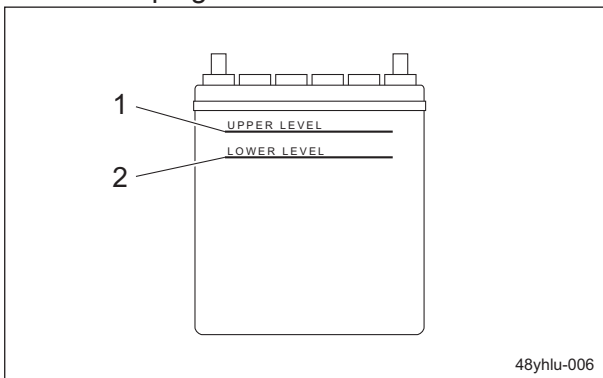
When adding distilled water, be careful not to add an excessive amount.

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.

Electrical system

⚠ 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.

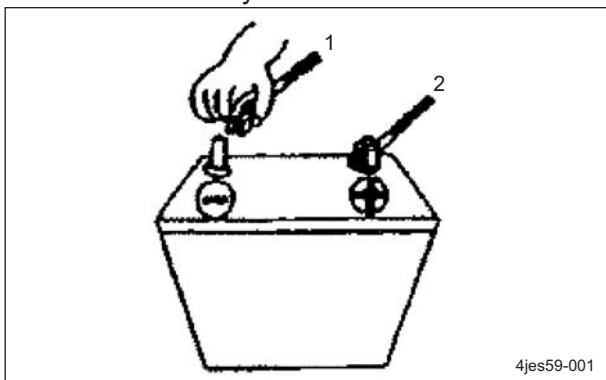
When replacing the battery, follow these steps:

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. Loosen the mounting bracket and remove the old battery.

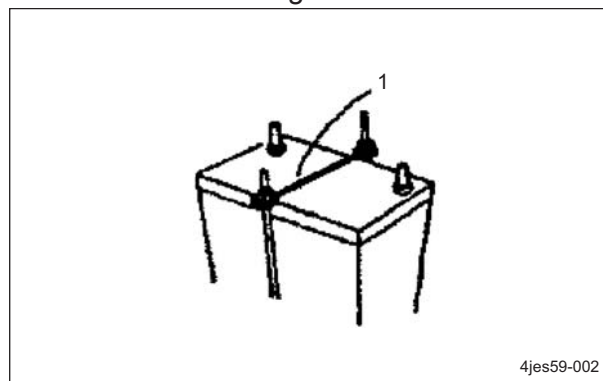


Replacement of Battery_001

1	(-) Cable
2	(+) Cable

Installing a new battery

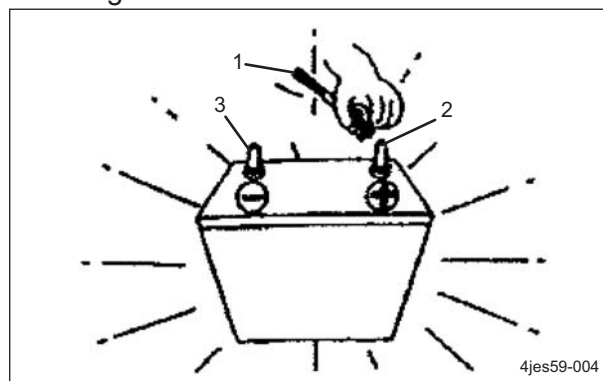
1. Install the new battery with the correct polarities and firmly secure the battery with the mounting bracket.



Replacement of Battery_002

1	Mounting bracket
---	------------------

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

Electrical system

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.

Maintenance Page 6-2

About MaintenancePage 6-2

Specifications Page 6-2

Tire Pneumatic Pressure Page 6-2

Adjusted Value Page 6-2



Main body

Main body

Maintenance

About Maintenance

This chapter provides descriptions of the main inspection and maintenance procedures for the GM2810.

For information on daily checks, maintenance and handling of the machine, please refer to the separate GM2810 Owner's Operating Manual and Parts Catalog.

Specifications

Tire Pneumatic Pressure

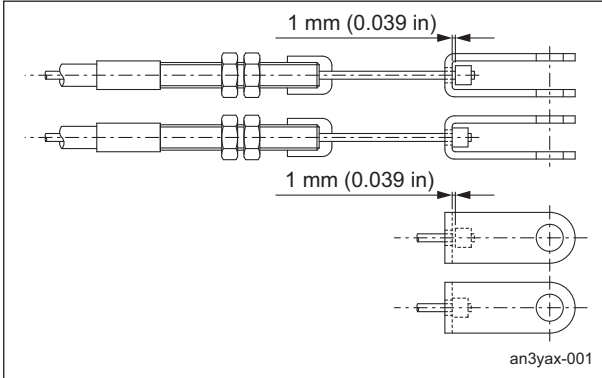
	kPa	kgf-cm ²	psi=lb-in
Front wheel	150	1.5	21.83
Rear wheel	140	1.4	20.37

Adjusted Value

		mm	in
Rod distance (between rod end centers)	Forward rod	923	36.34
	Reverse rod	923	36.34
	Neutral adjustment rod	221	8.70
Spring compression distance (forward rod part)	Compression spring on pedal side	83	3.27
	Compression spring on pump side	82	3.23
Spring compression distance (neutral adjustment rod part)	Compression spring	55	2.17
Brake wire part	Pedal side clearance	1	0.039
Toe angle		0 ± 5	0 ± 0.20

Adjusted Value of the Foot Brake Wire

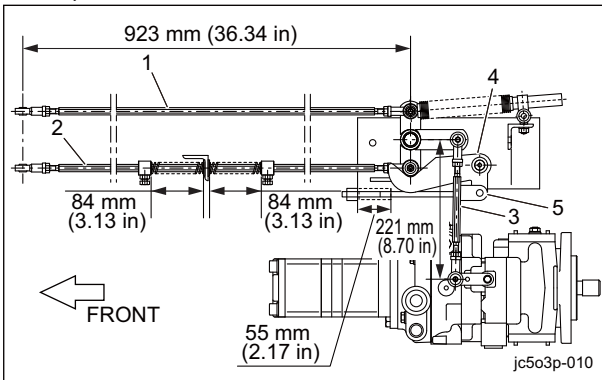
The clearance adjusted value of brake wire on the pedal side is described below.



Adjusted Value of the Foot Brake Wire_001

Adjustment of Traveling Rod

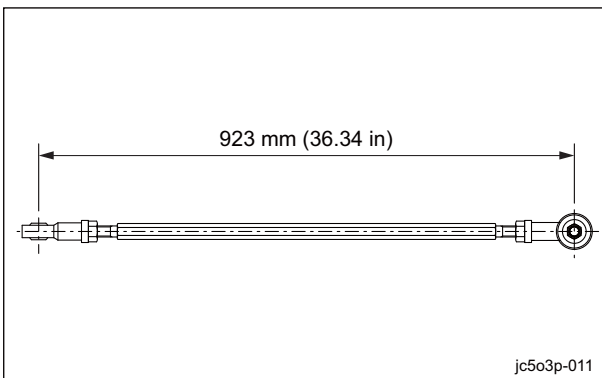
Here are the adjusted values of the traveling rod distance (between the centers of the rod ends).



Adjustment of Traveling Rod_001

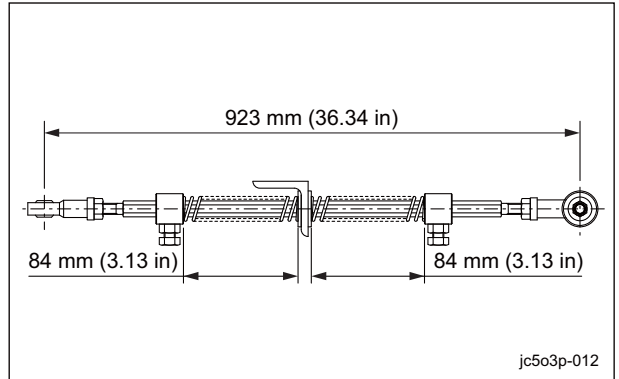
1	Reverse rod
2	Forward rod
3	Neutral adjustment rod
4	Pump neutral lever
5	Lever adjustment bracket

1. Forward rod



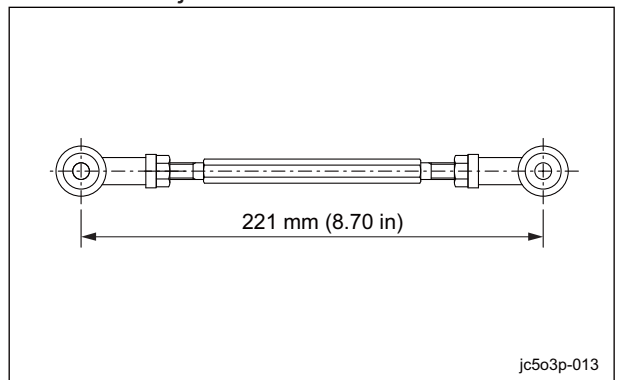
Adjustment of Traveling Rod_002

2. Reverse rod



Adjustment of Traveling Rod_003

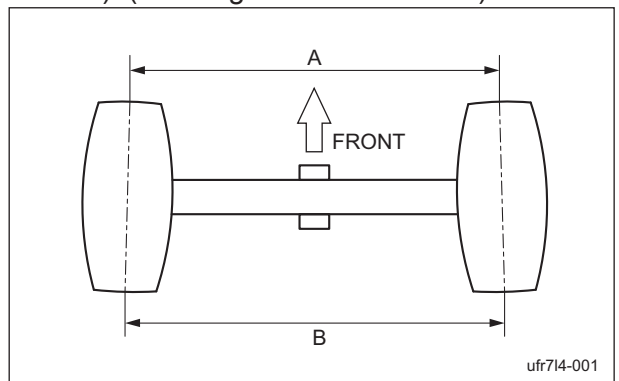
3. Neutral adjustment rod



Adjustment of Traveling Rod_004

Adjusted Value of the Toe Angle

The toe angle adjustment is 0 ± 5 mm (0 ± 0.20 in). (Toe angle amount = A - B)



Adjusted Value of the Toe Angle_001

Main body

Main body

Operating Machine and Mower Units

Maintenance Page 7-2

About Maintenance Page 7-2

Specifications Page 7-2

Mower Unit Layout Page 7-2

Grease Page 7-2

Special Tool Page 7-3

List of Special Tools Page 7-3

Adjustment Page 7-5

Cutting Height Adjustment Page 7-5

Removal and installation of each section Page 7-5

Mower unit Page 7-5

Rotary Knife Page 7-6

Front Roller Assy Page 7-10

Rear Roller Assy Page 7-12

Cutting Height Adjusting Plate Page 7-13

Mower Arm Page 7-14

Inspection and repair of each section Page 7-16

Rotary Knife Page 7-16

Housing Page 7-24

Roller Page 7-28

Mower Arm Page 7-31

Operating Machine and Mower Units

Maintenance

About Maintenance

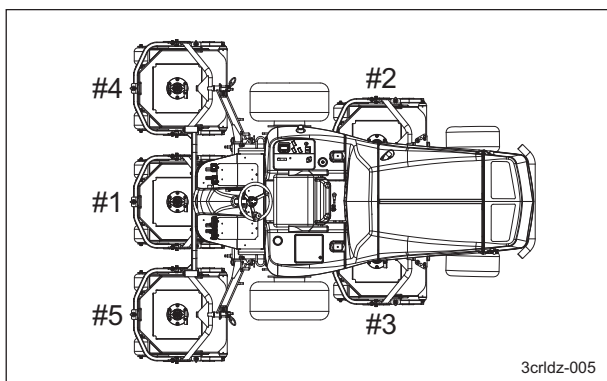
This chapter provides descriptions of the main inspection and maintenance procedures for the GM2810 mower units.

For information on daily checks, maintenance and handling of the machine, please refer to the separate GM2810 Owner's Operating Manual and Parts Catalog.

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

Specifications

Mower Unit Layout



Mower Unit Layout_001

Grease

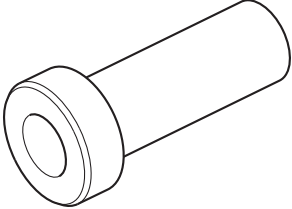
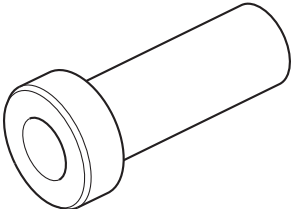
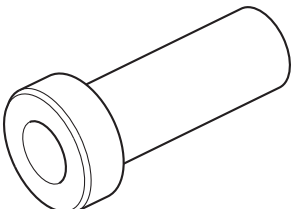
Use the following type of grease on the operating machine and mower units.

Grease	Excelite EP No. 2 (urea base)
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Operating Machine and Mower Units

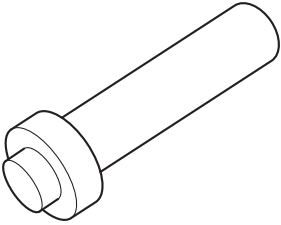
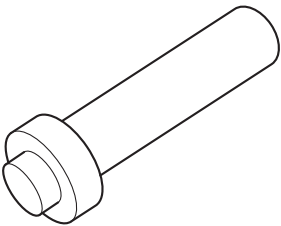
Special Tool

List of Special Tools

<p>6303 Bearing driver</p>  <p>q9c6v6-009</p>	<p>K4802000752</p>	<p>Used when installing bearings with outer $\Phi 47$ and inner $\Phi 17$</p>
<p>6204 Bearing driver</p>  <p>q9c6v6-009</p>	<p>K4802000762</p>	<p>Used when installing bearings with outer $\Phi 47$ and inner $\Phi 20$</p>
<p>6208 Bearing driver</p>  <p>q9c6v6-009</p>	<p>K4802000772</p>	<p>Used when installing bearings with outer $\Phi 80$ and inner $\Phi 40$</p>

Operating Machine and Mower Units

Operating Machine and Mower Units

<p>35 Oil seal installer</p>  <p>q9c6v6-011</p>	<p>K4802000782</p>	<p>Used when installing $\Phi 35$ oil seals</p>
<p>82 Oil seal installer</p>  <p>q9c6v6-011</p>	<p>K4802000792</p>	<p>Used when installing $\Phi 82$ oil seals</p>

Operating Machine and Mower Units

Adjustment

Cutting Height Adjustment

Make adjustments so as to obtain desired cutting height.
See the handling manual for method for adjustment.

Removal and installation of each section

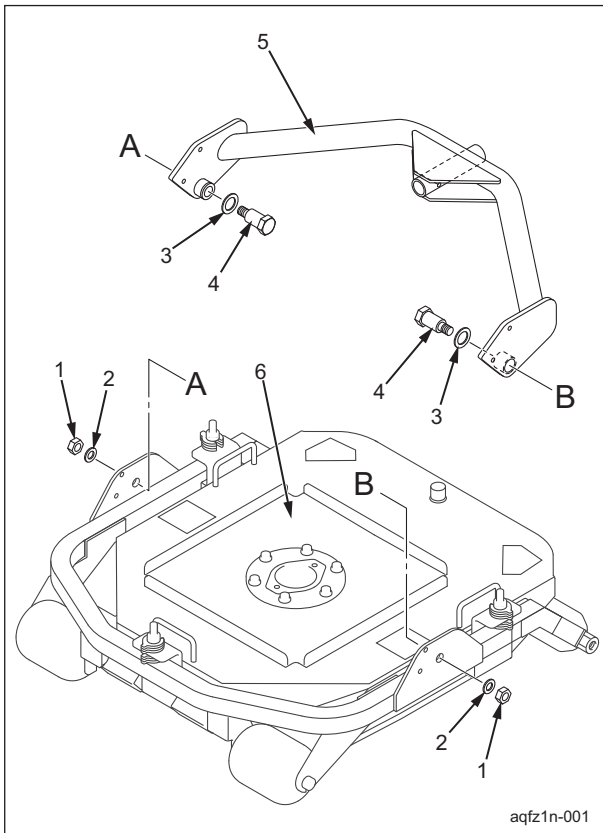
Mower unit

Removal of Mower Unit

! Danger

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

1. Remove the gear motor.
2. Remove the nuts, spring washers, washers, and shoulder bolts that are used to attach the mower unit to the mower arm.



Removal of Mower Unit_001

1	Nut
2	Spring washer
3	Washer
4	Shoulder bolt
5	Mower arm
6	Mower unit

3. Pull out the mower unit to remove it.

Installation of Mower Unit

! Danger

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

! Caution

See the list in "Tightening torques" (Page 3-5) .
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

Rotary Knife

Removal of Rotary Knife

■ Mower unit #1

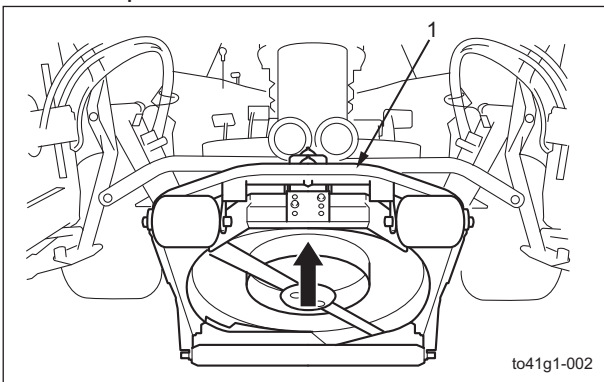
⚠ Danger

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.

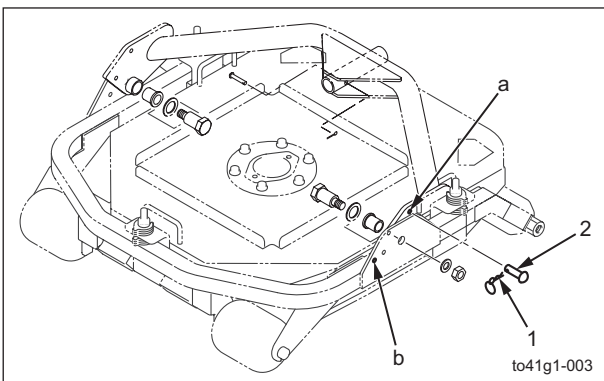
1. Start the engine, and then raise the mower units.
2. Stop the engine, and then remove the key.
3. Pull up the mower unit.



Mower unit #1_001

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

4. Remove the cotter pin and hardened roundhead pin inserted at a, and then insert them at b.

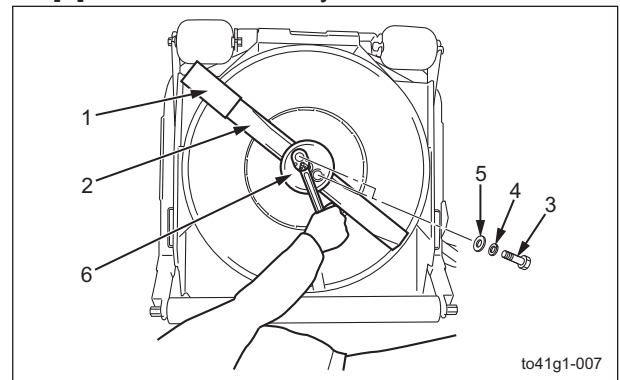


Mower unit #1_002

1	Cotter pin
2	Hardened roundhead pin

5. 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.
- [2] Remove the two bolts, spring washers and washers used to install the rotary knife.
- [3] Remove the knife guide.
- [4] Remove the rotary knife.



Mower unit #1_003

1	Square pipe
2	Rotary knife
3	Bolt
4	Spring washer
5	Washer
6	Knife guide

Operating Machine and Mower Units

■Mower Units #2/#3

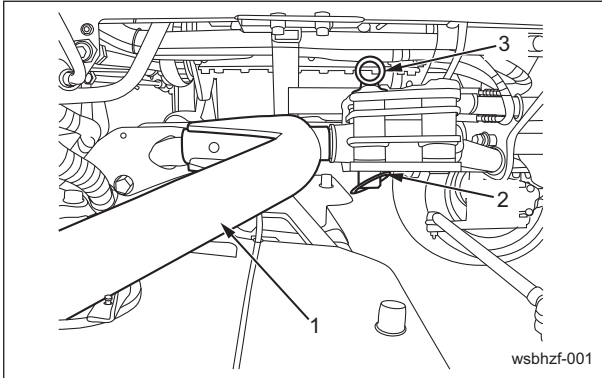
⚠ Danger

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.

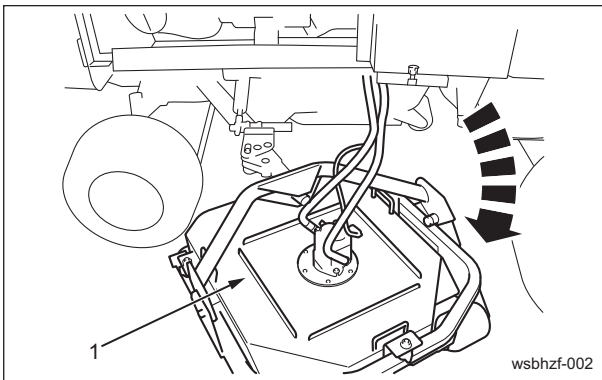
1. Remove the clip pin installed on the mower arm, and then pull out the grip pin.



Mower Units #2/#3_001

1	Mower arm
2	Clip pin
3	Grip pin

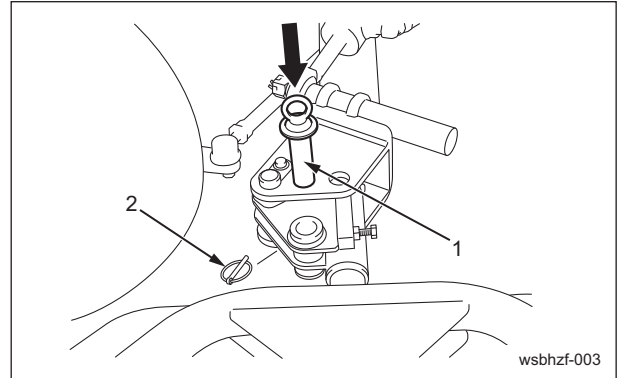
2. Pull out the mower unit.



Mower Units #2/#3_002

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

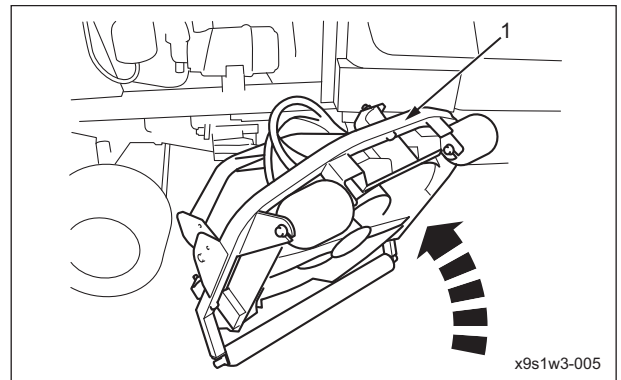
3. Install the grip pin and clip pin in the locking hole for maintenance.



Mower Units #2/#3_003

1	Grip pin
2	Clip pin

4. Start the engine, and then raise the mower units.
5. Stop the engine, and then remove the key.
6. Lift the mower unit at the front.



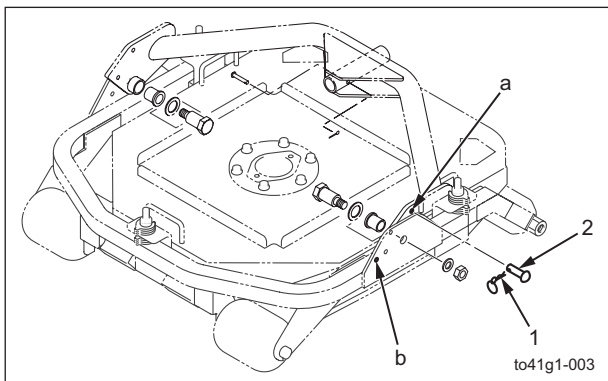
Mower Units #2/#3_004

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

Operating Machine and Mower Units

Operating Machine and Mower Units

7. Remove the cotter pin and hardened roundhead pin inserted at a, and then insert them at b.

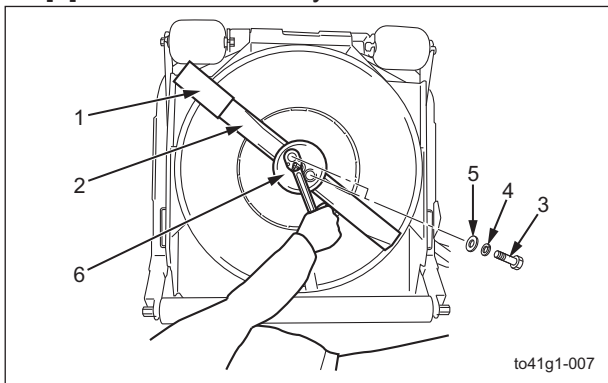


Mower Units #2/#3_005

1	Cotter pin
2	Hardened roundhead pin

8. 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.
- [2] Remove the two bolts, spring washers and washers used to install the rotary knife.
- [3] Remove the knife guide.
- [4] Remove the rotary knife.



Mower Units #2/#3_006

1	Square pipe
2	Rotary knife
3	Bolt
4	Spring washer
5	Washer
6	Knife guide

■Mower Units #4/#5

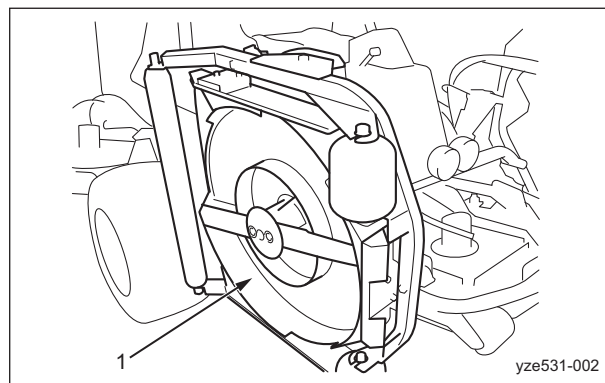
⚠ Danger

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.

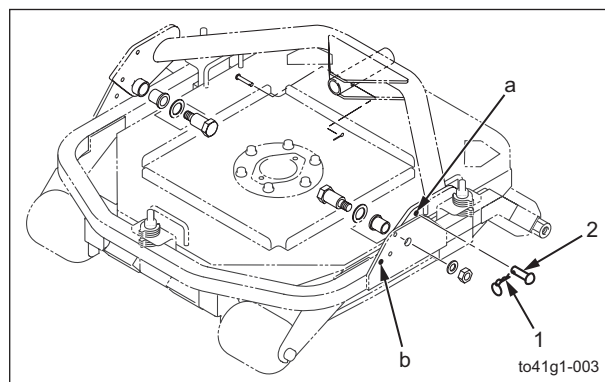
1. Start the engine, and then raise the mower units.



Mower Units #4/#5_001

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

- 2. Stop the engine, and then remove the key.
- 3. Remove the cotter pin and hardened roundhead pin inserted at a, and then insert them at b.



Mower Units #4/#5_002

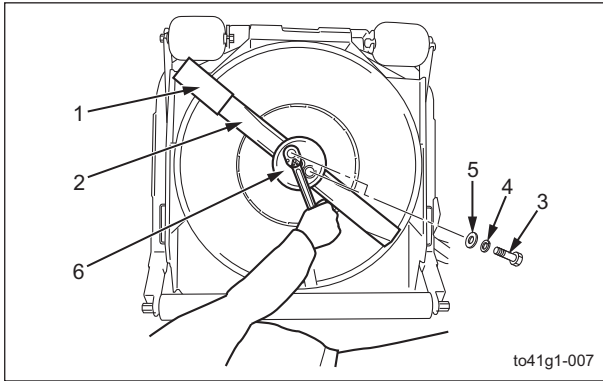
1	Cotter pin
2	Hardened roundhead pin

4. 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.

Operating Machine and Mower Units

- [2] Remove the two bolts, spring washers and washers used to install the rotary knife.
- [3] Remove the knife guide.
- [4] Remove the rotary knife.



Mower Units #4/#5_003

1	Square pipe
2	Rotary knife
3	Bolt
4	Spring washer
5	Washer
6	Knife guide

Installation of Rotary Knife

⚠ Danger

The rotary knife is an edged tool. Take extra care in handling since they could cut your hands or legs.

⚠ Caution

See the list in "Tightening torques" (Page 3-5) . Note that the Baroness product warranty may not apply to defects caused by incorrect or overtorque tightening etc.

⚠ Caution

The rotary knife has a specific installation direction. Do not install the rotary knife facing the wrong direction.

Important

The tightening torque for the knife mounting bolt is 67 - 85 N-m (683.20 - 866.75 kgf-cm).

For installing it, reverse the removing procedure.

Operating Machine and Mower Units

Front Roller Assy

Removal of Front Roller Assembly

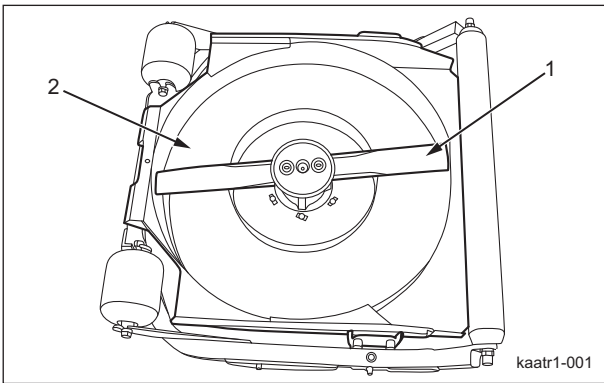
⚠ Danger

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.

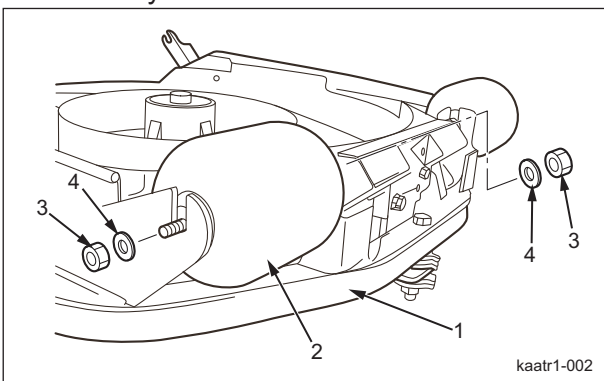
1. Remove the mower units. (See "Removal of Mower Unit" (Page 7-5) .)
2. Reverse the mower units.



Removal of Front Roller Assembly_001

1	Rotary knife
2	Mower unit

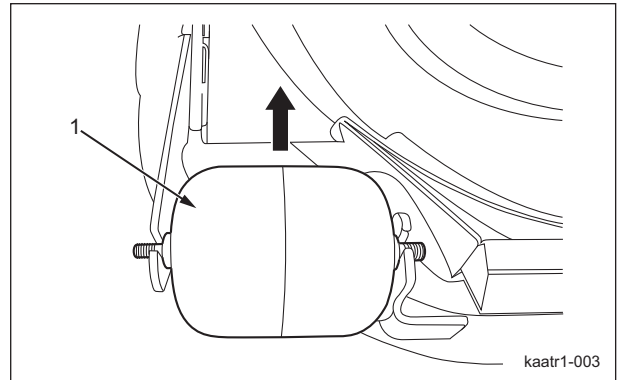
3. Remove the left and right nuts and washers that are used to attach the front roller assembly to the mower frame.



Removal of Front Roller Assembly_002

1	Mower frame
2	Front roller assembly
3	Nut
4	Washer

4. Lift the front roller assembly and remove it from the mower frame.



Removal of Front Roller Assembly_003

1	Front roller assembly
---	-----------------------

5. Follow the same procedure to remove the front roller assembly on the opposite side.

Operating Machine and Mower Units

Installation of Front Roller Assembly

⚠ Danger

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

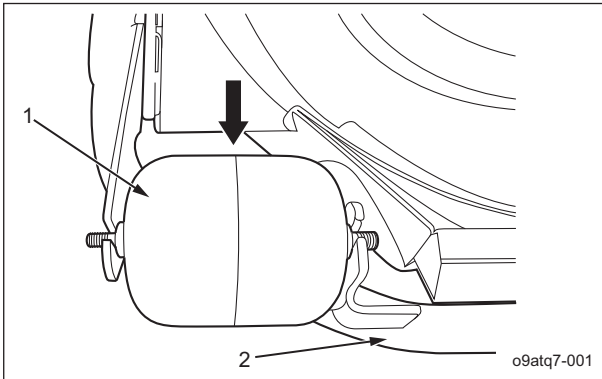
⚠ Caution

When touching edged tools, wear gloves, since they could cut your hands.

⚠ Caution

See the list in "Tightening torques" (Page 3-5) .
Note that the Baroness product warranty may not apply to defects caused by incorrect or overtorque tightening etc.

- 1. Insert the front roller assembly onto the mower frame.



Installation of Front Roller Assembly_001

1	Front roller assembly
2	Mower frame

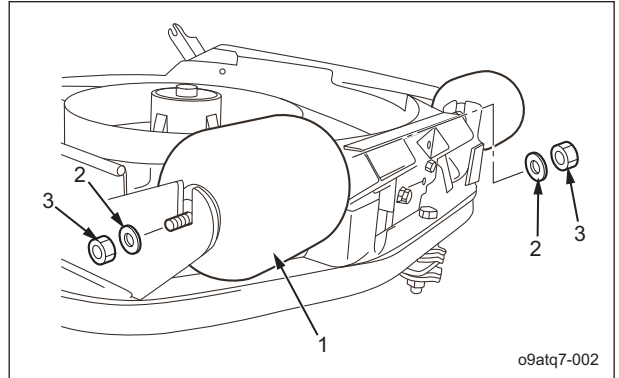
Note:

If the front roller assembly is not fully inserted, tap it with a plastic hammer until it fits into the correct installation position.

- 2. Follow the steps below to install the disc springs and nuts on the left and right ends of the shaft.

- [1] Temporarily tighten the disc springs and nuts on the left and right ends so the shaft will not move out of place.

- [2] Tighten the disc springs and nuts on the left and right ends.



Installation of Front Roller Assembly_002

1	Front roller assembly
2	Disc spring
3	Nut

- 3. Follow the same steps to complete the installation on the opposite side.

Operating Machine and Mower Units

Rear Roller Assy

Removal of Rear Roller Assembly

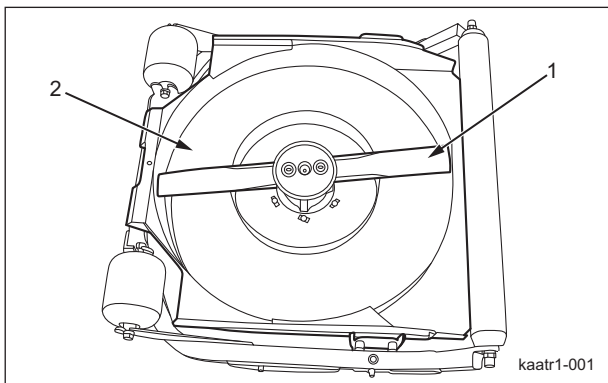
! Danger

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.

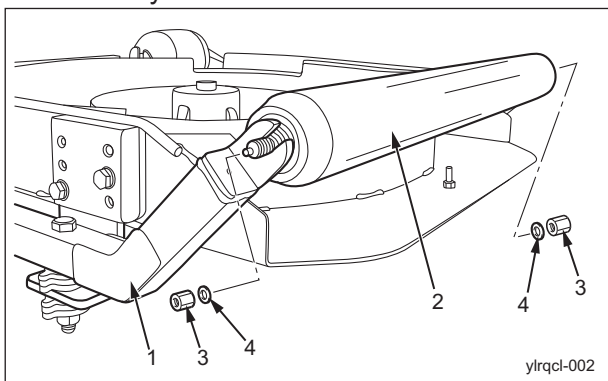
1. Remove the mower units. (See "Removal of Mower Unit" (Page 7-5) .)
2. Reverse the mower units.



Removal of Rear Roller Assembly_001

1	Rotary knife
2	Mower unit

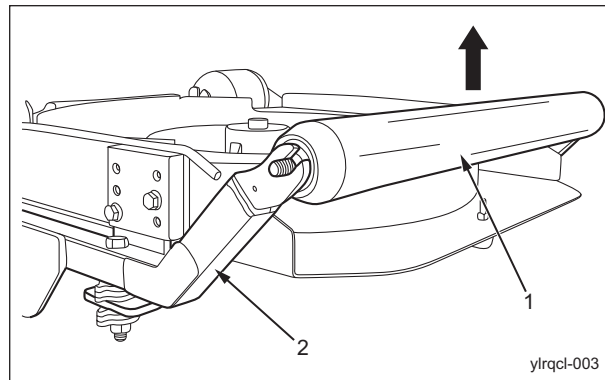
3. Remove the left and right nuts and washers that are used to attach the rear roller assembly to the mower frame.



Removal of Rear Roller Assembly_002

1	Mower frame
2	Rear roller assembly
3	Nut
4	Washer

4. Lift the rear roller assembly and remove it from the mower frame.



Removal of Rear Roller Assembly_003

1	Rear roller assembly
2	Mower frame

Installation of Rear Roller Assy

! 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.

! Caution

See the list in "Tightening torques" (Page 3-5) .
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

Cutting Height Adjusting Plate

Removal of Cutting Height Adjustment Plate

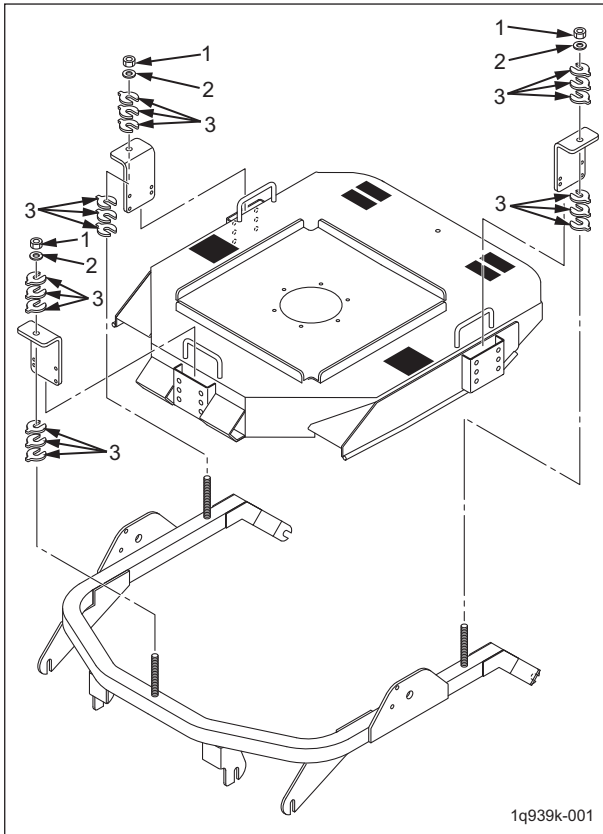
Danger

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.

1. Remove the mower frame. (See "Removal of Mower Unit" (Page 7-5) .)
2. Remove nut, washer, and adjustment collar.



Removal of Cutting Height Adjustment Plate_001

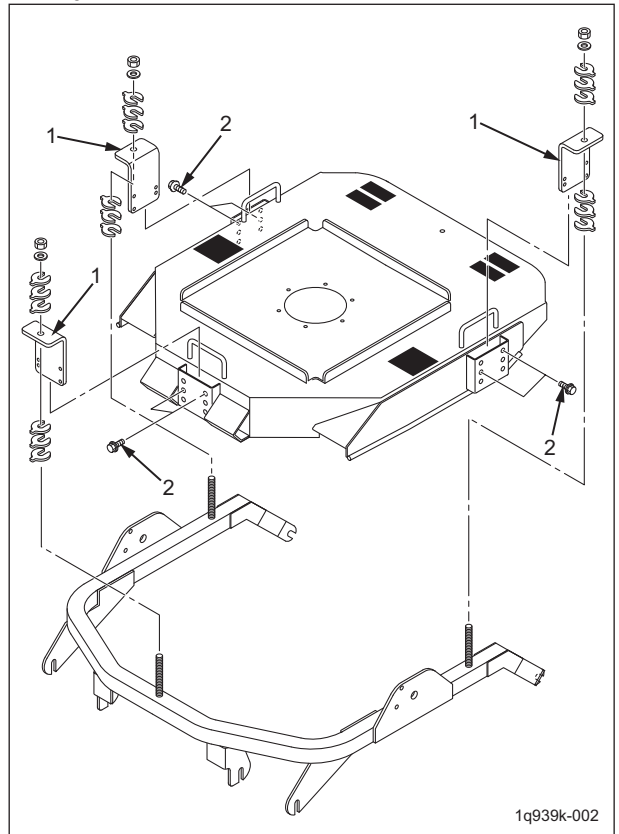
1	Nut
2	Washer
3	Adjusting collar

Important

The cutting height adjustment plate has six holes.

Check and mark the installation position of the bolts used to install when removing the cutting height adjustment plate.

3. Remove the bolts with the flange used to install the cutting height adjustment plate, and then remove the cutting height adjustment plate.



Removal of Cutting Height Adjustment Plate_002

1	Cutting height adjusting plate
2	Bolt with flange

Operating Machine and Mower Units

Installation of Cutting Height Adjusting Plates

⚠ 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.

⚠ Caution

See the list in "Tightening torques" (Page 3-5) .
Note that the Baroness product warranty may not apply to defects caused by incorrect or overtorque tightening etc.

For installation, reverse the removing procedure.

Mower Arm

Removal of Mower Arm

⚠ Danger

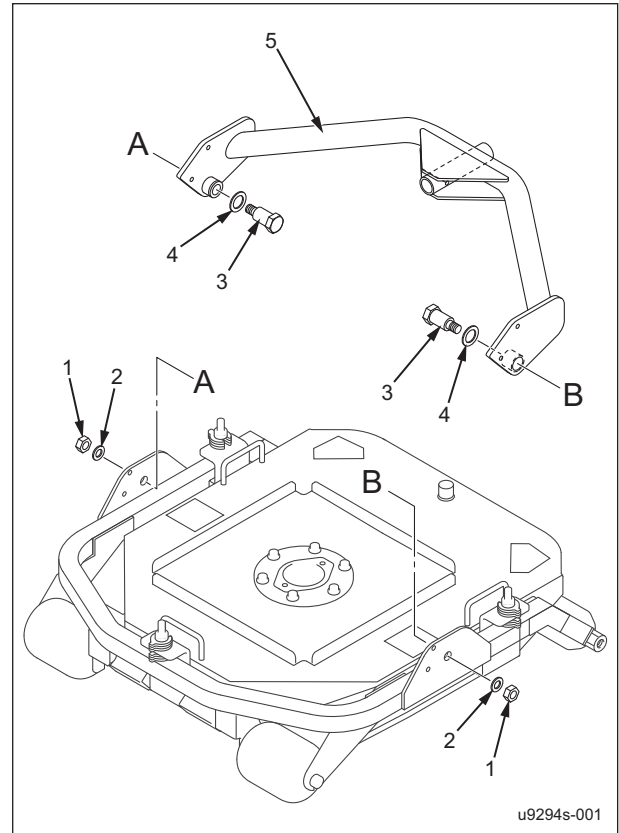
The rotary knife is an edged tool. Handle them carefully, since they could cut your hands or legs.

⚠ Caution

When touching edged tools, wear gloves, since they could cut your hands.

1. Remove the mower units. (See "Removal of Mower Unit" (Page 7-5) .)
2. Follow the steps below to remove the mower arm.
 - [1] Remove the nut, spring washer, shoulder bolt then washer in this order.

- [2] Pull up the mower arm upwards to remove it.



Removal of Mower Arm_001

1	Nut
2	Spring washer
3	Shoulder bolt
4	Washer
5	Mower arm

Operating Machine and Mower Units

Installation of Mower Arm

⚠ 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.

⚠ Caution

See the list in "Tightening torques" (Page 3-5) .
Note that the Baroness product warranty may not apply to defects caused by incorrect or overtorque tightening etc.

For installing it, reverse the removing procedure.
For details on adjustment of mowing height, please refer to the separate Handling Manual.

Operating Machine and Mower Units

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.

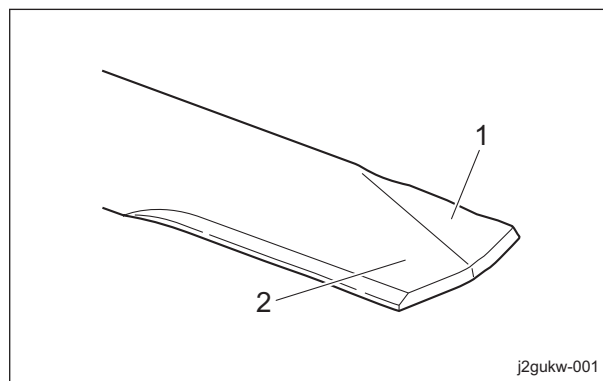
Inspect the rotary knife, and if necessary, sharpen, balance or replace it.

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

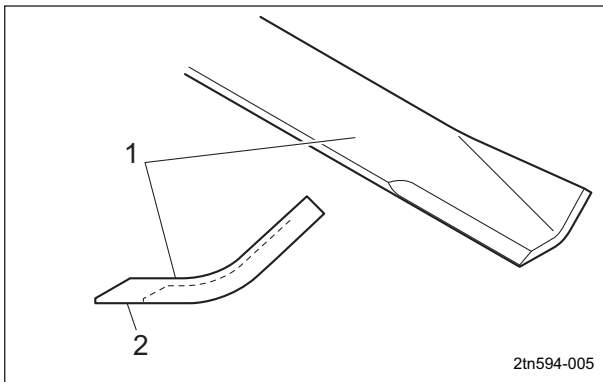
If the rotary knife becomes worn or damaged, a crack or tear between the sail and flat part will result. Take extra care since a broken piece of the rotary knife may fly off while it is rotating.

⚠ 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.



Replacement of Rotary Knife_001

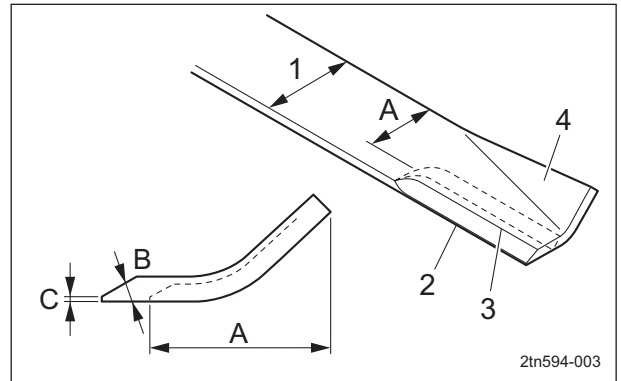
1	Rotary knife top side
2	Rotary knife bottom side

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.

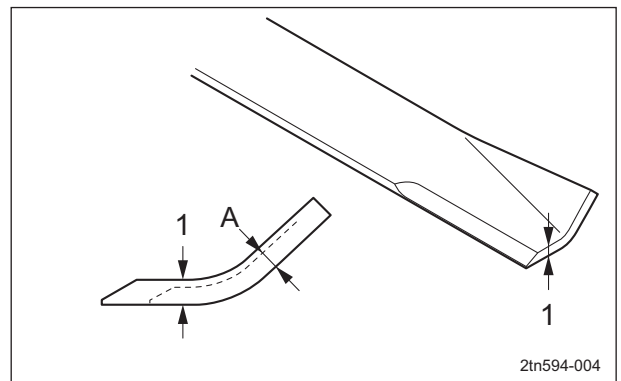
1. When the narrowest part of the rotary knife has a width of less than 2/3 of the width of a new knife



Replacement of Rotary Knife_002

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



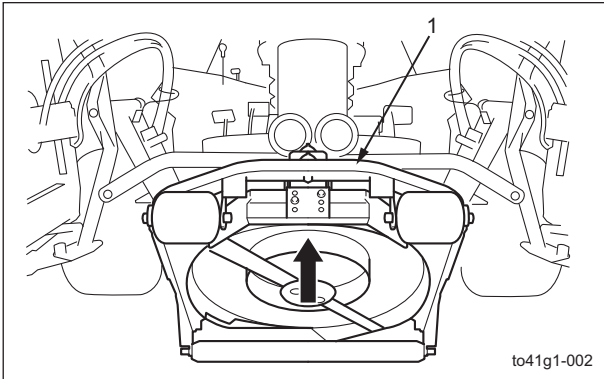
Replacement of Rotary Knife_003

1	Thickness
A	less than 1/3

Operating Machine and Mower Units

■Mower unit #1

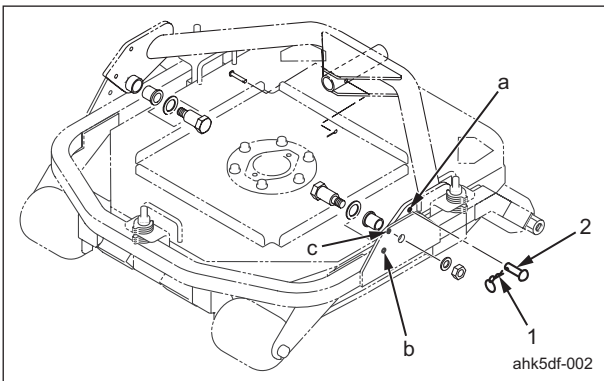
1. Start the engine, and then raise the mower units.
2. Stop the engine, and then remove the key.
3. Lift the mower unit at the front.



Mower unit #1_001

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

4. Remove the cotter pin and hardened roundhead pin inserted at a, and then insert them at b.



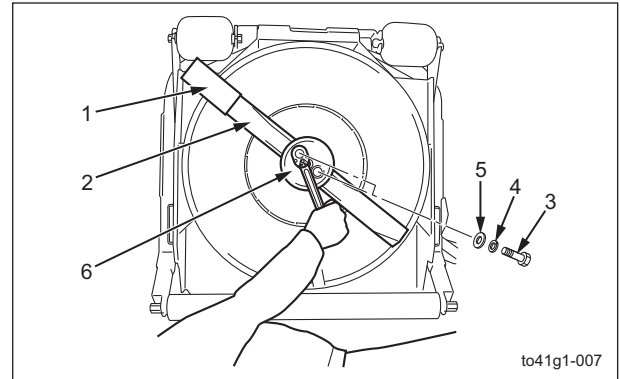
Mower unit #1_002

1	Cotter pin
2	Hardened roundhead pin

5. 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.
- [2] Remove the two bolts, spring washers and washers used to install the rotary knife.
- [3] Remove the knife guide.

- [4] Remove the rotary knife.



Mower unit #1_003

1	Square pipe
2	Rotary knife
3	Bolt
4	Spring washer
5	Washer
6	Knife guide

Important

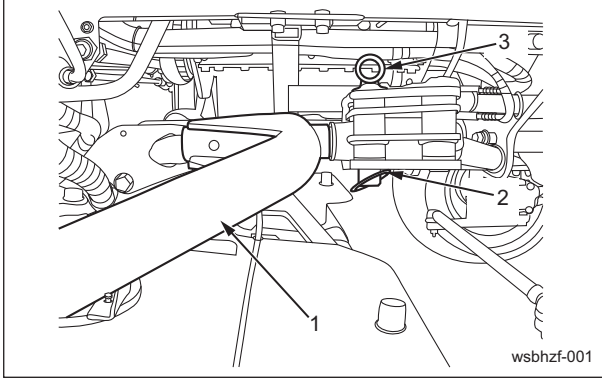
The tightening torque for the knife mounting bolt is 67 - 85 N-m (683.20 - 866.75 kgf-cm).

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

Operating Machine and Mower Units

■ Mower Units #2/#3

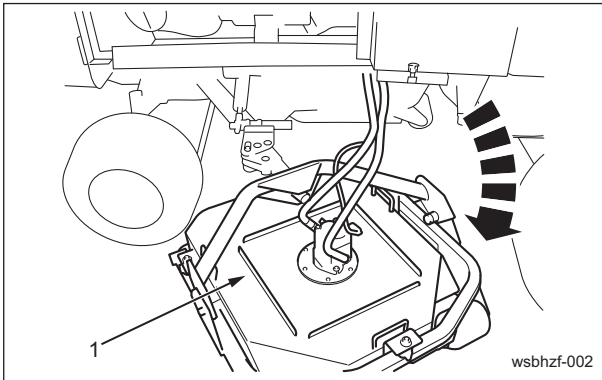
1. Remove the clip pin installed on the mower arm, and then pull out the grip pin.



Mower Units #2/#3_001

1	Mower arm
2	Clip pin
3	Grip pin

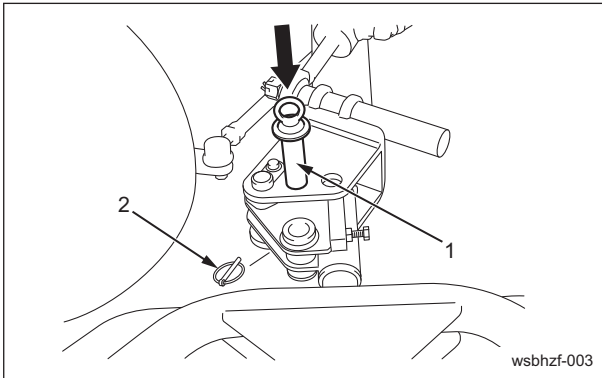
2. Pull out the mower unit.



Mower Units #2/#3_002

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

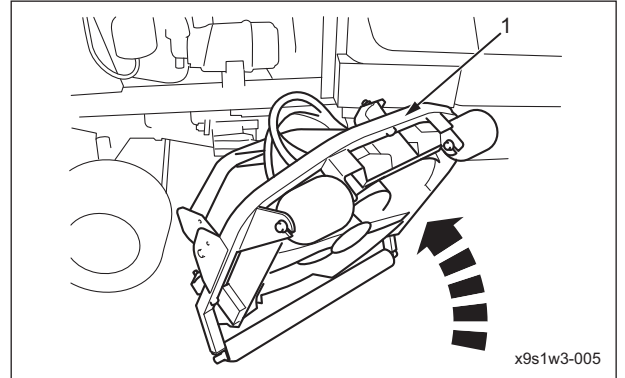
3. Install the grip pin and clip pin in the mounting hole for maintenance.



Mower Units #2/#3_003

1	Grip pin
2	Clip pin

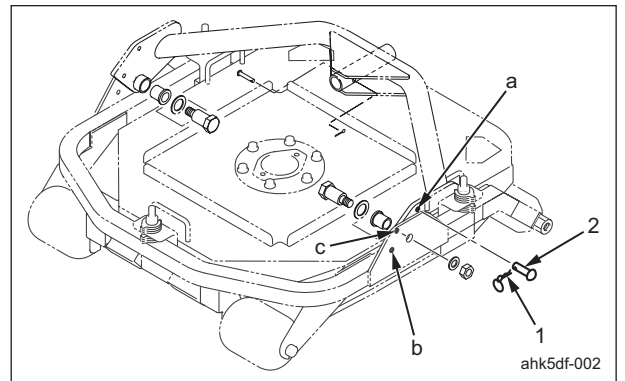
4. Start the engine, and then raise the mower units.
5. Stop the engine, and then remove the key.
6. Lift the mower unit at the front.



Mower Units #2/#3_004

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

7. Remove the cotter pin and hardened roundhead pin inserted at a, and then insert them at b.



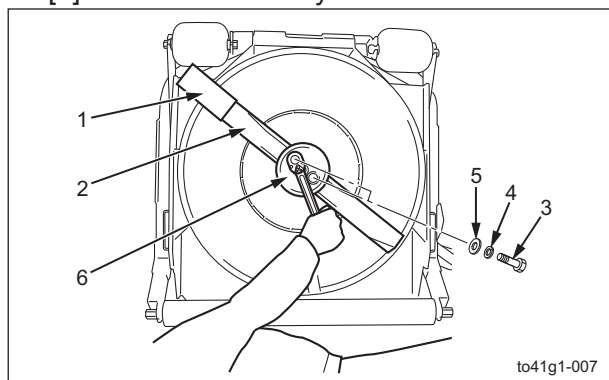
Mower Units #2/#3_005

1	Cotter pin
2	Hardened roundhead pin

8. 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.
 - [2] Remove the two bolts, spring washers and washers used to install the rotary knife.
 - [3] Remove the knife guide.

Operating Machine and Mower Units

[4] Remove the rotary knife.



Mower Units #2/#3_006

1	Square pipe
2	Rotary knife
3	Bolt
4	Spring washer
5	Washer
6	Knife guide

Important

The tightening torque for the knife mounting bolt is 67 - 85 N-m (683.20 - 866.75 kgf-cm).

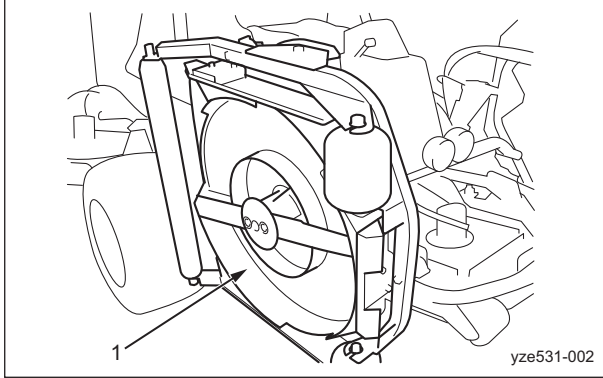
9. Install the rotary knife.

For installing the rotary knife, reverse the removing procedure.

Operating Machine and Mower Units

■Mower Units #4/#5

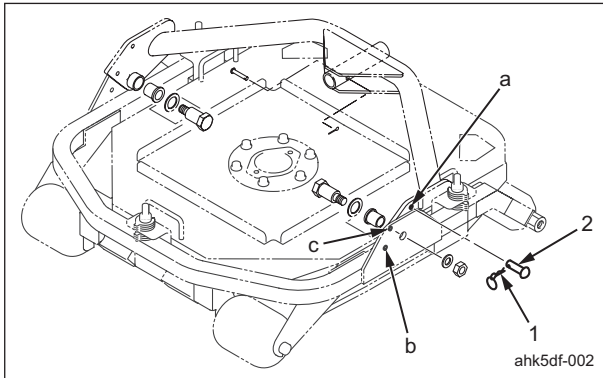
1. Start the engine, and then raise the mower units.



Mower Units #4/#5_001

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

2. Stop the engine, and then remove the key.
3. Remove the cotter pin and hardened roundhead pin inserted at a, and then insert them at c.

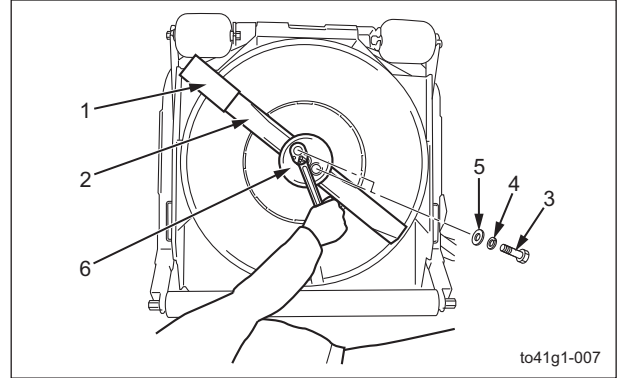


Mower Units #4/#5_002

1	Cotter pin
2	Hardened roundhead pin

4. 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.
 - [2] Remove the two bolts, spring washers and washers used to install the rotary knife.
 - [3] Remove the knife guide.

[4] Remove the rotary knife.



Mower Units #4/#5_003

1	Square pipe
2	Rotary knife
3	Bolt
4	Spring washer
5	Washer
6	Knife guide

Important

The tightening torque for the knife mounting bolt is 67 - 85 N-m (683.20 - 866.75 kgf-cm).

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

Operating Machine and Mower Units

Grinding of Rotary Knife

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

⚠ 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.

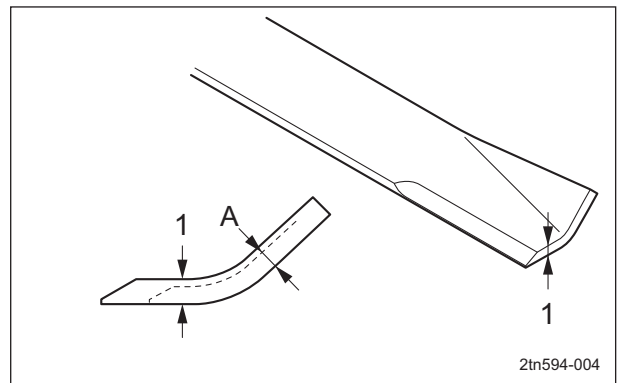
⚠ Caution

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.

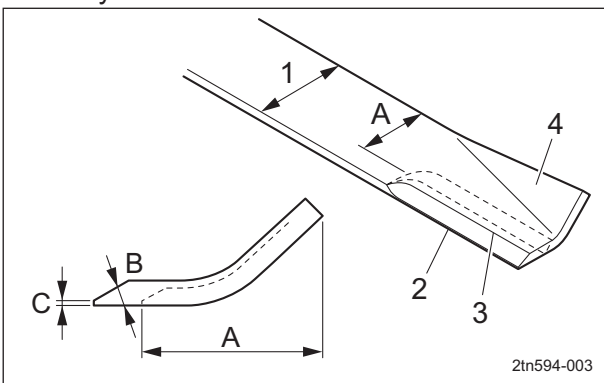
1. When, after grinding, the width of the rotary knife to the blade edge is 2/3 or more of the total width of a new knife
2. When, after grinding, the blade base of the rotary knife does not reach the sail

3. When the thinnest part of the rotary knife has a thickness of 1/3 or more of the thickness of a new knife



Grinding of Rotary Knife_002

1	Thickness
A	1/3 or more



Grinding of Rotary Knife_001

Operating Machine and Mower Units

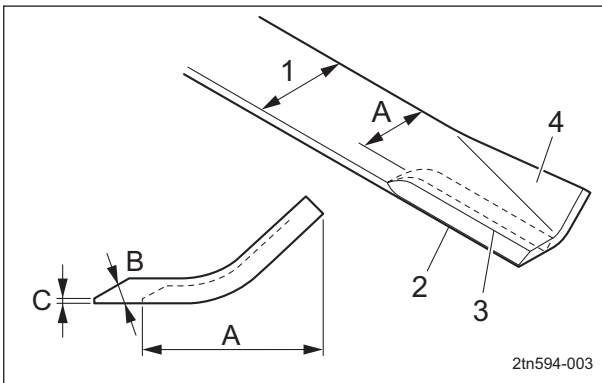
Follow the steps below to grind the rotary knife.

1. Remove the rotary knife from the machine.
(See "Removal of Rotary Knife" (Page 7-6)
"Change of Rotary Knife" (Page 7-17) .)

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 7-23) .)
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.

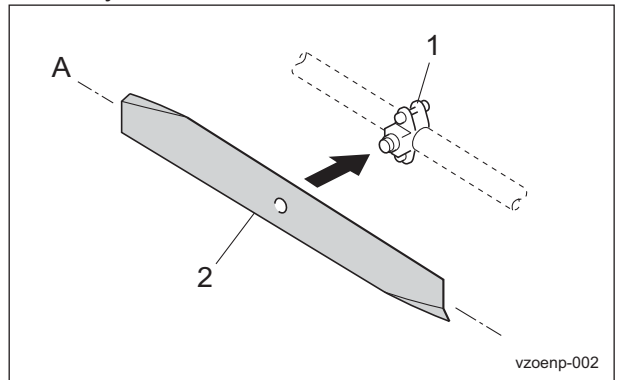
⚠ Caution

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 "Removal of Rotary Knife" (Page 7-6)
"Change of Rotary Knife" (Page 7-17) .)
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

Housing

Inspection of Housing

Bearing wear due to frequent usage or bearing damage caused by water infiltration may prevent the rotary knife from rotating smoothly. Inspect and replace parts such as oil seals and bearings.

- 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.

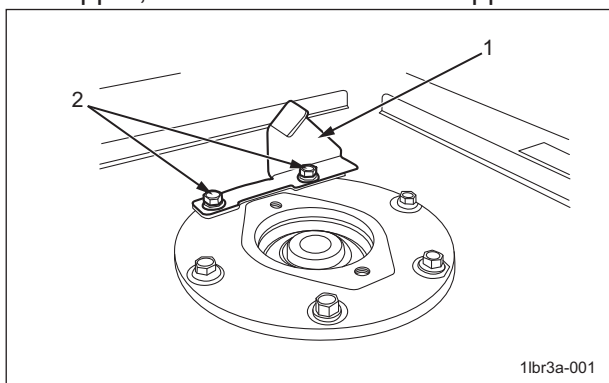
⚠ Danger

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.

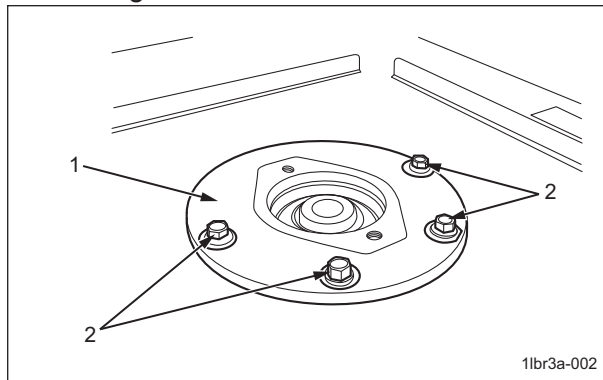
1. Remove the mower unit. (See "Removal of Mower Unit" (Page 7-5) .)
2. Remove the two bolts used to install the stopper, and then remove the stopper.



Inspection of Housing_001

1	Stopper
2	Bolt

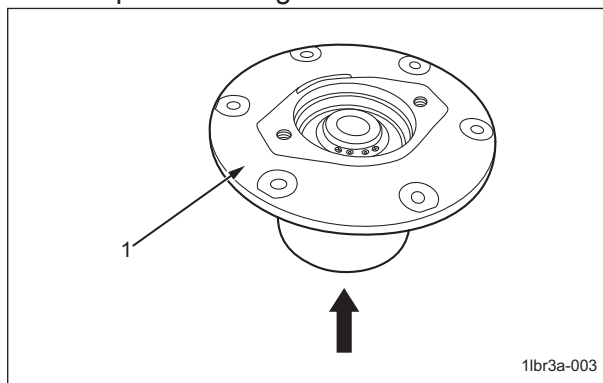
3. Remove the four bolts used to install the housing.



Inspection of Housing_002

1	Housing
2	Bolt

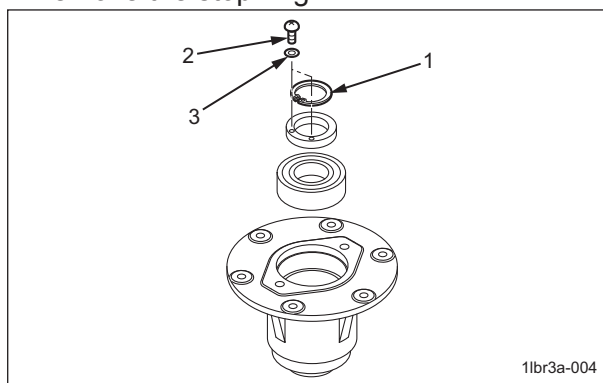
4. Pull up the housing to remove it.



Inspection of Housing_003

1	Housing
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5. Remove the roundhead screw and washer used to install the stop ring, and then remove the stop ring.

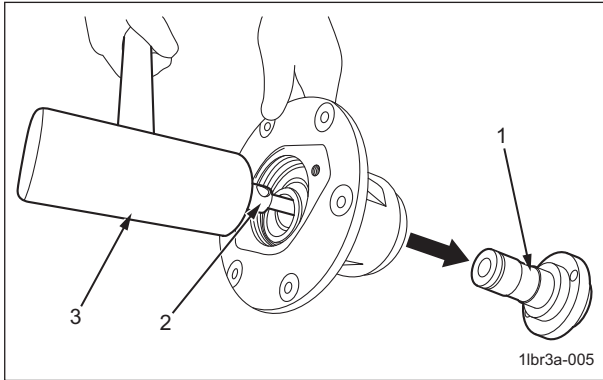


Inspection of Housing_004

1	Stop ring
2	Roundhead screw
3	Washer

Operating Machine and Mower Units

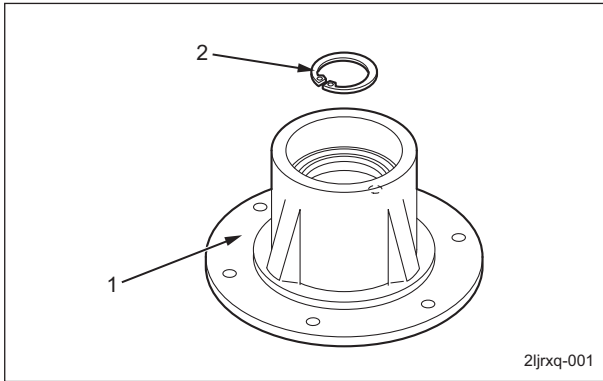
6. In order to avoid damage to the shaft when removing it, use an iron pipe, etc., and tap the pipe with a plastic hammer.



Inspection of Housing_005

1	Shaft
2	Iron pipe
3	Plastic hammer

7. Place the housing upside down and remove the stop ring.



Inspection of Housing_006

1	Housing
2	Stop ring

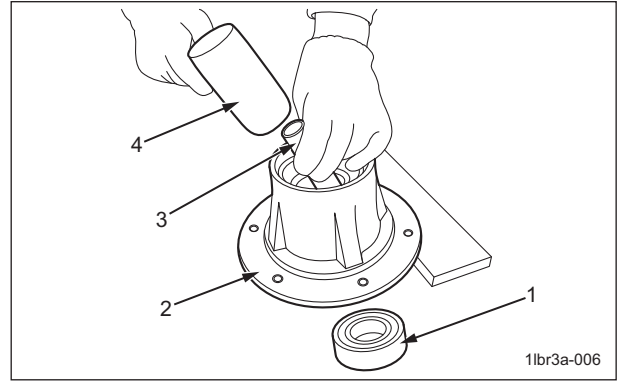
Important

Be careful not to hit the rubber part since the bearing may be damaged.

8. With the housing turned upside down, follow the steps below to remove the bearing.

[1] Place blocks of wood, etc., under the housing to create space for the bearing to be pushed out.

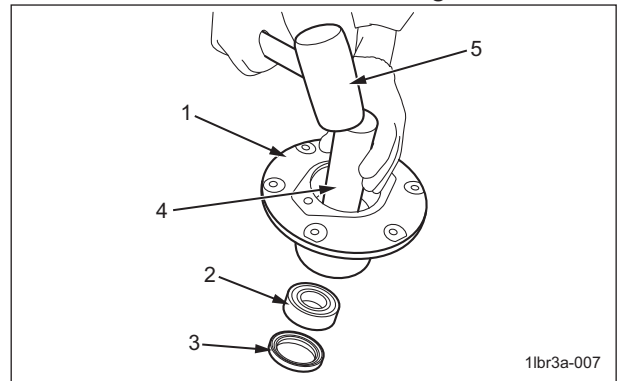
[2] Use an iron pipe and tap it with a plastic hammer to remove the bearing.



Inspection of Housing_007

1	Bearing
2	Housing
3	Iron pipe
4	Plastic hammer

9. Place the housing right-side up, and then use an iron pipe and tap it with a plastic hammer to remove the bearing and oil seal.



Inspection of Housing_008

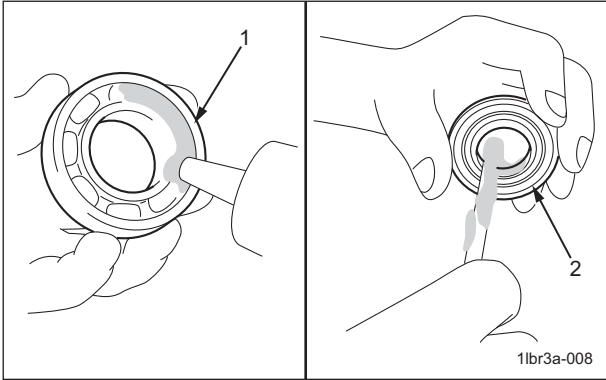
1	Housing
2	Bearing
3	Oil seal
4	Iron pipe
5	Plastic hammer

Operating Machine and Mower Units

Important

Be sure to replace the bearings, oil seals and O-rings with new ones.

10. 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.



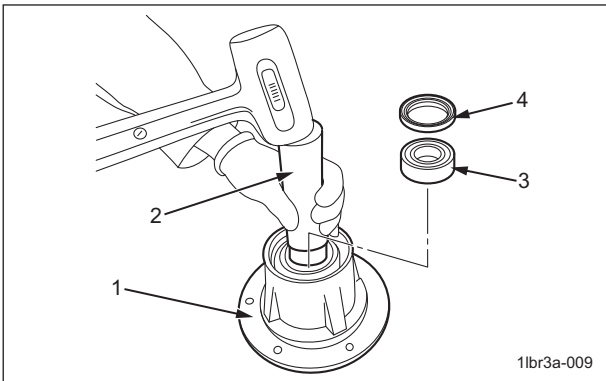
Inspection of Housing_009

1	Bearing
2	Oil seal

Caution

See the list in "Tightening torques" (Page 3-5). Note that the Baroness product warranty may not apply to defects caused by incorrect or overtorque tightening etc.

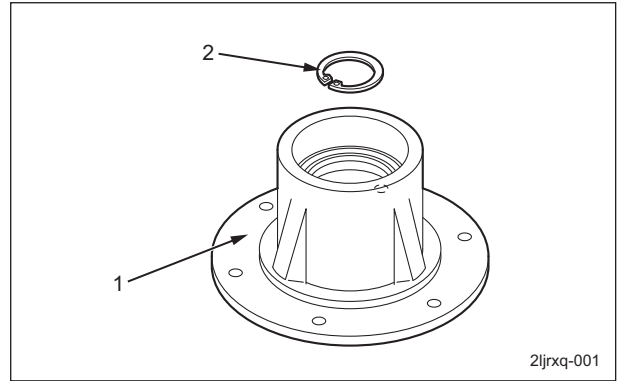
11. Place the housing upside down, and then drive in the bearing and oil seal evenly. Note Use a bearing driver to drive in the bearings and oil seals.



Inspection of Housing_010

1	Housing
2	Bearing driver
3	Bearing
4	Oil seal

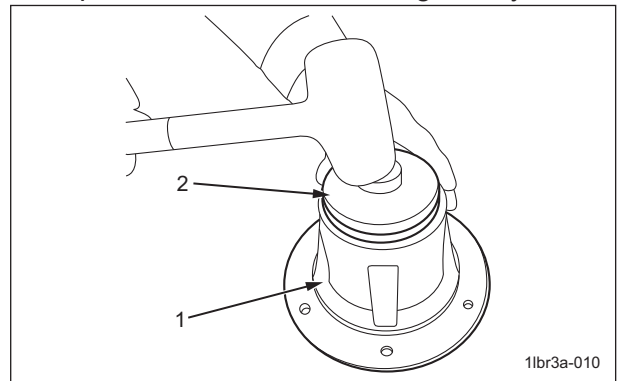
12. Attach the stop ring.



Inspection of Housing_011

1	Housing
2	Stop ring

13. Tap the shaft into the housing evenly.

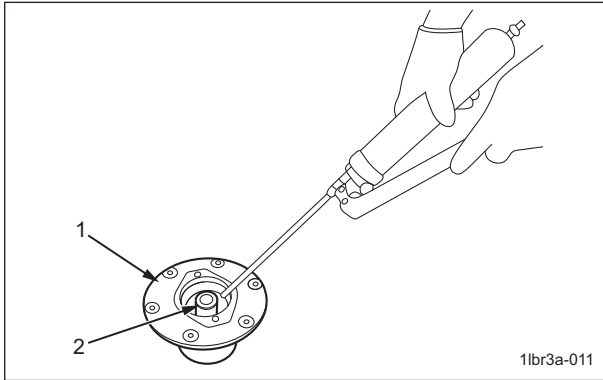


Inspection of Housing_012

1	Housing
2	Shaft

Operating Machine and Mower Units

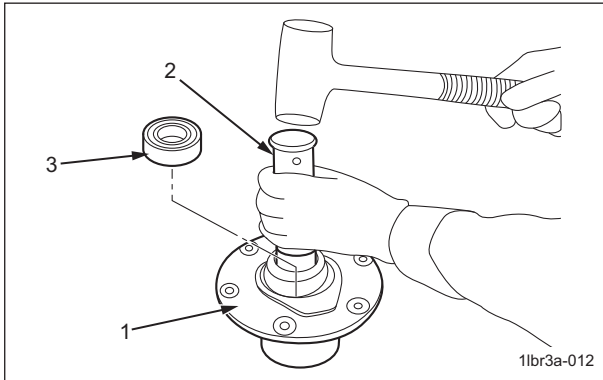
14. Place the housing right-side up, and then inject an appropriate amount of oil around the shaft.



Inspection of Housing_013

1	Housing
2	Shaft

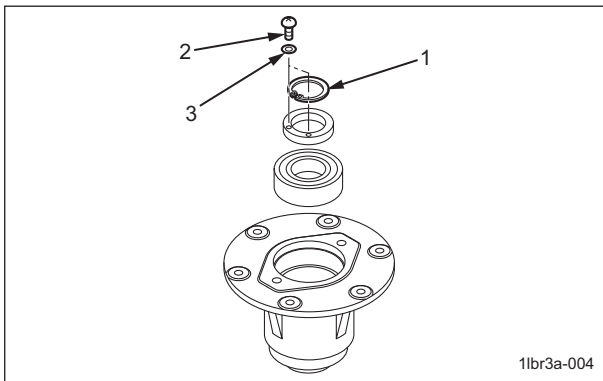
15. Drive the bearing into the housing evenly.
Note
 Use a bearing driver to drive in the bearings and oil seals.



Inspection of Housing_014

1	Housing
2	Bearing driver
3	Bearing

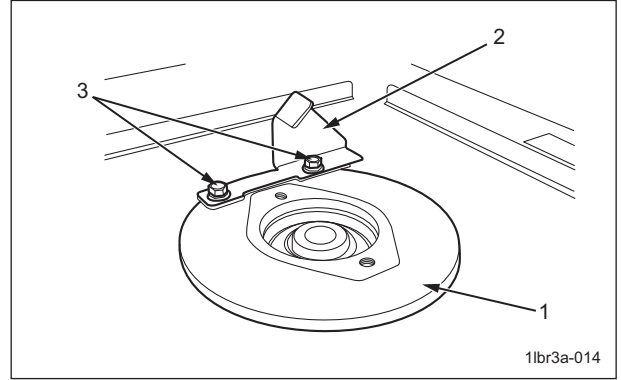
16. Install the stop ring, and then install the washer and roundhead screw.



Inspection of Housing_015

1	Stop ring
2	Roundhead screw
3	Washer

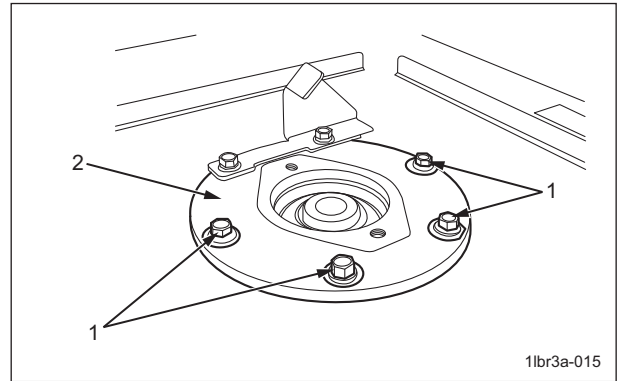
17. Insert the housing into the mower unit, and then temporarily install the stopper with the two bolts A.



Inspection of Housing_016

1	Housing
2	Stopper
3	Bolt A

18. Temporarily install the housing with the remaining four bolts B.

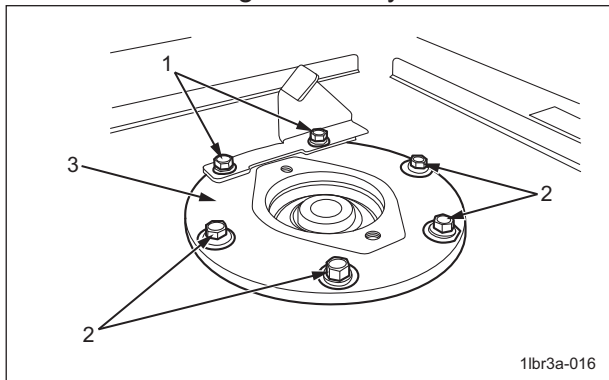


Inspection of Housing_017

1	Bolt B
2	Housing

Operating Machine and Mower Units

19. Evenly tighten bolts A and B, little by little, until the housing is securely installed.



Inspection of Housing_018

1	Bolt A
2	Bolt B
3	Housing

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

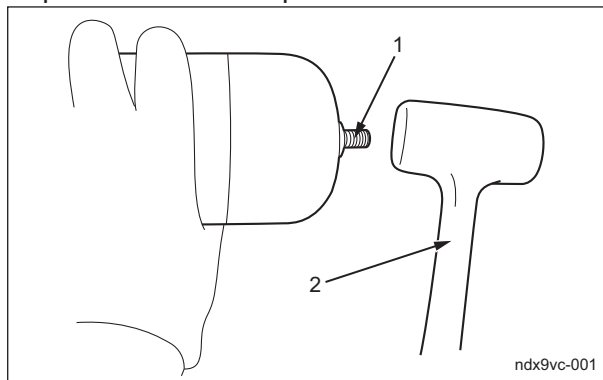
When touching edged tools, wear gloves, since they could cut your hands.

1. Remove the front roller ass'y. (See "Removal of Front Roller Assembly" (Page 7-10) .)

⚠ Caution

Pay attention not to damage the threads when you hit the shaft with a hammer.

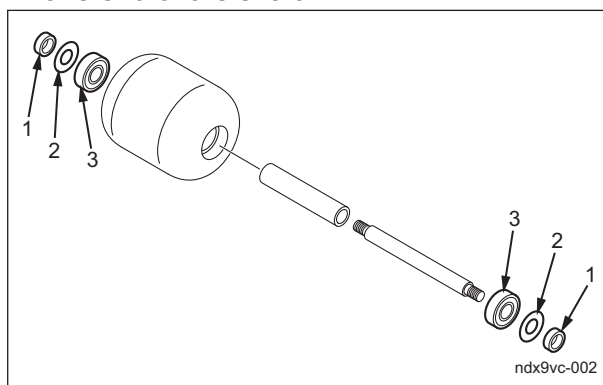
2. Knock one end of the wheel shaft with a plastic hammer to push out the shaft.



Inspection of Front Roller_001

1	Wheel shaft
2	Plastic hammer

3. Remove collar, washer, and bearing from one end of the shaft.



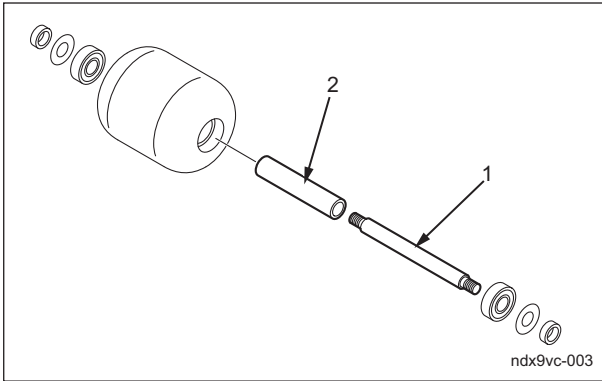
Inspection of Front Roller_002

1	Collar
2	Washer
3	Bearing

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

Operating Machine and Mower Units

5. Remove collar from the wheel shaft.



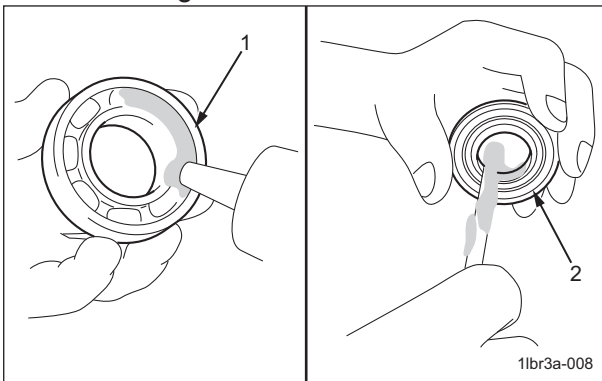
Inspection of Front Roller_003

1	Wheel shaft
2	Collar

Important

Be sure to replace the bearing with new one.

6. Have new bearings, and apply a profuse amount of grease.



Inspection of Front Roller_004

1	Bearing
2	Oil seal

Caution

See the list in "Tightening torques" (Page 3-5) .
Note that the Baroness product warranty may not apply to defects caused by incorrect or overtorque tightening, etc.

- 7. Install the front roller ass'y following the reversed procedure of the procedure 2 to 5.
- 8. Make sure that the roller rotates smoothly with no play when the roller shaft is fixed.
- 9. Apply grease. (See "Greasing Points" (Page 3-12) .)

10. Install the front roller ass'y. (See "Installation of Front Roller Assembly" (Page 7-11) .)

Inspection of Rear Roller

Wear of bearings due to frequent usage and invasion of water may damage bearings to prevent smooth rotation of the roller. Inspect and replace the parts such as the oil seal, 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 wear or damage of the oil seal.
- Make sure that there is no wear or rust of 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.

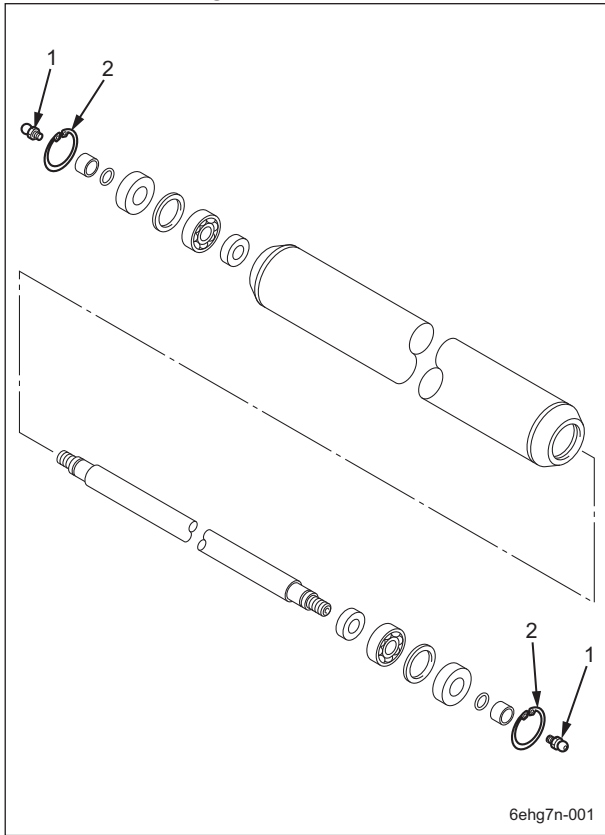
1. Remove the rear roller ass'y. (See "Removal of Rear Roller Assembly" (Page 7-12) .)

Caution

Pay attention not to damage the threads when you hit the shaft with a hammer.

Operating Machine and Mower Units

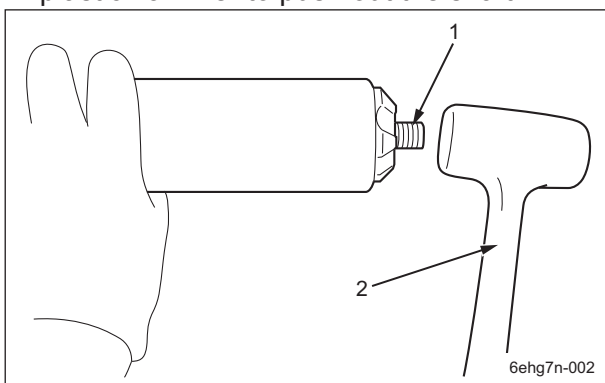
2. Remove the grease nipple and stop ring on the left and right side.



Inspection of Rear Roller_001

1	Grease nipple
2	Stop ring

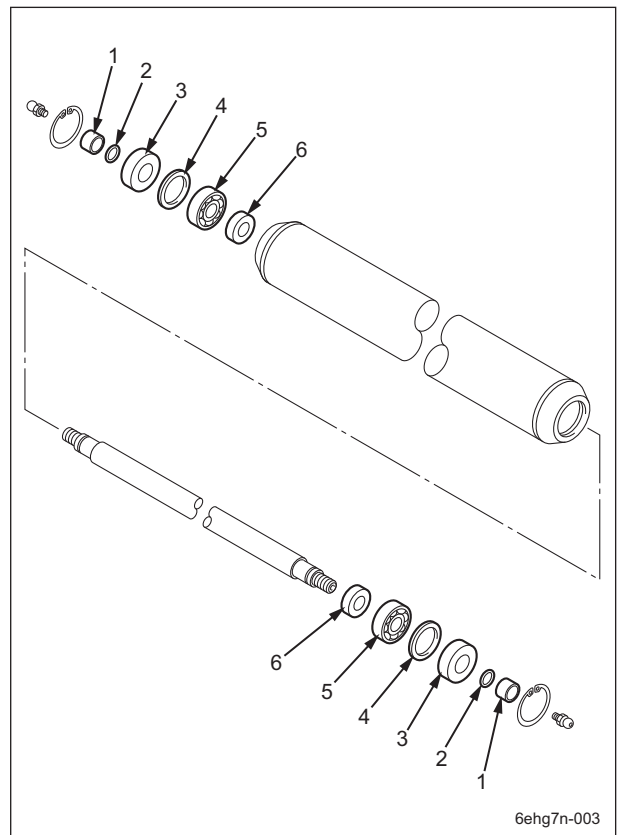
3. Knock one end of the roller shaft with a plastic hammer to push out the shaft.



Inspection of Rear Roller_002

1	Roller shaft
2	Plastic hammer

4. Remove collar, O-ring, oil seal-A, washer, bearing and oil seal-B from one end of the shaft.



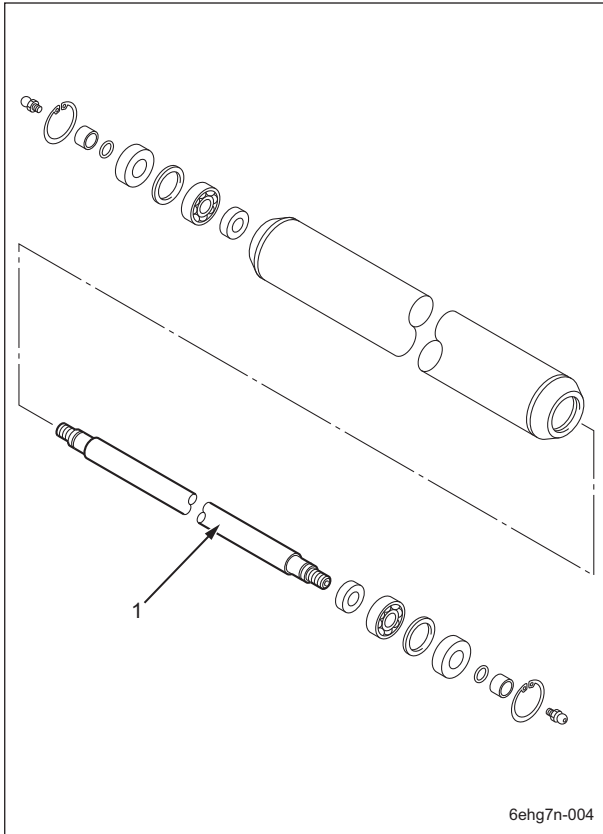
Inspection of Rear Roller_003

1	Collar
2	O-ring
3	Oil seal-A
4	Washer
5	Bearing
6	Oil seal-B

5. Follow the same steps to remove them from the other side.

Operating Machine and Mower Units

6. Remove the roller shaft.



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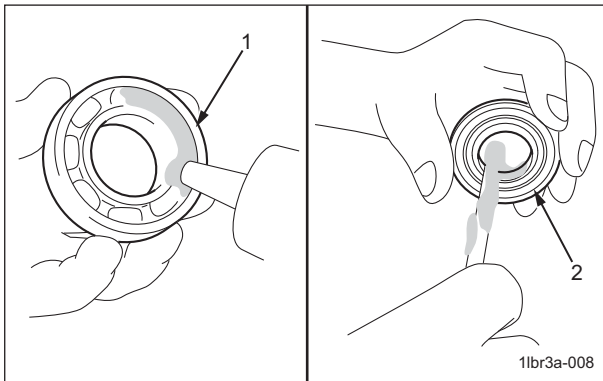
Inspection of Rear Roller_004

1	Roller shaft
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Important

Be sure to replace the bearings, oil seals and O-rings with new ones.

7. Have new bearings and oil seals ready, and apply a profuse amount of grease. Apply a profuse amount of grease to the lip of the oil seal.



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Inspection of Rear Roller_005

1	Bearing
2	Oil seal

Caution

See the list in "Tightening torques" (Page 3-5) .

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

8. Install the rear roller ass'y following the reversed procedure of the procedure 2 to 6.
9. Make sure that the roller has no play and rotates smoothly when the roller shaft is fixed and the roller is rotated.
10. Apply grease. (See "Greasing Points" (Page 3-12) .)
11. Install the rear roller ass'y. (See "Installation of Rear Roller Assy" (Page 7-12) .)

Mower Arm

Inspection of Mower Arm

Due to frequent use, or bends etc. caused by damage during use or transportation, the finish may not be smooth or the machine may not cut properly. In this case, check the mower arm and replace the parts, if necessary.

- Make sure that the bushing is not loose inside the mower arm.
- Check the tightening state of the attaching portion with the mower frame.
- Check if there is a change in shape etc. on the mower arm.

Refer to ("Removal of Mower Arm" (Page 7-14)) and ("Installation of Mower Arm" (Page 7-15)) for information on attaching and removing the mower arm.

Operating Machine and Mower Units

Troubleshooting

Relating to the Engine Page 8-2

Relating to Traveling Page 8-5

Relating to Steering Page 8-8

**Relating to Operating Machine and
Mower Unit Page 8-9**



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, rotary knife rotation switch not set to the "OFF" position, or traveling pedal not in neutral).	Electrical System - Measurements - Interlock System
	Faulty interlock system component (seat switch, neutral switch, parking brake switch, rotary knife rotation switch (rocker switch), rotary knife rotation relay (power relay), seat switch relay (power relay), brake switch relay (power relay), neutral switch relay (power relay), starter relay, engine stop relay, rotary knife detection relay)	Electrical System - Electrical Components Electrical System - Electrical Components - Power Relays
	Faulty 5A/15A fuse	Electrical System - Electrical Components - Fuse Box (E, H or J)
	Faulty fusible link (50 A, 30 A)	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 - Inspection/Repair of Each Part - Fuel Filter
	Wrong fuel	Engine Handling Manual

Troubleshooting

Problem	Cause	Reference
The engine does not start (but the starter motor turns).	Clogged air cleaner element	Engine - Inspection/Repair of Each Part - Air Cleaner
	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
The engine starts, then immediately stops.	The interlock system was activated (left the seat without applying the parking brake).	Electrical System - Measurements - Interlock System
	Clogged air cleaner element	Engine - Inspection/Repair of Each Part - Air Cleaner
	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 - Inspection/Repair of Each Part - Fuel Filter
	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 - Measurements - Battery Electrical System - Electrical Components - General Inspections/ Repairs - Battery
	Insufficient fan belt tension	Engine - Inspection/Repair of Each Part - Fan/Fan Belt
	Disconnected coupler in charging circuit wire or faulty wire	Inspect and repair the wire.
	Faulty alternator	Engine Maintenance Manual
Buzzer warning about overheating sounds	Rear cover, radiator or oil cooler blocked with dirt or dust	Engine - Inspection/Repair of Each Part - Cooling System
	Insufficient amount of coolant	This machine's Owner's Operating Manual
	Insufficient fan belt tension	Engine - Inspection/Repair of Each Part - Fan/Fan Belt
	Faulty thermostat	Engine Maintenance Manual
	Faulty water temperature switch	Engine Maintenance Manual
The monitor LED (yellow) turned on.	Abnormality detected unrelated to engine output low/stop	Engine Maintenance Manual referring to monitor fault code
The monitor LED (red) turned on.	Abnormality detected related to engine output low/ stop	Engine Maintenance Manual referring to monitor fault code

Relating to Traveling

Problem	Cause	Reference
Traveling power is poor.	Engine rpm is slow.	This machine operating manual
	Engine does not run smooth.	Engine maintenance manual
	The parking brake is applied.	This machine 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 operating manual
	Amount of hydraulic oil is low.	This machine operating manual
	Blockage of hydraulic oil line filter	Hydraulic system - Inspection of each part, repair - Hydraulic oil filter
	Hydraulic oil is too cool.	This machine operating manual
	Dirt in the hydraulic oil (contamination, invasion of water or air)	Hydraulic system - Inspection of each part, repair - Hydraulic oil
	Viscosity of the hydraulic oil is wrong.	Hydraulic system - Specifications Hydraulic system - Inspection of each part, repair - Hydraulic oil
	Insufficient cooling of the hydraulic oil cooler	Engine - Inspection and repair of each part - Cooling system
	Pressure of the piston pump is not high enough.	Hydraulic system - Measurement - Traveling circuit
	Malfunction of the piston pump	Hydraulic system - Removal and installation of each part - Piston pump
Malfunction of the wheel motor	Hydraulic system - Removal and installation of each part - Wheel motor	
It does not travel (in the case without the aforementioned causes).	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 operating manual
	The piston pump speed change lever does not operate.	Main body - Adjustment - Traveling rod - Adjustment of traveling rod

Troubleshooting

Problem	Cause	Reference
It does not travel (in the case without the aforementioned causes).	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 selection does not work.	Malfunction of the 2WD/4WD changeover switch (rocker switch)	Electrical system - Electrical equipment - Rocker switch
	Malfunction of terminal relay (relay box 2)	Electrical system - Electrical equipment - Terminal relay
	Malfunction of the 2WD/4WD changeover valve	Electrical system - Electrical equipment - Solenoid valve - 2WD/4WD changeover valve
The differential lock does not work.	Malfunction of the differential lock switch (auto return switch)	Electrical system - Electrical equipment - Auto return switch
	Malfunction of the terminal relay	Electrical system - Electrical equipment - Terminal relay
	15A fuse blew	Electrical system - Electrical equipment - Fuse box (D)
	Insufficient adjustment of the differential lock valve	Close the dial of the variable valve of the differential lock valve completely.
	Malfunction of the differential lock valve	Electrical system - Electrical equipment - Solenoid valve - Differential lock valve
It travels forward or backward even when the pedal is released.	Malfunction of neutral of the piston pump	Main body - Adjustment - Traveling rod - Adjustment of traveling rod
	Malfunction of bearing of neutral lever part	Replacement of the bearing
	Adhesion or play of the pedal/rod/lever part	Main body - Inspection of each part, repair - Traveling rod
	Malfunction of neutral of the manual servo	Neutral adjustment, replacement of the manual servo
Brake does not work.	The brake wire is broken (extended) or adhered.	Main body - Inspection of each part, repair - Brake wire

Troubleshooting

Problem	Cause	Reference
Brake does not work.	Disk pad is worn out (remaining thickness is 3mm or less).	Main body - Inspection of each part, repair - Brake Reference- "RT mechanical brake manual" (Page 9-13)
	Insufficient adjustment of the brake adjust nut part	Reference- "RT mechanical brake manual" (Page 9-13)
	Disk pad part has water, dust, oil, etc.	Reference- "RT mechanical brake manual" (Page 9-13)
	Adhesion of the torque plate ass'y and the sleeve	Reference- "RT mechanical brake manual" (Page 9-13)

Troubleshooting

Relating to Steering

Problem	Cause	Reference
Power steering is not working (steering operation is heavy)	Engine rpm is slow	This machine operating manual
	Tire pressure is low	This machine operating manual
	Lack of grease on the kingpin	Maintenance standards and maintenance - Greasing
	Amount of the hydraulic oil is low.	This machine operating manual
	Block of hydraulic suction filter	Hydraulic system - Inspection of each part, repair - Replacement of the suction filter
	Hydraulic oil is too cool.	Hydraulic system - Inspection of each part, repair - Hydraulic oil
	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 Hydraulic system - Inspection of each part, repair - Hydraulic oil
	Insufficient cooling of the hydraulic oil cooler	Engine - Inspection and repair of each part - Cooling system
	Malfunction of the orbitrol	Hydraulic system - Measurement - Steering circuit Hydraulic system - Removal and installation of each part - orbitrol
	Malfunction of steering cylinder	Hydraulic system - Removal and installation of each part - Steering cylinder
Malfunction of the gear pump	Hydraulic system - Measurement - Steering circuit Hydraulic system - Removal and installation of each part - Gear pump	

Relating to Operating Machine and Mower Unit

Problem	Cause	Reference
Rotary knife does not rotate (all mower units).	The knife rotation switch is not turned ON.	This machine operating manual
	The mower unit is not completely down.	This machine operating manual Electrical system - Electrical equipment - About electrical equipment - Rotary knife rotation circuit
	Malfunction of the knife rotation switch (rocker switch)	Electrical system - Electrical equipment - Rocker switch
	Amount of the hydraulic oil is low.	This machine operating manual
	Block of suction filter	Hydraulic system - Inspection of each part, repair - Hydraulic oil filter
	Malfunction of the gear pump	Hydraulic system - Measurement - Steering circuit Hydraulic system - Removal and installation of each part - Gear pump
Rotary knife does not rotate (mower unit #2/#3/#4 or mower unit #1/#5)	Malfunction of terminal relay (relay box 2)	Electrical system - Electrical equipment - Terminal relay
	Malfunction of proximity sensor	Hydraulic system - Adjustment - Proximity sensors Electrical system - Electrical equipment - Proximity sensors
	Malfunction of rotary knife rotation valve	Electrical system - Electrical equipment - Solenoid valve - Rotary knife rotation valve
	Malfunction of the gear pump	Hydraulic system - Measurement - Steering circuit Hydraulic system - Removal and installation of each part - Gear pump

Troubleshooting

Troubleshooting

Problem	Cause	Reference
Rotary knife does not rotate (one mower unit).	Malfunction of the gear motor	Hydraulic system - Measurement - Rotary knife rotation motor circuit Hydraulic system - Removal and installation of each part - Gear motor
	Blockage inside of mower unit	Removal of foreign objects and cleaning inside of mower unit
Rotary knife rotation speed is slow (all mower units).	Engine rpm is slow.	This machine operating manual
	Hydraulic oil temperature is low.	This machine operating manual
	Amount of the hydraulic oil is low.	This machine operating manual
	Block of suction filter	Hydraulic system - Inspection of each part, repair - Hydraulic oil filter
	Malfunction of the gear pump	Hydraulic system - Measurement - Steering circuit Hydraulic system - Removal and installation of each part - Gear pump
Rotary knife rotation speed is slow (mower unit #2/#3/#4 or mower unit #1/#5)	Malfunction of rotary knife rotation valve	Electrical system - Electrical equipment - Solenoid valve - Rotary knife rotation valve
	Malfunction of the gear pump	Hydraulic system - Measurement - Steering circuit Hydraulic system - Removal and installation of each part - Gear pump
Rotary knife rotation speed is slow (one mower unit)	Malfunction of the gear motor	Hydraulic system - Measurement - Steering circuit Hydraulic system - Removal and installation of each part - Gear pump
Rotary knife rotation does not stop (all mower units).	Malfunction of the knife rotation switch (rocker switch)	Electrical system - Electrical equipment - Rocker switch
Rotary knife rotation does not stop (mower unit #2/#3/#4 or mower unit #1/#5).	Malfunction of terminal relay (relay box 2)	Electrical system - Electrical equipment - Terminal relay

Troubleshooting

Problem	Cause	Reference
Rotary knife rotation does not stop (mower unit #2/#3/#4 or mower unit #1/#5).	Malfunction of proximity sensor	Hydraulic system - Adjustment - Proximity sensors Electrical system - Electrical equipment - Proximity sensors
	Malfunction of rotary knife rotation valve	Electrical system - Electrical equipment - Solenoid valve - Rotary knife rotation valve
Mower unit is not raised (all mower units).	Engine rpm is slow.	This machine operating manual
	Amount of the hydraulic oil is low.	This machine operating manual
	Block of suction filter	Hydraulic system - Inspection of each part, repair - Hydraulic oil filter
	Malfunction of control valve	Hydraulic system - Removal and installation of each part - Control valve
Mower unit is not raised (one mower unit).	Malfunction of the gear pump	Hydraulic system - Measurement - Steering circuit Hydraulic system - Removal and installation of each part - Gear pump
	Malfunction of up/down cylinder	Hydraulic system - Measurement - Steering circuit Hydraulic system - Removal and installation of each part - Up/down cylinder
Mower unit is not raised (one mower unit).	Dropped mounting pin of up/down cylinder	Installation of mounting pin of up/down cylinder
	Lack of grease on the lift arm fulcrum	Maintenance standards and maintenance - Greasing
	Amount of the hydraulic oil is low.	This machine operating manual
Mower unit is not lowered (all mower units).	Block of suction filter	Hydraulic system - Inspection of each part, repair - Hydraulic oil filter
	Malfunction of control valve	Hydraulic system - Removal and installation of each part - Control valve

Troubleshooting

Problem	Cause	Reference
Mower unit is not lowered (all mower units).	Malfunction of the gear pump	Hydraulic system - Measurement - Steering circuit Hydraulic system - Removal and installation of each part - Gear pump
Mower unit is not lowered (mower unit #4/#5).	Mower lock lever is not released.	This machine operating manual
	Main body is inclined.	Move the main body to level surface.
Mower unit lowering speed is slow (all mower units).	Insufficient adjustment of assist valve	Hydraulic system - Adjustment - Assist valve
	Hydraulic oil temperature is low.	This machine operating manual
Mower unit lowering speed is slow (mower unit #4/#5).	Insufficient adjustment of slow return valve	Loosen the lock nut and loosen the adjustment knob.
Mower unit lowers by itself too quickly.	Malfunction of up/down cylinder	Hydraulic system - Removal and installation of each part - Up/down cylinder
	Malfunction of control valve	Hydraulic system - Removal and installation of each part - Control valve
Mowed face is not flat.	Cutting height adjustments of all the mower units are not even.	This machine operating manual
	Malfunction of bearing of mower unit roller	Operating machine and mower unit - Inspection of each part, repair - Roller
	Malfunction of bearing and shaft of mower unit housing	Operating machine and mower unit - Inspection of each part, repair - Housing
	Deformation of rotary knife	Operating machine and mower unit - Inspection of each part, repair - Rotary knife
	Adhesion, deformation and wear of mower arm	Operating machine and mower unit - Inspection of each part, repair - Mower arm
Mowed face is not clean (in the case without the aforementioned causes).	Engine rpm is slow.	This machine operating manual
	Operation speed is fast.	This machine operating manual
	Volume of mowing is too much.	This machine operating manual
	Wear of rotary knife	Operating machine and mower unit - Inspection of

Troubleshooting

Problem	Cause	Reference
Mowed face is not clean (in the case without the aforementioned causes).	Wear of rotary knife	each part, repair - Rotary knife
	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.

Troubleshooting

- Specifications Page 9-2**
- Maintenance Schedule Page 9-3**
- Hydraulic circuit diagramPage 9-5**
- Electrical Circuit Page 9-6**
- Electric wiring diagram Page 9-9**
- List of Consumables Page 9-11**
- RT mechanical brake manual Page 9-13**

Reference

Specifications

GM2810

Main body	Total length	370 cm (145.67 in)
	Total width	During traveling: 230 cm (90.55 in)/during operation: 300 cm (118.11 in)
	Total height	230 cm (90.55 in)
	Wheelbase	172 cm (67.72 in)
	Tread	Front wheel: 190.4 cm (74.96 in)/rear wheel: 110 cm (43.30 in)
	Total weight	During traveling: 2,080 kg (4,586 lb)/during operation: 1,638 kg (3,611 lb) (with ROPS, sunshade, empty fuel tank)
	Drive	HST4WD (2WD/4WD selectable)
	Traveling speed	Forward: 16 km/h (9.9 mph)/reverse: 6 km/h (3.7 mph)
	Steering wheel	Power steering (orbitrol + hydraulic cylinder)
	Brake	Front two wheel disk mechanical type
Wheel size: Pneumatic pressure	Front wheel	29 x 14.00 - 15:150 kPa (1.53 kgf/cm ²) (21.83 psi)
	Rear wheel	20 x 12.00 - 10:140 kPa (1.43 kgf/cm ²) (20.37 psi)
Operating machine (Mower unit)	Rotary knife	Width: 69 cm (27 in)
	Cutting height	2.0 - 9.15 cm (0.79 - 3.60 in)
	Cutting width: 5 units	280 cm (110 in)
Engine	Model	Kubota V2403-CR-TE4B (Diesel Turbo)
	Type	Vertical water-cooled 4-cycle diesel engine with turbo charger
	Total displacement	2,434 cc (148.5 cu. in)
	No load rpm	1,450 - 2,600 rpm
	Maximum output	43.2 kW/2,400 rpm (58.9 PS/2,400 rpm)
	Fuel consumption	236 g/kW · h (173 g/PS · h)
	Engine oil in use	Be sure to use engine oil that is classified as API Service Grade CJ-4, with an SAE Viscosity that is appropriate for the operating environment (ambient temperature).
Battery	105D31R	
Volume	Quantity of engine oil	9.7 dm ³ (9.7 L) (2.56 U.S. gal.) (including filter)
	Coolant capacity	12 dm ³ (12 L) (3.17 U.S. gal.) (including reserve tank)
	Fuel tank capacity	51 dm ³ (51 L) (13.5 U.S. gal.) (sulfur-free light oil)
	Hydraulic tank capacity	44 dm ³ (44 L) (11.6 U.S. gal.) (Shell Tellus S2M46 or equivalent: ISO VG46)

Maintenance Schedule

GM2810

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 (or brush) 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)		

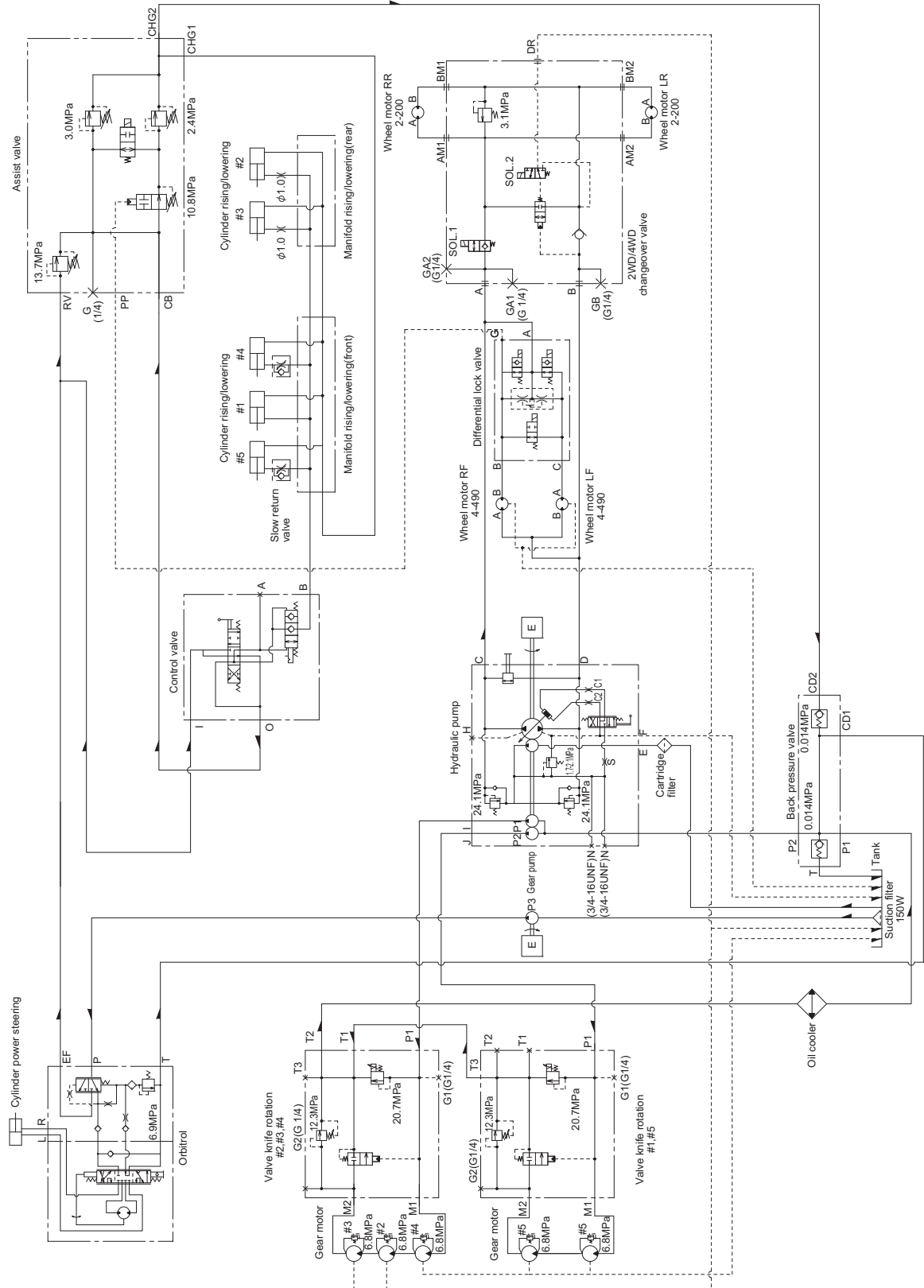
Reference

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	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Electromagnetic pump filter	○					△								
	Fuel strainer					○						△			
	Fuel pipe	○													
	Cleaning the exterior	○													
By model	Sedimenter				○										
	Air cleaner	○													
	Outer element						△				△			Whichever comes first	
	Inner element										△				
	Draining and inspecting the water separator				○										
	Cleaning the water separator									○					
	Inspecting the injector													Every 1,500 hrs.	
	Replacing the oil separator element													Every 1,500 hrs.	
DPF cleaning													Every 3,000 hrs.		

The values for consumables are not guaranteed.
Replace the steering cylinder hoses every 2 years.

Hydraulic circuit diagram

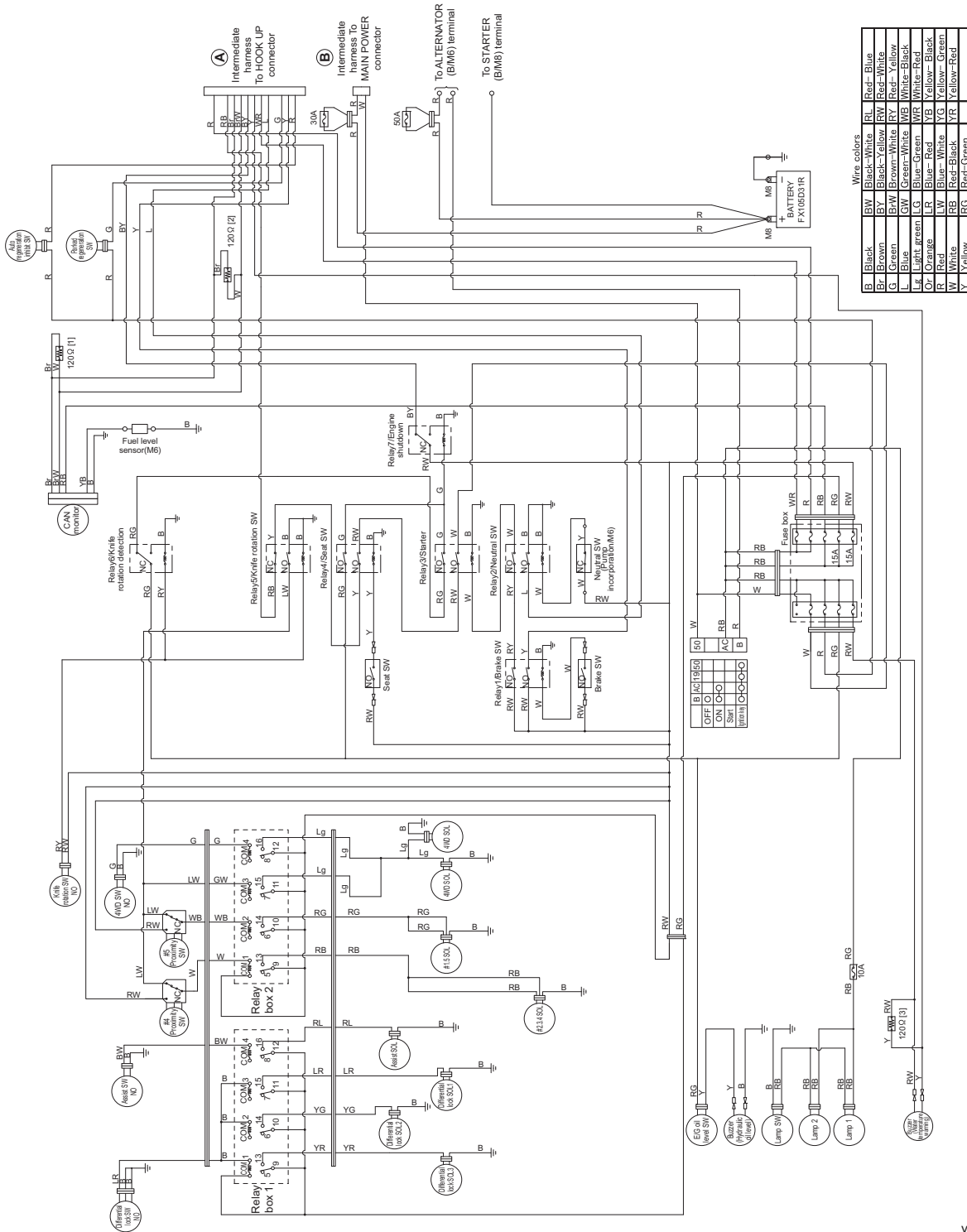


Hydraulic circuit diagram_001

Reference

Electrical Circuit

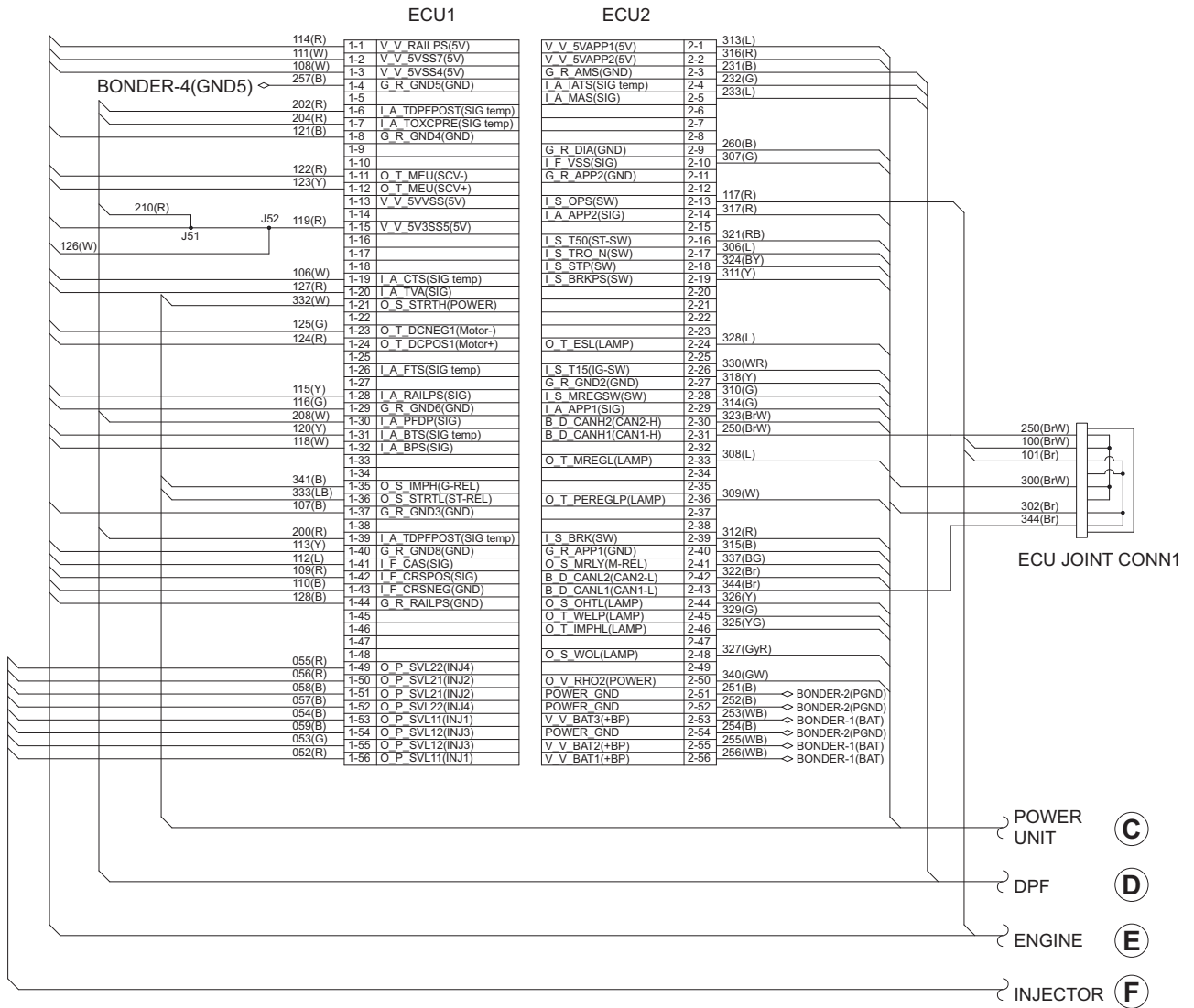
Main Harness Side



Electrical Circuit_001

vgmkv-021E

Intermediate Harness Side



Reference

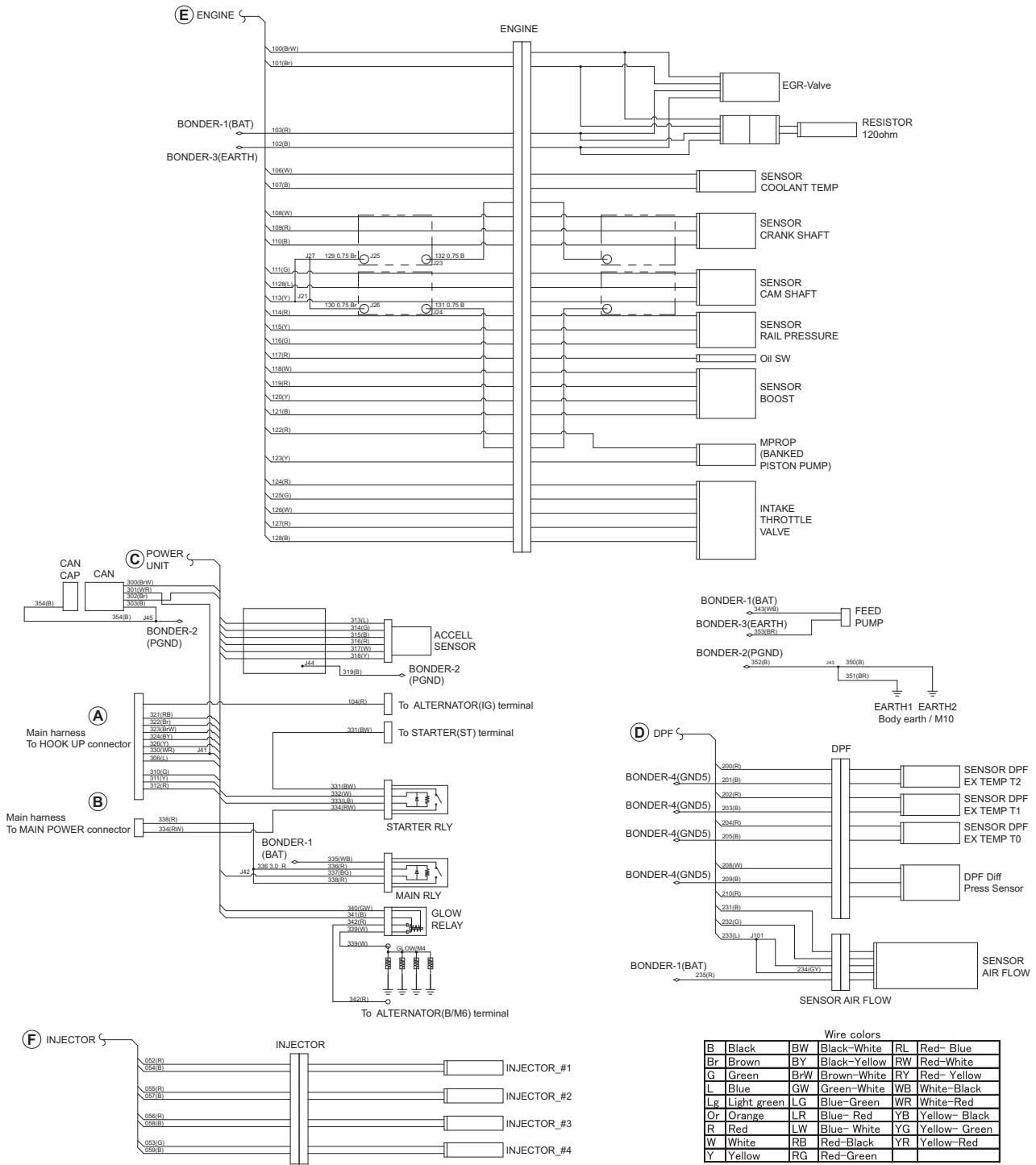
Wire colors

B	Black	BW	Black-White	RL	Red-Blue
Br	Brown	BY	Black-Yellow	RW	Red-White
G	Green	BrW	Brown-White	RY	Red-Yellow
L	Blue	GW	Green-White	WB	White-Black
Lg	Light green	LG	Blue-Green	WR	White-Red
Or	Orange	LR	Blue-Red	YB	Yellow-Black
R	Red	LW	Blue-White	YG	Yellow-Green
W	White	RB	Red-Black	YR	Yellow-Red
Y	Yellow	RG	Red-Green		

vgmkv-025E

Electrical Circuit_002

Reference

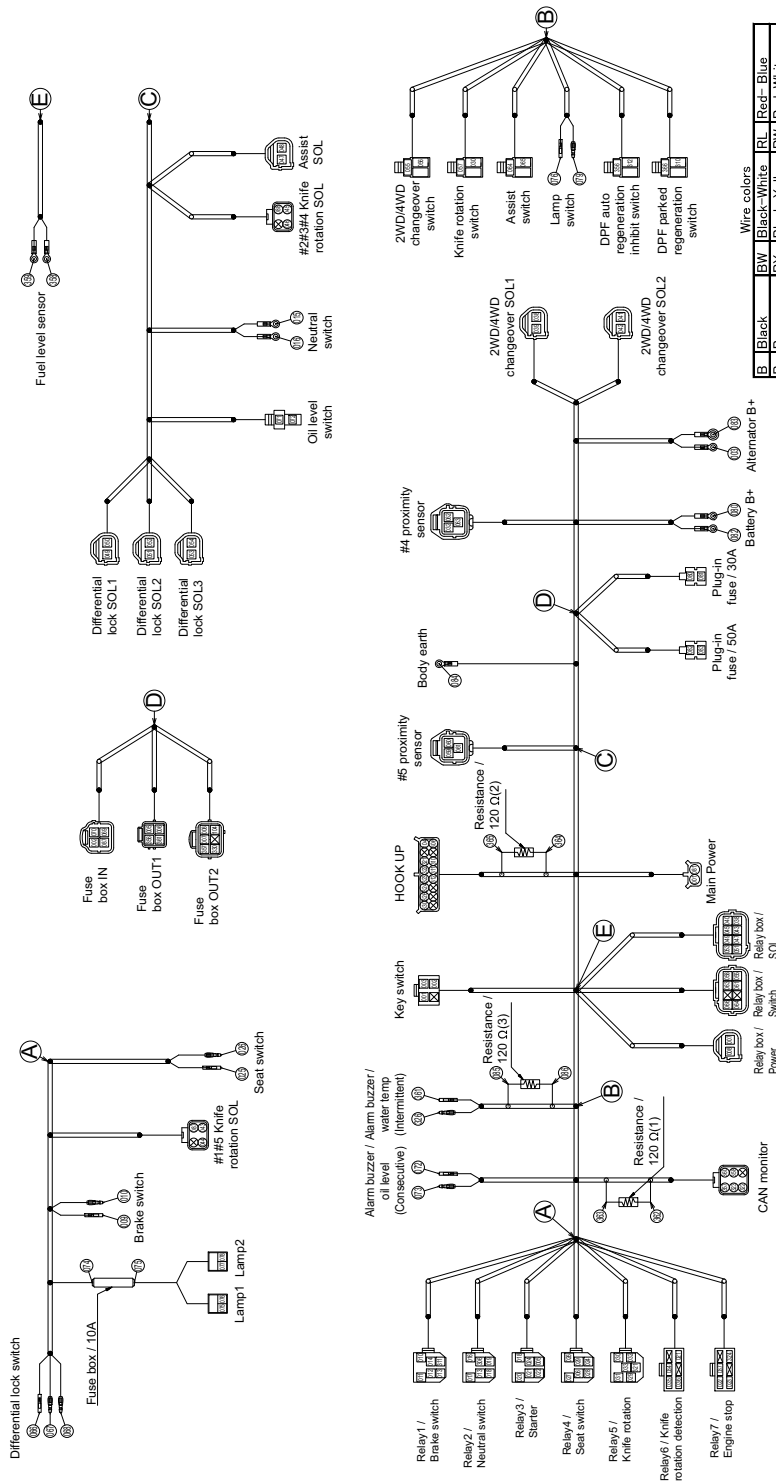


vgmkv-022E

Electrical Circuit_003

Electric wiring diagram

Main harness



Wire colors

B	Black	BW	Black-White	RL	Red-Blue
Br	Brown	BY	Black-Yellow	RW	Red-White
G	Green	BRW	Brown-White	RY	Red-Yellow
L	Blue	GW	Green-White	WB	White-Black
Lg	Light green	LG	Blue-Green	WB	White-Black
Or	Orange	LR	Blue-Red	WR	White-Red
R	Red	LW	Blue-White	YB	Yellow-Black
W	White	RB	Red-Black	YR	Yellow-Red
Y	Yellow	RG	Red-Green		

WIRE No.	FROM	TO	WIRE Color	Size	WIRE Size
001	Key switch	Main Power	2.0f W	0.85	B
002	Key switch	Fuse box IN	2 W	0.85	W
003	Key switch	Fuse box IN (terminal)	2 W	0.85	W
004	001	Fuse box IN	2 W	0.85	W
005	Fuse box OUT1	Relay3	0.85 W	0.85	W
006	Fuse box OUT1	Relay4	0.85 W	0.85	W
007	Fuse box OUT2	Relay5	0.85 W	0.85	W
008	Fuse box OUT2	Relay6	0.85 W	0.85	W
009	008	Relay box / Power	0.85 W	0.85	W
010	008	Brakes switch	0.85 W	0.85	W
011	Relay1	Relay1	0.85 W	0.85	W
012	009	Relay1	0.85 W	0.85	W
013	009	Relay2	0.85 W	0.85	W
014	008	Neutral switch	0.85 W	0.85	W
015	008	Neutral switch	0.85 W	0.85	W
016	008	Relay3	0.85 W	0.85	W
017	008	Relay4	0.85 W	0.85	W
018	Relay2	Relay3	0.85 W	0.85	W
019	Relay2	Relay4	0.85 W	0.85	W
020	Relay3	Relay5	0.85 W	0.85	W
021	Relay3	Relay6	0.85 W	0.85	W
022	Relay3	Relay7	0.85 W	0.85	W
023	Relay4	Relay7	0.85 W	0.85	W
024	Relay4	Relay8	0.85 W	0.85	W
025	008	Seat switch	0.85 W	0.85	W
026	008	Seat switch	0.85 W	0.85	W
027	Relay4	Relay4	0.85 W	0.85	W
028	Relay4	Relay5	0.85 W	0.85	W
029	Relay4	Relay6	0.85 W	0.85	W
030	Relay4	Relay7	0.85 W	0.85	W

Electric wiring diagram_001

kcl9bj-028E

List of Consumables

The consumables are described below.



Use tools appropriate for each replacement operation.

	Code	Part name	Qty.	Remarks	
Engine	Fan belt	PF17266-9701-0	V-belt 42.5 cog	1	
	Engine oil filter	PFHH164-3243-0	Oil element	1	
	Fuel filter	PF1J521-4317-0	Fuel element	1	
	Air cleaner	PF59800-2611-0	Air cleaner element	1	
	Air cleaner	PF3A111-1913-0	Element (inner)	1	
	Separator	PF1J520-4306-0	Filter element assy	1	
	Oil separator	PF1J770-0581-0	Element kit (separator)	1	
Main body (including hydraulic and electrical systems)	Suction filter	K3413000040	Suction filter SFT-10-150W	1	
	Hydraulic oil filter	K3410000030	Replacement filter F-913-1	1	
	Hydraulic Oil	K2913100200	Tellus S2M46, 20 L can	-	Hydraulic tank capacity: 44.0 dm ³ (44.0 L) (11.62 U.S. gals)
	Steering cylinder	Y4020K-SK	Cylinder seal kit	1	
	Mower cylinder #1	YIS-40D-SK	Seal kit	1	
	Mower cylinders #2/#3/#4/#5	YIS-45B-SK	Cylinder seal kit	4	
	Piston pump	Y72400-908	Seal kit for piston pump 72400	1	
	Gear pump	Y62-10313	Seal kit for gear pump PBB55RK513	1	
	Orbitrol (PV valve)	YBK0039A	Seal kit for orbitrol PV valve	1	
	Orbitrol UA-B4-D	YBA0271A	Seal kit for orbitrol UA-B4-D	1	
	Front wheel motor	YAE0325A	Seal kit for wheel motor 490BBAS (for shaft)	2	
	Front wheel motor	Y61234S	Seal kit for wheel motor 490BBAS (for rear)	2	
	Rear wheel motor	Y61090S	Seal kit for orbit motor 2000 (for rear)	2	
	Rear wheel motor	Y61091S	Seal kit for orbit motor 2000 (for shaft)	2	
	Terminal relay	G6B2114P-US-P6B	Replacement relay	8	
	Rotary knife rotation power relay	K3681000080	Power relay MR5A602A1K	2	Grey
	Power relay for seat/brake	K3681000070	Power relay MR5A411A1K	2	Brown
Starter, neutral, knife rotation SW detection, engine stop	K3681000010	Relay CA1-DC12V-N	2	Black	
Fusible link	K3630000160	Fusible link 30 A	1		
	K3630000150	Plug-in fuse 50 A	1		

Reference

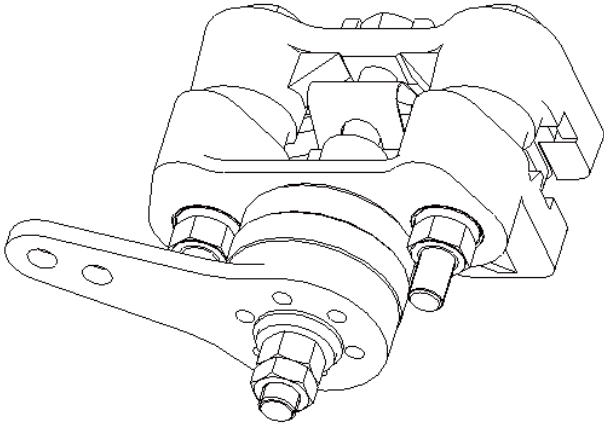
		Code	Part name	Qty.	Remarks
Main body (including hydraulic and electrical systems)	Fuse Box	K3631000070	Mini-blade fuse 5 A	7	
		K3631000110	Mini-blade fuse 15 A	2	
	Parking brake switch	K3671000150	Safety switch V17680A	1	
	Proximity sensor	K3720000120	Proximity sensor E2E-X5E2	2	
	Diff-lock switch	K3662000030	Auto-return switch ET115G	1	
	Rocker switch	K3661000050	Rocker switch	4	
	Rocker switch M	K3661000100	Rocker switch M	1	
	Key switch	PF15248-6359-0	Starter switch Assy	1	
	RT brake Assy	Y304-2221	Repair kit for RT brake	2	
	RT brake Assy	Y328-2845	Pad kit for RT brake	2	
	RT brake Assy	Y304J7024	Cam kit	2	
	Brake wire, right	K1120238000	Brake wire 2380	1	
Brake wire, left	K1120205500	Brake wire 2055	1		
Operating machine (mower unit)	Rotary knife	K253000009B	Rotary knife 690	5	

RT mechanical brake manual

MANUAL E 404



This manual is to be used in conjunction with the Illustrated Parts List EP2318.



MANUAL: E404

JAPAN POWER BRAKE INCORPORATED 

MANUAL E 404

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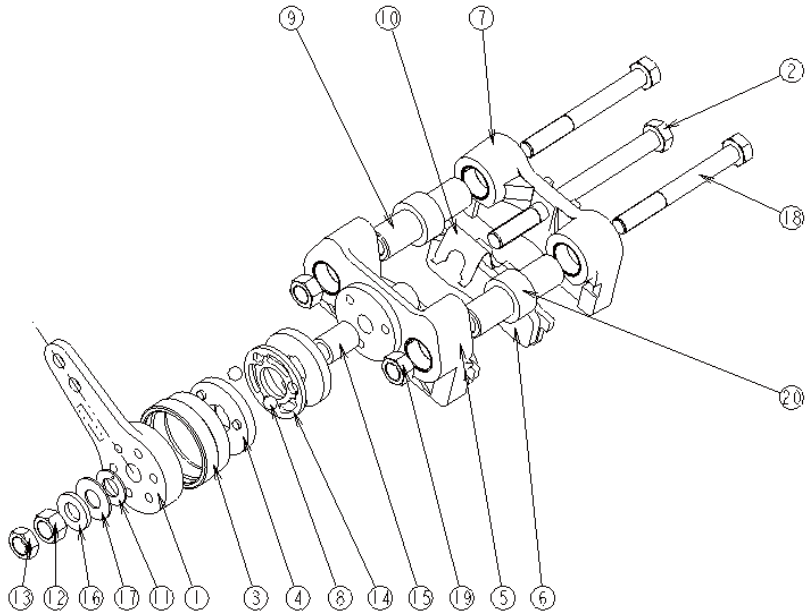
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MANUAL E 404

1. DESCRIPTION

The RT parking brake assembly is a ball and ramp, sliding caliper brake designed for use primarily as a parking brake, with some secondary braking capability. The brake has an open caliper design to facilitate changing linings, along with a retraction spring to reduce parasitic drag. It is sealed from the environment to provide a long and trouble free service life.

2. PARTS LIST



Reference

MANUAL 419-2318

1. PARTS LIST

ITEM NO.	DESCRIPTION	PART NO.	QTY	NOTE
1	LEVER	83-2009	1	
2	BOLT, ADJUSTING ½-20	43-2027	1	
3	BOOT	77-7215	1	
4	CAM	112-7030	2	
5	TORQUE PLATE	4-2015	1	
6	LINING & CARRIER ASSEMBLY	244-7845	2	
7	TORQUE PLATE	4-2025	1	
8	STAINLESS BALL	130J7002	3	
9	SLEEVE	54-2004	2	
10	SPRING	40-2030	1	
11	THRUST WASHER	111-7000	1	
12	1/2-20 NUT, ADJUSTMENT ½-20	63-611	1	
13	NUT, ADJUSTMENT JAM ½-20	63-7631	1	
14	RETAINER	56-7948	1	
15	ID SEAL	68-8436	1	
16	WASHER, HARDENED	80-7836	1	
17	WASHER, STAINLESS	43-9060	1	
18	BOLT M12×1.75	43-2126	2	
19	NUT M12×1.75	63-2103	2	
20	OD SEAL	77-2011	2	

2. PARTS KIT

ITEM NO.	DESCRIPTION	PART NO.	QTY	NOTE
-	OVERHAUL KIT, RT BRAKE ASSY	304-2221	1	
6	LINING & CARRIER ASSEMBLY	244-7845	2	
10	SPRING	40-2030	1	
3	BOOT	77-7215	1	
15	ID SEAL	68-8436	1	
11	THRUST WASHER	111-7000	1	
20	OD SEAL	77-2011	2	
-	INSTRUCTION SHEET	585-2136	1	
-	LINING KIT, RT BRAKE ASSY	328-2845	1	
6	LINING & CARRIER ASSEMBLY	244-7845	2	
10	SPRING	40-2030	1	
-	INSTRUCTION SHEET	585-2136	1	
-	CAM KIT	304J7024	1	
4	CAM	112-7030	2	
8	STAINLESS BALL	130J7002	3	
14	RETAINER	56-7948	1	
-	GRASE	399-5	1	

MANUAL E 404

3. MOUNTING PROCEDURE

- 3.1. Insert Mounting Bolts through Sleeves (9) and thread Brake Mounting Locking Nuts as far as possible on Mounting Bolts. This is not required if brake assembly comes with the sleeve/bolt sub-assy (9). Position the brake over disc and align with mounting holes in mounting bracket.
- 3.2. Thread mounting bolts into mounting bracket, adjusting bolts until a .020" - .060" gap exists between the Sleeves (9) and the Locking Nuts. Tighten the Locking Nuts to 100 to 120 lb-ft of torque against the bracket.
- 3.3. Refer to Adjustment Procedure to set clearance of installed brake assembly.

4. ADJUSTMENT PROCEDURE

- 4.1. Loosen two Adjustment Nuts (12 & 13) (one full nut and one jam nut except when using a 0.50 inch thick disc which requires two jam nuts).
- 4.2. Tighten inner Nut (12) until firm contact is made with the disc by the linings. Torque to 100 lbs in. Make certain Lever (1) is in proper operating position for application.
- 4.3. Back off inner Nut (12) 4 to 5 flats and check that disc is free to move.
- 4.4. Tighten outer Nut (13) against inner Nut (12) to lock Adjustment Bolt (2) in place. Torque to 45 to 55 lb-ft.

5. Break inspection and maintenance

- 5.1. Inspection of brake and surroundings
Dirt or oil on the brake itself or its surroundings may have an adverse effect on brake performance and should be removed with a brush or a lint-free cloth.
- 5.2. Appearance inspection of the lining pad assembly (6)
If any cracks or abrasion have occurred in the friction material, replace the lining pad assembly. (See point 7 for the replacement method)
- 5.3. Thickness inspection of lining pad assembly (6)
The wear limit for the friction material of the lining pad assembly (excluding the carrier) is .12in. If it is less than .12in, replace the lining pad assembly. (See point 7 for the replacement method)
- 5.4. Greasing of moving parts
<Stainless ball bearing(8), cam(4)>
Grease is sufficiently applied during assembly, but the stainless ball bearing and cam should be disassembled and grease reapplied annually.
If a worn down part is discovered during inspection, replace the stainless ball bearing(8), cam(4), and retainer(14) as a set. (See point 6 for the replacement method)

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5.5. Replacement of rubber parts

Replacement of the boot(3), ID seal(15), and OD seal(20) is recommended annually or upon roadworthiness inspection.

6. BALL AND CAM REPLACEMENT

- 6.1. Remove both Adjustment Nuts (12 & 13), Thrust, Stainless Steel and Hardened Washers (11, 17 & 16), Lever (1), and Boot (3) from Adjustment Bolt (2).
- 6.2. Remove outer Cam (4) and Ball/Retainer Assembly (8) from Adjustment Bolt (2).
- 6.3. Use a screwdriver, or similar tool, to gently pry inner Cam (4) protrusions on back of cam, loose from Torque Plate (5), and remove from Adjusting Bolt (2). Remove Seal (15) from Adjusting Bolt (2).
- 6.4. Install the new Seal (15) on the Adjusting Bolt (2), inserting through inner Cam (4) until Seal (15) bottoms out on Torque plate (5).

NOTE: PRIOR TO THE INSTALLATION OF THE CAMS (4), IT IS RECOMMENDED THAT "ALPHA 2000" GREASE (ANTI-SEIZE & LUBRICATING COMPOUND) MANUFACTURED BY CHEMTOOL, BE APPLIED TO RAMP AREAS OF THE CAMS.

- 6.5. Install new inner Cam (4) on Adjusting Bolt (2), taking care to orient protrusions into holes in Torque Plate (5).
- 6.6. Install Ball/Retainer Assembly (8) onto Adjusting Bolt (2), orienting balls into pockets of inner Cam (4). Install outer Cam (4) onto Adjusting Bolt (2), orienting pockets onto Balls of Ball/Retainer Assembly (8). Install Boot (3) over cam assembly.
- 6.7. Install Lever (1), using protrusions on back of outer Cam (4) and holes in Lever (1) to orient lever to proper operating position.
- 6.8. Install remaining washers and nuts (11,17,16,12 & 13) and follow adjustment procedure in Section 4.

NOTE: MAKE SURE TO ORIENT COATED FACE OF THRUST WASHER (11) TOWARD STAINLESS STEEL WASHER (17).

7. LINING REPLACEMENT

- 7.1. Replace both linings when either has worn to .12in. remaining.
- 7.2. Loosen two Adjustment Nuts (12 & 13) enough to slide each Torque Plate (5 & 7) away from disc far enough to provide clearance to remove old carrier & lining assemblies (6) and install new ones. (It may be necessary to remove one or both Nuts.)
- 7.3. Collapse Lining Retraction Spring (10) and remove from brake Head Assembly.

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- 7.4. Slide Torque Plates (5 & 7) away from disc, move Carrier & Lining Assemblies (6) out of pockets, and remove from the Brake Head Assembly from the side.

NOTE: PRIOR TO THE INSTALLATION OF THE NEW LININGS, IT IS RECOMMENDED THAT A COATING OF "ALPHA 2000" GREASE (ANTI-SEIZE & LUBRICATING COMPOUND) MANUFACTURED BY CHEMTOOL, BE APPLIED TO THE INTERFACE OF

THE SLEEVE (9) AND THE TORQUE PLATES (5) & (7). AFTER GREASE HAS BEEN APPLIED, SLIDE TORQUE PLATES BACK AND FORTH ON SLEEVE AS FAR AS POSSIBLE TO INSURE THAT THE GREASE HAS BEEN INTRODUCED INTO THE BORES OF THE TORQUE PLATES.

- 7.5. Install new Carrier & Lining Assemblies (6) in each Torque Plate (5 & 7).
- 7.6. Install Lining Retention Spring (10) into Brake Head Assembly. Be sure spring's "feet" are positioned properly in holes in both Lining Carrier Assemblies (6).
- 7.7. Adjust brake per Section 4.

Reference

BARONESS[®]
Quality on Demand

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