

TDA1200·TDA1600

Tractor Mounted Aerator

Service Manual

Serial No. TDA1200 : 20004- • TDA1600 : 20004-

BARONESS[®]
Quality on Demand

Ver.1.1

TDA1200 • TDA1600

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 Kyoeisha.

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.

Kyoeisha 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 Kyoeisha.

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

The owner is responsible for training the users.

Such instruction should emphasize.

- [1] The need for care and concentration when working with ride-on machines.
- [2] Control of a ride-on machine sliding on a slope will not be regained by the application of the brake.
The main reasons for loss of control are
 - Insufficient wheel grip
 - Being driven too fast
 - Inadequate braking
 - The type of machine is unsuitable for its task

- 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.

Driving

- 1. When driving the tractor on any public roads, be sure to remove the operation machine in advance.
- 2. Do not operate the engine in a confined space where dangerous carbon monoxide fume can collect.
- 3. Only operate in good light, keeping away from holes and hidden hazards.
- 4. Before attempting to start the engine, disengage all attachments, shift into neutral, and engage the parking brake.
Sit on the seat and then start the engine.
Wear a seat belt, if any.
- 5. 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] When using a machine with a traveling clutch, engage the clutch slowly.
When going down a slope, keep the machine in gear.
 - [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.
 - [6] Never use the machine on a slope with any gradient angle greater than the specified angle or in a place where there is a danger of the machine slipping.
 - [7] If instructed to do so in the Owner's Manual, use a counterbalance or wheel balance.

- 6. Never operate the machine with guards, shields damaged, or without safety protective devices in place.
Be sure not to remove the interlock system. Make necessary adjustments before using the machine.
- 7. Do not change the engine governor settings or overspeed the engine.
Operating the engine at excessive speed may increase the hazard of personal injury.
- 8. Do the following before leaving the driver's seat.

[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.

- 9. Disengage the drive to attachments, stop the engine, and remove the ignition key if any of following conditions occurs.

[1] Before refueling.

[2] Before adjusting the cutting height.
However, the case is excluded that remote operation from the driver's seat is possible.

[3] Before cleaning blockages.

[4] Before checking, cleaning, or working the machine.

[5] 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.

- 10. Keep hands and feet away from the operating and rotating parts.
- 11. Before making any reverse travel, sufficiently check that the path is clear and that you can move backward safely.
Have someone guide you if it is difficult to check the area behind you.
- 12. Do not carry any passengers.
- 13. Never operate while people, especially children, or pets are nearby.
- 14. Slow down and use caution when making turns or crossing roads and sidewalks.
- 15. Stop the blade rotation before crossing surfaces other than grass.
- 16. Do not drive the operating machine while moving or taking a break.

Safety

17. When using attachments, never direct the discharge at bystanders or allow anyone near the machine while it is operating.
18. Do not operate the machine under the influence of alcohol or drug.
19. Take care when loading or unloading the machine onto a trailer or a truck. Load or unload the machine on 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 with sufficient strength. When using a running board, select one with sufficient strength, length, and width and that will not let the machine slip.
20. Close the fuel valve before transporting the machine.
21. Use care when approaching blind corners, shrubs, trees, or other objects that may obscure your vision.
22. Do not take your eyes off the road ahead. Do not operate the machine without holding the steering.
23. Keep the throttle in the "Low" position (turtle icon) while the engine is not in use. Shut off the fuel valve, if any.
6. If the engine is provided with a shut-off valve, shut off valve while storing or transporting.
7. Do not store any fuel near fire.
8. Never allow untrained personnel to service machine.
9. Inspection and maintenance shall be carried out after the muffler and engine has cooled.
10. Appropriately manage and correctly use the tools necessary for servicing or adjusting the machine.
11. Use jack stands to support components securely when required.
12. Carefully release pressure from components so that the pressure will not be released at once.
13. Be sure to depressurize the hydraulic system before performing maintenance operations on it such as removing hydraulic equipment.
14. 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.
15. 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 on high-pressure oil as it may pierce your skin, resulting in personal accidents. Should hydraulic oil enters your body, you must undergo surgery within a few hours in any facility which has experienced treatment of such industrial accidents. Otherwise, it will cause gangrene.

Maintenance and storage

1. Disengage drives on level ground, lower the attachments, set parking brake, stop engine and remove key from ignition before any repair, adjustment or cleaning work. Wait for all movement to stop before adjusting, cleaning or repairing the machine.
2. To prevent any fire hazard, keep the engine, silencer/muffler, battery compartment fuel storage area, cutting unit and drives free of grass, leaves, or excessive grease. If any oil or fuel is spilled, wipe it off.
3. Allow the engine to cool before storing in any enclosure.
4. Only cover the machine with a sheet after hot parts have sufficiently cooled down.
5. Never store the equipment with fuel in the tank inside a building where fumes may reach an open flame or spark.
16. Disconnect battery before making any repairs. Disconnect the negative terminal first and then the positive last. Reconnect the positive first and then the negative last.
17. Make sure that parts such as wires are not touching each other and that their covers have not come off.
18. Be careful enough for safety when inspecting the knife.
[1] Be sure to wear gloves and use caution.
[2] Be sure to replace any defective knives.

- [3] Be sure not to repair them by bending and stretching them or welding them.
19. Keep hands and feet away from moving parts.
Do not make any adjustments with the engine running.
20. Charge batteries in an open and well ventilated area, away from any spark and flames.
Unplug a charger before connecting to or disconnecting it from battery.
Wear protective clothing and goggles and use insulated tools.
21. Keep all parts in good working condition and all hardware tightened.
Replace any worn or damaged parts and labels.
22. Check that all nuts, bolts, and screws are properly tightened to ensure that the machine is always operated under safe working conditions.
23. When the fuel tank needs to be cleaned, do it 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 Barco dealer or Kyoisha.

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Safety

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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

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."

Principal tightening torques

Tightening Torque by Model

TDA1200/1600

Location	Code number	Part name	Tightening torque			Thread locking adhesive
			N-m	kgf-cm	lb-in	
Frame and cover	K0013161201	Bolt, heat-treated M16-120	210 - 260	2142 - 2652	1859.14 - 2301.79	—
	K0013160952	Bolt, heat-treated M16-95	210 - 260	2142 - 2652	1859.14 - 2301.79	—
	K0013160602	Bolt, heat-treated M16-60	210 - 260	2142 - 2652	1859.14 - 2301.79	—
	K0010120302	Bolt, heat-treated M12-30	104 - 134	1060.8 - 1366.8	920.71 - 1186.31	—
Front and rear rollers	K0071000372	Hydraulic motor bolt	52 - 67	530.4 - 683.4	460.35 - 593.15	—
	K0010100302	Bolt, heat-treated M10-30	58 - 76	591.6 - 775.2	513.47 - 672.82	—
	K0010120402	Bolt, heat-treated M12-40	104 - 134	1060.8 - 1366.8	920.71 - 1186.31	—
Gearbox	K0013121002	Bolt, heat-treated M12-100	104 - 134	1060.8 - 1366.8	920.71 - 1186.31	—
Crank	K0013140502	Bolt, heat-treated M14-50	140 - 188	1428 - 1917.6	1239.42-1664.37	—

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Maintenance standards and maintenance

Location	Code number	Part name	Tightening torque			Thread locking adhesive
			N-m	kgf-cm	lb-in	
Crank	K0013120702	Bolt, heat-treated M12-70	104 - 134	1060.8 - 1366.8	920.71 - 1186.31	○
	TDA12000362Z8	Nut M20-A	300 - 350	3060 - 3570	2655.91 - 3098.57	—
	TDA12000370Z8	Nut M24-B	300 - 350	3060 - 3570	2655.91 - 3098.57	—
	K0010080302	Bolt, heat-treated M8-30	28 - 38	285.6 - 387.6	247.88 - 336.41	—
	K0010120602	Bolt, heat-treated M12-60	104 - 134	1060.8 - 1366.8	920.71 - 1186.31	—
	K0013140452	Bolt, heat-treated M14-45	140 - 188	1428 - 1917.6	1239.42 - 1664.37	—
	K0145140002	U nut M14-P1.5	140 - 188	1428 - 1917.6	1239.42 - 1664.37	—
	K0010120502	Bolt, heat-treated M12-50	104 - 134	1060.8 - 1366.8	920.71 - 1186.31	—
	K0010100602	Bolt, heat-treated M10-60	58 - 76	591.6 - 775.2	513.47 - 672.82	—
	K0024100251	Bolt, w/hexagon hole, M10-25	29 - 38	295.8 - 387.6	256.73 - 336.41	—
	K0010100402	Bolt, heat-treated M10-40	29 - 38	295.8 - 387.6	256.73 - 336.41	—
	K0013101302	Bolt, heat-treated M10-130	29 - 38	295.8 - 387.6	256.73 - 336.41	—
Accessories and options	K0060080150	Stainless bolt, w/hexagon hole, M8-15	14 - 19	142.8 - 193.8	123.94 - 168.20	—
	K0060100800	Stainless bolt, w/hexagon hole, M10-80	29 - 38	295.8 - 387.6	256.73 - 336.41	
	K0060080150	Stainless bolt, w/hexagon hole, M8-15	14 - 19	142.8 - 193.8	123.94 - 168.20	
	K0010100402	Bolt, heat-treated M10-40	29 - 38	295.8 - 387.6	256.73 - 336.41	

Maintenance standards and maintenance

Lifting

Lifting point

⚠ Warning

When repairing the front roller or any parts related to the roller, place the machine on a solid flat floor such as concrete and remove any obstacles for safe work before lifting the machine.

To lift the machine, use the appropriate hoist and chain block.

Especially when replacing the front roller brackets (L) and (R), be sure to securely support the machine at the four points using jack stands.

If it is not supported securely, the machine may move or fall.

It may cause injury or death.

Use an adequately strong lifting sling.

The machine shall be lifted at the lifting point and fixed in the positions described in the jack stand points.

Do not lift nor place the machine on the jack stands in any other positions than the specified ones.

Doing so, the frames and parts may get damaged.

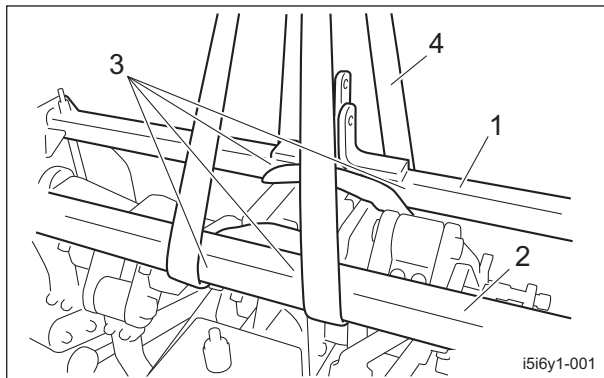
Lifting point and jack stand point

1. Lifting point

Front frame and rear frame

⚠ Caution

Attach the slings to the front and rear frames as shown in the figure, and lift them with keeping the left and right sides well balanced.



Lifting point and jack stand point_001

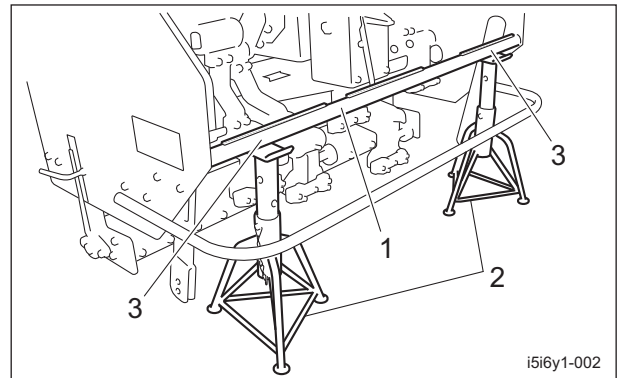
1	Front frame
2	Rear frame
3	Lifting point
4	Sling

2. Jack-stand points

[1] Rear frame pipe

⚠ Caution

Place the jack stands in the specified places.



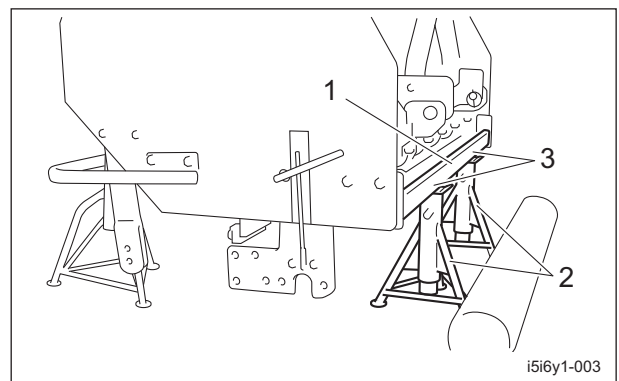
Lifting point and jack stand point_002

1	Rear frame pipe
2	Jack stands
3	Jack-stand points

[2] Box mounting bracket

⚠ Caution

Place the jack stands in the specified places.



Lifting point and jack stand point_003

1	Box mounting bracket
2	Jack stands
3	Jack-stand points

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.

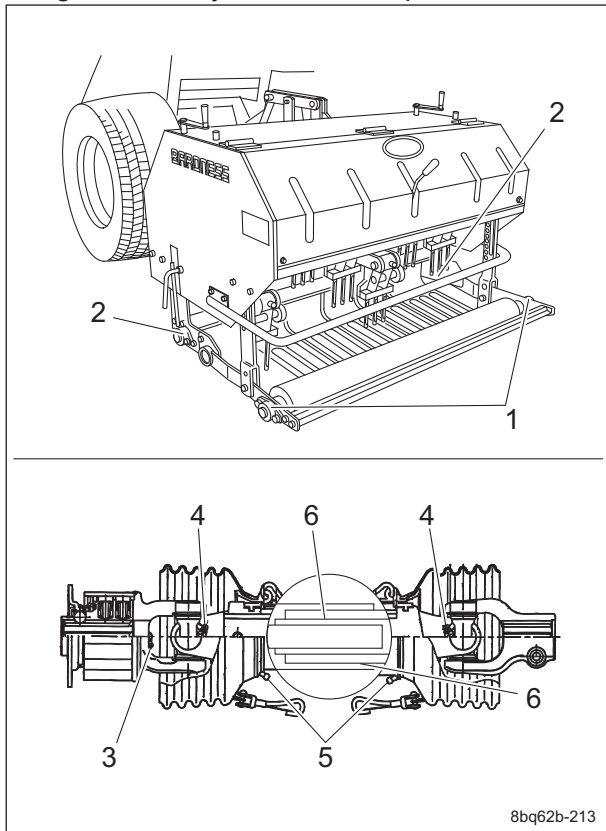
Other locations where the specified grease or lubricant is used are indicated in "Greasing Points".

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.

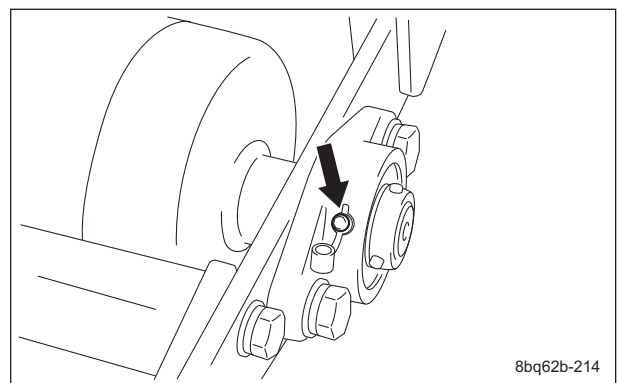


Greasing points_001

	Location	No. of Greasing Points
1	Rear roller	2
2	Front roller	2
3	Clutch	1
4	Journal cross	2
5	Safety cover	2
6	Slide (inner/outer tubes)	1

1. Rear roller

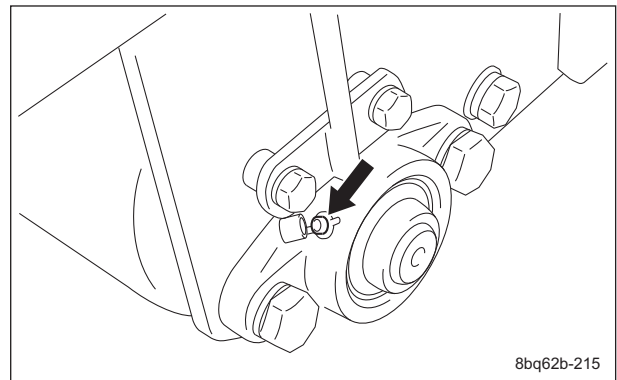
One location in each of the left and right side of the rear roller.



Greasing points_002

2. Front roller

One location in each of the left and right side of the front roller.

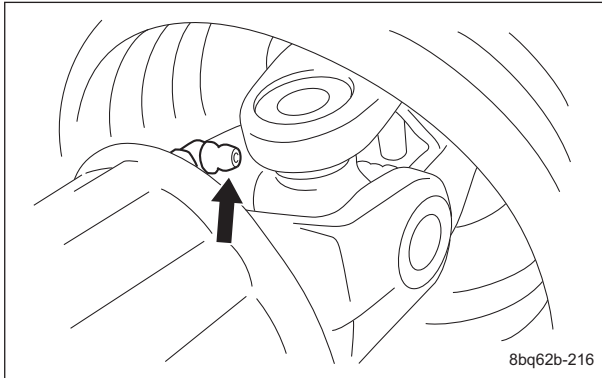


Greasing points_003

Maintenance standards and maintenance

3. Clutch

Use lithium grease (urea type) with molybdenum.

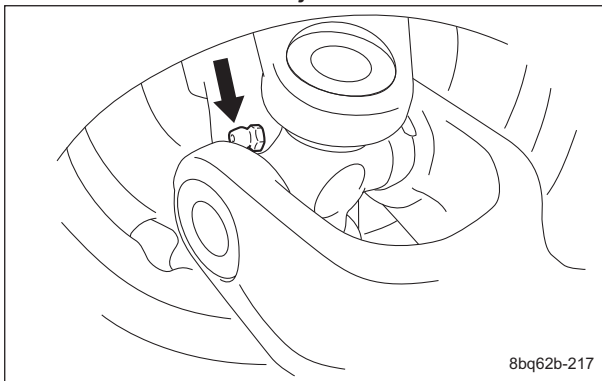


Greasing points_004

4. Journal cross

Use lithium grease (urea type) with molybdenum.

One location in each journal cross.

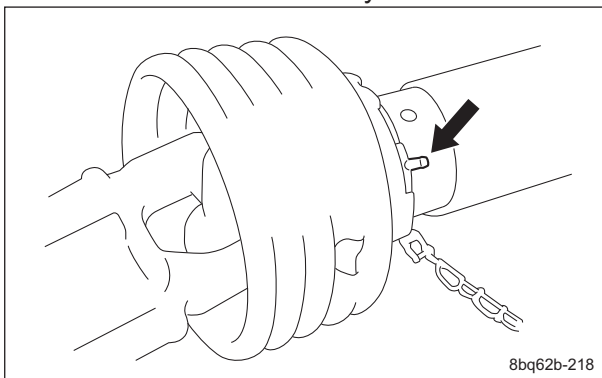


Greasing points_005

5. Safety cover

Use lithium grease (urea type) with molybdenum.

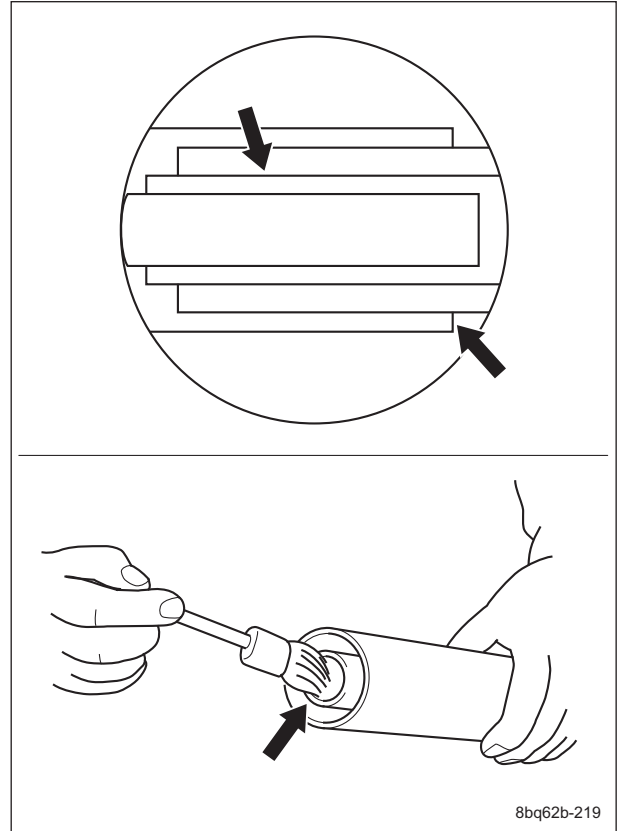
One location in each safety covers.



Greasing points_006

6. Slide (inner/outer tubes)

Pull out the slide and apply grease.



Greasing points_007

TDA1200 • TDA1600

Maintenance standards and maintenance

Operating Machine and Mower Units

Maintenance Page 4-2

About Maintenance Page 4-2

Specifications Page 4-2

Crank timing diagram Page 4-2

Grease Page 4-3

Oil Page 4-3

Special Tool Page 4-4

List of Special Tools Page 4-4

Removal and installation of each section Page 4-6

φ12.φ18 tine mounting board Page 4-6

Lower housing Assy Page 4-7

Spring box Page 4-9

Crank Assy Page 4-10

Gearbox Page 4-15

Front Roller Assy Page 4-19

Rear Roller Assy Page 4-20

Front roller bracket Page 4-22

Inspection and repair of each section Page 4-24

Lower housing Assy Page 4-24

Spring box Page 4-34

Crank Assy Page 4-38

Crank housing Page 4-42

Gearbox Page 4-44

Rear roller bracket Assy Page 4-60

TDA1200 • TDA1600

Operating Machine and Mower Units

Maintenance

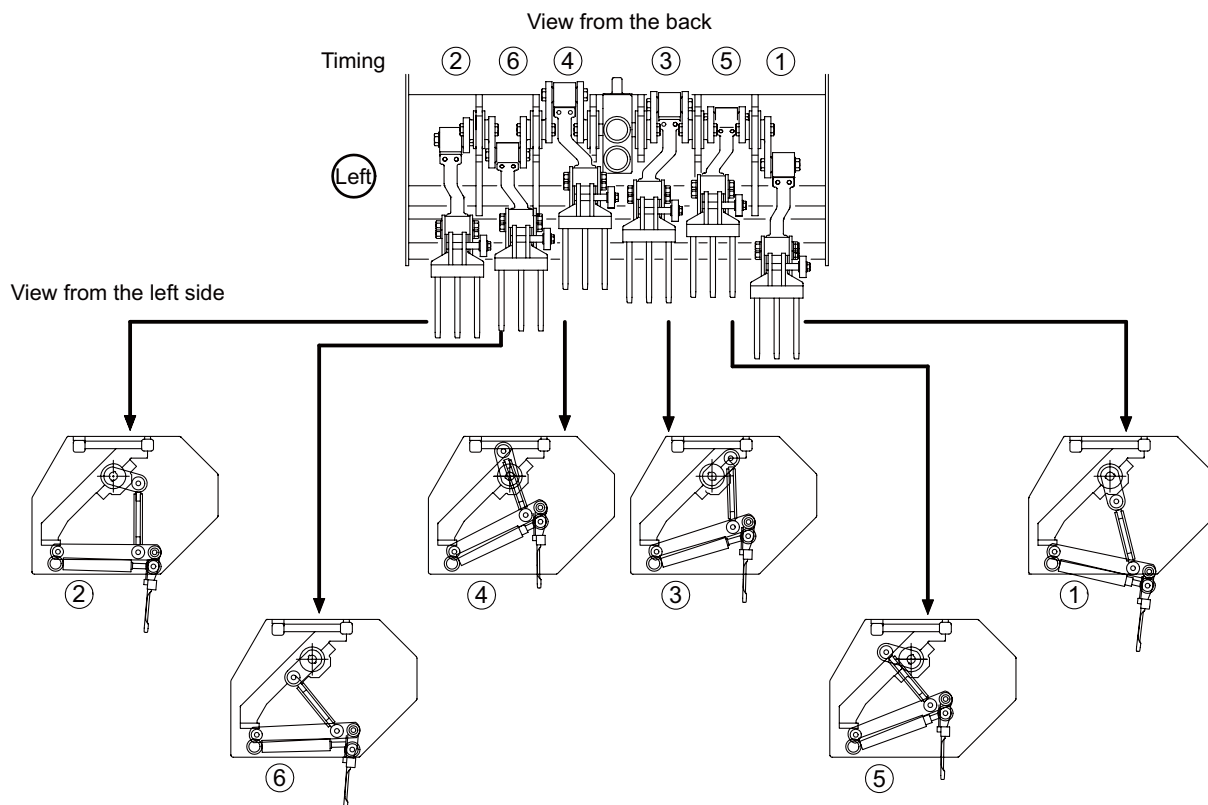
About Maintenance

This chapter describes primary checking and maintenance operations for TDA1200/1600. For information on daily checks, maintenance and handling of the machine, please refer to the separate TDA1200/1600 Owner's Operating Manual and Parts Catalog. For information on attaching and removing optional parts and attachments, please refer to the handling manual for the corresponding attachment.

Specifications

Crank timing diagram

TDA1200

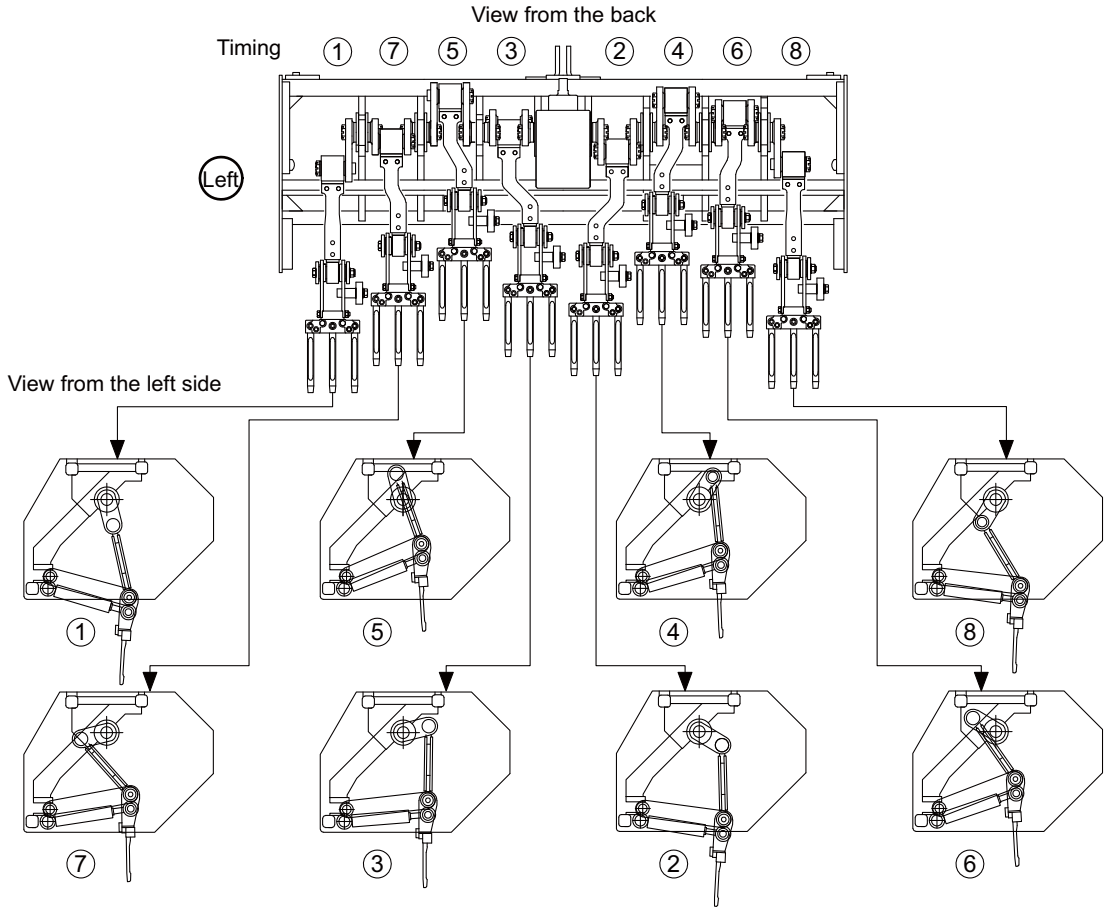


35gcfm-001

Crank timing diagram_001

Operating Machine and Mower Units

TDA1600



Grease

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

Grease	Excelite EP No. 2 (urea type)
--------	-------------------------------

Use the following type of grease on the drive shaft.

Grease	Lithium grease (urea type) with molybdenum
--------	--

Oil

Use the following type of oil on the gear boxes in the operating machine and mower units.

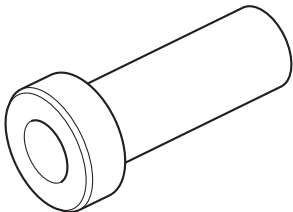
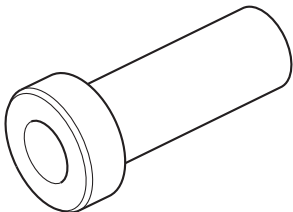
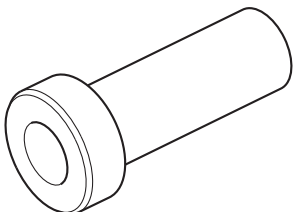
Oil	Gear oil VG680
-----	----------------

TDA1200 • TDA1600

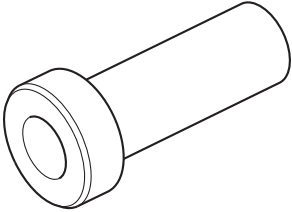
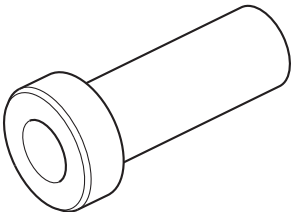
Operating Machine and Mower Units

Special Tool

List of Special Tools

6209 Bearing driver  q9c6v6-009	K4802000912	Used when installing bearings with outer $\Phi 85$ and inner $\Phi 45$
6204 Bearing driver  q9c6v6-009	K4802000762	Used when installing bearings with outer $\Phi 47$ and inner $\Phi 20$
6208 Bearing driver  q9c6v6-009	K4802000772	Used when installing bearings with outer $\Phi 80$ and inner $\Phi 40$

Operating Machine and Mower Units

6205 Bearing driver  q9c6v6-009	K4802000822	Used to knock-in and install the bearing of outer $\varnothing 52$ and inner $\varnothing 25$
6206 Bearing driver  q9c6v6-009	K4802000832	Used when installing bearings with outer $\varnothing 62$ and inner $\varnothing 30$

Operating Machine and Mower Units

Removal and installation of each section

φ12.φ18 tine mounting board

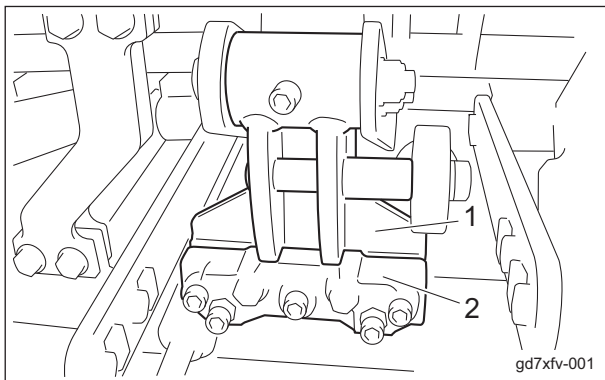
Removal of φ12.φ18 tine mounting board

Warning

When removing or installing any crank parts, be sure to secure the crank. If the crank is not secured, the crank may become unbalanced and rotate suddenly. It may cause injury or death.

- The machine is removed from the tractor with its upper link, up-down handle, and cover removed.

1. Remove the φ12.φ18 tine mounting board from the tine holder.



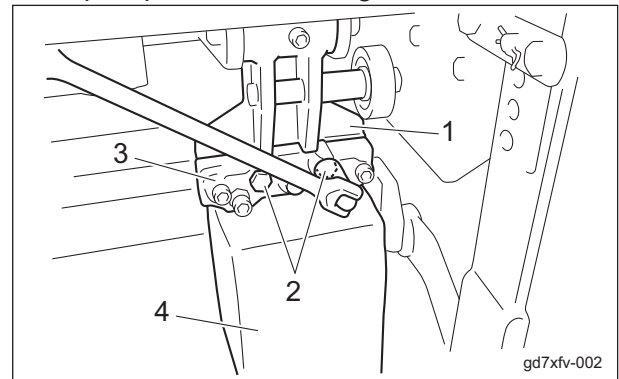
Removal of φ12.φ18 tine mounting board_001

1	Tine holder
2	φ12.φ18 tine mounting board

2.

- [1] Turn the crank and place the tine holder on a stage, so that the φ12.φ18 tine mounting board can be removed from that tine holder.

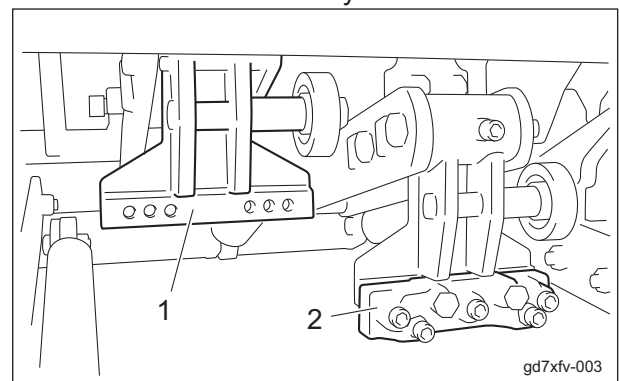
- [2] Install the socket on the spinner handle, and remove the two bolts and the φ12.φ18 tine mounting board.



Removal of φ12.φ18 tine mounting board_002

1	Tine holder
2	Bolt and spring washer
3	φ12.φ18 tine mounting board
4	Stage

3. Remove the other φ12.φ18 tine mounting boards in the same way.



Removal of φ12.φ18 tine mounting board_003

1	The condition after the φ12.φ18 tine mounting board is removed
2	The condition with the φ12.φ18 tine mounting board installed

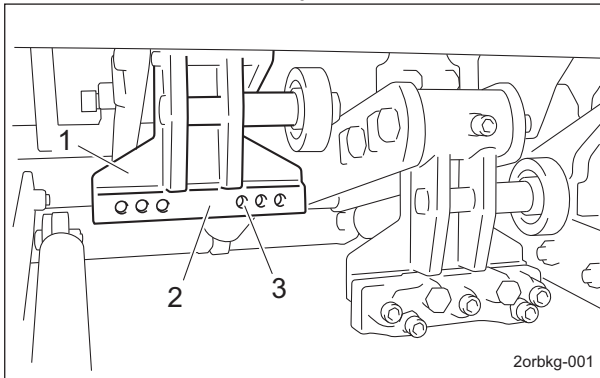
Operating Machine and Mower Units

Installation of $\phi 12.\phi 18$ tine mounting board

⚠ Caution

Refer to "Tightening torques" (Page 3-4) .
Note that the Baroness product warranty may not apply to any defects caused by incorrect or overtightening, etc.

1. Remove foreign matters such as sand on the contact area of the $\phi 12.\phi 18$ tine mounting board of the tine holder and in bolt holes completely.



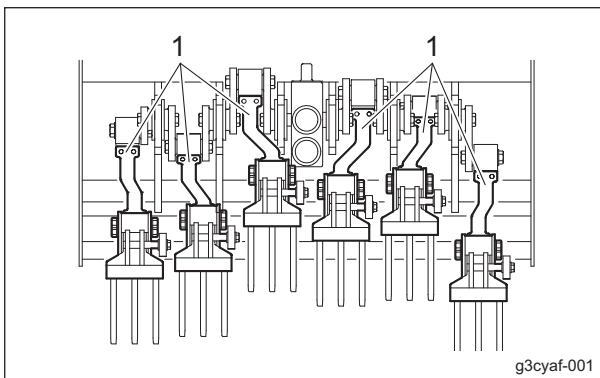
Installation of $\phi 12.\phi 18$ tine mounting board_001

1	Tine holder
2	Contact area of $\phi 12.\phi 18$ tine mounting board
3	Bolt hole

2. For installation, reverse the removing procedure.

Lower housing Assy

Lower housing Assy layout



Lower housing Assy layout_001

1	Lower housing Assy
---	--------------------

Removal of lower housing Assy

⚠ Warning

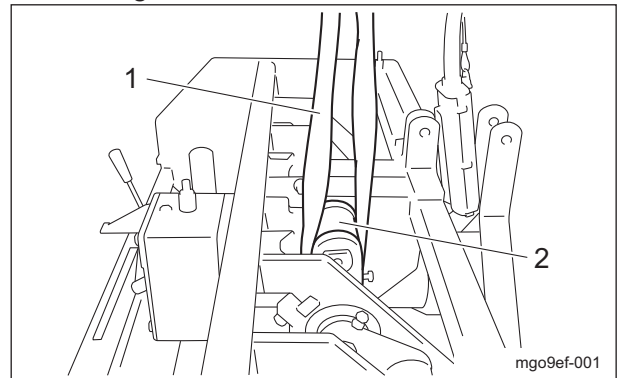
When removing or installing any crank parts, be sure to secure the crank.
If the crank is not secured, the crank may become unbalanced and rotate suddenly. It may cause injury or death.

- The machine is removed from the tractor with its upper link, up-down handle, and cover removed.
1. Attach the sling to the crank housing at the highest point after setting the lower housing Assy to be removed at the lowest point.

⚠ Caution

The purpose is not to lift the main body. Do not lift it up any more after the crank is secured.

2. Lift the sling up by using a hoist, etc., to the extent that the main body does not lift off from the ground and then secure the crank housing.

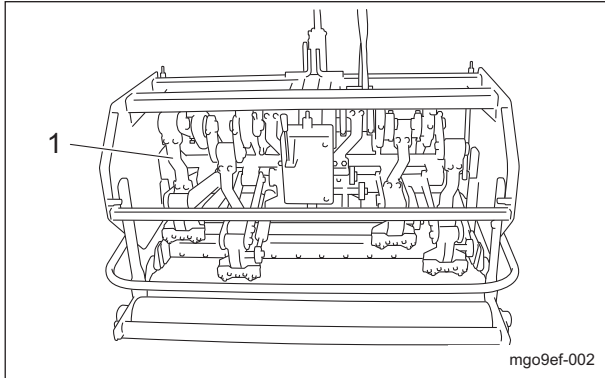


Removal of lower housing Assy_001

1	Sling
2	Crank housing

Operating Machine and Mower Units

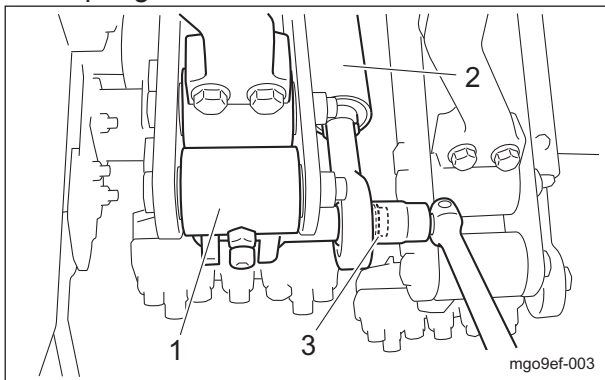
3. Remove the lower housing Assy set at the lowest point in the following procedure:



Removal of lower housing Assy_002

1	Lower housing Assy
---	--------------------

[1] Remove the bolt and spring washer from the tine holder and then remove the spring box.



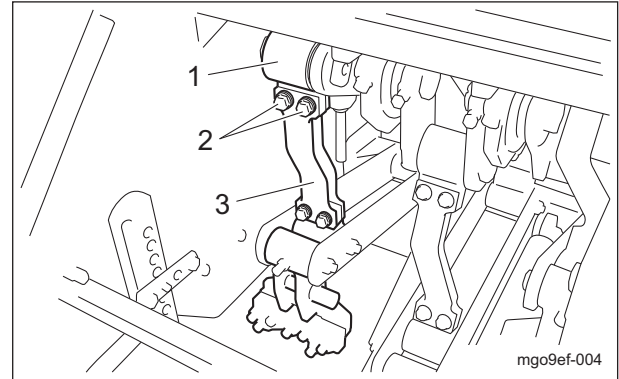
Removal of lower housing Assy_003

1	Tine holder
2	Spring box
3	Bolt and spring washer

Caution

Nuts shall be tighten until locking is released.

[2] Loosen the nuts of the bolts which are connecting the crank housing with the lower housing Assy.



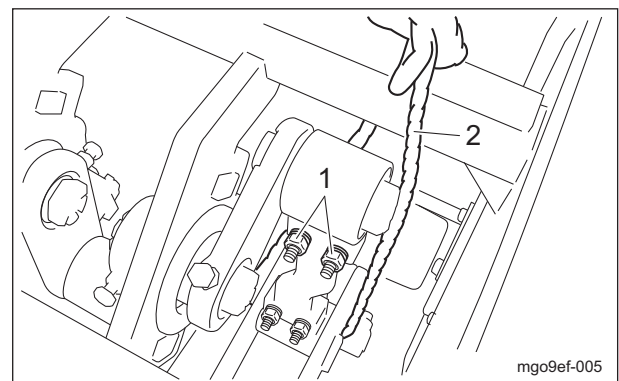
Removal of lower housing Assy_004

1	Crank housing
2	Bolt, washer, and nut
3	Lower housing Assy

Caution

Take a measure to prevent the lower housing Assy from falling by using a rope for safety because the Assy is heavy.

[3] Remove the bolts, spring washers, and nuts.

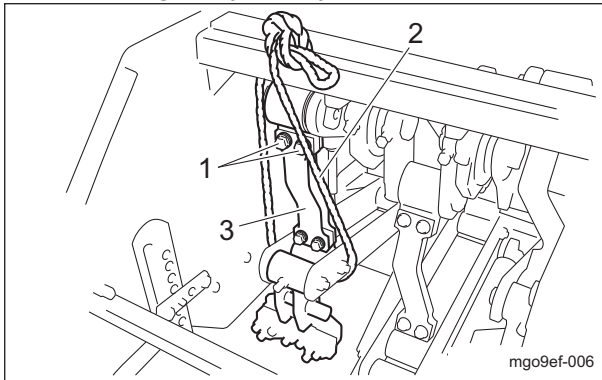


Removal of lower housing Assy_005

1	Bolt, washer, and nut
2	Rope

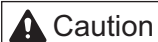
Operating Machine and Mower Units

- [4] Loosen the rope and lower the lower housing Assy slowly.



Removal of lower housing Assy_006

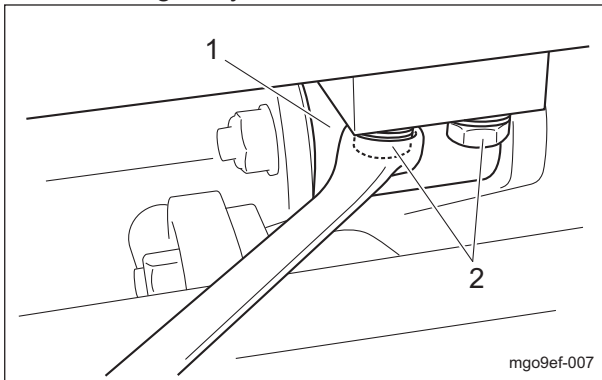
1	Bolt, washer, and nut
2	Rope
3	Lower housing Assy



Caution

The lower housing Assy is heavy. Handle them carefully, since they could pinch your hand.

- [5] Remove the bolts, washers, and spring washers which are securing the lower housing Assy, and remove the lower housing Assy.



Removal of lower housing Assy_007

1	Lower housing Assy
2	Bolt, washer, and spring washer

4. When removing the lower housing Assy after that, attach the sling to the crank housing at the highest point after setting the lower housing Assy to be removed at the lowest point, and follow the same procedure.

Installation of lower housing Assy



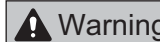
Caution

Refer to "Tightening torques" (Page 3-4) . Note that the Baroness product warranty may not apply to any defects caused by incorrect or overtightening, etc.

For installation, reverse the removing procedure.

Spring box

Removal of spring box



Warning

When removing or installing any crank parts, be sure to secure the crank. If the crank is not secured, the crank may become unbalanced and rotate suddenly. It may cause injury or death.

- The machine is removed from the tractor with its upper link, up-down handle, and cover removed.

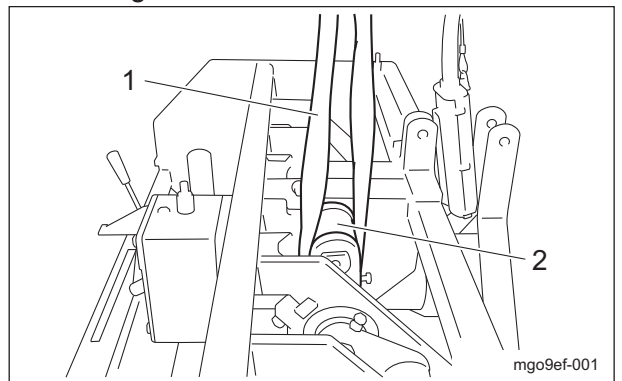
1. Attach the sling to the crank housing at the highest point after setting the spring box to be removed at the lowest point.



Caution

The purpose is not to lift the main body. Do not lift it up any more after the crank is secured.

2. Lift the sling up by using a hoist, etc., to the extent that the main body does not lift off from the ground and then secure the crank housing.

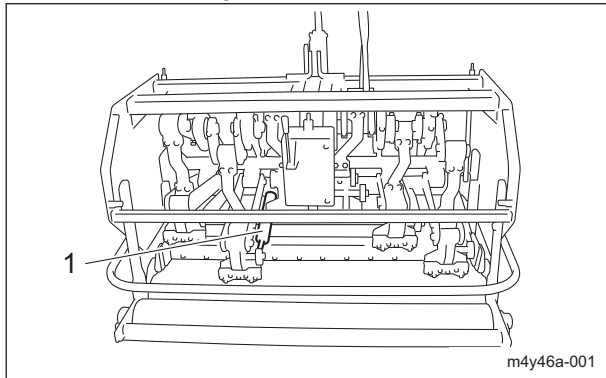


Removal of spring box_001

1	Sling
2	Crank housing

Operating Machine and Mower Units

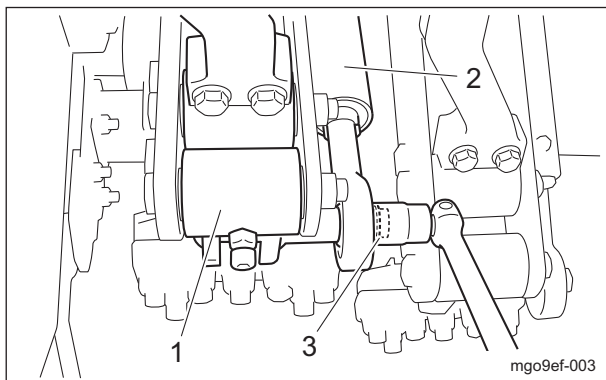
3. Remove the spring box at the lowest point in the following procedure:



Removal of spring box_002

1	Spring box
---	------------

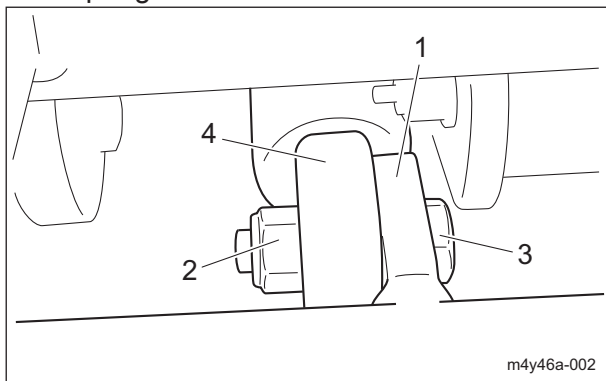
- [1] Remove the bolts and spring washers from the tine holder.



Removal of spring box_003

1	Tine holder
2	Spring box
3	Bolt and spring washer

- [2] Remove the nut and bolt from the box mounting bracket and then remove the spring box.



Removal of spring box_004

1	Box mounting bracket
2	Nut
3	Bolt
4	Spring box

4. When removing the spring box after that, attach the sling to the crank housing at the highest point after setting the spring box to be removed at the lowest point, and follow the same procedure.

Installation of spring box

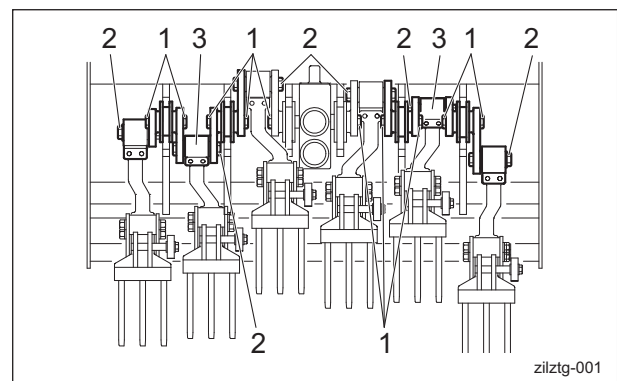
⚠ Caution

Refer to "Tightening torques" (Page 3-4) . Note that the Baroness product warranty may not apply to any defects caused by incorrect or overtightening, etc.

For installation, reverse the removing procedure.

Crank Assy

Crank Assy layout



Crank Assy layout_001

1	Slotted nut 20 and cotter pin for drive shaft
2	Slotted nut 24 and cotter pin for crank shaft
3	Crank Assy

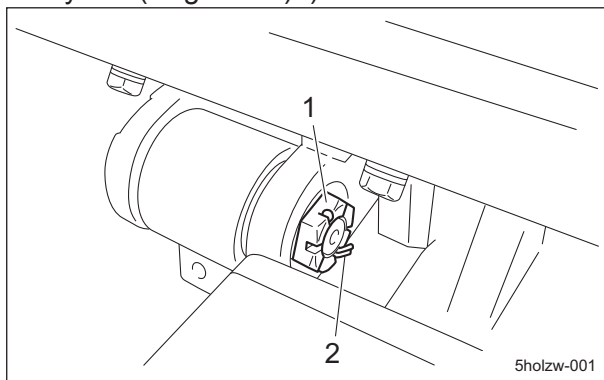
Operating Machine and Mower Units

Removal of crank Assy

Warning

When removing or installing any crank parts, be sure to secure the crank. If the crank is not secured, the crank may become unbalanced and rotate suddenly. It may cause injury or death.

- The machine is removed from the tractor with its upper link, up-down handle, and cover removed.
- 1. Remove the $\phi 12.\phi 18$ tine mounting board from the machine. (See "Removal of $\phi 12.\phi 18$ tine mounting board" (Page 4-6) .)
- 2. Remove the spring box from the machine. (See "Removal of spring box" (Page 4-9) .)
- 3. Remove the lower housing Assy from the machine. (See "Removal of lower housing Assy" (Page 4-7) .)
- 4. Remove all cotter pins securing the slotted nuts from the crank Assy. (See "Crank Assy layout" (Page 4-10) .)



Removal of crank Assy_001

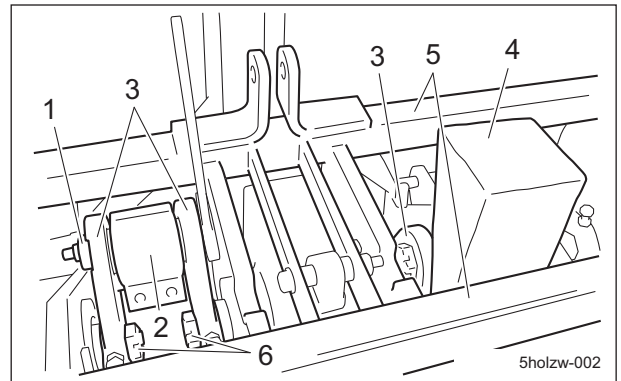
1	Slotted nut
2	Cotter pin

Caution

When removing and installing the crank nuts, be sure to secure the crank.

- 5. Secure the crank bracket by using a wood block, etc. so that it does not rotate when the nuts are loosen.
- 6. Loosen the cotter nuts of all crank shafts.
- 7. Loosen the left and right drive shaft nuts of the gear box.

8. Loosen all drive shaft nuts.



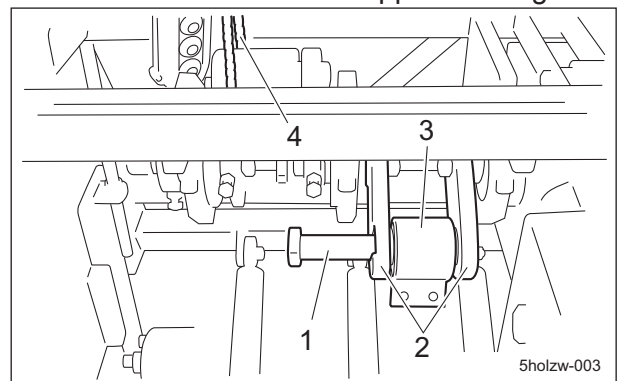
Removal of crank Assy_002

1	Crank shaft
2	Upper housing
3	Crank bracket
4	Locking wood block
5	Frame
6	Drive shaft nut

Caution

Take a measure to prevent rotation by using a rope.

9. Pull out the crank shaft from the crank bracket and remove the upper housing.



Removal of crank Assy_003

1	Crank shaft
2	Crank bracket
3	Upper housing
4	Rope

Operating Machine and Mower Units

10. Install the sling to the crank Assy.

⚠ Caution

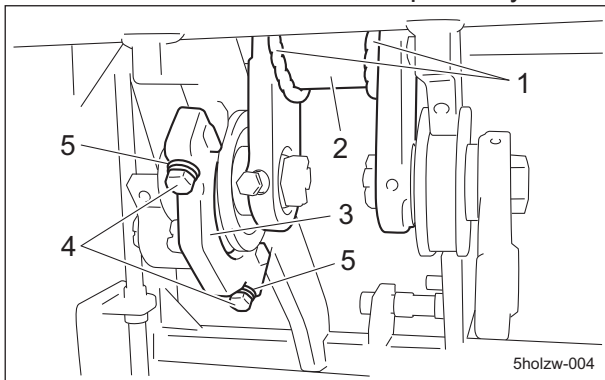
The purpose is not to lift the main body.
Do not lift it up any more after the crank is secured.

11. Lift the sling up by using a hoist, etc., to the extent that the main body does not lift up from the ground, and then secure the crank Assy.

12. Remove the bolt, spring washer and washer, and then remove the housing mounting board.

Note:

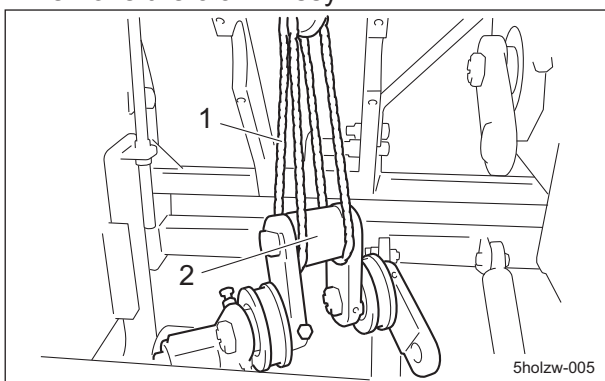
There are four and six fixing points in TDA1200 and TDA1600, respectively.



Removal of crank Assy_004

1	Sling
2	Crank Assy
3	Housing mounting board
4	Bolt and spring washer
5	Washer

13. Lift the sling up by using a hoist, etc. and remove the crank Assy



Removal of crank Assy_005

1	Sling
2	Crank Assy

14. Remove the other crank Assy in the same procedure.

Installation of crank Assy

⚠ Warning

When removing or installing any crank parts, be sure to secure the crank.
If the crank is not secured, the crank may become unbalanced and rotate suddenly. It may cause injury or death.

⚠ Caution

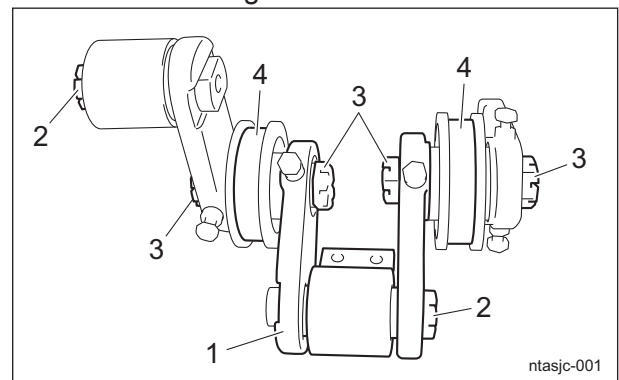
Refer to "Tightening torques" (Page 3-4) .
Note that the Baroness product warranty may not apply to any defects caused by incorrect or overtorque tightening, etc.

1. Prepare the left crank Assy in according with the following procedure.

(See "Crank Assy layout" (Page 4-10) .)

[1] Temporarily tighten each nut.

[2] Apply grease on the contact area of the crank housing.



Installation of crank Assy_001

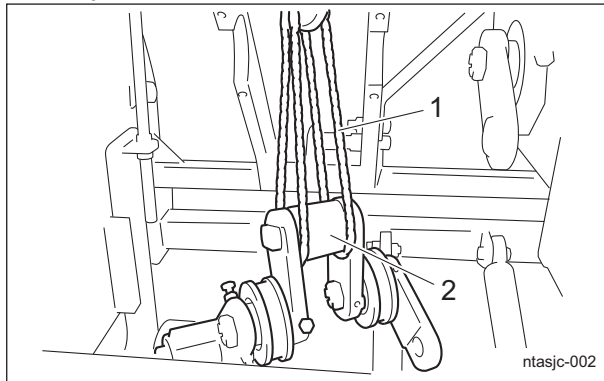
1	Left crank Assy
2	24 Nut
3	20 Nut
4	Crank housing contact area

Operating Machine and Mower Units

2. Install the sling on the left crank Assy in the position shown in the figure, and lift the sling with using a hoist, etc.

Note:

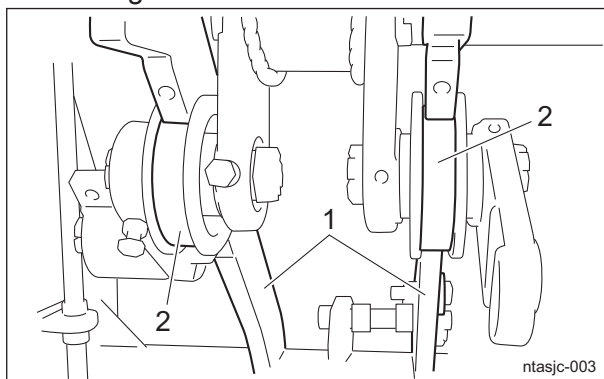
When lifting the left crank Assy, install the sling so that the left and right sides of the Assy will be balanced.



Installation of crank Assy_002

1	Sling
2	Left crank Assy

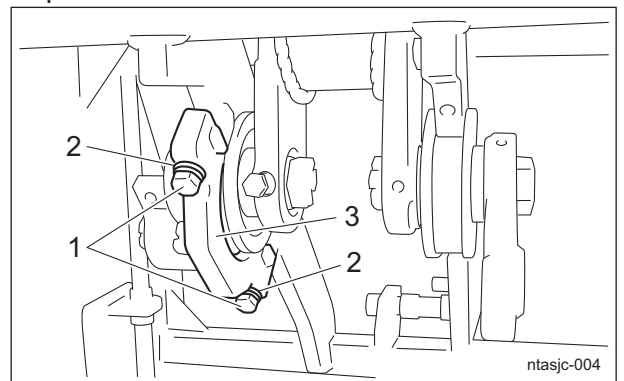
3. Insert the crank housing into the main body housing bracket.



Installation of crank Assy_003

1	Main body housing bracket
2	Crank housing

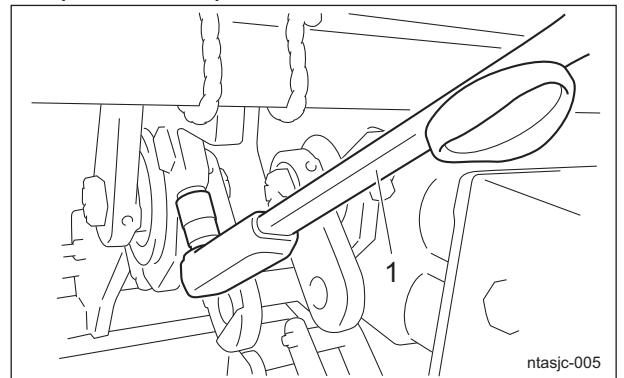
4. Install housing mounting bracket A with bolts, spring washers, and washers at two points.



Installation of crank Assy_004

1	Bolt and spring washer
2	Washer
3	Housing mounting board A

5. Tighten housing mounting board A on the specified torque.

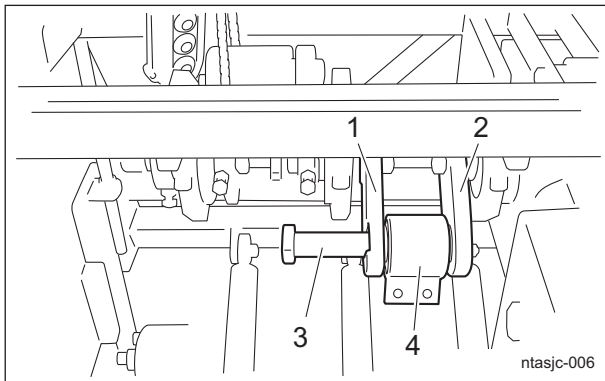


Installation of crank Assy_005

1	Torque wrench
---	---------------

Operating Machine and Mower Units

6. Insert the upper housing between crank bracket A and gear box-side crank bracket, and insert the crank shaft.

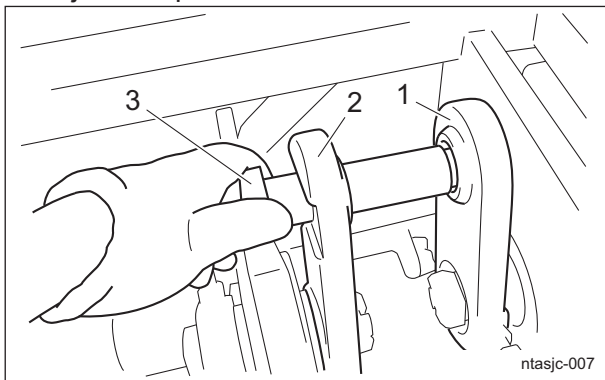


Installation of crank Assy_006

1	Crank bracket A
2	Gear box-side crank bracket
3	Crank shaft
4	Upper housing

Note:

If the crank shaft cannot be inserted because the positions of the holes of crank bracket A and the transmission-side crank bracket do not fit, loosen the bolts which is securing the housing mounting bracket to adjust the position of the shaft.

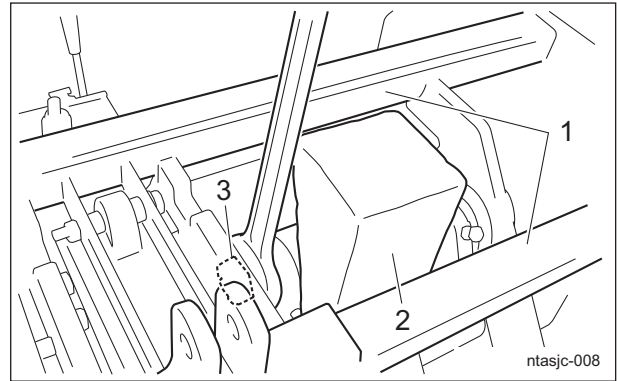


Installation of crank Assy_007

1	Transmission-side crank bracket
2	Left crank Assy-side crank bracket A
3	Crank shaft

7. Install the disc spring and slotted nut on the crank shaft.
8. Secure the crank bracket with a wood block, etc., in the rotation direction to tighten the nut, and then tighten it on the specified torque.

9. Tighten all of the other slotted nuts which have been tightened temporarily on the specified torque. (See "Crank Assy layout" (Page 4-10) .)

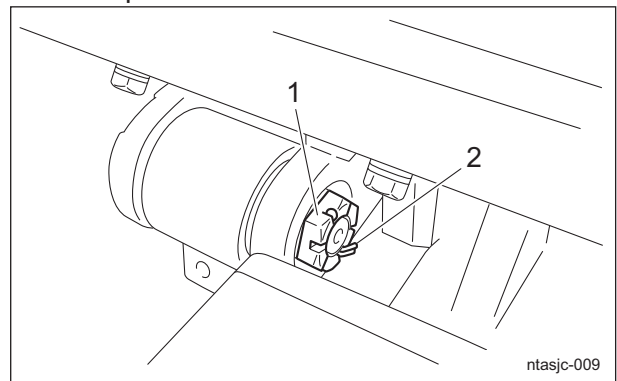


Installation of crank Assy_008

1	Frame
2	Wood block
3	Slotted nut

10. Install the cotter pins to all clotted nuts.

11. Install the left crank Assy as well in the same procedure.



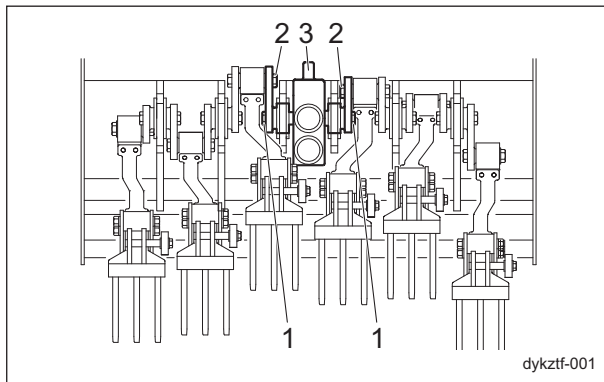
Installation of crank Assy_009

1	Slotted nut
2	Cotter pin

Operating Machine and Mower Units

Gearbox

Gear box layout



Gear box layout_001

1	Slotted nut 20 and cotter pin for drive shaft
2	Slotted nut 24 and cotter pin for crank shaft
3	Gearbox

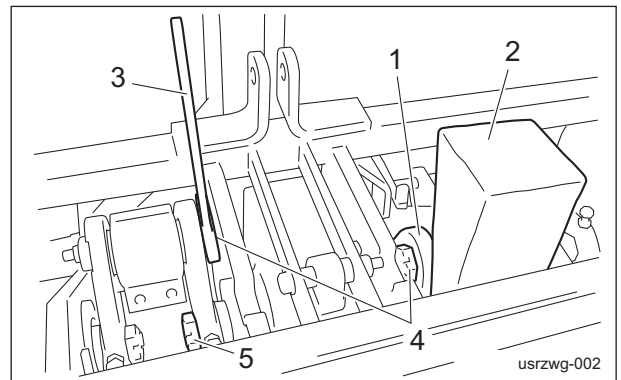
1	Gearbox
2	Upper arm
3	Slotted nut and cotter pin

⚠ Caution

When removing and installing the crank nuts, be sure to secure the crank.

3. Secure the crank bracket by using a wood block, etc. so that it does not rotate when the nuts are loosen.

4. Loosen the cotter nut of the crank shaft.



Removal of gear box_002

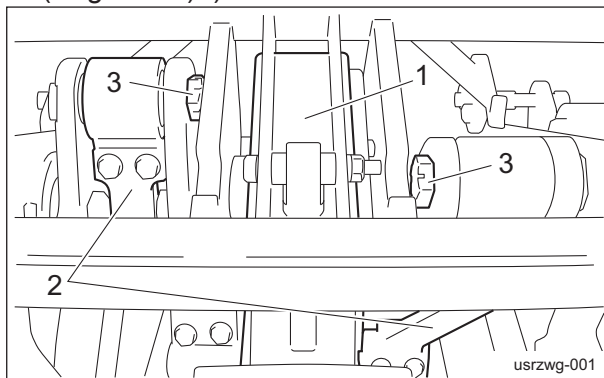
1	Crank
2	Wood block
3	Spanner
4	Slotted nut for crank shaft
5	Slotted nut for drive shaft

Removal of gear box

⚠ Warning

When removing or installing any crank parts, be sure to secure the crank. If the crank is not secured, the crank may become unbalanced and rotate suddenly. It may cause injury or death.

- The machine is removed from the tractor with its upper link, up-down handle, and cover removed.
- 1. Remove the upper arms from the left and right sides of the gear box. (See "Removal of lower housing Assy" (Page 4-7) .)
- 2. Remove the cotter pin from the slotted nut of the crank shaft. (See "Gear box layout" (Page 4-15) .)



Removal of gear box_001

⚠ Caution

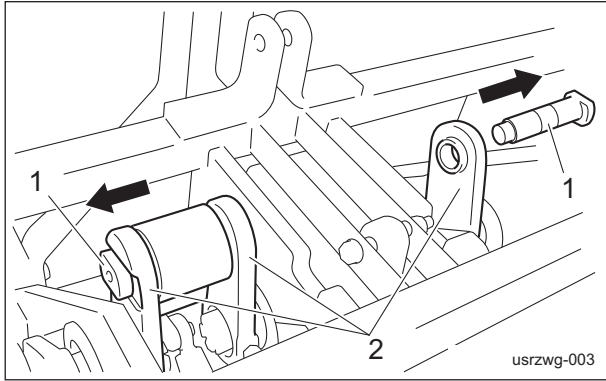
When removing and installing the crank nuts, be sure to secure the crank.

6. Secure the crank bracket by using a wood block, etc. so that it does not rotate when the nuts are loosen.

7. Loosen the cotter nuts of the left and right drive shafts.

Operating Machine and Mower Units

8. Pull out the left and right crank shafts from the crank brackets.

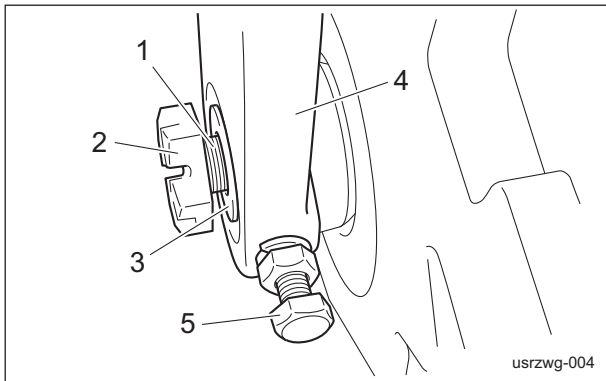


Removal of gear box_003

1	Crank shaft
2	Crank bracket

9. Remove the slotted nuts and disc springs from the left and right sides of the drive shaft.

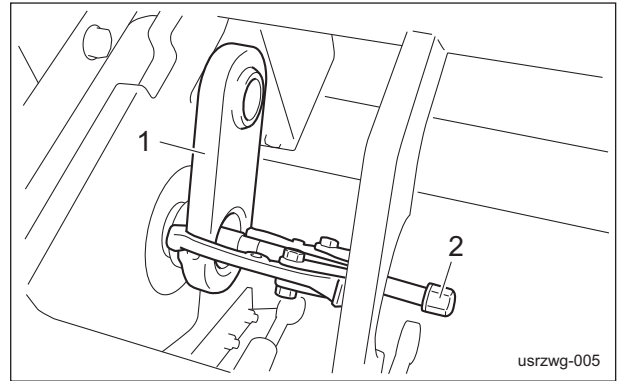
10. Remove the two bolts, nuts, and spring washers from the crank brackets.



Removal of gear box_004

1	Drive shaft
2	Slotted nut
3	Disc spring
4	Crank bracket
5	Bolt, nut, and spring washer

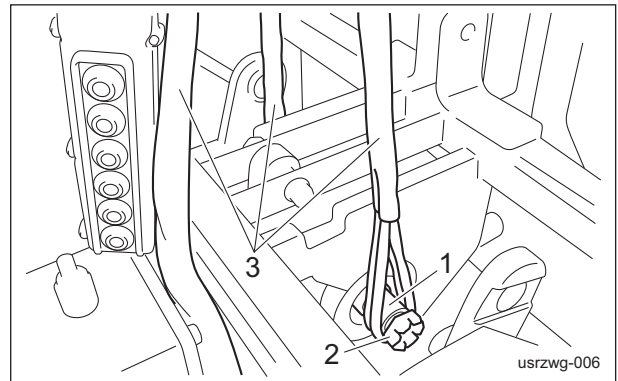
11. Remove the crank brackets from the drive shaft by using a pulley puller. Remove the one in the opposite side as well in the same procedure.



Removal of gear box_005

1	Crank bracket
2	Pulley puller

12. Install the cotter nuts to the left and right drive shafts to prevent the sling from coming off when lifting the sling up from the drive shaft.

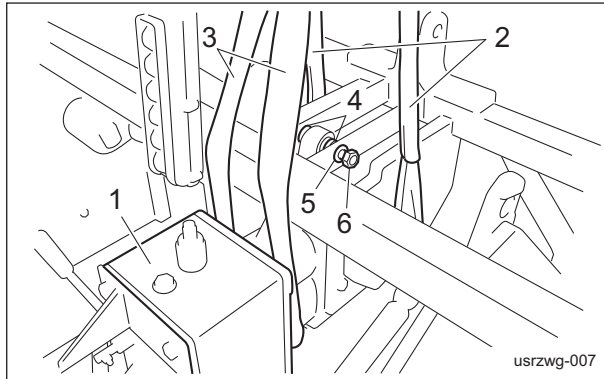


Removal of gear box_006

1	Drive shaft
2	Slotted nut
3	Sling

Operating Machine and Mower Units

13. Set sling A to the left and right sides of the drive shaft and sling B to the neck of the gear box so that the gear box can be lifted with keeping its stability.



Removal of gear box_007

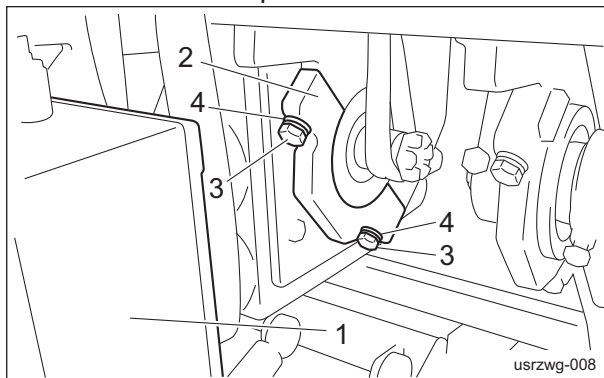
1	Gearbox
2	Sling A
3	Sling B
4	Collar
5	Washer
6	Bolt and U nut

14. Lift the gear box up with a hoist, etc. so that there is no play left between the slings and main body.
15. Remove the bolt, U nut, spring washer, and collar.

⚠ Caution

Confirm that there is no play in the slings lifting the gear box.

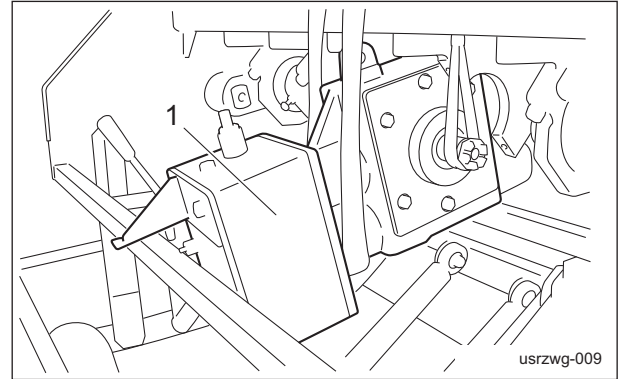
16. Remove the bolt, spring washer and washer, and then remove the housing mounting board. Remove the one in the opposite side as well in the same procedure.



Removal of gear box_008

1	Gearbox
2	Housing mounting board
3	Bolt and spring washer
4	Washer

17. Remove the gear box carefully from the main body.



Removal of gear box_009

1	Gearbox
---	---------

Installation of gear box

⚠ Warning

When removing or installing any crank parts, be sure to secure the crank. If the crank is not secured, the crank may become unbalanced and rotate suddenly. It may cause injury or death.

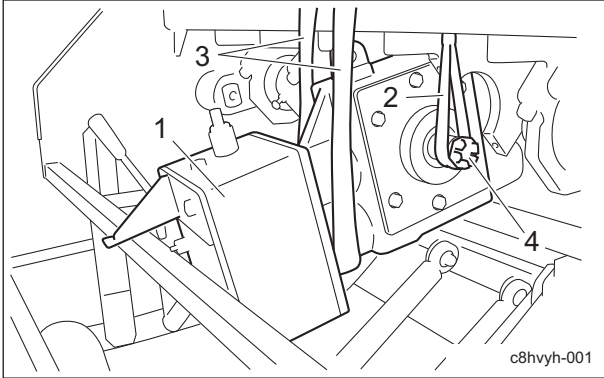
⚠ Caution

Refer to "Tightening torques" (Page 3-4) . Note that the Baroness product warranty may not apply to any defects caused by incorrect or overtightening, etc.

- The machine is removed from the tractor with its upper link, up-down handle, and cover removed.
1. Install the cotter nuts to the left and right drive shafts to prevent the sling from coming off when lifting the sling up from the drive shaft.
 2. Set sling A to the left and right sides of the drive shaft and sling B to the neck of the gear box so that the gear box can be lifted with keeping its stability.

Operating Machine and Mower Units

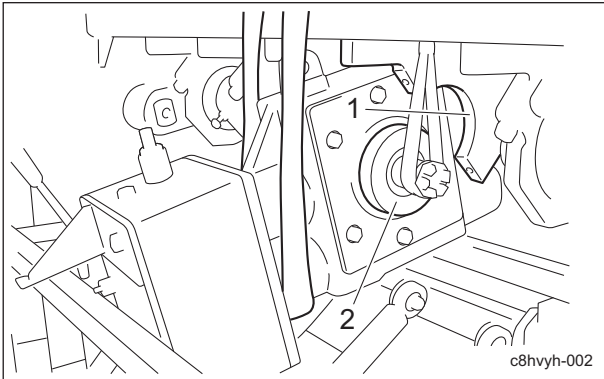
3. Lift the gear box with the slings.



Installation of gear box_001

1	Gearbox
2	Sling A
3	Sling B
4	Slotted nut

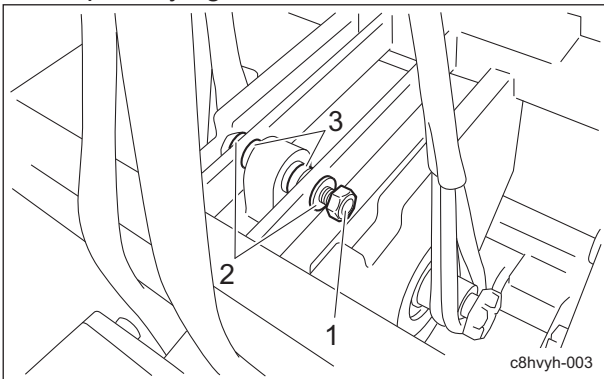
4. Insert the drive shaft housing of the gear box into the main body housing bracket.



Installation of gear box_002

1	Main body housing bracket
2	Drive shaft housing

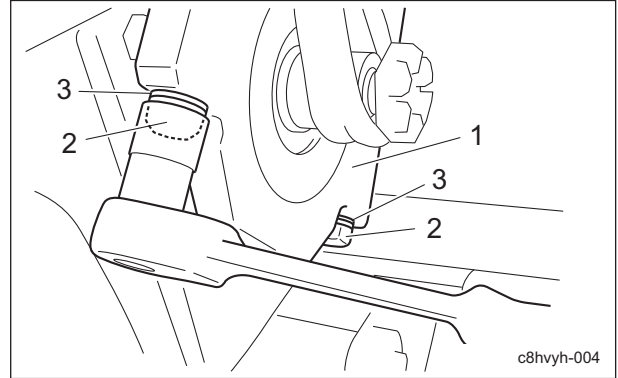
5. Attach the bolts, washers, and collars to the gear box and main body, and then temporarily tighten them with U nuts.



Installation of gear box_003

1	Bolt and U nut
2	Washer
3	Collar

6. Tighten the housing mounting board with bolts, spring washers, and washers on the specific torque.

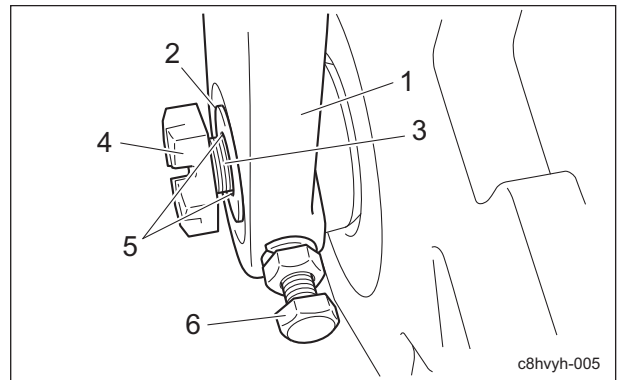


Installation of gear box_004

1	Housing mounting board
2	Bolt and spring washer
3	Washer

7. Tighten the temporarily tightened bolts on the upper part of the gear box on the specified torque.

8. Install two keys each to the left and right sides of the drive shaft.



Installation of gear box_005

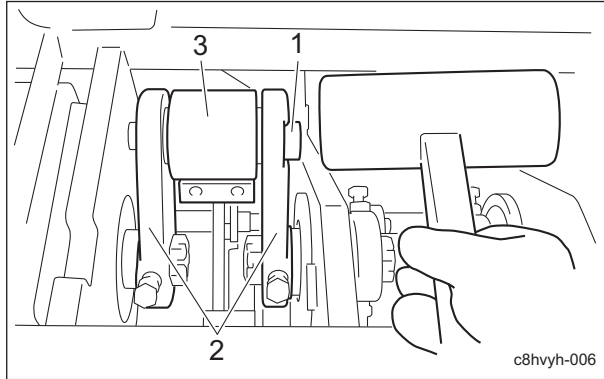
1	Crank bracket
2	Disc spring
3	Drive shaft
4	Slotted nut
5	Key
6	Bolt, nut, and spring washer

9. Drive in the crank brackets to the left and right drive shafts completely.

10. Install two disc springs each to the left and right drive shafts, and temporarily tighten the slotted nuts.

Operating Machine and Mower Units

11. Tighten the left and right crank bracket with bolts, nuts, and spring washers.
12. Install the upper housing Assy between the crank brackets and drive in the crank shaft.
13. Install and temporarily tighten the disc spring and cotter nut.



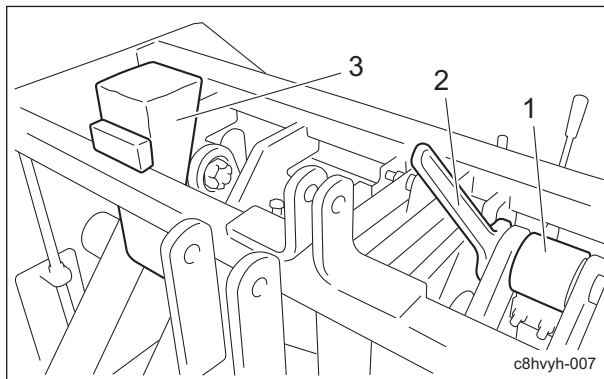
Installation of gear box_006

1	Crank shaft
2	Crank bracket
3	Upper housing Assy

⚠ Caution

When removing and installing the crank slotted nuts, be sure to secure the crank.

Secure the crank bracket by using a wood block, etc. so that it does not rotate when the nuts are loosen.



Installation of gear box_007

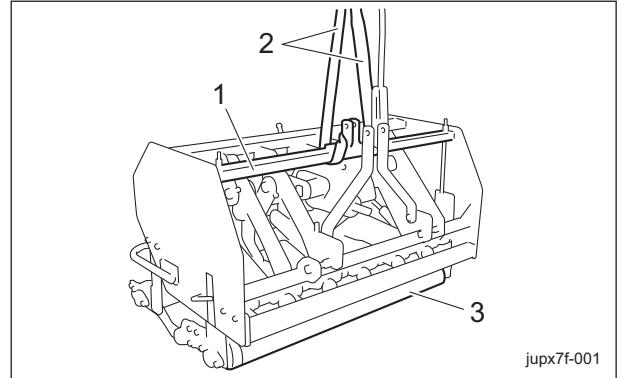
1	Crank
2	Spanner
3	Wood block

14. Tighten the slotted nuts of the drive shaft and crank shaft on the specified torque.
(See "Gear box layout" (Page 4-15) .)
15. Install the slotted pins.

Front Roller Assy

Removal of front roller Assy

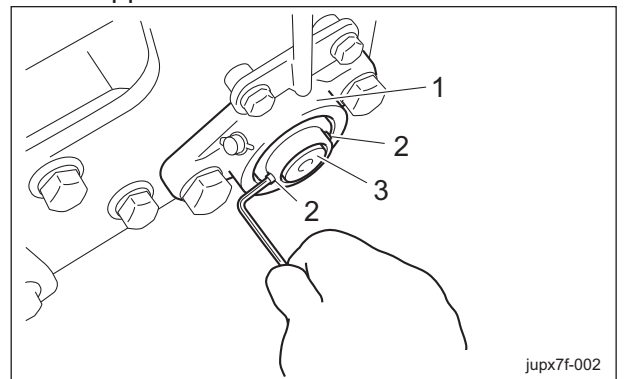
1. Install the sling to the front frame and lift it by using a hoist, etc. so that the roller lifts up off the ground.



Removal of front roller Assy_001

1	Front frame
2	Sling
3	Front roller

2. Loosen the hollow set securing the roller shaft of the flange unit.
Follow the same steps to loosen the one on the opposite side.

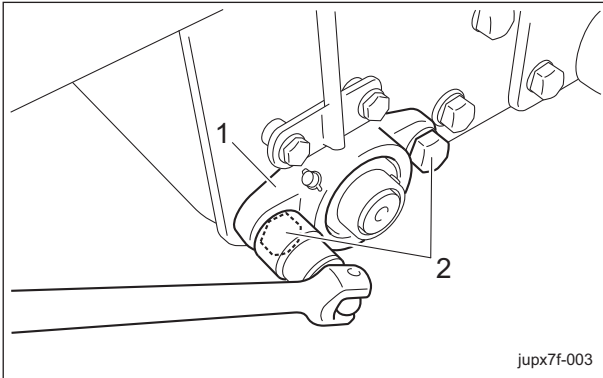


Removal of front roller Assy_002

1	Flange unit
2	Hollow set
3	Roller shaft

Operating Machine and Mower Units

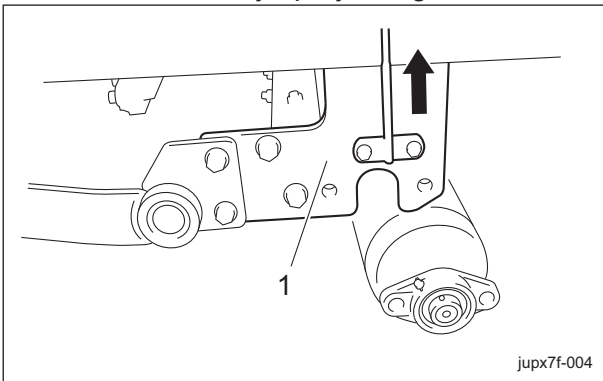
3. Remove the bolt and spring washer.
Follow the same steps to remove those on the other side.



Removal of front roller Assy_003

1	Flange unit
2	Bolt and spring washer

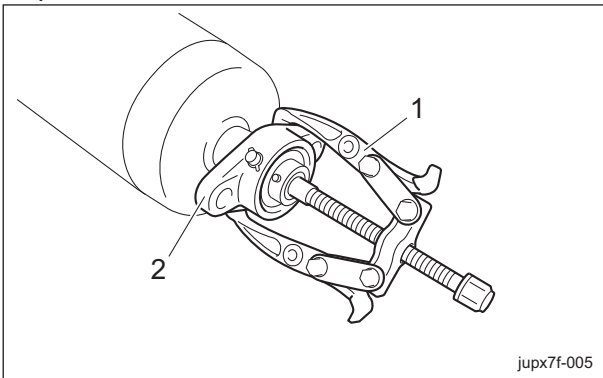
4. Lift the main body up by using a hoist, etc.



Removal of front roller Assy_004

1	Main body
---	-----------

5. Remove the flange unit by using a pulley puller.



Removal of front roller Assy_005

1	Pulley puller
2	Flange unit

Installation of front roller Assy

⚠ Caution

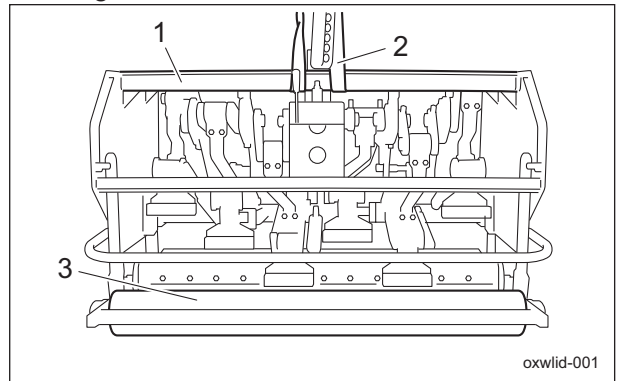
Refer to "Tightening torques" (Page 3-4) .
Note that the Baroness product warranty may not apply to any defects caused by incorrect or overtightening, etc.

For installation, reverse the removing procedure.

Rear Roller Assy

Removal of rear roller Assy

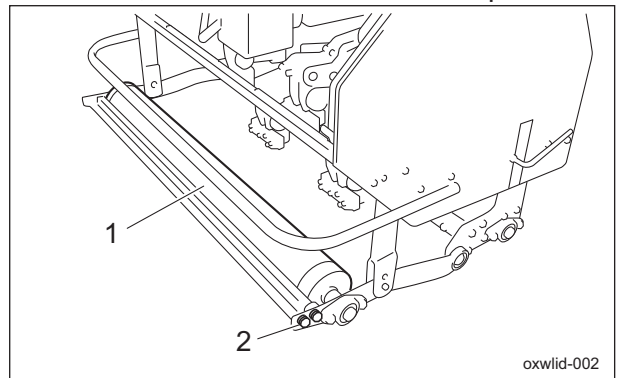
1. Install the sling to the rear frame and lift it with a hoist, etc. until the rear roller lifts off the ground.



Removal of rear roller Assy_001

1	Rear frame
2	Sling
3	Rear roller

2. Remove the bolt, spring washer and washer, and then remove the scraper.

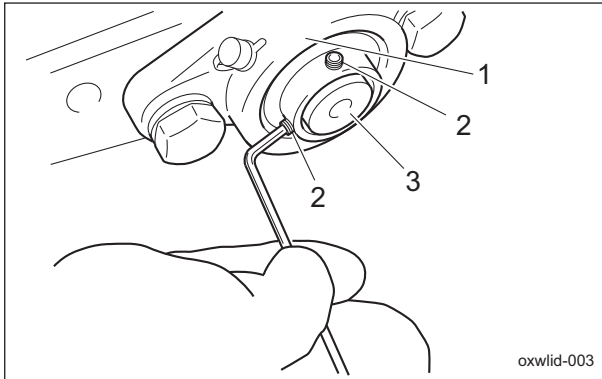


Removal of rear roller Assy_002

1	Scraper
2	Bolt, spring washer, and washer

Operating Machine and Mower Units

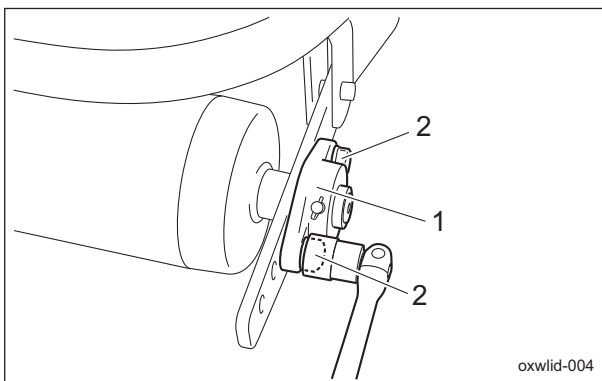
3. Loosen the hollow set securing the roller shaft of the flange unit.
Follow the same steps to loosen the one on the opposite side.



Removal of rear roller Assy_003

1	Flange unit
2	Hollow set
3	Roller shaft

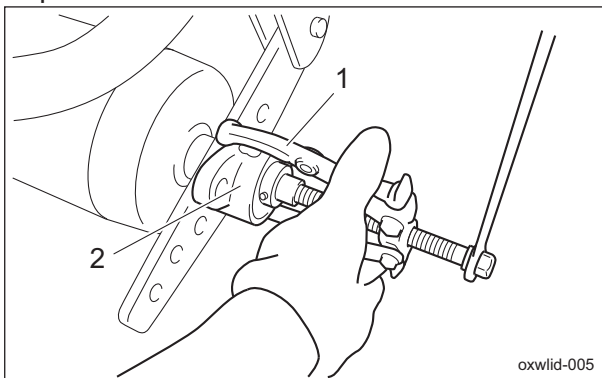
4. Remove the bolts and spring washers of the flange unit.
Follow the same steps to remove those on the other side.



Removal of rear roller Assy_004

1	Flange unit
2	Bolt and spring washer

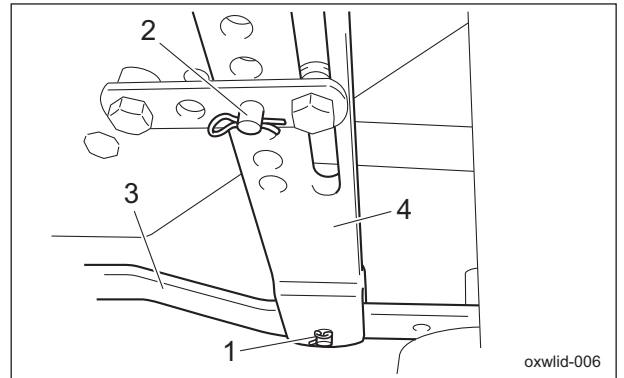
5. Remove the flange unit by using a pulley puller.



Removal of rear roller Assy_005

1	Pulley puller
2	Flange unit

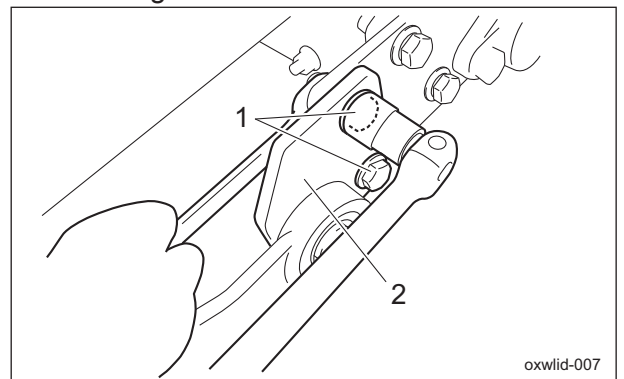
6. Remove snap pin A and the flat-head pin securing the rear roller bracket (R).
7. Remove snap pin B and the flat-head pin securing the roller mounting strap, lift the strap to the top, and then secure it with snap pin B and the flat-head pin.



Removal of rear roller Assy_006

1	Snap pin A and flat-head pin
2	Snap pin B and flat-head pin
3	Rear roller bracket (R)
4	Roller hanging strap

8. Remove the bolt, washer, and U nut from the front roller bracket and then the bracket mounting board.

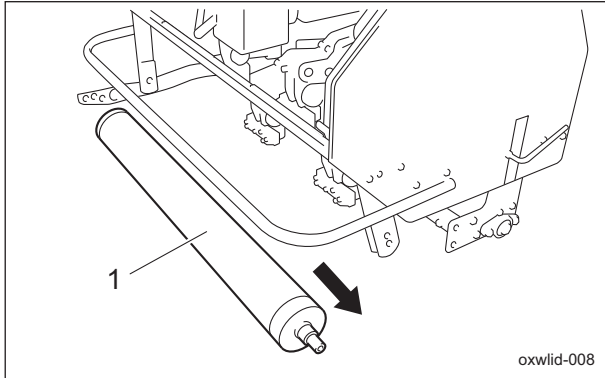


Removal of rear roller Assy_007

1	Bolt, washer, and U nut
2	Bracket mounting board

Operating Machine and Mower Units

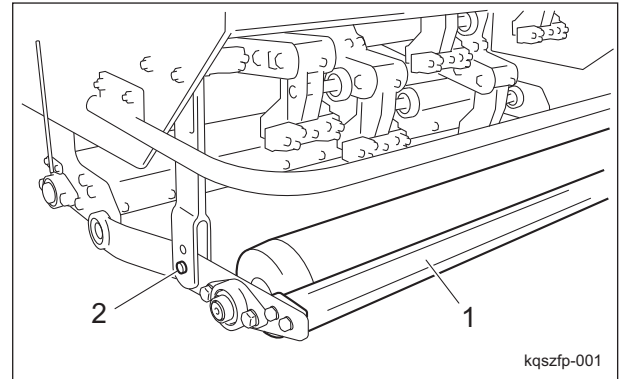
9. Remove the rear roller by sliding it to the right.



Removal of rear roller Assy_008

1	Rear roller
---	-------------

2. Remove snap pin A and the flat-head pin securing the rear roller Assy. Follow the same steps to remove those on the other side.



Removal of front roller bracket_002

1	Rear roller Assy
2	Snap pin A and flat-head pin

Installation of rear roller Assy

⚠ Caution

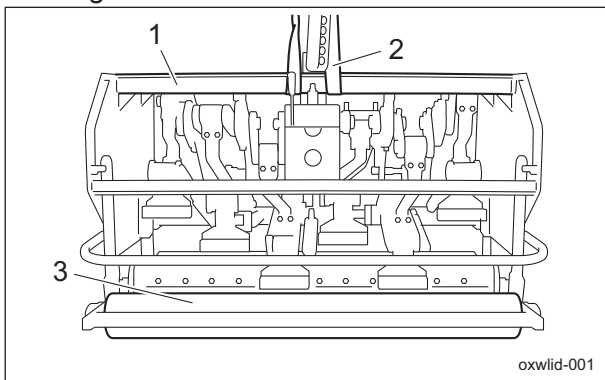
Refer to "Tightening torques" (Page 3-4) . Note that the Baroness product warranty may not apply to any defects caused by incorrect or overtorque tightening, etc.

For installation, reverse the removing procedure.

Front roller bracket

Removal of front roller bracket

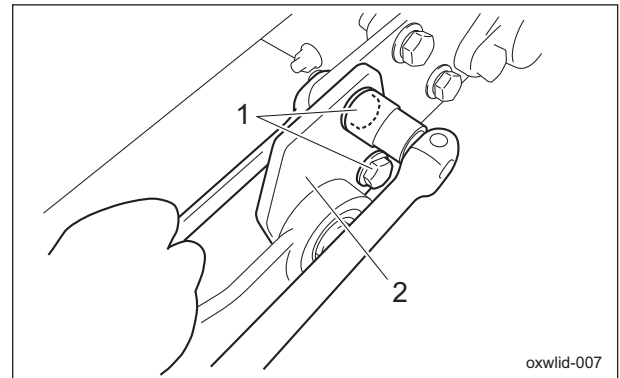
1. Install the sling to the rear frame and lift it with a hoist, etc. until the rear roller lifts off the ground.



Removal of front roller bracket_001

1	Rear frame
2	Sling
3	Rear roller

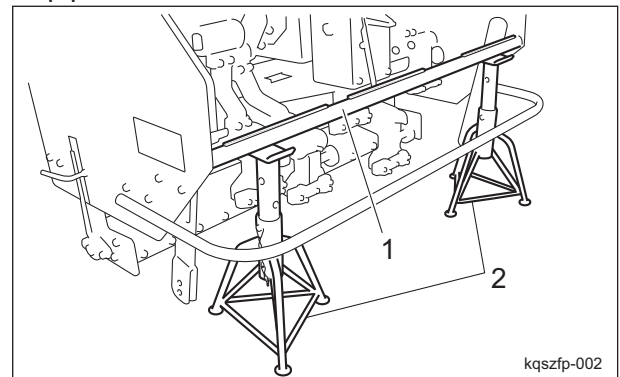
3. Remove the bolt, washer, and U nut and then remove the bracket mounting board. Follow the same steps to remove those on the other side.



Removal of front roller bracket_003

1	Bolt, washer, and U nut
2	Bracket mounting board

4. Place the jack stands under the rear frame pipe.



Removal of front roller bracket_004

Operating Machine and Mower Units

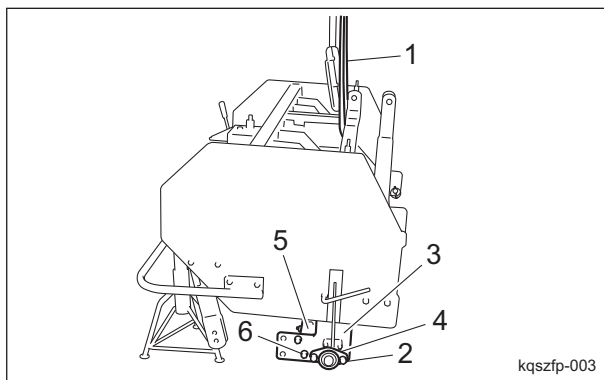
1	Rear frame pipe
2	Jack stands

5. Install the sling to the front frame and lift it with a hoist, etc. until the front roller lifts off the ground.
6. Remove the bolts and spring washers from the flange unit.
Follow the same steps to remove those on the other side.
7. Lift the main body up with a hoist, etc. and remove the front roller Assy.

Important

When removing the grass pressing mounting bracket and the left and right adjusting plates, check their positions and the quantity.

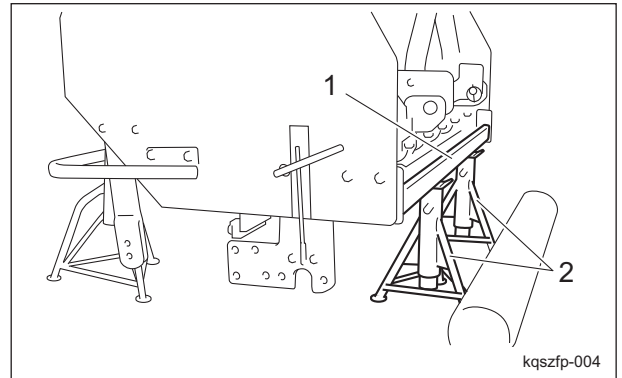
8. Remove the bolts, spring washers, and washers from the grass pressing mounting bracket.
Follow the same steps to remove those on the other side.



Removal of front roller bracket_005

1	Sling
2	Bolt and spring washer
3	Front roller Assy
4	Flange unit
5	Grass pressing mounting bracket
6	Bolt, spring washer, and washer

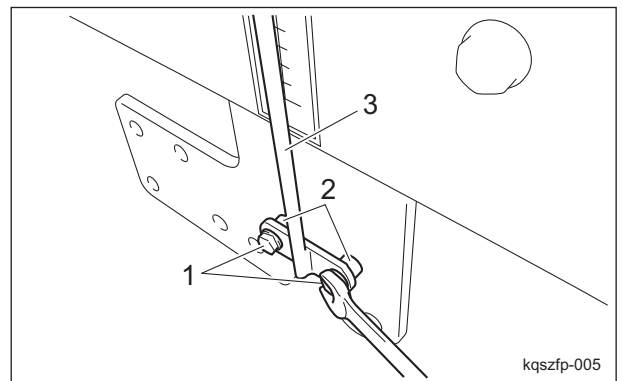
9. Place the jack stands in the box mounting bracket.



Removal of front roller bracket_006

1	Box mounting bracket
2	Jack stands

10. Remove the bolt, spring washer and collar, and then remove the depth gauge.
Follow the same steps to remove those on the other side.



Removal of front roller bracket_007

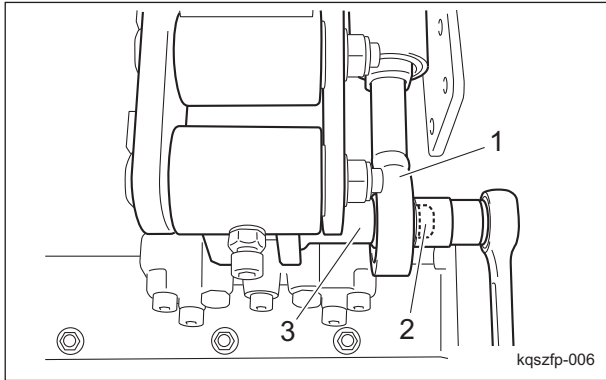
1	Bolt and spring washer
2	Collar
3	Depth gauge

Operating Machine and Mower Units

11. Remove the bolt and spring washer from the tine holder and then remove the spring box.

Note:

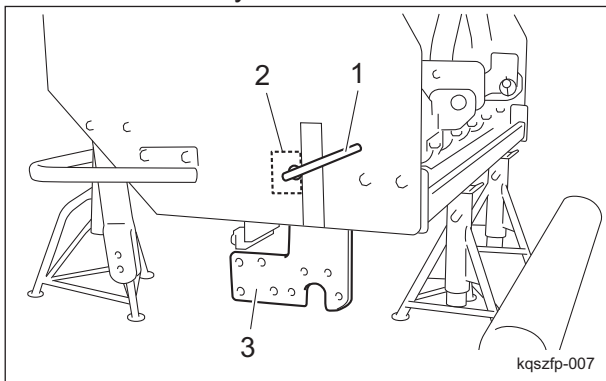
It makes it easier to remove the right front roller bracket.



Removal of front roller bracket_008

1	Spring box
2	Bolt and spring washer
3	Tine holder

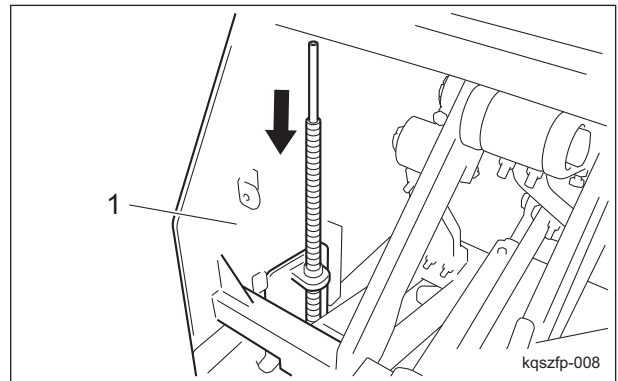
12. Loosen the roller stopper and hold the front roller bracket by hand.



Removal of front roller bracket_009

1	Roller stopper
2	Fastening plate
3	Front roller bracket

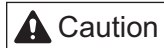
13. Remove the roller stopper and fastening plate together while holding the front roller bracket.



Removal of front roller bracket_010

1	Front roller bracket
---	----------------------

Installation of front roller bracket



Caution

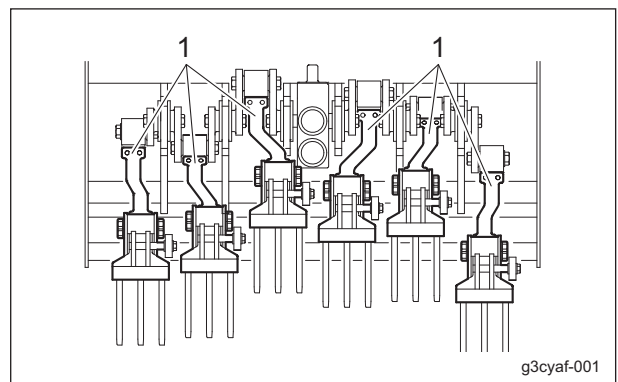
Refer to "Tightening torques" (Page 3-4) .
Note that the Baroness product warranty may not apply to any defects caused by incorrect or overtorque tightening, etc.

For installation, reverse the removing procedure.

Inspection and repair of each section

Lower housing Assy

Lower housing Assy layout



Lower housing Assy layout_001

1	Lower housing Assy
---	--------------------

Operating Machine and Mower Units

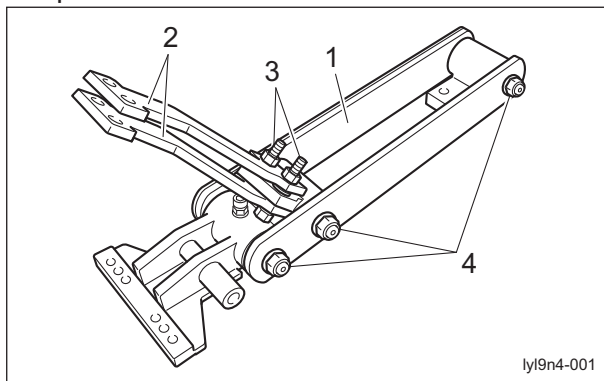
Inspection of lower housing Assy

■TDA1200

Wear of bearings due to frequent usage and invasion of water may damage bearings, etc., preventing smooth rotation of the tine holder, lower housing A, lower housing B, etc. Inspect and replace the parts such as the springs.

- Make sure that the tine holder or housing does not have any chip or crack.
- Make sure that there is no wear or rust of the bearing.
- Make sure that there is no play in the fit of the shaft and the bearing.
- Make sure that there is no bent, crack or break on the upper arm.
- Make sure that there is no bent, crack or break on the lower arm.
- Make sure that there is no bent or wear on the arm axis.

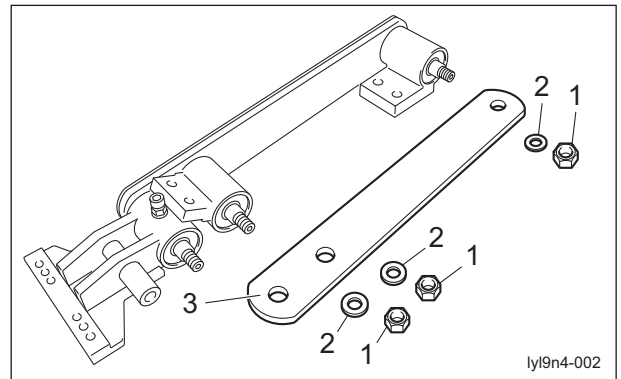
1. Remove the bolts, washers and U nut A from the lower housing Assy, and then remove the upper arm.
2. Loosen the U nut B on the arm axis at 3 places.



TDA1200_001

1	Lower housing Assy
2	Upper arm
3	Bolt, washer, and U nut A
4	Arm axis, disc spring, and U nut B

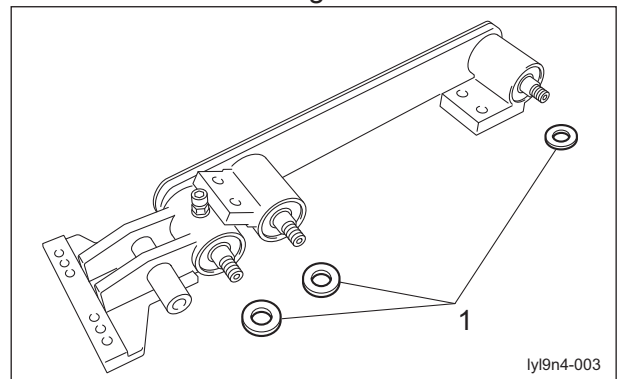
3. Remove U nuts B and washers from 3 places on the arm axis, and then remove the lower arm.



TDA1200_002

1	U nut B
2	Washer
3	Lower arm

4. Remove the bearing collar.



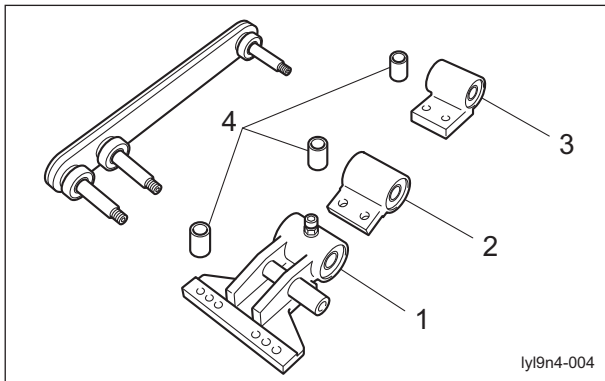
TDA1200_003

1	Bearing collar
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TDA1200 • TDA1600

Operating Machine and Mower Units

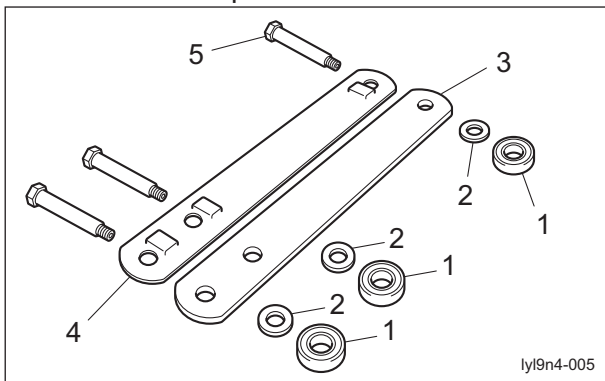
5. Remove the tine holder, lower housing A, and lower housing B, and then remove the collar.



TDA1200_004

1	Tine holder (with a bearing)
2	Lower housing A (with a bearing)
3	Lower housing B (with a bearing)
4	Collar

6. Remove the bearing, bearing collar, lower arm and lock plate from the arm axis.

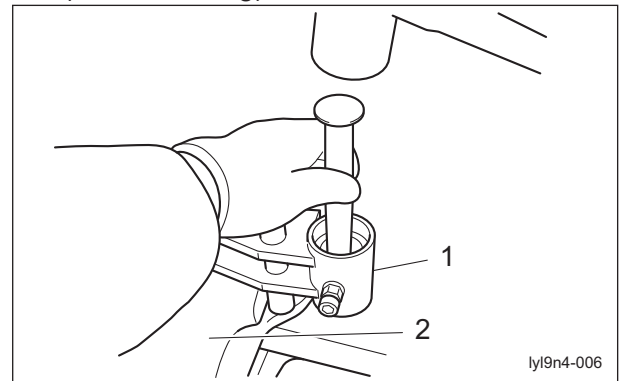


TDA1200_005

1	Bearing
2	Bearing collar
3	Lower arm
4	Lock plate
5	Arm axis

7. Fasten the tine holder (with a bearing) on the vice and then remove its bearing.

8. Remove bearings from the lower housing A (with a bearing) and the lower housing B (with a bearing), too.



TDA1200_006

1	Tine holder (with a bearing)
2	Vise

Caution

"Tightening torques" (Page 3-4) See the list. Note that the Baroness product warranty may not apply to any defects caused by incorrect or overtorque tightening, etc.

Important

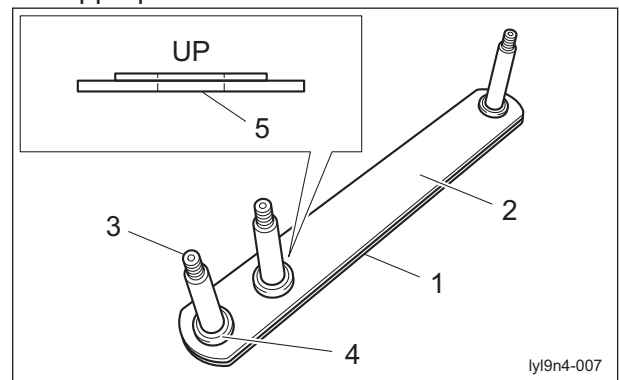
Be sure to replace the bearings, disc springs and U nuts with new ones.

9. Install the lock plate on the arm axis.
10. Lap the lower arm over from the above.

Important

Install the bearing collars with taking care of their correct directions.

11. Insert the bearing collars into each appropriate arm axis.

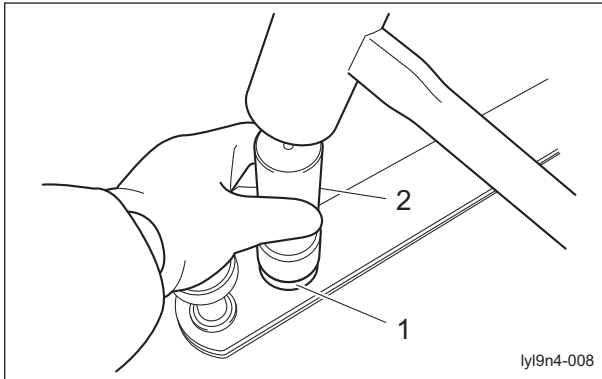


TDA1200_007

Operating Machine and Mower Units

1	Lock plate
2	Lower arm
3	Arm axis
4	Bearing collar
5	Top view of bearing collar

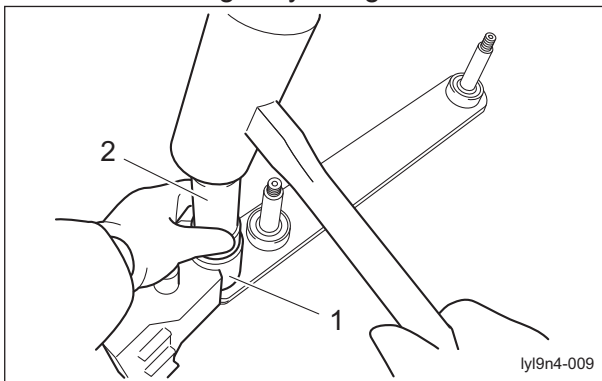
12. Drive bearings into the arm axis on 3 places by using a driver tool.



TDA1200_008

1	Bearing
2	Driver

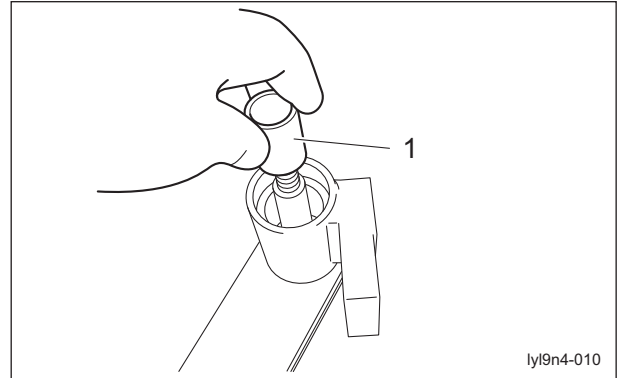
13. Drive the tine holder, lower housing A and lower housing B by using a driver tool.



TDA1200_009

1	Tine holder
2	Driver

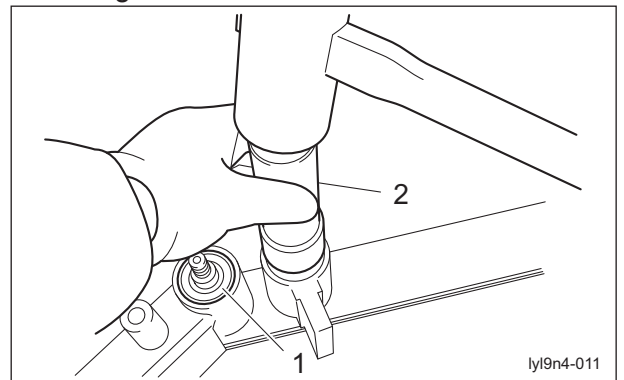
14. Insert the colors into the lower housing A, lower housing B and tine holder.



TDA1200_010

1	Collar
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15. Drive the bearings into the lower housing A, lower housing B and tine holder by using a driver tool.



TDA1200_011

1	Bearing
2	Driver

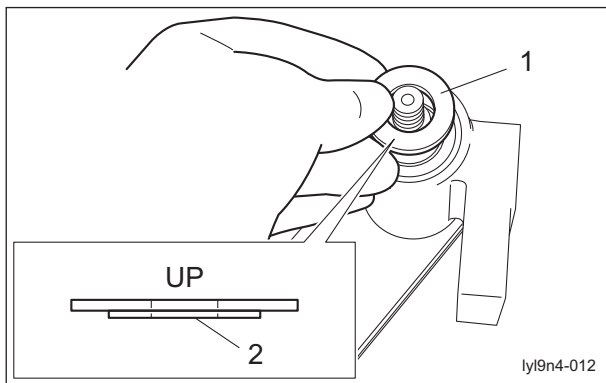
TDA1200 • TDA1600

Operating Machine and Mower Units

Important

Install the bearing collars with taking care of their correct directions.

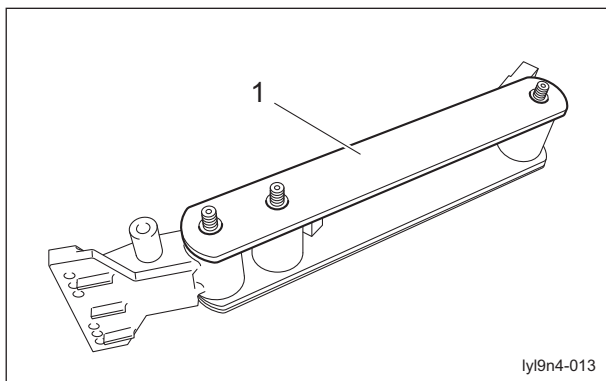
16. Insert the bearing collars into the lower housing A, lower housing B and tine holder.



TDA1200_012

1	Bearing collar
2	Top view of bearing collar

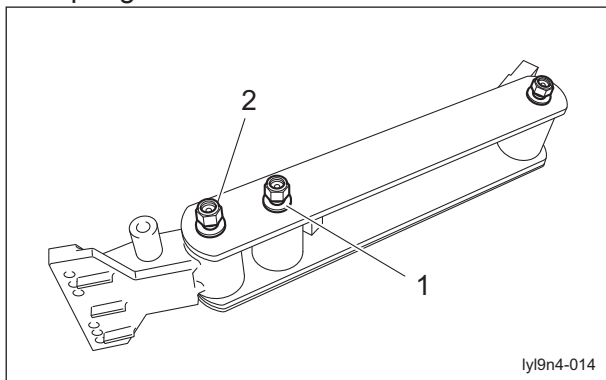
17. Install the lower arm from the above.



TDA1200_013

1	Lower arm
---	-----------

18. Tighten the arm axes by using a disc spring and U nut.



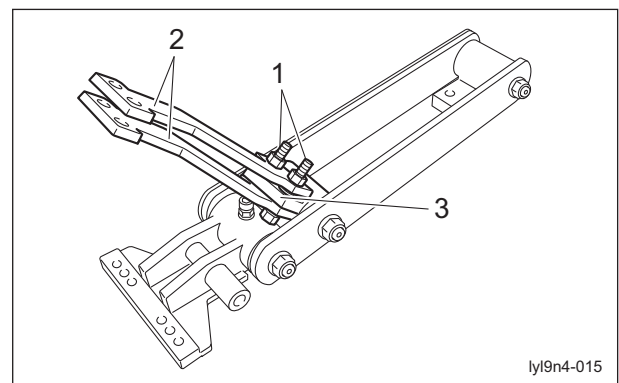
TDA1200_014

1	Disc spring
2	U nut

Important

There are 3 types of upper arms and they have their own places of installation and directions. (See "Crank timing diagram" (Page 4-2) .)

19. Install the upper arm onto the lower housing A by using the bolt, washer and U nut.



TDA1200_015

1	Bolt, washer, and U nut
2	Upper arm
3	Lower housing A

■TDA1600

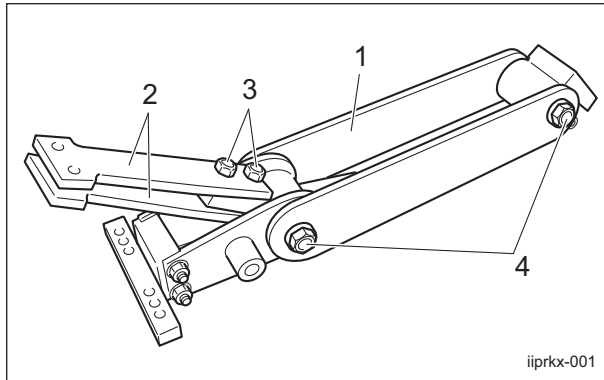
Wear of bearings due to frequent usage and invasion of water may damage bearings, etc., preventing smooth rotation of the tine holder, lower housing A, lower housing B, etc. Inspect and replace the parts such as the springs.

- Make sure that the tine holder or housing does not have any chip or crack.
- Make sure that there is no wear or rust of the bearing.
- Make sure that there is no play in the fit of the shaft and the bearing.
- Make sure that there is no bent, crack or break on the upper arm.
- Make sure that there is no bent, crack or break on the lower arm.
- Make sure that there is no bent or wear on the arm axis.

1. Remove the bolts, washers and U nut A from the lower housing Assy, and then remove the upper arm.

Operating Machine and Mower Units

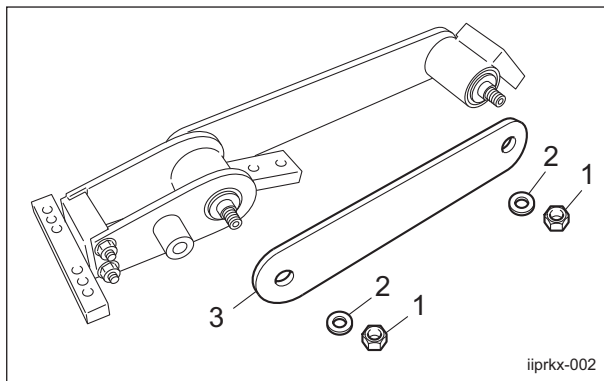
2. Loosen the U nut B on the arm axis at 2 places.



TDA1600_001

1	Lower housing Assy
2	Upper arm
3	Bolt, washer, and U nut A
4	Arm axis, disc spring, and U nut B

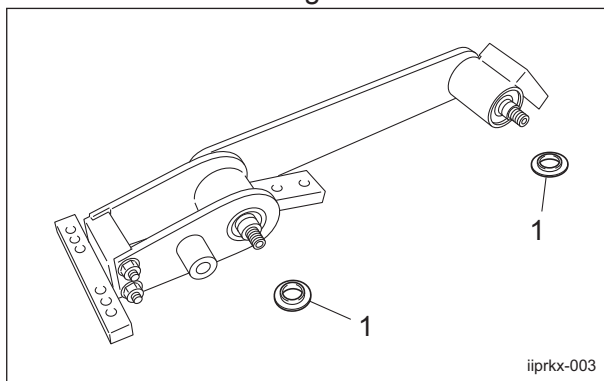
3. Remove U nuts B and washers from 2 places on the arm axis, and then remove the lower arm.



TDA1600_002

1	U nut B
2	Washer
3	Lower arm

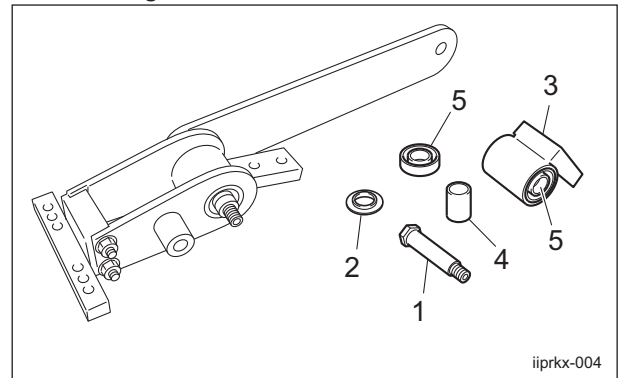
4. Remove the bearing collar.



TDA1600_003

1	Bearing collar
---	----------------

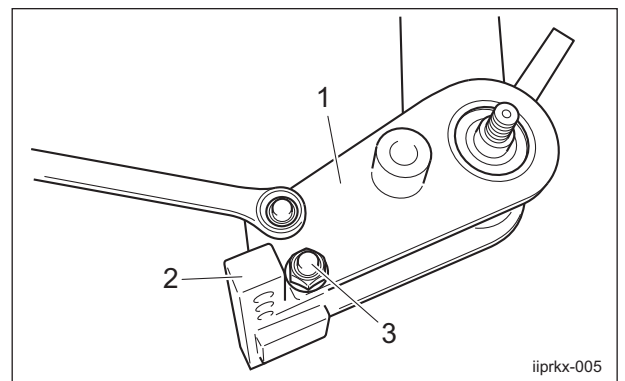
5. Strike the arm axis by using a wood hammer to remove it, and then remove the lower housing B, collar, bearing, and bearing collar.



TDA1600_004

1	Arm axis
2	Bearing collar
3	Lower housing B
4	Collar
5	Bearing

6. Loose the U nut.



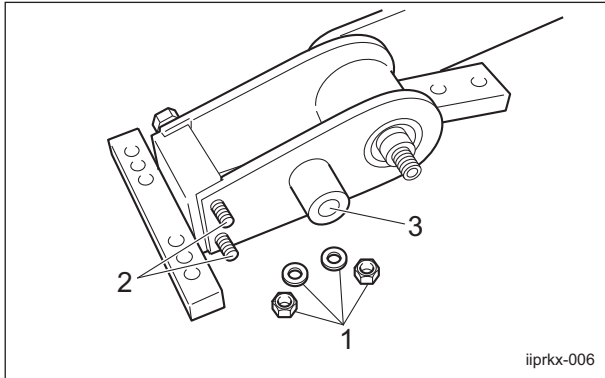
TDA1600_005

1	Tine holder Assy.
2	Tine holder
3	Bolt, washer, and U nut

TDA1200 • TDA1600

Operating Machine and Mower Units

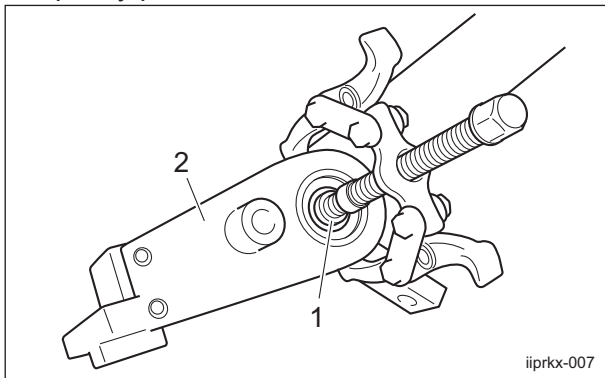
7. Remove the U nut and washer, and push the bolt down to the face of tine holder Assy.



TDA1600_006

1	U nut, washer
2	Bolt
3	Tine holder Assy.

8. Remove the tine holder B by using a pulley puller.



TDA1600_007

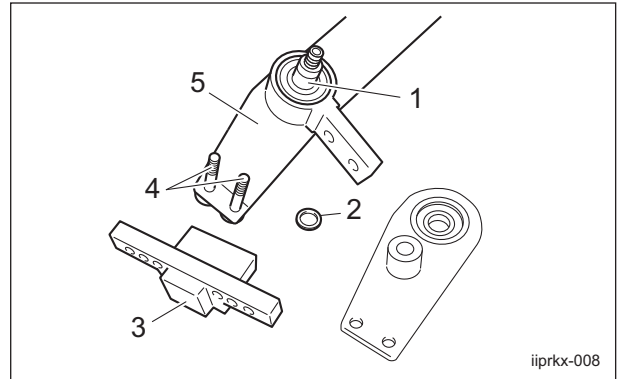
1	Arm axis
2	Tine holder B

Important

Tine holder has its installation direction. Confirm its direction.

9. Remove the collar from the arm axis, and then remove the tine holder from the bolt.

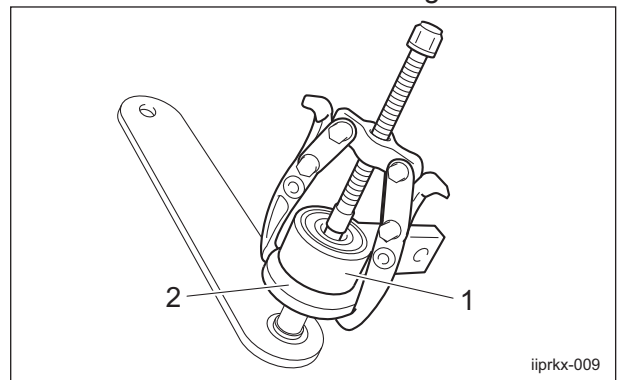
10. Remove the bolt from the time holder A.



TDA1600_008

1	Arm axis
2	Collar
3	Tine holder
4	Bolt
5	Tine holder A

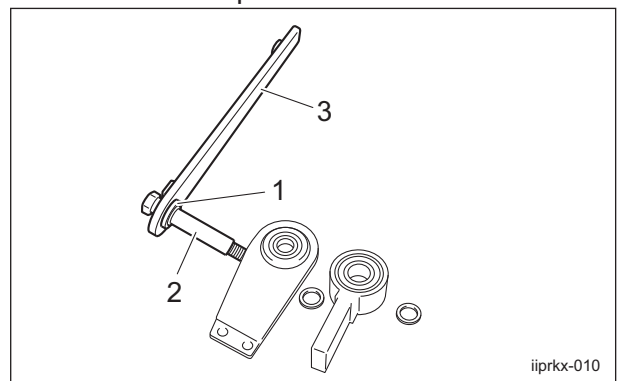
11. Hang the clicks on the pulley puller onto the tine holder A, and then remove the holder with the lower housing A attached.



TDA1600_009

1	Lower housing A
2	Tine holder A

12. Remove the bearing collar and arm axis from the lock plate.



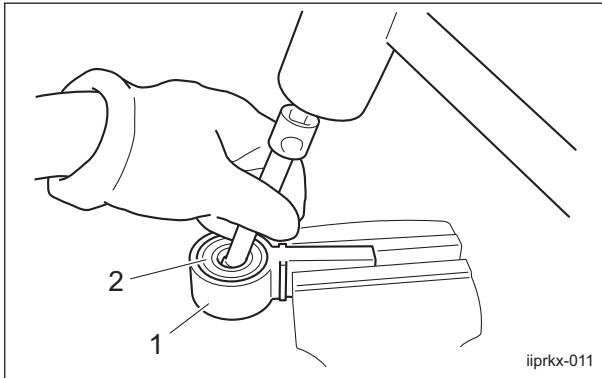
TDA1600_010

Operating Machine and Mower Units

1	Bearing collar
2	Arm axis
3	Lock plate

13. Fasten the lower housing A on a vice, and then remove its bearing.

14. Follow the same steps to remove a bearing from the other side.



TDA1600_011

1	Lower housing A
2	Bearing

Caution

"Tightening torques" (Page 3-4) See the list. Note that the Baroness product warranty may not apply to any defects caused by incorrect or overtightening, etc.

Important

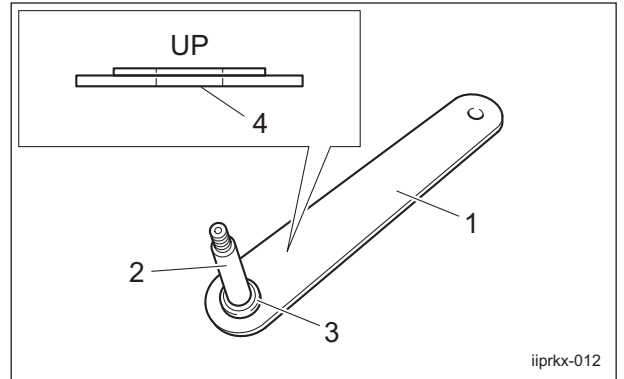
Be sure to replace the bearings, disc springs and U nuts with new ones.

15. Install the lock plate on the arm axis.

Important

Install the bearing collars with taking care of their correct directions.

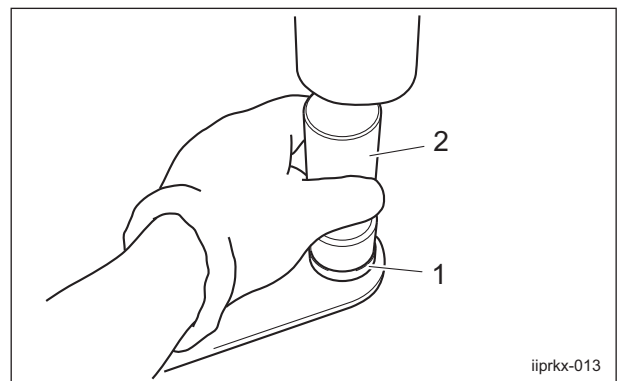
16. Insert bearing collars in each arm axis.



TDA1600_012

1	Lock plate
2	Arm axis
3	Bearing collar
4	Top view of bearing collar

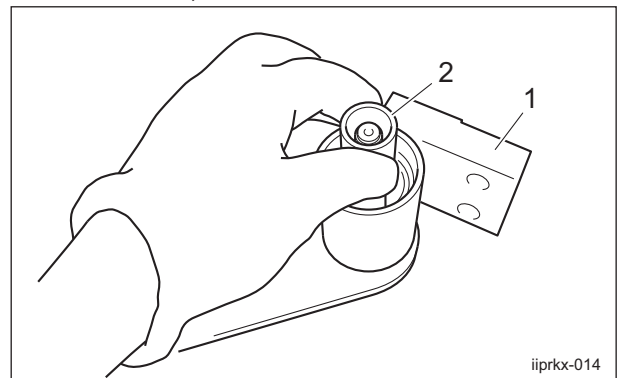
17. Drive a bearing into the arm axis which has been fixed on the lock plate by using a driver tool.



TDA1600_013

1	Bearing
2	Driver

18. Drive the lower housing B by using a driver tool, and then insert its collar.



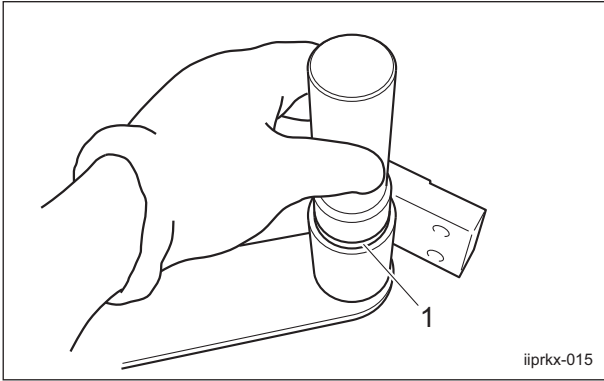
TDA1600_014

1	Lower housing B
2	Collar

TDA1200 • TDA1600

Operating Machine and Mower Units

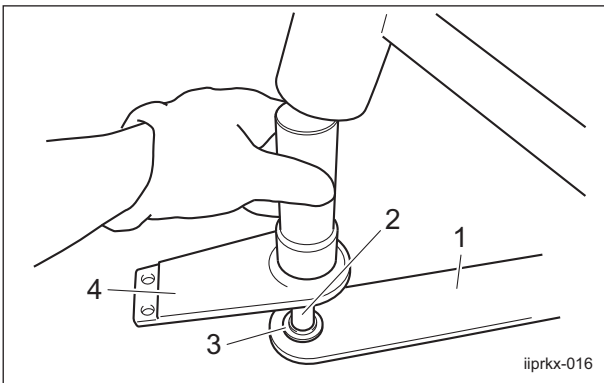
19. Drive a bearing into the lower housing B by using a driver tool.



TDA1600_015

1	Bearing
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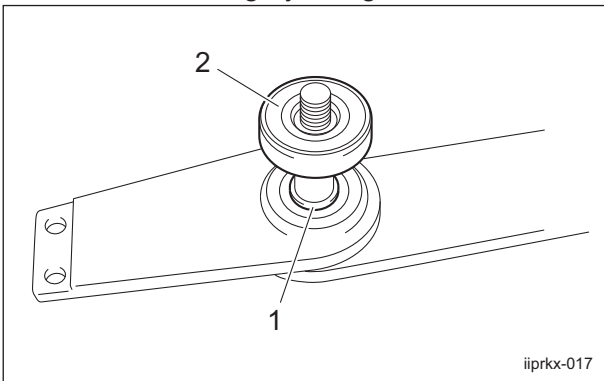
20. Install the arm axis and bearing collar on the other side of the lock plate, and then drive the tine holder A by using a driver tool.



TDA1600_016

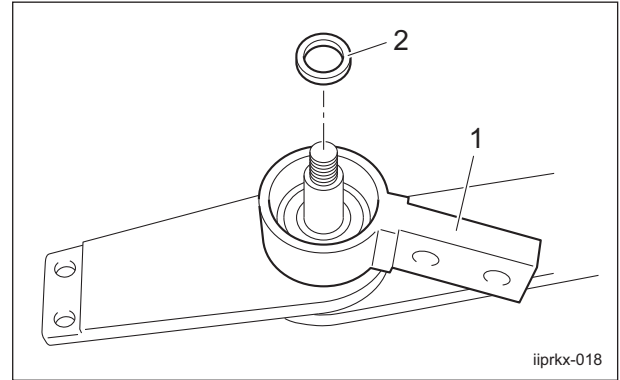
1	Lock plate
2	Arm axis
3	Bearing collar
4	Tine holder A

21. Install a collar onto the arm axis and then drive its bearing by using a driver tool.



TDA1600_017

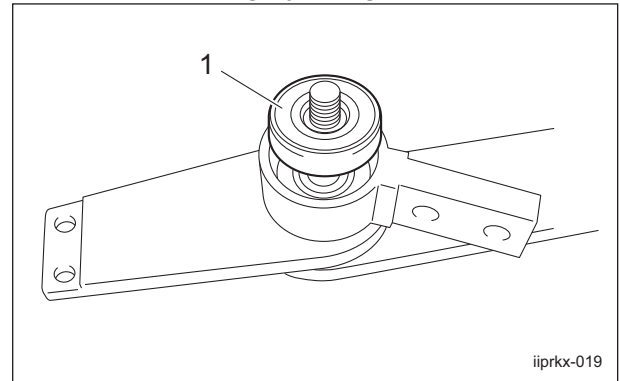
22. Drive the lower housing A by using a driver tool, and then insert its collar.



TDA1600_018

1	Lower housing A
2	Collar

23. Drive a bearing by using a driver tool.

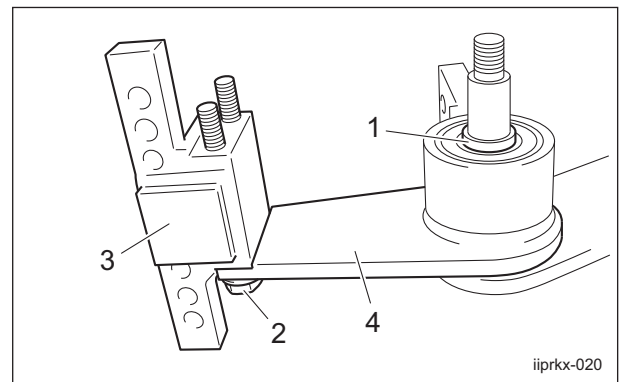


TDA1600_019

1	Bearing
---	---------

24. Install a collar into the arm axis.

25. Install 2 bolts onto the tine holder A, and then insert the tine holder.

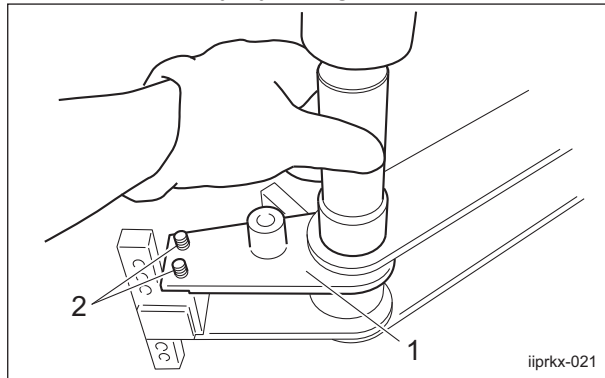


TDA1600_020

Operating Machine and Mower Units

1	Collar
2	Bolt
3	Tine holder
4	Tine holder A

26. Install the tine holder B onto the arm axis and the bolt, and then drive the tine holder B horizontally by using a driver tool.



TDA1600_021

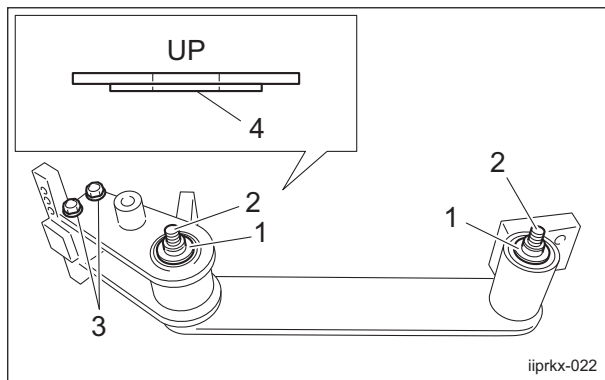
1	Tine holder B
2	Bolt

Important

Install the bearing collars with taking care of their correct directions.

27. Install the bearing collar onto 2 arm axes.

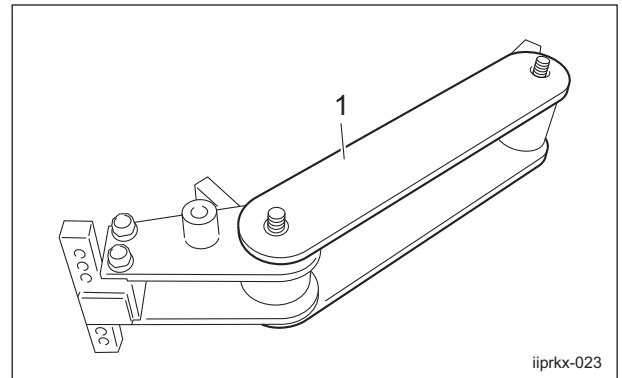
28. Install the washer and U nut onto the bolt.



TDA1600_022

1	Bearing collar
2	Arm axis
3	Washer, U nut
4	Top view of bearing collar

29. Install the lower arm.



TDA1600_023

1	Lower arm
---	-----------

30. Install the washers and U nuts onto 2 arm axes of the lower arm.

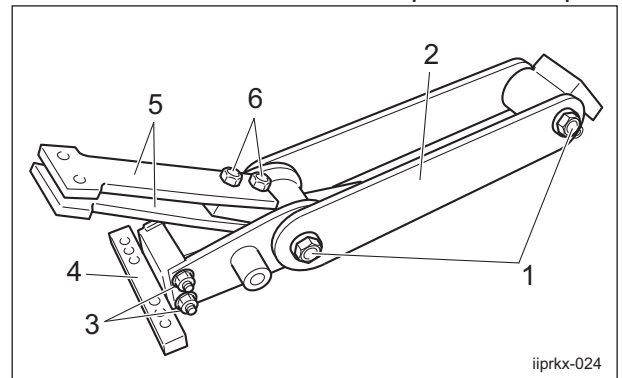
31. Install the washer and U nut onto the bolt A which holds the tine holder.

Important

There are 4 types of upper arms and they have their own places of installation and directions.
(See "Crank timing diagram" (Page 4-2) .)

32. Install the upper arm by using the bolt B, washer, and U nut.

33. Fasten all U nuts on their specified torque.



TDA1600_024

1	Arm axis, washer, and U nut
2	Lower arm
3	Bolt A, washer, and U nut
4	Tine holder
5	Upper arm
6	Bolt B, washer, and U nut

Operating Machine and Mower Units

Spring box

Inspection of spring box

Wear of bearings due to frequent usage and invasion of water may damage springs, bearings etc., preventing smooth rotation of the tine holder, spring box Assy, etc. Inspect and replace the parts such as the bearings and springs.

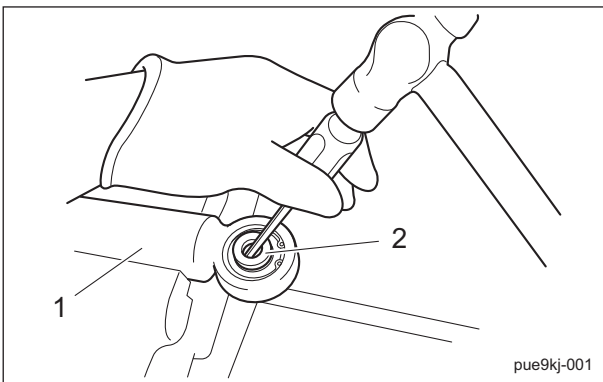
- Confirm that there is no crack nor tear in the bearing housing of the spring box.
- Confirm that there is no crack nor tear in the bearing housing of the spring shaft.
- Make sure that there is no wear or rust of the bearing.
- Make sure that there is no play in the fit of the shaft and the bearing.
- Make sure that the hole of the fastening bracket is not worn.
- Confirm that the compression spring is not broken nor shrunk.

Note:

Between the spring box Assys of TDA1200 and TDA1600, the spring box, compression box, and spring shaft varies, but the assembling and inspection methods are the same.

1. Remove the box fixing collar from the spring box.

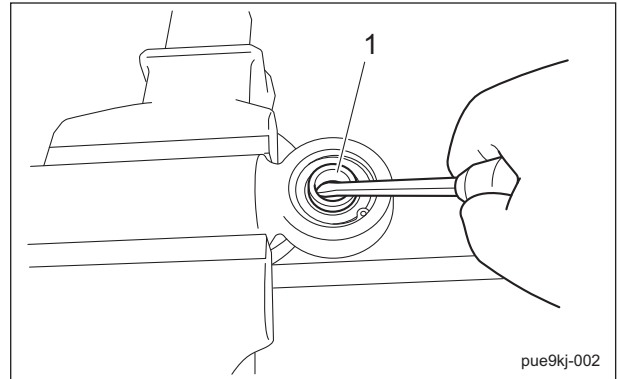
Remove the reverse side as well.



Inspection of spring box_001

1	Spring box
2	Box fixing collar

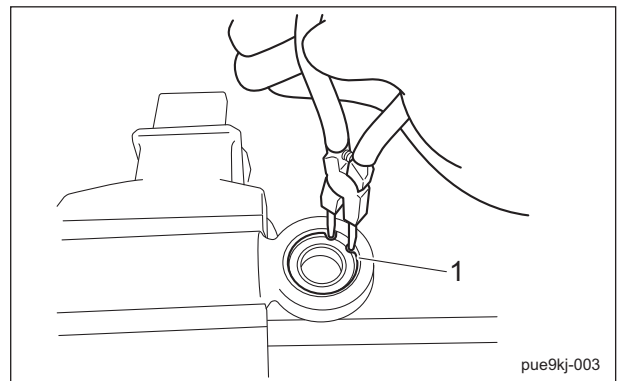
2. Remove the urethane collar.



Inspection of spring box_002

1	Urethane collar
---	-----------------

3. Remove the stop ring.
Remove the reverse side as well.

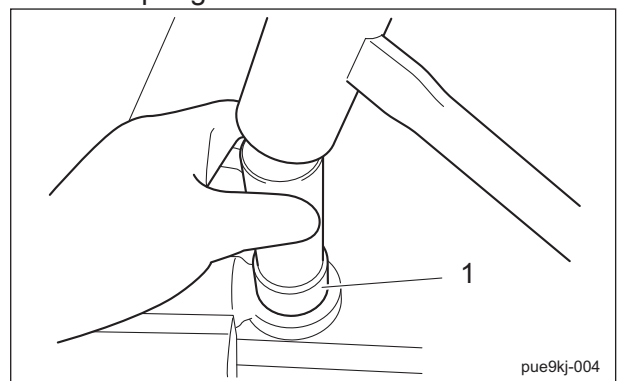


Inspection of spring box_003

1	Stop ring
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4. Drive out the bearing from the spring box by using a driver.

5. Remove the bearing from the housing part of the spring shaft as well.

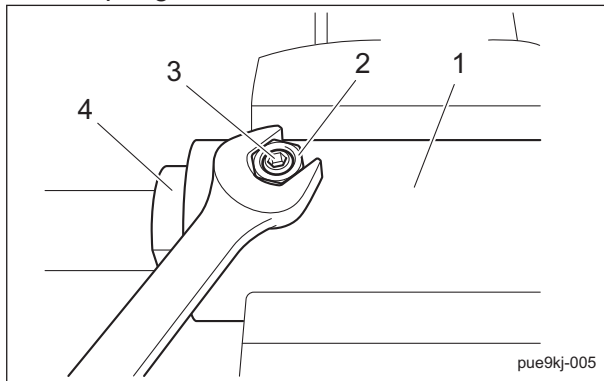


Inspection of spring box_004

1	Driver
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Operating Machine and Mower Units

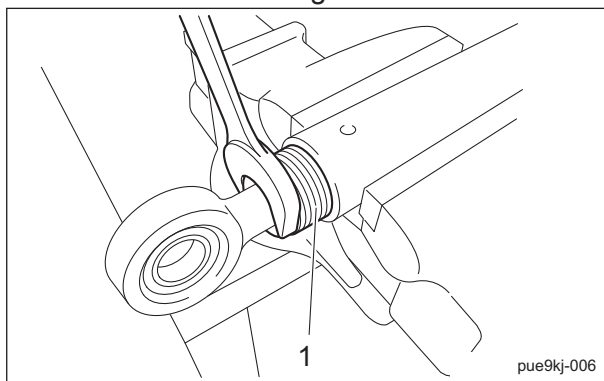
6. Loosen the nut and spring washer of the hollow set securing the fastening bracket to the spring box, and remove the hollow set.



Inspection of spring box_005

1	Spring box
2	Nut and spring washer
3	Hollow set
4	Fastening bracket

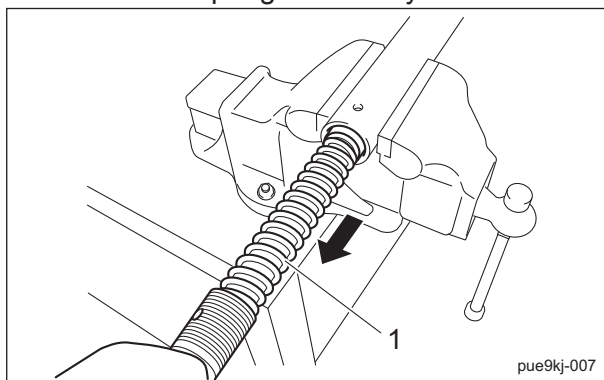
7. Remove the fastening bracket.



Inspection of spring box_006

1	Fastening bracket
---	-------------------

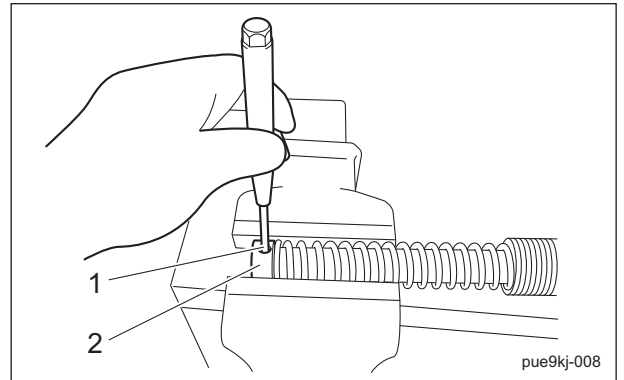
8. Pull out the spring shaft Assy.



Inspection of spring box_007

1	Spring shaft Assy
---	-------------------

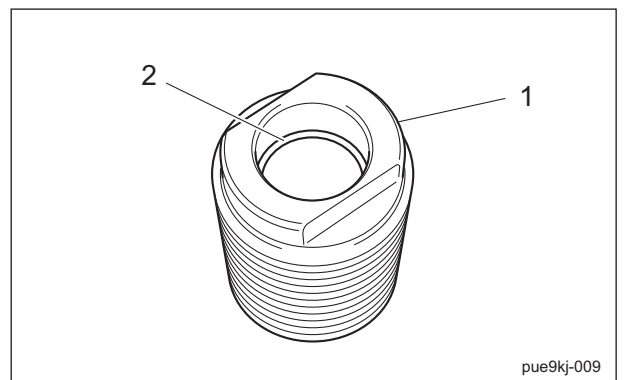
9. Remove the spiral pin from the spring stopper.



Inspection of spring box_008

1	Spiral pin
2	Spring stopper

10. Remove the O-ring from the fastening bracket.

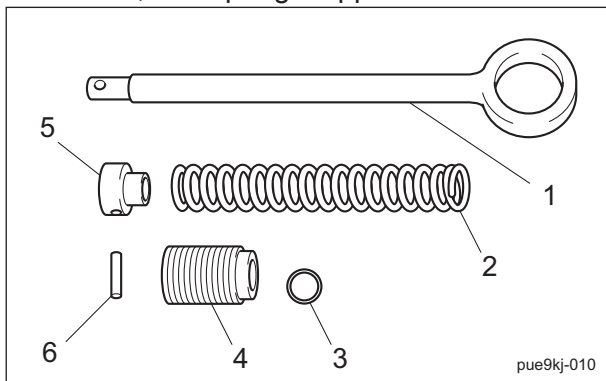


Inspection of spring box_009

1	Fastening bracket
2	O-ring

Operating Machine and Mower Units

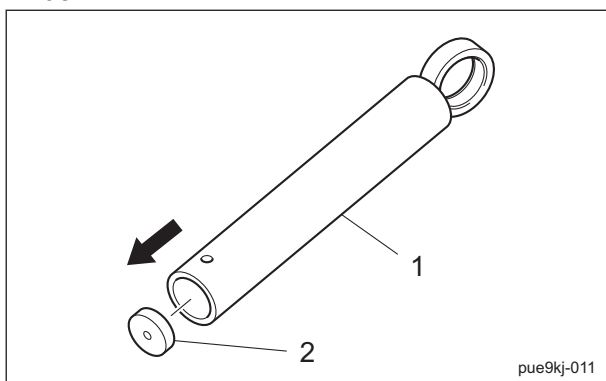
11. Confirm that there is no abnormality in the spring shaft, compression spring, fastening bracket, and spring stopper.



Inspection of spring box_010

1	Spring shaft B
2	Compression spring
3	O-ring
4	Fastening bracket
5	Spring stopper
6	Spiral pin

12. Remove the urethane sheet from the spring box.



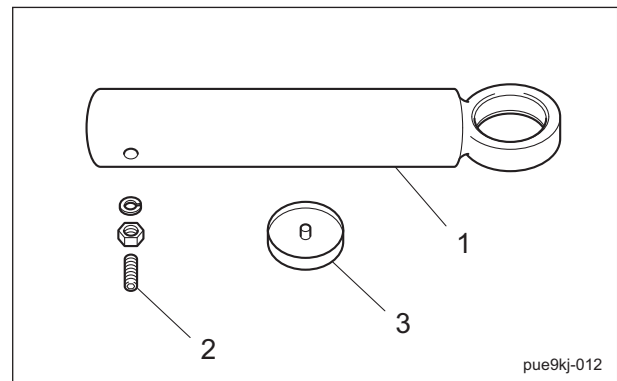
Inspection of spring box_011

1	Spring box
2	Urethane sheet

13. Confirm that there is no abnormality in the spring box, hollow set, spring washer, nor nut.

Note:

Replace the urethane sheet with a new one.



Inspection of spring box_012

1	Spring box
2	Hollow set, spring washer, and nut
3	Urethane sheet

Caution

"Tightening torques" (Page 3-4) See the list. Note that the Baroness product warranty may not apply to any defects caused by incorrect or overtorque tightening, etc.

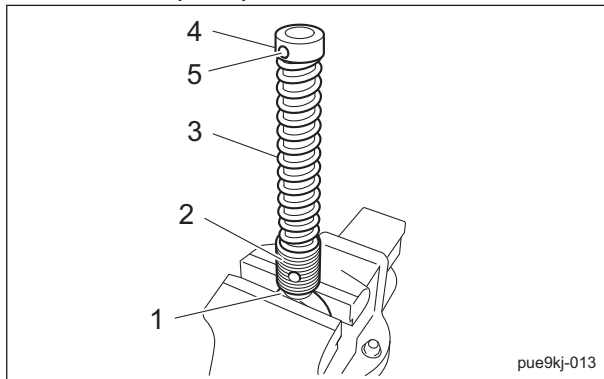
Important

Be sure to replace the bearings, spiral pins, O-rings, and urethane sheets with new ones.

14. Insert the spring shaft into the vise.
 15. Install the O-ring to the fastening bracket, apply grease on the inner surface of the fastening bracket, and insert it into the spring shaft.
 16. Insert the compression spring.

Operating Machine and Mower Units

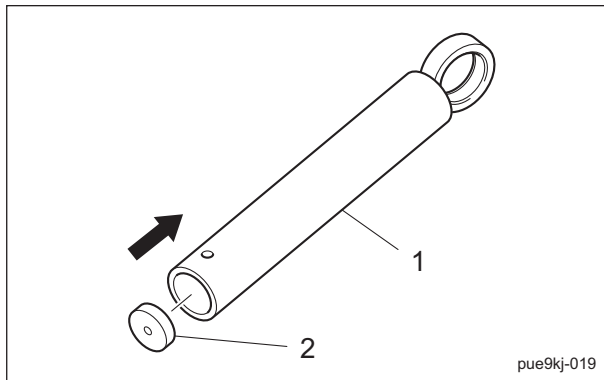
17. Adjust the hole for the pin of the spring stopper to the hole of the spring shaft and drive the spiral pin into the hole.



Inspection of spring box_013

1	Spring shaft
2	Fastening bracket
3	Compression spring
4	Spring stopper
5	Spiral pin

18. Insert the urethane sheet into the spring box

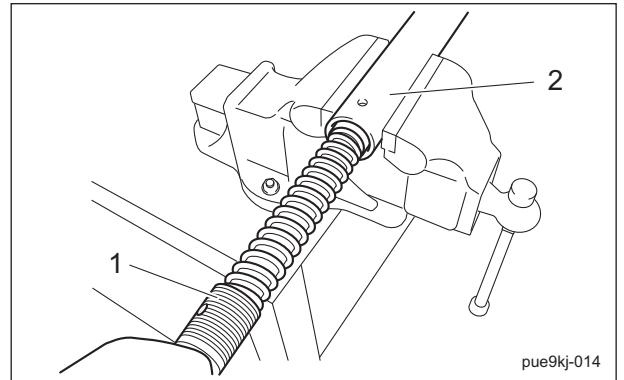


Inspection of spring box_014

1	Spring box
2	Urethane sheet

19. Apply little amount of grease evenly onto the compression spring of the spring shaft.

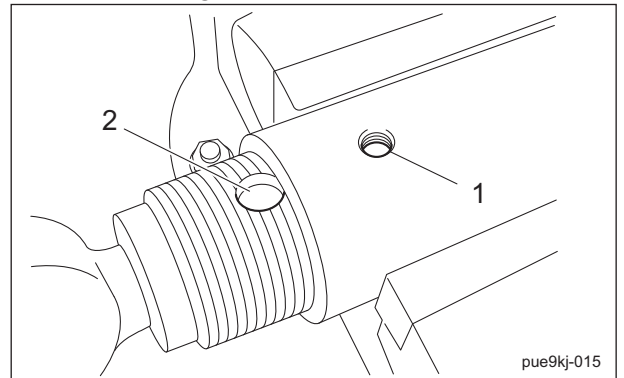
20. Insert the spring shaft Assy into the spring box.



Inspection of spring box_015

1	Spring shaft Assy
2	Spring box

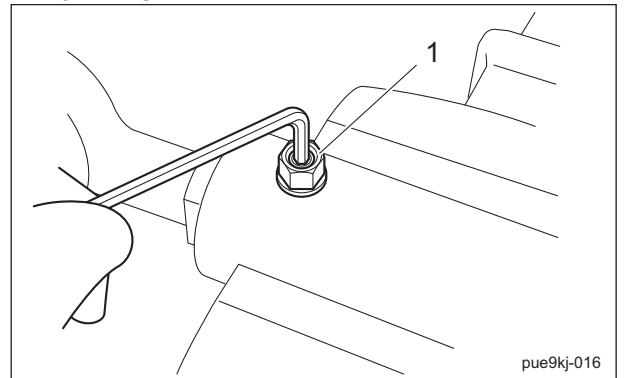
21. Tighten the fastening bracket and adjust it to the angle where the screw hole of the spring box matches with the fixing hole of the fastening bracket.



Inspection of spring box_016

1	Screw hole of spring box
2	Fixing hole of fastening bracket

22. Tighten the hollow set, secure the spring box and fastening bracket, and lock them by using a nut.

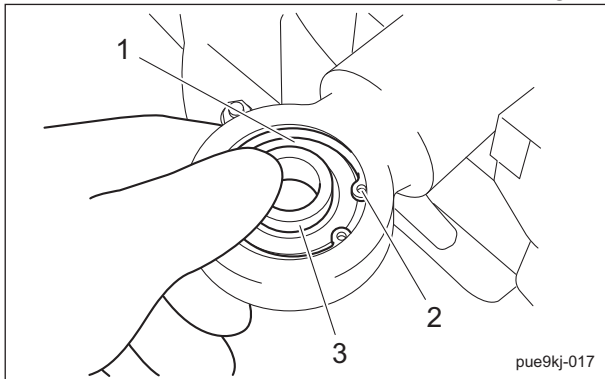


Inspection of spring box_017

1	Hollow set, spring washer, and nut
---	------------------------------------

Operating Machine and Mower Units

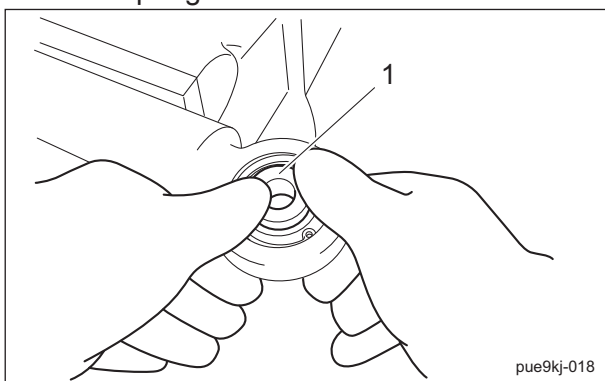
23. Drive the bearing by using a driver and install the stop rings to both sides of it.
 24. Push the urethane collar into the bearing.



Inspection of spring box_018

1	Bearing
2	Stop ring
3	Urethane collar

25. Install the box fixing collars into both sides of the spring box.



Inspection of spring box_019

1	Box fixing collar
---	-------------------

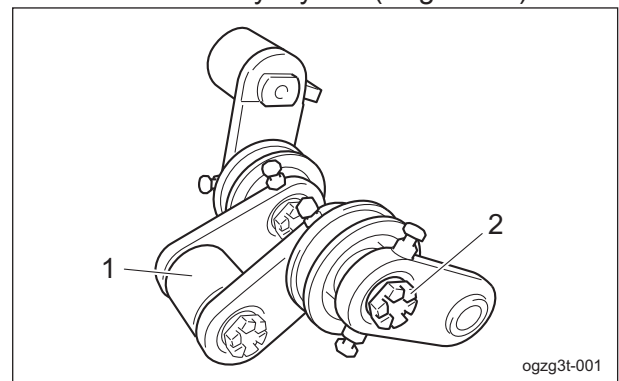
Crank Assy

Inspection of crank Assy

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.

- Confirm that there is no crack in the upper housing, crank bracket, and crank bracket A.
- Make sure that there is no wear or damage of the drive shaft nor crank shaft.
- Make sure that there is no wear or rust of the bearing.
- Make sure that there is no play in the fit of the shaft and the bearing.
- Confirm that there is no play in the upper housing nor bearing.
- Confirm that there is no play in the crank bracket, crank bracket, nor drive shaft.

1. Remove the crank Assy from the machine. See "Removal of crank Assy" (Page 4-11) .
2. Remove the cotter pin from the cotter pin from the slotted nut, and then the slotted nut and disc spring. See "Crank Assy layout" (Page 4-10) .

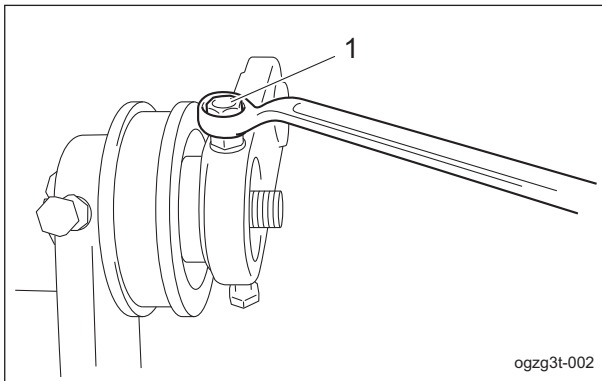


Inspection of crank Assy_001

1	Crank Assy
2	Slotted nut and disc spring

Operating Machine and Mower Units

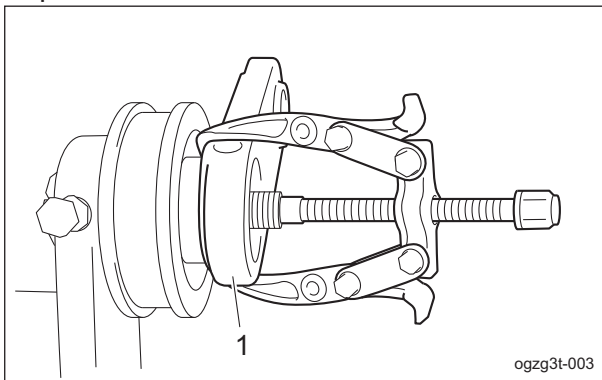
3. Loosen the nut and remove the bolt.
Follow the same steps to remove the bolt from the other side.



Inspection of crank Assy_002

1	Bolt, nut, and spring washer
---	------------------------------

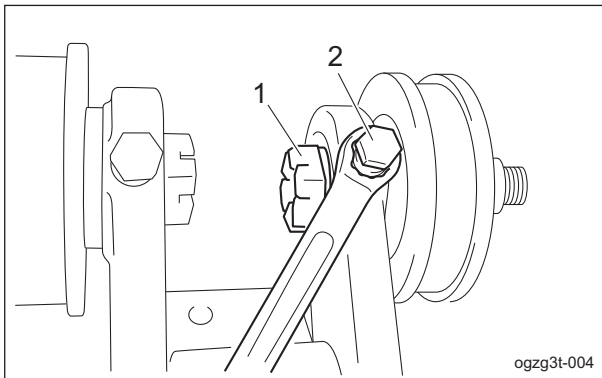
4. Remove the crank bracket by using a pulley puller.



Inspection of crank Assy_003

1	Crank bracket
---	---------------

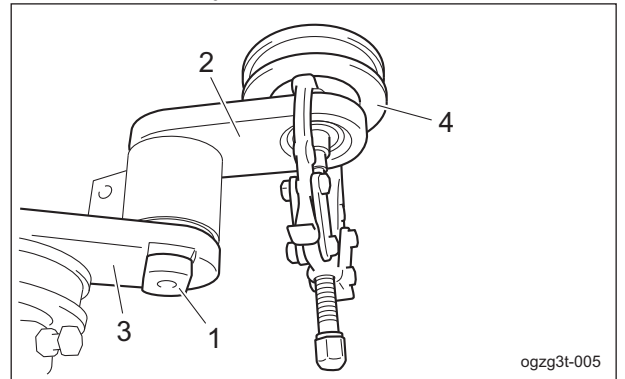
5. Remove the slotted nut and disc spring.
6. Loosen the nut and remove the bolt.
Follow the same steps to remove the bolt from the other side.



Inspection of crank Assy_004

1	Slotted nut and disc spring
2	Bolt, nut, and spring washer

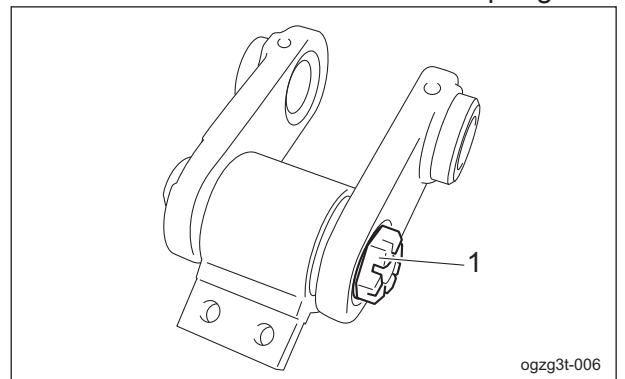
7. Open the angle between the crank bracket and crank bracket A by using the crank shaft as a fulcrum so that the angle between them will become 180°.
8. Remove the crank housing Assy by using a pulley puller.
9. Remove the other crank housing Assys in the same way.



Inspection of crank Assy_005

1	Crank shaft
2	Crank bracket
3	Crank bracket A
4	Crank housing Assy

10. Remove the slotted nut and disc spring.



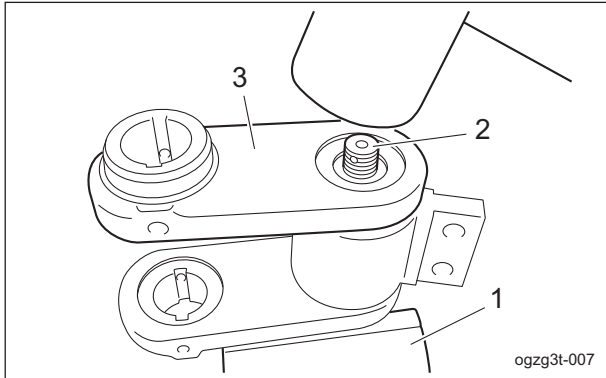
Inspection of crank Assy_006

1	Slotted nut and disc spring
---	-----------------------------

11. Place crank bracket A on the vise to provide a space for the crank shaft to come out.

Operating Machine and Mower Units

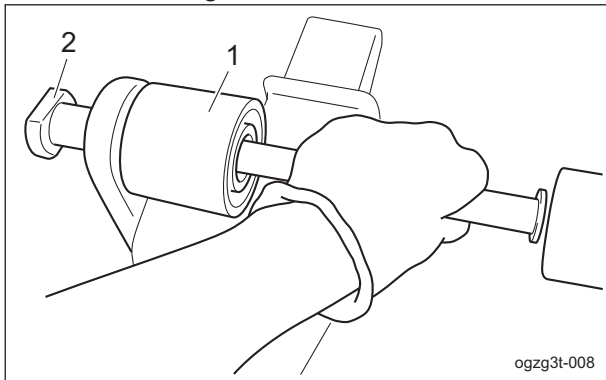
12. Knock the crank shaft by using a wooden hammer to pull it out up to the crank bracket face.



Inspection of crank Assy_007

1	Vise
2	Crank shaft
3	Crank bracket face

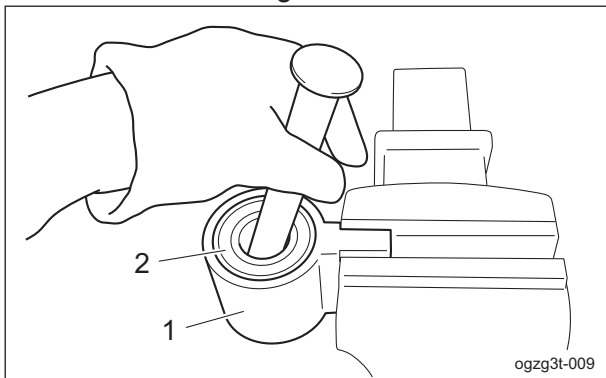
13. Secure the upper housing on a vise and remove the crank shaft by using a copper bar, etc. in a way that its threaded part will not be damaged.



Inspection of crank Assy_008

1	Upper housing
2	Crank shaft

14. Secure the upper housing on the vise and remove the bearing and collar.



Inspection of crank Assy_009

1	Upper housing
2	Bearing and collar

Important

Be sure to replace the bearings, disc springs and cotter pins with new ones.

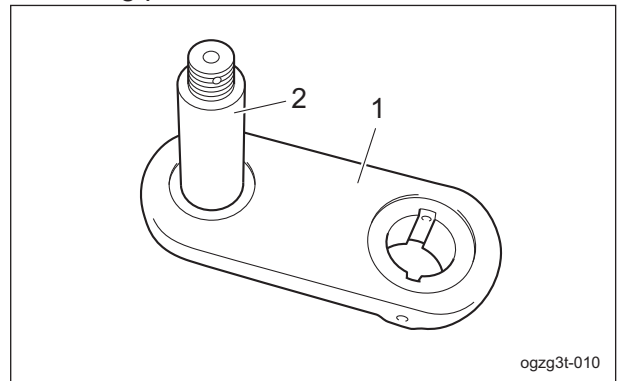
Important

The drive shaft has a specific installation direction. Confirm its direction.

Important

There are two types of crank shafts. Confirm their installation positions.

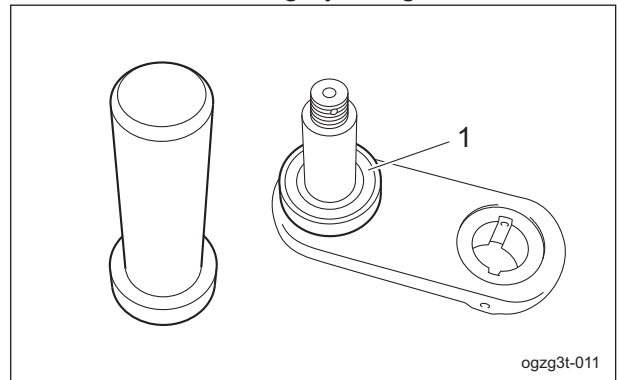
15. Insert crank shaft A from the side with the locking part of crank bracket A.



Inspection of crank Assy_010

1	Crank bracket A
2	Crank shaft A

16. Drive in the bearing by using a driver.

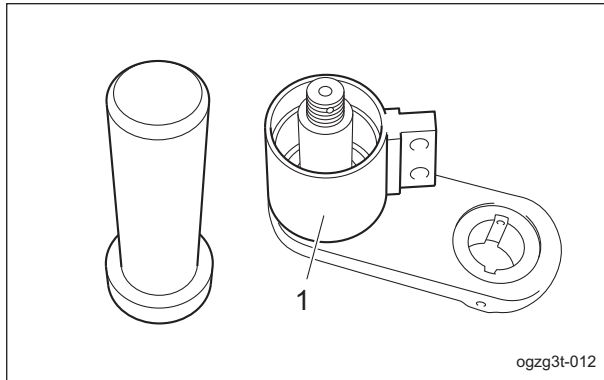


Inspection of crank Assy_011

1	Bearing
---	---------

Operating Machine and Mower Units

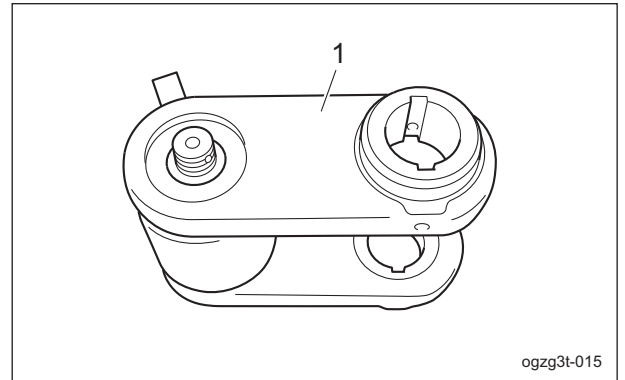
17. Drive in the upper housing by using a driver.



Inspection of crank Assy_012

1	Upper housing
---	---------------

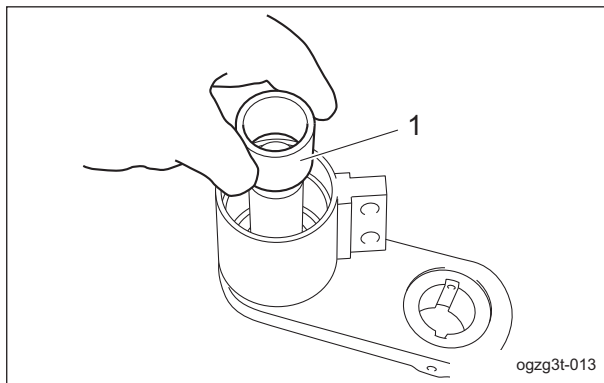
20. Install the crank bracket into the crank shaft.



Inspection of crank Assy_015

1	Crank bracket
---	---------------

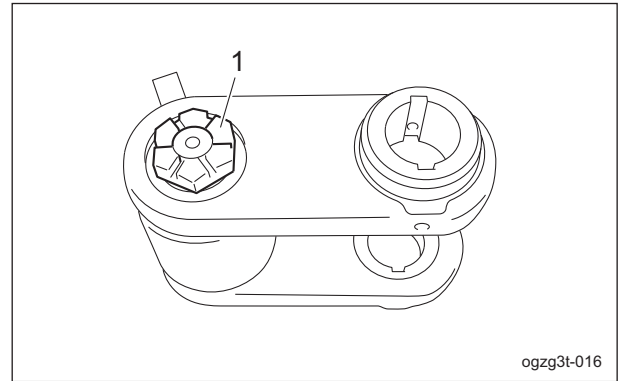
18. Insert the collar.



Inspection of crank Assy_013

1	Collar
---	--------

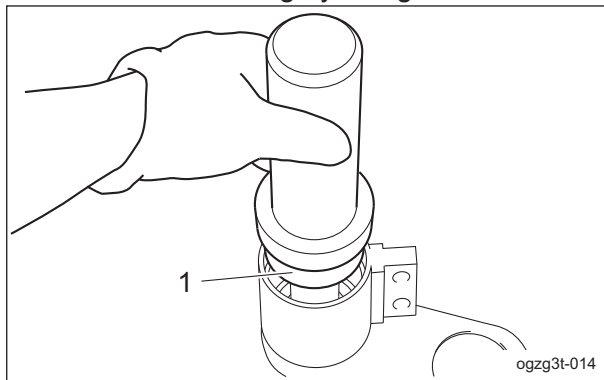
21. Install and temporarily fasten the disc spring and cotter nut.



Inspection of crank Assy_016

1	Slotted nut and disc spring
---	-----------------------------

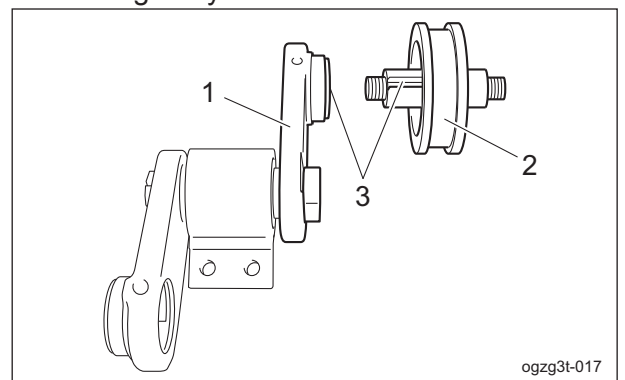
19. Drive in the bearing by using a driver.



Inspection of crank Assy_014

1	Bearing
---	---------

22. Fit and insert the key groove of the crank bracket into the key groove of the crank housing Assy.

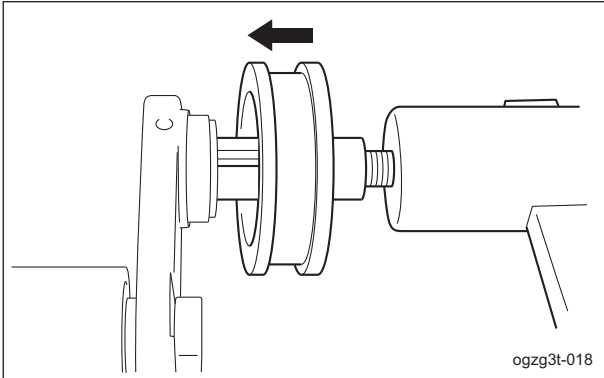


Inspection of crank Assy_017

1	Crank bracket A
2	Crank housing Assy
3	Key groove

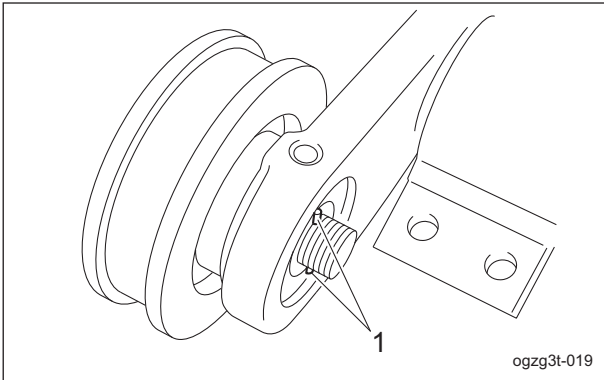
Operating Machine and Mower Units

23. Drive it in by using a wooden hammer to prevent any damage on the thread.



Inspection of crank Assy_018

24. Install the two double round head keys.



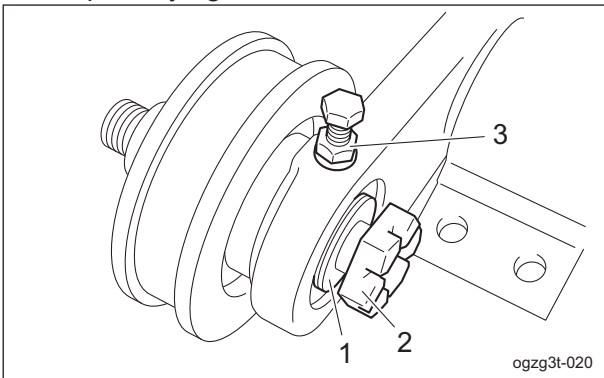
Inspection of crank Assy_019

1	Double round head key
---	-----------------------

Important

When tightening the slotted nut, fasten it with a specified torque after installing the crank Assy to the main body, and then install the cotter pin.
See "Crank Assy layout" (Page 4-10) .

25. Install the disc spring and cotter nut, and temporarily tighten the nut.



Inspection of crank Assy_020

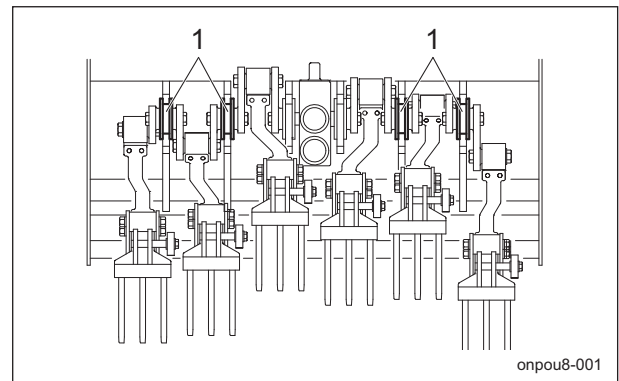
1	Disc spring
2	Slotted nut
3	Bolt, nut, and spring washer

26. Install two bolts, nuts, and spring washers, tighten them until the bolts hit the keys, and lock them with nuts.

27. Install the other crank Assys in the same way.

Crank housing

Crank housing layout



Crank housing layout_001

1	Crank housing
---	---------------

Inspection of crank housing

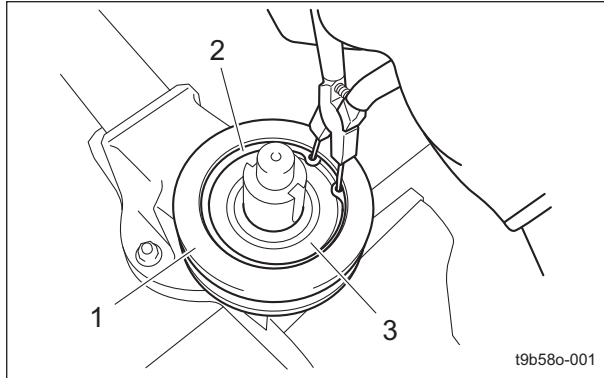
Wear of bearings due to frequent usage and invasion of water may damage bearings etc. and prevent smooth rotation of the roller. Inspect and replace the parts such as the bearings.

- Make sure that the housing does not have any chap or crack.
- Make sure that there is no wear or damage of the shaft.
- Make sure that there is no wear or rust of the bearing.
- Make sure that there is no play in the fit of the shaft and the bearing.

1. Remove the crank Assy from the machine.
See "Removal of crank Assy" (Page 4-11) .

Operating Machine and Mower Units

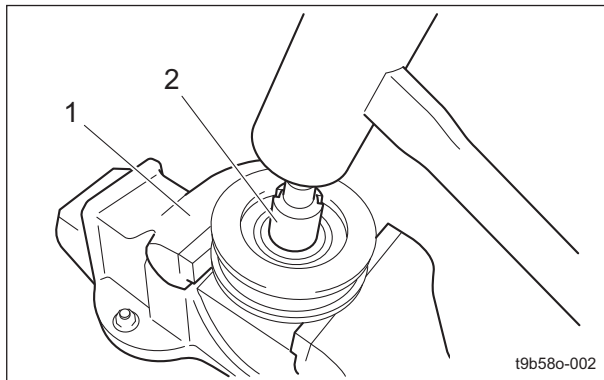
2. Remove the stop ring from the crank housing.



Inspection of crank housing_001

1	Crank housing
2	Stop ring
3	Bearing

3. Place the crank housing turned upside-down on the vise to provide a space for the bearing to come out.
4. Remove the drive shaft by striking it with a wooden hammer to prevent any damage on the shaft.

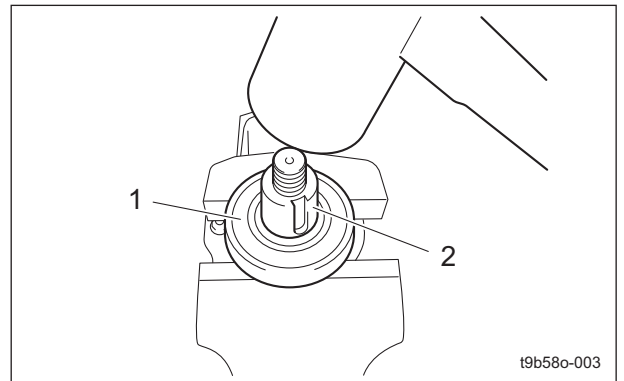


Inspection of crank housing_002

1	Vise
2	Drive shaft

5. Place the drive shaft on the vise to provide a space for the shaft to come out.

6. Remove the drive shaft by striking it with a wooden hammer to prevent any damage on the shaft.



Inspection of crank housing_003

1	Bearing
2	Drive shaft

Important

Be sure to replace the bearing with new one.

For installation, reverse the removing procedure.

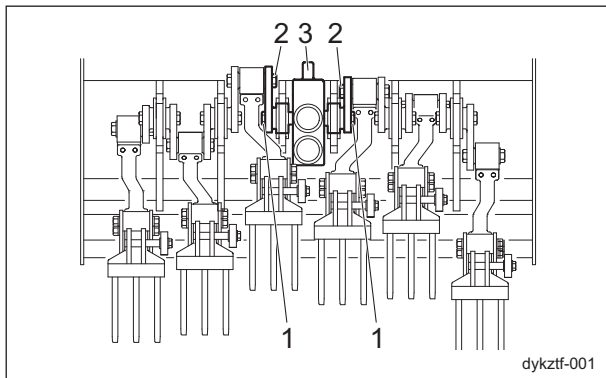
Note:

When driving in the bearing, use a bearing driver.

Operating Machine and Mower Units

Gearbox

Gear box layout



Gear box layout_001

1	Slotted nut 20 and cotter pin for drive shaft
2	Slotted nut 24 and cotter pin for crank shaft
3	Gearbox

Inspection of gear box

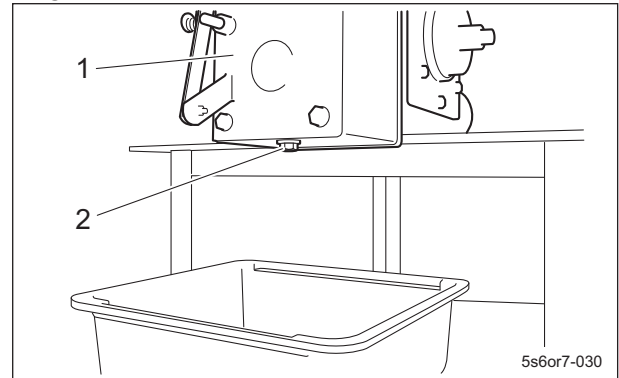
According to frequency of use, the bearings, bevel gear, gear and etc. can become worn and damaged. If the gearbox does not operate smoothly check and inspect bearings, bevel gear, gear and other parts for wear, cracks or damage and replace where necessary.

- Check for cracks on the gearbox.
- Check bearing for wear and rust.
- Check bevel gear for wear, cracking or chipping.
- On drive shafts A and B, check splines for wear, cracks and scratches.
- Check that there is no wear in the key grooves on drive shaft C.
- Check there is no abnormality in both keys.
- Check the wear on each stop ring.
- Do not re-use spring pin, O-ring, oil seal and seal washer, replace with new ones.

Important

Always replace spring pin, O-ring, oil seal and seal washers with new ones.

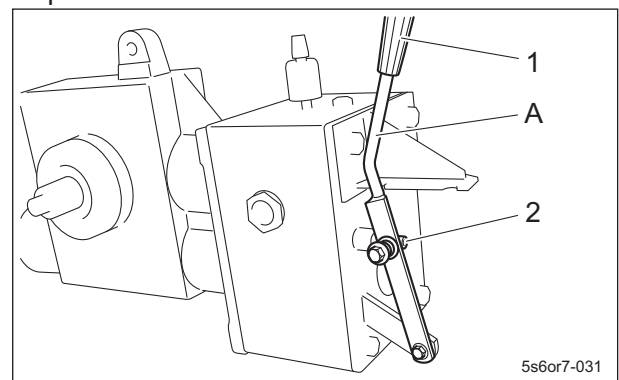
1. Remove 14 plug and 14 seal washer from gear box and drain oil.



Inspection of gear box_001

1	Gearbox
2	14 plug, 14 seal washer

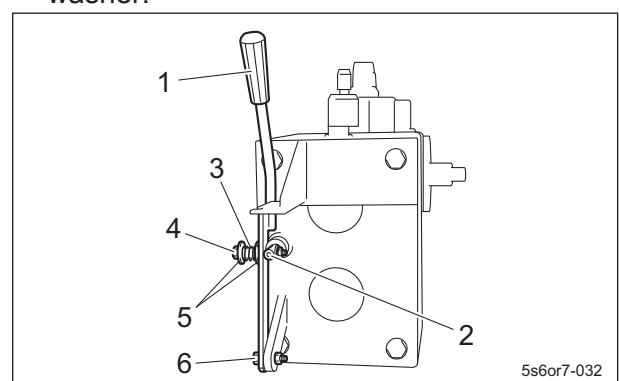
2. Make sure the change lever is in the low position.



Inspection of gear box_002

1	Change lever
2	Shift fork
A	Shift position (LOW speed)

3. Remove U nut and washer from 2 places on the shift lever. At shift fork, remove bolt, compression spring A and washers. At the bottom of the change lever remove bolt and washer.

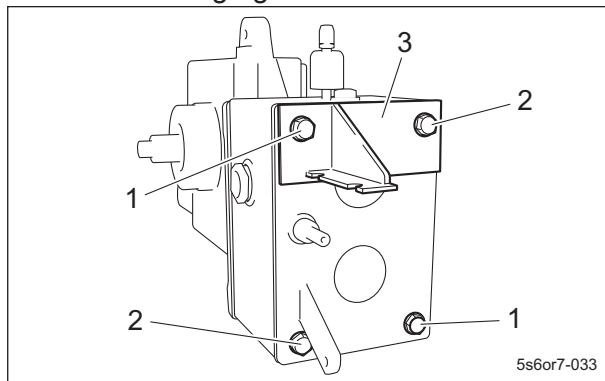


Inspection of gear box_003

Operating Machine and Mower Units

1	Change lever
2	Shift fork
3	Compression spring A
4	Bolt, washers, U nut
5	Washers
6	Bolt, washers, U nut

4. Remove knock bolts and bolts. Next remove change guide.

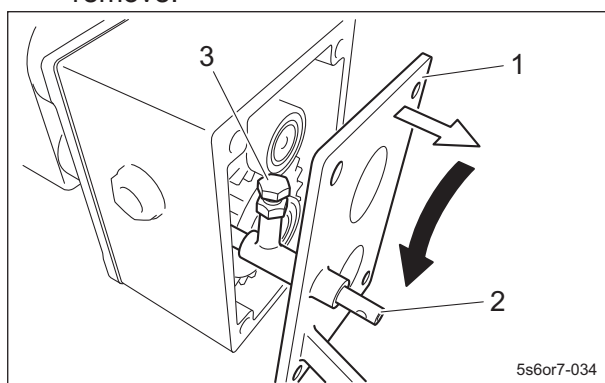


Inspection of gear box_004

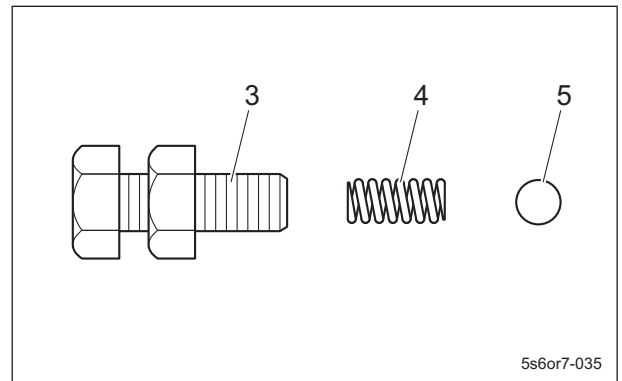
1	Knock bolt
2	Bolt
3	Change guide

5.

- [1] Pull out gearbox cover with the shifter fork in the direction of the white arrow. (It will stop at the high-speed side of gear.)
- [2] Loosen nut and remove bolt.
- [3] Rotate the gearbox cover in the direction of the black arrow (counter-clockwise) and remove compression spring B and steel ball.
- [4] Slide gearbox cover off of shifter fork to remove.



Inspection of gear box_005

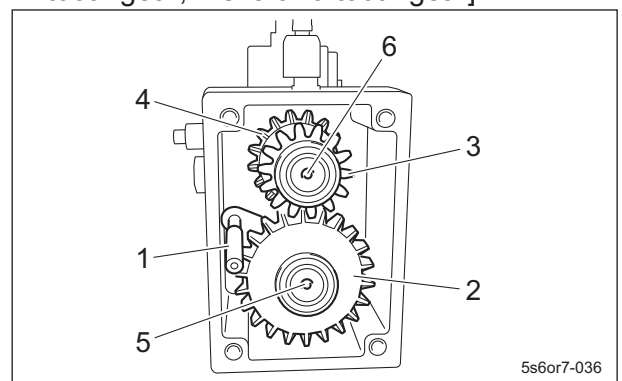


Inspection of gear box_006

1	Gearbox cover
2	Shifter fork
3	Bolt, nut
4	Compression spring B
5	Steel ball

6. Gears in the gearbox are composed of these gears.

[1-shaft 20-tooth, 22- tooth gear, 2-shaft 14-tooth gear, 2-shaft 16-tooth gear]



Inspection of gear box_007

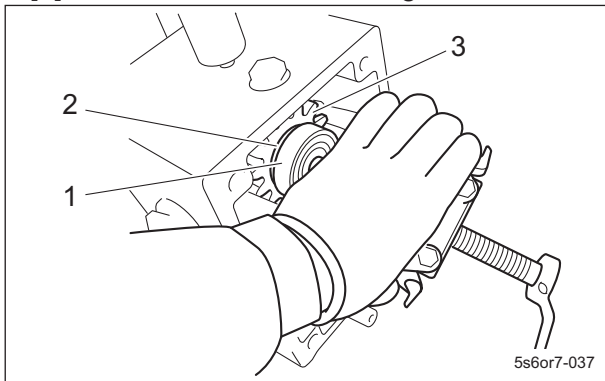
1	Shifter fork
2	1-shaft 20-tooth, 22-tooth gear
3	2-shaft 14-tooth gear
4	2-shaft 16-tooth gear
5	Drive shaft A
6	Drive shaft B

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Operating Machine and Mower Units

7.

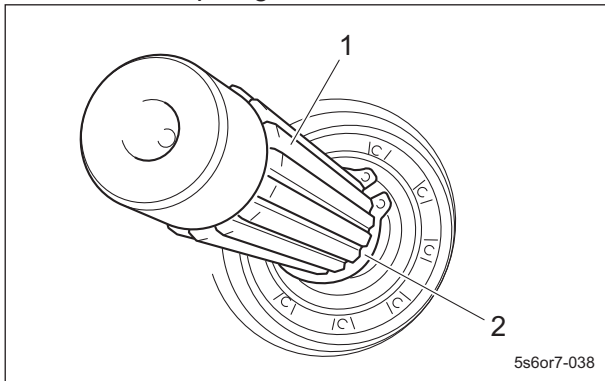
- [1] Use a bearing puller to remove bearing from drive shaft B.
- [2] Remove washers.
- [3] Next remove 2-shaft 14-tooth gear.
- [4] Remove bearing from drive shaft A with bearing puller.
- [5] Remove 1-shaft 20-tooth, 22-tooth gear and shifter fork together.
- [6] Remove 2-shaft 16-tooth gear.



Inspection of gear box_008

1	Bearing
2	3.2SPHC washers
3	14-tooth gear

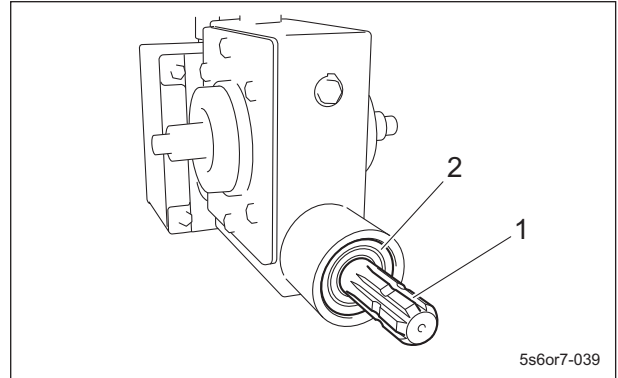
8. Remove stop ring from drive shaft B.



Inspection of gear box_009

1	Drive shaft B
2	Stop ring

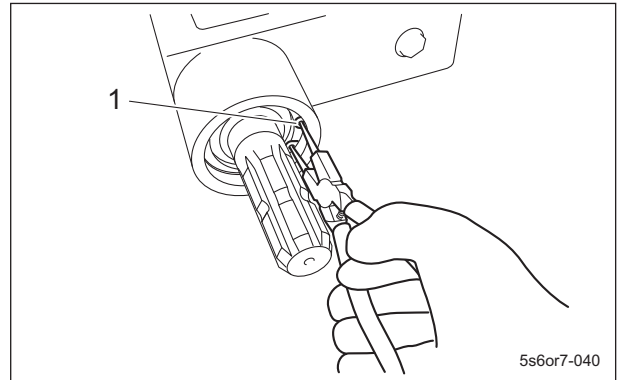
9. Remove oil seal from opposite side of gearbox.



Inspection of gear box_010

1	Drive shaft A
2	Oil seal

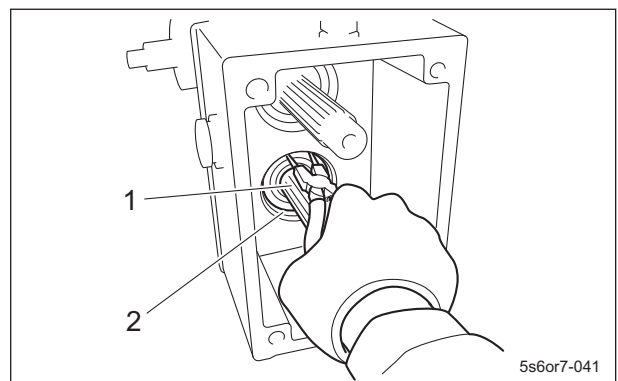
10. Remove stop ring.



Inspection of gear box_011

1	Stop ring
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11. From inside of gearbox remove stop ring from drive shaft A.

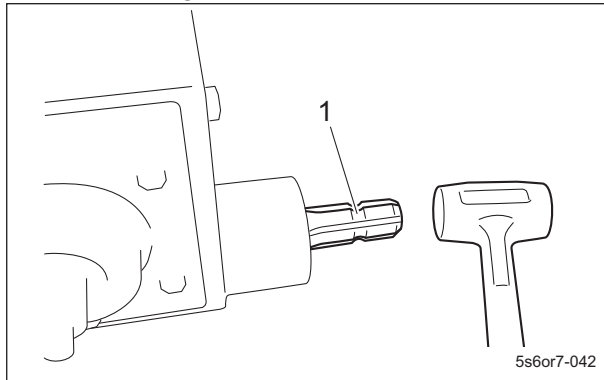


Inspection of gear box_012

1	Drive shaft A
2	Stop ring

Operating Machine and Mower Units

12. From opposite side tap out drive shaft A and bearing with a plastic hammer.



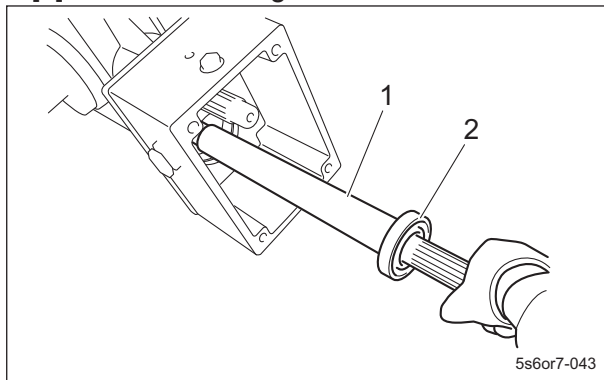
Inspection of gear box_013

1	Drive shaft A
---	---------------

- 13.

[1] Next remove drive shaft A from inside of gearbox.

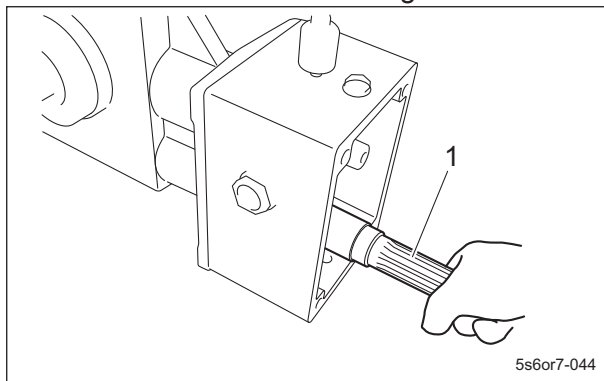
[2] Remove bearing from drive shaft A.



Inspection of gear box_014

1	Drive shaft A
2	Bearing

14. Re-insert drive shaft into original hole.



Inspection of gear box_015

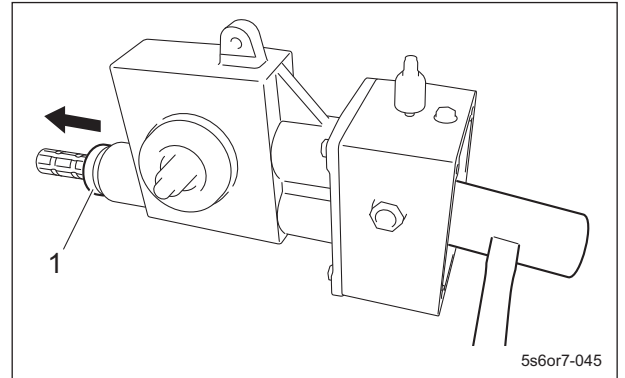
1	Drive shaft A
---	---------------

- 15.

[1] Remove bearing from gearbox using drive shaft A. Tap on drive shaft in the direction of the white arrow.

[2] Remove drive shaft A from gearbox.

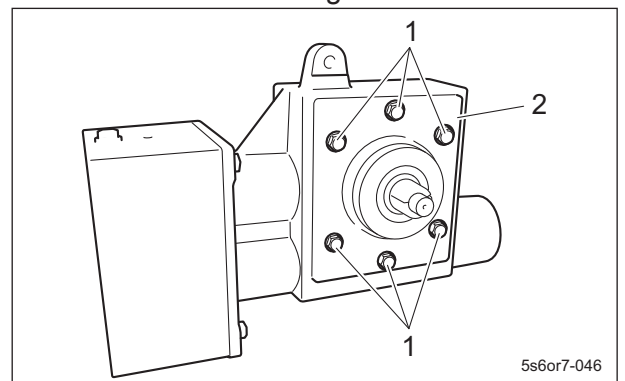
[3] Remove bearing from drive shaft A.



Inspection of gear box_016

1	Bearing
---	---------

16. Remove 6 bolts and S washers that attach the crankshaft housing.

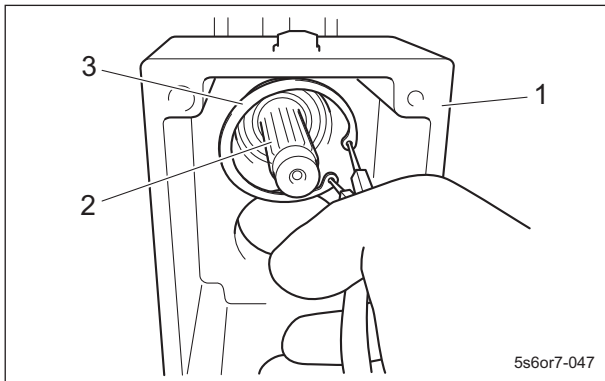


Inspection of gear box_017

1	Bolt, S washer
2	Crankshaft housing

Operating Machine and Mower Units

17. Remove the stop ring securing drive shaft B and bearings from inside of crank gearbox A.

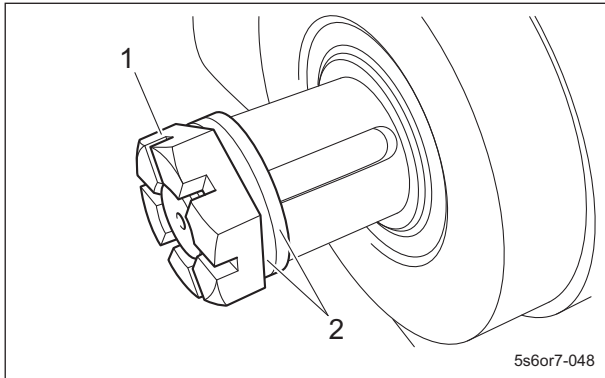


Inspection of gear box_018

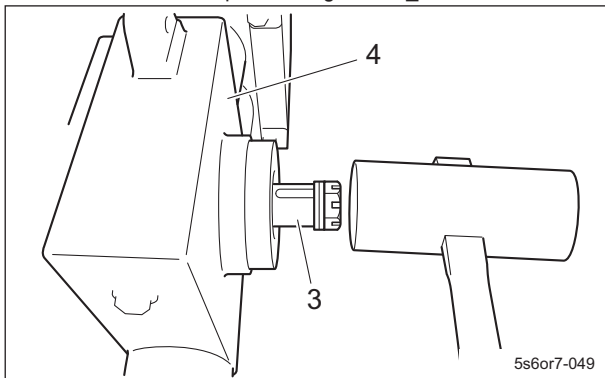
1	Crank gearbox A
2	Drive Shaft B
3	Stop ring

18.

- [1] Apply 2 M20 washers to threaded side of drive shaft C and fasten M20 nut.
[This is to protect the threaded portion of drive shaft C]
- [2] Tap lightly on crank shaft C with a wood hammer until a gap or space is created between the crankshaft housing and crank gearbox A.



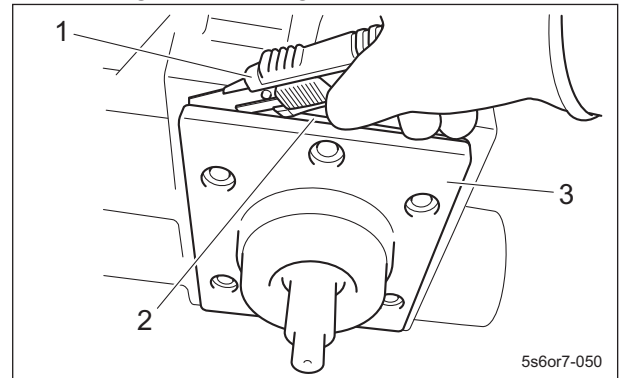
Inspection of gear box_019



Inspection of gear box_020

1	Nut (TDA1200 use M20, TDA1600 use M24)
2	Washer (TDA1200 use M20, TDA1600 use M24)
3	Drive shaft C
4	Crankshaft housing

19. Using a box-cutter or long blade cut away at packing and sealant between crankshaft housing and crank gearbox A.



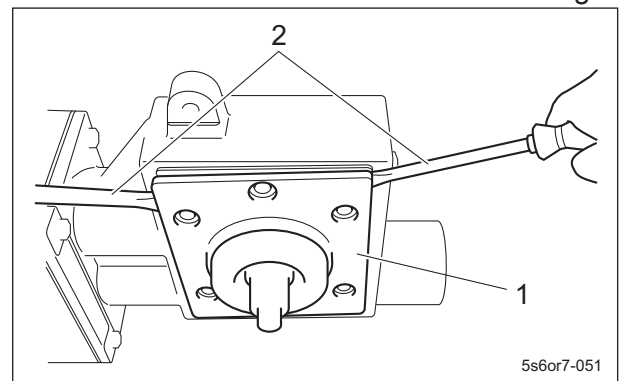
Inspection of gear box_021

1	Box-cutter
2	Packing
3	Crank gearbox A

Important

When you put a scratch on the crankshaft housing and or the crank gear box it may cause an oil leakage.
Can cover tips of screwdrivers with electric tape or similar to aid in prevention of scratching surfaces.

20. Using one or two flathead screwdrivers, carefully pry little by little while changing location to remove the crankshaft housing.

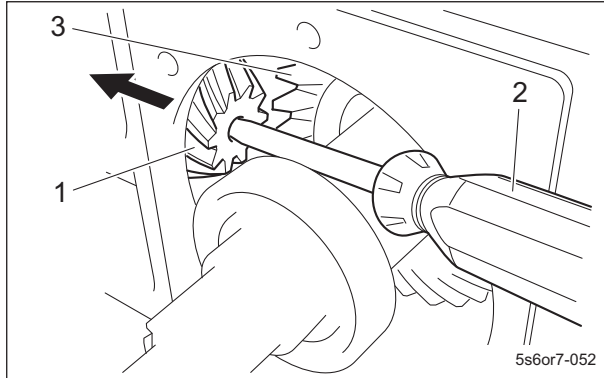


Inspection of gear box_022

1	Crankshaft housing
2	Flathead screwdriver

Operating Machine and Mower Units

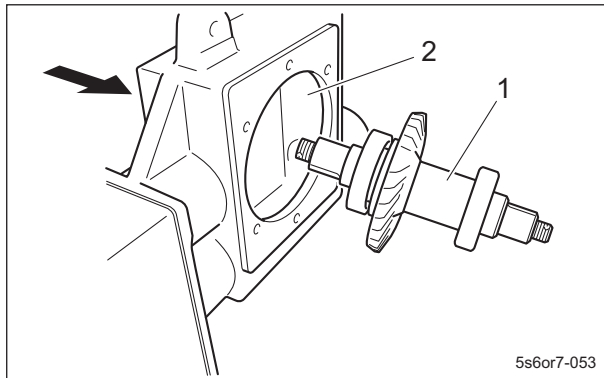
21. Use the screwdriver to push in the direction of arrow on the end of drive shaft B. Push drive shaft B until there is no contact between shaft and 30-tooth bevel gear drive.



Inspection of gear box_023

1	Drive shaft B
2	Screwdriver
3	30-tooth bevel gear

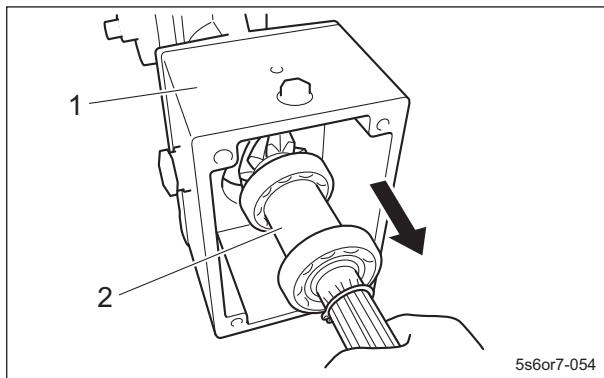
22. Remove drive shaft C Assy by pulling it out in the direction of arrow.



Inspection of gear box_024

1	Drive shaft C Assy
2	Crank gearbox A

23. To remove drive shaft B from crank gearbox B, pull shaft in the direction of arrow.

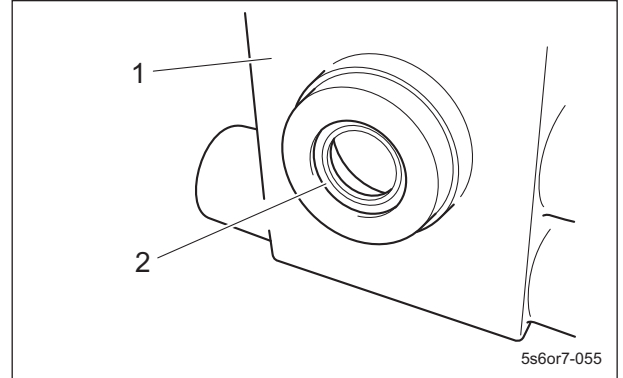


Inspection of gear box_025

1	Crank gearbox B
2	Drive shaft B

- 24.

- [1] Remove oil seal from crank gearbox A.
[2] Also remove oil seal from crankshaft housing (not pictured).

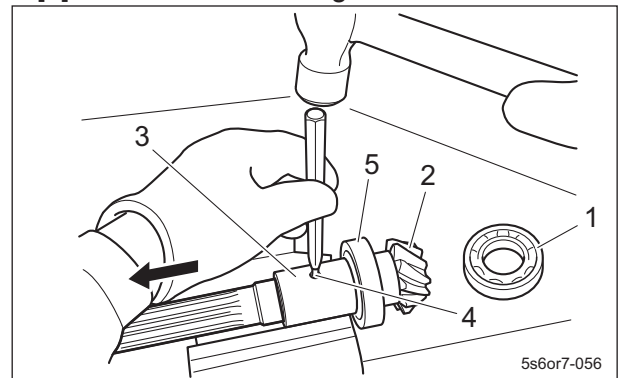


Inspection of gear box_026

1	Crank gearbox A
2	Oil seal

- 25.

- [1] Remove bearing A from drive shaft B.
[2] Hammer out spring pin.
[3] Slide collar off a drive shaft B in the direction of arrow.
[4] Now remove bearing B.



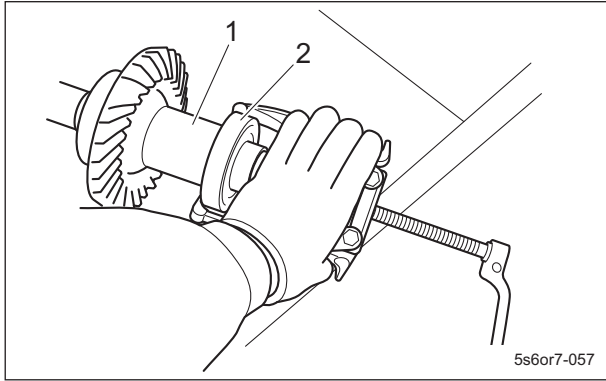
Inspection of gear box_027

1	Bearing A
2	Drive shaft B
3	Collar
4	Spring pin
5	Bearing B

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Operating Machine and Mower Units

26. Use a bearing puller to remove bearing from drive shaft C as pictured.



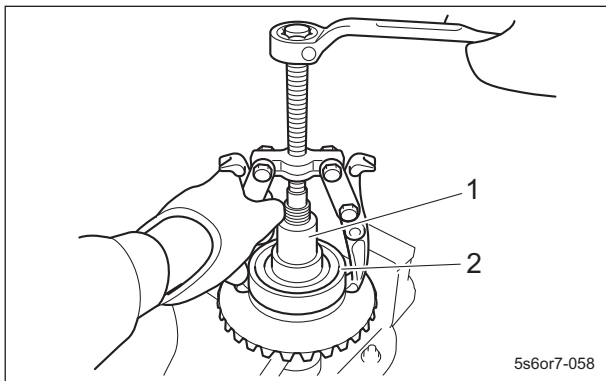
Inspection of gear box_028

1	Drive shaft C
2	Bearing

Important

Be very careful not to damage the 30-tooth bevel gear. Especially the bladed side.

27. Use a bearing puller to remove bearing from drive shaft C.

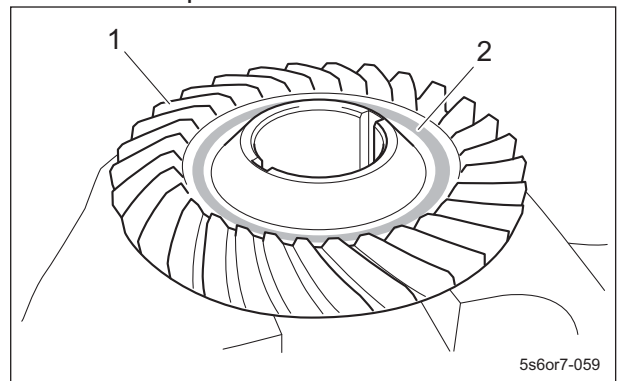


Inspection of gear box_029

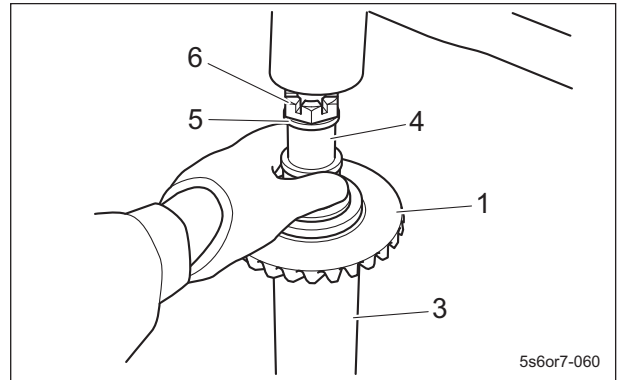
1	Drive shaft C
2	Bearing

- 28.

- [1] Prepare a pipe that fits in marked red area on bevel, and make sure it has no contact with the teeth or blades.
- [2] Apply 2 M20 washers to threaded side of drive shaft C and fasten M20 nut. [This is to protect the threaded portion of drive shaft C]
- [3] To remove 30-tooth bevel gear from pipe, place drive shaft C Assy in pipe making sure not to touch the blades on the bevel. Use wood hammer and hammer shaft until 30-tooth bevel gear and drive shaft C are separated.



Inspection of gear box_030



Inspection of gear box_031

1	30-tooth bevel gear
2	Pipe's point of contact
3	Pipe [thickness 7 mm <]
4	Drive shaft C
5	Washer (TDA1200 use M20, TDA1600 use M24)
6	Nut (TDA1200 use M20, TDA1600 use M24)

Operating Machine and Mower Units

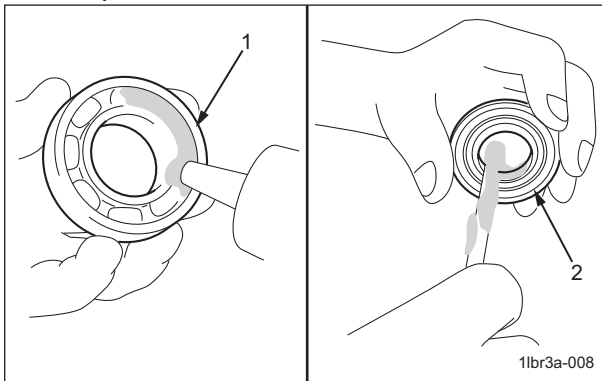
Important

When assembling, remove the old packing and wipe out all of the old liquid gasket and then attach a new packing.

Important

Oil seal, spring pin, O-ring and seal washer should always be replaced with new ones.

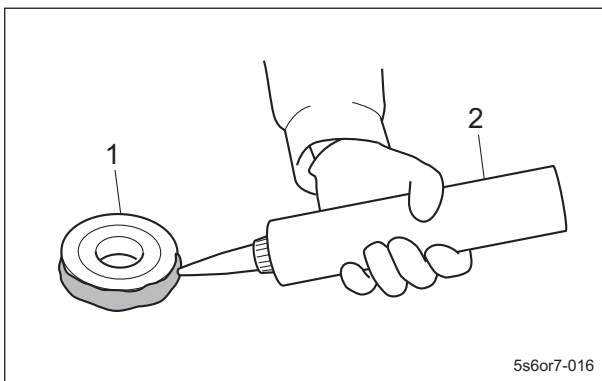
29. Have new bearings and oil seals ready with a profuse amount of the gear oil applied. Apply a profuse amount of the gear oil to the lip of the oil seal.



Inspection of gear box_032

1	Bearing
2	Oil seal

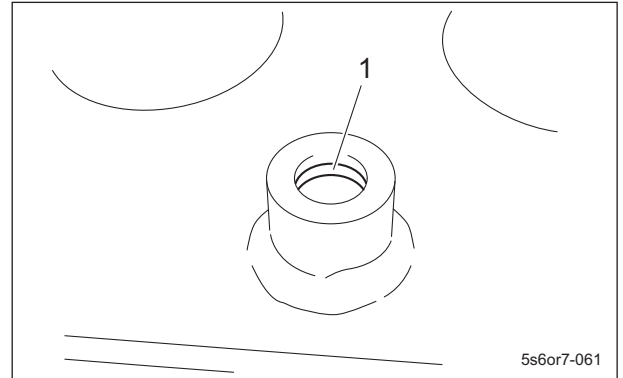
30. When driving in the oil seal, apply the liquid gasket (equivalent to ThreeBond 1104) on the outer surface.



Inspection of gear box_033

1	Oil seal
2	Liquid gasket (ThreeBond 1104)

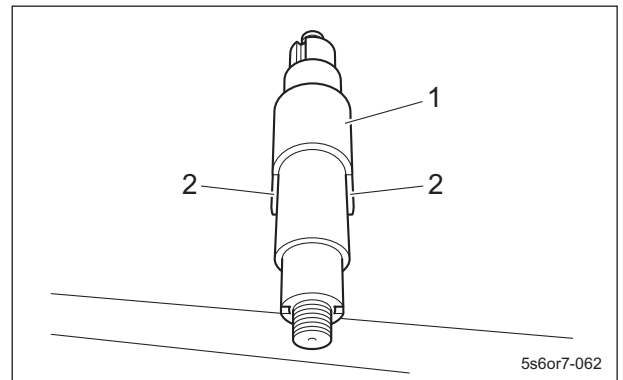
31. In the hole on the gearbox cover where the shifter fork goes through, please replace the O-ring with a new one.



Inspection of gear box_034

1	O-ring
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32. Attach 2 both-end round keys to each side of the drive shaft C.



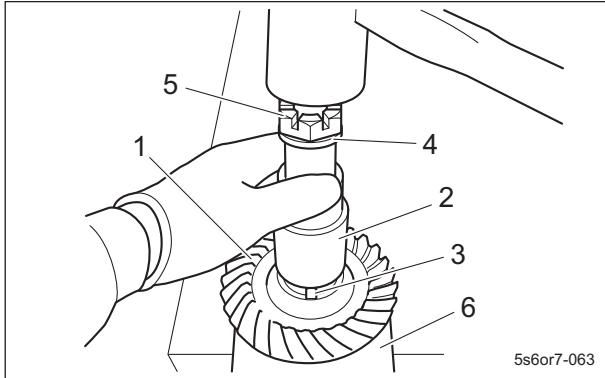
Inspection of gear box_035

1	Drive shaft C
2	Both-end round key

Operating Machine and Mower Units

33.

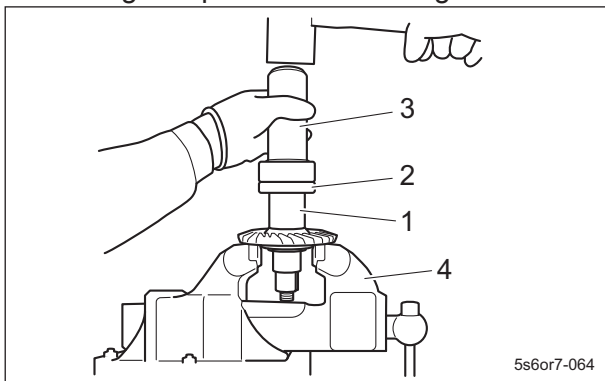
- [1] Attach washers and nut to drive shaft C to protect thread portion.
- [2] Align both-round end keys on drive shaft C with 30-tooth bevel gear and tap into place with wood hammer.
- [3] Be mindful of 30-tooth bevel gear and both-end keys when hammering on drive shaft C.



Inspection of gear box_036

1	30-tooth bevel gear
2	Drive shaft C
3	Both-end round key
4	Washer (TDA1200 use M20, TDA1600 use M24)
5	Nut (TDA1200 use M20, TDA1600 use M24)
6	Vice

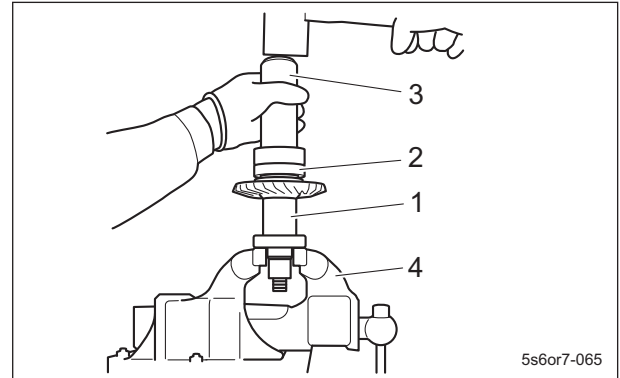
34. Place drive shaft C Assy into vice and tap bearing into place with a driving tool.



Inspection of gear box_037

1	Drive shaft C Assy
2	Bearing
3	Driving tool
4	Vice

35. Flip drive shaft C Assy in the vice and balance on bearing. Using driving tool to set other bearing onto drive shaft C Assy.



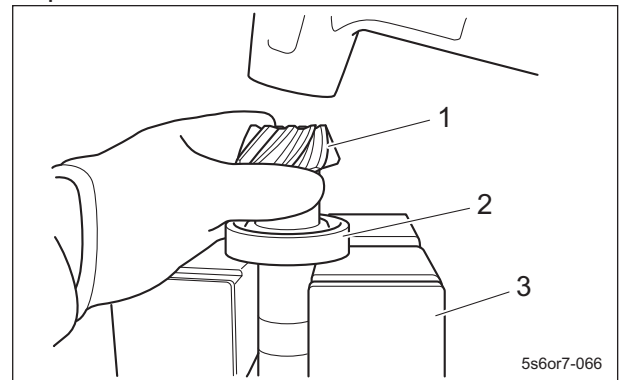
Inspection of gear box_038

1	Drive shaft C Assy
2	Bearing
3	Driving tool
4	Vice

Important

- When hammering be mindful not to damage bevel gear part of drive shaft B.
- Please note depth allowance of vice or base when hammering shaft into bearing.

36. Please tap drive shaft B into bearing with a plastic hammer.

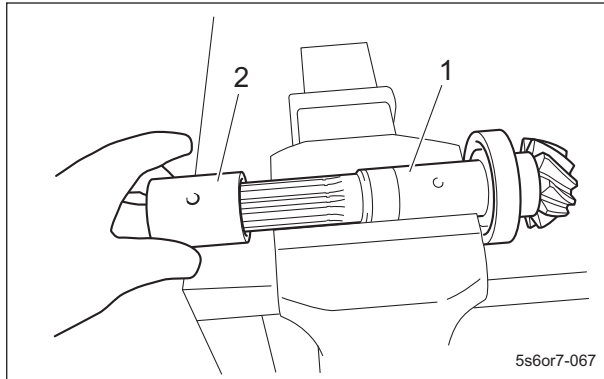


Inspection of gear box_039

1	Drive shaft B
2	Bearing
3	Vice or base

Operating Machine and Mower Units

37. Slide collar onto drive shaft B.

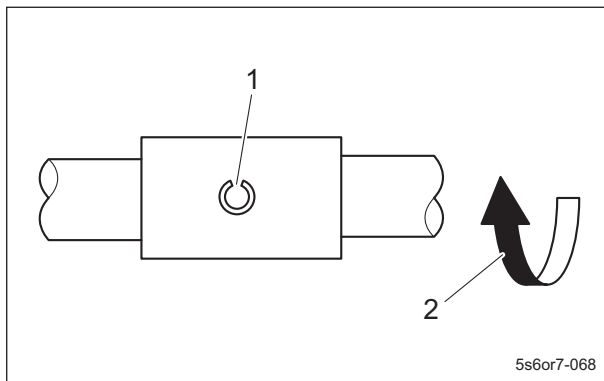


Inspection of gear box_040

1	Drive shaft B
2	Collar

Important

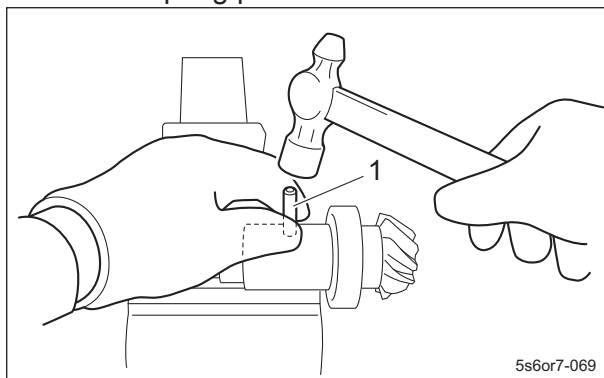
Drive in a spring pin so that its slit can face the direction receiving force as shown.



Inspection of gear box_041

1	Slit of spring pin
2	Rotation direction of shaft

38. Align holes on collar and drive shaft B and set with spring pin.



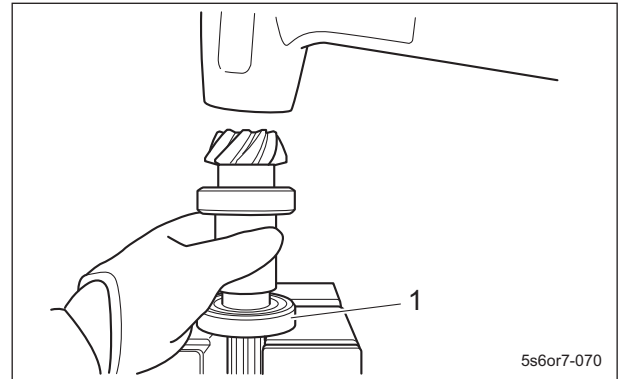
Inspection of gear box_042

1	Spring pin
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Important

- When hammering be mindful not to damage bevel gear part of drive shaft B.
- Please note depth allowance of vice or base when hammering shaft into bearing.

39. Please tap drive shaft B into bearing with a plastic hammer.

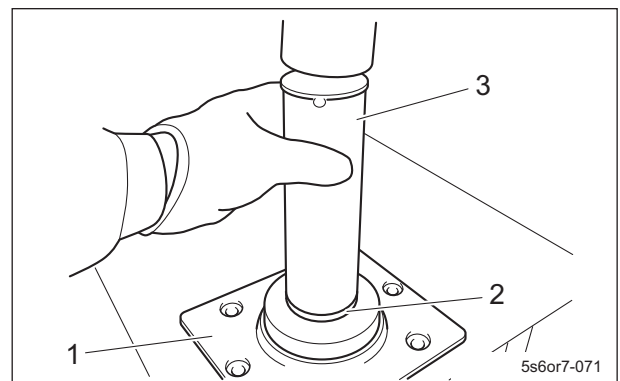


Inspection of gear box_043

1	Bearing
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40.

- [1] Apply the gear oil to the lip of the oil seal.
- [2] Apply liquid gasket or sealant to outer side of oil seal.
- [3] Carefully position oil seal and tap flush into the crankshaft housing with driving tool.



Inspection of gear box_044

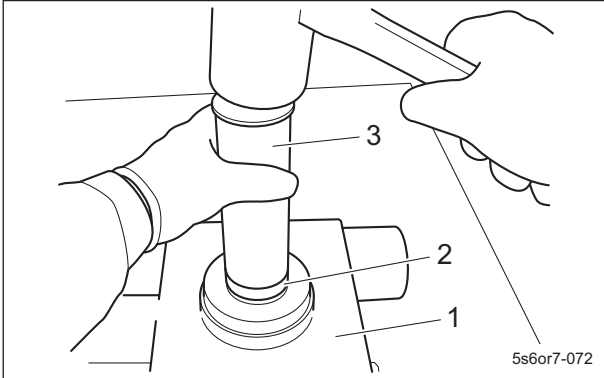
1	Crankshaft housing
2	Oil Seal
3	Driving tool

TDA1200 • TDA1600

Operating Machine and Mower Units

41.

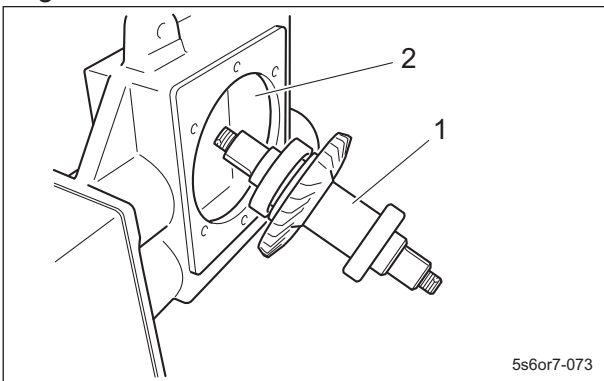
- [1] Apply the gear oil to the lip of the oil seal.
- [2] Apply liquid gasket or sealant to outer side of oil seal.
- [3] Carefully position oil seal and tap flush into the crank gearbox A with driving tool.



Inspection of gear box_045

1	Crank gearbox A
2	Oil seal
3	Driving tool

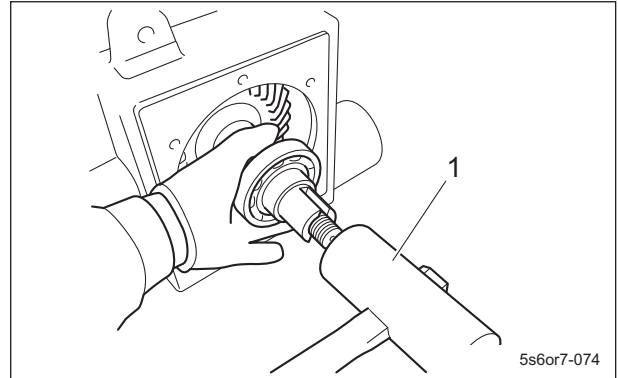
42. Prepare to attach drive shaft C to crank gearbox A.



Inspection of gear box_046

1	Drive shaft C Assy
2	Crank gearbox A

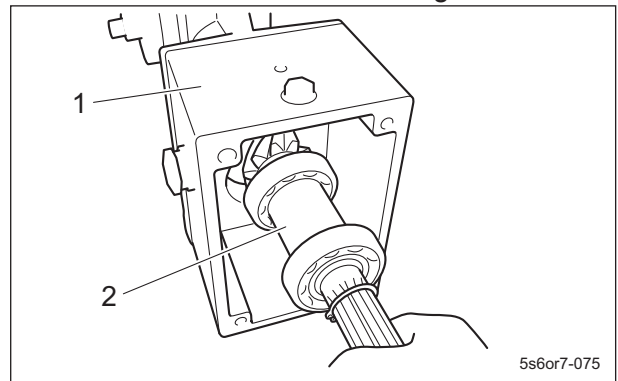
43. Carefully insert drive shaft C Assy into the oil seal of crank gearbox A. Be careful not to tear or damage the oil seal. With a wood hammer, tap end of drive shaft C Assy into position.



Inspection of gear box_047

1	Wood hammer
---	-------------

44. Insert drive shaft B into crank gearbox A.



Inspection of gear box_048

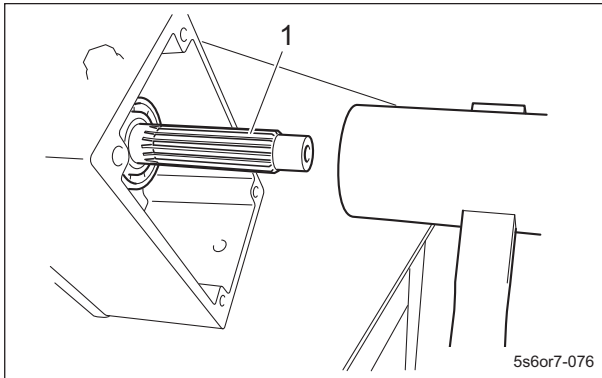
1	Crank gearbox B
2	Drive shaft B Assy

Operating Machine and Mower Units

Important

Check for clearance and alignment with drive shaft C. If necessary lightly hammer drive shaft C to make clearance for and align with drive shaft B.

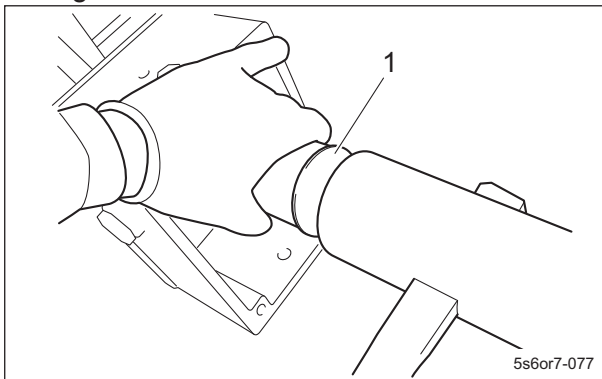
45. When installing drive shaft B into crank gearbox B be mindful of the first bearing and second bearing. Tap on drive shaft B to properly position.



Inspection of gear box_049

1	Drive shaft B Assy
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46. Using a driving tool, set drive shaft B into position. The second bearing should just clear the groove notched out for the stop ring.



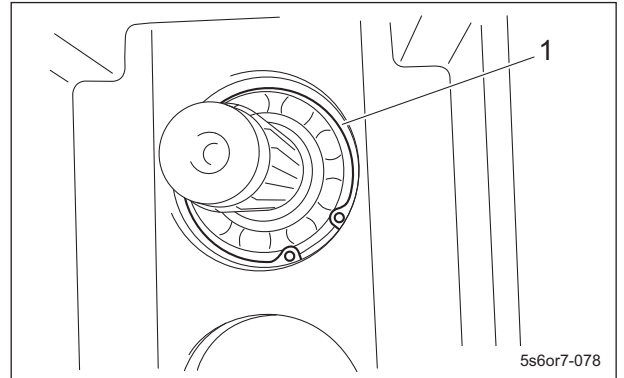
Inspection of gear box_050

1	Driving tool
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Important

Flat side of stop ring should be facing away from bearing.

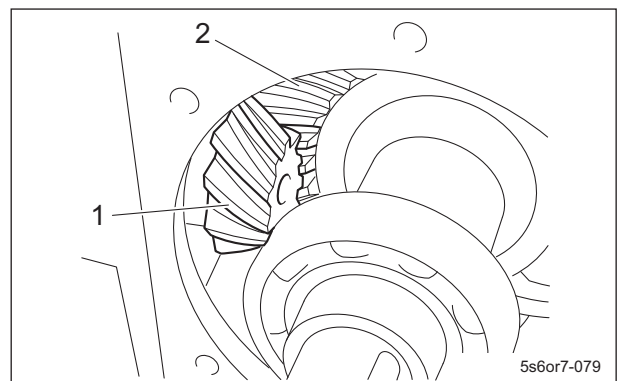
47. Install stop ring. Make sure stop ring is positioned correctly and fully sitting in groove.



Inspection of gear box_051

1	Stop ring
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48. Check to see that drive shaft gear B bevel gear and drive shaft C bevel gear align and turn.



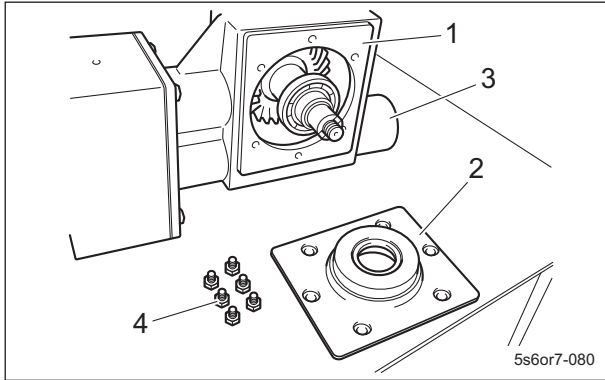
Inspection of gear box_052

1	Drive shaft B bevel gear
2	Drive shaft C bevel gear

Operating Machine and Mower Units

49.

- [1] Apply liquid gasket to both sides of packing B. Position and attach to crank gearbox A.
- [2] Align and attach crankshaft housing to crank gearbox A. Secure with bolts and S washers (finger-tighten).

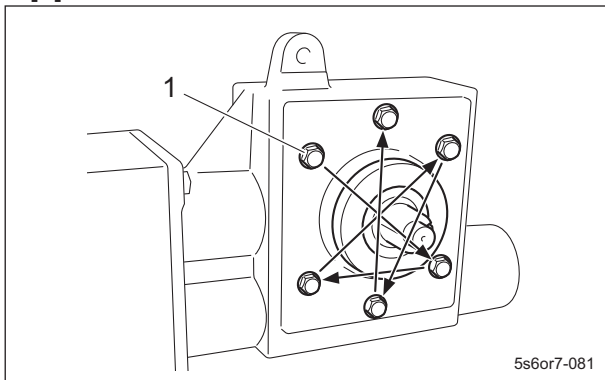


Inspection of gear box_053

1	Packing B
2	Crankshaft housing
3	Crank gearbox A
4	Bolt, S washer

50.

- [1] Tighten the bolts in the pattern shown by the torque 29 - 38 N-m (295.71 - 387.49 kgf-cm).
- [2] Check that drive shaft C turns.

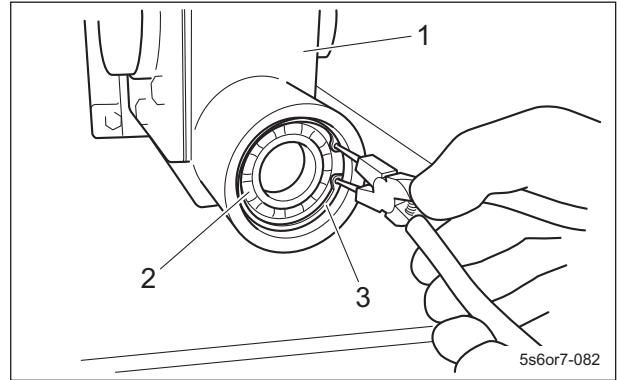


Inspection of gear box_054

1	Bolts, S washers
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51.

- [1] Place bearing into crank gearbox A. Use driving tool to set into position.
- [2] Install stop ring. Make sure stop ring is positioned correctly and fully sitting in groove. Flat side of stop ring should be facing away from bearing.

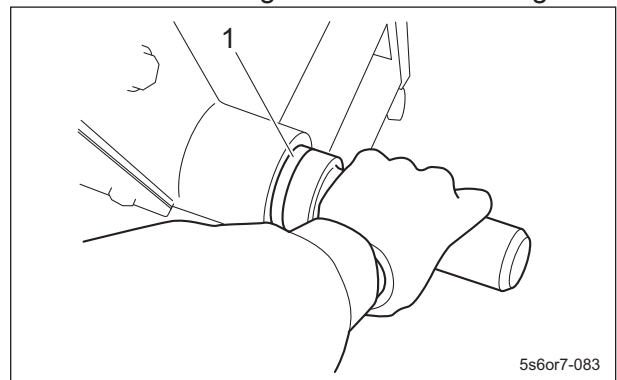


Inspection of gear box_055

1	Crank gearbox A
2	Bearing
3	Stop ring

52.

- [1] Apply the gear oil to the lip of the oil seal.
- [2] Apply liquid gasket or sealant to outer side of oil seal.
- [3] Carefully position oil seal and tap flush into the crank gearbox A with driving tool.



Inspection of gear box_056

1	Oil seal
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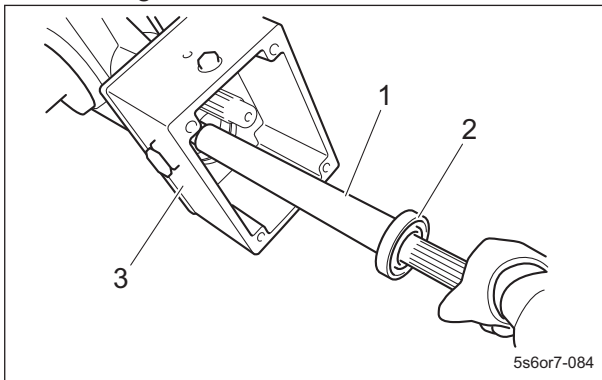
Operating Machine and Mower Units

Important

When installing drive shaft A do not scratch crank gearbox A. Gently slide through oil seal to avoid tearing or damaging.

53.

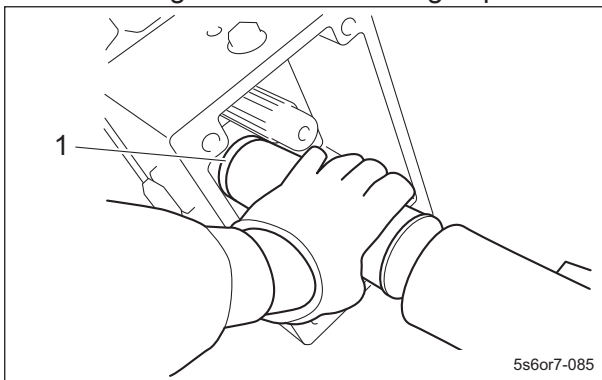
- [1] Attach bearing to drive shaft A.
- [2] Carefully slide drive shaft A into lower hole of crank gearbox B, through previously installed bearing and out through oil seal.



Inspection of gear box_057

1	Drive shaft A
2	Bearing
3	Crank gearbox B

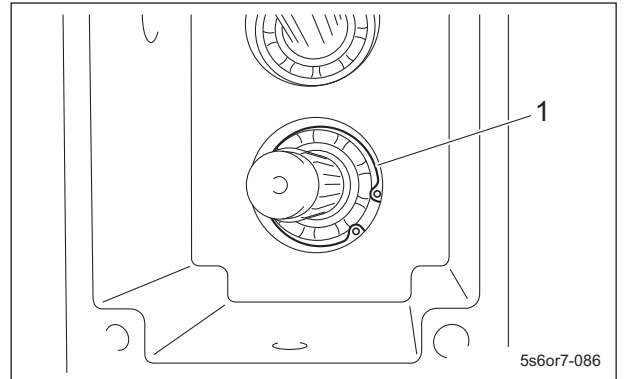
54. Use driving tool to seat bearing in place.



Inspection of gear box_058

1	Bearing
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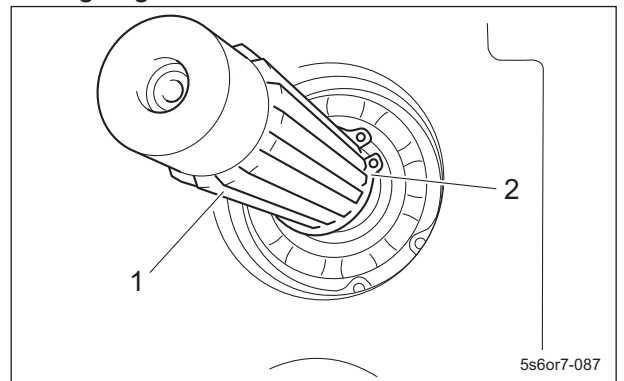
55. Install stop ring. Make sure stop ring is positioned correctly and fully sitting in groove. Flat side of stop ring should be facing away from bearing.



Inspection of gear box_059

1	Stop ring
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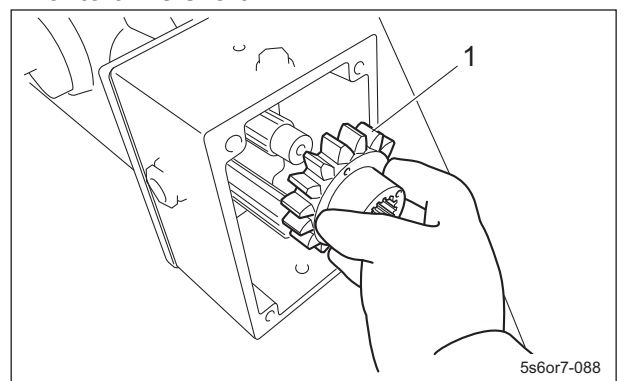
56. With the flat-side of the stop ring facing towards the pictured bearing, install stop ring in groove on drive shaft B.



Inspection of gear box_060

1	Drive shaft B
2	Stop ring

57. Install 2-shaft 16-tooth gear as pictured onto drive shaft B.



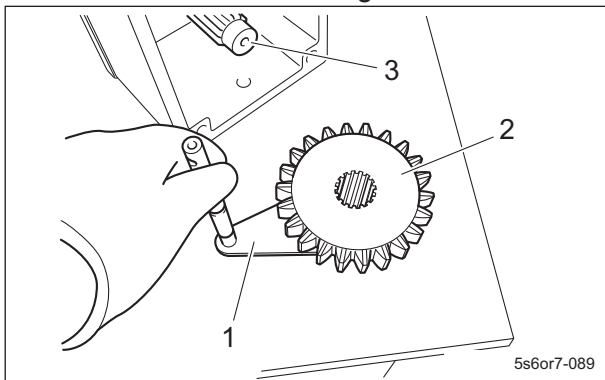
Inspection of gear box_061

1	2-shaft 16-tooth gear
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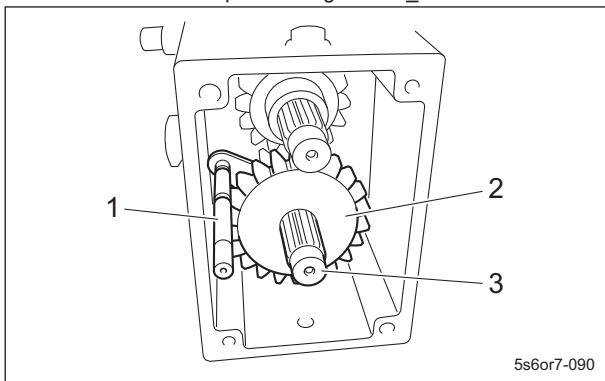
Operating Machine and Mower Units

58.

- [1] Place 1-shaft 20-tooth, 22-tooth gear on work bench with the 22-tooth gear facing up.
- [2] Position shifter fork between the 20-tooth gear and 22-tooth gear.
- [3] Install 1-shaft 20-tooth, 22-tooth gear and shifter fork onto drive shaft A together.
- [4] Check shifter fork positioning and make sure that the 22-tooth gear is in front.



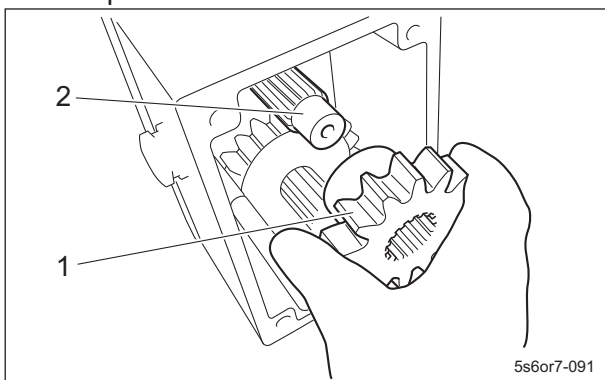
Inspection of gear box_062



Inspection of gear box_063

1	Shifter fork
2	1-shaft 20-tooth, 22-tooth gear
3	Drive shaft A

59. Slide 2-shaft 14-tooth gear onto drive shaft B as pictured.

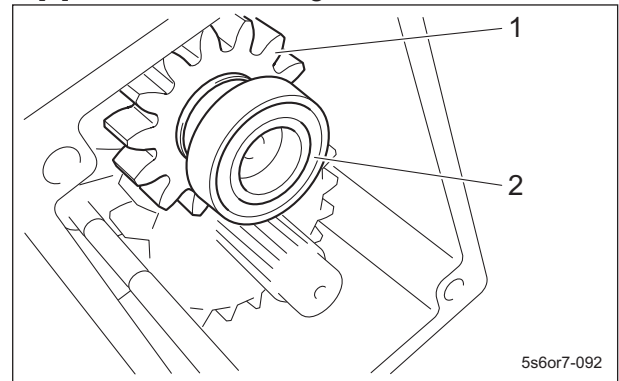


Inspection of gear box_064

1	2-shaft 14-tooth gear
2	Drive shaft B

60.

- [1] Install 2 washers onto drive shaft B.
- [2] Now install bearing onto drive shaft B.

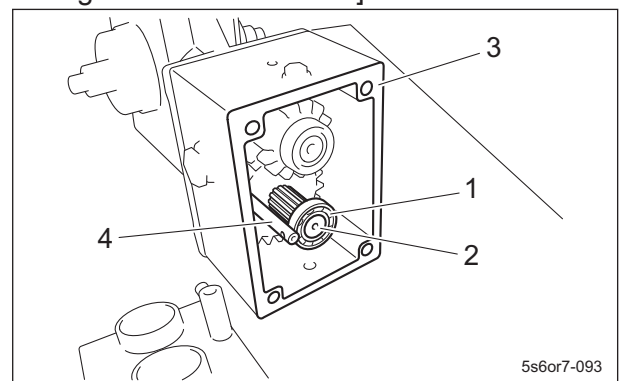


Inspection of gear box_065

1	Washers
2	Bearing

61.

- [1] Install bearing onto drive shaft A.
- [2] Apply liquid gasket to both sides of packing A. Position and attach to crank gearbox B.
- [3] Apply the gear oil to the tip portion of the shifter fork.
- [4] Check position of the shifter fork. Should be in front position.
[The 22-tooth gear on drive shaft A should be engaged with the 14-tooth gear on drive shaft B.]



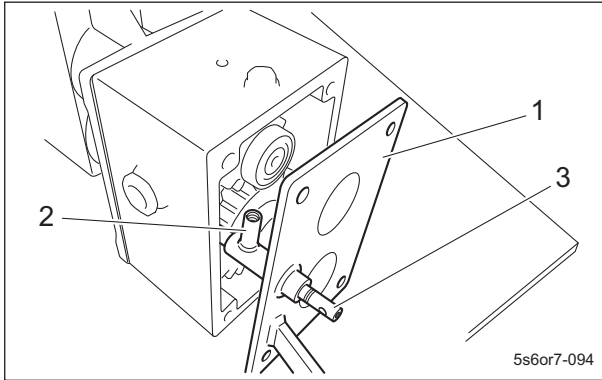
Inspection of gear box_066

1	Bearing
2	Drive shaft A
3	Packing A
4	Shifter fork

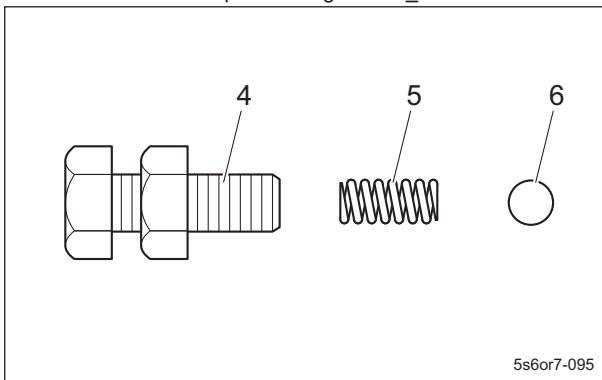
Operating Machine and Mower Units

62.

- [1] Match the spring holder on the gearbox cover to the first groove on the shifter fork.
- [2] Next install in order into the spring holder. Steel ball, compression spring followed by the bolt and nut.



Inspection of gear box_067

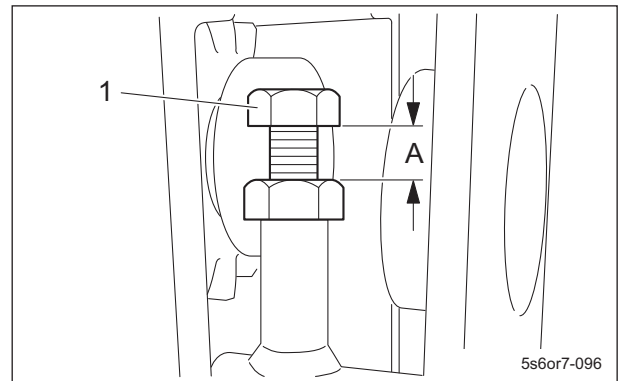


Inspection of gear box_068

1	Gearbox cover
2	Spring holder
3	Shifter fork
4	Bolt, nut
5	Compression spring
6	Steel ball

63.

- [1] Adjust the tension on the compression spring and steel ball by tightening or loosening the bolt. Suggested distance between bolt head and nut (A) 6 - 8 mm.
- [2] Once proper tension and adjustment is made, lock into position by fastening lock nut.

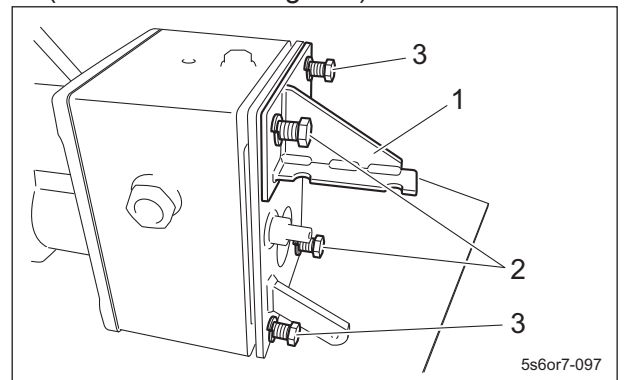


Inspection of gear box_069

1	Bolt pushing compression spring
---	---------------------------------

64. Align packing on crank gearbox B and install gear box cover and change guide. Secure into place with knock bolts, bolts and S washers. Refer to picture or parts catalog for placement of knock bolts and bolts.

Tighten the bolts by the torque 29 - 38 N-m (295.71 - 387.49 kgf-cm).



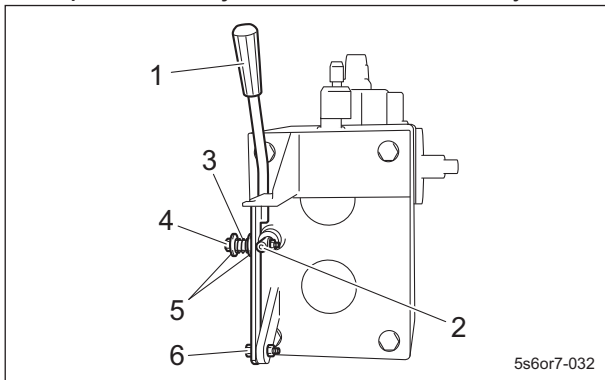
Inspection of gear box_070

1	Change guide
2	Knock bolt, S washer
3	Bolt, S washer

Operating Machine and Mower Units

65.

- [1] Attach the change lever to the shifter fork. Use parts in this order; bolt, washer, compression spring A, washer, change lever, shifter fork, washer, U nut. Do not fully tighten U nut at this time.
- [2] Next attach the bottom hole of the change lever to the protruding arm of the gearbox cover using bolt, washers, and U nut.
- [3] Tighten U nut to the bottom bolt, but be sure that the change lever is able to move smoothly. Do not overtighten U nut.
- [4] Tighten U nut on upper bolt so that 3 threads are visible coming out of the U nut.
- [5] Check that the change lever is securely installed and operates smoothly at each position. Adjust U nuts if necessary.



Inspection of gear box_071

1	Change lever
2	Shifter fork
3	Compression spring A
4	Bolt, washer, U nut
5	Washers
6	Bolt, washers, U nut

Rear roller bracket Assy

Inspection of rear roller bracket Assy

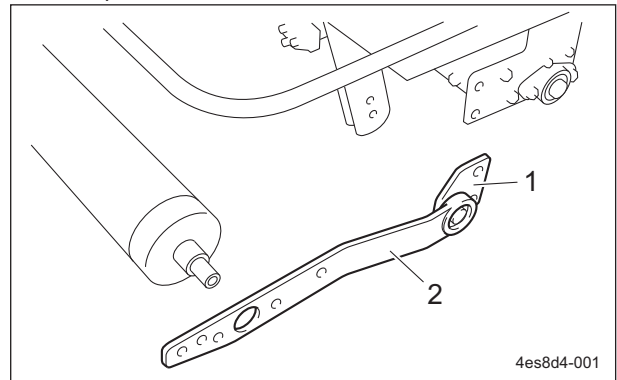
Wear of bearings due to frequent usage and invasion of water may damage bearings etc. and prevent smooth movement of the rear roller bracket. Inspect and replace the parts such as the bearings.

- Make sure that the housing does not have any chip or crack.
- Make sure that there is no wear or damage of the shaft.
- Make sure that there is no wear or rust of the bearing.
- Make sure that there is no play in the fit of the shaft and the bearing.

Important

The rear roller bracket Assy has a specific direction. Confirm its direction.

1. Remove the left and right rear roller bracket Assys from the main body. See "Removal of rear roller Assy" (Page 4-20) .

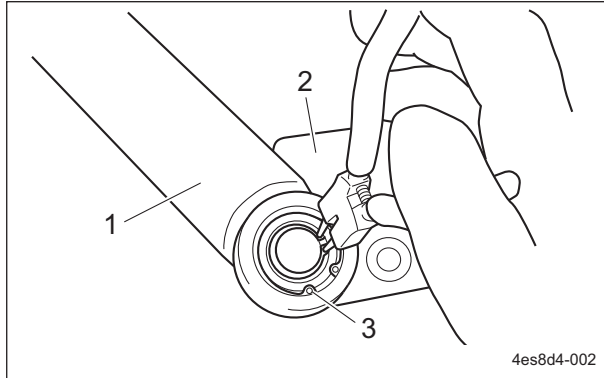


Inspection of rear roller bracket Assy_001

1	Bracket mounting board (R)
2	Rear roller bracket (R)

Operating Machine and Mower Units

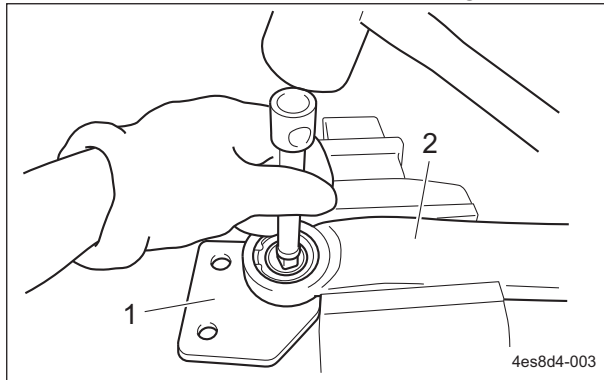
2. Remove the stop ring securing the rear roller bracket.



Inspection of rear roller bracket Assy_002

1	Rear roller bracket
2	Bracket mounting board
3	Stop ring

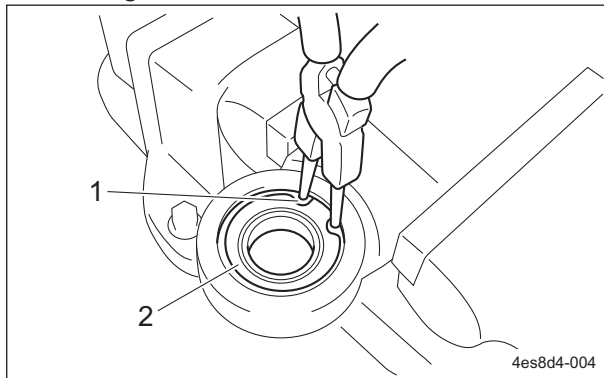
3. Secure the rear roller bracket to the vise and remove the bracket mounting board.



Inspection of rear roller bracket Assy_003

1	Bracket mounting board
2	Rear roller bracket

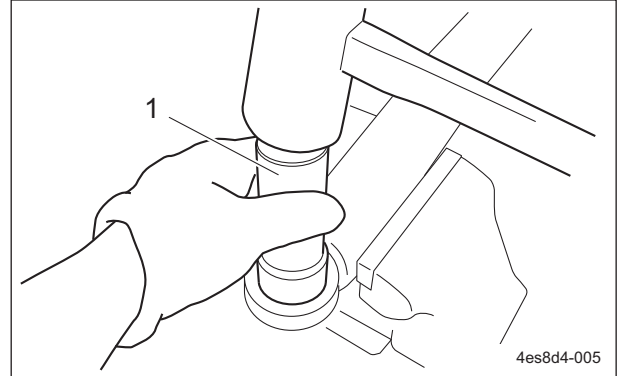
4. Remove the stop ring on both sides of the bearing.



Inspection of rear roller bracket Assy_004

1	Stop ring
2	Bearing

5. Remove the bearing by using a driver.



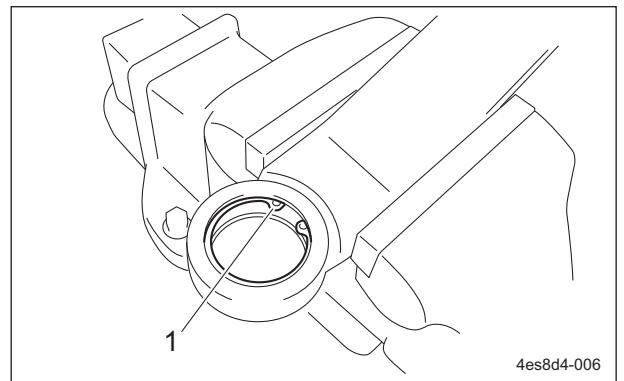
Inspection of rear roller bracket Assy_005

1	Driver
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Important

Be sure to use a driver when driving in a bearing.
Be sure to replace the bearing with new one.

6. Install the stop ring to the rear roller bracket.



Inspection of rear roller bracket Assy_006

1	Stop ring
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7. Turn the rear roller bracket upside down.

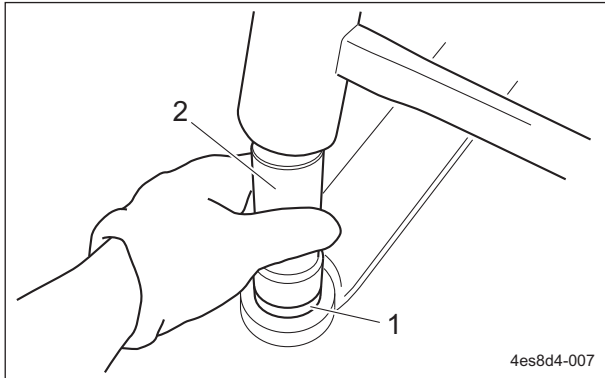
TDA1200 • TDA1600

Operating Machine and Mower Units

Important

Be sure to use a driver when driving in a bearing.
Be sure to replace the bearing with new one.

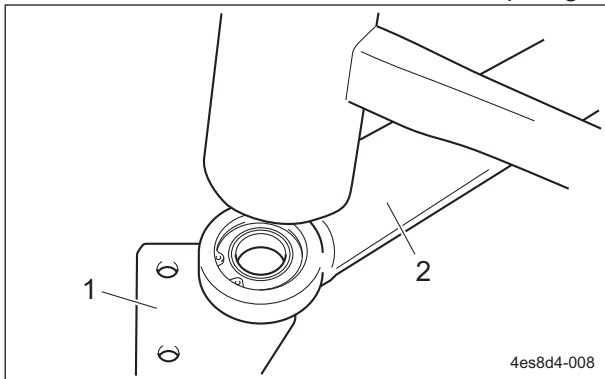
8. Drive in the bearing by using a driver and install the stop ring.



Inspection of rear roller bracket Assy_007

1	Bearing
2	Driver

9. Drive in the bracket mounting board to the rear roller bracket and install the stop ring.



Inspection of rear roller bracket Assy_008

1	Bracket mounting board
2	Rear roller bracket

Reference

Specifications Page 5-2

Maintenance Schedule Page 5-3

List of Consumables Page 5-4

Reference

Specifications

*The specifications of the tractor are different			
Model		TDA1200	TDA1600
Dimensions	Total length	97 cm (38.19 in)	97 cm (38.19 in)
	Total width	142 cm (55.91 in)	179 cm (70.47 in)
	Total height	85 cm (33.46 in)	85 cm (33.46 in)
Total weight		495 kg (1091.27 lb)	580 kg (1278.66 lb)
Operation width		117 cm (46.06 in)	156 cm (61.42 in)
Number of tines		18 units (various types are available as options)	24 units (various types are available as options)
Operating depth		Up to 25 cm (9.84 in) (depending on the conditions)	Up to 18 cm (7.09 in) (depending on the conditions)
Gear box oil quantity		3.8 dm ³ (3.8 L) (1.00 gal (US)) (Gear oil VG680)	3.8 dm ³ (3.8 L) (1.00 gal (US)) (Gear oil VG680)
Applicable tractor		13.2 kW (18 PS) or more	17.6 kW (24 PS) or more
Drive type		PTO drive	PTO drive
Mounting method		3-point link	3-point link
PTO rotation speed		Up to 400 rpm	Up to 1,000 rpm

Maintenance Schedule

TDA1200/1600

Follow the maintenance schedule below.

**Caution**

Use tools appropriate for each maintenance operation.

○...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 300 hrs.	Every 400 hrs.	Every 500 hrs.	Every 1 years	Every 2 years	Every 4 years	Remarks
Main body	Tightening the parts	○												
	Tire	○												
	Operating depth	○												
	Greasing, oiling				○									
	Cover	○												
	Oil Leakage	○												
	Transmission oil					●		△						100 hrs (first time)
	Cleaning the exterior	○												

The values for consumables are not guaranteed.

TDA1200 • TDA1600

Reference

List of Consumables

The consumables are described below.


Caution

Use tools appropriate for each replacement operation.

TDA1200		Code	Part name	Qty.	Remarks
Operating machine (mower unit)	Spring box Assy	TDA12000373Z0	Spring box Assy	6	
	Standard tine mounting board	TDA12000325A2	φ12φ18 tine mounting board	6	
	For left grass keep plate	TDA16000601ZD	Grass keep plate for double type 8A	3	
	For right grass keep plate	TDA16000602ZD	Grass keep plate for double type 8B	1	
	Standard tine	K2590000220	φ17V tine 215	18	

TDA1600		Code	Part name	Qty.	Remarks
Operating machine (mower unit)	Spring box Assy	TDA16000373Z0	Spring box 8Assy	8	
	Standard tine mounting board	TDA12000325A2	φ12φ18 tine mounting board	8	
	For middle grass keep plate	TDA16000601ZD	Grass keep plate for double type 8A	3	
	For left and right grass keep plates	TDA16000602ZD	Grass keep plate for double type 8B	2	
	Standard tine	K2590000220	φ17V tine 215	24	

