Form No. 18235SL Rev C

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Service Manual

Groundsmaster® 1200 Pull-Behind Rotary Mower

8111 Lyndale Avenue South
Bloomington, MN 55420

Original Instructions (EN)

Revision History

Revision	Date	Description
A	11/2018	Initial issue.
B	07/2020	Updated Cutting Unit chapter and added Foldout Drawings.
C	06/2021	Updated Chassis chapter.

Reader Comments

The Toro Company Technical Assistance Center maintains a continuous effort to improve the quality and usefulness of its publications. To do this effectively, we encourage user feedback. Please comment on the completeness, accuracy, organization, usability, and readability of this manual by an e-mail to servicemanuals@toro.com

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Notes:

Preface

The purpose of this publication is to provide the service technician with the information for troubleshooting, testing, and repair of the major systems and components on the Groundsmaster 1200 Pull-Behind Rotary Mower (Model No. 31905).

Refer to the *Operator's Manual* for installation, operation, maintenance, and adjustment instructions. Keep a copy of the *Operator's Manual* and *Parts Catalog* for your machine and its accessories with this *Service Manual* for reference. Additional copies of the *Operator's Manual* and *Parts Catalog* are available at www.toro.com.

The Toro Company reserves the right to change the product specifications or this publication without notice.

DANGER

This safety symbol means danger. When you see this symbol, carefully read the instructions that follow. Failure to obey the instructions could kill or cause serious permanent injury or disability.

WARNING

This safety symbol means warning. When you see this symbol, carefully read the instructions that follow. Failure to obey the instructions can result in serious injury.

CAUTION

This safety symbol means caution. When you see this symbol, carefully read the instructions that follow. Failure to obey the instructions can result in minor to moderate injury.

IMPORTANT

The *Important* notice will give the important instructions which you must follow to prevent damage to the systems or components on the machine.

Note: A **Note** will give general information about the correct operation, maintenance, service, testing, or repair of the machine.

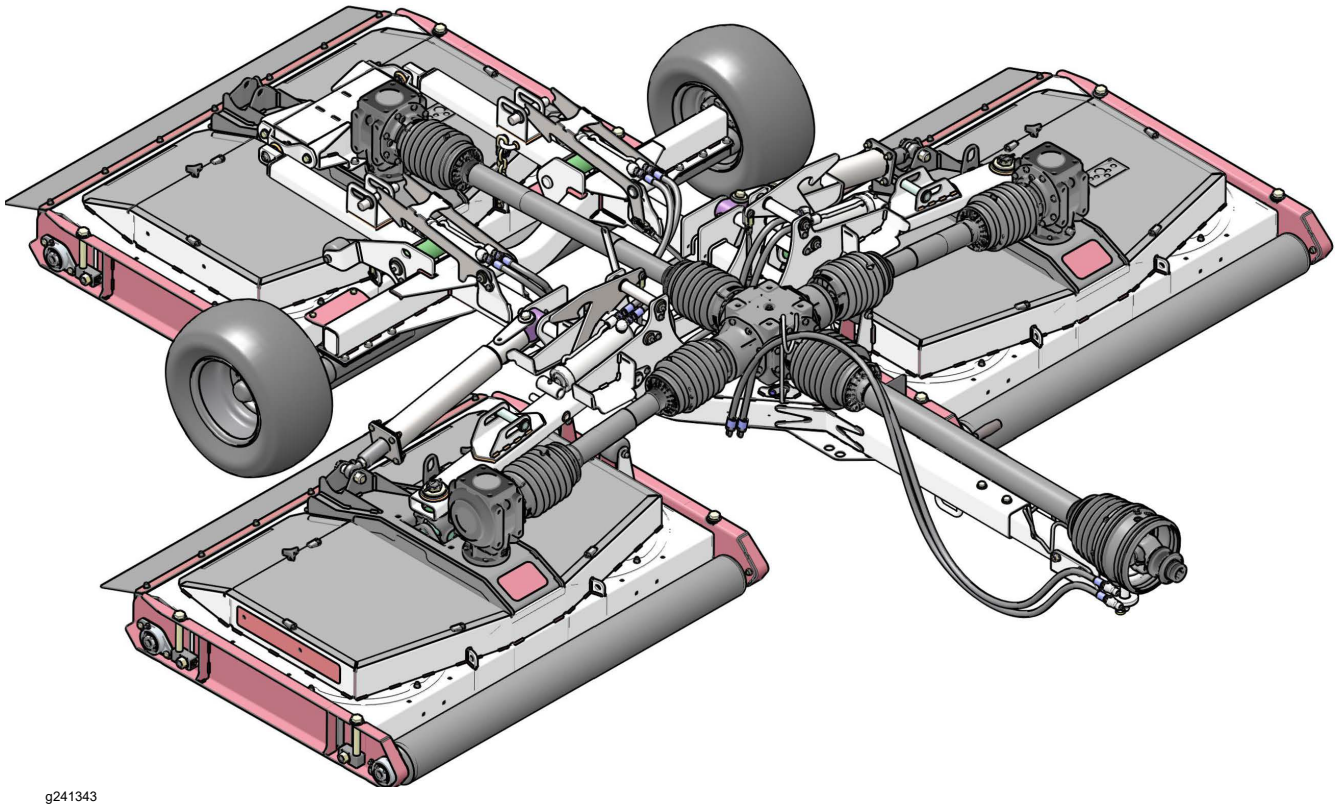

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Figure 1

Groundsmaster 1200 Pull-Behind Rotary Mower

Service Procedure Icons

The following icons appear throughout this Service Manual to bring attention to specific important details of a service procedure.

Critical Process

This icon is used to highlight:

- installing safety equipment (shields, guards, seat belts, brakes and R.O.P.S. components) that may have been removed.
- dimensions or settings that must be maintained for proper machine operation.
- a specific fastener tightening sequence.
- component orientation that may not be obvious.

Critical Torque

This icon is used to highlight an assembly torque requirement that is different than what is recommended in the Standard Torque Tables; refer to Torque Specifications (page 2–5).

Fluid Specifications

This icon is used to highlight fluid specifications and capacities that are less common, and may not appear on the machine service decal or in the machine *Operator's Manual*.

Note: Refer to the service decal on the machine and the machine *Operator's Manual* for commonly used fluid specifications and capacities.

Table of Contents

Table of Contents

Safety Instructions

The Groundsmaster 1200 Pull-Behind Rotary Mower machine is tested and certified by Toro for compliance with existing safety standards and specifications. Hazard control and accident prevention are partially dependent upon the design and configuration of the machine. They are also dependent upon awareness, concern and proper training of the personnel involved in the operation, transport, maintenance and storage of the machine. Improper use or failure to properly maintain the machine can result in injury or death. To reduce the potential for injury or death, comply with the following safety instructions.

⚠ WARNING ⚠

To reduce the potential of injury or death, comply with the following safety instructions as well as information found in the *Operator's Manuals* and the *Operator and Safety Training Videos* found on www.toro.com.

Before Operating the Machine

- Review and understand the contents of the *Operator's Manual* and all of the operating and safety decals on the machine before operation. Familiarize yourself with the controls, and know how to stop the machine quickly. Additional copies of the *Operator's Manual* are available at www.toro.com.
- View and understand the *Operator and Safety Training Videos* found on www.toro.com.
- Never allow children to operate the machine. Never allow adults to operate the machine without proper training.
- Become familiar with the controls. Know how to raise and disengage the cutting units and stop the tow vehicle quickly.
- Keep all shields, safety devices, and decals in place. If a shield, safety device, or decal is illegible or damaged, repair or replace it before operating the machine.
- Always wear substantial shoes. Do not operate machine while wearing sandals, tennis shoes, or sneakers. Do not wear loose fitting clothing which has the potential to get caught in moving parts and cause injury.
- Wearing safety glasses, safety shoes, long pants and a hard hat is advisable and may be required by local safety and insurance regulations.
- Make sure that operator is familiar with safe tow vehicle operation.
- Tighten any loose nuts, bolts, or screws to ensure that the machine is in safe operating condition.
- Make sure that the Groundsmaster 1200 Pull-Behind Rotary Mower is properly attached to the tow vehicle; refer to the *Tow Vehicle Operator's Manual*.
- Make sure the entire work area is clear of objects which might be picked up and thrown by the cutting units.
- Do not carry passengers on the machine. Keep everyone, especially children and pets, away from the area of operation.

While Operating the Machine

- Operate the machine cutting units only in well-lit areas.
- Watch for holes or other hidden hazards.
- Do not drive close to sand traps, ditches, creeks, or other hazards.
- Reduce speed when making sharp turns. Avoid sudden stops and starts.
- Before backing up, look to the rear to ensure no one is behind the machine.
- Watch out for traffic when near or crossing roads. Always yield the right-of-way.
- Keep hands, feet, and clothing away from moving parts and the cutting unit discharge area.
- Raise the cutting units completely, and ensure they are locked in position when driving from one work area to another.
- Before starting the engine on the tow vehicle:
  - Apply the parking brake.
  - Make sure that the traction lever or transmission is in neutral and the PTO is disengaged.
  - Refer to the tow vehicle Operator's Manual for safe starting procedures.
- Do not run the tow vehicle engine in a confined area without an adequate ventilation. Exhaust fumes are hazardous and could be deadly.
- If any abnormal vibration is detected, disengage the PTO and stop the tow vehicle immediately. Determine the source of the vibration and correct any problem(s) before resuming the use of the pull-behind rotary mower.
- While operating, the combination of the tow vehicle and the mower exceed noise levels of 85dB. Hearing protection is recommended for prolonged exposure.
- If a cutting unit strikes a solid object or vibrates abnormally, stop immediately, and turn the engine off. Wait for all motion to stop before inspecting for damage. A damaged cutting unit must be repaired or replaced before operation can resume.
- Traverse slopes carefully. Do not start or stop suddenly when traveling uphill or downhill.
- **DON'T RISK INJURY!** When a person or pet appears unexpectedly in or near the area while operating an the mower, **STOP**. Careless operation, combined with terrain angles, ricochets or improperly positioned guards can lead to thrown object injuries. Do not resume operation until the area is cleared.
- Before leaving the operator's position of the tow vehicle:
  - Disengage PTO power to the pull-behind rotary, and lower the unit to the ground.
  - Apply the parking brake on the tow vehicle. Stop the engine and remove key from the ignition switch.
  - Wait for all moving parts to stop before leaving the tow vehicle.

Maintenance and Service

The maintenance procedures and recommended service intervals for the Groundsmaster 1200 Pull-Behind Rotary Mower is covered in the *Groundsmaster 1200 Operator's Manual*. Refer to this publication when performing the regular equipment maintenance. Several maintenance procedures have break-in intervals identified in the operators manual.

- Before servicing or making adjustments to the pull-behind rotary mower, disengage the tow vehicle PTO, position pull-behind rotary mower on a level surface and lower pull-behind rotary mower to the ground. Apply tow vehicle parking brake, stop engine and remove key from the ignition switch.
- Make sure that the machine is in safe operating condition by keeping all the nuts, bolts, and screws tight.
- Ensure that all of the hydraulic line connectors are tight and that all the hydraulic hoses and lines are in good condition before applying pressure to the hydraulic system.
- Use eye protection when working on the hydraulic system and its components.
- Keep your body and hands away from pin-hole leaks in the hydraulic lines that eject hydraulic fluid under high pressure. Use cardboard or paper to find hydraulic leaks. The hydraulic fluid escaping under pressure can penetrate the skin and cause injury. If hydraulic fluid is accidentally injected into the skin, you must have it surgically removed within a few hours by a doctor familiar with this type of injury. Otherwise, gangrene may result.
- Before disconnecting or performing any work on the hydraulic system, release all the pressure in the system by parking the machine on a level surface, lowering the cutting unit (or implement) completely, and then shutting off the engine.
- Never step over the PTO shaft to reach other side of the pull-behind mower. Walk around the machine instead.
- Before disconnecting the pull-behind rotary mower from the tow vehicle, install the storage stand to the pull-behind rotary mower frame and park the mower on a hard, level surface.
- Use care when checking or servicing the cutting units. Always wear gloves, and use caution when servicing the cutting units.
- When removing the cutting units, tires, or performing other service, use the correct blocks, hoists, and jacks to raise and support the machine. Ensure that the machine is parked on a solid, level surface, such as a concrete floor. Always block the wheels with chocks. Use appropriate jack stands to support the raised machine. Failing to properly support the machine with appropriate jack stands can cause the machine to move or fall and can result in personal injury.
- If major repairs are necessary, contact your Authorized Toro Distributor.
- At the time of manufacture, the machine conformed to all of the applicable safety standards. To ensure the optimum performance and continued safe use of the machine, use only genuine Toro replacement parts and accessories. Use of non-Toro replacement parts and accessories can result in non-conformance with safety standards and can potentially void the warranty.

Safety and Instructional Decals

Numerous safety and instruction decals are affixed to the Groundsmaster 1200 Pull-Behind Rotary Mower. If any decal becomes illegible or damaged, install a new decal. Decal part numbers are listed in the *Groundsmaster 1200 Parts Catalog*. Order replacement decals from Authorized Toro Distributor.

Chapter 2

Specifications and Maintenance

Table of Contents

Specifications

Overall Dimensions

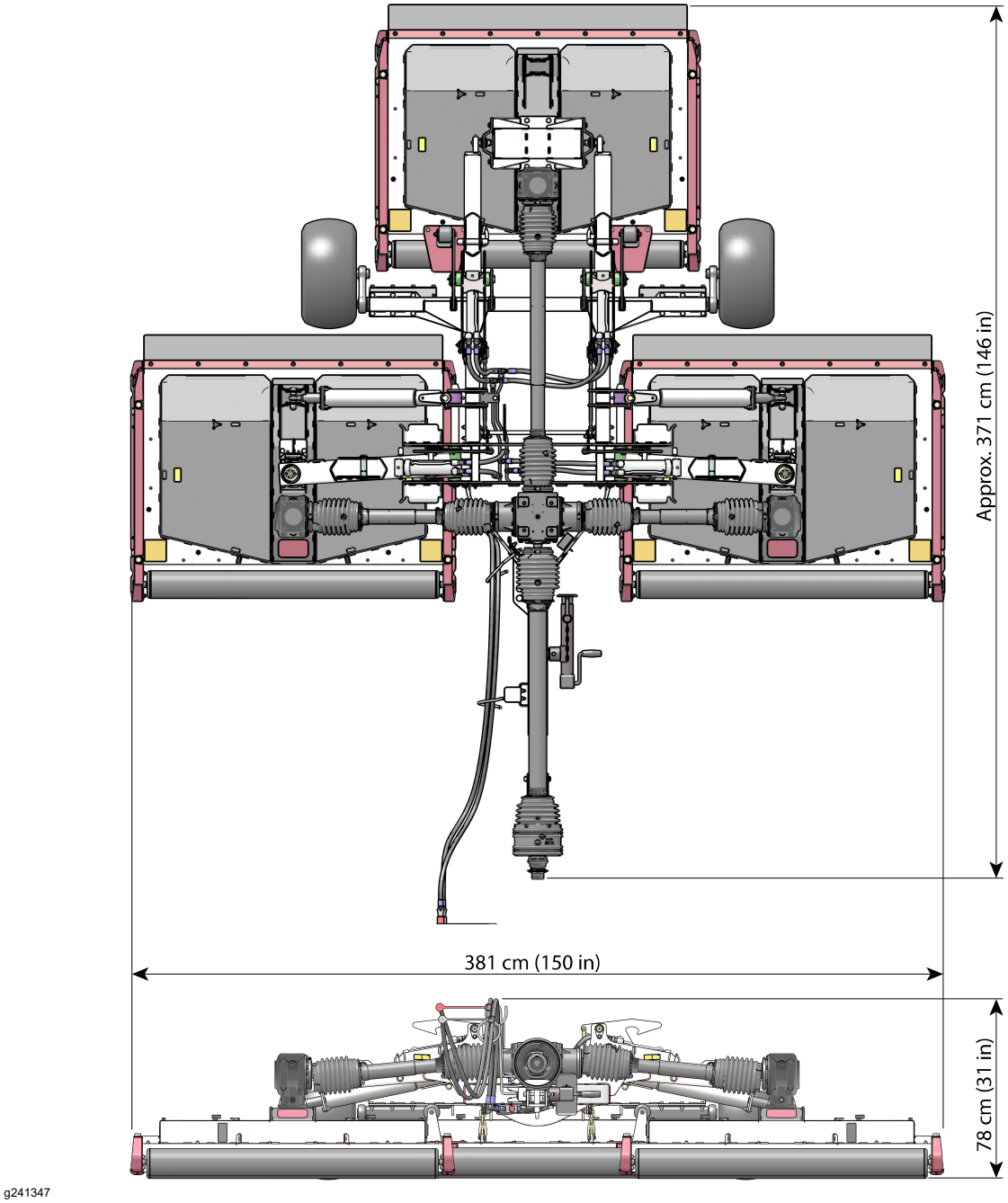

Figure 2

Groundsmaster 1200 Pull-Behind Rotary Mower
Cutting Units Lowered (Mow Position)

Overall Dimensions (continued)

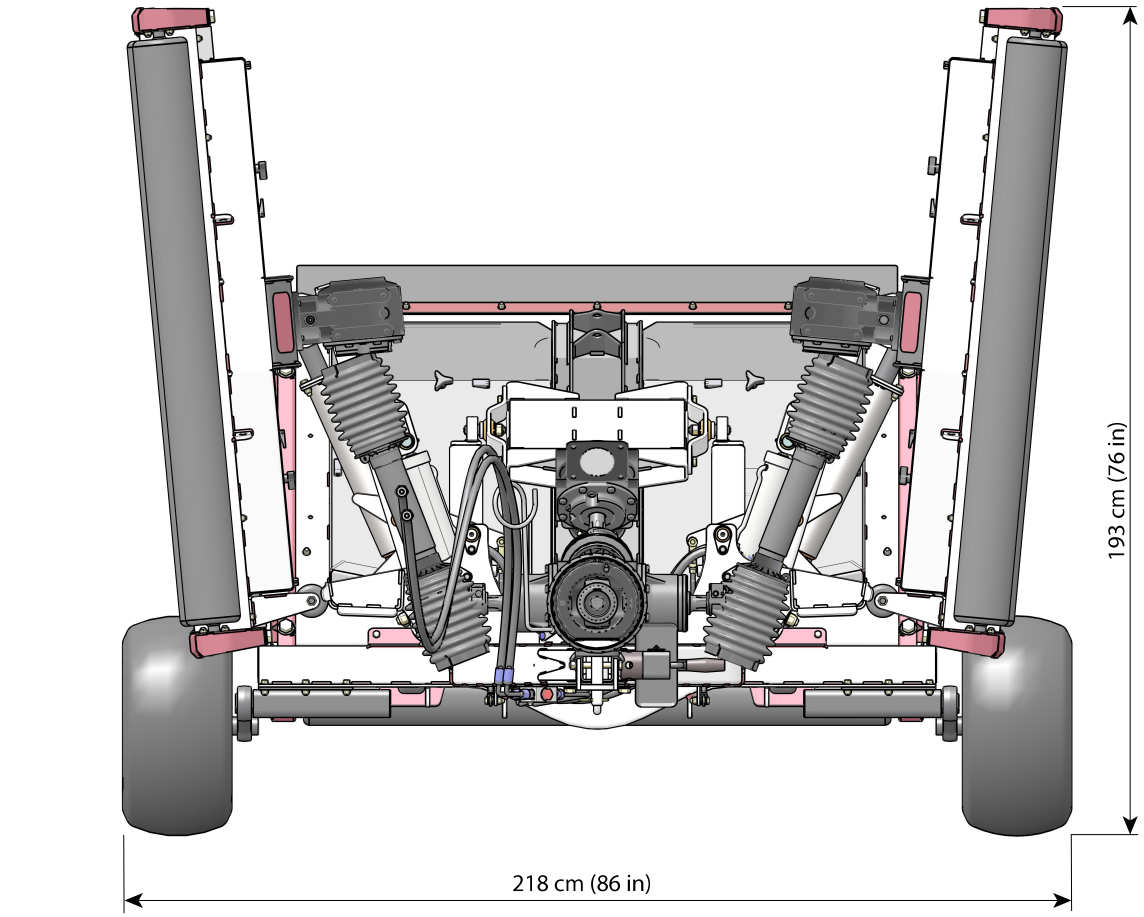

Figure 3

Groundsmaster 1200 Pull-Behind Rotary Mower
Cutting Units Raised (Transport Position)

Chassis

Item	Description
Tire size	20 x 10 - 10, 6 ply, Tubeless
Tire pressure	206.8 kPa (30 psi)
Wheel lug nut torque	75 to 101 N·m (55 to 75 ft-lb)
Torsion axle bolt	37 to 45 N·m (27 to 33 ft-lb)

Cutting Units

Mounting	Cutting units are supported by lift arms, controlled with hydraulic lift cylinders
Construction	Cutting unit decks are welded steel, reinforced with channels and plates
Height−of−cut range	13 to 102 mm (0.5 to 4 inches)
Cutting unit drive	A main drive shaft is connected to the center gearbox. 3 individual cutting unit gear boxes are driven by the main gear box. Each cutting unit gear box drives 3 spindle(s) by Kevlar V−belt(s). The blade spindles are 31.7 mm (1.25 inch) shafts, supported by greaseable, tapered roller bearings.
Cutting blade	Cutting blade dimensions are 483 mm (19 inches) long, 64 mm (2.5 inches) wide and 6.4 mm (0.25 inch) thick. An anti−scalp cup is installed on each cutting blade. Each cutting unit includes three blades.
Width of cut	Total width of cut is 365 cm (144 inches)
Discharge	Clippings are discharged from the rear of each cutting unit.

Torque Specifications

The recommended fastener torque values are listed in the following tables. For critical applications, as determined by Toro, either the recommended torque or a torque that is unique to the application is clearly identified and specified in this manual.

These torque specifications for the installation and tightening of the fasteners will apply to all the fasteners which do not have a specific requirement identified in this manual. The following factors must be considered when applying the torque: cleanliness of the fastener, use of a liquid thread sealant (e.g., Loctite), degree of lubrication on the fastener, presence of a prevailing torque feature (e.g., Nylock nut), hardness of the surface underneath the head of the fastener, or any similar condition which affects the installation.

As noted in the following tables, the torque values should be reduced by 25% for the lubricated fasteners to achieve the same stress as a dry fastener. The torque values must be reduced when the fastener is threaded into the aluminum or brass. The specific torque value should be determined based on the aluminum or brass material strength, fastener size, length of thread engagement, etc.

Calculating the Torque Values When Using a Drive-Adapter Wrench

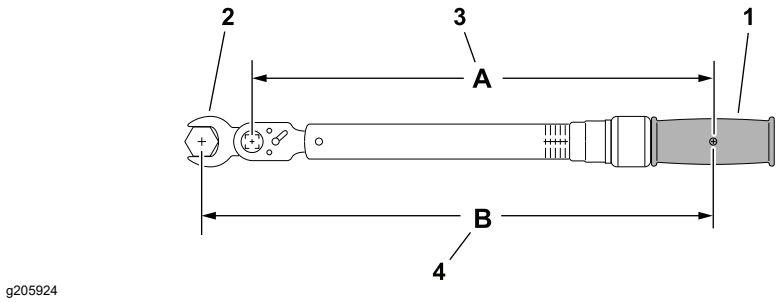

Figure 4

Torque Conversion Factor = A / B

1. Torque wrench
2. Drive-adapter wrench (crows foot)
3. A (effective length of torque wrench)
4. B (effective length of torque wrench and drive-adapter wrench combined)

Using a drive-adapter wrench (e.g., crowfoot wrench) in any position other than 90° and 270° to the frame of the torque wrench will affect the measured torque value because of the effective length (lever) changes. When using a torque wrench with a drive-adapter, multiply the listed torque recommendation by the calculated torque conversion factor (Figure 4) to determine proper tightening torque. When using a torque wrench with a drive-adapter wrench, the calculated torque will be lower than the listed torque recommendation.

Example: The measured effective length of the torque wrench (distance from the center of the handle to the center of the square drive) is 457 mm (18 inches).

The measured effective length of the torque wrench with the drive-adapter wrench installed (distance from the center of the handle to the center of the drive-adapter wrench) is 483 mm (19 inches).

The calculated torque conversion factor for this torque wrench with this drive-adapter wrench would be 18/19 = 0.947.

If the listed torque recommendation for a fastener is **103 to 127 N·m (76 to 94 ft-lb)**, the proper torque when using this torque wrench with a drive-adapter wrench would be **98 to 121 N·m (72 to 89 ft-lb)**.

Identifying the Fastener

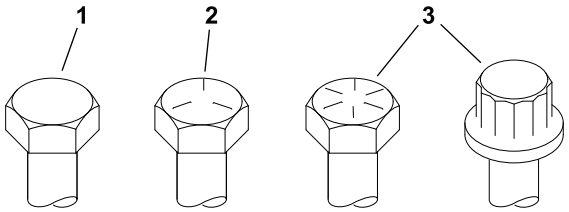

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Figure 5

Inch Series Bolts and Screws

1. Grade 1
2. Grade 5
3. Grade 8

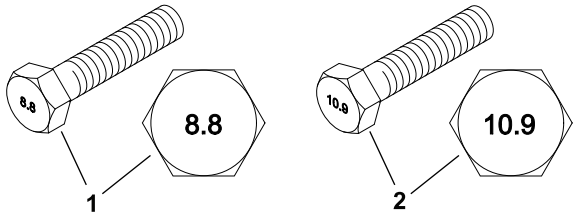

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Figure 6

Metric Bolts and Screws

1. Class 8.8
2. Class 10.9

Fasteners with a Locking Feature

IMPORTANT

If a fastener with a locking feature or previously applied thread locking compound is reused, clean the fastener threads and apply new thread locker to the fastener during installation.

Locking features are designed to create friction and prevent a fastener from loosening. Locking features can be found on externally or internally threaded fasteners. Common examples are plastic inserts incorporated into the fastener and pre-applied “dry” thread locking compound. Keep in mind, a fastener with a locking feature usually means there will be friction during initial installation and during removal.

Toro recommends replacing fasteners with a locking feature once they have been removed because the effectiveness of the locking feature diminishes with each reuse. If it is necessary to reuse a fastener with a locking feature; apply a thread locking compound (Loctite, for example) to the fastener during installation. Use the appropriate strength and type of thread locking compound based on application, fastener size or information found in the product operators manual, service manual, or installation instructions.

Standard Torque for Dry, Zinc Plated, and Steel Fasteners (Inch Series)

Thread Size	Grade 1, 5 and 8 with Thin Height Nuts	SAE Grade 1 Bolts, Screws, and Studs with Regular Height Nuts (SAE J995 Grade 2 or Stronger Nuts)		SAE Grade 5 Bolts, Screws, and Studs with Regular Height Nuts (SAE J995 Grade 2 or Stronger Nuts)		SAE Grade 8 Bolts, Screws, and Studs with Regular Height Nuts (SAE J995 Grade 2 or Stronger Nuts)	
	in-lb	in-lb	N·cm	in-lb	N·cm	in-lb	N·cm
# 6 - 32 UNC	10 ± 2	13 ± 2	147 ± 23	15 ± 2	169 ± 23	23 ± 3	262 ± 34
# 6 - 40 UNF				17 ± 2	192 ± 23	25 ± 3	282 ± 34
# 8 - 32 UNC	13 ± 2	25 ± 5	282 ± 56	29 ± 3	328 ± 34	41± 5	463 ± 56
# 8 - 36 UNF				31 ± 4	350 ± 45	43 ± 5	486 ± 56
# 10 - 24 UNC	18 ± 2	30 ± 5	339 ± 56	42 ± 5	475 ± 56	60 ± 6	678 ± 68
# 10 - 32 UNF				48 ± 5	542 ± 56	68 ± 7	768 ± 79
1/4 - 20 UNC	48 ± 7	53 ± 7	599 ± 79	100 ± 10	1130 ± 113	140 ± 15	1582 ± 169
1/4 - 28 UNF	53 ± 7	65 ± 10	734 ± 113	115 ± 12	1299 ± 136	160 ± 17	1808 ± 192
5/16 - 18 UNC	115 ± 15	105 ± 15	1186 ± 169	200 ± 25	2260 ± 282	300 ± 30	3390 ± 339
5/16 - 24 UNF	138 ± 17	128 ± 17	1146 ± 192	225 ± 25	2542 ± 282	325 ± 33	3672 ± 373
	ft-lb	ft-lb	N·m	ft-lb	N·m	ft-lb	N·m
3/8 - 16 UNC	16 ± 2	16 ± 2	22 ± 3	30 ± 3	41 ± 4	43 ± 5	58 ± 7
3/8 - 24 UNF	17 ± 2	18 ± 2	24 ± 3	35 ± 4	47 ± 5	50 ± 6	68 ± 8
7/16 - 14 UNC	27 ± 3	27 ± 3	37 ± 4	50 ± 5	68 ± 7	70 ± 7	95 ± 9
7/16 - 20 UNF	29 ± 3	29 ± 3	39 ± 4	55 ± 6	75 ± 8	77 ± 8	104 ± 11
1/2 - 13 UNC	30 ± 3	48 ± 7	65 ± 9	75 ± 8	102 ± 11	105 ± 11	142 ± 15
1/2 - 20 UNF	32 ± 4	53 ± 7	72 ± 9	85 ± 9	115 ± 12	120 ± 12	163 ± 16
5/8 - 11 UNC	65 ± 10	88 ± 12	119 ± 16	150 ± 15	203 ± 20	210 ± 21	285 ± 28
5/8 - 18 UNF	75 ± 10	95 ± 15	129 ± 20	170 ± 18	230 ± 24	240 ± 24	325 ± 33
3/4 - 10 UNC	93 ± 12	140 ± 20	190 ± 27	265 ± 27	359 ± 37	375 ± 38	508 ± 52
3/4 - 16 UNF	115 ± 15	165 ± 25	224 ± 34	300 ± 30	407 ± 41	420 ± 43	569 ± 58
7/8 - 9 UNC	140 ± 20	225 ± 25	305 ± 34	430 ± 45	583 ± 61	600 ± 60	813 ± 81
7/8 - 14 UNF	155 ± 25	260 ± 30	353 ± 41	475 ± 48	644 ± 65	667 ± 66	904 ± 89

Note: Reduce the torque values listed in the table above by 25% for lubricated fasteners. Lubricated fasteners are defined as threads coated with a lubricant, such as engine oil, or a thread sealant, such as Loctite.

Note: The torque values must be reduced when installing the fasteners into threaded aluminum or brass. The specified torque value should be determined based on the aluminum or base material strength, fastener size, length of thread engagement, etc.

Note: The nominal torque values listed above for Grade 5 and 8 fasteners are based on 75% of the minimum proof load specified in SAE J429. The tolerance is approximately ± 10% of the nominal torque value. The thin height nuts include jam nuts.

Standard Torque for Dry, Zinc Plated, and Steel Fasteners (Metric Fasteners)

Thread Size	Class 8.8 Bolts, Screws, and Studs with Regular Height Nuts (Class 8 or Stronger Nuts)		Class 10.9 Bolts, Screws, and Studs with Regular Height Nuts (Class 10 or Stronger Nuts)	
M5 X 0.8	57 ± 6 in-lb	644 ± 68 N·cm	78 ± 8 in-lb	881 ± 90 N·cm
M6 X 1.0	96 ± 10 in-lb	1085 ± 113 N·cm	133 ± 14 in-lb	1503 ± 158 N·cm
M8 X 1.25	19 ± 2 ft-lb	26 ± 3 N·m	28 ± 3 ft-lb	38 ± 4 N·m
M10 X 1.5	38 ± 4 ft-lb	52 ± 5 N·m	54 ± 6 ft-lb	73 ± 8 N·m
M12 X 1.75	66 ± 7 ft-lb	90 ± 10 N·m	93 ± 10 ft-lb	126 ± 14 N·m
M16 X 2.0	166 ± 17 ft-lb	225 ± 23 N·m	229 ± 23 ft-lb	310 ± 31 N·m
M20 X 2.5	325 ± 33 ft-lb	440 ± 45 N·m	450 ± 46 ft-lb	610 ± 62 N·m

Note: Reduce the torque values listed in the table above by 25% for lubricated fasteners. Lubricated fasteners are defined as threads coated with a lubricant, such as engine oil, or a thread sealant, such as Loctite.

Note: The torque values must be reduced when installing the fasteners into threaded aluminum or brass. The specified torque value should be determined based on the aluminum or base material strength, fastener size, length of thread engagement, etc.

Note: The nominal torque values listed above are based on 75% of the minimum proof load specified in SAE J1199. The tolerance is approximately ± 10% of the nominal torque value.

Other Torque Specifications

SAE Grade 8 Steel Set Screws

Thread Size	Recommended Torque	
	Square Head	Hex Socket
1/4 - 20 UNC	140 ± 20 in-lb	73 ± 12 in-lb
5/16 - 18 UNC	215 ± 35 in-lb	145 ± 20 in-lb
3/8 - 16 UNC	35 ± 10 ft-lb	18 ± 3 ft-lb
1/2 - 13 UNC	75 ± 15 ft-lb	50 ± 10 ft-lb

Thread Cutting Screws (Zinc Plated Steel)

Type 1, Type 23 or Type F	
Thread Size	Baseline Torque**
No. 6 - 32 UNC	20 ± 5 in-lb
No. 8 - 32 UNC	30 ± 5 in-lb
No. 10 - 24 UNC	38 ± 7 in-lb
1/4 - 20 UNC	85 ± 15 in-lb
5/16 - 18 UNC	110 ± 20 in-lb
3/8 - 16 UNC	200 ± 100 in-lb

Other Torque Specifications (continued)

Wheel Bolts and Lug Nuts

Thread Size	Recommended Torque*	
7/16 - 20 UNF Grade 5	65 ± 10 ft-lb	88 ± 14 N·m
1/2 - 20 UNF Grade 5	80 ± 10 ft-lb	108 ± 14 N·m
M12 X 1.25 Class 8.8	80 ± 10 ft-lb	108 ± 14 N·m
M12 X 1.5 Class 8.8	80 ± 10 ft-lb	108 ± 14 N·m

*For steel wheels and non-lubricated fasteners

Thread Cutting Screws (Zinc Plated Steel)

Thread Size	Threads per Inch		Baseline Torque**
	Type A	Type B	
No. 6	18	20	20 ± 5 in-lb
No. 8	15	18	30 ± 5 in-lb
No. 10	12	16	38 ± 7 in-lb
No. 12	11	14	85 ± 15 in-lb

**The hole size, material strength, material thickness, and material finish must be considered when determining the specified torque values. All the torque values are based on the non-lubricated fasteners.

Conversion Factors

in-lb X 11.2985 = N·cm

ft-lb X 1.3558 = N·m

N·cm X 0.08851 = in-lb

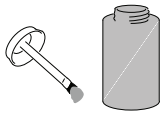
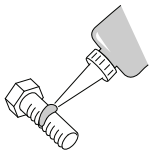
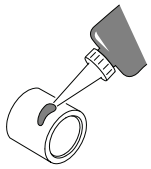
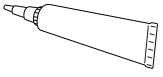
N·m X 0.7376 = ft-lb

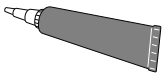
Shop Supplies

The procedures found in this *Service Manual* may recommend the use of commonly used shop supplies (lubricants, sealants and adhesives). A symbol denoting the use of a shop supply may appear in figures that support a procedure. Always refer to the written procedure for specific information regarding the type and the application of a shop supply.

IMPORTANT

Always follow manufacturers instructions when using or storing shop supplies.

ANTI-SEIZE LUBRICANT Used to prevent corrosion, galling and seizure between metal parts. Most often applied to shafts and bores during assembly. Unless otherwise specified, high viscosity regular grade lithium-graphite based anti-seize lubricant should be used.	
GREASE Can be used to pre-fill (pack) bearings, boots and seals prior to assembly, ease installation of components during assembly, or fill cavities between moving parts through grease fittings after assembly. Unless otherwise noted, refer to the machine *Operator's Manual* or *Installation Instructions* for grease specifications.	
THREAD LOCKING COMPOUND (Thread Locker) Used to lock threaded fasteners in position. Available in low, medium and high strength for various size fasteners and applications. Most thread locking compounds are applied immediately prior to fastener installation. Some thread locking compounds use a "Wicking" feature, and can be applied after fastener installation. Most thread locking compounds allow the fastener to be removed with standard tools once cured. High strength thread locking compounds may require applying heat to the fastener and the surrounding area to allow fastener removal. **Note:** Some fasteners have a dry thread locking compound pre-applied (Patch-Loc) so no additional thread locking compound is necessary when installing a "new" fastener. These fasteners are designed to be removed and re-installed only once before applying additional thread locking compound is necessary.	
RETAINING COMPOUND (bearings and sleeves) An adhesive used to secure bearings, bushings and cylindrical parts into housings or onto shafts. When cured, bearing and sleeve retaining compound fills the gap between mating parts with a hard resin that increases load distribution and protects against corrosion.	
ADHESIVE Used to secure a variety of components immediately prior to assembly. May be recommended for installing new components or when reusing a component that had a pre-applied adhesive such as hood seals, mouldings and weather-stripping.	
THREAD SEALANT Used to seal threaded fittings and sensors from air, fuel and oil pressure leaks and prevent galling and seizure between threaded parts. A thread sealant in paste firm is preferred over sealant tape. The sealant should remain semi-pliable to allow for component removal with standard tools. Some thread sealants may require the use of a cleaner or primer prior to use.	

GASKET COMPOUND Used to create a seal between mating parts. Gasket compounds may be used with or without the presence of a pre-formed gasket. Gasket compounds may be solvent or silicone based, and cure when exposed to air or designed to cure in an air-less environment (anaerobic). Most gasket compounds are designed to be applied to clean surfaces free of oil, chemical residue and previously used gaskets or gasket compounds.	
SILICONE SEALANT Designed for a broad variety of sealing and bonding requirements, silicone sealants are usually room temperature vulcanizing (RTV) which form a flexible silicone rubber that bonds to a wide variety of smooth or porous materials when cured. Standard silicone sealants are designed to perform in temperatures from -51°C to 232°C (-60°F to 400°F), while high temperature variants can preform in temperatures up to 343°C (650°F).	

Special Tools

You can order these special tools from your Toro Distributor. Some tools may also be available from a local tool supplier.

Hydraulic O-Ring Kit

Toro Part No. 117-2727

This kit includes O-rings in a variety of sizes for the face seal and port seal hydraulic connections. To help prevent a hydraulic leak, replace the O-rings when you open the hydraulic connection.

Troubleshooting

There are a number of factors that can contribute to unsatisfactory quality of cut, some of which may be turf conditions. Conditions such as the excessive thatch, sponginess, or attempting to cut off too much grass height may not always be overcome by adjusting the cutting unit or machine. It is important to remember that the lower the height-of-cut setting, the more critical these factors are.

Remember that the effective or actual height-of-cut depends on the cutting unit weight, tire pressures, hydraulic counterbalance settings, and turf conditions.

Factors That Can Affect Quality of Cut

Factor	Possible Problem/Correction
1. Maximum governed engine speed	Check that the engine is running at the correct high-idle speed. Always mow at high engine speed.
2. Blade speed	All the cutting unit blades should rotate at the same speed.
3. Tire pressure	Check the air pressure of all the tires including castor tires. Adjust to the pressures specified in the Operator's Manual.
4. Blade condition	Sharpen the blades if their cutting edges are dull or nicked. Inspect the blade sail for wear or damage. Replace the blade if necessary.
5. Mower housing condition	Ensure that the cutting chamber is in good condition. Keep the underside of the cutting unit clean. The unwanted material buildup can reduce the cutting performance.
6. Height-of-cut	Ensure that all cutting unit height-of-cut adjustments are the same. Adjust the cutting unit as specified in the Operator's Manual. The effective (actual) height-of-cut may be different than the bench set height-of-cut.
7. Cutting unit alignment and ground following	Check the lift arms for wear, damage, or binding. Also, inspect for bent or damaged pivot shafts.
8. Roller and castor wheel condition	All rollers and caster wheels should rotate freely. Replace the bearings if they are worn or damaged.
9. Grass conditions	Mow when the grass is dry for best cutting results. Also, remove only 2.5 cm (1 inch) or 1/3 of the grass blade when cutting.
10. Machine traction speed	Mowing at too fast of a traction speed will result in poor after cut appearance and missed patches of grass.

GEARS – The Systematic Approach to Defining, Diagnosing and Solving Problems

Gather Information

- Information reported by the customer.
- Information observed by you.
- Establish the what, where, and when of the issue.

Evaluate Potential Causes

- Consider possible causes of the problem to develop a hypothesis.
- Narrow down the focus of the problem.

Assess Performance

- Ensure you have all the necessary tools for testing.
- Test all potential causes of the failure.
- Reevaluate and create a new hypothesis if necessary.

Repair

- Return the unit to service by repairing, rebuilding or replacing.

Solution Confirmation

- Did the issue go away?
- Was the root cause of the issue correctly repaired?
- Are there any other new symptoms?

Table of Contents

General Information

The operators manuals provides information regarding the operation, general maintenance, and maintenance intervals for your Groundsmaster 1200 Pull-Behind Rotary Mower. Refer to the operators manual for additional information when servicing the machine.

Service and Repairs

Wheels

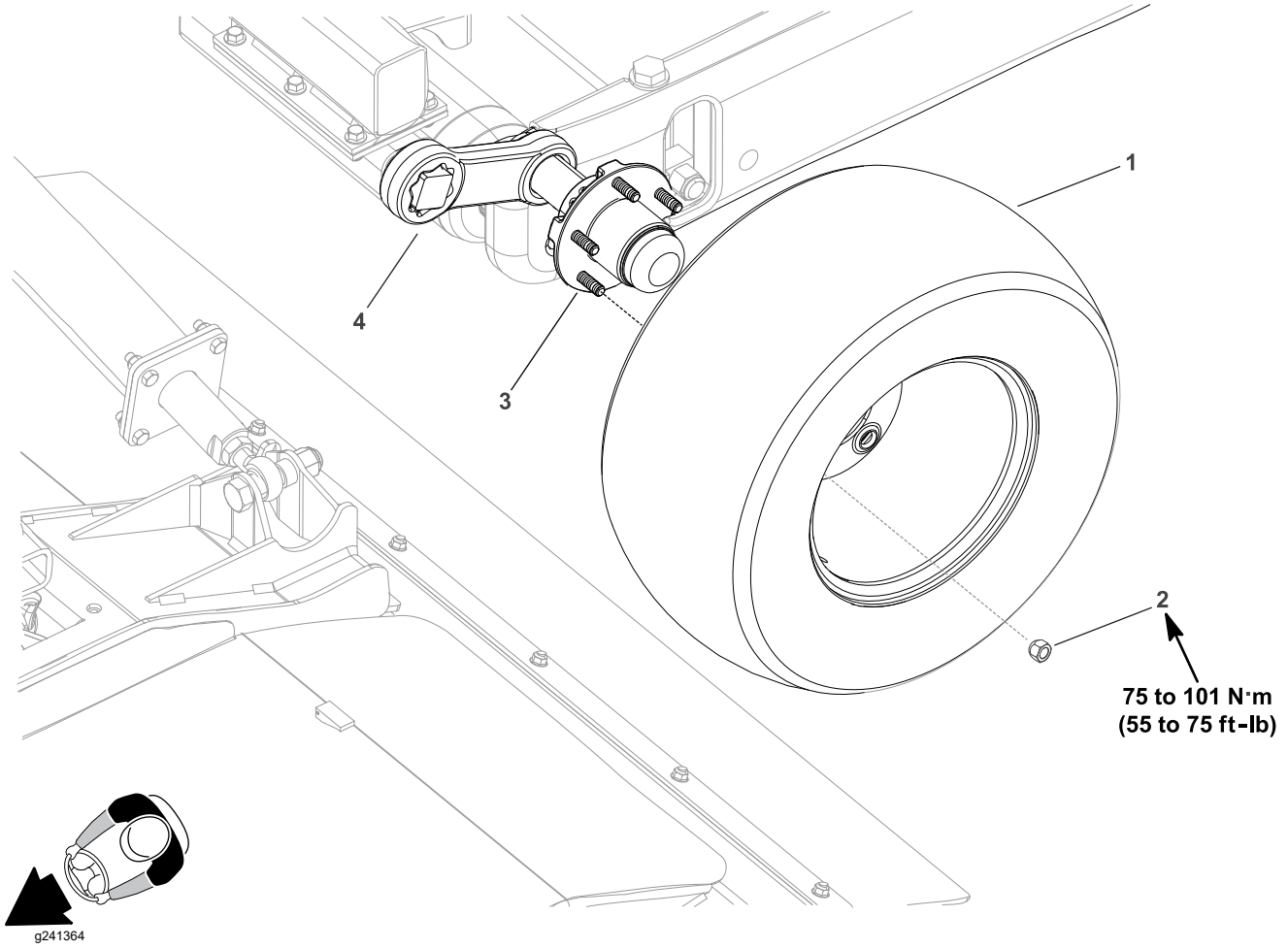


Figure 7

1. Wheel and tire assembly
2. Wheel lug nut (5 each per wheel)
3. Wheel hub assembly
4. Torsion axle

Removing the Wheel

1. Park the machine on a level surface, lower the cutting units and disengage the PTO. Remove the main drive shaft and disconnect the machine from the tow vehicle. Secure the machine with tow bar jack (refer to the *Groundsmaster 1200 Operator's Manual* for further instructions on the proper way to use the tow bar jack).
2. Block the wheel that you are not removing with chocks to prevent the machine from moving.
3. Lift the machine from the ground and support the raised machine with a jack stand (refer to the *Groundsmaster 1200 Operator's Manual* for further instructions on the proper way to use jack stands).
4. Loosen but do not remove the 5 wheel-lug nuts (2) that secure the wheel to the hub assembly.

IMPORTANT

Before lifting the machine with a jack, review and follow the Jacking Instructions from the *Groundsmaster 1200 Operator's Manual*.

5. Jack the machine up until the wheel is off the ground. Support the machine with appropriate jack stands.
6. Remove the 5 wheel-lug nuts (2) and remove the wheel.

Installing the Wheel

1. Install the wheel (1) to the wheel hub assembly (3).
2. Install the 5 lug nuts until they are snug.
3. Lower the machine to the ground.

WARNING

Failure to maintain proper torque could result in failure or loss of wheel and may result in personal injury.

Torque the wheel-lug nuts properly.

4. Torque the wheel-lug nuts (2) to **75 to 101 N·m (55 to 75 ft-lb)** in a star pattern.
5. Check and adjust the tire pressures; refer to Chassis (page 2–4).

Wheel Bearings

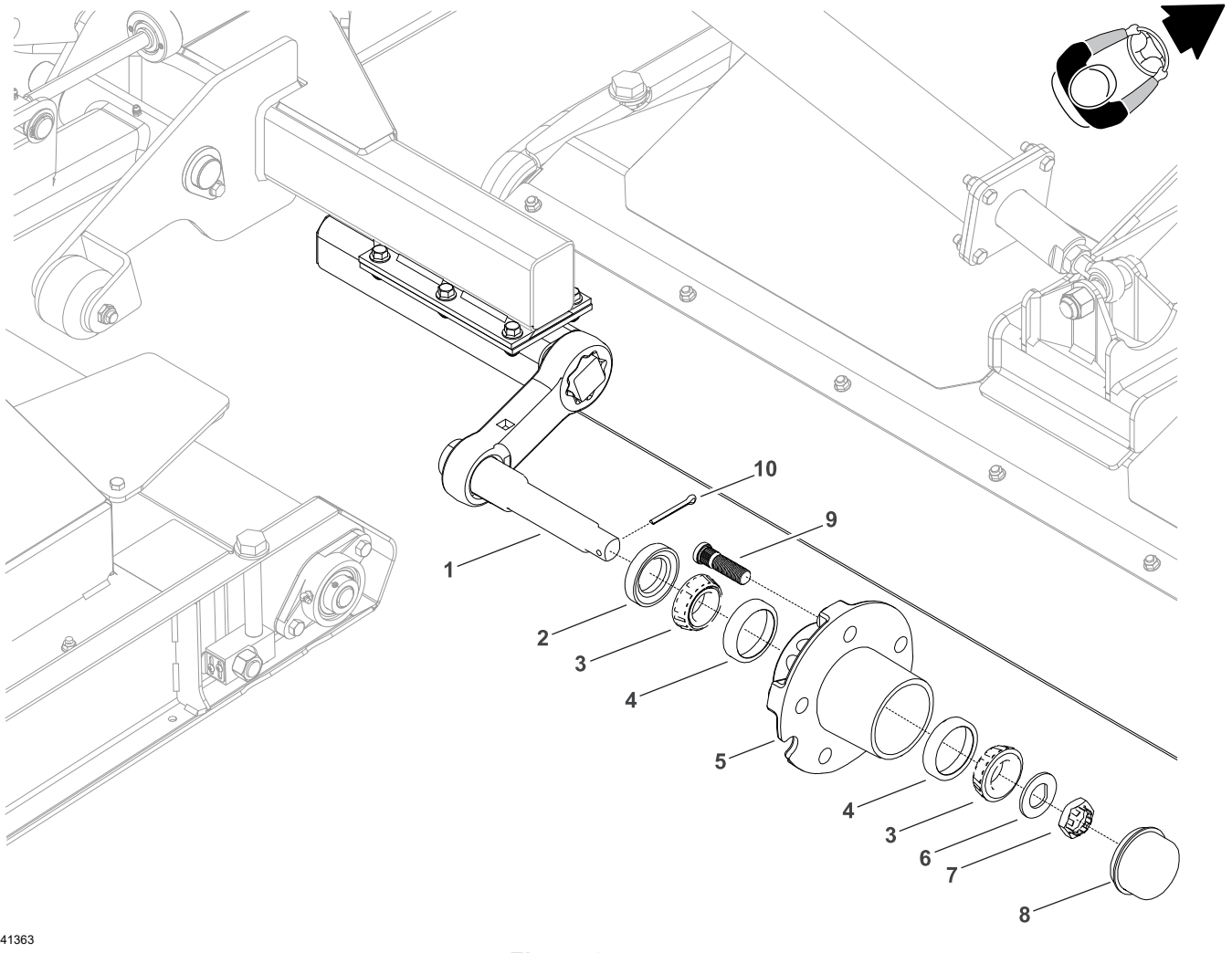


Figure 8

1. Torsion axle
2. Oil seal
3. Bearing cone (2 each per axle)
4. Bearing cup (2 each per axle)
5. Wheel hub
6. Spindle washer
7. Slotted nut
8. Dust cap
9. Drive studs (5 each per hub)
10. Cotter pin

Disassembling the Wheel Bearings

Note: Refer to Figure 8 during this procedure.

1. Park the machine on a level surface, lower the cutting units and disengage the PTO. Remove the main drive shaft and disconnect the machine from the tow vehicle. Secure the machine with tow bar jack (refer to the *Groundsmaster 1200 Operator's Manual* for further instructions on the proper way to use the tow bar jack).
2. Block the wheel that you are not removing with chocks to prevent the machine from moving.
3. Lift the machine from the ground and support the raised machine with a jack stand (refer to the *Groundsmaster 1200 Operator's Manual* for further instructions on the proper way to use jack stands).
4. Remove the wheel.
5. Carefully remove the dust cap (8) from the wheel hub.

Disassembling the Wheel Bearings (continued)

6. Straighten and remove the cotter pin (10) from the torsion axle.
7. Remove the slotted nut (7) and spindle washer (6) that secure the wheel hub (5) to the torsion axle (1).
8. Slide and remove the wheel hub (5) from the torsion axle (1).
9. Disassemble the wheel hub (5) as follows:

   Note: Ensure that you do not damage the hub bore.

   A. Pull the oil seal (2) out of the wheel hub. Discard the used oil seal.

   B. Remove the bearing cones (3) from both sides of the wheel hub (5). Clean the bearings in solvent. Inspect the bearings to ensure they are in good operating condition.

   C. Clean the inside of the wheel hub (5). Inspect the bearing cups (4) and bearing cones (3) for wear, pitting, or other noticeable damage. Always replace bearing cups and cones as a set.

   D. Inspect the drive studs (9) from the wheel hub. Replace any worn or damaged studs.

10. Clean and inspect the torsion axle (1). Replace any worn or damaged axles.

Assembling the Wheel Bearings

1. Clean all the wheel hub components before assembly.
2. Assemble the wheel hub as follows:

   A. Press the bearing cups (4) into the hub until they seat against shoulder of the wheel hub.

   B. Fill the wheel hub (5) approximately 50% full of grease.

   C. Pack both the bearing cones (3) with grease. Install the greased inner bearing cone into the cup on inboard side of the wheel hub.

   D. Install the new oil seal

IMPORTANT

The seal must be pressed in so that it is flush with the end of the wheel hub. The lip of the seal must face the bearing.

   E. Lubricate the inner surface of the new seal and press it flush with the edge of the wheel hub.

   F. Pack inside of the wheel hub (5) with some grease. Position the remaining bearing cone (3) into the outer bearing cup (4).

3. Slide the wheel hub assembly (5) onto the spindle shaft (1) and secure it in place with the spindle washer (6) and slotted nut (7). Do not tighten the nut or install the cotter pin (12).

4. Rotate the wheel hub by hand and tighten the slotted nut (7) to **8.5 to 11.3 N·m (75 to 100 in-lb)** to seat the bearings (3). Once the bearings have been seated, back the nut off.

5. Rotate the wheel hub and tighten the slotted nut (7) to a final torque of **1.7 to 2.3 N·m (15 to 20 in-lb)**. After you torque the nut, ensure that the wheel hub (5) does not wobble as it turns.
6. Tighten the nut until the next-possible cotter pin hole in the nut is aligned. Install the cotter pin (10) to secure the slotted nut.
7. Install the dust cap (8).
8. Install the wheel; refer to Installing the Wheel (page 3–4).
9. Remove the jack stands or blocks and lower the machine to the ground.

Torsion Axle Assembly

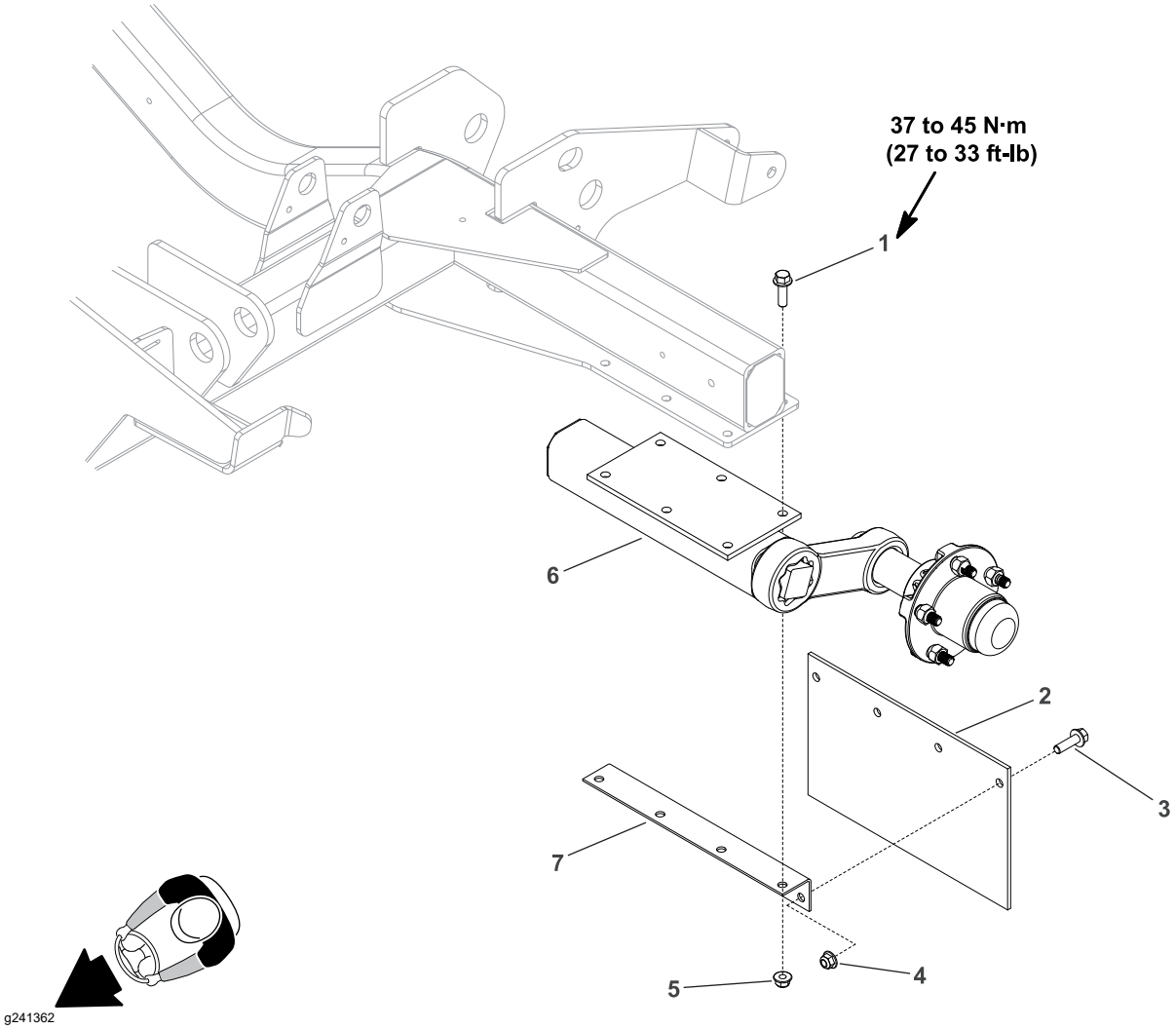


Figure 9

1. Flange head bolt (6 each)
2. Rubber flap
3. Flange head bolt (4 each)
4. Nut (4 each)
5. Nut (6 each)
6. Torsion axle
7. Flap bracket

Replacement torsion axle assemblies are supplied with new wheel hub assemblies already installed.

Removing the Torsion Axle Assembly

Note: Refer to Figure 9 during this procedure.

1. Park the machine on a level surface, lower the cutting units and disengage the PTO. Remove the main drive shaft and disconnect the machine from the tow vehicle. Secure the machine with tow bar jack; refer to the *Groundsmaster 1200 Operator's Manual*.
2. Block the wheel that you are not removing with chocks to prevent the machine from moving.
3. Lift the machine from the ground and support the raised machine with a jack stand; refer to *Groundsmaster 1200 Operator's Manual*.
4. Remove the wheel; refer to Removing the Wheel (page 3–3).

Removing the Torsion Axle Assembly (continued)

5. If necessary, remove the wheel bearings; refer to Disassembling the Wheel Bearings (page 3–5).
6. Remove the 6 nuts (5) and bolts (1) that secures the torsion axle (6) and flap bracket (7) to the frame assembly.
7. Remove the torsion axle (6) and flap bracket (7) from the frame assembly.
8. If necessary, remove the 4 nuts (4) and bolts (3) that secures the rubber flap (2) to the flap bracket (7). Remove the rubber flap from the flap bracket.
9. Inspect the torsion axle (6) for wear or damage. Replace the torsion axle if necessary.

Assembling the Torsion Axle Assembly

1. Clean the torsion axle assembly (6) before the assembly.
2. If removed, install the rubber flap (2) to the flap bracket (7) and secure with 4 bolts (3) and nuts (4).
3. Install the torsion axle assembly (6) and flap bracket (7) to the frame assembly and secure with 6 bolts (1) and nuts (5).

⚠ WARNING ⚠

Failure to maintain proper nut torque could result in failure or loss of the wheel and may result in personal injury.

Maintain the proper torque of the nuts.

4. Torque tighten the nuts (5) to **37 to 45 N·m (27 to 33 ft-lb)**.
5. If removed, install the wheel bearings; refer to Assembling the Wheel Bearings (page 3–6).
6. Install the wheels; refer to Installing the Wheel (page 3–4).

Hitch Assembly

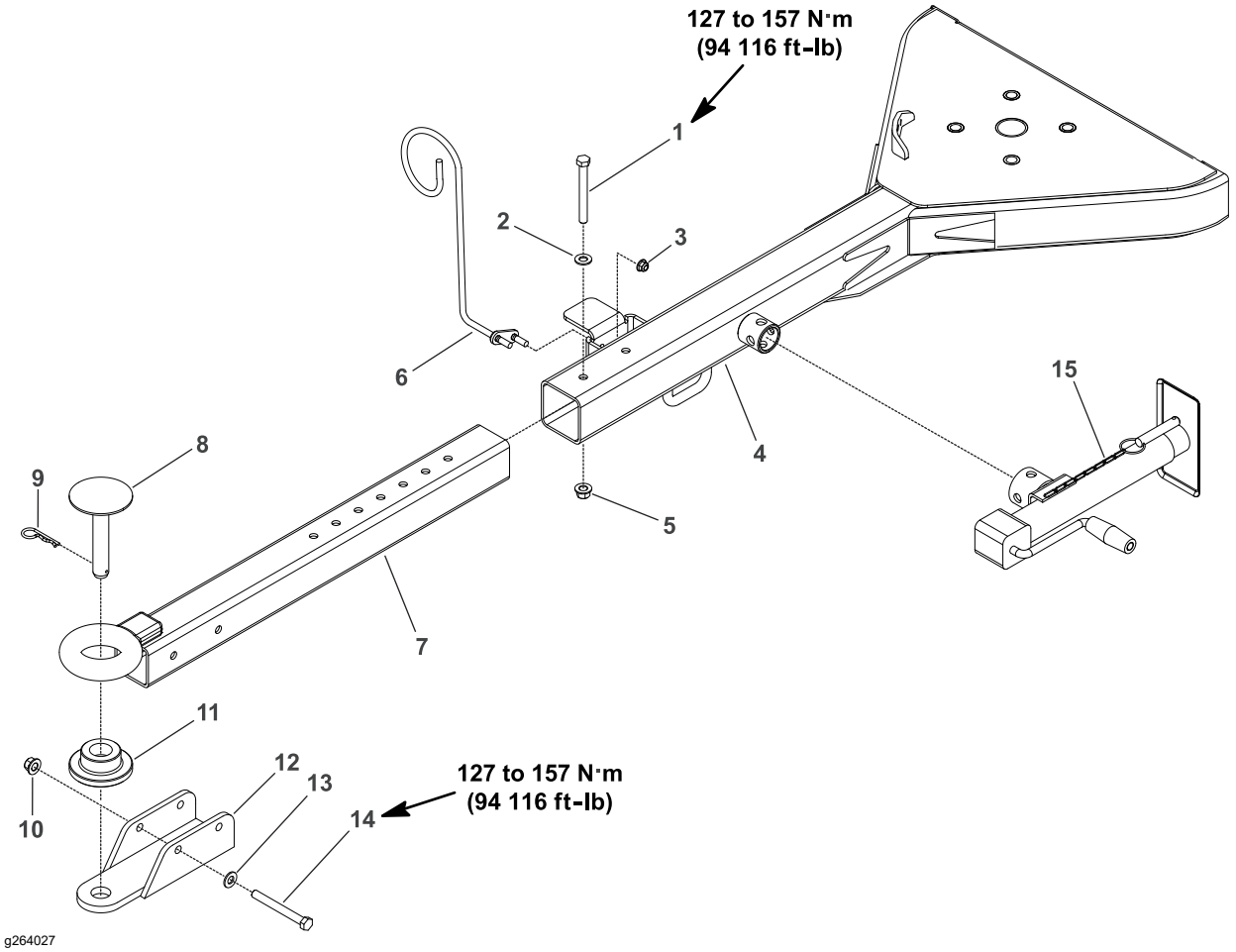


Figure 10

1. Bolt (2 each)	6. Hose guide (2 each)	11. Flange bushing
2. Flat washer (2 each)	7. Hitch assembly	12. Clevis assembly
3. Nut (4 each)	8. Hitch pin assembly	13. Flat washer (2 each)
4. Frame assembly	9. Hair pin	14. Bolt (2 each)
5. Nut (2 each)	10. Nut (2 each)	15. Tow bar jack

Disassembling the Hitch Assembly

Note: Refer to Figure 10 during this procedure.

1. Park the machine on a level surface, lower the cutting units and disengage the PTO. Remove the main drive shaft and disconnect the machine from the tow vehicle. Secure the machine with tow bar jack; refer to the *Groundsmaster 1200 Operator's Manual*.
2. Remove the 2 bolts (1), washers (2) and nuts (5) that secures the hitch assembly (7) to the frame assembly (4).
3. Remove the hitch assembly (7) from the frame assembly (4).
4. If necessary, disassemble the hitch assembly (7) as follows:
   A. Remove the hair pin (9) and hitch pin assembly (8) from the hitch assembly (7).
   B. Remove the flange bushing (11) from the hitch assembly (7).
   C. Remove the 2 bolts (14), washer (13) and nuts (10) that secures the clevis assembly (12) to the hitch assembly(7).

Disassembling the Hitch Assembly (continued)

D. Remove the clevis assembly (12) from the hitch assembly (7).

5. If necessary, remove the 2 nuts (3) that secures the hose guide (6) to the frame assembly (4). Remove the hose guides from the frame assembly.

Assembling the Hitch Assembly

1. If removed, install the hose guides (6) to the frame assembly (4) and secure with the 2 nuts (3).
2. Assemble the hitch assembly (7) as follows:
   A. Install the clevis assembly (12) to the hitch assembly (7) and secure with the 2 bolts (14), washers (13) and nuts (10).

   B. Torque tighten the bolts (14) to **127 to 157 N·m (94 to 116 ft-lb)**.

   C. If removed, install the flange bushing (11) into the hitch assembly (7).

   D. Install the hitch pin assembly (8) into the hitch assembly (7) and secure with the hair pin (9).

3. Install the hitch assembly (7) to the frame assembly (4) and secure with 2 bolts (1), washers (2) and nuts (5).

4. Torque tighten the bolts (1) to **127 to 157 N·m (94 to 116 ft-lb)**.

Side Cutting Unit Lift Arm Assembly

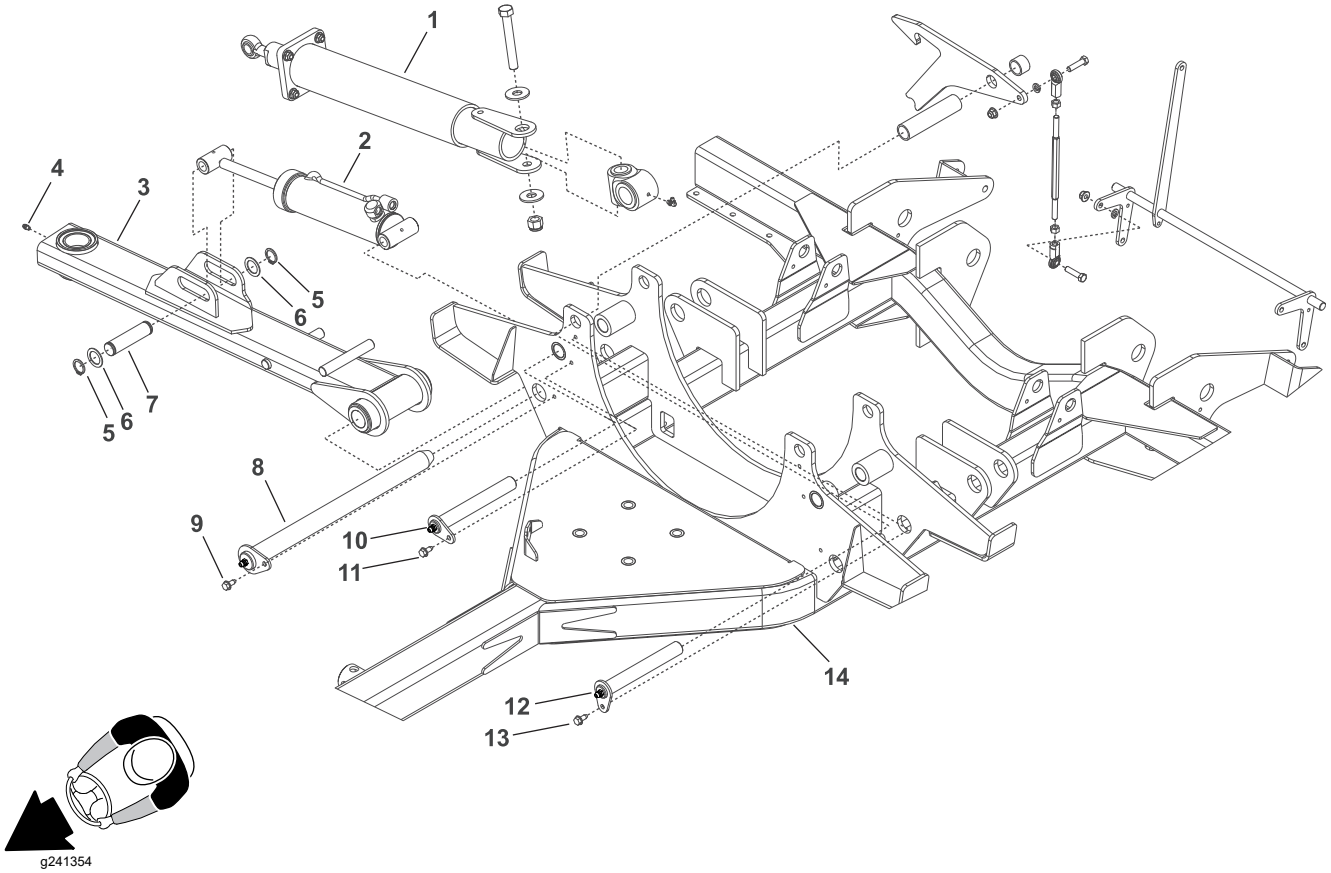


Figure 11

Right side lift arm assembly (shown)

1. Impact arm assembly
2. Lift cylinder
3. Lift arm (RH shown)
4. Grease fitting (2 each)
5. Snap ring (2 each)
6. Washer (2 each)
7. Pin
8. Lift arm pin assembly
9. Bolt
10. Lift cylinder pin assembly
11. Bolt
12. Latch wing pin assembly
13. Bolt
14. Frame assembly

Removing the Side Cutting Unit Lift Arm Assembly

Note: Refer to Figure 11 during this procedure.

1. Park the machine on a level surface, lower the cutting units and disengage the PTO. Remove the main drive shaft and disconnect the machine from the tow vehicle. Secure the machine with tow bar jack; refer to the *Groundsmaster 1200 Operator's Manual*.
2. Remove the cutting unit covers.
3. Remove the lift cylinder (2) from the side cutting unit lift arm (3); refer to Removing the Cutting Unit Lift Cylinder (page 4–9).
4. If necessary, remove the impact arm assembly (1) from the frame assembly (14); refer to Removing the Impact Arm Assembly (page 3–21).
5. Remove the side cutting unit lift arm (3) from the joint yoke and cutting unit connection; refer to Removing the Lift Arm Joint Yoke (page 3–14).
6. Remove the bolt (9), lift arm pin assembly (8) and remove the side cutting unit lift arm assembly (3) from the frame assembly (14).

Removing the Side Cutting Unit Lift Arm Assembly (continued)

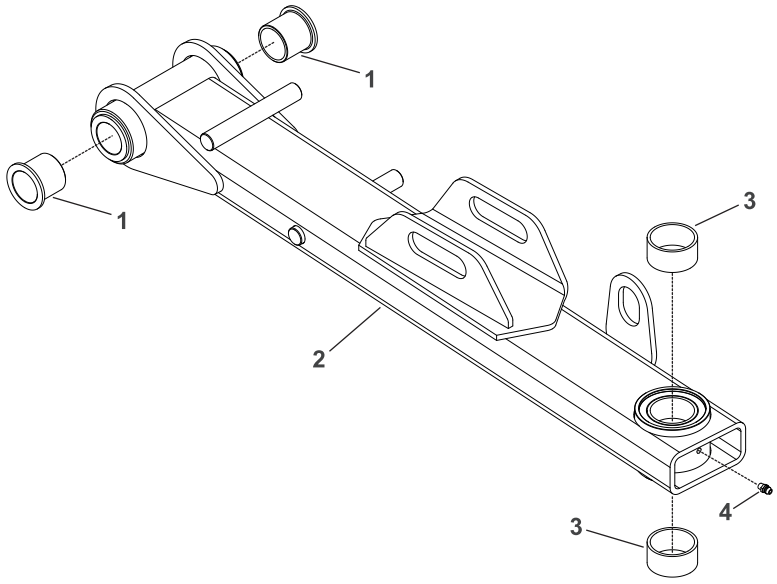


Figure 12

1. Flange bushing (2 each)
2. Lift arm assembly
3. Straight bushing (2 each)
4. Grease fitting

7. If necessary, remove the grease fitting (item 4 in Figure 12), flange bushings (1) and straight bushings (3) from the lift arm assembly (2).
8. Thoroughly clean the lift arm assembly bores (2).

Installing the Side Cutting Unit Lift Arm Assembly

1. If removed, install the grease fitting (4), flange bushings (1) and straight bushings (3) to the lift arm assembly (2).
2. Position the lift arm assembly onto the main frame assembly and secure with the lift arm pin.
3. Install the yoke joint and cutting unit connection to the side cutting unit lift arm; refer to Installing the Lift Arm Joint Yoke (page 3–16).
4. Install the impact arm assembly to the frame assembly; refer to Installing the Impact Arm Assembly (page 3–24).
5. Install the lift cylinder to the side cutting unit lift arm; refer to Installing the Cutting Unit Lift Cylinder (page 4–10).
6. Install the cutting unit covers.
7. Lubricate the grease fittings (4) after the assembly is complete; refer to *Groundsmaster 1200 Operator's Manual*.
8. Prior to returning the machine to service, raise and lower the cutting unit to verify that hydraulic hoses and fittings do not contact anything throughout the full range of movement.

Lift Arm Joint Yoke (side cutting units only)

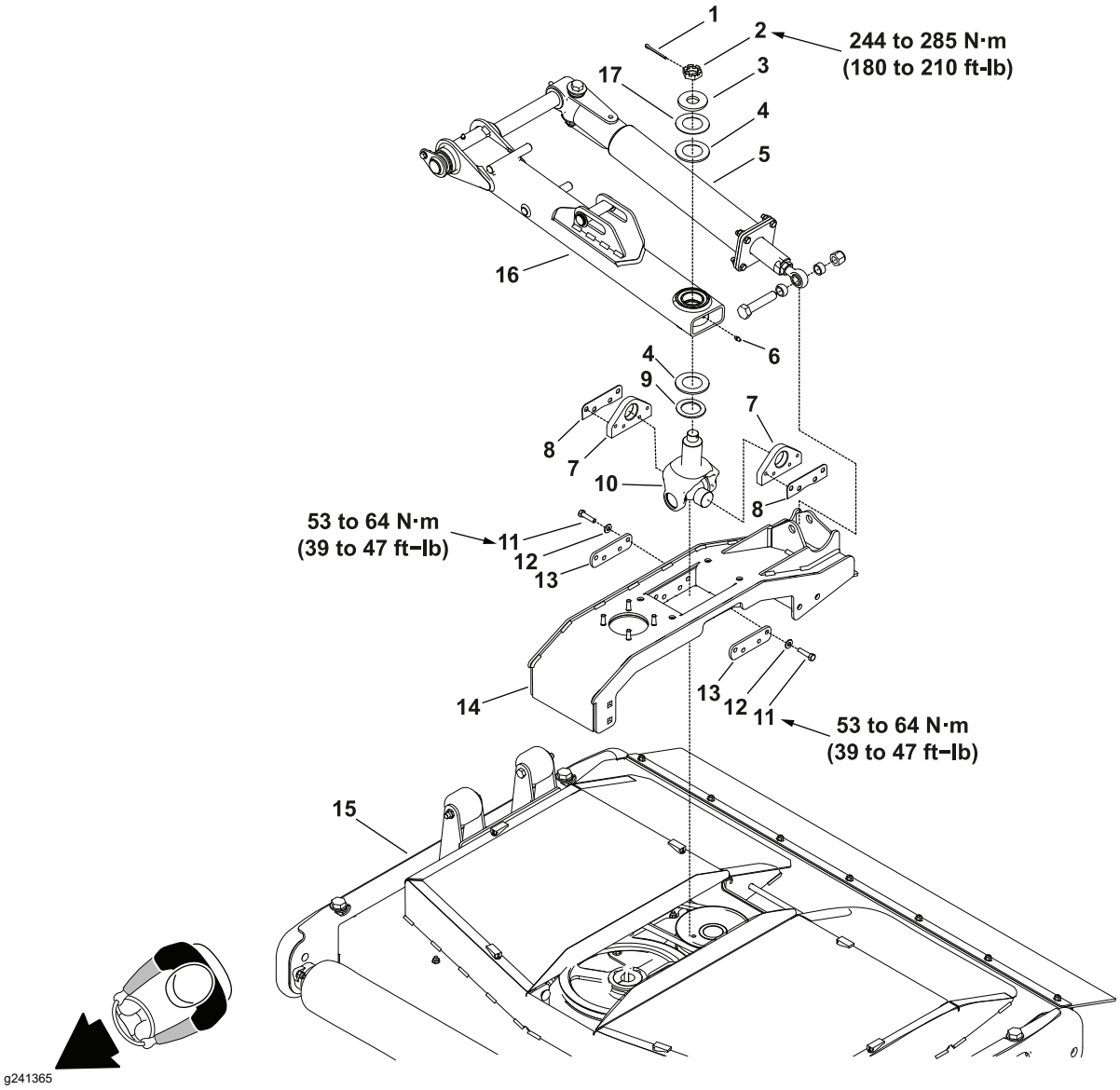


Figure 13

Left Side Cutting Unit (shown)

1.	Cotter pin	7.	Base mount (2 each)	13.	Bolt plate (2 each)
2.	Slotted hex nut	8.	Shim (2 each)	14.	Deck mount assembly
3.	Hardened washer	9.	Spacer - 4.2 mm (0.165 in)	15.	Cutting unit
4.	Thrust washer - 3.2 mm (0.125 in) (2 each)	10.	Joint yoke	16.	Lift arm
5.	Impact arm	11.	Bolt (8 each)	17.	Thrust washer - 0.8 mm (0.032 in)
6.	Grease fitting	12.	Hardened washer (8 each)		

Removing the Lift Arm Joint Yoke

Note: Refer to Figure 13 during this procedure.

1. Park the machine on a level surface, lower the cutting units and disengage the PTO. Remove the main drive shaft and disconnect the machine from the tow vehicle. Secure the machine with tow bar jack; refer to the *Groundsmaster 1200 Operator's Manual*.
2. Remove the cutting unit covers.

Removing the Lift Arm Joint Yoke (continued)

3. Remove the cotter pin (1), slotted hex nut (2), hardened washer (3) and thrust washers (4 and 17) from joint yoke shaft.
4. Remove the 8 bolts (11), hardened washers (12) and 2 bolt plates (13) that secure the base mounts to the deck mount assembly (14).
5. Raise the lift arm assembly (16) enough to free the joint yoke (10) and base mounts (7) from the lift arm assembly and deck mount assembly (14).
6. Locate and retrieve the thrust washers (4 and 17) and spacer (9) from the yoke shaft (10).
7. Locate and retrieve the shim (8) from between each base mount and deck mount assembly.

Disassembling the Joint Yoke

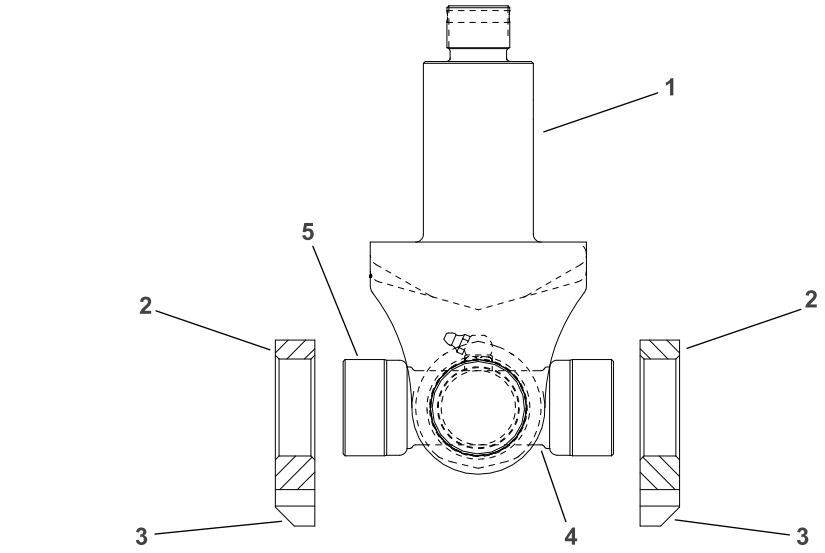


Figure 14

1. Joint yoke
2. Base mount
3. Angled edge
4. Cross
5. Roller Bearing Cap (4 each)

1. Remove the outer snap rings from the joint yoke.
2. Remove the base mounts and collect the bearing rollers. Press the bearing caps from the base mounts.
3. Use a press to remove the cross and remaining bearings from the yoke:

IMPORTANT

Support the yoke when removing the cross and bearings to prevent damaging the yoke.

A. Place a small socket against one bearing and a large socket against the yoke on the opposite side.
B. While supporting the large socket, apply pressure on small socket to partially push the opposite bearing into the large socket.
C. Remove the yoke from press, grasp partially removed bearing and tap on the yoke to completely remove the bearing.

Disassembling the Joint Yoke (continued)

D. Repeat process for remaining bearing.

E. Thoroughly clean and inspect all components.

Assembling the Joint Yoke

1. Apply a coating of grease to the bearing bores of the yoke and base mounts. Also, apply grease to the bearings and seals of the cross assembly.
2. Press one bearing partially into the yoke.

IMPORTANT

Take care when installing the cross into the bearing to avoid damaging the bearing seal.

3. Carefully insert the cross into the bearing and yoke.
4. Hold the cross in alignment and press the bearing until it hits the yoke.
5. Carefully place the second bearing into the yoke bore and onto the cross shaft. Press the bearing into the yoke.
6. Install the snap rings to the bearings to secure the bearings in place.
7. Install the remaining bearings on cross.
8. Press the base mounts onto the bearing caps with the angled edge of the mounts away from the joint; refer to Figure 14. The outside of the cross bearing cups should be flush with the base mount surfaces.
9. Ensure that the assembled joint yoke moves without binding. Slight binding can usually be eliminated by lightly rapping the yoke lugs with a soft faced hammer. If binding continues, disassemble joint yoke to identify and eliminate source of binding.

Installing the Lift Arm Joint Yoke

1. Install the joint yoke to the lift arm:

   A. Place a 4.2 mm (0.165 in) spacer (9) and then 3.2 mm (0.125 in) thrust washer (4) onto the joint yoke shaft.

   B. Insert the yoke shaft up through the lift arm bushings.

   C. Place a 3.2 mm (0.125 in) thrust washer (4) onto the joint yoke shaft followed by a 0.8 mm (0.032 in) thrust washer followed by a hardened washer (3). Use additional 0.8 mm (0.032 in) thrust washers as needed to remove as much clearance as possible between the thrust washer and the hardened washer.

   D. Install the slotted hex nut (2) to secure the joint yoke to the lift arm. Torque tighten the nut from **244 to 285 N·m (180 to 210 ft−lb)**. Ensure that the joint yoke rotates in lift arm without binding and that excessive clearance does not exist in the yoke assembly.

2. Carefully lower the lift arm to position base mounts to the cutting unit connection.

   Note: Orient yoke with the grease fitting towards the outside if the machine.

Installing the Lift Arm Joint Yoke (continued)

3. Install the shims (8) between the cutting unit connection and base mounts and secure the base mounts with 8 cap screws (11), hardened washers (12) and 2 bolt plates (13). Tighten the bolts (11) from **53 to 64 N·m (39 to 47 ft−lb)**.
4. Grease the joint yoke and lift arm bushing after installation.
5. Before returning the machine to service, raise and lower the cutting unit to verify that hydraulic hoses and fittings do not contact anything throughout the full range of movement.

Rear Cutting Unit Lift Arm Assembly

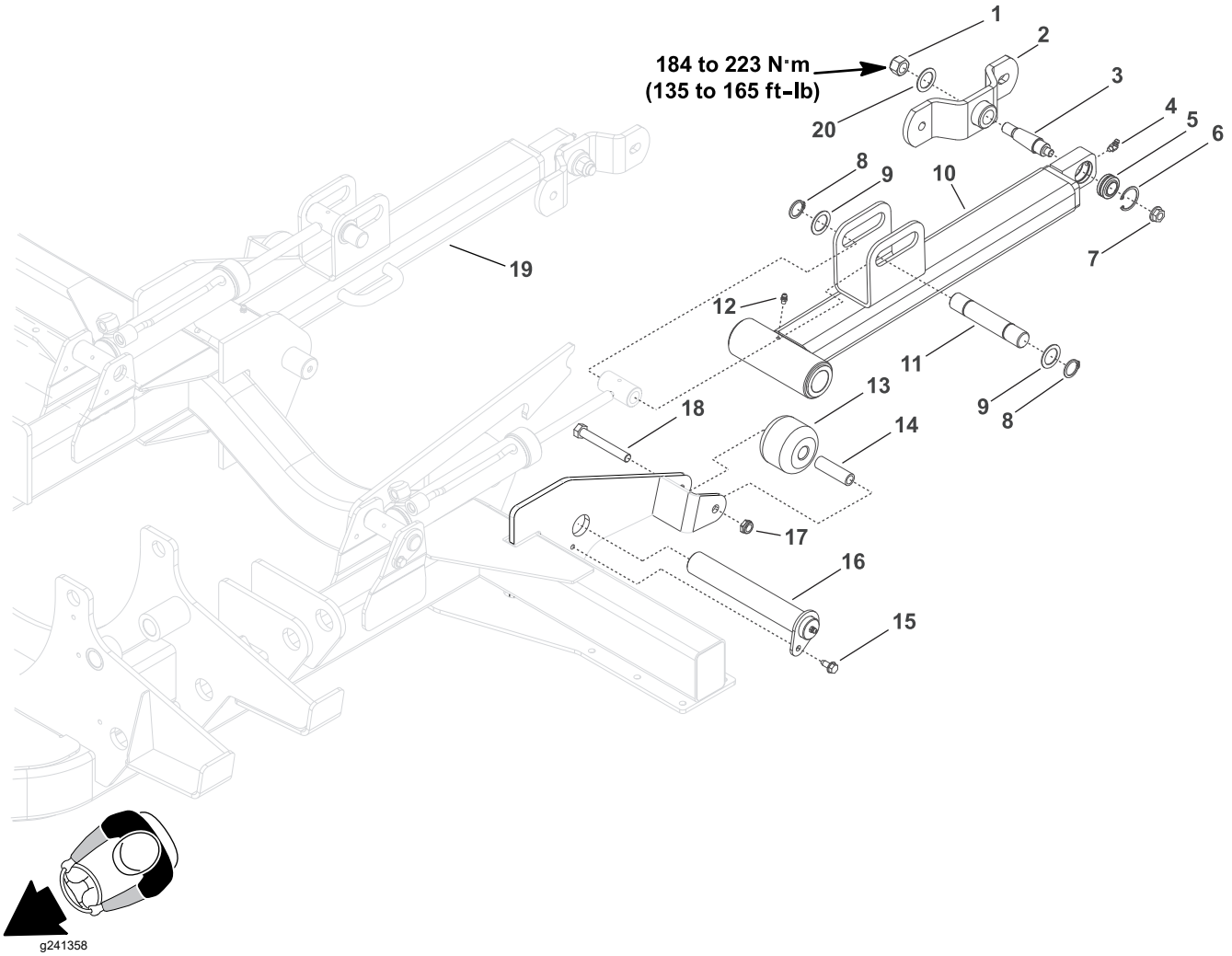


Figure 15

1. Lock nut
2. Hub support assembly
3. Tapered stud
4. Grease fitting
5. Spherical bearing
6. Retaining ring
7. Flange nut
8. Retaining ring (2 each)
9. Thrust washer (2 each)
10. Lift arm LH assembly
11. Cylinder pin
12. Grease fitting
13. Roller
14. Spacer tube
15. Washer head bolt
16. Lift arm pin assembly
17. Hex nut
18. Bolt
19. Lift arm RH assembly
20. Flat washer

Removing the Rear Cutting Unit Lift Arm Assembly

Note: Refer to Figure 15 during this procedure.

1. Park the machine on a level surface, lower the cutting units and disengage the PTO. Remove the main drive shaft and disconnect the machine from the tow vehicle. Secure the machine with tow bar jack; refer to the *Groundsmaster 1200 Operator's Manual*.
2. Remove the cutting unit covers.
3. Remove the lift cylinders from the cutting unit lift arms; refer to Removing the Cutting Unit Lift Cylinder (page 4–9).
4. Remove the washer head bolt (15) that secure the lift arm pin assembly (16).
5. Support the lift arm (10) and slide the lift arm pin assembly (16).

Removing the Rear Cutting Unit Lift Arm Assembly (continued)

6. Remove the nuts, bolts and washers that secures the hub support assembly to the cutting unit assembly.
7. Remove the cutting unit lift arm assembly from the machine.
8. As required, disassemble the lift arm assembly:
   A. Remove the flange nut (7) and carefully drive the tapered shaft and hub support from the lift arm.
   B. Remove the retaining ring and spherical bearing from the lift arm.
   C. Press the flange bushing from the lift arm. Thoroughly clean lift arm bore.
   D. If necessary, remove the lock nut (1), washer (20) and press the hub support (2) from the tapered stud (3).
   E. If necessary, remove the grease fitting from the lift arm.

Installing the Rear Cutting Unit Lift Arm Assembly

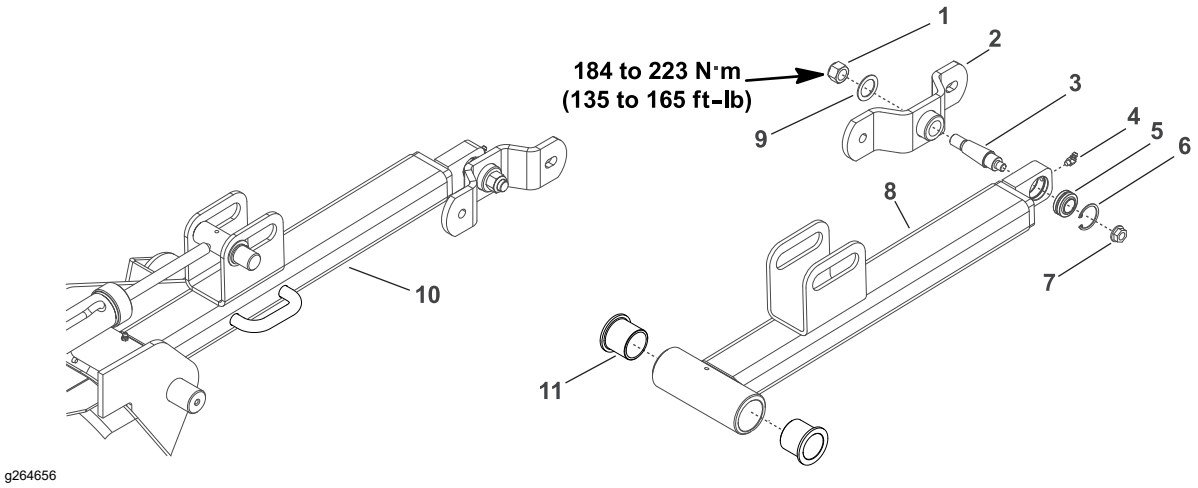


Figure 16

1. Lock nut (2 each)
2. Hub support assembly (2 each)
3. Tapered stud (2 each)
4. Grease fitting (2 each)
5. Spherical bearing (2 each)
6. Retaining ring (2 each)
7. Flange nut (2 each)
8. Lift arm LH assembly
9. Flat washer (2 each)
10. Lift arm RH assembly
11. Flange bushing (4 each)

1. If removed, install the components to the lift arm:
   A. The grease fitting (4) into the lift arm (8).
   B. Lightly lubricate the new flange bushings (11) and press the bushings all the way into lift arm. Ensure that the bushing flange is pressed fully to the lift arm surface.
   C. The spherical bearing (5) onto the tapered stud (3) and secure with the flange nut (7). Install the stud (3) and spherical bearing into the lift arm and secure with the retaining ring (6).

D. Thoroughly clean the tapered surfaces of the stud (3) and mounting boss of hub support. Secure the hub support to tapered stud with a flat washer and lock nut. Tighten the lock nut (1) from **184 to 223 N·m (135 to 165 ft-lb)**.

2. Position the slotted hole of the hub supports toward the rear of the machine and install the cutting unit lift arm assembly (10) to the cutting unit and secure with 4 nuts, bolts and washers.
3. Align the lift arm assembly (10) to the frame and install the lift arm pin assembly (15) and bolt.
4. Install the lift cylinders to the cutting unit lift arm; refer to Installing the Cutting Unit Lift Cylinder (page 4–10).
5. Install the cutting unit covers.
6. Lubricate the grease fittings after the assembly is complete; refer to *Groundsmaster 1200 Operator's Manual*.
7. Before returning the machine to service, raise and lower the cutting unit to verify that hydraulic hoses and fittings do not contact anything throughout the full range of movement.

Impact Arm Assembly

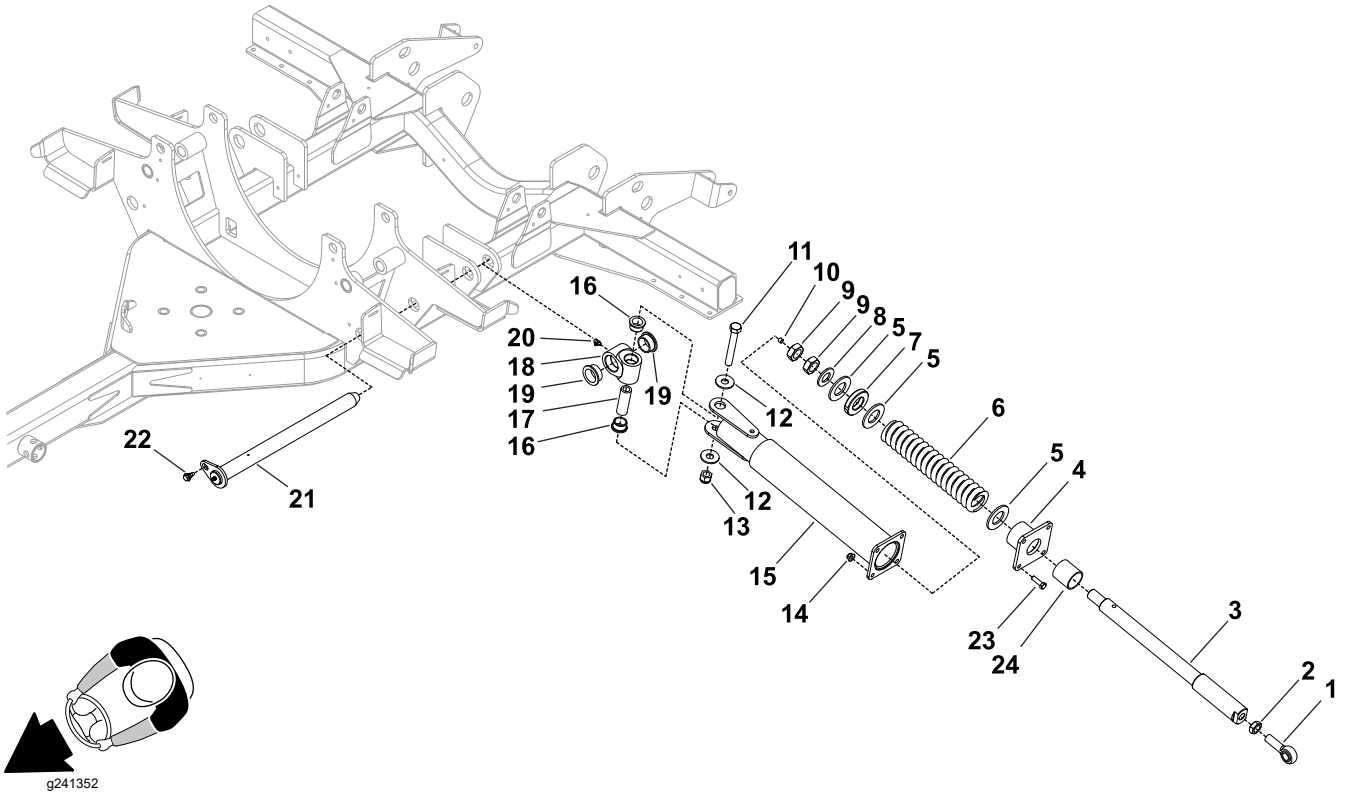


Figure 17

1.	Rod end	9.	Jam nut (2 each)	17.	Spacer tube
2.	Jam nut	10.	Pipe plug	18.	Pivot hub
3.	Spring shaft	11.	Bolt	19.	Flange bushing (2 each)
4.	Housing	12.	Flat washer (2 each)	20.	Grease fitting
5.	Washer (3 each)	13.	Lock nut	21.	Lift arm pin assembly
6.	Spring	14.	Flange nut (4 each)	22.	Bolt
7.	Plastic bearing	15.	Impact arm housing	23.	Bolt (4 each)
8.	Flat washer	16.	Flange bushing (2 each)	24.	Plain bushing

Removing the Impact Arm Assembly

Note: Refer to Figure 8 during this procedure.

1. Park the machine on a level surface, lower the cutting units and disengage the PTO. Remove the main drive shaft and disconnect the machine from the tow vehicle. Secure the machine with tow bar jack; refer to the *Groundsmaster 1200 Operator's Manual*.

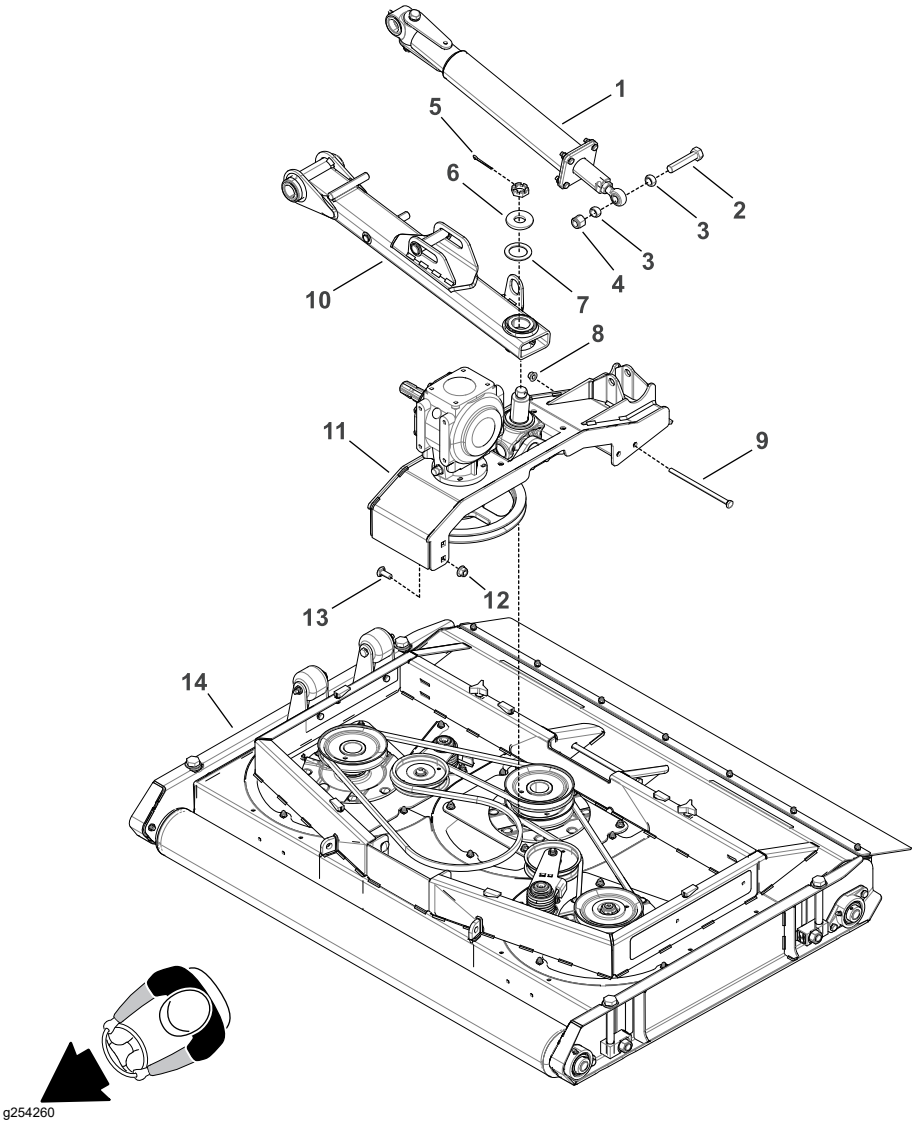


Figure 18

1.	Impact arm assembly	6.	Hardened washer	11.	Deck mount assembly
2.	Bolt	7.	Thrust washer	12.	Nut (4 each)
3.	Spindle spacer (2 each)	8.	Nut (2 each)	13.	Carriage bolt (4 each)
4.	Lock nut	9.	Bolt (2 each)	14.	Cutting unit
5.	Nut	10.	Lift arm assembly		

2. Remove the nut (item 4 in Figure 18), spacers (3) and the bolt (2) that secures the impact arm assembly (1) to cutting unit assembly (14).
3. Remove the bolt (item 11 in Figure 17), lock nut (13) and flat washers (12) that secures the rod end of the impact arm to the cutting unit frame.
4. Remove the bolt (22) and the lift arm pin assembly (21) from the machine and remove the pivot hub (18).

Disassembling the Impact Arm Assembly

1. Disassemble the impact arm assembly (15) and pivot hub (18) as required.
2. Thoroughly clean the impact arm components and inspect for worn parts. Replace components as needed.

Assembling the Impact Arm Assembly

1. Slide the washer (5), compression spring (6), second washer (5), plastic bearing (7), third washer (5), flat washer (8) and one jam nut (9) onto the spring shaft (3). Tighten jam nut so that spring length is **30.4 cm (12 inch)**.
2. Fit housing (4) over the rod end of assembled spring shaft assembly and insert assembly into the impact arm housing.
3. Temporarily secure the housing to impact arm housing with two bolts (23) and flange nuts (14).

IMPORTANT

All endplay must be removed from spring shaft assembly to allow proper operation and ensure long life.

4. Grasp end of the spring shaft. Push inward and pull outward on shaft to determine if endplay exists between the spring shaft assembly and impact arm housing assembly.
5. If endplay in the spring shaft assembly exists, insert a 3/4 inch socket onto the jam nut on spring shaft. Access to the jam nut can be obtained through the open end of the impact arm housing. Loosen jam nut (9) until all endplay in the shaft is removed.
6. When no endplay exists in the spring shaft assembly, remove the two cap screws and nuts securing the housing to the impact arm housing and remove the spring shaft assembly from the housing.

7. Thread second jam nut (9) onto the end of the spring shaft (4). While holding first jamnut with a wrench to prevent it from turning, tightening second jam nut from **184 to 223 N·m (135 to 165 ft-lb)** to secure the spring adjustment.
8. Thoroughly pack spring (6) with the grease. Apply approximately 1.1 kg (40 oz) of grease to clean spring.
9. Install the spring shaft assembly into impact arm housing and secure the housing with 4 bolts (23) and flange nuts (14).

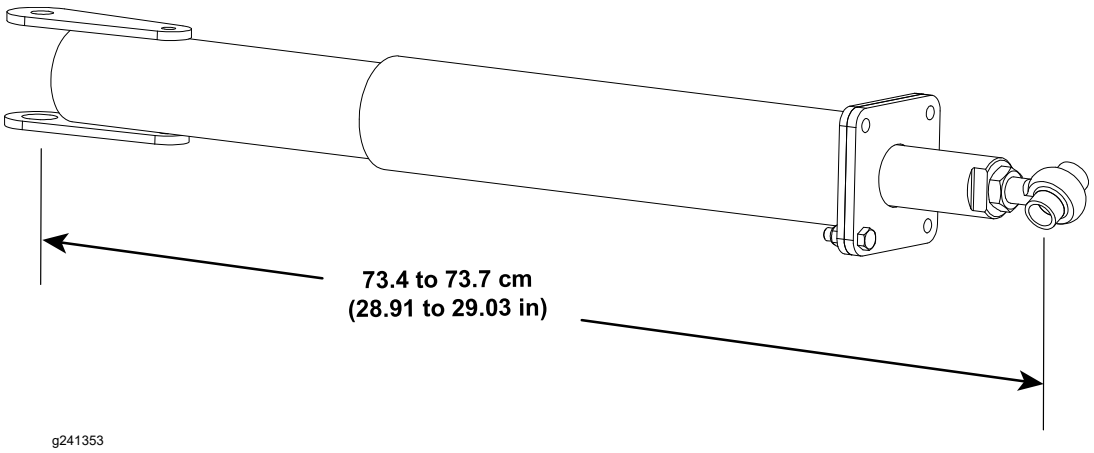


Figure 19

10. Thread rod end (1) with jam nut (2) into end of the spring shaft so that distance from center of the impact housing mounting hole is from **73.4 to 73.7 cm (28.91 to 29.03 in)**; refer to Figure 19. Do not tighten the jam nut until the impact arm is installed to cutting unit.

Installing the Impact Arm Assembly

1. Install the new pivot hub bushings (16 and 19).
2. Install the grease fitting (20) onto the pivot hub (18).

   Note: The orientation of the grease fitting (20) should be towards the small flange bushing (16).
3. Position the pivot hub assembly (18) onto the machine frame assembly.
4. Slide the lift arm pin assembly (21) through the pivot hub (18) and frame assembly. Secure the pin assembly (21) with a bolt (22).
5. Position the impact arm assembly onto the pivot hub (18) and secure with the washers (12), bolt (11) and lock nut (13).
6. Install the impact arm assembly (1) onto the cutting unit assembly (14) and secure with the bolt (2), spacers (3) and nut (4).
7. Tighten the rod end jam nut.
8. Lubricate the impact arm pivot hub grease fitting.
9. Before returning the machine to service, raise and lower the cutting unit to verify that hydraulic hoses and fittings do not contact anything throughout the entire range of movement.

Latch Linkage Assembly

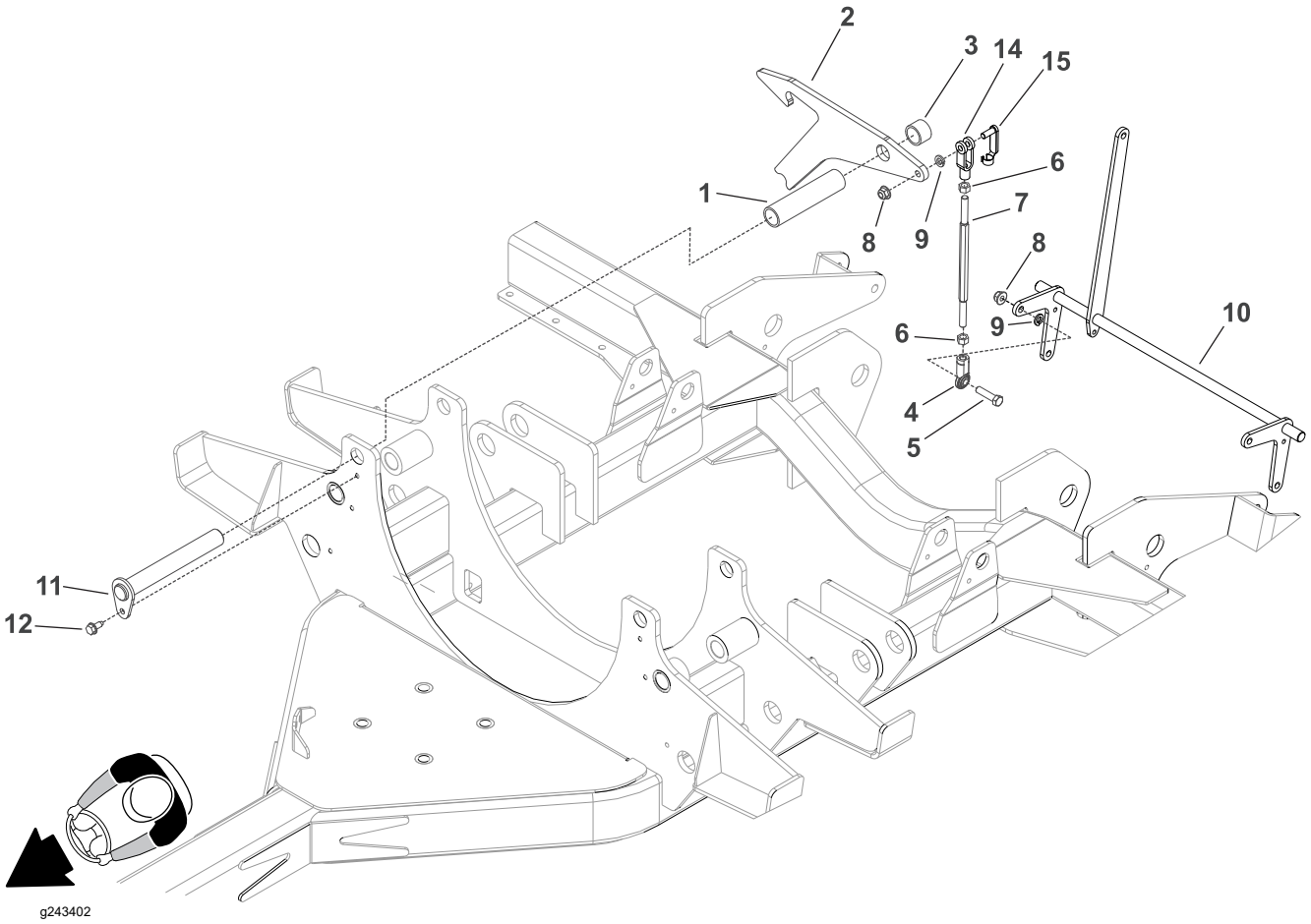


Figure 20

Side Cutting Unit Assembly (shown)

1. Latch spacer
2. Wing latch
3. Latch spacer
4. Rod end (left-hand thread)
5. Bolt
6. Hex nut (left or right-hand thread) (2 each)
7. Quadrant linkage rod
8. Flat head nut
9. Lock washer (2 each)
10. Latch shaft assembly
11. Wing latch pin assembly
12. Washer head bolt
13. Yoke linkage
14. Clevis spring pin

The entire latch linkage assembly must be secure and move freely. Repair or replace the latch linkage assembly components as necessary.

Adjust the quadrant linkage rod so that the clevis spring pin is centered in the slot of the wing latch.

Latch Linkage Assembly (continued)

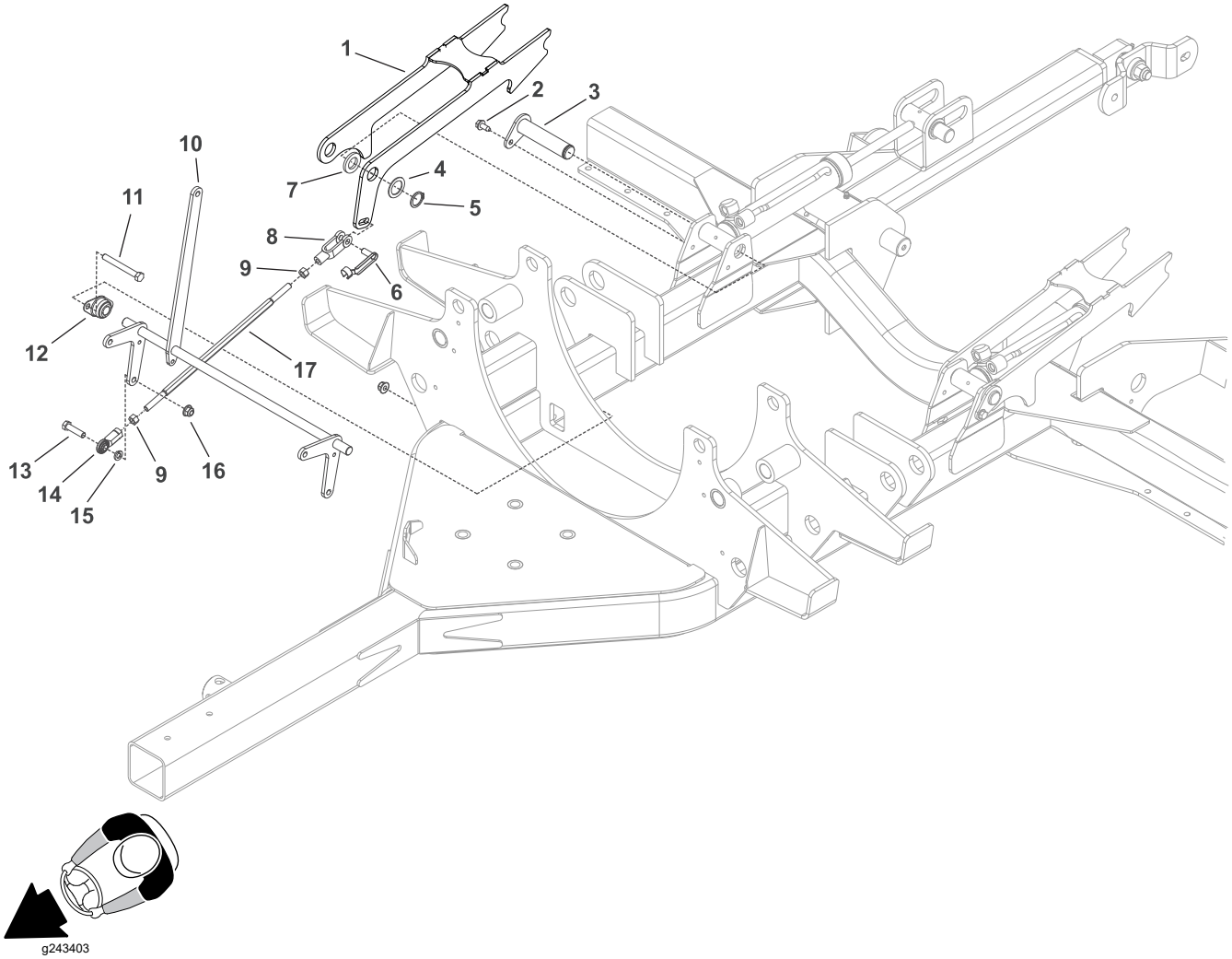


Figure 21

Rear Cutting Unit Assembly (shown)

1.	Rear latch	7.	Flat washer	13.	Bolt
2.	Washer head bolt	8.	Linkage brake yoke	14.	Rod end (left or right-hand thread)
3.	Latch pin assembly	9.	Hex nut (left or right-hand thread) (2 each)	15.	Lock washer
4.	Thrust washer	10.	Latch shaft assembly	16.	Flat head nut
5.	Retaining ring	11.	Bolt (2 each)	17.	Quadrant linkage rod
6.	Clevis spring pin	12.	Flange bushing mount		

After assembly, check the latch linkage assembly operation and re-adjust as necessary.

Chapter 4

Hydraulic System

Table of Contents

General Information

The Operator's Manual provides information regarding the operation, general maintenance, and maintenance intervals for your Groundsmaster 1200 Pull-Behind Rotary Mower. Refer to the Operator's Manual for additional information when servicing the Groundsmaster 1200 Pull-Behind Rotary Mower.

Hydraulic Hoses

The hydraulic hoses are subject to extreme conditions such as pressure differentials during operation and exposure to weather, sun, chemicals, very warm storage conditions, in addition to mishandling during operation and maintenance. These conditions can cause damage to the hose or deterioration to the hose material. Some hoses are more susceptible to these conditions than others. Examine all of the hydraulic hoses of the machine frequently and repair or replace them as necessary. Hoses that move during normal machine operation (cutting unit drive motors for example) should be replaced every 2 years. Check hydraulic hoses for the following signs of deterioration or damage:

- Hydraulic hoses should not be hard, cracked, cut, abraded, charred, leaking, or otherwise damaged.
- Hydraulic hoses should not be kinked, crushed, flattened, or twisted.
- Hydraulic hose covers should not be blistered, soft, degraded, or loose.
- Hydraulic hose fittings should not be cracked, damaged, or badly corroded.

⚠ WARNING ⚠

Release all pressure in the hydraulic system before performing any work on the hydraulic system:

- **Keep your body and hands away from pin-hole leaks or nozzles that eject hydraulic fluid under high pressure.**
- **Do not use your hands to search for leaks; use a piece of paper or cardboard.**
- **Hydraulic fluid escaping under pressure can have sufficient force to penetrate the skin and cause serious injury.**
- **If hydraulic fluid is injected into your skin, the fluid damage to your body must be surgically removed within a few hours by a doctor familiar with this form of injury or gangrene may result.**

When you replace a hydraulic hose, ensure that the hose is straight (not twisted) before you tighten the fittings. Observe the imprint (layline) on the hose to do this. Using two wrenches, hold the hose straight with one wrench and tighten the hose swivel nut onto the fitting with the other wrench; refer to Installing Hydraulic Hoses and Tubes (O-Ring Face Seal) (page 4–3).

Note: If the hose has an elbow at one end, tighten the swivel nut on the elbow end before you tighten the nut on the straight end of the hose.

For more hydraulic hose information, refer to the Toro Basics Series Training Book *Hydraulic Hose Servicing* (Part No. 94813SL).

Installing Hydraulic Hoses and Tubes (O-Ring Face Seal)

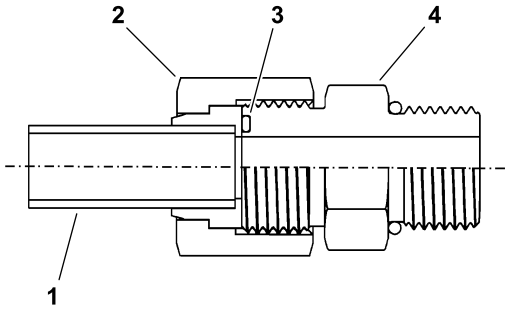


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Figure 22

1. Tube or hose
2. Swivel nut
3. O-ring
4. Fitting body

1. Ensure that all the threads, the sealing surfaces of the hose/tube, and the fitting are free of burrs, nicks, scratches, or unwanted material.
2. To help prevent a hydraulic leak, replace the face seal O-ring when you open the connection. Ensure that the O-ring is installed and correctly seated in the groove of the fitting. Lightly lubricate the O-ring with clean hydraulic fluid.
3. Align the hose/tube against the body of the fitting so that the flat face of the hose/tube sleeve fully touches the O-ring in the fitting (Figure 22).
4. Use your hand to thread the swivel nut onto the fitting. While you hold the hose/tube in alignment with a wrench, use a torque wrench to tighten the swivel nut to the recommended torque value within the specified range of torque values; refer to the Hose/Tube Installation Torque Table (page 4–4). This procedure to tighten the swivel nut requires a drive-adapter wrench (e.g., crowfoot wrench).

   Note: It may be necessary to use a drive-adapter wrench (e.g., crowfoot wrench) to install a hydraulic fitting; refer to Calculating the Torque Values When Using a Drive-Adapter Wrench (page 2–5).

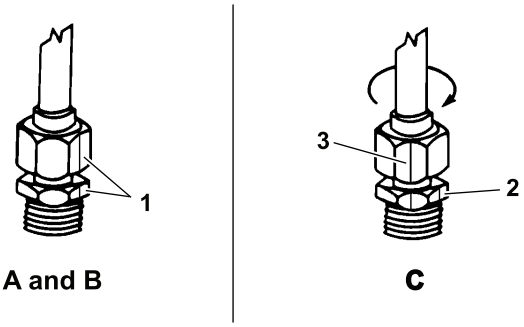

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Figure 23

1. Mark swivel nut and fitting body
2. Initial position
3. Final position

Installing Hydraulic Hoses and Tubes (O-Ring Face Seal) (continued)

Hose/Tube Installation Torque Table

Fitting Dash Size	Hose/Tube Side Thread Size (inch(es)—threads per inch)	Installation Torque
4	9/16—18	25 to 29 N·m (18 to 22 ft-lb)
6	11/16—16	37 to 44 N·m (27 to 33 ft-lb)
8	13/16—16	51 to 63 N·m (37 to 47 ft-lb)
10	1—14	82 to 100 N·m (60 to 74 ft-lb)
12	1–3/16—12	116 to 142 N·m (85 to 105 ft-lb)
16	1–7/16—12	150 to 184 N·m (110 to 136 ft-lb)
20	1–11/16—12	190 to 233 N·m (140 to 172 ft-lb)

Flats From Wrench Resistance Table

Size	FFWR
4 (1/4 inch nominal hose or tubing)	1/2 to 3/4
6 (3/8 inch)	1/2 to 3/4
8 (1/2 inch)	1/2 to 3/4
10 (5/8 inch)	1/2 to 3/4
12 (3/4 inch)	1/3 to 1/2
16 (1 inch)	1/3 to 1/2

5. If a torque wrench is not available or if space at the swivel nut prevents the use of a torque wrench, use the alternative procedure Flats From Wrench Resistance (FFWR) given below:

   A. Use a wrench to tighten the swivel nut onto the fitting until you feel light resistance with the wrench—approximately **3.39 N·m (30 in-lb)**.

   B. Put a mark on the swivel nut and body of the fitting (item 1 Figure 23). If connecting a hose, hold the hose in alignment with a wrench to prevent the hose from turning.

   C. Use a wrench to tighten the nut to the correct Flats From Wrench Resistance (compare items 2 and 3 in Figure 23).

Installing the Hydraulic Fittings (SAE Straight Thread O-Ring Fittings)

Installing a Non-Adjustable Fitting

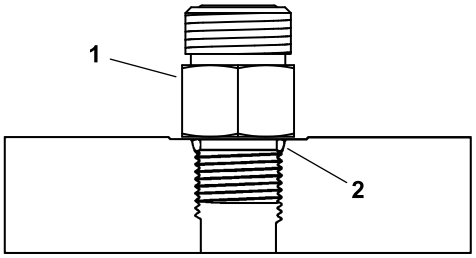

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Figure 24

1. Fitting
2. O-ring

1. Ensure that all the threads, the sealing surfaces of fitting, and the component port are free of burrs, nicks, scratches, or unwanted material.
2. To help prevent a hydraulic leak, replace the O-ring when you open the connection.
3. Lightly lubricate the O-ring with clean hydraulic fluid. Ensure that the threads of the fitting are clean with no lubricant applied.

IMPORTANT

Before tightening the fitting, determine the material used for the port the fitting is being installed in. Installing a fitting into an aluminum port requires reducing the installation torque.

4. Install the fitting into the port, then use a torque wrench and socket to tighten the fitting to the recommended torque value within the specified range of torque values; refer to the Fitting Installation Torque Table (page 4–7).

   Note: It may be necessary to use a drive-adapter wrench (e.g., crowfoot wrench) to install a hydraulic fitting; refer to Calculating the Torque Values When Using a Drive-Adapter Wrench (page 2–5).
5. If a torque wrench is not available or if space at the port prevents the use of a torque wrench, use the Flats From Finger Tight (FFFT) procedure given below:
   A. Install the fitting into the port and tighten the fitting down full length until finger-tight.
   B. If the port material is steel, tighten the fitting to the listed value; refer to the Flats From Finger Tight (FFFT) Table (page 4–7).
   C. If the port material is aluminum, tighten the fitting to 60% of the listed value; refer to the Flats From Finger Tight (FFFT) Table (page 4–7).

Installing an Adjustable Fitting

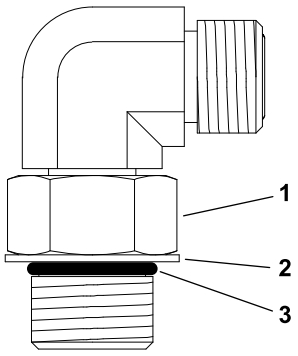

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Figure 25

1. Locknut
2. Back-up washer
3. O-ring

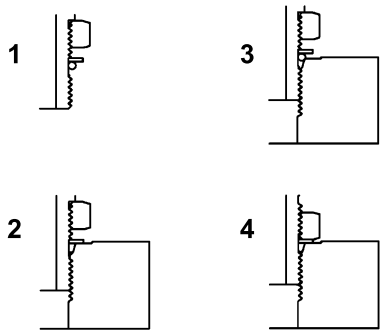

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Figure 26

1. Step 1: clearance the lock nut
2. Step 2: seat the back-up washer
3. Step 3: align the fitting
4. Step 4: tighten the lock nut

1. Ensure that all the threads, the sealing surfaces of fitting, and the component port are free of burrs, nicks, scratches, or unwanted material.
2. To help prevent a hydraulic leak, replace the O-ring when you open the connection.
3. Lightly lubricate the O-ring with clean hydraulic fluid. Ensure that the threads of the fitting are clean with no lubricant applied.
4. Turn back the lock nut as far as possible. Ensure that the back-up washer is not loose and it is pushed up as far as possible (Step 1 in Figure 26).
5. Install the adjustable fitting into the port by hand until the washer contacts the face of the port (Step 2 in Figure 26).
6. If the adjustable fitting needs to align with another component, rotate the fitting counterclockwise until it is aligned to the desired position (Step 3 in Figure 26). Do not rotate the adjustable fitting more than 1 turn counterclockwise.

IMPORTANT

Before tightening the fitting, determine the material used for the port the fitting is being installed in. Installing a fitting into an aluminum port requires reducing the installation torque.

Installing an Adjustable Fitting (continued)

7. Tighten the fitting lock nut (Step 4 in Figure 26):
   A. Hold the fitting in the correct alignment with a wrench and use a torque wrench and tighten the lock nut to the recommended torque value within the specified range of torque values; refer to the Fitting Installation Torque Table (page 4–7). This tightening procedure requires a drive-adapter wrench (e.g., crowfoot wrench); refer to Calculating the Torque Values When Using a Drive-Adapter Wrench (page 2–5).
   B. If a torque wrench is not available or if space at the port prevents the use of a torque wrench, hold the fitting in the correct alignment with a wrench and tighten the lock nut with a second wrench.
   C. If the port material is steel, tighten the fitting to the listed Flats From Finger Tight (FFFT) value; refer to the Flats From Finger Tight (FFFT) Table (page 4–7).
   D. If the port material is aluminum, tighten the fitting to 60% of the listed FFFT value; refer to the Flats From Finger Tight (FFFT) Table (page 4–7).

Fitting Installation Torque Table

Fitting Dash Size	Fitting Port Side Thread Size (inch(es)—threads per inch)	Installation Torque Into Steel Port	Installation Torque Into Aluminum Port
4	7/16—20	21 to 25 N·m (15 to 19 ft-lb)	13 to 15 N·m (9 to 11 ft-lb)
5	1/2—20	25 to 29 N·m (18 to 22 ft-lb)	15 to 20 N·m (11 to 15 ft-lb)
6	9/16—18	47 to 56 N·m (34 to 42 ft-lb)	28 to 35 N·m (20 to 26 ft-lb)
8	3/4—16	79 to 97 N·m (58 to 72 ft-lb)	48 to 58 N·m (35 to 43 ft-lb)
10	7/8—14	135 to 164 N·m (99 to 121 ft-lb)	82 to 100 N·m (60 to 74 ft-lb)
12	1–1/16—12	182 to 222 N·m (134 to 164 ft-lb)	110 to 134 N·m (81 to 99 ft-lb)
14	1–3/16—12	217 to 265 N·m (160 to 196 ft-lb)	131 to 160 N·m (96 to 118 ft-lb)
16	1–5/16—12	274 to 336 N·m (202 to 248 ft-lb)	165 to 202 N·m (121 to 149 ft-lb)
20	1–5/8—12	335 to 410 N·m (247 to 303 ft-lb)	202 to 248 N·m (149 to 183 ft-lb)

Flats From Finger Tight (FFFT) Table

Size	FFFT
4 (1/4 inch nominal hose or tubing)	1.00 ± 0.25
6 (3/8 inch)	1.50 ± 0.25
8 (1/2 inch)	1.50 ± 0.25
10 (5/8 inch)	1.50 ± 0.25
12 (3/4 inch)	1.50 ± 0.25
16 (1 inch)	1.50 ± 0.25

Hydraulic Schematic

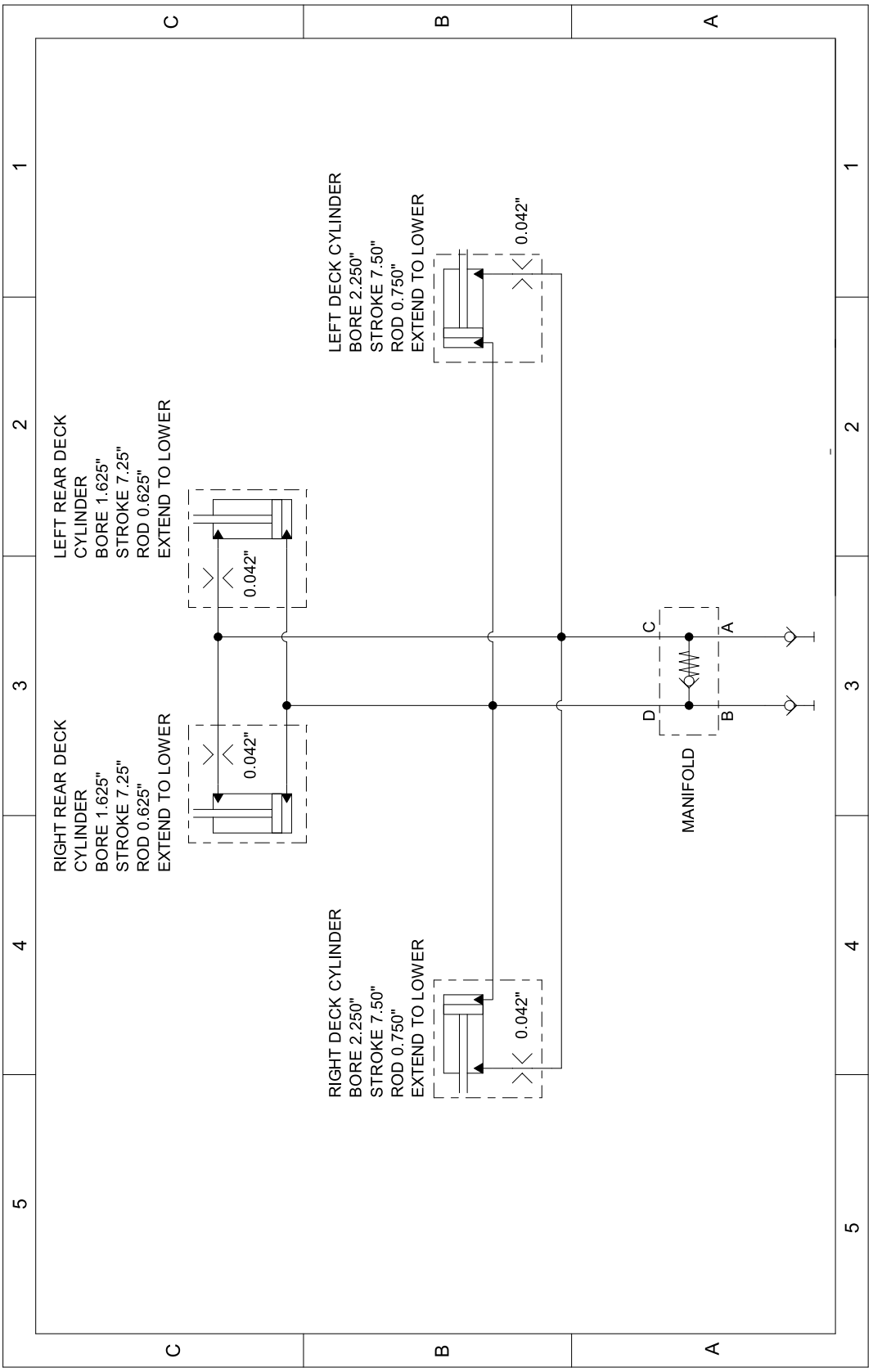

Figure 27

Service and Repairs

Cutting Unit Lift Cylinder

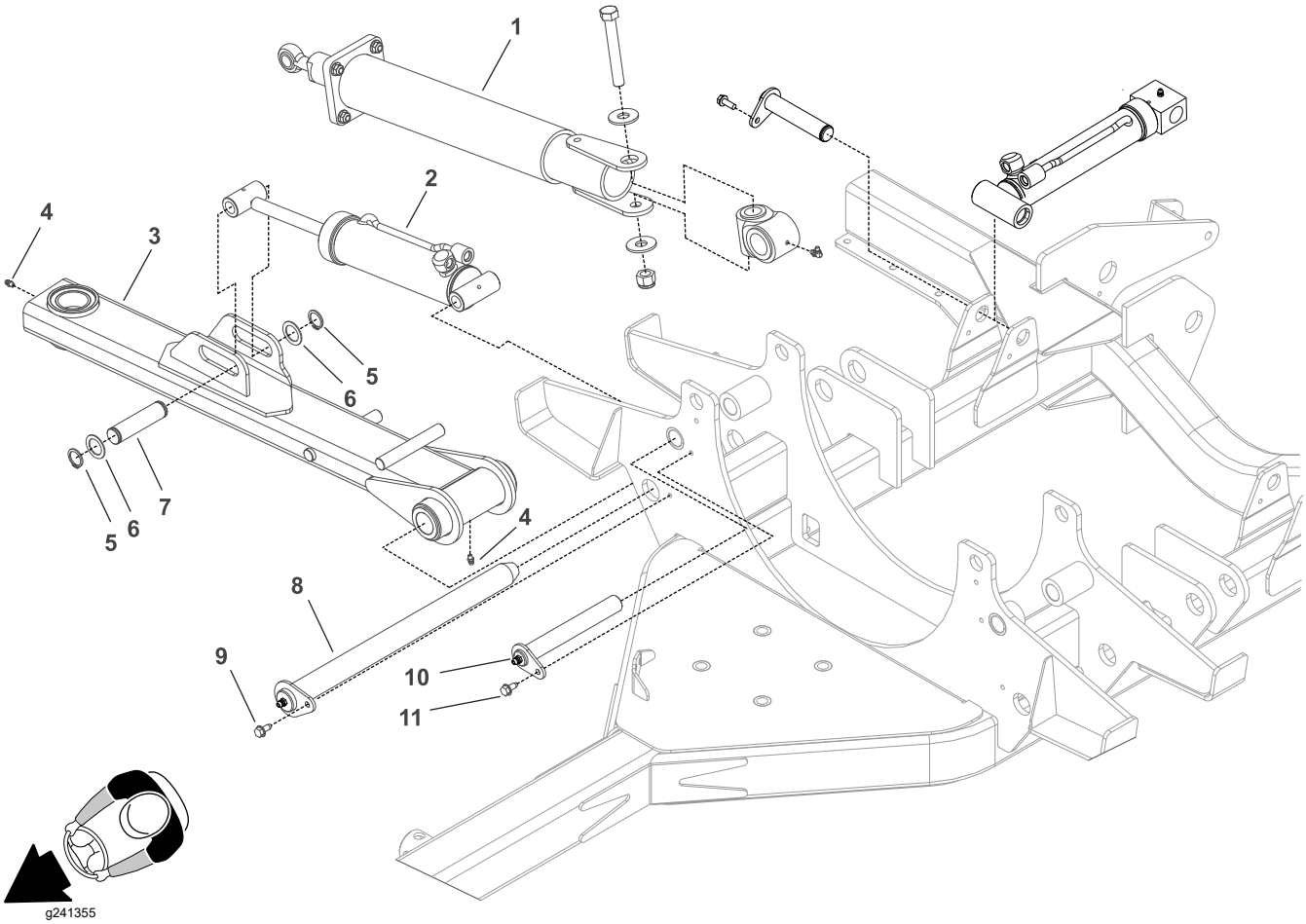

Figure 28

1. Impact arm assembly
2. Lift cylinder
3. Lift arm (RH shown)
4. Grease fitting (2 each)
5. Snap ring (2 each)
6. Washer (2 each)
7. Pin
8. Lift arm pin assembly
9. Bolt
10. Lift cylinder pin assembly
11. Bolt

Removing the Cutting Unit Lift Cylinder

Note: Refer to Figure 28 during this procedure.

1. Park the machine on a level surface, lower the cutting units and disengage the PTO. Remove the main drive shaft and disconnect the machine from the tow vehicle. Secure the machine with tow bar jack; refer to the *Groundsmaster 1200 Operator's Manual*.

   Note: Read the general precautions for removing and installing the hydraulic system components.

2. To prevent contamination of hydraulic system during the lift cylinder removal, thoroughly clean exterior of the cylinder and fittings.

Removing the Cutting Unit Lift Cylinder (continued)

WARNING

Ensure that the cutting units are fully lowered before loosening any of the machine hydraulic lines. If cutting units are not fully lowered as the hydraulic lines are loosened, the cutting unit may drop unexpectedly.

Note: To ease assembly, label all hydraulic hoses prior to disassembly to identify their correct position on the lift cylinder (item 2 in Figure 28).

3. Disconnect the hydraulic hoses from the lift cylinder fittings. Put caps or plugs on fittings and hoses to prevent contamination. Tag hydraulic lines for proper assembly.
4. Remove the snap rings (5), washers (6) and pin (7) that secures the lift cylinder (2) to the lift arm assembly (3).
5. Remove the bolt (11) that secures the lift cylinder pin assembly (10) to machine frame and remove the lift cylinder pin assembly (10).
6. Remove the lift cylinder (2) from the machine.
7. Remove the cylinder fitting and discard the O-rings.

Installing the Cutting Unit Lift Cylinder

1. If fittings were removed from the cylinder, lubricate and place new O-rings onto the fittings. Install the fittings onto cylinder ports using marks made during the removal process to properly orientate fittings.
2. Position the lift cylinder (2) onto the frame assembly and secure with the lift cylinder pin assembly (10) with the bolt (11).
3. Position the lift cylinder (2) into the lift arm assembly (3) and secure with the pin (7), washers (6) and snap rings (5).
4. Remove the caps or plugs from the hydraulic fittings and attache the hydraulic hoses to the lift cylinder.
5. Lubricate the lift cylinder grease fittings.
6. Before returning the machine to service, operate the lift cylinder from stop to stop to verify that the hydraulic hoses and fittings are not contacted by anything.
7. Check the hydraulic system for leaks and repair as necessary.

Servicing the Cutting Unit Lift Cylinder

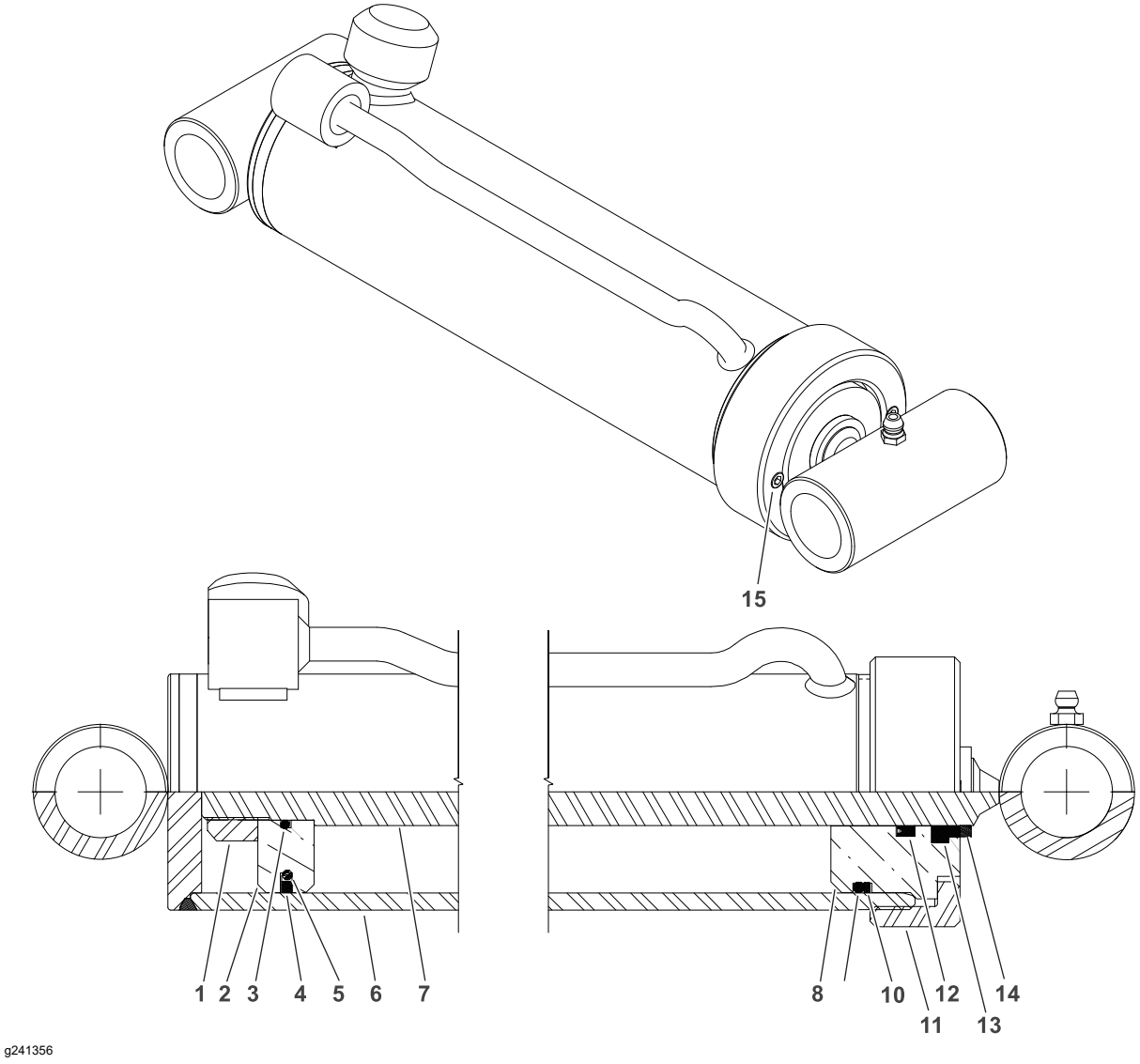

Figure 29

Side Cutting Unit Cylinder (shown)

1. Lock nut
2. Piston
3. O-ring
4. Piston seal
5. O-ring
6. Barrel assembly
7. Shaft assembly
8. Head
9. O-ring
10. Back−up ring
11. External collar
12. BT seal
13. Dust seal
14. Square O-ring
15. Set screw (2 each)

Disassembly of the Cutting Unit Lift Cylinder

Note: Refer to Figure 29 during this procedure.

1. Remove the oil from the lift cylinder by slowly pumping the cylinder shaft. After removing the oil from cylinder, plug both ports and clean outside of the cylinder.

Disassembly of the Cutting Unit Lift Cylinder (continued)

IMPORTANT

Prevent damage when clamping the cylinder's barrel into a vise; clamp on the barrel clevis only. Do not close vise on barrel.

2. Mount the lift cylinder in vise equipped with the soft jaws by clamping in the barrel clevis.
3. Remove the 2 set screws from the collar and remove the collar from the cylinder barrel.
4. Extract shaft assembly (7) with head (8) and piston (2) by carefully twisting and pulling the shaft.

IMPORTANT

When securing shaft in a vise, clamp on the shaft clevis only. Do not clamp vise jaws against the shaft surface.

5. Mount shaft securely in a vise by clamping on the clevis of the shaft. Remove the lock nut (1) from the shaft. Slide the shaft and head off the shaft.
6. Remove the piston seal (4), and O-rings (3 and 5) from the piston (2). Remove the O-ring (9), back-up ring (10), dust seal (13), square O-ring (14) and BT seal (12) from the head (8).
7. Wash parts in clean solvent. Dry parts with compressed air. Do not wipe parts dry with paper towels or cloth. Lint in a hydraulic system will cause damage.
8. Carefully inspect the internal surface of barrel for damage (deep scratches, out-of-round, etc.). Replace entire cylinder if any parts (other than seals) are damaged.

Assembly of the Cutting Unit Lift Cylinder

1. Ensure that all parts are clean before assembly.
2. Coat new O-rings, pistons seal, rod seal, back-up ring and dust seal with clean hydraulic oil:
   A. Install the piston seal (4), and O-rings (3 and 5) to the piston (2).
   B. Install the back-up ring (10), BT seal (12), O-ring (9) and dust seal (13) to the head (8).

IMPORTANT

When securing the shaft in vise, clamp on the shaft clevis only. Do not clamp vise jaws against the shaft surface.

3. Mount shaft securely in a vise equipped with soft jaws by clamping on the shaft clevis:
   A. Coat shaft with clean hydraulic oil.
   B. Slide external collar (11), head assembly (8) and piston assembly onto the shaft.

C. Secure the piston (2) to the shaft with the lock nut (1). Tighten lock nut:

- Side cutting unit cylinder 5/8 in. lock nut to **102 Nm (75 ft-lb)**.
- Rear cutting unit cylinder 1/2 in. lock nut to **54 Nm (40 ft-lb)**.

4. Lubricate head and piston with clean hydraulic oil. Slide the shaft assembly carefully into the cylinder barrel.

IMPORTANT

Prevent damage when clamping the cylinder's barrel into a vise; clamp on the barrel clevis only. Do not close vise on barrel.

5. Mount lift cylinder in a vise equipped with soft jaws by clamping on the barrel clevis.
6. Tighten the external collar (11) onto the cylinder barrel and secure with the 2 set screws.

Hydraulic Hoses

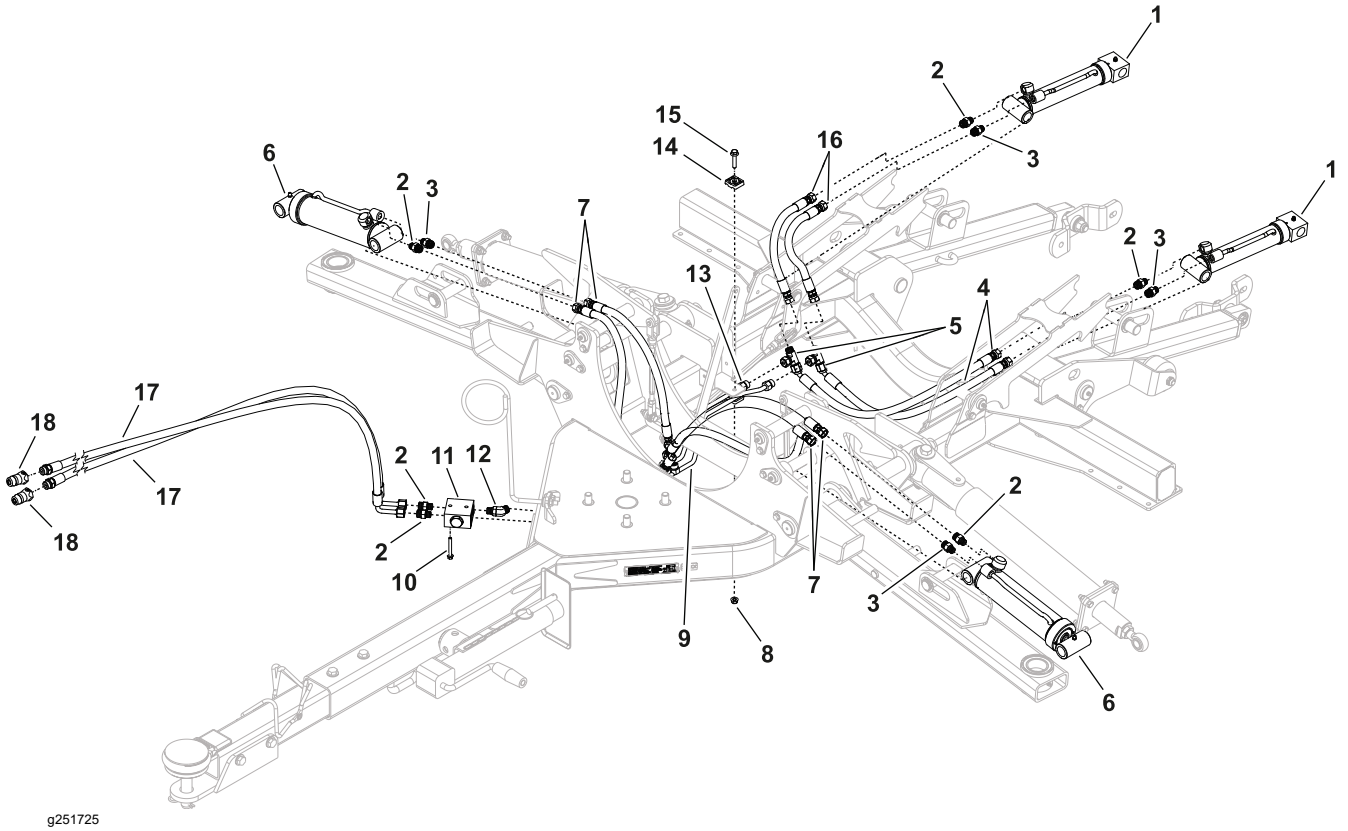

Figure 30

1. Cylinder assembly (2 each)	7. Hose assembly (2 each)	13. Tube assembly
2. Straight fitting	8. Flat head nut	14. Tube clamp
3. Orifice straight fitting	9. Tube assembly	15. Flat head screw
4. Hydraulic hose (2 each)	10. Flat head screw (2 each)	16. Hydraulic hose (2 each)
5. Tee fitting (2 each)	11. Manifold	17. Hydraulic hose (2 each)
6. Cylinder assembly (2 each)	12. Elbow fitting	18. Quick connect coupler (2 each)

The entire hydraulic hose assemblies must be secure properly. Repair or replace the hydraulic components as necessary.

After assembly, check the hydraulic hoses and cylinder assemblies for proper operation.

Note: Torque tighten the straight fittings and elbow fitting to **27.1 to 35.2 N·m (20 to 26 ft-lb)**.

Chapter 5

Cutting Unit Drive

Table of Contents

General Information

The *Operator's Manual* provides information regarding the operation, general maintenance, and maintenance intervals for your Groundsmaster 1200 Pull-Behind Rotary Mower. Refer to the *Operator's Manual* for additional information when servicing the Groundsmaster 1200 Pull-Behind Rotary Mower.

Service and Repairs

Main Drive Shaft

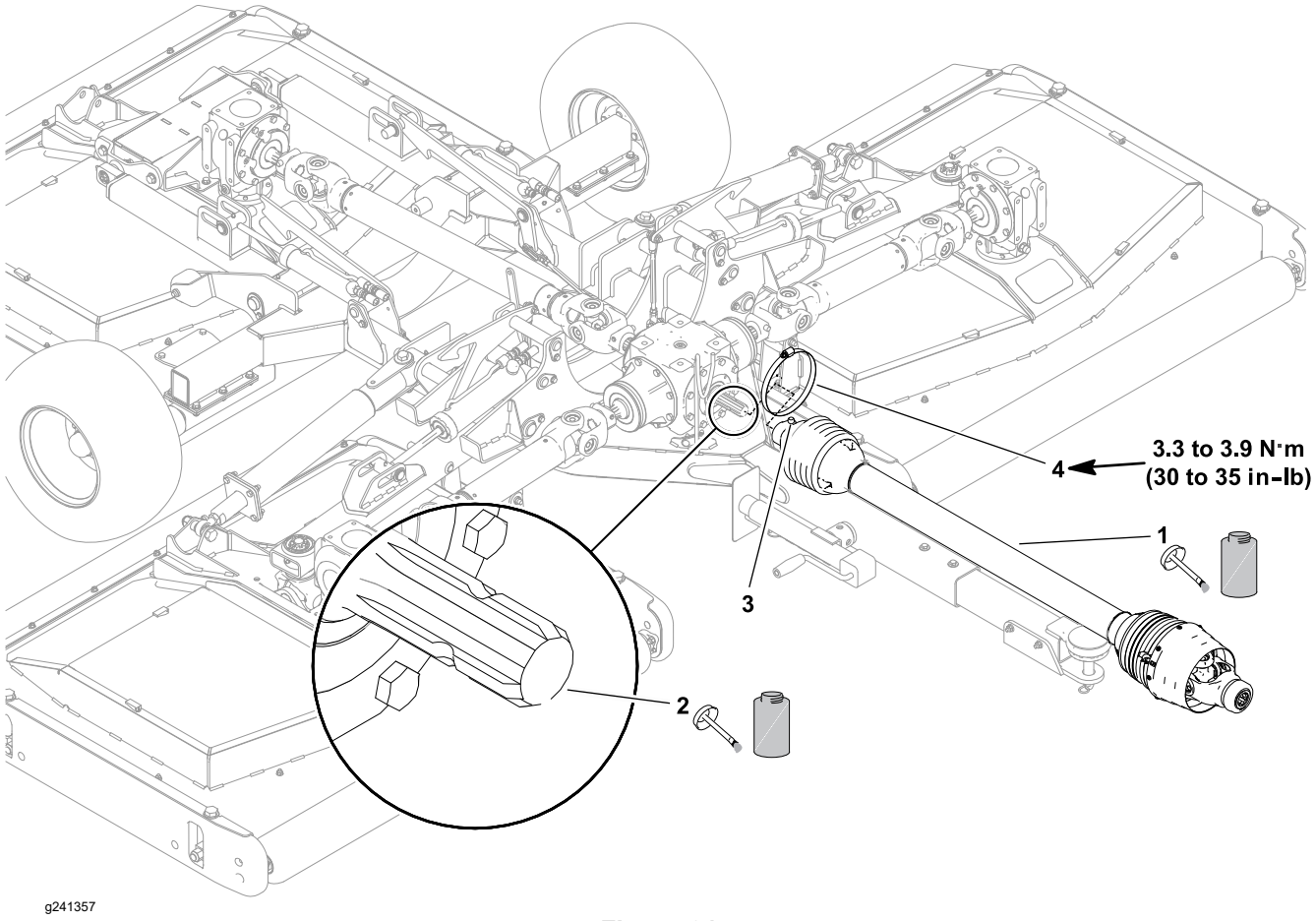

Figure 31

1. Main drive shaft
2. Center gear box shaft
3. Quick release pin
4. Clamp

Removing the Main Drive Shaft

1. Park the machine on a level surface, lower the cutting units and disengage the PTO. Remove the main drive shaft and disconnect the machine from the tow vehicle. Secure the machine with tow bar jack; refer to the *Groundsmaster 1200 Operator's Manual*.

⚠ WARNING ⚠

Support the drive shaft (weighs approximately 39 Kg (86 lb)) to prevent it from dropping and causing personal injury when removing.

2. Disconnect the main drive shaft (1) from the center gear box shaft (2) as follows:
   A. Loosen the clamp (4) and slide the shield cone (10) rearward on the main drive shaft (1).
   B. Press and hold the quick release pin on the end yoke (11) and slide the main drive shaft (1) rearward from the center gear box shaft.

Installing the Main Drive shaft

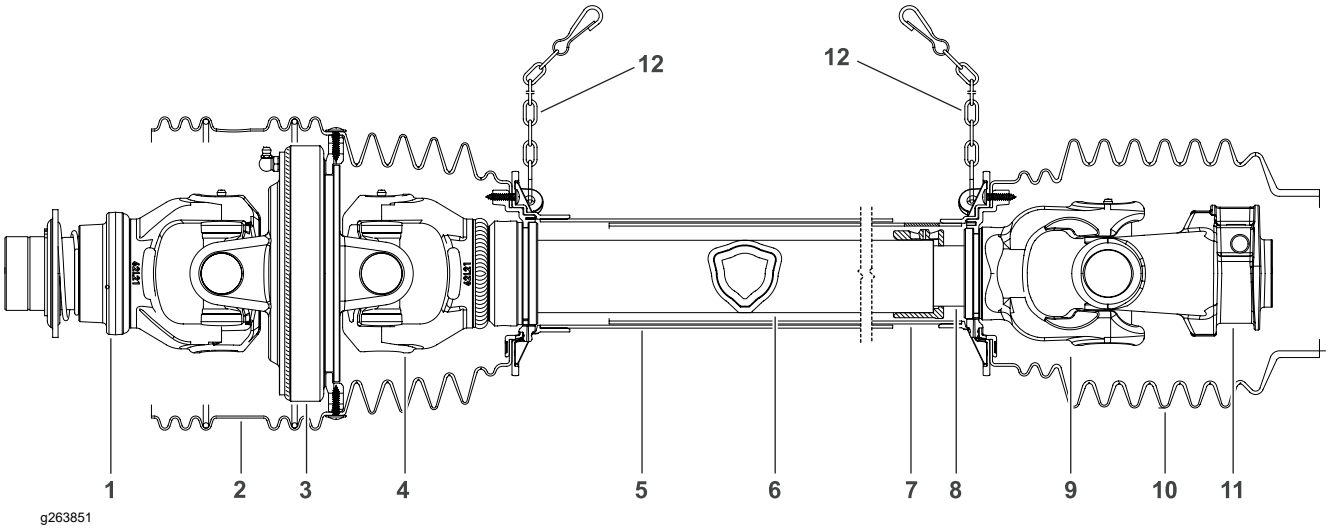

Figure 32

1. Yoke
2. Shield cone
3. Central body
4. Outer tube yoke
5. Outer shield tube
6. Outer cardan tube
7. Inner shield tube
8. Inner cardan tube
9. Inner tube yoke
10. Shield cone
11. Yoke
12. Shield chain

IMPORTANT

If the drive shaft tube and shaft were separated, ensure that the slip shaft yoke and slip tube yoke are aligned when the tube and shaft are assembled. Misalignment of the yokes will result in shortened drive shaft life and will cause unnecessary vibration when the cutting unit (or implement) is operated.

1. Apply antiseize lubricant to the splines of the center gear box shaft (item 2 in Figure 31) and main drive shaft (1).

WARNING

Support the drive shaft (weighs approximately 39 Kg (86 lb)) to prevent it from dropping and causing personal injury when installing.

2. Position the main drive shaft (1) to the center gear box shaft. Ensure that the slip tube yoke is toward the center gear box shaft.
   A. Align the splines on the main gear shaft and press the quick release pin (3) and slide the main drive shaft onto the main gear shaft.
   B. Release the quick release pin (3) and check the locking of main drive shaft by slightly pulling backward.
3. Lubricate the main drive shaft grease fittings; refer to the *Groundsmaster 1200 Operator's Manual*.
4. Slide the shield cone (10) onto the center gear box and torque tighten the clamp (4) to **3.3 to 3.9 N·m (30 to 35 in-lb)**.

Cutting Unit Drive Shafts

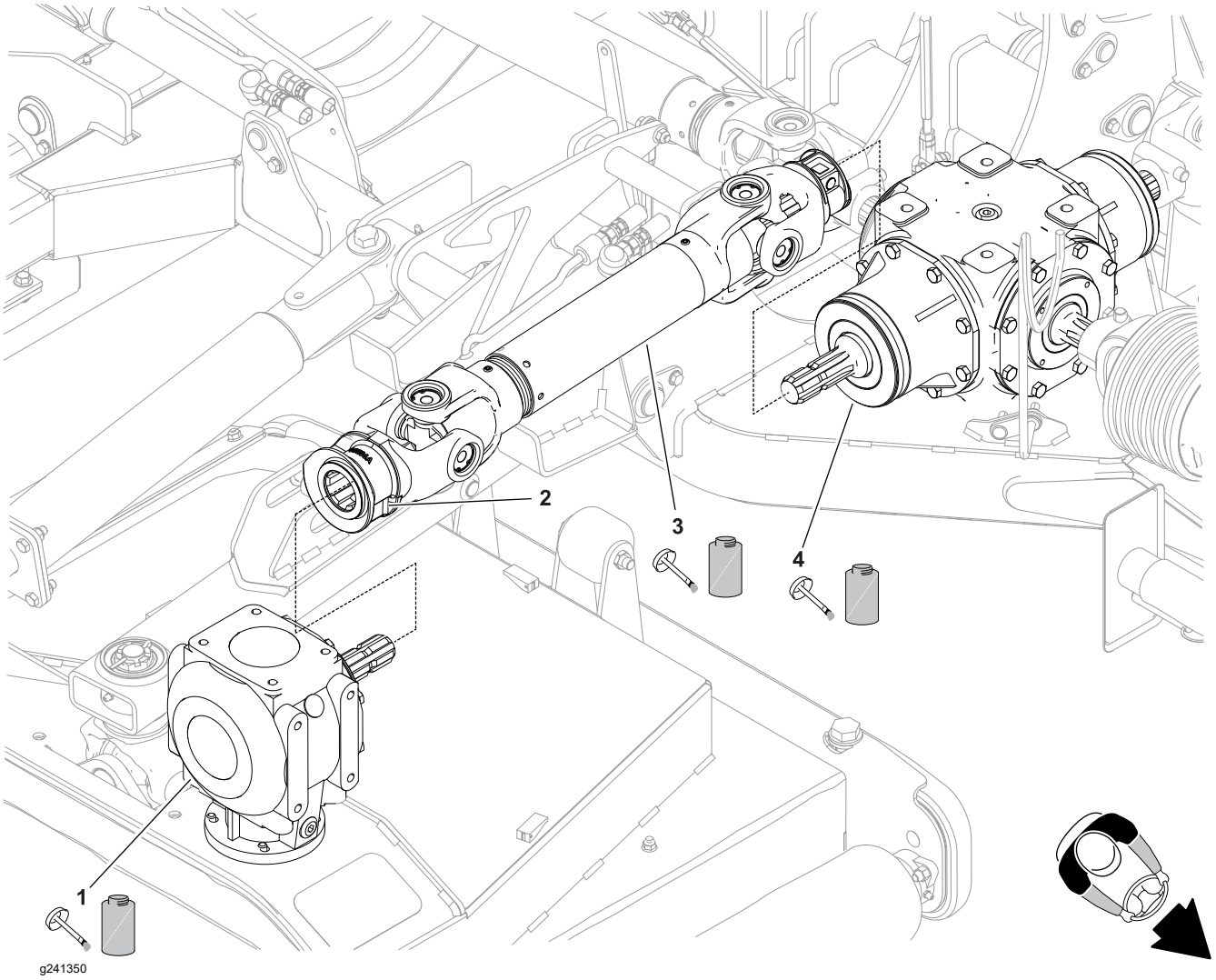

Figure 33

1. Cutting unit gear box
2. Quick release pin
3. Cutting unit drive shaft
4. Center gear box

Removing the Cutting Unit Drive Shafts

1. Park the machine on a level surface, lower the cutting units and disengage the PTO. Remove the main drive shaft and disconnect the machine from the tow vehicle. Secure the machine with tow bar jack; refer to the *Groundsmaster 1200 Operator's Manual*.

⚠ WARNING ⚠

Support the drive shaft (weighs approximately 16 Kg (36 lb)) to prevent it from dropping and causing personal injury when removing.

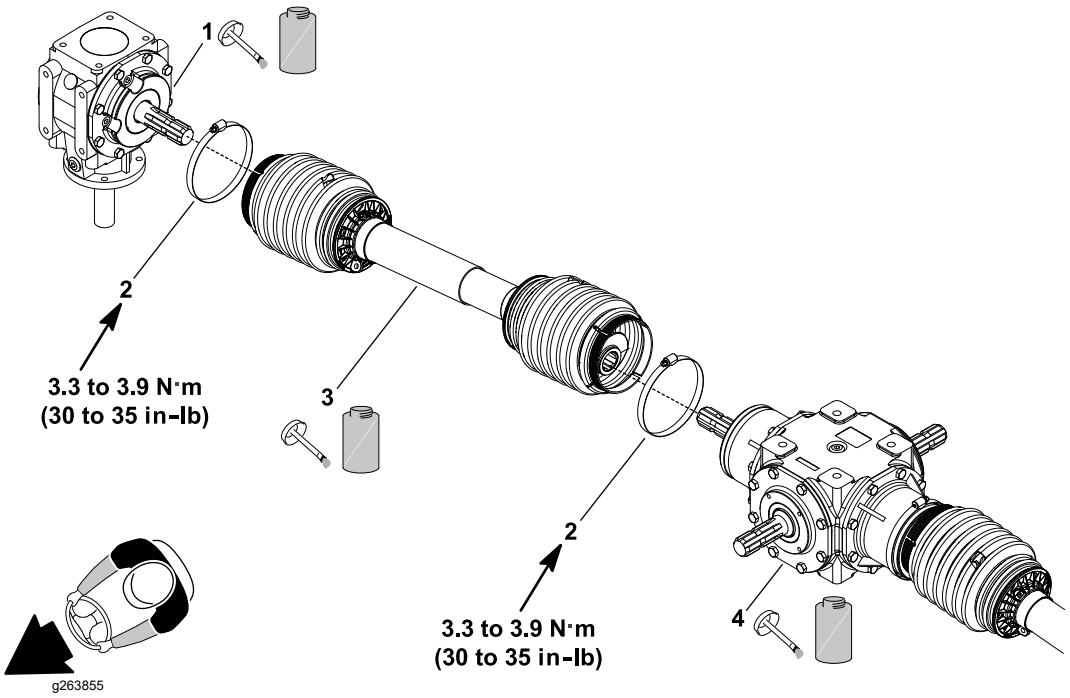

Figure 34

1. Cutting unit gear box
2. Clamp (2 each)
3. Cutting unit drive shaft
4. Main gear box

2. Disconnect the cutting unit drive shaft (3) from the centre gear box shaft (4) as follows:
   A. Loosen the clamp (2) and slide the shield cone (10) on the cutting unit drive shaft (3).
   B. Press and hold the quick release pin and (2) on the end yoke (11) of the cutting unit drive shaft (3).
   C. Slide the cutting unit drive shaft (3) from the center gear box shaft (4).

⚠ WARNING ⚠

Support the drive shaft (weighs approximately 16 Kg (36 lb)) to prevent it from dropping and causing personal injury when removing.

3. Disconnect the cutting unit drive shaft (3) from the cutting unit gear box (1).
   A. Loosen the clamp (2) and slide the shield cone (2) on the cutting unit drive shaft (3).
   B. Press and hold the quick release pin (2) on the end yoke (1) of the cutting unit drive shaft (3).
   C. Slide the cutting unit drive shaft (3) from the cutting unit gear box shaft (1).
4. Repeat steps 2 and 3 for the left hand drive shaft.
5. Repeat steps 2 and 3 for the rear drive shaft.

Installing the Cutting Unit Drive Shafts

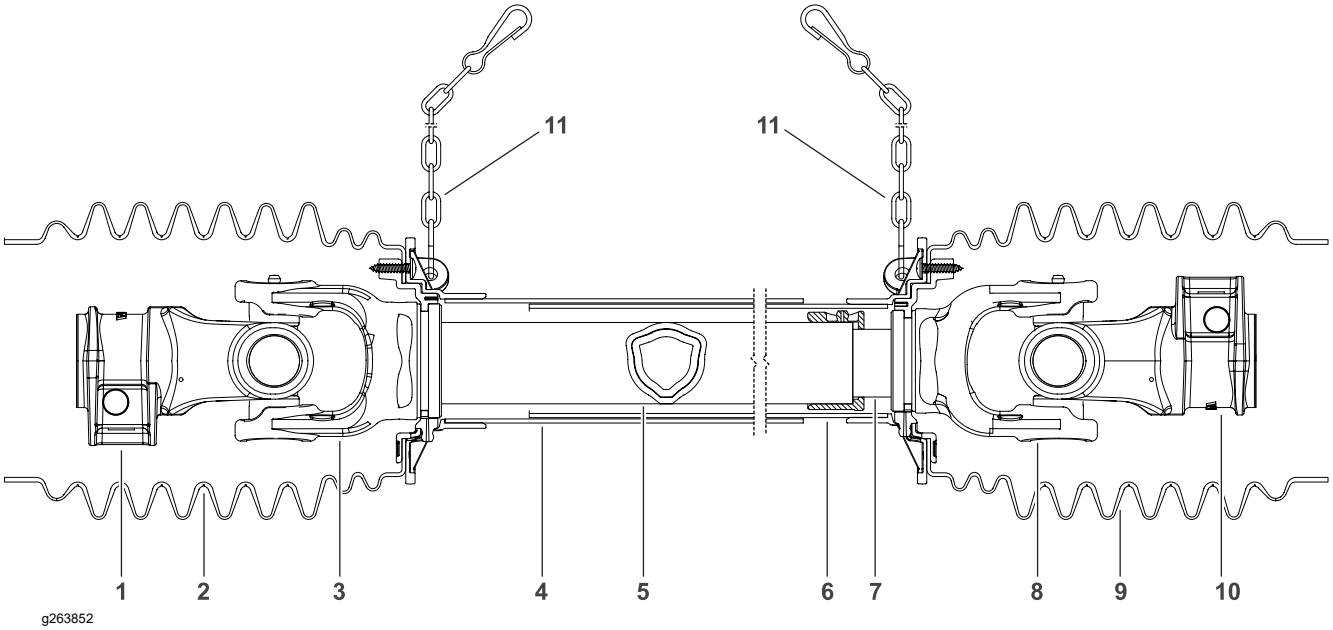

Figure 35

1. Yoke
2. Shield cone
3. Slip tube yoke
4. Outer shield tube
5. Slip tube
6. Inner shield tube
7. Slip shaft
8. Slip shaft yoke
9. Shield cone
10. Yoke
11. Shield chain

IMPORTANT

If the cutting unit drive shaft tube and shaft were separated, ensure that the slip shaft yoke and slip tube yoke are aligned when the tube and shaft are assembled. Misalignment of the yokes will result in shortened drive shaft life and will cause unnecessary vibration when the cutting unit (or implement) is operated.

1. Apply antiseize lubricant to the splines of the center gear box shaft (4), cutting unit drive shafts (3) and cutting unit gear box (1).

⚠ WARNING ⚠

Support the drive shaft (weighs approximately 16 Kg (36 lb)) to prevent it from dropping and causing personal injury when installing.

2. Position the cutting unit drive shaft (3) to the main gear box (4). Ensure that the slip tube yoke is toward the cutting unit gear box.
   A. Align the splines on the main gear shaft (4) to the cutting unit drive shaft and press the quick release pin (2) and slide the cutting unit drive shaft onto the main gear shaft.
   B. Release the quick release pin (2) and check the locking of drive shaft (3) by slightly pulling backward.
3. Position the cutting unit drive shaft (3) to the cutting unit gear box shaft (1).

A. Align the splines on the cutting unit gear shaft (1) to the cutting unit drive shaft and press the quick release pin (2) and slide the cutting unit drive shaft onto the cutting unit gear shaft.

B. Release the quick release pin (2) and check the locking of drive shaft (3) by slightly pulling backward.

4. Repeat steps 2 and 3 for the left hand drive shaft.
5. Repeat steps 2 and 3 for the rear drive shaft.
6. Lubricate the cutting unit drive shaft grease fittings; refer to the *Operator's Manual*.

7. Slide the shield cones onto the center gear box and cutting unit gear box. Torque tighten the clamp (4) to **3.3 to 3.9 N·m (30 to 35 in-lb)**.

Servicing the Drive Shaft

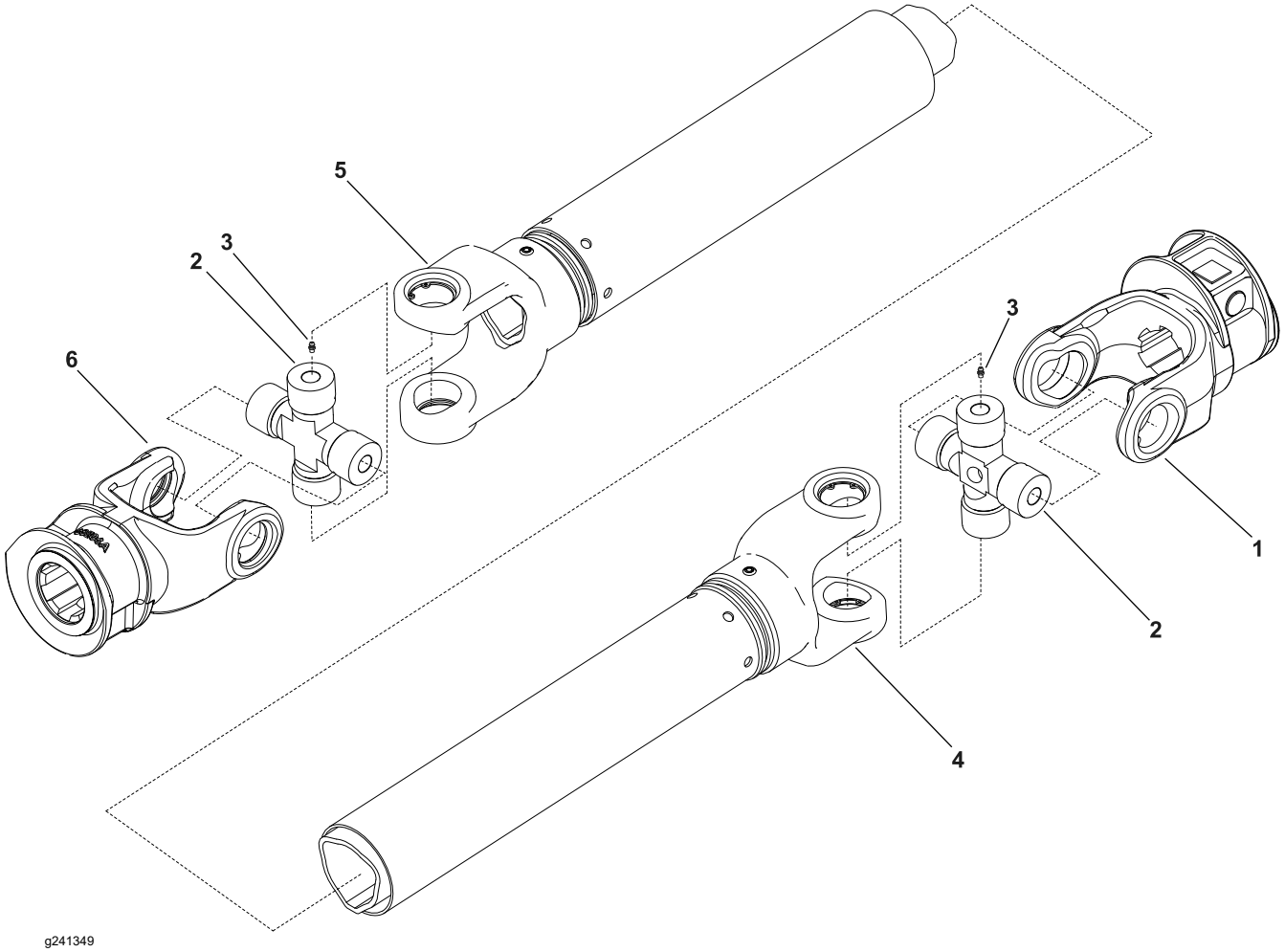

Figure 36
Cutting Unit Drive Shaft (shown)

1. End yoke
2. Universal joint kit (cross and bearings) (2 each)
3. Grease fitting
4. Slip shaft yoke
5. Slip tube yoke
6. End yoke

Disassembling the Drive Shaft

1. Remove the cutting unit drive shaft from the machine; refer to Removing the Cutting Unit Drive Shafts (page 5–5).
2. Remove the snap rings (3) that secure the bearings in the yokes.

IMPORTANT

Support the yokes when removing and installing the bearings to prevent damage.

3. Use a press to remove the cross and bearings (2) from the yokes.
4. Clean the drive shaft yoke (4) and end yoke (1).
5. Inspect the drive shaft yoke (4) and end yoke (1) for wear, pitting or other noticeable damage. Replace the parts that are worn or damaged.

Assembling the Drive Shaft

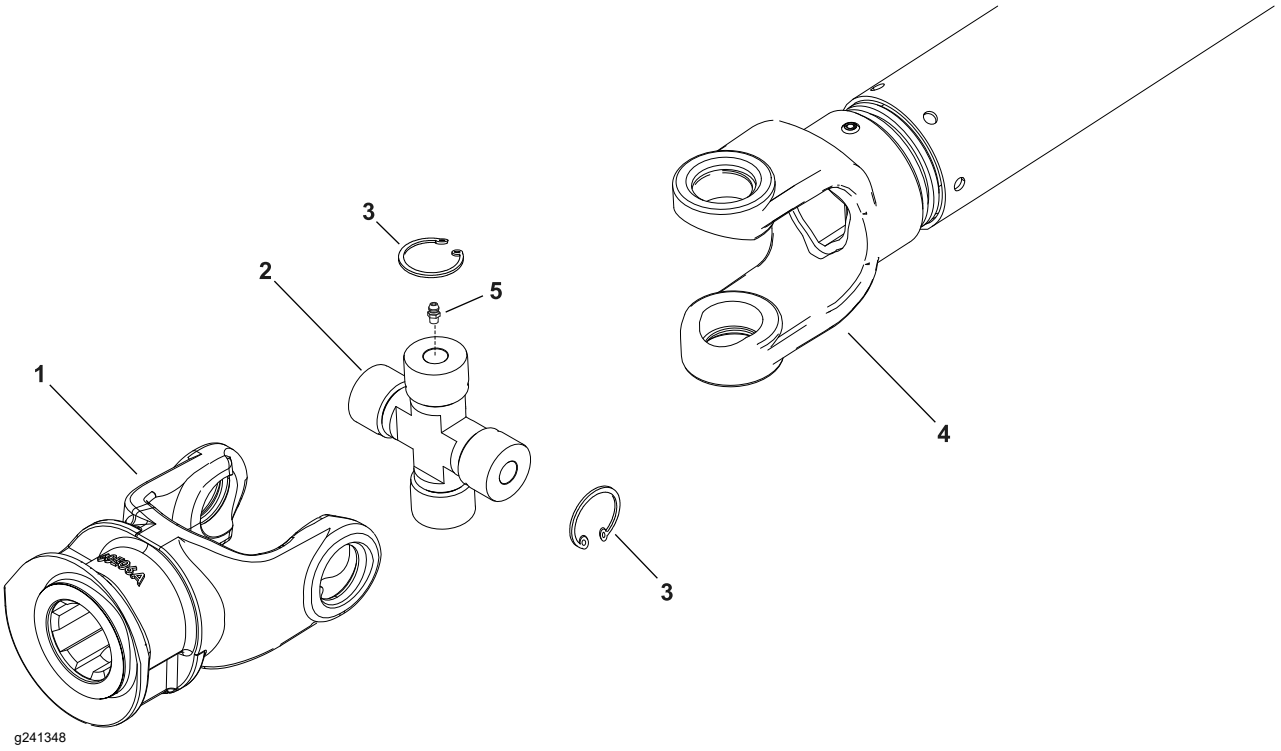

Figure 37
Cutting Unit Drive Shaft (shown)

1. End yoke
2. Cross and bearing kit
3. Retaining ring
4. Shaft yoke
5. Grease fitting

1. Install new cross and bearings as follows:
   A. Apply a thick layer of grease to the bearing bores in the end yoke and shaft yoke.
   B. Press 1 bearing partially into the yoke.
   C. Insert the cross into the yoke and bearing.
   D. Hold the cross in alignment and press the bearing in until it hits the yoke.
   E. Install the retaining ring into the yoke groove to secure installed bearing.
   F. Place second bearing into the yoke bore and onto the cross shaft. Press the bearing into the yoke and secure with the retaining ring.
   G. Repeat the procedure for the other yoke.
   H. Apply grease to the cross until it comes out of all the 4 bearing cups.
2. Ensure that the assembled joint moves without any binding. Lightly rap the yoke lugs with a soft-faced hammer to remove slight binding. If binding continues, disassemble the joint to identify the source of binding.
3. Install the cutting unit drive shaft to the machine; refer to Installing the Cutting Unit Drive Shafts (page 5–7).

Cutting Unit Gear Box

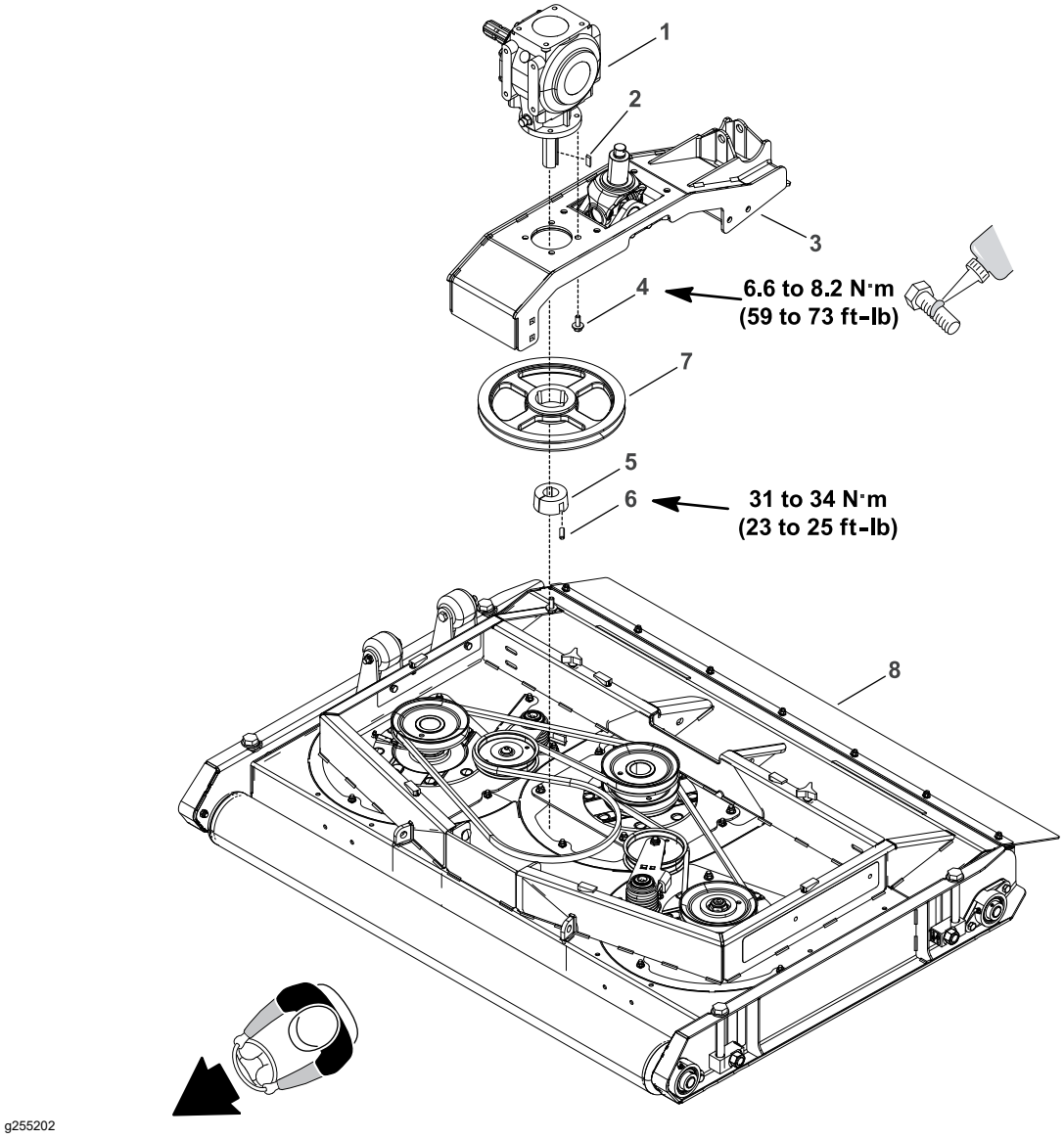

Figure 38

1. Gear box
2. Key
3. Deck mount assembly
4. Bolt (4 each)
5. Set screw (2 each)
6. Taper lock bushing
7. Drive pulley
8. Cutting unit

Removing the Cutting Unit Gear Box

Note: Refer toFigure 38 during this procedure.

1. Park the machine on a level surface, lower the cutting units and disengage the PTO. Remove the main drive shaft and disconnect the machine from the tow vehicle. Secure the machine with tow bar jack; refer to the *Groundsmaster 1200 Operator's Manual*.
2. Disconnect the drive shaft from the cutting unit gear box; refer to Removing the Cutting Unit Drive Shafts (page 5–5).
3. Remove the cutting unit covers from the top of the cutting unit. Remove the drive belt from the cutting unit pulleys; refer to the *Operator's Manual*.
4. Remove the deck mount assembly (3) from the cutting unit assembly (8); refer to Removing the Deck Mount Assembly (page 6–5).

5. Remove the drive pulley (7) from the gear box shaft (1) as follows:

   A. Remove the 2 set screws (5) that secure the taper lock bushing (6) to the drive pulley (7) on the cutting unit gear box shaft.

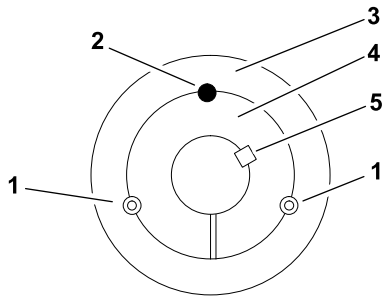

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Figure 39

1. Set screw installation position
2. Set screw removal position
3. Drive pulley
4. Taper lock bushing
5. Key

   B. Install 1 of the removed set screws into the threaded hole of the bushing; refer to Figure 39. Tighten the set screw to loosen the bushing from the pulley hub.

   C. Slide the bushing and pulley from the cutting unit gear box shaft.

   D. Locate and retrieve the key (2).

6. Remove the 4 bolts (4) that secure the cutting unit gear box assembly (1) to the deck mount assembly (3).

   Note: If the bolts (4) are hard to remove with the hand tools, apply localized heat to bolts (4). Disassemble the bolts (4) while hot.

7. Remove the cutting unit gear box assembly (1) from the deck mount assembly (3). If necessary, drain the lubricant from the cutting unit gear box (1).

8. If necessary, remove and replace the oil seals in the cutting unit gear box.

   Note: The gear box replacement is necessary as the internal gear box components are not available separately.

Installing the Cutting Unit Gear Box

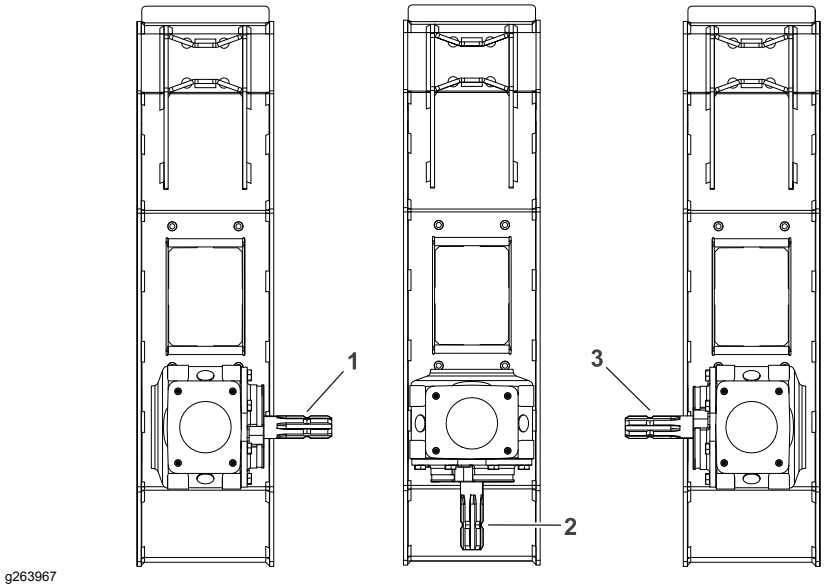


Figure 40

1. Right cutting unit gear box
2. Center cutting unit gear box
3. Left cutting unit gear box

1. If removed, fill the cutting unit gear box (1) with **1.06 L (1.13 qt)** of Toro premium tractor fluid or Mobil 424.
2. If oil seals were removed from the cutting unit gear box, install new seals to the cutting unit gear box (1).
3. Clean the bolts (4) and apply blue loctite (Toro part number **114-5069**) to the threads of the bolts (4).
4. Install the cutting unit gear box assembly (1) to the deck mount assembly (3) and secure with the 4 bolts (4).
5. Torque tighten the bolts (4) to **6.6 to 8.2 N·m (59 to 73 ft-lb)**.
6. Remove any debris from the gearbox input shaft, drive pulley bore and taper lock bushing.

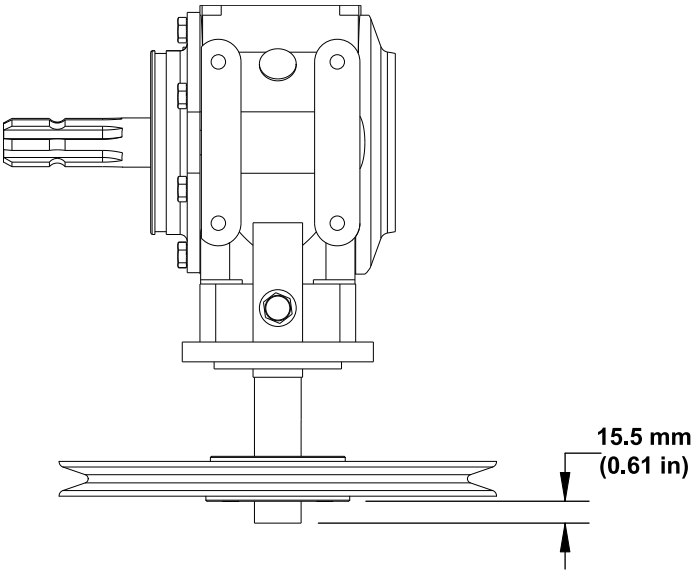


Figure 41

7. Position the key (item 2 in Figure 38), pulley, and then the taper lock bushing (6) to the cutting unit gear box output shaft (1). Slide the taper lock bushing (6) onto the shaft. Align the threaded holes of the pulley with the non-threaded holes of the taper lock bushing (6).
8. Make sure that the bottom of the taper lock bushing (6) is **15.5 mm (0.61 in)** from end of the gear box output shaft.

9. Apply oil to the threads of the set screws and install the screws into the threads of the pulley; refer to Figure 39. Alternately and evenly torque the set screws to **31 to 34 N·m (23 to 25 ft-lb)**.
10. Fill the set screws heads and bushing threads with grease to prevent them from filling with debris.
11. Install the deck mount assembly (3) to the cutting unit assembly (8); refer to Installing the Deck Mount Assembly (page 6–7).
12. Install the drive belt: refer to the *Groundsmaster 1200 Operator's Manual*.
13. Connect the drive shaft to the cutting unit gear box; refer to Installing the Cutting Unit Drive Shafts (page 5–7).
14. Install the cutting unit covers; refer to the *Groundsmaster 1200 Operator's Manual*.

Center Gear Box

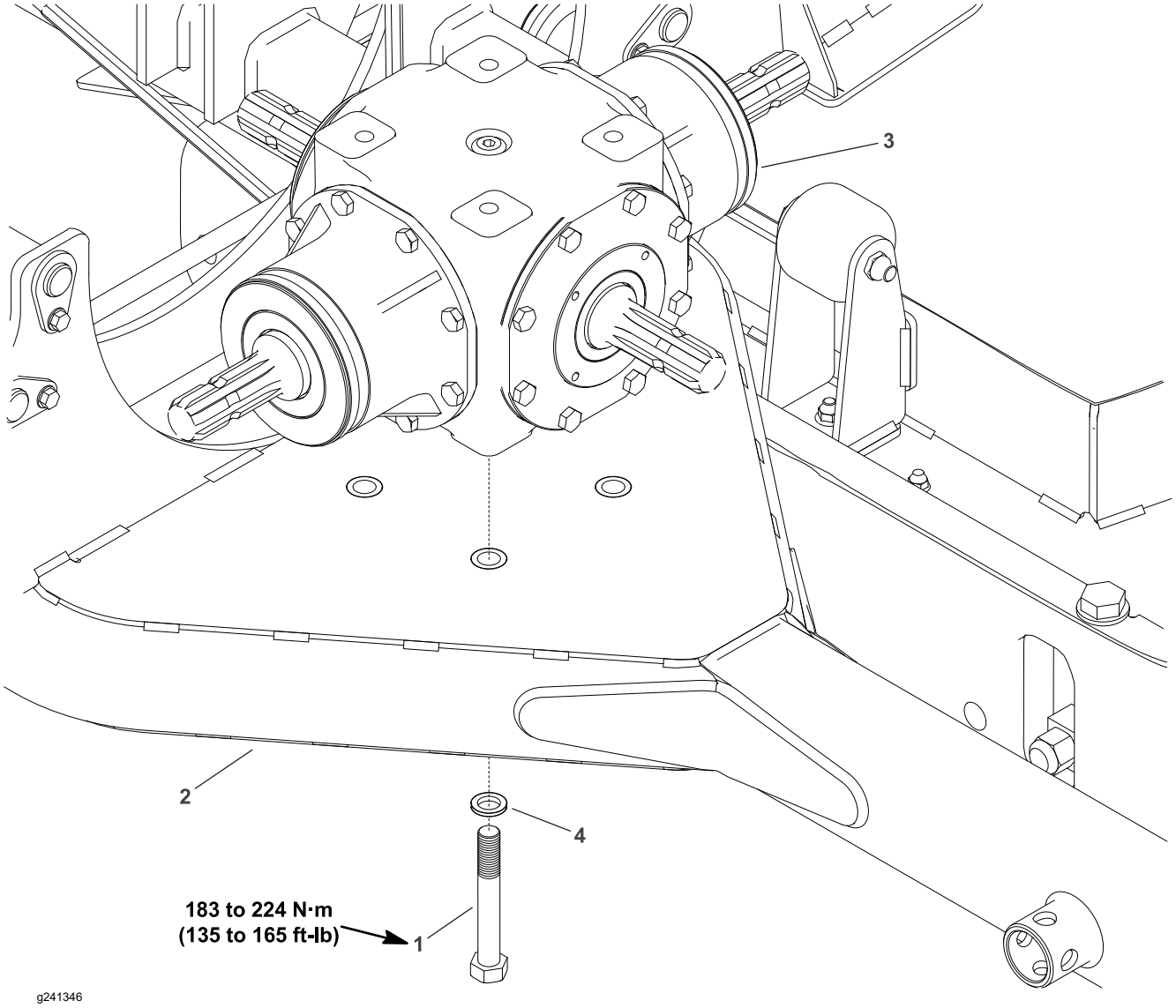


Figure 42

1. Bolt (4 each)
2. Frame assembly
3. Center gear box
4. Washer (4 each)

Removal of Center Gear Box

Note: Refer to Figure 42 during this procedure.

1. Park the machine on a level surface, lower the cutting units and disengage the PTO. Remove the main drive shaft and disconnect the machine from the tow vehicle. Secure the machine with tow bar jack; refer to the *Groundsmaster 1200 Operator's Manual*.
2. Disconnect the main drive shaft from the center gear box; refer to Removing the Main Drive Shaft (page 5–3).
3. Disconnect the cutting unit drive shafts from the center gear box; refer to Removing the Cutting Unit Drive Shafts (page 5–5).
4. Remove the 4 bolts (1) and 4 washers (4) that secure the center gear box assembly (3) to the frame (2).
5. Remove the center gear box assembly (3) from the frame (2). Drain the lubricant from the center gear box.

Removal of Center Gear Box (continued)

6. If necessary, remove and replace the oil seals in the center gear box.

   Note: The gear box replacement is necessary as the internal gear box components are not available separately.

Installing the Center Gear Box

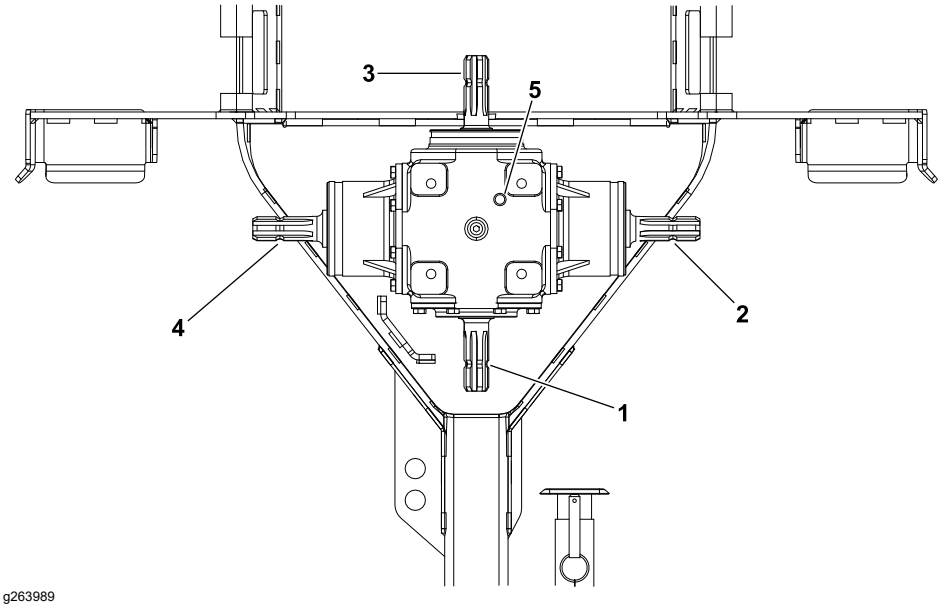


Figure 43

1. Input shaft
2. Output shaft to left cutting unit
3. Output shaft to rear cutting unit (no bolts surface)
4. Output shaft to right cutting unit
5. Dip stick

1. If oil seals were removed from the center gear box, install new seals to the center gear box. Make sure that the center gear box is filled with **2.48 L (2.6 qt)** of Toro premium tractor fluid or Mobil 424.
2. Position the center gear box assembly (item 2 in Figure 42) on to the frame (3); refer to Figure 43. Ensure that the dip stick is facing topside of the gear box.
3. Secure the center gear box assembly (2) to the frame (3) with the 4 bolts (1) and 4 washers (4). Alternately and evenly torque the bolts to **183 to 224 N·m (135 to 165 ft-lb)**.
4. Connect the cutting unit drive shafts to the center gear box; refer to Installing the Cutting Unit Drive Shafts (page 5–7).
5. Connect the main drive shaft to the center gear box; refer to Installing the Main Drive shaft (page 5–4).

Table of Contents

General Information

Operator's Manual

The *Operator's Manual* provides information regarding the operation, general maintenance, and maintenance intervals for the cutting unit on your machine. Refer to the *Operator's Manual* for additional information when servicing the cutting unit.

Adjustments

⚠ CAUTION ⚠

Do not work on the cutting unit or lift arms with the tow vehicle engine running.

Always shut off the engine and remove the key from the key switch of the tow vehicle before working on the cutting unit.

Refer to the *Operator's Manual* for cutting unit adjustment procedures.

Service and Repairs

⚠ WARNING ⚠

Do not start the engine and engage the PTO switch when the PTO drive shaft is disconnected from the cutting unit. If you start the engine and the PTO shaft is allowed to rotate, serious personal injury and machine damage could result.

⚠ CAUTION ⚠

Do not work on the cutting unit or lift arms with the tow vehicle engine running.

Always shut off the engine and remove the key from the key switch of the tow vehicle before working on the cutting unit.

Cutting Unit

Refer to *Groundsmaster 1200 Operator's Manual* for cutting unit blade and belt removal and installation procedure.

Deck Mount Assembly

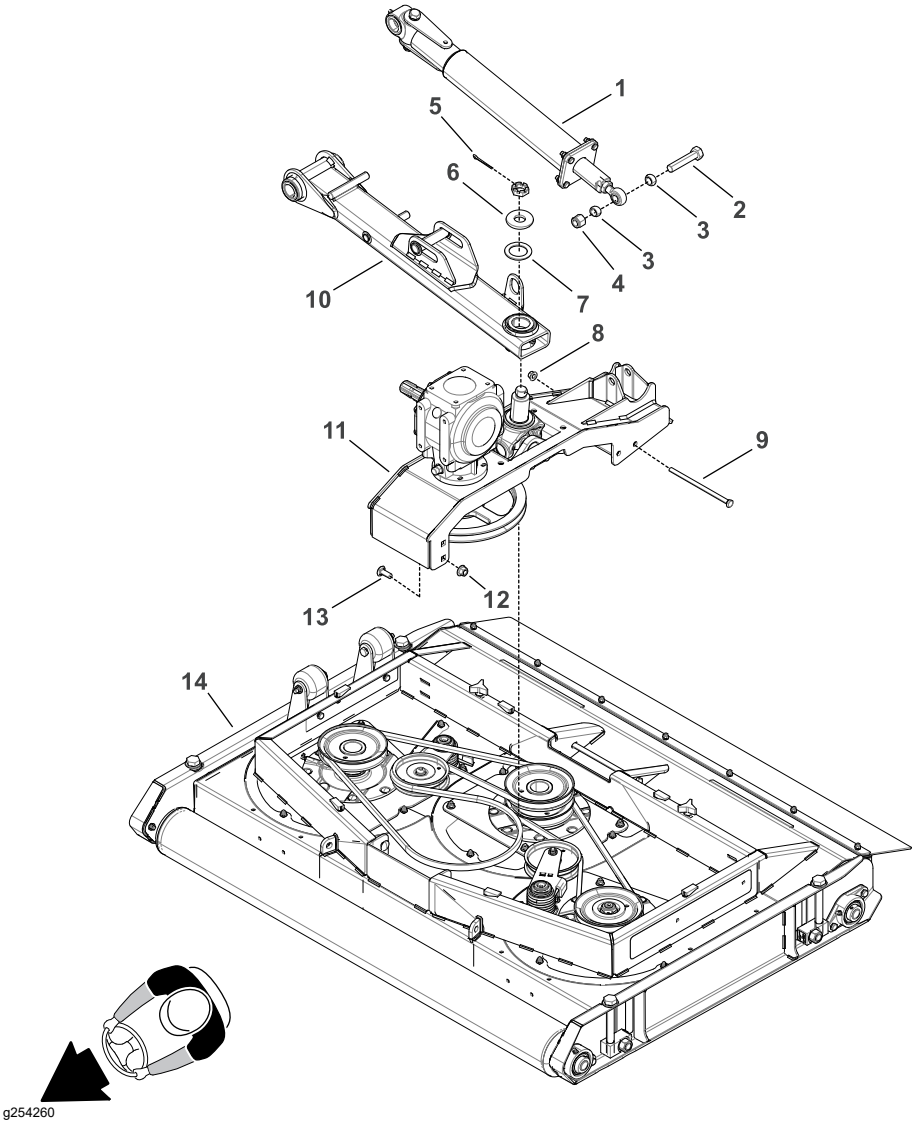


Figure 44

1.	Impact arm assembly	6.	Hardened washer	11.	Deck mount assembly
2.	Bolt	7.	Thrust washer	12.	Nut (4 each)
3.	Spindle spacer (2 each)	8.	Nut (2 each)	13.	Carriage bolt (4 each)
4.	Lock nut	9.	Bolt (2 each)	14.	Cutting unit
5.	Nut	10.	Lift arm assembly		

Removing the Deck Mount Assembly

Note: Refer to Figure 44 during this procedure.

1. Park the machine on a level surface, lower the cutting units and disengage the PTO. Remove the main drive shaft and disconnect the machine from the tow vehicle. Secure the machine with tow bar jack; refer to the *Groundsmaster 1200 Operator's Manual*.
2. Remove the cutting unit drive shafts; refer to Removing the Cutting Unit Drive Shafts (page 5–5).
3. Remove the deck covers from the top of the cutting unit.
4. Use a ⅜" or ½" drive ratchet or breaker bar to relieve idler pulley tension and remove the drive belt.

5. Disconnect the impact arm assembly (1) from cutting unit assembly (14) by removing the nut (3), spacers (3) and bolt (2); refer to Removing the Impact Arm Assembly (page 3–21).
6. Remove the lift arm assembly (10) from the cutting unit assembly (14); refer to Removing the Lift Arm Joint Yoke (page 3–14) and Removing the Rear Cutting Unit Lift Arm Assembly (page 3–18).
7. Remove the nuts (8 and 12), bolts (9), and carriage bolts (13) that secures the deck mount assembly (11) to the cutting unit (14).

⚠ CAUTION ⚠

Make sure that the hoist or lift used to remove the deck mount assembly (weighs approximately 75 Kg (165 lb)) can properly support the deck mount assembly with gear box.

8. Connect the suitable hoist or lift to the deck mount assembly. Lift and remove the deck mount assembly (11) from the cutting unit assembly (14).
9. Remove the cutting unit gear box from the deck mount assembly. Refer to Removing the Cutting Unit Gear Box (page 5–11).

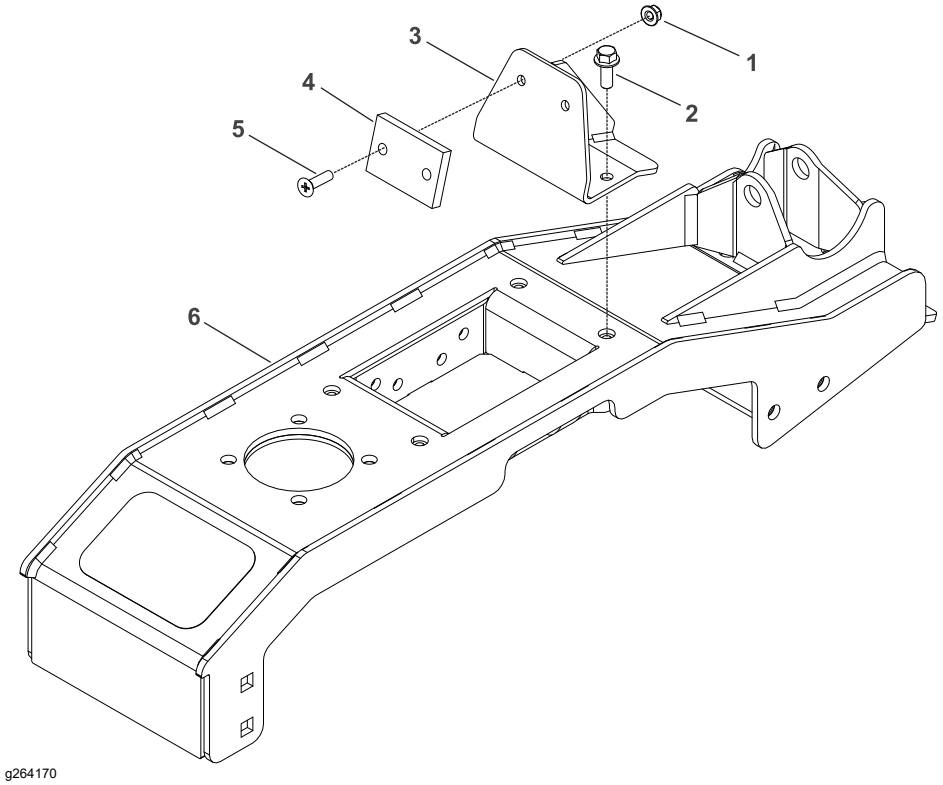


Figure 45

1. Flange nut (2 each)
2. Bolt (2 each)
3. Deck stop assembly
4. Bumper pad
5. Screw (2 each)
6. Deck mount assembly

10. If necessary, remove the 2 bolt (2) that secures the deck stop assembly (3) to the deck mount assembly (6). Remove the deck stop assembly from the deck mount assembly.

Removing the Deck Mount Assembly (continued)

11. If necessary, remove the 2 screws (5 in Figure 45) that secures the bumper pad (4) to the deck stop assembly (3). Remove the bumper pad from the deck stop assembly.

Installing the Deck Mount Assembly

1. If removed, install the bumper pad (4) onto the deck stop assembly (3) and secure with the 2 screws (5) and nuts (1). Ensure that the heads of screws are flushed and recessed to **1.5 mm (0.06 in)** with the bumper pads (4).
2. If removed, install the deck stop assembly (3) to the deck mount assembly (6) and secure with the 2 bolts (2).
3. If removed, install the cutting unit gear box to the deck mount assembly. Refer to Installing the Cutting Unit Gear Box (page 5–13).

⚠ CAUTION ⚠

Make sure that the hoist or lift used to install the deck mount assembly (weighs approximately 75 Kg (165 lb)) can properly support the deck mount assembly with gear box.

---

4. Connect the suitable hoist or lift to front and rear of the deck mount assembly. Slowly lower the deck mount assembly (item 11 in Figure 44) into the cutting unit assembly (14).

   Note: Add shims as needed on alternate sides of the bolts (9) to remove the gap as possible before tightening the bolts (9).
5. Install the carriage bolts (13), bolts (9) and nuts (8 and 12).
6. Install the lift arm assembly (10) onto the cutting unit assembly (14). Refer to Installing the Lift Arm Joint Yoke (page 3–16) and Installing the Rear Cutting Unit Lift Arm Assembly (page 3–19).
7. Install the impact arm assembly (1) onto the cutting unit assembly (14) and secure with the bolt (2), spacers (3) and nut (3); refer to Installing the Impact Arm Assembly (page 3–24).
8. Use a ⅜” or ½” drive ratchet or breaker bar to relieve idler pulley tension and install the drive belt.
9. Install the cutting unit covers from the top of the cutting unit.
10. Install the cutting unit drive shafts; refer to Installing the Cutting Unit Drive Shafts (page 5–7).

Idler Assemblies

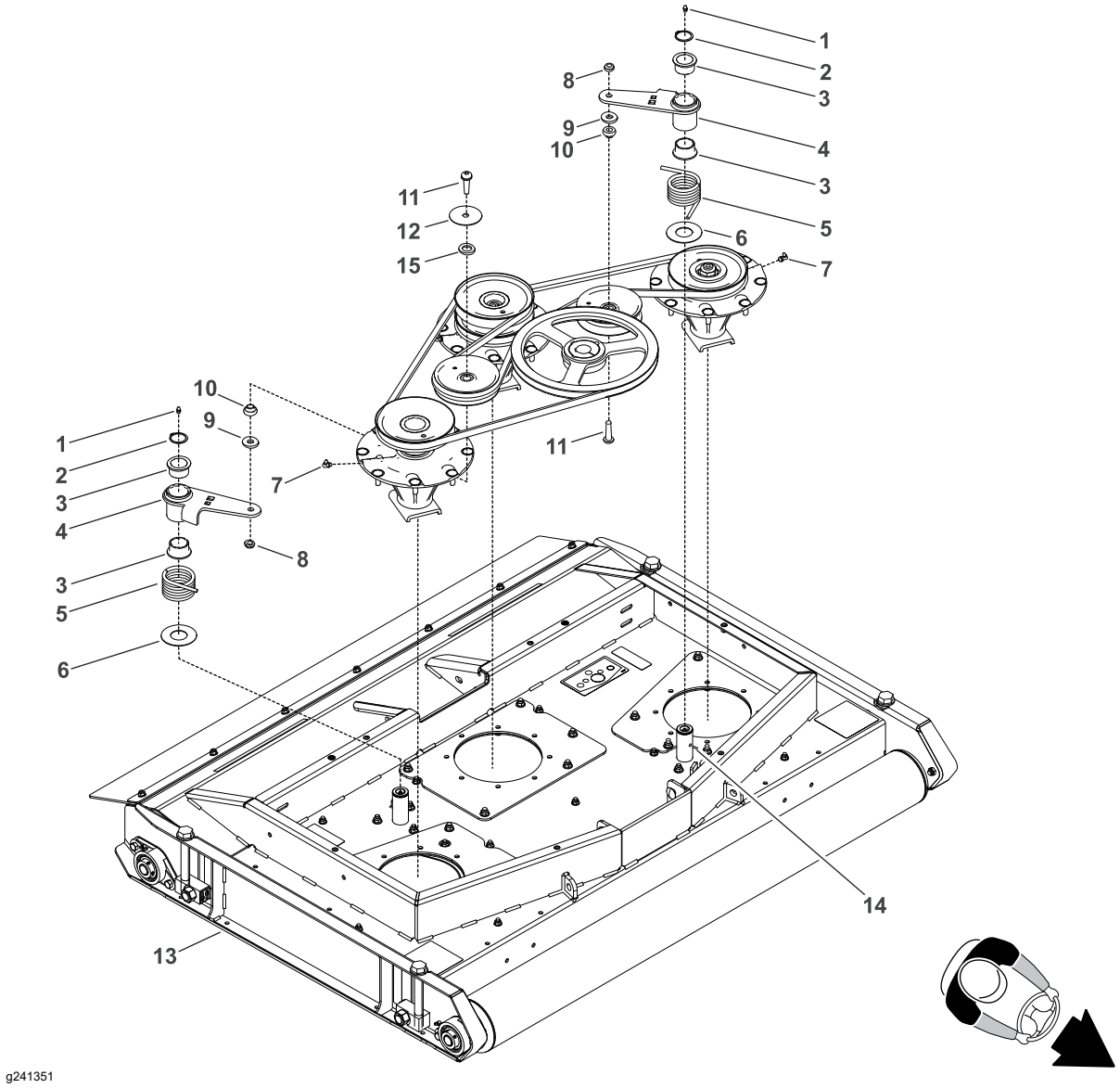


Figure 46

1. Grease fitting	6. Flat washer	11. Button head screw
2. Retaining ring	7. Grease fitting	12. Washer
3. Flange bushing (2 each)	8. Locknut	13. Cutting unit
4. Idler arm	9. Flat washer	14. Idler pivot
5. Torsion spring	10. Idler spacer	15. Lock washer

Removing the Idler Assembly

Note: Refer to Figure 46 during this procedure.

1. Park the machine on a level surface, lower the cutting units and disengage the PTO. Remove the main drive shaft and disconnect the machine from the tow vehicle. Secure the machine with tow bar jack; refer to the *Groundsmaster 1200 Operator's Manual*.
2. Remove the cutting unit covers from the top of the cutting unit.
3. Use a ⅜" or ½" drive ratchet or breaker bar to relieve idler pulley tension and remove the drive belt.

4. Remove the retaining ring (2) that secures the idler assembly to the idler pivot (14).

⚠ CAUTION ⚠

The torsion spring (5) is under heavy load and can cause personal injury.

Be careful when removing the tension from the torsion spring of the idler arm.

5. For additional leverage, slide a nut driver or small piece of pipe onto either end of the idler arm torsion spring (5). Apply enough load against the torsion spring to release it from the spring stop or idler arm and carefully lift the idler assembly from the idler pivot. Release the torsion spring slowly.

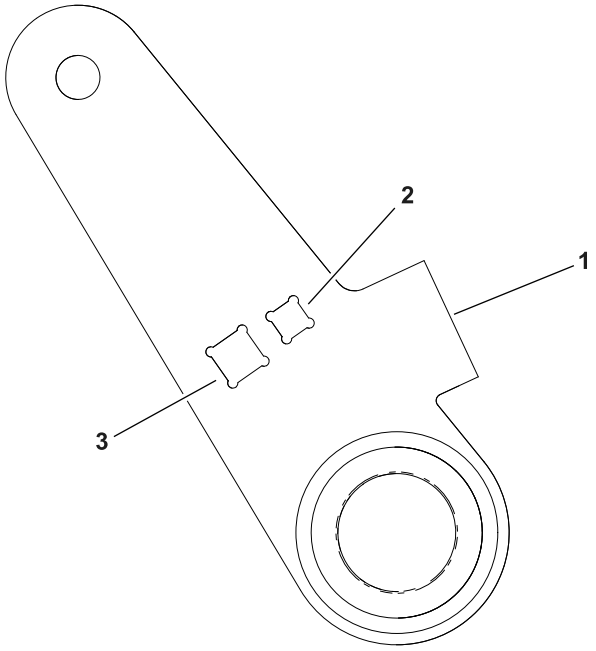


Figure 47

1. Idler arm (right)
2. 3/8 inch square drive
3. 1/2 inch square drive

6. Remove, repair and replace the idler components as necessary; refer to Figure 46.

Installing the Idler Assembly

1. Assemble the idler components as shown in Figure 46.
2. If removed, install the flat washer (6) over the idler pivot (14).

⚠ CAUTION ⚠

The spring is under heavy load and can cause personal injury.

Be careful when applying the tension from the torsion spring of the idler arm.

---

3. For additional leverage, slide nut driver or small piece of pipe onto either end of the idler arm torsion spring (5). Apply enough load against the torsion spring to release it from the spring stop or the idler arm and carefully lower the idler assembly all the way onto the idler pivot (14). Slowly release the torsion spring against the spring stop and idler arm.
4. Secure the idler assembly to idler pivot with retaining ring (2).
5. Use a ⅜" or ½" drive ratchet or breaker bar to relieve idler pulley tension and install drive belt. Ensure that the idler pulley applies tension against the back side of the belt.
6. Install the cutting unit covers to the cutting unit.

Blade Spindles

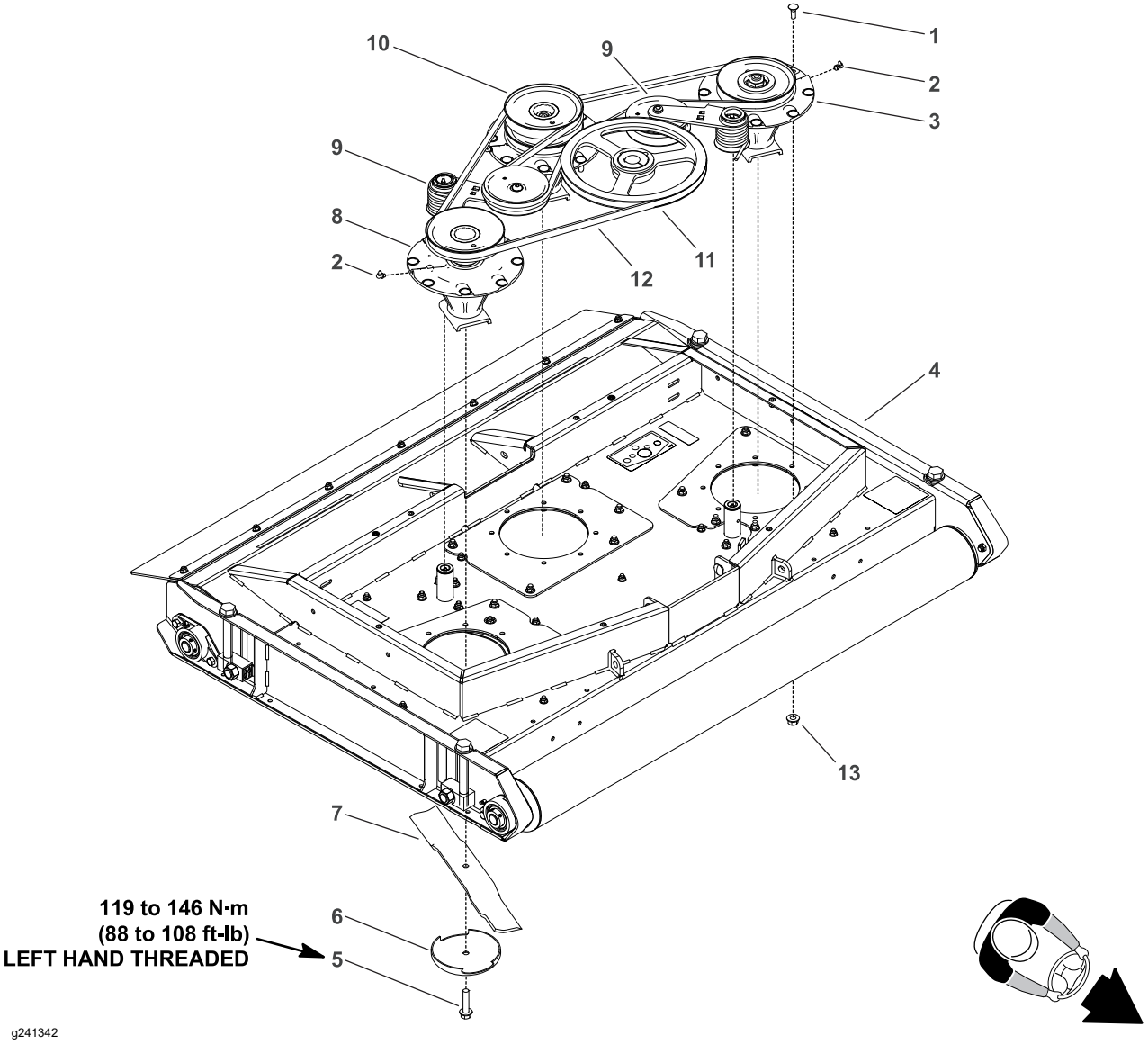


Figure 48

1. Ribbed neck bolt (8 each per spindle)
2. Grease nipple
3. Left spindle assembly
4. Cutting unit
5. Blade bolt (3 each)
6. Anti-scalp cup (3 each)
7. Cutting blade (3 each)
8. Right spindle assembly
9. Idler assembly (2 each)
10. Center spindle assembly
11. Drive pulley
12. Drive belt (2 each)
13. Flange nut (24 each)

Removing the Blade Spindle

Note: Refer to Figure 48 during this procedure.

1. Park the machine on a level surface, lower the cutting units and disengage the PTO. Remove the main drive shaft and disconnect the machine from the tow vehicle. Secure the machine with tow bar jack; refer to the *Groundsmaster 1200 Operator's Manual*.
2. Remove the cutting unit covers from the top of the cutting unit.
3. Use a ⅜" or ½" drive ratchet or breaker bar to relieve idler pulley tension and remove drive belt(s) (12) from spindle to be serviced.

CAUTION

Contact with a sharp blade can cause serious injury.

Wear gloves or wrap sharp edges of the blade with a rag.

IMPORTANT

The cutting unit blades rotate counterclockwise when viewed from overhead. The blade bolts (5) have left hand threads.

4. Remove the blade bolt (5), anti-scalp cup (6), and cutting blade (7) from the spindle; refer to Figure 48.
5. Remove 8 flange nuts (13) and 8 ribbed neck bolts (1) that secure spindle assembly to the cutting unit.
6. Record the spindle assembly orientation and lift the spindle assembly from the cutting unit.

Disassembling the Blade Spindle

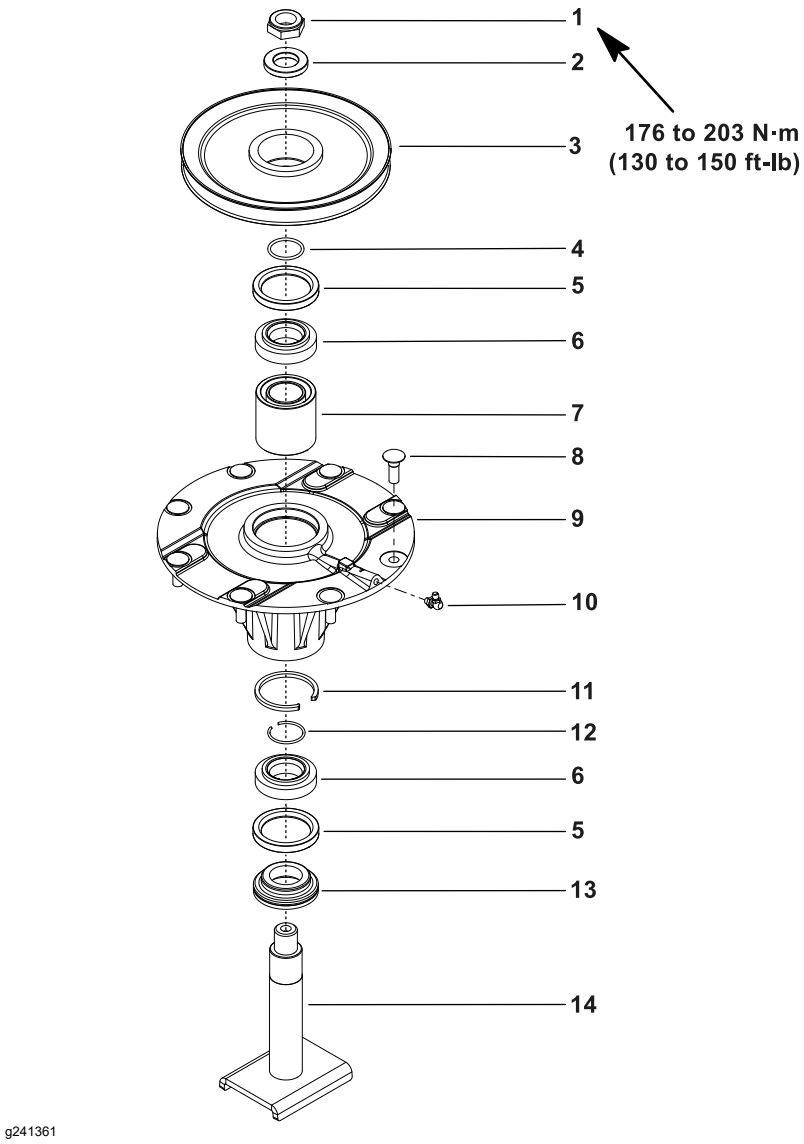


Figure 49
Low Spindle Assembly (shown)

1.	Locknut	6.	Bearing set	11.	Large snap ring
2.	Special hardened washer	7.	Bearing spacer	12.	Spacer ring
3.	Pulley	8.	Ribbed neck bolt (8 each)	13.	Shaft spacer
4.	O-ring	9.	Spindle housing	14.	Spindle shaft
5.	Oil seal (2 each)	10.	Grease fitting		

Note: Refer to Figure 49 during this procedure.

1. Remove the locknut (1) from the top of the spindle shaft (14).
2. Remove the special hardened washer (2) and pulley (3) from the shaft (14).
3. Use an arbor press to remove the spindle shaft (14) from the spindle housing (9).

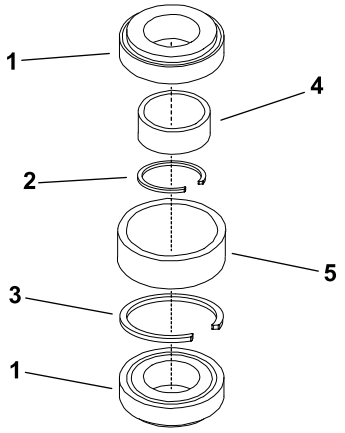
   Note: Ensure that the spindle shaft spacer remains on the spindle shaft.
4. Remove the oil seals (5) from the spindle housing (9).
5. Remove the bearing set (6), O-ring (4), bearing spacer (7), and spacer ring (12) from the spindle housing (9).

Disassembling the Blade Spindle (continued)

6. Discard the spindle shaft O−ring (4).
7. Use an arbor press to remove the 2 bearing sets (6) and bearing spacer (7) from the spindle housing.

   Note: The large retaining ring can remain inside the spindle housing. Removing the large retaining ring is very difficult.
8. Remove the damaged drive studs (8) and replace as needed.

Assembling the Blade Spindle



g189007

Figure 50

1. Bearing
2. Spacer ring
3. Large snap ring
4. Inner bearing spacer
5. Outer bearing spacer

Note: A replacement spindle bearing set contains 2 bearings, a spacer ring, and a large snap ring (items 1, 2, and 3 in Figure 50). You cannot purchase these parts separately. Also, do not mix the bearing set components from one cutting unit spindle to the another.

Note: A replacement bearing spacer set includes the inner spacer and outer spacer (4 and 5). Do not mix the bearing spacers from one cutting unit spindle to the another.

IMPORTANT

If new bearings are installed into a used spindle housing, it is not necessary to replace the original large snap ring. If the original snap ring is in good condition with no sign of damage (e.g., spun bearing), leave the snap ring in the housing and discard the snap ring that comes with the new bearings. If the large snap ring is damaged, replace the snap ring.

1. If the large snap ring was removed from the spindle housing, install the snap ring into the housing groove. Ensure that the snap ring is fully seated in the housing groove.
2. Install the outer spacer into the top of the spindle housing. Ensure that the outer spacer fits against the snap ring.

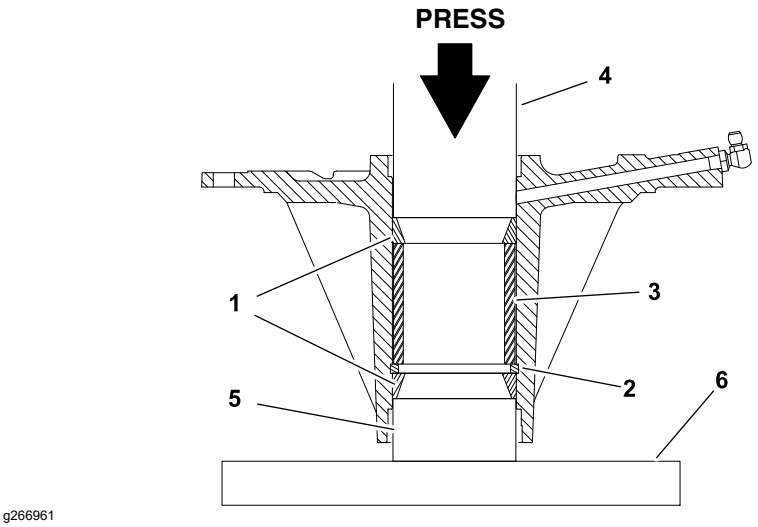


Figure 51

1. Bearing cups
2. Large snap ring
3. Large spacer
4. Arbor press
5. Support
6. Arbor press base

3. Use an arbor press to push the bearing cups into the top and bottom of the spindle housing. The top bearing cup must contact the outer spacer that was previously installed, and the bottom bearing cup must contact the snap ring.
4. Ensure that the assembly is correct by supporting the bottom bearing cup and pressing the top bearing cup against it; refer to Figure 51.
5. Pack the bearing cones with grease. Apply a film of grease on the lips of the oil seals and O-ring.

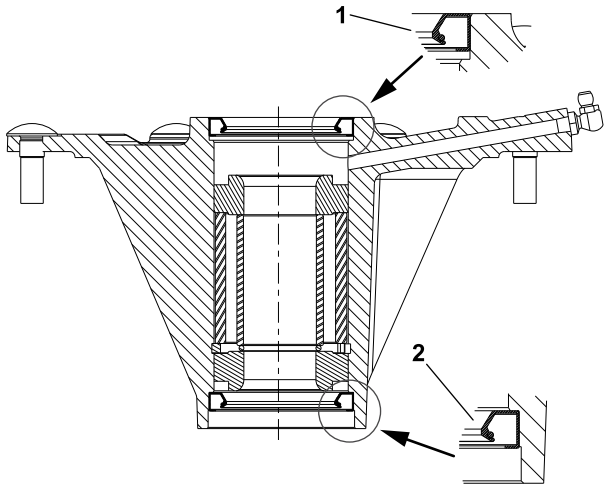


Figure 52

1. Upper seal installation
2. Bottom seal installation

6. Install the lower bearing cone and oil seal into the bottom of the spindle housing. The bottom seal must have the lip facing out (down). This seal installation allows grease to purge from the spindle during the lubrication process; refer to Figure 52.

IMPORTANT

If you are replacing the bearings, ensure that you use the spacer ring that is included with a new bearing set; refer to Figure 50.

7. Slide the spacer ring and inner bearing spacer into the spindle housing, then install the upper bearing cone and oil seal into the top of the housing. The upper seal must have the lip facing in (down). Also, install upper seal so it is flush to **1.5 mm (0.060 inch)** recessed to the housing surface; refer to Figure 52.
8. Examine the spindle shaft and shaft spacer to ensure that there are no burrs or nicks that could damage the oil seals. Lubricate the shaft and spacer with grease.
9. Install the spindle shaft spacer onto the shaft. Place a thin sleeve or tape on the spindle shaft splines to prevent damage of the seal during the installation of the shaft and carefully slide the spindle shaft with the spacer up through the spindle housing.

   Note: The bottom oil seal and spindle spacer fit together when the spindle is fully installed.

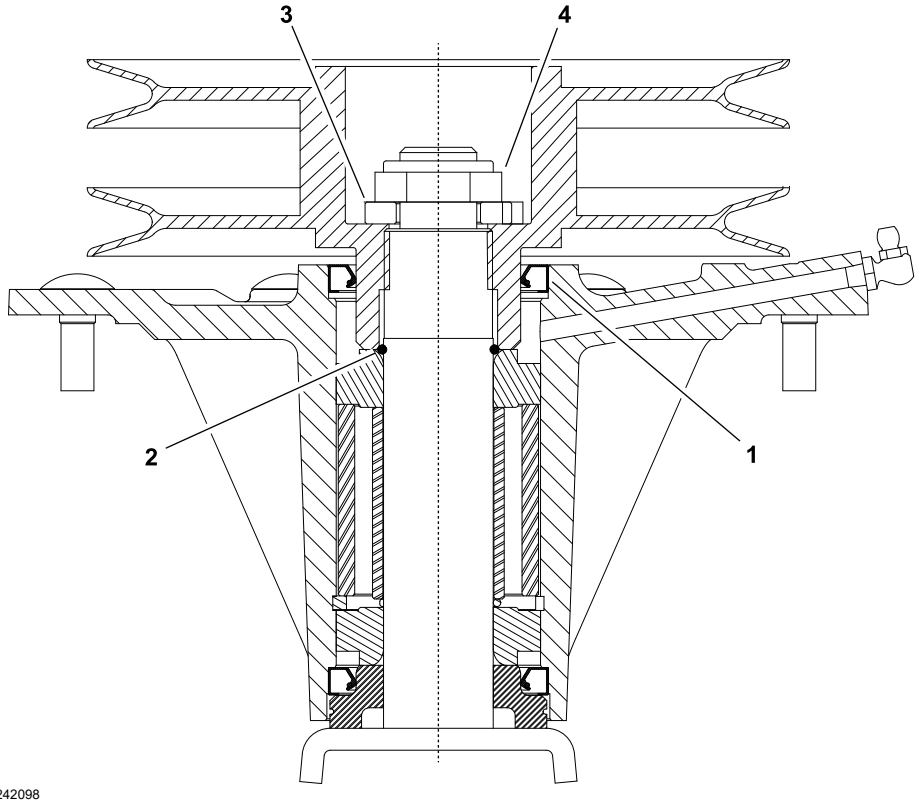


Figure 53

1. Upper seal
2. O-ring
3. Hardened washer
4. Locknut

10. Install the O-ring to the top of the spindle shaft; refer to Figure 53.

11. Install the pulley (hub down), special hardened washer, and locknut to the spindle shaft (refer to Figure 53); torque the locknut to **176 to 203 N·m (130 to 150 ft-lb)**.

IMPORTANT

A pneumatic grease gun can produce high pressure inside the spindle housing that can damage the spindle seals. Thus, do not use a pneumatic grease gun for greasing of the spindle housings.

12. Attach a hand pump grease gun to the grease fitting on the housing and fill the housing cavity with grease until the grease starts to come out of the lower seal.
13. Rotate the spindle shaft to ensure that it turns freely.

Installing the Blade Spindle

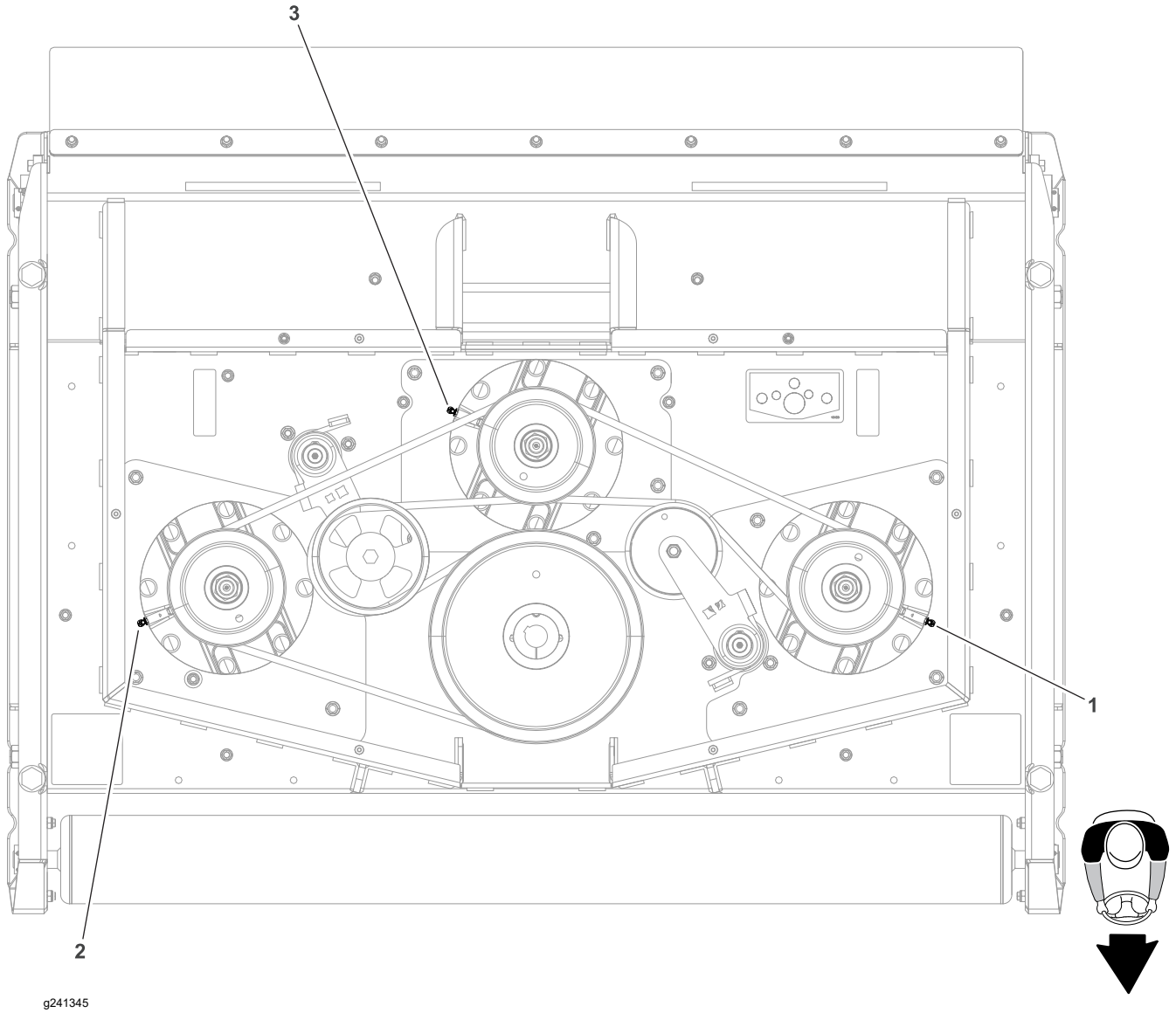


Figure 54

1. Left spindle grease fitting
2. Right spindle grease fitting
3. Center spindle grease fitting

1. Position the spindle on the cutting unit and note the orientation of the grease fitting; refer to Figure 54.

2. Attach the spindle assembly to the cutting unit with the 8 ribbed neck bolts (item 1 in Figure 48) and 8 flange nuts (13).

IMPORTANT

The curved part of the blade must be pointing upward toward the inside of the mower to ensure proper cutting.

IMPORTANT

The cutting unit blades rotate counterclockwise when viewed from overhead. The blade bolts (5) have left hand threads.

3. Install the cutting blade (7), anti-scalp cup (6), and blade bolt (5); torque tighten the blade bolt to **119 to 146 N·m (88 to 108 ft-lb)**.
4. Slowly rotate the cutting blades (7 in Figure 48) to check that the blades do not contact any cutting unit component(s).
5. Use a ⅜” or ½” drive ratchet or breaker bar to relieve idler pulley tension and install drive belt(s) (12).
6. Lubricate the spindle grease fittings.
7. Install the cutting unit covers.

Rollers

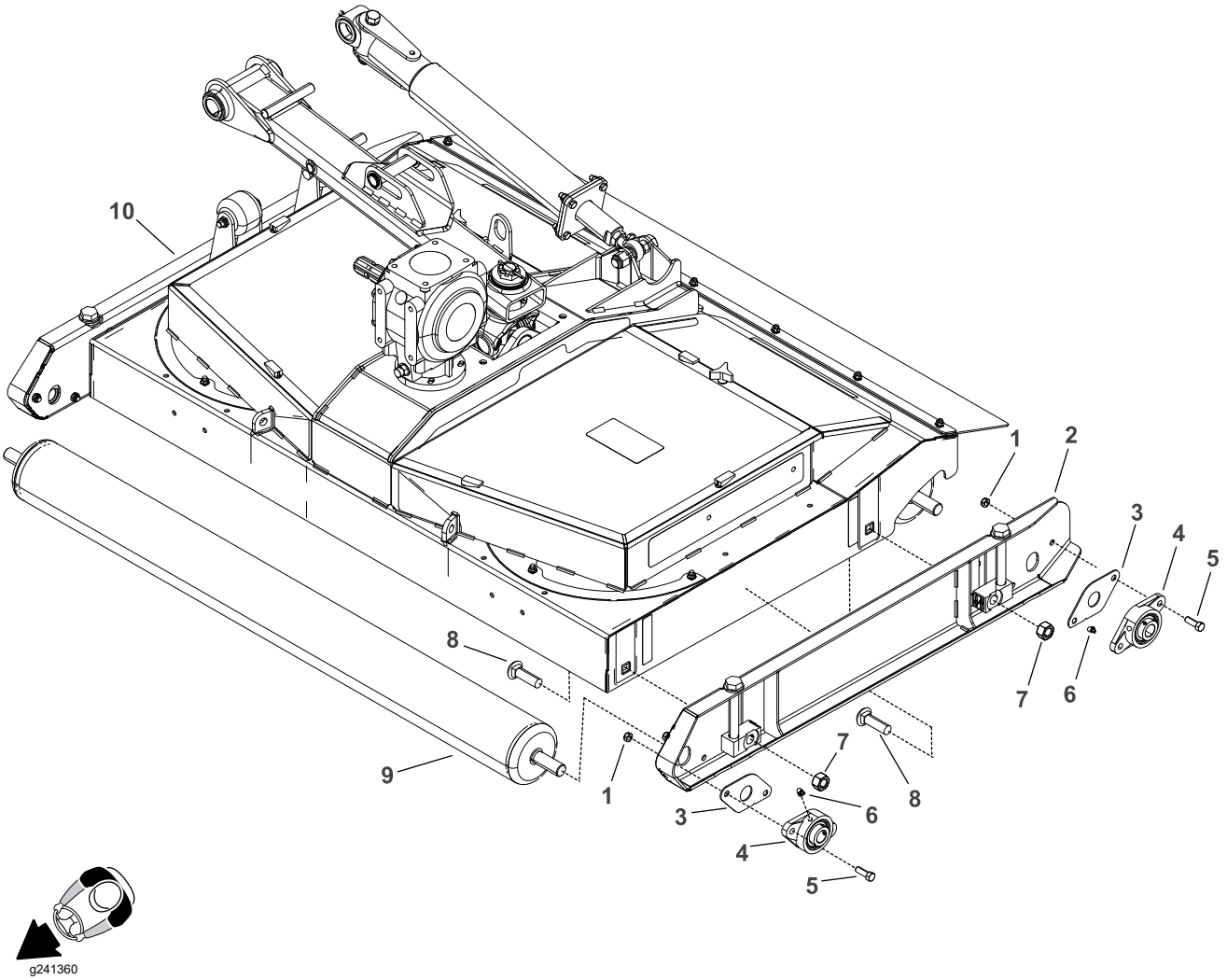


Figure 55

1. Lock nut (8 each)
2. Skid assembly LH
3. Bearing shim (4 each)
4. Flange bushing (4 each)
5. Bolt (8 each)
6. Grease fitting (4 each)
7. Nut (4 each)
8. Carriage bolt (4 each)
9. Roller assembly
10. Cutting unit assembly

Removing the Rollers

Note: Refer to Figure 55 during this procedure.

1. Park the machine on a level surface, lower the cutting units and disengage the PTO. Remove the main drive shaft and disconnect the machine from the tow vehicle. Secure the machine with tow bar jack; refer to the *Groundsmaster 1200 Operator's Manual*.
2. Loosen the set screws in the collars of the roller bearings.
3. Loosen and remove the nuts (7) and carriage bolt that secures the LH skid assembly (2) to the cutting unit (10).
4. Remove the LH skid assembly (2) from the cutting unit assembly (10).
5. Slide and remove the roller assembly (9) from the cutting unit assembly (10).
6. If necessary, remove the nuts (1), bolts (5), flange bushing (4) and bearing shim (3) from the LH skid assembly (2).
7. Loosen and remove the grease fittings (6) from the flange bushing (4).

Installing the Rollers

1. If removed, install the grease fittings (6) on the flange bushing (4).

IMPORTANT

Replacement roller bearings include straight grease fittings. Fit 90° grease fittings in bearings prior to installation. Position grease fitting toward the outside of the cutting unit.

2. If removed, install the bearing shim (3), flange bushing (4), bolts (5) and nuts (1) onto the LH skid assembly (2).
3. Slide the roller assembly (9) into the skid assemblies.

4. Install the LH skid assembly (2) to the cutting unit assembly (10) and secure with the carriage bolts (8) and nuts (7). Tighten the nuts (7) to **40 to 47 N·m (29 to 35 ft-lb).**
5. Center the roller between the skids and tighten the 2 set screws in each roller bearing coller.
6. Check and adjust the height of cut and mower pitch; refer to the machine *Operator's Manual*.

Kicker Roller and Balance Weights (Side cutting units only)

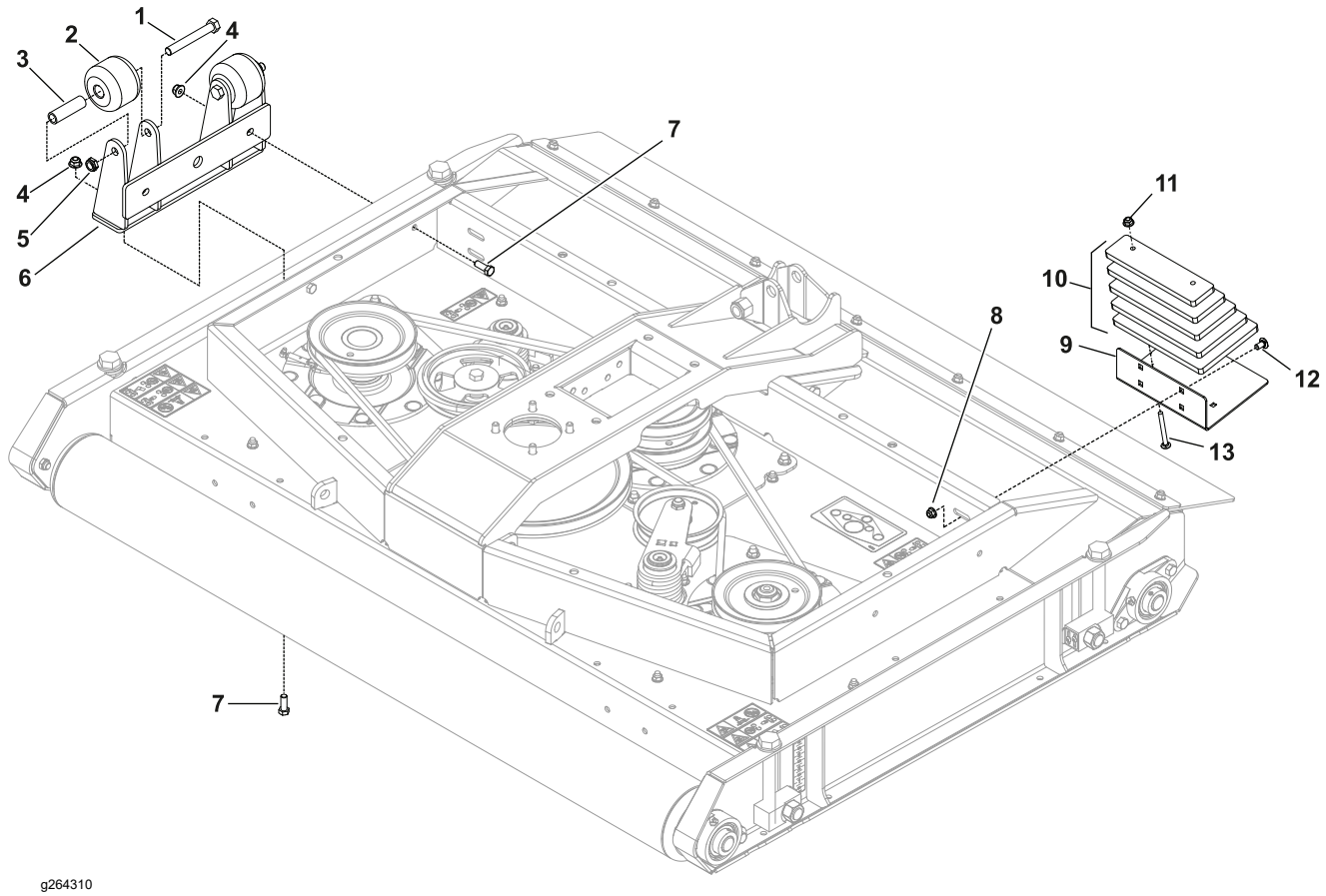


Figure 56

Side Cutting Unit (shown)

1. Bolts (2 each)
2. Roller (2 each)
3. Spacer tube (2 each)
4. Flange nut (4 each)
5. Nut (2 each)
6. Kicker roller assembly
7. Bolt (4 each)
8. Flange nut (4 each)
9. Weight bracket
10. Weights
11. Flange nut (2 each)
12. Carriage bolt (4 each)
13. Carriage bolt (2 each)

Park the machine on a level surface, lower the cutting units and disengage the PTO. Remove the main drive shaft and disconnect the machine from the tow vehicle. Secure the machine with tow bar jack; refer to the *Groundsmaster 1200 Operator's Manual*.

Remove and install the kicker roller and balance weights as necessary using the Figure 56 as reference.

Appendix A

Foldout Drawings

Table of Contents

Electrical Drawing Designations

Note: A splice used in a wire harness will be identified on the wire harness diagram by SP. The manufacturing number of the splice is also identified on the wire harness diagram (e.g., SP01 is splice number 1).

Wire Color

The following abbreviations are used for wire harness colors on the electrical schematics and wire harness drawings in this chapter.

ABBREVIATION	COLOR
BK	BLACK
BR or BN	BROWN
BU	BLUE
GN	GREEN
GY	GRAY
OR	ORANGE
PK	PINK
R or RD	RED
T	TAN
VIO	VIOLET
W or WH	WHITE
Y or YE	YELLOW

Numerous harness wires used on the Toro machines include a line with an alternate color. These wires are identified with the wire color and line color with either a / or _ separating the color abbreviations listed above (e.g., R/BK is a red wire with a black line, OR_BK is an orange wire with a black line).

Wire Size

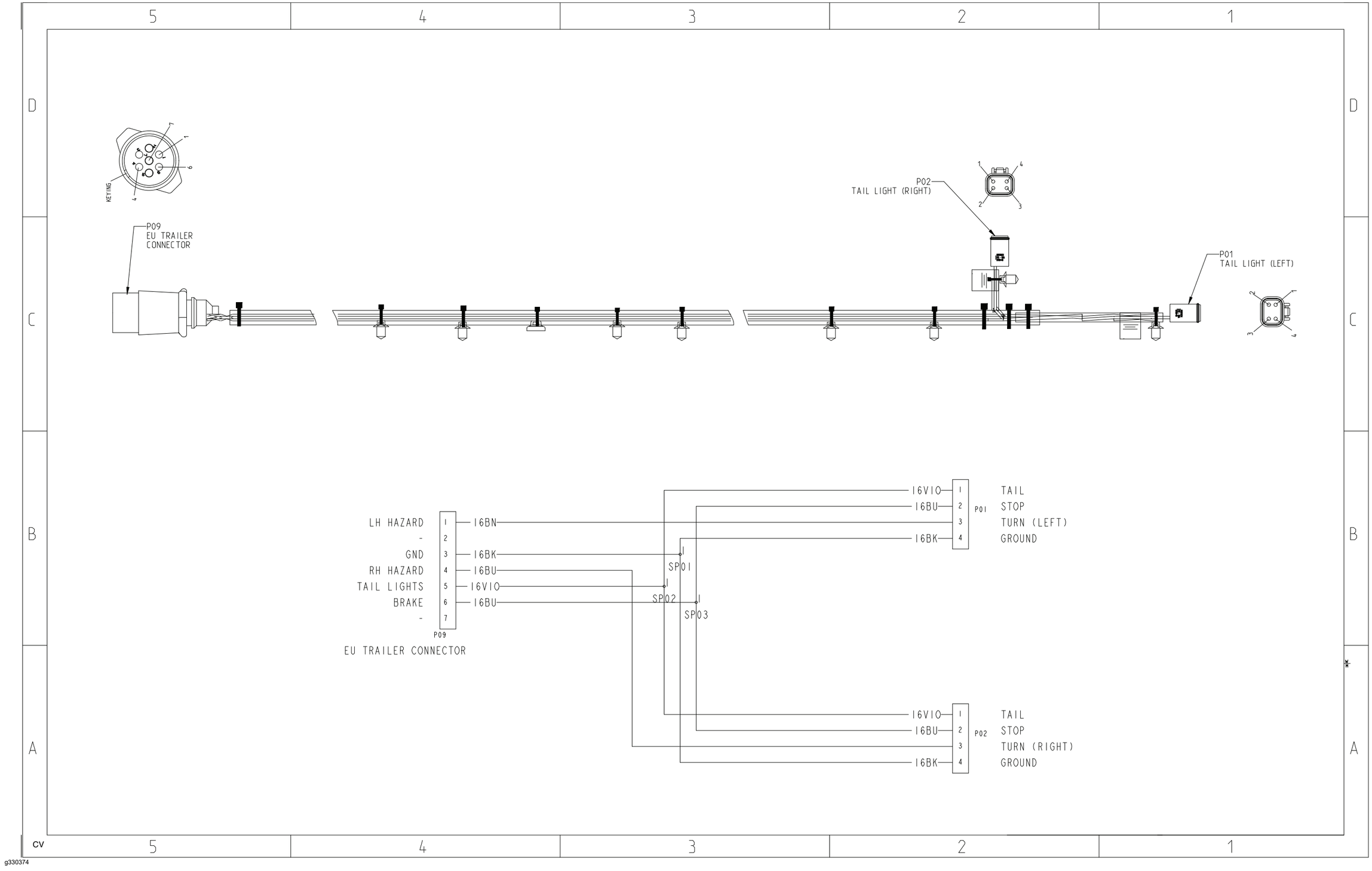
The individual wires of the electrical harness diagrams in this chapter identify both the wire color and the wire size.

Examples:

- 16 BK = 16 AWG (American Wire Gauge) wire that has a black insulator
- 050 R = 0.5 mm metric wire that has a red insulator (AWG equivalents for metric wire appear in the following table)

AWG Equivalents for Metric Wire		
Diagram Label	**Metric Size**	**AWG Equivalent**
050	0.5 mm	20 GA
175	0.75 mm	18 GA
100	1.0 mm	16 GA
150	1.5 mm	14 GA

Wire Harness Drawing - Homologation Kit



Count on it.