### **Service Manual**

# TORO.

## GreensPro™ 1200

### Preface

The purpose of this publication is to provide the service technician with information for troubleshooting, testing, and repairing assemblies and components on the GreensPro 1200.

REFER TO THE OPERATOR'S MANUAL FOR OPERATING, MAINTENANCE, AND ADJUSTMENT INSTRUCTIONS. Space is provided in Chapter 2 of this book to insert the Operator's Manual and Parts Catalog for your machine. Replacement catalogs are available on the Internet at www.toro.com.

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



This safety symbol means DANGER, WARNING, or CAUTION, PERSONAL SAFETY INSTRUCTION. When you see this symbol, carefully read the instructions that follow. Failure to obey the instructions may result in personal injury.

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

IMPORTANT: The IMPORTANT notice will give important instructions which must be followed to prevent damage to systems or components on the machine.



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# **TORO**

### Chapter 1

# Safety

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### **Safety Instructions**

GreensPro 1200 machines have been tested and certified by Toro for compliance with existing safety standards and specifications. Although hazard control and accident prevention are partially dependent upon the design and configuration of the machine, these factors are also dependent upon the awareness, concern, and proper training of the personnel involved in the operation, transport, maintenance, and storage

### **Before Operating**

1. Operate the machine only after reviewing and understanding the contents of the Operator's Manual. A replacement Operator's Manual is available on the internet at www.toro.com.

2. Never allow children to operate the machine or allow adults to operate it without proper instructions.

3. Become familiar with the controls and know how to stop the machine and engine quickly.

4. Keep all shields, safety devices, and decals in place. If a shield, safety device, or decal is malfunctioning, illegible, or damaged, repair or replace it before operating the machine.

5. Always wear substantial shoes. Do not operate machine while wearing sandals, tennis shoes, or sneakers. Do not wear loose fitting clothing, which could get caught in moving parts and cause personal injury.

of the machine. Improper use or maintenance of the machine can result in injury or death. To reduce the potential for injury or death, comply with the following safety instructions.



To reduce the potential for injury or death, comply with the following safety instructions.

6. Wearing safety glasses, safety shoes, long pants, ear protection, and a hard hat is advisable and required by some local safety and insurance regulations.

7. Keep everyone, especially children and pets, away from the areas of operation.

8. Since gasoline is highly flammable, handle it carefully.

a. Use an approved gasoline container.

b. Do not remove cap from fuel tank when engine is hot or running.

- c. Do not smoke while handling gasoline.
- d. Fill fuel tank outdoors.
- e. Wipe up any spilled gasoline.

f. Do not fill fuel tank higher than to the bottom of fuel tank insert. Fuel may leak from filler neck when machine is tilted for servicing if tank is overfilled.

### While Operating

1. Do not run the engine in a confined area without adequate ventilation. Exhaust fumes are hazardous and could be deadly.

2. Always stand behind the machine when starting the engine. Always sit in the operator's seat when operating the machine.

3. To start the engine:

a. Open fuel shutoff valve. Make sure spark plug wire is connected to spark plug.

b. Move on/off switch to ON position. Set choke to full choke position (cold start) and throttle to half throttle.

c. Pull starter cord to start engine.

- 4. To stop the engine:
  - a. Reduce engine speed to SLOW.
  - b. Move on/off switch to OFF position to stop engine.

5. Do not touch engine, muffler, or exhaust pipe while engine is running or soon after it has stopped, because these areas are hot enough to cause burns.

6. Whenever machine is left unattended, park machine on a level surface and be sure engine is stopped.

7. Close fuel shutoff valve if machine is not to be used for an extended period of time. Also, close fuel shutoff valve if machine is to be transported.

#### Maintenance and Service

1. The Operator's Manual and engine Owner's Manual provide information regarding the operation, general maintenance, and maintenance intervals for your GreensPro machine. Refer to these publications for additional information when servicing the machine.

2. Before servicing or making adjustments to the machine, stop the engine and wait for all machine motion to stop. Remove the spark plug wire from the spark plug to prevent accidental starting of the engine.

If Greenspro is attached to tow vehicle, apply tow vehicle parking brake, stop engine, and remove key from ignition switch.

3. To make sure entire machine is in good condition, keep all nuts, bolts, screws, and belts properly tightened.

4. To reduce potential fire hazard, keep the engine area free of excessive grease, grass, leaves, and accumulation of dirt.

5. If the engine must be running to perform maintenance or make an adjustment, keep hands, feet, clothing, and all parts of the body away from all moving parts. Keep bystanders away.

6. Do not overspeed the engine by changing governor settings. Recommended engine high idle speed is 3200 rpm. To ensure safety and accuracy, check engine speed with a tachometer.

7. Engine must be shut off and cooled down before checking oil or adding oil to the engine crankcase.

8. When performing general maintenance and service on the machine, it is recommended that the machine be parked on a clean, level surface with the transport wheels in the raised and locked position. The machine will be more stable when positioned on the rollers.

9. If service of underdeck items (e.g., steering or transmission linkage) is necessary, raise machine with hoist or other lifting device. Support raised machine with appropriate jackstands on all corners of the machine to prevent it from shifting or falling. Excessive tilting of the machine should be avoided.

10. When lowering machine from transport position, make sure that the ground is clean and level. This will prevent unexpected movement of the machine and potential roller damage.

11.If major repairs are necessary or assistance is required, contact your Authorized TORO Distributor.

12.At the time of manufacture, the machine conformed to all applicable safety standards. To ensure optimum performance and continued safety certification of the machine, use genuine TORO replacement parts and accessories. Replacement parts and accessories made by other manufacturers may result in nonconformance with the safety standards and the warranty may be voided.

13. When disposing of hazardous waste products, take them to an authorized disposal site. Waste products must not be allowed to contaminate surface water, drains, or sewer systems.

### Safety and Instruction Decals

Safety decals and instructions are easily visible to the operator and are located near any area of potential danger. Replace any decal that is damaged or lost. Decal part numbers are listed in your Parts Catalog. Order replacement decals from your Authorized TORO Distributor.

### Chapter 2

# **Product Records and Maintenance**

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### **Product Records**

Insert Operator's Manual and Parts Catalog for your GreensPro 1200 at the end of this section. In addition, if any optional equipment or accessories have been installed to your machine, insert the Installation Instructions, Operator's Manuals, and Parts Catalogs for those options at the end of this chapter.

### Maintenance

Maintenance procedures and recommended service intervals for the GreensPro 1200 are covered in the Operator's Manual. Refer to that publication when performing regular equipment maintenance.

### **Decimal and Millimeter Equivalents**

Fractions		Decimals	mm	Fractions		Decimals	mm
1/32	1/64	0.015625	-0.397	17/32 -	33/64	0.515625	- 13.097
1/16	3/64	0.046875	- 1.191	0/16	35/64	0.546875	- 13.891
2/22	5/64	0.078125	-1.984	10/22	37/64	0.578125	- 14.684
1/9	7/64	0.109375	- 2.778	5/8	39/64	0.609375	- 15.478
5/32	9/64	0.140625	- 3.572	21/32 -	41/64	0.640625	- 16.272
2/16	11/64	0.171875	- 4.366	11/16	43/64	0.671875	- 17.066
7/32	13/64	0.203125	-5.159	23/32 -	45/64	0.703125	- 17.859
1/4	15/64	0.234375	-5.953 -6.350	3/4	47/64	0.734375	- 18.653
9/32	17/16	0.265625	-6.747 -7.144	25/32 -	49/64	0.765625	- 19.447 - 19.844
5/16	19/64	0.296875	- 7.541 - 7.938	13/16	51/64	0.796875	- 20.241 - 20.638
11/32	21/64	0.328125 	- 8.334 - 8.731	27/32 -	53/64	0.828125 - 0.84375	- 21.034 - 21.431
3/8	23/64	0.359375 - 0.3750	- 9.128 - 9.525	7/8	55/64	0.859375 - 0.8750	- 21.828 - 22.225
13/32	25/64	0.390625 	- 9.922 - 10.319	29/32 -	57/64	0.890625	- 22.622 - 23.019
7/64 —	27/64	0.421875 - 0.4375	- 10.716 - 11.112	15/16	59/64	0.921875 - 0.9375	- 23.416 - 23.812
15/32	29/64	0.453125 	- 11.509 - 11.906	31/32 -	61/64	0.953125 - 0.96875	- 24.209 - 24.606
1/2 ——	31/64	0.484375 - 0.5000	- 12.303 - 12.700	1	63/64	0.984375 - 1.000	- 25.003 - 25.400
1 mm	= 0.039	37 in.		0.001 ir	n. = 0. C	)254 mm	

### **U.S. to Metric Conversions**

	To Convert	Into	Multiply By
Linear	Miles	Kilometers	1.609
Measurements	Yards	Meters	0.9144
	Feet	Meters	0.3048
	Feet	Centimeters	30.48
	Inches	Meters	0.0254
	Inches	Centimeters	2.54
	Inches	Millimeters	25.4
Area	Square Miles	Square Kilometers	2.59
	Square Feet	Square Meters	0.0929
	Square Inches	Square Centimeters	6.452
	Acre	Hectare	0.4047
Volume	Cubic Yards	Cubic Meters	0.7646
	Cubic Feet	Cubic Meters	0.02832
	Cubic Inches	Cubic Centimeters	16.39
Weight	Tons (Short)	Metric Tons	0.9078
	Pounds	Kilograms	0.4536
	Ounces (Avdp.)	Grams	28.3495
Pressure	Pounds/Sa. In.	Kilopascal	6.895
	Pounds/Sq. In.	Bar	0.069
Work	Foot-pounds	Newton-Meters	1.356
	Foot-pounds	Kilogram-Meters	0.1383
	Inch-pounds	Kilograms-Centimeter	1.152144
Liquid Volume	Quarts	Liters	0.9463
	Gallons	Liters	3.785
Liquid Flow	Gallon/Minutes	Liters/Minute	3.785
Temperature	Fahrenheit	Celsius	1. Subtract 32°
			2. Multiply by 5/9

### **Torque Specifications**

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 Service Manual.

These Torque Specifications for the installation and tightening of fasteners shall apply to all fasteners that do not have a specific requirement identified in this Service Manual. The following factors shall be considered when applying torque: cleanliness of the fastener, use of a thread sealant (e.g., Loctite<sup>®</sup>), degree of lubrication on the fastener, presence of a prevailing torque feature (e.g., Nylock nut), hardness of the surface underneath the fastener's head, or a similar condition that affects the installation.

As noted in the following tables, torque values should be reduced by 25% for lubricated fasteners to achieve the similar stress as a dry fastener. Torque values may also have to be reduced when the fastener is threaded into 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.

The standard method of verifying torque shall be performed by marking a line on the fastener (head or nut) and mating part, then backing off fastener 1/4 of a turn. Measure the torque required to tighten the fastener until the lines match up.

### **Fastener Identification**

(Figures 1 and 2.)



Figure 1: Inch Series Bolts and Screws

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

Thread Size	Grade 1, 5, & 8 with Thin Height Nuts	SAE Grade 1 Bolts, Screws, Studs, & Sems with Regular Height Nuts (SAE J995 Grade 2 or Stronger Nuts)		ade 1, 5, & SAE Grade 1 Bolts, Screws, Studs, & SAE Grade 5 Bolts, Screws, Studs, & Sems with Regular Height Nuts (SAE J995 Grade 2 or Stronger Nuts)		SAE Grade 8 Bolts, Screws, Studs, & Sems with Regular Height Nuts (SAE J995 Grade 5 or Stronger Nuts)	
	in-lb	in-lb	N⋅m	in-lb	N⋅m	in-lb	N∙m
# 6 - 32 UNC	10 + 2	12 + 2	1 47 + 0 23	15 <u>+</u> 2	1.69 ± 0.23	23 <u>+</u> 3	2.62 ± 0.34
# 6 - 40 UNF	10±2	13±2	1.47 ± 0.25	17 <u>+</u> 2	1.92 ± 0.23	25 <u>+</u> 3	2.82 ± 0.34
# 8 - 32 UNC	12 . 0	05 + 5		29 <u>+</u> 3	3.28 ± 0.34	41 <u>+</u> 5	4.63 ± 0.56
# 8 - 36 UNF	13 <u>+</u> 2	25 <u>+</u> 5	2.82 ± 0.30	31 <u>+</u> 4	3.5 ± 0.45	43 <u>+</u> 5	4.86 ± 0.56
# 10 - 24 UNC	10 , 0	20 + 5	2 20 5 0 56	42 <u>+</u> 5	4.75 ± 0.56	60 <u>+</u> 6	6.78 ± 0.68
# 10 - 32 UNF	10 <u>+</u> 2	30 <u>+</u> 5	3.39 ± 0.50	48 <u>+</u> 5	5.42 ± 0.56	68 <u>+</u> 7	7.68 ± 0.79
1/4 - 20 UNC	48 <u>+</u> 7	53 <u>+</u> 7	5.99 ± 0.79	100 <u>+</u> 10	11.3 ± 1.13	140 <u>+</u> 15	15.82 ± 1.69
1/4 - 28 UNF	53 <u>+</u> 7	65 <u>+</u> 10	7.34 ± 1.13	115 <u>+</u> 12	13.0 ± 1.36	160 <u>+</u> 17	18.08 ± 1.92
5/16 - 18 UNC	115 <u>+</u> 15	105 <u>+</u> 15	11.86 ± 1.69	200 <u>+</u> 25	22.6 ± 2.82	300 <u>+</u> 30	33.9 ± 3.39
5/16 - 24 UNF	138 <u>+</u> 17	128 <u>+</u> 17	14.46 ± 1.92	225 <u>+</u> 25	25.4 ± 2.82	325 <u>+</u> 33	36.72 ± 3.73
	ft-lb	ft-lb	N∙m	ft-lb	N∙m	ft-lb	N∙m
3/8 - 16 UNC	<b>ft-lb</b> 16 <u>+</u> 2	<b>ft-lb</b> 16 <u>+</u> 2	<b>N</b> ⋅m 22 ± 3	<b>ft-lb</b> 30 ± 3	<b>N</b> ∙m 41 <u>+</u> 4	<b>ft-lb</b> 43 ± 5	<b>N∙m</b> 58 ± 7
3/8 - 16 UNC 3/8 - 24 UNF	<b>ft-lb</b> 16 ± 2 17 ± 2	ft-lb 16 ± 2 18 ± 2	<b>N</b> ⋅m 22 ± 3 24 ± 3	<b>ft-lb</b> 30 ± 3 35 ± 4	<b>N</b> ⋅m 41 ± 4 47 ± 5	<b>ft-lb</b> 43 ± 5 50 ± 6	<b>N</b> ⋅m 58 ± 7 68 ± 8
3/8 - 16 UNC 3/8 - 24 UNF 7/16 - 14 UNC	ft-lb           16 ± 2           17 ± 2           27 ± 3	ft-lb           16 ± 2           18 ± 2           27 ± 3	N·m $22 \pm 3$ $24 \pm 3$ $37 \pm 4$	ft-lb $30 \pm 3$ $35 \pm 4$ $50 \pm 5$	N·m $41 \pm 4$ $47 \pm 5$ $68 \pm 7$	ft-lb           43 ± 5           50 ± 6           70 ± 7	<b>N</b> ⋅m 58 ± 7 68 ± 8 95 ± 9
3/8 - 16 UNC 3/8 - 24 UNF 7/16 - 14 UNC 7/16 - 20 UNF	ft-lb $16 \pm 2$ $17 \pm 2$ $27 \pm 3$ $29 \pm 3$	ft-lb       16 ± 2       18 ± 2       27 ± 3       29 ± 3	N·m $22 \pm 3$ $24 \pm 3$ $37 \pm 4$ $39 \pm 4$	ft-lb $30 \pm 3$ $35 \pm 4$ $50 \pm 5$ $55 \pm 6$	N·m $41 \pm 4$ $47 \pm 5$ $68 \pm 7$ $75 \pm 8$	ft-lb           43 ± 5           50 ± 6           70 ± 7           77 ± 8	<b>N</b> ⋅m 58 ± 7 68 ± 8 95 ± 9 104 ± 11
3/8 - 16 UNC 3/8 - 24 UNF 7/16 - 14 UNC 7/16 - 20 UNF 1/2 - 13 UNC	ft-lb $16 \pm 2$ $17 \pm 2$ $27 \pm 3$ $29 \pm 3$ $30 \pm 3$	ft-lb $16 \pm 2$ $18 \pm 2$ $27 \pm 3$ $29 \pm 3$ $48 \pm 7$	N·m $22 \pm 3$ $24 \pm 3$ $37 \pm 4$ $39 \pm 4$ $65 \pm 9$	ft-lb $30 \pm 3$ $35 \pm 4$ $50 \pm 5$ $55 \pm 6$ $75 \pm 8$	N·m $41 \pm 4$ $47 \pm 5$ $68 \pm 7$ $75 \pm 8$ $102 \pm 11$	ft-lb $43 \pm 5$ $50 \pm 6$ $70 \pm 7$ $77 \pm 8$ $105 \pm 11$	N·m $58 \pm 7$ $68 \pm 8$ $95 \pm 9$ $104 \pm 11$ $142 \pm 15$
3/8 - 16 UNC 3/8 - 24 UNF 7/16 - 14 UNC 7/16 - 20 UNF 1/2 - 13 UNC 1/2 - 20 UNF	ft-lb $16 \pm 2$ $17 \pm 2$ $27 \pm 3$ $29 \pm 3$ $30 \pm 3$ $32 \pm 4$	ft-lb $16 \pm 2$ $18 \pm 2$ $27 \pm 3$ $29 \pm 3$ $48 \pm 7$ $53 \pm 7$	N·m $22 \pm 3$ $24 \pm 3$ $37 \pm 4$ $39 \pm 4$ $65 \pm 9$ $72 \pm 9$	ft-lb $30 \pm 3$ $35 \pm 4$ $50 \pm 5$ $55 \pm 6$ $75 \pm 8$ $85 \pm 9$	N·m $41 \pm 4$ $47 \pm 5$ $68 \pm 7$ $75 \pm 8$ $102 \pm 11$ $115 \pm 12$	ft-lb $43 \pm 5$ $50 \pm 6$ $70 \pm 7$ $77 \pm 8$ $105 \pm 11$ $120 \pm 12$	N·m $58 \pm 7$ $68 \pm 8$ $95 \pm 9$ $104 \pm 11$ $142 \pm 15$ $163 \pm 16$
3/8 - 16 UNC 3/8 - 24 UNF 7/16 - 14 UNC 7/16 - 20 UNF 1/2 - 13 UNC 1/2 - 20 UNF 5/8 - 11 UNC	ft-lb $16 \pm 2$ $17 \pm 2$ $27 \pm 3$ $29 \pm 3$ $30 \pm 3$ $32 \pm 4$ $65 \pm 10$	ft-lb $16 \pm 2$ $18 \pm 2$ $27 \pm 3$ $29 \pm 3$ $48 \pm 7$ $53 \pm 7$ $88 \pm 12$	N·m $22 \pm 3$ $24 \pm 3$ $37 \pm 4$ $39 \pm 4$ $65 \pm 9$ $72 \pm 9$ $119 \pm 16$	ft-lb $30 \pm 3$ $35 \pm 4$ $50 \pm 5$ $55 \pm 6$ $75 \pm 8$ $85 \pm 9$ $150 \pm 15$	N·m $41 \pm 4$ $47 \pm 5$ $68 \pm 7$ $75 \pm 8$ $102 \pm 11$ $115 \pm 12$ $203 \pm 20$	ft-lb $43 \pm 5$ $50 \pm 6$ $70 \pm 7$ $77 \pm 8$ $105 \pm 11$ $120 \pm 12$ $210 \pm 21$	N·m $58 \pm 7$ $68 \pm 8$ $95 \pm 9$ $104 \pm 11$ $142 \pm 15$ $163 \pm 16$ $285 \pm 28$
3/8 - 16 UNC 3/8 - 24 UNF 7/16 - 14 UNC 7/16 - 20 UNF 1/2 - 13 UNC 1/2 - 20 UNF 5/8 - 11 UNC 5/8 - 18 UNF	ft-lb $16 \pm 2$ $17 \pm 2$ $27 \pm 3$ $29 \pm 3$ $30 \pm 3$ $32 \pm 4$ $65 \pm 10$ $75 \pm 10$	ft-lb $16 \pm 2$ $18 \pm 2$ $27 \pm 3$ $29 \pm 3$ $48 \pm 7$ $53 \pm 7$ $88 \pm 12$ $95 \pm 15$	N·m $22 \pm 3$ $24 \pm 3$ $37 \pm 4$ $39 \pm 4$ $65 \pm 9$ $72 \pm 9$ $119 \pm 16$ $129 \pm 20$	ft-lb $30 \pm 3$ $35 \pm 4$ $50 \pm 5$ $55 \pm 6$ $75 \pm 8$ $85 \pm 9$ $150 \pm 15$ $170 \pm 18$	N·m $41 \pm 4$ $47 \pm 5$ $68 \pm 7$ $75 \pm 8$ $102 \pm 11$ $115 \pm 12$ $203 \pm 20$ $230 \pm 24$	ft-lb $43 \pm 5$ $50 \pm 6$ $70 \pm 7$ $77 \pm 8$ $105 \pm 11$ $120 \pm 12$ $210 \pm 21$ $240 \pm 24$	N·m $58 \pm 7$ $68 \pm 8$ $95 \pm 9$ $104 \pm 11$ $142 \pm 15$ $163 \pm 16$ $285 \pm 28$ $325 \pm 33$
3/8 - 16 UNC 3/8 - 24 UNF 7/16 - 14 UNC 7/16 - 20 UNF 1/2 - 13 UNC 1/2 - 20 UNF 5/8 - 11 UNC 5/8 - 18 UNF 3/4 - 10 UNC	ft-lb $16 \pm 2$ $17 \pm 2$ $27 \pm 3$ $29 \pm 3$ $30 \pm 3$ $32 \pm 4$ $65 \pm 10$ $75 \pm 10$ $93 \pm 12$	ft-lb $16 \pm 2$ $18 \pm 2$ $27 \pm 3$ $29 \pm 3$ $48 \pm 7$ $53 \pm 7$ $88 \pm 12$ $95 \pm 15$ $140 \pm 20$	N·m $22 \pm 3$ $24 \pm 3$ $37 \pm 4$ $39 \pm 4$ $65 \pm 9$ $72 \pm 9$ $119 \pm 16$ $129 \pm 20$ $190 \pm 27$	ft-lb $30 \pm 3$ $35 \pm 4$ $50 \pm 5$ $55 \pm 6$ $75 \pm 8$ $85 \pm 9$ $150 \pm 15$ $170 \pm 18$ $265 \pm 27$	N·m $41 \pm 4$ $47 \pm 5$ $68 \pm 7$ $75 \pm 8$ $102 \pm 11$ $115 \pm 12$ $203 \pm 20$ $230 \pm 24$ $359 \pm 37$	ft-lb $43 \pm 5$ $50 \pm 6$ $70 \pm 7$ $77 \pm 8$ $105 \pm 11$ $120 \pm 12$ $210 \pm 21$ $240 \pm 24$ $375 \pm 38$	N·m $58 \pm 7$ $68 \pm 8$ $95 \pm 9$ $104 \pm 11$ $142 \pm 15$ $163 \pm 16$ $285 \pm 28$ $325 \pm 33$ $508 \pm 52$
3/8 - 16 UNC 3/8 - 24 UNF 7/16 - 14 UNC 7/16 - 20 UNF 1/2 - 13 UNC 1/2 - 20 UNF 5/8 - 11 UNC 5/8 - 11 UNC 5/8 - 18 UNF 3/4 - 10 UNC 3/4 - 16 UNF	ft-lb $16 \pm 2$ $17 \pm 2$ $27 \pm 3$ $29 \pm 3$ $30 \pm 3$ $32 \pm 4$ $65 \pm 10$ $75 \pm 10$ $93 \pm 12$ $115 \pm 15$	ft-lb $16 \pm 2$ $18 \pm 2$ $27 \pm 3$ $29 \pm 3$ $48 \pm 7$ $53 \pm 7$ $88 \pm 12$ $95 \pm 15$ $140 \pm 20$ $165 \pm 25$	N·m $22 \pm 3$ $24 \pm 3$ $37 \pm 4$ $39 \pm 4$ $65 \pm 9$ $72 \pm 9$ $119 \pm 16$ $129 \pm 20$ $190 \pm 27$ $224 \pm 34$	ft-lb $30 \pm 3$ $35 \pm 4$ $50 \pm 5$ $55 \pm 6$ $75 \pm 8$ $85 \pm 9$ $150 \pm 15$ $170 \pm 18$ $265 \pm 27$ $300 \pm 30$	N·m $41 \pm 4$ $47 \pm 5$ $68 \pm 7$ $75 \pm 8$ $102 \pm 11$ $115 \pm 12$ $203 \pm 20$ $230 \pm 24$ $359 \pm 37$ $407 \pm 41$	ft-lb $43 \pm 5$ $50 \pm 6$ $70 \pm 7$ $77 \pm 8$ $105 \pm 11$ $120 \pm 12$ $210 \pm 21$ $240 \pm 24$ $375 \pm 38$ $420 \pm 43$	N·m $58 \pm 7$ $68 \pm 8$ $95 \pm 9$ $104 \pm 11$ $142 \pm 15$ $163 \pm 16$ $285 \pm 28$ $325 \pm 33$ $508 \pm 52$ $569 \pm 58$
3/8 - 16 UNC 3/8 - 24 UNF 7/16 - 14 UNC 7/16 - 20 UNF 1/2 - 13 UNC 1/2 - 20 UNF 5/8 - 11 UNC 5/8 - 11 UNC 5/8 - 18 UNF 3/4 - 10 UNC 3/4 - 16 UNF 7/8 - 9 UNC	ft-lb $16 \pm 2$ $17 \pm 2$ $27 \pm 3$ $29 \pm 3$ $30 \pm 3$ $32 \pm 4$ $65 \pm 10$ $75 \pm 10$ $93 \pm 12$ $115 \pm 15$ $140 \pm 20$	ft-lb $16 \pm 2$ $18 \pm 2$ $27 \pm 3$ $29 \pm 3$ $48 \pm 7$ $53 \pm 7$ $88 \pm 12$ $95 \pm 15$ $140 \pm 20$ $165 \pm 25$ $225 \pm 25$	N·m $22 \pm 3$ $24 \pm 3$ $37 \pm 4$ $39 \pm 4$ $65 \pm 9$ $72 \pm 9$ $119 \pm 16$ $129 \pm 20$ $190 \pm 27$ $224 \pm 34$ $305 \pm 34$	ft-lb $30 \pm 3$ $35 \pm 4$ $50 \pm 5$ $55 \pm 6$ $75 \pm 8$ $85 \pm 9$ $150 \pm 15$ $170 \pm 18$ $265 \pm 27$ $300 \pm 30$ $430 \pm 45$	N·m $41 \pm 4$ $47 \pm 5$ $68 \pm 7$ $75 \pm 8$ $102 \pm 11$ $115 \pm 12$ $203 \pm 20$ $230 \pm 24$ $359 \pm 37$ $407 \pm 41$ $583 \pm 61$	ft-lb $43 \pm 5$ $50 \pm 6$ $70 \pm 7$ $77 \pm 8$ $105 \pm 11$ $120 \pm 12$ $210 \pm 21$ $240 \pm 24$ $375 \pm 38$ $420 \pm 43$ $600 \pm 60$	N·m $58 \pm 7$ $68 \pm 8$ $95 \pm 9$ $104 \pm 11$ $142 \pm 15$ $163 \pm 16$ $285 \pm 28$ $325 \pm 33$ $508 \pm 52$ $569 \pm 58$ $813 \pm 81$

Product Records and Maintenance

**NOTE:** Torque values may have to be reduced when installing fasteners into threaded aluminum or brass. The specific torque value should be determined based on the fastener size, the aluminum or base material strength, length of thread engagement, etc.

**NOTE:** Reduce 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 thread sealant such as Loctite<sup>®</sup>.

**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  $\pm$  10% of the nominal torque value. Thin height nuts include jam nuts.

Thread Size	Class 8.8 Bolts, Screws and Studs with Regular Height Nuts (Class 8 or Stronger Nuts)		Class 10.9 Bolts, Sc Regular H (Class 10 or S	rews and Studs with eight Nuts Stronger Nuts)
M5 X 0.8	57 <u>±</u> 6 in−lb 6.44 ± 0.68 N·m		78 <u>+</u> 8 in-lb	8.81 ± 0.90 N⋅m
M6 X 1.0	96 <u>+</u> 10 in-lb	10.85 ± 1.13 N⋅m	133 <u>+</u> 14 in-lb	15.03 ± 1.58 N⋅m
M8 X 1.25	19 <u>+</u> 2 ft-lb	26 <u>+</u> 3 N⋅m	28 <u>+</u> 3 ft-lb	38 <u>+</u> 4 N⋅m
M10 X 1.5	38 <u>+</u> 4 ft-lb	52 <u>+</u> 5 N⋅m	54 <u>+</u> 6 ft-lb	73 <u>+</u> 8 N⋅m
M12 X 1.75	66 <u>+</u> 7 ft-lb	90 <u>+</u> 10 N⋅m	93 <u>+</u> 10 ft-lb	126 <u>+</u> 14 N⋅m
M16 X 2.0	166 <u>+</u> 17 ft-lb	225 <u>+</u> 23 N⋅m	229 <u>+</u> 23 ft-lb	310 <u>+</u> 31 N⋅m
M20 X 2.5	325 <u>+</u> 33 ft-lb	440 <u>+</u> 45 N⋅m	450 <u>+</u> 46 ft-lb	610 <u>+</u> 62 N⋅m

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

**NOTE:** Torque values may have to be reduced when installing fasteners into threaded aluminum or brass. The specific torque value should be determined based on the fastener size, the aluminum or base material strength, length of thread engagement, etc.

**NOTE:** Reduce 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 thread sealant such as Loctite<sup>®</sup>.

**NOTE:** The nominal torque values listed above are based on 75% of the minimum proof load specified in SAE J1199. The tolerance is approximately  $\pm$  10% of the nominal torque value.

### Other Torque Specifications

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

#### SAE Grade 8 Steel Set Screws

#### Wheel Bolts and Lug Nuts

Thread Size	Recommen	ded Torque**
7/16 - 20 UNF Grade 5	65 <u>+</u> 10 ft-lb	88 <u>+</u> 14 N⋅m
1/2 - 20 UNF Grade 5	80 <u>+</u> 10 ft-lb	108 <u>+</u> 14 N⋅m
M12 X 1.25 Class 8.8	80 <u>+</u> 10 ft-lb	108 <u>+</u> 14 N⋅m
M12 X 1.5 Class 8.8	80 <u>+</u> 10 ft-lb	108 <u>+</u> 14 N⋅m

\*\* For steel wheels and non-lubricated fasteners.

### Thread Cutting Screws (Zinc Plated Steel)

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

### Thread Cutting Screws (Zinc Plated Steel)

Thread	Threads per Inch		Bassline Torque*
Size	Туре А	Туре В	Baseline Torque
No. 6	18	20	20 <u>+</u> 5 in-lb
No. 8	15	18	30 <u>+</u> 5 in-lb
No. 10	12	16	38 <u>+</u> 7 in-lb
No. 12	11	14	85 <u>+</u> 15 in-lb

\*Hole size, material strength, material thickness, and finish must be considered when determining specific torque values. All torque values are based on non-lubricated fasteners.

### **Conversion Factors**

in-lb x 11.298 = N⋅cm
in-lb x 0.1130 = N⋅m
ft-lb x 1.3558 = N⋅m

*N*·*cm* x 0.08851 = in-lb *N*·*m* x 8.851 = in-lb *N*·*m* x 0.7376 = ft-lb This page is intentionally blank.

# **TORO**®

### Chapter 3

# **Gasoline Engine**

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Engine	

### Introduction

This chapter gives information about specifications and repair of the Honda GX200 gasoline engine used in the GreensPro 1200. Described adjustments and repairs require tools that are commonly available in many service shops.

Some service and repair parts for the engine in your GreensPro machine are supplied through your Authorized TORO Distributor. Be prepared to provide your distributor with the TORO model and serial number of your machine to obtain parts.

Detailed information on engine operation, general maintenance, maintenance intervals, and adjustments is given in the Honda GX200 Owner's Manual.

Detailed information on engine troubleshooting, testing, disassembly, and assembly is given in the Honda Service Manual that is available from Honda. The use of some specialized tools and test equipment is explained in the Honda Service Manual. However, the specialized nature of some engine repairs may dictate that the work be done at an engine repair facility.

When disposing of hazardous waste products, take them to an authorized disposal site. Waste products must not be allowed to contaminate surface water, drains, or sewer systems.

### **Operator's Manual**

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

### **Engine Identification**

The engine serial number and type are stamped on the engine near the oil filler dipstick. The engine serial number and type will assist in identifying the correct parts and service information for the Honda engine in your GreensPro machine.

### Specifications

Item	Description
Make	Honda, 4-stroke, OHV, Single Cylinder, Air-Cooled, Gasoline Engine, GX2000
Bore x Stroke	2.68 in. x 2.13 in. (68.0 mm x 54.0 mm)
Total Displacement	12.0 cu. in. (196 cc)
Carburetor	Float Feed Fixed Main Jet
Governor	Mechanical Flyweight
Idle Speed (no load)	1250–1600 rpm
High Idle (no load)	3200 rpm
Direction of rotation	Counterclockwise (Facing PTO Shaft)
Fuel	Unleaded Automotive Grade Gasoline
Fuel Tank Capacity	3.3 U.S. Quarts (3.1 Liters)
Engine Oil	See Operator's Manual
Lubrication System	Splash Type
Oil Capacity	0.63 U.S. Quarts (0.6 Liters)
Air Cleaner	Dual Element
Ignition System	Transistorized Flywheel Magneto
Spark Plug	NGK BPR6ES
Spark Plug Gap	0.028 to 0.031 in. (0.7 to 0.8 mm)
Dry Weight	35.5 lb (16.1 kg)

### Fuel Evaporative Control System

(Figure 1.)

To meet worldwide emission standards, the engine that powers your GreensPro is equipped with a fuel cap that has an integrated carbon canister. This fuel cap captures fuel vapors from the fuel tank prior to venting to atmosphere.



Figure 1

To prevent saturating the carbon canister in the fuel cap, it is important to make sure that the fuel tank is not overfilled. The maximum fuel level for the fuel tank is to the bottom of the fuel tank insert (1). The insert also prevents the fuel from saturating the fuel cap during machine movement. Do not overfill the tank when refueling. Refer to the Honda GX200 Owner's Manual for additional information.

### **Service and Repairs**

### Engine

#### Removal

(Figures 2 through 8.)

1. Park machine on a clean, level surface with the transport wheels in the raised and locked position. Make sure engine is OFF. Remove spark plug wire from the spark plug.

2. Close the fuel shutoff valve.

3. Remove transmission cover from machine (see Transmission Cover in the Service and Repairs section of Chapter 5 - Chassis).



Figure 2

4. Remove two nuts (1), two washers (2), two cap screws (3), and four spacers (4).



Figure 3

5. Remove three lock nuts (6), three cap screws (7), and six flat washers (8).

6. Remove rear support frame (5).



Figure 4



Figure 5

**NOTE:** Cap screws (10) can be accessed through holes in the frame.

7. Remove lock nuts (9), cap screws (10), and flat washers (11).

8. Remove the engine.



Figure 6

9. Remove two lock nuts (13), flat washers (14), and cap screws (15), and remove drive coupling (12).

**NOTE:** Machines with serial numbers above 313000000 include an engine that has a different output shaft and collar than earlier machines. Use the procedure that matches your engine collar assembly.



Figure 7

- 15. Engine (machine serial number below 313000000)
- 16. Square key
- 17. Engine collar
- 18. Set screw

10. For machines with serial numbers below 313000000, measure and record the distance from the end of the engine collar (17) to the engine cover before removing the collar to ensure correct installation. Loosen set screw (18) and remove engine collar (17) and square key (16).



#### Figure 8

- 19. Engine (machine serial number above 313000000)
- 20. Square key
- 21. Engine shaft spacer
- 22. Engine collar
- 23. Flat washer
- 24. Lock washer
- 25. Socket-head cap screw

11. For machines with serial numbers above 313000000, remove socket-head cap screw (25), lock washer (24), and flat washer (23), and remove engine collar (22), engine shaft spacer (21), and square key (20).

#### Gasoline Engine

#### Installation

#### (Figures 9 through 15.)

**NOTE:** Machines with serial numbers above 313000000 include an engine that has a different output shaft and collar than earlier machines. Use the procedure that matches your engine collar assembly.



Figure 9

- 1. Engine (machine serial number below 313000000)
- 2. Square key
- 3. Engine collar
- 4. Set screw

1. For machines with serial numbers below 313000000, install square key (2) and engine collar (3) on the engine output shaft, positioning collar the same distance as noted during removal. Secure the engine collar by tightening set screw (4).



### Figure 10

- 5. Engine (machine serial number above 313000000)
- 6. Square key
- 7. Engine shaft spacer
- 8. Engine collar
- 9. Flat washer
- 10. Lock washer
- 11. Socket-head cap screw

2. For machines with serial numbers above 313000000, install engine collar (8), engine shaft spacer (7), and square key (6) on the engine output shaft. Secure using socket-head cap screw (11), lock washer (10), and flat washer (9).



#### Figure 11

3. Install drive coupling (12) using two lock nuts (13), flat washers (14), and cap screws (15).



Figure 12



Figure 13

4. Place engine on frame. Secure engine using lock nuts (16), cap screws (17), and flat washers (18).



Figure 14

5. Install rear support frame (19) using three lock nuts (20), three cap screws (21), and six flat washers (22).



Figure 15

6. Connect the drive coupling to the engine collar using two nuts (23), two washers (24), two cap screws (25), and four spacers (26).

IMPORTANT: To prevent drive coupling damage, make sure that no distortion of coupling exists after securing engine collar to coupling. If coupler distortion is evident, loosen engine and reposition engine on frame so that coupling is not distorted.

7. Install and secure transmission cover (see Transmission Cover in the Service and Repairs section of Chapter 5 - Chassis).

8. Lower and secure the seat platform.

## Chapter 4



# **Hydraulic System**

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HYDRO-GEAR BDR SERVICE AND REPA	IR
MANUAL	

### Introduction

Some service and repair parts for the transmission in your GreensPro machine are supplied through your Authorized TORO Distributor. Be prepared to provide your distributor with the TORO model and serial number of your machine to obtain parts.

When disposing of hazardous waste products, take them to an authorized disposal site. Waste products must not be allowed to contaminate surface water, drains, or sewer systems.

### Specifications

Item	Description
Transmission	Hydro-Gear Hydrostatic Transmission
	(Model BDR)
Pump Displacement (per revolution)	0.62 in <sup>3</sup> (10.2 cc)
Motor Displacement (per revolution)	1.33 in <sup>3</sup> (21.8 cc)
Hydraulic Tank Capacity	5.3 U.S. Quarts (5.0 Liters)
Hydraulic Oil	See Operator's Manual
Hydraulic Filter	Spin-on Cartridge Type

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### Hydraulic Hoses

Hydraulic hoses are subject to extreme conditions such as pressure differentials during operation and exposure to weather, sun, chemicals, very warm storage conditions, or mishandling during operation or maintenance. These conditions can cause damage or premature deterioration. Some hoses are more susceptible to these conditions than others. Inspect the hoses frequently for signs of deterioration or damage.

When replacing a hydraulic hose, be sure that the hose is straight (not twisted) before tightening the fittings. This can be done by observing the imprint on the hose. Use two wrenches: hold the hose straight with one and tighten the hose swivel nut onto the fitting with the other.

For additional hydraulic hose information, refer to Toro service training book, Hydraulic Hose Servicing (Part Number 94813SL).

## CAUTION

Before disconnecting or performing any work on hydraulic system, relieve all pressure in system. Stop engine and depress each of the motion pedals fully to relieve hydraulic pressure in the traction circuit.

Keep body and hands away from pin hole leaks or nozzles that eject hydraulic fluid under high pressure. Use paper or cardboard, not hands, to search for leaks. Hydraulic fluid escaping under pressure can have sufficient force to penetrate the skin and cause serious injury. If fluid is injected into the skin, it must be surgically removed within a few hours by a doctor familiar with this type of injury. Gangrene may result from such an injury.

### Hydraulic Fitting and Hose Installation

IMPORTANT: The hydraulic fittings and hoses used on the GreensPro 1200 have both SAE and BSP threads. If fittings or hoses are replaced, make sure that the replacement has the correct type of threads, or component damage and leakage will occur.

1. Make sure all threads and sealing surfaces of hydraulic fitting, component port, and hydraulic hose are free of damage or foreign material.

2. As a preventative measure against leakage, it is recommended that fitting seals (if equipped) be replaced anytime the connection is opened. Lightly lubricate the seal with clean hydraulic oil. Make sure the seal is installed and properly seated on the fitting.

3. The fitting threads should be clean with no lubricant applied.

4. Install the hydraulic fitting into the component port. Then, use a torque wrench and socket to tighten the fitting to the recommended installation torque that is listed in the assembly procedures in this Service Manual. 5. Thread the hydraulic hose swivel nut onto the fitting by hand. While holding the hose with a wrench to prevent it from rotating, use a torque wrench to tighten the hose swivel nut to the recommended installation torque that is listed in the assembly procedures in this Service Manual.

IMPORTANT: This tightening process may require the use of an offset wrench (e.g., crowfoot wrench). Use of an offset wrench will affect torque wrench calibration due to the effective length change of the torque wrench. Tightening torque when using a torque wrench with an offset wrench will be lower than the recommended installation torque. Refer to Using a Torque Wrench with an Offset Wrench.

### Using a Torque Wrench with an Offset Wrench

(Figure 1.)

Use of an offset wrench (e.g., crowfoot wrench) will affect torque wrench calibration due to the effective change of torque wrench length. When using a torque wrench with an offset wrench, multiply the listed torque recommendation by the calculated torque conversion factor (Figure 1) to determine proper tightening torque. Tightening torque when using a torque wrench with an offset wrench will be lower than the listed torque recommendation.

**Example:** The measured affective length of the torque wrench (distance from the center of the handle to the center of the square drive) is 18 in..

The measured effective length of the torque wrench with the offset wrench installed (distance from the center of the handle to the center of the offset wrench) is 19 in..

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

If the listed torque recommendation for a fastener is from 76 to 94 lb-ft, the proper torque when using this torque wrench with an offset wrench would be from 72 to 98 lb-ft.



Figure 1

### **Relieving Hydraulic System Pressure**

Before disconnecting or performing any work on the GreensPro 1200 hydraulic system, all pressure in the hydraulic system must be relieved. Park machine on a level surface. Make sure engine is OFF.

To relieve hydraulic pressure in the traction circuit, depress each of the motion pedals fully.

### **Traction Circuit Component Failure**

The GreensPro 1200 traction circuit includes the transmission, oil tank, and oil filter. If a component in the traction circuit should fail, debris and contamination from the failed component will circulate throughout the traction circuit. This contamination can damage other components in the circuit, so the contamination must be removed to prevent additional component failure.

If a component failure occurs in the traction circuit, it is critical that the entire traction circuit be drained, disassembled, and thoroughly cleaned to ensure that all contamination is removed from the circuit. Replace the oil filter. If any debris remains in the traction circuit and the machine is operated, the debris can cause additional component failure.

### General Precautions for Removing and Installing Hydraulic System Components

#### Before Repair or Replacement of Components

1. Before removing any parts from the hydraulic system, park machine on a level surface, make sure the engine is OFF, and remove the spark plug wire from the spark plug.

2. Clean machine before disconnecting, removing, or disassembling any hydraulic components. Make sure hydraulic components, hoses, connections, and fittings are cleaned thoroughly. Always keep in mind the need for cleanliness when working on hydraulic equipment.



Before disconnecting or performing any work on hydraulic system, all pressure in the system must be relieved. See Relieving Hydraulic System Pressure in the General Information section.

3. Put caps or plugs on any hydraulic lines, hydraulic fittings, and components left open or exposed, to prevent contamination.

4. Put labels on disconnected hydraulic lines and hoses for proper installation after repairs are completed.

5. Note the position of hydraulic fittings (especially elbow fittings) on hydraulic components before removal. Mark parts if necessary to make sure they will be aligned properly when reinstalling hydraulic hoses and tubes.

#### After Repair or Replacement of Components

1. Check oil level in the hydraulic reservoir and add correct oil, if necessary. Drain and refill hydraulic system reservoir. Change oil filter if component failure was severe or system is contaminated. (Refer to Operator's Manual.)

2. Lubricate O-rings and seals with clean hydraulic oil before installing hydraulic components.

3. Make sure caps and plugs are removed from the hydraulic tubes, hydraulic fittings, and components before reconnecting.

4. Use proper tightening methods when installing hydraulic hoses and fittings. (See Hydraulic Fitting Installation in this section.)

5. Make sure caps or plugs are removed from the hydraulic tubes, hydraulic fittings, and components before reconnecting.

6. After repairs, check control linkages or cables for proper adjustment, binding, or broken parts.

7. After disconnecting or replacing any hydraulic components, operate machine functions slowly until air is out of system.

8. Check for hydraulic oil leaks. Shut off engine and correct leaks if necessary. Check oil level in hydraulic reservoir and add correct oil if necessary.

9. When disposing of hazardous waste products, take them to an authorized disposal site. Waste products must not be allowed to contaminate surface water, drains, or sewer systems.

### **Service and Repairs**

### Transmission

#### Removal

(Figures 2 through 7.)

1. Park machine on a clean, level surface with the transport wheels in the raised and locked position. Make sure engine is OFF. Remove spark plug wire from the spark plug.

2. Move motion pedals to relieve system pressure.

3. Remove transmission cover from machine (see Transmission Cover in the Service and Repairs section of Chapter 5 - Chassis).

4. Drain oil from oil tank into a suitable container.



Figure 2

5. Thoroughly clean hose end and fittings on the transmission assembly to prevent oil system contamination.

6. Label all hoses and fittings for assembly purposes. Remove hoses (1 and 2) from fittings on transmission assembly. Drain hoses into a suitable container.

7. Put clean plugs in disconnected hoses and fittings to prevent system contamination.



Figure 3

8. Remove nut (4), and disconnect damper (3).

9. Remove lock nut (5), cap screw (9), bushing (7), and two flat washers (6), and disconnect linkage arm (8).



Figure 4

10. Remove two lock nuts (10), two washers (11), two cap screws (12), and four bushings (13).



Figure 5

11. Remove lock nut (14), cap screw (15), and two flat washers (16) at the bottom of the transmission.

12. Support the transmission.



Figure 6

13. Remove nut (20) and flat washer (21).

14. Remove lock nut (18), flat washer (17), cap screw (24), flat washer (22), pivot bushing (25), two Oilite<sup>®</sup> bushings (26), and spacer (19), and remove idler arm assembly (23).



Figure 7

15. Remove the retaining ring (31).

16. Remove three lock nuts (27), three cap screws (28), and six flat washers (29), and pull transmission (32) back until the two 8-tooth sprockets (30) are free of the shaft.

17. Remove transmission (32).

#### Disassembly

(Figures 8 and 9.)





1. Measure and record the distance from the end of the pump collar (1) to the transmission housing before removing the pump collar to ensure correct installation.

2. Loosen cap screw (2) and remove pump collar (1), transmission fan (3), fan support ring (5), and key (4).



Figure 9

- 3. Remove straight fitting (6) and O-ring (7).
- 4. Remove straight fitting (13) and O-ring (14).

5. Remove lock nut (12), cap screw (10), two flat washers (9), and spacer (8), and remove damper plate (11).

#### Assembly

(Refer to Figures 8 and 9.)

1. Install damper plate (11), two flat washers (9), spacer (8), cap screw (10), and lock nut (12).

2. Install straight fitting (13) and O-ring (14). Tighten fitting to 26 lb-ft (35 N·m).

3. Install straight fitting (6) and O-ring (7). Tighten fitting to 26 lb-ft (35 N·m).

4. Place transmission fan (3) and fan support ring (5) over the transmission input shaft.

5. Install key (4) in transmission input shaft.

6. Install pump collar (1) on the transmission input shaft, positioning it the same distance as noted during removal. Tighten cap screw (2).

#### Installation

(Figures 10 through 15.)



Figure 10

1. Place transmission (6) on the roller chassis.

2. Apply anti-seize lubricant to transmission output shaft.

3. Position 8-tooth sprockets (4) in the drive chain and align the gears with the transmission output shaft. Move the transmission toward the mounting bracket while guiding the gears onto the shaft.

4. Secure the 8-tooth sprockets (4) to the transmission output shaft using a retaining ring (5).

5. Secure the transmission to the bracket using three cap screws (1), three lock nuts (2), and six flat washers (3).



Figure 11

6. Install idler arm assembly (13) using cap screw (14), flat washer (12), pivot bushing (15), two  $\text{Oilite}^{\textcircled{R}}$  bushings (16), spacer (9), flat washer (7), and nut (8).

7. Install flat washer (11) and nut (10).

**NOTE:** If additional chain tension adjustment is needed, nuts on tension rod can both be installed on side of frame bracket that is closest to machine centerline.

**NOTE:** If the drive chain tension assembly requires service, see Drive Chain Tension Assembly in this section.



Figure 12

8. Install cap screw (15), lock nut (16), and two flat washers (17) at the bottom of the transmission.



Figure 13

9. Connect transmission collar to drive coupling using two lock nuts (18), two washers (19), two cap screws (20), and four bushings (21).

IMPORTANT: To prevent drive coupling damage, make sure that no distortion of coupling exists after securing engine collar to coupling. If coupling distortion is evident, loosen transmission and reposition transmission on frame so that coupling is not distorted. If necessary, engine can be loosened and repositioned to reduce distortion of the coupling.



10.Connect linkage arm (27) using cap screw (28), bushing (26), lock nut (24), and two flat washers (25).

11. Connect damper (22) using nut (23).



Figure 15

12. Remove plugs that were installed in hoses and fittings during the removal process.

13. Using labels placed during removal, attach oil hoses (29 and 30) to fittings on the transmission assembly. Tighten hose swivel nuts to 24 lb-ft (32 N·m).

14. Adjust drive chain tension and lubricate chain. (Refer to Operator's Manual.) Dri-Slide<sup>®</sup> Multi-Purpose Lubricant (or equivalent) is recommended for chain lubrication.

After drive chain adjustment, the drive chain should have 0.200 in. to 0.300 in. (5 to 8 mm) deflection at mid-span between sprockets.

15. Fill oil tank with new oil. (Refer to Operator's Manual.)

16. Install and secure transmission cover (see Transmission Cover in the Service and Repairs section of Chapter 5 - Chassis).

17. Lower and secure the seat platform.

18. Operate machine. Check oil level and adjust if necessary. Check components for leaks. Tighten any loose connections.

19. Raise machine onto transport wheels, check transmission return to neutral setting and adjust as necessary. (See HYDRO-GEAR BDR SERVICE AND REPAIR MANUAL.)
#### **Transmission Service**

(Figure 16.)



#### Figure 16: Transmission

- 1. Upper housing assembly
- 2. Lower housing
- 3. Central section assembly
- 4. Seal
- 5. Washer
- 6. Retaining ring
- 7. Retaining ring
- 8. Ball bearing
- 9. Plug

- 10. Swash plate 11. Thrust bearing
- 12. Input shaft
- 13. Thrust washer
- 14. Block spring
- 15. Pump block assembly
- 16. Hollow pin (2 used)
- 17. Charge relief spring
- 18. Ball

- 19. Relief plate
- 20. O-ring
- 21. Motor block assembly
- 22. Socket-head screw (3 used)
- 23. Bolt
- 24. Motor shaft
- 25. Thrust bearing
- 26. Ball bearing
- 27. Retaining ring

29 Botoining ring	27 Botoining ring (2 used)
20. Retaining mig	37. Retaining ring (2 used)
29. Bearing retainer	38. Bypass plate
30. Slot guide	39. Bypass actuator
31. Trunnion arm	40. Seal
32. Gasket	41. Seal
33. Seal	42. Washer
34. Control arm	43. Cap screw (9 used)
35. Lock nut	44. O-ring
36. Bypass arm	45. Charge pump

**NOTE:** The Hydro-Gear BDR transmission used in your GreensPro 1200 is illustrated in Figure 16. If transmission part numbers are not identified in your Parts Catalog, contact your Authorized TORO Distributor. Before disassembling the transmission, make sure that the outside of the transmission is thoroughly cleaned. For service of transmission, see the HYDRO-GEAR BDR SERVICE AND REPAIR MANUAL at the end of this chapter.

- 46. Charge pump housing
- 47. Cap screw (2 used)
- 48. Retaining ring
- 49. Return arm
- 50. Washer (2 used)
- 51. Screw
- 52. Scissors arm assembly
- 53. Extension spring

#### **Drive Chain Tension Assembly**

#### Removal

(Figure 17.)

1. Park machine on a clean, level surface with the transport wheels in the raised and locked position. Make sure engine is OFF. Remove spark plug wire from the spark plug.

2. Remove drive chain tension assembly from machine (see Transmission in this section).





1. Pivot bushing	10. Flat washer
2. Oilite <sup>®</sup> bushing (2 used)	11. Nut
3. Idler sprocket assembly	12. Tension rod
4. Bolt	13. Lock nut
5. Bearing (2 used)	14. Flat washer (2 used)
6. Idler sprocket	15. Nut
7. Spacer	16. Lock nut
8. Idler gear bushing	17. Flat washer
9. Cap screw	18. Idler arm

3. Remove the pivot bushing (1) and two  $\text{Oilite}^{\mathbb{R}}$  bushings (2) from the idler arm (18).

4. Remove lock nut (16), flat washer (17), idler gear bushing (8), idler sprocket assembly (3), and bolt (4) from idler arm (18).

**NOTE:** Perform step 5 only if it is necessary to replace bearings (5).

5. Remove two bearings (5) and spacer (7) from idler sprocket (6).

6. Remove cap screw (9), lock nut (13), and two flat washers (14), and remove tension rod (12) from idler arm (18).

#### Installation

(Refer to Figure 17.)

1. Install the tension rod (12) on idler arm (18) using cap screw (9), two flat washers (14), and lock nut (13).

**NOTE:** Perform step 2 only if it is necessary to replace bearings (5).

2. Install two bearings (5) and spacer (7) in idler sprocket (6).

3. Install the idler sprocket assembly (3) on idler arm (18) using bolt (4), idler gear bushing (8), flat washer (17), and lock nut (16).

4. Install two Oilite<sup>®</sup> bushings (2) and pivot bushing (1) in the idler arm (18).

5. Install drive chain tension assembly to machine (see Transmission in this section).

6. Adjust drive chain tension and lubricate chain. (Refer to Operator's Manual.) Dri-Slide<sup>®</sup> Multi-Purpose Lubricant (or equivalent) is recommended for chain lubrication.

After drive chain adjustment, the drive chain should have 0.200 in. to 0.300 in. (5 to 8 mm) deflection at mid-span between sprockets.

#### Oil Tank

#### Removal

(Figures 18 through 20.)

1. Park machine on a clean, level surface with the transport wheels in the raised and locked position. Make sure engine is OFF. Remove spark plug wire from the spark plug.

2. Move motion pedals to relieve system pressure.

3. Remove transmission cover from machine (see Transmission Cover in the Service and Repairs section of Chapter 5 - Chassis).

4. Drain hydraulic oil from oil tank into a suitable container.



Figure 18

5. Thoroughly clean hose end and fittings on the oil tank to prevent oil system contamination.

6. Label all hoses and fittings for assembly purposes. Remove hoses (1 and 2) from fittings on oil tank. Drain hoses into a suitable container.

7. Put clean plugs in disconnected hoses and fittings to prevent system contamination.



Figure 19

8. Remove two lock nuts (4), two cap screws (5), and four flat washers (6).

9. Remove oil tank assembly (3). If oil tank is being replaced, proceed to next step.



- 10. Remove two adapter fittings (10) and seals (9).
- 11. Remove drain plug (12) and seal (11).

10. Adapter fitting (2 used)

#### Installation

(Figures 21 through 23.)





- 1. Cap 2. Oil tank 3. Seal (2 used)
- 5. Seal 6. Drain plug 7. Decal
- 4. Adapter fitting (2 used)
- 1. Install drain plug (6) and seal (5).
- 2. Install adapter fittings (4) and seals (3). Tighten adapter fittings to 26 ft-lb (35 N·m).



Figure 22

3. Position oil tank assembly (8) on machine. Secure tank to chassis using two cap screws (9), two lock nuts (10), and four flat washers (11).

4. Remove plugs that were installed in hoses and fittings during the removal process.



Figure 23

5. Using labels placed during removal, attach hoses (12 and 13) to fittings on the oil tank. Tighten hose swivel nuts to 24 ft-lb ( $32 \text{ N} \cdot \text{m}$ ).

6. Fill oil tank with new oil. (Refer to Owner's Manual.)

7. Install and secure transmission cover (see Transmission Cover in the Service and Repairs section of Chapter 5 - Chassis).

8. Lower and secure seat platform.

9. Operate machine. Check oil level and adjust if necessary. Check components for leaks. Tighten any loose connections.

#### **Oil Filter Assembly**

#### Removal

(Figures 24 and 25.)

1. Park machine on a clean, level surface with the transport wheels in the raised and locked position. Make sure engine is OFF. Remove spark plug wire from the spark plug.

2. Move motion pedals to relieve system pressure.

3. Remove transmission cover from machine (see Transmission Cover in the Service and Repairs section of Chapter 5 - Chassis).

4. Drain oil from oil tank into a suitable container.

5. Thoroughly clean hose end and fittings on the oil filter assembly to prevent oil system contamination.



Figure 24

6. Label all hoses and fittings for assembly purposes. Remove hoses (1 and 5) from fittings on oil filter assembly. Drain hoses into a suitable container.

7. Put clean plugs in disconnected hoses and fittings to prevent system contamination.

8. Remove two cap screws (2), lock washers (3), and flat washers (4), and remove oil filter assembly (6).



Figure 25

9. Remove two straight fittings (7) from oil filter assembly (8).

#### Installation

(Figures 26 and 27.)



Figure 26

1. Apply thread sealant tape to threads of straight fittings (1) that will be threaded into the oil filter assembly (2).



Figure 27

2. Install the oil filter assembly (2) onto bracket using two cap screws (4), lock washers (5), and flat washers (6).

3. Remove plugs that were installed in hoses and fittings during the removal process.

4. Using labels placed during removal, attach hoses (3 and 7) to fittings on the oil filter assembly.

5. Fill oil tank with new oil. (Refer to Operator's Manual.)

6. Install and secure transmission cover (see Transmission Cover in the Service and Repairs section of Chapter 5 - Chassis).

7. Lower and secure seat platform.

8. Operate machine. Check oil level and adjust if necessary. Check components for leaks. Tighten any

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## Chapter 5

## Chassis

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## Specifications

Item	Description
Steering Wheel Bolt Torque	225 in-lb (25.4 N·m)
Transport Wheel Lug Nut Torque	80 ft-lb (108 N·m)
Transport Wheel Tire Pressure	10 psi (0.65 bar)
Axle Clamp Bolt Torque	35 ft-lb (47.5 N⋅m)
Tow Bar Clamp Bolt Torque	35 ft-lb (47.5 N⋅m)

#### **Operator's Manual**

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

#### **Steering Operation**

(Figure 1.)



Figure 1

5. Front steering head linkage arm

4. Steering disc assembly

6. Steering pivot rod 7. Steering pivot

- 1. Rear steering head
- 2. Front steering head
- 3. Rear steering head linkage arm

The GreensPro steering system includes a number of components that cause the front steering head (2) and rear steering head (1) to rotate when the steering wheel is turned by the operator. The rotation of the steering heads allows the machine to change direction. The amount the steering wheel can be turned is limited, so the turning circle of the greens roller is relatively large.

Steering system components include the steering wheel and attached steering shaft, which is connected to the steering pivot (7), steering pivot rod (6), steering disc assembly (4), rear steering head linkage arm (3), front steering head linkage arm (5), rear steering head assembly (1), and front steering head assembly (2). With the exception of the steering wheel and steering shaft, steering system components are attached to the bottom of the chassis shown in Figure 1. When the steering wheel is turned by the operator, the steering pivot (7) is rotated. Steering pivot movement causes the steering disc assembly (4) to be rotated by the steering pivot rod (6), which connects the steering pivot (7) with the steering disc assembly (4). The steering disc assembly (4) is connected to two steering heads by the rear steering head linkage arm (3) and the front steering head linkage arm (5). Rotation of the steering disc assembly (4) causes rotation of the steering heads, which allows the machine to change direction while in motion.

#### **Traction Control Operation**

(Figure 2.)



Figure 2

- 1. Traction roller 2. Quadrant lever
- 3. Rear traction link

4. Pedal rod pivot
 5. RH front traction link
 6. RH motion pedal

The GreensPro traction system uses two motion pedals connected to the hydraulic transmission control arm to control machine direction and speed. With the engine running and motion pedals in the neutral position, the transmission supplies no drive to the traction roller (1), so the machine remains in position. When one of the motion pedals is depressed, the traction control linkage moves the transmission control arm so the transmission output drives the traction roller. Machine movement will occur in the direction of the depressed pedal.

Traction control system components include the righthand motion pedal (6), left-hand motion pedal (7), lefthand front traction link (8), right-hand front traction link (5), pedal rod pivot (4), rear traction link (3), quadrant lever (2), and a transmission link. The motion pedals extend through the chassis. Traction control system components are attached to the bottom of the chassis shown in Figure 2. The motion pedals extend through the chassis, as does the link that attaches to the transmission control arm. 7. LH motion pedal
 8. LH front traction link

The two foot-operated motion pedals are on either side of the steering wheel column. These pedals control the motion of the traction roller (1). The pedals are connected to a common pedal rod pivot (4) so the motion pedals cannot be pressed down at the same time. Depressing the right-hand motion pedal (6) will move the machine to the right, and depressing the lefthand motion pedal (7) will move the machine to the left. The farther the pedal is depressed, the faster the machine will move in that direction.

#### Lifting Bar Adjustment

(Figures 3 and 4.)

1. Park machine on a clean, level surface with the transport wheels in the raised and locked position. Make sure engine is OFF. Remove spark plug wire from spark plug.

2. Raise machine (transport wheels down and locked).

 $\begin{array}{c}
 1 \\
 3 \\
 4 5 6 7 8
\end{array}$ 

Figure 3

3. Support rear of machine to relieve load on tow bar lever (2).

4. Remove cap screw (4), washer (5), bushing (6), washer (7), and lock nut (8), and disconnect lifting bar (3) from tow bar lever (2). Repeat procedure for other side of machine.



Figure 4

**NOTE:** One end of the lifting bar has left-hand threads. Before attempting to loosen the ball joint jam nuts, inspect the visible ball joint threads to determine which end of the lifting bar has left-hand threads.

5. Loosen jam nuts (1) on lifting bar (3) and turn lifting bar to achieve a distance of 26.77 in. (680 mm) between centers of ball joints (9). Tighten jam nuts (1). Repeat procedure for other side of machine. 6. Connect lifting bar (3) to tow bar lever (2) using cap screw (4), washer (5), bushing (6), washer (7), and lock nut (8). Repeat for other side of machine.

7. Remove support from rear of machine.

#### Lift Arm Catch Adjustment

(Figure 5.)

1. Park machine on a clean, level surface with the transport wheels in the raised and locked position. Make sure engine is OFF. Remove spark plug wire from spark plug.



Figure 5

**NOTE:** The linkage arm assembly includes a linkage arm, two ball joints, and two nuts. To allow adjustment, one of the linkage arm ends has left-hand threads, so one ball joint and nut also have left-hand threads. Before attempting to loosen a nut for linkage adjustment, inspect the visible threads on the linkage arm to determine thread direction.

2. Loosen jam nuts (1) on linkage arm (2) and turn linkage arm to achieve a distance of 7.09 in. (180 mm) between centers of ball joints (3).

 Make sure that lift arm catch properly engages lifting arm. It may be necessary to adjust linkage arm (2) length for proper operation.

4. After completing adjustments, tighten jam nuts (1).

#### Steering Linkage Adjustments

(Figures 6 through 13.)

1. Park machine on a clean, level surface with the transport wheels in the raised and locked position. Make sure engine is OFF. Remove spark plug wire from spark plug.

2. Using a suitable lifting device, raise and support the machine to allow steering linkage adjustment.



Figure 6

3. Insert a block (2) between steering pivot assembly (3) and chassis frame (1) to prevent steering pivot assembly (3) from moving during adjustment, and to position steering pivot assembly (3) square with chassis frame (1). Block should be approximately 1 in. (25.4 mm) thick.

**NOTE:** Each of the steering linkage assemblies includes a linkage rod, two ball joints, and two hex nuts. To allow adjustment, one of the linkage rod ends has left-hand threads, so one ball joint and hex nut also have left-hand threads. Before attempting to loosen a hex nut for linkage disassembly, inspect the visible threads on the linkage rod to determine thread direction.



Figure 7

4. Loosen jam nuts (5) and turn steering pivot rod (4) to achieve a distance of 21.06 in. (535 mm) between centers of ball joints (6). Do not tighten jam nuts until final step of steering linkage adjustments procedure.



Figure 8

5. Loosen jam nuts (7) of both steering head linkage arms (8). Turn steering head linkage arms to achieve a distance of 6.53 in. (166 mm) between centers of ball joints (9). Do not tighten jam nuts until final step of steering linkage adjustments procedure.



Figure 9

6. Using a suitable clamp (10), secure the frames of both steering heads together, so that the heads are parallel to each other. Place a straightedge (12) across steering rollers (11) to ensure steering rollers are in alignment. Adjust steering head linkage arms (8) (refer to step 4) as necessary to achieve alignment.



Figure 10



Figure 11

7. Adjust steering head linkage arms (8) until spacers (14) are flat against the steering disc (13). If the linkage arms are incorrectly adjusted, the spacers will not be flat against the steering disc (shown in Figure 10).

8. Remove block (2) from between steering pivot assembly (3) and chassis frame (1).



9. Position steering wheel (15) square with machine.

Chassis



Figure 13

10. Place a straightedge or angle iron (16) across front of steering head assemblies (17) to check alignment. If adjustment is needed, turn steering pivot rod (4) as necessary to align steering heads.

11.Tighten jam nuts (5) on steering pivot rod (4), and tighten jam nuts (7) on steering head linkage arms (8).

#### Motion Pedal Adjustment

(Figures 14 and 15.)

1. Park machine on a clean, level surface with the transport wheels in the raised and locked position. Make sure engine is OFF. Remove spark plug wire from spark plug.



#### Figure 14

2. Check motion pedal for correct adjustment by placing a straightedge (1) across the top of motion pedals (2). The straightedge should indicate that the pedals are even with each other when correctly adjusted.



#### Figure 15

3. If the straightedge determines that the pedals are not even, adjustment of the linkage arm connected to the transmission (3) is necessary.

4. To adjust linkage arm, remove transmission cover from machine to gain access to transmission linkage arm (see Transmission Cover in the Service and Repairs section of this chapter). **NOTE:** The linkage arm length should be approximately 7.09 in. (180 mm) between the centers of the ball joints (4).

5. Loosen jam nuts (5) on linkage arm (3) and then adjust linkage arm length until the motion pedals are even with each other.

6. Tighten jam nuts (5) when linkage arm length is correct.

7. Install transmission cover and secure with cap screw (see Transmission Cover in the Service and Repairs section of this chapter).

#### Steering Wheel

#### Removal

(Figure 16.)

1. Park machine on a clean, level surface with the transport wheels in the raised and locked position. Make sure engine is OFF. Remove spark plug wire from spark plug.



Figure 16

2. Remove steering wheel cap (1).

3. Remove steering wheel bolt (2), lock washer (3), and flat washer (4).

4. Remove steering wheel (5) from upper steering shaft (7).

5. Remove steering shaft cover (6) from upper steering shaft (7).

6. Repair or replace parts as necessary.

#### Installation

(Refer to Figure 16.)

1. Install steering shaft cover (6) over upper steering shaft (7).

2. Install steering wheel (5) on upper steering shaft (7).

3. Install flat washer (4), lock washer (3), and steering wheel bolt (2). Tighten steering wheel bolt (2) to 225 in-lb ( $25.4 \text{ N} \cdot \text{m}$ ).

4. Install steering wheel cap (1).

#### **Steering Tower**

#### Removal

(Figures 17 through 25.)

1. Park machine on a clean, level surface with the transport wheels in the raised and locked position. Make sure engine is OFF. Remove spark plug wire from spark plug.

2. Remove steering wheel (see Steering Wheel in this section).



Figure 17

3. Remove six cap screws (1) and lock washers (2), and remove column cover (3).



Figure 18

4. Remove two cap screws (6), four flat washers (7), and two lock nuts (8) securing upper bearing assembly (5) to steering column box (4).

5. Remove four cap screws (9), eight flat washers (10), and four lock nuts (11). Remove steering column box (4) from steering column (12).



Figure 19

**NOTE:** For assembly purposes, mark the location of the upper bearing assembly (5) on the upper steering shaft (13).

6. Loosen two socket head set screws (14), and remove upper bearing assembly (5) from upper steering shaft (13).



Figure 20

7. Remove four cap screws (15), eight flat washers (16), and four lock nuts (17).

8. Remove two cap screws (18), four flat washers (19), and two lock nuts (20), and remove steering column (12) from chassis (21).



Figure 21

**NOTE:** Woodruff keys are installed in the upper steering shaft (13) and steering pivot assembly (25). Be careful not to lose Woodruff keys during upper steering shaft and universal joint (26) removal.

9. Loosen two socket head set screws (23) on middle bearing, and remove middle bearing assembly (22) from upper steering shaft (13).

10. Loosen cap screw (24) on universal joint (26).

11. Remove upper steering shaft (13) from universal joint (26).



Figure 22

12. Loosen cap screw (27) and remove universal joint (26) from steering pivot assembly (25).

13. Using a suitable lifting device, raise and support the machine to allow removal of the steering shaft.



Figure 23

14. Remove cap screw (29), two flat washers (30), and lock nut (31), and remove steering pivot rod (28) from steering pivot assembly (25).



Figure 24

15. Remove two cap screws (32), four flat washers (33), and two lock nuts (34), and remove steering pivot assembly (25) from chassis (21).



Figure 25

**NOTE:** For assembly purposes, mark the location of the lower bearing (36) on the steering pivot assembly (25).

16. Loosen two socket-head set screws (38). Remove upper flange (35), bearing (36), and lower flange (37) from steering pivot assembly (25).

17. Repair or replace parts as necessary.

#### Installation

(Figures 26 through 36.)



Figure 26

1. Install lower flange (5) and bearing (1) onto steering pivot assembly (2), to achieve an approximate distance of 3.13 in. (7.95 mm) (6) from bottom of steering pivot assembly (2).

Install upper flange (3) onto steering pivot assembly
 (2), and tighten two socket-head set screws (4).



Figure 27

3. Install steering pivot assembly (2), two cap screws (7), four flat washers (8), and two lock nuts (9) to chassis (10). Make sure that beveled corners of pivot assembly are oriented toward front of machine.



Figure 28

4. Attach steering pivot rod (11) to steering pivot assembly (2) with cap screw (12), plated washer (13), flat washer (14), and lock nut (15).



Figure 29

5. Install Woodruff key (16) into slot on steering pivot assembly (2).



Figure 30

6. Install universal joint (17) on steering pivot assembly (2), and tighten cap screw (18).



Figure 31

7. Install Woodruff key (20) into slot of upper steering shaft (19).



Figure 32

8. Install upper steering shaft (19) into universal joint (17), and tighten cap screw (23).

9. Slide bearing assembly (21) onto upper steering shaft (19).

10. Tighten two socket-head set screws (22), securing bearing assembly (21) to upper steering shaft (19).





11. Attach steering column (24) to roller chassis (10) with four cap screws (25), flat washers (26), and lock nuts (27).

12. Install two cap screws (28), flat washers (29), and lock nuts (30) to front of steering column (24).



Figure 34

**NOTE:** Do not tighten the socket-head set screws on the upper bearing assembly (31) until the final height adjustment has been made.

13. Install upper bearing assembly (31) onto upper steering shaft (19).



Figure 35

**NOTE:** Tightening the cap screws (35) will draw the upper bearing assembly (31) into the opening (32) on the top of the steering column box (40).

14. Guide upper steering shaft (19) through opening (32) in the top of steering column box (40) when installing steering column box (40) on steering column (24). Install four cap screws (36), flat washers (37), and lock nuts (38).

15. Install two cap screws (33), flat washers (34), and lock nuts (35).

16. Tighten bearing socket-head set screws (39), securing the upper bearing assembly (31) to upper steering shaft (19).

17. Lubricate universal joint (17) with grease.

#### GreensPro 1200



Figure 36

18. Install column cover (41) using six cap screws (42) and lock washers (43).

19. Install steering wheel (see Steering Wheel in this section).

20. Lower machine to the ground.

21. Check steering linkage adjustment and adjust if necessary (see Steering Linkage Adjustments in the Adjustments section of this chapter).

#### Steering Control Assembly

(Figure 37.)



#### Figure 37

- 17. Flat washer (6 used)
- 18. Plated washer (4 used)
- 19. Ball joint (LH threads) (3 used)
- 20. Hex nut (LH threads) (3 used)
- 21. Oilite® bushing (2 used)
- 22. Ball joint (3 used)

- Bolt (2 used)
  Lock nut
  Pivot bushing
  Bolt
  Bushing (4 used)
  Flat washer
- 7. Steering disc
- 8. Linkage arm (2 used)

- 10. Steering pivot rod 11. Bolt (4 used)
- 12. Hex nut (LH threads) (3 used)
- 13. Steering spacer

9. Steering pivot

- 14. Front steering head
- 15. Rear steering head
- 16. Hex nut (6 used)

**NOTE:** When servicing the steering linkage assemblies, steering disc, or steering heads, refer to Figure 37. Service procedures for these items are included on the following pages of this section.

#### Removal

#### (Figures 38 through 41.)

**NOTE:** Refer to illustration of steering control assembly (Figure 37) in this section when removing and servicing the steering linkage assemblies.

1. Park machine on a clean, level surface with the transport wheels in the raised and locked position. Make sure engine is OFF. Remove spark plug wire from spark plug.

2. Using a suitable lifting device, raise and support the machine.



Figure 38

3. From undercarriage of machine, locate steering pivot rod (1).

**NOTE:** As steering linkage assemblies are removed from machine, make sure that locations of washers and spacers are noted for assembly purposes.



Figure 39

4. Remove cap screw (2), plated washer (3), flat washer (4), and lock nut (5), and remove steering pivot rod (1) from steering pivot assembly (6).



Figure 40

5. Remove cap screw (9), lock nut (7), flat washer (8), and two plated washers (11). Remove steering pivot rod (1) from steering disc assembly (10).



Figure 41

6. Remove cap screw (12), flat washer (13), lifting handle bushing (14), and lock nut (15) connecting linkage arm (16) to steering disc assembly (10).

7. Remove cap screw (17), lifting handle bushing (18), flat washer (19), and lock nut (20) connecting linkage arm (16) to front steering head assembly (21).

8. Repeat steps 6 and 7 to remove rear steering linkage arm from rear steering head assembly (22).

9. Repair or replace parts as necessary.

**NOTE:** Each of the linkage assemblies includes a linkage rod, two ball joints, and two hex nuts. To allow adjustment, one of the linkage rod ends has left-hand threads so one ball joint and hex nut also have left-hand threads. Before attempting to loosen a hex nut for linkage disassembly, inspect the visible threads on the linkage rod to determine thread direction.

#### Installation

#### (Figures 42 through 44.)

1. If steering linkage assemblies were disassembled, refer to Figure 37 for correct linkage length. Leave hex nuts on linkage loose until final steering adjustments have been completed.



Figure 42

2. Install linkage arm (6) to front steering head assembly (11), and secure with cap screw (7), lifting handle bushing (8), flat washer (9), and lock nut (10).

3. Install other end of linkage arm (6) to steering disc assembly (1), and secure with cap screw (2), lifting handle bushing (3), flat washer (4), and lock nut (5).

4. Repeat steps 1 and 2 to connect rear steering linkage arm to rear steering head assembly (12).



Figure 43

5. Install steering pivot rod (15) to steering disc assembly (1), and secure with cap screw (16), two plated washers (17), flat washer (14), and lock nut (13).



Figure 44

6. Install other end of steering pivot rod (15) to steering pivot assembly (18), and secure with cap screw (19), plated washer (20), flat washer (21), and lock nut (22).

7. Adjust linkage as necessary (see Steering Linkage Adjustments in the Adjustments section of this chapter).

8. Lower machine to the ground.

#### Steering Disc Assembly

**NOTE:** Refer to illustration of steering control assembly (Figure 37) in this section when removing and servicing the steering linkage assemblies.

#### Removal

(Figures 45 through 47.)

1. Park machine on a clean, level surface with the transport wheels in the raised and locked position. Make sure engine is OFF. Remove spark plug wire from spark plug.

2. Using a suitable lifting device, raise and support the machine.



Figure 45

3. Remove front linkage arm (1), rear linkage arm (4), and steering pivot rod (3) from steering disc assembly (2) (see Steering Linkages in this section).



Figure 46

4. While supporting steering disc assembly (2) to prevent it from falling, remove lock nut (6) and plated washer (7). Then remove steering disc assembly (2) and steering spacer bushing (5) from chassis (8).



Figure 47

5. Remove cap screw (9) and flat washer (10) from chassis (8).

6. If necessary, remove pivot bushing and two Oilite® bushings from steering disc (2).

#### Installation

(Figures 48 through 51.)



Figure 48

1. Install cap screw (2) and flat washer (3) to roller chassis (1).



Figure 49

2. If bushings were removed from steering disc (6), press new Oilite<sup>®</sup> bushings (4) into steering disc (6). Then insert pivot bushing (5) into installed Oilite<sup>®</sup> bushings (4).

3. Install steering spacer bushing (7) and then steering disc assembly (6) onto cap screw.



Figure 50

4. Install plated washer (8) and lock nut (9) securing steering disc (6) to chassis (1).



Figure 51

5. Secure front linkage arm (10), rear linkage arm (13), and pivot rod (12) to steering disc assembly (11) (see Steering Linkages in this section).

6. Lower machine to the ground.

7. Check steering operation and adjust steering linkages if necessary (see Steering Linkage adjustments in the Adjustments section of this chapter).

#### **Steering Head Assembly**

**NOTE:** Refer to illustration of steering control assembly (Figure 37) in this section when removing and servicing the steering linkage assemblies.

#### Removal

(Figures 52 through 54.)

1. Park machine on a clean, level surface with the transport wheels in the raised and locked position. Make sure engine is OFF. Remove spark plug wire from spark plug.

2. Using a suitable lifting device, raise and support the machine.



Figure 52

**EXAMPLE CAUTION** Be careful when removing or installing spring. The spring is under heavy load and may cause personal injury.

3. Remove lock nut (3) and flat washer (4), and disconnect tension spring (1) and anchor screw (2).



Figure 53

4. Remove lock nut (7), flat washer (9), lifting handle bushing (10), cap screw (5), and linkage arm (6) from steering head assembly (8).

5. Support the steering head assembly (8).



#### Figure 54

6. Remove four lock nuts (11), four cap screws (12), and eight flat washers (13), and remove steering head assembly (8).

#### Disassembly and Assembly

(Figure 55.)



Figure 55

- 1. Cap screw
- 2. Lock washer (5 used)
- 3. Fixing collar
- 4. Bearing
- 5. Bearing housing assembly
- 6. Axle bushing
- 7. Cap screw (2 used)
- 8. Flat washer (16 used)
- 9. Front steering head housing
- 10. Cap screw (4 used)
- 11. Long steering roller assembly
- 12. Short steering roller assembly
- 13. Lock nut (6 used)
- 14. Pivot shaft assembly
- 15. Cap screw (4 used)

2. The bearing (4) is pressed into the bearing housing (5). If bearing replacement is necessary, make sure that new bearing is pressed all the way to the shoulder in the housing during installation.

#### Installation

(Figures 56 through 58.)



Figure 56

1. Install steering head assembly (4) using four cap screws (1), four lock nuts (2), and eight flat washers (3).



Figure 57

2. Connect linkage arm (6) to steering head assembly (4) using cap screw (5), flat washer (8), spacer (9), and lock nut (7).



Figure 58



Be careful when removing or installing spring. The spring is under heavy load and may cause personal injury.

3. Connect tension spring (10) and anchor screw (11) to steering head assembly (4) using lock nut (12) and flat washer (13).

4. Lower machine to the ground.

#### **Steering Rollers**

#### **Disassembly and Assembly**

(Figure 59.)



#### Figure 59

8. Long roller spacer (3 used)

5. Roller spacer

6. Short roller spacer

- 1. Lock nut (2 used per roller assembly)
- 2. Bearing (4 used per roller assembly)
- 3. Bearing housing (4 used per roller assembly) 7. Long steering roller (3 used)
- 4. Short steering roller

1. Park machine on a clean, level surface with the transport wheels in the raised and locked position. Make sure engine is OFF. Remove spark plug wire from spark plug.

2. Remove steering rollers from steering head assembly. (See Steering Head Assembly in this section.)

3. Remove and replace parts as necessary to repair the steering rollers.

9. Short steering axle

- 10. Long steering roller assembly (3 used)
- 11. Short steering roller assembly 12. Long steering axle

4. The bearing housing (3) is pressed into the steering roller, and the bearing (2) is pressed into the bearing housing. If bearing or bearing housing is removed from steering roller, make sure that new components are pressed fully into the roller during installation.

5. When installing lock nuts (1), tighten nuts equally on both ends of the roller to allow free rotation of the rollers. Do not overtighten lock nuts.

6. Install steering rollers in steering head assembly. (See Steering Head Assembly in this section.)

#### **Drive Roller Assembly**

#### Removal

(Figures 60 through 65.)

1. Park machine on a clean, level surface with the transport wheels in the raised and locked position. Make sure engine is OFF. Remove spark plug wire from the spark plug.

2. Using a suitable lifting device, raise and support the machine.

3. Remove transmission cover from machine (see Transmission Cover in this section).





4. Remove nut (4) and flat washer (5).

5. Remove lock nut (1), two flat washers (2), cap screw (7), flat washer (8), and spacer (3), and remove drive chain tension assembly (6).



Figure 61

6. Remove retaining ring (9).



Figure 62 7. Remove two set screws (10).


Figure 63

8. Thread one of the set screws (10) into the remaining hole in hub (12), and remove hub, sprocket (13), and drive chain (11).





9. Remove key (14).

10. Support the drive roller assembly (15).

11. Remove two lock nuts (16), two cap screws (17), and four flat washers (18).



Figure 65

12. Remove two lock nuts (19), two cap screws (20), and four flat washers (21) on other side of roller assembly.



To prevent personal injury, make sure that drive roller assembly is supported as it is removed from the machine. Drive roller assembly weighs approximately 66 pounds (30 kg).

13. Remove drive roller assembly (15).

## Disassembly

(Figure 66.)



#### Figure 66

- 1. Bearing assembly (2 used)
- 2. Collar (2 used)
- 6. Keyed roller axle

5. Flat washer (6 used)

- Cap screw (6 used)
  Lock washer (6 used)
- 7. Drive roller 8. Roller axle

1. Loosen set screws (9), and remove bearing assemblies (1).

2. Measure and record distance from the face of each collar (2) to the face on the flange of roller axles (6 and 8) to ensure correct installation.

3. Loosen socket-head set screws (10), and remove collars (2).

4. Remove three cap screws (3), lock washers (4), and flat washers (5), and remove roller axles (6 and 8).

9. Set screw (2 used) 10. Socket-head set screw (2 used)

## Assembly

(Refer to Figure 66.)

Install roller axles (6 and 8) using three cap screws
 (3), lock washers (4), and flat washers (5).

2. Install collars (2), positioning each of them the same distance from the roller axle flange as recorded during removal. Tighten socket-head set screws (10).

3. Install bearing assemblies (1), and tighten (but do not overtighten) set screws (9). Bearing assemblies may need to be repositioned after drive roller assembly has been installed in machine.

## Installation

(Figures 67 through 71.)



Figure 67



1. Lift drive roller assembly (4) into place, and attach bearing assembly (5) to frame using two cap screws (1), two lock nuts (2), and four flat washers (3).



Figure 68

2. Attach bearing assembly (7) at other end of drive roller assembly (4) to frame using two cap screws (8), two lock nuts (9), and four flat washers (10).

**NOTE:** After installation of drive roller, make sure that it is centered between frame brackets. If necessary, loosen set screws on bearing collars and move roller so that it is centered in frame.



Figure 69

3. Apply anti-seize lubricant to transmission output shaft. Install 8-tooth sprockets (11) on transmission output shaft. Make sure that sprockets are aligned and flanges (13) are facing each other.

4. Install retaining ring (12).



Figure 70 5. Install drive chain (17) and sprocket (14).

6. Apply a thin film of oil to outside diameter of hub (15) before installation.

7. Install key (16) and hub (15), aligning the three holes in the hub and sprocket.

8. Install and tighten two set screws (13).



Figure 71

9. Install drive chain tension assembly (23) using cap screw (24), spacer (20), flat washer (25), two flat washers (18), and lock nut (19).

10. Install flat washer (22) and nut (21).

**NOTE:** If additional chain tension adjustment is needed, both nuts on tension rod can be installed on outside of frame bracket.

11. Adjust drive chain tension and lubricate chain. (Refer to Operator's Manual.) Dri-Slide<sup>®</sup> Multi-Purpose Lubricant (or equivalent) is recommended for lubrication.

After drive chain adjustment, the drive chain should have 0.200 in. to 0.300 in. (5 to 8 mm) deflection at mid-span between the sprockets.

12. Install and secure transmission cover (see Transmission Cover in this section).

13. Lower machine to the ground.

# **Transport Wheel**

## Removal

(Figure 72.)

1. Park machine on a clean, level surface with the transport wheels in the raised and locked position. Make sure engine is OFF. Remove spark plug wire from spark plug.



## Figure 72

- 2. Remove four lug nuts (1).
- 3. Remove transport wheel and tire assembly (2).

## Installation

(Refer to Figure 72.)

1. Install transport wheel and tire assembly (2) using four lug nuts (1).



2. Tighten lug nuts in an alternating pattern to 80 ft-lb (108  $N{\cdot}m).$ 

3. Adjust tire pressure to 10 psi (0.65 bar).

## **Transport Wheel Hub**

## Removal

(Figure 73.)



Figure 73

- 1. Bearing (2 used)
- 2. Spacer
- 3. Transport wheel hub
- 4. Cap screw
- 5. Lock washer
- 6. Spacer

1. Park machine on a clean, level surface with the transport wheels in the raised and locked position. Make sure engine is OFF. Remove spark plug wire from spark plug.

2. Remove transport wheels. (See Transport Wheel in this section.)

3. Remove cap screw (4), lock washer (5), and spacer (6).

- 4. Remove transport wheel hub (3).
- 5. Inspect bearings (1) and replace as necessary.

## Installation

(Refer to Figure 73.)

1. Install transport wheel hub (3), and align spacer (2) as necessary.

2. Install spacer (6), lock washer (5), and cap screw (4).

3. Install transport wheels. (See Transport Wheel in this section.) Make sure that wheel lug nuts are properly tightened to 80 lb-ft ( $108 \text{ N} \cdot \text{m}$ ).

# Lift Arm Assembly

## Removal

(Figure 74.)



## Figure 74

1. Axle clamp bolt (6 used)	7. Flat washer	13. Lifting bar	19. Gas spring	25. Nut
2. Lock washer (6 used)	8. Nut	14. Cap screw	20. Nut	26. Lifting axle
3. Flat washer (6 used)	9. Lock washer	15. Flat washer	21. Flat washer (2 used)	27. Lifting bar
4. Axle clamp plate (3 used)	10. Cap screw	16. Lock washer	22. Flat washer	28. Bushing
5. Axle clamp (3 pairs used)	11. Cap screw	17. Lock nut (2 used)	23. Lock nut	29. Flat washer
6. Lock nut	12. Bushing	18. Flat washer	24. Cap screw	30. Cap screw

1. Park machine on a clean, level surface with the transport wheels in the raised and locked position. Make sure engine is OFF. Remove spark plug wire from spark plug.

2. Remove transport wheel hubs. (See Transport Wheel Hub in this section.)

3. Release latch, lower the transport axle, and support the tow bar.

# Chassis

4. Remove lock nut (17), two flat washers (21), nut (20), and cap screw (24), and disconnect gas spring (19) from lifting axle (26).

5. Remove lock nut (23), flat washer (20), cap screw (30), flat washer (29), and bushing (28), and disconnect lifting bar (27) from lifting axle (26).

6. Remove lock nut (6), flat washer (7), cap screw (14), flat washer (15), and bushing (12), and disconnect lifting bar (13) from lifting axle (26).

7. Remove six axle clamp bolts (1), lock washers (2) and flat washers (3), and remove three axle clamp plates (4) and axle clamps (5).

8. Remove lifting axle (26).

#### Installation

(Refer to Figure 74.)

1. Place bottom halves of axle clamps (5) on vehicle frame, positioning them above the mounting holes.

2. Place lifting axle (26) on axle clamps (5), positioning welded flanges between outer axle clamps.

3. Install upper halves of axle clamps (5) and axle clamp plates (4), and secure, using six flat washers (3), lock washers (2), and axle clamp bolts (1). Tighten axle clamp bolts (1) to 35 ft-lb ( $47.5 \text{ N} \cdot \text{m}$ ).

4. Before securing lifting bars to lifting axle, check that the length of the lifting bars is 26.77 in. (680 mm) between centers of ball joints. Adjust lifting bar if necessary (see Lifting Bar Adjustment in the Adjustments section of this chapter).

5. Connect lifting bar (13) to lifting axle (26) using bushing (12), cap screw (14), flat washer (15), flat washer (7), and lock nut (6).

6. Connect lifting bar (27) to lifting axle (26) using bushing (28), cap screw (30), flat washer (29), flat washer (22), and lock nut (23).

7. Connect gas spring (19) to lifting axle (26) using cap screw (24), nut (20), two flat washers (21), and lock nut (17).

8. Release latch, and raise transport axle.

9. Install transport wheel hubs. (See Transport Wheel Hub in this section.)

10.Install transport wheels. (See Transport Wheel in this section.) Make sure that wheel lug nuts are properly tightened to 80 lb-ft (108 N·m).

# Lift Arm Catch Assembly

## Removal

(Figure 75.)



## Figure 75

- 1. Lock nut (2 used) 5. Wheel lock plate 9. Lock nut 13. Spring 2. Nut (2 used) 6. Lock nut (2 used) 10. Flat washer (2 used) 3. Nut (2 used) 7. Nut 11. Nut (2 used) 4. Cap screw (2 used) 8. Flat washer (2 used) 12. Linkage arm assembly
  - 14. Cap screw (2 used) 15. Wheel lock assembly 16. Ball joint

17. Nut 18. Linkage arm

- 19. Nut (LH threads)
- 20. Ball joint (LH threads)

- 1. Park machine on a clean, level surface with the transport wheels in the raised and locked position. Make sure engine is OFF. Remove spark plug wire from spark plug.
- 2. Place blocks under transport wheels.
- 3. Release wheel lock (15), and allow transport wheels to rest on blocks.

Chassis



Be careful when removing or installing spring. The spring is under heavy load and may cause personal injury.

4. Disconnect spring (13) from wheel lock (15).

5. Remove two nuts (11), flat washers (10), and cap screws (14), and remove linkage arm assembly (12).

6. Remove two lock nuts (6), and remove wheel lock plate (5), wheel lock assembly (15), and two nuts (2).

**NOTE:** The linkage arm assembly includes a linkage arm, two ball joints, and two nuts. To allow adjustment, one of the linkage arm ends has left-hand threads so one ball joint and nut also have left-hand threads. Before attempting to loosen a nut for linkage disassembly, inspect the visible threads on the linkage arm to determine thread direction.

#### Installation

(Refer to Figure 75.)

1. Install wheel lock plate (5) and wheel lock assembly (15) using two nuts (2) and lock nuts (6). Tighten lock nuts (6) so wheel lock plate and wheel lock assembly do not move; then loosen lock nuts to allow wheel lock plate and wheel lock assembly to move freely.

2. If linkage arm assembly (12) was disassembled, adjust linkage arm length so distance between centers of ball joints is 7.09 in. (180 mm).

3. Install linkage arm assembly (12) using two cap screws (14), flat washers (10), and nuts (11).



4. Connect spring (13) to wheel lock assembly (15).

5. Make sure that wheel lock is engaged and remove blocks from under transport wheels.

6. Check operation of lift arm catch and adjust linkage arm assembly if required (see Lift Arm Catch Adjustment in the Adjustments section of this chapter).

## **Tow Bar Assembly**

## Removal

(Figure 76.)



## Figure 76

1. Ball joint	6. Flat washer	11. Nut (2 used)	16. Bushing	21. Lifting bar
2. Nut	7. Ball joint	12. Tow bar	17. Ball joint (LH threads)	22. Nut
3. Lifting bar	8. Bushing	13. Axle clamp plate (8 used)	18. Flat washer	23. Ball joint
4. Nut	9. Axle clamp (4 pairs used)	14. Heavy flat washer (16 used)	19. Cap screw	24. Nut (8 used)
5. Cap screw	10. Flat washer (2 used)	15. Tow bar clamp screw (8 used)	20. Nut (LH threads)	

1. Park machine on a clean, level surface with the transport wheels in the raised and locked position. Make sure engine is OFF. Remove spark plug wire from spark plug.

2. Raise machine (transport wheels down and locked). Chock the transport wheels and support front and rear of the machine to prevent it from shifting.

3. Support the tow bar (12).

4. Remove nut (11), flat washer (10), cap screw (5),

flat washer (6), and bushing (8), and disconnect lifting bar (3) from tow bar (12).

5. Remove nut (11), flat washer (10), cap screw (19), flat washer (18), and bushing (16), and disconnect lifting bar (21) from tow bar (12).

6. Lower the tow bar (12) to the ground.

7. Remove eight nuts (24), eight tow bar clamp screws (15), and 16 heavy flat washers (14), and remove four pairs of axle clamps (9) and eight axle clamp plates (13).

8. Remove tow bar (12).

#### Installation

(Refer to Figure 76.)

1. Install the tow bar (12) using four pairs of axle clamps (9) and eight axle clamp plates (13), eight nuts (24), eight tow bar clamp screws (15), and 16 heavy flat washers (14). The fasteners for the tow bar should be tightened to 35 ft-lb (47.5 N-m).

2. Before securing lifting bars to tow bar, check that the length of the lifting bars is 26.77 in. (680 mm) between centers of ball joints. Adjust lifting bar if necessary (see Lifting Bar Adjustment in the Adjustments section of this chapter).

3. Connect lifting bar (21) to tow bar (12) using bushing (16), cap screw (19), flat washer (18), nut (11), and flat washer (10).

4. Connect lifting bar (3) to tow bar (12) using bushing (8), cap screw (5), flat washer (6), flat washer (10), and nut (11).

## **Transmission Cover**

#### Removal

(Figures 77 and 78.)

1. Park machine on a clean, level surface with the transport wheels in the raised and locked position. Make sure engine is OFF. Remove spark plug wire from spark plug.



Figure 77

2. Remove lock nut (2), two flat washers (3), and cap screw (4).

3. Tilt seat and seat pan (1) forward.



Figure 78

4. Remove cap screw (5) that secures transmission cover (6) to support frame.

5. Remove transmission cover (6) from machine.

## Installation

(Refer to Figures 77 and 78.)

1. Install transmission cover (6) to machine and secure with cap screw (5).

2. Lower seat platform.

3. Secure seat platform with lock nut (2), two flat washers (3), and cap screw (4).

# Seat Assembly

## Removal

(Figures 79 through 82.)

1. Park machine on a clean, level surface with the transport wheels in the raised and locked position. Make sure engine is OFF. Remove spark plug wire from spark plug.



Figure 79

2. Remove lock nut (2), two flat washers (3), and cap screw (4), and tilt seat pan (1) forward.



Figure 80

3. Disconnect hour meter wire harness (9) from seat pan (1).

4. Remove four nuts (6), lock washers (7), and flat washers (8). Remove seat (5) from seat pan (1).



Figure 81

**NOTE:** For assembly purposes, note the orientation of the two seat rails (11) prior to removal.

5. Remove four cap screws (10), and remove seat rails (11) from seat (5).



Figure 82

**NOTE:** For assembly purposes, note the position of the flat washers (13) prior to seat pan (1) removal.

6. Remove two lock nuts (12), six flat washers (13), and two cap screws (14) securing seat pan (1) to machine.

7. Replace or repair parts as necessary.

## Installation

(Figures 83 through 86.)



Figure 83

**NOTE:** Do not overtighten cap screws (2) when installing the seat base. The seat base may not lift properly if cap screws are overtightened.

1. Position seat pan (1) on machine and secure using two cap screws (2), six flat washers (3), and two lock nuts (4).



Figure 84

**NOTE:** It may be necessary to move the slide portion of each adjuster rail to install cap screws.

2. Install seat adjuster rails (7) on seat (5) using four cap screws (6).



Figure 85

3. Position adjuster rails equally and install seat (5) securely onto seat pan (1) with four flat washers (8), lock washers (9), and nuts (10).

4. Connect hour meter wire harness (11) to seat pan (1).



Figure 86

5. Ensure the seat pan (1) is rotated in the down position completely. Install cap screw (12), two flat washers (13), and lock nut (14) to secure seat assembly to machine.

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