



LCE Products

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# Toro Z Master G3 3000/5000/6000 Series Service Manual



# ABOUT THIS MANUAL

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This service manual was written expressly for Toro service technicians. The Toro Company has made every effort to make the information in this manual complete and correct.

Basic shop safety knowledge and mechanical/electrical skills are assumed. The Table of Contents lists the systems and the related topics covered in this manual.

The following service materials are available in addition to this service manual:

Hydrostatic Transmissions:	Parker UHT Series HB Hydrostatic Transmission Service Manual (HY13-1512-M2/US)
Wheel Motors:	Parker/Ross Wheel Motor Service Manual (HY13-1512-006-M1/US 3/07)
Engine:	Engine service manuals (available through Kohler and Kawasaki)
Hydraulic Troubleshooting:	Interactive Hydraulic Systems Troubleshooting DVD - Toro Part #492-4777
Electrical Troubleshooting:	Interactive Electrical Troubleshooting DVD - Toro Part #492-9193

The Z Master G3, 3000, 5000, and 6000, model years 2009 to 2012, are covered in this manual.

The hydrostatic drive system is precision machinery. Maintain strict cleanliness control during all stages of service and repair. Cover or cap all hose ends and fittings whenever they are exposed. Even a small amount of dirt or other contamination can severely damage the system.

We are hopeful that you will find this manual a valuable addition to your service shop. If you have any questions or comments regarding this manual, please contact us at the following address:

**The Toro Company  
RLC Service Training Department  
8111 Lyndale Avenue South  
Bloomington, MN 55420**

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

# **ABOUT THIS MANUAL**

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# TABLE OF CONTENTS

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## 1 - Safety Information

General Information.....	1-1
Think Safety First.....	1-1

## 2 - Specifications

Torque Specifications .....	2-1
Standard Torque for Dry, Zinc Plated & Steel Fasteners (Inch Series) .....	2-2
Standard Torque for Dry, Zinc & Steel Fasteners (Metric Fasteners).....	2-3
Other Torque Specifications .....	2-4
Equivalents & Conversions.....	2-5
Decimal & Millimeter Equivalents.....	2-5
U.S. to Metric Conversions .....	2-6
G3 3000/5000/6000 Series Specifications .....	2-7
G3 3000/5000/6000 Series Specifications cont.....	2-8
G3 3000/5000/6000 Series Specifications cont.....	2-9
Dimensions.....	2-10
Commercial 3000 Series.....	2-10
G3/Professional 5000 Series .....	2-10
Dimensions.....	2-11
G3/Professional 6000 Series .....	2-11
Dimensions.....	2-12
G3/Professional 6000 Series cont. ....	2-12

## 3 - Chassis

Caster Fork Assembly Replacement .....	3-1
Caster Fork Assembly Removal.....	3-1
Caster Bearing Replacement .....	3-2
Caster Fork Assembly Installation.....	3-4
Front Wheel Bearing Replacement .....	3-5
Front Wheel Bearing Removal.....	3-5
Front Wheel Bearing Installation.....	3-7
Fuel Tank Replacement.....	3-9
Fuel Tank Removal .....	3-9
Fuel Tank Installation .....	3-12
Throttle Control Assembly Replacement (Kohler EFI Engine).....	3-14
Throttle Control Assembly Removal.....	3-14
Throttle Control Assembly Installation.....	3-16
Park Brake Handle Assembly Replacement (2012 & Later).....	3-18
Park Brake Handle Removal (2012 & Later).....	3-18
Park Brake Handle Installation (2012 & Later).....	3-20
Park Brake Cable Replacement (2011 & Prior).....	3-21
Left Park Brake Cable Removal (2011 & Prior).....	3-21
Left Park Brake Cable Installation (2011 & Prior).....	3-24
Right Park Brake Cable Removal (2011 & Prior).....	3-27
Right Park Brake Cable Installation (2011 & Prior).....	3-29
Adjusting the Parking Brake .....	3-32
Park Brake Cable Replacement (2012 & Later).....	3-34
Left Park Brake Cable Removal (2012 & Later).....	3-34
Left Park Brake Cable Installation (2012 & Later).....	3-37
Right Park Brake Cable Removal (2012 & Later).....	3-41
Right Park Brake Cable Installation (2012 & Later).....	3-44

# TABLE OF CONTENTS

---

## 3 - Chassis cont.

Brake Caliper Replacement.....	3-47
Brake Caliper Removal.....	3-47
Brake Caliper Installation.....	3-49
Motion Control Damper Replacement.....	3-51
Motion Control Damper Removal.....	3-51
Motion Control Damper Installation.....	3-52
Adjusting the Motion Control Damper.....	3-52
Adjusting the Motion Control Neutral Lock Pivot.....	3-53
Adjusting the Control Handle Position.....	3-53
Motion Control Assembly Replacement.....	3-54
Motion Control Assembly Removal.....	3-54
Motion Control Assembly Installation.....	3-58

## 4 - Engine

Engine Replacement.....	4-1
Engine Removal.....	4-1
Engine Installation.....	4-7

## 5 - Hydraulic System

Hydrostatic Pump Removal.....	5-1
G3 UHT Transmission Replacement (2009 through 2011 models).....	5-1
G3 UHT Transmission Removal (2009 - 2011 models).....	5-1
G3 UHT Transmission Installation (2009 - 2011 models).....	5-9
Burnishing the Brake.....	5-20
UHT Transmission Replacement (2012 & later models).....	5-23
UHT Transmission Removal (2012 & later models).....	5-23
UHT Transmission Installation (2012 & later models).....	5-28
Wheel Hub Slotted Nut Installation.....	5-32
Adjusting the Motion Control Linkage (Neutral Adjustment).....	5-34
Checking the Hydraulic Oil.....	5-36
Flow Test Instructions.....	5-37
Hydraulic Pump Drive Belt Replacement.....	5-40
Using the Drive Wheel Release Valves.....	5-41

## 6 - Mower Decks

Mower Belt Replacement.....	6-1
Mower Belt Removal.....	6-1
Mower Belt Installation.....	6-2
Mower Deck Replacement.....	6-3
Mower Deck Removal.....	6-3
Mower Deck Installation.....	6-6
Extension Spring Adjustment (2010 - 2012 Models).....	6-6
Mower Spindle Replacement.....	6-7
Mower Spindle Removal (2009 Model G3 Series Units).....	6-7
Mower Spindle Installation (2009 Model G3 Series Units).....	6-8
Mower Spindle Disassembly (2009 Model G3 Series Units).....	6-9
Mower Spindle Assembly (2009 Model G3 Series Units).....	6-12
Mower Spindle Replacement (2010 & Later Model G3, 3000/5000/6000 Series Units).....	6-16
Mower Spindle Removal (2010 & Later Model G3, 3000/5000/6000 Series Units).....	6-16
Mower Spindle Installation (2010 & Later Model G3, 3000/5000/6000 Series Units).....	6-17

# TABLE OF CONTENTS

---

## 6 - Mower Decks cont.

Mower Spindle Disassembly (2010 & Later Model G3, 3000/5000/6000 Series Units) .....	6-18
Mower Spindle Assembly (2010 & Later Model G3, 3000/5000/6000 Series Units) .....	6-20
Leveling the Mower Deck .....	6-23
Deck Leveling .....	6-23
Servicing the Cutting Blades .....	6-27
Before Inspecting or Servicing the Blades .....	6-27
Inspecting the Blades .....	6-28
Checking for Bent Blades .....	6-28
Removing the Blades .....	6-29
Sharpening the Blades .....	6-30
Installing the Blades .....	6-30
Electric PTO Clutch Replacement .....	6-31
Electric PTO Clutch Removal .....	6-31
Electric PTO Clutch Installation .....	6-32
Using the Clutch Shim .....	6-33
Removing the Clutch Shim .....	6-33
Safety Check .....	6-35

## 7 - Electrical

General .....	7-1
Relay .....	7-1
Purpose .....	7-1
Location .....	7-1
How It Works .....	7-1
Testing .....	7-2
PTO Switch .....	7-3
Purpose .....	7-3
Location .....	7-3
How It Works .....	7-3
Testing .....	7-3
Ignition Switch .....	7-5
Purpose .....	7-5
Location .....	7-5
How It Works .....	7-5
Testing .....	7-5
Park Brake Switch .....	7-6
Purpose .....	7-6
Location .....	7-6
How It Works .....	7-6
Testing .....	7-6
Seat Switch .....	7-7
Purpose .....	7-7
Location .....	7-7
How It Works .....	7-7
Testing .....	7-7
Neutral Safety Switch .....	7-8
Purpose .....	7-8
Location .....	7-8
How It Works .....	7-8
Testing .....	7-8

# TABLE OF CONTENTS

---

## 7 - Electrical cont.

TVS Diode .....	7-9
Purpose.....	7-9
Location .....	7-9
How It Works.....	7-9
Testing.....	7-9
Fuel Sender .....	7-10
Purpose.....	7-10
Location .....	7-10
How It Works.....	7-10
Testing.....	7-10
Fuel/Hour Meter.....	7-11
Purpose.....	7-11
Location .....	7-11
How It Works.....	7-11
Testing.....	7-11
Electric PTO Clutch .....	7-12
Purpose.....	7-12
Location .....	7-12
How It Works.....	7-12
Testing.....	7-12
Coil Resistance Measurement .....	7-12
Measuring Clutch Current Draw.....	7-13

## General Information



This symbol means WARNING or PERSONAL SAFETY INSTRUCTION - read the instruction because it has to do with your safety. Failure to comply with the instruction may result in personal injury or even death.

This manual is intended as a service and repair manual only. The safety instructions provided herein are for troubleshooting, service, and repair of the G3 3000/5000/6000 Series Mower. The G3 3000/5000/6000

Series mower and attachment operator's manuals contain safety information and operating tips for safe operating practices. Operator's manuals are available through your Toro parts source or:

**The Toro Company  
Publications Department  
8111 Lyndale Avenue South  
Bloomington, MN 55420**

## Think Safety First

### Avoid unexpected starting of engine...

Always turn off the engine and disconnect the spark plug wire(s) before cleaning, adjusting, or repair.

### Avoid lacerations and amputations...

Stay clear of all moving parts whenever the engine is running. Treat all normally moving parts as if they were moving whenever the engine is running or has the potential to start.

### Avoid burns...

Do not touch the engine, muffler, or other components which may increase in temperature during operation, while the unit is running or shortly after it has been running.

### Avoid fires and explosions...

Avoid spilling fuel and never smoke while working with any type of fuel or lubricant. Wipe up any spilled fuel or oil immediately. Never remove the fuel cap or add fuel when the engine is running. Always use approved, labeled containers for storing or transporting fuel and lubricants.

### Avoid asphyxiation...

Never operate an engine in a confined area without proper ventilation.

### Avoid injury from batteries...

Battery acid is poisonous and can cause burns. Avoid contact with skin, eyes, and clothing. Battery gases can explode. Keep cigarettes, sparks, and flames away from the battery.

### Avoid injury due to inferior parts...

Use only original equipment parts to ensure that important safety criteria are met.

### Avoid injury to bystanders...

Always clear the area of bystanders before starting or testing powered equipment.

### Avoid injury due to projectiles...

Always clear the area of sticks, rocks, or any other debris that could be picked up and thrown by the powered equipment.

### Avoid modifications...

Never alter or modify any part unless it is a factory approved procedure.

### Avoid unsafe operation...

Always test the safety interlock system after making adjustments or repairs on the machine. Refer to the Electrical section in this manual for more information.



# SAFETY INFORMATION

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# SPECIFICATIONS

## Torque Specifications

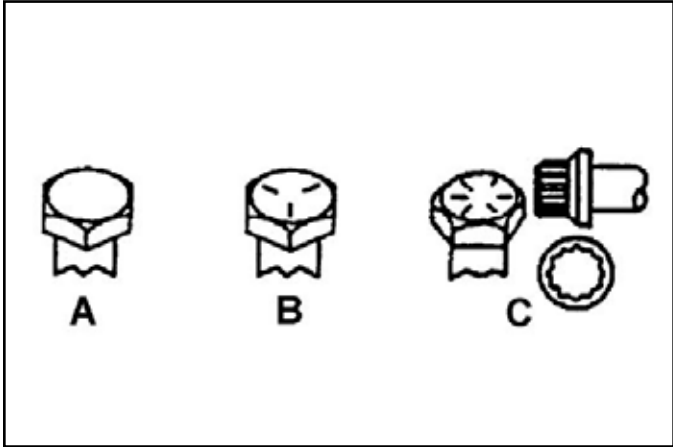
Recommended fastener torque values are listed in the following tables. For critical applications, as determined by Toro, either the recommended torque or a torque that is unique to the application is clearly identified and specified in the service manual.

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

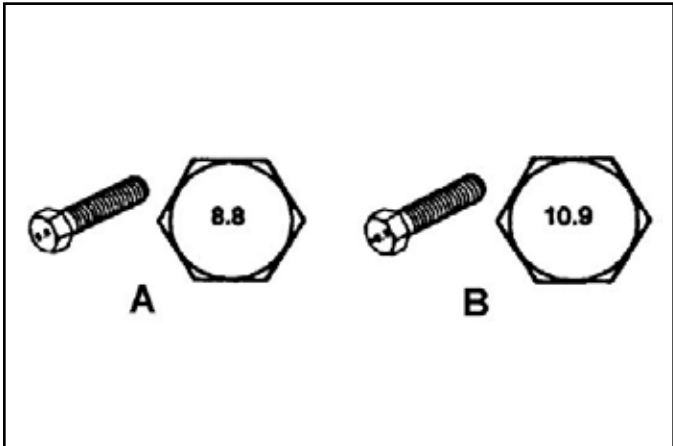
As noted in the following tables, torque values should be reduced by 25% for lubricated fasteners to achieve the similar stress as a dry fastener. Torque values may also have to be reduced when the fastener is threaded into aluminum or brass. The specific torque value should be determined based on the 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 back off fastener 1/4 of a turn. Measure the torque required to tighten the fastener until the lines match up.

## Fastener Identification



Inch Series bolts and Screws	
(A) Grade 1 & 2 (B) Grade 5	(C) Grade 8



Metric Bolts and Screws	
(A) Class 8.8	(B) Class 10.9

# SPECIFICATIONS

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

2

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)		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 2 or Stronger Nuts)	
	In-lb	In-lb	N-cm	In-lb	N-cm	In-lb	N-cm
# 6 - 32 UNC	10 ± 2	13 ± 2	147 ± 23	15 ± 2	169 ± 23	23 ± 2	260 ± 34
# 6 - 40 UNF				17 ± 2	190 ± 20	25 ± 2	280 ± 20
# 8 - 32 UNC	13 ± 2	25 ± 5	282 ± 30	29 ± 3	330 ± 30	41 ± 4	460 ± 45
# 8 - 36 UNF				31 ± 3	350 ± 30	43 ± 4	31 ± 3
# 10 - 24 UNC	18 ± 2	30 ± 5	339 ± 56	42 ± 4	475 ± 45	60 ± 6	674 ± 70
#10 - 32 UNF				48 ± 4	540 ± 45	68 ± 6	765 ± 70
1/4 - 20 UNC	48 ± 7	53 ± 7	599 ± 79	100 ± 10	1125 ± 100	140 ± 15	1580 ± 170
1/4 - 28 UNF	53 ± 7	65 ± 10	734 ± 113	115 ± 10	1300 ± 100	160 ± 15	1800 ± 170
5/16 - 18 UNC	115 ± 15	105 ± 15	1186 ± 169	200 ± 25	2250 ± 280	300 ± 30	3390 ± 340
5/16 - 24 UNF	138 ± 17	128 ± 17	1446 ± 192	225 ± 25	2540 ± 280	325 ± 30	3670 ± 340
	<b>ft-lb</b>	<b>ft-lb</b>	<b>N-m</b>	<b>ft-lb</b>	<b>N-m</b>	<b>ft-lb</b>	<b>N-m</b>
3/8 - 16 UNC	16 ± 2	16 ± 2	22 ± 3	30 ± 3	41 ± 4	43 ± 4	58 ± 5
3/8 - 24 UNF	17 ± 2	18 ± 2	24 ± 3	35 ± 3	47 ± 4	50 ± 4	68 ± 5
7/16 - 14 UNC	27 ± 3	27 ± 3	37 ± 4	50 ± 5	68 ± 7	70 ± 7	68 ± 9
7/16 - 20 UNF	29 ± 3	29 ± 3	39 ± 4	55 ± 5	75 ± 7	77 ± 7	104 ± 9
1/2 - 13 UNC	30 ± 3	48 ± 7	65 ± 9	75 ± 8	102 ± 11	105 ± 10	142 ± 14
1/2 - 20 UNF	32 ± 3	53 ± 7	72 ± 9	85 ± 8	115 ± 11	120 ± 10	163 ± 14
5/8 - 11 UNC	65 ± 10	88 ± 12	119 ± 16	150 ± 15	203 ± 20	210 ± 20	285 ± 27
5/8 - 18 UNF	75 ± 10	95 ± 15	129 ± 20	170 ± 15	230 ± 20	240 ± 20	325 ± 27
3/4 - 10 UNC	93 ± 12	140 ± 20	190 ± 27	265 ± 25	359 ± 34	374 ± 35	508 ± 47
3/4 - 16 UNF	115 ± 15	165 ± 25	224 ± 34	300 ± 25	407 ± 34	420 ± 35	569 ± 47
7/8 - 9 UNC	140 ± 20	225 ± 25	305 ± 34	430 ± 45	583 ± 61	600 ± 60	813 ± 81
7/8 - 14 UNF	155 ± 25	260 ± 30	353 ± 41	475 ± 45	644 ± 61	660 ± 60	895 ± 81

**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 oil, graphite, or thread sealant such as Loctite.

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

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

Thread Size	Class 8.8 Bolts, Screws, and Studs with Regular Height Nuts (Class 8 or Strong Nuts)		Class 10.9 Bolts, Screws, and Studs with Regular Height Nuts (Class 10 or Strong Nuts)	
M5 X 0.8	57 ± 5 in-lb	644 ± 68 N-cm	78 ± 8 in-lb	881 ± 90 N-cm
M6 X 1.0	96 ± 10 in-lb	1085 ± 113 N-cm	133 ± 14 in-lb	1503 ± 158 N-cm
M8 X 1.25	19 ± 2 ft-lb	26 ± 3 N-m	28 ± 3 ft-lb	38 ± 4 N-m
M10 X 1.5	38 ± 4 ft-lb	52 ± 5 N-m	54 ± 6 ft-lb	73 ± 8 N-m
M12 X 1.75	66 ± 7 ft-lb	90 ± 10 N-m	93 ± 10 ft-lb	126 ± 14 N-m
M16 X 2.0	166 ± 15 ft-lb	225 ± 23 N-m	229 ± 23 ft-lb	310 ± 31 N-m
M20 X 2.5	325 ± 33 ft-lb	440 ± 45 N-m	450 ± 36 ft-lb	610 ± 62 N-m

**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 oil, graphite, or thread sealant such as Loctite.

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

# SPECIFICATIONS

## Other Torque Specifications

### SAE Grade 8 Steel Set Screws

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

### Wheel Bolts and Lug Nuts

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

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

### Thread Cutting Screws (Zinc Plated Steel)

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

### Thread Cutting Screws (Zinc Plated Steel)

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

\* 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

$$\begin{aligned} \text{in-lb} \times 11.2985 &= \text{N-cm} \\ \text{ft-lb} \times 1.3558 &= \text{N-m} \end{aligned}$$

$$\begin{aligned} \text{N-cm} \times 0.08851 &= \text{in-lb} \\ \text{N-m} \times 0.73776 &= \text{ft-lb} \end{aligned}$$

# SPECIFICATIONS

## Equivalents & Conversions

### Decimal & Millimeter Equivalents

Fractions	Decimals	mm	Fractions	Decimals	mm
1/64	0.015625	0.397	33/64	0.515625	13.097
1/32	0.03125	0.794	16/32	0.53125	13.484
3/64	0.046875	1.191	35/64	0.546875	13.891
1/16	0.0625	1.588	9/16	0.5625	14.288
5/64	0.078125	1.984	37/64	0.578125	14.684
3/32	0.9375	2.381	19/32	0.59375	15.081
1/8	0.1250	3.175	5/8	0.6250	15.875
9/64	0.140625	3.572	41/64	0.640625	16.272
5/32	0.15625	3.969	21/32	0.65625	16.669
11/64	0.171875	4.366	43/64	0.671875	17.066
3/16	0.1875	4.762	11/16	0.6875	17.462
13/64	0.203125	5.159	45/64	0.703125	17.859
7/32	0.21875	5.556	23/32	0.71875	18.256
15/64	0.234375	5.953	47/64	0.734375	18.653
1/4	0.2500	6.350	3/4	0.7500	19.050
17/64	0.265625	6.747	49/64	0.765625	19.447
9/32	0.28125	7.144	25/32	0.78125	19.844
19/64	0.296875	7.541	51/64	0.796875	20.241
5/16	0.3125	7.541	13/16	0.8125	20.638
21/64	0.328125	8.334	53/64	0.828125	21.034
11/32	0.34375	8.731	27/32	0.84375	21.431
23/64	0.359375	9.128	55/64	0.859375	21.828
3/8	0.3750	9.525	7/8	0.8750	22.225
25/64	0.390625	9.922	57/64	0.890625	22.622
13/32	0.40625	10.319	29/32	0.90625	23.019
27/64	0.421875	10.716	59/64	0.921875	23.416
7/16	0.4375	11.112	15/16	0.9375	23.812
29/64	0.453125	11.509	61/64	0.953125	24.209
15/32	0.46875	11.906	31/32	0.96875	24.606
31/64	0.484375	12.303	63/64	0.984375	25.003
1/2	0.5000	12.700	1	1.000	25.400
1 mm = 0.03937 in.			0.001 in. = 0.0254 mm		

2

# SPECIFICATIONS

## U.S. to Metric Conversions

2

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

# SPECIFICATIONS

## G3 3000/5000/6000 Series Specifications

Engines:	20.5 hp (15.4kW)	22 hp (16.2 kW)	23.5 hp (17.6kW)	24 hp (17.9 kW)
Make	Kawasaki	Kawasaki FX	Kawasaki	Kawasaki FX
Model	FX651V	FX691V	FX730V	FX691V
Hi-Idle	3600 ±100 RPM	3600 ± 100 RPM	3600 ±100 RPM	3600 ± 100 RPM
Low-Idle	1550 RPM	1550 RPM	1550 RPM	1800 RPM
Spark Plug	NGK BPR4ES	NGK BPR4ES	NGK BPR4ES	NGK BPR4ES
Oil	SAE 10w-30 / SAE10w-40	SAE 10w-30 / SAE10w-40	SAE 10w-30 / SAE10w-40	SAE 10w-30 / SAE10w-40
Oil Capacity	2.2Qt. (2.1 L)	2.2 Qt. (2.1 L)	2.2 Qt. (2.1 L)	2.2 Qt. (2.1 L)
CARB	No	No	78924	78922 / 78926 78928
EPA	Yes	Yes	Yes	Yes
Heavy Duty Air Canister	Standard	Standard	Standard	Standard

Engines:	24.5 hp (18.5 kW)	25.5 hp (19.2 kW)	25.5 hp (19.2 kW)
Make	Kawasaki	Kawasaki	Kawasaki (Propane)
Model	FX751V	FX801V	FX801V
Hi-Idle	3600 ± 100 RPM	3600 ± 100 RPM	3750 ± 50 RPM
Low-Idle	1550 RPM	1550 RPM	1550 RPM
Spark Plug	NGK BPR4ES	NGK BPR4ES	NGK BPR4ES
Oil	SAE 10w-30 / SAE10w-40	SAE 10w-30 / SAE10w-40	SAE 10w-30 / SAE10w-40
Oil Capacity	2.2 Qt. (2.1 L)	2.2 Qt. (2.1 L)	1.9 Qt. (1.8 L)
CARB	No	No	No
EPA	Yes	Yes	Yes
Heavy Duty Air Canister	Standard	Standard	Standard

Engines:	23 hp (17.2 kW)	25 hp (18.6 kW)	27 hp (20.1 kW)	29 hp (21.6 kW)	34 hp (25.4 kW)
Make	Kohler Command	Kohler Command	Kohler Command Pro	Kohler EFI	Kohler Command
Model	CV680S	CV730S	CV740S	ECV749	FH921V
Hi-Idle	3800 ± 50 RPM	3800 ± 50 RPM	3800 ± 50 RPM	3800 ± 50 RPM	3600 ± 100
Low-Idle	1800 RPM	1800 RPM	1800 RPM	1800 RPM	1550 RPM
Spark Plug	Champion R12YC	Champion R12YC	Champion R12YC	Champion R12YC	NGK BPR5ES
Oil	SAE 10w-30 / SAE10w-40	SAE 10w-30 / SAE10w-40	SAE 10w-30 / SAE10w-40	SAE 10w-30 / SAE10w-40	SAE 10w-30 / SAE10w-40
Oil Capacity	2.0 Qt. (1.9 L)	2.0 Qt. (1.9 L)	2.0 Qt. (1.9 L)	2.0 Qt. (1.9 L)	1.8 Qt. (1.7 L)
CARB	No	No	No	No	No
EPA	Yes	Yes	Yes	Yes	Yes
Heavy Duty Air Canister	Standard	Standard	Standard	Standard	Standard



# SPECIFICATIONS

## G3 3000/5000/6000 Series Specifications cont.

### Fuel System:

<b>Fuel Tank Capacity</b>	8 Gallon (US) (26.5 L)	12 Gallon (US) (45.4 L)	43.5 lb Propane (19.7 kg)
<b>Fuel Gauge</b>	Located on top of tank.		Located on tank
<b>Fuel Delivery System</b>	Fuel pump		Vapor draw

### Traction Drives:

<b>Hydraulic Drive System</b>	Unitized Pump & Motor			
<b>Pump</b>	12cc No Fans	12cc w/Check Valve	12cc w/Shock Valve	16cc w/Shock Valve
<b>Motor</b>	14.6 cir	14.6 cir	14.6 cir	17.1 cir
<b>Hydraulic Fluid</b>	Toro Hypr-Oil (500 hr service) or Mobil 1 15w50 Motor Oil (250 hr service)			
<b>Hydraulic Fluid Capacity</b>	52 oz. (1.5 liters) per side w/ filter change			
<b>Ground Speed</b>	0 to 8 mph fwd	0 to 10 mph fwd	0 to 10 mph fwd	0 to 12 mph fwd
<b>Release Valves</b>	External lever on each unit. Allow unit to be moved without engine running			
<b>Pump drive</b>	Belt tension via spring loaded idler			

<b>Mowing Decks:</b>	<b>48"</b>	<b>52"</b>	<b>60"</b>	<b>72"</b>
<b>Cutting Deck</b>	Turbo Force	Turbo Force	Turbo Force	Turbo Force
<b>Cutting Height</b>	1.0" to 5.5" (25.4mm - 139.7mm) in .25" (6.3mm) increments			
<b>Blade Tip Speed</b>	18500 + ft/min	18500 + ft/min	18500 + ft/min	18500 + ft/min
<b>Spindle</b>	Standard Greasable Ball Bearing	Standard Greasable Ball Bearing	Standard Greasable Ball Bearing	Tapered Roller or Greasable Ball Bearing
<b>Configuration</b>	Tools Adjust or Hand Adjust Baffle			
<b>Clutch</b>	Models with 29 hp and under utilize a 200 ft-lb clutch. Models above 29 hp utilize a 250 ft-lb clutch.			
<b>PTO Idler</b>	Spring-loaded idler system			
<b>Construction</b>	7 gauge (.179"/ 4.5mm) Steel Welded Construction			
<b>Blades</b>	16.5" long, .250" thick, 2.5" wide, heat treated steel blades, qty 3	18.0" long, .250" thick, 2.5" wide, heat treated steel blades, qty 3	20.5" long, .250" thick, 2.5" wide, heat treated steel blades, qty 3	24.5" long, .250" thick, 2.5" wide, heat treated steel blades, qty 3

## G3 3000/5000/6000 Series Specifications cont.

### Electrical System:

<b>Voltage</b>	12 volt, negative ground
<b>Battery Type</b>	Wet-Battery
<b>Fuses</b>	Blade Type
<b>Hourmeter with Service Indicator</b>	Standard Equipment

### Controls:

Steering Levers	Dual, wrap-around, hydraulic dampened, with cushioned grips
Parking Brake	Right hand operated lever with cushioned grip
Deck Lift	Foot lift assist via foot pedal
Cutting Height	Controlled by keyed height of cut pin

# SPECIFICATIONS

## Dimensions

### Commercial 3000 Series

Model #	Wheel Base	Overall Length		Width Outside Tires	Overall Width (Chute Down)	Gate Width	Overall Height		Weight
		ROPS Up	ROPS Folded				ROPS Up	ROPS Folded	
	in./cm	in./cm	in./cm	in./cm	in./cm	in./cm	in./cm	in./cm	lbs./kg
74952	47.7/ 121.2	79.2/ 201.2	80.9/ 205.5	45.7/ 116.1	63.6/ 161.5	54.0/ 137.2	70.5/ 179.1	46.8/ 118.9	1120/ 508.0
74953	47.7/ 121.2	79.2/ 201.2	80.9/ 205.5	45.7/ 116.1	67.6/ 171.7	57.5/ 146.1	70.5/ 179.1	46.8/ 118.9	1168/ 529.8
74954	50.6/ 128.5	83.1/ 211.1	84.8/ 215.4	53.0/ 134.6	75.7/ 192.2	61.7/ 156.8	70.5/ 179.1	46.8/ 118.9	1165/ 528.0

### G3/Professional 5000 Series

Model #	Wheel Base	Overall Length	Width Outside Tires	Overall Width (Chute Down)	Gate Width	Overall Height		Weight
						ROPS Up	ROPS Folded	
	in./cm	in./cm	in./cm	in./cm	in./cm	in./cm	in./cm	lbs./kg
74901	47.7/121.2	79.2/201.2	45.7/116.1	63.6/161.5	54.0/137.2	70.5/179.1	46.8/118.9	1120/ 508.0
74903	47.7/121.2	79.2/201.2	45.7/116.1	67.6/171.7	57.5/146.1	70.5/179.1	46.8/118.9	1168/ 529.8
74915	50.6/128.5	83.1/211.1	53.0/134.6	75.7/192.3	61.7/156.7	70.5/179.1	46.8/118.9	1216/ 551.6
74916	53.6/136.1	86.1/218.7	59.1/150.1	87.6/222.5	73.6/186.9	70.5/179.1	46.8/118.9	1296/ 588.0
74930	50.6/128.5	83.1/211.1	53.0/134.6	75.7/192.3	61.7/156.7	70.5/179.1	46.8/118.9	1255/ 569.0

# SPECIFICATIONS

## Dimensions

### G3/Professional 6000 Series

Model #	Wheel Base	Overall Length	Width Outside Tires	Overall Width (Chute Down)	Gate Width	Overall Height		Weight
						ROPS Up	ROPS Folded	
	in./cm	in./cm	in./cm	in./cm	in./cm	in./cm	in./cm	lbs./kg
<b>74922</b>	47.7/121.2	79.2/201.2	45.7/116.1	63.6/161.5	54.0/137.2	70.5/179.1	46.8/118.9	1147/ 520.3
<b>74923</b>	47.7/121.2	79.2/201.2	45.7/116.1	63.6/161.5	54.0/137.2	70.5/179.1	46.8/118.9	1147/ 520.3
<b>74925</b>	50.6/128.5	83.1/211.1	53.0/134.6	75.7/192.3	61.7/156.7	70.5/179.1	46.8/118.9	1254/ 568.8
<b>74926</b>	50.6/128.5	83.1/211.1	53.0/134.6	75.7/192.3	61.7/156.7	70.5/179.1	46.8/118.9	1255/ 569.3
<b>74927</b>	53.6/136.1	86.1/218.7	59.1/150.1	87.6/222.5	73.6/186.9	70.5/179.1	46.8/118.9	1334/ 605.1
<b>74928</b>	53.6/136.1	86.1/218.7	59.1/150.1	87.6/222.5	73.6/186.9	70.5/179.1	46.8/118.9	1350/ 612.3
<b>74935</b>	50.6/128.5	83.1/211.1	53.0/134.6	75.7/192.3	61.7/156.7	70.5/179.1	46.8/118.9	1269/ 575.6
<b>74936</b>	50.6/128.5	83.1/211.1	53.0/134.6	75.7/192.3	61.7/156.7	70.5/179.1	46.8/118.9	1269/ 575.6
<b>74937</b>	53.6/136.1	86.1/218.7	59.1/150.1	87.6/222.5	73.6/186.9	70.5/179.1	46.8/118.9	1349/ 611.9
<b>74938</b>	53.6/136.1	86.1/218.7	59.1/150.1	87.6/222.5	73.6/186.9	70.5/179.1	46.8/118.9	1349/ 611.9
<b>74975</b>	50.6/128.5	83.1/211.1	53.0/134.6	75.7/192.3	61.7/156.7	70.5/179.1	46.8/118.9	1255/ 569.3
<b>74977</b>	53.6/136.1	86.1/218.7	59.1/150.1	87.6/222.5	73.6/186.9	70.5/179.1	46.8/118.9	1352/ 613.3
<b>78922</b>	47.7/121.2	79.2/201.2	45.7/116.1	63.6/161.5	54.0/137.2	70.5/179.1	46.8/118.9	1147/ 520.3
<b>78924</b>	47.7/121.2	79.2/201.2	45.7/116.1	67.6/171.7	57.5/146.1	70.5/179.1	46.8/118.9	1147/ 520.3
<b>78926</b>	50.6/128.5	83.1/211.1	53.0/134.6	75.7/192.3	61.7/156.7	70.5/179.1	46.8/118.9	1255/ 569.3
<b>78928</b>	53.6/136.1	86.1/218.7	59.1/150.1	87.6/222.5	73.6/168.9	70.5/179.1	46.8/118.9	1350/ 612.3

# SPECIFICATIONS

## Dimensions

### G3/Professional 6000 Series cont.

Model #	Wheel Base	Overall Length	Width Outside Tires	Overall Width (Chute Down)	Gate Width	Overall Height		Weight
						ROPS Up	ROPS Folded	
	in./cm	in./cm	in./cm	in./cm	in./cm	in./cm	in./cm	lbs./kg
74902TE	47.7/121.2	79.2/201.2	45.7/116.1	63.6/161.5	54.0/137.2	70.5/179.1	46.8/118.9	1226/ 556.0
74923TE	47.7/121.2	79.2/201.2	45.7/116.1	63.6/161.5	54.0/137.2	70.5/179.1	46.8/118.9	1190/ 539.8
74925TE	50.6/128.5	83.1/211.1	53.0/134.6	75.7/192.3	61.7/156.7	70.5/179.1	46.8/118.9	1301/ 590.1
74941CP	47.7/121.2	79.2/201.2	45.7/116.1	63.6/161.5	54.0/137.2	70.5/179.1	46.8/118.9	1205/ 546.6
74943CP	47.7/121.2	79.2/201.2	45.7/116.1	67.6/171.7	57.5/146.1	70.5/179.1	46.8/118.9	1210/ 548.8
74945CP	50.6/128.5	83.1/211.1	53.0/134.6	75.7/192.3	61.7/156.7	70.5/179.1	46.8/118.9	1254/ 568.8
74955CP	50.6/128.5	83.1/211.1	53.0/134.6	75.7/192.3	61.7/156.7	70.5/179.1	46.8/118.9	1259/ 571.1
74957CP	53.6/136.1	86.1/218.7	59.1/150.1	87.6/222.5	73.6/186.9	70.5/179.1	46.8/118.9	1350/ 612.3
74960CP	50.6/128.5	83.1/211.1	53.0/134.6	75.7/192.3	61.7/156.7	70.5/179.1	46.8/118.9	1269/ 575.6
74961CP	53.6/136.1	86.1/218.7	59.1/150.1	87.6/222.5	73.6/186.9	70.5/179.1	46.8/118.9	1349/ 611.9

## Caster Fork Assembly Replacement

### Caster Fork Assembly Removal

1. Raise the front of the machine off the ground, leaving enough clearance to remove the caster fork from the frame.
2. Remove the grease cap from the frame (Fig. 001).



Fig. 001

PICT-0351

3. Remove the locknut (Fig. 002).



Fig. 002

PICT-0352a

4. Slide the caster fork assembly out of the frame (Fig. 003).



Fig. 003

PICT-0355

# CHASSIS

## Caster Bearing Replacement

1. Remove the 3 Belleville washers (Fig. 004).



Fig. 004

PICT-0359a

2. Remove the top tapered bearing (Fig. 005).



Fig. 005

PICT-0361a

3. Remove the bottom grease seal (Fig. 006).



Fig. 006

PICT-0364a

4. Remove the bottom tapered bearing (Fig. 007).



Fig. 007

PICT-0365

5. Drive the top and bottom tapered bearing cups out of the caster fork hub (Fig. 008).



Fig. 008

PICT-0367a

7. Pack the upper and lower tapered bearings with grease (No. 2 general purpose lithium base or molybdenum grease).
8. Install the lower bearing into the caster fork hub (Fig. 010).



Fig. 010

PICT-0368a

6. Install new tapered bearing cups by pressing each bearing cup into the caster fork hub so that the thicker part of the taper is pressed in first. The bearing cups should seat against the shoulder inside the frame.

Section view of caster fork hub (Fig. 009).

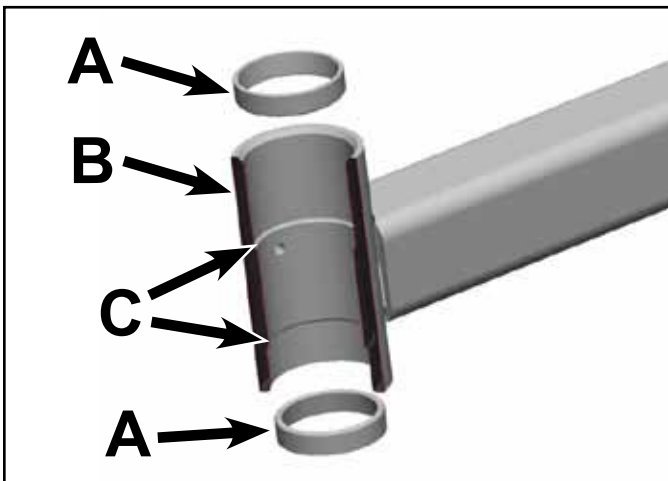


Fig 009 tapered bearing cup install

- A. Tapered Bearing Cup (2)
- B. Caster fork hub (sectioned)
- C. Machined shoulder inside caster fork hub (2)

9. Install the lower grease seal into the bottom of the caster fork hub (Fig. 011).



Fig. 011

PICT-0371a



# CHASSIS

10. Install the upper bearing fork hub (Fig. 012).



Fig. 012

PICT-0372a

## Caster Fork Assembly Installation

1. Install 3 Belleville washers as shown (Fig. 013).

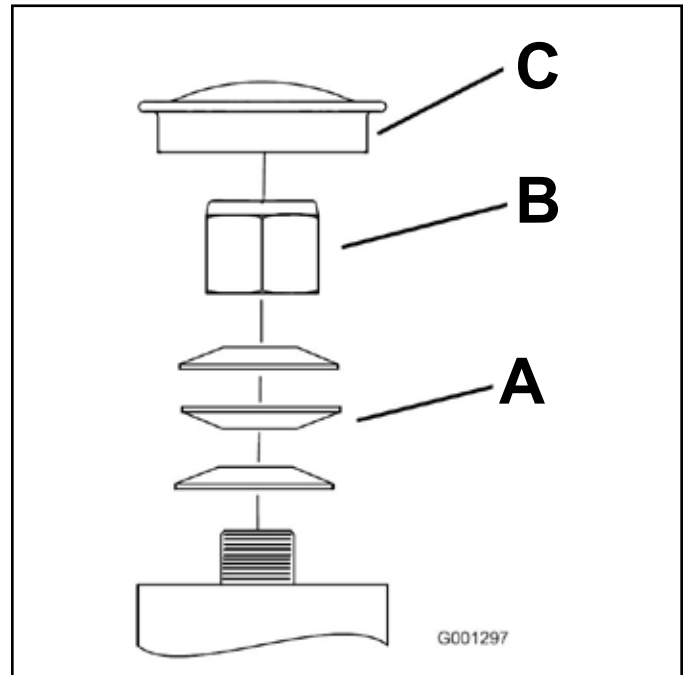


Fig. 013

fig. 69 G001297

- A. Spring washer (3)
- B. Lock nut
- C. Dust Cap

2. Slide the caster fork assembly into the hub (Fig. 014).



Fig. 014

PICT-0355

3. Install the locknut. Tighten the locknut until the Belleville washers are flat, then back the nut off 1/4 turn to properly set the preload on the bearings (Fig. 015).



Fig. 015

PICT-0373a

4. Remove the plug located on the side of the caster hub. Install a grease fitting. Apply grease (No. 2 general purpose lithium base or molybdenum grease) into the hub until it passes through the upper bearing. Fill the top cavity with grease (Fig. 016).



Fig. 016

PICT-0375a

5. Remove the grease fitting and install the grease plug.

## Front Wheel Bearing Replacement

### Front Wheel Bearing Removal

1. Raise the front of the machine off the ground.
2. Remove the wheel the axle bolt and nut (Fig. 017).



Fig. 017

PICT-0378a

3. Remove the wheel assembly from the fork (Fig. 018).



Fig. 018

PICT-0379a

# CHASSIS

4. Remove the 2 seal guards (Fig. 019).



Fig. 019

PICT-0380a

6. Remove the axle caster (Fig. 021).



Fig. 021

PICT-0383a

5. Remove 2 spacer nuts from the axle caster (Fig. 020).



Fig. 020

PICT-0382a

7. Remove the two caster seals from the wheel assembly (Fig. 022).



Fig. 022

PICT-0384a

3

8. Remove the 2 tapered bearings from the wheel assembly (Fig. 023).



Fig. 023

PICT-0385a

9. Drive the bearing cup out of the wheel assembly (Fig. 024).



Fig. 024

PICT-0387a

## Front Wheel Bearing Installation

1. Install a new tapered bearing cup into the wheel assembly by pressing each bearing cup into the wheel hub so that the thicker part of the taper is pressed into the wheel hub first. The bearing cups should seat against the shoulder divots inside the wheel hub (Fig. 025).



Fig. 025

PICT-0389a

2. Pack both tapered bearings with grease (No. 2 general purpose lithium base or molybdenum grease).
3. Install the tapered bearings into each side of the wheel hub (Fig. 026).



Fig. 026

PICT-0390a

# CHASSIS

4. Install the grease seals into each side of the wheel hub (Fig. 027).



Fig. 027

PICT-0392a

6. Install the 2 spacer nuts and tighten (Fig. 029).



Fig. 029

PICT-0382a

5. Install the caster axle (Fig. 028).



Fig. 028

PICT-0393a

7. Install the two guard seals, screw, nut and tighten (Fig. 030).



Fig. 030

PICT-0394a

## Fuel Tank Replacement

### Fuel Tank Removal

1. Turn the fuel valve to the "Off" position.
2. Siphon the fuel from the fuel tank.

**Note:** The only recommended way to remove the fuel from the tank is by using a siphon pump.

3. Remove the 4 bolts retaining the seat base assembly to the frame (Fig. 031).



Fig. 031

PICT-0396a

4. Lift the seat up enough to remove the wiring plug to the seat switch (Fig. 032).



Fig. 032

PICT-0398a

5. Remove the 4 screws retaining the right and left hand motion control covers (Fig. 033).



Fig. 033

PICT-0412a

6. Remove the two bolts and nuts retaining the seat mount to the frame (Fig. 034).



Fig. 034

PICT-0413a

# CHASSIS

7. Remove 2 bolts retaining the front of the seat mount to the frame (Fig. 035).



Fig. 035

PICT-0401a

9. Cut the tie strap around the fuel sender plug (Fig. 037).



Fig. 037

PICT-0406a

8. Lift the seat mount from the frame (Fig. 036).

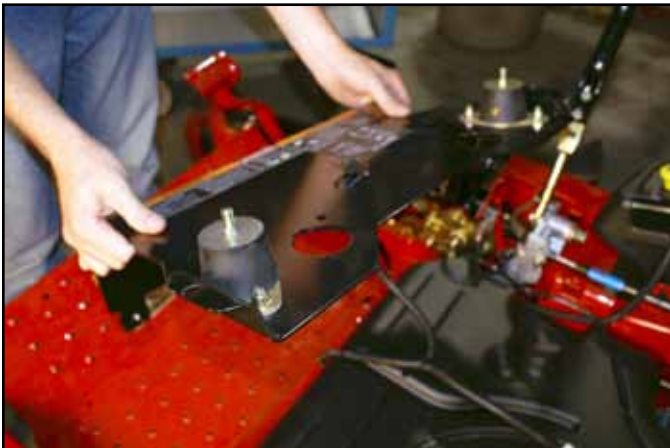


Fig. 036

PICT-0417a

10. Unplug the fuel sender plug from the wiring harness (Fig. 038).



Fig. 038

PICT-0409a

11. Disconnect the vapor line retainers from the fuel manifold (Fig. 039).



Fig. 039

PICT-0421a

13. Remove the fuel tank from the frame of the unit (Fig. 041).



Fig. 041

PICT-0426a

12. With the fuel valve in the OFF position, remove the fuel clamp from the engine fuel line (Fig. 040).



Fig. 040

PICT-0422a



# CHASSIS

## Fuel Tank Installation

1. Install fuel tank into the frame (Fig. 042).



Fig. 042

PICT-0426a

2. Install the fuel clamp around the fuel line to the fuel valve.
3. Connect the vapor line retainers to the fuel manifold (Fig. 043).



Fig. 043

PICT-0421a

4. Plug the fuel sender plug to the wiring harness (Fig. 044).



Fig. 044

PICT-0409a

5. Install a tie strap around the red, yellow, and black wires around the wiring connector (Fig. 045).



Fig. 045

PICT-0427a

6. Install the seat mount to the frame (Fig. 046).



Fig. 046

PICT-0415a

8. Install seat and connect the seat switch (Fig. 048).



Fig. 048

PICT-0398a

7. Install 2 bolts and nuts on the right and left side of the seat frame (Fig. 047).



Fig. 047

PICT-0413a

9. With flange nuts, tighten the seat and seat base to the 4 seat isolators (Fig. 049).



Fig. 049

PICT-0396a

# CHASSIS

10. Install the right and left motion control covers with 2 screws each (Fig. 050).



Fig. 050

DSCN-4238a

11. Turn the valve to the "On" position.

## Throttle Control Assembly Replacement (Kohler EFI Engine)

### Throttle Control Assembly Removal

1. Disconnect the negative battery cable from the battery terminal.
2. Remove the knob from the throttle control assembly (Fig. 051).



Fig. 051

DSCN-4247a

3. Remove the 4 screws securing the control panel to the RH Fender Console assembly (Fig. 052).



Fig. 052

DSCN-4249a

4. Remove the locknuts and carriage bolts securing the throttle control to the control panel (Fig. 053).

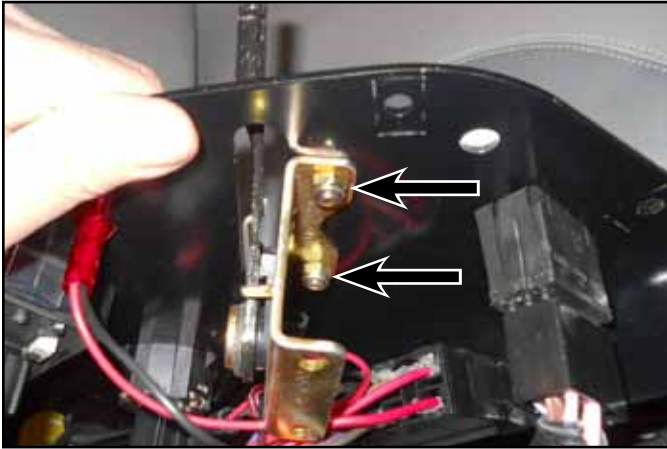


Fig. 053

DSCN-4250a

6. Remove the Z-bend end of the cable from the throttle arm assembly (Fig. 055).



Fig. 055

DSCN-4258a

5. Loosen the cable clamp and remove the throttle cable from underneath it (Fig. 054).

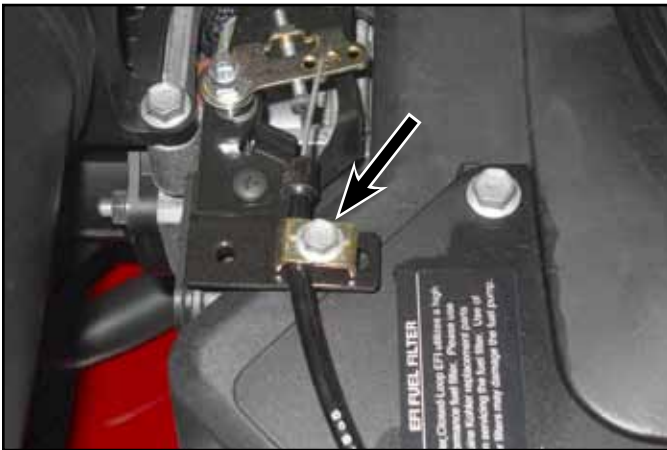


Fig. 054

DSCN-4253a

7. Slide the throttle cable through the hose clamp next to the engine (Fig. 056).



Fig. 056

DSCN-4259a

# CHASSIS

8. Continue sliding the cable through the second hose clamp next to the frame brace for the ROPS assembly and pull the throttle cable out of the unit (Fig. 057).



Fig. 057

DSCN-4260a

## Throttle Control Assembly Installation

1. Slide the throttle cable through the hose clamp next to the frame brace for the ROPS assembly (Fig. 058).



Fig. 058

DSCN-4260a

2. Slide the throttle cable through the hose clamp located next to the engine (Fig. 059).



Fig. 059

DSCN-4259a

3. Install the throttle control in the control panel using 2 carriage bolts and lock nuts (Fig. 060).

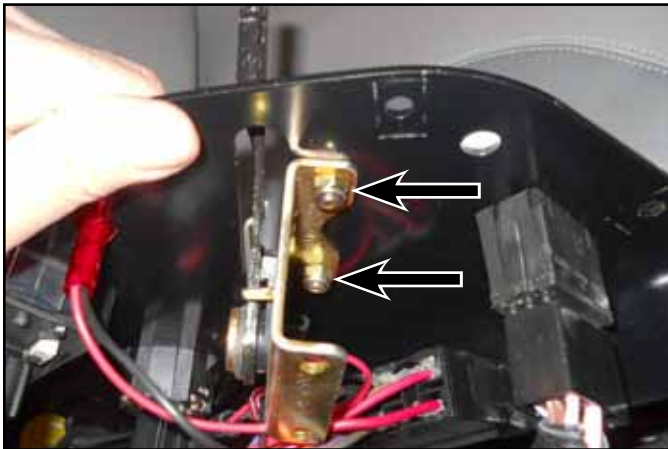


Fig. 060

DSCN-4250a

5. Install the knob to the throttle control assembly (Fig. 062).



Fig. 062

DSCN-4247a

4. Install the 4 screws securing the control panel to the RH Fender Console (Fig. 061).



Fig. 061

DSCN-4249a

6. Move the throttle control to the slow idle position (Fig. 063).



Fig. 063

DSCN-4277a

# CHASSIS

7. Install the throttle cable under the throttle clamp. Install the throttle Z-bend in the middle hole on the throttle arm assembly (Fig. 064).



Fig. 064 DSCN-4279a

8. Move the throttle arm assembly to the low idle position and tighten the throttle cable clamp (Fig. 065).

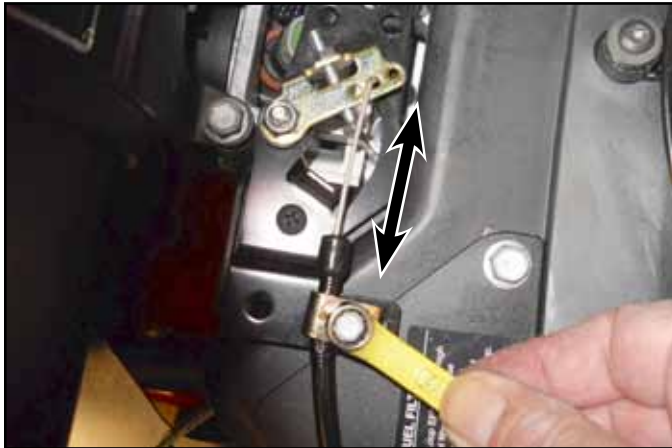


Fig. 065 DSCN-4281a

9. Move the throttle control back and forth checking the operation of the throttle arm assembly.
10. Connect the negative battery cable to the battery.

## Park Brake Handle Assembly Replacement (2012 & Later)

### Park Brake Handle Removal (2012 & Later)

1. Remove the two screws retaining the right hand motion control cover assembly to the frame and remove the cover (Fig. 066).

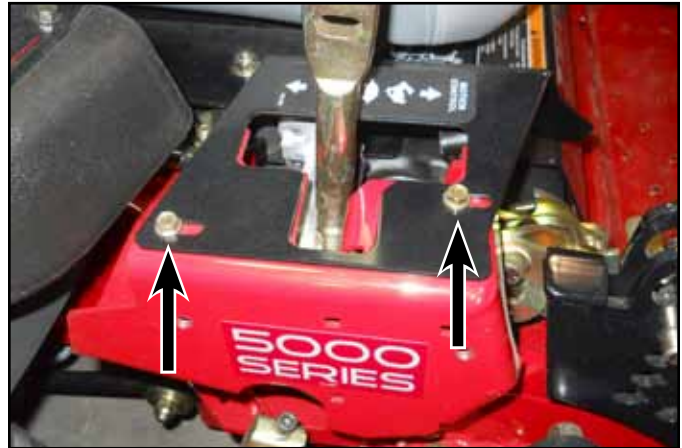


Fig. 066 DSCN-2614a

2. Unplug the wire harness from the park brake switch (Fig. 067).



Fig. 067 DSCN-2617a

3. Remove two screws and spacers retaining the park brake handle assembly to the frame (Fig. 068).

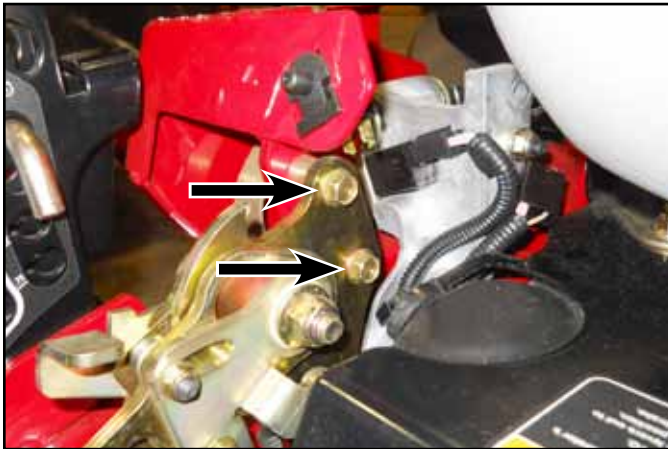


Fig. 068

DSCN-2619a

5. Remove two e-rings retaining the park brake cables to the park-brake pivot assembly and slide the cables out of the slots. Remove the park-brake handle assembly from the unit (Fig. 070).

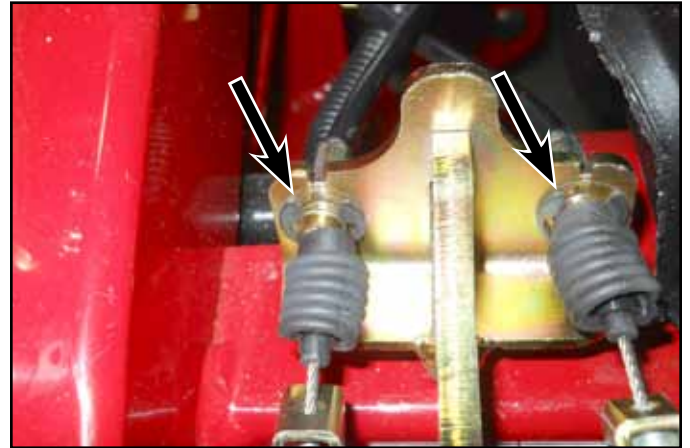


Fig. 070

DSCN-2626a

4. Remove the two cotter pins and clevis pins retaining the right and left park brake cables to the handle assembly (Fig. 069).

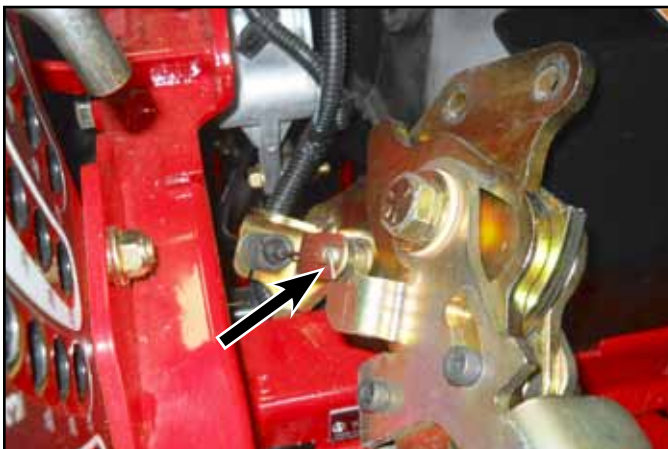


Fig. 069

DSCN-2623a



# CHASSIS

## Park Brake Handle Installation (2012 & Later)

1. Install the left and right brake cables in the slots in the bottom of the brake pivot assembly and install the e-rings (Fig. 071).

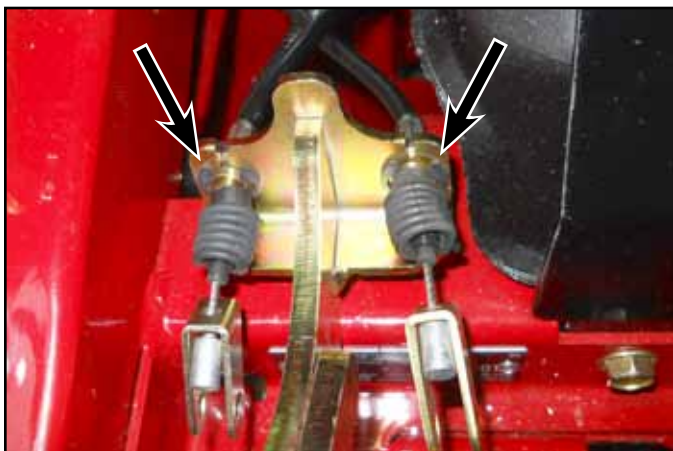


Fig. 071 DSCN-2627a

2. Install the clevis ends of the right and left brake cables to the parking brake handle assembly using two clevis pins and cotter pins (Fig. 072).

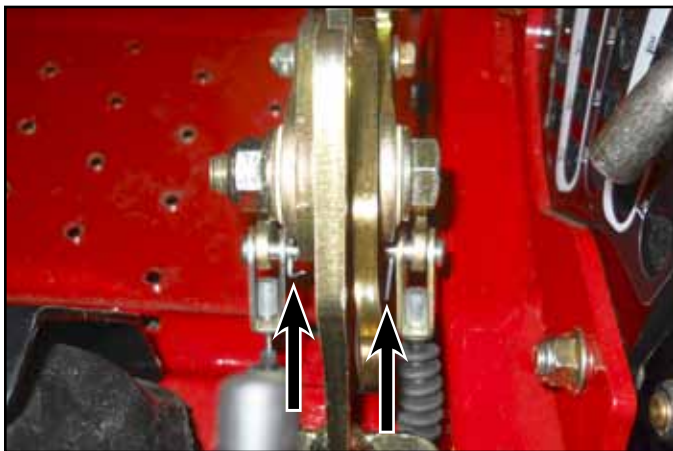


Fig. 072 DSCN-2635a

3. Install two screws through the park brake handle, two spacers, and tighten the assembly to the frame (Fig. 073).



Fig. 073 DSCN-2637a

4. Plug the wire harness to the park brake switch.
5. Install the two screws retaining the right hand motion-control cover assembly to the frame and tighten (Fig. 074).



Fig. 074 DSCN-2614a

6. Operate the park brake handle to make sure everything is moving freely.

## Park Brake Cable Replacement (2011 & Prior)

### Left Park Brake Cable Removal (2011 & Prior)

1. Raise the rear end of the unit and install jack stands under the tie down loops on the frame. Remove the RH and LH wheels from the unit (Fig. 075).



Fig. 075

PICT-8962

2. Disengage the park brake lever.
3. Remove the two nuts located on the end of park brake cable (Fig. 076).

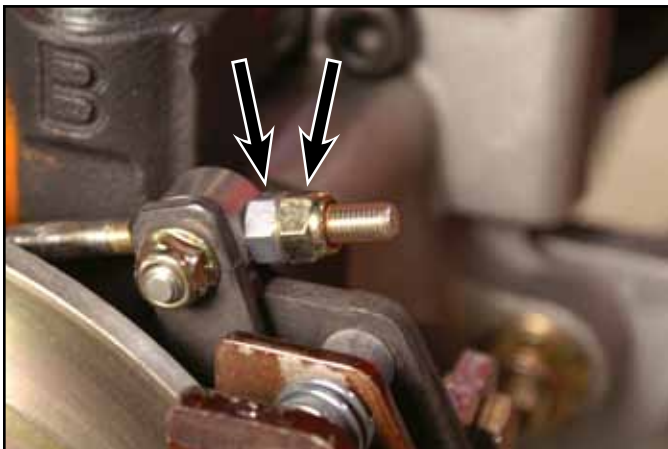


Fig. 076

PICT-9075a

4. With needle nose pliers, squeeze the tabs on the brake cable and pull the brake cable out of the slot in the cable anchor (Fig. 077).

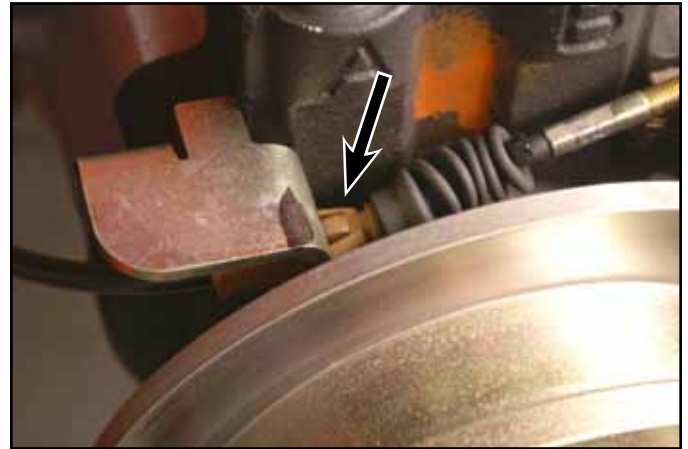


Fig. 077

PICT-8969a

5. Slide the brake cable out of the cable anchor and out towards the front (Fig. 078).



Fig. 078

PICT-8970a

# CHASSIS

6. Release the brake cable retainer holding the brake cable to the cradle. Push the cable through the routing hole and remove (Fig. 079).



Fig. 079

PICT-8974a

8. Remove the brake cable from the retainers located on the cradle (Fig. 081).

**Note: The cable is routed around the cradle.**

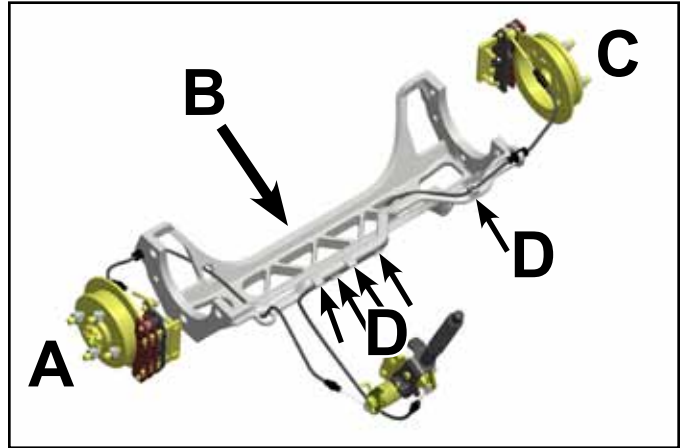


Fig. 081

cables routing #4

7. Remove the tie strap securing the brake cable to the cradle (Fig. 080).



Fig. 080

PICT-8977a

9. Remove the cotter pin located on the clevis pin holding the cable clevis to the brake lever (Fig. 082).



Fig. 082

PICT-8999a

- A. Right side brake assembly
- B. Cradle

- C. Left side brake assembly
- D. Retainer (5)

10. Remove the clevis pin from the cable yoke (Fig. 083).



Fig. 083

PICT-9001a

11. Release the brake cable retainer holding the brake cable to the frame (Fig. 084).

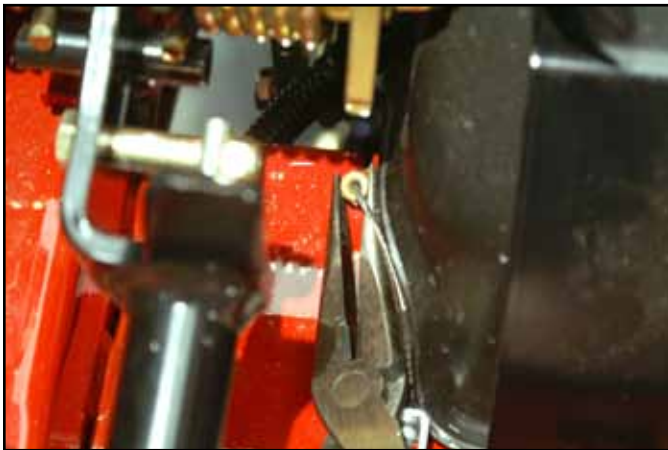


Fig. 084

PICT-9008a

12. Slide the cable out of the slot (Fig. 085).



Fig. 085

PICT-9014a

13. Pull the cable out over the frame cross bar and remove it from the unit (Fig. 086).



Fig. 086

PICT-9017a

# CHASSIS

## Left Park Brake Cable Installation (2011 & Prior)

1. Route the clevis end of the brake cable over the frame cross bar (Fig. 087).



Fig. 087

PICT-9017a

2. Route the brake cable up through the slotted hole in the frame and push the snap end fitting of the brake cable into the slot (Fig. 088).



Fig. 088

PICT-9021a

3. Position the brake cable clevis to the brake lever assembly. Install a clevis pin through the brake cable clevis and the brake lever assembly (Fig. 089).



Fig. 089

PICT-9001a

4. Install a cotter pin through the clevis pin to secure (Fig. 090).

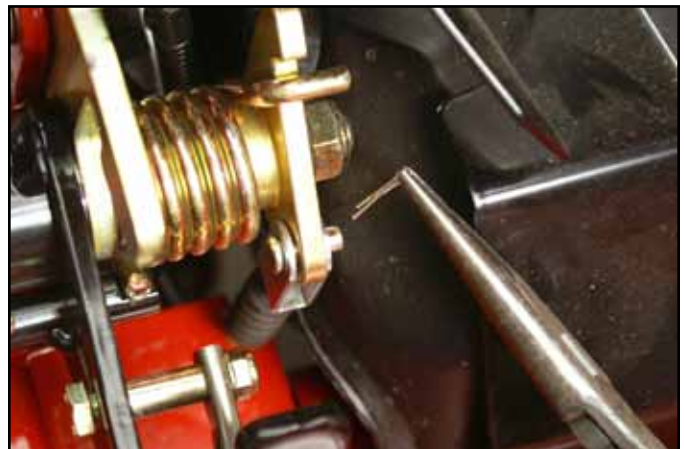


Fig. 090

PICT-8999a

5. Route the brake cable into the retainers on the cradle following the routing diagram (Fig. 091).

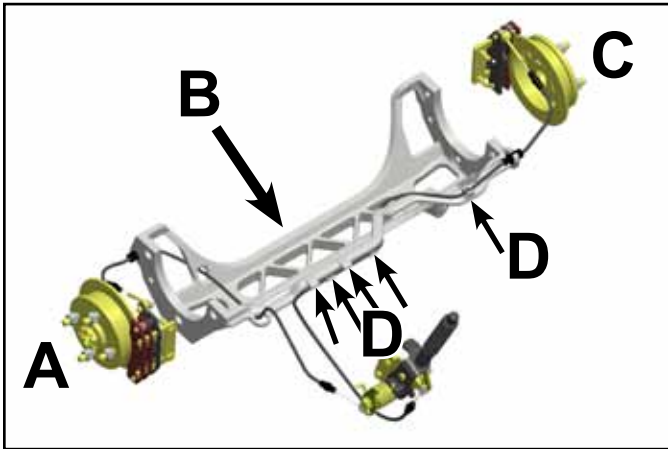


Fig. 091 cables routing #4

- |                              |                             |
|------------------------------|-----------------------------|
| A. Right side brake assembly | C. Left side brake assembly |
| B. Cradle                    | D. Retainer (5)             |

6. Install the left hand brake cable retainer into the cradle so that the retainer tab is installed in the slot on the cradle (Fig. 092).



Fig. 092 PICT-9027a

7. Slide the brake cable behind the wheel hub and slide the threaded end of the brake cable through the trunnion located in the brake caliper (Fig. 093).

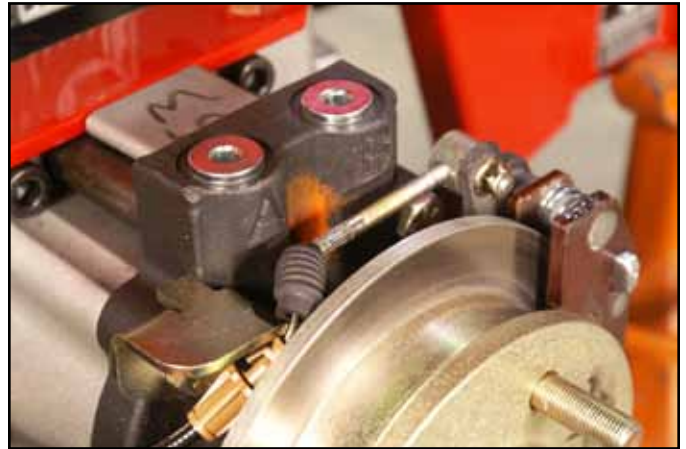


Fig. 093 PICT-9063a

8. Install the brake cable snap fitting into the slotted bracket (Fig. 094).



Fig. 094 PICT-9065a

# CHASSIS

9. Slide the rubber boot over the snap fitting (Fig. 095).



Fig. 095

PICT-9077a

11. Install a standard nut and a lock nut onto the threaded brake cable rod (Fig. 097).

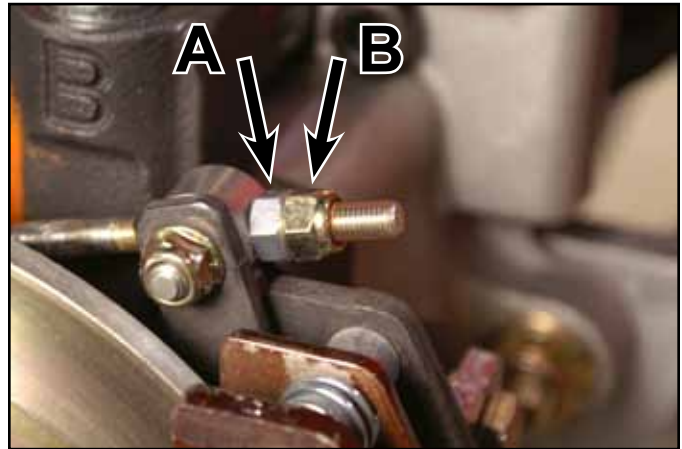


Fig. 097

PICT-9075a

10. Install a tie strap securing the brake cable to the cradle (Fig. 096).



Fig. 096

PICT-9070a

- A. Standard nut      B. Lock nut

12. Adjust the park brake. Refer to "Adjusting the Parking Brake" on page 3-32.

## Right Park Brake Cable Removal (2011 & Prior)

1. Raise the rear end of the unit and install jack stands under the tie down loops on the frame. Remove the RH and LH wheels from the unit (Fig. 098).



Fig. 098

PICT-8962

2. Disengage the park brake lever.
3. Remove the two nuts located on the end of the park brake cable (Fig. 099).

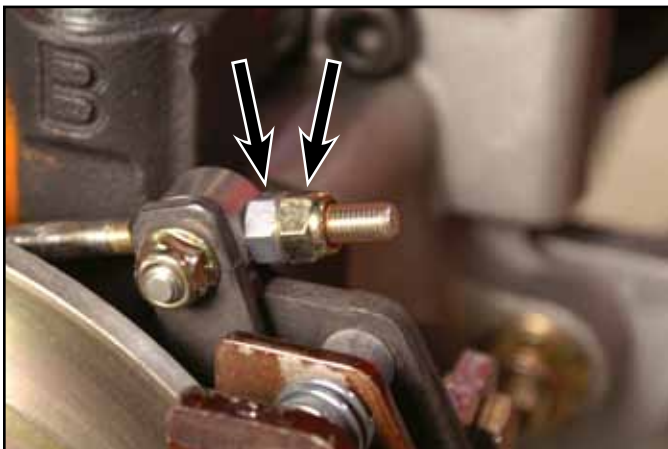


Fig. 099

PICT-9075

4. With needle nose pliers, squeeze the tabs on the brake cable and pull brake cable out of the slot in the cable anchor (Fig. 100).

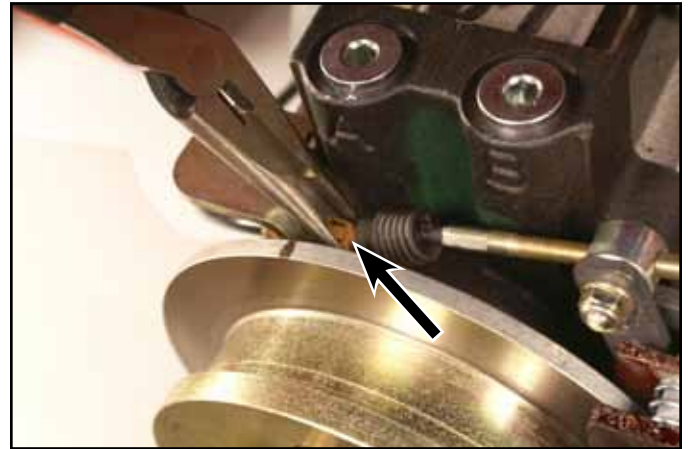


Fig. 100

PICT-9083a

3

5. Slide the brake cable out of the cable anchor and out towards the rear of the unit (Fig. 101).



Fig. 101

PICT-9084a



# CHASSIS

- Release the brake cable retainer holding the brake cable to the cradle (Fig. 102).



Fig. 102 PICT-9085a

- Pull the brake cable through the hole in the side of the frame (Fig. 104).



Fig. 104 PICT-9087a

- Guide the brake cable through the two holes in the cradle (Fig. 103).

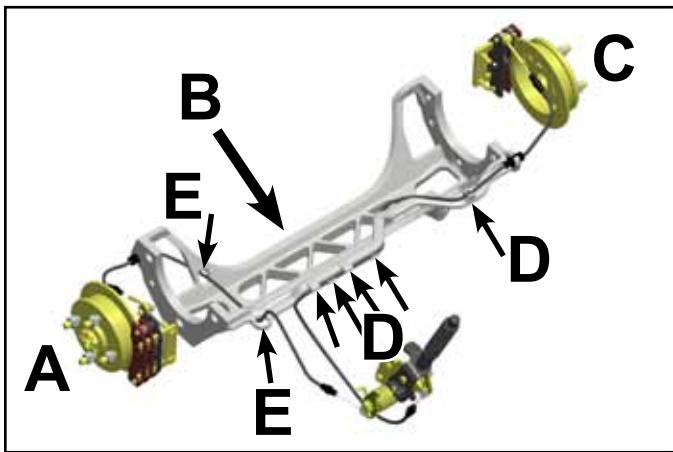


Fig. 103 cables routing #4

- |                              |                             |
|------------------------------|-----------------------------|
| A. Right side brake assembly | C. Left side brake assembly |
| B. Cradle                    | D. Retainer (5)             |
|                              | E. Hole (2)                 |

- Remove the cotter pin located on the clevis pin holding the brake cable clevis to the park brake lever (Fig. 105).



Fig. 105 PICT-9090a

10. Squeeze the tabs on the brake cable snap fitting and remove the brake cable from the slot on the side of the frame (Fig. 106).



Fig. 106

PICT-9092a

## Right Park Brake Cable Installation (2011 & Prior)

1. Install the brake cable snap fitting into the slot located on the side of the frame (Fig. 107).



Fig. 107

PICT-9092a

2. Position the brake cable clevis to the brake lever assembly. Install a clevis pin through the brake cable clevis and the brake lever assembly (Fig. 108).



Fig. 108

PICT-9099a

# CHASSIS

3. Install a cotter pin through the clevis pin (Fig. 109).



Fig. 109 PICT-9101a

5. Route the brake cable through the side hole in the frame and down through the hole in the cradle (Fig. 111).

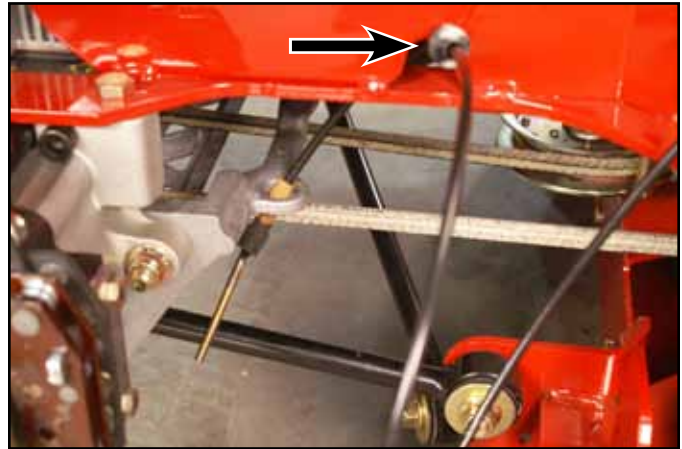


Fig. 111 PICT-9105a

4. Install the rubber seal over the end of the brake snap fitting (Fig. 110).

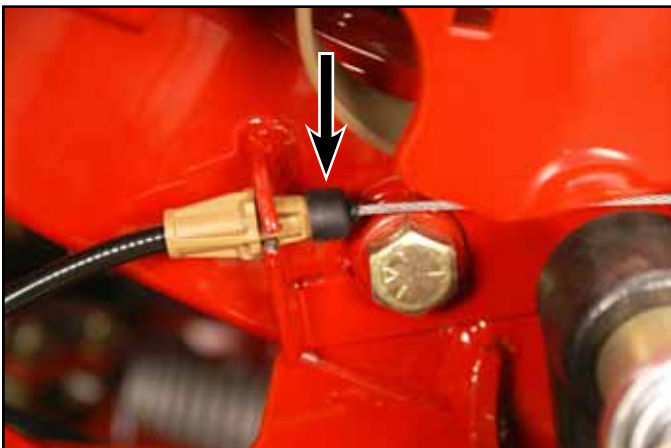


Fig. 110 PICT-9103a

6. Route the brake cable from the hole in the cradle, back to the slot of the cradle (Fig. 112).

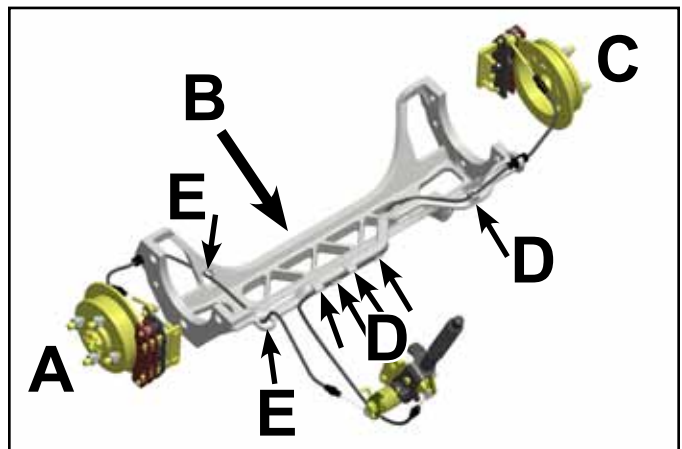


Fig. 112 cables routing #4

- |                              |                             |
|------------------------------|-----------------------------|
| A. Right side brake assembly | C. Left side brake assembly |
| B. Cradle                    | D. Retainer (5)             |
|                              | E. Hole (2)                 |

7. Install the right hand brake cable retainer into the cradle so that the retainer tab is installed in the slot on the cradle (Fig. 113).



Fig. 113 PICT-9111a

8. Route the brake cable behind the wheel hub and slide the threaded end into the trunnion on the caliper (Fig. 114).



Fig. 114 PICT-9113a

9. Install the snap fitting into the slotted bracket (Fig. 115).



Fig. 115 PICT-9114a

10. Install a standard nut and a lock nut onto the threaded brake cable rod (Fig. 116).

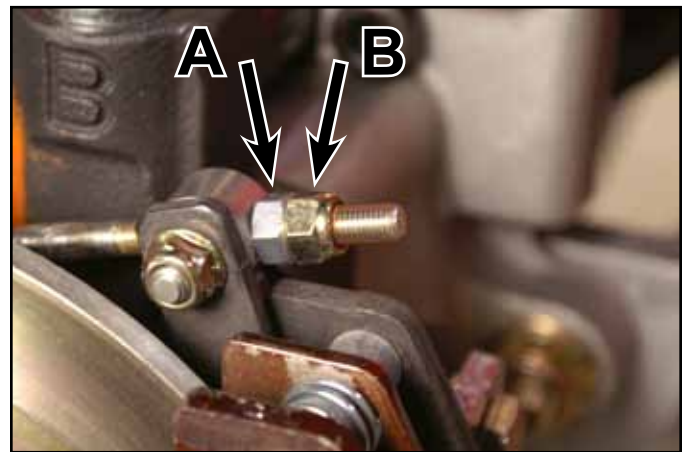


Fig. 116 PICT-9075a

- A. Standard nut      B. Lock nut

11. Adjust the park brake. Refer to "Adjusting the Parking Brake" on page 3-32.

# CHASSIS

## Adjusting the Parking Brake

1. Open the push valve (vertical position) on the hydro unit that you are replacing the brake cable on (Fig. 117).

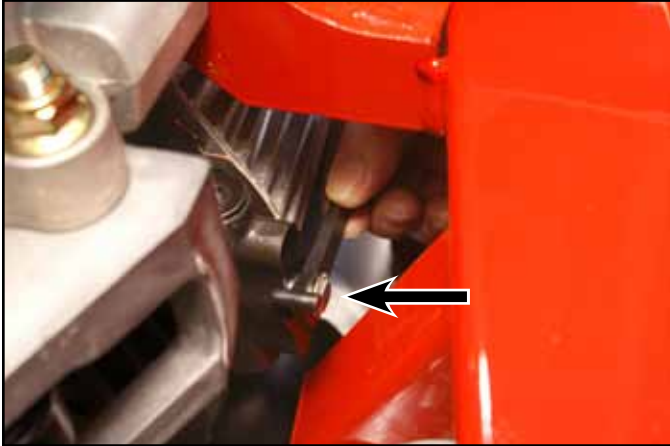


Fig. 117

PICT-8677a

2. Ensure the parking brake is disengaged.

**Note:** The left side brake is being adjusted in the following steps; the right side adjustment is performed the same way.

3. Using hands and fingers only, push the caliper lever arm forward to engage the brake pads on the wheel hub until the lever stops (Fig. 118).

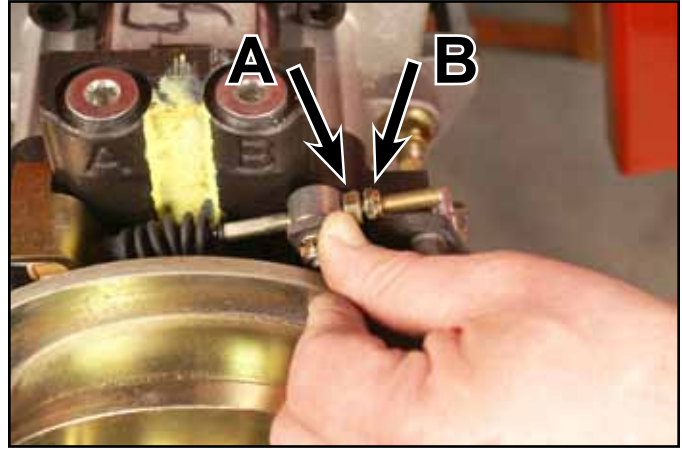


Fig. 118

PICT-8679a

A. Standard nut

B. Lock nut

4. While holding the lever, use the other hand or fingers to pull the cable threaded end tight through the swivel. Spin the standard nut against the swivel (Fig. 119).



Fig. 119

PICT-8680a

5. Try to turn the wheel hub in both directions relative to the caliper. There should be slight movement between them; some friction/resistance is acceptable.
6. If there is no movement between the hub rotor and the caliper then back off the standard nut one turn from the swivel and repeat step 5.
7. If the hub rotor moves freely relative to the caliper, then tighten the standard nut one turn against the swivel and repeat step 5.
8. Once step 5 is achieved, hold the threaded rod end with a tool and tighten the lock nut against the standard nut. Do not allow the cable to turn when the lock nut is tightened (Fig. 120).

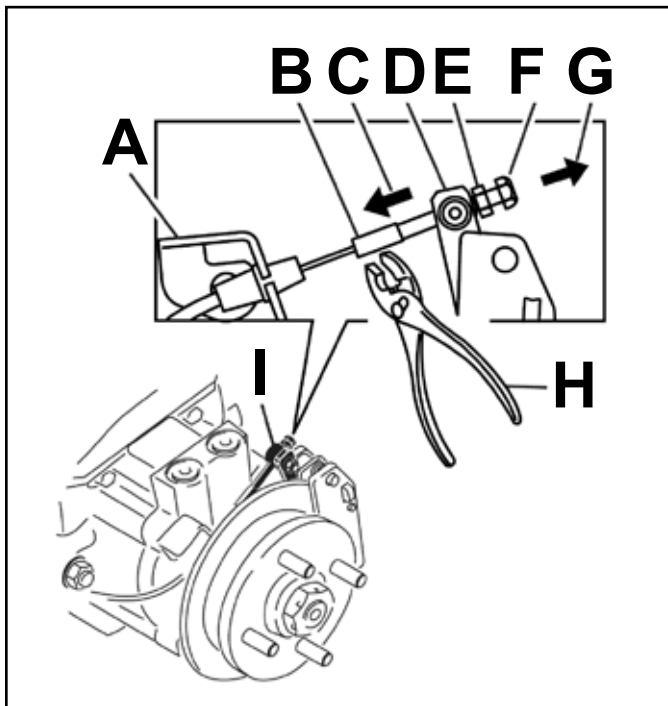


Fig. 120

fig. 63 G010208

- |                              |                            |
|------------------------------|----------------------------|
| A. Cable anchor              | F. Lock nut                |
| B. Threaded rod              | G. Pull cable threaded rod |
| C. Push lever this direction | this direction             |
| D. Caliper lever arm         | H. Hold threaded rod with  |
| E. Standard nut (shown       | pliers                     |
| against swivel)              | I. Swivel (pivot head)     |

9. Close the drive wheel release valve (horizontal operating position) (Fig. 121).

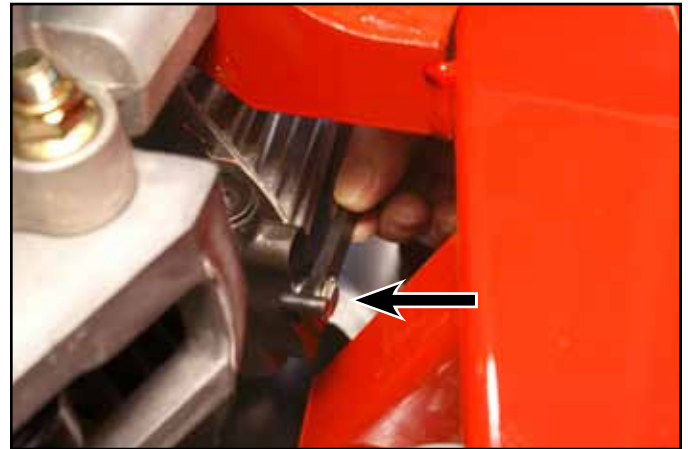


Fig. 121

PICT-8677a

10. Install the RH and LH wheels on the unit and remove both jack stands and lower the unit.

# CHASSIS

## Park Brake Cable Replacement (2012 & Later)

### Left Park Brake Cable Removal (2012 & Later)

1. Raise the rear end of the unit and install jack stands under the tie down loop on the frame. Remove the RH and LH wheels from the unit (Fig. 122).



Fig. 122

DSCN-4311a

2. Disengage the park brake lever.
3. Remove the e-ring, washer, and brake pin from the L-Bracket (Fig. 123).



Fig. 123

DSCN-4314a

4. Hold the threaded rod end with a tool, and with a socket wrench remove the lock nut and washer from the end of the cable (Fig. 124). Continue to remove the washer and spring.



Fig. 124

DSCN-4315a

5. Remove the e-ring from the groove in the cable end, and the cable anchor located on the transmission (Fig. 125).



Fig. 125

DSCN-4318a

6. Pull the brake cable out of the cable anchor on the transmission and slide it out of the slot (Fig. 126).



Fig. 126 DSCN-4325a

8. Remove the two clips retaining the brake cable to the frame (Fig. 128).

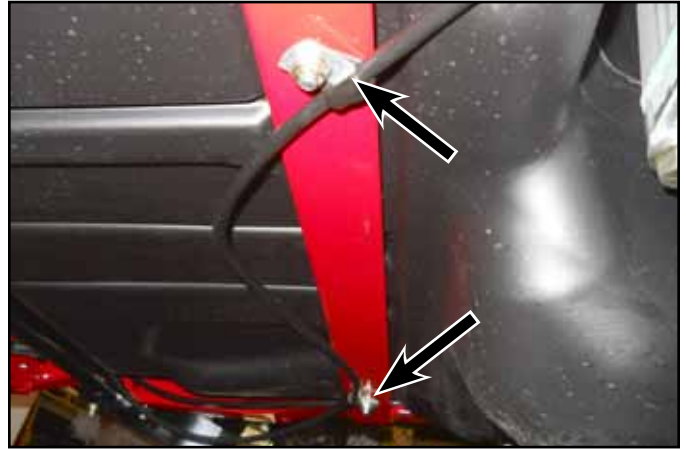


Fig. 128 DSCN-4328a

7. Squeeze the tabs on the conduit fitting and remove it from cable bracket located on the frame (Fig. 127).



Fig. 127 DSCN-4327a

9. Remove the two screws retaining the right hand motion control cover assembly to the frame and remove (Fig. 129).

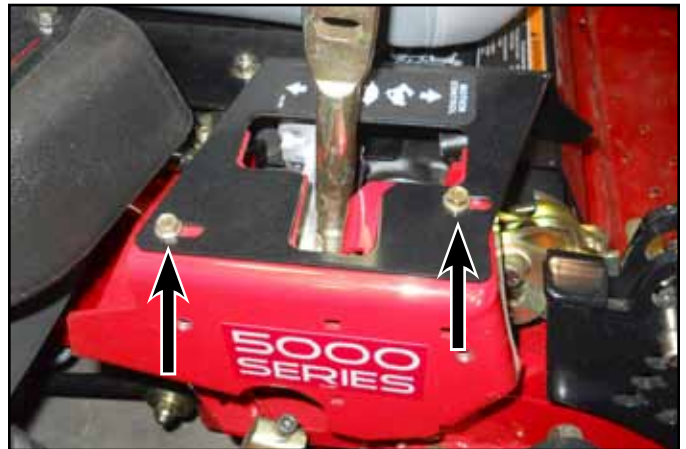


Fig. 129 DSCN-2614a



# CHASSIS

10. Unplug the wire harness from the park brake switch (Fig. 130).



Fig. 130 DSCN-2617a

12. Remove the cotter pin and clevis pin on the left side of the park brake handle (Fig. 132).



Fig. 132 DSCN-4330a

11. Remove two screws and spacers retaining the park brake handle assembly to the frame (Fig. 131).

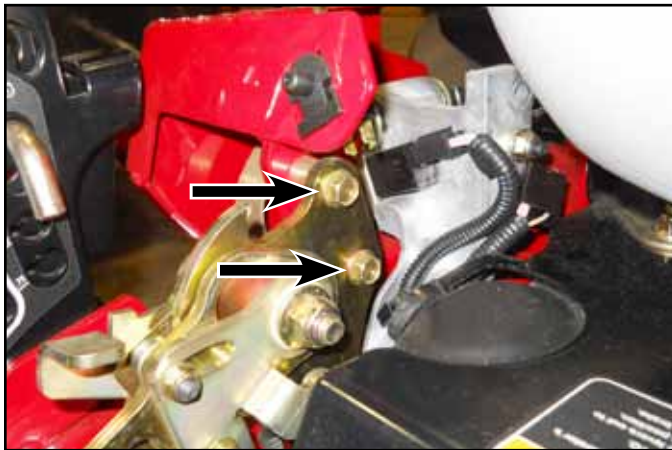


Fig. 131 DSCN-2619a

13. Remove the e-ring retaining the brake cable to the park brake pivot assembly and slide the cables out of the slots (Fig. 133). Slide the brake cable out of the unit.



Fig. 133 DSCN-4333

## Left Park Brake Cable Installation (2012 & Later)

1. Install brake cable with the clevis end out toward the park brake handle (Fig. 134).



Fig. 134

DSCN-4358a

2. Install the brake cable grooved fitting into the slot on the bottom of the brake pivot assembly and install e-ring (Fig. 135).



Fig. 135

DSCN-4335a

3. Install the clevis pin through the clevis end of the brake cable to the park-brake handle assembly and install a cotter pin (Fig. 136).



Fig. 136

DSCN-4330a

4. Install two screws and spacers through the park brake handle and tighten the assembly to the frame (Fig. 137).

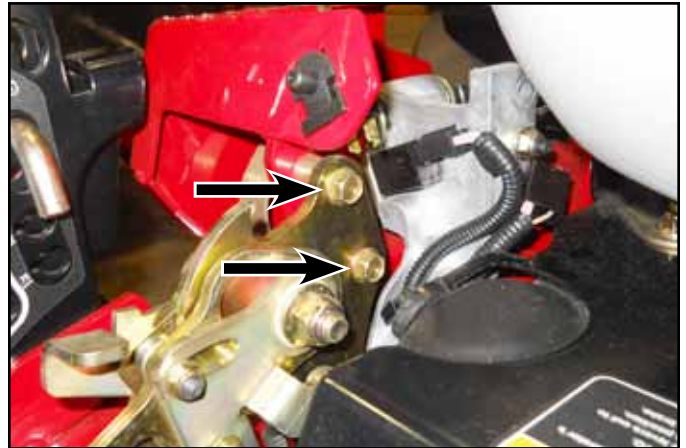


Fig. 137

DSCN-2619a

# CHASSIS

5. Route the brake cable through the two clips located under the frame of the unit and tighten (Fig. 138).

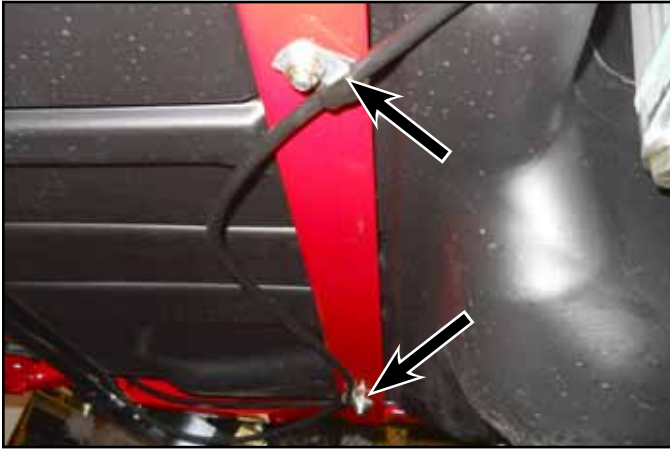


Fig. 138 DSCN-4328a

7. Slide the brake cable into the cable anchor slot on the transmission (Fig. 140).



Fig. 140 DSCN-4325a

6. Squeeze the tabs on the conduit fitting and install in the cable bracket located on the frame (Fig. 139).



Fig. 139 DSCN-4327a

8. Install the end of the brake cable through the cable anchor and install an e-ring (Fig. 141).



Fig. 141 DSCN-4361a

9. Install the L-bracket, spring, washer, and nut on the threaded end of the brake cable (Fig. 142).



Fig. 142

DSCN-4336a

10. Install the L-Bracket with brake pin, washer, and e-ring to the brake caliper (Fig. 143).

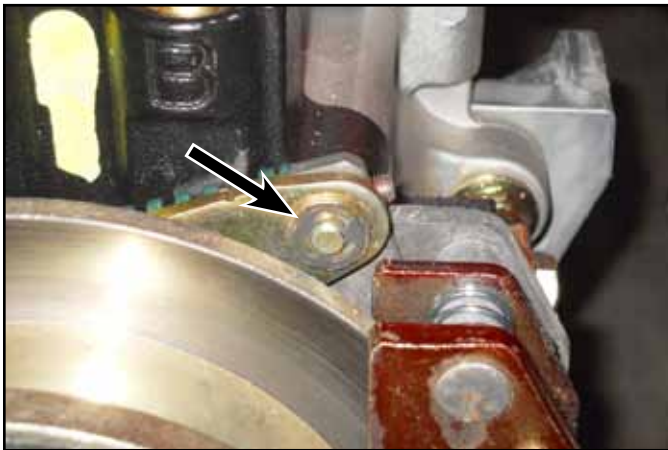


Fig. 143

DSCN-4314a

11. Engage the parking brake. Measure the overall length of the compression spring (Fig. 144). The correct length should be between 1-1/2" and 1-9/16" (3.8 and 4.9cm). If the spring length is within this range, no adjustment is needed. If it is not, proceed.

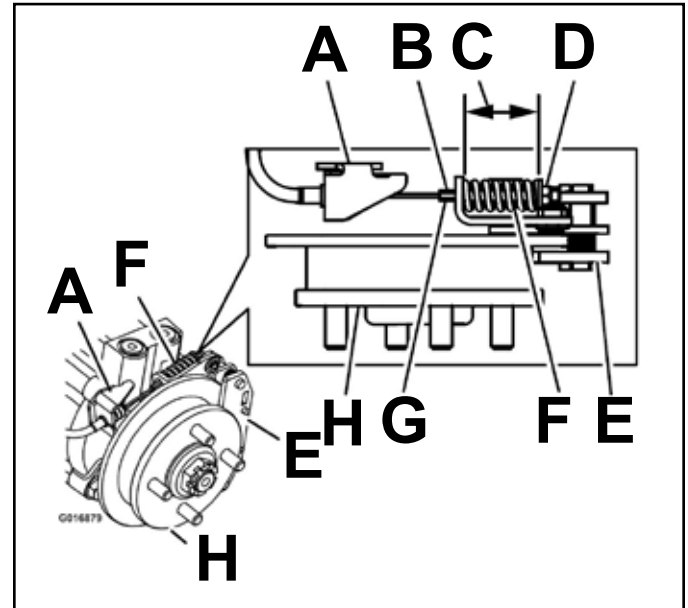


Fig. 144

fig. 79 G016879

(Left Hand brake shown above)

- |                           |                       |
|---------------------------|-----------------------|
| A. Cable anchor           | E. Caliper            |
| B. Hold threaded rod here | F. Compression spring |
| C. Measure                | G. Threaded rod       |
| D. Lock nut               | H. Hub                |

# CHASSIS

12. Hold the end of the threaded rod with a tool and adjust the lock nut until the spring length is between 1-1/2" and 1-9/16" (3.8 and 4.0cm) (Fig. 145).

**Note:** Do not allow the cable to turn when the nut are being turned.



Fig. 145 DSCN-4315a

13. Disengage the parking brake. Rotate the drive wheel release handle to the released position. Turn the wheel hub by hand in both directions relative to the caliper; no drag of the caliper pad on the wheel hub is desired.
14. After adjusting the brake, cycle the brake handle a minimum of six times to allow the cable to seat into the sheath and mounting tabs. Recheck the spring length.
15. Rotate the drive wheel release handle to the operating position.

16. Plug the wire harness to the park brake switch (Fig. 146).



Fig. 146 DSCN-2617a

17. Install the two screws retaining the right hand motion-control cover assembly to the frame (Fig. 147).



Fig. 147 DSCN-2614a

18. Install the rear tires and torque lug nuts between 103.5 – 126.5 ft-lbs. (140.5 – 171.5 Nm).
19. Remove the jack stands and lower the unit.

## Right Park Brake Cable Removal (2012 & Later)

1. Raise the rear end of the unit and install jack stands under the tie down loop on the frame. Remove the RH and LH wheels from the unit (Fig. 148).



Fig. 148 DSCN-4311a

2. Disengage the park brake lever.
3. Remove the e-ring, washer, and brake pin from the L-Bracket (Fig. 149).



Fig. 149 DSCN-4364a

4. Hold the end of the threaded rod with a tool and with a socket wrench remove the lock nut and washer from the end of the cable (Fig. 150). Remove the washer, spring and the L-Bracket.



Fig. 150 DSCN-4366a

5. Remove the e-ring from the groove in the cable end and cable anchor located on the transmission (Fig. 151).

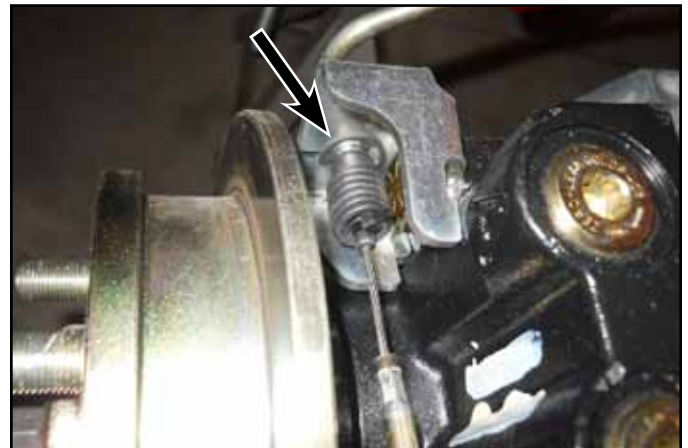


Fig. 151 DSCN-4368

# CHASSIS

6. Pull the brake cable out of the cable anchor on the transmission and slide it out of the slot (Fig. 152).



Fig. 152 DSCN-4370a

8. Unplug the wire harness from the park brake switch (Fig. 154).



Fig. 154 DSCN-2617a

7. Remove the two screws retaining the right hand motion control cover assembly to the frame and remove (Fig. 153).

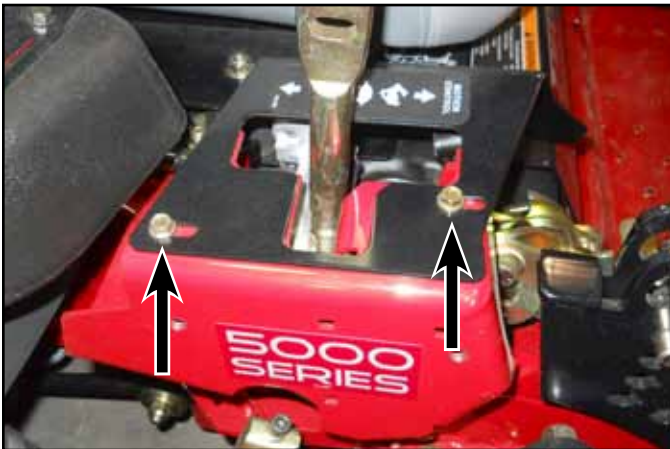


Fig. 153 DSCN-2614a

9. Remove two screws and spacers retaining the park brake handle assembly to the frame (Fig. 155).

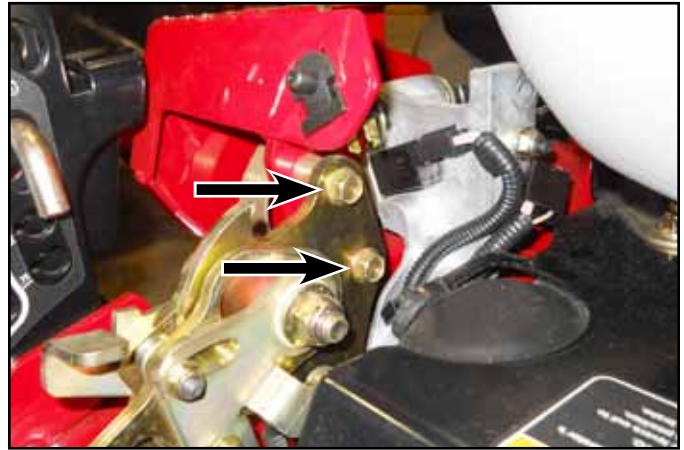


Fig. 155 DSCN-2619a

10. Remove the cotter pin and clevis pin on the right side of the park brake handle (Fig. 156).



Fig. 156 DSCN-4373a

12. Remove the brake cable from the unit (Fig. 158).



Fig. 158 DSCN-4379a

11. Remove the e-ring retaining the brake cable to the park-brake pivot assembly and slide the cable out of the slot (Fig. 157).



Fig. 157 DSCN-4377a



# CHASSIS

## Right Park Brake Cable Installation (2012 & Later)

1. Install brake cable with the clevis end out toward the park brake handle (Fig. 159).



Fig. 159 DSCN-4385a

2. Install the brake cable grooved fitting into the slot on the bottom of the brake pivot assembly and install the e-ring (Fig. 160).

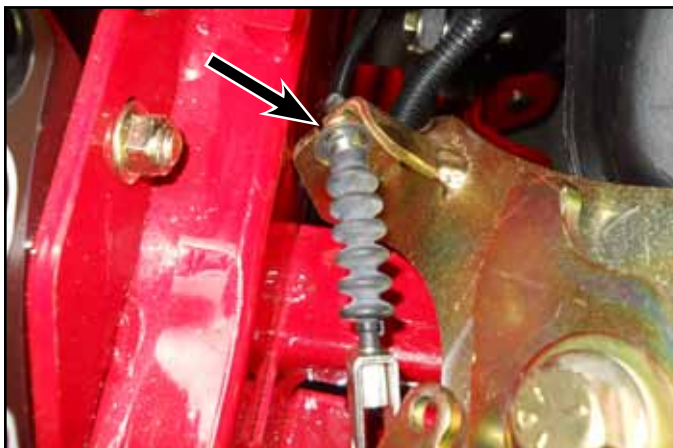


Fig. 160 DSCN-4375a

3. Install the clevis and cotter pin to the right side of the park brake handle (Fig. 161).

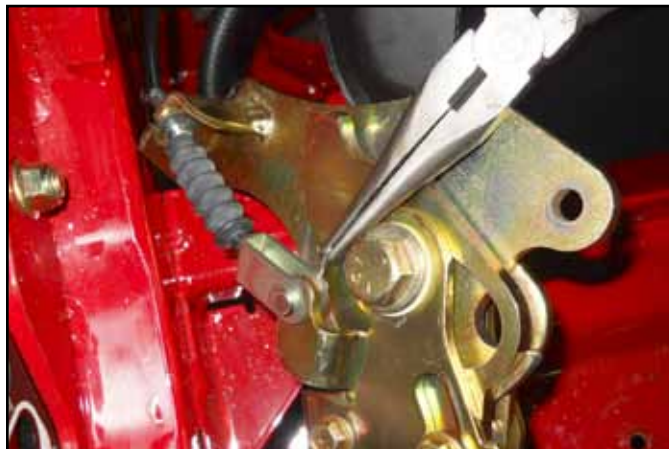


Fig. 161 DSCN-4373a

4. Install two screws and spacers retaining the park brake handle assembly to the frame (Fig. 162).

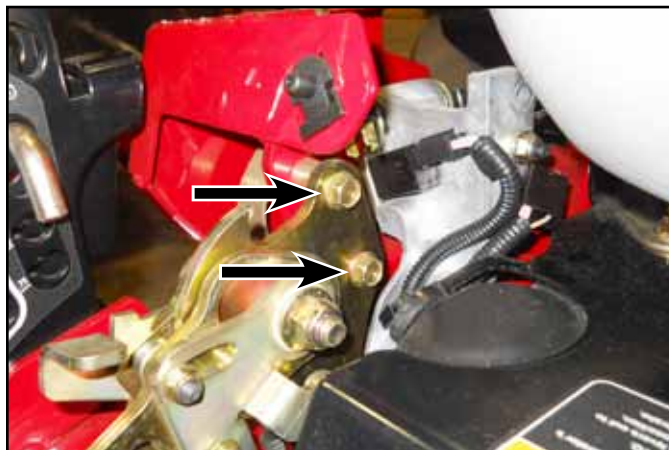


Fig. 162 DSCN-2619a

5. Route the brake cable back to the inside of the frame (Fig. 163).



Fig. 163 DSCN-4379a

7. Install the end of the brake cable through the cable anchor and install the e-ring (Fig. 165).



Fig. 165 DSCN-4370a

6. Slide the brake cable into the cable anchor slot on the transmission (Fig. 164).



Fig. 164 DSCN-4370a

8. Install the L-Bracket, spring, washer, and nut on the threaded end of the brake cable (Fig. 166).

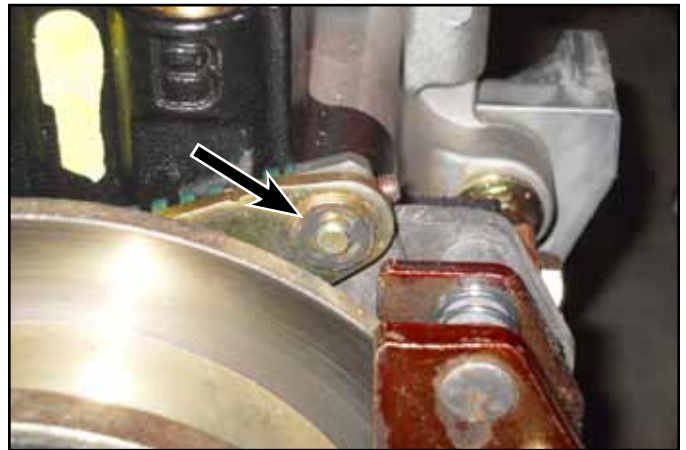


Fig. 166 DSCN-4314a

# CHASSIS

- Engage the parking brake. Measure the overall length of the compression spring (Fig. 167). Measure the overall length of the compression spring. The correct length should be between 1-1/2" and 1-9/16" (3.8 and 4.9cm). If the spring length is within this range, no adjustment is needed. If it is not, proceed.

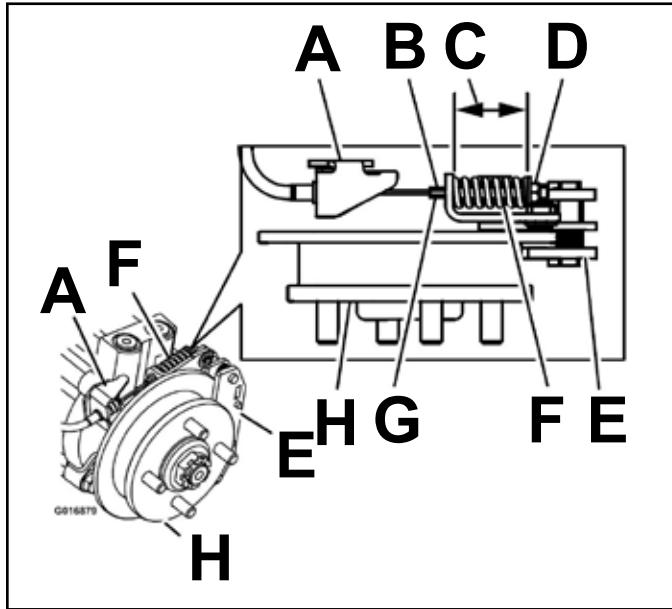


Fig. 167 fig. 79 G016879

(Left Hand brake shown above)

- |                           |                       |
|---------------------------|-----------------------|
| A. Cable anchor           | E. Caliper            |
| B. Hold threaded rod here | F. Compression spring |
| C. Measure                | G. Threaded rod       |
| D. Lock nut               | H. Hub                |

- Hold the end of the threaded rod with a tool and adjust the lock nut until the spring length is between 1-1/2" and 1-9/16" (3.8 and 4.0cm) (Fig. 168).

**Note: DO NOT allow the cable to turn when the nuts are being turned.**



Fig. 168 DSCN-4315a

- Disengage the parking brake. Rotate the drive wheel release handle to the released position. Turn the wheel hub by hand in both directions relative to the caliper; no drag of the caliper pad on the wheel hub is desired.
- After adjusting the brake, cycle the brake handle a minimum of six times to allow the cable to seat into the sheath and mounting tabs. Recheck the spring length.
- Rotate the drive wheel release handle to the operating position.

14. Plug the wire harness to the park brake switch (Fig. 169).



Fig. 169

DSCN-2617a

15. Install the two screws retaining the right hand motion-control cover assembly to the frame (Fig. 170).

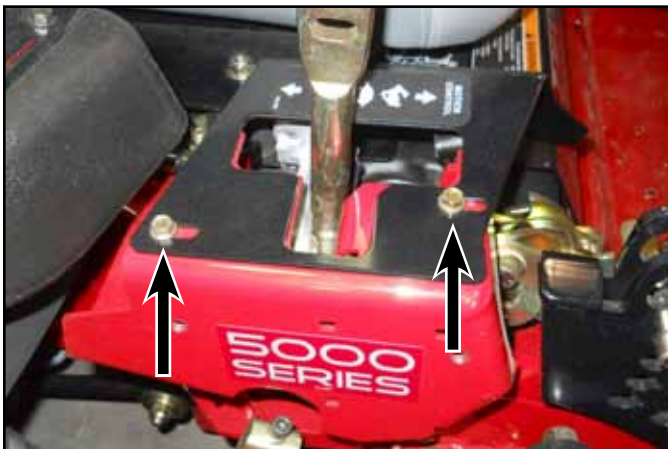


Fig. 170

DSCN-2614a

16. Install the rear tires and torque lug nuts between 103.5 – 126.5 ft-lbs. (140.5 – 171.5 Nm).
17. Remove the jack stands and lower the unit.

## Brake Caliper Replacement

### Brake Caliper Removal

**Note:** The left side is being removed; use the same instructions for right side removal.

1. Raise the rear end of the unit and install jack stands under the tie down loop on the frame. Remove the wheel.
2. Disengage the park brake lever.
3. Remove the e-ring, washer, and brake pin from the L-Bracket (Fig. 171).

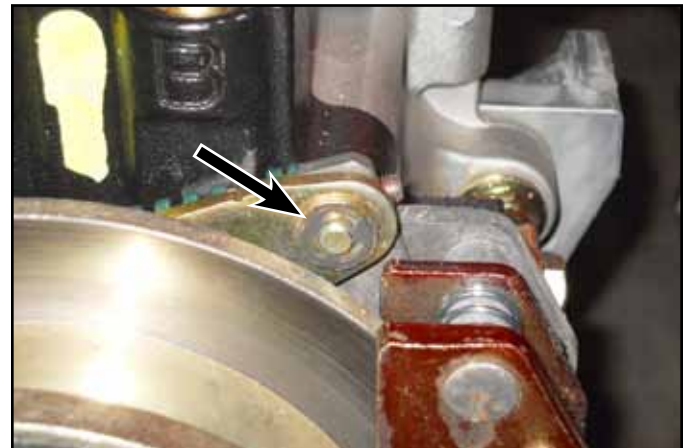


Fig. 171

DSCN-4314a

# CHASSIS

4. Hold the end of the threaded rod with a tool, and with a socket wrench, remove the lock nut and washer from the end of the cable (Fig. 172). Remove the washer and spring.



Fig. 172 DSCN-4315a

5. Remove the two bolts retaining the brake mount plate to the transmission (Fig. 173).

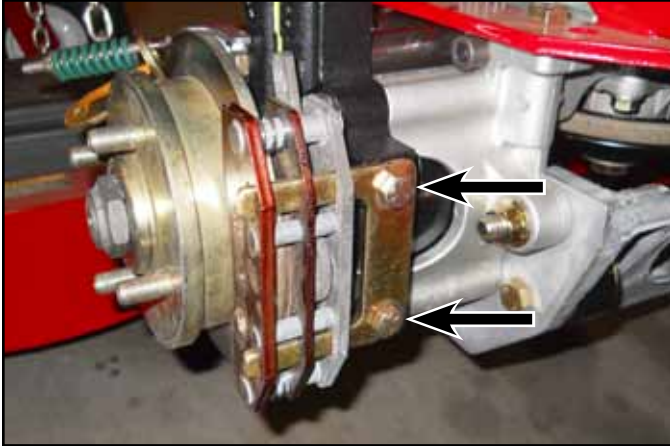


Fig. 173 DSCN-4388a

6. Remove the brake caliper from the transmission (Fig. 174).



Fig. 174 DSCN-4392a

7. Remove the brake mount plate from the caliper (Fig. 175).



Fig. 175 DSCN-4394a

## Brake Caliper Installation

1. Install the brake mount plate to the caliper (Fig. 176).

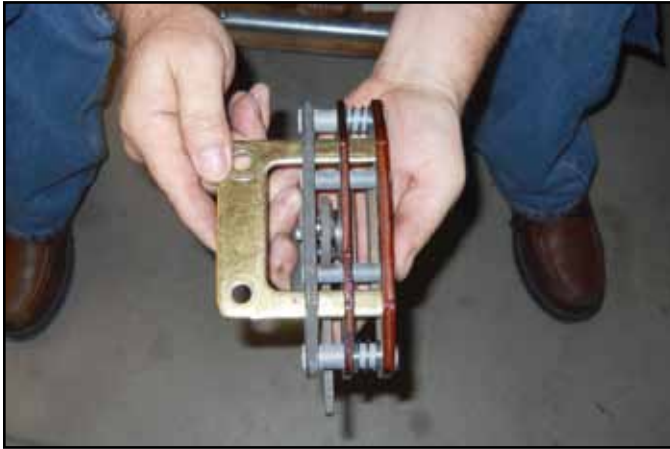


Fig. 176

DSCN-4398a

2. Apply thread locker to the 2 bolts that retain the brake mount plate (Fig. 177).

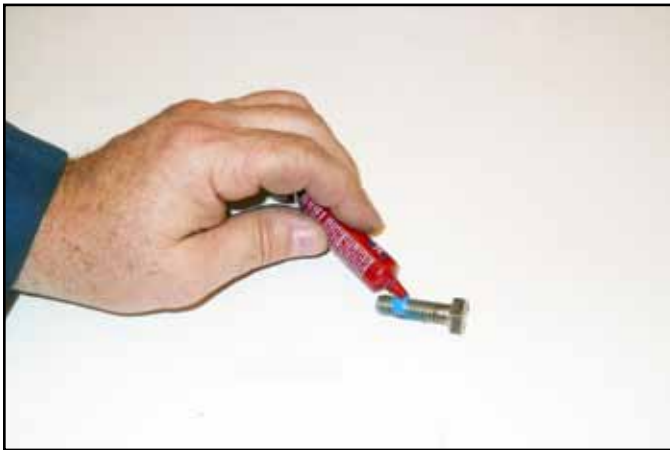


Fig. 177

DSCN-4400a

3. Install two washers between the brake mount plate and the transmission and tighten the bolts (Fig. 178).

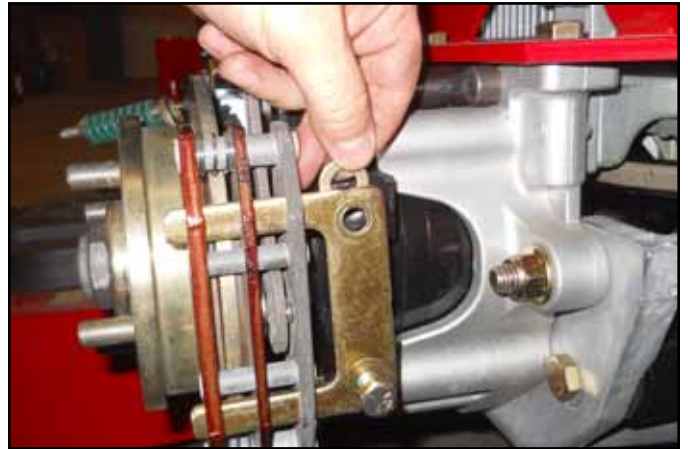


Fig. 178

DSCN-4402a

4. Install the L-bracket, spring, washer, and nut on the threaded end of the brake cable (Fig. 179).

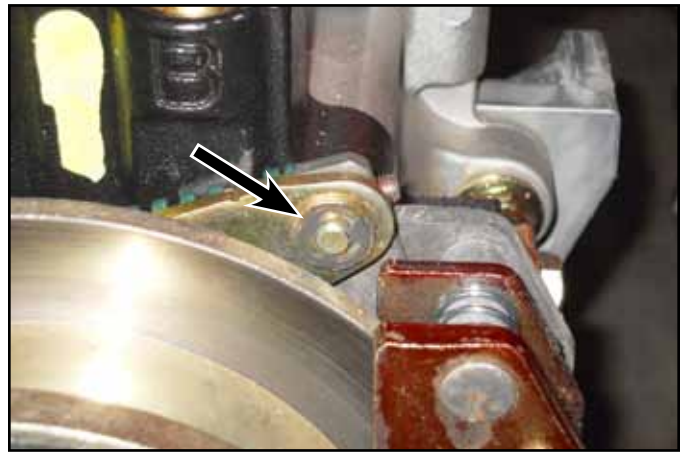


Fig. 179

DSCN-4314a

# CHASSIS

- Engage the parking brake. Measure the overall length of the compression spring (Fig. 180). The correct length should be between 1-1/2" and 1-9/16" (3.8 and 4.9cm). If the spring length is within this range, no adjustment is needed. If it is not, proceed.

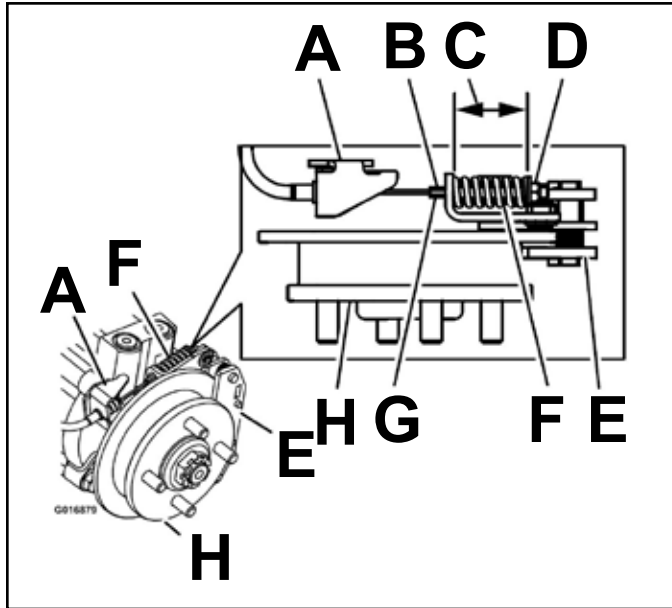


Fig. 180 fig. 79 G016879

(Left Hand brake shown above)

- |                           |                       |
|---------------------------|-----------------------|
| A. Cable anchor           | E. Caliper            |
| B. Hold threaded rod here | F. Compression spring |
| C. Measure                | G. Threaded rod       |
| D. Lock nut               | H. Hub                |

- Hold the end of the threaded rod with a tool, and adjust the lock nut until the spring length is between 1-1/2" and 1-9/16" (3.8 and 4.0cm) (Fig. 181).

**Note: DO NOT allow the cable to turn when the nuts are being turned.**



Fig. 181 DSCN-4315a

- Disengage the parking brake. Rotate the drive wheel release handle to the released position. Turn the wheel hub by hand in both directions relative to the relative to the caliper; no drag of the caliper pad on the wheel hub is desired.
- After adjusting the brake, cycle the brake handle a minimum of six times to allow the cable to seat into the sheath and mounting tabs. Recheck the spring length.
- Rotate the drive wheel release handle to the operating position.
- Install the rear tire and torque lug nuts between 103.5 – 126.5 ft-lbs. (140.5 – 171.5 Nm).
- Remove the jack stands and lower the unit.

## Motion Control Damper Replacement

**Note:** There is a right and left motion control damper. The following removal and installation procedures are on the left damper. The procedure is the same for the right damper.

### Motion Control Damper Removal

1. Park the machine on a level surface, disengage the PTO, turn the ignition OFF and remove the key.
2. Remove the nut securing the damper ball joint to the frame.

**Note:** You will need a T-40 Torx wrench to hold the bolt while removing (Fig. 182).



Fig. 182

DSCN-4445a

3. Remove the nut securing the damper to the motion control assembly (Fig. 183).

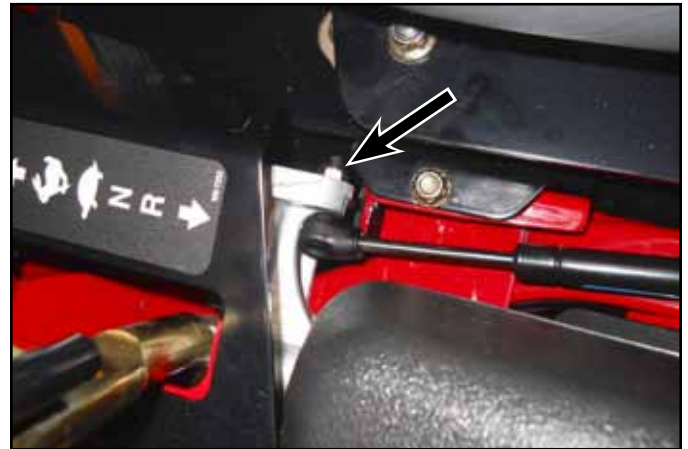


Fig. 183

DSCN-4448a

4. Remove the damper assembly (Fig. 184).



Fig. 184

DSCN-4450a



# CHASSIS

## Motion Control Damper Installation

Motion Control Damper (Fig. 185)

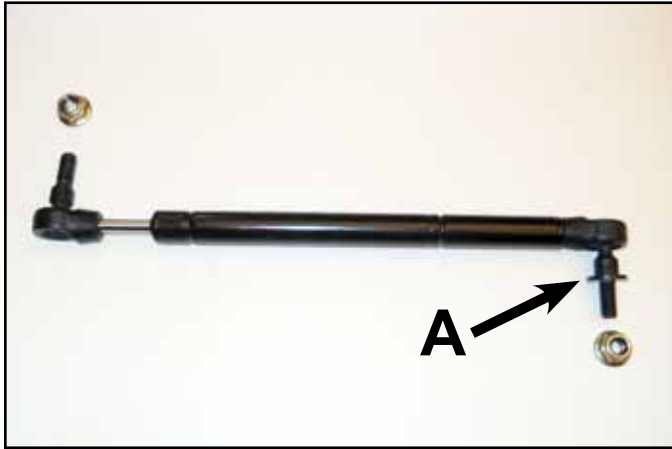


Fig. 185

DSCN-4452a

A. Belleville washer

1. Install the damper with ball joint end that has the Belleville washer into the frame. Torque the lock nut to 200 in-lbs. (16.7 ft-lbs. or 22.6 Nm) (Fig. 186).



Fig. 186

DSCN-4450a

2. Install the other end of the damper to the motion control assembly, normally in the center hole and tighten the lock nut to 200 in-lbs. (16.7 ft-lbs. or 22.6 Nm). For adjustments, see "Adjusting the Motion Control Damper" on page 3-52.

## Adjusting the Motion Control Damper

**Note:** The top damper mounting bolt can be adjusted to obtain a more desired motion control lever resistance. See Figure 187 for mounting options.

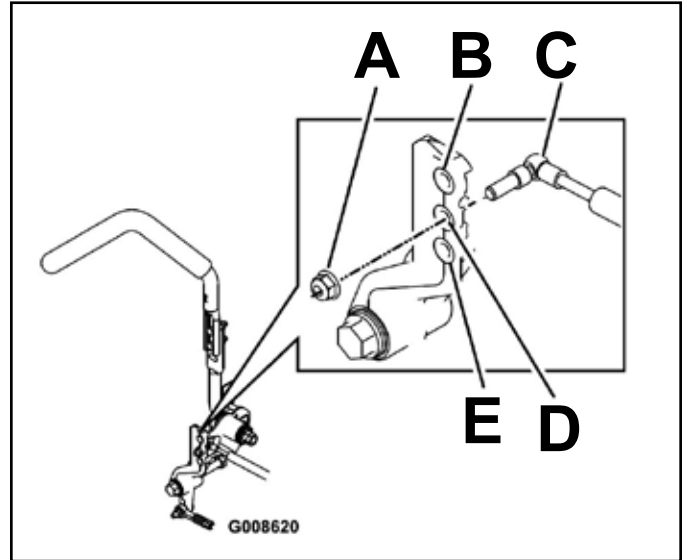


Fig. 187

fig. 87 G008620

- A. Torque the lock nut to 200 in-lbs. (16.7 ft-lbs. or 22.6 Nm). Bolt must protrude past end of locknut after torque.
- B. Most resistance (firmest feel)
- C. Damper
- D. Medium resistance (medium feel)
- E. Least resistance (softest feel)

## Adjusting the Motion Control Neutral Lock Pivot

**Note:** The flanged nut can be adjusted to obtain a more desired motion control lever resistance when moving it to the neutral lock position. See Figure 188 for adjustment options.

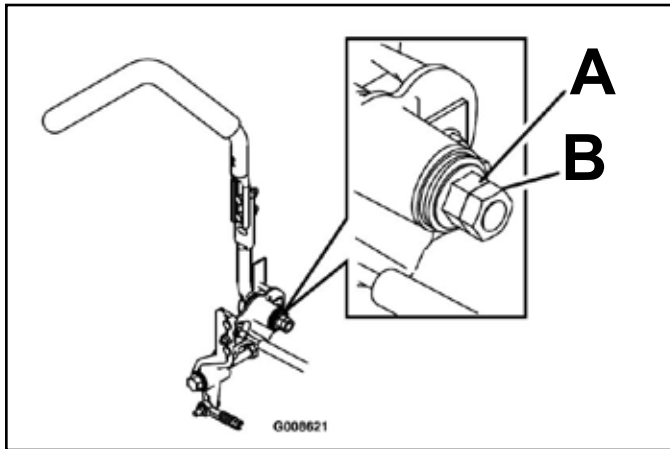


Fig. 188

fig. 88 G008621

A. Flanged nut                      B. Jam nut

1. Loosen the jam nut.
2. Tighten or loosen the flanged nut to the desired feel. For more resistance, tighten the flange nut. For less resistance, loosen the flange nut.
3. Tighten jam nut.

## Adjusting the Control Handle Position

**Note:** There are two height positions for the control levers; high and low. Remove the bolts to adjust the height for the operator.

1. Disengage the PTO, move the motion control levers to the neutral locked position, and set the parking brake.
2. Stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
3. Loosen the bolts and flange nuts installed (Fig. 189).

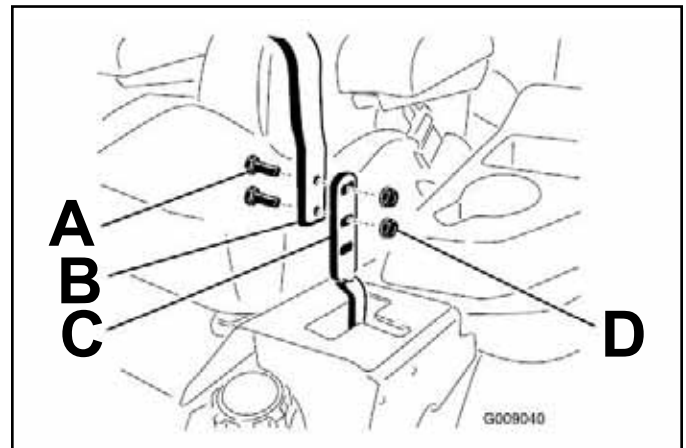


Fig. 189

fig. 84 G009040

A. Bolt                                      C. Control lever  
B. Handle                                  D. Nut

# CHASSIS

- Align the levers front to rear position by bringing the levers together to the neutral position and slide them until they are aligned, then tighten the bolts (Fig. 190).

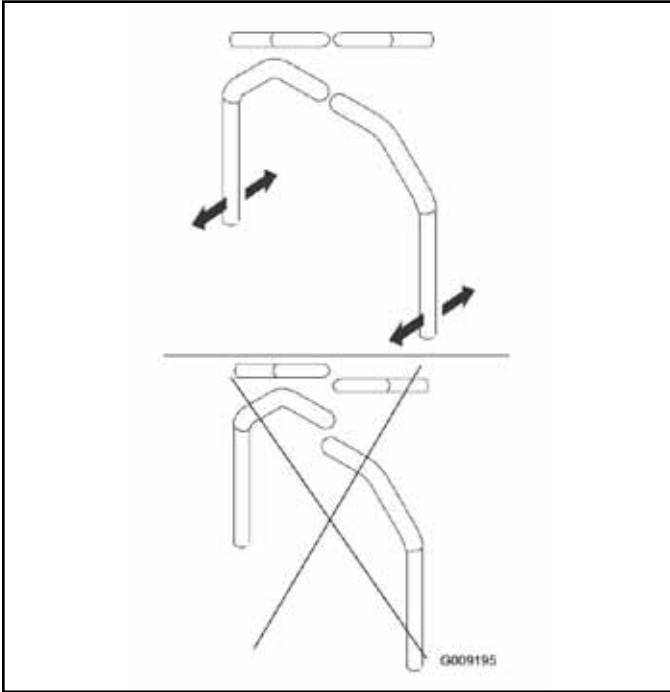


Fig. 190

fig. 85 G009195

## Motion Control Assembly Replacement

### Motion Control Assembly Removal

**Note:** This procedure is performed on the left hand motion control assembly; follow the same procedure for the right hand side.

- Park the machine on a level surface, disengage the PTO, turn the ignition key to OFF position and remove the key.
- Remove the 2 screws retaining the LH motion control cover assembly (Fig. 191).

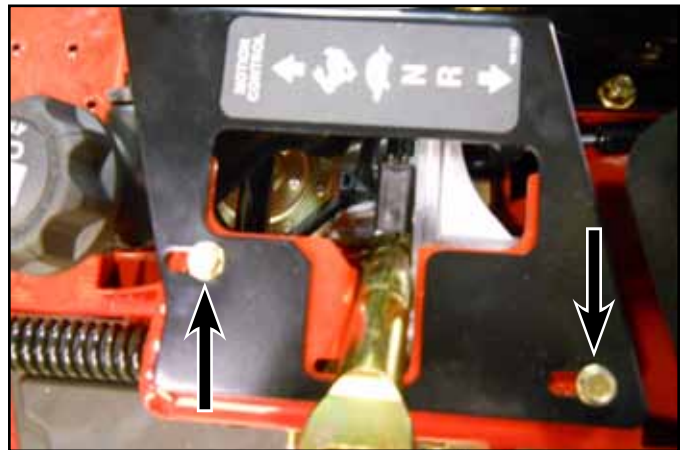


Fig. 191

DSCN-4454

3. Remove the two bolts and nuts retaining the LH steering handle assembly to the LH lever-control motion (Fig. 192).



Fig. 192 DSCN-4459a

5. Remove the plug connector to the neutral switch (Fig. 194).



Fig. 194 DSCN-4464a

4. Remove the lock nut from the damper motion control from the LH motion control assembly (Fig. 193).

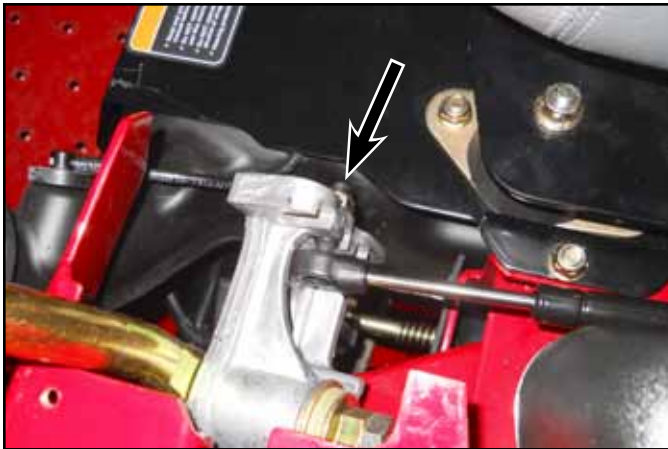


Fig. 193 DSCN-4462a

6. Remove the wire harness from the wire anchor on the LH motion control assembly (Fig. 195).

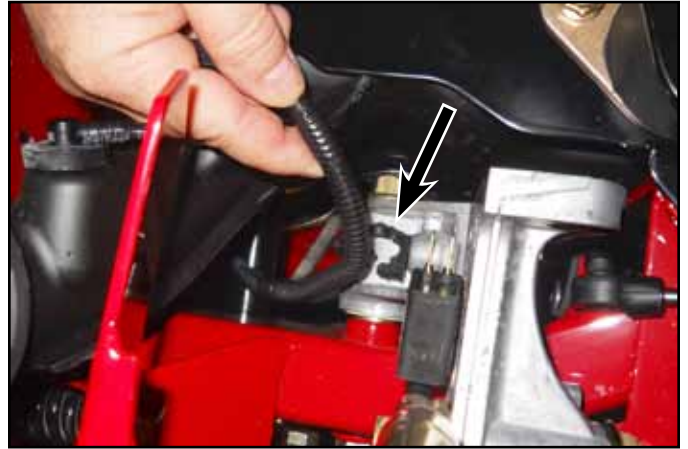


Fig. 195 DSCN-4466a

# CHASSIS

7. Remove screw, flat washer and nut retaining the front pump linkage to the LH motion control assembly (Fig. 196).

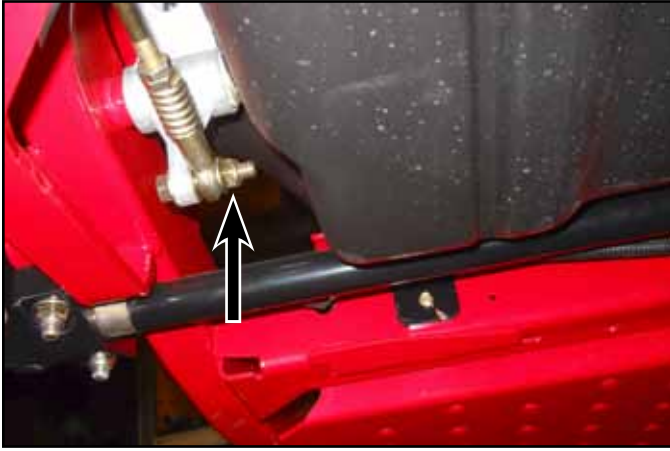


Fig. 196 DSCN-4470a

9. Remove the pivot hub from the LH motion control (Fig. 198).



Fig. 198 DSCN-4474a

8. Remove the bolt securing the pivot hub and the LH motion control to the frame (Fig. 197).

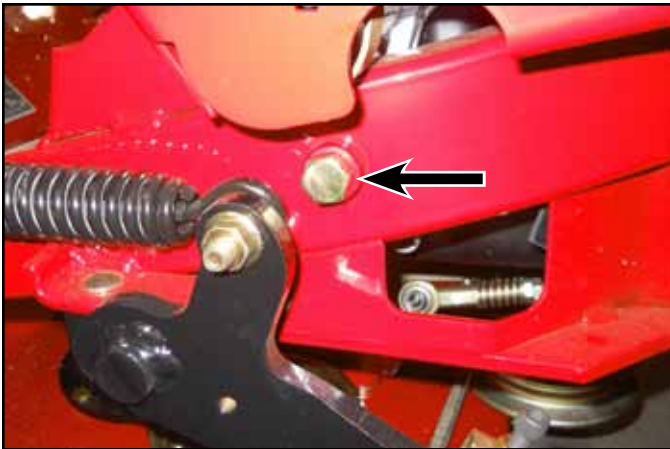


Fig. 197 DSCN-4473a

10. Remove the wire harness anchor from the LH motion control (Fig. 199).



Fig. 199 DSCN-4475

11. Remove the neutral switch from the LH motion control (Fig. 200).



Fig. 200 DSCN-4476a

13. Remove the jam nut from the LH motion control lever (Fig. 202).



Fig. 202 DSCN-4480

12. Remove the carriage bolt and nut retaining the leaf spring to the LH motion control (Fig. 201).

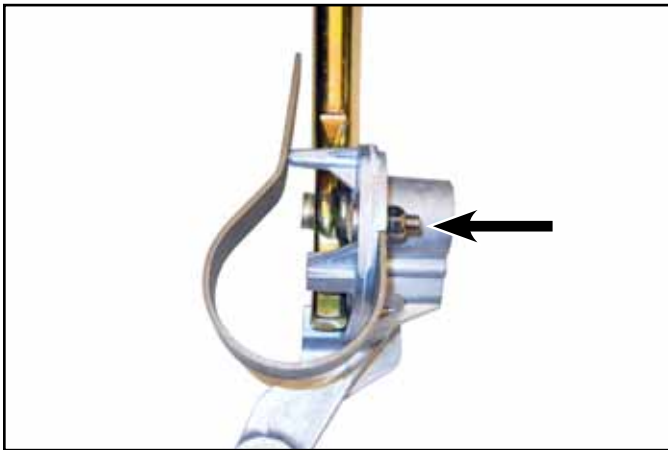


Fig. 201 DSCN-4492b

14. Remove the nut, two spring washers, flat washer and LH motion control lever from the LH motion control (Fig. 203).

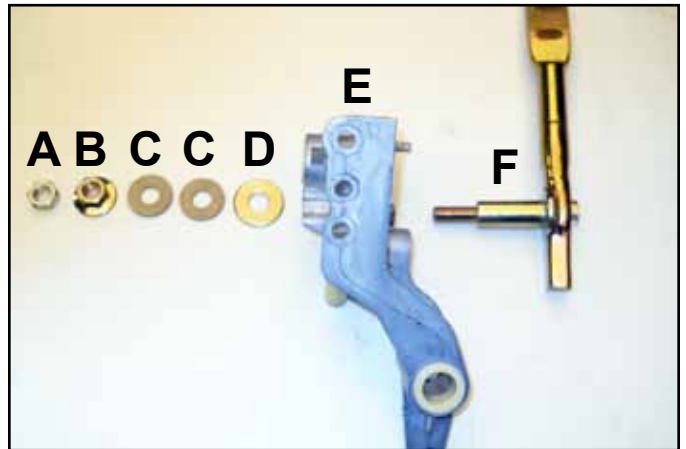


Fig. 203 DSCN-4485a

- A. Jam nut
- B. Nut
- C. Spring washer (2)
- D. Flat washer
- E. LH motion control
- F. Motion control lever

# CHASSIS

## Motion Control Assembly Installation

1. Install 4 new flange bushings in the LH motion control (Fig. 204).

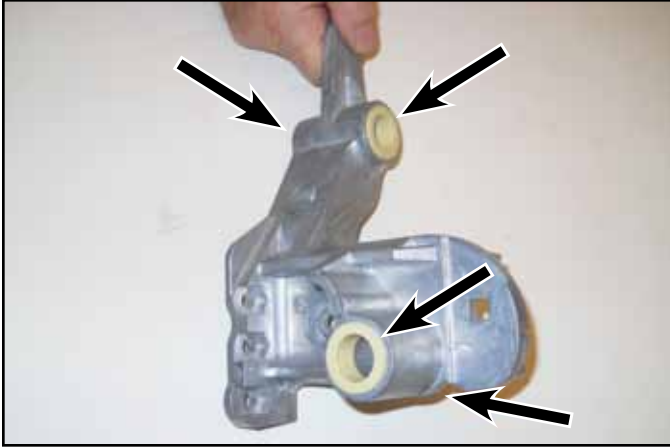


Fig. 204

DSCN-4487a

2. Install motion control lever in the LH motion control (Fig. 205).



Fig. 205

DSCN-4488a

3. Install flat washer on motion control lever (Fig. 206).



Fig. 206

DSCN-4489a

4. Install the two spring washers with the crown side of the washers facing out (Fig. 207).



Fig. 207

DSCN-4490

5. Install the nut and tighten so it is snug (Fig. 208).



Fig. 208

DSCN-4491a

7. Install the neutral switch to the motion control lever (Fig. 210).



Fig. 210

DSCN-4495a

6. Install the spring leaf with carriage bolt and nut (Fig. 209).



Fig. 209

DSCN-4492a

8. Install the wire harness anchor to the motion control lever (Fig. 211).



Fig. 211

DSCN-4496a



# CHASSIS

9. Secure the LH control assembly to the frame with a bolt and the pivot tube (Fig. 212).

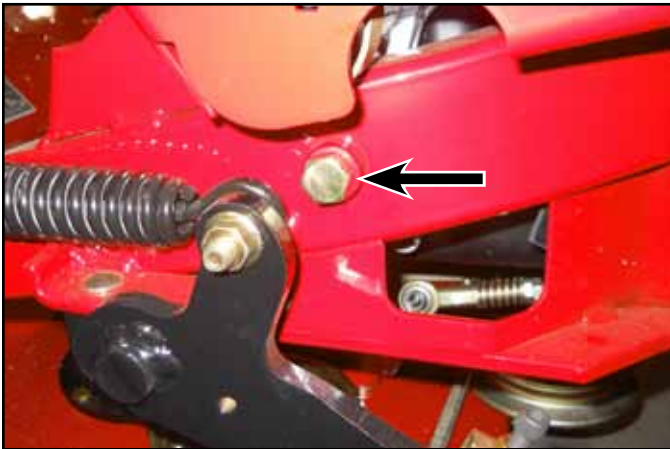


Fig. 212 DSCN-4473a

11. Install the wiring harness in the wire anchor located on the LH motion control assembly (Fig. 214).



Fig. 214 DSCN-4502a

10. Install the plug connector to the neutral switch (Fig. 213).



Fig. 213 DSCN-4500a

12. Install the lock nut from the damper motion control to the LH motion control assembly (Fig. 215).



Fig. 215 DSCN-4462a

13. Secure the front pump linkage assembly to the LH motion control assembly with a bolt, washer and nut.

**Note:** The washer must be installed between the LH motion control assembly and the ball joint on the front pump linkage assembly (Fig. 216).



Fig. 216

DSCN-4470a

14. Install the two bolts and nuts retaining the LH steering handle assembly to the LH motion control lever (Fig. 217).



Fig. 217

DSCN-4459a

15. For adjustments on the control handles and the motion control neutral lock, see “Adjusting the Motion Control Neutral Lock Pivot” on page 3-53 and “Adjusting the Control Handle Position” on page 3-53.

16. Install the 2 screws retaining the LH motion control cover assembly (Fig. 218).

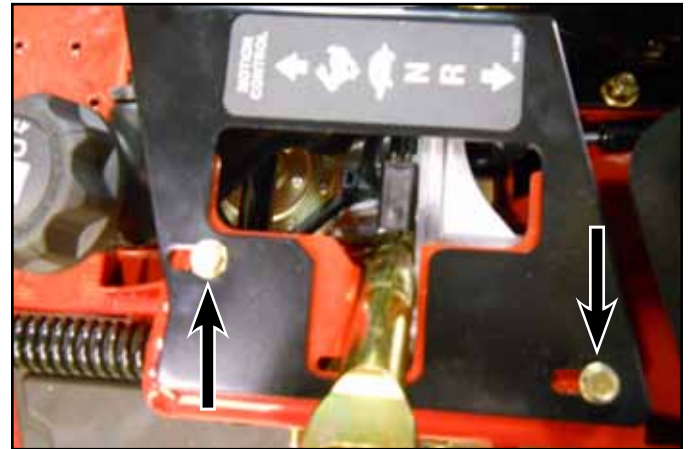


Fig. 218

DSCN-4454a

17. Start the unit, disengage the park brake lever, and run for about 5 minutes operating the forward and reverse handle forward/reverse. Move the motion control lever to the neutral position and observe the rear tire for movement. If the rear tire creeps in the forward position, perform a neutral adjustment. A slight creep in reverse is allowable. See “Adjusting the Motion Control Linkage (Neutral Adjustment)” on page 5-34.

**3**

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## Engine Replacement

**Note:** The following procedure for removing and installing the engine was performed on a Kohler 29 HP EFI engine. You can follow the same procedures for removing other engines from the Z Master G3, 3000, 5000, and 6000 Series units.

## Engine Removal

1. Remove the battery negative and positive cables. Remove the battery from the frame.
2. On tilt seats, lift the seat up, or non-tilt seats, slide the seat forward and turn the fuel shut off valve to the OFF position (Fig. 219).



Fig. 219

DSCN-4635a

3. Raise the machine in the rear and support it with jack stands (Fig. 220).



Fig. 220

DSCN-0071a

4. Remove the 3 carriage bolts and nuts retaining the RH bumper to the frame (Fig. 221).

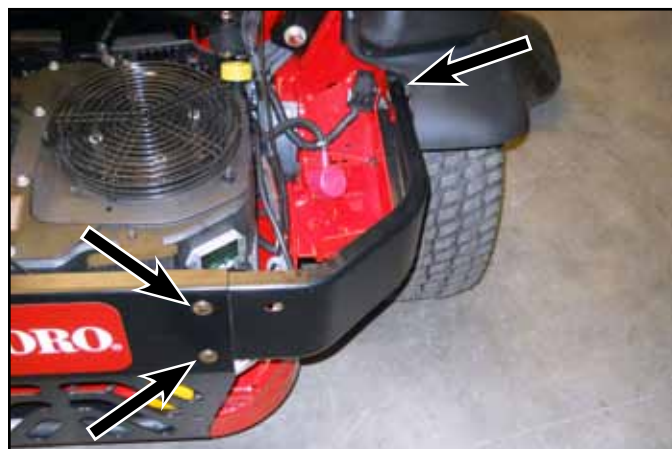


Fig. 221

DSCN-4637a

4

# ENGINE

5. Remove the 3 carriage bolts and nuts retaining the LH bumper to the frame and rear guard (Fig. 222).

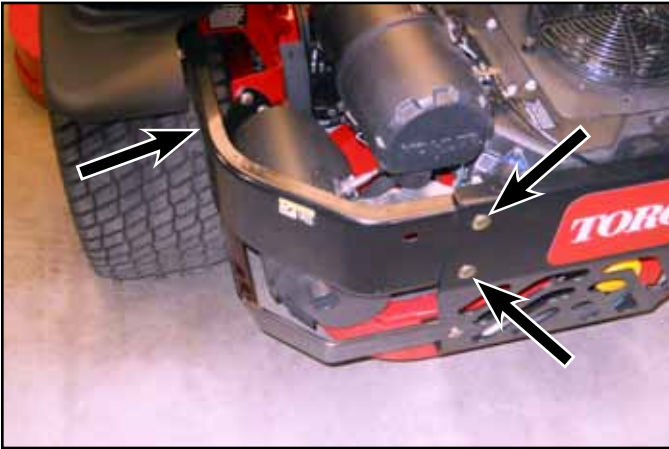


Fig. 222 DSCN-0004a

7. Loosen the cable clamp and remove the throttle cable (Fig. 224).



Fig. 224 DSCN-4253a

4

6. Remove the 2 nuts retaining the rear guard to the frame and 1 carriage bolt and nut retaining the muffler guard to the rear guard (Fig. 223).

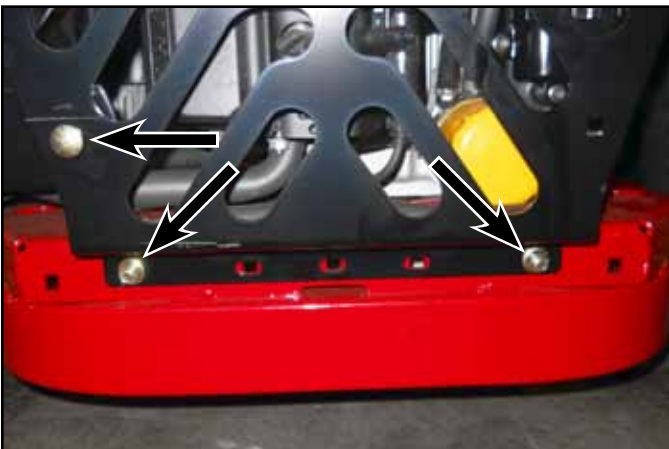


Fig. 223 DSCN-0012a

8. Remove the z-bend end of the cable from the throttle arm assembly (Fig. 225).



Fig. 225 DSCN-4258a

9. Remove the fuel line from the fuel filter (Fig. 226).



Fig. 226

DSCN-0013a

11. Remove the vent line from the air filter assembly (Fig. 228).



Fig. 228

DSCN-0018a

10. Remove the fuel hose from the hose clamp and pull the hose forward away from the engine (Fig. 227).



Fig. 227

DSCN-0011a

12. Lift and remove the floor pan; then, with a 3/8" breaker bar in the hole for the idler arm, turn clockwise to loosen the mower deck drive-belt and remove it from the electric PTO clutch (Fig. 229).



Fig. 229

DSCN-0020a

4

# ENGINE

13. Using a 1/2" drive breaker bar installed in the square hole in the pump idler assembly, rotate the pump idler arm counter-clockwise to relieve tension on the v-belt (Fig. 230). Remove the v-belt from around the engine drive pulley.



Fig. 230 DSCN-0025a

15. Remove the bolt, spring washers, and washer retaining the electric PTO clutch to the engine crankshaft (Fig. 232). Slide the clutch off the crankshaft.



Fig. 232 DSCN-0031a

14. Unplug the wire plug from the electric PTO clutch (Fig. 231).



Fig. 231 DSCN-0028a

16. Remove the engine sheave from the engine crankshaft (Fig. 233).



Fig. 233 DSCN-0032a

4

17. Remove the key from the engine crankshaft (Fig. 234).



Fig. 234

DSCN-0034a

19. With a hoist raise the engine approximately 6" above the frame (Fig. 236).



Fig. 236

DSCN-0047a

18. Remove the 4 engine bolts and Belleville washers retaining the engine to the frame (Fig. 235).

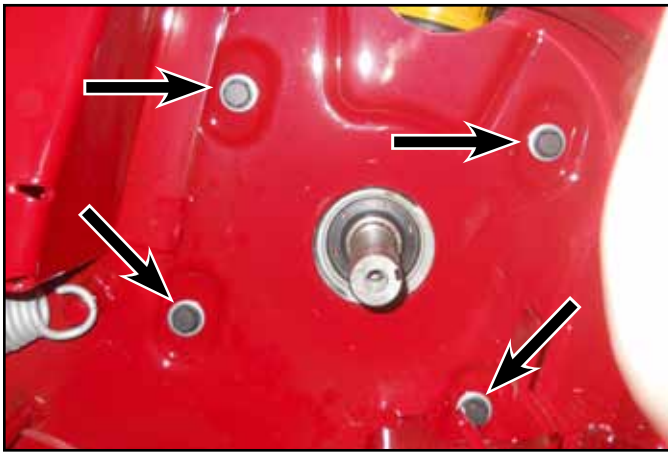


Fig. 235

DSCN-0038a

20. Remove the starter motor bolt at the top of the starter, then remove the battery ground wire and the wiring harness ground wire (Fig. 237).



Fig. 237

DSCN-0043a



# ENGINE

21. Unplug the wiring harness plug from the engine harness plug (Fig. 238).



Fig. 238

DSCN-0049a

23. Remove the engine from the frame (Fig. 240).



Fig. 240

DSCN-0053a

## 4

22. On the bottom of the starter solenoid disconnect the red wire and red positive cable (Fig. 239).



Fig. 239

DSCN-0050a

## Engine Installation

1. Place the engine approximately 6" above the frame in the engine bay area.
2. Install the battery ground cable and wiring harness ground wire to the starter motor bolt (Fig. 241).



Fig. 241

DSCN-0043a

3. Install red positive cable and red wire to the bottom of the starter solenoid (Fig. 242).



Fig. 242

DSCN-0050a

4. Plug the wiring harness plug into the engine wiring harness plug connector (Fig. 243).



Fig. 243

DSCN-0049a

5. Lower the engine to the frame.
6. Align the four holes of the engine base to the frame using 4 bolts and Belleville washers. Torque the bolts to  $30 \pm 3$  ft-lbs. ( $40.7 \pm 4.07$  Nm) (Fig. 244).



Fig. 244

DSCN-0055

4

# ENGINE

7. Install the key to the engine crankshaft (Fig. 245).



Fig. 245 DSCN-0034a

9. Install the bolt, spring washers (with crown of the washers facing the bolt head), and washer (Fig. 247).

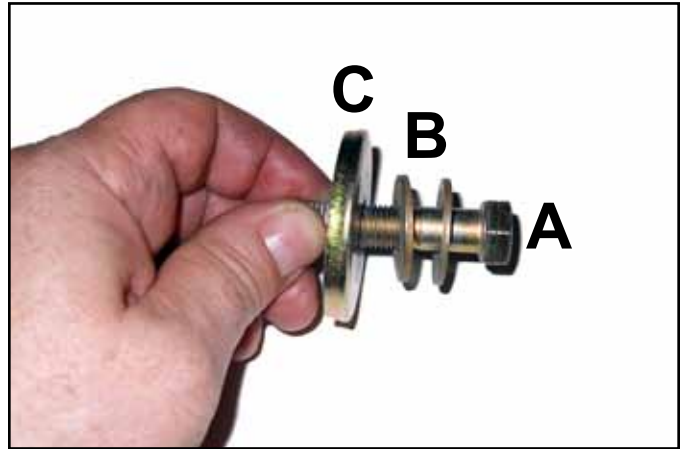


Fig. 247 DSCN-0060a

8. Install the engine sheave on the crankshaft (Fig. 246).



Fig. 246 DSCN-0032a

10. Install the electric PTO clutch on the crankshaft, make sure the slot on the clutch fits on the clutch anchor. Using the bolt, spring washers, and washer torque the clutch bolt to  $55 \pm 6$  ft-lbs. ( $74.6 \pm 8.1$  Nm) (Fig. 248).



Fig. 248 DSCN-0061a

4

11. Plug the clutch wire plug into the electric PTO clutch (Fig. 249).



Fig. 249

DSCN-0028a

13. Using a 3/8" breaker bar, install the mower idler arm assembly and relieve the tension on the idler arm assembly. Install the mower drive belt around the electric PTO clutch (Fig. 251).



Fig. 251

DSCN-0020a

12. Using a 1/2" drive breaker bar installed in the square hole in the pump idler assembly, rotate the pump idler arm counter-clockwise to allow room to install the v-belt around the engine pulley (Fig. 250).



Fig. 250

DSCN-0025a

14. Install the floor pan.
15. Install the vent line to the air filter assembly (Fig. 252).



Fig. 252

DSCN-0018a

# ENGINE

16. Route the fuel line and the throttle cable through the hose clamp located on the right hand side of the frame next to the battery box (Fig. 253).

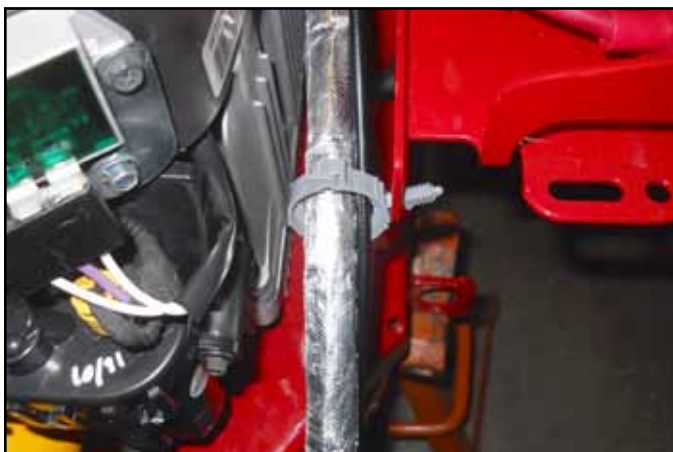


Fig. 253

DSCN-0063a

18. Slide the throttle cable through the hose clamp located next to the engine (Fig. 255).



Fig. 255

DSCN-4259a

17. Install the fuel line and fuel clamp on the fuel filter (Fig. 254).



Fig. 254

DSCN-0013a

19. Install the z-bend of the throttle cable into the middle hole in the throttle arm assembly (Fig. 256).



Fig. 256

DSCN-4261

4

20. Install the throttle cable in the cable clamp (Fig. 257).



Fig. 257

DSCN-4253a

22. Move the throttle arm assembly to the low-idle position and tighten the throttle cable clamp (Fig. 259).



Fig. 259

DSCN-4281a

21. Move the throttle control to the slow idle position (Fig. 258).



Fig. 258

DSCN-4277a

23. Move the throttle control back and forth, checking the operation of the throttle arm assembly.

24. Install 2 nuts retaining the rear guard to the frame and 1 carriage bolt nut retaining the muffler guard to the rear guard (Fig. 260).

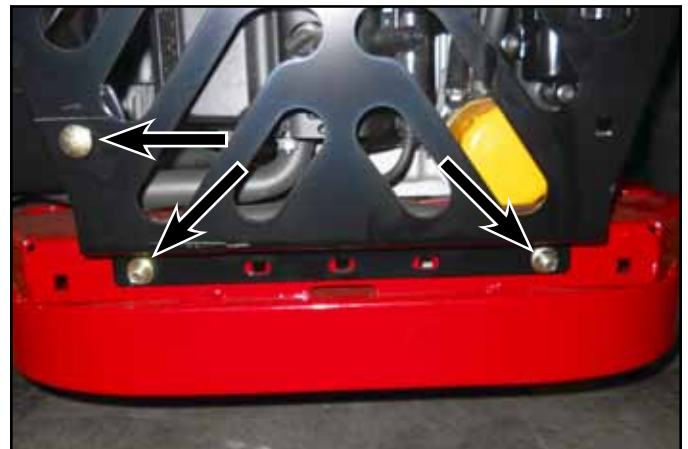


Fig. 260

DSCN-0012a

# ENGINE

---

25. Install 3 carriage bolts and nuts retaining the LH bumper to the frame and rear guard (Fig. 261).

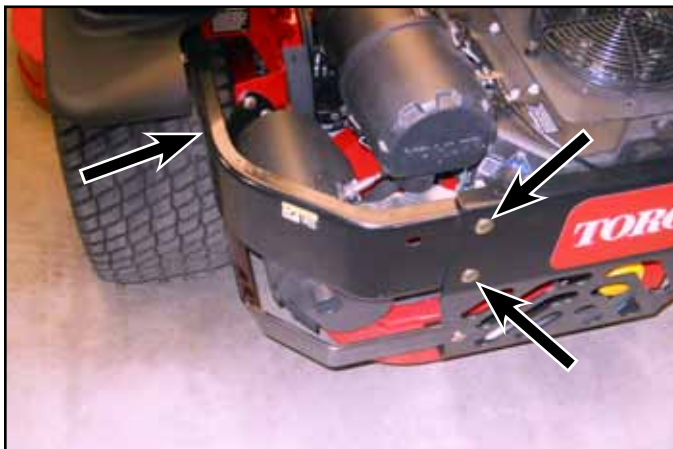


Fig. 261

DSCN-0004a

4

26. Install the 3 carriage bolts and nuts retaining the RH bumper to the frame and rear guard (Fig. 262).

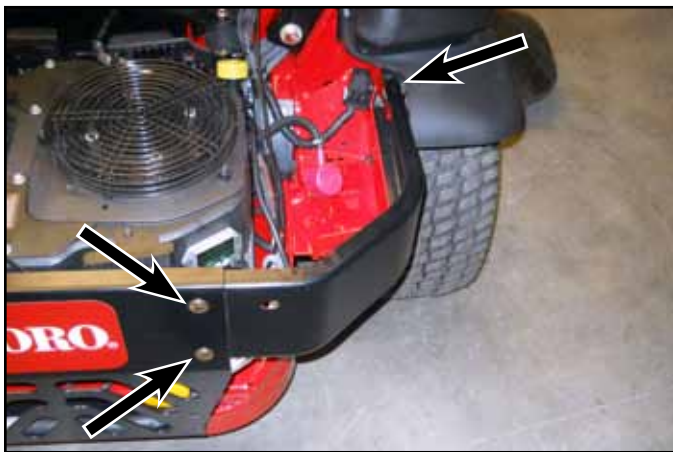


Fig. 262

DSCN-4637a

27. Turn the fuel shut off valve to the "On" position; for tilt seats, lift the seat; for non-tilt seats, slide the seat forward to access the fuel shut off valve.
28. Lower the machine to the ground with a floor jack, after removing the jack stands.
29. Install the battery in the frame. Install the positive and negative battery cables.

## Hydrostatic Pump Removal

**Note:** Cleanliness is a key factor in a successful repair of any hydrostatic system. Thoroughly clean all exposed surfaces prior to any type of maintenance. Cleaning all parts by using a solvent wash and air-drying is usually adequate. As with any precision equipment, all parts must be kept free of foreign material and chemicals. Protect all exposed sealing areas and open cavities from damage and foreign material.

## G3 UHT Transmission Replacement (2009 through 2011 models)

**Note:** The following procedures cover replacing the left hand UHT Transmission. The same procedures can be followed to remove the right hand UHT Transmission.

## G3 UHT Transmission Removal (2009 - 2011 models)

1. Position the machine on a level surface.
2. Disengage the PTO, move the motion control levers to the neutral locked position and set the parking brake.
3. Stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.

4. Remove the negative battery cable from the battery (Fig. 263).



Fig. 263

PICT-8541a

5. Raise the seat and remove the guard from above the UHT that is being replaced (Fig. 264).



Fig. 264

PICT-8695a



# HYDRAULIC SYSTEM

6. Lower the mower deck to the lowest position. Lift the floor pan up and remove it (Fig. 265).

**Note:** On international models, unbolt the floor pan.



Fig. 265

PICT-8543

7. With a 3/8" drive breaker bar installed in the square hole of the idler bracket, rotate the idler bracket clockwise to relieve belt tension (Fig. 266).



Fig. 266

PICT-8545a

8. Remove the mower deck drive belt from the center mower spindle pulley (Fig. 267).



Fig. 267

PICT-8546a

9. Remove the mower deck drive belt from around the electric PTO clutch and pull the belt forward so it clears the hydro cradle assembly (Fig. 268).



Fig. 268

PICT-8693a

5

# HYDRAULIC SYSTEM

10. Raise the rear of the unit and support it with 2 jack stands placed under the right and left tie down loops (Fig. 269).

**Note:** Tires should be at least 6" (15.2cm) off the floor.



Fig. 269

PICT-8548

11. Remove the two rear wheels (Fig. 270).



Fig. 270

PICT-8550a

12. Using a 1/2" drive breaker bar installed in the square hole in the pump idler assembly, rotate the pump idler arm counter-clockwise to relieve tension on the v-belt (Fig. 271).



Fig. 271

PICT-8557a

13. With tension removed, remove the v-belt from around the transmission pulleys and the engine drive pulley (Fig. 272).



Fig. 272

PICT-8561a

5

# HYDRAULIC SYSTEM

14. On the side of the machine being serviced, remove the bolt and washer securing the hydro control arm to the hydro drive control shaft (Fig. 273).

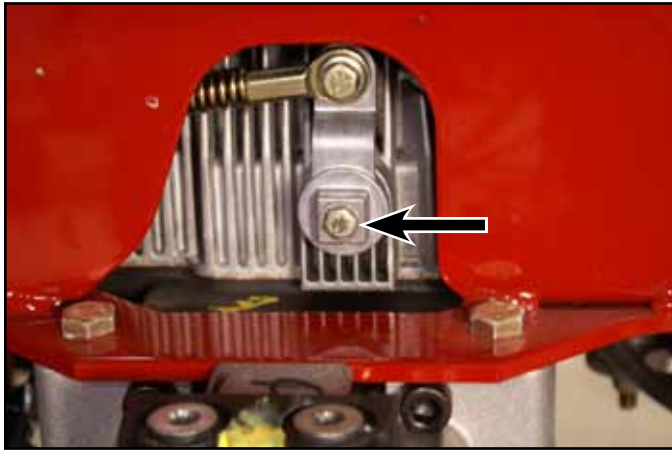


Fig. 273

PICT-8563

16. On the side of the machine being serviced, remove the cotter pin securing the castle nut to the wheel hub (Fig. 275).

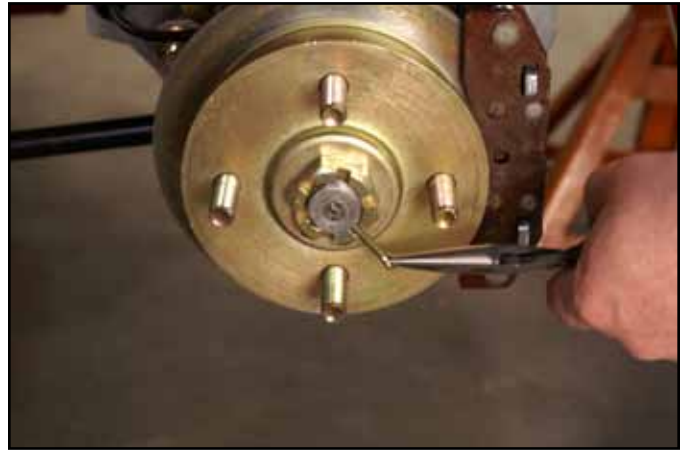


Fig. 275

PICT-8578

15. On the side of the machine being serviced, pry the control arm off the square tapered shaft (Fig. 274).

**5** **Note:** Be careful to not damage the trunnion shaft seal.



Fig. 274

PICT-8566

17. On the side of the machine being serviced, remove the castle nut from the wheel hub (Fig. 276).



Fig. 276

PICT-8580

# HYDRAULIC SYSTEM

18. Release the parking brake.
19. Remove the nut securing the brake swivel to the brake caliper arm (Fig. 277).



Fig. 277 PICT-8582a

20. Remove the 2 bolts and washers securing the brake caliper to the UHT (Fig. 278).

**Note:** There is a spacer washer on each bolt between the caliper bracket and the UHT.



Fig. 278 PICT-8584

21. Remove the caliper assembly from the wheel hub (Fig. 279).



Fig. 279 PICT-8586a

22. Repeat steps 19 – 21 on the opposite side of the machine.
23. On the side of the machine being serviced, use a wheel hub puller (Toro part no. TOR6006) to remove the wheel hub from the UHT wheel shaft (Fig. 280).



Fig. 280 PICT-8587a

5

# HYDRAULIC SYSTEM

24. Squeeze the tabs on the brake cable and pull the brake cable out of the slot in the cable anchor bracket (Fig. 281).



Fig. 281

PICT-8655

26. Release the brake cable retainer holding the brake cable to the cradle. Pull the retainer toward the end of the cable and push the cable through the routing holes so the slack is on the front side (Fig. 283).



Fig. 283

PICT-8592a

25. Pull back the rubber boot, exposing the brake cable, and slide the cable out of the cable anchor bracket slot (Fig. 282).



Fig. 282

PICT-8591a

27. Repeat steps 24 – 26 on the opposite side of the machine.

28. Pull 2 or 3 inches of cable toward the center of the machine and release the brake cable from the retainers on the cradle (Fig. 284).

**Note: Only the left hand brake cable is installed in the cradle retainers.**



Fig. 284

PICT-8649a

# HYDRAULIC SYSTEM

29. On the side of the machine being serviced, remove the bottom carriage bolt and nut securing the UHT to the cradle (Fig. 285).



Fig. 285

PICT-8605a

31. On the side of the machine **not** being serviced, remove the 3 carriage bolts and nuts securing the UHT to the cradle (Fig. 287).

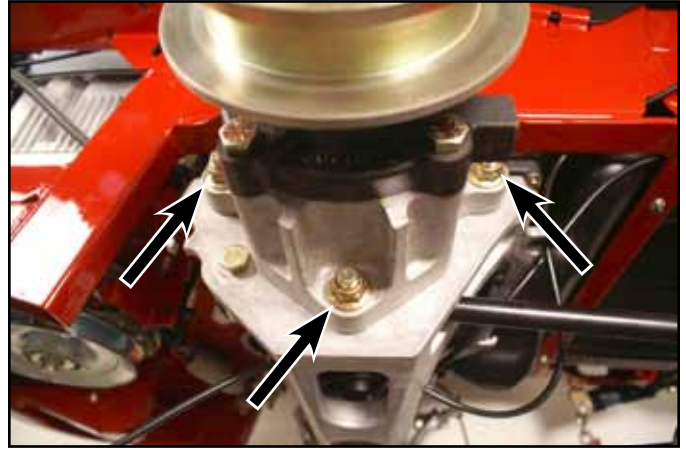


Fig. 287

PICT-8615a

30. On the side of the machine being serviced, loosen the 2 carriage bolts and nuts located on either side of the UHT securing it to the cradle (Fig. 286).

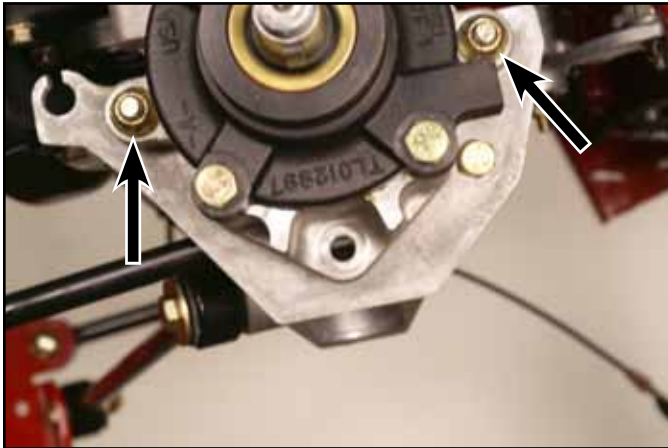


Fig. 286

PICT-8607a

32. Position a floor jack under the cradle on the side of the machine being serviced. Raise the floor jack to contact the cradle (Fig. 288).



Fig. 288

PICT-8617

# HYDRAULIC SYSTEM

33. On the side of the machine being serviced, remove the 2 bolts securing the UHT to the frame (Fig. 289).

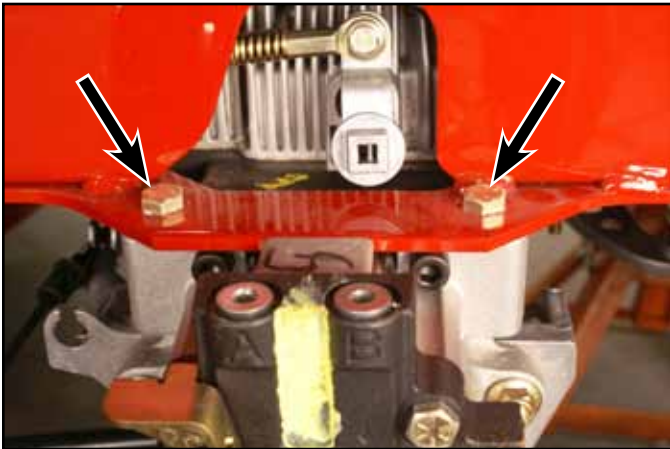


Fig. 289

PICT-8619a

35. Remove the 2 nuts from the bolts securing the UHT to the cradle (Fig. 291).

**Caution:** The UHT weighs approximately 80 lbs. (36.29kg).

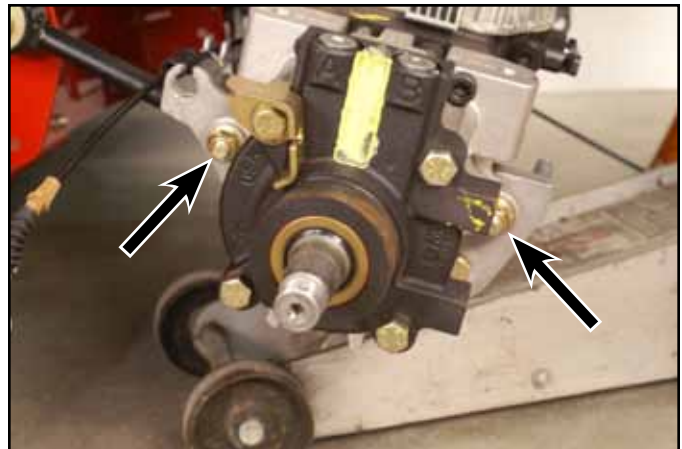


Fig. 291

PICT-8623a

34. Lower the UHT/cradle assembly from the frame by lowering the floor jack. Take care that the brake cables and UHT fan are clear of the frame (Fig. 290).

**Note:** Ensure the control arm shaft clears the frame and the control arm linkage doesn't get caught between the frame and the UHT as it is being lowered.



Fig. 290

PICT-8620

36. Remove the UHT from the cradle (Fig. 292).



Fig. 292

PICT-8624

## G3 UHT Transmission Installation (2009 - 2011 models)

1. Using the top 2 bolts as guides, position the UHT into the cradle and slide the unit onto the 2 bolts (Fig. 293).

**Note:** Be careful not to damage the UHT drive pulley. Make sure the dump valve is in the closed (horizontal) position.

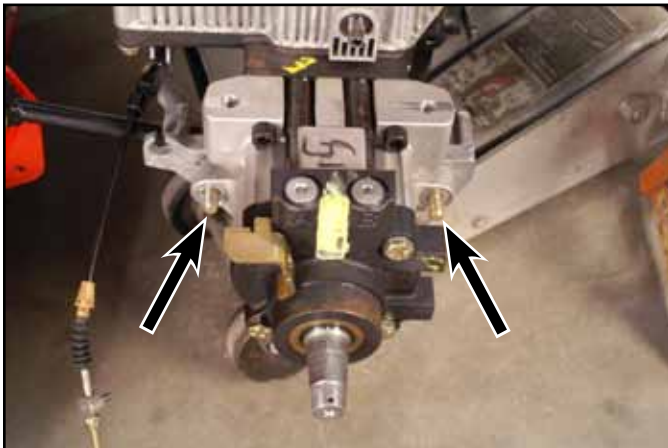


Fig. 293

PICT-8629a

2. Loosely install a nut onto each of the bolts securing the UHT to the cradle (Fig. 294).

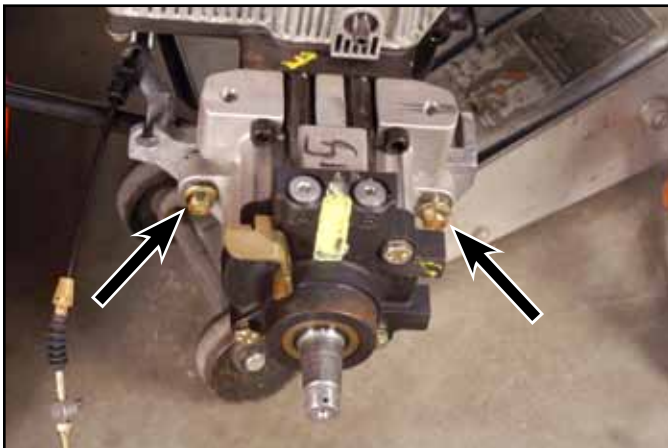


Fig. 294

PICT-8631a

3. Lift the UHT/cradle assembly up to the frame with a floor jack. Align the UHT mounting holes with the holes in the frame (Fig. 295). On the opposite side, ensure the cradle mounting holes align with the mounting holes on the UHT (Fig. 296).



Fig. 295

PICT-8633a



Fig. 296

PICT-8637a



# HYDRAULIC SYSTEM

4. Raise the mower deck to the 3" (7.6cm) height-of-cut position.
5. On the side of the machine that was serviced, loosely install 2 mounting bolts, coming from the top down, through the frame and into the UHT (Fig. 297).



Fig. 297

PICT-8638a

7. On the side of the machine being serviced, tighten the 3 bolts securing the cradle to the UHT and the 2 bolts securing the UHT to the frame (Fig. 299).

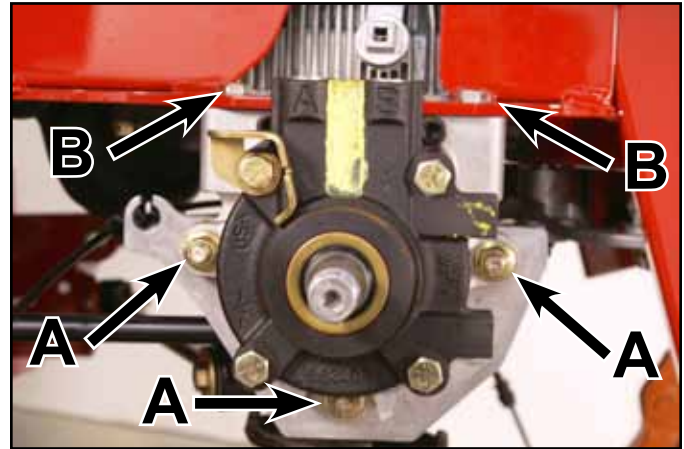


Fig. 299

PICT-8640a

- A. Cradle to UHT nuts
- B. UHT mounted to frame bolts

## 5

6. Loosely install 3 bolts and nuts securing the cradle to the UHT that was not serviced. The floor jack may have to be repositioned to align holes (Fig. 298).

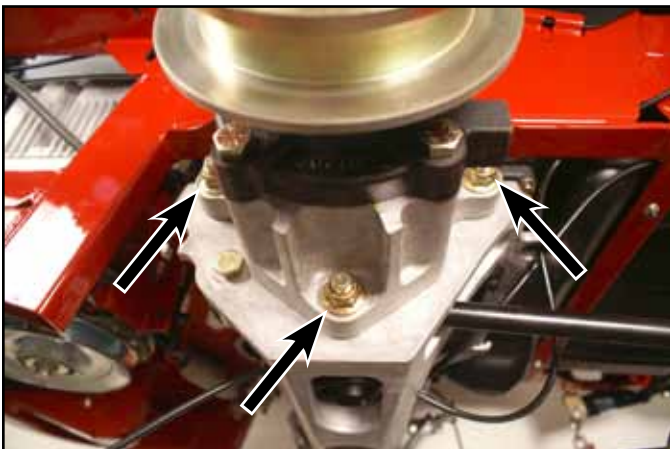


Fig. 298

PICT-8615a

8. Tighten the 3 bolts and nuts securing the cradle to the UHT that was not serviced (Fig. 300).

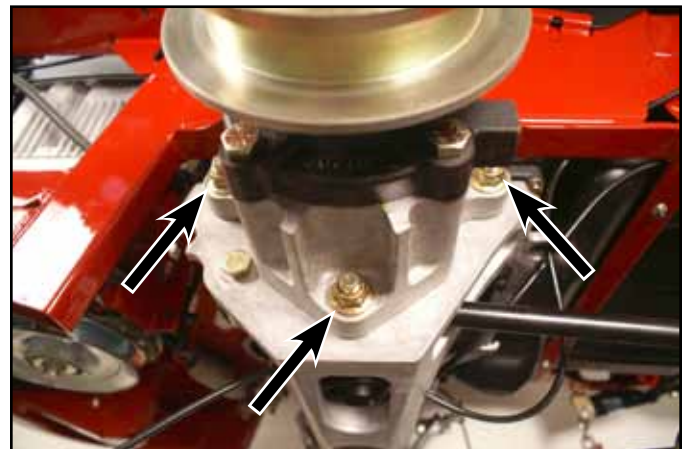


Fig. 300

PICT-8615a

# HYDRAULIC SYSTEM

9. Remove the floor jack.
10. Apply thread locking compound to control arm bolt (Fig. 301).



Fig. 301

PICT-8643a

12. Install the left hand brake cable retainer into the cradle so that the retainer tab is installed in the slot on the cradle (Fig. 303).



Fig. 303

PICT-8646a

11. Install the control arm bolt and washer securing the control arm linkage to the UHT. Torque the bolt to 10 ft-lbs. (13.55 Nm) (Fig. 302).



Fig. 302

PICT-8644a

13. Route the left hand brake cable around the cradle and into the cable retainers (Fig. 304).



Fig. 304

PICT-8649a

5

# HYDRAULIC SYSTEM

14. Pull the boot back and slide the brake cable into the slot in the cable anchor bracket. Slide the boot up and over the end of the cable retainer to ensure water is sealed out (Fig. 305).



Fig. 305 PICT-8659a

17. Slide the brake cable swivel through the brake caliper and loosely install a nut onto the swivel (Fig. 307).



Fig. 307 PICT-8663a

- 5
15. Repeat steps 12 and 14 to install the right hand brake cable.
16. Slide the wheel hub onto the UHT shaft aligning the keyway in the wheel hub with the key in the UHT shaft. Loosely install the castle nut (Fig. 306).

**Note:** Do not use anti-seize compound on the wheel hub.



Fig. 306 PICT-8661a

18. Position the brake caliper onto the wheel hub aligning the holes in the brake mount plate with the mounting holes in the UHT. Slide a washer between the UHT and the brake mount plate. Install a bolt ensuring the washer is captured and tighten the bolt (Fig. 308).



Fig. 308 PICT-8665a

# HYDRAULIC SYSTEM

19. Repeat step 18 to install the other brake mounting bolt.
20. Tighten the brake cable swivel nut to secure (Fig. 309).



Fig. 309

PICT-8668a

21. Repeat steps 17 thru 20 to install the brake caliper on the opposite wheel hub.

**Note:** If a brake component or wheel hub is being replaced, follow the “Burnishing the Brake” procedure on page 5-20.

Adjust the Parking Brake:

**Note:** For this example, the left side brake is being adjusted; the right side brake adjustment is the same procedure.

22. Open the valve(s) (vertical position) on the UHTs (Fig. 310).

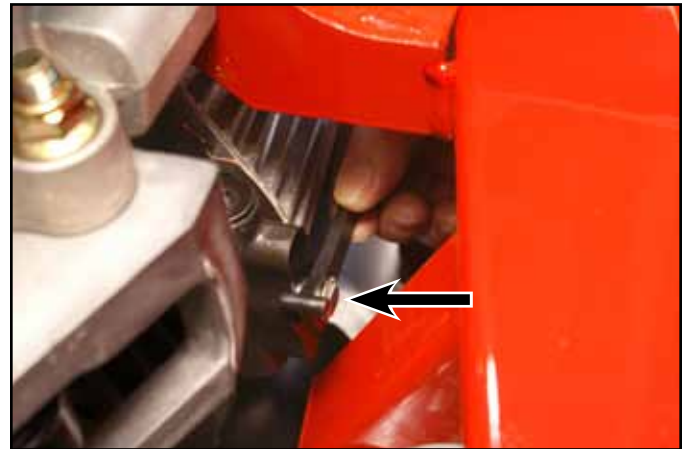


Fig. 310

PICT-8677a

23. Ensure the parking brake is disengaged.
24. Using your thumb, push the caliper lever arm forward to engage the brake pads on the wheel hub until the lever stops (Fig. 311).

Note the order of the standard nut and the lock nut on the end of the brake cable.

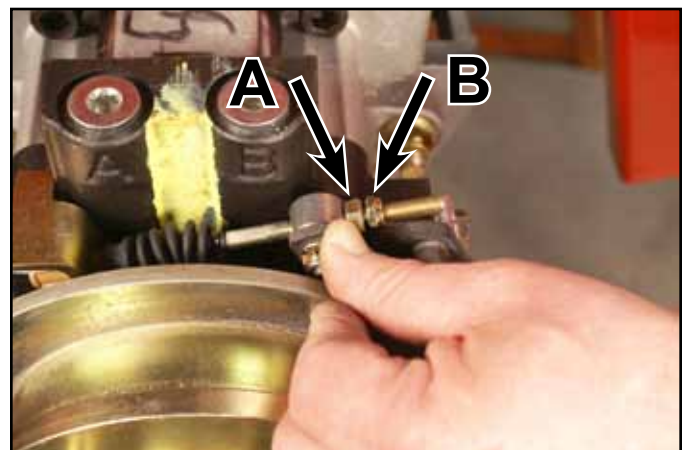


Fig. 311

PICT-8679a

A. Standard nut

B. Lock nut

# HYDRAULIC SYSTEM

25. While holding the lever, pull the cable threaded end tight through the swivel. Spin the standard nut against the swivel (Fig. 312).



Fig. 312 PICT-8680a

26. Try to turn the wheel hub in both directions relative to the caliper. There should be slight movement between them; some friction/resistance is acceptable.

27. If there is no movement between the hub rotor and the caliper then back off the standard nut one turn from the swivel and repeat step 26.

28. If the hub rotor moves very freely relative to the caliper, then tighten the standard nut one turn against the swivel and repeat step 26.

29. Once step 26 is achieved, hold the threaded rod end with a tool and tighten the lock nut against the standard nut. Do not allow the cable to turn when the lock nut is tightened (Fig. 313).

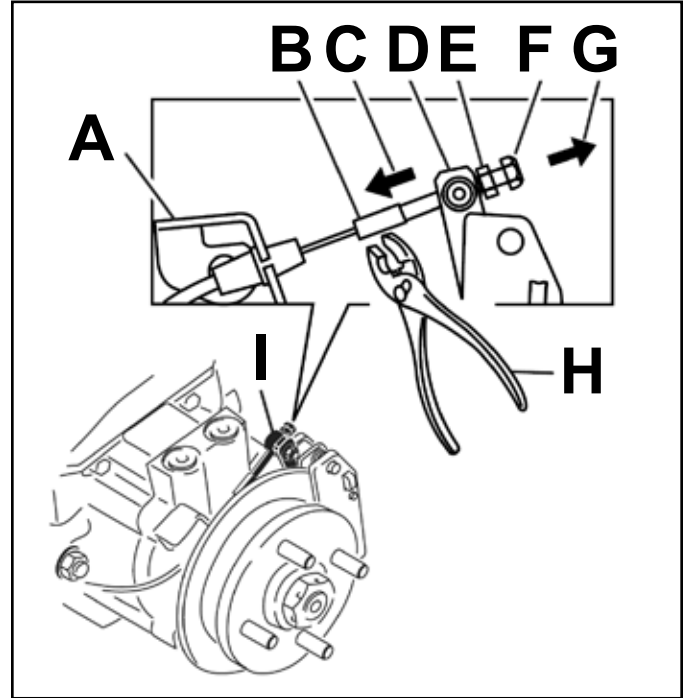


Fig. 313 fig. 63 G010208

- A. Cable anchor
- B. Threaded rod
- C. Push lever this direction
- D. Caliper lever arm
- E. Standard nut (shown against swivel)
- F. Lock nut
- G. Pull cable threaded rod this direction
- H. Hold threaded rod with pliers
- I. Swivel (pivot head)

5

# HYDRAULIC SYSTEM

30. Close the drive wheel release valve (horizontal operating position) (Fig. 314).



Fig. 314

PICT-8677a

31. Repeat steps 24 - 30 on the opposite side of the machine.
32. Engage the parking brake.
33. Torque the castle nut to 200 ft-lbs. (271 Nm) (Fig. 315).



Fig. 315

PICT-8687

34. Check the distance from the bottom of the slot in the castle nut to the inside edge of the cross hole in the shaft. Two threads or less should be showing (Fig. 316).

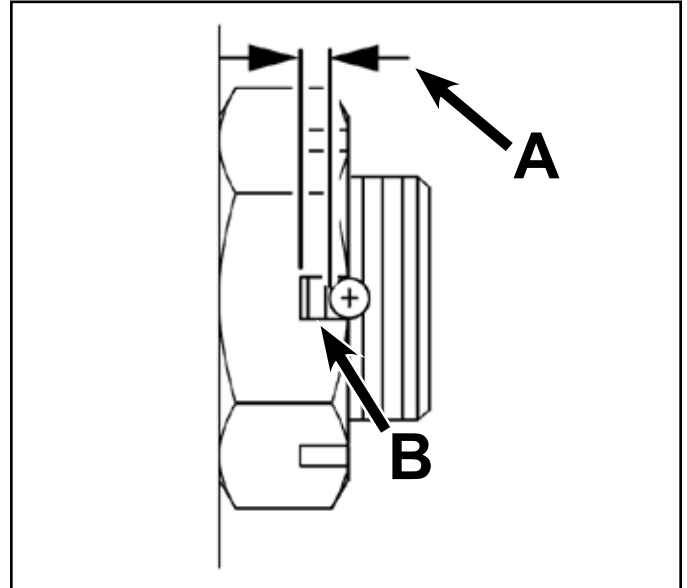


Fig. 316

fig. 58 G008603

- A. 0.1" (25mm) max
- B. No more than 2 threads (0.1" (25mm) max) should be showing here

# HYDRAULIC SYSTEM

35. If more than two threads (0.1"/25mm) are showing, remove the nut and install a washer between the hub and the castle nut.
36. If a washer was added, re-torque the slotted nut to 200 ft-lbs. (271 Nm) (Fig. 317).



Fig. 317 PICT-8687a

39. Using a 1/2" drive breaker bar installed in the square hole in the pump idler assembly, rotate the idler arm counter-clockwise, tensioning the spring to allow room to install the belt (Fig. 319).



Fig. 319 PICT-8557a

37. If necessary, tighten the castle nut until the next set of slots line up with the cross hole in the shaft. Do not loosen the nut to align the slot.
38. Install the cotter pin. Use a new cotter pin if needed (Fig. 318).



Fig. 318 PICT-8689

40. While holding spring tension, install the v-belt around the UHT pulleys and the engine drive pulley. Release tension when belt is in place (Fig. 320).



Fig. 320 PICT-8561a

5

# HYDRAULIC SYSTEM

41. Route the mower deck drive belt around the electric PTO clutch (Fig. 321).



Fig. 321

PICT-8693a

42. With a 3/8" drive breaker bar installed into the square hole in the idler bracket, rotate the idler clockwise to relieve tension (Fig. 322).



Fig. 322

PICT-8545a

43. Route the mower deck drive belt around the mower deck pulleys. Refer to the mower deck routing decal (Fig. 323).

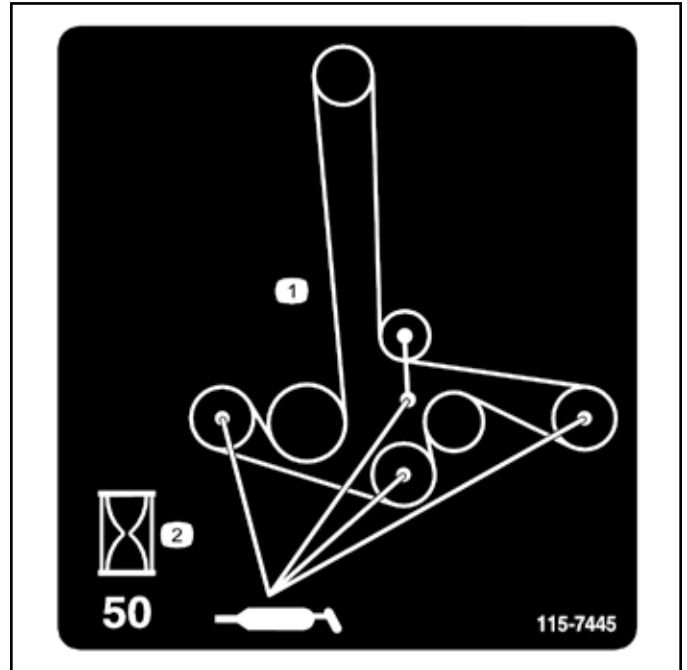


Fig. 323

decal 115-7445



# HYDRAULIC SYSTEM

44. Install rear wheels and torque lug nuts to 90 - 95 ft-lbs. (122 - 129 Nm).
45. Lower the machine to the ground.
46. Connect the negative battery cable to the battery (Fig. 324).



Fig. 324

PICT-8541a

48. Install the floor pan (Fig. 326).



Fig. 326

PICT-8543

**5**

47. Reinstall the guard above the UHT (Fig. 325).



Fig. 325

PICT-8696

# HYDRAULIC SYSTEM

Check the hydraulic fluid level:

49. Raise the seat up.
50. Clean the area around the dipsticks of UHT reservoirs (Fig. 327).
51. Remove one dipstick from the UHT reservoir (Fig. 327).
52. Wipe the dipstick off and thread the dipstick into the reservoir.
53. Remove the dipstick and look at the metal end (Fig. 327). The level needs to be within knurled section. If oil level is low, slowly pour only enough oil into the UHT reservoir to raise the level to the knurled section.

**Important: Do not overfill the UHT with oil as damage may occur. Do not run the machine with oil below the knurled section or damage may occur.**

54. Install the dipstick. Repeat for opposite side.
55. Operate the machine to bring transmissions to normal temperature.
56. Position the machine on a level surface.
57. Disengage the PTO, move the motion control levers to the neutral locked position and set the parking brake.

58. Stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
59. Allow the engine and hydraulic system to cool for ten minutes. Recheck oil level and top off as required (Fig. 327).

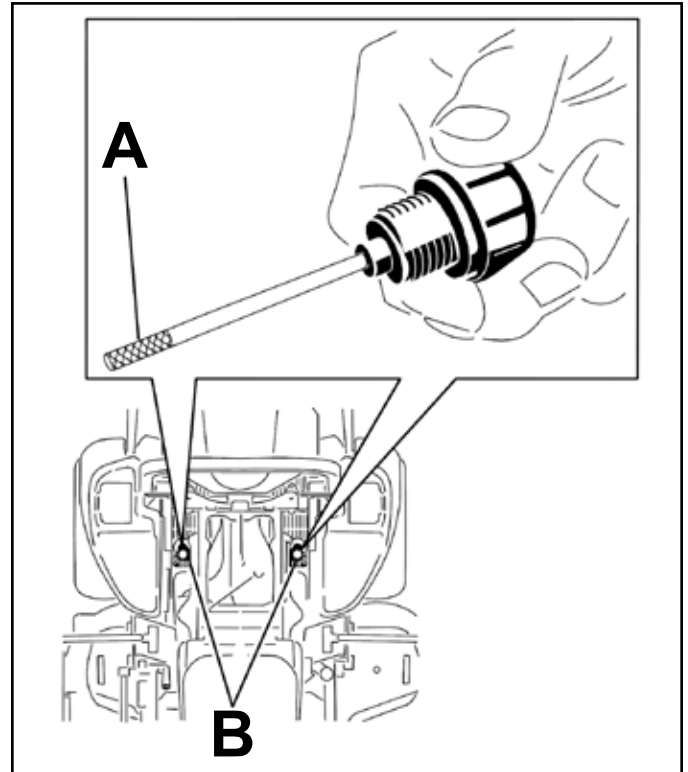


Fig. 327

fig. 76 G008967

This is a top view (under seat)

- A. Oil level within knurled section      B. Dipstick locations

# HYDRAULIC SYSTEM

## Burnishing the Brake

1. Raise the rear of the machine and support it with 2 jack stands placed under the right and left tie down loops (Fig. 328).



Fig. 328

PICT-8548

3. Clear the area of any flammable material before starting the burnishing process.
4. Rotate the drive wheel release valve to the "operating" position (Fig. 330).

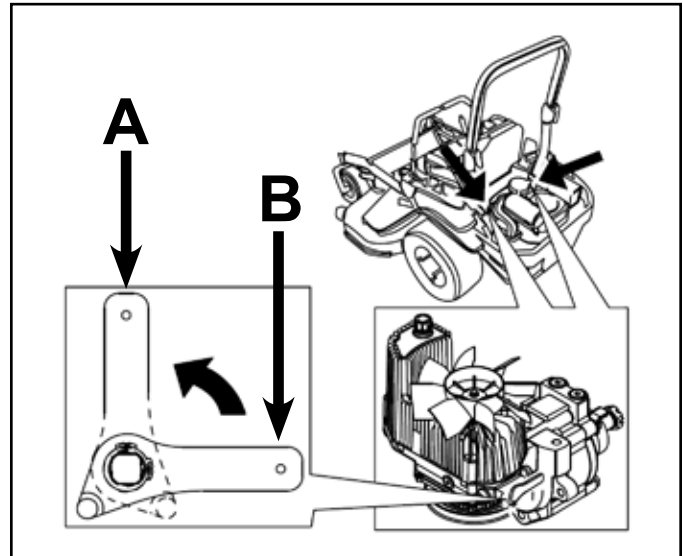


Fig. 330

fig. 36 G008957

- A. Vertical: "released" to push the machine      B. Horizontal: "operating" to drive the machine

2. Remove the two rear wheels (Fig. 329).



Fig. 329

PICT-8550a

5. Engage the parking brake.
6. Install a 1/2" x 6" (approximately) rod or bolt through the 2" height -of-cut hole (Fig. 331).



Fig. 331 G3CheckValveParkBrake\_a

5

# HYDRAULIC SYSTEM

7. Start the mower while in the operating position.
8. Release the parking brake so the handle rests on the 1/2" x 6" rod or bolt.
9. Move the throttle over to the full throttle position.
10. Move both motion control levers to the full forward position and hold for 15 seconds.
11. Move both motion control levers to the full reverse position and hold for 15 seconds.
12. Turn off the engine and completely release the parking brake by removing the 1/2" x 6" rod or bolt.
13. Allow the hubs to cool until they are cool enough to safely touch.
14. Rotate the drive wheel release valve to the "release" position (Fig. 332).

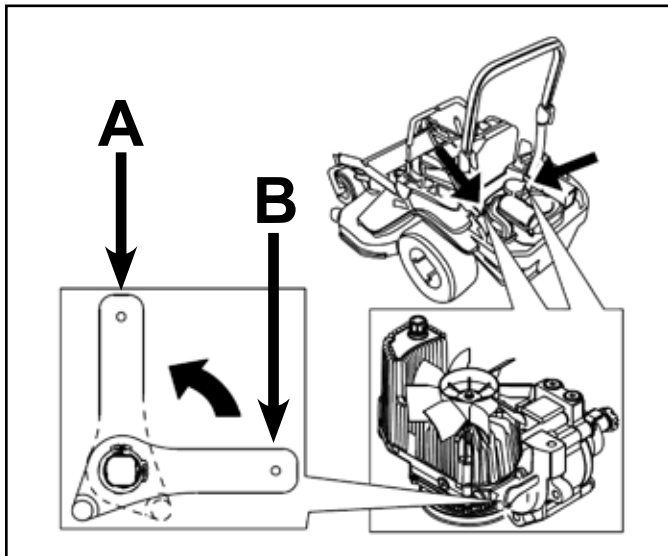


Fig. 332

fig. 36 G008957

- A. Vertical: "released" to push the machine      B. Horizontal: "operating" to drive the machine

15. Ensure the parking brake is disengaged.
16. Using your thumb, push the caliper lever arm forward to engage the brake pads on the wheel hub until the lever stops (Fig. 333).

Note the order of the standard nut and the lock nut on the end of the brake cable.

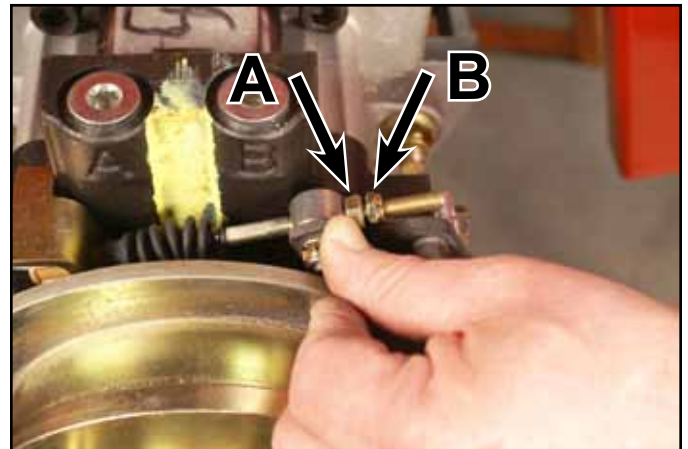


Fig. 333

PICT-8679a

A. Standard nut

B. Lock nut

5

# HYDRAULIC SYSTEM

17. While holding the lever, pull the cable threaded end tight through the swivel. Spin the standard nut against the swivel (Fig. 334).



Fig. 334

PICT-8680a

18. Try to turn the wheel hub in both directions relative to the caliper. There should be slight movement between them; some friction/resistance is acceptable.

19. If there is no movement between the hub rotor and the caliper then back off the standard nut one turn from the swivel and repeat step 18.

20. If the hub rotor moves very freely relative to the caliper, then tighten the standard nut one turn against the swivel and repeat step 18.

21. Once step 18 is achieved, hold the end of the threaded rod with a tool and tighten the lock nut against the standard nut. Do not allow the cable to turn when the nuts are turned (Fig. 335).

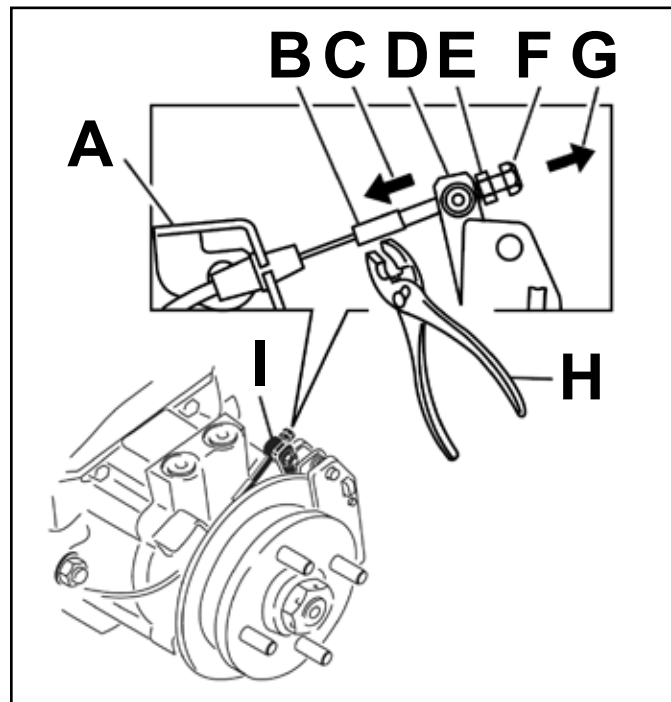


Fig. 335

fig. 63 G010208

- |                              |                            |
|------------------------------|----------------------------|
| A. Cable anchor              | F. Lock nut                |
| B. Threaded rod              | G. Pull cable threaded rod |
| C. Push lever this direction | this direction             |
| D. Caliper lever arm         | H. Hold threaded rod with  |
| E. Standard nut (shown       | pliers                     |
| against swivel)              | I. Swivel (pivot head)     |

5

22. Close the drive wheel release valve (horizontal operating position) (Fig. 336).



Fig. 336

PICT-8677a

23. Install the rear wheels. Torque the lug nuts to 90 - 95 ft-lbs. (122 - 129 Nm).
24. Remove the jack stands and lower the machine to the ground.

## UHT Transmission Replacement (2012 & later models)

### UHT Transmission Removal (2012 & later models)

**Note:** The following procedures cover replacing the left hand UHT transmission. The same procedures can be followed to remove the right hand UHT Transmission.

1. Position the machine on a level surface.
2. Disengage the PTO, move the motion control levers to the neutral locked position. Apply the park brake.
3. Stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
4. Remove the negative battery cable from the battery.
5. Raise the rear of the unit and support it with two jack stands under the right and left tie down loops. Remove the RH and LH wheels from the unit (Fig. 337).



Fig. 337

DSCN-4311a

# HYDRAULIC SYSTEM

- Using a 1/2" drive breaker bar installed in the square hole in the pump idler assembly, rotate the pump idler arm counter-clockwise to relieve tension on the v-belt (Fig. 338).



Fig. 338 DSCN-4504a

- On the side of the machine being serviced, remove the bolt and washer securing the hydro drive control shaft (Fig. 340).



Fig. 340 DSCN-4510a

- With the tension removed from the belt, remove the v-belt from around the left side transmission pulley (Fig. 339).



Fig. 339 DSCN-4508a

- Pry the control arm off the square tapered shaft (Fig. 341).

**Note:** Be careful to not damage the trunnion shaft seal.



Fig. 341 DSCN-4515a

5

# HYDRAULIC SYSTEM

10. On the side of the machine being serviced, remove the locknut from the wheel hub (Fig. 342).



Fig. 342

DSCN-4516a

13. Hold the end of the threaded rod with a tool. With a socket wrench, remove the lock nut and washer from the end of the cable (Fig. 344). Remove the washer and spring.



Fig. 344

DSCN-4315a

11. Disengage the park brake lever.

12. Remove the e-ring, washer, and brake pin from the L-Bracket (Fig. 343).



Fig. 343

DSCN-4314a

14. Remove the e-ring from the groove in the cable end and the cable anchor located on the transmission (Fig. 345).



Fig. 345

DSCN-4318a

5



# HYDRAULIC SYSTEM

15. Pull the brake cable out of the cable anchor on the transmission and slide it out of the slot (Fig. 346).



Fig. 346 DSCN-4325a

17. On the side of the machine not being serviced, remove the three carriage bolts and nuts securing the UHT transmission to the cradle (Fig. 348).

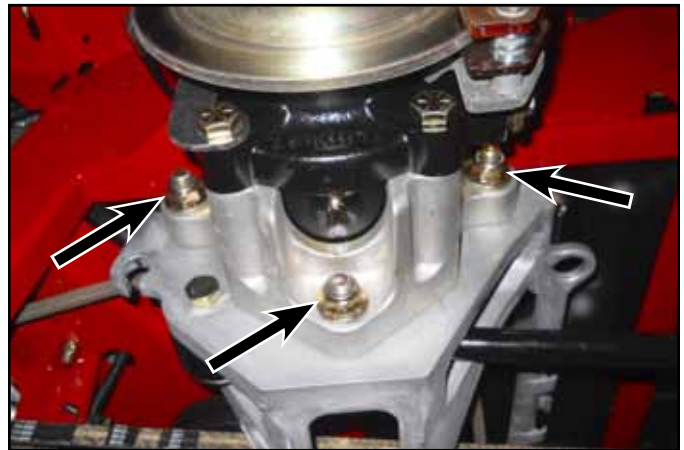


Fig. 348 DSCN-4518a

16. On the side of the machine being serviced, use a wheel hub puller (Toro part number TOR6006) to remove the wheel hub from the UHT wheel shaft (Fig. 347).



Fig. 347 DSCN-4517a

18. On the side of the machine being serviced, remove the bottom carriage bolt and nut securing the UHT transmission to the cradle (Fig. 349).



Fig. 349 DSCN-4520a

5

# HYDRAULIC SYSTEM

19. Position a floor jack under the cradle on the side of the machine being serviced. Raise the floor jack to contact the cradle (Fig. 350).



Fig. 350

DSCN-4522a

20. On the side of the machine being serviced, remove the two bolts securing the UHT transmission to the frame (Fig. 351).

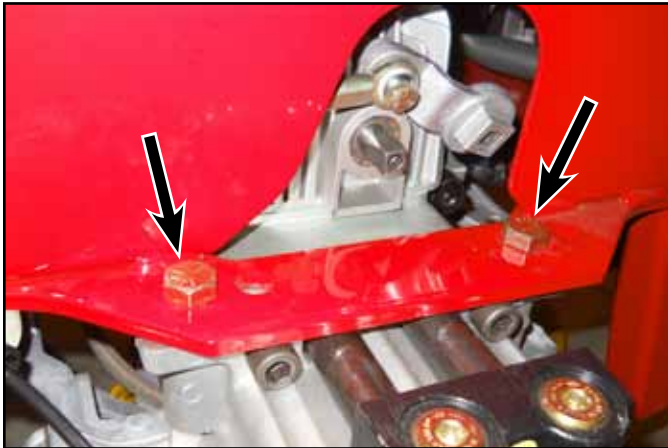


Fig. 351

DSCN-4528a

21. Lower the UHT transmission/cradle assembly from the frame by lowering the floor jack. Take care that the UHT transmission fan clears the frame.

**Note:** Ensure the control arm shaft clears the frame, and the control arm linkage doesn't get caught between the frame and the UHT transmission, as it is being lowered.

22. Remove the two nuts from the carriage bolts securing the UHT transmission to the cradle (Fig. 352).



Fig. 352

DSCN-4529a

23. Remove the UHT transmission from the cradle (Fig. 353).

**Caution:** The UHT weighs approximately 80 lbs. (36.29kg).



Fig. 353

DSCN-4533

# HYDRAULIC SYSTEM

## UHT Transmission Installation (2012 & later models)

1. Using the top two bolts as guides, position the UHT transmission into the cradle and slide the unit onto the two bolts (Fig. 354).

**Note:** Be careful not to damage the UHT transmission pulley. Make sure the release valve lever is in the closed (horizontal) position.

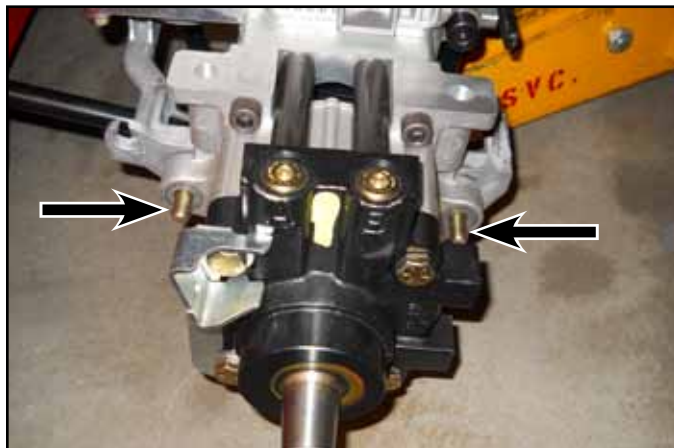


Fig. 354

DSCN-4535a

2. Loosely install a nut onto each of the bolts securing the UHT transmission to the cradle (Fig. 355).



Fig. 355

DSCN-4536a

3. Lift the UHT transmission/cradle assembly up to the frame with a floor jack. On the side of the machine that was serviced, loosely install two mounting bolts, coming from the top down, through the frame and into the UHT transmission (Fig. 356).



Fig. 356

DSCN-4546a

4. On the opposite side, ensure the cradle mounting holes align with the mounting holes on the UHT transmission (Fig. 357).



Fig. 357

DSCN-4539a

# HYDRAULIC SYSTEM

- Loosely install three bolts and nuts securing the cradle to the UHT transmission that was not serviced. The floor jack might have to be repositioned to align holes (Fig. 358).



Fig. 358

DSCN-4551a

- Tighten the three bolts and nuts securing the cradle to the UHT transmission on the side that was not serviced. Torque them to  $75 \pm 8$  ft-lbs. ( $101.7 \pm 10.8$  Nm) (Fig. 360).

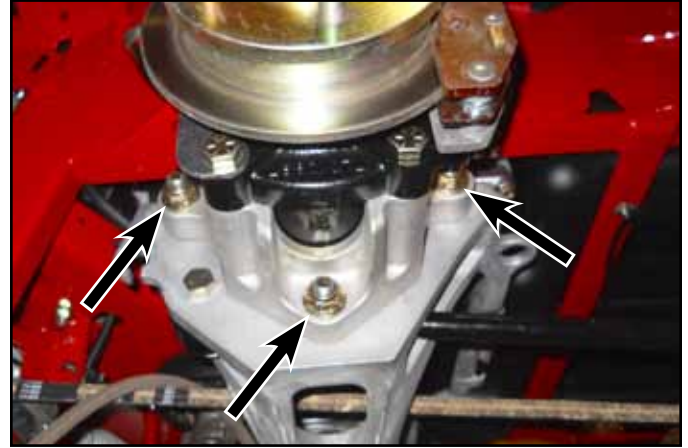


Fig. 360

DSCN-4551a

- On the side of the machine being serviced, tighten the 3 bolts and nuts securing the cradle to the UHT transmission and the 2 bolts securing the UHT transmission to the frame, torque the nuts and bolts to  $75 \pm 8$  ft-lbs. ( $101.7 \pm 10.8$  Nm) (Fig. 359).

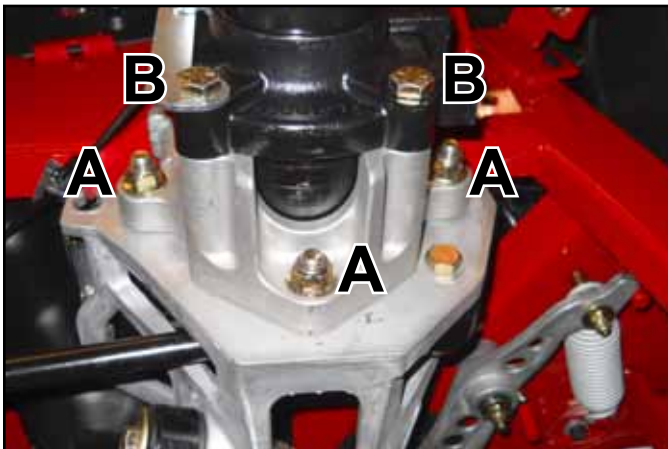


Fig. 359

DSCN-4550a

- A. Cradle to UHT nuts
- B. UHT mounted frame bolts

- Remove the floor jack.
- Apply thread locking compound to the control arm bolt (Fig. 361).



Fig. 361

DSCN-4552a

5

# HYDRAULIC SYSTEM

11. Install the control arm bolt and washer securing the control arm linkage to the UHT transmission. Torque the bolt to 10 ft-lbs. (13.55 Nm) (Fig. 362).



Fig. 362 DSCN-4554a

13. Slide the brake cable into the cable anchor slot on the transmission (Fig. 364).



Fig. 364 DSCN-4325a

12. Slide the wheel hub onto the UHT transmission shaft aligning the keyway in the wheel hub with the key in the UHT shaft. Loosely install the nut (Fig. 363).

**Note:** Do not use anti-seize compound on the wheel hub.



Fig. 363 DSCN-4555a

14. Install the end of the brake cable through the cable anchor and install an e-ring (Fig. 365).

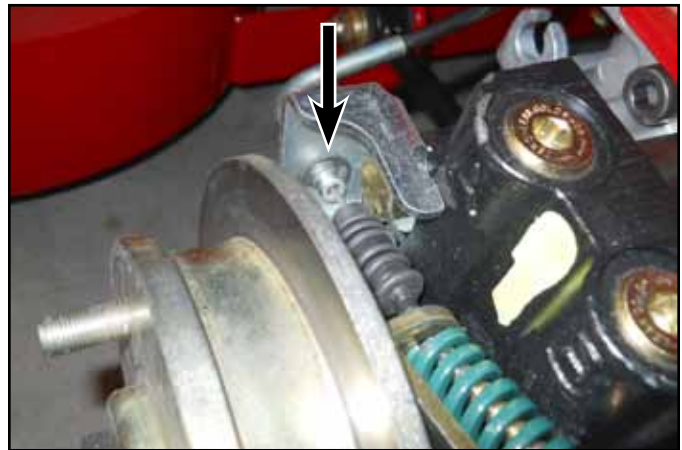


Fig. 365 DSCN-4361a

5

# HYDRAULIC SYSTEM

15. Install the L-Bracket, spring, washer, and nut on the threaded end of the brake cable (Fig. 366).



Fig. 366

DSCN-4336a

16. Install the L-Bracket with brake pin, washer, and e-ring to the brake caliper (Fig. 367).

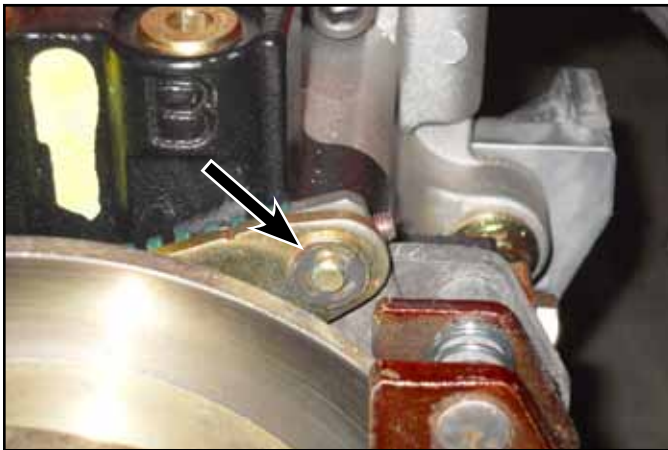


Fig. 367

DSCN-4314a

17. Engage the parking brake. Measure the overall length of the compression spring (Fig. 368). The correct length should be between 1-1/2" and 1-9/16" (3.8 and 4.9cm). If the spring length is within this range, no adjustment is needed. If it is not, proceed.

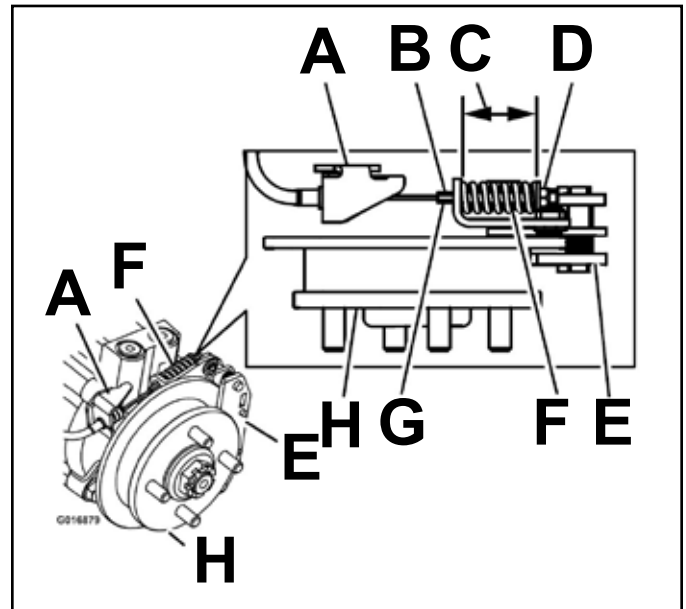


Fig. 368

fig. 79 G016879

(Left Hand brake shown above)

- |                           |                       |
|---------------------------|-----------------------|
| A. Cable anchor           | E. Caliper            |
| B. Hold threaded rod here | F. Compression spring |
| C. Measure                | G. Threaded rod       |
| D. Lock nut               | H. Hub                |

# HYDRAULIC SYSTEM

18. Hold the end of the threaded rod with a tool and adjust the lock nut until the spring length is between 1-1/2" and 1-9/16" (3.8 and 4.0cm) (Fig. 369).

**Note:** DO NOT allow the cable to turn when the nut is being turned.



Fig. 369

DSCN-4315a

## Wheel Hub Slotted Nut Installation

22. Installing the wheel Hub slotted nut
  - Style A (black finish): (Fig. 370)

Torque the slotted nut to 211 - 260 ft-lbs. (286 - 352 Nm).

**Note:** Do Not use anti-seize on wheel hub.

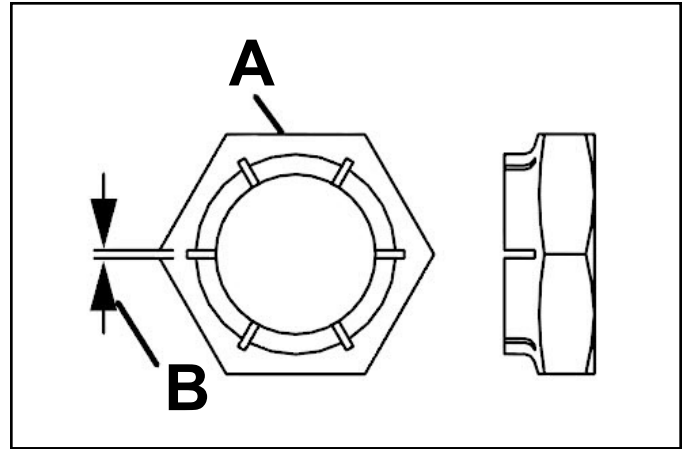


Fig. 370

fig. 67 G011815\_A

A. Style A (black finish)    B. 0.03" (0.76mm)

- Style B (yellow zinc): (Fig. 371)

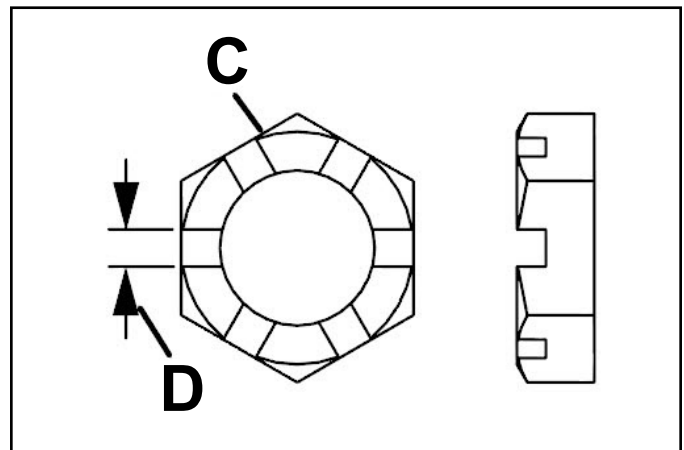


Fig. 371

fig. 67 G011815\_B

C. Style B (yellow zinc)    B. 0.24" (6mm)

- 5
19. Disengage the parking brake. Rotate the drive wheel release handle to the released position. Turn the wheel hub by hand in both directions relative to the caliper; no drag of the caliper pad on the wheel hub is desired.
  20. After adjusting the brake, cycle the brake handle a minimum of six times to allow the cable to seat into the sheath and mounting tabs. Recheck the spring length.
  21. Rotate the drive wheel release handle to the operating position.

# HYDRAULIC SYSTEM

- a. Torque the slotted nut to 200 ft-lbs. (271 Nm).
- b. Check distance from bottom of slot in nut to inside edge of hole. Two threads (0.1" / 0.0cm) or less should be showing.
- c. If more than two threads (0.1" / 0.254cm) are showing, remove nut and install washer between hub and nut.
- d. Torque the slotted nut to 200 ft-lbs. (271 Nm).
- e. Then tighten nut until the next set of slots line up with cross-hole in shaft. Do not loosen nut to align the slot. If required, tighten to the next set of slots.
- f. Install a new cotter pin.

**Note: Do not use anti-seize on wheel hub.**

23. Using a 1/2" drive breaker bar installed in the square hole in the pump idler assembly, rotate the idler arm counter-clockwise to relieve tension and install the v-belt around the engine pulley, UHT transmission pulleys and the idler pulley (Fig. 372).

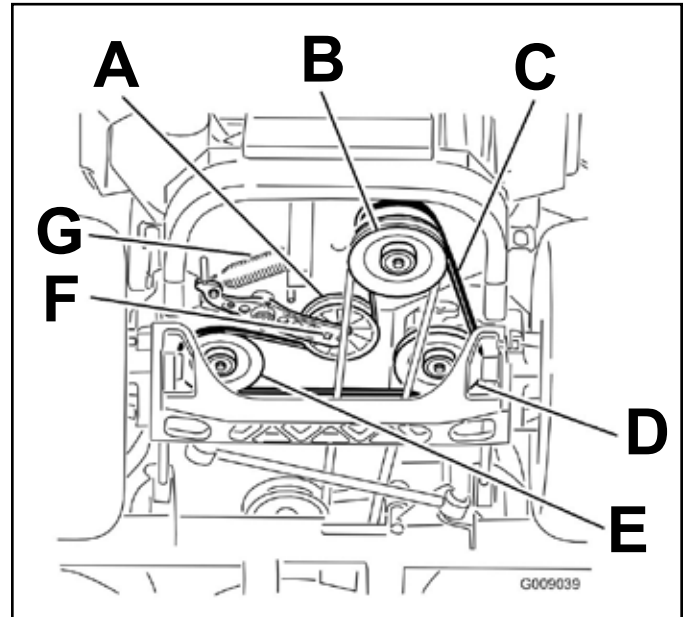


Fig. 372

fig. 83 G009039

- |                             |                             |
|-----------------------------|-----------------------------|
| A. Idler pulley             | E. LH hydraulic pump pulley |
| B. Clutch pulley            | F. Square hole in idler arm |
| C. Pump drive belt          | G. Idler spring             |
| D. RH hydraulic pump pulley |                             |

24. Install the rear tires and torque the lug nuts to 103.5 – 126.5 ft-lbs. (140.5 – 171.5 Nm).
25. Install the negative battery cable to the battery.
26. Start the unit up and allow the unit to warm up for about 5 minutes, moving the motion control levers from forward to reverse. Bring the motion control levers into the neutral position. The rear tires should not move forward or reverse. If they do creep, see “Adjusting the Motion Control Linkage (Neutral Adjustment)” on page 5-34.
27. Remove the jack stands and lower the unit down.



# HYDRAULIC SYSTEM

## Adjusting the Motion Control Linkage (Neutral Adjustment)

The adjustment nuts are located on either side of the fuel tank, below the seat on the pump control linkages (Fig. 373). Rotating the pump linkage nuts with a 1/2" wrench allows fine tuning adjustments so that the machine does not move in neutral. Any adjustments on the linkage should be made for neutral positioning only.

### Warning

Engine must be running and drive wheels must be turning so motion control adjustment can be performed. Contact with moving parts or hot surfaces may cause personal injury.

Keep fingers, hands, and clothing clear of rotating components and hot surfaces.

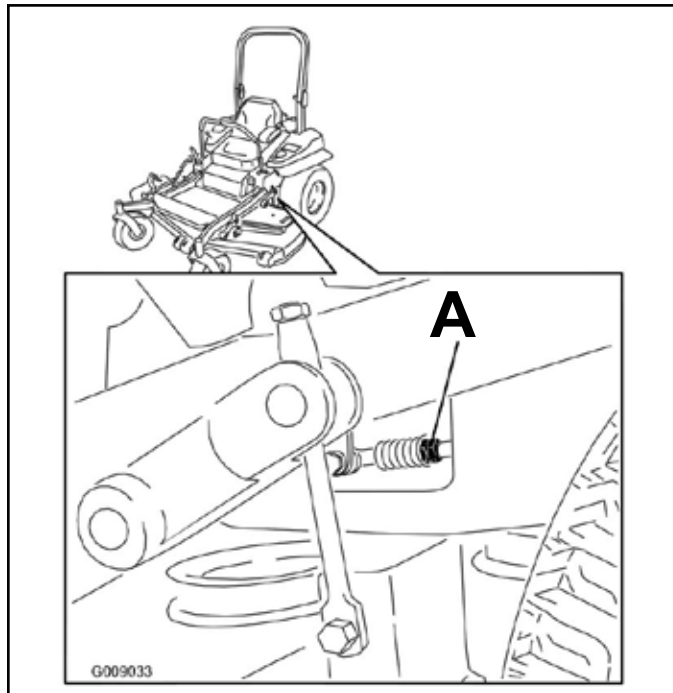


Fig. 373

fig. 86 G009033

A. Double nuts

1. Prior to starting the engine, push the deck lift pedal and remove the height of cut pin. Lower the deck to the ground.
2. Raise the rear of machine up and support with jack stands (or equivalent support) just high enough to allow drive wheels to turn freely.
3. On some units you can lift and tilt the seat to locate the seat switch, on other units the seat must be removed to get to the seat switch (Fig. 374).



Fig. 374

PICT-0398a

4. Unplug the seat switch and temporarily install a jumper wire across the terminals in the connector of the main wiring harness (Fig. 375).



Fig. 375

DSCN-4620a

# HYDRAULIC SYSTEM

5. Start engine.

**Note: Brake must be engaged and motion control levers out to start the engine. Operator does not have to be in the seat because of the jumper wire being used.**

6. Run engine at full throttle and release the brake.

7. Run the unit at least 5 minutes with the drive levers at full forward speed to bring hydraulic oil up to operating temperature.

**Note: The motion control lever needs to be in neutral while making any necessary adjustments.**

8. Bring the motion control levers into the neutral position. Adjust pump control rod lengths by rotating the double nuts on the rod in the appropriate direction until the wheels do not move forward or reverse (Fig. 376).

**Note: A slight creep in reverse is acceptable.**



Fig. 376

DSCN-4622a

9. Move the motion control levers to the reverse position and while applying slight pressure to the lever allow the reverse indicator springs to bring the levers back to neutral. The wheels must stop turning or slightly creep in reverse.

10. Shut off unit. Remove the jumper wire from the wire harness and plug connector into the seat. If the seat was removed, install the seat.

11. Remove the jackstands and lower the unit to the ground.

12. Raise the deck and re-install the height of cut pin.

13. Check that the machine does not creep in neutral with the park brakes disengaged.

# HYDRAULIC SYSTEM

## Checking the Hydraulic Oil

**Service Interval:** Every 50 hours - check the hydraulic oil level

1. Position the machine on a level surface.
2. Disengage the PTO, move the motion control levers to the neutral locked position and set the parking brake.
3. Stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
4. Allow the engine and hydraulic system to cool for ten minutes.

**Note:** The oil level on the dipstick will be incorrect when the oil is checked at operating temperature.

5. Move the seat forward.

6. Clean the area around the dipsticks of hydraulic system reservoirs (Fig. 377).

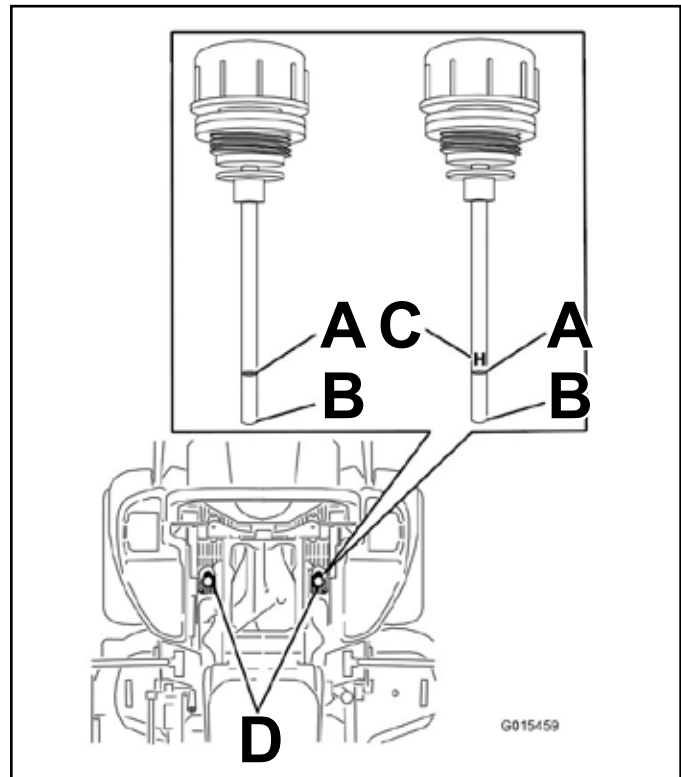


Fig. 377

fig. 89 G015459

(Either dipstick can be used in the machine)

- |         |                                  |
|---------|----------------------------------|
| A. Full | C. "H" means high level          |
| B. Add  | D. Dipstick locations under seat |

7. Remove one dipstick from the hydraulic reservoir (Fig. 377).
8. Wipe the dipstick off and thread the dipstick into the reservoir.
9. Remove the dipstick and look at the end (Fig. 377). If the oil level is at or below the add mark, slowly pour only enough oil into the hydraulic reservoir to raise the level to the full or H line.

**Important:** Do not overfill the hydraulic units with oil as damage may occur. Do not run the machine with oil below the add mark.

10. Install the dipstick.
11. Repeat procedure for the other dipstick.

## Flow Test Instructions

**Note:** The Flow Test Kit allows the dealer to easily determine if the UHT transmission pump is faulty by isolating the pump section from the wheel motor (Fig. 378).

The following information describes how to test the pump by installing the Flow Test Kit and simulating a wheel motor load.

### Warning

Portions of the procedure require testing while the vehicle is operated in an elevated position.

Ensure vehicle is properly secured to prevent injury to the service technician or bystanders.

Do not attempt any adjustments with the engine running. When working around vehicle linkages, use extreme caution.

High temperatures can be generated.

Follow all safety procedures in the vehicle owner's manual.



Fig. 378

9792\_a

Part number 116-1373

1. Raise the rear end of the unit and install jack stands under the tie down loops on the frame. Remove the RH and LH wheels from the unit (Fig. 379).



Fig. 379

DSCN-4311a

2. On some units you can lift and tilt the seat to locate the seat switch, on other units the seat must be removed to get to the seat switch (Fig. 380).



Fig. 380

PICT-0398a

# HYDRAULIC SYSTEM

3. Unplug the seat switch and temporarily install a jumper wire across the terminals in the connector of the main wiring harness (Fig. 381).



Fig. 381

DSCN-4620a

4. Isolate the pump from the wheel motor by removing the two plugs from the top of the wheel motor assembly and installing the flow test kit. Install the Diagnostic Plug in port "A", and the Straight Fitting into port "B" (Fig. 382). Take precautions to ensure no debris gets into the wheel motor system ports.

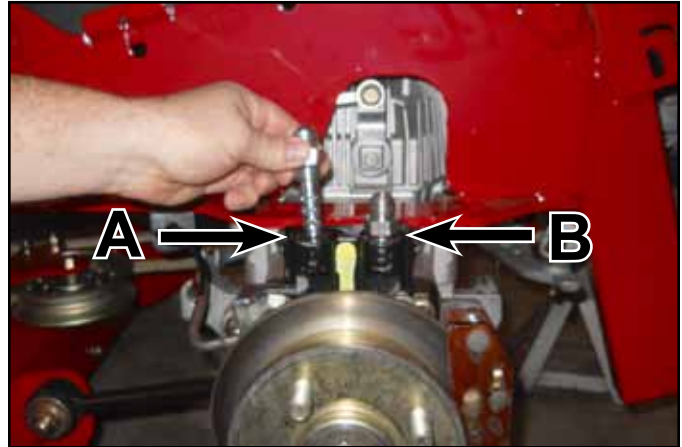


Fig. 382

DSCN-4625a

There is no need to determine the direction of flow with the Parker flow tester. The flow meter may be connected in either direction into the high-pressure system lines (Fig. 383).

**Caution: All fittings and hoses must be securely attached. The test is accomplished using the vehicle's high-pressure system lines. Failure to secure connections could result in bodily injury.**



Fig. 383

DSCN-4626a

5

# HYDRAULIC SYSTEM

5. Completely open the restriction valve on the flow tester.
  6. Start the engine.
  7. Slowly bring engine up to maximum operating speed.
  8. Move the vehicle's motion control lever on the side that is being tested all the way into the forward position. Have someone hold the motion control lever to prevent false readings.
  9. Continue to operate without any load to allow the system oil temperature to rise.
- Note: Raising the temperature of the oil will make a difference in your readings. To complete the test accurately, the oil temperature should fall between 110° and 140° F (43.3° and 60° C).**
10. Tighten the restriction valve until the difference between the pressure gauge readings is 300 psi (21 bar). Record the flow reading from the bidirectional flow meter.
  11. Tighten the restriction valve until the difference between the pressure gauge readings is 1000 psi (69 bar) and record the flow reading again.

12. The maximum allowable flow rate change is shown below. If the difference exceeds this level, the pump is unacceptable.
13. When testing is complete, re-install the motor port plugs. Torque to 35 to 50 ft-lbs. (47.4 to 67.8 Nm).

Series	Displacement cc/rev (nominal)	Max. Allowable Flow Rate Change* (gpm)
UHT	12 to 16	1.0

\*Max. Allowable Flow Rate Change is equal to the flow rate at 300 psi minus the flow rate at 1000 psi.

## EXAMPLE:

First Reading	300 psi (21 bar)	5 gpm (19 l/min)
Second Reading	1000 psi (69 bar)	<u>-3 gpm (11 l/min)</u>
Difference		2 gpm (8 l/min)

By subtracting the second reading from the first, a defective pump can be identified. In the example above, 2 gpm indicates a defective pump.

# HYDRAULIC SYSTEM

## Hydraulic Pump Drive Belt Replacement

1. Disengage the PTO and set the parking brake.
2. Stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
3. Remove the mower belt. Refer to "Mower Belt Removal" on page 6-1.
4. Raise the rear of the machine and support it with jack stands (Fig. 384).



Fig. 384

DSCN-0071a

5. Use a ratchet or breaker bar in the square hole of the idler arm to remove the idler spring (Fig. 385).

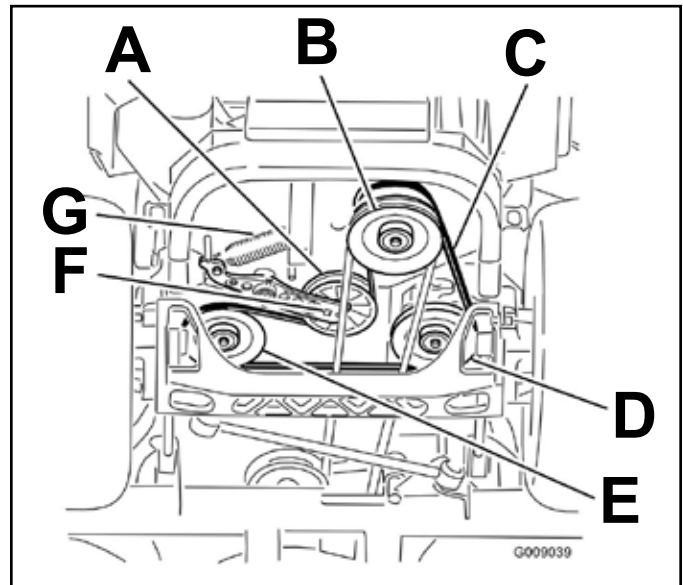


Fig. 385

fig. 83 G009039

- |                                     |                                    |
|-------------------------------------|------------------------------------|
| A. Idler pulley                     | E. Left hand hydraulic pump pulley |
| B. Clutch pulley                    | F. Square hole in idler arm        |
| C. Pump drive belt                  | G. Idler spring                    |
| D. Right hand hydraulic pump pulley |                                    |

6. Unhook the idler spring from the frame (Fig. 385).
7. Remove the belt from the hydraulic unit drive pulleys and the engine pulley.
8. Install the new belt around engine pulley and the two drive pulleys.
9. Using a ratchet in the square hole in the idler arm, install the idler spring to the frame (Fig. 385).
10. Install the mower belt. Refer to "Mower Belt Installation" on page 6-2.
11. Lower the machine to the ground.

## Using the Drive Wheel Release Valves

### WARNING

Hands may become entangled in the rotating drive components below the engine deck, which could result in serious injury.

Stop the engine, remove the key, and allow all moving parts to stop before accessing the drive wheel release valves.

### WARNING

The engine and hydraulic drive units can become very hot. Touching a hot engine or hydraulic drive units can cause severe burns.

Allow the engine and hydraulic drive units to cool completely before accessing the drive wheel release valves.

The drive wheel release valves are located in the back of each hydraulic drive unit, under the seat.

**Note: Make sure the release valves are in fully horizontal position when operating the machine or severe damage to the hydraulic system can occur.**

1. Disengage the PTO (blade control switch) and turn the ignition key to off. Move the levers to neutral locked position and apply the parking brake. Remove the key.

2. Rotate the release valve levers vertically to push the machine. This allows hydraulic oil to by-pass the pump enabling the wheels to turn (Fig. 386).

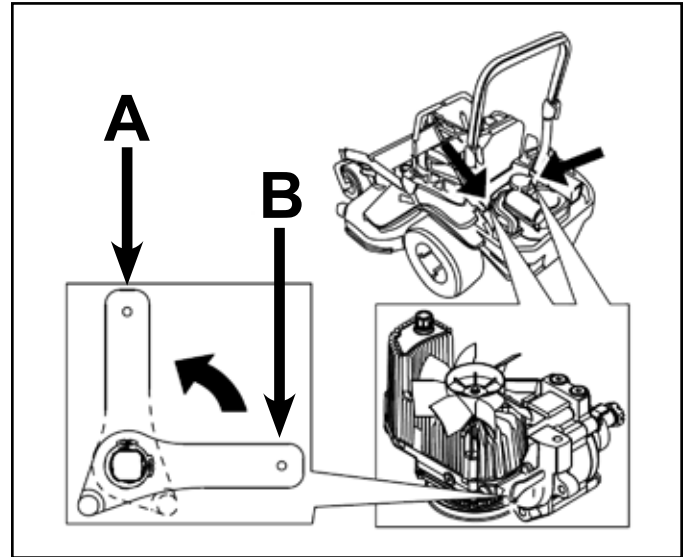


Fig. 386

fig. 36 G008957

- A. Vertical: "released" to push the machine      B. Horizontal: "operating" to drive the machine

3. Disengage parking brake before pushing.
4. Rotate the release valve levers horizontally to run the machine (Fig. 386).



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**5**

## Mower Belt Replacement

### Mower Belt Removal

1. Disengage the PTO, move the motion control levers to the neutral locked position, and set the parking brake.
2. Stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
3. Lower the mower to the 3" (76mm) height-of-cut.
4. Remove the RH belt cover (Fig. 387) and the LH belt cover.



Fig. 387

DSCN-0064a

5. Lift the floor pan.
6. With a 3/8" ratchet or breaker bar in the square hole in the idler arm, release tension on the idler-spring (Fig. 388).



Fig. 388

DSCN-0066a

7. Remove the belt from the mower deck pulleys (Fig. 389).



Fig. 389

DSCN-0067a

# MOWER DECKS

8. Remove the belt guide on the spring-loaded idler arm shown in (Fig. 390).

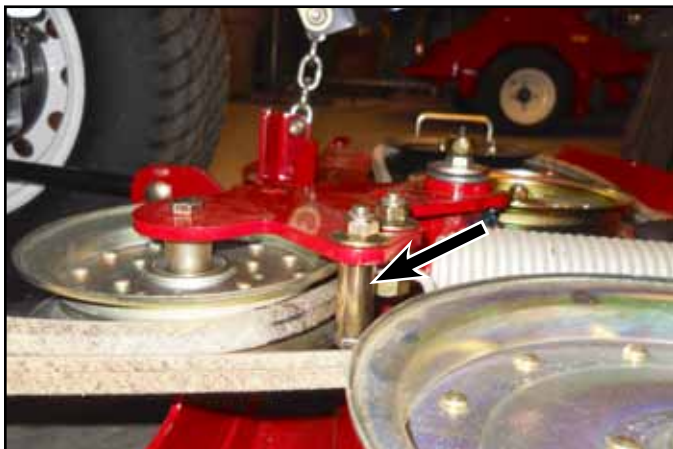


Fig. 390

DSCN-0069a

9. Remove the existing belt.

## Mower Belt Installation

1. Install the new belt around the mower deck pulleys and the clutch pulley under the engine (Fig. 391).

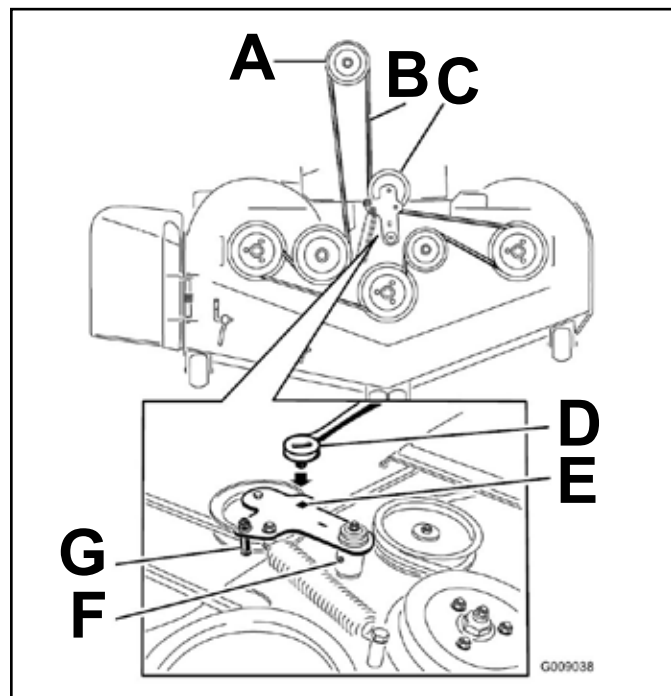


Fig. 391

fig. 81 G009038

- |                               |   |
|-------------------------------|---|
| A. Clutch pulley              | E. Square hole in the idler arm for the ratchet |
| B. Mower belt                 | F. Idler grease zerk                            |
| C. Spring-loaded idler pulley | G. Belt guide                                   |
| D. Ratchet                    |   |

2. Install the belt guide on the idler arm shown in (Fig. 391).
3. Using a 3/8" ratchet or breaker bar in the square hole in the idler arm, install the idler spring (Fig. 391). Make sure the spring ends are seated in the anchor grooves.

4. Install the RH and LH belt covers (Fig. 392).



Fig. 392

DSCN-0064a

## Mower Deck Replacement

### Mower Deck Removal

**Note:** Before servicing or removing the mower deck, the spring loaded deck arms must be locked out.

#### WARNING

Deck lift-arm assemblies have stored energy. Removing the deck with out releasing the stored energy can cause serious injury or death.

Do not attempt to disassemble the deck from the front frame without locking out the stored energy.

1. Stop engine, wait for all moving parts to stop, and remove key. Engage parking brake.
2. Remove height adjustment pin and lower the deck to the ground.
3. Place the height adjustment pin in the 3" (7.6cm) cutting height position. This locks the deck lift arms in the lower position when the deck is removed and the stored energy in the deck spring is released.
4. Remove the RH and LH belt covers (Fig. 393).



Fig. 393

DSCN-0072

# MOWER DECKS

5. Lift up the floor pan and insert a ratchet or breaker bar into the square hole in the deck idler assembly (Fig. 394)

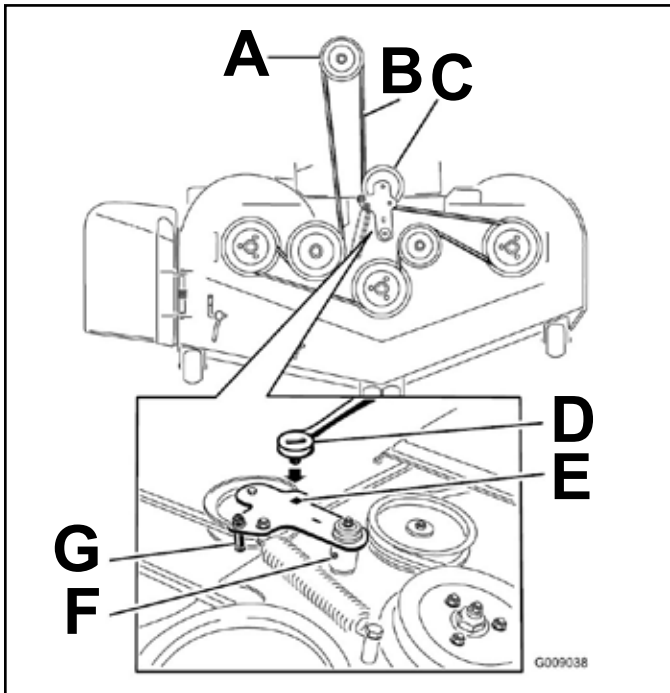


Fig. 394

fig. 81 G009038

- |                               |   |
|-------------------------------|---|
| A. Clutch pulley              | E. Square hole in the idler arm for the ratchet |
| B. Mower belt                 | F. Idler grease zerk                            |
| C. Spring-loaded idler pulley | G. Belt guide                                   |
| D. Ratchet                    |   |

6. Rotate the deck idler assembly clockwise and remove the mower drive belt from electric PTO clutch pulley (Fig. 394).

# MOWER DECKS

7. Remove and retain the hardware on both sides of the deck (Fig. 395 or Fig. 396).

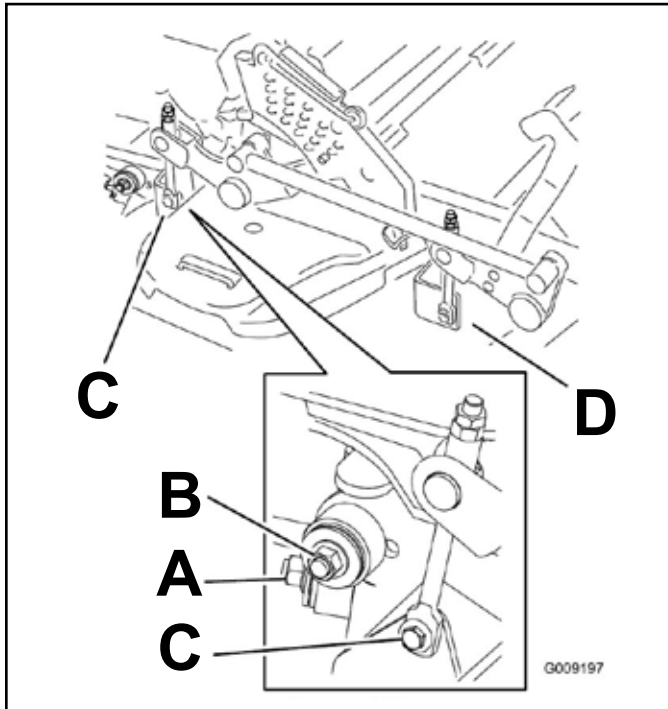


Fig. 395

fig. 105 G009197

- A. Right stabilizer
- B. Deck strut (right side shown)
- C. Remove the rear deck lift attachment shoulder bolt & nut
- D. Remove the front deck lift attachment shoulder bolt & nut

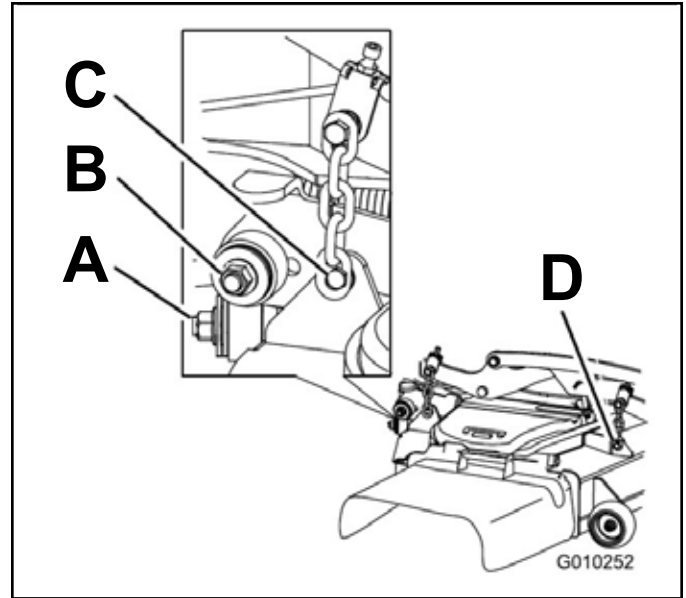


Fig. 396

fig. 106 G010252

- A. Right stabilizer
  - B. Deck strut (right side shown)
  - C. Remove the rear deck lift attachment shoulder bolt & nut
  - D. Remove the front deck lift attachment shoulder bolt & nut
8. Raise the deck struts and secure them in the up position. Slide the deck out on the right side of the machine.

# MOWER DECKS

## Mower Deck Installation

Reverse the order of mower deck removal.

## Extension Spring Adjustment (2010 - 2012 Models)



Fig. 397

DSCN-0136

DECK SIZE	(X.XX) DIMENSION
48	.62
52	.62
60	1.00
72	.62

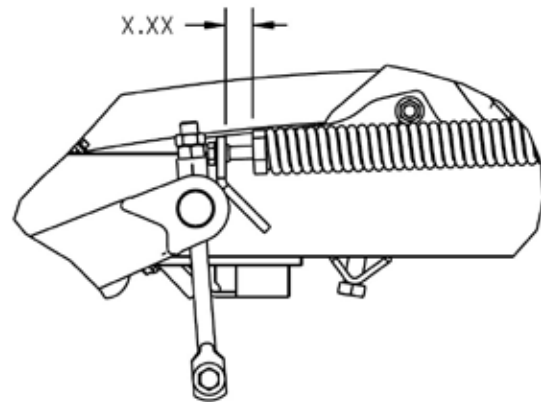


Fig. 398

116-5700K12

6

## Mower Spindle Replacement

### Mower Spindle Removal (2009 Model G3 Series Units)

The following procedure applies to removing any of the three mower spindles. This example shows removing the right side spindle.

1. Park the machine on level surface, disengage the PTO clutch, turn the ignition off and remove the key.
2. Remove the negative battery cable from the battery.
3. Remove the RH mower deck belt cover (Fig. 399).



Fig. 399

DSCN-0072

4. Lift and remove the floor pan and with a 3/8" ratchet or breaker bar in the square hole for the idler arm, loosen the mower deck drive-belt and remove belt from RH mower spindle-pulley (Fig. 400).



Fig. 400

DSCN-0020a

5. Remove three bolts retaining the pulley to the pulley hub (Fig. 401).



Fig. 401

DSCN-2662a



# MOWER DECKS

---

6. Raise the mower deck to the transport position.
7. Remove the mower blade from the spindle assembly.
8. Remove the 5 bolts and nuts retaining the spindle assembly to the mower deck (Fig. 402).

## Mower Spindle Installation (2009 Model G3 Series Units)

Reverse the order of mower spindle removal (2009 model G3 Series units).



Fig. 402

DSCN-2666a

6

## Mower Spindle Disassembly (2009 Model G3 Series Units)

1. Place the blade saddle in a vise.
2. Remove the nut and washer (Fig. 403).



Fig. 403

DSCN-2669a

3. Remove the pulley hub and square key (Fig. 404).



Fig. 404

DSCN-2670a

4. Remove the bearing shield (Fig. 405).



Fig. 405

DSCN-2671a

5. Remove the spindle housing from the spindle shaft assembly (Fig. 406).



Fig. 406

DSCN-2672a

# MOWER DECKS

6. Remove the seal spacer from the top of the spindle housing (Fig. 407).



Fig. 407

DSCN-2673a

8. Remove the top oil seal from the spindle housing (Fig. 409).



Fig. 409

DSCN-2675a

7. Remove the seal spacer from the bottom of the spindle housing (Fig. 408).



Fig. 408

DSCN-2674a

9. Remove the bearing from the top of the spindle housing (Fig. 410).



Fig. 410

DSCN-2676a

6

# MOWER DECKS

10. Remove the spacer (Fig. 411).



Fig. 411

DSCN-2677a

12. Remove the bearing from the bottom of the spindle (Fig. 413).



Fig. 413

DSCN-2680a

11. Turn the spindle housing over and remove the oil seal from the bottom of the spindle housing (Fig. 412). Note the orientation of the lower oil seal. The open end of the seal faces outwards to help relieve pressure from over-greasing the spindle assembly.



Fig. 412

DSCN-2679a

13. Using a hammer and a driver with a square edge, drive both the top and bottom bearing races out of the spindle housing (Fig. 414).



Fig. 414

DSCN-2681a

# MOWER DECKS

14. Remove the large spacer in the spindle housing (Fig. 415).



Fig. 415 DSCN-2682a

## Mower Spindle Assembly (2009 Model G3 Series Units)

1. Install the spacer through the top of the spindle housing (Fig. 417).



Fig. 417 DSCN-2688a

15. This view shows the 2 bearing races and the large spacer in the spindle housing (Fig. 416).



Fig. 416 DSCN-2684a

A. Bearing race spacer B. Center spacer

2. Using a press, install the upper bearing race into the spindle housing (Fig. 418).

**Note:** The wider inside diameter of the bearing race should be facing up to accept the tapered bearing.



Fig. 418 DSCN-2689a

3. Turn the spindle housing over and install the lower bearing race into the spindle housing (Fig. 419).

**Note:** The wider inside diameter of the bearing race should be facing up to accept the tapered bearing.



Fig. 419

DSCN-2690a

4. Pack the bearing with No. 2 grease and install the bearing (Fig. 420).



Fig. 420

DSCN-2691a

5. Install the lower seal (Fig. 421).

**Note:** The open lip of the seal should be facing outward.



Fig. 421

DSCN-2692a

6. Using a seal driver, drive or press the seal on the lower end of the spindle housing until the seal is flush with the outer edge of the housing (Fig. 422).



Fig. 422

DSCN-2693a

# MOWER DECKS

7. Install the inner spacer to the spindle assembly (Fig. 423).



Fig. 423

DSCN-2700a

9. Install the seal. Press it flush with the top of the housing (Fig. 425).



Fig. 425

DSCN-2696a

8. Pack the bearing with No. 2 grease and install the bearing (Fig. 424).



Fig. 424

DSCN-2694a

10. Install the bearing shield and the seal spacer onto the spindle shaft (Fig. 426).



Fig. 426

DSCN-2702a

6

# MOWER DECKS

11. Lower the spindle housing over the spindle shaft (Fig. 427).



Fig. 427

DSCN-2703a

13. Install bearing shield (Fig. 429).



Fig. 429

DSCN-2705a

12. Install the seal spacer on the top of the spindle housing (Fig. 428).



Fig. 428

DSCN-2704a

14. Install the square key onto the spindle shaft.

15. Install the pulley hub on the spindle shaft (Fig. 430).

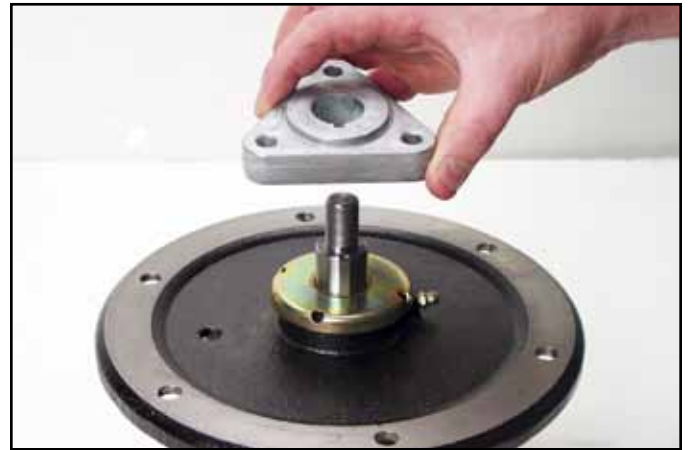


Fig. 430

DSCN-2707a



# MOWER DECKS

16. Install the heavy washer and nut on the top of the spindle shaft (Fig. 431).

**Note:** The cup side of the washer should be facing down toward the pulley hub.



Fig. 431

DSCN-2708a

17. Torque the top nut to 100 - 120 ft-lbs. (135.58 - 162.7 Nm) (Fig. 432).



Fig. 432

DSCN-2709a

18. Grease the spindle assembly using a grease gun with No. 2 grease.

## Mower Spindle Replacement (2010 & Later Model G3, 3000/5000/6000 Series Units)

### Mower Spindle Removal (2010 & Later Model G3, 3000/5000/6000 Series Units)

**Note:** The following procedure applies to removing any of the three mower spindles. This procedure shows removing the right side spindle.

1. Park the machine on level surface, disengage the PTO clutch, turn the ignition switch off and remove the key.
2. Remove the negative battery cable from the battery.
3. Remove the RH mower deck belt cover (Fig. 433).



Fig. 433

DSCN-0072

4. Lift and remove the floor pan. With a 3/8" ratchet or breaker bar in the square hole for the idler arm, loosen the mower deck belt and remove the belt from the RH mower spindle-pulley (Fig. 434).



Fig. 434

DSCN-0020a

## Mower Spindle Installation (2010 & Later Model G3, 3000/5000/6000 Series Units)

Reverse the order of mower spindle removal (2010 & later model G3, 3000/5000/6000 Series units).

1. Install the spindle assembly in the mower deck and tighten the 6 flange nuts. Torque the nuts to  $37 \pm 4$  ft-lbs. ( $50 \pm 5.4$  Nm).

5. Raise the mower deck to the top transport position. Remove the mower blade from the spindle shaft.
6. Remove the 6 flange nuts retaining the spindle assembly to the mower deck and remove the spindle assembly from the deck (Fig. 435).



Fig. 435

DSCN-0079a

# MOWER DECKS

## Mower Spindle Disassembly (2010 & Later Model G3, 3000/5000/6000 Series Units)

1. Remove the 3 flange nuts retaining the pulley to the spindle hub (Fig. 436).



Fig. 436

DSCN-0082a

2. Remove the top lock nut and washer from the spindle shaft (Fig. 437).



Fig. 437

DSCN-0087a

3. Remove the spindle hub assembly (Fig. 438).



Fig. 438

DSCN-0089a

4. Remove the spindle shaft (Fig. 439).



Fig. 439

DSCN-0090a

6

# MOWER DECKS

5. Remove the top oil seal (Fig. 440).



Fig. 440

DSCN-0092a

7. Remove the spacer from the spindle housing (Fig. 442).



Fig. 442

DSCN-0094a

6. Using a hammer and driver with a square edge, drive the bearing out of the spindle housing (Fig. 441).



Fig. 441

DSCN-0093

8. Using a hammer and driver with a square edge, drive the bottom bearing and seal out of the spindle housing (Fig. 443).



Fig. 443

DSCN-0096a

# MOWER DECKS

**Note:** There is a snap ring located in the spindle housing (Fig. 444). If replacing the bearings and seals only, there is no need to remove the snap ring, unless it shows damage.



Fig. 444

DSCN-0106a

## Mower Spindle Assembly (2010 & Later Model G3, 3000/5000/6000 Series Units)

1. Install the bottom bearing. Press up against the snap ring (Fig. 445).



Fig. 445

DSCN-0118a

2. Apply a film of grease around the lip of the seal and install the lip of the seal face inward (Fig. 446).



Fig. 446

DSCN-0119a

6

# MOWER DECKS

3. Install the spacer in the spindle housing (Fig. 447).



Fig. 447

DSCN-0116a

4. Turn the spindle housing over and press the bearing in the bottom of the housing until the bearing seats against the spacer (Fig. 448).



Fig. 448

DSCN-0111a

**Note:** The open lip of the seal should be facing outward (Fig. 449).



Fig. 449

DSCN-0112a

# MOWER DECKS

5. Press seal into the bottom of the spindle housing (Fig. 450).



Fig. 450 DSCN-0115a

7. Install the spindle hub on the spindle shaft (Fig. 452).



Fig. 452 DSCN-0123a

6. Install spindle shaft in the spindle housing (Fig. 451).



Fig. 451 DSCN-0122a

8. Install the washer and lock nut retaining the spindle hub to the spindle shaft. Torque the nut to  $120 \pm 5$  ft-lbs. ( $162.7 \pm 6.8$  Nm) (Fig. 453).



Fig. 453 DSCN-0125

9. Install the pulley on the spindle hub and torque the 3 flange nuts to  $37 \pm 4$  ft-lbs. ( $50 \pm 5.4$  Nm).
10. Grease the spindle assembly using No. 2 grease.

## Leveling the Mower Deck

### Deck Leveling

**Note: Ensure the mower deck is leveled before matching the height-of-cut (HOC).**

1. Position the mower on a flat surface.
2. Stop engine, wait for all moving parts to stop, and remove key. Engage parking brake.
3. Check the tire pressure in the drive tires. Proper inflation pressure for tires is 13 psi (90 kPa). Adjust if necessary.
4. Position the transport lock in the latching position.
5. Push the deck lift pedal all the way forward and the deck will latch at the 5 1/2" (14cm) transport position (Fig. 454).

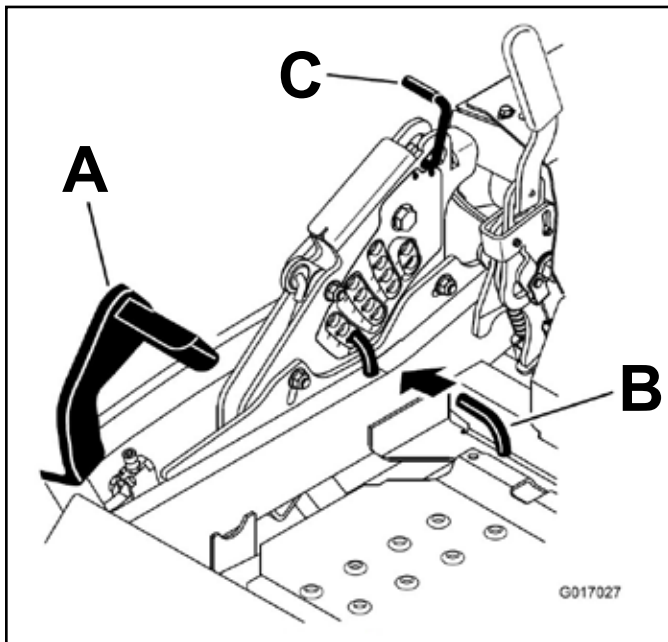


Fig. 454 fig. 92 G017027

- A. Deck lift pedal
- B. Height -of-cut pin
- C. Transport lock

6. Insert the height adjustment pin into the 3" (7.6cm) cutting height location.
7. Release the transport lock and allow the deck to lower to the cutting height.
8. Raise the discharge chute.
9. On both sides of the deck, measure from the level surface to the front tip of the blade (Position A). The measurement should read 3" (7.6mm) (Fig. 455).

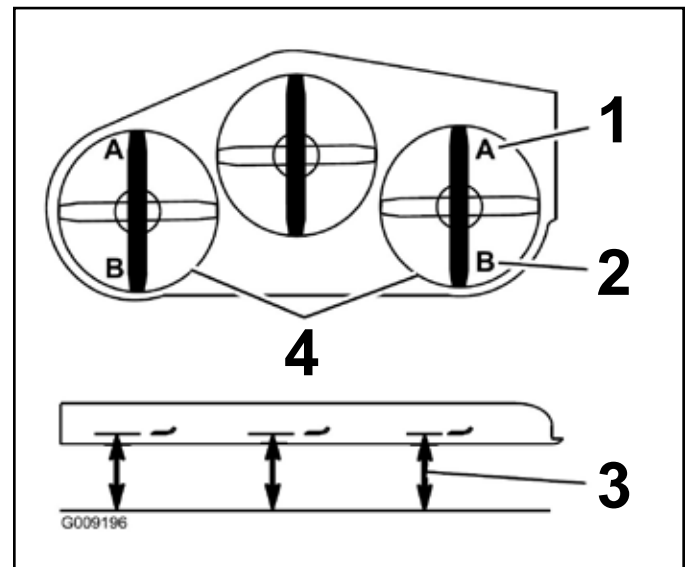


Fig. 455 fig. 93 G009196

1. 3" (7.6cm) at A is correct
2. 3-1/4" (8.3cm) at B is correct
3. Measure here from the blade tip to hard surface
4. Measure at A & B on both sides



# MOWER DECKS

10. For mower decks shown below, fine-tune the adjustment nut on the front deck lift-assembly by turning it (Fig. 456).

**Note:** To increase the height, turn the adjustment nut clockwise; to decrease, turn counter-clockwise.

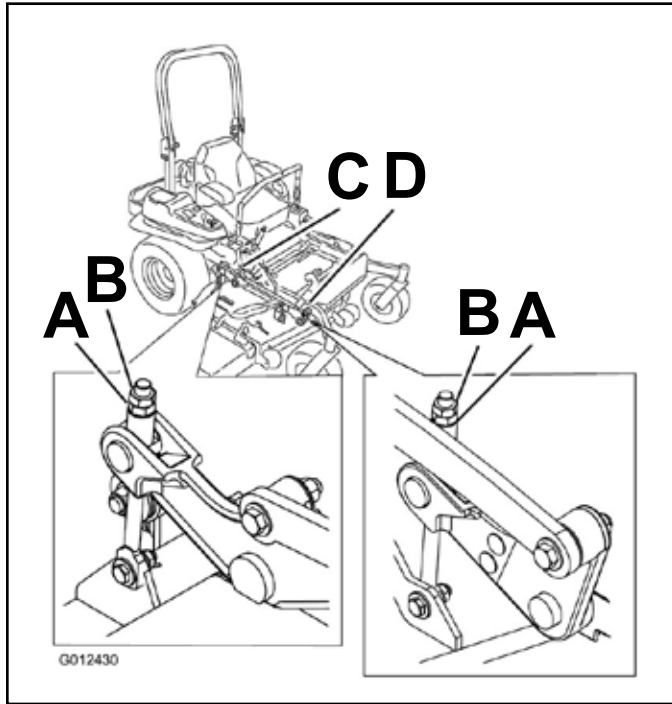


Fig. 456 fig. 94 G012430

- A. Adjustment nut
- B. Jam nut
- C. Rear deck adjustment
- D. Front deck adjustment

11. For mower decks shown below, fine-tune the adjustment nut on the front deck lift-assembly by turning it (Fig. 457).

**Note:** To increase the height, turn the adjustment nut clockwise; to decrease, turn counter-clockwise.

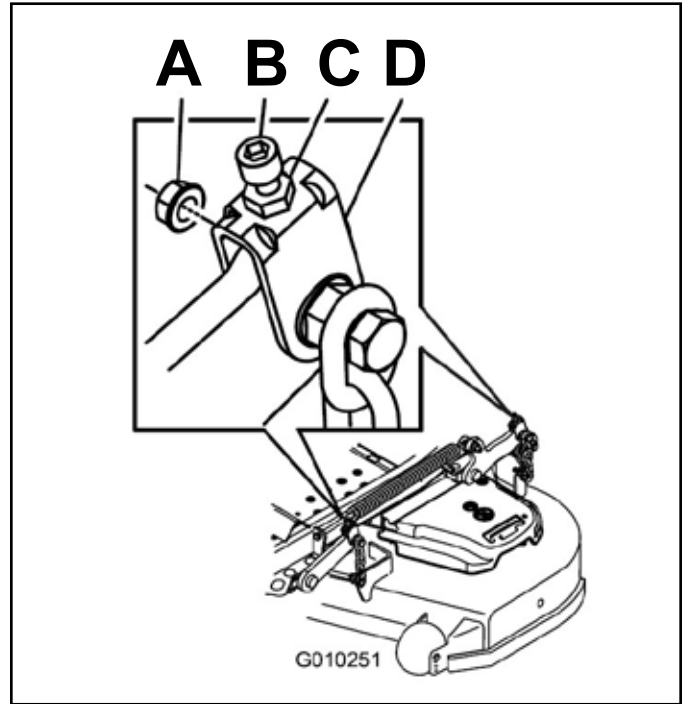


Fig. 457 fig. 95 G010251

- A. Whizlock nut
- B. Adjuster screw
- C. Jam nut
- D. Yoke

6

# MOWER DECKS

12. If the front deck links do not have enough adjustment to achieve accurate cut height, the single point adjustment can be utilized to gain more adjustment.
13. To adjust the single point system, loosen the two bolts at the bottom of the height-of-cut plate (Fig. 458).

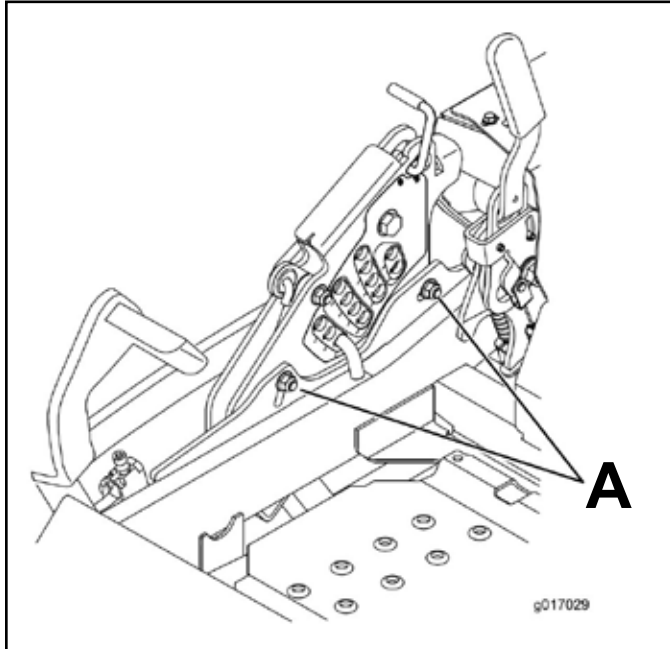


Fig. 458

fig. 96 G017029

A. Bolts at the bottom of the height-of-cut plate

14. If the deck is too low, tighten the single point adjustment bolt by rotating it clockwise. If the deck is too high, loosen the single point adjustment bolt by rotating it counterclockwise (Fig. 459).

**Note:** Loosen or tighten the single point adjustment bolt enough to move the height-of-cut plate mounting bolts at least 1/3 the length of the available travel in their slots. This will regain some up and down adjustment on each of the four deck links.

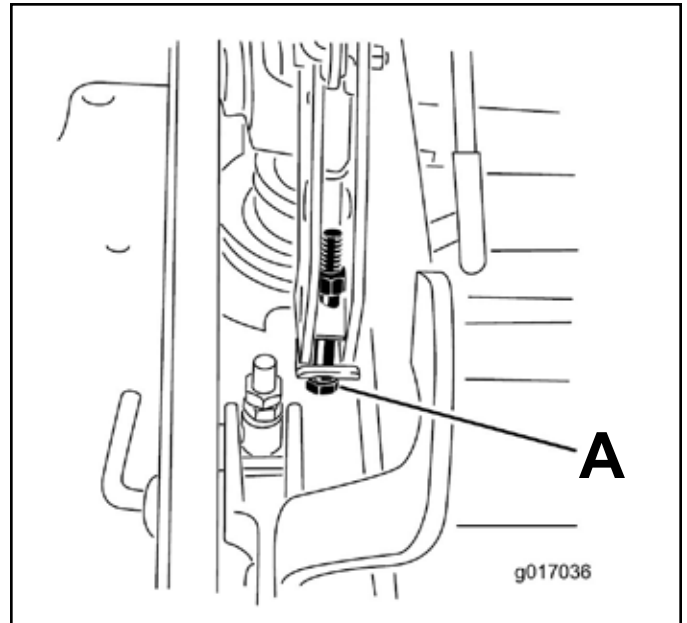


Fig. 459

fig. 97 G017036

A. Single point adjustment bolt

6

# MOWER DECKS

15. Tighten the two bolts at the bottom of the height-of-cut plate (Fig. 460). Torque to 27-33 ft-lbs. (37-45 Nm).

**Note:** In most conditions, the back blade tip should be adjusted 1/4" (6.4mm) higher than the front.

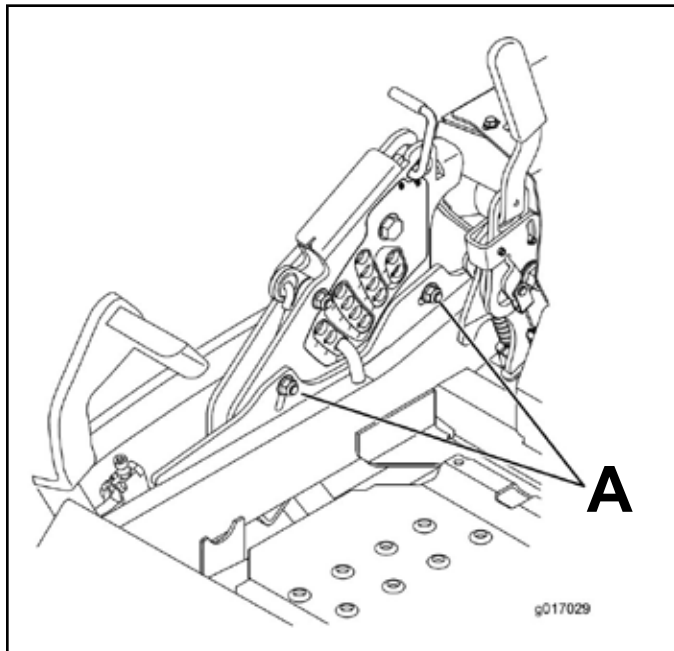


Fig. 460

fig. 96 G017029

A. Bolts at the bottom of the height-of-cut plate

16. On both sides of the deck, measure from the level surface to the back tip of the blade (Position B). The measurement should read 3-1/4" (8.3cm) (Fig 461).

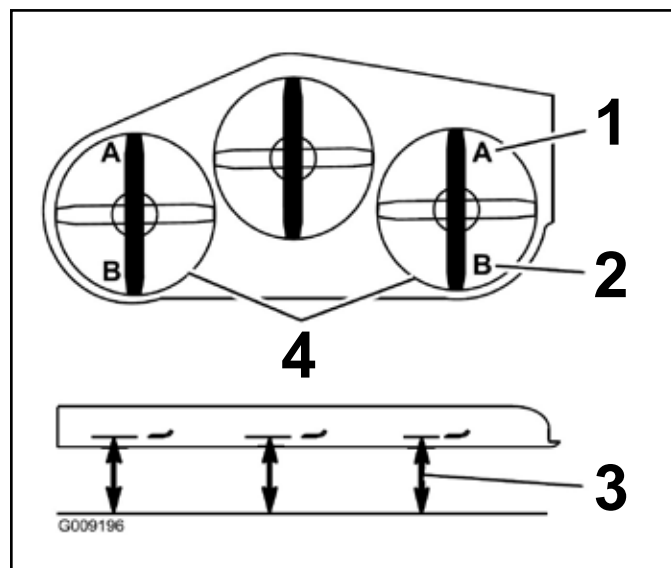


Fig. 461

fig. 93 G009196

1. 3" (7.6cm) at A is correct
2. 3-1/4" (8.3cm) at B is correct
3. Measure here from the blade tip to hard surface
4. Measure at A & B on both sides

6

17. Fine-tune the adjustment nut on the front deck lift assembly by turning it (Fig. 462).

**Note:** To increase the height, turn the adjustment nut clockwise; to decrease, turn counter-clockwise.

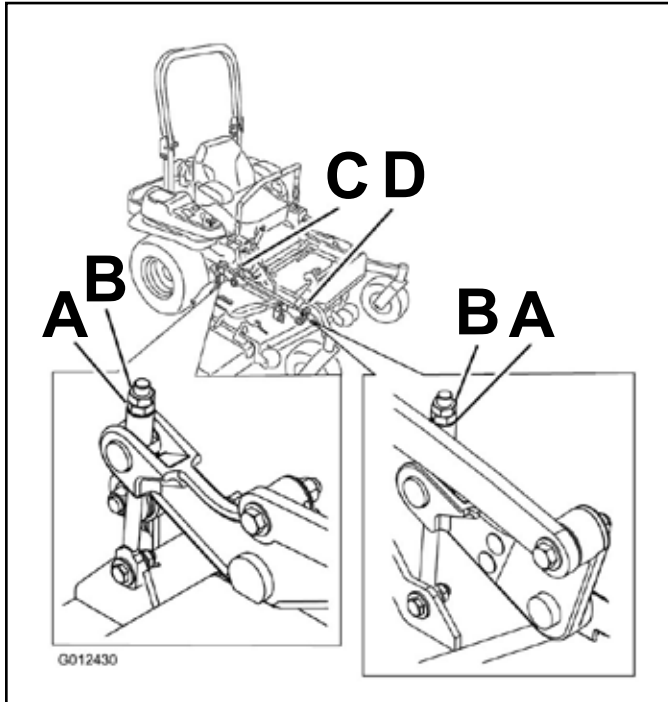


Fig. 462

fig. 94 G012430

- A. Adjustment nut                      C. Rear deck adjustment  
B. Jam nut                                D. Front deck adjustment

18. Measure until all four sides are the correct height. Tighten all the jam nuts on the deck lift arm assemblies.

19. Lower discharge chute.

## Servicing the Cutting Blades

Maintain sharp blades throughout the cutting season because sharp blades cut cleanly without tearing or shredding the grass blades. Tearing and shredding turns grass brown at the edges, which slows growth and increases the chance of disease.

Check the cutter blades daily for sharpness, and for any wear or damage. File down any nicks and sharpen the blades as necessary. If a blade is damaged or worn, replace it immediately with a genuine Toro replacement blade. For convenient sharpening and replacement, you may want to keep extra blades on hand.



**DANGER**



A worn or damaged blade can break, and a piece of the blade could be thrown into the operator's or bystander's area, resulting in serious personal injury or death.

- Inspect the blade periodically for wear or damage.
- Replace a worn or damaged blade.

## Before Inspecting or Servicing the Blades

Park the machine on a level surface, disengage the blade control switch (PTO), and set the parking brake. Turn the ignition key to Off. Remove the key.

# MOWER DECKS

## Inspecting the Blades

**Service Interval:** Before each use or daily

1. Inspect the cutting edges (Fig. 463).

**Note:** If the edges are not sharp or have nicks, remove and sharpen the blades. Refer to “Sharpening the Blades” on page 6-30.

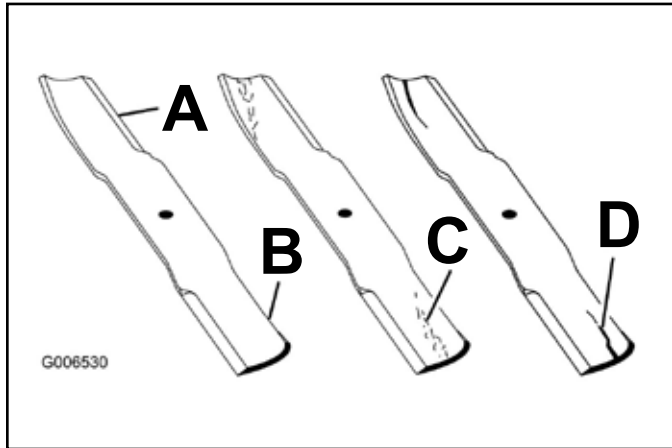


Fig. 463

fig. 98 G006530

- |                 |                      |
|-----------------|----------------------|
| A. Cutting edge | C. Wear/slot forming |
| B. Curved Area  | D. Crack             |

2. Inspect the blades, especially the curved area (Fig. 098). If you notice any damage, wear, or a slot forming in this area (Fig. 463), immediately install a new blade.

## Checking for Bent Blades

1. Disengage the blade control switch (PTO), move the motion control levers to the neutral locked position and set the parking brake.
2. Stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
3. Rotate the blades until the ends face forward and backward (Fig. 464). Measure from a level surface to the cutting edge, position A, of the blades (Fig. 464). Note this dimension.

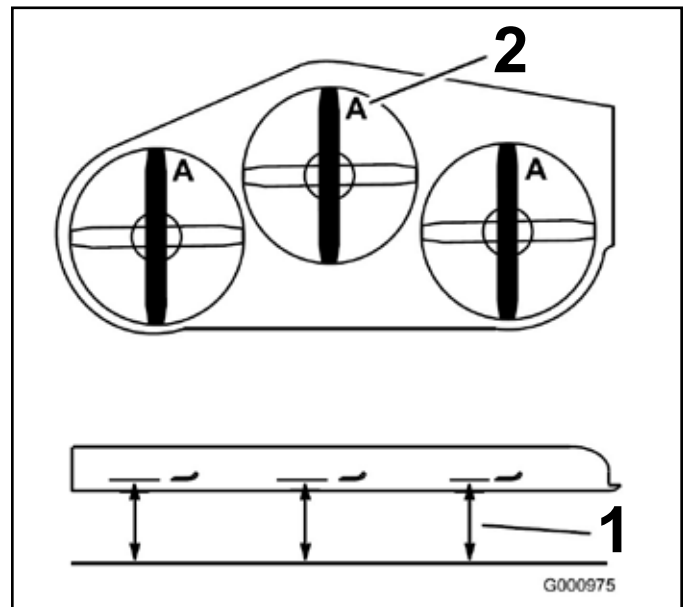


Fig. 464

fig. 99 G000975

1. Measure here from blade to hard surface
2. Position A

6

4. Rotate the opposite ends of the blades forward.
5. Measure from a level surface to the cutting edge of the blades at the same position as in step 3 above.
6. The difference between the dimensions obtained in steps 3 and 4 must not exceed 1/8" (3mm). If this dimension exceeds 1/8" (3mm), the blade is bent and must be replaced; refer to "Removing the Blades" on page 6-29 and "Installing the Blades" on page 6-30.

## WARNING

A blade that is bent or damaged could break apart and could seriously injure or kill you or bystanders.

- Always replace bent or damaged blade with a new blade.
- Never file or create sharp notches in the edges or surfaces of blade.

## Removing the Blades

Blades must be replaced if a solid object is hit, if the blade is out of balance, or is bent. To ensure optimum performance and continued safety conformance of the machine, use genuine Toro replacement blades. Replacement blades made by other manufacturers may result in non-conformance with safety standards.

1. Hold the blade end using a rag or thickly padded glove.
2. Remove the blade bolt, curved washer, and blade from the spindle shaft (Fig. 465).

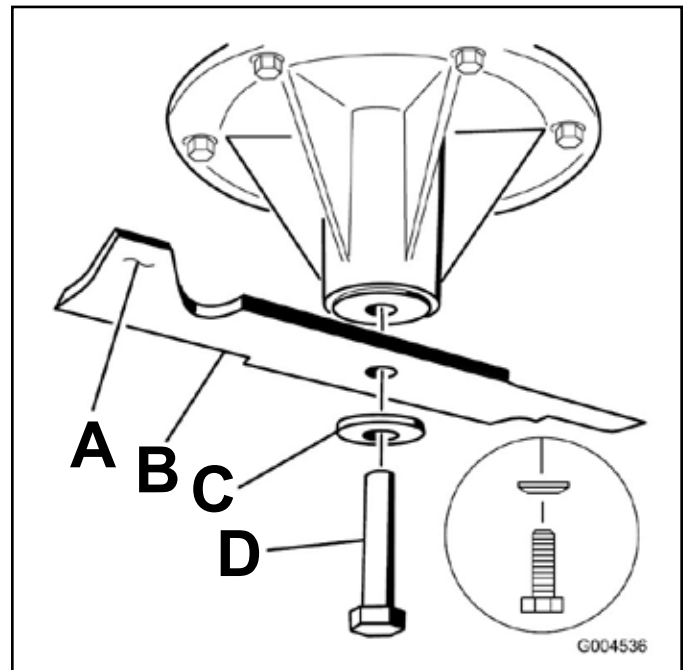


Fig. 465

fig. 100 G004536

- |                       |                  |
|-----------------------|------------------|
| A. Sail area of blade | C. Curved washer |
| B. Blade              | D. Blade bolt    |

# MOWER DECKS

## Sharpening the Blades

### WARNING

When sharpening blade, pieces of blade could be thrown and cause serious injury.

Wear proper eye protection when sharpening blade.

1. Use a file to sharpen the cutting edge at both ends of the blade (Fig. 466). Maintain the original angle. The blade retains its balance if the same amount of material is removed from both cutting edges.

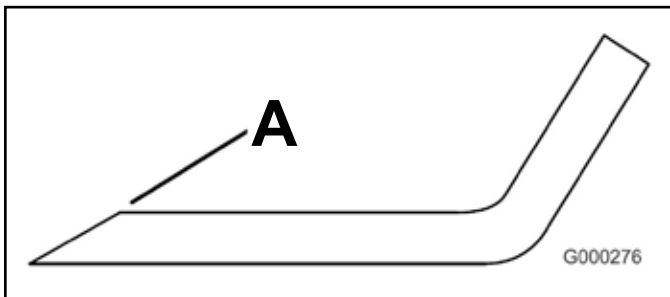


Fig. 466

fig. 101 G000276

- A. Sharpen at original angle

2. Check the balance of the blade by putting it on a blade balancer (Fig. 467). If the blade stays in a horizontal position, the blade is balanced and can be used. If the blade is not balanced, file some metal off the end of the sail area only (Fig. 468). Repeat this procedure until the blade is balanced.

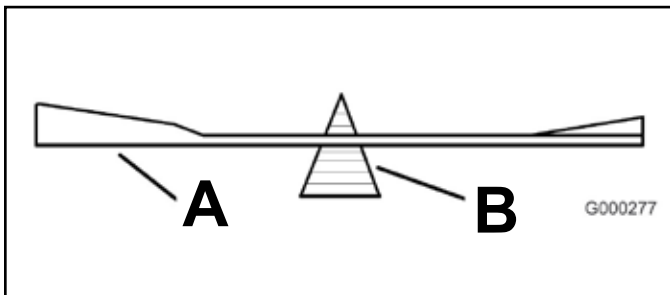


Fig. 467

fig. 102 G000277

- A. Blade

- B. Balancer

## Installing the Blades

1. Install the blade onto the spindle shaft (Fig. 468).

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

2. Install the spring disk and blade bolt. The spring disk cone must be installed toward the bolt head (Fig. 468). Torque the blade bolt to 85-110 ft-lbs. (115-150 Nm).

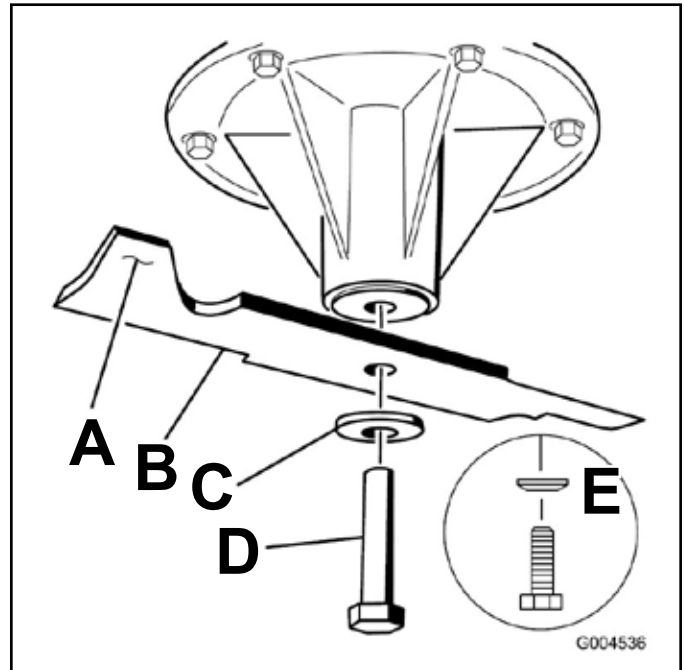


Fig. 468

fig. 100 G004536

- A. Sail area of blade

- B. Blade

- C. Spring disk

- D. Blade bolt

- E. Cone towards bolt head

## Electric PTO Clutch Replacement

### Electric PTO Clutch Removal

1. Remove the battery negative cable from the battery.
2. Lift and remove the floor pan. With a 3/8" breaker bar in the hole for the idler arm, loosen the mower deck drive-belt and remove from the electric PTO clutch (Fig. 469).



Fig. 469

DSCN-0020a

3. Raise the machine in the rear and support it with jack stands (Fig. 470).



Fig. 470

DSCN-0071a

4. Unplug the wire plug from the electric PTO clutch (Fig. 471).



Fig. 471

DSCN-0028a

5. Remove the bolt, spring washers, and washer retaining the electric PTO to the engine crankshaft and remove from the clutch (Fig. 472).



Fig. 472

DSCN-0031a



# MOWER DECKS

## Electric PTO Clutch Installation

1. Prepare the clutch bolt, spring washers (with crown of the washers facing the bolt head), and washer (Fig. 473).



Fig. 473

DSCN-0060a

- A. Bolt  
B. Spring Washer (2)  
C. Washer

2. Install the electric PTO clutch on the crankshaft; make sure the slot on the clutch fits on the clutch anchor. Using the bolt, spring washers, and washer, torque the clutch bolt to  $55 \pm 6$  ft-lbs. ( $74.6 \pm 8$  Nm) (Fig. 474).



Fig. 474

DSCN-0061a

3. Plug the clutch wire plug into the electric PTO clutch (Fig. 475).



Fig. 475

DSCN-0028a

4. Using a 3/8" breaker bar, install the mower idler arm assembly and relieve the tension on the idler arm assembly. Install the mower drive belt around the electric PTO clutch (Fig. 476).



Fig. 476

DSCN-0020a

5. Install the floor pan.
6. Remove the jack stands and lower the machine to the ground.
7. Install the battery negative cable to the battery.

## Using the Clutch Shim

Some later model year units have been built with clutches that contain a brake shim. When the clutch brake has worn to the point where the clutch no longer engages consistently, the shim can be removed to extend the clutch life (Fig. 477).

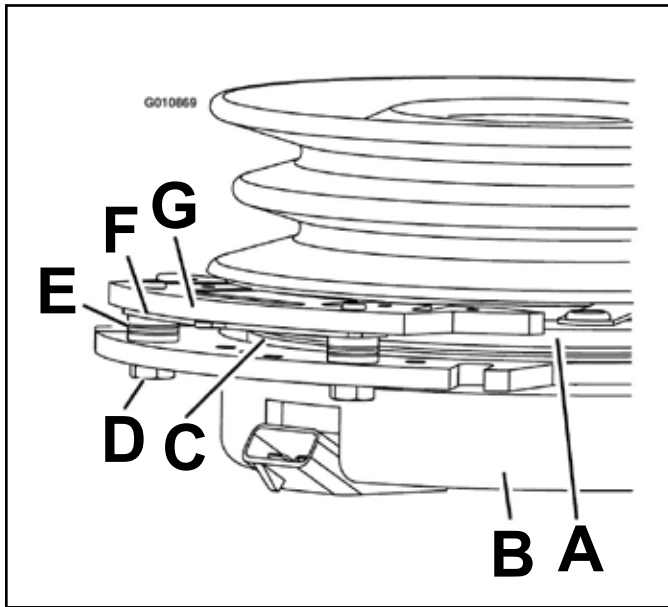


Fig. 477

fig. 70 G010869

- |                        |                 |
|------------------------|-----------------|
| A. Armature            | E. Brake spacer |
| B. Field shell         | F. Re-gap shim  |
| C. Rotor               | G. Brake pole   |
| D. Brake mounting bolt |                 |

## Removing the Clutch Shim

1. Stop the engine, wait for all moving parts to stop, and remove the key. Engage the parking brake. Allow the machine to cool completely before starting these instructions.
2. Using an air compressor, blow out any debris from under the brake pole and around the brake spacers (Fig. 478).

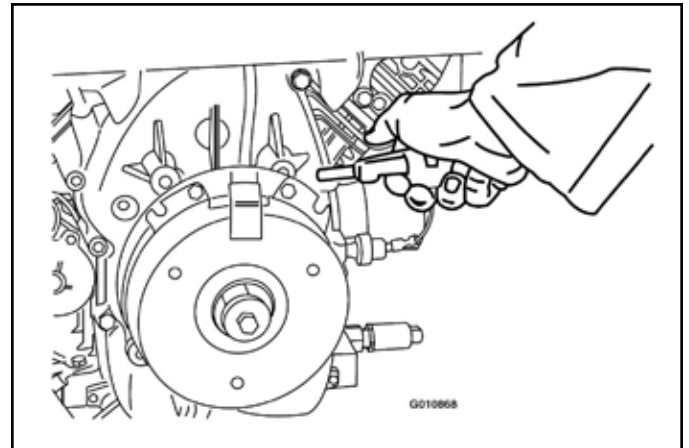


Fig. 478

fig. 71 G010868

3. Check the condition of the wire harness leads, connectors, and terminals. Clean or repair as necessary.
4. Verify that 12V is present at the clutch connector when the PTO switch is engaged.

# MOWER DECKS

5. Measure the gap between the rotor and armature. If the gap is greater than 0.04" (1mm), proceed.
6. Loosen both brake mounting-bolts one-half to one full turn (Fig. 479).

**Note:** Do not remove the brake pole from the field shell/armature. The brake pole has worn to match the armature and needs to continue to match after the shim is removed to ensure proper brake torque.

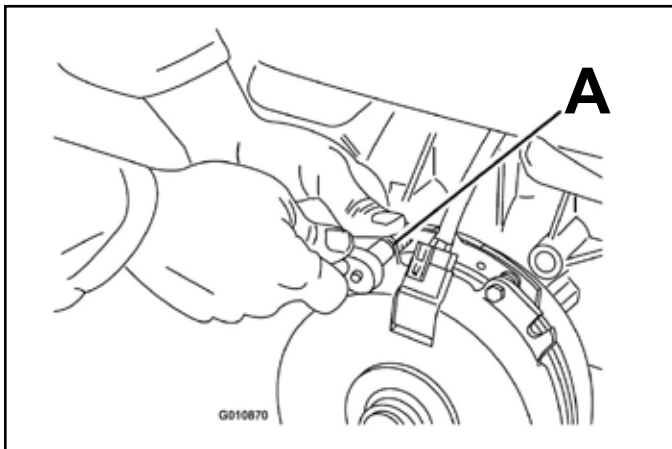


Fig. 479 fig. 72 G010870

- A. Brake mounting bolt

7. Using needle nose pliers, or by hand, take hold of the tab and remove the shim (Fig. 480).

**Note:** Do not discard the shim until proper clutch function has been confirmed.

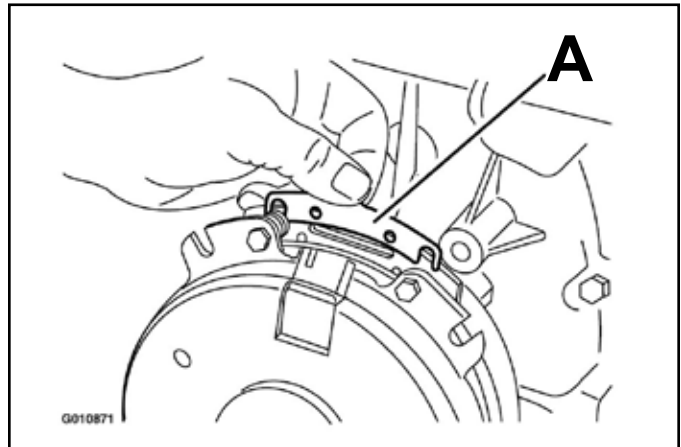


Fig. 480 fig. 73 G010871

- A. Brake mounting bolt
8. Using a pneumatic line, blow out any debris from under the brake pole and around the brake spacers.
  9. Re-torque each bolt (M6 x 1) to 10 ± 0.5 ft-lbs. (13 ± 0.7 Nm).

- Using a 0.010" thick feeler gauge, verify that a gap is present between the rotor and armature face on both sides of the brake pole (Fig. 481 and Fig. 482).

**Note:** Due to the way the rotor and armature faces wear (peaks and valleys) it is sometimes difficult to measure the true gap.

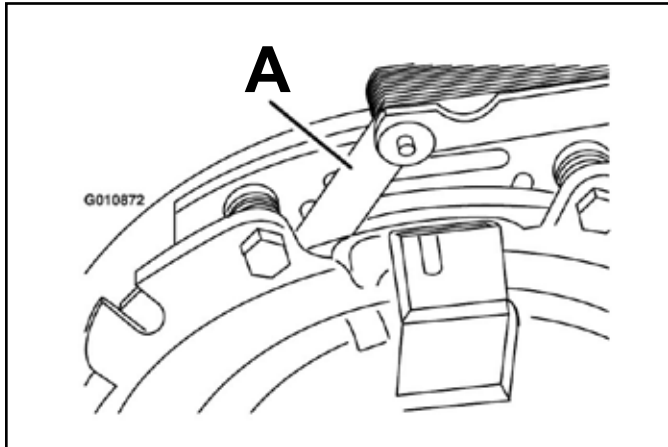


Fig. 481

fig. 74 G010872

A. Feeler gauge

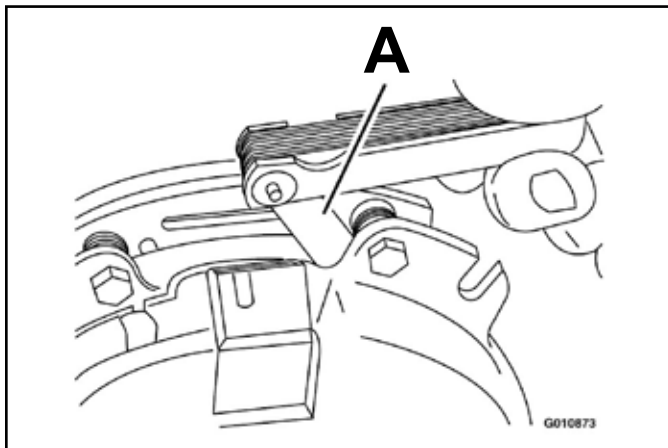


Fig. 482

fig. 75 G010873

A. Feeler gauge

- If the gap is less than 0.010 inch, then reinstall the shim and reference the Troubleshooting section of the Owner's Manual.
- If the gap is sufficient, proceed with the "Safety Check" on page 6-35.

## Safety Check

- Sit on the seat and start the engine.
- Make sure the blades Do Not engage with the PTO switch "off" and the clutch disengaged. If the clutch does not disengage, reinstall the shim and reference the Troubleshooting section of the Owner's Manual.
- Engage and disengage the PTO switch ten consecutive times to ensure the clutch is functioning properly. If the clutch does not engage properly, reference the Troubleshooting section of the Owner's Manual.

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## General

**Note:** Interactive Electrical Troubleshooting DVD, Part #492-9193 is also available.

## Relay

### Purpose

There is one relay on this machine.

1. **Start Relay:** Functions as an electronic switch. Once the safety connections are met, the relay will activate completing the circuit to the starter solenoid.

### Location

The relay is located on the frame, right side of the engine, in front of the battery (Fig. 483).



Fig. 483

DSCN-0008

## How It Works

A relay is an electrically actuated switch.

1. **Coil:** Terminals 85 and 86 are connected to a coil. Applying 12 volts to these terminals energizes the coil turning it into an electromagnet.
2. **Switch:** Terminals 30, 87 and 87a are actually part of a single pole, double throw (SPDT) switch. Terminal 30 is the common lead. The switch is spring loaded so that 30 and 87a are connected when the coil is not energized. When the coil is energized, the switch is “thrown” and terminals 30 and 87 are connected (Fig. 484).



Fig. 484

DSC-2517a

# ELECTRICAL

## Testing

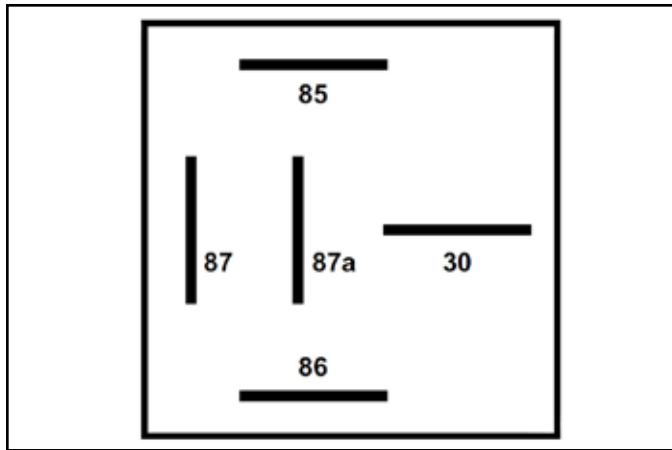


Fig. 485 relay pin diagram

5. Disconnect voltage and multimeter leads from relay terminals (Fig. 486).

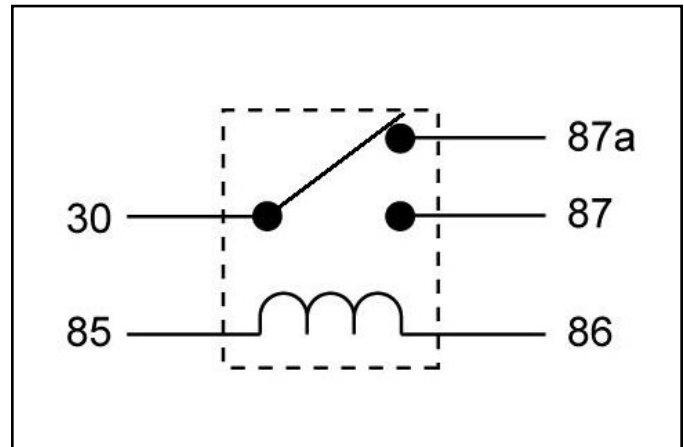


Fig. 486 xl relay

1. Disconnect the relay from the harness.
2. Verify the coil resistance between terminals 85 and 86 with a multimeter (ohms setting). Resistance should be from 70 to 90 ohms. There should be continuity between terminals 87a and 30.
3. Connect multimeter (ohms setting) leads to relay terminals 30 and 87. Ground terminal 86 and apply +12 VDC to 85. The relay should make and break continuity between terminals 30 and 87 when 12 VDC is applied and removed from terminal 85.
4. Connect multimeter (ohms setting) leads to relay terminals 30 and 87a. Apply +12 VDC to terminal 85. With terminal 86 still grounded, the relay should break and make continuity between terminals 30 and 87a as 12 VDC is applied and removed from terminal.

7

## PTO Switch

### Purpose

The PTO (Power Take Off) switch is typically used to activate the Electric PTO Clutch and to function as part of the safety interlock system.

### Location

The PTO Switch is located on the control panel on the right fender (Fig. 487).



Fig. 487

DSCN-0142a

### Testing

1. Disengage the PTO, set the parking brake, and turn the ignition to OFF and remove the key.
2. Remove the 4 screws holding the control panel to the fuel tank.
3. Disconnect the wiring harness from the PTO switch.
4. Press in the locking tabs, on each side of the switch, and pull the switch out of the control panel.
5. Verify that there is continuity between the appropriate terminals in the ON and OFF positions (Fig. 488).

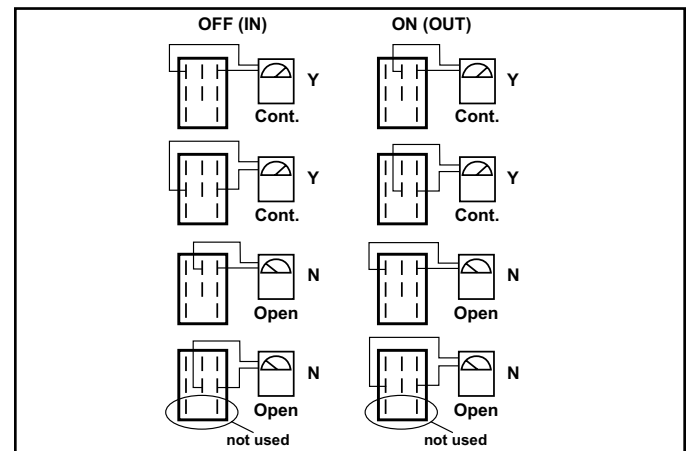


Fig. 488

PTO switch test

### How It Works

Contacts inside the switch electrically connect various terminals in both "On" and "Off" position. When the PTO is pulled out to the ON position, current flows to the electric clutch and it engages. When the switch is pushed in to OFF position, current flows through the PTO switch to the Park Brake switch as part of the circuit used to ensure safe starting.



# ELECTRICAL

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6. Replace the switch if your test results do not correspond with those given in Fig. PTO switch test.
7. Mount the PTO switch back into the control panel and reinstall the wiring harness (Fig. 489).

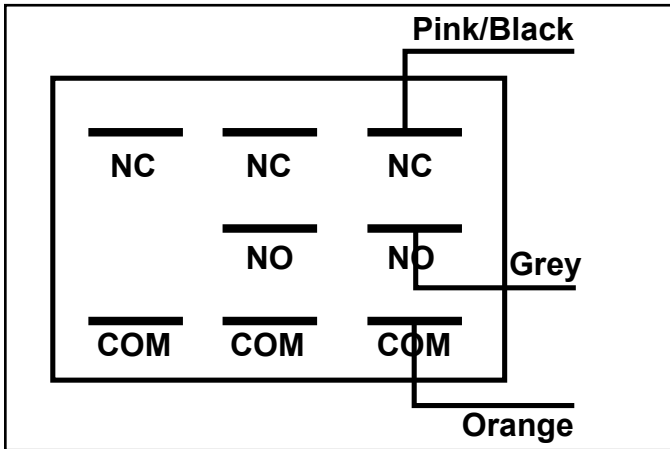


Fig. 489 PTO clutch switch b

7

## Ignition Switch

### Purpose

The ignition switch makes the proper connections for the starter, accessories, and safety circuits.

### Location

The ignition switch is located on the control panel, on the right fender (Fig. 490).



Fig. 490

DSCN-0142a

### How It Works

Detents inside the switch give it 3 positions: OFF, RUN, and START. The START position is spring loaded so the key automatically returns to RUN when released (Fig. 491).

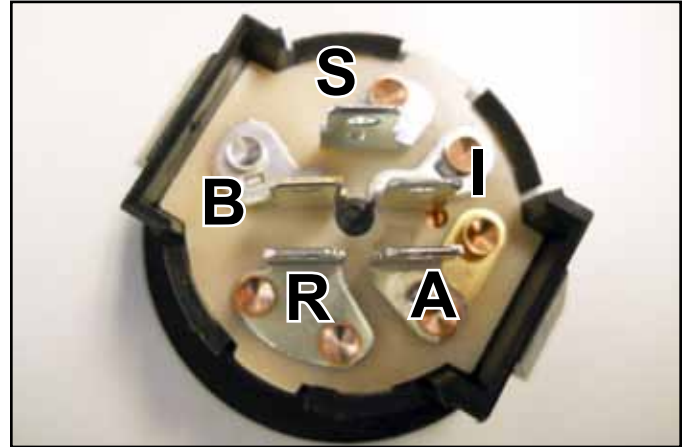


Fig. 491

DSCN-0173a

### Ignition Switch Wiring Connections

- B** - Battery voltage "In"
- S** - Starting Circuit
- I** - Fuel sender & Start Relay
- A** - Accessories
- R** - Regulator

### Testing

1. Disconnect the switch from the wiring harness.
2. Verify that continuity exists between the terminals listed for the switch position.
3. Verify there is NO continuity between terminals not listed for the position.

<b>OFF</b>	No continuity between terminals
<b>RUN</b>	Continuity – B R I A
<b>START</b>	Continuity – B R I S

# ELECTRICAL

## Park Brake Switch

### Purpose

The purpose of the brake switch is to ensure the machine is in neutral and the parking brake is applied before attempting to start the machine.

### Location

The park brake switch is located on the right side of the seat, behind the park brake lever (Fig. 492).

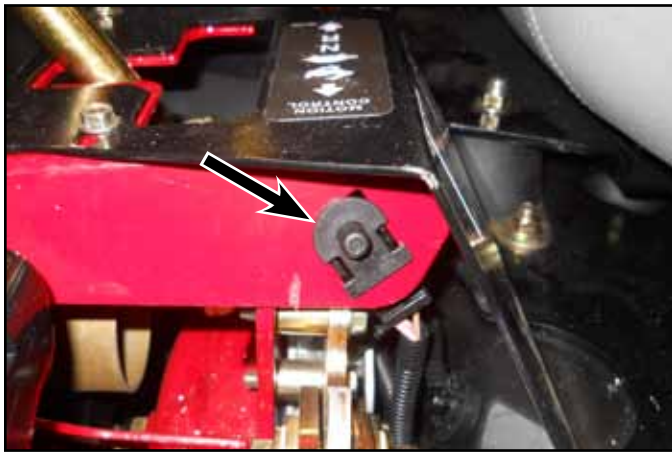


Fig. 492

DSCN-0145

### How It Works

When starting, it functions to ensure the park brake is in the ON position. At the same time it allows current to flow through the remainder of the starting safety circuit. When the park brake is released in the OFF position, it bypasses both neutral switches, permitting the control levers to be used, as long as the operator is in the seat to maintain current to the safety circuit (Fig. 493).



Fig. 493

DSCN-0148a

### Testing

1. Disconnect the switch from the wiring harness.
2. Using a VOM or test light, check first to ensure there is no continuity between either terminal, plunger out.
3. With the plunger pushed in, there should be continuity between the terminals.

## Seat Switch

### Purpose

The switch is in the safety circuit. If the engine is running and the operator vacates the seat with either the PTO or the parking brake disengaged, the engine will shut down.

**Note:** There is a delay module in the system, located in the hour meter module; there will be a slight delay before the engine shuts down after the operator vacates the seat.

### Location

The seat switch is mounted under the seat to the seat frame (Fig. 494).



Fig. 494

PICT-0398a

### How It Works

When the seat is vacated, the switch is open and there should be NO continuity between the two terminals. When the seat is occupied, the switch closes and there should be continuity between the two terminals (Fig. 495).



Fig. 495

DSCN-0148a

### Testing

1. Disconnect the switch from the wiring harness.
2. Using a VOM, check first to ensure there is NO continuity between either terminal, plunger out.
3. With the plunger pushed in, there should be continuity between the terminals.

# ELECTRICAL

## Neutral Safety Switch

### Purpose

Used to ensure the motion control handles are in neutral to start the unit. It is activated by moving the motion control handles to the neutral position (handles outward).

### Location

Remove the motion control cover to see the neutral switches that are located on each of the motion control assemblies (Fig. 496).



Fig. 496

DSCN-0147a

### How It Works

This single pole plunger (normally open) type switch has two terminals. When the motion control handles are in the neutral position (handles in the out position), it pushes on the plunger, closing the contact and connecting the terminals (Fig. 497).



Fig. 497

DSCN-0150a

### Testing

1. Disconnect the switch from the wiring harness.
2. Use a VOM, check first to ensure there is no continuity between the terminals, plunger out.
3. With the plunger pushed in, there should continuity between the terminals.

## TVS Diode

### Purpose

The TVS Diode is a surge protector for the electric PTO clutch.

### Location

The TVS Diode is located on the right hand side of the engine, plugged into the wiring harness (Fig. 498).



Fig. 498

DSCN-0005a

### How It Works

This is a surge protector for the electric PTO clutch. It clamps the voltage off of the PTO clutch (Fig. 499).



Fig. 499

DSCN-0149a

### Testing

1. Check to see if the 10 amp fuse is blown for the PTO clutch.
2. With a multi-tester, check the oms. It should read an open line both ways.

# ELECTRICAL

## Fuel Sender

### Purpose

The fuel sender uses an ultrasonic device that measures the level of fuel in the fuel tank.

### Location

The fuel sender is located under the seat, on top of the fuel tank (Fig. 500).



Fig. 500

DSCN-0127a

### How It Works

The sender measures the time it takes for an ultrasonic signal to travel from the sender to the fuel in the fuel tank and back to the sender to determine the fuel level (Fig. 501).



Fig. 501

DSCN-0166a

### Testing

Apply 12 volts to the red lead, ground the black lead and measure the voltage at the yellow lead.

The voltage should be between 0.5 volts (empty) and 4.5 volts (full).

## Fuel/Hour Meter

### Purpose

The solid state multi-function meter records the number of hours the engine has operated. Also, it checks the condition of the battery, it is a fuel gauge, and it has indicators for the safety switches.

### Location

The fuel/hour meter is located on the control panel on the right fender (Fig. 502).



Fig. 502

DSCN-0142a

### How It Works

The solid state multi-function meter which has no serviceable parts. The functions include an hour meter which records the number of hours the engine has operated. A fuel gauge which a light will light up when the fuel is low (about 1 gallon of fuel left) and also has indicator bars to indicate how much fuel is in the fuel tank. Battery light when the battery is low. Also, there are safety indicators that illuminate when the safety interlock switches are in the correct position for starting; PTO clutch switch, Park Brake Switch, Neutral Switch, and Seat Safety Switch.

### Testing

No test procedure. Cannot be bypassed without extreme modifications to the electrical system.



# ELECTRICAL

## Electric PTO Clutch

### Purpose

The electric clutch controls the engagement and disengagement of the Power Take Off (PTO) pulley.

### Location

The electric clutch is located on the PTO end of the engine crankshaft.

### How It Works

The PTO clutch is composed of three major components; the field, the clutch plate, and the friction plate. The clutch plate always turns with the engine. The field is a coil of wire wound around an iron core, which acts like an electromagnet when power is applied. The friction plate is the only piece that can slide inward and outward on the crankshaft axis. It is spring loaded away from contact with the clutch plate. When the clutch is not energized, the clutch plate rests against the brake material opposite the clutch plate. When energized the friction plate is drawn into the clutch plate magnetically and the two rotate as one component.

### Testing

**7** If the electric PTO clutch does not engage or is suspect as the cause of an electrical problem in the PTO circuit, use the following troubleshooting steps to determine whether the clutch has failed or another electrical problem exists.

## Coil Resistance Measurement

1. Disengage the PTO, set the parking brake, turn the ignition to the "off" position and remove the ignition key.
2. Disconnect the clutch harness from the main harness.
3. Set the multimeter or volt/ohm meter to check resistance (ohms).
4. Connect the meter lead wires to the clutch wires as shown (Fig. 503).

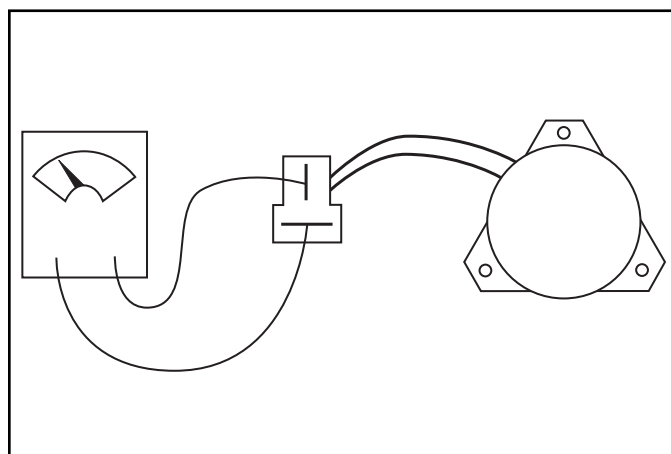


Fig. 503 coil resist measure

5. The meter should read around 1.84 ohms (meter readings may vary). If the reading is above or below these readings, the field has failed and needs to be replaced. If the reading falls between 2-4 ohms, measure clutch current draw.

## Measuring Clutch Current Draw

1. Disengage the PTO, set the parking brake, turn the ignition key to OFF, and remove the key.
2. Disconnect the PTO clutch harness from the main harness.
3. Set the multimeter to check amps (10 amp scale).
4. Connect the positive meter lead to terminal (1) of the main harness (Fig. 504).

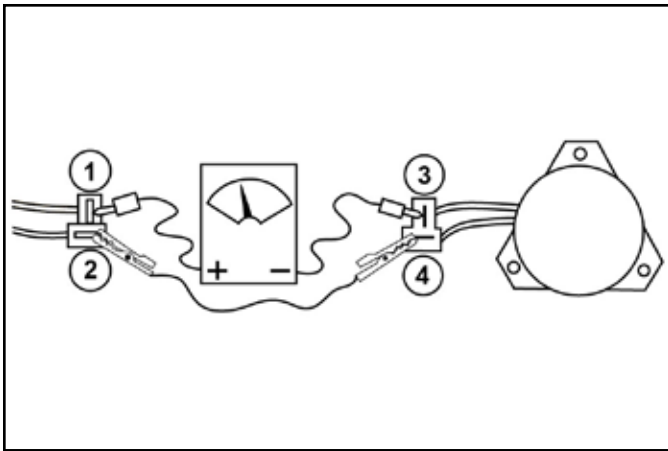


Fig. 504

diag 3-7a

5. Connect the negative meter lead to the clutch harness terminal (3) (Fig. 504).
6. Connect a short jumper lead from terminal (2) to terminal (4) Fig. 000. (above)
7. Turn the ignition switch to the "RUN" position. Turn the PTO switch to the "ON" position.
8. If the meter reading is 6.5 amps or above, the system is functioning properly. If the meter reading is below 6.5 amps, check the electrical system for problems (i.e., the battery, ignition switch, PTO switch, or wiring harness). Make sure the negative side of the wiring has a good connection to chassis ground.

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# **Toro Z Master G3 3000/5000/6000 Series Service Manual**