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TORO®

Count on it.

Service Manual

60V MAX e21 Power Clear® Snow Thrower with Flex—Force Power System® Service Manual

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8111 Lyndale Avenue South
Bloomington, MN 55420

Original Instructions (EN)
Contact us at www.Toro.com.

Revision History

Preface

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.

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/SWS Customer Care Department

8111 Lyndale Avenue South

Bloomington, MN 55420

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

Service Procedure Icons

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

Critical Process

This icon is used to highlight:

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

Critical Torque

This icon is used to highlight an assembly torque requirement that is different than what is recommended in the Standard Torque Tables.

Fluid Specifications

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

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

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Safety Instructions

DANGER

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

WARNING

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

CAUTION

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

Think Safety First

Avoid unexpected starting of engine…

Always turn off the engine, remove the ignition key 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 be hot during operation, while the unit is running or shortly after it has been running.

Avoid fires and explosions…

Use extreme care in handling fuel. It is flammable and its vapors are explosive. Extinguish all cigarettes, cigars, pipes, and other sources of ignition. 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. Do not add or drain fuel in an enclosed space. Do not store the machine or fuel container where there is an open flame, spark, or pilot light, such as on a water heater or other appliance.

Avoid asphyxiation…

Do not operate an engine in a confined area without proper ventilation.

Avoid injury from batteries…

Think Safety First (continued)

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.

Avoid electrical shock…

Never touch electrical wires or components while the engine is running. They can be sources of shock. De-energize the system if you are having to do repairs. If testing electrical components ensure you are working in a dry environment.

Hydraulic System...

Release all pressure in the hydraulic system before performing any work on the system. Keep your body and hands away from pin-hole leaks or nozzles that eject hydraulic fluid under high pressure. Do not use your hands to search for leaks. Hydraulic fluid escaping under pressure can have sufficient force to penetrate under the skin and cause serious injury. Seek medical attention right away if hydraulic fluid gets in the skin.

Personal Protective Equipment…

Tie back long hair, and do not wear loose clothing or jewelry. Use appropriate personal protective equipment (PPE) for protecting yourself from potential hazards in the environment in which you will work. Each process outlined in this manual may need different PPE to protect the service person. Use the proper PPE for the task at hand.

Tools…

All tools should be in proper working order. Do not use tools that are broken or in disrepair. Use the proper tool for the proper application.

Lifts, Hoists, and Jacks…

All lifts, hoists, and jacks should be used in accordance with the manufacturer information. Inspect lifts, hoists, and jacks prior to use. Do not overload lifts, hoists, and jacks. Do not work under a suspended load. Ensure chock blocks are used on equipment that can move. Use lifts or jacks and jack stands that are rated to support the total weight of the machine and any attachments. Do not rely on jacks to support the machine. If you are unsure of the operation of any lifts, hoists, and jacks do not use.

Fire Extinguishers…

Think Safety First (continued)

The proper class of fire extinguisher should be used in case of fire.

Class A extinguishers are for ordinary combustible materials such as paper, wood, cardboard, and most plastics. The numerical rating on these types of extinguishers indicates the amount of water it holds and the amount of fire it can extinguish. Geometric symbol (green triangle).

Class B fires involve flammable or combustible liquids such as gasoline, kerosene, grease and oil. The numerical rating for class B extinguishers indicates the approximate number of square feet of fire it can extinguish. Geometric symbol (red square).

Class C fires involve electrical equipment, such as appliances, wiring, circuit breakers and outlets. Never use water to extinguish class C fires - the risk of electrical shock is far too great! Class C extinguishers do not have a numerical rating. The C classification means the extinguishing agent is non-conductive. Geometric symbol (blue circle).

ABC fire extinguishers are a dry chemical type used for multiple purposes. See above information for description. Ensure fire extinguishers are serviceable and replace any that are discharged or out of inspection dates

Chapter 2

Specifications and Maintenance

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Specifications

60V MAX e21 Power Clear® Snow Thrower with Flex—Force Power System®	
Model	**39901/39902**
Throw Distance	Up to 12 m (40 ft)
Clearing Width	53 cm (21 inches)
Weight	27.2 kg (60 lb)
Length	145 cm (57 inches)
Width	53 cm (21 inches)
Height	72 cm (28.5 inches)

Torque Specifications

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

These torque specifications for the installation and tightening of fasteners shall apply for 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 (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

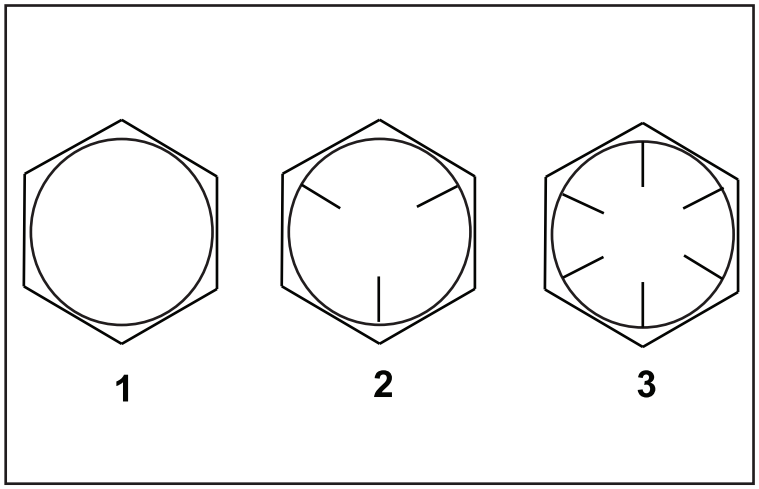

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Figure 1

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

Metric Bolts and Screws

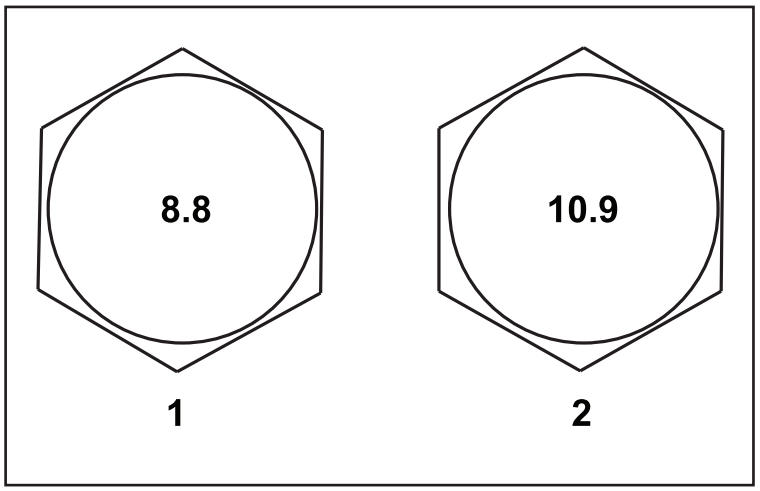

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Figure 2

1. Class 8.8
2. Class 10.9

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

Thread Size	Grade 1, 5, & 8 Fasteners with Thin Height Nuts	SAE Grade 1 Bolts, Screws, Studs & Sems with Regular Height Nuts (SAE Grade 2 or Better Nut)		SAE Grade 5 Bolts, Screws, Studs & Sems with Regular Height Nuts (SAE Grade 5 or Better Nut)		SAE Grade 8 Bolts, Screws, Studs & Sems with Regular Height Nuts (SAE Grade 8 or Better Nut)	
	in-lb	in-lb	N • cm	in-lb	N • cm	in-lb	N • cm
#6-32 UNC	10 ± 2	13 ± 2	147 ± 23	15 ± 2	169 ± 23	23 ± 3	260 ± 34
#6-40 UNF				17 ± 2	192 ± 23	25 ± 3	282 ± 34
#8-32 UNC	13 ± 2	25 ± 5	282 ± 30	29 ± 3	328 ± 34	41 ± 5	463 ± 56
#8-36 UNF				31 ± 4	350 ± 45	43 ± 5	486 ± 56
#10-24 UNC	18 ± 2	30 ± 5	339 ± 56	42 ± 5	475 ± 56	60 ± 6	678 ± 68
#10-32 UNF				48 ± 5	542 ± 56	68 ± 7	768 ± 79
1/4-20 UNC	48 ± 7	53 ± 7	599 ± 79	100 ± 10	1130 ± 113	140 ± 15	1582 ± 169
1/4-28 UNF	53 ± 7	65 ± 10	734 ± 113	115 ± 12	1299 ± 136	160 ± 17	1808 ± 192
5/16-18 UNC	115 ± 15	105 ± 15	1186 ± 169	200 ± 25	2260 ± 282	300 ± 30	3390 ± 339
5/16-24 UNF	138 ± 17	128 ± 17	1446 ± 192	225 ± 25	2542 ± 282	325 ± 33	3672 ± 373
	ft-lb	ft-lb	N • m	ft-lb	N • m	ft-lb	N • m
3/8-16 UNC	16 ± 2	16 ± 2	22 ± 3	30 ± 3	41 ± 4	43 ± 5	58 ± 7
3/8-24 UNF	17 ± 2	18 ± 2	24 ± 3	35 ± 4	47 ± 5	50 ± 6	68 ± 8
7/16-14 UNC	27 ± 3	27 ± 3	37 ± 4	50 ± 5	68 ± 7	70 ± 7	95 ± 9
7/16-20 UNF	29 ± 3	29 ± 3	39 ± 4	55 ± 6	75 ± 8	77 ± 8	104 ± 11
1/2-13 UNC	30 ± 3	48 ± 7	65 ± 9	75 ± 8	102 ± 11	105 ± 11	142 ± 15
1/2-20 UNF	32 ± 4	53 ± 7	72 ± 9	85 ± 9	115 ± 12	120 ± 12	163 ± 16
5/8-11 UNC	65 ± 10	88 ± 12	119 ± 16	150 ± 15	203 ± 20	210 ± 21	285 ± 28
5/8-18 UNF	75 ± 10	95 ± 15	129 ± 20	170 ± 18	230 ± 24	240 ± 24	325 ± 33
3/4-10 UNC	93 ± 12	140 ± 20	190 ± 27	265 ± 27	359 ± 37	375 ± 38	508 ± 52
3/4-16 UNF	115 ± 15	165 ± 25	224 ± 34	300 ± 30	407 ± 41	420 ± 43	569 ± 58
7/8-9 UNC	140 ± 20	225 ± 25	305 ± 34	430 ± 45	583 ± 61	600 ± 60	813 ± 81
7/8-14 UNF	155 ± 25	260 ± 30	353 ± 41	475 ± 48	644 ± 65	667 ± 66	904 ± 89

Note: Reduce 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.

Torque values my 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.

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 nuts include jam nuts.

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

Thread Size	Class 8.8 Bolts, Screws, Studs with Regular Height Nuts (Class 8 or Stronger Nuts)		Class 10.9 Bolts, Screws, Studs with Regular Height Nuts (Class 10 or stronger Nuts)	
	in-lb	N • cm	in-lb	N • cm
M5 X 0.8	57 ± 6	644 ± 68	78 ± 8	881 ± 90
M6 X 1.0	96 ± 10	1085 ± 113	133 ± 14	1503 ± 158
	ft-lb	**N • m**	**ft-lb**	**N • m**
M8 X 1.25	19 ± 2	26 ± 3	28 ± 3	38 ± 4
M10 X 1.5	38 ± 4	52 ± 5	54 ± 6	73 ± 8
M12 X 1.75	66 ± 7	90 ± 10	93 ± 10	126 ± 14
M16 X 2.0	166 ± 17	255 ± 23	229 ± 23	310 ± 31
M20 X 2.5	325 ± 33	440 ± 45	450 ± 46	610 ± 62

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.

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.

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.

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
1/2 - 13 UNC	75 ± 15 ft-lb	50 ± 10 ft-lb
3/8 - 16 UNC	35 ± 10 ft-lb	18 ± 3 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

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

Conversion Factors

in-lb X 11.2985 = N • cm

ft-lb X 1.3558 = N • m

N • cm X 0.08851 = in-lb

N • cm X 0.73776 = ft-lb

Thread Cutting Screws (Zinc Plated Steel)

Threads 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.

Equivalents and Conversions

Decimal and 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	**11/64**	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**		

U.S. to Metric Conversions

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

Chapter 3

Troubleshooting

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GEARS

The Systematic approach to defining, diagnosing and solving problems.

G

Gather Information

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

E

Evaluate Potential Causes

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

A

Assess Performance

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

R

Repair

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

S

Solution Confirmation

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

Error Beep Table

Error Type	Number of Beeps	Next Step
Communication Error	2	1. Verify motor driver and battery functionality. 2. Replace motor driver and/or battery as necessary.
Time Out Error	3	1. Verify motor driver and battery functionality. 2. Replace motor driver and/or battery as necessary.
Motor Driver Error	4	1. Verify motor driver functionality. 2. Replace motor driver as necessary.
Motor Driver Error	5	1. Verify motor driver functionality. 2. Replace motor driver as necessary.
Hall Sensor Error	6	1. Verify the error occurs. 2. Replace the motor.
Motor Driver Error	7	1. Verify motor driver functionality. 2. Replace motor driver as necessary.
Communication Low Error from Battery, Low Power	8	1. Charge the battery. 2. Replace as necessary.
Motor Driver Block Error	9	1. Verify motor driver functionality. 2. Replace motor driver as necessary.
Internal Error Code	10	1. Verify motor driver functionality. 2. Replace motor driver as necessary.
Communication High Error from Battery Communication	11	1. Verify motor driver functionality. 2. Replace motor driver as necessary.
Motor Error	12	1. Verify motor driver functionality. 2. Replace motor driver as necessary.
Current Error	13	1. Cutting motor overloaded. Reduce load. 2. Verify cutting chamber is free from debris and deck is clean.
Precharge Error	14	1. Verify motor driver functionality. 2. Replace motor driver as necessary.
Gryoscope Error	15	1. Place snowthrower flat on the ground and try again. 2. If same error occurs, replace the motor driver.
Temp Error	16	1. Discontinue use and allow the machine to cool. 2. If same error occurs, replace the motor driver.
Calibration Error	18	1. Verify motor driver and battery functionality. 2. Replace motor driver and/or battery as necessary.

General Troubleshooting

See Operator’s Manual for troubleshooting information.

Chapter 4

Battery

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General Information

This is a 60 volt MAX snowthrower.

Service and Repairs

Battery Track Assembly

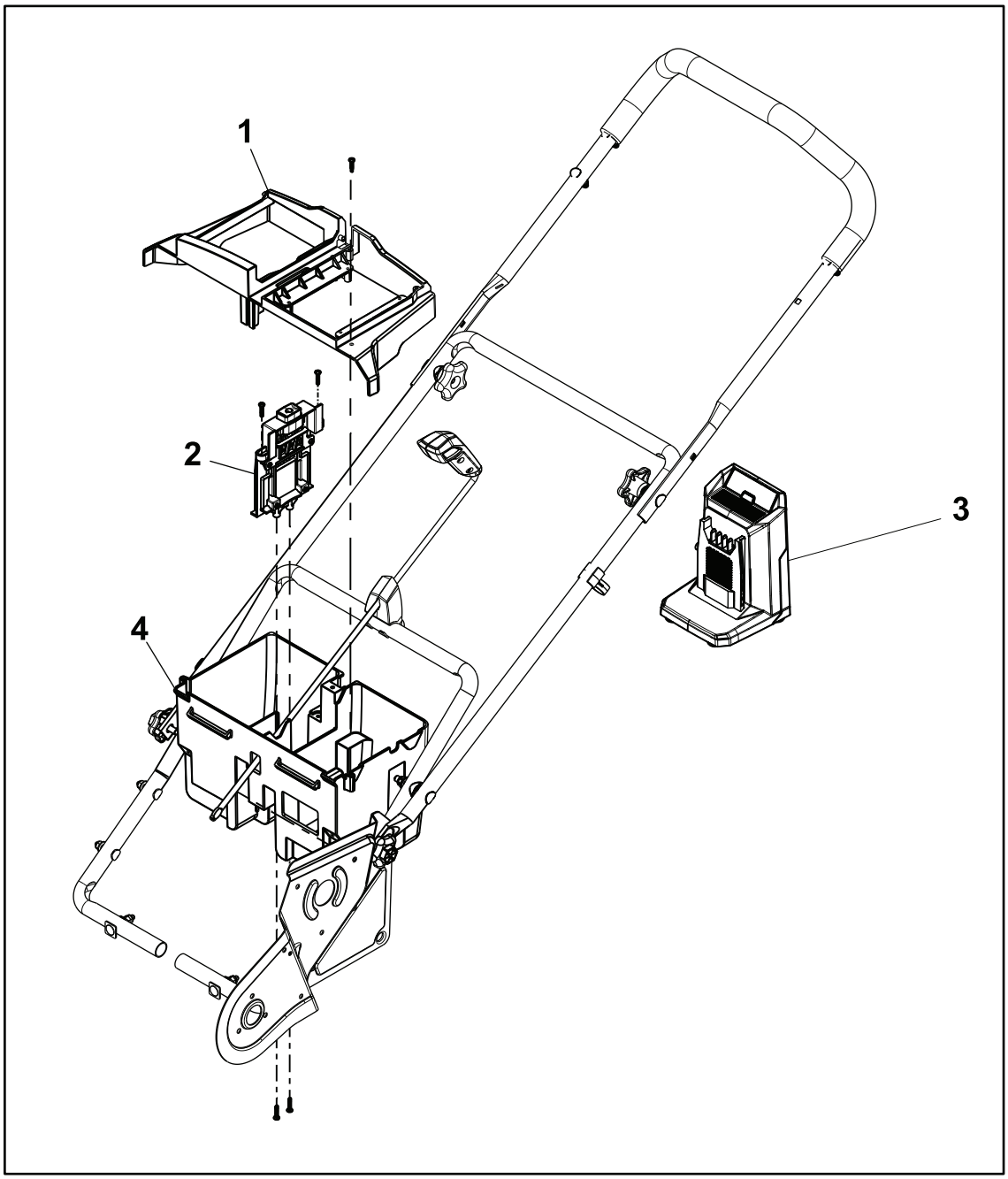

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Figure 3

1. Battery Container Skirt
2. Battery Track Assembly
3. 60v Charger
4. Battery Container

Battery Track Assembly Replacement

Battery Track Assembly Removal

1. Park the machine on a level surface and wait for all moving parts to stop.

WARNING

When removing or installing the battery, do not allow the battery terminals to touch any metal parts of the machine. Do not allow metal tools to short between the battery terminals and metal parts of the machine.

2. Lift the battery cover and remove the battery from the machine.
3. Pull and remove the chute control rod from the machine.
4. Remove the 2 screws securing the controller cover to the battery container skirt. Remove the controller cover from the machine.
5. Remove the 4 screws securing the motor driver to the battery container skirt.

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Figure 4

6. Lift the motor driver from the battery container skirt and disconnect all the wire attachments. Remove the motor driver from the battery container skirt.
7. Remove the 2 screws securing the battery container skirt to the battery container.

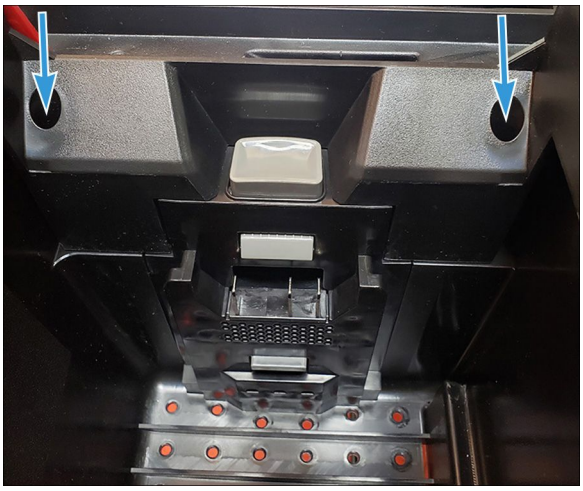

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Figure 5

8. Remove the 3 screws securing the battery container skirt to the battery container. Remove the battery container skirt from the machine.

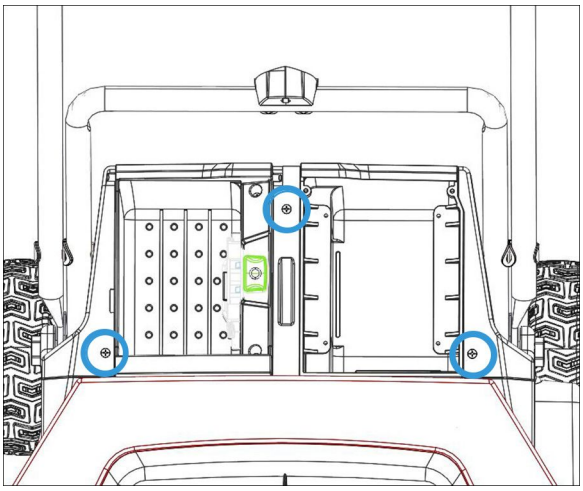

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Figure 6

9. Flip the machine over so the auger housing is facing the floor. Remove the 2 screws securing the battery track assembly to the battery container.

Battery Track Assembly Removal (continued)

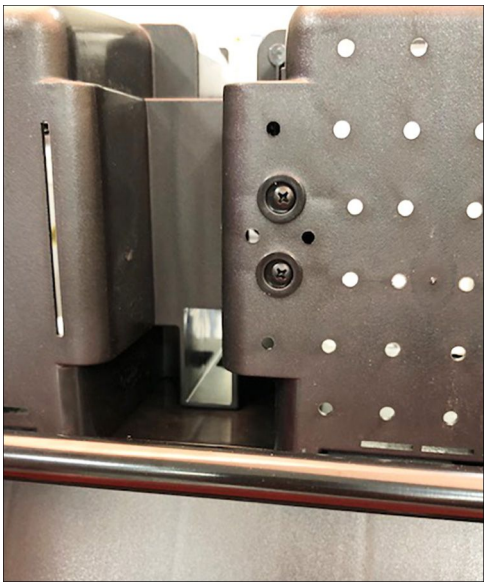

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Figure 7

10. Flip the machine over so the wheels are on the ground. Remove the 2 screws securing the battery track assembly to the battery container. Remove the battery track assembly from the battery container skirt.

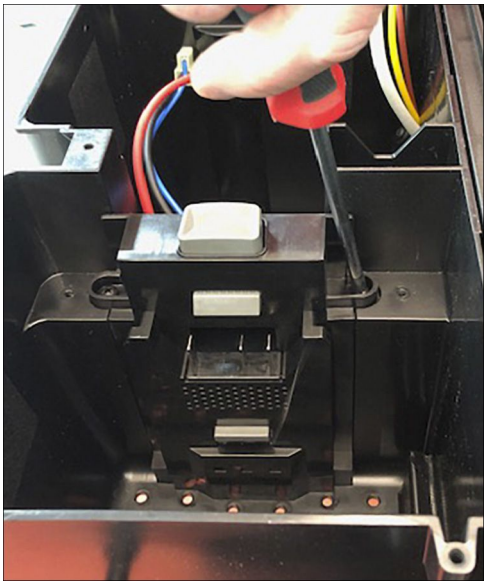

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Figure 8

Battery Track Assembly Installation

1. Install the battery track assembly into the battery container. Install the 2 screws securing the battery track assembly to the battery container. Torque the screws to 1.1-1.7 N • m (10-15 in-lb).

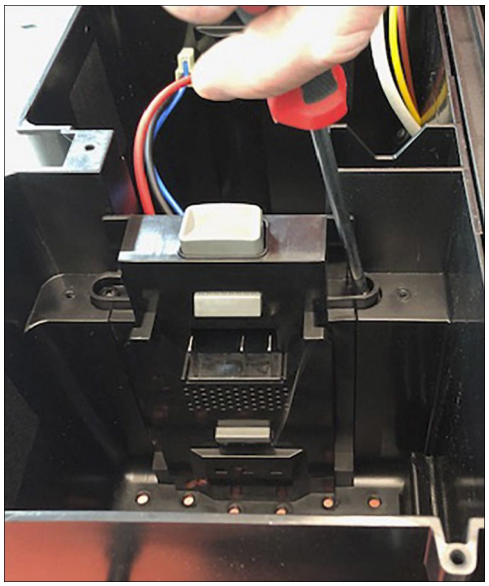

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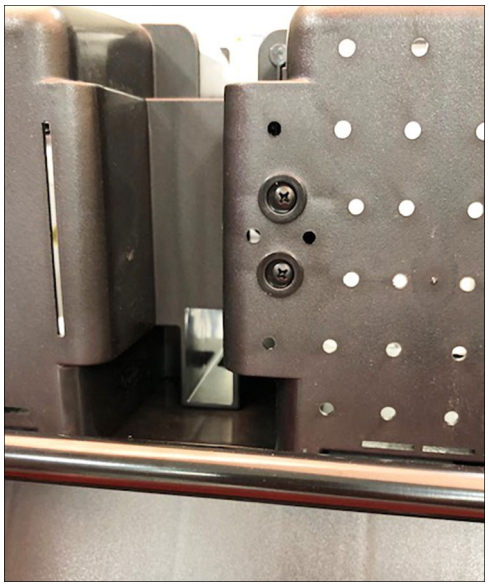
Figure 9

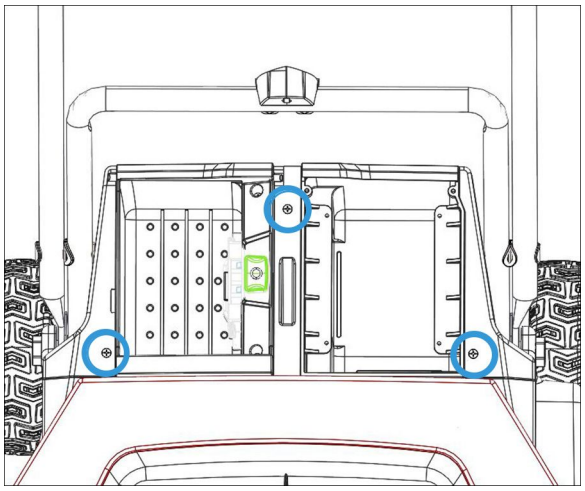
2. Flip the machine over so the auger housing is facing the floor. Install the 2 screws securing the battery track assembly to the frame. Torque the screws to 1.1-1.7 N • m (10-15 in-lb).



g320309

Figure 10

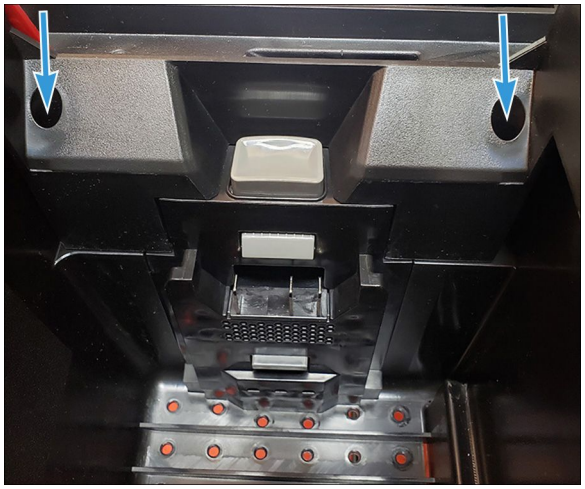
3. Flip the machine over so the wheels are on the ground. Install the battery container skirt onto the battery container. Install the 3 screws securing the battery container skirt to the battery container. Torque the screws to 1.1-1.7 N • m (10-15 in-lb).



g320289

Figure 11

4. Install the 2 screws securing the battery container skirt to the battery container. Torque the screws to 1.1-1.7 N • m (10-15 in-lb).



g320276

Figure 12

5. Connect all the wire attachments to the motor driver.
6. Install the 4 screws securing the motor driver to the battery container skirt. Torque the screws to 1.1-1.7 N • m (10–15 in-lb).

g320303

Figure 13

7. Install the 2 screws securing the controller cover to the battery container skirt. Torque the screws to 1.1-1.7 N • m (10-15 in-lb).
8. Install the chute control rod into the machine.

⚠ WARNING ⚠

When removing or installing the battery, do not allow the battery terminals to touch any metal parts of the machine. Do not allow metal tools to short between the battery terminals and metal parts of the machine.

9. Install the battery into the machine.

Chapter 5

Drive System

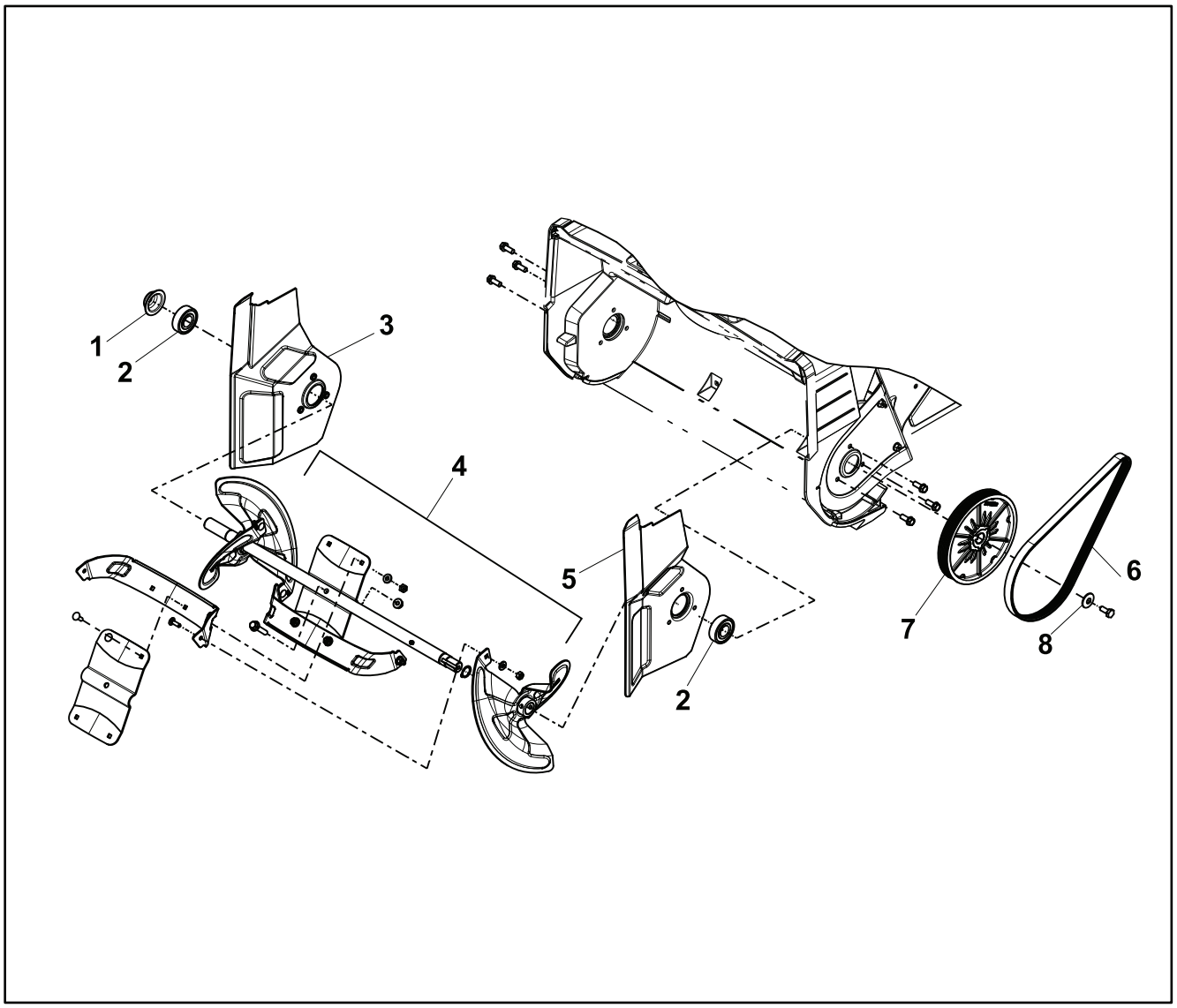
Table of Contents

General Information

This is a free wheeling snowthrower with no drive assist.

Service and Repairs

Rotor Assembly



g320450

Figure 14

1. RH Sideplate Cap
2. Ball Bearing
3. RH Extension
4. Rotor
5. LH Extension
6. Ribbed Belt
7. Rotor Pulley Asm
8. Belleville Washer

Ribbed V-Belt Replacement

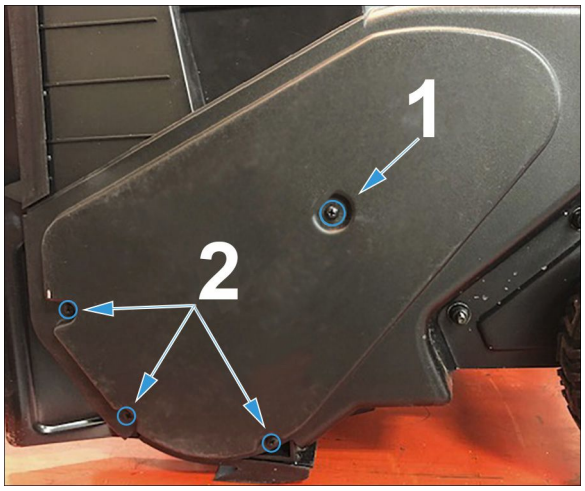
Ribbed V-Belt Removal

1. Park the machine on a level surface and wait for all moving parts to stop.

WARNING

When removing or installing the battery, do not allow the battery terminals to touch any metal parts of the machine. Do not allow metal tools to short between the battery terminals and metal parts of the machine.

2. Lift the battery cover and remove the battery from the machine.
3. Remove the plastic screw securing the belt cover to the LH frame plate assembly. Remove the 3 screws securing the belt cover to the housing. Remove the belt cover from the machine.

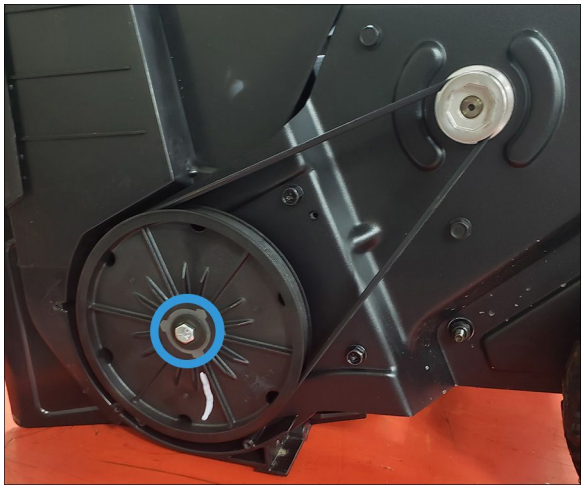


g320499

Figure 15

1. Plastic Screw
2. Screws

4. Remove the screw and Belleville washer securing the rotor pulley assembly to the rotor shaft.

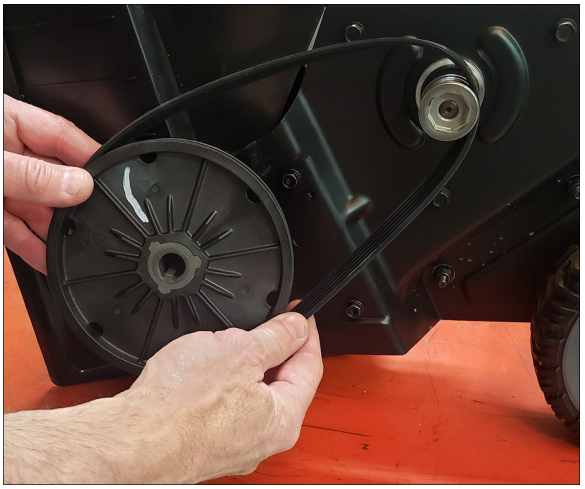


g323087

Figure 16

Ribbed V-Belt Removal (continued)

5. Remove the rotor pulley assembly from the rotor shaft.



g320312

Figure 17

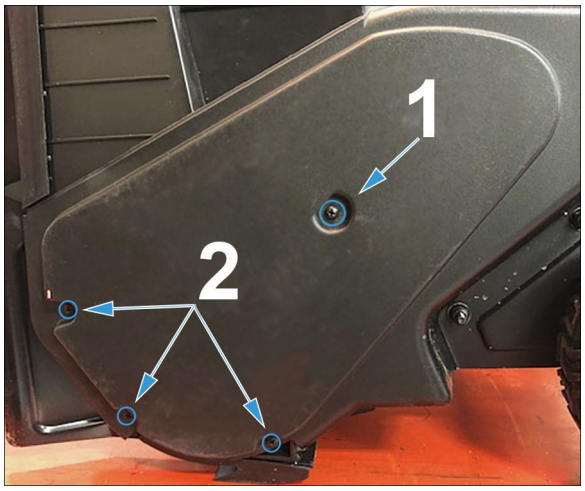
6. Remove ribbed V-belt from the rotor pulley assembly and the motor pulley.

Ribbed V-Belt Installation

1. Install the rotor pulley assembly onto the rotor shaft. Install the Belleville washer and new screw securing the rotor pulley assembly to the rotor shaft. Torque screw to 10–12.4 N • m (90-110 in-lb).
2. Apply Loctite to threads of motor pulley.
3. Thread the new ribbed V-belt around the motor pulley and route the ribbed V-belt around the rotor pulley assembly.

   Note: Install new ribbed V-belt each time the V-belt is installed. Failure to do so can result in impaired rotor function.

4. Install the belt cover to the housing. Install the plastic screw securing the belt cover to the LH frame plate assembly. Install the 3 screws securing the belt cover to the housing. Torque the screws to 1.7–2.3 N • m (15–20 in-lb).



g320499

Figure 18

1. Plastic Screw
2. Screws

WARNING

When removing or installing the battery, do not allow the battery terminals to touch any metal parts of the machine. Do not allow metal tools to short between the battery terminals and metal parts of the machine.

5. Install the battery into the machine.

Rotor Replacement

Rotor Removal

1. Park the machine on a level surface and wait for all moving parts to stop.

WARNING

When removing or installing the battery, do not allow the battery terminals to touch any metal parts of the machine. Do not allow metal tools to short between the battery terminals and metal parts of the machine.

2. Lift the battery cover and remove the battery from the machine.
3. Remove the ribbed V-belt. Ribbed V-Belt Replacement (page 5–4)
4. Remove the 3 screws securing the LH frame plate to the housing and LH extension.

g320292

Figure 19

5. Remove the 2 screw securing the LH frame plate to the housing

g320272

Figure 20

6. Remove the 3 screws securing the RH frame plate to the housing and the RH extension.

g320293

Figure 21

7. Remove the 3 screws securing the RH frame plate to the housing.

g320294

Figure 22

8. Remove the 2 screws securing the RH frame plate to the housing.

g320274

Figure 23

9. Slide and remove the rotor assembly from the housing.

g321114

Figure 24

Rotor Installation

1. Slide and install the rotor assembly to the housing.

2. Install the 2 screws securing the RH frame plate to the housing. Torque the screws to 2.8–4 N • m (25–35 in-lb).

g320274

Figure 25

3. Install the 3 screws securing the RH frame plate to the housing. Torque the screws to 2.3–2.8 N • m (20–25 in-lb).

g320294

Figure 26

4. Install the 3 screws securing the RH frame plate to the housing and RH extension. Torque the screws to 5–6.8 N • m (45–60 in-lb).

g320293

Figure 27

5. Install the 2 screw securing the LH frame plate to the housing. Torque the screws to 2.8–4 N • m (25–35 in-lb).

g320272

Figure 28

6. Install the 3 screws securing the LH frame plate to the housing and the LH extension. Torque the screws to 5–6.8 N • m (45–60 in-lb).

g320292

Figure 29

7. Install the ribbed V-belt. Ribbed V-Belt Installation (page 5–5)

WARNING

When removing or installing the battery, do not allow the battery terminals to touch any metal parts of the machine. Do not allow metal tools to short between the battery terminals and metal parts of the machine.

8. Install the battery into the machine.

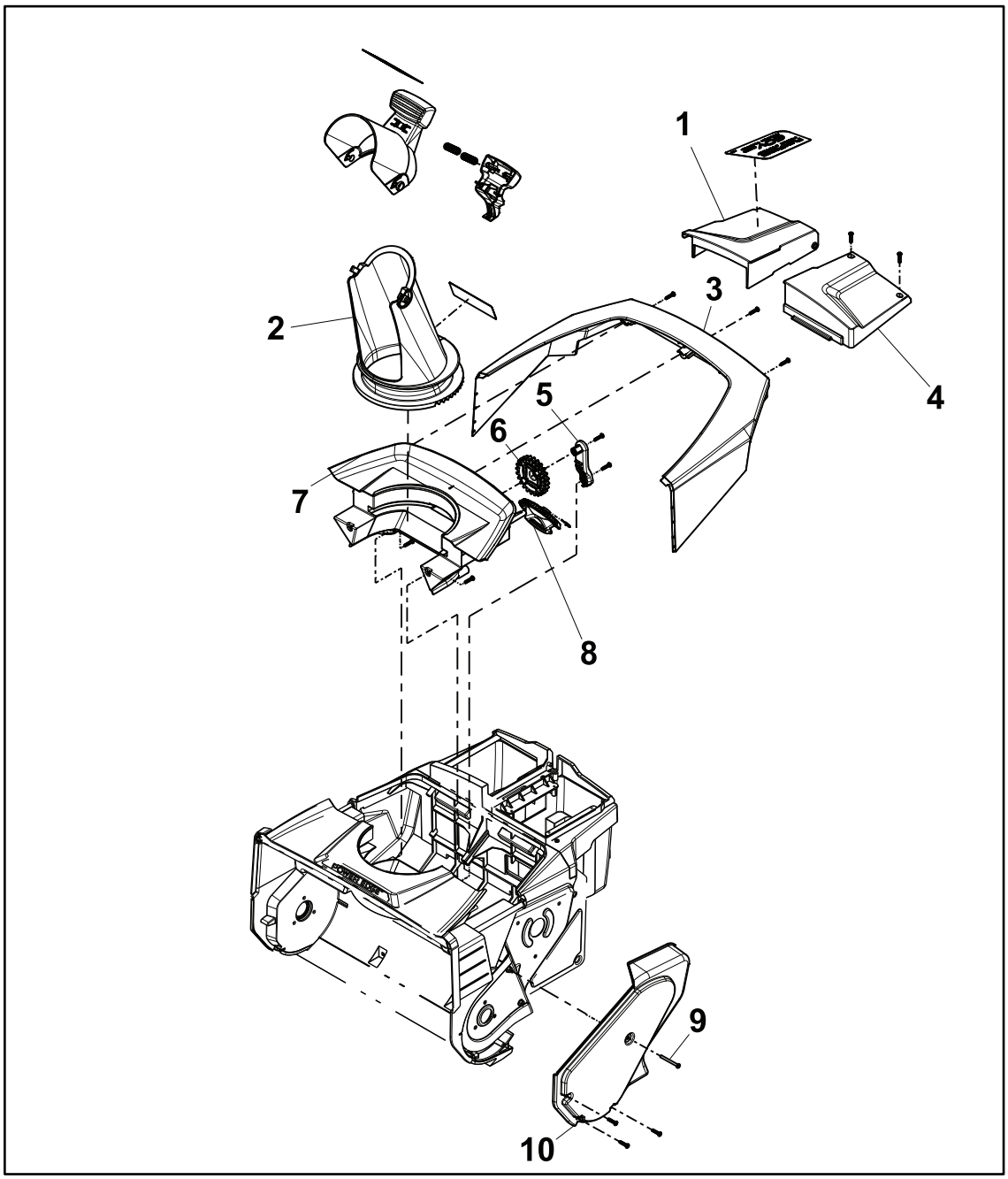
Table of Contents

General Information

This snowthrower is equipped with a manual rotation chute and throw distance selection.

Service and Repairs

Chute Assembly



g320445

Figure 30

1. Battery Cover
2. Chute
3. Shroud
4. Controller Cover
5. Gear Bracket
6. Chute Gear
7. Rear Chute
8. Sector Gear
9. Plastic Screw
10. Belt Cover

Chute Gear Replacement

Chute Gear Removal

1. Park the machine on a level surface and wait for all moving parts to stop.

WARNING

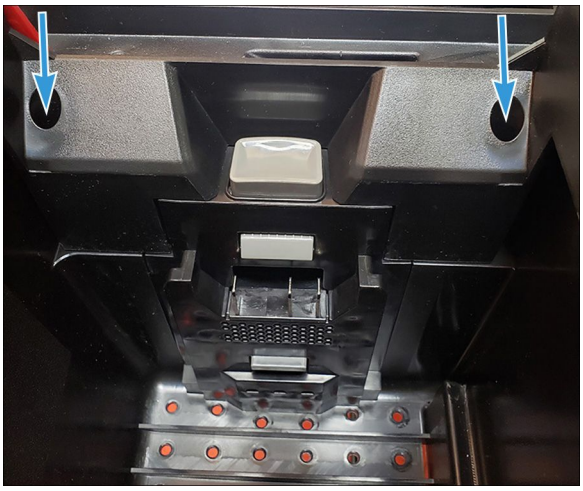
When removing or installing the battery, do not allow the battery terminals to touch any metal parts of the machine. Do not allow metal tools to short between the battery terminals and metal parts of the machine.

2. Lift the battery cover and remove the battery from the machine.
3. Pull and remove the chute control rod from the machine.
4. Remove the 2 screws securing the controller cover to the battery container skirt. Remove the controller cover from the battery container.
5. Remove the 4 screws securing the motor driver to the battery container skirt.

g320303

Figure 31

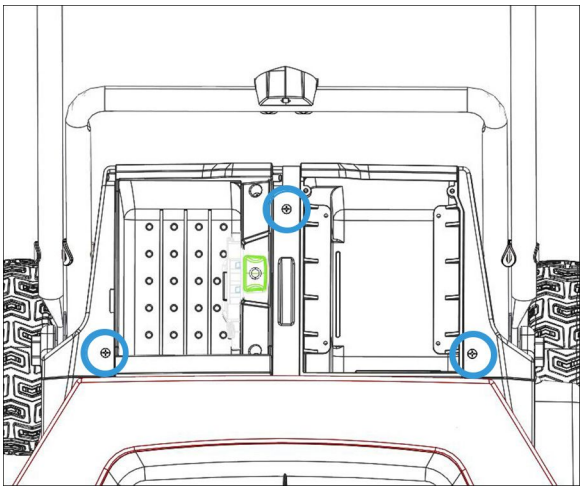
6. Lift the motor driver from the battery container skirt and disconnect all the wire attachments. Remove the motor driver.
7. Remove the 2 screws securing the battery container skirt to the battery container.



g320276

Figure 32

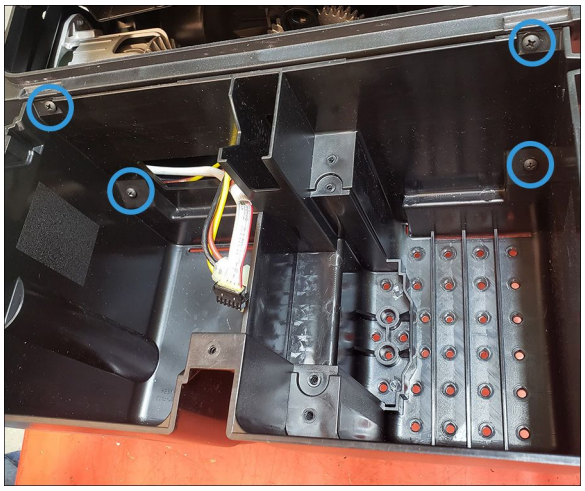
8. Remove the 3 screws securing the battery container skirt to the battery container. Remove the battery container skirt.



g320289

Figure 33

9. Remove the 4 screws and washers securing the battery container to the bulkhead. Remove the battery container from the bulkhead.



g320297

Figure 34

10. Remove the 3 screws securing the shroud to the rear chute. Remove the shroud from the rear chute.
11. Remove the 2 screws securing the LH frame assembly plate to the bulkhead.

g320271

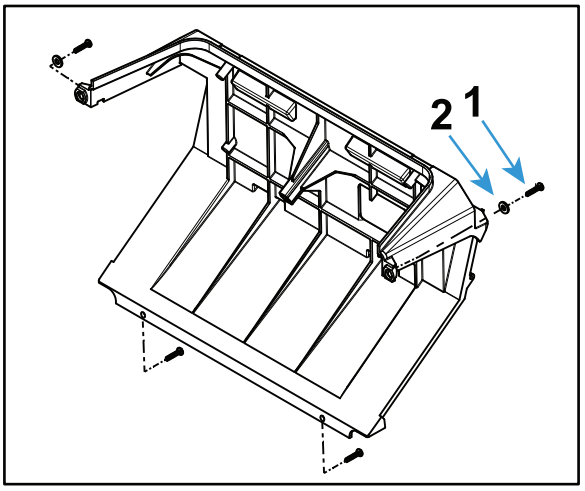
Figure 35

12. Remove the 2 screws securing the RH frame assembly plate to the bulkhead.

g320273

Figure 36

13. Remove the 2 screws and 2 washers securing the upper bulkhead to the upper housing.



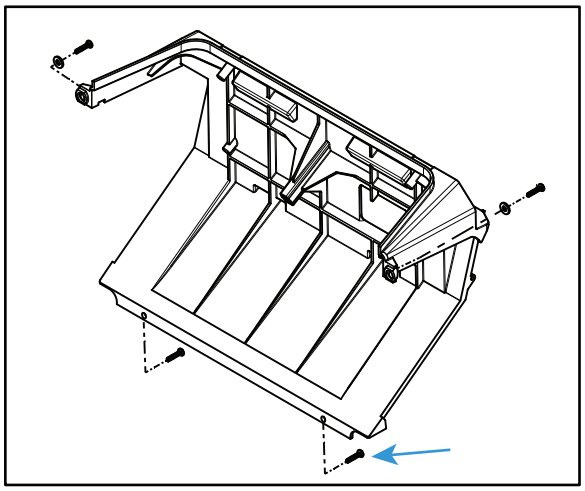
g320494

Figure 37

1. Screw
2. Washer

14. Remove the 2 screws securing the lower bulkhead to the lower housing. Remove the bulkhead from the housing.

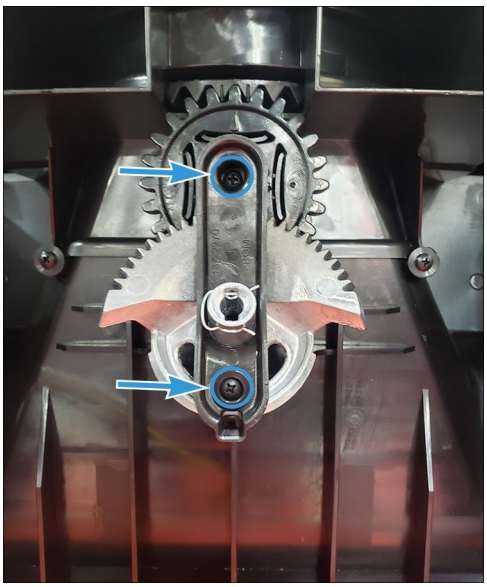
Chute Gear Removal (continued)



g324235

Figure 38

15. Remove the 2 screws securing the gear bracket to the rear chute and the housing.



g320270

Figure 39

16. Remove the gear bracket and attached sector gear from the chute gear.
17. Remove the chute gear from the rear chute.

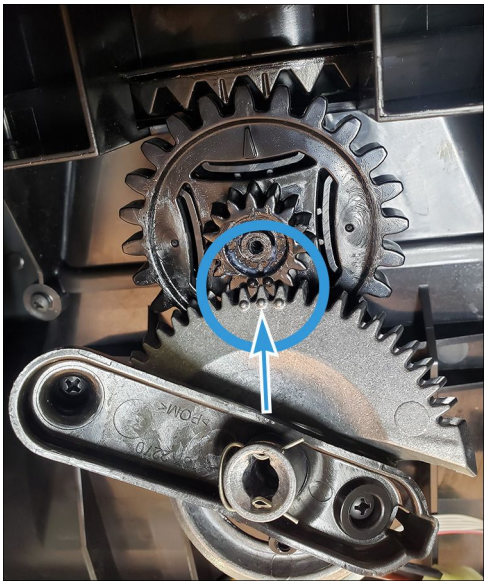
Chute Gear Installation

1. Install the chute gear on the rear chute so that the chute gear arrow is aligned between the two vertical lines on the chute .

g321111

Figure 40

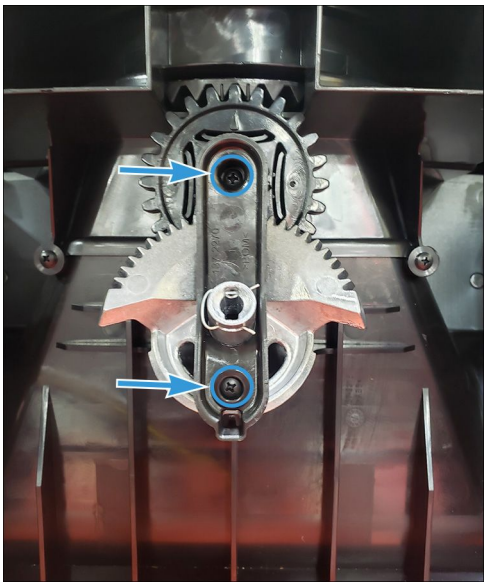
2. Clock the sector gear to the chute gear by aligning the middle dot of the sector gear between the two does of the chute gear.



g321112

Figure 41

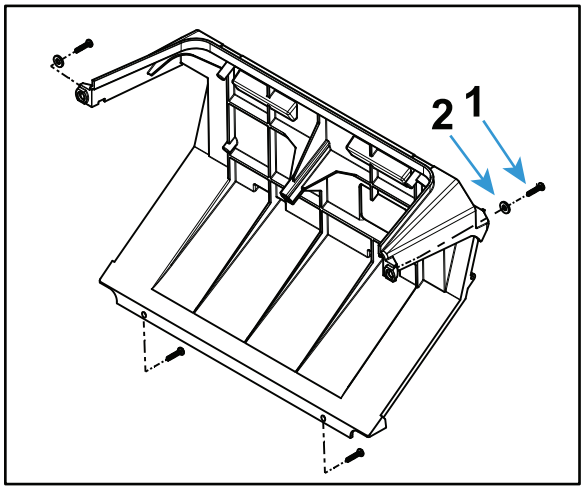
3. Install the 2 screws securing the gear bracket to the rear chute and housing. Torque the screws to 1.1-1.7 N • m (10-15 in-lb).



g320270

Figure 42

4. Install the 2 screws and 2 washers securing the upper bulkhead to the upper housing. Torque the screws to 2.26–2.82 N• m (20–25 in-lb).

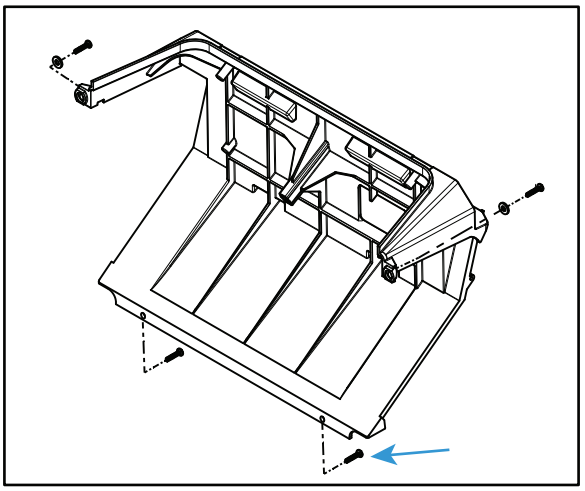


g320494

Figure 43

1. Screw
2. Washer

5. Install the 2 screws securing the lower bulkhead to the lower housing. Torque the screws to 2.26–2.82 N• m (20–25 in-lb).



g324235

Figure 44

6. Install the 2 screws securing the RH frame plate assembly to the bulkhead. Torque the screws to 2.26–2.82 N• m (20–25 in-lb).

g320273

Figure 45

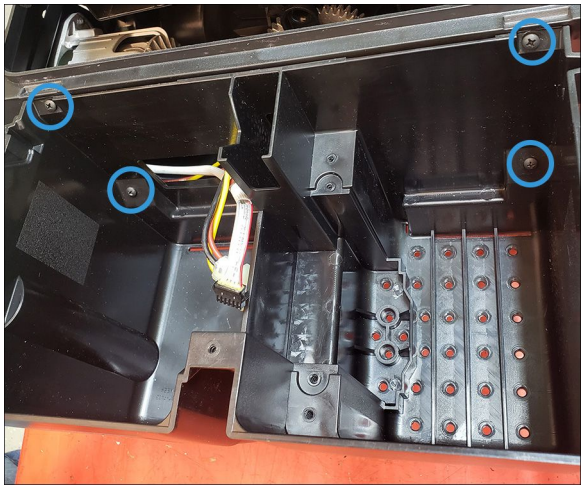
7. Install the 2 screws securing the LH frame plate assembly to the bulkhead. Torque the screws to 2.26–2.82 N• m (20–25 in-lb).

g320271

Figure 46

8. Install the shroud onto the rear chute. Install the 3 screws securing the shroud to the rear chute. Torque the screws to 1.1-1.7 N • m (10-15 in-lb).

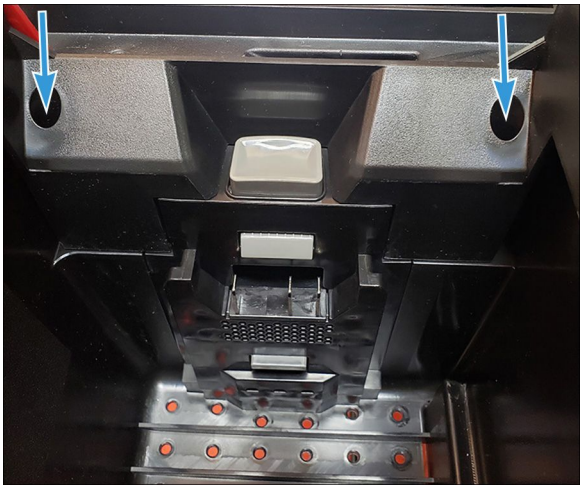
9. Install the battery container to the bulk head. Install the 4 screws and washers securing the battery container to the bulkhead. Torque the screws to 1.1-1.7 N • m (10-15 in-lb).



g320297

Figure 47

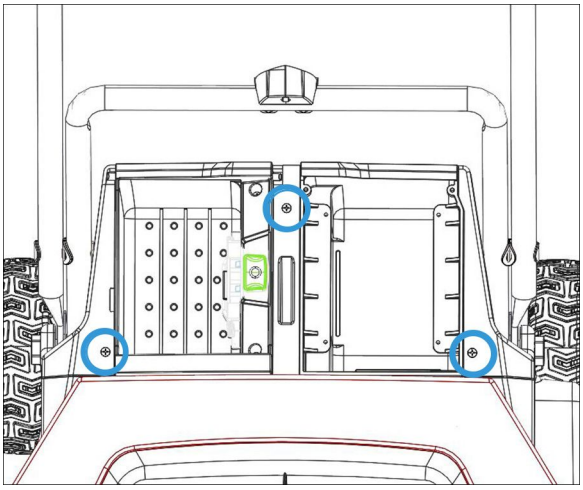
10. Install the 2 screws securing the battery container skirt to the battery container. Torque the screws to 1.1-1.7 N • m (10-15 in-lb)



g320276

Figure 48

11. Install the 3 screws securing the battery container skirt to the battery container. Torque the screws to 1.1-1.7 N • m (10-15 in-lb).



g320289

Figure 49

12. Connect all wiring to the motor driver.

13. Install the 4 screws securing the motor driver to the battery container skirt. Torque the screws to 1.1-1.7 N • m (10-15 in-lb).

g320303

Figure 50

14. Install the 2 screws securing the controller cover to the battery container skirt. Torque the screws to 1.1-1.7 N • m (10-15 in-lb).
15. Install the chute control rod.

⚠ WARNING ⚠

When removing or installing the battery, do not allow the battery terminals to touch any metal parts of the machine. Do not allow metal tools to short between the battery terminals and metal parts of the machine.

16. Install the battery into the machine.

Chute Replacement

Chute Removal

1. Park the machine on a level surface and wait for all moving parts to stop.

⚠ WARNING ⚠

When removing or installing the battery, do not allow the battery terminals to touch any metal parts of the machine. Do not allow metal tools to short between the battery terminals and metal parts of the machine.

2. Lift the battery cover and remove the battery from the machine.
3. Remove the chute gear. Chute Gear Removal (page 6–4)
4. Remove the 4 screws securing the rear chute to the housing.

g320296

Figure 51

5. Lift and remove the rear chute and chute from the housing.

g321113

Figure 52

Chute Installation

1. Install the chute and rear chute onto the housing.

2. Install the 4 screws securing the rear chute to the housing. Torque the screws to 1.7–2.3 N • m (15–20 in-lb).

g320296

Figure 53

3. Install the chute gear. Chute Gear Installation (page 6–8)

WARNING

When removing or installing the battery, do not allow the battery terminals to touch any metal parts of the machine. Do not allow metal tools to short between the battery terminals and metal parts of the machine.

4. Install the battery into the machine.

Table of Contents

General Information

This snowthrower is equipped with a push button motor start and safety switch located in the handle lever.

Service and Repairs

Dash Panel Assembly

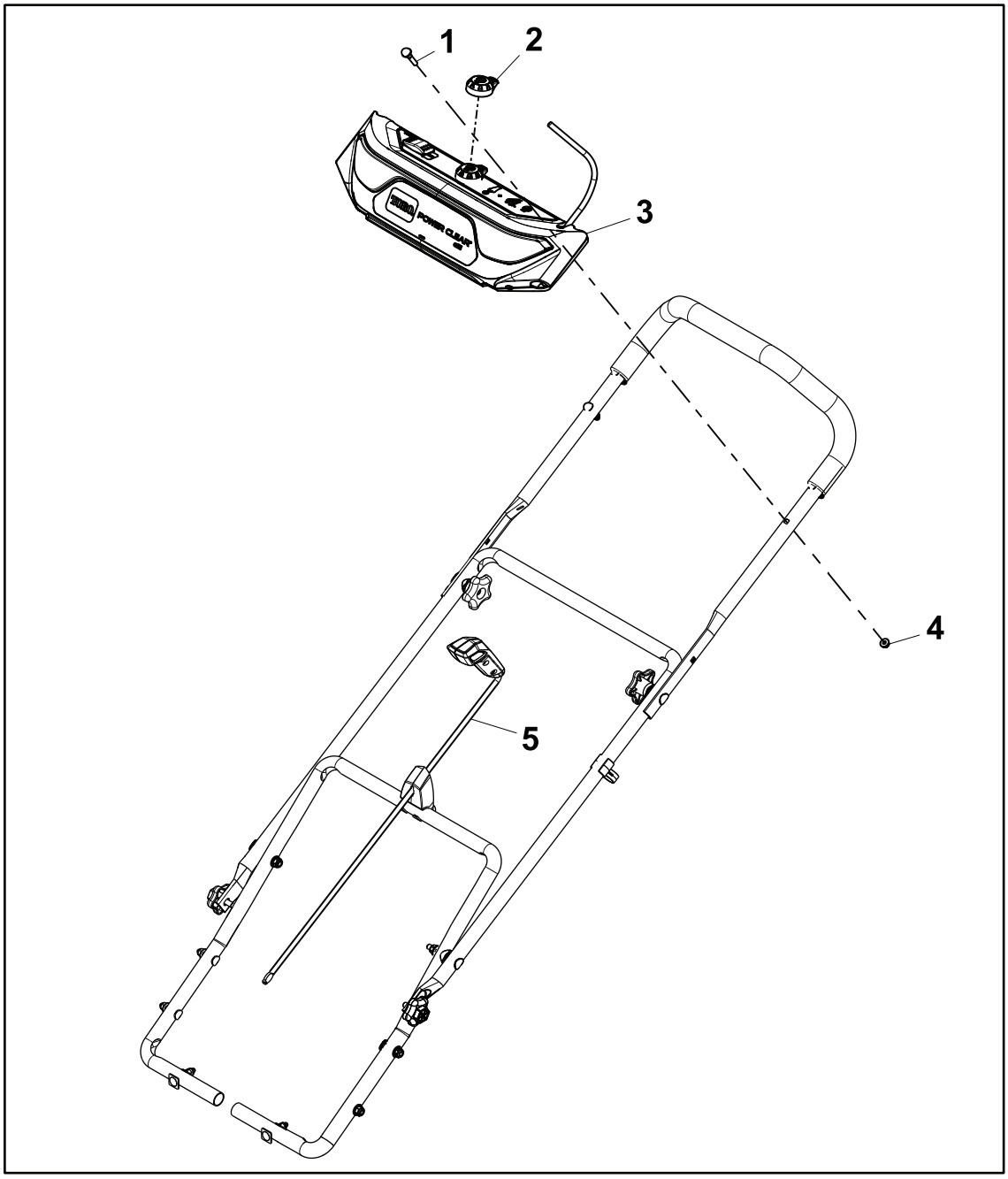


Figure 54

1. Handle Screw
2. Bail Key
3. Dash Panel Asm
4. Flange Nut
5. Chute Control Rod

Dash Panel Assembly Replacement

Dash Panel Assembly Removal

1. Park the machine on a level surface and wait for all moving parts to stop.

WARNING

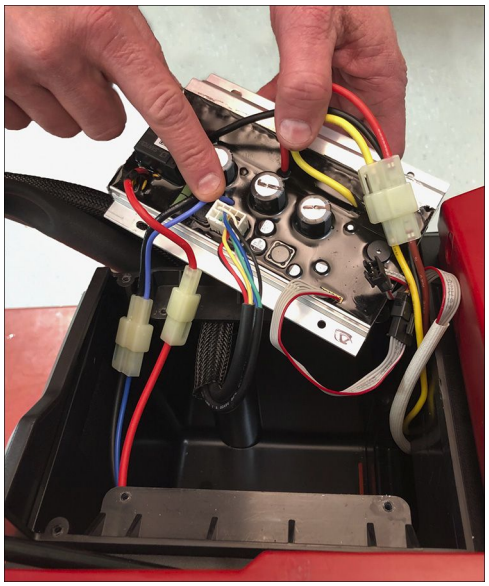
When removing or installing the battery, do not allow the battery terminals to touch any metal parts of the machine. Do not allow metal tools to short between the battery terminals and metal parts of the machine.

2. Lift the battery cover and remove the battery from the machine.
3. Remove the 2 screws securing the controller cover to the battery container skirt.
4. Remove the 4 screws securing the motor driver to the battery container skirt.

g320303

Figure 55

5. Disconnect the harness from the motor driver.



g320304

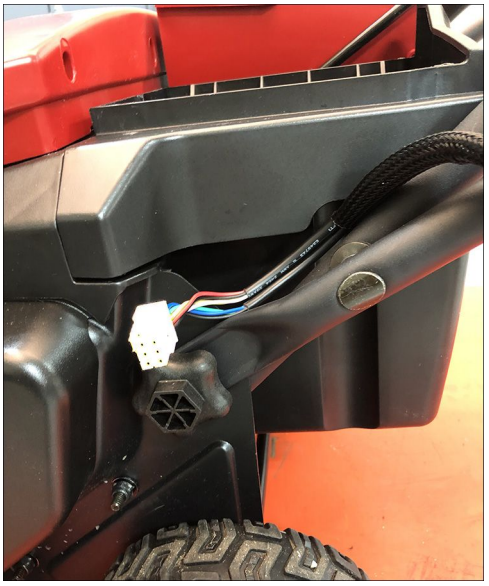
Figure 56

6. Remove the screw securing battery container skirt to the battery container.

g320521

Figure 57

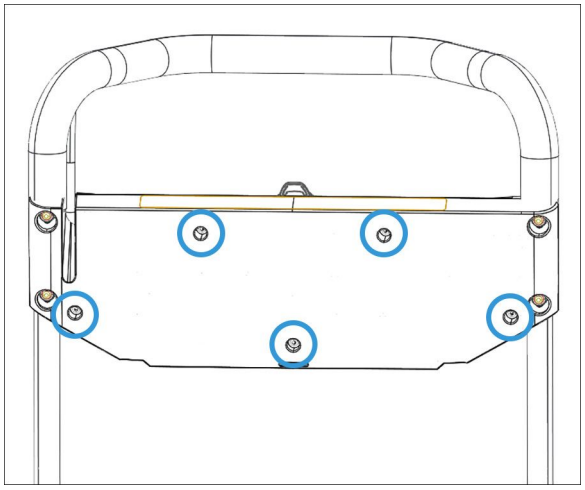
7. Remove the harness from the battery container.



g320305

Figure 58

8. Remove the 5 screws securing the front and rear dash panels.

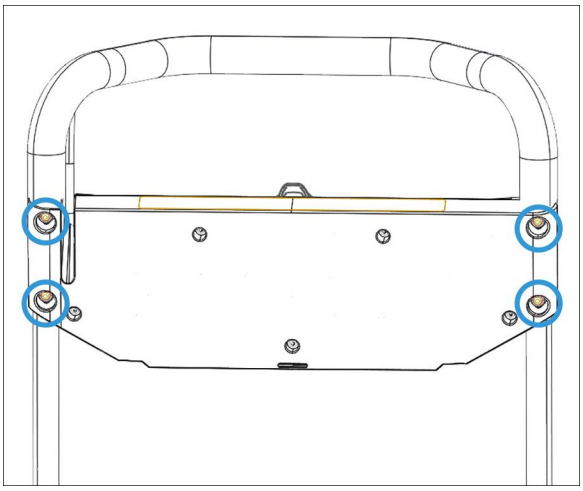


g320298

Figure 59

9. Remove the 4 flange nuts and 4 handle screws securing the front and rear dash panels onto the upper handle assembly.

Dash Panel Assembly Removal (continued)



g320295

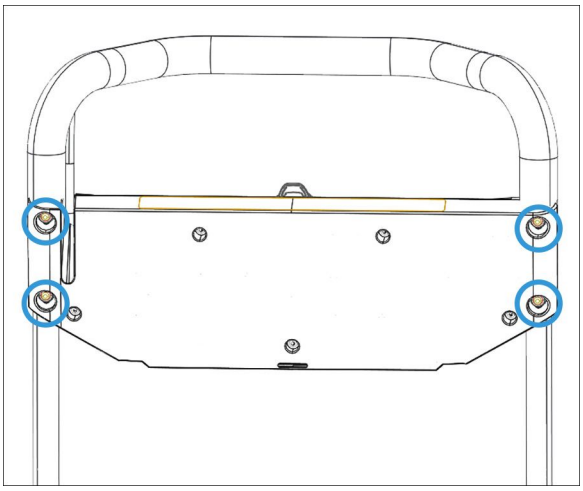
Figure 60

10. Separate the front and rear dash panels from the upper handle assembly.

Dash Panel Assembly Installation

1. Position the front and rear dash panels onto the upper handle assembly.

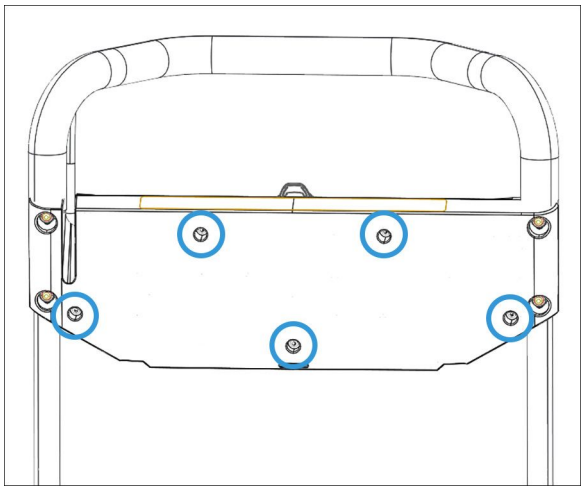
2. Install the 4 nuts and 4 handle screws securing the front and rear dash panels onto the upper handle. Torque the flange nuts to 4.5–5.6 N • m (40–50 in-lb).



g320295

Figure 61

3. Install 5 screws securing the front and rear dash panels. Torque the screws to 1.1-1.7 N • m (10-15 in-lb)



g320298

Figure 62

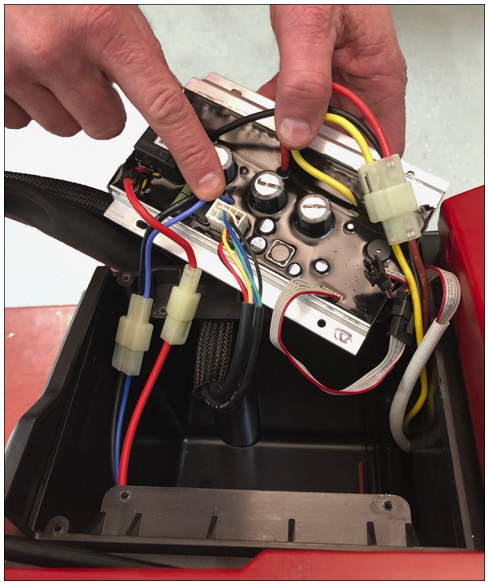
4. Route the harness through the battery container.

5. Install the screw securing battery container skirt to the battery container. Torque the screw to 1.1-1.7 N • m (10-15 in-lb).

g320521

Figure 63

6. Connect the harness to the motor driver.



g320304

Figure 64

7. Install the 4 screws securing the motor driver to the battery container skirt. Torque the screws to 1.1-1.7 N • m (10-15 in-lb).

g320303

Figure 65

8. Install the 2 screws securing the controller cover to the battery container skirt. Torque the screws to 1.1-1.7 N • m (10-15 in-lb).

WARNING

When removing or installing the battery, do not allow the battery terminals to touch any metal parts of the machine. Do not allow metal tools to short between the battery terminals and metal parts of the machine.

9. Install the battery into the machine.

Chapter 8

Motor

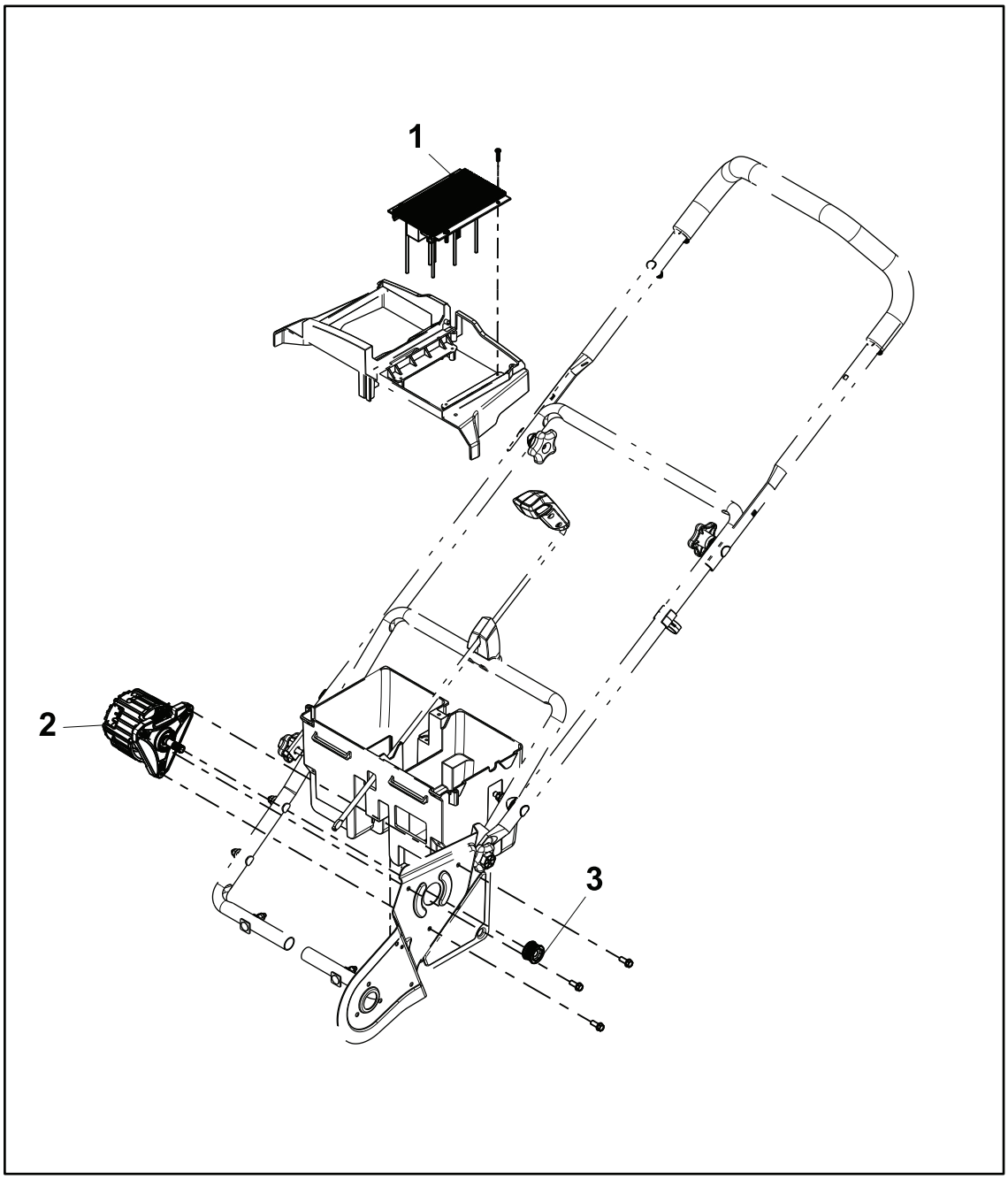
Table of Contents

General Information

This snowthrower comes with a pulley installed and a 60 volt motor. The 60 volt motor is not serviceable.

Service and Repairs

Motor and Motor Driver Assembly



g320493

Figure 66

1. Motor Driver
2. 60v Snowblower Motor
3. Motor Pulley

Motor Driver Replacement

Motor Driver Removal

1. Park the machine on a level surface and wait for all moving parts to stop.

WARNING

When removing or installing the battery, do not allow the battery terminals to touch any metal parts of the machine. Do not allow metal tools to short between the battery terminals and metal parts of the machine.

2. Lift the battery cover and remove the battery from the machine.
3. Pull and remove the chute control rod from the machine.
4. Remove the 2 screws securing the controller cover to the battery.
5. Remove the 4 screws securing the motor driver to the battery container skirt.

g320303

Figure 67

6. Lift the motor driver from the battery container skirt and disconnect all the wire attachments. Remove the motor driver.

Motor Driver Installation

1. Connect all the wire attachments to the motor driver.
2. Install the 4 screws securing the motor driver to the battery container skirt. Torque the screws to 1.1-1.7 N • m (10-15 in-lb).

g320303

Figure 68

3. Install the 2 screws securing the controller cover to the battery container skirt. Torque the screws to 1.1-1.7 N • m (10-15 in-lb).
4. Install the chute control rod.

WARNING

When removing or installing the battery, do not allow the battery terminals to touch any metal parts of the machine. Do not allow metal tools to short between the battery terminals and metal parts of the machine.

5. Install the battery into the machine.

Motor Replacement

Motor Removal

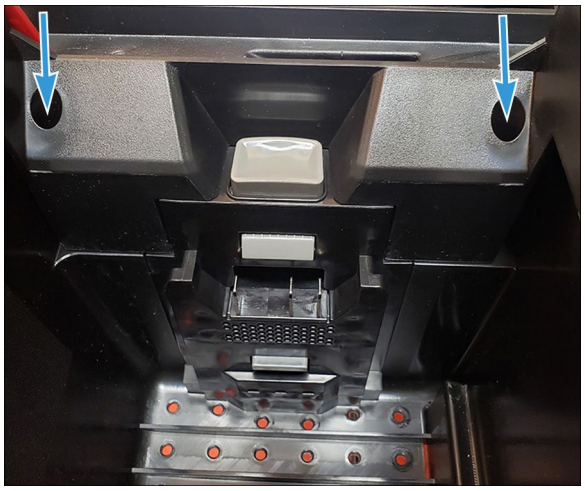
1. Park the machine on a level surface and wait for all moving parts to stop.

WARNING

When removing or installing the battery, do not allow the battery terminals to touch any metal parts of the machine. Do not allow metal tools to short between the battery terminals and metal parts of the machine.

2. Lift the battery cover and remove the battery from the machine.
3. Pull and remove the chute control rod from the machine.
4. Remove the motor driver from the machine. Motor Driver Removal (page 8–4)

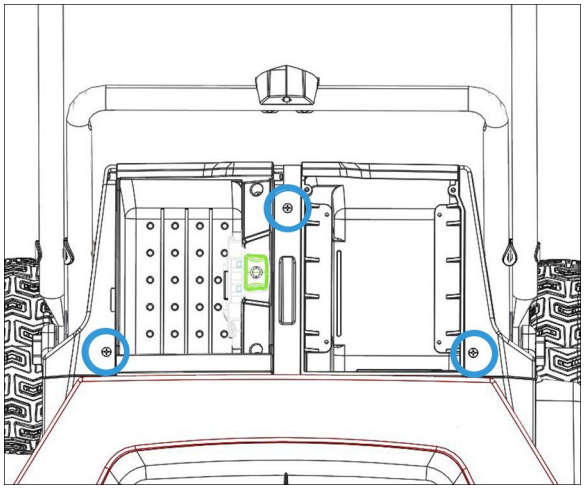
5. Remove the 2 screws securing the battery container skirt to the battery container.



g320276

Figure 69

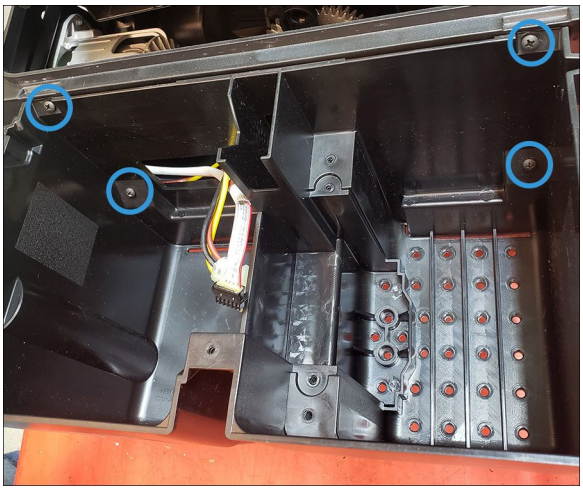
6. Remove the 3 screws securing the battery container skirt to the battery container. Remove the battery container skirt.



g320289

Figure 70

7. Remove the 4 screws and 4 washers securing the battery container to the bulk head. Remove the battery container from the machine.



g320297

Figure 71

8. Remove the 3 screws securing the shroud to the rear chute. Remove the shroud from the machine.
9. Remove the 2 screws securing the LH frame assembly plate to the bulkhead.

g320271

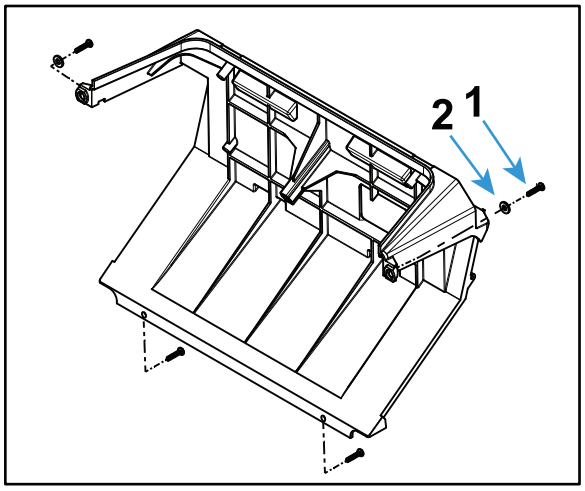
Figure 72

10. Remove the 2 screws securing the RH frame assembly plate to the bulkhead.

g320273

Figure 73

11. Remove the 2 screws and 2 washers securing the upper bulkhead to the upper housing.

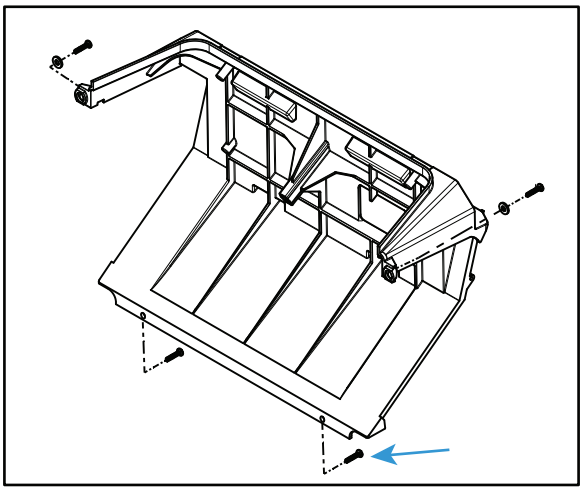


g320494

Figure 74

1. Screw
2. Washer

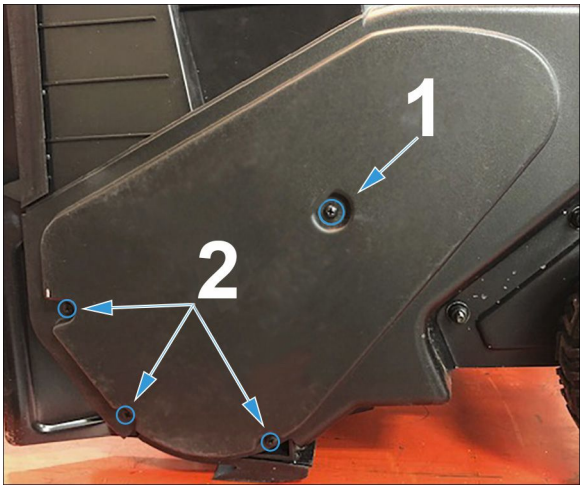
12. Remove the 2 screws securing the lower bulkhead to the lower housing. Remove the bulkhead from the housing.



g324235

Figure 75

13. Remove the plastic screw securing the belt cover to the LH frame plate assembly. Remove the 3 screws securing the belt cover to the housing. Remove the belt cover from the machine.

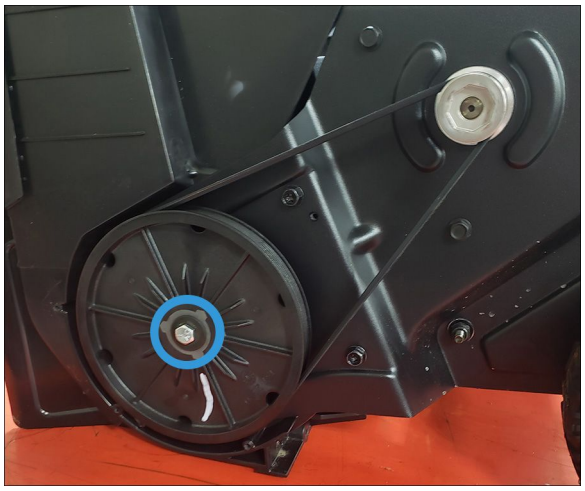


g320499

Figure 76

1. Plastic Screw
2. Screws

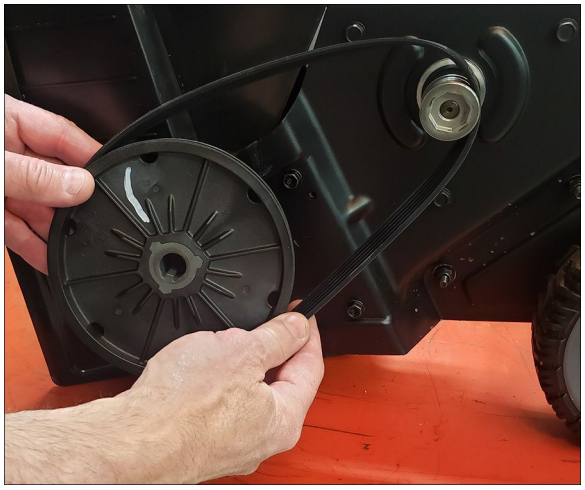
14. Remove the screw and Belleville washer securing the rotor pulley assembly to the rotor shaft.



g323087

Figure 77

15. Remove the rotor pulley assembly from the rotor shaft.



g320312

Figure 78

16. Remove the ribbed V-belt from the rotor pulley assembly and the motor pulley.
17. Remove the 3 screws securing the motor to the LH frame plate. Remove the motor from LH frame plate.

g320288

Figure 79

g320311

Figure 80

Motor Installation

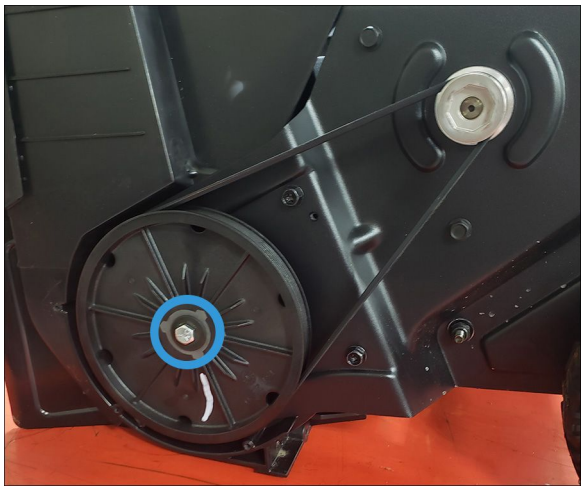
1. Route motor pulley through LH frame plate pass-through hole.

2. Install the 3 screws securing the motor to the LH frame plate. Torque the screws to 8.5–11.3 N • m (75–100 in-lb).

g320288

Figure 81

3. Install the rotor pulley assembly to the rotor shaft. Install the Belleville washer and new screw securing the rotor pulley assembly to the rotor shaft. Torque screw to 10–12.4 N • (90-110 in-lb).



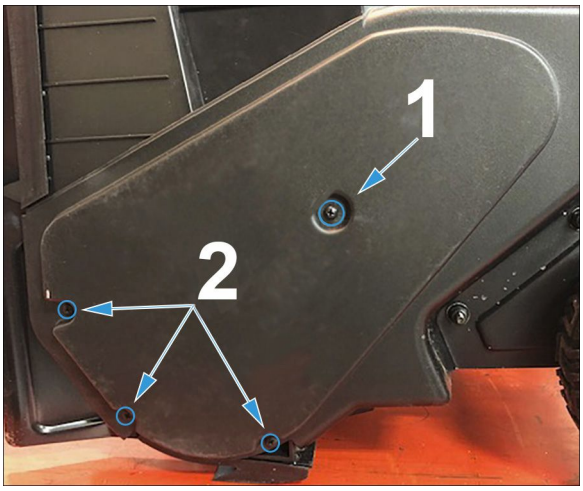
g323087

Figure 82

4. Apply Loctite to the motor pulley threads.
5. Thread the new ribbed V-belt around the motor pulley and route the ribbed V-belt around the rotor pulley assembly.

   Note: Install a new ribbed V-belt each time the ribbed V-belt is installed. Failure to do so can result in impaired rotor function.

6. Install the belt cover to the housing. Install the plastic screw securing the belt cover to the LH frame plate assembly. Install the 3 screws securing the belt cover to the housing. Torque the screw to 1.7–2.3 N • m (15–20 in-lb).

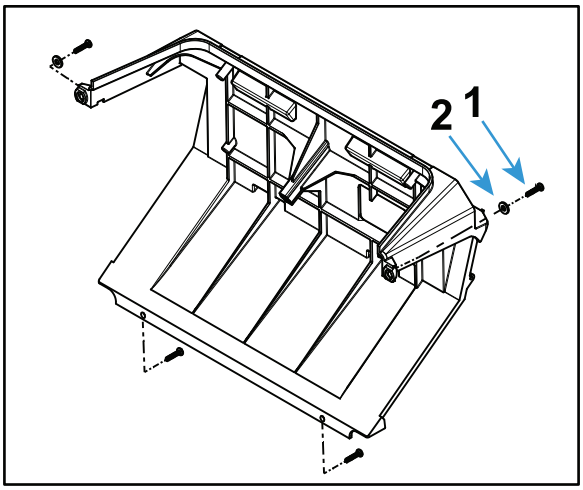


g320499

Figure 83

1. Plastic Screw
2. Screws

7. Install the bulkhead onto the housing. Install the 2 screws and 2 washers securing the upper bulkhead to the upper housing. Torque the screws to 2.26–2.82 N• m (20–25 in-lb).

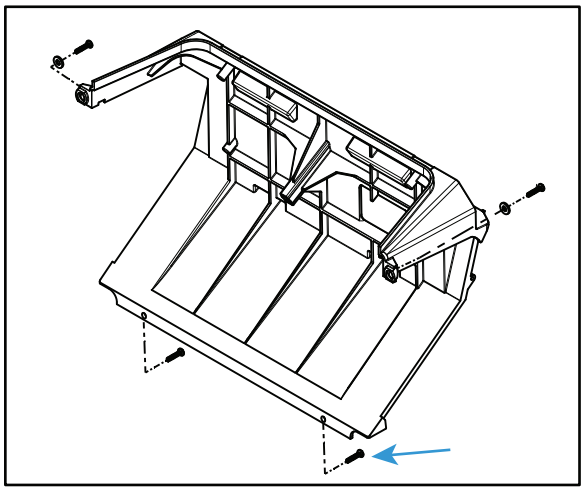


g320494

Figure 84

1. Screw
2. Washer

8. Install the 2 screws securing the lower bulkhead to the lower housing. Torque the screws to 2.26–2.82 N• m (20–25 in-lb).



g324235

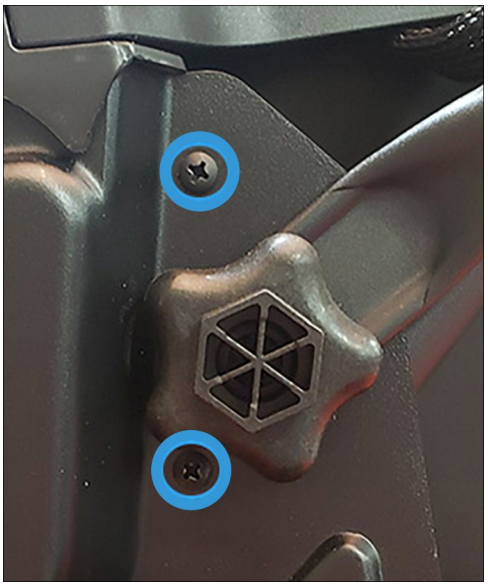
Figure 85

9. Install the 2 screws securing the RH frame assembly plate to the bulkhead. Torque the screws to 2.26–2.82 N• m (20–25 in-lb).

g320273

Figure 86

10. Install the 2 screws securing the LH frame assembly plate to the bulkhead. Torque the screws to 2.26–2.82 N• m (20–25 in-lb).

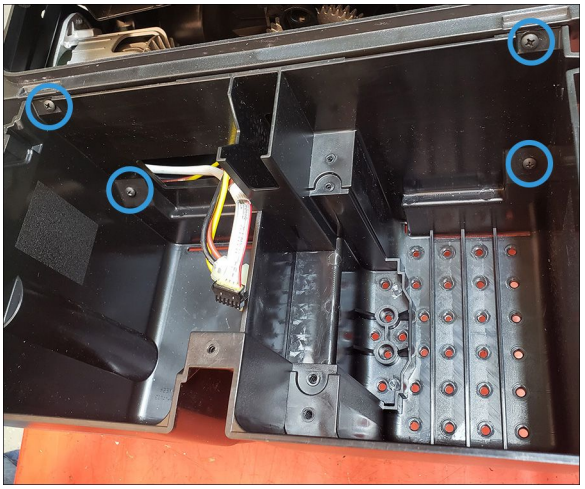


g320271

Figure 87

11. Install the shroud to the rear chute. Install the 3 screws securing the shroud to the rear chute. Torque the screws to 1.1-1.7 N • m (10-15 in-lb).

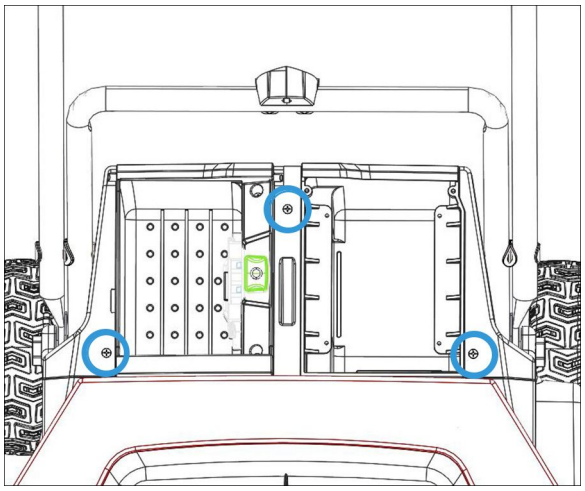
12. Install the battery container to the bulk head. Install the 4 screws and 4 washers securing the battery container to the bulk head. Torque the screws to 2.26–2.82 N• m (20–25 in-lb).



g320297

Figure 88

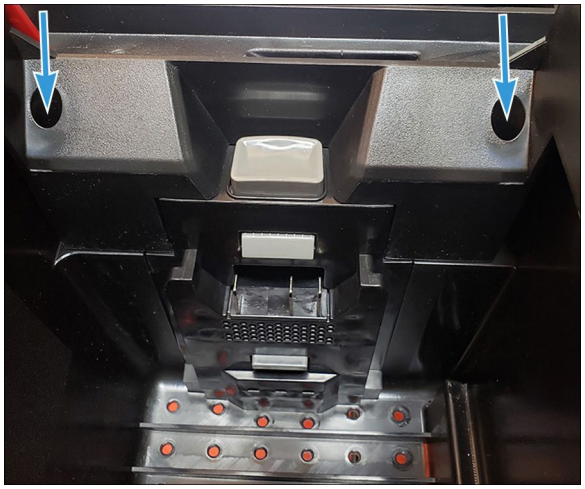
13. Install the battery container skirt to the battery container. Install the 3 screws securing the battery container skirt to the battery container. Torque the screws to 1.1-1.7 N • m (10-15 in-lb).



g320289

Figure 89

14. Install the 2 screws securing the battery container skirt to the battery container.



g320276

Figure 90

15. Install the motor driver into the machine. Motor Driver Installation (page 8–4)
16. Install the chute control rod.

WARNING

When removing or installing the battery, do not allow the battery terminals to touch any metal parts of the machine. Do not allow metal tools to short between the battery terminals and metal parts of the machine.

17. Install the battery into the machine.