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Count on it.

Service Manual

TITAN® Max 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

TITAN® Max Specifications	
Model	**76601**
Engine	26 HP Kohler with Pro Air Cleaner
Engine Model	KT745-3094
Engine Displacement	747cc
Engine Speed	3600 ± 100
Engine Oil Capacity	1.9 L (64 fl oz) with oil filter
Frame/Axle Width	Fully Welded Tubular Frame
Deck Size	152.4 cm (60 inches)
Deck Configuration	3-Blade
Deck Construction	Fabricated
HOC Type	4 Point
HOC Range	3.81–12.7 cm (1.5-5.0 inches)
Fuel Tank Capacity	26.5 L (7 gallons)
CARB Compliant	No
EPA Complaint	Yes
Clutch	Warner 142.36 N • m (105 ft-lb)
Hydros	Hydro-Gear ZT-3100
Hydro Oil Capacity (With Filters Removed)	4.45 L (1.2 gallons)
Unit Speed	9.0 mph
Rear Wheels/Tires	58.42 x 3.48–30.48 cm (23 x 12-12 inches)
Castor Tires	13 x 6.5-6 Smooth
Seat (INC with Armrests)	60.96 cm (24 inch) Seats INC with armrests
Seat Slide	Lever Slide
Floor Mat	Molded Rubber
Recycler	Optional
Bagging System	Optional
Hourmeter	Standard
Foot Lift Assist	Standard
Deck Spring Assist	N/A
Hitch Kit	Standard
Anti-scalpe Rollers	Yes
Battery Size	300CCA
Gross Weight (lb)	Unit 876
Length	208.79 cm (82.2 inches)
Width (Deflector Down)	191.3 cm (75.3 inches)
Width (Deflector Up)	160.5 cm (63.2 inches)
Height (ROPS Down)	116 cm (45.7 inches)
Height (ROPS Up)	179.6 cm (70.7 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

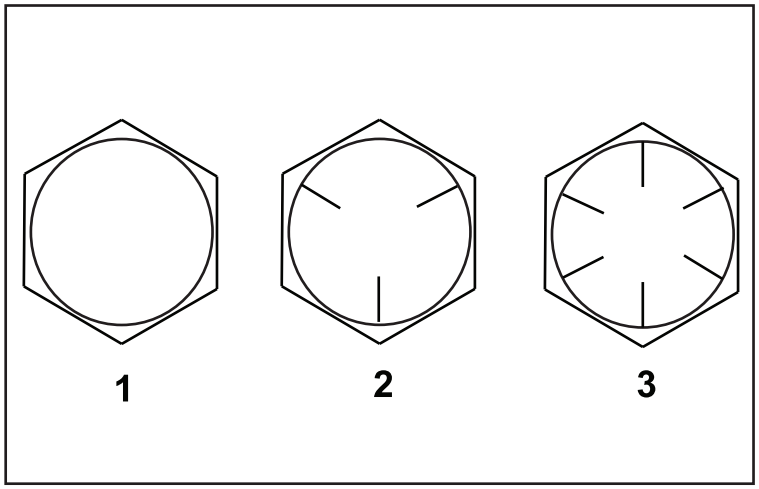

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Figure 1

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

Metric Bolts and Screws

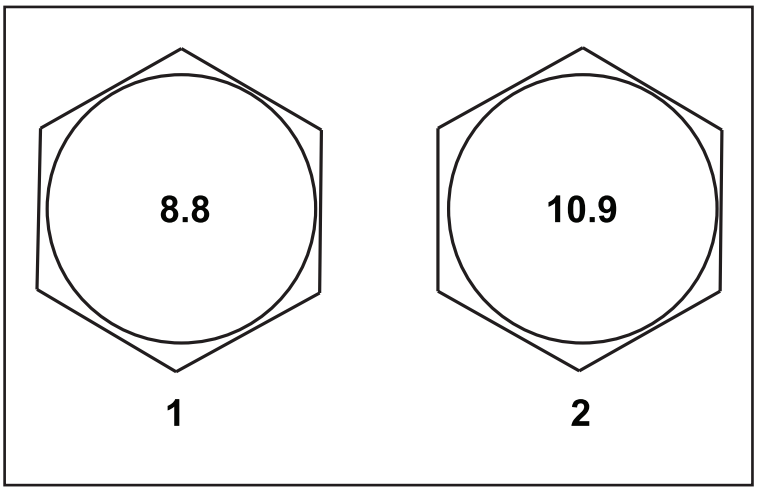

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Figure 2

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

General Troubleshooting

Problem	Possible Cause	Corrective Action
The starter does not crank	The blade control switch (PTO) is engaged.	Move the blade-control switch (PTO) to the disengaged position.
	The parking brake is not engaged.	Set the parking brake.
	The motion-control levers are not in the Neutral-Lock position.	Ensure that the motion-control levers are in the Neutral-Lock position.
	The battery is dead.	Charge the battery.
	The electrical connections are corroded or loose.	Check the electrical connects for good contact.
	The fuse is blown.	Replace the fuse.
	The relay or switch is worn or damaged.	Test and replace faulty relay or switch.
The engine does not start, starts hard, or fails to keep running	The fuel tank is empty.	Fill the fuel tank.
	The fuel shut-off valve is closed.	Open the fuel shut-off valve.
	The oil level in the crankcase is low.	Add oil to the crankcase.
	The throttle is not in the correct position.	Be sure that the throttle control is midway between the slow and fast positions.
	There is dirt in the fuel filter.	Replace the fuel filter.
	There is dirt, water, or stale fuel in the fuel system.	Clean and flush the fuel system.
	The air cleaner is dirty.	Clean or replace the air cleaner element.
	The seat switch is not functioning properly.	Check the seat-switch indicator. Replace the seat if necessary.
	The electrical connections are corroded, loose, or damaged.	Check the electrical connections for good contact. Clean the connector terminals thoroughly with electrical-contact cleaner, apply dielectric grease, and make the appropriate connections.
	The relay or switch is worn or damaged.	Test and replace faulty relay or switch.
	The spark plug is fouled or improperly gapped.	Adjust or replace the spark plug.
	The spark plug wire is not connected.	Check the spark plug wire connection.
Engine loses power	The engine load is excessive.	Reduce the ground speed.
	The air cleaner is dirty.	Clean the air cleaner element.
	The oil level in the crankcase is low.	Add oil to the crankcase.
	The cooling fins and air passages above the engine are plugged.	Remove the obstruction and thoroughly clean cooling fins and the air passages.
	The vent hole in the fuel cap is plugged.	Clean or replace the fuel cap.
	There is dirt in the fuel filter.	Replace the fuel filter.
	There is dirt, water, or stale fuel in the fuel system.	Clean and flush the fuel system.

General Troubleshooting (continued)

Problem	Possible Cause	Corrective Action
The engine overheats	The engine load is excessive.	Reduce the ground speed.
	The oil level in the crankcase is low.	Add oil to the crankcase.
	The cooling fins and the air passages above the engine are plugged.	Remove the obstruction and thoroughly clean cooling fins and the air passages.
The mower pulls to the left or right (with levers fully forward)	The tracking needs adjustment.	Adjust the tracking.
	The tire pressure in the drive tires is not correct.	Adjust the tire pressure in the drive tires.
The machine does not drive	The bypass valves are not closed tight.	Tighten the bypass valves.
	The pump belt is worn, loose or broken.	Change the belt.
	The pump belt is off a pulley.	Change the belt.
	The idler spring is broken or missing.	Replace the spring.
	The hydraulic oil level is low or too hot.	Add hydraulic oil to the reservoirs or let it cool down.
The machine vibrates abnormally	The cutting blade(s) is/are bent or unbalanced.	Install new cutting blade(s).
	The blade mounting bolt is loose.	Tighten the blade mounting bolt.
	The engine mounting bolts are loose.	Tighten the engine mounting bolts.
	The engine pulley, idler pulley, or blade pulley is loose.	Tighten the appropriate pulley, check to make sure idler springs are not over stretched.
	The engine pulley is damaged.	Replace the engine pulley.
	The blade spindle is bent.	Replace the spindle.
	The motor mount is loose or worn.	Check the mounting bolts.
The machine produces an uneven cutting height	The blade(s) is/are not sharp.	Sharpen the blade(s).
	The cutting blade(s) is/are bent.	Install new cutting blade(s).
	The mower deck is not level.	Level the mower deck from side-to-side and front-to-rear.
	The underside of mower is dirty.	Clean the underside of the mower.
	The tire pressure is not correct.	Adjust the tire pressure.
	The blade spindle is bent.	Replace the spindle.
The blades do not rotate	The mower deck belt is damaged, worn, loose, or broken.	Install a new deck belt.
	The mower deck belt is off the pulley.	Install the mower belt on the deck pulley and check the idler pulley, idler arm, and spring for correct position and function.
	The pump drive belt is worn, loose or broken.	Check the belt tension or install a new belt.
	The idler spring is broken or missing.	Replace the spring.

General Troubleshooting (continued)

Problem	Possible Cause	Corrective Action
The clutch does not engage	The fuse is blown.	Replace the fuse. Check the coil resistance, battery charge, charging system, and wiring connections, and replace components if necessary.
	There is a low voltage supply at the clutch.	Check the coil resistance, battery charge, charging system, and wiring connections and replace parts if necessary.
	The coil is damaged.	Replace the clutch.
	There is inadequate current supply.	Repair or replace the clutch lead wire or electrical system. Clean the connector contacts.
	The rotor/armature air gap is too large.	Remove the shim or replace the clutch.

Chapter 4

Engine

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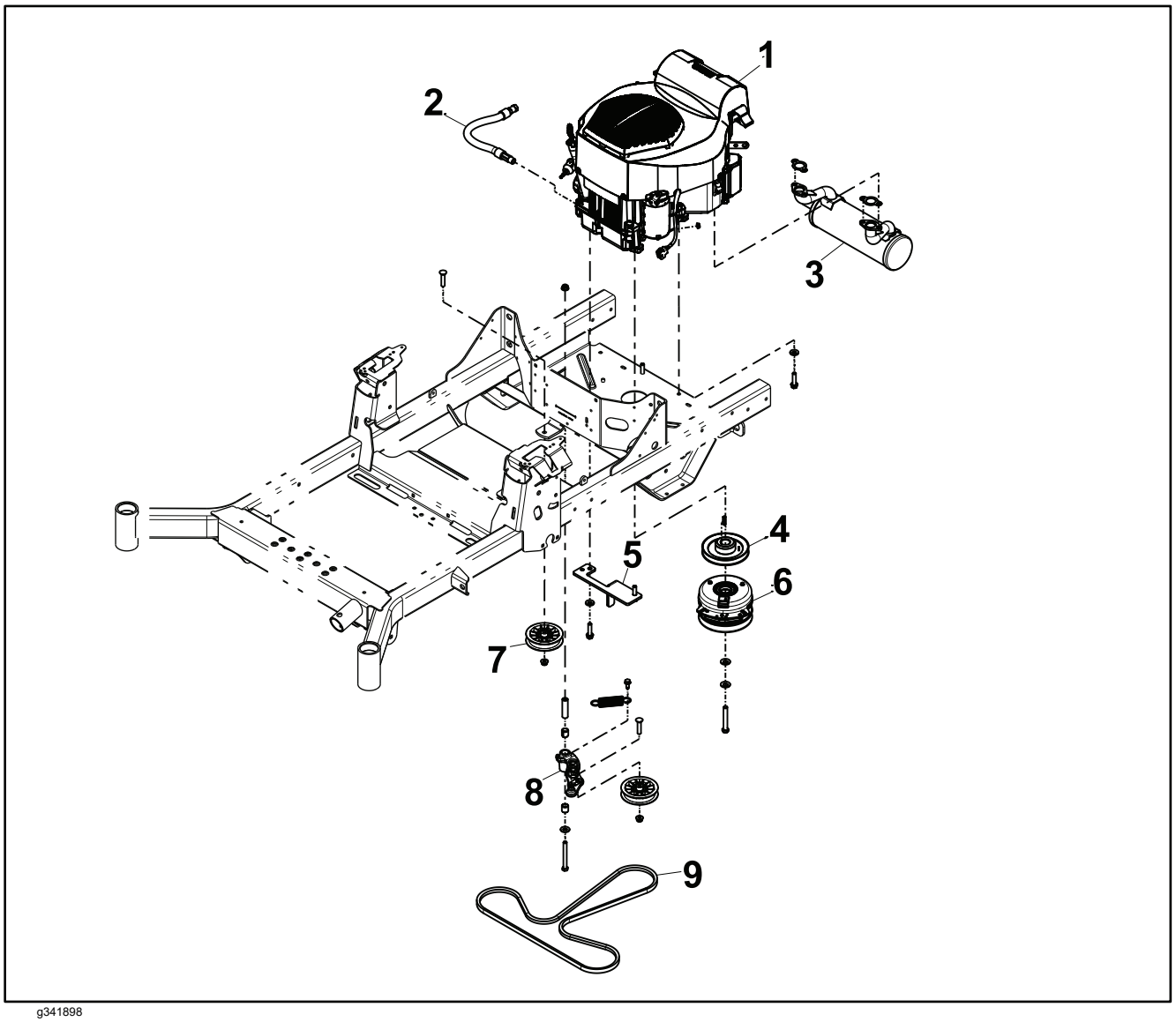
General Information

The Titan Max uses A 26 HP 747cc Kohler twin cylinder OHV 4 cycle engine with a pro air cleaner (KT745-3094).

Service and Repairs

Engine Assembly



g341898

Figure 3

1. Engine
2. Oil Drain Hose Assembly
3. Muffler
4. Engine Sheave
5. Clutch Anchor
6. PTO Clutch
7. Flat Idler Pulley
8. Idler Arm Assembly
9. V-belt

Engine Replacement

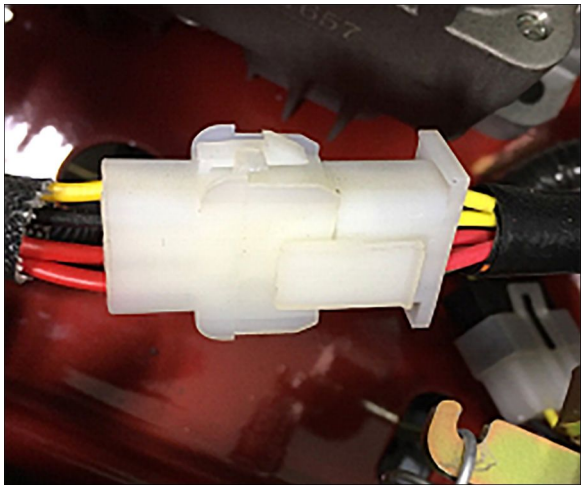
Engine Removal

1. Park the machine on a level surface and disengage the PTO. Stop the engine, wait for all moving parts to stop, and remove key. Engage the parking brake.
2. Disconnect the battery by removing the negative cable first, then the positive cable from the battery.
3. Drain the oil into a suitable container.
4. Close the fuel supply.

g344221

Figure 4

5. Remove the engine guard.
6. Remove the deck drive belt from the mower deck. Deck Drive Belt Removal (page 6–10)
7. Remove the hydrostatic drive belt from the machine. Hydrostatic Drive Belt Removal (page 7–8)
8. Disconnect the chassis wire harness from the main engine wire harness.



g335893

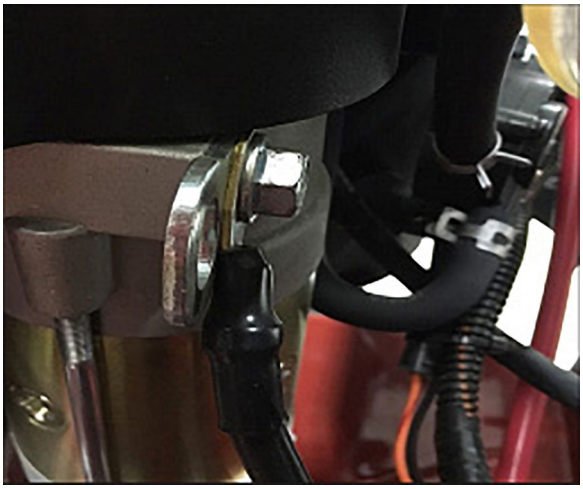
Figure 5

9. Disconnect the red (B+) wire from the starter.

g335895

Figure 6

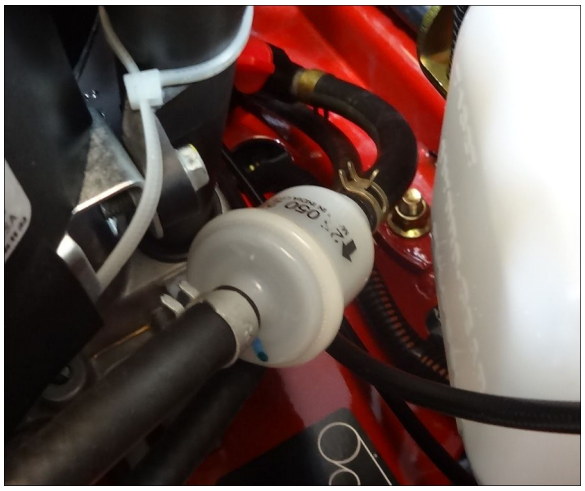
10. Disconnect the black engine ground wire.



g344817

Figure 7

11. Disconnect the fuel supply line at the fuel filter.



g349637

Figure 8

12. Disconnect the throttle cable. Throttle Cable Assembly Removal (page 5–26)
13. Disconnect the choke cable. Choke Control Assembly Removal (page 5–29)
14. Disconnect the clutch wire from the clutch.
15. Remove the (7/16 x 3 inch) clutch mounting screw and 2 washers. Slip the clutch off of the crankshaft.

    Note: Before removing the clutch, note the orientation of the clutch wire and the clutch.
16. Remove the engine pulley. Retain the square key securing the pulley to the crankshaft.
17. Remove the 4 (0.375-16 x 1.500 inch) engine mounting screws.

    Note: Before removing the engine mounting screws, note the orientation of the clutch anchor. The clutch wire can remain attached to the clutch anchor.
18. Remove the engine from the frame.

Engine Installation

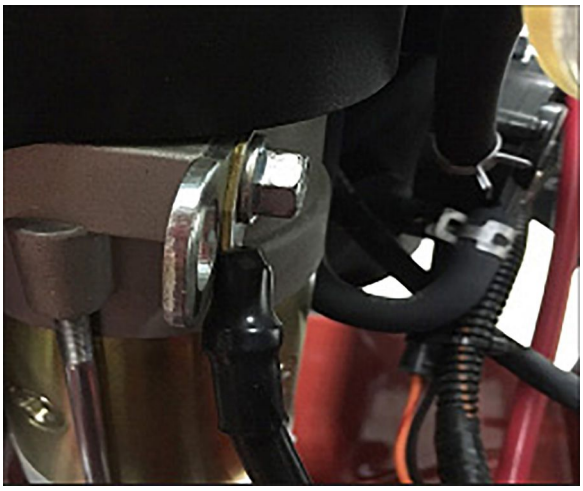
1. Prepare the frame and secure any fuel lines or wire harness components.
2. Install the engine onto the frame.
3. Align the 4 holes of the engine base to the frame and attach the 2 (0.375-16 x 1.500 inch) rear mounting screws and belleville washers loosely.
4. Attach the front 2 screws and belleville washers through the clutch anchor and into the engine base.

5. Torque the 4 screws to 36.6–44.7 N • m (27–33 ft-lb).
6. Install the key and engine pulley onto the crankshaft.

   Note: Install the engine pulley with the larger diameter hub toward the engine.
7. Install the clutch onto the crankshaft ensuring that the slot in the clutch aligns with the tab on the clutch anchor.

8. Install the 2 spring washers and the (7/16 x 3 inch) clutch screw. Torque the screw to 66.4–82.7 N • m (49-61 ft-lb).

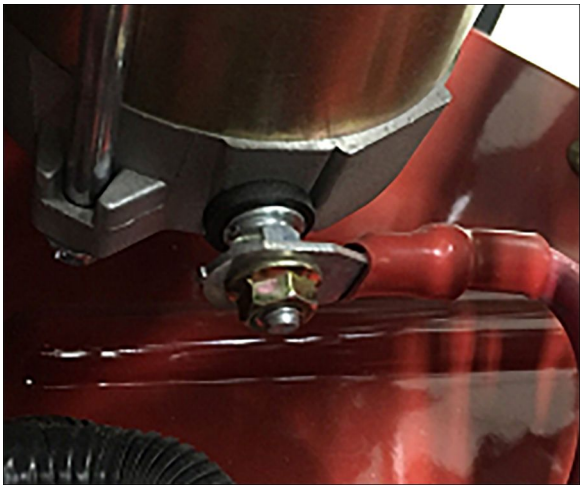
9. Install the hydrostatic drive belt onto the machine. Hydrostatic Drive Belt Installation (page 7–8)
10. Install the deck drive belt onto the mower deck. Deck Drive Belt Installation (page 6–12)
11. Connect the clutch wire to the clutch.
12. Connect the choke cable. Choke Control Assembly Removal (page 5–29)
13. Connect the throttle cable. Throttle Cable Assembly Installation (page 5–27)
14. Connect the black engine ground wire.



g344817

Figure 9

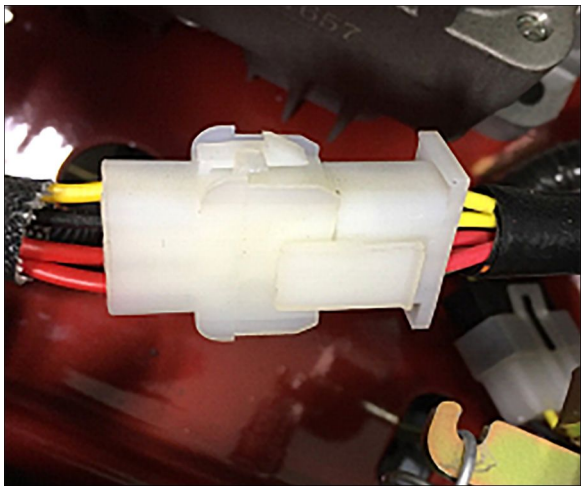
15. Connect the red (B+) wire from the starter.



g335895

Figure 10

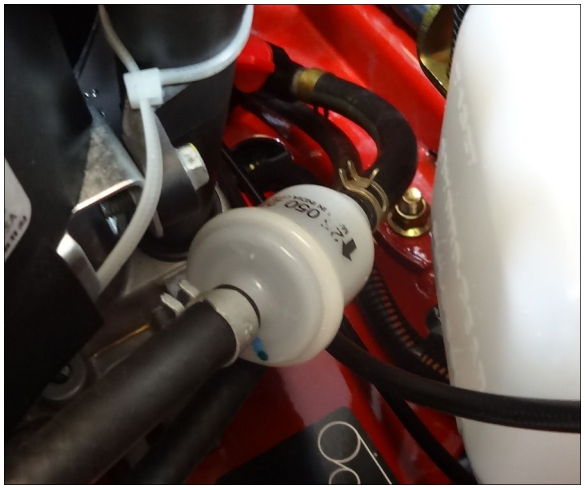
16. Connect the chassis wire harness to the main engine wire harness.



g335893

Figure 11

17. Connect the fuel supply line to the fuel filter.



g349637

Figure 12

18. Install the engine guard.
19. Open the fuel supply valve.

g344221

Figure 13

20. Fill the crankcase with approved oil and verify proper oil level.
21. Connect the battery by installing the positive cable first, then the negative cable to the battery.
22. Verify the proper function of the unit.
23. Verify the engine RPM is set to 3600 ± 100.

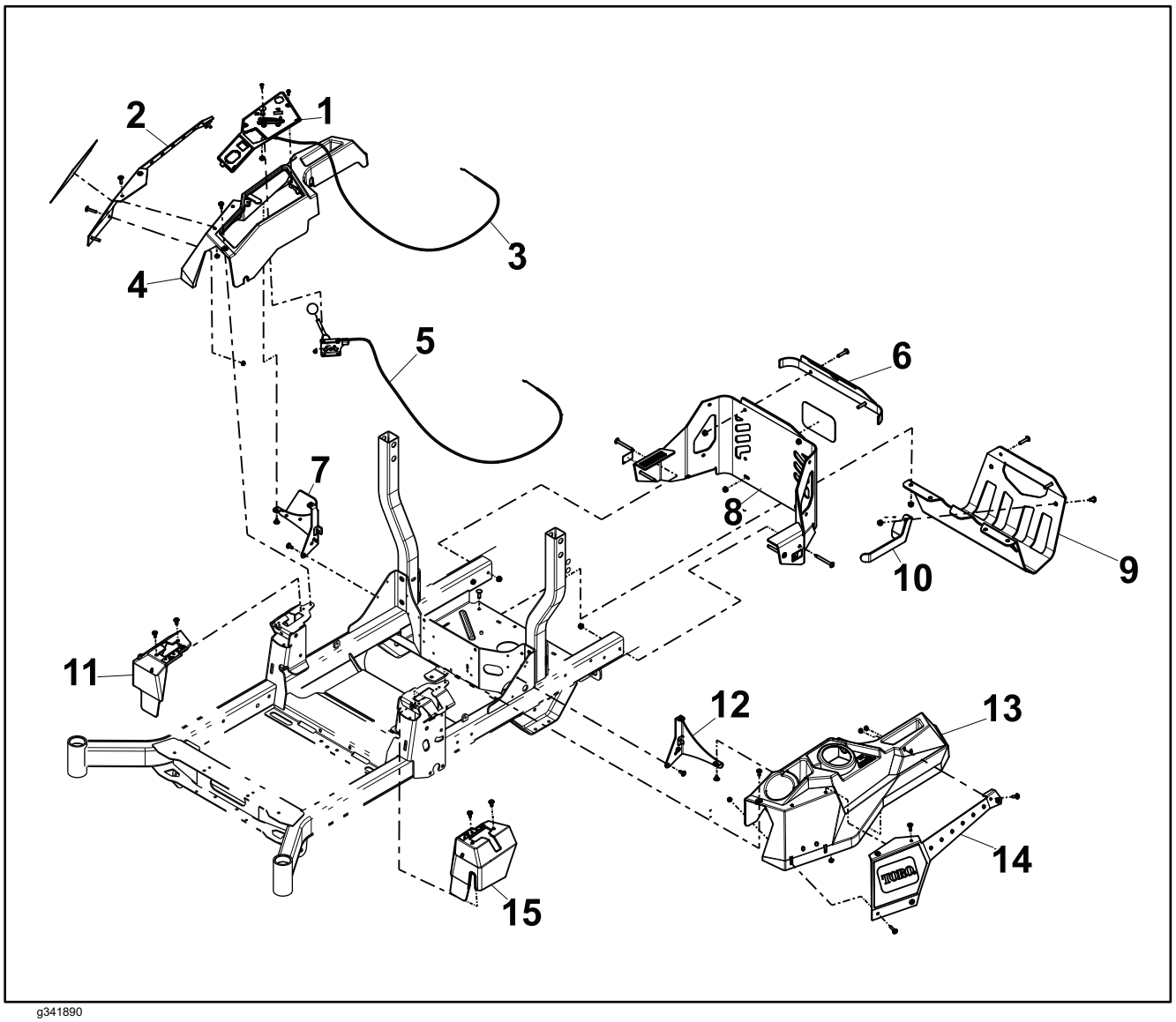
Table of Contents

General Information

The Titan Max series uses a 11 GA fully welded frame with a Roll Over Protection System (ROPS).

Service and Repairs

Chassis Assembly 1

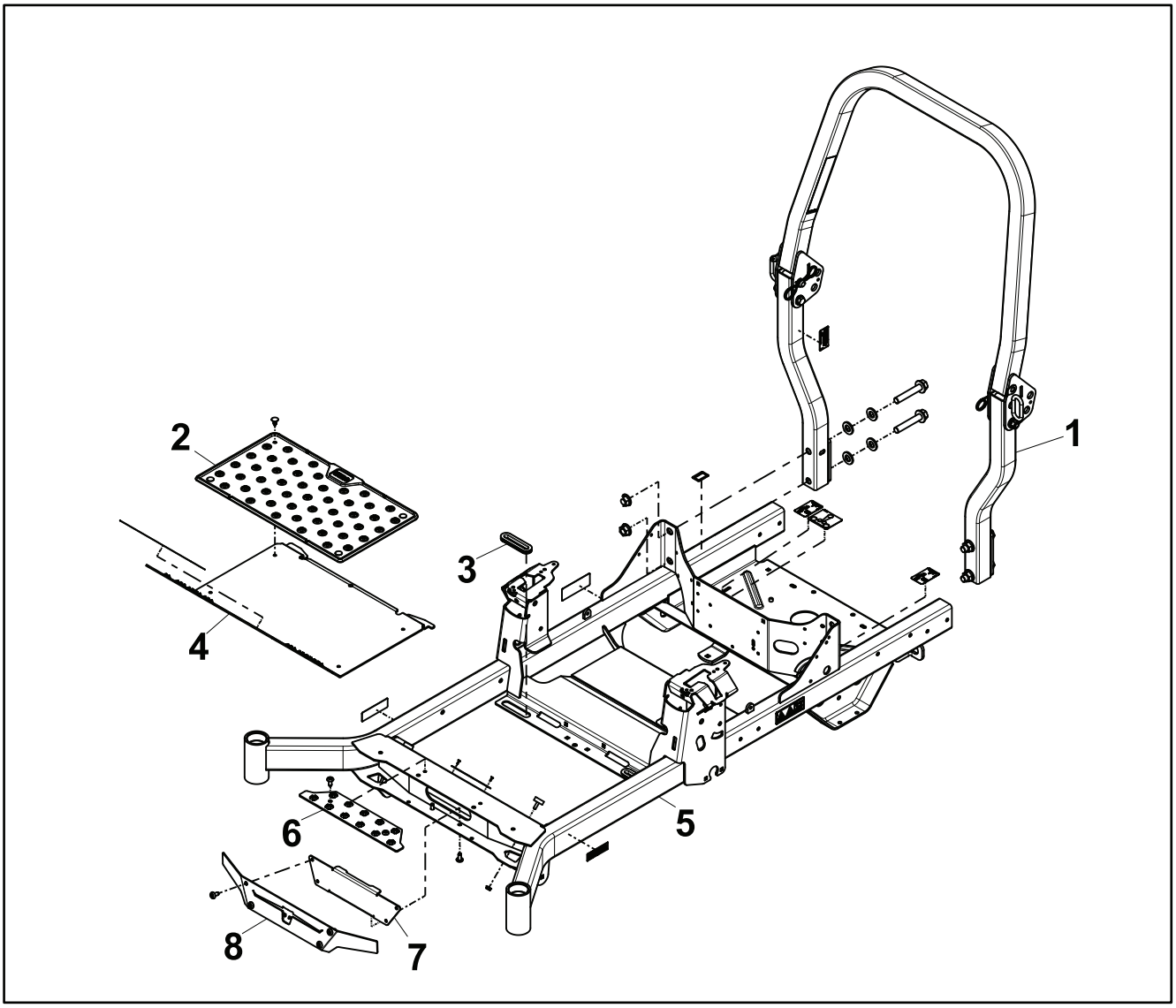


g341890

Figure 14

1. Control Panel Assembly
2. RH Pod Cover
3. Choke Control Cable
4. RH Console
5. Throttle Control Cable
6. Upper Rear Trim
7. RH Console Support
8. Rear Guard Assembly
9. Muffler Guard
10. Muffler Guard Bracket
11. RH Motion Control Cover
12. LH Console Bracket
13. LH Console
14. LH Cover
15. LH Motion Control Cover

Chassis Assembly 2

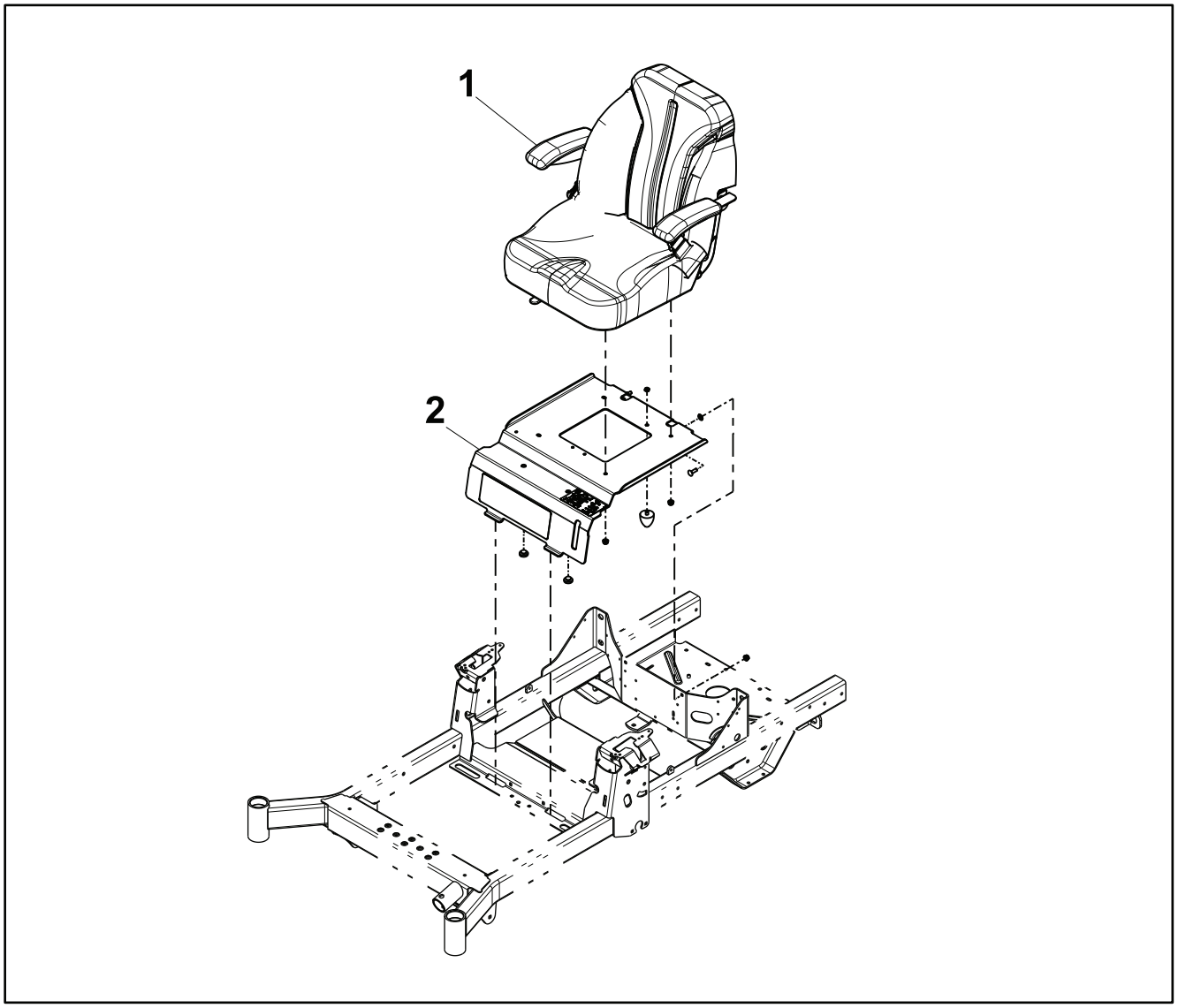


g341888

Figure 15

1. ROPS Assembly
2. Floor Mat
3. Rubber Grommet
4. Floor Pan Assembly
5. Frame
6. Step Plate
7. Backer Plate
8. Fascia Plate

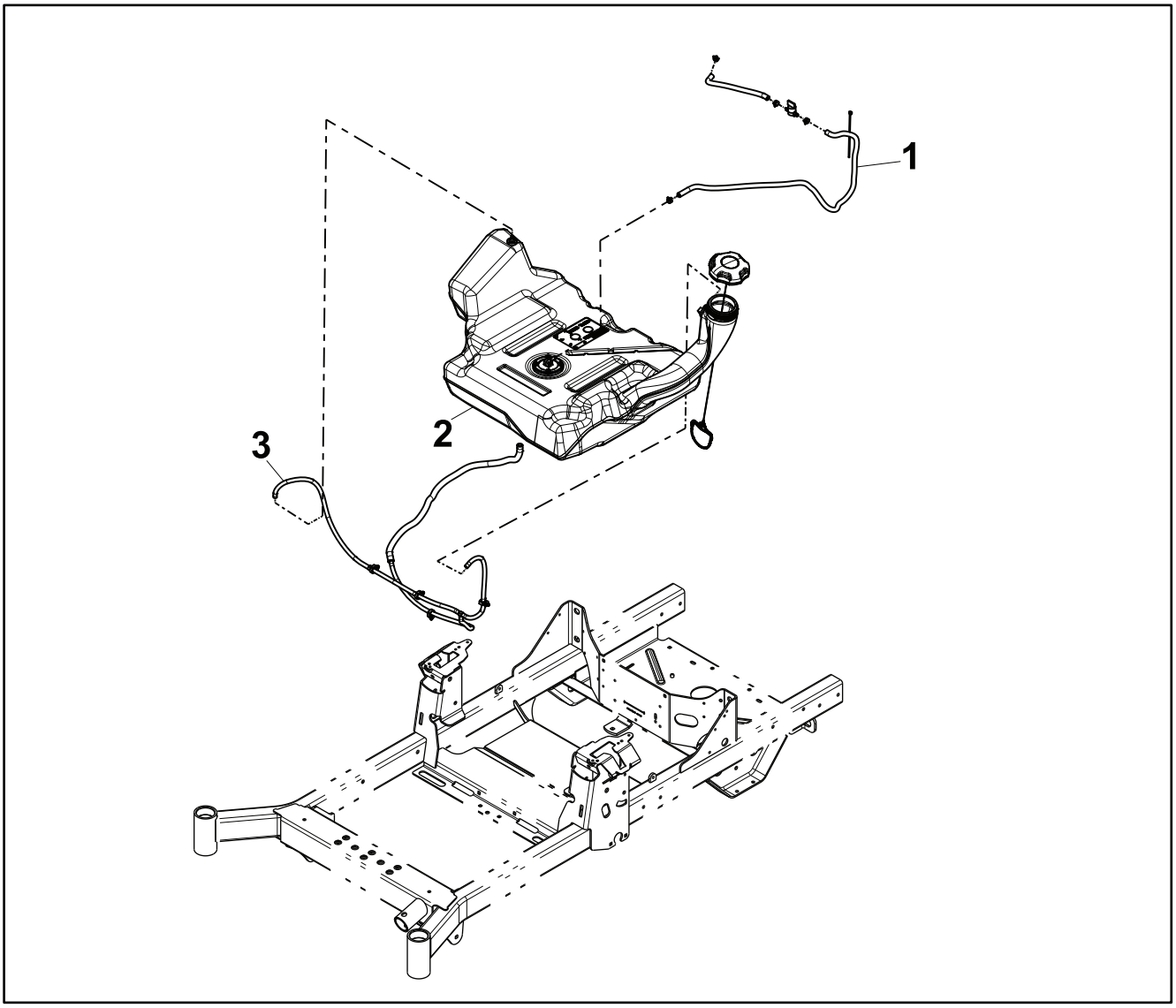
Chassis Assembly 3



g341892

Figure 16

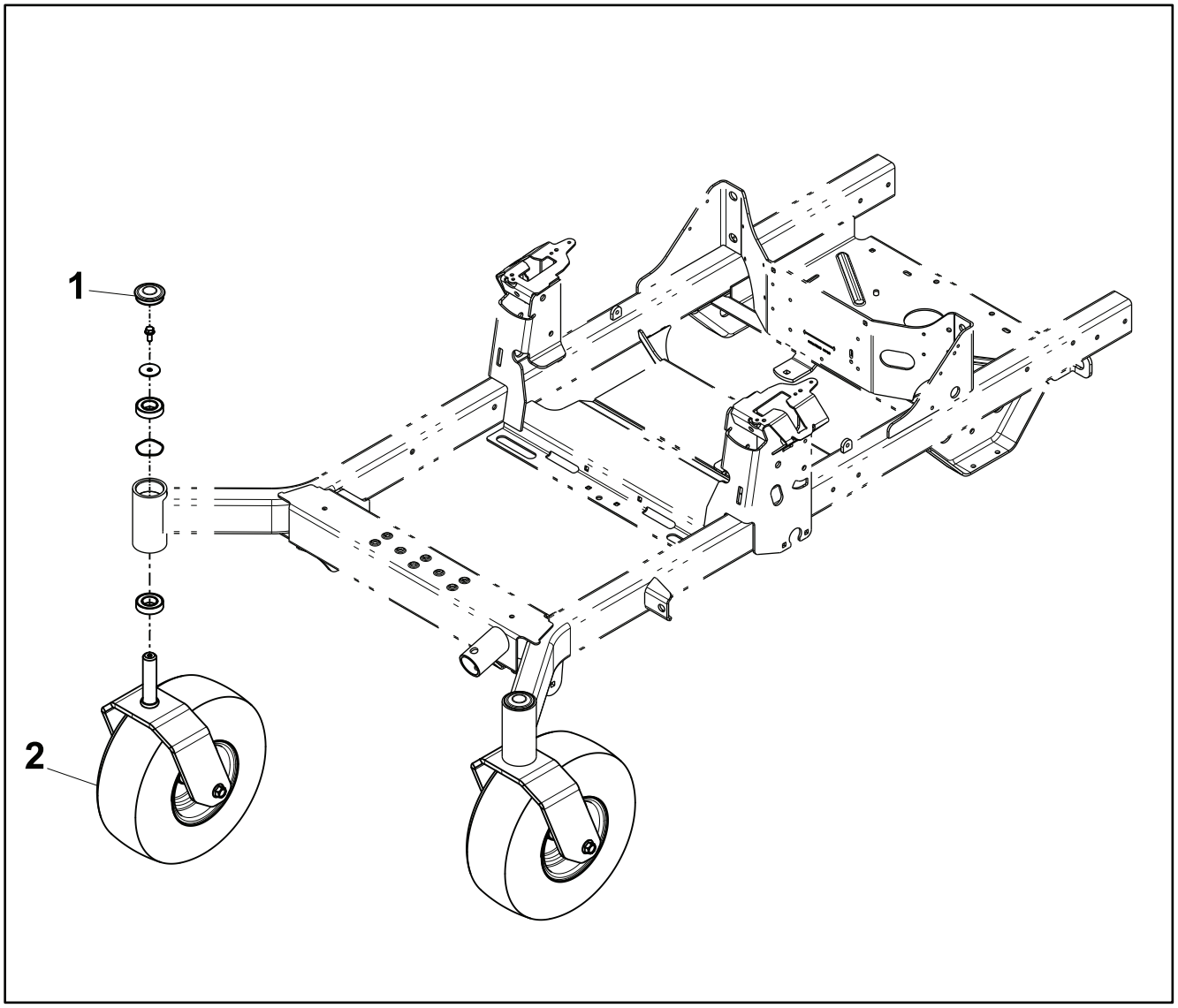
1. Seat
2. Fixed Seat Plate



g341891

Figure 17

1. Fuel Hose Assembly
2. Fuel Tank
3. Vent Hose Assembly



g341894

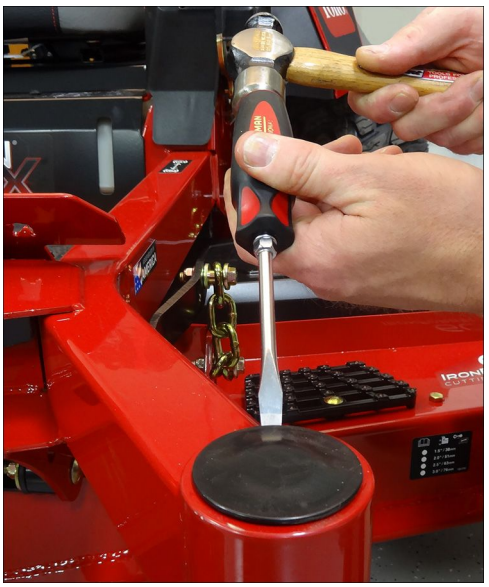
Figure 18

1. Grease Cap
2. Front Caster Wheel Assembly

Caster Assembly and Bearing Replacement

Caster Assembly and Bearing Removal

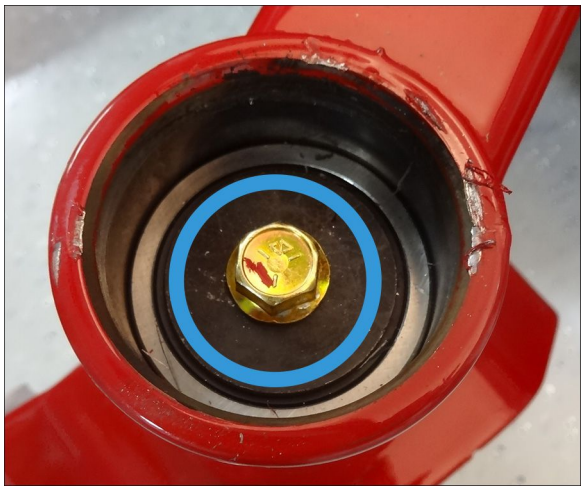
1. Park the machine on a level surface and disengage the PTO. Stop the engine, wait for all moving parts to stop, and remove key. Engage the parking brake.
2. Disconnect the battery by removing the negative cable first, then the positive cable from the battery.
3. Raise and support the unit so that the front wheels are off the ground, block rear wheels.
4. Using a hammer and flat head screw driver, remove the grease cap.



g342953

Figure 19

5. Support the underside of the caster fork, and remove the (0.313-18NC x 0.750 inch) screw and washer securing the caster fork to the frame.



g342955

Figure 20

6. Remove the caster fork from the main frame. Inspect the caster fork shaft for wear or damage.
7. Using a punch and hammer, remove the upper and lower bearings from the axle.

g342956

Figure 21

8. Inspect the 2 bearings for wear or damage. Replace if necessary.
9. Inspect the inside of the axle bearing area for damage or excessive wear.

Caster Assembly and Bearing Installation

1. Clean the surface inside the axle bearing area, keeping surface clean of debris.
2. Using a (32 mm) socket and a hammer, install the lower bearing from the bottom side into the axle. Verify the bearing is fully seated.

   Note: The bearings are sealed and do not require grease/lubrication.
3. Using a (32 mm) socket and a hammer, install the upper bearing from the bottom side into the axle. Verify the bearing is fully seated.

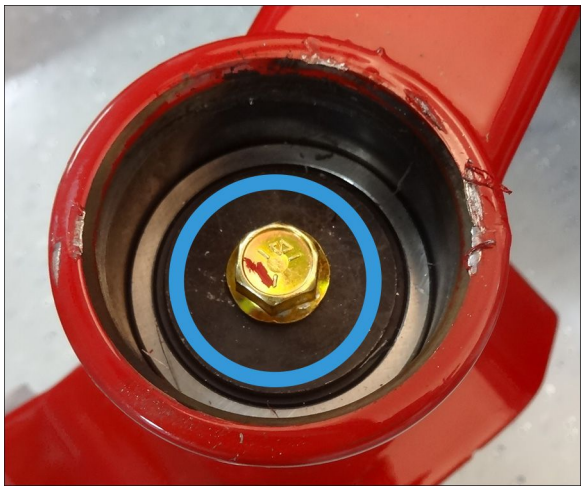
   Note: The bearings are sealed and do not require grease/lubrication.

g342957

Figure 22

4. Apply anti-seize to fork shaft before installing.
5. Install the caster from the bottom side of the frame and place flat washer on top of the bearing.

6. Install the (0.313-18NC x 0.750 inch) screw and tighten to the caster shaft. Torque the screw to 22.597 ± 2.82 N • m (200 ± 25 in-lb).



g342955

Figure 23

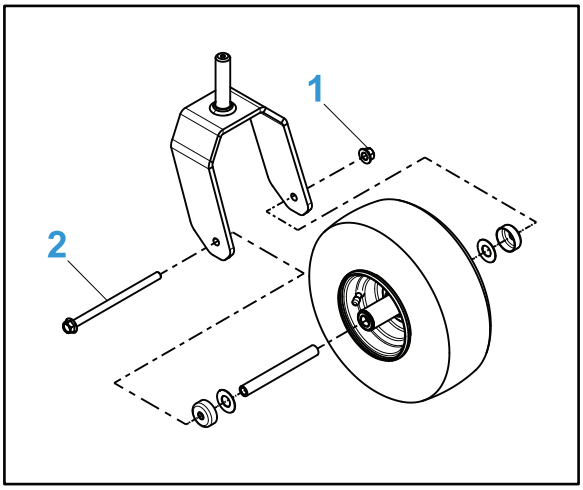
7. Using a (32 mm) socket and a hammer, install the grease cap onto the frame.

   Note: Replace the grease cap if damaged.
8. Connect the battery by installing the positive cable first, then the negative cable to the battery.
9. Lower the unit and verify proper function.

Caster Wheel Service

Caster Wheel Disassembly

1. Park the machine on a level surface and disengage the PTO. Stop the engine, wait for all moving parts to stop, and remove key. Engage the parking brake.
2. Disconnect the battery by removing the negative cable first, then the positive cable from the battery.
3. Raise and support the unit so that the front wheels are off the ground, block rear wheels.
4. Remove the (0.50-13 inch) nut and (1/2–13 x 8.38 inch) screw securing the caster wheel to the caster fork.

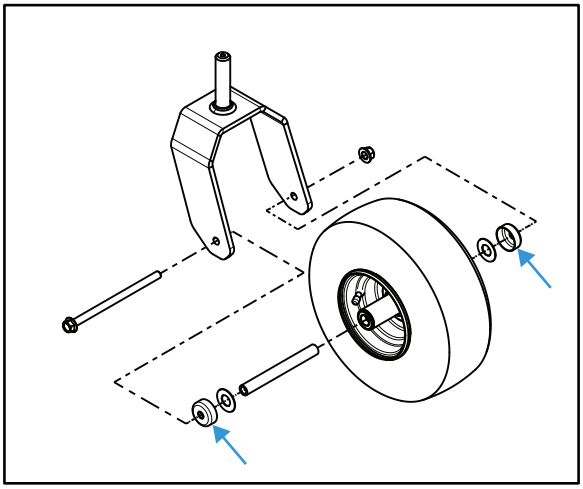


g342888

Figure 24

1. Nut
2. Screw

5. Remove the 2 seal guards and washers from the wheel hub.



g342889

Figure 25

6. Remove the caster wheel spanner from the bearings.
7. Using a punch and a hammer, remove the 2 bearings from the caster wheel.

Caster Wheel Disassembly (continued)

g342890

Figure 26

8. Inspect the bearings for wear or damage and replace if necessary.

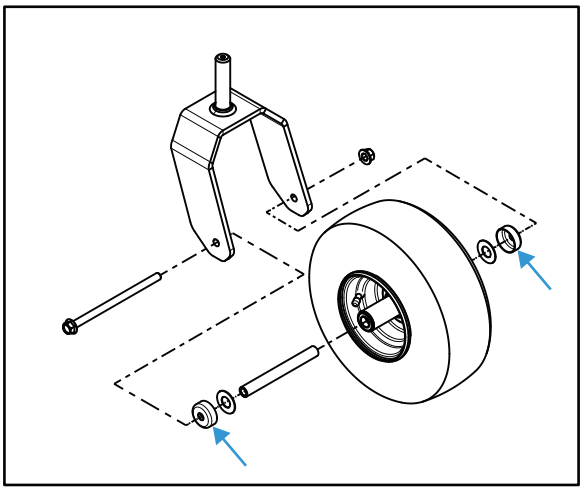
Caster Wheel Assembly

1. Ensure that the wheel is clean and free of debris or excessive wear.
2. Using a (1 1/6 inch) socket and hammer, install the 2 bearings into the caster wheel.

g342921

Figure 27

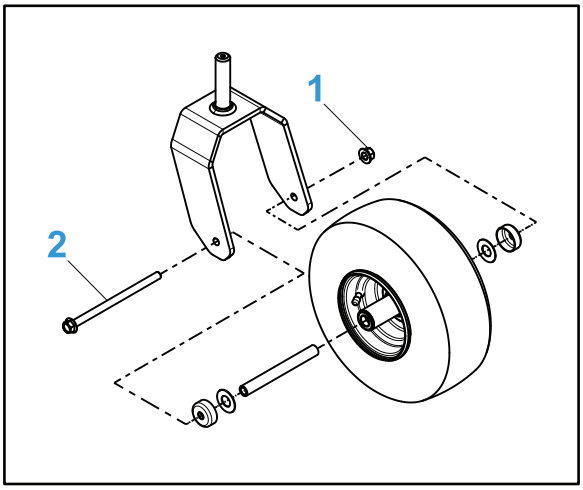
3. Install the caster wheel spanner into the caster wheel.
4. Install the 2 seal guards and washers onto the caster wheel hubs.



g342889

Figure 28

5. Assemble the caster wheel onto the caster fork.
6. Install the (1/2–13 x 8.38 inch) screw and (0.50-13 inch) nut securing the wheel to the caster fork. Torque the screw to 8.47 ± 0.90 N • m (75 ± 8 in-lb).



g342888

Figure 29

1. Nut
2. Screw

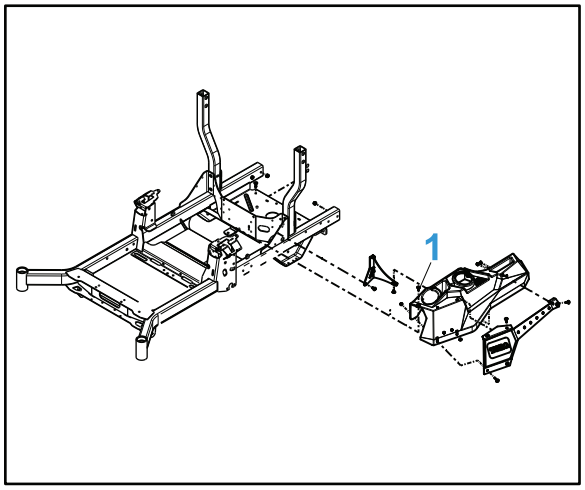
7. Lower the unit and verify proper function.
8. Connect the battery by installing the positive cable first, then the negative cable to the battery.

Left Console Replacement

Left Console Removal

1. Park the machine on a level surface and disengage the PTO. Stop the engine, wait for all moving parts to stop, and remove key. Engage the parking brake.
2. Disconnect the battery by removing the negative cable first, then the positive cable from the battery.
3. Remove the battery from the battery tray.

4. Remove the (T30) torx screw securing the left console to the chassis.



g342987

Figure 30

1. Torx Screw

5. Remove the 2 screws (T30) securing the left console bracket to the chassis.

g342988

Figure 31

6. Remove the fuel cap and disconnect the keeper line.

   Note: Ensure the keeper line does not fall into the fuel tank.

Left Console Removal (continued)

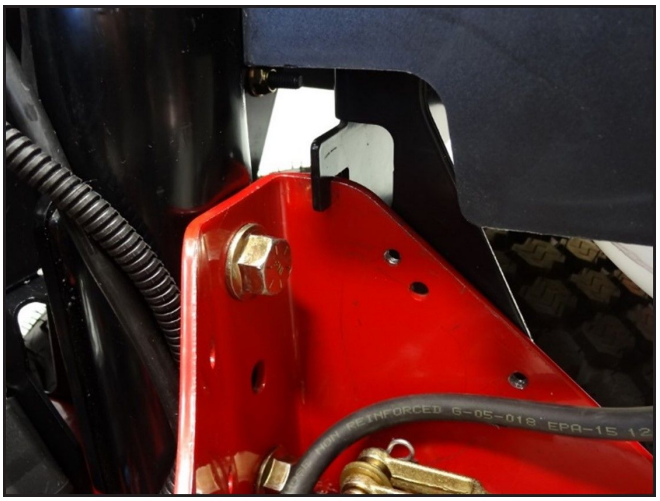
g342993

Figure 32

7. Remove the left console from the machine.
8. Replace the fuel cap.

Left Console Installation

1. Remove the fuel cap from the gas tank.
2. Lower the left console into place. Ensuring the left console seats properly on the support.



g342994

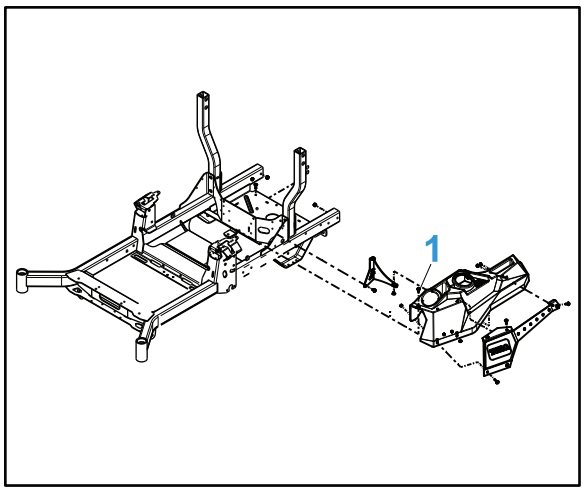
Figure 33

3. Install the keeper line into the fuel cap. Install the fuel cap.
4. Install the 2 screws (T30) securing the LH console bracket to the chassis.

g342988

Figure 34

5. Install the (T30) torx screw securing the LH console to the chassis.



g342987

Figure 35

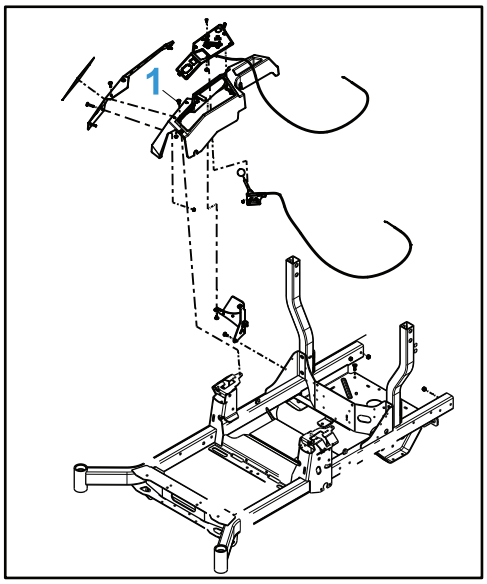
1. Torx Screw

6. Install the battery onto the battery tray and secure with the battery strap.
7. Connect the battery by installing the positive cable first, then the negative cable to the battery.

Right Console Replacement

Right Console Removal

1. Park the machine on a level surface and disengage the PTO. Stop the engine, wait for all moving parts to stop, and remove key. Engage the parking brake.
2. Disconnect the battery by removing the negative cable first, then the positive cable from the battery.
3. Remove the (T30) torx screw securing the RH console to the chassis .

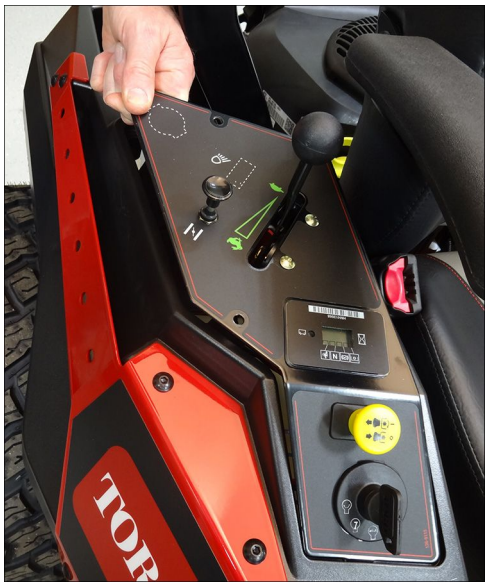


g343007

Figure 36

4. Remove the 2 (T25) screws securing the console to the console bracket on the underside of the console.
5. Remove the (10–14 x 1/2 inch) plastic screw securing the control panel assembly to the console.
6. Lift the console upward off of the machine, while feeding the control panel assembly through the opening in the console.

   Note: The control panel assembly should be supported while servicing the machine, to avoid damage to cables or the wire harness.



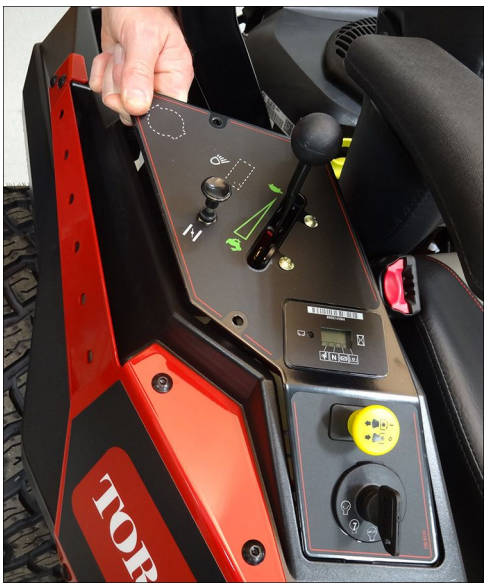
g344218

Figure 37

Right Console Installation

1. Lower the console into place, while moving the control panel assembly through the opening in the console and into position. Verify the console seats properly on the supports.

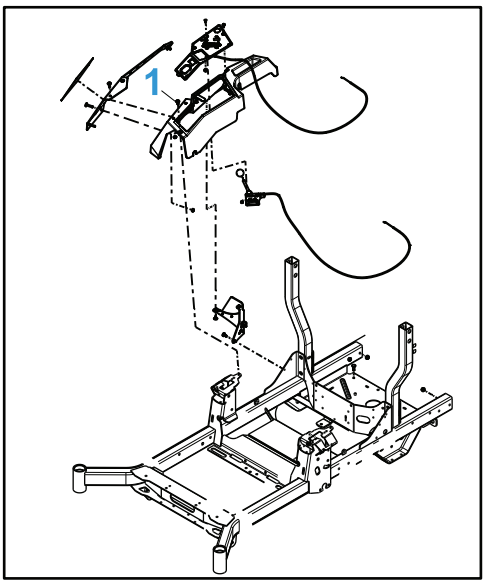
   Note: Before securing the control panel to the console, ensure that all cables and electrical connections are seated firmly in place on the underside of the control panel assembly.



g344218

Figure 38

2. Secure the control panel assembly to the console with a hex screw.
3. Install the (10–14 x 1/2 inch) plastic screw securing the control panel assembly to the console.
4. Install the 2 (T25) screws securing the console to the console bracket on the underside of the console.
5. Install the (T30) torx screw securing the RH console to the chassis.



g343007

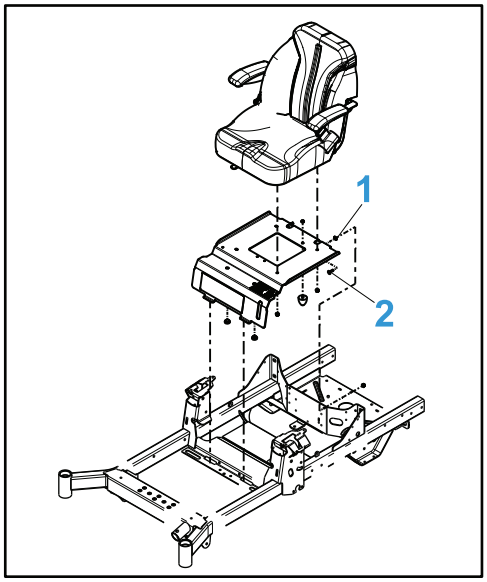
Figure 39

6. Connect the battery by installing the positive cable first, then the negative cable to the battery.

Seat Replacement

Seat Removal

1. Park the machine on a level surface and disengage the PTO. Stop the engine, wait for all moving parts to stop, and remove key. Engage the parking brake.
2. Disconnect the battery by removing the negative cable first, then the positive cable from the battery.
3. Slide the seat forward.
4. Remove the 2 (5/16-18 inch) nuts and 2 (0.312-18 x 1.000 inch) carriage screws securing the seat plate to the chassis.



g344224

Figure 40

1. Nut
2. Carriage Screw

5. Tip the seat forward, remove the 2 wire retainers from the bottom of the seat and seat plate.

g344219

Figure 41

6. Disconnect the seat switch from the seat.

g344220

Figure 42

7. Remove the seat from the seat plate.

Seat Installation

1. With the seat plate tipped forward, hold the seat on the seat plate.
2. Connect the seat switch to the seat.

g344220

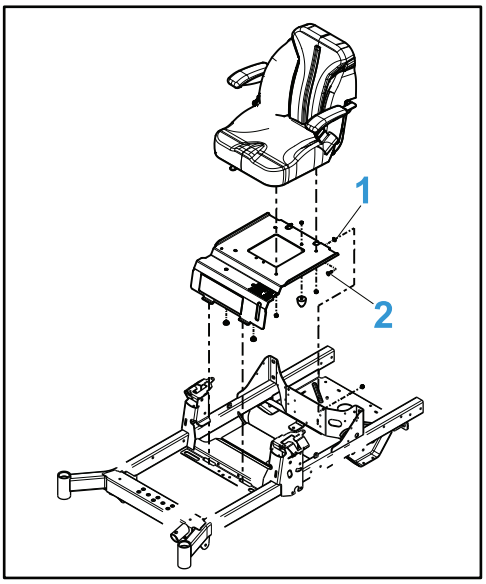
Figure 43

3. Install the 2 wire retainers to the bottom of the seat and seat plate.

g344219

Figure 44

4. Install the 2 (5/16-18 inch) nuts and 2 (0.312-18 x 1.000 inch) carriage screws securing the seat plate to the chassis. Torque the screws to 22.597 ± 2.82 N • m (200 ± 25 in-lb).



g344224

Figure 45

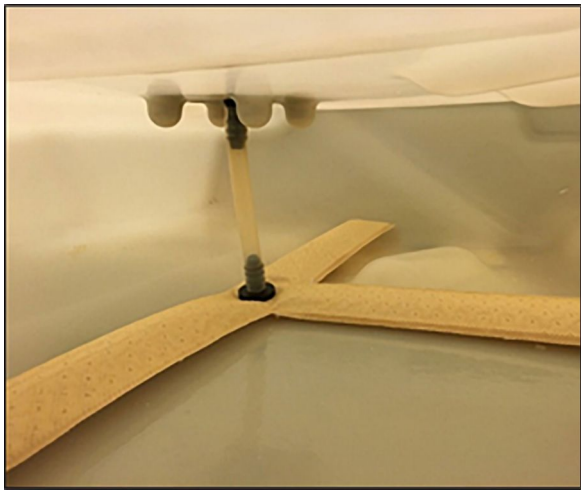
1. Nut
2. Carriage Screw

5. Connect the battery by installing the positive cable first, then the negative cable to the battery.

Fuel Tank Replacement

Fuel Tank Removal

Note: The fuel pick-up system is designed to pull fuel from any part of the tank in low fuel situations as well as reducing the affect of debris in the tank.



g336089

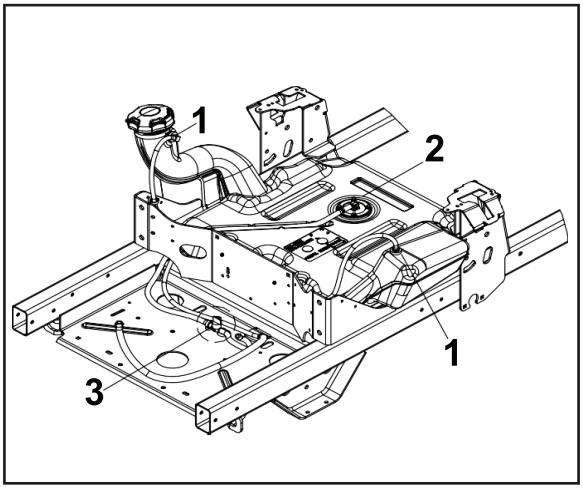
Figure 46

1. Park the machine on a level surface and disengage the PTO. Stop the engine, wait for all moving parts to stop, and remove key. Engage the parking brake.
2. Disconnect the battery by removing the negative cable first, then the positive cable from the battery.
3. Close the fuel supply valve.

g344221

Figure 47

4. Remove the left and rights consoles from the machine. Left Console Removal (page 5–13) Right Console Removal (page 5–16)
5. Remove the seat from the machine. Seat Removal (page 5–19)
6. Disconnect the fuel supply line and the 2 vent lines from the fuel tank.



g336088

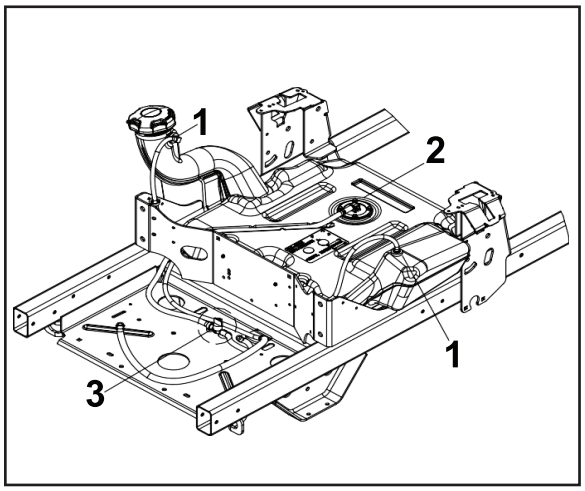
Figure 48

1. Vent Hose Assembly
2. Fuel Supply Line
3. Fuel Shut-Off Valve

7. Lift the fuel tank assembly from the machine by sliding the tank rearward and up, away from the frame.

Fuel Tank Installation

1. Position the fuel tank assembly onto the frame with the vent ports toward the rear of the machine.
2. Connect the 2 vent lines to the fuel tank.
3. Connect the fuel supply line to the fuel tank and route the fuel line in the detents molded into the tank.



g336088

Figure 49

1. Vent Hose Assembly
2. Fuel Supply Line
3. Fuel Shut-Off Valve

4. Install the seat onto the machine. Seat Installation (page 5–20)
5. Install the left and right consoles. Left Console Installation (page 5–15) Right Console Installation (page 5–18)
6. Open the fuel supply valve.

g344221

Figure 50

7. Connect the battery by installing the positive cable first, then the negative cable to the battery.

Roll Over Protection System (ROPS) Replacement

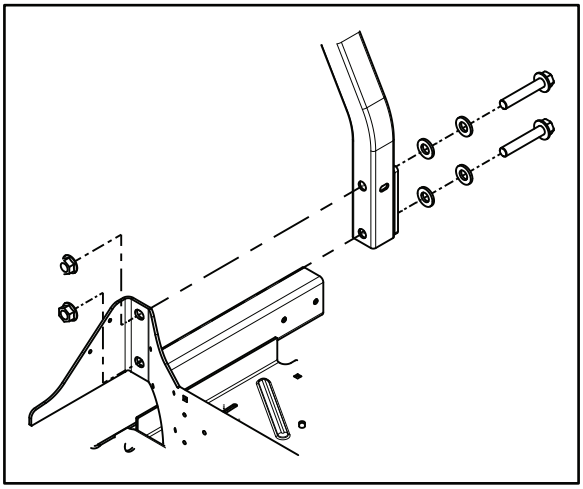
Roll Over Protection System (ROPS) Removal

1. Park the machine on a level surface and disengage the PTO. Stop the engine, wait for all moving parts to stop, and remove key. Engage the parking brake.
2. Disconnect the battery by removing the negative cable first, then the positive cable from the battery.
3. Fold the ROPS assembly into the upright position and lock in place.

Roll Over Protection System (ROPS) Removal (continued)

Note: For easier access, remove the left and right side consoles. Left Console Removal (page 5–13) Right Console Removal (page 5–16)

4. Support the ROPS assembly and remove the 2 screws, 4 washers, and 2 nuts securing the LH ROPS assembly to the chassis. Repeat on the RH ROPS assembly.



g344235

Figure 51

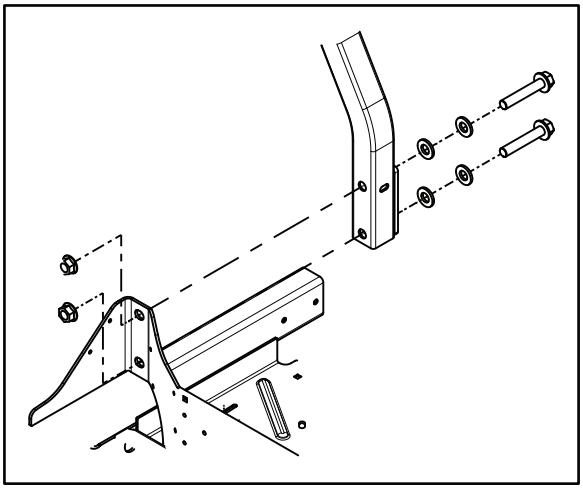
5. Lift and remove the ROPS assembly from the machine.

Roll Over Protection System (ROPS) Installation

1. Install the ROPS assembly onto the machine.

2. Install the 2 screws, 4 washers, and 4 nuts securing the LH ROPS assembly to the chassis. Repeat on the RH ROPS assembly.

Note: The orientation of the ROPS hardware is critical. Verify the screws are orientated correctly.



g344235

Figure 52

3. Torque the ROPS connecting hardware to 122–135.58 N • m (90–100 ft-lb).
4. If the left and right consoles were removed, install the left and right consoles. Left Console Installation (page 5–15) Right Console Installation (page 5–18)
5. Connect the battery by installing the positive cable first, then the negative cable to the battery.

Throttle Cable Assembly Replacement

Throttle Cable Assembly Removal

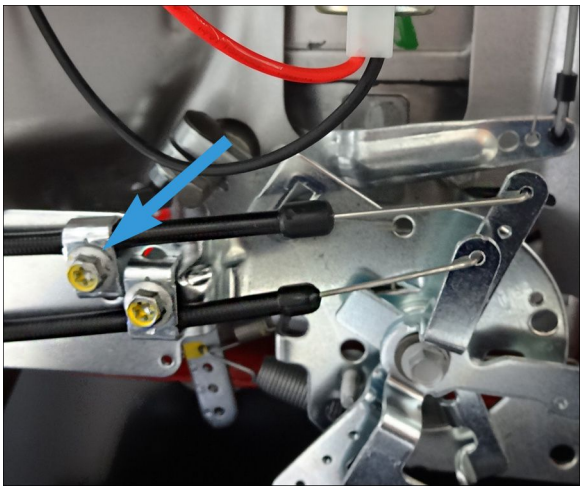
1. Park the machine on a level surface and disengage the PTO. Stop the engine, wait for all moving parts to stop, and remove key. Engage the parking brake.
2. Disconnect the battery by removing the negative cable first, then the positive cable from the battery.
3. Remove the control panel assembly from the right console. Right Console Removal (page 5–16)
4. Remove the knob from the throttle lever.

g336055

Figure 53

5. Remove the 2 (10-24 x 1/2 inch) screws and 2 (10-24 inch) nuts securing the throttle control assembly to the control panel assembly.
6. Remove the 4 (5/16-18 x 2 3/4 inch) torx screws, 4 (5/16-18 inch) nuts, 2 (0.312-18 x 1.000 inch) carriage screws, and 2 (5/16-18 inch) nuts securing the rear guard to the mainframe.
7. Loosen the clamp securing the throttle cable to the throttle plate.

Throttle Cable Assembly Removal (continued)



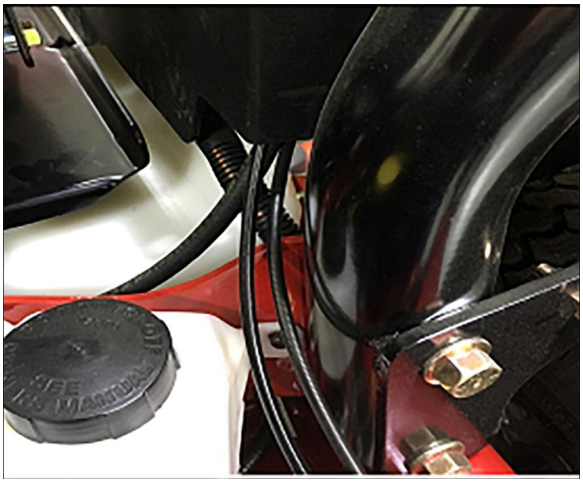
g344236

Figure 54

8. Remove the throttle cable from the throttle plate, noting the position of the cable in the plate.
9. Pull the throttle cable assembly through the console and out of the machine.

Throttle Cable Assembly Installation

1. Route the throttle cable through the right console between the ROPS and the hydraulic fluid reservoir, under the fuel and vent lines, and under the electrical.



g336057

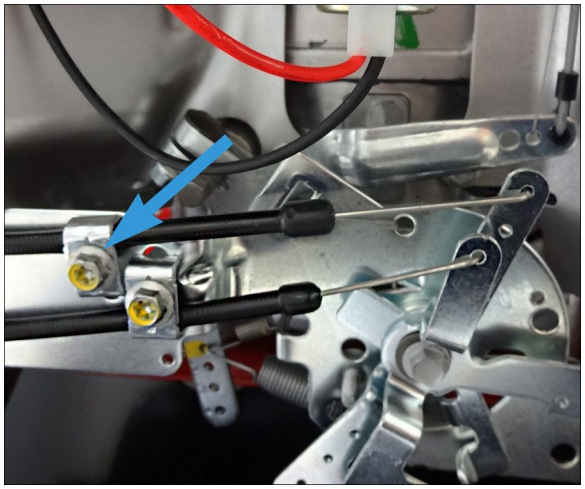
Figure 55

2. Attach the throttle cable assembly to the control panel assembly using 2 screws and nuts.
3. Install the knob on the throttle lever.

g336055

Figure 56

4. Install the throttle cable from the throttle plate.
5. Move the throttle control lever to the slow idle position.
6. Place the z-bend of the throttle cable in the throttle plate on the engine in the position previously noted.
7. Place the cable under the cable clamp.
8. Tighten the clamp securing the throttle cable to the throttle plate.



g344236

Figure 57

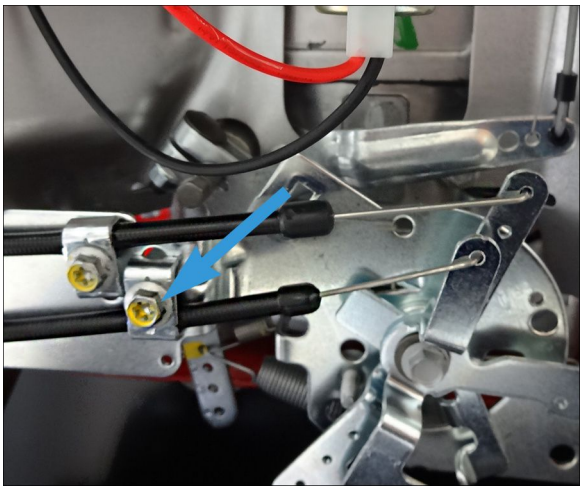
9. Install the 4 (5/16-18 x 2 3/4 inch) torx screws, 4 (5/16-18 inch) nuts, 2 (0.312-18 x 1.000 inch) carriage screws, and 2 (5/16-18 inch) nuts securing the rear guard to the mainframe. Torque all fasteners to 24.29 ± 3.95 N • m (215 ± 35 in-lb).
10. Install the 2 (10-24 x 1/2 inch) screws and 2 (10-24 inch) nuts securing the throttle cable assembly to the control panel assembly.
11. Install the control panel assembly onto the right console. Right Console Installation (page 5–18)
12. Ensure that the throttle control lever is in the slow idle position and tighten the cable clamp.

13. Connect the battery by installing the positive cable first, then the negative cable to the battery.
14. Verify the proper function of the unit.

Choke Control Assembly Replacement

Choke Control Assembly Removal

1. Park the machine on a level surface and disengage the PTO. Stop the engine, wait for all moving parts to stop, and remove key. Engage the parking brake.
2. Disconnect the battery by removing the negative cable first, then the positive cable from the battery.
3. Remove the 4 (5/16-18 x 2 3/4 inch) torx screws, 4 (5/16-18 inch) nuts, 2 (0.312-18 x 1.000 inch) carriage screws, and 2 (5/16-18 inch) nuts securing the rear guard to the mainframe.
4. Loosen the clamp securing the choke cable to the choke plate on the engine.



g344320

Figure 58

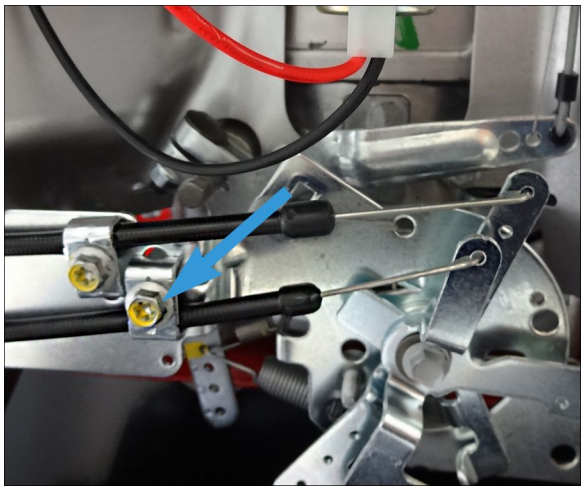
5. Remove the choke cable from the plate, noting the position of the cable in the plate.
6. Remove the control panel assembly from the right console. Right Console Removal (page 5–16)
7. On the bottom side of the control panel assembly, loosen the jam nut securing the choke lever in place. Remove the nut from the choke cable.
8. Pull the choke cable assembly through the control panel and out of the machine.

Choke Control Assembly Installation

1. Route the choke cable through the right console between the ROPS and the hydraulic fluid reservoir, under the fuel and vent lines, and under the electrical.
2. Thread the jam nut over the choke cable up to the control panel assembly
3. Attach the choke cable assembly to the control panel with the jam nut.
4. Install the control panel assembly into the right console. Right Console Installation (page 5–18)
5. Move the choke control lever to the open position (down).

Choke Control Assembly Installation (continued)

6. Place the z-bend of the choke cable in the choke plate on the engine in the position previously noted.
7. Place the cable under the cable clamp.
8. Ensure that the choke control lever is pressed down fully and tighten the cable clamp.



g344320

Figure 59

9. Install the rear guard to the main frame.

10. Install the 4 (5/16-18 x 2 3/4 inch) torx screws, 4 (5/16-18 inch) nuts, 2 (0.312-18 x 1.000 inch) carriage screws, and 2 (5/16-18 inch) nuts securing the rear guard to the mainframe. Torque all fasteners to 24.29 ± 3.95 N • m (215 ± 35 in-lb).
11. Connect the battery by installing the positive cable first, then the negative cable to the battery.
12. Verify the proper function of the unit.

Park Brake Handle Assembly Replacement

Park Brake Handle Assembly Removal

1. Park the machine on a level surface and disengage the PTO. Stop the engine, wait for all moving parts to stop, and remove key. Engage the parking brake.
2. Disconnect the battery by removing the negative cable first, then the positive cable from the battery.
3. Release the parking brake (park brake handle down).
4. Remove the left console. Left Console Removal (page 5–13)
5. Remove the locking cotter pin securing the upper brake linkage to the park brake lever.
6. To completely remove the upper brake linkage, remove the locking cotter pin from the brake shaft and remove the clevis pin. The linkage can now be removed from the frame slot for inspection, adjustment, or replacement.
7. Remove the (0.375-16 x 1.500 inch) screw and (3/8-16 inch) flange nut from the park brake lever assembly.

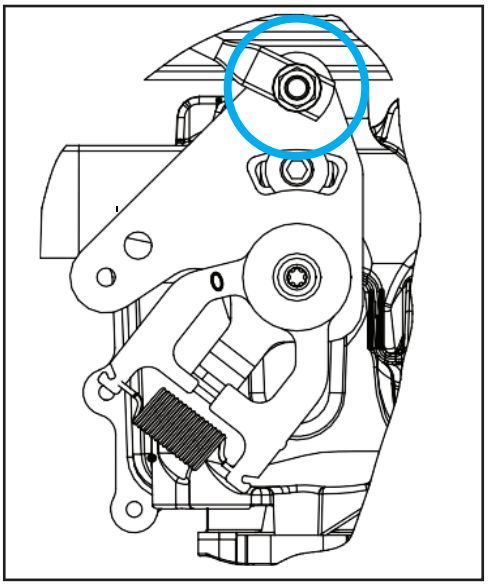
Park Brake Handle Assembly Installation

1. Connect the upper brake linkage to the brake shaft.
2. With the park brake handle hardware orientated as shown, install the (0.375-16 x 1.500 inch) screw and (3/8-16 inch) flange nut.
3. With the park brake shaft in disengaged position and the park brake lever in the lower position, rotate the upper brake linkage until the end aligns with the hole in the park brake lever.
4. Secure with a locking cotter pin.
5. Cycle the park brake lever to ensure that it locks in the engaged position.
6. Install the left console. Left Console Removal (page 5–13)
7. Connect the battery by installing the positive cable first, then the negative cable to the battery.
8. Verify the proper function of the unit.

Motion Control Assembly Replacement

Motion Control Assembly Removal

1. Park the machine on a level surface and disengage the PTO. Stop the engine, wait for all moving parts to stop, and remove key. Engage the parking brake.
2. Disconnect the battery by removing the negative cable first, then the positive cable from the battery.
3. Remove the left and right consoles. Left Console Removal (page 5–13)
Right Console Removal (page 5–16)
4. Raise and support the unit so that the front wheels are off the ground, block rear wheels.
5. Remove the 2 (3/8-16 X 1.00 inch) screws securing the motion control handle to the motion control assembly.
6. Remove the (5/16-18 inch) shoulder screw securing the motion control damper from the motion control assembly.
7. Disconnect the motion control linkage from the transmission.

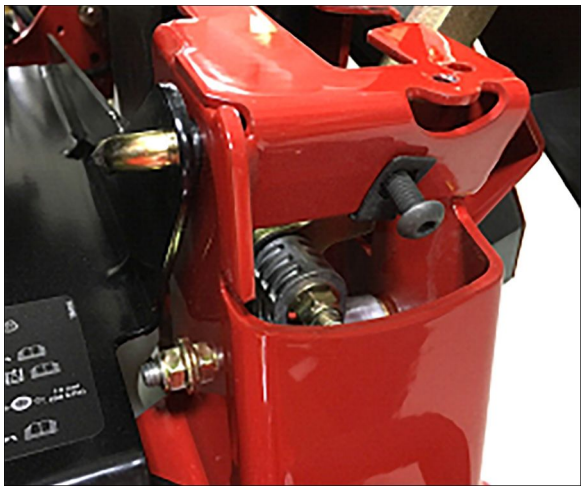


g336043

Figure 60

8. Disconnect the motion control assembly from the frame.

Motion Control Assembly Removal (continued)



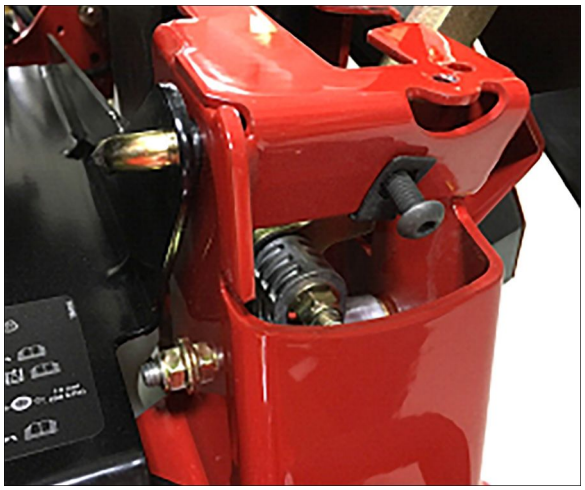
g336044

Figure 61

9. Lower the motion control assembly through the frame toward the center of the machine, remove the assembly.

Motion Control Assembly Installation

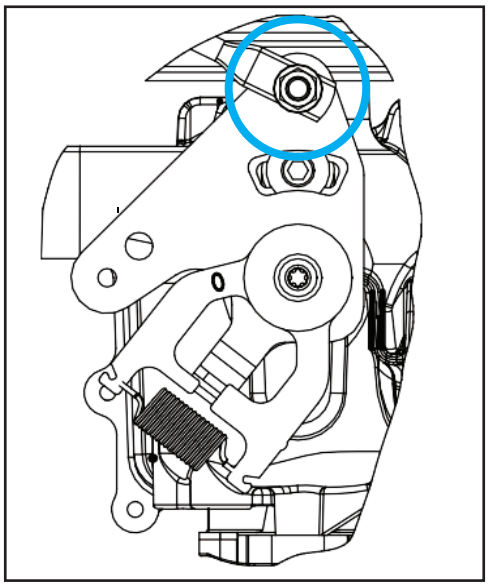
1. Raise and support the unit so that the front wheels are off the ground, block rear wheels.
2. Position the motion control assembly in place with the linkage extending toward the transmission.
3. Secure the motion control assembly to the frame.



g336044

Figure 62

4. Connect the motion control linkage to the transmission.



g336043

Figure 63

5. Adjust the nut on the motion control assembly until the motion control nut is centered in the control plate slot.

6. Install the motion control damper to the motion control assembly, secure with a (5/16-18 inch) shoulder screw. Torque the screw to 9.039–11.298 N • m (80-100 in-lb).

7. Install the motion control handle to the motion control assembly, secure with 2 (3/8-16 X 1.00 inch) screws. Torque the screw to 40.67 ± 4.07 N • m (30 ± 3 ft-lb).

8. Adjust the motion control linkages. See the product Operator's Manual for the motion control linkage adjusting procedure.
9. Lower the unit to the floor.
10. Install the left and right consoles. Left Console Installation (page 5–15) Right Console Installation (page 5–18)
11. Connect the battery by installing the positive cable first, then the negative cable to the battery.
12. Verify the proper function of the unit.
13. Adjust the tracking if necessary. See the product Operator's Manual for the tracking adjustment procedure.

Chapter 6

Mower Deck

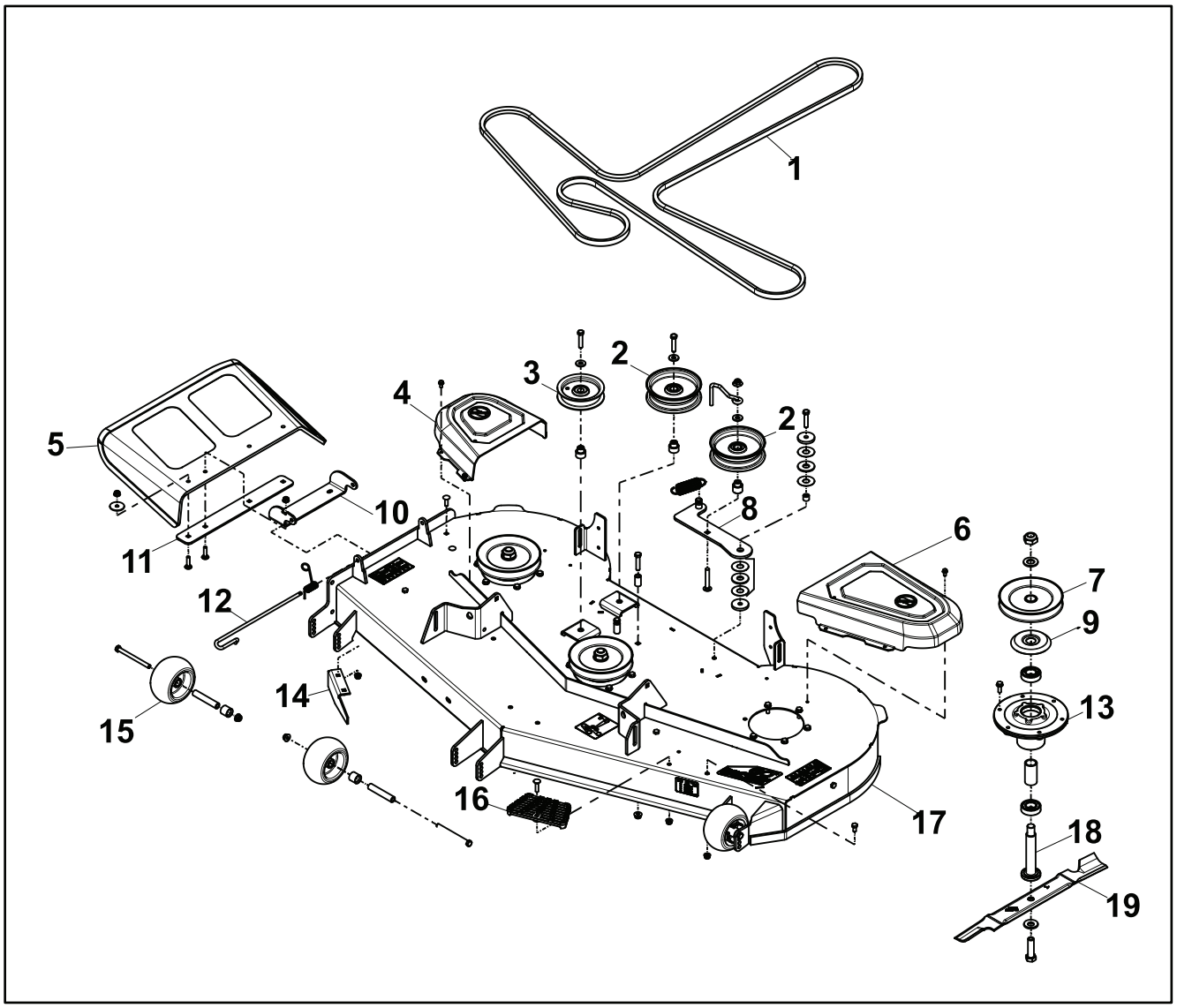
Table of Contents

General Information

The Titan Max uses a 60 inch fabricated deck and a 4-point lift system. This includes a front deck strut for lateral stability. All units have a 0.59–1.77 cm (1.5-4.5 inch) height of cut range and are built from 10 GA steel.

Service and Repairs

Mower Deck Assembly 1

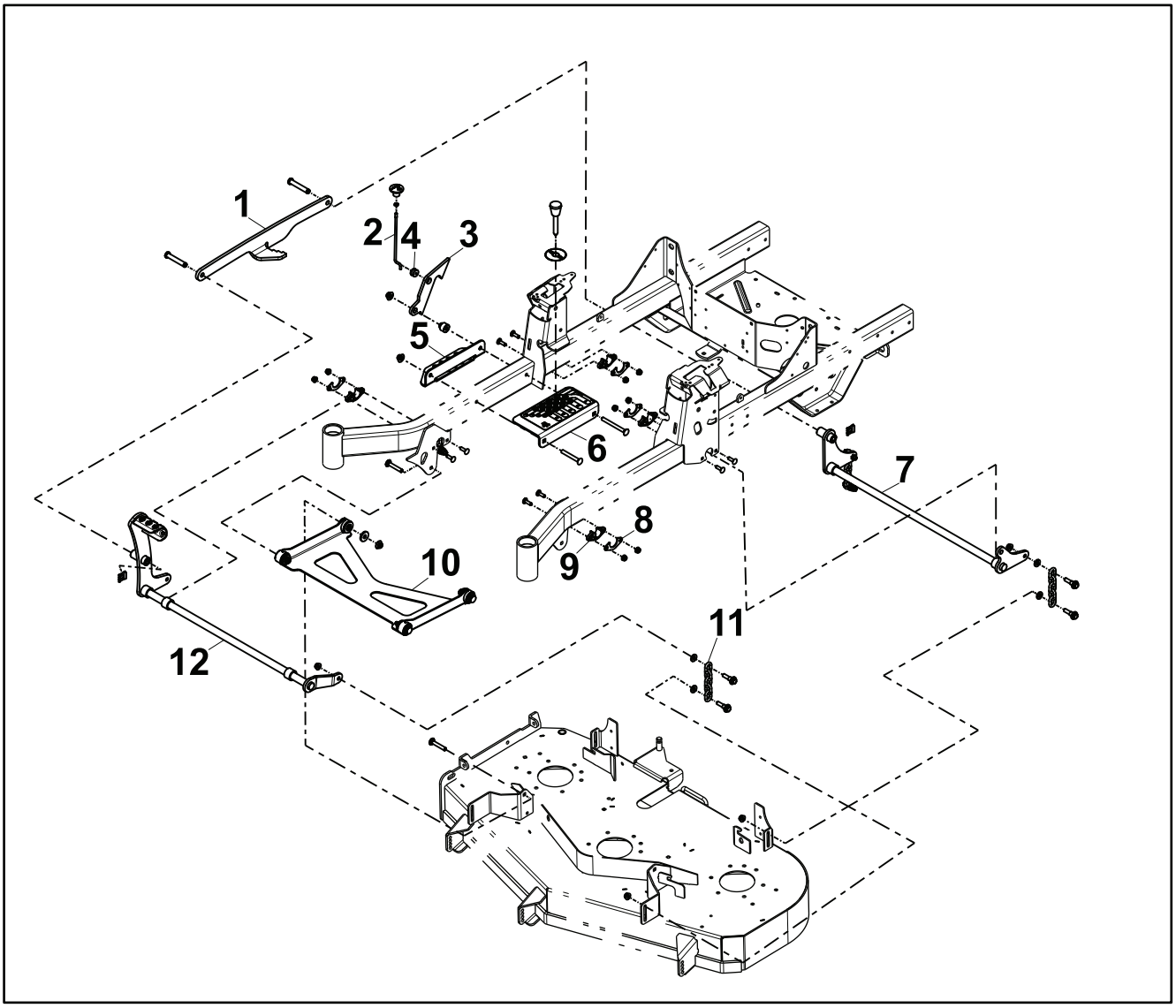


g344576

Figure 64

1. Deck Drive Belt
2. Idler Pulley
3. Flat Idler Pulley
4. RH Belt Cover
5. Bearing Shield
6. LH Belt Cover
7. Drive Blade Sheave
8. Idler Arm
9. Discharge Deflector
10. Upper Deflector Bracket
11. Deflector Plate
12. Chute Pin
13. Spindle Assembly
14. Cutoff Baffle
15. Anti Scalp Roller
16. Deck Step
17. Deck Assembly
18. Spindle Shaft
19. Hi Flo Blade

Mower Deck Assembly 2



g341897

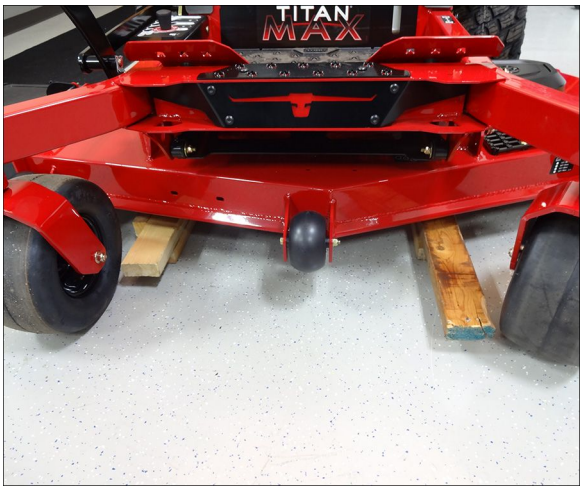
Figure 65

1. Lift Link
2. Transport Lock Rod
3. Transport Lock Plate
4. Grommet
5. Lower Hoc Angle
6. Bracket Assembly
7. Rear Deck Lift Shaft
8. Deck Lift Gusset
9. Flange Bushing
10. Deck Strut Assembly
11. Deck Chain Assembly
12. Deck Lift Shaft

Mower Deck Replacement

Mower Deck Removal

1. Park the machine on a level surface and disengage the PTO. Stop the engine, wait for all moving parts to stop, and remove key. Engage the parking brake.
2. Disconnect the battery by removing the negative cable first, then the positive cable from the battery.
3. Place 2 (2x4) blocks underneath each side of the mower deck.



g344396

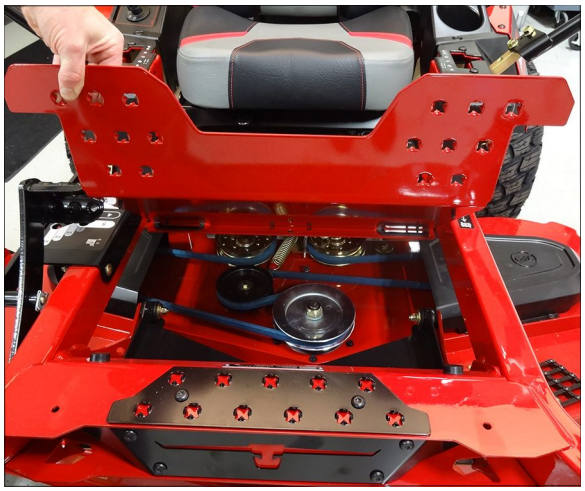
Figure 66

4. Place the height of cut pin into the third hole to lock the mower deck in the lowest height-of-cut position.

g344397

Figure 67

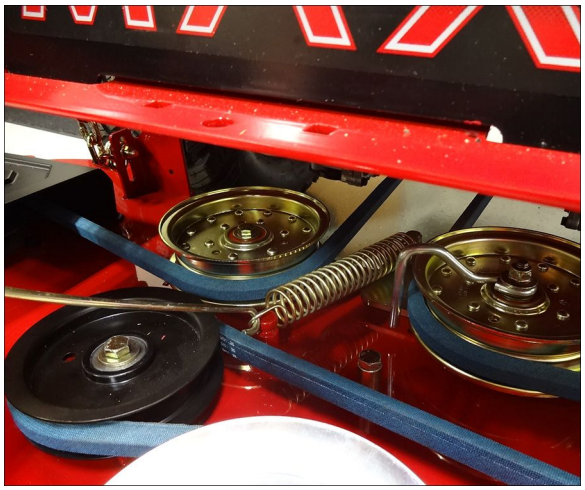
5. Lift and remove the floor pan from the machine.



g344398

Figure 68

6. Using a spring removal tool, remove the spring from the mower deck.



g344399

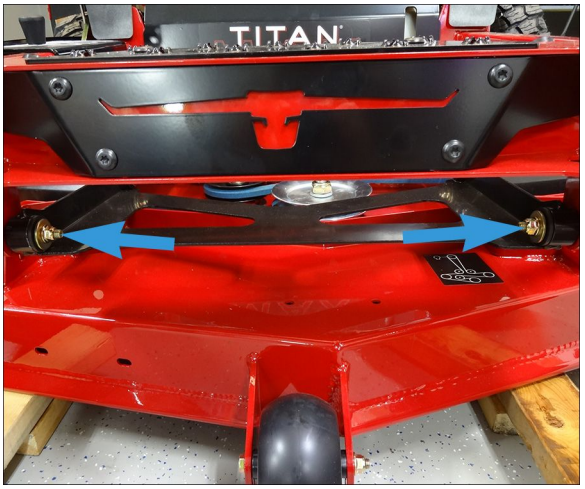
Figure 69

7. Remove the deck drive belt from the PTO clutch.

g344400

Figure 70

8. Remove the 2 (0.375-16 x 2.250 inch) carriage screws, 2 (3/8-16) nuts, and 2 washers securing the deck strut assembly to the frame.



g344401

Figure 71

9. Remove the 2 (3/8 inch) LH upper shoulder screws and 2 (3/8-16 inch) washers securing the deck support chains to the deck lift shaft. Repeat on the RH side of the machine.

g344402

Figure 72

10. Raise and support the unit so that the front wheels are off the ground, block rear wheels.
11. Remove the mower deck.

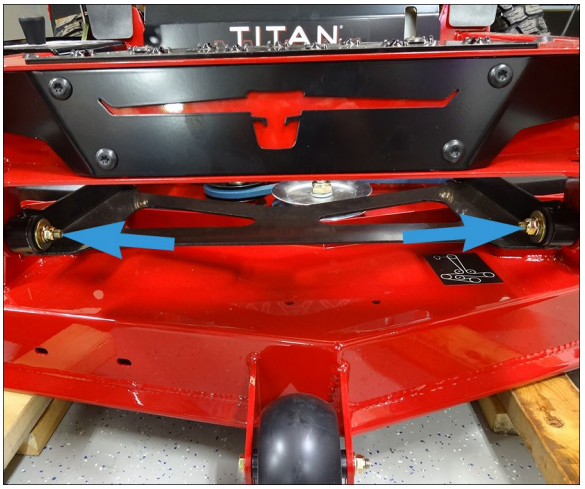
Mower Deck Installation

1. Raise and support the unit so that the front wheels are off the ground, block the rear wheels.
2. Place the mower deck under the machine.
3. Lower the unit to the floor.
4. Install the 2 (3/8 inch) LH upper shoulder screws and 2 (3/8-16 inch) washers securing the deck support chains to the deck lift shaft. Repeat on the RH side of the machine.

g344402

Figure 73

5. Install the 2 (0.375-16 x 2.250 inch) carriage screws, 2 (3/8-16) nuts, and 2 washers securing the deck strut assembly to the frame.



g344401

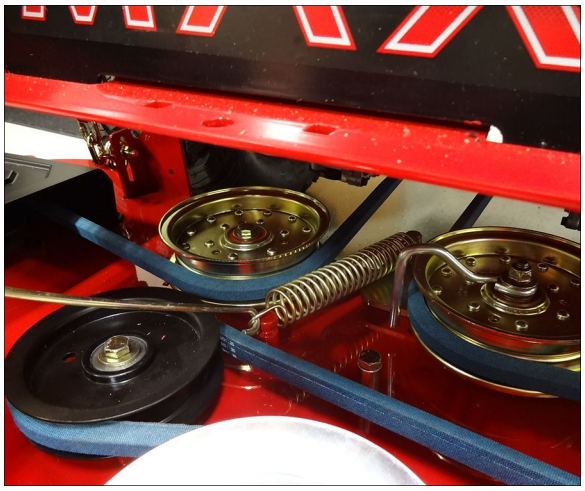
Figure 74

6. Install the deck drive belt to the PTO clutch.

g344400

Figure 75

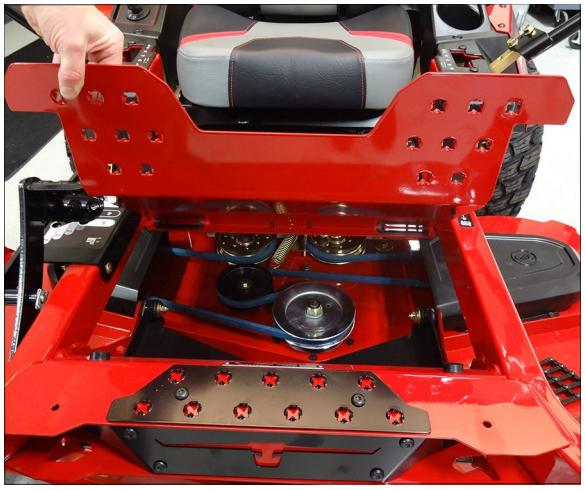
7. Using a spring removal tool, install the spring onto the mower deck.



g344399

Figure 76

8. Install the floor pan onto the machine.



g344398

Figure 77

9. Connect the battery by installing the positive cable first, then the negative cable to the battery.
10. Verify proper function of the unit.

Deck Drive Belt Replacement

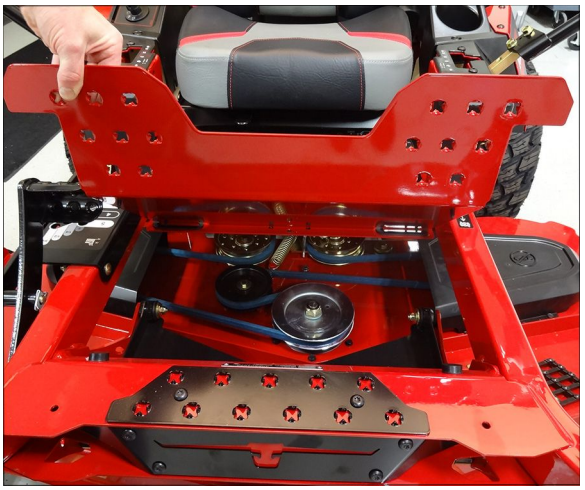
Deck Drive Belt Removal

1. Park the machine on a level surface and disengage the PTO. Stop the engine, wait for all moving parts to stop, and remove key. Engage the parking brake.
2. Disconnect the battery by removing the negative cable first, then the positive cable from the battery.
3. Place the height of cut pin into the third hole to lock the mower deck in the lowest height-of-cut position.

g344397

Figure 78

4. Lift and remove the floor pan from the machine.

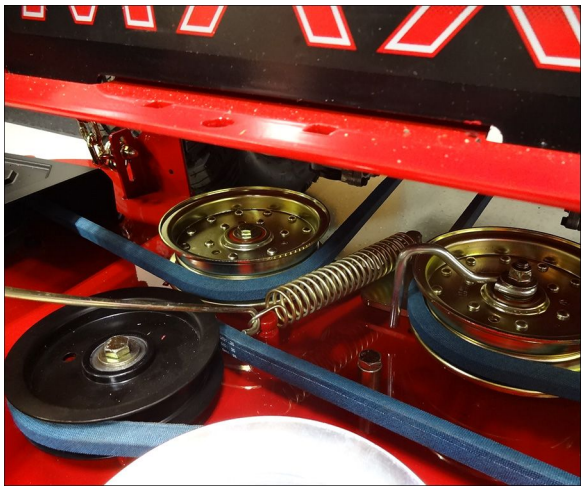


g344398

Figure 79

5. Using a spring removal tool, remove the spring from the mower deck.

Deck Drive Belt Removal (continued)



g344399

Figure 80

6. Remove the deck drive belt from the PTO clutch.

g344400

Figure 81

7. Remove the 4 (0.250-20 x 0.500 inch) screws securing the LH belt cover to the mower deck. Remove the LH belt cover from the mower deck. Repeat on the RH side of the machine.
8. Loosen the (3/8-16 inch) nut securing the idler pulley to the idler arm.
9. Remove the deck drive belt from the mower deck.

Deck Drive Belt Installation

1. Route the deck drive belt around the mower pulleys.
2. Tighten the (3/8-16 inch) nut securing the idler pulley to the idler arm.
3. Install LH belt cover onto the mower deck and secure with 4 (0.250-20 x 0.500 inch) screws. Repeat on the RH side of the machine.
4. Install the deck drive belt to the PTO clutch.

g344400

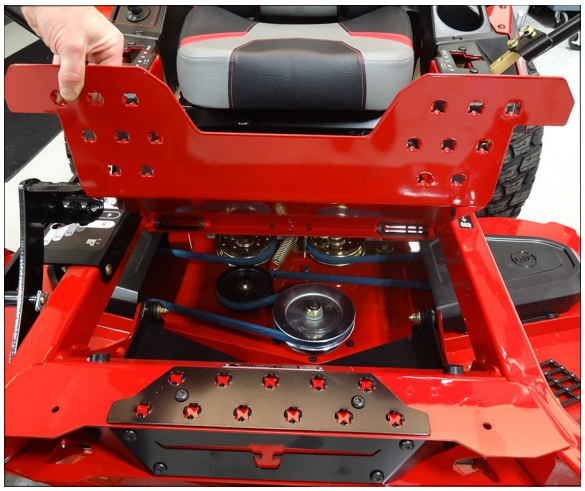
Figure 82

5. Using a spring removal tool, install the spring onto the mower deck.

g344399

Figure 83

6. Install the floor pan onto the machine.



g344398

Figure 84

7. Connect the battery by installing the positive cable first, then the negative cable to the battery.
8. Verify proper function of the unit.

Mower Spindle Replacement

Mower Spindle Removal

1. Remove the mower deck. Mower Deck Removal (page 6–5)
2. Remove the 4 (0.250-20 x 0.500 inch) screws securing the LH belt cover to the mower deck. Remove the LH belt cover from the mower deck. Repeat on the RH side of the machine.
3. Remove the deck drive belt from the mower deck.
4. Raise and support the mower deck.
5. From the underside of the mower deck, remove the blade screw and washer securing each mower blade to the mower deck.

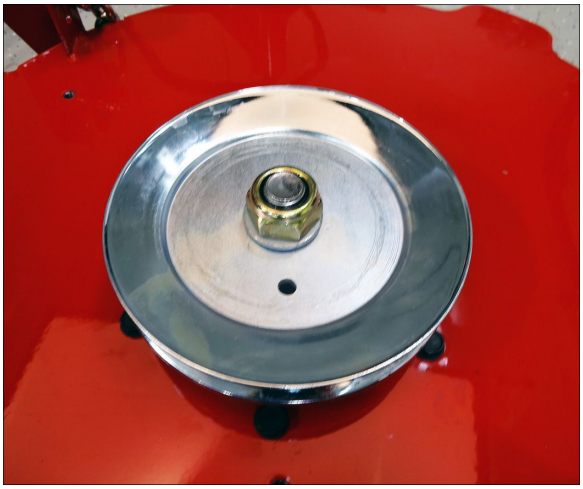
g344424

Figure 85

6. Lower the mower deck to the ground to access the topside of the mower deck.

Mower Spindle Removal (continued)

7. From the topside of the mower deck, remove the (0.750-16 inch) spindle lock nut and washer securing the each spindle shaft to the drive blade sheaves.



g344425

Figure 86

8. Remove each drive blade sheave and spindle shaft from the mower deck.
9. Remove the bearing shields.
10. Remove and discard the 6 (5.16-18 x 7/8 inch) taptite screws securing spindle assemblies to the mower deck.

g344426

Figure 87

11. Remove the spindle assemblies from the mower deck.
12. Using a hammer and a punch, remove the 2 bearings and spacers from each spindle assembly.

Mower Spindle Installation

1. Using a (32 mm) socket and a hammer, install the top bearings into the spindles.

g344427

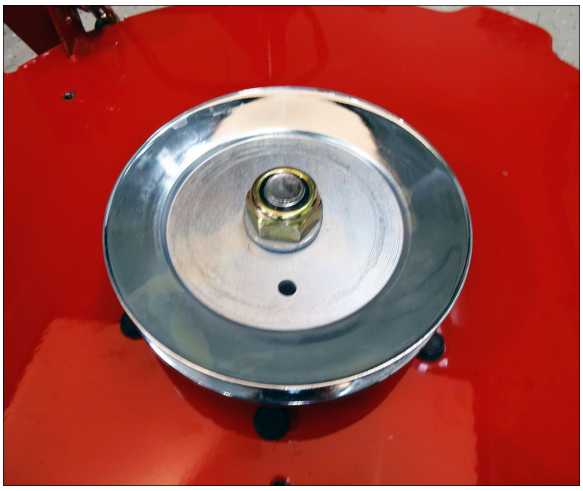
Figure 88

2. Install the spacers into the bottom of the spindles.
3. Using a (32 mm) socket and a hammer, install the bottom bearings into the spindles.
4. Install the spindle assemblies into the mower deck.
5. Install the 6 (5.16-18 x 7/8 inch) new taptite screws securing spindle assemblies to the mower deck. Torque the screws to 13.6–18.98 N • m (10–14 ft-lb).

g344426

Figure 89

6. Install the bearing shields.
7. Install each drive blade sheave and spindle shaft into the mower deck.
8. Install the (0.750-16 inch) spindle lock nut and washer securing the each spindle shaft to the drive blade sheaves. Torque the nut to 135.58–149 N • m (100–110 ft-lb).



g344425

Figure 90

9. Raise and support the mower deck.

10. From the underside of the mower deck, install the blade screw and washer securing each mower blade to the mower deck. Torque the screw to 135.58–149 N • m (100–110 ft-lb).

g344424

Figure 91

11. Lower the mower deck to the ground to access the topside of the mower deck.
12. Install the deck drive belt onto the mower deck.
13. Install the LH drive belt cover to the mower deck, secure with 4 (0.250-20 x 0.500 inch) screws. Repeat on the RH side of the machine.
14. Install the mower deck onto the machine. Mower Deck Installation (page 6–8)

Belt Tensioner Replacement

Belt Tensioner Removal

1. Remove the mower deck. Mower Deck Removal (page 6–5)
2. Remove the 4 (0.250-20 x 0.500 inch) screws securing the LH belt cover to the mower deck. Repeat on the RH side of the mower deck.

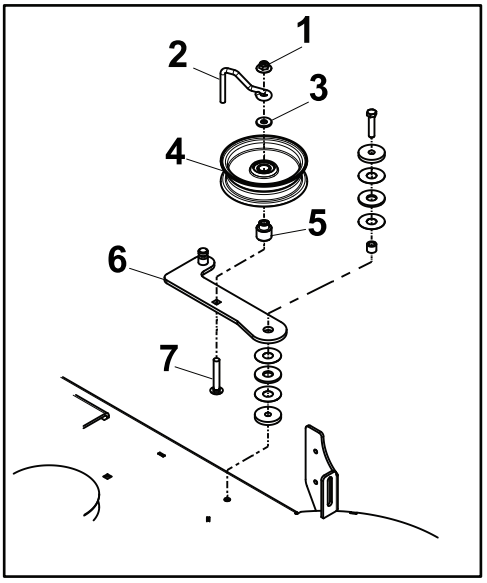
3. Remove the deck drive belt from the mower deck.
4. Remove the (3/8-16 inch) nut securing the idler pulley to the idler arm.

g344577

Figure 92

5. Remove the idler belt guide, washer, idler pulley, idler bushing, and screw (0.375-16 x 2.5 inch) from the idler arm.

   Note: Take note of the position of the belt guide next to the idler arm.



g344579

Figure 93

1. Flange Nut
2. Belt Guide
3. Washer
4. Flat Idler Pulley
5. Idler Bushing
6. Idler Arm
7. Screw

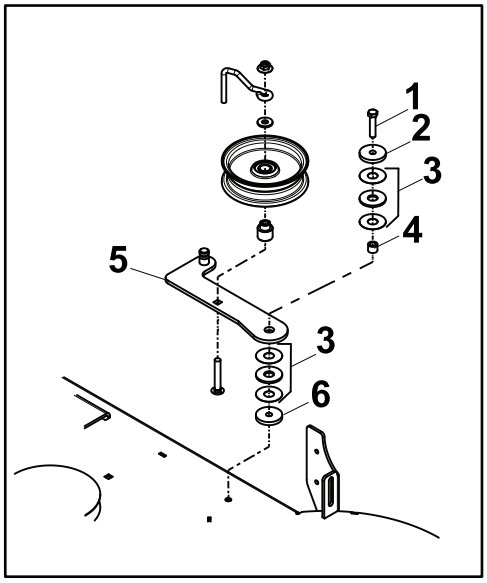
6. Remove the (5/16-18 inch) flange nut and (3/8-16 x 1.750 inch) screw securing the end of the idler arm to the mower deck.

Belt Tensioner Removal (continued)

g344578

Figure 94

7. Remove the 2 washers, 6 friction washers, and spacer from the mower deck.



g344580

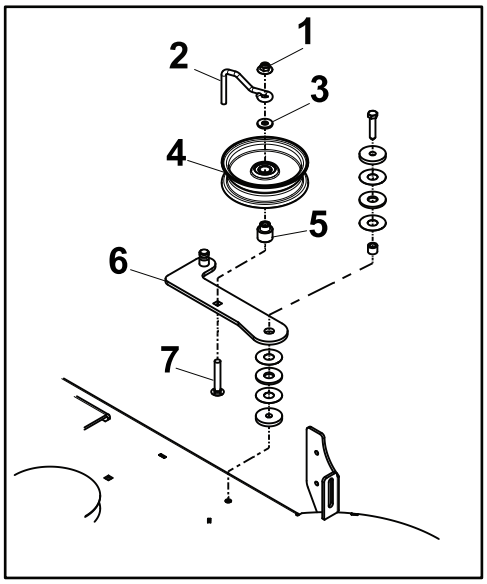
Figure 95

1. Screw
2. Washer
3. Friction Washer
4. Lift Lever Bushing
5. Idler Arm
6. Washer

8. Remove the idler arm from the mower deck.
9. Inspect the 6 friction washers for damage. Replace if necessary.

Belt Tensioner Installation

1. Install the (0.375-16 x 2.5 inch) screw into the underside of the idler arm. Verify the screw is on the correct side of the idler arm.
2. Install the idler bushing, idler pulley, washer, idler belt guide, and nut onto the idler arm.

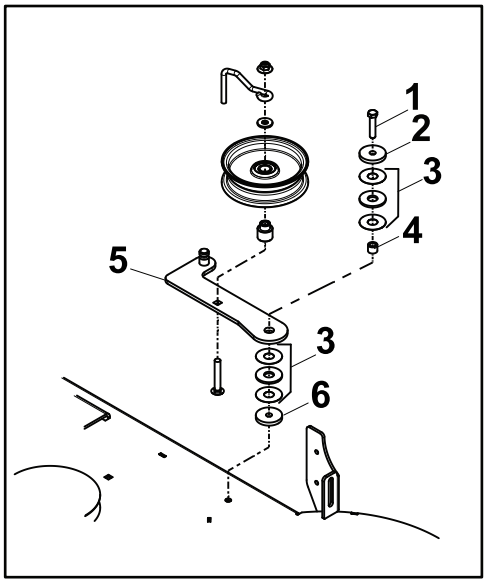


g344579

Figure 96

1. Flange Nut
2. Belt Guide
3. Washer
4. Flat Idler Pulley
5. Idler Bushing
6. Idler Arm
7. Screw

3. Place the washer and 3 friction washers over the hole where the end of the idler arm will be installed
4. Install the idler arm onto washer stack.
5. Install the spacer, 3 friction washers, and washer onto the end of the idler arm.



g344580

Figure 97

1. Screw
2. Washer
3. Friction Washer
4. Lift Lever Bushing
5. Idler Arm
6. Washer

6. Install the (3/8-16 x 1.750 inch) screw and (5/16-18 inch) nut securing the end of the idler arm to the mower deck. Torque the screw to 40.67 ± 4.067 N • m (30 ± 3 ft-lb).

g344578

Figure 98

7. Verify the idler arm is installed in the correct orientation.
8. Install the deck drive belt onto the mower deck.
9. Install the LH belt cover onto the mower deck, secure with 4 (0.250-20 x 0.500 inch) screws. Repeat on the RH side of the
10. Install the mower deck onto the machine. Mower Deck Installation (page 6–8)

Chapter 7

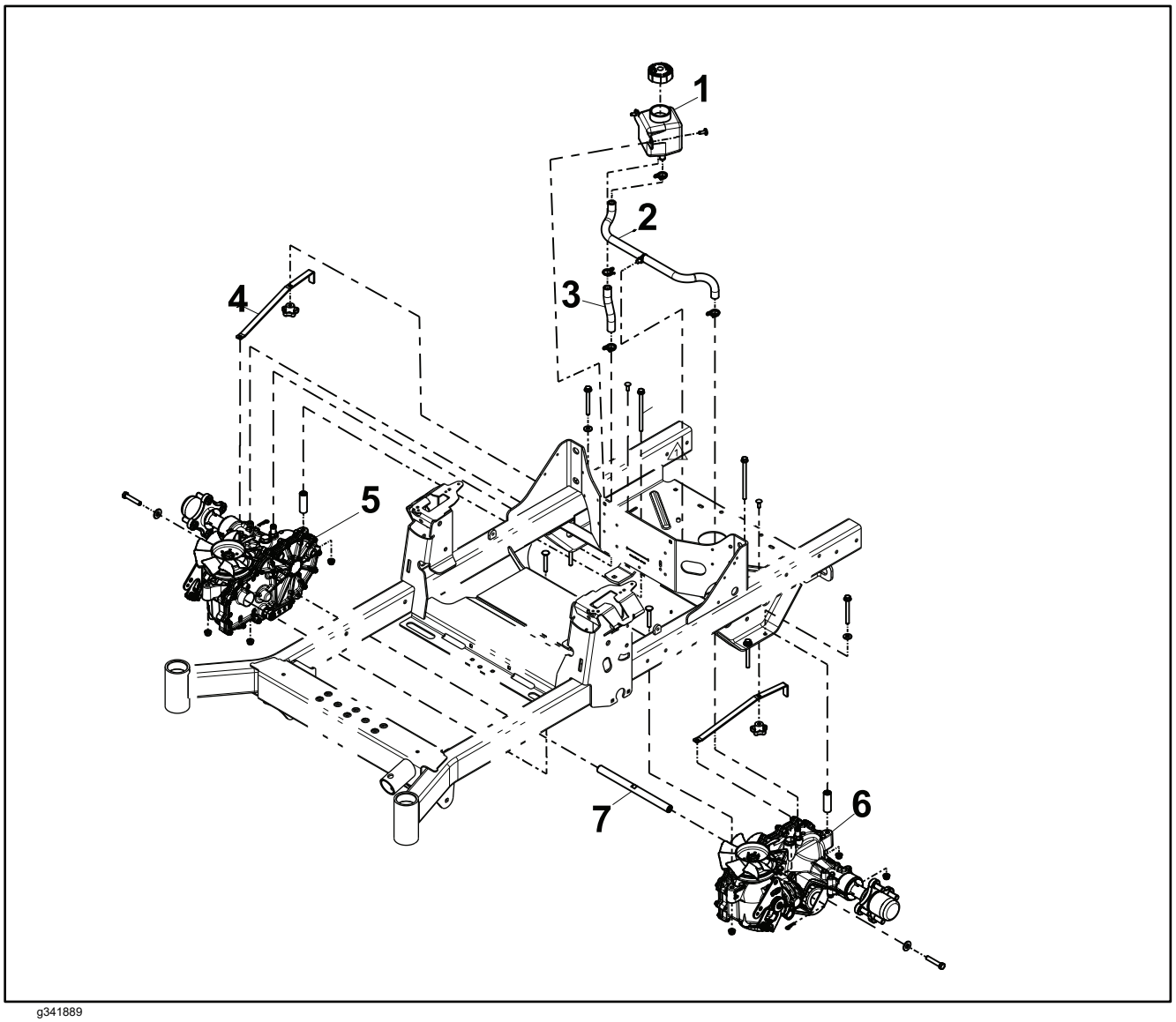
Hydrostatic Drive System

Table of Contents

General Information

The Titan Max series of mowers use Hydro-Gear hydrostatic transaxle ZT-3100. The drive uses an engine oil with a minimum rating of 9.0 cst (55 SUS) at 110 ºC (230 ºF) and an API classification of SL is recommended. A 20W50 engine oil has been selected for use by the factory and is recommended for normal operating procedures. The ZT-3100 oil capacity is 4.45 L (150 fl-oz) (with filters removed).

Hydrostatic Drive Assembly 1

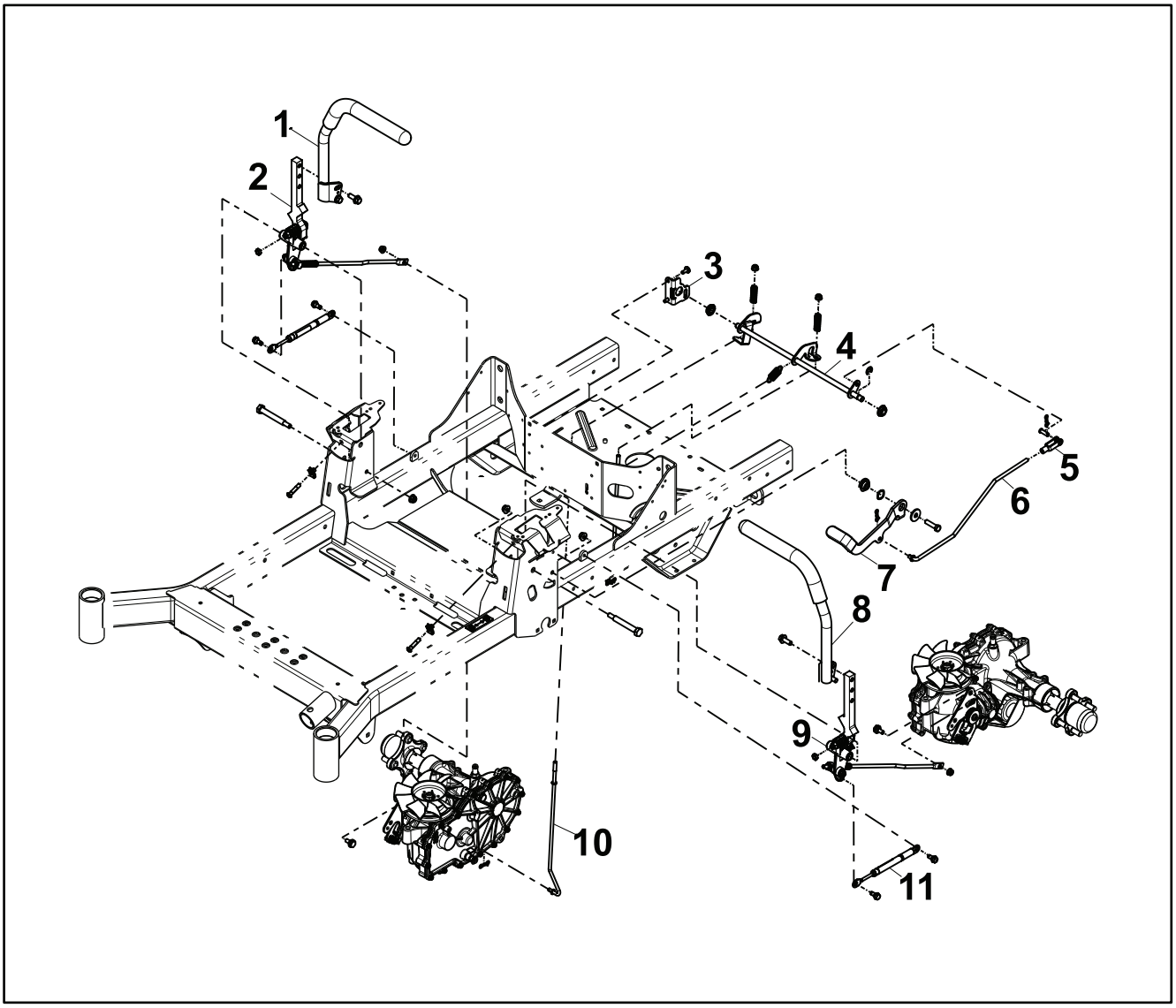


g341889

Figure 99

1. Hydraulic Tank
2. Hydraulic Hose
3. Hydraulic Routed Hose
4. Hydro Bypass Arm
5. RH Transaxle Assembly
6. LH Transaxle Assembly
7. Spacer Shaft

Hydrostatic Drive Assembly 2



g341893

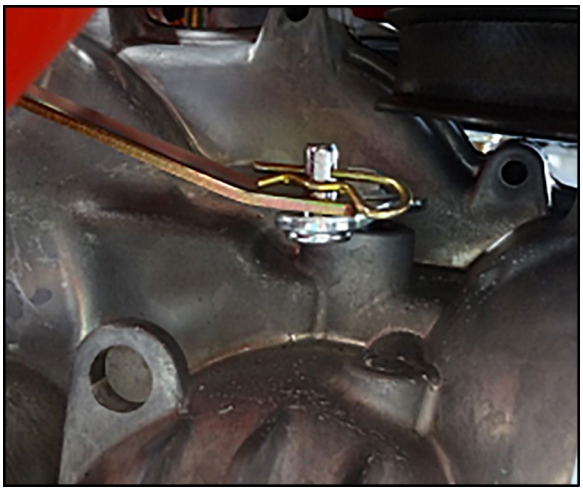
Figure 100

1. RH Control Handle Assembly
2. RH Motion Control Assembly
3. Brake Bracket
4. Brake Shaft
5. Adjustable Yoke
6. Upper Brake Linkage
7. Brake Lever
8. LH Control Handle Assembly
9. LH Motion Control Assembly
10. Lower Brake Linkage
11. Damper

Hydrostatic Drive Transmission Replacement

Hydrostatic Drive Transmission Removal

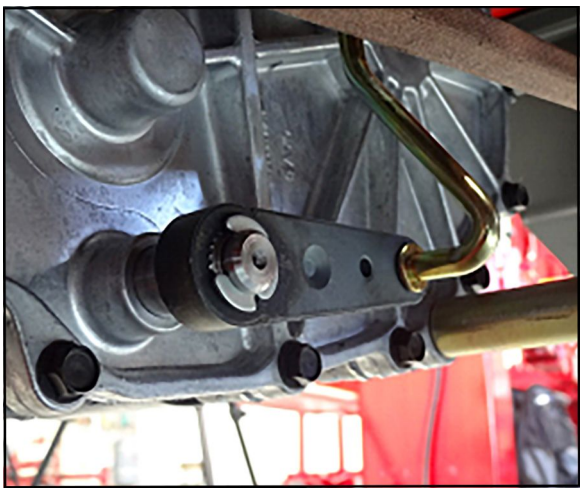
1. Park the machine on a level surface and disengage the PTO. Stop the engine, wait for all moving parts to stop, and remove key. Engage the parking brake.
2. Disconnect the battery by removing the negative cable first, then the positive cable from the battery.
3. Raise and support the unit so that the front wheels are off the ground, block rear wheels.
4. Remove the drive wheels.
5. Remove the deck drive belt from the mower deck. Deck Drive Belt Removal (page 6–10)
6. Remove the hydrostatic drive belt from the machine. Hydrostatic Drive Belt Removal (page 7–8)
7. Disconnect the motion control linkage from the transmission.
8. Disconnect the bypass arm.



g336196

Figure 101

9. Disconnect the lower brake linkage from the transmission.



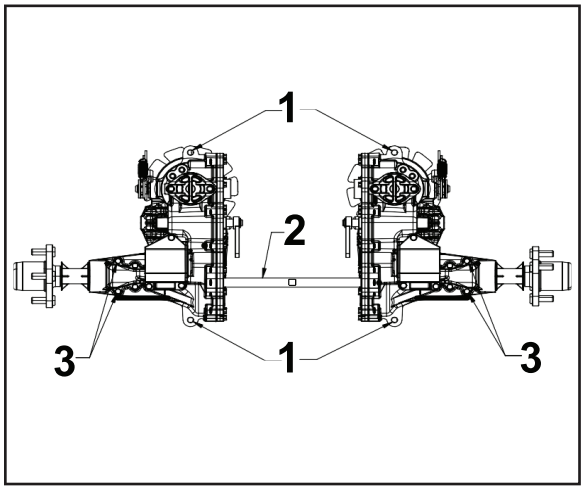
g336197

Figure 102

10. Disconnect the hydraulic fluid hose from the top of the transmission.

Hydrostatic Drive Transmission Removal (continued)

11. Remove the (0.375-16 x 2.00 inch) screw that connects the transmission to the cross shaft.
12. Remove the 2 (0.312-18 x 2.250 inch) front hydro mounting screws and 2 (5/16-18 inch) nuts.
13. Remove the 2 (5/16-18 x 4.75 inch) rear hydro mounting screws and 2 (5/16-18 inch) nuts.



g336195

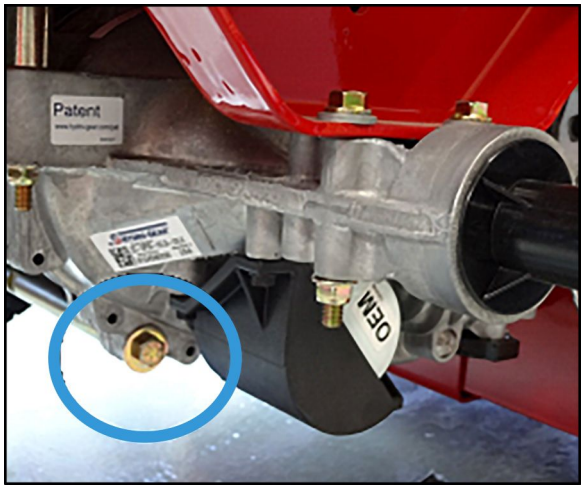
Figure 103

1. Front and Rear Mounting Screws
2. Cross Shaft
3. Axle Horn Screws

14. Support the transmission, loosen and remove the 2 (5/16-18 inch) axle horn nuts, washers, and 2 (5/16-18 x 3.00 inch) screws. Lower the transmission.

Hydrostatic Drive Transmission Installation

1. Lift and support the transmission, and install the 2 (5/16-18 x 3.00 inch) axle horn screws, washers, and nuts (5/16-18 inch). Do not fully tighten the nuts at this time.
2. Align the cross shaft and install the screw (0.375-16 x 2.00 inch) through the transmission into the cross shaft. Do not tighten at this time.



g336198

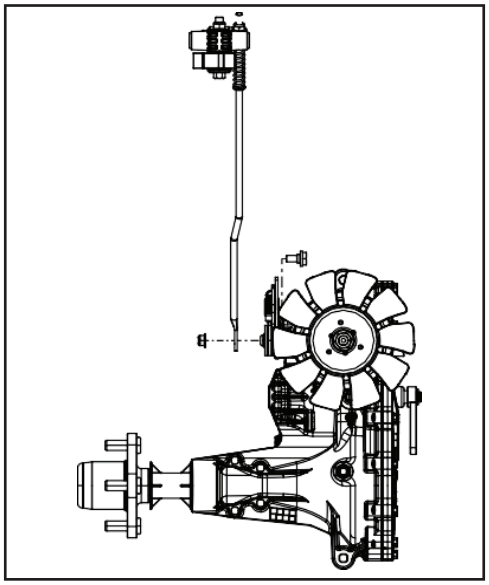
Figure 104

3. Install the 2 (0.312-18 x 2.250 inch) front and 2 (5/16-18 x 4.75 inch) rear hydro mounting screws, washers, and (5/16-18 inch) nuts. Do not tighten at this time.

4. Torque the cross shaft screw to 61 ± 6.779 N • m (43 ± 5 ft-lb).

5. Tighten the rear hydro mounting screw.
6. Tighten the 2 axle horn screw.
7. Tighten the front hydro mounting screw.
8. Remove the protective cap from the hydraulic oil nipple (if installing a new hydrostatic drive). Install the hydraulic fluid hose, and move the hose clamp into place.
9. Connect the lower brake linkage to the transmission.
10. Connect the bypass arm.
11. Connect the motion control linkage.

    Note: Attach the motion control linkage as shown with the offset toward the outside of the machine.



g336199

Figure 105

12. Install the hydrostatic drive belt onto the machine. Hydrostatic Drive Belt Installation (page 7–8)
13. Install the deck drive belt onto the mower deck. Deck Drive Belt Installation (page 6–12)

14. Verify that the (3/4-16 inch) hub nut is torqued to 325.4-352.5 N • m (240–260 lb-ft).

15. Install the drive wheel and torque the lug nuts. Torque the nuts to 122–135.58 N • m (90–100 ft-lb).

16. Add hydraulic oil to the reservoir to the FULL COLD line.
17. Connect the battery by installing the positive cable first, then the negative cable to the battery.

18. Purge the air out of the system. Refer to the product Operator's Manual the purging air procedures.
19. Adjust the neutral setting if necessary. Refer to the product Operator's Manual for adjusting the neutral setting procedures.
20. Lower the unit and verify proper function.
21. Adjust the tracking if necessary. Refer to the product Operator's Manual for the track adjusting procedures.

Hydrostatic Drive Belt Replacement

Hydrostatic Drive Belt Removal

1. Park the machine on a level surface and disengage the PTO. Stop the engine, wait for all moving parts to stop, and remove key. Engage the parking brake.
2. Disconnect the battery by removing the negative cable first, then the positive cable from the battery.
3. Remove the deck drive belt from the mower deck. Deck Drive Belt Removal (page 6–10)
4. Raise and support the unit so that the front wheels are off the ground, block rear wheels.
5. Remove the (0.375–16 x 1.500 inch) screw and belleville washer securing the anchor clutch. Remove the anchor clutch.
6. Remove the idler spring from the post.
7. Remove the hydrostatic drive belt from the pulleys.

Hydrostatic Drive Belt Installation

1. Route the hydrostatic drive belt around the pulleys.
2. Install the idler spring onto the post.

3. Install the anchor clutch onto the machine and secure with the belleville washer and (0.375–16 x 1.500 inch) screw. Torque the screw to 36.6–44.74 N • m (27–33 ft-lb).
4. Install the deck drive belt onto the mower deck. Deck Drive Belt Installation (page 6–12)
5. Lower the unit.
6. Connect the battery by installing the positive cable first, then the negative cable to the battery.
7. Verify the proper function of the unit.

Chapter 8

Electrical System

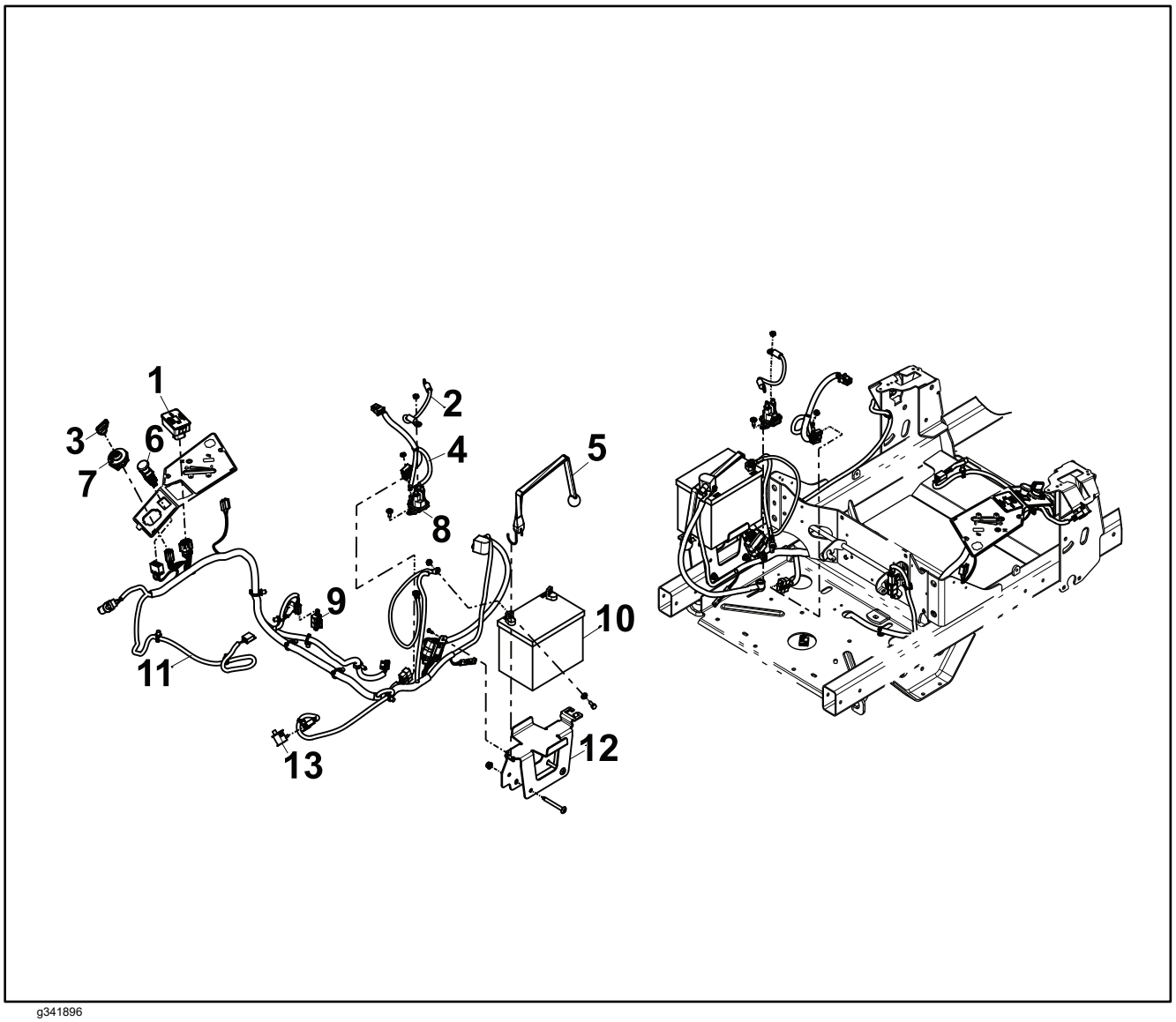
Table of Contents

General Information

The Titan Max utilizes a 12VDC electrical system. The systems consist of a 300cca 12v battery. The system use 2 neutral lock switches on the motion control levers, seat switch, brake switch, blade engagement switch (PTO), ignition switch, 15 AMP main fuse, and 20 AMP charging system fuse. This system also uses a start relay, electric PTO clutch, hour meter, TVS diode, and starter solenoid.

Service and Repairs

Electrical Assembly



g341896

Figure 106

1. Module Assembly
2. Hour Meter
3. Ignition Key
4. Wire Harness Adapter
5. Bungle Strap
6. PTO Switch
7. Ignition Switch
8. Solenoid
9. Switch
10. Battery
11. Wire Harness
12. Battery Tray
13. Bail Switch

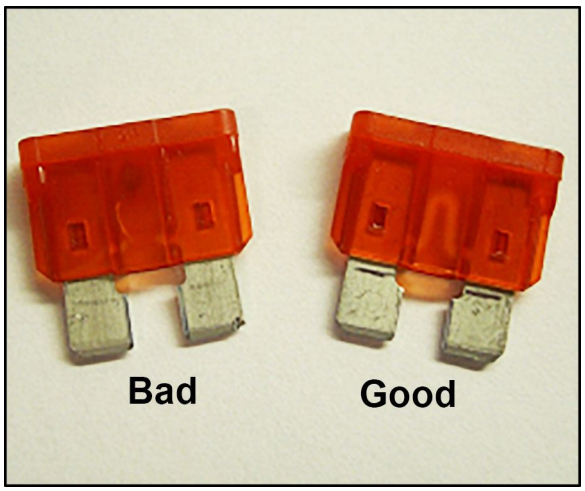
Fuse Block and Fuses

The fuse block houses the fuses that protect the electrical system from electrical surges.

Note: Always use Toro fuses when replacing a damaged or blown fuse.

Fuse Block and Fuses Test

1. Visually inspect the fuses. A failed fuse can be identified by a broken or melted element inside the fuse cover or a damaged spade.



g336414

Figure 107

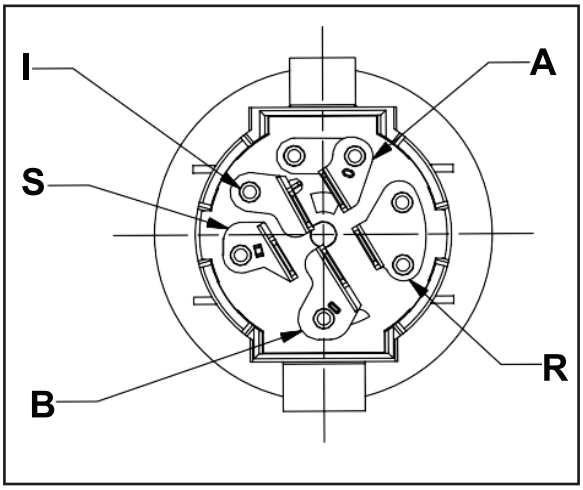
2. Using a digital multi-meter set to the OHM or Continuity setting, check the continuity between the fuse blades. If the fuse is OPEN (no continuity), replace the fuse and test the circuit.

Key/Ignition Switch

The ignition switch makes the proper connections for the starter, safety circuits, and accessories. Detents inside the switch control the three switch positions: OFF, RUN, and START. The START position is spring loaded so that it automatically returns to the RUN position when released.

Ignition Switch Wiring Connections

- B - Battery Voltage In
- S - Starting Circuit
- I - PTO Switch
- A - Operator Presence Switch, Safety Interlock Switches
- R - Regulator, Charging Circuit



g350861

Figure 108

Key/Ignition Switch Test

1. Remove the control panel from the right console.
2. Disconnect the ignition switch from the wire harness.
3. Using a digital multi-meter set to the OHM or Continuity setting, verify that continuity exists between the terminals listed for each switch position.
4. Using a digital multi-meter set to the OHM or Continuity setting, verify that NO continuity exists between the terminals not listed for each switch position.

Position	Circuit "Make"
OFF	None
RUN	B + R + I + A
START	B + R + I + S

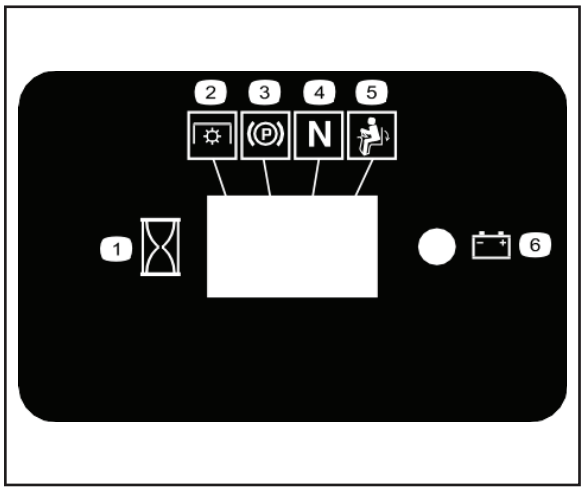
Hour Meter

The hour meter records hours of operation when the ignition key is ON and the PTO switch is ON.

Hour Meter Status Check

With the ignition key in the ON position, verify the hour meter operation by inspecting the hour meter status icons.

- Icon 2 — verify the PTO status icon light is illuminated when the PTO switch is in the ON position, parking brake is released, and the operator is in the seat. The PTO status icon light should turn off when the PTO switch is turned off or the operator leaves the seat.
- Icon 3 — verify the parking brake status icon light is illuminated when the parking brake is engaged. The parking brake status icon light should turn off when the brake is disengaged.
- Icon 4 — verify the neutral status icon light is illuminated when both of the steer sticks are in the neutral lock position. The neutral status icon light should turn off when the steers sticks are moved inward to the drive position.
- Icon 5 — verify the seat switch operation status icon light is illumined when the operator is present in the seat. The seat switch operation status icon light should turn off when the operator leaves the seat.



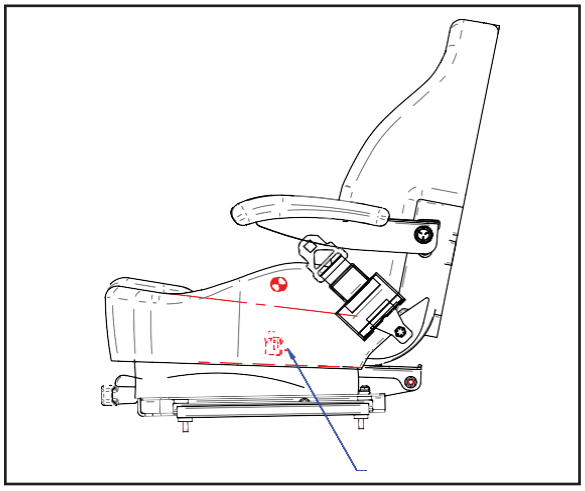
g336418

Figure 109

Operator Presence Switch (Seat Switch)

With the ignition switch in the RUN position, and the operator presence switch closed (operator is in the seat), battery voltage is supplied to the neutral switches.

Note: The operator presence switch is part of the seat assembly.



g336419

Figure 110

Operator Presence Switch (Seat Switch) Test

1. Disconnect the wire harness from the operator presence switch, located on the bottom of the seat assembly.
2. Using a digital multi-meter set to the OHM or continuity setting, test the continuity between the two switch terminals.
   - When the seat is vacated, the switch should NOT have continuity (open).
   - When the operator is present, the switch should have continuity (closed).

Neutral Switch - Left and Right

The neutral switch is a single pole plunger type switch (normally open) with two terminals. When the plunger is depressed, the circuit closes and there is continuity between the terminals.

Motion control levers in neutral position (OUT), the switch will have continuity (closed).

Motion control levers in the operating position (IN), the switch will NOT have continuity (open).

g336403

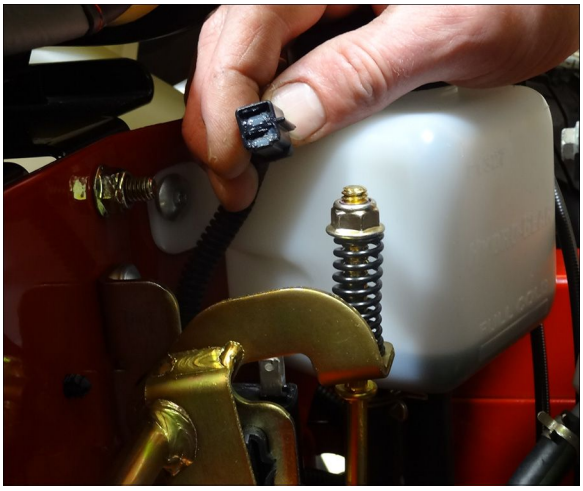
Figure 111

Parking Brake Switch

The parking brake switch is a single pole plunger type switch (normally open) with two terminals. When the plunger is depressed (parking brake ON), the circuit closes and there is continuity between the terminals. This allows battery voltage to flow to the rest of the safety interlock system.

Parking brake ON, the switch should have continuity (closed).

Parking brake OFF, the switch should NOT have continuity (open).

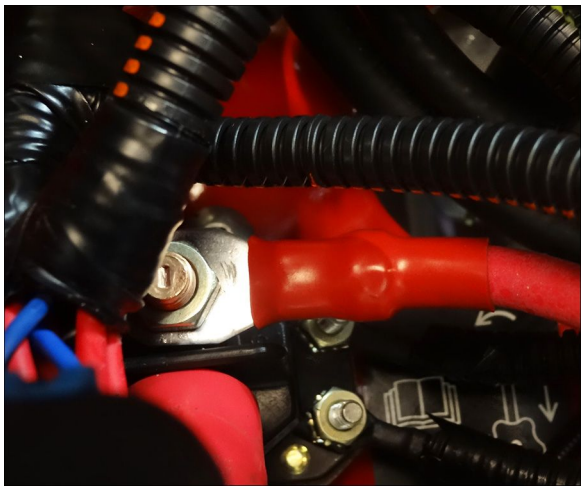


g344832

Figure 112

Starter Solenoid

The solenoid is a remote switch that connects the battery to the starter motor when the ignition switch is turned to START. The solenoid protects the ignition switch from the high current drawn by the starter motor.

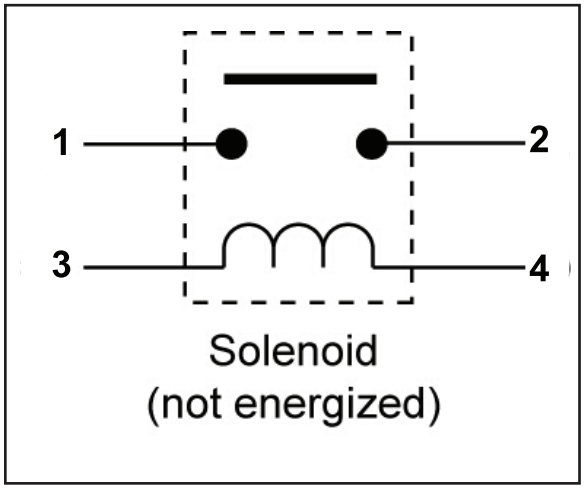


g344833

Figure 113

Starter Solenoid Test

1. Disconnect the solenoid from the wiring harness.
2. With a multi-meter set to the OHM or continuity setting, check to ensure that terminals 1 and 2 are open (no continuity).
3. Apply 12 volts (DC) to terminal 3 and ground terminal 4. Terminals 1 and 2 should now be closed (continuity).



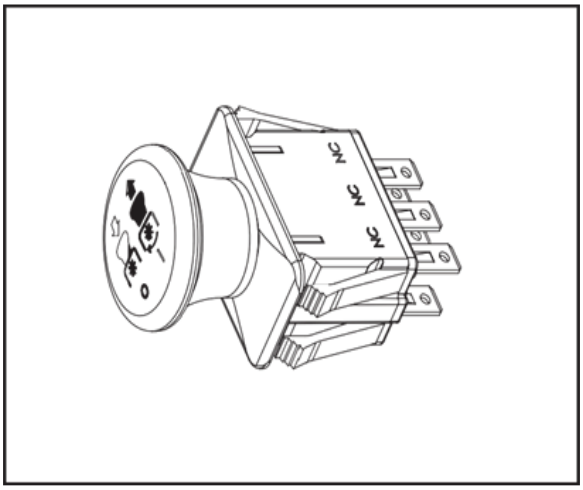
g336407

Figure 114

PTO Switch

The PTO switch provides battery voltage from the ignition switch to the PTO clutch.

As part of the safety interlock system, the PTO switch will prevent the engine from cranking/starting when in the ON position by preventing the start relay from grounding through the hour meter.



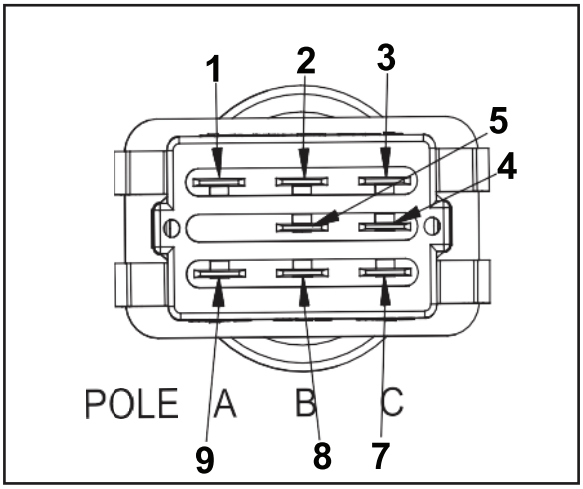
g336408

Figure 115

Note: The engine will not crank over when the PTO switch is in the ON position. All switches are supplied in parallel and feed into the Hour Meter.

PTO Switch Test

1. Remove the control panel from the right console.
2. Disconnect the PTO switch from the wire harness.
3. With the switch in the ON position (button pulled OUT).



g336409

Figure 116

4. Using a digital multi-meter set to the OHM or Continuity setting, verify the following:
   - Pin 2 and 5 should have continuity (closed)
   - Pin 1 and 4 should have continuity (closed)
   - Pin 1 and 7 should NOT have continuity (open)
   - Pin 2 and 8 should NOT have continuity (open)
5. With the switch in the OFF position (button pushed IN):
   - Pin 1 and 7 should have continuity (closed)
   - Pin 2 and 8 should have continuity (closed)
   - Pin 1 and 4 should NOT have continuity (open)

- Pin 2 and 5 should NOT have continuity (open)

Electric PTO Clutch

The PTO clutch electronically controls the engagement and disengagement of the PTO pulley (deck belt).

The PTO clutch is composed of three major components:

- Field
- Clutch Plate
- Friction Plate

The clutch plate always turns with the engine (crankshaft). The field is a coil of wire on an iron core which becomes an electromagnet when power is applied. The friction plate is the only piece that moves vertically on the crankshaft. It is normally spring loaded so that it is not in contact with the clutch plate and is pressed against the brake material opposite the clutch plate. When power is applied, the friction plate is pulled toward the clutch plate and the two rotate as one. When the clutch plate and the friction plate rotate as different speeds it is known as clutch slipping.

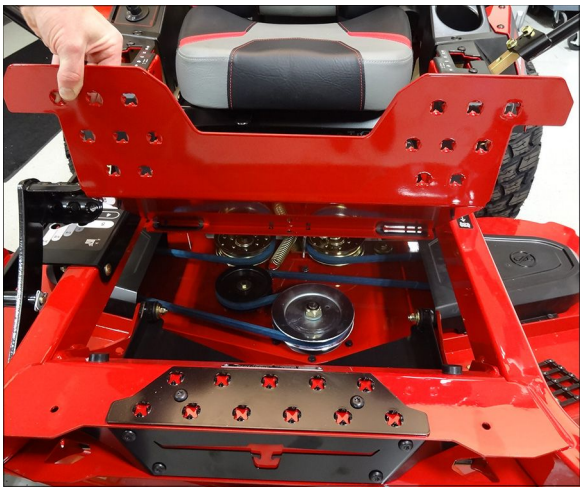
Electric PTO Clutch Removal

1. Park the machine on a level surface and disengage the PTO. Stop the engine, wait for all moving parts to stop, and remove key. Engage the parking brake.
2. Disconnect the battery by removing the negative cable first, then the positive cable from the battery.
3. Place the height of cut pin into the third hole to lock the mower deck in the lowest height of cut position.

g344397

Figure 117

4. Lift and remove the floor pan from the machine.



g344398

Figure 118

5. Using a spring removal tool, remove the spring from the mower deck.

g344399

Figure 119

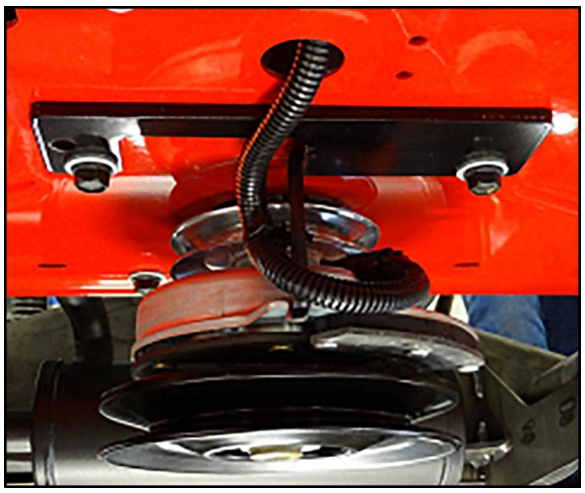
6. Remove the deck drive belt from the PTO clutch.

Electric PTO Clutch Removal (continued)

g344400

Figure 120

7. Disconnect the clutch wire connector from the PTO clutch.



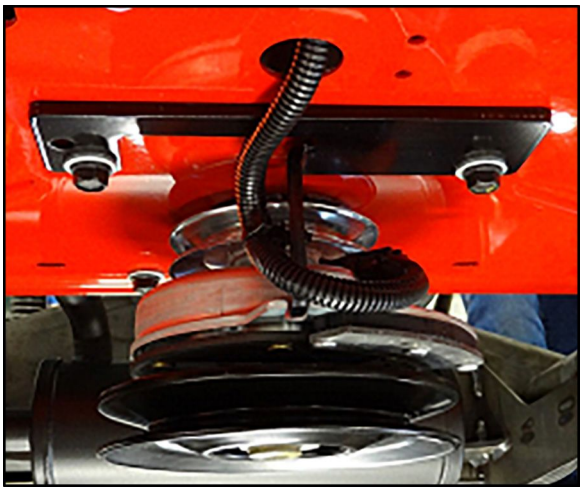
g336161

Figure 121

8. Remove the screw and 2 spring washers securing the PTO clutch to the machine.
9. Remove the PTO clutch from the machine.

Electric PTO Clutch Installation

1. Install the PTO clutch onto the underside of the machine, secure with the 2 spring washers and (7/16 x 3 inch) screw. Torque the screw to 66.4–82.7 N • m (49–61 ft-lbs).
2. Connect the clutch wire connector to the PTO clutch.



g336161

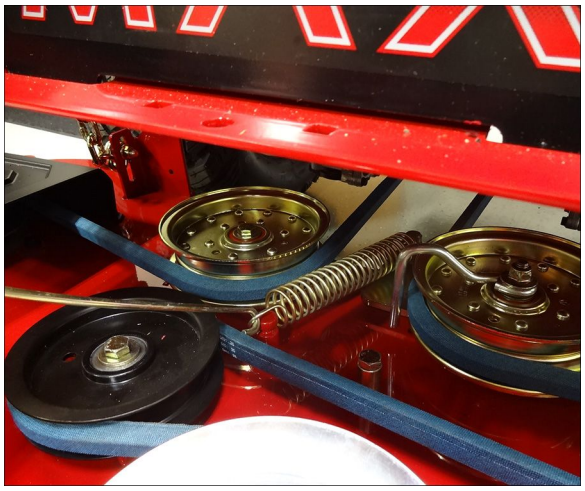
Figure 122

3. Install the deck drive belt onto the PTO clutch.

g344400

Figure 123

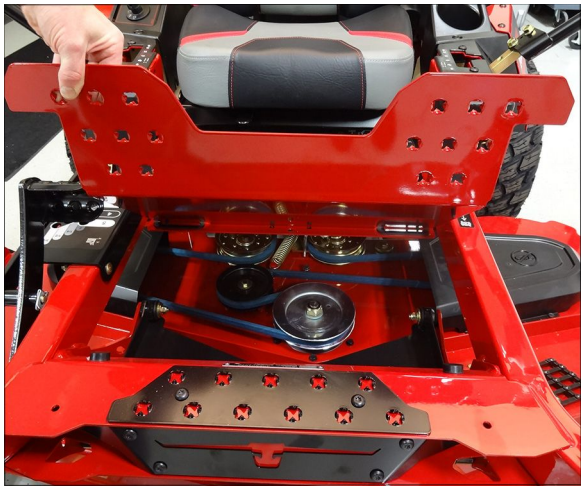
4. Using the spring removal tool, install the spring onto the mower deck.



g344399

Figure 124

5. Install the floor pan onto the machine.



g344398

Figure 125

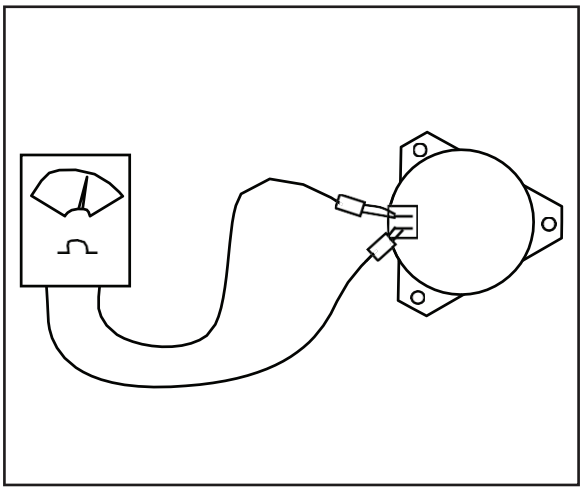
6. Connect the battery by installing the positive cable first, then the negative cable to the battery.
7. Verify the proper function of the machine.

Electric PTO Clutch-Coil Resistance Measurement Test

If the PTO clutch is not engaging or is suspect as a cause of electrical problems, use the following electrical troubleshooting steps. These procedures will help determine if the clutch has failed as a result of or is the cause of an electrical problem.

1. Park the machine on a level surface and disengage the PTO. Stop the engine, wait for all moving parts to stop and remove the key. Engage the parking brake.
2. Disconnect the clutch wire connector.
3. Set the multi-meter to measure resistance (OHMs setting).
4. Connect the meter lead wires to the terminals in the clutch connector.

Electric PTO Clutch-Coil Resistance Measurement Test (continued)



g336410

Figure 126

5. See the PTO Clutch Electrical Specifications chart.

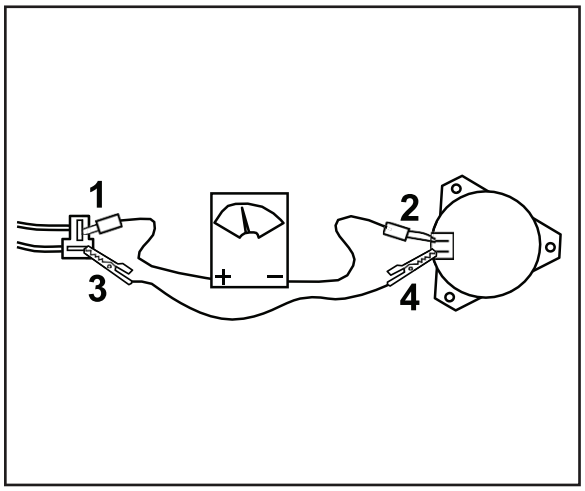
Resistance (OHMs)	AMP Draw	Continuity to Ground
3.05 ± 5%	3.93	OPEN

Electric PTO Clutch- PTO Clutch Continuity to Ground Test

1. Park the machine on a level surface and disengage the PTO. Stop the engine, wait for all moving parts to stop and remove the key. Engage the parking brake.
2. Disconnect the clutch wire connector.
3. Set the multi-meter to measure resistance (OHM setting).
4. Connect one multi-meter lead to the engine, chassis or battery ground. Connect the other multi-meter lead to each of the clutch connector terminals.
5. The clutch connector terminals should never have continuity to ground and should be OPEN at all times.
6. If continuity is found between the PTO connector and ground, the PTO clutch and the PTO switch must be replaced.

Electric PTO Clutch- Measuring Clutch Current Draw

Note: Do not measure current draw if the clutch has shorted to ground or if the resistance measurement is out of specification.



g336411

Figure 127

1. Park the machine on a level surface and disengage the PTO. Stop the engine, wait for all moving parts to stop, and remove the key. Engage the parking brake.
2. Disconnect the clutch wire connector.
3. Set the multi-meter to measure amps (10 amp scale).
4. Connect the positive meter lead to the chassis harness terminal 1.
5. Connect the negative meter lead to the corresponding wire terminal 2.
6. Connect a short jumper lead from terminal 3 to terminal 4.
7. Turn the ignition switch to RUN and the PTO switch to the ON position.
8. Record the amp reading and refer to the PTO Clutch Electrical Specification Chart below.

PTO Clutch Electrical Specification Chart

Resistance (OHMs)	AMP Draw	Continuity to Ground
3.05 ± 5%	3.93	OPEN

TVS Diode

The TVS diode protects the electrical system from current surges caused by PTO engagement and disengagement.

g336413

Figure 128

TVS Diode Testing

If the main fuse blows each time the PTO clutch is engaged, check the TVS diode.

1. Disconnect the TVS diode from the harness.
2. Connect each lead of the meter to each terminal of the TVS diode.
3. If the TVS diode is internally shorted, replace the TVS diode.
4. If the TVS diode is not internally shorted, check the wiring and the clutch.

Appendix A

Foldout Drawings

Table of Contents

Electrical Drawing Abbreviations

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

Abbreviation	Color
BK	Black
BR or BN	Brown
BU	Blue
GN	Green
GY	Gray
OR or OG	Orange
PK	Pink
R or RD	Red
T or TN	Tan
VIO or VT	Violet
W or WH	White
Y or YE	Yellow

Numerous harness wires include a line with an alternate color. These wires are identified with the wire color followed by a / or _ and then the line color (e.g, R/BK is a red wire with a black line; OR_BK is an orange wire with a black line).

Note: The electrical harness drawings in this chapter identify both the wire color and the wire gauge. For example, 16 BK on a harness diagram identifies a 16 gauge wire with black insulation.

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

Kohler Engine Electrical Schematic