



LCE Products

SERVICE MANUAL

Grandstand



Issued: February 2016

ABOUT THIS MANUAL

This service manual was written expressly for Toro and Lawn-Boy 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.

For information specific to the hydrostatic drive used in this unit, refer to the appropriate hydrostatic drive manufacturer's service and repair instructions.

Toro Grandstand model years 2016 and newer are covered in this manual. The manual may also be specified for use on later model products.

Both 2016 and newer models were used during the writing of this manual. You may see slight differences in the photos depending on which model you are servicing.

Due to the compact design, parts were removed for photographic purposes when necessary.

The hydraulic components are sophisticated pieces of machinery. Maintain strict cleanliness control during all stages of servicing and repair. Cover or cap all hose ends and fittings whenever they are exposed. Even a small amount of dirt or other contamination can severely damage the system.

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

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

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SAFETY INFORMATION

1

General Information

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

This manual is intended as a service and repair manual only. The safety instructions provided herein are for troubleshooting, service, and repair of the

Think Safety First

Avoid unexpected starting of engine...

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

Avoid lacerations and amputations...

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

Avoid burns...

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

Avoid fires and explosions...

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

Avoid asphyxiation...

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

Toro GrandStand Stand-on Mower. The GrandStand mower and attachment operator's manuals contain safety information and operating tips for safe operating practices. Operator's manuals are available through your Toro parts source or:

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Publications Department
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Avoid injury from batteries...

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

Avoid injury due to inferior parts...

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

Avoid injury to bystanders...

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

Avoid injury due to projectiles...

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

Avoid modifications...

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

Avoid unsafe operation...

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

Specifications

Engines

Output (Max @ 3600)	22 HP (16.4 kW)	23 HP (18.6 kW)	25 HP (20.1 kW)	26.5 HP (20.1 kW)
Make	Kawasaki	Kohler		
Model	FX691V	ECV730 (EFI)	ECV740 (EFI)	ECV749 (EFI)
High-Idle	3600 RPM			
Starter	Electric			
No. of Cylinders	2 / V-Twin			
Piston Displacement	44.3 cu. in. (726 cc)	45.6 cu. In. (747 cc)		
Bore	3.1 in. (78 mm)	3.27 in. (83 mm)		
Stroke	3.0 in. (76 mm)	2.72 in. (69 mm)		
Oil Capacity	4.4 Pint (2.1 L)	4.0 Pint (1.9 L)		
Air Cleaner	Dual Element, Heavy Duty			
PTO Shaft	1-1/8 in. (28.5 mm)			
PTO Shaft Length	3.94 in. (100 mm)			
Muffler	Front			
Charging Coil	Electric Clutch Coil			
Voltage	Regulated			
Oil Filter	Spin on Type			
California	Yes	No		
EPA	Yes			
RFI	Per Canada and USA			

2

Specifications

Fuel System

Fuel Capacity	10.6 Gallons
Fuel Shut-Off Valve	In line between fuel filter and fuel tank
Fuel Tank	Blow-molded .080 in. wall
Fuel Gauge	N/A-Natural tank color.
Mounting	Located inside the tower and constrained by bolt-on bracket.

Construction

Engine Base	1/4 in. (.250) thick 50 ksi.
Carrier Frame	3 x 1.5 x 11 gauge (0.130 in.) wall tube welded to 7 GA 0.1793 in., side plates with 0.3125 in. mounting plates. Frame includes deck lift mounts, battery box, front caster fork hubs and tie downs.
Hydro IHT Mounting	.250 in thick 50 ksi steel plates welded to frame tubes.
Control Tower	(2) 12 gauge (0.10) thick panels, (1) 10 gauge (right side) and (2) 0.75 O.D. x 11 gauge (0.12) wall steel tube reference bars. The control tower bolts to the carrier frame.
Deck Lift System	The lift system has 4 contact points. Two at the front of the deck and two rear of the deck. Lifting is aided by the use of one extension springs. Deck height adjustments are in 0.25 inch increments from 1.5 inch to 5 inch measured at the blade tip.
Traction Control	Toro Twin Lever Control System
Platform	1.00 O.D. X .120 Wall high strength (50 ksi) steel formed tube welded to 10 gauge (.13) steel sheet. The platform is covered with a vinyl/neoprene anti-fatigue mat. The platform is able to swing into an upright position and locked for transport.
Unit Tie Down	3/8 in. diameter rod loop, 4.50 in. wide, welded to rear of frame and sides of front carrier frame tubes.

Mower Construction

Height of Cut Range	1.5 in. to 5.00 in., in ¼ in. increments
Blades	Three, .250 thick heat treated steel blades
Spindles	Machined steel 25 mm shaft diameter
Spindle Housing	Ductile cast iron, 9-3/8 in. diameter mounted with 6 bolts
Spindle Bearings	Sealed 25 mm ball bearings
Deck	7 gauge (.179 in.) steel welded construction
Blade Tip Speed	48 in. - 17,097 ft/m calculated @ 3600 engine RPM 52 in. - 18,651 ft/m calculated @ 3600 engine RPM 60 in. - 18,032 ft/m calculated @ 3600 engine RPM 122 cm - 15,981 ft/m calculated @ 3100 engine RPM
Mower Deck Skid Plate	Standard
Adjustable Discharge Baffle	Standard
Rubber Discharge Chute	Standard

Traction Drive

Integrated Hydraulic Transmission (IHT)	Tuff Torque - TZT1310 (modified) with cooling fans
Hydraulic Oil Filter	Internal Transmission 0.25 Micron Filters
Hydraulic Fluid	15W50 Synthetic Oil (Hypr-oil 500)
Hydraulic Fluid Capacity	5.0 qts (4.7 L) with filter change
Ground Speed	Variable: Forward- 0 To 10.0 mph Reverse- 0 To 4.0 mph
Parking Brake	Internal Transmission
Hour-meter	Standard Equipment

Wheel and Tires

Front Castor Tires	11 x 4.0-5, Smooth Tread, Semi-Pneumatic. Wheel with tapered roller bearings.
Front Castor Fork	Heavy-duty commercial design with 1 in. diameter pivot shaft. Pivot hubs have tapered roller bearings and grease fitting access holes (plugged) for lubrication.
Rear Traction Tires	20 x 10.5 x 8, 4 ply Kenda brand K500 Super Turf

Specifications

Mower Deck

Mower Engagement	Engine mounted electric clutch
Clutch	Warner model 200 CMS, Rating 271 Nm (200 ft-lb) Double Spring
Clutch Adjustment	Requires minimum gap 0.010 inch. Remove shim when gap is above 0.040 inch.
PTO Idler	PTO idler arm with torsional spring applied tension.
PTO/Deck Drive Belt	48/52/60 in. decks: 5V section with Aramid (Kevlar) cords and standard (non clutching) envelope.

Unit Dimensions

Model	Height	Width		Length		Weight
		Deflector Down	Deflector Raised	Platform Up	Platform Down	
48 in.	48 in.	63.5 in.	49.6 in.	61 in.	75 in.	890 lbs.
52 in.	48 in.	67.6 in.	53.8 in.	61 in.	75 in.	895 lbs.
60 in.	48 in.	75.9 in.	62 in.	64.7 in.	79 in.	941 lbs.

Torque Specifications

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

These torque specifications for the installation and tightening of fasteners shall apply to all fasteners which do not have a specific requirement identified in the service manual. The following factors shall be considered when applying torque: cleanliness of the fastener, use of a thread sealant (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

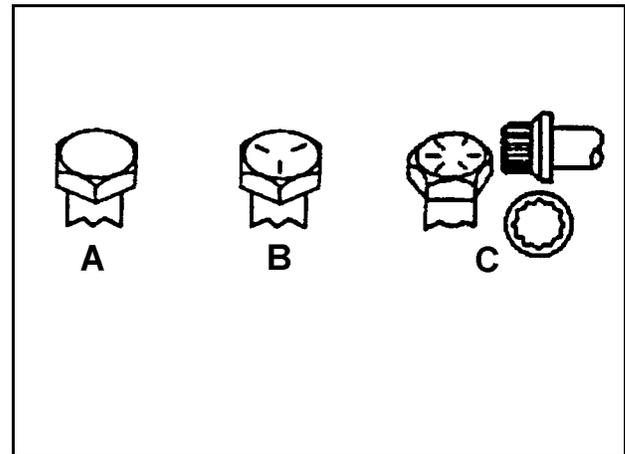


Figure 1

Inch Series Bolts and Screws	
(A) Grade 1 (B) Grade 5	(C) Grade 8

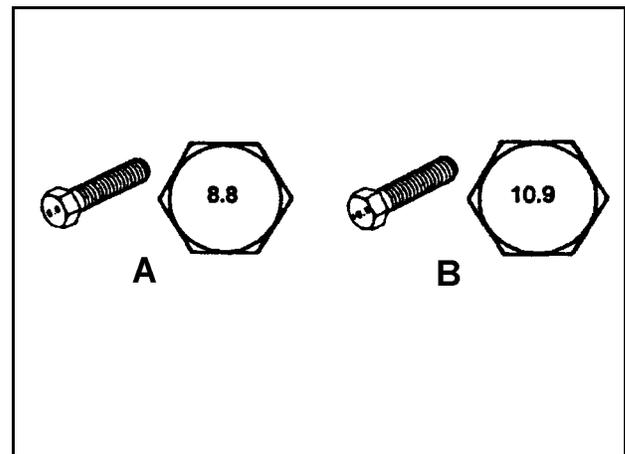


Figure 2

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

Specifications

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

Thread Size	Grade 1, 5, & 8 with Thin Height Nuts	SAE Grade 1 Bolts, Screws, Studs, & Sems with Regular Height Nuts (SAE J995 Grade 2 or Stronger Nuts)		SAE Grade 5 Bolts, Screws, Studs, & Sems with Regular Height Nuts (SAE J995 Grade 2 or Stronger Nuts)		SAE Grade 8 Bolts, Screws, Studs, & Sems with Regular Height Nuts (SAE J995 Grade 2 or Stronger Nuts)	
	In-lb	In-lb	N-cm	In-lb	N-cm	In-lb	N-cm
# 6 - 32 UNC	10 ± 2	13 ± 2	147 ± 23	15 ± 2	170 ± 20	23 ± 2	260 ± 20
# 6 - 40 UNF				17 ± 2	190 ± 20	25 ± 2	280 ± 20
# 8 - 32 UNC	13 ± 2	25 ± 5	282 ± 30	29 ± 3	330 ± 30	41 ± 4	460 ± 45
# 8 - 36 UNF				31 ± 3	350 ± 30	43 ± 4	31 ± 3
# 10 - 24 UNC	18 ± 2	30 ± 5	339 ± 56	42 ± 4	475 ± 45	60 ± 6	674 ± 70
#10 - 32 UNF				48 ± 4	540 ± 45	68 ± 6	765 ± 70
1/4 - 20 UNC	48 ± 7	53 ± 7	599 ± 79	100 ± 10	1125 ± 100	140 ± 15	1580 ± 170
1/4 - 28 UNF	53 ± 7	65 ± 10	734 ± 113	115 ± 10	1300 ± 100	160 ± 15	1800 ± 170
5/16 - 18 UNC	115 ± 15	105 ± 17	1186 ± 169	200 ± 25	2250 ± 280	300 ± 30	3390 ± 340
5/16 - 24 UNF	138 ± 17	128 ± 17	1446 ± 192	225 ± 25	2540 ± 280	325 ± 30	3670 ± 340
	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 ± 4	58 ± 5
3/8 - 24 UNF	17 ± 2	18 ± 2	24 ± 3	35 ± 3	47 ± 4	50 ± 4	68 ± 5
7/16 - 14 UNC	27 ± 3	27 ± 3	37 ± 4	50 ± 5	68 ± 7	70 ± 7	68 ± 9
7/16 - 20 UNF	29 ± 3	29 ± 3	39 ± 4	55 ± 5	75 ± 7	77 ± 7	104 ± 9
1/2 - 13 UNC	30 ± 3	48 ± 7	65 ± 9	75 ± 8	102 ± 11	105 ± 10	142 ± 14
1/2 - 20 UNF	32 ± 3	53 ± 7	72 ± 9	85 ± 8	115 ± 11	120 ± 10	163 ± 14
5/8 - 11 UNC	65 ± 10	88 ± 12	119 ± 16	150 ± 15	203 ± 20	210 ± 20	285 ± 27
5/8 - 18 UNF	75 ± 10	95 ± 15	129 ± 20	170 ± 15	230 ± 20	240 ± 20	325 ± 27
3/4 - 10 UNC	93 ± 12	140 ± 20	190 ± 27	265 ± 25	359 ± 34	374 ± 35	508 ± 47
3/4 - 16 UNF	115 ± 15	165 ± 25	224 ± 34	300 ± 25	407 ± 34	420 ± 35	569 ± 47
7/8 - 9 UNC	140 ± 20	225 ± 25	305 ± 34	430 ± 45	583 ± 61	600 ± 60	813 ± 81
7/8 - 14 UNF	155 ± 25	260 ± 30	353 ± 41	475 ± 45	644 ± 61	660 ± 60	895 ± 81

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

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

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

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

Thread Size	Class 8.8 Bolts, Screws, and Studs with Regular Height Nuts (Class 8 or Strong Nuts)		Class 10.9 Bolts, Screws, and Studs with Regular Height Nuts (Class 10 or Strong Nuts)	
M5 X 0.8	57 ± 5 in-lb	640 ± 60 N-cm	78 ± 7 in-lb	885 ± 80 N-cm
M6 X 1.0	96 ± 9 in-lb	1018 ± 100 N-cm	133 ± 13 in-lb	1500 ± 150 N-cm
M8 X 1.25	19 ± 2 ft-lb	26 ± 3 N-m	27 ± 2 ft-lb	36 ± 3 N-m
M10 X 1.5	38 ± 4 ft-lb	52 ± 5 N-m	53 ± 5 ft-lb	72 ± 7 N-m
M12 X 1.75	66 ± 7 ft-lb	90 ± 10 N-m	92 ± 9 ft-lb	125 ± 12 N-m
M16 X 2.0	166 ± 15 ft-lb	225 ± 20 N-m	229 ± 22 ft-lb	310 ± 30 N-m
M20 X 2.5	325 ± 33 ft-lb	440 ± 45 N-m	450 ± 37 ft-lb	610 ± 50 N-m

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

Note: 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.

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

Specifications

Other Torque Specifications

SAE Grade 8 Steel Set Screws

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

Wheel Bolts and Lug Nuts

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

** For steel wheels and non-lubricated fasteners.

Thread Cutting Screws (Zinc Plated Steel)

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

Thread Cutting Screws (Zinc Plated Steel)

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

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

Conversion Factors

$in-lb \times 11.2985 = N-cm$
 $ft-lb \times 1.3558 = N-m$

$N-cm \times 0.08851 = in-lb$
 $N-m \times 0.73776 = ft-lb$

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	11/16	0.6875	17.462
13/64	0.203125	5.159	45/64	0.703125	17.859
7/32	0.21875	5.556	23/32	0.71875	18.256
15/64	0.234375	5.953	47/64	0.734375	18.653
1/4	0.2500	6.350	3/4	0.7500	19.050
17/64	0.265625	6.747	49/64	0.765625	19.447
9/32	0.28125	7.144	25/32	0.78125	19.844
19/64	0.296875	7.541	51/64	0.796875	20.241
5/16	0.3125	7.541	13/16	0.8125	20.638
21/64	0.328125	8.334	53/64	0.828125	21.034
11/32	0.34375	8.731	27/32	0.84375	21.431
23/64	0.359375	9.128	55/64	0.859375	21.828
3/8	0.3750	9.525	7/8	0.8750	22.225
25/64	0.390625	9.922	57/64	0.890625	22.622
13/32	0.40625	10.319	29/32	0.90625	23.019
27/64	0.421875	10.716	59/64	0.921875	23.416
7/16	0.4375	11.112	15/16	0.9375	23.812
29/64	0.453125	11.509	61/64	0.953125	24.209
15/32	0.46875	11.906	31/32	0.96875	24.606
31/64	0.484375	12.303	63/64	0.984375	25.003
1/2	0.5000	12.700	1	1.000	25.400
1 mm = 0.03937 in.			0.001 in. = 0.0254 mm		

Specifications

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/Sq. In.	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 32° 2. Multiply by 5/9

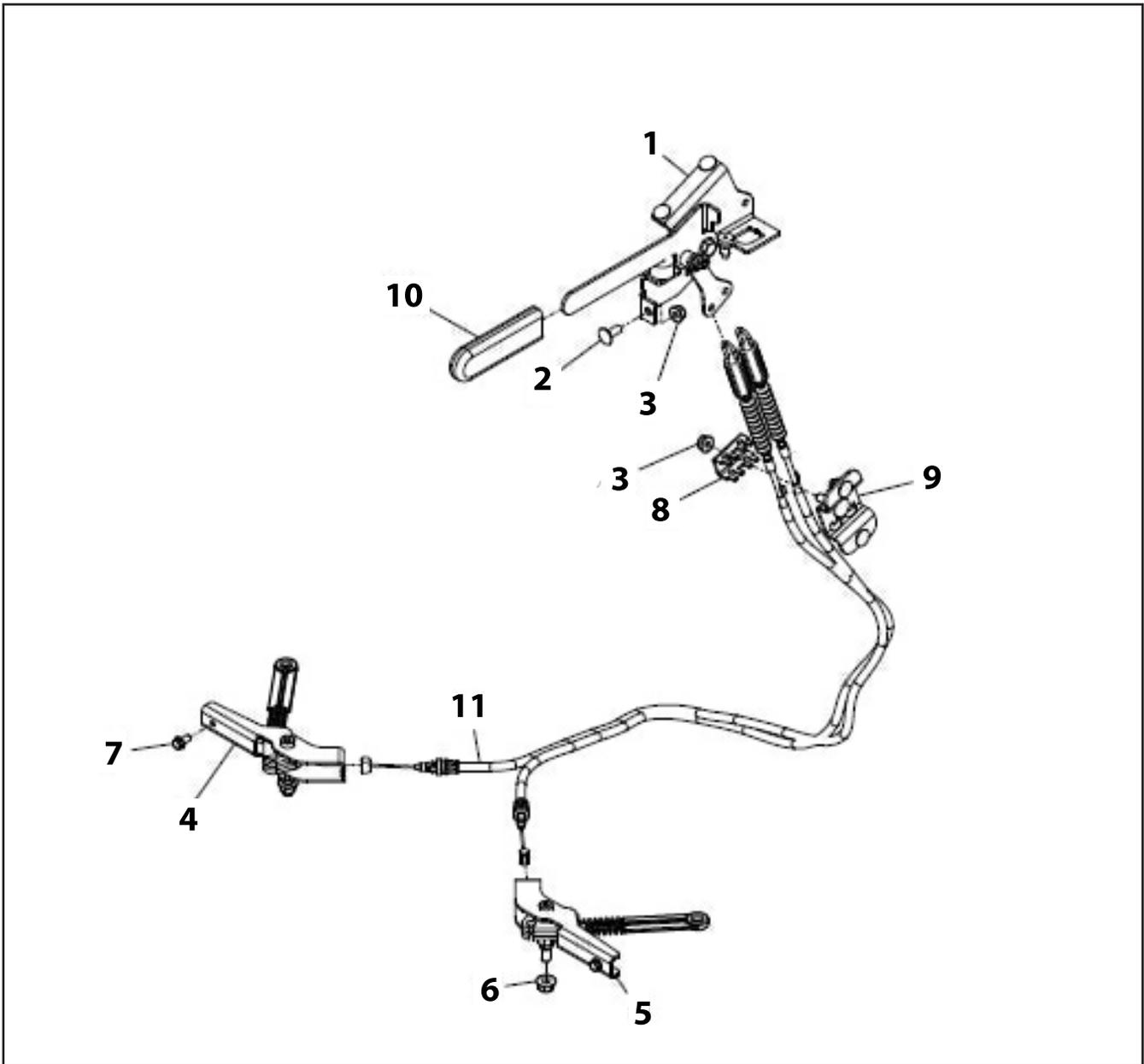


Figure 3

- | | |
|--------------------------|----------------------|
| 1. Brake Handle Asm. | 7. HWH Screw |
| 2. Carr Screw | 8. Cable Clamp |
| 3. Flange Nut | 9. Brake Cable Mount |
| 4. RH Brake Caliper Asm. | 10. Lever Grip |
| 5. LH Brake Caliper Asm. | 11. Brake Cable |
| 6. Flange Nut | |

CHASIS

Parking Brake Removal (Figure 3)

1. Place the jack stands underneath the frame.
2. Remove the fuel tank, see "Fuel Tank Removal," page 3-10.
3. Lower deck to the lowest position.
4. Remove the IHT fan.
5. Remove the IHT drive belt from pulleys.
6. Remove the skid plates.
7. Move the parking brake handle to the OFF position.
8. Loosen the cable clamp on the tower.
9. Unhook the springs from the brake handle assembly.
10. Remove brake cable from clamp.
11. Remove the cotter pin from the brake caliper on IHT parking brake arm.
12. Remove the mounting screw from tower.
13. Undo flange nut from bottom of the caliper (Figure 4).



Figure 4

14. Brake caliper should be free and removed from tower.
15. Unplug wiring harness from brake handle assembly
16. Remove the 2 bolts from the top of the tower holding brake handle assembly and bolt holding the brake handle assembly on the front of the tower.
17. Remove grip from brake handle assembly.
18. Drop brake handle through the hole in the tower. Remove from tower.

Parking Brake Installation (Figure 3)

1. Attach the bail switch to the brake handle assembly
2. Lift brake handle assembly through the hole in the tower.
3. Place foam grip on the brake handle assembly.
4. Secure brake handle assembly with 3 nuts and bolts.
5. Hook the cable spring to the brake handle assembly.
6. Run cables through the cable clamp (do not tighten at this time).
7. Place both cable ends into the brake calipers.
8. Route calipers to the frame, ensure cables do not interfere with IHT fans, pulleys or IHT belt.
9. Drop the brake caliper arm into the hole of IHT parking brake arm (Figure 5).



Figure 5

10. Use screw to attach brake caliper to horizontal bar on frame
11. Align brake caliper with hole in the frame and secure with flange nut (Figure 6). Torque to 125 +/- 20 in. lbs

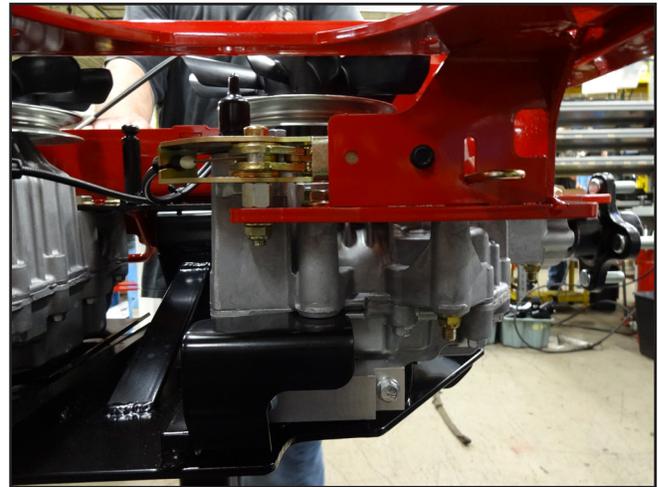


Figure 6

12. Pull downward on both cables and tighten the cable clamp. Torque to 125 +/- 20 in. lbs.

CHASIS

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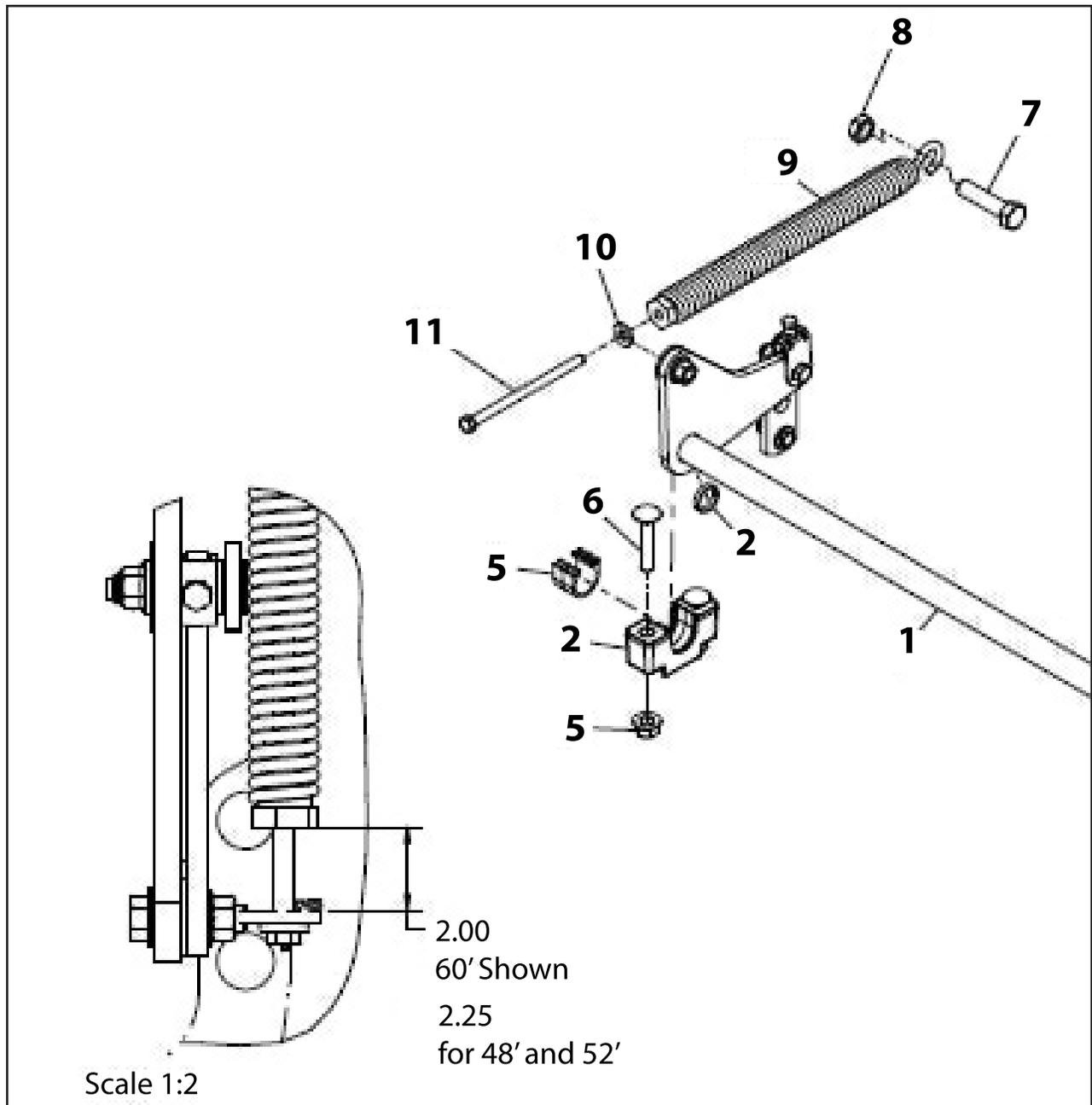


Figure 7

- 1. Front Cross Shaft
- 2. Split Spacer
- 3. Lock Nut
- 4. Bearing Cross Shaft Support
- 5. Front Cross Shaft Support
- 6. Carr Bolt

- 7. HH Screw
- 8. Jam Nut
- 9. Extension Spring Asm.
- 10. Belleville Washer
- 11. HH Tap Bolt

Height of Cut Assembly Removal (Figure 7)

1. Remove the fuel tank, see “Fuel Tank Removal,” page 3-10.
2. Lower deck to lowest position.
3. Remove the deck, see “Deck Removal,” page 7-3..
4. Remove the deck lift assembly.
5. Remove height of cut link from right rear lift arm by removing bolt and nut.
6. Remove height of cut link from height of cut assembly by removing bolt and nut.
7. Remove retaining ring from height of cut lever assembly.
8. Remove nuts holding height of cut assembly from inside of tower.
9. Remove height of cut assembly.

NOTE: Flanged bushing can remain in tower and still usable.

Height of Cut Assembly Installation (Figure 7)

1. Place 3 bolts through the height of cut plate and decal assembly (outer plate). Place face down with bolts pointing up.
2. Place the short spacer on the top right bolt, long spacer on bottom right bolt, and short spacer on left bolt.
3. Place height of cut lever and flat washer on height of cut plate and decal assembly.
4. Place height of cut plate (inner) on bolts and height of cut lever (place 2 cable ties in the height of cut holes to keep assembly together).
5. Place spacer on top right bolt and left bolt.
6. Place flanged bushing into hole on tower.
7. Place bolt through bottom hole of height of cut lever assembly.
8. Line up bolts and height of cut lever with holes in tower, tighten nuts and place retaining ring. Remove the cable ties.
9. Attach height of cut link and tighten bolt. Tighten to 67 +/- 10 ft. lbs.
10. Attach deck lift assembly.
11. Attach the deck.
12. Install the fuel tank.
13. Level the deck.

CHASIS

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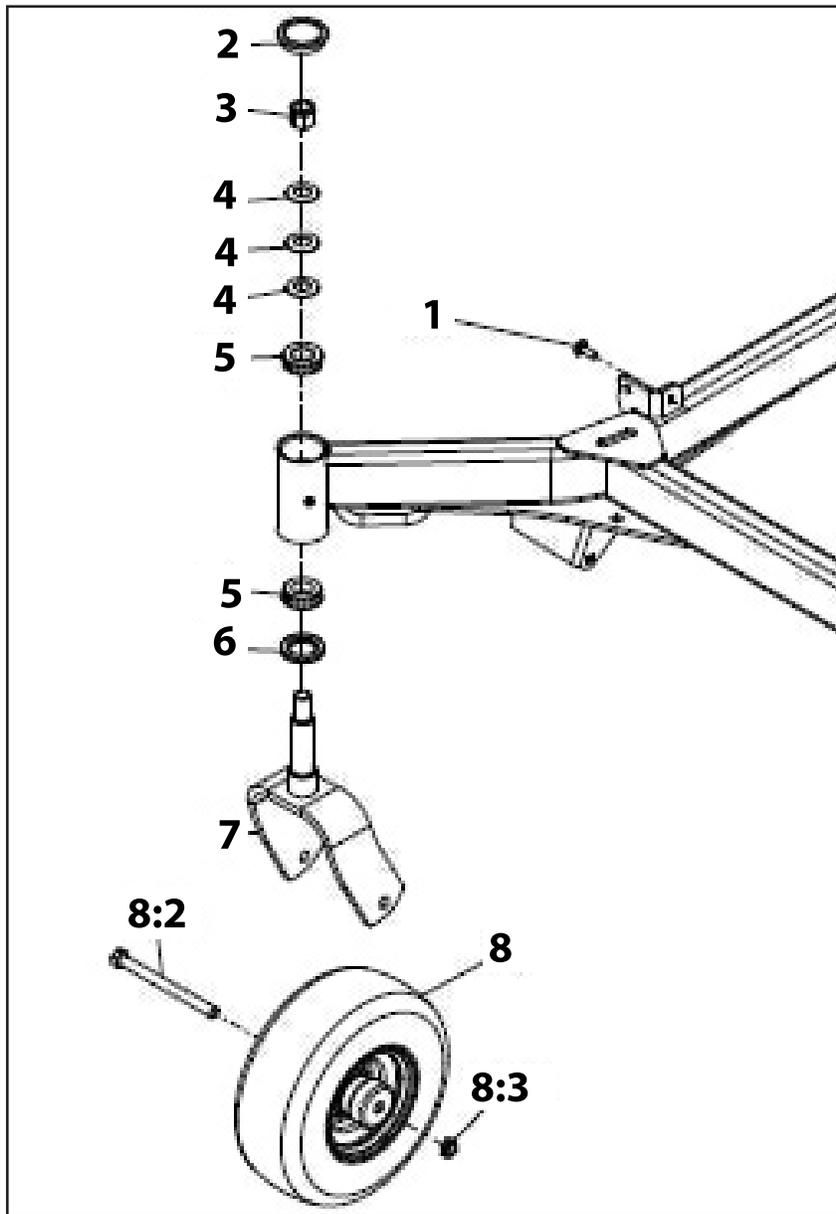


Figure 8

NOTE: Accessory unit frame shown.

- 1. Carr Screw
- 2. Grease Cap
- 3. NI Lock Nut
- 4. Belleville Washer

- 5. Tapered Roller Bearing
- 6. Grease Seal
- 7. Plug
- 8. Wheel/Tire and bearing Asm.

Caster Wheel Assembly Removal (Figure 8)

1. Remove the grease cap from the top of the caster wheel pivot tube.
2. Remove the nut from the caster fork shaft.
3. Remove the caster fork and wheel assembly.
4. Remove the three Belleville washers from the caster wheel pivot tube.
5. Remove the upper tapered roller bearing from the caster wheel pivot tube.
6. Remove the grease seal from the bottom of the caster wheel pivot tube. Remove the lower tapered roller bearing.
7. Using a blunt punch, remove the upper and lower bearing cups from the caster wheel pivot tube.
8. Remove the nut securing the caster wheel axle bolt. Remove the axle bolt.
9. Remove the caster wheel assembly from the caster fork.
10. Remove the seal guard from both sides of the wheel hub.
11. Remove the spacer nut from the caster axle.

NOTE: The spacer nuts are both threaded onto the caster axle. One of the spacer nuts will need to be removed after it has been removed from the caster wheel.

12. Remove the grease seal from both sides of the caster wheel.
13. Remove the LH and RH tapered bearings.

Caster Wheel Assembly Installation (Figure 8)

1. Pack the caster wheel tapered roller bearing with high temperature grease.
2. Install the bearing into the wheel hub.
3. Install the grease seal into the wheel hub.
4. Repeat steps 1, 2, and 3 on the other side of the caster wheel.
5. Fill the center of the wheel hub with high temperature grease.
6. Position the caster axle through the bearing and seal assembly.
7. Install a spacer nut onto both ends of the caster axle.
8. Position the seal guard onto both sides of the caster wheel hub.
9. Secure the caster wheel assembly to the caster fork using the axle bolt and nut.
10. Install the upper and lower bearing cups into the pivot tube.

NOTE: There should be approximately 3 internal spacer nut threads visible on both sides, indicating the axle is centered.

NOTE: A socket can be used as a driver. Take care not to scar the race surface.

11. Pack the pivot tube tapered roller bearings with high temperature grease.
12. Install the lower bearing into the pivot tube.
13. Install grease seal into the base of the pivot tube.
14. Install the upper bearing into the pivot tube.
15. Install the 3 Belleville washers into the pivot tube.

**NOTE: Bottom: Crown Up
Middle: Crown Down
Top: Crown up**

CHASIS

16. Position the caster wheel and fork assembly up through the pivot hub.
17. Secure the caster wheel and fork assembly with the nut.
18. Tighten the locknut until spring washers are flat (15 ft-lbs.) and then back off a $\frac{1}{4}$ turn to properly set the preload on the bearings.
19. Remove the plug from the side of the pivot hub.
20. Install a grease zerk into the port on the side of the pivot hub.
21. Fill the pivot hub cavity until grease is purging out through the upper bearing.
22. Replace the grease zerk with the plug.
23. Install the grease cap onto the top of the pivot hub.

3

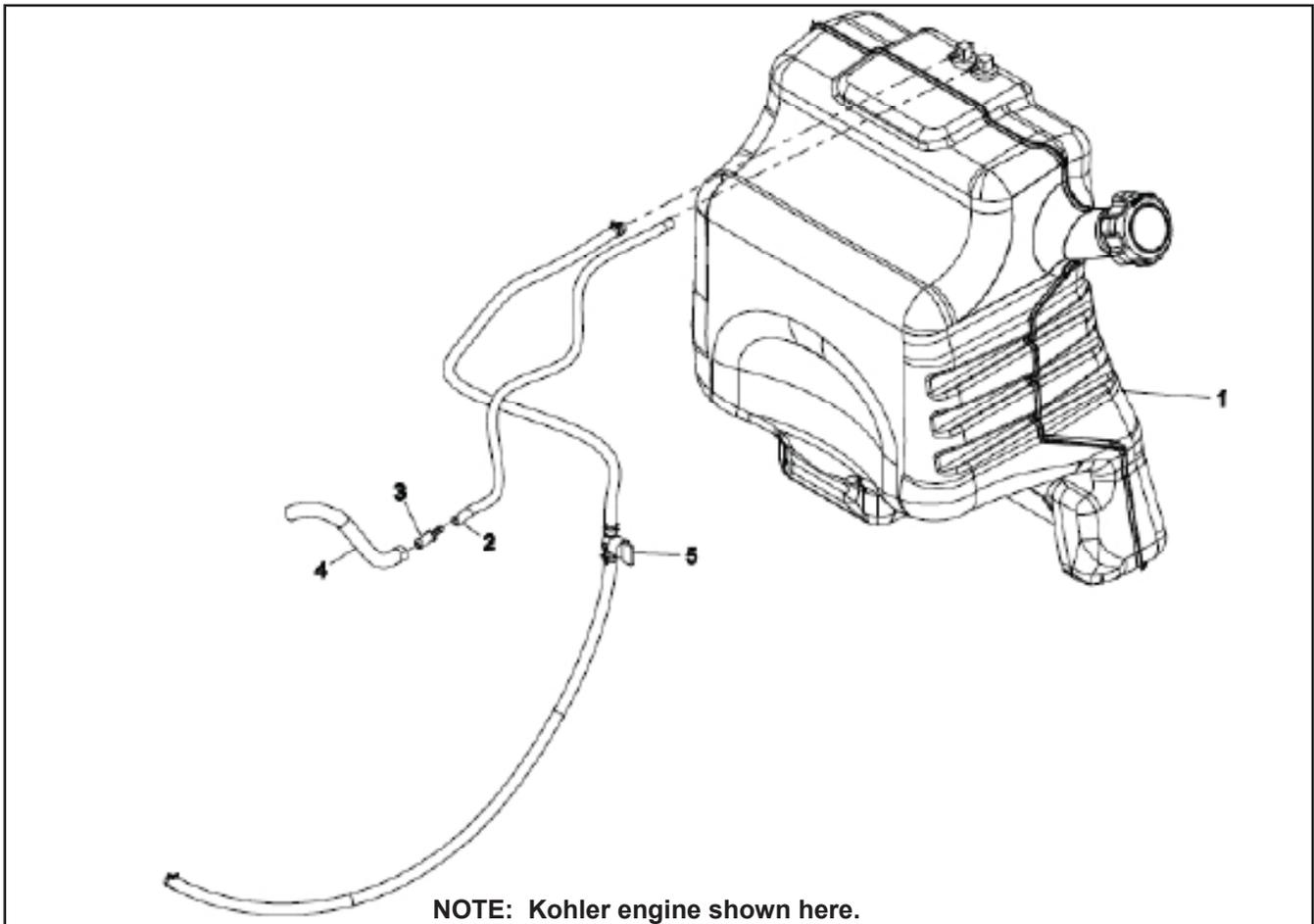


Figure 9

- 1. Fuel Tank Asm.
- 2. Fuel Hose
- 3. Straight Fitting

- 4. Fuel Hose
- 5. Fuel Line Asm.

CHASIS

Fuel Tank Removal (Figure 9)

1. Set parking brake.
2. Close the fuel shut-off valve.
3. Place the platform in the down position.
4. Lower the knee cushion.
5. Remove the 4 bolts holding the cross bracket to the tower.
6. Disconnect fuel line and vent hose.
7. Remove the tank and place on a flat surface.

NOTE: Fuel tank can be emptied by either using a syphon or by pouring the fuel out into an approved container by using the fill neck.

Fuel Tank Installation (Figure 9)

1. Replace the tank in the tower
2. Connect the fuel line and vent line
3. Install the cross bracket and secure with 4 bolts.
4. Lift up knee cushion.
5. Open fuel shut-off valve.

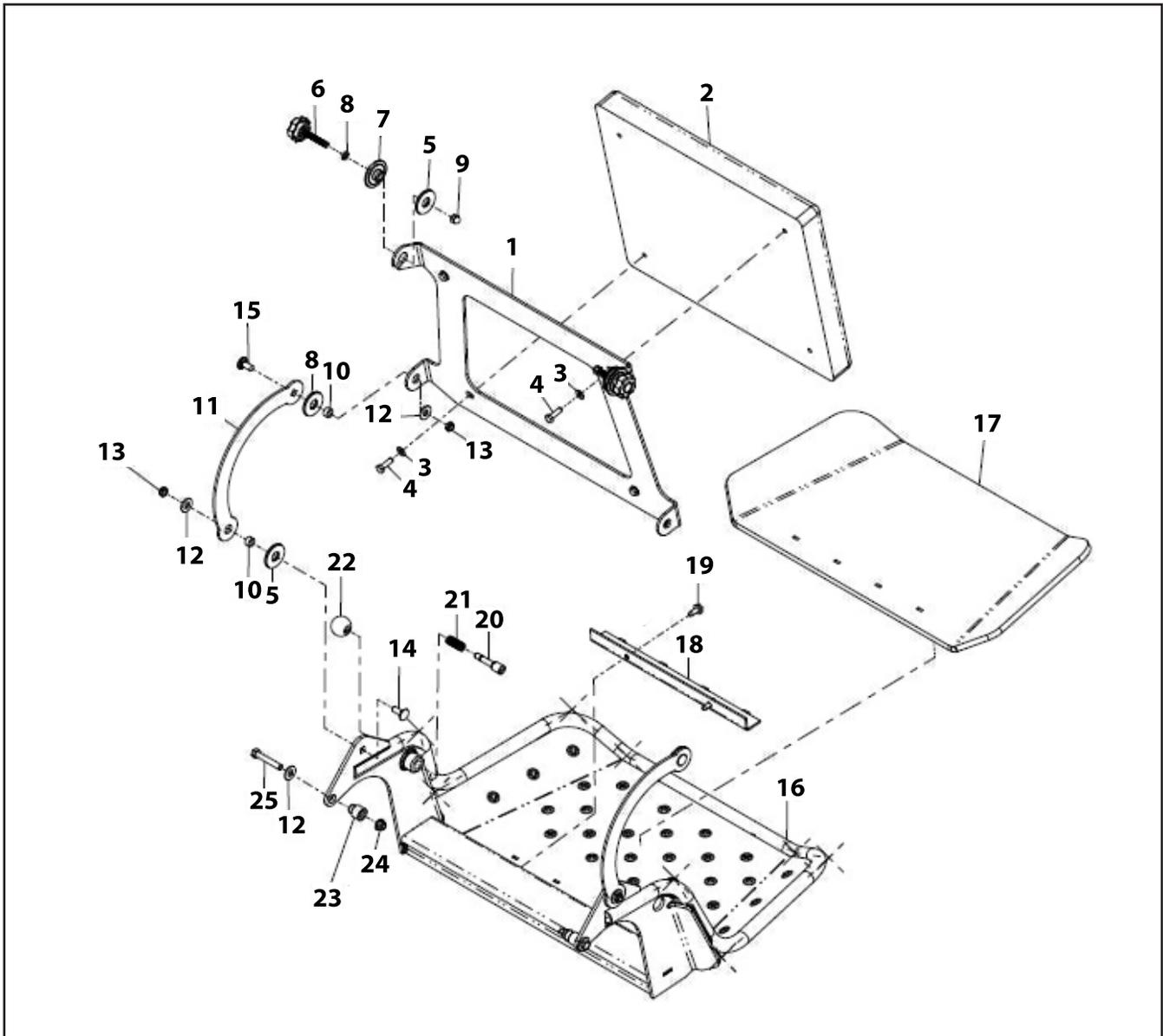


Figure 10

- | | |
|------------------------------|---------------------|
| 1. Pad Hinge | 14. Carr Bolt |
| 2. Cushion Pad | 15. Carr Screw |
| 3. Flat Washer | 16. Platform Asm. |
| 4. HH Screw | 17. Foot Mat |
| 5. Composite Friction Washer | 18. Shield Clamp |
| 6. Knob | 19. HWHTF Screw |
| 7. Bushing Slide | 20. Latch Pin |
| 8. Lock Washer | 21. Spring |
| 9. Acorn Nut | 22. Ball Knob |
| 10. Spacer | 23. Flanged Bushing |
| 11. Pad Link | 24. NI Flanged Nut |
| 12. Flat Washer | 25. HH Screw |
| 13. NI Lock Nut | |

CHASIS

Platform Removal (Figure 10)

1. Loosen the knobs on the tower.
2. Lower the cushion.
3. Remove the 4 bolts securing the fuel tank bracket.
4. Remove the fuel and vent lines from the top of the fuel tank.
5. Remove the fuel tank.
6. Remove the 2 mounting bolts from the bottom of the tower.
7. Remove the platform and cushion assembly from machine, may need assistance.
8. Remove the hinge pad from platform.
9. Remove the rubber mat from platform by removing the shield clamp.
10. Remove the link arms from platform.
11. Remove the ball knob assembly from platform.

Platform Installation (Figure 10)

1. Secure the 4 rubber bumpers to the frame using 4 nuts. Larger bumpers to outside of the machine.
2. Position the spring on the latch pin.
3. Position the latch pin and spring assembly into the platform.
4. Apply thread-locking compound to the threads of the knob.
5. Install the knob onto the latch pin. Torque to 40 +/- 10 in. lbs.
6. Position the carriage bolt through the platform, add friction washer, spacer, pad link, flat washer and lock nut. Torque to 105 +/- in. lbs.
8. Repeat steps for opposite side.
10. Place 4 screws with flat washers through hinge pad and secure cushion to hinge pad. Torque to 100 +/- 20 in. lbs.
11. Place 2 thread forming screws outside of the shield clamp, align tabs with holes in rubber mat and secure to platform. Torque to 200 +/- 25 in. lbs.
12. Place the carriage screw outside of the link through lock washer, spacer, and bottom hinge pad hole (Figure 11). Add flat washer, tighten the lock nut.

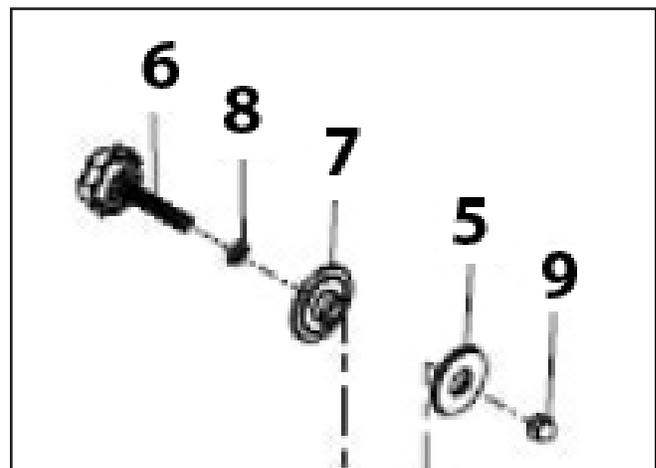


Figure 11

13. Repeat for opposite side.
14. Place the knob shaft through the hole in the tower.
Secure with acorn nut.
15. On stud outside of tower, place composite friction washer, slide bushing, and lock washer. Add the knob.
16. Repeat for opposite side of tower.

NOTE: Platform assembly is complete.

17. Attach platform assembly to 3rd hole in tower from back (easier to have two people when attaching), torque flange nut to 30 +/- ft. lbs.
18. Repeat for opposite side of tower.
19. Tighten knobs on the tower.

CHASIS

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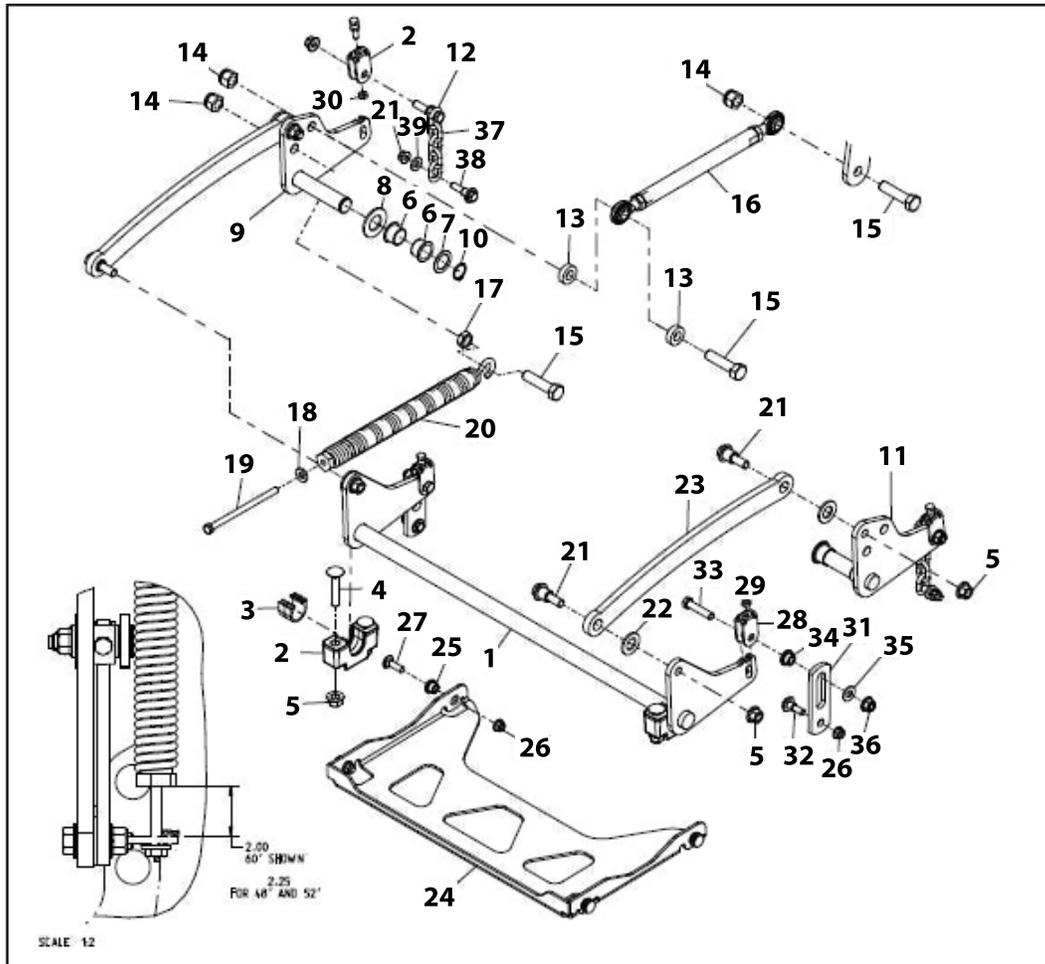


Figure 12

- | | |
|--------------------------------------|--------------------------|
| 1. Front Cross Shaft Asm. | 20. Extension Spring Asm |
| 2. Front Bearing Support Cross Shaft | 21. HHF Shoulder Screw |
| 3. Front Bearing Cross Shaft | 22. Flat Washer |
| 4. Carr Bolt | 23. Lift Link |
| 5. Lock Nut | 24. Strut Plate |
| 6. Bushing | 25. Flanged Bushing |
| 7. Thrust Washer | 26. NI Flange Bushing |
| 8. Flat Washer | 27. Carr Bolt |
| 9. RH Lift Arm Asm. | 28. Deck Adjust Yoke |
| 10. Retaining Ring | 29. HH Screw |
| 11. Rear Lift Asm. | 30. Jam Nut |
| 12. HOC Lever Asm. | 31. HH Screw |
| 13. Washer | 32. Flanged Bushing |
| 14. NI Lock Nut | 33. Lift Link |
| 15. HH Screw | 34. Flat Washer |
| 16. HOC Link Asm. | 35. HF Nut |
| 17. Jam Nut | 36. HHF Shoulder Screw |
| 18. Belleville Washer | 37. Deck Lift Chain Asm. |
| 19. HH Bolt Tap | 38. Shoulder Bolt |
| | 39. Spacer |

Deck Lift Assembly Removal (Figure 12)

1. Lower the deck to the lowest cutting position.
2. Lower the cushion.
3. Remove the 4 bolts holding the fuel tank bracket.
4. Remove the fuel tank.
5. Lift up the engine guard to access the deck belts (Figure 13).



Figure 13

6. Remove the deck belt from the PTO clutch.
7. Remove the 2 bolts holding the lift link to the deck.
8. Remove the deck from the machine by removing the 4 bolts that hold the deck to the deck hangers.

NOTE: Recommend placing 2, 2x4's underneath the deck to prevent damage and move to side for ease of removal.

9. Remove the tap bolt from the extension spring.
(There will be no tension in the deck lift assembly).
10. Remove bolt holding the height of cut link assembly to the lift arm.
11. Remove the 4 bolts holding the 2 black lift links.
12. Remove the 4 carriage bolts holding the 2 support cross shafts.

13. Remove the snap retaining ring from left and right hand lift arm. Remove the lift arms.
14. Remove the bolt holding the height of cut link from the height of cut assembly.
15. Remove yokes, flat links, link chains from the rear lift arms and front cross shaft.
16. Loosen all yokes and flat links to help with the deck leveling after installation.

CHASIS

Deck Lift Assembly Installation

1. Place bearing in support cross shaft and bolt to the frame. Torque to 80 +/- 8 ft. lbs.
2. Place the inner and outer bushings into the frame where left and right rear lift assemblies are placed.
3. Place a flat washer on the left and right rear lift arms. Push into the frame holes.
4. Push the left and right rear lift arms through the frame. Add thrust washer, secure with retaining ring.
5. Place igus bushing on the right hand side of the cross shaft.
6. Place the left and right black link lift into the top holes on the lift arms (Figure 14).



Figure 14

NOTE: From behind machine left hand, side should be inside of the lift assemblies.

7. Measure from center of the height of cut link assembly rod end to the other center end. Measurement should be 14 in.
8. Secure the rod to height of cut assembly with a bolt and nut. Torque to 67 +/- 10 ft. lbs.
9. Secure other end of rod to the right rear lift arm. Torque to 67 +/- 10 ft. lbs.
10. Place the nut on the bolt and tighten. Place bolt in the hole of right rear lift arm assembly and tighten. Torque to 67 +/- 10 ft. lbs.

3-16

11. Attach the spring to the bolt and place cupped washer (cup washer facing bolt head) on tap screw. Place through frame and tighten (Figure 15).

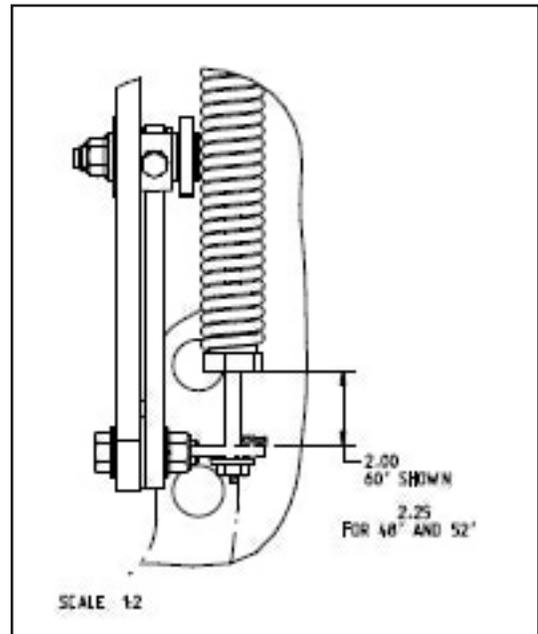


Figure 15

12. Attach the yokes, lift chains, and flat lift link on lift arm assemblies. Yoke nuts torqued to 50 +/- 5 ft. lbs.
13. Place the deck under the machine.
14. Place 2 bolts, 2 bushing and 2 nuts on the strut and attach to the deck.
15. Using 2 bolts and 2 nuts attach the flat lift links to the deck. Leave the deck loose.
16. Attach the chain to the rear deck hangers. Leave the hangers loose
17. Deck is attached.
18. Refer to "Deck Leveling," page 7-1.

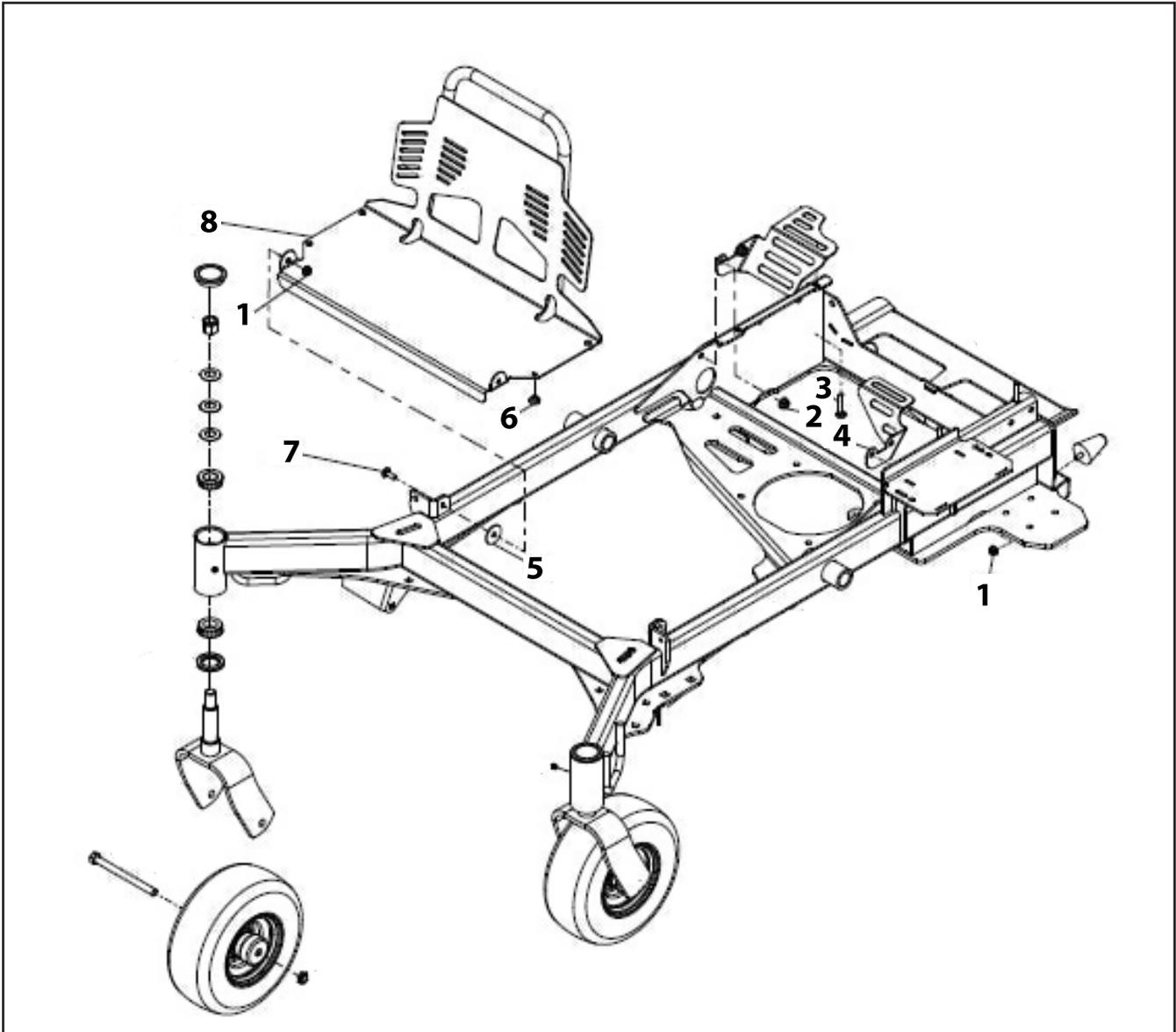


Figure 16

- 1. NI Flange Nut
- 2. NI Flange Nut
- 3. Carr Screw
- 4. LH Fan Guard

- 5. Nylon Washer
- 6. Bumper
- 7. Carr Screw
- 8. Engine Guard Asm.

CHASIS

Engine Guard Removal (Figure 16)

1. Remove the 2 nuts on the inside of the engine guard.
2. Remove the 2 nylon washers on the outside holes of the engine guard.
3. Pull up to remove the engine guard.

Engine Guard Installation

1. Place the engine guard assembly in the space between the frame rails.
2. Push the engine guard to one side then insert the nylon washer in the space on opposite side.
3. Place bolt through the hole in the frame, nylon washer and engine guard. Secure with a nut.

NOTE: Do not over tighten at this time.

4. On the opposite side of the engine guard assembly, place bolt through hole in frame, engine guard, and nylon washer. Secure with nut.

Tower Removal

1. Lower the deck and take tension out of the height of cut assembly.
2. Remove the height of cut assembly, see “Height of Cut Assembly Removal,” page 3-5.
3. Remove the cushion assembly.
4. Remove the fuel tank, see “Fuel Tank Removal,” page 3-10.
5. Remove the knee cushion retention knobs.
6. Remove the wiring harness, see “Wiring Harness Removal,” page 8-2.
7. Remove the hour-meter, PTO switch, and throttle control.

NOTE: You will have to remove the choke control if equipped.

8. Remove the platform, see “Platform Removal,” page 3-12.
9. Remove the controls, see “Left Hand Motion Control Removal,” page 4-2 and “Right Hand Motion Control Removal,” page 4-3.
10. Remove the parking brake, see “Parking Brake Removal,” page 3-2.

NOTE: You do not have to remove the brake cables and brake calipers.

11. Drain fluid from the hydraulic reservoir and hose. Remove both items.
12. Remove the fuel tank mount.
13. Remove the bolt and nut holding the fan guard into place.
14. Remove the 4 bolts and nuts holding the tower to the frame.

Tower Installation

1. Install the tower to the frame. Secure fan guards with nuts and bolts.
2. Install the 4 bolts and nuts to secure the tower to the frame (Figure 17).

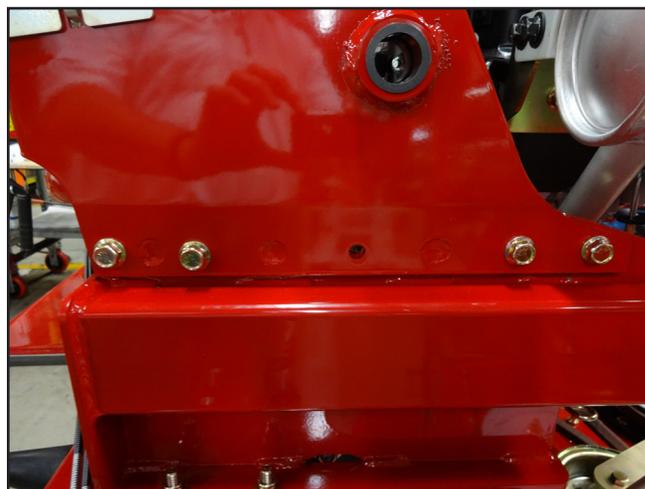


Figure 17

3. Install the fuel tank mount.
4. Install the hydraulic reservoir and hose.
5. Install the brake cable and brake handle.
6. Install the hour-meter, PTO switch, and throttle control.
7. Install the wiring harness, see “Wiring Harness Installation,” page 8-2.
8. Install the controls, See “Left and Right Hand Motion Control Installation,” page 4-3 and 4-4.
9. Install the platform, see page 3-12.
10. Install the height of cut assembly,
11. Install the fuel tank, page 3-10.
12. Install the cushion retention knobs.
13. Lift the knee cushion in place.

NOTE: Tracking and speed will have to be set once the controls are installed. Hydraulic fluid will need to be added.

CHASIS

Frame Removal

1. Remove the deck from the frame, see “Deck Removal,” page 7-3.
2. Remove the deck lift from the frame.
3. Remove the height of cut assembly from the tower, see “Height of Cut Removal,” page 3-5.
4. Remove the fuel tank from the tower, see “Fuel Tank Removal,” page 3-10.
5. Remove the engine from the frame, see “Engine Removal,” page 5-2.
6. Remove the platform and cushion assembly from the tower, see “Platform Removal,” page 3-12.
7. Remove the motion controls from the tower, see “Adjusting Motion Control Levers,” page 4-2.
8. Remove the parking brake from the frame, see “Parking Brake Removal,” page 3-2.
9. Remove the IHT’s from the frame, see “IHT Removal,” page 6-6.
10. Remove the wiring harness, see “Wiring Harness Removal,” page 8-2.
11. Remove the tower from the frame.
12. Remove the casters from the frame, see “Caster Wheel Assembly Removal,” page 3-7.

Frame Installation

1. Install the brake calipers onto the frame.
2. Install the casters onto the frame, see “Caster Wheel Assembly Removal,” page 3-7.
3. Install the IHT’s onto the frame, see “IHT Installation,” page 6-7.
4. Install the deck onto frame lift, see “Deck Installation,” page 7-3.
5. Install the engine onto the frame, see “Engine Installation,” page 5-3.
6. Install the tower onto the frame, see “Tower Installation,” page 3-19.
7. Install the wiring harness onto frame, see “Wiring Harness Installation,” page 8-2.
8. Install the motion controls into the tower, see “Adjusting Motion Control Levers,” page 4-2.
9. Install the height of cut assembly onto the tower, see “Height of Cut Assembly Installation,” page 3-5.
10. Install the platform and cushion on the tower, see “Platform Installation,” page 3-12.
11. Install the deck onto the tower, see “Deck Installation,” page 7-3.
12. Level the deck.
13. Install the fuel tank, see “Fuel Tank Installation,” page 3-10.
14. Set the speed of the IHT’s, see “Speed Setting Procedure,” page 6-2.

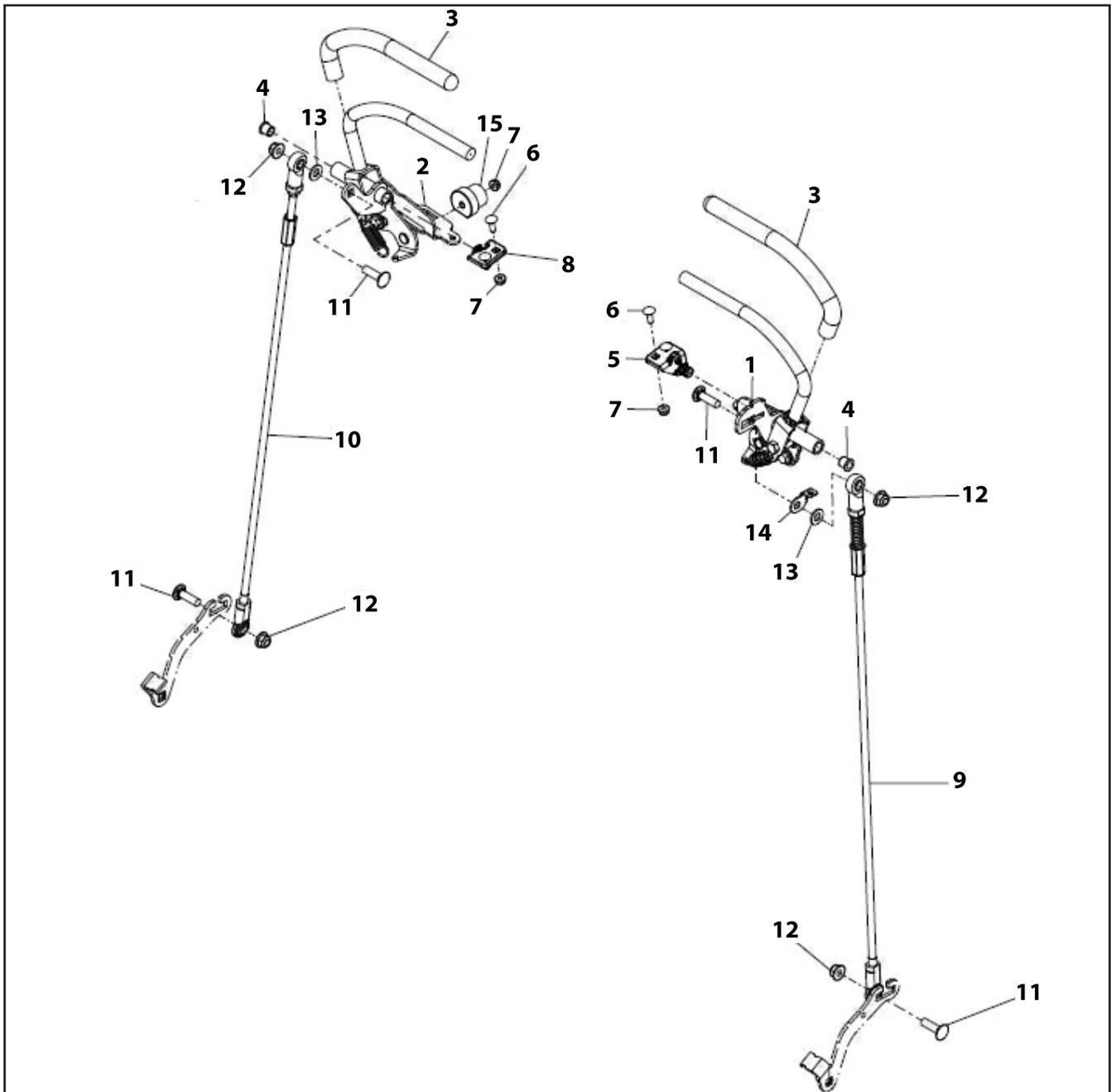


Figure 18

- | | |
|---------------------------|------------------------------|
| 1. LH Control Handle Asm. | 9. LH Control Rod Asm. |
| 2. RH Control Handle Asm. | 10. RH Control Rod Asm. |
| 3. Grip | 11. Carr Screw |
| 4. Bearing | 12. NI Flange Nut |
| 5. LH Pivot Tab | 13. Flat Washer |
| 6. Carr Bolt | 14. Speed Adjustment Bracket |
| 7. NI Flange Nut | 15. Cam |
| 8. RH Pivot Tab | |

CONTROLS

Adjusting Motion-Control Levers (Figure 18)

NOTE: If the motion-control levers do not align horizontally, adjust the right side motion-control lever.

1. Disengage the PTO, move the motion-control levers to the neutral position. Set the parking brake.
2. Stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
3. Push the motion-control levers out of the NEUTRAL-LOCK position.
4. Check if the right motion-control lever aligns horizontally with the left motion-control lever.

NOTE: To adjust the motion-control levers horizontally, adjust the cam.

5. Release the cushion from the rear of the machine.
6. Loosen the nut holding the cam.
7. Adjust the cam until it aligns with the left motion-control lever and tighten the nut.

NOTE: Moving the cam clockwise (in the vertical position) lowers the handle; moving the cam counterclockwise (in the vertical position) raises the handle.

Important: Ensure that the flat portion of the cam does not go above a vertical position (right or left); otherwise you may damage the switch.

8. Repeat steps 3 through 8 for the left motion-control

Left Hand Motion Control Removal

NOTE: IHT are shipped with the Internalized Hydraulic Transmission (Figure 19).

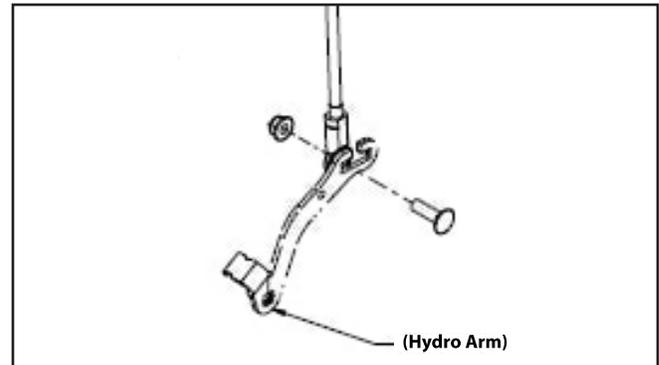


Figure 19

1. Lower the cushion.
2. Remove the fuel tank, see "Fuel Tank Removal," page 3-10.
3. Remove bolt and nut from the slot on the left IHT arm.
4. Remove bolt and nut from the top of the control holding pivot tab and left hand control assembly.
5. Remove the control rod from the tower.
6. Unclip the left hand motion control switch.
7. Remove the bolt and nut from the front of tower.
8. Remove the 2 bolts and nuts securing the left hand motion control to the tower.
9. Place the left hand motion control through the tower.

Left Hand Motion Control Installation

1. Install the grip on the left hand motion control assembly.
2. Install the igus bearing onto end of the motion control.
3. Lift left hand motion control assembly through the tower and secure with bolt and nut in the front and 2 bolts on top of the tower. Ensure pivot tab is installed (Figure 20). Torque to 75 +/- in. lbs.



Figure 20

4. Install bolt through the motion control assembly, speed adjustment bracket, and upper control rod end. Secure with nut. Torque to 36 +/- 4 ft. lbs.
5. Place bolt through the IHT control arm, and lower end of control rod. Secure with nut. Torque to 36 +/- 4 ft. lbs.

NOTE: Forward position of slot for 10 mph, rear position of slot for 8 mph.

NOTE: Ensure control rod does not rub on fuel tank tube mount.

6. Once both sides are complete refer to section speed settings, see "Speed Setting Procedure," page 6-2.

Right Hand Motion Control Removal

NOTE: IHT are shipped with the Internalized Hydraulic Transmission. (show IHT arm on drawing).

1. Lower the cushion.
2. Remove the fuel tank, see "Fuel Tank Removal," page 3-10.
3. Remove bolt and nut from slot on the right IHT arm.
4. Remove bolt and nut from the top of the control holding pivot tab and right hand control assembly.
5. Remove control rod from the tower.
6. Unclip the right hand motion control switch.
7. Remove bolt and nut from the front of the tower.
8. Remove the 2 bolts and nuts securing the right hand motion control to the tower.
9. Drop the right hand motion control through the tower.

CONTROLS

Right Hand Motion Control Installation

1. Install the grip on the right hand motion control assembly.
2. Secure the cam in place with nut on the motion control assembly.

NOTE: The flat side should point towards the ground.

3. Install igus bearing onto the end of the motion control.
4. Lift the right hand motion control assembly through the tower. Secure with bolt and nut in the front and 2 bolts on top of the tower. Ensure pivot tab is installed. Torque to 75 +/- in. lbs. Refer to page 4-3.
5. Install bolt through the motion control assembly, washer, and upper control rod end. Secure with nut. Torque to 36 +/- 4 ft. lbs.
6. Place bolt through the IHT control arm. Lower end of the control rod and secure with nut. Torque to 36 +/- 4 ft. lbs.

NOTE: Forward position of slot for 10 mph, rear position of slot for 8 mph.

NOTE: Ensure control rod does not rub on the fuel tank tube mount.

7. Once both sides are complete, see "Speed Setting Procedure," page 6-2.

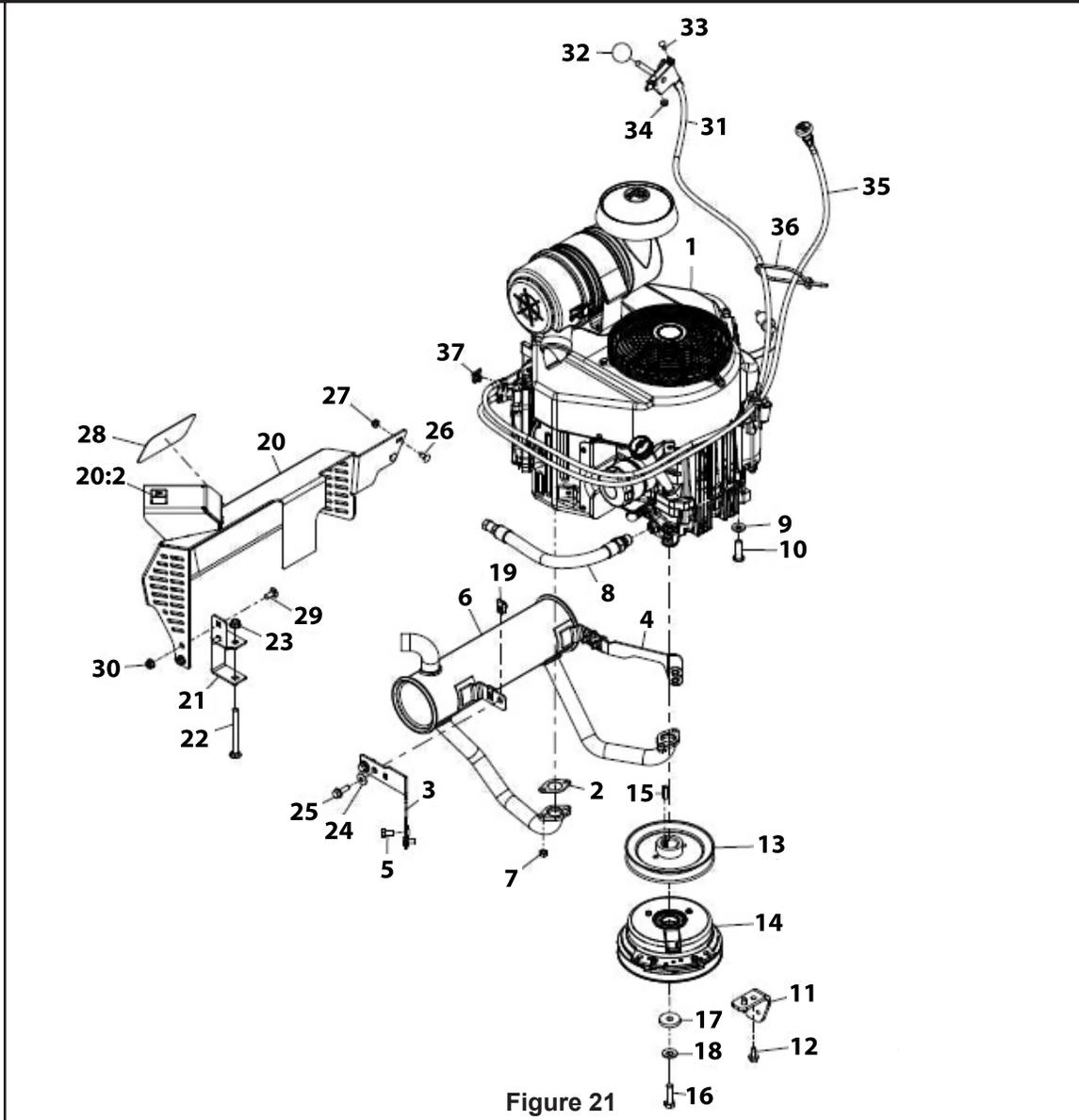


Figure 21

- | | | |
|-------------------------------|----------------------------|-----------------|
| 1. Kawasaki Engine | 19. U Nut | 37. Cable Clamp |
| 2. Exhaust Gasket | 20. Muffler Guard Asm. | |
| 3. Front Muffler Bracket | 21. Guard Mounting Bracket | |
| 4. Rear Muffler Bracket | 22. Carr Screw | |
| 5. HHF Screw | 23. NI Flange Nut | |
| 6. Kawi Muffler | 24. HHF Screw | |
| 7. Nut | 25. HHF Screw | |
| 8. Engine Oil Drain Hose Asm. | 26. Carr Screw | |
| 9. Belleville Washer | 27. NI Flanged Nut | |
| 10. Screw | 28. Decal | |
| 11. Clutch Stop | 29. Carr Screw | |
| 12. HWHTF Screw | 30. NI Nut Flange | |
| 13. Trans Drive Pulley | 31. Throttle Asm. | |
| 14. Clutch | 32. Ball Knob | |
| 15. Key | 33. Carr Bolt | |
| 16. HH Screw | 34. Flange Lock Nut | |
| 17. Washer | 35. Choke Cable | |
| 18. Spring Washer | 36. Cable Tie | |

ENGINE

Engine Removal (Figure 21)

1. Turn off the engine and remove the key from the ignition.
2. Lower the deck to the lowest height of cut.
3. Turn fuel shut-off valve to the OFF position.
4. Remove the negative and positive battery cables from the battery.
5. Drain the oil from the engine using a drain hose.
6. Remove the oil drain hose from the engine. Set aside for reuse.
7. Remove the muffler shield by removing the bolts on the front of the muffler shield and 2 bolts on the rear of muffler shield (Figure 22).

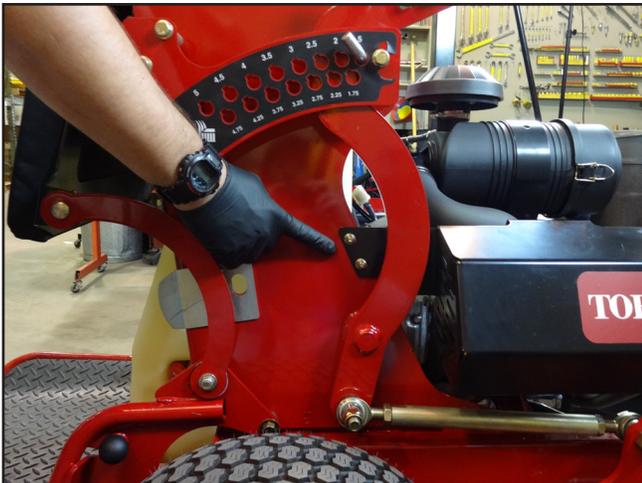


Figure 22

8. Loosen and remove the 2 bolts; one on left and one on right muffler brackets.
9. Loosen and remove the 4 bolts securing the muffler to the engine.
10. Remove the 2 bolts securing the muffler bracket to the engine.
11. Set the muffler aside to reuse.
12. Remove the throttle or choke cable (may or may not have choke cable depending on engine type) (Figure 23).

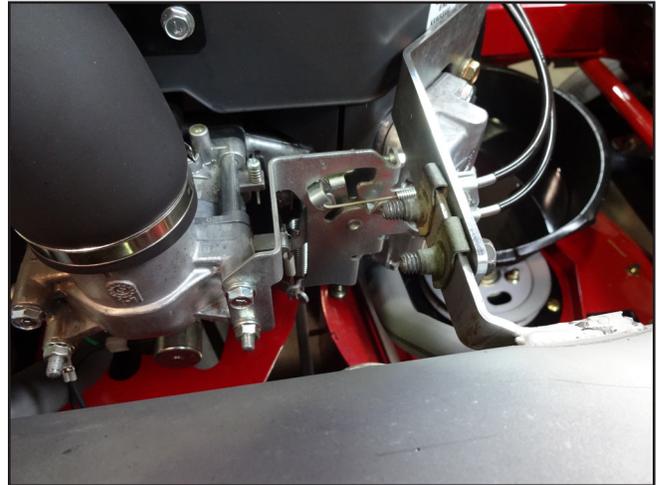


Figure 23

13. Remove the fuel line from the pump. Drain fuel from the line.
14. Remove the vent line from the air cleaner.
15. Unplug the engine-wiring harness from the Toro wiring harness.
16. Remove bolt from the engine ground.
17. Remove the deck belt from the PTO clutch.
18. Pull down the kneepad.
19. Remove the 4 bolts securing the cross brace.
20. Remove the fuel line and vent line from the top of tank.
21. Remove the fuel tank and place on a flat surface.
22. Remove the deck drive belt.
23. Remove the drive idler spring.
24. Remove the drive belt.
25. Remove the bolt-holding clutch on the crankshaft.
26. Disconnect wiring lead on the clutch.
27. Remove the pulley, PTO, key, and drive pulley from the crankshaft.

28. Remove the 4 bolts securing engine to the frame. (torx bit required).
29. Remove the engine.

Engine Installation (Figure 21)

1. Install the oil drain tube to the engine. Torque to 20 +/- 3 ft. lbs
2. Lower engine to the frame and secure it with 4 mounting bolts. Torque to 30+/- 4 ft. lbs
3. Add anti-seize to the crankshaft.
4. Install the drive pulley with the key-way. Ensure the larger diameter end is toward the engine.
5. Install the clutch, spring washer, and washer. Ensure clutch is in the clutch stop. Torque to 55 +/- 5 ft. lbs. Add Loctite to the bolt.
6. Reconnect wire lead to the clutch.
7. Install muffler to the engine.
8. Install mounting brackets to the engine using 2 bolts.
9. Attach the muffler to the brackets. Muffler guard should have about 1 in. clearance on each side of the muffler.
10. Install drive belt to the pulley.
11. Install the drive spring.
12. Connect the wiring harness.
13. Attach the engine ground and wires.
14. Connect the vent hose to the air cleaner.
15. Connect the fuel line to pump.
16. Install the fuel tank.
17. Install the vent hose and fuel hose on the tank.
18. Install the cross bracket and the 4 bolts. Torque 24 +/- 3 ft. lbs.
19. Lift the kneepad and install.
20. Install the muffler shield (Figure 24 and 25).

ENGINE



Figure 24

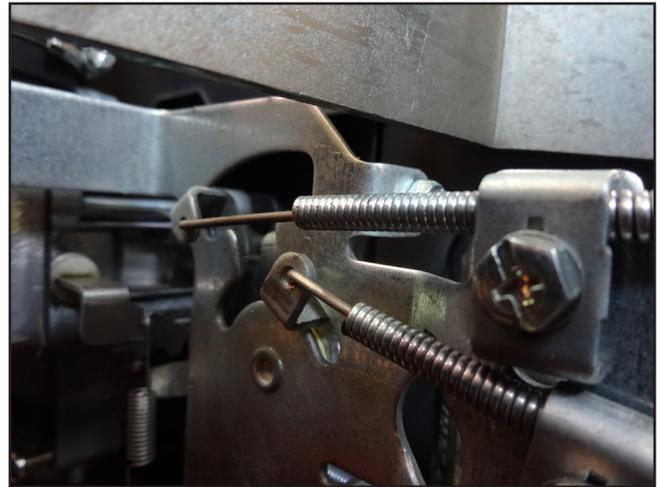


Figure 26

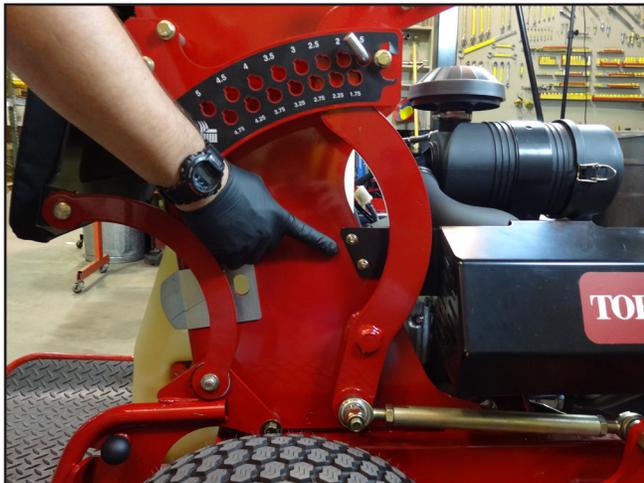


Figure 25

21. Install the throttle and choke cable. Throttle cable on top and choke cable on the bottom (Figure 26). Adjustment may be needed.

NOTE: In EFI engine there will be no choke cable.

22. Connect the negative and positive battery cable to the battery.
23. Fill oil to manufactures recommendations.
24. Turn fuel shut-off to ON position and look for leaks.

HYDRAULIC DRIVE SYSTEM

IHT Service

Service Interval: After the first 50 hours

Every 500 hours/Yearly (whichever comes first)—
Change the hydraulic filter and hydraulic fluid.

Note: Change the hydraulic fluid more frequently in severe conditions or in a hot operating climate.

1. Lower the cushion.
2. Remove the fuel tank, see “Removing the Fuel Tank,” page 3-10.
3. Remove the hydraulic-reservoir cap.
4. Locate the 2 drain plugs in the bottom of each transmission. Place a drain pan under the plugs.
5. Remove the drain plugs.
6. Allow the hydraulic fluid to fully drain from the machine.
7. Remove the hydraulic filter cap and filter from each transmission.
8. Install new hydraulic filters with the spring side facing out. Install the filter caps.
9. Install the drain plugs.
10. Loosen the vent plug in each transmission until loose.

Note: This allows air to escape the hydraulic system as you add hydraulic fluid (Figure 27).

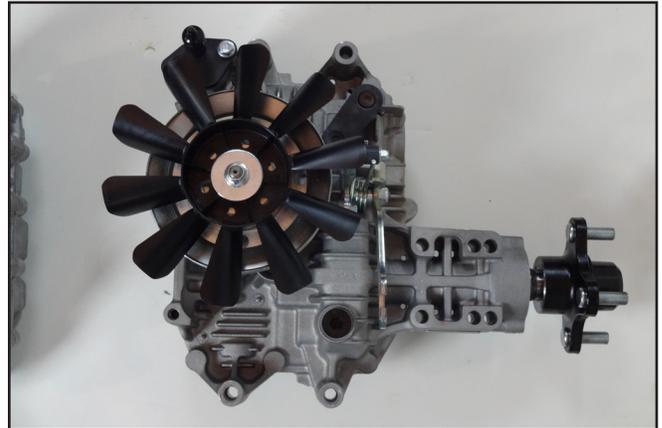


Figure 27

11. Slowly add fluid to the hydraulic tank until it starts to come out 1 of the vent plugs.
 12. Tighten the vent plugs.
 13. Add fluid until the cold fill line on the hydraulic reservoir is reached.
- NOTE: Do not overfill.**
14. Install the hydraulic-tank cap.
 15. Install the fuel tank.
 16. Start the engine and let it run for about 2 minutes to purge air from the system.
 17. Stop the engine and check for leaks.

HYDRAULIC DRIVE SYSTEM

Speed Setting Procedure

Tracking Procedure

*Goal is to match the Forward speed of 10 MPH and reverse speed of RH control.

Set Engine RPM to **3600 RPM**.

Adjust **RH** control rod to ensure forward ground speed of 10 MPH.

- Hub RPM = 175 RPM
- RH turn of control rod to reduce speed
- LH turn of control rod to increase speed

Move **RH** control to Forward position and record ground speed.

Move **RH** control to Reverse position and record ground speed.

Move **LH** control to Forward and Reverse positions, record speeds.

- Both Forward and Reverse speeds greater than RH, **Reduce Pivot Radius**.
- Both Forward and Reverse speed less than RH, **Increase Pivot Radius**.
- Forward speed of LH is greater than RH, **Shorten Control Rod, RH turns**.
- Forward speed of LH is less than RH, **Lengthen Control Rod, LH turns**.

NOTE: Each revolution of the control rod should equate to approximately ~.25 MPH. (4.35 RPM. Full extension or reduction of the pivot radius from nominal will adjust speed (Figure 28, 29 and 30) ~+/-1 MPH. 1 Wheel RPM = .0572 MPH. or 175 RPM = 10 MPH

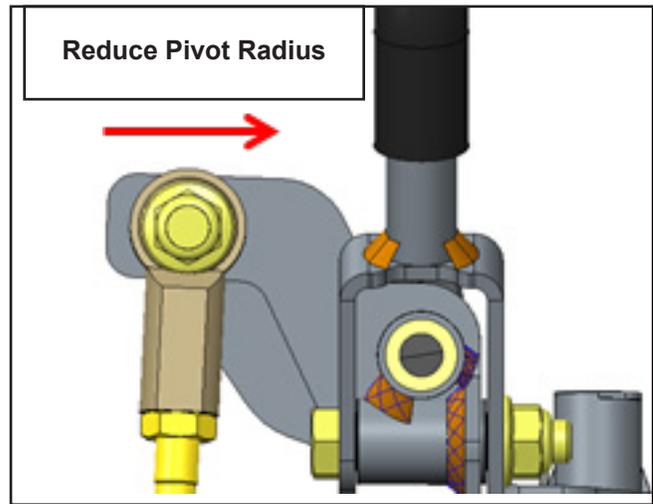


Figure 28

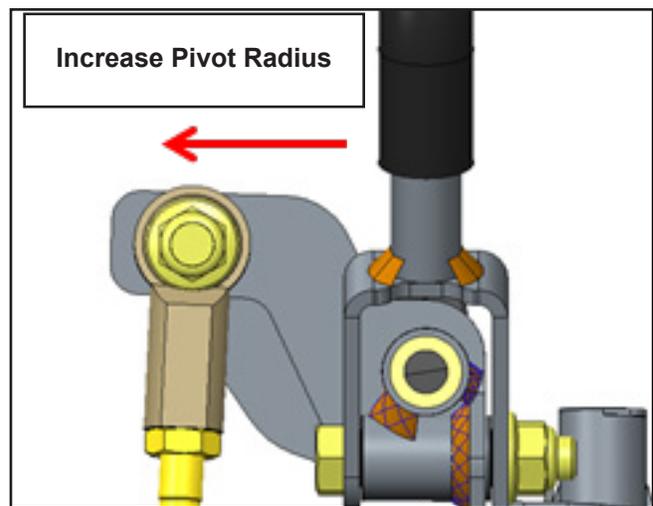


Figure 29

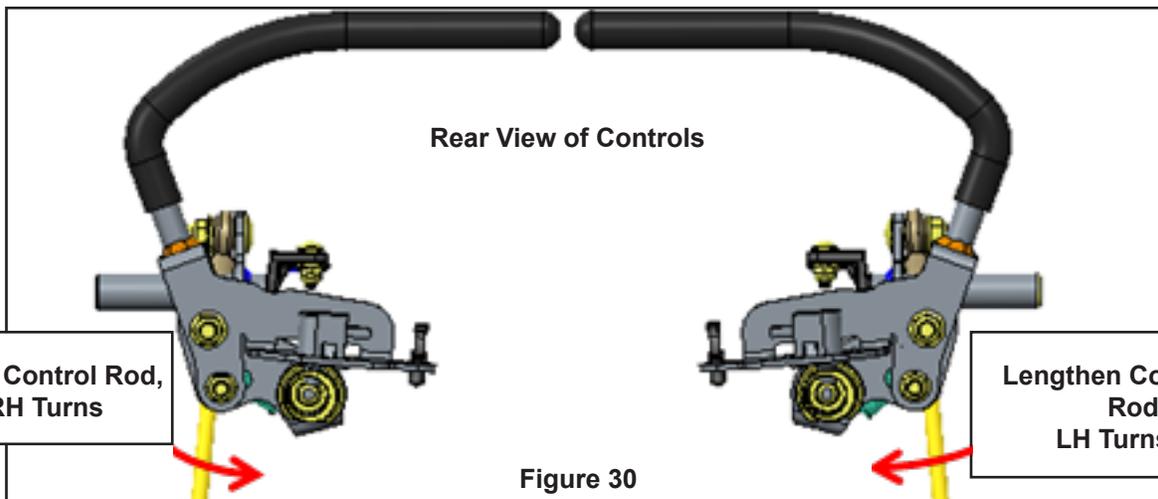


Figure 30

HYDRAULIC DRIVE SYSTEM

If the right hand transmission has been replaced, repeat tracking procedure of a new machine.

1. Set forward speed on right transmission to 175 RPM, record value. (LOCK CONTROL ROD WITH JAM NUT, NO FURTHER ADJUSTMENTS ARE MADE TO THIS SIDE)
2. Move right control to reverse, record value.
3. Move left hand control to forward, record value.
4. Move left hand control to reverse, record value.
5. Use tracking program and tool to determine how to adjust control rod and pivot radius. (LEFT HAND ONLY)
6. Adjust control rod and pivot radius according to program recommendations.
7. Move left hand control to forward, record value.
8. Move left hand control to reverse, record value.
9. Fine tune LEFT control rod such that wheel RPM is +/-2 RPM for reverse and +/-5 RPM forward.

If only the left hand transmission has replaced.

1. Move the right hand control to the forward position, record value.
2. Move the right hand control to reverse, record value.
3. Move left hand control to forward, record value.
4. Move left hand control to reverse, record value.
5. Use tracking program and tool to determine how to adjust control rod and pivot radius. (LEFT HAND ONLY).
6. Adjust control rod and pivot radius according to program recommendations.
7. Move left hand control to forward, record value.
8. Move left hand control to reverse, record value.
9. Fine tune LEFT control rod such that wheel RPM is +/-2 RPM for reverse and +/-5 RPM forward.

HYDRAULIC DRIVE SYSTEM

Bleeding the Hydraulic System

The traction system is self-bleeding, however, it may be necessary to bleed the system if fluid is changed or after work is performed on the system.

1. Disengage the PTO and set the parking brake.
2. Stop the engine and wait for all moving parts to stop before leaving the operating position.
3. Raise the rear of the machine onto jack stands high enough to raise the drive wheels off the ground.
4. Start the engine and move the throttle control to the idle position.

NOTE: If the drive wheel does not rotate, it is possible to assist the purging of the system by carefully rotating the tire in the forward direction.

5. Check the hydraulic fluid level as it drops. Add fluid as required to maintain the proper level.
6. Repeat this procedure for the opposite wheel.

HYDRAULIC DRIVE SYSTEM

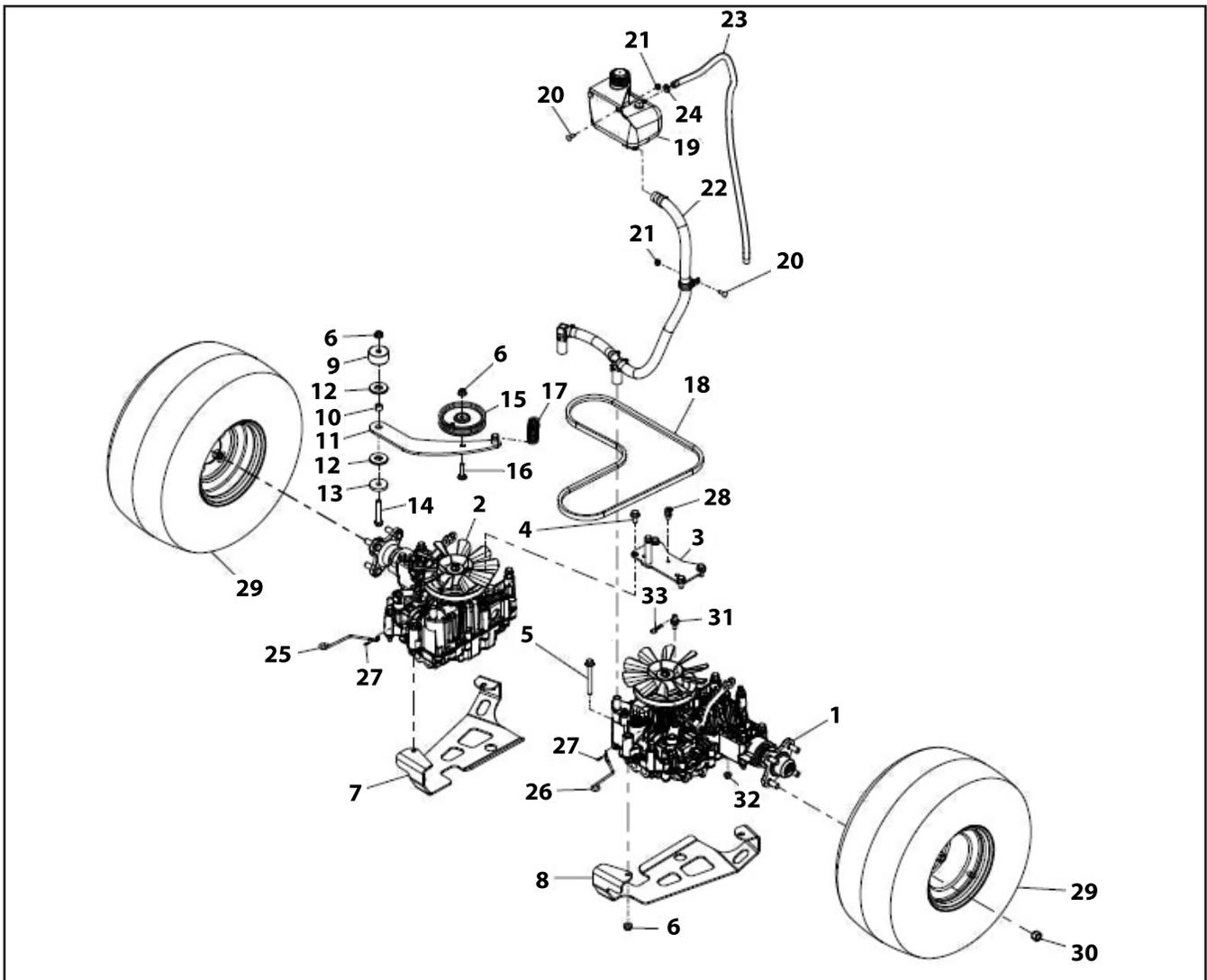


Figure 31

- | | |
|-------------------------------|--------------------------------|
| 1. LH Transaxle | 17. V Belt |
| 2. RH Transaxle | 18. Hydraulic Tank |
| 3. Transaxle Support | 19. Carr Screw |
| 4. HHF Screw | 20. NI Nut Flange |
| 5. NI Flanged Nut | 21. Hydraulic Hose Asm. |
| 6. RH Skid Plate | 22. Transmission Breather Hose |
| 7. LH Skid Plate | 23. Hose Clamp |
| 8. Spacer | 24. RH Bypass Rod |
| 9. Lever Bushing | 25. LH Bypass Rod |
| 10. Idler Arm Asm. | 26. Hair Pin |
| 11. Composite Friction Washer | 27. Tie Clip |
| 12. Plain Washer | 28. Wheel and Tire Asm. |
| 13. HHF Screw | 29. Lug Nut |
| 14. Idler Pulley | 30. Hex Spacer |
| 15. Carr Screw | 31. NI Flange Nut |
| 16. Extension Spring | 32. Cotter Pin |

HYDRAULIC DRIVE SYSTEM

IHT Removal (Figure 31)

1. Place platform in the down position.

NOTE: Remove if needed for ease of access.

2. Place cushion in the down position.

3. Remove the fuel-tank.

4. Place deck in the lowest position.

5. Remove cap to the hydraulic tank.

6. Remove the 2 drain plugs on each IHT.

NOTE: Drain plugs can be identified in the following picture. All other fasteners removed (Figure 32).

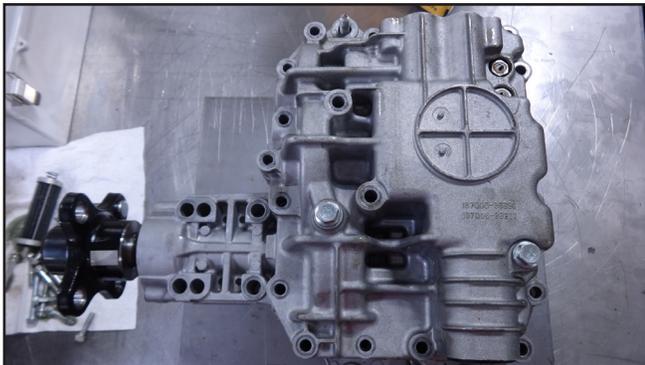


Figure 32

7. Drain fluid from both the IHT's.

8. Replace the drain plugs.

9. Remove the hydraulic hose assembly from the top of the IHTs.

10. Loosen the brake cables from the brake cable mount.

11. Remove the spring extension.

12. Remove the drive belt from the IHT's.

13. Raise the rear end of machine and place on jack stands.

14. Remove fuel tank support bracket from the frame.

15. Remove the wheels from the IHT's.

16. Remove the transaxel support plate.

17. Remove skid plates from the IHT's.

18. Remove the fans and pulley's from the IHT's.

19. Remove the control rods from the control arms on the IHT's.

NOTE: Position control rod sits in the IHT control arm (Figure 33).



Figure 33

20. Remove the brake calipers from the brake arm on the IHT's.

21. Remove the bypass rods from the IHT's.

22. Remove the remaining 6 bolts holding each of the IHT's to the frame.

23. Lower the IHT's through the bottom of the frame.

HYDRAULIC DRIVE SYSTEM

IHT Installation (Figure 31)

1. Mount the IHT to the frame using 6 bolts and nuts to secure each side. Torque to 48 +/- 7 ft. lbs.
2. Install the brake caliper to the brake arm on IHT.
3. Install the bypass rod to the IHT.
4. Install the transaxle support assembly to the IHT's. Torque to 32 +/- 3 ft. lbs.
5. Install skid plates to the frame and the IHT's. Torque to 30 +/- 3 ft. lbs.
6. Route the drive belt to the engine and the IHT's (Figure 34).

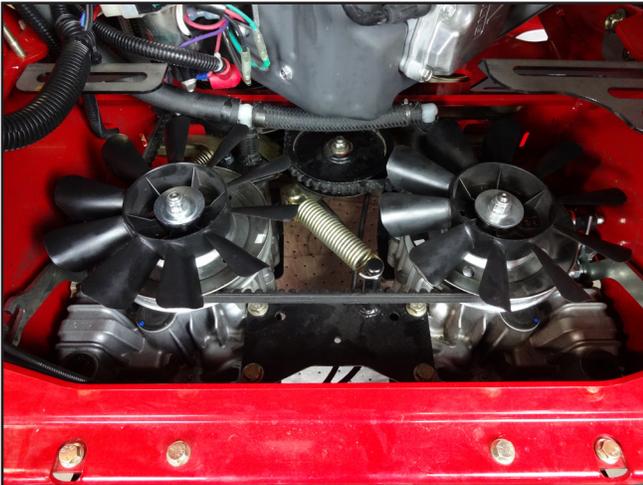


Figure 34

7. Route the hydraulic hose assembly to top of the IHT's.

NOTE: Lube the hose with vanishing oil to slide on the IHT mount. Secure hose to mount with worm clamp.

8. Attach spring to the idler arm pulley and transaxle support assembly.
9. Attach the fuel tank bracket to the frame.
10. Route the brake cables away from the pulleys and fans.
11. Attach the wheels to the IHT's.

NOTE: Rear tires should match in size. Torque to 80 +/- 10 ft. lbs.

12. Remove the jack stands.
13. Fill the IHT's with Toro Hypr Oil, refer to Owner's manual page "XXX."
14. Purge air from the IHT's.
15. Set speed for the IHT's as per service manual speed setting.
16. Check the IHT's and hoses for leaks.
17. Install the platform.
18. Install the fuel-tank.
19. Lift cushion to the UP position.

Deck Leveling

NOTE: It is suggested to level the deck side to side and front to back at the same time.

Leveling the mower deck from side to side.

1. Loosen the side nut and jam nut in the yokes.
2. Position the blades perpendicular to the machine. Measure the blade tips on a level surface.
3. Rotate the top bolt of the yokes to adjust the height of the mower deck.

NOTE: Rotate the bolts clockwise to raise the deck, rotate the bolt counterclockwise to lower it.

4. Tighten the jam nuts and side bolts.
5. Verify the deck is level side to side by measuring at the blade tips (Figure 35).

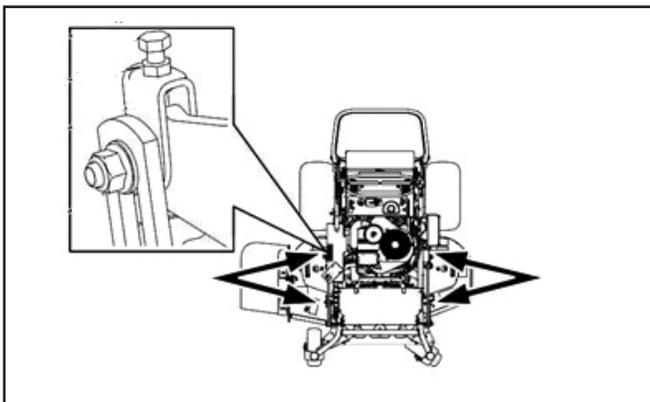


Figure 35

Leveling the mower deck front to back

1. Adjust the tire pressure in the rear tires to the correct specifications.

NOTE: Tire pressure should be 13 psi.

2. Position 1 blade front-to-rear. Measure the front and rear locations of the blade on a level surface. Measure each end of the blade tip.

NOTE: The mower blade should be 6 mm (1/4 in.) lower in the front, than in the rear of the blade tip.

3. Loosen the jam nut and side bolt in the yokes.
4. Rotate the top bolt of the yokes to adjust the height of the mower deck.

NOTE: Rotate the bolts clockwise to raise the deck, rotate the bolt counterclockwise to lower.

5. Tighten the jam nuts and side bolts.
6. Verify deck is level from front to rear by measuring at the blade tips (Figure 36).

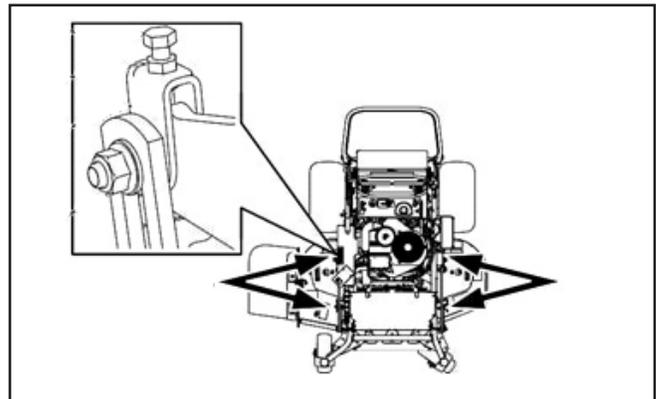


Figure 36

MOWER DECK

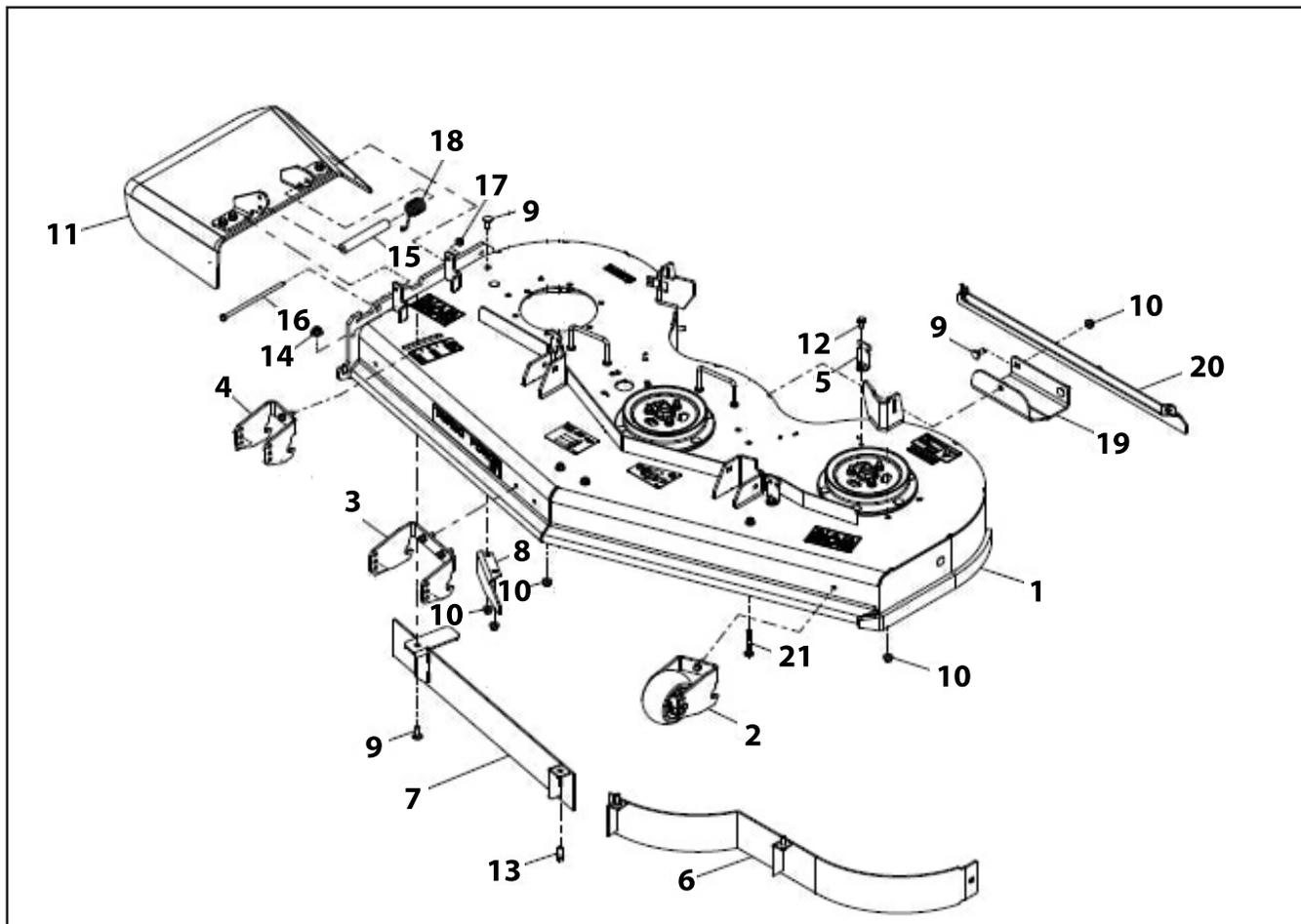


Figure 37

- | | |
|-------------------------|--------------------|
| 1. Deck Asm. | 12. HWHTF Screw |
| 2. LH Wheel Bracket | 13. HWH Screw |
| 3. Center Wheel Bracket | 14. NI Flange Nut |
| 4. RH Wheel Bracket | 15. Spacer |
| 5. Cover Bracket | 16. HH Screw |
| 6. Baffle Asm. | 17. NI Flange Nut |
| 7. Baffle Asm. | 18. Torsion Spring |
| 8. Discharge Baffle | 19. Skid |
| 9. Carr Bolt | 20. Bracket Skid |
| 10. NI Flange Nut | 21. Carr Screw |
| 11. Deflection Asm. | |

Deck Removal (Figure 37)

1. Place 2, 2x4 under the deck to prevent damage.
2. Lower the deck to lowest height of cut.

NOTE: Lowest height of cut 1.5 in.

3. Remove 2 bolts on the strut plate that secure to the deck.
4. Remove the 2 bolts that secure the left and right flat lift link to the deck
5. Remove the left and right bolts that hold the deck lift chains to the deck.
6. Loosen the 4 yoke jam nuts.

NOTE: This will aid in deck install and leveling.

Deck Installation (Figure 37)

1. Place jacks under the deck to lift the deck into position.
2. Insert bolts from outside the plate strut and attach to the deck. Ensure bushing is in place on both sides. Torque to 32 +/- 4 ft. lbs.
3. Install bolts from inside the flat link and deck.

NOTE: Wait till deck is completely on before tightening down. Torque to 50 +/- 5 ft. lbs.

4. Install bolts from inside to outside the lift chain and attach to deck. Wait to tighten bolts.
5. Level the deck, see "Deck Leveling," page 7-1.

MOWER DECK

Deck Disassembly

1. Lower deck to the lowest position.
2. Remove plastic belt covers from the deck.
3. Remove the deck belt from the PTO.
4. Remove the deck from the machine, see “Deck Removal,” page 7-1.
5. Remove belt from the deck.

NOTE: If able to safely lift the deck, support and rest deck on the rear edge. This will aid in disassembly.

6. Remove the anti-scalp wheels and mounting brackets.
7. Remove the discharge chute assembly.
8. Remove the blades from the spindles.
9. Remove the pulley and spindle assemblies from the deck shell.
10. Remove the torsion idler assembly from the deck shell.
11. Remove the wire-form covers from the deck shell.
12. Remove the bracket covers from the deck.
13. Remove all 3 baffles from underneath the deck.

NOTE: Lay the deck down for next step.

14. Remove the rear skid plate and bracket assembly from the deck shell.

Deck Assembly

NOTE: If possible, stand deck shell on back edge and brace. This will aid in assembly.

1. Assemble and install anti-scalp wheels and mounting brackets.
2. Install the discharge baffle.
3. Install the curved baffle assembly.
4. Install the straight baffle assembly.

NOTE: Install the straight baffle in the open “c” position.

5. Attach the rear skid plate to the skid bracket.
6. Attach the rear skid assembly to the deck.
7. Install 4 wire-form covers to the deck.
8. Install the pulleys to the spindles. Secure with nuts. Torque to 36 +/- 4 ft. lbs.
9. Install the bolt from the bottom of deck through; hole in deck, pulley spacer, idler pulley, and spacer. Secure with nut. Torque to 36 +/- 4 ft. lbs.
10. Install the spindle assemblies in the deck. Torque to 36 +/- 4 ft. lbs.
11. Install bolt through the end of torsion idler arm, pulley. Secure with nut. Torque to 36 +/- 4 ft. lbs.

NOTE: Grease torsion arm assembly before installation.

12. Install blades to the spindles. Ensure spacer is attached. Torque to 105 +/- 5 ft. lbs.
13. Install 3 bracket covers to the deck.
14. Install the deflector assembly to the deck.
15. Install all decals to the deck.
16. Route the belt through pulleys as shown on diagram (Figure 38).

Spindle Disassembly

1. Remove the lock nut from end of the spindle.
2. Remove the axel washer from the spindle.
3. Remove the spindle hub assembly from the end of the spindle shaft.
4. Remove the spindle shaft from the spindle housing.
5. Remove the lower spindle bearing.
6. Remove the spacer from the spindle housing.
7. Flip the spindle over and drive the upper bearing out of spindle housing.

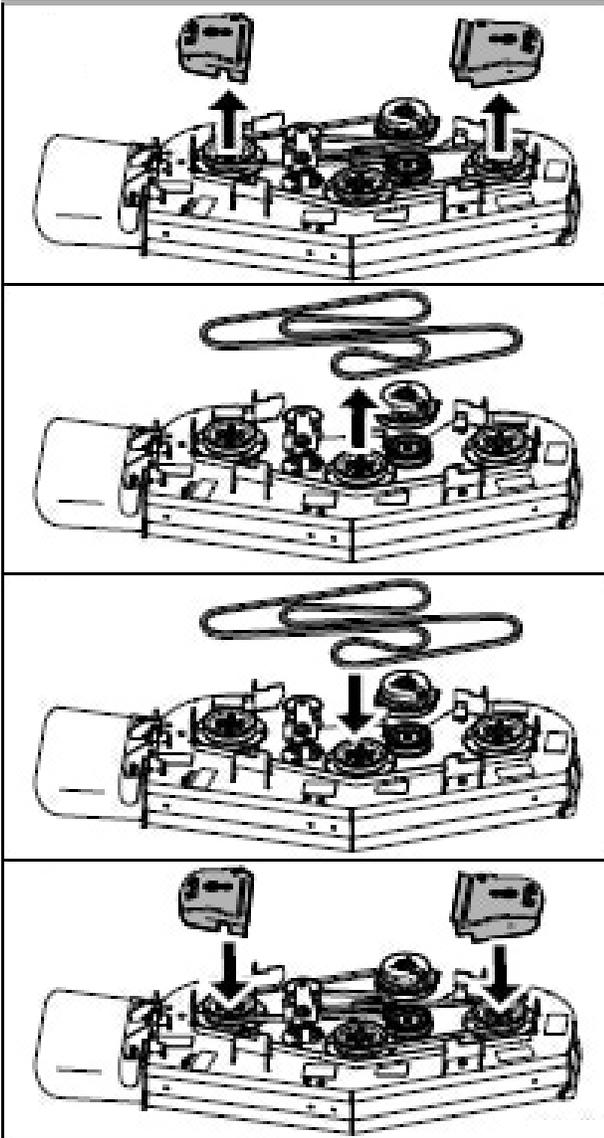


Figure 38

MOWER DECK

Spindle Assembly

1. Prior to assembly, inspect all parts for chips, burrs and any foreign material.
2. Use fixture to press the outer ring of the upper bearing against the bearing stop.
3. Place the spacer in the spindle housing.
4. Insert the bearing into the spindle housing.

NOTE: Push until the bearing touches the spacer.

5. Insert the spindle shaft into the spindle housing.
6. Place the spindle hub assembly over the spindle shaft.
7. Place washer over the spindle hub assembly.
8. Secure with lock nut.

NOTE: Torque nut to 120 +/- 5 ft. lbs.

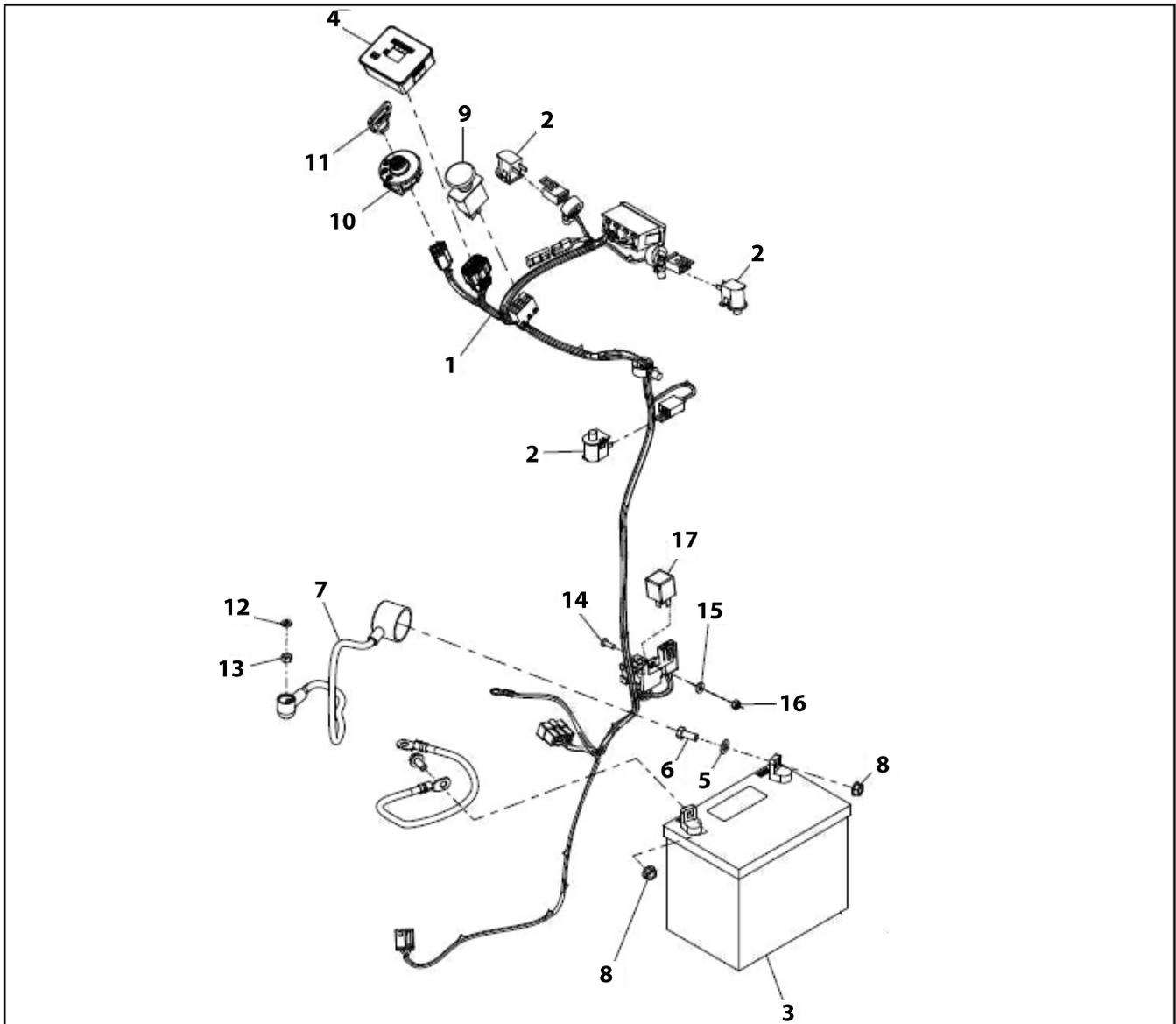


Figure 39

- | | |
|---------------------------|---------------------|
| 1. Wire Harness | 10. Ignition Switch |
| 2. Bail Switch | 11. Ignition Key |
| 3. Battery | 12. Lock Washer |
| 4. Hour-Meter Module | 13. Hex Nut |
| 5. Flat Washer | 14. PPH Screw |
| 6. HH Screw | 15. Flat Washer |
| 7. Positive Battery Cable | 16. NI Lock Nut |
| 8. HHF Nut | 17. Relay |
| 9. PTO Switch | |

ELECTRICAL

Wiring Harness Removal (Figure 39)

1. Lower the platform.
2. Lower the knee cushion.
3. Lower the deck to the lowest height of cut.
4. Disconnect the wire harness. Remove the fuse block.
5. Disconnect the wire harness left hand bail switch.
6. Disconnect the wire harness right hand bail switch.
7. Disconnect the wire harness from the ignition switch.
8. Disconnect the wire harness from the PTO switch.
9. Disconnect the wire harness from the hour-meter.
10. Disconnect the wire harness start relay connector from the relay and tower.

NOTE: On machines with Kawasaki engines, there will be a fuse holder attached to the start relay connector that needs to be removed .

11. Disconnect the ground from the engine.
12. Disconnect the wire harness from the engine wiring harness.
13. Disconnect the wire harness from the clutch.

Wiring Harness Installation (Figure 39)

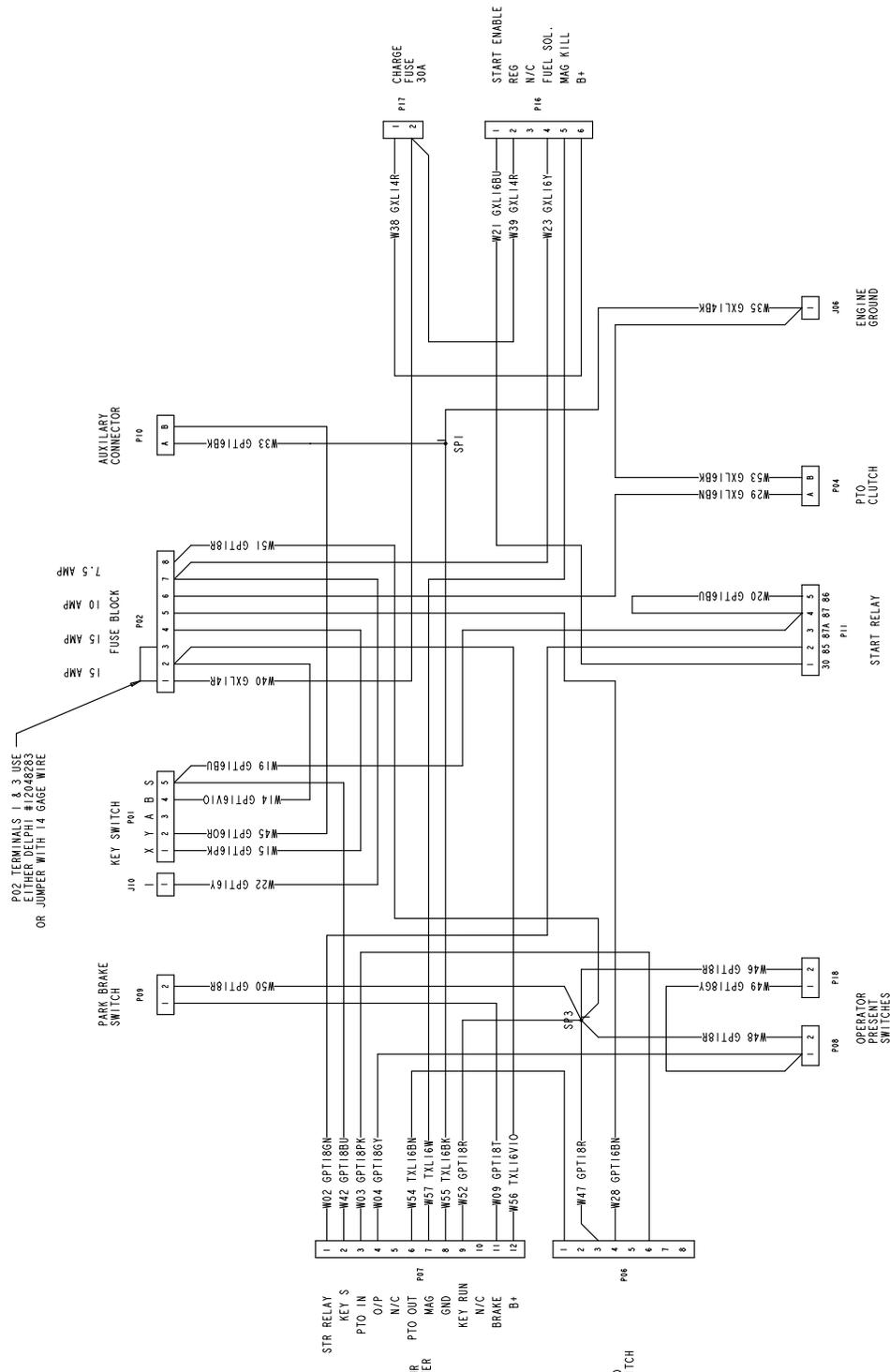
1. Install the wire harness to the fuse block into the tower.
2. Install the wire harness to the right bail switch.
3. Install the wire harness to the PTO switch.
4. Install the wire harness to the hour-meter.
5. Install the wire harness to the ignition switch.
6. Install the wire harness to the left hand bail.
7. Install the start relay block to the tower.

NOTE: If the machine has a Kawasaki engine then ensure you install the 25 amp fuse and holder at this step.

8. Install the wire harness ground to the engine.
9. Connect the wire harness to the engine wire harness.
10. Connect the wire harness to the clutch.

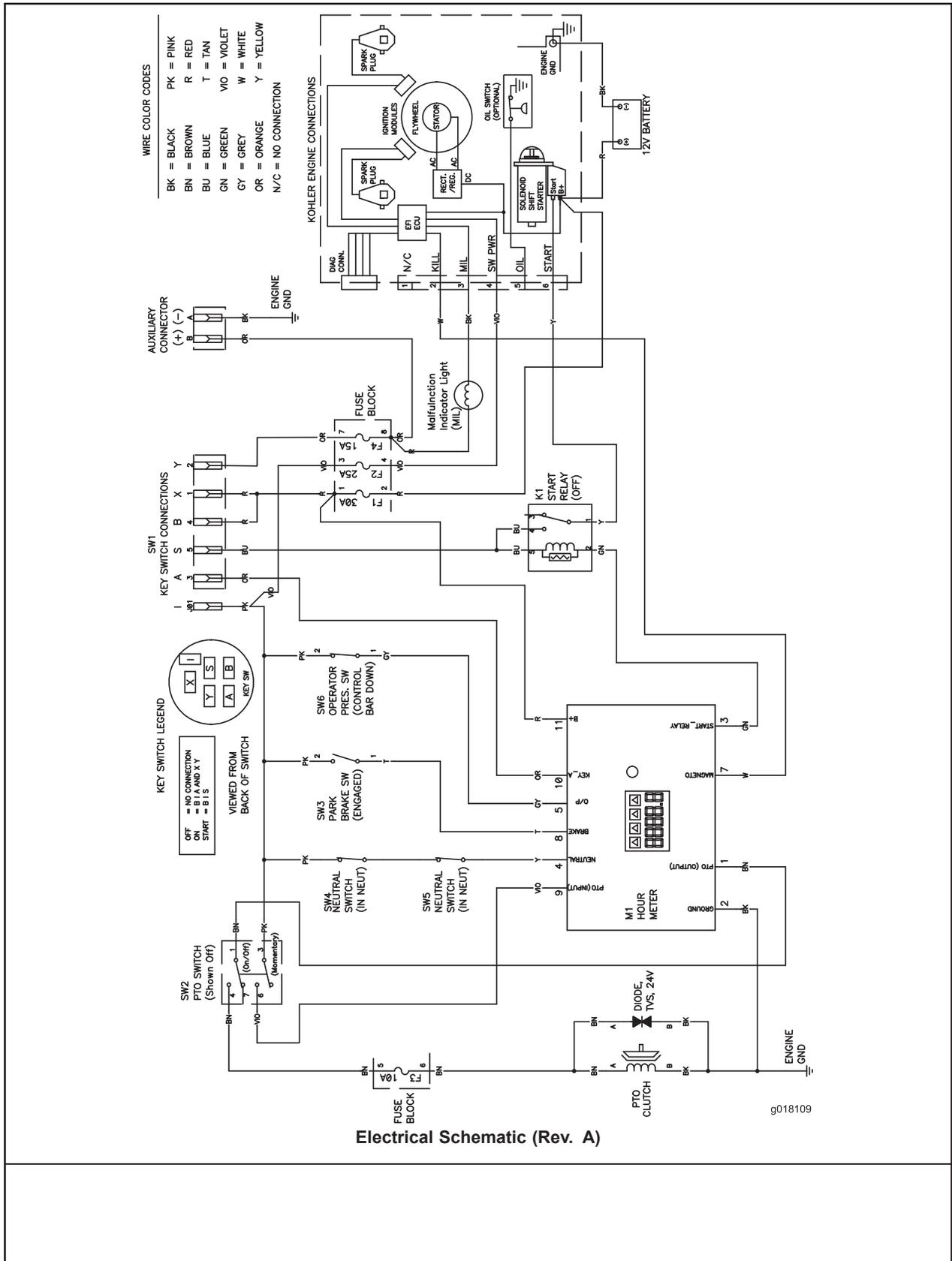
NOTE: Ensure the wire harness routing does not interfere with any moving parts.

Schematics



Electrical Schematic (Rev. A)

G031553



g018109



LCE Products