



LCE Products

Toro GrandStand Stand-on Mower Service Manual



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 additional information on the electrical system, please refer to the Toro Electrical Demystification Guide (492-4761) and subsequent. For service information on drive systems, please refer to the Hydro-Gear BDP service manual (492-4779). For information specific to the engines used on this unit, refer to the appropriate engine manufacturer's service and repair instructions.

Toro GrandStand model years 2009 - 2010 are covered in this manual. The manual may also be specified for use on later model products.

Both 2009 and 2010 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 service and repair. Cover or cap all hose ends and fittings whenever they are exposed. Even a small amount of dirt or other contamination can severely damage the system.

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

The Toro Company
Residential and Landscape Contractor Service Training Department
8111 Lyndale Avenue South
Bloomington, MN 55420

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

ABOUT THIS MANUAL

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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 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:

**The Toro Company
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8111 Lyndale Avenue South
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Think Safety First

Avoid unexpected starting of engine...

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

Avoid lacerations and amputations...

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

Avoid burns...

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

Avoid fires and explosions...

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

Avoid asphyxiation...

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

Avoid injury from batteries...

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

Avoid injury due to inferior parts...

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

Avoid injury to bystanders...

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

Avoid injury due to projectiles...

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

Avoid modifications...

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

Avoid unsafe operation...

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

SAFETY INFORMATION

1

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Torque Specifications

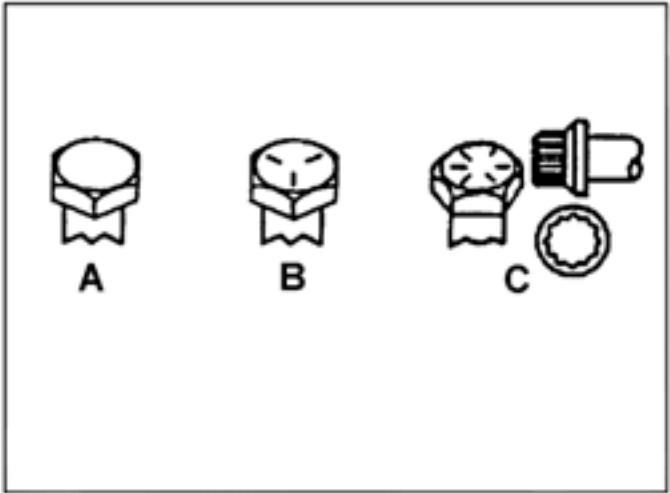
Recommended fastener torque values are listed in the following tables. For critical applications, as determined by Toro, either the recommended torque or a torque that is unique to the application is clearly identified and specified in the service manual.

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.

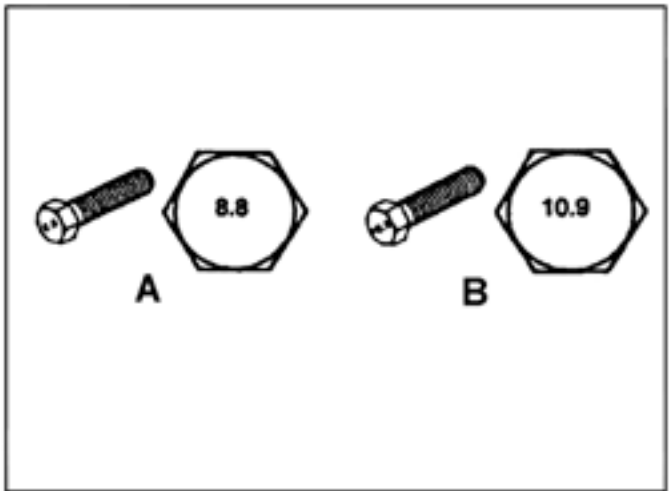
As noted in the following tables, torque values should be **reduced by 25% for lubricated fasteners** to achieve the similar stress as a dry fastener. Torque values may also have to be reduced when the fastener is threaded into aluminum or brass. The specific torque value should be determined based on 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



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



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

SPECIFICATIONS

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

2

Thread Size	Grade 1, 5, & 8 with Thin Height Nuts	SAE Grade 1 Bolts, Screws, Studs, & Sems with Regular Height Nuts (SAE J995 Grade 2 or Stronger Nuts)		SAE Grade 5 Bolts, Screws, Studs, & Sems with Regular Height Nuts (SAE J995 Grade 2 or Stronger Nuts)		SAE Grade 8 Bolts, Screws, Studs, & Sems with Regular Height Nuts (SAE J995 Grade 2 or Stronger Nuts)	
	In-lb	In-lb	N-cm	In-lb	N-cm	In-lb	N-cm
# 6 - 32 UNC	10 ± 2	13 ± 2	147 ± 23	15 ± 2	169 ± 23	23 ± 2	260 ± 34
# 6 - 40 UNF				17 ± 2	190 ± 20	25 ± 2	280 ± 20
# 8 - 32 UNC	13 ± 2	25 ± 5	282 ± 30	29 ± 3	330 ± 30	41 ± 4	460 ± 45
# 8 - 36 UNF				31 ± 3	350 ± 30	43 ± 4	31 ± 3
# 10 - 24 UNC	18 ± 2	30 ± 5	339 ± 56	42 ± 4	475 ± 45	60 ± 6	674 ± 70
#10 - 32 UNF				48 ± 4	540 ± 45	68 ± 6	765 ± 70
1/4 - 20 UNC	48 ± 7	53 ± 7	599 ± 79	100 ± 10	1125 ± 100	140 ± 15	1580 ± 170
1/4 - 28 UNF	53 ± 7	65 ± 10	734 ± 113	115 ± 10	1300 ± 100	160 ± 15	1800 ± 170
5/16 - 18 UNC	115 ± 15	105 ± 15	1186 ± 169	200 ± 25	2250 ± 280	300 ± 30	3390 ± 340
5/16 - 24 UNF	138 ± 17	128 ± 17	1446 ± 192	225 ± 25	2540 ± 280	325 ± 30	3670 ± 340
	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 & Steel Fasteners (Metric Fasteners)

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

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

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

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

SPECIFICATIONS

Other Torque Specifications

SAE Grade 8 Steel Set Screws

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

Wheel Bolts and Lug Nuts

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

** For steel wheels and non-lubricated fasteners.

Thread Cutting Screws (Zinc Plated Steel)

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

Thread Cutting Screws (Zinc Plated Steel)

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

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

Conversion Factors

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

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

SPECIFICATIONS

Equivalents & Conversions

Decimal & Millimeter Equivalents

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

SPECIFICATIONS

U.S. to Metric Conversions

2

	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

SPECIFICATIONS

Domestic GrandStand Specifications

Engines:

	Output (Max. @ 3600 RPM's)					
	18 hp (13.4kW)	19 hp (14.2kW)	20 hp (14.9kW)	23 hp (17.2kW)	24 hp (17.9kW)	26 hp (19.4kW)
Make	Kawasaki	Kawasaki	Kawasaki	Kawasaki	Kawasaki	Kawasaki
Model	FS541V	FH580V	FS600V	FH680V	FS691V	FS730V
Hi-Idle	3600 ± 100 RPM	3600 ± 100 RPM	3600 ± 100 RPM	3600 ± 100 RPM	3600 ± 100 RPM	3600 ± 100 RPM
Starter	Electric	Electric	Electric	Electric	Electric	Electric
Spark Plug	NGK BPR4ES	Champion RCJ8Y	NGK BPR4ES	NGK BPR4ES	NGK BPR4ES	NGK BPR4ES
Oil	SAE 10w-30/ SAE10w-40	SAE 10w-30/ SAE10w-40	SAE 10w-30/ SAE10w-40	SAE 10w-30/ SAE10w-40	SAE 10w-30/ SAE10w-40	SAE 10w-30/ SAE10w-40
Oil Capacity	2.1 Qt. (2.0 L)	3.8 Pint (1.8L)	2.1 Qt. (2.0 L)	2.0 Qt. (1.9 L)	2.2 Qt. (2.2 L)	2.2 Qt. (2.2 L)
CARB	79534 / 79536	79558 / 79559	No	Yes	79548 / 79549	79551

Fuel System:

7 or 12 Gallons (26.5 or 45.4L) fuel tank capacity

Traction Drives:

Traction Control:	Toro "Split-Handle" Control Levers
Hydraulic Pump:	Two Hydro-Gear Model PG 10cc (Same Part # / No Left & Right)
Hydraulic Wheel Motor:	Two Parker TEO-195
Hydraulic Oil Filter:	25 Micron Automotive Spin-On Type
Hydraulic Fluid:	Toro Hypr-Oil or Equivalent Synthetic 15w50
Hydraulic Fluid Capacity:	2.1 quarts (1.9 liters)
Parking Brake:	Standard Equipment
Ground Speed: (Hydro-MPH)	Variable, 3 (5 kph) to 8 (13 kph) MPH Fwd / 0 to 3 (5 kph) MPH Rev
Hourmeter with Service Indicator:	Standard Equipment

Wheels & Tires:

Front Castors Tires:	11"x4" - 5", 4 ply, Smooth Tread, Semi Pneumatic
Front Castors Fork:	Heavy-Duty Design with 1" (25.4mm) Diameter Pivot Shaft
Rear Traction Tires:	20"x10"-8", 4 ply with Turf Traction Tread

Mower Drive:

SPECIFICATIONS

Domestic GrandStand Specifications cont.

Mower Engagement:	Engine Mounted Electric Clutch
Clutch Adjustment:	Periodic Air Gap Adjustment Required - .018" + .003" (0.45 + 0.0762 mm)
PTO Drive Belt:	HB Section w/Aramid (Kevlar) Cords and Dry Clutching Envelope
PTO Idler:	Spring Loaded Pivot Hub w/Friction Washer Dampening
Deck Drive Belt:	HA Section with Aramid (Kevlar) Cords and Standard (Non-Clutching) Envelope
Deck Drive Idler:	Spring Loaded Pivot Hub w/Friction Washer Dampening

Mower Decks:

HOC Range:	1" to 5" in 1/4" increments (25.4mm to 127mm in 6.3mm increments)
Blades:	Three .250" (6.3mm) Thick Heat Treated Steel Blades
Spindles:	Machined Steel 1.00" (25mm) Diameter Shaft
Spindle Housing:	Ductile Cast Iron, 9-3/8" (24cm) Diameter Mounted with Six Bolts
Bearings:	Greasable Ball Bearings with Grease Fitting for Lubrication
Construction:	7 gauge (.179" / 4.5mm) Steel Welded Construction
Blade Tip Speed: (Domestic)	48" - 18,750 ft/m calculated @ 3600 engine RPM 52" - 18,750 ft/m calculated @ 3600 engine RPM 60" - 18,750 ft/m calculated @ 3600 engine RPM
Skid Plate:	Standard
Adjustable Discharge Baffle:	Standard
Rubber Discharge Chute:	Standard

Unit Dimensions:

Deck Width	Height	Width Deflector Down	Width Deflector Raised	Length Platform Down	Length Platform Up	Weight*
48" (122cm)	48" (122cm)	63.5" (161cm)	49.5" (126cm)	74" (188cm)	53" (135cm)	887 lbs (400kg)
52" (132cm)	48" (122cm)	67.5" (171cm)	53.5" (135cm)	74" (188cm)	53" (135cm)	900 lbs (408kg)
60" (152cm)	48" (122cm)	75.5" (191cm)	61.5" (156cm)	74" (188cm)	53" (135cm)	925 lbs (419kg)

* Estimated operating weight

SPECIFICATIONS

International GrandStand Specifications

Engines:

	Output (Max. @ 3000 RPM's)		
	19 hp (14.2 kW)	20 hp (17.2 kW)	23 hp (17.2 kW)
Make	Kawasaki	Kawasaki	Kawasaki
Model	FH580V	FS600V	FH680V
Hi-Idle	2900 ± 100 RPM	2900 ± 100 RPM	2900 ± 100 RPM
Starter	Electric	Electric	Electric
Spark Plug	Champion RCJ8Y	NGK BPR4ES	NGK BPR4ES
Oil	SAE 10w-30 / SAE10w-40	SAE 10w-30 / SAE10w-40	SAE 10w-30 / SAE10w-40
Oil Capacity	1.8 L (3.8 pint)	1.9 L (4.0 pint)	1.9 L (4.0 pint)

Fuel System:

26.5 L (7 gal.) Fuel Tank Capacity

Traction Drives:

Traction Control:	Toro Twin Lever Control Levers
Hydraulic Pump:	Two Hydro-Gear Model PG 10cc (Same Part # / No Left & Right)
Hydraulic Wheel Motor:	Two Parker TEO-195
Hydraulic Oil Filter:	25 Micron Automotive Spin-On Type
Hydraulic Fluid:	Toro Hypr-Oil or Equivalent Synthetic 15w50
Hydraulic Fluid Capacity:	1.9 L (2.1 quarts)
Parking Brake:	Standard Equipment
Ground Speed:	Variable, 3 (5 kph) to 8 (13 kph) MPH Fwd / 0 to 3 (5 kph) MPH Rev
Hourmeter with Service Indicator	Standard Equipment

Wheels and Tires:

Front Castors Tires:	11"x4" - 5", 4 ply, Smooth Tread, Semi Pneumatic
Front Castors Fork:	Heavy-Duty Design with 25.4mm (1") Diameter Pivot Shaft
Rear Traction Tires:	20"x10"-8", 4 ply with Turf Traction Tread

SPECIFICATIONS

International GrandStand Specifications cont.

Mower Drive:

Mower Engagement:	Engine Mounted Electric Clutch
Clutch Adjustment:	Periodic Air Gap Adjustment Required - 0.45 ± 0.0762 mm (.018" \pm .003")
PTO Drive Belt:	HB Section W/ Aramid (Kevlar) Cords and Dry Clutching Envelope
PTO Idler:	Spring Loaded Pivot Hub w/Friction Washer Dampening
Deck Drive Belt:	HA Section with Aramid (Kevlar) Cords and Standard (Non-Clutching) Envelope
Deck Drive Idler:	Spring Loaded Pivot Hub w/Friction Washer Dampening

Mower Decks:

HOC Range:	25.4mm (1") to 127mm (5") in 6.3mm (1/4") increments
Blades:	Three 6.3mm (.250") Thick Heat Treated Steel Blades
Spindles:	Machined Steel 25.4mm (1") Diameter Shaft
Spindle Housing:	Ductile Cast Iron, Mounted with Six Bolts
Bearings:	Greasable Ball Bearings with Grease Fitting for Lubrication
Construction:	7 gauge (.179" / 4.5mm) Steel Welded Construction
Blade Tip Speed:	122cm (48") - 18,750 ft/m calculated @ 3600 engine RPM 132cm (52") - 18,750 ft/m calculated @ 3600 engine RPM
Skid Plate:	Standard
Adjustable Discharge Baffle:	Standard
Rubber Discharge Chute:	Standard

Unit Dimensions:

Deck Width	Height	Width Deflector Down	Width Deflector Raised	Length Platform Up	Length Platform Down	Weight*
122cm (48")	122cm (48")	161cm (63.5")	126cm (49.5")	135cm (53")	188cm (74")	400 kg (881 lbs)
132cm (52")	122cm (48")	171cm (67.5")	135cm (53")	135cm (53")	188cm (74")	408 kg (900 lbs)

*Estimated operating weight

Parking Brake Assembly Replacement

Parking Brake Assembly Removal

1. Move the parking brake lever to the "OFF" position (Fig. 0001).



Fig. 0001

IMG-1302a

2. Remove the hairpin cotter and clevis pin securing the linkage yoke at the lower end of the brake rod to the brake assembly (Fig. 0002).

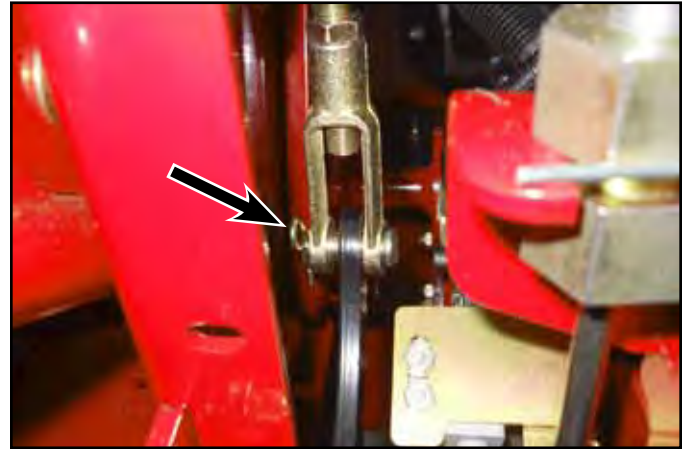


Fig. 0002

DSCN-0264a

3. Move the parking brake lever to the "ON" position (Fig. 0003).



Fig. 0003

IMG-1310a

3

CHASSIS

4. Remove the hairpin cotter from the top end of the parking brake rod. Slide the top end of the rod out of the handle (Fig. 0004).

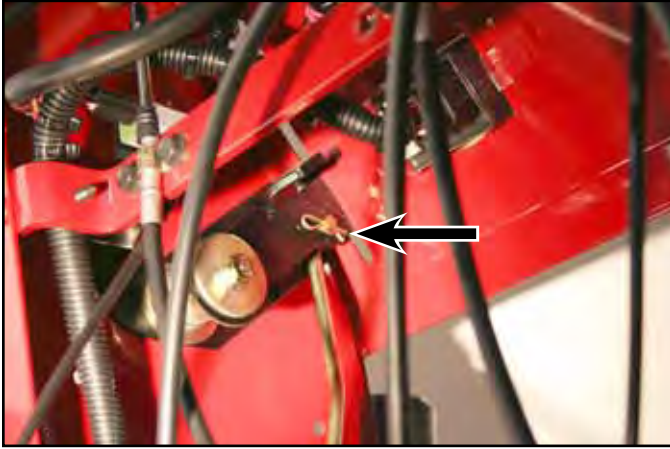


Fig. 0004

IMG-9347a

5. Remove the hairpin cotter and clevis pin securing the top and bottom brake arms to the brake lever (Fig. 0006).



Fig. 0006

DSCN-0268a

Note: 2010 models use a nut to secure the upper end of the parking brake rod (Fig. 0005).



Fig. 0005

DSCN-0261a

6. Disconnect the wire harness from the brake switch (Fig. 0007).



Fig. 0007

DSCN-0265a

7. Remove the carriage bolt and nut securing the brake lever and brake switch plate to the control tower, then remove the brake lever and brake switch plate (Fig. 0008).



Fig. 0008

DSCN-0255a

9. Remove the shoulder bolt, thick washer and nut securing the LH side of the brake assembly to the chassis, then remove the brake assembly (Fig. 0010).

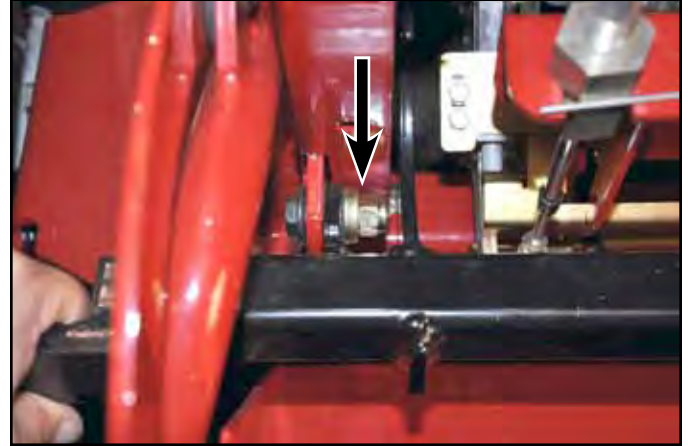


Fig. 0010

IMG-1325a

8. Remove the bolt and nut securing the RH side of the brake assembly and torsion spring assembly to the chassis (Fig. 0009).

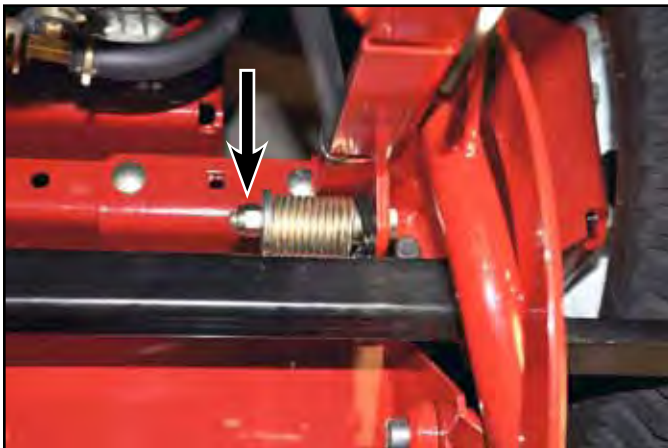


Fig. 0009

IMG-1324a

CHASSIS

Parking Brake Assembly Installation

1. Secure the LH side of the brake assembly to the chassis using the shoulder bolt, thick washer and nut (Fig. 0011).

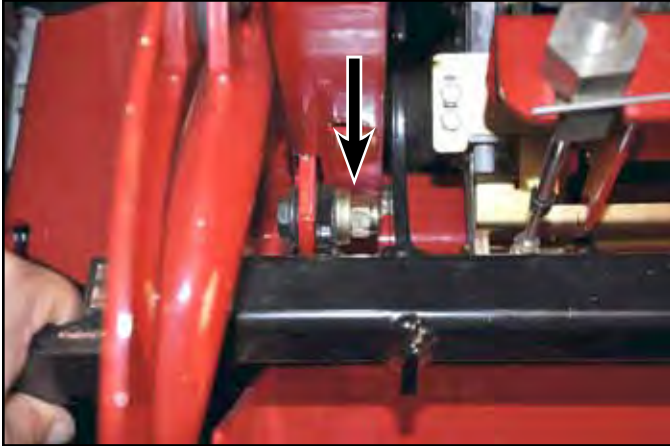


Fig. 0011

IMG-1325a

2. Place the small spacer onto the bolt that secures the RH side of the brake assembly (Fig. 0012).

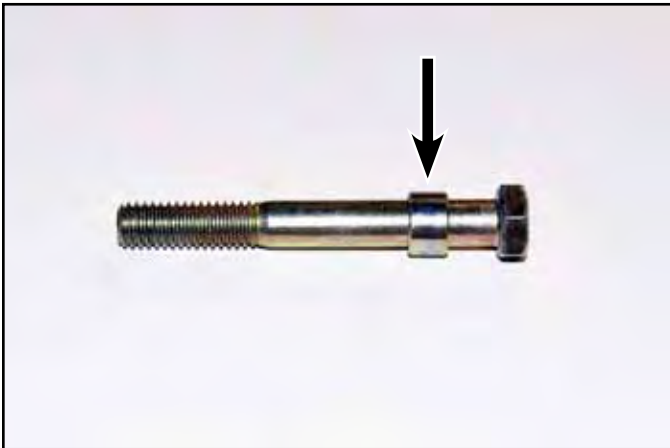


Fig. 0012

IMG-1329a

3. Position the bolt and spacer through the chassis mount and brake assembly. The spacer must be nested in the chassis mount (Fig. 0013).

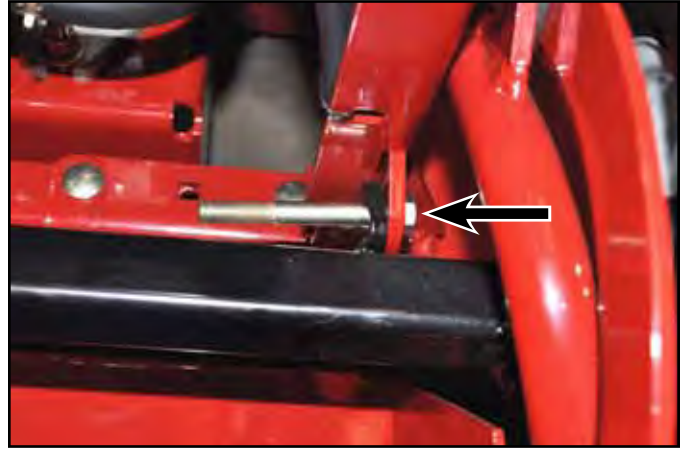


Fig. 0013

IMG-1332a

4. Position the large spacer onto the bolt (Fig. 0014).



Fig. 0014

IMG-1334a

5. Position the torsion spring over the spacer and bolt. The straight end of the spring is secured by the chassis, the curved end hooks under the brake assembly (Fig. 0015).

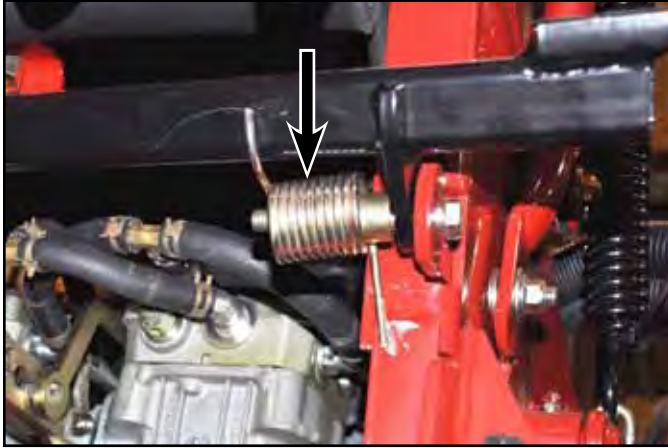


Fig. 0015

IMG-1336a

6. Secure the RH assembly using the washer and nut (Fig. 0016).

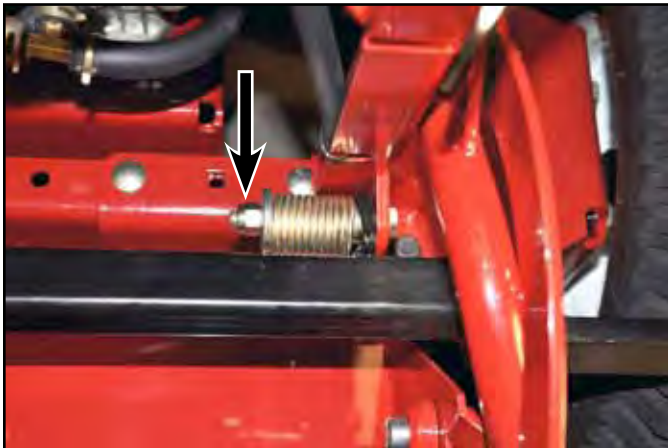


Fig. 0016

IMG-1324a

7. Position the carriage bolt through the RH side of the control tower (Fig. 0017).



Fig. 0017

IMG-1338a

3

8. Position the switch plate onto the carriage bolt (Fig. 0018).

Note: The switch plate has a square hole that must be nested onto the square shank of the carriage bolt.



Fig. 0018

IMG-1344a

CHASSIS

9. Position one of the large washers onto the carriage bolt (Fig. 0019).

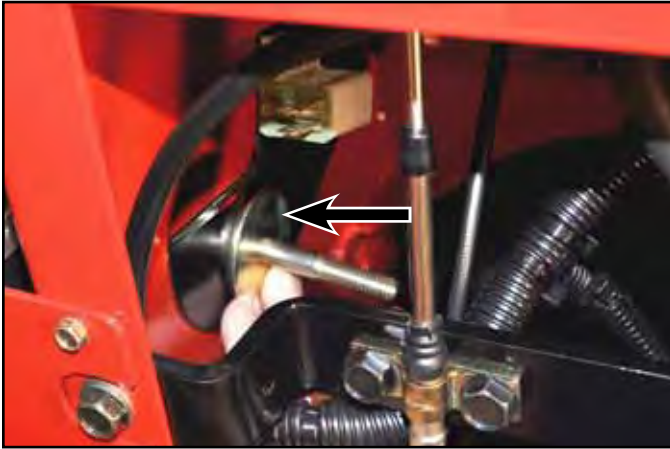


Fig. 0019 IMG-1348a

11. Position the brake lever through the control panel and onto the shouldered spacer (Fig. 0021).



Fig. 0021 IMG-1355a

10. Position the shouldered spacer onto the carriage bolt (Fig. 0020).



Fig. 0020 IMG-1351a

12. Secure the brake lever assembly with the large washer and nut (Fig. 0022).

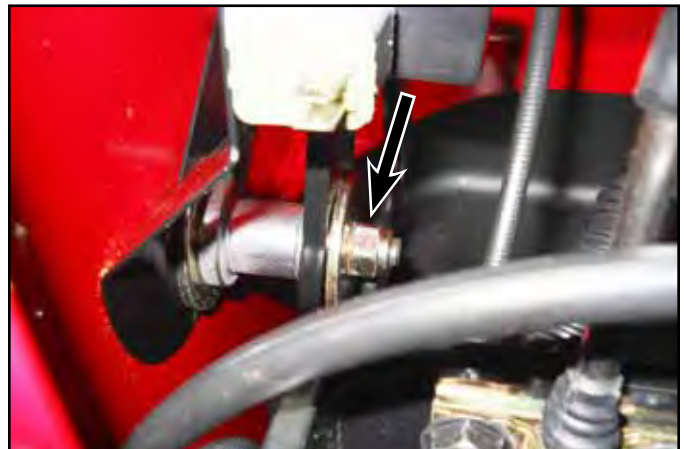


Fig. 0022 DSCN-0255a

13. Position the clevis pin through the bottom brake arm (Fig. 0023).



Fig. 0023

IMG-1365a

15. Position the top brake arm onto the clevis pin (Fig. 0025).

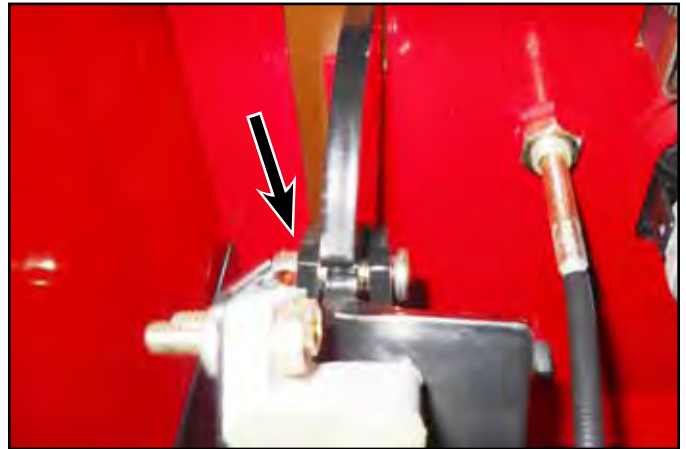


Fig. 0025

DSCN-0259a

14. Insert the clevis pin through the brake lever (Fig. 0024).

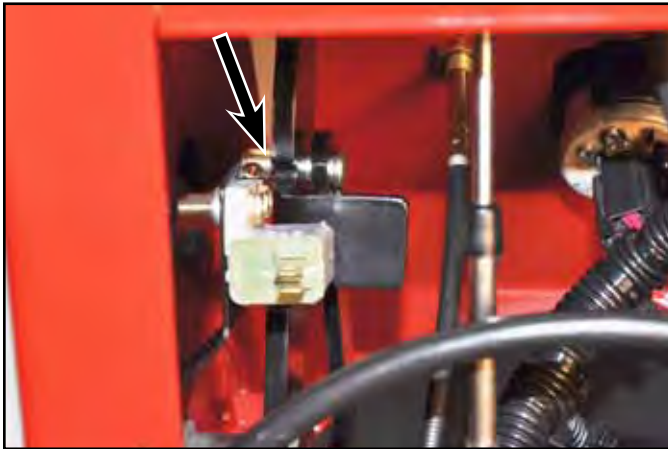


Fig. 0024

IMG-1367a

16. Install the hairpin cotter to the clevis pin (Fig. 0026).



Fig. 0026

DSCN-0268a

CHASSIS

17. Plug the wire harness into the brake switch (Fig. 0027).



Fig. 0027

DSCN-0265a

18. Feed the brake rod up through the fuel tank base and secure the upper end to the brake arm using a hairpin cotter (Fig. 0028).

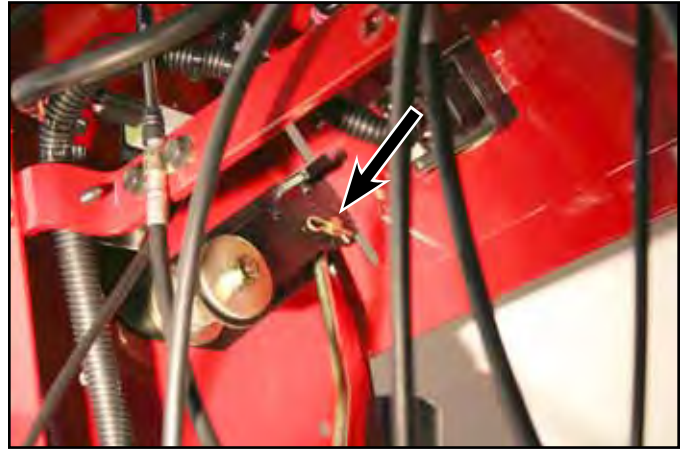


Fig. 0028

IMG-9347a

Note: 2010 models use a nut to secure the upper end of the parking brake rod (Fig. 0029).



Fig. 0029

DSCN-0261a

19. Secure the yoke on the lower end of the brake rod to the brake assembly using a clevis pin and hairpin cotter (Fig. 0030).

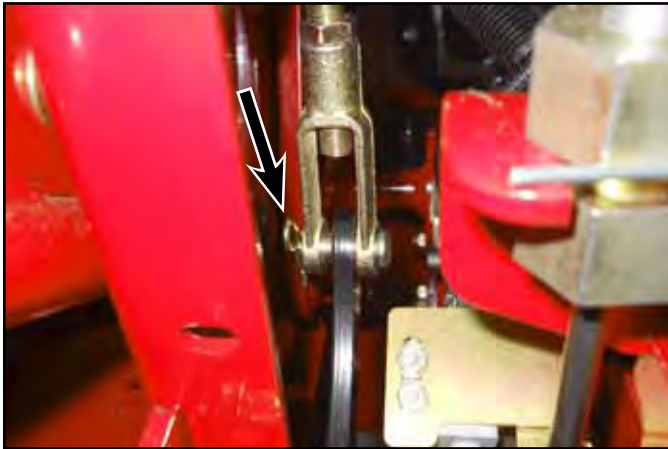


Fig. 0030

DSCN-0264a

21. If adjustment is needed, remove the clevis pin securing the yoke to the brake arm. Rotate the yoke to obtain the desired gap (Fig. 0032).



Fig. 0032

DSCN-0264a

20. The brake assembly should contact the tires when there is approximately 3/4" (1.9cm) gap between the front edge of the control panel slot and the front edge of the brake lever (Fig. 0031).

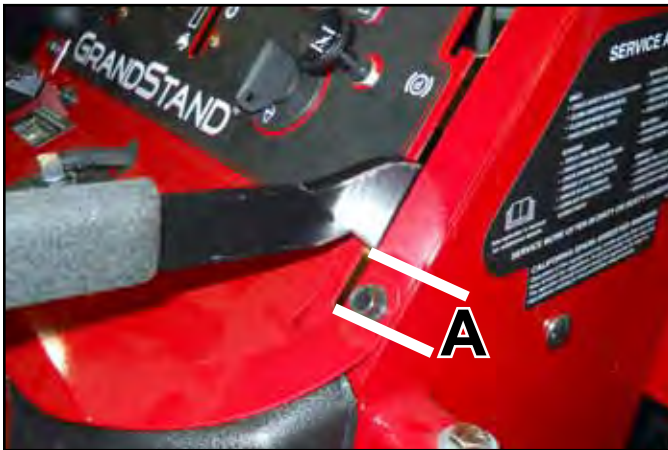


Fig. 0031

DSCN-0263a

A. 3/4" (1.9cm)

CHASSIS

Height of Cut (HOC) Handle Assembly Replacement

HOC Handle Assembly Removal

1. Lower the deck onto two boards to support the weight of the deck assembly (Fig. 0033).



Fig. 0033

IMG-1373a

2. **2009 only:** Remove the nut at the base of the lift bar (Fig. 0034).

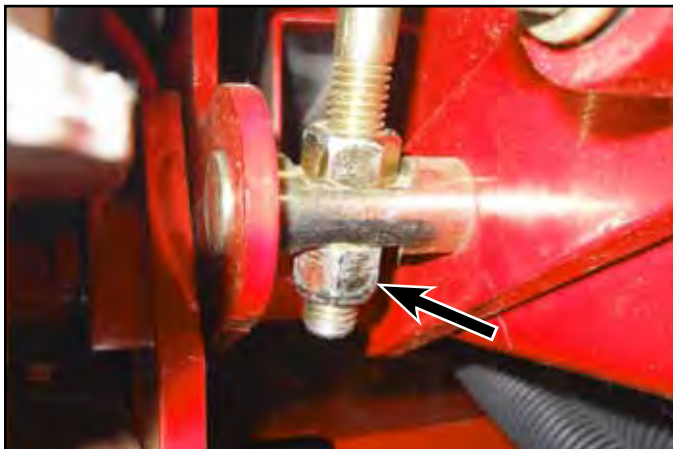


Fig. 0034

DSCN-0274a

3. **2010 only:** Remove the dampener assembly from the base of the lift bar (Fig. 0035).



Fig. 0035

DSCN-0272a

4. Remove the shoulder bolt, washer and spring securing the height of cut (HOC) lever to the HOC handle assembly (Fig. 0036).

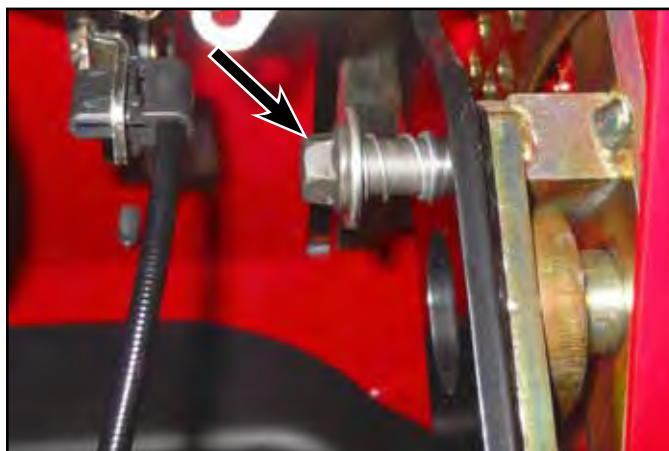


Fig. 0036

DSCN-0280a

5. Remove the HOC lever through the slot in the control panel (Fig. 0037).



Fig. 0037

DSCN-0283a

7. Remove the two sets of bolts, nuts and spacers securing the HOC bracket to the side of the control tower (Fig. 0039).

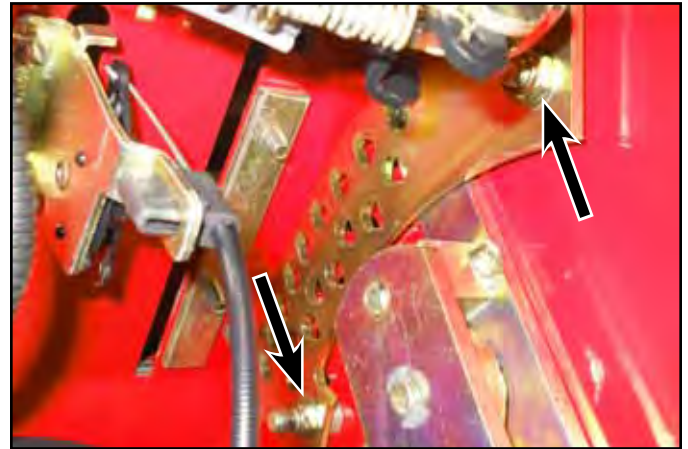


Fig. 0039

DSCN-0284a

6. Remove the "E" clip that secures the pivot hub in the HOC handle assembly (Fig. 0038).

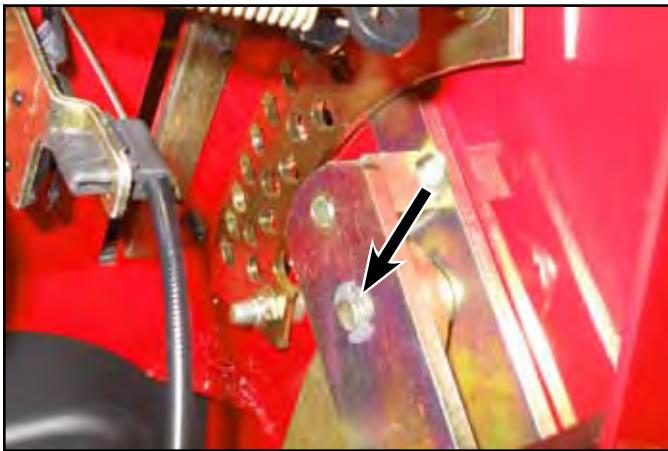


Fig. 0038

DSCN-0285a

8. Remove the carriage bolt and nut securing the HOC handle assembly to the control tower (Fig. 0040).



Fig. 0040

DSCN-0288a

CHASSIS

9. Move the HOC handle assembly from its frame mount; then remove the lift bar pivot hub (Fig. 0041).



Fig. 0041 DSCN-0292a

HOC Handle Assembly Installation

1. Install the plastic bushing into the upper end of the lift bar (Fig. 0043).



Fig. 0043 DSCN-0297a

10. Remove the lift bar by lowering it down through the fuel tank base.
11. Remove the HOC handle assembly from the control tower.
12. Remove the plastic bushing from the upper end of the lift bar (Fig. 0042).



Fig. 0042 DSCN-0297a

2. Position the lift bar up through the slot in the fuel tank base, to the approximate mounting location Fig. 0044).



Fig. 0044

DSCN-0307a

3. Install the lift arm pivot hub into the HOC handle assembly (Fig. 0046).

Note: Do not install the “E” clip. It will be installed in a later step.



Fig. 0046

DSCN-0303a

Note: 2010 only: The tube welded to the base of the lift bar must face to the right (Fig. 0045).

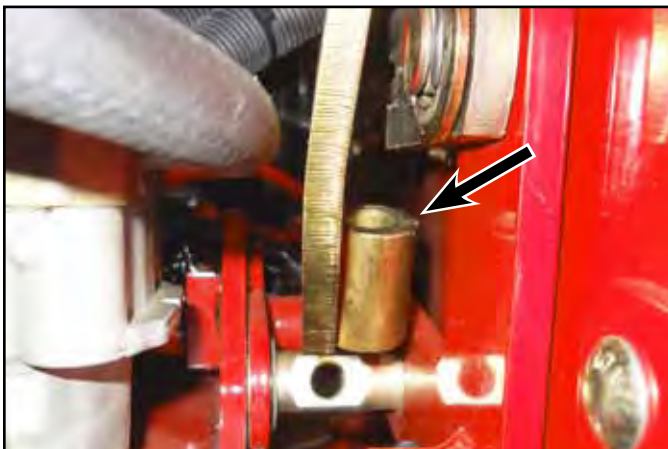


Fig. 0045

DSCN-0304a

4. Position the HOC handle assembly in the control tower, just above its mounting bracket. Install the lift bar onto the pivot hub (Fig. 0047).

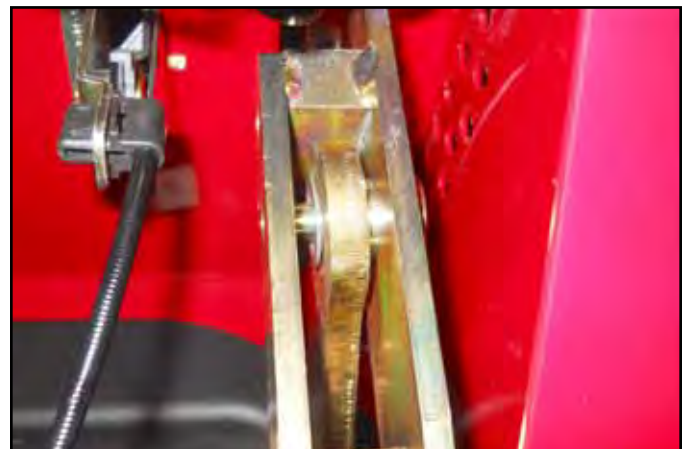


Fig. 0047

DSCN-0291a

CHASSIS

5. Secure the pivot hub with the "E" clip (Fig. 0048).

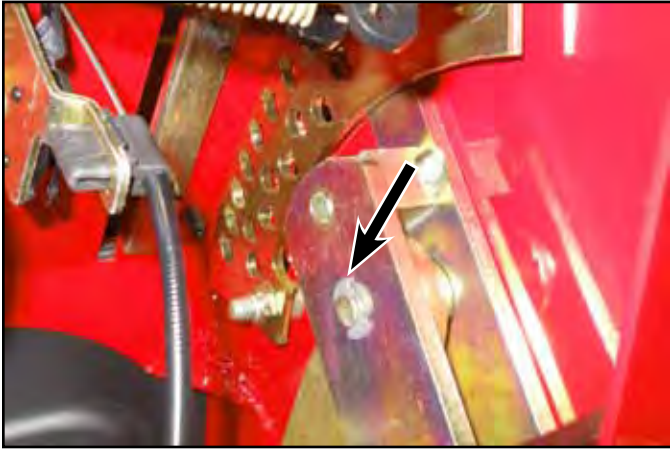


Fig. 0048

DSCN-0285a

7. Place the two HOC bracket bolts through the side of the control panel. The carriage bolt goes into the upper hole (Fig. 0050).

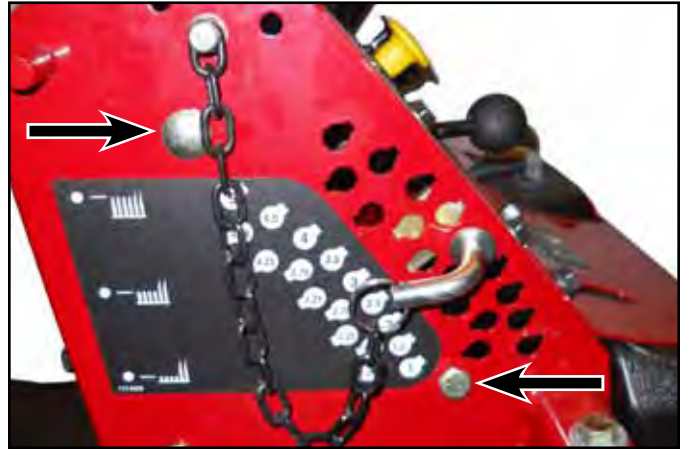


Fig. 0050

DSCN-0323a

6. Secure the HOC handle assembly to the control tower using the carriage bolt and nut (Fig. 0049).

Note: Do not over-tighten. The HOC handle assembly must move freely.

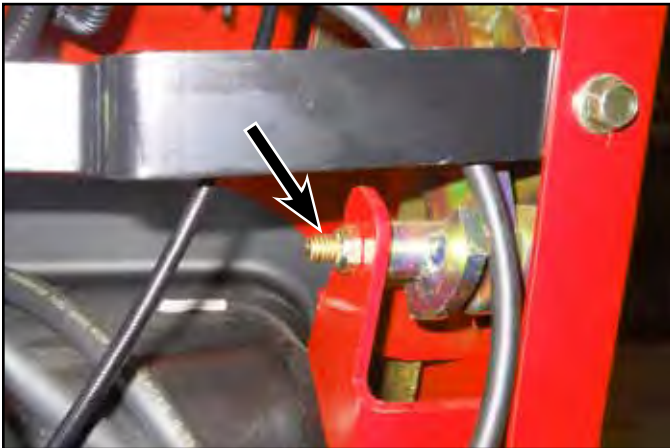


Fig. 0049

DSCN-0288a

8. Place a spacer over each of the bolts (Fig. 0051).



Fig. 0051

DSCN-0325a

9. Place the HOC bracket onto the two bolts and secure with nuts (Fig. 0052).

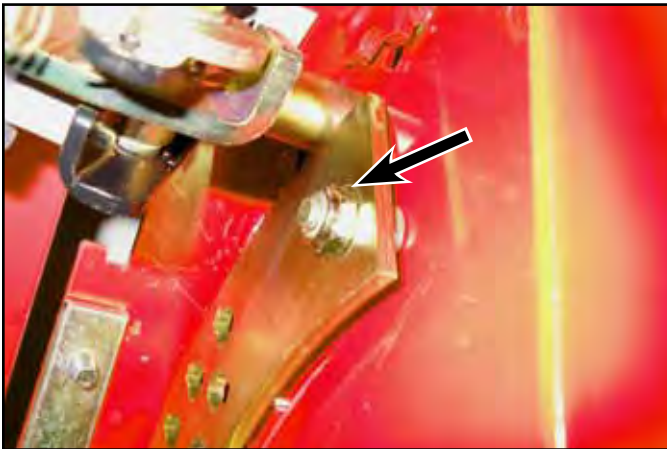


Fig. 0052

DSCN-0330a

11. Place the washer, then the spring onto the HOC lever shoulder bolt (Fig. 0054).



Fig. 0054

DSCN-0335a

10. Position the HOC lever in through the control panel, then onto the HOC handle assembly (Fig. 0053).



Fig. 0053

DSCN-0333a

12. Secure the HOC lever with the shoulder bolt assembly (Fig. 0055).

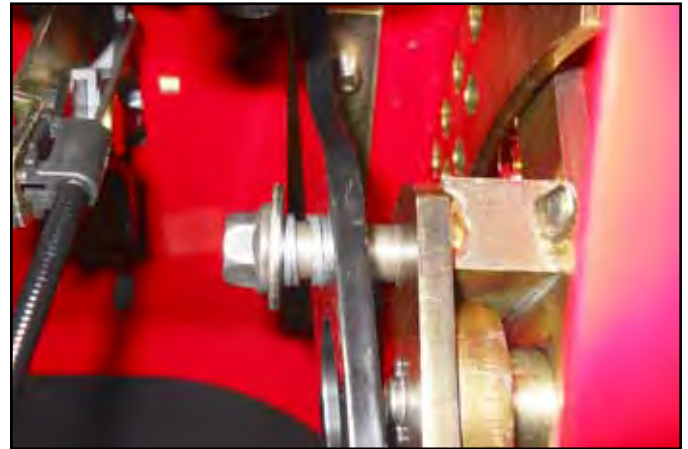


Fig. 0055

DSCN-0340a

CHASSIS

13. **2009 only:** Secure the lower end of the lift bar to the rear cross shaft assembly using a nut. Thread the nut onto the bolt until there are 3 threads protruding (Fig. 0056).

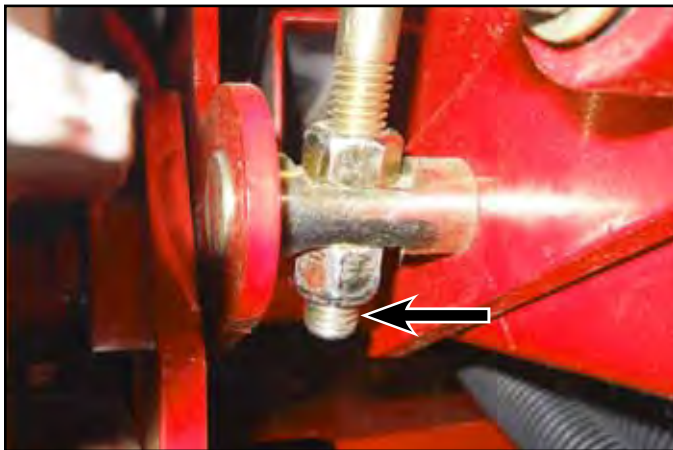


Fig. 0056 DSCN-0274a

14. **2010 only:** Secure the lower end of the lift bar to the rear cross shaft assembly using the dampener assembly and nut. Thread the dampener assembly bolt into the nut until there are 3 threads protruding (Fig. 0057).

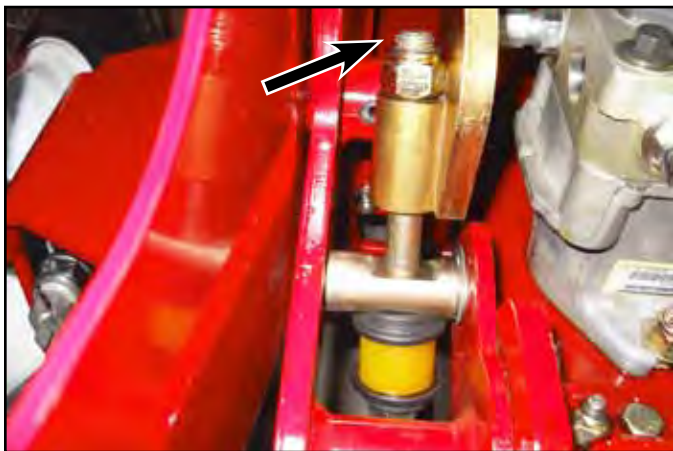


Fig. 0057 DSCN-0793a

15. Remove the boards supporting the deck (Fig. 0058).



Fig. 0058 IMG-1373a

16. Place the HOC pin into the 3" (7.62cm) HOC position, then verify that the blade tips are also at 3" (7.62cm).

Note: Use the dampener assembly bolt (2009 uses a nut) to adjust as needed (Fig. 0059).



Fig. 0059 DSCN-0272a

Caster Wheel Assembly Replacement

Caster Wheel Assembly Removal

1. Remove the grease cap from the top of the caster wheel pivot tube (Fig. 0060).



Fig. 0060

DSCN-0357a

2. Remove the nut from the caster fork shaft (Fig. 0061).



Fig. 0061

DSCN-0359a

3. Remove the caster fork and wheel assembly.
4. Remove the three Bellville washers from the caster wheel pivot tube (Fig. 0062).



Fig. 0062

DSCN-0362a

5. Remove the upper tapered roller bearing from the caster wheel pivot tube (Fig. 0063).



Fig. 0063

DSCN-0364a

CHASSIS

6. Remove the grease seal from the bottom of the caster wheel pivot tube (Fig. 0064).



Fig. 0064

DSCN-0370a

8. If replacing the wheel bearings, use a blunt punch to remove the upper and lower bearing cups from the caster wheel pivot tube (Fig. 0066).



Fig. 0066

DSCN-0392a

7. Remove the lower tapered roller bearing (Fig. 0065).



Fig. 0065

DSCN-0416a

9. Remove the nut securing the caster wheel axle bolt, then remove the axle bolt (Fig. 0067).



Fig. 0067

DSCN-0376a

10. Remove the caster wheel assembly from the caster fork.

11. Remove the seal guard from both sides of the wheel hub (Fig. 0068).



Fig. 0068

DSCN-0377a

12. Remove the spacer nut from the caster axle (Fig. 0069).



Fig. 0069

DSCN-0379a

3

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 (Fig. 0070).

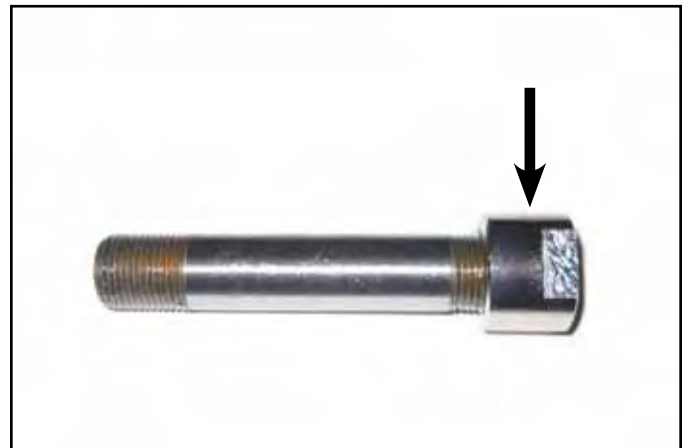


Fig. 0070

DSCN-0383a

CHASSIS

13. Remove the grease seal from both sides of the caster wheel (Fig. 0071).



Fig. 0071 DSCN-0387a

Caster Wheel Assembly Installation

1. Pack the caster wheel tapered roller bearing with high temperature grease (Fig. 0073).



Fig. 0073 DSCN-0407a

14. Remove the LH and RH tapered bearings (Fig. 0072).



Fig. 0072 DSCN-0389a

2. Install the bearing into the wheel hub (Fig. 0074).



Fig. 0074 DSCN-0389a

3. Install grease seal into the wheel hub (Fig. 0075).



Fig. 0075

DSCN-0393a

6. Position the caster axle through the bearing and seal assembly (Fig. 0077).



Fig. 0077

DSCN-0398a

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 (Fig. 0076).



Fig. 0076

DSCN-0406a

7. Install a spacer nut onto both ends of the caster axle (Fig. 0078).

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



Fig. 0078

DSCN-0379a

3

CHASSIS

8. Position the seal guard onto both sides of the caster wheel hub (Fig. 0079).



Fig. 0079 DSCN-0377a

10. Install the upper and lower bearing cups into the pivot tube (Fig. 0081).



Fig. 0081 DSCN-0410a

9. Secure the caster wheel assembly to the caster fork using the axle bolt and nut (Fig. 0080).



Fig. 0080 DSCN-0376a

Note: A socket can be used as a driver. Take care not to scar the race surface (Fig. 0082).



Fig. 0082 DSCN-0413a

11. Pack the pivot tube tapered roller bearings with high temperature grease (Fig. 0083).



Fig. 0083

DSCN-0407a

13. Install grease seal into the base of the pivot tube (Fig. 0085).



Fig. 0085

DSCN-0414a

12. Install the lower bearing into the pivot tube (Fig. 0084).



Fig. 0084

DSCN-0416a

14. Install the upper bearing into the pivot tube (Fig. 0086).



Fig. 0086

DSCN-0418a

CHASSIS

15. Install the 3 Bellville washers into the pivot tube (Fig. 0087).



Fig. 0087

DSCN-0428a

16. Insert the caster wheel and fork assembly through the pivot hub (Fig. 0089).



Fig. 0089

DSCN-0431a

Note: Bottom: Crown Up / Middle: Crown Down / Top: Crown up (Fig. 0088).



Fig. 0088

DSCN-0423a

17. Secure the caster wheel and fork assembly with the nut (Fig. 0090).



Fig. 0090

DSCN-0360a

18. Tighten locknut until spring washers are flat (15 ft-lbs./20 Nm) and then back off a 1/4 turn to properly set the pre-load on the bearings.

19. Remove the plug from the side of the pivot hub (Fig. 0091).



Fig. 0091

DSCN-0436a

20. Install a grease zerk into the port on the side of the pivot hub (Fig. 0092).



Fig. 0092

DSCN-0434a

21. Fill the pivot hub cavity until grease is purging out through the upper bearing (Fig. 0093).



Fig. 0093

DSCN-0438a

22. Replace the grease zerk with the plug (Fig. 0094).



Fig. 0094

DSCN-0436a

CHASSIS

23. Install the grease cap onto the top of the pivot hub (Fig. 0095).



Fig. 0095

DSCN-0357a

Fuel Tank Assembly Replacement

Fuel Tank Assembly Removal

1. Turn the fuel shutoff valve to the "OFF" position (Fig. 0096).



Fig. 0096

DSCN-0457a

2. Siphon the fuel from the fuel tank.

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

3. Remove the height of cut (HOC) pin and lower the deck (Fig. 0097).



Fig. 0097

DSCN-0459a

4. **2009 only:** Remove the 90 degree fuel line vent fitting from the fuel tank (Fig. 0098).



Fig. 0098

IMG-9299a

6. **2009 only:** Slide the hose clamp back from the fuel tank fitting, then slide the fuel line off the fuel tank fitting (Fig. 0100).

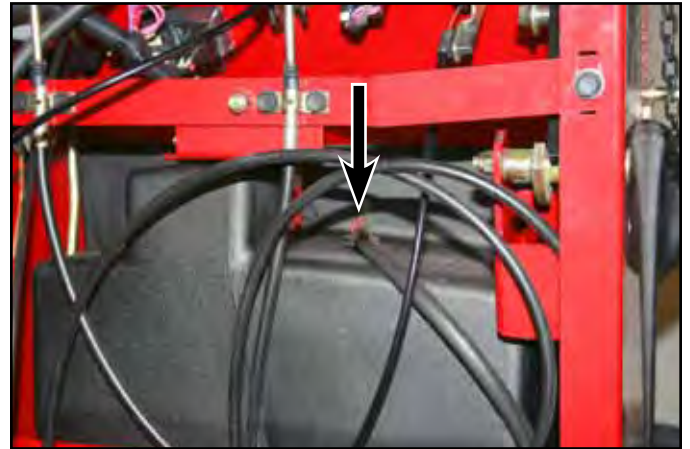


Fig. 0100

IMG-9292a

5. **2009 only:** Remove the rubber grommet from the fuel tank (Fig. 0099).



Fig. 0099

IMG-9530b

7. **2009 only:** Remove the carriage bolt and nut securing the fuel tank bracket to the frame bracket, then remove the fuel tank support (Fig. 0101).



Fig. 0101

IMG-9304b

CHASSIS

8. **2010 only:** Remove the vent line from the 90 degree vent fitting (Fig. 0102).



Fig. 0102

DSCN-0461a

10. **2010 only:** Slide the hose clamp off the fuel pick-up tube fitting, then remove the fuel line from the fitting (Fig. 0104).



Fig. 0104

DSCN-0466a

9. **2010 only:** Remove the 90 degree vent fitting, then rubber grommet from the fuel tank (Fig. 0103).



Fig. 0103

DSCN-0463a

11. **2010 only:** Remove the four thread forming screws securing the tank bracket to the control panel (Fig. 0105).

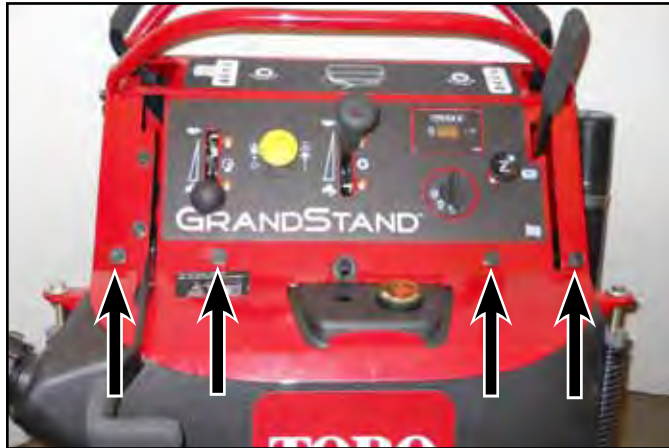


Fig. 0105

DSCN-0467a

12. Remove the fuel tank from the control tower Fig. 0106).



Fig. 0106

IMG-9307a

Fuel Tank Assembly Installation

1. Position the fuel tank into the control tower (Fig. 0107).



Fig. 0107

IMG-9307a

2. **2009 only:** Secure the fuel tank bracket to the frame bracket using the carriage bolt and nut (Fig. 0108).



Fig. 0108

IMG-9304b

CHASSIS

3. **2009 only:** Position the fuel line onto the pick-up tube fitting and secure with the hose clamp (Fig. 0109).

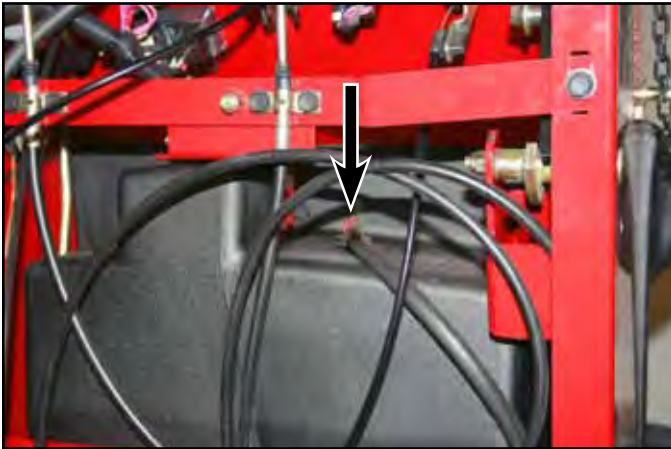


Fig. 0109

IMG-9292a

5. **2009 only:** Install the 90 degree fuel line vent fitting into the fuel tank (Fig. 0111).



Fig. 0111

IMG-9299a

4. **2009 only:** Install the rubber grommet into the fuel tank (Fig. 0110).



Fig. 0110

IMG-9530b

6. **2010 only:** Secure the tank bracket using four thread forming screws (Fig. 0112).

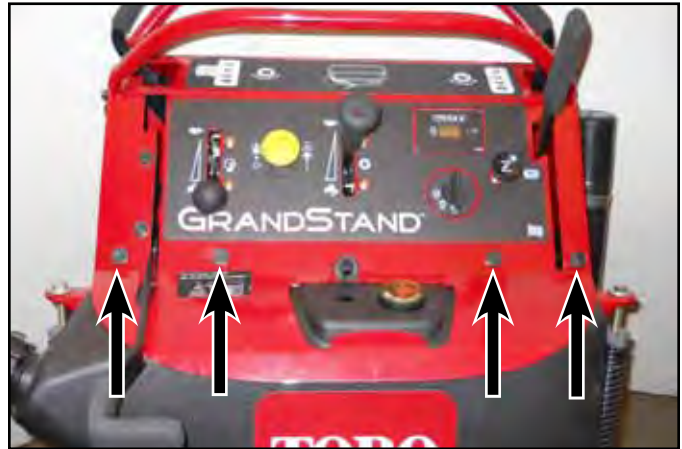


Fig. 0112

DSCN-0467a

7. **2010 only:** Slide the fuel line onto the pick-up tube fitting and secure with the hose clamp (Fig. 0113).

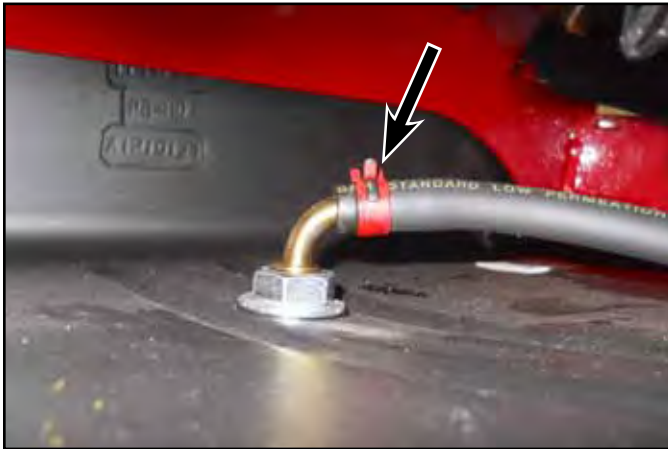


Fig. 0113

DSCN-0466a

9. **2010 only:** Install the 90 degree fitting into the rubber grommet (Fig. 0115).

Note: A thin film of oil will ease installation of the fitting barb.



Fig. 0115

DSCN-0463a

8. **2010 only:** Install the rubber grommet into the fuel tank (Fig. 0114).



Fig. 0114

DSCN-0469a

10. Install the vent hose onto vent fitting (Fig. 0116).



Fig. 0116

DSCN-0461a

CHASSIS

Platform & Cushion Assembly Replacement

Platform & Cushion Assembly Removal

1. Remove both hairpin cotter pins securing the cushion pad to the control tower, then lower the operator cushion onto the operator platform (Fig. 0117).



Fig. 0117

DSCN-0478a

2. Remove the carriage bolts, spacers, friction washers, washers and nuts securing the pad hinge to the pad links (Fig. 0118).



Fig. 0118

DSCN-0577a

3. Remove the four sets of bolts and washers securing the upper and lower pad hinges to the cushion pad (Fig. 0119).



Fig. 0119

DSCN-0488a

4. Remove the two thread forming screws securing the shield, foot mat bracket, and foot mat to the platform (Fig. 0120).

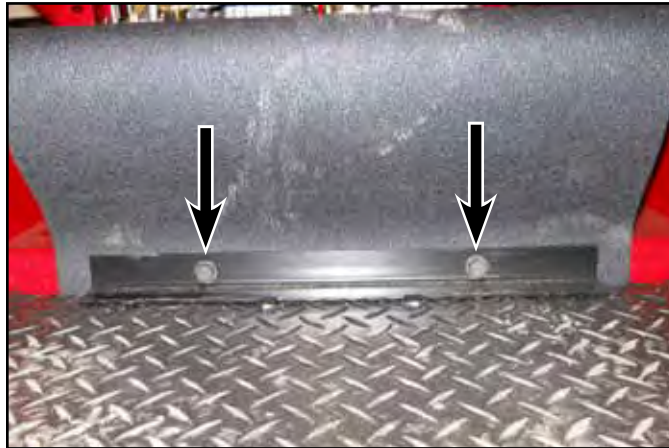


Fig. 0120

DSCN-0490a

5. Remove the RH and LH carriage bolts, washers, spacers, and nuts securing the platform to the carrier frame (Fig. 0121).

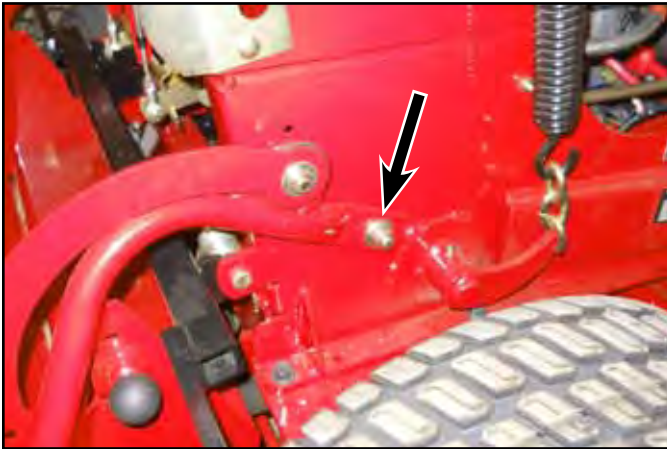


Fig. 0121

DSCN-0493a

7. Remove the knob from the platform latch pin (Fig. 0123).



Fig. 0123

DSCN-0500a

6. Remove the carriage bolts, friction washers, spacers and nuts securing the LH and RH pad links to the platform (Fig. 0122).



Fig. 0122

DSCN-0496a

8. Remove the latch pin and spring from the platform (Fig. 0124).



Fig. 0124

DSCN-0501a

CHASSIS

9. Remove the four nuts securing the four rubber bumpers to the platform (Fig. 0125).

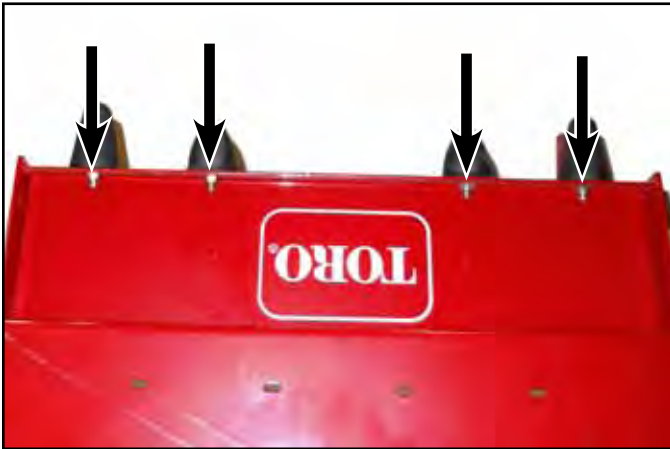


Fig. 0125

DSCN-0505a

Platform & Cushion Assembly Installation

1. Secure the four rubber bumpers to the platform using four nuts (Fig. 0126).

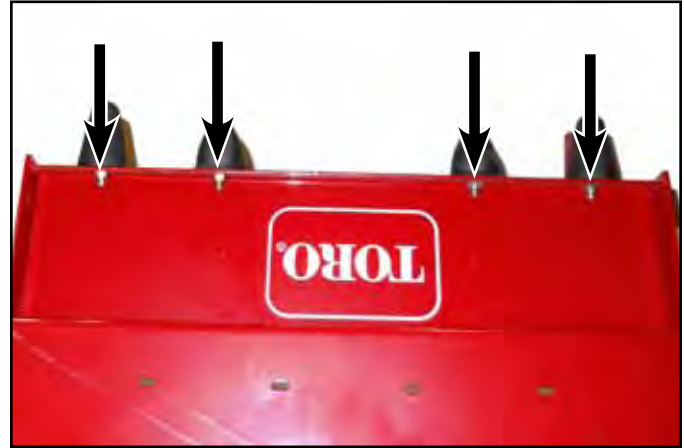


Fig. 0126

DSCN-0505a

2. Position the spring on the latch pin (Fig. 0127).



Fig. 0127

DSCN-0512a

3. Position the latch pin and spring assembly into the platform (Fig. 0128).



Fig. 0128

DSCN-0517a

5. Install the knob onto the latch pin (Fig. 0130).



Fig. 0130

DSCN-0498a

4. Apply thread-locking compound to the threads of the knob (Fig. 0129).



Fig. 0129

DSCN-0521a

6. Position the carriage bolt and spacer into the tab on the platform (Fig. 0131).



Fig. 0131

DSCN-0548a

CHASSIS

7. Position the friction washer, then the pad link over the spacer (Fig. 0132).

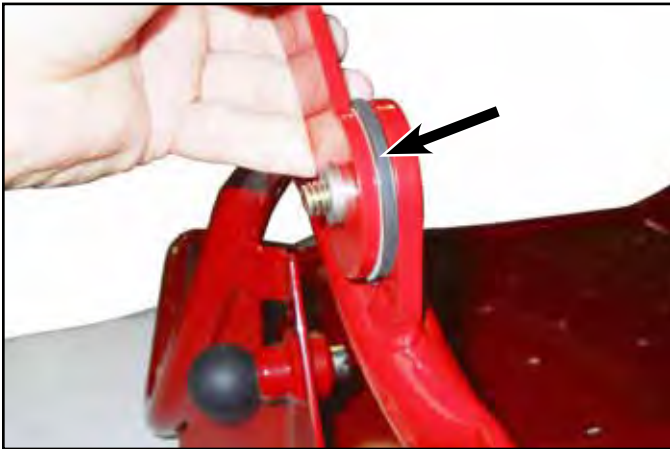


Fig. 0132 DSCN-0549a

9. Repeat steps 6, 7, and 8 on the other side.

10. Position the carriage bolt through the brake support and the carrier frame (Fig. 0134).

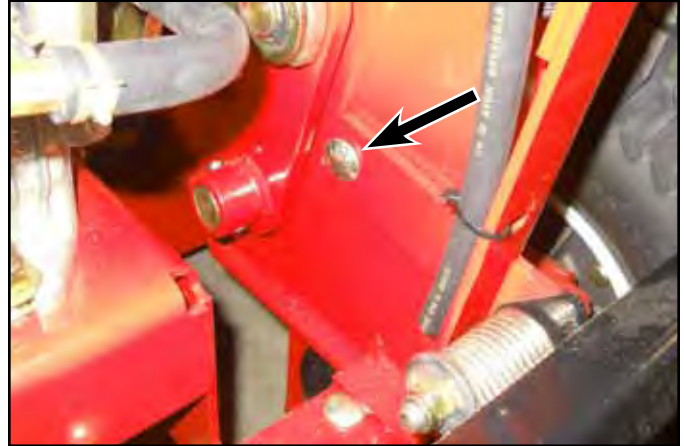


Fig. 0134 DSCN-0531a

8. Secure the assembly with a washer and nut (Fig. 0133).

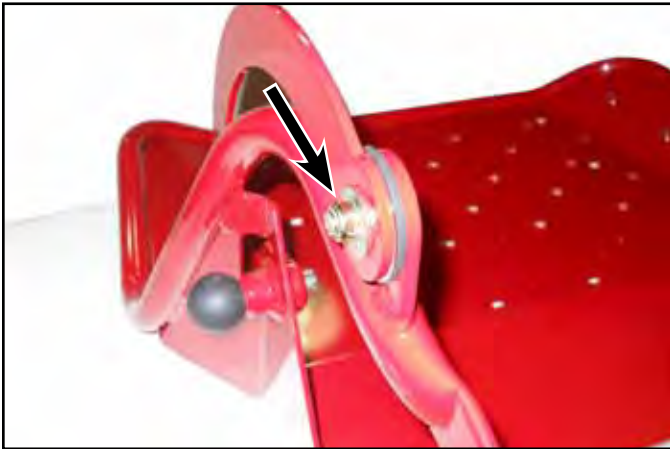


Fig. 0133 DSCN-0555a

11. Position a washer over the carriage bolt (Fig. 0135).

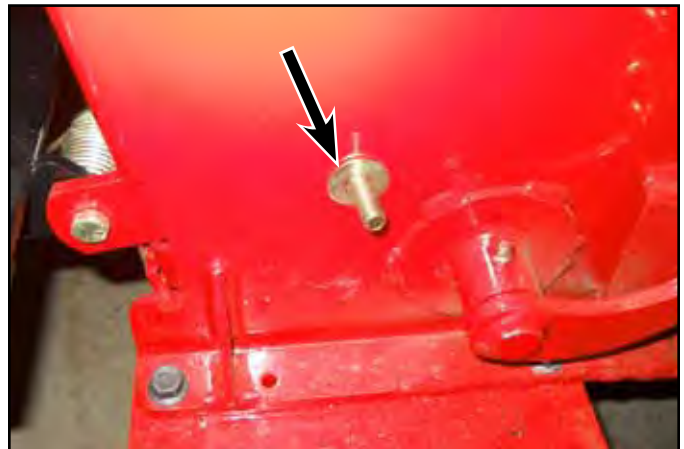


Fig. 0135 DSCN-0562a

12. Position the platform so the carriage bolt protrudes through the platform pivot hole (Fig. 0136).



Fig. 0136

DSCN-0557a

14. Secure the assembly with a washer and nut (Fig. 0138).

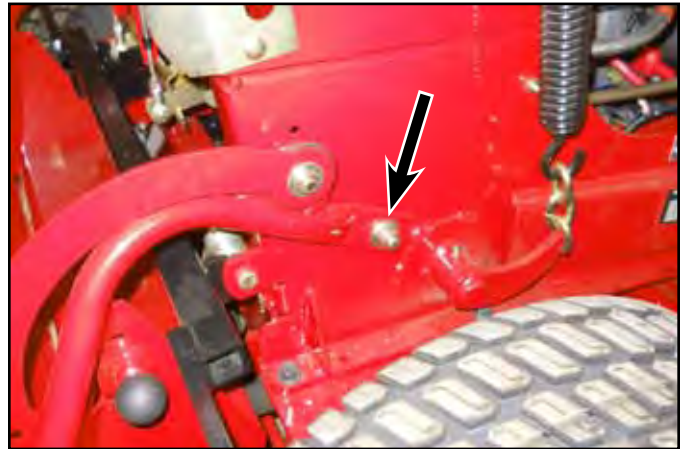


Fig. 0138

DSCN-0493a

13. Position the spacer over the carriage bolt and into the platform pivot hole (Fig. 0137).



Fig. 0137

DSCN-0560a

15. Repeat steps 10 through 14 on the other side of the machine.

16. Secure the shield, foot mat bracket, and foot mat to the platform using two thread forming screws (Fig. 0139).



Fig. 0139

DSCN-0490a

CHASSIS

17. Secure the shield and lower hinge bracket to the operator cushion using two screws and washers (Fig. 0140).

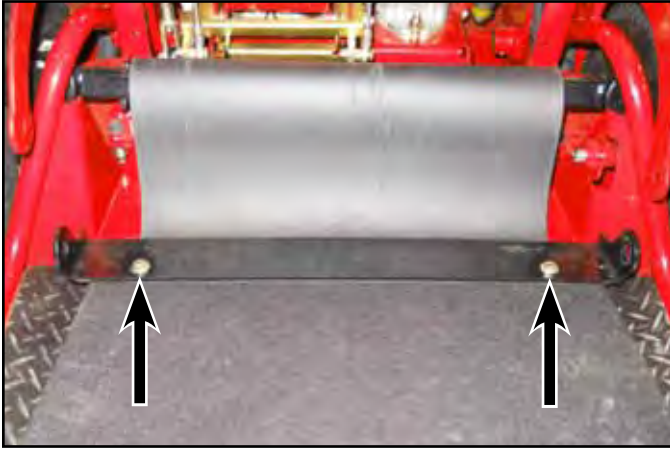


Fig. 0140

DSCN-0564a

19. Align the pad link with the lower hinge bracket (Fig. 0142).



Fig. 0142

DSCN-0568a

18. Secure the upper hinge bracket to the operator cushion using two screws and washers (Fig. 0141).



Fig. 0141

DSCN-0566a

20. Place a friction washer between the pad link and lower hinge bracket (Fig. 0143).



Fig. 0143

DSCN-0571a

21. Insert a carriage bolt through the pad link assembly (Fig. 0144).



Fig. 0144

DSCN-0572a

23. Secure the assembly with a nut and washer (Fig. 0146).



Fig. 0146

DSCN-0577a

22. Position the spacer over the carriage bolt and into the friction washer and lower hinge bracket (Fig. 0145).



Fig. 0145

DSCN-0576a

24. Repeat steps 19 through 23 on the other side of the machine.

25. Raise the operator cushion assembly into the operating position and secure with the hairpin cotters and slide bushings (Fig. 0147).



Fig. 0147

DSCN-0582a

CHASSIS

Lift Assist Cylinder Replacement (2009 only)

Lift Assist Cylinder Removal (2009 only)

1. Turn the engine off and remove the key from the ignition.
2. Set the parking brake.
3. Place Height-of-Cut lever in the transport position.
4. Unlatch cover clamp at front end of gas spring cover (Fig. 0148).

3

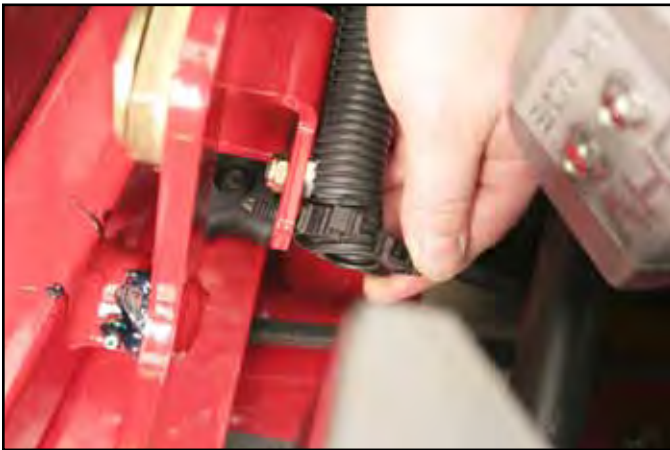


Fig. 0148

IMG-9686a

5. Remove the spring cover (Fig. 0149).



Fig. 0149

IMG-9688a

6. Remove the retaining clip from the front end of the gas spring assembly (Fig. 0150).



Fig. 0150

IMG-9697a

- Repeat steps 4 through 6 on the other side if replacing both gas spring assemblies.
- Loosen the lower lock nut on the lift bar 1/2 turn (Fig. 0151 and Fig. 0152).

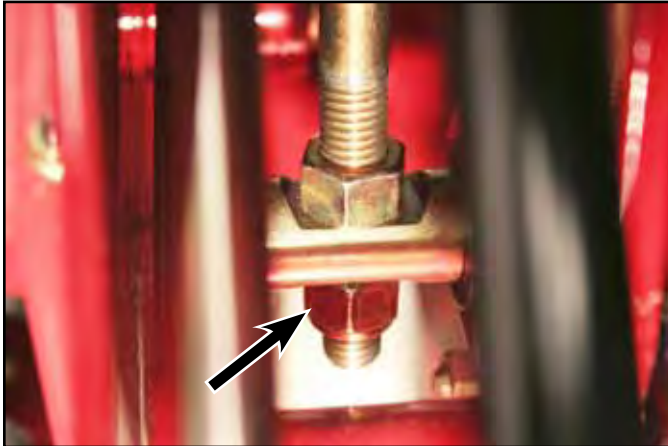


Fig. 0151

IMG-9705a



Fig. 0152

IMG-0088a

- Spin the upper nut approximately 1/2" (1.27cm) up the lift bar (Fig. 0153).

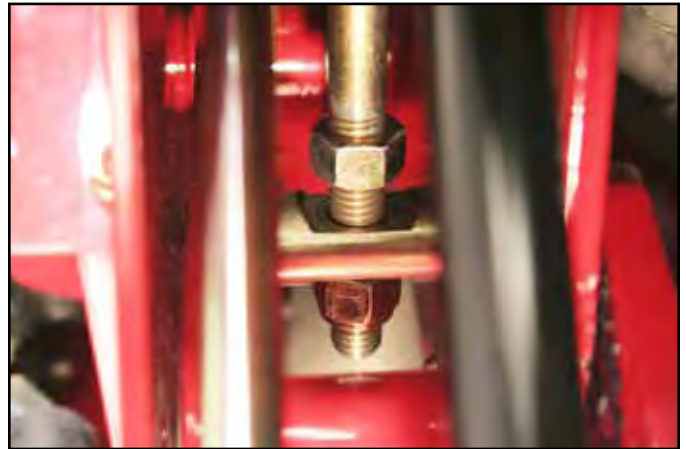


Fig. 0153

IMG-9749a

- Tighten the lower nut on the lift bar until the compression force on the gas spring assembly has been relieved and the gas spring assembly can easily be removed from the ball stud (Fig. 0154).



Fig. 0154

IMG-9709a

3

CHASSIS

11. Repeat step 10 on the other side if replacing both gas spring assemblies.
12. Loosen the lower nut on the lift bar approximately 2 turns until the Height-Of-Cut handle can be moved from the transport position (Fig. 0155).

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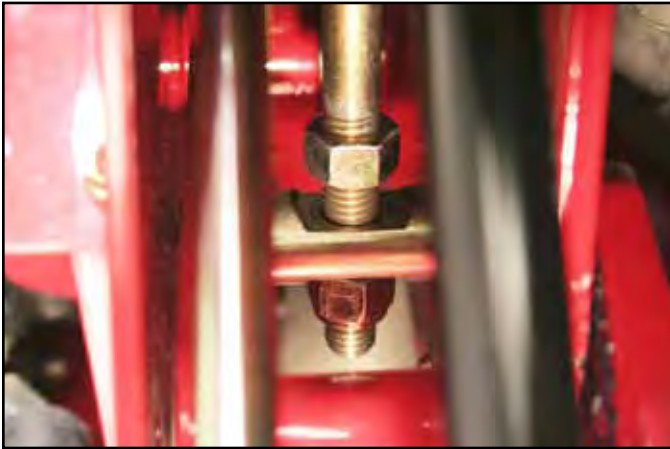


Fig. 0155 IMG-9749a

13. Lower the Height-Of-Cut handle to the 1" (2.54cm) height-of-cut setting (Fig. 0156).



Fig. 0156 IMG-9738a

14. Remove the retaining clip from the rear end of the gas spring assembly (Fig. 0157).



Fig. 0157 IMG-9711a

15. Remove the gas spring assembly (Fig. 0158).



Fig. 0158 IMG-9714a

16. Repeat steps 14 and 15 on the other side if replacing both gas spring assemblies.

Lift Assist Cylinder Installation (2009 only)

1. Ensure both retaining clips are in the position shown (Fig. 0159) and (Fig. 0160).



Fig. 0159

IMG-9718a



Fig. 0160

IMG-9720a

2. Install the large cylinder end of the gas spring assembly onto the rear ball stud by pressing the gas spring socket onto the ball stud until it is secured by the spring clip (Fig. 0161).



Fig. 0161

IMG-9724a

3. Repeat step 2 on the other side if replacing both gas spring assemblies.
4. Raise the mower deck to the transport position (Fig. 0162).



Fig. 0162

IMG-0080a

CHASSIS

5. Tighten the lower nut on the lift bar until the front end of the gas spring aligns with the ball stud (Fig. 0163 and Fig. 0164).

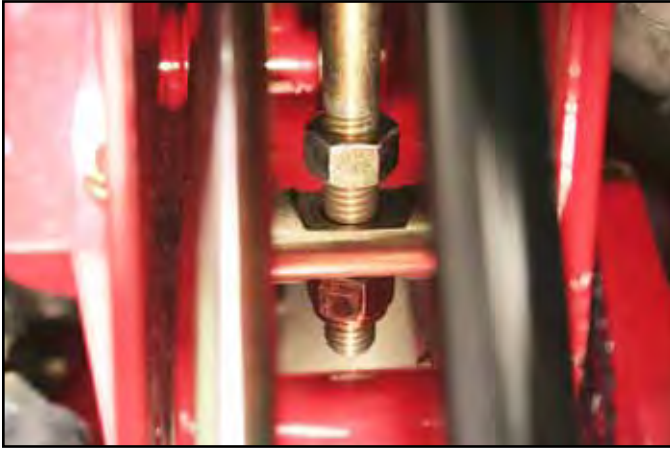


Fig. 0163

IMG-9749a

6. Snap the front end of the gas spring onto the ball stud (Fig. 0165).



Fig. 0165

IMG-9735a

7. Slide the spring cover onto the gas spring assembly (Fig. 0166).



Fig. 0164

IMG-9729a



Fig. 0166

IMG-9688a

8. Secure the spring cover with the cover clamp (Fig. 0167).

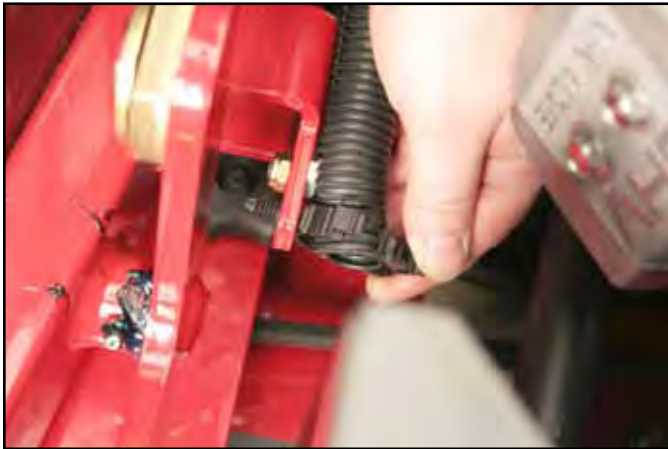


Fig. 0167

IMG-9686a

11. Lower the Height-of-Cut lever to the 3" (7.62cm) Height-Of-Cut position (Fig. 0169).



Fig. 0169

IMG-9739a

9. Repeat steps 5 thru 8 on the other side if replacing both gas spring assemblies.
10. Loosen the lower nut on the lift bar assembly approximately 3 turns until the Height-Of-Cut handle can be taken out of the transport position (Fig. 0168).

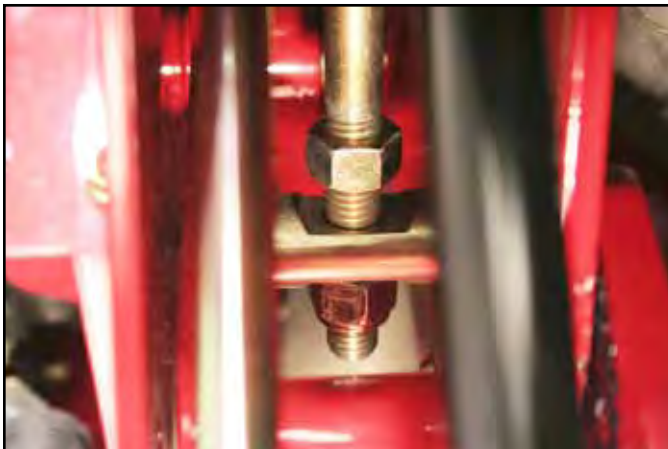


Fig. 0168

IMG-9749a

12. Position the center blade in the front-to-back position. Check the blade height at the front of the center blade. Adjust the lower nut on the lift bar assembly until the blade height measurement reaches 3" (7.62cm) (Fig. 0170).



Fig. 0170

IMG-9746a

CHASSIS

13. Turn the upper nut on the lift bar assembly down to the height-of-cut pin (Fig. 0171).

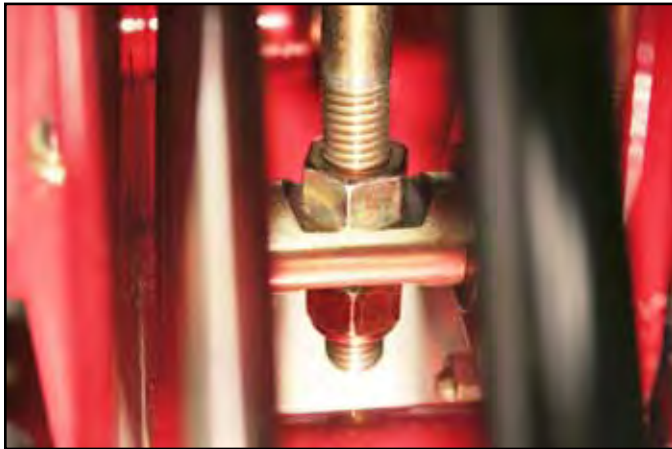


Fig. 0171 IMG-9705

14. Tighten the lower nut on the lift bar assembly to secure the HOC adjustment (Fig. 0172).

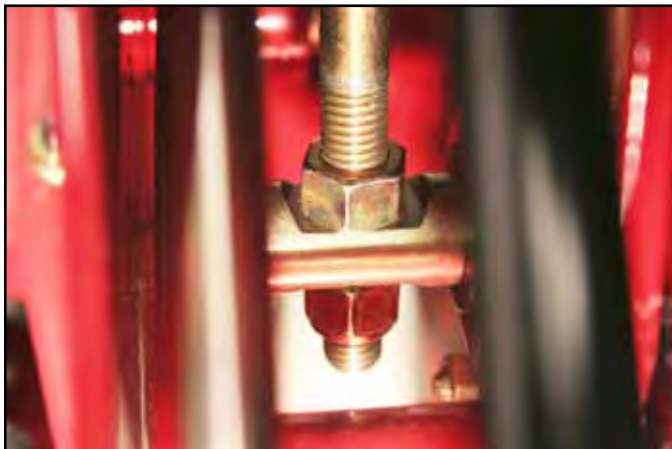


Fig. 0172 IMG-9705

Lift Assist Spring Replacement (2010 only)

Lift Assist Spring Removal (2010 only)

1. Move the height of cut (HOC) lever to the transport position (Fig. 0173).



Fig. 0173 DSCN-0441a

2. Support the deck with a floor jack (Fig. 0174).



Fig. 0174 DSCN-0442a

3

3. Move the HOC lever to the 1" (2.54cm) position (Fig. 0175).



Fig. 0175

DSCN-0445a

5. Remove the spring and chain assembly (Fig. 0177).



Fig. 0177

DSCN-0451a

4. Remove the bolt and washer securing the lift assist spring to the control tower (Fig. 0176).



Fig. 0176

DSCN-0447a

CHASSIS

Lift Assist Springs Installation (2010 only)

1. Position the chain between the spring hook and pivot shaft assembly (Fig. 0178).



Fig. 0178 DSCN-0453a

2. Secure the spring and chain assembly to the control tower using the bolt and washer (Fig. 0179).



Fig. 0179 DSCN-0455a

3. Install the bolt until the gap between the control tower mount and spring cap is 1-1/2" (3.8cm) for 60" decks / 2" (5cm) 48" or 52" decks (Fig. 0180).

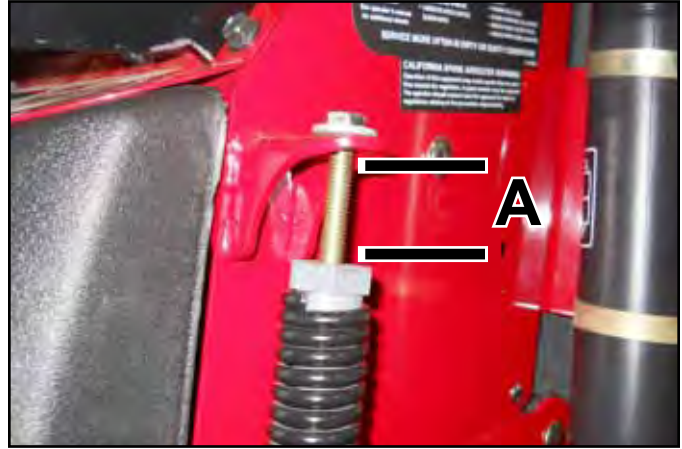


Fig. 0180

DSCN-1527a

- A. 1-1/2" (3.8cm) for 60" decks
2" (5cm) for 48" for 52" decks
4. Move the HOC lever to the transport position, then remove the floor jack.

Wheel Motor Housing Assembly Replacement

Wheel Motor Housing Assembly Removal

1. Apply the parking brake.
2. Break the torque of the four lug nuts securing the tire assembly to the wheel hub (Fig. 0181).

Note: Only slightly loosen the lug nuts, do not remove at this time.

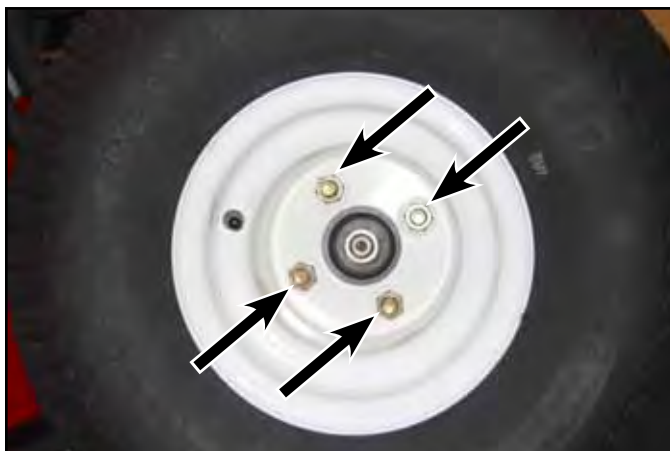


Fig. 0181

DSCN-0608a

3. Break the torque of the wheel motor shaft nut (Fig. 0182).

Note: Only slightly loosen the wheel motor shaft nut, do not remove at this time.

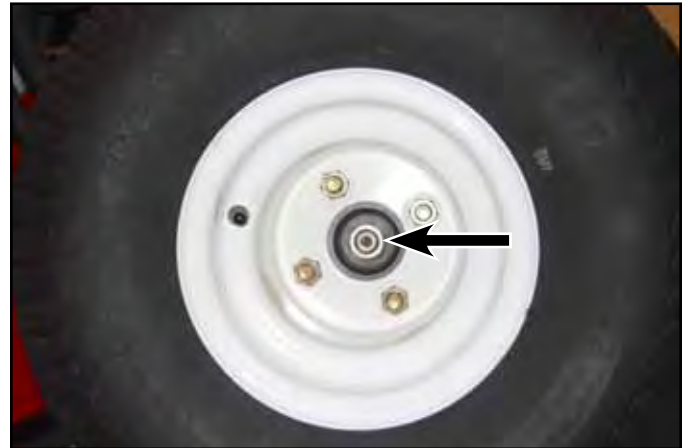


Fig. 0182

DSCN-0608a

3

4. Repeat steps 2 and 3 on the other side of the machine.
5. Raise the rear of the machine and secure with jack stands (Fig. 0183).

Note: Position the jack stands under the rear of the deck.



Fig. 0183

DSCN-0606a

CHASSIS

6. Remove both tires by removing the four lug nuts securing each tire to it's hub (Fig. 0184).

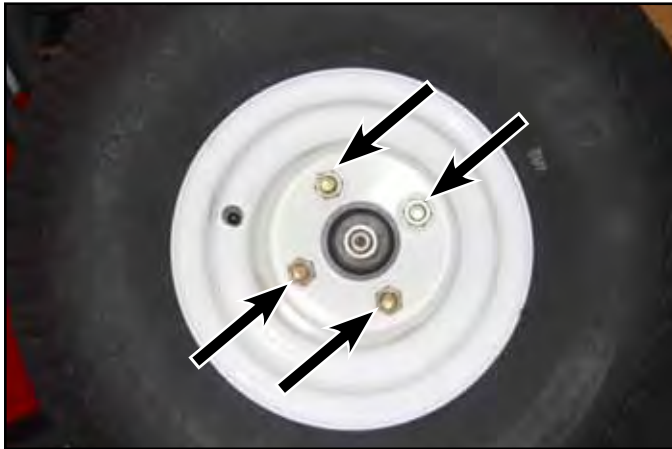


Fig. 0184

DSCN-0608a

8. Remove both wheel hubs by using a puller (Toro P/N TOR6006) and four lug nuts (Fig. 0186).



Fig. 0186

DSCN-0614a

7. Remove the wheel motor nut from both wheel motors (Fig. 0185).



Fig. 0185

DSCN-0611a

- Note:** Install the lug nut with the taper facing outward (Fig. 0187).



Fig. 0187

DSCN-0615a

3

9. Remove the woodruff key from both of the wheel motor shafts (Fig. 0188).



Fig. 0188

DSCN-0628a

12. Position a drain pan under the wheel motor (Fig. 0190).



Fig. 0190

DSCN-0634a

10. Thoroughly clean the area around the hydraulic fittings to prevent debris from entering the system.
11. Mark the hoses, corresponding fittings, and motor ports to ensure the hoses are reconnected in their original positions (Fig. 0189).



Fig. 0189

DSCN-0631a

13. Disconnect both hydraulic hoses from the wheel motor fittings (Fig. 0191).



Fig. 0191

DSCN-0636a

CHASSIS

14. Remove both sets of hydraulic fittings from the wheel motor (Fig. 0192).

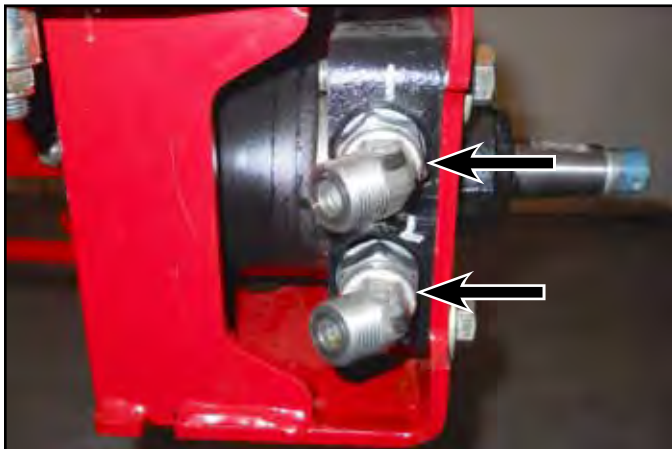


Fig. 0192 DSCN-0670a

16. Remove the four bolts and washers securing the wheel motor to the wheel motor housing (Fig. 0194).



Fig. 0194 DSCN-0647a

15. Cap the wheel motor ports and hydraulic hoses to prevent debris from entering the system (Fig. 0193).



Fig. 0193 DSCN-0639a

17. Remove the wheel motor from the wheel motor housing.

18. Repeat steps 6 through 17 on the other side of the machine.

19. Support the motor mount/axle assembly with a floor jack (Fig. 0195).



Fig. 0195 DSCN-0649a

3

20. Remove the four sets (2 per side) of fasteners securing the wheel motor housing assembly to the carrier frame (Fig. 0196).

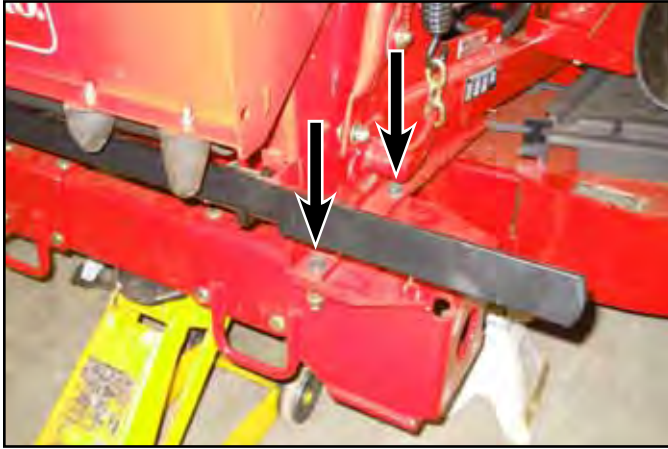


Fig. 0196

DSCN-0652a

Wheel Motor Housing Assembly Installation

1. Secure the motor mount center section to the motor mounts using eight carriage bolts and nuts (Fig. 0198).

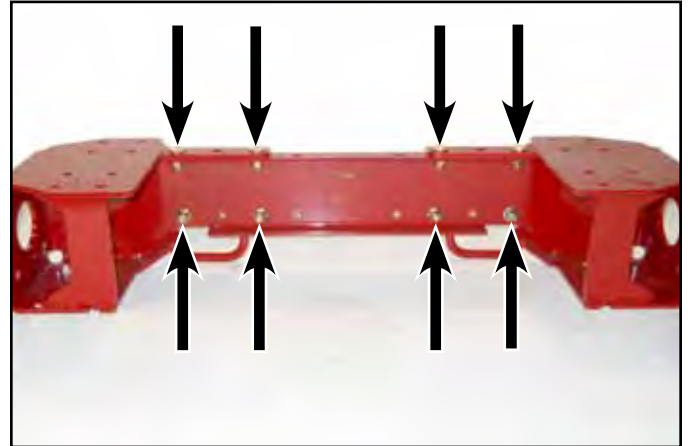


Fig. 0198

DSCN-0658a

21. Remove the wheel motor housing assembly.
22. Remove the eight carriage bolts and nuts securing the motor mount center section to the RH and LH motor mounts (Fig. 0197).

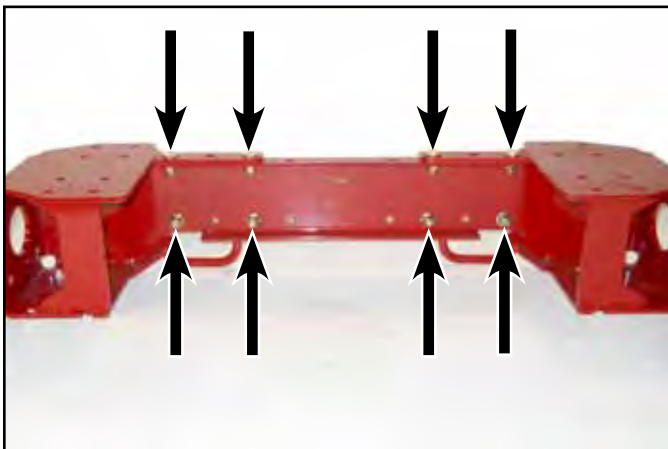


Fig. 0197

DSCN-0658a

Note: The wheel motor housing assembly can be configured for a wide stance (Fig. 0198) or a narrow stance (Fig. 0199).



Fig. 0199

DSCN-0661a

CHASSIS

2. Position the motor mount/axle assembly under the carrier frame (Fig. 0200).



Fig. 0200 DSCN-0649a

4. Tighten the four sets of fasteners.
5. Position the wheel motor into the wheel motor housing (Fig. 0202).



Fig. 0202 DSCN-0664a

3. Loosely install the four sets of bolts (2 per side), spacers, and nuts that secure the motor mount/axle assembly to the carrier frame (Fig. 0201).

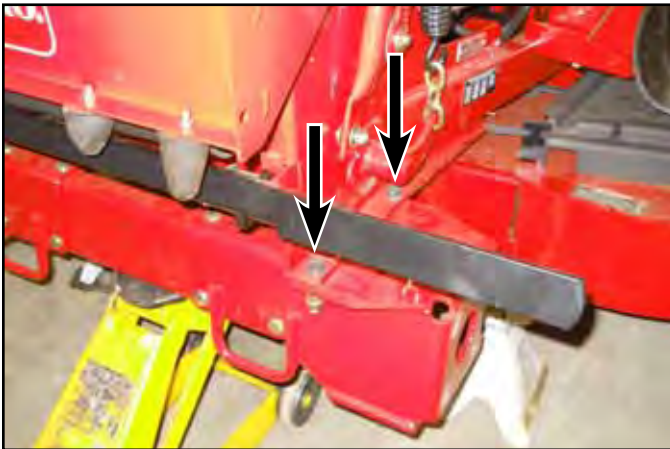


Fig. 0201 DSCN-0652a

6. Secure the wheel motor to the wheel motor housing using four bolts and Belleville washers. Torque the bolts to 75 ± 8 ft-lbs. (102 ± 10 Nm) (Fig. 0203).

Note: Install the Belleville washers with the crown facing the bolt head.



Fig. 0203 DSCN-0668a

7. Replace the fitting o-rings. Install the two motor fittings so they point towards the machine. Secure the position of the fittings with the fitting jam nut (Fig. 0204).

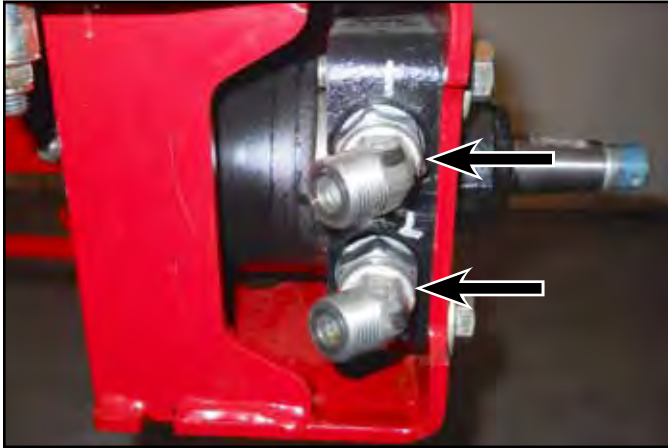


Fig. 0204

DSCN-0670a

9. Repeat steps 5 through 8 on the other side of the machine.
10. Position the woodruff key in the wheel motor shaft (Fig. 0206).



Fig. 0206

DSCN-0675a

8. Install the hydraulic hoses to the hydraulic fittings (Fig. 0205).



Fig. 0205

DSCN-0673a

11. Position the wheel hub onto the motor shaft (Fig. 0207).



Fig. 0207

DSCN-0676a

CHASSIS

12. Apply thread-locking compound to the wheel motor shaft threads (Fig. 0208).



Fig. 0208

DSCN-0679a

13. Install the wheel motor nut to the wheel motor shaft (Fig. 0209).

Note: The wheel motor nut will have the proper torque applied in a later step.



Fig. 0209

DSCN-0680a

14. Secure the tire assembly to the wheel hub using four lug nuts (Fig. 0210).

Note: The lug nuts will have the proper torque applied in a later step.



Fig. 0210

DSCN-0683a

15. Repeat steps 10 through 14 on the other side of the machine.
16. Remove the jack stands and lower the machine to the ground.
17. Apply the parking brake.

18. Tighten the wheel motor nut and lug nuts (Fig. 0211).

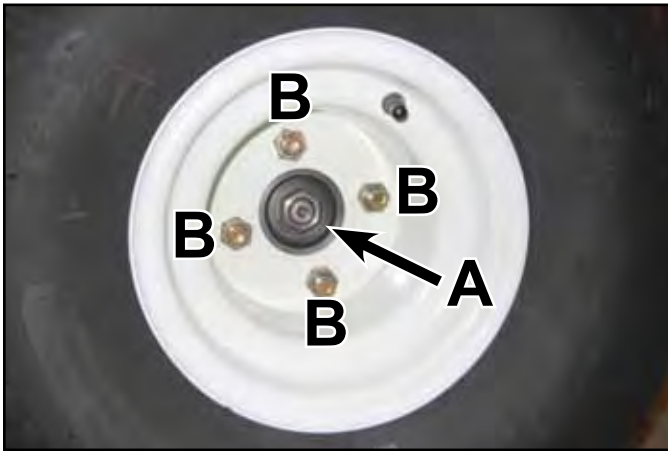


Fig. 0211

DSCN-0683a

- A. 200 ± 25 ft-lbs. (271 ± 33 Nm)
- B. 80 ± 10 ft-lbs. (108 ± 13 Nm)

19. Bleed the hydraulic system. See “Bleeding the Hydraulic System” on page 6-95.

Cross Shaft & Lift Assembly Replacement

Cross Shaft & Lift Assembly Removal

1. **2009 only:** Remove the lift assist cylinder. See “Lift Assist Cylinder Removal (2009 only)” on page 3-40.
2. Place two boards under the deck and lower the deck onto them (Fig. 0212).

Note: The boards need to be long enough to support the front and rear of the deck.

3



Fig. 0212

DSCN-0685a

3. **2009 only:** Remove the nut securing the lift bar to the rear cross shaft assembly (Fig. 0213).



Fig. 0213

DSCN-0795a

CHASSIS

4. **2010 only:** Remove the dampener assembly that secures the lift bar to the rear cross shaft assembly (Fig. 0214).

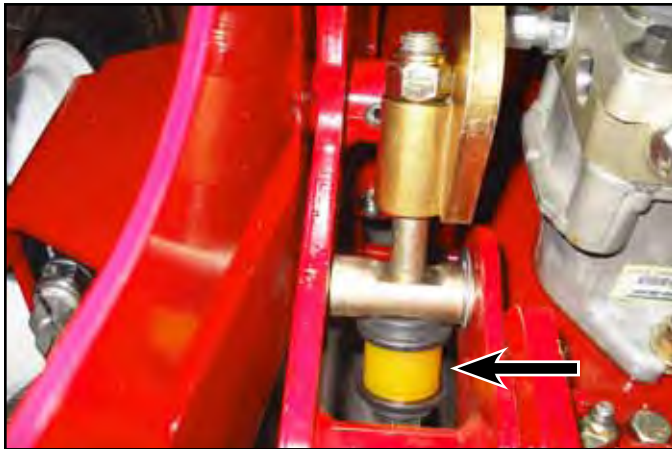


Fig. 0214 DSCN-0793a

7. Mark the hydraulic fittings and hoses so they can be correctly installed upon reassembly (Fig. 0216).



Fig. 0216 DSCN-0691a

5. Remove the fuel tank. See “Fuel Tank Assembly Removal” on page 3-26.
6. Remove the cable ties securing the high pressure hoses (Fig. 0215).



Fig. 0215 DSCN-0689a

8. Remove the high pressure hoses from the pump fittings (Fig. 0217).

Note: Cap the pump and hose fittings to prevent debris from entering the hydraulic system.



Fig. 0217 DSCN-0696a

9. **2010 only:** Remove the bolts and washers securing the extension spring assemblies and chains to the RH and LH sides of the control tower (Fig. 0218).

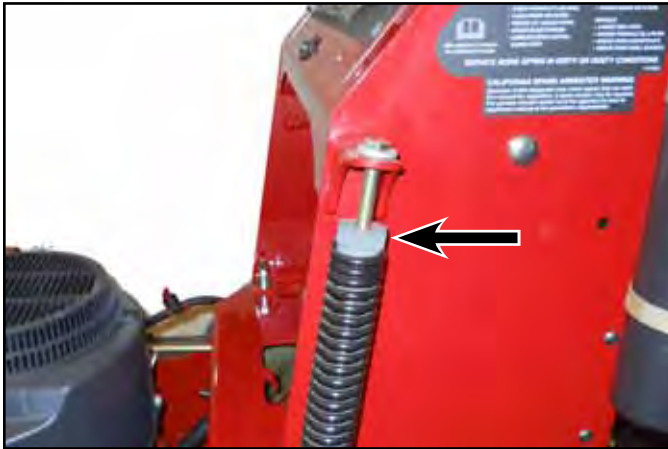


Fig. 0218

DSCN-0700a

10. Remove the “E” clips and washers securing the RH and LH lift rod to the rear cross shaft assembly (Fig. 0219).

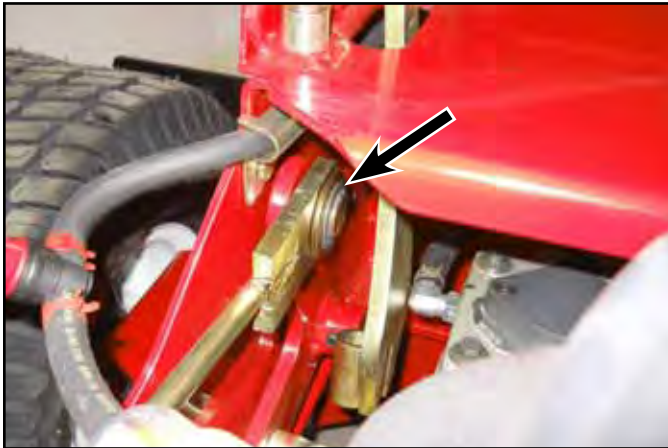


Fig. 0219

DSCN-0704a

11. **48” and 52” decks only:** Remove the nuts from the end of the lift rods and remove the RH and LH lift rods (Fig. 0220).

Note: Leave the inside nuts in their location to minimize deck leveling adjustments at the end of this procedure.



Fig. 0220

DSCN-0707a

12. **60” decks only:** Loosen the rear jam nuts securing the LH and RH lift rods to the turn buckle, then remove the RH and LH lift rods (Fig. 0221).

Note: Note the position of the jam nuts to minimize deck leveling adjustments at the end of this procedure.

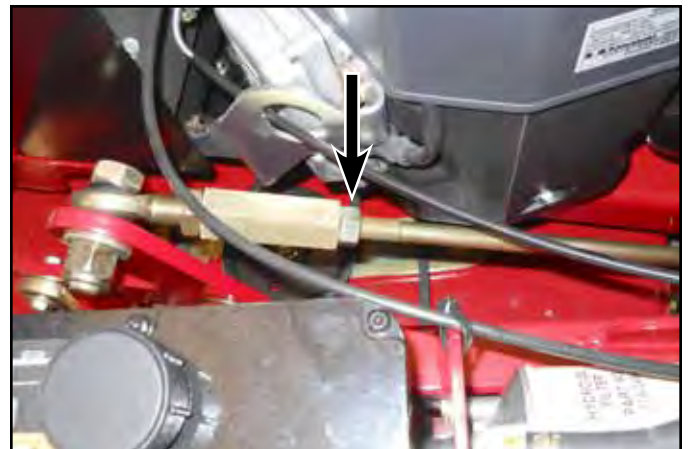


Fig. 0221

DSCN-0710a

CHASSIS

13. **2009 only:** Remove the bolts, spacers, washers and nuts securing the cross shaft assembly to the carrier frame (Fig. 0222).

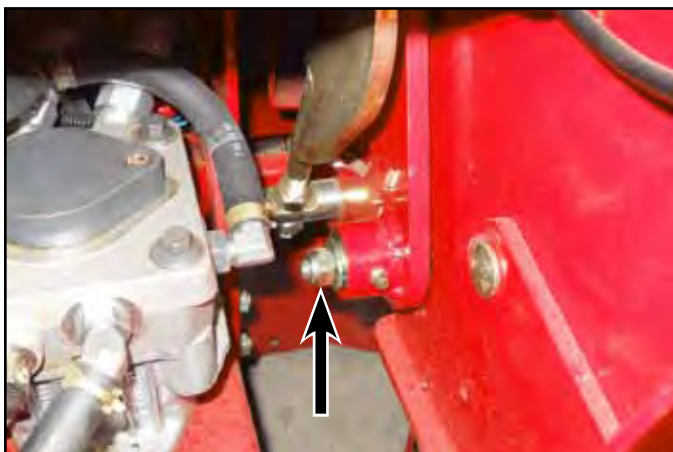


Fig. 0222

DSCN-1602a

14. **2010 only:** Using a blunt punch, drive the spiral pins that secure the LH and RH pivot shafts to the rear cross shaft assembly (Fig. 0223).

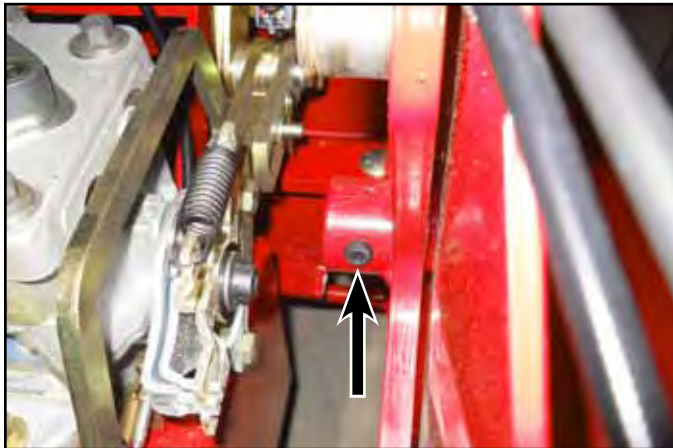


Fig. 0223

DSCN-0712a

15. **2010 only:** Remove the LH and RH pivot shafts from the rear cross shaft assembly and carrier frame hub (Fig. 0224).

Note: 48" and 52" decks are set to a narrow stance. Remove the wheels to remove the pivot shafts.



Fig. 0224

DSCN-0717a

16. Remove the four sets of carriage bolts and nuts (four per side) securing the LH and RH lift plates to the engine base (Fig. 0225).



Fig. 0225

DSCN-0720a

17. Remove the lift plates (Fig. 0226).



Fig. 0226

DSCN-0723a

19. Remove the "E" clip securing the height of cut (HOC) pin to the rear cross shaft assembly (Fig. 0228).



Fig. 0228

DSCN-0751a

18. Remove the rear cross shaft from the machine (Fig. 0227).



Fig. 0227

DSCN-0730a

20. Remove the HOC pin from the rear cross shaft assembly (Fig. 0229).

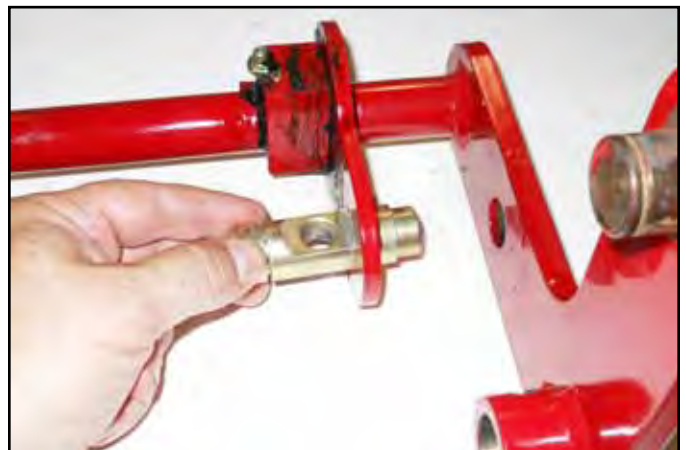


Fig. 0229

DSCN-0740a

CHASSIS

21. Remove the two 45 degree grease fittings from the LH and RH grease blocks (Fig. 0230).

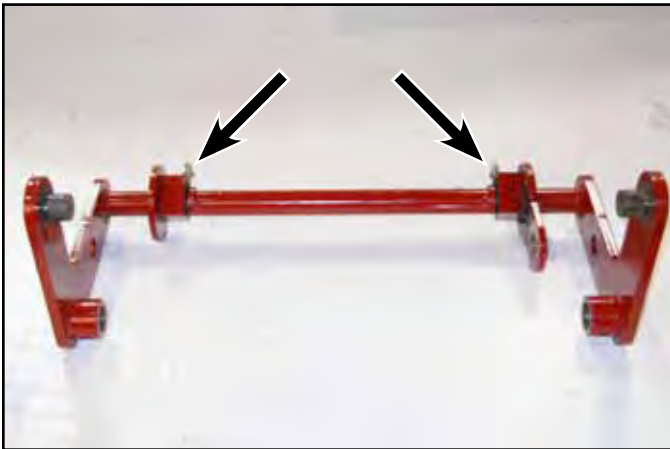


Fig. 0230

DSCN-0744a

Cross Shaft & Lift Assembly Installation

1. Install the 45 degree grease fitting into the LH and RH grease blocks. Position the fitting so it faces upward (Fig. 0231).



Fig. 0231

DSCN-0747a

2. Position the HOC pin in the rear cross shaft assembly (Fig. 0232).

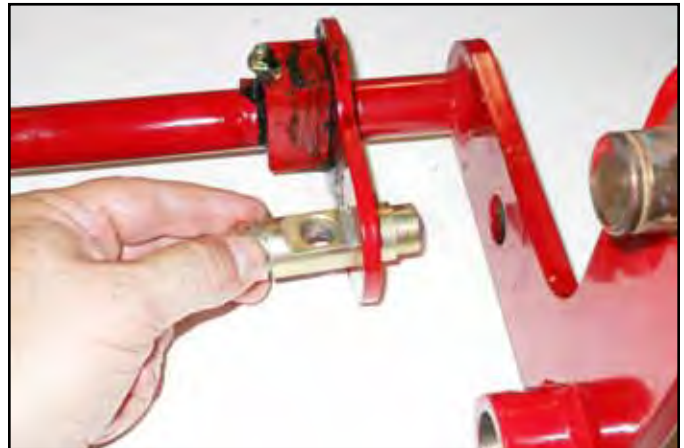


Fig. 0232

DSCN-0740a

3. Secure the position of the HOC pin with the "E" clip (Fig. 0233).



Fig. 0233

DSCN-0751a

4. Position the rear cross shaft onto the engine base (Fig. 0234).

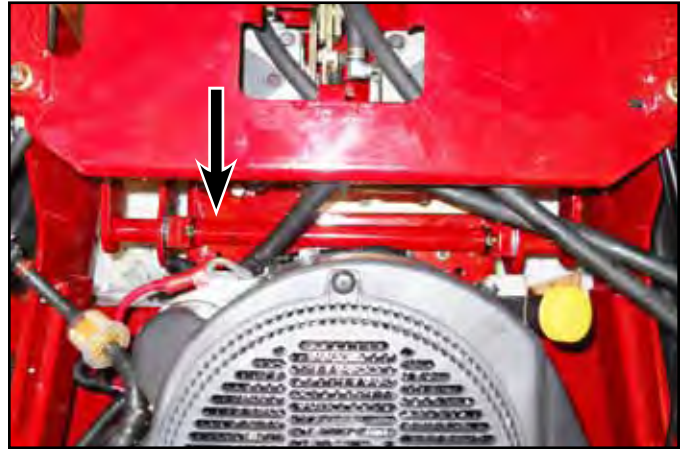


Fig. 0234

DSCN-0752a

3

Note: Position the grease blocks so the grease fittings are pointing upwards (Fig. 0235).

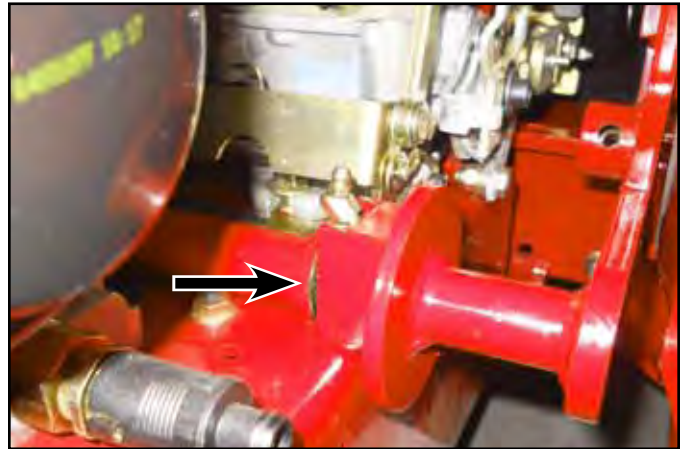


Fig. 0235

DSCN-0756a

CHASSIS

5. Position the right hand lift plate over the grease block with the bolt hole pattern aligned with the mating pattern on the engine base (Fig. 0236).



Fig. 0236

DSCN-0758a

7. **2009 only:** Tighten the four sets of fasteners.
8. **2010 only:** The right side lift plate is secured with three long carriage bolts and one short (Fig. 0238).



Fig. 0238

DSCN-0768a

6. **2009 only:** Loosely install four carriage bolts, Belleville washers, nuts (Fig. 0237).



Fig. 0237

DSCN-0784a

9. **2010 only:** Loosely install the short carriage bolt and nut in the upper left bolt hole (Fig. 0239).

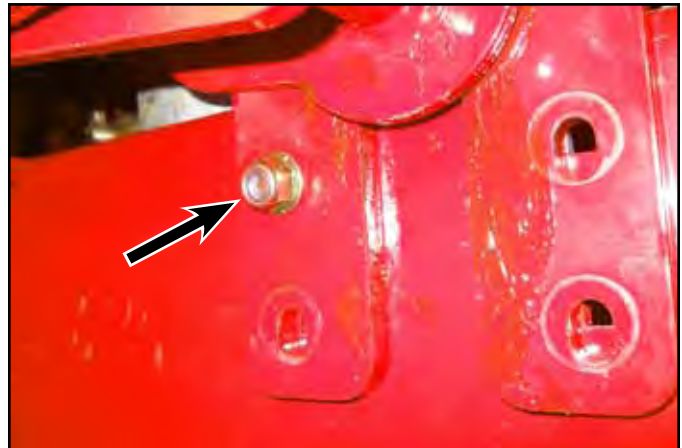


Fig. 0239

DSCN-0770a

10. **2010 only:** Loosely install the remaining three carriage bolts, Belleville washers, and nuts (Fig. 0240).



Fig. 0240 DSCN-0772a

13. Loosely install four carriage bolts, Belleville washers, nuts (Fig. 0242).



Fig. 0242 DSCN-0784a

11. **2010 only:** Tighten the four sets of fasteners.
12. Position the left hand lift plate over the grease block with the bolt hole pattern aligned with the mating pattern on the engine base (Fig. 0241).

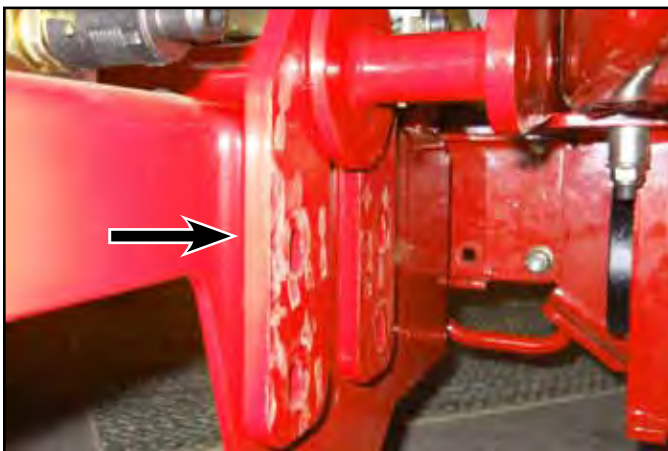


Fig. 0241 DSCN-0780a

14. Tighten the four sets of fasteners.
15. **2009 only:** Install the spacer into the rear cross shaft hub (Fig. 0243).

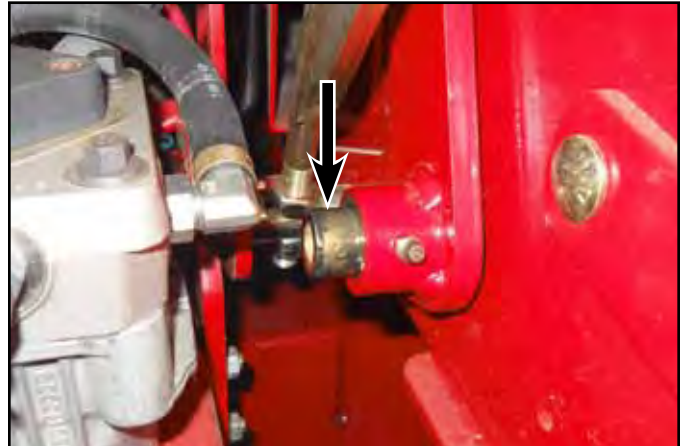


Fig. 0243 DSCN-1603a

CHASSIS

16. **2009 only:** Install the bolt through the carrier frame, then through the spacer and hub assembly (Fig. 0244).



Fig. 0244

DSCN-1606a

18. **2009 only:** Repeat steps 15, 16 and 17 on the other side of the unit.

19. **2010 only:** Position the RH pivot shaft through the carrier frame hub and rear cross shaft assembly (Fig. 0246).



Fig. 0246

DSCN-0717a

17. **2009 only:** Secure the assembly using a washer and nut (Fig. 0245).

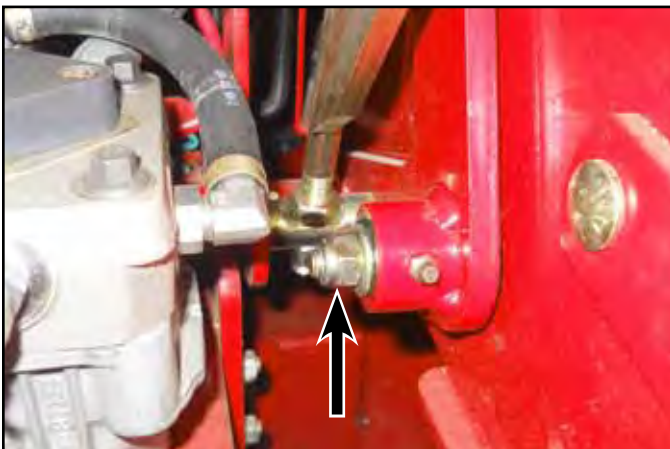


Fig. 0245

DSCN-1607a

20. **2010 only:** Rotate the pivot shaft so the spiral pin hole of the pivot shaft aligns with the spiral pin hole of the rear cross shaft assembly, then secure the assembly with the spiral pin (Fig. 0247).



Fig. 0247 DSCN-0791a

21. **2010 only:** Repeat steps 19 and 20 on the LH side of the machine.

22. **48" and 52" decks:** Install the lift rod through the lift rod bracket and secure with nut (Fig. 0249).



Fig. 0249 DSCN-0798a

Note: The spiral pin ends need to be flush to the lift arm hub (Fig. 0248).

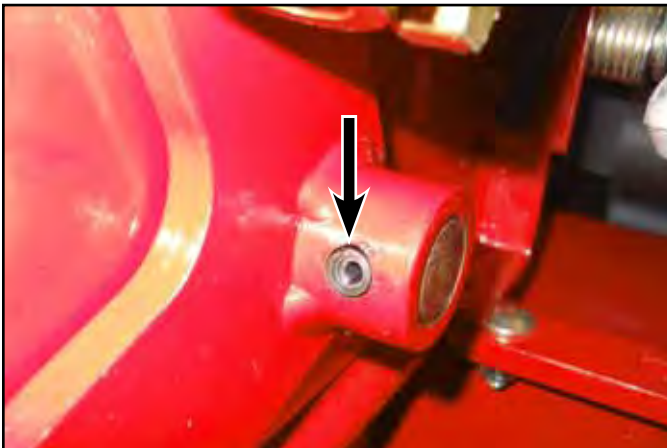


Fig. 0248 DSCN-1400a

23. **60" decks:** Install the lift rod to the turnbuckle and secure with jam nut (Fig. 0250).

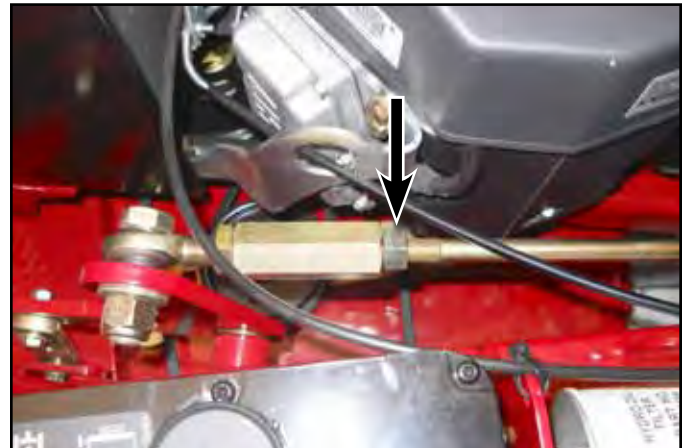


Fig. 0250 DSCN-0797a

CHASSIS

24. Position the opposite end of the lift rod over the stud on the rear cross shaft assembly (Fig. 0251).

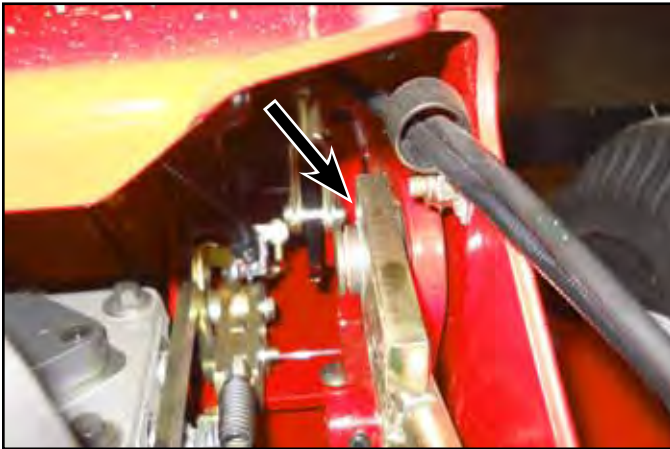


Fig. 0251 DSCN-0801a

25. Position the large washer over the rear cross shaft stud (Fig. 0253).



Fig. 0253 DSCN-0807a

Note: Ensure the flange bearing is still in place (Fig. 0252).

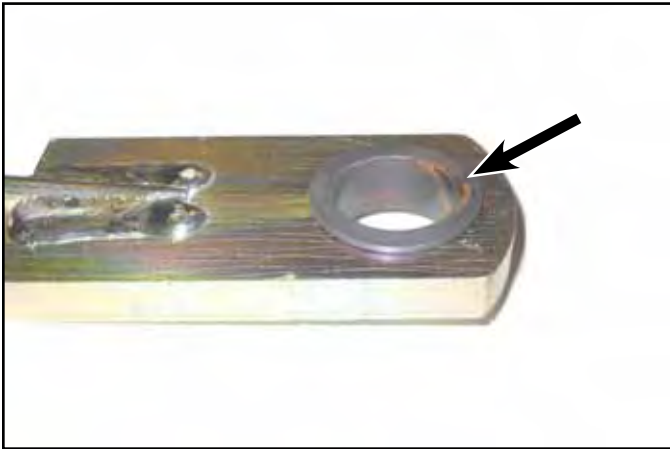


Fig. 0252 DSCN-0804a

26. Secure the assembly using the "E" clip (Fig. 0254).

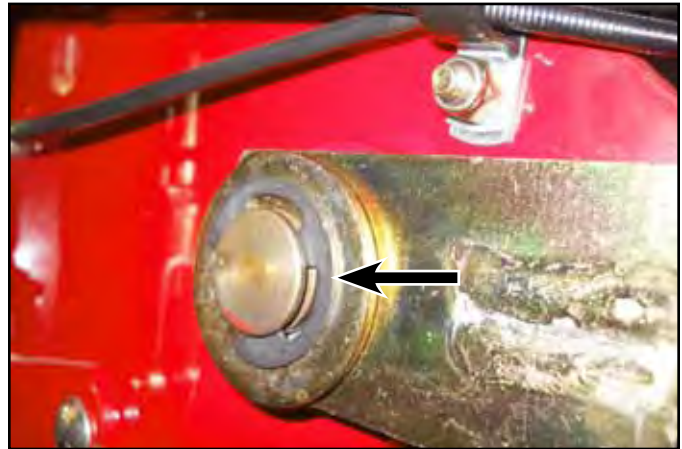


Fig. 0254 DSCN-0808a

27. Repeat steps 24 through 26 on the other side of the machine.
28. Replace the fitting o-rings. Install the high pressure hoses to the pumps in their original positions (Fig. 0255).



Fig. 0255 DSCN-0810a

30. **2009 only:** Install the lift assist cylinder. See “Lift Assist Cylinder Installation (2009 only)” on page 3-43.
31. **2010 only:** Position the chain between the pivot shaft and extension spring assembly (Fig. 0257).



Fig. 0257 DSCN-0815a

29. Secure the hose routings using three cable ties (Fig. 0256).

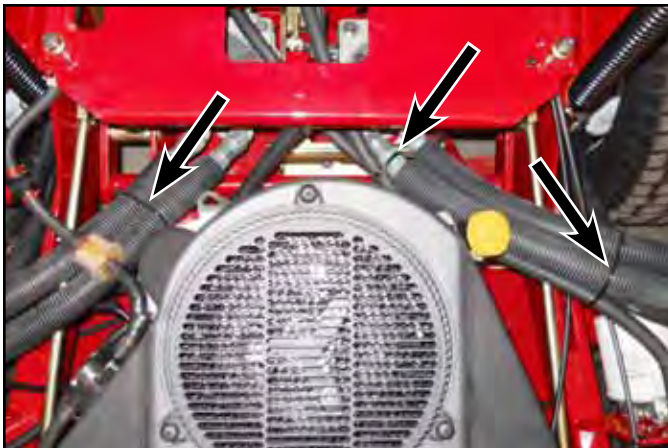


Fig. 0256 DSCN-0689a

32. **2010 only:** Secure the extension spring assembly and chain to the control tower using the bolt and washer (Fig. 0258).

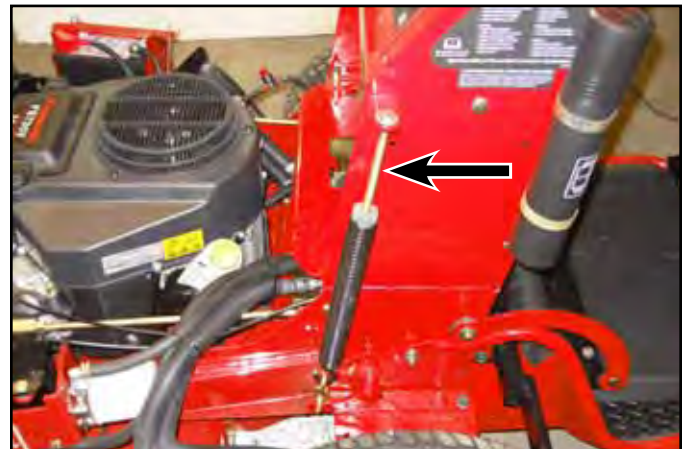


Fig. 0258 DSCN-0818a

CHASSIS

33. **2010 only:** Install the bolt until the gap between the control tower mount and spring cap is 1-1/2" (3.8cm) for 60" decks / 2" (5cm) 48" or 52" decks (Fig. 0259).

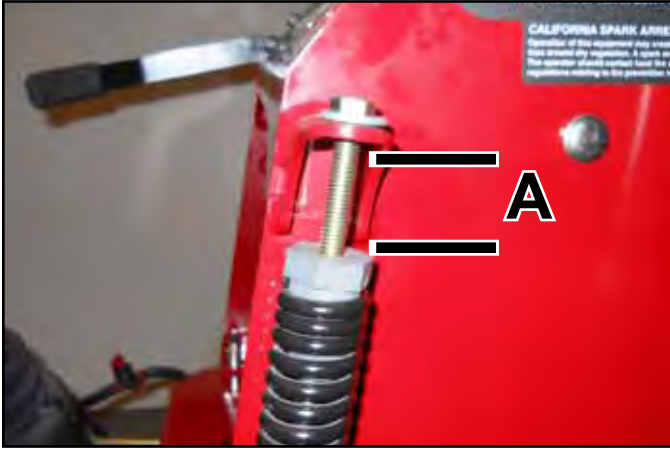


Fig. 0259 DSCN-0820a

- A. 1-1/2" (3.8cm) for 60" decks
2" (5cm) for 48" for 52" decks

34. **2010 only:** Repeat steps 31 through 33 on the other side of the machine.
35. Install the fuel tank. See "Fuel Tank Assembly Installation" on page 3-29.
36. **2009 only:** Secure the lower end of the lift bar to the rear cross shaft assembly using a nut. Thread the nut onto the bolt until there are 3 threads protruding (Fig. 0260).

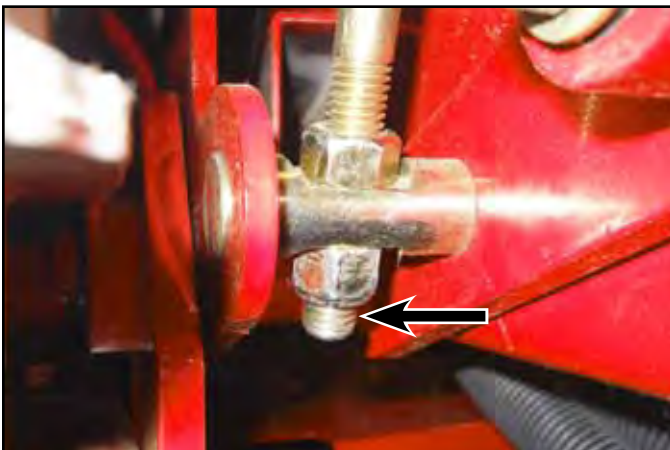


Fig. 0260 DSCN-0274a

37. **2010 only:** Secure the lower end of the lift bar to the rear cross shaft assembly using the dampener assembly and nut. Thread the dampener assembly bolt into the nut until there are 3 threads protruding (Fig. 0261).

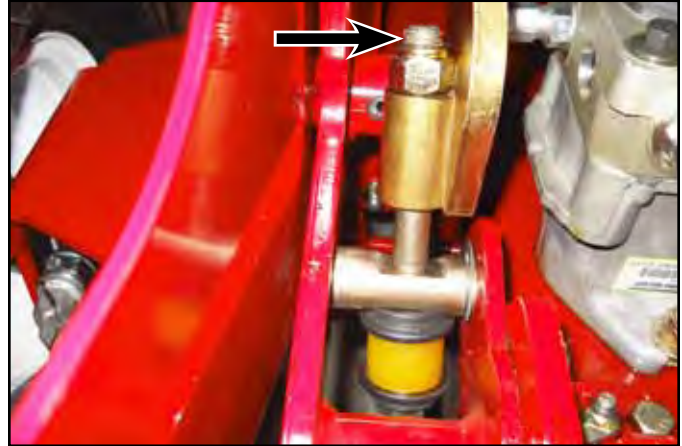


Fig. 0261 DSCN-0793a

38. Place the HOC pin into the 3" (7.62cm) HOC position, then verify that the blade height is also at 3" (7.62cm).

Note: Use the dampener assembly bolt (2009 uses a nut) to adjust as needed (Fig. 0262).

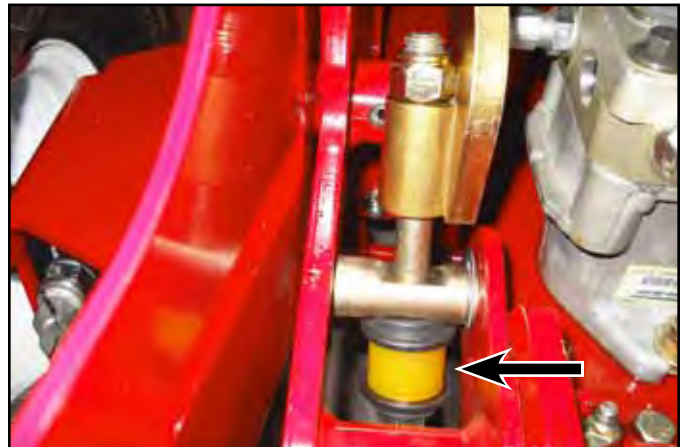


Fig. 0262 DSCN-0793a

39. Bleed the hydraulic system. See "Bleeding the Hydraulic System" on page 6-95.

Engine Base Replacement

Engine Base Removal

1. **2009 only:** Remove the lift assist cylinder. See “Lift Assist Cylinder Removal (2009 only)” on page 3-40.
2. Place two boards under the deck and lower the deck onto them (Fig. 0263).

Note: The boards need to be long enough to support the front and rear of the deck.



Fig. 0263

DSCN-0685a

3. **2009 only:** Remove the nut securing the lift bar to the rear cross shaft assembly (Fig. 0264).

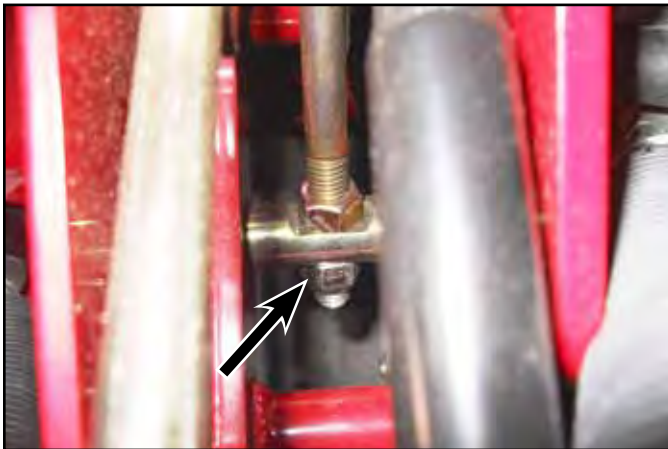


Fig. 0264

DSCN-0795a

4. **2010 only:** Remove the dampener assembly that secures the lift bar to the rear cross shaft assembly (Fig. 0265).

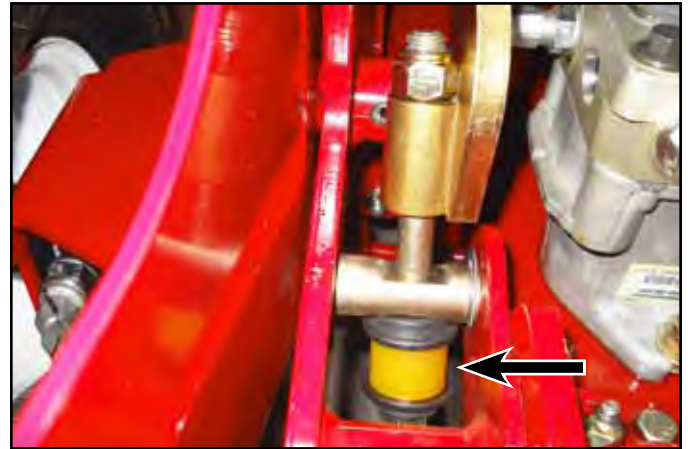


Fig. 0265

DSCN-0793a

5. Remove the fuel tank. See “Fuel Tank Assembly Removal” on page 3-26.
6. Remove the cable ties securing the high-pressure hoses (Fig. 0266).

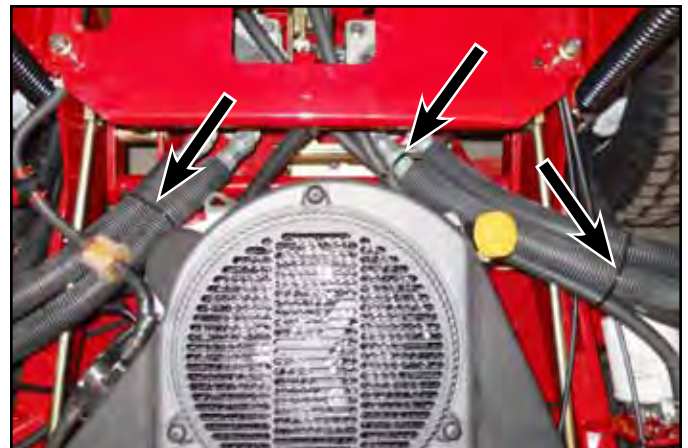


Fig. 0266

DSCN-0689a

CHASSIS

7. Mark the hydraulic fittings and hoses so they can be correctly installed upon reassembly (Fig. 0267).



Fig. 0267

DSCN-0691a

9. **2010 only:** Remove the bolts and washers securing the extension spring assemblies and chains to the RH and LH sides of the control tower (Fig. 0269).

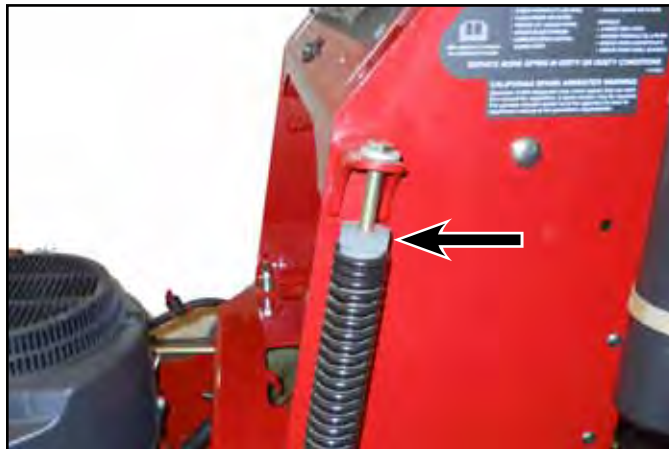


Fig. 0269

DSCN-0700a

8. Remove the high-pressure hoses from the pump fittings (Fig. 0268).

Note: Cap the pump and hose fittings to prevent debris from entering the hydraulic system.



Fig. 0268

DSCN-0696a

10. Remove the "E" clips and washers securing the RH and LH lift rod to the rear cross shaft assembly (Fig. 0270).

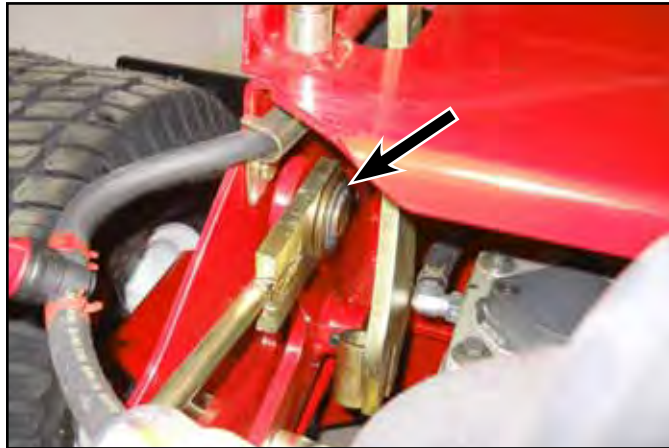


Fig. 0270

DSCN-0704a

11. **48" and 52" decks only:** Remove the nuts from the end of the lift rods and remove the RH and LH lift rods (Fig. 0271).

Note: Leave the inside nuts in their location to minimize deck leveling adjustments at the end of this procedure.



Fig. 0271

DSCN-0707a

12. **60" decks only:** Loosen the rear jam nuts securing the LH and RH lift rods to the turn buckle, then remove the RH and LH lift rods (Fig. 0272).

Note: Note the position of the jam nuts to minimize deck leveling adjustments at the end of this procedure.



Fig. 0272

DSCN-0710a

13. **2009 only:** Remove the bolts, spacers, washers and nuts securing the cross shaft assembly to the carrier frame (Fig. 0273).

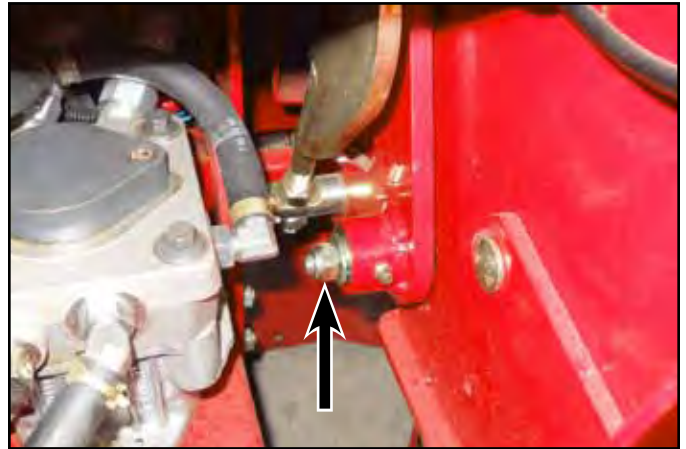


Fig. 0273

DSCN-1602a

14. **2010 only:** Using a blunt punch, drive the spiral pins that secure the LH and RH pivot shafts to the rear cross shaft assembly (Fig. 0274).

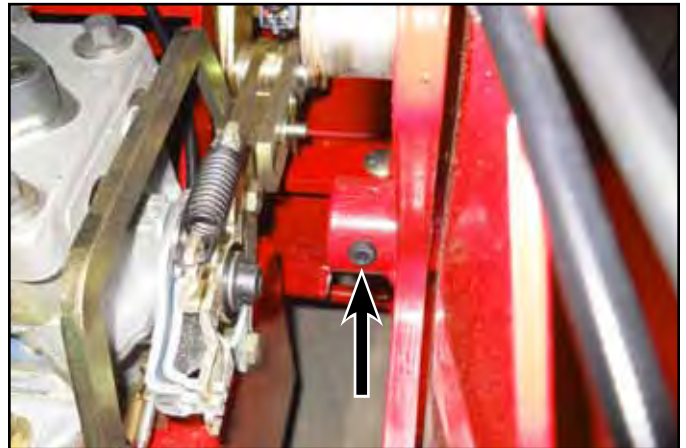


Fig. 0274

DSCN-0712a

CHASSIS

15. **2010 only:** Remove the LH and RH pivot shafts from the rear cross shaft assembly and carrier frame hub (Fig. 0275).

Note: 48" and 52" decks are set to a narrow stance. Remove the wheels to remove the pivot shafts. Reinstall the wheels after removing the pivot shafts.



Fig. 0275

DSCN-0717a

16. Remove the four carriage bolts and nuts securing the muffler guard and guard panel to the carrier frame, then remove both (Fig. 0276).

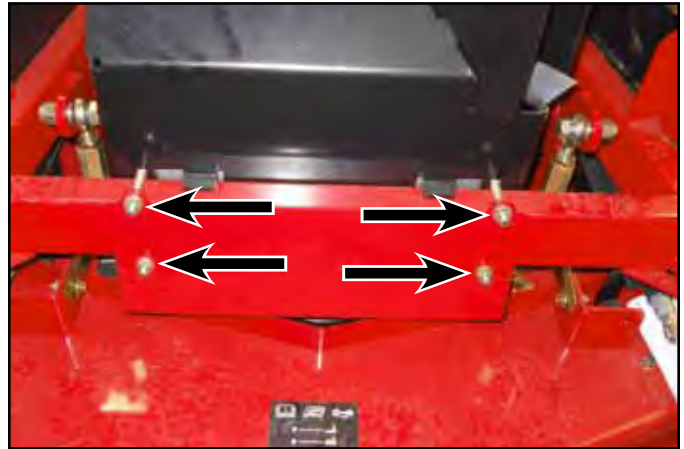


Fig. 0276

DSCN-0932a

Note: 48" and 52: models use two guard mounting brackets instead of the single guard panel (Fig. 0277).

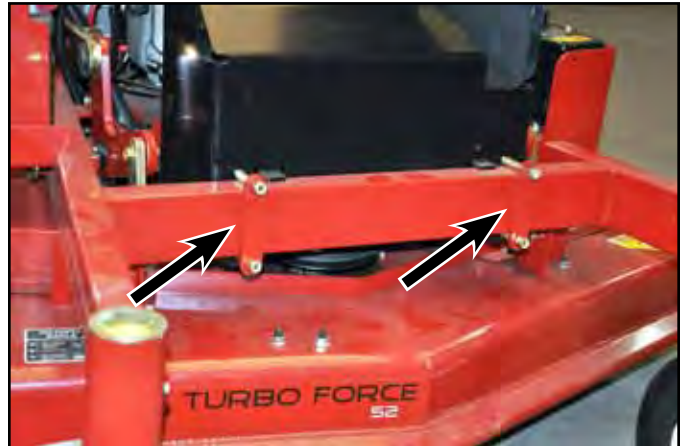


Fig. 0277

IMG-0586a

17. Remove the shoulder bolts, washers, and nuts securing the LH and RH lift links to the deck (Fig. 0278).

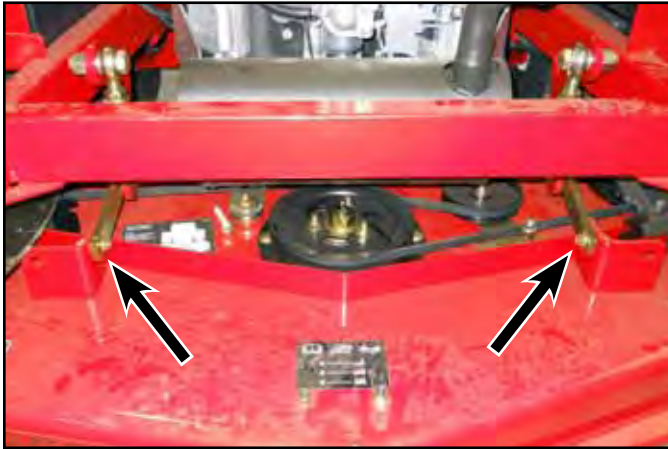


Fig. 0278

DSCN-0935a

18. Loosen the cable clamp securing the choke cable to the engine throttle plate, then remove the cable from the clamp (Fig. 0279).

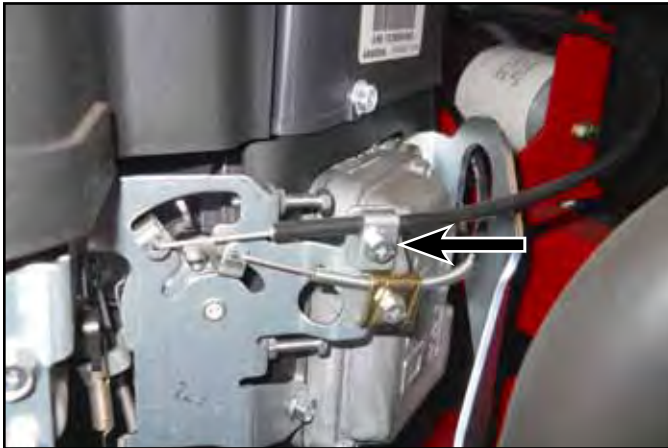


Fig. 0279

DSCN-0941a

19. Remove the “Z” bend from the engine choke lever (Fig. 0280).



Fig. 0280

DSCN-0945a

20. Loosen the cable clamp securing the throttle cable to the engine throttle plate, then remove the cable from the clamp (Fig. 0281).

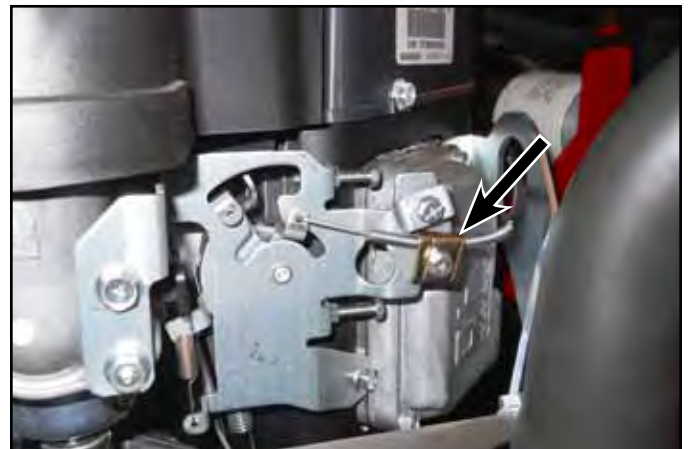


Fig. 0281

DSCN-0946a

CHASSIS

21. Remove the “Z” bend from the engine throttle lever (Fig. 0282).



Fig. 0282

DSCN-0950a

23. Remove the nut and bolt securing the negative cable to the battery (Fig. 0284).



Fig. 0284

DSCN-0953a

22. Remove the two sets of wing nuts and hold down bolts securing the battery cover to the battery tray, then remove the cover (Fig. 0283).



Fig. 0283

DSCN-0952a

24. Remove the nut and bolt securing the positive cable to the battery (Fig. 0285).



Fig. 0285

DSCN-0957a

25. Slide the hose clamp back on the fuel line and remove the fuel line from the fuel filter (Fig. 0286).



Fig. 0286

DSCN-0959a

26. Slide the hose clamp back on the low-pressure return hose, then remove the hose from the "T" fitting (Fig. 0288).



Fig. 0288

DSCN-0965a

Note: Position a pan under the fuel hose to catch any fuel remaining in the fuel hose (Fig. 0287).



Fig. 0287

DSCN-0962a

27. Slide the hose clamp back on the low-pressure suction hose, then remove the hose from the "T" fitting (Fig. 0289).

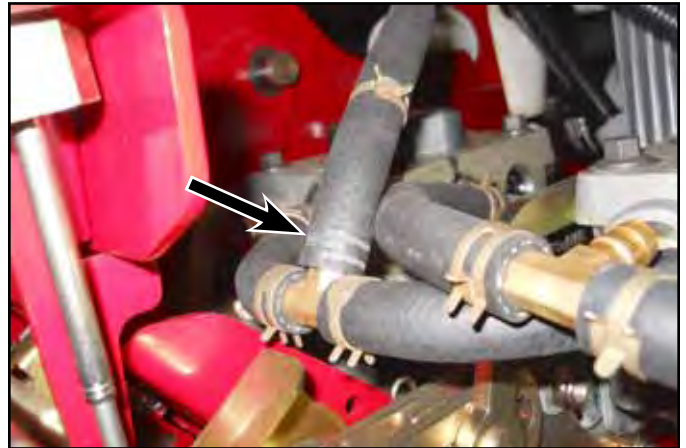


Fig. 0289

DSCN-0967a

CHASSIS

28. Disconnect the wire harness from the neutral switch (Fig. 0290).

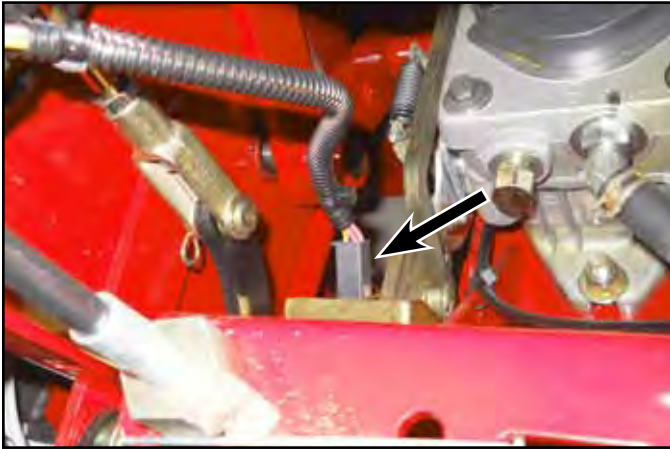


Fig. 0290

DSCN-0974a

30. Unplug the pink wire from the green fuel solenoid wire (Fig. 0292).

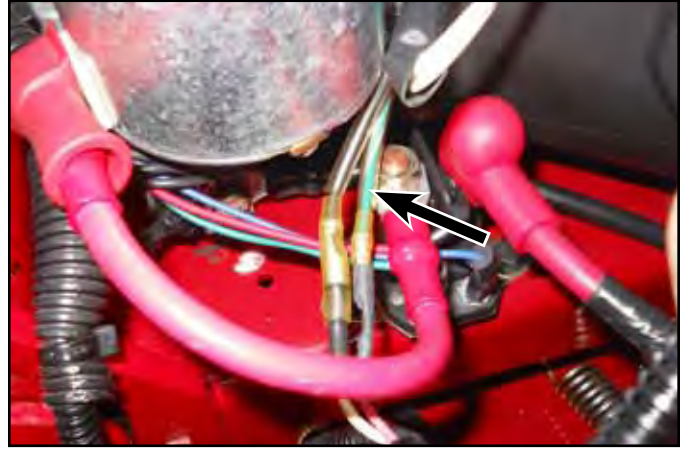


Fig. 0292

DSCN-0978a

29. Disconnect the violet wire from the voltage regulator (Fig. 0291).

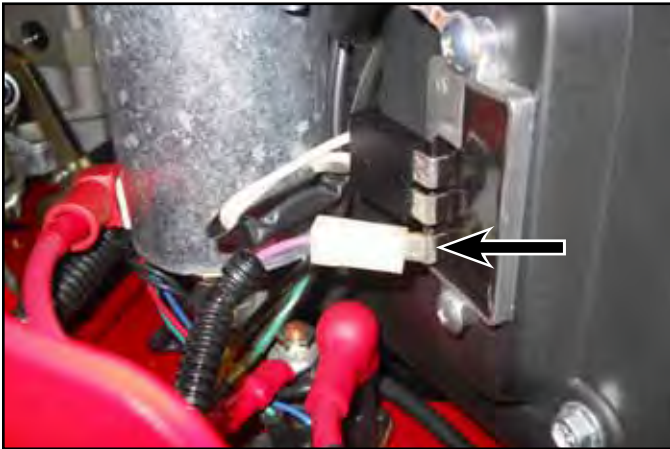


Fig. 0291

DSCN-0977a

31. Unplug the white wire from the black magneto wire (Fig. 0293).

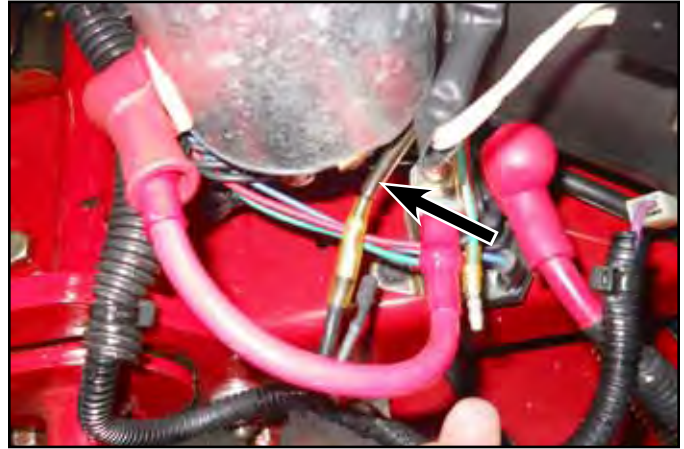


Fig. 0293

DSCN-0980a

32. Remove nut and lock washer securing the positive battery cable and red wire eyelet to the solenoid post (Fig. 0294).



Fig. 0294 DSCN-0984a

34. Remove the bolt and washer securing the ground wires to the engine block (Fig. 0296).

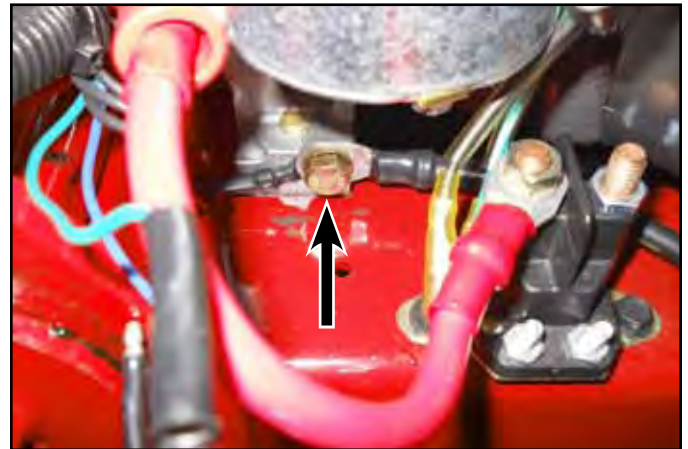


Fig. 0296 DSCN-0991a

33. Remove the green and blue bullet connectors from the two small studs on the solenoid (Fig. 0295).

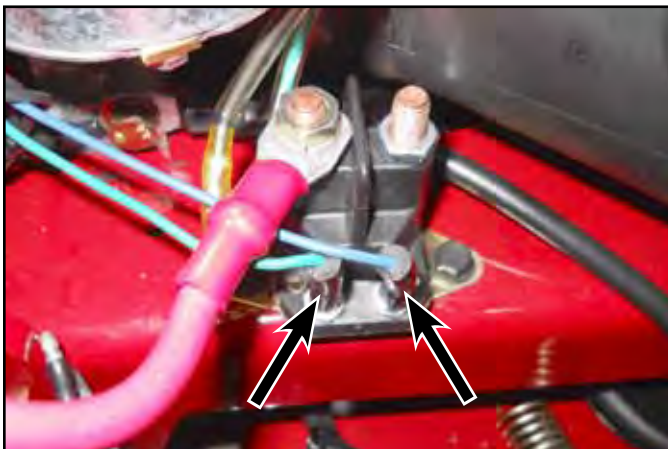


Fig. 0295 DSCN-0988a

35. Disconnect the clutch wires from the wiring harness (Fig. 0297).

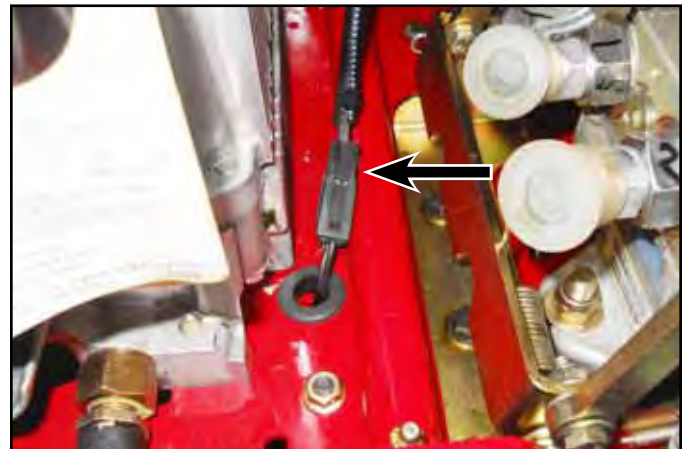


Fig. 0297 DSCN-0993a

CHASSIS

36. Remove both sets of bolts, nuts, and spacers securing the lower end of the control cables to the control fork assemblies (Fig. 0298).



Fig. 0298

DSCN-0996a

38. Remove the two cable ties securing the speed control cable to the RH control cable and the lower LH side of the linkage mount (Fig. 0300).

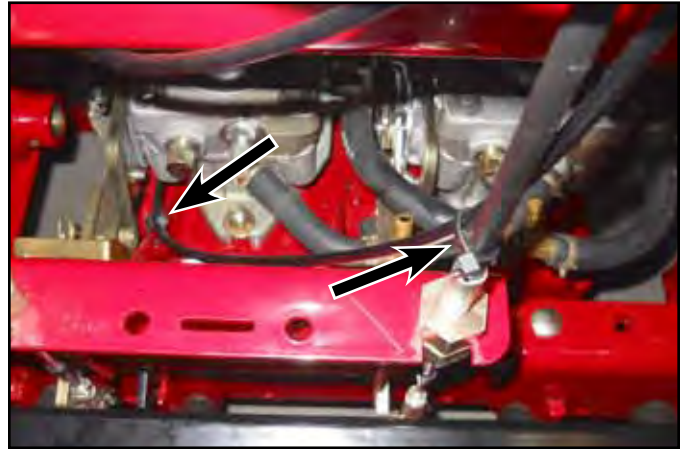


Fig. 0300

DSCN-1000a

37. Remove the spring clip securing the motion control cables to the linkage mount (Fig. 0299).



Fig. 0299

DSCN-0999a

39. Remove the motion control cables from the linkage mount (Fig. 0301).

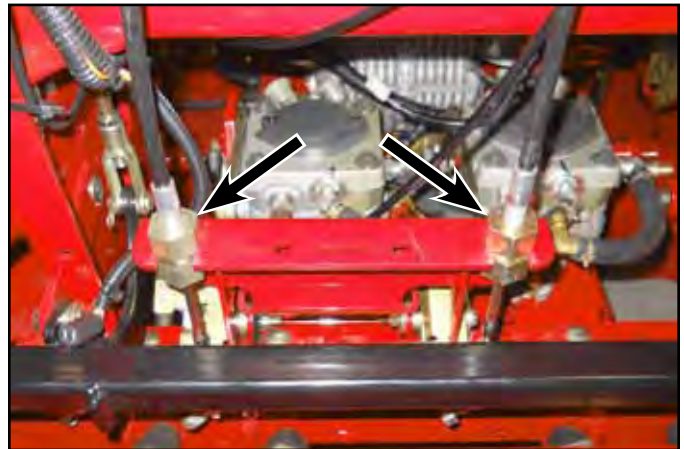


Fig. 0301

DSCN-1005a

3

40. Remove the speed control cable clip from the speed control handle assembly (Fig. 0302).



Fig. 0302

DSCN-1010a

42. Remove the four sets of bolts, spacers and nuts (two sets per side) that secure the axle and wheel assembly to the carrier frame (Fig. 0304).

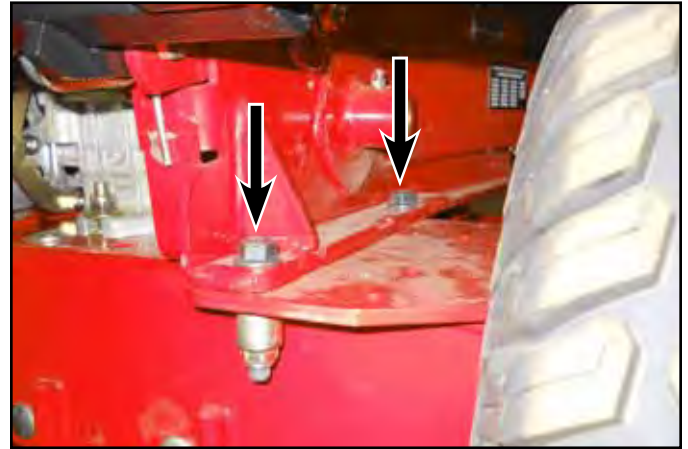


Fig. 0304

DSCN-1019a

41. Remove the "Z" bend of the speed control cable from the speed control handle assembly (Fig. 0303).



Fig. 0303

DSCN-1015a

43. Using two people or a hoist, lift the rear end of the carrier frame and tower assembly (Fig. 0305).



Fig. 0305

DSCN-1024a

CHASSIS

44. Walk the carrier frame and tower assembly forward, over the engine and deck assembly (Fig. 0306).



Fig. 0306

DSCN-1028a

46. Remove the two thread forming screws securing the solenoid to the engine base (Fig. 0308).

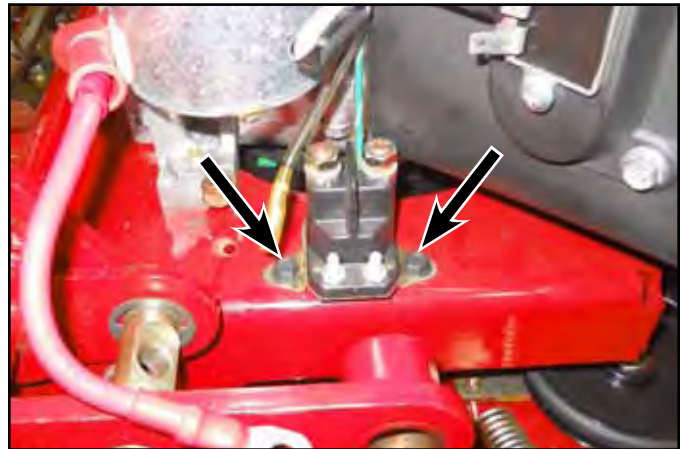


Fig. 0308

DSCN-1032a

45. Remove the nut and lock washer securing the starter cable to the solenoid post (Fig. 0307).



Fig. 0307

DSCN-1030a

47. Remove the four sets of carriage bolts, washers and nuts securing the lift plate to the engine base (Fig. 0309).



Fig. 0309

DSCN-1240a

48. Remove the lift plate (Fig. 0310).



Fig. 0310

DSCN-1035a

49. Repeat steps 46 and 47 on the other side of the engine base.

50. Remove the rear cross shaft assembly from the engine base (Fig. 0311).

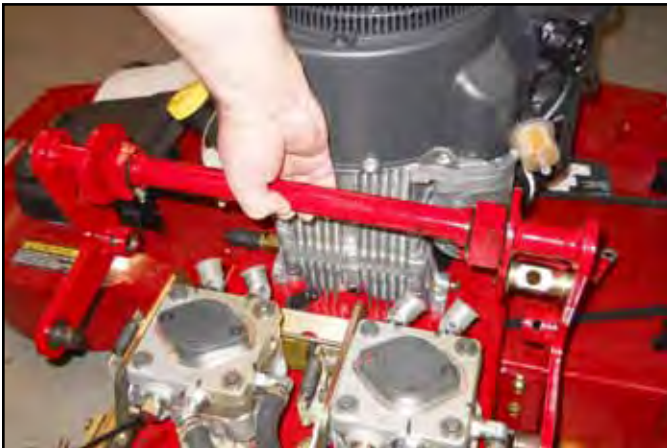


Fig. 0311

DSCN-1036a

51. **2009 only:** Remove the hairpin cotter and washer securing the front ends of the shifter links to the shifter bracket (Fig. 0312).

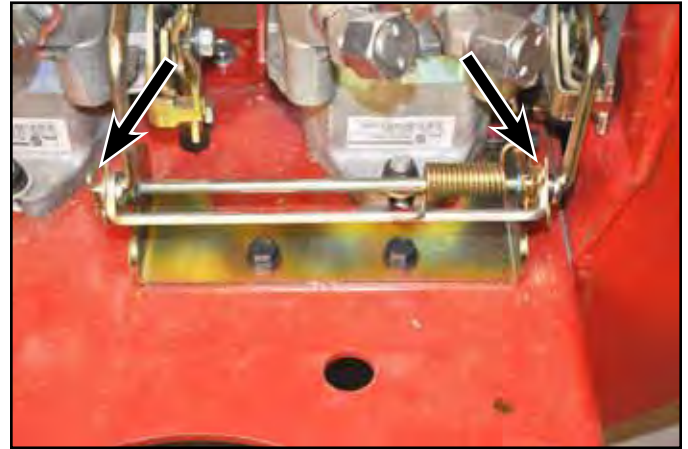


Fig. 0312

IMG-0348a

52. **2010 only:** Remove the bolts, nuts, washers and spacers securing the front end of the shifter links to the shifter bracket (Fig. 0313).

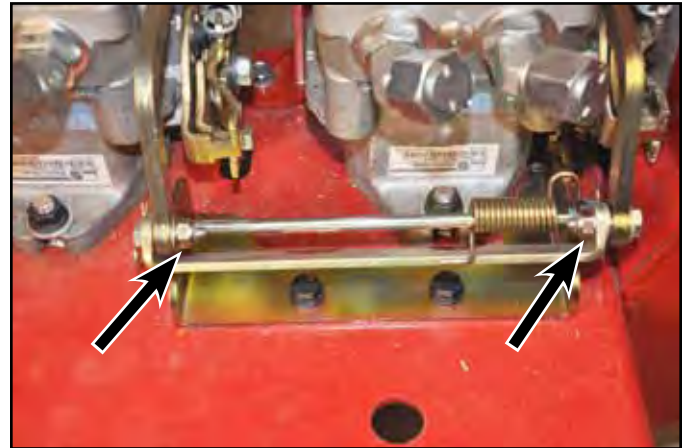


Fig. 0313

IMG-0346a

CHASSIS

53. Remove the hairpin cotter and washer from the rear end of the shifter links (Fig. 0314).

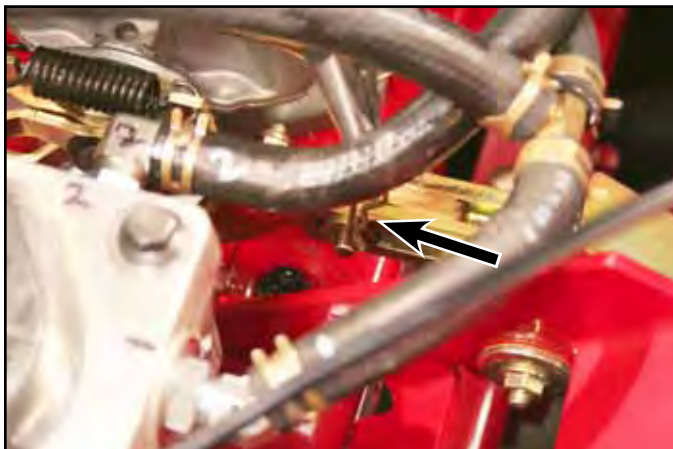


Fig. 0314

IMG-9424a

55. **2009 only:** Serial range 290000210 - 290999999: There are 3 rollers located on the rear end of the RH shifter link rod inside the control fork assembly and pump control arm. Slide the left hand roller off the rear end of the RH shifter link rod (Fig. 0316).

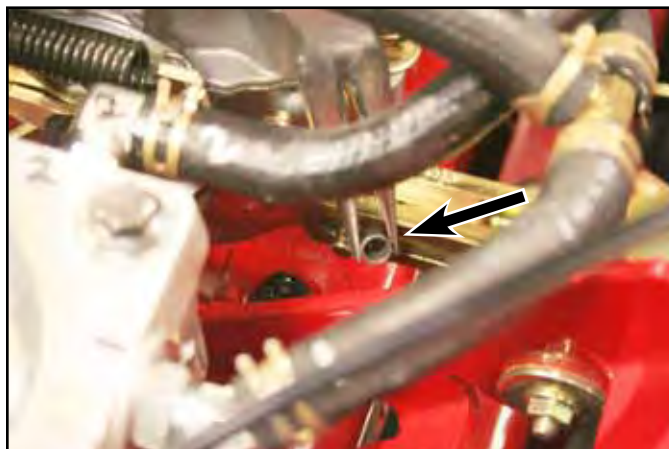


Fig. 0316

IMG-9430a

54. **2009 only:** Serial range 290000001 - 290000209: Remove the RH shifter link rod and the 3 rollers located on the rear end of the shifter link rod from the inside of the control fork assembly and pump control arm (Fig. 0315).



Fig. 0315

IMG-9486a

56. **2009 only:** Serial range 290000210 - 290999999: Remove the rear end of the RH shifter link and the right hand roller (Fig. 0317).

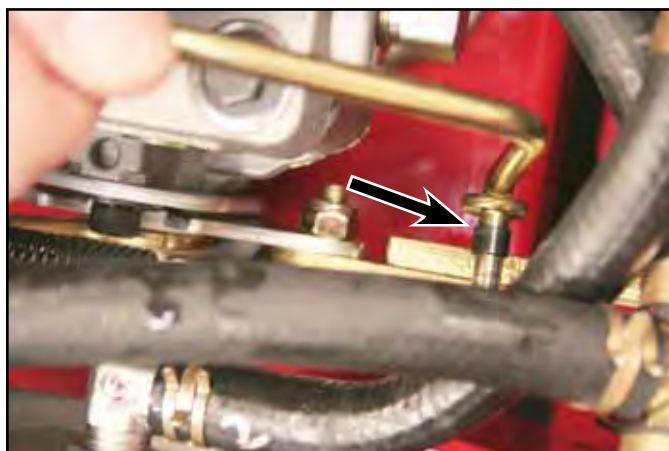


Fig. 0317

IMG-9432a

57. **2009 only:** Serial range 290000210 - 290999999: Push down on the control fork assembly and remove the center roller from the pump control arm slot (Fig. 0318).



Fig. 0318

IMG-9436a

58. **2009 only:** Repeat steps 54 through 57 on the LH side.

59. **2010 only:** Remove the shifter links and the 3 rollers located on the rear end of the shifter links inside of the control fork assemblies (Fig. 0319).



Fig. 0319

IMG-0936a

Shifter Link and Roller Configurations (Fig. 0320):

- A. **2009:** Serial range 290000001-290000210; 3 rollers, all thin and same size
- B. **2009:** Serial range 290000211-290999999; 3 rollers, large center roller
- C. **2010:** Serial range 310000001-310999999; 3 rollers, all large and same size

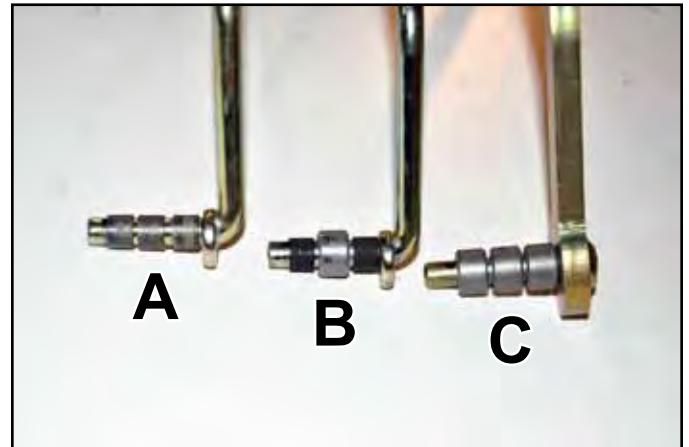


Fig. 0320

IMG-0941a

60. Unhook the "J" hook end of the torsion spring from the shifter plate (Fig. 0321).

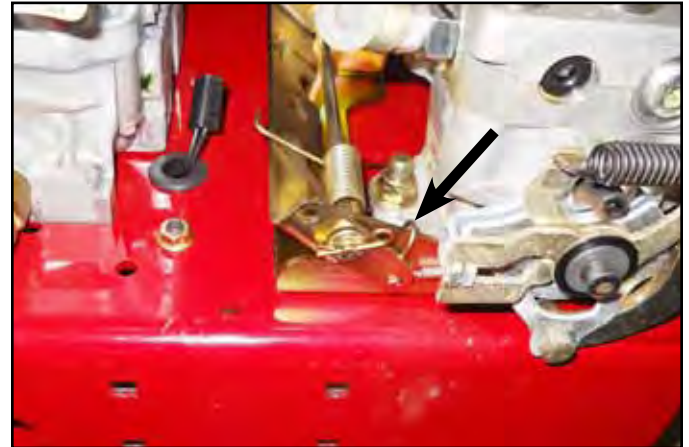


Fig. 0321

DSCN-1039a

CHASSIS

61. Remove the two thread forming screws and washers securing the shifter and speed control cable assembly to the engine base (Fig. 0322).

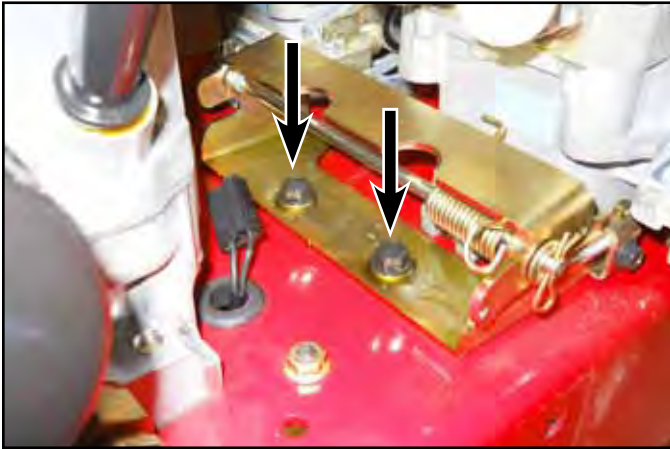


Fig. 0322

DSCN-1042a

63. Remove the three thread forming screws securing the drive linkage mount assembly to the engine base (Fig. 0324).



Fig. 0324

DSCN-1049a

62. Remove the shifter and speed control cable assembly (Fig. 0323).



Fig. 0323

DSCN-1043a

64. Remove the drive linkage mount assembly from the engine base.

65. Using a spring tool, remove the deck idler spring from the spring anchor (Fig. 0325).



Fig. 0325

DSCN-1050a

66. Remove the deck belt from the clutch pulley (Fig. 0326).

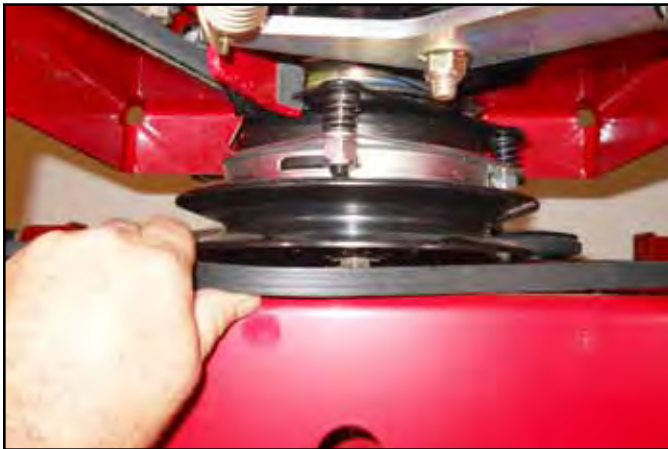


Fig. 0326

DSCN-1053a

68. Remove the drive belt.

69. Remove the two set screws securing the pump pulley to the pump input shaft (Fig. 0328).



Fig. 0328

DSCN-1066a

67. Using a spring tool, remove the hydro drive idler spring from the spring anchor (Fig. 0327).

Note: On 2009 machines the extension spring hooks to the rear of the engine base.

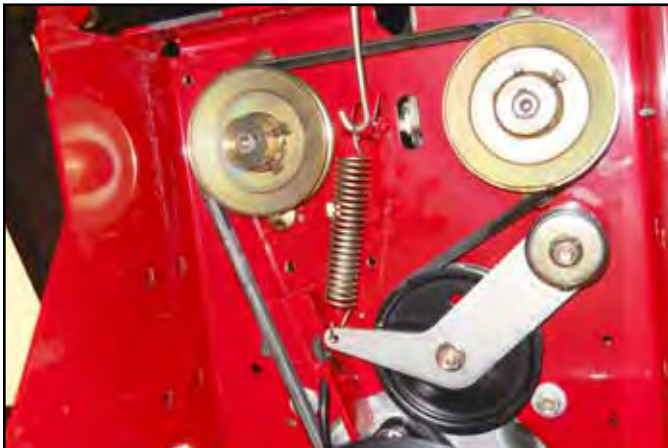


Fig. 0327

DSCN-1059a

70. Remove the pump pulley.

71. Remove the key from the key slot in the pump input shaft (Fig. 0329).



Fig. 0329

DSCN-1074a

CHASSIS

72. Repeat steps 69 through 71 on the other pump.
73. Remove the two sets of carriage bolts, washers and nuts securing the pump to the engine base (Fig. 0330).

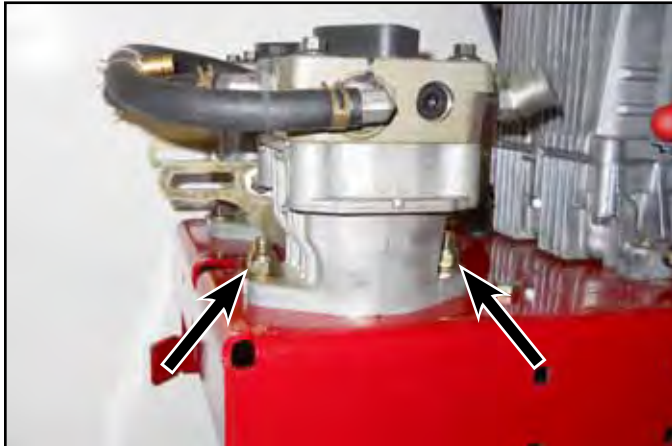


Fig. 0330 DSCN-1078a

74. Repeat step 73 on the other pump.
75. Remove both pumps from the engine base (Fig. 0331).



Fig. 0331 DSCN-1083a

76. Remove the bolt and nut securing the idler assembly to the engine base, then remove the assembly (Fig. 0332).



Fig. 0332 DSCN-1086a

77. **2010 only:** Remove the cable tie securing the clutch wires to the clutch stop (Fig. 0333).



Fig. 0333 DSCN-1087a

78. Push the clutch wire and frame grommet down through the engine base (Fig. 0334).



Fig. 0334 DSCN-1092a

80. **2010 only:** Remove the nut securing the thread forming screw used to secure the clutch anchor (Fig. 0336).



Fig. 0336 DSCN-1096a

79. **2009 only:** Remove the bolt, washers, spacer and nut securing the clutch brake strap to the engine base (Fig. 0335).



Fig. 0335 IMG-9755

81. **2010 only:** Remove the thread forming screw securing the clutch anchor to the engine base (Fig. 0337).

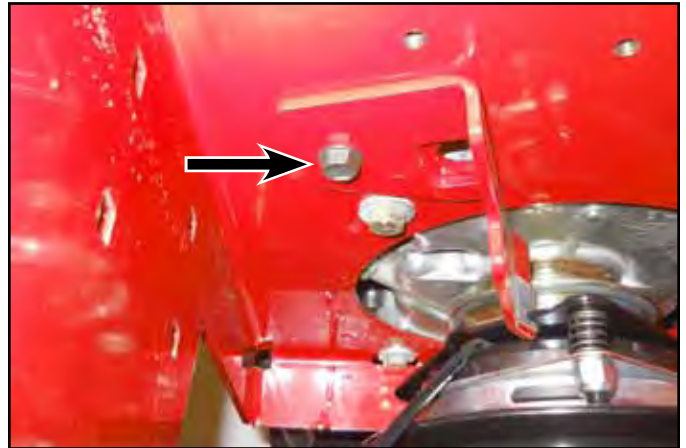


Fig. 0337 DSCN-1094a

CHASSIS

82. Using a hoist, support the weight of the engine and engine base (Fig. 0338).



Fig. 0338

DSCN-1102a

84. Remove the two sets of carriage bolts and nuts securing the rear of the engine base to the rear of the mower deck (Fig. 0340).

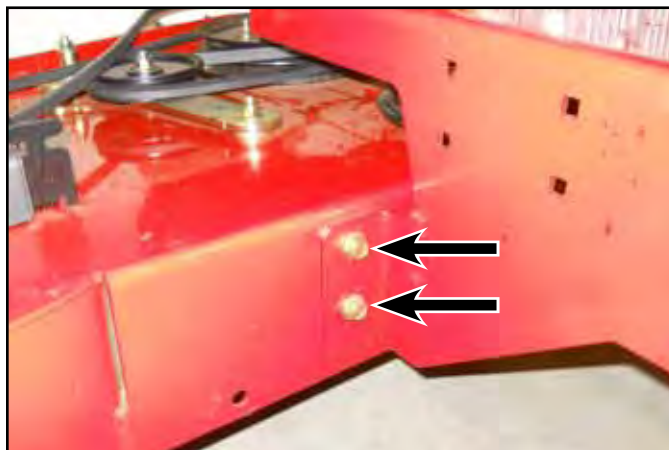


Fig. 0340

DSCN-1112a

83. Remove the bolt and nut securing the front engine base mounting tab to the top of the mower deck (Fig. 0339).

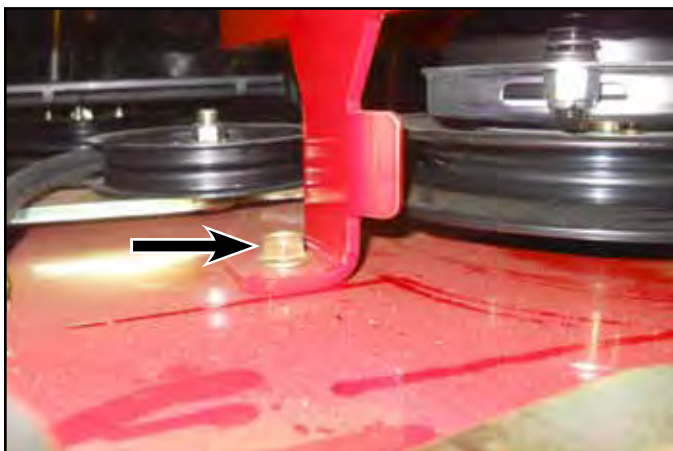


Fig. 0339

DSCN-1107a

85. Repeat step 84 on the other side of the engine base.

86. Raise the engine and engine base off the mower deck.

87. Remove one spark plug and feed a minimum of 2 feet (61cm) of 3/8" (.95cm) rope into the cylinder to prevent engine rotation (Fig. 0341).

Note: Rotate crankshaft as needed to permit feeding the rope into the cylinder.



Fig. 0341

IMG-9634a

3

88. Remove the bolt, spring washer and washer securing the clutch to the engine crankshaft (Fig. 0342).



Fig. 0342

DSCN-1114a

90. Remove the hydro drive pulley from the engine crankshaft (Fig. 0344).



Fig. 0344

DSCN-1119a

89. Remove the clutch from the engine crankshaft (Fig. 0343).



Fig. 0343

DSCN-1116a

91. Remove the key from the keyway in the engine crankshaft (Fig. 0345).



Fig. 0345

DSCN-1134a

CHASSIS

92. Remove the four engine mounting bolts and Belleville washers securing the engine to the engine base (Fig. 0346).

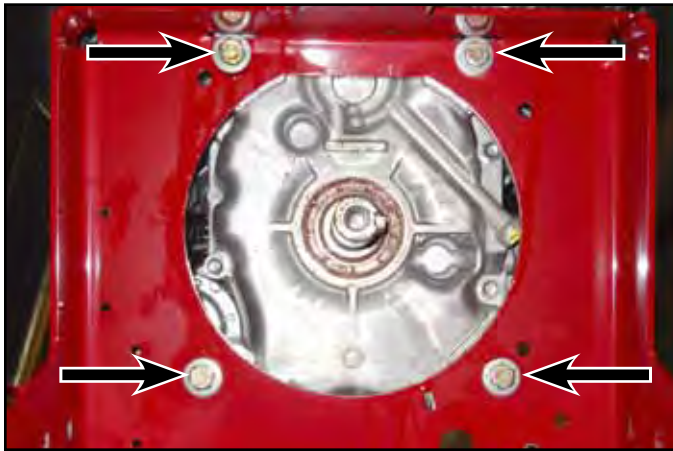


Fig. 0346

DSCN-1126a

Engine Base Installation

1. Secure the engine base to the engine using four sets of bolts and Belleville washers. Install the Belleville washers with the crown facing the bolt head. Torque to 200 ± 25 in-lbs. ($22.6 + 2.8$ Nm) (Fig. 0348).

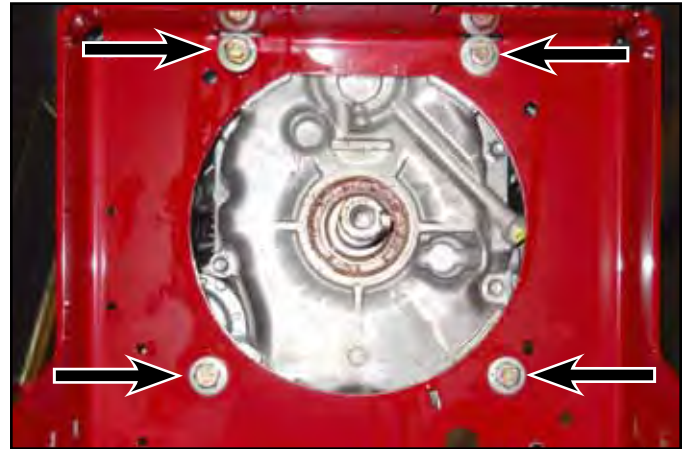


Fig. 0348

DSCN-1126a

Note: Support the engine base. The engine base will be free once the four engine mounting bolts and Belleville washers have been removed (Fig. 0347).



Fig. 0347

DSCN-1136a

Note: Apply thread-locking compound to the bolt threads prior to installation (Fig. 0349).

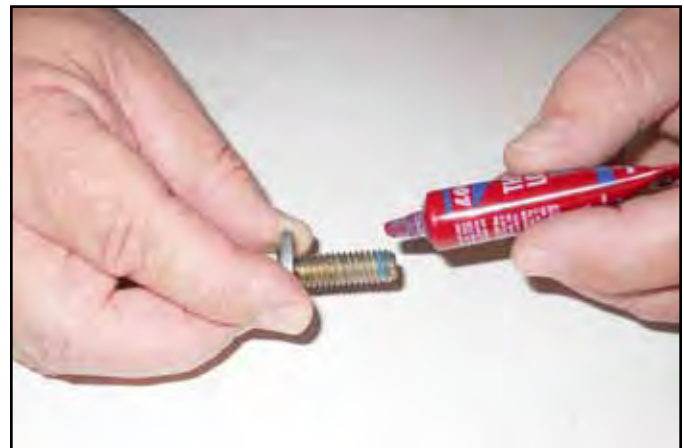


Fig. 0349

DSCN-1138a

2. Install the square key in the crankshaft and apply anti-seize around the crankshaft (Fig. 0350).



Fig. 0350 DSCN-1142a

4. Apply thread locking compound to clutch bolt threads (Fig. 0352).



Fig. 0352 DSCN-1148a

3. Install the hydro drive pulley onto the engine crankshaft (Fig. 0351).

Note: Install the pulley with the long hub facing the engine.



Fig. 0351 DSCN-1143a

5. Secure the electric clutch onto the engine crankshaft using the clutch bolt, spring washer and washer (Fig. 0353).



Fig. 0353 DSCN-1114a

CHASSIS

6. Torque the clutch bolt to 55 ± 5 ft-lbs. (75 ± 7 Nm).
7. Remove the rope from the engine cylinder and install the spark plug (Fig. 0354).

3



Fig. 0354 IMG-9634a

8. **2009 only:** Secure the clutch brake strap to the engine base using the bolt, washers, spacer and nut (Fig. 0355).



Fig. 0355 IMG-9755a

9. **2010 only:** Secure the clutch anchor to the engine base using the thread forming screw (Fig. 0356).



Fig. 0356 DSCN-1158a

Note: Ensure the rubber stop is nested in the clutch plate and the locating tab is located in the engine base slot (Fig. 0357).

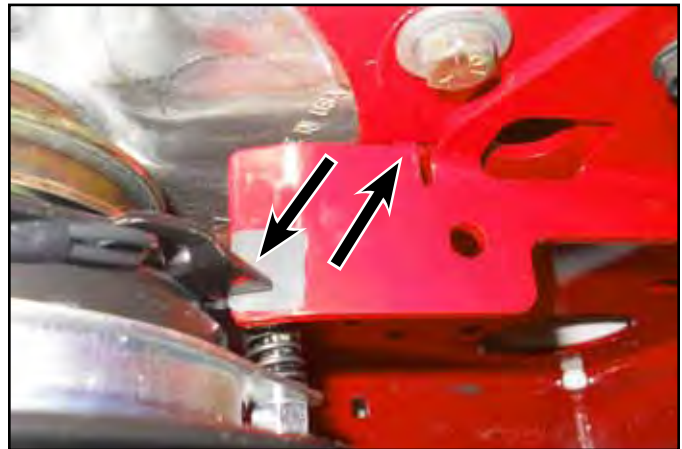


Fig. 0357 DSCN-1157a

10. **2010 only:** Secure the thread forming screw using the nut (Fig. 0358).

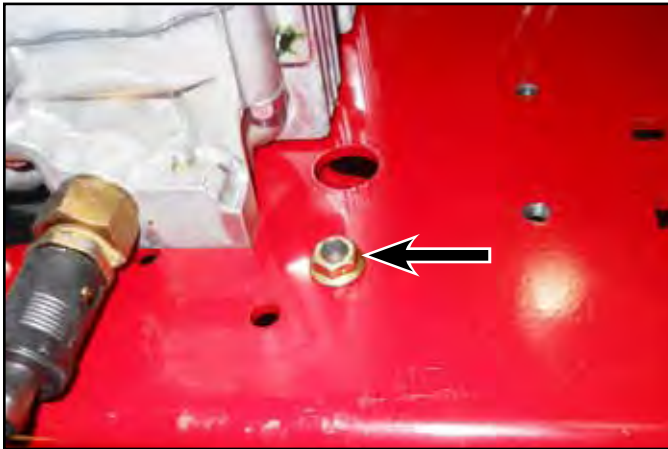


Fig. 0358 DSCN-1161a

12. **2010 only:** Secure the clutch wires to the clutch stop using a cable tie (Fig. 0360).

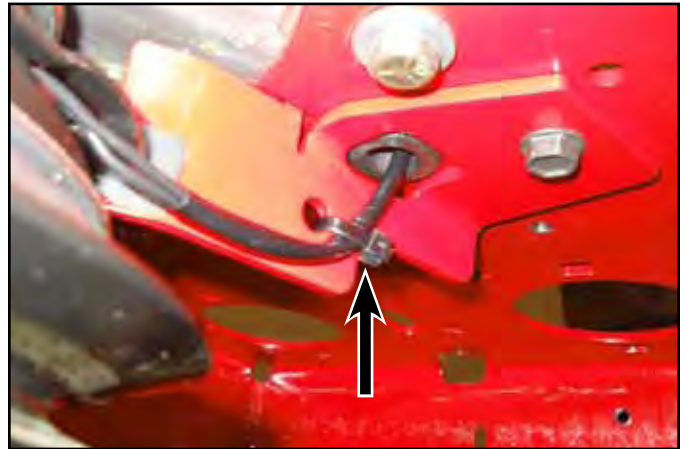


Fig. 0360 DSCN-1165a

11. Feed the clutch wires up through the engine base and install the rubber grommet into the engine base (Fig. 0359).

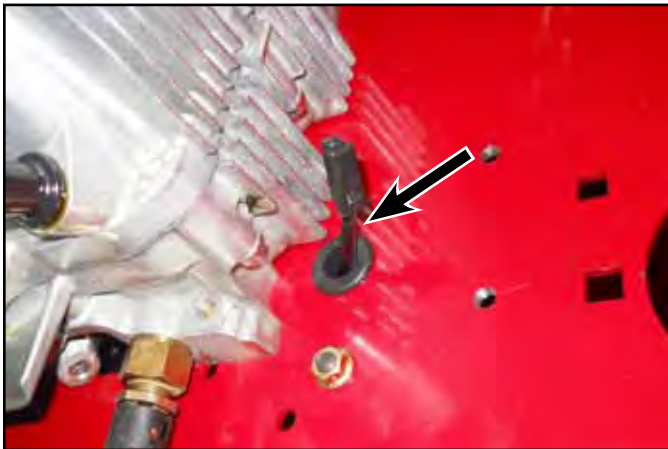


Fig. 0359 DSCN-1163a

13. Position the engine and engine base plate assembly onto the mower deck (Fig. 0361).



Fig. 0361 DSCN-1166a

CHASSIS

14. Loosely install the bolt and nut securing the engine plate front mounting tab to the top of the mower deck (Fig. 0362).



Fig. 0362

DSCN-1169a

15. Loosely install the two sets of bolts and nuts securing the rear of the engine base to the rear of the mower deck (Fig. 0363).

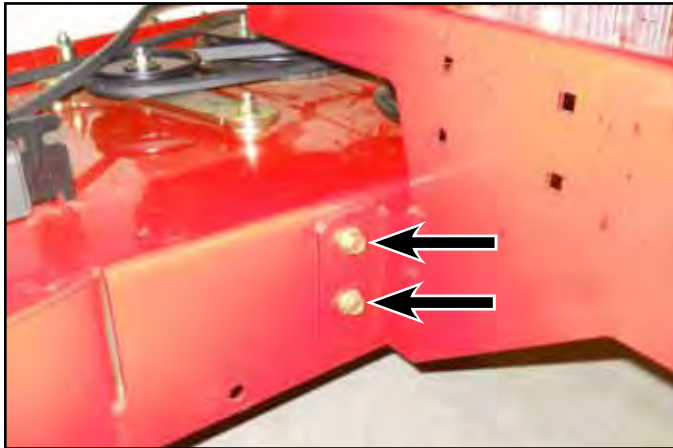


Fig. 0363

DSCN-1112a

16. Repeat step 15 on the other side of the engine plate.
17. Tighten all five sets of nuts and bolts securing the engine base to the mower deck.
18. Remove the hoist from the engine assembly.
19. Place the idler pivot bolt down through the engine base (Fig. 0364).



Fig. 0364

DSCN-1170a

20. Place the large spacer, one friction composite washer and bushing onto the pivot bolt (Fig. 0365).



Fig. 0365

DSCN-1178a

3

21. Place the idler assembly onto the pivot bolt (Fig. 0366).



Fig. 0366

DSCN-1180a

23. Secure the idler assembly with a nut (Fig. 0368).



Fig. 0368

DSCN-1190a

22. Place one friction composite washer and steel washer onto the pivot bolt (Fig. 0367).



Fig. 0367

DSCN-1185a

24. Position the pumps on the engine base (Fig. 0369).



Fig. 0369

DSCN-1192a

CHASSIS

25. Secure the pump to the engine base using two carriage bolts, washers and nuts (Fig. 0370).

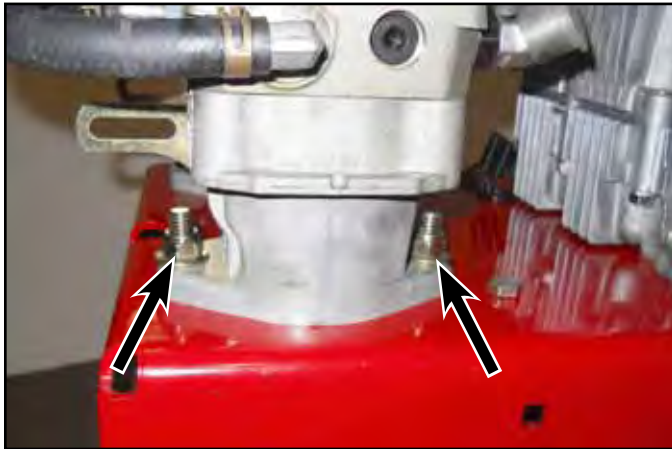


Fig. 0370

DSCN-1194a

28. Position the pulley on the pump shaft and secure with the two set screws (Fig. 0372).

Note: The face of the pulley hub should be flush with the end of the pump shaft.



Fig. 0372

DSCN-1199a

26. Repeat step 25 on the other pump.

27. Install the square key in the pump input shaft and apply anti-seize around the shaft (Fig. 0371).



Fig. 0371

DSCN-1198a

29. Position the pump drive belt around the engine, idler and pump pulleys (Fig. 0373).

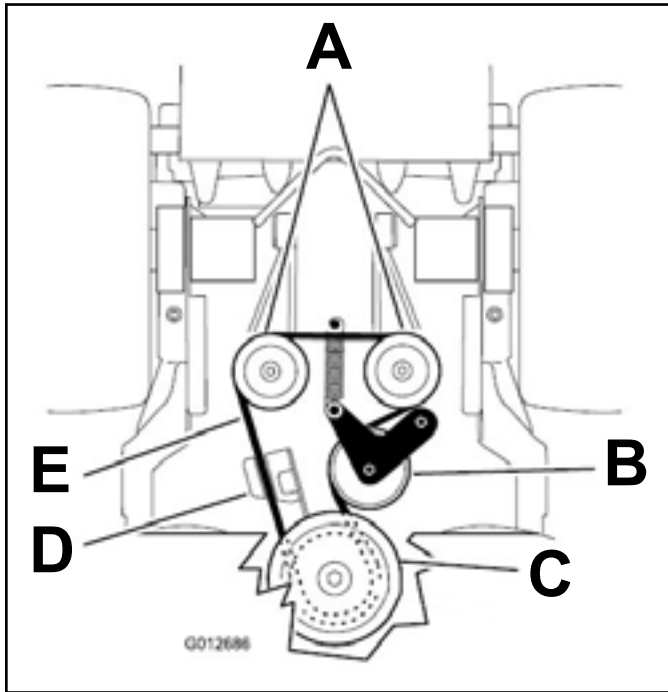


Fig. 0373 fig. 66 G012686

- A. Hydraulic pumps
- B. Idler pulley
- C. Clutch pulley
- D. Clutch retainer
- E. Pump drive belt

30. Using a spring tool, secure the pump drive belt idler spring to the anchor (Fig. 0374).

Note: On 2009 machines, the idler spring is anchored to the back of the engine plate.



Fig. 0374 DSCN-1059a

31. Place the mower deck belt around the clutch pulley (Fig. 0375).



Fig. 0375 DSCN-1054a

3

CHASSIS

32. Using a spring tool, secure the mower deck idler spring to the spring anchor (Fig. 0376).



Fig. 0376

DSCN-1206a

33. Secure the drive linkage mount assembly to the engine base using three thread forming screws (Fig. 0377).

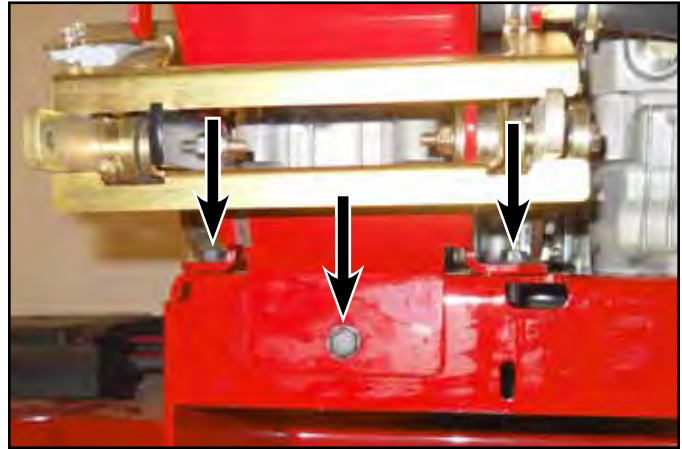


Fig. 0377

DSCN-1047a

Note: The pump control arm must nest in the center of the control forks (Fig. 0378).

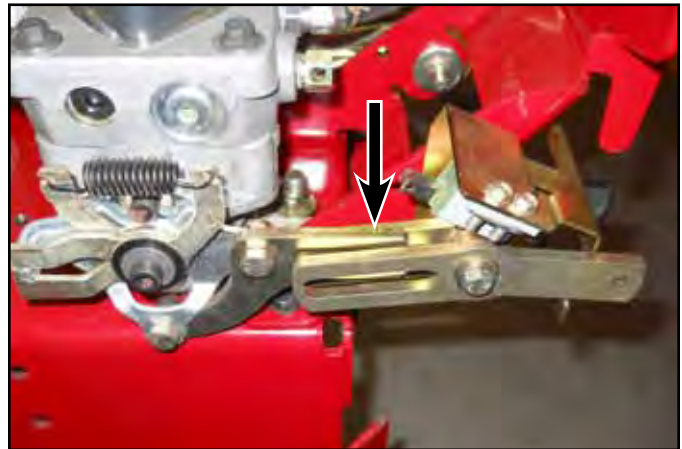


Fig. 0378

DSCN-1211a

34. Route the speed control cable along the left side of the LH pump (Fig. 0379).



Fig. 0379

DSCN-1214a

35. Secure the shifter and speed control cable assembly to the engine base using two thread forming screws and washers (Fig. 0381).

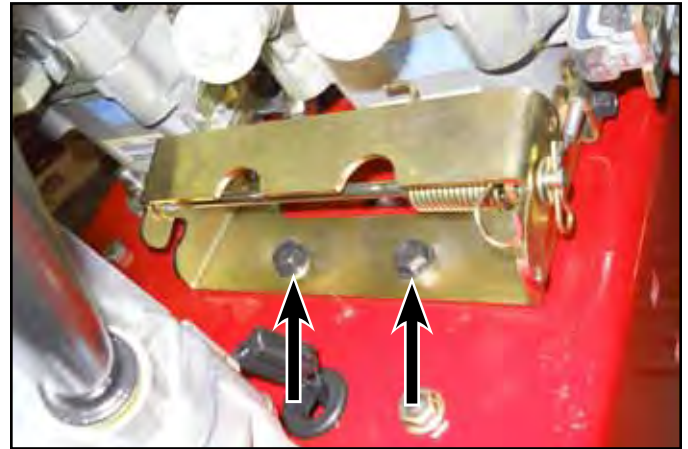


Fig. 0381

DSCN-1218a

Note: The speed control cable must route up the front side of the drive linkage mount assembly (Fig. 0380).

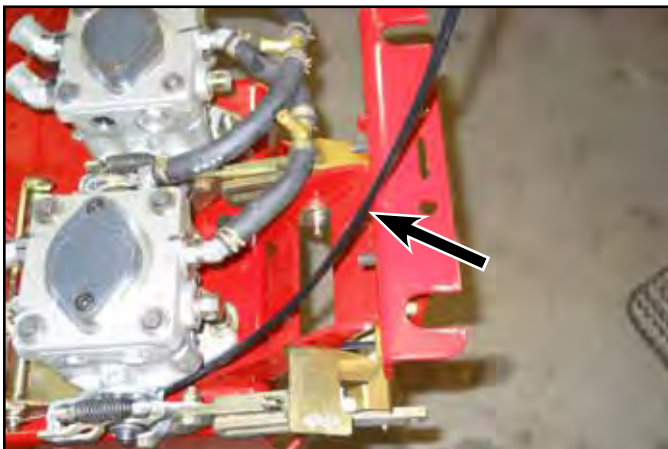


Fig. 0380

DSCN-1215a

36. Hook the "J" hook end of the torsion spring on the lower shifter plate (Fig. 0382).

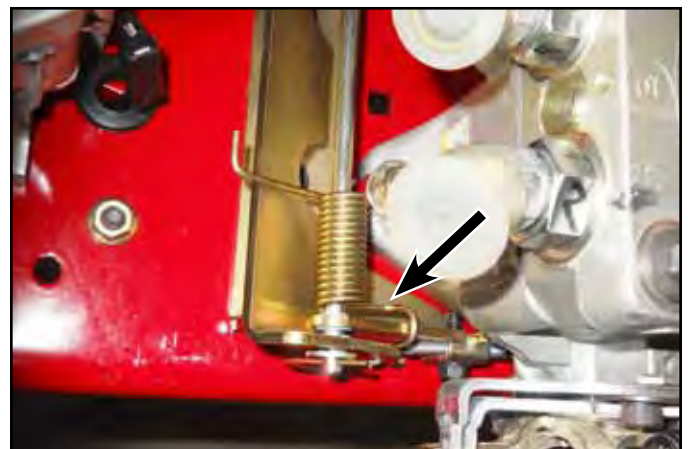


Fig. 0382

DSCN-1221a

CHASSIS

Shifter Link and Roller Configurations (Fig. 0383):

- A. **2009:** Serial range 290000001 - 290000210;
3 rollers, all thin and same size
- B. **2009:** Serial range 290000211 - 290999999;
3 rollers, large center roller
- C. **2010:** Serial range 310000001 - 310999999;
3 rollers, all large and same size

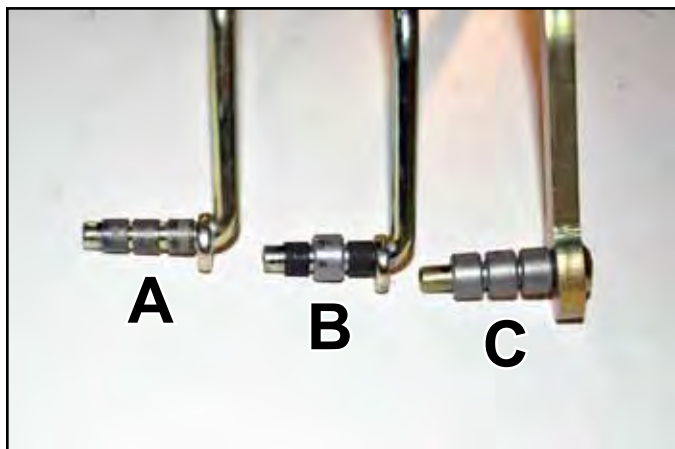


Fig. 0383

IMG-0941a

37. **2009 only:** Serial range 290000001 - 290000209:
Slide 3 rollers onto the rear end of the RH shifter link rod. Slide the rear end of the shifter link rod (with 3 rollers) into the control fork assembly (Fig. 0384).

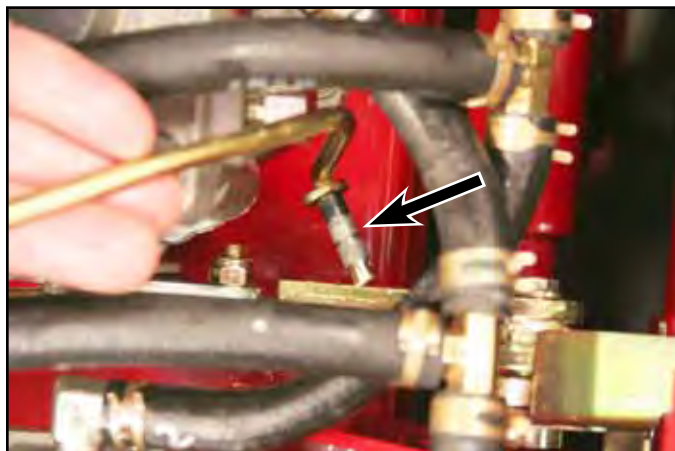


Fig. 0384

IMG-9486a

38. **2009 only:** Serial range 290000210 - 290999999:
Push down on the control fork assembly and slide the center roller into the slot of the pump control arm (Fig. 0385).

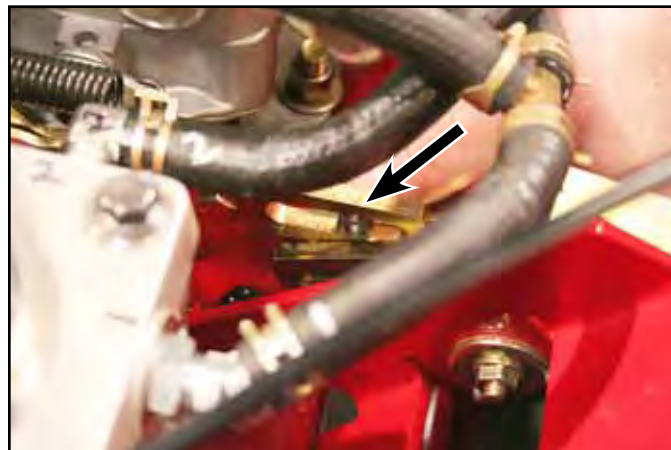


Fig. 0385

IMG-9436a

39. **2009 only:** Serial range 290000210 - 290999999:
Using an Allen wrench, locate the center roller and slide the Allen wrench through it (Fig. 0386).

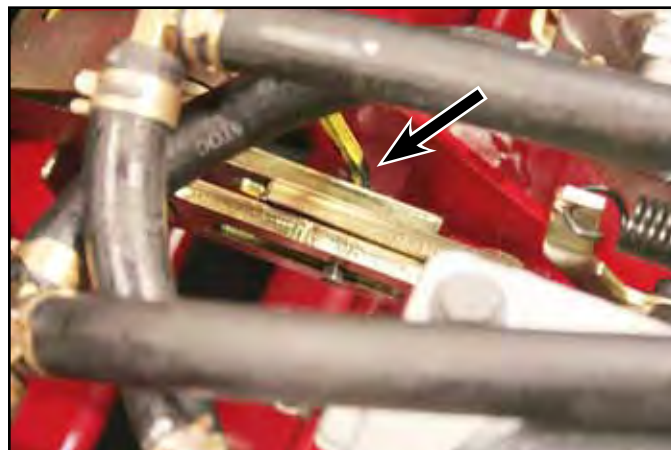


Fig. 0386

IMG-9492a

40. **2009 only:** Serial range 290000210 - 290999999: Slide the right hand roller onto the rear end of the right hand shifter link rod. Slide the rear end of the shifter link rod (with roller) through the control fork assembly following the Allen wrench through to capture the center roller on the shifter link rod (Fig. 0387).

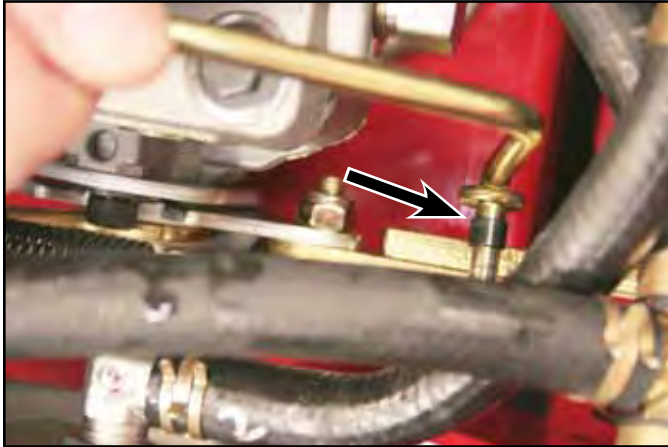


Fig. 0387

IMG-9432a

41. **2009 only:** Serial range 290000210 and up: Slide the left hand roller onto the rear end of the right hand shifter link rod and into the outside of the control fork assembly (Fig. 0388).

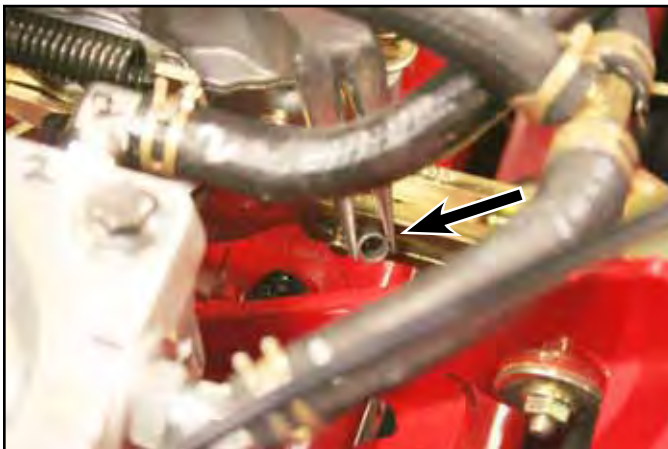


Fig. 0388

IMG-9430a

42. **2009 only:** Secure the front end of the RH shifter link to the shifter bracket using a hairpin cotter and washer (Fig. 0389).

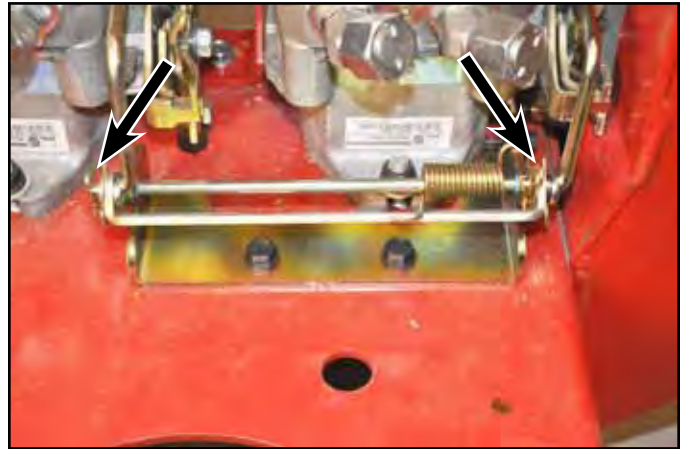


Fig. 0389

IMG-0348a

43. **2009 only:** Repeat steps 37 through 42 on the LH side.

44. **2010 only:** Slide 3 rollers onto the rear end of the shifter links. Slide the rear end of the shifter links (with three rollers) into the control fork assemblies (Fig. 0390).

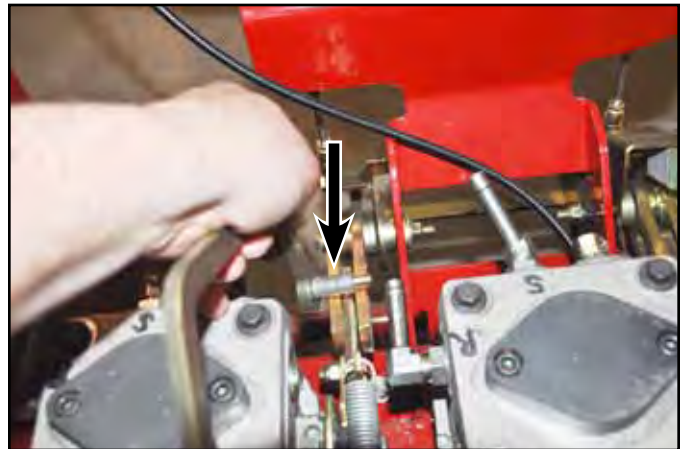


Fig. 0390

IMG-0948a

CHASSIS

45. **2010 only:** Place a spacer into the front end of the shifter link (Fig. 0391).



Fig. 0391

IMG-0946a

47. Install the washer and hairpin cotter to the end of the speed control linkage (Fig. 0393).

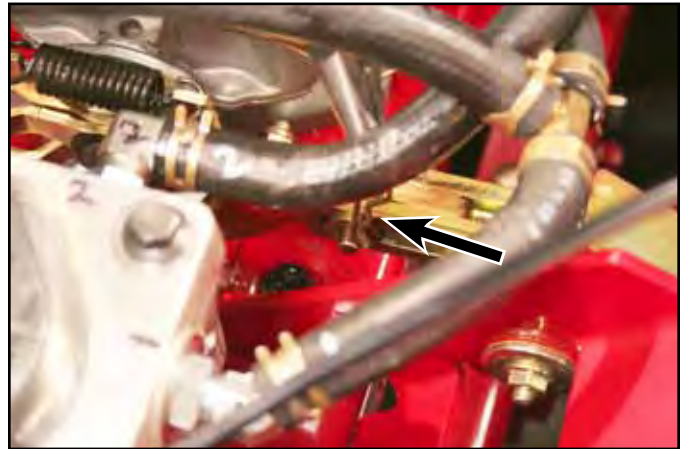


Fig. 0393

IMG-9424a

46. **2010 only:** Secure the shifter link to the shifter bracket with a bolt, two washers and nut (Fig. 0392).



Fig. 0392

IMG-0905a

48. Secure the solenoid to the engine base using two thread forming screws (Fig. 0394).

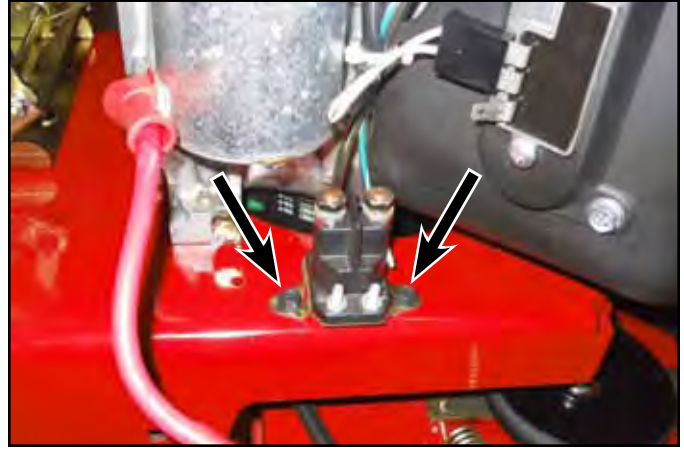


Fig. 0394

DSCN-1222a

49. Secure the starter cable to the solenoid post using the nut and lock washer (Fig. 0395).



Fig. 0395

DSCN-1224a

50. Position the rear cross shaft assembly onto the engine base (Fig. 0396).



Fig. 0396

DSCN-1228a

3

Note: The grease blocks must be positioned with the grease zerk facing upward (Fig. 0397).



Fig. 0397

DSCN-1232a

CHASSIS

51. Position the right hand lift plate over the grease block with the bolt hole pattern aligned with the mating pattern on the engine base (Fig. 0398).



Fig. 0398

DSCN-1233a

53. **2009 only:** Tighten the four sets of fasteners.

54. **2010 only:** The right side lift plate is secured with three long carriage bolts and one short (Fig. 0400).



Fig. 0400

DSCN-0768a

52. **2009 only:** Loosely install four carriage bolts, Belleville washers and nuts (Fig. 0399).



Fig. 0399

DSCN-1240a

55. **2010 only:** Loosely install the short carriage bolt and nut in the upper left bolt hole (Fig. 0401).



Fig. 0401

DSCN-1236a

56. **2010 only:** Loosely install the remaining three carriage bolts, Belleville washers, and nuts (Fig. 0402).



Fig. 0402 DSCN-1237a

59. Loosely install four carriage bolts, Belleville washers, nuts (Fig. 0404).



Fig. 0404 DSCN-1243a

57. **2010 only:** Tighten the four sets of fasteners.

58. Position the left hand lift plate over the grease block with the bolt hole pattern aligned with the mating pattern on the engine base (Fig. 0403).



Fig. 0403 DSCN-1245a

60. Tighten the four sets of fasteners.

61. Position the rear axle assembly behind the engine base assembly (Fig. 0405).



Fig. 0405 DSCN-1378a

CHASSIS

62. Using two people or a hoist, lift the rear end of the carrier frame and tower assembly (Fig. 0406).



Fig. 0406

DSCN-1382a

64. Loosely install the four sets of bolts, spacers and nuts (two sets per side) that secure the axle and wheel assembly to the carrier frame (Fig. 0408).

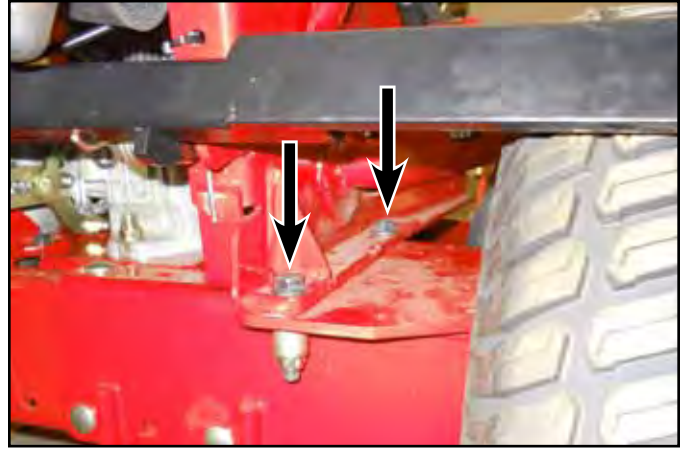


Fig. 0408

DSCN-1386a

63. Walk the carrier frame and tower assembly rearward, over the engine and deck assembly (Fig. 0407).



Fig. 0407

DSCN-1385a

Note: The bolts are installed downwards though the carrier frame, then down through the wheel motor mounts (Fig. 0409).



Fig. 0409

DSCN-1389a

65. Tighten all four sets of fasteners.

66. **2009 only:** Install the spacer into the rear cross shaft hub (Fig. 0410).

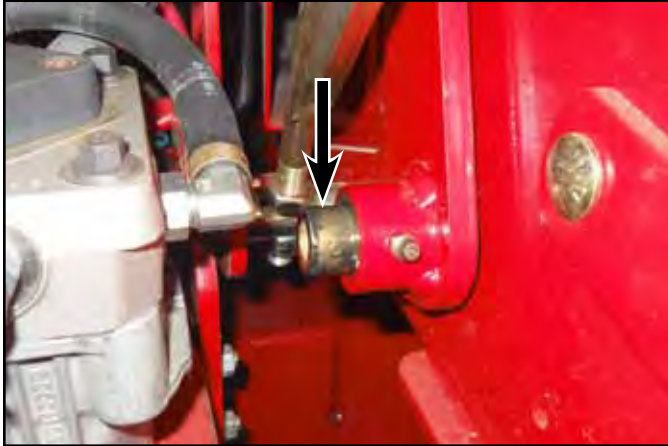


Fig. 0410 DSCN-1603a

67. **2009 only:** Install the bolt through the carrier frame, then through the spacer and hub assembly (Fig. 0411).



Fig. 0411 DSCN-1606a

68. **2009 only:** Secure the assembly using a washer and nut (Fig. 0412).

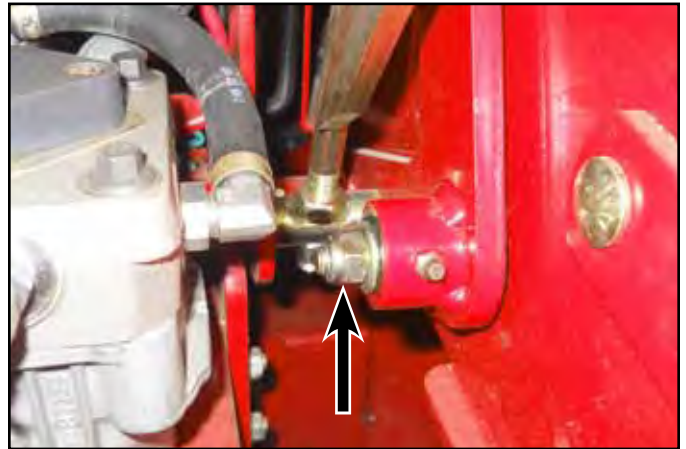


Fig. 0412 DSCN-1607a

69. **2009 only:** Repeat steps 66 through 68 on the other side of the unit.

70. **2010 only:** Position the RH pivot shaft through the carrier frame hub and rear cross shaft assembly (Fig. 0413).

Note: 48" and 52" decks are set to a narrow stance. Remove the wheels to install the pivot shafts. Reinstall the wheels after installing the pivot shafts.



Fig. 0413 DSCN-1392a

CHASSIS

71. **2010 only:** Rotate the pivot shaft so the spiral pin hole of the pivot shaft aligns with the spiral pin hole of the rear cross shaft assembly, then secure the assembly with the spiral pin (Fig. 0414).



Fig. 0414 DSCN-1395a

72. **2010 only:** Repeat steps 70 and 71 on the LH side of the machine.

73. Connect the “Z” bend of the speed control cable to the speed control handle assembly (Fig. 0416).



Fig. 0416 DSCN-1015a

Note: The spiral pin ends need to be flush to the lift arm hub (Fig. 0415).

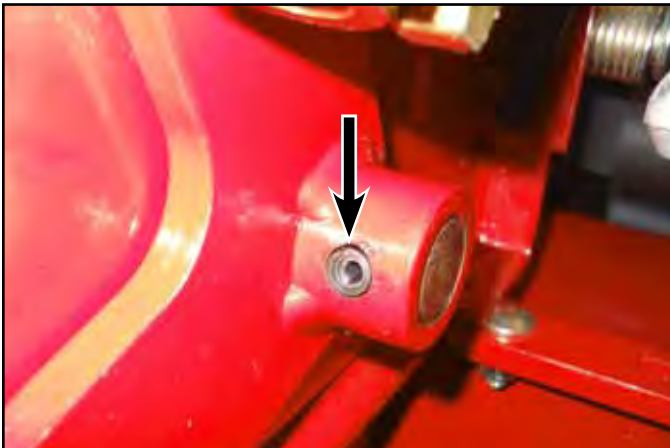


Fig. 0415 DSCN-1400a

74. Secure the speed control cable to the speed control handle assembly with the clip on the end of the cable jacket (Fig. 0417).



Fig. 0417 DSCN-1482a

75. Install the motion control cable adjustment nuts into the linkage mount (Fig. 0418).

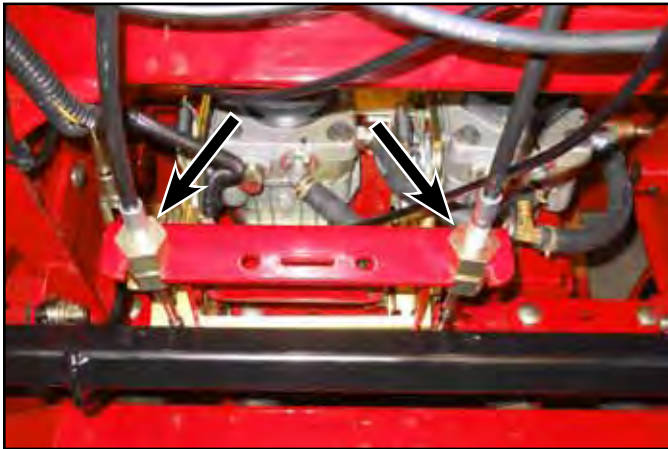


Fig. 0418

DSCN-1409a

77. Secure the speed control cable to the RH control cable and the lower LH side of the linkage mount using cable ties (Fig. 0420).

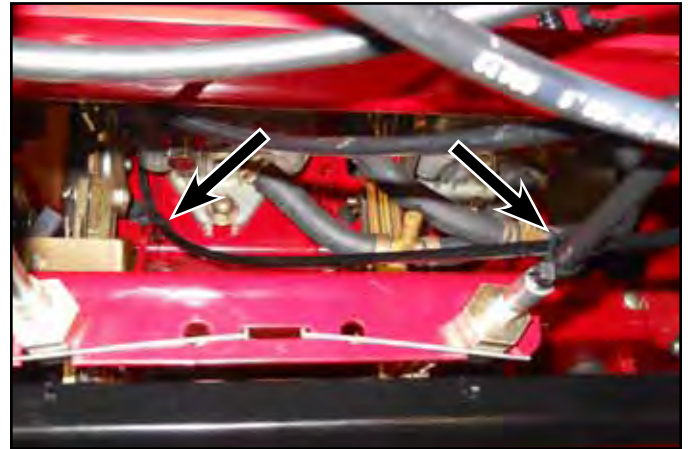


Fig. 0420

DSCN-1414a

76. Secure the motion control cables to the linkage mount using the spring clip (Fig. 0419).

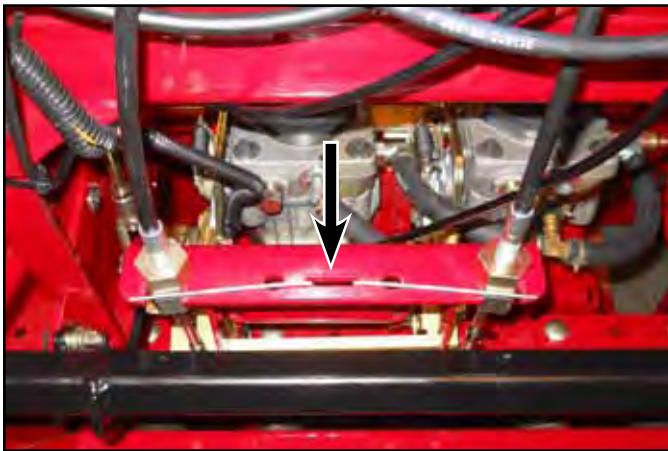


Fig. 0419

DSCN-1410a

78. Secure the rod ends at the base of the control cables to the control forks using the bolts, spacers and nuts (Fig. 0421).

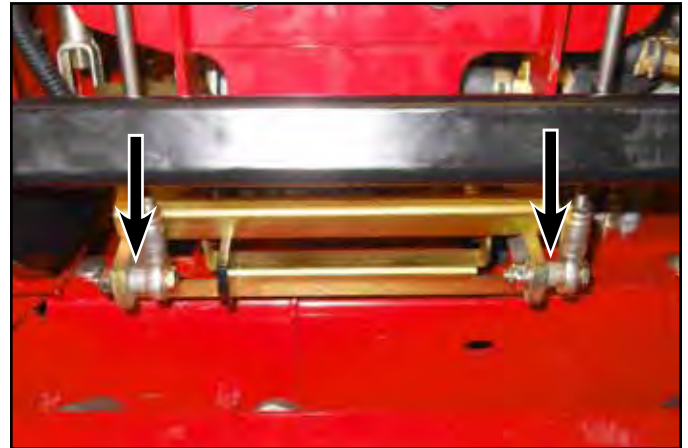


Fig. 0421

DSCN-1416a

3

CHASSIS

79. Connect the wire harness to the neutral switch (Fig. 0422).

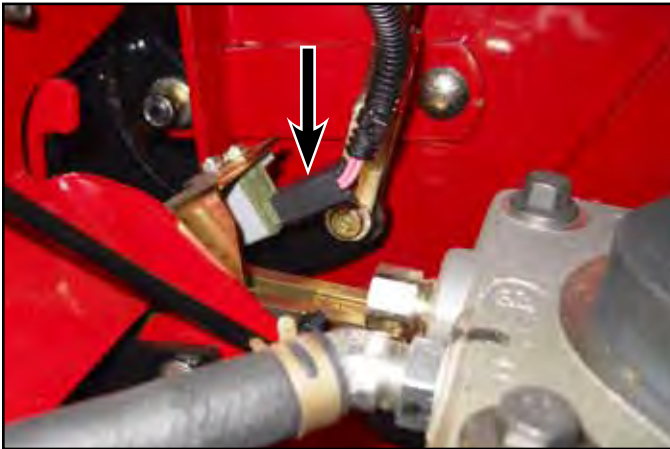


Fig. 0422

DSCN-1421a

81. Connect the black wire eyelet and battery ground cable to the engine block using a bolt and washer (Fig. 0424).



Fig. 0424

DSCN-1446a

80. Connect the wire harness to the clutch harness (Fig. 0423).

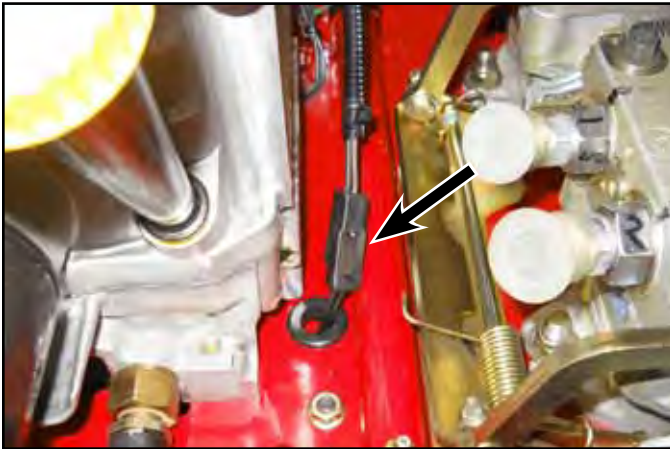


Fig. 0423

DSCN-1423a

82. Connect the green and blue wire bullet connectors to the two small studs on the solenoid (Fig. 0425).

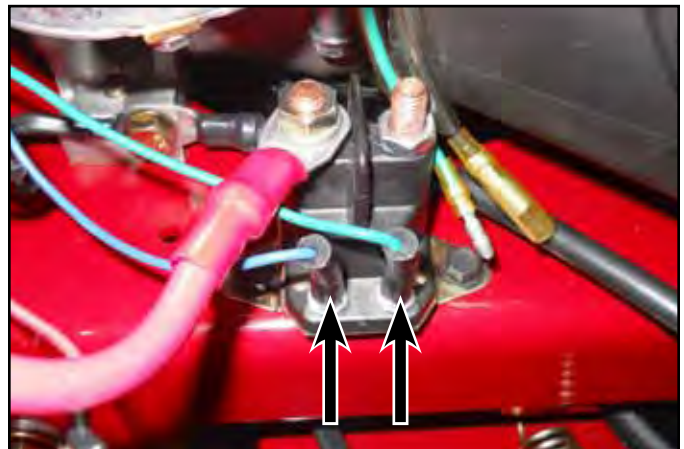


Fig. 0425

DSCN-1447a

83. Connect the white wire connector to the black magneto wire (Fig. 0426).

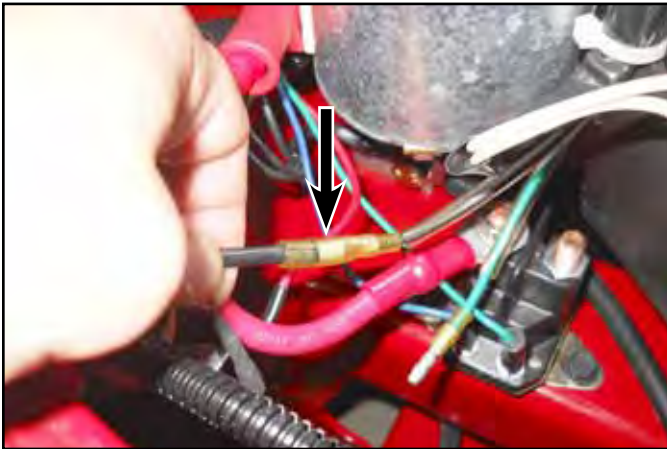


Fig. 0426

DSCN-1449a

85. Connect the purple wire connector to the rectifier (Fig. 0428).



Fig. 0428

DSCN-1453a

84. Connect the pink wire connector to the green fuel solenoid wire (Fig. 0427).

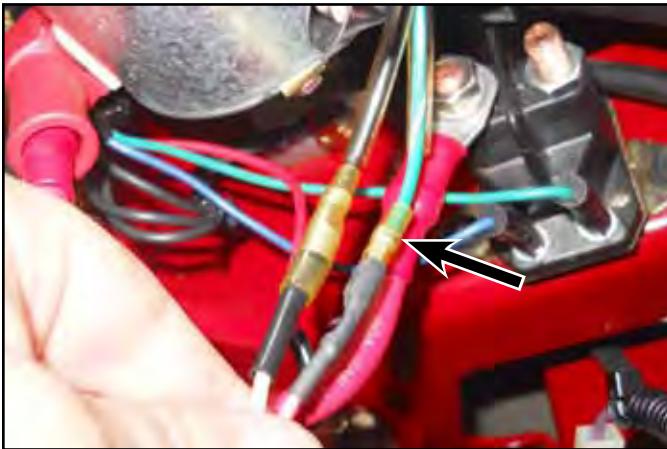


Fig. 0427

DSCN-1451a

CHASSIS

86. Secure the red wire eyelet and battery positive cable to the solenoid post using a nut and lock washer (Fig. 0429).



Fig. 0429

DSCN-1456a

87. **48" and 52" decks:** Install the lift rod through the lift rod bracket and secure with nut (Fig. 0431).



Fig. 0431

DSCN-1459a

Note: Position the red boot over the solenoid post after installing cables (Fig. 0430).



Fig. 0430

DSCN-1457a

88. **60" decks:** Install the lift rod to the turnbuckle and secure with jam nut (Fig. 0432).



Fig. 0432

DSCN-1462a

89. Position the opposite end of the lift rod over the stud on the rear cross shaft assembly (Fig. 0433).

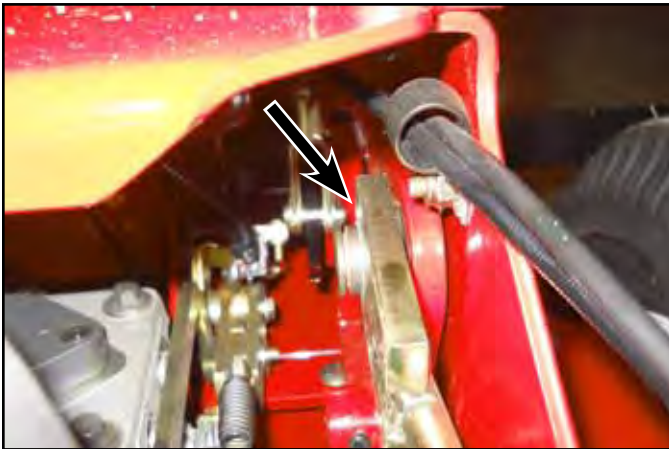


Fig. 0433

DSCN-0801a

90. Position the large washer over the rear cross shaft stud (Fig. 0435).



Fig. 0435

DSCN-0807a

Note: Ensure the flange bearing is still in place (Fig. 0434).

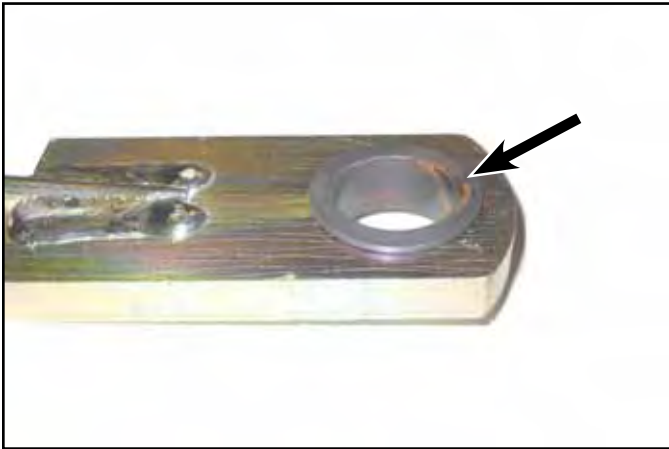


Fig. 0434

DSCN-0804a

91. Secure the assembly using the "E" clip (Fig. 0436).



Fig. 0436

DSCN-0808a

CHASSIS

92. Repeat steps 87 through 91 on the other side of the machine.
93. Secure the lower ends of the lift links using the shoulder bolts, washers and nuts (Fig. 0437).

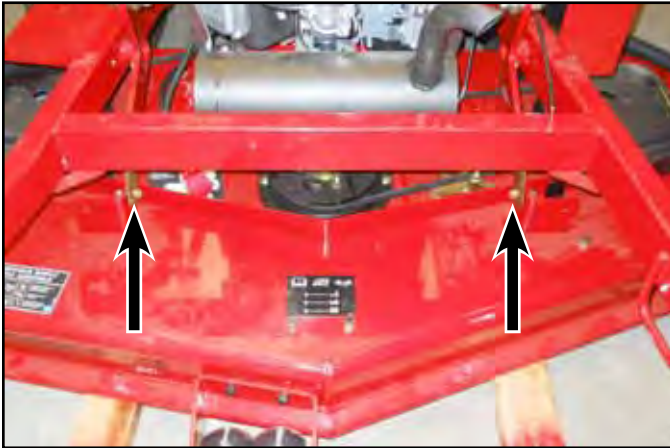


Fig. 0437

DSCN-1467a

Note: Install the thin washer between the lift link and deck bracket (Fig. 0438).

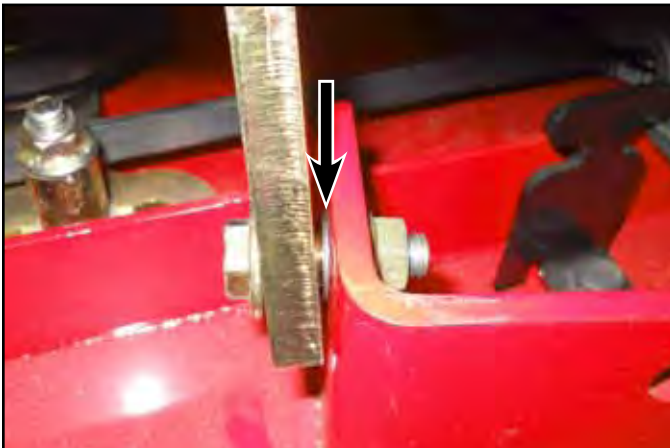


Fig. 0438

DSCN-1469a

94. Hook the “Z” bend of the throttle cable into the throttle control lever and loosely clamp the outer housing of the throttle cable with the cable clamp (Fig. 0439).

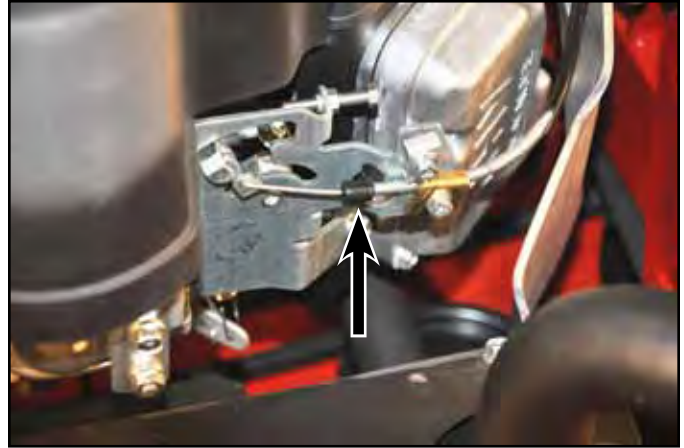


Fig. 0439

IMG-0575a

95. Move the throttle lever to the “Fast” position (Fig. 0440).



Fig. 0440

DSCN-1478a

96. With the engine throttle control lever in the “Fast” position, pull the slack from the cable jacket and tighten the throttle cable clamp (Fig. 0441).



Fig. 0441

IMG-0576a

98. Push the choke knob in so it is in the “Open” position (Fig. 0443).



Fig. 0443

DSCN-1479a

97. Hook the “Z” bend of the choke cable into the choke control lever and loosely clamp the outer housing of the choke cable with the cable clamp (Fig. 0442).

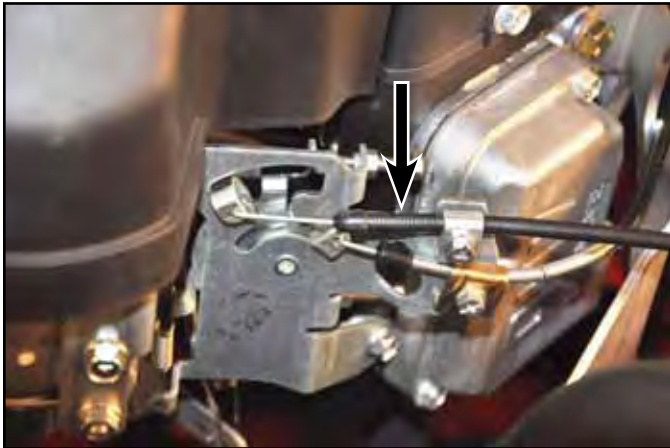


Fig. 0442

IMG-0579a

99. While holding the engine choke control lever in the “Open” position, pull the slack from the cable jacket and tighten the choke cable clamp (Fig. 0444).



Fig. 0444

DSCN-1655a

CHASSIS

100. Position the muffler guard assembly and loosely install the four carriage bolts, two guard mounting brackets and nuts (Fig. 0445).

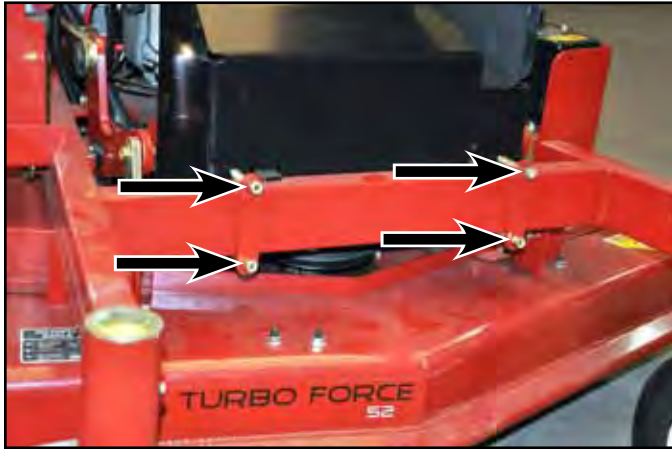


Fig. 0445

IMG-0586a

101. Make sure the muffler exhaust pipe is centered in the muffler guard assembly, then tighten all four bolts and nuts (Fig. 0447).

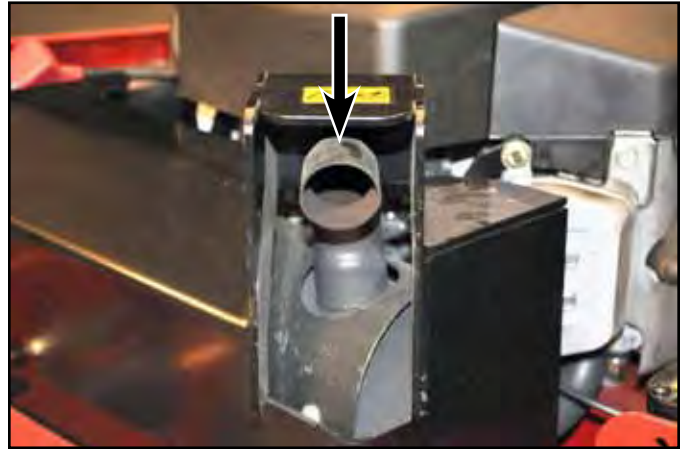


Fig. 0447

DSCN-0589a

Note: 60" models have a guard panel, not the two guard mounting brackets (Fig. 0446).

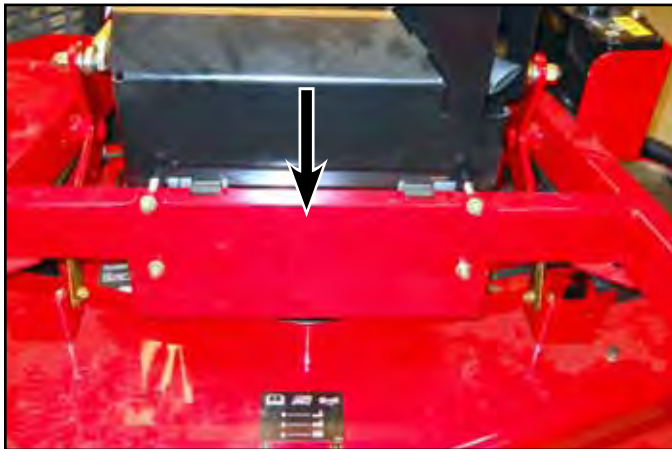


Fig. 0446

DSCN-1471a

3

102. Secure the low-pressure suction line to the “T” fitting using the hose clamp (Fig. 0448).

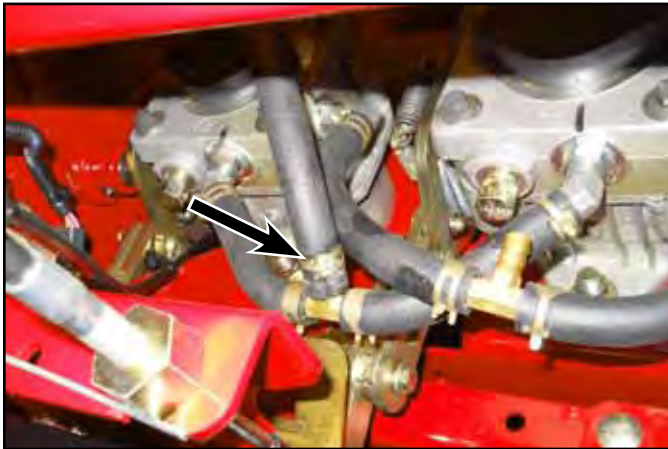


Fig. 0448

DSCN-1473a

103. Secure the low-pressure return line to the “T” fitting using the hose clamp (Fig. 0450).



Fig. 0450

DSCN-1485a

Note: The opposite end of the low-pressure suction line is connected to the hydraulic oil filter (Fig. 0449).



Fig. 0449

DSCN-1475a

Note: The opposite end of the low-pressure return line is connected to the base of the hydraulic reservoir (Fig. 0451).



Fig. 0451

DSCN-1489a

CHASSIS

104. Replace the fitting o-rings. Install the high-pressure hoses to the pumps in their original positions (Fig. 0452).



Fig. 0452 DSCN-0810a

106. Secure the fuel hose to the fuel filter using the hose clamp (Fig. 0454).

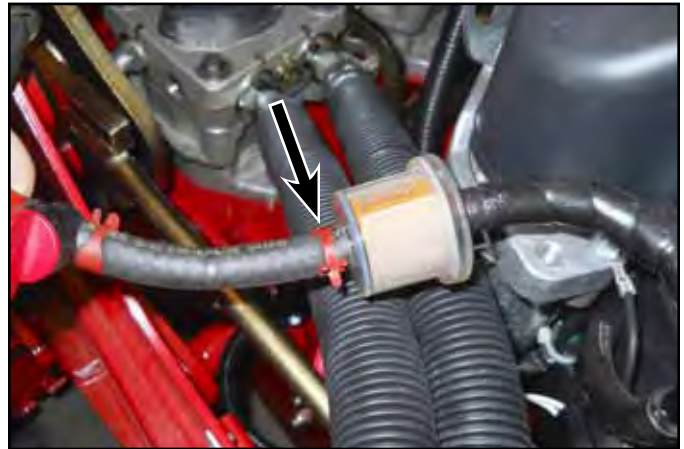


Fig. 0454 DSCN-1484a

105. Secure the hose routings using three cable ties (Fig. 0453).

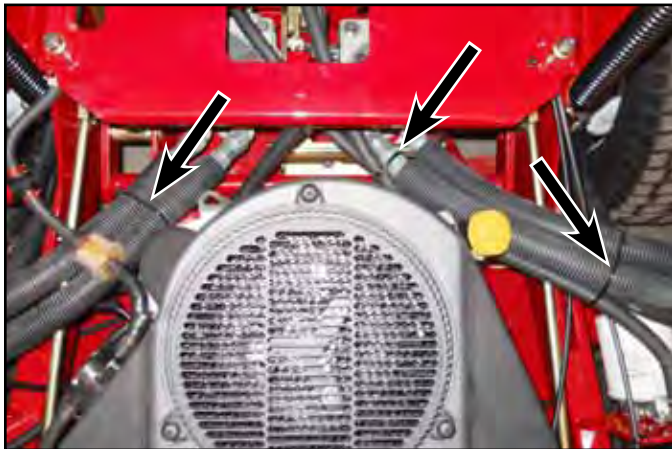


Fig. 0453 DSCN-0689a

107. **2009 only:** Install the lift assist cylinder. See “Lift Assist Cylinder Installation (2009 only)” on page 3-43.

108. **2010 only:** Position the chain between the pivot shaft and extension spring assembly (Fig. 0455).

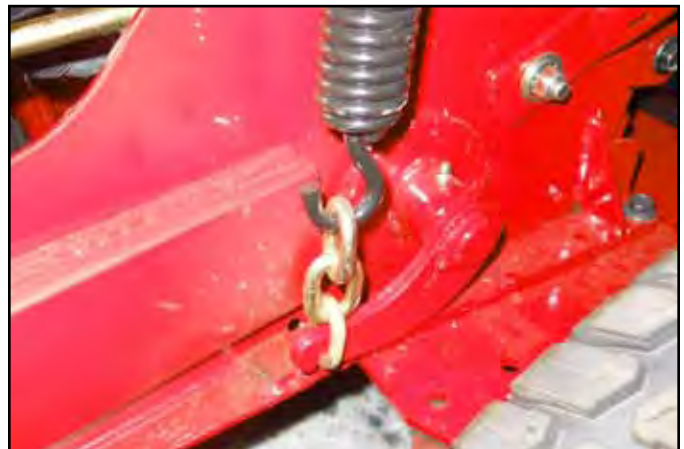


Fig. 0455 DSCN-0815a

109. **2010 only:** Secure the extension spring assembly and chain to the control tower using the bolt and washer (Fig. 0456).



Fig. 0456

DSCN-0818a

110. **2010 only:** Install the bolt until the gap between the control tower mount and spring cap is 1-1/2" (3.8mm) for 60" decks / 2" (50mm) 48" or 52" decks (Fig. 0457).

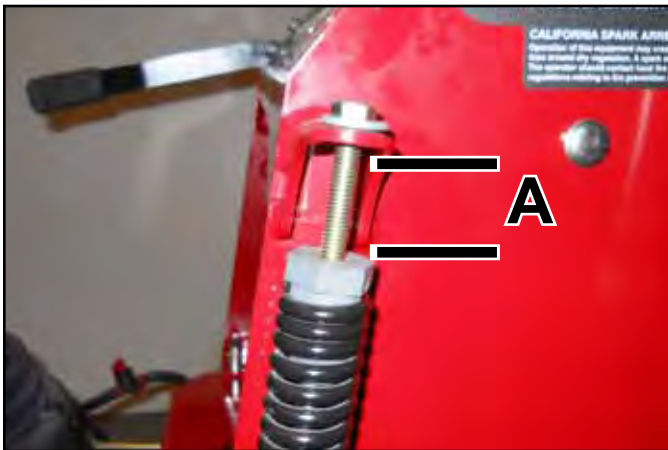


Fig. 0457

DSCN-0820a

- A. 1-1/2" (3.8cm) for 60" decks
2" (5cm) for 48" for 52" decks

111. **2010 only:** Repeat steps 108 through 110 on the other side of the machine.

112. Install the fuel tank. See "Fuel Tank Assembly Installation" on page 3-29.

113. **2009 only:** Secure the lower end of the lift bar to the rear cross shaft assembly using a nut. Thread the nut onto the bolt until there are 3 threads protruding. Secure the position with the jam nut (Fig. 0458).

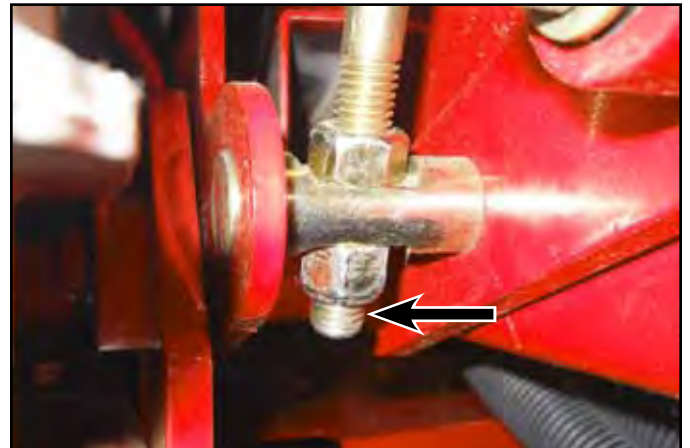


Fig. 0458

DSCN-0274a

CHASSIS

114. **2010 only:** Secure the lower end of the lift bar to the rear cross shaft assembly using the dampener assembly and nut. Thread the dampener assembly bolt into the nut until there are 3 threads protruding (Fig. 0459).

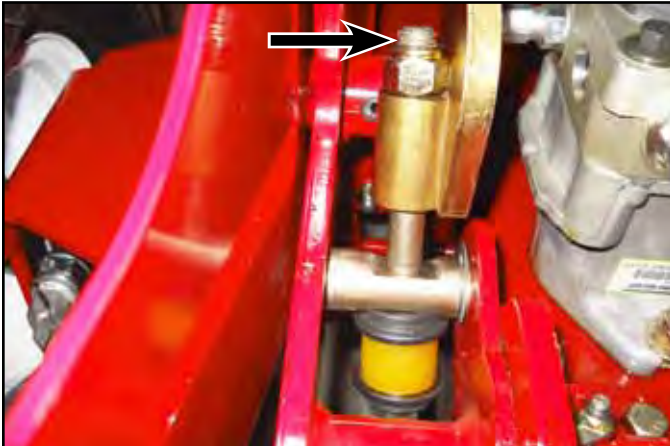


Fig. 0459 DSCN-0793a

116. Secure the red positive cable to the positive terminal on the battery using a bolt, washer and nut (Fig. 0461).

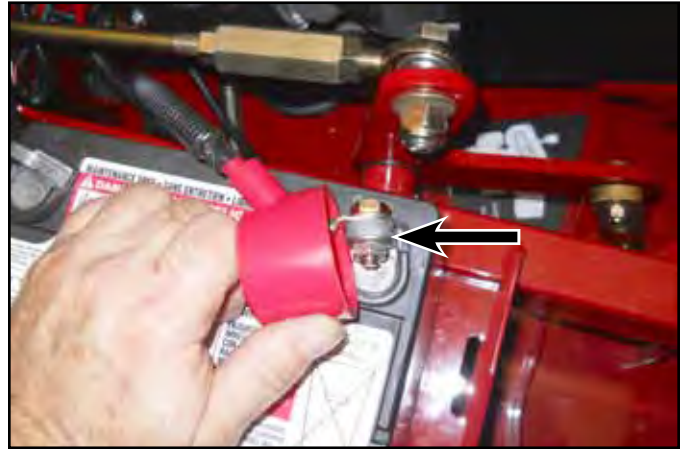


Fig. 0461 DSCN-1495a

115. Position the battery on the battery tray (Fig. 0460).



Fig. 0460 DSCN-1493a



Fig. 0462 DSCN-1497a

Note: Position the red protective boot over the terminal once the cable is secured (Fig. 0462).

117. Secure the black ground cable to the negative terminal on the battery using the bolt, washer and nut (Fig. 0463).



Fig. 0463

DSCN-1499a

118. Secure the battery to the battery tray using the battery cover, hold down bolts and wing nuts (Fig. 0464).

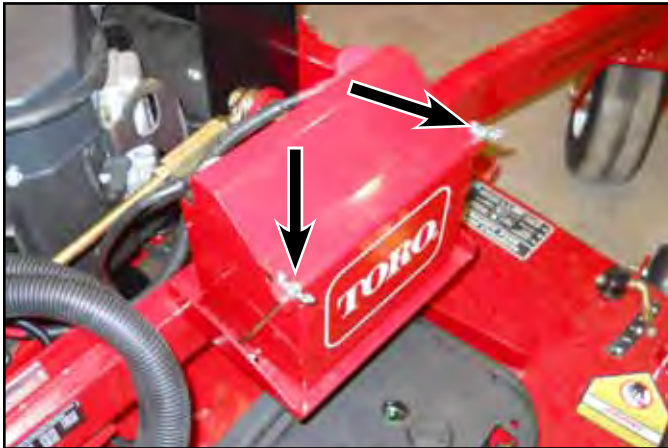


Fig. 0464

DSCN-1504a

119. Verify the mower deck is properly adjusted. See "Mower Deck Adjustments - Correcting the Mower Quality of Cut" on page 7-50.

120. Bleed the hydraulic system. See "Bleeding the Hydraulic System" on page 6-95.

Carrier Frame Replacement

Carrier Frame Removal

1. **2009 only:** Remove the lift assist cylinder. See "Lift Assist Cylinder Removal (2009 only)" on page 3-40.
2. Place two boards under the deck and lower the deck onto them (Fig. 0465).

Note: The boards need to be long enough to support the front and rear of the deck.



Fig. 0465

DSCN-0685a

3. **2009 only:** Remove the nut securing the lift bar to the rear cross shaft assembly (Fig. 0466).



Fig. 0466

DSCN-0795a

CHASSIS

4. **2010 only:** Remove the dampener assembly that secures the lift bar to the rear cross shaft assembly (Fig. 0467).

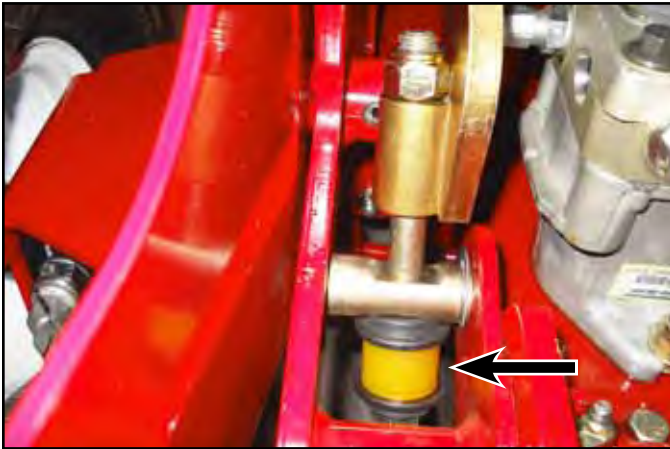


Fig. 0467

DSCN-0793a

7. Mark the hydraulic fittings and hoses so they can be correctly installed upon reassembly (Fig. 0469).



Fig. 0469

DSCN-0691a

5. Remove the fuel tank. See "Fuel Tank Assembly Removal" on page 3-26.
6. Remove the cable ties securing the high-pressure hoses (Fig. 0468).

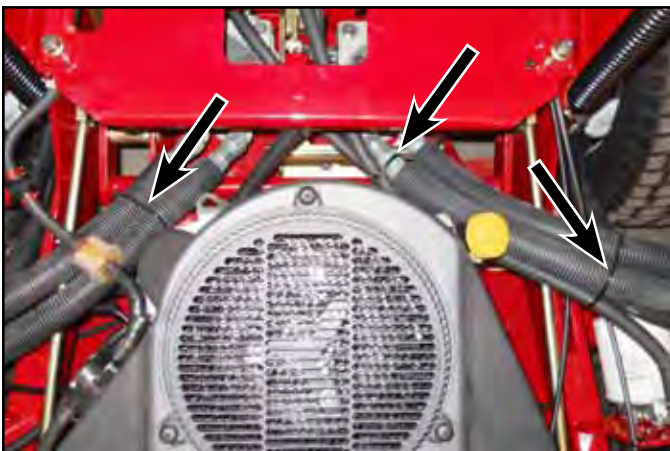


Fig. 0468

DSCN-0689a

8. Remove the high-pressure hoses from the pump fittings (Fig. 0470).

Note: Cap the pump and hose fittings to prevent debris from entering the hydraulic system.



Fig. 0470

DSCN-0696a

9. **2010 only:** Remove the bolts and washers securing the extension spring assemblies and chains to the RH and LH sides of the control tower (Fig. 0471).



Fig. 0471

DSCN-0700a

10. Remove the “E” clips and washers securing the RH and LH lift rod to the rear cross shaft assembly (Fig. 0472).

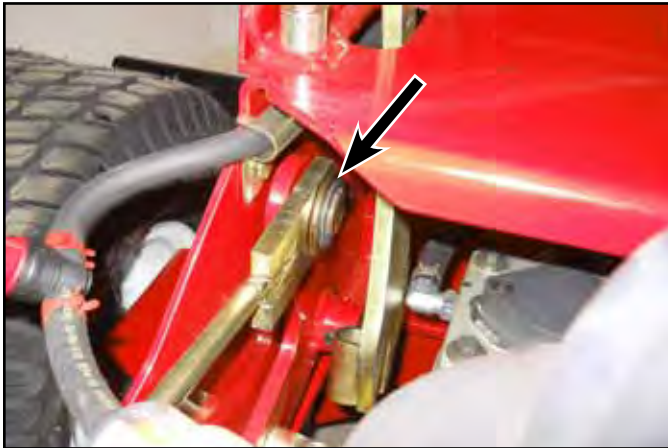


Fig. 0472

DSCN-0704a

11. **48” and 52” decks only:** Remove the nuts from the end of the lift rods and remove the RH and LH lift rods (Fig. 0473).

Note: Leave the inside nuts in their location to minimize deck leveling adjustments at the end of this procedure.



Fig. 0473

DSCN-0707a

12. **60” decks only:** Loosen the rear jam nuts securing the LH and RH lift rods to the turn buckle, then remove the RH and LH lift rods (Fig. 0474).

Note: Note the position of the jam nuts to minimize deck leveling adjustments at the end of this procedure.

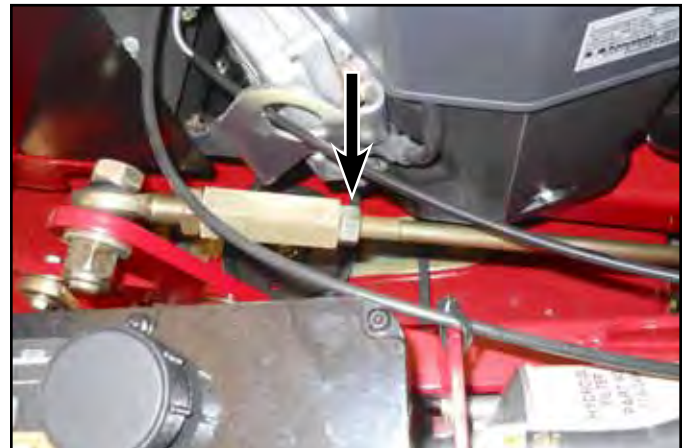


Fig. 0474

DSCN-0710a

CHASSIS

13. **2009 only:** Remove the bolts, spacers and washers securing the cross shaft assembly to the carrier frame (Fig. 0475).

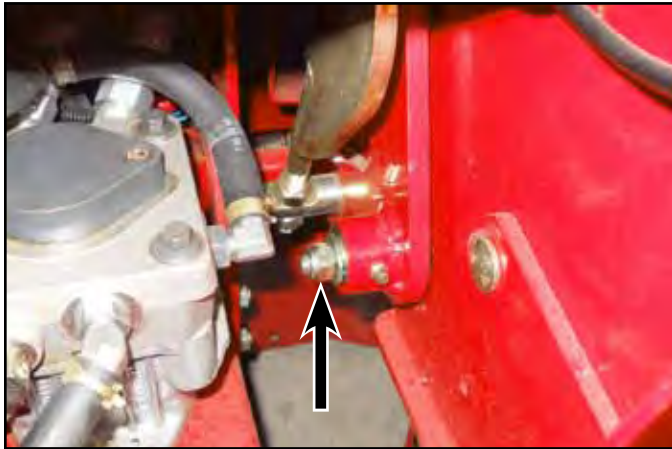


Fig. 0475

DSCN-1602a

14. **2010 only:** Using a blunt punch, drive the spiral pins that secure the LH and RH pivot shafts to the rear cross shaft assembly (Fig. 0476).

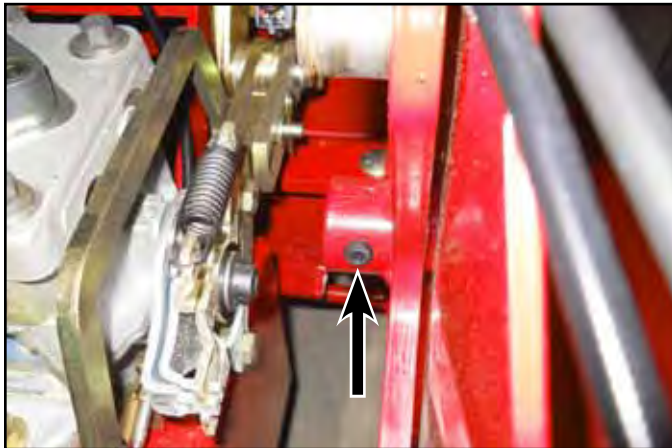


Fig. 0476

DSCN-0712a

15. **2010 only:** Remove the LH and RH pivot shafts from the rear cross shaft assembly and carrier frame hub (Fig. 0477).

Note: 48" and 52" decks are set to a narrow stance. Remove the wheels to remove the pivot shafts. Reinstall the wheels after removing the pivot shafts.



Fig. 0477

DSCN-0717a

16. Remove the four carriage bolts and nuts securing the muffler guard and guard panel to the carrier frame, then remove both (Fig. 0478).

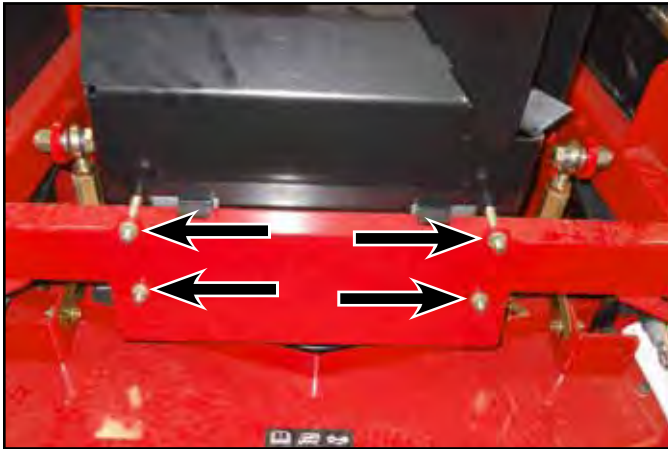


Fig. 0478

DSCN-0932a

17. Remove the shoulder bolts, washers and nuts securing the LH and RH lift links to the deck (Fig. 0480).

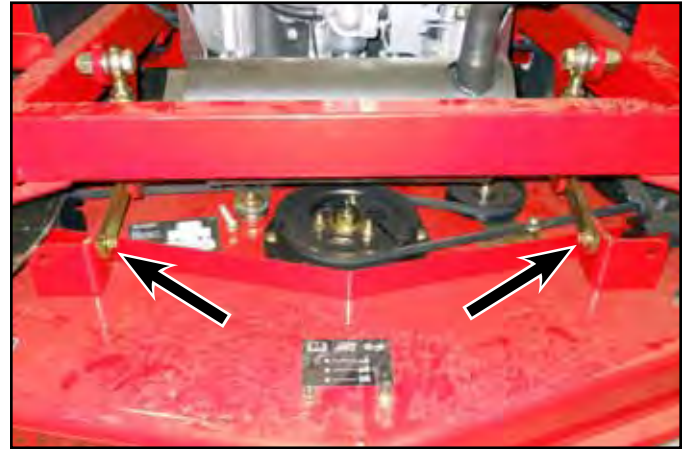


Fig. 0480

DSCN-0935a

Note: 48" and 52" models use two guard mounting brackets instead of the single guard panel (Fig. 0479).

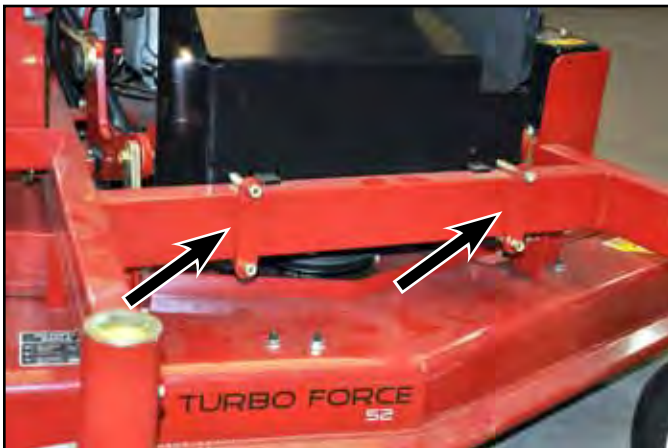


Fig. 0479

IMG-0586a

18. Loosen the cable clamp securing the choke cable to the engine throttle plate, then remove the cable from the clamp (Fig. 0481).

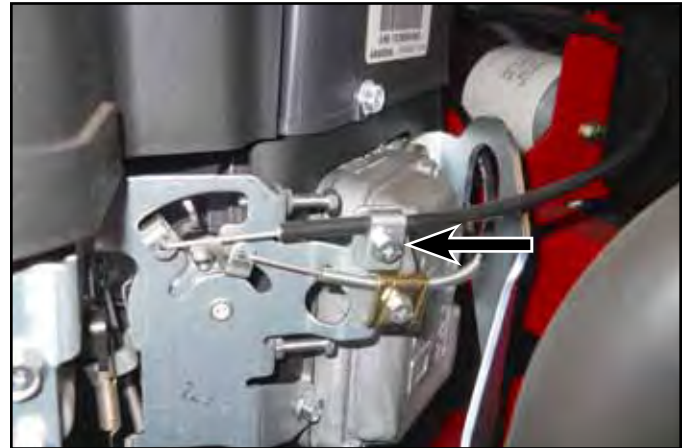


Fig. 0481

DSCN-0941a

CHASSIS

19. Remove the “Z” bend from the engine choke lever (Fig. 0482).



Fig. 0482 DSCN-0945a

21. Remove the “Z” bend from the engine throttle lever (Fig. 0484).



Fig. 0484 DSCN-0950a

20. Loosen the cable clamp securing the throttle cable to the engine throttle plate, then remove the cable from the clamp (Fig. 0483).

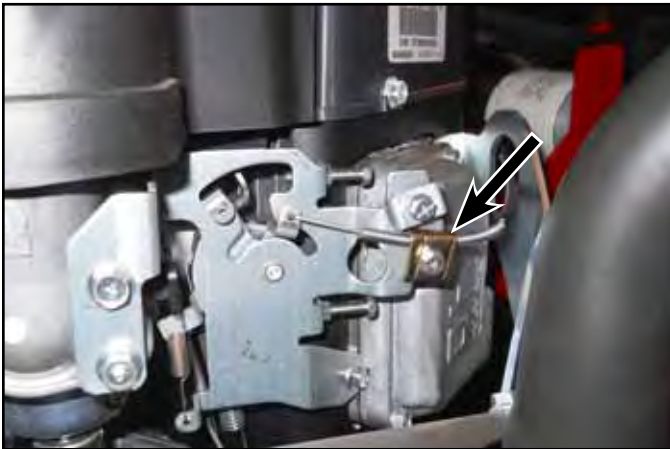


Fig. 0483 DSCN-0946a

22. Remove the two sets of wing nuts and hold down bolts securing the battery cover to the battery tray, then remove the cover (Fig. 0485).



Fig. 0485 DSCN-0952a

23. Remove the nut and bolt securing the negative cable to the battery (Fig. 0486).



Fig. 0486 DSCN-0953a

25. Slide the hose clamp back on the fuel line and remove the fuel line from the fuel filter (Fig. 0488).



Fig. 0488 DSCN-0959a

24. Remove the nut and bolt securing the positive cable to the battery (Fig. 0487).



Fig. 0487 DSCN-0957a

Note: Position a pan under the fuel hose to catch any fuel remaining in the fuel hose (Fig. 0489).



Fig. 0489 DSCN-0962a

3

CHASSIS

26. Slide the hose clamp back on the low-pressure return hose, then remove the hose from the "T" fitting (Fig. 0490).



Fig. 0490 DSCN-0965a

27. Slide the hose clamp back on the low-pressure suction hose, then remove the hose from the "T" fitting (Fig. 0491).

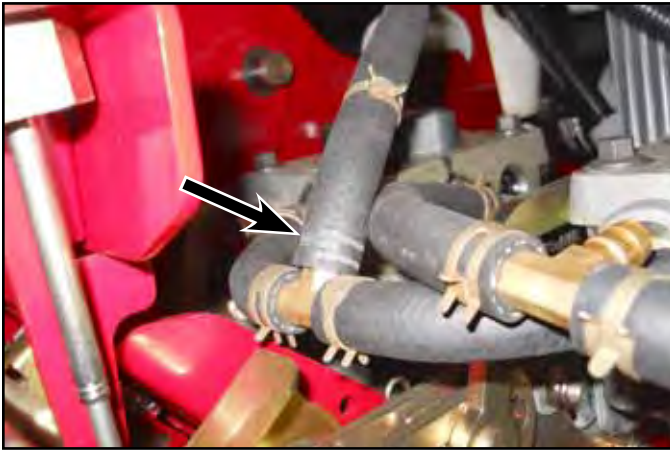


Fig. 0491 DSCN-0967a

28. Disconnect the wire harness from the neutral switch (Fig. 0492).

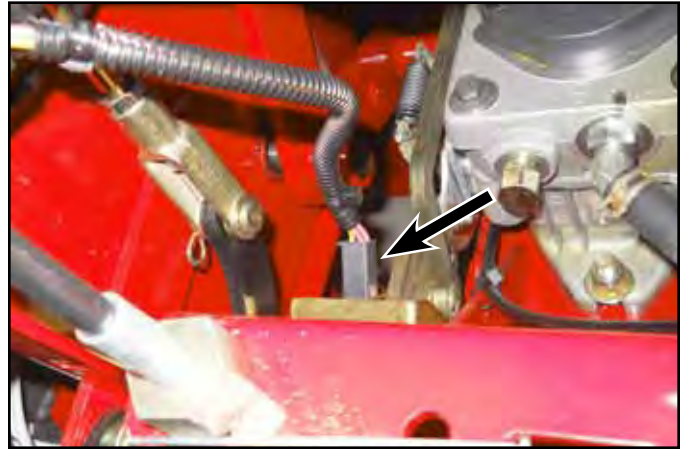


Fig. 0492 DSCN-0974a

29. Disconnect the violet wire from the voltage regulator (Fig. 0493).

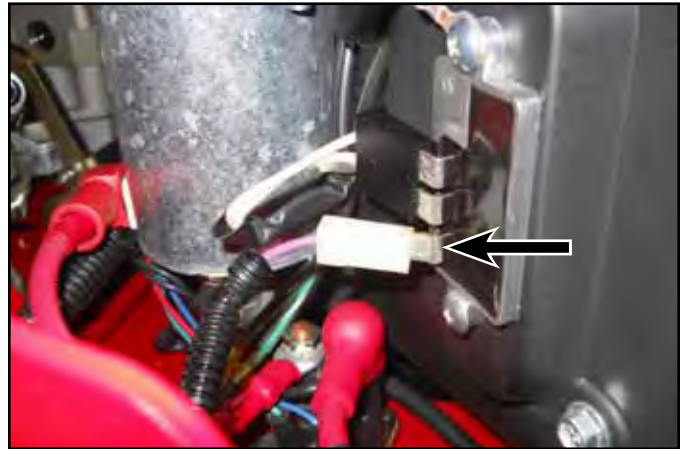


Fig. 0493 DSCN-0977a

30. Unplug the pink wire from the green fuel solenoid wire (Fig. 0494).

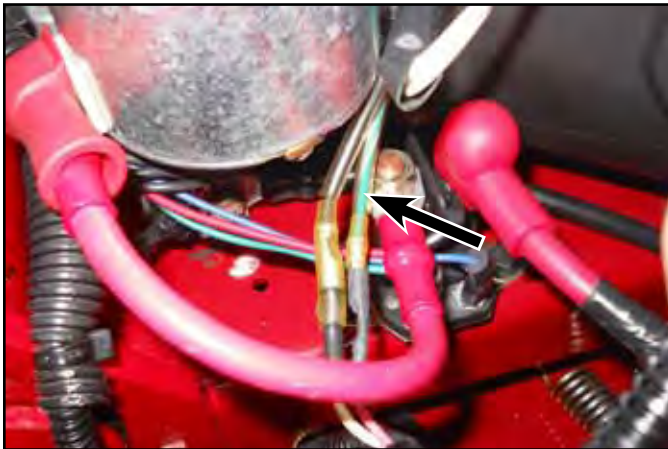


Fig. 0494 DSCN-0978a

32. Remove nut and lock washer securing the positive battery cable and red wire eyelet to the solenoid post (Fig. 0496).

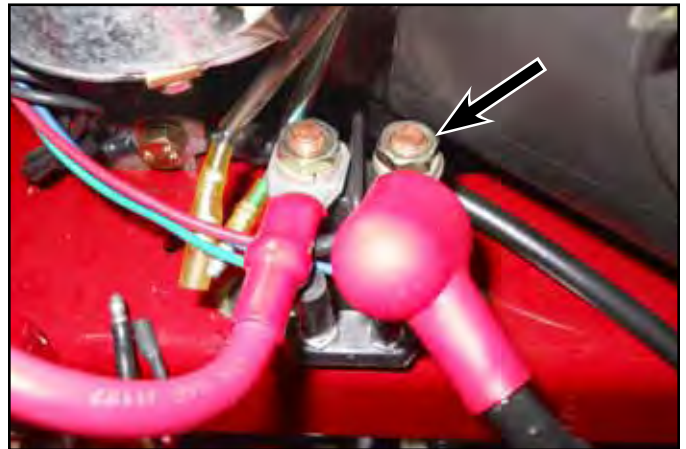


Fig. 0496 DSCN-0984a

31. Unplug the white wire from the black magneto wire (Fig. 0495).

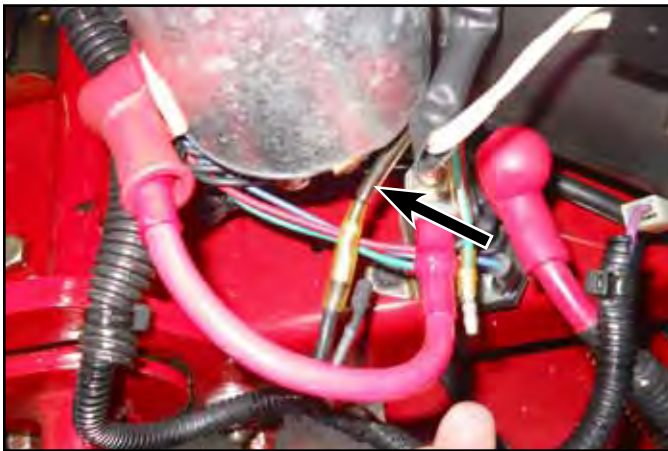


Fig. 0495 DSCN-0980a

33. Remove the green and blue bullet connectors from the two small studs on the solenoid (Fig. 0497).

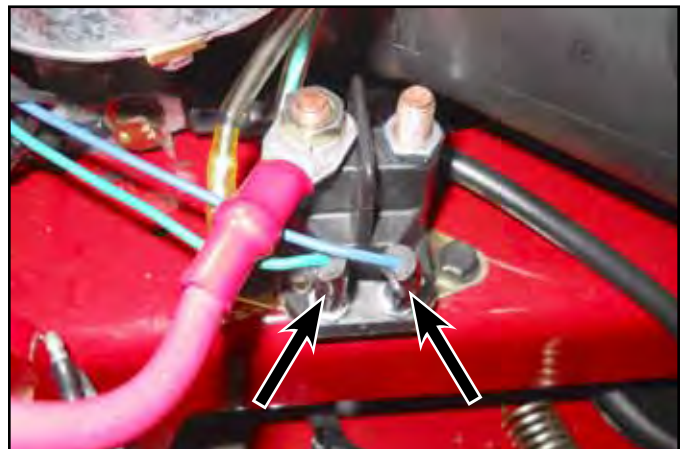


Fig. 0497 DSCN-0988a

CHASSIS

34. Remove the bolt and washer securing the ground wires to the engine block (Fig. 0498).

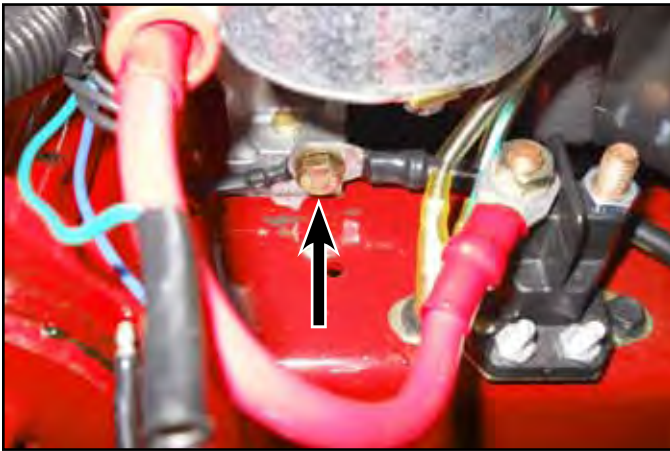


Fig. 0498

DSCN-0991a

36. Remove both sets of bolts, nuts and spacers securing the lower end of the control cables to the control fork assemblies (Fig. 0500).



Fig. 0500

DSCN-0996a

35. Disconnect the clutch wires from the wiring harness (Fig. 0499).

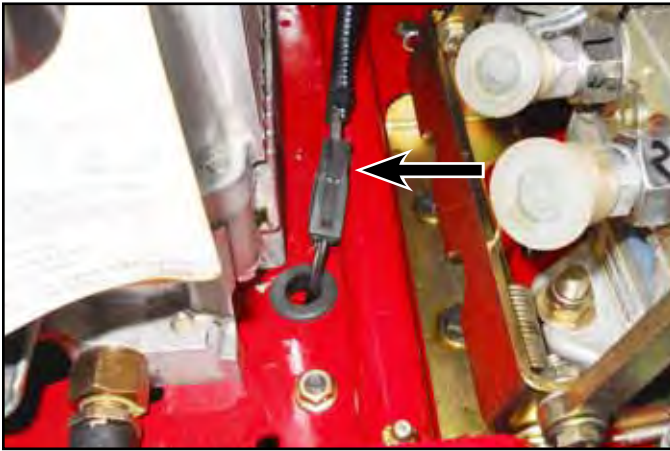


Fig. 0499

DSCN-0993a

37. Remove the spring clip securing the motion control cables to the linkage mount (Fig. 0501).



Fig. 0501

DSCN-0999a

38. Remove the two cable ties securing the speed control cable to the RH control cable and the lower LH side of the linkage mount (Fig. 0502).

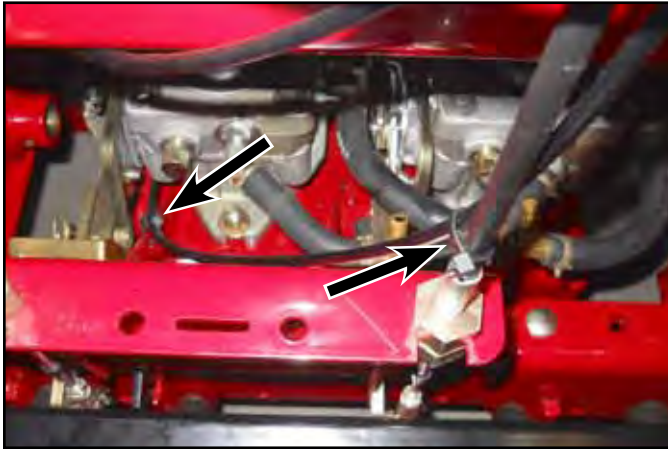


Fig. 0502

DSCN-1000a

40. Remove the speed control cable clip from the speed control handle assembly (Fig. 0504).



Fig. 0504

DSCN-1010a

39. Remove the motion control cables from the linkage mount (Fig. 0503).

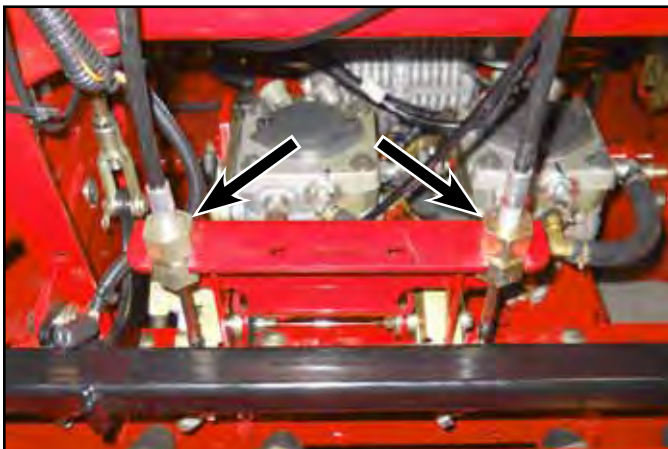


Fig. 0503

DSCN-1005a

41. Remove the "Z" bend of the speed control cable from the speed control handle assembly (Fig. 0505).



Fig. 0505

DSCN-1015a

CHASSIS

42. Remove the four sets of bolts, spacers and nuts (two sets per side) that secure the axle and wheel assembly to the carrier frame (Fig. 0506).

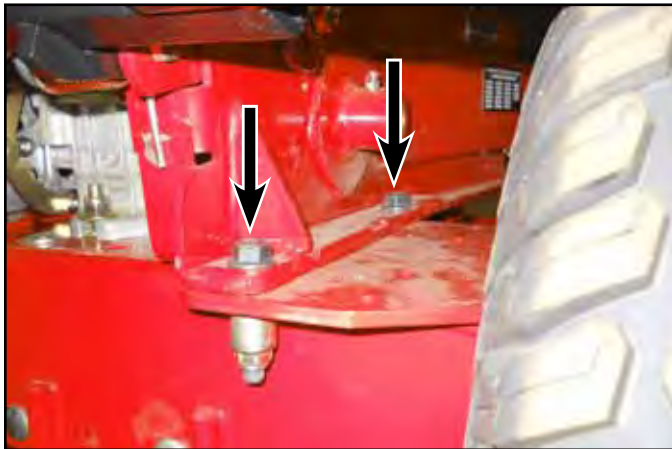


Fig. 0506

DSCN-1019a

44. Walk the carrier frame and tower assembly forward, over the engine and deck assembly (Fig. 0508).



Fig. 0508

DSCN-1028a

43. Using two people or a hoist, lift the rear end of the carrier frame and tower assembly (Fig. 0507).



Fig. 0507

DSCN-1024a

45. Remove the nut and bolt securing the fuel hose bracket (securing the fuel hose) to the RH side of the carrier frame (Fig. 0509).

Note: 2009 models use an "R" clamp to secure the position of the fuel hose.



Fig. 0509

DSCN-1247a

46. Remove bolt and nut securing the “R” clamp (securing choke and throttle cables) to the LH side of the carrier frame (Fig. 0510).



Fig. 0510

DSCN-1249a

48. Remove the hairpin cotter and clevis pin securing the brake rod yoke to the brake assembly (Fig. 0512).



Fig. 0512

DSCN-1254a

47. Remove the cable tie securing the choke cable to the LH rear side of the carrier frame (Fig. 0511).



Fig. 0511

DSCN-1251a

49. Remove the two sets (one set per side) of carriage bolts, washers and nuts securing the platform and brake assemblies to the carrier frame (Fig. 0513).



Fig. 0513

DSCN-1257a

CHASSIS

50. Remove the platform assembly from the carrier frame (Fig. 0514).



Fig. 0514

DSCN-1260a

52. **2010 only:** Remove the cable tie securing the fuel vent hose to the RH side of the carrier frame (Fig. 0516).

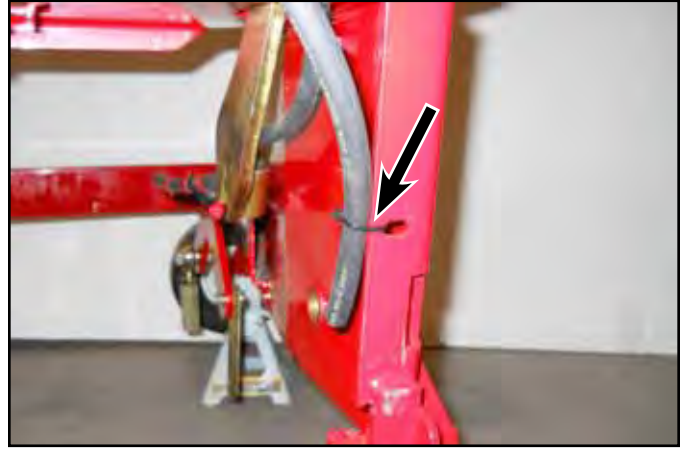


Fig. 0516

DSCN-1269a

51. Remove the brake assembly from the carrier frame (Fig. 0515).



Fig. 0515

DSCN-1263a

53. Remove the four sets (one set in each corner) of bolts, spacers and nuts securing the tower assembly to the carrier frame (Fig. 0517).

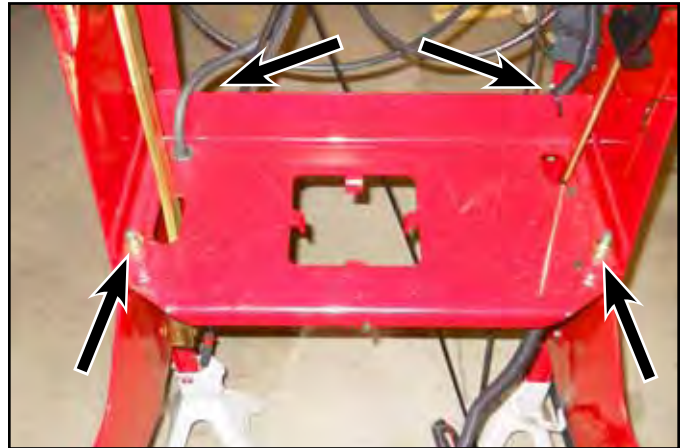


Fig. 0517

DSCN-1264a

54. Remove the tower assembly from the carrier frame (Fig. 0518).



Fig. 0518

DSCN-1271a

56. Slide the hose clamp back on the low-pressure suction line where it connects to the filter inlet fitting (Fig. 0520).



Fig. 0520

DSCN-1318a

55. Remove bolt and nut securing the “R” clamp (securing the low-pressure return line) to the hydraulic reservoir (Fig. 0519).



Fig. 0519

DSCN-1273a

57. Remove the two sets of bolts, washers, spacers and nuts securing the hydraulic reservoir to the tank mount (Fig. 0521).



Fig. 0521

DSCN-1317a

CHASSIS

58. Place an oil drain pan below the reservoir. Remove the reservoir from the tank mount (Fig. 0522).



Fig. 0522

DSCN-1276a

59. Remove the two sets of bolts and washers securing the hydraulic filter head assembly (Fig. 0524).



Fig. 0524

DSCN-1284a

Note: While lifting the tank from the tank bracket, remove the low-pressure hose from the filter inlet fitting (Fig. 0523).



Fig. 0523

DSCN-1282a

60. Remove the "E" clip and washer securing the lift assembly (Fig. 0525).

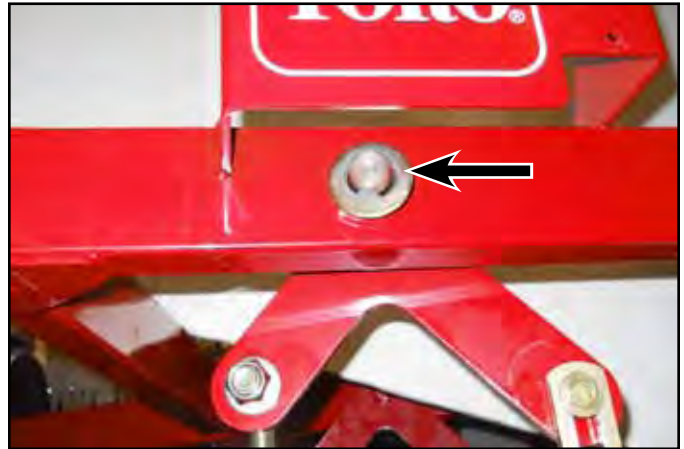


Fig. 0525

DSCN-1287a

61. Remove the lift assembly from the carrier frame (Fig. 0526).



Fig. 0526

DSCN-1294a

62. Repeat step 60 and 61 on the other side of the carrier frame.

63. Remove the grease zerk from the LH & RH rear pivot hubs (Fig. 0528).



Fig. 0528

DSCN-1297a

Note: Ensure the thin washer is removed with the lift assembly (Fig. 0527).

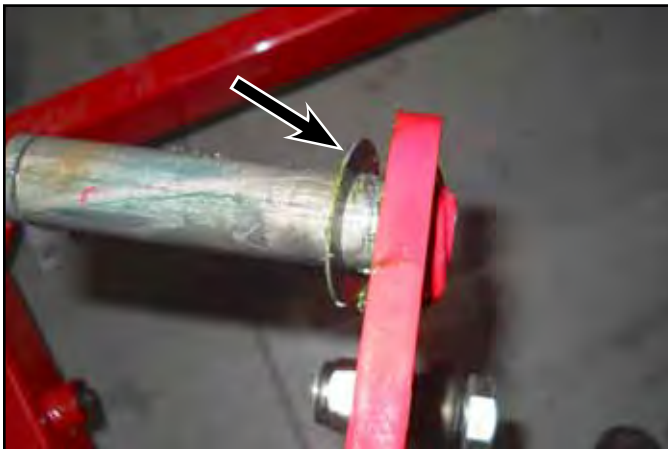


Fig. 0527

DSCN-1308a

64. Remove the grease zerk from the LH & RH front pivot hubs (Fig. 0529).

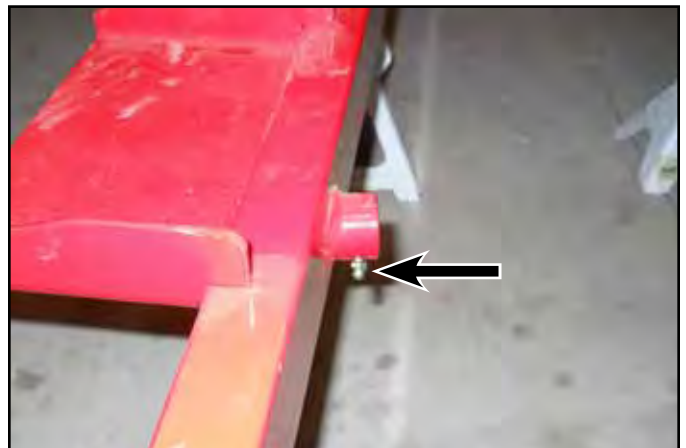


Fig. 0529

DSCN-1300a

CHASSIS

65. Remove the two front caster wheel assemblies. See “Caster Wheel Assembly Removal” on page 3-17.
66. Using a drill, carefully remove the two pop rivets securing the model/serial plate (Fig. 0530).

3



Fig. 0530

DSCN-1306a

Carrier Frame Installation

1. Using pop rivets, secure the original model/serial plate to the carrier frame (Fig. 0531).



Fig. 0531

DSCN-1306a

2. Install the two front caster wheel assemblies. See “Caster Wheel Assembly Installation” on page 3-20.
3. Install the grease zerk into the LH & RH front pivot hubs (Fig. 0532).

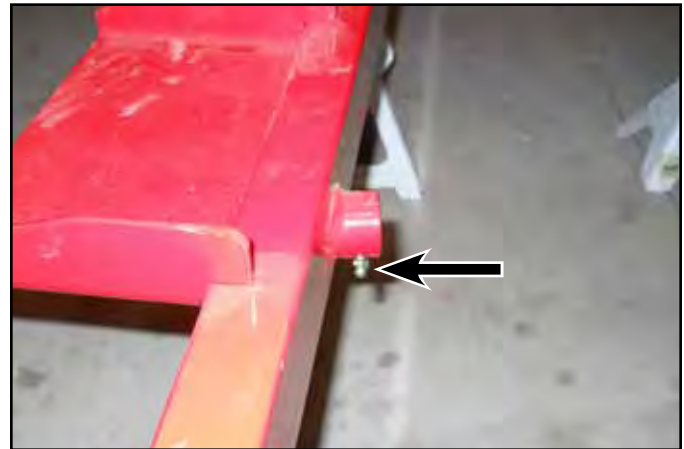


Fig. 0532

DSCN-1300a

4. Install the grease zerk into the LH & RH rear pivot hubs (Fig. 0533).

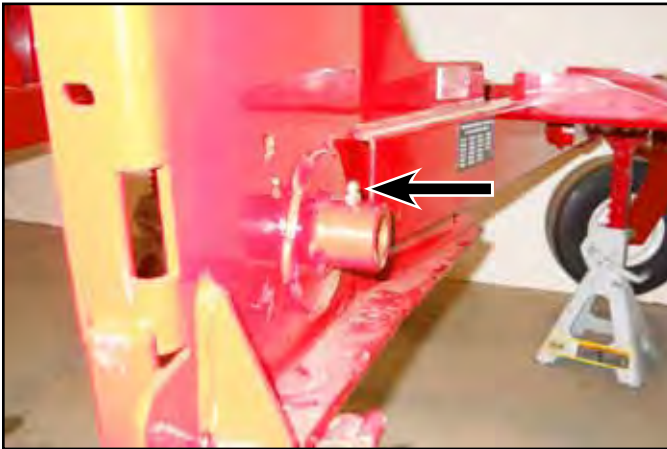


Fig. 0533

DSCN-1297a

5. Install the lift assembly to the carrier frame (Fig. 0534).

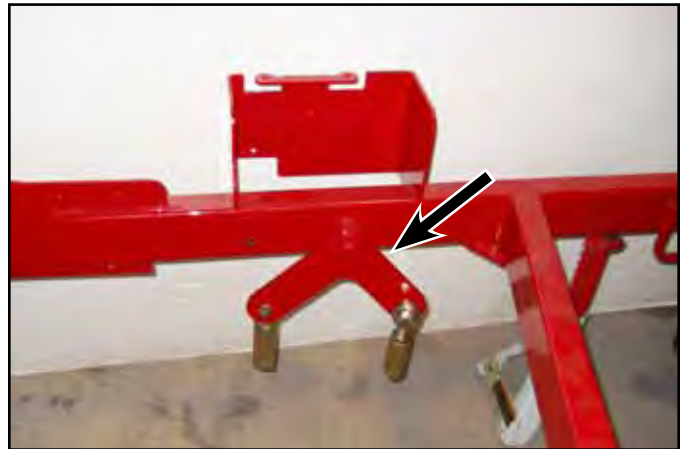


Fig. 0534

DSCN-1311a

3

Note: Ensure the thin washer is in place on the lift assembly pivot post (Fig. 0535).

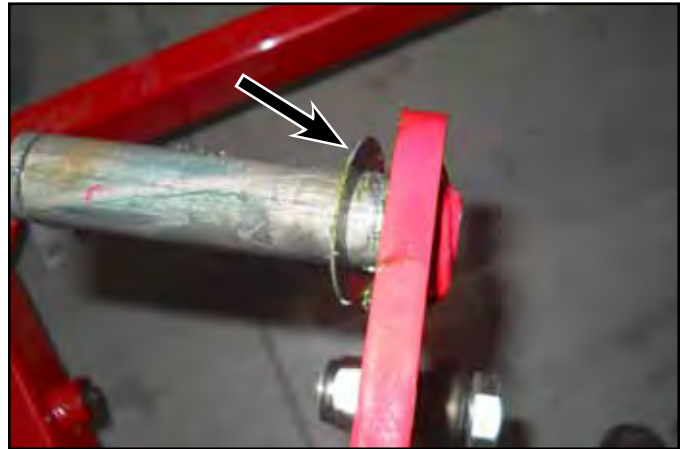


Fig. 0535

DSCN-1308a

CHASSIS

- Secure the lift assembly to the carrier frame using the large washer and "E" clip (Fig. 0536).

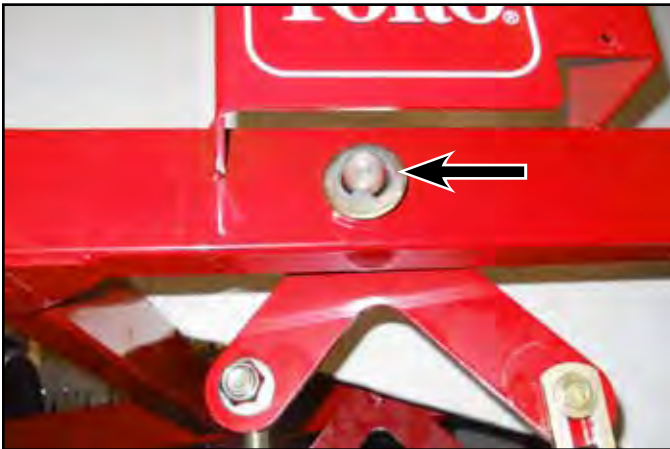


Fig. 0536

DSCN-1287a

- Position the hydraulic reservoir in the hydraulic reservoir mount (Fig. 0538).



Fig. 0538

DSCN-1276a

- Repeat steps 5 and 6 on the other side.
- Secure the hydraulic filter head assembly to the hydraulic reservoir mount using two bolts and washers (Fig. 0537).



Fig. 0537

DSCN-1313a

Note: Install the low pressure suction line to the hydraulic filter inlet fitting as the tank is being lowered into position (Fig. 0539).



Fig. 0539

DSCN-1281a

10. Position the two spacers between the hydraulic reservoir and the hydraulic reservoir mount (Fig. 0540).



Fig. 0540

DSCN-1314a

11. Secure the hydraulic reservoir and spacers to the hydraulic reservoir mount using two bolts, washers and nuts (Fig. 0541).



Fig. 0541

DSCN-1316a

12. Secure the low-pressure suction line to the hydraulic filter inlet fitting using the hose clamp (Fig. 0542).

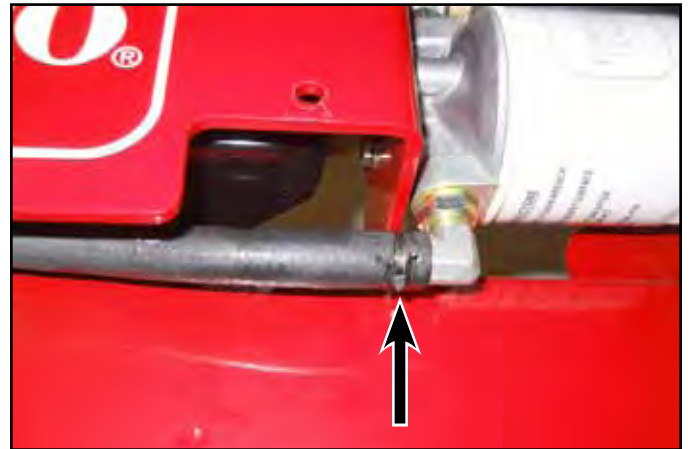


Fig. 0542

DSCN-1321a

13. Secure the “R” clamp (securing the low-pressure return line) to the hydraulic reservoir mount using the bolt and nut (Fig. 0543).

Note: The tabs of the “R” clamp straddle the hydraulic reservoir mount.



Fig. 0543

DSCN-1323a

CHASSIS

14. Position the tower assembly onto the carrier frame (Fig. 0544).



Fig. 0544

DSCN-1271a

15. Loosely install the two sets of bolts, spacers and nuts that secure the front of the tower to the carrier frame using (Fig. 0545).

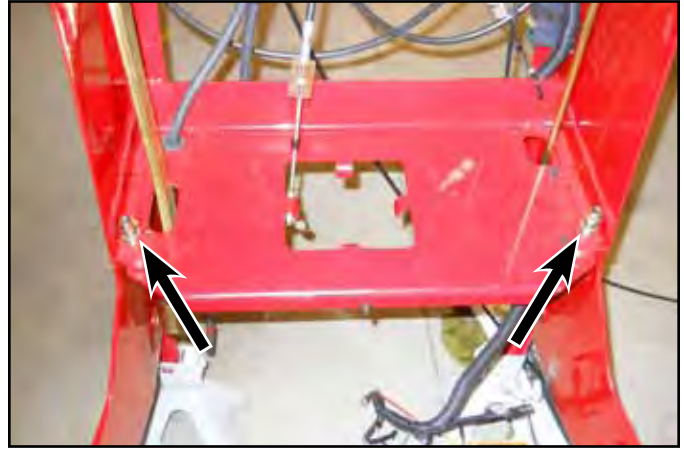


Fig. 0545

DSCN-1325a

Note: The bolt is installed upwards through the carrier frame, then up through the tower assembly (Fig. 0546).

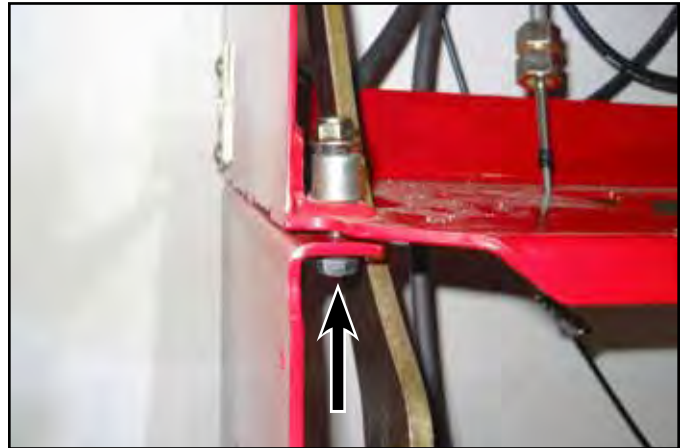


Fig. 0546

DSCN-1327a

3

16. Loosely install the two sets of bolts, spacers and nuts that secure the rear of the tower to the carrier frame (Fig. 0547).

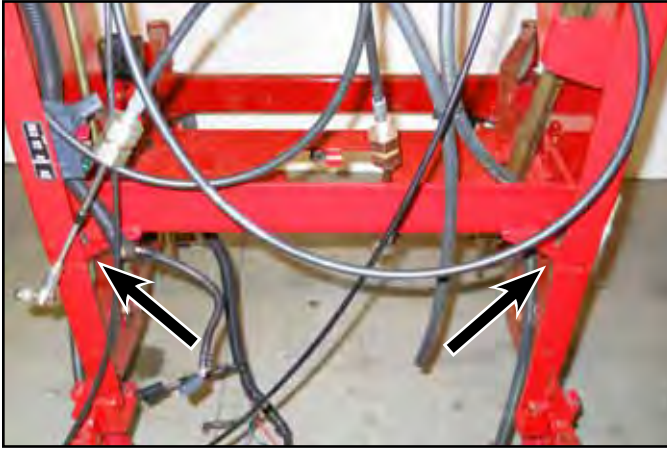


Fig. 0547

DSCN-1328a

17. Tighten all four sets of fastener assemblies.

18. **2010 only:** Secure the fuel vent hose to the RH side of the carrier frame using a cable tie (Fig. 0549).

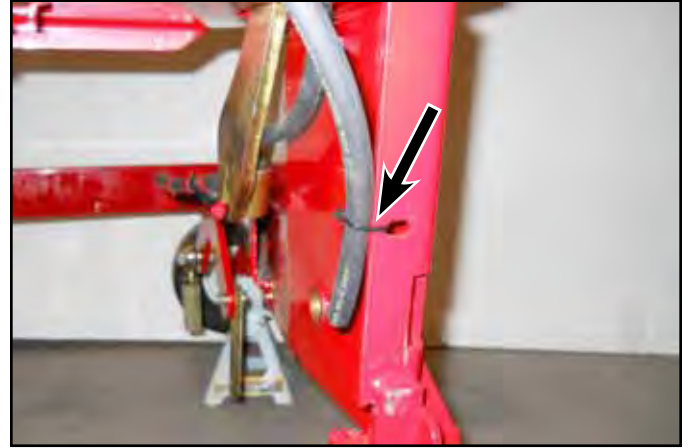


Fig. 0549

DSCN-1269a

Note: The bolt is installed downwards through the tower, then down through the carrier frame (Fig. 0548).

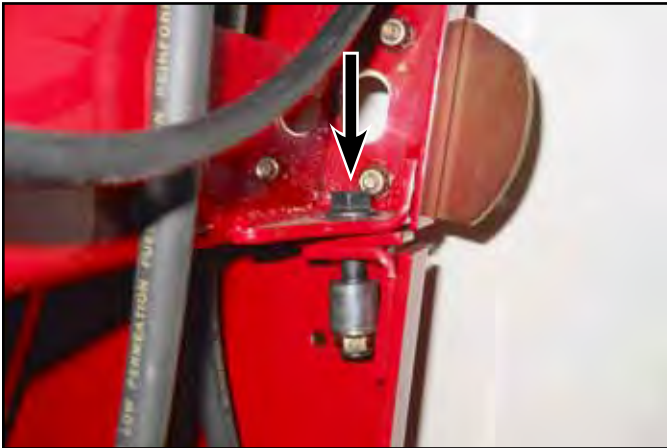


Fig. 0548

DSCN-1331a

CHASSIS

19. Position the brake arm assembly in the carrier frame (Fig. 0550).



Fig. 0550 DSCN-1332a

20. Position the platform assembly onto the carrier frame (Fig. 0552).



Fig. 0552 DSCN-1258a

Note: Align the square bolt hole in the end of the brake support with the square bolt hole in the side of the carrier frame (Fig. 0551).

Note: The brake arm torsion spring will be set in a later step.

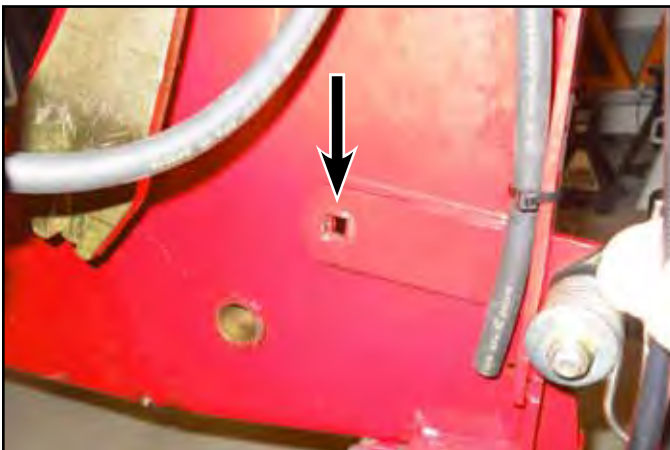


Fig. 0551 DSCN-1336a

Note: The pivot hole in the platform aligns with the square hole in the carrier frame (Fig. 0553).

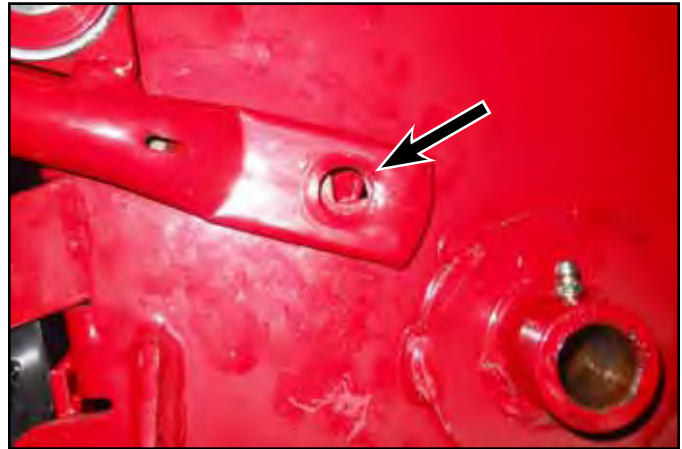


Fig. 0553 DSCN-1337a

21. Position the carriage bolt through the brake support and the carrier frame (Fig. 0554).

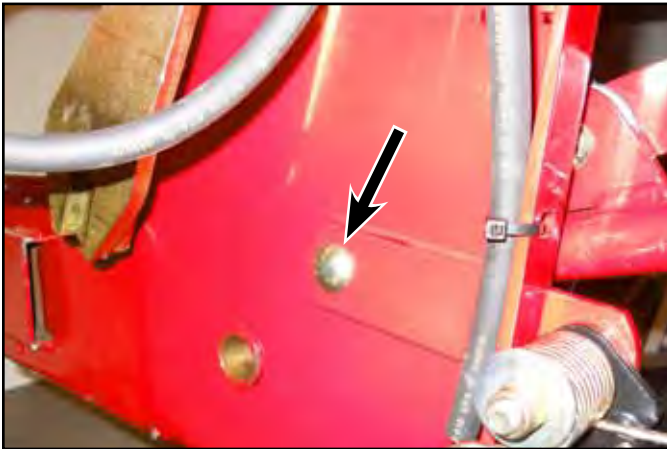


Fig. 0554 DSCN-1340a

23. Position the platform so carriage bolt protrudes through the platform pivot hole (Fig. 0556).



Fig. 0556 DSCN-1344a

22. Position a washer over the carriage bolt (Fig. 0555).



Fig. 0555 DSCN-1342a

24. Position the spacer over the carriage bolt and into the platform pivot hole (Fig. 0557).

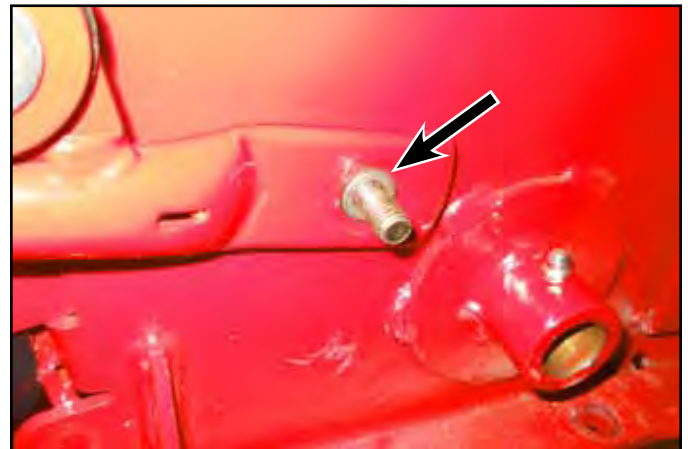


Fig. 0557 DSCN-1346a

3

CHASSIS

25. Secure the assembly with a washer and nut (Fig. 0558).



Fig. 0558 DSCN-1255a

28. Remove the nut and washer securing the brake arm torsion spring, then remove the spring (Fig. 0560).



Fig. 0560 DSCN-1362a

26. Repeat steps 21 through 25 on the other side of the machine.

27. Move the platform to the "Up" position (Fig. 0559).



Fig. 0559 DSCN-1359a

29. Position the torsion spring over the spacer and bolt. The straight end of the spring is secured by the chassis, the curved end hooks under the brake assembly (Fig. 0561).

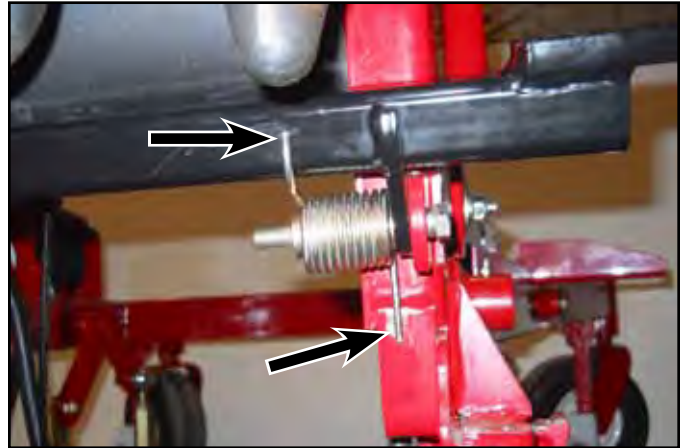


Fig. 0561 DSCN-1361a

30. Secure the torsion spring assembly using the washer and nut (Fig. 0562).



Fig. 0562

DSCN-1362a

32. Secure the brake rod to the brake arm assembly using the clevis pin and hairpin cotter (Fig. 0564).



Fig. 0564

DSCN-1367a

31. Lower the platform assembly to the "Down" position (Fig. 0563).



Fig. 0563

DSCN-1365a

33. Secure the fuel hose bracket (securing the fuel hose) to the RH side of the carrier frame using the bolt and nut (Fig. 0565).

Note: 2009 product use an "R" clamp to secure the position of the fuel hose.



Fig. 0565

DSCN-1369a

CHASSIS

34. Route the choke cable between the brake rod and the carrier frame (Fig. 0566).



Fig. 0566 DSCN-1371a

36. Secure the "R" clamp (securing the throttle and choke cables) to the LH side of the carrier frame using a bolt and nut (Fig. 0568).



Fig. 0568 DSCN-1249a

35. Secure the choke cable to the carrier frame using a cable tie (Fig. 0567).

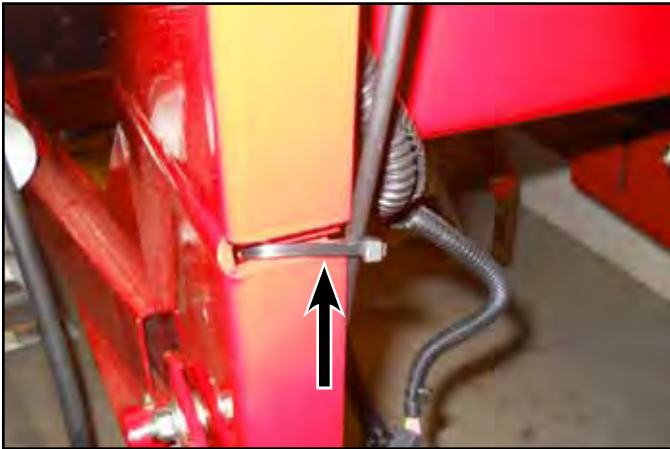


Fig. 0567 DSCN-1373a

37. Place the platform assembly in the "UP" position (Fig. 0569).



Fig. 0569 DSCN-1359a

38. Position the rear axle assembly behind the engine base assembly (Fig. 0570).



Fig. 0570

DSCN-1378a

40. Walk the carrier frame and tower assembly rearward, over the engine and deck assembly (Fig. 0572).



Fig. 0572

DSCN-1385a

39. Using two people or a hoist, lift the rear end of the carrier frame and tower assembly (Fig. 0571).



Fig. 0571

DSCN-1382a

CHASSIS

41. Loosely install the four sets of bolts, spacers, and nuts (two sets per side) that secure the axle and wheel assembly to the carrier frame using (Fig. 0573).



Fig. 0573 DSCN-1386a

42. Tighten all four sets of fasteners.

43. **2009 only:** Install the spacer into the rear cross shaft hub (Fig. 0575).

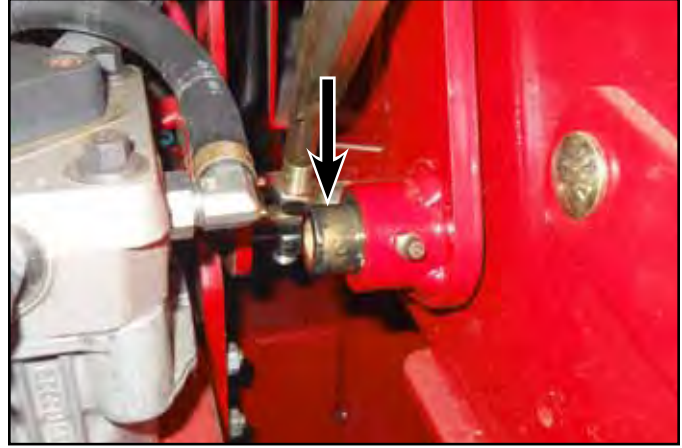


Fig. 0575 DSCN-1603a

Note: The bolts are installed downwards through the carrier frame, then down through the wheel motor mounts (Fig. 0574).



Fig. 0574 DSCN-1389a

44. **2009 only:** Install the bolt through the carrier frame, then through the spacer and hub assembly (Fig. 0576).



Fig. 0576 DSCN-1606a

45. **2009 only:** Secure the assembly using a washer and nut (Fig. 0577).

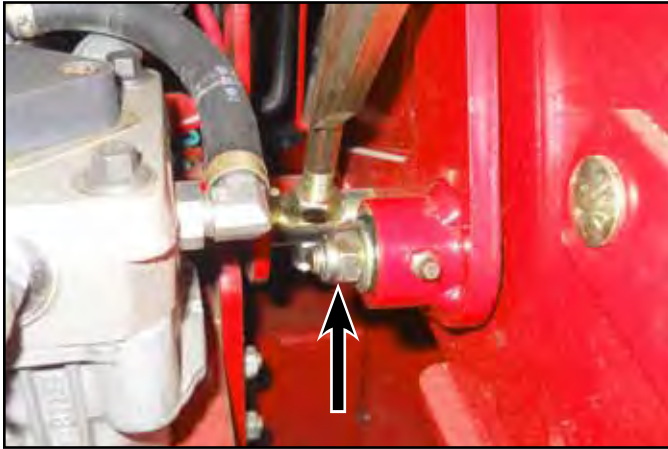


Fig. 0577

DSCN-1607a

48. **2010 only:** Rotate the pivot shaft so the spiral pin hole of the pivot shaft aligns with the spiral pin hole of the rear cross shaft assembly, then secure the assembly with the spiral pin (Fig. 0579).



Fig. 0579

DSCN-1395a

46. **2009 only:** Repeat steps 43 through 45 on the other side of the unit.
47. **2010 only:** Position the RH pivot shaft through the carrier frame hub and rear cross shaft assembly (Fig. 0578).

Note: 48" and 52" decks are set to a narrow stance. Remove the wheels to install the pivot shafts. Reinstall the wheels after installing the pivot shafts.



Fig. 0578

DSCN-1392a

Note: The spiral pin ends need to be flush to the lift arm hub (Fig. 0580).

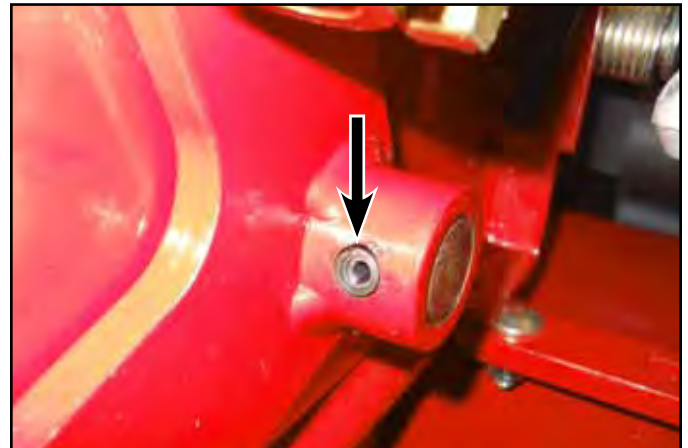


Fig. 0580

DSCN-1400a

CHASSIS

49. **2010 only:** Repeat steps 47 and 48 on the LH side of the machine.

50. Install the "Z" bend of the speed control cable to the speed control handle assembly (Fig. 0581).

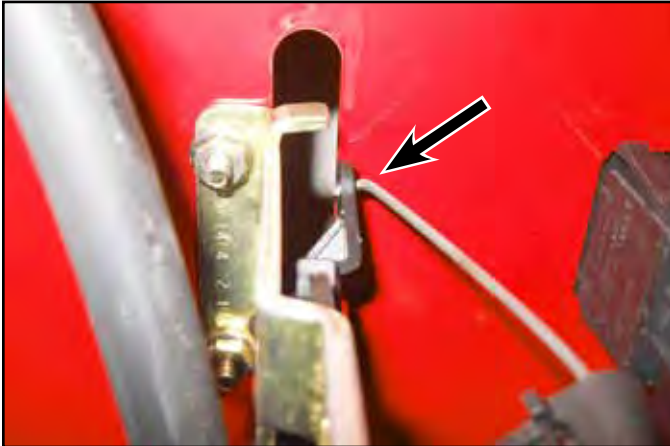


Fig. 0581 DSCN-1015a

51. Secure the speed control cable to the speed control handle assembly with the clip on the end of the cable jacket (Fig. 0582).



Fig. 0582 DSCN-1482a

52. Install the motion control cable adjustment nuts into the linkage mount (Fig. 0583).

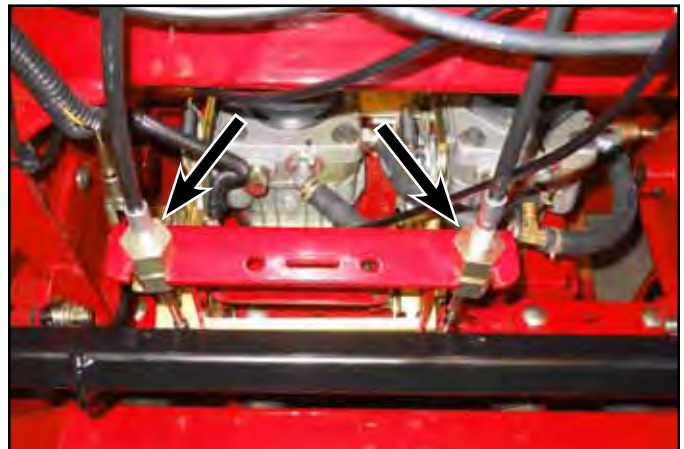


Fig. 0583 DSCN-1409a

53. Secure the motion control cables to the linkage mount using the spring clip (Fig. 0584).

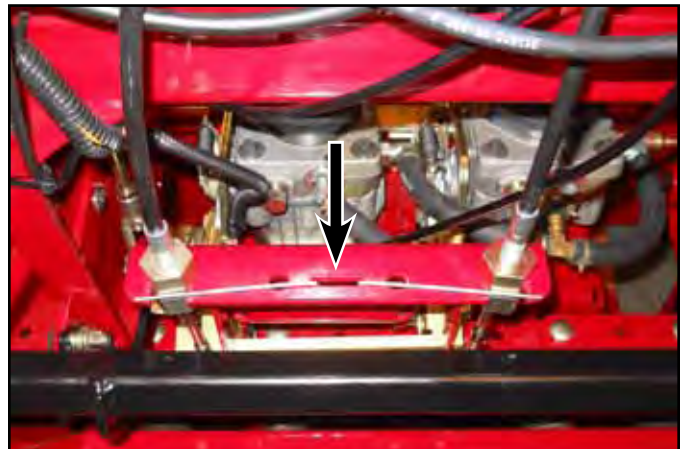


Fig. 0584 DSCN-1410a

54. Secure the speed control cable to the RH control cable and the lower LH side of the linkage mount using cable ties (Fig. 0585).

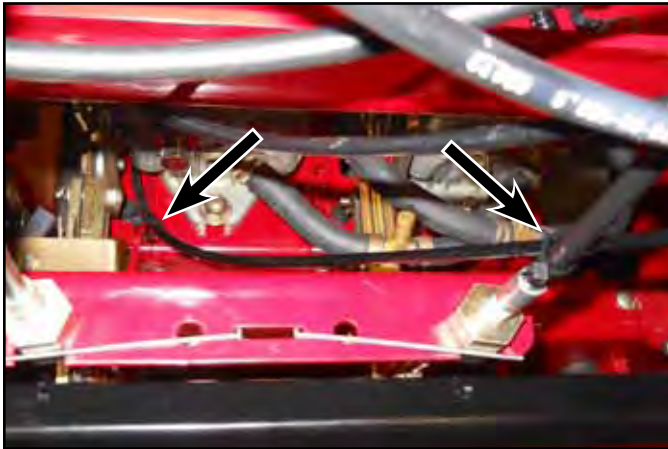


Fig. 0585

DSCN-1414a

56. Connect the wire harness to the neutral switch (Fig. 0587).

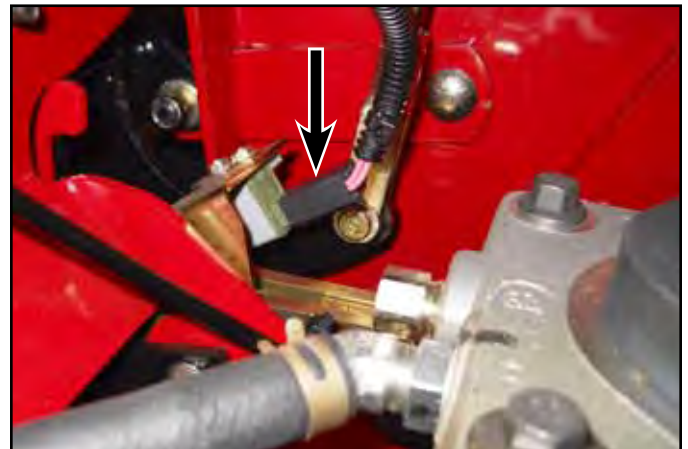


Fig. 0587

DSCN-1421a

55. Secure the rod ends at the base of the control cables to the control forks using the bolts, spacers and nuts (Fig. 0586).

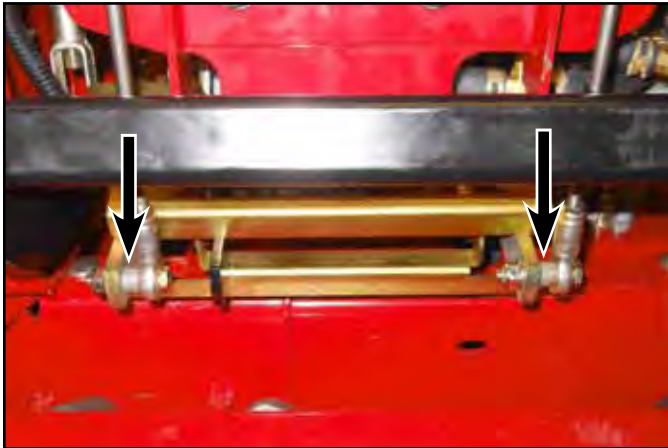


Fig. 0586

DSCN-1416a

57. Connect the wire harness to the clutch harness (Fig. 0588).



Fig. 0588

DSCN-1423a

CHASSIS

58. Connect the black wire eyelet and battery ground cable to the engine block using a bolt and washer (Fig. 0589).



Fig. 0589 DSCN-1446a

60. Connect the white wire connector to the black mag-neto wire (Fig. 0591).

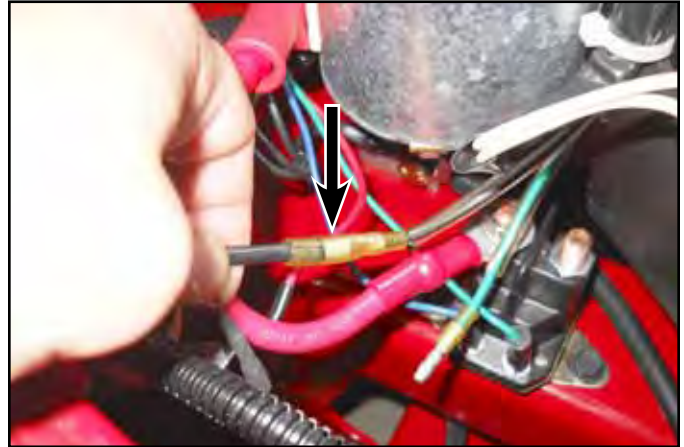


Fig. 0591 DSCN-1449a

59. Connect the green and blue wire bullet connectors to the two small studs on the solenoid (Fig. 0590).

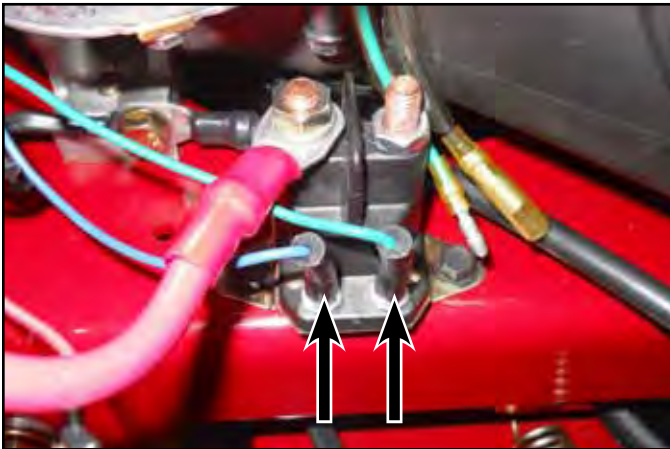


Fig. 0590 DSCN-1447a

61. Connect the pink wire connector to the green fuel solenoid wire (Fig. 0592).

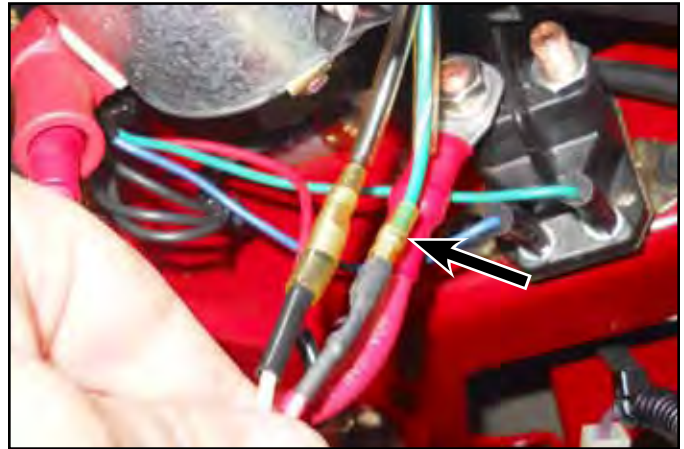


Fig. 0592 DSCN-1451a

62. Connect the purple wire connector to the rectifier (Fig. 0593).



Fig. 0593

DSCN-1453a

63. Secure the red wire eyelet and battery positive cable to the solenoid post using a nut and lock washer (Fig. 0594).



Fig. 0594

DSCN-1456a

3

Note: Position the red boot over the solenoid post after installing cables (Fig. 0595).



Fig. 0595

DSCN-1457a

CHASSIS

64. **48" and 52" Decks:** Install the lift rod through the lift rod bracket and secure with nut (Fig. 0596).



Fig. 0596

DSCN-1459a

66. Position the opposite end of the lift rod over the stud on the rear cross shaft assembly (Fig. 0598).

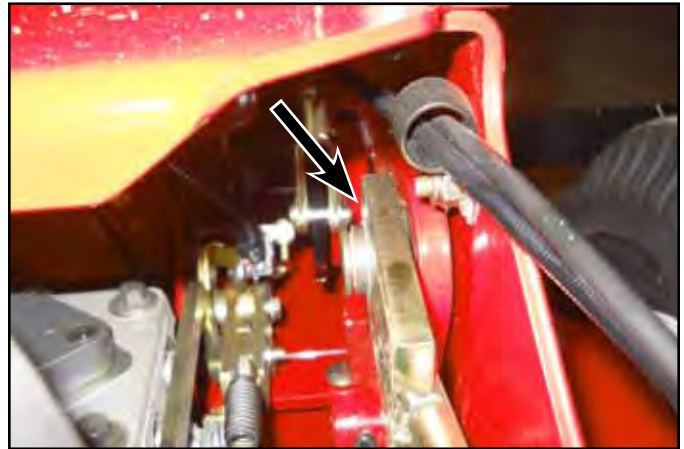


Fig. 0598

DSCN-0801a

65. **60" Decks:** Install the lift rod to the turnbuckle and secure with jam nut (Fig. 0597).



Fig. 0597

DSCN-1462a

Note: Ensure the flange bearing is still in place (Fig. 0599).

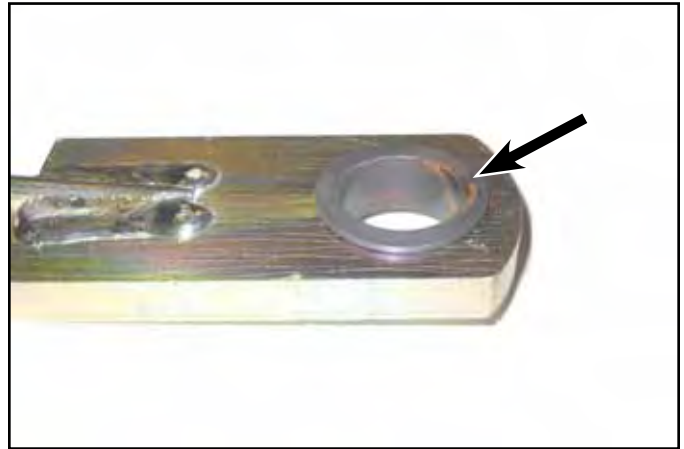


Fig. 0599

DSCN-0804a

3

67. Position the large washer over the rear cross shaft stud (Fig. 0600).



Fig. 0600

DSCN-0807a

69. Repeat steps 64 through 68 on the other side of the machine.

70. Secure the lower ends of the lift links using the shoulder bolts, washers, and nuts (Fig. 0602).



Fig. 0602

DSCN-1467a

68. Secure the assembly using the "E" clip (Fig. 0601).



Fig. 0601

DSCN-0808a

Note: Install the thin washer between the lift link and deck bracket (Fig. 0603).

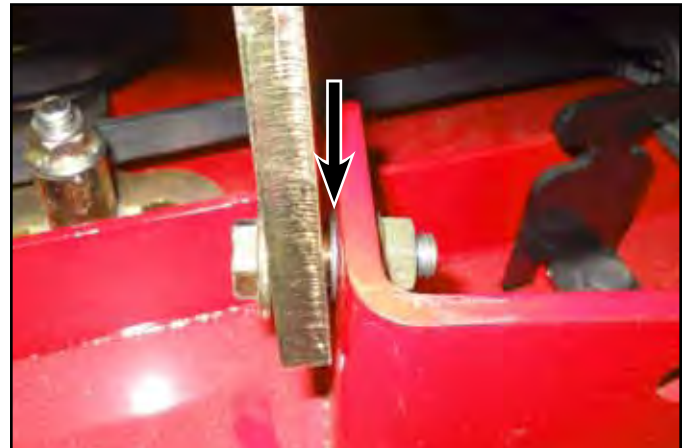


Fig. 0603

DSCN-1469a

CHASSIS

71. Hook the “Z” bend of the throttle cable into the throttle control lever and loosely clamp the outer housing of the throttle cable with the cable clamp (Fig. 0604).



Fig. 0604

IMG-0575a

73. With the engine throttle control lever in the “Fast” position, pull the slack from the cable jacket and tighten the throttle cable clamp (Fig. 0606).



Fig. 0606

IMG-0576a

72. Move the throttle lever to the “Fast” position (Fig. 0605).



Fig. 0605

DSCN-1478a

74. Hook the “Z” bend of the choke cable into the choke control lever and loosely clamp the outer housing of the choke cable with the cable clamp (Fig. 0607).



Fig. 0607

IMG-0579a

75. Push the choke knob in so it is in the “Open” position (Fig. 0608).



Fig. 0608

DSCN-1479a

77. Position the muffler guard assembly and loosely install the four carriage bolts, two guard mounting brackets and nuts (Fig. 0610).

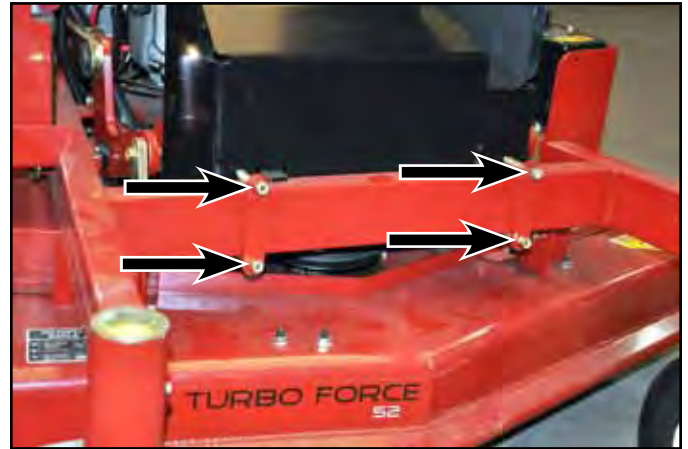


Fig. 0610

IMG-0586a

76. While holding the engine choke control lever in the “Open” position, pull the slack from the cable jacket and tighten the choke cable clamp (Fig. 0609).



Fig. 0609

IMG-1655a

Note: 60” models have guard panel, not the two guard mounting brackets (Fig. 0611).



Fig. 0611

DSCN-1471a

CHASSIS

78. Make sure the muffler exhaust pipe is centered in the muffler guard assembly, then tighten all four bolts and nuts (Fig. 0612).

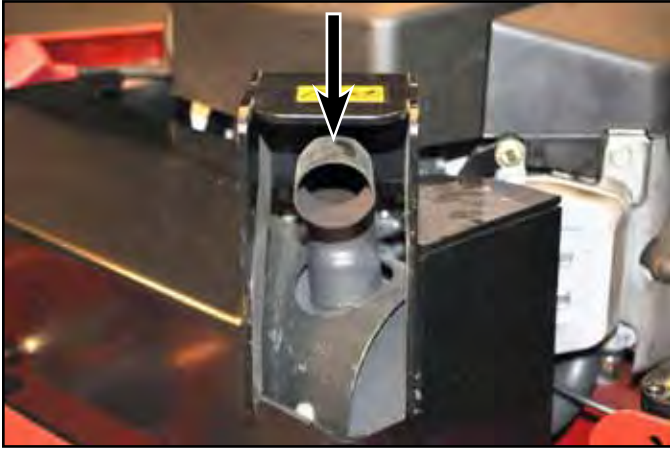


Fig. 0612

IMG-0589a

79. Secure the low-pressure suction line to the “T” fitting using the hose clamp (Fig. 0613).

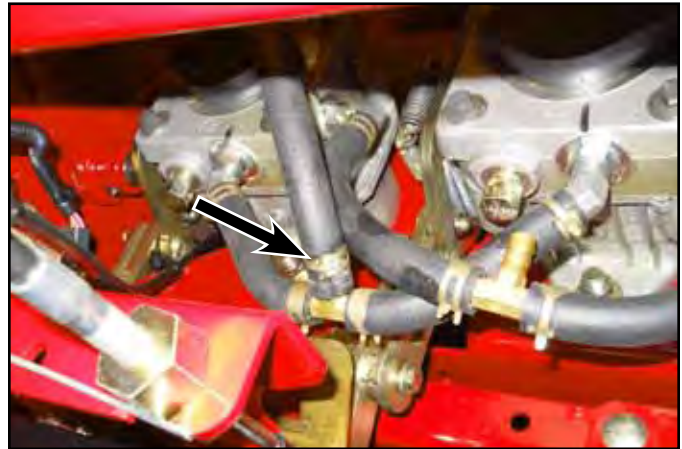


Fig. 0613

DSCN-1473a

Note: The opposite end of the low-pressure suction line is connected to the hydraulic oil filter (Fig. 0614).



Fig. 0614

DSCN-1475a

80. Secure the low-pressure return line to the "T" fitting using the hose clamp (Fig. 0615).



Fig. 0615

DSCN-1485a

81. Replace fitting o-rings. Install the high-pressure hoses to the pumps in their original positions (Fig. 0617).



Fig. 0617

DSCN-0810a

Note: The opposite end of the low-pressure return line is connected to the base of the hydraulic reservoir (Fig. 0616).



Fig. 0616

DSCN-1489a

82. Secure the hose routings using three cable ties (Fig. 0618).

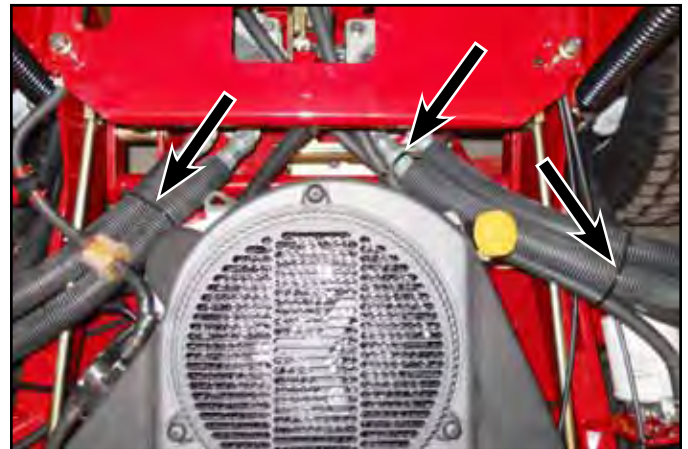


Fig. 0618

DSCN-0689a

CHASSIS

83. Secure the fuel hose to the fuel filter using the hose clamp (Fig. 0619).



Fig. 0619 DSCN-1484a

86. **2010 only:** Secure the extension spring assembly and chain to the control tower using the bolt and washer (Fig. 0621).



Fig. 0621 DSCN-0818a

84. **2009 only:** Install the lift assist cylinder. See "Lift Assist Cylinder Installation (2009 only)" on page 3-43.

85. **2010 only:** Position the chain between the pivot shaft and extension spring assembly (Fig. 0620).

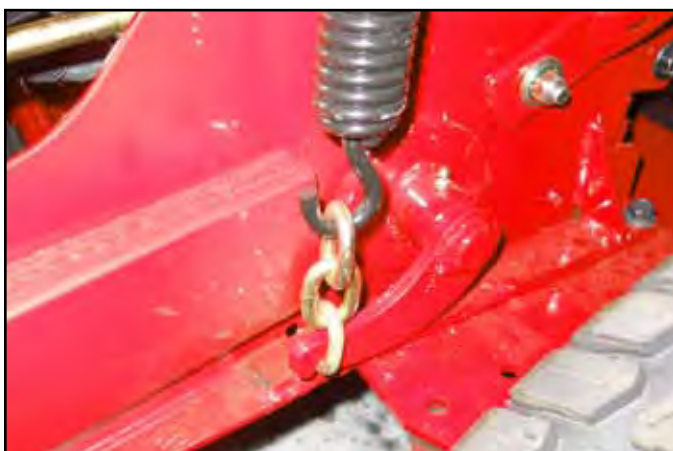


Fig. 0620 DSCN-0815a

87. **2010 only:** Install the bolt until the gap between the control tower mount and spring cap is 1-1/2" (3.8cm) for 60" decks / 2" (5cm) 48" or 52" decks (Fig. 0622).

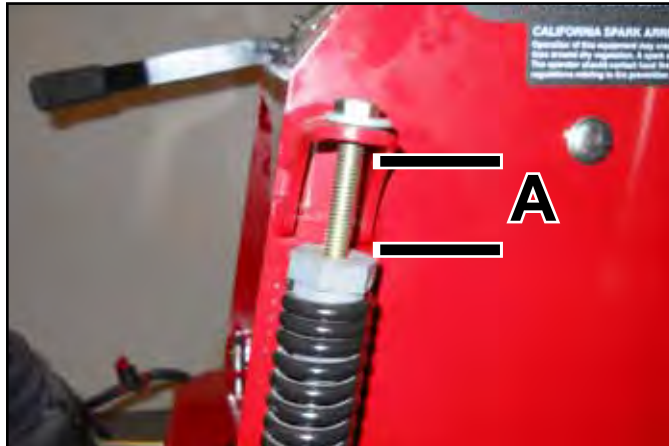


Fig. 0622 DSCN-0820a

- A. 1-1/2" (3.8cm) for 60" decks
2" (5cm) for 48" for 52" decks

- 88. **2010 only:** Repeat steps 85 and 86 on the other side of the machine.
- 89. Install the fuel tank. See "Fuel Tank Assembly Installation" on page 3-29.
- 90. **2009 only:** Secure the lower end of the lift bar to the rear cross shaft assembly using a nut. Thread the nut onto the bolt until there are 3 threads protruding (Fig. 0623).

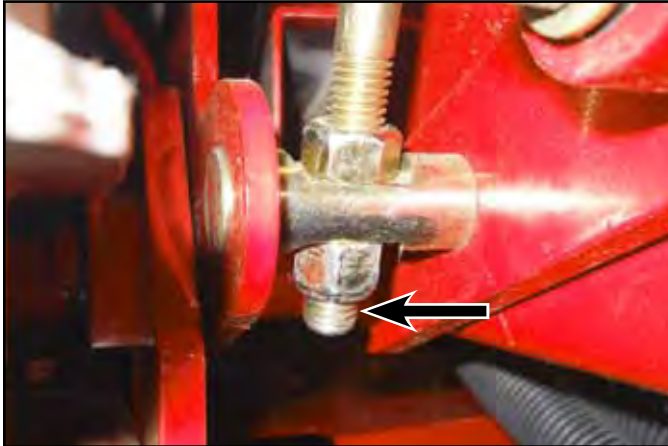


Fig. 0623

DSCN-0274a

- 91. **2010 only:** Secure the lower end of the lift bar to the rear cross shaft assembly using the dampener assembly and nut. Thread the dampener assembly bolt into the nut until there are 3 threads protruding (Fig. 0624).

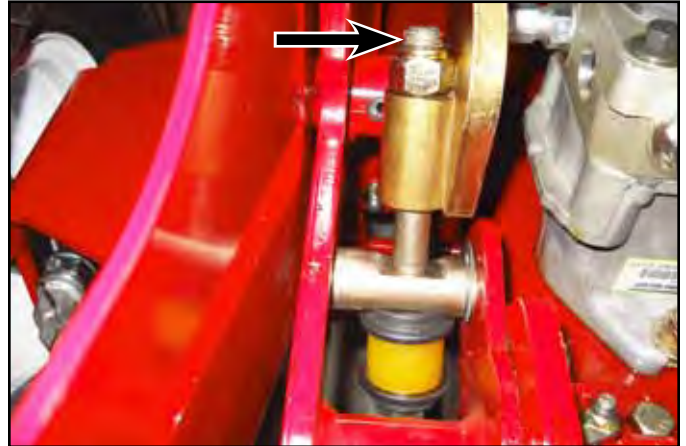


Fig. 0624

DSCN-0793a

3

- 92. Position the battery on the battery tray (Fig. 0625).



Fig. 0625

DSCN-1493a

CHASSIS

93. Secure the red positive cable to the positive terminal on the battery using a bolt, washer, and nut (Fig. 0626).



Fig. 0626

DSCN-1495a

94. Secure the black ground cable to the negative terminal on the battery using the bolt, washer and nut (Fig. 0628).



Fig. 0628

DSCN-1499a

Note: Position the red protective boot over the terminal once the cable is secured (Fig. 0627).



Fig. 0627

DSCN-1497a

95. Secure the battery to the battery tray using the battery cover, hold down bolts and wing nuts (Fig. 0629).

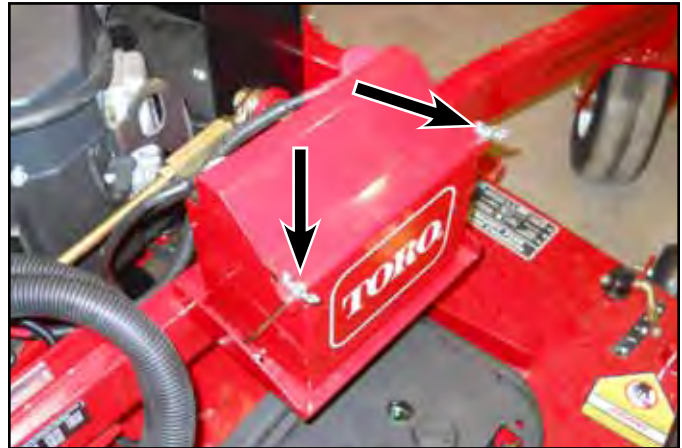


Fig. 0629

DSCN-1504a

96. Verify the mower deck is properly adjusted. See "Mower Deck Adjustments - Correcting the Mower Quality of Cut" on page 7-50.

97. Bleed the hydraulic system. See "Bleeding the Hydraulic System" on page 6-95.

LH Motion Control Lever Replacement

LH Motion Control Lever Removal

1. Remove the bolt, nut & spacer securing the end of the control cable to the LH motion control lever (Fig. 0630).



Fig. 0630

IMG-0953a

2. Remove the two screws securing the pivot shaft inside the LH motion control lever (Fig. 0631 & 0632).



Fig. 0631

IMG-0955a

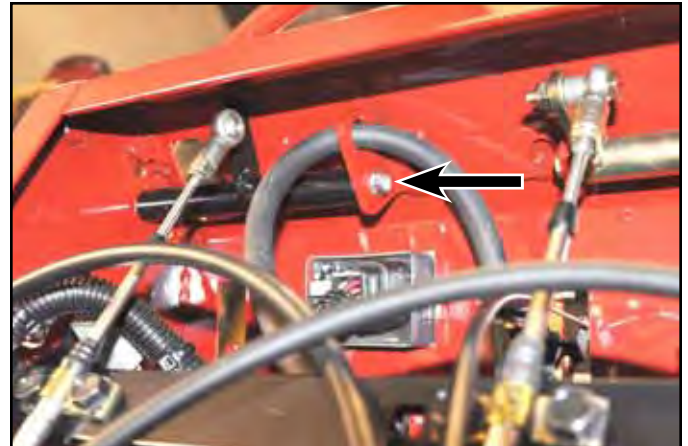


Fig. 0632

IMG-0956a

Note: Only one bolt will typically back out due to both threading into the same inner rod. A #4 easy-out can be used to secure the pivot rod. The bolt on the opposite side can then be removed (Fig. 0633).

4



Fig. 0633

IMG-0958a

CONTROLS

3. Remove the LH control lever assembly from the control tower (Fig. 0634).



Fig. 0634

IMG-0964a

5. Remove the two plastic bearings from the ends of the control handle (Fig. 0636).



Fig. 0636

IMG-0973a

4

4. Remove the pivot rod from the motion control handle (Fig. 0635).



Fig. 0635

IMG-0971a

LH Motion Control Lever Installation

1. Install a plastic bearing into each end of the control handle (Fig. 0637).

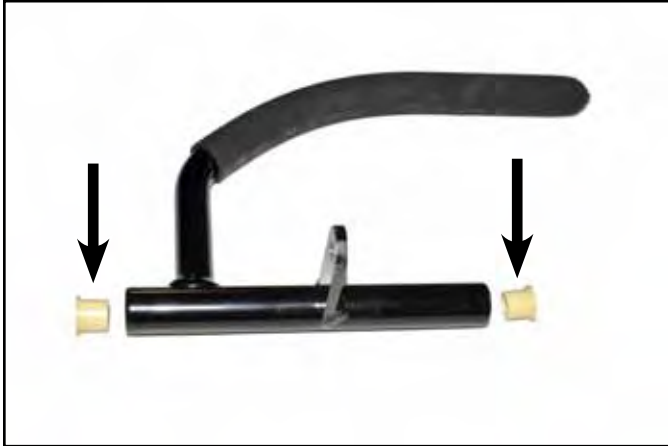


Fig. 0637

IMG-0973a

2. Install the pivot rod into the center of the control handle (Fig. 0638).



Fig. 0638

IMG-0971a

3. Secure the control handle assembly in the control tower using two bolts (Fig. 0639 & 0640).



Fig. 0639

IMG-0955a

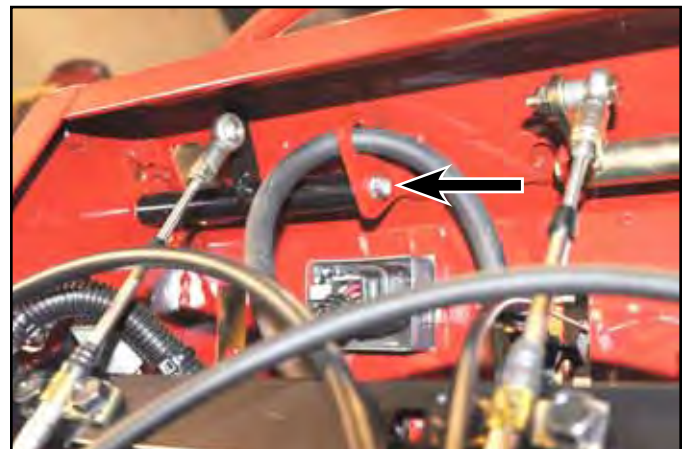


Fig. 0640

IMG-0956a

4

CONTROLS

4. Secure the control cable to the motion control lever using a bolt, nut and spacer (Fig. 0641).



Fig. 0641

IMG-0953a

RH Motion Control Lever Replacement

RH Motion Control Lever Removal

1. Remove the bolt, nut & spacer securing the end of the control cable to the RH motion control lever (Fig. 0642).

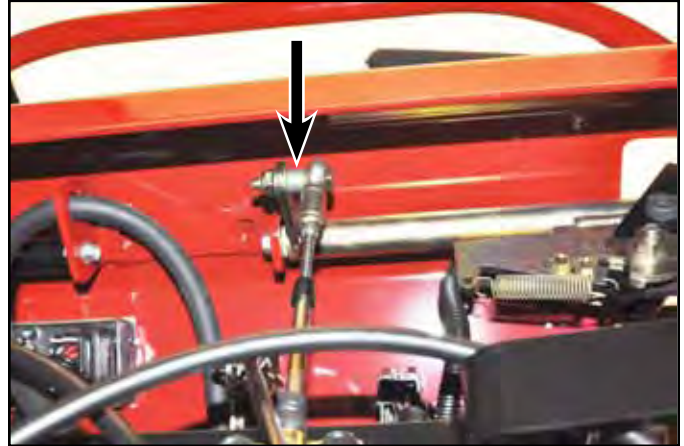


Fig. 0642

IMG-0974a

2. Unplug the wire harness from the OPC switch (Fig. 0643).



Fig. 0643

IMG-0976a

4

3. Remove the two screws securing the pivot shaft inside the RH motion control lever (Fig. 0644 & 0645).

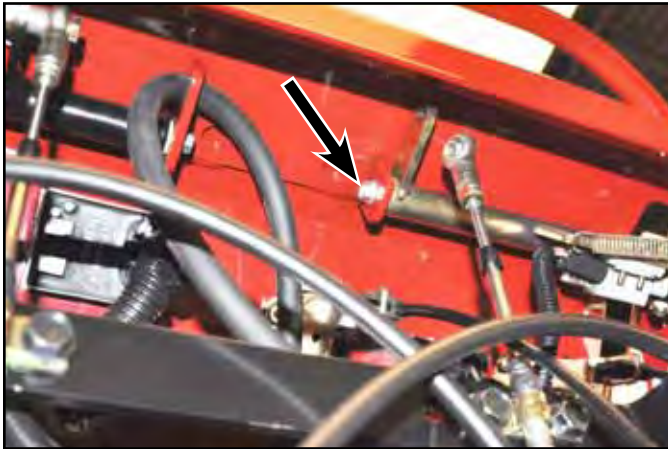


Fig. 0644

IMG-0977a



Fig. 0645

IMG-0979a

Note: Only one bolt will typically back out due to both threading into the same inner rod. A #4 easy-out can be used to secure the pivot rod. The bolt on the opposite side can then be removed (Fig. 0646).



Fig. 0646

IMG-0980a

4

4. Remove the RH control lever assembly from the control tower (Fig. 0647).



Fig. 0647

IMG-0983a

CONTROLS

5. Remove the pivot rod from the motion control handle (Fig. 0648).



Fig. 0648

IMG-0986a

7. Remove the two screws and tapped plate securing the OPC switch to the control handle assembly (Fig. 0650).

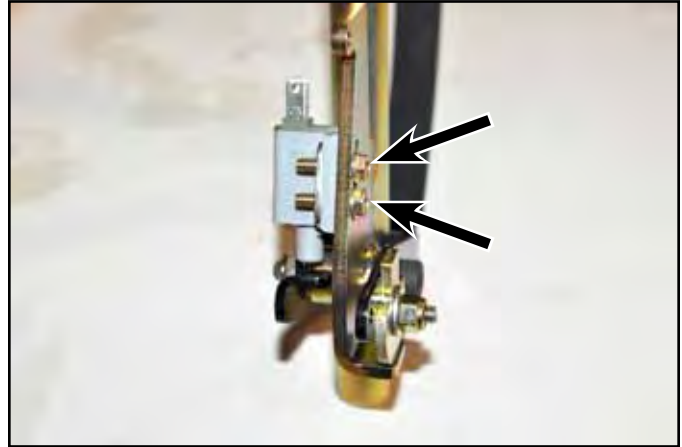


Fig. 0650

IMG-0989a

6. Remove the extension spring from the assembly (Fig. 0649).



Fig. 0649

IMG-0987a

8. Remove the bolt and nut securing the RH handle to the motion control assembly (Fig. 0651).



Fig. 0651

IMG-0996a

4

9. Remove the nut and washer securing the adjustment cam to the RH control lever (Fig. 0652).

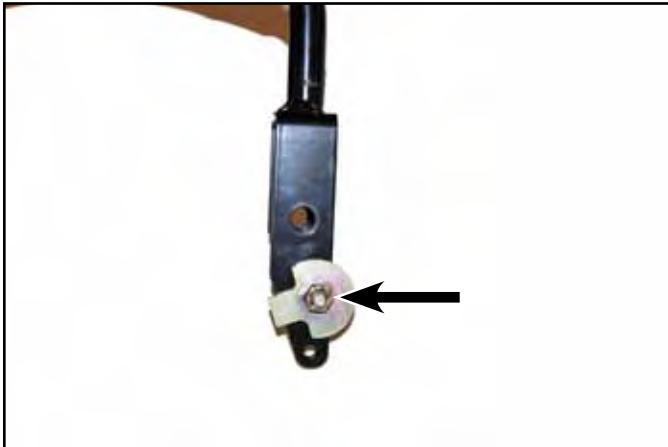


Fig. 0652

IMG-0999a

10. Remove the four plastic bearings from the motion control assembly (Fig. 0653).



Fig. 0653

IMG-1002a

RH Motion Control Lever Installation

1. Install the four plastic bearings to the motion control assembly (Fig. 0654).



Fig. 0654

IMG-1002a

4

2. Loosely secure the adjustment cam to the RH control lever (Fig. 0655).

Note: This nut will be tightened later in the process.

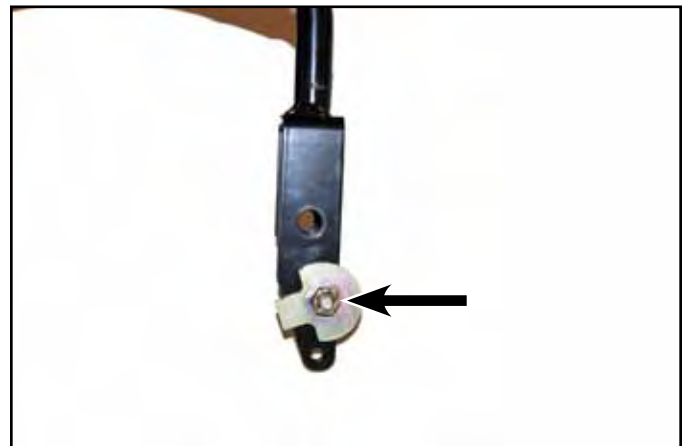


Fig. 0655

IMG-0999a

CONTROLS

3. Secure the RH control lever to the motion control assembly with the shoulder bolt and nut (Fig. 0656).



Fig. 0656

IMG-0996a

5. Install the extension spring to the motion control assembly (Fig. 0658).



Fig. 0658

IMG-0987a

4

4. Loosely secure the OPC switch to the motion control assembly (Fig. 0657).

Note: These will be tightened later in the process.

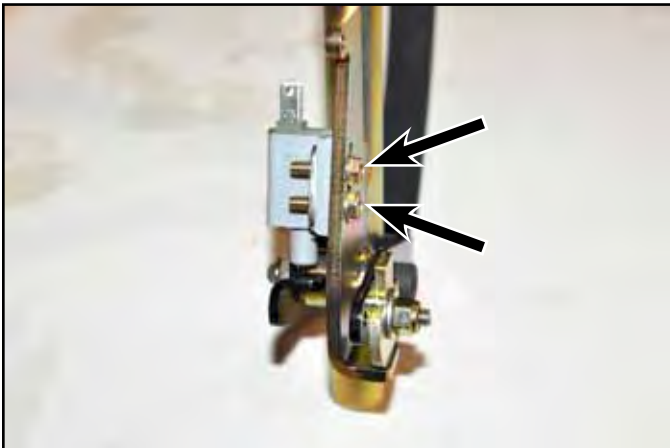


Fig. 0657

IMG-0989a

6. Install the pivot rod into the motion control assembly (Fig. 0659).



Fig. 0659

IMG-0986a

7. Secure the control handle assembly in the control tower using two bolts (Fig. 0660 & 0661).

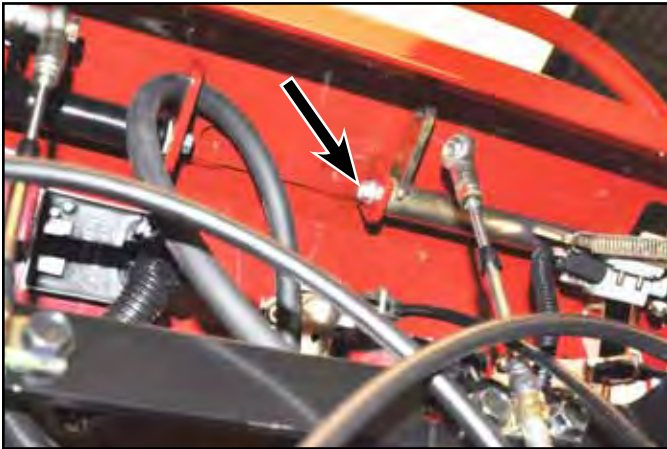


Fig. 0660

IMG-0977a

8. Install the wire harness onto the OPC switch (Fig. 0662).



Fig. 0662

IMG-0976a



Fig. 0661

IMG-0979a

9. Position the RH control handle so it is horizontally aligned with the LH lever (Fig. 0663).

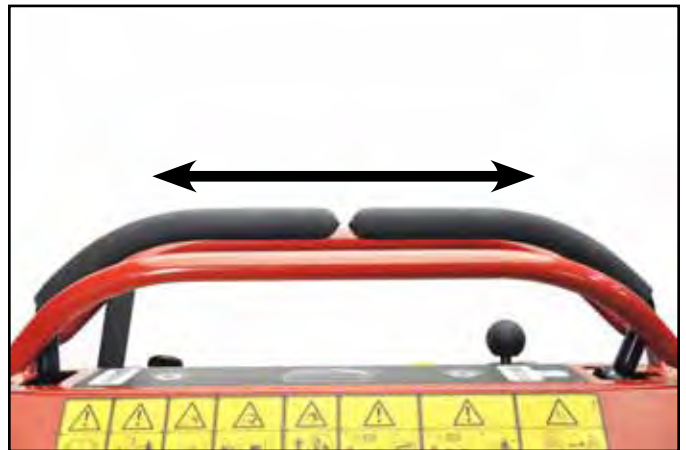


Fig. 0663

IMG-058a

CONTROLS

10. Secure the position of the RH lever by tightening the nut on the adjustment cam on the RH control assembly (Fig. 0664).



Fig. 0664

IMG-059a

12. Secure the position of the switch by tightening the two mounting screws (Fig. 0666).

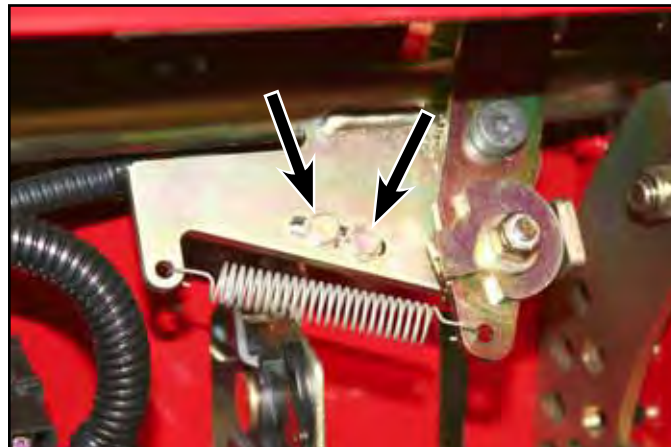


Fig. 0666

IMG-8390a

11. Adjust the OPC switch so there is .125" (3mm) gap between the switch plunger and the control handle tab when the control handle is in the operating position (Fig. 0665).

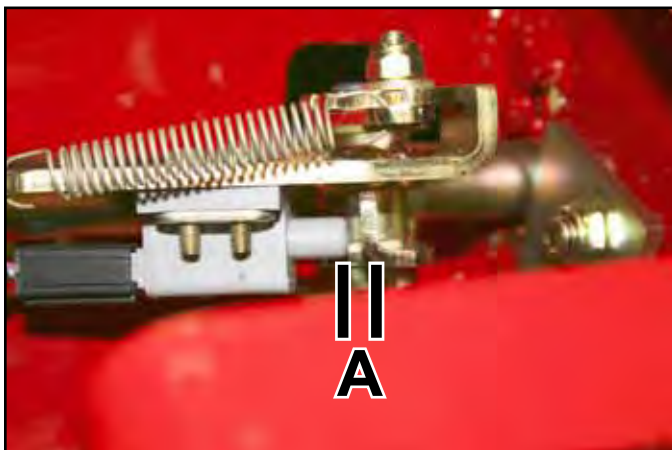


Fig. 0665

IMG-8389a

A. .125" (3mm) gap

13. Secure the control cable to the motion control lever using a bolt, nut and spacer (Fig. 0667).

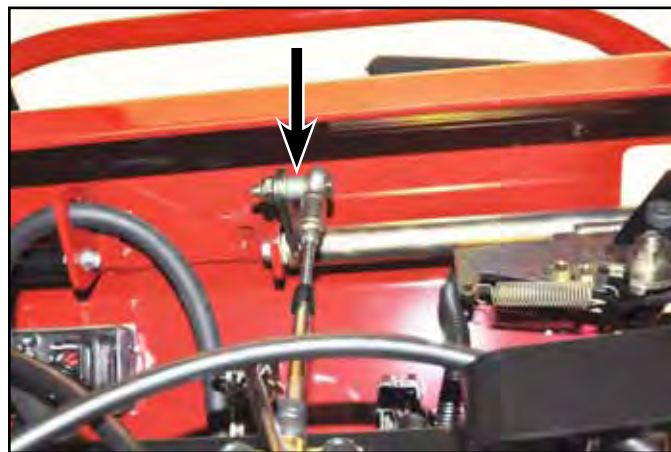


Fig. 0667

IMG-0974a

RH Control Linkage Replacement

RH Control Linkage Removal

1. Remove the bolt, nut and spacer securing the lower end of the control cable to the RH control fork assembly (Fig. 0668).

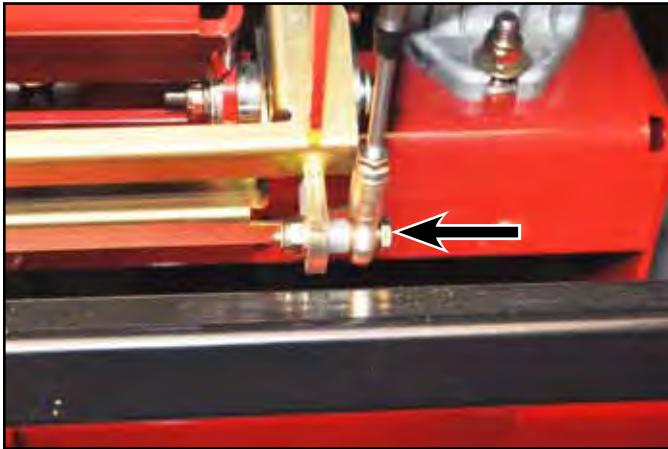


Fig. 0668

IMG-1008a

2. Remove the spring clip securing the motion control cable to the linkage mount (Fig. 0669).

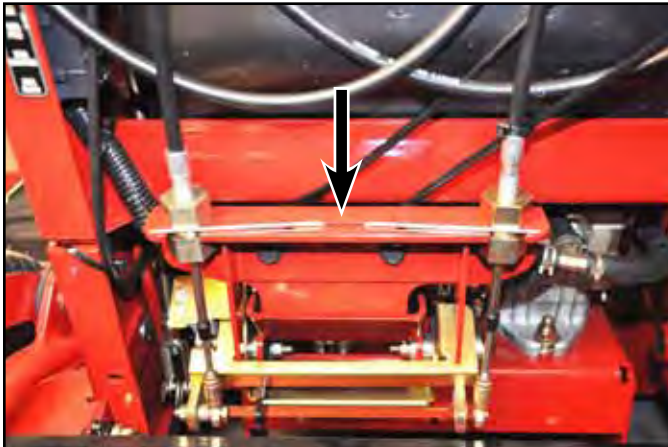


Fig. 0669

IMG-1009a

3. Remove the cable tie securing the speed control cable to the RH motion control cable, then remove the motion control cable from the linkage mount (Fig. 0670).

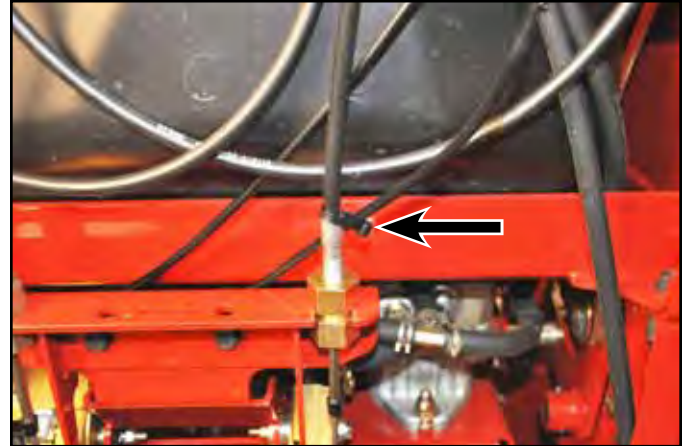


Fig. 0670

IMG-1011a

4

4. **2009 Only:** Remove the hairpin cotter and washer securing the front end of the RH shifter link to the shifter bracket (Fig. 0671).



Fig. 0671

IMG-9422a

CONTROLS

5. **2010 Only:** Remove the bolt, nut, washers and spacer securing the front end of the RH shifter link to the shifter bracket (Fig. 0672).

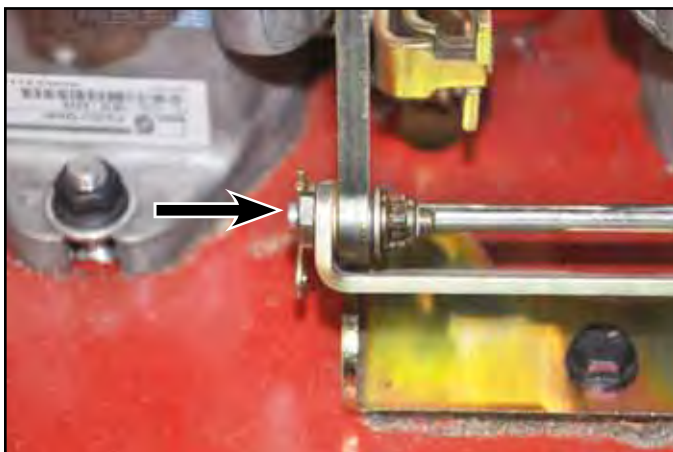


Fig. 0672

IMG-0905a

7. **2009 Only: Serial range 290000001 - 290000209:** Remove the right hand shifter link rod and the 3 rollers located on the rear end of the shifter link rod from the inside of the control fork assembly and pump control arm (Fig. 0674).

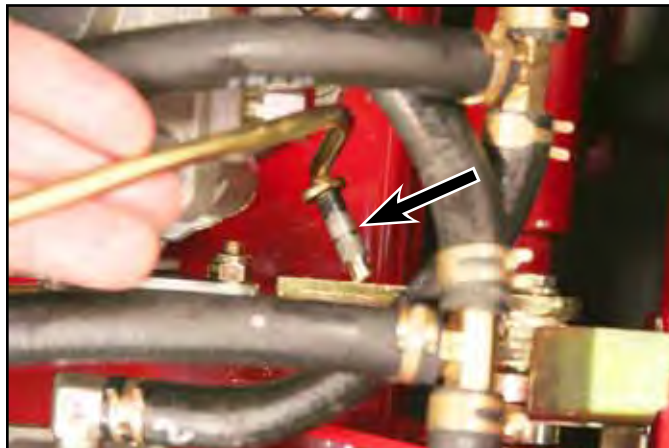


Fig. 0674

IMG-9486a

6. Remove the hairpin cotter and washer from the rear end of the shifter link (Fig. 0673).



Fig. 0673

IMG-9424a

8. **2009 Only: Serial range 290000210 - 290999999:** There are 3 rollers located on the rear end of the RH shifter link rod inside the control fork assembly and pump control arm. Slide the left hand roller off the rear end of the RH shifter link rod (Fig. 0675).

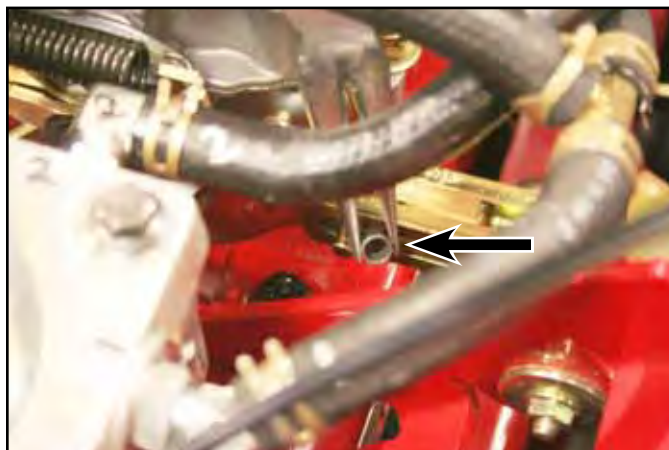


Fig. 0675

IMG-9430a

4

9. **2009 Only:** Serial range 290000210 - 290999999: Remove the rear end of the RH shifter link and the right hand roller (Fig. 0676).

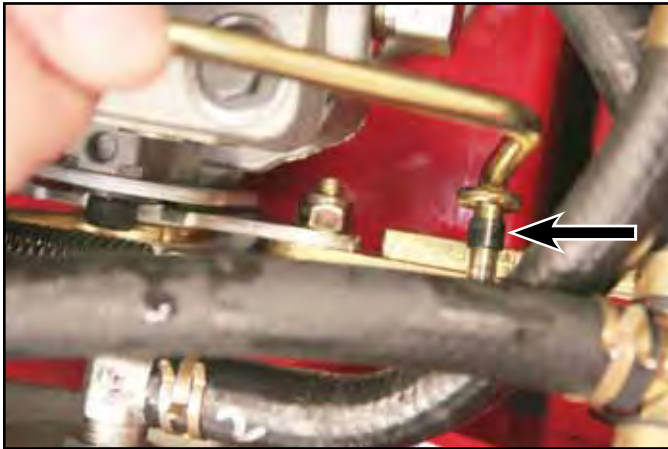


Fig. 0676

IMG-9432a

11. **2010 Only:** Remove the RH shifter link and the 3 rollers located on the rear end of the shifter link inside of the control fork assembly (Fig. 0678).



Fig. 0678

IMG-0936a

10. **2009 Only:** Serial range 290000210 - 290999999: Push down on the control fork assembly and remove the center roller from the pump control arm slot (Fig. 0677).

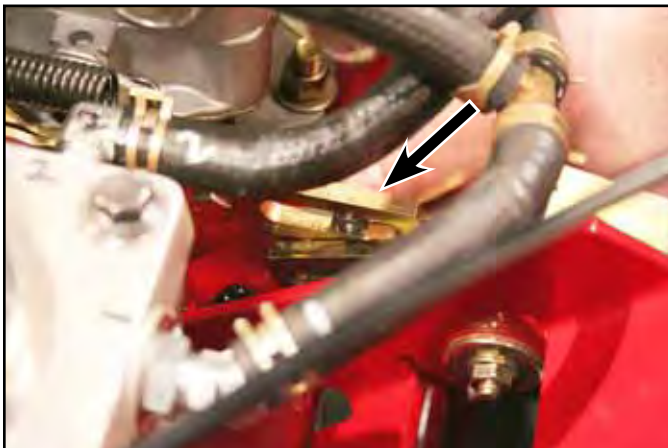


Fig. 0677

IMG-9436a

Shifter Link and Roller Configurations (Fig. 0679):

- A. **2009:** Serial range 290000001-290000210: 3 rollers, all thin and same size
- B. **2009:** Serial range 290000211-290999999: 3 rollers, large center roller
- C. **2010:** Serial range 310000001-310999999: 3 rollers, all large and same size

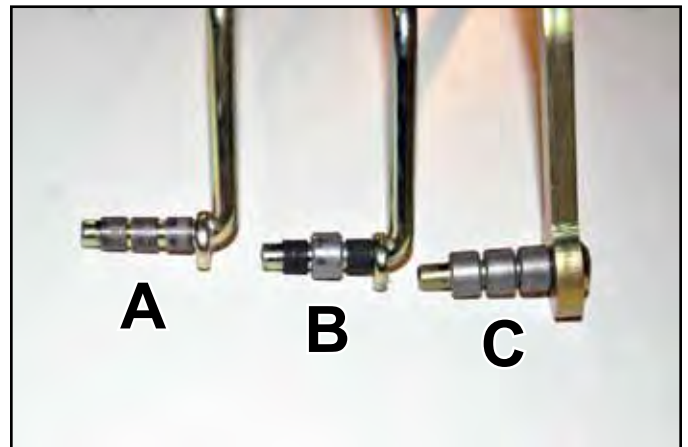


Fig. 0679

IMG-0941a

CONTROLS

12. Remove the nut and large washer securing the control fork assembly (Fig. 0680).

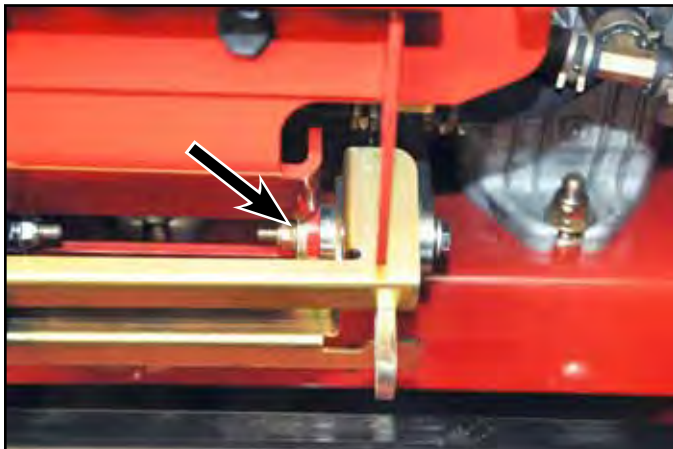


Fig. 0680

IMG-1013a

14. Remove the shoulder hub and control fork assembly (Fig. 0682).



Fig. 0682

IMG-1016a

13. Remove the bolt and washer from the shoulder hub (Fig. 0681).



Fig. 0681

IMG-1015a

15. Remove the two sets of bolts and nuts securing the pump control arm to the pump RTN (Return to Neutral) mechanism (Fig. 0683).

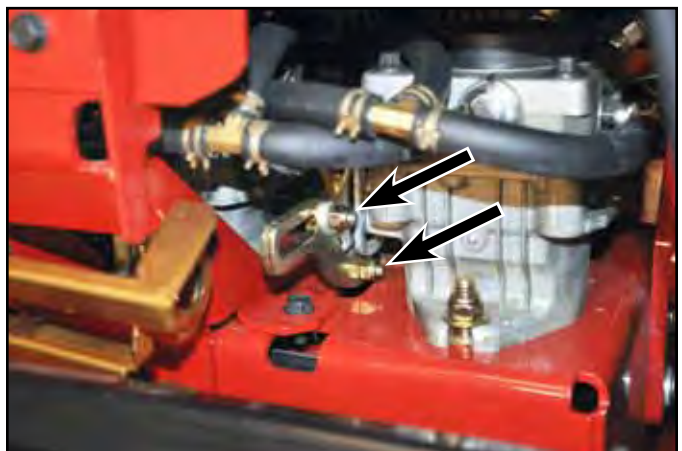


Fig. 0683

IMG-1018a

4

RH Control Linkage Installation

1. Secure the pump control arm to the pump RTN mechanism using two bolts and nuts (Fig. 0684).



Fig. 0684

IMG-1018a

2. Position the shoulder hub into the two neutral switch levers (Fig. 0685).

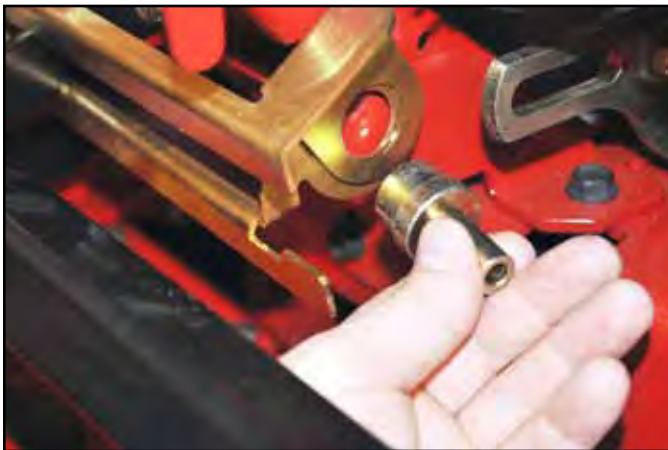


Fig. 0685

IMG-1019a

3. Position the control fork on the shoulder hub with the forked end straddling the pump control arm (Fig. 0686).

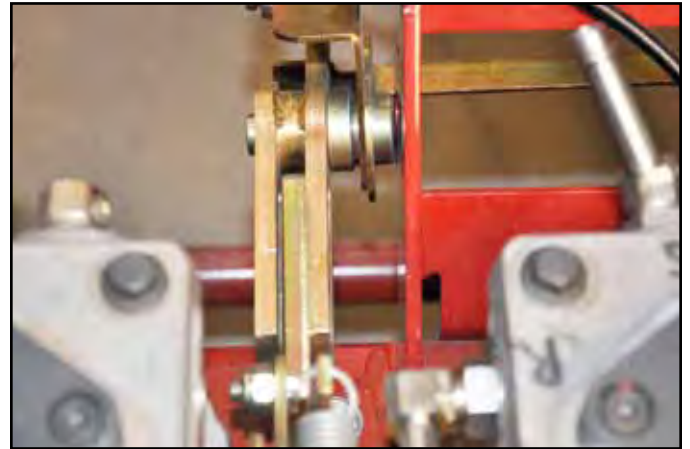


Fig. 0686

IMG-1041a

4. Install the bolt with washer through the center of the shoulder hub (Fig. 0687).



Fig. 0687

IMG-1015a

4

CONTROLS

- Loosely install the large washer and nut securing the control fork and shoulder hub assembly to the linkage mount (Fig. 0688).

Note: This will be tightened later in this procedure.

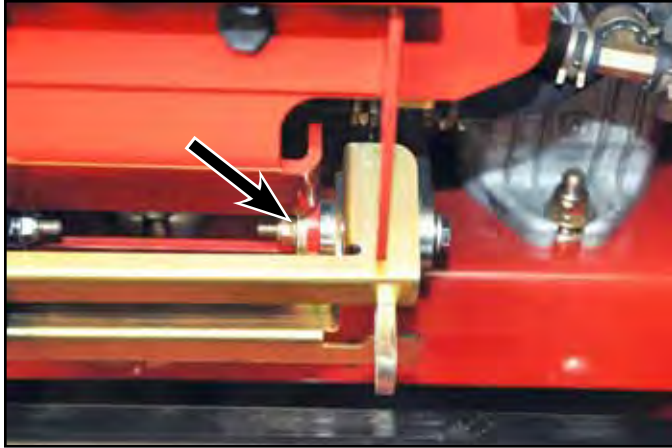


Fig. 0688

IMG-1013a

Shifter Link and Roller Configurations (Fig. 0689):

- 2009:** Serial range 290000001-290000210:
3 rollers, all thin and same size
- 2009:** Serial range 290000211-290999999:
3 rollers, large center roller
- 2010:** Serial range 310000001-310999999:
3 rollers, all large and same size

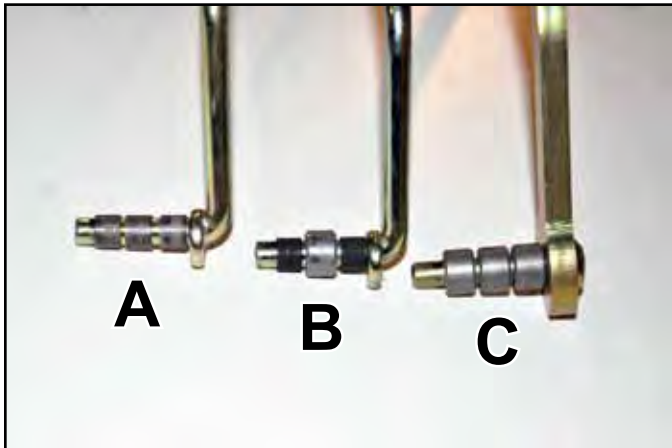


Fig. 0689

IMG-0941a

- 2009 Only:** Serial range 290000001 – 290000209:
Slide 3 rollers onto the rear end of the RH shifter link rod. Slide the rear end of the shifter link rod (with 3 rollers) into the control fork assembly (Fig. 0690).

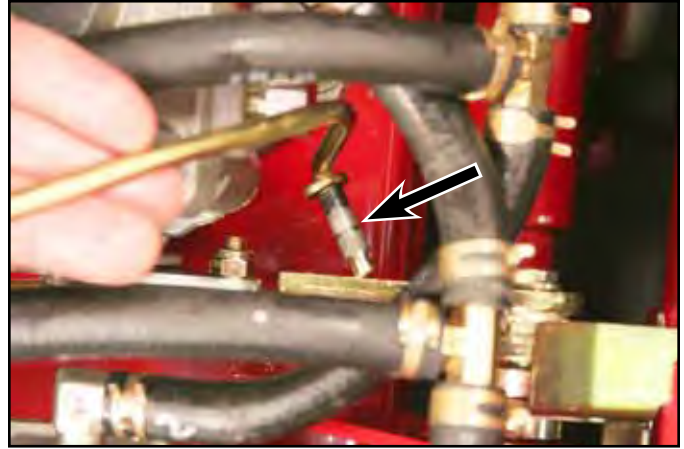


Fig. 0690

IMG-9486a

- 2009 Only:** Serial range 290000210 -290999999:
Push down on the control fork assembly and slide the center roller into the slot of the pump control arm (Fig. 0691).

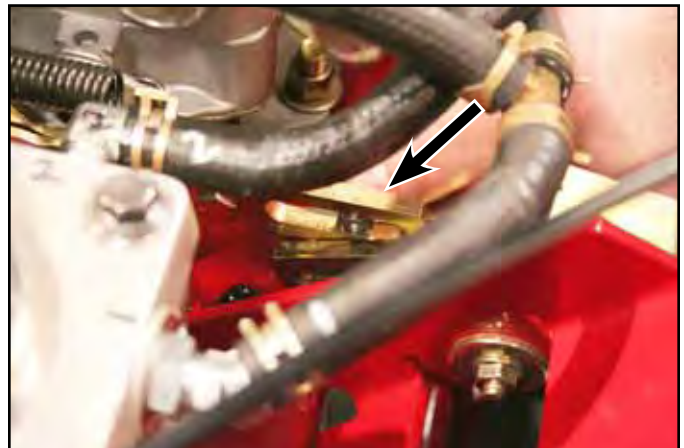


Fig. 0691

IMG-9436a

8. **2009 Only:** Serial range 290000210 -290999999: Using an Allen wrench, locate the center roller and slide the Allen wrench through it (Fig. 0692).

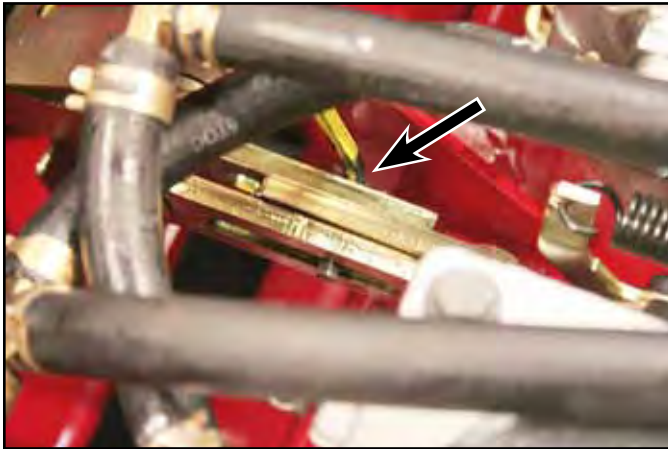


Fig. 0692

IMG-9492a

10. **2009 Only:** Serial range 290000210 and up: Slide the left hand roller onto the rear end of the right hand shifter link rod and into the outside of the control fork assembly (Fig. 0694).

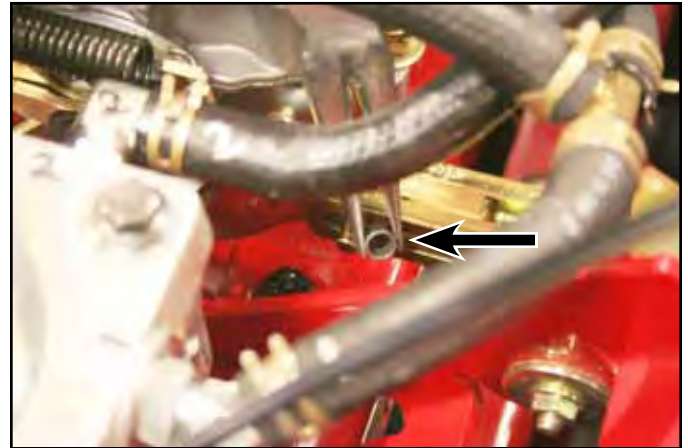


Fig. 0694

IMG-9430a

9. **2009 Only:** Serial range 290000210 -290999999: Slide the right hand roller onto the rear end of the right hand shifter link rod. Slide the rear end of the shifter link rod (with roller) through the control fork assembly following the Allen wrench through to capture the center roller on the shifter link rod (Fig. 0693).

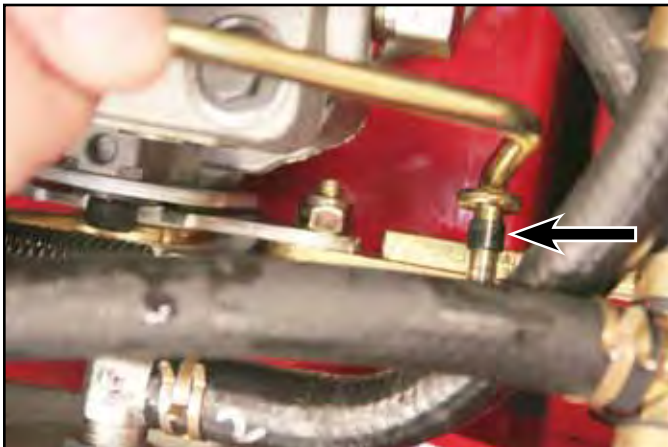


Fig. 0693

IMG-9432a

11. **2009 Only:** Secure the front end of the RH shifter link to the shifter bracket using a hairpin cotter and washer (Fig. 0695).



Fig. 0695

IMG-9422a

CONTROLS

12. **2010 Only:** Slide 3 rollers onto the rear end of the RH shifter link. Slide the rear end of the shifter link (with three rollers) into the control fork assembly (Fig. 0696).

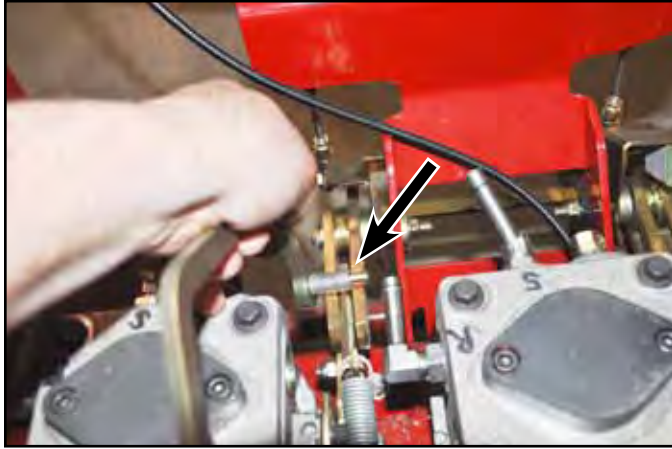


Fig. 0696

IMG-0948a

13. **2010 Only:** Place a spacer into the front end of the shifter link (Fig. 0697).



Fig. 0697

IMG-0946a

14. **2010 Only:** Secure the shifter link to the shifter bracket with a bolt two washers and nut (Fig. 0698).

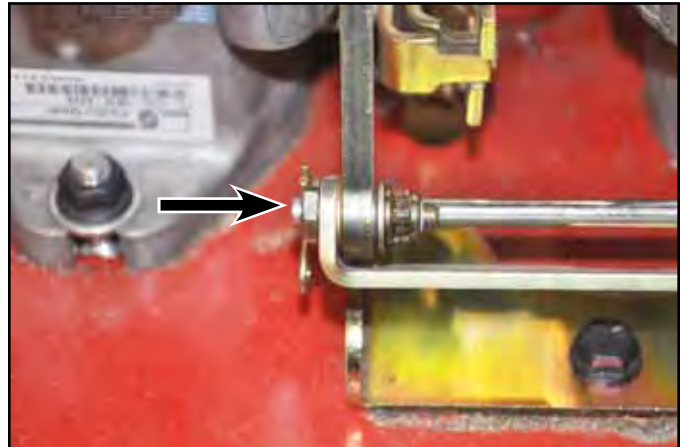


Fig. 0698

IMG-0905a

15. Insert a 7/32nd Allen wrench into the slots of the control fork and control arm in front of the speed control linkage rollers (Fig. 0699).

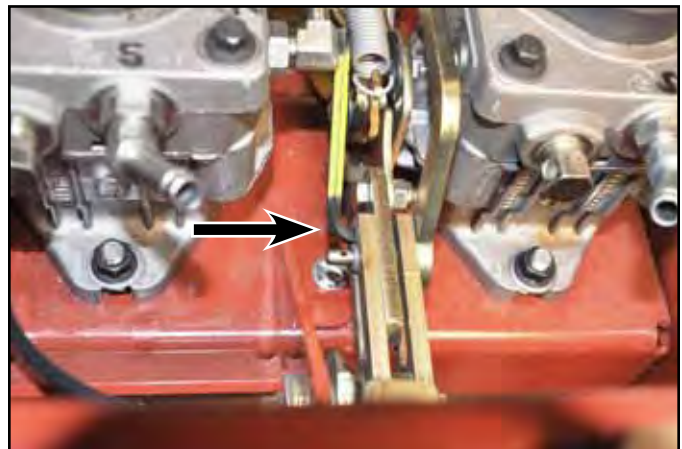


Fig. 0699

IMG-1032a

4

16. While pulling the control fork assembly rearward (not so hard that the speed control linkage moves) tighten the screw that goes through the center of the shoulder hub (Fig. 0700).

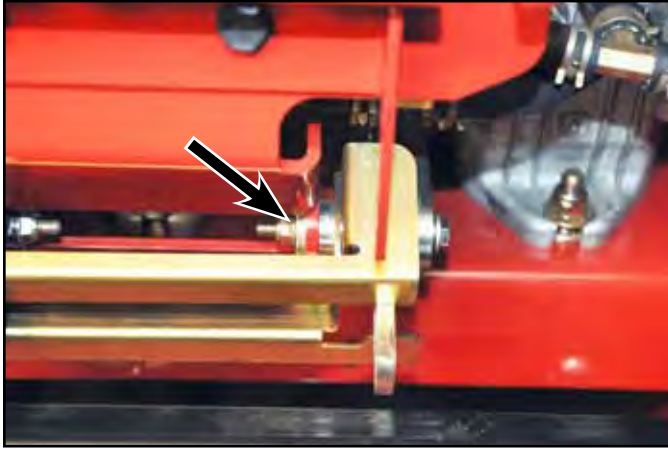


Fig. 0700

IMG-1013a

Note: It is important to keep the pump control arm and control fork slots aligned with each other. This can be achieved by making sure the top of the pump control arm and control fork are parallel to each other (Fig. 0701).

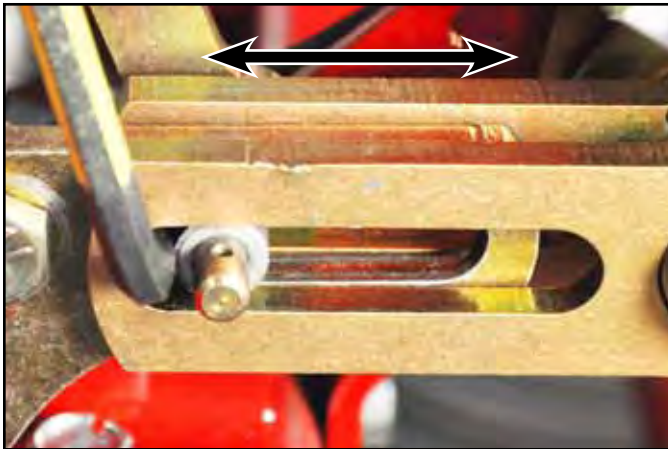


Fig. 0701

DSC-0527a

17. Install the washer and hairpin cotter to the end of the speed control linkage (Fig. 0702).

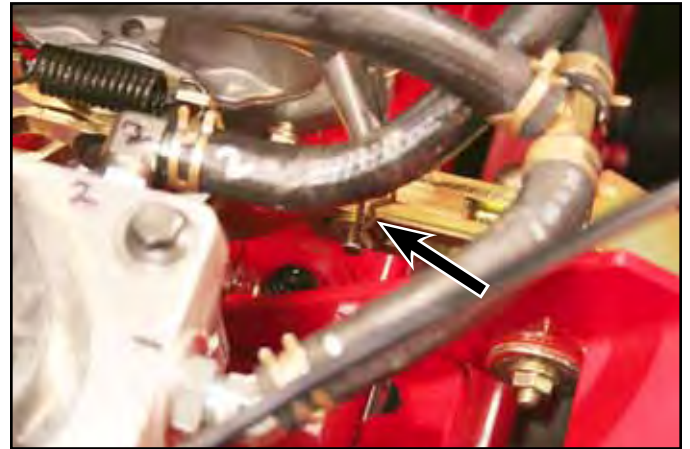


Fig. 0702

IMG-9424a

4

18. Position the motion control cable adjustment nut into the slot on the linkage mount and secure the speed control cable to the motion control cable with a cable tie (Fig. 0703).

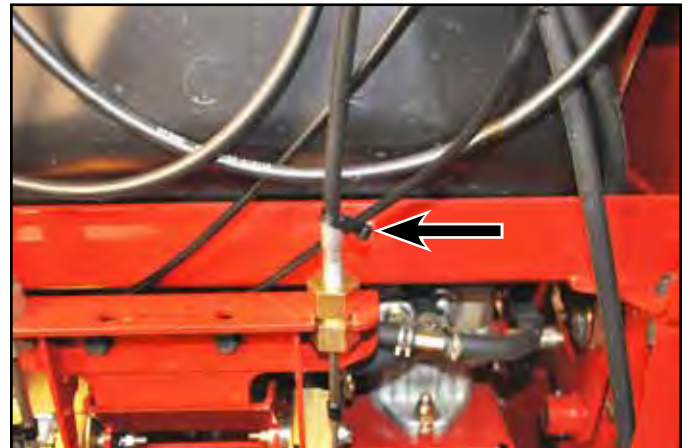


Fig. 0703

IMG-1011a

CONTROLS

19. Secure the cable to the linkage mount with the spring clip (Fig. 0704).

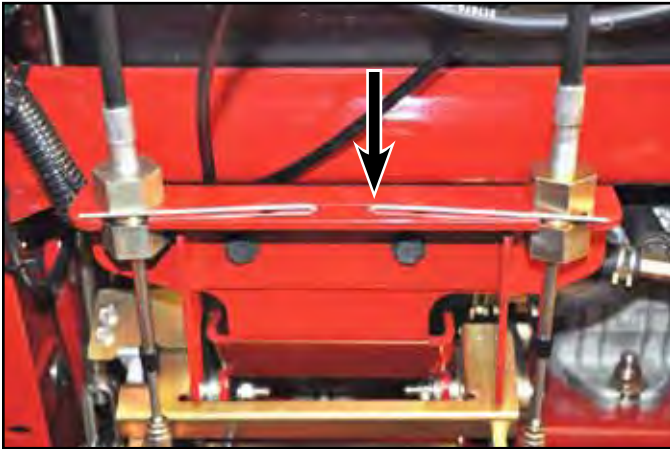


Fig. 0704

IMG-1022a

4

20. Secure the end of the control cable to the control fork using the bolt, nut and spacer (Fig. 0705).

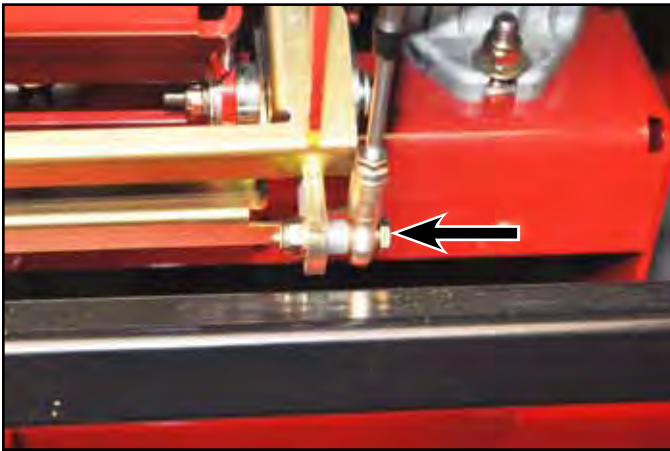


Fig. 0705

IMG-1008a

LH Control Linkage Replacement

LH Control Linkage Removal

1. Remove the bolt, nut & spacer securing the lower end of the control cable to the LH control fork assembly (Fig. 0706).

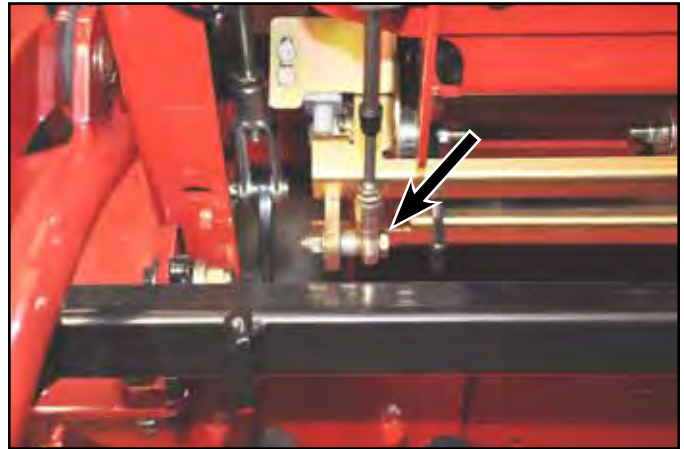


Fig. 0706

IMG-1033a

2. Remove the spring clip securing the motion control cable to the linkage mount (Fig. 0707).

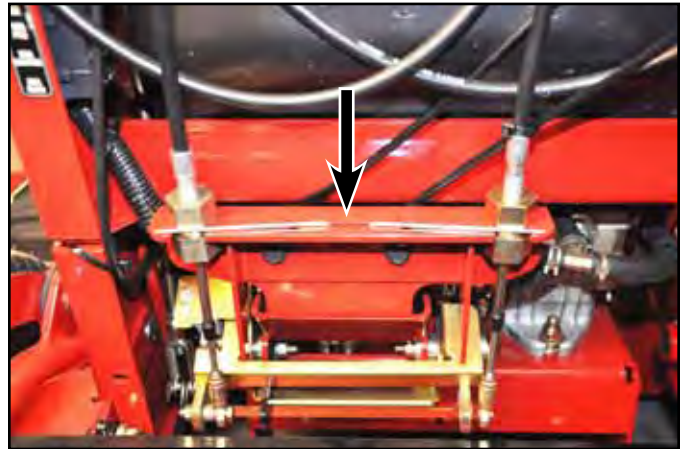


Fig. 0707

IMG-1009a

3. Remove the LH motion control cable from the linkage mount (Fig. 0708).

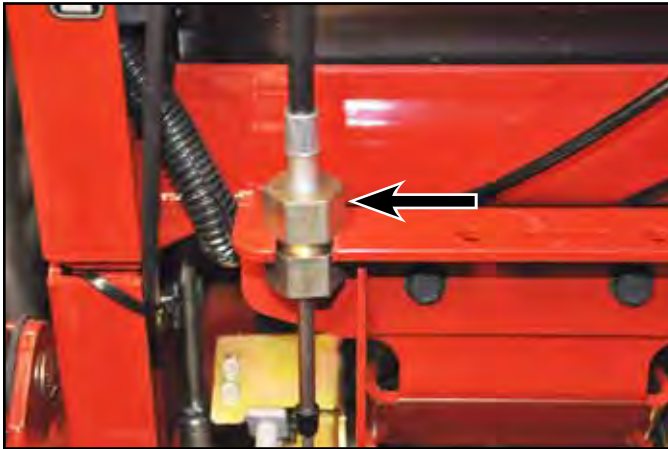


Fig. 0708

IMG-1035a

5. **2010 Only:** Remove the bolt, nut, washers, and spacer securing the front end of the LH shifter link to the shifter bracket (Fig. 0710).

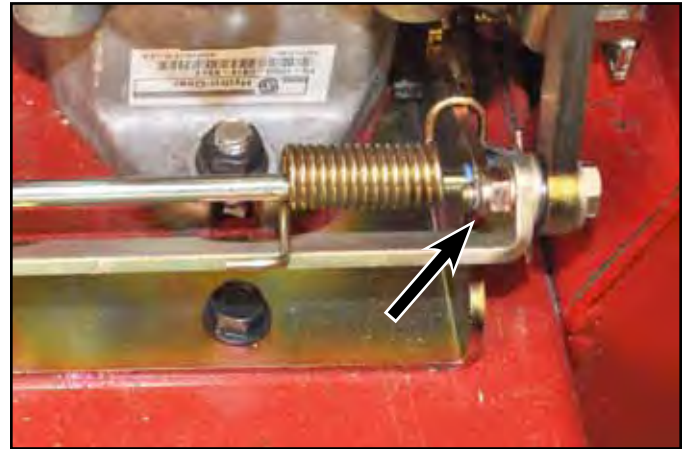


Fig. 0710

IMG-0346_b

4. **2009 Only:** Remove the hairpin cotter and washer securing the front end of the LH shifter link to the shifter bracket (Fig. 0709).

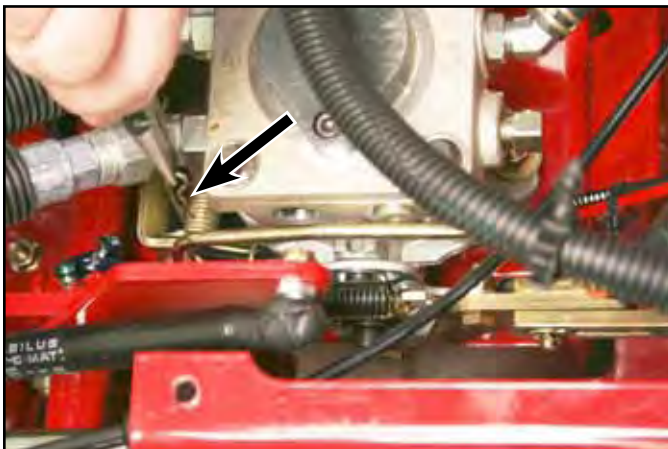


Fig. 0709

IMG-9358a

6. Remove the hairpin cotter and washer from the rear end of the shifter link (Fig. 0711).

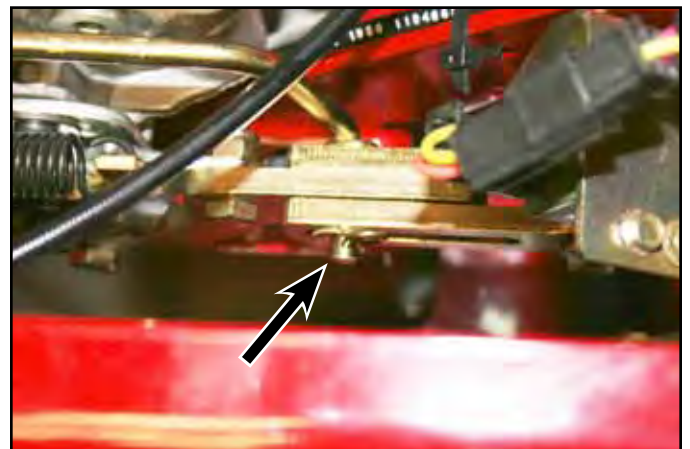


Fig. 0711

IMG-9361a

4

CONTROLS

7. **2009 Only:** Serial range 290000001 - 290000209: Remove the LH shifter link rod and the 3 rollers located on the rear end of the shifter link rod from the inside of the control fork assembly and pump control arm (Fig. 0712).

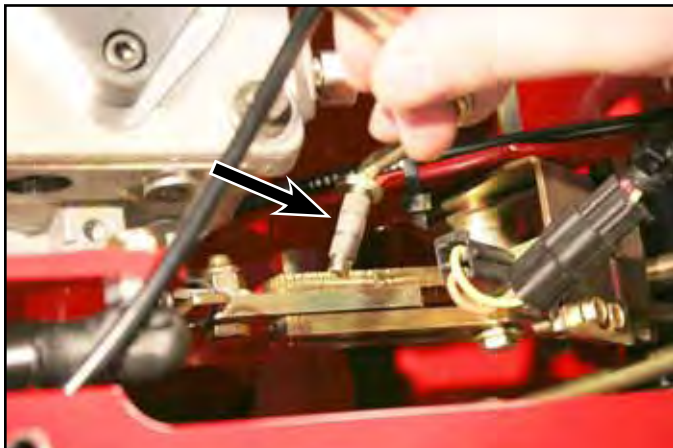


Fig. 0712

IMG-9373a

9. **2009 Only:** Serial range 290000210 - 290999999: Remove the rear end of the LH shifter link and the right hand roller (Fig. 0714).

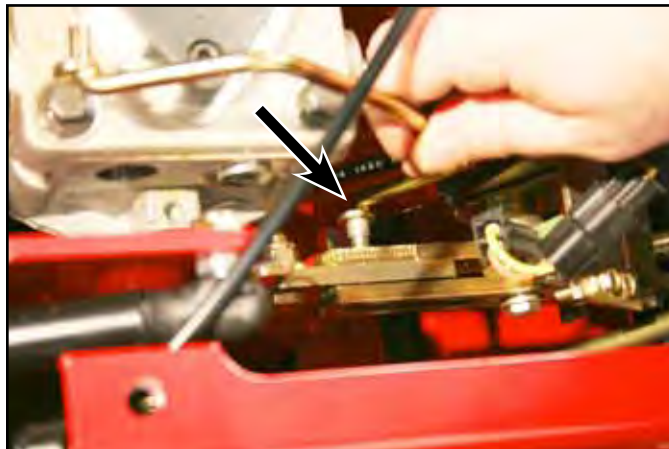


Fig. 0714

IMG-9367a

8. **2009 Only:** Serial range 290000210 - 290999999: There are 3 rollers located on the rear end of the LH shifter link rod inside the control fork assembly and pump control arm. Slide the left hand roller off the rear end of the LH shifter link rod (Fig. 0713).

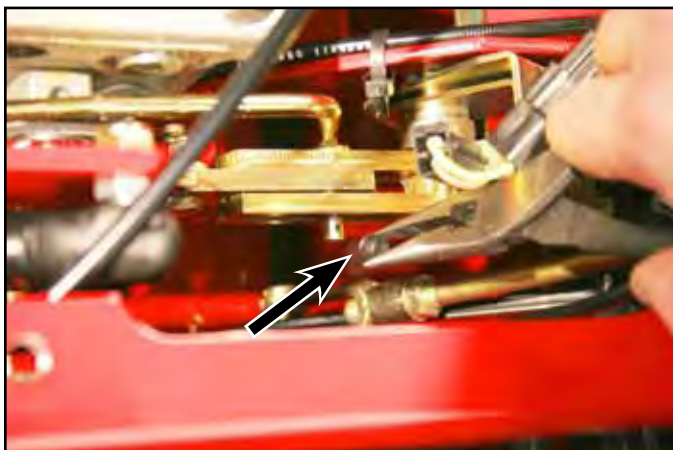


Fig. 0713

IMG-9365a

10. **2009 Only:** Serial range 290000210 - 290999999: Push down on the control fork assembly and remove the center roller from the pump control arm slot (Fig. 0715).

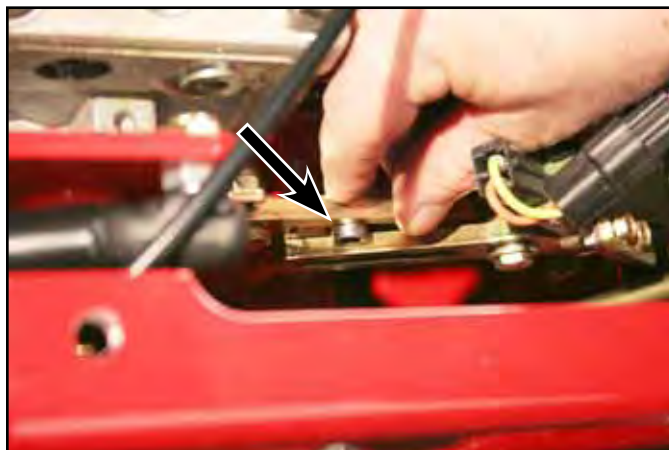


Fig. 0715

IMG-9371a

11. **2010 Only:** Remove the LH shifter link and the 3 rollers located on the rear end of the shifter link inside of the control fork assembly (Fig. 0716).

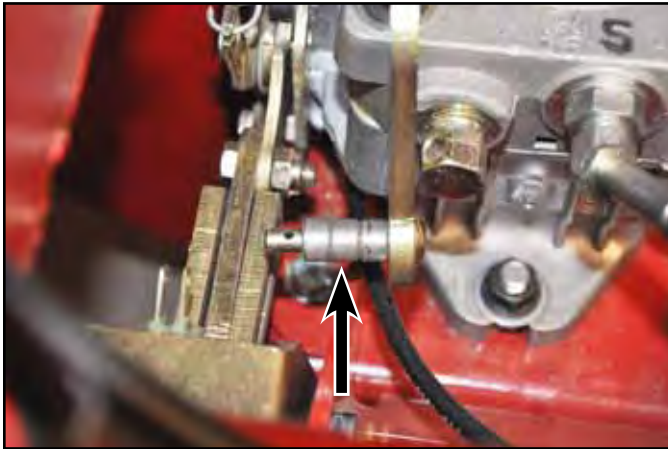


Fig. 0716

IMG-1038a

Shifter Link and Roller Configurations (Fig. 0717):

- D. **2009:** Serial range 290000001-290000210:
3 rollers, all thin and same size
- E. **2009:** Serial range 290000211-290999999:
3 rollers, large center roller
- F. **2010:** Serial range 310000001-310999999:
3 rollers, all large and same size

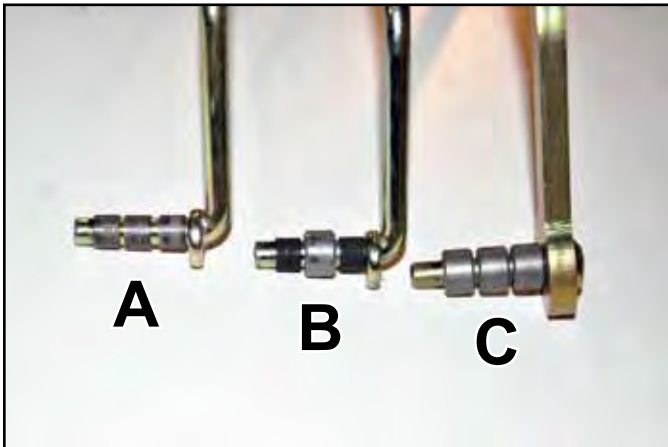


Fig. 0717

IMG-0941a

12. Remove the nut and switch stop arm securing the control fork assembly (Fig. 0718).

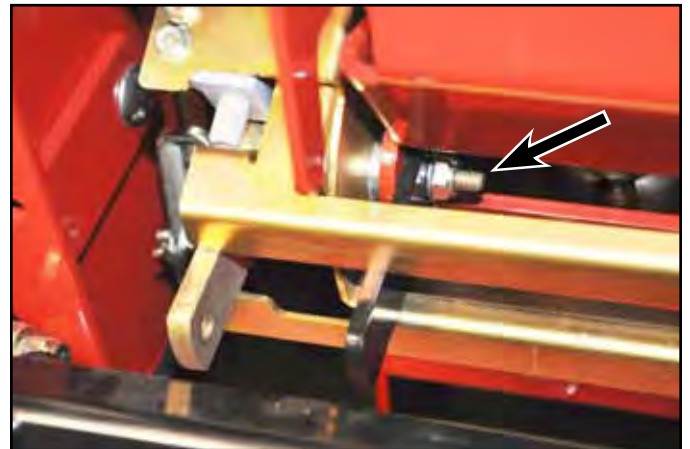


Fig. 0718

IMG-1043a

4

13. Remove the bolt and washer from the shoulder hub (Fig. 0719).

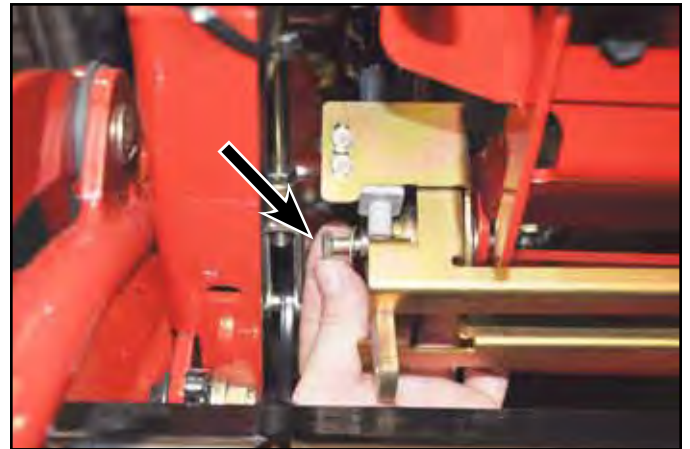


Fig. 0719

IMG-1044a

CONTROLS

14. Remove the shoulder hub and control fork assembly (Fig. 0720).



Fig. 0720

IMG-1045a

LH Control Linkage Installation

1. Secure the pump control arm to the pump RTN mechanism using two bolts and nuts (Fig. 0722).

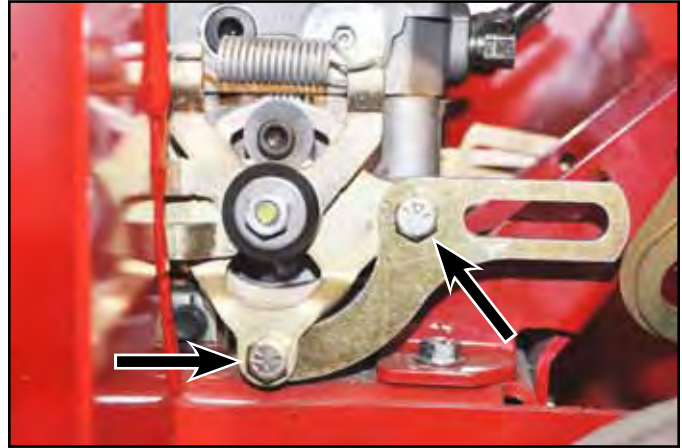


Fig. 0722

IMG-1047a

15. Remove the two sets of bolts and nuts securing the pump control arm to the pump RTN (Return to Neutral) mechanism (Fig. 0721).

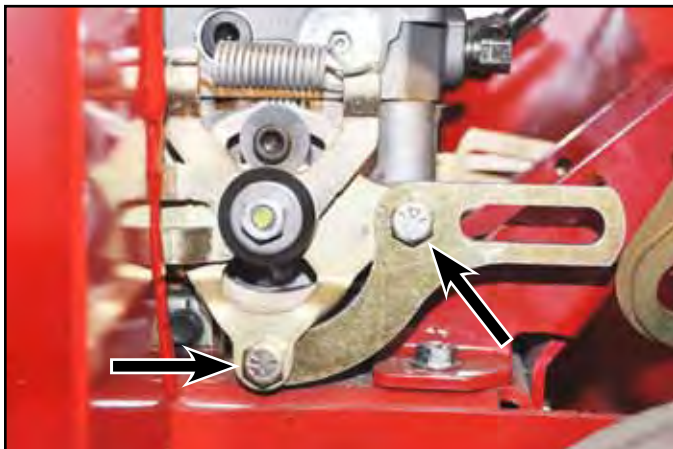


Fig. 0721

IMG-1047a

2. Position the shoulder hub into the two neutral switch levers (Fig. 0723).

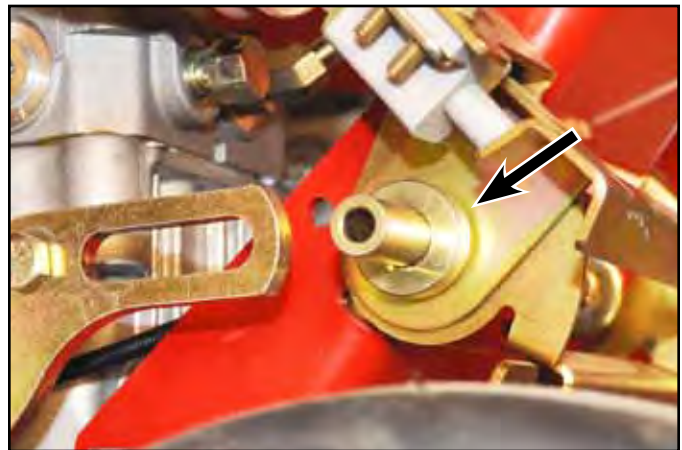


Fig. 0723

IMG-1049a

4

3. Position the control fork on the shoulder hub with the forked end straddling the pump control arm (Fig. 0724).



Fig. 0724

IMG-1050a

5. Loosely install the switch stop arm and nut securing the control fork and shoulder hub assembly to the linkage mount (Fig. 0726).

Note: This will be tightened later in this procedure.

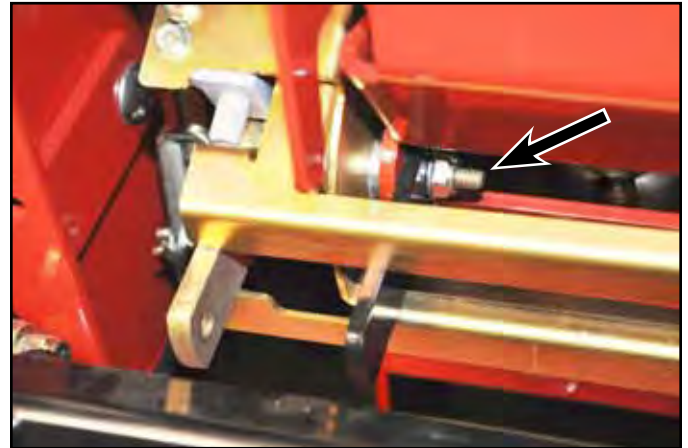


Fig. 0726

IMG-1043a

4. Install the bolt with washer through the center of the shoulder hub (Fig. 0725).

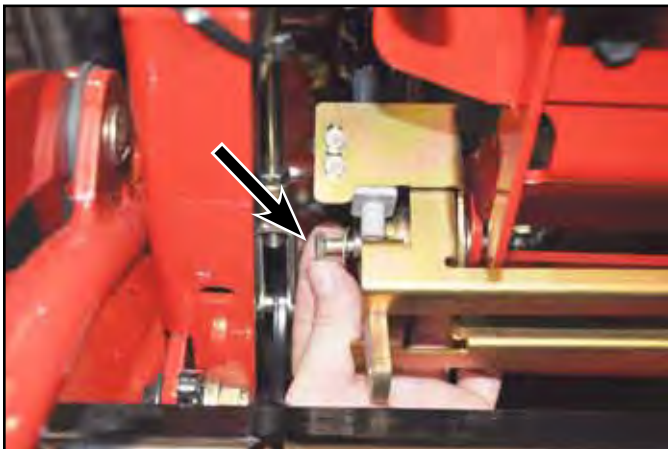


Fig. 0725

IMG-1044a

Shifter Link and Roller Configurations (Fig. 0727):

- D. **2009:** Serial range 290000001-290000210:
3 rollers, all thin and same size
- E. **2009:** Serial range 290000211-290999999:
3 rollers, large center roller
- F. **2010:** Serial range 310000001-310999999:
3 rollers, all large and same size

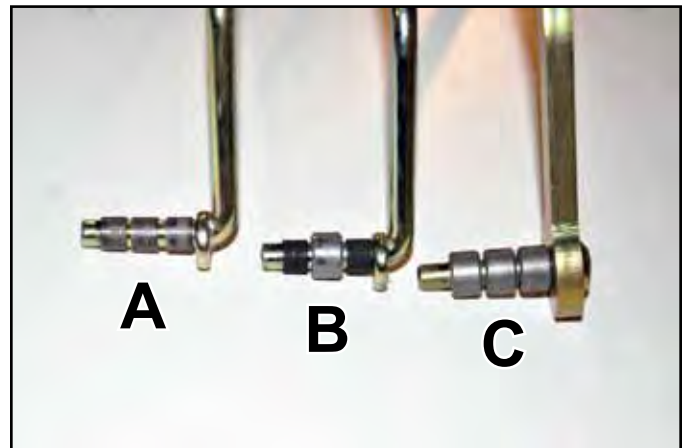


Fig. 0727

IMG-0941a

CONTROLS

6. **2009 Only:** Serial range 290000001 - 290000209: Slide 3 rollers onto the rear end of the LH shifter link rod. Slide the rear end of the shifter link rod (with 3 rollers) into the control fork assembly (Fig. 0728).

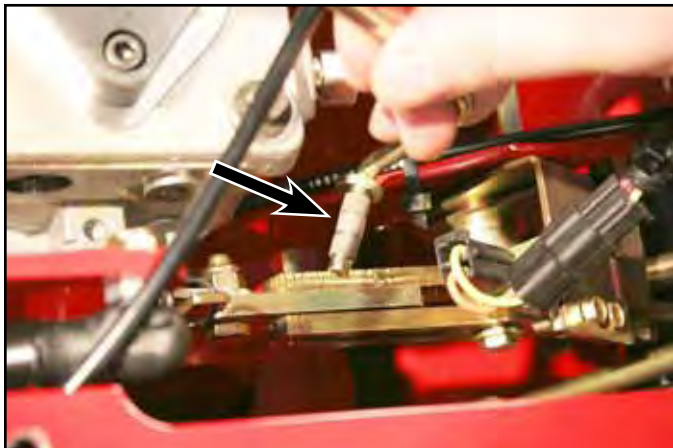


Fig. 0728

IMG-9373a

8. **2009 Only:** Serial range 290000210 - 290999999: Using an Allen wrench, locate the center roller and slide the Allen wrench through it (Fig. 0730).

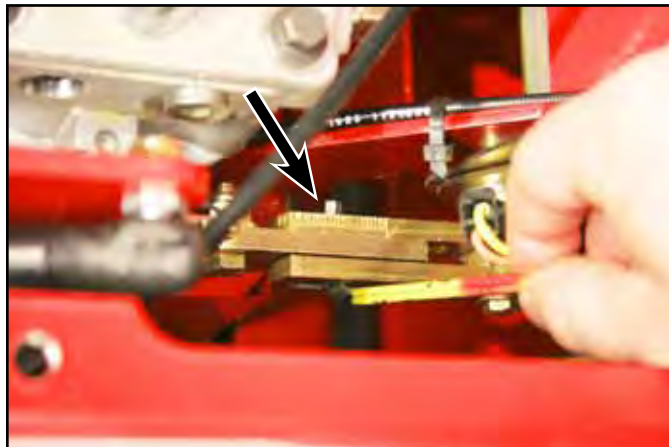


Fig. 0730

IMG-9401a

7. **2009 Only:** Serial range 290000210 - 290999999: Push down on the control fork assembly and slide the center roller into the slot of the pump control arm (Fig. 0729).

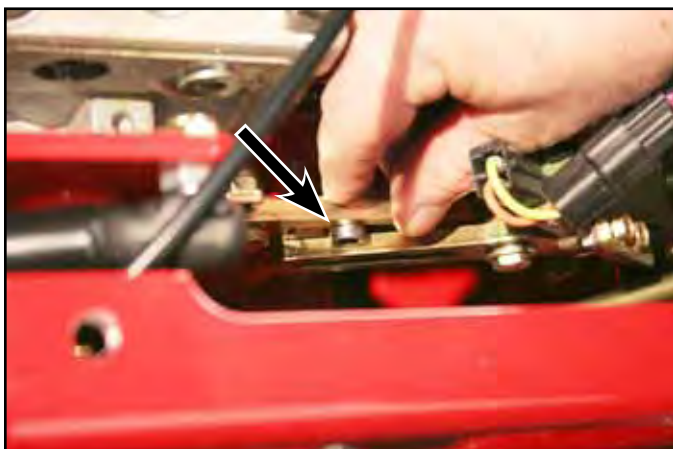


Fig. 0729

IMG-9371a

9. **2009 Only:** Serial range 290000210 - 290999999: Slide the right hand roller onto the rear end of the LH shifter link rod. Slide the rear end of the shifter link rod (with roller) through the control fork assembly following the Allen wrench through to capture the center roller on the shifter link rod (Fig. 0731).



Fig. 0731

IMG-9367a

4

10. **2009 only:** Serial range 290000210 and up: Slide the left hand roller onto the rear end of the LH shifter link rod and into the outside of the control fork assembly (Fig. 0732).

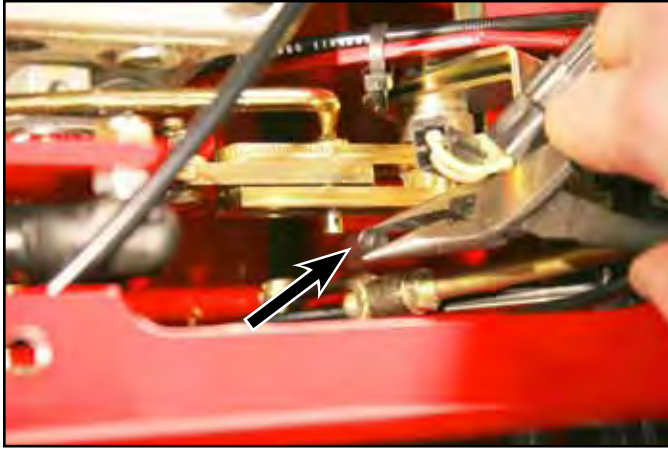


Fig. 0732

IMG-9365a

12. **2010 Only:** Slide 3 rollers onto the rear end of the LH shifter link. Slide the rear end of the shifter link (with three rollers) into the control fork assembly (Fig. 0734).

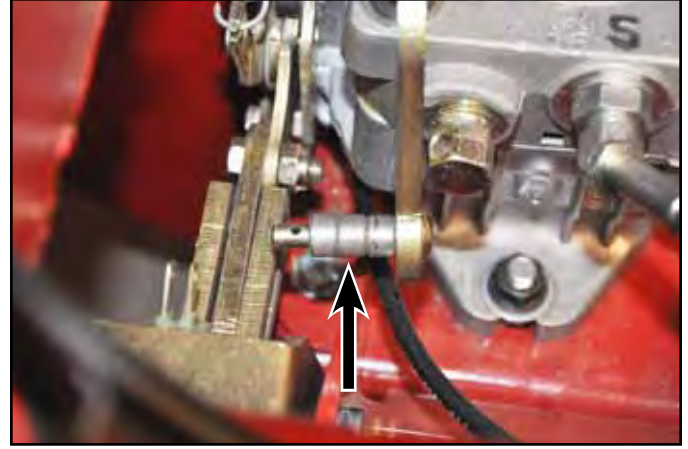


Fig. 0734

IMG-1038a

11. **2009 Only:** Secure the front end of the LH shifter link to the shifter bracket using a hairpin cotter and washer (Fig. 0733).



Fig. 0733

IMG-9422a

13. **2010 Only:** Place a spacer into the front end of the shifter link (Fig. 0735).



Fig. 0735

IMG-0946a

CONTROLS

14. **2010 Only:** Secure the shifter link to the shifter bracket with a bolt two washers and nut (Fig. 0736).

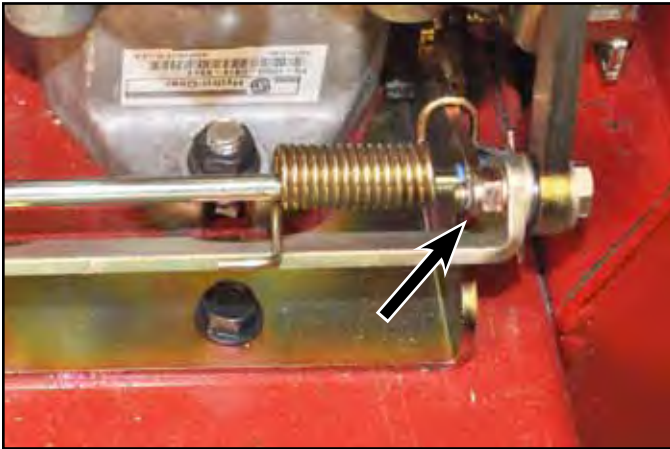


Fig. 0736

IMG-0346_b

16. Insert a 7/32nd Allen wrench into the slots of the control fork and control arm in front of the speed control linkage rollers (Fig. 0738).



Fig. 0738

DSC-0504a

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15. Using a cable tie, secure the neutral switch plates with the switch stop arm nested between them (Fig. 0737).

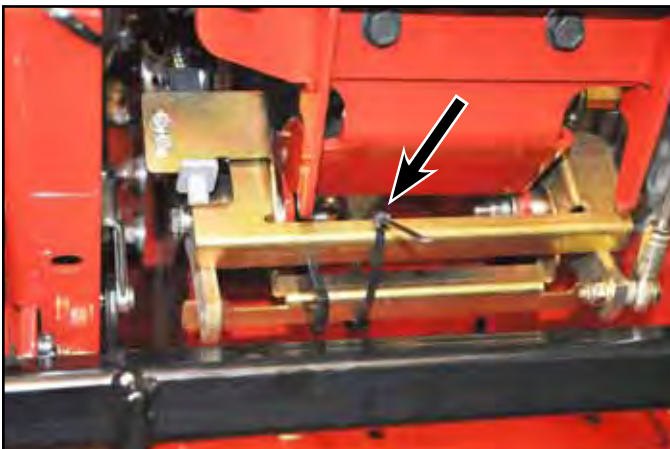


Fig. 0737

IMG-1052a

17. While pulling the control fork assembly rearward (not so hard that the speed control linkage moves) tighten the screw that goes through the center of the shoulder hub (Fig. 0739).

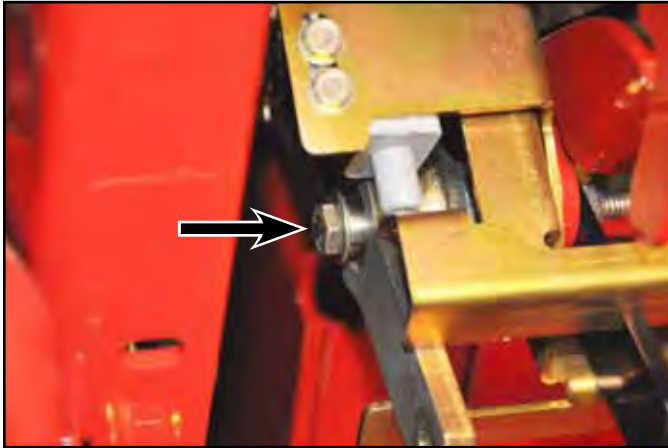


Fig. 0739

IMG-1057a

Note: It is important to keep the pump control arm and control fork slots aligned with each other. This can be achieved by making sure the top of the pump control arm and control fork are parallel to each other (Fig. 0740).

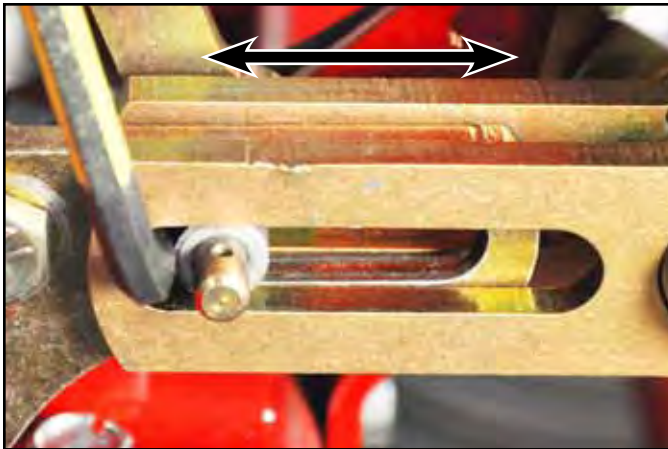


Fig. 0740

DSC-0527a

18. Install the washer and hairpin cotter to the end of the speed control linkage (Fig. 0741).

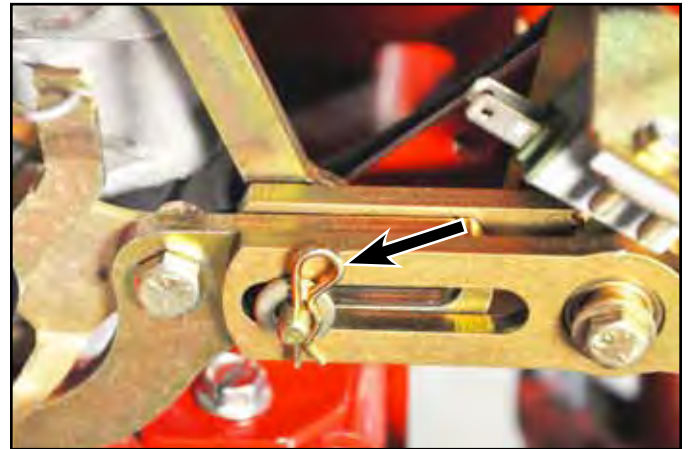


Fig. 0741

DSC-0516a

19. Remove the cable tie securing the neutral switch plates to the switch stop arm (Fig. 0742).

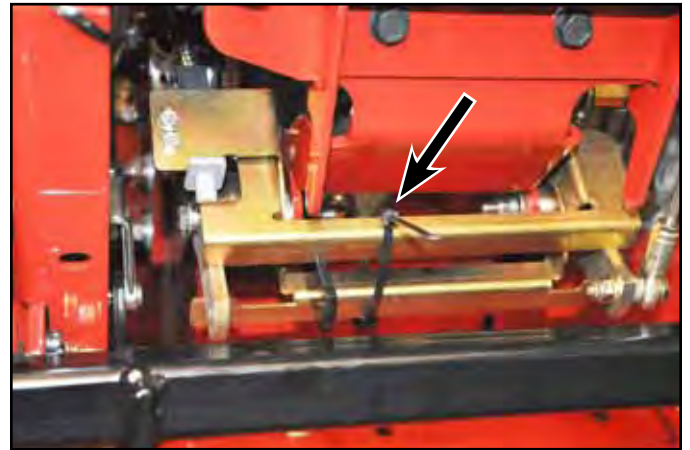


Fig. 0742

IMG-1052a

CONTROLS

20. Position the motion control cable adjustment nut into the slot on the linkage mount (Fig. 0743).

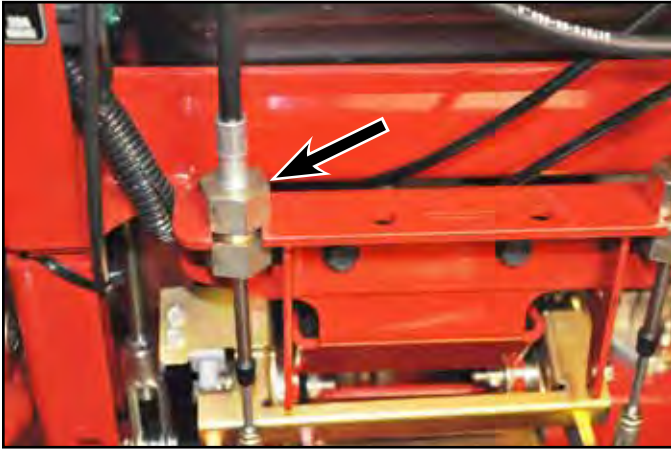


Fig. 0743

IMG-1058a

22. Secure the end of the control cable to the control fork using the bolt, nut and spacer (Fig. 0745).

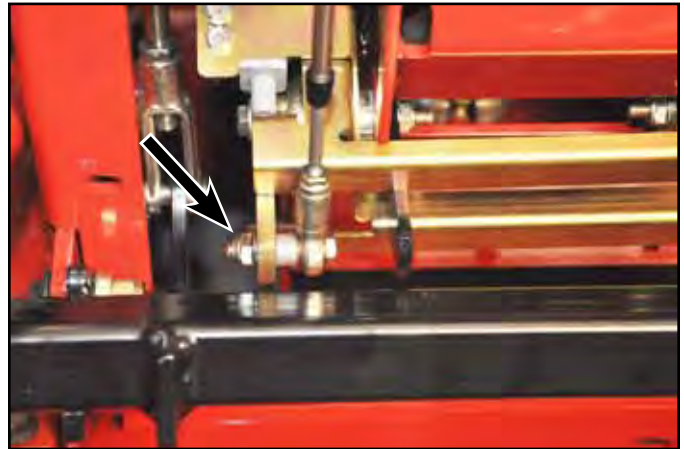


Fig. 0745

IMG-1061a

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21. Secure the cable to the linkage mount with the spring clip (Fig. 0744).

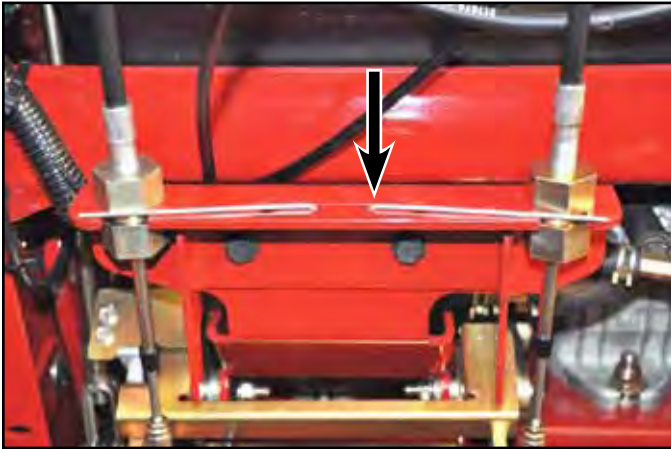


Fig. 0744

IMG-1022a

Speed Control Cable & Shifter Replacement

Speed Control Cable & Shifter Removal

1. Remove the speed control handle knob and then the two screws and nuts securing the handle assembly to the control tower (Fig. 0746).



Fig. 0746

IMG-0145a

2. Remove the cable clip and then the "Z" bend of the cable from the speed control lever assembly (Fig. 0747).



Fig. 0747

IMG-0145a

3. Remove the two cable ties securing the speed control cable to the RH control cable and the left side of the linkage mount (Fig. 0748).

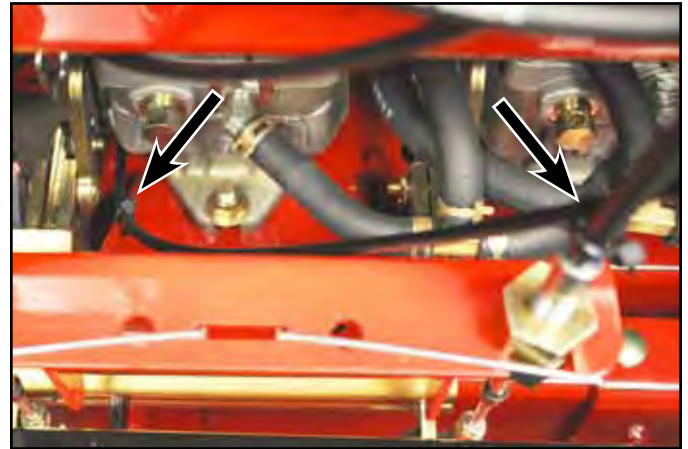


Fig. 0748

IMG-1089a

4. **2009 Only:** Remove the hairpin cotters and washers securing the RH & LH shifter links to the shifter brackets (Fig. 0749).

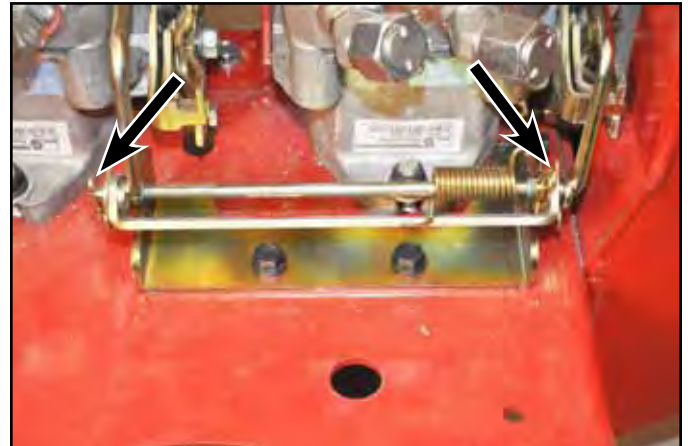


Fig. 0749

IMG-0348a

CONTROLS

5. **2010 Only:** Remove the bolt, nut, washers, and spacer securing the front end of the RH & LH shifter links to the shifter bracket (Fig. 0750).

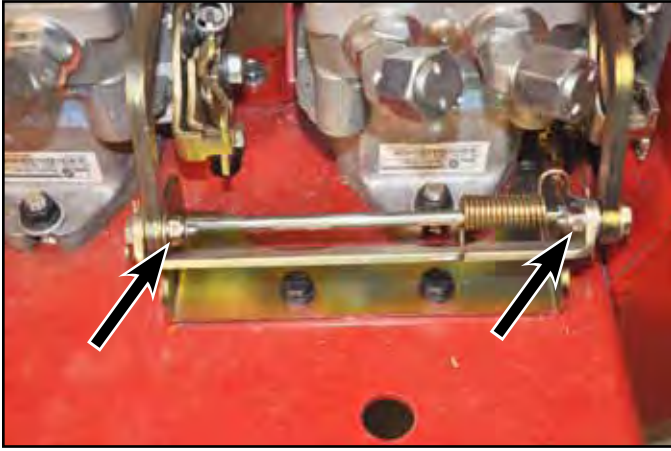


Fig. 0750

IMG-0346a

7. Remove the two screws securing the shifter bracket assembly to the engine base (Fig. 0752).

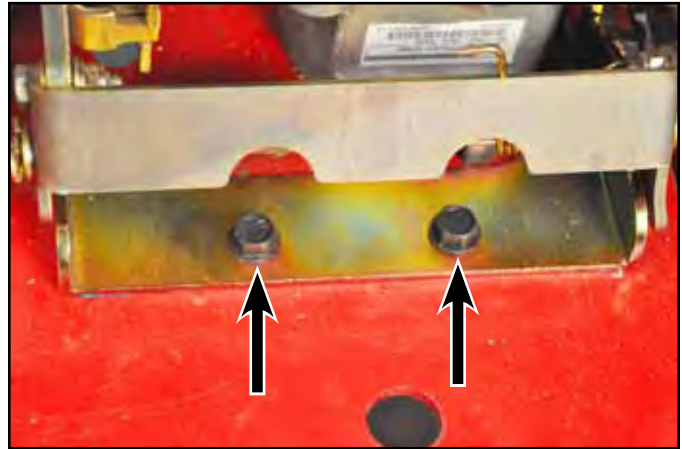


Fig. 0752

IMG-0153a

6. Using a spring tool, unhook the "J" end of the torsion spring from the lower shifter bracket (Fig. 0751).

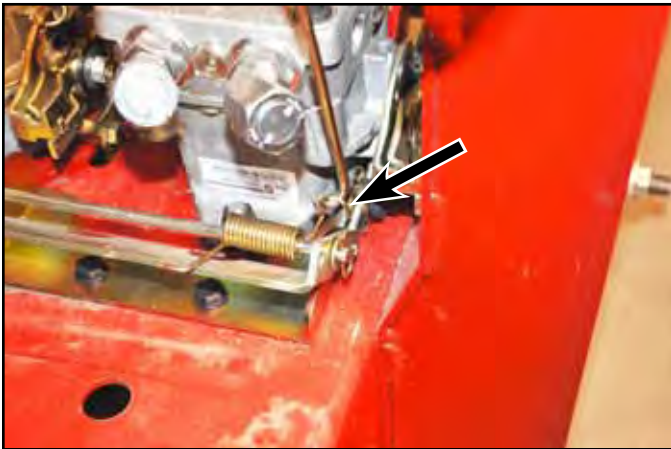


Fig. 0751

IMG-1121a

8. Remove the shifter bracket assembly and speed control cable from the chassis (Fig. 0753).



Fig. 0753

IMG-0159a

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9. Remove the screw and cable clamp securing the speed control cable to the shifter bracket assembly (Fig. 0754).

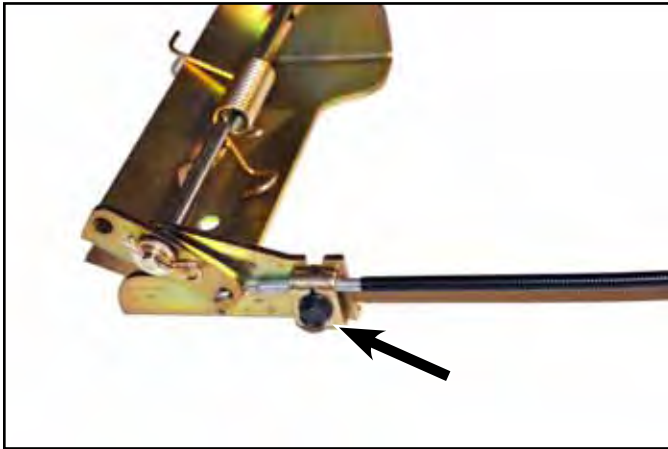


Fig. 0754

IMG-1070a

11. Remove the hairpin cotter and washer from both ends of the hinge pin (Fig. 0756).



Fig. 0756

IMG-1123a

10. Remove the "Z" bend of the speed control cable from the shifter assembly (Fig. 0755).

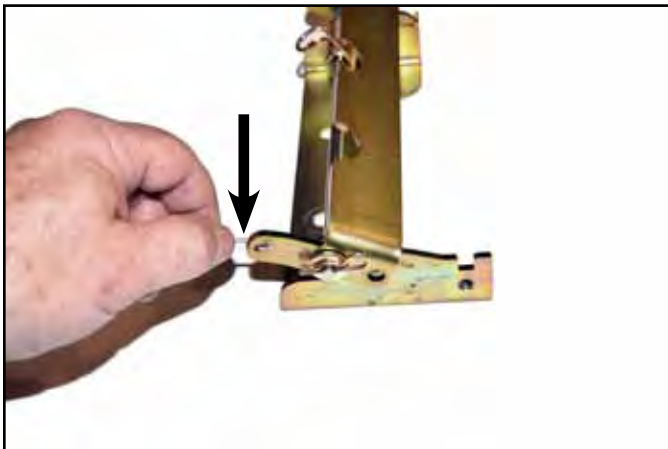


Fig. 0755

IMG-1071a

12. Remove the hinge pin and torsion spring from the shifter assembly (Fig. 0757).

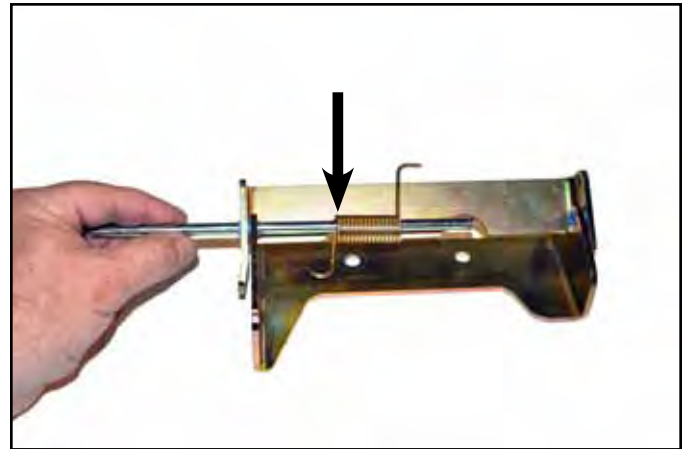


Fig. 0757

IMG-1125a

CONTROLS

13. Remove the two plastic bushings from the lower shifter bracket (Fig. 0758).

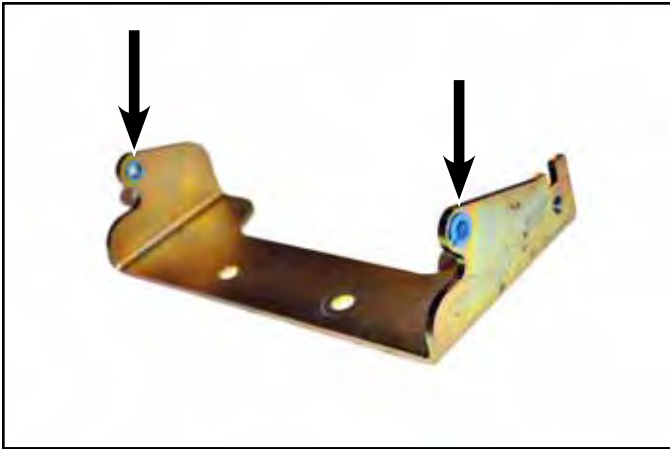


Fig. 0758

IMG-1077a

Speed Control Cable & Shifter Installation

1. Install two plastic bushings into the upper shift bracket (Fig. 0760).



Fig. 0760

IMG-1078a

14. Remove the two plastic bushings from the upper shifter bracket (Fig. 0759).

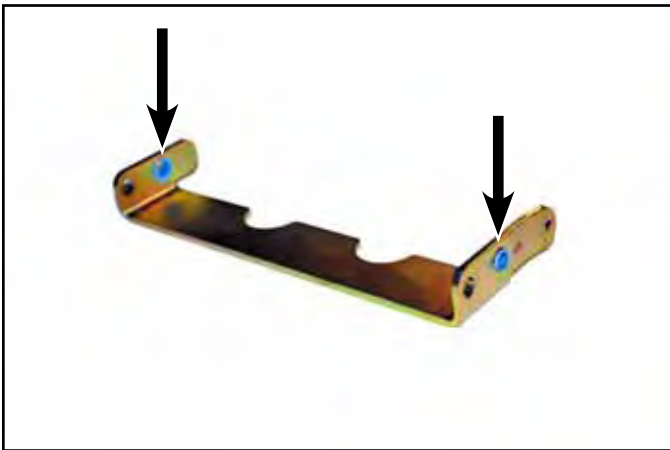


Fig. 0759

IMG-1078a

2. Install two plastic bushings into the lower shift bracket (Fig. 0761).

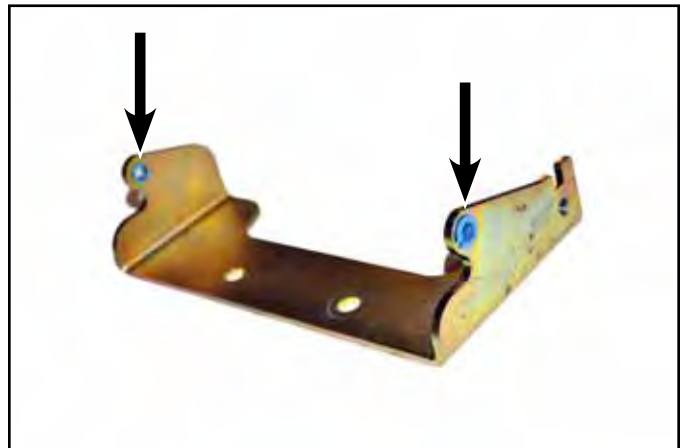


Fig. 0761

IMG-1077a

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3. Install the hinge pin through one side of the upper and lower shifter brackets, through the torsion spring, then through the opposite end of the shifter brackets (Fig. 0762).

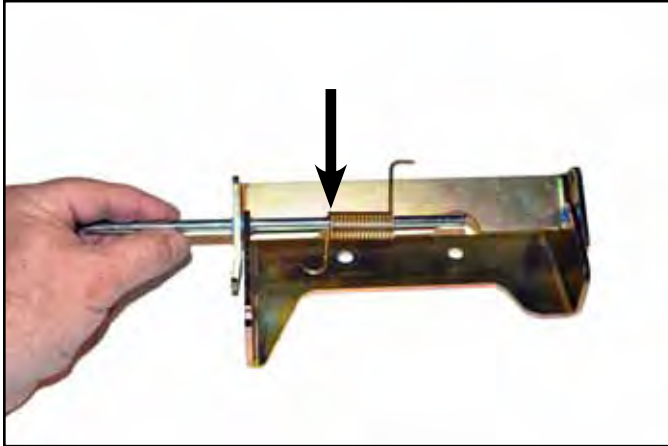


Fig. 0762

IMG-1125a

4. Secure the hinge pin with a hairpin cotter and washer on both ends (Fig. 0763).

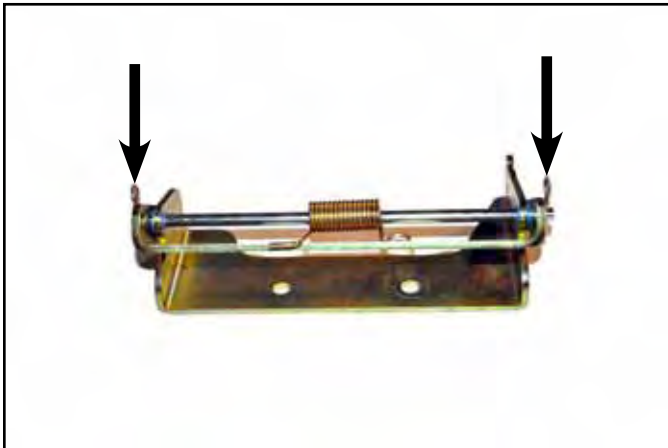


Fig. 0763

IMG-1123a

5. Hook the "Z" bend of the speed control cable to the shifter bracket assembly (Fig. 0764).

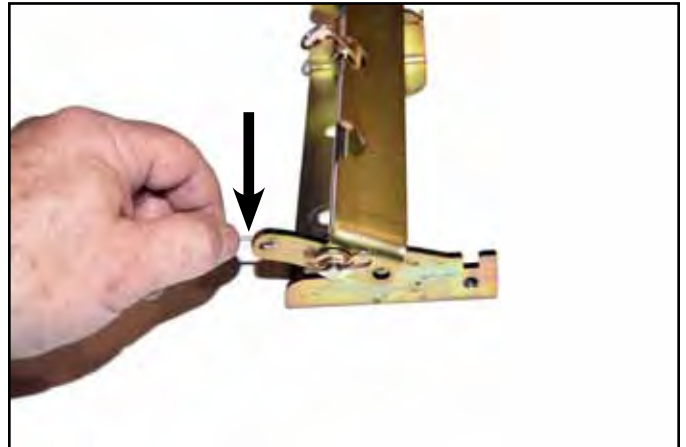


Fig. 0764

IMG-1071a

6. Loosely install the screw and cable clamp to the shifter assembly (Fig. 0765).

Note: This clamp will be tightened later in this process.

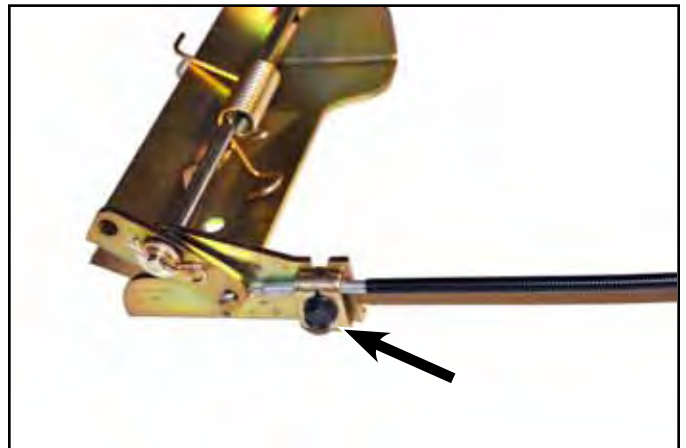


Fig. 0765

IMG-1070a

CONTROLS

7. Secure the shifter bracket assembly to the engine base using two thread forming screws (Fig. 0766).

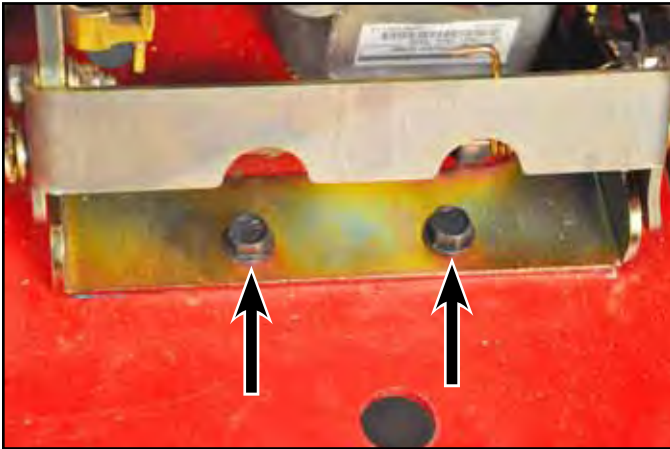


Fig. 0766

IMG-0153a

8. Using a spring tool, hook the "J" end of the torsion spring to the lower shifter bracket (Fig. 0768).

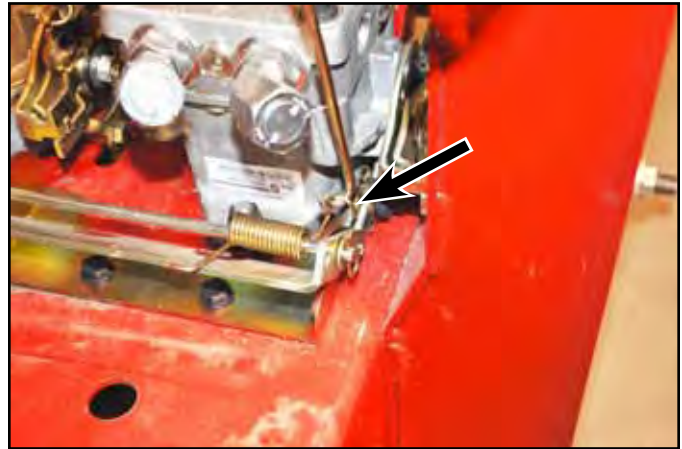


Fig. 0768

IMG-1121a

4

Note: The speed control cable must be routed between the LH pump RTN (Return to Neutral) mechanism, then upward behind the linkage mount (Fig. 0767).

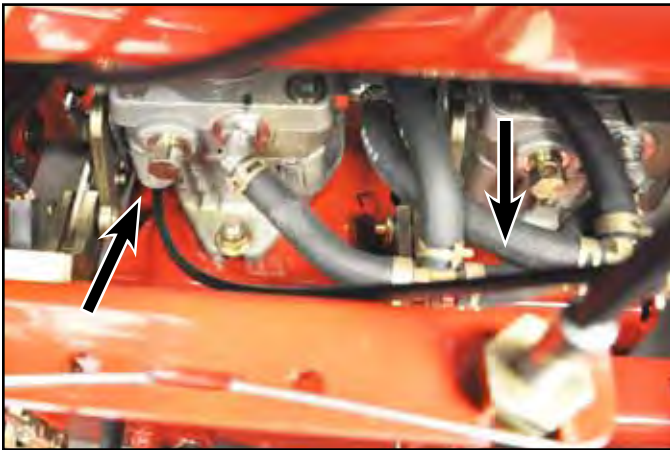


Fig. 0767

IMG-1086a

9. **2009 Only:** Secure the front end of the shifter links to the shifter bracket using a hairpin cotter and washer (Fig. 0769).

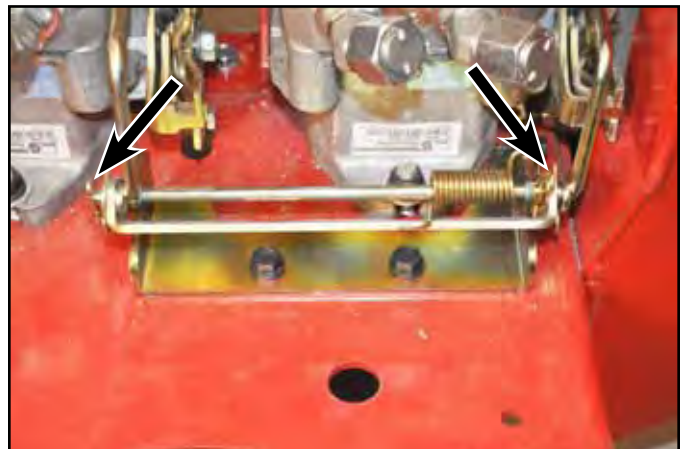


Fig. 0769

IMG-0348a

10. **2010 Only:** Place a spacer into the front end of the shifter links (Fig. 0770).



Fig. 0770

IMG-0946a

11. **2010 Only:** Secure the shifter links to the shifter bracket with a bolt two washers and nut (Fig. 0771).

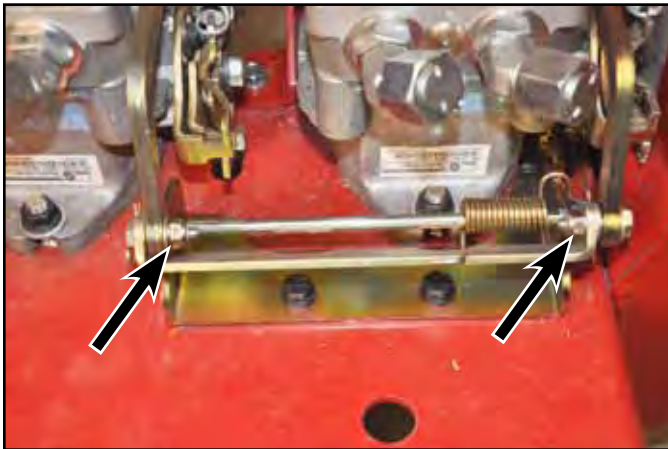


Fig. 0771

IMG-0346a

12. **2010 Only:** Repeat steps 10 & 11 on the opposite shifter link.

13. Hook the "Z" bend of the speed control cable to the speed control lever assembly and secure with the cable clip (Fig. 0772).



Fig. 0772

IMG-0150a

14. Secure the lever assembly to the control tower using two screws and nuts, then install the handle knob (Fig. 0773).



Fig. 0773

IMG-0145a

CONTROLS

15. Move the speed control lever to the "FAST" position (Fig. 0774).



Fig. 0774

PICT-9749a

17. Using cable ties, secure the speed control cable to the RH control cable and the left side of the linkage mount (Fig. 0776).

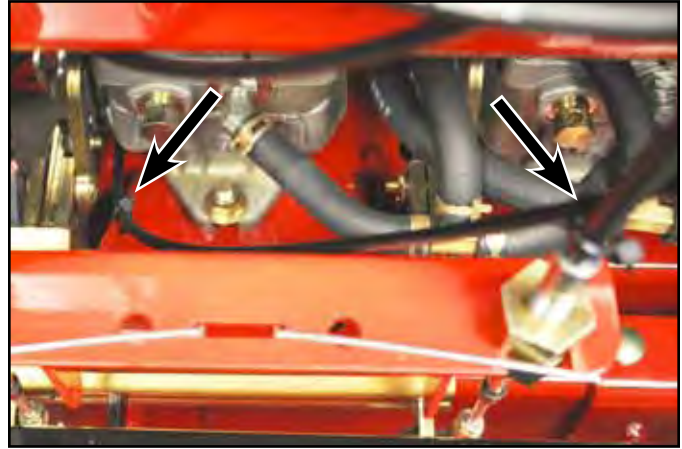


Fig. 0776

IMG-1089a

16. Pull rearward on the cable jacket to remove any slack, then tighten the cable clamp securing the cable jacket to the shifter bracket (Fig. 0775).

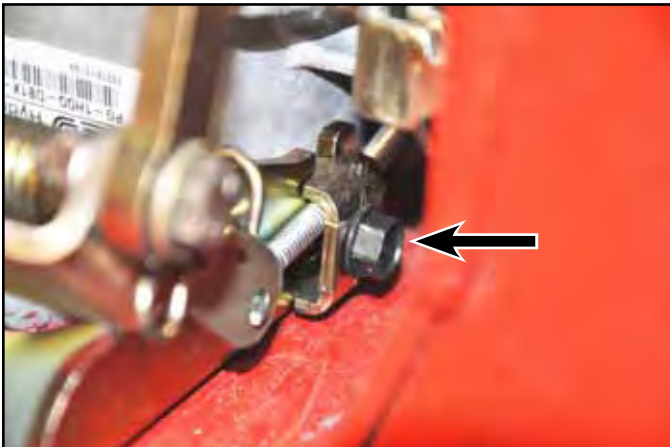


Fig. 0775

DSC-0488a

4

Speed Control Adjustment

1. Set the HOC lever to 2" (5cm), and then move the speed control lever to the "FAST" position.
2. Loosen the cable clamp securing the speed control cable jacket to the shifter bracket (Fig. 0777).

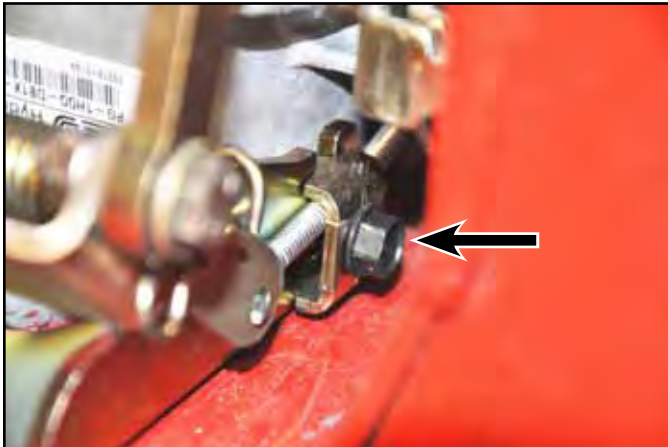


Fig. 0777

DSC-0488a

3. Loosen the screws that go through the center of the LH and RH shoulder hubs (Fig. 0778).

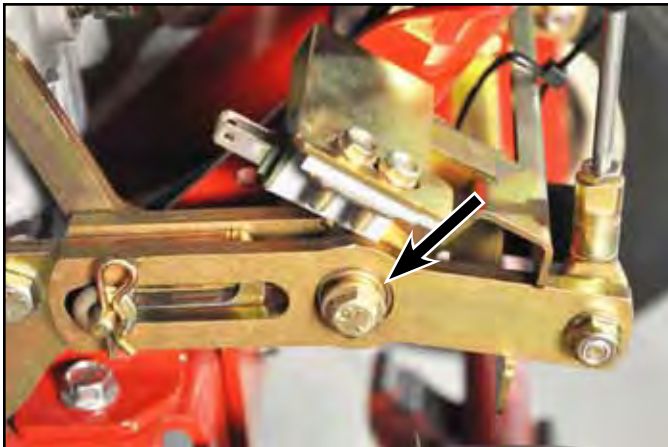


Fig. 0778

DSC-0514a

4. Remove the hairpin cotter and washer from the LH speed control linkage (Fig. 0779).

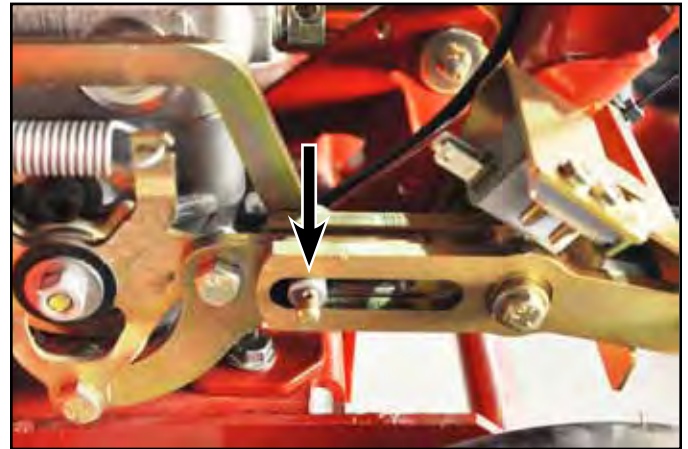


Fig. 0779

DSC-0513a

4

5. Insert a 7/32" (approx. 5.6mm) Allen wrench into the slots of the control fork and control arm in front of the LH speed control linkage rollers (Fig. 0780).

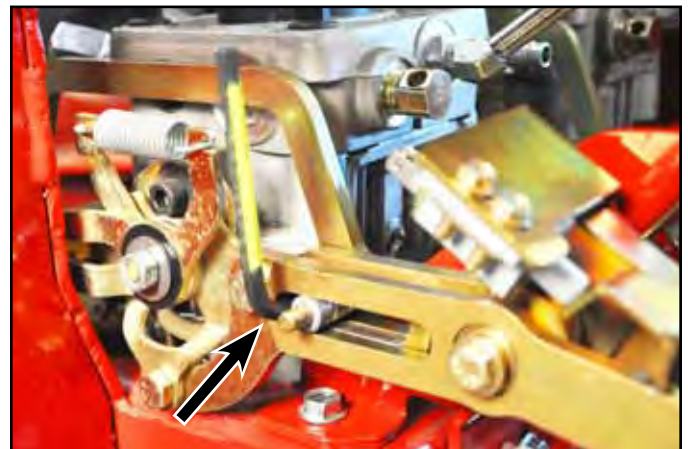


Fig. 0780

DSC-0504a

CONTROLS

6. Push the speed control linkage forward (Fig. 0781). The Allen wrench establishes the intended air gap between the rollers and end of the control linkage slots.



Fig. 0781

DSC-0522a

8. The switch stop arm must be aligned with the cable end of the control forks. Using a cable tie, secure the neutral assembly to align the components (Fig. 0783).

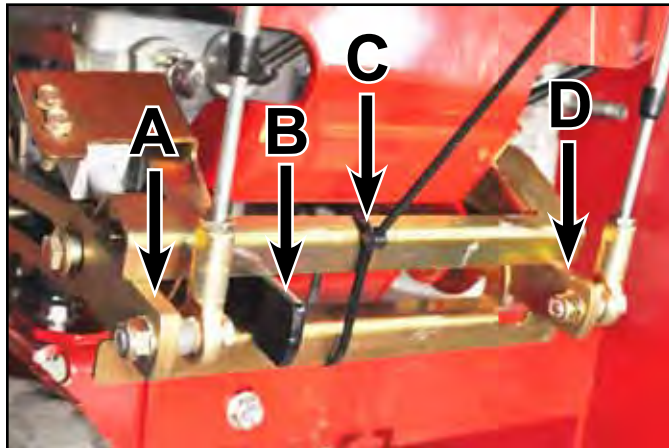


Fig. 0783

DSC-0508a

7. Tighten the clamp securing the speed control cable jacket to the shifter bracket (Fig. 0782).

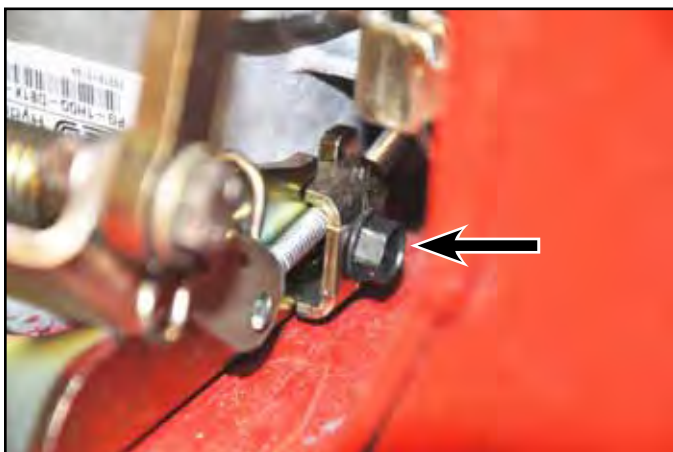


Fig. 0782

DSC-0488a

- A. LH control fork
B. Switch stop arm
C. Cable tie
D. RH control fork

4

9. While pulling the control fork assembly rearward (not so hard that the speed control linkage moves) tighten the screw that goes through the center of the LH shoulder hub (Fig. 0784).



Fig. 0784 DSC-0504a

Note: It is important to keep the pump control arm and control fork slots aligned with each other (Fig. 0785). This can be achieved by making sure the top of the pump control arm and control fork are parallel to each other (Fig. 0786).

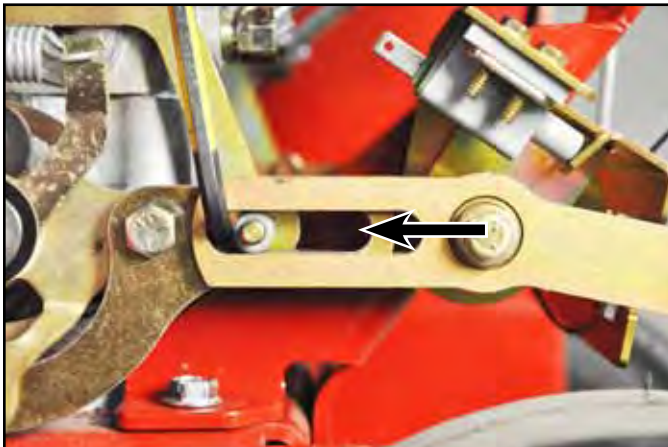


Fig. 0785 DSC-0528a

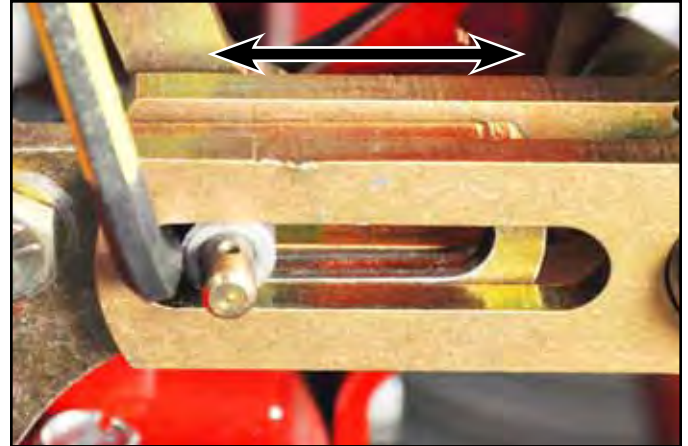


Fig. 0786 DSC-0527a

10. Remove the allen wrench from the slots of the control fork and control arm.
11. Install the washer and hair pin to the end of the speed control linkage (Fig. 0787).

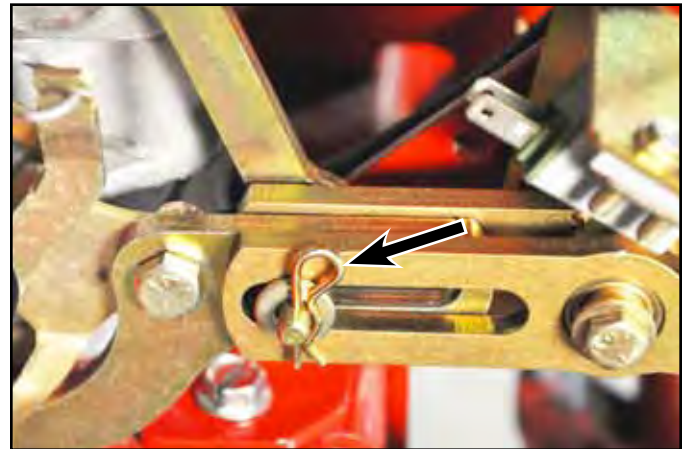


Fig. 0787 DSC-0516a

12. Repeat steps 4 through 11 (skipping steps 6 and 7) on the RH side.
13. Cut the cable tie from the neutral assembly.

CONTROLS

Control Cable Replacement

This procedure was written using the left hand control cable. This procedure is the same for either side.

Control Cable Removal

1. Remove the bolt, nut & spacer securing the lower end of the control cable to the control fork assembly (Fig. 0788).

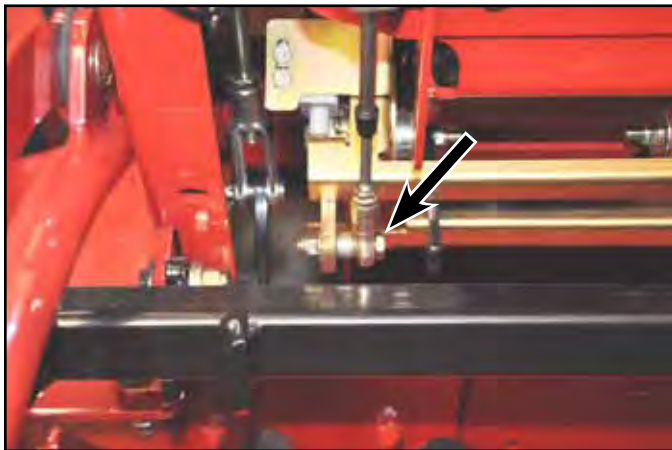


Fig. 0788

IMG-1033a

2. Remove the spring clip securing the motion control cable to the linkage mount (Fig. 0789).

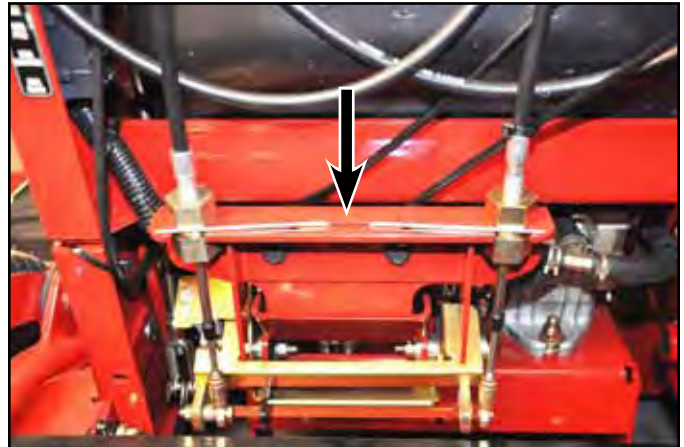


Fig. 0789

IMG-1009a

3. Remove the motion control cable from the linkage mount (Fig. 0790).

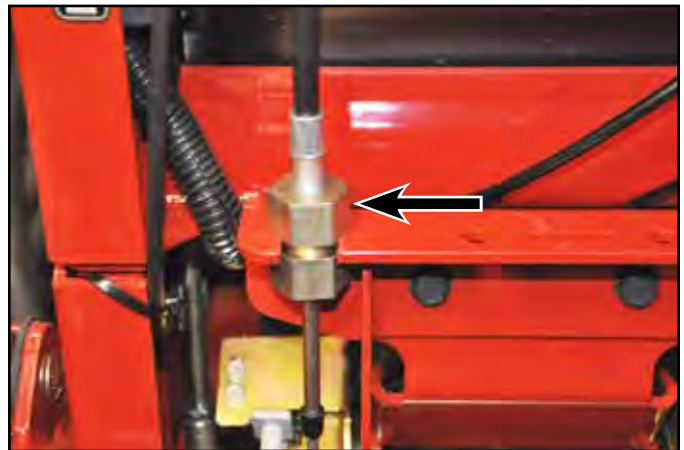


Fig. 0790

IMG-1035a

4. Remove the bolt, nut and spacer securing the upper end of the control cable to the motion control handle assembly (Fig. 0791).

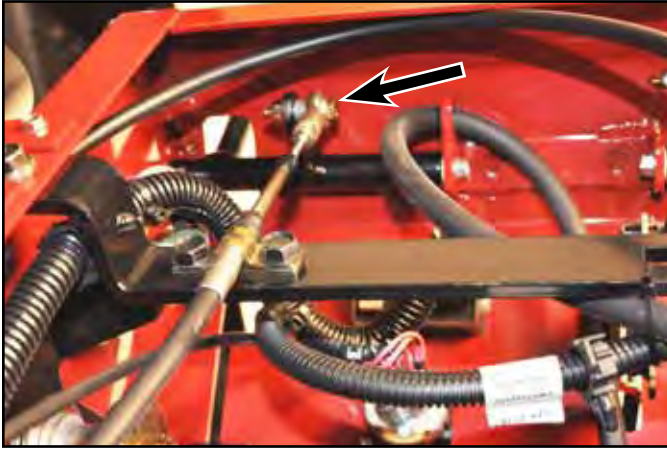


Fig. 0791

IMG-1093a

5. Remove the two thread forming screws, cable clamp and spacer plate securing the control cable to the cable bar (Fig. 0792).



Fig. 0792

IMG-1098a

Control Cable Installation

1. Position the control cable with the cable's locating groove in line with the bolt holes in the cable bar (Fig. 0793).

Note: Ensure the dust cover boot is covering the joint between the cable sleeve and jacket.

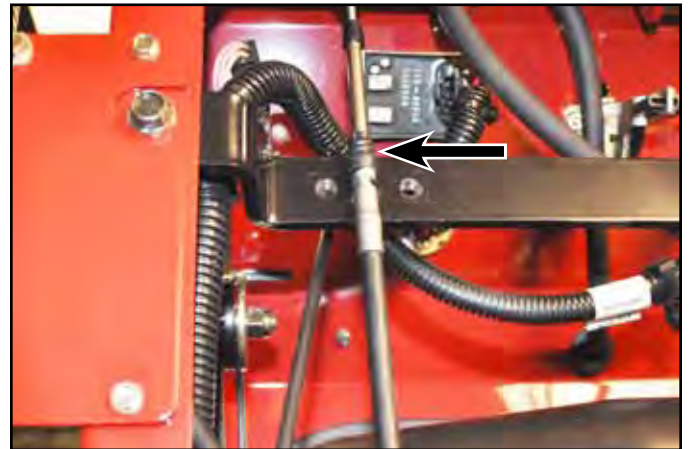


Fig. 0793

IMG-1105a

2. Position the spacer plate between the cable and the cable bar (Fig. 0794).

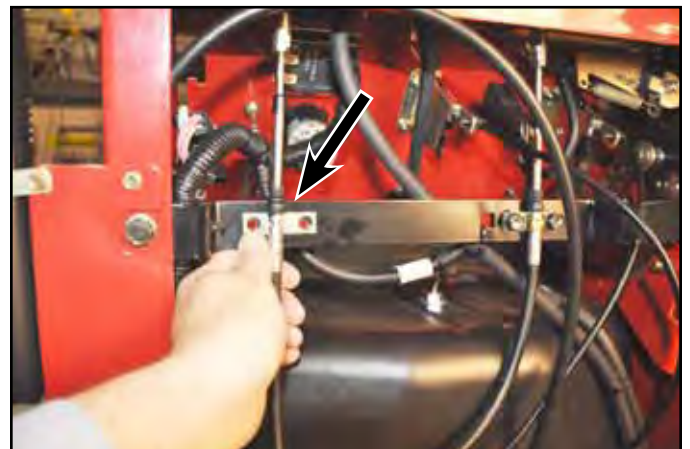


Fig. 0794

IMG-1107a

4

CONTROLS

3. Position the cable clamp on the control cable (Fig. 0795).

Note: Ensure the dimple in the cable clamp is nested in the locating slot of the control cable.



Fig. 0795

IMG-1113a

4. Secure the cable, cable clamp, and spacer to the cable bar using two thread forming screws (Fig. 0796).

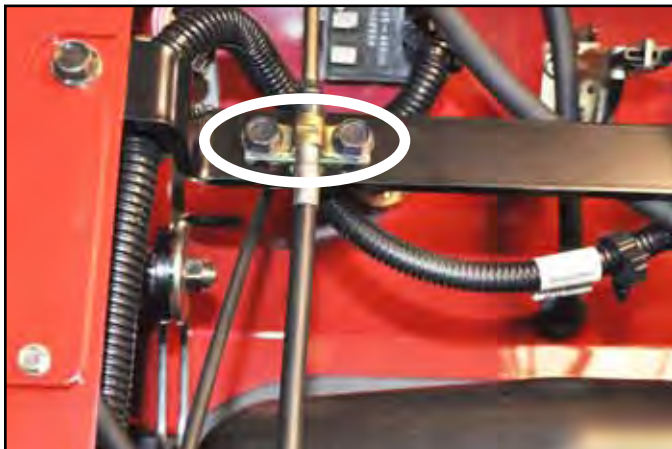


Fig. 0796

IMG-1098a

5. Secure the upper end of the control cable to the motion control handle assembly using a bolt, spacer and nut (Fig. 0797).

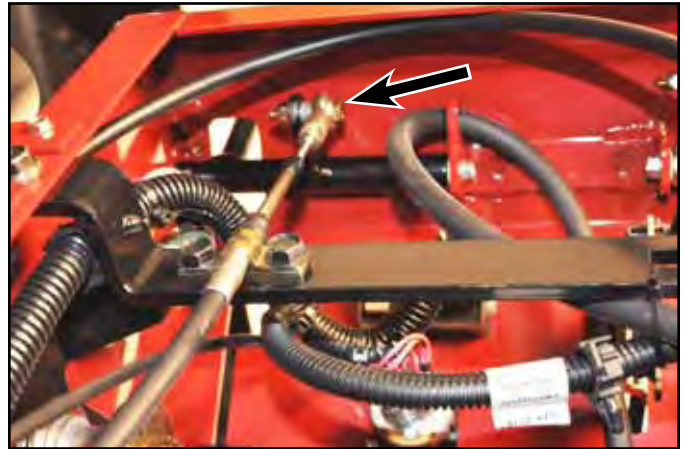


Fig. 0797

IMG-1093a

6. Loop the control cable up and behind the cable bar, then back down towards the linkage mount (Fig. 0798).

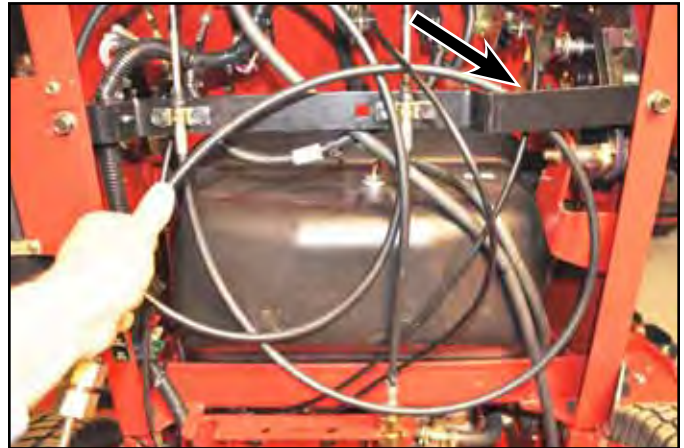


Fig. 0798

IMG-1114a

7. Position the adjustment nut of the control cable in the linkage mount (Fig. 0799).

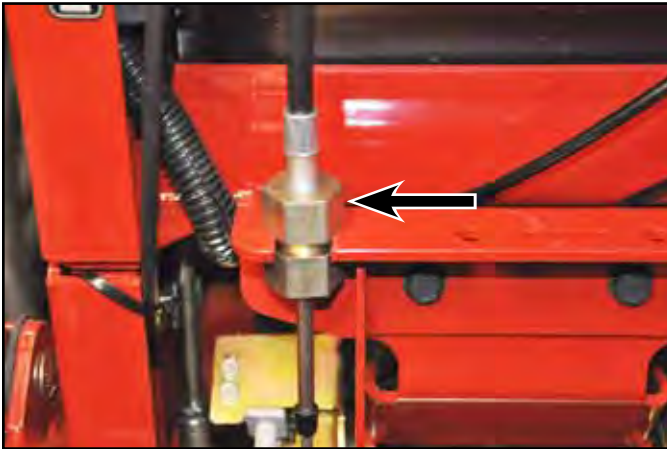


Fig. 0799

IMG-1035a

9. Secure the lower end of the control cable to the control fork using a bolt, spacer, and nut (Fig. 0801).

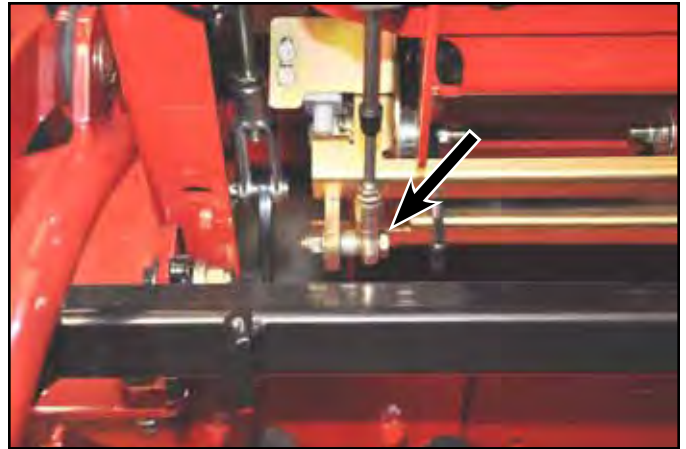


Fig. 0801

IMG-1033a

8. Secure the control cable to the linkage mount using the spring clip (Fig. 0800).

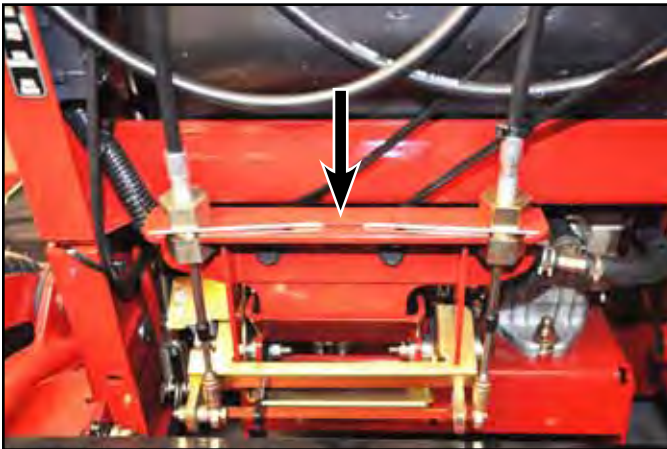


Fig. 0800

IMG-1009a

CONTROLS

Choke Cable Replacement

Choke Cable Removal

1. Remove the bolt and cable clamp securing the choke cable to the engine throttle plate (Fig. 0802).

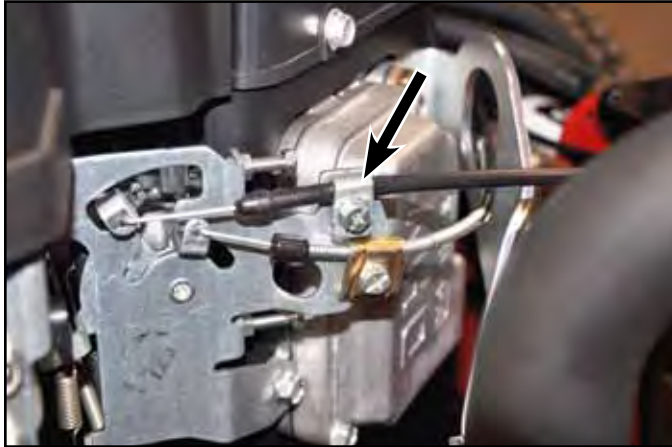


Fig. 0802

IMG-1127a

2. Remove the "Z" bend of the choke cable from the engine choke arm (Fig. 0803).



Fig. 0803

IMG-1129a

3. Cut the cable tie securing the choke cable to the frame, then pull the cable rearward from the frame (Fig. 0804).

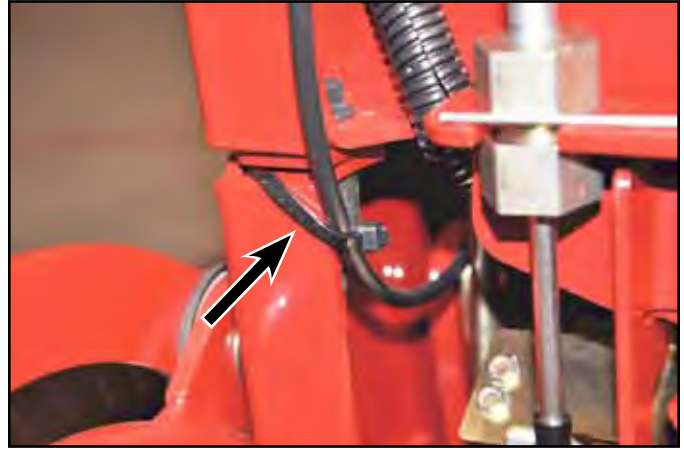


Fig. 0804

IMG-1132a

4. Remove the nut securing the choke cable to the control panel (Fig. 0805).

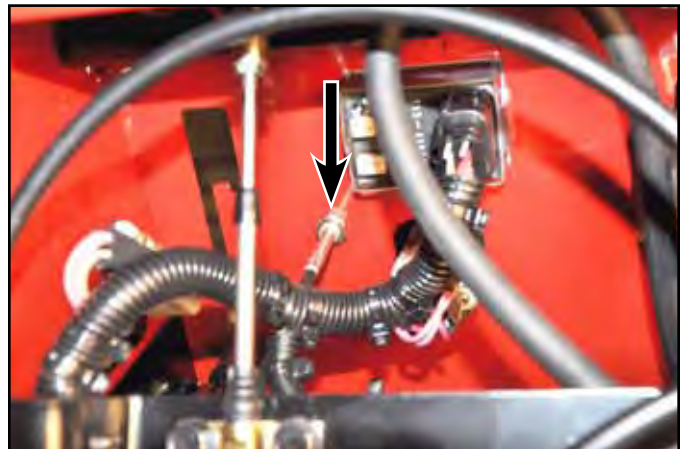


Fig. 0805

IMG-1135a

5. Remove the choke cable from the control panel (Fig. 0806).



Fig. 0806

IMG-1137a

Choke Cable Installation

1. Feed the choke cable through the mounting hole in the control panel (Fig. 0807).



Fig. 0807

IMG-1137a

4

2. Secure the choke cable to the control panel using a nut (Fig. 0808).

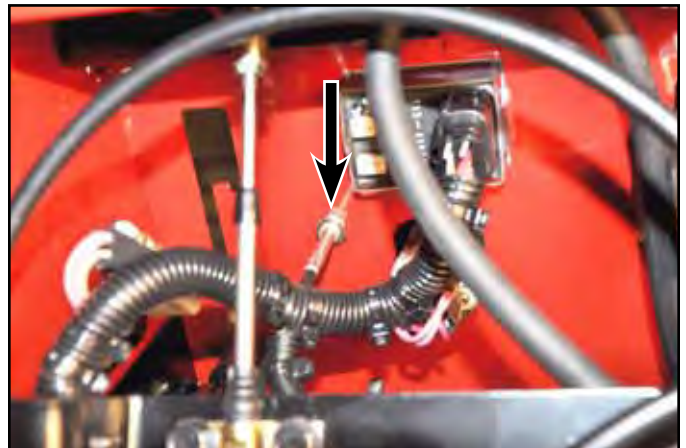


Fig. 0808

IMG-1135a

CONTROLS

3. Feed the cable through the frame, to the left of the brake linkage (Fig. 0809).

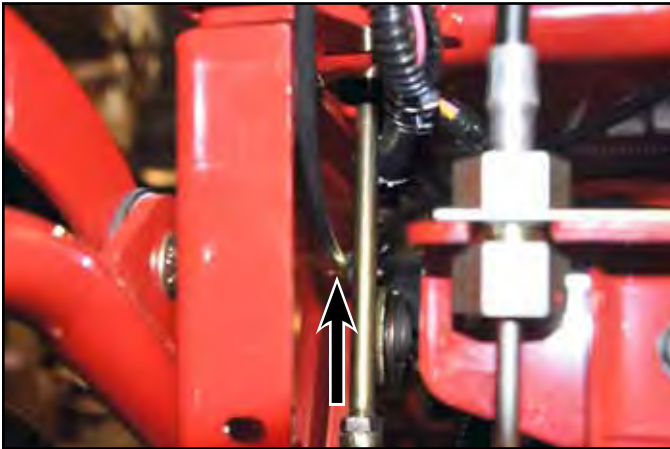


Fig. 0809

IMG-1142a

5. Install the choke cable "Z" bend into the engine choke lever (Fig. 0811).



Fig. 0811

IMG-1129a

4

4. Feed the choke cable through the "R" clamp located on the front, lower corner of the control tower (Fig. 0810).



Fig. 0810

IMG-1143a

6. Position the choke cable to the engine throttle plate and loosely install the screw and cable clamp (Fig. 0812).

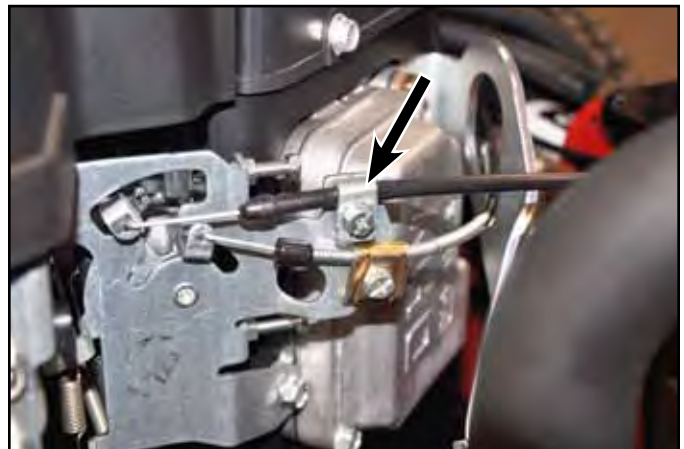


Fig. 0812

IMG-1127a

7. Secure the choke cable to the frame using a cable tie (Fig. 0813).

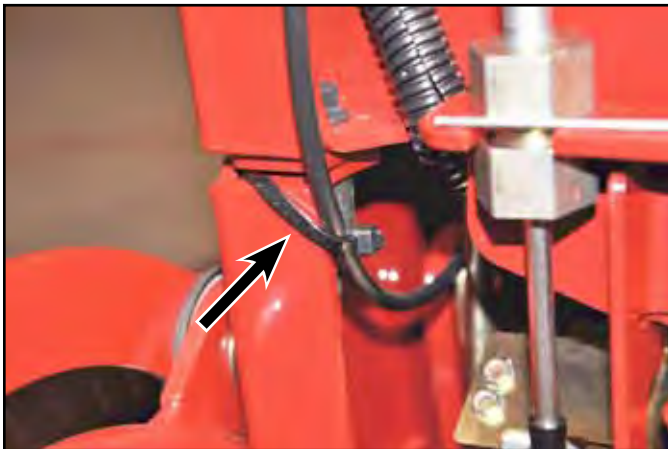


Fig. 0813

IMG-1132a

9. Ensure the choke is fully open in the throat of the carburetor (Fig. 0815).



Fig. 0815

IMG-1148a

8. Ensure the choke knob is in the "OPEN" position (Fig. 0814).



Fig. 0814

IMG-1302a

10. While holding the engine choke lever in the "OPEN" position, pull the slack from the cable jacket (Fig. 0816).



Fig. 0816

IMG-1150a

CONTROLS

11. Secure the position of the choke cable with the screw and cable clamp (Fig. 0817).

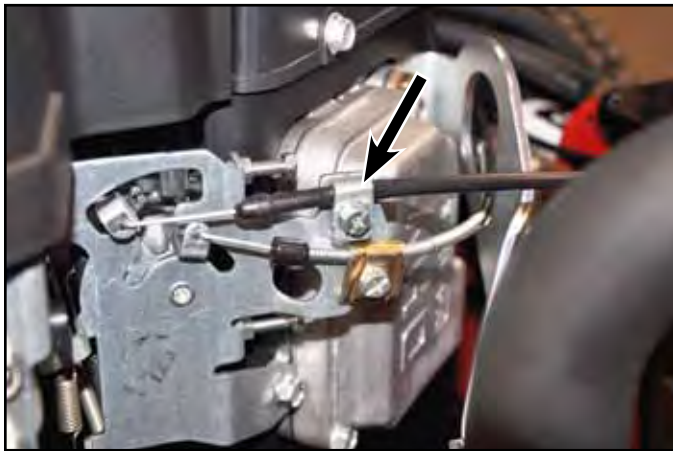


Fig. 0817

IMG-1127a

4

12. Ensure the choke is functioning correctly by moving the choke knob in and out while observing the choke plate in the carburetor throat.

Throttle Cable Replacement

Throttle Cable Removal

1. Remove the bolt and cable clamp securing the throttle cable to the engine throttle plate (Fig. 0818).

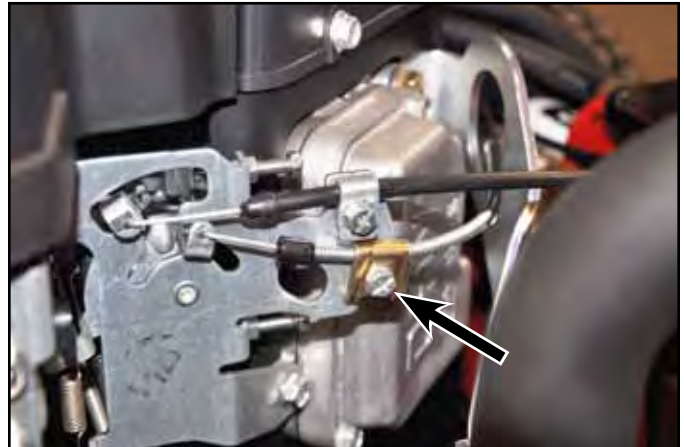


Fig. 0818

IMG-1127a

2. Remove the "Z" bend of the throttle cable from the engine throttle arm (Fig. 0819).

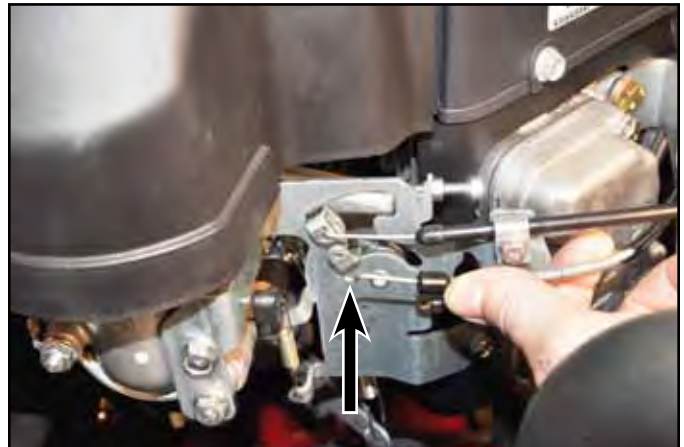


Fig. 0819

IMG-1154a

3. From the rear of the machine, pull the cable rearward from the frame.
4. Remove the throttle knob from the throttle lever (Fig. 0820).



Fig. 0820

IMG-1156a

6. Remove the cable clip and then the "Z" bend of the cable from the throttle control lever assembly (Fig. 0822).



Fig. 0822

IMG-1160a

5. Remove the two screws and nuts securing the throttle lever assembly to the control panel (Fig. 0821).



Fig. 0821

IMG-1158a

CONTROLS

Throttle Cable Installation

1. Hook the "Z" bend of the speed control cable to the speed control lever assembly and secure with the cable clip (Fig. 0823).



Fig. 0823

IMG-1160a

2. Secure the lever assembly to the control tower using two screws and nuts (Fig. 0824).



Fig. 0824

IMG-1158a

3. Apply medium strength thread-locking material to the threads of the handle knob (Fig. 0825).



Fig. 0825

IMG-1161a

4. Install the handle knob to the throttle lever (Fig. 0826).



Fig. 0826

IMG-1156a

5. Route the throttle cable downward between the control cables and fuel tank, then forward under the fuel tank shelf (Fig. 0827).

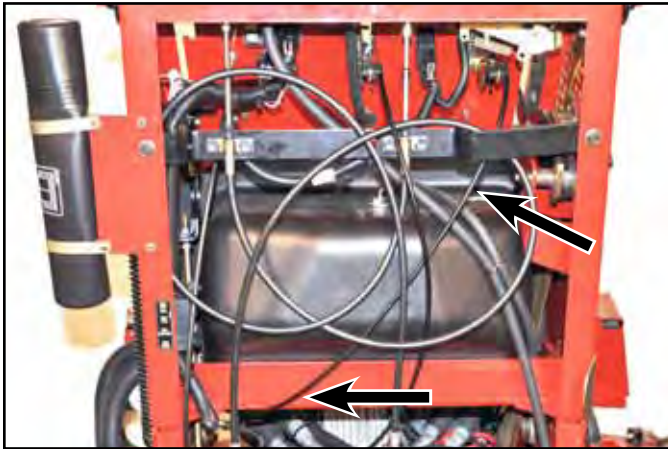


Fig. 0827

IMG-1162a

7. Feed the throttle cable through the muffler mount (Fig. 0829).

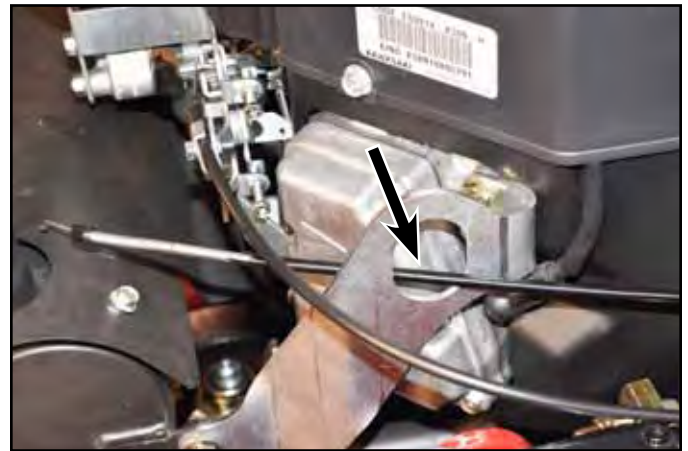


Fig. 0829

IMG-1171a

6. Feed the throttle cable through the "R" clamp located on the front, lower corner of the control tower (Fig. 0828).



Fig. 0828

IMG-1167a

8. Install the throttle cable "Z" bend into the engine throttle lever (Fig. 0830).

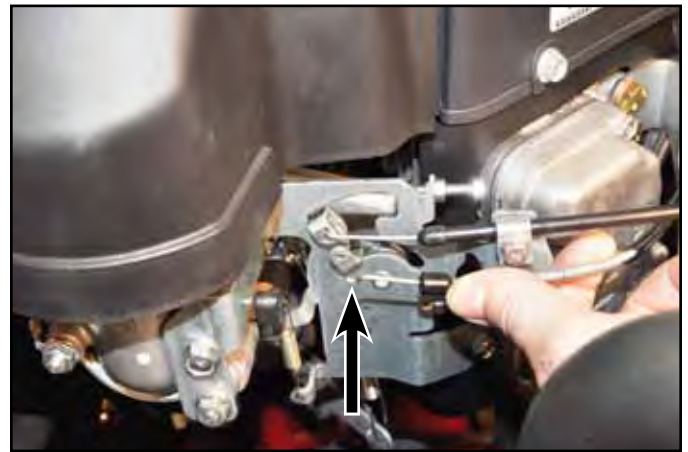


Fig. 0830

IMG-1154a

CONTROLS

9. Position the throttle cable to the engine throttle plate and loosely install the screw and cable clamp (Fig. 0831).

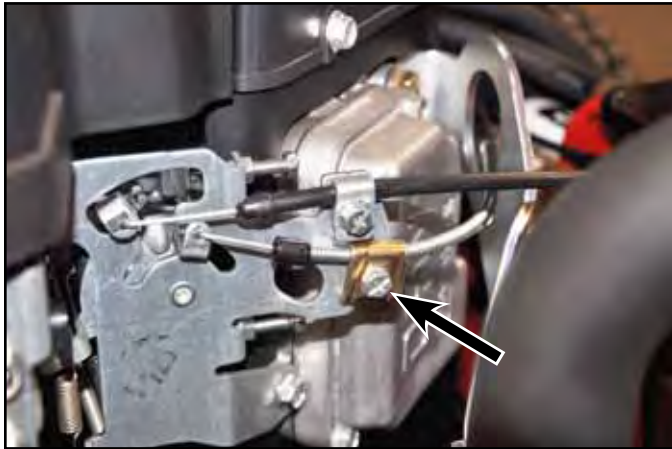


Fig. 0831

IMG-1127a

11. While holding the engine throttle lever in the "Fast" position, pull the slack from the cable jacket (Fig. 0833).



Fig. 0833

DSCN-1578a

10. Move the throttle lever to the "FAST" position (Fig. 0832).



Fig. 0832

IMG-1172a

12. Secure the position of the throttle cable with the screw and cable clamp (Fig. 0834).

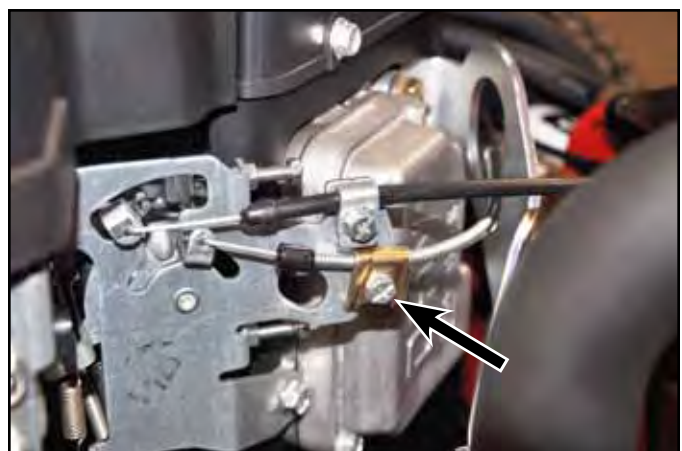


Fig. 0834

IMG-1127a

13. Ensure the throttle is functioning correctly by moving the throttle lever from "FAST" to "SLOW" while observing the engine throttle lever.

Engine Replacement

Engine Removal

1. Turn the engine off and remove the key from the ignition.
2. Turn the fuel shutoff valve to the "OFF" position (Fig. 0835).



Fig. 0835

IMG-0447a

3. Remove the two hold down bolts and wing nuts securing the battery cover. Then remove the cover (Fig. 0836).



Fig. 0836

IMG-0450a

4. Remove the negative and then the positive battery cables and remove the battery (Fig. 0837).



Fig. 0837

IMG-0453a

5. Slide the hose clamp off the fuel line where it connects to the fuel pump (Fig. 0838).



Fig. 0838

IMG-0457a

5

ENGINE

6. Remove the fuel line from the fuel pump. Drain the fuel into suitable container (Fig. 0839).



Fig. 0839

IMG-0458a

8. Unplug the pink wire from the green fuel solenoid wire (Fig. 0841).



Fig. 0841

IMG-0464a

7. Remove the violet wire from the voltage regulator (Fig. 0840).



Fig. 0840

IMG-0462a

9. Unplug the white wire from the black magneto wire (Fig. 0842).

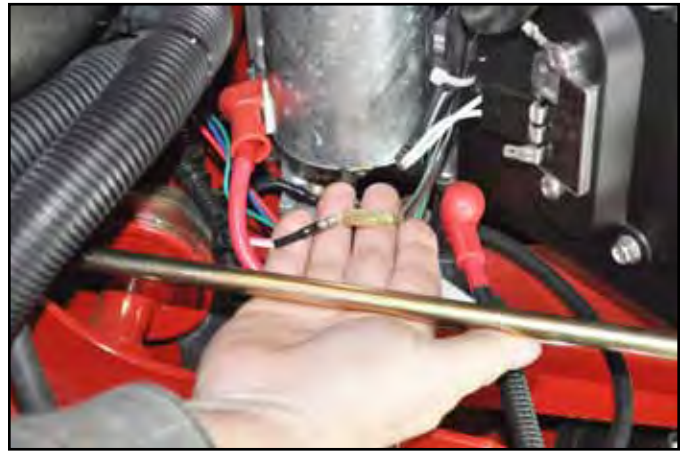


Fig. 0842

IMG-0465a

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10. Remove the bolt and washer securing the ground wires to the engine block (Fig. 0843).

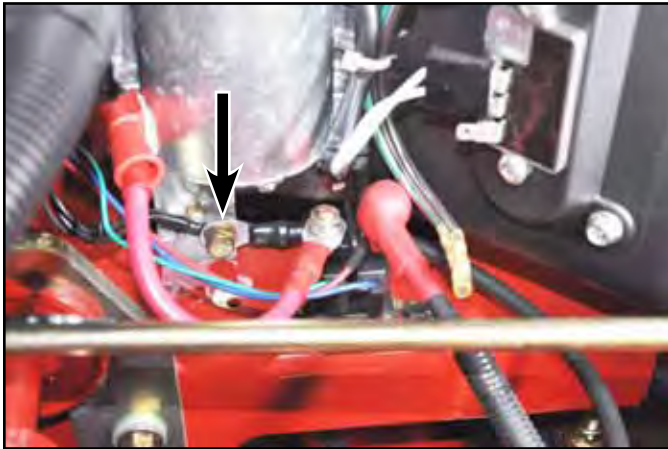


Fig. 0843 IMG-0467a

12. Unplug the clutch wires from the wiring harness (Fig. 0845).



Fig. 0845 IMG-0474a

11. Remove nut and lock washer securing the starter wire to the solenoid (Fig. 0844).

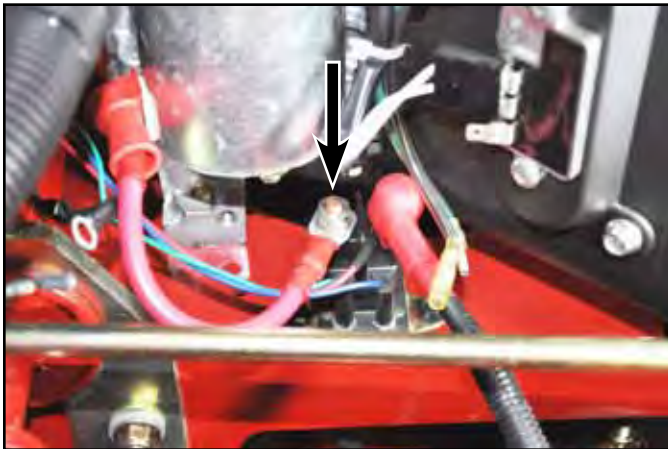


Fig. 0844 IMG-0470a

13. Push the grommet and the electrical plug connector down through the engine base (Fig. 0846).

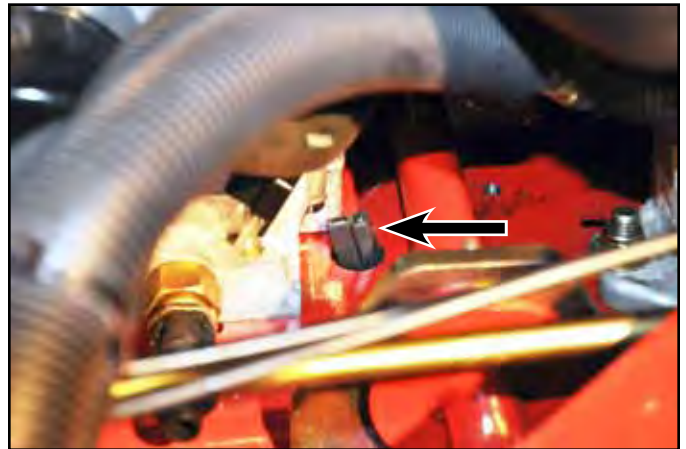


Fig. 0846 IMG-0493a

ENGINE

14. Remove the four nuts, two mounting guard brackets, and four carriage bolts retaining the muffler guard assembly to the front frame (Fig. 0847).

Note: 60" models have a guard panel, not the two guard mounting brackets



Fig. 0847

IMG-0475a

16. Loosen the screw on the choke cable clamp and remove the choke cable from the engine panel control (Fig. 0849).



Fig. 0849

IMG-0483a

5 15. Remove the muffler guard assembly (Fig. 0848).



Fig. 0848

IMG-0481a

17. Loosen the screw on the throttle cable clamp and remove the throttle cable from the engine panel control (Fig. 0850).

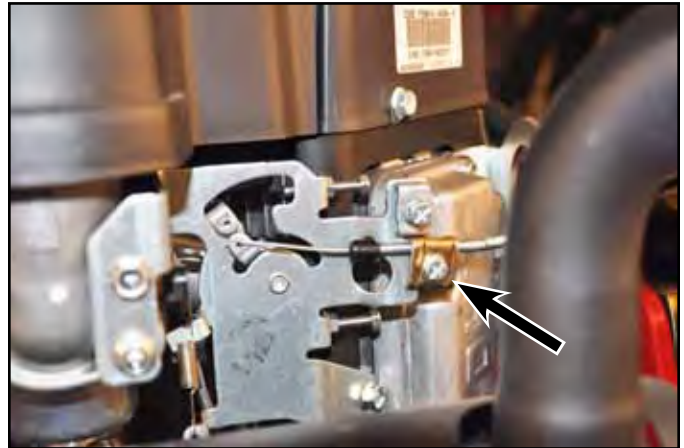


Fig. 0850

IMG-0484a

18. Remove the right hand mower belt cover (Fig. 0851).



Fig. 0851

IMG-0485a

19. With a spring tool, remove the extension spring from the spring anchor bracket (Fig. 0852).



Fig. 0852

IMG-0487a

20. Raise the machine so the underside of the chassis can be accessed.

21. **2009 ONLY:** Remove the bolt, washers, spacer and nut securing the clutch brake strap to the engine base (Fig. 0853).



Fig. 0853

IMG-9755a

22. Remove the mower belt from around the PTO electric clutch (Fig. 0854).



Fig. 0854

IMG-0494a

5

ENGINE

23. With a spring tool, remove the extension spring from the spring anchor bracket (Fig. 0855).

Note: On 2009 machines the extension spring hooks to the back of the engine base.



Fig. 0855

IMG-0496a

24. Remove the hydraulic drive belt from around the engine and hydraulic pump pulleys (Fig. 0856).



Fig. 0856

IMG-0497a

25. Remove the 3 carriage bolts and 3 nuts securing the skid plate to the mower deck and remove the skid plate (Fig. 0857).

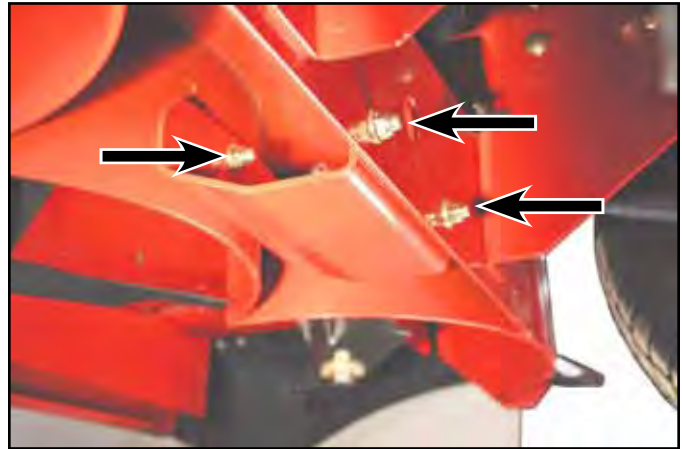


Fig. 0857

IMG-0503a

26. Remove one spark plug and feed a minimum of 2 feet (61cm) of 3/8" (.95cm) rope into the cylinder to prevent engine rotation (Fig. 0858).

Note: Rotate crankshaft as needed to permit feeding the rope into the cylinder.



Fig. 0858

IMG-9634a

27. Remove the bolt, spring washer and washer securing the clutch to the engine crankshaft (Fig. 0859).

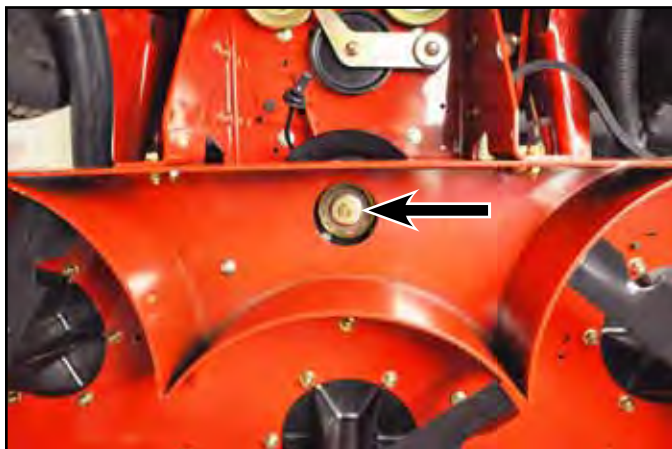


Fig. 0859

IMG-0506a

29. Remove the four engine mounting bolts and Belleville washers securing the engine to the engine base (Fig. 0861).

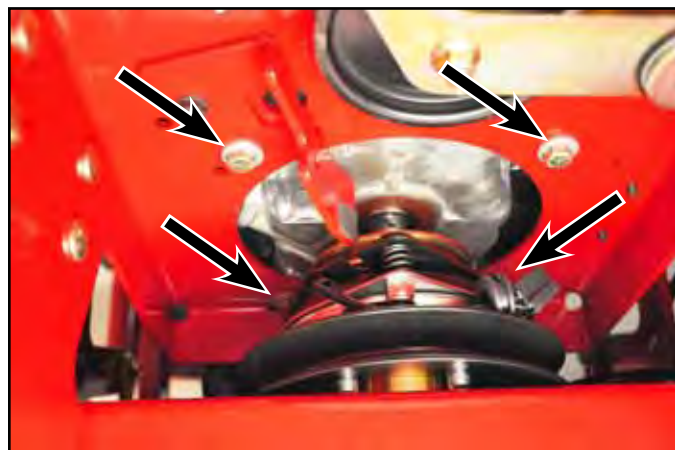


Fig. 0861

IMG-0516a

28. Lower the clutch onto the top of the mower deck (Fig. 0860).



Fig. 0860

IMG-0507a

30. Remove the engine from the engine base (Fig. 0862).

Note: The electric PTO clutch and drive pulley will slide off the engine crankshaft when removing the engine from the engine base.



Fig. 0862

IMG-0517a

5

ENGINE

31. Remove the square key from the engine crankshaft (Fig. 0863).



Fig. 0863

IMG-0520a

33. Remove four nuts and lock washers securing the muffler to the engine (Fig. 0865).

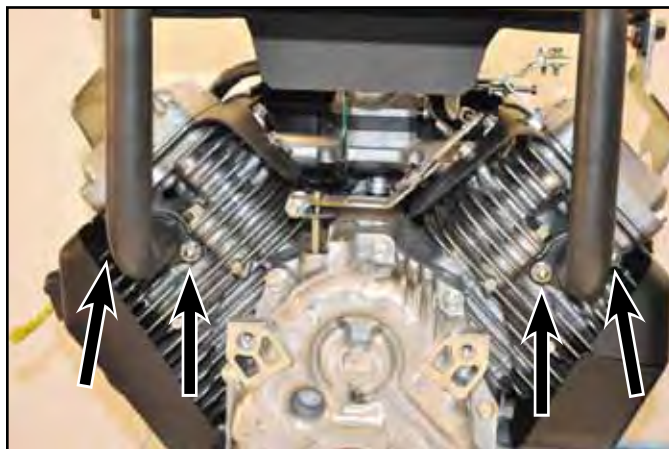


Fig. 0865

IMG-0522a

32. Remove the two bolts, spacers and nuts securing the left and right side muffler brackets to the muffler (Fig. 0864).

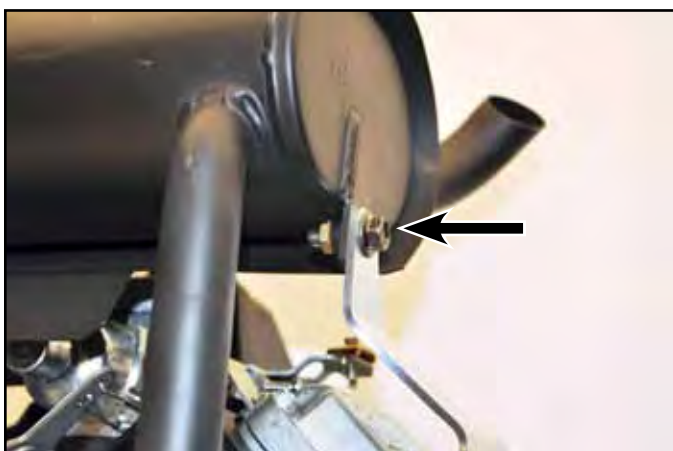


Fig. 0864

IMG-0542a

34. Remove the four bolts and lock washers (2 per side) securing the right and left hand muffler brackets to the engine (Fig. 0866).



Fig. 0866

IMG-0528a

5

Engine Installation

1. Secure the RH and LH muffler brackets to the engine using four bolts and lock washers (Fig. 0867).



Fig. 0867

IMG-0528a

2. Position a new exhaust gasket on the exhaust studs for both exhaust ports (Fig. 0868).



Fig. 0868

IMG-0531a

3. Secure the muffler to the engine using four nuts and lock washers. Torque to 19 ± 2 ft-lbs. (26 ± 3 Nm) (Fig. 0869).

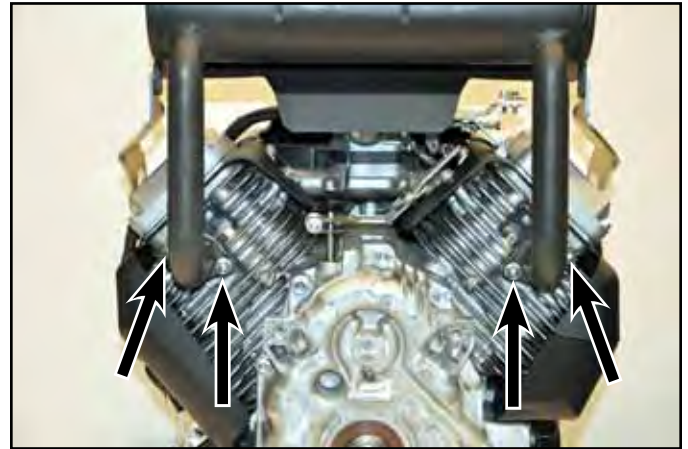


Fig. 0869

IMG-0532a

4. Install the two bolts, spacers, and nuts securing the left and right side muffler brackets to the muffler (Fig. 0870).

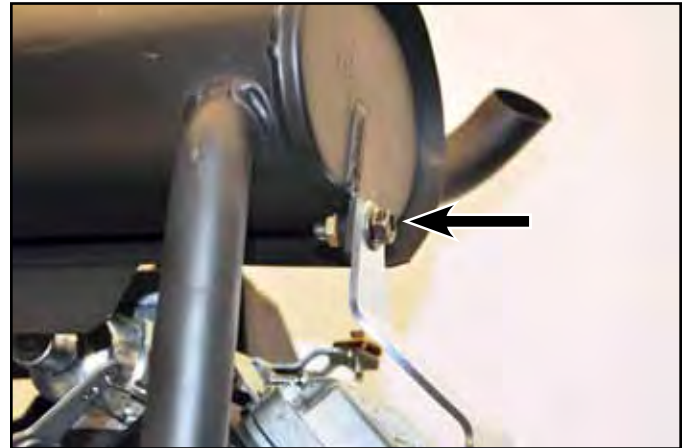


Fig. 0870

IMG-0542a

ENGINE

5. Install the square key in the crankshaft and apply anti-seize around the crankshaft (Fig. 0871).



Fig. 0871

IMG-0545a

8. Apply thread locking compound to clutch bolt threads (Fig. 0873).



Fig. 0873

IMG-0563a

6. Lower the engine into the chassis until the base of the engine is approximately 1-1/2" (3.81cm) from the engine base.

7. Install the engine drive pulley with the large hub facing up toward the engine (Fig. 0872).



Fig. 0872

IMG-0557a

9. Install the electric clutch onto the engine crankshaft and loosely install the clutch bolt, spring washer and washer (Fig. 0874).

Note: On 2010 models, make sure the PTO bracket stop fits into the slot on the clutch.



Fig. 0874

IMG-0558a

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10. Install the 4 screws and Belleville washers securing the engine to the engine base. Torque the screws to 30 ± 4 ft-lbs. (41 ± 5 Nm) (Fig. 0875).

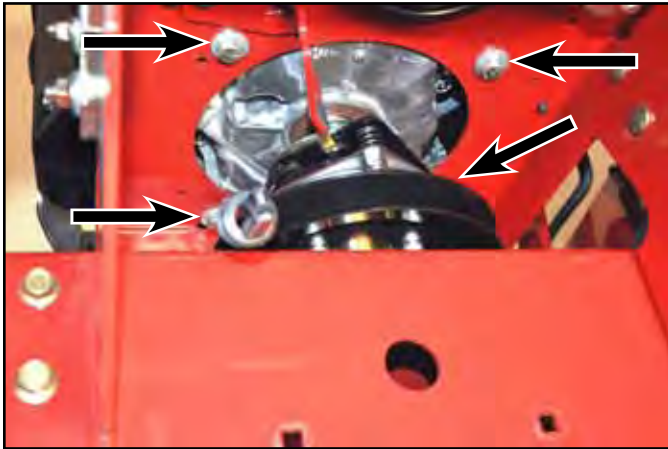


Fig. 0875

IMG-0511a

11. Remove one spark plug and feed a minimum of 2 feet (61cm) of 3/8" (.95cm) rope into the cylinder to prevent engine rotation (Fig. 0876).

Note: Rotate crankshaft as needed to permit feeding the rope into the cylinder.



Fig. 0876

IMG-9634a

12. Torque the clutch bolt to 55 ± 5 ft-lbs. (75 ± 7 Nm) (Fig. 0877).



Fig. 0877

IMG-0566a

13. Remove the rope from the engine cylinder and install spark plug.

14. **2009 ONLY:** Install the bolt, washers, spacer and nut securing the clutch brake strap to the mower deck (Fig. 0878).

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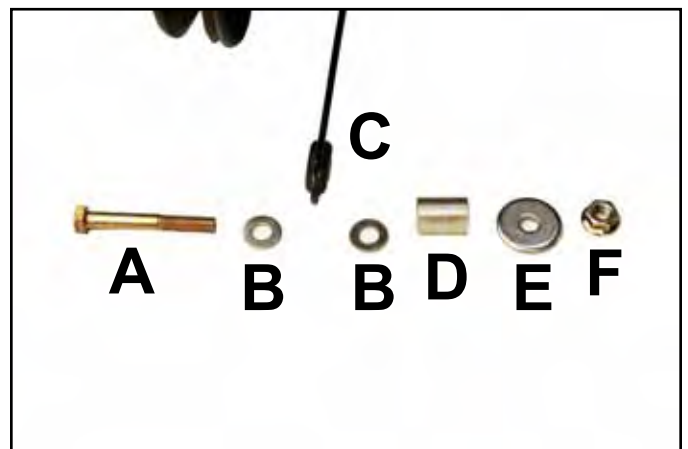


Fig. 0878

IMG-9624a

- | | |
|-----------------|-----------|
| A. Bolt | D. Spacer |
| B. Washers (2) | E. Washer |
| C. Clutch strap | F. Nut |

ENGINE

15. Feed the clutch wire through the hole in the engine base and install the rubber grommet (Fig. 0879).



Fig. 0879 IMG-0567a

16. Install the pump drive belt around the engine drive pulley, the two hydraulic pump pulleys and the idler pulley (Fig. 0880).



Fig. 0880 IMG-0568a

17. Install the extension spring from the idler bracket to the spring anchor bracket (Fig. 0881).

Note: On 2009 machines the extension spring hooks to the back of the engine base.



Fig. 0881 IMG-0496a

18. Install the 3 carriage bolts and 3 nuts securing the skid plate to the mower deck (Fig. 0882).

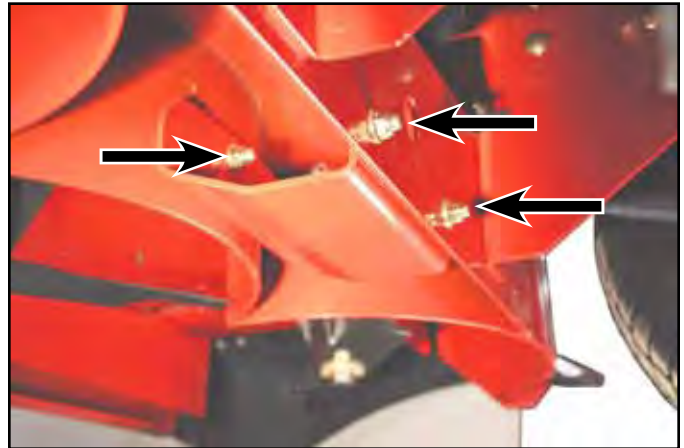


Fig. 0882 IMG-0503a

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19. Install the deck drive belt. Ensure the deck drive belt is routed properly around the mower deck pulleys. Refer to belt routing decal 117-0486 (Fig. 0883).



Fig. 0883

fig. 1 117-0486

20. With a spring tool, install the extension spring to the spring anchor bracket (Fig. 0884).



Fig. 0884

IMG-0487a

21. Install the right hand mower belt cover (Fig. 0885).



Fig. 0885

IMG-0485a

22. Hook the "Z" bend of the throttle cable into the throttle control lever and loosely clamp the outer housing of the throttle cable with the cable clamp (Fig. 0886).



Fig. 0886

IMG-0575a

ENGINE

23. Move the throttle lever to the “Fast” position (Fig. 0887).



Fig. 0887

DSC-4512a

25. Hook the “Z” bend of the choke cable into the choke control lever and loosely clamp the outer housing of the choke cable with the cable clamp (Fig. 0889).



Fig. 0889

IMG-0579a

24. With the engine throttle control lever in the “Fast” position, pull the slack from the cable jacket and tighten the throttle cable clamp (Fig. 0888).



Fig. 0888

IMG-0576a

26. Push the choke knob in so it is in the “Open” position (Fig. 0890).



Fig. 0890

DSC-4515a

5

27. While holding the engine choke control lever in the "Open" position, pull the slack from the cable jacket and tighten the choke cable clamp (Fig. 0891).



Fig. 0891

IMG-0584a

29. Make sure the muffler exhaust is centered in the muffler guard assembly, then tighten all four bolts and nuts (Fig. 0893).

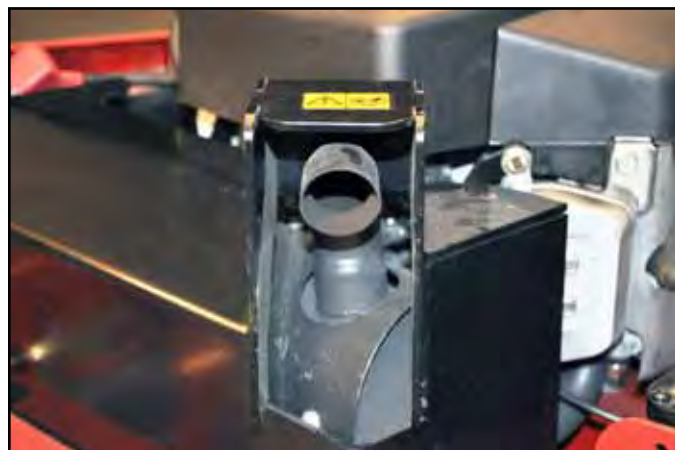


Fig. 0893

IMG-0589a

28. Position the muffler guard assembly and loosely install the four carriage bolts, two mounting guard brackets and nuts (Fig. 0892).

Note: 60" models have a guard panel, not the two guard mounting brackets

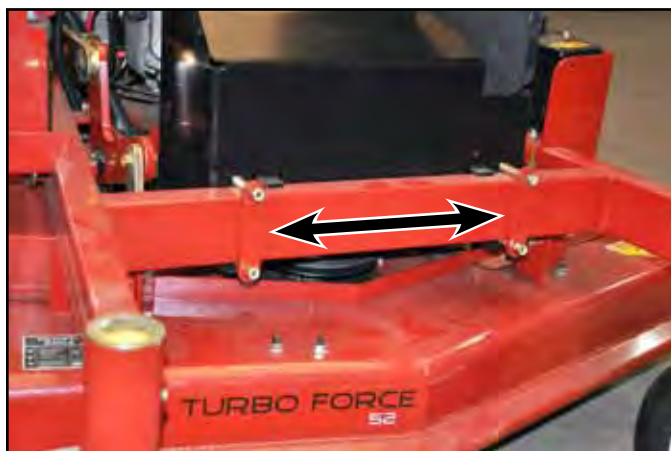


Fig. 0892

IMG-0586a

30. Connect the electric clutch plug to the wiring harness connector (Fig. 0894).



Fig. 0894

IMG-0474a

ENGINE

31. Install the battery ground wire and the wiring harness ground wire to the engine block (Fig. 0895).

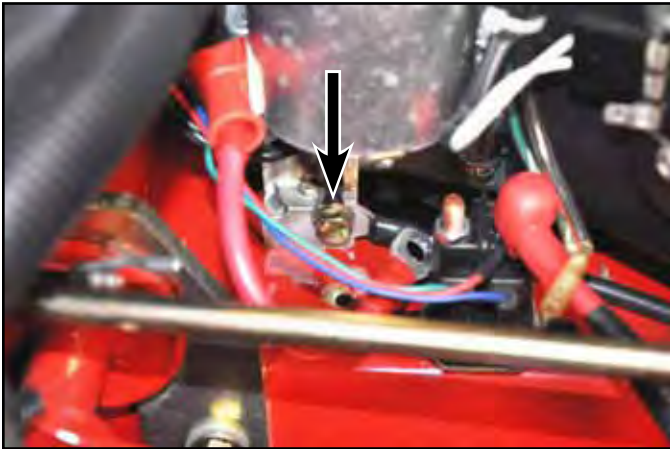


Fig. 0895 IMG-0593a

33. Connect the white wire to the black magneto wire (Fig. 0897).



Fig. 0897 IMG-0465a

32. Install the starter wire to the solenoid using a lock washer and nut (Fig. 0896).

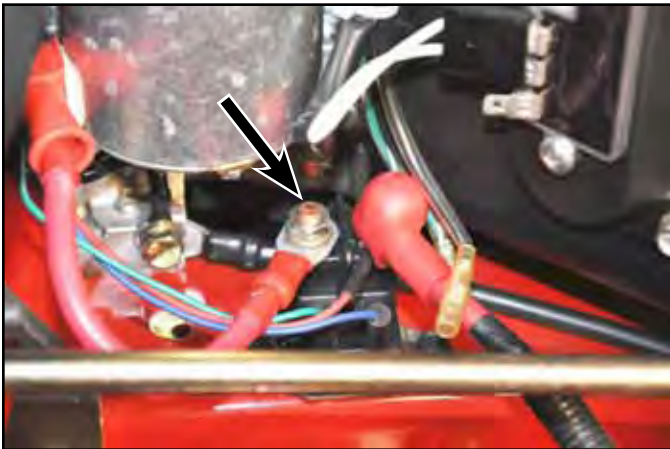


Fig. 0896 IMG-0594a

34. Connect the pink wire to the green fuel solenoid wire (Fig. 0898).



Fig. 0898 IMG-0464a

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35. Connect the violet wire to the voltage regulator (Fig. 0899).



Fig. 0899

IMG-0462a

36. Secure the fuel line to the fuel pump using the hose clamp (Fig. 0900).



Fig. 0900

IMG-0457a

37. Position the battery on the battery tray and using the bolt nut and washer, secure the positive battery cable to the battery. Using the bolt nut and washer, secure the negative battery cable to the battery (Fig. 0901).



Fig. 0901

IMG-0453a

38. Install the battery cover with the two hold down bolts and wing nuts (Fig. 0902).



Fig. 0902

IMG-0450a

ENGINE

39. Turn the fuel shutoff valve to the "ON" position (Fig. 0903).



Fig. 0903

DSC-4516a

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HYDRAULIC DRIVE SYSTEM

Pump Drive Belt Replacement

Pump Drive Belt Removal

1. Remove the RH belt cover (Fig. 0904).



Fig. 0904

IMG-0796a

2. Using a spring tool, remove the mower deck idler spring from the spring anchor (Fig. 0905).

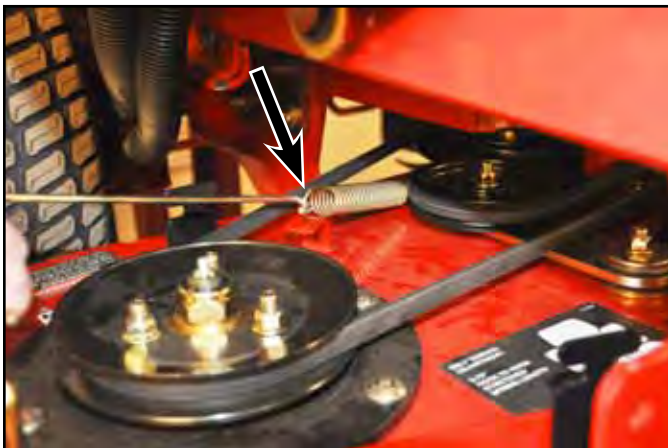


Fig. 0905

IMG-0797a

3. Remove the mower deck belt from around the clutch pulley (Fig. 0906).



Fig. 0906

IMG-0799a

4. Using a spring tool, remove the pump drive belt idler spring from the spring anchor (Fig. 0907).

Note: On 2009 machines, the idler spring is anchored to the back of the engine base.

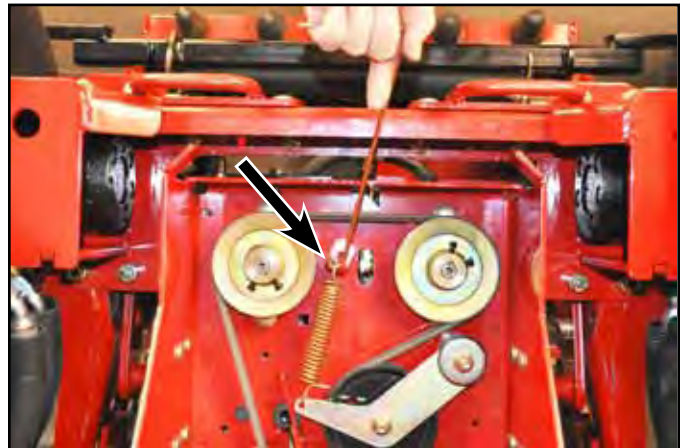


Fig. 0907

IMG-0801a

HYDRAULIC DRIVE SYSTEM

5. **2010 Only:** The spring anchor is held in place by spring tension. Once the spring is removed, the anchor can be removed (Fig. 0908).

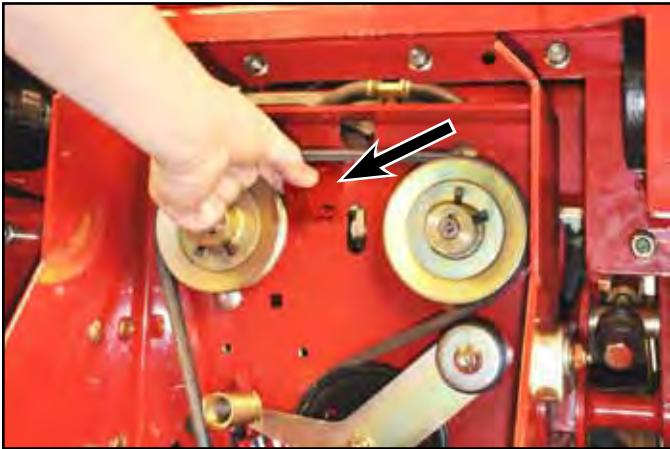


Fig. 0908

IMG-0803b

6. Remove the pump drive belt from around the engine and pump pulleys.

Pump Drive Belt Installation

1. Position the pump drive belt around the engine, idler and pump pulleys (Fig. 0909).

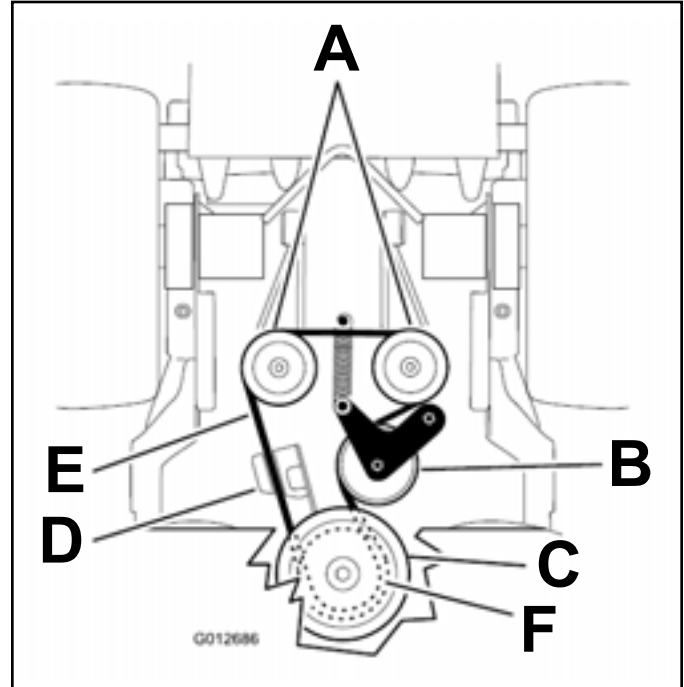


Fig. 0909

fig. 66 G012686

- | | |
|--------------------|--------------------|
| A. Hydraulic pumps | D. Clutch retainer |
| B. Idler pulley | E. Pump drive belt |
| C. Clutch pulley | F. Engine pulley |

HYDRAULIC DRIVE SYSTEM

2. **2010 Only:** Position the spring anchor into the engine base (Fig. 0910).



Fig. 0910

IMG-0803b

4. Place the mower deck belt around the clutch pulley (Fig. 0912).



Fig. 0912

IMG-0799a

3. Using a spring tool, secure the pump drive belt idler spring to the anchor (Fig. 0911).

Note: On 2009 machines, the idler spring is anchored to the back of the engine base.

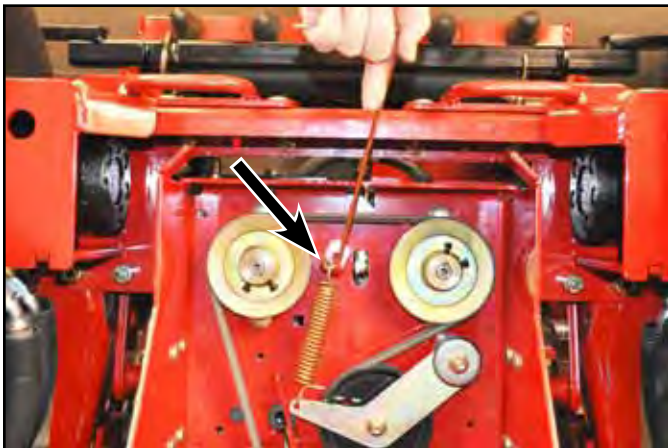


Fig. 0911

IMG-0801a

5. Using a spring removal tool, secure the mower deck idler spring to the spring anchor (Fig. 0913).

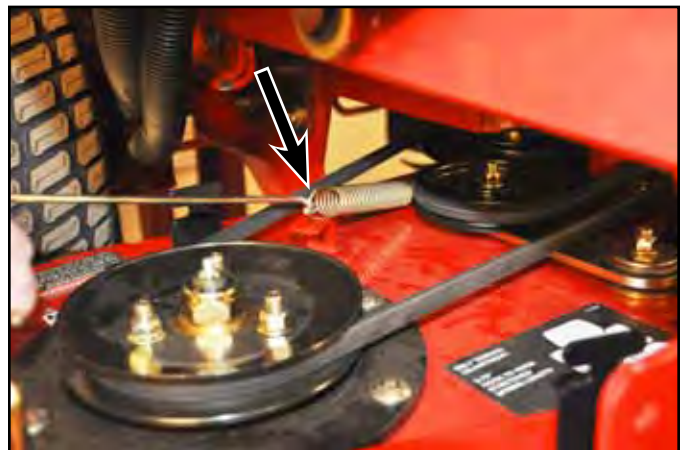


Fig. 0913

IMG-0797a

HYDRAULIC DRIVE SYSTEM

6. Install the RH belt cover (Fig. 0914).



Fig. 0914

IMG-0796a

Pump Drive Belt Idler Replacement

Pump Drive Belt Idler Removal

1. Using a spring tool, remove the pump drive belt idler spring from the spring anchor (Fig. 0915).

Note: On 2009 machines, the idler spring is anchored to the back of the engine base.

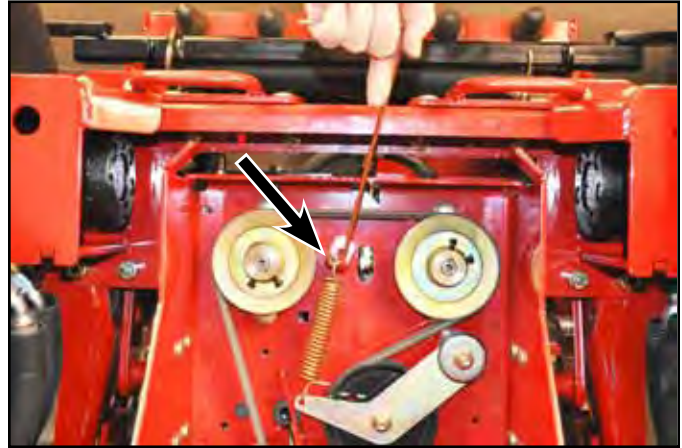


Fig. 0915

IMG-0801a

2. **2010 Only:** The spring anchor is held in place by spring tension. Once the spring is removed, the anchor can be removed (Fig. 0916).

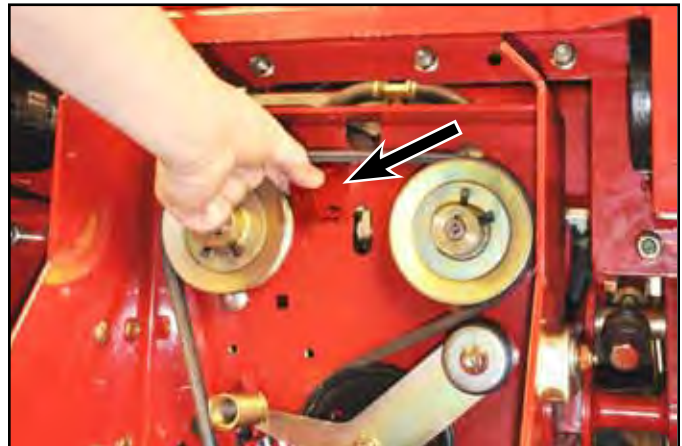


Fig. 0916

IMG-0803b

HYDRAULIC DRIVE SYSTEM

3. Remove the idler spring from the idler plate (Fig. 0917).



Fig. 0917

IMG-0804a

5. Remove the bolt and nut securing the idler assembly to the engine base, then remove the assembly (Fig. 0919).

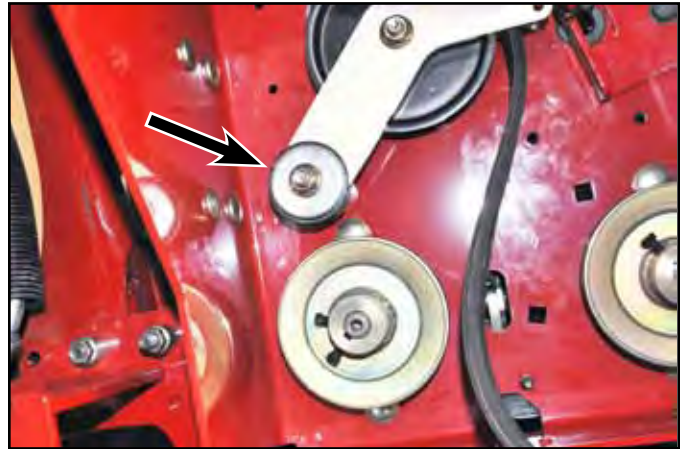


Fig. 0919

IMG-0806a

4. Remove the belt from around the pump and idler pulleys (Fig. 0918).



Fig. 0918

IMG-0805a

6. Remove the large spacer, two friction composite washers, spacer and washer (Fig. 0920).

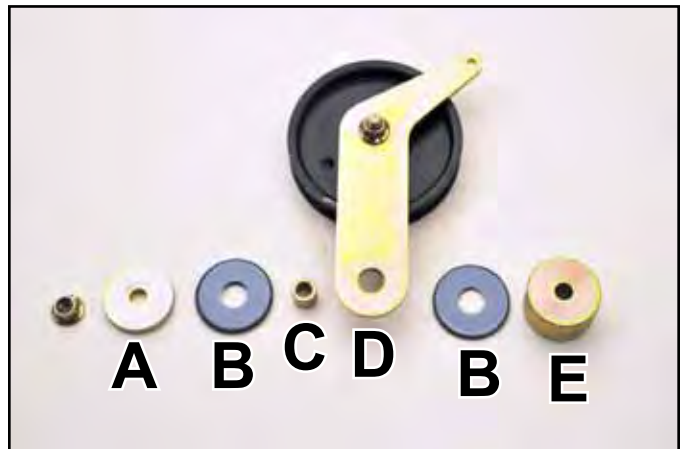


Fig. 0920

IMG-0808a

- | | |
|----------------------------------|-----------------|
| A. Steel washer | C. Bushing |
| B. Friction composite washer (2) | D. Idler plate |
| | E. Large spacer |

6

HYDRAULIC DRIVE SYSTEM

- Remove the bolt, washers and nut securing the idler pulley to the idler plate (Fig. 0921).

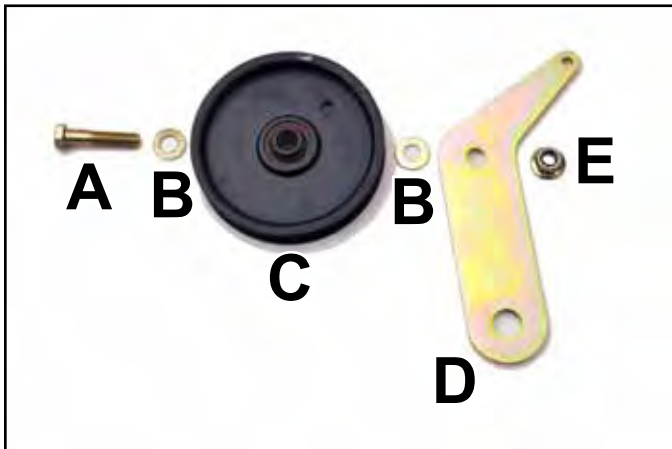


Fig. 0921

IMG-0810a

- A. Bolt
- B. Washer (2)
- C. Idler pulley
- D. Idler plate
- E. Nut

Pump Drive Belt Idler Installation

- Secure the idler pulley to the idler plate using bolt, washers and nut (Fig. 0922).

Note: The pulley hub needs to face the idler plate.

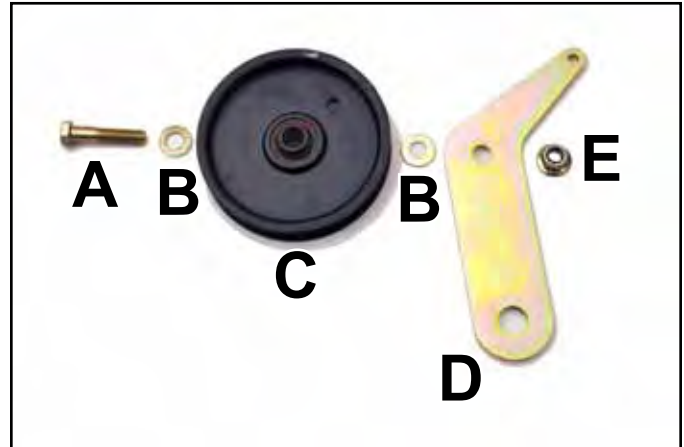


Fig. 0922

IMG-0810a

- A. Bolt
- B. Washer (2)
- C. Idler pulley
- D. Idler plate
- E. Nut

- Insert the pivot bolt through the engine base (Fig. 0923).



Fig. 0923

IMG-0814a

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HYDRAULIC DRIVE SYSTEM

3. Place the large spacer, one friction composite washer and bushing onto the pivot bolt (Fig. 0924).



Fig. 0924

IMG-0818a

5. Place one friction composite washer and steel washer onto the pivot bolt (Fig. 0926).



Fig. 0926

IMG-0820a

4. Place the idler assembly onto the pivot bolt (Fig. 0925).



Fig. 0925

IMG-0819a

6. Secure the idler assembly with a nut (Fig. 0927).



Fig. 0927

IMG-0806a

HYDRAULIC DRIVE SYSTEM

7. Position the pump drive belt around the engine, idler and pump pulleys (Fig. 0928).

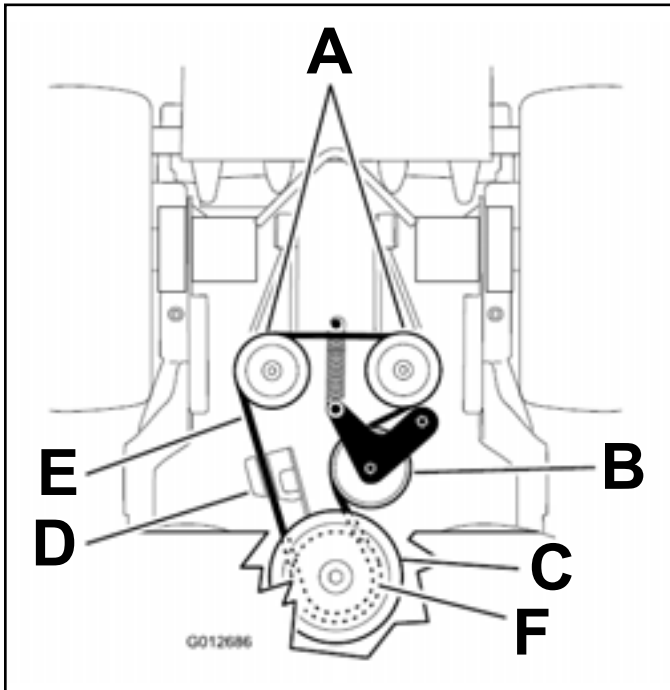


Fig. 0928

fig. 66 G012686

- | | |
|--------------------|--------------------|
| A. Hydraulic pumps | D. Clutch retainer |
| B. Idler pulley | E. Pump drive belt |
| C. Clutch pulley | F. Engine pulley |

8. **2010 Only:** Position the spring anchor into the engine base (Fig. 0929).

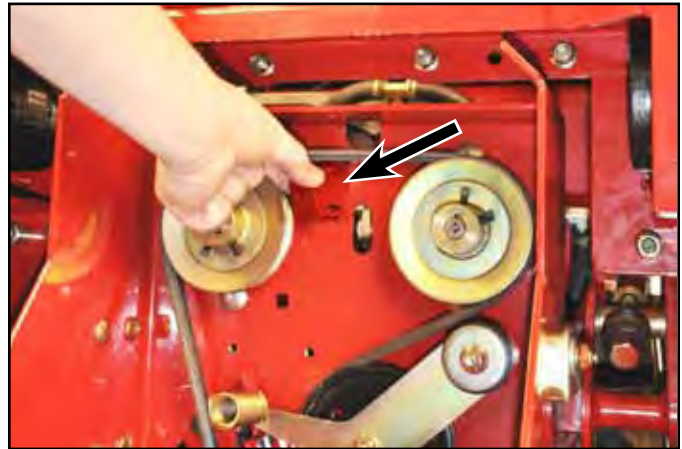


Fig. 0929

IMG-0803b

9. Using a spring tool, secure the pump drive belt idler spring to the anchor (Fig. 0930).

Note: On 2009 machines, the idler spring is anchored to the back of the engine plate.

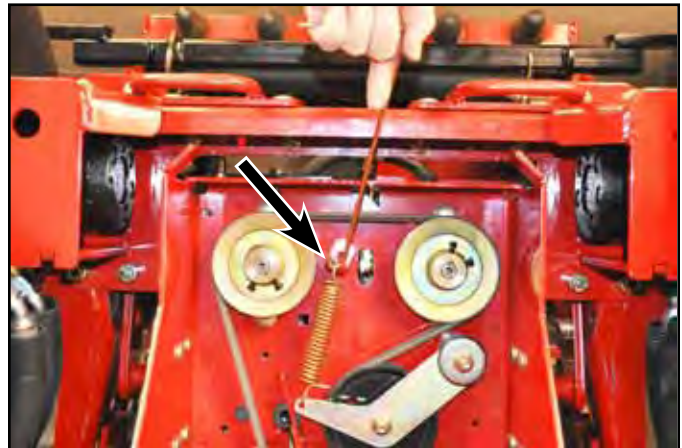


Fig. 0930

IMG-0801a

6

HYDRAULIC DRIVE SYSTEM

Left Hydraulic Pump Replacement

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

Upon removal, all seals, o-rings, and gaskets should be replaced. During installation, lightly lubricate all seals, o-rings, and gaskets with clean petroleum jelly prior to assembly.

5. Remove the pump belt from around the pump pulleys (Fig. 0932).



Fig. 0932

IMG-9274a

Left Hydraulic Pump Removal

1. Turn the engine off and remove the key from the ignition.
2. Set the parking brake.
3. Raise and support the machine.
4. Using a spring tool (Toro Part No. 92-5771), remove the pump idler extension spring (Fig. 0931).

Note: 2010 machines have the end of the extension spring connected to an anchor, not the back side of the engine base.

6. Remove the 2 set screws from the left pump pulley (Fig. 0933).

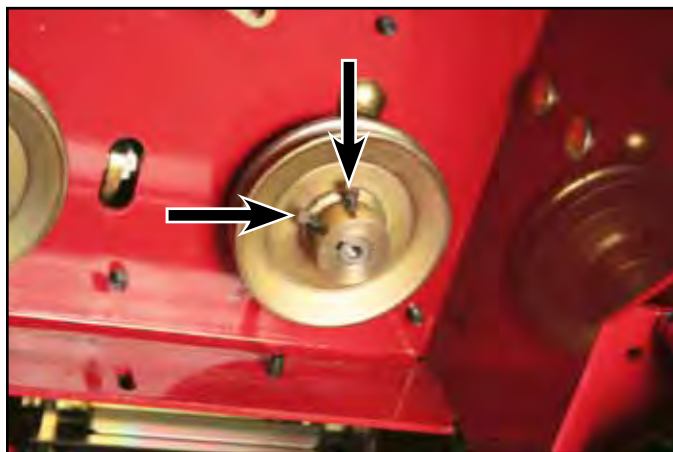


Fig. 0933

IMG-9275a



Fig. 0931

IMG-9273a

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HYDRAULIC DRIVE SYSTEM

7. Remove the left pump pulley from the pump shaft (Fig. 0934).



Fig. 0934

IMG-9465a

8. Remove the key from the pump shaft keyway (Fig. 0935).



Fig. 0935

IMG-9277a

9. Lower the machine to the ground.

10. Lower the operator cushion assembly and lay it on the platform.

11. Turn the fuel shut-off valve to the OFF position (Fig. 0936).



Fig. 0936

IMG-9283a

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HYDRAULIC DRIVE SYSTEM

12. Siphon the fuel from the fuel tank:

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

- A. Clean around the fuel cap to prevent debris from getting into the fuel tank.
- B. Remove the fuel cap.
- C. Insert a siphon pump hose into the fuel tank (Fig. 0937).



Fig. 0937

IMG-9592a

- D. Using the siphon pump, transfer the fuel into a clean gas can.
- E. Wipe up any spilled fuel.

13. **2009 only:** Remove the 90 degree fuel line vent fitting from the fuel tank (Fig. 0938).



Fig. 0938

IMG-9299a

14. **2009 only:** Remove the rubber grommet from the fuel tank (Fig. 0939).



Fig. 0939

IMG-9530a

HYDRAULIC DRIVE SYSTEM

15. Slide the hose clamp back from the fuel tank fitting. Slide the fuel line off the fuel tank fitting (Fig. 0940).

Note: There may be some fuel leakage.

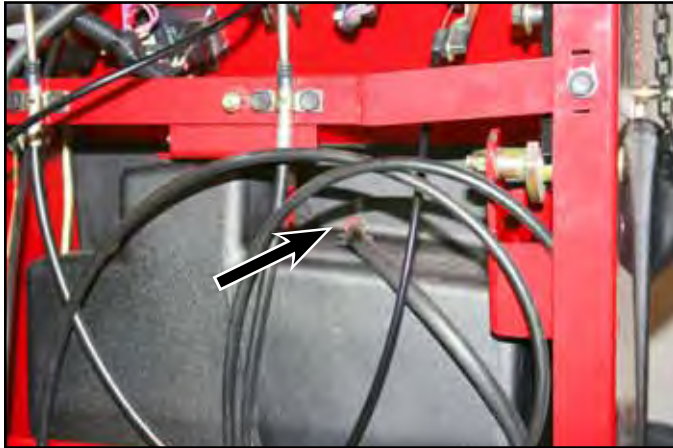


Fig. 0940

IMG-9292a

17. **2009 only:** Remove the fuel tank support bracket (Fig. 0942).

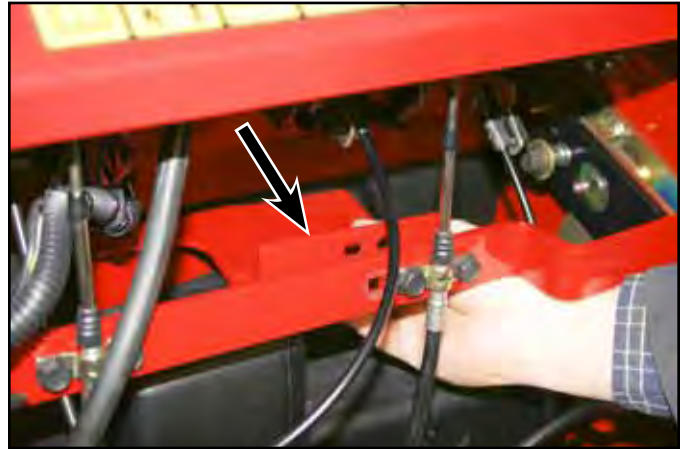


Fig. 0942

IMG-9305a

16. **2009 only:** Remove the carriage bolt and nut securing the fuel tank support to the frame bracket (Fig. 0941).



Fig. 0941

IMG-9304a

18. **2010 only:** Remove the fuel vent hose from the tank fitting (Fig. 0943).



Fig. 0943

IMG-0896a

HYDRAULIC DRIVE SYSTEM

19. **2010 only:** Remove the four self-tapping screws securing the tank bracket to the control tower (Fig. 0944).

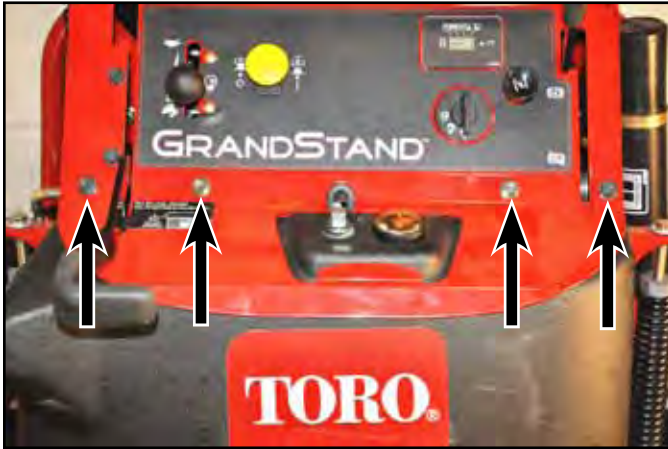


Fig. 0944

IMG-0897a

20. Position the deck height adjustment to 1" (2.54cm) (Fig. 0945).

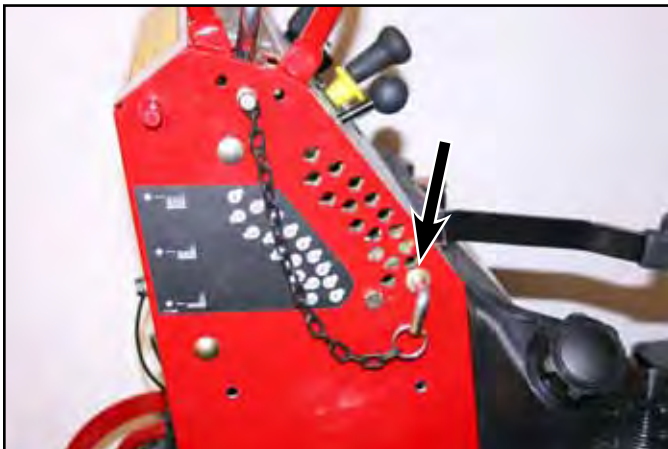


Fig. 0945

IMG-9306a

21. Remove the fuel tank from the machine (Fig. 0946).



Fig. 0946

IMG-9307a

22. Remove the 3 push cable ties by driving them through the tower frame (Fig. 0947).

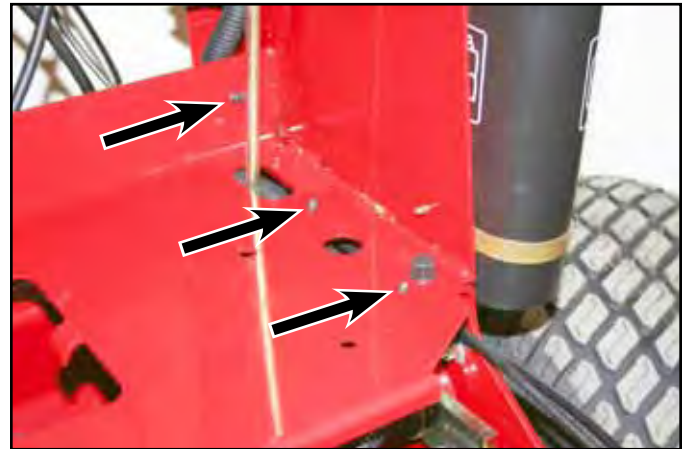


Fig. 0947

IMG-9314a

HYDRAULIC DRIVE SYSTEM

23. Loosen the bolt and nut securing the strike plate to the tower two full turns to gain access to the bolt below it (Fig. 0948).



Fig. 0948

IMG-9316a

25. Raise the deck to the transport position and secure the deck in position with straps (Fig. 0950).



Fig. 0950

IMG-9339a

24. Remove the bolt and nut securing the fuel line r-clamp to the frame (Fig. 0949).



Fig. 0949

IMG-9329a

26. Raise and support the machine.

27. **2009 only:** Remove the lock nut from the lower end of the lift bar (Fig. 0951).

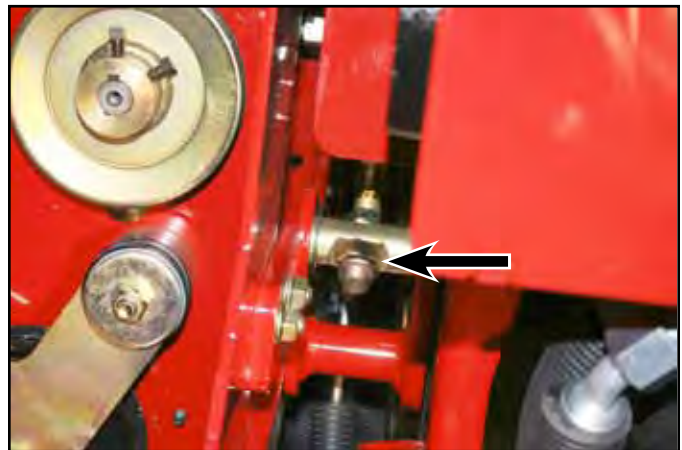


Fig. 0951

IMG-9344a

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HYDRAULIC DRIVE SYSTEM

28. **2010 only:** Remove the nut securing the lift dampener assembly to the base of the HOC lift bar (Fig. 0952).



Fig. 0952

IMG-0901a

30. Remove the hairpin cotter from the top end of the parking brake rod. Slide the top end of the rod out of the handle (Fig. 0954).

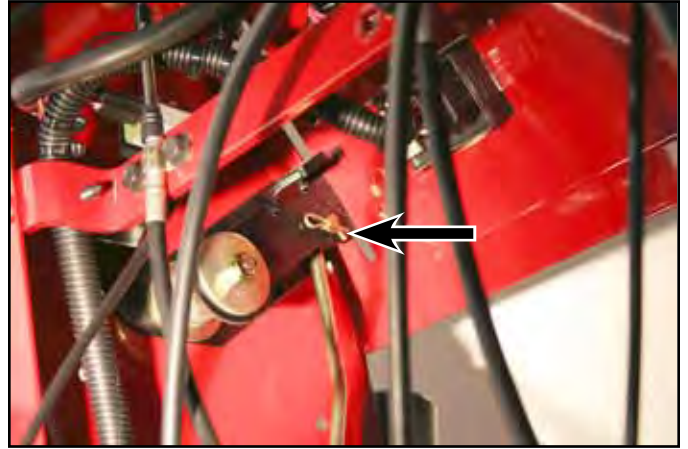


Fig. 0954

IMG-9347a

29. **2010 only:** Remove the adjustment bolt and washer from the upper end of the lift assist springs on both sides of the control tower (Fig. 0953).

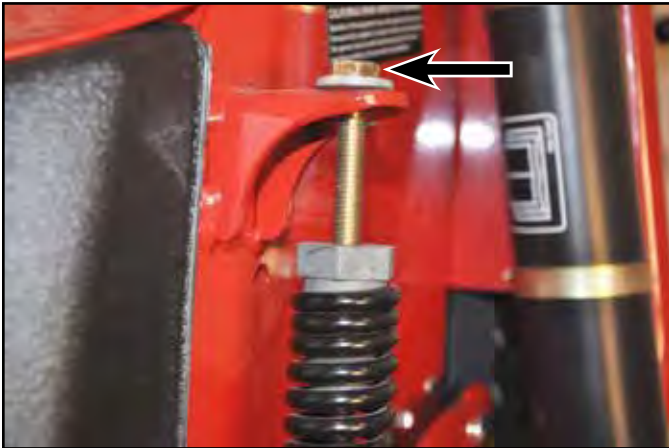


Fig. 0953

IMG-0902a

Note: 2010 models use a nut to secure the upper end of the parking brake rod (Fig. 0955).



Fig. 0955

DSCN-0261a

HYDRAULIC DRIVE SYSTEM

31. Remove the nuts from the 4 self-tapping screws securing the tower to the frame (Fig. 0956).

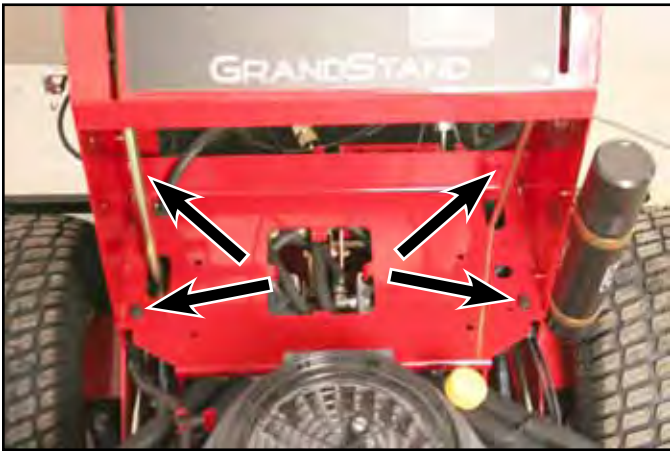


Fig. 0956

IMG-9516a

33. Remove the spring clip from the drive linkage mount (Fig. 0958).



Fig. 0958

IMG-9350a

32. Remove the 4 self-tapping screws securing the tower to the frame (Fig. 0957).

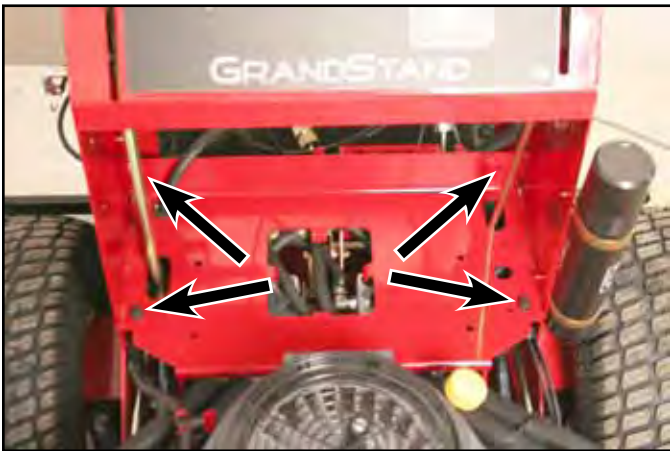


Fig. 0957

IMG-9516a

34. Remove the 2 traction control cables from the drive linkage mount slots (Fig. 0959).



Fig. 0959

IMG-9351a

6

HYDRAULIC DRIVE SYSTEM

35. Lift the tower assembly up off the frame and lay it back as shown, taking care that the lift bar is routed out from under the right hand lift cylinder and the brake rod is routed out from under the control panel (Fig. 0960).

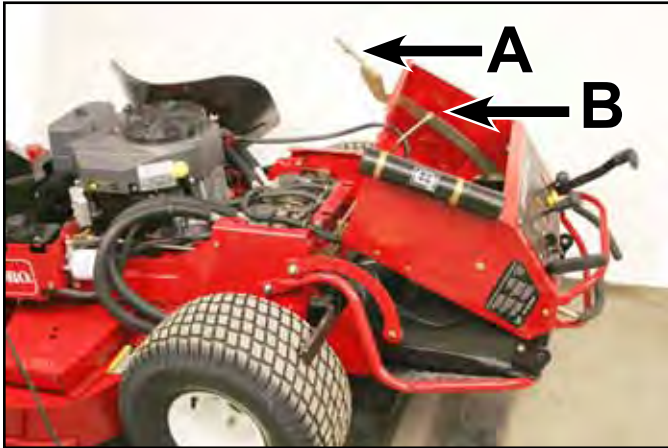


Fig. 0960

IMG-9352a

A. Lift rod

B. Brake rod

36. Remove the cable tie securing the wire harness and 2 low pressure hydraulic hoses (Fig. 0961).



Fig. 0961

IMG-9354a

37. **2009 only:** Remove the hairpin cotter and washer from the front end of the left hand shifter link rod (Fig. 0962).

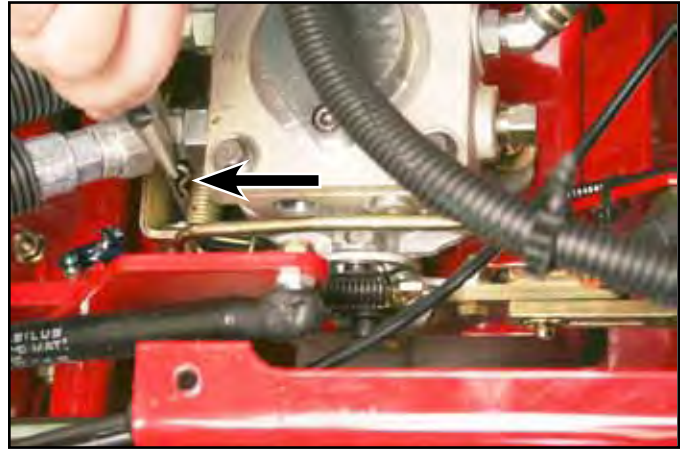


Fig. 0962

IMG-9358a

38. **2010 only:** Remove the bolt, nut, washers and spacer securing the LH shifter link to the shifter bracket (Fig. 0963).

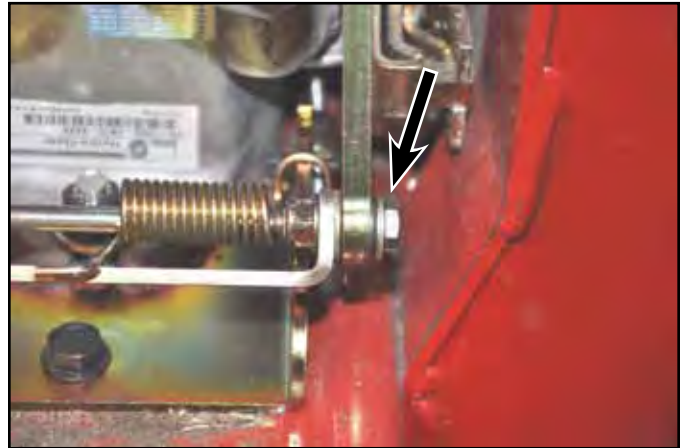


Fig. 0963

IMG-0904a

HYDRAULIC DRIVE SYSTEM

39. Remove the hairpin cotter and washer from the rear end of the left hand shifter link rod (Fig. 0964).

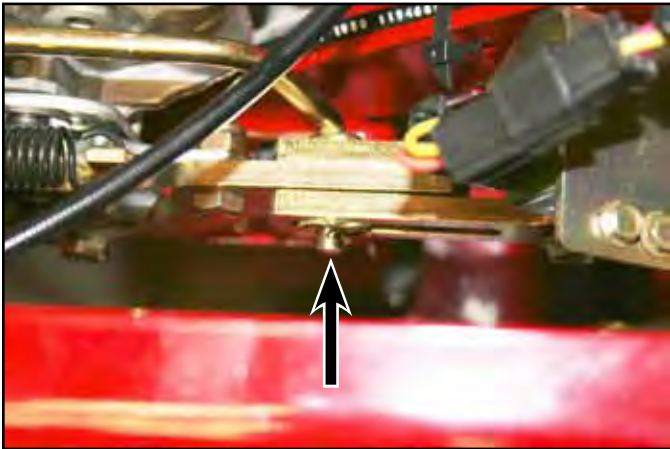


Fig. 0964

IMG-9361a

41. Serial range 290000210 - 290999999: Remove the front end of the left hand shifter link rod. There are 3 rollers located on the rear end of the left hand shifter link rod inside the control fork assembly. Slide the left hand roller off the rear end of the left hand shifter link rod (Fig. 0966).

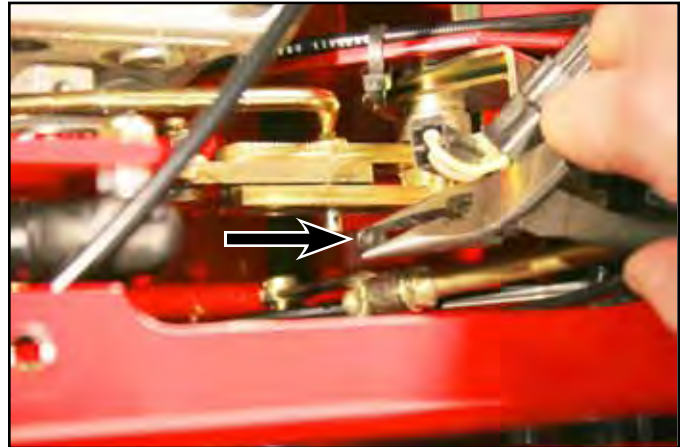


Fig. 0966

IMG-9365a

40. Serial range 290000001 - 290000209: Remove the left hand shifter link rod and the 3 rollers located on the rear end of the shifter rod inside the control fork assembly (Fig. 0965).

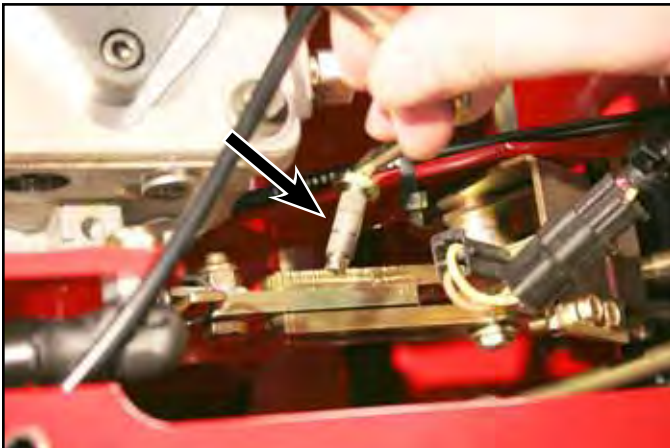


Fig. 0965

IMG-9373a

42. Serial range 290000210 - 290999999: Remove the rear end of the left hand shifter link rod and the right hand roller (Fig. 0967).



Fig. 0967

IMG-9367a

6

HYDRAULIC DRIVE SYSTEM

43. Serial range 290000210 - 290999999: Push down on the control fork assembly and remove the center roller from the pump control arm slot (Fig. 0968).

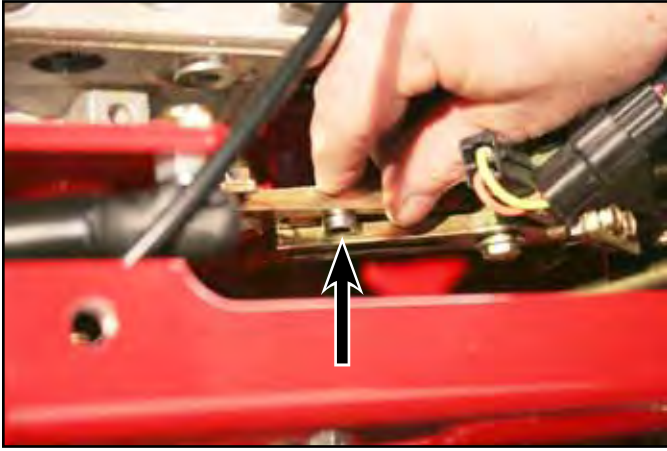


Fig. 0968

IMG-9371a

44. **2010 only**: Remove the LH shifter link and the 3 rollers located on the rear end of the shifter link inside of the control fork assembly (Fig. 0969).



Fig. 0969

IMG-0936a

Shifter Link and Roller Configurations (Fig. 0970):

- A. **2009**: Serial range 290000001-290000210: 3 rollers, all thin and same size
- B. **2009**: Serial range 290000211-290999999: 3 rollers, large center roller
- C. **2010**: Serial range 310000001-310999999: 3 rollers, all large and same size

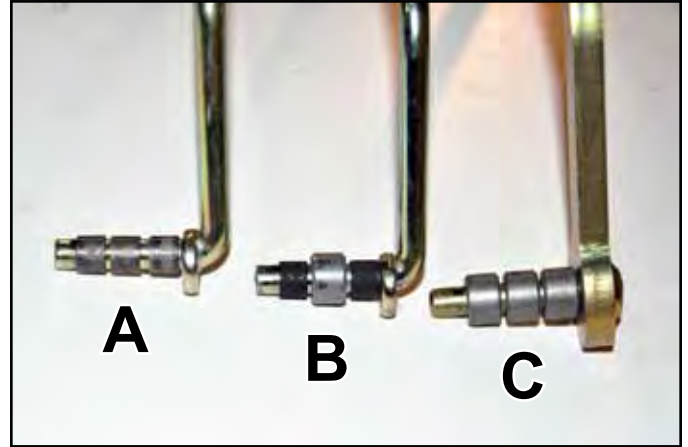


Fig. 0970

IMG-0941a

45. Mark the hydraulic pump, fittings and lines (Fig. 0971):

- 1) Charge line
- 2) Return line
- 3) High pressure hose
- 4) High pressure hose

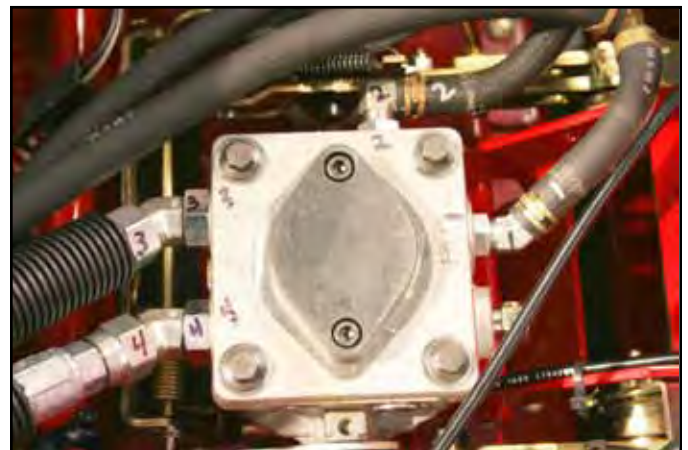


Fig. 0971

IMG-9378a

HYDRAULIC DRIVE SYSTEM

46. Slide the hose clamp back from the fitting and remove the charge line (Fig. 0972).

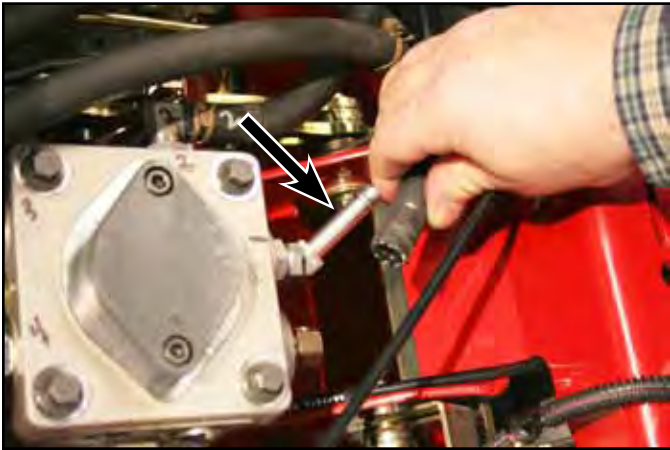


Fig. 0972

IMG-9380a

48. Remove the 2 high pressure hoses (Fig. 0974).



Fig. 0974

IMG-9383a

47. Slide the hose clamp back from the fitting and remove the return line (Fig. 0973).

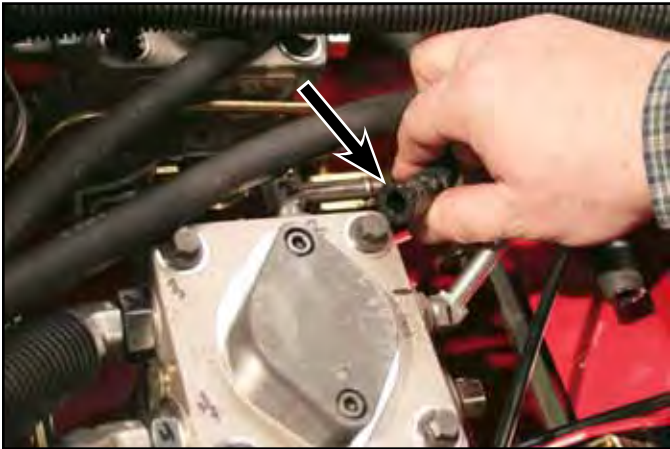


Fig. 0973

IMG-9381a

49. Remove the 2 carriage bolts, nuts, and washers securing the pump to the frame (Fig. 0975).



Fig. 0975

IMG-9386a

HYDRAULIC DRIVE SYSTEM

50. Remove the left hand pump (Fig. 0976).



Fig. 0976

IMG-9387a

52. If you are servicing the pump, refer to the Hydro-Gear P Series Hydrostatic Pumps Service and Repair Manual (Form No. BLN 52503).

53. If you are installing a new pump, transfer all markings and all 4 fittings to the new pump (Fig. 0978).



Fig. 0978

IMG-9394a

51. Remove the 2 bolts and nuts securing the pump control arm to the pump. Remove the pump control arm (Fig. 0977).

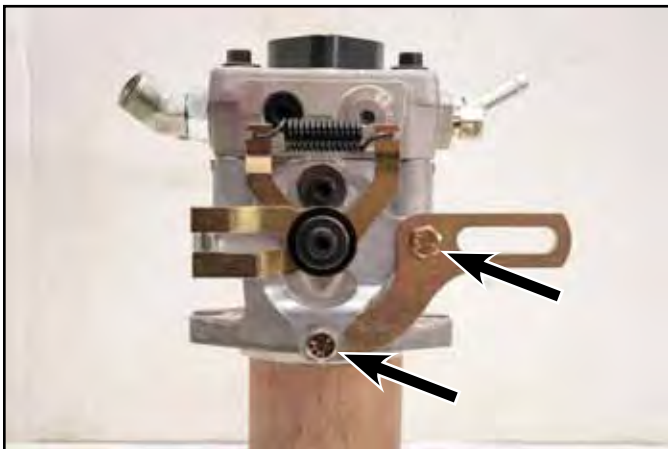


Fig. 0977

IMG-9391a

HYDRAULIC DRIVE SYSTEM

Left Hydraulic Pump Installation

1. Position the Pump Control Arm to the pump linkage and install 2 bolts and nuts to secure (Fig. 0979).

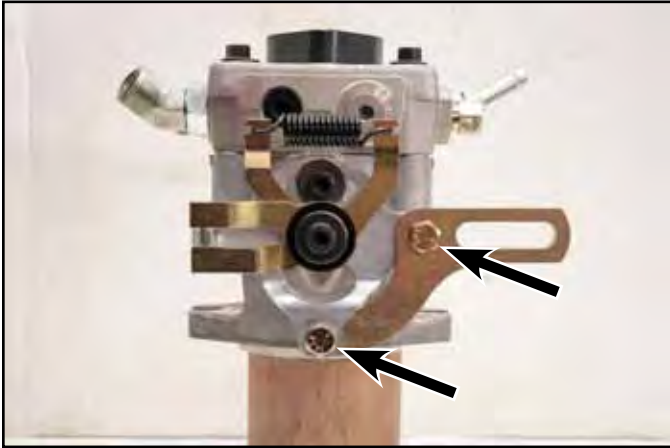


Fig. 0979

IMG-9391a

2. Position the left hand pump into the frame. Align the mounting flange on the pump with the mounting holes in the frame (Fig. 0980).

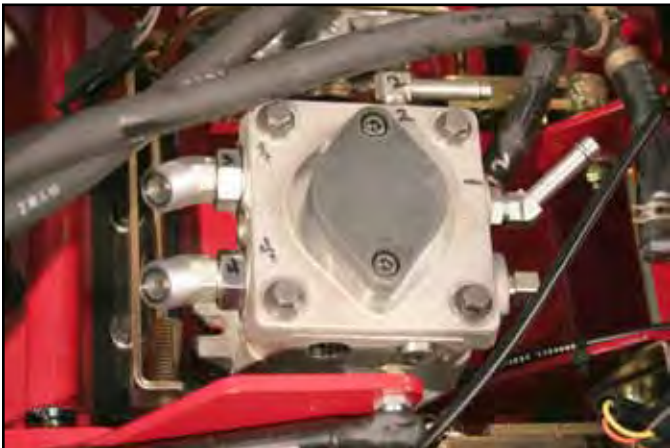


Fig. 0980

IMG-9395a

3. Install 2 carriage bolts, nuts and washers securing the pump to the frame (Fig. 0981).



Fig. 0981

IMG-9386a

4. Install the hoses/fittings to the fittings located on the pump. Ensure the markings on the hoses match the markings on the fittings/pump:
 - a. Install the high pressure hoses (Fig. 0982)



Fig. 0982

IMG-9383a

HYDRAULIC DRIVE SYSTEM

- b. Install the return line and secure with the hose clamp (Fig. 0983)



Fig. 0983

IMG-9397a

- c. Install the charge line and secure with the hose clamp (Fig. 0984)



Fig. 0984

IMG-9398

Shifter Link and Roller Configurations (Fig. 0985):

- A. **2009:** Serial range 290000001-290000210; 3 rollers, all thin and same size
- B. **2009:** Serial range 290000211-290999999; 3 rollers, large center roller
- C. **2010:** Serial range 310000001-310999999; 3 rollers, all large and same size

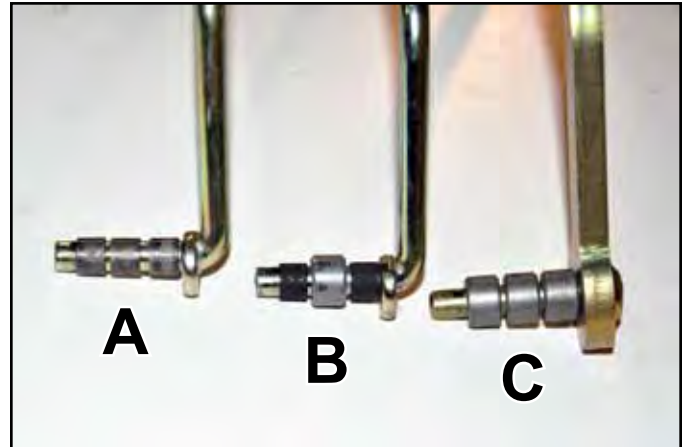


Fig. 0985

IMG-0941a

5. Serial range 290000001 - 290000209: Slide 3 rollers onto the rear end of the left hand shifter link rod. Slide the rear end of the shifter link rod (with 3 rollers) into the control fork assembly (Fig. 0986).

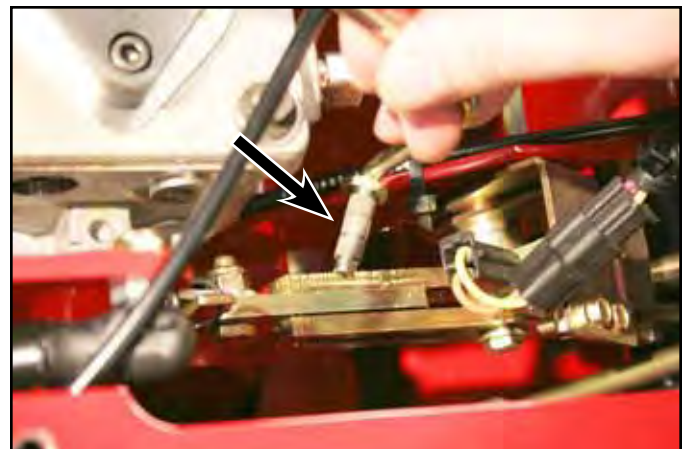


Fig. 0986

IMG-9373a

6

HYDRAULIC DRIVE SYSTEM

6. Serial range 290000210 - 290999999: Push down on the control fork assembly and slide the center roller into the slot of the pump control arm (Fig. 0987).

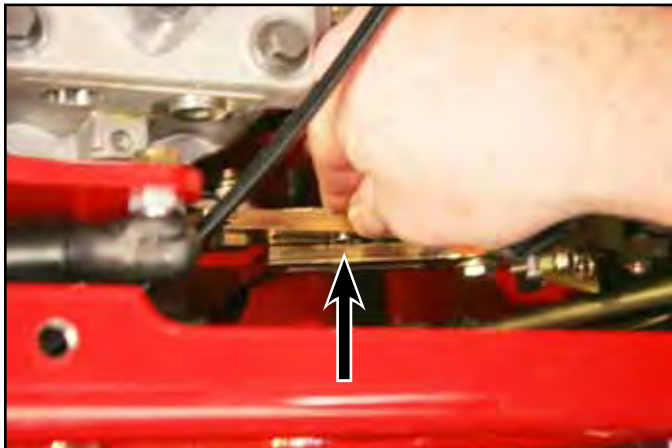


Fig. 0987

IMG-9400

8. Serial range 290000210 - 290999999: Slide the right hand roller onto the rear end of the left hand shifter link rod. Slide the rear end of the shifter link rod (with roller) through the control fork assembly following the Allen wrench through to capture the center roller on the shifter link rod (Fig. 0989).

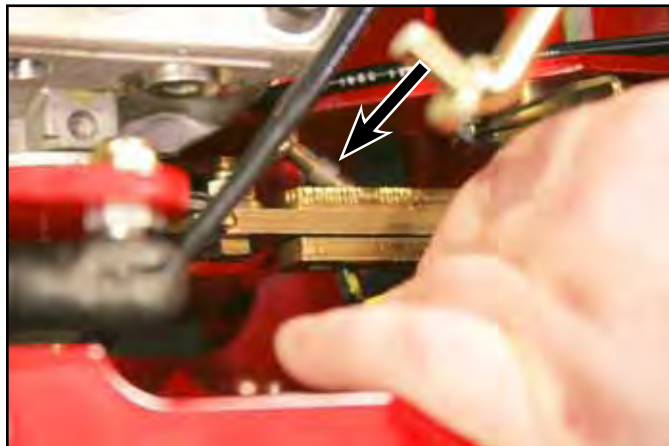


Fig. 0989

IMG-9407a

7. Serial range 290000210 - 290999999: Using an Allen wrench as a pilot, locate the center roller and slide the Allen wrench through it (Fig. 0988).



Fig. 0988

IMG-9405

9. Serial range 290000210 - 290999999: Slide the left hand roller onto the rear end of the left hand shifter link rod and into the outside of the control fork assembly (Fig. 0990).

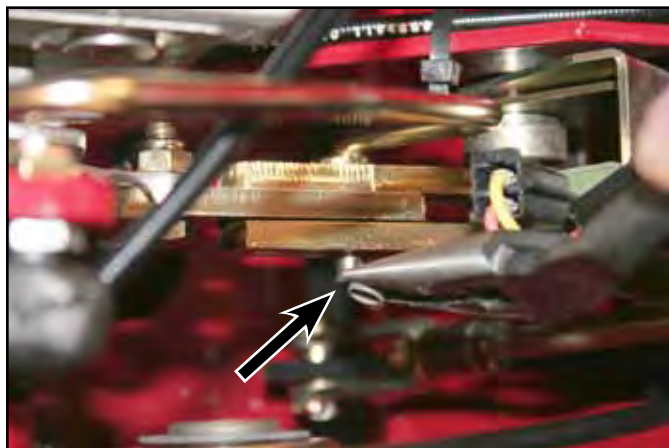


Fig. 0990

IMG-9410

6

HYDRAULIC DRIVE SYSTEM

10. **2010 only:** Slide 3 rollers onto the rear end of the left hand shifter link. Slide the rear end of the shifter link (with three rollers) into the control fork assembly (Fig. 0991).



Fig. 0991

IMG-0936a

12. **2009 only:** Slide the front end of the left hand shifter link rod into the left side of the dual shifter arm. Slide a washer onto the front end of the shifter link rod. Install a hairpin to secure (Fig. 0993).

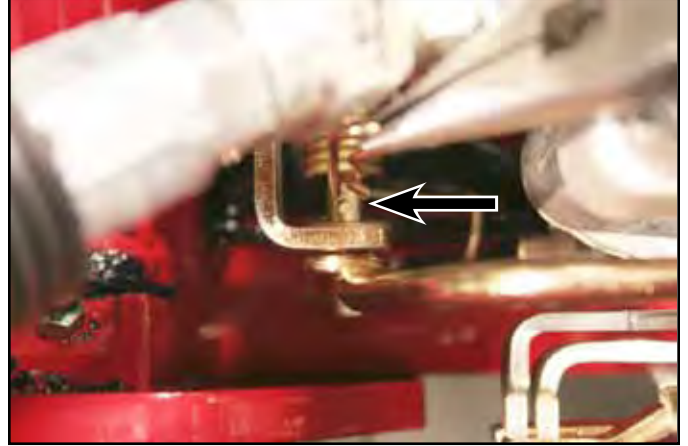


Fig. 0993

IMG-9415a

11. Slide a washer onto the rear end of the shifter link rod. Install a hairpin cotter to secure (Fig. 0992).

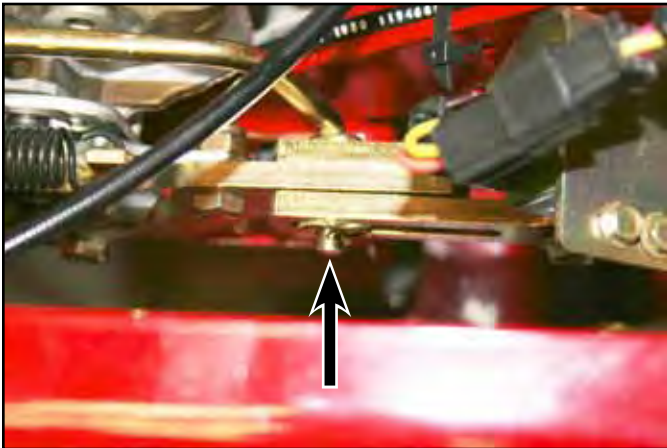


Fig. 0992

IMG-9361a

13. **2010 only:** Place a spacer into the front end of the shifter link (Fig. 0994).



Fig. 0994

IMG-0946a

6

HYDRAULIC DRIVE SYSTEM

14. **2010 only:** Secure the shifter link to the shifter bracket with a bolt two washers and nut (Fig. 0995).

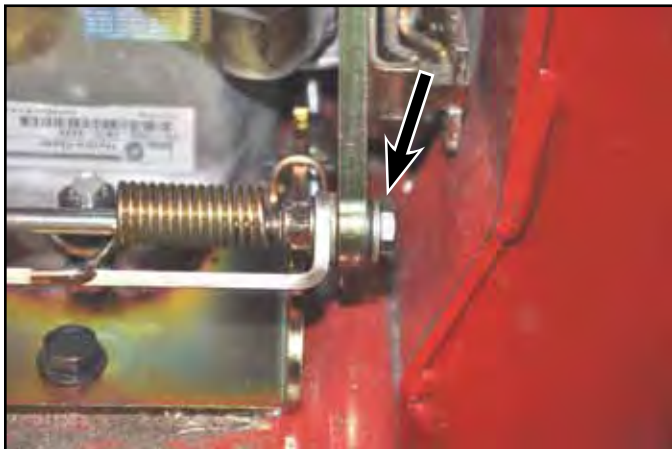


Fig. 0995

IMG-0904a

15. Install a cable tie securing the wire harness and 2 low pressure hydraulic hoses (Fig. 0996).



Fig. 0996

IMG-9501a

16. Lift the tower assembly up and lower it onto the frame, taking care that the lift bar is routed between the right hand lift cylinder and the RH Lift Rod assembly. Also ensure the top end of the brake rod is routed under the control panel and up to the brake handle lever (Fig. 0997).



Fig. 0997

IMG-9513a

17. Align the tower and frame mounting holes. Install 4 self-tapping screws to secure the tower to the frame (Fig. 0998).

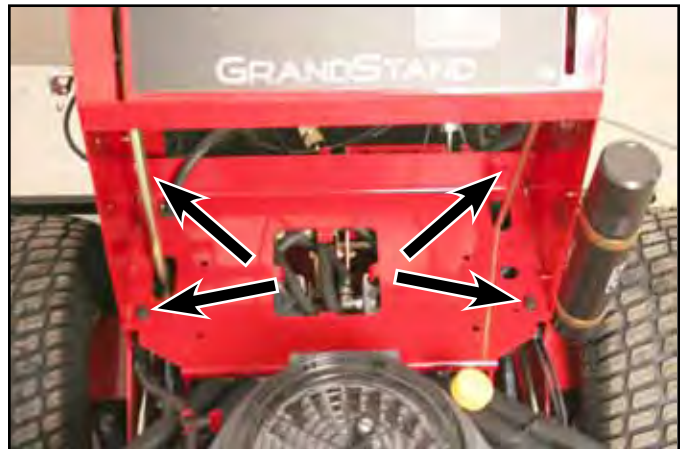


Fig. 0998

IMG-9516a

HYDRAULIC DRIVE SYSTEM

18. Position the choke cable R-clamp onto the self-tapping screw located on the left hand rear corner where the tower meets the main frame. Install a nut to secure (Fig. 0999).



Fig. 0999

PICT-8609a

20. Install 3 push cable ties through the holes located in the base of the tower (Fig. 1001).

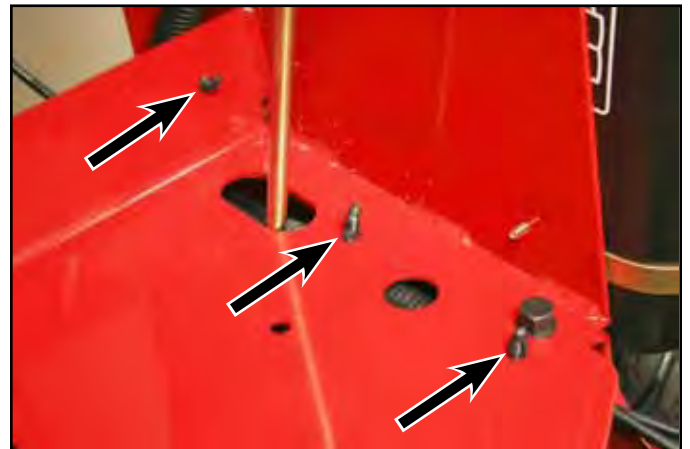


Fig. 1001

IMG-9524a

19. Install 3 nuts to the remaining 3 self-tapping screws securing the tower to the frame (Fig. 1000).

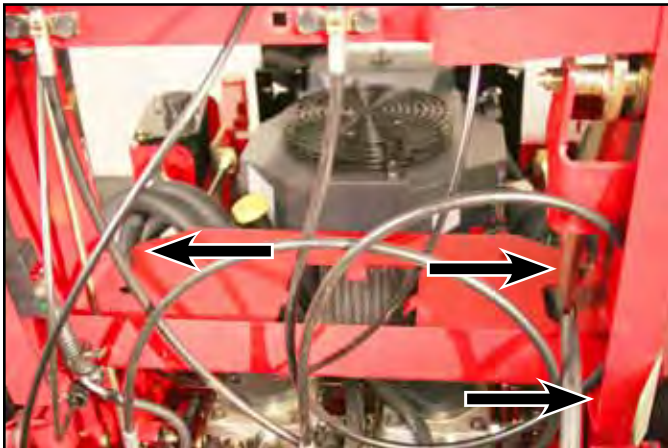


Fig. 1000

IMG-9338a

HYDRAULIC DRIVE SYSTEM

21. Slide the top end of the brake rod into the brake handle. Install a hairpin cotter to secure the top end of the parking brake rod to the brake handle (Fig. 1002).

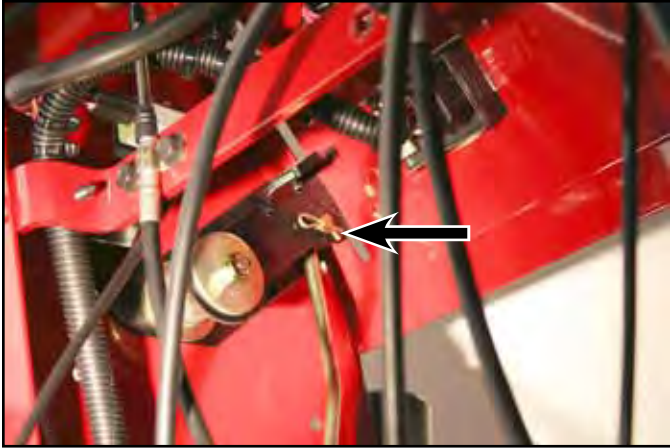


Fig. 1002 IMG-9347

Note: 2010 models use a nut to secure the upper end of the parking brake rod (Fig. 1003).



Fig. 1003 DSCN-0261a

22. Position the fuel line r-clamp to the frame and install a bolt and nut to secure (Fig. 1004).

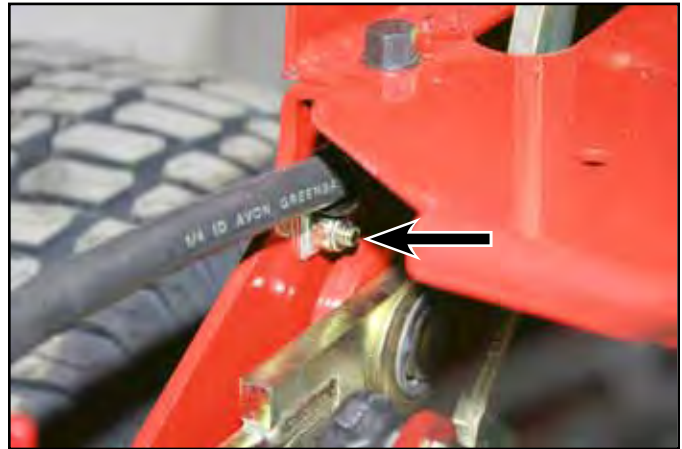


Fig. 1004 IMG-9329a

23. Tighten the bolt and nut through the lower mounting holes securing the strike plate to the tower (Fig. 1005).



Fig. 1005 IMG-9316a

HYDRAULIC DRIVE SYSTEM

24. Slide the 2 traction control cables into the drive linkage mount slots (Fig. 1006).



Fig. 1006

IMG-9351a

26. **2010 only:** Secure the upper end of the lift assist springs to the control tower with the adjustment screw and washer (Fig. 1008).

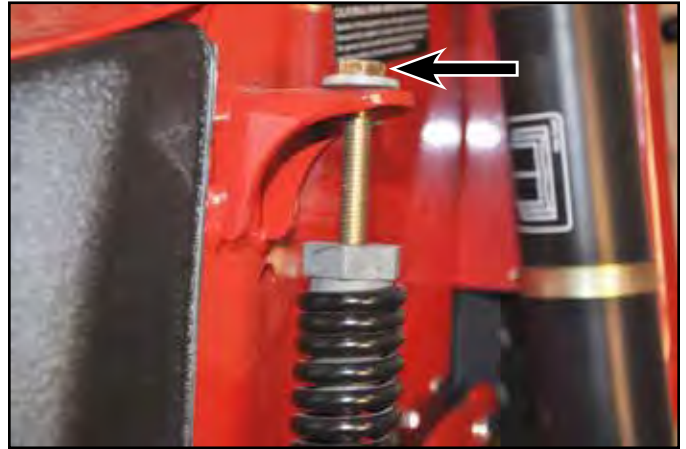


Fig. 1008

IMG-0902a

25. Install the spring clip into the drive linkage mount (Fig. 1007).



Fig. 1007

IMG-9350a

27. **2010 only:** Adjust the gap between the upper spring bracket and the top of the spring nut insert (Fig. 1009).

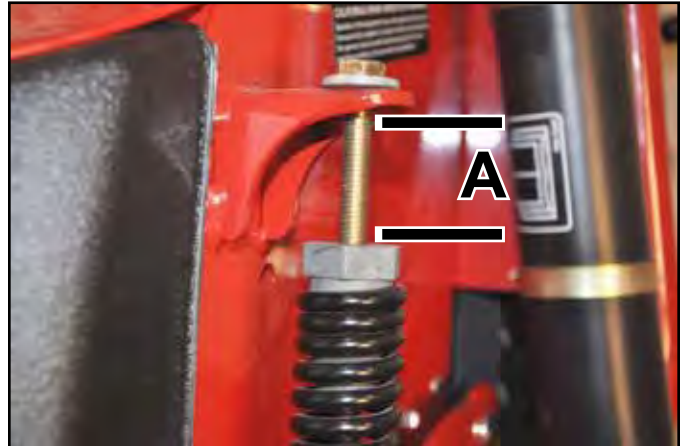


Fig. 1009

IMG-0902a

A. 1.5" (3.8cm) for 60" decks
2" (5cm) for 48" & 52" decks

6

HYDRAULIC DRIVE SYSTEM

28. **2009 only:** Install a lock nut onto the lower end of the lift bar securing it to the height-of-cut pin (Fig. 1010).

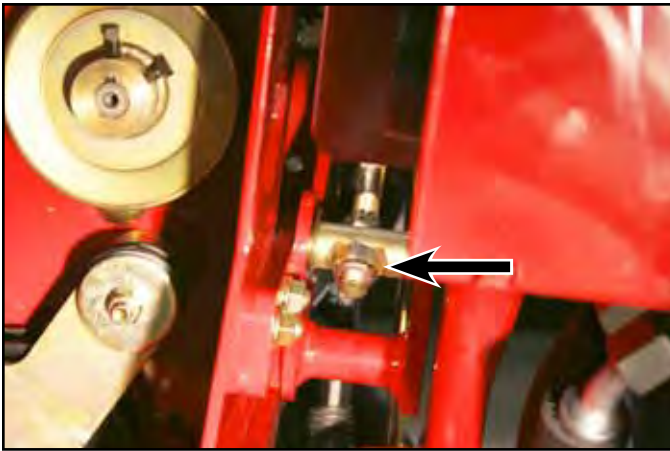


Fig. 1010

IMG-9345a

30. Lower the machine.

31. Remove the straps securing the mower deck (Fig. 1012). Lower the deck to the 1" (2.54cm) height-of-cut position (Fig. 1012 and Fig. 1013).



Fig. 1012

IMG-9339a

29. **2010 only:** Secure the lift bar to the HOC pin using the lift dampener and nut (Fig. 1011).



Fig. 1011

IMG-0901a

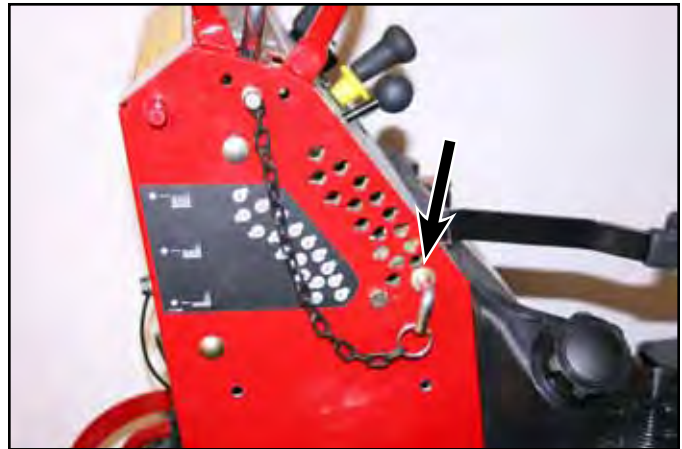


Fig. 1013

IMG-9306a

6

HYDRAULIC DRIVE SYSTEM

32. Position the fuel tank into the tower (Fig. 1014).



Fig. 1014

IMG-9307a

34. **2009 only:** Install a carriage bolt and nut securing the fuel tank support bracket to the frame bracket (Fig. 1016).



Fig. 1016

IMG-9304a

33. **2009 only:** Position the fuel tank support bracket (Fig. 1015).

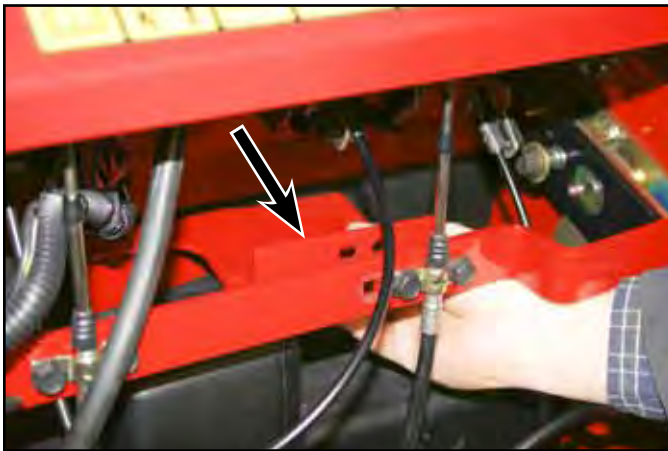


Fig. 1015

IMG-9305a

35. **2010 only:** Secure the tank bracket to the control tower using 4 self tapping screws (Fig. 1017).



Fig. 1017

IMG-0897a

HYDRAULIC DRIVE SYSTEM

36. **2010 only:** Install the vent hose to the tank fitting (Fig. 1018).



Fig. 1018

DSC-4530a

38. **2009 only:** Install the fuel tank vent fitting grommet into the fuel tank opening (Fig. 1020).



Fig. 1020

IMG-9530a

37. Slide the fuel outlet line onto the fuel tank fitting. Position the hose clamp to secure (Fig. 1019).

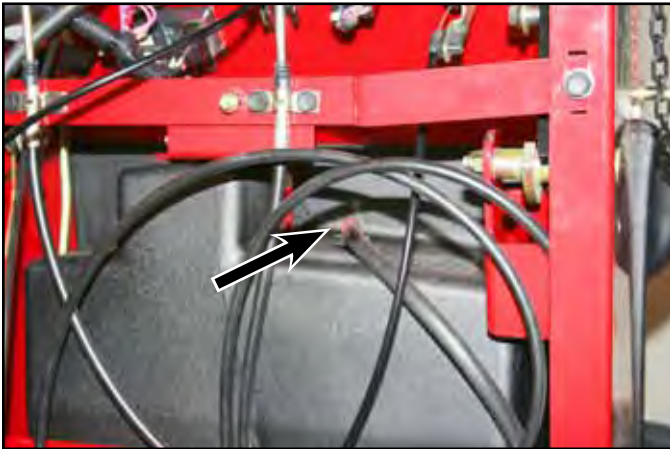


Fig. 1019

IMG-9292a

39. **2009 only:** Install the 90 degree fuel line vent fitting into the grommet (Fig. 1021).



Fig. 1021

IMG-9299a

HYDRAULIC DRIVE SYSTEM

40. Install the operator cushion assembly to the tower.
41. Move the HOC lever to the transport level.
42. Move the platform to the up position.
43. Raise the machine to access the pump pulley.
44. Apply anti-seize compound to the left hand pump shaft (Fig. 1022).



Fig. 1022

IMG-9460a

45. Install a key into the pump shaft keyway (Fig. 1023).



Fig. 1023

IMG-9463a

46. Apply thread locking compound to 2 pulley set screws (Fig. 1024).



Fig. 1024

IMG-9467a

HYDRAULIC DRIVE SYSTEM

47. Slide the left pump pulley onto the pump shaft (Fig. 1025).



Fig. 1025

IMG-9464a

49. Route the pump belt around the pump pulleys (Fig. 1027).



Fig. 1027

IMG-9543a

48. Install the 2 left pump pulley set screws (Fig. 1026).



Fig. 1026

IMG-9471a

50. Using a spring tool (Toro Part No. 92-5771), install the pump idler extension spring (Fig. 1028).

Note: 2010 machines have the end of the extension spring connected to an anchor, not the back side of the engine base.



Fig. 1028

IMG-9545a

HYDRAULIC DRIVE SYSTEM

51. Lower the machine.
52. Turn the fuel shut-off valve to the ON position (Fig. 1029).



Fig. 1029

IMG-9284a

53. Refill the hydraulic oil as needed. Remove air from the hydraulic system. Follow the “Bleeding the Hydraulic System” procedure, on page 6-95.
54. Test operate the machine. Adjust the tracking and neutral as needed.

Right Hydraulic Pump Replacement

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

Upon removal, all seals, o-rings, and gaskets should be replaced. During installation, lightly lubricate all seals, o-rings, and gaskets with clean petroleum jelly prior to assembly.

Right Hydraulic Pump Removal

1. Turn the engine off and remove the key from the ignition.
2. Set the parking brake.
3. Raise and support the machine.
4. Using a spring tool (Toro p/n: 92-5771), remove the pump idler extension spring (Fig. 1030).

Note: 2010 machines have the end of the extension spring connected to an anchor, not the back side of the engine base.



Fig. 1030

IMG-9273a

HYDRAULIC DRIVE SYSTEM

5. Remove the pump belt from around the pump pulleys (Fig. 1031).



Fig. 1031

IMG-9274a

7. Remove the right pump pulley from the pump shaft (Fig. 1033).



Fig. 1033

IMG-9480a

6. Remove the 2 set screws from the right pump pulley (Fig. 1032).



Fig. 1032

IMG-9475a

8. Remove the key from the pump shaft keyway (Fig. 1034).



Fig. 1034

IMG-9535a

6

HYDRAULIC DRIVE SYSTEM

9. Lower the machine to the ground.
10. Lower the operator cushion assembly and lay it on the platform.
11. Turn the fuel shut-off valve to the OFF position (Fig. 1035).



Fig. 1035

IMG-9283a

12. Siphon the fuel from the fuel tank:

Note: The only way to remove fuel from the tank is with a siphon pump.

- A. Clean around the fuel cap to prevent debris from getting into the fuel tank.
- B. Remove the fuel cap.
- C. Insert a siphon pump hose into the fuel tank (Fig. 1036).



Fig. 1036

IMG-9592a

- D. Using the siphon pump, transfer the fuel into a clean gas can.
- E. Wipe up any spilled fuel.

6

HYDRAULIC DRIVE SYSTEM

13. **2009 only:** Remove the 90 degree fuel line vent fitting from the fuel tank (Fig. 1037).



Fig. 1037

IMG-9299a

15. Slide the hose clamp back from the fuel tank fitting. Slide the fuel line off the fuel tank fitting (Fig. 1039).

Note: There may be some fuel leakage.

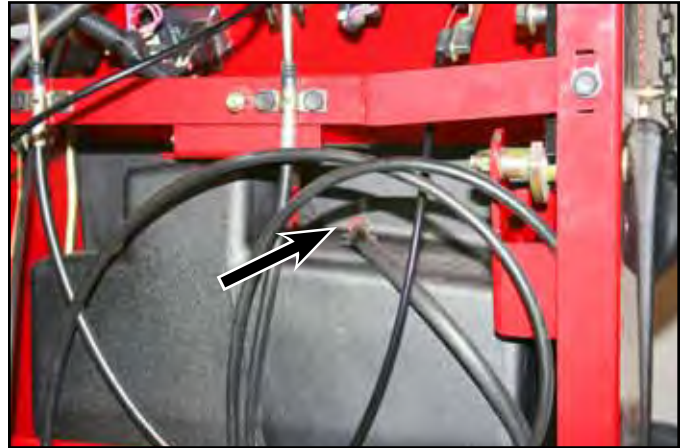


Fig. 1039

IMG-9292a

14. **2009 only:** Remove the rubber grommet from the fuel tank (Fig. 1038).



Fig. 1038

IMG-9530a

16. **2009 only:** Remove the carriage bolt and nut securing the fuel tank support to the frame bracket (Fig. 1040).



Fig. 1040

IMG-9304a

HYDRAULIC DRIVE SYSTEM

17. **2009 only:** Remove the fuel tank support bracket (Fig. 1041).

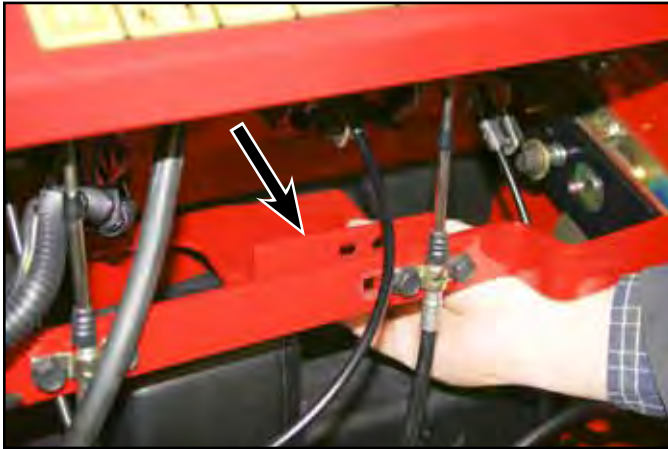


Fig. 1041

IMG-9305a

19. **2010 only:** Remove the four self-tapping screws securing the tank bracket to the control tower (Fig. 1043).



Fig. 1043

IMG-0897a

18. **2010 only:** Remove the fuel vent hose from the tank fitting (Fig. 1042).



Fig. 1042

IMG-0896a

20. Position the deck height adjustment to 1" (2.54cm) (Fig. 1044).

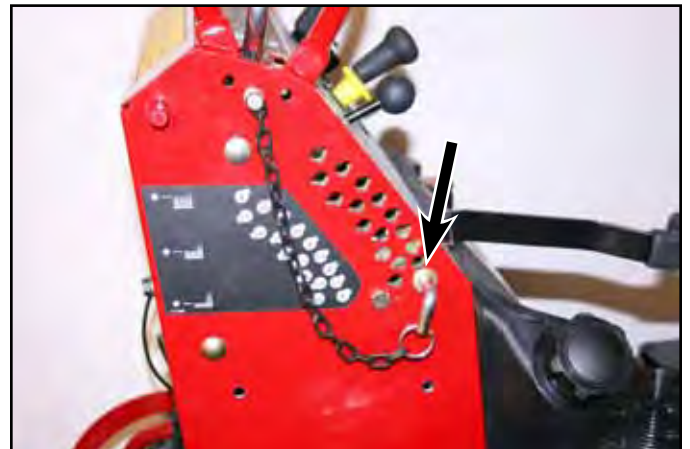


Fig. 1044

IMG-9306a

HYDRAULIC DRIVE SYSTEM

21. Remove the fuel tank from the machine (Fig. 1045).



Fig. 1045

IMG-9307a

23. Loosen the nut and bolt securing the strike plate to the tower 2 full turns to gain access to the bolt below it (Fig. 1047).



Fig. 1047

IMG-9316a

22. Remove the 3 push cable ties by driving them through the tower frame (Fig. 1046).

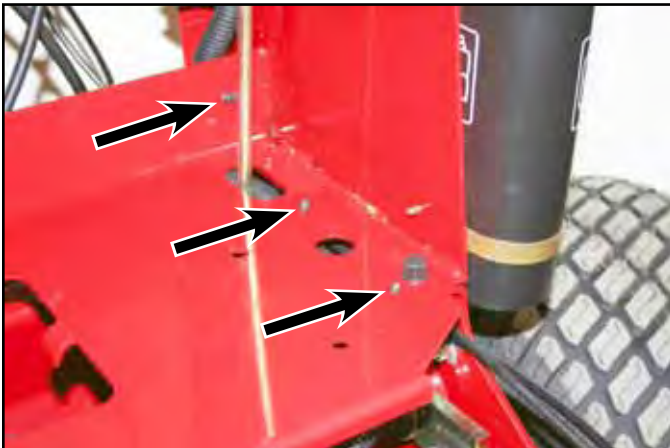


Fig. 1046

IMG-9314a

24. Remove the bolt and nut securing the fuel line r-clamp to the frame (Fig. 1048).



Fig. 1048

IMG-9329a

HYDRAULIC DRIVE SYSTEM

25. Raise the deck to the transport position and secure the deck in position with straps (Fig. 1049).



Fig. 1049

IMG-9339a

28. **2010 only:** Remove the nut securing the lift dampener assembly to the base of the HOC lift bar (Fig. 1051).

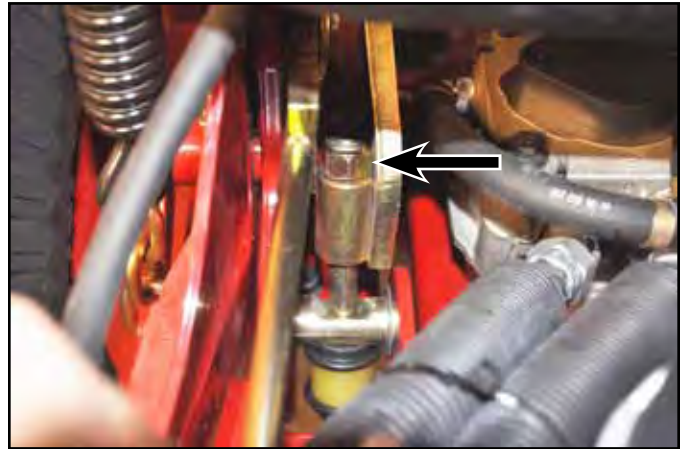


Fig. 1051

IMG-0901a

26. Raise and support the machine.

27. **2009 only:** Remove the lock nut from the lower end of the lift bar (Fig. 1050).

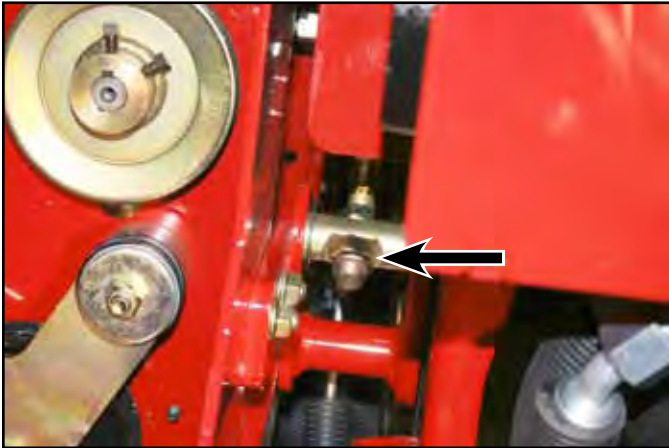


Fig. 1050

IMG-9344a

29. **2010 only:** Remove the adjustment bolt and washer from the upper end of the lift assist springs on both sides of the control tower (Fig. 1052).

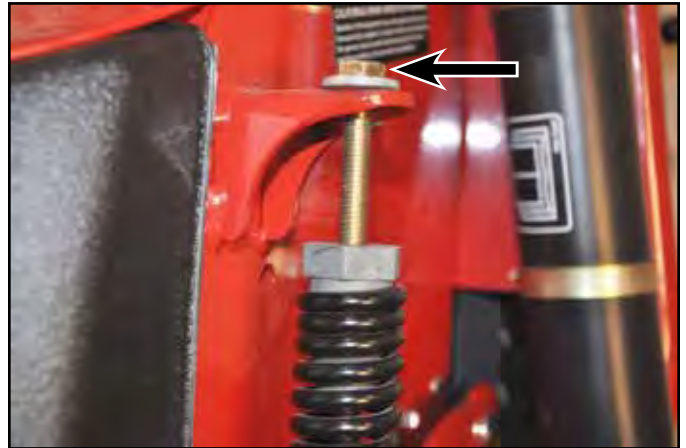


Fig. 1052

IMG-0902a

HYDRAULIC DRIVE SYSTEM

30. Remove the hairpin cotter from the top end of the parking brake rod. Slide the top end of the rod out of the handle (Fig. 1053).

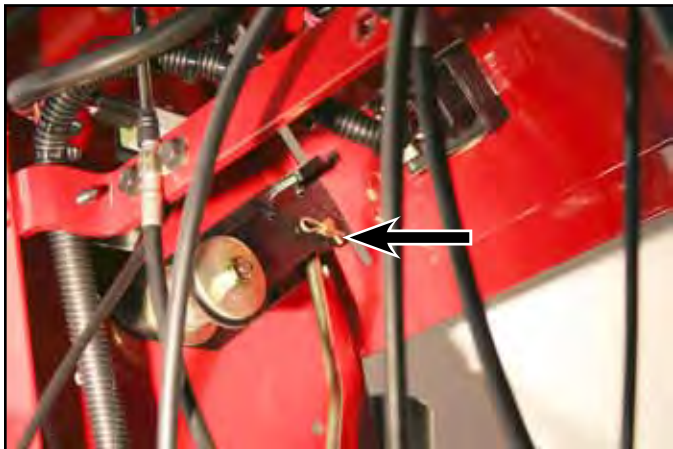


Fig. 1053

IMG-9347a

31. Remove the nuts from the 4 self-tapping screws securing the tower to the frame (Fig. 1055).

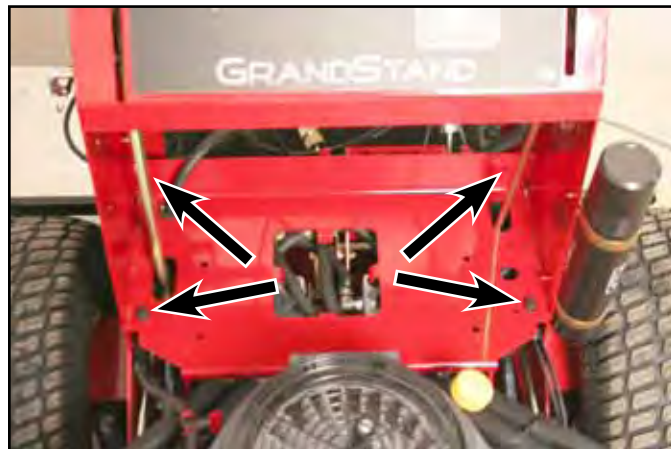


Fig. 1055

IMG-9516a

Note: 2010 models use a nut to secure the upper end of the parking brake rod (Fig. 1054).



Fig. 1054

DSCN-0261a

32. Remove the 4 self-tapping screws securing the tower to the frame (Fig. 1056).

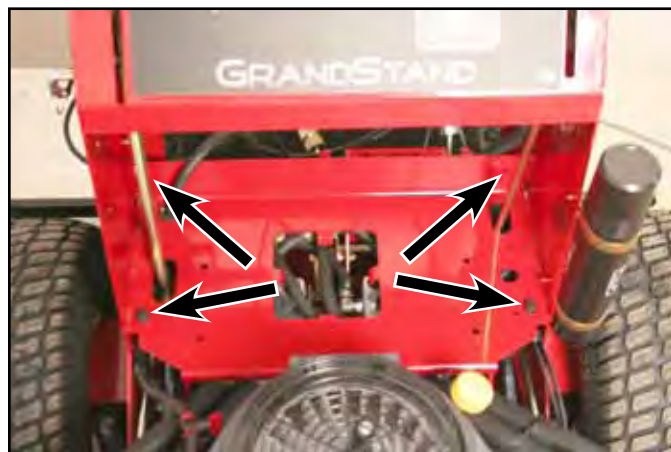


Fig. 1056

IMG-9516a

6

HYDRAULIC DRIVE SYSTEM

33. Remove the spring clip from the drive linkage mount (Fig. 1057).



Fig. 1057

IMG-9350a

34. Remove the 2 traction control cables from the drive linkage mount slots (Fig. 1058).



Fig. 1058

IMG-9351a

35. Lift the tower assembly up off the frame and lay it back as shown, taking care that the lift bar is routed out from under the right hand lift cylinder and the brake rod is routed out from under the control panel (Fig. 1059).

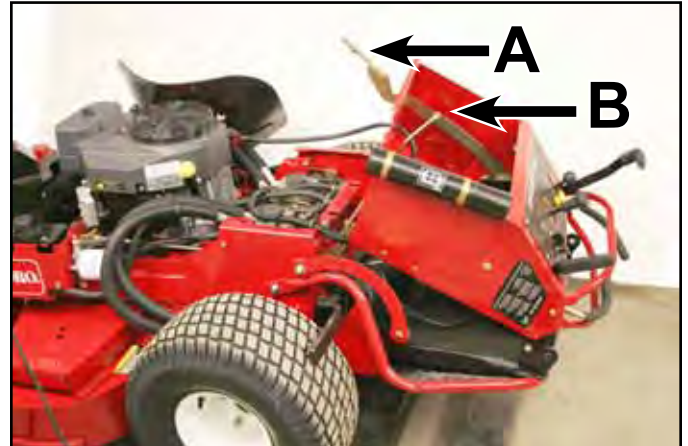


Fig. 1059

IMG-9352a

A. Lift bar

B. Brake rod

36. Remove the cable tie securing the wire harness and 2 low pressure hydraulic hoses (Fig. 1060).



Fig. 1060

IMG-9354a

HYDRAULIC DRIVE SYSTEM

37. **2009 only:** Remove the hairpin cotter and washer from the front end of the right hand shifter link rod and slide the front end of the rod out of the shifter arm (Fig. 1061).



Fig. 1061 IMG-9422a

39. Remove the hairpin cotter and washer from the rear end of the right hand shifter link rod (Fig. 1063).

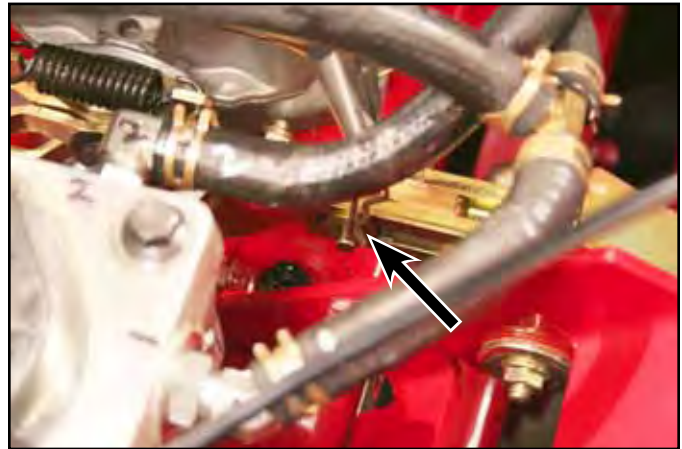


Fig. 1063 IMG-9424a

38. **2010 only:** Remove the bolt, nut, washers and spacer securing the RH shifter link to the shifter bracket (Fig. 1062).

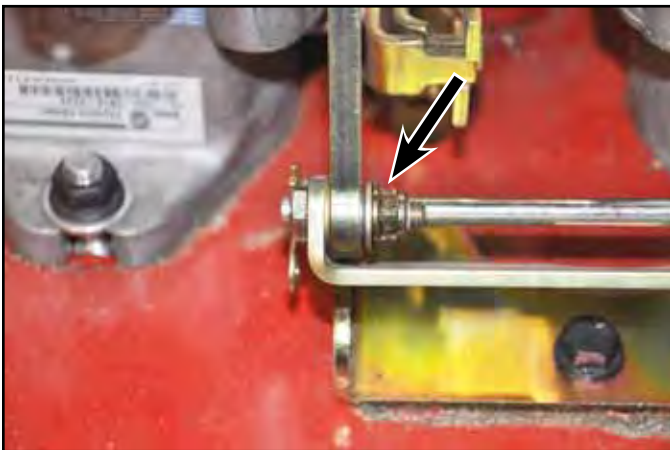


Fig. 1062 IMG-0905a

40. Serial range 290000001 - 290000209: Remove the right hand shifter link rod and the 3 rollers located on the rear end of the shifter link rod from the inside of the control fork assembly and pump control arm (Fig. 1064).

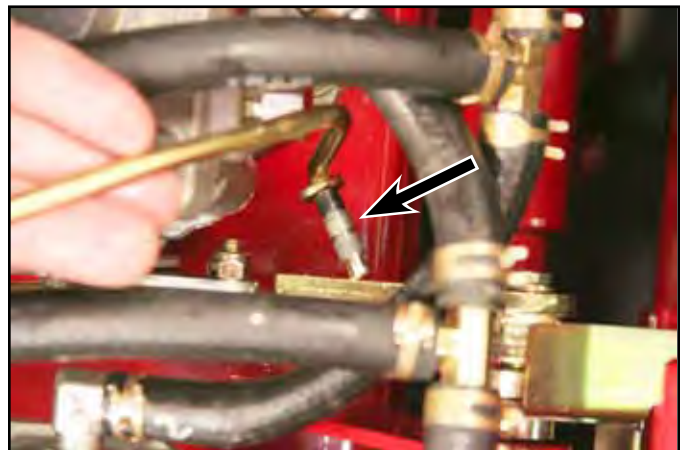


Fig. 1064 IMG-9486a

6

HYDRAULIC DRIVE SYSTEM

41. Serial range 290000210 - 290999999: There are 3 rollers located on the rear end of the right hand shifter link rod inside the control fork assembly and pump control arm. Slide the left hand roller off the rear end of the right hand shifter link rod (Fig. 1065).

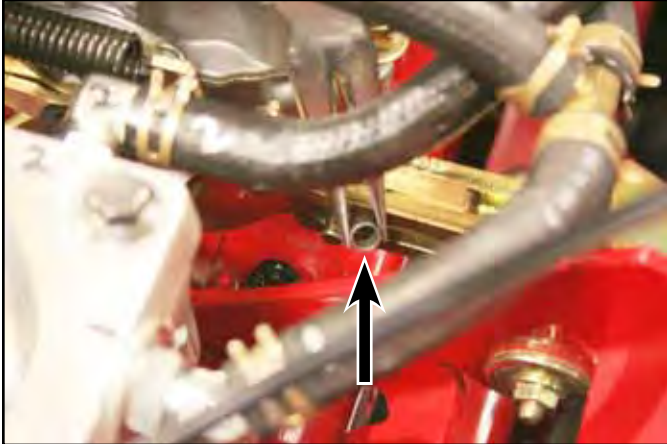


Fig. 1065

IMG-9430a

42. Serial range 290000210 - 290999999: Remove the rear end of the right hand shifter link rod and the right hand roller (Fig. 1066).

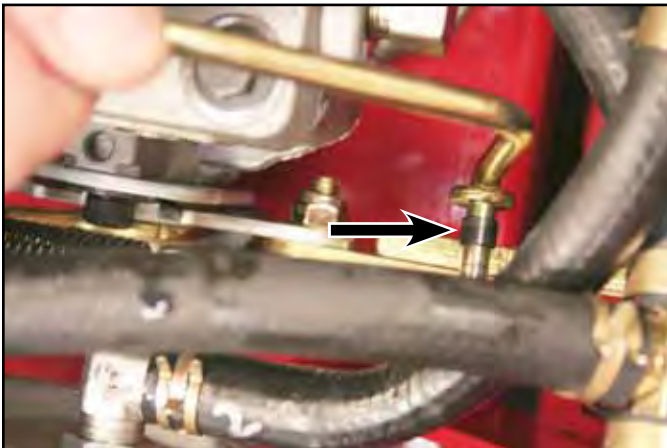


Fig. 1066

IMG-9432a

43. Serial range 290000210 - 290999999: Push down on the control fork assembly and remove the center roller from the pump control arm slot (Fig. 1067).

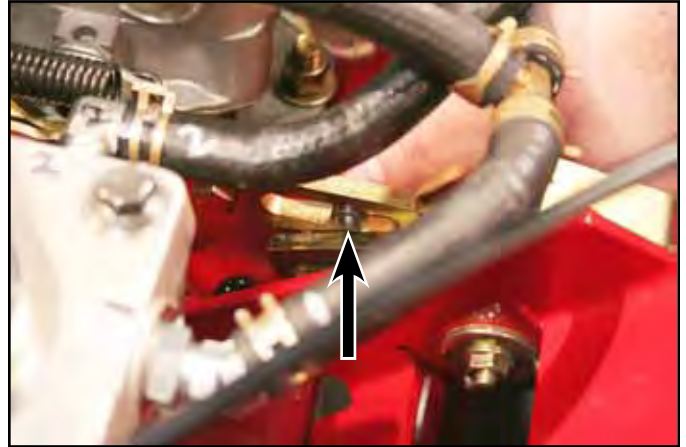


Fig. 1067

IMG-9436a

44. **2010 only**: Remove the RH shifter link and the 3 rollers located on the rear end of the shifter link inside of the control fork assembly (Fig. 1068).

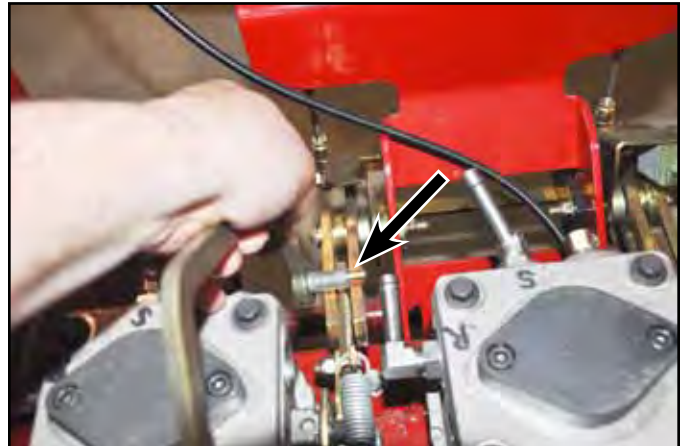


Fig. 1068

IMG-0948a

HYDRAULIC DRIVE SYSTEM

Shifter Link and Roller Configurations (Fig. 1069):

- A. **2009:** Serial range 290000001-290000210;
3 rollers, all thin and same size
- B. **2009:** Serial range 290000211-290999999;
3 rollers, large center roller
- C. **2010:** Serial range 310000001-310999999;
3 rollers, all large and same size

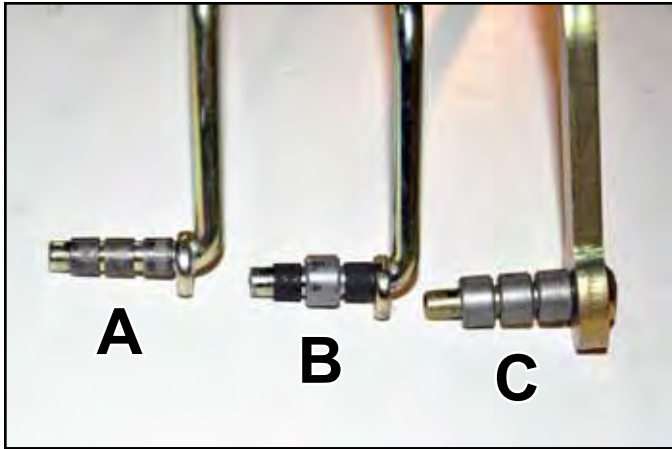


Fig. 1069

IMG-0941a

- 46. Slide the hose clamp back from the fitting and remove the return line (Fig. 1071).



Fig. 1071

IMG-9442a

- 45. Mark the hydraulic pump, fittings and lines (Fig. 1070).

- 1) Charge line
- 2) Return line
- 3) High pressure hose
- 4) High pressure hose

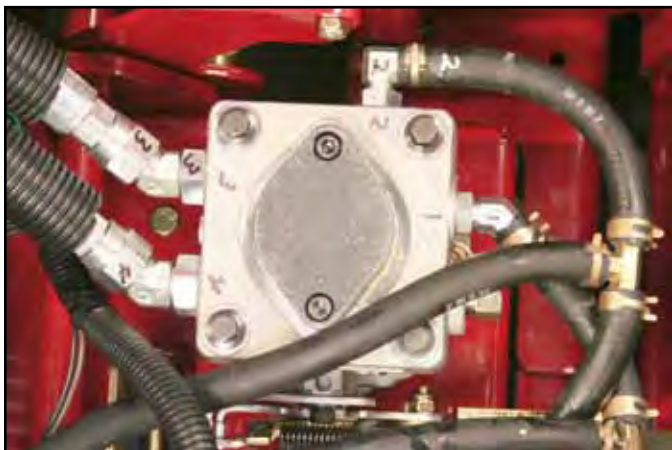


Fig. 1070

IMG-9440a

- 47. Slide the hose clamp back from the fitting and remove the charge line (Fig. 1072).



Fig. 1072

IMG-9447a

HYDRAULIC DRIVE SYSTEM

48. Remove both high pressure hoses (Fig. 1073).



Fig. 1073

IMG-9448a

50. Remove the right hand pump (Fig. 1075).



Fig. 1075

IMG-9483a

49. Remove the 2 carriage bolts, nuts, and washers securing the pump to the frame (Fig. 1074).



Fig. 1074

IMG-9457a

51. Remove the 2 bolts and nuts securing the pump control arm to the pump. Remove the pump control arm (Fig. 1076).

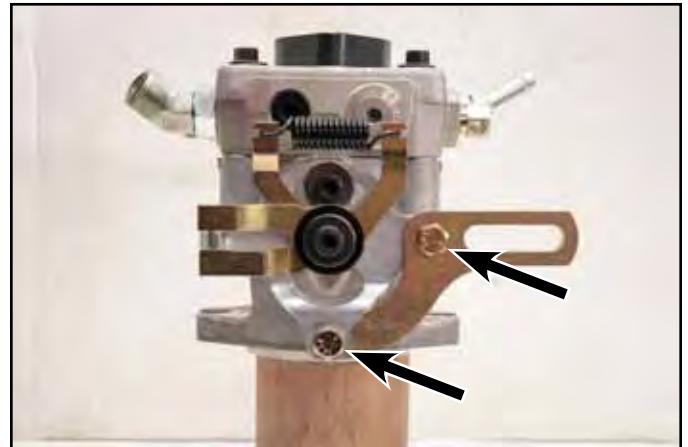


Fig. 1076

IMG-9391a

HYDRAULIC DRIVE SYSTEM

52. If you are servicing the pump, refer to the Hydro-Gear P Series Hydrostatic Pumps Service and Repair Manual (Form No. BLN 52503).
53. If you are installing a new pump, transfer all markings and all 4 fittings to the new pump (Fig. 1077).



Fig. 1077

PICT-8870a

Right Hydraulic Pump Installation

1. Position the Pump Control Arm to the pump linkage and install 2 bolts and nuts to secure (Fig. 1078).

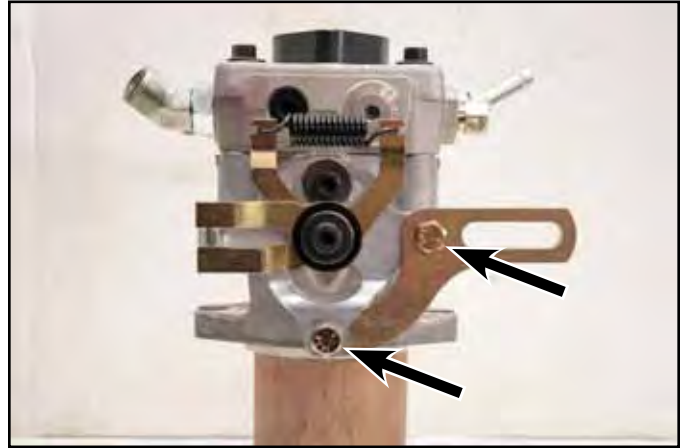


Fig. 1078

IMG-9391a

2. Position the right hand pump into the frame. Align the mounting flange on the pump with the mounting holes in the frame (Fig. 1079).



Fig. 1079

IMG-9483a

HYDRAULIC DRIVE SYSTEM

3. Install 2 carriage bolts, nuts and washers securing the pump to the frame (Fig. 1080).



Fig. 1080

IMG-9457a

- b. Install the charge line and secure with the hose clamp (Fig. 1082).



Fig. 1082

IMG-9446a

4. Install the hoses to the fittings located on the pump. Ensure the markings on the hoses match the markings on the fittings and pump:
 - a. Install the high pressure hoses (Fig. 1081).



Fig. 1081

IMG-9451a

- c. Install the return line and secure with the hose clamp (Fig. 1083).



Fig. 1083

IMG-9443a

HYDRAULIC DRIVE SYSTEM

Shifter Link and Roller Configurations (Fig. 1084):

- A. **2009:** Serial range 290000001-290000210;
3 rollers, all thin and same size
- B. **2009:** Serial range 290000211-290999999;
3 rollers, large center roller
- C. **2010:** Serial range 310000001-310999999;
3 rollers, all large and same size

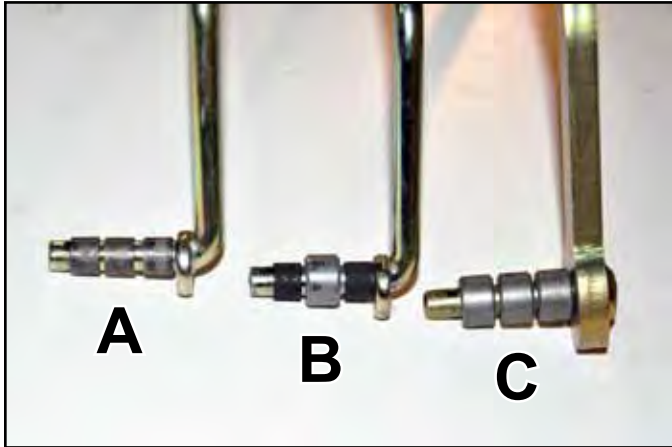


Fig. 1084

IMG-0941a

5. Serial range 290000001 - 290000209: Slide 3 rollers onto the rear end of the right hand shifter link rod. Slide the rear end of the shifter link rod (with 3 rollers) into the control fork assembly (Fig. 1085).

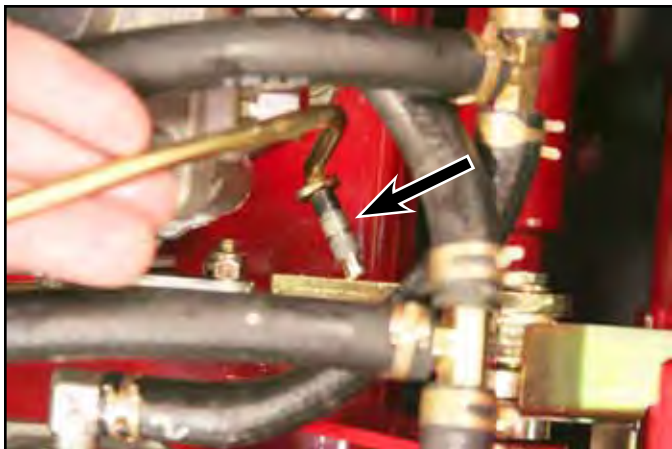


Fig. 1085

IMG-9486a

6. Serial range 290000210 - 290999999: Push down on the control fork assembly and slide the center roller into the slot of the pump control arm (Fig. 1086).



Fig. 1086

IMG-9437a

7. Serial range 290000210 - 290999999: Using an Allen wrench as a pilot, locate the center roller and slide the Allen wrench through it (Fig. 1087).

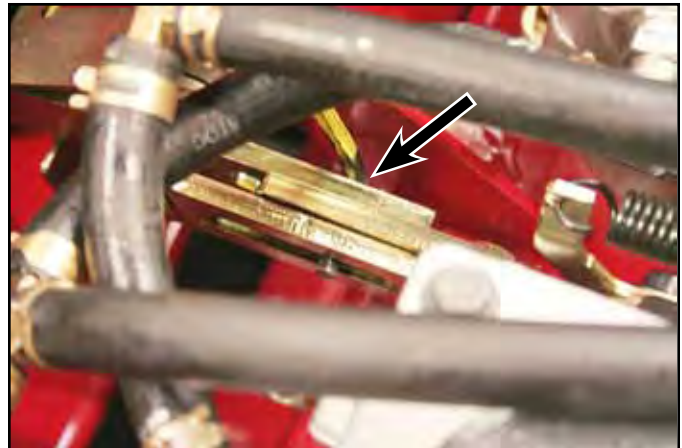


Fig. 1087

IMG-9492a

6

HYDRAULIC DRIVE SYSTEM

8. Serial range 290000210 - 290999999: Slide the right hand roller onto the rear end of the right hand shifter link rod. Slide the rear end of the shifter link rod (with roller) through the control fork assembly following the Allen wrench through to capture the center roller on the shifter link rod (Fig. 1088).

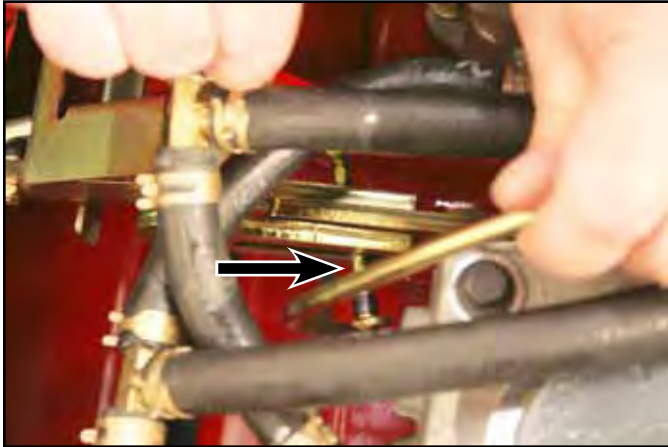


Fig. 1088

IMG-9499

9. Serial range 290000210 - 290999999: Slide the left hand roller onto the rear end of the right hand shifter link rod and into the outside of the control fork assembly (Fig. 1089).

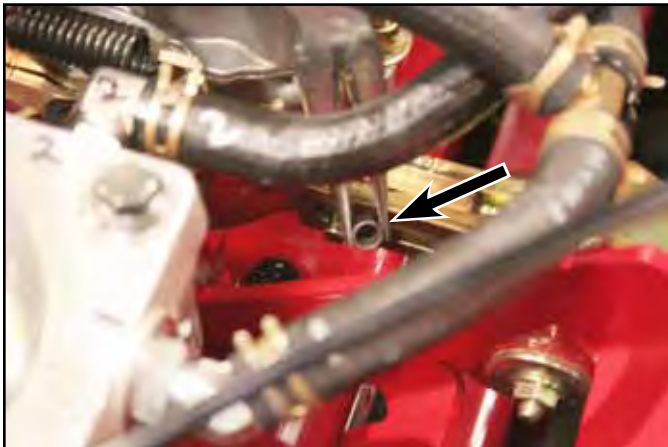


Fig. 1089

IMG-9431a

10. **2010 only**: Slide 3 rollers onto the rear end of the left hand shifter link. Slide the rear end of the shifter link (with three rollers) into the control fork assembly (Fig. 1090).

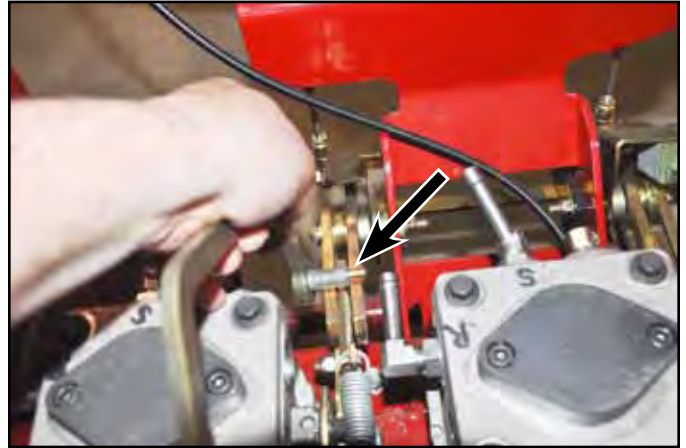


Fig. 1090

IMG-0948a

11. Slide a washer onto the rear end of the shifter link rod. Install a hairpin cotter to secure (Fig. 1091).

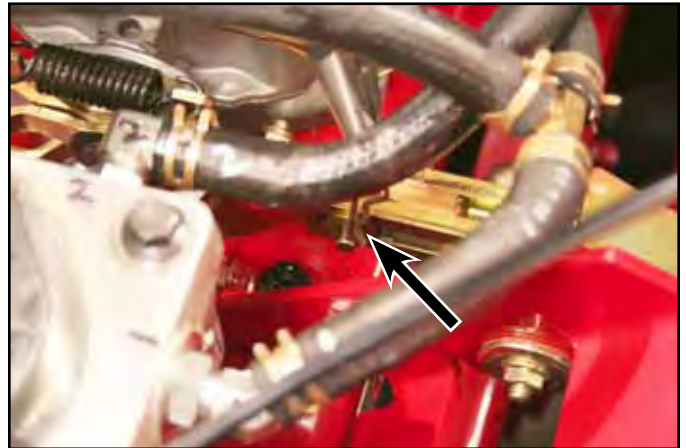


Fig. 1091

IMG-9424a

HYDRAULIC DRIVE SYSTEM

12. **2009 only:** Slide the front end of the right hand shifter link rod into the left side of the dual shifter arm. Slide a washer onto the front end of the shifter link rod. Install a hairpin to secure (Fig. 1092).



Fig. 1092

IMG-9423a

14. **2010 only:** Secure the shifter link to the shifter bracket with a bolt two washers and nut (Fig. 1094).

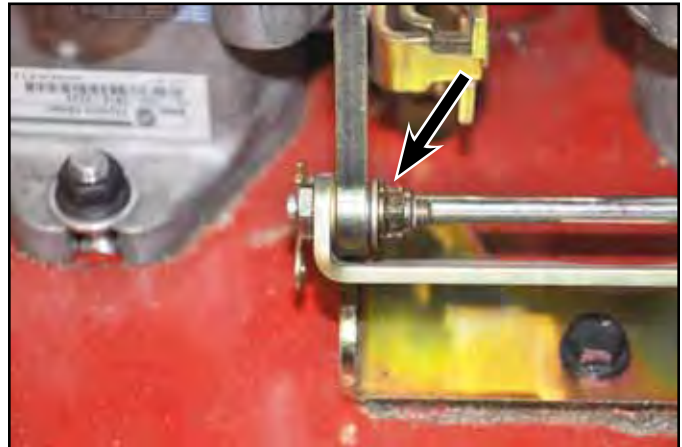


Fig. 1094

IMG-0905a

13. **2010 only:** Place a spacer into the front end of the shifter link (Fig. 1093).



Fig. 1093

IMG-0946a

15. Install a cable tie securing the wire harness and 2 low pressure hydraulic hoses (Fig. 1095).



Fig. 1095

IMG-9501a

HYDRAULIC DRIVE SYSTEM

16. Lift the tower assembly up and lower it onto the frame, taking care that the lift bar is routed between the right hand lift cylinder and the RH Lift Rod assembly. Also ensure the top end of the brake rod is routed under the control panel and up to the brake handle lever (Fig. 1096).



Fig. 1096

IMG-9513a

17. Align the tower and frame mounting holes. Install 4 self-tapping screws to secure the tower to the frame (Fig. 1097).

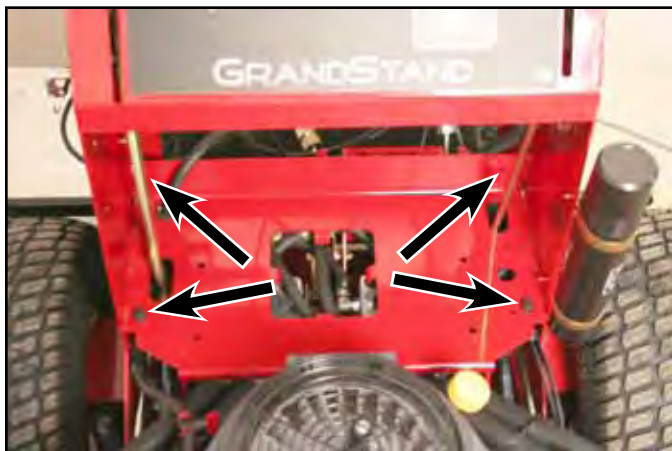


Fig. 1097

IMG-9516a

18. Position the choke cable R-clamp onto the self-tapping screw located on the left hand rear corner where the tower meets the main frame. Install a nut to secure (Fig. 1098).



Fig. 1098

PICT-8609a

19. Install 3 nuts to the remaining 3 self-tapping screws securing the tower to the frame (Fig. 1099).

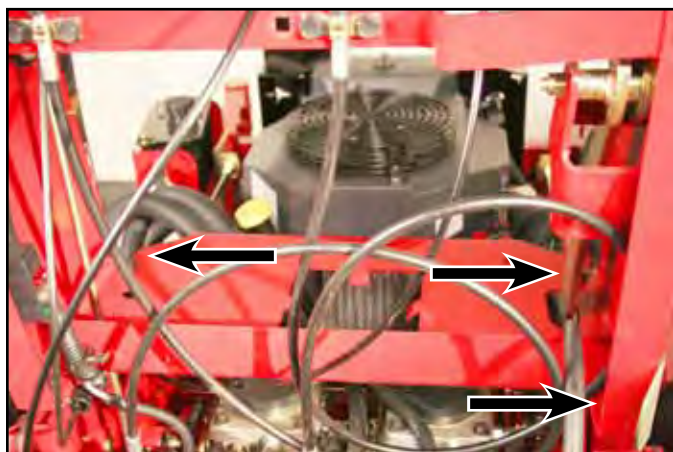


Fig. 1099

IMG-9338a

HYDRAULIC DRIVE SYSTEM

20. Install 3 push cable ties through the holes located in the base of the tower (Fig. 1100).

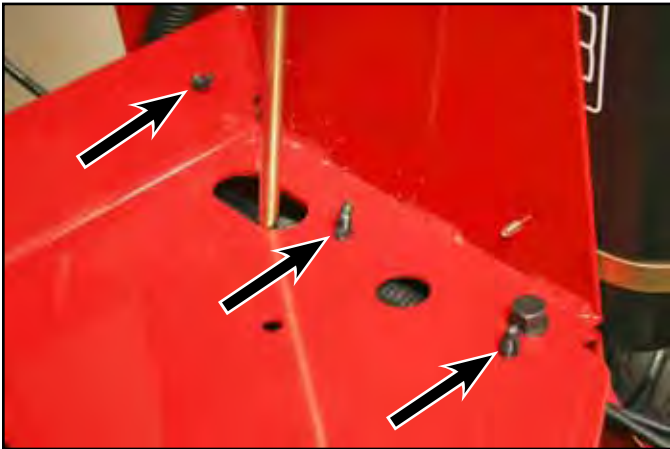


Fig. 1100

IMG-9524a

21. Slide the top end of the brake rod into the brake handle. Install a hairpin cotter to secure the top end of the parking brake rod to the brake handle (Fig. 1101).

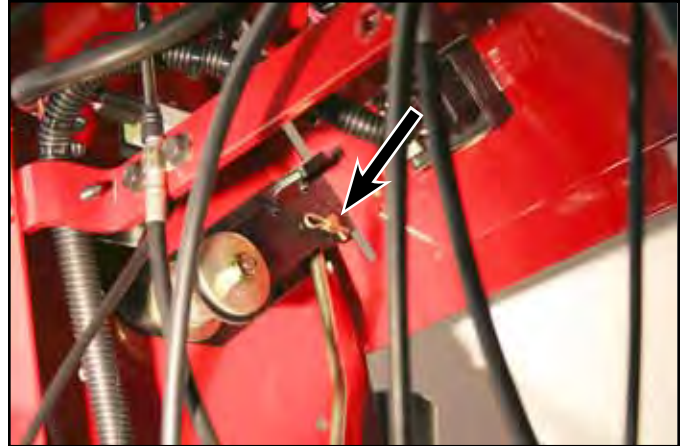


Fig. 1101

IMG-9347a

Note: 2010 models use a nut to secure the upper end of the parking brake rod (Fig. 1102).



Fig. 1102

DSCN-0261a

HYDRAULIC DRIVE SYSTEM

22. Position the fuel line r-clamp to the frame and install a bolt and nut to secure (Fig. 1103).



Fig. 1103

IMG-9329a

24. Slide the 2 traction control cables into the drive linkage mount slots (Fig. 1105).



Fig. 1105

IMG-9351a

23. Tighten the bolt and nut securing the strike plate to the tower (Fig. 1104).

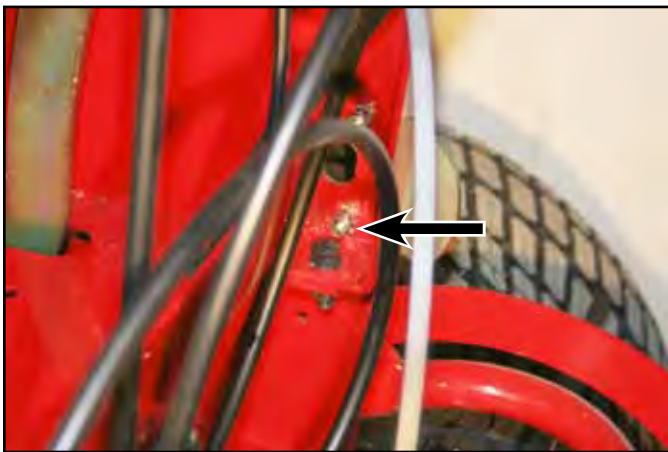


Fig. 1104

IMG-9316a

25. Install the spring clip into the drive linkage mount (Fig. 1106).



Fig. 1106

IMG-9350a

HYDRAULIC DRIVE SYSTEM

26. **2009 only:** Install a lock nut onto the lower end of the lift bar securing it to the height-of-cut pin (Fig. 1107).

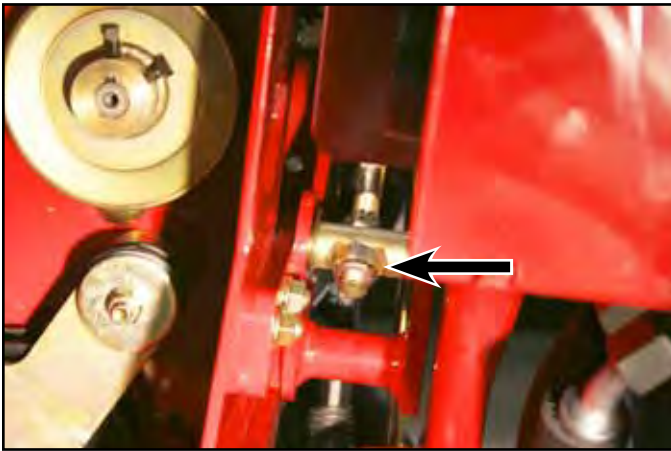


Fig. 1107

IMG-9345a

28. **2010 only:** Adjust the gap between the upper spring bracket and the top of the spring nut insert (Fig. 1109).

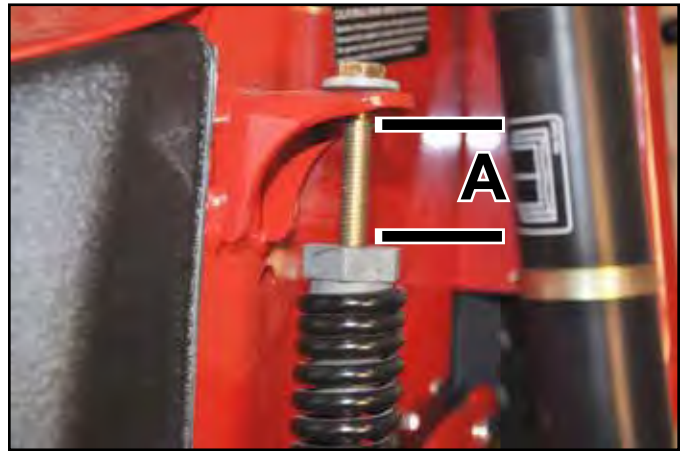


Fig. 1109

IMG-0902a

27. **2010 only:** Secure the upper end of the lift assist springs to the control tower with the adjustment screw and washer (Fig. 1108).

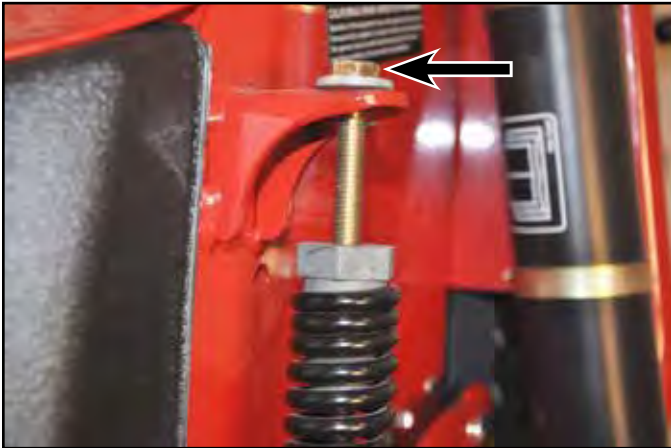


Fig. 1108

IMG-0902a

- A. 1.5" (3.8cm) for 60" decks
2" (5cm) for 48" & 52" decks

HYDRAULIC DRIVE SYSTEM

29. Lower the machine.

30. Remove the straps securing the mower deck (Fig. 1110). Lower the deck to the 1" (2.54cm) height-of-cut position (Fig. 1111).



Fig. 1110

IMG-9339a

31. Position the fuel tank into the tower (Fig. 1112).



Fig. 1112

IMG-9307a

32. **2009 only:** Position the fuel tank support bracket (Fig. 1113).

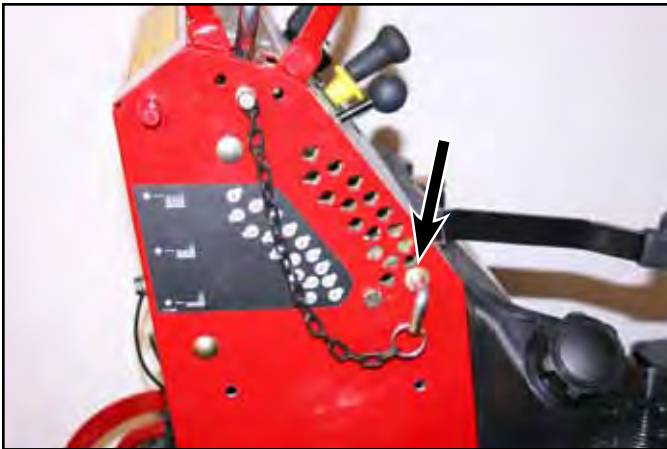


Fig. 1111

IMG-9306a

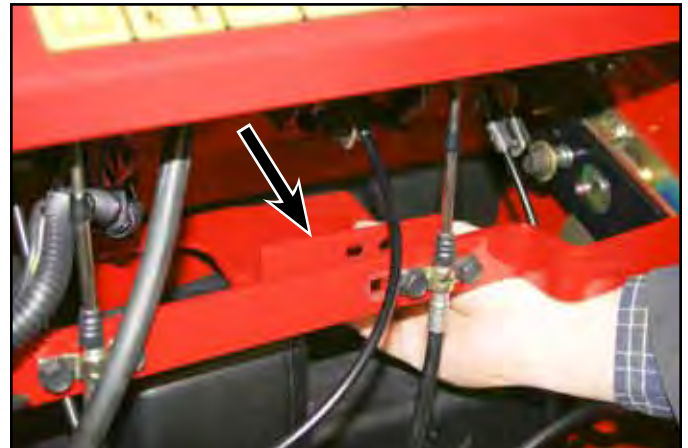


Fig. 1113

IMG-9305a

HYDRAULIC DRIVE SYSTEM

33. **2009 only:** Install a carriage bolt and nut securing the fuel tank support bracket to the frame bracket (Fig. 1114).



Fig. 1114

IMG-9304a

35. **2010 only:** Install the vent hose onto the tank fitting (Fig. 1116).



Fig. 1116

DSC-4530a

34. **2010 only:** Secure the tank bracket to the control tower using 4 self tapping screws (Fig. 1115).



Fig. 1115

IMG-0897a

36. Slide the fuel outlet line onto the fuel tank fitting. Position the hose clamp to secure (Fig. 1117).

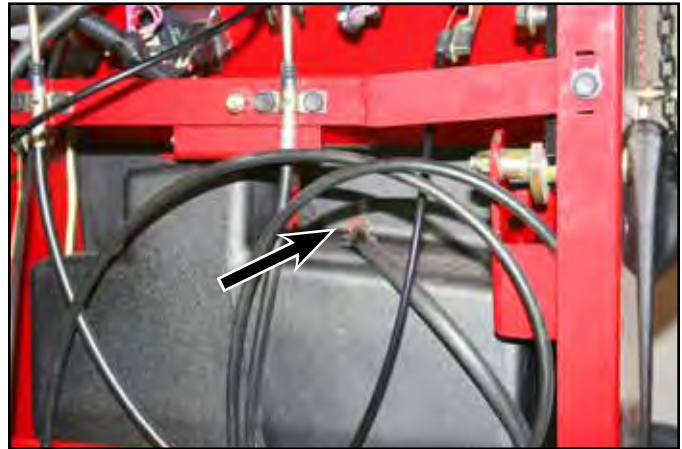


Fig. 1117

IMG-9292a

6

HYDRAULIC DRIVE SYSTEM

37. **2009 only:** Install the fuel tank vent fitting grommet into the fuel tank opening (Fig. 1118).



Fig. 1118

IMG-9530a

38. **2009 only:** Install the 90 degree fuel line vent fitting into the grommet (Fig. 1119).



Fig. 1119

IMG-9299a

39. Install the operator cushion assembly to the tower.
40. Move the HOC lever to the transport level.
41. Move the platform to the up position.
42. Raise the machine to access the pump pulley.
43. Apply anti-seize compound to the right hand pump shaft (Fig. 1120).



Fig. 1120

IMG-9536a

44. Install a key into the pump shaft keyway (Fig. 1121).



Fig. 1121

IMG-9538a

HYDRAULIC DRIVE SYSTEM

45. Slide the right hand pump pulley onto pump shaft (Fig. 1122).



Fig. 1122

IMG-9540a

47. Install the 2 pump pulley set screws (Fig. 1124).



Fig. 1124

IMG-9475a

46. Apply thread locking compound to the 2 pump pulley set screws (Fig. 1123).



Fig. 1123

IMG-9467a

48. Route the pump belt around the pump pulleys (Fig. 1125).



Fig. 1125

IMG-9543a

6

HYDRAULIC DRIVE SYSTEM

49. Using a spring tool (Toro Part No. 92-5771), install the pump idler extension spring (Fig. 1126).

Note: 2010 machines have the end of the extension spring connected to an anchor, not the back side of the engine base.



Fig. 1126

IMG-9545a

50. Lower the machine.

51. Turn the fuel shut-off valve to the ON position (Fig. 1127).



Fig. 1127

IMG-9284a

52. Refill the hydraulic oil as needed. Remove air from the hydraulic system. Follow the "Bleeding the Hydraulic System" procedure on page 6-95.
53. Test operate the machine. Adjust tracking and neutral as needed.

HYDRAULIC DRIVE SYSTEM

Wheel Motor Replacement

The following procedure was done on the left hand wheel motor. The procedure is the same for the right hand wheel motor.

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

Upon removal, all seals, o-rings, and gaskets should be replaced. During installation, lightly lubricate all seals, o-rings, and gaskets with clean petroleum jelly prior to assembly.

Wheel Motor Removal

1. Disengage the PTO and set the parking brake.
2. Stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
3. Engage the parking brake.
4. Loosen the wheel motor nut (Fig. 1128).



Fig. 1128

IMG-9906a

5. Loosen the four wheel lug nuts (Fig. 1129).



Fig. 1129

IMG-9853a

6. Raise the rear of the machine (Fig. 1130).



Fig. 1130

IMG-9840a

HYDRAULIC DRIVE SYSTEM

7. Support the machine with two jackstands just behind the deck (Fig. 1131).



Fig. 1131

IMG-9909a

9. Remove lug nuts (Fig. 1133).



Fig. 1133

IMG-9917a

8. Release the parking brake (Fig. 1132).



Fig. 1132

IMG-9856a

10. Remove the wheel (Fig. 1134).



Fig. 1134

IMG-9919a

HYDRAULIC DRIVE SYSTEM

11. Remove the wheel motor axle nut (Fig. 1135).



Fig. 1135

IMG-9921a

13. Advance the forcing screw through the hub until it firmly contacts the wheel motor shaft (Fig. 1137).



Fig. 1137

IMG-9929a

12. Install a hub puller (Toro p/n: TOR6006) onto the wheel studs.

Note: The lug nuts should be installed backwards so the flat side is against the puller (Fig. 1136).



Fig. 1136

IMG-9925a

6

HYDRAULIC DRIVE SYSTEM

14. Tighten the lug nuts evenly (approximately 1/4 to 1/2 turn at a time) until the hub pops off the wheel motor shaft (Fig. 1138 and Fig. 1139).



Fig. 1138

IMG-9932a

15. Remove the hub puller from the hub.
16. Remove the woodruff key from the keyway (Fig. 1140).



Fig. 1140

IMG-9938a



Fig. 1139

IMG-9935a

17. Thoroughly clean the area around the hydraulic fittings to prevent debris from entering the system.
18. Mark the hose and wheel motor fittings to identify the upper and lower hoses (Fig. 1141).



Fig. 1141

IMG-9876a

6

HYDRAULIC DRIVE SYSTEM

19. Position a drain pan under the wheel motor (Fig. 1142).



Fig. 1142

IMG-9944a

21. Cap the hose ends and wheel motor fittings so that debris does not enter the system (Fig. 1144).



Fig. 1144

IMG-9885a

20. Disconnect both hydraulic hoses from the wheel motor (Fig. 1143).



Fig. 1143

IMG-9879a

22. Loosen the jam nuts on the upper wheel motor fitting (Fig. 1145).



Fig. 1145

IMG-9893a

6

HYDRAULIC DRIVE SYSTEM

23. Remove the upper fitting from the wheel motor. Cap the wheel motor port so that debris does not enter the system. (Fig. 1146).



Fig. 1146

IMG-9897a

26. Remove the upper carriage bolt and nut from the center motor mount closest to the wheel motor being removed (Fig. 1148).

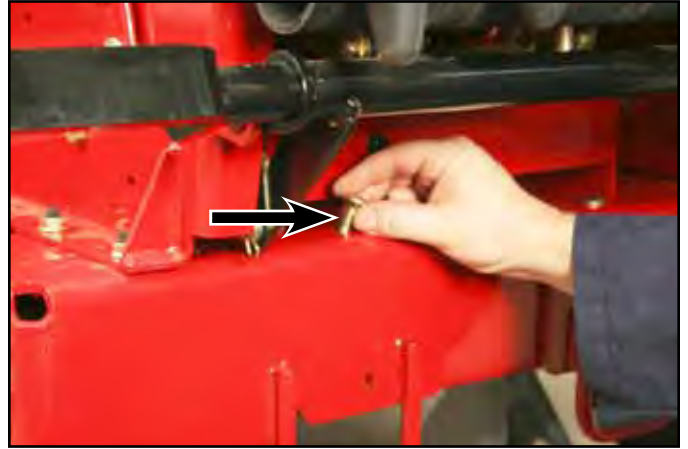


Fig. 1148

IMG-9949a

24. Repeat steps 22 and 23 to remove the lower wheel motor fitting.

25. Remove the 2 lower carriage bolts and nuts securing the center motor mount to the LH and RH motor mount assemblies (Fig. 1147).



Fig. 1147

IMG-9948a

27. Loosen the remaining nut until it is flush with the end of the carriage bolt (Fig. 1149).

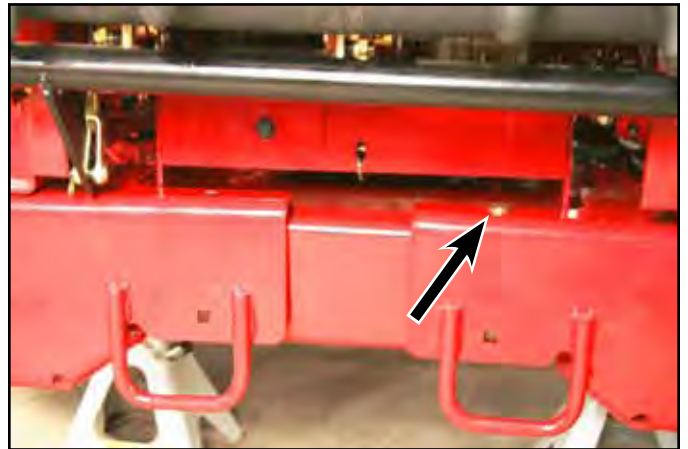


Fig. 1149

IMG-9953a

HYDRAULIC DRIVE SYSTEM

28. **2009 only:** While supporting the motor mount assembly, remove the two nuts (leave the bolts) attaching the motor mount assembly to the frame assembly (Fig. 1150).



Fig. 1150

IMG-9956a

29. Lower the motor mount assembly just enough to allow the bolts to clear the holes in the frame assembly and then remove the motor mount assembly out to the side of the machine (Fig. 1152).



Fig. 1152

IMG-9961a

Note: 2010 models use bolts, spacers and nuts to secure the motor mount to the frame (Fig. 1151).

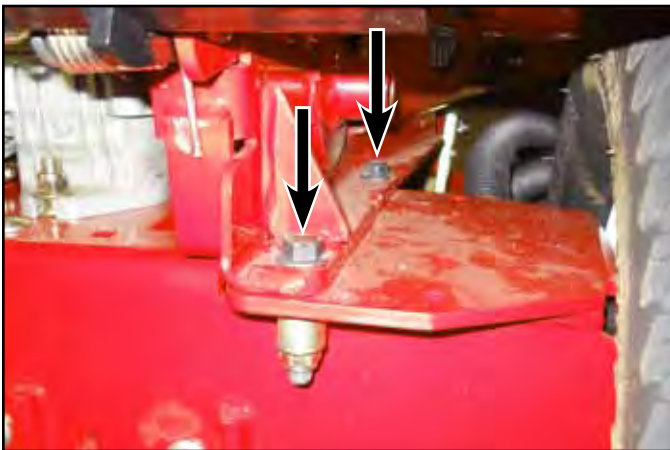


Fig. 1151

DSCN-1020a

30. Remove the 4 bolts securing the wheel motor to the motor mount assembly (Fig. 1153).



Fig. 1153

IMG-9965a

HYDRAULIC DRIVE SYSTEM

31. Remove the wheel motor (Fig. 1154).



Fig. 1154

IMG-9969a

32. To service the wheel motor, refer to the Parker/Ross Wheel Motor Service Manual (Toro Form No. HY13-1521-M2/US).

Wheel Motor Installation

1. Position the wheel motor into the motor mount assembly (Fig. 1155).



Fig. 1155

IMG-9969a

2. Loosely install 4 bolts securing the wheel motor to the motor mount (Fig. 1156).



Fig. 1156

IMG-9975a

HYDRAULIC DRIVE SYSTEM

- Slide the wheel motor mount assembly in from the side of the machine and raise it into position (Fig. 1157).



Fig. 1157

IMG-9961a

- While supporting the motor mount assembly, loosely install two nuts onto the bolts securing it to the frame (Fig. 1158).



Fig. 1158

IMG-9979a

Note: 2010 models use bolts, spacers and nuts to secure the motor mount to the frame (Fig. 1159).

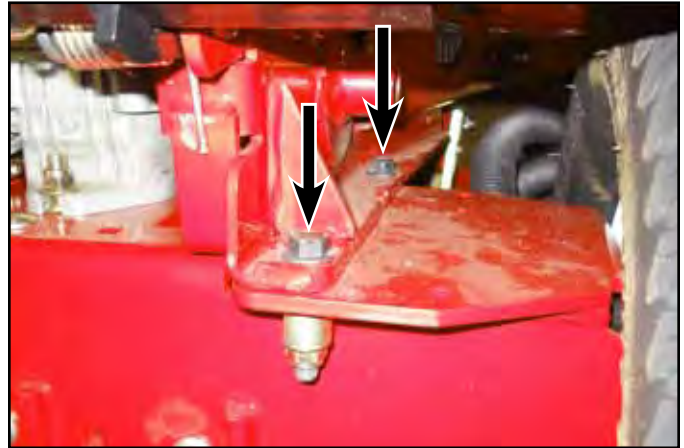


Fig. 1159

DSC-1020a

HYDRAULIC DRIVE SYSTEM

- Loosely install 3 carriage bolts and nuts fastening the center motor mount to the motor mount assemblies (Fig. 1160).

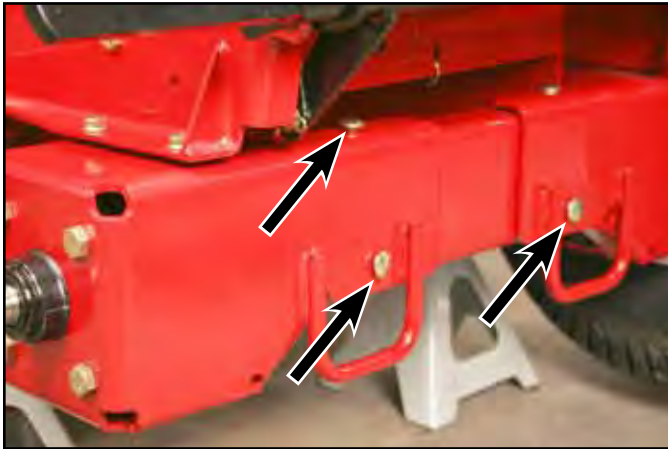


Fig. 1160

IMG-9986a

- Tighten the two nuts attaching the motor mount assembly to the frame assembly (Fig. 1162).



Fig. 1162

IMG-9989a

- Tighten the 4 nuts fastening the center motor mount to the motor mount assemblies (Fig. 1161).

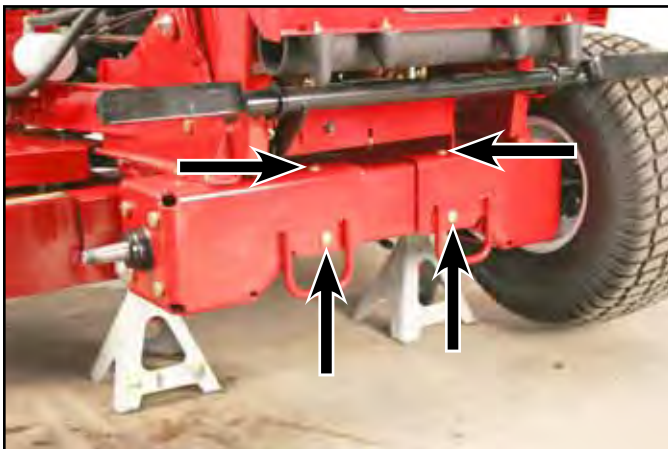


Fig. 1161

IMG-9946a

- Tighten the four bolts securing the wheel motor to the motor mount assembly (Fig. 1163).



Fig. 1163

IMG-9995a

HYDRAULIC DRIVE SYSTEM

9. Install the two fittings into the wheel motor ports (Fig. 1164).

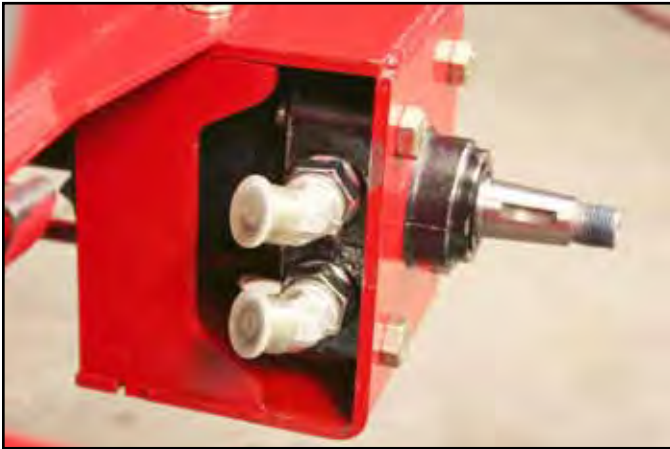


Fig. 1164

IMG-9999a

11. Install both hydraulic hoses to the wheel motor. Make sure the hoses are routed to the correct fitting (marked earlier) (Fig. 1166).



Fig. 1166

IMG-9877a

10. Position the fittings as shown and tighten the jam nuts (Fig. 1165).



Fig. 1165

IMG-9892a

12. Install the woodruff key into the wheel motor shaft keyway (Fig. 1167).



Fig. 1167

IMG-9938a

6

HYDRAULIC DRIVE SYSTEM

13. Install the wheel hub onto the wheel motor shaft (Fig. 1168).



Fig. 1168

IMG-0008a

15. Loosely install a wheel motor nut (Fig. 1170).



Fig. 1170

IMG-0013a

14. Apply thread locking compound to the threads on the wheel motor shaft (Fig. 1169).



Fig. 1169

IMG-0009a

16. Slide the wheel onto the wheel hub (Fig. 1171).



Fig. 1171

IMG-9919a

HYDRAULIC DRIVE SYSTEM

17. Loosely install 4 lug nuts (Fig. 1172).



Fig. 1172

IMG-0015a

19. Apply the parking brake (Fig. 1174).



Fig. 1174

PICT-8610a

18. Ensure wheel motor hoses are not in contact with tire (Fig. 1173).

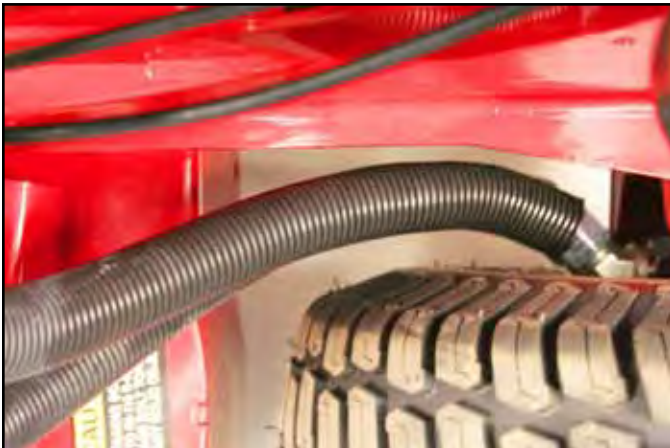


Fig. 1173

IMG-0031a

20. Remove the two jackstands and lower the machine to the floor (Fig. 1175).



Fig. 1175

IMG-0021a

6

HYDRAULIC DRIVE SYSTEM

21. Torque the four wheel lug nuts to 85 ± 5 ft-lbs. (115 ± 6.8 Nm) (Fig. 1176).



Fig. 1176

IMG-0029a

22. Torque the wheel motor nut to 200 ± 25 ft-lbs. (271 ± 33.9 Nm) (Fig. 1177).



Fig. 1177

IMG-0025a

23. Refill the hydraulic oil as needed. Purge air from the hydraulic system. See "Bleeding the Hydraulic System" on page 6-95.
24. Test operate the machine and verify proper operation.

Reservoir Tank Replacement

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

Upon removal, all seals, o-rings, and gaskets should be replaced. During installation, lightly lubricate all seals, o-rings, and gaskets with clean petroleum jelly prior to assembly.

Reservoir Tank Removal

1. Remove bolt, nut and washer from the "R" clamp securing the low pressure return line to the reservoir bracket (Fig. 1178).

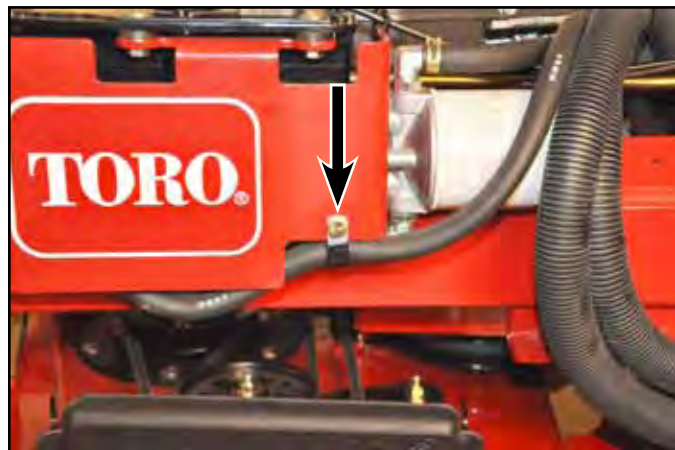


Fig. 1178

IMG-0821a

HYDRAULIC DRIVE SYSTEM

2. Move the hose clamp from the tank fitting so the low pressure return hose can be removed (Fig. 1179).



Fig. 1179

IMG-0822a

4. Move the hose clamp from the filter fitting so the hose can be removed (Fig. 1181).

Note: Due to the short length, remove the hose from the filter fitting as the tank is removed.



Fig. 1181

IMG-0832a

3. Position a drain pan under the reservoir tank. Remove the low pressure return line from the tank fitting and drain the fluid into the pan (Fig. 1180).



Fig. 1180

IMG-0829a

5. Remove the two sets of bolts, nuts, washers and spacers securing the reservoir tank to the tank bracket (Fig. 1182).



Fig. 1182

IMG-0834a

6

HYDRAULIC DRIVE SYSTEM

6. While lifting the tank from the bracket, slide the suction line off the filter fitting (Fig. 1183).



Fig. 1183

IMG-0836a

8. Remove the low pressure hose from the tank fitting (Fig. 1185).



Fig. 1185

IMG-0840a

7. Move the hose clamp from the tank fitting so the low pressure return hose can be removed (Fig. 1184).



Fig. 1184

IMG-0838a

9. Loosen the jam nut securing the position of the 45 degree fitting (Fig. 1186).



Fig. 1186

IMG-0841a

HYDRAULIC DRIVE SYSTEM

10. Remove the fitting from the reservoir tank (Fig. 1187).



Fig. 1187

IMG-0843a

12. Loosen the jam nut securing the position of the 90 degree fitting (Fig. 1189).



Fig. 1189

IMG-0844a

11. Remove the o-ring from the fitting (Fig. 1188).



Fig. 1188

IMG-0854a

13. Remove the fitting from the reservoir tank (Fig. 1190).



Fig. 1190

IMG-0846a

6

HYDRAULIC DRIVE SYSTEM

14. Remove the o-ring from the fitting (Fig. 1191).



Fig. 1191

IMG-0855a

Reservoir Tank Installation

1. Install new o-rings onto the reservoir fittings (Fig. 1192).

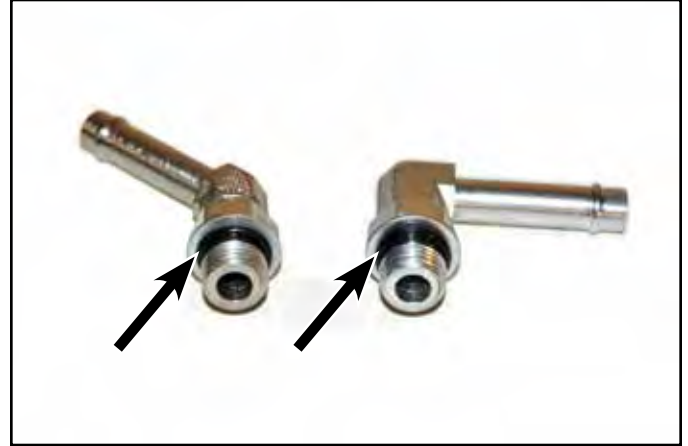


Fig. 1192

IMG-0883a

2. Install the 90 degree fitting into the base of the reservoir (Fig. 1193).



Fig. 1193

IMG-0885a

HYDRAULIC DRIVE SYSTEM

3. Orient the fitting so it is pointing straight rearward. Secure the position with the fitting jam nut (Fig. 1194).



Fig. 1194

IMG-0886a

5. Orient the fitting so it is at a 1 o'clock position. Secure the position with the fitting jam nut (Fig. 1196).



Fig. 1196

IMG-0888a

4. Install the 45 degree fitting into the base of the reservoir (Fig. 1195).



Fig. 1195

IMG-0887a

6. Install the low pressure suction line to the 90 degree fitting and secure with hose clamp (Fig. 1197).



Fig. 1197

IMG-0889a

6

HYDRAULIC DRIVE SYSTEM

7. Position the reservoir into the reservoir bracket. While lowering the reservoir into place, install the low pressure hose onto the filter mount bracket fitting (Fig. 1198).



Fig. 1198

IMG-0836a

9. Position the two spacers between the reservoir mounting surface and the reservoir bracket (Fig. 1200).



Fig. 1200

IMG-0891a

8. Secure the hose to the fitting with the hose clamp (Fig. 1199).



Fig. 1199

IMG-0832a

10. Secure the reservoir assembly to the reservoir bracket using two sets of screws, washers and nuts (Fig. 1201).



Fig. 1201

IMG-0834a

HYDRAULIC DRIVE SYSTEM

11. Install the low pressure return line to the 45 degree fitting and secure with the hose clamp (Fig. 1202).



Fig. 1202

IMG-0892a

13. Fill the reservoir to the "COLD" fluid level (Fig. 1204).

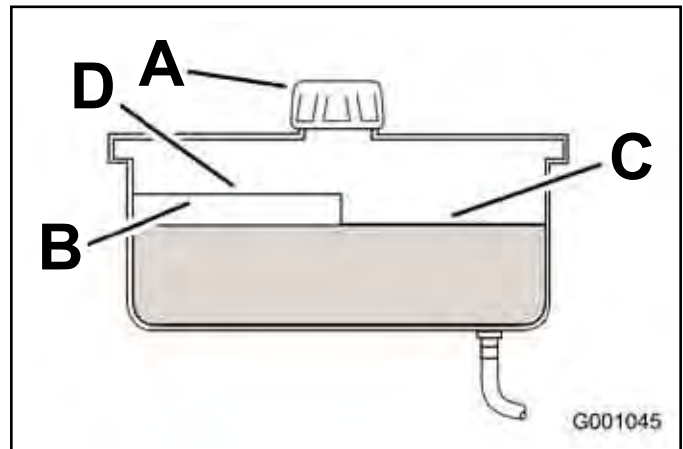


Fig. 1204

fig. 68 G001045

12. Secure the hose to the reservoir bracket using the "R" clamp, bolt, washer and nut (Fig. 1203).

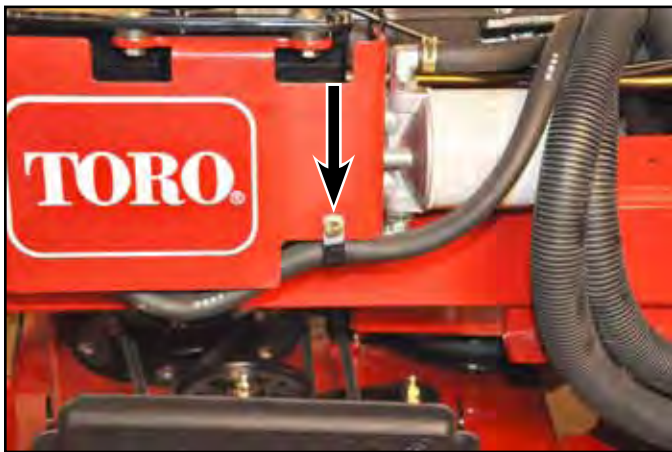


Fig. 1203

IMG-0821a

14. Bleed the hydraulic system. See "Bleeding the Hydraulic System" on page 6-95.

- A. Cap
B. Baffle
C. Cold fluid level-full
D. Hot fluid level-full

6

HYDRAULIC DRIVE SYSTEM

Hydraulic Filter Mount Replacement

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

Upon removal, all seals, o-rings, and gaskets should be replaced. During installation, lightly lubricate all seals, o-rings, and gaskets with clean petroleum jelly prior to assembly.

2. Move the hose clamp from the tank fitting so the low pressure return hose can be removed (Fig. 1206).



Fig. 1206

IMG-0822a

Hydraulic Filter Mount Removal

1. Remove bolt, nut and washer from the “R” clamp securing the low pressure return line to the reservoir bracket (Fig. 1205).

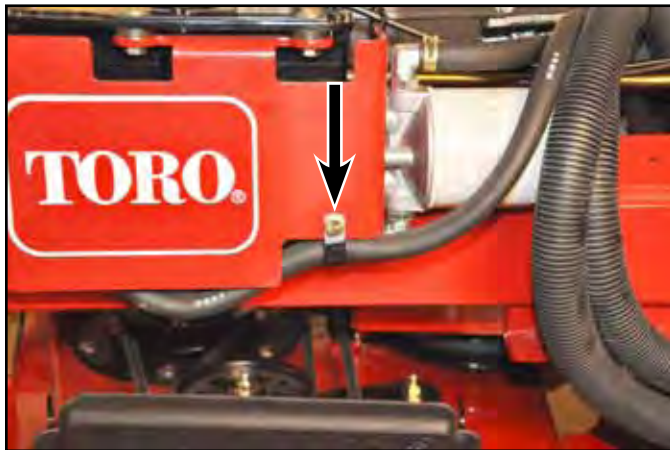


Fig. 1205

IMG-0821a

3. Position a drain pan under the reservoir tank. Remove the low pressure return line from the tank fitting and drain the fluid into the pan (Fig. 1207).



Fig. 1207

IMG-0829a

HYDRAULIC DRIVE SYSTEM

4. Move the hose clamp from the filter fitting so the hose can be removed (Fig. 1208).

Note: Due to the short length, remove the hose from the filter fitting as the tank is removed.



Fig. 1208

IMG-0832a

6. While lifting the tank from the bracket, slide the suction line off the filter fitting (Fig. 1210).



Fig. 1210

IMG-0836a

5. Remove the two sets of bolts, nuts, washers and spacers securing the reservoir tank to the tank bracket (Fig. 1209).



Fig. 1209

IMG-0834a

7. Remove the hydraulic filter (Fig. 1211).



Fig. 1211

IMG-0856a

6

HYDRAULIC DRIVE SYSTEM

8. Move the hose clamp from the filter mount fitting so the hose can be removed (Fig. 1212).



Fig. 1212

IMG-0857a

10. Remove the two bolts and washers securing the filter mount to the tank bracket (Fig. 1214).



Fig. 1214

IMG-0879a

9. Remove the low pressure suction line from the filter mount fitting (Fig. 1213).



Fig. 1213

IMG-0859a

11. Loosen the jam nuts securing the position of the 90 degree fittings (Fig. 1215).

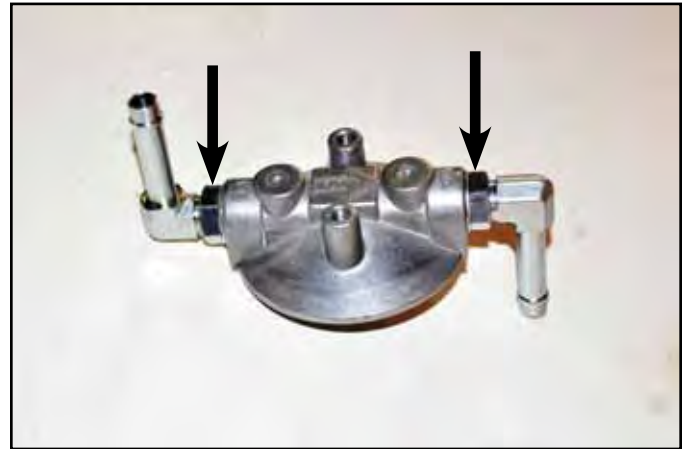


Fig. 1215

IMG-0864a

HYDRAULIC DRIVE SYSTEM

12. Remove the fittings from the filter mount (Fig. 1216).



Fig. 1216

IMG-0867a

Hydraulic Filter Mount Installation

1. Install new o-rings onto the fittings (Fig. 1218).

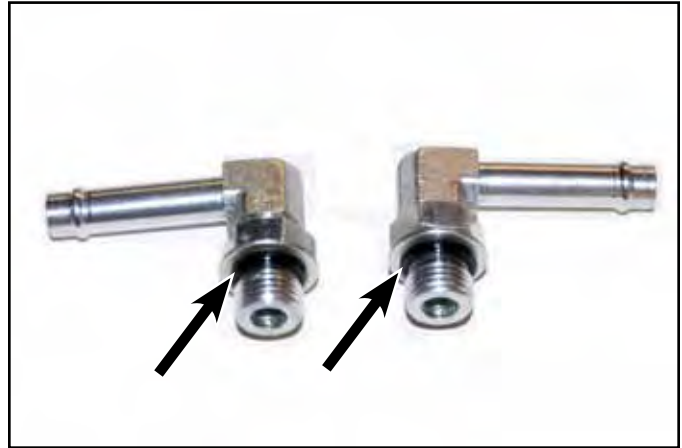


Fig. 1218

IMG-0869a

13. Remove the o-rings from the fittings (Fig. 1217).



Fig. 1217

IMG-0866a

2. Install a fitting into the filter mount "OUT" port (Fig. 1219).



Fig. 1219

IMG-0871a

6

HYDRAULIC DRIVE SYSTEM

3. Orient the fitting so it is pointing rearward, towards the filter mounting face. Secure the position with the fitting jam nut (Fig. 1220).



Fig. 1220

IMG-0875a

5. Orient the fitting so it is pointing forward, away from the filter mounting face. Secure the position with the fitting jam nut (Fig. 1222).



Fig. 1222

IMG-0877a

4. Install a fitting onto the filter mount "IN" port (Fig. 1221).



Fig. 1221

IMG-0877a

6. Position the filter mount so the "FLOW" arrow is pointing up (Fig. 1223).



Fig. 1223

IMG-0878a

6

HYDRAULIC DRIVE SYSTEM

7. Secure the filter mount to the hydraulic reservoir using two bolts and washers (Fig. 1224).

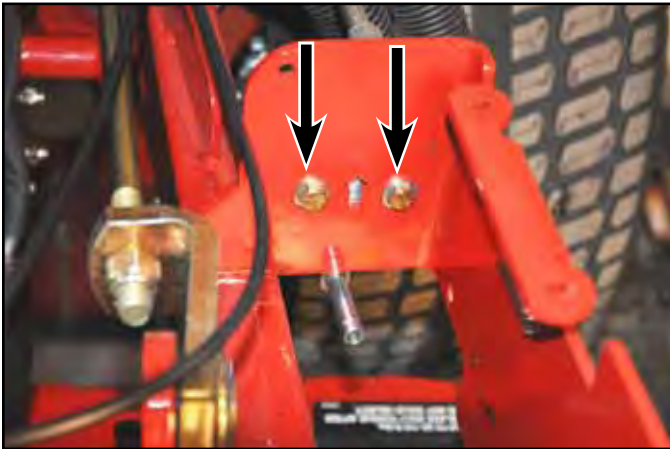


Fig. 1224

IMG-0879a

9. Apply a thin layer of oil to the filter's rubber seal (Fig. 1226).



Fig. 1226

IMG-0881a

8. Install the low pressure suction hose to the filter mount fitting and secure with hose clamp (Fig. 1225).



Fig. 1225

IMG-0857a

10. Install the oil filter to the filter mount (Fig. 1227).



Fig. 1227

IMG-0882a

6

HYDRAULIC DRIVE SYSTEM

11. Position the reservoir into the reservoir bracket. While lowering the reservoir into place, install the low pressure hose onto the filter mount bracket fitting (Fig. 1228).



Fig. 1228

IMG-0836a

13. Position the two spacers between the reservoir mounting surface and the reservoir bracket (Fig. 1230).



Fig. 1230

IMG-0891a

12. Secure the hose to the fitting with the hose clamp (Fig. 1229).



Fig. 1229

IMG-0832a

14. Secure the reservoir assembly to the reservoir bracket using two sets of screws, washers and nuts (Fig. 1231).



Fig. 1231

IMG-0834a

HYDRAULIC DRIVE SYSTEM

15. Install the low pressure return line to the 45 degree fitting and secure with the hose clamp (Fig. 1232).



Fig. 1232

IMG-0892a

17. Fill the reservoir to the "COLD" fluid level (Fig. 1234).

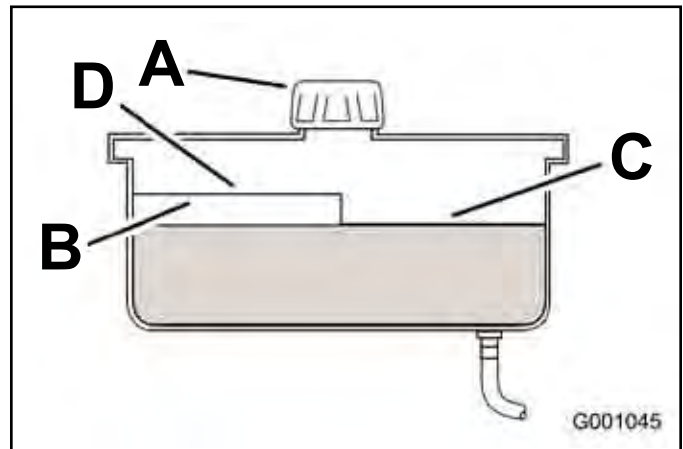


Fig. 1234

fig. 68 G001045

A. Cap
B. Baffle

C. Cold fluid level-full
D. Hot fluid level-full

16. Secure the hose to the reservoir bracket using the "R" clamp, bolt, washer and nut (Fig. 1233).

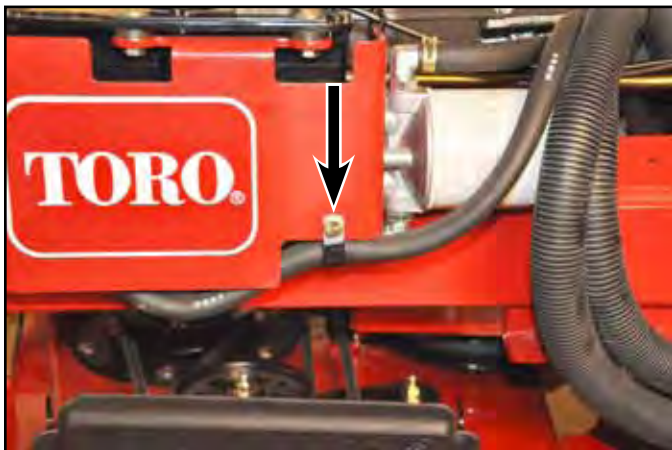


Fig. 1233

IMG-0821a

18. Bleed the hydraulic system. See "Bleeding the Hydraulic System" on page 6-95.

6

HYDRAULIC DRIVE SYSTEM

Hydraulic Testing

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

When using a Bi-Directional Flow Test Kit, determining directional flow is not necessary. The flow meter may be connected in either direction into the forward and reverse high pressure system lines.



Caution:



Ensure all fittings and hoses are attached securely. This test is performed on the machine's high pressure system. Failure to comply could result in serious injury.

1. Apply the parking brake.
2. Loosen the 4 lug nuts.
3. Raise the rear of the machine and secure with jack stands.
4. Release the parking brake.
5. Remove the 4 lug nuts and the wheel assembly (Fig. 1235).



Fig. 1235

IMG-0907a

HYDRAULIC DRIVE SYSTEM

6. Thoroughly clean the area around the hydraulic fittings to prevent debris from entering the system.
7. Mark the hoses and corresponding wheel motor fitting ports to ensure the hoses are connected to their original locations (Fig. 1236).



Fig. 1236

IMG-0911a

10. Cap the wheel motor fittings so debris does not enter the system.
11. Attach the hydraulic hoses to the flow test gauge (Fig. 1238).

Note: When using a flow test gauge that is not bi-directional, damage to the flow tester could occur if the machine is operated in reverse.



Fig. 1238

IMG-0916a

8. Position a drain pan under the wheel motor.
9. Disconnect both hydraulic hoses from the wheel motor (Fig. 1237).



Fig. 1237

IMG-0913a

12. Open the restriction valve all the way (counter-clockwise) (Fig. 1239).



Fig. 1239

IMG-0917a

6

HYDRAULIC DRIVE SYSTEM

13. Run the machine for 2 minutes in forward (no load) to purge air from the system.
14. Run the machine at full throttle (no load). Verify the RPM with a tachometer: 3200 ± 150 RPM. **Do not exceed 3600 RPM.**
15. With the drive control fully forward, slowly tighten the restriction valve until the gauge indicates 300 PSI (21 bar) (Fig. 1240).



Fig. 1240

IMG-0921a

16. Record the flow reading from the bi-directional flow meter. Make a second flow reading at 1100 PSI and record that reading (Fig. 1241). Subtract the first reading from the second reading and determine if it is an acceptable GPM.



Fig. 1241

IMG-0920a

Example:

1st Reading: 300 psi (21 bar) reading 7 gpm (26 l/m).
2nd Reading: 1100 psi (76 bar) reading 3 gpm (11 l/m).

$$\begin{array}{r} 7 \text{ gpm (1st reading)} \\ - 3 \text{ gpm (2nd reading)} \\ \hline 4 \text{ gpm (the difference)} \end{array}$$

Refer to the Hydro-Gear pump service manual for maximum acceptable "flow droop", or difference.

Note: Disassemble and inspect the wheel motor if the pump is damaged due to mechanical failure, excessive wear, or the hydraulic fluid is overheated or contaminated in any way. Flush or replace hydraulic lines and reservoir to remove any contamination.

6

HYDRAULIC DRIVE SYSTEM

17. After all necessary repairs have been made, re-connect the hydraulic hoses to the wheel motor fittings.
18. Slide the wheel and tire assembly onto the hub and snug fit the 4 lug nuts on the wheel hub studs.
19. Lower the machine so the rear tires are resting on the ground.
20. Apply the parking brake.
21. Tighten and torque the 4 lug nuts to 85 ± 8 ft-lbs. (115 ± 10.8 Nm) (Fig. 1242).



Fig. 1242

IMG-0029a

22. Fill the reservoir with hydraulic fluid as specified. Note that there are fill level lines inside of the reservoir (Fig. 1243).

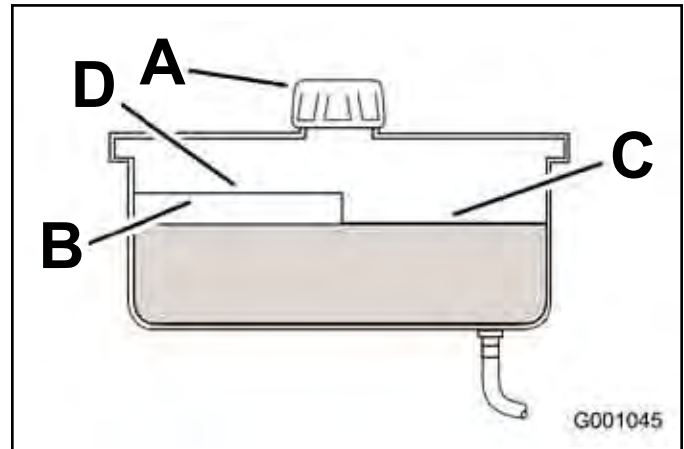


Fig. 1243

fig. 68 G001045

- | | |
|-----------|--------------------------|
| A. Cap | C. Cold fluid level-full |
| B. Baffle | D. Hot fluid level-full |

23. Release the parking brake.
24. Bleed the hydraulic system. See "Bleeding the Hydraulic System" on page 6-95.
25. Test operate machine and adjust tracking and neutral as needed.

HYDRAULIC DRIVE SYSTEM

Bleeding the Hydraulic System

Due to the effects air has on efficiency in hydrostatic drive applications, it is critical that air is purged from the system.

These purge procedures should be implemented any-time a hydrostatic system has been opened for maintenance or any additional oil has been added to the system.

Air creates inefficiency because it has compression and expansion rates that are higher than that of oil.

Air trapped in the oil may cause the following symptoms:

- Noisy operation
- Lack of power or drive after short-term operation
- High operation temperature and excessive expansion of oil.

Before starting, make sure the reservoir is at the proper oil level.

The following procedures should be performed with the vehicle drive wheels off the ground, then repeated under normal operating conditions.

1. Disengage the PTO.
2. Stop the engine and wait for all moving parts to stop before leaving the operating position.
3. Support the rear of the machine on jack stands high enough to raise the drive wheels off the ground.
4. With the bypass valve open and the engine running, slowly move the directional control in both forward and reverse directions (5 to 6 times). As air is purged from the unit, the oil level will drop.
5. With the bypass valve closed and the engine running, slowly move the directional control in both forward and reverse directions (5 to 6 times). Check the oil level, and add oil as required after stopping engine.
6. It may be necessary to repeat Steps 4 and 5 until all the air is completely purged from the system. When normal forward and reverse speed is obtained, purging is complete.



WARNING

POTENTIAL FOR SERIOUS INJURY

Certain procedures require the vehicle engine to be operated and the vehicle to be raised off of the ground. To prevent possible injury to the servicing technician and/or bystanders, ensure the vehicle is properly secured.

HYDRAULIC DRIVE SYSTEM

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Mower Deck Belt Replacement

Mower Deck Belt Removal

1. Turn the ignition off and remove the key.
2. Move the mower deck to the 1" (25mm) HOC.
3. Remove the RH and LH belt covers (Fig. 1244).



Fig. 1244

IMG-0485a

4. With a spring tool, remove the extension spring from the spring anchor bracket (Fig. 1245).



Fig. 1245

IMG-0487a

5. Remove the belt from around the pulleys.

Mower Deck Belt Installation

1. Install the deck drive belt. Ensure the deck drive belt is routed properly around the mower deck and clutch pulleys. Refer to belt routing decal 117-0486 (Fig. 1246).



Fig. 1246

fig. 1 117-0486

2. With a spring tool, install the extension spring to the spring anchor bracket (Fig. 1247).



Fig. 1247

IMG-0487a

MOWER DECK

3. Verify the idler pulley spring is stretched to 5-3/4" (14.6 cm) from hook to hook (Fig. 1248).

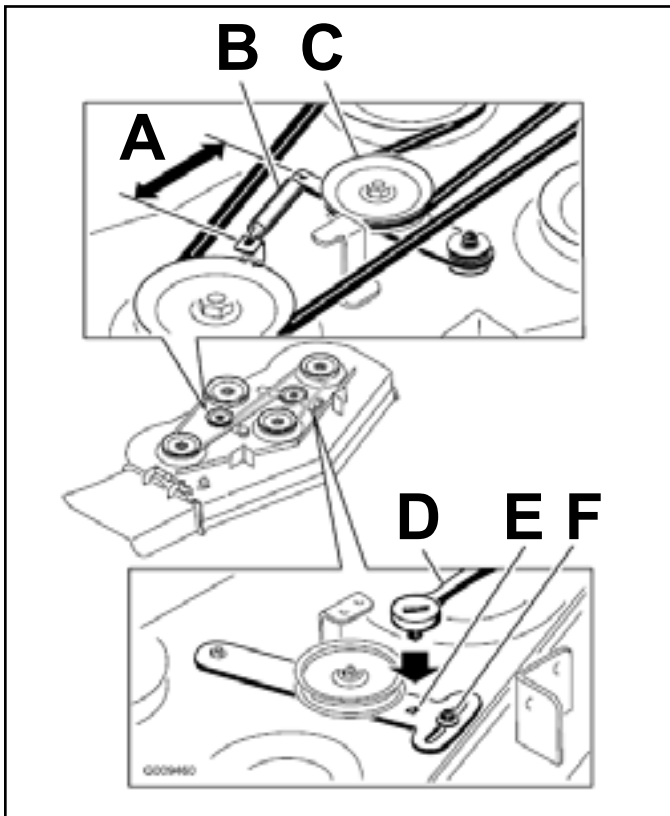


Fig. 1248 fig. 61 G009460

- | | |
|--------------------------------------|----------------------------|
| A. 5-3/4" (14.6cm) from hook to hook | D. Ratchet |
| B. Spring | E. Square hole for ratchet |
| C. Spring loaded idler | F. Nut |

4. If the idler pulley spring requires adjustment, loosen the front idler pulley by loosening the nut (Fig. 1248).
5. Using a ratchet in the front idler arm, tighten the idler pulley until the spring is stretched to 5-3/4" (14.6 cm) from hook to hook (Fig. 1248).
6. Secure the front idler arm by tightening the nut (Fig. 1248).
7. Install the RH and LH mower belt covers (Fig. 1249).



Fig. 1249

IMG-0485a

7

Spindle Replacement & Service

Mower Deck Spindle Removal

1. Disengage the PTO and set the parking brake.
2. Stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
3. Engage the parking brake.
4. Lower the mower deck to the lowest height-of-cut position.
5. Remove the belt covers (Fig. 1250).



Fig. 1250

IMG-9548a

6. Loosen the front idler by loosening the nut (Fig. 1251).



Fig. 1251

IMG-9550a

7. Remove the mower deck belt from the mower deck pulleys (Fig. 1252).



Fig. 1252

IMG-9553a

MOWER DECK

8. Raise the mower deck to the transport position (highest height-of-cut) and pin it to secure (Fig. 1253).



Fig. 1253 IMG-9557a

9. Remove the wingnut from the battery hold down bolt (Fig. 1254).



Fig. 1254 IMG-9568a

10. Remove the battery hold down bolt (Fig. 1255).



Fig. 1255 IMG-9570a

11. Repeat steps 8 and 9 to remove the battery hold down on the other side of the battery cover.

12. Remove the battery cover (Fig. 1256).



Fig. 1256 IMG-9574a

7

MOWER DECK

13. Disconnect the negative battery cable from the negative (-) battery terminal (Fig. 1257).



Fig. 1257

IMG-9575a

14. Slide the red boot off the positive (red) battery terminal. Remove the positive (red) battery cable from the positive (+) battery terminal (Fig. 1258).



Fig. 1258

IMG-9579a

15. Remove the battery (Fig. 1259).



Fig. 1259

IMG-9585a

16. Clean around the hydraulic tank cap to prevent debris from getting into the tank.
17. Remove the cap from the hydraulic tank and place a piece of plastic wrap over the opening. Reinstall the hydraulic tank cap (Fig. 1260).



Fig. 1260

IMG-9587a

MOWER DECK

18. Siphon the fuel from the fuel tank.

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

- A. Clean around the fuel cap to prevent debris from getting into the fuel tank.
- B. Remove the fuel cap.
- C. Insert a siphon pump hose into the fuel tank (Fig. 1261).



Fig. 1261

IMG-9592a

- D. Using the siphon pump, transfer the fuel into a clean gas can.
- E. Wipe up any spilled fuel.

19. With two people, raise the front of the mower so it rests on the drive tires and the platform (Fig. 1262).



Fig. 1262

IMG-9752a

20. Block the mower deck blade (Fig. 1263).



Fig. 1263

IMG-9764a

MOWER DECK

21. Remove the 3 bolts securing the pulley to the spindle pulley hub (Fig. 1264).

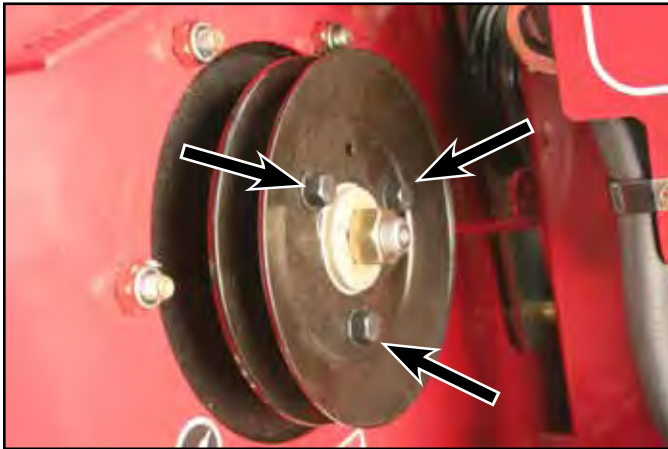


Fig. 1264

IMG-9765a

23. Block the mower deck blade and remove the blade bolt, washer and blade from the spindle (Fig. 1266 and Fig. 1267).



Fig. 1266

IMG-9775a

22. Remove the pulley from the spindle (Fig. 1265).



Fig. 1265

IMG-9772a



Fig. 1267

IMG-9779a

MOWER DECK

24. Remove the 6 bolts and nuts securing the spindle housing to the mower deck (Fig. 1268).



Fig. 1268

IMG-9780a

25. Remove the spindle assembly from the mower deck (Fig. 1270).



Fig. 1270

IMG-9816a

Note: 2010 machines have the spindle housing mounted to the top of the deck. From the underside of the deck, remove the 6 nuts securing the spindle housing (Fig. 1269).

26. To service the spindle, refer to "Spindle Service" on page 7-14.



Fig. 1269

IMG-0794a

Mower Deck Spindle Installation

1. Position the spindle assembly to the deck. Orient the spindle so that the grease fitting is easily accessible (Fig. 1271).



Fig. 1271

IMG-9822a

2. Install 6 bolts and nuts to secure the spindle assembly to the mower deck (Fig. 1272).



Fig. 1272

IMG-9782a

Note: 2010 machines have the spindle housing mounted to the top of the deck. From the underside of the deck, install the 6 nuts securing the spindle housing (Fig. 1273).



Fig. 1273

IMG-0794a

3. Slide the crowned blade bolt washer onto the blade bolt so the crown is toward the bolt head (Fig. 1274).



Fig. 1274

IMG-9825a

MOWER DECK

- Slide the blade bolt through the blade (Fig. 1275).



Fig. 1275

IMG-9827a

- Block the blade and torque the blade bolt to 85 - 110 ft-lbs. (115 - 149 Nm) (Fig. 1277).



Fig. 1277

IMG-9833a

- Install the blade, blade bolt and washer onto the spindle assembly (Fig. 1276).



Fig. 1276

IMG-9830a

- Position the pulley on the spindle housing assembly (Fig. 1278).



Fig. 1278

IMG-9773a

7

MOWER DECK

8. With the blade blocked, secure the belt pulley to the top of the spindle housing assembly with the 3 bolts (Fig. 1279).

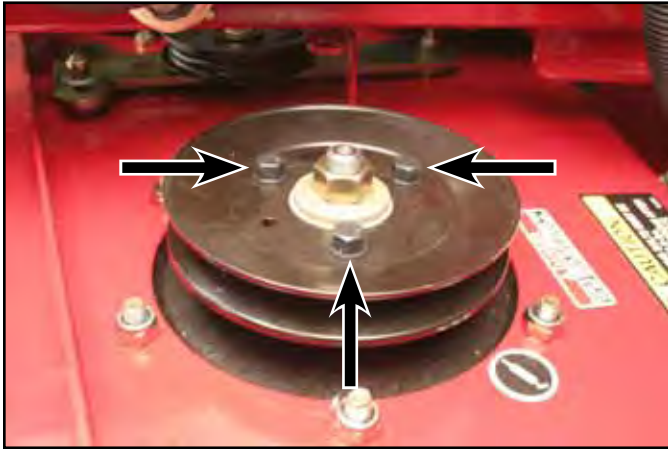


Fig. 1279

IMG-9770a

9. Grease the spindle assembly with No. 2 general purpose lithium base or molybdenum base grease until grease begins to ooze out of the bearings. (Fig. 1280).



Fig. 1280

IMG-9835a

10. With two people, lower the front of the mower to the ground.

11. Position the battery onto the battery tray (Fig. 1281).



Fig. 1281

IMG-9660a

12. Install the positive (red) battery cable to the positive (+) battery terminal and slide the red boot over the positive (red) battery terminal connection. (Fig. 1282).



Fig. 1282

IMG-9662a

MOWER DECK

13. Install the negative battery cable to the negative (-) battery terminal (Fig. 1283).



Fig. 1283

IMG-9665a

15. Install the two battery hold down bolts and wing nuts to secure (Fig. 1285).



Fig. 1285

IMG-9672a

14. Position the battery cover over the battery (Fig. 1284).



Fig. 1284

IMG-9667a

16. Remove the hydraulic tank cap and remove the piece of plastic over the tank opening. Reinstall the hydraulic cap (Fig. 1286).



Fig. 1286

IMG-9675a

MOWER DECK

17. Lower the mower deck to the lowest height-of-cut (Fig. 1287).

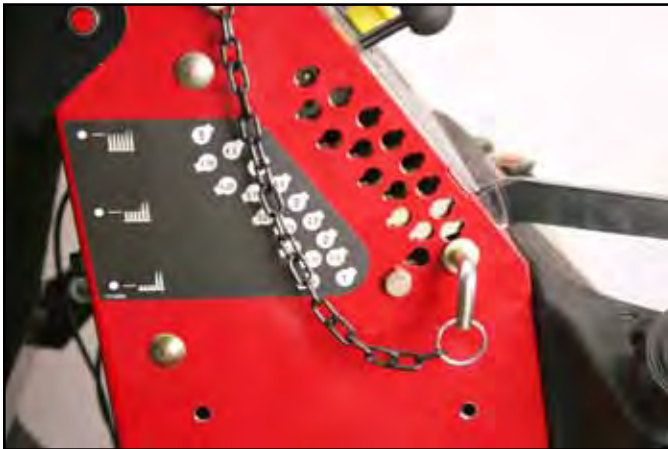


Fig. 1287

IMG-9676a

18. Route the mower deck belt around the mower deck pulleys and clutch pulley. Refer to the belt routing decal (Fig. 1288):



Fig. 1288

fig. 1 117-0486

19. Using a ratchet in the idler arm, tension the arm until the spring is stretched 5-3/4" (14.6cm) from hook to hook, then tighten the nut (Fig. 1289):

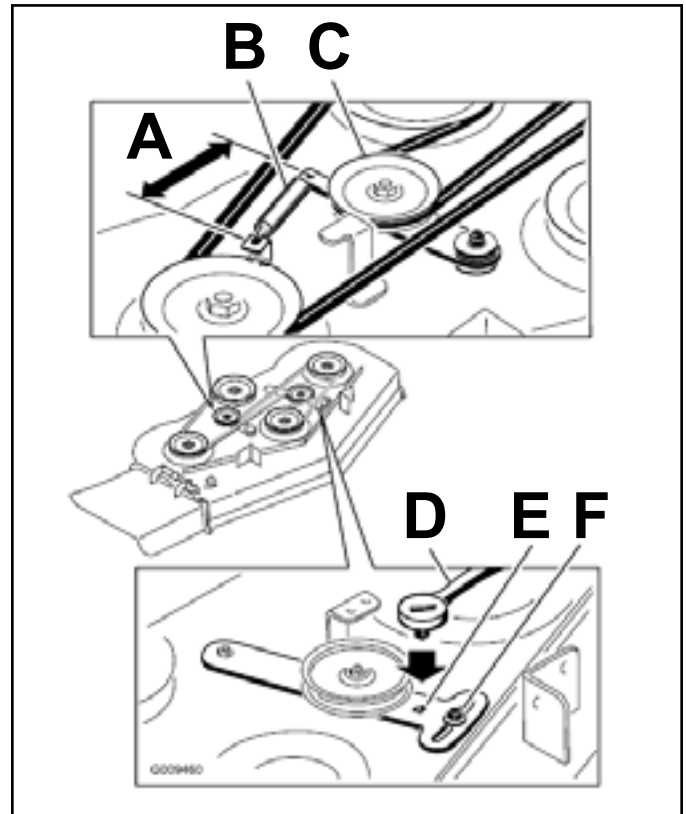


Fig. 1289

fig. 61 G009460

- A. 5-3/4" (14.6cm) from hook to hook
- B. Spring
- C. Spring loaded idler
- D. Ratchet
- E. Square hole for ratchet
- F. Nut

MOWER DECK

20. Install the LH and RH belt covers onto the mower deck (Fig. 1290).



Fig. 1290

IMG-9548a

22. Add fuel to the fuel tank.

Spindle Service

1. Remove the hex nut from the end of the spindle shaft (Fig. 1291).



Fig. 1291

IMG-9789a

2. Remove the washer from the end of the spindle shaft (Fig. 1292).



Fig. 1292

IMG-9790a

MOWER DECK

3. Remove the pulley hub from the end of the spindle shaft (Fig. 1293).



Fig. 1293

IMG-9791a

5. Remove the bearing shield from the spindle assembly (Fig. 1295).

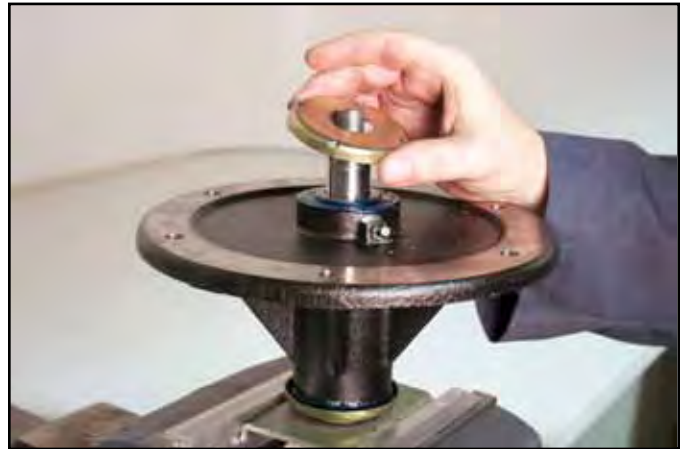


Fig. 1295

IMG-9793a

4. Remove the square key from the spindle shaft keyway (Fig. 1294).



Fig. 1294

IMG-9792a

6. Remove the thrust washer from the spindle assembly (Fig. 1296).



Fig. 1296

IMG-9794a

MOWER DECK

7. Remove the spindle housing assembly from the spindle shaft (Fig. 1297).



Fig. 1297

IMG-9795a

9. Remove the bearing shield from the spindle shaft (Fig. 1299).



Fig. 1299

IMG-9796a

8. Remove the thrust washer from the spindle shaft. (It may stick to the bottom of the spindle housing.) (Fig. 1298)



Fig. 1298

IMG-9797a

10. Drive out one of the bearings from the spindle housing (Fig. 1300).



Fig. 1300

IMG-9798a

7

11. Remove the bearing spacer from the spindle housing (Fig. 1301).



Fig. 1301

IMG-9799a

13. Remove the grease fitting from the spindle housing (Fig. 1303).



Fig. 1303

IMG-9802a

12. Turn the housing over and drive the second bearing out of the spindle housing (Fig. 1302).



Fig. 1302

IMG-9800a

14. Inspect the spindle assembly components. Replace if damaged or worn.

Note: Spindle shaft keyway can be significantly damaged before the spindle shaft requires replacement.

15. Install a grease fitting into the spindle housing (Fig. 1304).



Fig. 1304

IMG-9802a

MOWER DECK

16. Press a new bearing into one end of the spindle housing hub (Fig. 1305).



Fig. 1305

IMG-9804a

18. Press a new bearing into the end of the spindle housing hub (Fig. 1307).



Fig. 1307

IMG-9809a

17. Turn the spindle housing over and slide a bearing spacer into the spindle hub (Fig. 1306).



Fig. 1306

IMG-9807a

19. Slide the bearing shield onto the spindle shaft (Fig. 1308).



Fig. 1308

IMG-9796a

7

20. Slide the thrust washer onto the spindle shaft (Fig. 1309).



Fig. 1309

IMG-9797a

22. Slide the thrust washer onto the spindle shaft (Fig. 1311).



Fig. 1311

IMG-9794a

21. Slide the spindle housing assembly onto the spindle shaft (Fig. 1310).



Fig. 1310

IMG-9795a

23. Slide the bearing shield onto the spindle shaft (Fig. 1312).



Fig. 1312

IMG-9793a

MOWER DECK

24. Insert the square key into the spindle shaft keyway (Fig. 1313).



Fig. 1313

IMG-9792a

26. Slide the washer onto the end of the spindle shaft (Fig. 1315).



Fig. 1315

IMG-9790a

25. Slide the pulley hub onto the end of the spindle shaft (hub side up) aligning it with the square key (Fig. 1314).



Fig. 1314

IMG-9791a

27. Install the hex nut onto the end of the spindle shaft and torque to 100 ± 10 ft-lbs. (135.5 ± 13.5 Nm) (Fig. 1316).



Fig. 1316

IMG-9814a

7

Spring Idler & Adjustment Idler Replacement

Spring Idler Removal

1. Remove the mower deck belt. Refer to "Mower Deck Belt Removal" on page 7-1.
2. Remove the carriage bolt and nut securing the spring idler assembly to the deck (Fig. 1317).



Fig. 1317

IMG-0597a

3. Remove the spring idler assembly (Fig. 1318).



Fig. 1318

IMG-0599a

4. Remove the spring from the idler plate (Fig. 1319).



Fig. 1319

IMG-0600a

MOWER DECK

- Remove the two plain washers, two friction composite washers, and bushing (Fig. 1320).

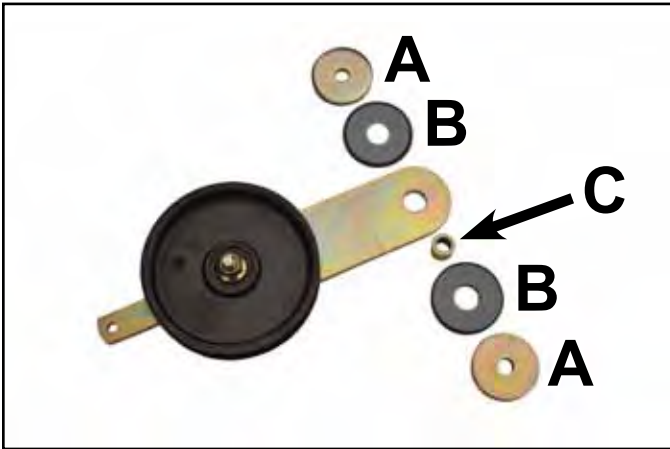


Fig. 1320 IMG-0601a

- A. Plain washer (2)
- B. Friction composite washer (2)
- C. Bushing

- Remove the carriage bolt, nut, and washers securing the pulley to the idler plate (Fig. 1321).

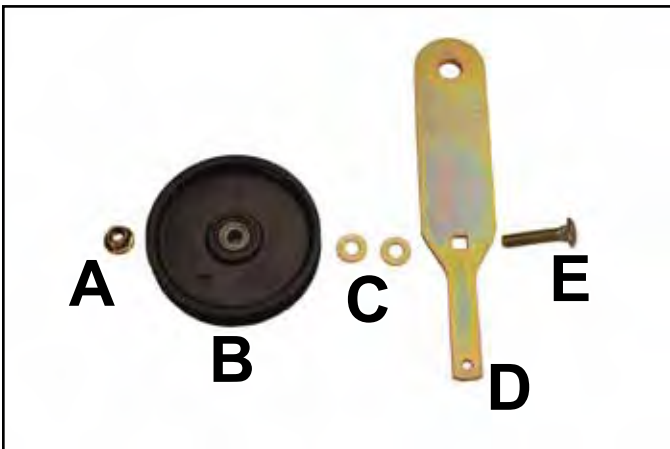


Fig. 1321 IMG-0603a

- A. Nut
- B. Idler pulley
- C. Washer (2)
- D. Idler plate
- E. Carriage bolt

Spring Idler Installation

- Install the carriage bolt, nut, and washers securing the pulley (hub down) to the idler plate (Fig. 1322).

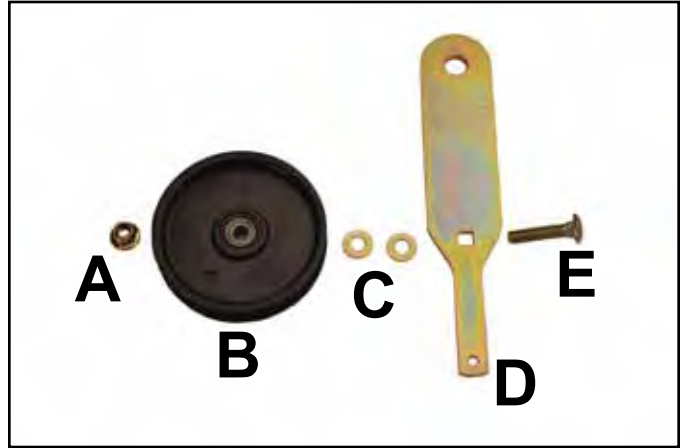


Fig. 1322 IMG-0603a

- A. Nut
- B. Idler Pulley
- C. Washer (2)
- D. Idler Plate
- E. Carriage Bolt

- Place the carriage bolt up through the mower deck and install a plain washer and bushing (Fig. 1323).



Fig. 1323 IMG-0621a

3. Install a friction composite washer, idler plate, friction composite washer, plain washer, and secure with nut (Fig. 1324).

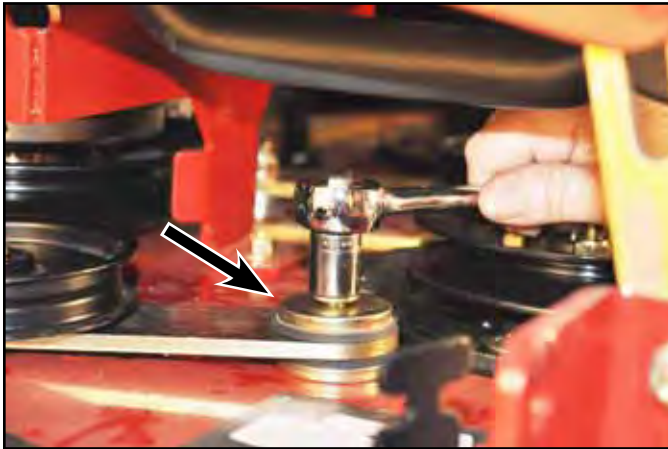


Fig. 1324

IMG-0623a

4. Install extension spring on the idler plate with the hook of the spring coming from the bottom of the idler plate upwards (Fig. 1325).



Fig. 1325

IMG-0625a

5. Secure the spring to the spring anchor and install the mower deck belt. Refer to "Mower Deck Belt Installation" on page 7-1.

Adjustment Idler Removal

1. Remove the mower deck belt. Refer to "Mower Deck Belt Removal" on page 7-1.
2. Remove the carriage bolt, nut, washer and spacer securing the slotted end of the idler plate (Fig. 1326).



Fig. 1326

IMG-0605a

3. Remove the carriage bolt, nut and spacer securing the pivot end of the idler plate (Fig. 1327).



Fig. 1327

IMG-0607a

MOWER DECK

- Remove the idler adjust assembly from the mower deck (Fig. 1328).



Fig. 1328 IMG-0608a

Adjustment Idler Installation

- Install the carriage bolt, nut, and washers securing the pulley (hub down) to the idler plate (Fig. 1330).

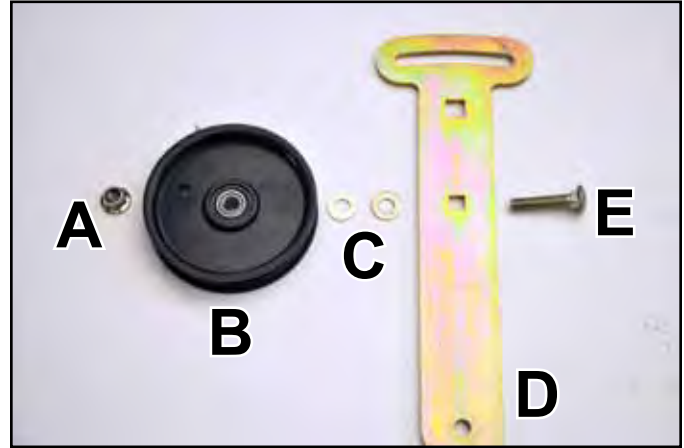


Fig. 1330 IMG-0609a

- Remove the carriage bolt, nut, and washers securing the pulley to the idler plate (Fig. 1329).

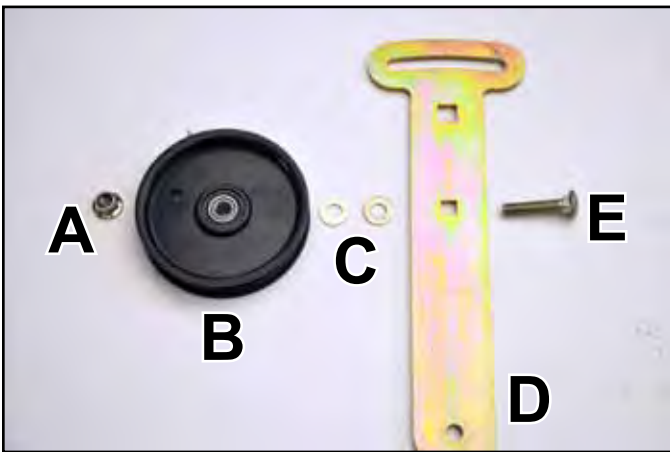


Fig. 1329 IMG-0609a

- | | |
|-----------------|------------------|
| A. Nut | D. Idler Plate |
| B. Idler Pulley | E. Carriage Bolt |
| C. Washer (2) | |

- Place the carriage bolt up through the mower and install a spacer (Fig. 1331).

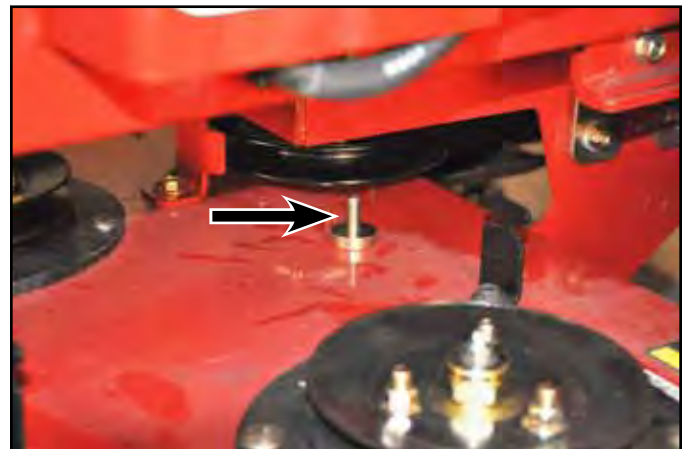


Fig. 1331 IMG-0612a

- | | |
|-----------------|------------------|
| A. Nut | D. Idler Plate |
| B. Idler Pulley | E. Carriage Bolt |
| C. Washer (2) | |

MOWER DECK

3. Install idler adjust assembly and secure with nut (Fig. 1332).

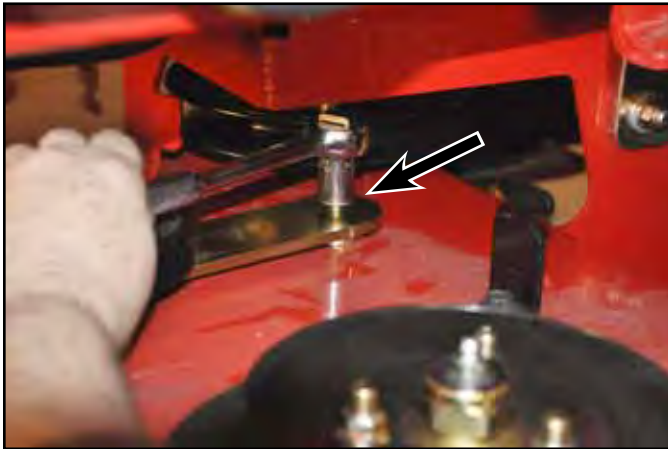


Fig. 1332

IMG-0614a

5. Install carriage bolt through the mower deck, spacer, idler plate, Belleville washer, and loosely install the nut (Fig. 1334).



Fig. 1334

IMG-0620a

4. Position spacer between the mower deck and the idler adjust assembly (Fig. 1333).



Fig. 1333

IMG-0618a

6. Install the mower deck belt. Refer to "Mower Deck Belt Installation" on page 7-1.

MOWER DECK

Baffles & Skid Plate Replacement

Fixed Baffle Removal

1. Remove the two nuts from the self-tapping screws located on the top of the mower deck for the fixed baffle (Fig. 1335).

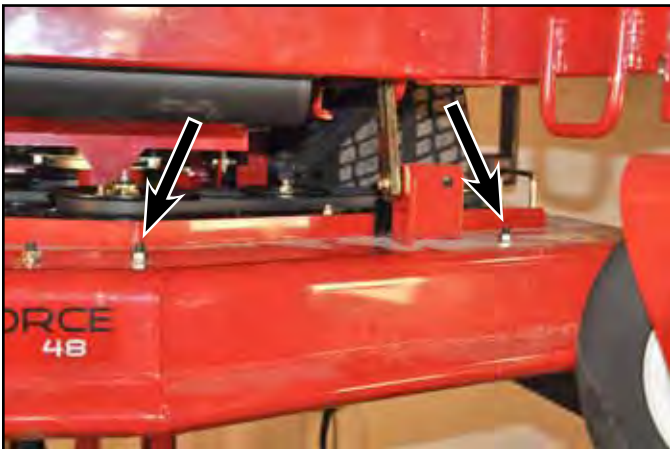


Fig. 1335

IMG-0627a

2. Remove the carriage bolt and nut for the fixed baffle located on the left side of the mower deck (Fig. 1336).



Fig. 1336

IMG-0629a

3. Remove the two self-tapping screws securing the fixed baffle to the deck (Fig. 1337).

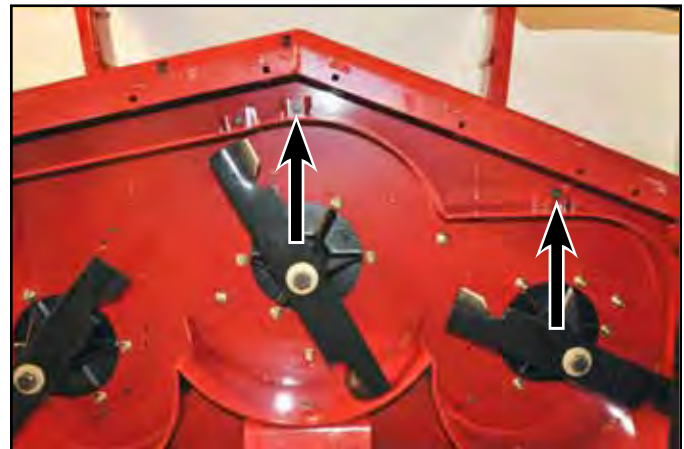


Fig. 1337

IMG-0634a

4. Remove the baffle from the mower deck (Fig. 1338).



Fig. 1338

IMG-0638a

7

Fixed Baffle Installation

1. Position the fixed baffle into the mower deck (Fig. 1339).



Fig. 1339

IMG-0638a

2. Loosely install the carriage bolt and nut through the hole located on the left side of the mower deck (Fig. 1340).



Fig. 1340

IMG-0629a

3. Install the two self-tapping screws through the fixed baffle to the mower deck (Fig. 1341).

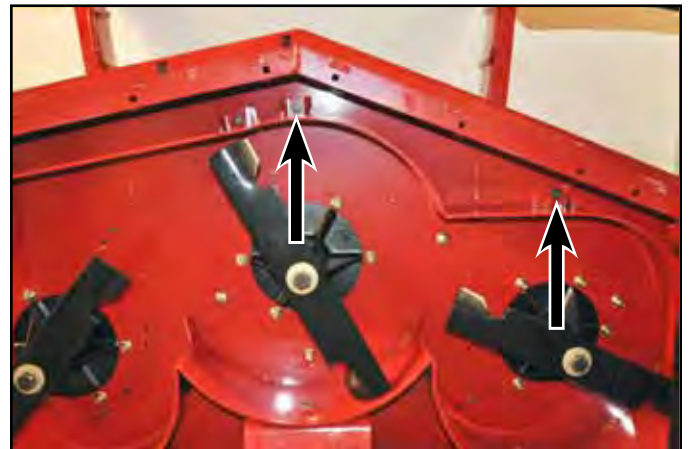


Fig. 1341

IMG-0634a

4. Tighten the carriage bolt and nut on the fixed baffle and left hand side of the mower deck (Fig. 1342).

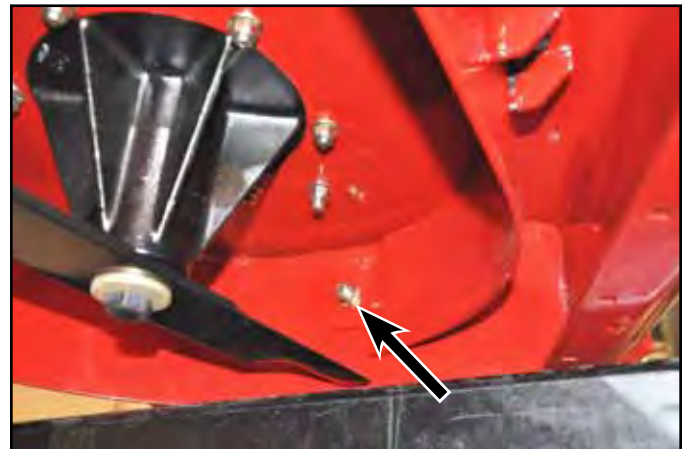


Fig. 1342

IMG-0629a

MOWER DECK

5. Install two nuts on the self-tapping screws retaining the fixed baffle (Fig. 1343).

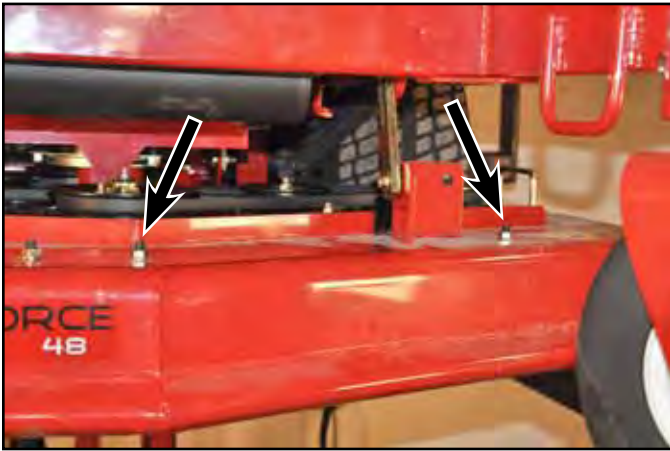


Fig. 1343

IMG-0627a

Adjustable Baffle Removal

1. Remove the nut from the thread forming screw located on the top of the mower for the adjustable baffle (Fig. 1344).

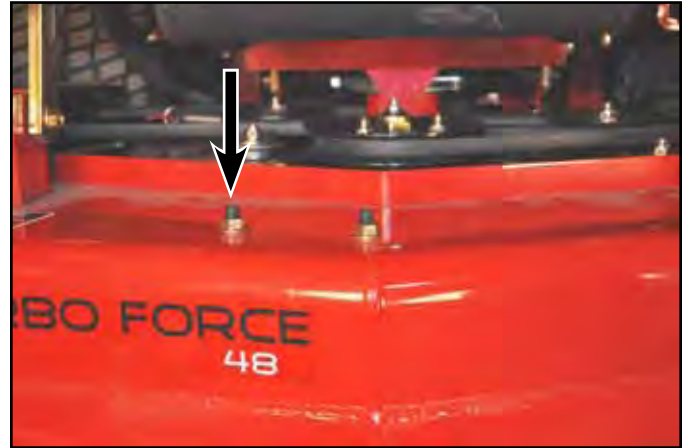


Fig. 1344

IMG-0787a

2. Remove the lever assembly from the adjustable baffle by unscrewing the lever from the adjustable baffle (Fig. 1345).



Fig. 1345

IMG-0643a

7

MOWER DECK

3. Remove the thread forming screw from the adjustable baffle assembly (Fig. 1346).



Fig. 1346

IMG-0790a

5. Remove the nut that secures the lock lever to the lock cap (Fig. 1348).



Fig. 1348

IMG-0666a

4. Remove the adjustable baffle from the mower deck (Fig. 1347).



Fig. 1347

IMG-0650a

6. Disassemble the lock lever assembly (Fig. 1349).



Fig. 1349

IMG-0669a

MOWER DECK

Adjustable Baffle Installation

1. Secure the lock screw in the lock cap with the lock lever (Fig. 1350).



Fig. 1350

IMG-0681a

2. Secure the lock lever with nut (Fig. 1351).



Fig. 1351

IMG-0666a

3. Secure the adjustable baffle to the mower deck with a thread forming screw (Fig. 1352).



Fig. 1352

IMG-0790a

4. Install a nut on the thread forming screw (Fig. 1353).

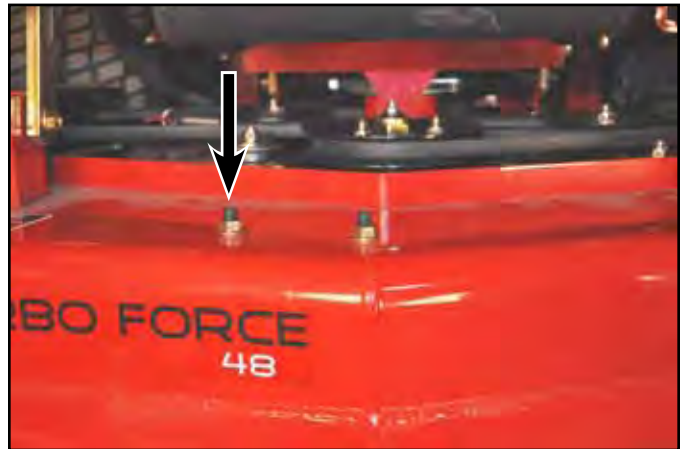


Fig. 1353

IMG-0787a

5. Apply anti-seize compound onto the lock screw threads (Fig. 1354).



Fig. 1354

IMG-0687a

6. Thread the lever assembly in the adjustable baffle (Fig. 1355).



Fig. 1355

IMG-0689a

Discharge Baffle Removal

1. Remove the right hand belt cover (Fig. 1356).



Fig. 1356

IMG-0671a

2. Remove the two nuts from the thread forming screws that secure the discharge baffle (Fig. 1357).



Fig. 1357

IMG-0674a

MOWER DECK

3. Remove the two thread forming screws retaining the discharge baffle to the deck (Fig. 1358).

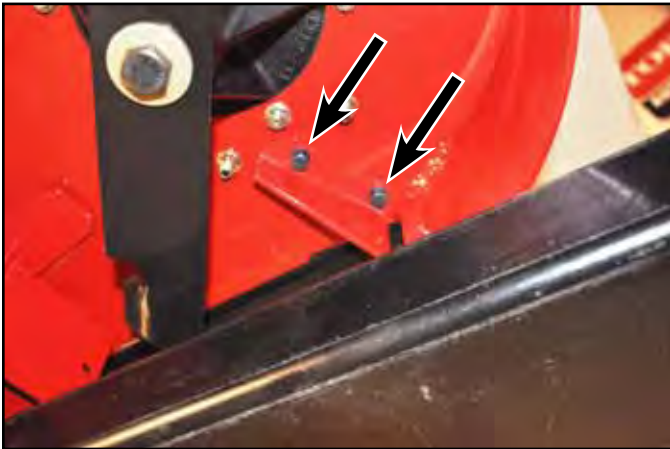


Fig. 1358

IMG-0791a

Discharge Baffle Installation

1. Secure the discharge baffle with two thread forming screws (Fig. 1360).

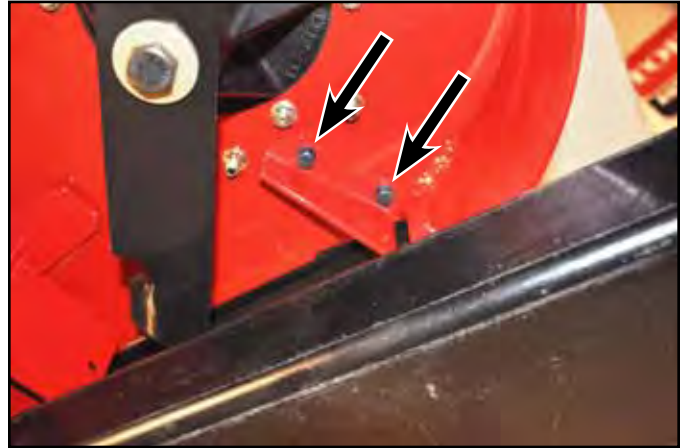


Fig. 1360

IMG-0791a

4. Remove the discharge baffle from the underside of the mower deck (Fig. 1359).

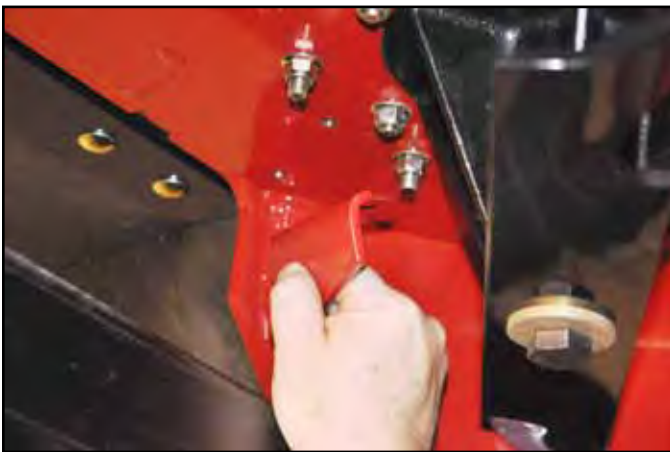


Fig. 1359

IMG-0680a

2. Install two nuts to the thread forming screws retaining the discharge baffle to the mower deck (Fig. 1361).



Fig. 1361

IMG-0674a

3. Install the RH belt cover (Fig. 1362).



Fig. 1362

IMG-0671a

Skid Plate Removal

1. Remove the three nuts and carriage bolts securing the skid plate to the mower deck (Fig. 1363).



Fig. 1363

IMG-0503a

2. Remove the skid plate from the mower deck (Fig. 1364).



Fig. 1364

IMG-0504a

MOWER DECK

Skid Plate Installation

1. Position the skid plate into the mower deck (Fig. 1365).



Fig. 1365

IMG-0504a

2. Secure the skid plate to the mower deck with three carriage bolts and nuts (Fig. 1366).

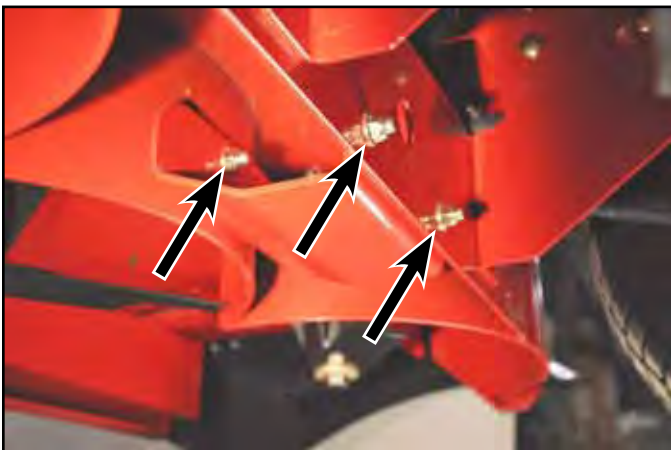


Fig. 1366

IMG-0503a

Anti-Scalp Roller Replacement (60" Models Only)

Single Anti-Scalp Roller Removal

1. Remove the nut from the roller axle bolt (Fig. 1367).



Fig. 1367

IMG-0692a

2. Remove the axle bolt and roller assembly from the wheel bracket (Fig. 1368).



Fig. 1368

IMG-0693a

MOWER DECK

3. Remove the spacer from the spanner tube (Fig. 1369).



Fig. 1369

IMG-0694a

5. Remove the thread forming screw securing the wheel bracket to the deck and remove the bracket (Fig. 1371).



Fig. 1371

IMG-0696a

4. Remove the spanner tube from the roller (Fig. 1370).



Fig. 1370

IMG-0695a

MOWER DECK

Single Anti-Scalp Roller Installation

1. Position the wheel bracket on the deck so the wheel bracket tabs are aligned with the slots on the deck (Fig. 1372).



Fig. 1372

IMG-0698a

2. Secure the wheel bracket to the deck with a thread forming screw (Fig. 1373).



Fig. 1373

IMG-0696a

3. Insert the spanner tube through the roller (Fig. 1374).



Fig. 1374

IMG-0695a

4. Place the spacer onto the spanner tube (Fig. 1375).



Fig. 1375

IMG-0694a

5. Secure the roller assembly to the wheel bracket with the axle bolt and nut (Fig. 1376).



Fig. 1376

IMG-0691a

Double Anti-Scalp Roller Removal

1. Remove the nut from the roller axle bolt (Fig. 1377).



Fig. 1377

IMG-0700a

2. Remove the axle bolt and roller assembly from the wheel bracket (Fig. 1378).



Fig. 1378

IMG-0702a

MOWER DECK

3. Remove the spanner tube from the rollers (Fig. 1379).



Fig. 1379

IMG-0704a

4. Remove the two thread forming screws securing the wheel bracket to the deck and remove the bracket (Fig. 1380).



Fig. 1380

IMG-0707a

Double Anti-Scalp Roller Installation

1. Position the wheel bracket on the deck so the wheel bracket tabs are aligned with the slots on the deck (Fig. 1381).



Fig. 1381

IMG-0709a

2. Secure the wheel bracket to the deck with two thread forming screws (Fig. 1382).



Fig. 1382

IMG-0707a

7

3. Insert the spanner tube through the rollers with the roller hubs facing outward (Fig. 1383).



Fig. 1383

IMG-0711a

4. Secure the roller assembly to the wheel bracket with the axle bolt and nut (Fig. 1384).



Fig. 1384

IMG-0700a

Belt Cover Brackets Replacement

Early 2009 Belt Cover Bracket Removal

1. Remove the knob securing the belt cover (Fig. 1385).



Fig. 1385

IMG-0714a

2. Remove the belt cover (Fig. 1386).



Fig. 1386

IMG-0715a

MOWER DECK

3. Remove the self-tapping screw securing the belt cover bracket to the deck (Fig. 1387).



Fig. 1387

IMG-0718a

Early 2009 Belt Cover Bracket Installation

1. Position the belt cover bracket on the deck so the dimple on the deck is aligned with the dimple on the bracket (Fig. 1388).



Fig. 1388

IMG-0717a

2. Secure the bracket to the deck using a self-tapping screw (Fig. 1389).



Fig. 1389

IMG-0718a

3. Install the belt cover (Fig. 1390).



Fig. 1390

IMG-0715a

4. Secure the belt cover with the belt cover knob (Fig. 1391).



Fig. 1391

IMG-0714a

Mid 2009 & Later Belt Cover Brackets Removal

1. Remove the belt cover (Fig. 1392).



Fig. 1392

IMG-0720a

2. Remove the self-tapping screws securing the cover brackets to the mower deck (Fig. 1393).

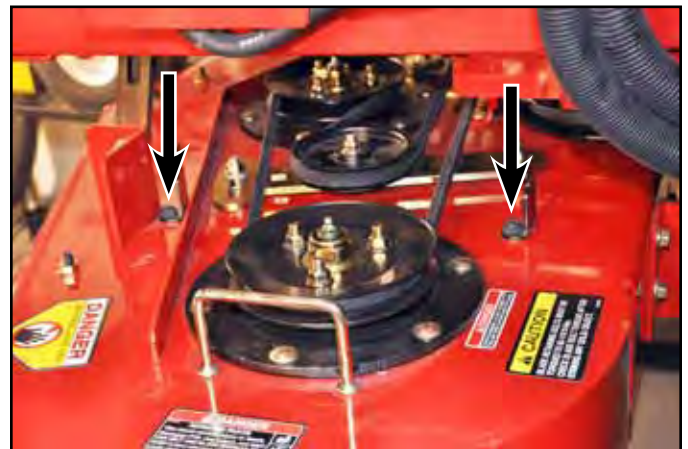


Fig. 1393

IMG-0721a

MOWER DECK

3. From the underside of the deck, remove the two nuts securing the wire form bracket to the deck, then remove the wire form bracket (Fig. 1394).

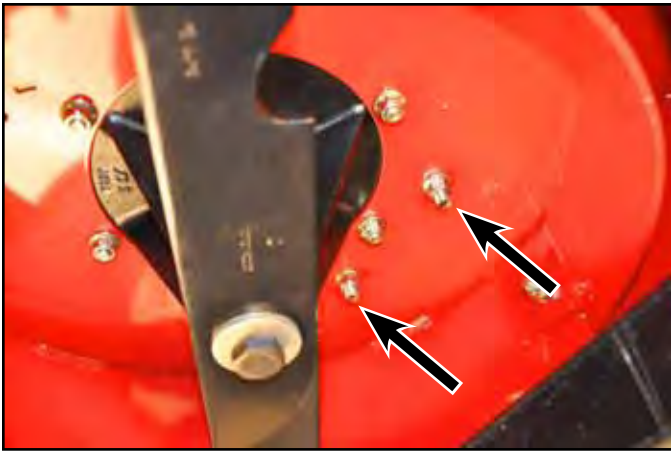


Fig. 1394

IMG-0722a

Mid 2009 & Later Belt Cover Brackets Installation

1. Position the wire form bracket through the holes in the top of the deck (Fig. 1395).



Fig. 1395

IMG-0724a

2. Using two nuts, secure the wire form bracket to the deck (Fig. 1396).

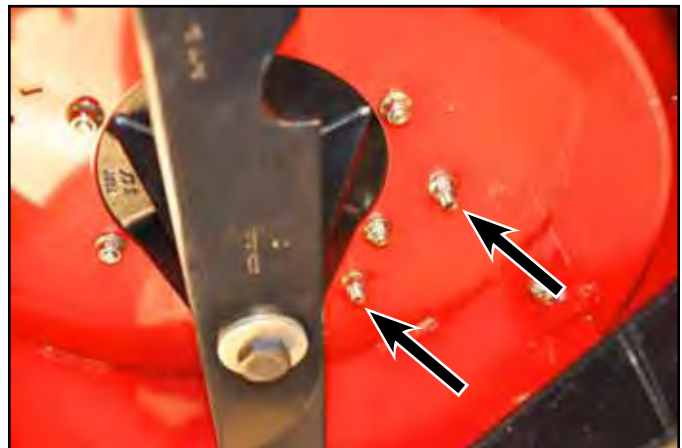


Fig. 1396

IMG-0722a

MOWER DECK

3. Position the cover bracket on the deck so the cover bracket tab engages the slot in the deck (Fig. 1397).



Fig. 1397

IMG-0728a

5. Repeat steps 3 and 4 for second bracket.
6. Install the belt cover (Fig. 1399).



Fig. 1399

IMG-0720a

4. Secure the cover bracket with a thread forming screw (Fig. 1398).

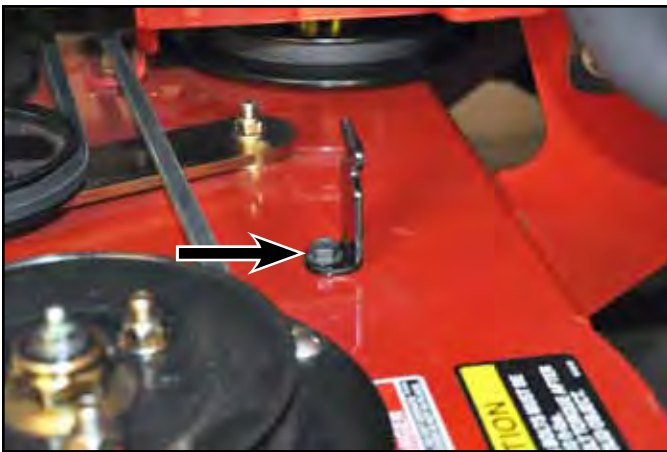


Fig. 1398

IMG-0768a

MOWER DECK

Grass Deflector Replacement

Grass Deflector Removal

1. Unhook the spring from the deflector assembly (Fig. 1400).

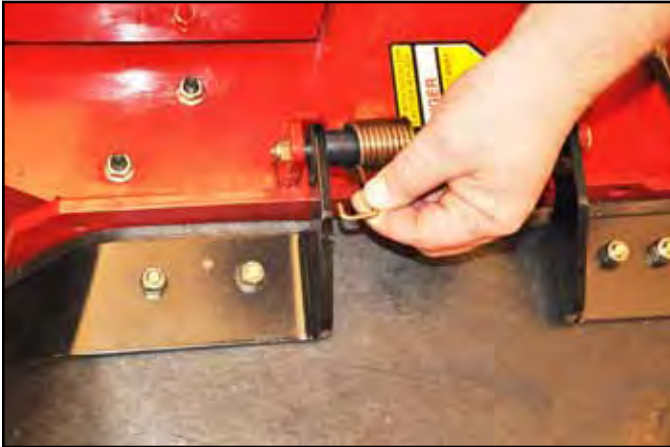


Fig. 1400

IMG-0729a

2. Remove the nut securing the deflector pivot bolt (Fig. 1401).



Fig. 1401

IMG-0730a

3. Remove the pivot bolt, spacer and spring. Then remove the deflector assembly (Fig. 1402).



Fig. 1402

IMG-0731a

4. Remove the four carriage bolts and nuts securing the hinge brackets and discharge strap to the rubber deflector (Fig. 1403).



Fig. 1403

IMG-0735a

7

Grass Deflector Installation

1. Insert the four carriage bolts into the discharge strap (Fig. 1404).

Note: The bolt pattern is oriented so that the two bolt holes that are closer to each other are on the left.



Fig. 1404

IMG-0755a

2. Position and press the rubber deflector onto the four carriage bolts (Fig. 1405).



Fig. 1405

IMG-0759a

3. Secure the front hinge bracket to the assembly using two nuts (Fig. 1406).



Fig. 1406

IMG-0762a

4. Secure the rear hinge bracket to the assembly using two nuts (Fig. 1407).



Fig. 1407

IMG-0763

MOWER DECK

- Slide the spring onto the spacer (Fig. 1408).



Fig. 1408

IMG-0764a

- Position the deflector assembly to the mower deck (Fig. 1409).



Fig. 1409

IMG-0765a

- Secure the deflector assembly, spacer and spring with the pivot bolt and nut (Fig. 1410).

Note: The spring "J" hooks must be mounted so one is on each side of the mounting plate.



Fig. 1410

IMG-0766a

- Hook the end of the spring on the deflector's rear hinge bracket (Fig. 1411).



Fig. 1411

IMG-0767a

7

Mower Deck Replacement

Mower Deck Removal

1. Remove the mower deck belt. Refer to "Mower Deck Belt Removal" on page 7-1.
2. Use a strap to secure the engine base to the frame on both sides (Fig. 1412).

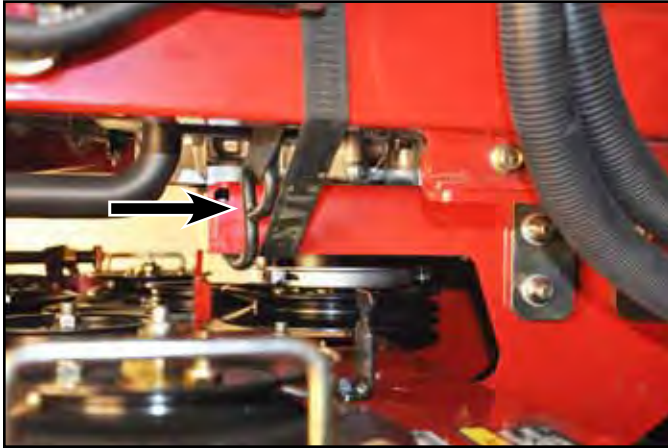


Fig. 1412

IMG-0772a

3. Remove the bolt and nut securing the front of the engine base to the deck (Fig. 1413).



Fig. 1413

IMG-0773a

4. Remove the four bolts and nuts securing the engine base to the rear of the deck (Fig. 1414).

Note: The rear of the deck is now free from the engine base and can be lowered to the ground.



Fig. 1414

IMG-0781a

5. Remove the shoulder bolt, washer and nut securing one of the front lift links to the mower deck (Fig. 1415).



Fig. 1415

IMG-0782a

MOWER DECK

6. Remove the shoulder bolt, nut and washer securing the other front lift link to the mower deck.

Note: The front of the deck is now free from the lift assembly and can be lowered to the ground.

7. Slide the mower deck assembly out from under the chassis.

Mower Deck Installation

1. Position the mower deck under the chassis.
2. Insert the shoulder bolt through the deck lift link and add the steel washer (Fig. 1416).



Fig. 1416

IMG-0783a

3. Insert the shoulder bolt through the deck bracket and secure with nut (Fig. 1417).



Fig. 1417

IMG-0785a

MOWER DECK

- Repeat steps 2 and 3 on the other side.
- Loosely install four bolts and nuts to secure the engine base to the rear of the deck (Fig. 1418).



Fig. 1418

IMG-0781a

- Secure the front engine base tab to the top of the deck using a nut and bolt (Fig. 1419).



Fig. 1419

IMG-0773a

- Tighten the four bolts and nuts securing the engine base to the rear of the deck (Fig. 1420).



Fig. 1420

IMG-0781a

- Remove the strap from the engine base (Fig. 1421).

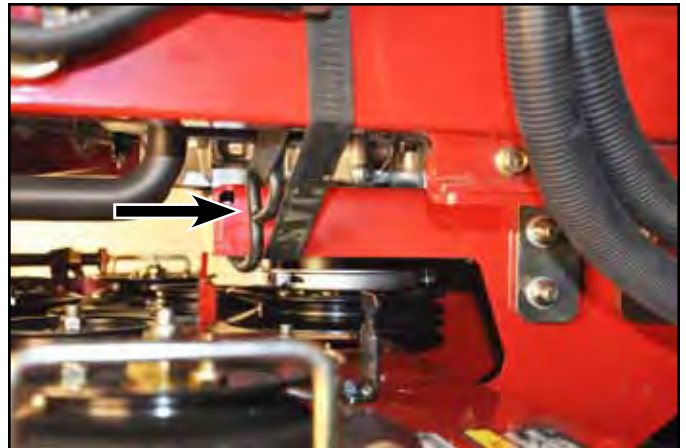


Fig. 1421

IMG-0772a

- Install the mower deck belt. Refer to "Mower Deck Belt Installation" on page 7-1.

7

MOWER DECK

Mower Deck Adjustments - Correcting the Mower Quality of Cut

If one deck blade cuts lower than the other, correct as follows.

Note: Tire air pressure is critical in these procedures.

1. Disengage the PTO and set the parking brake.
2. Stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position. Disconnect the spark plug wire(s) from the spark plug(s).
3. Check that the blades and spindle shafts are not bent. Refer to Checking for Bent Blades.
4. Set the height-of-cut to the 3" (7.6cm) position. Refer to Adjusting the Height-Of-Cut in Operation.
5. Perform the steps in the following procedures in order.

Checking the Mower Deck Side-to-Side Height

1. Adjust the rear tire pressure to 12-14 psi (83-97kPa).
2. Ensure the blades are not bent. Refer to Checking for Bent Blades.
3. Position the blades side-to-side. Measure at **B** and **C** locations from a level surface to the cutting edge of blade tips (Fig. 1422).

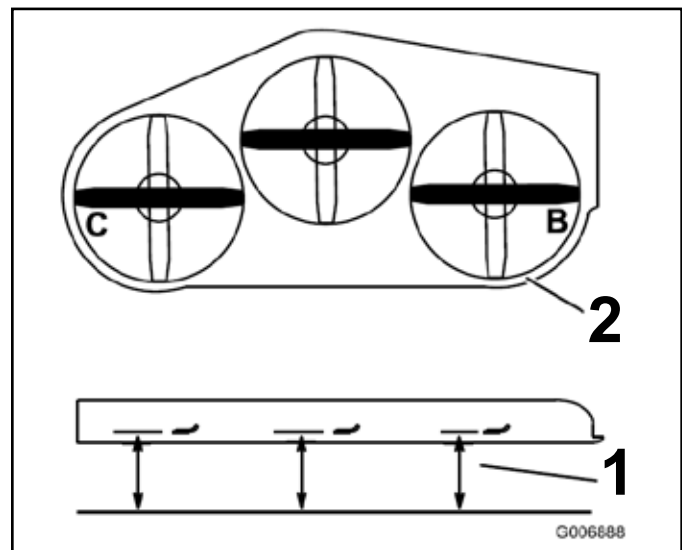


Fig. 1422

fig. 82 G006888

1. Measure from a level surface
2. Measure blade at points **B** & **C**
4. The difference between measurements **B** and **C** should be no more than 1/4" (6mm). If it is not correct, proceed to Changing the Mower Deck Side-to-Side Height.

7

Changing the Mower Deck Side-to-Side Height

Changing the side-to-side height is done by adjusting the rear tire pressure and U-plates on the side of the engine deck.

1. Change the rear tire pressure. Do this to the corresponding side that needs adjustment.
2. Locate the U-plates on the side of the engine deck (Fig. 1423).

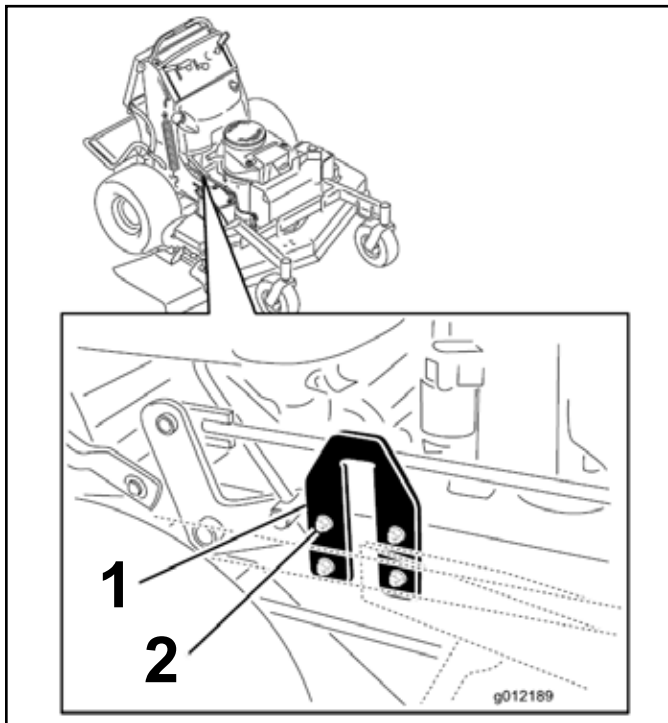


Fig. 1423

fig. 83 G012189

1. U-plate
2. Nuts & bolts
3. Loosen the U-plate on one side and adjust it up or down to make the difference between measurements **B** and **C** 1/4" (6mm) or less (Fig. 1423).
4. Proceed to Checking the Mower Deck Front-to-Rear Pitch.

Checking the Mower Deck Front-to-Rear Pitch

1. Adjust the rear tire pressure to 12-14 psi (83-97kPa).
2. Position one blade front-to-rear. Measure at **A** and **B** locations from a level surface to the cutting edge of the blade tips (Fig. 1424).

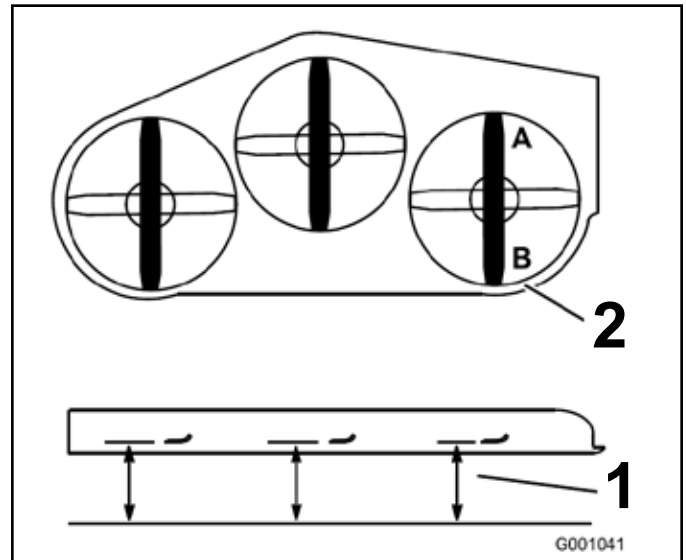


Fig. 1424

fig. 84 G001041

1. Measure blade at points **A** & **B**
2. Measure from a level surface
3. The mower blade should be a 1/4" (6mm) lower in front at **A** than in the rear at **B**. Rotate blades and repeat for other blades. If it is not correct, proceed to Changing the Deck Front-to-Rear Pitch.

MOWER DECK

Changing the Mower Deck Front-to-Rear Pitch

Changing the front-to-rear pitch is done by adjusting the front height-of-cut posts.

1. Place 3 pieces of 2x4 wood under the mower deck as shown in Fig. 1425. Stand the 2x4's on the 4" part.

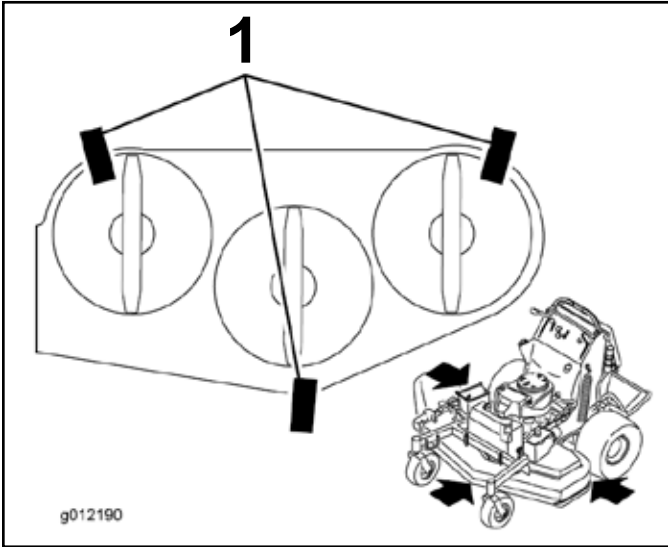


Fig. 1425

fig. 85 G012190

1. 2x4 piece of wood under mower deck

2. Loosen both the front and rear nuts on the adjustment rods (Fig. 1426).

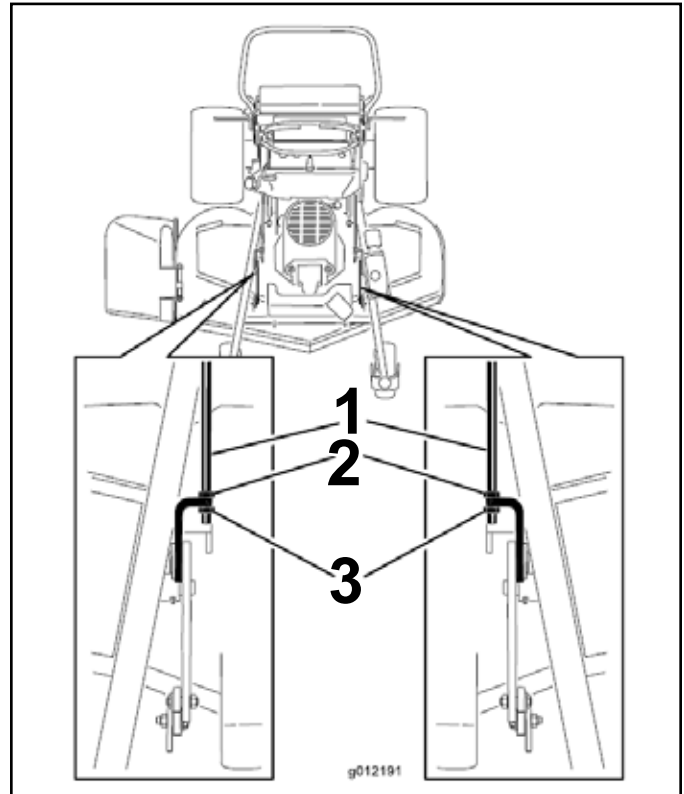


Fig. 1426

fig. 86 G0012191

1. Adjustment rods
 2. Rear nuts
 3. Front nuts
3. The weight of the mower deck must be resting on all three of the 2x4's (Fig. 1426). The back lip of the mower deck is built 1/4" (6mm) lower than the front lip of the mower deck.
 4. Tighten both the front and rear nuts.
 5. Check the front-to-rear pitch of the cutting unit.
 6. If the dimensions are not correct, adjust the front and rear nuts on either side to get the correct front-to-rear pitch (Fig. 1426).

Matching Height-of-Cut

1. Check the rear tire pressure.
2. Set the height-of-cut to the 3" (7.6cm) position.
3. With the machine on level surface, position one blade front-to-rear. Measure at **A** and from level surface to the cutting edge of the blade tips (Fig. 1427).

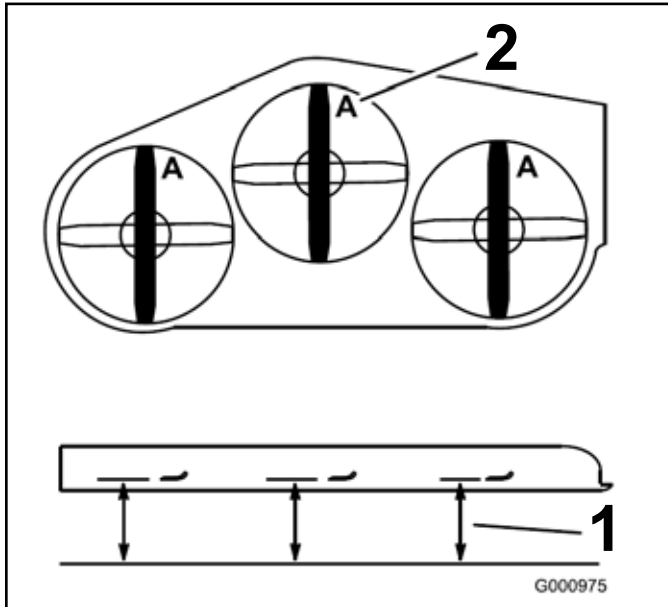


Fig. 1427

fig. 87 G000975

1. Measure from a level surface
2. Measure blade at point **A**

4. The measurement should be 3" (7.6cm).
5. If it does not measure correctly, locate the height-of-cut rod on the right side of the machine (Fig. 1428).

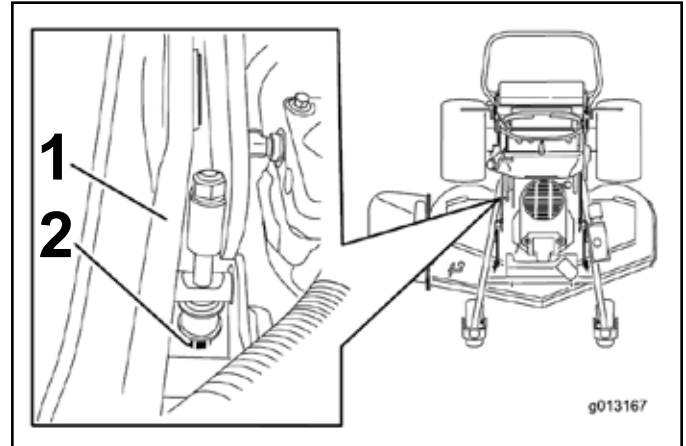


Fig. 1428

fig. 88 G013167

1. Height-of-cut rod
 2. Adjustment bolt
6. Adjust the adjustment bolt until the blade tips match 3" (7.6cm) (Fig. 1428).

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Additional information can be found in the LCE Electrical Troubleshooting DVD #492-9193, available through your Toro parts supplier.

CAUTION

Before performing any tests with a continuity light or ohmmeter, disconnect the component from the wire harness. This ensures you are testing the component rather than another circuit.

Interlock modules **MUST** be removed from the circuit before performing any tests with an ohmmeter or continuity light. Battery voltage can damage these modules if applied to the wrong terminals.

Component Testing

Ignition Switch

Purpose

The ignition switch provides the proper switching for the starter, ignition, accessories, and safety circuits.

Location

The ignition switch is located on the control panel (Fig. 1429).



Fig. 1429

IMG-1177a

How It Works

Detents inside the switch gives it 3 positions: OFF, RUN and START. The START position is spring loaded so the cylinder automatically returns to RUN once the key is released (Fig. 1430).

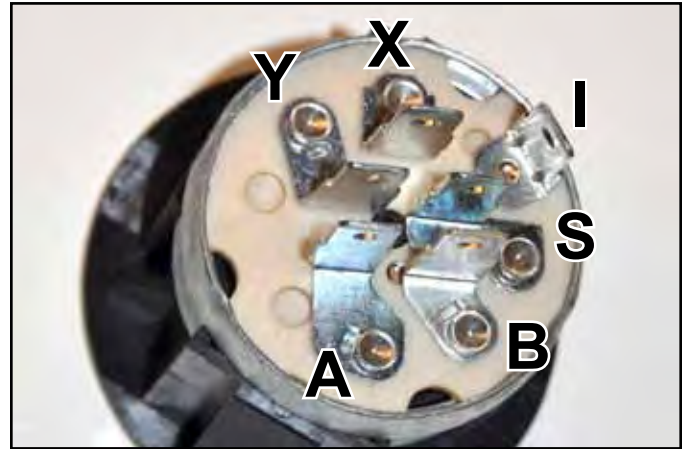


Fig. 1430

IMG-1192a

B - Battery voltage "in"	Y - Alternator/Regulator circuit
S - Starting circuit	X - Alternator/Regulator circuit
I - Safety & starting circuit	
A - Auxiliary circuit	

Testing

1. Disconnect the switch from the wire harness.
2. Verify that continuity exists between the terminals listed for the switch position (see table below). Verify that there is NO continuity between the terminals not listed for the switch position (see table below):

OFF	No continuity between terminals
RUN	Continuity – B I A and X Y
START	Continuity – B I S

ELECTRICAL

Power Take Off (PTO) Switch

Purpose

The Power Take Off (PTO) Switch is used to turn on the Electric PTO Clutch and function as part of the safety interlock system.

Location

The PTO switch is located on the control panel (Fig. 1431).



Fig. 1431

IMG-1177a

How It Works

The PTO switch has 3 positions: Fully depressed (OFF), a middle detent (RUN) and a momentary full out (START). When the PTO switch is pulled out to the "START" position, contacts inside the switch electrically connect various terminals. Those terminals allow voltage to flow to the electric clutch which causes it to engage.

Testing

1. Disengage the PTO, set the parking brake, turn the ignition to OFF and remove the key.
2. Disconnect the wire harness from the PTO switch.
3. Press in on the locking tabs on each side of the switch and pull the switch out of the control panel.
4. Verify that there is continuity between the appropriate terminals in the ON and OFF positions (Fig. 1432). Use diagram below.
5. Replace the switch if your test results do not correspond with those given in the diagram below (Fig. 1432).

Fully Depressed "OFF"	Middle Detent "RUN"	Momentary Full Out "START"
1-7 Continuity	6-3 No Continuity	6-3 Continuity
1-4 No Continuity	1-4 Continuity	1-4 Continuity
6-3 No Continuity		

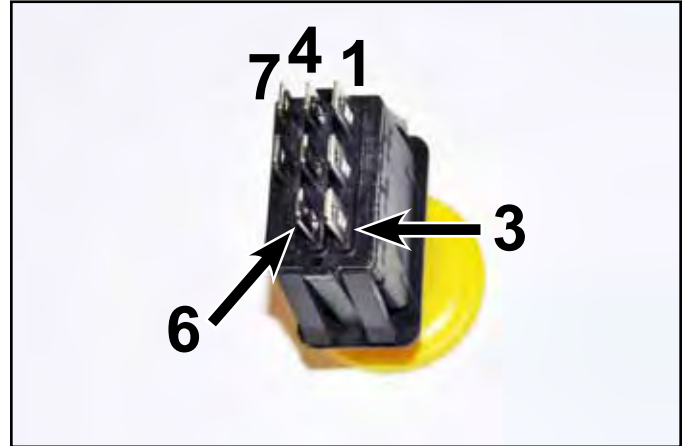


Fig. 1432

IMG-1193a

Electric (PTO) Clutch

Purpose

This clutch electrically controls the engagement and disengagement of the Power Take Off (PTO) pulley, which drives the mower deck belt.

Location

The electric clutch is located on the PTO end of the engine crankshaft, under the machine (Fig. 1433).

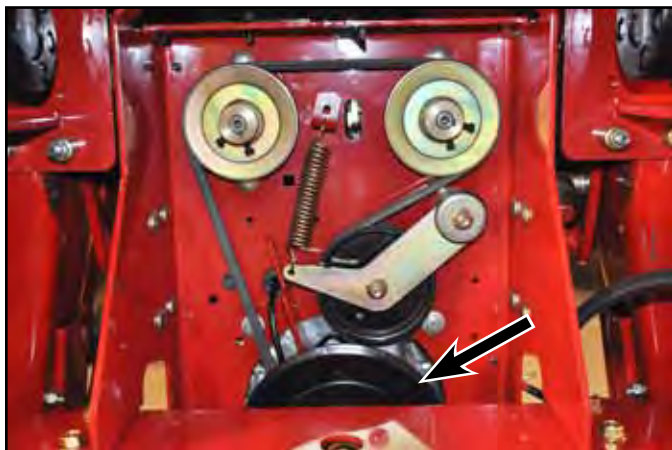


Fig. 1433

IMG-0570a

How It Works

The PTO clutch is composed of three major components: the field, the clutch plate, and the friction plate. The clutch plate always turns with the engine. The field is a coil of wire on an iron core, which becomes an electromagnet when power is applied.

The friction plate is the only piece that can slide up and down on the crankshaft axis. 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. When power is applied, the friction plate is drawn toward the clutch plate and the two rotate as one.

Testing

If the electric PTO clutch is not engaging or is suspected as a cause of electrical problems, use the troubleshooting procedures below. These procedures will help you determine if the clutch has failed or is the cause of the electrical problem.

Coil Resistance Measurement

1. Disengage the PTO, set the parking brake, turn the ignition OFF, and remove the key.
2. Disconnect clutch wire connector from the wire harness.
3. Set the multimeter or volt/ohm meter to check resistance (ohms).
4. Connect the multimeter leads to the wires in the clutch connector (Fig. 1434).
5. The meter should read between 2.40 ohms and 3.40 ohms. If the reading is above or below these readings, the field has failed and needs to be replaced. If the reading is between these two limits, measure the clutch current draw (next).

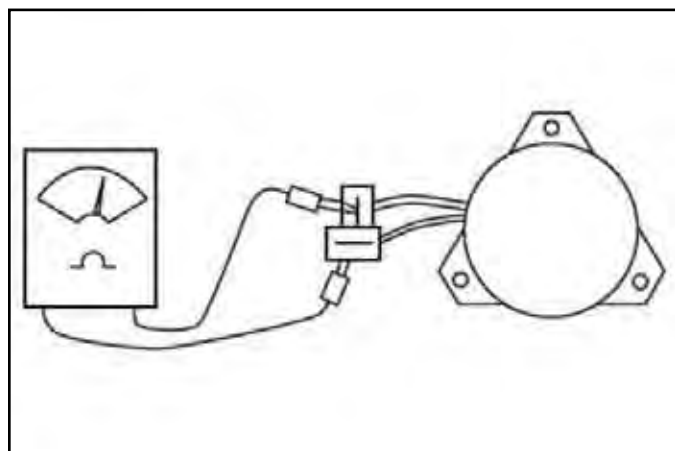


Fig. 1434

coil resist measurmt

ELECTRICAL

Measuring Clutch Current Draw

1. Disengage the PTO, set the parking brake, turn the ignition OFF, and remove the key.
2. Disconnect the clutch wire connector from the wire harness.
3. Set the multimeter to check amps (10 amp scale).
4. Connect the positive meter lead to the tractor terminal (1) of the clutch wire (Fig. 1435).
5. Connect the negative meter lead to the corresponding wire terminal (3) (Fig. 1435).
6. Connect a short jumper lead from terminal (2) to terminal (4) (Fig. 1435).

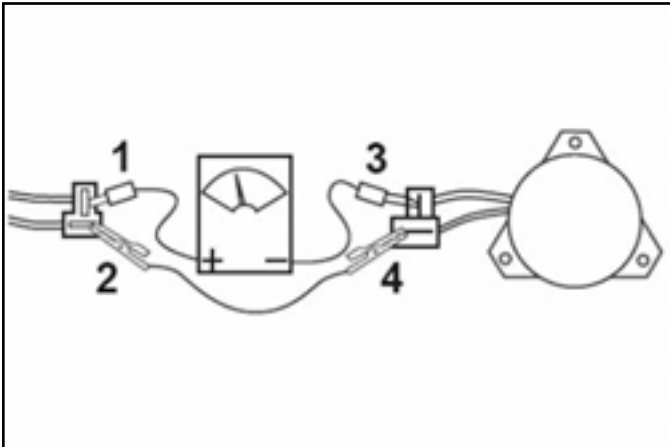


Fig. 1435 clutch current draw

7. Turn the ignition key to the "RUN" position and the PTO switch to the "ON" position.
8. If the meter reads 4.2 amps or above, the system is functioning properly. If the meter reading is below 4.2 amps, check the electrical system for problems (i.e., the battery, ignition switch, PTO switch, or wiring harness may be malfunctioning).

Solenoid

Purpose

The purpose of the solenoid is to connect the battery to the starter motor on the engine when the ignition switch is turned to "START". The solenoid is used to protect the ignition switch from the high current drawn from by the starter motor (Fig. 1436).



Fig. 1436

IMG-1198a

Location

The solenoid is located between the RH hydraulic pump and the engine, on the RH side of the machine (Fig. 1437).



Fig. 1437

IMG-1182a

How It Works

The solenoid has two primary parts. One, a coil wire is wrapped around an iron core. Whenever 12 volts is applied to the coil, it becomes a magnet. The other part is a bar type switch. Because it has a large contact area with contact terminals, it can easily handle the high current loads required by the starter motor of the engine.

When 12 volts is applied to the coil, it becomes an electromagnet. This quickly pulls the contact bar toward the contacts and closes the switch. When power is removed from the coil, the spring loaded bar returns to its "normal open" position. The solenoid closes and opens the switch very quickly. This minimizes the "arcing" that can damage other kinds of switches.

The ignition switch is protected because only a small amount of current is needed to activate the coil.

Testing

1. Disconnect the solenoid from the wire harness.
2. With a multimeter set to the 'ohms' setting, ensure terminals "C" and "D" are open (no continuity).
3. Apply +12 VDC to terminal "A" and ground terminal "B". Terminals "C" and "D" should now be closed (continuity) (Fig. 1438).
4. You should be able to hear the solenoid switch "click" when you make the connection (Fig. 1438).

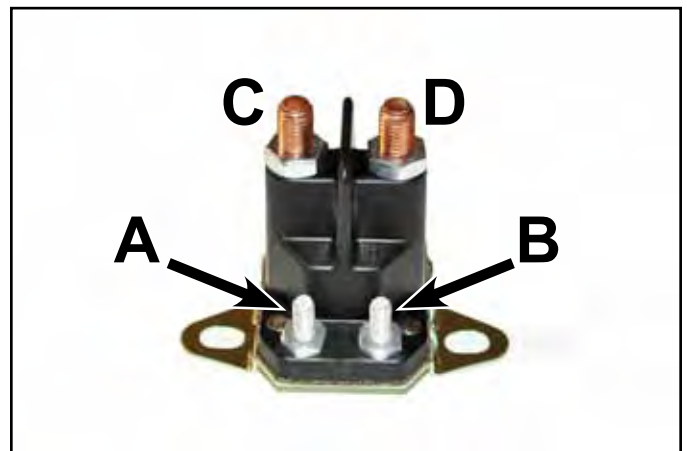


Fig. 1438

IMG-1198a

A & B Coil Terminals

C & D Contact Terminals

ELECTRICAL

Operator Presence Control (OPC) Switch

Purpose

The Operator Presence Control (OPC) Switch is part of the safety circuit. If the PTO is engaged and the operator vacates the machine, the PTO will shut down (Fig. 1439).



Fig. 1439

IMG-0001a

Location

The Operator Presence Control (OPC) Switch is located inside the RH side of the control panel, as part of the RH control lever assembly (Fig. 1440).

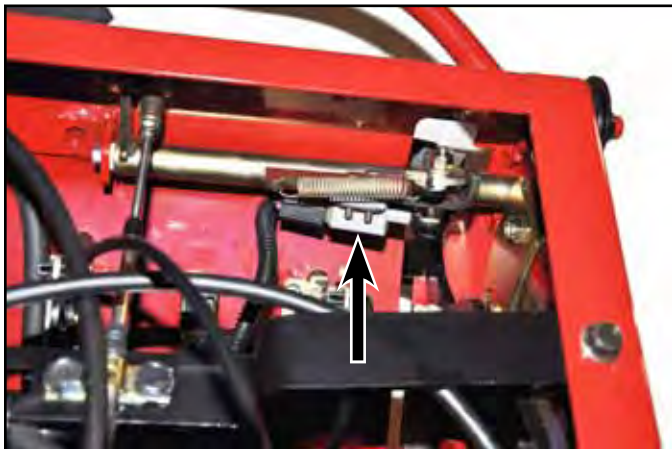


Fig. 1440

IMG-1202a

How It Works

This is a “Normally Closed (NC)” switch. The letters “NC” will be stamped on the terminals. When the RH control lever is in the “UP” position, the switch is open and there is no continuity between the switch terminals.

Testing

Turn the ignition key to the run position (do not start the machine). While observing the black triangle for the OPC indicator on the hour meter, move the RH control lever up and down. If the black triangle turns on and off, the switch is good.

If the black triangle for the OPC indicator fails to turn on when the RH control lever is moved up and down, the switch needs to be checked for continuity.

1. Disconnect the switch from the wire harness.
2. With a multimeter set to the “Ohms” setting or a continuity light, verify that there is continuity between the terminals (plunger out).
3. With the plunger pushed in, there should be NO continuity between the terminals.

Neutral Switch

Purpose

The Neutral Switch is part of the safety circuit. The neutral switch is used to ensure the motion control levers are in the neutral position allowing the machine to start (Fig. 1441).



Fig. 1441

IMG-0001a

Location

The Neutral Switch is located in the rear, lower left side of the control tower. It is connected to the upper switch lever at the control linkage assembly (Fig. 1442).

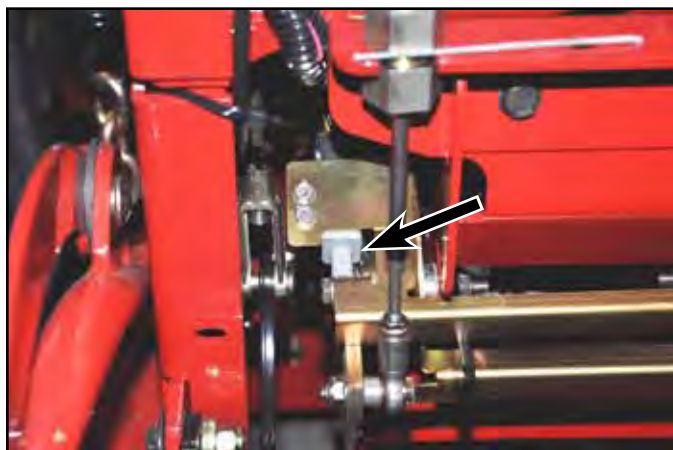


Fig. 1442

IMG-1205a

How It Works

This is a “Normally Closed (NC)” switch. The letters “NC” will be stamped on the terminals. When the control levers are in the neutral position, the switch is open and there is no continuity between the switch terminals.

Testing

Turn the ignition key to the run position (do not start the machine). While observing the black triangle for the Neutral indicator on the hour meter, move one of the control levers in and out of the neutral position. If the black triangle turns on and off, the switch is good.

If the black triangle for the neutral indicator fails to turn on when the control lever is moved in and out of the neutral position, the switch needs to be checked for continuity.

1. Disconnect the switch from the wire harness.
2. With a multimeter set to the “Ohms” setting or a continuity light, verify that there is continuity between the terminals (plunger out).
3. With the plunger pushed in, there should be NO continuity between the terminals.

ELECTRICAL

Parking Brake Switch

Purpose

The Parking Brake Switch is part of the safety circuit. The parking brake switch is used to shut down the engine if the machine leaves neutral with the parking brake on (Fig. 1443).



Fig. 1443

IMG-0001a

Location

The Parking Brake Switch is located inside the LH side of the control panel, as part of the parking brake control lever assembly (Fig. 1444).

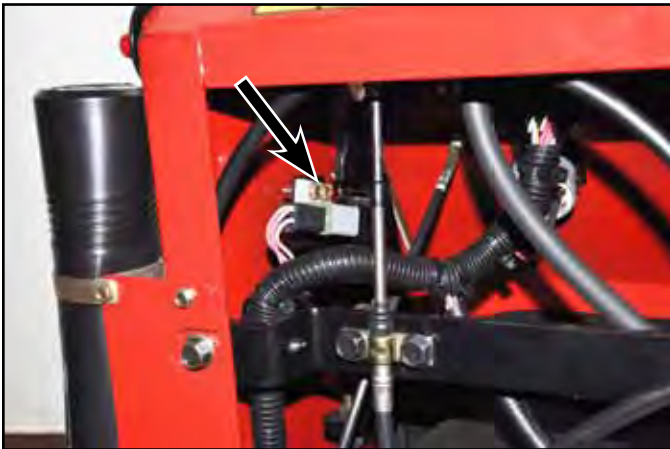


Fig. 1444

IMG-1204a

How It Works

This is a “Normally Closed (NC)” switch. The letters “NC” will be stamped on the terminals. When the parking brake is engaged, the switch is closed and there is continuity between the switch terminals.

Testing

Turn the ignition key to the run position (do not start the machine). While observing the black triangle for the parking brake indicator on the hour meter, engage and disengage the parking brake. If the black triangle turns on and off, the switch is good.

If the black triangle for the parking brake indicator fails to turn on when the parking brake is engaged and disengaged, the switch needs to be checked for continuity.

1. Disconnect the switch from the wire harness.
2. With a multimeter set to the “Ohms” setting or a continuity light, verify that there is continuity between the terminals (plunger out).
3. With the plunger pushed in, there should be NO continuity between the terminals.

Fuse Block & Fuses

Purpose

The fuse block houses the electrical system fuses.

Location

The fuse block is located on the rear, LH side of the control tower (Fig. 1445).

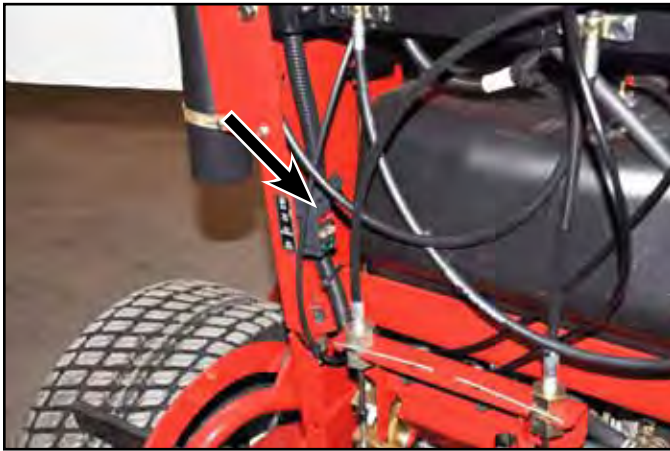


Fig. 1445

IMG-1209a

How It Works

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

Testing

The fuses used in this application can be visually inspected. A failed fuse can be identified by the broken/melted element inside the fuse cover or a damaged spade (Fig. 1446).



Fig. 1446

IMG-1214a

ELECTRICAL

Hour Meter/Control Module

Purpose

The hour meter/control module keeps track of the actual running hours of the engine. It has safety interlock indicators to let the operator know the position of the corresponding component. It also provides the operator with the battery output voltage.

Location

The hour meter is located on the control panel (Fig. 1447).



Fig. 1447

IMG-1177a

How It Works

1. Hour Meter – Hours are accumulated when 12.8 volts are generated by the engine. Battery voltage is not great enough to engage the hour meter function (Fig. 1448).
2. Battery Light Indicator – If the ignition key is turned to the “ON” position for a few seconds, the battery voltage will be displayed in the area the hours are normally displayed. The battery light turns on when the battery charge is below 12 volts (Fig. 1448).
3. Safety Interlock Indicators – The display uses black triangles to indicate the position of an interlock system component (Fig. 1448).

Note: The neutral indicator is the only triangle that MUST be on for the unit to start.

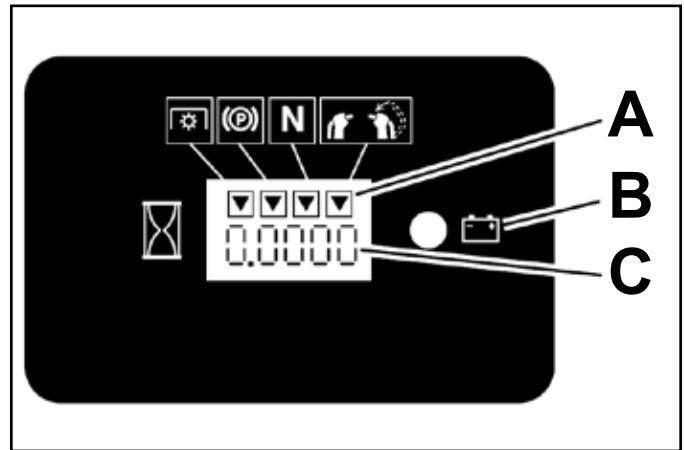


Fig. 1448

fig. 5 G009467

- A. Safety interlock symbols C. Hour Meter
B. Battery Light

Testing

The hour meter is tested by testing the inputs. As an example, if the neutral indicator (black triangle) will not illuminate, the neutral switch needs to be tested. If the switch tests good, the hour meter is at fault. This troubleshooting method will work for any of the inputs.

Component Replacement

Ignition Switch Removal

1. Remove the wire harness and spade connector from the back of the ignition switch (Fig. 1449).

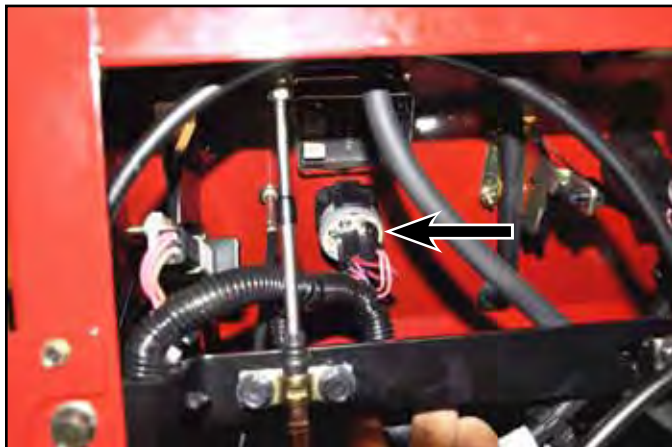


Fig. 1449

IMG-1220a

2. Depress the two tabs on the sides of the switch (Fig. 1450).



Fig. 1450

IMG-1227a

3. Remove the switch through the front of the control panel (Fig. 1451).



Fig. 1451

IMG-1230a

ELECTRICAL

Ignition Switch Installation

1. Install the switch into the control panel. Ensure that the mounting clips have secured the switch in the control panel (Fig. 1452).



Fig. 1452

IMG-1230a

Note: The switch must be orientated so it can be read from the operator position (Fig. 1453).



Fig. 1453

IMG-1232a

2. Install the spade connector with the two pink wires to the "I" terminal of the switch (Fig. 1454).

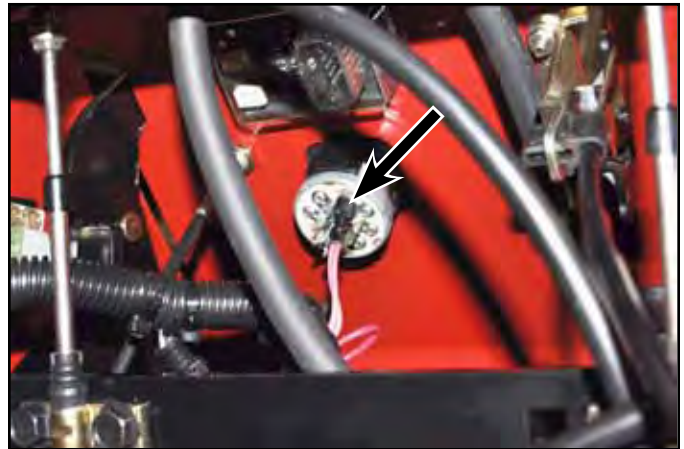


Fig. 1454

IMG-1234a

3. Install the wire harness to the switch (Fig. 1455).



Fig. 1455

IMG-1220a

Power Take Off (PTO) Switch Removal

1. Remove the wire harness from the back of the PTO switch (Fig. 1456).



Fig. 1456

IMG-1240a

2. Depress the four tabs securing the switch to the control panel (Fig. 1457).

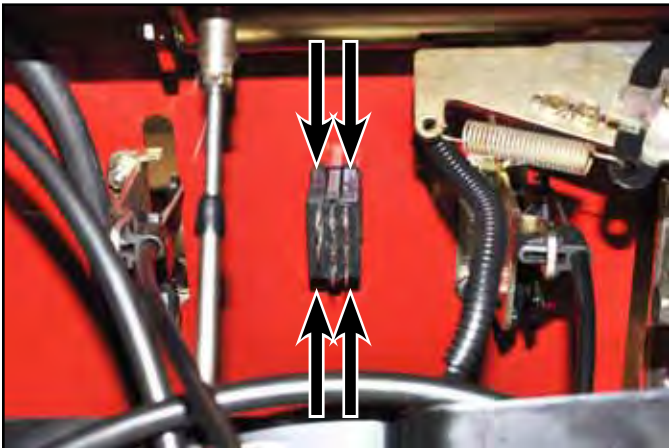


Fig. 1457

IMG-1243a

3. Remove the switch through the front of the control panel (Fig. 1458).



Fig. 1458

IMG-1246a

ELECTRICAL

Power Take Off (PTO) Switch Installation

1. Install the switch into the control panel. Ensure that the mounting clips have secured the switch in the control panel (Fig. 1459).



Fig. 1459

IMG-1246a

2. Install the wire harness to the back of the switch (Fig. 1460).



Fig. 1460

IMG-1240a

Electric PTO Clutch Removal

1. Turn the engine off and remove the key from the ignition.
2. Set the parking brake.
3. Lower the mower deck to the lowest height-of-cut position.
4. Remove the LH and RH belt covers (Fig. 1461).



Fig. 1461

IMG-9548a

5. Loosen the front idler pulley by loosening the nut (Fig. 1462).



Fig. 1462

IMG-9550a

6. Remove the mower deck belt from the mower deck (Fig. 1463).



Fig. 1463

IMG-9553a

8. Remove the wingnut from the battery hold down bolt (Fig. 1465).



Fig. 1465

IMG-9568a

7. Raise the mower deck to the transport position (highest height-of-cut) and pin it to secure (Fig. 1464).



Fig. 1464

IMG-9557a

9. Remove the battery hold down bolt (Fig. 1466).



Fig. 1466

IMG-9570a

ELECTRICAL

10. Repeat steps 8 and 9 to remove the battery hold down on the other side of the battery cover.

11. Remove the battery cover (Fig. 1467).



Fig. 1467

IMG-9574a

13. Slide the red boot off the positive (red) battery terminal. Remove the positive (red) battery cable from the positive (+) battery terminal (Fig. 1469).



Fig. 1469

IMG-9579a

12. Disconnect the negative battery cable from the negative (-) battery terminal (Fig. 1468).



Fig. 1468

IMG-9575a

14. Remove the battery (Fig. 1470).



Fig. 1470

IMG-9585a

15. Clean around the hydraulic tank cap to prevent debris from getting into the tank.
16. Remove the cap from the hydraulic tank and place a piece of plastic wrap over the opening. Reinstall the hydraulic tank cap (Fig. 1471).



Fig. 1471

IMG-9587a

17. Siphon the fuel from the fuel tank:

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

- A. Clean around the fuel cap to prevent debris from getting into the fuel tank.
- B. Remove the fuel cap.

- C. Insert a siphon pump hose into the fuel tank (Fig. 1472).



Fig. 1472

IMG-9592a

- D. Using the siphon pump, transfer the fuel into a clean gas can.
- E. Wipe up any spilled fuel.

18. With two people, raise the front of the mower so it rests on the drive tires and the platform in the up position (Fig. 1473).



Fig. 1473

IMG-9752a

ELECTRICAL

19. Remove the 3 carriage bolts and 3 nuts securing the skid plate to the mower deck (Fig. 1474).

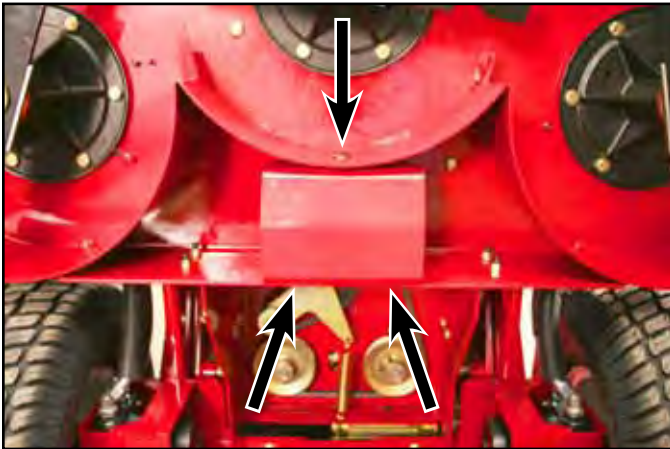


Fig. 1474

IMG-9600a

21. Disconnect the clutch wire connector from the wire harness and push the clutch connector and grommet through to the bottom side of the engine base (Fig. 1476).

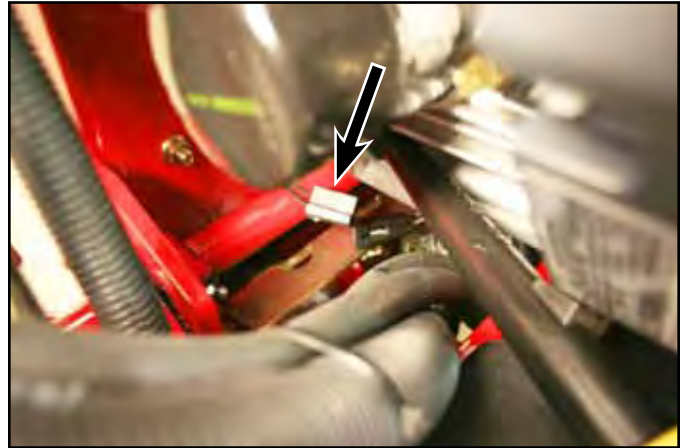


Fig. 1476

IMG-9599a

20. Remove the skid plate (Fig. 1475).



Fig. 1475

IMG-9601a

22. **2009 only:** Remove the bolt, washers, spacer and nut securing the clutch brake strap to the mower deck (Fig. 1477).



Fig. 1477

IMG-9755a

Note: On 2010 models the clutch is secured by an anchor bracket (Fig. 1478).



Fig. 1478

DSCN-1157a

23. Remove only the nuts from the 5 bolts securing the mower deck to the engine base (Fig. 1479).

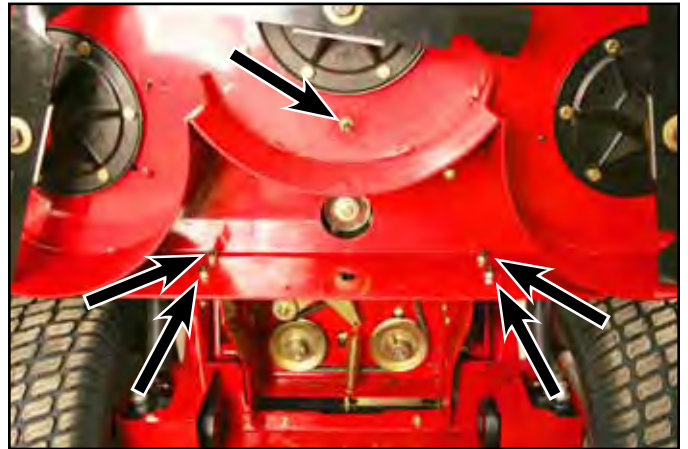


Fig. 1479

IMG-9604a

24. Remove the upper bolt securing the engine base to the mower deck (Fig. 1480).

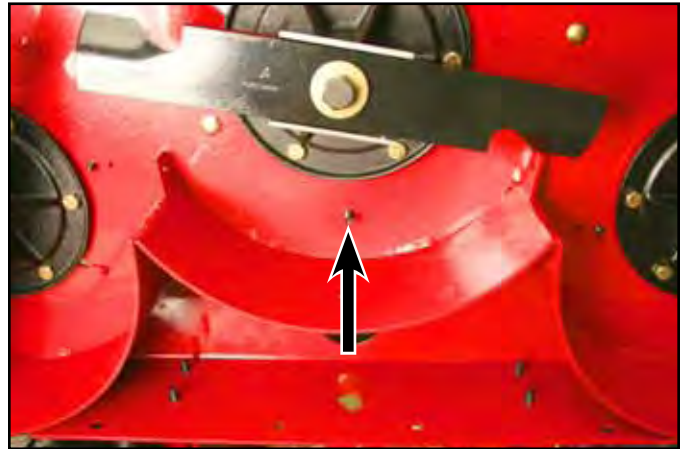


Fig. 1480

IMG-9605a

ELECTRICAL

25. Remove 1 of the 4 lower bolts securing the engine base to the mower deck and replace it with a screwdriver to keep the deck in position (Fig. 1481).

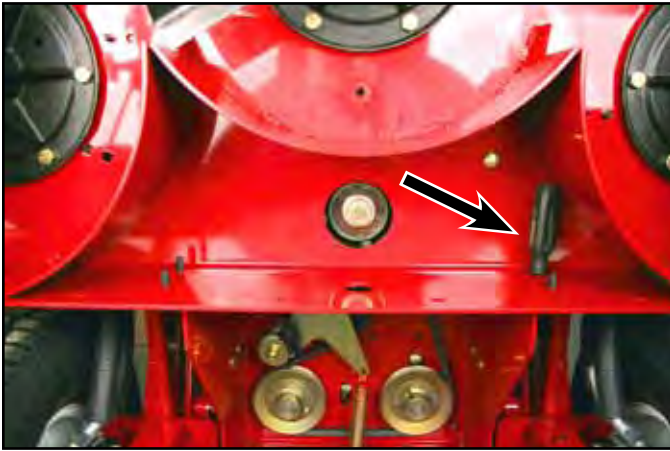


Fig. 1481 IMG-9640a

26. Remove the remaining 3 lower bolts securing the engine base to the mower deck (Fig. 1482).

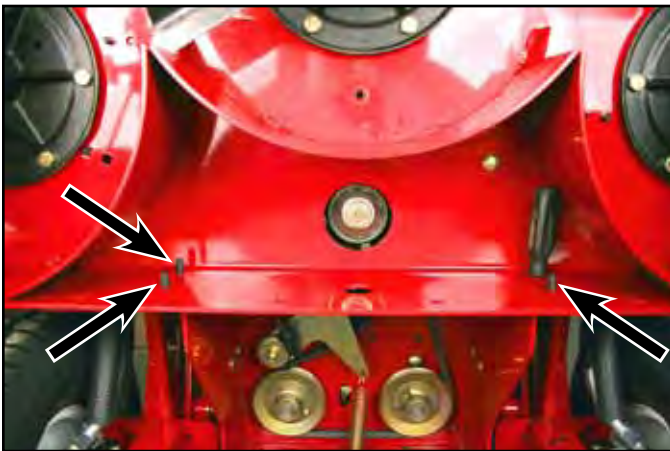


Fig. 1482 IMG-9640a

27. Remove the screwdriver and slide the rear of the mower deck 2" (5cm) away from the engine base so that the top mower deck hole aligns with the bottom hole in the engine base. Insert the screwdriver to secure the alignment. This will provide enough clearance to slide the clutch off the crankshaft (Fig. 1483).

Note: Use caution to make sure the deck does not slide off the engine base brackets.



Fig. 1483 IMG-9610a

28. Remove one spark plug and feed a minimum of 2 feet (61cm) of 3/8" (.95cm) rope into the cylinder to prevent engine rotation (Fig. 1484).

Note: Rotate crankshaft as needed to permit feeding the rope into the cylinder.



Fig. 1484 IMG-9633a

29. Remove the clutch bolt, spring washer and flat washer (Fig. 1485).



Fig. 1485

IMG-9611a

31. **2009 only:** Remove the nut and spring washer from the bolt securing the brake clutch strap to the clutch (Fig. 1487).



Fig. 1487

IMG-9617a

30. Slide the clutch off the crankshaft and remove it from the machine (Fig. 1486).



Fig. 1486

IMG-9614a

32. **2009 only:** Remove the strap assembly (Fig. 1488).



Fig. 1488

IMG-9618a

ELECTRICAL

33. **2009 only:** Remove the flat washer (Fig. 1489).



Fig. 1489

IMG-9619a

35. **2009 only:** Remove the 2 spacers from the 2 grommets in the clutch brake strap (Fig. 1491).



Fig. 1491

IMG-9621a

34. **2009 only:** Remove the bolt and washer from the clutch (Fig. 1490).



Fig. 1490

IMG-9620a

36. **2009 only:** Remove the 2 grommets from the clutch brake strap (Fig. 1492). Renew worn parts as needed.



Fig. 1492

IMG-9622a

Electric PTO Clutch Installation

1. Using a feeler gauge, check the clutch air gap at each of the 3 adjustment slots. The gap should be set to 0.015" (0.381mm). Make sure the gauge is inserted between the armature and the rotor friction surfaces. Adjust the clutch as necessary (Fig. 1493).



Fig. 1493

PICT-0554a

2. **2009 only:** Install 2 grommets into the clutch brake strap (Fig. 1494).



Fig. 1494

IMG-9622a

3. **2009 only:** Slide 2 spacers into the 2 grommets in the clutch brake strap (Fig. 1495).



Fig. 1495

IMG-9621a

4. **2009 only:** Install a bolt and washer into the clutch plate (Fig. 1496).



Fig. 1496

IMG-9620a

ELECTRICAL

5. **2009 only:** Slide a flat washer onto the bolt (Fig. 1497).



Fig. 1497

IMG-9619a

7. **2009 only:** Slide a spring washer (crown side up) onto the bolt (Fig. 1499).



Fig. 1499

IMG-9623a

6. **2009 only:** Slide the strap assembly onto the bolt (Fig. 1498).



Fig. 1498

IMG-9618a

8. **2009 only:** Install a nut onto the bolt securing the brake clutch strap assembly to the clutch (Fig. 1500).



Fig. 1500

IMG-9617a

9. Apply anti-seize to the crankshaft (Fig. 1501).

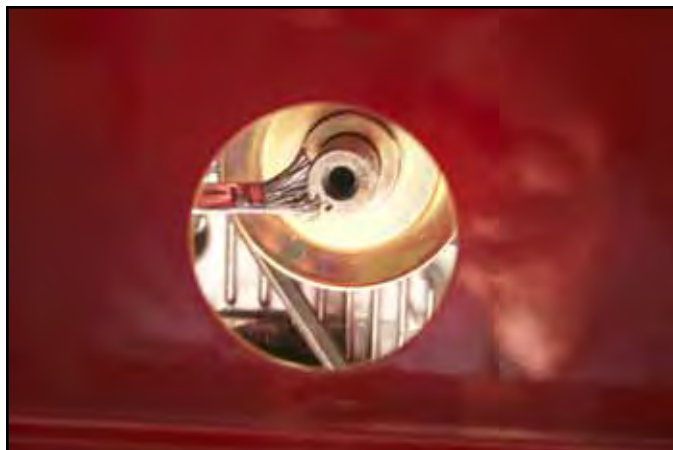


Fig. 1501

IMG-9627a

10. Slide the clutch onto the crankshaft aligning the keyway with the key in the crankshaft (Fig. 1502).



Fig. 1502

IMG-9614a

Note: On 2010 models, the clutch stop bracket must be nested in the slot on the clutch (Fig. 1503).



Fig. 1503

DSCN-1157a

ELECTRICAL

11. Install the spring washer (crown toward the bolt head) and flat washer to the clutch bolt (Fig. 1504).



Fig. 1504

IMG-9630a

13. Torque the clutch bolt to 55 ft-lbs. (75 Nm) (Fig. 1506).



Fig. 1506

IMG-9645a

12. Apply thread-locking compound to the threads of the clutch bolt (Fig. 1505).

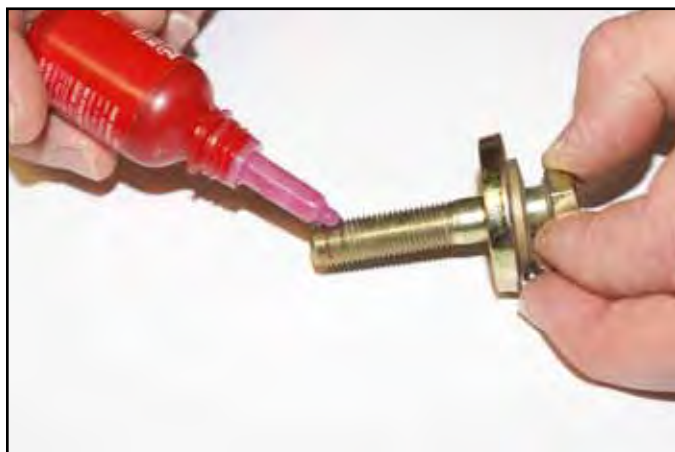


Fig. 1505

PICT-8700a

14. Install the bolt, washers, spacer and nut securing the clutch brake strap to the mower deck (Fig. 1507).

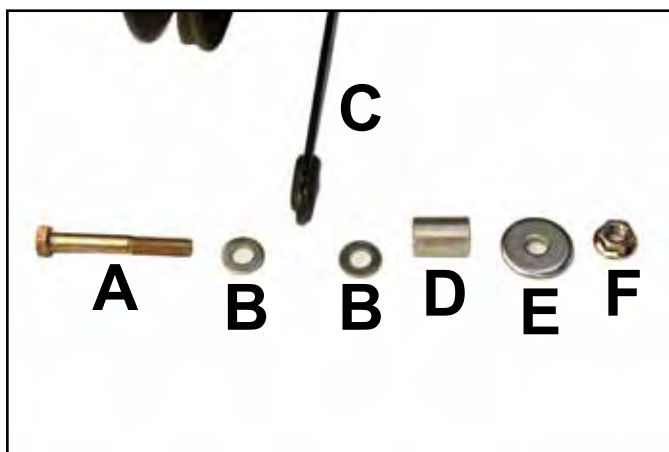


Fig. 1507

IMG-9624a

- | | |
|-----------------|-----------|
| A. Bolt | D. Spacer |
| B. Washers (2) | E. Washer |
| C. Clutch strap | F. Nut |

15. Insert the clutch connector through the engine base. Install the rubber grommet into the hole in the engine base (Fig. 1508).



Fig. 1508

IMG-9758a

17. Remove the rope from the spark plug hole and reinstall the spark plug (Fig. 1510).



Fig. 1510

IMG-9633a

16. Connect the clutch wire connector to the wire harness (Fig. 1509).

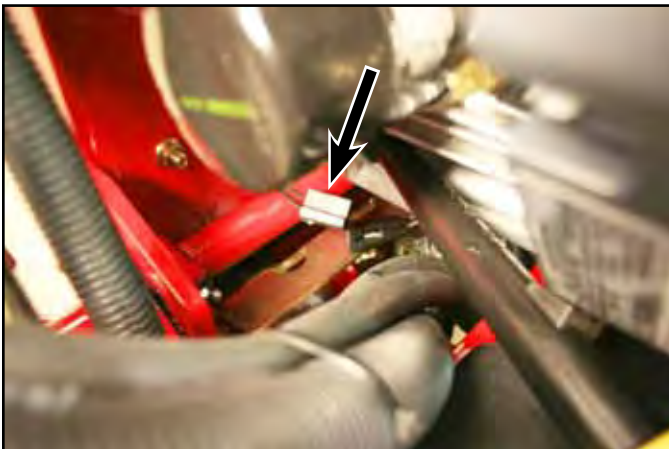


Fig. 1509

IMG-9599a

18. Remove the screwdriver securing the deck and slide the rear of the mower deck towards the engine base. Realign the 4 bolt holes at the back of the mower deck with the four holes in the engine base. Insert a screwdriver to secure the alignment (Fig. 1511).

Note: Use caution to make sure the deck does not slide off the engine base brackets.



Fig. 1511

IMG-9649a

ELECTRICAL

19. Install 3 of the 4 lower bolts securing the mower deck to the engine base. Remove the screwdriver (Fig. 1512).



Fig. 1512

IMG-9651a

21. Install the upper bolt securing the engine base to the mower deck (Fig. 1514).

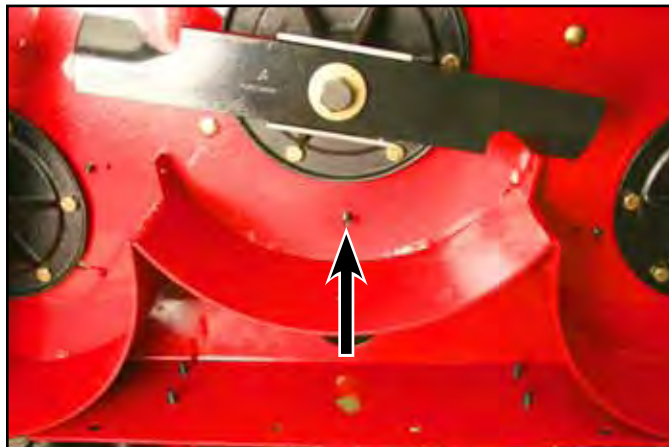


Fig. 1514

IMG-9605a

20. Install the remaining (4th) bolt (Fig. 1513).



Fig. 1513

IMG-9608a

22. Install the nuts on the 5 bolts securing the mower deck to the engine base (Fig. 1515).

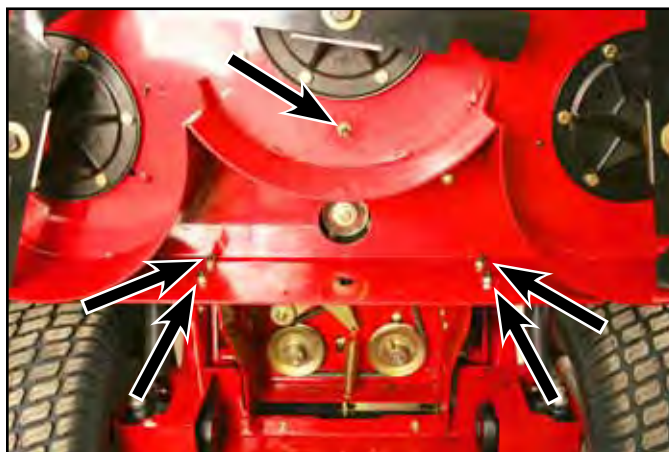


Fig. 1515

IMG-9604a

23. Position the skid plate to the mower deck (Fig. 1516).



Fig. 1516

IMG-9658a

24. Install the 3 carriage bolts and 3 nuts securing the skid plate to the mower deck (Fig. 1517).

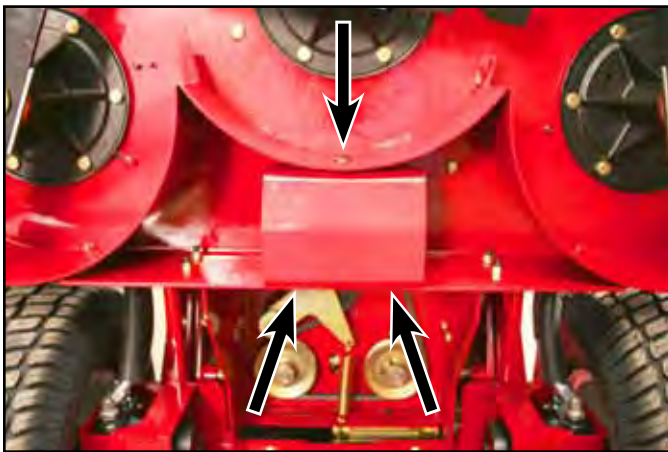


Fig. 1517

IMG-9600a

25. With two people, lower the front of the mower, returning it to the upright position.

26. Position the battery onto the battery tray (Fig. 1518).



Fig. 1518

IMG-9660a

27. Install the positive (red) battery cable to the positive (+) battery terminal and slide the red boot over the positive (red) battery terminal connection (Fig. 1519).



Fig. 1519

IMG-9662a

ELECTRICAL

28. Install the negative battery cable to the negative (-) battery terminal (Fig. 1520).



Fig. 1520

IMG-9665a

30. Install the two battery hold down bolts and wing nuts to secure (Fig. 1522).



Fig. 1522

IMG-9672a

29. Position the battery cover over the battery (Fig. 1521).



Fig. 1521

IMG-9667a

31. Remove the hydraulic tank cap and remove the piece of plastic over the tank opening. Reinstall the hydraulic cap (Fig. 1523).



Fig. 1523

IMG-9675a

32. Lower the mower deck to the lowest height-of-cut (Fig. 1524).



Fig. 1524

IMG-9676a

33. Route the mower deck belt around the mower deck pulleys and clutch pulley. Refer to the belt routing decal (Fig. 1525):



Fig. 1525

117-0486a

34. Using a ratchet in the idler arm, tension the arm until the spring is stretched 5-3/4" (14.6cm) hook to hook and then tighten the nut (Fig. 1526).

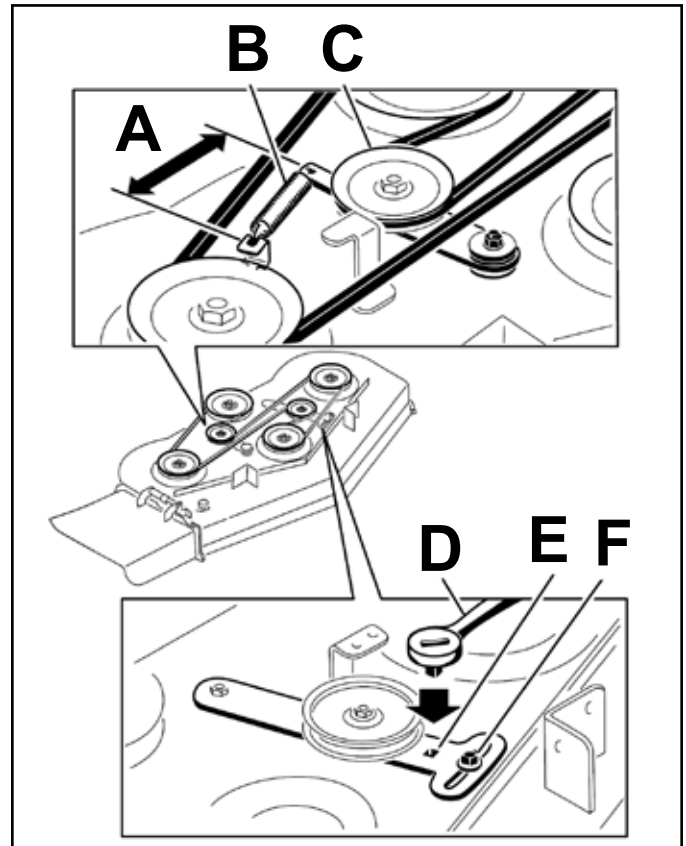


Fig. 1526

fig. 61 G009460

- A. 5-3/4" (14.6cm) from hook to hook
- B. Spring
- C. Spring loaded idler
- D. Ratchet
- E. Square hole for ratchet
- F. Nut

ELECTRICAL

35. Install the LH and RH belt covers onto the mower deck (Fig. 1527).



Fig. 1527

IMG-9548a

36. Add fuel to the fuel tank.
37. If a new electric PTO clutch was installed, the clutch must be burnished. Refer to "Electric PTO Clutch Burnishing Procedure" following.

Electric PTO Clutch Burnishing Procedure

Note: This procedure needs to be done only when installing a new clutch.

The clutch should be burnished as part of the predelivery service, or whenever a new clutch is installed. Burnishing ensures full contact between the armature and rotor friction surfaces, for smooth clutch engagement and maximum power transfer.

With deck drive belt installed, run the engine at half throttle. Engage and disengage the mower 5 times (10 seconds on/10 seconds off).

Increase engine RPM to 3/4 to full throttle. Engage and disengage mower 5 times (10 seconds on/10 seconds off).

Using a feeler gauge, check the clutch air gap at each of the 3 adjustment slots. The gap should be set to 0.015" (0.381mm). Make sure the gauge is inserted between the armature and the rotor friction surfaces. Adjust the clutch as necessary (Fig. 1528).



Fig. 1528

PICT-0554a

Solenoid Removal

1. Disconnect the black ground cable from the battery (Fig. 1529).



Fig. 1529

IMG-1287a

2. Move the terminal cover off the positive cable coming from the battery, then remove the nut and lock washer securing the positive battery cable and red wire eyelet (Fig. 1530).



Fig. 1530

IMG-1289a

3. Remove the nut and lock washer securing the positive cable that goes to the starter (Fig. 1531).

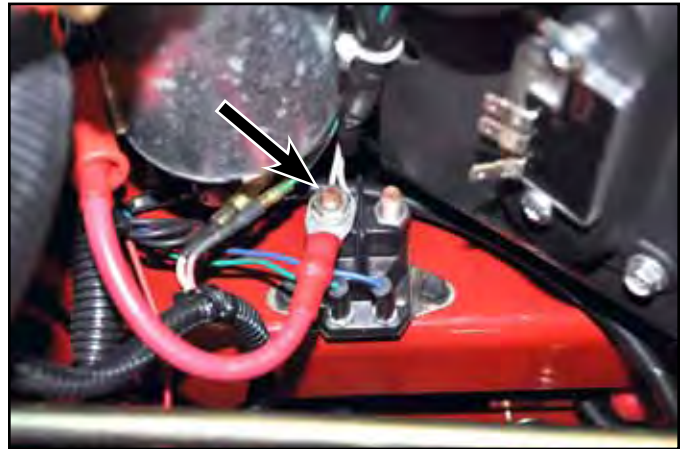


Fig. 1531

IMG-1294a

4. Remove the green and blue bullet connectors from the two small studs on the solenoid (Fig. 1532).

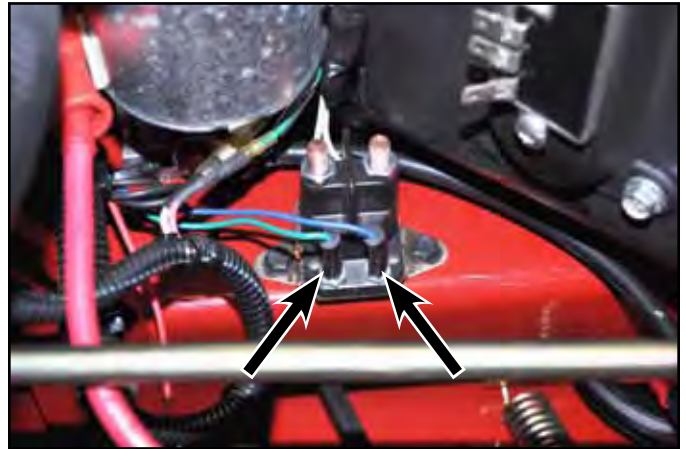


Fig. 1532

IMG-1295a

ELECTRICAL

5. Remove the two thread forming screws securing the solenoid the engine base plate (Fig. 1533).

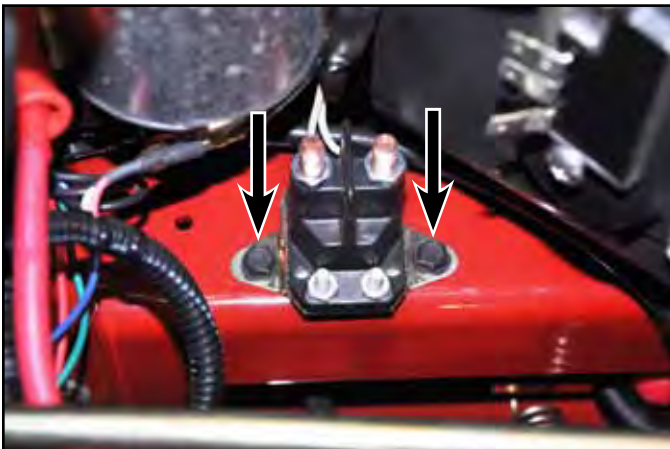


Fig. 1533

IMG-1297a

Solenoid Installation

1. Secure the solenoid to the engine base using two thread forming screws (Fig. 1534).

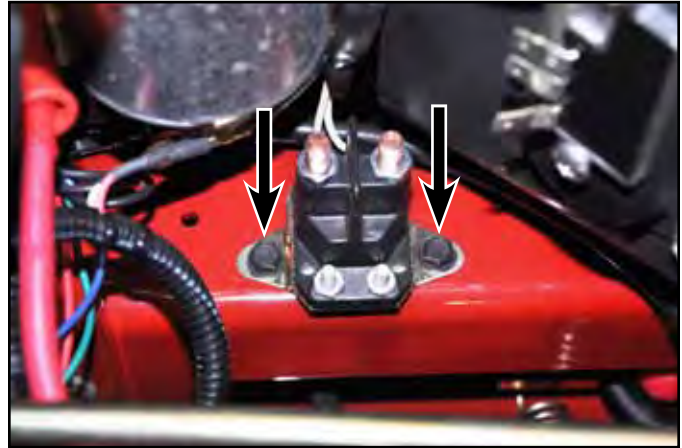


Fig. 1534

IMG-1297a

2. Install the blue and green wires to the two small studs on the solenoid using the wire's bullet connectors (Fig. 1535).

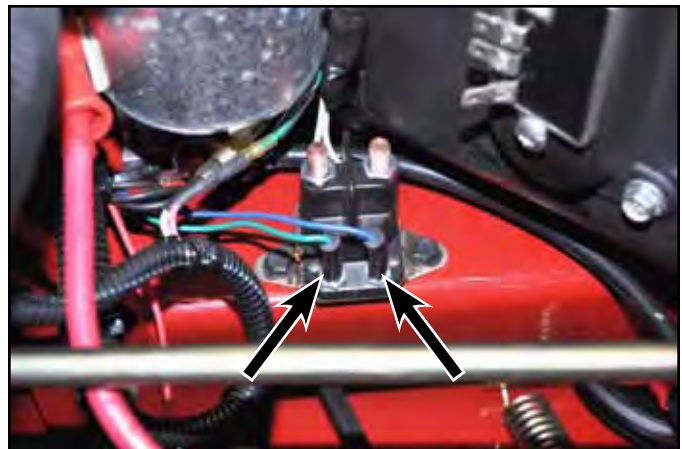


Fig. 1535

IMG-1295a

3. Secure the starter positive cable to the LH solenoid stud with a nut and lock washer (Fig. 1536).

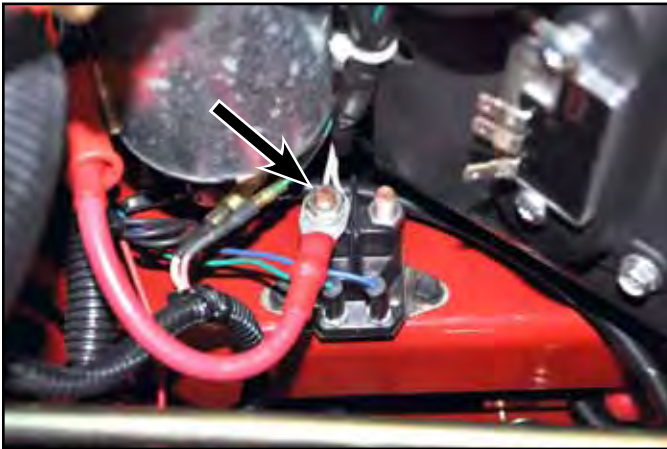


Fig. 1536

IMG-1294a

5. Position the positive cable terminal cover over the terminal connection (Fig. 1538).



Fig. 1538

IMG-1299a

4. Secure the positive battery cable and red wire eyelet to the solenoid using a nut and lock washer (Fig. 1537).



Fig. 1537

IMG-1289a

6. Secure the black ground cable to the battery negative terminal (Fig. 1539).

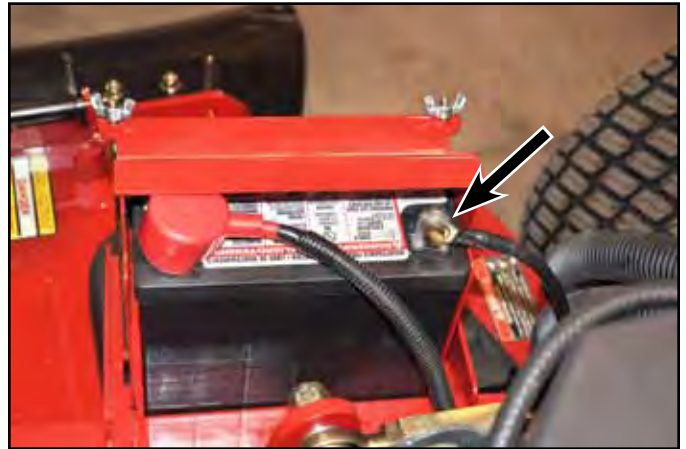


Fig. 1539

IMG-1287a

ELECTRICAL

Operator Presence Control (OPC) Switch Removal

1. Remove the wire harness from the switch (Fig. 1540).



Fig. 1540

IMG-1262a

Operator Presence Control (OPC) Switch Installation

1. Loosely install the two screws and threaded plate that secure the switch to the control handle assembly (Fig. 1542).



Fig. 1542

IMG-1264a

2. Remove the two screws and threaded plate that secure the switch to the control handle assembly and remove the switch (Fig. 1541).



Fig. 1541

IMG-1264a

2. Move the RH control lever to the operating position (Fig. 1543).



Fig. 1543

IMG-058a

3. Position the switch so there is an 1/8" (3mm) gap between the switch plunger and the tab on the handle assembly (Fig. 1544).



Fig. 1544

IMG-1267a

5. Plug the wire harness into the switch (Fig. 1546).



Fig. 1546

IMG-1262a

4. Secure the position of the switch by tightening the two mounting screws (Fig. 1545).



Fig. 1545

IMG-1264a

ELECTRICAL

Neutral Switch Removal

1. Remove the wire harness from the switch (Fig. 1547).

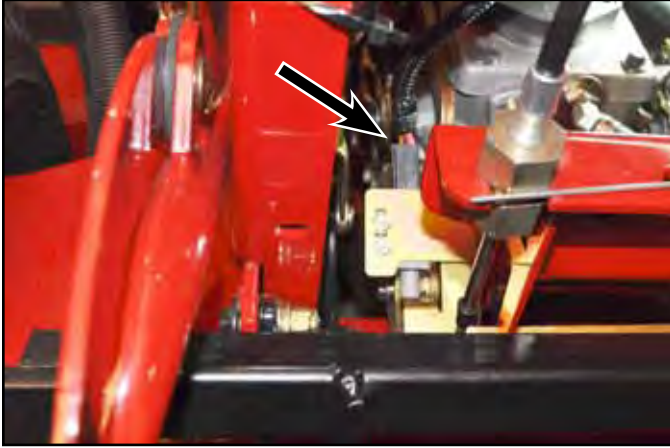


Fig. 1547

IMG-1272a

2. Remove the two screws and threaded plate that secure the switch to the neutral plate and remove the switch (Fig. 1548).

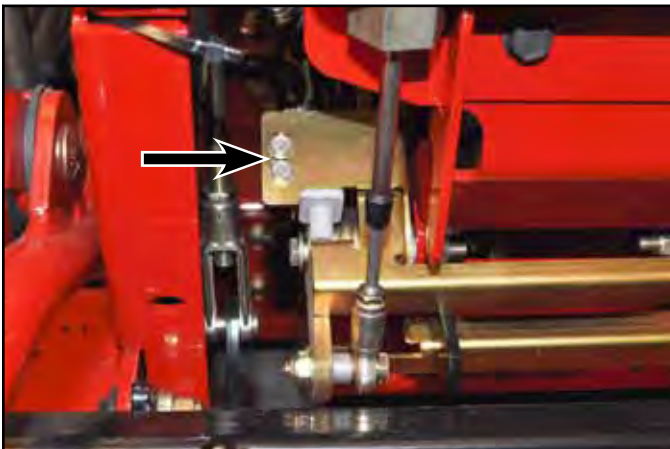


Fig. 1548

IMG-1276a

Neutral Switch Installation

1. Loosely install the two screws and threaded plate that secure the switch to the control handle assembly (Fig. 1549).
2. With the controls in the neutral position, position the switch so there is an 1/8" (3mm) gap between the switch plunger and the tab on the neutral plate (Fig. 1549).
3. Secure the position of the switch by tightening the two mounting screws (Fig. 1549).

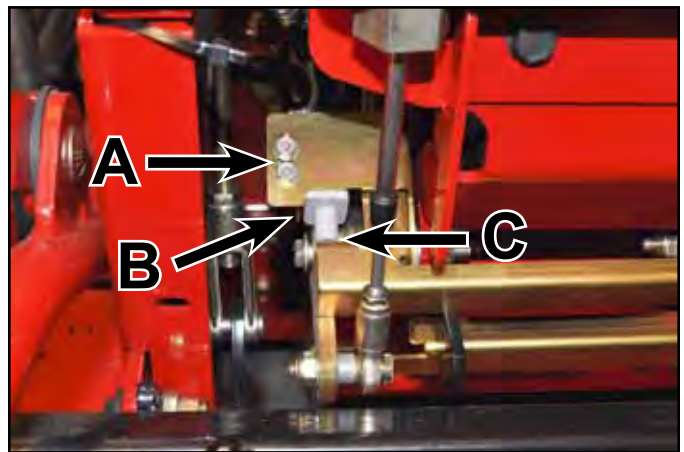


Fig. 1549

IMG-1276a

- A. Screw (2)
B. Switch
C. 1/8" (3mm) gap

4. Plug the wire harness into the switch (Fig. 1550).



Fig. 1550

IMG-1272a

Parking Brake Switch Removal

1. Remove the wire harness from the switch (Fig. 1551).

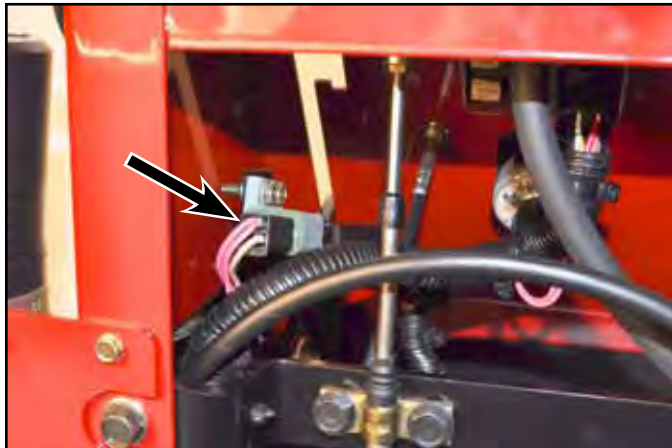


Fig. 1551

IMG-1281a

Parking Brake Switch Installation

1. Loosely install the two screws and threaded plate that secure the switch to the brake assembly (Fig. 1553).

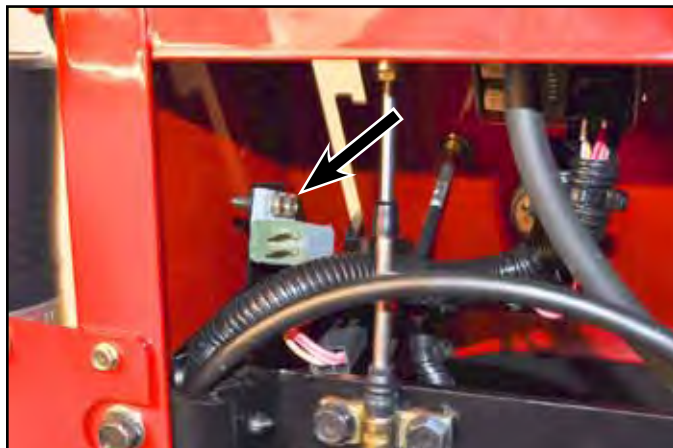


Fig. 1553

IMG-1283a

2. Remove the two screws and threaded plate that secure the switch to the brake assembly and remove the switch (Fig. 1552).

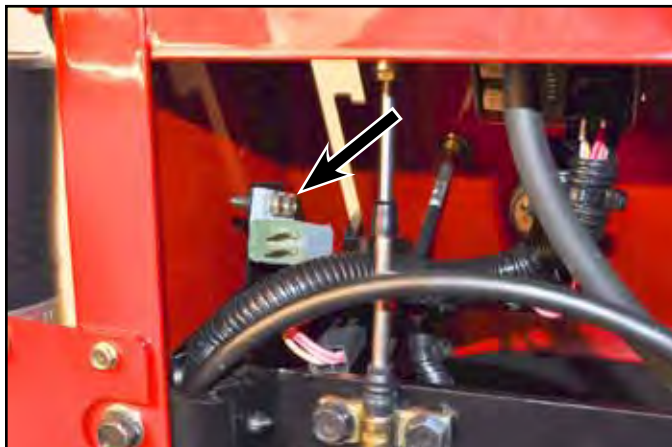


Fig. 1552

IMG-1283a

ELECTRICAL

2. With the brake engaged, position the switch so there is an $1/8"$ (3mm) gap between the switch body and the tab on the brake arm (Fig. 1554).

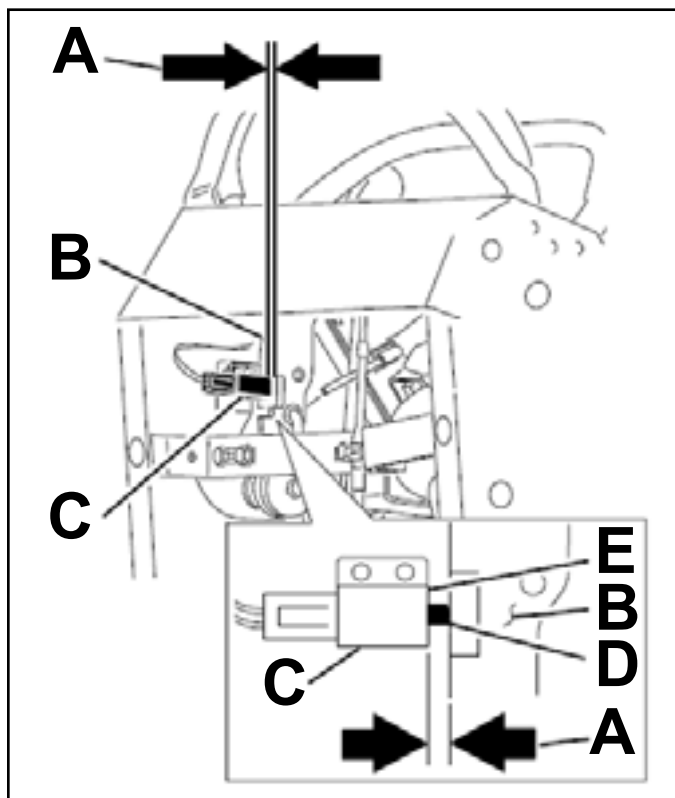


Fig. 1554

fig. 64 G012873

- A. $1/8"$ (3mm) gap needed between switch and brake lever
- B. Brake lever
- C. Switch
- D. Switch button
- E. Face of the switch

3. Secure the position of the switch by tightening the two mounting screws (Fig. 1555).

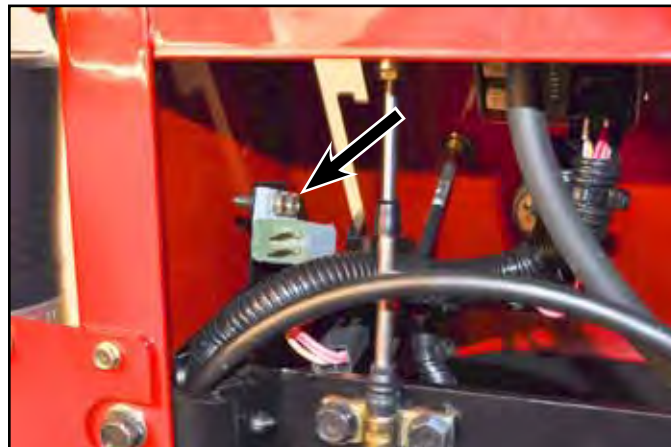


Fig. 1555

IMG-1283a

4. Plug the wire harness into the switch (Fig. 1556).

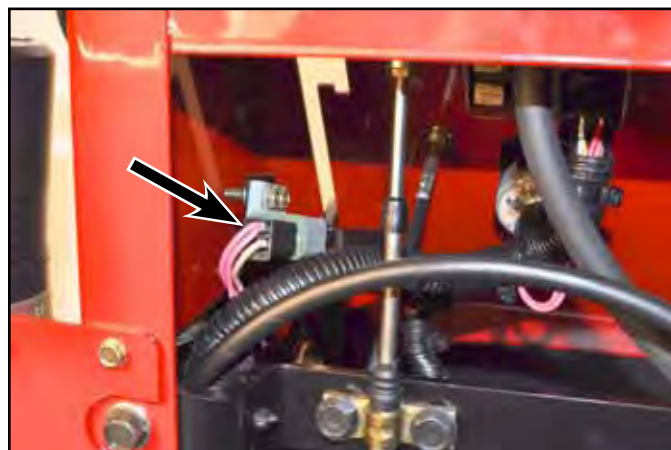


Fig. 1556

IMG-1281a

Hour Meter/Control Module Removal

1. Remove the wire harness from the back of the hour meter (Fig. 1557).



Fig. 1557

IMG-1247a

2. Depress the two tabs securing the hour meter to the control panel (Fig. 1558).

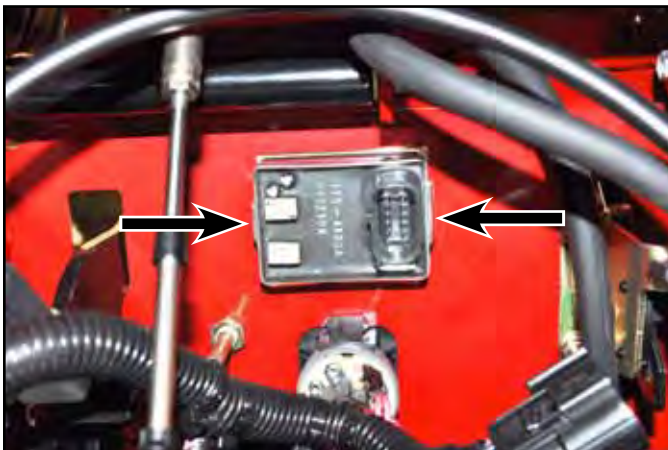


Fig. 1558

IMG-1249a

3. Remove the hour meter through the front of the control panel (Fig. 1559).



Fig. 1559

IMG-1252a

ELECTRICAL

Hour Meter/Control Module Installation

1. Install the hour meter into the control panel. Ensure that the mounting clips have secured the switch in the control panel (Fig. 1560).



Fig. 1560

IMG-1252a

2. Install the wire harness to the back of the hour meter (Fig. 1562).



Fig. 1562

IMG-1247a

Note: The hour meter must be orientated so it can be read from the front of the machine (Fig. 1561).



Fig. 1561

IMG-1254a

GrandStand Hydraulic Schematic

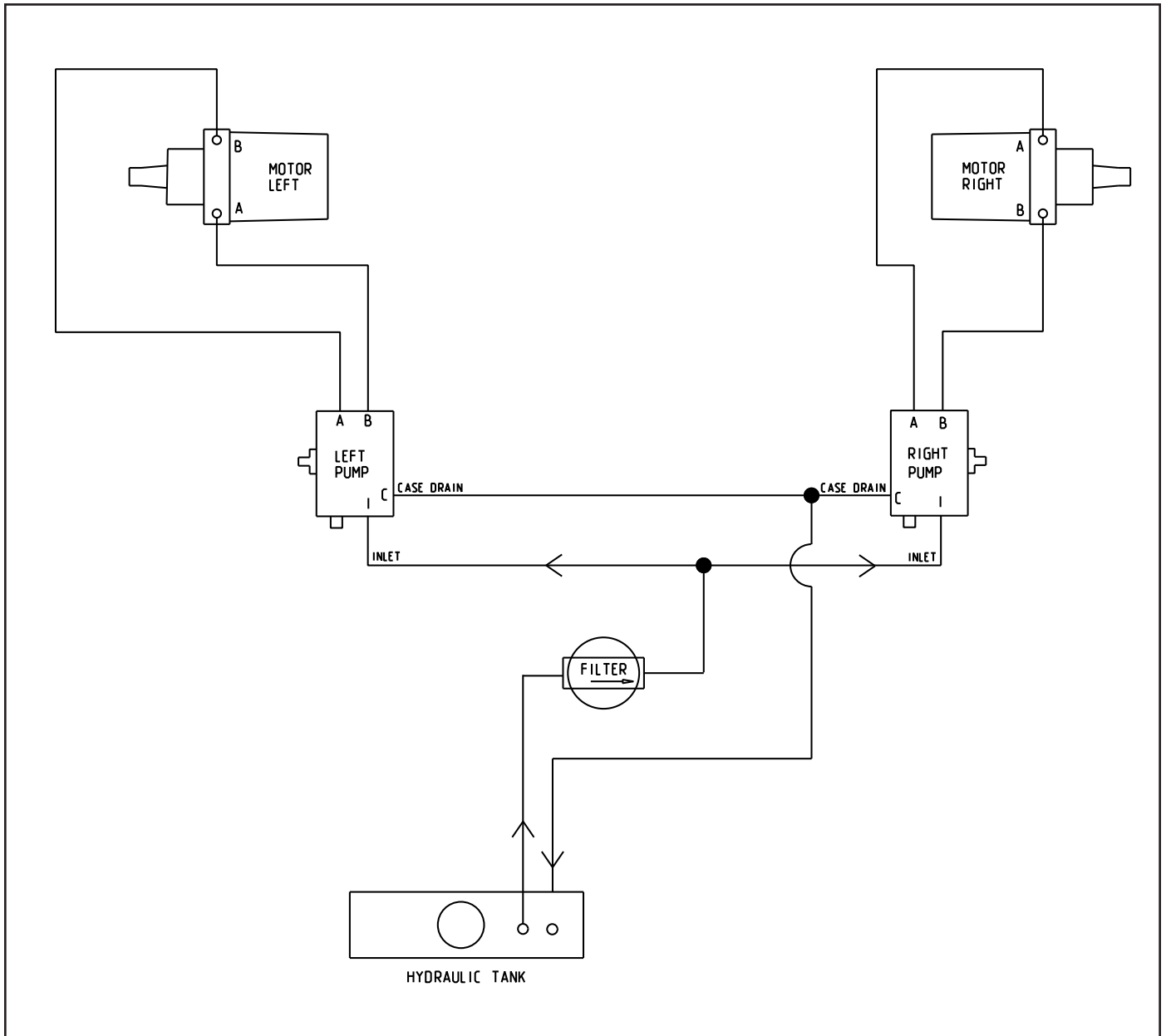


Fig. 1563

hydr scheme G009494

SCHEMATICS

GrandStand Electrical Schematic

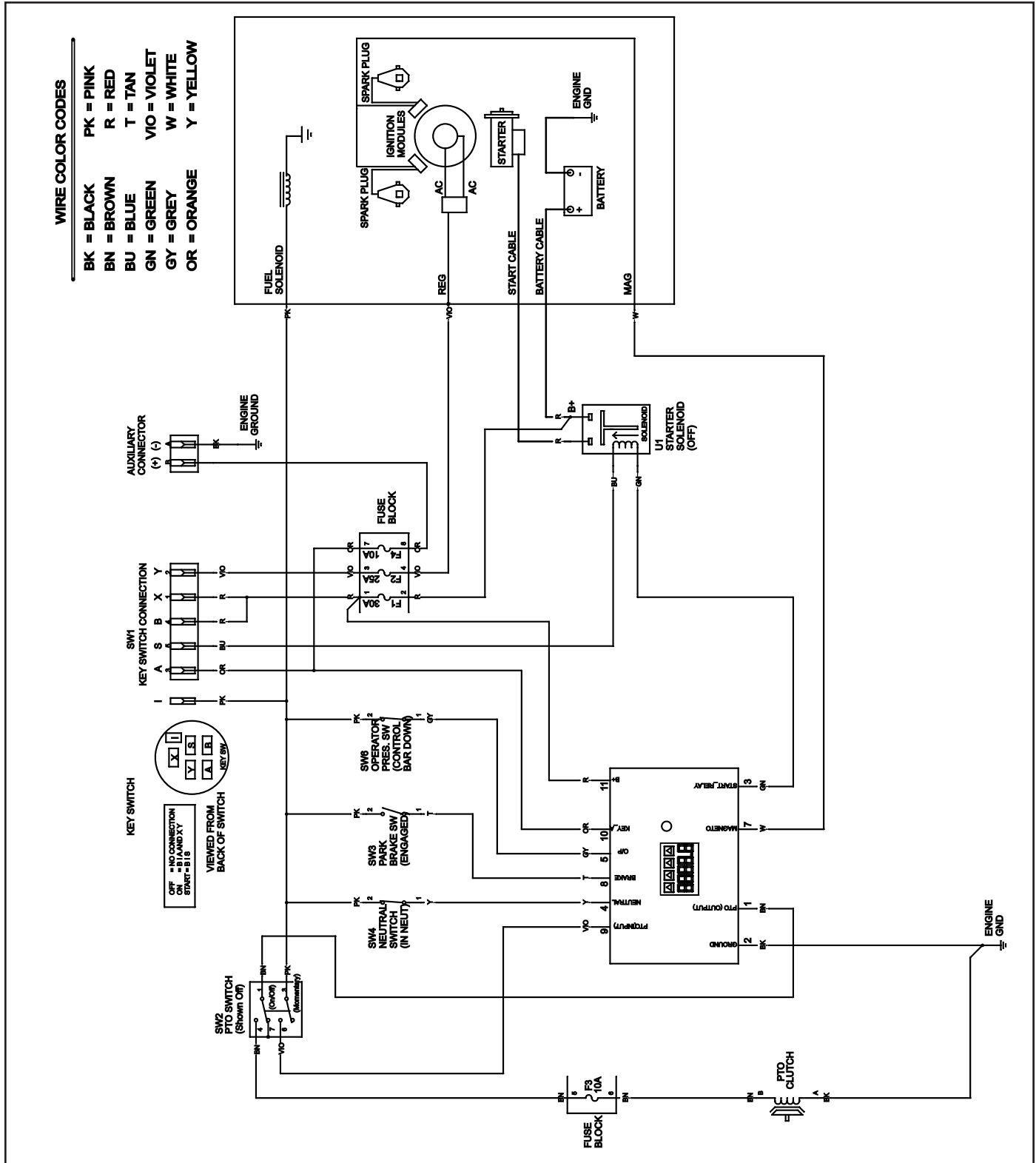


Fig. 1564

elec scheme G009493



Toro GrandStand Stand-on Mower Service Manual