TORO®

LCE Products

Z580/Z589 DFI Z Master

Service Manual

ABOUT THIS MANUAL

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

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

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

Hydrostatic Pumps:	Hydro-Gear P Series Pumps - Service and Repair Manual Form #BLN 52503
Wheel Motors:	Hydro-Gear HGM-E Wheel Motor Service Manual Form #492-9139
Engine:	Kawasaki FD791D Engine Service Manual (available through Kawasaki) Form #99924-2061-03
Hydraulic Troubleshooting:	Interactive hydraulic troubleshooting and failure analysis on DVD Form #492-4777
Electrical Troubleshooting:	Interactive electrical troubleshooting and wiring diagrams on DVD Form # 492-9193

The Z Master Z580/Z589 with liquid-cooled DFI Kawasaki engine, model years 2007 to 2009, are covered in this manual.

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

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

The Toro Company
LCE 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.

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General Information

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

This manual is intended as a service and repair manual only. The safety instructions provided herein are for troubleshooting, service, and repair of the Z Master Z580/Z589 with liquid-cooled DFI Kawasaki engine.

The riding mower and attachment operator's manual contain safety information and operating tips for safe operating practices. Operator's manuals are available online at www.toro.com, through your Toro parts source or:

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

Think Safety First

Avoid unexpected starting of engine...

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

Avoid lacerations and amputations...

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

Avoid burns...

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

Avoid fires and explosions...

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

Avoid asphyxiation...

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

Avoid injury from batteries...

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

Avoid injury due to inferior parts...

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

Avoid injury to bystanders...

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

Avoid injury due to projectiles...

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

Avoid modifications...

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

Avoid unsafe operation...

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

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Specifications

Configurations

Model	Engine	Deck
74253	29 hp Kawasaki Liquid Cool DFI	60” (152.4cm) Turbo Force SD Mower
74254	29 hp Kawasaki Liquid Cool DFI	72” (182.8cm) Turbo Force SD Mower
74253CP	29 hp Kawasaki Liquid Cool DFI	60” (152.4cm) Turbo Force SD Mower
74254CP	29 hp Kawasaki Liquid Cool DFI	72” (182.8cm) Turbo Force SD Mower

Power System

Engine	Kawasaki FD791D-AS07
High Idle	3800 ± 100 RPM
Low Idle	2250 ± 150 RPM
Engine Oil Capacity	2.1 qt. (1.98 L)
Heavy Duty Canister Air Cleaner	Standard
Hydraulic Pumps	Hydro-Gear variable displacement 16 cc/rev hydrostatic with shock valves
Wheel Motors	Twin Hydro-Gear HGM 18E positive displacement with 1.25” (3.175cm) heavy duty tapered shafts
Ground Speed	Forward: 0 - 11 mph (0 - 17.7 k/hr) Reverse: 0 - 6.3 mph (0 - 10.1 k/hr)
Hour Meter	Standard
Rear Drive Tires	24” x 12.0 -12” 4 ply
Front Caster Tires	13” x 6.5 - 6” Semi-pneumatic with smooth tread
Tire Pressure	13 psi (89.6 kPa) (rear drive tires only)
Fuel / Capacity	12 gallons (6 gallons per tank) (45.4 L / 22.7 L per tank)
Cooling System Capacity	5.5 qt. (5.2 liter)

SPECIFICATIONS

Electrical

Engine Charging Coil	40 Amp
Voltage	12 volt, negative ground
Battery	BCI group 26, 540 CCA
Gauges and Alarms	• Top panel mounted hour meter • Audio alarm for excess engine temperature • Lighted indicators for engine malfunction and excess engine temperature • Push/pull PTO switch
Fuses	Blade type, 30 Amp ignition, 30 Amp cooling fan and 10 Amp engine

Mowing Deck

	60” (152.4cm)	72” (182.8cm)
Type	Turbo Force™	Turbo Force™
Deck Construction	Fabricated, 7-gauge high-strength steel	Fabricated, 7-gauge high-strength steel
Deck Depth	5-1/2” (13.97cm)	5-1/2” (13.97cm)
Adjustable Discharge Baffle	Standard	Standard
Spindle Housings	Reinforced cast iron	Reinforced cast iron
Spindle Shaft / Bearings	1” (2.54cm) Steel shaft/tapered roller bearings	1” (2.54cm) Steel shaft/tapered roller bearings
Blade Tip Speed	18,500 ft/min (5,638.8 meters/min) at high idle	18,500 ft/min (5,638.8 meters/min) at high idle
Height of Cut	1.5” - 5” in .25” increments (3.81 - 12.7cm in .635cm increments)	1.5” - 5” in .25” increments (3.81 - 12.7cm in .635cm increments)
Anti-Scalp Rollers	6 Adjustable	6 Adjustable

Operator Zone

	60” (152.4cm)	72” (182.8cm)
Steering Levers	Dual, wrap-around hydraulically dampened, with cushioned grips	Dual, wrap-around hydraulically dampened, with cushioned grips
Parking Brake	Left hand operated lever with cushioned grip	Left hand operated lever with cushioned grip
Folding ROPS	Standard	Standard
Deck Lift Assist Pedal	Standard	Standard
Arm Rests	Standard	Standard
Seat Belt	Retractable	Retractable
Z Stand	Optional	Optional

Dimensions

	60” (152.4cm)	72” (182.8cm)
Weight	1423 lbs. (645kg)	1482 lbs. (672kg)
Wheel Base	53.6” (136cm)	56.8” (144.3kg)
Overall Length	81.6” (207cm)	84.6” (215cm)
Width Outside Tires	53.2” (135cm)	57.2” (145cm)
Overall Width (outside deck)	76” (193cm)	88” (224cm)
Gate Width	62” (157.5cm)	74” (188cm)
Overall Height	72” (183cm)	72” (183cm)

Torque Specifications

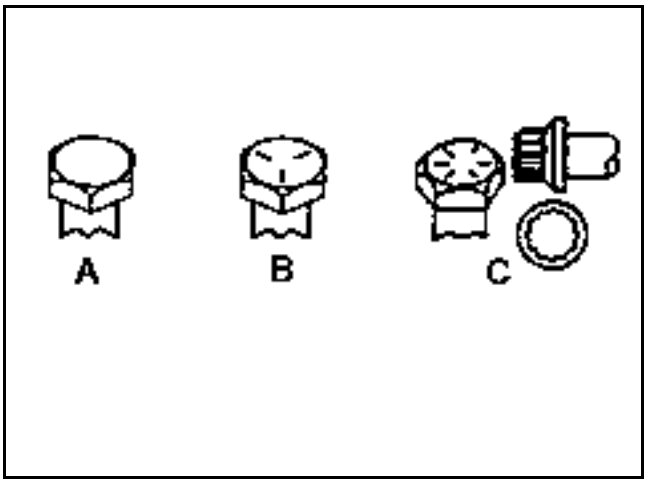
Recommended fastener torque values are listed in the following tables. For critical applications, as determined by Toro, either the recommended torque or a torque that is unique to the application is clearly identified and specified in the service manual.

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.

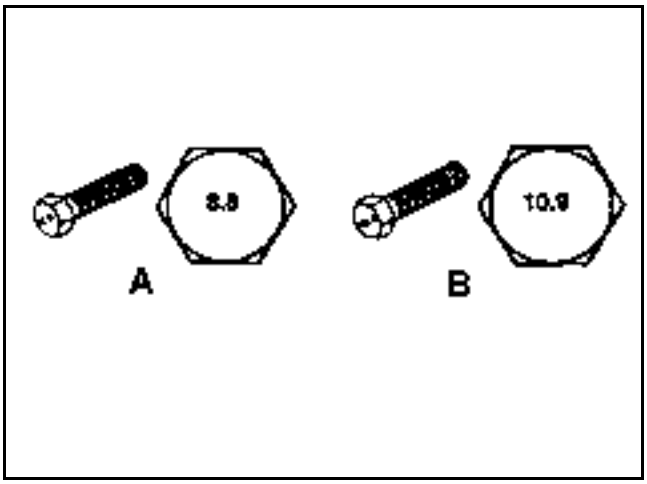
As noted in the following tables, torque values should be **reduced by 25% for lubricated fasteners** to achieve the similar stress as a dry fastener. Torque values may also have to be reduced when the fastener is threaded into aluminum or brass. The specific torque value should be determined based on 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 (B) Grade 5	(C) Grade 8



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

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

Thread Size	Grade 1, 5, & 8 with Thin Height Nuts	SAE Grade 1 Bolts, Screws, Studs, & Sems with Regular Height Nuts (SAE J995 Grade 2 or Stronger Nuts)		SAE Grade 5 Bolts, Screws, Studs, & Sems with Regular Height Nuts (SAE J995 Grade 2 or Stronger Nuts)		SAE Grade 8 Bolts, Screws, Studs, & Sems with Regular Height Nuts (SAE J995 Grade 2 or Stronger Nuts)	
	In-lb	In-lb	N-cm	In-lb	N-cm	In-lb	N-cm
# 6 - 32 UNC	10 ± 2	13 ± 2	147 ± 23	15 ± 2	170 ± 20	23 ± 2	260 ± 20
# 6 - 40 UNF				17 ± 2	190 ± 20	25 ± 2	280 ± 20
# 8 - 32 UNC	13 ± 2	25 ± 5	282 ± 30	29 ± 3	330 ± 30	41 ± 4	460 ± 45
# 8 - 36 UNF				31 ± 3	350 ± 30	43 ± 4	31 ± 3
# 10 - 24 UNC	18 ± 2	30 ± 5	339 ± 56	42 ± 4	475 ± 45	60 ± 6	674 ± 70
#10 - 32 UNF				48 ± 4	540 ± 45	68 ± 6	765 ± 70
1/4 - 20 UNC	48 ± 7	53 ± 7	599 ± 79	100 ± 10	1125 ± 100	140 ± 15	1580 ± 170
1/4 - 28 UNF	53 ± 7	65 ± 10	734 ± 113	115 ± 10	1300 ± 100	160 ± 15	1800 ± 170
5/16 - 18 UNC	115 ± 15	105 ± 17	1186 ± 169	200 ± 25	2250 ± 280	300 ± 30	3390 ± 340
5/16 - 24 UNF	138 ± 17	128 ± 17	1446 ± 192	225 ± 25	2540 ± 280	325 ± 30	3670 ± 340
	ft-lb	ft-lb	N-m	ft-lb	N-m	ft-lb	N-m
3/8 - 16 UNC	16 ± 2	16 ± 2	22 ± 3	30 ± 3	41 ± 4	43 ± 4	58 ± 5
3/8 - 24 UNF	17 ± 2	18 ± 2	24 ± 3	35 ± 3	47 ± 4	50 ± 4	68 ± 5
7/16 - 14 UNC	27 ± 3	27 ± 3	37 ± 4	50 ± 5	68 ± 7	70 ± 7	68 ± 9
7/16 - 20 UNF	29 ± 3	29 ± 3	39 ± 4	55 ± 5	75 ± 7	77 ± 7	104 ± 9
1/2 - 13 UNC	30 ± 3	48 ± 7	65 ± 9	75 ± 8	102 ± 11	105 ± 10	142 ± 14
1/2 - 20 UNF	32 ± 3	53 ± 7	72 ± 9	85 ± 8	115 ± 11	120 ± 10	163 ± 14
5/8 - 11 UNC	65 ± 10	88 ± 12	119 ± 16	150 ± 15	203 ± 20	210 ± 20	285 ± 27
5/8 - 18 UNF	75 ± 10	95 ± 15	129 ± 20	170 ± 15	230 ± 20	240 ± 20	325 ± 27
3/4 - 10 UNC	93 ± 12	140 ± 20	190 ± 27	265 ± 25	359 ± 34	374 ± 35	508 ± 47
3/4 - 16 UNF	115 ± 15	165 ± 25	224 ± 34	300 ± 25	407 ± 34	420 ± 35	569 ± 47
7/8 - 9 UNC	140 ± 20	225 ± 25	305 ± 34	430 ± 45	583 ± 61	600 ± 60	813 ± 81
7/8 - 14 UNF	155 ± 25	260 ± 30	353 ± 41	475 ± 45	644 ± 61	660 ± 60	895 ± 81

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

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

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

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

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

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

Note: 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.

Other Torque Specifications

SAE Grade 8 Steel Set Screws

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

Wheel Bolts and Lug Nuts

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

** For steel wheels and non-lubricated fasteners.

Thread Cutting Screws (Zinc Plated Steel)

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

Thread Cutting Screws (Zinc Plated Steel)

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

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

Conversion Factors

in-lb X 11.2985 - N-cm
ft-lb X 1.3558 = N-m

N-cm X - 0.08851 = in-lb
N-cm X 0.73776 - ft-lb

Equivalents and Conversions

Decimal and Millimeter Equivalents

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

U.S. to Metric Conversions

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

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Castor Fork Assembly Replacement

Castor Fork Assembly Removal

1. Raise the front of the machine off the ground leaving enough clearance to remove the castor fork from the carrier frame.

2. Remove the grease cap from the frame (Fig. 001).

Fig 001 IMG-7694a

3. Remove the locknut (Fig. 002).

Fig 002 IMG-7874a

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

Fig 003 IMG-7700a

Castor Bearing Replacement

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

Fig 004 IMG-7703a

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

Fig 005 IMG-7706a

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

Fig 006 IMG-7709a

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

Fig 007 IMG-7711a

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

Fig 008 IMG-7714a

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

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

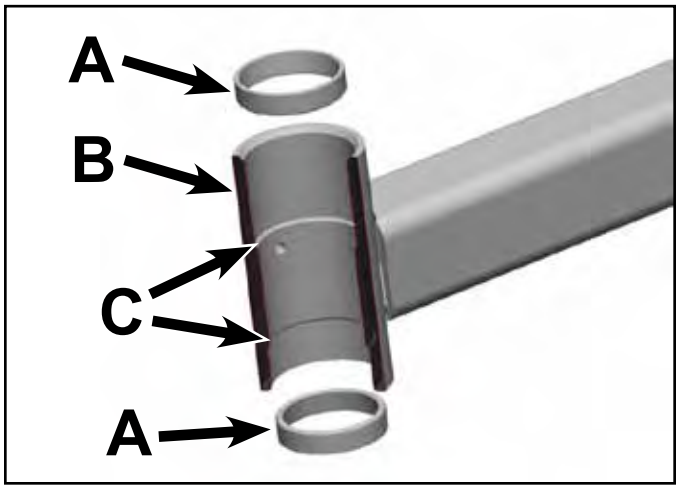

Fig 009 tapered bearing cup install

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

7. Pack the upper and lower tapered bearings with grease (No. 2 general purpose lithium base or molybdenum grease).

8. Install the lower bearing into the caster fork hub (Fig. 010).

Fig 010 IMG-7722a

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

Fig 011 IMG-7725a

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

Fig 012 IMG-7731a

Castor Fork Assembly Installation

1. Install 3 Bellville washers as shown (Fig. 013):

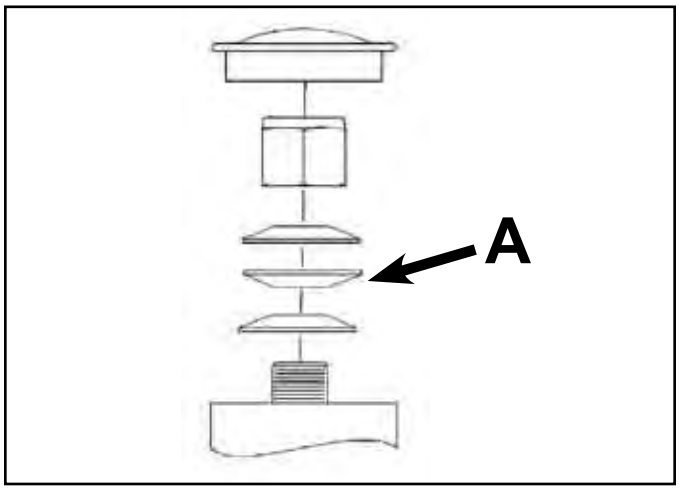

Fig 013 fig. 49 G001297

A. Belleville washers

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

Fig 014 IMG-7700a

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

Fig 015 IMG-7874a

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

Fig 016 PICT-2897a

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

6. Install the dust cap onto the frame (Fig. 017).

Fig 017 IMG-7734a

Front Wheel Bearing Replacement

1. Raise the front of the machine off the ground.
2. Remove the wheel axle bolt and nut (Fig. 018).

Fig 018 IMG-7736a

3. Remove the wheel assembly from the fork (Fig. 019).

Fig 019 IMG-7878a

4. Remove the castor spacer from the wheel assembly (Fig. 020).

Fig 020 IMG-7742a

5. Remove both bearing spacers (one on each side) from the wheel assembly (Fig. 021).

Fig 021 IMG-7744a

6. Drive the bearing cup, bearing and bearing seal out of the wheel assembly. Repeat on the opposite side (Fig. 022).

Fig 022 IMG-7748a

Wheel Assembly (Fig. 023)

Fig 023 IMG-7880a

A. Bearing spacer (2)
B. Grease seal (2)
C. Tapered bearing (2)
D. Tapered bearing cup (2)
E. Wheel and tire assembly
F. Caster spacer
G. Wheel assembly axle bolt
H. Nut

7. Install a new tapered bearing cup into the wheel assembly by pressing each bearing cup into the wheel hub so that the thicker part of the taper is pressed into the wheel hub first. The bearing cups should seat against the shoulder divots inside the wheel hub (Fig. 024).

Fig 024 IMG-7881a

8. Pack both tapered bearings with grease (No. 2 general purpose lithium base or molybdenum grease).

9. Install the tapered bearings into each side of the wheel hub (Fig. 025).

Fig 025 IMG-7882a

10. Install the grease seals into each side of the wheel hub (Fig. 026).

Fig 026 IMG-7883a

11. Install a bearing spacer into each side of the wheel hub (Fig. 027).

Fig 027 IMG-7884a

12. Install the castor spacer into the wheel hub (Fig. 028).

Fig 028 IMG-7885a

13. Position the wheel assembly into the caster fork (Fig. 029).

Fig 029 IMG-7878a

14. Install the axle bolt and nut securing the wheel assembly to the fork (Fig. 030).

Fig 030 IMG-7736a

15. Apply grease (No. 2 general purpose lithium base or molybdenum grease) to the wheel assembly grease fitting (Fig. 031).

Fig 031 IMG-7886a

Fuel Tank Replacement

Right Side Fuel Tank Removal

1. Raise the seat and remove the front engine shield (Fig. 032).

Fig 032 IMG-0303a

2. Turn the fuel shut-off valve to OFF position (Fig. 033).

Fig 033 IMG-0304a

3. Disconnect the negative battery cable.

4. Remove the right rear wheel assembly (Fig. 034).

Fig 034 IMG-0307a

5. Remove the clamp securing the fuel line to the fitting on the bottom of the fuel tank. Slide the fuel hose off the fitting and drain the fuel from the tank (Fig. 035).

Fig 035 IMG-0308a

6. Remove the clamp securing the return fuel line to the fitting on the operator's side of the fuel tank. Slide the fuel hose off the fitting (Fig. 036).

Fig 036 IMG-0309a

7. Remove the nuts, springs and washers from the 3 studs on the underside of the fuel tank (Fig. 037).

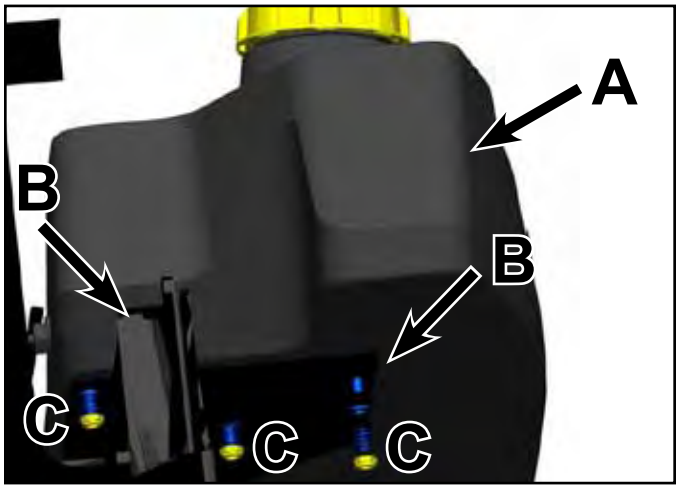

Fig 037 RH fuel tank fasteners a

A. Fuel tank
B. Frame
C. Mounting stud fastener assembly (3)

8. Remove the bolt, lockwasher and washer securing the left front corner of the fuel tank to the frame (Fig. 038).

Fig 038 IMG-0310a

9. Lift the fuel tank off the frame (Fig. 039).

Fig 039 IMG-0313a

Right Side Fuel Tank Installation

1. Position the fuel tank onto the frame (Fig. 040).

Fig 040 IMG-0313a

2. Slide a hose clamp onto the return fuel line. Slide the return fuel line onto the fitting located on the operator's side of the fuel tank (Fig. 041).

Fig 041 IMG-0317a

3. Position the hose clamp and tighten (Fig. 042).

Fig 042 IMG-0320a

4. Slide a hose clamp onto the intake fuel line. Slide the intake fuel line onto the fitting located on the bottom of the fuel tank. Position the hose clamp and tighten (Fig. 043).

Fig 043 IMG-0321a

5. Loosely install a bolt, lock washer, and washer through the frame and into the front left corner of the fuel tank (Fig. 044).

Fig 044 IMG-0310a

6. Loosely install a washer, spring and nut onto each of the three studs on the underside of the fuel tank (Fig. 045).

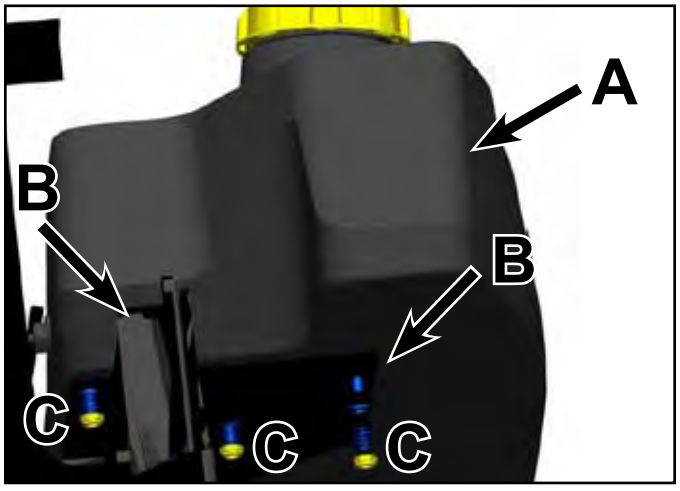

Fig 045 RH fuel tank fasteners a

7. Tighten the 3 nuts until three threads protrude past the nut. Do not over-tighten (Fig. 046).

Fig 046 PICT-3290a

8. Tighten the bolt located in the front corner of the tank to frame (Fig. 047).

Fig 047 IMG-0310a

9. Install the right rear wheel assembly (Fig. 048).

Fig 048 IMG-0307a

10. Install the negative battery cable.

11. Install the front engine shield (Fig. 049).

Fig 049 IMG-0303a

Left Side Fuel Tank Removal

1. Raise the seat and remove the front engine shield (Fig. 050).

Fig 050 IMG-0303a

2. Turn the fuel shut-off valve to the “OFF” position (Fig. 051).

Fig 051 IMG-0304a

3. Disconnect the negative battery cable.

4. Remove the left rear wheel assembly (Fig. 052).

Fig 052 IMG-0322a

5. Remove the 4 screws and washers securing the control panel to the fuel tank (Fig. 053).

Fig 053 IMG-0327a

6. Remove the cable tie securing the throttle cable to the fuel fitting (Fig. 054).

Fig 054 IMG-0328a

7. Move the control panel assembly away from the fuel tank (Fig. 055).

Fig 055 IMG-0331a

8. Remove the hose clamp from the fuel return line and fitting located on the operator's side of the fuel tank (Fig. 056).

Fig 056 IMG-0333a

9. Remove the return fuel line from the fuel fitting (Fig. 057).

Fig 057 IMG-0335a

10. Remove the hose clamp from the fuel intake line and fitting located on the underside of the fuel tank (Fig. 058).

Fig 058 IMG-0338a

11. Remove the fuel line from the fuel fitting and drain the fuel from the fuel tank (Fig. 059).

Fig 059 IMG-0341a

12. Remove the nuts, springs and washers from the 3 fuel tank mounting studs located on the underside of the fuel tank (Fig. 060).

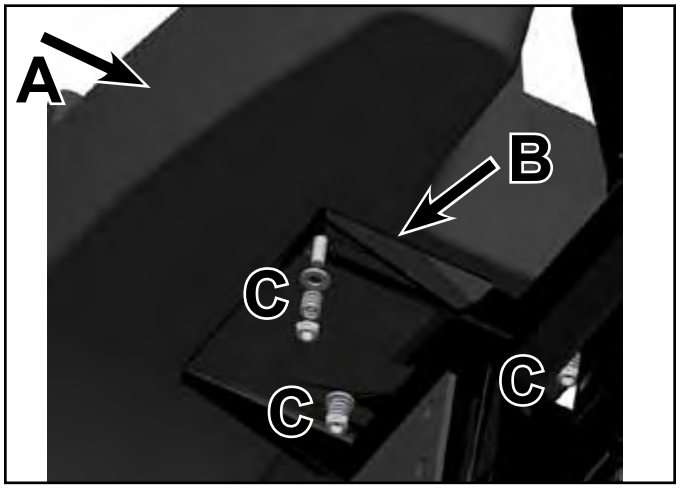

Fig 060 LH fuel tank fasteners a

A. Fuel tank
B. Frame
C. Mounting stud fastener assembly (3)

13. Remove the nut and washer retaining the fuel shut-off valve to the fuel valve bracket (Fig. 061).

Fig 061 IMG-0351a

14. Remove the bolt and washers securing the right front corner of the fuel tank to the frame (Fig. 062).

Fig 062 IMG-0350a

15. Remove the fuel tank from the frame (Fig. 063).

Fig 063 IMG-0345a

Left Side Fuel Tank Installation

1. Position the fuel tank onto the frame (Fig. 064).

Fig 064 IMG-0345a

2. Slide a hose clamp onto the return fuel hose. Install the fuel return hose onto the fuel-fitting barb located on the operator's side of the fuel tank. Slide the hose clamp into position and tighten (Fig. 065).

Fig 065 IMG-0354a

3. Slide the hose clamp onto the fuel intake hose. Install the fuel intake hose onto the fuel-fitting barb located on the underside of the fuel tank. Slide the hose clamp into position and tighten (Fig. 066).

Fig 066 IMG-0338a

4. Install a bolt, lock washer, and washer into the right front corner of the fuel tank securing it to the frame (Fig. 067).

Fig 067 IMG-0350a

5. Loosely install a washer, spring and nut onto each of the three studs on the underside of the fuel tank (Fig. 068).

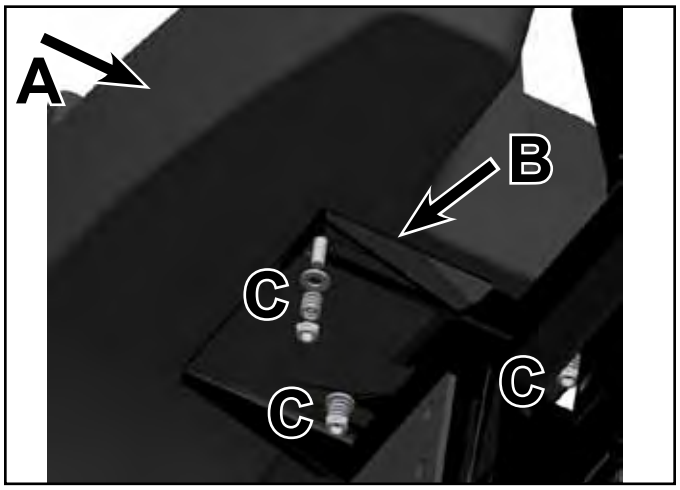

Fig 068 lh fuel tank fasteners

A. Fuel tank
B. Frame
C. Mounting stud fastener assembly (3)

6. Tighten the nuts until three threads protrude past the nut. Do not over-tighten (Fig. 069).

Fig 069 PICT-3290

7. Install the fuel shut-off valve to the fuel valve bracket with a washer and nut (Fig. 070).

Fig 070 IMG-0351a

8. Install 4 screws and washers securing the control panel to the fuel tank (Fig. 071).

Fig 071 IMG-0327a

9. Install a cable tie securing the throttle cable to the fuel tank fitting located on the operator's side of the fuel tank (Fig. 072).

Fig 072 IMG-0416a

10. Install the left rear tire assembly and lower the machine to the ground.

11. Install the negative battery cable.

12. Install the front engine shroud (Fig. 073).

Fig 073 IMG-0303a

13. Lower the seat.

Fuel Tank Fitting Replacement

There are 2 fuel fittings located on each of the fuel tanks. The following procedure can be used to replace any of the fittings (Fig. 074).

Fig 074 IMG-7771a

1. Remove the nut and washer securing the fitting to the fuel tank (Fig. 075).

Fig 075 IMG-7772a

2. Using a magnet tool, remove the fitting from the inside of the fuel tank (Fig. 076).

Fig 076 IMG-7774a

3. Using a magnet tool, install a fuel tank fitting by inserting it through the fuel tank opening (Fig. 077).

Fig 077 IMG-7775a

4. Loosely install a washer and nut to secure the fuel tank fitting to the fuel tank (Fig. 078).

Fig 078 IMG-7772a

5. Position the fuel tank fittings as shown (Fig. 079, Fig. 080 and Fig. 081):

Right and left fuel tank bottom fitting

Fig 079 IMG-7781a

Right side fuel tank operator's side fitting

Fig 080 DSC-4856a

Left side fuel tank operator's side fitting

Fig 081 DSC-4854a

6. Tighten the fitting nut.

Hood Assembly Replacement

Hood Assembly Removal

1. Unhook the rubber latch that is located on the rear of the hood (Fig. 082).

Fig 082 IMG-0361a

2. Remove the two hairpin cotters, clevis pins, and washers in the left and right hinges (Fig. 083).

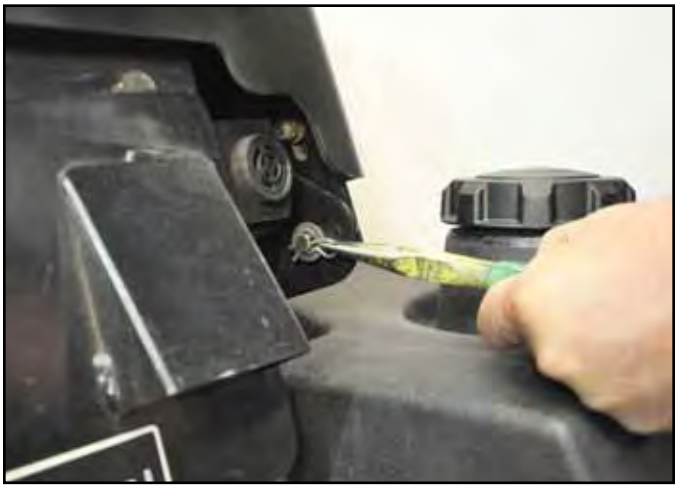

Fig 083 IMG-0365a

3. Lift the hood and remove from the machine (Fig. 084).

Fig 084 IMG-0369a

Hood Assembly Installation

1. Align the hood pivot brackets with holes in the pivot bracket on the frame (Fig. 085).

Fig 085 IMG-0370a

2. Install a clevis pin, washer and hairpin cotter into each of the pivot brackets (Fig. 086).

Note: The hood screen can contact the radiator cap. The pressure on the cap can result in a crack at the cap adapter joint, resulting in loss of radiator pressure and overheating.

Check the clearance between the hood screen and the radiator cap. If there is any interference, the hood can be adjusted using the slotted holes in the hood mounting brackets.

Fig 086 IMG-0365a

Hood hinge plate adjustment slots (Fig. 087).

Fig 087 IMG-0381a

Hood pivot plate adjustment slots (Fig. 088).

Fig 088 IMG-0382a

3. Lower the hood and hook the rubber latch located at the rear of the hood (Fig. 089).

Fig 089 IMG-0361a

Throttle Control Assembly Replacement

Throttle Control Assembly Removal

1. Raise the seat.
2. Disconnect the negative battery cable from the battery terminal.
3. Remove the knob from the throttle control assembly (Fig. 090).

Fig 090 IMG-0383a

4. Remove the 4 screws securing the control panel to the left hand fuel tank (Fig. 091).

Fig 091 IMG-0385a

5. Remove the locknuts and carriage bolts securing the throttle control to the control panel (Fig. 092).

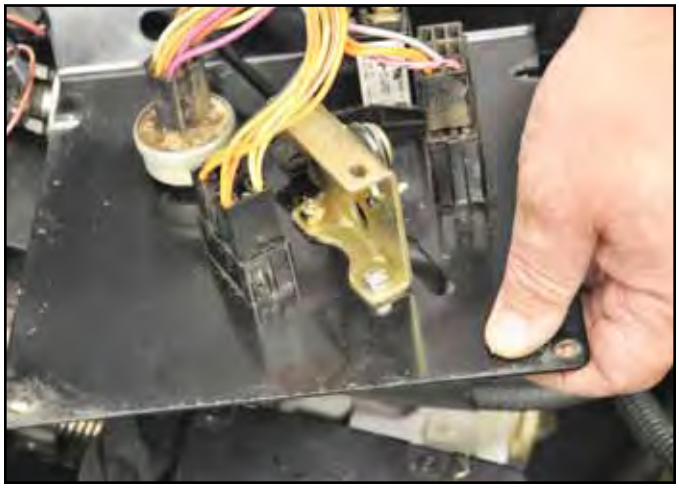

Fig 092 IMG-0386a

6. Remove the front engine panel shield assembly (Fig. 093).

Fig 093 IMG-0303a

7. Remove the cable tie securing the throttle cable to the fuel tank fitting (Fig. 094).

Fig 094 IMG-0328a

8. Remove the cable tie securing the throttle cable to the bracket located behind the voltage regulator (Fig. 095).

Fig 095 IMG-0387a

9. Loosen the cable clamp and remove the throttle cable (Fig. 096).

Fig 096 IMG-0388a

10. Remove the z-bend end of the cable from the throttle arm assembly (Fig. 097).

Fig 097 IMG-0390a

11. Remove the throttle cable from the unit.

Throttle Control Assembly Installation

1. Slide the throttle cable through the slot in the side of the control panel (Fig. 098).

Fig 098 IMG-0392a

2. Install the throttle cable assembly into the slot in the control panel (Fig. 099).

Fig 099 IMG-0393a

3. Install the carriage bolts and locknuts securing the throttle control assembly to the control panel (Fig. 100).

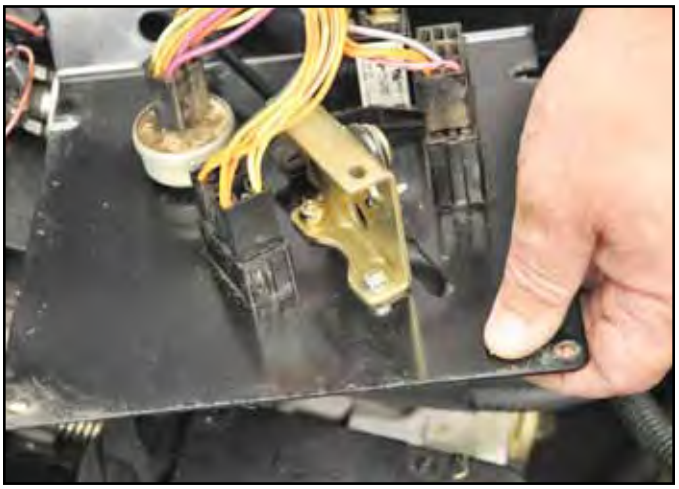

Fig 100 IMG-0386a

4. Route the throttle cable behind the fuel tank fitting (Fig. 101).

Fig 101 IMG-0396a

5. Route the throttle cable behind the engine breather tube (Fig. 102).

Fig 102 IMG-0397a

6. Then route the cable back on the right side of the engine to the throttle linkage (Fig. 103).

Fig 103 IMG-0405a

7. Insert the z-bend of the throttle cable into the throttle arm assembly (Fig. 104).

Fig 104 IMG-0406a

8. Install the throttle cable into the cable clamp on the engine throttle linkage (Fig. 105).

Fig 105 IMG-0407a

9. Install the 4 screws securing the control panel to the left hand fuel tank. Install the knob for the throttle control assembly. Move the throttle control to the low idle speed setting (Fig. 106).

Fig 106 IMG-0408a

10. Adjust the throttle linkage on the engine. Lightly push the cable toward the Z-bend end of the cable and tighten the cable clamp (Fig. 107).

Fig 107 IMG-0410a

11. Install a cable tie securing the throttle cable to the bracket located behind the voltage regulator (Fig. 108).

Fig 108 IMG-0414a

12. Install a cable tie securing the throttle cable to the fuel tank fitting located on the operator's side of the fuel tank (Fig. 109).

Fig 109 IMG-0416a

13. Install the front engine shield assembly (Fig. 110).

Fig 110 IMG-0303a

14. Connect the negative battery cable.

15. Start the unit and operate the throttle control, to check for proper function and adjustment.

Brake Lever Replacement

The left fuel tank and hood have been removed for photo purposes.

Brake Lever Removal

1. Raise the seat.
2. Disconnect the negative battery cable from the battery terminal.
3. Lower the seat.
4. Release the parking brake (forward position).
5. Remove the cotter pin and clevis pin securing the brake linkage yoke to the brake lever assembly (Fig. 111).

Fig 111 PICT-2915a

6. Lift the floor pan assembly.
7. Remove the brake lever pivot shaft cotter pin (Fig. 112).

Fig 112 IMG-7922a

8. Slide the brake lever out of the pivot bushings (Fig. 113).

Fig 113 PICT-2913a

9. With a hammer and punch tap out the two pivot bushings (Fig. 114).

Fig 114 PICT-2883a

10. Inspect the brake shaft and bushings for excessive wear. Replace any worn or damaged components (Fig. 115).

Fig 115 PICT-2887a

Brake Lever Installation

1. Raise the floor pan assembly.
2. Install the two bushings into the brake lever pivot mounting hole (Fig. 116).

Fig 116 PICT-2891a

3. Slide the brake lever assembly pivot through the bushings (Fig. 117).

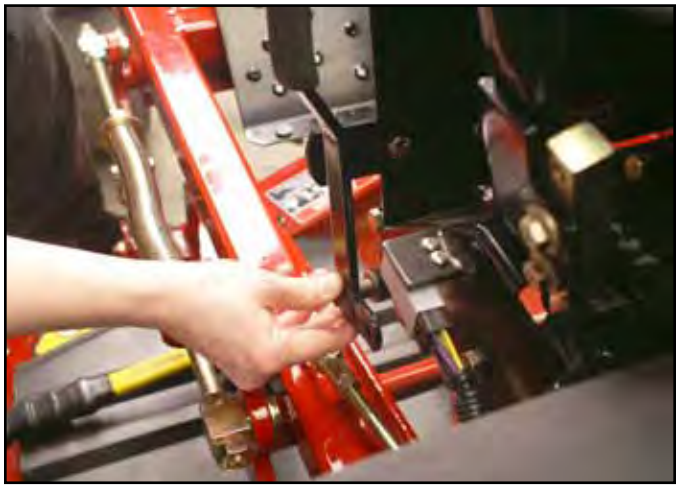

Fig 117 PICT-2892a

4. Install a cotter pin into the pivot shaft (Fig. 118).

Fig 118 IMG-7922a

5. Lower the floor pan assembly.
6. Move the parking brake lever into the released (forward) position.
7. Position the brake linkage yoke to the brake lever. Install a clevis and cotter pin to secure (Fig. 119).

Fig 119 PICT-2895a

Brake Band Replacement

Note: The following procedures can be followed for both right and left brake band removal and installation.

Brake Band Removal

1. Remove the rear tire (Fig. 120).

Fig 120 PICT-2919a

2. Remove the 3 bolts, spacer and retainer from the brake band assembly (Fig. 121).

Fig 121 PICT-2920a

3. Remove the 2 spacers from the brake band (Fig. 122).

Fig 122 PICT-2935a

4. Remove the brake band from the wheel and hub assembly (Fig. 123).

Fig 123 PICT-2933a

5. Inspect the brake band. Replace if worn or damaged.

Brake Band Assembly (Fig. 124)

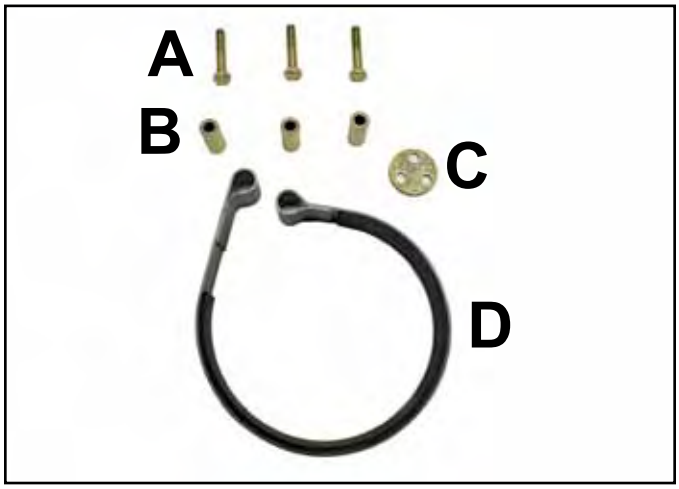

Fig 124 PICT-2926a

A. Shoulder bolt (3)
B. Spacer (3)
C. Retainer
D. Brake band

Brake Band Installation

1. Slide the brake band onto the wheel hub assembly (Fig. 125).

Fig 125 PICT-2933a

2. Slide a spacer into each end of the brake band (Fig. 126).

Fig 126 PICT-2935a

3. Position the brake band retainer and loosely install 2 bolts through the retainer, brake band spacers and into the brake bracket (Fig. 127).

Fig 127 PICT-2941a

4. Position the third spacer between the retainer and the brake bracket. Loosely install the third bolt through the retainer and spacer and into the brake bracket (Fig. 128).

Fig 128 PICT-2936a

5. Tighten the 3 brake band retainer bolts (Fig. 129).

Fig 129 PICT-2942a

6. Install the rear tire (Fig. 130).

Fig 130 PICT-2919a

7. Check operation/adjustment of the parking brake. See “Adjusting the Parking Brake” on page 3-65.

Brake Cross Shaft Replacement

Note: The front engine shield has been removed for photo purposes.

Brake Cross Shaft Removal

1. Raise the seat.
2. Remove the negative battery cable from the battery.
3. Raise the rear tires off the ground and remove the left and right tires (Fig. 131).

Note: To prevent the unit from rolling, block the front tires.

Fig 131 PICT-2919a

4. Remove the two clevis spring pins securing the brake rod linkage yokes to the left side of the brake cross shaft (Fig. 132).

Fig 132 PICT-2954a

5. Remove the clevis spring pin securing the brake rod linkage yoke to the right side of the brake cross shaft (Fig. 133).

Fig 133 PICT-2956a

6. Remove the 2 bolts and nuts securing the right side flange bearing to the frame. Remove the flange bearing from the cross shaft (Fig. 134).

Fig 134 PICT-2958a

7. Remove the 2 bolts and nuts securing the left side flange bearing to the frame. Remove the flange bearing from the cross shaft (Fig. 135).

Fig 135 PICT-2960a

8. Remove brake cross shaft (Fig. 136).

Fig 136 PICT-2964a

9. Inspect brake cross shaft and bearings. Replace if worn or damaged (Fig. 137).

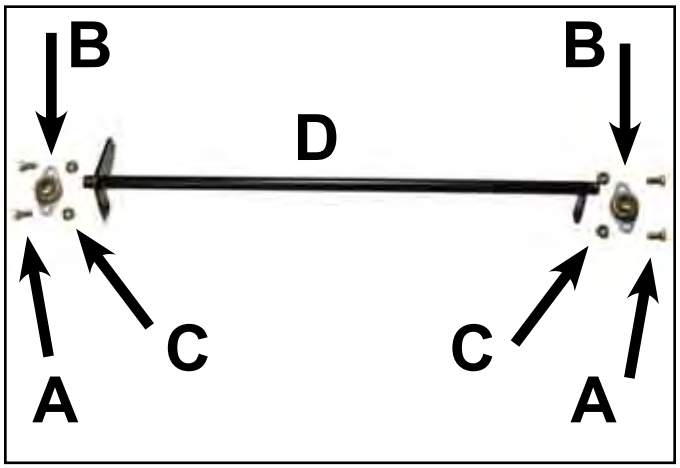

Fig 137 PICT-2968a

A. Bolt (4)
B. Side flange bearing (2)
C. Nuts (4)
D. Brake cross shaft

Brake Cross Shaft Installation

1. Slide the brake cross shaft into position (Fig. 138).

Note: The end of the cross shaft with two tabs is installed on the left side of the machine.

Fig 138 PICT-2964a

2. Position a flange bearing onto each end of the cross shaft with the flange facing outward (Fig. 139).

Fig 139 PICT-2970a

3. Position the flange bearing on the right end of the cross shaft and install 2 bolts and nuts securing the flange bearing to the frame (Fig. 140).

Fig 140 PICT-2958a

4. Position the flange bearing to the left side of the frame and install 2 bolts and nuts to secure the flange bearing to the frame (Fig. 141).

Fig 141 PICT-2960a

5. Ensure the brake cross shaft rotates freely in the flange bearings.

6. Install the clevis spring pin securing the brake rod linkage yoke to the right side of the brake cross shaft (Fig. 142).

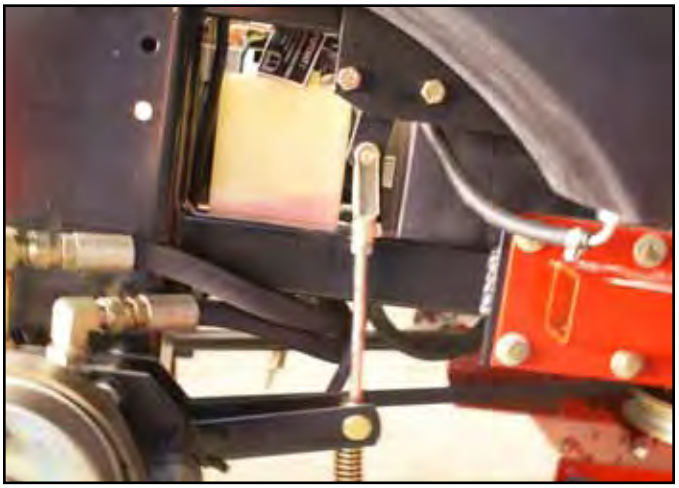

Fig 142 PICT-2956a

7. Install the two clevis spring pins securing the brake rod linkage yokes to the left side of the brake cross shaft (Fig. 143).

Fig 143 PICT-2954a

8. Install the left and right rear tires and lower the machine to the ground (Fig. 144).

Fig 144 PICT-2919a

9. Lower the seat.

10. Adjust the parking brake. Refer to “Adjusting the Parking Brake” on page 3-65.

Deck Lift Lever Replacement

Deck Lift Lever Removal

1. Park the machine on a level surface, disengage the PTO, turn the ignition off and remove the key.
2. Raise the seat.
3. Remove the negative battery cable from the battery.
4. Place the mower deck in the transport position. Position wood blocks under each corner of the mower deck (Fig. 145).

Fig 145 PICT-2971a

5. Lower the mower deck onto the blocks to remove tension from the deck lift chains (Fig. 146).

Fig 146 PICT-2973a

6. Remove the lower stop bolt from the deck lift plate (Fig. 147).

Fig 147 PICT-2978a

7. Loosen the jam nut and hex nut on the right hand and left hand deck lift rods until the deck support springs are fully extended (Fig. 148).

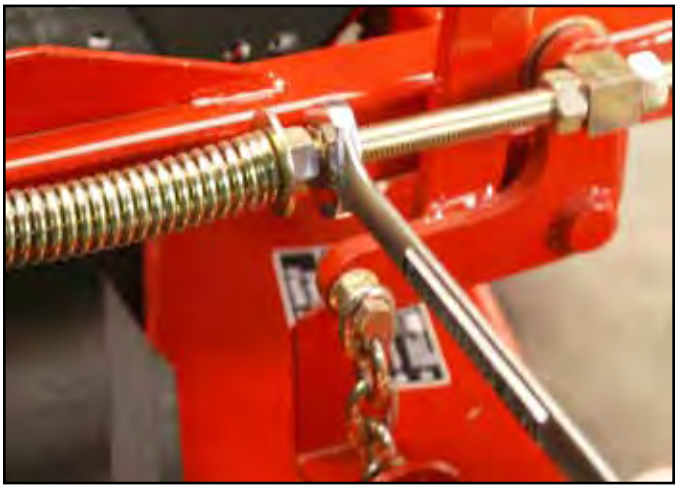

Fig 148 PICT-2980a

8. Remove the hex nut from the back end of the right and left deck lift assemblies (Fig. 149).

Fig 149 PICT-2982a

9. Lower the deck lift lever to its lowest position. The rear deck swivel mounts should clear the deck lift rods on both sides. The mower deck lift linkage should now be fully unloaded (Fig. 150).

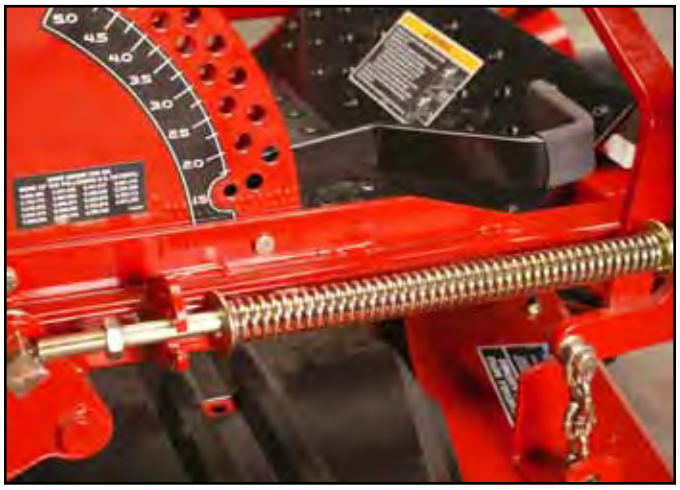

Fig 150 PICT-2984a

10. Remove the bolt, nut and lift lever bushing that secures the inner deck lift plate to the frame (Fig. 151).

Fig 151 PICT-2987a

11. Remove the outside hex head flange nut at the top of the inner deck lift plate. Remove the hitch pin assembly from the bolt (Fig. 152).

Fig 152 PICT-2988a

12. Loosen the inner hex head flange nut. Pivot the inner deck lift plate up (Fig. 153).

Fig 153 PICT-2991a

13. Raise the floor pan.

14. Remove the front bolt and nut that secure the 2 deck lift arms to the deck lift cross shaft assembly. Pivot the deck lift arms away from the cross shaft assembly and remove the bushing from the hole in the cross shaft assembly tab (Fig. 154).

Fig 154 PICT-3000a

15. Remove the E-clip from the deck lift arm pivot (Fig. 155).

Fig 155 PICT-3002a

16. Remove the deck lift lever assembly from the pivot (Fig. 156).

Fig 156 PICT-3014a

Note: There may be interference between the lift lever assembly and the floor pan hinge when trying to remove the lift lever assembly (Fig. 157).

Fig 157 PICT-3005a

17. If there is interference between the lift lever assembly and the floor pan hinge, loosen the right hand floor pan hinge mounting hardware, push the hinge upward and re-tighten the floor pan hinge mounting hardware (Fig. 158).

Fig 158 PICT-3008a

Deck Lift Lever Assembly (Fig. 159)

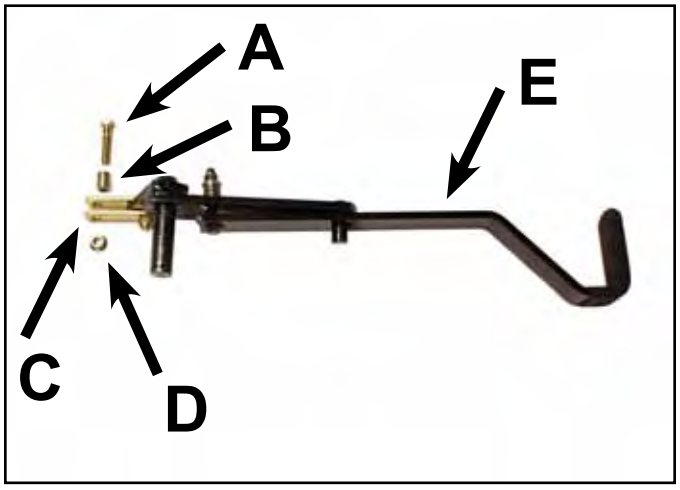

Fig 159 PICT-3015a

A. Bolt
B. Bushing
C. Deck lift arm (2)
D. Nut
E. Lift Lever Assembly

Deck Lift Lever Installation

1. Slide the deck lift lever assembly pivot into the pivot mount on the frame (Fig. 160).

Fig 160 PICT-3011a

2. Install an E-clip onto the deck lift lever pivot (Fig. 161).

Fig 161 PICT-3018a

3. Slide the bushing into the hole in the cross shaft assembly tab (Fig. 162).

Fig 162 PICT-3019a

4. Rotate the deck lift arms forward to align them with the bushing in the cross shaft assembly tab. Install a bolt and nut to secure (Fig. 163).

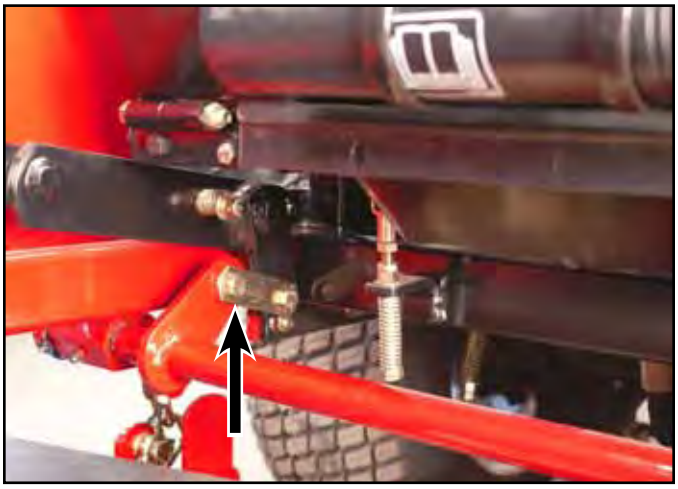

Fig 163 PICT-3000a

5. Rotate the inner deck lift plate down to the mounting hole in the frame. Position a spacer in between the inner and outer plates. Install a bolt and nut to secure (Fig. 164).

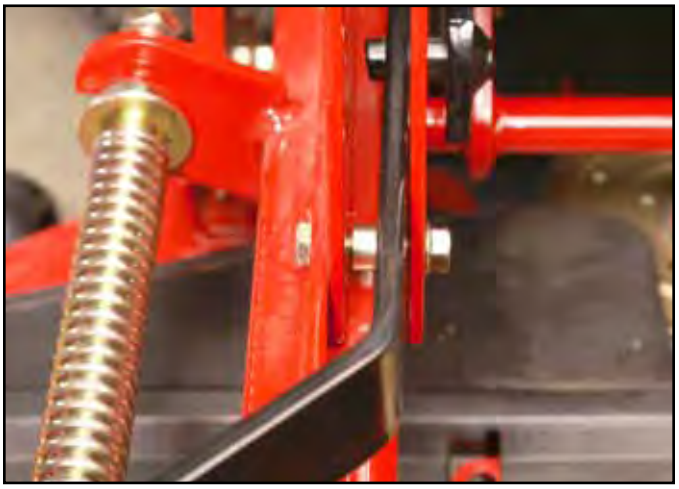

Fig 164 PICT-3022a

6. Lower the floor pan assembly.

7. Tighten the nut on the bolt at the top of the inner deck lift plate (Fig. 165).

Fig 165 PICT-3023a

8. Slide the hitch pin lanyard onto the bolt (Fig. 166).

Fig 166 PICT-3027a

9. Install a second nut onto the bolt securing the hitch pin lanyard in place; do not tighten nut against the lanyard (Fig. 167).

Fig 167 PICT-3028a

10. Lift up on the lift lever and install the lower stop bolt into the deck lift plate (Fig. 168).

Fig 168 PICT-2978a

11. Lower the lift lever. The deck lift lever rods should run through the rear swivels (Fig. 169).

Fig 169 PICT-3029a

12. Install a hex nut onto the back end of the right and left deck lift assemblies (Fig. 170).

Fig 170 PICT-2982a

13. Raise the mower deck to the transport position. Remove the wood blocks. Tighten the adjusting nut on the deck lift assemblies so that the following length is achieved between the two large washers (Fig. 171):

    A. 52” Mower Deck: 11.0” ± .25” (27.9 ± .6cm)
    B. 60” Mower Deck: 10.5” ± .25” (26.7 ± .6cm)
    C. 72” Mower Deck: 11.5” ± .25” (29.2 ± .6cm)

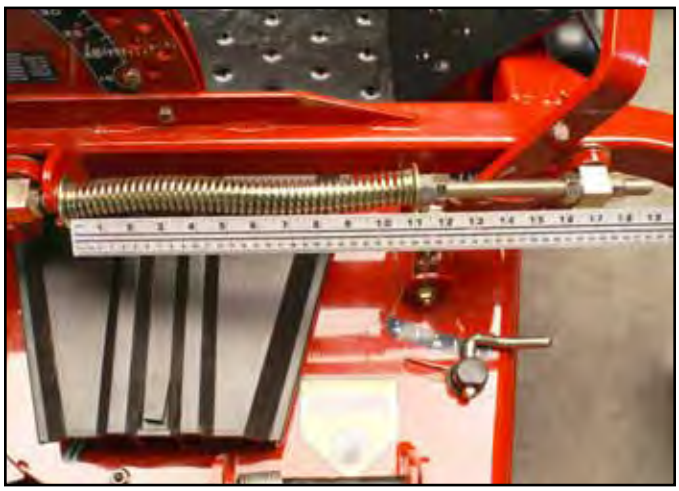

Fig 171 PICT-3034a

14. Check the deck level adjustment. Refer to “Leveling the Mower” on page 7-79.

15. Apply grease to the grease fitting on the deck lift lever pivot (Fig. 172).

Fig 172 PICT-3035a

16. Install the negative battery cable from the battery.

17. Lower the seat.

Motion Control Assembly Replacement

Motion Control Assembly Removal

1. Park the machine on a level surface, disengage the PTO, turn the ignition off and remove the key.

2. Raise the seat.

3. Remove the negative battery cable from the battery.

4. Remove both floor pan assembly hinge bolts and nuts (Fig. 173).

Fig 173 PICT-3052a

5. Remove the floor pan assembly (Fig. 174).

Fig 174 PICT-3053a

6. Remove the 2 top pocket mounting bolts, washers and nuts and the 2 bottom pocket mounting bolts and nuts (Fig. 175).

Note: Raise the seat to remove the top two bolts and nuts.

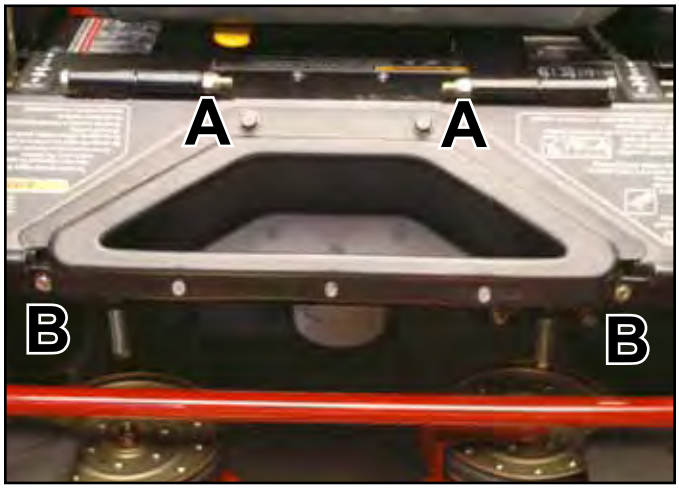

Fig 175 PICT-3055a

A. Bolt, washer, nut B. Bolt, nut

7. Remove the pocket (Fig. 176).

Fig 176 PICT-3057a

Right Hand Motion Control Assembly Removal

8. Remove the 2 bolts and washers securing the right lever to the control shaft arm. Remove the right lever (Fig. 177).

Fig 177 PICT-3064a

9. Remove the outside nut from the bolt that secures the motion control damper to the right hand motion control assembly (Fig. 178).

Fig 178 PICT-3066a

10. Disconnect the harness from the neutral switch located under the right side of the traction frame assembly (Fig. 179).

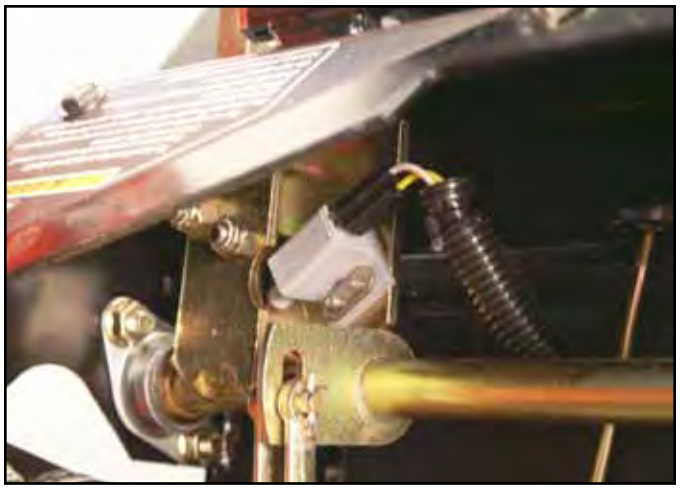

Fig 179 PICT-3075a

11. Remove the bolt, washer and nut that secure the right hand control rod assembly to the right hand motion control assembly (Fig. 180).

Fig 180 PICT-3079a

12. Remove the cotter pin and clevis pin that secure the neutral return yoke to the right hand motion control assembly (Fig. 181).

Fig 181 PICT-3081a

13. Loosen the jam nut on the right hand neutral return spring assembly. Remove the yoke from the neutral return bolt (Fig. 182).

Fig 182 PICT-3087a

14. Remove the 2 bolts and nuts securing the side flange bearing to the inside of the traction frame (Fig. 183).

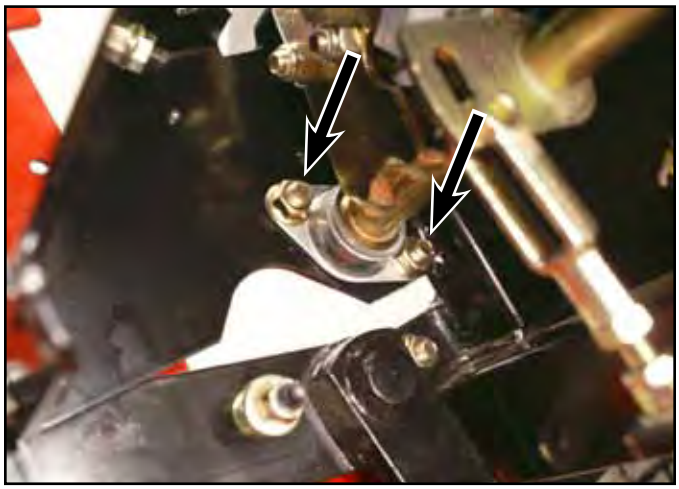

Fig 183 PICT-3084a

15. Remove the 2 bolts and nuts securing the side flange bearing to the left hand motion control assembly (Fig. 184).

Fig 184 PICT-3086a

16. Remove the right hand motion control assembly and right hand control shaft arm assembly (Fig. 185).

Fig 185 PICT-3088a

17. Inspect the side flange bearings. Replace if worn or damaged (Fig. 186).

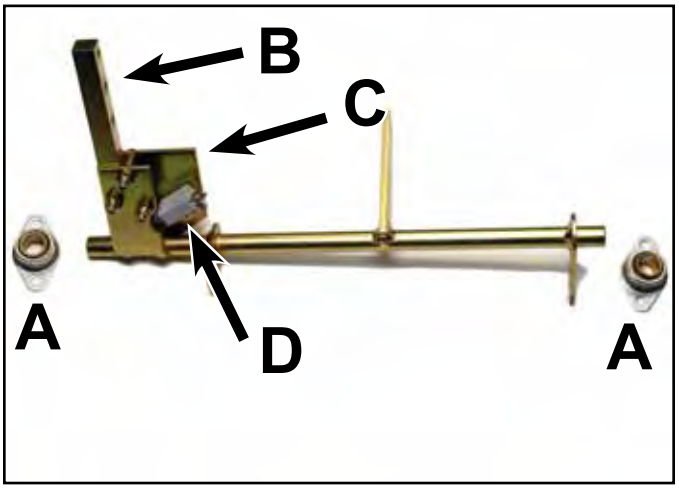

Fig 186 PICT-3091a

A. Side flange bearing (2)
B. Control shaft arm
C. Right hand motion control assembly
D. Neutral switch

Left Hand Motion Control Assembly Removal

18. Remove the 2 bolts, and washers securing the left lever to the control shaft arm. Remove the left lever (Fig. 187).

Fig 187 PICT-3098a

19. Raise the seat and remove the outside nut from the bolt that secures the motion control damper to the left hand motion control assembly (Fig. 188).

Fig 188 PICT-3102a

20. Disconnect the harness from the neutral switch located under the traction frame assembly.

Note: Access the switch from under the seat area.

21. Remove the bolt, washer and nut that secure the left hand control rod assembly to the left hand motion control assembly (Fig. 189).

Fig 189 PICT-3109a

22. Remove the cotter pin and clevis pin that secure the neutral return yoke to the left hand motion control assembly (Fig. 190).

Fig 190 PICT-3124a

23. Loosen the left hand neutral return assembly jam nut. Remove the yoke from the neutral return bolt (Fig. 191).

Fig 191 PICT-3126a

24. Remove the nut, bolt and washer securing the left hand control rod ball joint to the hydrostatic pump control arm (Fig. 192).

Fig 192 PICT-3131a

25. Remove the left hand control rod assembly (Fig. 193).

Fig 193 PICT-3133a

26. Remove the 2 bolts and nuts securing the side flange bearing to the inside of the traction frame (Fig. 194).

Fig 194 PICT-3128a

27. Remove the left hand motion control assembly and left hand control shaft arm assembly (Fig. 195).

Fig 195 PICT-3135a

28. Inspect the side flange bearings. Replace if worn or damaged (Fig. 196).

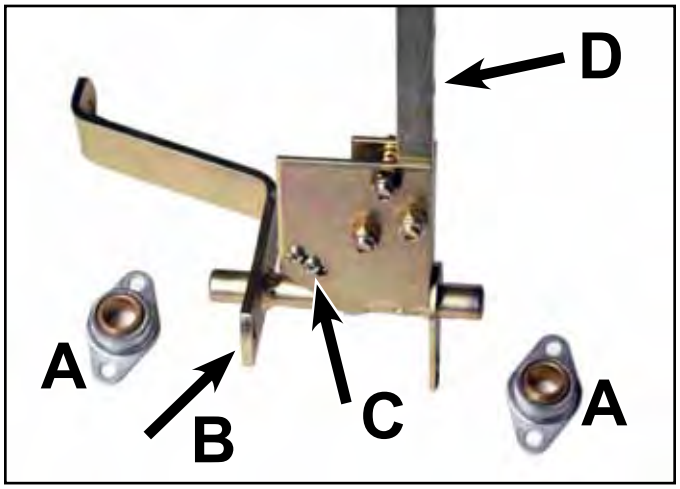

Fig 196 PICT-3137a

A. Side flange bearing (2)
B. Left hand motion control assembly
C. Neutral switch (on reverse side)
D. Control shaft arm

Left Hand Motion Control Assembly Installation

1. Slide a side flange bearing onto each end of the left hand motion control assembly (Fig. 197).

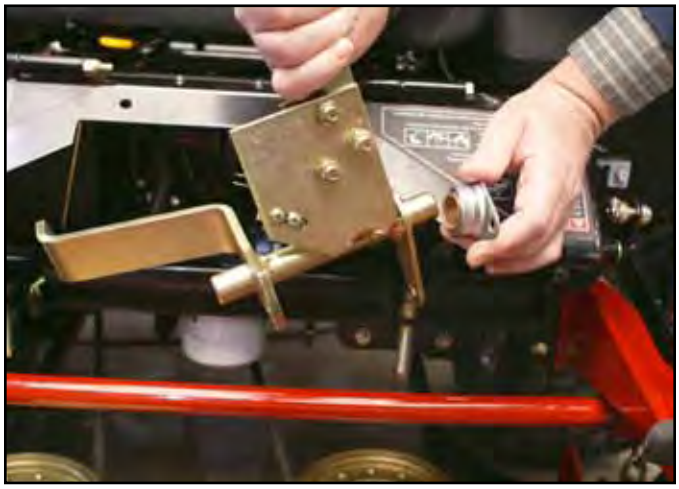

Fig 197 PICT-3138a

2. Position the left hand motion control assembly and control shaft arm assembly into the traction frame (Fig. 198).

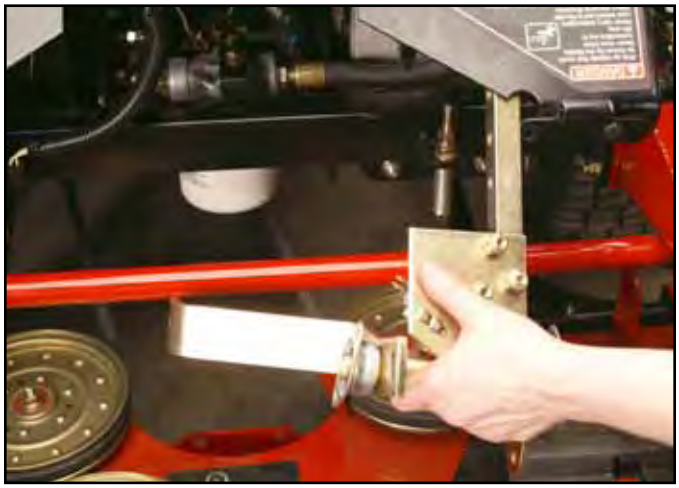

Fig 198 PICT-3134a

3. Install 2 bolts and nuts securing the side flange bearing to the inside of the traction frame (Fig. 199).

Fig 199 PICT-3128a

4. Position the left hand control rod assembly into the traction frame (Fig. 200).

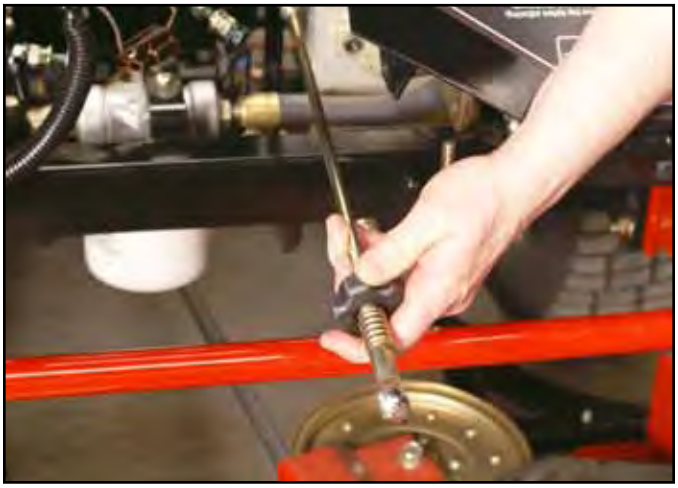

Fig 200 PICT-3133a

5. Install a bolt, washer and nut securing the left hand control rod ball joint to the hydrostatic pump control arm (Fig. 201).

Note: The washer is installed between the ball joint and the control arm.

Fig 201 PICT-3131a

6. Install the neutral return yoke onto the neutral return bolt (Fig. 202).

Fig 202 PICT-3126a

7. Position the left hand neutral return yoke to the left hand motion control tab and install a clevis pin and cotter pin (Fig. 203).

Fig 203 PICT-3124a

8. Tighten the jam nut to secure the neutral adjustment yoke (Fig. 204).

Note: The neutral return spring may need adjustment after the motion contol levers are installed. The motion control lever, when moved to reverse position, should spring back to the neutral postions when the handles are let go.

Fig 204 PICT-3142a

Right Hand Motion Control Assembly Installation

9. Slide a side flange bearing onto each end of the right motion control assembly (Fig. 205).

Fig 205 PICT-3092a

10. Position the right hand motion control assembly and control shaft arm assembly into position under the traction frame (Fig. 206).

Fig 206 PICT-3088a

11. Position the side flange bearing to the left hand motion control assembly and loosely install 2 bolts and nuts to secure the side flange bearing (Fig. 207).

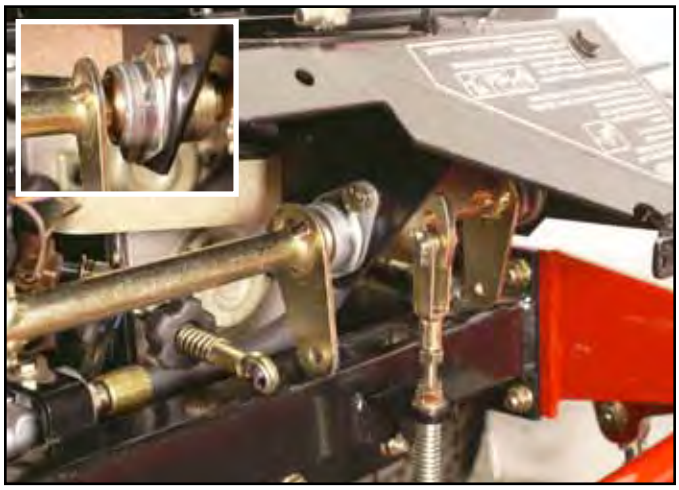

Fig 207 PICT-3144a

12. Position the side flange bearing to the inside of the traction control frame and loosely install 2 bolts and nuts securing the side flange bearing (Fig. 208).

Fig 208 PICT-3084a

13. Thread the yoke onto the neutral return bolt (Fig. 209).

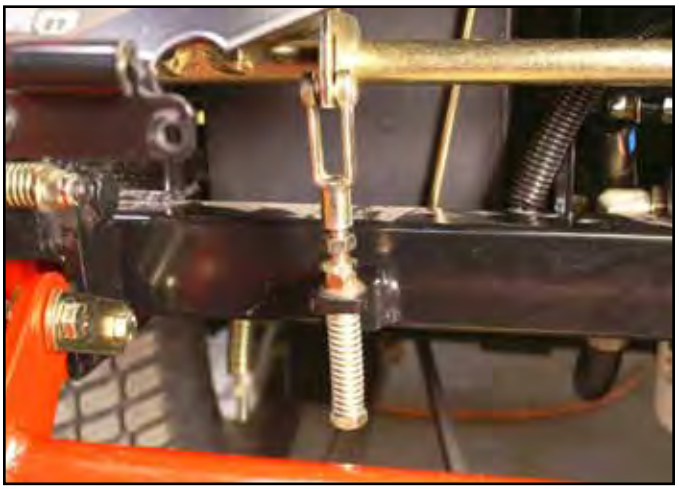

Fig 209 PICT-3145a

14. Position the neutral return yoke to the right hand motion control tab and install a clevis pin. Install a cotter pin into the clevis pin to secure (Fig. 210).

Fig 210 PICT-3081a

15. Tighten the jam nut to secure the yoke (Fig. 211).

Note: The neutral return spring may need adjustment after the motion contol levers are installed. The motion control lever, when moved to reverse position, should spring back to the neutral postions when the handles are let go.

Fig 211 PICT-3149a

16. Install the bolt, washer and nut securing the right hand control rod assembly to the right hand motion control assembly (Fig. 212).

Note: The washer is installed between the ball joint and motion control assembly tab.

Fig 212 PICT-3151a

17. Install a bolt, washer and nut securing the left hand control rod assembly to the left hand motion control assembly (Fig. 213).

Note: The washer is installed between the ball joint and motion control assembly tab.

Fig 213 PICT-3109a

18. Raise the seat and insert the right and left damper bolts into the right and left motion control assembly tabs. Install a nut onto each of the damper bolts to secure the motion control dampers to the motion control assemblies (Fig. 214).

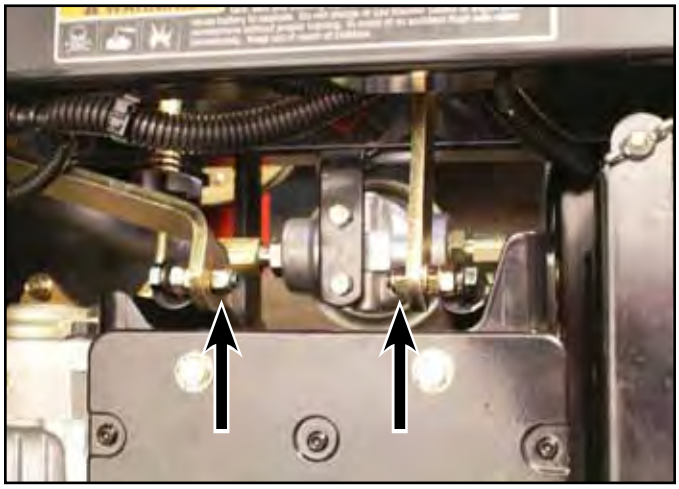

Fig 214 PICT-3156a

19. Connect the harness to the 2 neutral switches located under the seat, behind the left hand and right and sides of the traction control frame under the traction frame assembly.

Right hand neutral switch (Fig. 215)

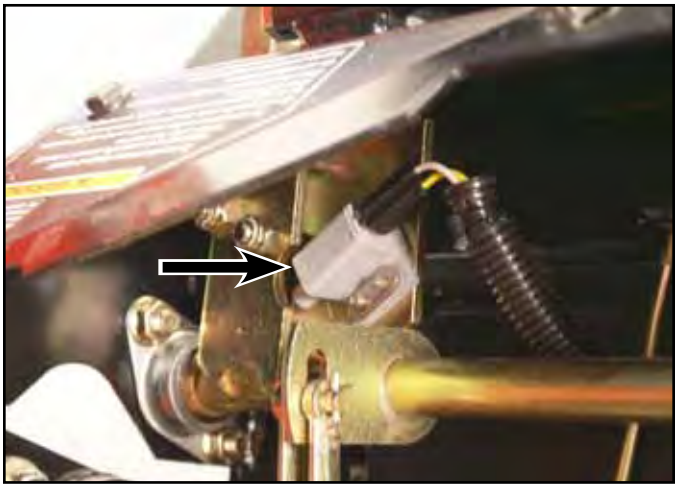

Fig 215 PICT-3075a

Left hand neutral switch - access by raising seat (Fig. 216)

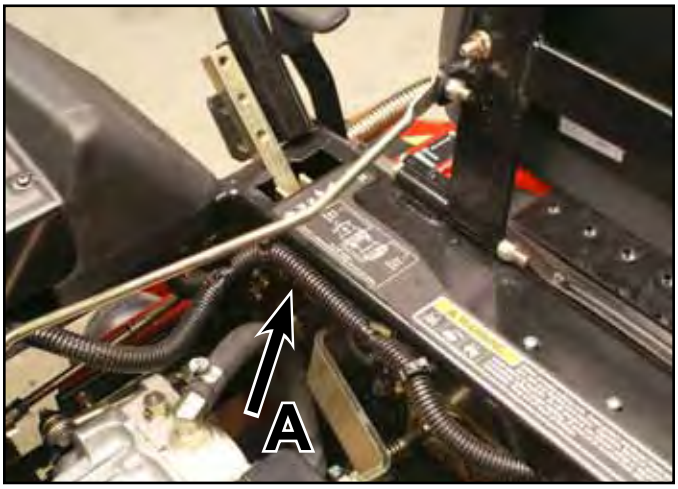

Fig 216 PICT-4221a

A. Left hand neutral switch located under the traction frame front console.

20. Tighten all 6 bolts and nuts securing the 4 side flange bearings:

A. Flange bearing mounted to the inside (right) of the traction control frame (Fig. 217).

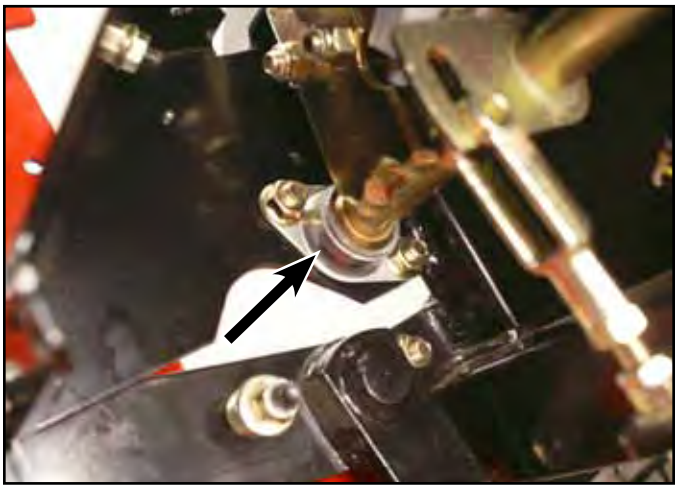

Fig 217 PICT-3084a

B. Flange bearings mounted to the left hand motion control assembly (Fig. 218).

Fig 218 PICT-3086a

C. Flange bearing mounted to the inside (left) of the traction frame (Fig. 219).

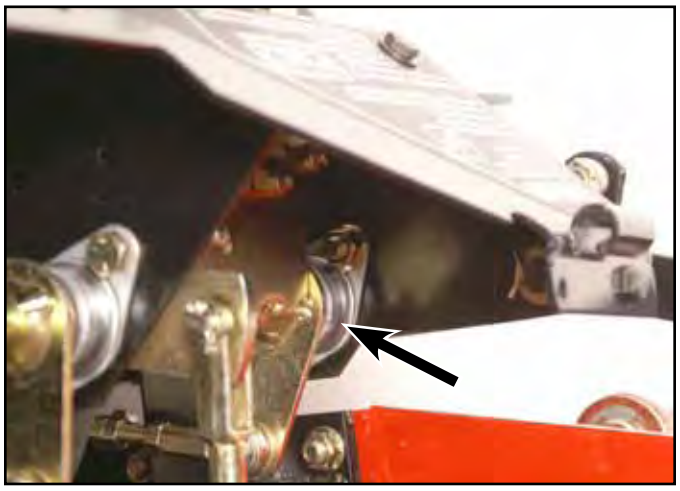

Fig 219 PICT-3161a

21. Position the left hand control lever to the left hand control shaft arm. Install 2 bolts, and washers securing the left lever to the control shaft arm (Fig. 220).

Fig 220 PICT-3098a

22. Position the right hand control lever to the right hand control shaft arm. Install 2 bolts, and washers securing the right hand lever to the control shaft arm (Fig. 221).

Fig 221 PICT-3064a

23. Adjust the control handle neutral position. Refer to “Adjusting the Control Handle Neutral Position” on page 4-27.

24. Adjust the hydrostatic pump neutral. Refer to “Setting the Hydrostatic Pump Neutral” on page 4-28.

Motion Control Assembly Installation

25. Insert the pocket into the traction frame (Fig. 222).

Fig 222 PICT-3057a

26. Install 2 top pocket mounting bolts, washers and nuts and 2 bottom pocket mounting bolts and nuts (Fig. 223).

Note: Raise the seat to install the top 2 bolts, washers and nuts.

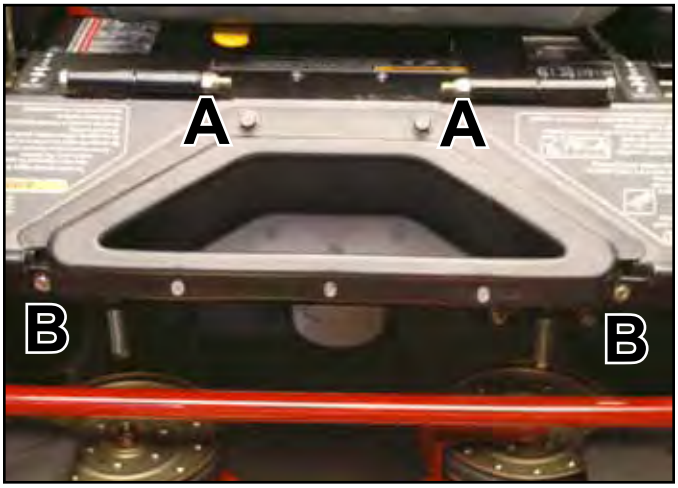

Fig 223 PICT-3055a

A. Bolt, washer, nut B. Bolt, nut

27. Position the floor pan assembly (Fig. 224).

Fig 224 PICT-3053a

28. Install both floor pan assembly hinge bolts and nuts (Fig. 225).

Fig 225 PICT-3052a

29. Install the negative battery cable from the battery.

30. Lower the seat.

Motion Control Damper Replacment

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

Motion Control Damper Removal

1. Park the machine on a level surface, disengage the PTO, turn the ignition off and remove the key.
2. Raise the seat.
3. Remove the negative battery cable from the battery.
4. Remove the outer nut from the bolt on the lower end of the damper (Fig. 226).

Fig 226 PICT-3171a

5. Remove the outer nut from the bolt on the upper end of the damper (Fig. 227).

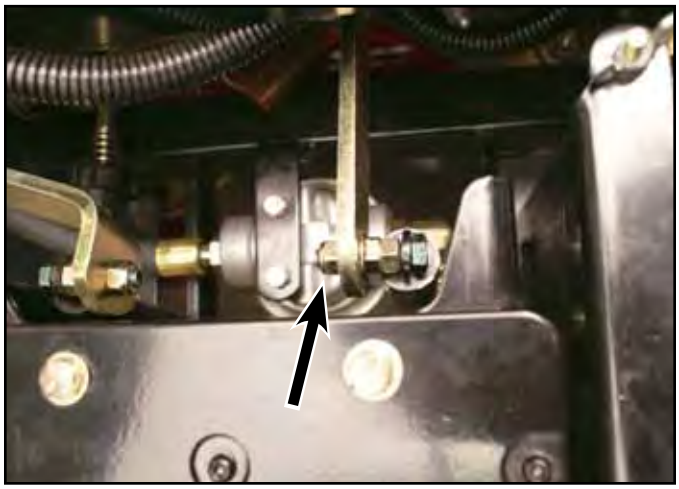

Fig 227 PICT-3173a

6. Remove the damper assembly (Fig. 228).

Fig 228 PICT-3178a

Damper Assembly (Fig. 229)

Fig 229 PICT-3181a

Motion Control Damper Installation

1. Raise the seat.
2. Position the damper assembly with the rod end down (Fig. 230).

Fig 230 PICT-3178a

3. Insert the upper damper bolt into the motion control assembly arm. Install a nut to secure the upper end of the damper (Fig. 231).

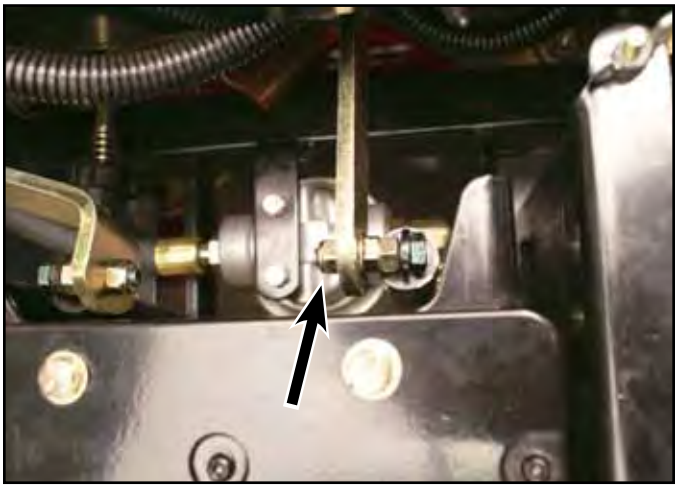

Fig 231 PICT-3173a

4. Insert the lower damper bolt into the frame and install a nut to secure the lower end of the damper (Fig. 232).

Fig 232 PICT-3171

5. Install the negative battery cable to the battery.
6. Lower the seat.

Adjusting the Parking Brake

1. Engage the parking brake, (lever up).

2. Measure the length of the spring. Measurement should be 2-1/2” (64mm) between the washers (Fig. 233).

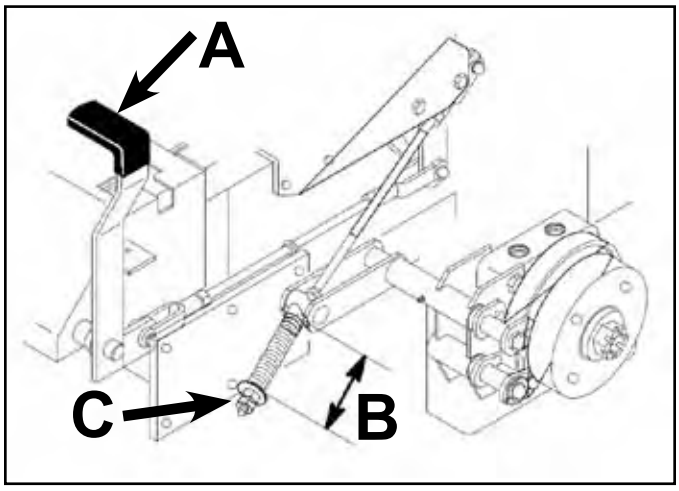

Fig 233 fig. 57 G001294

A. Brake lever in engaged position
B. Spring 2-1/2” (64mm)
C. Adjusting nut & jam nut

3. If adjustment is necessary, release the parking brake, loosen the jam nut below the spring and adjust the nut directly below the spring (Fig. 233). Turn the nut until the correct measurement is obtained. Turn the nut clockwise to shorten spring length and turn counterclockwise to lengthen the spring.

4. Tighten the two nuts together.

5. Engage the parking brake, lever up. Check the measurement of the spring again.

6. If adjustment is necessary, repeat the procedures above.

7. Repeat on the opposite side of machine.

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Hydrostatic Tandem Pump Replacement

Note: Cleanliness is a key factor in a successful repair of any hydrostatic system. Thoroughly clean all exposed surfaces prior to any type of maintenance. Cleaning all parts with 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. Lightly lubricate all seals, o-rings and gaskets with clean petroleum jelly prior to installation.

Hydrostatic Tandem Pump Removal

1. Park the machine on a level surface, disengage the PTO, set the parking brake, turn the ignition off and remove the key.
2. Raise the seat.
3. Remove the negative battery cable from the battery.
4. Remove the front engine shield (Fig. 234).

Fig 234 IMG-0303a

5. Remove the pump idler arm spring using a spring tool (Toro p/n: 92-5771) (Fig. 235).

Fig 235 IMG-0595a

6. Remove the belt from the pump pulley (Fig. 236).

Fig 236 IMG-0431a

7. Remove the 2 pump pulley set screws (Fig. 237).

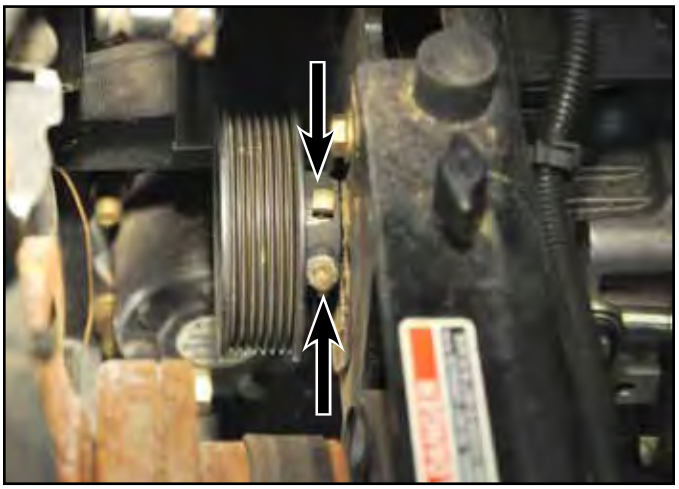

Fig 237 IMG-0433a

8. Remove the pump pulley (Fig. 238).

Fig 238 IMG-0434a

9. Remove the key from the keyway (Fig. 239).

Fig 239 IMG-0439a

10. Remove the bolt, nut and washer securing the right hand control rod assembly to the pump control arm (Fig. 240).

Fig 240 PICT-3195a

11. Remove the bolt, nut and washer securing the left hand control rod assembly to the pump control arm (Fig. 241).

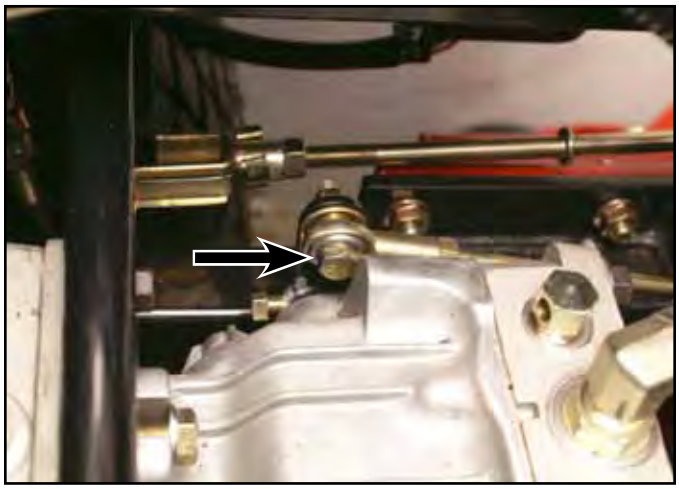

Fig 241 PICT-3196a

12. Remove the cable tie securing the 2 RH wheel motor hydraulic hoses to the frame (Fig. 242).

Fig 242 PICT-3197a

13. Unplug the harness from the PTO clutch connector (Fig. 243).

Fig 243 IMG-0441a

14. Remove the cable tie securing the PTO clutch wire to the frame (Fig. 244).

Fig 244 PICT-3200a

15. Remove the hose clamp located on the hydraulic suction hose coming from the oil filter (Fig. 245).

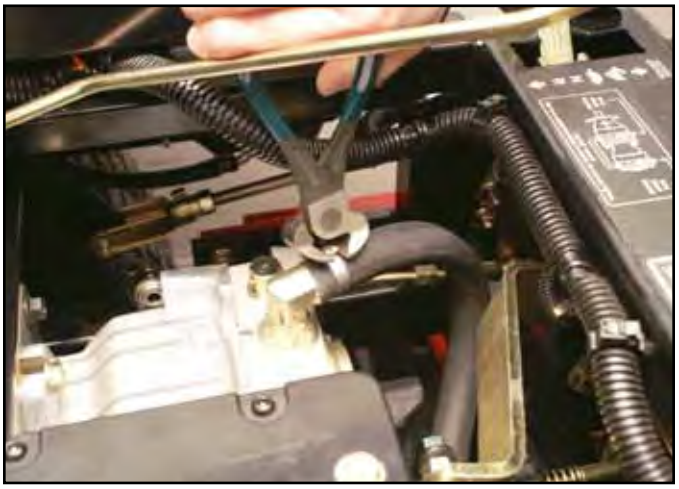

Fig 245 PICT-3202a

16. Remove the hydraulic suction hose from the fitting on top of the hydrostatic pump (Fig. 246).

Note: When removing hydraulic hoses from the pump, cap the hose end and the fitting on the hydrostatic pump to ensure dirt and debris does not enter the system.

Fig 246 PICT-3203a

17. Raise the rear of the unit and remove both right and left rear tires.

18. Mark or tag the wheel motor hydraulic hoses and fittings to ensure they are reconnected correctly.

19. Remove the two hydraulic hoses from the RH wheel motor (Fig. 247).

Fig 247 PICT-3217a

20. Cap the hydraulic hoses and fittings (Fig. 248).

Fig 248 PICT-3207a

21. Remove the two hydraulic hoses from the LH wheel motor (Fig. 249).

Fig 249 PICT-3208a

22. Cap the hydraulic hoses and fittings (Fig. 250).

Fig 250 PICT-3215a

23. Remove the hose clamp located on the hydraulic hose routed from the oil cooler to the left side of the hydrostatic pump (Fig. 251).

Fig 251 PICT-3211a

24. Remove the hydraulic hose from the fitting barb (Fig. 252).

Fig 252 PICT-3331a

25. Remove the two bolts, washers and nuts securing the front of the hydrostatic pump (by the input shaft) to the frame (Fig. 253).

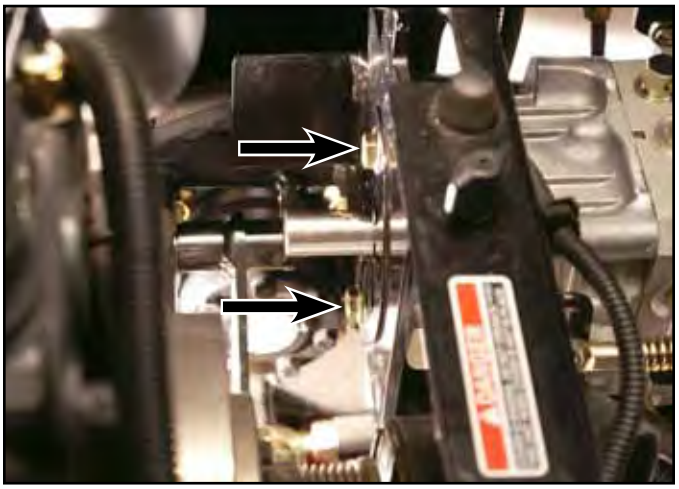

Fig 253 PICT-3257a

26. Remove the pump shield plate from the hydrostatic pump input shaft (Fig. 254).

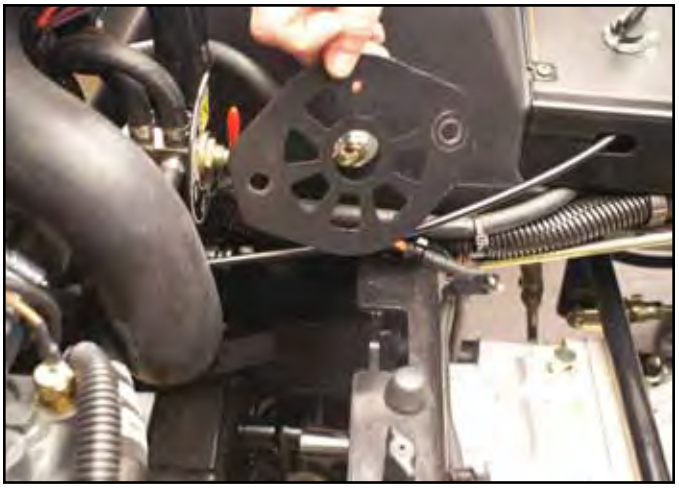

Fig 254 PICT-3269a

27. Remove the two bolts, washers, and nuts holding the pump bracket to the frame of the unit (Fig. 255).

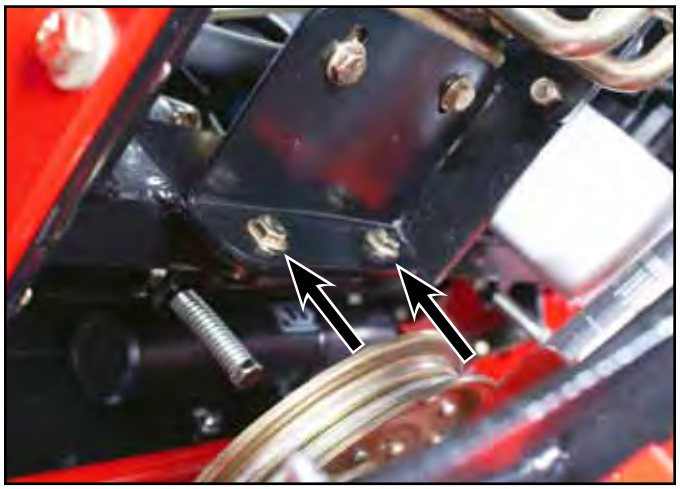

Fig 255 PICT-3265a

28. Position the mower deck in the lowest height-of-cut position (Fig. 256).

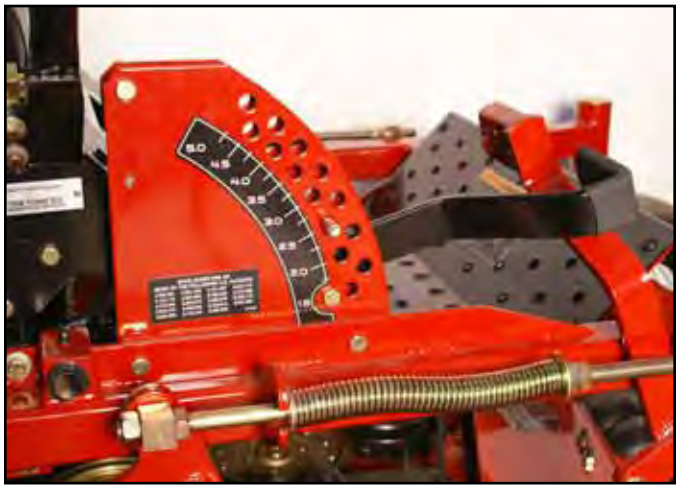

Fig 256 PICT-4179a

29. Carefully lower the hydrostatic pump from the frame (Fig. 257).

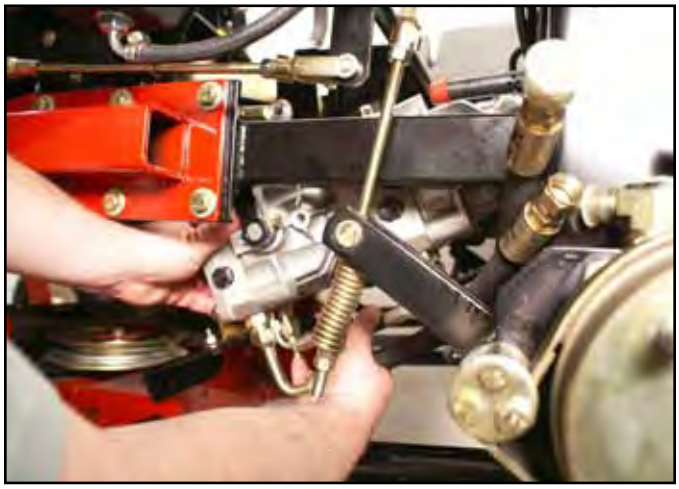

Fig 257 PICT-3271a

30. Mark the wheel motor hose and pump fitting locations (Fig. 258).

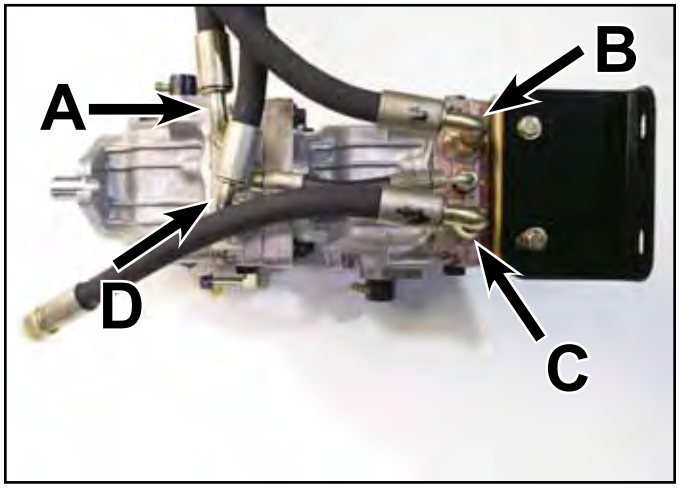

Fig 258 PICT-3298a

A. RH wheel motor, front hose fitting
B. LH wheel motor, rear hose fitting
C. LH wheel motor, front hose fitting
D. RH wheel motor, rear hose fitting

31. Remove all 4 wheel motor hoses from the pump fittings (Fig. 259).

Fig 259 PICT-3300a

32. Remove the 2 bolts, washers and nuts securing the pump mounting bracket to the pump. Remove the mounting bracket (Fig. 260).

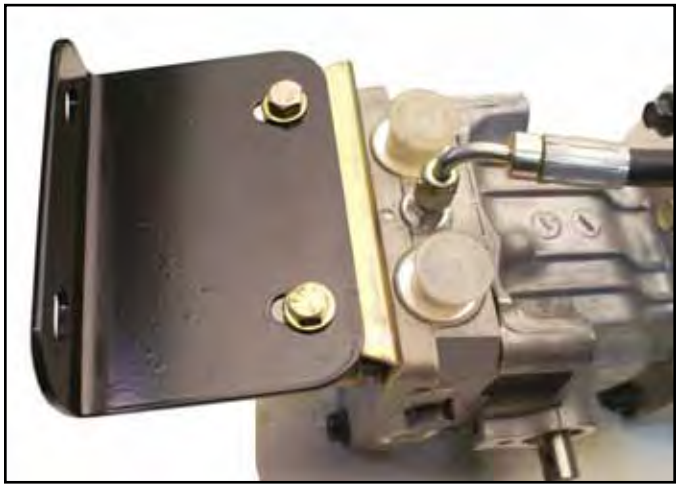

Fig 260 PICT-4204a

33. Remove the set screw securing the control arm to the pump control shaft. Remove the control arm from the pump control shaft (Fig. 261).

Fig 261 PICT-3302a

34. Repeat step 33 to remove the opposite control arm from the pump.

35. For tandem pump service, refer to the Hydro-Gear P Series Pumps Service and Repair Manual (form BLN-52503)

36. Transfer all fittings and markings to the new hydrostatic tandem pump (Fig. 262).

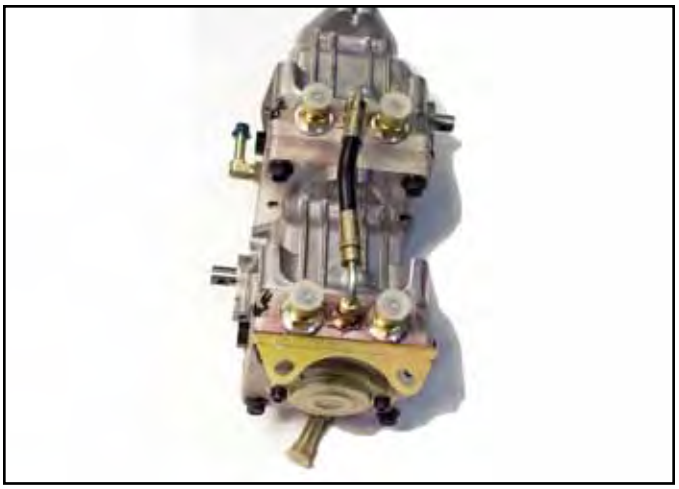

Fig 262 PICT-3305a

Hydrostatic Tandem Pump Installation

1. Apply thread locking compound to the pump control arm set screw (Fig. 263).

Fig 263 PICT-3307a

2. Thread the set screw into the control arm. Slide a control arm onto the pump control shaft and tighten the set screw (Fig. 264).

Fig 264 PICT-3302a

3. Repeat steps 1 and 2 to install the other control arm to the opposite pump control shaft.

4. Position the pump mounting bracket to the pump. Loosely install 2 bolts, washers and nuts securing the pump mounting bracket to the pump (Fig. 265).

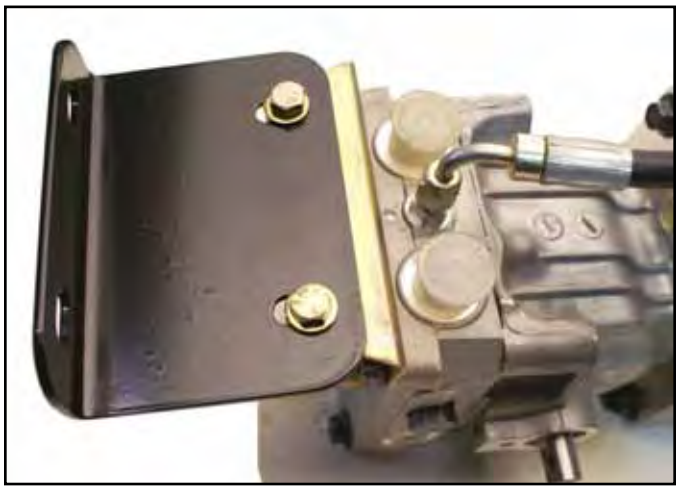

Fig 265 PICT-4204a

5. Lower the mower deck to the lowest height-of-cut position.

6. From under the machine, position the pump input shaft through the hole in the frame (Fig. 266).

Fig 266 PICT-3309a

7. Align the pump mounting bracket to the frame and loosely install 2 bolts, washers and nuts (Fig. 267).

Fig 267 PICT-3312a

8. Position the pump shield plate over the pump shaft, against the frame. Install 2 two bolts, washers and nuts securing the pump shield plate and pump to the frame (Fig. 268).

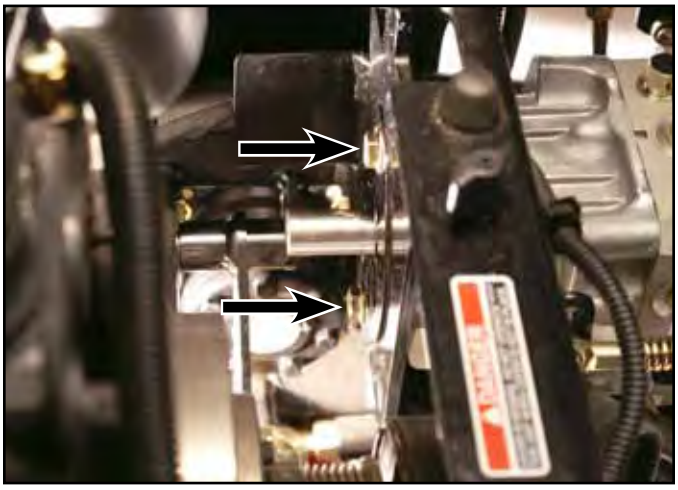

Fig 268 PICT-3257a

9. Tighten the 2 bolts securing the pump mounting bracket to the bracket on the frame. Tighten the 2 bolts securing the mounting bracket to the pump (Fig. 269).

Fig 269 PICT-3259a

10. Loosely install the 4 wheel motor hoses to the bottom of the pump. Note the location of each hose by the markings on the hose fittings and the pump (Fig. 270).

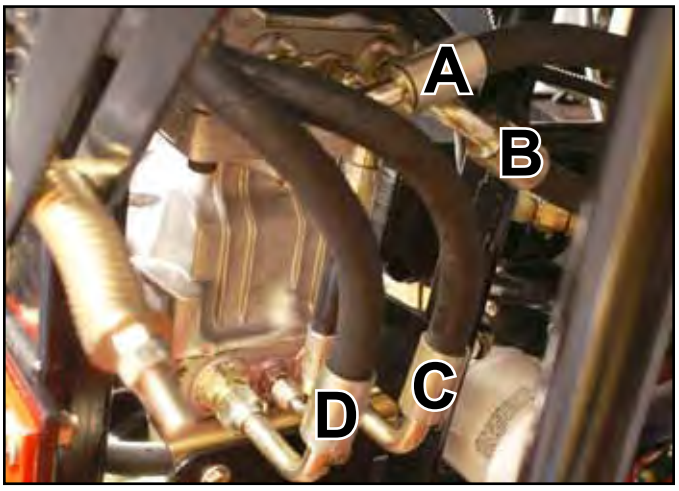

Fig 270 PICT-3322a

A. RH wheel motor, rear hose fitting
B. RH wheel motor, front hose fitting
C. LH wheel motor, rear hose fitting
D. LH wheel motor, front hose fitting

11. Install the LH wheel motor hoses. Note the location of each of the hoses by the markings on the hoses and wheel motor fittings (Fig. 271).

Fig 271 PICT-3324a

12. Tighten the LH wheel motor hose fittings at the pump and at the wheel motor.

13. Install the RH wheel motor hoses. Note the location of each of the hoses by the markings on the hoses and the wheel motor fittings (Fig. 272).

Fig 272 PICT-3327a

14. Tighten the RH wheel motor hose fittings at the pump and at the wheel motor.

15. With the hose clamp on the oil cooler hose, slide the hose onto the pump fitting (Fig. 273).

Fig 273 PICT-3331a

16. Position the hose clamp over the hose and fitting barb (Fig. 274).

Fig 274 PICT-3211a

17. Slide a hose clamp over the hydraulic suction hose (Fig. 275).

Fig 275 PICT-3333a

18. Slide the hydraulic suction hose onto the pump fitting on top of the hydrostatic pump (Fig. 276).

Fig 276 PICT-3203a

19. Position the hose clamp and tighten (Fig. 277).

Fig 277 PICT-3337

20. Plug the harness plug into the PTO clutch connector (Fig. 278).

Fig 278 IMG-0441a

21. Install a cable tie securing the PTO clutch wire to the frame (Fig. 279).

Fig 279 PICT-3200a

22. Install a cable tie securing the 2 RH wheel motor hydraulic hoses to the frame (Fig. 280).

Fig 280 PICT-3197

23. Position the left hand control rod ball joint to the pump control arm. Install a bolt, washer and nut securing the left hand control rod assembly to the pump control arm (Fig. 281).

Note: The washer is installed between the ball joint and the control arm.

Fig 281 PICT-3196a

24. Position the right hand control rod ball joint to the pump control arm. Install a bolt, washer and nut securing the right hand control rod assembly to the pump control arm (Fig. 282).

Note: The washer is installed between the ball joint and the control arm.

Fig 282 PICT-3195a

25. Apply anti-seize compound onto the pump input shaft (Fig. 283).

Fig 283 IMG-0444a

26. Install the key into the pump shaft keyway (Fig. 284).

Fig 284 IMG-0446a

27. Apply thread locking compound to the 2 pump pulley set screws (Fig. 285).

Fig 285 PICT-3307a

28. Loosely install the 2 set screws into the pump pulley (Fig. 286).

Fig 286 PICT-3342a

29. Slide the pump pulley onto the pump shaft (Fig. 287).

Fig 287 PICT-3345a

Belt Alignment Tool (Toro p/n: 110-0876) (Fig. 288):

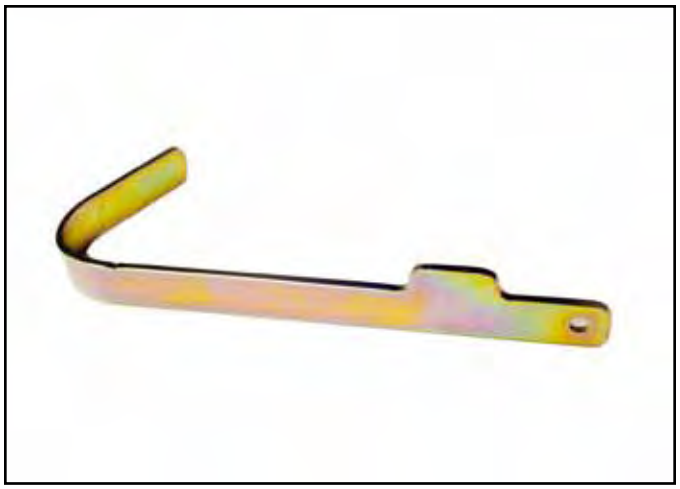

Fig 288 alignment tool _a

30. Hook the belt alignment tool (Toro p/n: 110-0876) onto the engine drive sheave. Align the hydro pump drive pulley so that the tool lies squarely within the outer sheaves (Fig. 289).

Fig 289 hydro belt alignment_a

31. Rotate the too so that it faces to the right side of the machine. Hook the end into the hydro pump drive pulley on the front of the engine. There is a raised contact area on the tool. Loosen the gearbox input pulley and locate it so the outside of the pulley just makes contact with the raised contact area of the tool (Fig. 290). Since the distance between the clutch sheaves and the hydro pump drive sheave on the engine is fixed, the tool uses the hydro drive sheave for reference for doing both belt alignment procedures.

Fig 290 deck drive alignment_a

32. Tighten the 2 pump pulley set screws. Torque to 12.1 ± 1.6 in-lbs. (1.37 ± 0.18 Nm) (Fig. 291).

Fig 291 IMG-0447a

33. Install the pump drive belt (Fig. 292).

Fig 292 IMG-0431a

34. Using a spring tool (Toro p/n: 92-5771), install the pump idler arm spring (Fig. 293).

Fig 293 IMG-0595a

35. Install the right and left rear wheels.

36. Install the front engine shield (Fig. 294).

Fig 294 IMG-0303a

37. Install the negative battery cable.

38. Lower the seat.

39. Purge the hydraulic system. Refer to “Purging the Hydraulic System” on page 4-26.

40. Adjust the control handle neutral position. Refer to “Adjusting the Control Handle Neutral Position” on page 4-27.

41. Adjust the hydrostatic pump neutral. Refer to “Setting the Hydrostatic Pump Neutral” on page 4-28.

Wheel Motor Replacement

The following procedures are the same for the left and right wheel motor.

Wheel Motor Removal

1. Park the machine on a level surface, disengage the PTO, turn the ignition off and remove the key.

2. Raise the seat.

3. Remove the negative battery cable from the battery.

4. Support the unit on jack stands and remove the rear wheel.

5. Apply the parking brake. Remove the cotter pin from the wheel motor shaft (Fig. 295).

Fig 295 PICT-3350a

6. Remove the castle nut securing the wheel hub to the wheel motor (Fig. 296).

Fig 296 PICT-3351a

7. Using a Wheel Hub Puller (Toro p/n: TOR4097), remove the wheel hub from the wheel motor shaft (Fig. 297).

Fig 297 PICT-3353a

8. Release the parking brake.

9. Remove the 3 bolts, spacers and the retainer from the brake band assembly and remove the brake band (Fig. 298).

Fig 298 PICT-3358a

10. Mark or tag the wheel motor hoses and fittings to ensure they are reconnected correctly (Fig. 299).

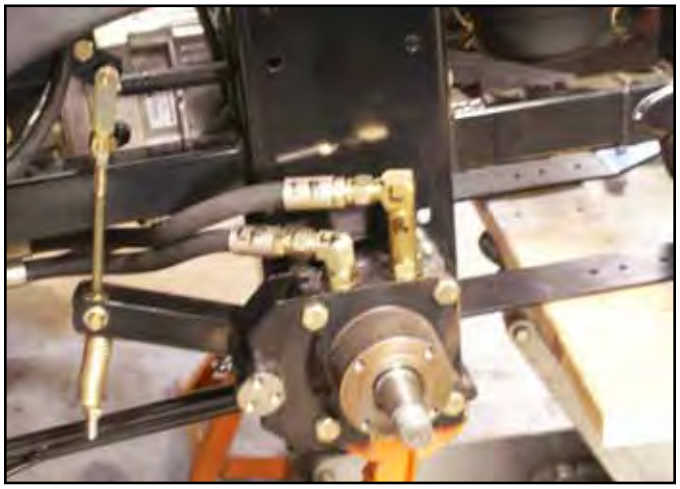

Fig 299 PICT-3365a

11. Disconnect the wheel motor hoses from the wheel motor fittings (Fig. 300).

Note: Cap the hoses and fittings to prevent debris from entering the system.

Fig 300 PICT-3366a

12. Remove the wheel motor fittings from the wheel motor (Fig. 301).

Fig 301 PICT-3367a

13. Loosen all 4 wheel motor mounting bolts (Fig. 302).

Fig 302 PICT-3370a

14. Remove the front 2 wheel motor mounting bolts, spacers and nuts (Fig. 303).

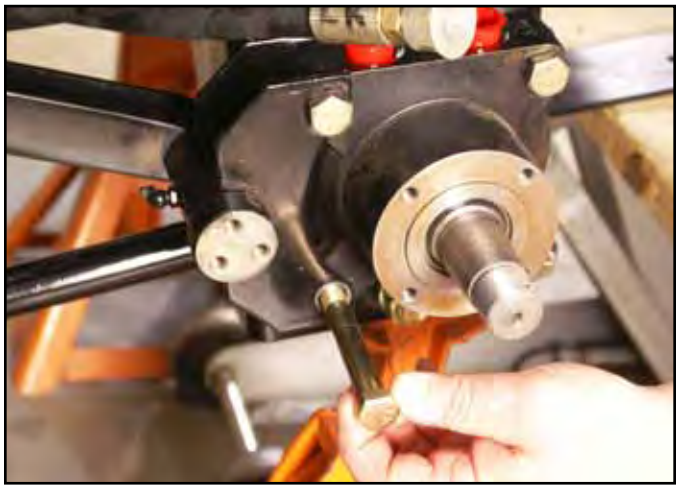

Fig 303 PICT-3376a

15. Swing the brake linkage forward away from the wheel motor (Fig. 304).

Fig 304 PICT-3374a

16. Remove the 2 rear wheel motor mounting bolts, spacers and nuts (Fig. 305).

Fig 305 PICT-3377a

17. Remove the wheel motor (Fig. 306).

Fig 306 PICT-3378a

18. For wheel motor service, refer to Parker/Ross Wheel Motor Service Manual (form no. 492-4753).

Wheel Motor Installation

Note: As a reminder, prior to connecting the hydraulic lines, the o-rings should be replaced with new ones and lightly lubricated with petroleum jelly.

Note: There are two different spacers used on the wheel motors (Fig. 307). The short spacers are used in the front of the wheel motor (with the brake linkage) and the long spacers are used to retain the back of the wheel motor.

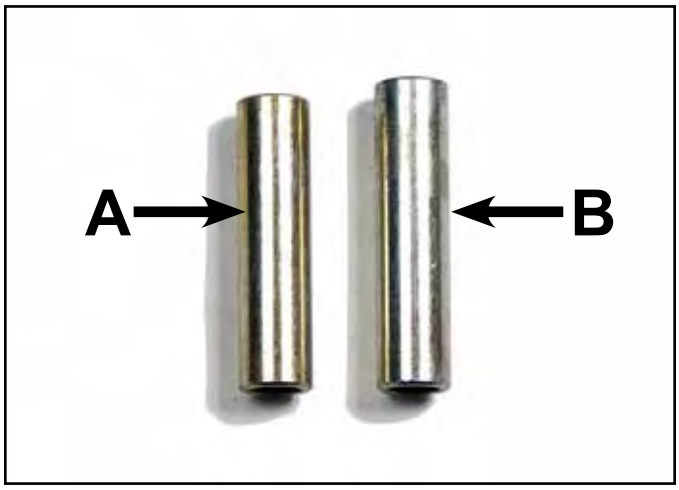

Fig 307 DSC-2117a

A. Short spacer B. Long spacer

1. Insert the wheel motor into the frame. Loosely install the 2 rear wheel motor mounting bolts, long spacers and nuts (Fig. 308).

Fig 308 PICT-3377a

2. Swing the brake linkage into position (Fig. 309).

Fig 309 PICT-3374a

3. Loosely install the 2 front wheel motor mounting bolts, short spacers and nuts (Fig. 310).

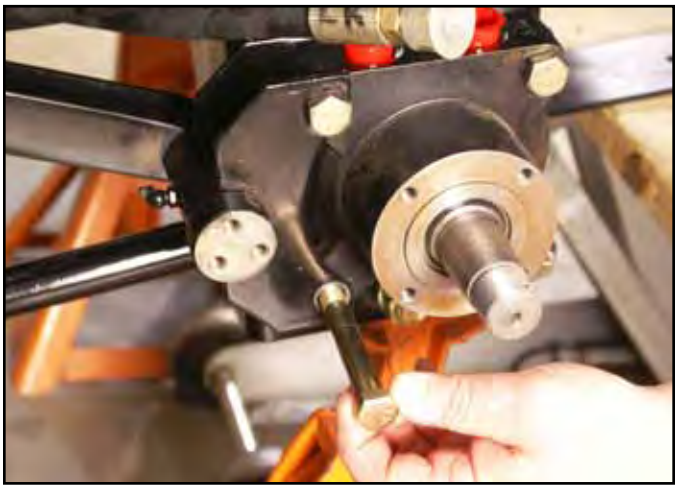

Fig 310 PICT-3376a

4. Torque the 4 wheel motor mounting bolts to 100 ± 8 ft-lbs. (136 ± 11 Nm) (Fig. 311).

Fig 311 PICT-3382a

5. Install the wheel motor fittings. Note the location markings (Fig. 312).

Fig 312 PICT-3367a

6. Install the wheel motor hoses onto the wheel motor fittings. Note the location markings (Fig. 313).

Fig 313 PICT-3366a

7. Slide the brake band assembly over the wheel motor hub. Install the 3 spacers, the retainer and 3 brake band bolts into brake bracket (Fig. 314).

Fig 314 PICT-3358a

8. Make sure the parking brake is released.

9. Make sure the woodruff key is in place in the motor shaft. Clean the shaft and wheel hub bore with solvent to remove any trace of grease or oil. Slide the wheel hub onto the wheel motor shaft and into the brake band (Fig. 315).

Fig 315 PICT-3384a

10. Apply the parking brake.

11. Install a castle nut onto the wheel motor shaft. Torque the castle nut to 125 ft-lbs (170 Nm) (Fig. 316).

Fig 316 PICT-3385a

12. Check the distance from bottom of the slot in the nut to the inside edge of the hole. Two threads or less should be showing (Fig. 317).

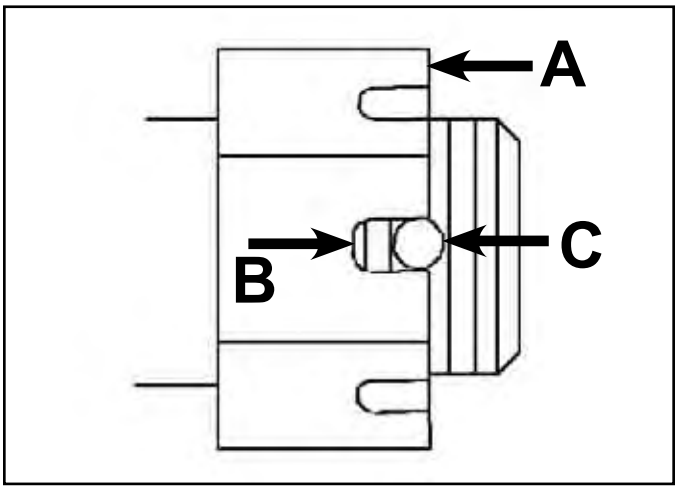

Fig 317 fig. 48 G001051 b

A. Slotted nut
B. Two threads or less showing
C. Hole in threaded shaft

Note: If more than two threads are showing remove nut and install washer between hub and nut and then:

a. Torque the slotted nut to 125 ft-lbs. (170 Nm) (Fig. 318).

b. If necessary, tighten the nut until the next set of slots line up with the hole in the shaft (Fig. 318).

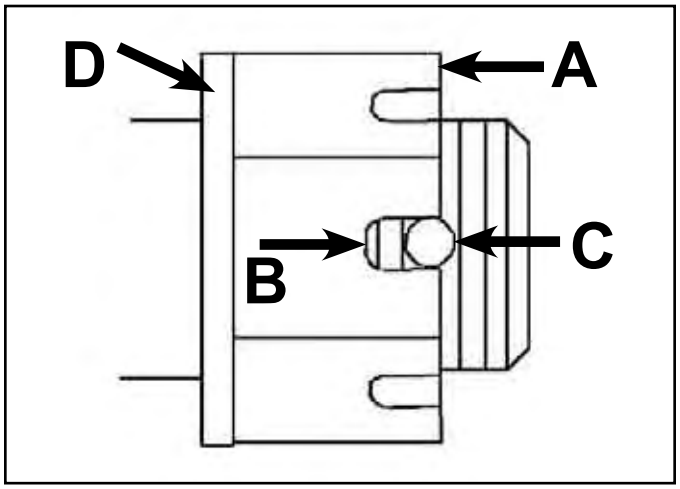

Fig 318 fig. 48 G001051 a

A. Slotted nut
B. Two threads or less showing
C. Hole in threaded shaft
D. Washer (if needed)

13. Install a cotter pin into the wheel motor shaft (Fig. 319).

Fig 319 PICT-3350a

14. Install the rear wheel.

15. Install the negative battery cable.

16. Lower the seat.

17. Purge the hydraulic system. Refer to “Purging the Hydraulic System” on page 4-26.

18. Adjust the tracking. See “Adjusting the Tracking” on page 4-32.

Purging the Hydraulic System

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

1. Raise rear of the machine so the wheels are off the ground and support it with jack stands (Fig. 320).

Fig 320 IMG-0448a

2. Start the engine and run it at low idle speed. Engage the motion control lever on one side and spin the wheel by hand (Fig. 321).

Fig 321 PICT-3465a

3. When the wheel begins to spin on its own, keep it engaged until the wheel drives smoothly (minimum 2 minutes).

4. Check the hydraulic fluid level in the reservoir and add as required to maintain proper level.

5. Repeat this procedure on the opposite wheel.

Adjusting the Control Handle Neutral Position

If the motion control levers do not align or do not move easily into the console notch, adjustment is required. Adjust each lever, spring and rod separately.

1. Disengage the PTO, move the motion control levers to the neutral locked position and set the parking brake.

2. Stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.

3. Raise the seat (Fig. 322).

Fig 322 IMG-0449a

4. Begin with either the left or right motion control lever.

5. Move the lever to the neutral position but not locked (Fig. 323).

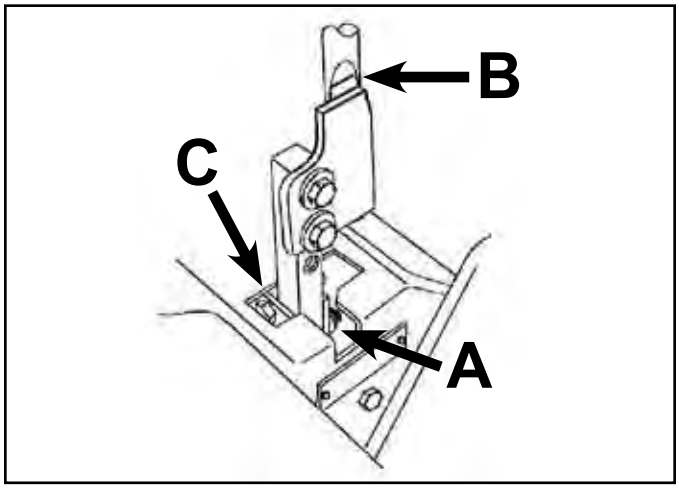

Fig 323 fig. 62 G001046

A. Neutral locked position
B. Control lever
C. Neutral position

6. Pull the lever back until the clevis pin (on arm below pivot shaft) contacts the end of the slot (just beginning to put pressure on the spring) (Fig. 324).

7. Check where the control lever is relative to the notch in console (Fig. 323). It should be centered with the neutral lock notch, to allow lever to pivot outward to the neutral lock position.

8. If adjustment is needed, loosen the nut and jam nut against the yoke (Fig. 324).

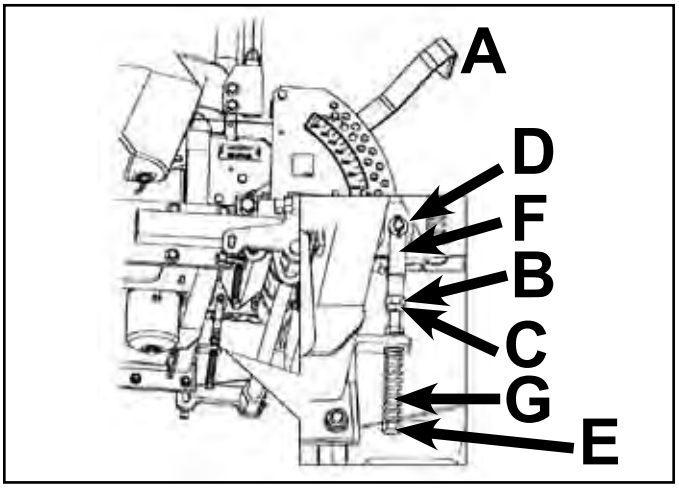

Fig 324 fig. 63 G001155

A. Height-of-cut lever
B. Nut against yoke
C. Jam nut
D. Clevis pin in slot
E. Adjustment bolt
F. Yoke
G. Spring

9. Apply slight rearward pressure on the motion control lever, turn the head of the adjustment bolt in the appropriate direction until the control lever is centered in the neutral lock position (Fig. 324).

Note: Keeping rearward pressure on the lever will keep the pin at the end of the slot and allow the adjustment bolt to move the lever to the appropriate position.

10. Tighten the nut and jam nut (Fig. 324).

11. Repeat procedure for the opposite control handle.

Setting the Hydrostatic Pump Neutral

1. Raise the machine and support with jack stands so that the rear tires are off the ground (Fig. 325).

Fig 325 IMG-0448a

2. Raise the seat (Fig. 326).

Fig 326 IMG-0449a

3. Remove the bolt and nut securing the seat rod to the seat. Rotate the seat rod up and out of the way of the hydrostatic pump (Fig. 327).

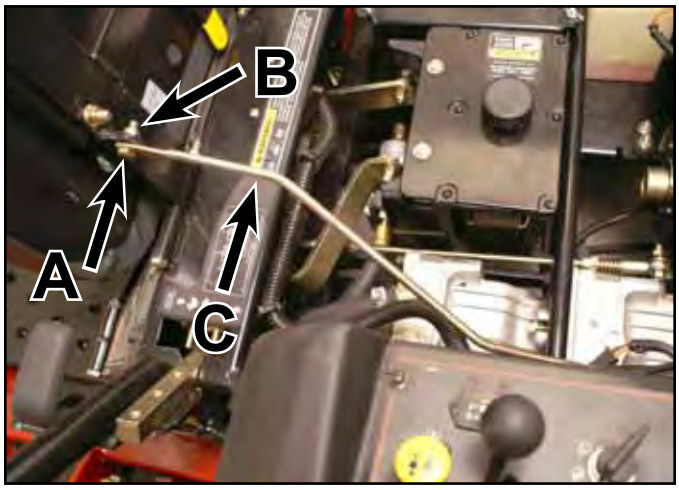

Fig 327 PICT-5324a

A. Bolt
B. Nut
C. Seat rod

4. Disconnect the wire harness terminals from the seat switch. Install a jumper wire into the harness terminals (Fig. 328).

Fig 328 PICT-3474a

Setting the Right Hydraulic Pump Neutral Position

5. Place the motion control levers in the neutral position.

6. Start the engine, open the throttle 1/2 way and release parking brake.

7. Adjust the pump rod length by rotating the knob, in the appropriate direction, until the right wheel is stopped or slightly creeping in reverse (Fig. 329).

Fig 329 PICT-3477a

8. Move the motion control lever forward and reverse, then back to neutral. The wheel must stop turning; it is acceptable to have a slight creep in reverse.

9. Open the throttle to Fast. Make sure the wheel remains stopped or slightly creeps in reverse; adjust if necessary.

Setting the Left Hydraulic Pump Neutral Position

10. Place the motion control levers in the neutral position.

11. Loosen the jam nuts at the ball joints on the pump control rod (Fig. 330).

Fig 330 PICT-3486a

12. Start the engine, open the throttle 1/2 way and release the parking brake.

13. Adjust the pump rod length by rotating double nuts on rod, in the appropriate direction, until wheel is stopped or slightly creeps in reverse (Fig. 331).

Note: The front nut on the pump rod has left-hand threads.

Fig 331 PICT-3489a

14. Move the motion control lever forward and reverse, then back to neutral. The wheel must stop turning; it is acceptable to have a slight creep in reverse.

15. Open the throttle to Fast. Make sure the wheel remains stopped or slightly creeps in reverse; adjust if necessary.

16. Tighten the jam nuts at the ball joints (Fig. 332).

Fig 332 PICT-3486a

17. After both pump neutrals are set, shut off the machine.

18. Remove the jumper wire from the wire harness terminals and plug the terminals into the seat switch (Fig. 333).

Fig 333 PICT-3491a

19. Install the seat rod and lower the seat into position.

20. Lower the machine.

Adjusting the Tracking

The machine has a knob located under the seat to adjust the tracking.

Important: Adjust the handle neutral and hydrostatic pump neutral before adjusting the tracking. Refer to "Adjusting the Control Handle Neutral Position" on page 4-27 and "Setting the Hydrostatic Pump Neutral" on page 4-28.

1. Start the engine. Test the machine in a large, flat, paved area for accurate results.
2. Push both control levers forward the same distance.
3. Check if the machine pulls to one side. If it does, stop the machine and set the parking brake.
4. Unlatch the seat and tilt the seat forward to access the tracking knob.

Note: Determine the left and right sides of the machine from the normal operating position.

5. To make the machine go right, turn the knob towards the right side of the machine (Fig. 334).

Fig 334 PICT-3475a

6. To make the machine go left, turn the knob towards the left side of the machine (Fig. 335).

Fig 335 PICT-3475a

7. Repeat adjustment until the tracking is correct. If experiencing difficulty with the tracking adjustment, check:
   1. Rear tire pressure and outside circumference do not differ greatly from side-to-side.
   2. Front castor wheels pivot freely.
   3. Wheel motors not loose/carrier frame or chassis not bent or cracked.

Hydraulic Flow Testing

The following procedure was performed on the right hand wheel motor hoses. It can be performed on either the right or left side of the machine.

Note: Cleanliness is a key factor in successful flow testing of the hydraulic system. Thoroughly clean all exposed surfaces prior to any type of maintenance. Cleaning all parts with 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.

Hydraulic Flow Testing Procedure

1. Lift the back of the unit so the side being tested is off the ground. Place jack stands under the rear frame to support the unit. Remove the rear tire (Fig. 336).

Note: Be careful not to place jack stands near any moving parts or areas not capable of supporting the weight of the machine.

Fig 336 PICT-3494a

2. Clean any dirt or debris away from the hydraulic line fittings. Mark each of the hoses and fittings so they will be properly re-installed after testing. Remove the hydraulic lines.

Note: Cap the fittings to prevent dirt from entering the hydraulic system (Fig. 337).

Fig 337 PICT-3496a

3. Connect the hydraulic hose fittings to the hydraulic flow tester (Fig. 338).

Note: The flow tester shown is bidirectional so it does not matter which order the hoses are connected to the flow tester. If using a directional flow tester, be sure to correctly connect hoses.

Fig 338 PICT-3507a

4. Check the hydraulic reservoir. Fill as needed with Toro® Hypr-Oil™ 500 hydraulic oil or Mobil® 1, 15w-50 oil.

5. Unplug the wire harness clutch wire from the electric PTO clutch to prevent accidental engagement of the mower deck (Fig. 339).

Fig 339 IMG-0456a

6. Lift the seat and unplug the harness terminals from the seat switch. Temporarily install a jumper wire across the harness terminals (Fig. 340).

Fig 340 PICT-3471a

7. Verify the restrictor valve on the hydraulic flow tester is in the fully “Opened” position (Fig. 341).

Fig 341 PICT-3497a

8. Start the machine. Run it for approximately 5 minutes to warm the oil in the hydrostatic system.

9. Release the parking brake and bring both levers to the inside neutral position. Set the engine throttle to full RPM.

10. Stroke the left hand hydrostatic lever fully forward. Very slowly, rotate the “T” handle of the adjustable flow tester restrictor valve until the pressure gauge reaches 500 PSI (3447 kPa). The measured flow should be 13 to 15 gpm (49 to 56.8 lpm) (Fig. 342).

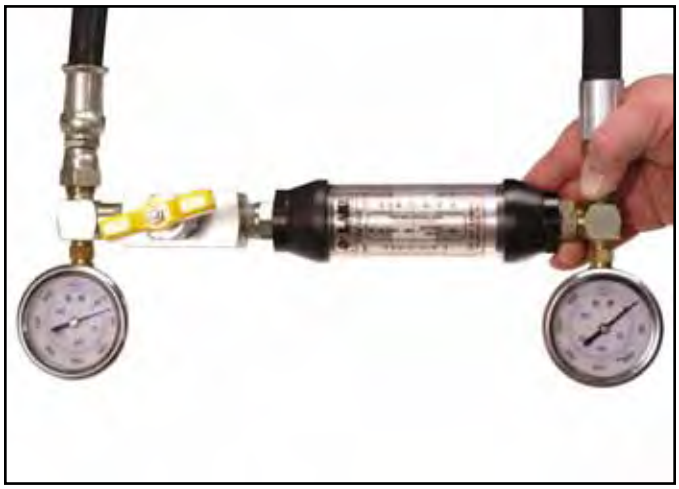

Fig 342 PICT-3509a

11. With the unit at full engine throttle speed, slowly rotate the “T” handle of the flow tester restrictor valve clockwise until the pressure gauge reads approximately 1000 to 1200 psi (6895 to 8274 kPa) (Fig. 343).

Caution: DO NOT operate the machine for an extended period of time at the 1200 psi (8274 kPa) rate.

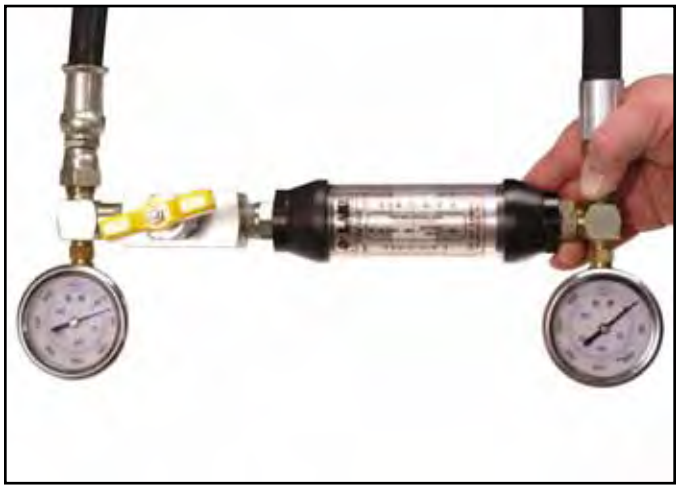

Fig 343 PICT-3509a

12. Record the difference or “flow droop” of the pump. For the Hydro-Gear PR Series pump, maximum allowable “flow droop” is 2.5 gpm (9.46lpm). Any droop greater than 2.5 gpm (9.46lpm) is considered unacceptable and the pump should be repaired/ replaced barring any other potential causes.

13. Return the motion control lever to the neutral position and return both levers to the neutral locked position. Engage the parking brake. Slow the engine speed to idle and turn the ignition switch to the OFF position.

14. Remove the hydraulic flow tester from the hydraulic lines.

15. Install the hydraulic lines to the wheel motor. Note the previously marked hose and fitting positions.

16. Check the hydraulic reservoir. Fill as necessary to the “Hot” level mark (Fig. 344).

Note: Cold oil level has been lowered by 1/4” (.64cm) from that shown in 2006-2008 Operator Manuals.

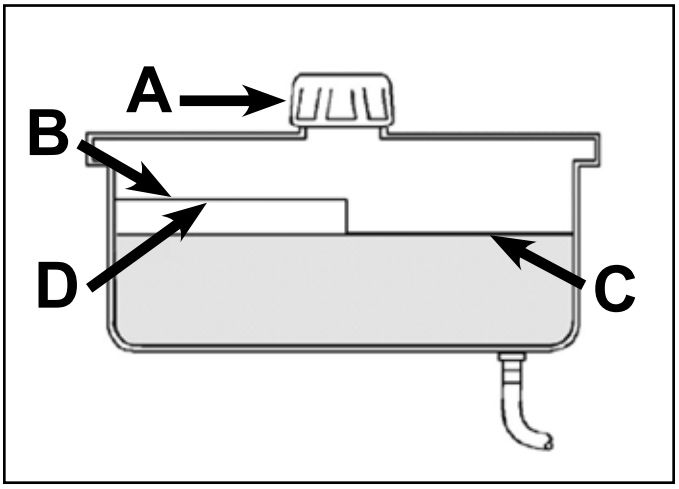

Fig 344 fig. 55 line art

A. Cap
B. Baffle
C. Cold fluid level - full
D. Hot fluid level - full

17. Reinstall the rear tire and lower the unit to the ground.

18. Remove the temporary jumper cable from the wire harness seat switch terminals. Plug the wire harness terminals into the seat switch (Fig. 345).

Fig 345 PICT-3471a

19. Plug the wire harness electric clutch wire into the electric PTO clutch (Fig. 346).

Fig 346 IMG-0456a

20. Lower the seat.

Traction Pump Drive Belt Replacement

Traction Pump Drive Belt Removal

1. Park the machine on a level surface, disengage the PTO, turn the ignition off and remove the key.
2. Raise the seat.
3. Remove the negative battery cable from the battery.
4. Remove the front engine panel (Fig. 347).

Fig 347 IMG-0303a

5. Unplug the harness connector from the electric PTO clutch (Fig. 348).

Fig 348 IMG-0456a

6. Remove the 2 carriage bolts and nuts securing the clutch stop bracket to the frame (Fig. 349).

Fig 349 IMG-0460a

7. Remove the clutch stop bracket (Fig. 350).

Fig 350 IMG-0461a

8. With a spring tool (Toro p/n: 92-5771), remove the gear box idler assembly spring (Fig. 351).

Fig 351 IMG-0463a

9. With tension released from the gearbox idler, remove the PTO clutch belt from the clutch and gearbox pulleys (Fig. 352).

Fig 352 PICT-3519a

10. Using a spring tool (Toro p/n: 92-5771), remove the traction pump idler assembly spring (Fig. 353).

Fig 353 IMG-0421a

11. Remove the traction pump drive belt from the pump pulley. Lift up on the gearbox idler pulley and remove the belt by sliding it out around the electric PTO clutch (Fig. 354).

Fig 354 PICT-3523a

Traction Pump Drive Belt Installation

1. Slide the traction pump drive belt over the electric PTO clutch (Fig. 355).

Fig 355 PICT-3523a

2. While lifting up on the gearbox idler pulley, route the traction pump drive belt around the pump pulley and the engine pulley as shown (Fig. 356):

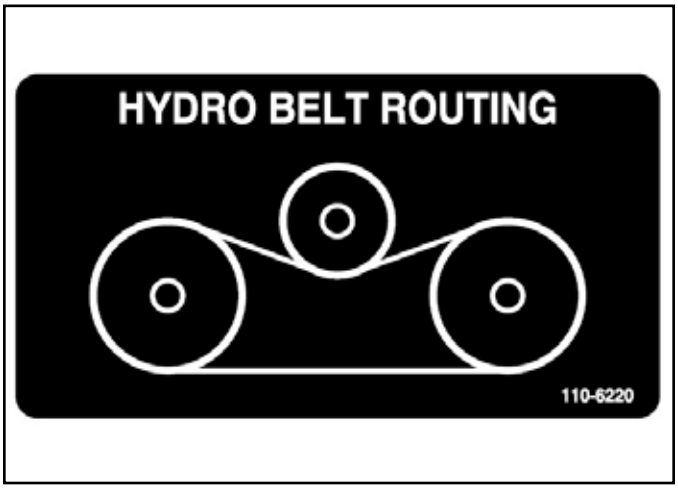

Fig 356 fig. 110-6220

3. Using a spring tool (Toro p/n: 92-5771), install the traction pump idler assembly spring (Fig. 357).

Fig 357 IMG-0421a

4. With tension released from the gearbox idler, install the PTO clutch belt around the electric PTO clutch and gearbox pulleys as shown (Fig. 358):

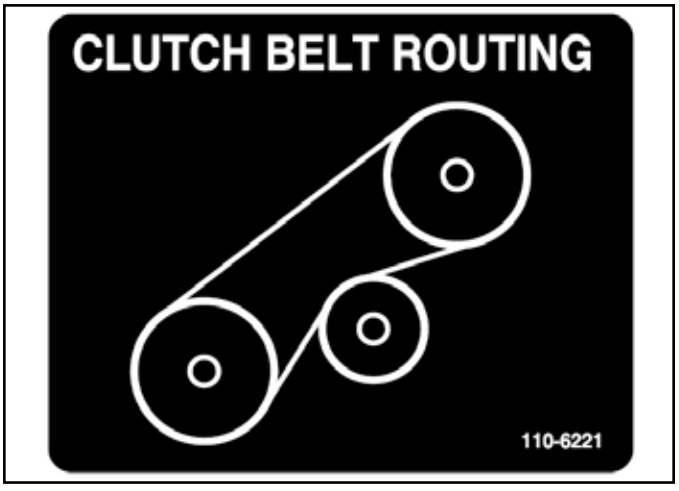

Fig 358 fig. 110-6221

5. Position the clutch stop bracket (Fig. 359).

Fig 359 IMG-0461a

6. Using a spring tool (Toro p/n: 92-5771) install the gear box idler assembly spring (Fig. 360).

Fig 360 IMG-0463a

7. Install 2 carriage bolts and nuts to secure the clutch stop bracket to the frame (Fig. 361).

Fig 361 IMG-0460a

8. Plug the harness connector into the electric PTO clutch (Fig. 362).

Fig 362 IMG-0456a

9. Install the front engine panel (Fig. 363).

Fig 363 IMG-0303a

10. Install the negative battery cable from the battery.

11. Lower the seat.

Hydraulic Oil Cooler Replacement

Hydraulic Oil Cooler Removal

1. Park the machine on a level surface, disengage the PTO, engage the parking, turn the ignition OFF and remove the key.

2. Raise the seat and hood assembly (Fig. 364).

Fig 364 IMG-0465a

3. Remove the 3 nuts and washers **(Note: the right carriage bolt will come out)** retaining the hydraulic cooler to the radiator top plate (Fig. 365).

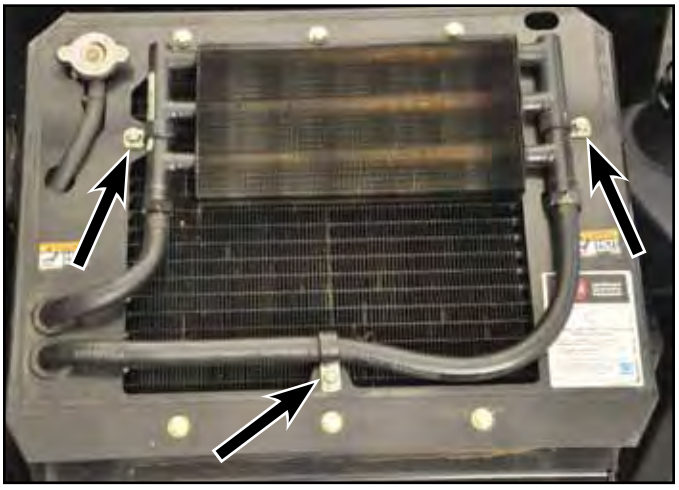

Fig 365 IMG-0466a

4. Lift the hydraulic cooler from the radiator top plate (Fig. 366).

Fig 366 IMG-0467a

5. Remove the right hose clamp and hose on the right side of cooler over a drain pan (Fig. 367).

Fig 367 IMG-0468a

6. Remove the left hose clamp and remove the hose.

Hydraulic Oil Cooler Installation

1. Install R-clamps on the right and left side of the hydraulic oil cooler (Fig. 368).

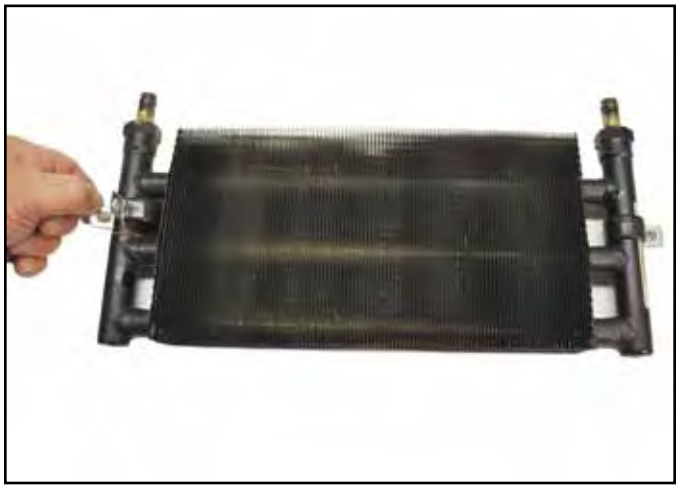

Fig 368 IMG-0469a

2. Install the two hydraulic hoses and hose clamps to the hydraulic oil cooler (Fig. 369).

Fig 369 IMG-0470a

3. Install carriage bolt through the right side radiator top plate and R-clamp and then a washer and nut (Fig. 370).

Fig 370 IMG-0471a

4. Install a washer and nut on the other 2 carriage bolts and tighten.

5. Start the unit and run the engine; check for any leaks. Turn the engine OFF. Check and top off the oil level in the oil reservoir.

6. Lower the hood assembly and seat.

Hydraulic Reservoir Tank Replacement

Hydraulic Reservoir Tank Removal

1. Park the machine on a level surface, disengage the PTO, engage the parking brake, turn the ignition off and remove the key.
2. Raise the seat.
3. Remove the negative battery cable from the battery.
4. Raise the floor pan assembly (Fig. 371).

Fig 371 PICT-3388a

5. Remove the left hand mower deck belt cover (Fig. 372).

Fig 372 PICT-3389a

6. Unhook the idler spring from the mower deck idler arm and spring post with a spring tool (Toro p/n: 92-5771) (Fig. 373).

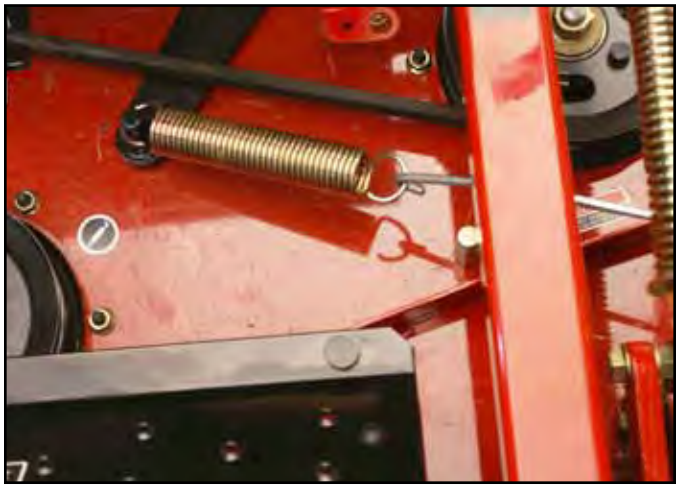

Fig 373 PICT-3391a

7. Remove the mower deck belt from the PTO drive pulley (Fig. 374).

Fig 374 IMG-0627a

8. Place a drain pan under the hydraulic reservoir tank.

9. Remove the hydraulic filter hose from the fitting on the bottom of the hydraulic reservoir (Fig. 375).

Fig 375 PICT-3401a

10. Slide the hose clamp down the oil cooler hose, off the tank fitting barb (Fig. 376).

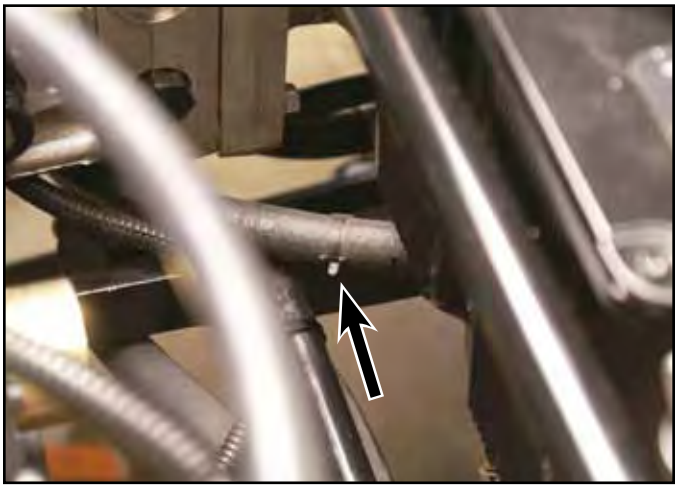

Fig 376 PICT-3396a

11. Remove the oil cooler hose from the tank fitting. Allow the hydraulic fluid to drain into the drain pan (Fig. 377).

Fig 377 PICT-3397a

12. Remove the 2 bolts, washers and nuts securing the reservoir to the hydraulic tank bracket (Fig. 378).

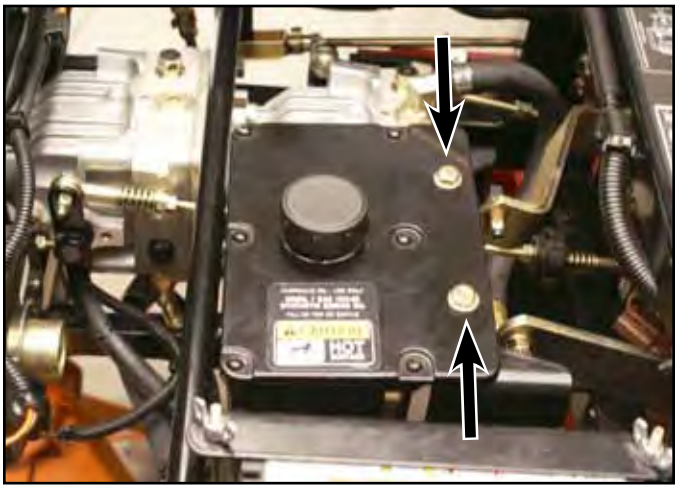

Fig 378 PICT-3409a

13. Remove the hydraulic reservoir (Fig. 379).

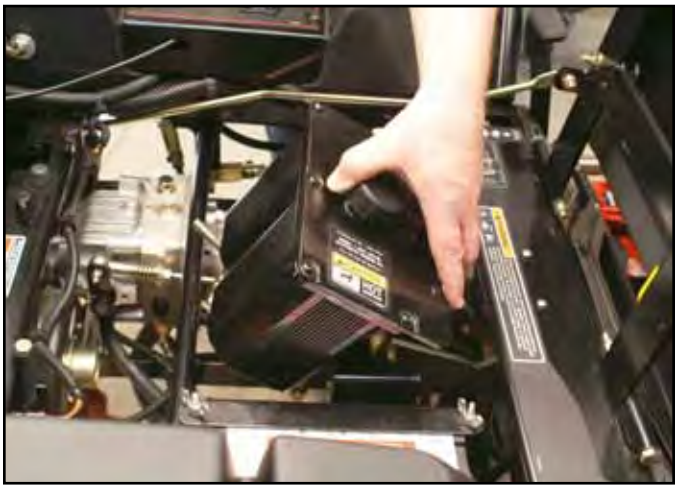

Fig 379 PICT-3411a

Hydraulic Reservoir Tank Installation

1. Transfer the 2 hydraulic tank fittings to the new hydraulic reservoir tank (Fig. 380).

Fig 380 PICT-3416a

2. Position the hydraulic reservoir onto the tank bracket (Fig. 381).

Fig 381 PICT-3411a

3. Install 2 bolts, washers and nuts to secure the reservoir to the hydraulic tank bracket (Fig. 382).

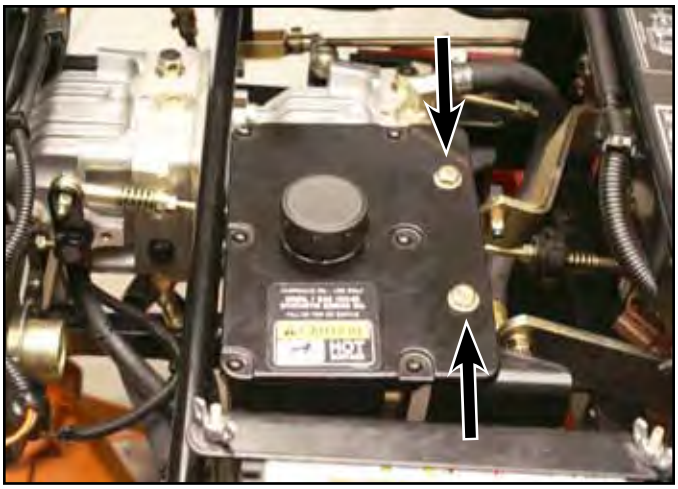

Fig 382 PICT-3409a

4. Install the oil cooler hose onto the tank fitting on the bottom of the hydraulic reservoir (Fig. 383).

Fig 383 PICT-3397a

5. Position the hose clamp to secure the oil cooler hose to the tank fitting barb (Fig. 384).

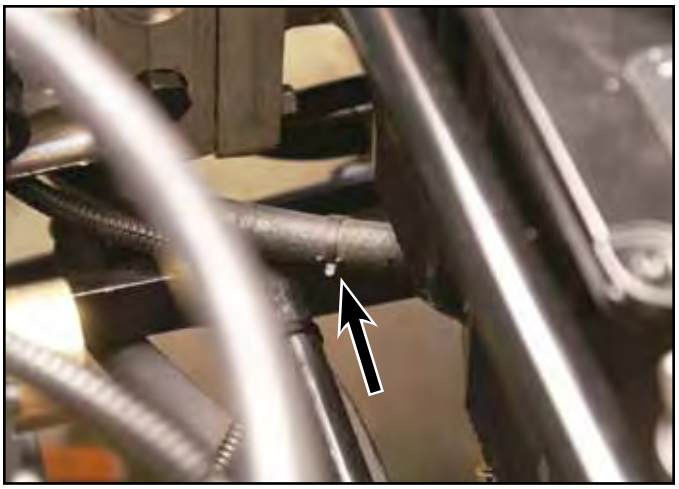

Fig 384 PICT-3396a

6. Install the hydraulic filter hose to the fitting on the bottom of the hydraulic reservoir (Fig. 385).

Fig 385 PICT-3401a

7. Route the mower deck belt around the PTO drive pulley (Fig. 386).

Fig 386 IMG-0627a

8. Hook the idler spring from the mower deck idler arm to the spring post using a spring tool (Toro p/n: 92-5771) (Fig. 387).

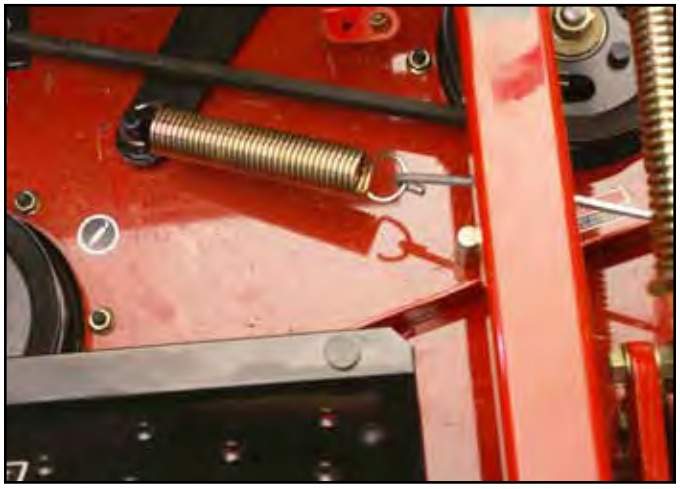

Fig 387 PICT-3391a

9. Install the left hand mower deck belt cover (Fig. 388).

Fig 388 PICT-3389a

10. Lower the floor pan assembly (Fig. 389).

Fig 389 PICT-3388a

11. Install the negative battery cable.

12. Lower the seat.

13. Fill the reservoir to the cold oil level (Fig. 390).

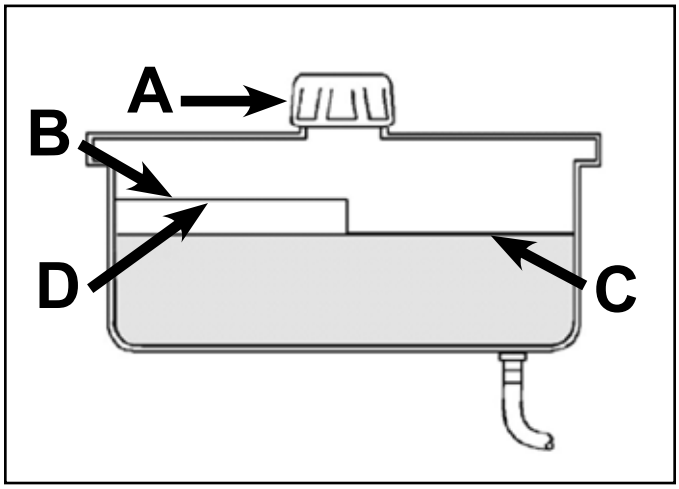

Fig 390 fig 55 line art

A. Cap
B. Baffle
C. Cold fluid level - full
D. Hot fluid level - full

14. Purge the hydraulic system. Refer to “Purging the Hydraulic System” on page 4-26.

Pushing the Machine by Hand

1. Disengage the power take off (PTO) and turn the ignition key to off. Move the levers to neutral locked position and apply parking brake. Remove the key.
2. Raise the seat.
3. Rotate the by-pass valves counterclockwise 1 turn. This allows hydraulic fluid to by-pass the pump enabling the wheels to turn (Fig. 391).

Important: Do not rotate by-pass valves more than 1 turn. This prevents valves from coming out of the body and allowing fluid to run out.

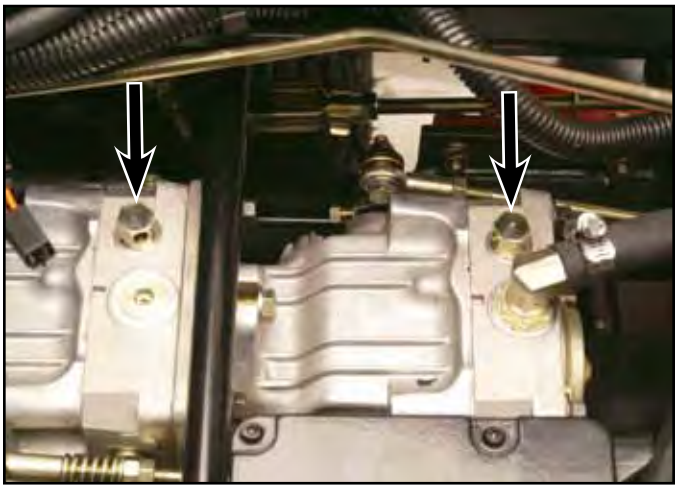

Fig 391 PICT-3524a

4. Lower the seat.
5. Disengage parking brake before pushing.

Switching from Hand Pushing the Machine to Machine Operation

1. Engage the parking brake.
2. Raise the seat.
3. Rotate the by-pass valves clockwise 1 turn to operate machine (Fig. 392).

Note: Do not over-tighten the by-pass valves.

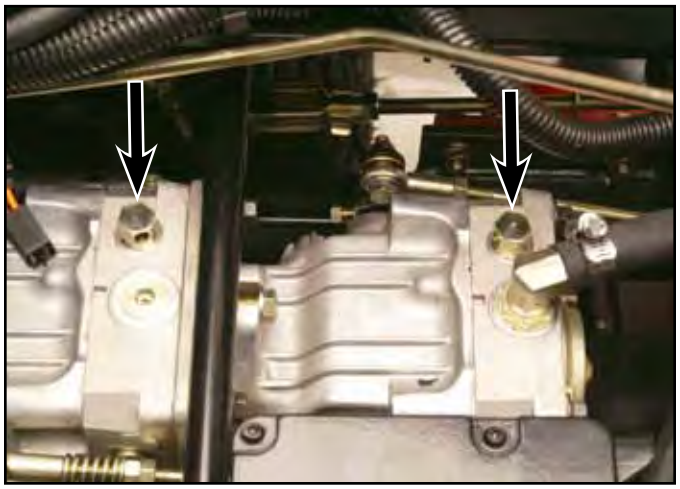

Fig 392 PICT-3524a

4. Lower the seat.

Engine Replacement

Engine Removal

1. Park the machine on a level surface, disengage the PTO, turn the ignition OFF and remove the key.
2. Raise the seat.
3. Remove the battery negative cable from the battery.
4. Remove the front engine panel (Fig. 393).

Fig 393 IMG-0303a

5. Remove the Radiator. Refer to “Radiator Removal” on page 5-19.
6. Remove the hood assembly. Refer to “Hood Assembly Removal” on page 3-22.
7. Remove the 2 bolts and nuts retaining the air cleaner bracket to the bottom radiator plate (Fig. 394).

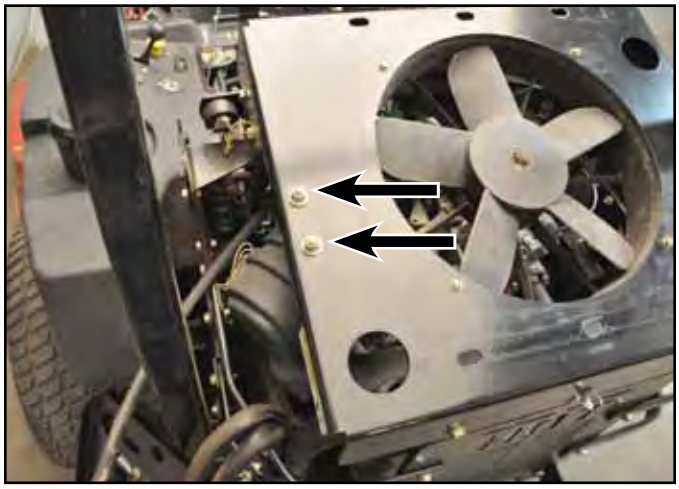

Fig 394 IMG-0505a

8. Remove the 2 bolts, washers, and nuts retaining the ECM mount plate to the bottom radiator plate (Fig. 395).

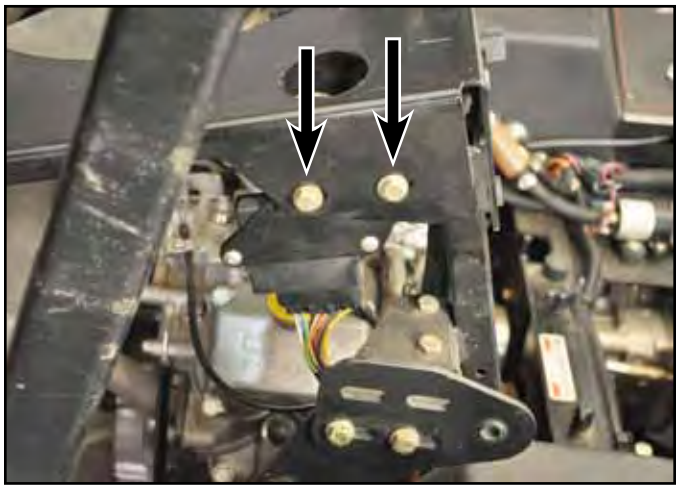

Fig 395 IMG-0507a

9. Remove the 4 bolts, washers and nuts retaining the bottom radiator plate to the right hand and left hand radiator brace assemblies (Fig. 396).

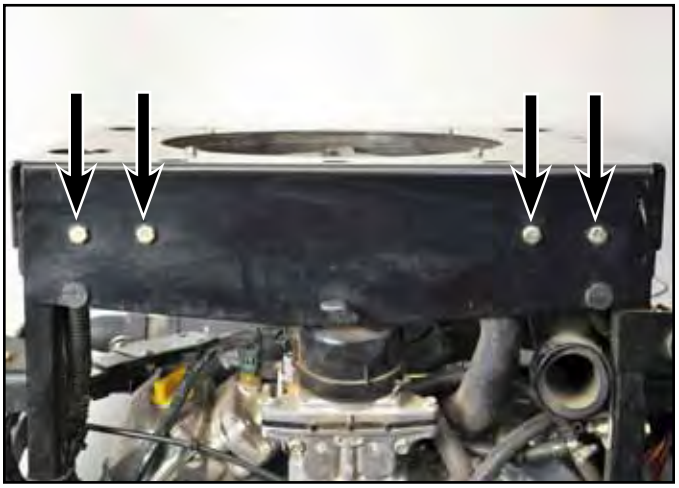

Fig 396 IMG-0509a

10. Remove the 2 bolts, washers and nuts retaining the left side of the bottom radiator plate to the LH radiator brace assembly (Fig. 397).

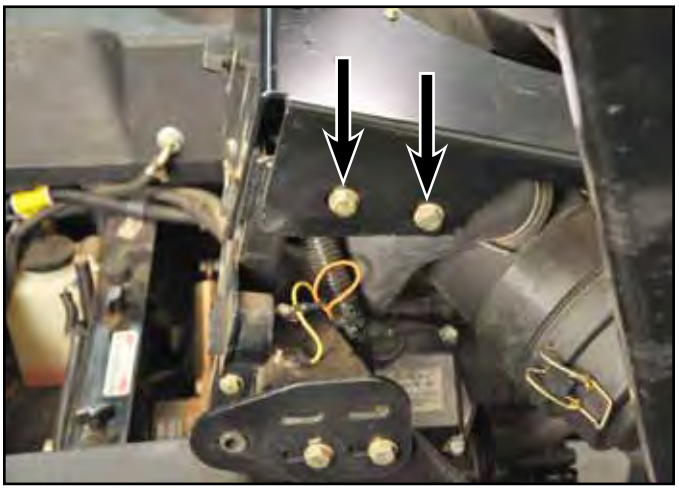

Fig 397 IMG-0510a

11. Remove the rear 2 bolts, washers and nuts retaining the rear guard assembly to the bottom radiator plate (Fig. 398).

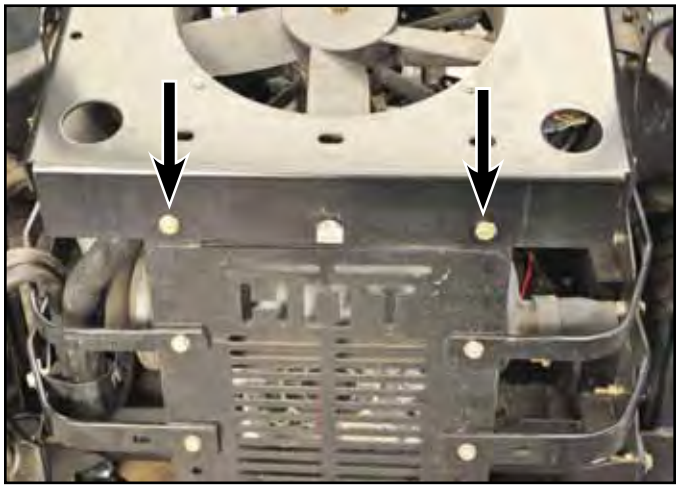

Fig 398 IMG-0511a

12. Lift the bottom radiator plate and unplug the cooling fan from the electrical harness (Fig. 399).

Fig 399 IMG-0512a

13. Remove the bottom radiator plate from the radiator brace assemblies (Fig. 400).

Fig 400 IMG-0514a

14. Loosen the hose clamp for the air filter, located on the engine (Fig. 401).

Fig 401 IMG-0515a

15. Remove the air cleaner assembly from the engine (Fig. 402).

Fig 402 IMG-0516a

16. Loosen and remove the 2 bolts, washers, and nuts located on top rib of the RH support bracket assembly. Remove 1 bolt, washer and nut retaining the lower strap guard to the frame (Fig. 403).

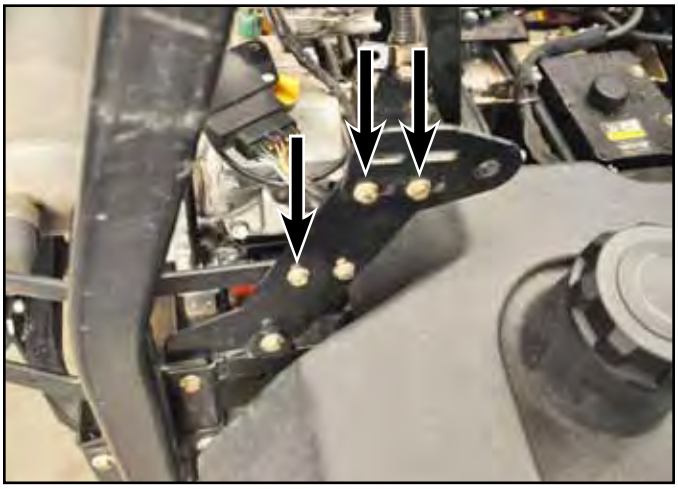

Fig 403 IMG-0517a

17. Remove 1 bolt, washer and nut retaining the R-clamp to the left side strap guard (Fig. 404). Remove the R-clamp.

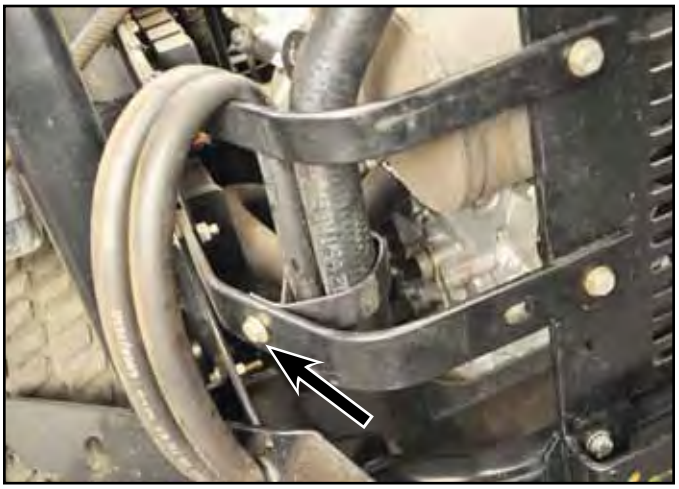

Fig 404 IMG-0518a

18. Loosen and remove the 2 bolts, washers and nuts located on the top rib of the LH support bracket assembly. Remove 1 bolt, washer and nut retaining the strap guard to the frame (Fig. 405).

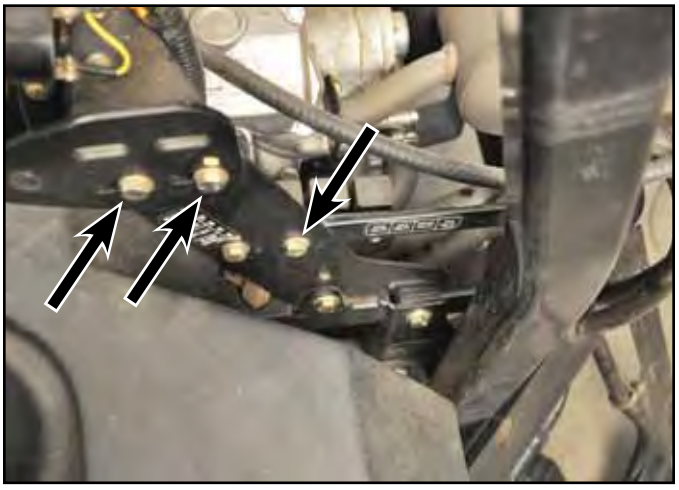

Fig 405 IMG-0519a

19. Remove the 2 bolts and nuts retaining the rear guard assembly to the frame (Fig. 406).

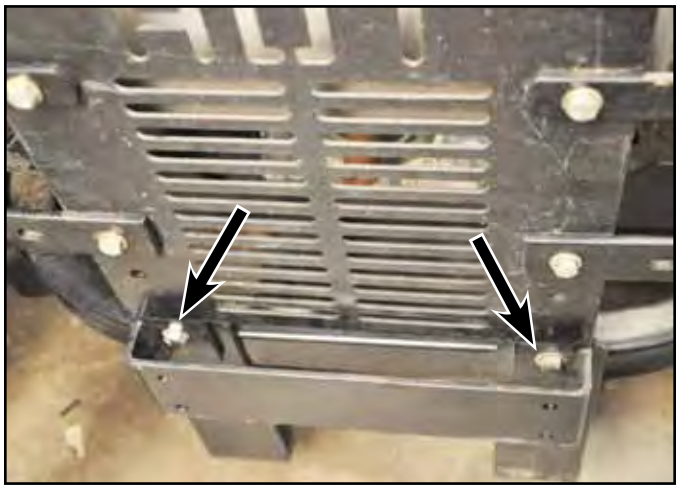

Fig 406 IMG-0522a

20. Remove the rear guard assembly with the top strap, top rib and the strap guards attached (Fig. 407).

Fig 407 IMG-0524a

21. Remove the electric PTO clutch. Refer to “Electric PTO Clutch Removal” on page 7-34.

22. Using a spring tool (Toro P/N 92-5771), remove the hydraulic pump idler arm spring (Fig. 408).

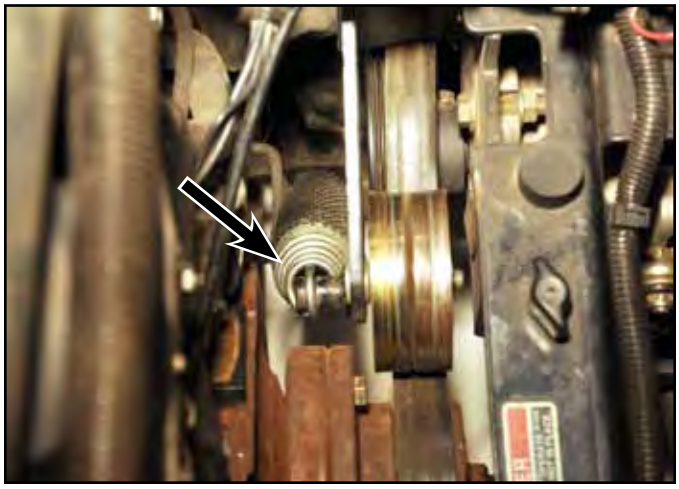

Fig 408 IMG-0595a

23. Remove the belt from the hydraulic pump pulley (Fig. 409).

Fig 409 IMG-0431a

24. Remove the cable tie securing the throttle cable to on the bracket behind the voltage regulator (Fig. 410).

Fig 410 IMG-0535a

25. Loosen the throttle cable clamp and remove the throttle cable (Fig. 411).

Fig 411 IMG-0537a

26. Remove the Z-bend of the throttle cable from the engine throttle linkage (Fig. 412).

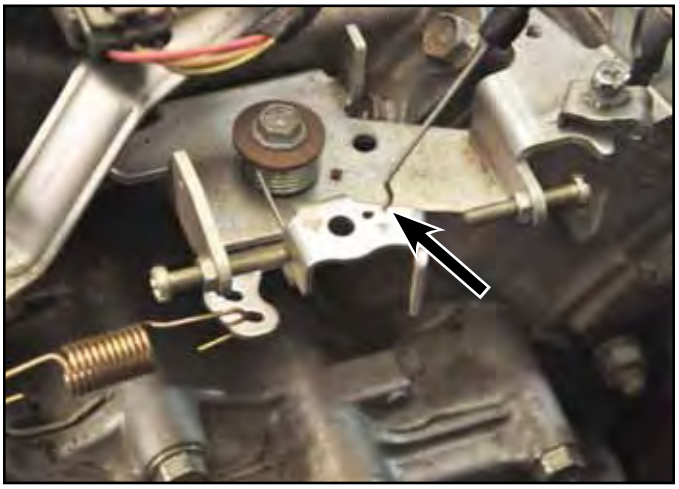

Fig 412 IMG-0539a

27. Remove the throttle cable from the engine (Fig. 413).

Fig 413 IMG-0541a

28. Pull the radiator overflow tube forward, away from the engine (Fig. 414).

Fig 414 IMG-0542a

29. Loosen the hose clamp located on the fuel line next to the fuel filter and remove the fuel line (Fig. 415).

Fig 415 IMG-0544a

30. At the return fuel line “T” fitting, remove the hose clamp and fuel line that runs to the fuel shutoff valve (Fig. 416).

Fig 416 IMG-0548a

31. Remove the bolt and washer retaining the ground wire terminals to the engine block (Fig. 417).

Fig 417 IMG-0550a

32. Remove the plug connector to the starter solenoid (Fig. 418).

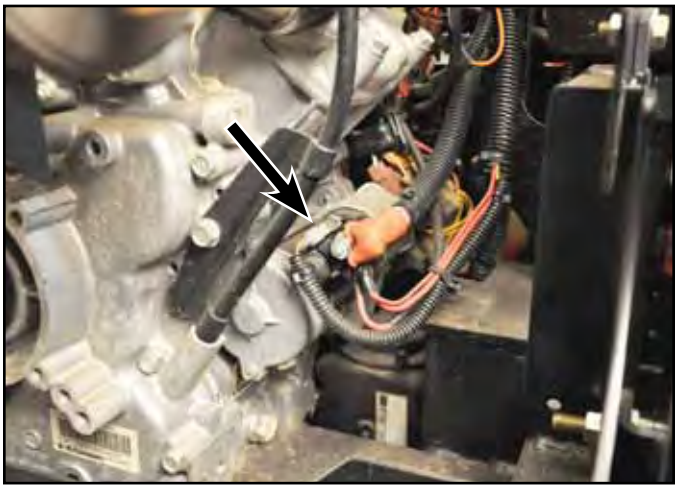

Fig 418 IMG-0551a

33. Slide the red rubber protection boot off the terminal of the starter solenoid and remove the nut, washer and 3 red wire terminals (Fig. 419).

Fig 419 IMG-0553a

34. Unplug the orange to white wire plug that goes to the voltage regulator (Fig. 420).

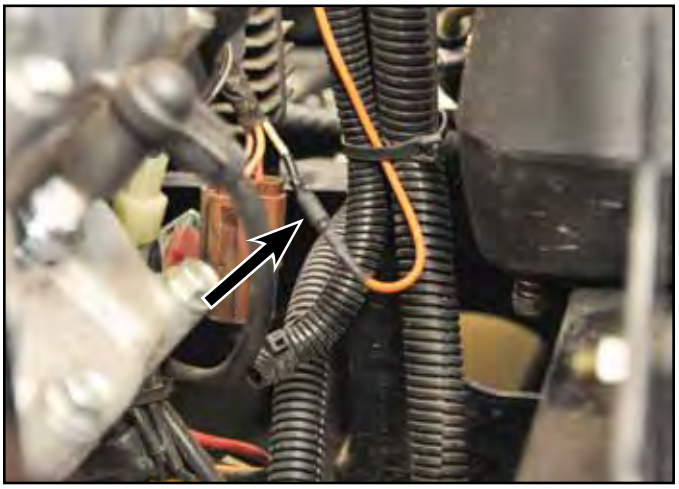

Fig 420 IMG-0554a

35. Unplug the connector from the wiring harness to the ECU unit (Fig. 421).

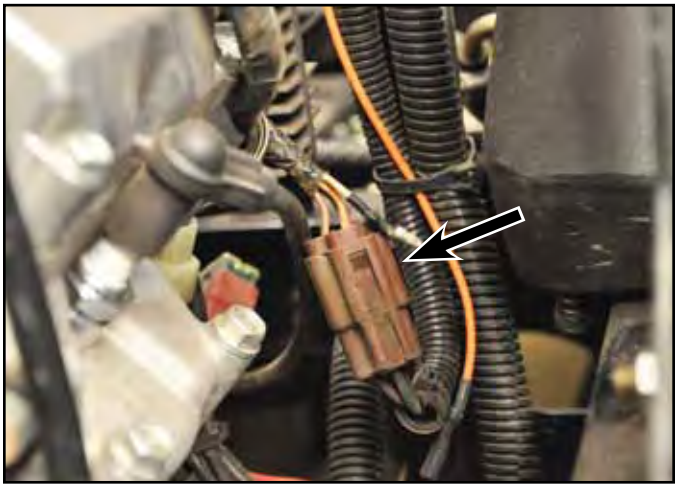

Fig 421 IMG-0555a

36. Cut the cable tie retaining the wires going to the starter solenoid (Fig. 422).

Fig 422 IMG-0560a

37. Unplug the engine connector harness from the main harness (Fig. 423).

Fig 423 IMG-0562a

38. From the bottom of the frame, remove the 4 engine bolts and Belleville washers securing the engine (Fig. 424).

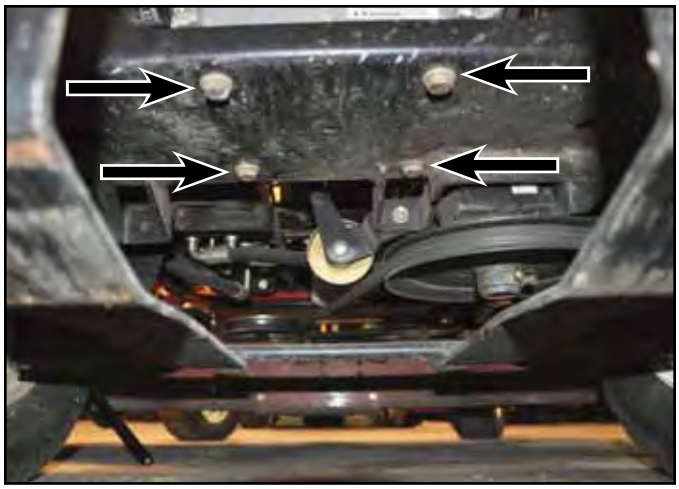

Fig 424 IMG-0567a

39. Remove the engine from the frame (Fig. 425).

Fig 425 IMG-0571a

Engine Installation

1. Lower the engine onto the frame. Install 4 bolts and Belleville washers through the frame and into the base of the engine. Tighten the bolts.

2. Plug the engine connector to the harness (Fig. 426).

Fig 426 IMG-0562a

3. Plug the connector from the wiring harness to the ECU unit (Fig. 427).

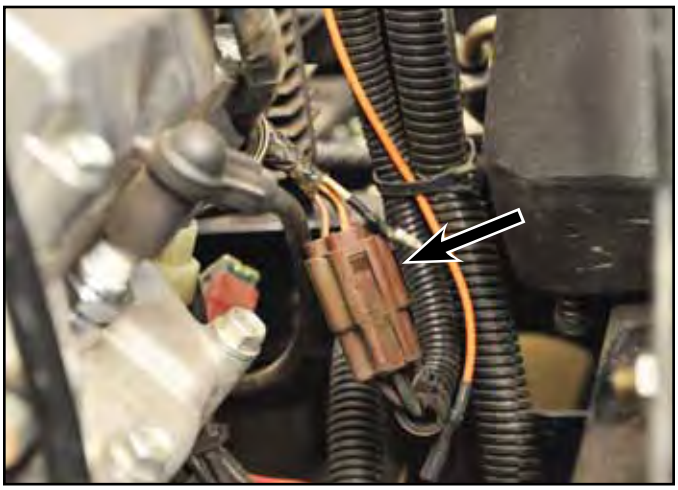

Fig 427 IMG-0555a

4. Plug the orange and wire plug that goes to the voltage regulator (Fig. 428).

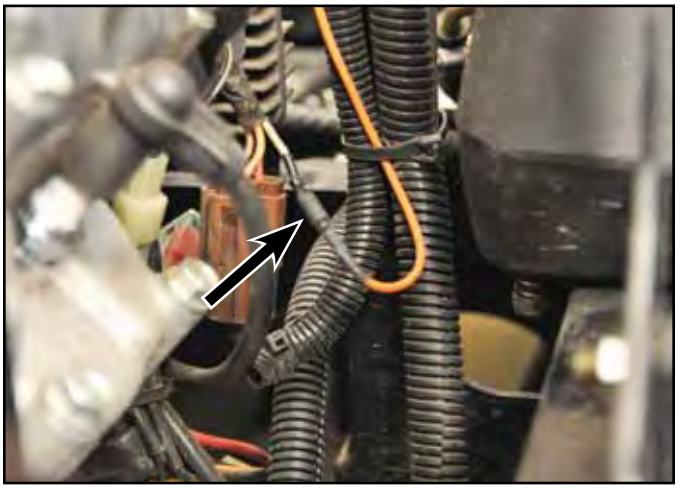

Fig 428 IMG-0554a

5. Install the 3 red wire terminals on the starter solenoid stud with a washer and nut (Fig. 429).

Fig 429 IMG-0574a

6. Install the plug connector to the starter solenoid (Fig. 430).

Fig 430 IMG-0575a

7. Install a cable tie around the wires going to the starter solenoid (Fig. 431).

Fig 431 IMG-0579a

8. Install the ground wires on the bolt and washer (Fig. 432).

Fig 432 IMG-0580a

9. Install the bolt and ground wires to the engine block (Fig. 433).

Fig 433 IMG-0550a

10. Install the fuel line from the fuel valve to the joint connecting two fuel lines and tighten the hose clamp (Fig. 434).

Fig 434 IMG-0548a

11. Install the fuel line to the fuel filter and tighten the hose clamp (Fig. 435).

Fig 435 IMG-0544a

12. Route the radiator overflow tube toward the rear of the engine between the fuel lines (Fig. 436).

Fig 436 IMG-0581a

13. Continue routing the radiator overflow tube back, placing it under the fuel line at the top of the engine (Fig. 437).

Fig 437 IMG-0585a

14. Route the engine throttle cable behind the engine breather tube (Fig. 438).

Fig 438 IMG-0541a

15. The throttle cable routes back to the throttle linkage on the engine. Install the z-bend of the throttle cable into the throttle linkage (Fig. 439).

Fig 439 IMG-0586a

16. Install the throttle cable into the throttle cable clamp. Place the throttle lever in the Slow (idle) position (Fig. 440).

Fig 440 IMG-0587a

17. With slight pressure pushing on the throttle cable towards the throttle linkage, tighten the throttle cable clamp (Fig. 441).

Fig 441 IMG-0590a

18. Secure the throttle cable to the engine bracket located behind the voltage regulator with a cable tie (Fig. 442).

Fig 442 IMG-0591a

19. Install the hydraulic pump belt around the engine pulley and the pump pulley (Fig. 443).

Fig 443 IMG-0592a

20. Connect the hydraulic pump idler spring to the pin on the idler arm, using a spring tool (Fig. 444).

Fig 444 IMG-0595a

21. Install the electric PTO clutch. Refer to “Electric PTO Clutch Installation” on page 7-36.

22. Install the rear guard assembly with the top strap, rib top, and the guards attached (Fig. 445).

Fig 445 IMG-0524a

23. Install the 2 bolts and nuts retaining the bottom of the rear guard assembly to the frame (Fig. 446).

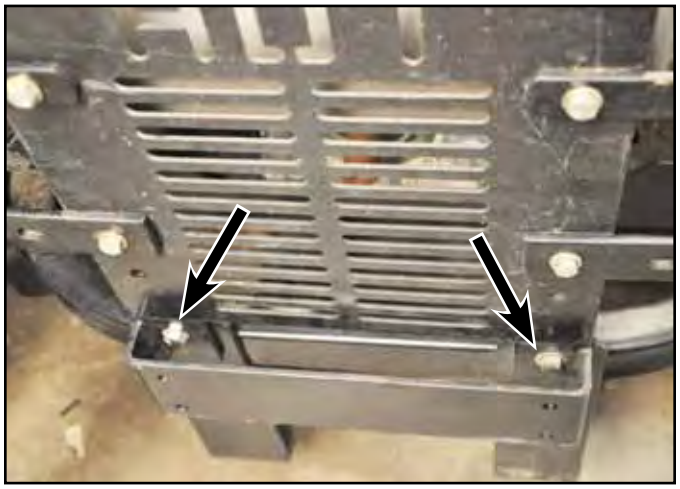

Fig 446 IMG-0522a

24. Install 2 bolts through the LH support bracket through the top strap and to the bracket for the relays. Install a nut and tighten (Fig. 447).

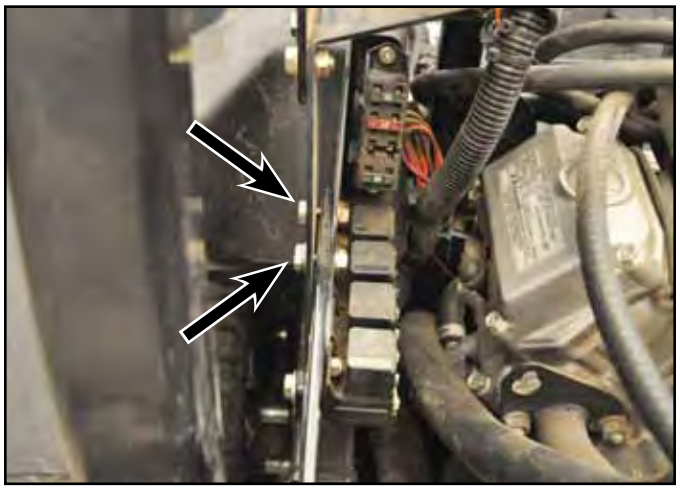

Fig 447 IMG-0602a

25. Install a bolt through LH support bracket through the strap guard and a nut (Fig. 448).

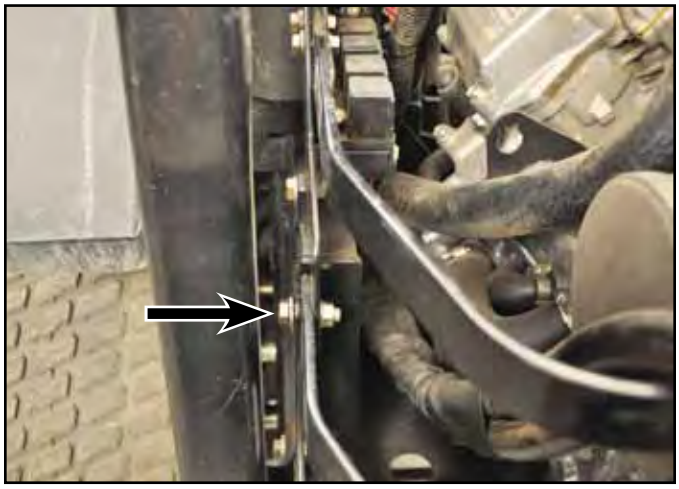

Fig 448 IMG-0603a

26. Install 2 bolts with washers through the RH bracket support assembly and the top rib and install a nut and tighten. Install a bolt with washer through the frame, strap guard, and the RH bracket support assembly. Install a nut and tighten (Fig. 449).

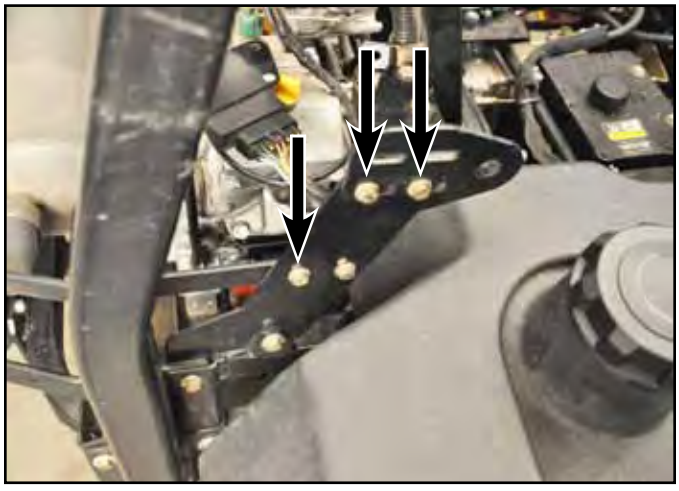

Fig 449 IMG-0517a

27. Install the air cleaner inlet hose through the R-clamp located on the LH radiator brace assembly (Fig. 450).

Fig 450 IMG-0604a

28. Install the air cleaner outlet hose to the engine and tighten the hose clamp (Fig. 451).

Fig 451 IMG-0605a

29. With the cooling fan located on the bottom radiator plate, connect the cooling fan electrical plug to the wiring harness (Fig. 452).

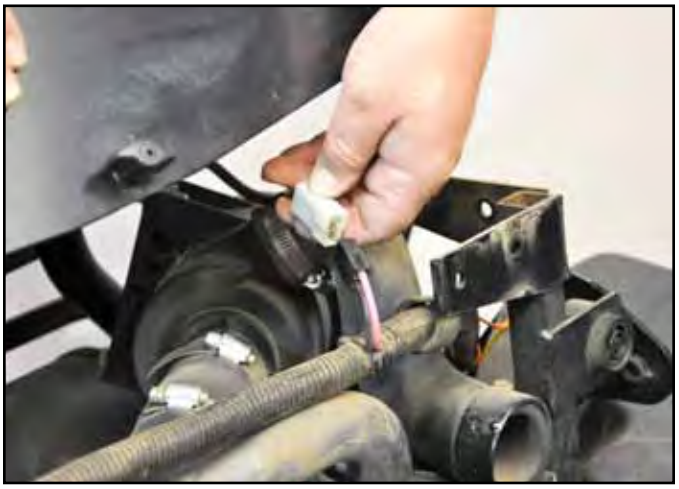

Fig 452 IMG-0512a

30. Install the bottom radiator plate on the right and left radiator brace assemblies (Fig. 453) and on the rear guard assembly (Fig. 454).

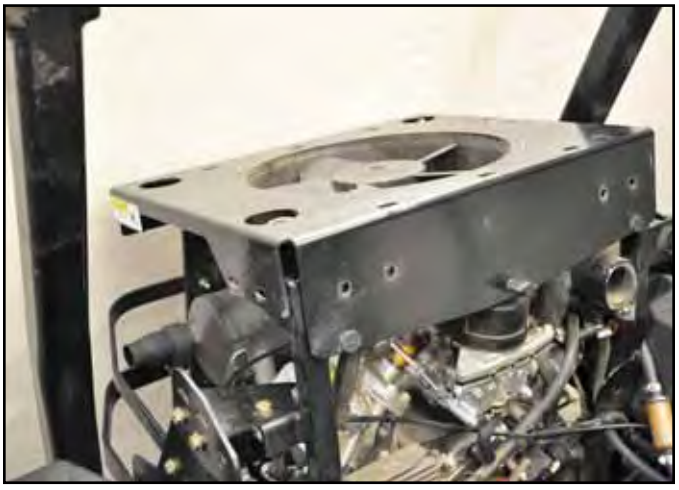

Fig 453 IMG-0607a

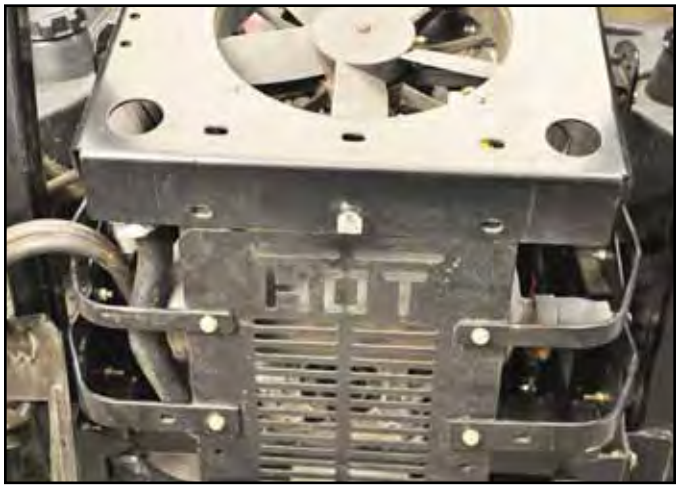

Fig 454 IMG-0608a

31. Install 2 bolts, washers and nuts retaining the rear guard assembly to the bottom radiator plate (Fig. 455).

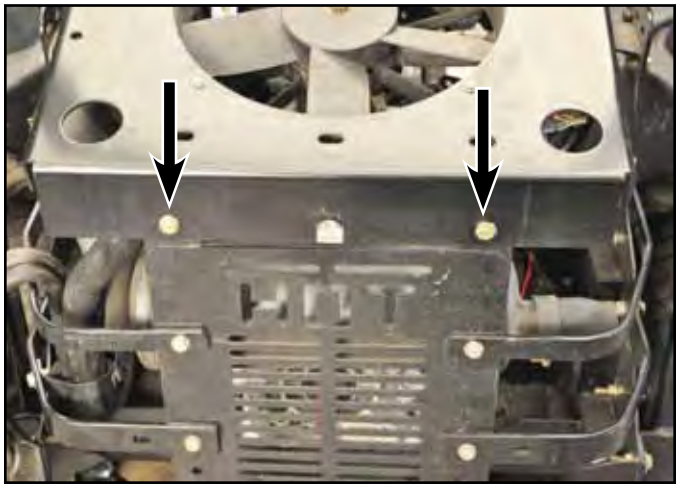

Fig 455 IMG-0511a

32. Install 2 bolts, washers, and nuts retaining the left side of the bottom radiator plate to the LH radiator brace assembly (Fig. 456).

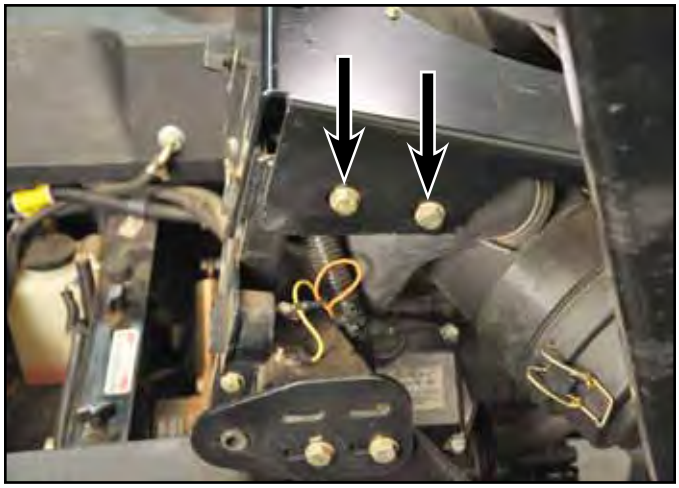

Fig 456 IMG-0510a

33. Install 2 bolts with washers through holes (A & B) on the bottom radiator plate, through the right and left radiator brace assemblies, through two R-clamps retaining the wiring harness. Then install 2 nuts and tighten (Fig. 457).

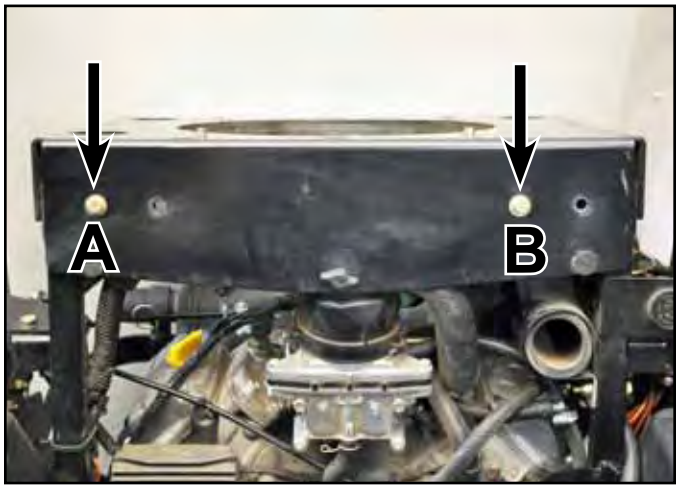

Fig 457 IMG-0609a

34. Install 2 bolts with washers through two holes on the bottom radiator plate, through the right and left radiator brace assemblies and install 2 nuts and tighten (Fig. 458).

Fig 458 IMG-0509a

35. Install 2 bolts with washers through the right side bottom radiator plate, through the right radiator brace assembly, then through the ECM mount plate and install a nut and tighten (Fig. 459).

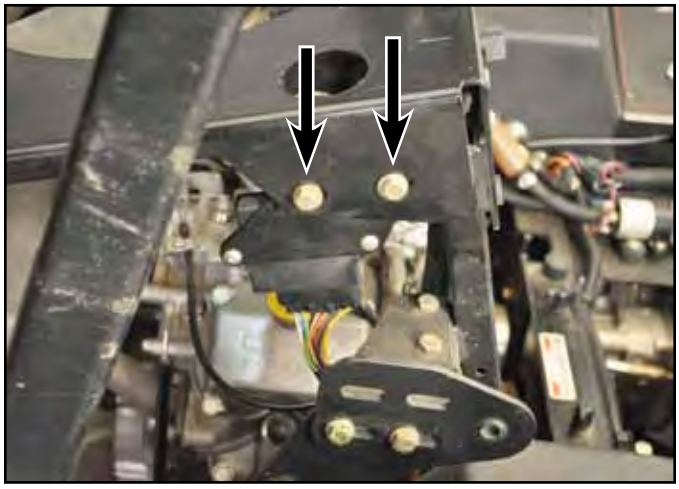

Fig 459 IMG-0507a

36. Install 2 bolts through the air cleaner bracket and then through the bottom radiator plate and install 2 nuts and tighten (Fig. 460).

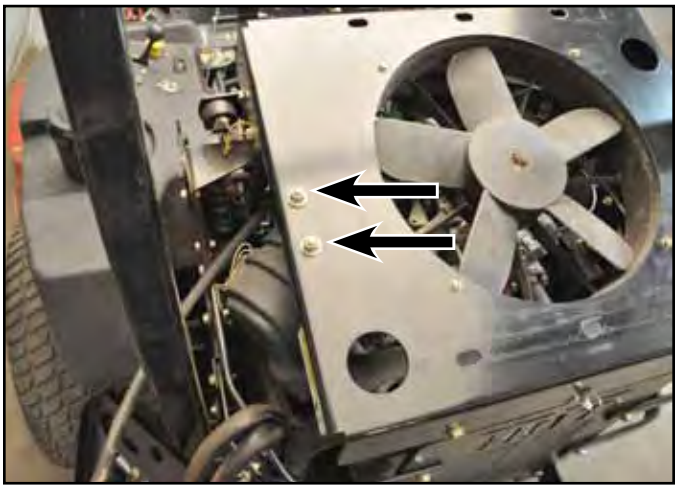

Fig 460 IMG-0505a

37. Install the radiator. Refer to “Radiator Installation” on page 5-22.

38. Install 1 bolt with washer and nut to secure the R-clamp around the two hydraulic hoses for the hydraulic oil cooler and the radiator hose to the strap guard (Fig. 461).

Fig 461 IMG-0618a

39. Install the hood assembly. Refer to “Hood Assembly Installation” on page 3-23.

40. Install the front engine panel (Fig. 462).

Fig 462 IMG-0303a

41. Install the battery negative cable to the battery.

42. Lower the seat.

43. Test operate the engine and all systems to ensure proper function.

Radiator Replacement

Radiator Removal

DANGER! Discharge of hot pressurized coolant or touching hot radiator and surrounding parts can cause severe burns.

- **Do not** remove radiator cap or open drain petcock when the engine is hot. Always allow the engine to cool at least 15 minutes or until the radiator cap is cool enough to touch without burning your hand before removing the radiator cap or opening drain petcock.
- **Do not** touch radiator and surrounding parts that are hot.

1. Park the machine on a level surface, disengage the PTO, turn the ignition switch OFF and remove the key.
2. Remove the front engine panel shield assembly (Fig. 463).

Fig 463 IMG-0303a

3. Raise the seat and remove the negative battery cable from the battery.
4. Raise the hood assembly (Fig. 464).

Fig 464 IMG-0465a

5. Place a drain pan under the lower right hand corner of the radiator.
6. Remove the radiator cap. Place a funnel below the radiator plug located on the lower right hand corner of the radiator. With a pair of pliers, open the radiator petcock to drain the radiator (Fig. 465).

Fig 465 IMG-0472a

7. Allow the coolant to drain from the radiator.

8. Turn the radiator petcock to the off position.

9. Remove the cable tie securing the overflow hose to the radiator cap barb (Fig. 466).

Fig 466 IMG-0473a

10. Slide the overflow hose from the barb on the radiator cap flange and pull the overflow hose out and away from the radiator (Fig. 467).

Fig 467 IMG-0476a

11. Remove the 6 bolts and washers retaining the top radiator plate to the radiator (Fig. 468).

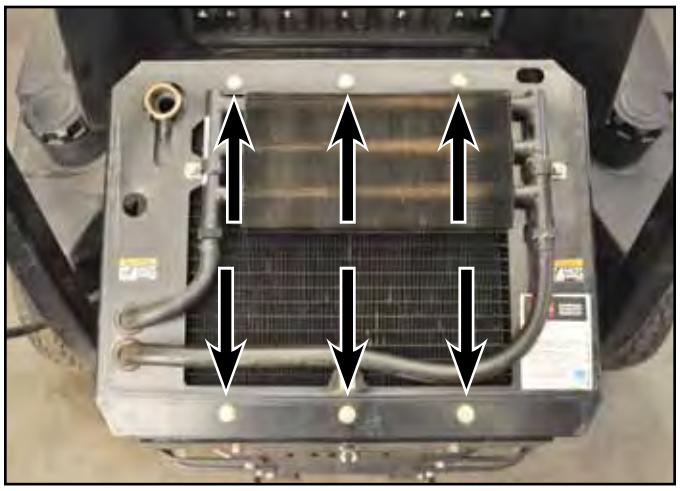

Fig 468 IMG-0477a

12. Remove the top radiator plate, along with the hydraulic oil cooler, and carefully lay it on the floor (Fig. 469).

Fig 469 IMG-0480a

13. Remove the 6 bolts and washers retaining the radiator to the bottom radiator plate; 3 are located in back of the radiator (Fig. 470) and 3 are located in the front.

Fig 470 IMG-0484a

14. Raise the front end of the radiator and loosen the hose clamp securing the right hand radiator hose to the flange on the upper right hand corner of the radiator (Fig. 471).

Fig 471 IMG-0485a

15. Loosen and remove the hose clamp securing the left hand radiator hose to the lower left hand corner of the radiator (Fig. 472).

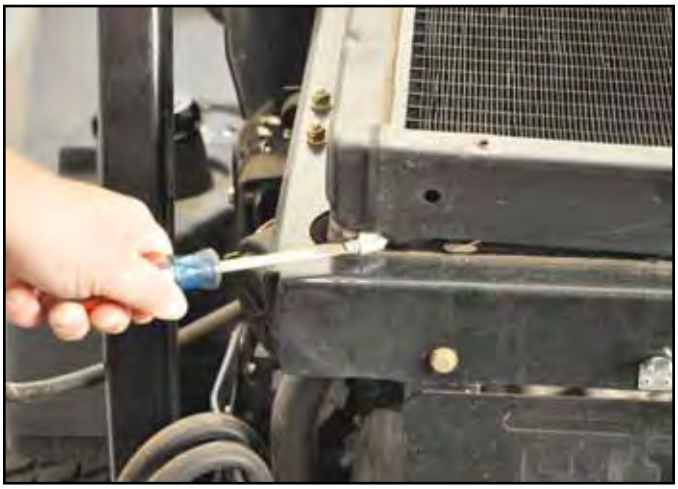

Fig 472 IMG-0486a

16. Place a drain pan under the left hand rear corner of the radiator.

17. Remove the left hand radiator hose from the lower left hand corner of the radiator. Drain the coolant into the drain pan (Fig. 473).

Fig 473 IMG-0490a

18. Remove the radiator from the bottom radiator plate (Fig. 474).

Fig 474 IMG-0504a

Radiator Installation

1. Install the radiator on the bottom radiator plate (Fig. 475).

Fig 475 IMG-0504a

2. Install the left hand radiator hose on the lower left hand corner of the radiator and tighten the hose clamp (Fig. 476).

Fig 476 IMG-0486a

3. Install the right hand radiator hose to the right hand corner of the radiator and tighten the hose clamp (Fig. 477).

Fig 477 IMG-0485a

4. Install 6 bolts with washers retaining the radiator to the bottom radiator plate; 3 are located in the back of the radiator (Fig. 478) and 3 are located in the front.

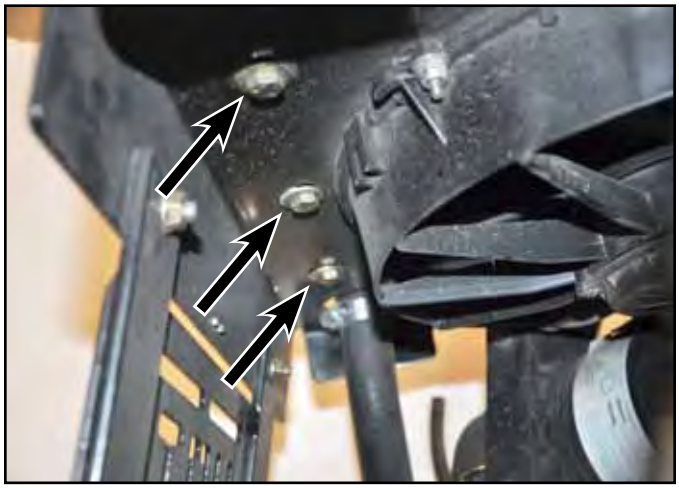

Fig 478 IMG-0484a

5. Install the top radiator plate, along with the hydraulic cooler, on top of the radiator (Fig. 479).

Fig 479 IMG-0611a

6. Install 6 bolts with washers retaining the top radiator plate to the radiator (Fig. 480).

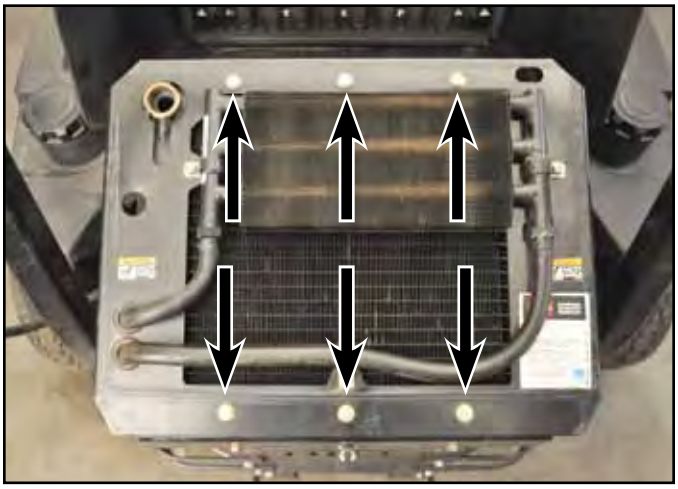

Fig 480 IMG-0477a

7. Slide the overflow hose through the slot located on the top radiator plate and onto the barb on the radiator cap flange (Fig. 481).

Fig 481 IMG-0612a

8. Install a cable tie securing the overflow hose to the radiator cap barb (Fig. 482).

Fig 482 IMG-0613a

9. With a pair of pliers, make sure the radiator petcock is closed (Fig. 483).

Fig 483 IMG-0472a

10. Fill the radiator with 50/50 mix of extended life antifreeze/Dec-Cool® and water.

Note: Cooling System capacity: 156 ounces (4.6 liters)

11. Install the radiator cap (Fig. 484).

Fig 484 IMG-0614a

12. Check the anti-freeze overflow bottle and make sure it is up to indicator line (Fig. 485).

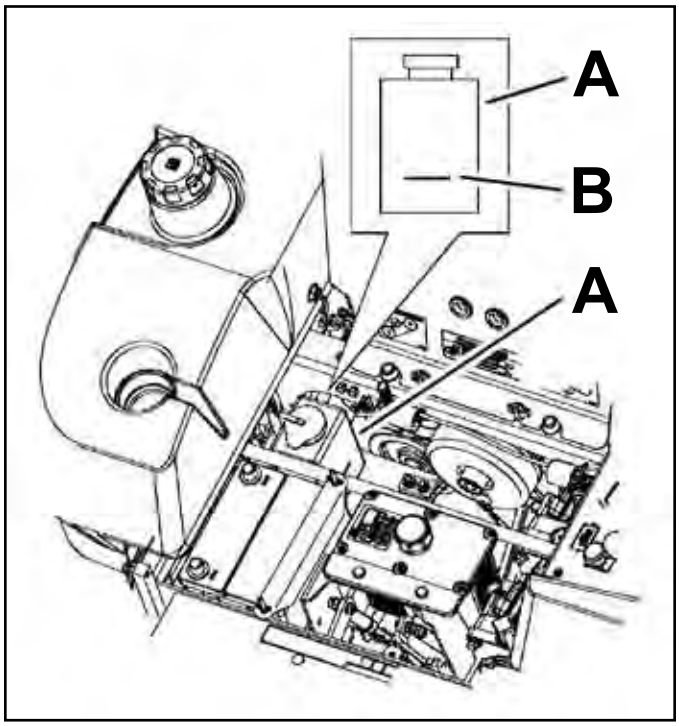

Fig 485 fig. 51 G001103

A. Coolant overflow bottle
B. Indicator line on side of overflow bottle

13. Lower the hood assembly (Fig. 486).

Fig 486 IMG-0616a

14. Install the negative battery cable to the battery and lower the seat.

15. Start the machine a check for any fluid leaks. Top off cooling system as needed.

Cooling Fan Replacement

Cooling Fan Removal

1. Remove the radiator. Refer to “Radiator Removal” on page 5-19.

2. Remove the 6 bolts, washers, nuts on the top of the rear guard assembly and the 2 bolts and nuts at the bottom of the rear guard assembly (Fig. 487).

Note: The 2 top bolts and the 2 bottom bolts are different lengths than the 4 center bolts.

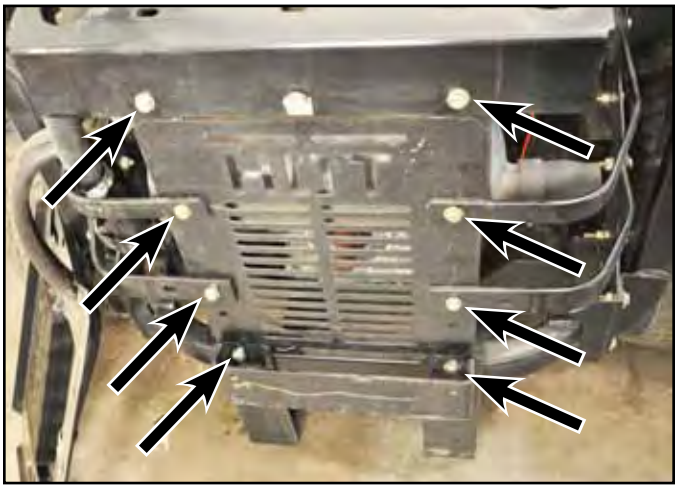

Fig 487 IMG-0491a

3. Remove the rear guard assembly from the unit (Fig. 488).

Fig 488 IMG-0496a

4. Remove the 4 bolts, washers and nuts retaining the fan assembly to the bottom radiator plate (Fig. 489).

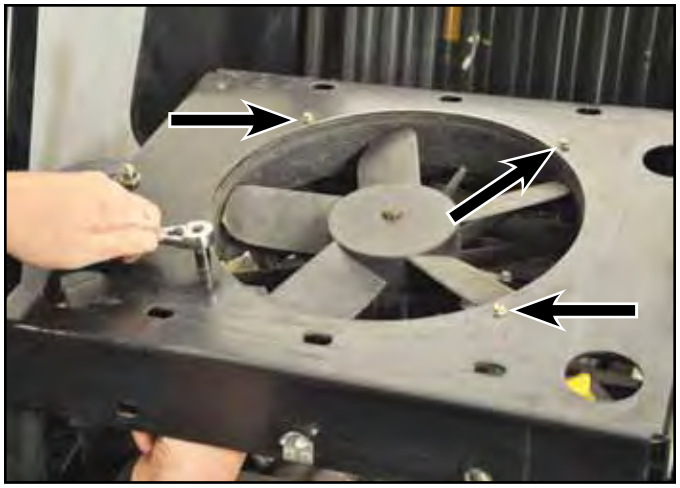

Fig 489 IMG-0497a

5. Lower the cooling fan and unplug the cooling fan connector from the harness connector (Fig. 490).

Fig 490 IMG-0499a

6. Remove the cooling fan from under the bottom radiator plate (Fig. 491).

Fig 491 IMG-0500a

Cooling Fan Installation

1. Slide the fan under the bottom radiator plate (Fig. 492).

Fig 492 IMG-0500a

2. Connect the cooling fan electrical connector to the wiring harness connector (Fig. 493).

Fig 493 IMG-0501a

3. Install the 4 bolts, washers and nuts retaining the fan assembly to the bottom radiator plate (Fig. 494). Tighten the bolts and nuts.

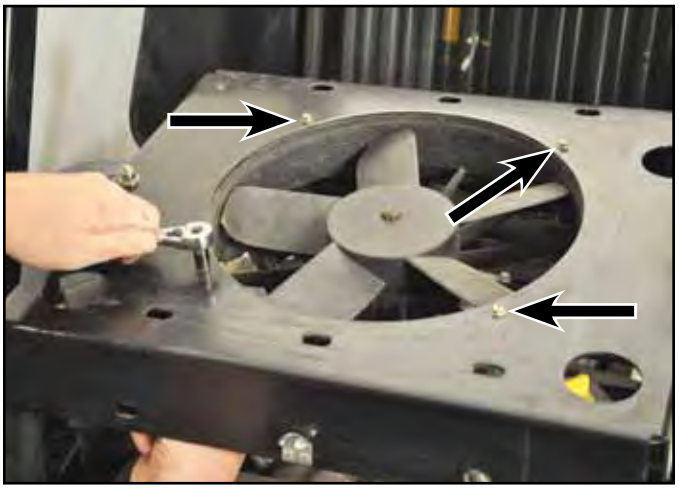

Fig 494 IMG-0497a

4. Install the rear guard assembly to the unit (Fig. 495).

Fig 495 IMG-0503a

5. Install 2 bolts, washers, and nuts on the top of the rear guard and the bottom radiator plate and then install 4 bolts, washer and nuts through the 4 guard straps and rear guard. Install 2 bolts and nuts through the bottom of the rear guard and the frame (Fig. 496).

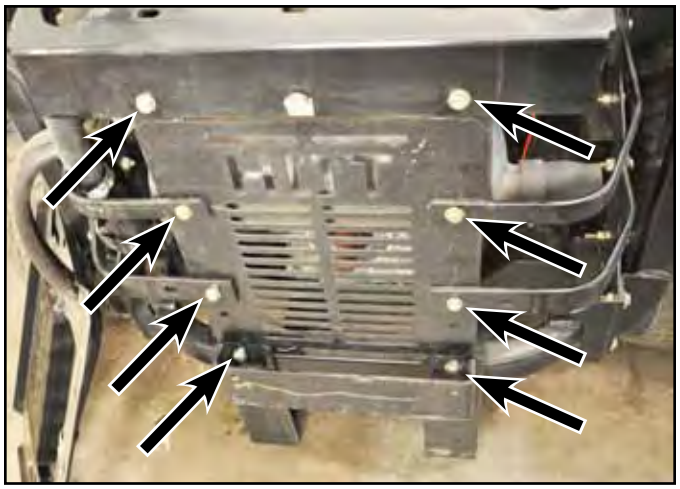

Fig 496 IMG-0491a

Fuel Pump Replacement

Fuel Pump Removal

1. Park the machine on a level surface, disengage the PTO, turn the ignition switch OFF and remove the key.
2. Raise the seat.
3. Remove the battery negative cable from the battery.
4. Turn the fuel valve to the OFF position (Fig. 497).

Fig 497 IMG-0619a

5. Remove the cable tie around the fuel pump wires and the wiring harness (Fig. 498).

Fig 498 IMG-0635a

6. Unplug the fuel pump from the wiring harness (Fig. 499).

Fig 499 IMG-0637a

7. Remove 2 bolts and nuts retaining the fuel pump to the frame (Fig. 500).

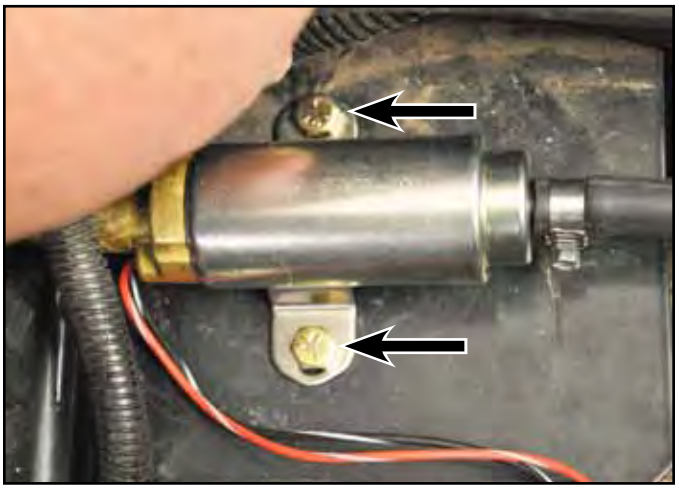

Fig 500 IMG-0639a

8. Loosen the hose clamp on the fuel line from the pump to the filter (Fig. 501). Remove the fuel line from the pump.

Fig 501 IMG-0641a

9. Loosen the hose clamp on the fuel line from the fuel pump to the engine (Fig. 502). Remove the fuel line from the pump.

Fig 502 IMG-0642a

10. Remove the fuel pump (Fig. 503).

Fig 503 IMG-0643a

Fuel Pump Installation

1. Install hose clamp around the fuel line from the engine to the fuel pump and tighten clamp (Fig. 504).

Fig 504 IMG-0642a

2. Install hose clamp on the fuel line from the fuel filter to the fuel pump and tighten the clamp (Fig. 505).

Fig 505 IMG-0641a

3. Install two bolts and nuts and mount the fuel pump to the frame (Fig. 506).

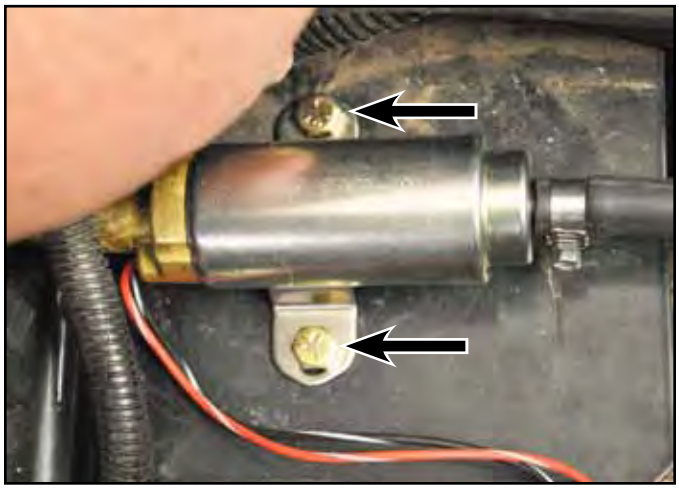

Fig 506 IMG-0639a

4. Plug the fuel pump into the wiring harness (Fig. 507).

Fig 507 IMG-0637a

5

5 Install a cable tie around fuel pump wires and the wiring harness (Fig. 508).

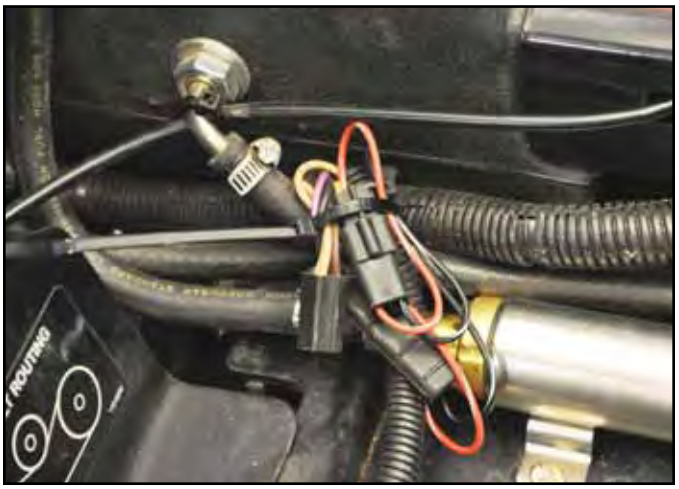

Fig 508 IMG-0645a

6. Turn the fuel valve to the right or left fuel tank (Fig. 509).

Fig 509 IMG-0619a

7. Install the battery negative cable to the battery.

8. Lower the seat.

Checking the Radiator Coolant

Note: Do not open the radiator cap. Doing this may introduce air into the cooling system.

1. Position the machine on a level surface, stop the engine, and set the parking brake.

2. Raise the seat.

3. With the engine cool, check the overflow bottle level. The fluid needs to be up to the indicator line (bump) on the outside of the overflow bottle (Fig. 510).

4. If the coolant level is low, add a 50/50 mix of extended life antifreeze/Dex-Cool® and water to the overflow bottle. Fill the overflow bottle to the indicator line on the bottle (Fig. 510).

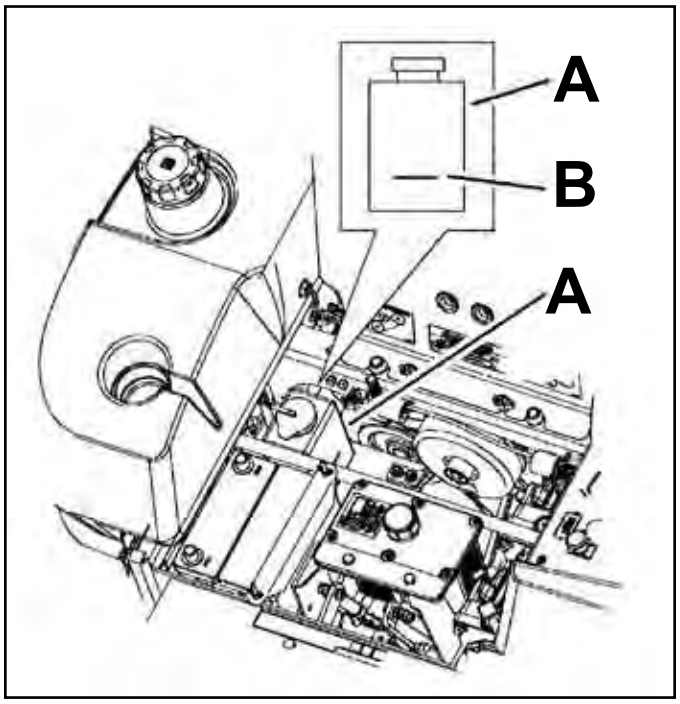

Fig 510 fig. 51 G001103

A. Coolant overflow bottle

B. Indicator line on side of overflow bottle

General

Note: Interactive Electrical Troubleshooting DVD, Form No. 492-9171 is also available.

Relays

There are four relays in the Z580 and Z589 liquid cooled Kawasaki DFI.

Relays have 4 functions in the Z580 and Z590 Liquid Cooled models:

- Start Relay
- Kill Relay
- Fan Relay
- Fuel Pump Relay

Purpose

1. **Start Relay:** If all conditions of the safety system are met, the start relay will activate allowing current to flow to the starter solenoid when the ignition is in the “start” position.

2. **Kill Relay:** If any of the conditions of the safety circuit are not met during operation the kill relay is de-energized which will ground the ignition coil. Also, when turning the ignition switch to the “OFF” position the kill relay will de-energized which will ground the ignition coil.

3. **Fan Relay:** Activates when the ignition switch is in the “RUN” position, energizing the cooling fan.

4. **Fuel Pump Relay:** Activates when the ignition switch is in the “RUN” position, providing 12VDC to the fuel pump.

Location

The 4 relays are located to the left of the engine attached to the top support strap (Fig. 511).

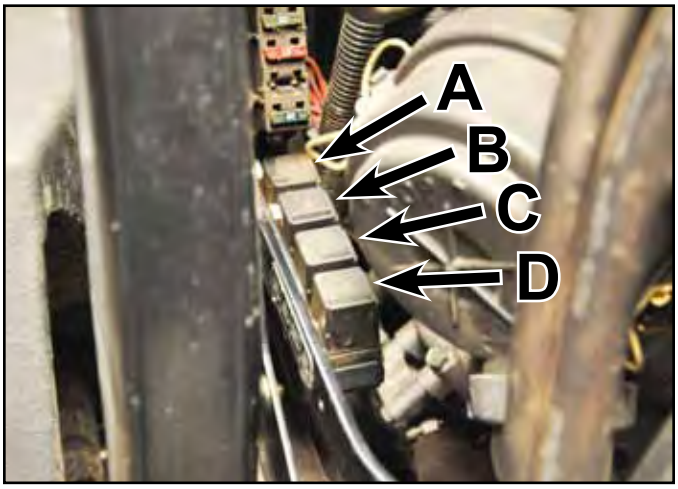

Fig 511 IMG-0647a

A. Fuel Pump Relay
B. Kill Relay
C. Start Relay
D. Fan Relay

6

How It Works

A relay is an electrically actuated switch.

1. **Coil:** Terminals 85 and 86 are connected to a coil. Applying 12 volts to these terminals energizes the coil turning it into an electromagnet.

2. **Switch:** Terminals 30, 87 and 87a are actually part of a single pole, double throw (SPDT) switch. Terminal 30 is the common lead. The switch is spring loaded so that 30 and 87a are connected when the coil is not energized. When the coil is energized, the switch is “thrown” and 30 and 87 are connected (Fig. 512).

Fig 512 DSC-2517a

Testing

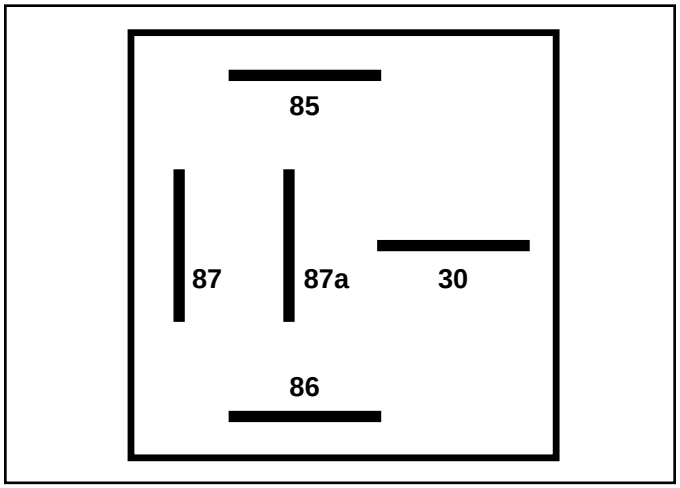

Fig 513 relay pin diagram

1. Disconnect the relay from the harness.

2. Verify the coil resistance between terminals 85 and 86 with a multimeter (ohms setting). Resistance should be from 70 to 90 ohms. There should be continuity between terminals 87a and 30.

3. Connect multimeter (ohms setting) leads to relay terminals 30 and 87. Ground terminal 86 and apply +12 VDC to 85. The relay should make and break continuity between terminals 30 and 87 when 12 VDC is applied and removed from terminal 85.

4. Connect multimeter (ohms setting) leads to relay terminals 30 and 87a. Apply +12 VDC to terminal 85. With terminal 86 still grounded, the relay should break and make continuity between terminals 30 and 87a as 12 VDC is applied and removed from terminal.

5. Disconnect voltage and multimeter leads from relay terminals (Fig. 514).

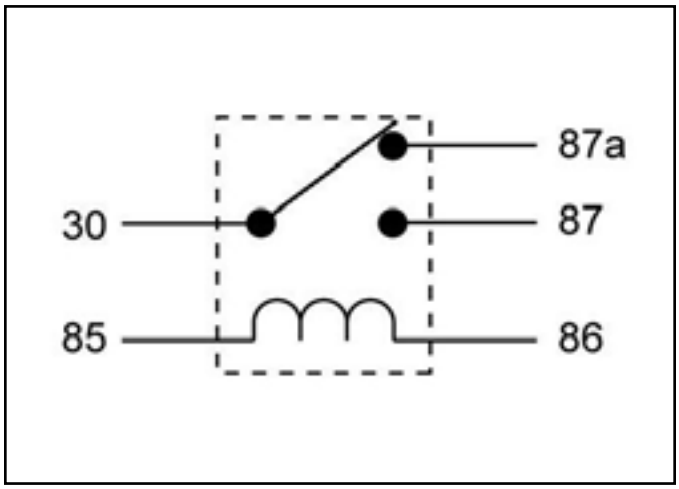

Fig 514 xl relay

PTO Switch

Purpose

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

Location

The PTO switch is located on the control panel, on the left side of the operator (Fig. 515).

Fig 515 IMG-0648a

How It Works

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

Testing

1. Disengage the PTO, set the parking brake, and turn the ignition to OFF and remove the key.
2. Remove the 4 screws holding the control panel to the fuel tank.
3. Disconnect the wiring harness from the PTO switch.
4. Press in the locking tabs, on each side of the switch, and pull the switch out of the control panel.
5. Verify that there is continuity between the appropriate terminals in the ON and OFF positions (Fig. 516).

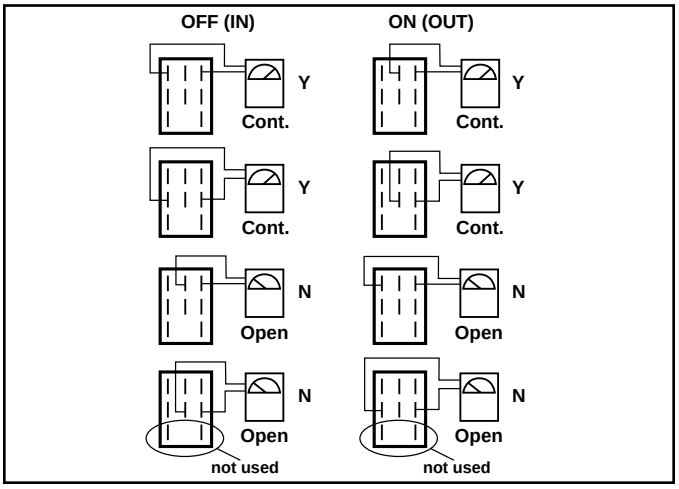

Fig 516 PTO switch test

6. Replace the switch if your test results do not correspond with those given in Fig. PTO switch test.
7. Mount the PTO switch back into the control panel and reinstall the wiring harness (Fig. 517).

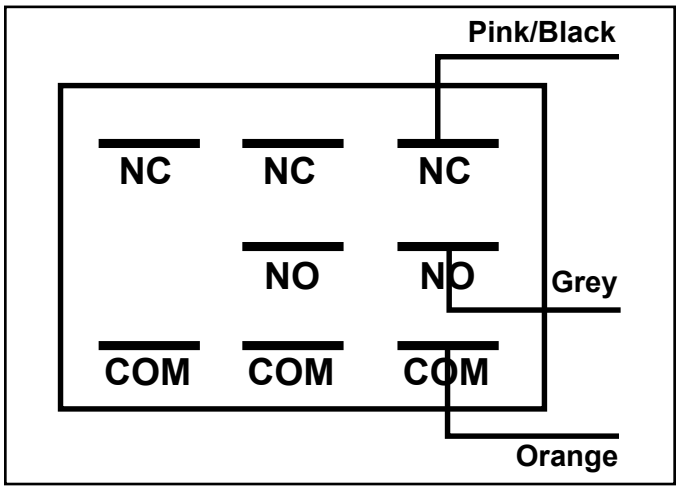

Fig 517 PTO Clutch switch b

Ignition Switch

Purpose

The ignition switch provides the proper switching for the starter, accessories, and safety circuits.

Location

The ignition switch is located on the control panel, to the left side of the operator (Fig. 518).

Fig 518 IMG-0648a

How It Works

Detents inside the switch give 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. 519).

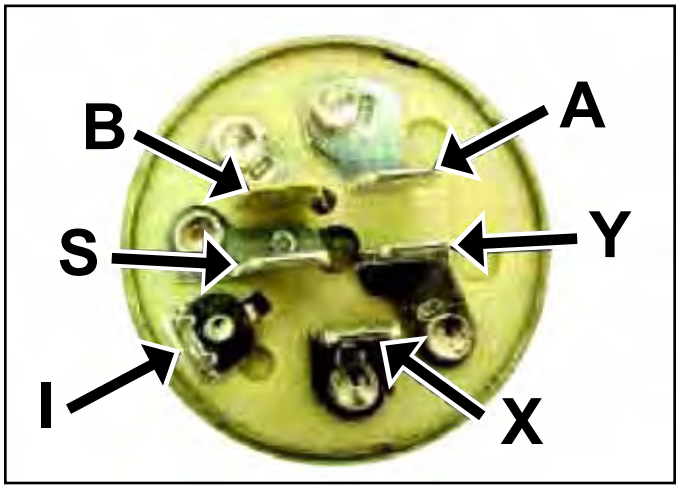

Fig 519 mvc-166a

Ignition Switch Wiring Connections
B = Battery voltage “in”
S = Starting Circuit
I = Safety Circuit, Gauges, and Start Circuit
A = Alternator/Charge Circuit
Y = Safety and Start Circuit
X = Safety/Start/Delay Module

Testing

1. Disconnect the switch from the wiring harness.

2. Verify that continuity exists between the terminals listed for the switch position. Verify that there is NO continuity between terminals not listed for the switch position.

OFF	No continuity between terminals
RUN	Continuity - B I A X Y
START	Continuity - B I S

Neutral Safety Switch

Purpose

Used to ensure the motion control handles are in neutral to start the unit. It is actuated by moving the motion control handles to the neutral position (handles outward).

Location

To gain access to the neutral safety switches, remove the front storage pocket. There are 2 neutral switches. One for the right motion control handle and one for the left motion control handle (Fig. 520).

Fig 520 PICT-4139a

How It Works

This single pole plunger (normally open) type switch has two terminals. When the motion control handles are in the neutral position (handles in the out position), it pushes on the plunger, closing the contact and connecting the terminals (Fig. 521).

Fig 521 DSC-2527a

Testing

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

Parking Brake Switch

Purpose

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

Location

The park brake switch is located on the left side, below the left motion control handle (Fig. 522).

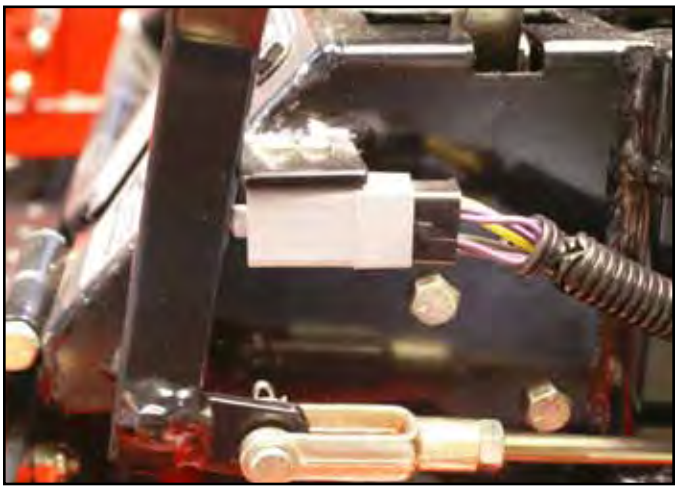

Fig 522 PICT-4141

How It Works

In the start position it is used to ensure the park brake is in the ON position. At the same time it allows current to flow through for safety circuit. When the park brake is released in the OFF position it bypasses both neutral switches, as long as the operator is in the seat to maintain current for the safety circuit (Fig. 523).

Fig 523 CLR DSC-2528

Testing

1. Disconnect the switch from the wiring harness.

The park brake switch is a double pole switch. When the park brake is in the ON position, a pair of closed terminals is part of the starting safety interlock circuit. When the brake is released after starting, the other pair of terminals closes, bypassing the neutral switches and applying power to the seat switch circuit.

2. Using a multimeter, follow the procedures listed below (Fig. 524).

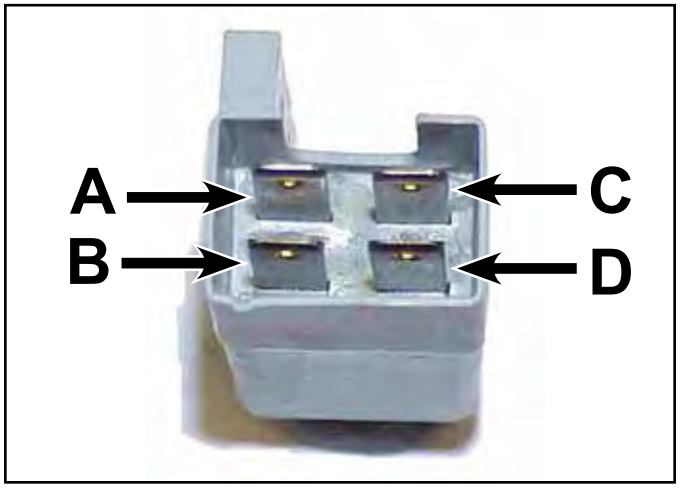

Fig 524 rev brake switch

Plunger Not Depressed	Plunger Depressed
A/B Terminals - Closed Circuit - Continuity	A/B Terminals - Open Circuit - No Continuity
C/D Terminals - Open Circuit - Not Continuity	C/D Terminals - Closed Circuit - Continuity

Seat Switch

Purpose

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

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

Location

The seat switch is located under the seat in the rear right hand corner of the compartment (Fig. 525). If the machine is equipped with the optional deluxe seat, the seat switch is mounted under the seat.

Fig 525 PICT-4144a

How It Works

When the seat is vacated, the switch is open and there should be NO continuity between the two terminals. When the seat is occupied, the switch closes and there should be continuity between the two terminals (Fig. 526).

Fig 526 PICT-4146a

Testing

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

Delay Module

Purpose

When operating the unit on rough terrain and the operator comes off the seat, the seat delay module will temporarily delay the engine shutting down, preventing erratic engine operation.

Location

The seat delay module is located under the seat assembly behind the storage pocket (Fig. 527).

Fig 527 IMG-0662a

How It Works

The seat delay module circuit board is made up of several different electrical components, such as a transient voltage suppressor, capacitor, transistors, carbon film resistors, diodes and a relay. These all work together to supply seat switch temporary voltage to the circuit to keep the engine running in case of short term voltage interruption (Fig. 528).

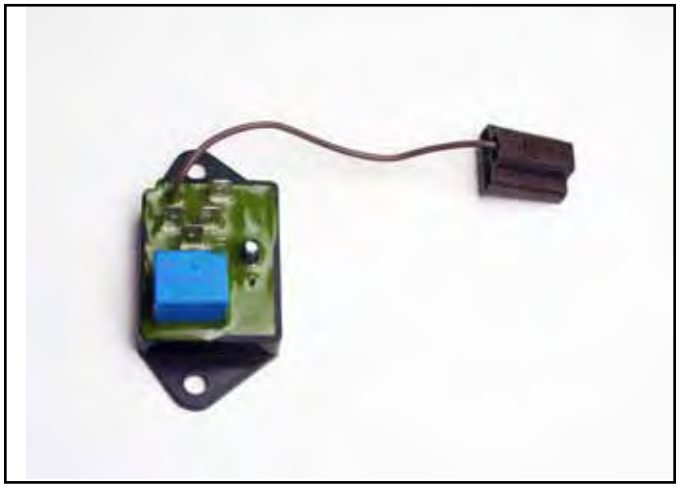

Fig 528 DSC-2532a

Testing

1. Raise the seat and disconnect the seat switch. Install a jumper wire in place of the seat switch (Fig. 529).

Fig 529 PICT-4156a

2. Remove the 4 bolts to the control panel and raise the panel.

3. Connect a VOM positive lead to the violet wire on the module (Fig. 530). Connect the negative lead to the battery negative terminal.

Fig 530 PICT-4153a

Follow the procedure below to test the delay module function.

1. Disengage the parking brake.

2. Pull the right and left motion control levers out of the neutral position.

3. Turn the ignition key to the RUN position.

4. The meter should read approximately 12 volts DC.

5. Disconnect one of the jumper wire leads. The meter should hold around 12 volts and then read 0 volts DC after approximately 1 to 3 seconds.

6. If you do not get 12 volts DC at the violet wire when turning the ignition switch to the RUN position, verify the following:

   - 12 VDC at the orange wire terminal.
   - 12 VDC at the brown wire terminal.
   - 0 VDC at the black wire terminal.

If all these conditions are met, replace the seat delay module.

High Temperature Audible Alarm (Solid Tone)

Purpose

This machine has an audible alarm that alerts the user to turn off the engine or engine damage can occur from overheating.

Location

The audible alarm is located behind the seal to the left of the front engine access panel (Fig. 531).

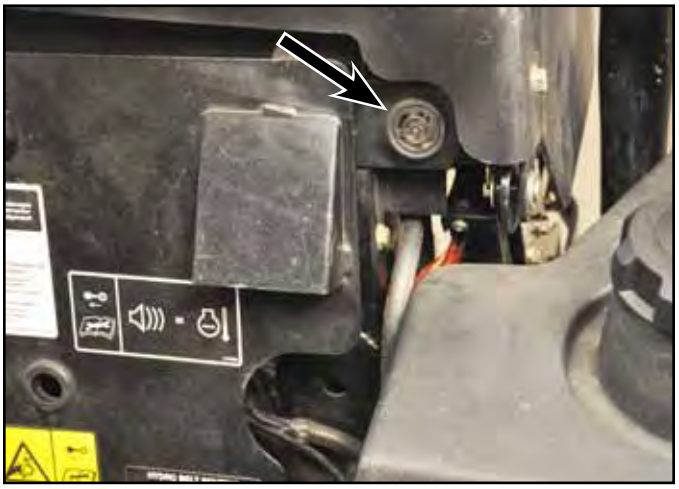

Fig 531 IMG-0665a

How It Works

A continuous tone will sound when the engine temperature switch connects to ground as the engine reaches a certain temperature (Fig. 532).

Fig 532 DSC-2538a

Testing

Connect a positive lead from a 12 volt battery to the + terminal on the back of the audible alarm. Connect the negative lead to the S terminal on the back of the audible alarm. The alarm should emit a continuous tone.

Temperature Sender

Purpose

The temperature sender is a temperature-dependent variable resistor. When the coolant reaches an excessive operating temperature, the switch will close and complete a circuit and will activate the audible alarm and the high temperature light on the control panel.

Location

The temperature sender is located on the left side of the engine on the intake manifold between the air cleaner and muffler (Fig. 533).

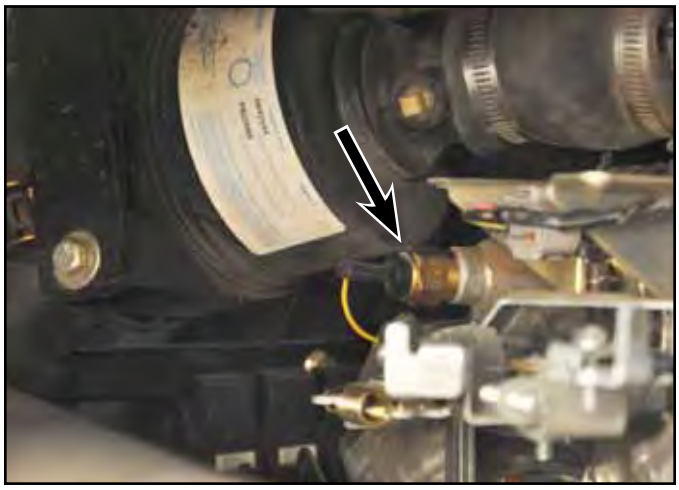

Fig 533 IMG-0681a

How It Works

When the water temperature reaches an excessive operating temperature, the switch will close internally and ground the high temperature audible alarm and the light on the control panel (Fig. 534).

Fig 534 IMG-0680a

Testing

It is not practical to test the switch in a shop environment. The temperature switch closes between 226° to 237° F (108° to 114°C).

Oil Pressure Switch

Purpose

The oil pressure switch completes the circuit that activates the hour meter and the radiator fan relay.

Location

The oil pressure switch is located on the lower left side of the engine block, next to the engine oil filter (Fig. 535).

Fig 535 IMG-0683a

How It Works

When the engine oil pressure builds, the switch closes to complete the circuit for both the hour meter and the cooling fan relay (Fig. 536).

Fig 536 IMG-0690a

Testing

The switch can be tested with an ohmmeter. There should be no continuity between the wire terminal and ground with the engine not running. There should be continuity between the wire terminal and ground when the engine is running.

Engine High Temperature & Malfunction Indicator Light Cluster

Purpose

There are two purposes for this light cluster:

1. In addition to the high temperature audible alarm, there is an accompanying light for visual representation of high temperature. It is a red light.

2. If the malfunction indicator light illuminates, during operation, the electronic control unit (ECU) has detected a problem or fault in the direct fuel injection (DFI) system.

Location

The high temperature and malfunction indicator light cluster is located on the control panel left side of the operator position (Fig. 537).

Fig 537 IMG-0648a

How It Works

The engine high temperature light is connected in parallel with the high temperature audible alarm. The light gives a visual indicator that the engine has reached a high temperature.

The malfunction indicator light illuminates when it has detected a problem or fault in the engine direct fuel injection system (Fig. 538).

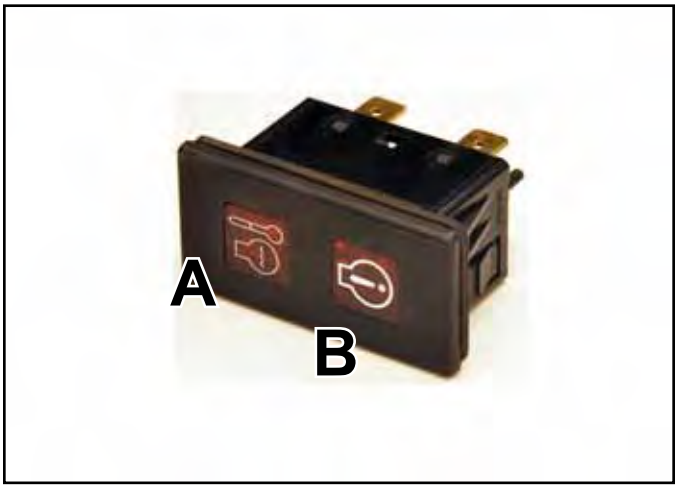

Fig 538 IMG-0672a

A. High Temperature light

B. Malfunction Indicator light

6

Testing

The indicator lights can be tested with an ohmmeter. There should be continuity between terminals, A - B and C - D (Fig. 539).

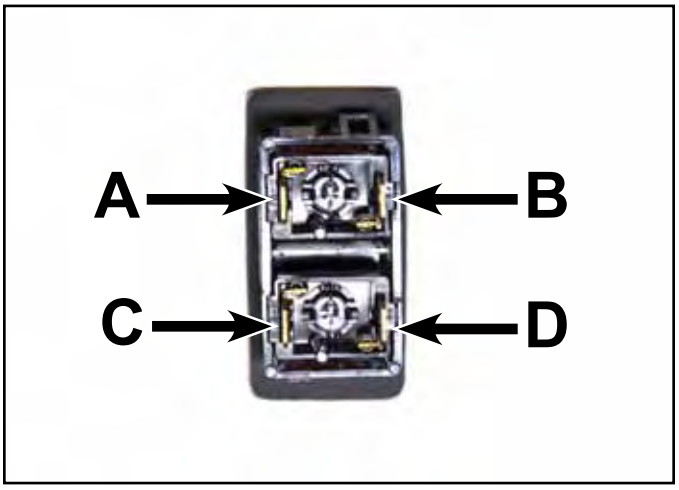

Fig 539 IMG-0679a

Hour Meter

Purpose

The hour meter keeps track of the actual engine running hours.

Location

The hour meter is positioned on the control panel which is located on the left side of the operator position (Fig. 540).

Fig 540 IMG-0648a

How It Works

The hour meter is made up of an electric “winder” and a mechanical clock movement. When power is applied, a coil is energized to wind the movement. The movement unwinds in about 2 seconds. As it finishes its rotation, it re-energizes the coil so that the cycle can start over (Fig. 541).

Fig 541 DSC-2560a

Testing

Verify that 12 volts DC is present across the two terminals when the engine is running. If there is no continuity, replace the hour meter. The meter is a permanently sealed unit and is not repairable.

Electric PTO Clutch

Purpose

The electric clutch controls the engagement and disengagement of the Power Take-off (PTO) pulley.

Location

The electric PTO clutch is located on the flywheel end of the crankshaft (Fig. 542).

Fig 542 PICT-4187a

How It Works

The PTO clutch is composed of three major components; the field, the clutch plate, and the friction plate. The clutch plate always turns with the engine. The field is a coil of wire wound around an iron core, which acts like an electromagnet when power is applied. The friction plate is the only piece that can slide inward and outward on the crankshaft axis. It is spring loaded away from contact with the clutch plate. When the clutch is not energized, the clutch plate rests against the brake material opposite the clutch plate. When energized the friction plate is drawn into the clutch plate magnetically and the two rotate as one component.

Testing

1. Disengage the PTO, set the parking brake, turn the ignition to the “off” position and remove the ignition key. Disconnect negative battery cable.

2. Disconnect the clutch harness from the main harness.

3. Set the multimeter or volt/ohm meter to check resistance (ohms).

4. Connect the meter lead wires to the clutch wires as shown (Fig. 543).

Fig 543 IMG_8116a

5. The meter should read:
   Warner clutch: 1.0 – 2.7 ohms,
   Ogura clutch: 2.4 ohms

If the reading is above or below these readings, the field has failed and needs to be replaced. If the reading falls within the specified resistance, measure clutch coil continuity (see next).

Clutch Coil Continuity Test

This test can be performed the same way on both the Warner and Orgura clutches.

1. Disengage PTO.

2. Raise the seat and disconnect the negative battery cable from the battery.

3. Unplug the harness connector from the clutch (Fig. 544).

Fig 544 PICT-3933a

4. Using a continuity tester, touch one tester lead to one of the clutch terminals and the other lead to the clutch housing.

5. If the tester shows a resistance reading, the field has failed and needs to be replaced.

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Mower Belt Replacement

1. Disengage the PTO, move the motion control levers to the neutral locked position and set the parking brake.

2. Stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.

3. Raise the floor pan (Fig. 545).

Fig 545 PICT-4011a

4. Remove the right hand and left hand belt covers (Fig. 546).

Fig 546 PICT-4012a

5. Using a spring tool (Toro p/n: 92-5771), remove the mower deck belt idler spring (Fig. 547).

Fig 547 PICT-4013a

7

6. Remove the belt guide from the idler arm pulley (Fig. 548).

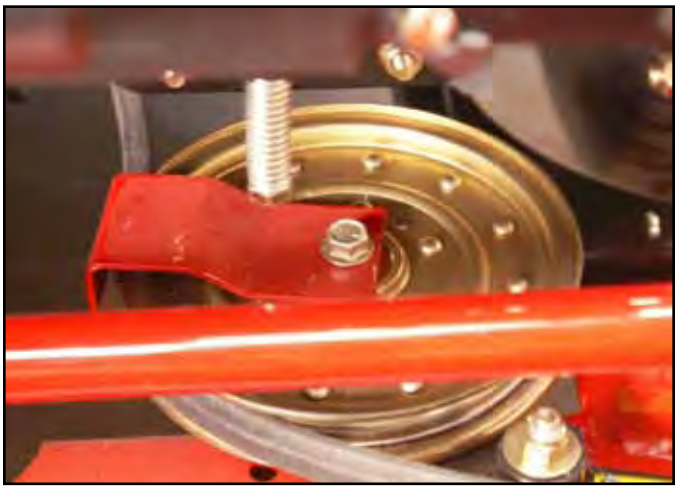

Fig 548 PICT-4060a

7. Remove the existing belt (Fig. 549).

Fig 549 PICT-4044a

8. Install a new belt around the mower pulleys and the gearbox pulley under the engine. Refer to the belt routing decal (Fig. 550).

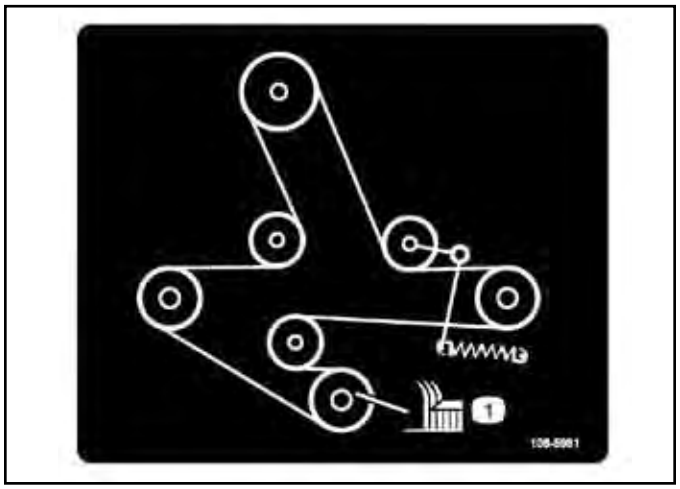

Fig 550 fig. 108-5981

9. Install the belt guide on the spring loaded idler at a 45 degree angle as shown (Fig. 551):

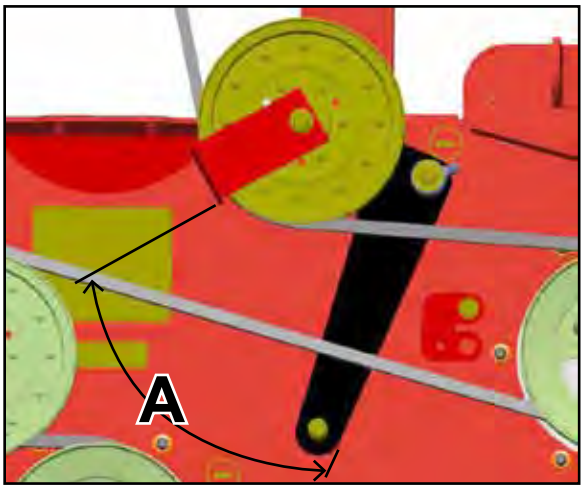

Fig 551 belt guide position_a

A. 45º

10. Install mower deck belt idler spring (Fig. 552).

Fig 552 PICT-4013a

11. Install the right hand and left hand belt covers (Fig. 553).

Fig 553 PICT-4012a

12. Lower the floor pan.

13. 72” mower decks only: Adjust Mower Deck Belt tension. Refer to “72” Mower Deck Belt Tension Adjustment” on page 7-62.

Mower Deck Removal

1. Park the machine on a level surface, disengage the PTO, turn the ignition off and remove the key.
2. Raise the seat.
3. Remove the negative battery cable from the battery.
4. Raise the floor pan assembly (Fig. 554).

Fig 554 PICT-4011a

5. Remove the left and right mower deck belt covers (Fig. 555).

Fig 555 PICT-4012a

6. Using a spring tool (Toro p/n: 92-5771), remove the mower deck idler spring (Fig. 556).

Fig 556 PICT-4013a

7. Remove the mower deck belt from the gearbox deck drive pulley (Fig. 557).

Fig 557 IMG-0693a

8. Place the mower deck in the transport position. Position wood blocks under each corner of the mower deck. Lower the mower deck onto the blocks to remove tension from the deck lift chains (Fig. 558).

Fig 558 PICT-4019a

9. Push the deck lift handle to the lowest height-of-cut position to overcome the tension of the lift assist springs. Insert the hitch pin above the deck lift handle to lock the handle in the down position (Fig. 559).

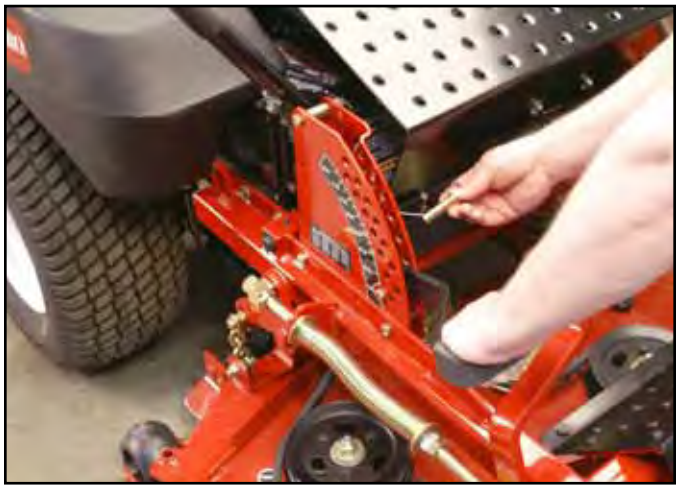

Fig 559 PICT-4021a

10. Remove the outer nut from each of the 4 deck chain assemblies (Fig. 560).

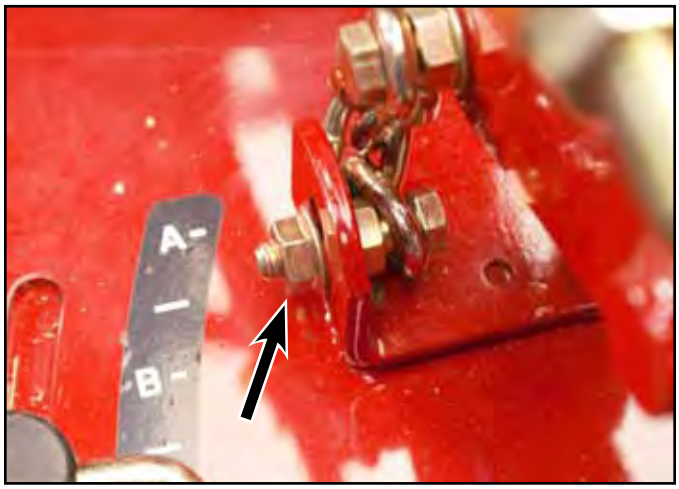

Fig 560 PICT-4023a

11. Raise the deck lift lever to the transport position (Fig. 561).

Fig 561 PICT-4029a

12. Remove the bolt and nut securing the strut to the mower deck (Fig. 562).

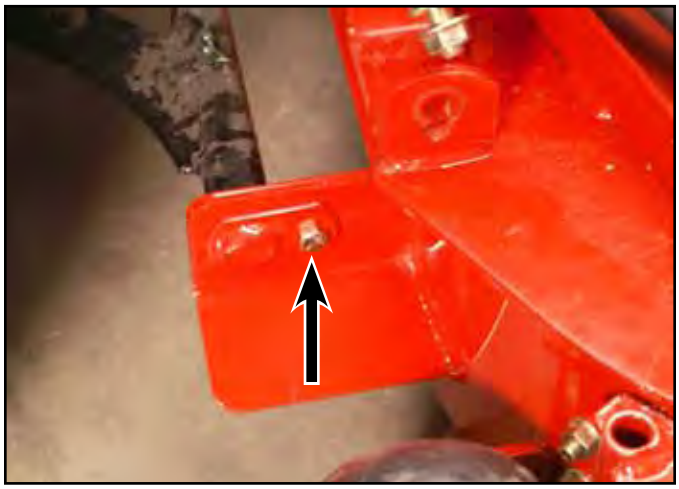

Fig 562 PICT-4036a

13. Repeat the above step to remove the bolt and nut securing the opposite strut from the mower deck.

14. Pull both strut pins to free the mower deck from the struts (Fig. 563).

Fig 563 PICT-4038a

15. Tie the struts up, out of the way of the mower deck.

16. Remove the 4 wood blocks from each corner of the mower deck.

17. Turn the right front castor wheel so the castor fork is angled forward to allow more clearance for sliding the mower deck out (Fig. 564).

Fig 564 PICT-4041a

18. Slide the mower deck out from under the right side of the frame (Fig. 565).

Fig 565 PICT-4042a

Mower Deck Installation

1. Turn the right front wheel so the castor fork is angled forward to allow more clearance for sliding the mower under the frame (Fig. 566).

Fig 566 PICT-4041a

2. Slide the mower deck under the right side of the frame (Fig. 567).

Fig 567 PICT-4043a

3. Slide a wood block under each corner of the mower deck.

4. Push the deck lift handle to the lowest height-of-cut position to overcome the tension of the lift assist springs. Insert the hitch pin above the deck lift handle to lock the handle in the down position (Fig. 568).

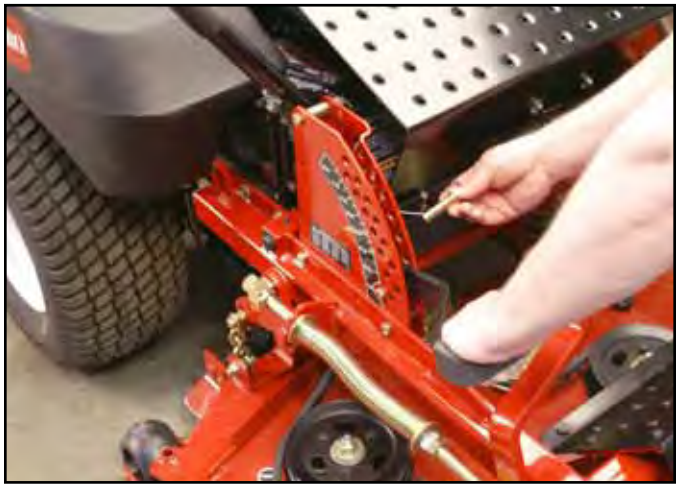

Fig 568 PICT-4021a

5. Insert the deck chain assembly bolt into the chain brackets on the mower deck. The front chain bolts are installed in the bottom of the bracket slot and the rear chain bolts are installed in the top of the bracket slot. Install a nut onto each of the chain bolts (Fig. 569).

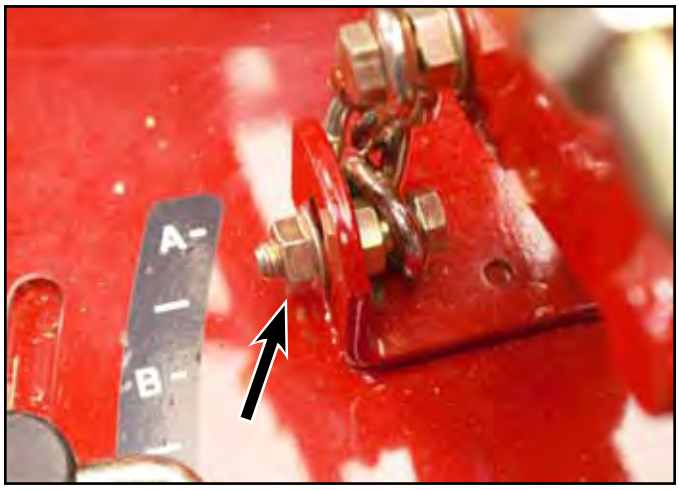

Fig 569 PICT-4023a

6. Place the mower deck in the transport position. Remove the wood blocks from under each corner of the mower deck.

7. Align each strut with the mower deck strut brackets and install the strut pins (Fig. 570).

Fig 570 PICT-4038a

8. Install a bolt and nut to secure each strut pin to the mower deck (Fig. 571).

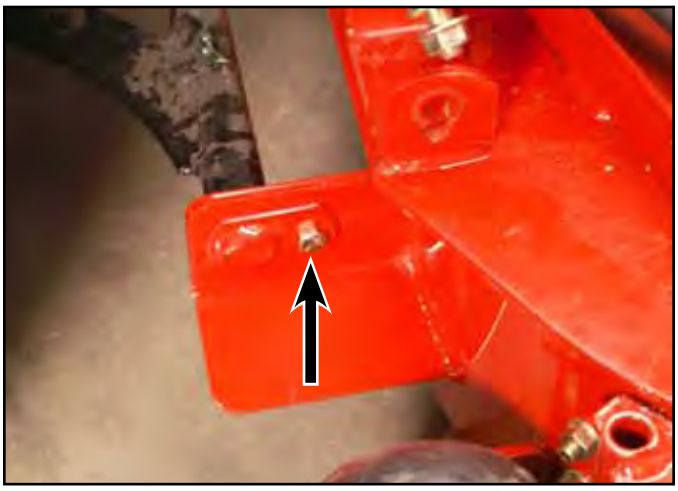

Fig 571 PICT-4036a

7

9. Route the mower deck belt around the mower deck pulleys and gearbox deck drive pulley. Refer to the belt routing decal (Fig. 572).

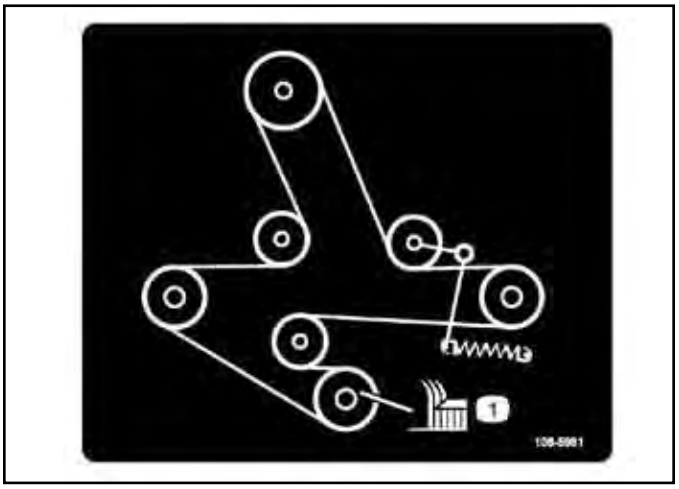

Fig 572 fig. 108-5981

10. Install the mower deck idler spring (Fig. 573).

Fig 573 PICT-4013a

11. Install the left and right mower deck belt covers (Fig. 574).

Fig 574 PICT-4012a

12. Lower the floor pan assembly (Fig. 575).

Fig 575 PICT-4011a

13. Install the negative battery cable to the battery.

14. Lower the seat.

Mower Spindle Replacement

Mower Spindle Removal

1. Park the machine on a level surface, disengage the PTO, turn the ignition off and remove the key.
2. Raise the seat.
3. Remove the negative battery cable from the battery.
4. Raise the floor pan assembly (Fig. 576).

Fig 576 PICT-4011a

5. Remove the left and right mower deck belt covers (Fig. 577).

Fig 577 PICT-4012a

6. Using a spring tool (Toro p/n: 92-5771), remove the mower deck idler spring (Fig. 578).

Fig 578 PICT-4013a

7

7. Remove the mower deck belt from the spindle pulley (Fig. 579).

Fig 579 PICT-4044a

8. Remove the nuts from the 6 spindle mounting bolts (Fig. 580).

Fig 580 PICT-4045a

9. **72" mower decks:** Remove 3 bolts retaining the pulley to the pulley hub (Fig. 581).

Fig 581 DSC-2662a

10. **72" mower decks:** Raise the mower deck to the transport position.

11. **72" mower decks:** Remove the mower blade from the spindle assembly.

12. **72" mower decks:** Remove the 6 bolts and nuts from the spindle assembly. Remove the spindle assembly (Fig. 582).

Fig 582 DSC-2666a

13. **60" mower decks:** Remove the 6 spindle mounting bolts securing the spindle housing to the mower deck (Fig. 583).

Fig 583 PICT-4046a

14. **60" mower decks:** Carefully lower the spindle assembly out of the mower deck (Fig. 584).

Fig 584 PICT-4049a

15. **60" mower decks:** Remove the spindle blade bolt and washer (Fig. 585).

Fig 585 PICT-4050a

16. **60" mower decks:** Remove the blade (Fig. 586).

Fig 586 PICT-4053a

17. **60” mower decks:** Remove the 3 bolts securing the pulley to the spindle hub (Fig. 587).

Fig 587 PICT-4055a

18. **60” mower decks:** Remove the pulley from the spindle assembly (Fig. 588).

Fig 588 PICT-4056a

Mower Deck Spindle Rebuild

1. Remove the nut and washer (Fig. 589).

Fig 589 DSC-2669a

2. Remove the pulley hub and square key (Fig. 590).

Fig 590 DSC-2670a

3. Remove the bearing shield (Fig. 591).

Fig 591 DSC-2671a

4. Remove the spindle housing from the spindle shaft assembly (Fig. 592).

Fig 592 DSC-2672a

5. Remove the seal spacer from the top of the spindle housing (Fig. 593).

Fig 593 DSC-2673a

6. Remove the seal spacer from the bottom of the spindle housing (Fig. 594).

Fig 594 DSC-2674a

7. Remove the top oil seal from the spindle housing (Fig. 595).

Fig 595 DSC-2675a

8. Remove the tapered roller bearing from the top of the spindle housing (Fig. 596).

Fig 596 DSC-2676a

9. Remove the spacer (Fig. 597).

Fig 597 DSC-2677a

10. Turn the spindle housing over and remove the oil seal from the bottom of the spindle housing (Fig. 598). Note the orientation of the lower oil seal. The open end of the seal faces outwards to help relieve pressure from over-greasing the spindle assembly.

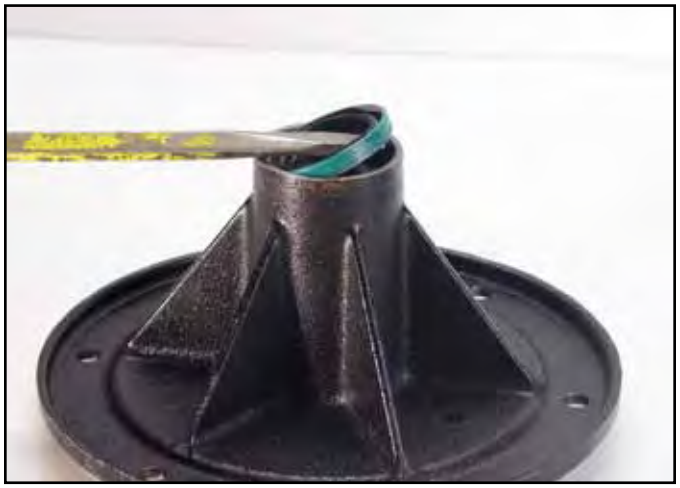

Fig 598 DSC-2679a

11. Remove the tapered roller bearing from the bottom of the spindle (Fig. 599).

Fig 599 DSC-2680a

12. Using a hammer and a driver with a square edge, drive both the top and bottom bearing races out of the spindle housing (Fig. 600).

Fig 600 DSC-2681a

13. Remove the large spacer in the spindle housing (Fig. 601).

Fig 601 DSC-2682a

14. This view shows the 2 bearing races and the large spacer in the spindle housing (Fig. 602). Note the internal snap ring in the housing; it is not necessary to remove it when installing new bearing races and the spacer.

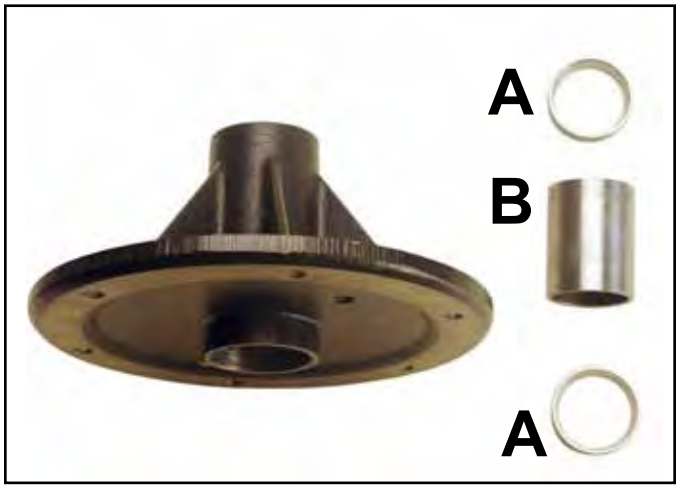

Fig 602 DSC-2684a

A. Bearing Race B. Spacer

7

15. Install the spacer through the top of the spindle housing (Fig. 603).

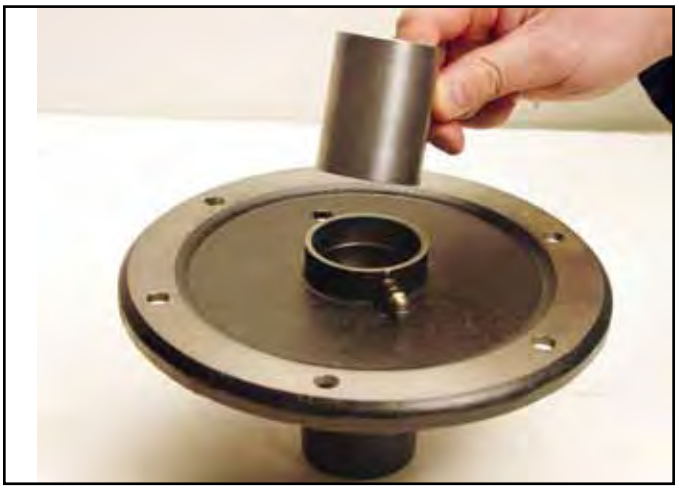

Fig 603 DSC-2688a

16. Using a press, install the upper bearing race into the spindle housing (Fig. 604).

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

Fig 604 DSC-2689a

17. Turn the spindle housing over and install the lower bearing race into the spindle housing (Fig. 605).

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

Fig 605 DSC-2690a

18. Pack the tapered bearing with #2 grease and install the tapered bearing (Fig. 606).

Fig 606 DSC-2691a

19. Install the lower seal (Fig. 607).

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

Fig 607 DSC-2692a

20. Using a seal driver, drive or press the seal on the lower end of the spindle housing until the seal is flush with the outer edge of the housing (Fig. 608).

Fig 608 DSC-2693a

21. Install the inner spacer to the spindle assembly (Fig. 609).

Fig 609 DSC-2700a

22. Pack the tapered bearing with #2 grease and install the tapered bearing (Fig. 610).

Fig 610 DSC-2694a

23. Install the seal. Press it flush with the top of the housing (Fig. 611).

Note: The open lip of the seal faces inward.

Fig 611 DSC-2696a

24. Install the bearing shield and the seal spacer onto the spindle shaft (Fig. 612).

Fig 612 DSC-2702a

25. Lower the spindle housing over the spindle shaft (Fig. 613).

Fig 613 DSC-2703a

26. Install the seal spacer on the top of the spindle housing (Fig. 614).

Fig 614 DSC-2704a

27. Install bearing shield (Fig. 615).

Fig 615 DSC-2705a

28. Install the square key onto the spindle shaft (Fig. 616).

Fig 616 DSC-2706a

29. Install the pulley hub on the spindle shaft (Fig. 617).

Fig 617 DSC-2707a

30. Install the heavy washer and nut on the top of the spindle shaft (Fig. 618).

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

Fig 618 DSC-2708a

7

31. Torque the top nut to 100 to 120 ft-lbs. (135.58 to 162.7 Nm) (Fig. 619).

Fig 619 DSC-2709a

32. Grease the spindle assembly using a grease gun with #2 grease.

Mower Spindle Installation

1. **72" mower decks:** Position the spindle assembly into the mower deck. Install the 6 self-tapping bolts securing the spindle assembly to the mower deck (Fig. 620).

Fig 620 DSC-2666a

2. **72" mower decks:** Install the mower blade onto the spindle assembly. Torque bolt to 85 - 110 ft-lbs. (115-149 Nm).

3. **72" mower decks:** Install 3 bolts retaining the pulley to the spindle hub. Torque bolts to 23 ft-lbs. (31 Nm) (Fig. 621).

Fig 621 DSC-2662a

4. **60” mower decks:** Position the pulley onto the spindle assembly (Fig. 622).

Fig 622 PICT-4056a

5. **60” mower decks:** Install 3 bolts securing the pulley to the spindle hub. Torque bolts to 23 ft-lbs. (31 Nm) (Fig. 623).

Fig 623 PICT-4055a

6. **60” mower decks:** Position the blade to the spindle shaft retainer (Fig. 624).

Fig 624 PICT-4053a

7. **60” mower decks:** Install the spindle blade bolt and washer. Torque to 85-110 ft-lbs. (115-149 Nm) (Fig. 625).

Fig 625 PICT-4058a

8. **60” mower decks:** Carefully position the spindle assembly into the mower deck (Fig. 626).

Fig 626 PICT-4049a

9. **60” mower decks:** Install 6 spindle mounting bolts securing the spindle housing to the mower deck (Fig. 627).

Fig 627 PICT-4046a

10. Install a nut onto each of the 6 spindle mounting bolts (Fig. 628).

Fig 628 PICT-4045a

11. Route the mower deck belt around the spindle pulley. Refer to the belt routing diagram (Fig. 629):

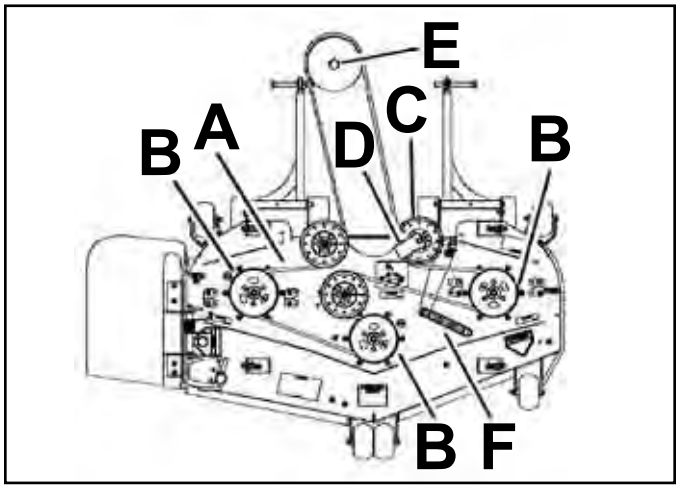

Fig 629 fig. 55 G001067

A. Mower belt
B. Mower spindle pulley
C. Mower idler pulley
D. Belt guide
E. Gearbox pulley
F. Spring

12. Install the mower deck idler spring (Fig. 630).

Fig 630 PICT-4013a

13. Install the left and right mower deck belt covers (Fig. 631).

Fig 631 PICT-4012a

14. Lower the floor pan assembly (Fig. 632).

Fig 632 PICT-4011a

15. Install the negative battery cable to the battery.

16. Lower the seat.

7

Mower Deck Idler Assembly Replacement

Mower Deck Idler Assembly Removal

1. Park the machine on a level surface, disengage the PTO, turn the ignition off and remove the key.
2. Raise the seat.
3. Remove the negative battery cable from the battery.
4. Raise the floor pan assembly (Fig. 633).

Fig 633 PICT-4011a

5. Remove the left and right mower deck belt covers (Fig. 634).

Fig 634 PICT-4012a

6. Using a spring tool (Toro p/n: 92-5771), remove the mower deck idler spring (Fig. 635).

Fig 635 PICT-4013a

7. Remove the bolt, belt guide and 2 flat washers securing the idler pulley to the idler arm (Fig. 636).

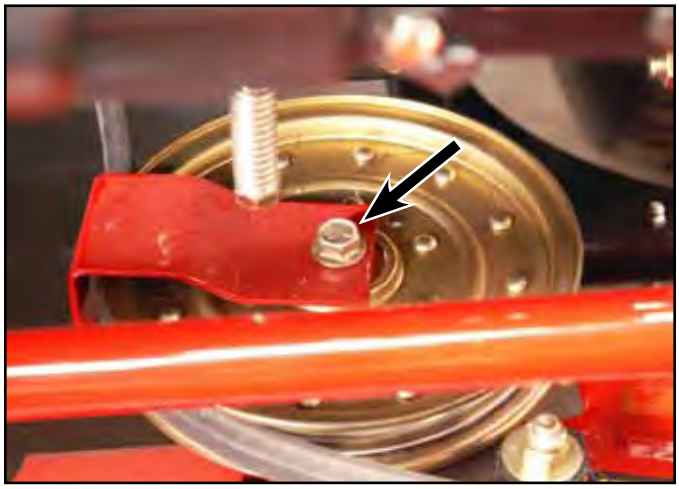

Fig 636 PICT-4061a

8. Remove the pulley from the idler arm assembly (Fig. 637).

Fig 637 PICT-4063a

9. Remove the bolt, nut and 2 washers securing the idler arm assembly to the mower deck (Fig. 638).

Note: One of the washers is between the idler arm and mower deck.

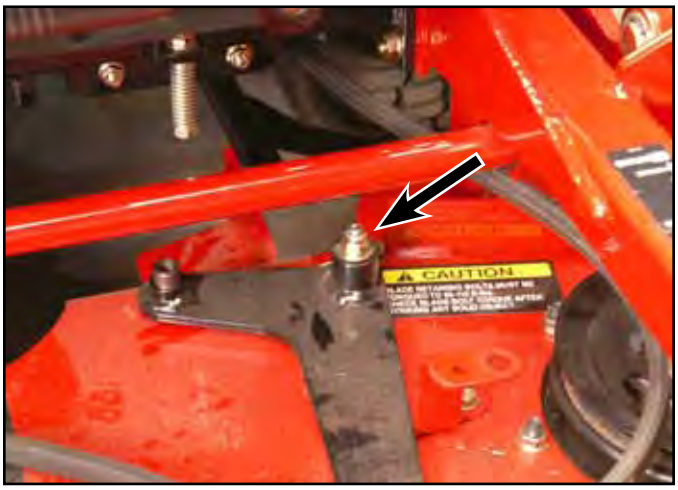

Fig 638 PICT-4065a

10. Remove the idler arm assembly from the mower deck (Fig. 639).

Fig 639 PICT-4067a

7

11. Remove the 2 bushings and 1 spacer from the idler arm (Fig. 640).

Fig 640 PICT-4073a

12. Remove the grease fitting from the idler arm pivot (Fig. 641).

Fig 641 PICT-4070a

Mower Deck Idler Assembly Installation

1. Install a grease fitting into the idler arm pivot (Fig. 642).

Fig 642 PICT-4070a

2. Press 2 bushings into the idler arm pivot (Fig. 643).

Fig 643 PICT-4077a

3. Slide a spacer into the idler arm pivot (Fig. 644).

Fig 644 PICT-4082a

4. Position a washer onto the mower deck in the idler arm pivot location (Fig. 645).

Fig 645 PICT-4083a

5. Position the idler arm assembly onto the mower deck with the pivot placed over the washer (Fig. 646).

Fig 646 PICT-4084a

6. Install a bolt, nut and washer to secure the idler arm assembly to the mower deck (Fig. 647).

Fig 647 PICT-4065a

7. Position the pulley onto the idler arm assembly (Fig. 648).

Fig 648 PICT-4063a

8. Route the mower deck belt into the pulley and place 2 washers on top of the pulley (Fig. 649).

Fig 649 PICT-4086a

9. Position the belt guide onto the 2 washers so that it is 45 degrees from the idler arm (Fig. 650).

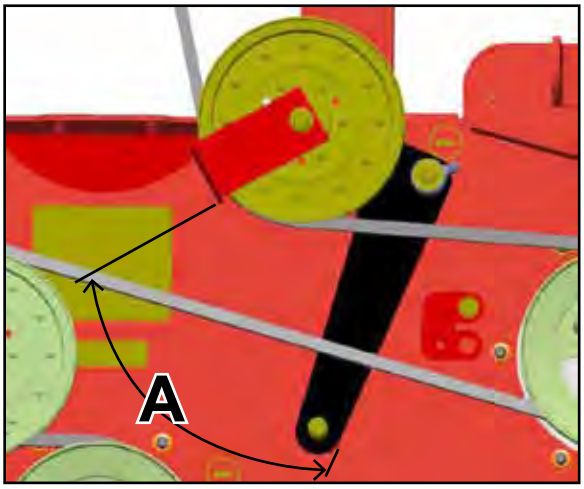

Fig 650 belt guide position_a

A. 45º

10. Install a bolt to secure the belt guide to the pulley (Fig. 651).

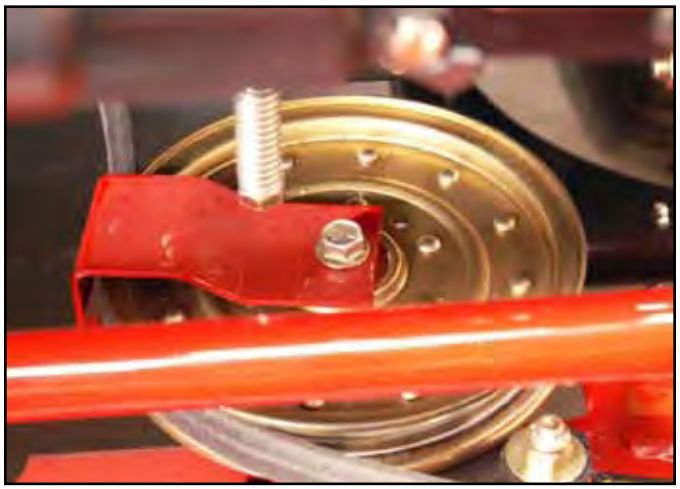

Fig 651 PICT-4061a

11. Apply grease to the idler arm pivot grease fitting (Fig. 652).

Fig 652 PICT-4127a

12. Ensure the mower deck belt is properly routed around the pulleys. Refer to the belt routing decal (Fig. 653).

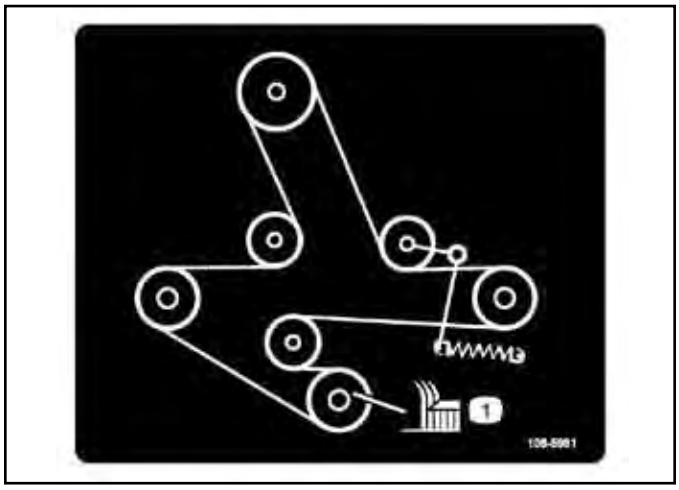

Fig 653 fig. 108-5981

13. Install the mower deck idler spring (Fig. 654).

Fig 654 PICT-4013a

14. Install the left and right mower deck belt covers (Fig. 655).

Fig 655 PICT-4012a

15. Lower the floor pan assembly (Fig. 656).

Fig 656 PICT-4011a

16. Install the negative battery cable to the battery.

17. Lower the seat.

Fixed Pulley Replacement

Fixed Pulley Removal

1. Park the machine on a level surface, disengage the PTO, turn the ignition off and remove the key.
2. Raise the seat.
3. Remove the negative battery cable from the battery.
4. Raise the floor pan assembly (Fig. 657).

Fig 657 PICT-4011a

5. Remove the left and right mower deck belt covers (Fig. 658).

Fig 658 PICT-4012a

6. Using a spring tool (Toro p/n: 92-5771), remove the mower deck idler spring (Fig. 659).

Fig 659 PICT-4013a

7. Remove the bolt, washer and nut securing the fixed pulley to the mower deck (Fig. 660).

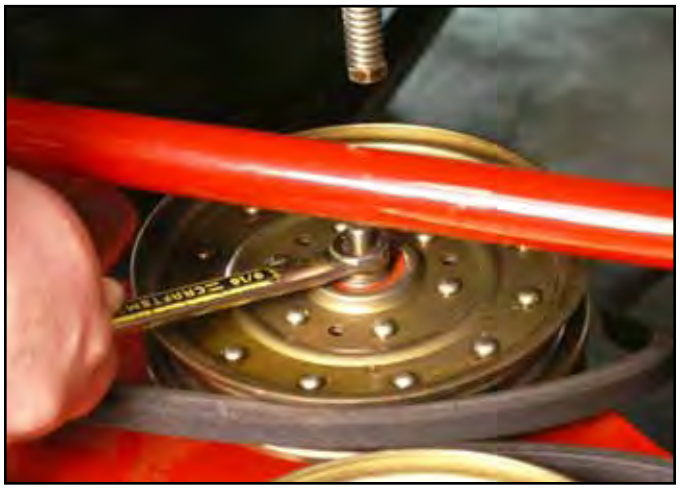

Fig 660 PICT-4090a

8. Remove the pulley from the pulley mount (Fig. 661).

Fig 661 PICT-4093a

7

9. Remove the pulley mount (Fig. 662).

Fig 662 PICT-4095a

Fixed Pulley Installation

1. Position the pulley mount onto the mower deck (Fig. 663).

Fig 663 PICT-4095a

2. Position the pulley onto the pulley mount (Fig. 664).

Fig 664 PICT-4093a

3. Install a bolt, washer and nut securing the fixed pulley to the mower deck (Fig. 665).

Fig 665 PICT-4100a

4. Route the mower deck belt. Refer to the belt routing decal (Fig. 666).

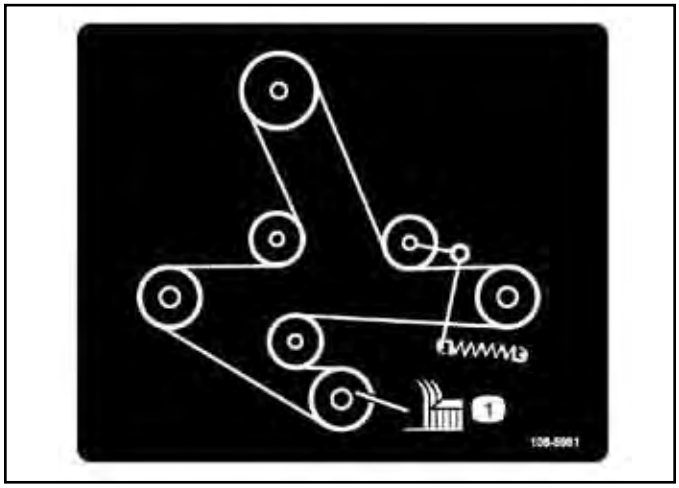

Fig 666 fig. 108-5981

5. Install the mower deck idler spring (Fig. 667).

Fig 667 PICT-4013a

6. Install the left and right mower deck belt covers (Fig. 668).

Fig 668 PICT-4012a

7

7. Lower the floor pan assembly (Fig. 669).

Fig 669 PICT-4011a

8. Install the negative battery cable to the battery.
9. Lower the seat.

Electric PTO Clutch Replacement

Electric PTO Clutch Removal

1. Park the machine on a level surface, disengage the PTO, turn the ignition OFF and remove the key.
2. Raise the seat.
3. Remove the negative battery cable from the battery.
4. Remove the front engine panel (Fig. 670).

Fig 670 IMG-0303a

5. Unplug the harness connector from the electric PTO clutch (Fig. 671).

Fig 671 IMG-0528a

6. Using a spring tool (Toro p/n: 92-5771) unhook the spring from the gearbox idler arm assembly (Fig. 672).

Fig 672 IMG-0463a

7. Remove the gearbox drive belt from around the electric PTO clutch pulley (Fig. 673).

Fig 673 PICT-3934a

8. Remove the center clutch bolt, spring washers, and clutch retainer (Fig. 674).

Fig 674 IMG-0530a

9. Remove 2 bolts and nuts retaining the clutch stop strap to the frame (Fig. 675).

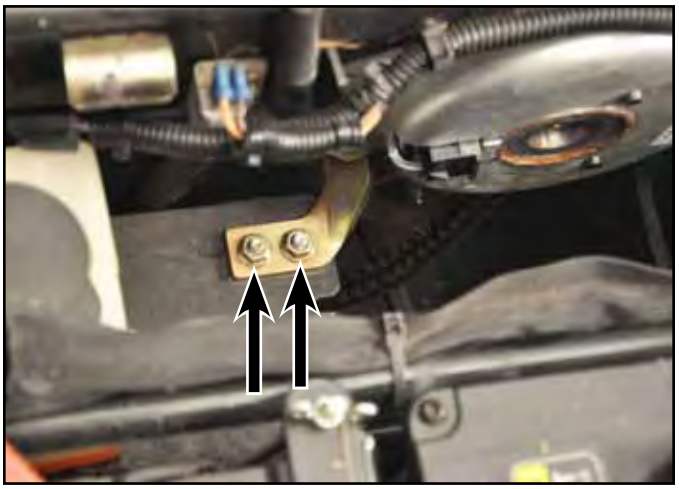

Fig 675 IMG-0532a

10. Remove the electric PTO clutch from the stub shaft (Fig. 676).

Fig 676 IMG-0534a

Electric PTO Clutch Installation

1. Apply anti-seize compound to the stub shaft (Fig. 677).

Fig 677 IMG-0596a

2. Install the electric PTO clutch to the crankshaft (Fig. 678).

Fig 678 IMG-0597a

3. Apply thread locking compound to the center clutch bolt (Fig. 679).

Fig 679 IMG-0599a

4. Install center clutch bolt, spring washers, and clutch retainer. Note the direction of the spring washers (Fig. 680).

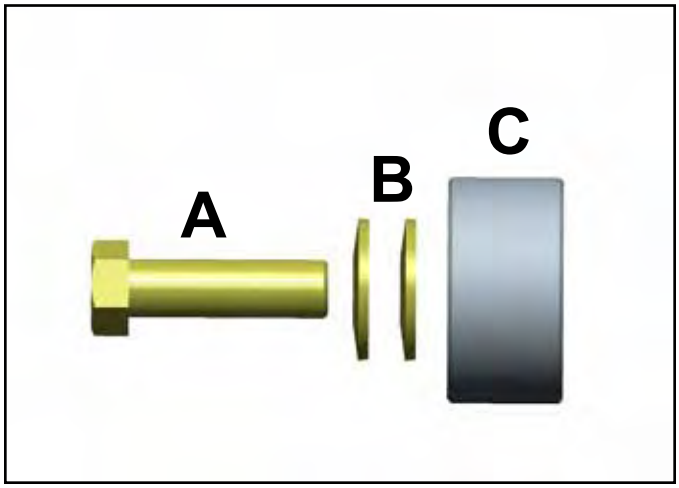

Fig 680 clutch bolt retainer asm

A. Clutch bolt
B. Spring washer (2)
C. Clutch retainer

5. Torque the center clutch bolt to 50 ft-lbs. (67.8 Nm) (Fig. 681).

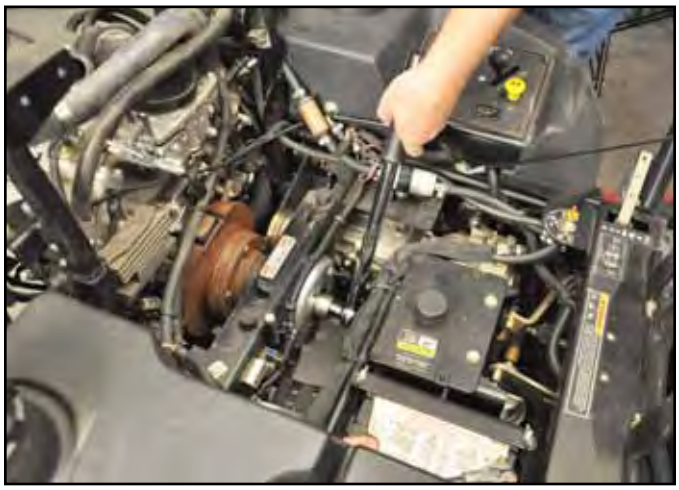

Fig 681 IMG-0600a

6. Install the gearbox drive belt around the electric PTO clutch and the gearbox pulley (Fig. 682).

Fig 682 IMG-0601a

7. With a spring tool (Toro p/n: 92-7551), hook the spring to the idler arm assembly (Fig. 683).

Fig 683 IMG-0463a

8. Install the clutch stop strap to the frame using 2 bolts, washers, and nuts (Fig. 684).

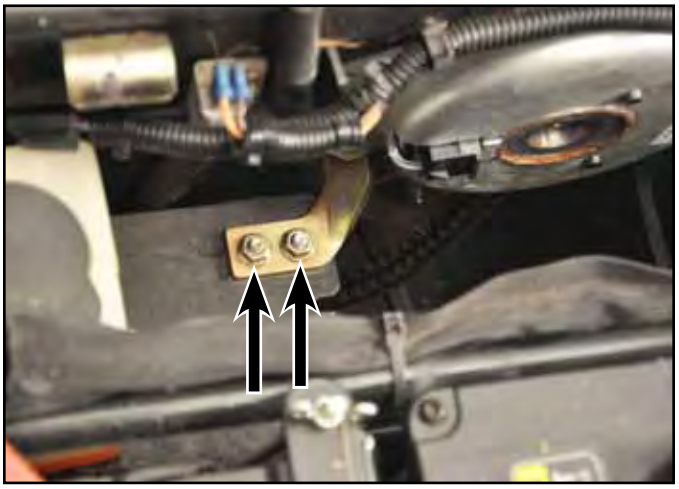

Fig 684 IMG-0532a

9. Plug the harness connector to the electric PTO clutch (Fig. 685).

Fig 685 IMG-0528a

10. Install the front engine panel (Fig. 686).

Fig 686 IMG-0303a

11. Install the negative battery cable.

12. Lower the seat.

Gearbox Assembly Replacement

Gearbox Assembly Removal

1. Park the machine on a level surface, disengage the PTO, turn the ignition off and remove the key.
2. Raise the seat.
3. Remove the negative battery cable from the battery.
4. Remove the front engine panel (Fig. 687).

Fig 687 IMG-0303a

5. Remove the right rear wheel and tire assembly (Fig. 688).

Fig 688 IMG-0620a

6. Using a spring tool (Toro p/n: 92-5771) unhook the spring from the gearbox idler assembly (Fig. 689).

Fig 689 IMG-0463a

7. Remove the gearbox drive belt from the drive pulley (Fig. 690).

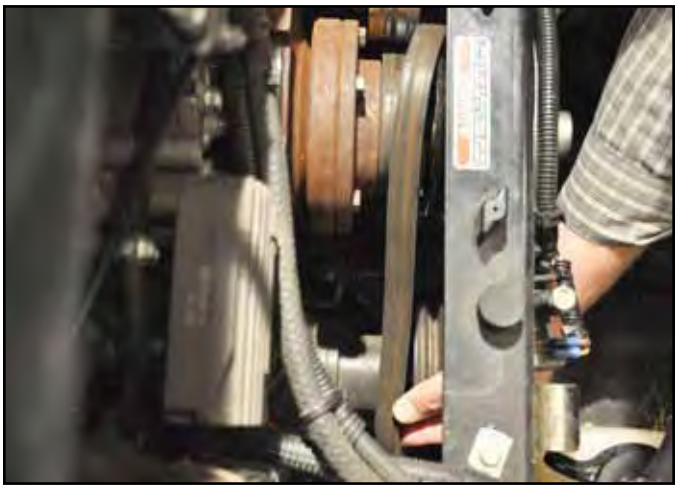

Fig 690 IMG-0626a

8. Raise the floor pan assembly (Fig. 691).

Fig 691 PICT-3877a

9. Remove the left hand mower deck belt cover (Fig. 692).

Fig 692 PICT-3879a

10. Using a spring tool (Toro p/n: 92-5771), remove the mower deck idler spring (Fig. 693).

Fig 693 PICT-3880a

11. Remove the deck drive belt from the gearbox pulley (Fig. 694).

Fig 694 IMG-0627a

12. Remove the 4 mounting bolts and lock washers securing the gearbox assembly to the frame (Fig. 695).

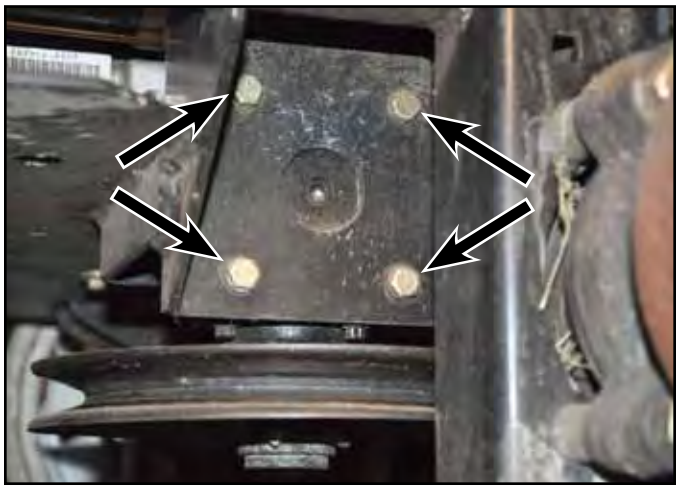

Fig 695 IMG-0630a

13. Remove the gearbox assembly (Fig. 696).

Fig 696 IMG-0632a

14. Remove the 2 set screws from the gearbox driven pulley (Fig. 697).

Fig 697 PICT-3907a

15. Remove the pulley (Fig. 698).

Fig 698 PICT-3909a

16. Remove the key from the keyway (Fig. 699).

Fig 699 PICT-3910a

17. Remove the 2 set screws from the gearbox drive pulley (Fig. 700).

Fig 700 PICT-3908a

18. Remove the pulley (Fig. 701).

Fig 701 PICT-3918a

19. Remove the key from the keyway (Fig. 702).

Fig 702 PICT-3912a

20. Inspect the keys, gearbox shafts and pulleys. Replace if worn or damaged.

21. Check the gearbox oil level. Refer to “Checking the Gearbox Oil Level” on page 7-48. To change the gearbox oil, see “Changing Gearbox Oil” on page 7-49.

Gearbox Assembly Installation

1. Apply anti-seize compound to both gearbox assembly shafts (Fig. 703).

Fig 703 PICT-3913a

2. Install a key into the gearbox drive shaft keyway (Fig. 704).

Fig 704 PICT-3915a

3. Apply thread locking compound to all 4 pulley set screws. Start the set screws into the pulley hubs (Fig. 705).

Fig 705 PICT-3917a

Slide the gearbox drive pulley onto the gearbox drive shaft (Fig. 706).

Note: Install the pulley so that the pulley hub is flush ± .03" (0.76mm) with the end of the gearbox shaft.

Fig 706 PICT-3918a

4. Tighten the set screws (Fig. 707).

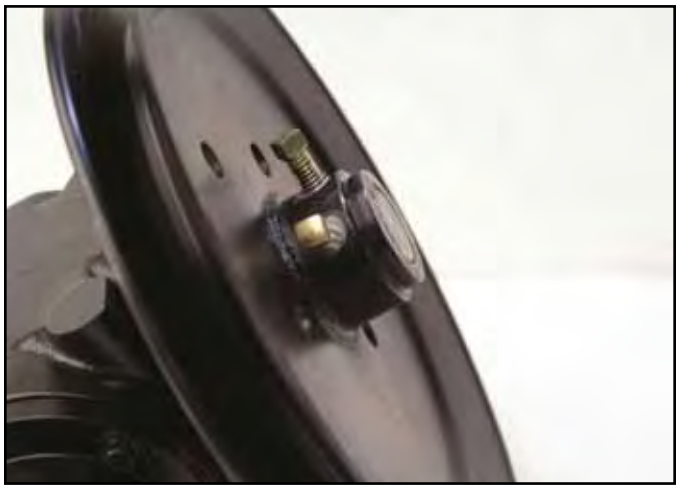

Fig 707 PICT-3919a

5. Torque each set screw to 145 ± 20 in-lbs. (16 ± 2.25 Nm) (Fig. 708).

Fig 708 PICT-3921a

6. Install a key into the gearbox driven shaft keyway (Fig. 709).

Fig 709 PICT-3924a

7. Slide the driven pulley onto the gearbox driven shaft (Fig. 710).

Fig 710 PICT-3909a

Note: Install the pulley so that the hub is .06" (1.5mm) from the end of the gearbox driven shaft. Tighten the set screws (Fig. 711).

Fig 711 PICT-3925a

8. Torque each set screw to 145 ± 20 in-lbs. (16 ± 2.25 Nm) (Fig. 712).

Fig 712 PICT-3927a

9. Position the gearbox assembly to the frame (Fig. 713).

Fig 713 IMG-0632a

10. Install 4 mounting bolts and lock washers securing the gearbox assembly to the frame. Torque the 4 mounting bolts to 145 ± 20 in-lbs. (16 ± 2.25 Nm) (Fig. 714).

Fig 714 IMG-0634a

11. Install the deck drive belt around gearbox mower deck drive pulley (Fig. 715).

Fig 715 IMG-0627a

12. Using a spring tool (Toro p/n: 92-5771), install the mower deck idler spring (Fig. 716).

Fig 716 PICT-3880a

13. Install the left hand mower deck belt cover (Fig. 717).

Fig 717 PICT-3879a

14. Lower the floor pan assembly (Fig. 718).

Fig 718 PICT-3877a

15. Position the gearbox drive belt around the gearbox drive pulley (Fig. 719).

Fig 719 IMG-0626a

16. Using a spring tool (Toro p/n: 92-5771), install the spring to the gearbox idler assembly (Fig. 720).

Fig 720 IMG-0463a

17. Install the right rear wheel and tire assembly (Fig. 721).

Fig 721 IMG-0620a

18. Install the front engine panel (Fig. 722).

Fig 722 IMG-0303a

19. Install the negative battery cable to the battery.

20. Lower the seat.

Checking the Gearbox Oil Level

1. Park the machine on a level surface.

2. Disengage the PTO, move the motion control levers to the neutral locked position and set the parking brake.

3. Stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.

4. Remove the side or rear plug on the gear box (Fig. 723).

Note: Gearbox removed from machine for photo clarity.

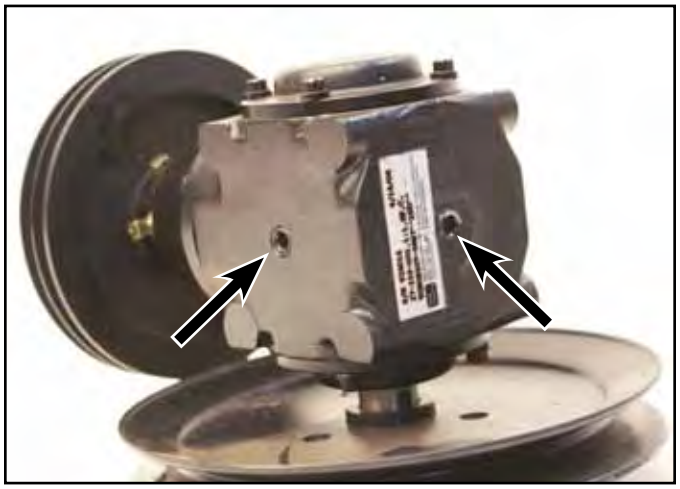

Fig 723 PICT-3899a

5. The oil should be at the level of the fill plug.

6. Add oil if needed to bring it to the correct level. Use SAE 75W–90 Synthetic Gear Lube.

Changing Gearbox Oil

Service Interval: Initial at 100 hours, then yearly.

1. Remove the gearbox assembly from the machine. Refer to “Gearbox Assembly Removal” on page 7-39.

Note: The pulleys do not have to be removed from the gearbox.

2. Remove the 2 plugs located on the side and rear of the gearbox assembly (Fig. 724).

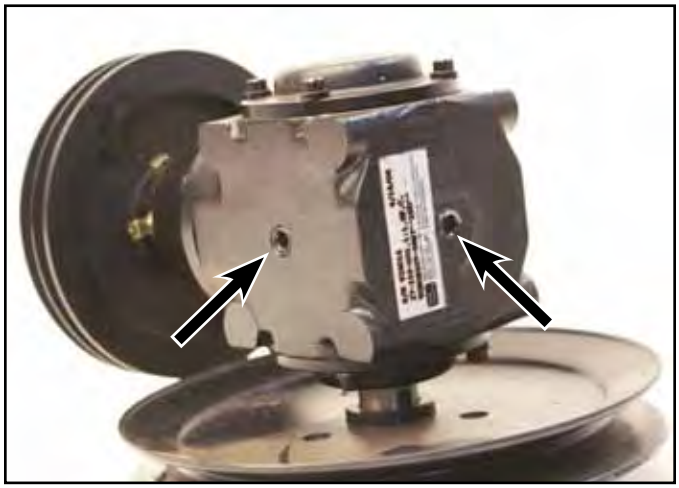

Fig 724 PICT-3899a

3. Drain the oil from the gearbox into a drain pan.

4. Fill the gearbox assembly with 75W-90 Synthetic Gear Lube until the oil level reaches the plug openings (Fig. 725). Capacity 6 oz. (.177 liters).

Fig 725 PICT-3901a

5. Install the 2 plugs into the side and rear of the gearbox assembly (Fig. 726).

Fig 726 PICT-3899a

6. Install the gearbox assembly. Refer to “Gearbox Assembly Installation” on page 7-43.

Strut Replacement

Note: The right rear wheel assembly has been removed for photo purposes.

Strut Removal

1. Park the machine on a level surface, disengage the PTO, turn the ignition off and remove the key.
2. Raise the seat.
3. Remove the negative battery cable from the battery.
4. Raise the floor pan assembly (Fig. 727).

Fig 727 PICT-4011a

5. Remove the left and right mower deck belt covers (Fig. 728).

Fig 728 PICT-4012a

6. Using a spring tool (Toro p/n: 92-5771), remove the mower deck idler spring. Remove the mower deck belt from the gearbox deck drive pulley (Fig. 729).

Fig 729 PICT-4013a

7

7. Remove the bolt and nut securing the strut pin to the mower deck strut bracket (Fig. 730).

Fig 730 PICT-4108a

8. Remove the strut pin (Fig. 731).

Fig 731 PICT-4111a

9. Remove the nut, lockwasher and bolt securing the strut balljoint to the frame (Fig. 732).

Fig 732 PICT-4105a

10. Remove the strut assembly (Fig. 733).

Fig 733 PICT-4115a

11. Remove the grease fittings from the strut (Fig. 734).

Fig 734 PICT-4116a

12. Loosen the balljoint jam nut (Fig. 735).

Fig 735 PICT-4119a

13. Remove the balljoint and jam nut from the strut (Fig. 736).

Fig 736 PICT-4121a

Strut Installation

1. Install the balljoint and jam nut into the strut. The length of the strut should be 17.31” (43.97cm) from the center of the balljoint to the center of the cross shaft of the strut (Fig. 737).

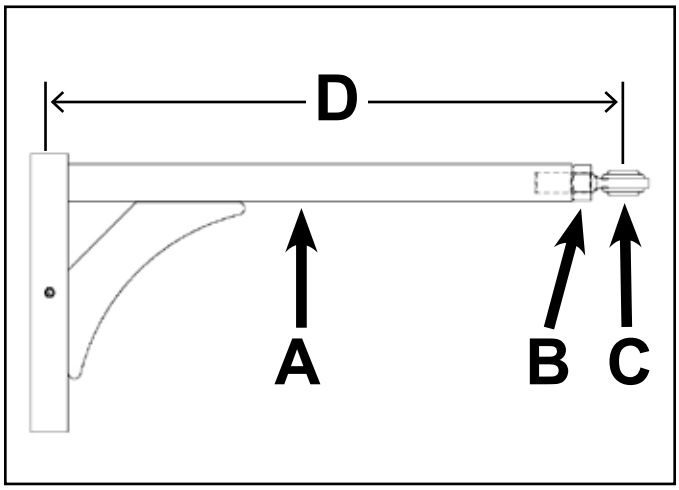

Fig 737 fig. 108-5969

A. Strut
B. Jam nut
C. Balljoint
D. 17.31” (43.97cm)

2. Tighten the jam nut to secure the balljoint position (Fig. 738).

Note: Position balljoint perpendicular to strut.

Fig 738 PICT-4119a

3. Install 2 grease fittings into the strut (Fig. 739).

Fig 739 PICT-4116a

4. Position the strut assembly balljoint to the frame. Secure it to the frame with a bolt, lockwasher and nut (Fig. 740).

Fig 740 PICT-4105a

5. Position the front end of the strut between the strut brackets on the rear of the mower deck and install the strut pin (Fig. 741).

Fig 741 PICT-4111a

6. Install a bolt and nut securing the strut pin to the mower deck strut bracket (Fig. 742).

Fig 742 PICT-4108a

7. Apply grease to the strut grease fitting (Fig. 743).

Fig 743 PICT-4128a

8. Route the mower deck belt. Refer to the belt routing decal (Fig. 744).

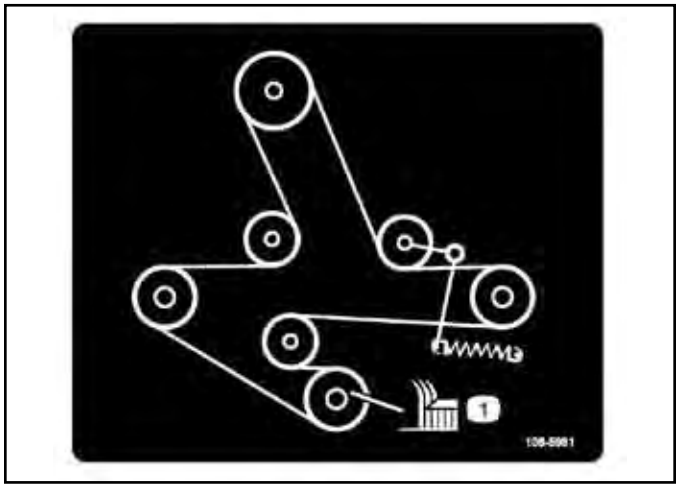

Fig 744 fig. 108-5981

9. Install the mower deck idler spring (Fig. 745).

Fig 745 PICT-4013a

10. Install the left and right mower deck belt covers (Fig. 746).

Fig 746 PICT-4012a

11. Lower the floor pan assembly (Fig. 747).

Fig 747 PICT-4011a

12. Install the negative battery cable to the battery.

13. Lower the seat.

72” Mower Deck Belt Tension Adjustment Plate Replacement

72” Mower Deck Belt Tension Adjustment Plate Removal

1. Park the machine on a level surface, disengage the PTO, turn the ignition off and remove the key.
2. Raise the seat.
3. Remove the negative battery cable from the battery.
4. Raise the floor pan assembly (Fig. 748).

Fig 748 PICT-4011a

5. Remove the left and right mower deck belt covers (Fig. 749).

Fig 749 PICT-4012a

6. Using a spring tool (Toro p/n: 92-5771), remove the mower deck idler spring (Fig. 750).

Fig 750 PICT-4013a

7. Remove the belt from around the adjustment plate pulley.

8. Remove the nut from the pivot bolt (Fig. 751).

Note: The pivot bolt will fall through to the underside of the deck when the nut is removed.

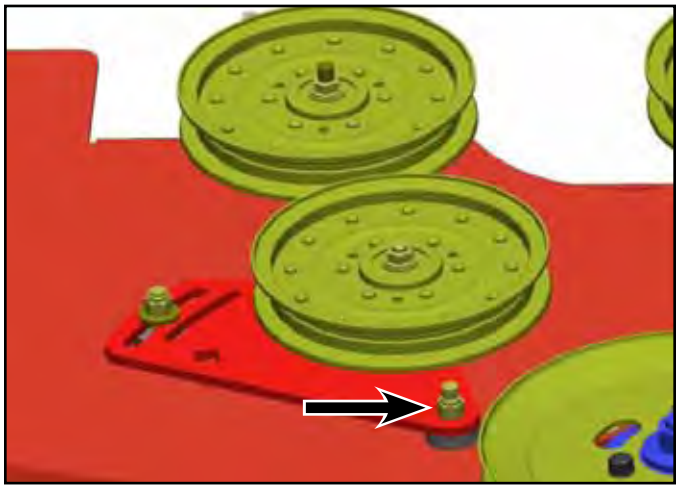

Fig 751 6666a

9. Remove the nut and washer from the adjustment plate slot bolt (Fig. 752).

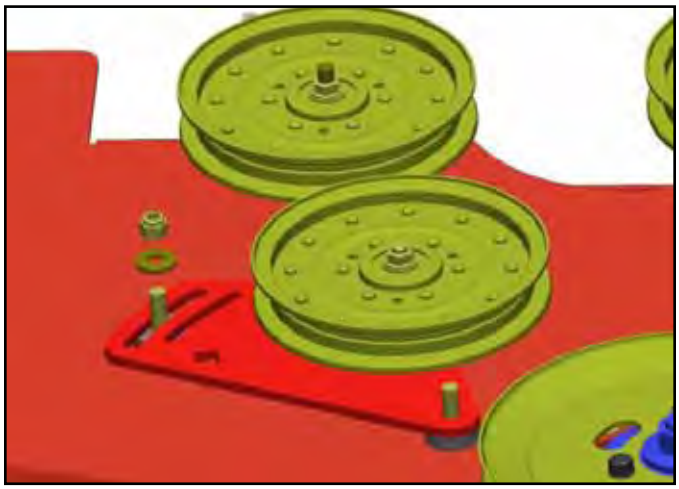

Fig 752 6667a

10. Remove the tension adjustment plate assembly (Fig. 753).

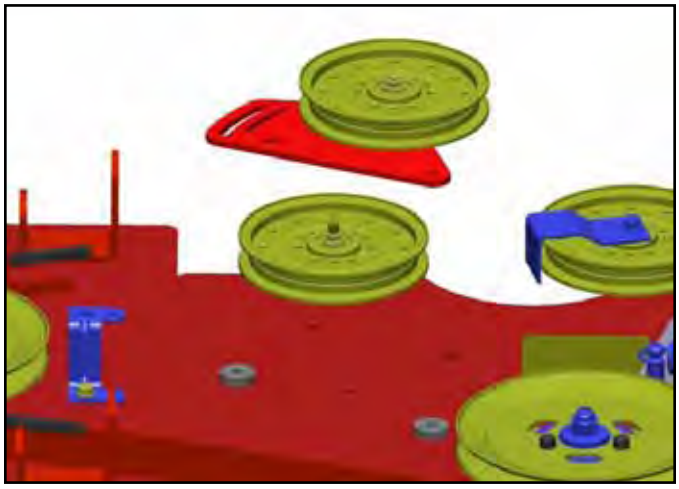

Fig 753 PICT-6668a

11. Remove the 2 spacers from the mower deck (Fig. 754).

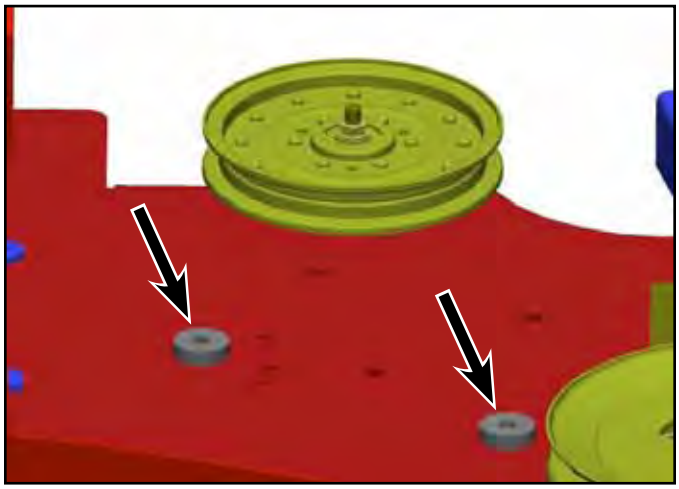

Fig 754 6669a

12. Remove the nut, washer and bolt securing the pulley to the adjustment plate (Fig. 755).

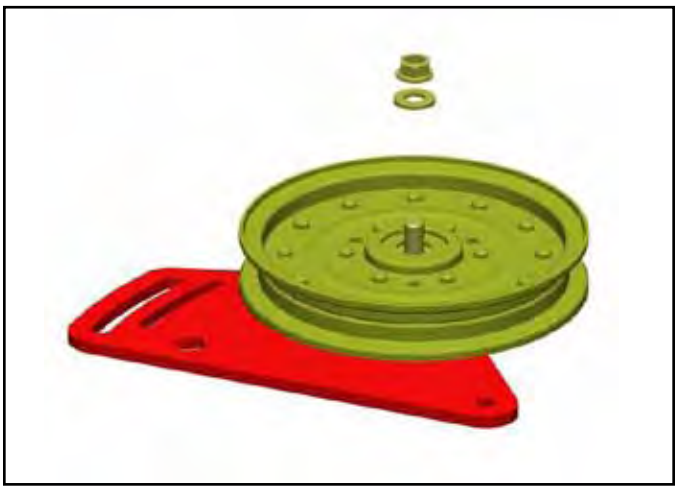

Fig 755 6670a

13. Remove the pulley from the idler bushing (Fig. 756).

Fig 756 6671a

14. Remove the idler bushing (Fig. 757).

Fig 757 6672a

72” Mower Deck Belt Tension Adjustment Plate Installation

1. Position the idler bushing onto the tension adjustment plate (Fig. 758).

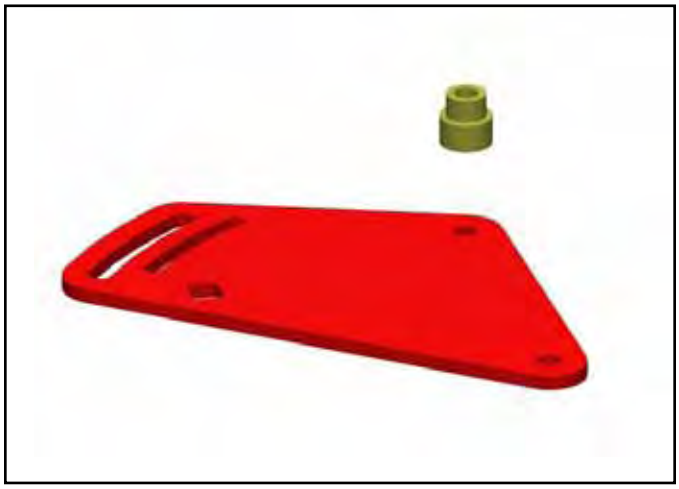

Fig 758 6672a

2. Insert the mounting bolt up through the idler bushing and place the pulley onto the bushing (Fig. 759).

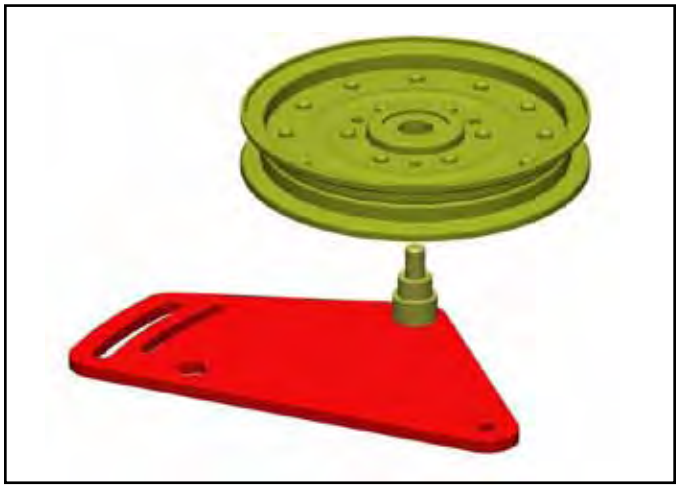

Fig 759 6671a

3. Install a washer and nut onto the pulley bolt securing the pulley to the adjustment plate (Fig. 760).

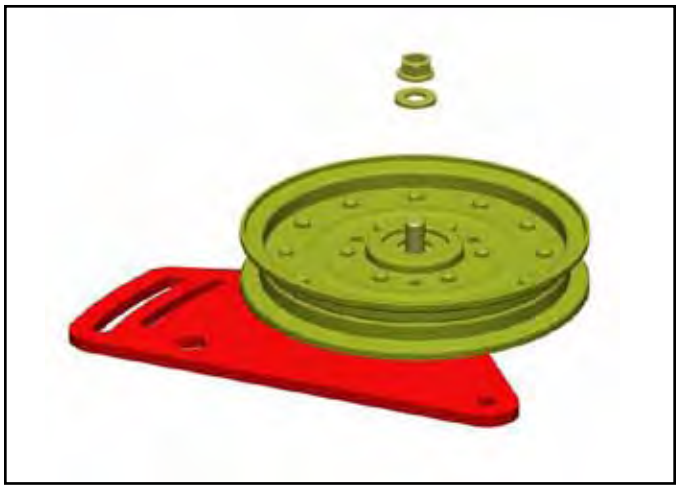

Fig 760 6670a

4. Position 2 spacers onto the mower deck (Fig. 761).

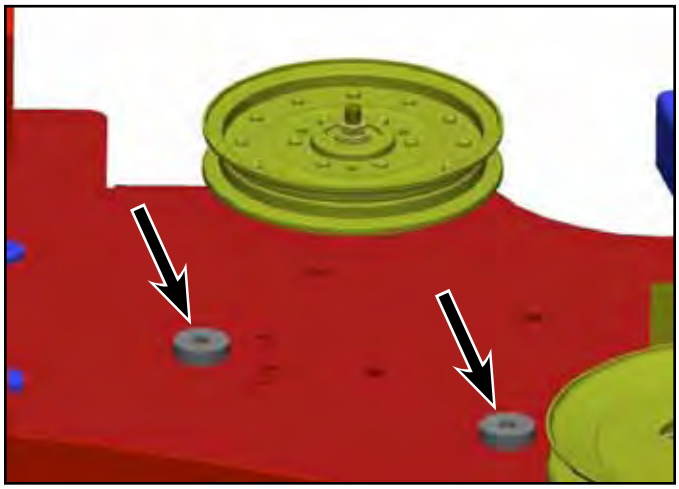

Fig 761 6669a

5. Position the tension adjustment plate assembly onto the mower deck making sure the spacers are in place (Fig. 762).

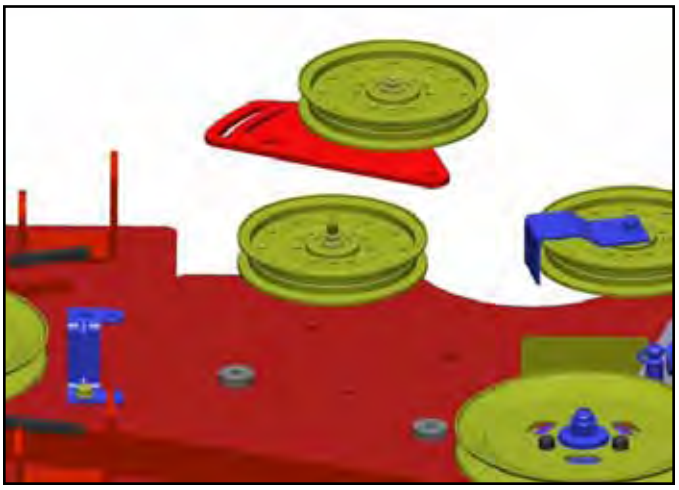

Fig 762 PICT-6668a

6. Insert 2 bolts up through the mower deck, spacers and tension adjustment plate. Install a washer and nut onto each bolt (Fig. 763).

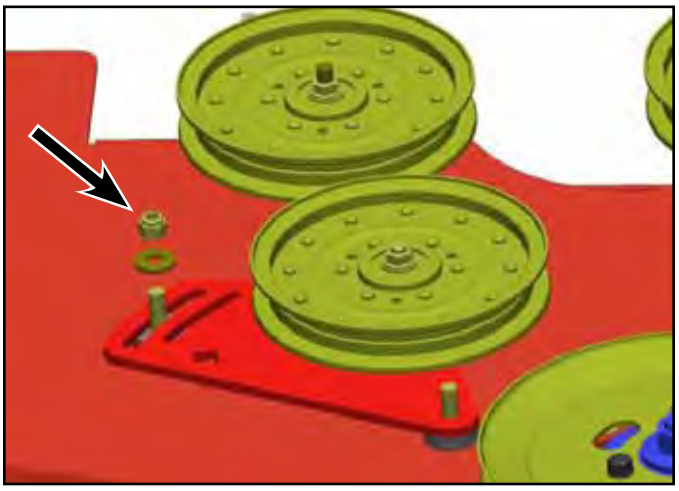

Fig 763 6667a

7. Route the belt around the adjustment plate pulley. Refer to the belt routing decal (Fig. 764).

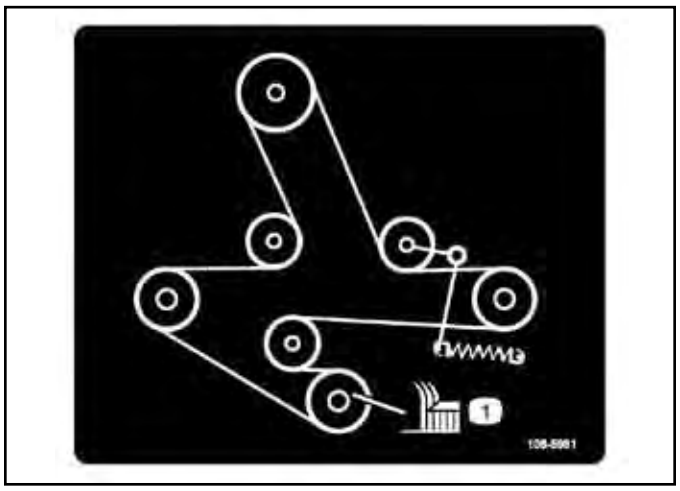

Fig 764 fig. 108-5981

8. Install the mower deck idler spring (Fig. 765).

Fig 765 PICT-4013a

9. Adjust the mower belt tension. Refer to “72” Mower Deck Belt Tension Adjustment” on page 7-62.

10. Install the left and right mower deck belt covers (Fig. 766).

Fig 766 PICT-4012a

11. Lower the floor pan assembly (Fig. 767).

Fig 767 PICT-4011a

12. Install the negative battery cable to the battery.

13. Lower the seat.

72” Mower Deck Belt Tension Adjustment

Important: To ensure proper mower belt tension, which will result in longer belt life, check the mower belt tension after the first 8 hours of use and 8 hours after each belt change.

1. Disengage the PTO, move the motion control levers to the neutral locked position, and set the parking brake.

2. Stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.

3. Place the mower deck in the 3” (76mm) height-of-cut position.

4. Measure the mower deck idler spring length (Fig. 768). If the spring length is between 10” and 10-1/4” (25.4 and 26.0cm), from post to post, no adjustment is needed.

   If it is not between 10” and 10-1/4” (25.4 and 26.0cm), continue:

5. Loosen the bolts holding the idler plate (Fig. 768).

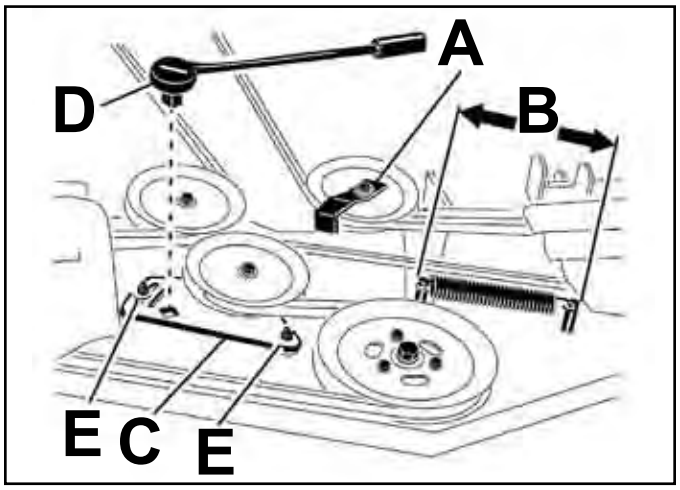

Fig 768 fig. 62 G006478

A. Belt guide install at a 45 degree angle
B. Idler spring length between 10 & 10-1/4” (25.4 & 26.0cm)
C. Idler plate
D. Ratchet or breaker bar
E. Idler plate bolt

6. Insert a ratchet or breaker bar into the square hole in the idler plate (Fig. 768).

7. Rotate the ratchet or breaker bar to move the idler plate until the idler spring is between 10” and 10-1/4” (25.4 and 26.0cm) from post to post (Fig. 768).

8. While holding the belt tension and spring length, tighten the idler plate bolts to secure the idler plate (Fig. 768).

Gearbox Rebuild

1. Remove the two gearbox drain plugs and drain the oil from the gearbox (Fig. 769).

Fig 769 PICT-5631a

2. Remove the 4 bolts securing the pinion housing to the case (Fig. 770).

Note: The bolts securing the end caps to the gearbox housing are patch lock bolts and must be replaced with new patch lock bolts.

Fig 770 PICT-5636a

3. Carefully remove the pinion assembly (Fig. 771).

Fig 771 PICT-5646a

4. Remove the o-ring from the pinion pilot (Fig. 772).

Fig 772 PICT-5649a

7

5. Remove the shim(s) (Fig. 773).

Fig 773 PICT-5650a

6. Remove the 8 end cap screws (4 securing each end cap) (Fig. 774 and Fig. 775).

Note: The bolts securing the end caps to the gear-box housing are patch lock bolts and must be replaced with new patch lock bolts.

Fig 774 PICT-5651a

Fig 775 IMG-8490a

7. Remove the closed end cap (Fig. 776).

Fig 776 PICT-5657a

8. Remove the o-ring from the closed end cap (Fig. 777).

Fig 777 IMG-8491a

9. Remove the open end cap and cross shaft assembly (Fig. 778).

Fig 778 PICT-5658a

10. Remove the o-ring from the cross shaft pilot (Fig. 779).

Fig 779 PICT-5664a

11. Remove the shim(s) (Fig. 780).

Fig 780 PICT-5666a

12. Remove the cross shaft from the open end cap (Fig. 781).

Fig 781 PICT-5667a

Pinion Shaft Teardown

13. Secure the pinion shaft in a vise.

14. Remove the lock nut from the pinion shaft (Fig. 782).

Fig 782 IMG-8494a

15. Remove the washer from the pinion shaft (Fig. 783).

Fig 783 IMG-8495a

16. Using a gear puller, remove the cross shaft gear from the pinion shaft (Fig. 784).

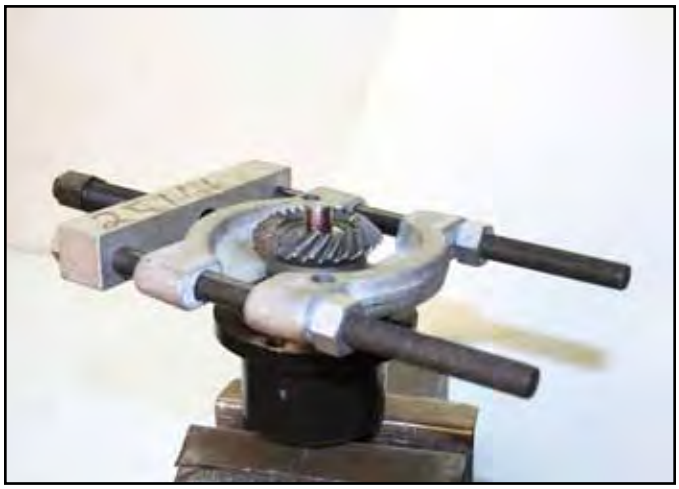

Fig 784 IMG-8499

17. Remove the key from the shaft keyway (Fig. 785).

Fig 785 IMG-8501

18. Place the pinion shaft assembly in a press, shaft side down. Press the pinion shaft assembly out of the pinion housing (Fig. 786).

Fig 786 IMG-8503

19. Remove the bearing and shaft assembly from the pinion housing (Fig. 787).

Fig 787 IMG-8504

7

20. Remove the grease seal from the shaft (Fig. 788).

Fig 788 IMG-8507a

21. Place the shaft assembly in a press and press the bearing off the shaft (Fig. 789).

Fig 789 IMG-8509a

22. Place the pinion housing in a vise and remove the inner and outer bearing races from the housing (Fig. 790).

Note: The inner race and housing must be heated to remove the races.

Fig 790 IMG-8514a

Cross Shaft Teardown

23. Place the cross shaft in a press with the pinion gear bearing facing up.

24. Press the pinion gear and bearing off the cross shaft (Fig. 791).

Fig 791 IMG-8517a

25. Remove the key from the shaft keyway (Fig. 792).

Fig 792 IMG-8519a

26. Position the cross shaft in the press so the opposite bearing is facing up. Press the bearing off the shaft (Fig. 793).

Fig 793 IMG-8520a

Open End Cap Teardown

27. Remove the oil seal from the open end cap (Fig. 794).

Fig 794 IMG-8536a

28. Remove the bearing race from the open end cap (Fig. 795).

Note: The inner race and housing must be heated to remove the race.

Fig 795 IMG-8537a

Closed End Cap Teardown

29. Remove the bearing race from the closed end cap (Fig. 796).

Note: The inner race and housing must be heated to remove the race.

Fig 796 IMG-8537a

Closed End Cap Rebuild

30. Press the bearing race into the open end cap (Fig. 797).

Fig 797 IMG-8537a

Open End Cap Rebuild

31. Press the oil seal into the open end cap (Fig. 798).

Fig 798 IMG-8538a

32. Press the bearing race into the open end cap (Fig. 799).

Fig 799 IMG-8537a

Cross Shaft Rebuild

33. Place the cross shaft in the press and press a new bearing onto the shaft (Fig. 800).

Fig 800 IMG-8525a

34. Install the key into the shaft keyway (Fig. 801).

Fig 801 IMG-8519a

35. Place the cross shaft in a press with the installed bearing down.

36. Align the keyway in the pinion gear with the key installed in the shaft. Press the pinion gear onto the shaft (Fig. 802).

Fig 802 IMG-8529a

37. Press the bearing onto the shaft (Fig. 803).

Fig 803 IMG-8530a

Pinion Shaft Rebuild

38. Press a new bearing race into the outer end of the pinion housing (Fig. 804).

Fig 804 IMG-8532a

39. Press a new bearing race into the inner end of the pinion housing (Fig. 805).

Fig 805 IMG-8534a

40. Place the pinion shaft assembly in a press and press the bearing onto the shaft (Fig. 806).

Fig 806 IMG-8540a

41. Slide the bearing and shaft assembly into the pinion housing (Fig. 807).

Fig 807 IMG-8541a

42. Place the assembly into a press and press a new bearing into the pinion housing (Fig. 808).

Fig 808 IMG-8542a

43. Install the key into the pinion shaft keyway (Fig. 809).

Fig 809 IMG-8543a

44. Align the keyway in the pinion gear with the key installed in the shaft. Press the pinion gear onto the shaft (Fig. 810).

Fig 810 IMG-8546a

45. Install a washer onto the pinion shaft (Fig. 811).

Fig 811 IMG-8547a

46. Install the lock nut onto the pinion shaft (Fig. 812).

Note: Secure the assembly in a vise and tighten the lock nut enough to draw the gear and washer until the bearings bind slightly. Back off the nut approximately 1/8 of a turn.

Fig 812 IMG-8494a

47. Place a protective wrap around the shaft keyway to protect the grease seal on installation.

48. Press the grease seal into the pinion housing (Fig. 813).

Fig 813 IMG-8550a

Gearbox Assembly

49. Assemble the closed end cap onto the gearbox (Fig. 814).

Note: The end cap is oriented onto the gearbox adjacent to the 2 drain plug holes.

Fig 814 IMG-8554a

50. Install 4 new bolts securing the closed end cap to the gearbox housing. Torque the bolts to 280 – 325 in-lbs. (31.6 – 36.7 Nm) (Fig. 815).

Note: The bolts are to be tightened in a crisscross pattern.

Fig 815 PICT-6429a

51. Insert the cross shaft into the gearbox. Seat the cross shaft bearing into the closed end cap (Fig. 816).

Fig 816 IMG-8558a

52. Install .013” (.33mm) thickness of shims onto the open end cap (Fig. 817).

Note: The shim color corresponds to its thickness:
Blue: .005” (.127mm) thick
Green: .003” (.076mm) thick
Brown: .010” (.254mm) thick

Fig 817 IMG-8561a

53. Install a new end cap o-ring (Fig. 818).

Fig 818 IMG-8562a

54. Apply a protective film onto the shaft keyway.

55. Install the open end cap assembly over the cross shaft and onto the gearbox (Fig. 819).

Fig 819 IMG-8559a

56. Install 4 new bolts securing the open end cap to the gearbox housing. Torque the bolts to 280 – 325 in-lbs. (31.6 – 36.7 Nm) (Fig. 820).

Note: Tighten the bolts in a crisscross pattern.

Fig 820 IMG-8582a

57. Check the cross shaft end play measurement, it should be between .004” and .012” (.101 and .305mm). Adjust the open end cap shims to adjust backlash (Fig. 821).

Fig 821 IMG-8564a

58. Install .013” (.33mm) thickness of shims onto the pinion housing (Fig. 822).

Note: The shim color corresponds to its thickness:
Blue: .005” (.127mm) thick
Green: .003” (.076mm) thick
Brown: .010” (.254mm) thick

Fig 822 IMG-8567a

59. Install a new o-ring onto the pinion housing (Fig. 823).

Fig 823 IMG-8569a

60. Insert the pinion shaft assembly into the gearbox assembly seating the pinion gear into the cross shaft gear (Fig. 824).

Fig 824 IMG-8570a

61. Install 4 new bolts securing the pinion assembly to the gearbox housing. Torque the bolts to 280 – 325 in-lbs. (31.6 – 36.7 Nm) (Fig. 825).

Note: The bolts are to be tightened in a crisscross pattern.

Fig 825 IMG-8580a

62. Check the pinion shaft end play measurement, it should be between .004” and .012” (.101 and .305mm). Adjust the pinion housing shims to adjust backlash (Fig. 826).

Note: Pinion housing shims and open end cap shims should not vary more than .005” (.127mm). If they vary more than that, adjust the cross shaft shimming until a better balance is achieved.

Fig 826 IMG-8572a

63. Fill the gearbox with 6 oz. (.15 liters) of 75W-90 synthetic gear oil with anti-foaming agent until it starts to flow out of the oil plug hole (Fig. 827).

Fig 827 IMG-8574a

64. Install the fill and drain plugs so they are flush with or below the housing mounting surfaces (Fig. 828).

Fig 828 IMG-8578a

Leveling the Mower

Setting up the Machine

1. Position mower on a flat surface.
2. Disengage the PTO, move the motion control levers to the neutral locked position and set the parking brake.
3. Stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
4. Check the tire pressure of all four tires. If needed, adjust to 13 psi (90 kPa).
5. Lower the mower to the 3” (76mm) height-of-cut position.
6. Inspect the four chains. The chains need to have tension.
   - If one rear chain is loose, lower (loosen) the front support arm on the same side. Refer to “Adjusting the Front-to-Rear Mower Pitch” on page 7-81.
   - If one front chain is loose, raise (tighten) the front support arm for that chain. Refer to “Adjusting the Front-to-Rear Mower Pitch” on page 7-81.

Leveling the Mower Side to Side

1. Position the right blade side-to-side (Fig. 829).

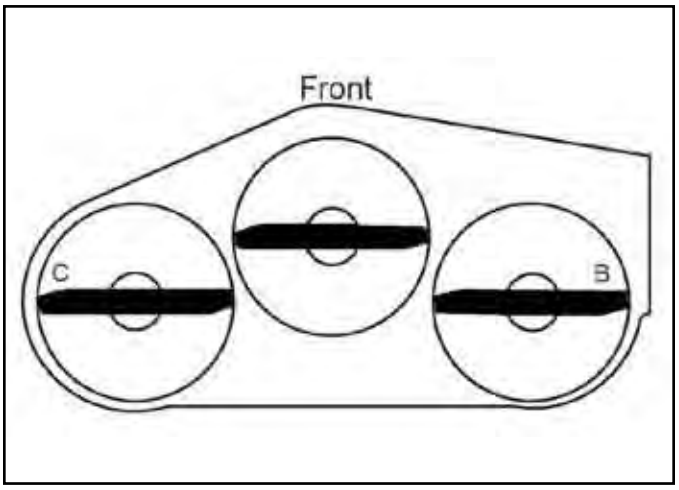

Fig 829 fig. 65 m-1078

2. Measure the right blade at the B location (Fig. 829), from a level surface to the cutting edge of the blade tip (Fig. 830).

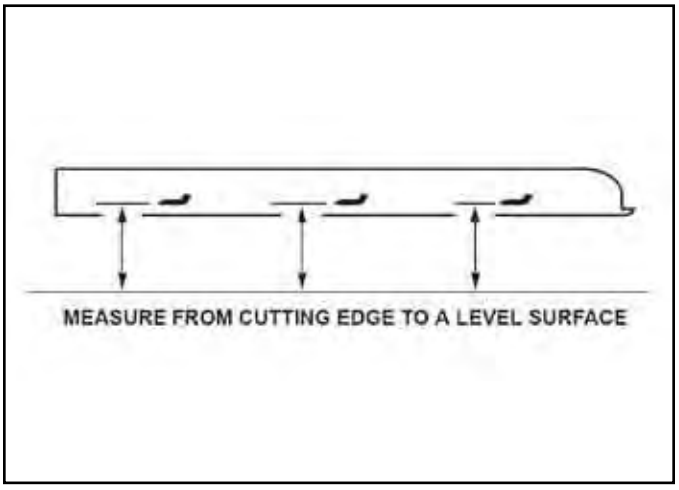

Fig 830 fig. 66 m-2539

3. Record this measurement. The measurement should be 3-1/8” to 3-1/4” (7.9 to 8.3cm).

4. Position the left blade side-to-side (Fig. 829).

5. Measure the left blade at the C location (Fig. 65 m-1078) from level surface to cutting edge of the blade tips (Fig. 66 m-2539).

6. Record this measurement. The measurement should be 3-1/8” to 3-1/4” (7.9 to 8.3cm).

7. If the measurement at positions B or C are not correct, loosen the bolt attaching the rear chain support arm (Fig. 831).

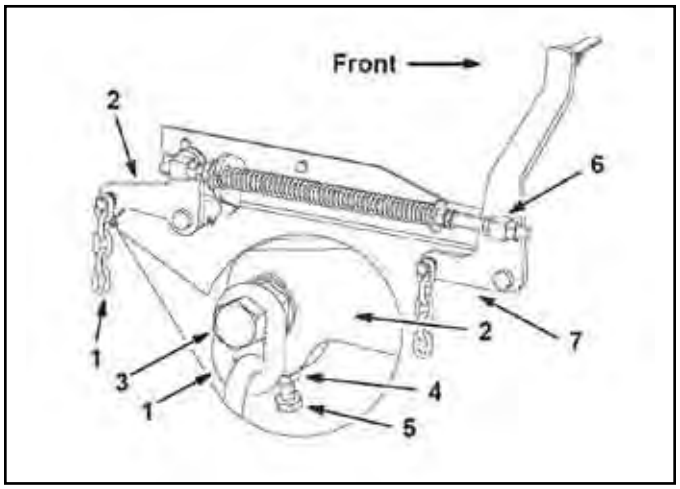

Fig 831 fig. 67 m-6830

1. Rear chain
2. Rear support arm
3. Bolt
4. Jam nut
5. Adjustment bolt
6. Front swivel
7. Front support arm

8. Loosen the jam nut under the rear support arm and use the adjustment bolt to get a measurement of 3-1/8” to 3-1/4” (7.9 to 8.3cm).

Note: Ideally both sides of the mower are set to the same distance.

9. Tighten the jam nut under the rear support arm and tighten the bolt securing the chain to the rear support arm.

Adjusting the Front to Rear Mower Pitch

1. Position the right blade front-to-rear (Fig. 832).

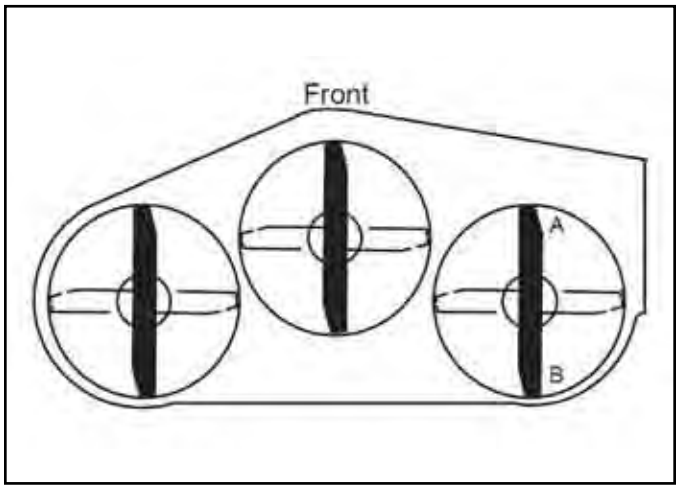

Fig 832 fig. 68 m-1078

2. Measure the right blade at the A location (Fig. 832), from a level surface to the cutting edge of the blade tip (Fig. 833).

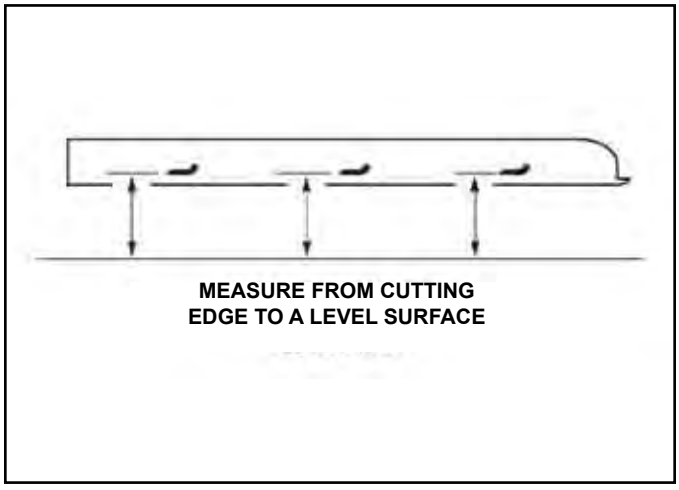

Fig 833 fig. 69 m-2539

3. Record the measurement.
4. Measure the right blade at the B location (Fig. 829) from a level surface to the cutting edge of the blade tip (Fig. 833).
5. Record this measurement.
6. The mower blade should be 1/4” to 3/8” (6 to 10mm) lower at position A than at position B (Fig. 832). If it is not correct, proceed to the following steps.

Note: Both of the front swivels need to be adjusted the same amount to maintain equal chain tension.

7. Loosen the front swivel jam nuts, at the front of the right and left swivels, approximately 1/2” (13mm) (Fig. 834).

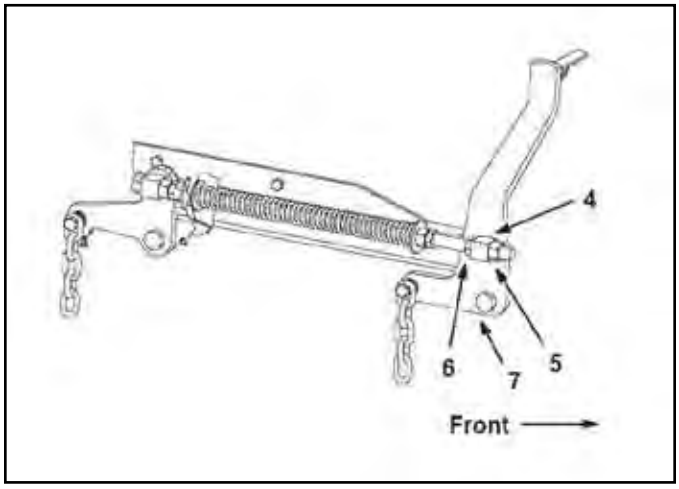

Fig 834 fig. 70 m-6831a

4. Front swivel
5. Swivel jam nut
6. Lift nut
7. Front support arm

7

8. Adjust the lift nuts on both the left and the right side of the machine (Fig. 834 and Fig. 835) to achieve 1/4” to 3/8” (6 to 10mm) lower in front A than in the rear at B (Fig. 832).

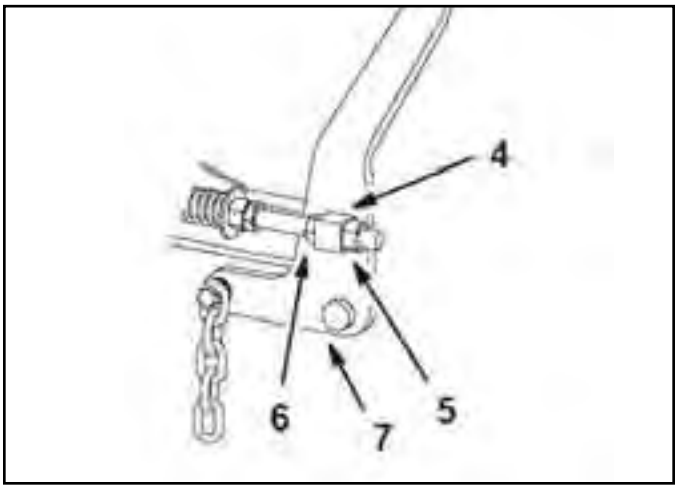

Fig 835 fig. 70 m-6831 rev

4. Front swivel
5. Swivel jam nut
6. Lift nut
7. Front support arm

9. Tighten both swivel jam nuts against the front swivel to lock the height.

10. Check to make sure there is equal tension on chains and adjust again if needed.

Adjusting the Compression Spring

1. Raise the mower lift lever to the transport position.

2. Check the distance between the two large washers, which should be 11-1/2” (29.2cm) (Fig. 836).

3. Adjust this distance, by loosening the spring jam nut and turning the nut in front of each spring (Fig. 836). Turning the nut clockwise will shorten the spring; counter-clockwise will lengthen the spring.

4. Lock the nut into position by tightening the spring jam nut (Fig. 836).

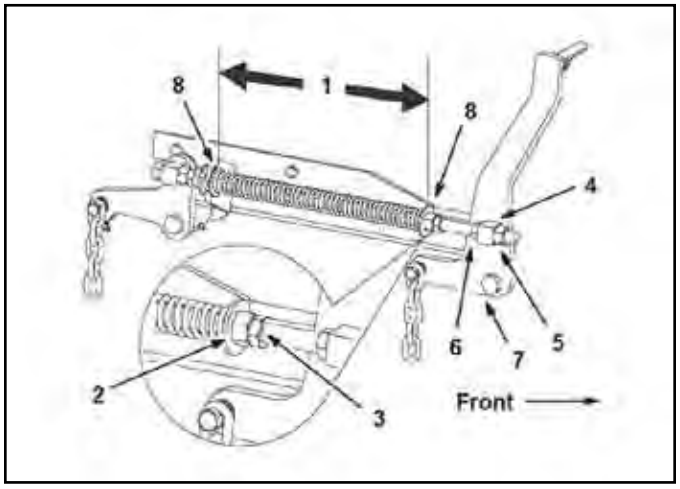

Fig 836 fig. 70 m-6831

1. 11-1/2” (29.2cm) between the large washers
2. Front nut
3. Spring jam nut
4. Front swivel
5. Swivel jam nut
6. Lift nut
7. Front support arm
8. Large washer

Z580/Z589 DFI Z Master

Service Manual

Form No. 492-9215