



LCE Products

Z Master Z597 Diesel Series 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 BDP-10A/16A/21L - Service and Repair Manual Form #492-4789
Wheel Motors:	Parker/Ross Wheel Motor Service Manual Form #492-4753
Diesel Engine:	Briggs & Stratton Daihatsu 3 Cylinder Liquid-Cooled Engine Repair Manual Form #492-0670
Hydraulic Troubleshooting:	Interactive hydraulic troubleshooting and failure analysis on compact disk Form #492-4777
Electrical Troubleshooting:	Interactive electrical troubleshooting and wiring diagrams on compact disk Form # 492-9143

The Z Master 597 model years 2004 and 2005 are covered in this manual. The manual may also be specified for use on later model products.

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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SAFETY INFORMATION

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 Z597 Zero-turn Riding Mower

The riding mower and attachment operator's manual contain safety information and operating tips for safe operating practices. Operator's manuals are available 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.

SPECIFICATIONS

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SPECIFICATIONS

MACHINE PROFILE PHOTOS

2



Fig 001

DSC-2789



Fig 003

DSC-2792



Fig 002

DSC-2790



Fig 004

DSC-2794

SPECIFICATIONS

Item	Specification
Engine	Briggs & Stratton® Vanguard™ Daihatsu® 27 Horsepower Diesel Engine
RPM setting	High RPM Setting (no load) 3850 ± 50 (International: 3450 ± 50) Low RPM Setting 1750
Fuel Capacity	12 gallons (45.4 liters) Diesel Fuel
Length	Z597 – 60" (152.4cm) TF Deck - 81.5" (207cm) Z597 – 72" (182.9cm) TF Deck - 84.5" (214.6cm)
Width	Z597 – 60" (152.4cm) TF Deck - 61.7" (156.7cm) - Deflector 76" (193cm) Z597 – 72" (182.9cm) TF Deck - 73.6" (186.9cm) - Deflector 88" (223.5cm)
Height	74" (188cm) ROPS Height Upright 55" (140cm) ROPS Folded
Weight	Z597 – 60" (152.4cm) TF Deck - 1630 lbs. (739.36kg) Z597 – 72" (182.9cm) TF Deck - 1695 lbs. (768.84kg)
Traction System	(2) Hydro-Gear BDP-21A, 21cc/rev with system check relief (Pump) (2) Parker/Ross MB18, 17.1 cir 1 ¼" Tapered Shaft (Wheel Motor)
Ground Speed	Forward: Infinite 0 – 12 mph Reverse: Infinite 0 – 8 mph
Tires	Rear: 26" x 12" – 12 Front: 13" x 6.5" – 6
Tire Pressure	Rear: 13 psi (90kPa) Front: 13 psi (90kPa)
Attachment Drive	200 ft-lb. electromagnetic clutch (271.16 Nm)
Battery	BCI Group Size: 26 540 cold cranking amps.

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SPECIFICATIONS

Item	Specification
Mower Deck	TURBO FORCE
Deck Construction	Fabricated, High Strength 7-gauge Steel/with Bull-nose Bumper
Deck Depth	5 1/2" (13.97cm)
Mower Baffles	Adjustable Discharge Baffle
Spindle Housing	9 3/8" (23.8cm) Diameter Cast Iron
Spindle Shaft/Bearings	1" (2.54cm) Shaft / Tapered Roller
Blade Tip Speed	18,500+ ft/min (5,638+ m/min)
Blades	1/4" (.635cm) Heat Treated Steel
Discharge Chute	5/16" (.79cm) Rubber
Cutting Height	1-1/2" – 5" (3.81 - 12.7cm)
Carrier Frame Construction	2" x 2" x 3/16" (5.08 x 5.08 x .476cm) Steel
Anti-scalp Rollers	6
Certification	ANSI, CARB, EPA, OSHA

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SPECIFICATIONS

General Specifications

Greasing and Lubrication:

Grease:	No. 2 general purpose lithium base or molybdenum grease.
Where to Add Grease:	See Check Service Reference Aid decal below.

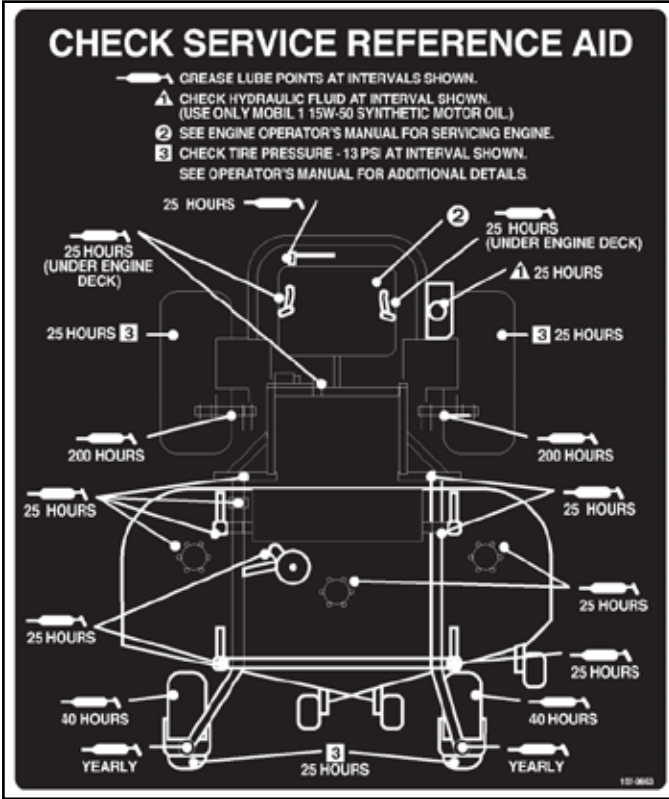


Fig 005

fig. 50 decal

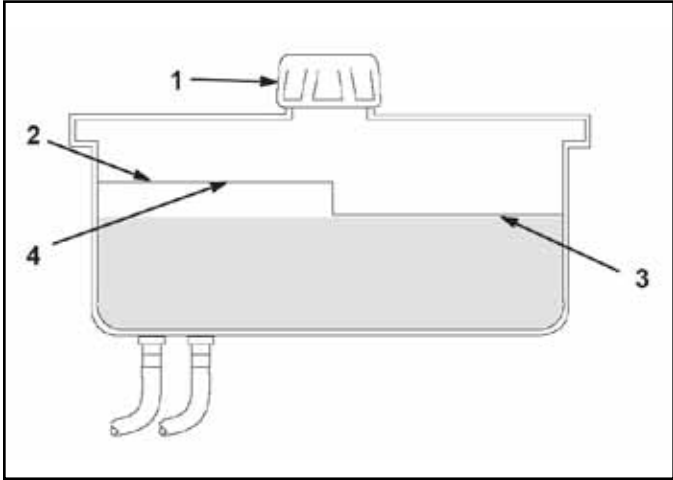


Fig 006

fig. 55 m-5615

- 1. Cap
- 2. Baffle
- 3. Cold fluid level - full
- 4. Hot fluid level - full

Hydraulic System Oil Capacity:	4 quarts (3.8 l)
Fluid Type:	Mobil 1 15W – 50 synthetic motor oil or equivalent synthetic oil
Fluid Level:	Check the fluid level while the fluid is warm. The fluid should be between cold and hot. Note: The fluid level should be to the top of the hot level of the baffle, when the fluid is hot (Fig. 006 above).

SPECIFICATIONS

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Model and Serial Number Location	The unit model and serial number plate is located on the right hand side of the unit, below the right side motion control lever (Fig. 007).
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Fig 007

DSC-2351

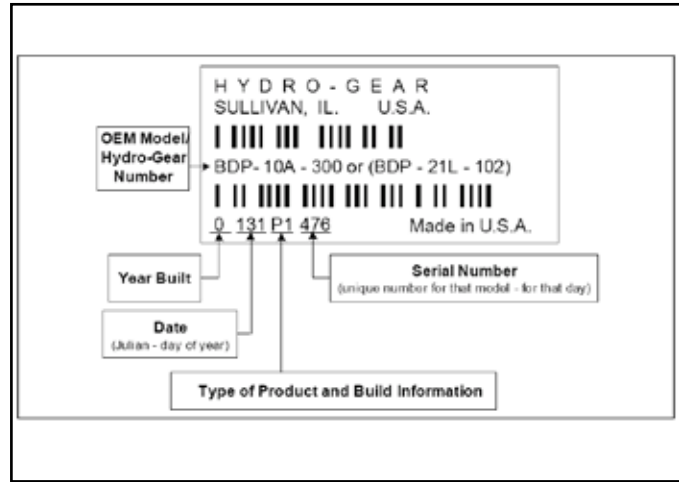


Fig 008

configuration

Engine Model and Serial Number Identification:	Consult the appropriate engine manufacture's service literature for the location and translation of the engine model and serial number information.
Hydrostatic Pumps Model and Serial Number:	The label above (Fig. 008), can be located on the pump housing. It identifies the model and configuration of the BDP pump.

Available Service Manuals / Service Aids

Hydrostatic Pumps:	Hydro-Gear BDP-10A/16A/21L – Service and Repair Manual Form # 492-4789
Wheel Motors:	Parker/Ross Wheel Motor Service Manual Form # 492-4753
Diesel Engine:	Briggs & Stratton Daihatsu 3 Cylinder Liquid-Cooled Engine Repair Manual Form # 492-0670
Hydraulic Troubleshooting:	Interactive hydraulic troubleshooting and failure analysis on compact disk Form #492-4777
Electrical Troubleshooting:	Interactive electrical troubleshooting and wiring diagrams on compact disk Form #492-9143

Torque Specifications

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

These torque specifications for the installation and tightening of fasteners shall apply to all fasteners which do not have a specific requirement identified in the service manual. The following factors shall be considered when applying torque: cleanliness of the fastener, use of a thread sealant (Loctite), degree of lubrication on the fastener, presence of a prevailing torque feature, hardness of the surface underneath of the fastener's head, or similar condition which affects the installation.

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

The standard method of verifying torque shall be performed by marking a line on the fastener (head or nut) and mating part, then back off fastener 1/4 of a turn. Measure the torque required to tighten the fastener until the lines match up.

Fastener Identification

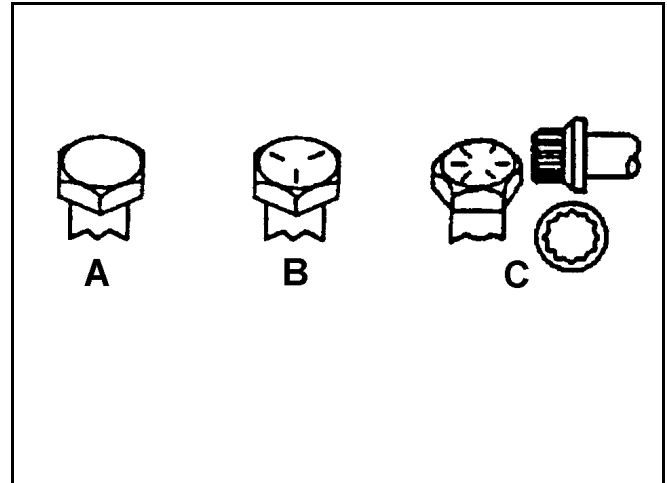


Figure A

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

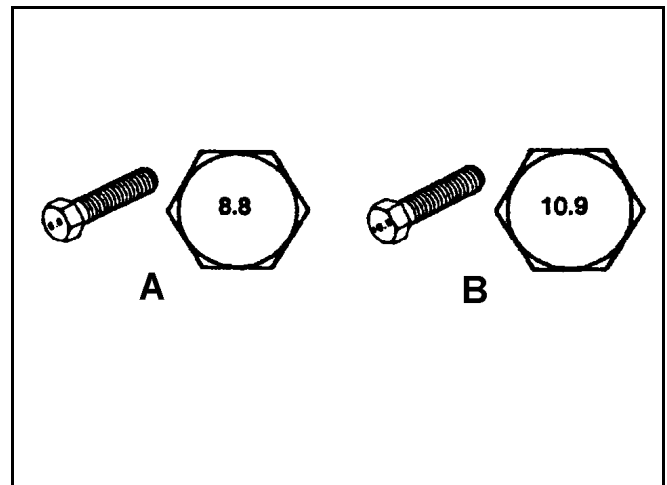


Figure B

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

SPECIFICATIONS

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

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

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

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

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

SPECIFICATIONS

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.

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SPECIFICATIONS

Other Torque Specifications

SAE Grade 8 Steel Set Screws

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

Wheel Bolts and Lug Nuts

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

** For steel wheels and non-lubricated fasteners.

Thread Cutting Screws (Zinc Plated Steel)

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

Thread Cutting Screws (Zinc Plated Steel)

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

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

Conversion Factors

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

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

SPECIFICATIONS

2

Equivalents and Conversions

Decimal and Millimeter Equivalents

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

SPECIFICATIONS

U.S. to Metric Conversions

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

2

Safety Information	1
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CHASSIS

Caster Fork Assembly Removal

1. Raise the front of the unit off the ground, allowing enough clearance to remove the castor fork from the bottom of the hub.
2. With a hammer and chisel, remove the top grease cap (Fig. 009).



Fig 009

mvc-1531

3. Remove the locknut (Fig. 010).



Fig 010

DSC-1532

4. Remove the Belleville washers, caster fork and wheel assembly (Fig. 011).



Fig 011

DSC-1533

Replacing the Caster Bearings

1. Remove the top tapered roller bearing (Fig. 012).



Fig 012

DSC-1534

2. Remove bottom seal and tapered roller bearing (Fig. 013).



Fig 013

DSC-1535

3. With a driver and hammer, remove both the bottom and top tapered bearing cups (Fig. 014).



Fig 014

DSC-1536

4. With a driver and hammer, install new bearing cups. The bearing cups are tapered; make sure the tapered/thicker end of the cup is installed inward for the top and bottom end (Fig. 015). Tap the bearing cups in until they seat against the step in the caster hub.



Fig 015

DSC-1537

CHASSIS

5. Pack the upper and lower tapered bearings prior to installation (Fig. 016).



Fig 016

DSC-1539

Castor Fork Assembly

1. Install the castor fork into the frame (Fig. 018).



Fig 018

DSC-1533

6. Install the lower bearing and seal, with the open end of the seal facing up (Fig. 017).



Fig 017

DSC-1538

2. Install the upper bearing.
3. Install the Belleville (spring) washers as shown in (Fig. 019).
 - A. Dust Cap
 - B. Locknut
 - C. Spring Washers

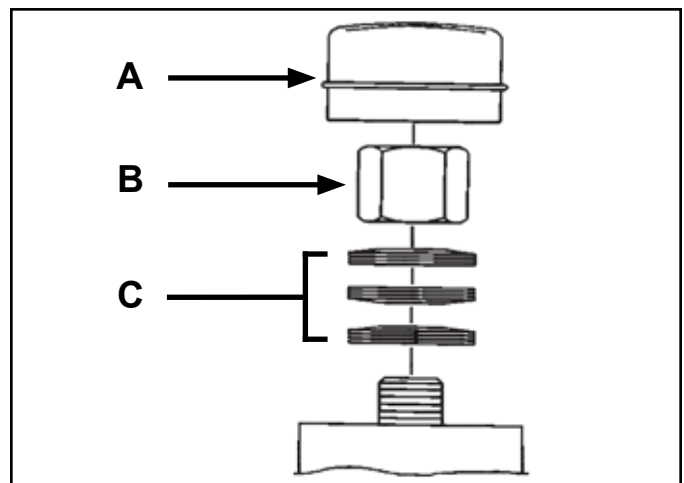


Fig 019

washers line art

4. Install the locknut and tighten until the spring washers are flat, then back off 1/4 turn to properly set the preload on the bearings (Fig. 020).



Fig 020

DSC-1532

6. Remove the grease fitting and install the grease plug.
7. Install the dust cap on the caster hub (Fig. 022).



Fig 022

DSC-1541

5. Remove the plug located on the side of the hub on the frame for the castor fork. Install a grease fitting. Pump grease into the housing until grease is passing through the upper bearing (Fig. 021).



Fig 021

DSC-1540

Front Wheel Removal and Bearing Replacement

1. Raise the front of the unit off the ground.
2. Remove the wheel bolt from the fork (Fig. 023).



Fig 023

DSC-1543

CHASSIS

3. Remove bearing spacers and the front caster spacer. Remove the seals located on each side of the wheel and both the tapered bearings (Fig. 024).

- | | |
|-------------------|-------------------------|
| A. Bearing Spacer | D. Caster Spacer |
| B. Bearing Seal | E. Retaining wheel nut |
| C. Taper Bearing | F. Retaining wheel bolt |

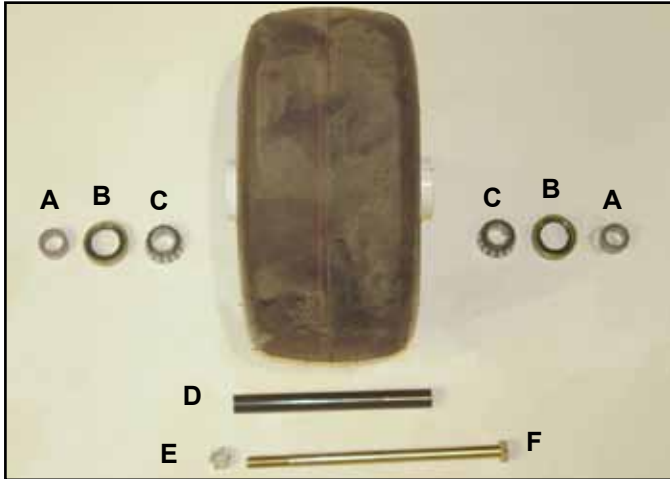


Fig 024

DSC-1546

4. Pack both tapered wheel bearings. Reassemble per Fig. 024. Pump grease into the wheel bearings through the grease fitting located on the rim (Fig. 025).



Fig 025

DSC-1547

Fuel Tank Removal

Right Side Fuel Tank Removal

1. Disconnect the negative battery cable. Empty the fuel tank.
2. Remove the fuel hose at the bottom of the fuel tank (Fig. 026).



Fig 026

DSC-1548

3. Remove the fuel return line located on the inside of the fuel tank (Fig. 027).



Fig 027

DSC-1549

4. Remove the front bolt, spacer, washer, and nut that secure the fuel tank bracket to the frame (Fig. 028).



Fig 028

DSC-1550

6. Remove bolt, washer, and nut securing the right rear of the fuel tank bracket to the frame (Fig. 030).

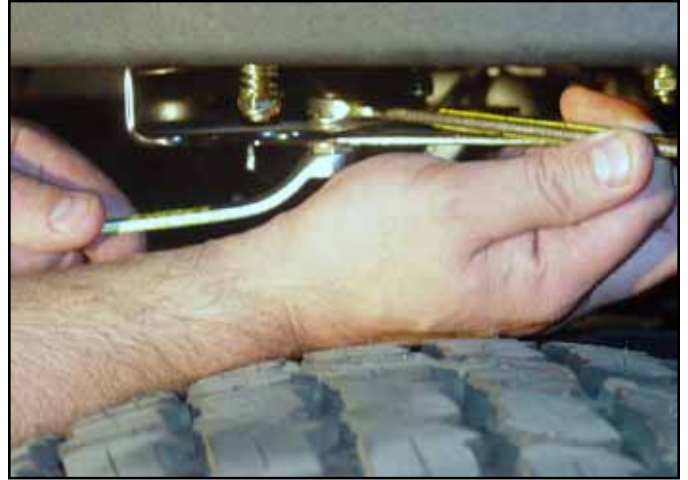


Fig 030

DSC-1553

5. Remove the bolt, washer, and nut securing the left rear of the fuel tank bracket to the frame (Fig. 029).



Fig 029

DSC-1552

7. Remove the tank from the frame (Fig. 031).



Fig 031

DSC-1555

CHASSIS

8. Remove the fuel tank bracket by removing 3 locknuts and springs and 1 bolt (Fig. 032).

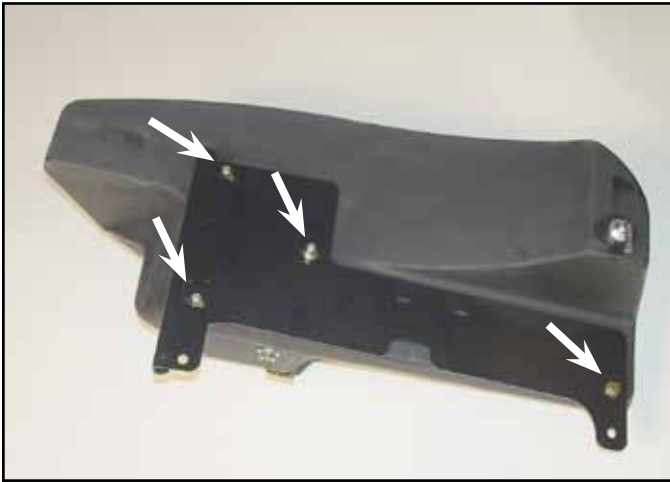


Fig 032

DSC-1556

Right Side Fuel Tank Installation

Reverse the order of removal.

Note: When tightening the nuts and springs on the fuel tank bracket, Do Not over-tighten the nuts. Tighten the nuts until there are three threads showing on the threaded stud (Fig. 033).

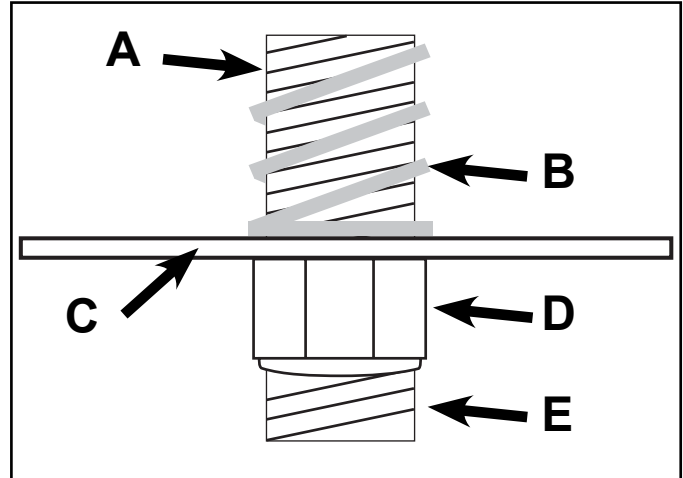


Fig 033

3 thread above nut

- | | |
|------------------------|--------------|
| A. Tank Stud | D. Nut |
| B. Compression Spring | E. 3 Threads |
| C. Tank mounting Plate | |

Left Side Fuel Tank Removal

1. Disconnect the negative battery cable. Empty the fuel tank.

2. Remove the 4 screws retaining the control panel and control panel shield to the tank (Fig. 034).



Fig 034

DSC-1563

5. Remove the return fuel line, located on the inside of the fuel tank (Fig. 036).



Fig 036

DSC-1565

3. Carefully remove the control panel and control panel shield by lifting the panel and sliding it to the middle of the unit.

NOTE: It is not necessary to disconnect any cables or wiring.

4. Unplug the 3 connectors that plug into the delay module (Fig. 035).

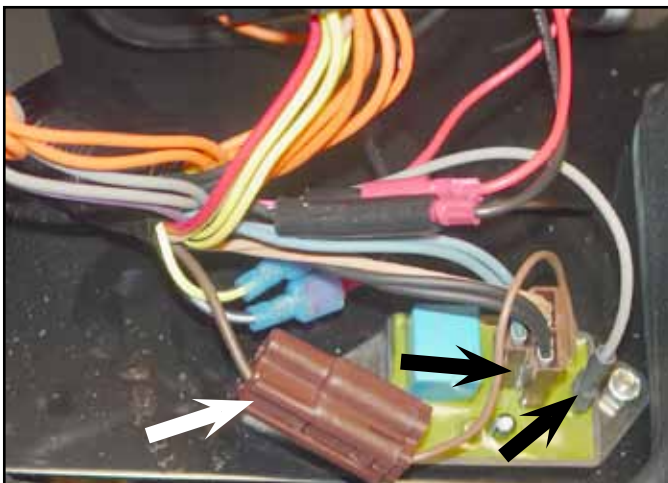


Fig 035

DSC-1578

6. Remove the fuel line, located under the front of the fuel tank (Fig. 037).



Fig 037

DSC-1566

CHASSIS

7. Remove the front bolt, spacer, washer, and nut that secure the fuel tank bracket to the frame (Fig. 038).



Fig 038

DSC-1568

9. Remove the bolt, washer, and nut that retain the fuel tank bracket to the frame. They are located under the left rear of the fuel tank (Fig. 040).

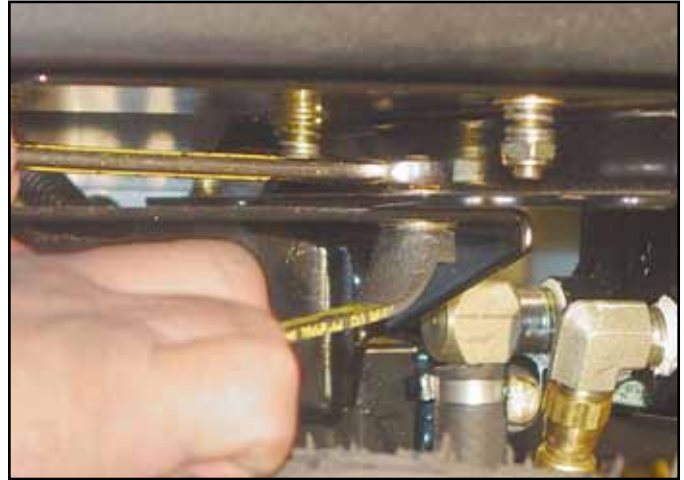


Fig 040

DSC-1573

8. Remove the bolt, washer, and nut that retain the fuel tank bracket to the frame. They are located under the right rear of the fuel tank (Fig. 039).



Fig 039

DSC-1571

10. Remove the fuel tank from the frame (Fig. 041).



Fig 041

DSC-1575

- Remove the fuel tank bracket by removing 3 locknuts, springs, and 1 bolt (Fig. 042).

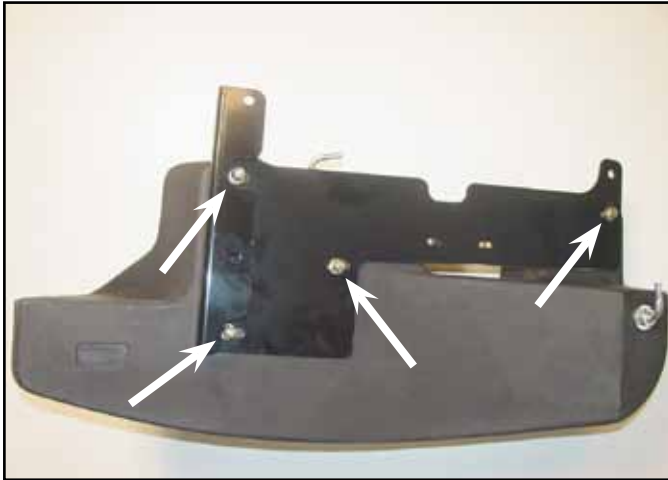


Fig 042

DSC-1576

Left Side Fuel Tank Installation

Reverse the order of removal.

Note: When tightening the nuts and bolts, Do Not over-tighten the nuts. Tighten until there are 3 threads showing on the threaded stud (Fig. 043).

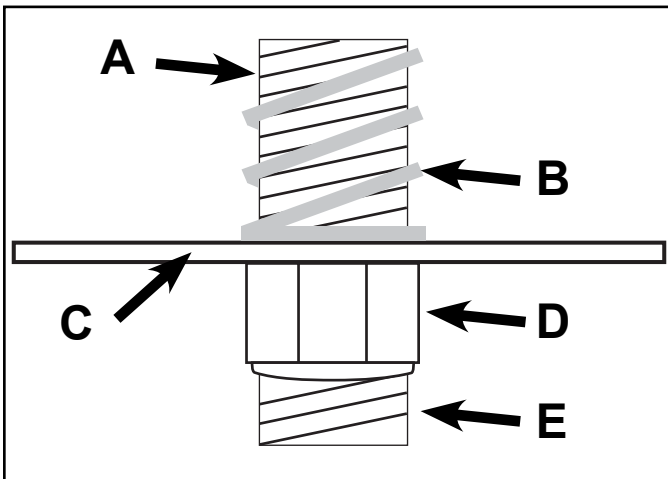


Fig 043

3 thread above nut

- | | |
|------------------------|--------------|
| A. Tank Stud | D. Nut |
| B. Compression Spring | E. 3 Threads |
| C. Tank mounting Plate | |

Hood Assembly Removal

- Unhook the two rubber latches located on the rear of the hood.
- Remove the two hairpins, clevis pins, and washers located in the front left and right side of the hood (Fig. 044).



Fig 044

DSC-1579

- Lift the hood and remove the stop lanyards located on each side of the hood. Remove the hood from the frame of the unit (Fig. 045).



Fig 045

DSC-1581

CHASSIS

Hood Assembly Installation

Reverse the order of removal.

Throttle Control Replacement

1. Disconnect the negative battery cable.
2. Remove the 4 screws retaining the control panel to the fuel tank (Fig. 046).



Fig 046

DSC-1584

3. Remove the ball knob located on the throttle control by applying upward pressure under the knob (Fig. 047).



Fig 047

DSC-1586

4. Remove the two locknuts and carriage bolts retaining the throttle cable assembly (Fig. 048).



Fig 048

DSC-1591

5. Disconnect the end of throttle cable at the swivel clamp, located on the throttle linkage at the injector pump (Fig. 049).



Fig 049

DSC-1592

6. Loosen the screw on the throttle casing clamp and remove the throttle cable (Fig. 050).

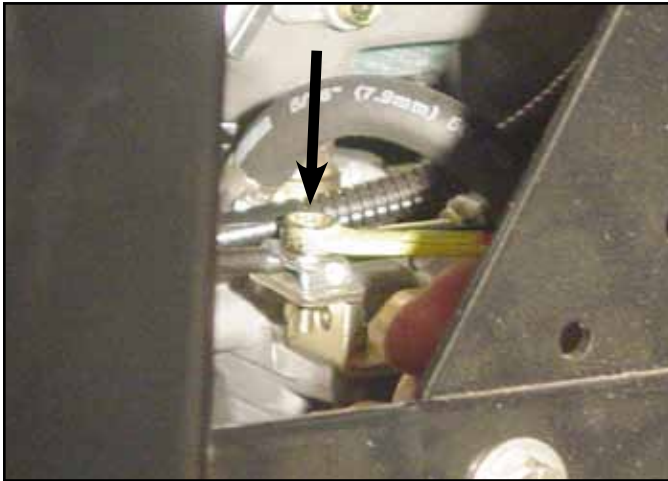


Fig 050

DSC-1593

7. Keeping the tie straps in place, slide the throttle cable through the two tie straps to remove it from the machine. One tie strap is located at the radiator fan motor mount, Ref. A, and the other is at the engine removal bracket, Ref. B (Fig. 051).

NOTE: DO NOT cut or remove the tie straps.

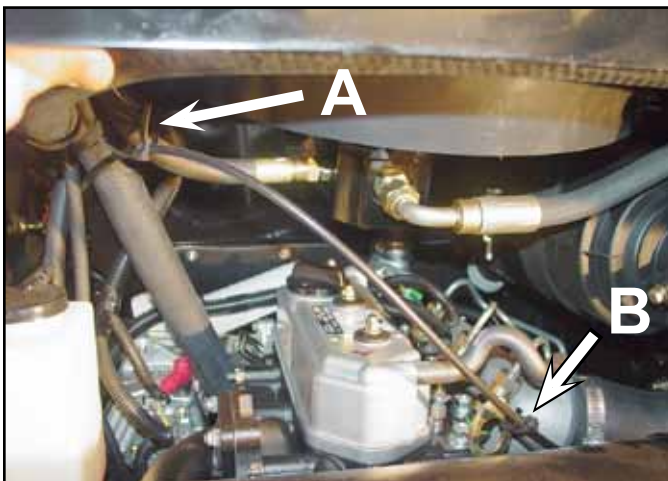


Fig 051

DSC-1594

Installation

1. Install the throttle control in the control plate. Install the two carriage bolts and nuts and tighten (Fig. 052).



Fig 052

DSC-1596

2. Feed the throttle cable through the tie strap on the radiator fan motor mount (Fig. 053).



Fig 053

DSC-1597

CHASSIS

3. Route the throttle cable through the tie strap located on the engine lifting bracket (Fig. 054).



Fig 054 DSC-1599

5. Install the throttle cable on the inside of the casing clamp, DO NOT tighten (Fig. 056).

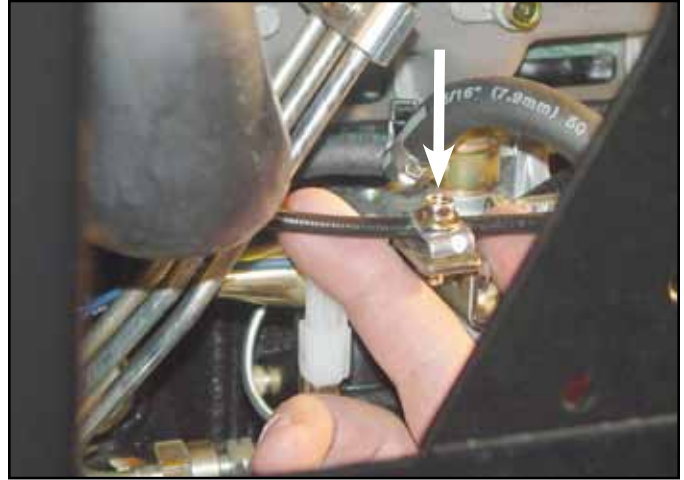


Fig 056 DSC-1605

4. The throttle cable is then routed around the fuel pump injector lines and through the swivel clamp.

Note: The cable wire should be routed through the swivel clamp, with the swivel clamp washer located under the cable wire (Fig. 055).

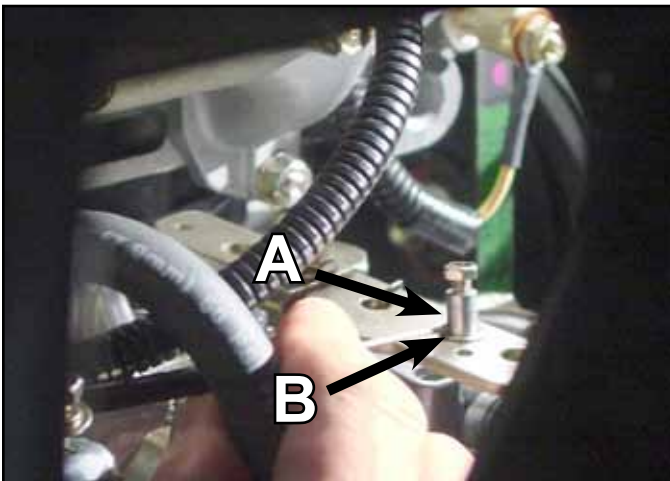


Fig 055 DSC-1600

A. Cable wire B. Washer

6. Install control panel to the fuel tank mount location (Fig. 057).



Fig 057 DSC-1606

7. Install throttle control knob and position throttle control lever to the idle position (Fig. 058).



Fig 058

DSC-1608

9. Tighten the cable housing clamp (Fig. 060).

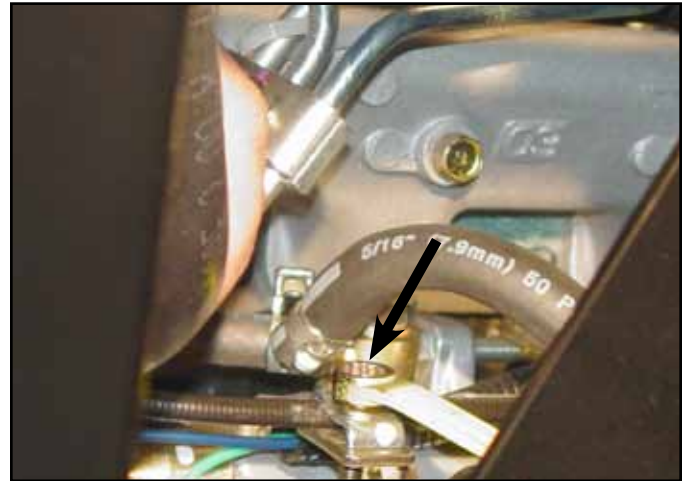


Fig 060

DSC-1616

8. Position the throttle cable swivel clamp until 1/4" (6.35mm) of the throttle cable wire protrudes through the opposite end of the clamp. Carefully tighten the swivel clamp screw (Fig. 059).

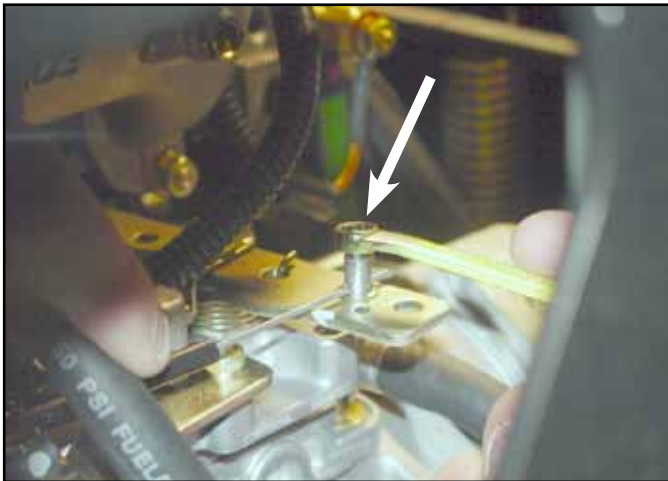


Fig 059

DSC-1614

10. Move the throttle control lever to the Full speed position. Verify injector pump arm contacts the high speed stop screw (Fig. 061).

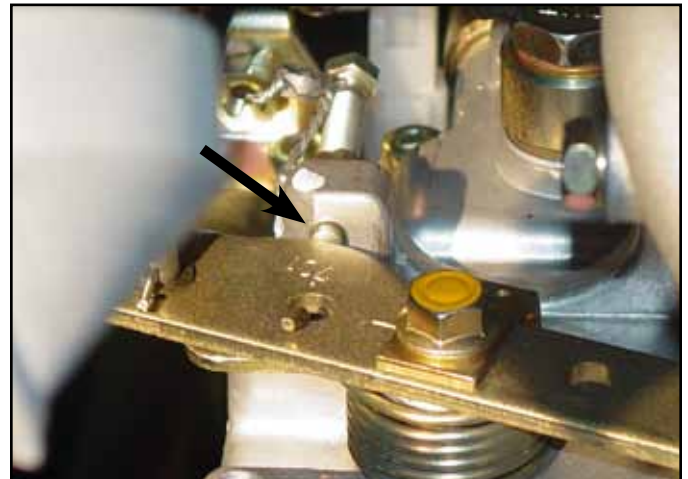


Fig 061

DSC-1617

CHASSIS

Brake Lever Removal

1. Release the parking brake (forward position).
2. Remove the cotter pin and clevis pin from the brake rod yoke (Fig. 062).



Fig 062

DSC-1618

4. Remove the brake shaft cotter pin (Fig. 064).

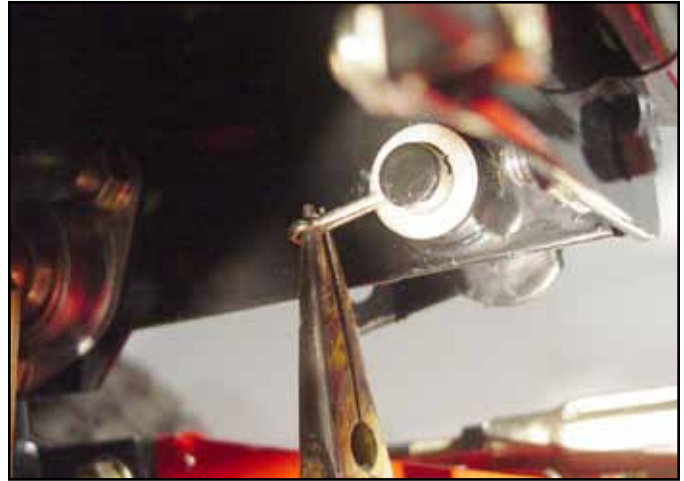


Fig 064

DSC-1620

3. Lift the floor pan assembly to access the brake lever shaft and cotter pin (Fig. 063).



Fig 063

DSC-1619

5. Slide the brake shaft out of the frame pivot bushings (Fig 065).



Fig 065

DSC-1621

- Using a hammer and punch, drive both brake lever control bearings from the brake pivot (Fig. 066).



Fig 066

DSC-1622

- Inspect the brake shaft and bushings for excessive wear. Replace any worn or broken components (Fig. 067).

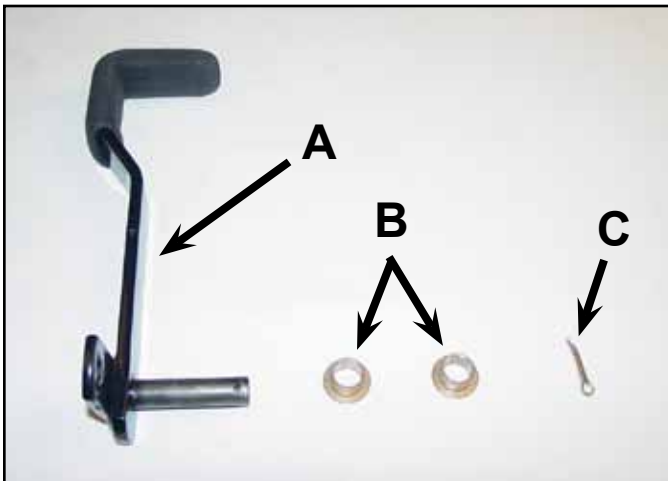


Fig 067

DSC-1623

- A. Brake Lever
- B. Bushings

- C. Cotter Pin

Brake Lever Installation

Reverse the order of removal

Brake Band Removal

- Raise the left rear tire off the ground (Fig. 068).



Fig 068

DSC-1624

- Remove the four wheel lug bolts.

CHASSIS

3. Remove bolts, brake band retainer, spacers, and brake band (Fig. 069).

- A. 3 Bolts
- B. Brake Band Retainer
- C. 3 Spacers
- D. Brake Band

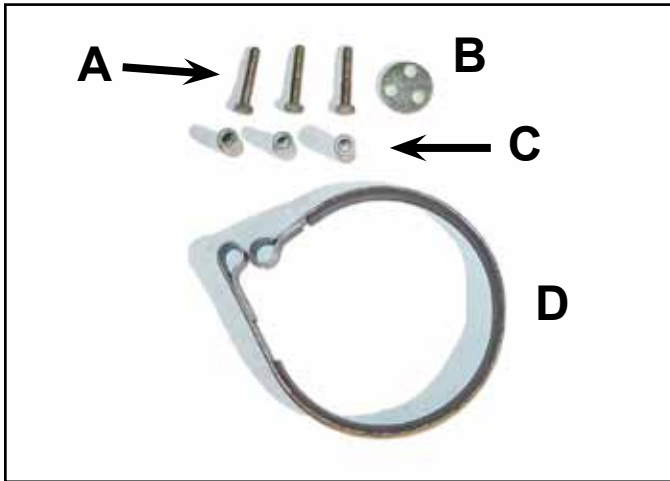


Fig 069

DSC-1626

2. Install the 3 bolts, brake band retainer, brake band, and spacers and tighten (Fig. 071).



Fig 071

DSC-1631

3. Install tire assembly and the 4 wheel bolts.

Brake Band Installation

1. Install the brake band around the wheel hub (Fig. 070).



Fig 070

DSC-1629

Brake Cross Shaft Removal

1. Raise the rear end of the unit and remove the right and left rear tires.

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

2. Remove the clevis spring pin from the brake rod and remove the rod (Fig. 072).



Fig 072

DSC-1632

4. On the right side, remove the cotter pin and clevis pin from the lower brake linkage assembly (Fig. 074).



Fig 074

DSC-1634

3. Remove the cotter pin and clevis pin from the left side lower brake linkage assembly (Fig. 073).



Fig 073

DSC-1633

5. On the right side, remove the two bolts and nuts holding the flange bearing (Fig. 075).



Fig 075

DSC-1635

3

CHASSIS

6. On the left side, remove the two bolts, spacers, and nuts holding the flange bearing (Fig. 076).



Fig 076

DSC-1636

8. Inspect brake shaft and flange bushings for excessive wear (Fig. 078).

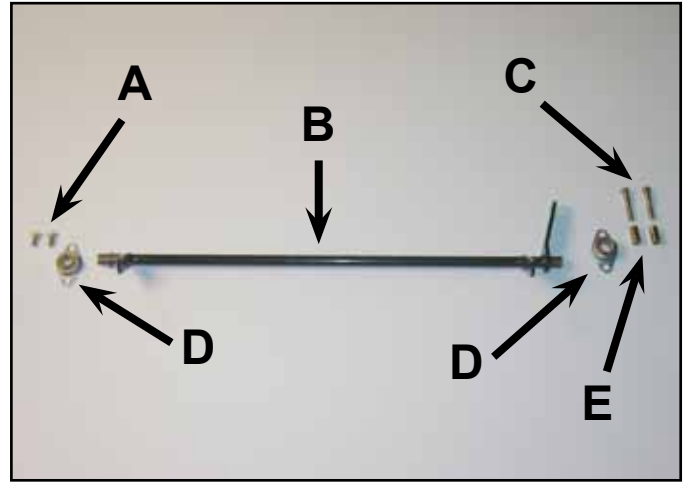


Fig 078

DSC-1638

- | | |
|----------------------|-------------------|
| A. RH Mounting Bolts | D. Flange Bearing |
| B. Brake Shaft | E. Spacers |
| C. LH Mounting Bolts | |

7. Remove the brake shaft from the frame (Fig. 077).



Fig 077

DSC-1637

Brake Shaft Installation

1. Install the flange bearing on the right side of the shaft. From the outside of the frame, align the flange bearing holes with the frame mounting holes. Install mounting hardware and tighten (Fig. 079).



Fig 079

DSC-1640

2. Install the flange bearing over the left side of the brake shaft, flange facing outward. Install mounting bolts from the outside of the flange, through brake retainer spacers, and through the frame.

Note: Before tightening the mounting hardware, be sure that the brake lever arm is pointing upward between the mounting hardware (Fig. 080).

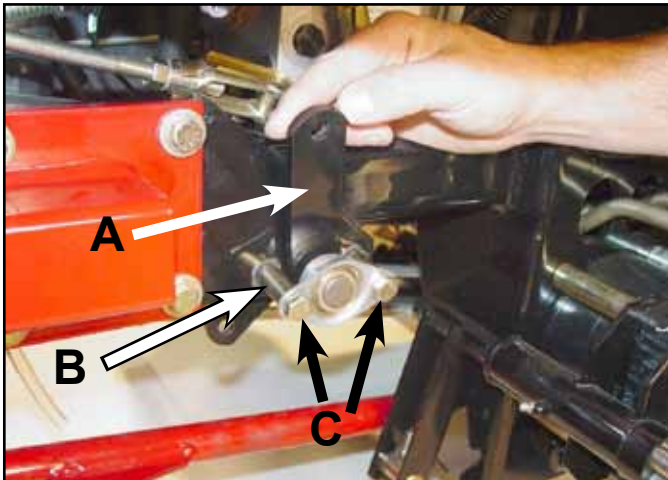


Fig 080

DSC-1641

- A. Brake Lever Arm
- B. Spacer
- C. Bolt

3. Install clevis pin connecting the lower brake assembly to brake shaft. Install cotter pin into clevis pin (Fig. 081). Repeat procedure for right side.



Fig 081

DSC-1643

3

4. Install clevis spring pin connecting brake rod to brake shaft. Rotate clevis spring pin until it clips onto brake rod clevis (Fig. 082).

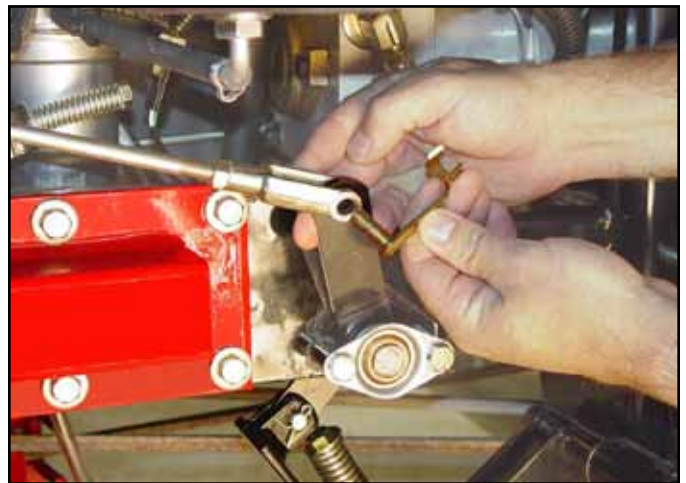


Fig 082

DSC-1644

5. Install left and right rear tires. Torque wheel mounting bolts to 95 ft-lbs (128.8 Nm).

CHASSIS

Adjusting the Parking Brake

Check the parking brake for proper adjustment.

1. Disengage the brake lever (lever down).
2. Measure the length of the spring. The measurement should be 2-3/4" (70mm) between the washers (Fig. 083).

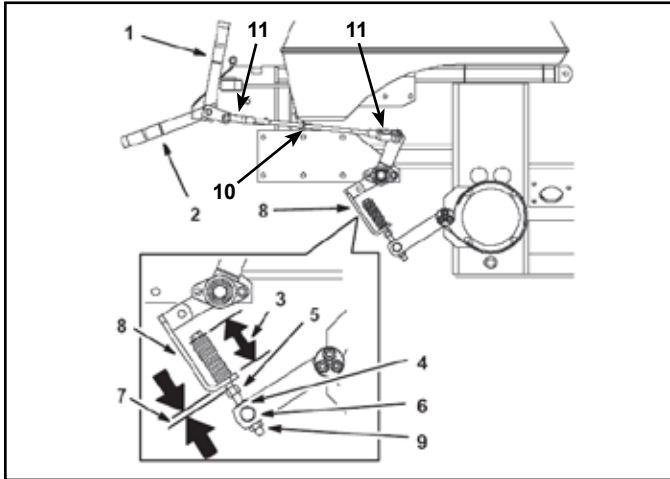


Fig 083

m-7417

- | | |
|---------------------------------|----------------------------------|
| 1. Brake lever - engaged | 7. 1/4 - 5/16" (5 - 8mm) |
| 2. Brake lever - disengaged | 8. Spring bracket |
| 3. Spring, 2-3/4" (70mm) | 9. Lock nut below trunion roller |
| 4. Jam nut above trunion roller | 10. Brake rod |
| 5. Nut below spring bracket | 11. Yoke |
| 6. Trunion roller | |

3. If an adjustment is necessary, loosen the jam nut below the spring and tighten the nut directly below the yoke (Fig. 083). Turn the nut until the correct measurement is obtained. Tighten the two nuts together and repeat on the opposite side of the unit.
4. Turn the nuts clockwise to shorten the spring length and counterclockwise to lengthen the spring.
5. Engage the parking brake (lever up).
6. Measure the distance between the spring bracket and the adjusting nut under spring bracket. The measurement should be 1/4 - 5/16" (5 - 8mm) (Fig. 083).
7. If adjustment is necessary, loosen the jam nut directly above the trunion roller. Turn the lock nut below the trunion roller until the correct measurement is obtained (Fig. 083).
8. Tighten the jam nut directly above the trunion roller (Fig. 083).

Note: If the 1/4 - 5/16" (5 - 8mm) can not be achieved, remove a pin from either yoke at the ends of the brake rod. Adjust the length of the rod so 1/4 - 5/16" (5 - 8mm) can be achieved and install the brake rod.

Deck Lift Lever Removal

1. Park the machine on a level surface, disengage the blade control (PTO), and turn the ignition key to *OFF* to stop the engine. Remove the ignition key.
2. Remove the lower stop bolt from the deck lift plate (Fig. 084).

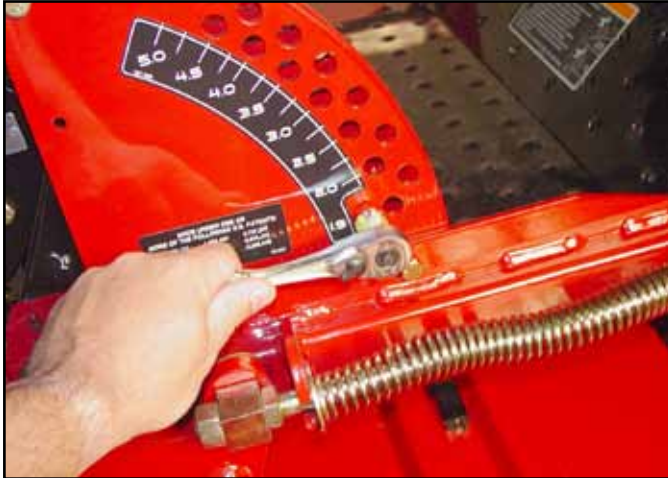


Fig 084

DSC-1647

3. With the mower deck in the transport position, place a 4"x 4" block under each corner of the deck. Lower the mower deck onto the support blocks to remove the weight from the support chains (Fig. 085).



Fig 085

DSC-1648

4. Loosen jam nuts on LH and RH deck lift rods until deck support springs are fully extended (Fig. 086).



Fig 086

DSC-1649

5. Remove hex nut from RH rear deck lift assembly. Repeat procedure for LH rear deck lift assembly (Fig. 087).



Fig 087

DSC-1650

CHASSIS

- Lower lift lever to its lowest position. Rear deck swivel mounts should clear deck lift rods on both sides. The mower deck lift linkage should now be fully unloaded (Fig. 088).

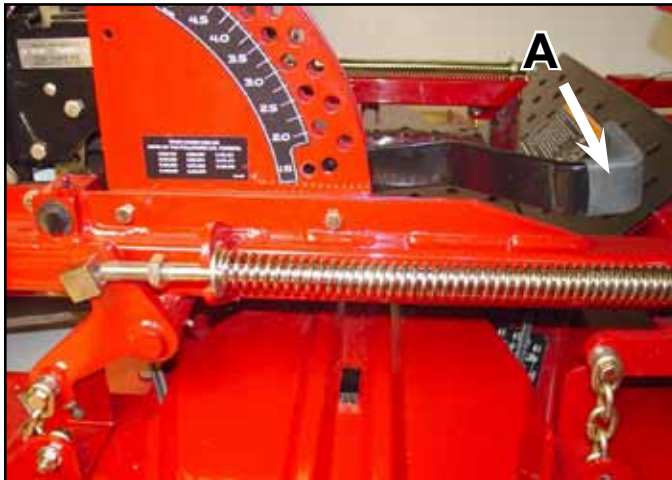


Fig 088

DSC-1651

A. Lift Lever at lowest position

- Loosen the top hex head flange nut at the deck lift plate mounting location. Pivot the INNER deck lift plate up and back toward the RH motion control lever (Fig. 090).



Fig 090

DSC-1653

- Remove hex bolt, nut, and lift lever bushing from the lower deck lift plate mounting location (Fig. 089).

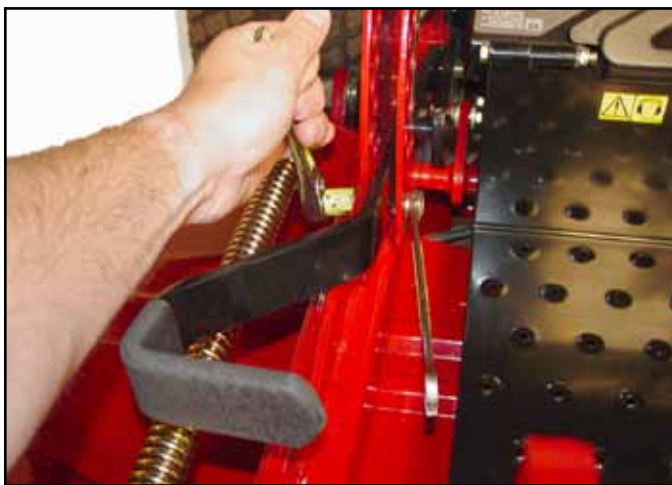


Fig 089

DSC-1652

- Lift the floor pan assembly to its fully opened position (Fig. 091).



Fig 091

DSC-1654

10. Remove hex bolt, bushing, and nylock nut connecting the deck lift arm plates to the mower deck rear cross-shaft lift assembly (Fig. 092).



Fig 092

DSC-1655

12. When removing the lift lever you may experience interference with the RH floor pan hinge or the front edge of the RH motion control plate, or both (Fig. 094).

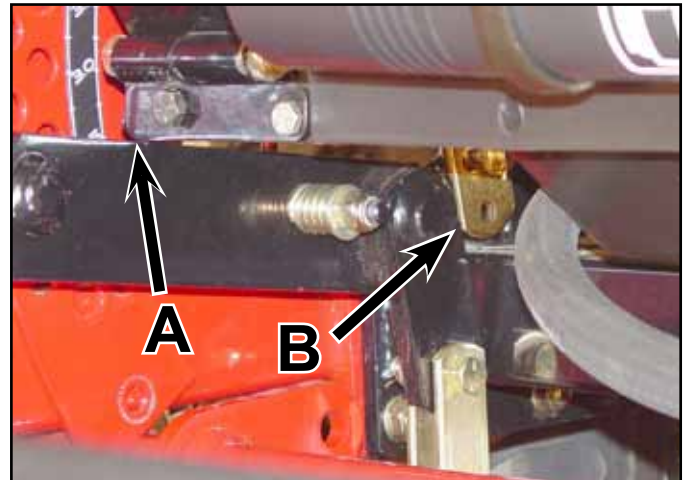


Fig 094

DSC-1657

11. Remove retainer clip from lift lever (Fig. 093).

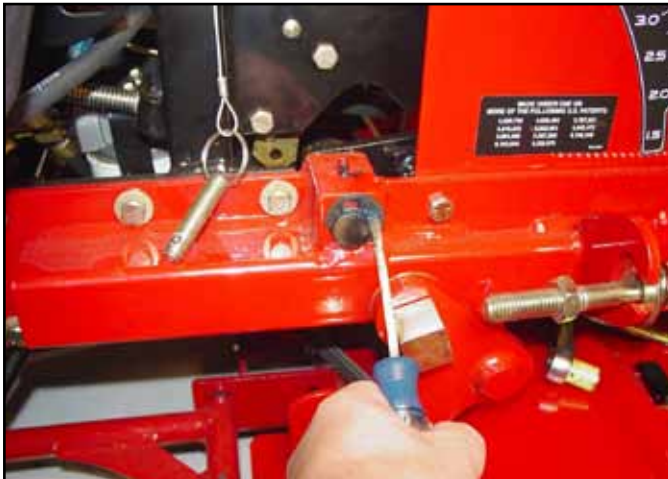


Fig 093

DSC-1656

13. If the lift lever contacts the RH floor pan hinge, loosen the RH floor pan hinge mounting hardware. Push the RH hinge upward. Re-tighten the RH floor pan hinge mounting hardware (Fig. 095).

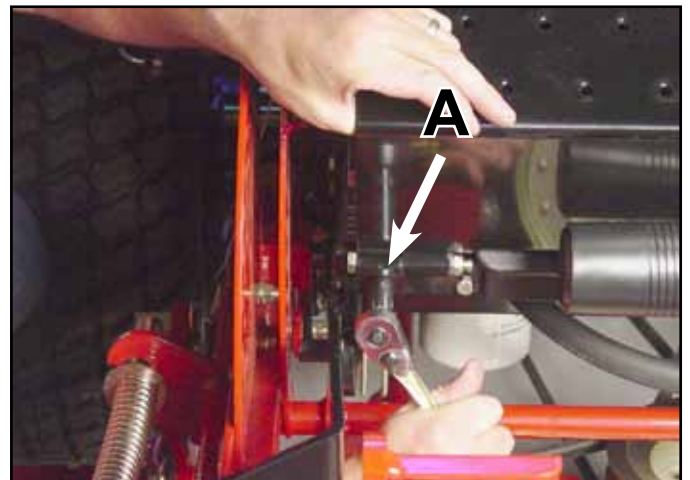


Fig 095

DSC-1661

- A. RH Floor pan hinge

CHASSIS

14. If the lift lever contacts the RH motion control plate, tilt and hold the floor pan assembly slightly forward. Move the RH motion control lever out of the neutral lock position and push it in the full forward position. Using a tie strap or wire, tie the floor pan assembly to the motion control arm to hold the floor pan assembly in place (Fig. 096).



Fig 096

DSC-1665

Deck Lift Lever Installation

1. For ease of installation, make sure deck lift arm plates, bushing, and hardware are installed on the lift lever grip assembly prior to installation as shown (Fig. 098).

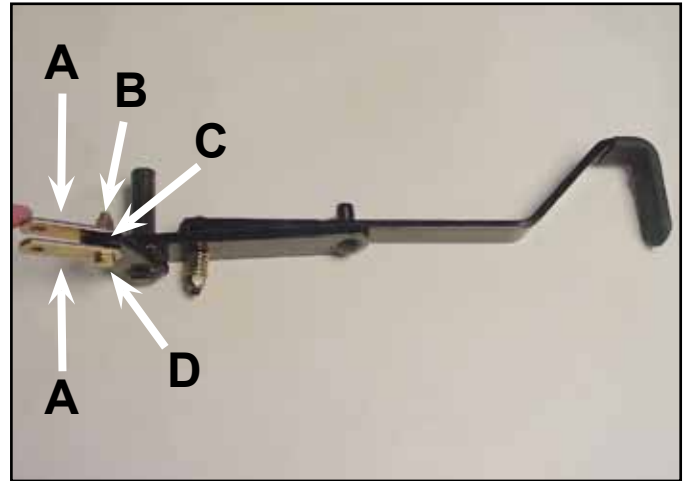


Fig 098

DSC-1668

- | | |
|----------|------------|
| A. Plate | C. Bushing |
| B. Nut | D. Bolt |

15. Carefully slide the lift lever assembly out of its carrier frame pivot (Fig. 097).



Fig 097

DSC-1667

2. Install lift lever assembly into front frame pivot location (Fig. 099).



Fig 099

DSC-1670

3. Install retainer clip to lift lever shaft (Fig. 100).



Fig 100

DSC-1672

5. Install hex bolt through deck lift plates and rear lift arm cross shaft bushing. Install nylock nut and tighten (Fig. 102).

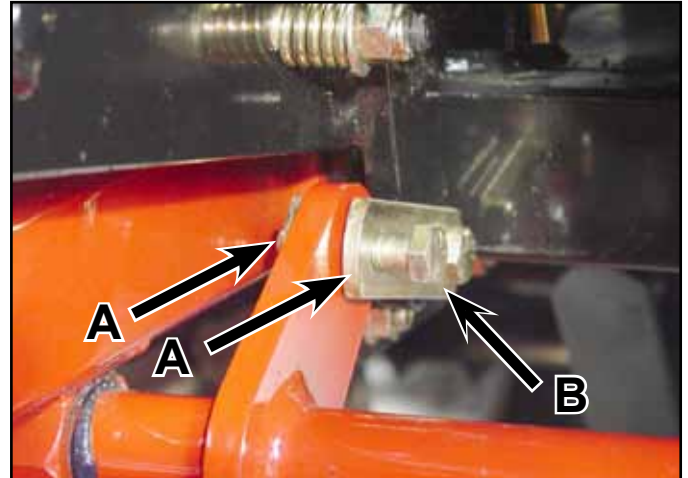


Fig 102

DSC-1675

4. Install bushing into rear lift arm cross shaft (Fig. 101).

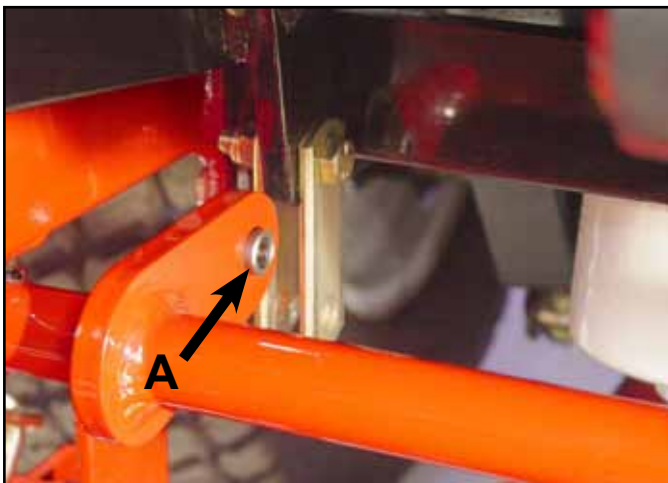


Fig 101

DSC-1674

A. Bushing

6. Rotate deck lift plate (inner) downward until lower mounting holes line up with hole in carrier frame and deck lift plate (outer). From the outside of the frame, install hex bolt, spacer, and flanged lock nut as shown. Tighten bolt (Fig. 103).

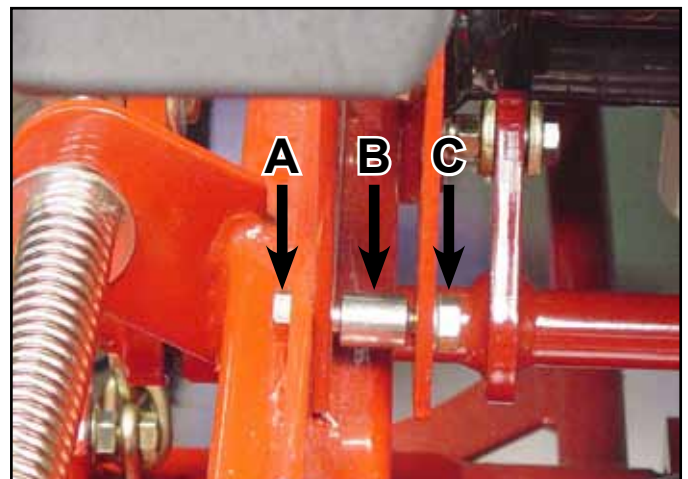


Fig 103

DSC-1677

A. Hex Bolt
B. Spacer

C. Flanged Lock Nut

CHASSIS

7. Align rear deck mount swivels with ends of deck lift rod (Fig. 104).



Fig 104 DSC-1680

8. Raise lift lever until deck mount swivels rest against deck rod jam nuts. Install HOC pin into deck lift plate height of cut holes to hold lift lever in this position (Fig. 105).

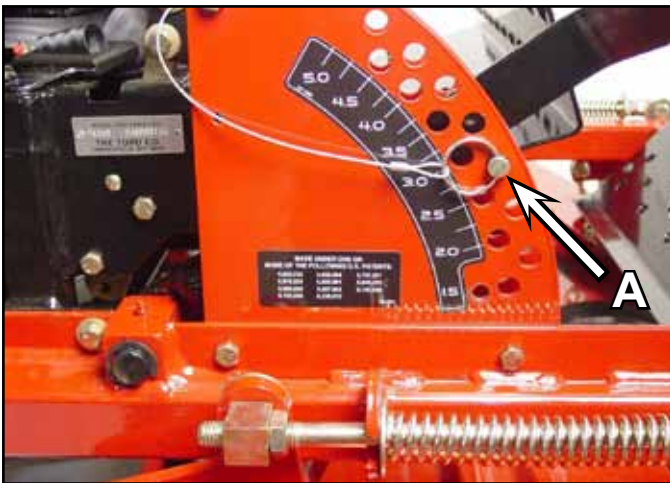


Fig 105 DSC-1681

A. HOC Pin

9. Install lower “stop” bolt through inner and outer deck lift plates. Install nylock nut and tighten until hex nut and bolt are seated firmly against the deck lift plates. DO NOT over-tighten or deck lift plates will deform inward causing height of cut hitch pin assembly to bind (Fig. 106).



Fig 106 DSC-1682

10. Install hex nut on end of deck lift rod. Tighten against deck mount swivel. Repeat procedure for opposite side deck lift rod (Fig. 107).

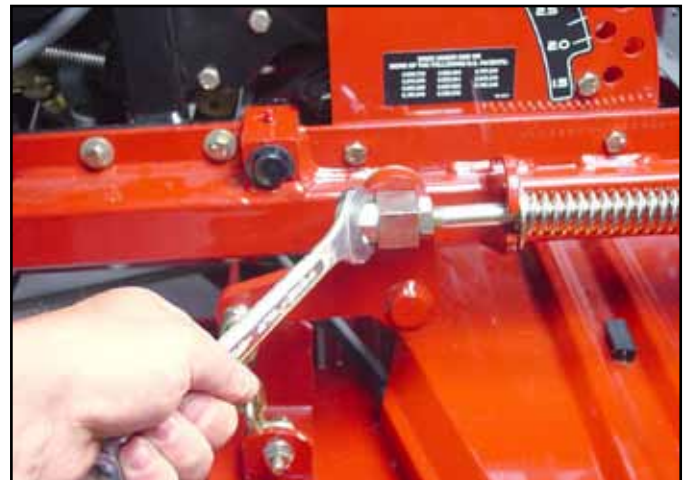


Fig 107 DSC-1683

11. Raise mower deck to the transport position. Remove support blocks. Check deck level adjustment (refer to the Leveling the Mower procedure, pg 7-46). Readjust compression spring length by turning front nut. Spring should be compressed to a length of 11-1/2" (29.2cm) between washers. Lock the front nut into position by tightening the spring jam nut (Fig. 108).



Fig 108

DSC-1685

12. Untie the floor pan assembly and lower. Return motion control lever to its neutral locked position.

Motion Control Assembly Removal

1. Remove both floor pan assembly hinge bolts (Fig. 109).



Fig 109

DSC-1686

2. Remove floor pan assembly (Fig. 110).



Fig 110

DSC-1689

CHASSIS

3. Remove (4) pocket mounting bolts (Fig. 111).



Fig 111

DSC-1690

5. Remove the two bolts retaining the lever assembly to the control arm shaft (Fig. 113).



Fig 113

DSC-2062

4. Remove pocket (Fig. 112).



Fig 112

DSC-1691

6. Disconnect motion control dampener from motion control assembly (Fig. 114).

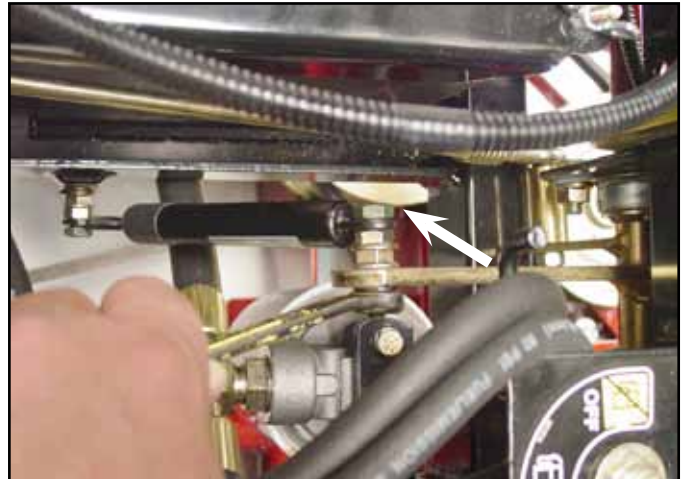


Fig 114

DSC-1695

7. Disconnect neutral switch wire harness from neutral switch (Fig. 115).

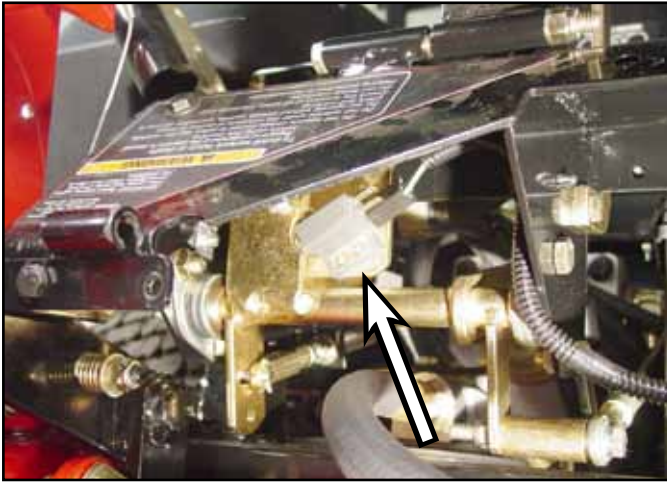


Fig 115

DSC-1693

9. Remove the cotter pin and clevis pin through the adjustable yoke for the neutral return bolt (Fig. 117).



Fig 117

DSC-2064

8. Remove bolt, spacer, and nut that retains the ball joint to the motion control (Fig. 116).



Fig 116

DSC-2063

10. Remove the two bolts and nuts that retain the flange bearing on the inside of the motion control (Fig. 118).



Fig 118

DSC-2066

CHASSIS

11. Remove the two bolts and nuts that retain the flange bearing on the outside of the motion control (Fig. 119).

Motion Control Assembly Installation

Reverse the order of removal



Fig 119

DSC-2067

12. Remove the motion control from the frame (Fig. 120).



Fig 120

DSC-2068

Safety Information	1
Specifications	2
Chassis	3
Hydraulic System	4
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Mower Decks	7

HYDRAULIC SYSTEM

Hydrostatic Pump Removal

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 by using a solvent wash and air drying is usually adequate. As with any precision equipment, all parts must be kept free of foreign material and chemicals. Protect all exposed sealing areas and open cavities from damage and foreign material.

Upon removal, all seals, O-rings, and gaskets should be replaced. Lightly lubricate all seals, O-Rings and gaskets with clean petroleum jelly prior to installation.

This procedure is showing the LH Hydrostatic Pump being removed. Use these same procedures to remove the RH Hydrostatic Pump.

1. Disconnect the negative and positive battery cables. Remove the battery from the unit.
2. Using compressed air, clean the area around the hydrostatic pump. Perform additional cleaning as needed to make sure it is free from any dirt and debris.
3. Remove the two knobs located on the engine access panel assembly. Remove both engine belt shield and the engine access panel (Fig. 121).



Fig 121

DSC-2071

4. Using a 3/8" drive ratchet, insert the drive end into the square hole in the pump belt tensioner arm. Relieve the tension on the hydrostatic pump v-belt and remove the belt (Fig. 122).



Fig 122

DSC-2073

5. Remove the bolt and nut retaining the hydro pump control linkage to the hydro control arm (Fig. 123).



Fig 123

DSC-2081

HYDRAULIC SYSTEM

6. Remove the case drain hydraulic hose, located on the left hand side of the hydrostatic pump (Fig. 124).

Note: When removing hydraulic hoses from the pump, cap the hose and the fitting on the hydrostatic pump. This is to make sure dirt and debris does not enter these areas.



Fig 124

DSC-2083

Note: Before removing the hydraulic lines from the hydrostatic pump, mark or tag one of the hoses to make sure they are reconnected correctly.

7. Remove the two hydraulic hoses on the bottom of the hydrostatic pump that go to the hydraulic motor (Fig. 125). Install caps on the hydraulic hoses and fittings.



Fig 125

DSC-2087

8. Remove the hydraulic suction line from the top of the hydrostatic pump (Fig. 126). Install caps on the hydraulic line and on the fitting.



Fig 126

DSC-2088

4

HYDRAULIC SYSTEM

9. Using a 12-point 3/8" socket, loosen the two set screws located on the hydro pump hub. Slide the hydrostatic pump hub and pulley off the hydrostatic pump shaft. Remove the key on the hydrostatic pump shaft (Fig. 127).



Fig 127

DSC-2089

11. Cut the two cable ties that hold the fuel line and the wiring harness (Fig. 129).



Fig 129

DSC-2092

10. Loosen and remove the two bolts and nuts retaining the hydrostatic pump to the frame (Fig. 128).



Fig 128

DSC-2091

12. Remove the hydrostatic pump from the frame (Fig. 130).



Fig 130

DSC-2094

13. For service work on the hydrostatic pump refer to the Hydro-Gear Service Manual, Form 492-4789.

HYDRAULIC SYSTEM

Hydrostatic Pump Installation

Note: Prior to connecting the hydraulic lines, replace the O-Rings with new ones and lightly lubricate with petroleum jelly.

1. Install the hydrostatic pump to the frame. Install and tighten the two bolts and nuts (Fig. 131).



Fig 131

DSC-2091

2. Install the key on the hydrostatic pump shaft; make sure the key is facing up on the shaft (Fig. 132).



Fig 132

DSC-2095

Note: Before installing the pulley, replace the set screws. The end of the set screws have a knurled cup point for retention and must not be re-used.

3. Install pulley and hydro pump hub on the hydrostatic pump shaft and key. Align the center of the hydrostatic pump pulley with the center of the idler pulley (Fig. 133).

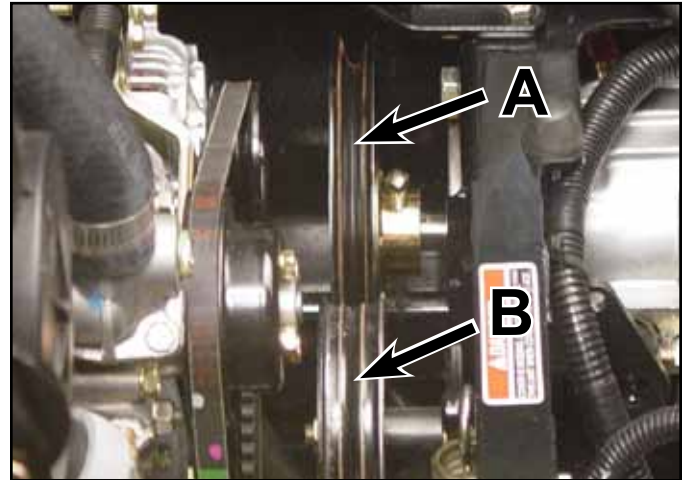


Fig 133

DSC-2097

A. Pump pulley

B. Idler Pulley

4. Tighten the two sets screws on the pulley using a 12-point 3/8" (9.5mm) socket (Fig. 134).



Fig 134

DSC-2089

4

HYDRAULIC SYSTEM

5. Install the hydraulic suction line on the top of the hydrostatic pump (Fig. 135).



Fig 135

DSC-2088

7. Install the case drain hydraulic line, located on the left hand side of the pump (Fig. 137).



Fig 137

DSC-2099

6. Install the two hydraulic hoses that run from the hydraulic wheel motor to the bottom of the hydrostatic pump (Fig. 136).



Fig 136

DSC-2098

8. Install and tighten the bolt and nut retaining the hydro pump control linkage to the hydro control arm (Fig. 138).



Fig 138

DSC-2081

Remember to install the hydraulic hoses to the correct port on the hydrostatic pump. If the lines are reversed, the hydrostatic wheel motor will turn in the direction opposite of motion control position.

Note: It may be easier to remove the rear tire assembly for installation of the bottom and side hydraulic hoses.

HYDRAULIC SYSTEM

- Using a 3/8" drive ratchet, insert the wrench into the square hole in the pump belt tensioner arm and relieve the tension to install the hydrostatic pump v-belt (Fig. 139).



Fig 139

DSC-2073

- Install two cable ties for the fuel line and the wiring harness (Fig. 140).



Fig 140

DSC-2101

- Install the battery in the unit and connect the positive and negative battery cables.
- Check the hydraulic fluid in the reservoir tank. Add oil if necessary, refer to Figure 006, page 2-5. Air will need to be purged in the system. Follow the procedures on Purging the Hydraulic System, page 4-13.
- Check the neutral adjustment. Follow procedures for Adjusting the Handle Neutral, page 4-24.
- Install the engine belt shield and the engine access panel. Install the two knobs (Fig. 141).



Fig 141

DSC-2071

HYDRAULIC SYSTEM

Wheel Motor Removal

1. Disconnect the battery negative cable.
2. Raise the rear wheels of the machine off the ground and support frame with jackstands. Remove the rear wheel (Fig. 142).



Fig 142

DSC-2102

4. Loosen and remove nut securing hub to the wheel motor output shaft (Fig. 144).



Fig 144

DSC-2105

3. Apply the parking brake and remove the cotter pin from the wheel motor output shaft (Fig. 143).



Fig 143

DSC-2103

5. Remove the 3 bolts securing the brake band to the actuator (Fig. 145).



Fig 145

DSC-2106

HYDRAULIC SYSTEM

6. Remove the brake band from the hub (Fig. 146).



Fig 146

DSC-2107

7. Install a wheel puller on to the hub and remove the hub from the motor output shaft (Fig. 147).



Fig 147

DSC-2108

Note: The Hub Removal Tool (TOR 4097) can also be used and is available through your Toro Distributor.

8. Clean any dirt or debris away from the hydraulic line fittings. Remove the hydraulic lines.

Note: Cap the fittings and hoses to prevent dirt from entering the hydraulic system (Fig. 148).



Fig 148

DSC-2110

9. Remove the front two wheel motor mounting bolts, lock washers, and nuts (Fig. 149).



Fig 149

DSC-2111

HYDRAULIC SYSTEM

10. Swing the brake linkage forward out of the way of the wheel motor. It may be necessary to loosen the back two bolts to remove the spacers (Fig. 150).



Fig 150

DSC-2113

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. 152). 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 152

DSC-2117

A. Short Spacer

B. Long Spacer

4

11. Remove the back two bolts, lock washers, spacers, and nuts and remove the wheel motor from the frame (Fig. 151).



Fig 151

DSC-2114

12. For service work on the wheel motor refer to the Parker/Ross Service Manual, Form #492-4753.

HYDRAULIC SYSTEM

1. Install wheel motor in the frame. Loosely install the back two bolts, long spacers, lock washers and nuts (Fig. 153).



Fig 153

DSC-2116

3. Install the two front bolts, short spacers, lock washers, and nuts through the wheel motor, brake linkage and frame (Fig. 155).



Fig 155

DSC-2120

2. Align the brake linkage up with the two front bolt holes (Fig. 154).



Fig 154

DSC-2119

4. Install the two rear bolts and long spacers through the wheel motor and frame.
5. Torque the bolts to 80 to 90 ft-lbs. (108 to 122 Nm) (Fig. 156).



Fig 156

DSC-2122

4

HYDRAULIC SYSTEM

6. Install and tighten the hydraulic lines (Fig. 157).



Fig 157

DSC-2123

8. Install the nut on the wheel motor shaft, DO NOT tighten (Fig. 159).



Fig 159

DSC-2126

7. Install wheel hub assembly, making sure the woodruff key is in place (Fig. 158).



Fig 158

DSC-2125

9. Install spacers, brake band retainer, and brake band around the wheel hub and tighten all three retainer bolts (Fig. 160).



Fig 160

DSC-2106

4

HYDRAULIC SYSTEM

10. Install rear wheel and wheel lug nuts and tighten.
11. Engage parking brake, torque the wheel hub nut to 125 ft-lbs. (169 Nm) (Fig. 161). Install cotter key through the nut and motor wheel shaft.

Note: Re-torque nut at 100 hours, and every 500 hours thereafter. Washer 1-523157 can be added under nut to keep cotter pin engaged with nut castellation.



Fig 161

DSC-2128

12. Check the park brake and adjust park brake if necessary. Refer to Adjusting the Parking Brake, page 3-22.
13. Reconnect the battery negative cable.
14. Check the hydraulic fluid in the reservoir tank. Add oil if necessary. Air will need to be purged in the system. Follow the procedures on Purging the Hydraulic System, page 4-13.

Purging the Hydraulic System

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

1. Raise the machine so wheels are off the ground and support with jack stands (Fig. 162).



Fig 162

DSC-2352

2. Start the engine and run at low idle speed. Slowly engage the motion control lever. If the wheel does not rotate immediately, it may be necessary to spin the wheel by hand to start purging air that is trapped in the system (Fig. 163).



Fig 163

DSC-2353

HYDRAULIC SYSTEM

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 and add fluid as required to maintain proper level.
5. Repeat this procedure on the opposite wheel.

Hydraulic Fan Pump Removal

Note: Cleanliness is a key factor in a successful repair of any hydraulic system. Thoroughly clean all exposed surfaces prior to any type of maintenance. Cleaning all parts by using a solvent wash and air drying is usually adequate. As with any precision equipment, all parts must be kept free of foreign material and chemicals. Protect all exposed sealing areas and open cavities from damage and foreign material.

Upon removal, all seals, O-rings, and gaskets should be replaced. Lightly lubricate all seals, O-rings and gaskets with clean petroleum jelly prior to installation.

1. Loosen the 4 bolts on the rear bumper assembly and remove.

Note: DO NOT remove the bolts (Fig. 164).

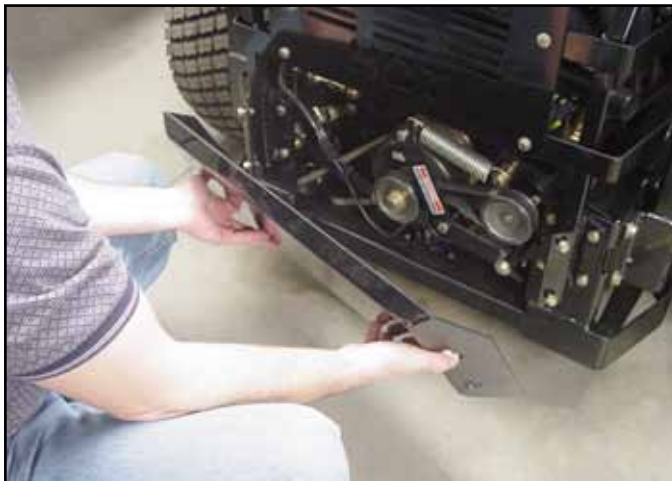


Fig 164

DSC-2359

2. Push down on the pump belt tensioner and remove the drive belt from the pulley on the PTO clutch. Remove the other end of the pump drive belt from the hydraulic pump pulley (Fig. 165).



Fig 165

DSC-2360

3. Loosen two hex set screws located on the hydraulic pump pulley (Fig. 166).



Fig 166

DSC-2361

HYDRAULIC SYSTEM

4. Remove the hydraulic pump pulley.

Note: It may be necessary to use a puller to remove the pulley (Fig. 167).



Fig 167

DSC-2362

Note: Cut a piece of cardboard approximately 8" x 18" (20.3 x 45.7cm) to be used as a deflector to channel oil away from the mower drive belt and pulleys located under the hydraulic pump fan (Fig. 168).



Fig 168

DSC-2363

5. Disconnect the three hydraulic lines connected to the hydraulic fan pump (Fig. 169).



Fig 169

DSC-2366

6. Remove the four bolts and nuts retaining the hydraulic fan pump to the fan pump mounting plate (Fig. 170).



Fig 170

DSC-2367

4

HYDRAULIC SYSTEM

7. Remove the hydraulic fan pump from the unit (Fig. 171).



Fig 171

DSC-2368

2. Install the three hydraulic lines to the hydraulic fan pump and tighten (Fig. 173).



Fig 173

DSC-2366

4 Hydraulic Fan Pump Installation

Note: Prior to connecting the hydraulic lines, replace the O-rings with new ones and lightly lubricate with petroleum jelly.

1. Install the hydraulic fan pump with four bolts and nuts to the fan pump mounting plate (Fig. 172).



Fig 172

DSC-2367

3. Install the square key in the hydraulic fan pump shaft. Install the fan pump pulley on the shaft. Before installing the set screws into the pulley, install a thread locking compound on the set screws and tighten (Fig. 174).

Note: Always use new set screws when installing the pump drive pulley.



Fig 174

DSC-2361

HYDRAULIC SYSTEM

4. Install pump drive belt around the hydraulic pump pulley. Push down the pump belt tensioner and install the belt around the PTO clutch pulley (Fig. 175).



Fig 175

DSC-2360

5. Install the rear bumper assembly and tighten the four bolts (Fig. 176).



Fig 176

DSC-2369

6. Check the hydraulic fluid in the reservoir tank. Add oil if necessary. Air may need to be purged in the system. Follow the procedures on Purging the Hydraulic System, page 4-13.

Hydraulic Fan Motor Removal

Note: Cleanliness is a key factor in a successful repair of any hydraulic system. Thoroughly clean all exposed surfaces prior to any type of maintenance. Cleaning all parts by using a solvent wash and air drying is usually adequate. As with any precision equipment, all parts must be kept free of foreign material and chemicals. Protect all exposed sealing areas and open cavities from damage and foreign material.

Upon removal all seals, O-rings, and gaskets should be replaced. Lightly lubricate all seals, O-rings, and gaskets with clean petroleum jelly prior to installation.

1. Unlatch and open the engine hood. Loosen and remove the rear heat shield from the frame (Fig. 177).



Fig 177

DSC-2370

HYDRAULIC SYSTEM

2. There are 6 bolts and nuts, 3 on each side, retaining the radiator and fan mounting plate assembly to the right and left upper frame assembly. Loosen, **DO NOT remove**, the two bolts and nuts at the front right and left side; this will allow you to pivot the assembly upward. Remove the rear 4 bolts and nuts (Fig. 178).

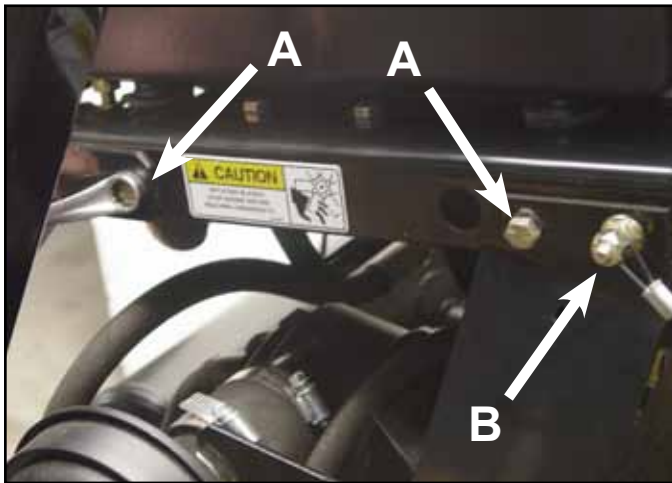


Fig 178

DSC-2371

A. Remove

B. Loosen

3. Remove the two knobs located on the engine access panel assembly. Remove the engine belt shield and the engine access panel (Fig. 179).

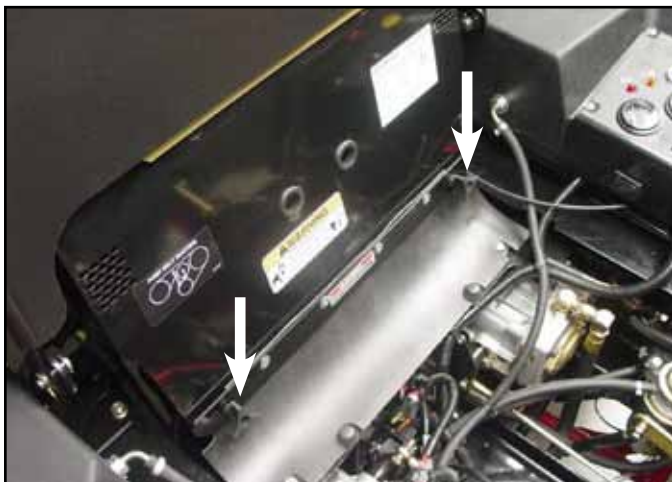


Fig 179

DSC-2071

4. Loosen and remove the clamp on the hydraulic return line located on the left side of the unit (Fig. 180).



Fig 180

DSC-2372

5. Remove the tie strap holding the throttle control cable. Remove the clamps holding the inlet cooling hose and the overflow hose to the radiator (Fig. 181).

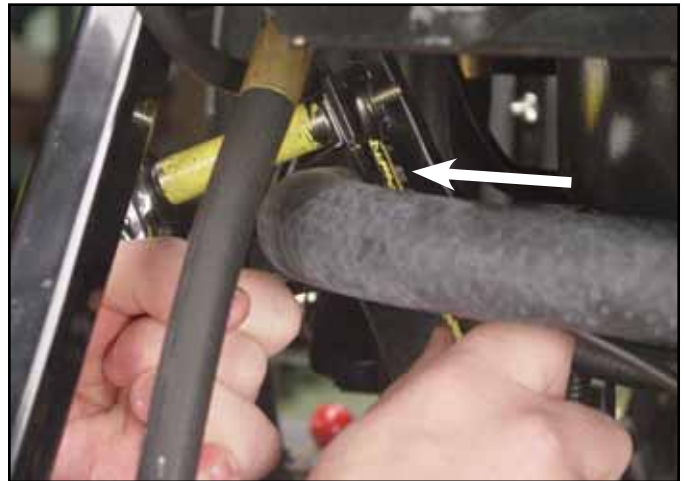


Fig 181

DSC-2374

HYDRAULIC SYSTEM

6. Tilt the fan mounting plate assembly and the radiator up approximately 5" (12.7cm) to get enough clearance to remove the hydraulic motor fan.

Caution: Do not raise too far, as damage could occur to some of the hydraulic lines and cooling hoses.

Use a nylon tie down strap between the fan mounting plate and the center section of the ROPS Bar to hold in place (Fig. 182).



Fig 182

DSC-2377

7. Place a small oil drain pan on top of the engine. Loosen and remove the hydraulic lines to the hydraulic fan motor (Fig. 183).



Fig 183

DSC-2378

8. Loosen and remove the 4 bolts and nuts holding the fan motor mount (Fig. 184).



Fig 184

DSC-2379

9. Remove the fan motor mount from the fan mounting plate (Fig. 185).



Fig 185

DSC-2380

HYDRAULIC SYSTEM

10. With a hex wrench loosen the two set screws on the fan hub and remove the fan (Fig. 186).

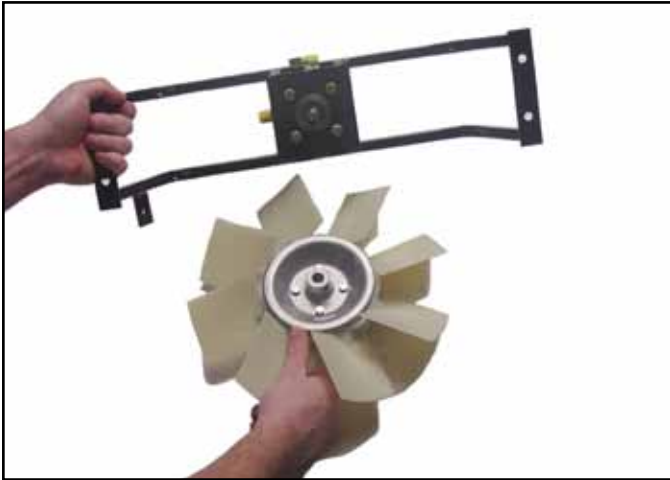


Fig 186

DSC-2382

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

2. Note the location of the hydraulic fittings and install the hydraulic fan motor to the fan motor mount tighten the 4 bolts and nuts (Fig. 188).



Fig 188

DSC-2384

11. Loosen and remove the 4 bolts and nuts retaining the hydraulic fan motor to the fan motor mount.

Hydraulic Fan Motor Installation

1. Note the orientation of the hydraulic fittings on the fan motor. The case drain fitting should be facing the mounting tab on the fan motor mount (Fig. 187).

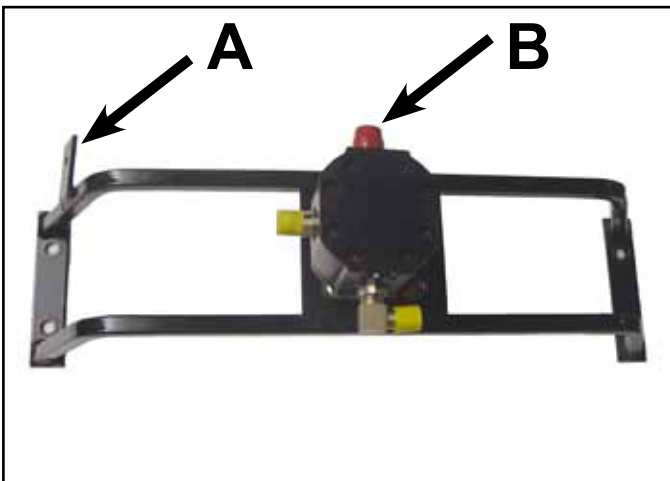


Fig 187

DSC-2383

3. Slide the fan assembly over the motor shaft, making sure the hub of the fan is facing toward the motor and the square key is on the shaft. The fan assembly should be installed so the motor shaft is recessed approximately 1/2" (12.7mm) from the outside of the fan hub (Fig. 189).

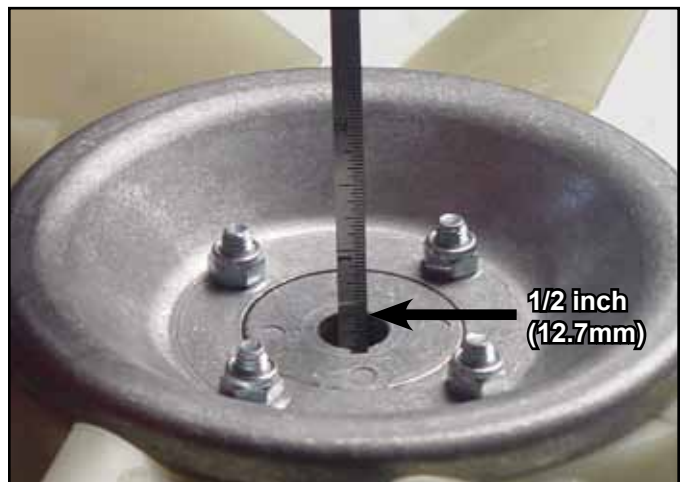


Fig 189

DSC-2391

A. Mounting tab

B. Case drain fitting

HYDRAULIC SYSTEM

4. Apply a thread locking compound to the hex set screws and tighten both screws (Fig. 190).



Fig 190

DSC-2396

5. Install the fan motor mount to the fan mounting plate (Fig. 191).



Fig 191

DSC-2380

6. Install the 4 bolts and nuts that retain the fan motor mount to the fan mounting plate.

Note: Make sure the mounting tab on the fan motor mount is facing toward the left rear of the unit. Before tightening the bolts and nuts, make sure the fan is centered in the middle of the fan shroud. Tighten the bolts and nuts (Fig. 192).

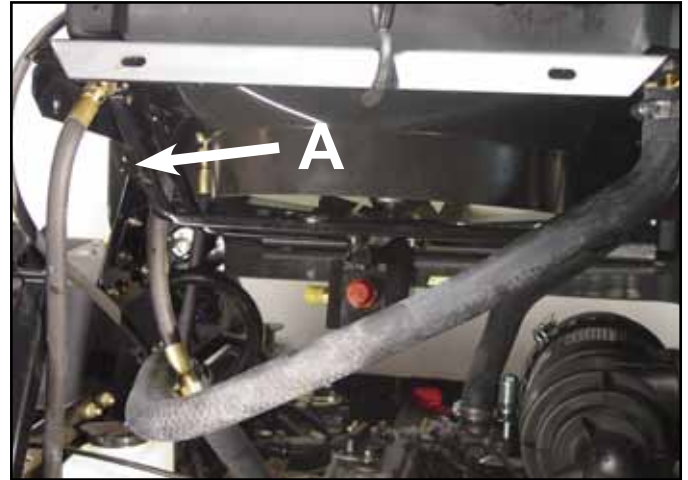


Fig 192

DSC-2404

A. Mounting tab

7. Install the hydraulic lines to the hydraulic fan motor and tighten (Fig. 193).



Fig 193

DSC-2378

HYDRAULIC SYSTEM

8. Remove the nylon tie strap to lower the fan mounting plate and radiator assembly. Reinstall the 4 bolts and nuts that retain the fan mounting plate to the right and left upper frame and tighten the bolts, including the front two nuts and bolts (Fig. 194).



Fig 194

DSC-2371

10. Install clamp, located on the left side of the unit, that retains the hydraulic return line. Tighten the bolt and nut (Fig. 196).



Fig 196

DSC-2372

4

9. Install the two hose clamps; the large clamp retaining the inlet cooling hose and the small clamp for the overflow hose to the radiator. Secure the throttle cable to the clamp with a tie strap (Fig. 195).



Fig 195

DSC-2405

11. Install the engine access panel and the engine belt shield with the two knobs (Fig. 197).



Fig 197

DSC-2071

HYDRAULIC SYSTEM

12. Install the rear heat shield and tighten the bolts (Fig. 198).



Fig 198

DSC-2370

1. Raise the frame and support the machine so drive wheels can rotate freely (Fig. 199).



Fig 199

DSC-2352

13. Close the engine hood and latch. Start unit up and operate for approximately 5 minutes and check the oil level in the reservoir.

2. Slide the seat fully forward, unlatch the seat and tilt the seat forward (Fig. 200).

Setting the Hydrostatic Pump Neutral

Note: Adjust handle neutral before setting pump neutral. See **Adjusting the Handle Neutral**, page 4-24.

This adjustment must be made with drive wheels turning.



Fig 200

DSC-2357

HYDRAULIC SYSTEM

3. Disconnect the electrical connector from the seat safety switch. Temporarily install a jumper wire across terminals in the wiring harness connector (Fig. 201).



Fig 201

DSC-2355

3. Unlatch the seat and tilt the seat up.
4. Begin with either the left or right motion control lever.
5. Move lever to the neutral position but not locked (Fig. 202).

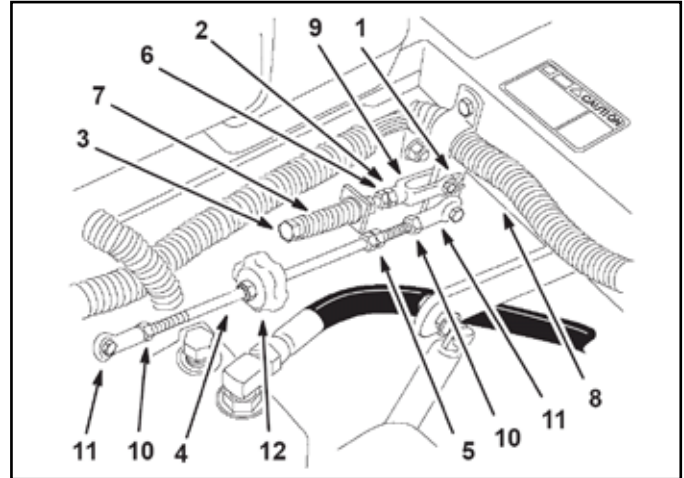


Fig 202

m-7510

- | | |
|-----------------------|-------------------|
| 1. Clevis pin in slot | 7. Spring |
| 2. Nut against yoke | 8. Pivot shaft |
| 3. Adjustment bolt | 9. Yoke |
| 4. Pump rod | 10. Locknut |
| 5. Double nuts | 11. Ball joint |
| 6. Jam nut | 12. Tracking knob |

6. Pull 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. 202).

4 Adjusting the Handle Neutral

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

Note: Motion control levers must be installed correctly. See *Installing the Motion Control Levers in the Set Up* instructions.

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.

HYDRAULIC SYSTEM

7. Check where the control lever is relative to notch in console (Fig. 203). It should be centered allowing lever to pivot outward to the neutral lock position.

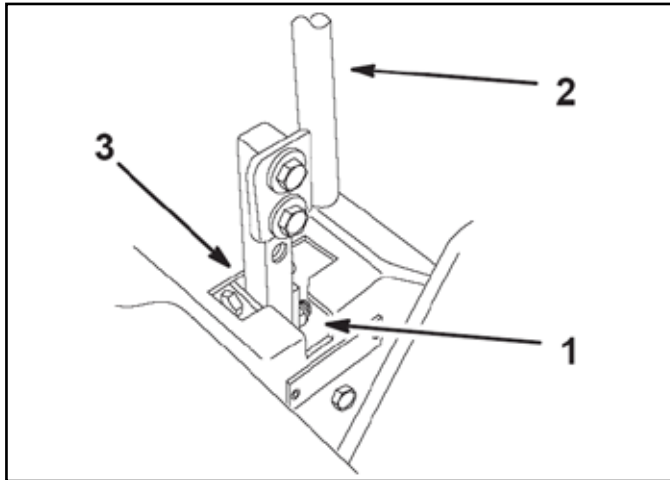


Fig 203

m-6282

1. Neutral locked position
 2. Control lever
 3. Neutral position
8. If adjustment is needed, loosen the nut and jam nut against the yoke (Fig. 202).
 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 neutral lock position (Fig. 203).
- 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. 202).
 11. Repeat on the opposite side of the machine.

Setting the LH Hydrostatic Pump Neutral

1. Start the engine, open throttle half way and release parking brake.

Note: Motion control lever must be in neutral while making any adjustments.

2. Adjust pump rod length by rotating the knob, in the appropriate direction, until the wheel is still or slightly creeping in reverse (Fig. 204).



Fig 204

DSC-2568

- A. Adjustment knob
3. Move motion control lever forward and reverse, then back to neutral. Wheel must stop turning or creep only slightly in reverse.
4. Open engine throttle to Fast. Make sure wheel remains stopped or slightly creeps in reverse; adjust if necessary.

HYDRAULIC SYSTEM

Setting the RH Hydrostatic Pump Neutral

1. Loosen the locknuts at the ball joints on pump control rod (Fig. 205).

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



Fig 205

DSC-2569

2. Start the engine, open the engine throttle half way and release the parking brake.

Note: Motion control lever must be in neutral while making any adjustments.

3. Adjust pump rod length by rotating double nuts on rod, in the appropriate direction, until wheel is still or slightly creeps in reverse (Fig. 206).



Fig 206

DSC-2570

4. Move motion control lever forward and reverse, then back to neutral. Wheel must stop turning or slightly creep in reverse.
5. Open engine throttle to fast. Make sure wheel remains stopped or slightly creeps in reverse, readjust if necessary.
6. Tighten the locknuts at the ball joints (Fig. 207).



Fig 207

DSC-2569

HYDRAULIC SYSTEM

7. After both pump neutrals are set, shut off the machine.
8. Remove jumper wire from the harness connector and plug the connector into the seat switch.
9. Lower the seat into position.
10. Remove the jack stands.

Adjusting the Tracking

The left-hand pump has a knob for adjusting the tracking (Fig. 208).



Fig 208

DSC-2568

Adjust the handle neutral and hydraulic pump neutral before adjusting the tracking. Refer to Adjusting the Handle Neutral on page 4-24 and Setting the Hydrostatic Pump Neutral on page 4-23.

1. Push both control levers forward the same distance (Fig. 209). Test operate the machine in an open, flat area.



Fig 209

DSC-2571

2. Check to see if the machine pulls to one side. If it does, stop the machine and set the parking brake.
3. Unlatch the seat and tilt the seat forward to access the tracking knob.

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

4

HYDRAULIC SYSTEM

4. To make the machine go right, turn the knob towards the right side of the machine (Fig. 210).

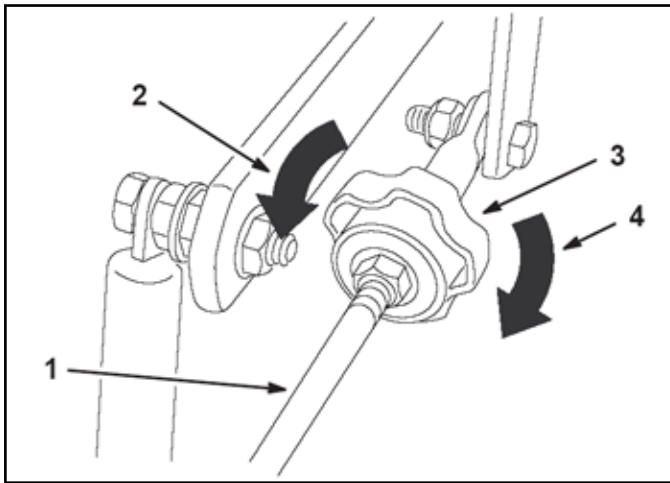


Fig 210

m-6280 1

- | | |
|--------------------------------|---------------------------------|
| 1. Pump rod | 3. Tracking knob |
| 2. Turn this way to track left | 4. Turn this way to track right |

5. To make the machine go left, turn the knob towards the left side of the machine (Fig. 210 above).
6. Repeat adjustments until the tracking is correct.

Hydraulic Flow Testing Procedure

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 by using a solvent wash and air drying is usually adequate. As with any precision equipment, all parts must be kept free of foreign material and chemicals. Protect all exposed sealing areas and open cavities from damage and foreign material.

1. Lift the back of the unit so the rear tire (left or right) is off the ground. Place jack stands under the rear frame to support the unit. Remove the rear tire; in this case the left rear tire is removed (Fig. 211).

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



Fig 211

DSC-2573

HYDRAULIC SYSTEM

2. Clean any dirt or debris away from the hydraulic line fittings. Remove the hydraulic lines.

Note: Cap the fittings to prevent dirt from entering the hydraulic system (Fig. 212).



Fig 212

DSC-2110

4. Check the hydraulic reservoir and fill as needed with Mobil 1, 15w-50 oil.

5. Disconnect the electric PTO clutch from the wiring harness to prevent accidental engagement of the mower deck (Fig. 214).



Fig 214

DSC-2601

3. Connect the hydraulic hose fittings to the hydraulic flow tester and tighten the fittings (Fig. 213). The flow tester shown is bidirectional so it does not matter in which order the hoses are connected to the flow tester. If using a directional flow tester, be sure to correctly connect hoses.



Fig 213

DSC-2576

6. Disconnect the seat switch. Temporarily install a jumper wire across the harness (Fig. 215).



Fig 215

DSC-2355

HYDRAULIC SYSTEM

7. Verify the restrictor valve on the hydraulic flow tester is in the fully "Opened" position.
8. Start the machine. Run the unit 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 between 13 to 15 gpm (49 to 56.8 lpm).
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).

Caution: DO NOT operate the machine for an extended period of time at the 1200 PSI rate.

12. Record the difference or "flow droop" of the pump. For the Hydro-Gear BDP 21 pump, maximum allowable "flow droop" is 2.0 gpm (7.5 lpm). Any droop greater than 2.0 gpm (7.5 lpm) is considered unacceptable and the pump should be repaired/ replaced barring any other potential causes.
13. Return the motion control lever to 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. Disconnect the hydraulic flow tester from the hydraulic lines.
15. Re-connect the hydraulic lines to the wheel motor. Tighten the hydraulic lines to the wheel motor.
16. Check the hydraulic reservoir and fill as necessary to the "Hot" level mark; refer to Figure 006, page 2-5.
17. Reinstall the left rear tire and lower the unit to the ground. Remove the temporary jumper cable and reconnect the seat switch. Reconnect the electric PTO clutch.

Cooling Fan Pump Flow Testing Procedure

1. Raise the seat and disconnect the seat switch plug from the harness. Temporary install a jumper lead into the harness.
2. Remove the muffler guard (Fig. 216).



Fig 216

DSC-2579

3. Unlatch and open the hood.
4. Slide a low profile oil catch pan or absorbent cloth pad under the fan motor and on top of the engine.

HYDRAULIC SYSTEM

- Remove the hydraulic pressure and return lines at the fan hydraulic motor. Connect the flow meter as shown (Fig. 217).

Note: If using a directional flow tester, be sure to correctly connect hoses.

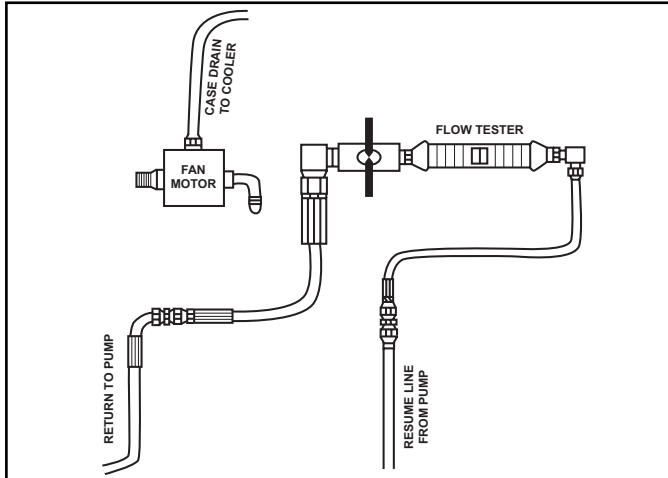


Fig 217

fan motor test

- Before starting the engine make sure the hydraulic lines are held away from moving parts and the muffler. The pump used in this system is designed to run at 1.6 to 1.7 gpm (6 to 6.4 lpm) at 3000 PSI (20684 kPa) continuous pressure. Under little or no restriction, you should measure 3 to 4 gpm (11 to 15 lpm) at full engine speed.
- Make sure the restrictor valve is in the full "OPEN" position. Start the engine. Allow at least 5 minutes for the hydraulic system to reach operating temperature. Run the machine at full speed. The gauge should read approximately 3 to 4 gpm (11 to 15 lpm) under no restriction. Record the flow reading.

- With the engine running at full rpm, carefully close the restrictor valve until 1500 PSI (10342 kPa) is reached. There should be approximately 1 gpm flow loss under pressure.

If flow drops more than 1 gpm (3.8 lpm), replace the pump. If the pump falls within spec, replace the motor or inspect the cooling system for other component failure.

Caution: DO NOT operate the machine for an extended period of time at 1500 psi (10342 kPa) system pressure. Hydraulic temperatures can rise quickly under pressure. Open the flow tester restrictor valve, bring the engine to idle, and shut the machine off.

- Remove the flow tester from the machine. Reconnect the hydraulic lines to the fan motor.
- Re-install the rear heat shield.
- Close the hood.
- Reconnect the seat switch and lower the seat.

Replacing the Traction Pump Drive Belt

Check the pump drive belt for wear after every 50 hours of operation.

- Tilt the seat forward and remove the front engine panel.

HYDRAULIC SYSTEM

- Using a 3/8" drive ratchet, pull the spring loaded idler toward the right side of the unit and remove the traction belt from the engine and hydro pump pulleys (Fig. 218).



Fig 218

DSC-2594

- Install the 3/8" drive ratchet, pull the spring loaded idler toward the right side of the unit and release the pressure on the spring.
- Install the front engine panels.

Pushing the Machine by Hand

Important: Always push the machine by hand. Never tow the machine because hydraulic system damage may occur.

- Disengage the power take off (PTO) and turn the ignition key to OFF. Move the levers to the neutral position and apply the parking brake.
- Rotate the by-pass valves counterclockwise 1 turn to push. This allows hydraulic fluid to by-pass the pump enabling the wheels to turn (Fig. 220).



Fig 220

DSC-2795

- Install the belt around the engine and hydro pump (Fig. 219).

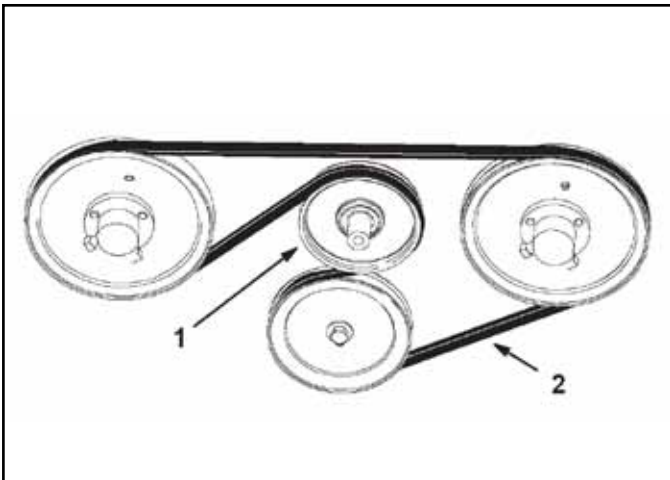


Fig 219

DSC-000

- Spring loaded idler pulley
- Pump drive belt

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

- Disengage the parking brake before pushing.

Changing to Machine Operation

Rotate the by-pass valves clockwise 1 turn to operate the machine (Fig. 221).

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

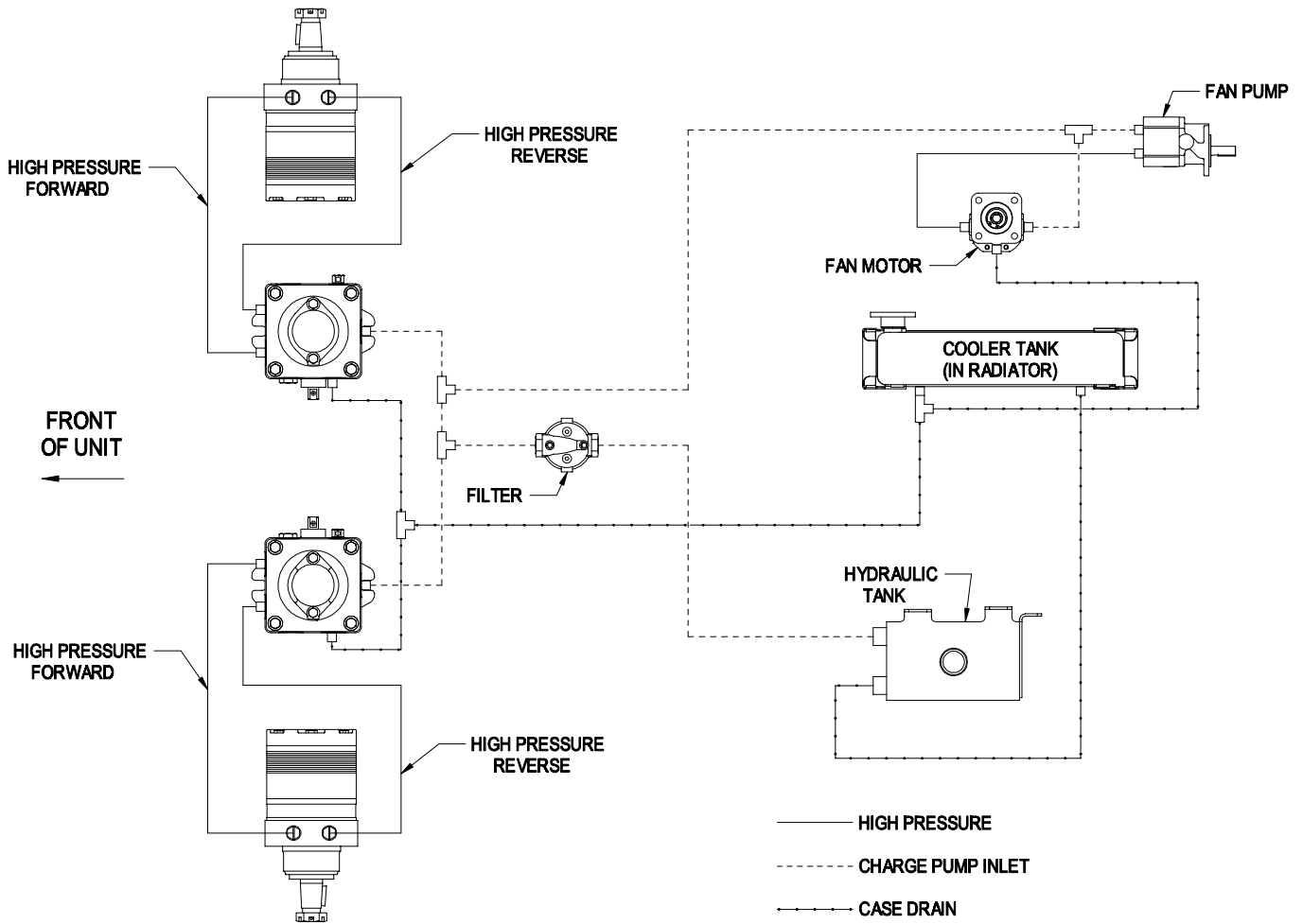
Note: The machine will not drive unless the by-pass valves are turned in.



Fig 221

DSC-2795

HYDRAULIC SYSTEM



Safety Information	1
Specifications	2
Chassis	3
Hydraulic System	4
Engine	5
Electrical	6
Mower Decks	7

ENGINE

Engine Removal

1. Disconnect the negative, then the positive battery cable and remove the battery from the unit.
2. Unlatch and open the engine hood. Loosen and remove the rear heat shield from the frame (Fig. 222).



Fig 222

DSC-2370

4. Remove the hood lanyard from the right and left radiator support bolts (Fig. 224)

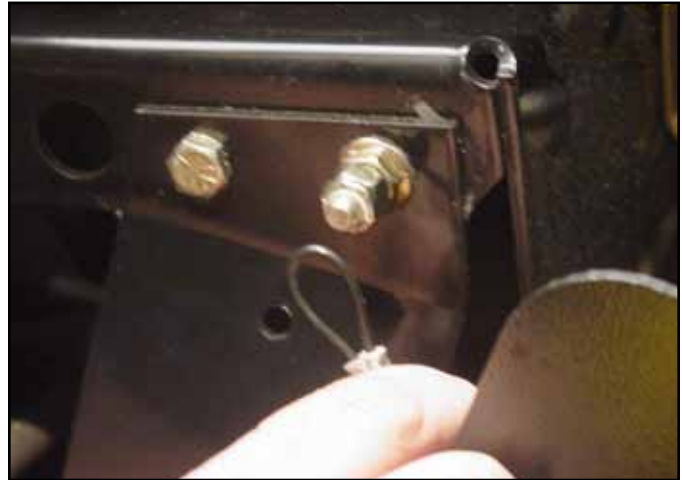


Fig 224

DSC-2410

5. Remove the left and right hair pins, the clevis pins and remove the hood (Fig. 225)



Fig 225

DSC-2411

- 5**
3. Remove the two knobs located on the engine access panel. Remove the engine belt shield and the engine access panel (Fig. 223).

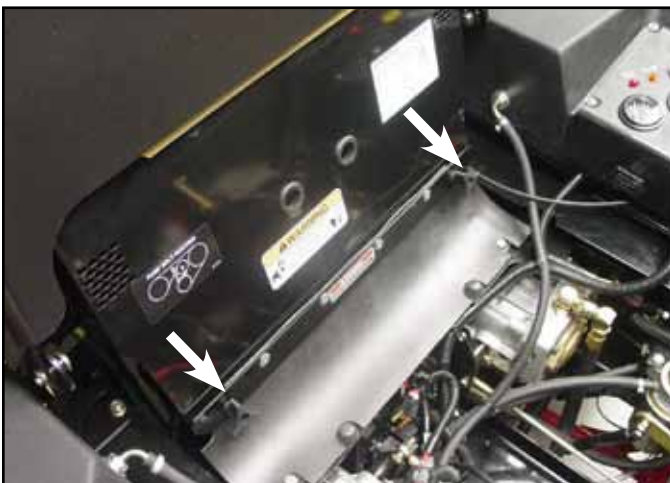


Fig 223

DSC-2071

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.
6. With a drain funnel and pan, open the radiator petcock, located at the lower right hand corner of the radiator, and drain the coolant out of the radiator (Fig. 226).



Fig 226

DSC-2413

7. At the left rear of machine, remove the tie strap and the clamp holding the engine inlet cooling hose and the overflow hose to the radiator (Fig. 227).



Fig 227

DSC-2374

8. At the right rear of machine, loosen and remove the hose clamp on the engine inlet cooling hose at the radiator (Fig. 228). Lower the hose and drain any coolant that is left in the hose.



Fig 228

DSC-2425

ENGINE

9. Located on the right side of the fan mounting plate assembly is an access hole to remove the hose clamp for the engine outlet hose, located at the radiator (Fig. 229). Remove the clamp and lower the hose to drain any coolant that is left in the hose.



Fig 229

DSC-2428

11. Remove the case drain hydraulic line at the tee fitting, located at the left front corner of the radiator (Fig. 231). A drain pan will be needed to catch any oil from the hydraulic line. Cap the fittings to prevent contamination.



Fig 231

DSC-2429

10. Place a small drain pan on top of the engine. Loosen and remove the hydraulic lines to the hydraulic fan motor (Fig. 230). Cap the fittings to protect from any dirt or debris.



Fig 230

DSC-2378

12. Loosen and remove the tank return hydraulic hose from the radiator. This line is located at the left rear corner of the radiator (Fig. 232). Cap the fittings to prevent contamination.

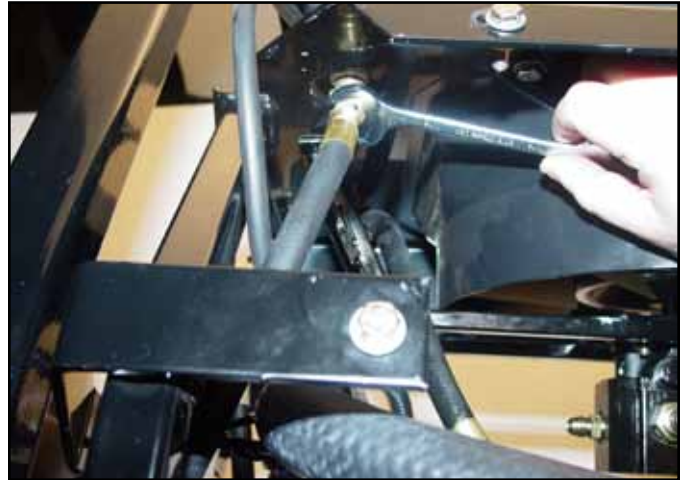


Fig 232

DSC-2433

5

13. Remove the tie strap holding the radiator overflow hose, located at the radiator cap (Fig. 233).



Fig 233

DSC-2434

14. Remove the six bolts, three on each side, retaining the radiator and fan mounting plate assembly to the right and left upper frame (Fig. 234).



Fig 234

DSC-2371

15. Remove the radiator and frame assembly (Fig. 235).



Fig 235

DSC-2435

16. Install a 3/8" ratchet wrench in the spring loaded idler arm and pull down to remove the pump drive belt from the engine and hydro pump pulleys (Fig. 236).



Fig 236

DSC-2439

ENGINE

17. Loosen the hose clamp on the air intake hose and remove the hose from the air filter (Fig. 237).



Fig 237

DSC-2440

19. Remove the air cleaner assembly (Fig. 239).



Fig 239

DSC-2442

18. Loosen the outer clamp on the short hose between the intake hood and the air filter. Remove the two bolts and nuts on the air cleaner mount (Fig. 238).



Fig 238

DSC-2441

20. Make sure the fuel valve is in the OFF position. Tag or mark the OUT or return fuel line. Loosen the clamps and remove the fuel lines from the engine (Fig. 240).

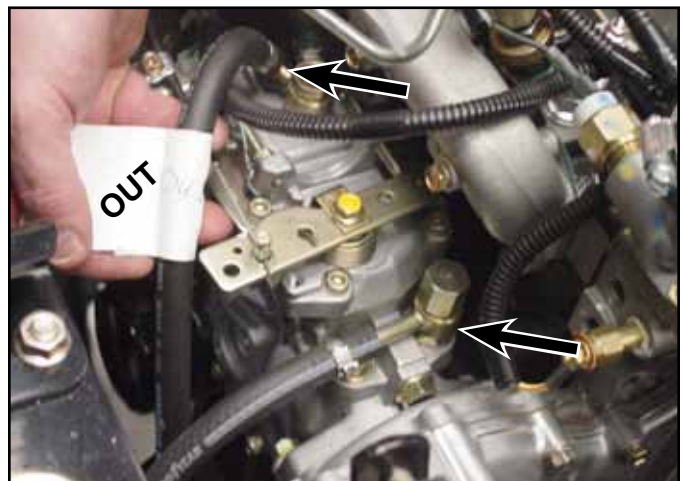


Fig 240

DSC-2443

21. Remove the throttle cable clamp and the throttle casing clamp from the fuel pump injector linkage (Fig. 241).

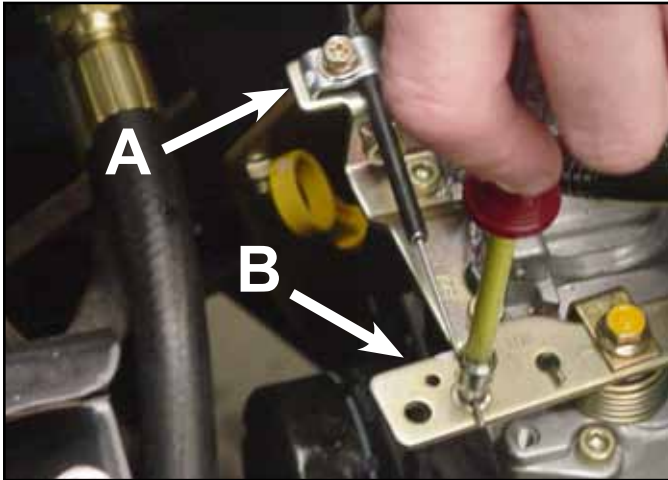


Fig 241

DSC-2444

- A. Throttle Casing Clamp
- B. Throttle Cable Clamp

22. Remove the following wires from the engine:
- Pink/Black wire to the glow plug strap (A)
 - Yellow/Red wire to the temperature sender (B)
 - Black/Green wire to the temperature switch (C)
- (Fig. 242).

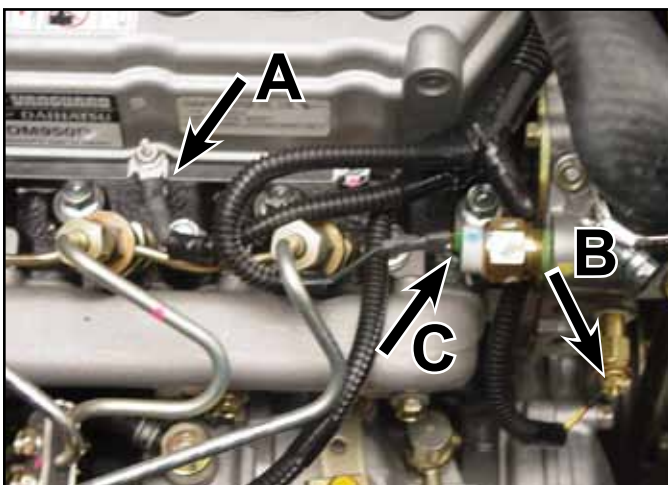


Fig 242

DSC-2445

23. Remove the following wires from the engine:
- Dark Blue wire to the oil pressure sending unit (E)
 - Dark Green wire to the fuel solenoid (F)
- (Fig. 243).

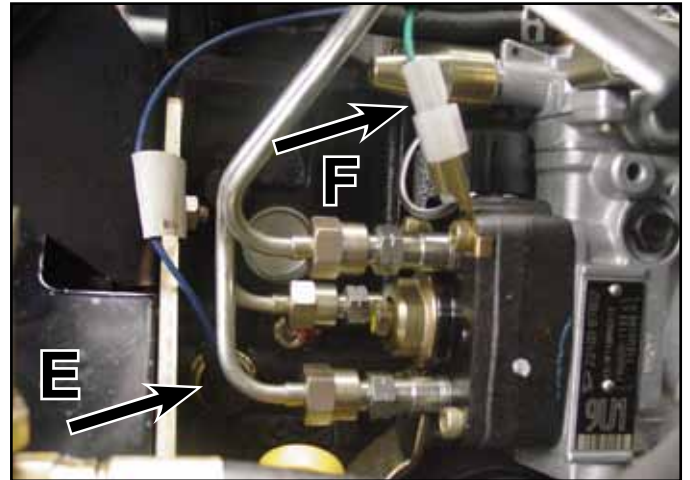


Fig 243

DSC-2446

24. Remove the bolt that holds the wire clamp located on top of the alternator (Fig. 244).



Fig 244

DSC-2447

ENGINE

25. Disconnect the red wire located on top of the alternator and unplug the wiring harness located at the back of the alternator (Fig. 245).

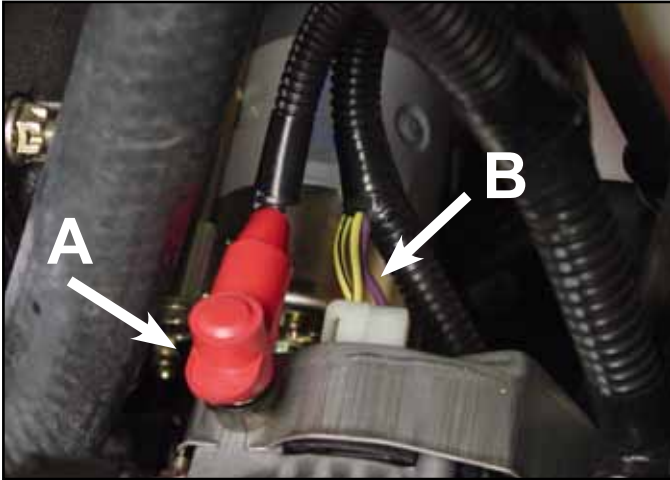


Fig 245

DSC-2546

- A. Red lead to alternator
- B. Alternator harness

27. Remove the Orange/Black wire and the Red wire to the starter motor.

29. Unplug the jack and plug to the electric PTO clutch.

30. Located below the starter motor are two ground wires bolted to a bracket attached to the engine block. Remove the bolt and nut (Fig. 247).

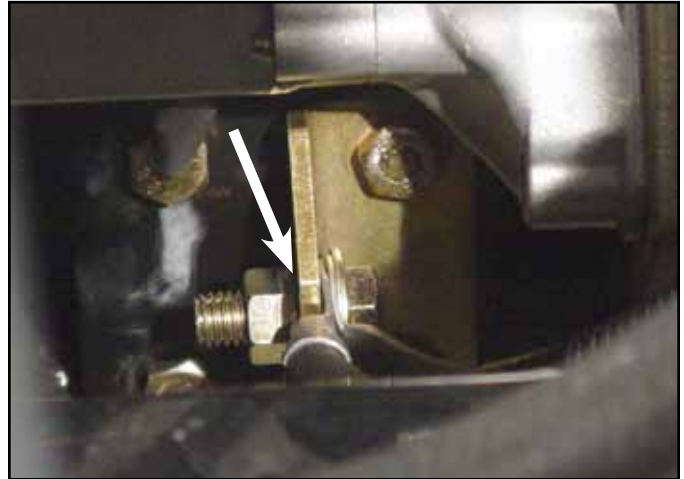


Fig 247

DSC-2451

26. Remove the bolt located at the adjusting strap and remove the alternator belt. Remove the bolt located at the bottom of the alternator and remove the alternator (Fig. 246).

31. Loosen the 4 bolts to the rear bumper assembly and remove (Fig. 248).



Fig 246

DSC-2448



Fig 248

DSC-2452

32. Pull the spring loaded idler down and remove the fan drive belt (Fig. 249).



Fig 249

DSC-2453

33. Remove the bolt and nut holding the clutch/brake strap and rotate the strap up and out of the way (Fig. 250).



Fig 250

DSC-2455

34. Remove both mower drive belts; refer to Replacing Mower Drive Belts, page 7-41.

35. Located on the left rear side of the engine is a ball joint assembly, between the frame and the engine flywheel cover. Remove the nut holding the assembly to the frame (Fig. 251).



Fig 251

DSC-2457

36. Remove the bolt holding the ball joint link to the flywheel cover (Fig. 252).



Fig 252

DSC-2458

ENGINE

37. Remove the bolt holding the ball joint link to the left front engine bracket (Fig. 253).



Fig 253

DSC-2460

38. On the left side of the engine, remove the bolt, nut and washers from the left hand engine mount (Fig. 254).



Fig 254

DSC-2468

39. Repeat the procedure on the right hand engine mount.

Note: Before removing the rear engine mount, install engine hoist to the lifting brackets located on top of the engine (Fig. 255). Raise until there is NO slack in the lift chain.

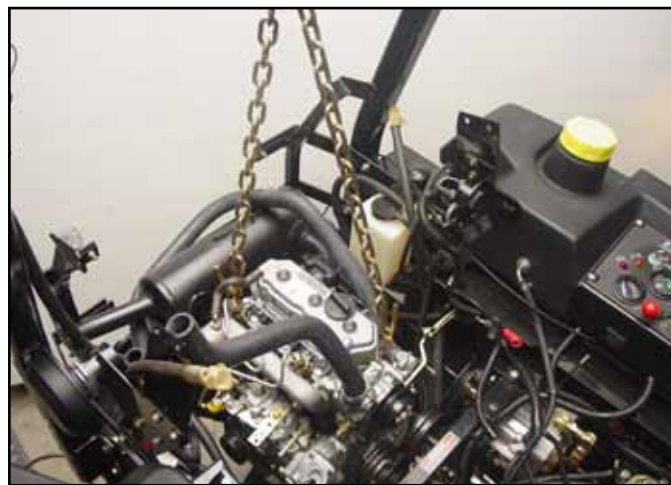


Fig 255

DSC-2469

40. Remove the bolt, washer and nut on the engine rear mount (Fig. 256).



Fig 256

DSC-2470

41. Carefully lift the engine with the hoist. As the engine is being lifted out, turn it slightly to gain clearance between the engine drive pulley, pump idler pulley, and the RH pump pulley. Also, you may have to turn the engine so the muffler clears the right rear radiator support bracket (Fig. 257).



Fig 257

DSC-2480

2. Carefully lower the engine into the frame of the unit. The engine will have to be turned slightly so the muffler clears the right rear radiator support bracket and to clear the engine drive pulley, pump idler pulley and the RH pump pulley.
3. Install the bolt and nut on the engine rear mount, do not tighten (Fig. 259).



Fig 259

DSC-2482

Engine Installation

1. Before installing the engine, make sure the large washer is located on top of the rear engine mount isolator (Fig. 258).



Fig 258

DSC-2481

ENGINE

4. Install the right hand engine mount bolt. Note the sequence of the washers from the bottom up: bolt, large washer, and then the small thick washer through the isolator; then a small washer and nut (Fig. 260). Do not tighten the bolt and nut.

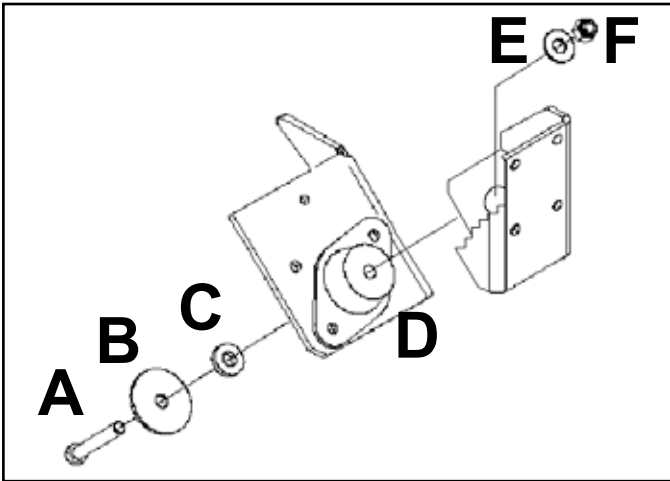


Fig 260 engine mount assembly c

- | | |
|-----------------------|-----------------|
| A. Bolt | D. Isolator |
| B. Large washer | E. Small washer |
| C. Small thick washer | F. Nut |

6. Before tightening the bolts and nuts on the engine mounts, check the alignment of the engine drive pulley to the right side pump pulley (Fig. 261). The right and left engine mount brackets are slotted to permit adjustment.

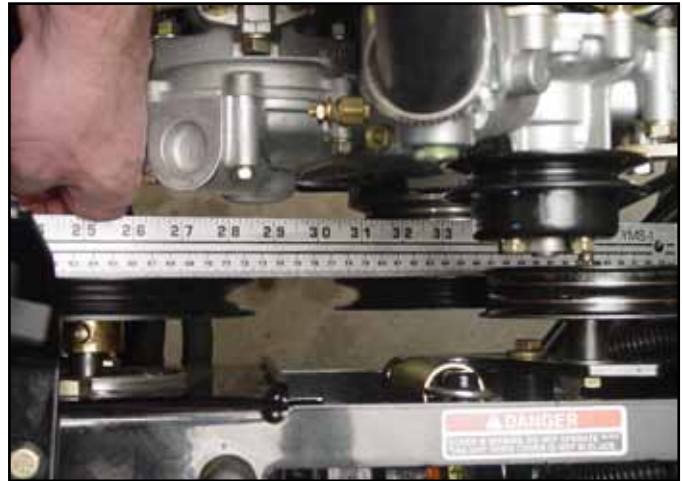


Fig 261

DSC-2483

5. Install the left hand engine mount bolt following the same pattern as the right hand engine mount bolt. Do not tighten the bolt and nut.

7. Tighten all three engine mount bolts and nuts once alignment has been achieved.

5

8. Install the front ball joint link assembly between the frame and the engine bracket (Fig. 262). Follow the hardware sequence in the diagram (Fig. 263).



Fig 262

DSC-2484

9. Install the rear ball joint assembly between the flywheel cover and the frame (Fig. 264). Follow the hardware sequence in the diagram (Fig. 265).



Fig 264

DSC-2457

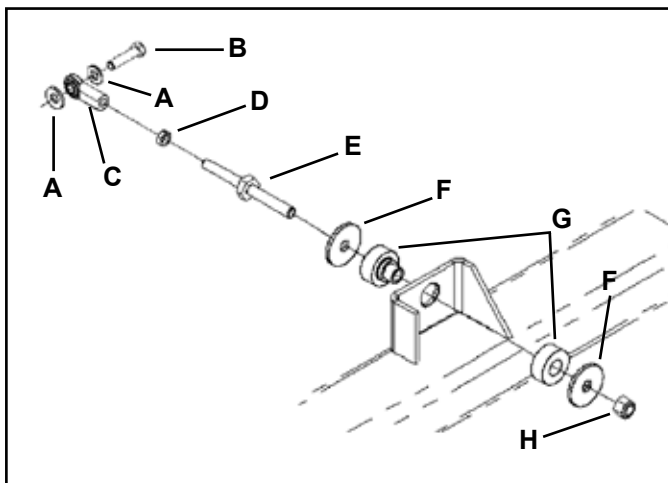


Fig 263

front

- | | |
|------------------------|----------------------|
| A. Washer | E. Link - ball joint |
| B. Screw HH | F. Washer, large |
| C. Ball joint assembly | G. Isolator |
| D. Nut - jam | H. Nut - lock |

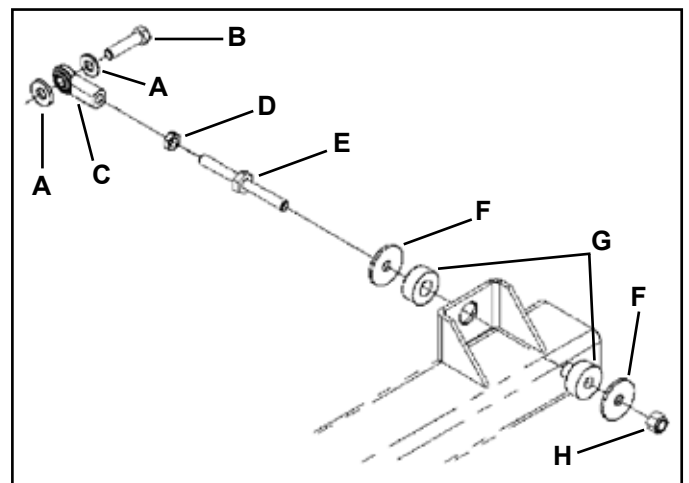


Fig 265

rear

- | | |
|------------------------|----------------------|
| A. Washer | E. Link - ball joint |
| B. Screw HH | F. Washer, large |
| C. Ball joint assembly | G. Isolator |
| D. Nut - jam | H. Nut - lock |

ENGINE

10. Install both the mower drive belts; refer to Replacing Mower Drive Belts, page 7-41.
11. Install the bolt, spacer, washers, and nuts holding the clutch/brake strap to the frame (Fig. 266). Follow the hardware sequence in the diagram (Fig. 267).



Fig 266

DSC-2488

12. Pull the spring loaded idler down and install the fan drive belt (Fig. 268).



Fig 268

DSC-2489

13. Secure the two ground wires to the bracket located below the starter motor on the engine (Fig. 269).



Fig 269

DSC-2451

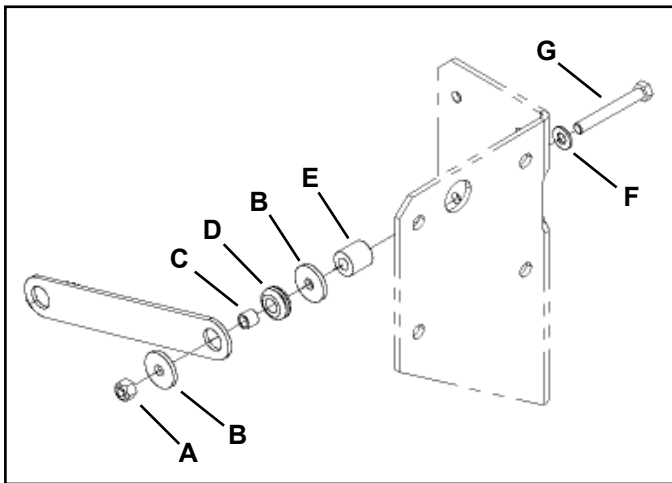


Fig 267

deck belt drive

- | | |
|-------------------|------------------|
| A. Nut - lock | E. Spacer, large |
| B. Washer, large | F. Washer, flat |
| C. Spacer | G. Screw, HH |
| D. Grommet, brake | |

5

14. Connect the electric PTO clutch (Fig. 270).



Fig 270

DSC-2490

15. Install the Orange/Black wire to the starter motor (Fig. 271).



Fig 271

DSC-2492

16. Install the bolt holding the bottom of the alternator to the bracket. Install the bolt through the adjusting strap to the alternator (Fig. 272).



Fig 272

DSC-2495

17. Install the alternator belt and follow the instructions for Tensioning the Alternator Belt, page 5-31.

18. Connect the Red wire to the top of the alternator and plug the wiring harness into the back of the alternator.

19. Install the bolt through the wiring clamp that holds the wiring harness to the top of the alternator (Fig. 273).



Fig 273

DSC-2447

ENGINE

20. Install the following wires to the engine:
- Dark Blue to the oil pressure sending unit (E)
 - Dark Green to the fuel solenoid (F)
- (Fig. 274).

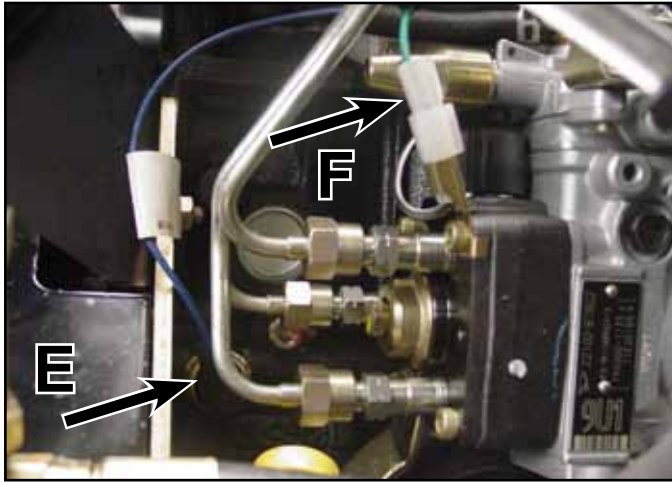


Fig 274

DSC-2446

22. Install the throttle cable; follow instructions under Throttle Control Installation page 3-13.
23. Install the two fuel lines to the injector pump. Make sure you install the tagged or marked fuel line to the Out or return connector (Fig. 276).

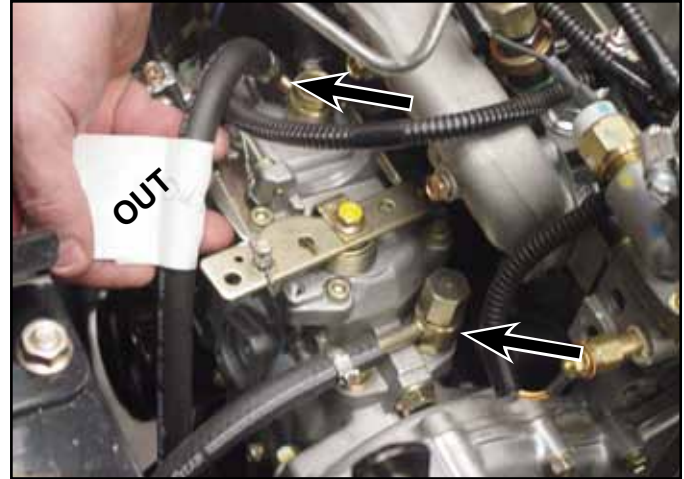


Fig 276

DSC-2443

21. Install the following wires:
- Pink/Black to the glow plug strap (A)
 - Yellow/Red to the temperature sender (B)
 - Black/Green to the temperature switch (C)
- (Fig. 275).

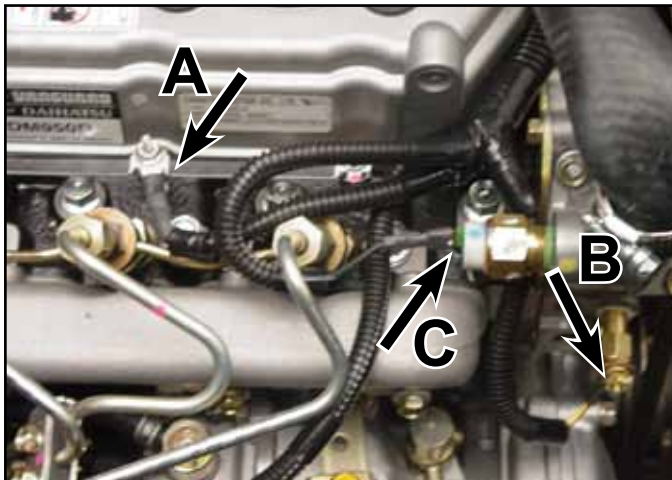


Fig 275

DSC-2445

24. Install the air cleaner assembly (Fig. 277).



Fig 277

DSC-2442

25. Tighten the hose clamps and the two bolts and nuts on the air cleaner mount (Fig. 278).

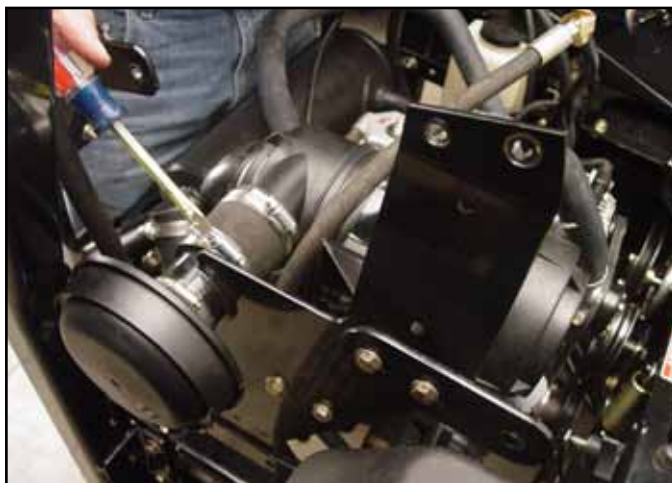


Fig 278

DSC-2441

27. Insert a 3/8" ratchet wrench into the spring loaded idler arm. Pull down to install the pump drive belt from the engine to the hydro pump pulleys (Fig. 280).



Fig 280

DSC-2439

26. Install the air intake hose between the engine and air filter. Tighten the hose clamps (Fig. 279).



Fig 279

DSC-2440

28. Install the radiator and frame assembly to the right and left upper frame (Fig. 281).



Fig 281

DSC-2435

ENGINE

29. Install the six bolts, three located on each side, retaining the radiator and fan mounting plate assembly to the right and left upper frame (Fig. 282).



Fig 282

DSC-2371

31. Install the tank return hydraulic hose to the radiator. The line is located at the left rear corner of the radiator (Fig. 284).



Fig 284

DSC-2433

30. Install the radiator overflow hose, located at the radiator cap. Install a tie strap to hold it in place (Fig. 283).



Fig 283

DSC-2496

32. Install the case drain hydraulic line at the tee fitting, located at the left front corner of the radiator assembly (Fig. 285).



Fig 285

DSC-2429

5

33. Install the three hydraulic lines to the hydraulic fan motor (Fig. 286).

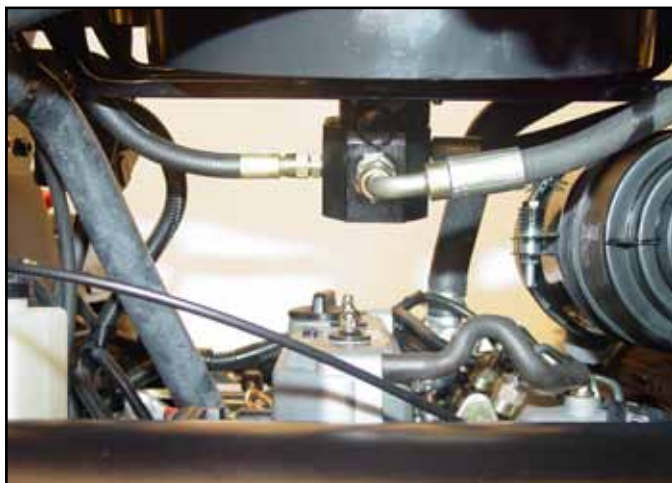


Fig 286

DSC-2500

35. Install the engine inlet hose to the radiator and tighten the hose clamp (Fig. 288)



Fig 288

DSC-2425

34. On the right side of the radiator, install the hose for the engine outlet to the radiator. Install the clamp and tighten the clamp through the access hole in the fan mounting plate (Fig. 287).



Fig 287

DSC-2428

36. Install the two clamps holding the engine inlet cooling hose and the overflow hose to the fan mounting plate (Fig. 289).



Fig 289

DSC-2374

ENGINE

37. Install coolant in the radiator (Fig. 290), and the overflow bottle (Fig. 291). Fill to the line indicator of the overflow bottle. Refer to Checking the Radiator Coolant, page 5-28.



Fig 290

DSC-2502



Fig 291

DSC-2503

38. Check the hydraulic fluid in the reservoir; refer to Figure 006, page 2-5.
39. Install the battery in the unit and connect the positive and negative battery cables.

40. Prime the fuel system; refer to Priming the Fuel System, page 5-34. Start the unit up and run for approximately 5 minutes.

41. Check for any leaks in the hydraulic fluid lines, fuel lines, and the coolant lines. The hydraulic system may need air purged from the hydraulic system, refer to Purging the Hydraulic System, page 4-13. Top up coolant and hydraulic fluid as needed.

42. Install the engine access panel with two knobs (Fig. 292).



Fig 292

DSC-2504

43. Install the rear bumper assembly and tighten the 4 bolts (Fig. 293).



Fig 293

DSC-2452

44. Install the rear heat shield (Fig. 294).



Fig 294

DSC-2370

Slip the hood lanyards on the radiator support bolts (Fig. 296).



Fig 296

DSC-2410

45. Install the engine hood assembly with clevis pins, washers and hairpins (Fig. 295).



Fig 295

DSC-2505

Cooling System

Removing the Radiator

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. Disconnect the battery negative cable.

5

ENGINE

2. Unlatch and open the engine hood. Loosen and remove the rear heat shield from the frame (Fig. 297).



Fig 297

DSC-2370

4. Slide the hood lanyard off the right and left radiator support bolts (Fig. 299).



Fig 299

DSC-2410

3. Remove the two knobs located on the engine access panel. Remove the engine belt shield and the engine access panel (Fig. 298).

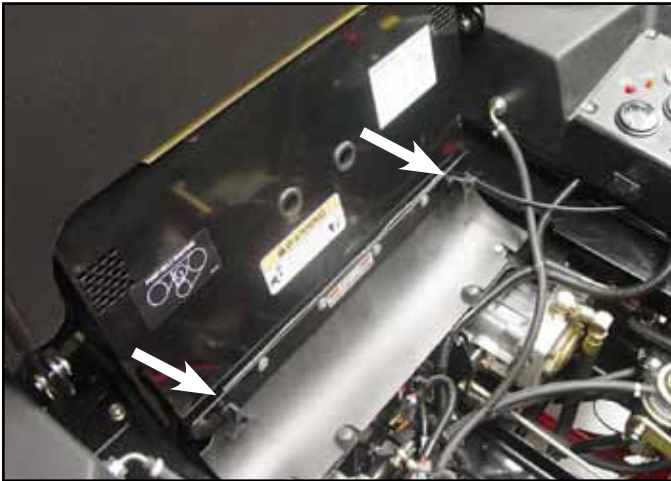


Fig 298

DSC-2071

5. Remove the right and left hair pins off the clevis pins and remove the hood assembly (Fig. 300).



Fig 300

DSC-2411

5

6. With a drain funnel and pan, open the radiator petcock, located at the lower right hand corner of the radiator, and drain the coolant out of the radiator (Fig. 301).



Fig 301

DSC-2413

8. Located on the right side of the fan mounting plate is an access hole to remove the hose clamp for the engine outlet hose, located at the radiator (Fig. 303). Remove the clamp and lower the hose to drain any coolant that is left in the hose.



Fig 303

DSC-2428

7. Loosen and remove the hose clamp on the engine inlet cooling hose at the radiator (Fig. 302). Lower the hose and drain any coolant that is left in the hose.



Fig 302

DSC-2425

9. Remove the tie strap holding the radiator overflow hose, located at the radiator cap (Fig. 304).



Fig 304

DSC-2434

ENGINE

10. Loosen and remove the tank return hydraulic hose from the radiator. This line is located at the left rear corner of the radiator (Fig. 305). Cap the hydraulic fittings to prevent contamination.



Fig 305

DSC-2652

12. Remove 6 bolts and washers located under the fan mounting plate assembly. 3 bolts are located in the front of the fan mounting plate (Fig. 307) and 3 are located in the rear (Fig. 308). These 6 bolts retain the radiator to the fan mounting plate.



Fig 307

DSC-2658

11. Loosen and remove the two hydraulic drain lines, connected to a T-fitting, located under the front left corner of the radiator (Fig. 306). These two hydraulic lines are the case drain lines for the hydro drive pumps and the hydraulic fan and route to the internal oil cooler. Cap the hydraulic fittings to prevent contamination.



Fig 306

DSC-2656



Fig 308

DSC-2657

5

13. Remove the radiator from the fan mounting plate (Fig. 309).



Fig 309

DSC-2659

2. Install the 3 bolts and washers located under the fan mounting plate assembly in the front (Fig. 311). **DO NOT TIGHTEN.**



Fig 311

DSC-2658

Radiator Installation

1. Install the radiator to the fan mounting plate assembly (Fig. 310).



Fig 310

DSC-2659

Install the 3 bolts and washers under the fan mounting plate assembly and in the rear (Fig. 312) **DO NOT TIGHTEN.**



Fig 312

DSC-2657

ENGINE

3. Before tightening the bolts and washers, check to make sure there is clearance between the fan blades and the engine cooling shroud and then tighten all 6 bolts.
4. Install the two hydraulic case drain lines to the T-fitting, located under the front left corner of the radiator (Fig. 313).



Fig 313

DSC-2656

6. Install the radiator overflow hose and tie strap the hose next to the radiator cap (Fig. 315).



Fig 315

DSC-2434

7. Install the engine outlet hose, located on the right side of the fan mounting plate assembly. Through the access hole tighten the hose clamp (Fig. 316).



Fig 316

DSC-2428

- 5**
5. Install and tighten the tank return hydraulic hose assembly to the radiator. This is located at the left rear corner of the radiator (Fig. 314).



Fig 314

DSC-2652

8. Install the engine inlet house and tighten the clamp (Fig. 317).



Fig 317

DSC-2425

14. Install the right and left hair pins to the clevis pins that hold the engine hood assembly (Fig. 318).



Fig 318

DSC-2411

9. Close the radiator petcock.
10. Fill the radiator with 50/50 mix of extended life antifreeze/Dex-Cool and water.

Check the antifreeze overflow bottle and make sure it is up to indicator line.

Cooling system capacity: 128 ounces (3.8l)

11. Check the hydraulic reservoir tank to make sure the fluid level is at the cold level mark.
12. Connect the negative battery cable. Start the unit up and operate for about 5 minutes. Observe all the cooling and hydraulic lines for any leaks.
13. Recheck the hydraulic reservoir tank at the hot level mark; add oil if necessary. Also, recheck the coolant level in the overflow bottle.

15. Slide the right and left hood lanyards on the radiator support bolts (Fig. 319).



Fig 319

DSC-2410

ENGINE

16. Install the engine belt shield and the engine access panel assembly with two knobs (Fig. 320).

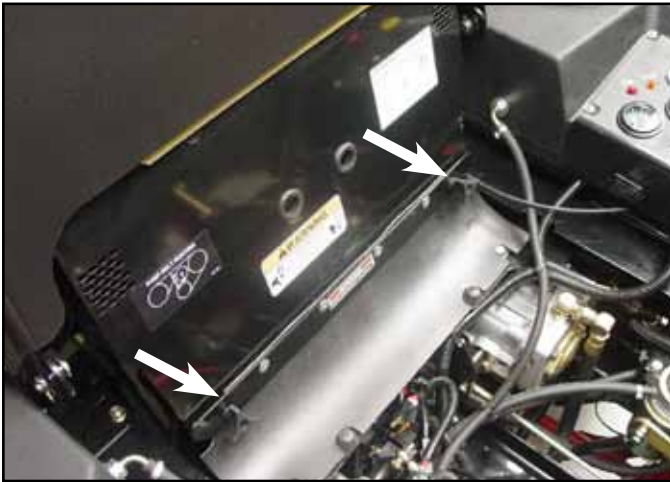


Fig 320

DSC-2071

17. Install the rear heat shield to the frame (Fig. 321).



Fig 321

DSC-2370

Checking the Radiator Coolant

Check the cooling system level daily.

Fluid Type: 50/50 mix of extended life antifreeze/Dex-Cool and water.

Cooling system capacity: 128 ounces (3.8l)

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

1. Position the machine on a level surface, stop the engine, and set the parking brake.
2. With the engine cool, check the overflow bottle level. The fluid needs to be up to the raised indicator line on the outside of overflow bottle (Fig. 322).

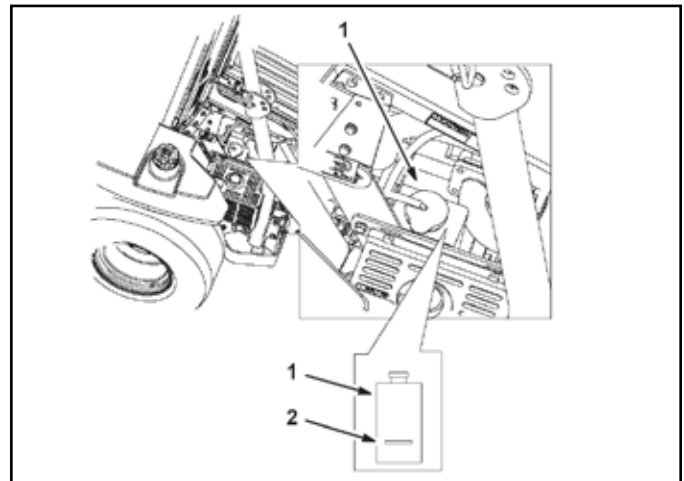


Fig 322

fig 47 m-7402

1. Coolant overflow bottle
2. Indicator line on side of overflow bottle
3. If the coolant level is low, add a 50/50 mix of extended life antifreeze/Dex-Cool and water to the overflow bottle to the indicator line on the bottle.

Replacing the Fan Pump Drive Belt

Check the fan pump drive belt for wear after every 50 hours of operation.

1. Loosen the bolts and remove the rear engine panel (Fig. 323).



Fig 323

DSC-2580

2. Pull the spring loaded idler down and remove the fan pump drive belt from the engine and pump pulley (Fig. 324).



Fig 324

DSC-2581

3. Install the new belt around the engine and hydro pump pulley.
4. Pull the spring loaded idler down and align the belt. Release the pressure on the spring loaded idler (Fig. 325).



Fig 325

DSC-2583

Replacing and Tensioning the Alternator Belt

Check the alternator belt for wear after every 50 hours of operation.

5

ENGINE

Replacing the Alternator Belt

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 operator position.
3. Tilt the seat forward and remove the front engine panel (Fig. 326)

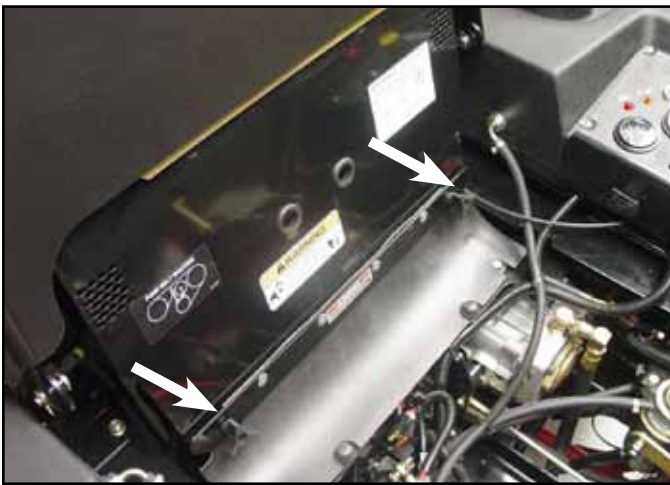


Fig 326

DSC-2071

5. Loosen the two bolts (top and bottom) holding the alternator (Fig. 327).



Fig 327

DSC-2584

6. Remove the belt from the pulleys and alternator.
7. Install a new belt around the pulleys and the alternator (Fig. 328).

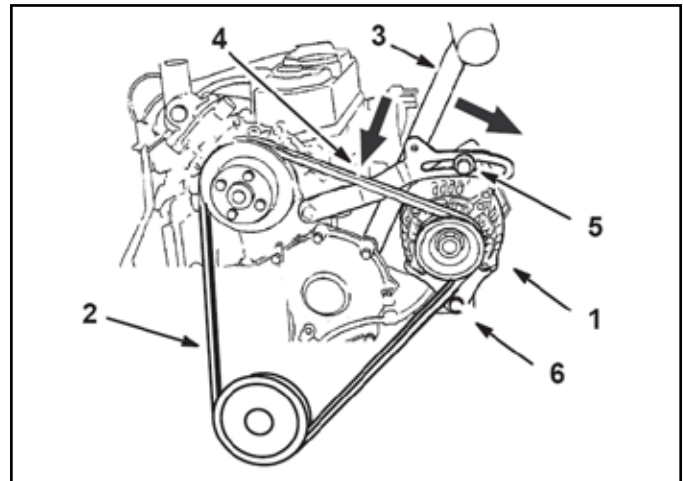


Fig 328

fig 80 m-7421

- | | |
|--------------------|---|
| 1. Alternator | 4. Deflection, 3/8 to 1/2 inch (10 to 13mm) |
| 2. Alternator belt | 5. Top bolt |
| 3. Handle | 6. Bottom bolt |

4. Remove the hydrostatic pump drive belt. Refer to Replacing the Traction Pump Drive Belt, page 4-31.

Tensioning the Alternator Belt

1. Place a wood tool handle between the alternator and cylinder block to use as a lever (Fig. 329).



Fig 329

DSC-2585

2. Adjust the alternator to the outside until there is 3/8 to 1/2 inch (10 to 13mm) deflection in the belt between the engine and the alternator (Fig. 328).
3. Tighten the alternator bolts.
4. Check the deflection in the belt again and adjust the belt if needed (Fig. 330).



Fig 330

DSC-2586

5. If the deflection is correct, torque the upper bolt to 170 in-lbs. (19 Nm) and the bottom bolt to 40 ft-lbs. (54 Nm) (Fig. 331).



Fig 331

DSC-2587

6. Install the pump drive belt; refer to Replacing the Traction Pump Drive Belt, page 4-31.
7. Install the front engine panel (Fig. 332).



Fig 332

DSC-2071

ENGINE

Servicing the Fuel Filter

Draining Water from the Fuel Filter

If the Water in Fuel Light comes on stop the engine and drain the water from the fuel filter.

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. Disconnect the negative battery cable.
4. Allow the machine to cool down.
5. Place a drain pan under the fuel filter and loosen the drain plug 1 turn (Fig. 333).

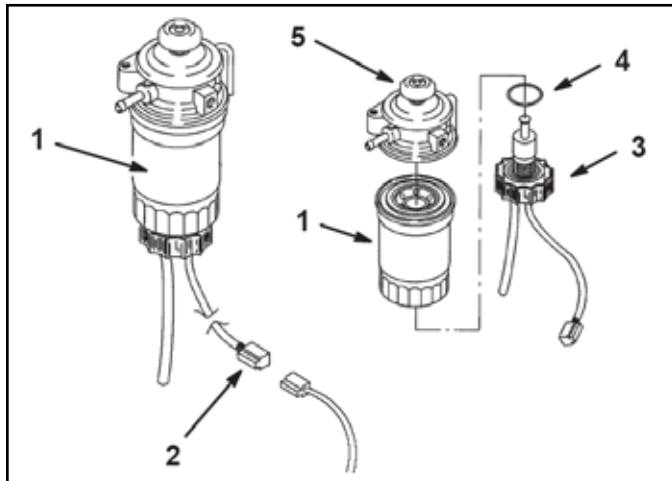


Fig 333

fig 48 m-7409

- | | |
|----------------|------------------------|
| 1. Fuel filter | 4. O-ring |
| 2. Sensor wire | 5. Metal Primer button |
| 3. Drain plug | |

6. Let the water drain. If necessary, operate the priming pump to drain water, but only until fuel flows from the filter (Fig. 334).



Fig 334

DSC-2588

7. Tighten the drain plug when fuel begins to flow.
8. Bleed the air from the fuel line by priming the fuel system. Refer to Priming the Fuel System, page 5-34.

Changing the Fuel Filter

Replace the fuel filter after every 800 operating hours or yearly, whichever occurs first.

Never reinstall a dirty filter once it is removed.

1. Allow the machine to cool down.
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 operator position.
4. Close the fuel shut-off valve (Fig. 335).



Fig 335

DSC-2589

5. Disconnect the sensor wire (Fig. 336).



Fig 336

DSC-2590

6. Remove the drain plug and discard the O-ring (Fig. 337).

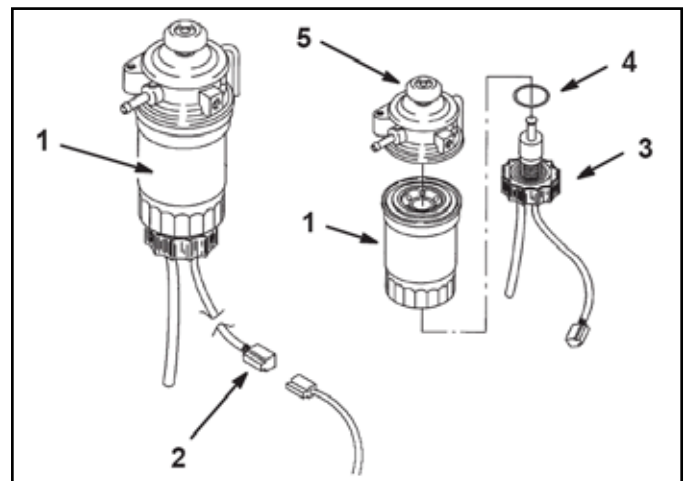


Fig 337

fig 48 m-7409

- | | |
|----------------|------------------------|
| 1. Fuel filter | 4. O-ring |
| 2. Sensor wire | 5. Metal Primer button |
| 3. Drain plug | |

ENGINE

7. Remove the filter.
8. Install a new filter by hand until the gasket contacts the housing, then tighten an extra 1/3 of a turn.
9. Install the drain plug with new O-ring and connect the sensor wire.
10. Bleed the air from the fuel line by priming the fuel system. Refer to Priming the Fuel System, page 5-34.
11. Open the fuel shut-off valve (Fig. 338).



Fig 338

DSC-2591

Priming the Fuel System

The primer pump is the gold metal button on top of the fuel filter (Fig. 339).



Fig 339

DSC-2593

To bleed air from the fuel system, push down on the primer pump until resistance becomes firm. This should take about 10 – 15 pushes on the primer button (Fig. 340).



Fig 340

DSC-2588

12. Start the engine and check for leaks.

Safety Information	1
Specifications	2
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Hydraulic System	4
Engine	5
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ELECTRICAL

ELECTRICAL SYSTEM

General

Note: Interactive Electrical Troubleshooting CD, Form 492-9143 is also available.

When turning the ignition switch clockwise to the RUN position, the glow plug indicator light will come on. After the glow plug indicator light goes out, turn the key to the START position and start the mower. The “Low Oil Pressure” alarm will sound a “pulse tone”. Once the engine starts and the oil pressure in the engine builds the alarm will stop; this is normal.

Current flows from the ignition switch to the start relay and on to the engine starter. At the same time, current flows to the PTO switch, park brake switch, through the two neutral motion control switches, then on to the fuel solenoid and energizes the start relay and glow plug relay.

RELAYS

Purpose

There are 4 relays.

1. Start Relay
2. Glow Plug Relay
3. Oil Pressure Relay
4. Alternator Relay.

- 6**
1. **Start Relay:** Once the safety connections are met, the relay will activate completing the circuit to the starter solenoid.
 2. **Glow Plug Relay:** Once the safety connections are met, the relay will activate and provide current to the glow plugs and Oil Pressure Relay.
 3. **Oil Pressure Relay:** During the time the glow plug relay is activated the oil pressure relay opens the warning buzzer ground circuit.
 4. **Alternator Relay:** The alternator relay completes the audible alarm ground circuit if the alternator is not charging.

Location

The alternator and the oil pressure relays are located behind the engine access panel on the left side (Fig. 341).

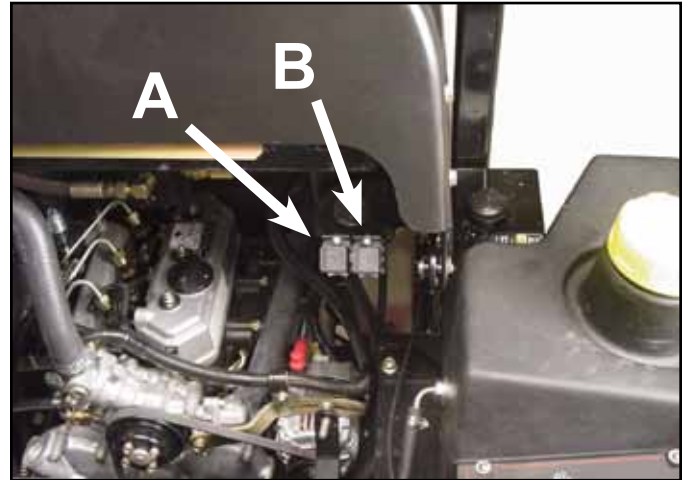


Fig 341

DSC-2515

- A. Oil Pressure Relay B. Alternator Relay

The glow plug and the start relay are located under the seat area, behind the battery (Fig. 342).

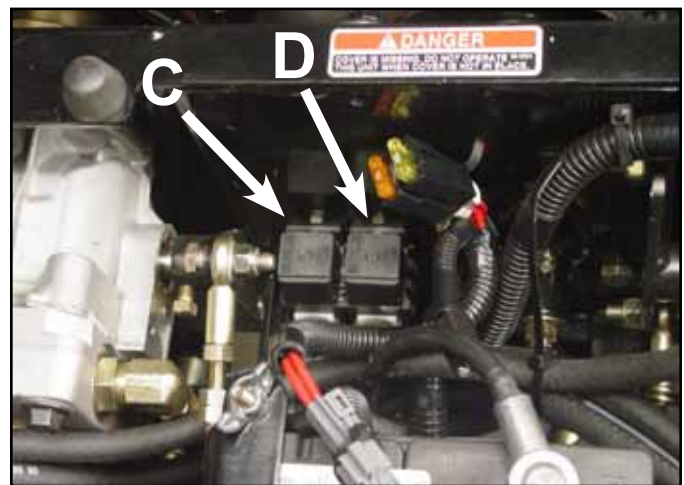


Fig 342

DSC-2516

- C. Start Relay D. Glow Plug Relay

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. 343).



Fig 343

DSC-2517

Testing

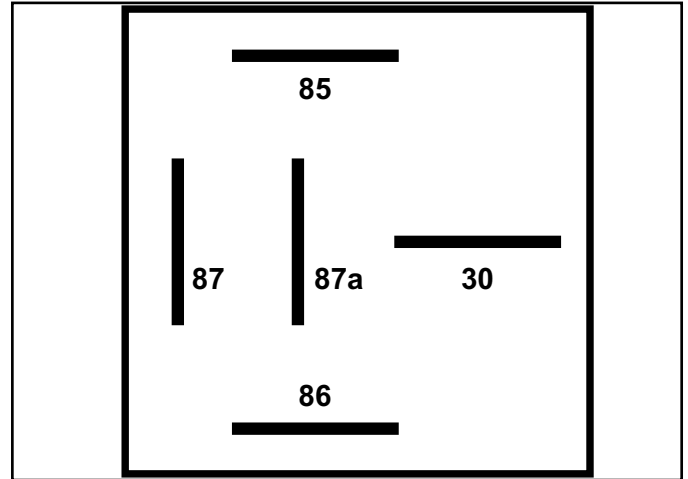


Fig 344

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 +12VDC 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.

ELECTRICAL

5. Disconnect voltage and multimeter leads from relay terminals (Fig. 345).

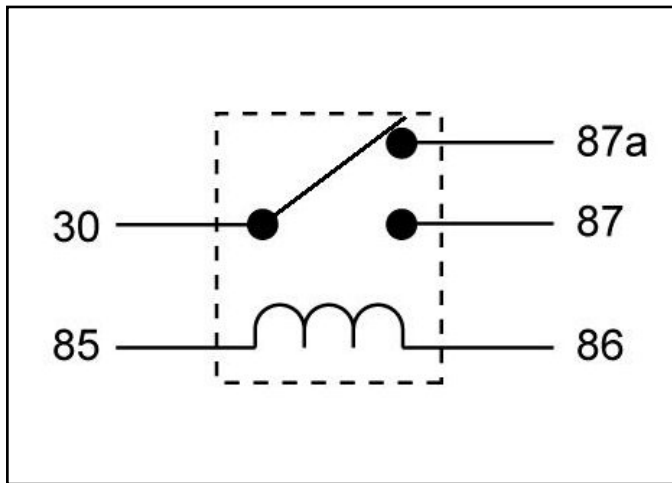


Fig 345

xl relay

Location

The PTO switch is located on the control panel, on the left side of the operator (Fig. 346).



Fig 346

DSC-2519

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.

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.

6

- Verify that there is continuity between the appropriate terminals in the ON and OFF positions (Fig. 347).

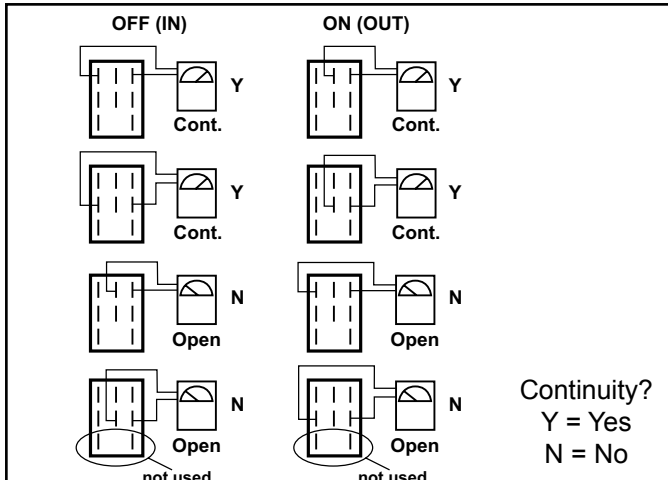


Fig 347 PTO switch test

- Replace the switch if your test results do not correspond with those given in Fig. 347.
- Mount the PTO switch back into the control panel and reinstall the wiring harness (Fig. 348).

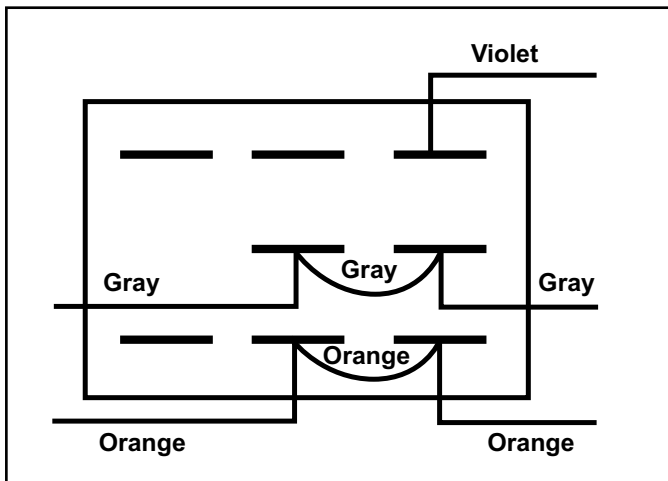


Fig 348 PTO clutch switch

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. 349).



Fig 349 DSC-2519

ELECTRICAL

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. 350).

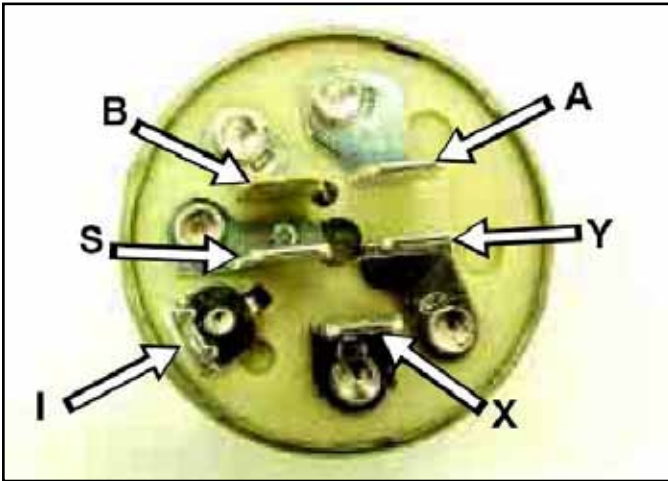


Fig 350

MVC-166

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

NEUTRAL SAFETY SWITCH

Purpose

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

Location

To gain access to the neutral safety switches, remove the front pocket. There are 2 neutral switches. One for the right motion control handle and one for the left motion control handle (Fig. 351).



Fig 351

DSC-2524

6

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 XY
START	Continuity – B I S

Testing

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. 352).



Fig 352

DSC-2527

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.

PARK BRAKE SWITCH

Purpose

The purpose of the 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. 353).

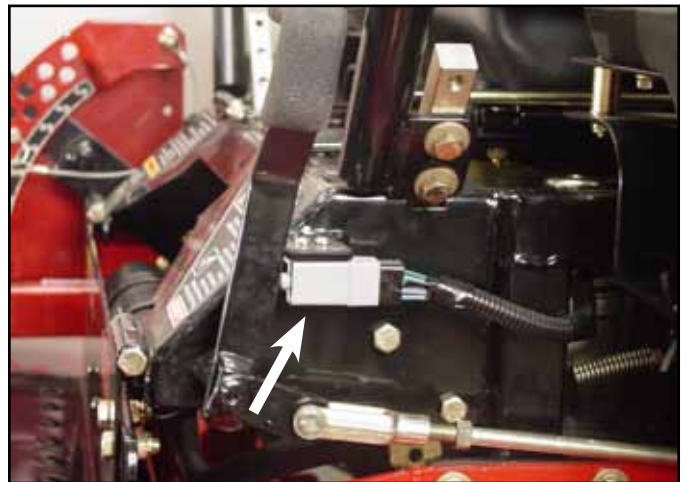


Fig 353

DSC-2525

ELECTRICAL

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. 354).



Fig 354

DSC-2528

- Using a multimeter, follow the procedures listed below (Fig. 355).

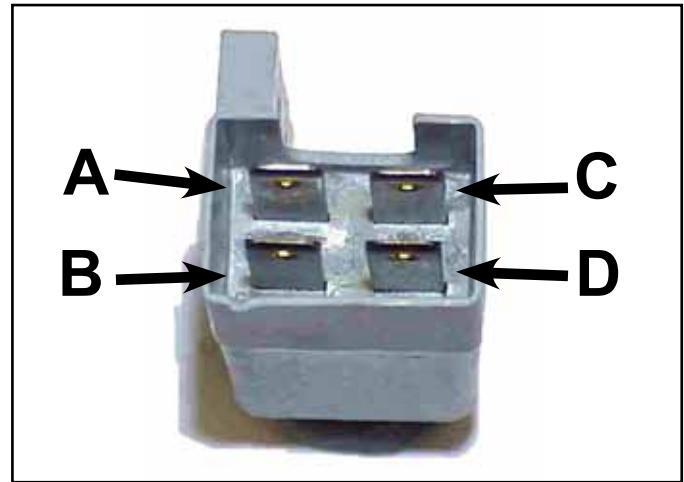


Fig 355

brake switch

Plunger <u>Not</u> Depressed	Plunger Depressed
A/B Terminals – Closed Circuit – Continuity	A/B Terminals – Open Circuit – No Continuity
C/D Terminals – Open Circuit – No Continuity	C/D Terminals – Closed Circuit – Continuity

Testing

- Disconnect the switch from the wiring harness.

6 The park brake 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.

SEAT SWITCH

Purpose

The 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 fastened to the bottom of seat base (Fig. 356).



Fig 356

DSC-2555

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. 357).



Fig 357

DSC-2556

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

ELECTRICAL

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 control panel on the LH fuel tank. (Fig. 358).



Fig 358

DSC-2534

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. 359).

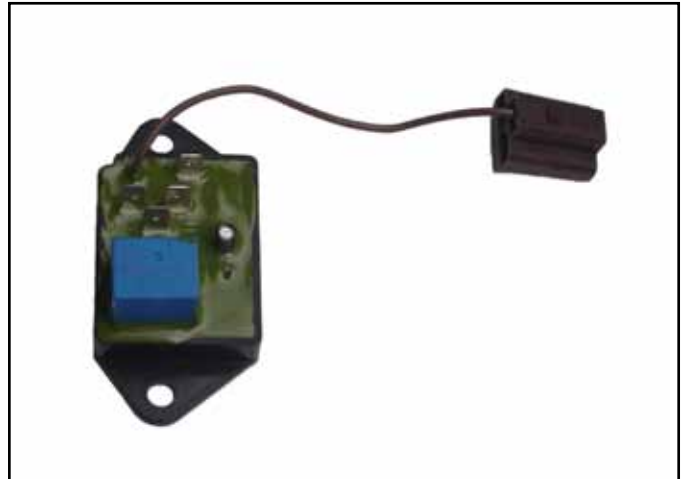


Fig 359

DSC-2532

Testing

1. Raise the seat and disconnect the seat switch. Install a jumper wire in place of the seat switch (Fig. 360).



Fig 360

DSC-2537

2. Remove the 4 bolts to the control panel and raise the panel.
3. Connect a VOM positive lead to the blue wire on the module (Fig. 361). Connect the negative lead to the battery negative terminal.



Fig 361

DSC-2536

4. 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. This test shows the delay module is working.
 6. If you do not get 12 volts DC at the light blue wire when turning the ignition switch to the RUN position, verify the following:
 1. 12VDC at the Tan wire terminal.
 2. 12VDC at the Brown wire terminal.
 3. 0 VDC at the Gray wire terminal.
 4. If all these conditions are met, replace the seat delay module.

DUAL-TONE ALARM

Purpose

The dual-tone alarm is an audible alarm system to alert the operator of the following:

PULSE TONE - Either the engine is low on oil pressure or the alternator is not charging. Note: On start-up of the engine it is normal for the alarm to pulse tone after the glow plugs have timed out until the engine is running and the oil pressure is up on the engine.

CONTINUOUS TONE - The engine is overheating.

In either case, when the alarm sounds while operating the unit, it should be shut down immediately.

Location

The audible alarm is located behind the engine access panel on the left side of the unit above the two relays (Fig. 362).

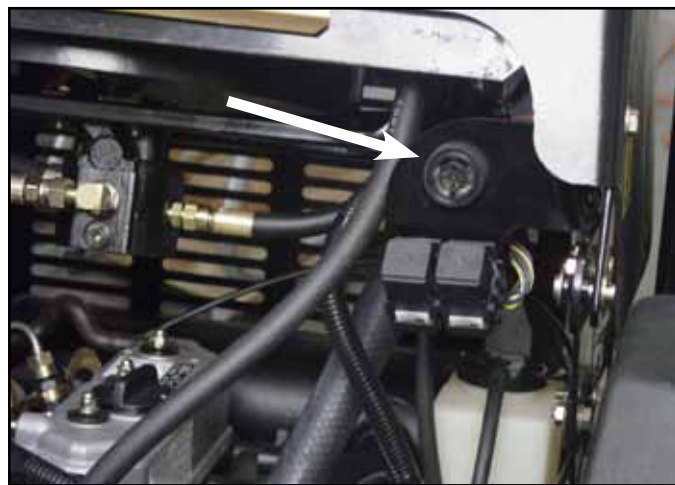


Fig 362

DSC-2535

ELECTRICAL

How It Works

12 VDC is applied to the audible alarm when the ignition key is on. For pulse and continuous tone a ground is needed to activate the audible alarm.

For pulse tone (alternator not charging) the alternator senses battery voltage dropping and grounds the alternator relay. The alternator relay activates and grounds the audible alarm to pulse tone.

For pulse tone (low oil pressure) the oil pressure switch is closed when the engine is not running. Oil pressure opens the switch contacts taking the wire to the switch off of ground. When the oil pressure drops, the contacts in the switch close and grounds the audible alarm to pulse tone.

For continuous tone the engine temperature switch connects to ground when the engine reaches a certain temperature. The audible alarm has a continuous tone (Fig. 363).



Fig 363

DSC-2538

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. You should have a continuous tone. Move the negative lead to the P terminal of the audible alarm and you should get a pulse tone (Fig. 364).



Fig 364

DSC-2539

6

GLOW PLUG CONTROLLER

Purpose

Controls the amount of time that voltage is sent to the glow plugs. The glow plug controller has an internal timer.

Location

The glow plug controller is located under the seat, behind the battery, fastened to the frame (Fig. 365).



Fig 365

DSC-2541

How It Works

The glow plug controller is a timer. When voltage is applied to the glow plug controller, it provides the ground for the glow plug relay coil, which activates, supplying current to the engine glow plugs. This is maintained for approximately 10 seconds in the ignition RUN position. In the ignition START position the glow plug controller is continuously on until the ignition switch moves back to the RUN position.

Testing

The glow plug timer (Fig. 366) can be tested as an individual component. Refer to the next page for proper testing procedures.



Fig 366

DSC-2545

ELECTRICAL

Step 1 Testing the “timed” output in the “run” position (Fig. 367).

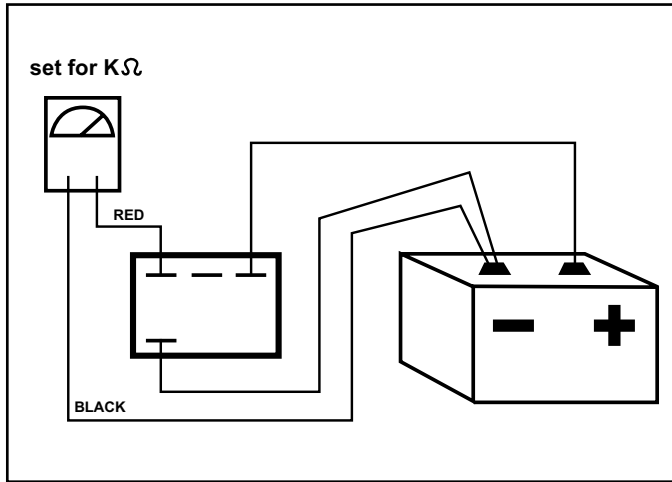


Fig 367 glow plug timer test 2

- A. Set VOM to read continuity in K ohms.
- B. Connect the red lead to referenced terminal “A” of the glow plug timer.
- C. Connect the negative lead to the negative terminal of the battery.
- D. Connect a jumper lead from terminal “D” of the timer to the negative terminal of the battery.
- E. Connect terminal “C” of the timer to the positive terminal of the battery and watch the meter. The meter should read continuity then increasing resistance until it reads “open”. The timeframe should be approximately 10 seconds from reading continuity to reading “open”.

Step 2 Testing continuous output in the “START” position (Fig. 368).

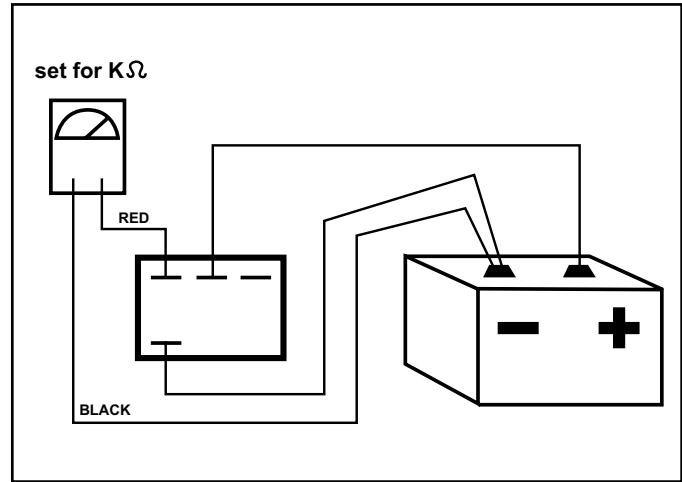


Fig 368 glow plug timer test 3

- A. Set VOM to read K ohms.
- B. Connect the red lead to terminal “A” of the glow plug timer.
- C. Connect the black lead to the negative terminal of the battery.
- D. Connect a jumper lead from terminal “D” of the timer to the negative terminal of the battery.
- E. Connect a jumper lead from terminal “B” of the timer to the positive terminal of the battery. The meter should hold at a constant continuity reading. The timer is reactivated in a continuous mode as the machine is being started.

TEMPERATURE SENDER

Purpose

The temperature sender is a temperature-dependent variable resistor. As the coolant temperature increases the internal resistance decreases. This causes a change in voltage applied to the water temperature gauge, which indicates a higher temperature.

Location

The temperature sender is located on the right side of the engine water pump (Fig. 369).



Fig 369

DSC-2547

How It Works

When the water temperature increases the internal resistance decreases which will cause the water temperature gauge to increase (Fig. 370).



Fig 370

DSC-2548

Testing

It is not practical to test the sender in a shop environment. If the gauge is not reading at all, temporarily ground the lead at the sender. If the meter reads full scale, the ground wire and gauge are OK and the sender is bad. If the gauge does not respond, check for 12 VDC at gauge and continuity of the ground lead. If OK, the gauge is bad. Erratic readings can be either the gauge or sender. Replace the sender first, when diagnosing.

ELECTRICAL

OIL PRESSURE SWITCH

Purpose

When the oil pressure drops, the switch activates an audible alarm which alerts the operator to shut the engine down immediately.

Location

Located on the right hand side of the engine block, above the oil dipstick tube (Fig. 371).

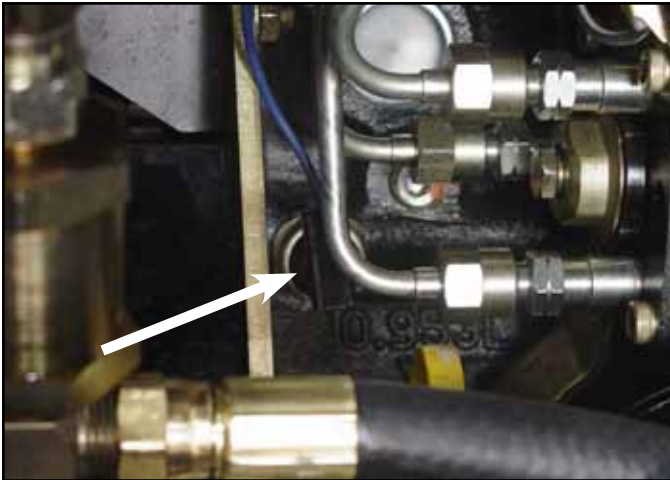


Fig 371

DSC-2558

How It Works

The oil pressure switch is a normally closed switch. When the engine is running, oil pressure builds and opens the contact in the switch. If the engine oil pressure drops, the contacts in the switch close, grounding the audible alarm, which alerts the operator to shut the unit down immediately (Fig. 372).



Fig 372

DSC-2557

Testing

If the audible alarm operates continuously (pulse mode) when the engine is running, disconnect the switch lead. If the alarm stops, the pressure switch is bad. The switch can also be tested with an ohmmeter. There should be continuity between the wire terminal and ground with the engine not running, and no continuity when the engine is running.

WATER TEMPERATURE GAUGE

Purpose

The purpose of the water temperature gauge is to monitor the engine coolant temperature.

Location

The water temperature gauge is located on the left side of the operator on the control panel (Fig. 373).



Fig 373

DSC-2550

How It Works

When the engine water temperature increases the water sending unit resistance decreases, which cause the needle on the water temperature gauge readings will increase (Fig. 374).



Fig 374

DSC-2549

Testing

Time-efficient shop testing is not possible. See information under Temperature Sender Testing, page 6-15.

ELECTRICAL

Back side of the Temperature Gauge with terminal and wire locations (Fig. 375).

- S Terminal - Yellow/Red Wire (to Temperature Sender)
- G Terminal - Black Wire (Ground)
- I Terminal - Orange Wire (I Terminal of the Ignition Switch)

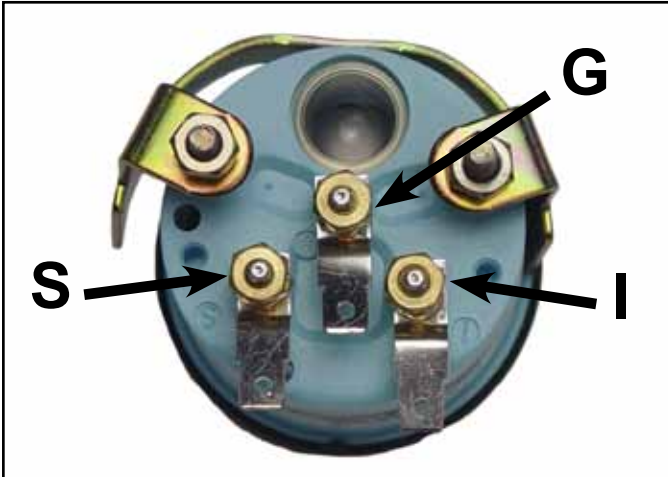


Fig 375 DSC-2551

Location

Raise the seat, the hour meter is located on the left side of the operator on the lower portion of the control panel (Fig. 376).



Fig 376 DSC-2559

HOUR METER

Purpose

The hour meter keeps track of the actual unit running hours or the time that the ignition key switch is in the RUN position.

How It Works

Since a normal clock might be affected by variations in voltage and current, 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. 377).



Fig 377 DSC-2560

Testing

Verify that 12 volts DC is present across the two terminals when the ignition key is in the RUN position. If so, and the meter is not running, replace the meter. If 12 volts is not present, check the connections. The meter is a permanently sealed unit and is not repairable.

VOLT METER GAUGE

Purpose

This gauge indicates the voltage across the battery.

Location

The voltmeter is located to the left side of the operator, on the control panel (Fig. 378).



Fig 378

DSC-2563

How It Works

The meter movement is proportional to the voltage level across the two terminals of the battery. This is accomplished by placing a resistor in parallel with the meter movement.

Testing

1. Remove the control panel from the tank by removing 4 screws.
2. With a Volt-ohm meter, place the negative probe on the battery negative terminal. Turn the ignition key to the RUN position.
3. Place the positive probe of the meter to the I (orange wire) terminal. You should read 12 volts DC on the meter.
4. Move the positive probe of the meter to the G (black wire) terminal. You should get 0 volts DC on the meter.
5. If you DO NOT get the above readings, replace the voltmeter.

ELECTRICAL

ELECTRIC PTO CLUTCH

Purpose

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

Location

The electric clutch is located on the PTO end of the crankshaft (Fig. 379).



Fig 379

DSC-2552

Testing

If the electric PTO clutch does not engage or is suspect as the cause of an electrical problem in the PTO circuit, use the following troubleshooting steps to determine whether the clutch has failed or another electrical problem exists.

Coil Resistance Measurement

1. Disengage the PTO, set the parking brake, turn the ignition to the "off" position and remove the ignition key.
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. 380).



Fig 380

DSC-2553

5. The meter should read between 2-4 ohms (meter readings may vary). If the reading is above or below these readings, the field has failed and needs to be replaced. If the reading falls between 2-4 ohms, measure clutch current draw.

6

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.

Measuring Clutch Current Draw

1. Disengage the PTO, set the parking brake, turn the ignition key to OFF, and remove the key.
2. Loosen 4 bolts and remove the rear bumper plate.
3. Disconnect the PTO clutch harness from the main harness.
4. Set the multimeter to check amps (10 amp scale).
5. Connect the positive meter lead to terminal (1) of the main harness (Fig. 381).

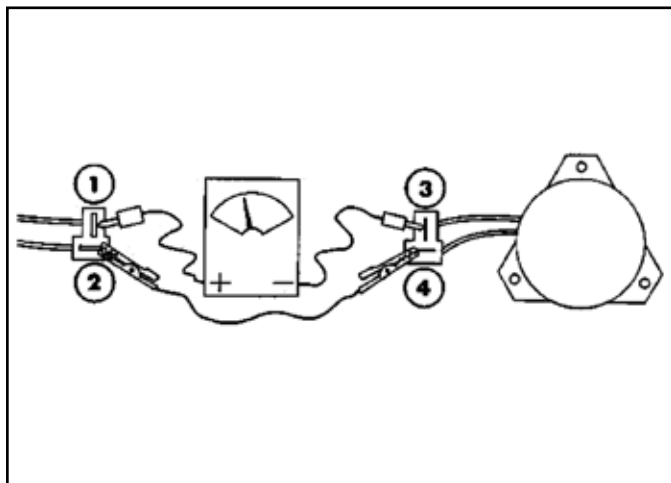


Fig 381

diag 3-7

6. Connect the negative meter lead to the clutch harness terminal (3), Fig. 381.

7. Connect a short jumper lead from terminal (2) to terminal (4) (Fig. 382).

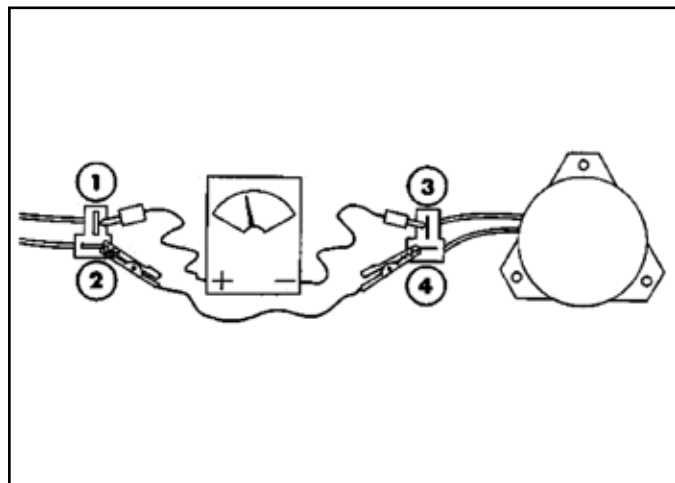


Fig 382

diag 3-7

8. Turn the ignition switch to the "RUN" position. Turn the PTO switch to the "ON" position.
9. If the meter reading is 3.5 amps or above, the system is functioning properly. If the meter reading is below 3.5 amps, check the electrical system for problems (i.e., the battery, ignition switch, PTO switch, or wiring harness). Make sure the negative side of the wiring has a good connection to chassis ground.

ELECTRICAL

FUEL FILTER SENSOR

Purpose

The fuel filter water sensor activates when too much water has accumulated in the water separator fuel filter. A warning light on the control panel indicates the need for fuel filter service.

Location

The fuel filter, with the fuel filter sensor, is located under the seat, on the left side of the unit. The fuel filter sensor is located under the fuel filter (Fig. 383).



Fig 383

DSC-2565

How It Works

The fuel filter sensor is a float type switch. Water is heavier than fuel and when water accumulates in the base of the sensor, a float raises and closes off a set of contacts. This completes the ground to the indicator light located on the control panel (Fig. 384).



Fig 384

DSC-2566

Testing

1. There are two wires located at the bottom of the fuel filter sensor.

2. Set the multimeter to read continuity. Place the meter probes on each wire. With the float at the bottom of the sensor you should have NO Continuity (Fig. 385).

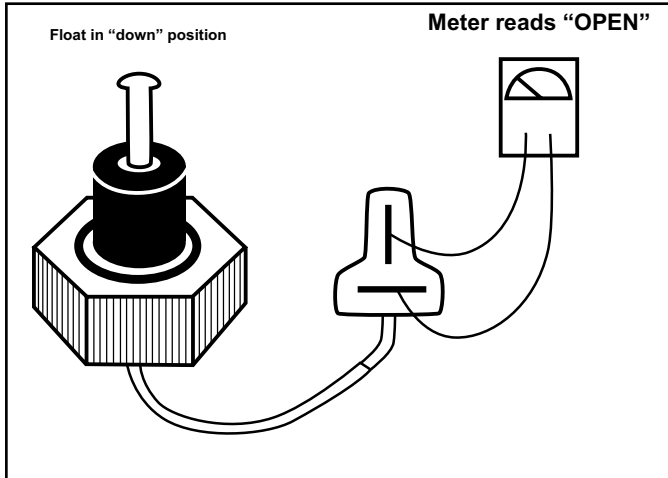


Fig 385 fuel filter sensor down

3. With the meter probes still on the wires of the sensor, raise the float upwards, you should have continuity (Fig. 386).

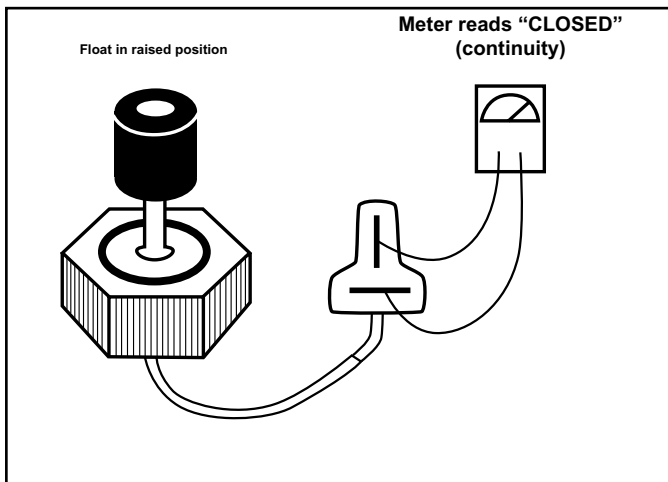


Fig 386 fuel filter sensor raised

ELECTRICAL

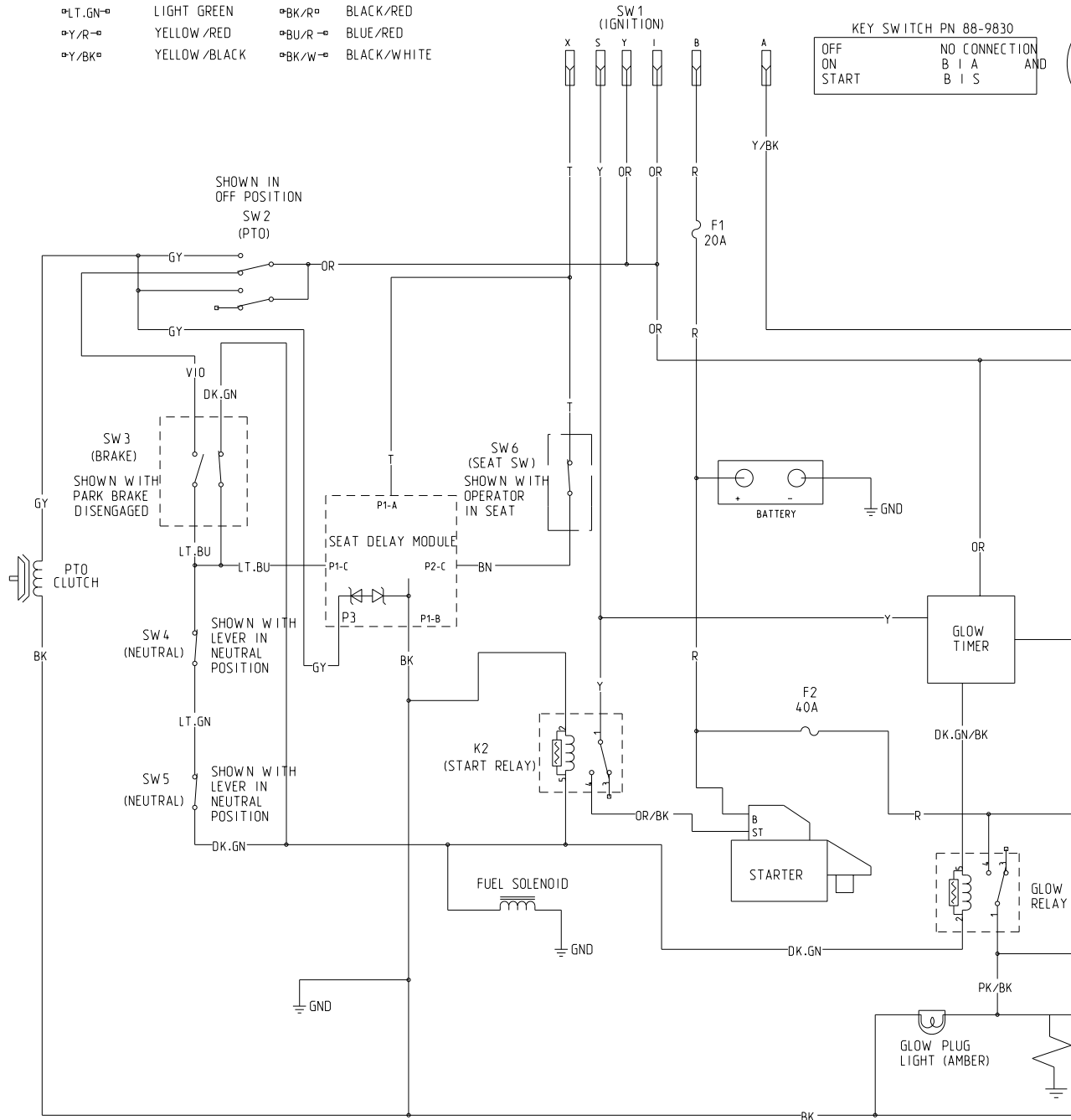
WIRE COLOR CODES

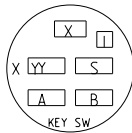
⊖GND	BLACK	⊖PK	PINK
⊖BN	BROWN	⊖R	RED
⊖BU	BLUE	⊖T	TAN
⊖GN	GREEN	⊖VIO	VIOLET
⊖GY	GREY	⊖W	WHITE
⊖OR	ORANGE	⊖Y	YELLOW
⊖DK.GN/BK	DARK GREEN/BLACK	⊖DK.GN	DARK GREEN
⊖OR/BK	ORANGE/BLACK	⊖PK/BK	PINK/BLACK
⊖LT.BU	LIGHT BLUE	⊖DK.BU	DARK BLUE
⊖LT.GN	LIGHT GREEN	⊖BK/R	BLACK/RED
⊖Y/R	YELLOW/RED	⊖BU/R	BLUE/RED
⊖Y/BK	YELLOW/BLACK	⊖BK/W	BLACK/WHITE

B&S DIESEL

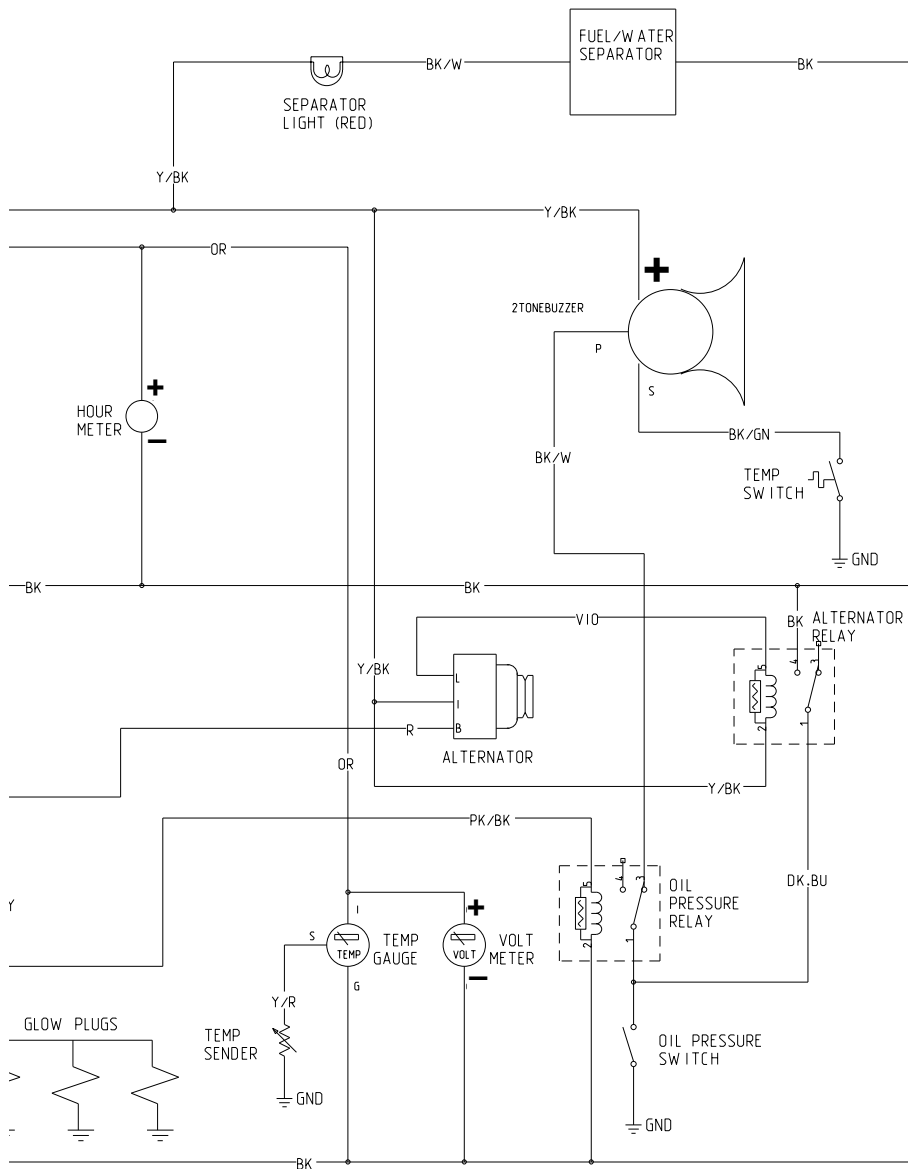
KEY SWITCH PN 88-9830

OFF	NO CONNECTION	AND ()
ON	B I A	
START	B I S	





TERMINAL VIEW FROM
BACK OF SWITCH



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Safety Information	1
Specifications	2
Chassis	3
Hydraulic System	4
Engine	5
Electrical	6
Mower Decks	7

MOWER DECKS

Electric PTO Clutch Removal

1. Loosen the 4 bolts holding the rear bumper assembly and remove from the unit (Fig. 387).



Fig 387

DSC-2595

2. Pull the spring loaded idler down and remove the fan drive belt (Fig. 388).



Fig 388

DSC-2596

3. Remove the bolt and nut retaining the idler pulley to the fan pump tension assembly (Fig. 389).



Fig 389

DSC-2597

4. Remove the bolt, spacer, washer, and nut retaining the extension spring to the top of the fan pump tension assembly (Fig. 390).



Fig 390

DSC-2598

MOWER DECKS

5. Disconnect the electric clutch harness from the wiring harness (Fig. 391).



Fig 391

DSC-2601

7. On the left side of the unit is the spring loaded idler pulley for the mower drive belt. Note the square cut hole in the idler bracket (Fig. 393).



Fig 393

DSC-2650

6. Remove the bolt, spacer, washers and nut retaining the clutch brake strap to the frame (Fig. 392).



Fig 392

DSC-2604

8. Insert a 12" long 3/8" drive extension into the square hole of the idler bracket. Use a 3/8" drive ratchet on the extension and pull back to relieve spring tension on the idler bracket. Remove the mower drive belt from the spring loaded idler pulley and outer PTO clutch sheave (Fig. 394).



Fig 394

DSC-2651

MOWER DECKS

9. On the right side of the unit is the spring loaded idler pulley for the second mower drive belt. Insert a 3/8" drive ratchet with a 6" extension into the square cut hole in the idler bracket. Pull back on the ratchet to relieve tension on the belt. Slip the belt off the idler pulley and the PTO clutch (Fig. 395).



Fig 395

DSC-2607

10. Using an air impact wrench, loosen the center bolt retaining the pulley and the PTO clutch (Fig. 396).



Fig 396

DSC-2613

11. Use a wheel puller to remove the fan pump drive pulley from the PTO clutch (Fig. 397).



Fig 397

DSC-2614

12. Remove the electric PTO clutch from the crankshaft (Fig. 398).



Fig 398

DSC-2615

PTO Clutch Installation

1. Apply anti-seize compound to the crankshaft (Fig. 399).



Fig 399

DSC-2616

2. Install the PTO clutch on the crankshaft (Fig. 400).



Fig 400

DSC-2617

3. Slide the spacer on the crankshaft (Fig. 401).



Fig 401

DSC-2618

4. Install drive pulley; make sure the square key is in the pulley (Fig. 402).



Fig 402

DSC-2619

MOWER DECKS

5. The retention hardware for the electric clutch is is: a bolt, 2 spring washers, and a large washer (Fig. 403).

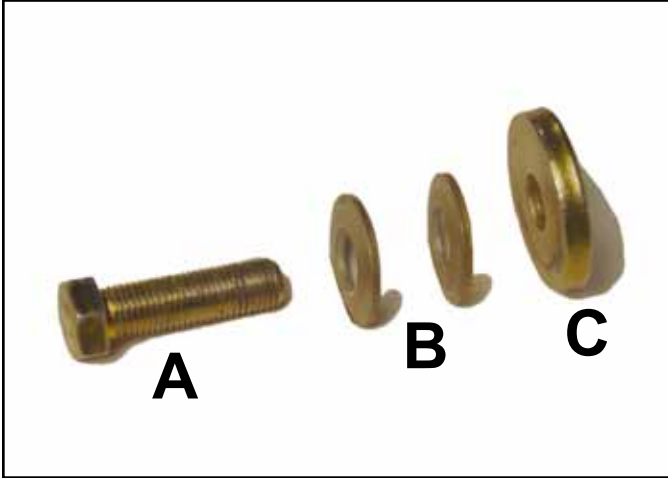


Fig 403 DSC-2620

- A. Bolt
- B. 2 Spring Washers
- C. Large Washer

6. Apply a thread locking compound to the bolt. Install bolt and hardware to the crankshaft. Torque the bolt 65 ft. lbs (88.13 Nm) (Fig. 404).



Fig 404 DSC-2621

7. Install the right side mower drive belt. Insert a 3/8" drive ratchet with a 6" extension into the square hole in the idler bracket. Pull back to relieve the tension on the idler arm and slip the belt on the inner sheave of the electric clutch drive pulley (Fig. 405).



Fig 405 DSC-2607

8. On the left side, insert a 3/8" drive ratchet with a 12" extension in the square hole in the idler bracket (Fig. 406). Pull back to relieve the tension on the idler arm.



Fig 406 DSC-2650

MOWER DECKS

Install the mower drive belt onto the outer clutch sheave, then the spring loaded idler pulley (Fig. 407).



Fig 407

DSC-2651

10. Connect the PTO clutch harness to the wiring harness (Fig. 409).



Fig 409

DSC-2601

9. Install bolt spacer, washers, and nut retaining the clutch/brake strap to the frame (Fig. 408). See Fig. 447 (pg 7-17) for hardware assembly sequence.



Fig 408

DSC-2604

11. Install bolt, spacer, washer, and nut to retain the extension spring to the top of the fan pump tension assembly (Fig. 410).



Fig 410

DSC-2598

MOWER DECKS

12. Install the idler pulley to the fan pump tension assembly with a bolt and nut (Fig. 411).



Fig 411

DSC-2597

13. Pull the spring loaded idler down and install the fan drive belt (Fig. 412).



Fig 412

DSC-2596

14. Install the rear bumper assembly and tighten the 4 bolts.

Mower Deck Removal

1. Loosen the 4 bolts holding the rear bumper assembly and remove from the unit (Fig. 413).



Fig 413

DSC-2595

2. Pull the spring loaded idler down and remove the fan drive belt (Fig. 414).



Fig 414

DSC-2596

MOWER DECKS

3. Disconnect the PTO clutch harness from the wiring harness (Fig. 415).



Fig 415

DSC-2601

5. On the left side of the unit is the spring loaded idler pulley for the mower drive belt. Note the square cut hole in the idler bracket (Fig. 417).



Fig 417

DSC-2650

4. Remove the bolt, spacer, washers and nut retaining the clutch/brake strap to the frame (Fig. 416).



Fig 416

DSC-2604

6. Insert a 3/8" drive ratchet with a 12" long extension, into the square hole of the idler bracket and pull back to relieve tension on the idler bracket. Remove the mower drive belt from the spring loaded idler pulley and PTO clutch pulley (Fig. 418).



Fig 418

DSC-2651

MOWER DECKS

7. On the right side of the unit is the spring loaded idler pulley for the inner mower drive belt. Insert a 3/8" ratchet drive with a 6" extension into the square hole in the idler bracket. Pull back on the ratchet to relieve tension on the belt. Slip the belt off the idler pulley and the PTO clutch pulley (Fig. 419).



Fig 419

DSC-2607

9. Remove the right side belt cover (Fig. 421).



Fig 421

DSC-2626

8. Lift the floor pan (Fig. 420).



Fig 420

DSC-2625



Fig 422

DSC-2628

MOWER DECKS

11. Remove the mower spindle belt from the top groove of the jackshaft sheave pulley (Fig. 423).



Fig 423

DSC-2629

13. Raise the mower deck to the transport position. Install a 4 x 4 wood block under the right side of the mower deck. Lower the deck to relieve tension on the lift chains on the right side (Fig. 425).



Fig 425

DSC-2623

12. Remove both the left and right mower drive belts from the jackshaft sheave (Fig. 424).



Fig 424

DSC-2630

14. Remove the front and rear lift chains from the right side of the mower deck (Fig. 426).



Fig 426

DSC-2631

MOWER DECKS

15. Remove the bolt and nut holding the right rear strut pin from the strut assembly (Fig. 427).



Fig 427

DSC-2632

17. Raise the deck to transport position. Install a 4 x 4 wood block under the left side of the mower deck. Lower the mower deck until it rests on the block of wood to relieve tension on the lift chains (Fig. 429).



Fig 429

DSC-2635

16. Remove the strut pin from the strut assembly and remove the assembly from the mower deck (Fig. 428).



Fig 428

DSC-2633

18. Push the lift handle to the lowest HOC position to overcome the tension of the lift assist springs. Use the hitch pin above the lift handle to lock the handle in the down position (Fig. 430).



Fig 430

DSC-2636

Tie strap the strut assembly up so it will be out of the way of the mower deck when sliding it out under the frame. Remove the 4 x 4 block of wood from the right side of the deck and allow the deck to sit on the floor.

MOWER DECKS

19. Follow steps 8 through 10 on the left side of the mower deck.
20. Remove the 4 x 4 wood block from under the left side of the mower deck and lower the deck to the floor.
21. Turn the right front wheel so the caster fork is angled forward. This will allow more clearance to slide the mower deck from under the frame (Fig. 431).



Fig 431

DSC-2637

22. Slide the mower deck out the right side of the unit (Fig. 432).



Fig 432

DSC-2638

Mower Deck Installation

1. Slide the mower deck under the unit.
2. Install a 4 x 4 wood block under the left side of the mower deck (Fig. 433).



Fig 433

DSC-2635

3. Install the strut pin through the strut assembly and install the bolt and nut (Fig. 434).



Fig 434

DSC-2639

MOWER DECKS

4. Install the rear and front lift chains to the mower deck (Fig. 435).



Fig 435

DSC-2640

11. Install the right mower drive belt on the bottom sheave of the jackshaft pulley (Fig. 436).



Fig 436

DSC-2641

5. Remove the hitch pin on the lift handle and raise the mower in the transport position.
6. Install a 4 x 4 wood block under the right side of the mower deck.
7. Lower the mower deck down on the wood block.
8. Install the strut pin in the strut assembly. Install and tighten the bolt and nut.
9. Install the rear and front lift chains to the mower deck.
10. Raise the mower deck and remove the wood block from under the mower.

12. Install the left mower drive belt on the middle sheave of the jackshaft pulley (Fig. 437).



Fig 437

DSC-2642

MOWER DECKS

13. Install the mower spindle belt around the idler pulleys and the top sheave of the jackshaft pulley (Fig. 438).



Fig 438

DSC-2643

14. Install the tension spring on the idler arm (Fig. 439).

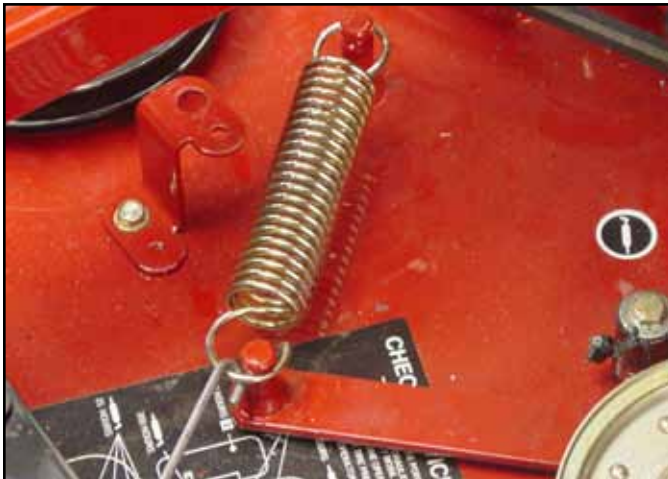


Fig 439

DSC-2645

15. Install the right side belt cover (Fig. 440).

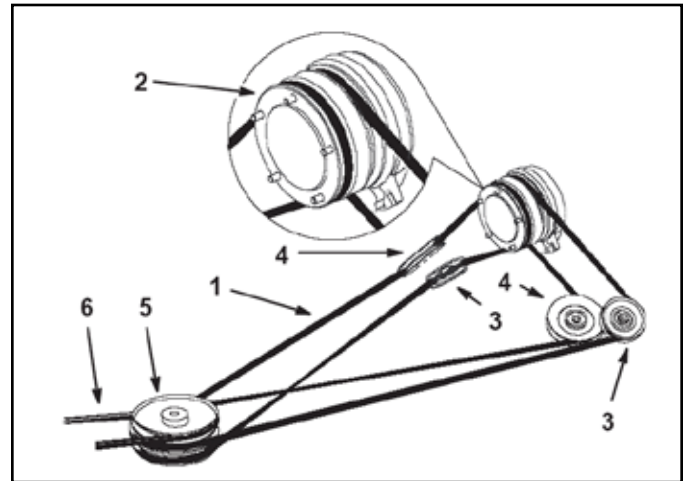


Fig 440

fig. 74 m-7404

- | | |
|-------------------------------|----------------------------|
| 1. Drive belt | 4. Adjustable idler pulley |
| 2. Clutch | 5. Three stacked pulleys |
| 3. Spring loaded idler pulley | 6. Mower belt |

16. Install the RH drive belt over the PTO clutch and around the inner drive sheave of the clutch (Fig. 441).



Fig 441

DSC-2646

MOWER DECKS

17. Install the RH drive belt around the fixed idler sheave. Insert a 3/8" drive ratchet with 6" extension into the 3/8" square hole in the idler arm. Pull toward the back of the machine to overcome the idler spring tension. Slip the RH drive belt over idler pulley and slowly release the idler arm (Fig. 442).

Note: Be sure the belt orientation is correct per Fig. 443.



Fig 442 DSC-2648

18. Install the LH drive belt over the electric PTO clutch and around the outer drive pulley.

19. Install the LH drive belt around the fixed idler pulley only.

20. On the left, insert a 3/8" drive ratchet with a 12" extension into the square hole in the idler bracket (Fig. 444).



Fig 444 DSC-2650

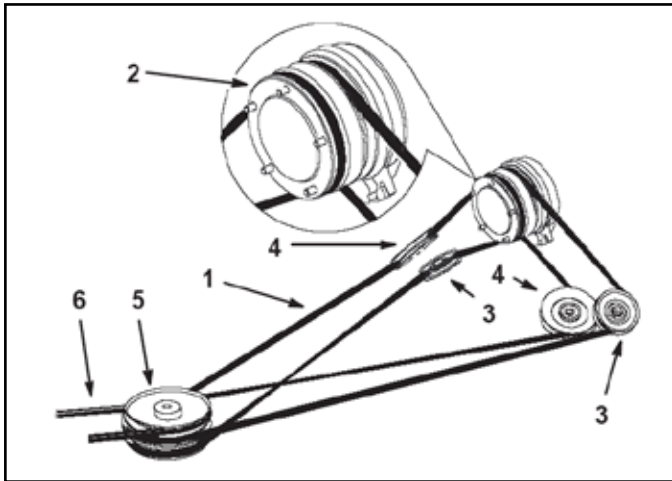


Fig 443 fig. 74 m-7404

- | | |
|-------------------------------|----------------------------|
| 1. Belt drive | 4. Adjustable idler pulley |
| 2. Clutch | 5. Three stacked pulleys |
| 3. Spring loader idler pulley | 6. Mower belt |

21. Pull back to relieve idler spring tension. Install the mower drive belt on the spring loaded idler pulley and the outer sheave of PTO pulley. Release the idler arm slowly (Fig. 445).



Fig 445 DSC-2651

MOWER DECKS

22. Install the bolt, spacer, washers, and nut holding the clutch/brake strap to the frame (Fig. 446).



Fig 446

DSC-2488

23. Connect the PTO clutch harness to the wiring harness plug (Fig. 448).



Fig 448

DSC-2601

Follow the hardware sequence in the diagram (Fig. 447).

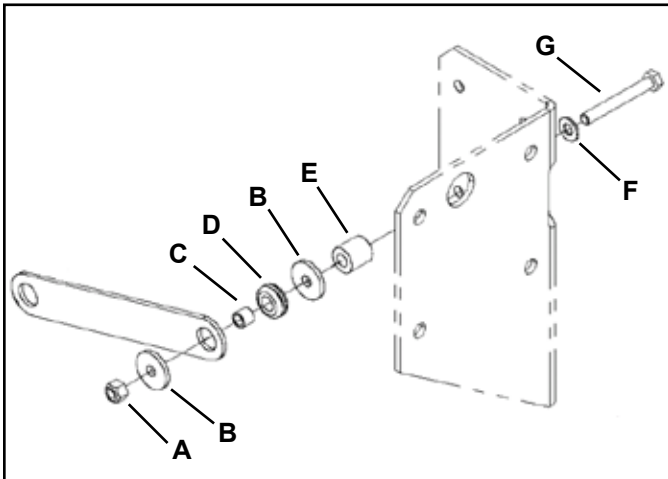


Fig 447

deck belt drive a

- | | |
|-------------------|------------------|
| A. Nut - lock | E. Spacer, large |
| B. Washer, large | F. Washer, flat |
| C. Spacer | G. Screw, HH |
| D. Grommet, brake | |

24. Pull the spring loaded idler down and install the fan drive belt (Fig. 449).



Fig 449

DSC-2596

MOWER DECKS

25. Install the rear bumper assembly and tighten the 4 bolts (Fig. 450).



Fig 450

DSC-2595

Mower Spindle Removal

This applies to removing any of the three mower spindles. This procedure shows removing the right side spindle.

1. Use a hoist or the Z Stand to raise the front of the mower deck.
2. Chock or block the drive wheels.
3. Disconnect the battery negative cable.
4. Lower the mower deck to the lowest position.
5. Lift the floor pan (Fig. 451).



Fig 451

DSC-2625

MOWER DECKS

6. Remove the right side belt cover (Fig. 452).



Fig 452

DSC-2626

8. Remove the mower spindle drive belt (Fig. 454).



Fig 454

DSC-2661

7. Remove the tension spring on the idler arm (Fig. 453).

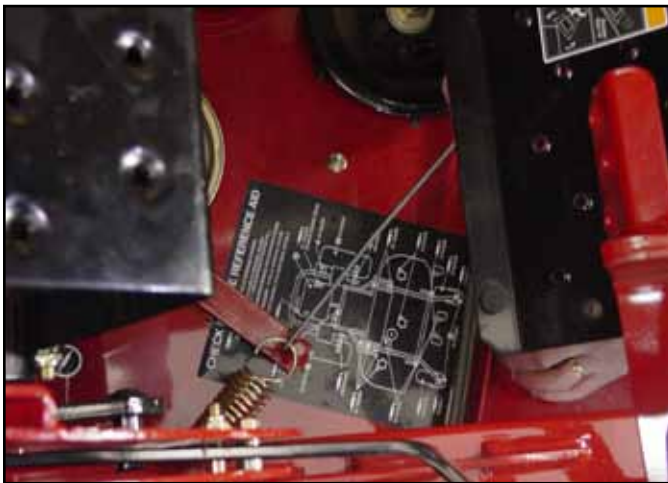


Fig 453

DSC-2628

9. Remove three bolts retaining the pulley to the pulley hub (Fig. 455).



Fig 455

DSC-2662

MOWER DECKS

10. Raise the mower deck to the transport position.
11. Remove the mower blade from the spindle assembly.
12. Remove the 6 bolts and nuts from the spindle assembly. Remove the spindle assembly (Fig. 456).

Note: Early production units did not have nuts on the bolts holding the spindle to the mower deck, It is recommended to install flange nuts to all of the bolts retaining the spindles to the mower deck.



Fig 456

DSC-2666

Mower Spindle Installation

Reverse the order of mower spindle removal.

Mower Spindle Disassembly

1. Remove the nut and washer (Fig. 457).



Fig 457

DSC-2669

2. Remove the pulley hub and square key (Fig. 458).



Fig 458

DSC-2670

MOWER DECKS

3. Remove the bearing shield (Fig. 459).



Fig 459

DSC-2671

5. Remove the seal spacer from the top of the spindle housing (Fig. 461).



Fig 461

DSC-2673

4. Remove the spindle housing from the spindle shaft assembly (Fig. 460).



Fig 460

DSC-2672

6. Remove the seal spacer from the bottom of the spindle housing (Fig. 462).



Fig 462

DSC-2674

7

MOWER DECKS

7. Remove the top oil seal from the spindle housing (Fig. 463).



Fig 463

DSC-2675

9. Remove the spacer (Fig. 465).



Fig 465

DSC-2677

8. Remove the tapered roller bearing from the top of the spindle housing (Fig. 464).



Fig 464

DSC-2676

10. Remove the split ring (Fig. 466).



Fig 466

DSC-2678

7

MOWER DECKS

11. Turn the spindle housing over and remove the oil seal from the bottom of the spindle housing (Fig. 467). 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 467

DSC-2679

12. Remove the tapered roller bearing from the bottom of the spindle (Fig. 468).



Fig 468

DSC-2680

13. Using a hammer and a driver with a square edge, drive both the top and bottom bearing races out of the spindle housing (Fig. 469).



Fig 469

DSC-2681

14. Remove the large spacer in the spindle housing (Fig. 470).



Fig 470

DSC-2682

7

MOWER DECKS

15. This view shows the 2 bearing races and the large spacer in the spindle housing (Fig. 471). Note the internal snap ring in the housing; it is not necessary to remove it when installing new bearing races and the spacer.

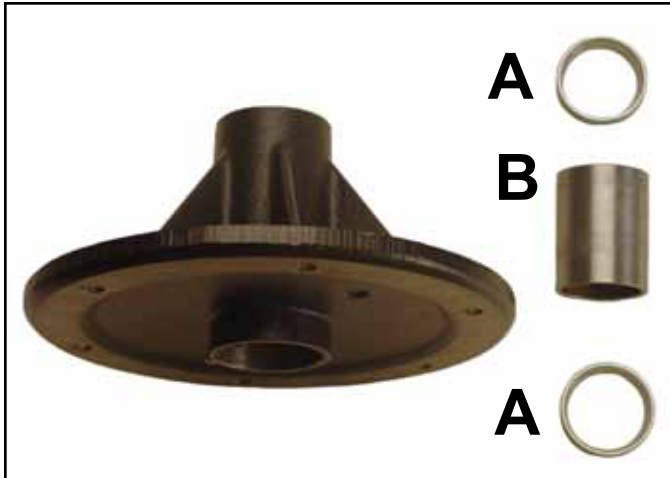


Fig 471

DSC-2684

- A. Bearing Race B. Spacer

Mower Spindle Assembly

1. Install the spacer through the top of the spindle housing (Fig. 472).



Fig 472

DSC-2688

2. Using a press, install the upper bearing race into the spindle housing (Fig. 473).

Note: The wider inside diameter of the bearing race should be facing up to accept the tapered bearing.



Fig 473

DSC-2689

7

MOWER DECKS

3. Turn the spindle housing over and install the lower bearing race into the spindle housing (Fig. 474).

Note: The wider inside diameter of the bearing race should be facing up to accept the tapered bearing.



Fig 474

DSC-2690

4. Pack the tapered bearing with #2 grease and install the tapered bearing (Fig. 475).



Fig 475

DSC-2691

5. Install the lower seal (Fig. 476).

Note: The open lip of the seal should be facing outward.



Fig 476

DSC-2692

6. 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. 477).



Fig 477

DSC-2693

MOWER DECKS

7. Turn the spindle assembly over and install the split ring spacer (Fig. 478).



Fig 478

DSC-2699

9. Pack the tapered bearing with #2 grease and install the tapered bearing (Fig. 480).



Fig 480

DSC-2694

8. Install the inner spacer to the spindle assembly (Fig. 479).



Fig 479

DSC-2700

10. Install the seal. Press it flush with the top of the housing (Fig. 481).

Note: The open lip of the seal faces inward.



Fig 481

DSC-2696

7

MOWER DECKS

11. Install the bearing shield and the seal spacer onto the spindle shaft (Fig. 482).

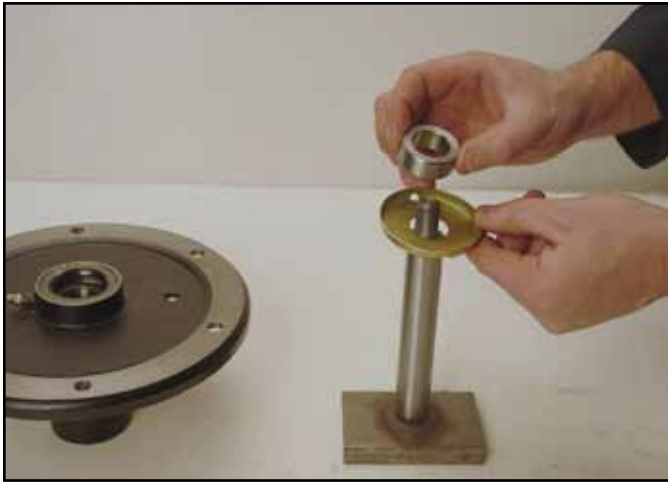


Fig 482

DSC-2702

13. Install the seal spacer on the top of the spindle housing (Fig. 484).



Fig 484

DSC-2704

12. Lower the spindle housing over the spindle shaft (Fig. 483).



Fig 483

DSC-2703

14. Install bearing shield (Fig. 485).



Fig 485

DSC-2705

MOWER DECKS

15. Install the square key onto the spindle shaft (Fig. 486).



Fig 486

DSC-2706

17. Install the heavy washer and nut on the top of the spindle shaft (Fig. 488).

Note: The cup side of the washer should be facing down toward the pulley hub.



Fig 488

DSC-2708

16. Install the pulley hub on the spindle shaft (Fig. 487).

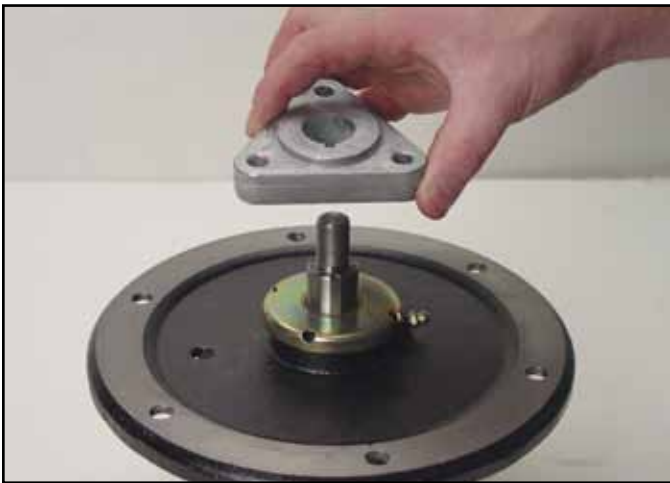


Fig 487

DSC-2707

18. Torque the top nut to 100 to 120 ft-lbs. (135.58 to 162.7 Nm) (Fig. 489).



Fig 489

DSC-2709

19. Grease the spindle assembly using a grease gun with #2 grease.

Mower Jackshaft Assembly Removal

1. Raise the rear of the machine and chock or block the front wheels.
2. Disconnect the battery negative cable.
3. Raise the floor pan (Fig. 490).



Fig 490

DSC-2625

4. Remove the right side belt cover (Fig. 491).



Fig 491

DSC-2626

5. Remove the tension spring on the idler arm (Fig. 492).

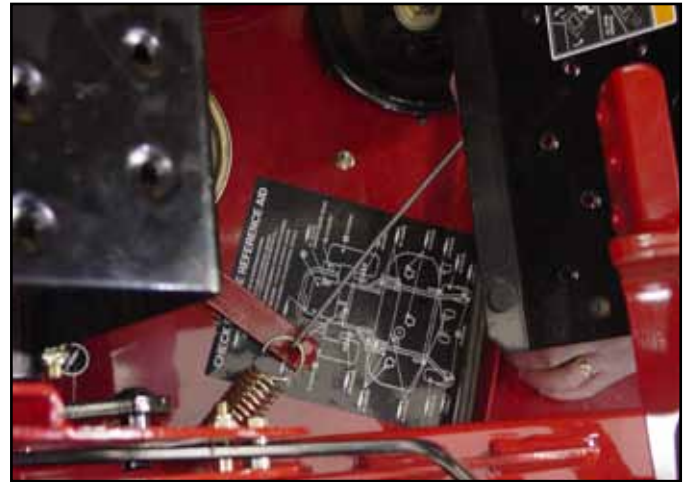


Fig 492

DSC-2628

6. Remove the mower spindle belt from the top sheave of the jackshaft pulley (Fig. 493).



Fig 493

DSC-2629

MOWER DECKS

7. Loosen the 4 bolts holding the rear bumper assembly and remove from the unit (Fig. 494).



Fig 494

DSC-2595

8. On the left side of the unit is the spring loaded idler pulley for the mower drive belt. Note the square cut hole in the idler bracket (Fig. 495).



Fig 495

DSC-2650

Note: Rear tire removed for clarity.

9. Insert a 3/8" drive ratchet with a 12" long extension into the square hole of the idler bracket. Pull back on the idler arm to relieve tension on the belt. Remove the mower drive belt from the spring loaded idler pulley (Fig. 496).



Fig 496

DSC-2651

10. On the right side of the unit is the spring loaded idler pulley for the inner mower drive belt. Insert a 3/8" drive ratchet with a 6" long extension into the square hole in the idler bracket. Pull back on the idler arm to relieve tension on the belt and slip the belt off the idler pulley (Fig. 497).

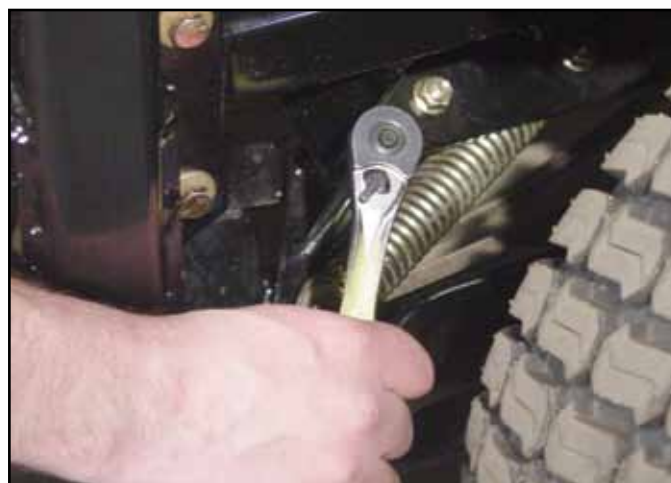


Fig 497

DSC-2607

MOWER DECKS

11. Lower the mower deck to the lowest cutting position.
12. Remove the right and left mower drive belts from the jackshaft pulley.
13. Remove the two bolts and washers retaining the jackshaft belt guide and the jackshaft assembly to the rear mower bracket (Fig. 498).



Fig 498

DSC-2711

14. Remove the remaining two bolts and washers retaining the jackshaft assembly to the rear deck bracket (Fig. 499).



Fig 499

DSC-2712

15. Remove the jackshaft assembly from the mower deck (Fig. 500).



Fig 500

DSC-2713

Mower Jackshaft Installation

Reverse the order of removal.

Note: The four washers holding the jackshaft assembly are Belleville washers. Make sure the cup side of the washers are facing the mower bracket before tightening.

MOWER DECKS

Mower Jackshaft and Pulley Assembly

The jackshaft housing and bearings are not available as separate components. Listed below is a view of the components of the jackshaft and pulley assembly (Fig. 501).

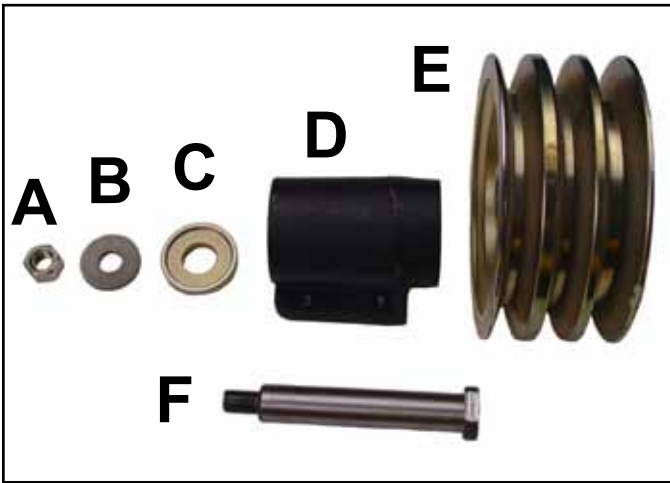


Fig 501

DSC-2714

- | | |
|------------------------|-----------------------|
| A. Retaining Nut | D. Jackshaft Assembly |
| B. Spring Washer | E. Jackshaft Pulley |
| C. Bottom Spacer Guard | F. Jackshaft |

Note: Item C., Bottom Spacer Guard is recessed. Make sure the recessed portion of the guard is facing the jackshaft bearing.

Right Hand Mower Idler Assembly Removal

1. Loosen the 4 bolts holding the rear bumper assembly and remove from the unit (Fig. 502).



Fig 502

DSC-2595

2. Remove the right side mower drive belt by inserting a 3/8" drive ratchet with a 6" long extension into the square cut hole in the idler bracket. Pull back to relieve the tension on the belt. Slip the belt off the idler pulley (Fig. 503).



Fig 503

DSC-2607

7

MOWER DECKS

3. Remove the RH idler pulley (Fig. 504)



Fig 504

DSC-2716

4. Loosen the idler stop flange nut (Fig. 505).



Fig 505

DSC-2719

5. Insert the ratchet with a 6" extension into the square-cut hole in the idler arm. Pull back on the idler arm to remove tension from the stop spacers and bolt. Remove the stop spacers and bolt and release the idler arm (Fig. 506).



Fig 506

DSC-2720

6. Remove the belt tensioner spacer, washer, and bolt to allow for removal of the extension spring (Fig. 507).



Fig 507

DSC-2725

MOWER DECKS

7. Remove the RH idler bolt (Fig. 508).



Fig 508

DSC-2727

9. Inspect the sleeve bearing and bushing for any wear (Fig. 510).



Fig 510

DSC-2731

8. Remove the RH idler assembly (Fig. 509).



Fig 509

DSC-2730

Right Hand Mower Idler Assembly Installation

1. Install the right hand idler assembly (Fig. 511).



Fig 511

DSC-2727

MOWER DECKS

2. Install the belt tensioner spacer, washer, bolt, and extension spring (Fig. 512).



Fig 512

DSC-2725

4. Install the RH idler pulley (Fig. 514).



Fig 514

DSC-2716

3. Insert the ratchet with 6" extension into the square hole in the idler arm. Pull back on the idler arm and install the idler stop bolt and spacers. Slowly release the idler arm until it contacts the stop bolt and spacers. Install the flange nut to the stop bolt and tighten (Fig. 513).



Fig 513

DSC-2720

5. Insert a ratchet with a 6" extension into the square hole in the idler bracket. Pull back relieving the tension on the idler pulley and install the mower drive belt (Fig. 515).



Fig 515

DSC-2607

7

MOWER DECKS

6. Install the rear bumper assembly and tighten the 4 bolts (Fig. 516).



Fig 516

DSC-2595

2. On the left side of the unit is the spring loaded idler pulley for the mower drive belt; note the square hole in the idler bracket (Fig. 518).



Fig 518

DSC-2650

Left Hand Mower Idler Assembly Removal

1. Loosen the 4 bolts holding the rear bumper assembly and remove from the unit (Fig. 517).



Fig 517

DSC-2595

Note: Rear tire removed for clarity.

3. Insert a 3/8" drive ratchet with a 12" extension into the square hole in the idler bracket. Pull back to relieve tension on the idler bracket. Remove the mower drive belt from the idler pulley (Fig. 519).



Fig 519

DSC-2651

MOWER DECKS

4. Relieve spring tension with the 3/8" ratchet drive to allow for removal of the stop bolt, spacer, and nut (Fig. 520).



Fig 520

DSC-2735

6. Remove the bolt and nut retaining the idler bracket to the frame (Fig. 522).



Fig 522

DSC-2741

5. Remove the bolt, spacer, 2 washers and nut on the stationary end of the tension spring toward the rear of the machine (Fig. 521).



Fig 521

DSC-2737

7. Remove the left hand idler bracket (Fig. 523).



Fig 523

DSC-2742

MOWER DECKS

8. Inspect the bushing and sleeve bearing for wear (Fig. 524).



Fig 524

DSC-2743

2. Fasten the tension spring to the frame with the bolt, spacer, 2 washers and a nut (Fig. 526).



Fig 526

DSC-2737

Left Hand Mower Idler Assembly Installation

1. Install the left hand idler bracket to the frame with bolt and nut (Fig. 525).



Fig 525

DSC-2741

3. Relieve the tension on the spring using a 3/8" drive ratchet and 12" extension. Install the stop bolt, spacer, and nut (Fig. 527).



Fig 527

DSC-2735

7

4. Relieve tension on the idler bracket with the 3/8" drive ratchet and 12" extension. Install the left side mower drive belt onto the idler pulley (Fig. 528).



Fig 528

DSC-2651

5. Install the rear bumper assembly and tighten the 4 bolts (Fig. 529).



Fig 529

DSC-2595

Replacing the Mower Spindle Belt

Belt squeal/slippage, frayed belt edges, burn marks and cracks are signs of a worn belt. Replace the mower belt if any of these conditions are evident.

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. Remove the right and left belt covers (Fig. 530).



Fig 530

DSC-2626

MOWER DECKS

4. Raise the floor pan (Fig. 531).



Fig 531

DSC-2625

6. Remove the mower belt from the mower pulleys, idler pulleys and the top groove of the triple sheave jackshaft pulley (Fig. 533).

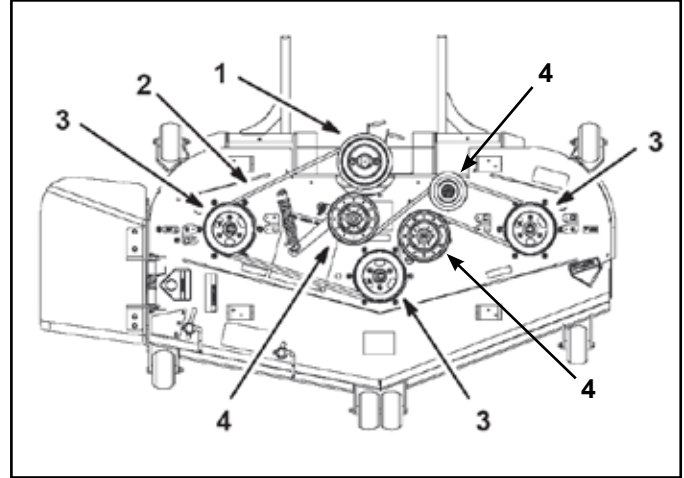


Fig 533

fig. 71 m-7419

5. Remove the tension spring on the idler arm (Fig. 532).



Fig 532

DSC-2628

7. Install the new belt around the mower pulleys, idler pulleys and the top groove of the triple sheave jackshaft pulley (Fig. 534).

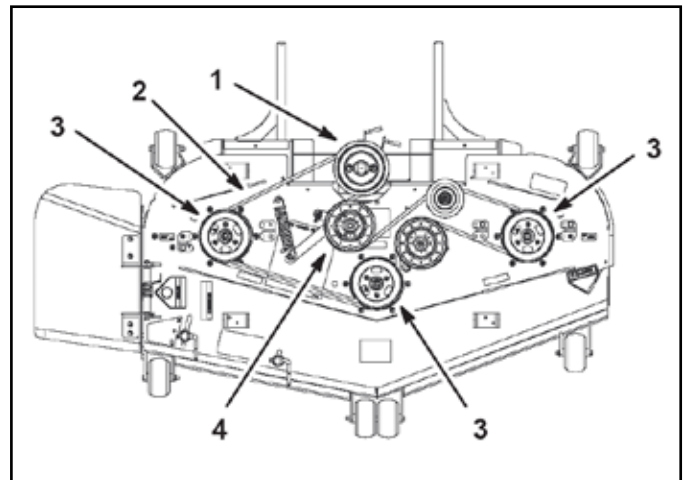


Fig 534

fig. 71 m-7419

- | | |
|-------------------------|-------------------------|
| 1. Triple sheave pulley | 3. Mower spindle pulley |
| 2. Mower belt | 4. Mower idler pulleys |

7

MOWER DECKS

8. Install the tension spring on the idler arm (Fig. 535).



Fig 535

DSC-2628

9. Install the belt covers and close the latches (Fig. 536).

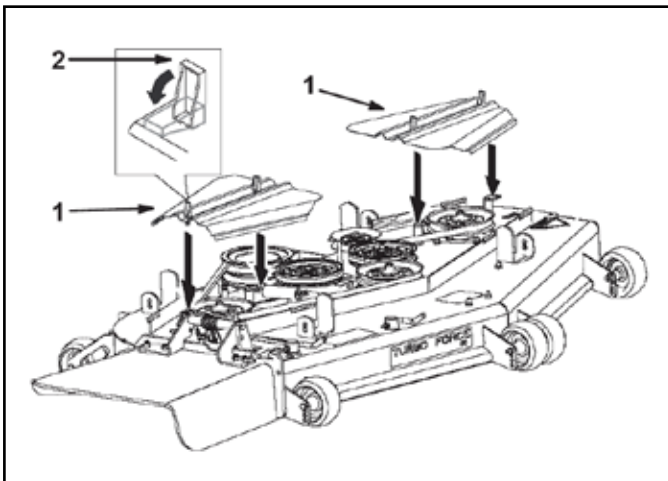


Fig 536

fig. 72 m-7422

1. Belt cover
2. Latch

Replacing Mower Drive Belts

Note: Remove the mower spindle belt first. If any of the primary drive belts need to be replaced, see Replacing the Mower Spindle Belt, page 7-39.

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. Loosen the 4 bolts holding the rear bumper assembly and remove from the unit (Fig. 537).



Fig 537

DSC-2595

MOWER DECKS

4. Pull the spring loaded idler down and remove the fan drive belt (Fig. 538).



Fig 538

DSC-2596

6. Remove the bolt, spacer, washers, and nut retaining the clutch/brake strap to the frame (Fig. 540).



Fig 540

DSC-2604

5. Disconnect the PTO clutch harness from the wiring harness (Fig. 539).



Fig 539

DSC-2601

7. There is a 3/8" square hole in the idler arm on the LH side of the machine (Fig. 541).



Fig 541

DSC-2650

Note: Rear tire removed for clarity.

MOWER DECKS

8. Insert a 3/8" drive ratchet with a 12" extension into the square hole of the idler bracket and pull back to relieve tension on the idler bracket. Remove the mower drive belt from the spring loaded idler pulley, fixed idler pulley, and the PTO clutch (Fig. 542).



Fig 542

DSC-2651

9. Insert a 3/8" drive ratchet with a 6" extension into the square hole in the RH idler bracket. Pull back on the idler arm to relieve tension on the belt. Slip the belt off the idler pulleys and the PTO clutch (Fig. 543).



Fig 543

DSC-2607

10. Raise the floor pan (Fig. 544).



Fig 544

DSC-2625

11. Remove the right side belt cover (Fig. 545).



Fig 545

DSC-2626

MOWER DECKS

12. Remove the tension spring (Fig. 546).

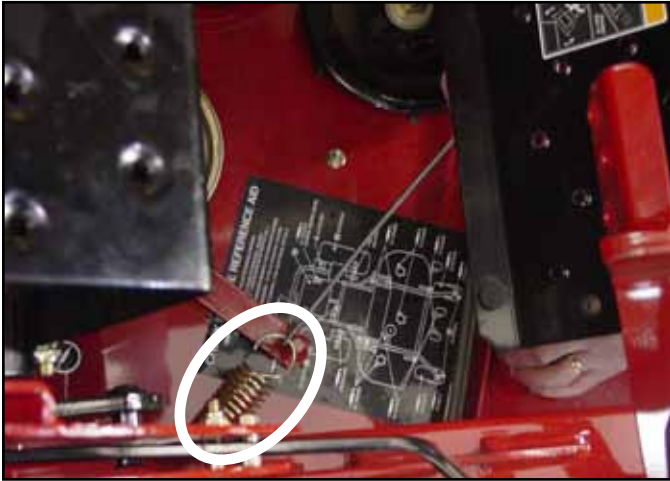


Fig 546

DSC-2628

14. Remove the drive belts from the jackshaft sheave pulley on the mower deck (Fig. 548).



Fig 548

DSC-2630

13. Remove the mower spindle belt from the top groove of the jackshaft pulley (Fig. 547).



Fig 547

DSC-2629

15. Install the new right mower drive belt on the bottom sheave of the jackshaft pulley, the adjustable idler pulley, and around the inner sheave of the PTO clutch pulley (Fig. 549).

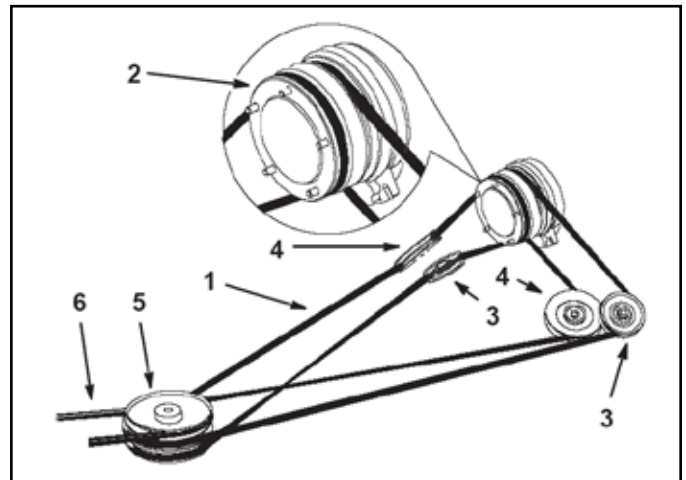


Fig 549

fig. 74 m-7404

- | | |
|-------------------------------|--------------------------|
| 1. Belt drive | 4. Fixed idler pulley |
| 2. Clutch | 5. Three stacked pulleys |
| 3. Spring loaded idler pulley | 6. Mower belt |

7

MOWER DECKS

16. Insert a 3/8" drive ratchet with a 6" extension into the square hole in the RH idler bracket. Pull back to relieve tension on the idler bracket. Install the belt onto the idler pulley (Fig. 550)



Fig 550

DSC-2607

18. Insert a 3/8" drive ratchet with a 12" extension into the square hole in the LH idler bracket. Pull back to relieve tension on the idler bracket. Install the new belt onto the idler pulley (Fig. 552).



Fig 552

DSC-2651

17. Install the new left mower drive belt on the middle sheave of the jackshaft pulley, the adjustable idler pulley, and around the outer sheave of the PTO clutch pulley (Fig. 551).

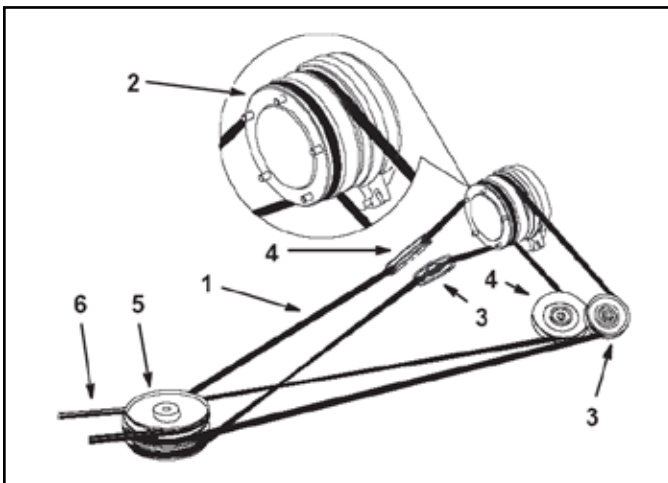


Fig 551

fig. 74 m-7404

- | | |
|-------------------------------|--------------------------|
| 1. Belt drive | 4. Fixed idler pulley |
| 2. Clutch | 5. Three stacked pulleys |
| 3. Spring loaded idler pulley | 6. Mowder belt |

19. Install the bolt, spacer, washers, and nut retaining the clutch/brake strap to the frame (Fig. 553).



Fig 553

DSC-2604

MOWER DECKS

20. Connect the electric PTO clutch harness to the wiring harness (Fig. 554).



Fig 554

DSC-2601

21. Pull the spring loaded idler bracket down and install the fan pump drive belt (Fig. 555)



Fig 555

DSC-2596

22. Install the mower spindle belt; refer to Mower Spindle Belt, page 7-39.

23. Install the rear bumper and tighten the 4 bolts (Fig. 556).



Fig 556

DSC-2595

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 inch (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 7-48.
 - If one front chain is loose, raise (tighten) the front support arm for that chain. Refer to Front-to-Rear Mower Pitch on page 7-48.

Leveling the Mower Side-to-Side

1. Position the right blade side-to-side (Fig. 557).

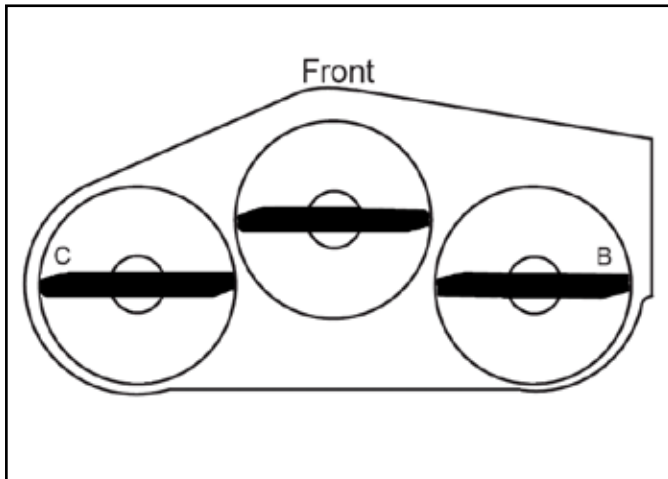


Fig 557

fig. 65 m-1078

2. Measure the right blade at the B location (Fig. 557), from a level surface to the cutting edge of the blade tip (Fig. 558).

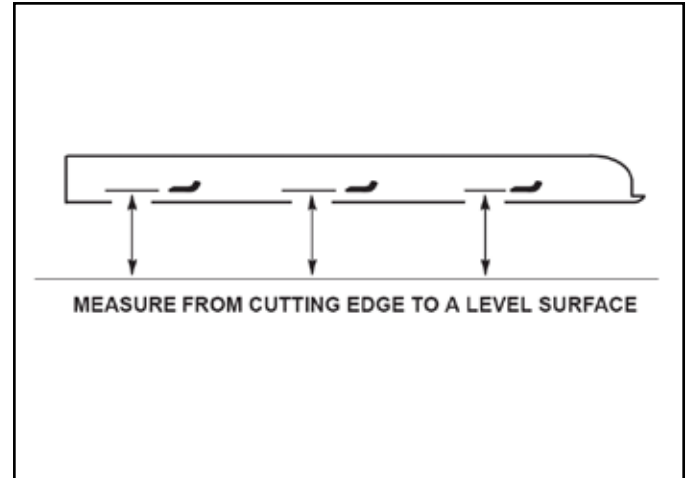


Fig 558

fig. 66 m-2539

3. Record this measurement. This measurement needs to be 3-1/8 to 3-1/4 inches (7.9 to 8.3cm).
4. Position the left blade side-to-side (Fig. 557).
5. Measure the left blade at the C location (Fig. 557) from level surface to cutting edge of the blade tips (Fig. 558).
6. Record this measurement. The measurement needs to be 3-1/8 to 3-1/4 inches (7.9 to 8.3cm).

MOWER DECKS

- If the measurement at positions B or C are not correct, loosen the bolt attaching the rear chain support arm (Fig. 559).

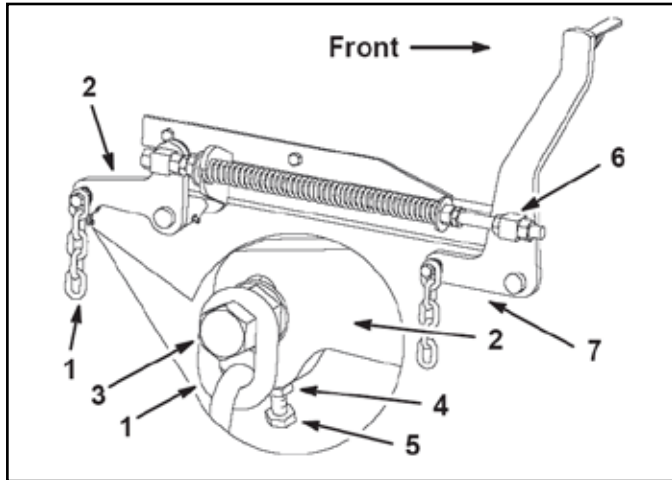


Fig 559 fig. 67 m-6830

- | | |
|---------------------|----------------------|
| 1. Rear chain | 5. Adjustment bolt |
| 2. Rear support arm | 6. Front swivel |
| 3. Bolt | 7. Front support arm |
| 4. Jam nut | |

- 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 inches (7.9 to 8.3cm).

Note: Ideally both sides of the mower are set to the same distance.

- 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

- Position the right blade front-to-rear (Fig. 560).

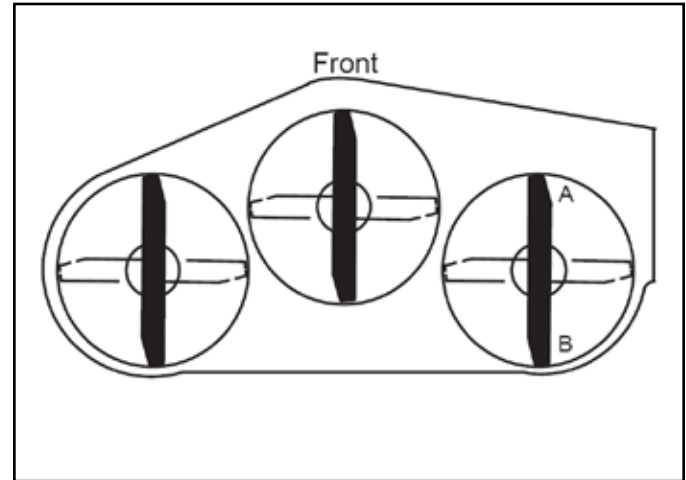


Fig 560 fig. 68 m-1078

- Measure the right blade at the A location (Fig. 560), from a level surface to the cutting edge of the blade tip (Fig. 561).

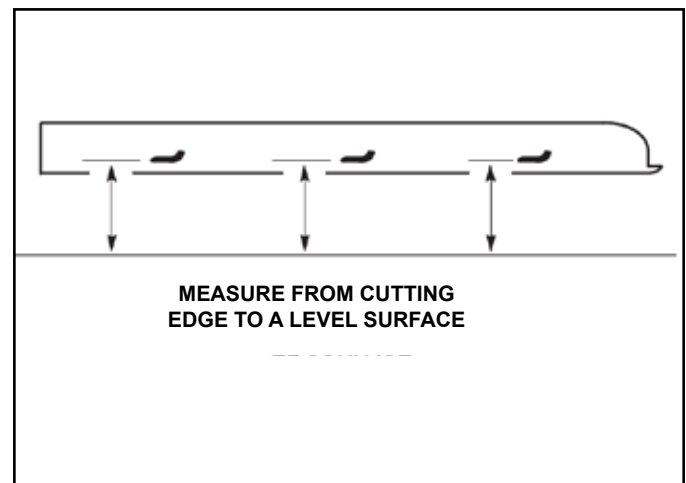


Fig 561 fig. 69 m-2539

MOWER DECKS

3. Record the measurement.
4. Measure the right blade at the B location (Fig. 560) from a level surface to the cutting edge of the blade tip (Fig. 561).
5. Record this measurement.
6. The mower blade should be 1/4 to 3/8 inch (6 to 10mm) lower at position A than at position B (Fig. 560). 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 inch (13mm) (Fig. 562 and Fig. 563).

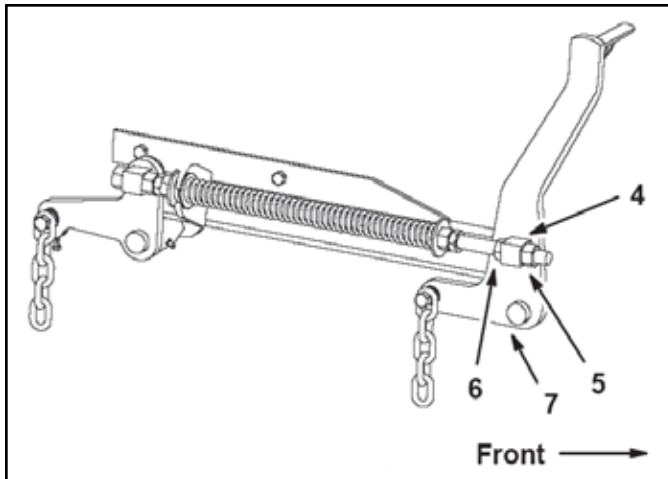


Fig 562 fig. 70 m-6831a

- | | |
|-------------------|----------------------|
| 4. Front swivel | 6. Lift nut |
| 5. Swivel jam nut | 7. Front support arm |

8. Adjust the lift nuts on both the left and the right side of the machine (Fig. 562 and Fig. 563) to achieve 1/4 to 3/8 inch (6 to 10mm) lower in front A than in the rear at B (Fig. 560).

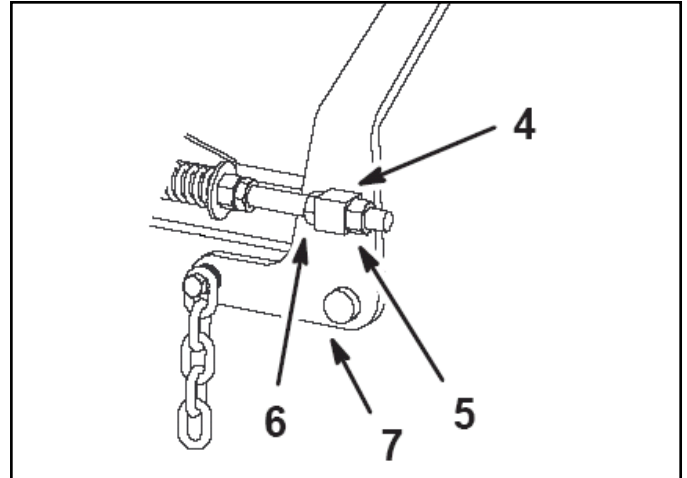


Fig 563 fig. 70 m-6831 rev

- | | |
|-------------------|----------------------|
| 4. Front swivel | 6. Lift nut |
| 5. Swivel jam 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.

MOWER DECKS

Adjusting the Compression Spring

1. Raise the mower lift lever to the transport position.
2. Check the distance between the two large washers, it needs to be 11-1/2 inches (29.2cm) (Fig. 564).
3. Adjust this distance, by loosening the spring jam nut and turning the nut in front of each spring (Fig. 564). 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. 564).

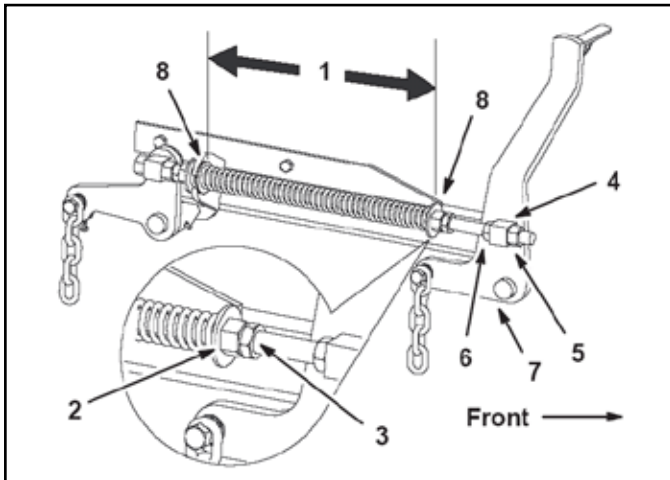


Fig 564

fig. 70 m-6831

- | | |
|---|----------------------|
| 1. 11-1/2" (29.2cm)
between the large
washers | 4. Front swivel |
| 2. Front nut | 5. Swivel jam nut |
| 3. Spring jam nut | 6. Lift nut |
| | 7. Front support arm |
| | 8. Large washer |



**Z Master Z597
Diesel Series
Service Manual**