

TORO®

Sitework Systems

TX525

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.

For service information on drive systems, please refer to the Hydro-Gear BDP-10A/16A/21L Pump service manual (form no. 492-4789), Hydro-Gear P Series Pump service manual (form no. BLN 52503) and Parker-Ross TF wheel motor service manual (form no. 492-4753). For information specific to the engines used on this unit, refer to the appropriate engine manufacturer's service and repair instructions.

Units covered on in this manual are: TX525 Wide and Narrow Track, model years 2007 - current

The manual may also be specified for use on later model products.

The hydraulic power 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:

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Bloomington, MN 55420

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

REVISIONS

Revision 000 8/01/10

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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 Sitework Systems TX525 compact utility loader.

The TX525 loader and attachment operator's manual contain safety information and operating tips for safe operating practices. Operator's manuals are available online at www.toro.com or:

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Think Safety First

Avoid unexpected starting of engine...

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

Avoid lacerations and amputations...

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

Avoid burns...

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

Avoid fires and explosions...

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

Avoid asphyxiation...

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

Avoid injury from batteries...

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

Avoid injury due to inferior parts...

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

Avoid injury to bystanders...

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

Avoid injury due to projectiles...

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

Avoid modifications...

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

Avoid unsafe operation...

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

SAFETY INFORMATION

Hydraulics Safety

- Inspect all hydraulic line connectors and fittings. Make sure all hydraulic hoses and lines are in good condition before applying pressure to the system.
- Keep body and hands away from pin hole leaks or nozzles that eject high pressure hydraulic fluid. Use cardboard or paper to find hydraulic leaks. Hydraulic fluid escaping under pressure can penetrate the skin and cause injury. Fluid accidentally injected into the skin must be surgically removed within a few hours by a doctor or gangrene may occur.
- Before disconnecting or performing any work on the hydraulic system, lower the loader arm/attachment to the ground and stop the engine so all pressure is relieved.
- Be sure you understand a service procedure before working on the machine.

SPECIFICATIONS

General Specifications

Item	Specification
Engine	Domestic: 22319 Ser #270000001 - 280999999 / D902E2B 22320 Ser #270000001 - 280999999 / D902E2B International: 22333 Ser #270000001 - 280999999 / D902E2B 22334 Ser #270000001 - 280999999 / D902E2B
RPM Setting	Domestic: No-load Speed – 3670 rpm +20/-50 rpm Low idle Speed – 1600 rpm ± 100 rpm International: No-load Speed – 3200 rpm +75/-50 rpm Low idle Speed – 1600 rpm ± 50 rpm
Oil Capacity	3.84 quarts (3.63 liters) with filter
Fuel Tank	6 gallons (22.7 liters)

Dimensions

	TX525 Narrow Track	TX525 Wide Track
Overall Length, without Bucket	70.7" (179.6cm)	70.7" (179.6cm)
Overall Length, with Bucket	92" (233.7cm)	92" (233.7cm)
Overall Width	33.7" (85.6cm)	41" (104.1cm)
Overall Height	46.1" (117.1cm)	46.1" (117.1cm)
Overall Operating Height, Fully Raised	90.1" (228.9cm)	90.1" (228.9cm)
Reach, Fully Raised	21.8" (55.4cm)	21.8" (55.4cm)
Reach Maximum	37" (94cm)	37" (94cm)
Dump Angle	38°	38°
Dump Height	46.1" (117.1cm)	46.1" (117.1cm)
Bucket Rollback, Ground Position	23°	23°
Bucket Rollback, Carry Position	23°	23°
Bucket Rollback, Fully Raised	85°	85°
Wheel Base	31.1" (79cm)	31.1" (79cm)
Ground Clearance Maximum	4.6" (11.7cm)	4.6" (11.7cm)

SPECIFICATIONS

Periodic Maintenance Items

Item	Specification	Maintenance Interval
Grease	General purpose grease	8 hours
Hydraulic Oil	10w-30 or 15w-40 API service CH4 or higher diesel engine oil	400 hours*
Hydraulic Filter	Toro OEM filter	8 hours initial, 200 hours thereafter
Engine Oil	Toro OEM filter	50 hours initial & 100 hours thereafter*
Engine Primary Air Filter	Toro OEM filter	200 hours*
Engine Safety Air Filter	Toro OEM filter	600 hours*
Cooling System	50/50 solution of water and ethylene glycol	8 hours - clean radiator 100 hours - check cooling system hoses yearly - change engine coolant

* More often in dusty, dirty conditions.

Performance (Narrow Track)

Item	Specification
Tip Capacity	1580 lbs. (716.6kg) (per SAE J732)
Operating Capacity	553 lbs. (250.8kg) (35% of tip per SAE J818)
Speed	0 - 4.5 mph (0 - 7.2km/hr) forward 0 - 2 mph (0 - 3.2km/hr) reverse
Weight	1904 lbs. (863.6kg) (traction unit only) 2024 lbs. (918kg) (w/TX bucket)

Performance (Wide Track)

Item	Specification
Tip Capacity	1580 lbs. (716.6kg) (per SAE J732)
Operating Capacity	553 lbs. (250.8kg) (35% of tip per SAE J818)
Speed	0 - 4.5 mph (0 - 7.2km/hr) forward 0 - 2 mph (0 - 3.2km/hr) reverse
Weight	2001 lbs. (907.6kg) (traction unit only) 2127 lbs. (964.7kg) (w/TX bucket)

SPECIFICATIONS

Hydraulic System

Item	Specification
Gear Pump	A two-section tandem gear pump powers the loader and auxiliary hydraulic systems. Section 1 (Auxiliary): 13.8 gpm @ 3600 rpm (52.2 liter/min) Section 2 (Loader): 6.0 gpm @ 3600 rpm (22.7 liter/min)
Loader Valve	A two-spool monoblock valve controls loader functions via a single lever joystick. Main Relief Setting: 2400 psi (165.5 bar) Loader Spool: A 4-position spool with closed, raise, lower, and float positions controls loader functions. Tilt Spool: A 3-position spool with 3000 psi (206.8 bar) work port relief controls the dump/curl cylinder functions.
Auxiliary Valve	A single spool valve controls the auxiliary flow to the TX attachments. The valve is actuated by single-step motion lever for forward and reverse-detent positions. Main Relief Setting: 3000 psi (206.8 bar)
Hydrostatic Pumps	The traction circuit is powered by dual hydrostatic pumps in a closed loop system. The hydrostatic pumps are belt driven off of the auxiliary drive shaft on the front of the engine. The circuit charge pressure is supplied by a 5 psi (.34 bar) check valve in the loader pump return circuit. The pumps have service bypass valves for towing and have shock valves to limit circuit pressure spikes. The pumps are mechanically actuated by the TX traction control system. Pump Displacement: 1.28 in ³ /rev (3.25cm ³ /rev) Pump Speed: 3050 rpm through pulley reduction @ 3600 engine rpm Shafts: .669" (1.7cm) diameter tapered shaft with 7/16" (1.1cm) threaded end Pulleys: Cast ductile iron "3V" pulleys Shock Valve Relief: 3000 psi (206.8 bar)
Wheel Motors	Two LSHT motors directly drive the track drive wheels. Displacement: 32.3 in ³ /rev (82cm ³ /rev) Mounting: Standard wheel mounting Shaft: 1 3/8" (3.5cm) tapered shaft with 1.125" (2.9cm) threaded end
Lift Cylinders	The lift circuit has 2 hydraulic cylinders that control loader height. Bore Size: 1.75" (4.4cm) Rod Size: 1.0" (2.5cm) Stroke: 18.4" (46.7cm) Working Pressure: 3000 psi (206.8 bar)
Dump Cylinder	The Quick-Attach angle is controlled by a single hydraulic cylinder. Bore Size: 2.75" (7cm) Rod Size: 1.25" (3.2cm) Stroke: 7.75" (19.7cm) Working Pressure: 3000 psi (206.8 bar)

SPECIFICATIONS

Hydraulic System cont.

Item	Specification
Tank	The hydraulic tank is a fabricated weldment integrated into the main frame. The tank has a cleanout access, stainless screens at the fill and suction ports and a remote breather connected via hose. Capacity: 10.5 gallons (39.7 liters)
Filter	In addition to the in-tank screens, the loader circuit passes through a 10 micron spin-on filter prior to returning to tank.

Electrical System

Item	Specification
Battery	12 volt, BCI group 55 battery with 585 CCA
Gauges	The control panel contains hour meter, fuel gauge, glow plug control, water temp, electrical charge and oil pressure.
Fuel System	Electric frame mounted pump
Ignition	The ignition switch is panel mounted with STOP-RUN-START positions.
Fuses	The machine has a fuse block with 2 separate fuses, 10 and 30 amp.

Track System

Item	Specification
Track	The tracks are Kevlar reinforced, endless rubber rings with 28 internal drive lugs. The outer tread on the tracks is a turf-friendly S-shaped pattern with pitched crosscuts. Track Width: TX525 (Narrow Track) - 5.88" (14.9cm) TX525 (Wide Track) - 9.5" (24.13cm) Track Pitch: 3.45" (8.8cm)
Drive Wheel	The drive wheels are single-piece, austempered ductile iron, squirrel cage castings. The wheels are mounted directly onto the tapered shafts of the wheel motors. Wheel Diameter: 11.63" (29.5cm) No. of Teeth: 11
Road Wheels	Constant track ground pressure is maintained by 20 ductile iron road wheels. The road wheels each have a sealed bearing that are protected by a secondary dirt seal on the inside and a gasketed steel cap on the outside.

Torque Specifications

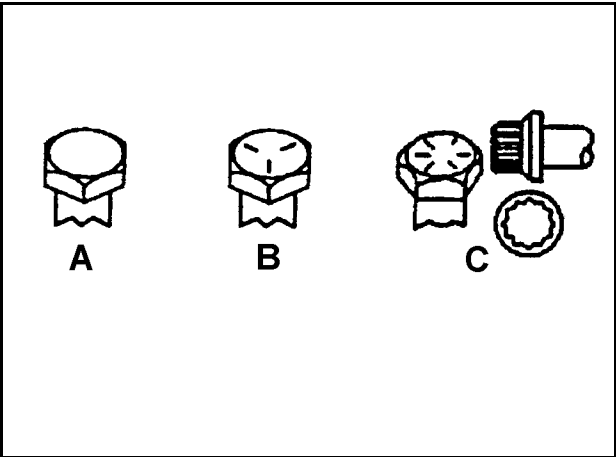
Recommended fastener torque values are listed in the following tables. For critical applications, as determined by Toro, either the recommended torque or a torque that is unique to the application is clearly identified and specified in the service manual.

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

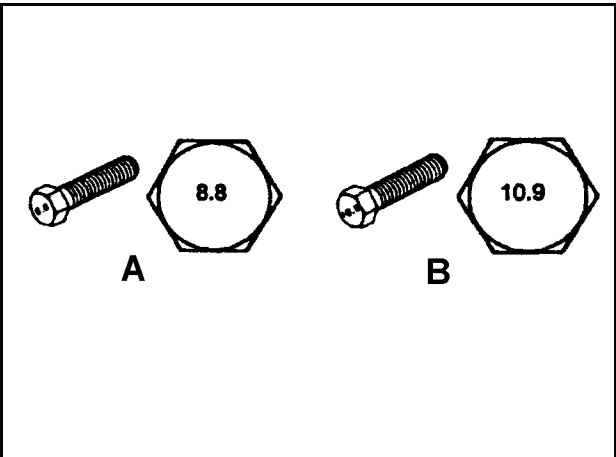
As noted in the following tables, torque values should be **reduced by 25% for lubricated fasteners** to achieve the similar stress as a dry fastener. Torque values may also have to be reduced when the fastener is threaded into aluminum or brass. The specific torque value should be determined based on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

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

Fastener Identification



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



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

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	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 Series)

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

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

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

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

SPECIFICATIONS

Other Torque Specifications

SAE Grade 8 Steel Set Screws

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

Wheel Bolts and Lug Nuts

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

** For steel wheels and non-lubricated fasteners.

Thread Cutting Screws (Zinc Plated Steel)

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

Thread Cutting Screws (Zinc Plated Steel)

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

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

Conversion Factors

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

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

SPECIFICATIONS

Equivalents 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	0.09375	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	7.938	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

MAINTENANCE

Recommended Maintenance Schedule

Maintenance Service Interval	Maintenance Procedure
After the first 8 hrs	<ul style="list-style-type: none"> • Change hydraulic filter
Daily	<ul style="list-style-type: none"> • Grease the traction unit • Check engine oil level • Check for loose fasteners • Clean/inspect the tracks for damage or wear • Check the cooling system • Drain water and other contaminants from the fuel filter/water separator • Clean the radiator • Remove debris from the traction unit
25 hrs	<ul style="list-style-type: none"> • Check hydraulic oil
After the first 50 hrs	<ul style="list-style-type: none"> • Change engine oil & filter • Check & adjust track tension
100 hrs	<ul style="list-style-type: none"> • Change engine oil • Check battery electrolyte level • Check battery cable connections • Check cooling system hoses • Check the alternator/fan belt tension (refer to engine operator's manual) • Check hydraulic lines for leaks, loose fittings, kinked lines, loose mounting supports, wear, weather and chemical deterioration • Check & adjust track tension • Check for dirt build-up in the chassis

Maintenance Service Interval	Maintenance Procedure
200 hrs	<ul style="list-style-type: none"> • Change hydraulic filter • Replace primary air filter • Change engine oil filter
250 hrs	<ul style="list-style-type: none"> • Check & grease the road wheels
400 hrs	<ul style="list-style-type: none"> • Inspect fuel lines for leaks • Change hydraulic oil and filter • Change the hydraulic fluid
500 hrs	<ul style="list-style-type: none"> • Replace the alternator/fan belt (refer to the engine operator's manual)
600 hrs	<ul style="list-style-type: none"> • Replace the safety air filter
1,500 hrs	<ul style="list-style-type: none"> • Replace all moving hydraulic hoses
Yearly	<ul style="list-style-type: none"> • Change the engine coolant • Check the condition of the hydraulic pump belt
Yearly Storage	<ul style="list-style-type: none"> • Check for loose fasteners • Touch up chipped paint • Adjust track tension • Check tracks and road wheels • Complete all yearly maintenance procedures specified in the engine operator's manual • Charge the battery and disconnect the cables (storage only)
Every 2 Years	<ul style="list-style-type: none"> • Drain & clean the fuel tank

Important: Refer to your engine operator's manual for additional maintenance procedures.

Note: The hourmeter does not have service indicators.

MAINTENANCE

Greasing the Traction Unit

Grease all pivot joints every 8 operating hours and immediately after every washing.

Grease Type: Lithium based NLGI2

1. Lower the loader arm and stop the engine. Remove the key from the ignition switch.
2. Clean the grease fittings with a rag.
3. Connect grease gun to each fitting and pump grease into the fittings until grease begins to ooze out (approximately 3 pumps).
4. Wipe any excess grease.

There are 12 grease fittings on the TX525:
(4) are located on the left side (Fig. 0001).

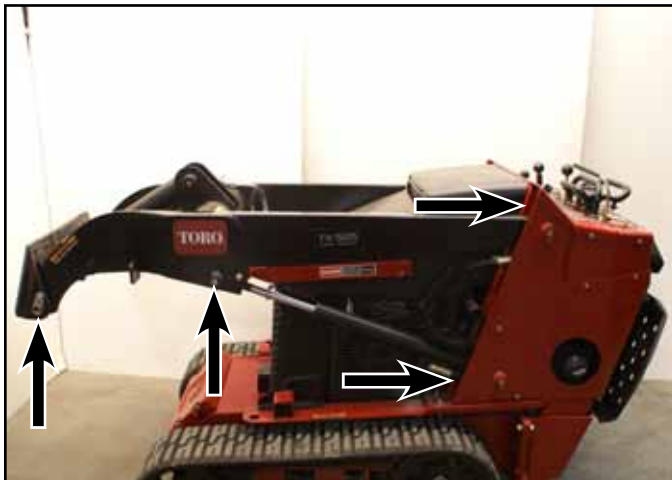


Fig 0001

PICT-8726a

(4) are located on the right side (Fig. 0002).

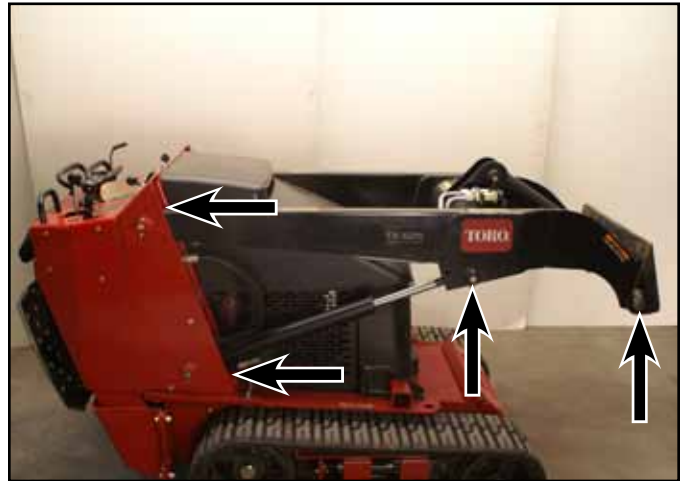


Fig 0002

PICT-8729a

(4) are located in the front on the quick attachment assembly and the front loader arm assembly (Fig. 0003).

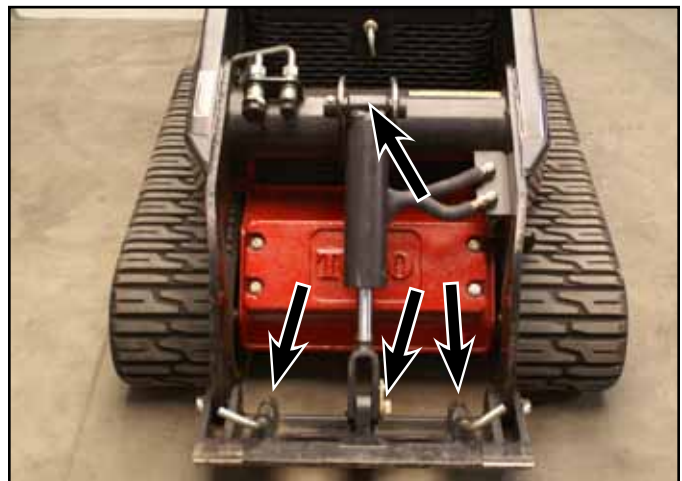


Fig 0003

PICT-8730

Maintaining the Road Wheels

1. If the inner wheels or the complete tray of wheels needs maintenance, remove the tracks. Refer to "Wide Track Removal" on page 7-68 or "Narrow Track Removal" on page 7-72.
2. Remove the snap ring from a road wheel (Fig. 0004).



Fig 0004

DSC-0821a

3. Remove the wheel bearing cap with seal (Fig. 0005).



Fig 0005

DSC-0822

4. Ensure that the road wheel turns smoothly on the bearing. If it does not turn smoothly or spin freely, replace the bearing; refer to "Road Wheel Rebuild" on page 7-79.
5. Check the grease under the cap and around the gasket. If it is dirty, gritty, or depleted, clean out all of the grease, replace the gasket, and fill the head of the cap with new grease (Fig. 0006).

Note: It is not always necessary to remove the track guide when replacing any of the road wheel bearings. They can also be removed by raising the unit off the ground. For safety reasons, make sure the frame of the unit is supported.



Fig 0006

DSC-0835a

MAINTENANCE

Hydraulic Reservoir Tank

Location

The hydraulic reservoir tank is located in the front of the TX525 unit.

Hydraulic Tank Capacity: 10.5 gallons (39.7 liters)

Type of Oil to Use: 10w-30 or 15w-40 detergent, diesel engine oil (API Service CH-4 or higher).

Checking the Hydraulic Fluid

Check the hydraulic fluid level daily before the engine is first started and after every 25 operating hours.

1. Remove the attachment, if one is installed.
2. Park the traction unit on a level surface, open the hood, raise the loader arm, install cylinder lock and fully retract the tilt cylinder.
3. Stop the engine, remove the key, and allow the engine to cool.
4. Remove the LH side grill.
5. Clean the area around the filler neck of the hydraulic tank (Fig. 0007).



Fig 0007

PICT-8731

6. Remove the cap from the filler neck and check the fluid level on the dipstick (Fig. 0008).



Fig 0008

PICT-8738

7. The fluid level should be between the marks on the dipstick. If the level is low, add enough fluid to raise it to the proper level.
8. Install the cap on the filler neck.
9. Install the RH side grill.
10. Start the unit, remove the cylinder lock and lower the loader arms.
11. Close the hood.

Replacing the Hydraulic Filter

Change the hydraulic filter:

- After the first 8 operating hours.
 - After every 200 operating hours.
1. Position the traction unit on a level surface.
 2. Lower the loader arm, stop the engine, and remove the key.
 3. Remove the rear access cover.
- IMPORTANT: Do not substitute an automotive oil filter or severe hydraulic system damage may result.**
4. Place absorbant towels under the filter.
 5. Remove the old filter (Fig. 0009).
 6. Wipe the surface of the filter adapter gasket area clean.
 7. Pre-fill the hydraulic oil filter with oil and apply a thin coat of oil to the rubber gasket on the replacement filter.
 8. Install the replacement hydraulic filter onto the filter adapter. Hand tighten it clockwise until the rubber gasket contacts the filter adapter, then tighten the filter an additional 3/4 turn.
 9. Remove absorbant towels and wipe up any spilled fluid.
 10. Open the hood. Start the engine, raise and lower the loader arm.
 11. Raise the loader arm and install cylinder lock.
 12. Stop the engine, remove the LH side grill, check the fluid level in the hydraulic tank (refer to "Checking the Hydraulic Fluid" on page 3-4) and add fluid to raise the level to the mark on the dipstick. Do not over fill the tank.
 13. Install LH side grill.
 14. Install the rear access cover.
 15. Remove cylinder lock and lower the loader arms.
 16. Close the hood.



Fig 0009

Belt 013

Note: Dispose of used oil and filters at a certified recycling center.

MAINTENANCE

Changing the Hydraulic Fluid

Change the hydraulic fluid every 400 operating hours or yearly.

Note: The hydraulic filter should be replaced whenever the hydraulic oil is changed.

1. Position the traction unit on a level surface and open the hood.
2. Raise the loader arm, install the cylinder lock, stop the engine, and remove the key.
3. Allow the traction unit to cool completely.
4. Place a large drain pan (capable of holding 15 gallons) under the drain plug on the front of the traction unit (Fig. 0010).



Fig 0010

PICT-8725

5. Remove the LH side grill.
6. Clean the area around the filler neck of the hydraulic tank. Remove the hydraulic tank cap and dipstick (Fig. 0011 and Fig. 0012).



Fig 0011

PICT-8731



Fig 0012

PICT-8738

7. Remove the drain plug and allow the oil to drain into the pan.
8. When oil is finished draining, install and tighten the drain plug.

Note: Dispose of the used oil at a certified recycling center.

9. Fill the hydraulic tank with approximately 10.5 gallons (39.7 liters) of 10w-30 or 15w-40 detergent, diesel engine oil (API Service CH-4 or higher).
10. Replace the hydraulic filter. Refer to "Replacing the Hydraulic Filter" on page 3-5.
11. Start the engine, remove the cylinder lock, raise and lower the loader arm, then drive the unit forward and backward to purge air from the system and check for leaks.
12. Stop the engine.
13. Check the hydraulic fluid level and top it off if necessary.
14. Replace the hydraulic tank cap and dipstick (Fig. 0013).



Fig 0013

PICT-8731

15. Install LH side grill.
16. Remove cylinder lock and lower the loader arms.
17. Close the hood.

Checking the Hydraulic Lines

After every 100 operating hours, check the hydraulic lines and hoses for leaks, loose fittings, kinked lines, loose mounting supports, wear, and weather or chemical deterioration. Replace all moving hydraulic hoses every 1500 hours or 2 years, whichever comes first. Make necessary repairs before operating.

Vents - Hydraulic Tank

Note: When checking hydraulic lines and hoses, also check the hydraulic tank vent to make sure it is clean and free of debris (Fig. 0014).



Fig 0014

PICT-8740

MAINTENANCE

Engine Servicing

Oil Dipstick - check oil level daily (Fig. 0015).

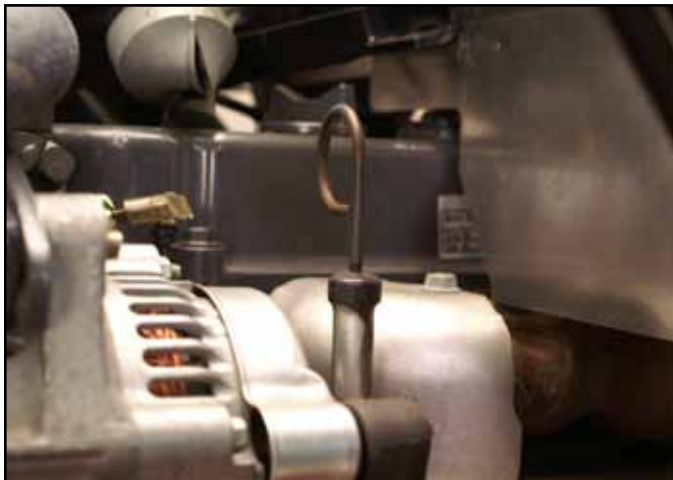


Fig 0015

PICT-8741

Oil Drain (Fig. 0016 and Fig. 0017)



Fig 0016

PICT-8914

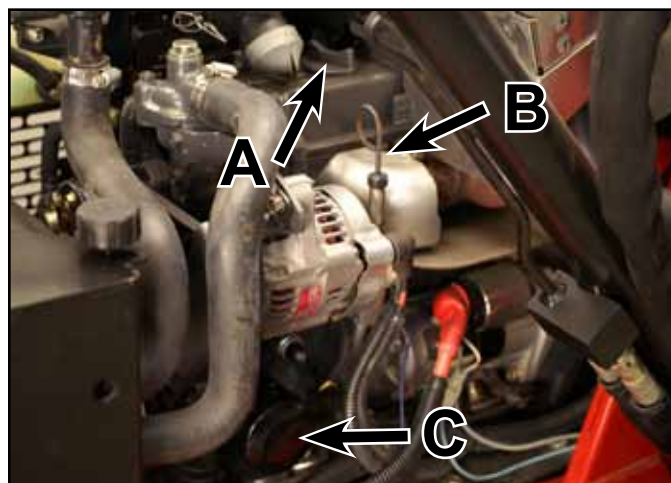


Fig 0017

PICT-8744

- A. Oil fill
- B. Oil dipstick
- C. Oil filter

- Change oil after the first 50 hrs then every 100 hrs^{1,2}
- Oil Filter 200 hrs^{1,3}

¹More often in dusty, dirty conditions.

²Change oil after the first 50 operating hours.

³For severe duty or rental applications, change every 100 operating hours.

Oil type: Detergent diesel engine oil (API Service CH-4 or higher)

Crankcase capacity: With filter 0.98 gallons (3.7 liters)

Servicing the Cooling System

Service Interval:

- Before each use or daily - Clean the radiator.
- Every 100 hours - Check the cooling system hoses.
- Yearly - Change the engine coolant.



Fig 0018

PICT-8749



If the engine has been running, the pressurized, hot coolant can escape and cause severe burns.

- Do not remove the radiator cap 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.
- Do not touch radiator and surrounding parts that are hot.
- Use a rag when opening the radiator cap, and open the cap slowly to allow steam to escape.

Cleaning Radiator

The engine fan draws the air from the engine compartment and pushes the air through that hydraulic oil cooler and radiator. Remove any build up of debris on the oil cooler and radiator with compressed air.

Engine Coolant

If you need to add engine coolant, refer to “Checking, Adding & Bleeding the Engine Coolant” on page 4-138.

Change the engine coolant yearly. Refer to “Changing Engine Coolant” on page 3-10.

MAINTENANCE

Changing Engine Coolant

1. Park the machine on a flat surface, open the hood and raise the loader arm. Lock the loader arm into position using the loader arm lock.
2. Turn the machine off and allow it to cool.
3. Remove the left and right hand side panels (Fig. 0019).



Fig 0019

PICT-4945

4. Remove the breather from the breather tube (Fig. 0020).



Fig 0020

PICT-4946a

5. Remove the 4 bolts securing the grill assembly to the frame (Fig. 0021).



Fig 0021

PICT-4953

MAINTENANCE

6. Slide the grill assembly forward (Fig. 0022).



Fig 0022

PICT-4955

8. Remove the grill assembly taking care not to damage the hydraulic tank breather hose (Fig. 0024).



Fig 0024

PICT-4961

7. Remove the 2 bolts and nuts securing the overflow tank bracket to the grill assembly (Fig. 0023).



Fig 0023

PICT-4959

9. Inspect the foam seals on the inside of the grill assembly. Replace if worn or damaged (Fig. 0025).

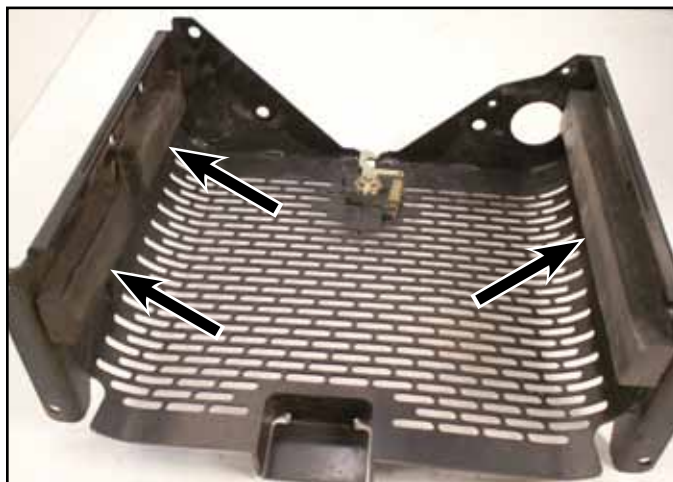


Fig 0025

PICT-5138a

MAINTENANCE

10. Place an absorbent towel under the oil cooler inlet fitting located on the lower left hand corner of the oil cooler.
11. Using a 1-1/16" and a 1-1/8" wrench, remove the oil cooler inlet line from the oil cooler inlet fitting (Fig. 0026).



Fig 0026

PICT-4965

12. Cap the hydraulic line and fitting so debris does not enter the system.
13. Place an absorbent towel under the oil cooler outlet fitting located on the upper right hand corner of the oil cooler.

14. Using a 1-1/16" and a 1-1/8" wrench, remove the oil cooler outlet line from the oil cooler outlet fitting (Fig. 0027).



Fig 0027

PICT-4968a

15. Cap the hydraulic line and fitting so debris does not enter the system.
16. Using a 1/2" socket, remove the 3 bolts securing the radiator mount to the frame (Fig. 0028).

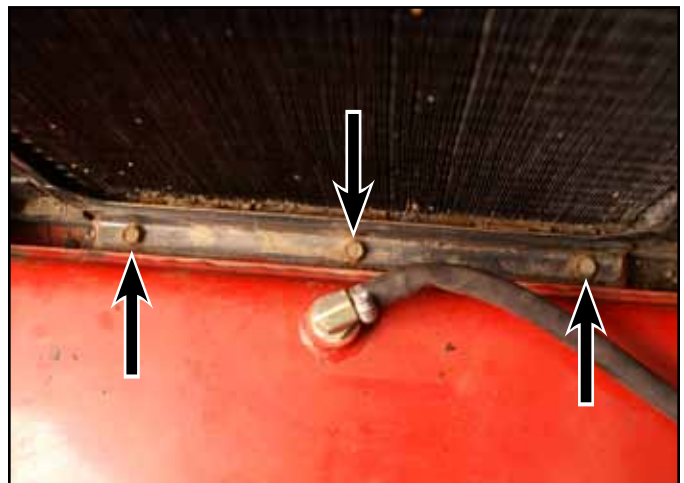


Fig 0028

PICT-4969

MAINTENANCE

17. Remove the front radiator mount (Fig. 0029).



Fig 0029

PICT-4971

18. Tilt the radiator/oil cooler assembly forward and lift it out of the frame so that the petcock drain is above the frame (Fig. 0030).



Fig 0030

PICT-4973

19. Slide a length of 5/16" hose onto the petcock drain. Place the other end of the hose into a drain pan. Open the petcock and remove the radiator cap to drain the anti-freeze (Fig. 0031).



Fig 0031

PICT-4974

20. Remove the drain hose and close the petcock.
21. Using a 17mm wrench, remove the engine block coolant drain plug (Fig. 0032).



Fig 0032

PICT-8910

MAINTENANCE

Changing Engine Coolant Assembly

1. Clean any debris around and under the radiator.
2. Using a 17mm wrench install the engine block coolant drain plug (Fig. 0033).



Fig 0033

PICT-8910

3. Remove the drain hose and close the petcock.
4. Position the radiator/oil cooler assembly into the frame so it is on top of the foam seals and behind the 3 radiator mount holes (Fig. 0034).



Fig 0034

PICT-5122

5. Using 1-1/16" and 1-1/8" wrenches, install the hydraulic outlet line to the oil cooler outlet fitting (Fig. 0035).



Fig 0035

PICT-5126

6. Position the radiator mount into the frame (Fig. 0036).



Fig 0036

PICT-5129

MAINTENANCE

7. Loosely install 3 screws that will secure the radiator mount to the frame (Fig. 0037).



Fig 0037

PICT-5131

9. Without moving the position of the radiator, slide the radiator mount against the radiator and tighten the 3 radiator mount screws (Fig. 0039).



Fig 0039

PICT-5137

8. Center the radiator and oil cooler assembly side to side in the frame so there is approximately a 1/8" space between the fan shroud and the fan. Spin the cooling fan. Ensure the fan does not come into contact with the fan shroud. Adjust the radiator side to side as necessary (Fig. 0038).



Fig 0038

PICT-5135

10. Position the grill onto the frame and route the breather tube in between the foam seals on the inner left side of the grill (Fig. 0040).



Fig 0040

PICT-5139

MAINTENANCE

11. Slide grill onto the frame so the grill base sits under the loader stops and the top of the grill sits on top of the radiator. Leave the grill in a slightly forward position. The overflow tank mounting holes should be just beyond the right hand boss on top of the radiator assembly. This will allow the overflow bottle assembly to be installed (Fig. 0041).

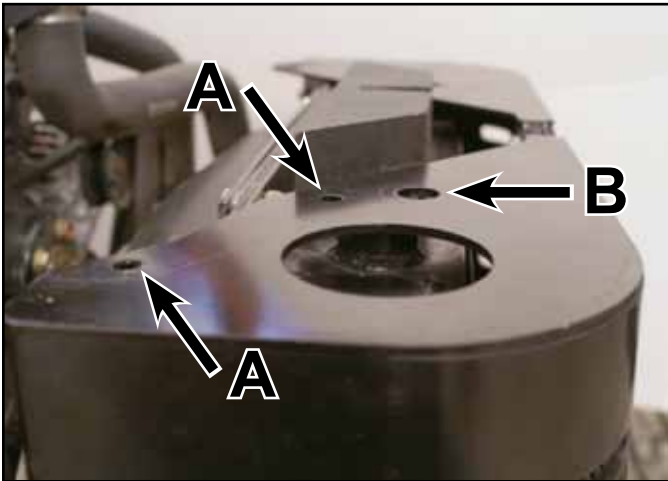


Fig 0041

PICT-5141a

- A. Overflow tank mounting holes
B. Right hand boss

12. Position the overflow tank bracket onto the grill assembly (Fig. 0042).



Fig 0042

PICT-5143a

13. Install 2 bolts and nuts securing the overflow bottle assembly to the grill assembly (Fig. 0043).



Fig 0043

PICT-5145

14. Slide the grill assembly back aligning the mounting holes with the holes in the frame. Loosely install 4 bolts securing the grill assembly to the frame and the 2 bolts and washers securing the grill to the radiator (Fig. 0044).



Fig 0044

PICT-5146

MAINTENANCE

15. Using a 1/2" socket, tighten the 4 bolts securing the grill assembly to the frame (Fig. 0045).



Fig 0045

PICT-5150

New style (use flange head bolts):



Fig 0047

PICT-5605

16. Check the cooling fan and shroud clearance. Adjust the position of the radiator if necessary.

17. Using a 9/16" socket, tighten the 2 bolts securing the radiator to the grill assembly (Fig. 0046 and Fig. 0047).

Old style (use bolts and washers):



Fig 0046

PICT-5604

18. Position the breather tube under the grill and install the breather (Fig. 0048).



Fig 0048

PICT-5157

MAINTENANCE

19. Fill the radiator. Refer to "Checking, Adding & Bleeding the Engine Coolant" on page 4-138.
20. Clean the area around the filler neck of the hydraulic tank.
21. Remove the cap from the filler neck.
22. Fill the hydraulic tank with of 10W-30 or 15W-40 detergent, diesel engine oil (API service CH-4 or higher).
23. Start the engine and let it run for a few minutes.
24. Stop the engine.
25. Check the fluid level on the dipstick. The fluid level should be between the marks on the dipstick.
26. Install the cap into the hydraulic tank filler neck.
27. Install the left and right hand side panels (Fig. 0049).



Fig 0049

PICT-4945

28. Remove the cylinder lock and lower the loader arms.
29. Close the hood.
30. Purge air from the hydraulic system. Refer to "Purging Air Procedure" on page 9-19.

Fuel System

Drain the fuel filter/water separator before each use or daily (Fig. 0050).

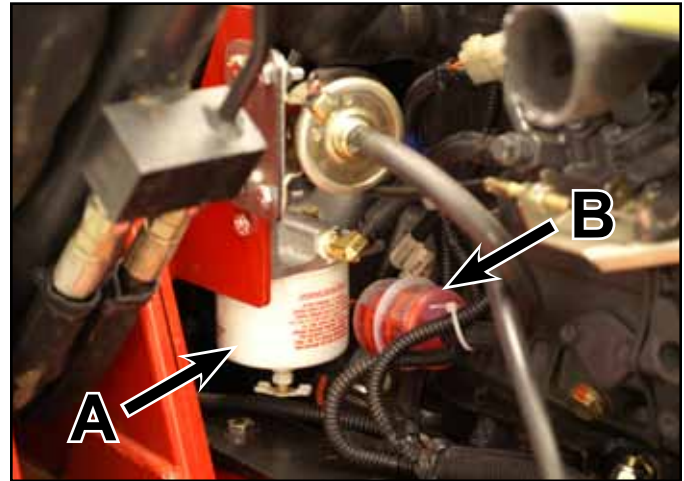


Fig 0050

PICT-8751

A. Fuel filter/water separator

B. In-line fuel filter

Drain & Clean Fuel Tank

Draining the fuel tank

Service interval: Every 2 years.

Replacing the fuel filter/water separator

Service interval: Every 400 hours

1. Clean the area where the fuel filter/water separator mounts.
2. Remove the fuel filter/water separator and clean the mounting surface.
3. Lubricate the gasket on the new fuel filter/water separator with clean oil.
4. Install the fuel filter/water separator by hand until the gasket contacts the mounting surface, then rotate it an additional 1/2 turn.

Fuel Tank Removal

1. Park the machine so that the tracks are resting on 2x4s.
2. Open the hood. Raise the loader arms, install the cylinder lock, stop the engine and remove the key.
3. Apply the parking brake.
3. Remove the rear access panel (Fig. 0051).



Fig 0051

PICT-4505a

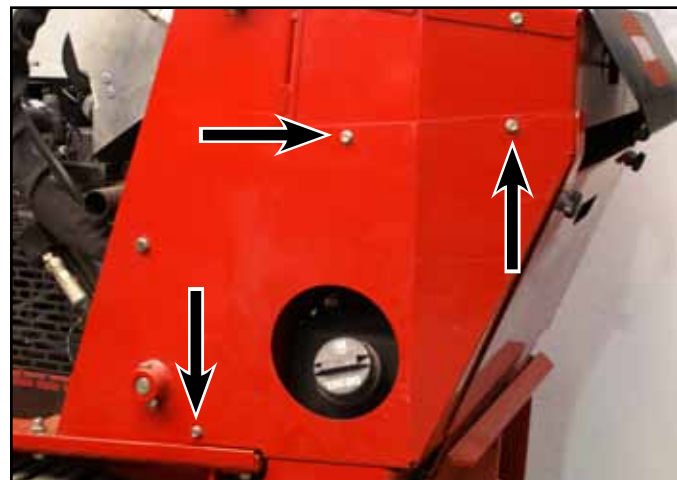


Fig 0052

PICT-8934

5. Using 3/4" and 1/2" sockets, remove the 7 bolts and nuts securing the rear frame cover to the frame and fuel tank bracket. Remove the rear frame cover (Fig. 0053).

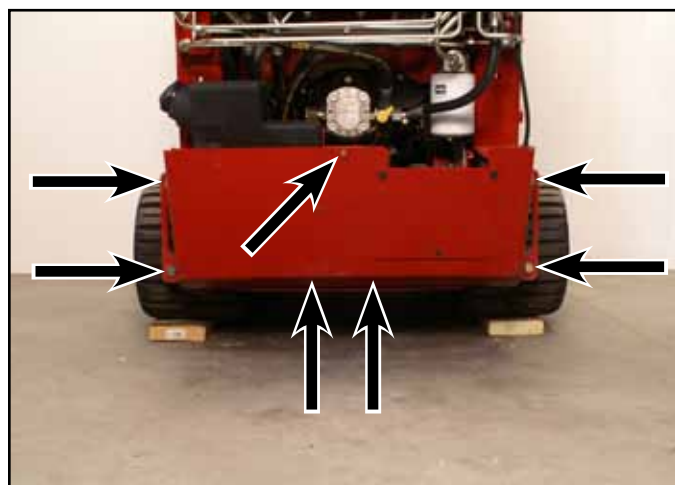


Fig 0053

PICT-5381

MAINTENANCE

6. Remove the fuel tank bracket (Fig. 0054).



Fig 0054

PICT-5625

7. Disconnect the two wires (black and orange) from the fuel sending unit located on the top of the fuel tank (Fig. 0055).



Fig 0055

PICT-4262a

8. Mark the suction fuel line and tank fitting with an "S" and the return fuel line and tank fitting with an "R" (Fig. 0056):
S - Fuel suction line
R - Fuel return line



Fig 0056

PICT-4263

9. Slide the 2 fuel hose clamps down the fuel line away from the fuel tank fittings (Fig. 0057).



Fig 0057

PICT-4264

10. Slide the 2 fuel lines off the fuel tank fittings. Remove the fuel tank (Fig. 0058).



Fig 0058

PICT-4265

Fuel Tank Installation

1. Slide the 2 fuel lines onto the fuel tank fittings. Install the fuel tank (Fig. 0059).



Fig 0059

PICT-4265

11. Remove the fuel cap and tip the fuel tank to dump any remaining fuel from the tank into a proper drain pan.
12. Add approximately 1/2 gallon (2 liters) clean fuel to the tank and install fuel cap and slosh the fuel in the tank remove the fuel cap and dump fuel into a proper drain pan. Repeat process until the fuel tank is clean. Replace the fuel tank if the fuel tank does not become clean.

2. Slide the 2 fuel hose clamps up the fuel line to the fuel tank fittings (Fig. 0060).



Fig 0060

PICT-4264

MAINTENANCE

3. Connect the two wires (black and orange) to the fuel sending unit located on the top of the fuel tank (Fig. 0061).

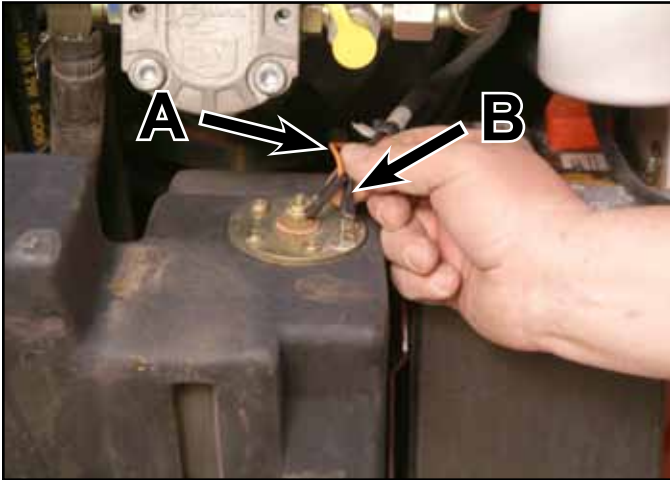


Fig 0061

PICT-4262a

- A. Orange wire (center terminal) B. Black wire (outside terminal)

4. Install the rear frame cover. Using 3/4" and 1/2" sockets, install the 7 bolts and nuts securing the rear frame cover to the frame and fuel tank bracket (Fig. 0062).

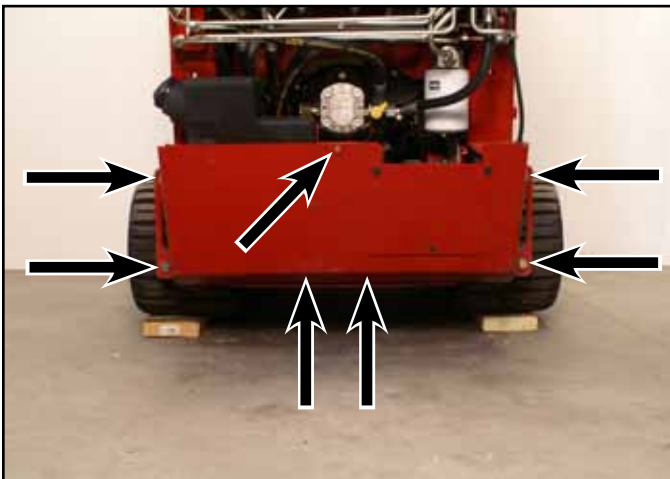


Fig 0062

PICT-5381

5. Install the fuel tank bracket nut and bolt (Fig. 0063).



Fig 0063

PICT-5625

6. Install the left and right rear cover support panels. Using a 3/8" socket, install the 6 screws that secure the left and right rear cover support panels to the tower assembly (3 screws per panel) (Fig. 0064).



Fig 0064

PICT-4256

MAINTENANCE

7. Install the rear access panel (Fig. 0065).



Fig 0065

PICT-4505a

8. Remove the right hand side panel (Fig. 0066).



Fig 0066

PICT-4942

9. Change the fuel filter/water separator and the inline fuel filter (if applicable).
10. Install the right hand side panel.
11. Remove the loader lock and lower the loader arm.
12. Close the hood.
13. Add fuel to the tank and install cap.
14. Release the parking brake.
15. Drive the unit off the 2x4's.

MAINTENANCE

Replacing the In-Line Fuel Filter (Serial numbers 280000500 & higher)

Replace the in-line filter when damage, contamination or debris is present.

1. Locate the in-line fuel filter (Fig. 0067) and note the direction of flow arrow on the side of the in-line filter.



Fig 0067

PICT-8751

Air Filter

Service Interval:

- Every 200 hours - replace the primary air filter
- Every 600 hours - replace the secondary air filter

** More often in dusty, dirty conditions*



Fig 0068

PICT-8748

2. Open the clamps on each end of the in-line filter and slide the hoses off of it. Discard the filter.
3. Slide the hoses over the end of a new filter, ensuring that the arrow on the filter is pointing in the same direction as the one on the old filter.
4. Secure the hoses with the hose clamps.

Fuse Block

To access the fuses, you must remove the heat shield.

1. Stop the engine and remove the key.
2. Raise the hood.
3. Pull the hairpin cotter from the bottom end of the hood prop rod and slide the prop rod out of the retaining brackets and the prop rod tab.
4. Remove the 4 screws securing the heat shield and then pull the shield out and up to remove it.
5. Check the fuses. Replace as necessary (Fig. 0069).

**Note: Fuses can be removed to check continuity.
The test meter should read less than 1 ohm.**



Fig 0069

PICT-8753

- A. 30 amp = Main circuit
- B. Empty
- C. 10 amp = Control panel / Relay
- D. Open position for optional accessories

6. Install the heat shield using the 4 screws removed previously.
7. Install the prop rod into the retaining brackets and prop rod tab and secure it with the hairpin cotter.
8. Close the hood.

Hydrostatic Pump Belt

Every 25 hours inspect the drive belt for wear or damage.

Replace the belt if you find any signs of wear, cracks, or damage or yearly, whichever comes first (Fig. 0070).



Fig 0070

PICT-8756

MAINTENANCE

Alternator/Fan Belt

Fan Belt Tension: Deflects 0.28 to 0.35" (7 to 9mm) when the belt is pressed in the middle of the span (Fig. 0071).

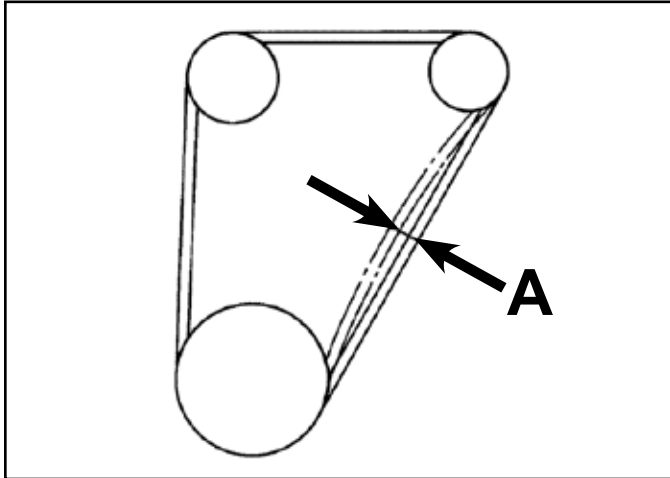


Fig 0071

fig. 3EEABAB1P017B

4. Replace fan belt if it is worn or damaged. Replace the pulley if the belt groove is worn excessively (Fig. 0072).

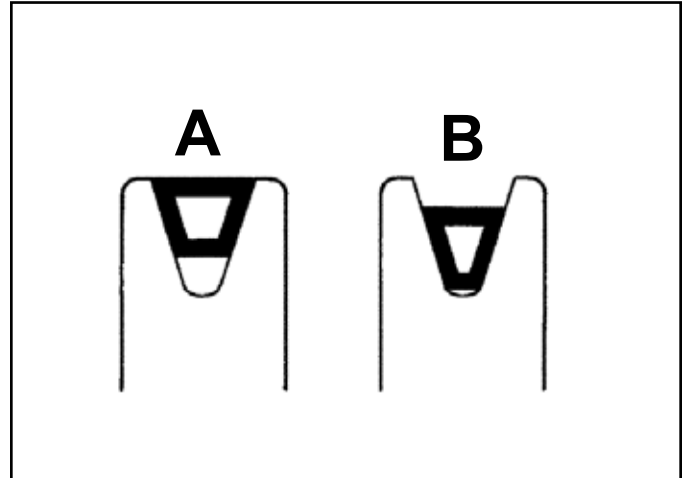


Fig 0072

fig. 3EEABAB1P018A

A. New belt

B. Worn belt

A. Deflection

1. Stop the engine and remove the key.
2. Apply moderate thumb pressure to belt between the alternator and crankshaft pulleys.
3. If tension is incorrect, loosen the alternator mounting bolts and, using a lever placed between the alternator and the engine block, pull the alternator out until the deflection of the belt falls within acceptable limits.

Track Inspection

Clean the track and drive assembly daily.

Check the track surface daily for cracks and tears.

Replace the track if it is torn or cut and/or the tread is worn (Fig. 0073).

Track Tread (cracked/damaged/worn):



Fig 0073

PICT-3377

Check the center lugs daily for gouging and excessive wear (Fig. 0074).

Center Lug (damaged/worn):



Fig 0074

PICT-3378

Track Tension Adjustment 2-3/4" (7cm) (Fig. 0075).

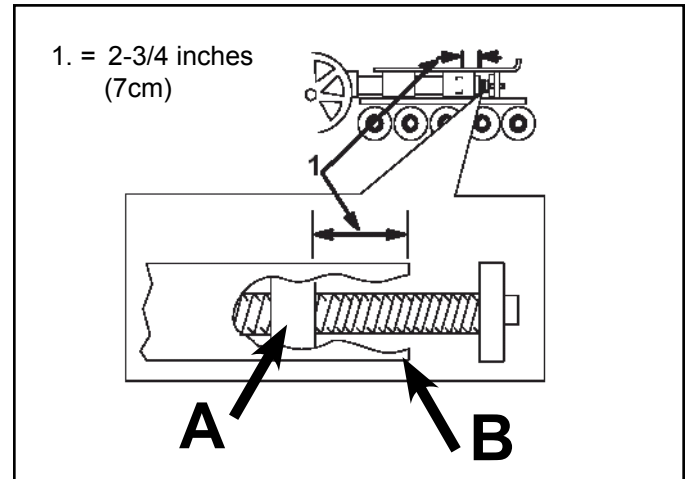


Fig 0075

track install #3

A. Tension nut

B. Tensioner arm

Use an alignment tool (Toro p/n: 110-0069) to align the track guide to drive wheel prior to installing a new track, or if the track lugs display abnormal wear or gouging in use.

Replace the track if most of the center lugs are gouged or worn 1/2" (1.27cm) on either side or a combination of both sides. Nominal lug width is 2 1/2" (6.35cm) at the base of the lug.

Refer to "Track Guide Alignment" on page 7-3.

Refer to "Track Replacement":

- "Wide Track Removal" on page 7-68.
- "Narrow Track Removal" on page 7-72.

MAINTENANCE

Battery Maintenance

Service Interval:

- Every 100 hours—Check the battery electrolyte level (batteries with inspection caps).
- Every 100 hours—Check the battery cable connections.

Battery Specification: 12 volt, 585 Cold Cranking Amps



Fig 0076 PICT-8762

Batteries are available in two basic versions; maintenance free and maintenance type.

With either type of battery it is important to have clean terminals and tight cable connections to the battery posts. Escaping gases from the battery causes corrosion at the terminals and other metal parts. The battery should be cleaned periodically using a baking soda and water mix; a couple of tablespoons baking soda to a pint (.5 liter) of water.

A maintenance type battery needs fluid level checks on a routine basis. Use distilled water to bring the battery cells to the correct level. Check and clean electrical connections and the charging system if the battery requires water frequently and corrosion becomes excessive; both are signs of over-charging.

A maintenance free battery is sealed and fluid can not be added.

Cold cranking amps (CCA) is a measurement of the number of amps a battery can deliver at 0° F (-17° C) for 30 seconds and not drop below 7.2 volts. So a high CCA battery rating is desirable, especially in cold weather. Sulfation of batteries starts when specific gravity falls below 1.225 or voltage measures less than 12.4 (12v Battery). Sulfation hardens the battery plates reducing and eventually destroying the ability of the battery to store a charge.

Sulfation is a normal process that slowly occurs over time and is the reason a battery eventually needs replacement. However, a battery that is allowed to become discharged and is left in this state will suffer permanent sulfation damage and require premature replacement. Occasional charging of the battery during storage is recommended to keep the specific gravity to recommended levels. This will minimize the sulfation of the battery plates.

State of Charge	Specific Gravity	Voltage 12V
100%	1.265	12.7
75%	1.225	12.4
50%	1.190	12.2
25%	1.155	12.0
Discharged	1.120	11.9

Battery Testing

You must first have the battery fully charged prior to any test. The surface charge must be removed before testing. To remove surface charge the battery must experience a load of 20 amps for 3 plus minutes.

Battery specific gravity can be measured by using a hydrometer or a refractometer.

Load testing removes amps from a battery much like start-ing an engine would. The battery may have a label with the amp load for testing and/or a CCA Cold Cranking Amp rating. The load test number is 1/2 of the CCA rating. For example, a 500 CCA battery would load test at 250 amps for 15 seconds. A load test can only be performed if the battery is near or at full charge.

If you have a maintenance free battery, the only ways to test are with a digital voltmeter and/or a load test.

The reading on the digital voltmeter should be the voltage shown in the previous table. If you have voltage readings in the 10.5 volts range on a charged battery, that indicates a shorted cell.

Batteries used in equipment stored for some portion of the year can discharge and sulfation between the battery plates can occur and shorten the life of the battery.

MAINTENANCE

Special Tools

Listed below are the special tools used in some of the procedures in this manual. To order these tools, contact the Toro Company.

Track Alignment Tool (Fig. 0077) - Toro P/N: 110-0069
For tool use example see page 7-3.



Fig 0077

PICT-4139a

Spring Removal Tool (Fig. 0079) - Toro P/N: 92-5771
For tool use example see page 7-6, step 10.

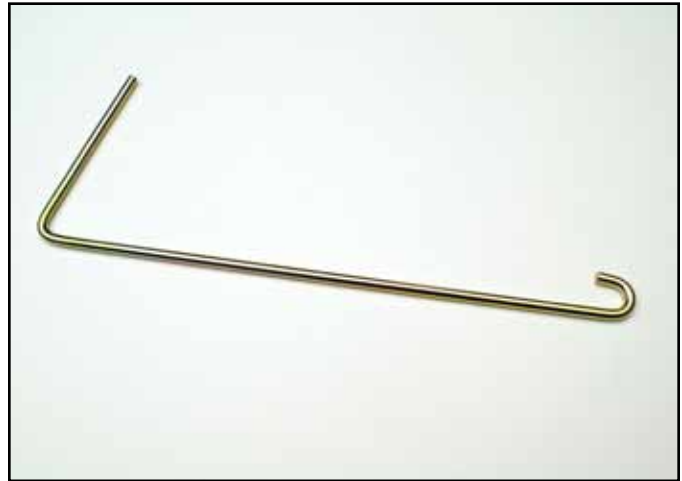


Fig 0079

PICT-4131b

Puller Kit (Fig. 0078) - Toro P/N: 112-2557
For tool use example see page 7-28, step 37.



Fig 0078

PICT-4143b

Radiator & Oil Cooler Replacement

Radiator & Oil Cooler Assembly Removal

Note: Cleanliness is a key factor for any service work involving 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.

Upon removal, all seals, o-rings, and gaskets should be replaced. During installation, lightly lubricate all seals, o-rings, and gaskets with clean petroleum jelly prior to assembly.

Protect the inner diameter of seals and o-rings from damage during assembly by covering the shaft machined features with plastic wrap or equivalent.

1. Park the machine on a flat surface and raise the hood.
2. Raise the loader arm and lock the loader arm into position using the loader arm lock.
3. Turn the machine off and remove the key. Allow the machine to cool.

4. Remove the left and right hand side panels (Fig. 0080).



Fig 0080

PICT-4945

5. Remove the breather from the breather tube (Fig. 0081).



Fig 0081

PICT-4946a

ENGINE

6. Remove the 4 bolts securing the grill assembly to the frame (Fig. 0082).



Fig 0082

PICT-4953

8. Remove the 2 bolts and nuts securing the overflow tank bracket to the grill assembly (Fig. 0084).



Fig 0084

PICT-4959

7. Slide the grill assembly forward (Fig. 0083).



Fig 0083

PICT-4955

9. Remove the grill assembly taking care not to damage the hydraulic tank breather hose (Fig. 0085).



Fig 0085

PICT-4961

10. Inspect the foam seals on the inside of the grill assembly. Replace if worn or damaged (Fig. 0086).

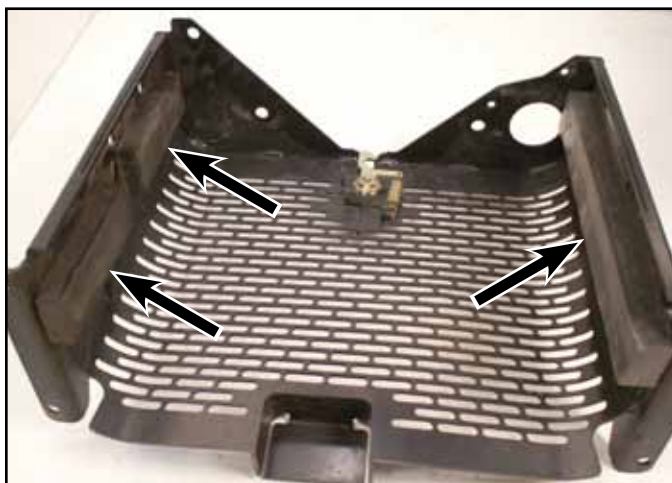


Fig 0086

PICT-5138a

11. Place an absorbent towel under the oil cooler inlet fitting located on the lower left hand corner of the oil cooler.
12. Using a 1-1/16" and a 1-1/8" wrench, remove the oil cooler inlet line from the oil cooler inlet fitting (Fig. 0087).



Fig 0087

PICT-4965

13. Cap the hydraulic line and fitting so debris does not enter the system.

14. Place an absorbent towel under the oil cooler outlet fitting located on the upper right hand corner of the oil cooler.

15. Using a 1-1/16" and a 1-1/8" wrench, remove the oil cooler outlet line from the oil cooler outlet fitting (Fig. 0088).



Fig 0088

PICT-4968a

16. Cap the hydraulic line and fitting so debris does not enter the system.

17. Using a 1/2" socket, remove the 3 bolts securing the radiator mount to the frame (Fig. 0089).

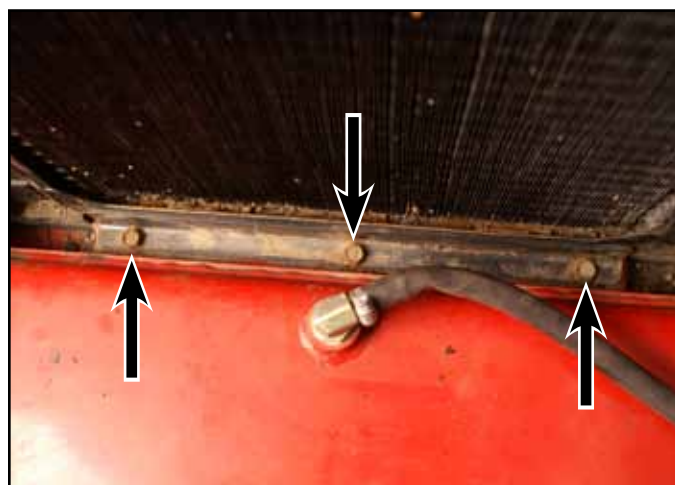


Fig 0089

PICT-4969

ENGINE

18. Remove the front radiator mount (Fig. 0090).



Fig 0090

PICT-4971

19. Tilt the radiator/oil cooler assembly forward and lift it out of the frame so that the petcock drain is above the frame (Fig. 0091).



Fig 0091

PICT-4973

20. Slide a length of 5/16" hose onto the petcock drain. Place the other end of the hose into a drain pan. Open the petcock and remove the radiator cap to drain the coolant (Fig. 0092).



Fig 0092

PICT-4974

21. Remove the drain hose and close the petcock.

22. Loosen the 2 hose clamps securing the 2 radiator hoses to the left hand side of the radiator (Fig. 0093).



Fig 0093

PICT-4975

23. Slide the 2 radiator hoses off the left hand side of the radiator (Fig. 0094).

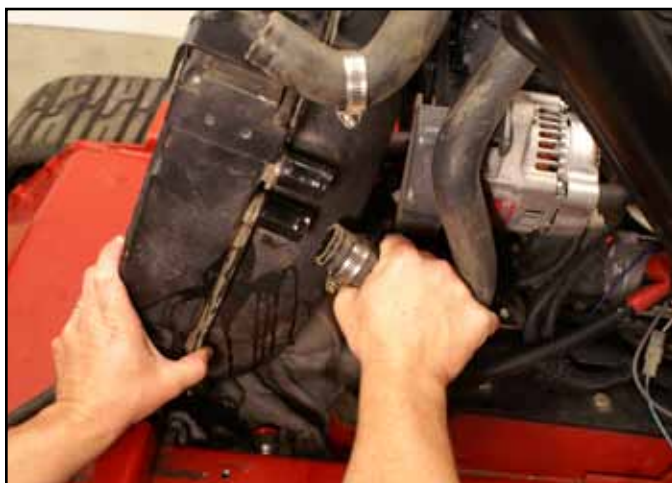


Fig 0094

PICT-4978

25. Remove the radiator/oil cooler assembly from the frame (Fig. 0096).



Fig 0096

PICT-4980

24. Loosen the hose clamp securing the radiator hose to the right hand side of the radiator. Slide the radiator hose off the right hand side of the radiator (Fig. 0095).



Fig 0095

PICT-4979

26. Cap the inlet and outlet flanges and fittings so that debris does not enter into the cooling system.

27. To repair or replace only the oil cooler, continue on to "Oil Cooler Removal". To repair or replace the radiator, refer to "Radiator Removal" on page 4-10.

ENGINE

Oil Cooler Removal

1. Remove the 4 bolts, 2 washers and 4 nuts securing the fan shroud to the radiator/oil cooler assembly (Fig. 0097).

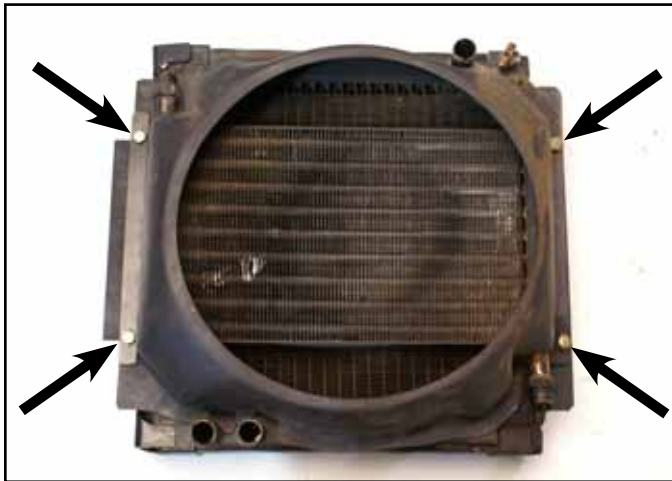


Fig 0097

PICT-5058

2. Remove the backing plate from the radiator/oil cooler assembly (Fig. 0098).



Fig 0098

PICT-5060

3. Remove the fan shroud from the radiator/oil cooler assembly (Fig. 0099).

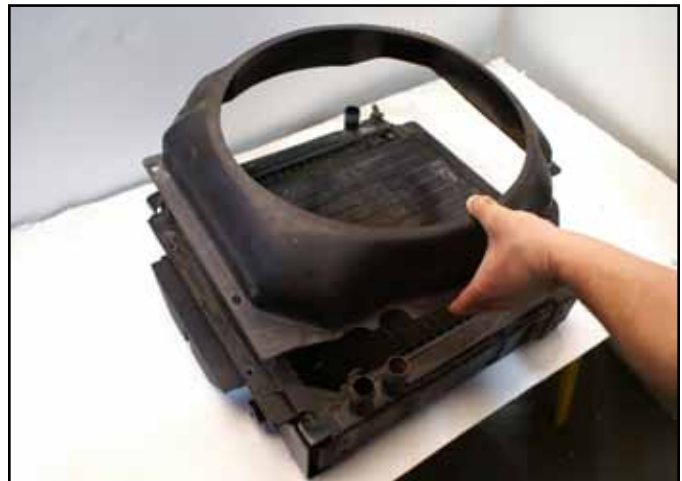


Fig 0099

PICT-5061

4. Using a 1/2" wrench, remove the 2 bolts, washers and lock washers securing the oil cooler to the top side of the radiator (Fig. 0100).

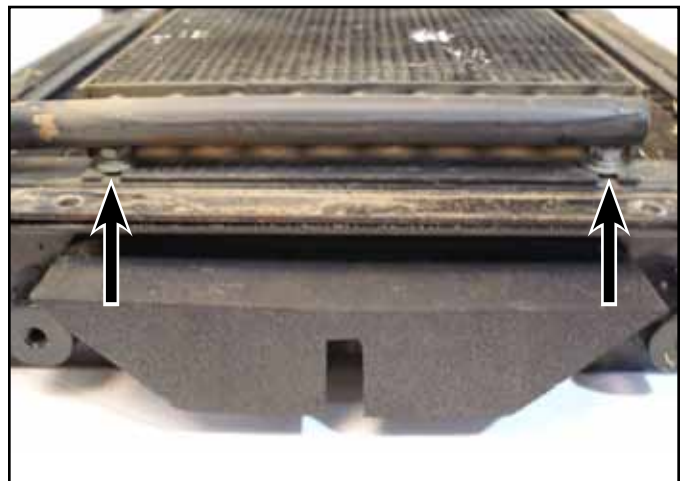


Fig 0100

PICT-5062

5. Using a 1/2" wrench, loosen the other 2 bolts, washers and lock washers securing the oil cooler to the bottom side of the radiator (Fig. 0101).



Fig 0101

PICT-5064

6. Remove the oil cooler from the radiator by sliding the oil cooler flange out from underneath the 2 bolts (Fig. 0102).



Fig 0102

PICT-5065

7. Inspect the oil cooler. Repair or replace.
8. Inspect the foam strips on the radiator. If worn or damaged, replace.

Oil Cooler Installation

1. Clean all dirt and debris from the radiator assembly.
2. Position the oil cooler onto the radiator by sliding the oil cooler mounting flange under the 2 flat washers on the bottom side of the radiator (Fig. 0103).



Fig 0103

PICT-5066

ENGINE

3. Loosely install the 2 bolts, lockwashers and washers securing the opposite oil cooler mounting flange to the top side of the radiator (Fig. 0104).



Fig 0104

PICT-5068

4. Center the oil cooler onto the radiator (Fig. 0105) and progressively tighten each of the 4 bolts to evenly secure the oil cooler to the radiator.



Fig 0105

PICT-5084a

5. Position the fan shroud onto the radiator/oil cooler assembly (Fig. 0106).



Fig 0106

PICT-5073

6. Position the backing plate onto shroud (Fig. 0107).



Fig 0107

PICT-5085

7. Loosely install 2 bolts and nuts securing the backing plate and fan shroud to the radiator/oil cooler assembly (Fig. 0108).



Fig 0108

PICT-5086

9. Tighten the 4 bolts securing the fan shroud to the radiator/oil cooler assembly (Fig. 0110).

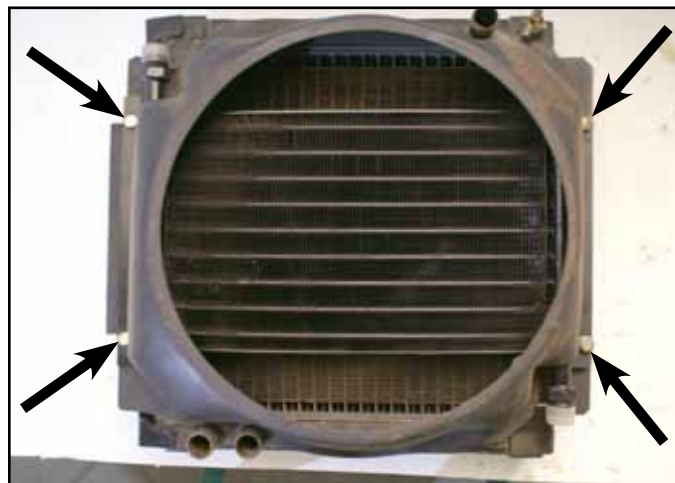


Fig 0110

PICT-5089a

8. Loosely install 2 bolts, washers and nuts securing the fan shroud to the radiator/oil cooler assembly (Fig. 0109).



Fig 0109

PICT-5087

10. Install the radiator/oil cooler assembly into the machine. Refer to "Radiator & Oil Cooler Assembly Installation" on page 4-15.

ENGINE

Radiator Removal

1. Remove the 4 bolts, 2 washers and 4 nuts securing the fan shroud to the radiator/oil cooler assembly (Fig. 0111).



Fig 0111

PICT-5081a

2. Remove the backing plate from the radiator/oil cooler assembly (Fig. 0112).



Fig 0112

PICT-5074

3. Remove the fan shroud from the radiator/oil cooler assembly (Fig. 0113).



Fig 0113

PICT-5073

4. Using a 1/2" wrench, remove the 2 bolts, washers and lock washers securing the oil cooler to the top side of the radiator (Fig. 0114).

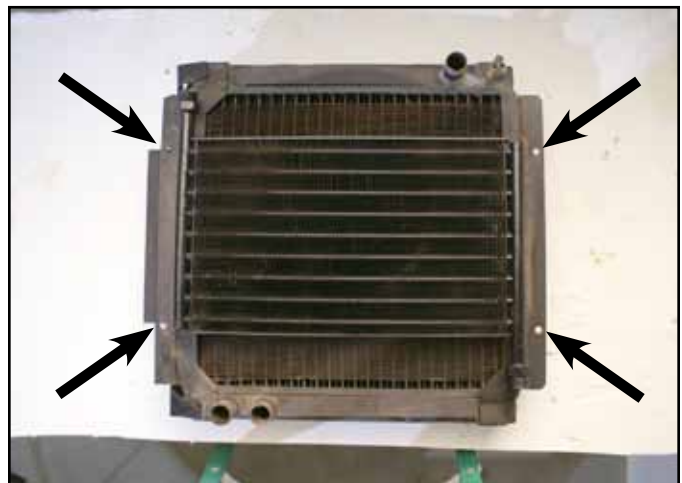


Fig 0114

PICT-5072a

5. Using a 1/2" wrench, loosen the 2 bolts securing the bottom side of the oil cooler to the radiator (Fig. 0115).



Fig 0115

PICT-5066

7. Remove the 2 oil cooler mounting bolts, lock washers and washers that are remaining in the radiator (Fig. 0117).



Fig 0117

PICT-5090

6. Remove the oil cooler from the radiator (Fig. 0116).



Fig 0116

PICT-5065

8. Remove the radiator bracket (Fig. 0118).



Fig 0118

PICT-5092a

ENGINE

9. Inspect the foam seals on the radiator bracket. Replace if worn or damaged (Fig. 0119 and Fig. 0120).

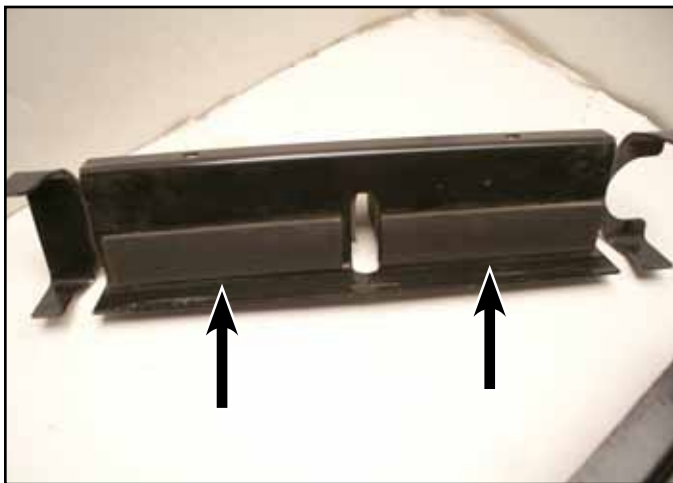


Fig 0119

PICT-5093a



Fig 0120

PICT-5094a

10. Inspect the radiator. Repair or replace.

Radiator Installation

1. Apply 2 foam seals onto the new radiator. Locate as shown (Fig. 0121 and Fig. 0122).

Right side:



Fig 0121

PICT-5095a

Left side:



Fig 0122

PICT-5096

- Slide the radiator bracket onto the radiator so that the mounting holes in the flanges line up (Fig. 0123).



Fig 0123

PICT-5098a

- Position the oil cooler onto the radiator by sliding the mounting flange onto the 2 bolts so that the mounting flange is located between the radiator and the flat washers (Fig. 0125).



Fig 0125

PICT-5100

- Thread 2 bolts, lockwashers and washers into the holes located on the bottom mounting flange (Fig. 0124).

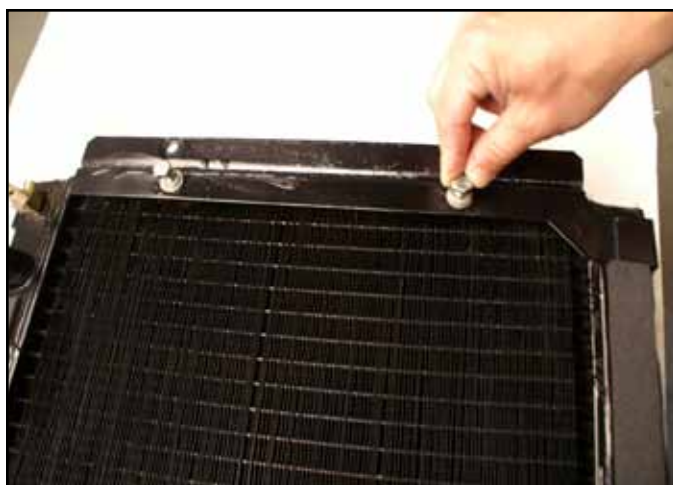


Fig 0124

PICT-5099

- Loosely install 2 bolts, lockwashers and flat washers through the top mounting flange of the oil cooler and into the radiator (Fig. 0126).



Fig 0126

PICT-5101

ENGINE

6. Center the oil cooler onto the radiator (Fig. 0127) and progressively tighten each of the 4 bolts to evenly secure the oil cooler to the radiator.



Fig 0127

PICT-5105a

8. Position the backing plate onto the fan shroud (Fig. 0129).



Fig 0129

PICT-5107

7. Position the fan shroud onto the radiator/oil cooler assembly (Fig. 0128).



Fig 0128

PICT-5106

9. Loosely install 2 bolts and nuts securing the backing plate and fan shroud to the radiator/oil cooler assembly (Fig. 0130).



Fig 0130

PICT-5108

10. Loosely install 2 bolts, washers and nuts securing the fan shroud to the radiator/oil cooler assembly (Fig. 0131).



Fig 0131

PICT-5109

11. Tighten the 4 bolts securing the fan shroud to the radiator/oil cooler assembly (Fig. 0132).



Fig 0132

PICT-5111a

12. Install the radiator/oil cooler assembly into the machine. Refer to "Radiator and Oil Cooler Assembly Installation" following.

Radiator & Oil Cooler Assembly Installation

1. Inspect the foam seals located inside the frame. Replace if worn or damaged (Fig. 0133).

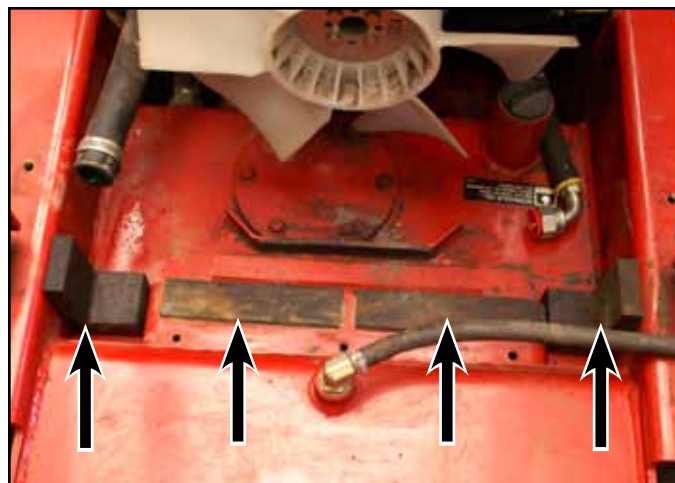


Fig 0133

PICT-5110

ENGINE

2. Position the radiator/oil cooler assembly into the frame so it is on top of the foam seals and behind the 3 radiator mount holes (Fig. 0134).



Fig 0134

PICT-5122

5. Slide the left radiator hoses (top hoses) onto the 2 radiator flanges (Fig. 0136).



Fig 0136

PICT-5124

3. Remove the protective caps from the inlet and outlet flanges and fittings.
4. Using 1-1/16" and 1-1/8" wrenches, install the hydraulic oil inlet line to the oil cooler inlet fitting (Fig. 0135).



Fig 0135

PICT-4965

6. Slide the hose clamps into position with the tightening screw heads facing outward as shown. This will allow access to these tightening screws through the grill assembly when it is in position. Tighten the hose clamps (Fig. 0137).



Fig 0137

PICT-5125

7. Using 1-1/16" and 1-1/8" wrenches, install the hydraulic outlet line to the oil cooler outlet fitting (Fig. 0138).



Fig 0138

PICT-5126

8. Slide the radiator inlet hose (bottom hose) onto the radiator flange (Fig. 0139).



Fig 0139

PICT-5127

9. Slide the hose clamp into position with the tightening screw head facing outward as shown. This will allow access to the tightening screw through the grill assembly when it is in position. Tighten the hose clamp (Fig. 0140).



Fig 0140

PICT-5128

10. Position the radiator mount into the frame (Fig. 0141).



Fig 0141

PICT-5129

ENGINE

11. Loosely install 3 screws that will secure the radiator mount to the frame (Fig. 0142).



Fig 0142

PICT-5131

13. Without moving the position of the radiator, slide the radiator mount against the radiator and tighten the 3 radiator mount screws (Fig. 0144).



Fig 0144

PICT-5137

12. Center the radiator and oil cooler assembly side to side in the frame so there is approximately a 1/8" (3.2mm) space between the fan shroud and the fan. Spin the cooling fan. Ensure the fan does not come into contact with the fan shroud. Adjust the radiator side to side as necessary (Fig. 0143).



Fig 0143

PICT-5135

14. Position the grill onto the frame and route the breather tube in between the foam seals on the inner left side of the grill (Fig. 0145).



Fig 0145

PICT-5139

15. Slide grill onto the frame so the grill base sits under the loader stops and the top of the grill sits on top of the radiator. Leave the grill in a slightly forward position. The overflow tank mounting holes should be just beyond the right hand boss on top of the radiator assembly. This will allow the overflow bottle assembly to be installed (Fig. 0146).

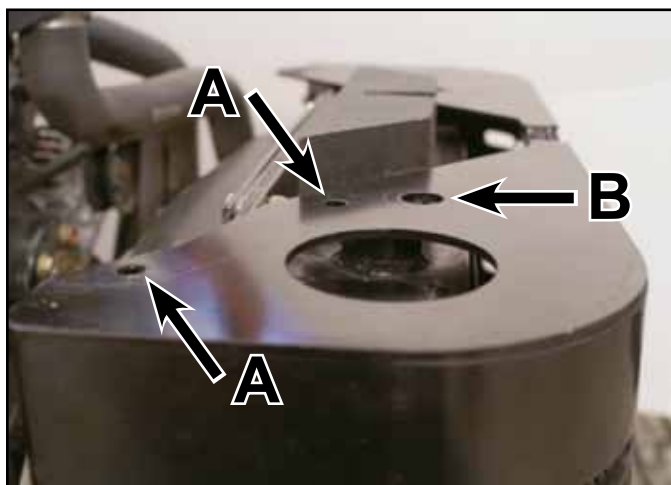


Fig 0146

PICT-5141a

- A. Overflow tank mounting holes
B. Right hand boss

16. Position the overflow tank bracket onto the grill assembly (Fig. 0147).



Fig 0147

PICT-5143a

17. Install 2 bolts and nuts securing the overflow bottle assembly to the grill assembly (Fig. 0148).



Fig 0148

PICT-5145

18. Slide the grill assembly back aligning the mounting holes with the holes in the frame. Loosely install 4 bolts securing the grill assembly to the frame and the 2 bolts and washers securing the grill to the radiator (Fig. 0149).

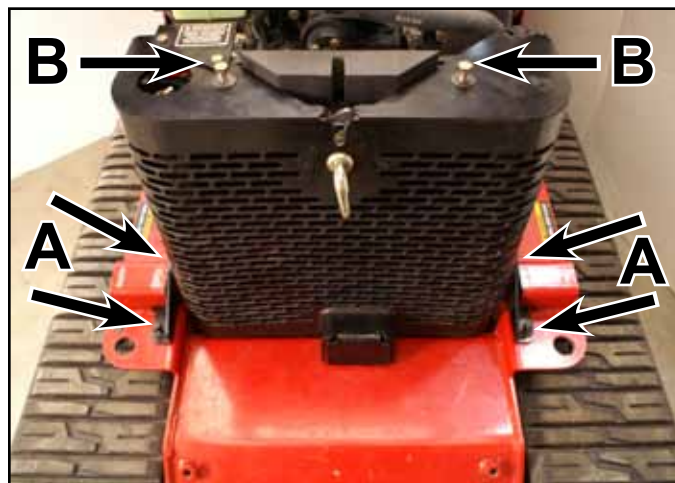


Fig 0149

PICT-5146

- A. 4 Grill assembly-to-frame bolts
B. 2 Grill assembly-to-radiator bolts and washers

ENGINE

19. Using a 1/2" socket, tighten the 4 bolts securing the grill assembly to the frame (Fig. 0150).



Fig 0150

PICT-5150

- TX525, serial #280000001 & higher, use flange head bolts:



Fig 0152

PICT-5605

20. Check the cooling fan and shroud clearance. Adjust the position of the radiator if necessary.

21. Using a 9/16" socket, tighten the 2 bolts securing the radiator to the grill assembly (Fig. 0151 and Fig. 0152).

TX525, serial #270000001 - 270999999, use bolts and washers:



Fig 0151

PICT-5604

22. Position the breather tube under the grill and install the breather (Fig. 0153).



Fig 0153

PICT-5157

23. Fill the radiator. Refer to “Checking, Adding & Bleeding the Engine Coolant” on page 4-138.
 24. Check the hydraulic oil level. Refer to “Checking the Hydraulic Fluid” on page 3-4.
 25. Purge air from the hydraulic system. Refer to “Purging Air Procedure” on page 9-19.
5. Using a 3/8” socket combination, loosen the engine intake hose clamp and slide the intake hose down off of the air filter assembly (Fig. 0154 and Fig. 0155).

Muffler Assembly & Air Cleaner Assembly Removal

Glow Plug, Fuel Injector Access

- To service the three glow plugs on the top side of the engine, the muffler must be removed.
- To service #1 cylinder fuel injector the air cleaner must be removed.
- To service #2 and #3 cylinder fuel injector the muffler must be removed.

Muffler Removal

1. Position the traction unit on a flat surface.
2. Open the hood.
3. Raise loader arms approximately 4” (10cm). Lock the loader arm into position using the loader arm lock.
4. Remove right and left side panels.



Fig 0154

PICT-3259



Fig 0155

PICT-3261

ENGINE

6. Using a 1/2" wrench and 1/2" socket combination, remove the bolt and nut securing the bottom of the muffler to the rear muffler bracket (Fig. 0156).



Fig 0156

PICT-3263

8. Using a 13mm socket combination, remove the 4 bolts and washers from the muffler and exhaust manifold flange (Fig. 0158).

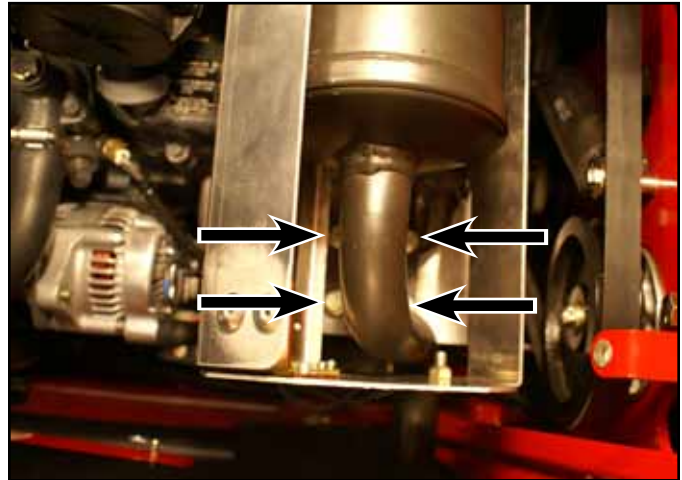


Fig 0158

PICT-3266

7. Using a 1/2" socket combination, remove the bolts securing the muffler to the front muffler bracket (Fig. 0157).



Fig 0157

PICT-3265

9. Remove the muffler assembly (Fig. 0159).



Fig 0159

PICT-3268

10. Replace the exhaust gasket (Fig. 0160).



Fig 0160

PICT-3271

Air Cleaner Assembly Removal

1. Using a 13mm socket, remove the 2 bolts and washers securing the air cleaner bracket assembly to the engine block (Fig. 0161).



Fig 0161

PICT-5232

2. Move the air cleaner assembly out of the way of the #1 cylinder injector to allow for testing and/or service (Fig. 0162).

Important: Keep the air cleaner assembly away from the exhaust manifold area.



Fig 0162

PICT-5334

For testing and service of the glow plugs, refer to the Kubota Service manual "Kubota D722/D902 Tier 2 Diesel Engine Service Manual" (Toro Form No. 492-4796) (Fig. 0163).

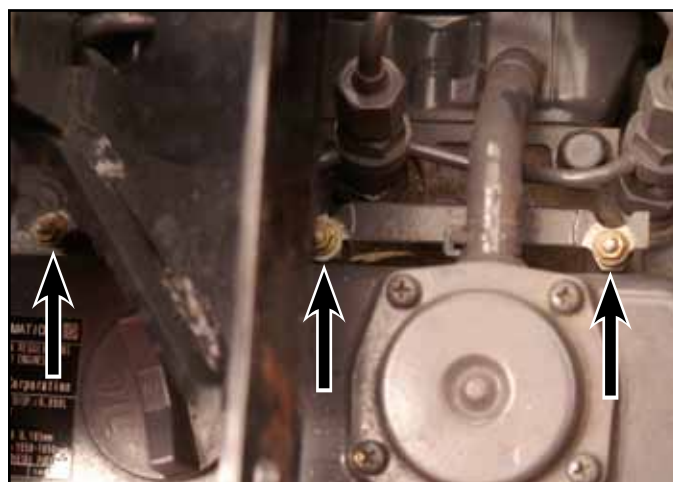


Fig 0163

PICT-5337

ENGINE

For testing and service of the injectors, refer to the Kubota Service manual "Kubota D722/D902 Tier 2 Diesel Engine Service Manual" (Toro Form No. 492-4796) (Fig. 0164).

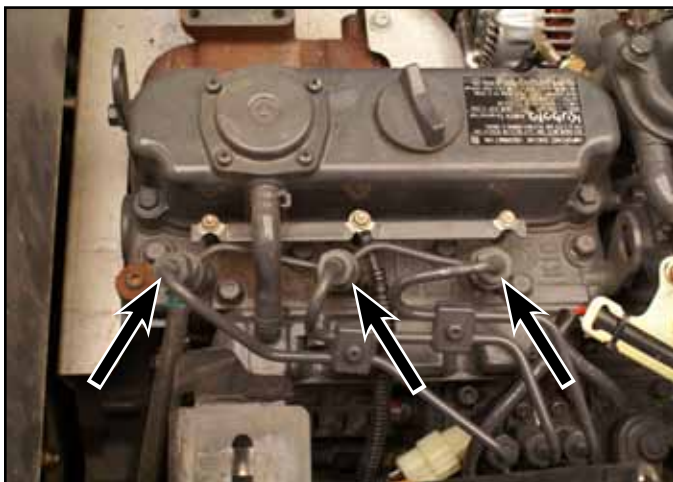


Fig 0164

PICT-5252

Air Cleaner Assembly & Muffler Assembly Installation

Air Cleaner Assembly Installation

1. Position the air cleaner so the mounting bracket holes align with the mounting holes in the engine block. Using a 13mm socket, install 2 new bolts and washers securing the air cleaner assembly to the engine block (Fig. 0165).



Fig 0165

PICT-5232

2. Torque the 2 bolts to 19 ± 2 ft-lbs. (25.7 ± 2.7 Nm) (Fig. 0166).



Fig 0166

PICT-5335

Muffler Installation

1. Ensure the exhaust gasket is in place (Fig. 0167).



Fig 0167

PICT-3270

2. To aid in the installation process, insert a bolt and washer into the right front position on the muffler flange (Fig. 0168).



Fig 0168

PICT-3272

3. Position the muffler assembly and thread the previously inserted bolt and washer into the exhaust manifold (Fig. 0169).



Fig 0169

PICT-3268

4. Loosely install the remaining 3 bolts and washers on the muffler and exhaust manifold flange (Fig. 0170).



Fig 0170

PICT-3266

ENGINE

5. Loosely install the bolts on the front muffler bracket (Fig. 0171).



Fig 0171

PICT-3265

7. Tighten the bolts on both the rear and front muffler brackets.
8. Tighten and torque the exhaust manifold bolts to 28 ft-lbs. (38 Nm) (Fig. 0173).



Fig 0173

PICT-3274

6. Using a 1/2" wrench and 1/2" socket combination, install and tighten the bolt and nut securing the bottom of the muffler to the rear muffler bracket (Fig. 0172).



Fig 0172

PICT-3263

9. Position and tighten the air intake hose clamp to the air filter assembly (Fig. 0174).



Fig 0174

PICT-3259

10. Replace the right and left side panels.

Alternator Replacement

Alternator Removal

1. Park the machine on a flat surface.
2. Raise the hood.
3. Raise the loader arm. Lock the loader arm into position using the loader arm lock.
4. Turn the machine off and remove the key. Allow the machine to cool.
5. Remove the rear access panel (Fig. 0175).
6. Using a 1/2" wrench, disconnect the negative battery cable from the battery (Fig. 0176).



Fig 0175

PICT-4505a



Fig 0176

PICT-5158

7. Remove the left hand side panel (Fig. 0177).



Fig 0177

PICT-4945

ENGINE

Alternator Mounting Styles

The three methods of attaching the alternator are illustrated and described below.

TX525 22319 #270000001 - 270000555
22320 #270000001 - 270000711
22333 #270000001 - 270000422
22334 #270000001 - 270000426

The engine gear case housing flange is threaded (Fig. 0178).



Fig 0178

PICT-5564

TX525 22319 #270000556 - 270000720
22320 #270000712 - 270000885
22333 #270000423 - 270000446
22334 #270000427 - 270000436

The engine gear case housing flange is threaded and fit with brackets (Fig. 0179).



Fig 0179

PICT-9354

TX525 22319 #270000721 & higher
22320 #270000886 & higher
22333 #270000447 & higher
22334 #270000437 & higher

The engine gear case housing flange is not threaded (not pictured).

8. Remove the boot from the terminal. Using a 10mm socket, remove the nut securing the positive cable to the alternator terminal (Fig. 0180).



Fig 0180

PICT-5161

10. Remove the positive battery cable terminal from the alternator terminal (Fig. 0182).



Fig 0182

PICT-5164

9. Remove the washer from the alternator terminal (Fig. 0181).



Fig 0181

PICT-5162

11. Unplug the harness connector from the alternator (Fig. 0183).



Fig 0183

PICT-5165

ENGINE

12. Using a 12mm socket, remove the flange nut securing the hex spacer to the dipstick (Fig. 0184).

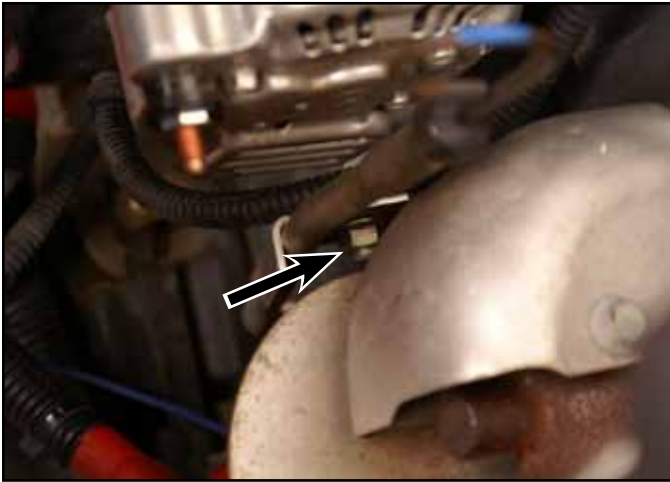


Fig 0184

PICT-5170

14. Slide the threaded hex spacer out of the dipstick bracket (Fig. 0186).



Fig 0186

PICT-5175

13. Using a 13mm socket and a 9/16" wrench on the hex spacer, loosen the alternator mounting bolt, lockwasher and flat washer securing the alternator to the engine block. Loosen the bolt enough to free the hex spacer (Fig. 0185).



Fig 0185

PICT-5171

15. Remove the mounting bolt, lock washer and washer (Fig. 0187).



Fig 0187

PICT-5176

16. Using a 12mm socket, support the alternator and remove the alternator belt tensioning bolt and lock-washer (Fig. 0188).



Fig 0188

PICT-5166

18. Remove the belt from the alternator pulley (Fig. 0190).



Fig 0190

PICT-5178

17. Remove the alternator belt guard (Fig. 0189).



Fig 0189

PICT-5177

19. Remove the alternator from the engine (Fig. 0191).



Fig 0191

PICT-5179

ENGINE

20. Remove the collar from the alternator (Fig. 0192).

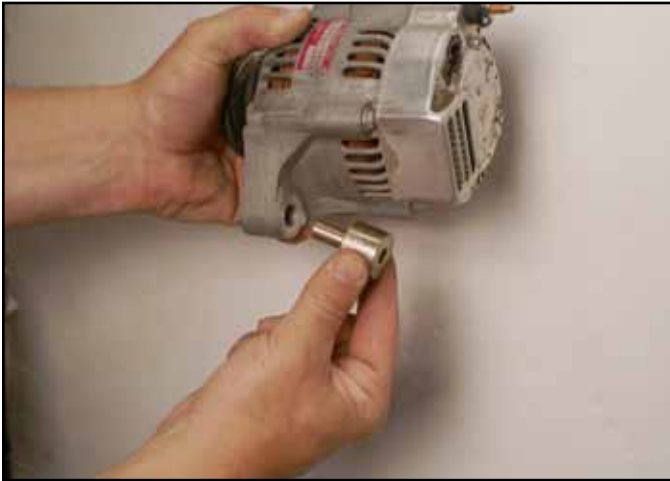


Fig 0192

PICT-5180a

Alternator Installation

1. Slide the collar into the mounting flange on the alternator (Fig. 0194).



Fig 0194

PICT-5180av

21. To service the alternator, refer to "Alternator Assembly Teardown" on page 4-153 (Fig. 0193).



Fig 0193

PICT-5181a

2. Position the alternator up to the engine block (Fig. 0195).



Fig 0195

PICT-5179

3. Route the alternator belt around the alternator pulley (Fig. 0196).



Fig 0196

PICT-5178

5. Using a 12mm socket, loosely install the alternator belt tensioning bolt and lockwasher (Fig. 0198).



Fig 0198

PICT-5166

4. Position the alternator belt guard up to the slotted bracket (Fig. 0197).



Fig 0197

PICT-5177

6. Loosely install the alternator mounting bolt, lock washer and washer through the belt guard, alternator, collar and into the alternator mounting flange (Fig. 0199).



Fig 0199

PICT-5176

ENGINE

7. Position the threaded hex spacer into the dipstick bracket and align it with the alternator mounting flange (Fig. 0200).



Fig 0200

PICT-5175

9. Using a 13mm socket and a 9/16" wrench, tighten the alternator mounting bolt, lockwasher and flat washer securing the alternator to the engine block and threaded hex spacer (Fig. 0202).



Fig 0202

PICT-5188

8. Apply tension to the alternator belt and tighten the top alternator mounting bolt (Fig. 0201).



Fig 0201

PICT-5565

10. Using a 12mm socket, install a flange nut onto the hex spacer securing it to the dipstick (Fig. 0203).

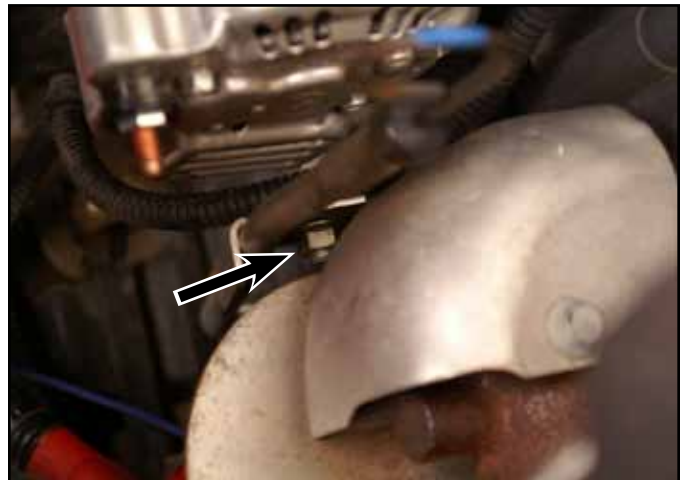


Fig 0203

PICT-5170

11. Tension the alternator belt. Refer to “Alternator/Fan Belt” on page 3-26.

12. Plug the harness connector into the alternator (Fig. 0204).



Fig 0204

PICT-5165

13. Slide the positive battery cable terminal onto the alternator terminal (Fig. 0205).



Fig 0205

PICT-5164

14. Slide a washer onto the alternator terminal (Fig. 0206).



Fig 0206

PICT-5162

15. Using a 10mm socket, install a nut securing the positive battery cable to the alternator terminal (Fig. 0207). Slide the boot onto the terminal.



Fig 0207

PICT-5161

ENGINE

16. Install the left hand side panel (Fig. 0208).



Fig 0208

PICT-4945

18. Install the rear access panel (Fig. 0210).



Fig 0210

PICT-4505a

17. Using a 1/2" wrench, connect the negative battery cable to the battery (Fig. 0209).



Fig 0209

PICT-5158

19. Lower the loader arm.

20. Lower the hood.

Checking the Alternator Belt Tension

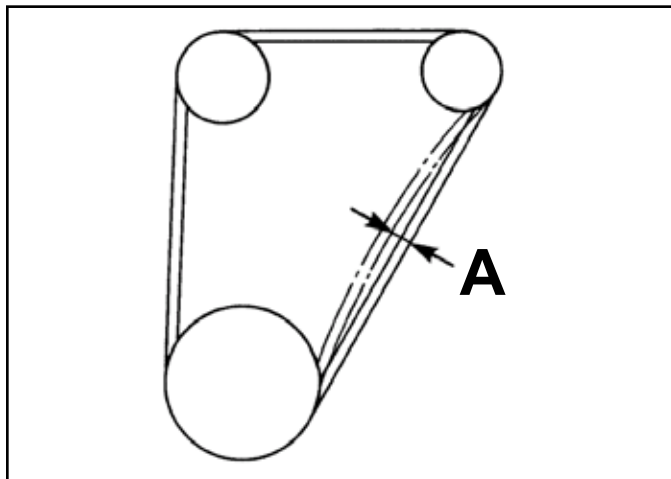


Fig 0211

fig. EEAB...17B

A. .28 to 0.35" (7.0 to 9.0mm)

1. Measure the deflection (A) by depressing the belt halfway between the fan drive pulley and alternator pulley at the specified force of 22 lbs. (98 N, 10kgf).
2. If the measurement is not within the factory specifications, loosen the alternator mounting screws and relocate the alternator to adjust and re-tighten the mounting screws.

Cooling Fan Replacement

Cooling Fan Removal

1. Remove the radiator and oil cooler assembly. Refer to "Radiator & Oil Cooler Assembly Removal" on page 4-1.
2. Using a 7/16" socket, remove the 4 bolts and lock-washers securing the cooling fan to the fan mount spacer (Fig. 0212).



Fig 0212

PICT-5112a

ENGINE

3. Slide the cooling fan off the fan mount spacer (Fig. 0213).



Fig 0213

PICT-5113a

5. Remove the fan mount spacer (Fig. 0215).



Fig 0215

PICT-5115

4. Secure the flywheel so that it can not turn. Use a 6mm Allen socket to remove the 3 bolts securing the fan mount spacer to the engine coupler (Fig. 0214).



Fig 0214

PICT-5114

Cooling Fan Installation

1. Apply thread locking compound to the fan mount spacer mounting bolts (Fig. 0216).



Fig 0216

PICT-5116a

2. Position the fan mount spacer to the engine coupler (Fig. 0217).



Fig 0217

PICT-5115

4. Torque the 3 bolts to 19 ± 2 ft-lbs. (25.7 ± 2.7 Nm) (Fig. 0219).

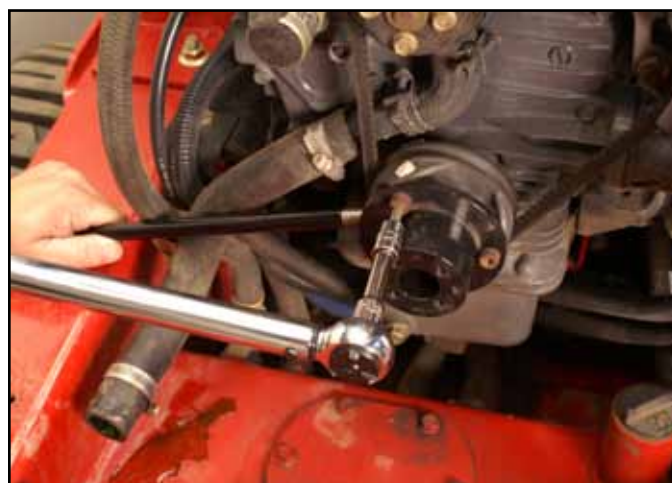


Fig 0219

PICT-5117

3. Secure the flywheel so that it can not turn. Use a 6mm Allen socket to install the 3 bolts securing the fan mount spacer to the engine coupler (Fig. 0218).



Fig 0218

PICT-5114

5. Slide the cooling fan onto the fan mount spacer (Fig. 0220).



Fig 0220

PICT-5113a

ENGINE

- Using a 7/16" socket, install 4 bolts and lockwashers securing the cooling fan to the fan mount spacer (Fig. 0221).



Fig 0221

PICT-5112a

- Torque the 4 bolts to 100 ± 10 in-lbs. (11.3 ± 1.1 Nm) (Fig. 0222).



Fig 0222

PICT-5118a

- Install the radiator and oil cooler assembly. Refer to "Radiator & Oil Cooler Assembly Installation on page 4-15.

Flywheel Replacement

Flywheel Removal

- Remove the tandem pump assembly from the pump mount. Refer to "Hydraulic Tandem Pump Removal" on page 6-30.
- Using a 13mm socket, remove the 4 bolts securing the pump mount to the engine housing (Fig. 0223).

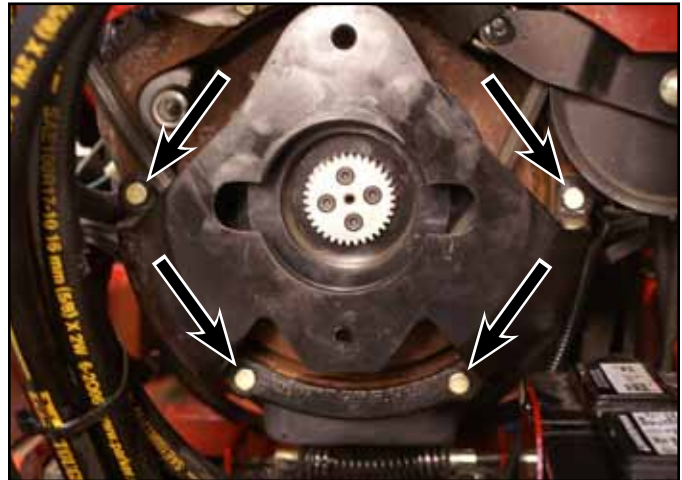


Fig 0223

PICT-4863

- Remove the pump mount (Fig. 0224).



Fig 0224

PICT-4861

4. Remove the hairpin cotter from the hood prop rod (Fig. 0225).



Fig 0225

Belt 001

6. Using a 1/2" wrench, remove the 2 lower heat shield screws (Fig. 0227).



Fig 0227

Belt 002

5. Support the hood and remove the prop rod (Fig. 0226).



Fig 0226

Belt 003

7. Using a 3/16" Allen wrench, remove the 2 upper heat shield screws (Fig. 0228).



Fig 0228

Belt 004

ENGINE

8. Remove the heat shield (Fig. 0229).



Fig 0229

Belt 005

10. Remove the belt from the right and left hydraulic traction pump pulleys (Fig. 0231).



Fig 0231

Belt 008

9. Using a spring tool (Toro p/n 92-5771), remove the idler spring from its post (Fig. 0230).



Fig 0230

Belt 007

11. Remove the left hand side grill (Fig. 0232).



Fig 0232

PICT-4945

12. Remove the drive belt from around the engine pulley (Fig. 0233).



Fig 0233

PICT-4862

14. Using a 6mm Allen socket, remove the 5 bolts securing the engine pulley to the flywheel (Fig. 0235).



Fig 0235

PICT-4856

13. Secure the flywheel to keep it from turning. You can do this by sliding a length of 5/16" diameter rod stock in between the fan mount pulley and fan mount spacer. The rod stock should be inserted so it runs on top of the fan mount pulley screw. The rod stock should be at least 16" (40.6cm) long so that it rests on the left hand loader arm lift cylinder (Fig. 0234).



Fig 0234

PICT-4840

15. Remove the engine pulley (Fig. 0236).



Fig 0236

PICT-4857

ENGINE

16. Using 14mm socket, remove the 5 bolts securing the flywheel to the crankshaft (Fig. 0237).



Fig 0237

PICT-4843

18. Inspect the starter engagement teeth. Replace the flywheel if worn or damaged (Fig. 0239).



Fig 0239

PICT-4847

17. Remove the flywheel (Fig. 0238).



Fig 0238

PICT-4844

Flywheel Installation

1. Slide the flywheel onto the crankshaft (Fig. 0240).

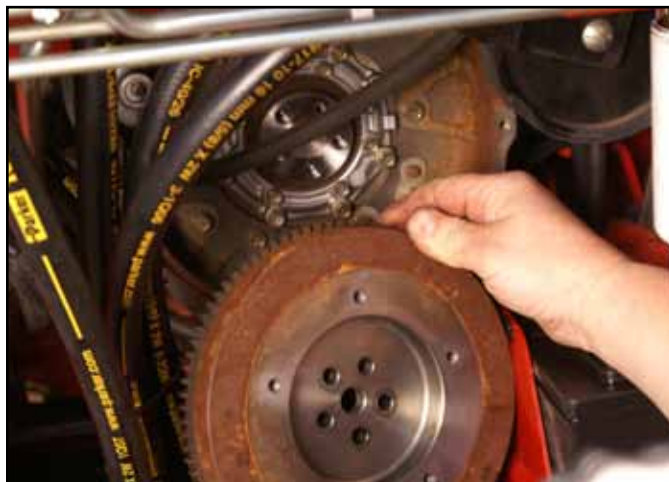


Fig 0240

PICT-4844

2. Apply engine oil to the 5 flywheel mounting bolt threads (Fig. 0241).



Fig 0241

PICT-4850a

4. Using 14mm socket, install the 5 oiled bolts to secure the flywheel to the crankshaft (Fig. 0243).



Fig 0243

PICT-4843

3. Secure the flywheel to keep it from turning. You can do this by sliding a length of 5/16" diameter rod stock in between the fan mount pulley and fan mount spacer. The rod stock should be inserted so it runs on top of the fan mount pulley screw. The rod stock should be at least 16" (40.6cm) long so that it rests on the left hand loader arm lift cylinder (Fig. 0242).



Fig 0242

PICT-4840

5. Torque the 5 flywheel mounting bolts to 39.8 to 43.4 ft-lbs. (53.9 to 58.8 Nm) (Fig. 0244).



Fig 0244

PICT-4852

ENGINE

6. Slide the engine pulley onto the crankshaft (Fig. 0245).



Fig 0245

PICT-4857

8. Torque the 5 engine pulley mounting bolts to 19 ± 2 ft-lbs. (25.7 ± 2.7 Nm) (Fig. 0247).



Fig 0247

PICT-4858

7. Using a 6mm Allen socket, install 5 bolts securing the engine pulley to the flywheel (Fig. 0246).



Fig 0246

PICT-4856

9. With the belt drive idler spring unhooked, route the drive belt around the engine pulley (Fig. 0248).



Fig 0248

PICT-4862

10. Position the pump mount to the engine (Fig. 0249).



Fig 0249

PICT-4861

11. Using a 13mm socket, install 4 bolts securing the pump mount to the engine housing (Fig. 0250).

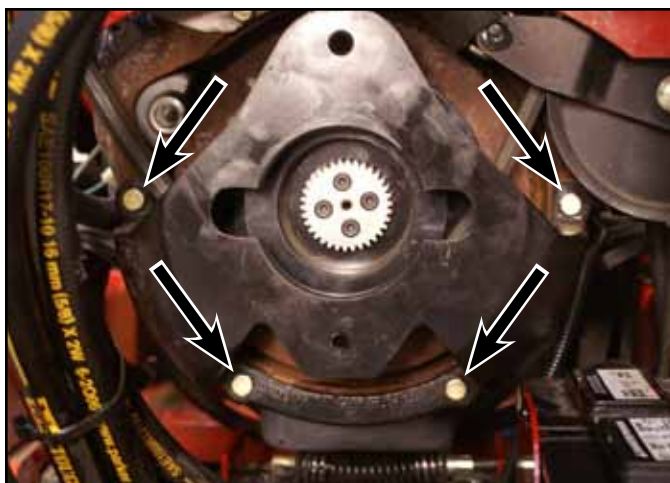


Fig 0250

PICT-4863

12. Ensure the belt is routed around the engine pulley and install the belt onto the right and left hydraulic traction pump pulleys (Fig. 0251).



Fig 0251

PICT-8902

13. Maneuver the spring tool (Toro p/n 92-5771) between the drive belt and the tower. Hook the idler spring to the spring post located on the tower and remove the spring tool (Fig. 0252).



Fig 0252

Belt 007

ENGINE

14. Position the heat shield (Fig. 0253).



Fig 0253

Belt 005

16. Using a 1/2" wrench, install the 2 lower heat shield screws (Fig. 0255).



Fig 0255

Belt 002

15. Using a 3/16" Allen wrench, install the 2 upper heat shield screws (Fig. 0254).



Fig 0254

Belt 004

17. Support the hood and install the prop rod (Fig. 0256).



Fig 0256

Belt 003

18. Install the hairpin cotter (Fig. 0257).



Fig 0257

Belt 001

19. Install the tandem pump and coupler assembly. Refer to "Hydraulic Tandem Pump Installation" on page 6-37.

Starter Replacement

Starter Removal

1. Park the machine on a flat surface.
2. Raise the hood.
3. Raise the loader arm. Lock the loader arm into position using the loader arm lock.
4. Turn the machine off and remove the key. Allow the machine to cool.
5. Remove the rear access panel (Fig. 0258).



Fig 0258

PICT-4505a

ENGINE

6. Using a 1/2" wrench, disconnect the negative battery cable from the battery (Fig. 0259).



Fig 0259

PICT-5158

8. Using a 12mm socket, remove the nut retaining the positive battery cable to the starter (Fig. 0261).



Fig 0261

PICT-5190

7. Remove the left hand side panel (Fig. 0260).



Fig 0260

PICT-4945

9. Remove the washer from the starter terminal (Fig. 0262).



Fig 0262

PICT-5191

10. Remove the positive battery cable from the starter terminal (Fig. 0263).

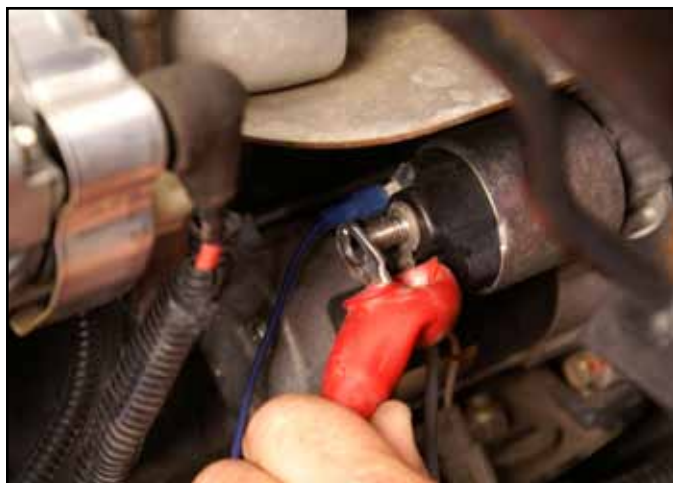


Fig 0263

PICT-5192

12. Remove the blue spade terminal from the starter (Fig. 0265).



Fig 0265

PICT-5194

11. Remove the grey fusible link wire from the starter terminal (Fig. 0264).

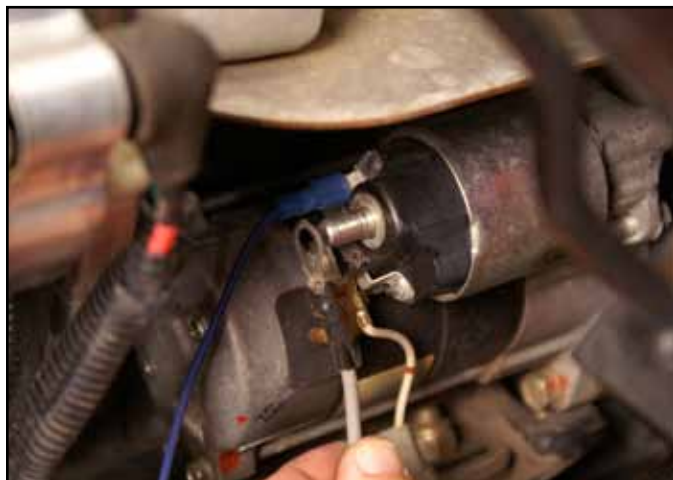


Fig 0264

PICT-5193

13. Unplug the wire harness from the starter (Fig. 0266).



Fig 0266

PICT-5196

ENGINE

14. Remove the 2 starter mounting bolts and lock-washers securing the starter to the engine block (Fig. 0267).



Fig 0267

PICT-5198

16. To service the starter refer to "Starter Assembly Teardown" on page 4-171 (Fig. 0269).



Fig 0269

PICT-5203a

15. Remove the starter assembly (Fig. 0268).



Fig 0268

PICT-5202

Starter Installation

1. Position the starter assembly to the engine block (Fig. 0270).



Fig 0270

PICT-5202

2. Install the 2 starter mounting bolts and lockwashers securing the starter to the engine block. Torque the bolts to 17.4 to 20.3 ft-lbs. (23.5 to 27.5 Nm) (Fig. 0271).



Fig 0271

PICT-5198

3. Plug the wire harness into the starter wire plug (Fig. 0272).



Fig 0272

PICT-5196

4. Plug the blue harness spade terminal onto the starter (Fig. 0273).

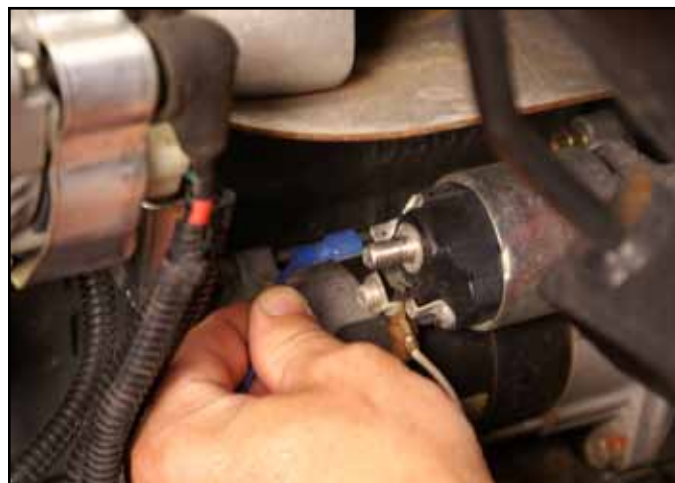


Fig 0273

PICT-5194

5. Slide the grey fusible link wire terminal onto the starter terminal (Fig. 0274).

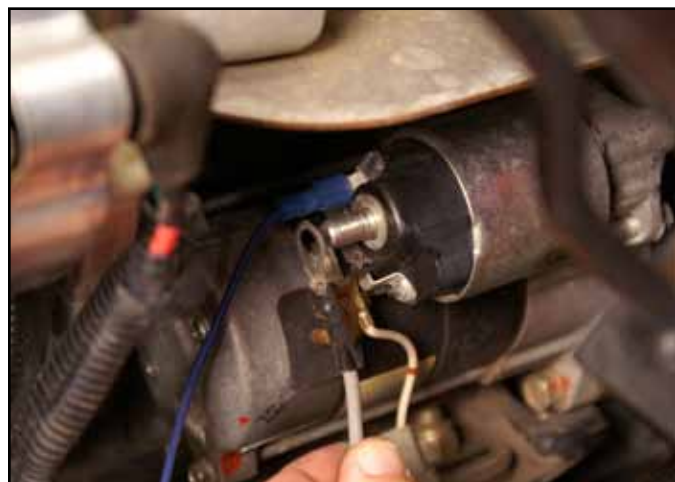


Fig 0274

PICT-5193

ENGINE

- Slide the positive battery cable onto the starter terminal (Fig. 0275).



Fig 0275

PICT-5192

- Using a 12mm socket, install a nut retaining the positive battery cable, grey wire and washer to the starter (Fig. 0277).



Fig 0277

PICT-5190

- Slide a washer onto the starter terminal (Fig. 0276).



Fig 0276

PICT-5191

- Install the left hand side panel (Fig. 0278).



Fig 0278

PICT-4945

10. Using a 1/2" wrench, connect the negative battery cable to the battery (Fig. 0279).



Fig 0279

PICT-5158

11. Install the rear access panel (Fig. 0280).



Fig 0280

PICT-4505a

12. Remove the loader arm lock and lower the loader arms.
13. Lower the hood.

Starter Solenoid Replacement

Starter Solenoid Removal

1. Park the machine on a flat surface.
2. Raise the hood.
3. Raise the loader arm. Lock the loader arm into position using the loader arm lock.
4. Turn the machine off and remove the key. Allow the machine to cool.
5. Remove the rear access panel (Fig. 0281).



Fig 0281

PICT-4505a

ENGINE

6. Using a 1/2" wrench, disconnect the negative battery cable from the battery (Fig. 0282).



Fig 0282

PICT-5158

8. Using a 12mm socket, remove the nut retaining the positive battery cable to the starter (Fig. 0284).



Fig 0284

PICT-5190

7. Remove the left hand side panel (Fig. 0283).



Fig 0283

PICT-4945

9. Remove the washer from the starter terminal (Fig. 0285).



Fig 0285

PICT-5191

10. Remove the positive battery cable from the starter terminal (Fig. 0286).

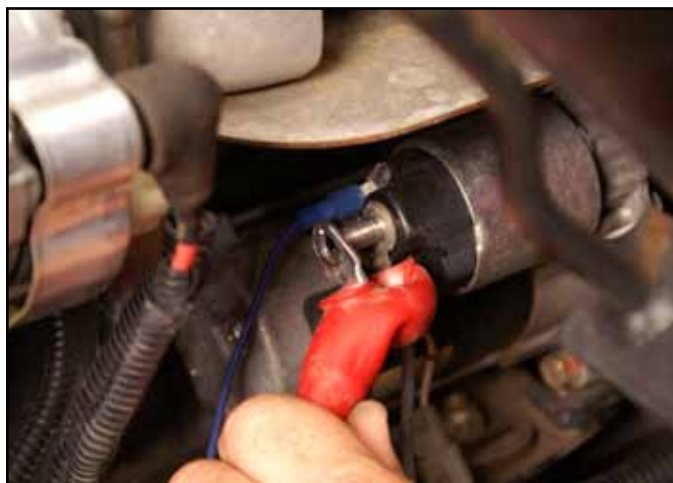


Fig 0286

PICT-5192

12. Remove the blue spade terminal from the starter (Fig. 0288).



Fig 0288

PICT-5194

11. Remove the grey fusible link wire from the starter terminal (Fig. 0287).

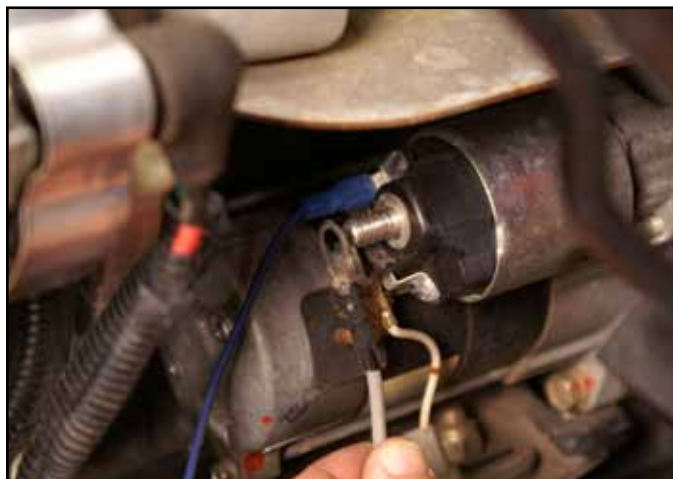


Fig 0287

PICT-5193

13. Unplug the wire harness from the starter plug (Fig. 0289).



Fig 0289

PICT-5196

ENGINE

14. Remove the 2 starter mounting bolts and lock-washers securing the starter to the engine block (Fig. 0290).



Fig 0290

PICT-5198

16. Remove the nut securing the white connector lead and grounding wire to the starter solenoid (Fig. 0292).



Fig 0292

PICT-5214a

15. Remove the starter assembly (Fig. 0291).



Fig 0291

PICT-5202

17. Remove the white connector lead (Fig. 0293).



Fig 0293

PICT-5215a

18. Remove the grounding wire (Fig. 0294).



Fig 0294

PICT-5216a

20. Remove the starter solenoid assembly (Fig. 0296).



Fig 0296

PICT-5218a

19. Using a 10mm socket, remove the 2 flange nuts securing the solenoid to the starter assembly (Fig. 0295).



Fig 0295

PICT-5217a

Starter Solenoid Installation

1. Position the starter solenoid assembly to the starter assembly. Ensure the joint of the solenoid switch is engaged into the drive lever (Fig. 0297).

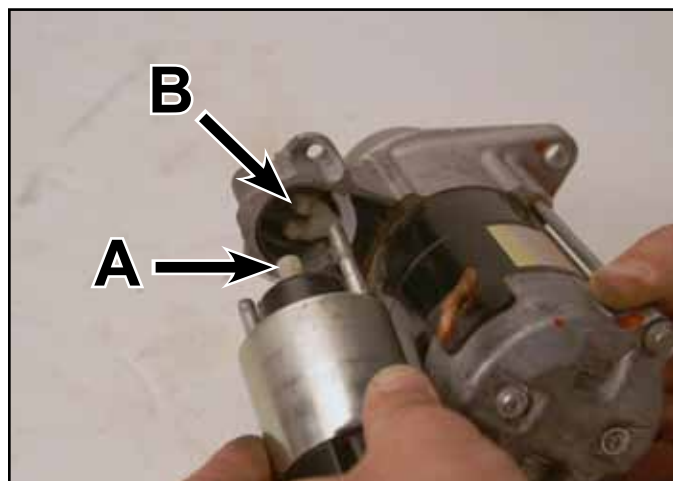


Fig 0297

PICT-5221a

A. Solenoid switch joint B. Drive lever

ENGINE

2. Using a 10mm socket, install 2 flange nuts securing the solenoid to the starter assembly (Fig. 0298).



Fig 0298

PICT-5217a

4. Slide the white connector lead onto the solenoid terminal (Fig. 0300).



Fig 0300

PICT-5215a

3. Slide the grounding wire onto the starter solenoid terminal (Fig. 0299).



Fig 0299

PICT-5216a

5. Using a 10mm socket, install the nut securing the white connector lead and grounding wire to the starter solenoid (Fig. 0301).



Fig 0301

PICT-5214a

6. Position the starter assembly to the engine block (Fig. 0302).



Fig 0302

PICT-5202

8. Plug the wire harness into the starter wire (Fig. 0304).



Fig 0304

PICT-5196

7. Install the 2 starter mounting bolts and lockwashers securing the starter to the engine block. Torque the bolts to 17.4 to 20.3 ft-lbs. (23.5 to 27.5 Nm) (Fig. 0303).

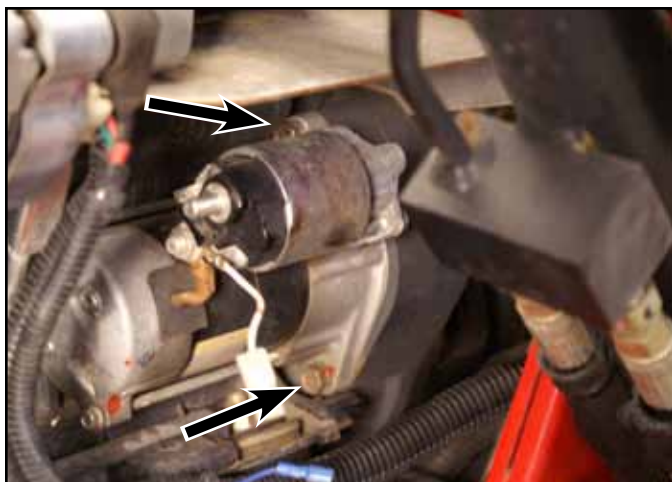


Fig 0303

PICT-5198

9. Plug the blue harness terminal onto the starter (Fig. 0305).



Fig 0305

PICT-5194

ENGINE

10. Slide the grey fusible link wire terminal onto the starter terminal (Fig. 0306).



Fig 0306

PICT-5193

12. Slide a washer onto the starter terminal (Fig. 0308).



Fig 0308

PICT-5191

11. Slide the positive battery cable onto the starter terminal (Fig. 0307).



Fig 0307

PICT-5192

13. Using a 12mm socket, install a nut retaining the positive battery cable, grey fusible link wire and washer to the starter terminal (Fig. 0309).



Fig 0309

PICT-5190

14. Install the left hand side panel (Fig. 0310).



Fig 0310

PICT-4945

16. Install the rear access panel (Fig. 0312).



Fig 0312

PICT-4505a

15. Using a 1/2" wrench, connect the negative battery cable to the battery (Fig. 0311).



Fig 0311

PICT-5158

17. Remove the loader arm lock and lower the loader arms.

18. Lower the hood.

ENGINE

Engine Removal

Note: Cleanliness is a key factor for any service work involving 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.

Upon removal, all seals, o-rings, and gaskets should be replaced. During installation, lightly lubricate all seals, o-rings, and gaskets with clean petroleum jelly prior to assembly.

Protect the inner diameter of seals and o-rings from damage during assembly by covering the shaft machined features with plastic wrap or equivalent.

1. Park the machine so that the tracks are resting on 2x4 wood blocks.
2. Apply the parking brake.
3. Raise the hood.
4. Raise the loader arm. Lock the loader arm into position using the loader arm lock.
5. Turn the machine off, remove the key and allow it to cool.

6. Remove the left and right hand side panels (Fig. 0313).



Fig 0313

PICT-4945

7. Remove the rear access panel (Fig. 0314).



Fig 0314

PICT-4505a

8. Using a 3/8" socket, remove the 6 screws that secure the left and right rear cover support panels to the tower assembly (3 screws per panel). Remove the panels (Fig. 0315).

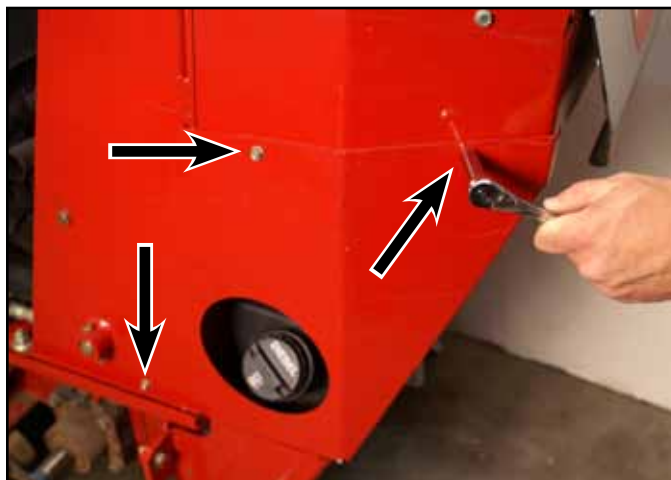


Fig 0315

PICT-4454

9. Using 3/4" and 1/2" sockets, remove the 7 bolts and nuts securing the rear frame cover to the frame and fuel tank bracket. Remove the rear frame cover (Fig. 0316).

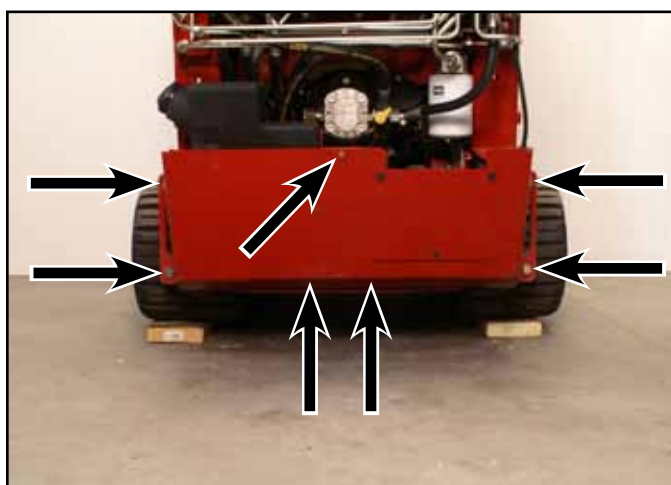


Fig 0316

PICT-5381

10. Remove the fuel tank bracket (Fig. 0317).



Fig 0317

PICT-5625

11. Disconnect the two wires (black and orange) from the fuel sending unit located on the top of the fuel tank (Fig. 0318).



Fig 0318

PICT-4262a

ENGINE

12. Mark the suction fuel line and tank fitting with an "S" and the return fuel line and tank fitting with an "R" (Fig. 0319):

S - Fuel suction line
R - Fuel return line



Fig 0319

PICT-4263

13. Slide the 2 fuel hose clamps down the fuel line away from the fuel tank fittings (Fig. 0320).



Fig 0320

PICT-4264

14. Slide the 2 fuel lines off the fuel tank fittings. Remove the fuel tank (Fig. 0321).



Fig 0321

PICT-4265

15. Remove the bolt, washer and nut securing the battery clamp to the frame. Remove the battery clamp (Fig. 0322).



Fig 0322

PICT-4310a

16. Slide the battery partially out of the battery mount. Disconnect the negative battery cable from the battery. Slide the battery out of the battery mount farther to access the positive battery cable terminal. Disconnect the positive battery cable and remove the battery and battery guard from the battery mount (Fig. 0323).



Fig 0323

PICT-5382

17. Using a 1/4" hex wrench, remove the engine oil drain plug located on the underside of the frame inside the right hand wheel and track assembly. Drain the engine oil into a drain pan (Fig. 0324).



Fig 0324

PICT-3283

18. Mark the tandem pump lines and fittings as follows:
A. Pump pressure line to loader valve (Fig. 0325)



Fig 0325

PICT-4765

- B. Pump pressure line to auxiliary valve (Fig. 0326)



Fig 0326

PICT-4766a

ENGINE

- C. Suction line from the tank (smaller fitting) (Fig. 0327).
- D. Suction line from the tank (larger fitting) (Fig. 0327).



Fig 0327

PICT-4767

- 21. Using a 1-1/8" wrench, remove the hydraulic line from the pump fitting labeled B (Fig. 0329).



Fig 0329

PICT-4770a

- 19. Place a drain pan under the hydraulic tandem pump.
- 20. Using a 15/16" wrench, remove the hydraulic line from the test port t-fitting (Fig. 0328).



Fig 0328

PICT-4768b

- 22. Loosen the hose clamps securing the suction lines to the pump fittings marked C and D (Fig. 0330).



Fig 0330

PICT-4773a

23. Slide the hoses off the suction fittings (Fig. 0331).



Fig 0331

PICT-4775a

26. Remove the 4 bolts securing the grill assembly to the frame (Fig. 0333).



Fig 0333

PICT-4953

24. Cap all the hydraulic lines and fittings so that debris does not enter the system.

25. Remove the breather from the hydraulic oil breather hose (Fig. 0332).



Fig 0332

PICT-4946a

27. Slide the grill assembly forward (Fig. 0334).



Fig 0334

PICT-4955

ENGINE

28. Remove the 2 bolts and nuts securing the overflow tank bracket to the grill assembly (Fig. 0335).



Fig 0335

PICT-4959

30. Inspect the foam seals on the inside of the grill assembly. Replace if worn or damaged (Fig. 0337).

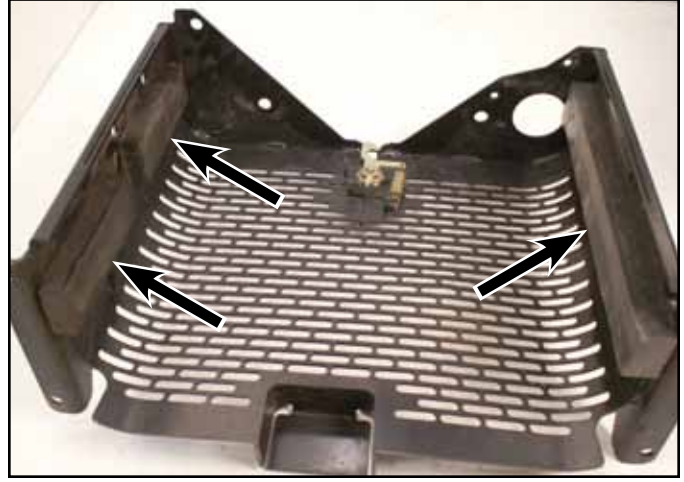


Fig 0337

PICT-5138a

29. Remove the grill assembly taking care not to damage the hydraulic tank breather hose (Fig. 0336).



Fig 0336

PICT-4961

31. Place an absorbent towel under the oil cooler inlet line fitting located on the lower left hand corner of the oil cooler.

32. Using 1-1/16" and 1-1/8" wrenches, remove the hydraulic oil inlet line from the oil cooler inlet fitting (Fig. 0338).



Fig 0338

PICT-4965

33. Cap the hydraulic line and fitting so debris does not enter the system.
34. Place an absorbent towel under the oil cooler outlet line fitting located on the upper right hand corner of the oil cooler.
35. Using 1-1/16" and 1-1/8" wrenches, remove the hydraulic oil outlet line from the oil cooler outlet fitting (Fig. 0339).



Fig 0339

PICT-4968a

36. Cap the hydraulic line and fitting so debris does not enter the system.
37. Using a 1/2" socket, remove the 3 bolts securing the front radiator mount to the frame (Fig. 0340).

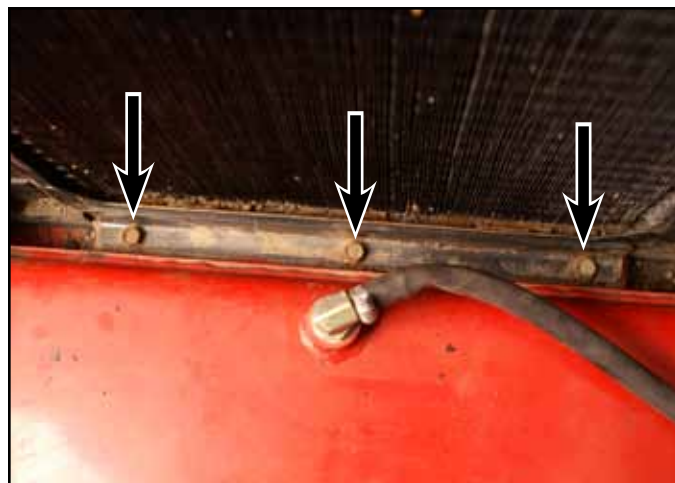


Fig 0340

PICT-4969

38. Remove the front radiator mount (Fig. 0341).



Fig 0341

PICT-4971

ENGINE

39. Tilt the radiator/oil cooler assembly forward and lift it out of the frame so that the drain petcock is above the frame (Fig. 0342).



Fig 0342

PICT-4973

40. Slide a length of 5/16" hose onto the drain petcock. Place the other end of the hose into a drain pan. Open the petcock and remove the radiator cap to drain the coolant (Fig. 0343).



Fig 0343

PICT-4974

41. Remove the drain hose and close the petcock. Set the radiator back in place in the frame.
42. Using a 3/8" socket, loosen the hose clamps securing the radiator hoses to the radiator fill tube and thermostat housing (Fig. 0344).

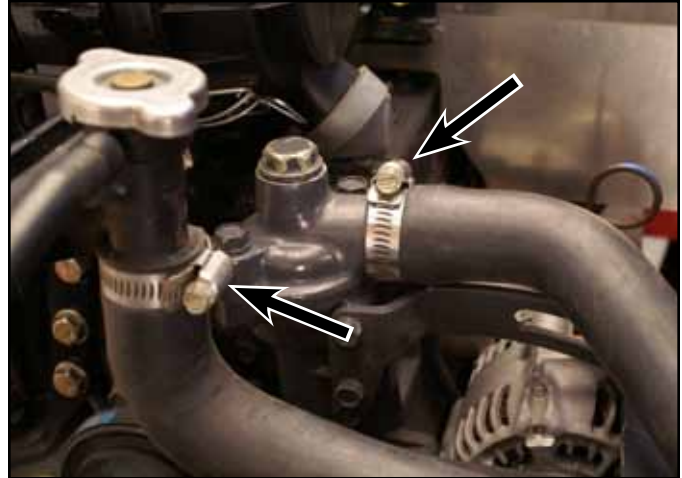


Fig 0344

PICT-5395

43. Slide the 2 radiator hoses off the radiator fill tube and the thermostat housing (Fig. 0345).



Fig 0345

PICT-5397

44. Using a 3/8" socket, loosen the hose clamp securing the radiator hose to the engine block (Fig. 0346).



Fig 0346

PICT-5399

46. Carefully remove the radiator and oil cooler assembly (Fig. 0348).



Fig 0348

PICT-5402

45. Slide the radiator hose off the engine block inlet (Fig. 0347).



Fig 0347

PICT-5400

47. Cap the radiator hoses and flanges so that debris does not enter the system.

48. Using a 3/8" socket, loosen the hose clamp securing the air intake hose to the engine intake (Fig. 0349).



Fig 0349

PICT-5405

ENGINE

49. Slide the intake hose off the engine intake (Fig. 0350).



Fig 0350

PICT-5407

51. Using a 13mm socket, remove the 2 bolts and washers securing the air cleaner mounting bracket to the engine block (Fig. 0352).

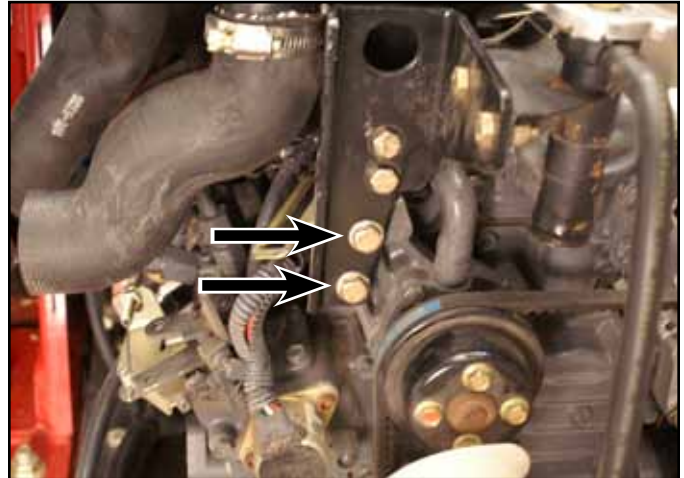


Fig 0352

PICT-5412

50. Using a 1/2" socket, remove the 2 bolts securing the air cleaner assembly to the muffler shield (Fig. 0351).

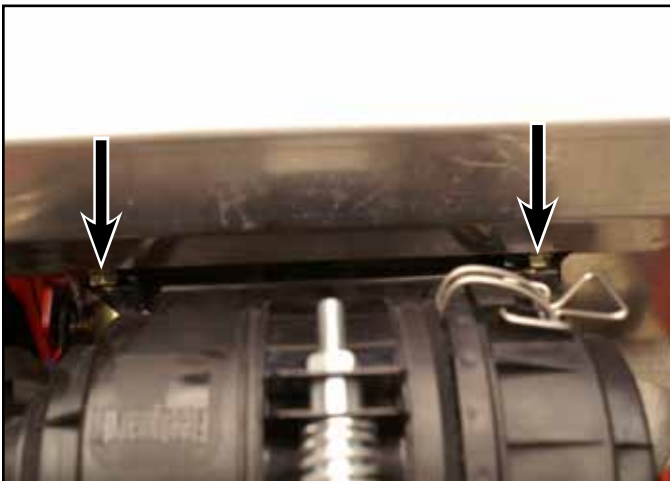


Fig 0351

PICT-5408

52. Remove the air cleaner and coolant overflow bottle assembly (Fig. 0353).



Fig 0353

PICT-5413

53. Using two 1/2" wrenches, remove the bolt, 2 washers and nut securing the muffler assembly to the engine bracket (Fig. 0354).



Fig 0354

PICT-5245

54. Using a 13mm socket, remove the 4 bolts and washers securing the muffler to the engine manifold (Fig. 0355).

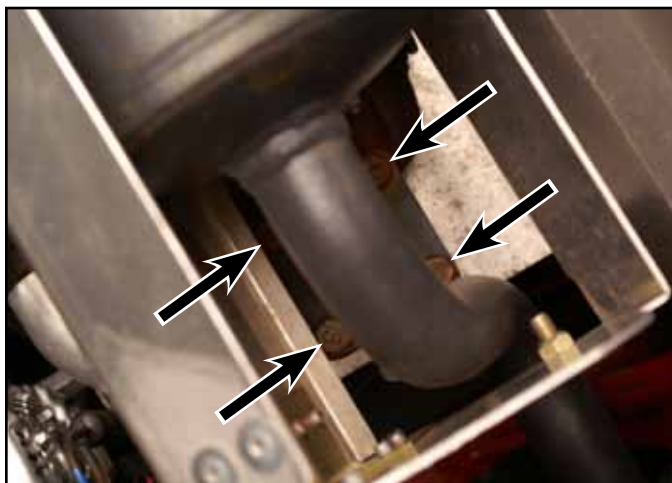


Fig 0355

PICT-5246

55. Remove the muffler assembly (Fig. 0356).



Fig 0356

PICT-5416

56. Remove the manifold gasket (Fig. 0357).



Fig 0357

PICT-5250

ENGINE

57. Remove the hairpin cotter from the hood rod (Fig. 0358).



Fig 0358

PICT-5417

58. Remove the hood rod (Fig. 0359).



Fig 0359

PICT-5418

59. Using a 3/16" Allen wrench, remove the top 2 screws. Using a 1/2" socket, remove the bottom 2 screws securing the heat shield to the tower (Fig. 0360).

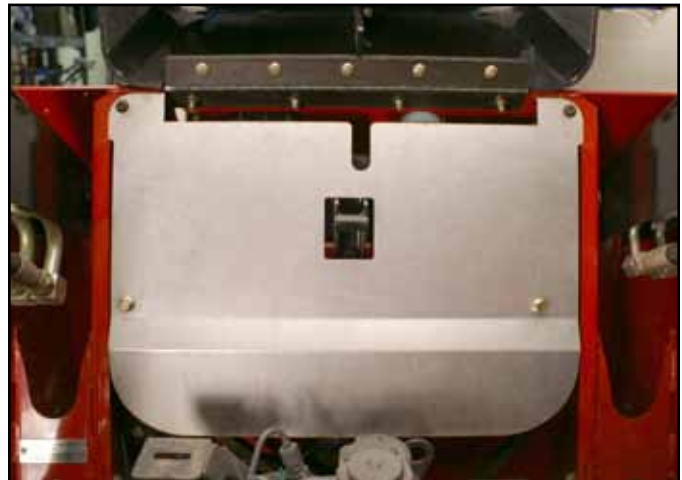


Fig 0360

PICT-5419a

60. Remove the heat shield (Fig. 0361).



Fig 0361

PICT-5421

61. Using a spring tool (Toro p/n 92-5771), unhook the idler spring from the spring post on the tower (Fig. 0362).



Fig 0362

PICT-5422

62. Remove the drive belt from around the pulleys (Fig. 0363).



Fig 0363

PICT-5423

63. Disconnect the harness terminal from the water temperature sensor (Fig. 0364).



Fig 0364

PICT-5429

64. Using a Phillips screw driver, disconnect the harness terminal from the engine oil pressure sensor (Fig. 0365).



Fig 0365

PICT-5432

ENGINE

65. Slide the boot off the alternator connection. Using a 10mm socket, remove the nut and washer securing the harness terminal to the alternator (Fig. 0366).



Fig 0366

PICT-5436

67. Disconnect the harness connector from the alternator (Fig. 0368).



Fig 0368

PICT-5439

66. Remove the harness terminal from the alternator (Fig. 0367).



Fig 0367

PICT-5437a

68. Unplug the harness connector from the .08mm (blue) fusible link wire (Fig. 0369).



Fig 0369

PICT-5444

69. Slide the red boot off the starter terminal. Using a 12mm socket, remove the nut from the starter terminal (Fig. 0370).



Fig 0370

PICT-5446

71. Remove the 2.0mm (grey) fusible link terminal from the starter terminal (Fig. 0372).



Fig 0372

PICT-5448

70. Remove the positive battery cable from the starter terminal (Fig. 0371).



Fig 0371

PICT-5447

72. Remove the blue spade connector from the starter terminal (Fig. 0373).



Fig 0373

PICT-5449

ENGINE

73. Using a 7mm socket, remove the nut securing the harness terminal to the glow plug (Fig. 0374).

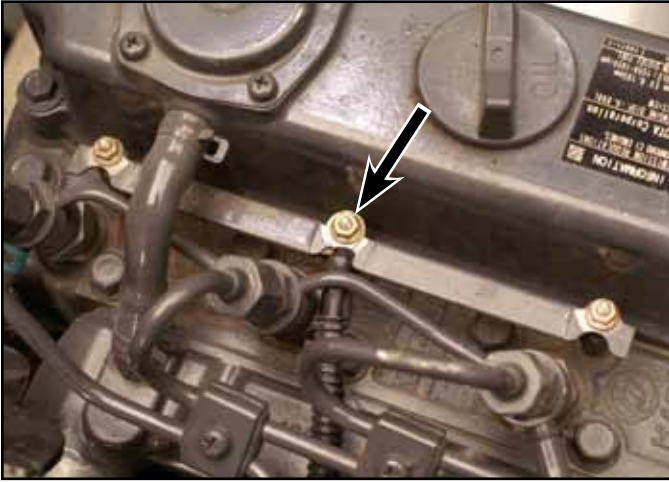


Fig 0374

PICT-5456

75. Unplug the harness connector from the engine shut-down solenoid (Fig. 0376).



Fig 0376

PICT-5459

74. Remove the harness terminal from the glow plug terminal (Fig. 0375).



Fig 0375

PICT-5457

76. Using a 13mm socket, remove the bolt securing the star washer, negative battery cable and harness terminal to the fuel injection pump (Fig. 0377).



Fig 0377

PICT-5460

77. Loosen the swivel clamp securing the throttle cable to the throttle control bracket (Fig. 0378).



Fig 0378

PICT-5465

79. Using a 10mm socket, remove the 2 bolts securing the throttle bracket to the engine (Fig. 0380).

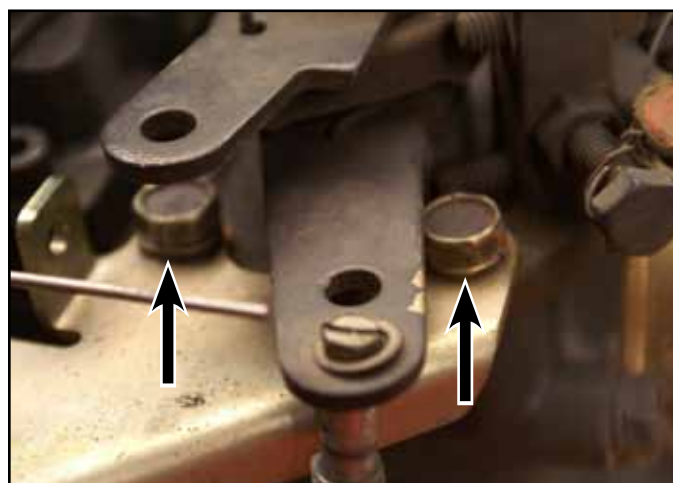


Fig 0380

PICT-5467

78. Move the throttle control to approximately 3/4 throttle until the throttle cable slides out of the swivel clamp (Fig. 0379).



Fig 0379

PICT-5466

80. Move the throttle bracket assembly away from the engine (Fig. 0381).



Fig 0381

PICT-5468

ENGINE

81. Slide the hose clamp back from the fuel line where it connects to the fuel injection pump. Slide the fuel line off (Fig. 0382).



Fig 0382

PICT-5470

83. Using a 1/2" socket, remove the top bolt and nut and the nut from the bottom bolt that secures the fuel pump bracket to the tower frame (Fig. 0384).

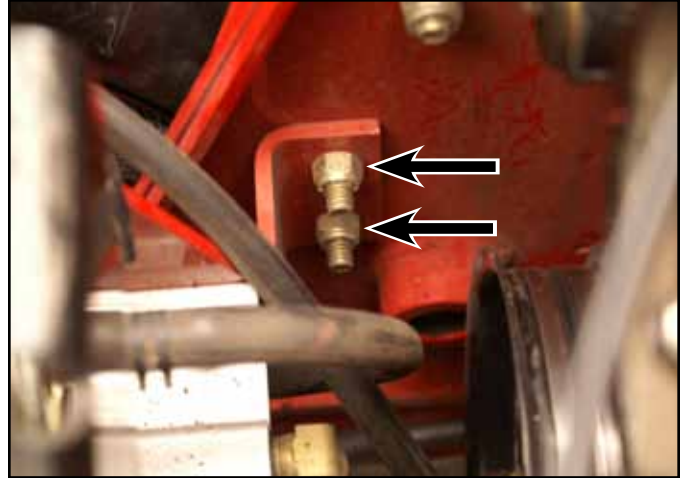


Fig 0384

PICT-5473

82. Slide the hose clamp back from the fuel line where it connects to the fuel injector. Slide the fuel line off (Fig. 0383).



Fig 0383

PICT-5472

84. Move the fuel pump assembly away from the engine.

Note: 280000501 and higher TX525 serialized products incorporate a partially revised fuel delivery system.

270000001 - 280000500 (Fig. 0385):



Fig 0385

PICT-5476

85. Loosen the hose clamp securing the oil drain hose to the engine. Disconnect the oil drain hose from the engine oil drain flange (Fig. 0386).



Fig 0386

PICT-5478

Note: Both the left hand and right hand cable guide appearance and position slightly changed from 2007 models to 2008 and newer models (Fig. 0388 and Fig. 0389):
2007 cable guides:

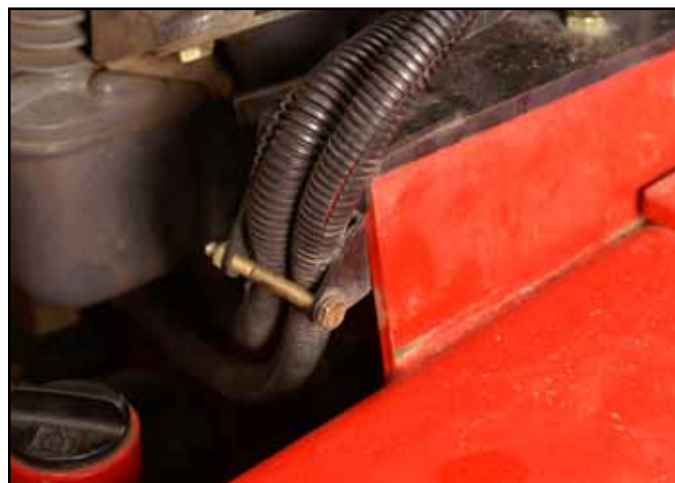


Fig 0388

PICT-5427

86. Using a 9/16" socket and wrench, remove the bolt and nut securing the right hand side of the engine assembly mount and cable guide to the mainframe (Fig. 0387).



Fig 0387

PICT-5479

2008 and newer cable guide:



Fig 0389

PICT-5425

ENGINE

87. Position the cable guide and the routed harness cables away from the engine assembly (Fig. 0390).



Fig 0390

PICT-5480

89. Using a 9/16" socket and wrench, remove the bolt and nut securing the left hand side of the engine assembly mount and cable guide to the mainframe (Fig. 0392).



Fig 0392

PICT-5482

88. Using a 9/16" socket and wrench, remove the remaining 2 bolts and nuts securing the right hand side of the engine assembly mount to the mainframe (Fig. 0391).



Fig 0391

PICT-5481

90. Position the cable guide and the routed harness cables away from the engine assembly (Fig. 0393).



Fig 0393

PICT-5483

91. Using a 9/16" socket and wrench, remove the remaining 2 bolts and nuts securing the left hand side of the engine assembly to the mainframe (Fig. 0394).



Fig 0394

PICT-5484

93. Lift engine out of the frame.

94. Using a 9/16" socket and wrench, remove the 2 screws securing the engine mount plate to the left hand engine mount (Fig. 0396).

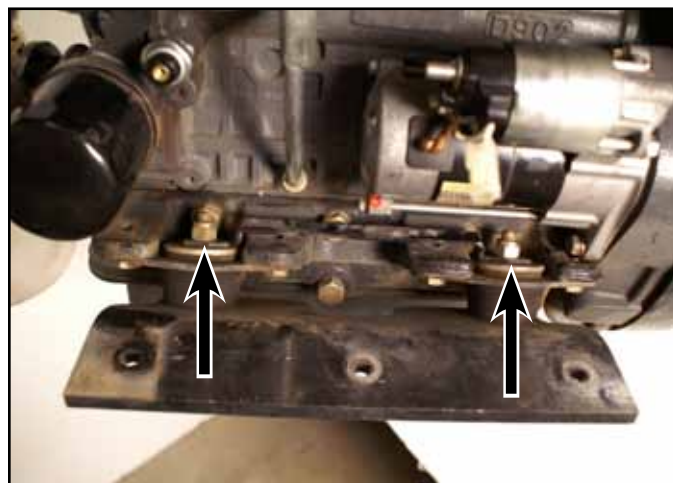


Fig 0396

PICT-5487

92. Position and center an engine hoist over the engine. Attach chain hooks into the engine lift brackets (Fig. 0395).



Fig 0395

PICT-5485

95. Remove the engine mount plate (Fig. 0397).



Fig 0397

PICT-5488

ENGINE

96. Remove the rebound strap (Fig. 0398).



Fig 0398

PICT-5490

98. Using a 1/2" socket, remove the 2 screws securing the forward ISO engine mount to the left hand engine mount (Fig. 0400).

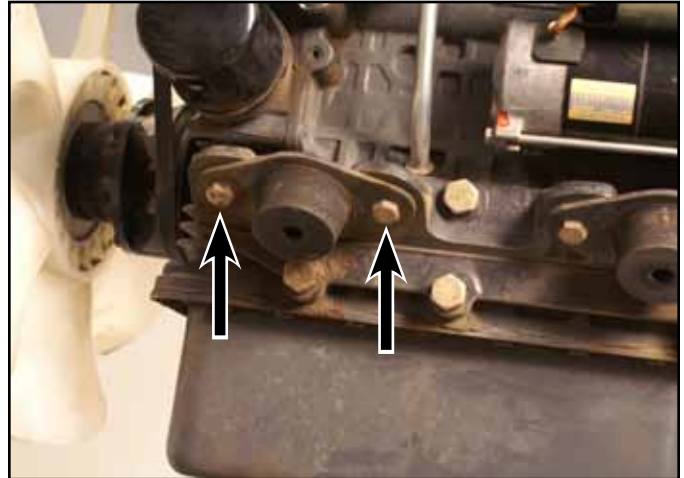


Fig 0400

PICT-5493

97. Remove the 2 rebound washers (Fig. 0399).



Fig 0399

PICT-5491

99. Remove the ISO engine mount (Fig. 0401).



Fig 0401

PICT-5494

100. Using a 17mm socket, remove the 5 screws securing the left hand engine mount to the engine (Fig. 0402).

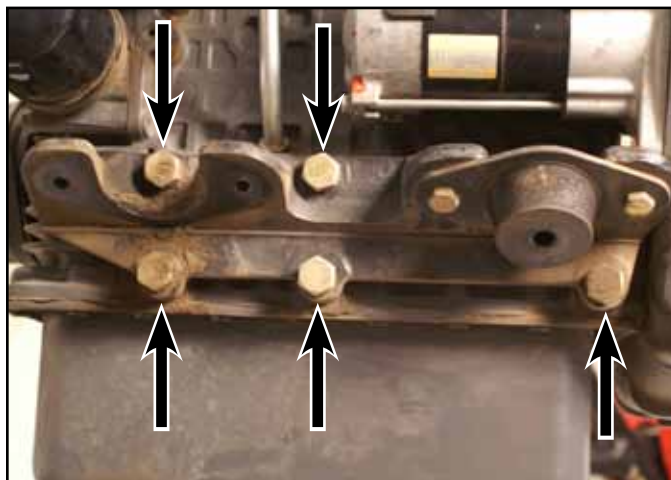


Fig 0402

PICT-5495

102. Transfer the engine from the engine hoist to an engine stand (Fig. 0404).



Fig 0404

PICT-5498

101. Remove the left hand engine mount from the engine (Fig. 0403).



Fig 0403

PICT-5497

Engine Component Removal

1. Using a 10mm socket, remove the screw securing the starter baffle plate to the exhaust manifold (Fig. 0405).



Fig 0405

PICT-5499

ENGINE

2. Using a 13mm socket, remove the 2 screws securing the starter baffle plate to the engine (Fig. 0406).



Fig 0406

PICT-5500a

4. Using a 12mm socket, remove the 2 bolts securing the starter assembly to the engine (Fig. 0408).

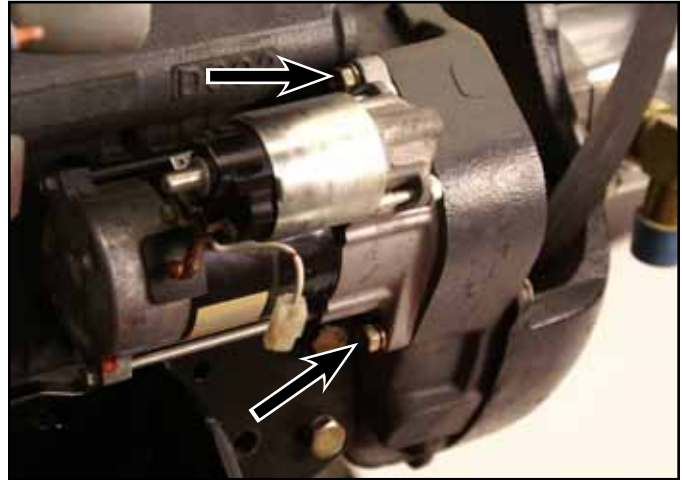


Fig 0408

PICT-5504

3. Remove the starter baffle plate (Fig. 0407).



Fig 0407

PICT-5501a

5. Remove the starter assembly from the engine (Fig. 0409).



Fig 0409

PICT-5506

6. Loosen the 2 alternator mounting bolts (Fig. 0410).

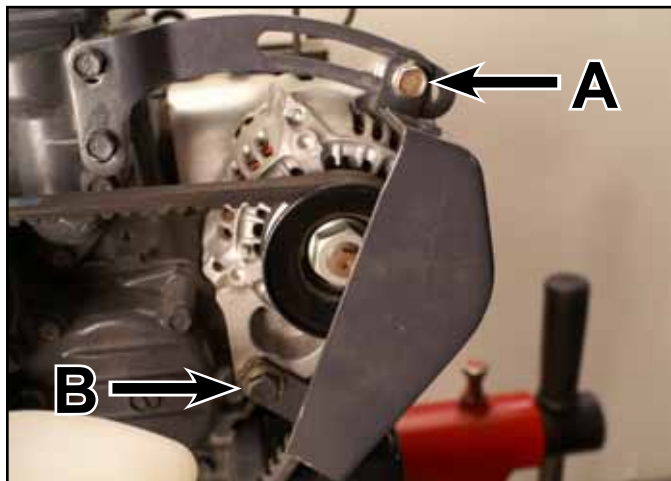


Fig 0410

PICT-5507

- A. 12mm socket (top bolt)
- B. 13mm socket (bottom bolt)

7. Pivot the alternator toward the engine to relieve belt tension.
8. Using a 13mm socket and a 9/16" wrench, secure the hex spacer and remove the bottom alternator mounting bolt, lockwasher and flat washer (Fig. 0411).



Fig 0411

PICT-5510

9. Remove the alternator belt (Fig. 0412).



Fig 0412

PICT-5514a

10. Remove the top mounting bolt, lockwasher, belt guard and alternator (Fig. 0413).



Fig 0413

PICT-5515a

ENGINE

11. Using a 12mm socket and a 9/16" wrench, remove the nut securing the hex spacer to the engine oil dipstick (Fig. 0414).



Fig 0414

PICT-5516

12. Remove the hex spacer (Fig. 0415).



Fig 0415

PICT-5518

13. Using an 11mm socket, remove the 4 bolts securing the fan to the fan mount spacer (Fig. 0416).



Fig 0416

PICT-5557a

14. Slide the fan off the fan mount spacer (Fig. 0417).



Fig 0417

PICT-5522a

15. Secure the fan mount spacer. Using a 1/4" Allen wrench, remove the 3 bolts securing the fan mount spacer to the engine coupler (Fig. 0418).



Fig 0418

PICT-5524

16. Remove the fan mount spacer (Fig. 0419).



Fig 0419

PICT-5525

17. Using a 1-1/8" wrench, remove the oil drain fitting from the oil pan (Fig. 0420 and Fig. 0421).

Note: There is a 90 degree angle oil drain fitting and a straight oil drain fitting.

- 90 degree oil drain fitting:



Fig 0420

PICT-5550a

- straight oil drain fitting:



Fig 0421

PICT-8773

ENGINE

18. Using a 10mm socket, remove the 2 bolts securing the engine shutdown solenoid bracket to the engine (Fig. 0422).



Fig 0422

PICT-5531

20. Remove the engine shutdown solenoid from the engine (Fig. 0424).



Fig 0424

PICT-5534

19. Using a 5mm Allen wrench, remove the 2 bolts and lockwashers securing the engine shutdown solenoid to the engine (Fig. 0423).



Fig 0423

PICT-5532

21. Using a 9/16" socket and wrench, remove the 2 bolts and nuts securing the engine mount plate to the right hand engine mount (Fig. 0425).

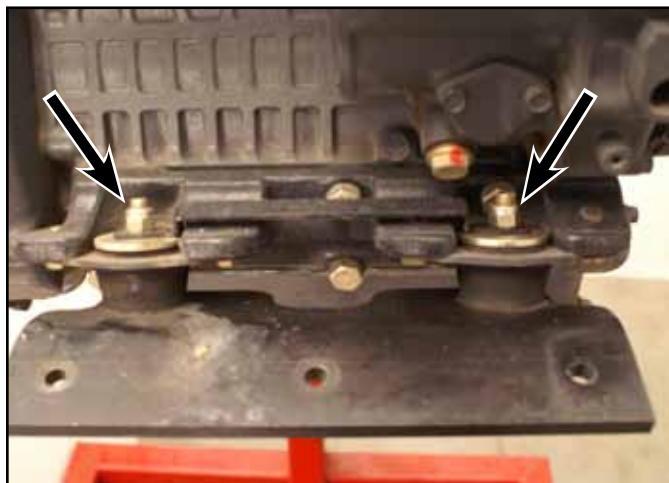


Fig 0425

PICT-5536

22. Remove the engine mount plate (Fig. 0426).



Fig 0426

PICT-5537

24. Remove the 2 rebound washers (Fig. 0428).



Fig 0428

PICT-5539

23. Remove the rebound strap (Fig. 0427).



Fig 0427

PICT-5538

25. Using a 1/2" socket, remove the 2 bolts securing the forward ISO engine mount to the right hand engine mount (Fig. 0429).

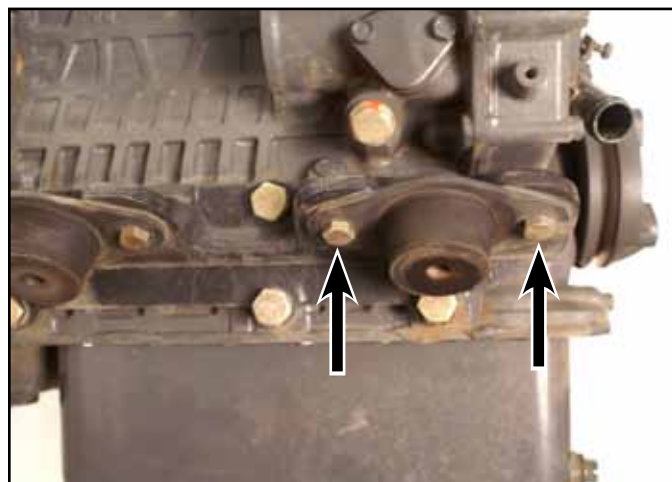


Fig 0429

PICT-5541

ENGINE

26. Remove the ISO engine mount (Fig. 0430).



Fig 0430

PICT-5542

28. Remove the right hand engine mount from the engine (Fig. 0432).



Fig 0432

PICT-5544

27. Using a 17mm socket, remove the 5 bolts securing the right hand engine mount to the engine (Fig. 0431).

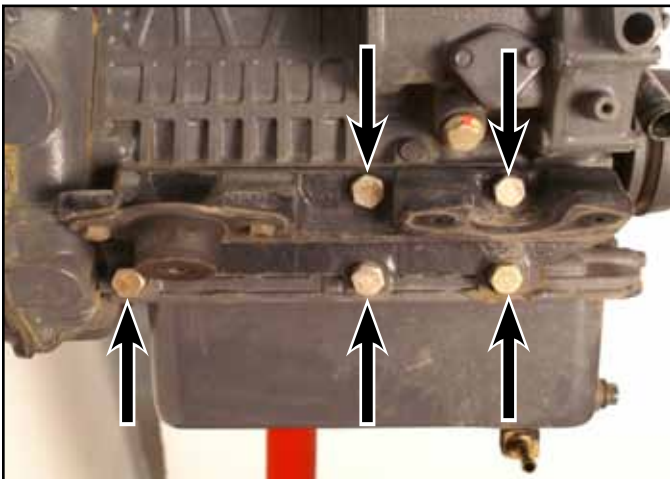


Fig 0431

PICT-5543

29. Using a 13mm socket, remove the 2 bolts and flat washers securing the muffler support to the engine block (Fig. 0433).



Fig 0433

PICT-5545

30. Remove the muffler mount (Fig. 0434).



Fig 0434

PICT-5546a

32. Remove the tandem pump/pump mount assembly and coupler from the engine (Fig. 0436).



Fig 0436

PICT-5531-2

31. Using a 13mm socket, remove the 4 bolts securing the tandem pump/pump mount assembly to the engine (Fig. 0435).

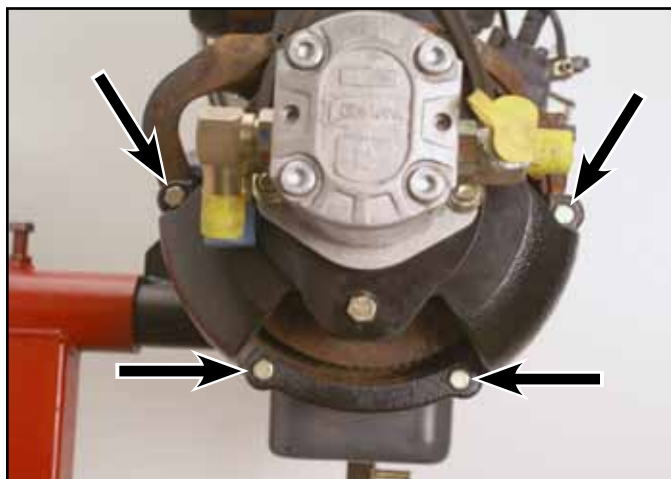


Fig 0435

PICT-5547a

33. Remove the drive belt from the engine (Fig. 0437).



Fig 0437

PICT-5533-2

ENGINE

34. Using a 6mm Allen head socket, remove the 5 bolts securing the engine pulley to the engine (Fig. 0438).

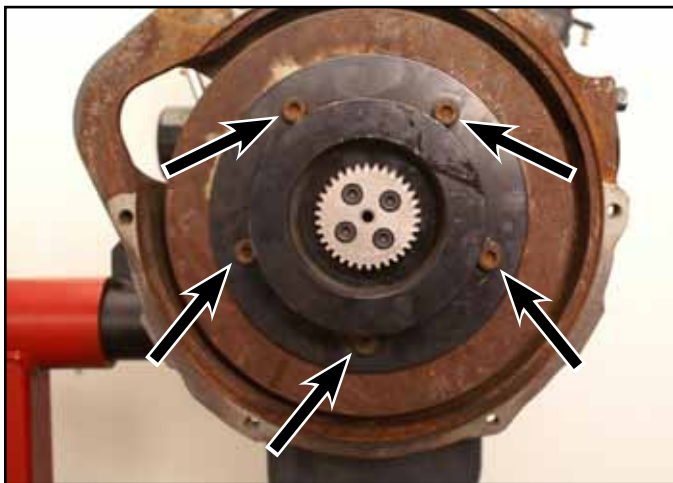


Fig 0438

PICT-5534-2

35. Remove the engine pulley from the engine (Fig. 0439).



Fig 0439

PICT-5537-2

36. To service the engine, refer to the Kubota D722/ D902 Tier 2 Diesel Engine Service Manual (Toro Form No. 492-4796).

Engine Installation

Engine Component Installation

1. Position the engine pulley to the engine (Fig. 0440).



Fig 0440

PICT-5537-2

2. Using a 6mm Allen head socket, install 6 bolts securing the engine pulley to the engine flywheel (Fig. 0441).



Fig 0441

PICT-5534-2

3. Torque the 6 bolts to 19 + 2 ft-lbs. (00 + 00 Nm) (Fig. 0442).



Fig 0442

IMG_8085

5. Position the tandem pump/pump mount assembly and coupler to the engine so that the coupler slides onto the engine gear (Fig. 0444).



Fig 0444

IMG_8087

4. Route the drive belt around the engine pulley (Fig. 0443).



Fig 0443

IMG_8086

6. Using a 13mm socket, install 4 bolts securing the tandem pump/pump mount assembly to the engine (Fig. 0445).

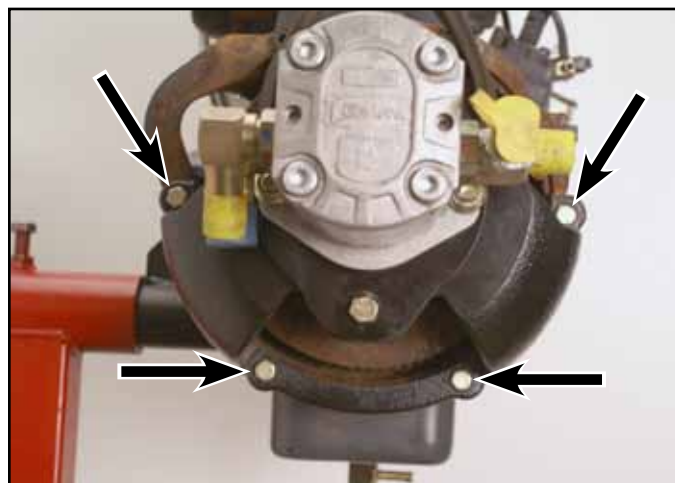


Fig 0445

PICT-5547a

ENGINE

7. Position the muffler mount to the engine (Fig. 0446).



Fig 0446

PICT-5546a

9. Position the right hand engine mount to the engine (Fig. 0448).



Fig 0448

PICT-5544

8. Using a 13mm socket, loosely install 2 new bolts and flat washers to attach the muffler mount to the engine block (Fig. 0447).



Fig 0447

IMG_8091

10. Using a 17mm socket, install 5 bolts securing the right hand engine mount to the engine (Fig. 0449).



Fig 0449

PICT-5543

11. Torque the 5 bolts to 38 ± 4 ft-lbs. (51.5 ± 5.4 Nm) (Fig. 0450).



Fig 0450

IMG_8090

13. Using a 1/2" socket, install 2 bolts securing the forward ISO engine mount to the right hand engine mount (Fig. 0452).



Fig 0452

IMG_8093

12. Position the ISO engine mount to the right hand engine mount (Fig. 0451).



Fig 0451

PICT-5542

14. Torque the 2 bolts to 220 ± 25 in-lbs. (24.8 ± 2.8 Nm) (Fig. 0453).



Fig 0453

IMG_8092

ENGINE

15. Position 2 rebound washers onto the ISO engine mounts (Fig. 0454).



Fig 0454

PICT-5539

17. Position the engine mount plate so that the bolts are inserted through the ISO mounts, rebound washers and rebound strap (Fig. 0456).



Fig 0456

PICT-5537

16. Position the rebound strap onto the rebound washers (Fig. 0455).



Fig 0455

IMG_8094

18. Using a 9/16" socket and wrench, install 2 nuts securing the engine mount plate to the right hand engine mount (Fig. 0457).

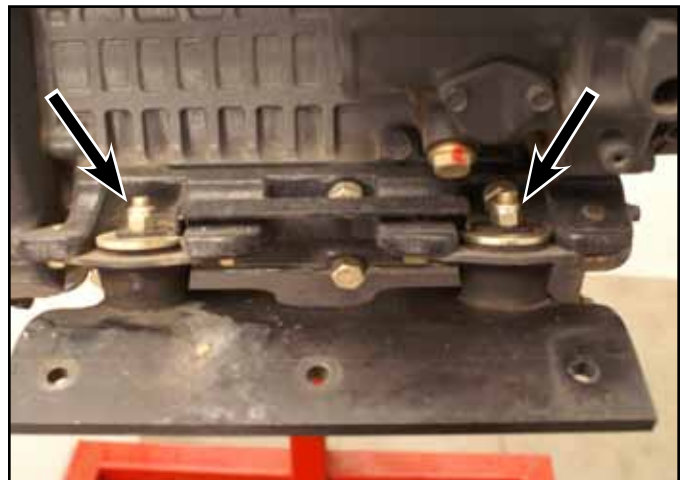


Fig 0457

PICT-5536

19. Torque the 2 bolts to 30 + 3 ft-lbs. (40.6 + 5.4 Nm) (Fig. 0458).



Fig 0458

IMG_8095

- Note:** Install the solenoid rod into the guide hole of the cylinder block (Fig. 0460).



Fig 0460

IMG_8097a

20. With the sealing o-ring in place, insert the engine shutdown solenoid into the engine (Fig. 0459).



Fig 0459

PICT-5534

21. Using a 5mm Allen wrench, install 2 bolts and lock washers securing the engine shutdown solenoid to the engine (Fig. 0461).



Fig 0461

PICT-5532

ENGINE

22. Route the solenoid wire and position the engine shutdown solenoid bracket onto the engine block (Fig. 0462).



Fig 0462

IMG_8098

24. Oil drain fitting: There are 2 oil drain fittings.

25. TX525 (22319 and 22320 #270000001 through 270999999) has a 90 degree fitting (Fig. 0464):



Fig 0464

PICT-5550

23. Using a 10mm socket, install 2 bolts securing the engine shutdown solenoid bracket to the engine (Fig. 0463).

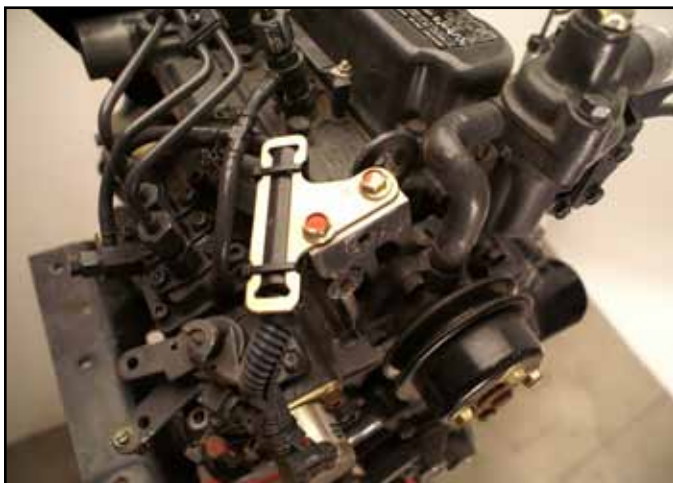


Fig 0463

PICT-5531

26. TX525 (22319 and 22320 #280000001 and higher) has a straight fitting (Fig. 0465):



Fig 0465

PICT-8773a

27. 90 degree oil drain fitting only: Use a new rubber sealing washer. Thread the locking nut up against the sealing washers as shown (Fig. 0466).



Fig 0466

PICT-5554a

29. Straight oil drain fitting only: Use a new rubber sealing washer. Using a 1-1/8" wrench, install the oil drain fitting into the oil pan and tighten (Fig. 0468).



Fig 0468

PICT-8723a

28. 90 degree oil drain fitting only: Thread the oil drain fitting into the oil pan until the washers rest against the oil pan. Position the oil drain fitting as shown. Using a 1" wrench to hold the oil drain fitting, use a 1-1/8" wrench to tighten the jam nut up against the washers (Fig. 0467).



Fig 0467

PICT-5555a

30. Apply thread locking compound to the 3 fan mount spacer bolts (Fig. 0469).



Fig 0469

PICT-5540a

ENGINE

31. Position the fan mount spacer (Fig. 0470).



Fig 0470

PICT-5525

33. Using a 1/4" Allen wrench, torque the 3 bolts to 19 ± 2 ft-lbs. (25.7 ± 2.7 Nm) (Fig. 0472).



Fig 0472

PICT-5556

32. Install 3 bolts securing the fan mount spacer to the engine coupler (Fig. 0471).



Fig 0471

PICT-5523

34. Slide the fan onto the fan mount spacer (Fig. 0473).

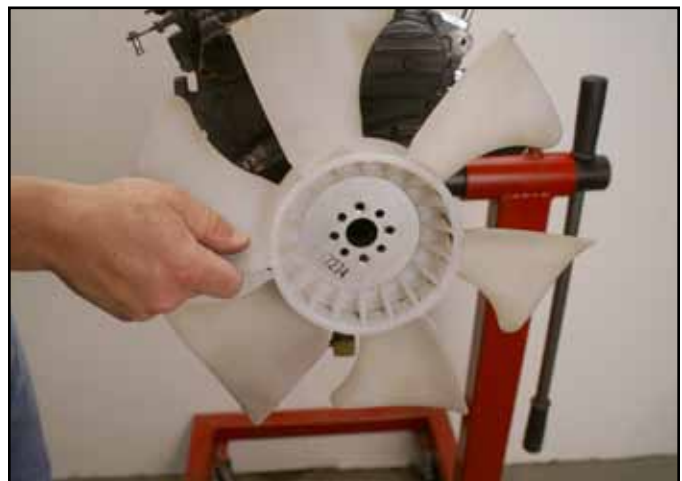


Fig 0473

PICT-5522a

35. Using an 7/16" socket, install 4 bolts securing the fan to the fan mount spacer (Fig. 0474).



Fig 0474

PICT-5521a

37. Position the hex spacer through the dipstick. Loosely install a nut onto the hex spacer (Fig. 0476).



Fig 0476

PICT-5518

36. Torque the 4 bolts to 100 ± 10 in-lbs. (11.3 ± 1.1 Nm) (Fig. 0475).



Fig 0475

PICT-5558a

38. Slide the alternator collar into the alternator mounting flange (Fig. 0477).



Fig 0477

PICT-5559

ENGINE

39. Position the alternator and belt guard to the alternator mounting bracket. Loosely install a mounting bolt and lockwasher securing the top of the belt guard and alternator (Fig. 0478).



Fig 0478

PICT-5561a

40. Route the alternator belt around the fan pulley, alternator pulley and the water pump. Position the belt guard to align the belt guard bolt hole with the bottom alternator mounting hole (Fig. 0479).

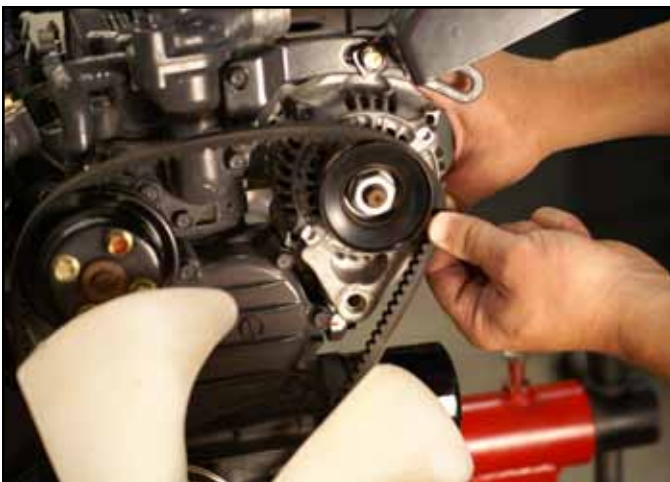


Fig 0479

PICT-5562

41. Using a 13mm socket and a 9/16" wrench, loosely install the bottom alternator mounting bolt, lockwasher and flat washer through the belt cover, gear case housing mounting flange, collar and into the hex spacer.

TX525 22319 #270000001 - 270000555
22320 #270000001 - 270000711
22333 #270000001 - 270000422
22334 #270000001 - 270000426

The engine gear case housing flange is threaded (Fig. 0480).



Fig 0480

PICT-5564

TX525 22319 #270000556 - 270000720
22320 #270000712 - 270000885
22333 #270000423 - 270000446
22334 #270000427 - 270000436

The engine gear case housing flange is not threaded (Fig. 0481).



Fig 0481

PICT-9354

TX525 22319 #270000721 & higher
22320 #270000886 & higher
22333 #270000447 & higher
22334 #270000437 & higher

The engine gear case housing flange is not threaded (not pictured).

42. Apply tension to the alternator belt and tighten the top alternator mounting bolt (Fig. 0482).



Fig 0482

PICT-5565

43. With the alternator belt tensioned, tighten the bottom alternator mounting bolt (Fig. 0483).



Fig 0483

PICT-5510

ENGINE

44. Measure the deflection (A) by depressing the belt halfway between the fan drive pulley and alternator pulley at the specified force of 22 lbs. (98 N, 10kgf) (Fig. 0484).

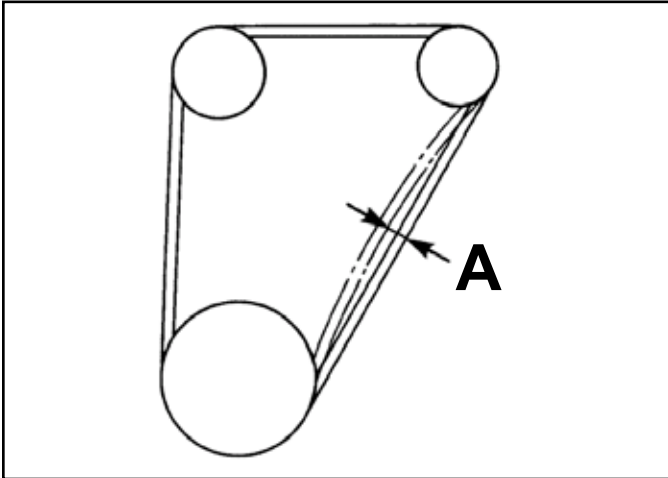


Fig 0484

fig. 3EEAB...17B

- A. .28 - .35" (7 – 9mm)

45. If the deflection measurement is not within the factory specifications, loosen the alternator mounting screws and relocate the alternator to adjust.

46. Using a 12mm socket and a 9/16" wrench, tighten the nut securing the hex spacer to the engine oil dipstick (Fig. 0485).



Fig 0485

PICT-5170

47. Position the starter assembly into the engine (Fig. 0486).



Fig 0486

PICT-5566

48. Using a 12mm socket, install 2 bolts and lock-washers securing the starter assembly to the engine (Fig. 0487).

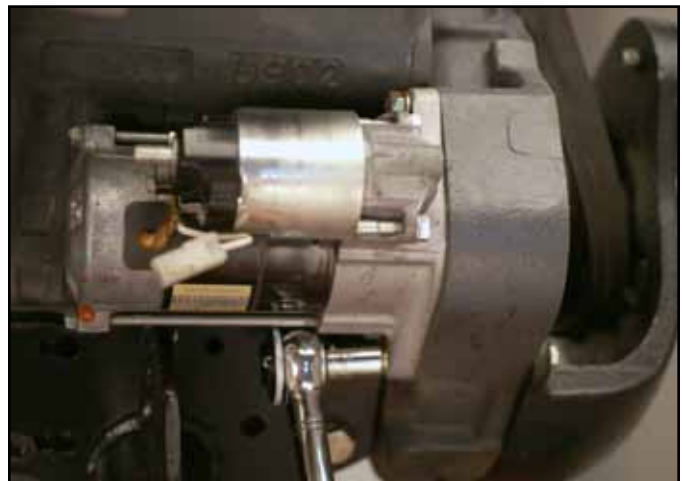


Fig 0487

PICT-5567a

49. Torque the starter mounting bolts to 17.4 - 20.3 ft-lbs. (23.5 - 27.5 Nm) (Fig. 0488).



Fig 0488

PICT-5568

51. Using a 13mm socket, install 2 bolts securing the starter baffle plate to the engine (Fig. 0490).



Fig 0490

PICT-5500a

50. Position the starter baffle plate (Fig. 0489).



Fig 0489

PICT-5501a

52. Torque the 2 bolts securing the starter baffle plate to the engine to 17.4 - 20.3 ft-lbs. (23.5 - 27.5 Nm) (Fig. 0491).



Fig 0491

PICT-5569a

ENGINE

53. Using a 10mm socket, install a bolt securing the starter baffle plate to the exhaust manifold (Fig. 0492).

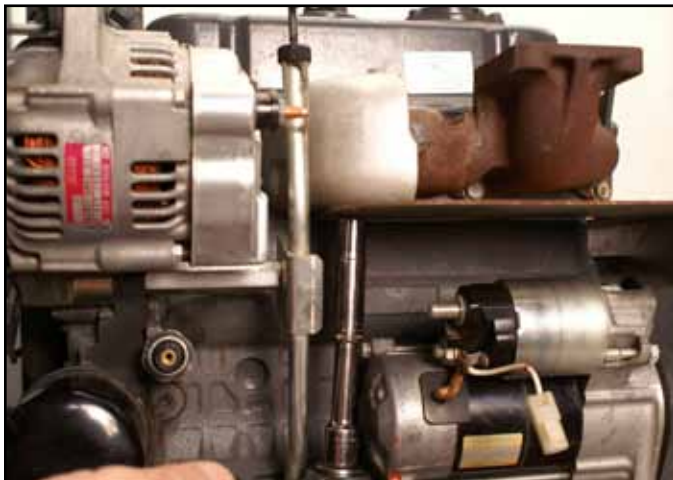


Fig 0492

PICT-5499

54. Torque the bolt securing the starter baffle plate to the exhaust manifold to 7.23 - 8.32 ft-lbs. (9.8 - 11.3 Nm) (Fig. 0493).

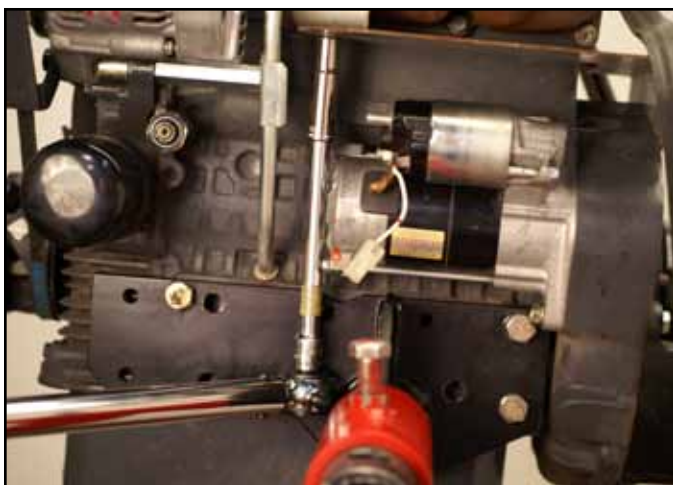


Fig 0493

PICT-5570

Engine Assembly Installation

1. Transfer the engine from the engine stand to the engine hoist (Fig. 0494).

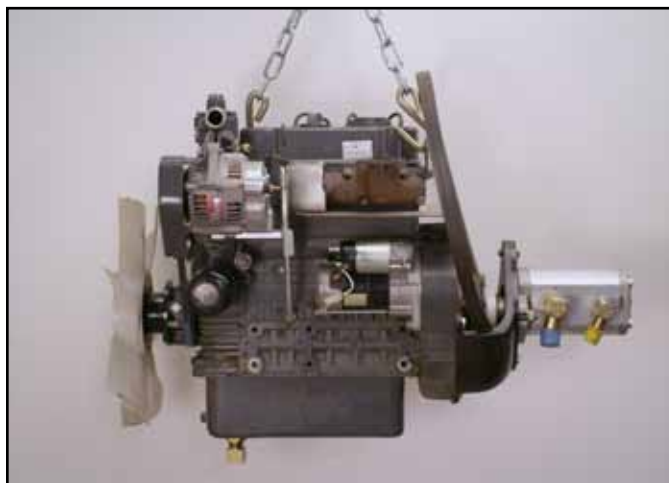


Fig 0494

PICT-5573a

2. Position the left hand engine mount to the engine (Fig. 0495).



Fig 0495

PICT-5497

3. Using a 17mm socket, install 5 bolts securing the left hand engine mount to the engine (Fig. 0496).

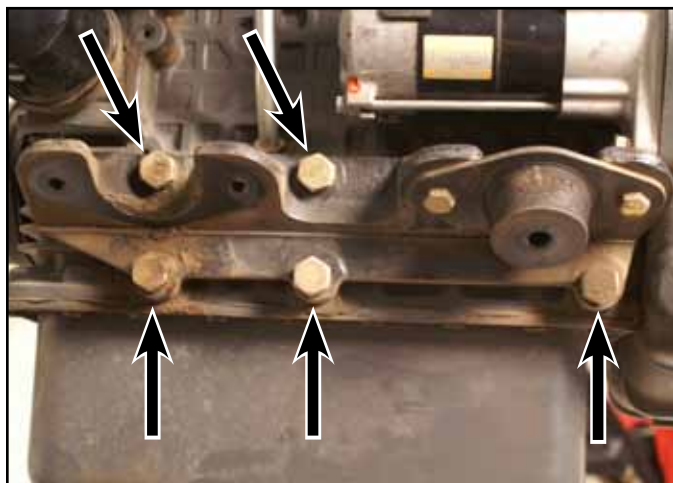


Fig 0496

PICT-5495

5. Position the ISO engine mount to the left hand engine mount (Fig. 0498).



Fig 0498

PICT-5494

4. Torque the 5 bolts to 38 ± 4 ft-lbs. (51.5 ± 5.4 Nm) (Fig. 0497).



Fig 0497

PICT-5574

6. Using a 1/2" socket, install 2 bolts securing the forward ISO engine mount to the left hand engine mount (Fig. 0499).



Fig 0499

PICT-5575

ENGINE

7. Torque the 2 bolts to 220 ± 25 in-lbs. (24.8 ± 2.8 Nm) (Fig. 0500).



Fig 0500

PICT-5576

9. Position the rebound strap onto the 2 rebound washers (Fig. 0502).



Fig 0502

PICT-5490

8. Position the 2 rebound washers onto the ISO engine mounts (Fig. 0501).



Fig 0501

PICT-5491

10. Position the engine mount plate so that the bolts are inserted through the ISO mounts, rebound washers and rebound strap (Fig. 0503).



Fig 0503

PICT-5489

11. Using a 9/16" socket and wrench, install 2 nuts securing the engine mount plate to the left hand engine mount (Fig. 0504).

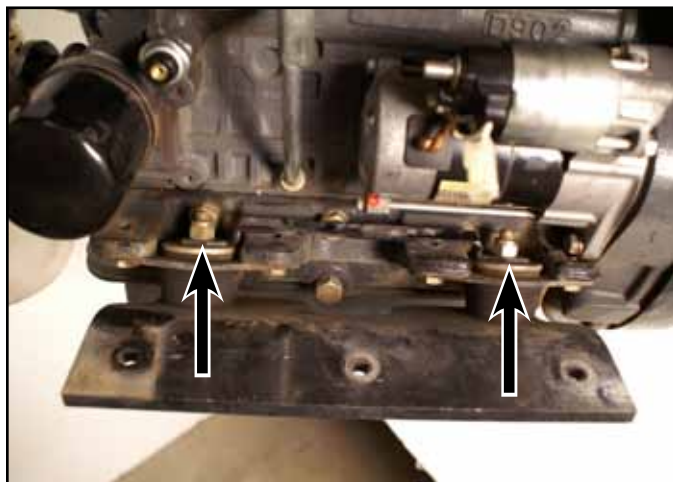


Fig 0504

PICT-5487

12. Torque the 2 bolts to 30 ± 3 ft-lbs. (41 ± 4 Nm) (Fig. 0505).



Fig 0505

PICT-5577

13. Position the engine into the mainframe aligning the mounting holes on the engine mount plates with the mounting holes in the mainframe.

14. Remove the engine hoist from the engine.

15. Using a 9/16" socket and wrench, loosely install the rear 2 bolts and nuts securing the left hand side of the engine assembly to the mainframe (Fig. 0506).



Fig 0506

PICT-5484

16. Using a 9/16" socket and wrench, loosely install the rear 2 bolts and nuts securing the right hand side of the engine assembly to the mainframe (Fig. 0507).



Fig 0507

PICT-5481

ENGINE

17. Position the left hand cable guide and the routed harness cables aligning the cable guide mounting hole with the engine and mainframe mounting hole (Fig. 0508).



Fig 0508

PICT-5483

2008 cable guide:



Fig 0510

PICT-5425

Note: Both the left hand and right hand cable guide appearance and position slightly changed from 2007 models to 2008 models (Fig. 0509 and Fig. 0510):
2007 cable guides:



Fig 0509

PICT-5427

18. Using a 9/16" socket and wrench, loosely install the bolt and nut securing the left hand side of the engine assembly and cable guide to the mainframe (Fig. 0511).



Fig 0511

PICT-5482

19. Position the right hand cable guide and the routed harness cables aligning the cable guide mounting hole with the engine and mainframe mounting hole (Fig. 0512).



Fig 0512

PICT-5578

20. Using a 9/16" socket and wrench, loosely install a bolt and nut securing the right hand side of the engine assembly and cable guide to the mainframe (Fig. 0513).



Fig 0513

PICT-5479

21. Torque all 6 engine mounting bolts to 30 ± 3 ft-lbs. (41 ± 4 Nm) (Fig. 0514).



Fig 0514

PICT-5579

22. Slide the oil drain hose onto the oil drain fitting located on the bottom of the oil pan. Position the hose clamp and tighten securing the oil drain hose to the engine (Fig. 0515).



Fig 0515

PICT-5477

ENGINE

23. Position the fuel pump and filter assembly to the engine. Slide the fuel pump mounting bracket (bottom mounting hole) onto the bolt that was left in the tower assembly upon removal (Fig. 0516).

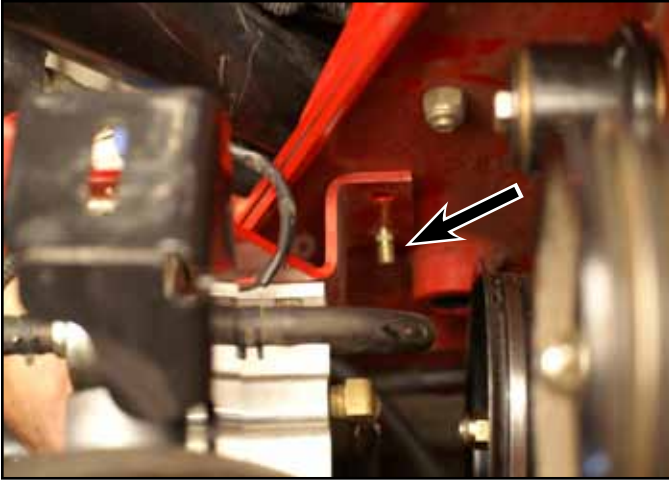


Fig 0516

PICT-5580

24. Using a 1/2" socket, install the top bolt and nut and the nut onto the bottom bolt securing the fuel pump and filter bracket to the tower frame (Fig. 0517).



Fig 0517

PICT-5581

25. Route the fuel return line up in between the fuel pump lines to the fuel injector (Fig. 0518).



Fig 0518

PICT-5582

26. Slide the fuel return line onto the fuel injector (Fig. 0519).



Fig 0519

PICT-5472

27. Slide the hose clamp up the fuel return line and into position securing the fuel line to the fuel injector (Fig. 0520).



Fig 0520

PICT-5471

29. Slide the hose clamp up the fuel line and into position securing the fuel line to the fuel injector pump (Fig. 0522).



Fig 0522

PICT-5469

28. Slide the fuel line onto the fuel injector pump (Fig. 0521).



Fig 0521

PICT-5470

ENGINE

30. Route the throttle cable to the left of the heat shield mount and over the top of the fuel pump (Fig. 0523 and Fig. 0524).



Fig 0523

PICT-5588

Note: Some TX525 models have a rubberized R-clamp secured to the top fuel pump mounting bolt. The throttle cable should be routed through that R-clamp (Fig. 0525).



Fig 0525

PICT-5583a



Fig 0524

PICT-5589

31. Position the throttle bracket assembly up to the mounting surface on the engine (Fig. 0526).



Fig 0526

PICT-5468

32. Using a 10mm socket, install 2 bolts securing the throttle bracket to the engine. Torque the 2 bolts to 7.23 to 8.32 ft-lbs. (9.8 to 11.3 Nm) (Fig. 0527).

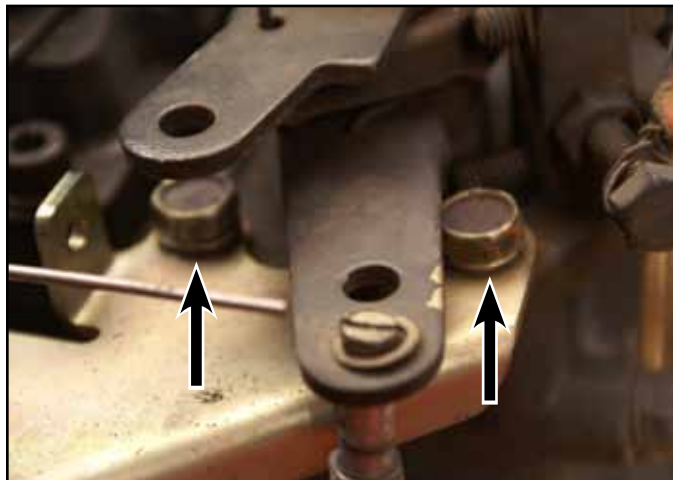


Fig 0527

PICT-5467

34. Tighten the swivel clamp securing the throttle cable to the throttle control bracket (Fig. 0529). Adjust the throttle cable. Refer to "Throttle Cable Adjustment" on page 4-142.



Fig 0529

PICT-5465

33. With the throttle control in the fast position, lift up the throttle bracket swivel clamp. Align the throttle cable and the swivel clamp hole. Move the throttle control lever to the slow position so that the throttle cable inserts through the swivel clamp (Fig. 0528).



Fig 0528

PICT-5586a

35. Slide the star washer, negative battery cable terminal and harness ground terminal onto a bolt (Fig. 0530).



Fig 0530

PICT-5462

ENGINE

36. Using a 13mm socket, install the bolt securing the star washer, negative battery cable and harness terminal to the fuel injection pump (Fig. 0531).



Fig 0531

PICT-5460

38. Route the glow plug harness cable behind the fuel line, under the solenoid connector and under the fuel injector lines (Fig. 0533).

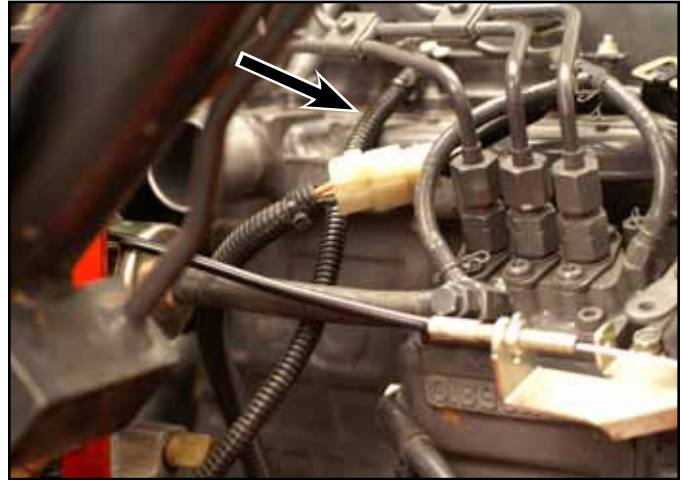


Fig 0533

PICT-5590

37. Plug the harness connector into the engine shut-down solenoid connector (Fig. 0532).



Fig 0532

PICT-5459

39. Slide the glow plug harness terminal onto the center glow plug terminal (Fig. 0534).



Fig 0534

PICT-5457

40. Using a 7mm socket, install a nut securing the harness terminal to the glow plug (Fig. 0535).



Fig 0535

PICT-5456

42. Route the fuel tank harness wires back to the rear of the machine between the tower and the hydraulic filter to tank line (Fig. 0537).



Fig 0537

PICT-5594

41. Position the fuel pump connector to the engine side of the fuel pump mounting bracket (Fig. 0536).

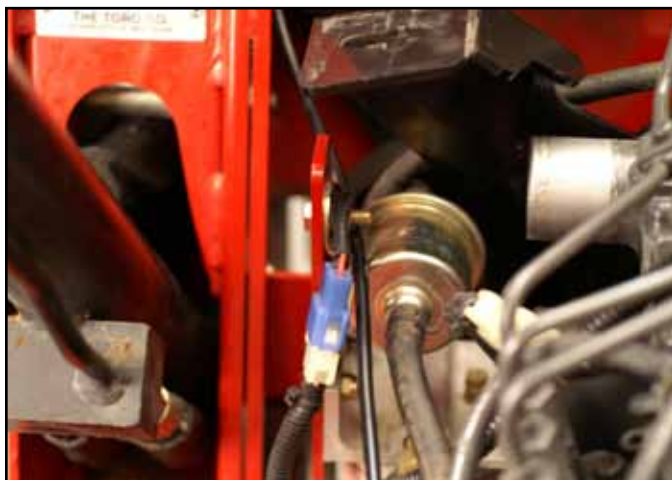


Fig 0536

PICT-5591

43. Install the blue spade connector onto the starter terminal (Fig. 0538).



Fig 0538

PICT-5449

ENGINE

44. Slide the 2.0mm (grey) fusible link terminal onto the starter terminal (Fig. 0539).



Fig 0539

PICT-5448

46. Using a 12mm socket, install a nut securing the fusible link and positive battery cable to the starter terminal. Slide the red boot over the terminal (Fig. 0541).



Fig 0541

PICT-5446a

45. Slide the positive battery cable onto the starter terminal (Fig. 0540).



Fig 0540

PICT-5447

47. Plug the harness connector into the .08mm (blue) fusible link connector (Fig. 0542).



Fig 0542

PICT-5444

48. Plug the harness connector into the alternator (Fig. 0543).



Fig 0543

PICT-5439a

50. Using a 10mm socket, install a nut and washer securing the harness terminal to the alternator (Fig. 0545). Slide the boot onto the terminal.



Fig 0545

PICT-5436

49. Slide the harness terminal onto the alternator terminal (Fig. 0544).



Fig 0544

PICT-5437a

51. Using a Phillips screw driver, install a screw securing the harness terminal to the engine oil pressure sensor (Fig. 0546).

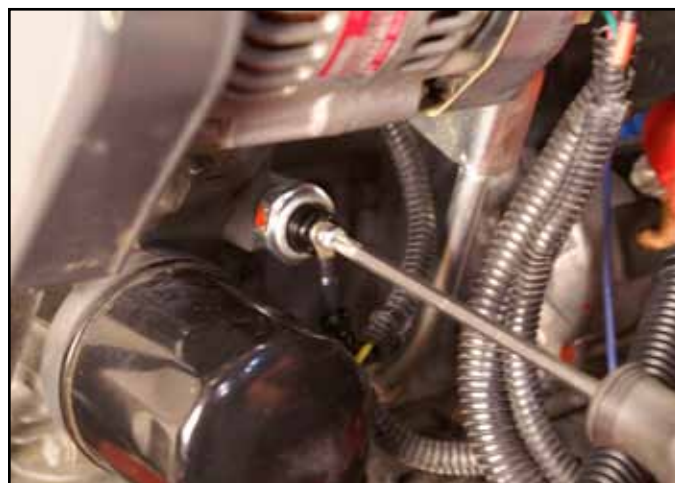


Fig 0546

PICT-5432

ENGINE

52. Water temperature harness wire routing:

TX525 (#270000001 - 270000400): up the left side of the engine, between the engine block and alternator, up to the temperature sensor (Fig. 0547).



Fig 0547

PICT-5596

TX525 (#270000401 & higher): up between the dipstick and alternator (Fig. 0548).



Fig 0548

PICT-5599a

53. Plug the harness terminal into the water temperature sensor (Fig. 0549).



Fig 0549

PICT-5429

54. Route the drive belt around the pulleys (rear view) (Fig. 0550).

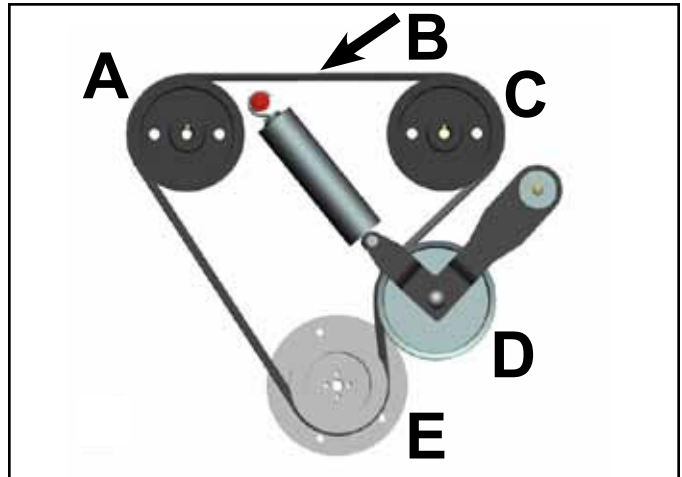


Fig 0550

TX525 belt routing

- | | |
|---------------------------|------------------|
| A. Left Hand Pump Pulley | D. Idler Pulley |
| B. Drive Belt | E. Engine Pulley |
| C. Right Hand Pump Pulley | |

55. Using a spring tool (Toro p/n: 92-5771), hook the idler spring to the spring post on the tower (Fig. 0551).



Fig 0551

PICT-5601

57. Using a 3/16" Allen wrench, install the top 2 screws. Using a 1/2" socket, install the bottom 2 screws securing the heat shield to the tower (Fig. 0553).



Fig 0553

PICT-5419a

56. Position the heat shield (Fig. 0552).



Fig 0552

PICT-5421

58. Install the hood rod (Fig. 0554).



Fig 0554

PICT-5418

ENGINE

59. Install a hairpin cotter into the hood rod (Fig. 0555).



Fig 0555

PICT-5417

61. Position the muffler assembly onto the muffler bracket and manifold (Fig. 0557).



Fig 0557

PICT-5416

60. Install a new manifold gasket (Fig. 0556).



Fig 0556

PICT-5250

62. Using a 13mm socket, install 4 bolts and washers securing the muffler to the engine manifold (Fig. 0558).



Fig 0558

PICT-5248

63. Torque the 4 bolts to 28 ± 3 ft-lbs. (38 ± 4 Nm) (Fig. 0559).



Fig 0559

PICT-5602a

65. Tighten the 2 bolts (previously loosely installed) securing the muffler mounting bracket to the engine block. Tighten the bolt securing the muffler to the muffler mounting bracket (Fig. 0561).

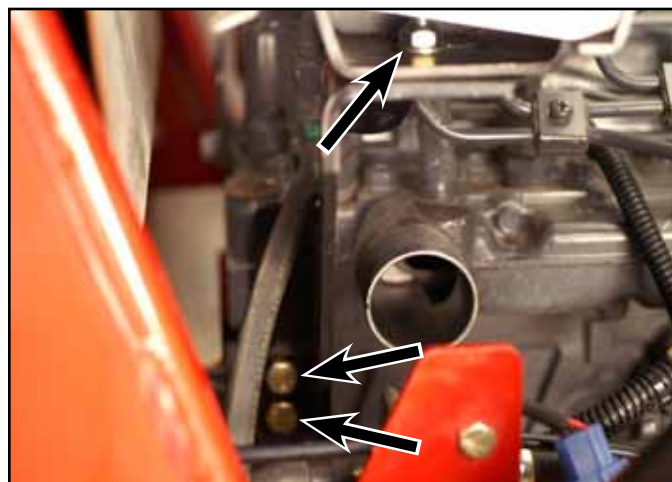


Fig 0561

PICT-5603

64. Using two 1/2" wrenches, snugly install the bolt, 2 washers and nut securing the muffler assembly to the muffler mounting bracket (Fig. 0560).



Fig 0560

PICT-5245

66. Position the air cleaner and coolant overflow bottle assembly onto the engine (Fig. 0562).



Fig 0562

PICT-5413

ENGINE

67. Slide the intake hose onto the engine intake (Fig. 0563).



Fig 0563

PICT-5407

69. Using a 1/2" socket, loosely install 2 bolts securing the air cleaner assembly to the muffler shield (Fig. 0565).

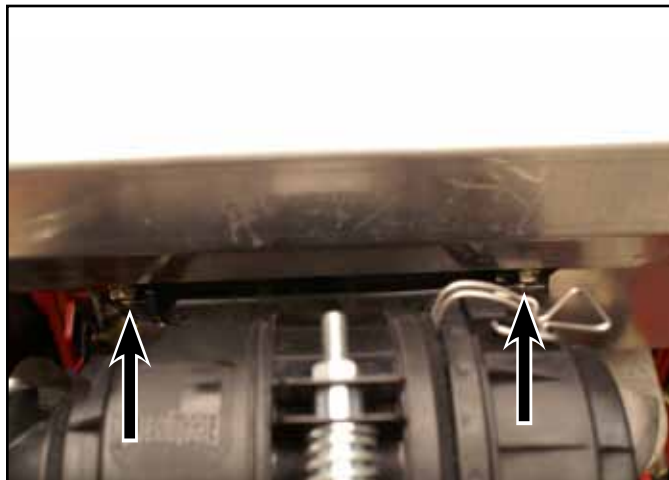


Fig 0565

PICT-5408

68. Position the hose clamp. Using a 3/8" socket, tighten the hose clamp securing the intake hose to the engine intake (Fig. 0564).



Fig 0564

PICT-5405

70. Using a 13mm socket, loosely install 2 new bolts and washers securing the air cleaner mounting bracket to the engine block (Fig. 0566).



Fig 0566

PICT-5412

71. Tighten the 2 bolts securing the air cleaner assembly to the muffler shield and the 2 bolts and washers securing the air cleaner mounting bracket to the engine block (Fig. 0567).

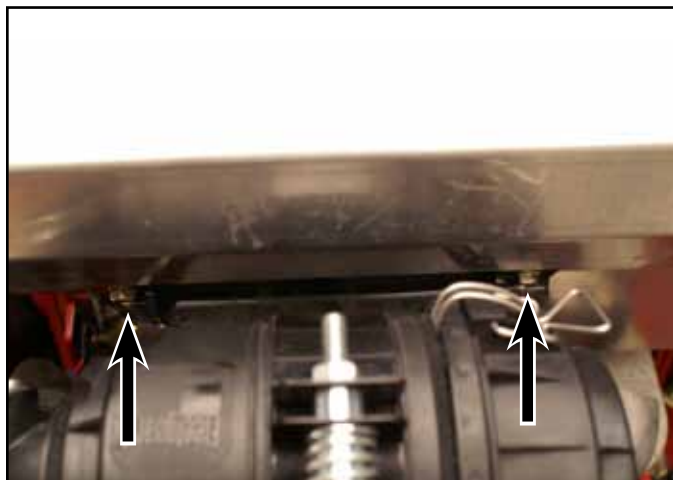


Fig 0567

PICT-5408

72. Carefully place the radiator and oil cooler assembly into the frame (Fig. 0568).



Fig 0568

PICT-5402

73. Using a 1-1/16" and a 1-1/8" wrench, install the hydraulic oil outlet line to the oil cooler outlet fitting (Fig. 0569).



Fig 0569

PICT-4968a

74. Using a 1-1/16" and a 1-1/8" wrench, install the hydraulic oil inlet line to the oil cooler inlet fitting (Fig. 0570).



Fig 0570

PICT-4965

ENGINE

75. Slide the radiator hose onto the engine block outlet (Fig. 0571).



Fig 0571

PICT-5400

77. Slide the 2 radiator hoses onto the radiator fill tube and the thermostat housing (Fig. 0573).



Fig 0573

PICT-5397

76. Position the hose clamp. Using a 3/8" socket, tighten the hose clamp securing the radiator hose to the engine block (Fig. 0572).



Fig 0572

PICT-5399

78. Position the 2 hose clamps. Using a 3/8" socket, tighten the hose clamps securing the radiator hoses to the radiator fill tube and thermostat housing (Fig. 0574).



Fig 0574

PICT-5395

79. Position the radiator mount into the frame (Fig. 0575).



Fig 0575

PICT-4971

80. Using a 1/2" socket, loosely install 3 screws holding the radiator mount to the frame (Fig. 0576).



Fig 0576

PICT-5131

81. Center the radiator and oil cooler assembly side to side in the frame so that there is approximately 1/8" (3.2mm) gap between the shroud and the fan. Spin the cooling fan. Ensure the fan does not come into contact with the shroud. Adjust the radiator side to side as necessary (Fig. 0577).



Fig 0577

PICT-5135

82. Without moving the position of the radiator, slide the radiator mount against the radiator and tighten the 3 radiator mount screws (Fig. 0578).



Fig 0578

PICT-5137

ENGINE

83. Inspect the foam seals on the inside of the grill assembly. Replace if worn or damaged (Fig. 0579).

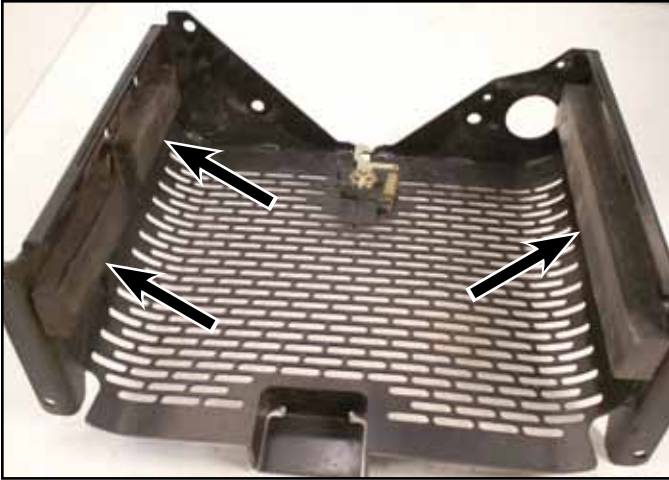


Fig 0579

PICT-5138

84. Position the grill onto the frame and route the breather tube in between the foam seals on the inner left side of the grill (Fig. 0580).



Fig 0580

PICT-5139

85. Slide the grill onto the frame so it sits under the loader stops and on top of the radiator. Leave the grill in a slightly forward position. The overflow tank mounting holes should be just beyond the right hand boss on top of the radiator assembly. This will allow the overflow bottle assembly to be installed (Fig. 0581).



Fig 0581

PICT-5141a

86. Position the overflow tank bracket onto the grill assembly (Fig. 0582).



Fig 0582

PICT-5143a

87. Install 2 bolts and nuts securing the overflow bottle assembly to the grill assembly (Fig. 0583).



Fig 0583

PICT-5145

- TX525 (#280000001 & higher): Have 2 flange head bolts, no washers (Fig. 0585).



Fig 0585

PICT-5605

88. Slide the grill assembly back aligning the mounting holes with the holes in the frame. Loosely install the 4 bolts securing the grill assembly to the frame and the 2 bolts and washers securing the grill to the radiator (Fig. 0584).



Fig 0584

PICT-5146

- TX525 (#270000001 - 270999999): Have 2 bolts and washers (Fig. 0586).



Fig 0586

PICT-5604

ENGINE

89. Using a 1/2" socket, tighten the 4 bolts securing the grill assembly to the frame (Fig. 0587).



Fig 0587

PICT-5150

92. Position the breather tube under the grill and install the breather (Fig. 0589).



Fig 0589

PICT-5157

90. Check the cooling fan and shroud clearance. Adjust the position of the radiator if necessary.

91. Using a 9/16" socket, install the 2 bolts and washers (if present) securing the radiator to the grill assembly (Fig. 0588).



Fig 0588

PICT-5604

93. Install the left and right hand side panels (Fig. 0590).



Fig 0590

PICT-4945

94. Slide the suction hoses onto the tandem pump suction fittings (Fig. 0591).

- C. Suction line from the tank (smaller fitting).
- D. Suction line from the tank (larger fitting).



Fig 0591

PICT-4775a

95. Position the hose clamps and tighten securing the suction hoses to the pump fittings marked C and D (Fig. 0592).



Fig 0592

PICT-4773a

96. Using a 1-1/8" wrench, install the hydraulic line to the pump fitting labeled B (Fig. 0593).



Fig 0593

PICT-4770a

97. Using a 15/16" wrench, install the hydraulic line to the test port t-fitting labeled A (Fig. 0594).



Fig 0594

PICT-4768b

ENGINE

98. Using a 1/4" hex wrench, install the engine oil drain plug located on the underside of the frame inside the right hand wheel and track assembly (Fig. 0595).



Fig 0595

PICT-3283

100. Position the battery clamp into the slot on the battery mount and line up the mounting hole with the hole in the frame. Install a bolt, washer and nut to secure the battery clamp to the frame (Fig. 0597).



Fig 0597

PICT-4310a

99. Slide the battery partially into the battery mount. Install the positive battery cable to the positive battery terminal. Slide the battery farther into the battery mount. Install the negative battery cable to the negative battery terminal. Slide the battery guard in between the battery and the frame so that the hole in the guard lines up with the battery clamp mounting hole in the frame (Fig. 0596).



Fig 0596

PICT-4330

101. Slide the 2 fuel lines onto the fuel tank fittings. Note the location markings (Fig. 0598).
S - Fuel suction line
R - Fuel return line



Fig 0598

PICT-4265

102. Position the 2 fuel hose clamps to secure the fuel lines to the fuel tank fittings (Fig. 0599).



Fig 0599

PICT-4264

104. Position the rear frame cover to the rear of the frame. Using 3/4" and 1/2" sockets, install 7 bolts and nuts to secure the rear frame cover to the frame and fuel tank bracket (Fig. 0601).

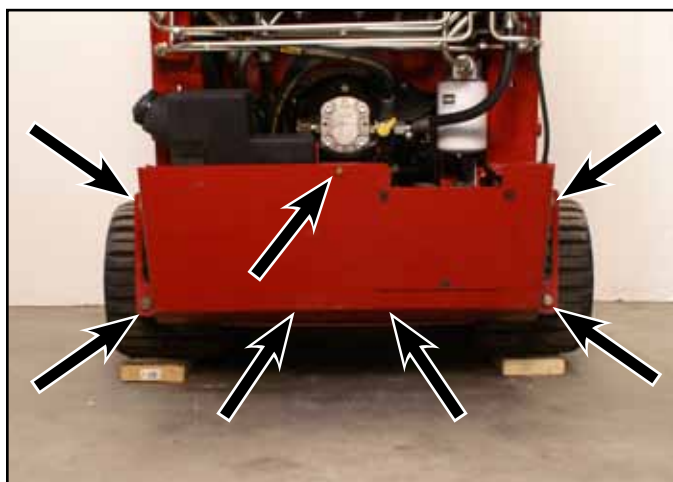


Fig 0601

PICT-5381

103. Position the fuel tank into the rear of the frame. Connect the two wires (black and orange) to the fuel sending unit located on the top of the fuel tank (Fig. 0600).

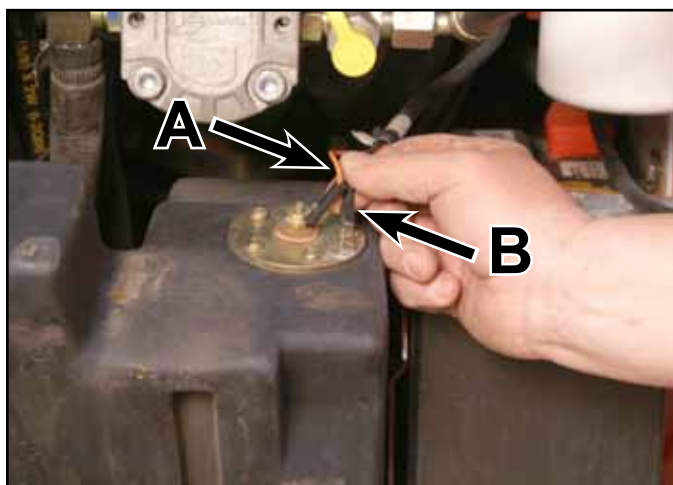


Fig 0600

PICT-4262a

- A. Center terminal (orange wire)
B. Outside terminal (black wire)

105. Position the left hand rear cover support panel to the tower. Using a 3/8" socket, install 3 screws to secure the left rear cover support panel to the tower assembly. Repeat to install the right hand rear cover support panel (Fig. 0602).



Fig 0602

PICT-4256

ENGINE

106. Install the rear access panel (Fig. 0603).



Fig 0603

PICT-4505a

107. Fill the engine with oil per specifications.
108. Fill the radiator. Refer to "Checking, Adding & Bleeding the Engine Coolant" on page 4-138.
109. Disengage the park brake and start the unit.
110. Adjust the throttle cable. Refer to "Throttle Cable Adjustment" on page 4-142.
111. Purge air from the hydraulic system. Refer to "Purging Air Procedure" on page 9-19. Check for any leaks at the hydraulic fittings and hoses.
112. Disengage the cylinder lock and lower the loader arms.
113. Close the hood.

Checking, Adding & Bleeding the Engine Coolant

1. Check the level of coolant in the expansion tank. The coolant should be at or above the mark on the tank (Fig. 0604).



Fig 0604

Coolant 001

If coolant level is low, complete the following steps:

Caution: Do not remove the coolant fill cap when the engine is hot. Always allow the engine to cool at least 15 minutes or until the coolant fill cap is cool to the touch before removing the coolant fill cap.

2. Remove the coolant fill cap (Fig. 0605).



Fig 0605

Coolant 002

3. Open the front and top coolant bleed valves (Fig. 0606 and Fig. 0607).



Fig 0606

Coolant 003

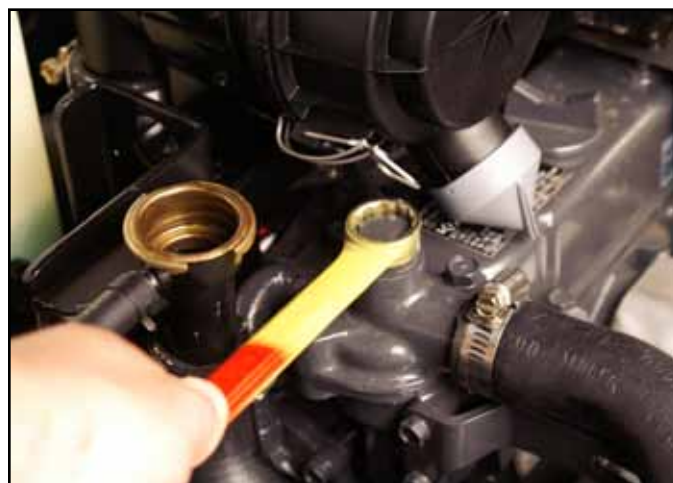


Fig 0607

Coolant 005

Note: The cooling system is filled with a 50/50 mixture of water and permanent ethylene glycol antifreeze.

4. Pour coolant mixture into the coolant filler neck until the coolant begins to come out of the front coolant bleed valve (Fig. 0608).



Fig 0608

Coolant 004

ENGINE

5. Close the front coolant bleed valve (Fig. 0609).



Fig 0609

Coolant 003

6. Pour coolant mixture into the coolant filler neck until the coolant begins to come out of the top coolant bleed valve (Fig. 0610 and Fig. 0611).



Fig 0610

Coolant 004



Fig 0611

Coolant 006

7. Close the top coolant bleed valve (Fig. 0612).



Fig 0612

Coolant 005

8. Pour coolant mixture into the coolant filler neck until the coolant level comes into the filler neck (Fig. 0613).



Fig 0613

Coolant 007

10. Remove the expansion tank cap and add coolant mixture into the expansion tank until it reaches the full line on the side of the tank (Fig. 0615).



Fig 0615

Coolant 009

9. Install the coolant fill cap (Fig. 0614).



Fig 0614

Coolant 002

11. Install the expansion tank cap (Fig. 0616).



Fig 0616

Coolant 008

ENGINE

Throttle Cable Adjustment

1. Raise the hood.
2. Remove the right hand side panel (Fig. 0617).



Fig 0617

PICT-8759

3. Move the air intake hose out of the way of the throttle plate. Using a 1/4" wrench, loosen the throttle cable swivel (Fig. 0618).



Fig 0618

PICT-7140

4. There should be approximately 3/16" to 1/4" (0.48 to 0.635cm) of cable through the swivel (Fig. 0619).



Fig 0619

PICT-7107

5. To adjust the amount of cable going through the swivel (Fig. 0620):
 - a. Using two 7/16" wrenches, loosen the two adjusting nuts securing the cable to the throttle bracket.
 - b. To shorten the cable: thread the nuts toward the cable end.
 - c. To lengthen the cable, thread the nuts further onto the cable.

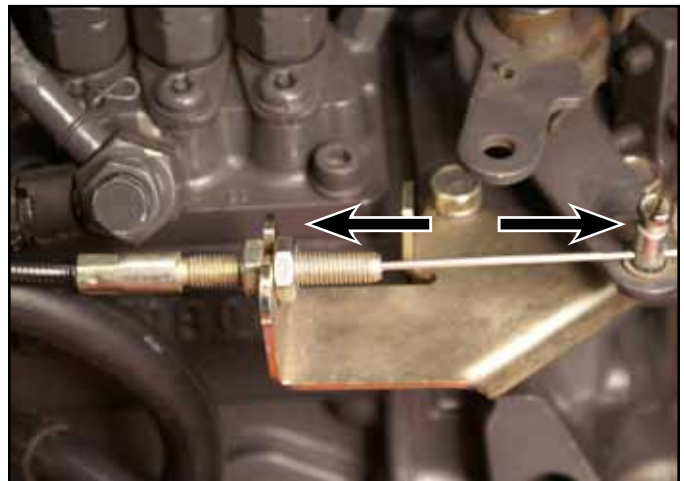


Fig 0620

PICT-7113

- d. Using two 7/16" wrenches, tighten the two adjusting nuts securing the throttle cable to the throttle plate (Fig. 0621).



Fig 0621

PICT-7143a

7. Move the throttle lever to the fast position to ensure the engine throttle lever rests against the high idle stop (Fig. 0623).



Fig 0623

PICT-7104

6. Hold the throttle lever over to the low idle stop. Using a 1/4" wrench, tighten the swivel clamp screw to hold the throttle cable wire (Fig. 0622).

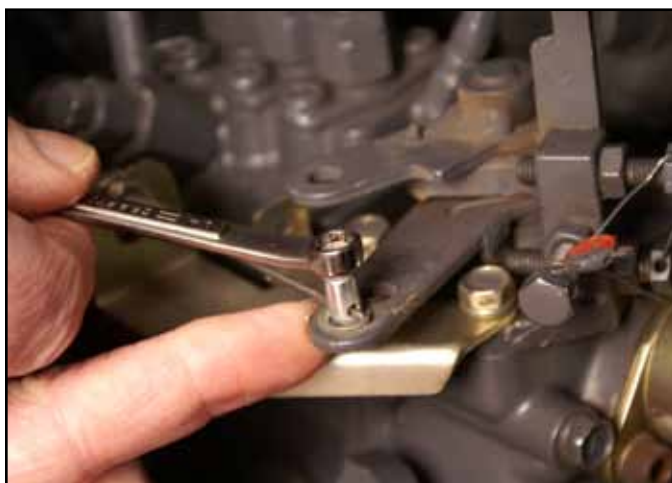


Fig 0622

PICT-7111

Note: When the throttle lever is in the fast position the engine throttle lever should NOT contact the throttle cable end (Fig. 0624).



Fig 0624

PICT-7123

ENGINE

8. Move the air intake hose back into position.
9. Install the right hand side panel (Fig. 0625).



Fig 0625

PICT-8759

10. Lower the hood.

Throttle Cable Replacement

Throttle Cable Removal

1. Position the traction unit on a flat surface.
2. Remove the ignition key.
3. Apply the parking brake.
4. Raise the hood.
5. Remove the hairpin cotter from the hood prop rod (Fig. 0626).



Fig 0626

PICT-7126

6. Support the hood and remove the prop rod (Fig. 0627).



Fig 0627

PICT-7128

8. Using a 3/16" Allen wrench, remove the 2 upper heat shield screws (Fig. 0629).



Fig 0629

PICT-7132

7. Using a 1/2" wrench, remove the 2 lower heat shield screws (Fig. 0628).



Fig 0628

PICT-7129

9. Remove the heat shield (Fig. 0630).



Fig 0630

PICT-7133

ENGINE

10. Remove the right hand side panel (Fig. 0631).



Fig 0631

PICT-7138

12. Using two 7/16" wrenches, loosen the adjusting nuts securing the throttle cable to the throttle plate (Fig. 0633).



Fig 0633

PICT-7143a

11. Move the air intake hose out of the way of the throttle plate. Using a 1/4" wrench, loosen the throttle cable swivel (Fig. 0632).



Fig 0632

PICT-7140

13. Remove the throttle cable from the throttle plate and slide the cable out of the swivel (Fig. 0634).



Fig 0634

PICT-7150a

14. Remove the clip securing the throttle cable to the throttle handle linkage (Fig. 0635).



Fig 0635

PICT-7151a

15. Unhook the throttle cable Z-bend from the throttle cable handle linkage (Fig. 0636).



Fig 0636

PICT-7155

16. Remove the throttle cable from the machine.

17. Remove the adjusting nuts from the throttle cable. Retain them for use on the new throttle cable (Fig. 0637).



Fig 0637

PICT-7158a

Throttle Cable Installation

1. Thread the adjusting nuts onto the throttle cable approximately half way up the threads leaving a gap between the two nuts to accommodate the throttle plate (Fig. 0638).



Fig 0638

PICT-7158a

ENGINE

2. Insert the throttle cable z-bend into the throttle control handle linkage (Fig. 0639).



Fig 0639

PICT-7155

4. Route the throttle cable down the tower to the right hand side of the shield support (Fig. 0641).



Fig 0641

PICT-7162

3. Install the throttle cable clip/retainer into the throttle control handle linkage to secure (Fig. 0640).



Fig 0640

PICT-7160

5. Route the throttle cable between the tower and the idler arm pivot (Fig. 0642).



Fig 0642

PICT-7163

6. Route the throttle cable between the fuel pump and fuel pump bracket, under the top mounting bolt (Fig. 0643).



Fig 0643

PICT-7165

Note: Some TX525 models have a rubberized R-clamp secured to the top fuel pump mounting bolt. The throttle cable is routed through this R-clamp (Fig. 0644).



Fig 0644

PICT-5583a

7. Insert the end of the throttle cable through the swivel (Fig. 0645).



Fig 0645

PICT-7168

8. Insert the throttle cable into the throttle bracket so the 2 nuts straddle the bracket (Fig. 0646).



Fig 0646

PICT-7169

ENGINE

9. There should be approximately 3/16" to 1/4" (0.48 to 0.635cm) of wire through the swivel (Fig. 0647).



Fig 0647

PICT-7107

10. Using two 7/16" wrenches, tighten the two adjusting nuts securing the throttle cable to the throttle plate (Fig. 0649).



Fig 0649

PICT-7143a

Note: To adjust the amount of wire going through the swivel loosen the two adjusting nuts securing the cable to the throttle bracket. To shorten the cable, thread the nuts toward the cable end. To lengthen the cable, thread the nuts further onto the cable (Fig. 0648).



Fig 0648

PICT-7113

11. Hold the throttle lever over to the low idle stop. Using a 1/4" wrench, tighten the swivel clamp screw to hold the throttle cable wire (Fig. 0650).



Fig 0650

PICT-7111

12. Move the throttle cable to the fast position to assure the engine throttle lever rests against the high idle stop (Fig. 0651).



Fig 0651

PICT-7104

13. Move the air intake hose back into position.
14. Install the right hand side panel (Fig. 0653).



Fig 0653

PICT-7138

Note: When the throttle lever is in the fast position the engine throttle lever should NOT contact the throttle cable end (Fig. 0652).



Fig 0652

PICT-7123

15. Position the heat shield (Fig. 0654).

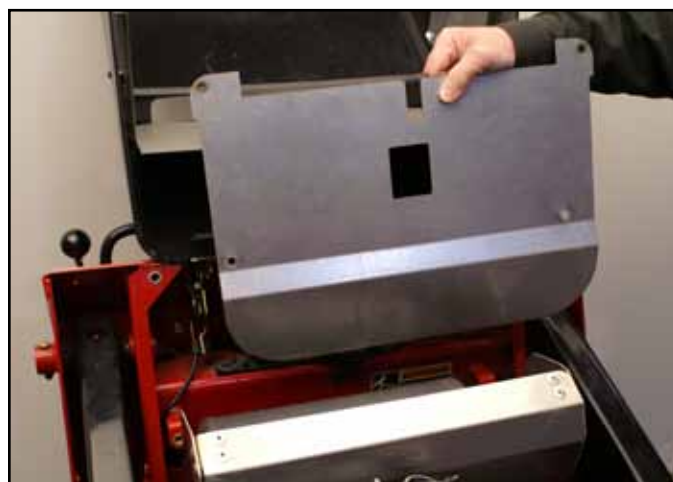


Fig 0654

PICT-7133

ENGINE

16. Using a 3/16" Allen wrench, install the 2 upper heat shield screws (Fig. 0655).



Fig 0655

PICT-7132

18. Support the hood and install the prop rod (Fig. 0657).



Fig 0657

PICT-7128

17. Using a 1/2" wrench, install the 2 lower heat shield screws (Fig. 0656).



Fig 0656

PICT-7129

19. Install the hairpin cotter into the hood prop rod (Fig. 0658).



Fig 0658

PICT-7126

20. Lower the hood.

Alternator Assembly Teardown

1. Position the alternator assembly into a vise.
2. Using a 22mm socket, remove the nut from the alternator shaft (Fig. 0659).



Fig 0659

PICT-8169

3. Remove the pulley from the alternator shaft (Fig. 0660).

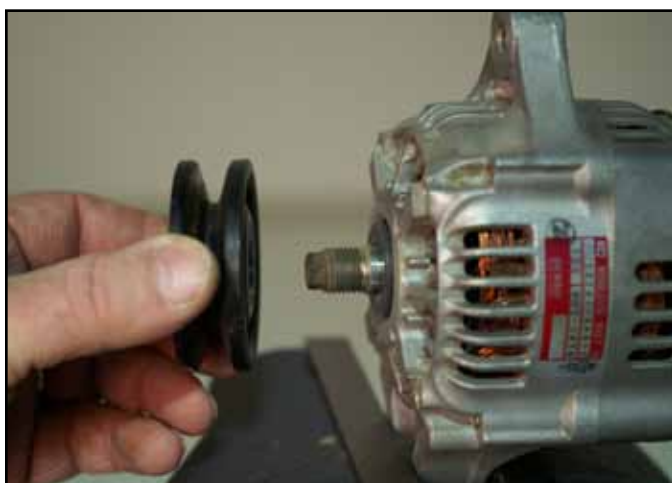


Fig 0660

PICT-8170

4. Remove the collar from the alternator shaft (Fig. 0661).



Fig 0661

PICT-8266

5. Using a 10mm socket, remove the battery post nut (Fig. 0662).



Fig 0662

PICT-8171

ENGINE

6. Slide the insulation bushing off the battery post (Fig. 0663).



Fig 0663

PICT-8172a

8. Remove the end cover from the alternator (Fig. 0665).

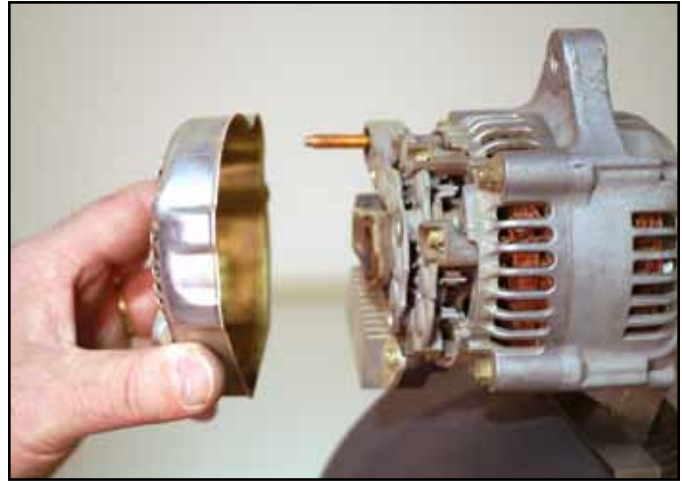


Fig 0665

PICT-8176a

7. Using a 7mm socket, remove the 3 bolts securing the end cover to the alternator (Fig. 0664).

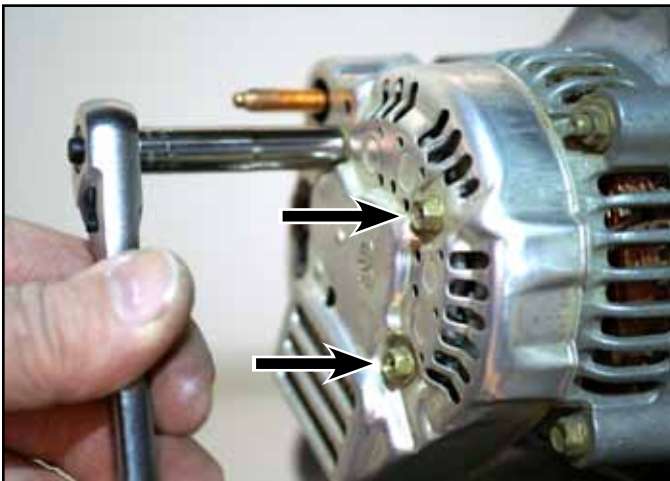


Fig 0664

PICT-8175a

9. Remove the 2 screws securing the brush holder to the alternator assembly (Fig. 0666).

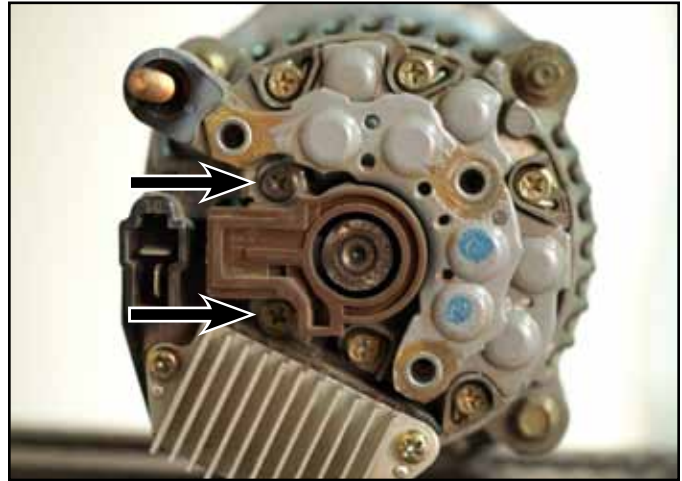


Fig 0666

PICT-8178

10. Remove the brush holder from the alternator assembly (Fig. 0667).

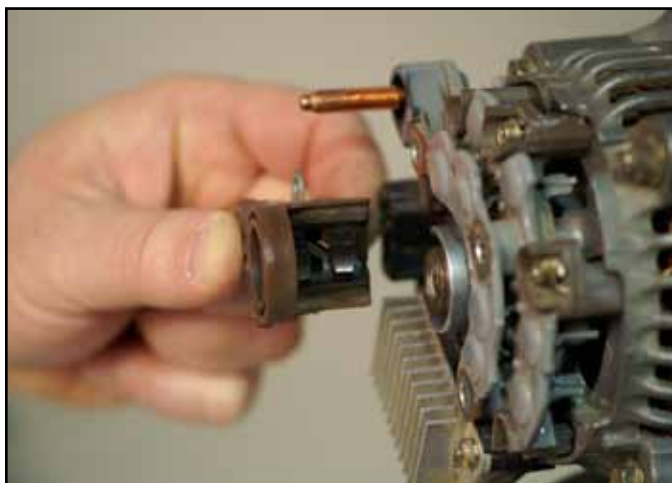


Fig 0667

PICT-8255

12. Remove the regulator assembly from the alternator (Fig. 0669).



Fig 0669

PICT-8181

11. Remove the 3 screws securing the regulator assembly to the alternator (Fig. 0668).

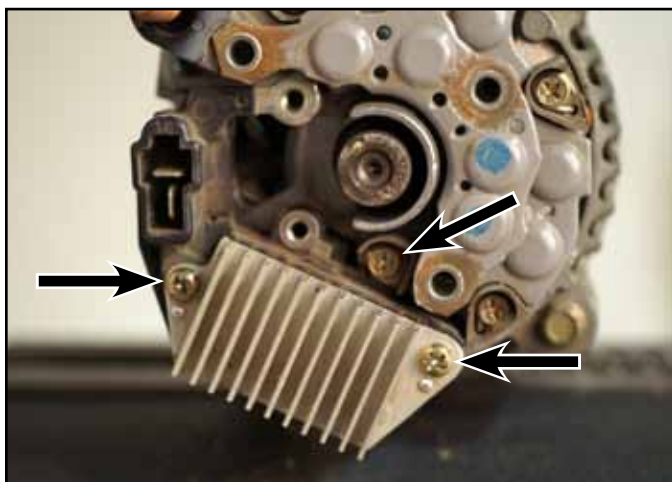


Fig 0668

PICT-8180

13. Remove the 4 screws securing the rectifier to the alternator assembly (Fig. 0670).

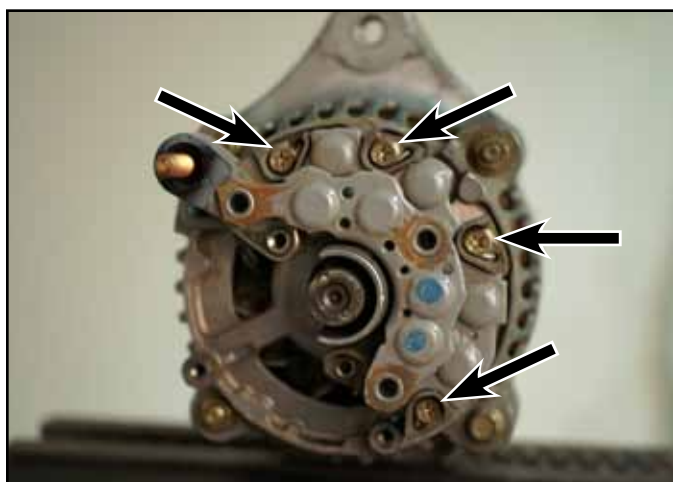


Fig 0670

PICT-8182

ENGINE

14. Straighten out the 4 coil wires that are threaded through the rectifier (Fig. 0671).

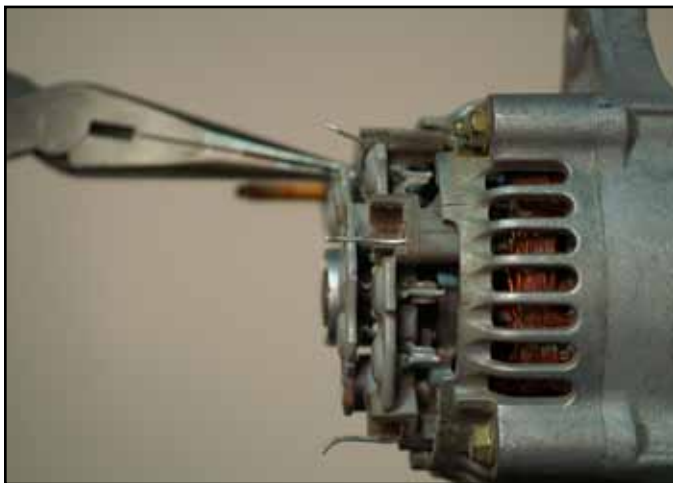


Fig 0671

PICT-8186

15. Remove the rectifier from the alternator assembly (Fig. 0672).

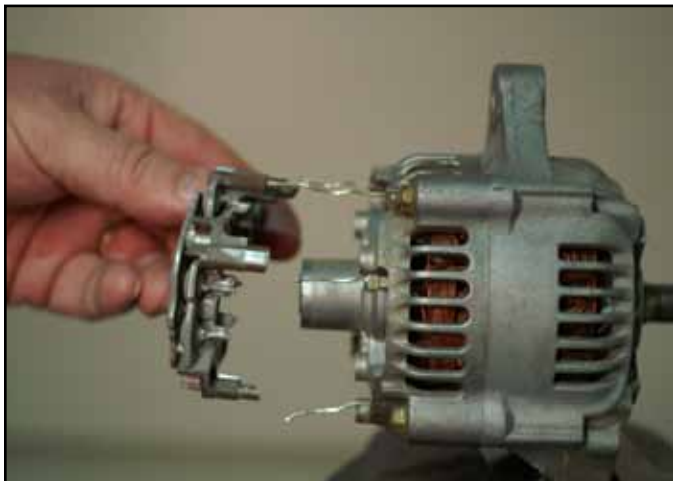


Fig 0672

PICT-8187

16. Using an 8mm socket, remove the 2 nuts and 2 bolts securing the rear end frame to the alternator assembly (Fig. 0673).

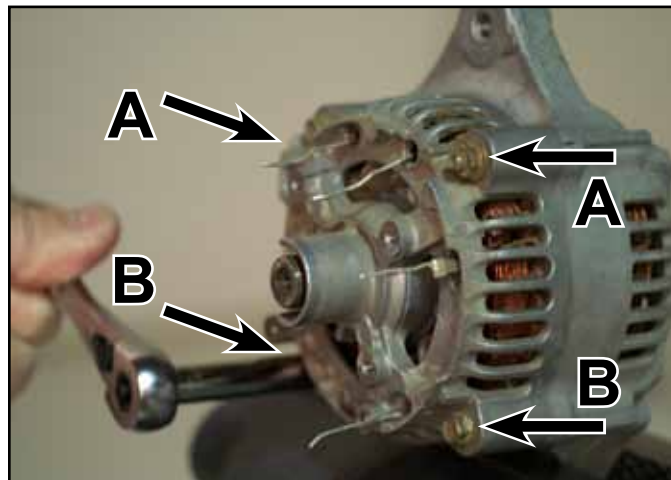


Fig 0673

PICT-8190

A. Nuts (2)

B. Bolts (2)

17. Remove the rear end frame and rotor assembly from the alternator assembly (Fig. 0674).

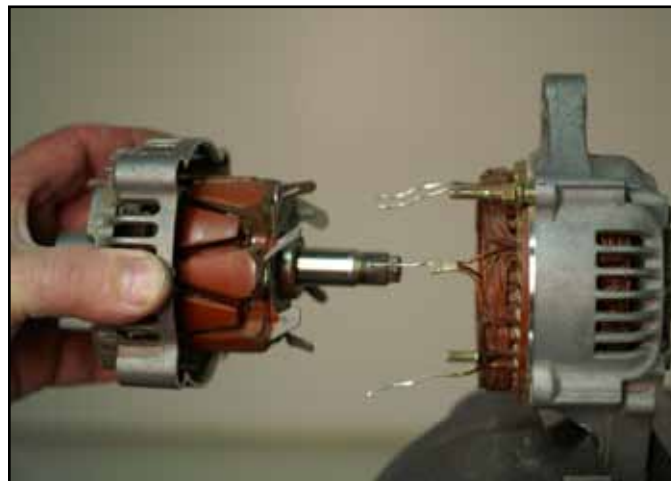


Fig 0674

PICT-8191

18. Remove the rotor from the end frame (Fig. 0675).



Fig 0675

PICT-8198

20. Using a straight screwdriver, remove the bearing cover from the bearing on the rotor shaft (Fig. 0677).



Fig 0677

PICT-8204a

19. Remove the wave washer from the rotor (Fig. 0676).

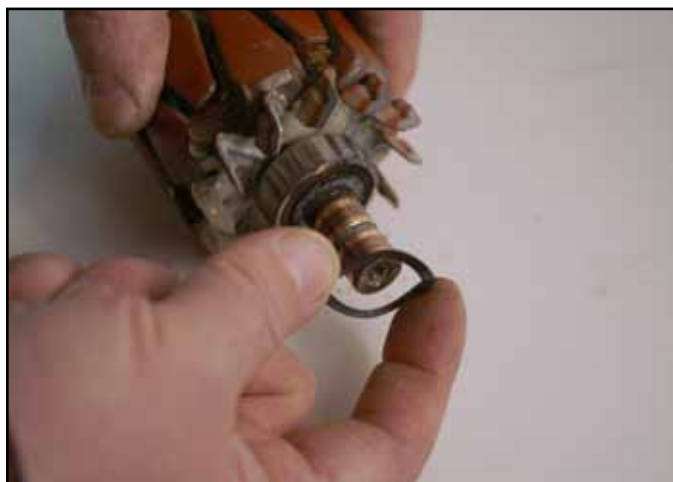


Fig 0676

PICT-8203a

21. Using a puller, remove the bearing from the rotor shaft (Fig. 0678).



Fig 0678

PICT-8206

ENGINE

22. Remove the washer from the rotor shaft (Fig. 0679).



Fig 0679

PICT-8208

24. Remove the retainer plate from the drive end frame (Fig. 0681).

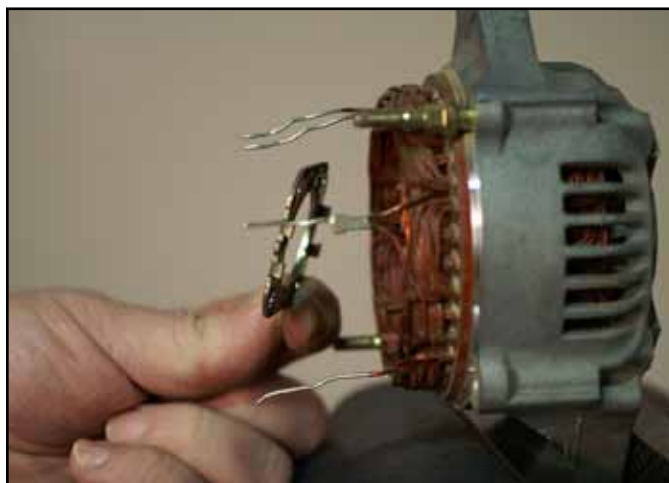


Fig 0681

PICT-8194

23. Using a Phillips screwdriver, remove the 4 screws securing the retainer plate to the inside of the drive end frame (Fig. 0680).

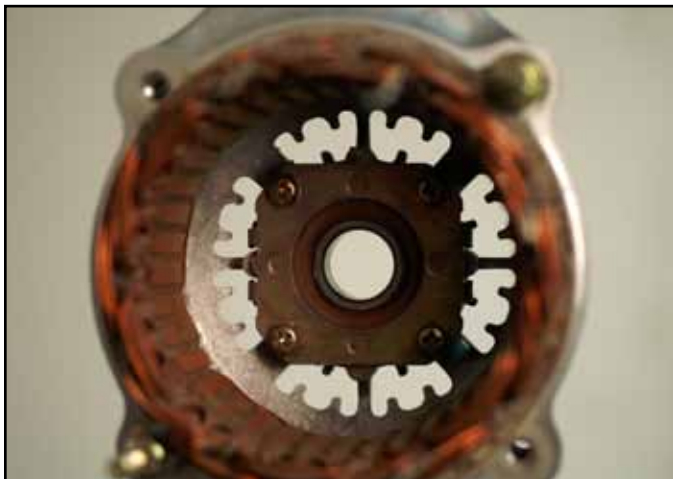


Fig 0680

PICT-8192

25. Press the bearing out of the drive end frame (Fig. 0682).

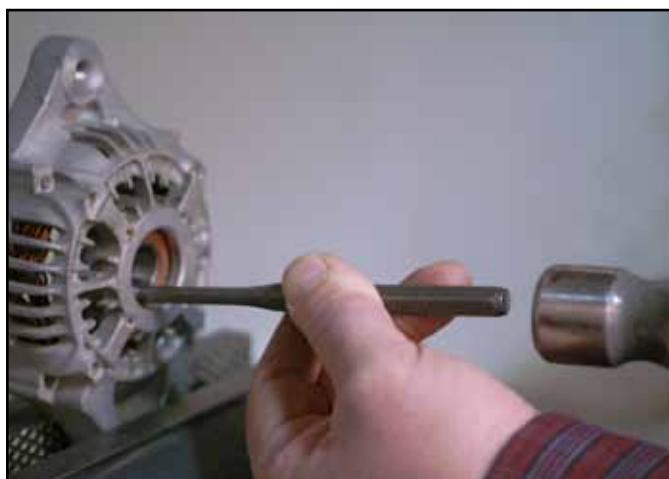


Fig 0682

PICT-8197a

26. Inspect the bearings, rotor shaft and brushes. Replace if worn or damaged.

27. Test the stator, rotor, slip ring, brush wear, and rectifier. Refer to "Alternator Testing" on page 4-159.

Alternator Testing

Stator



Fig 0683

PICT-8218

1. Measure the resistance across each lead of the stator coil with the resistance range on a circuit tester (Fig. 0684).



Fig 0684

PICT-8219

2. If the measurement is not less than 1 ohm, replace the stator.
3. Check the continuity across each stator coil lead and the core with the resistance range on a circuit tester (Fig. 0685).



Fig 0685

PICT-8220

4. If infinity is not indicated, replace the stator.

ENGINE

Rotor



Fig 0686

PICT-8215a

1. Measure the resistance across the slip rings with the resistance range on a circuit tester (Fig. 0687).

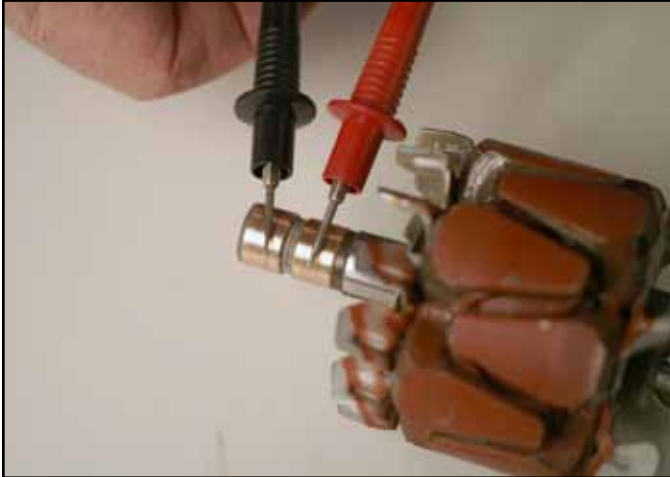


Fig 0687

PICT-8216a

2. If the resistance is not 2.9 ohms, replace the rotor.
3. Check the continuity across the slip ring and the core with the resistance range on a circuit tester (Fig. 0688).

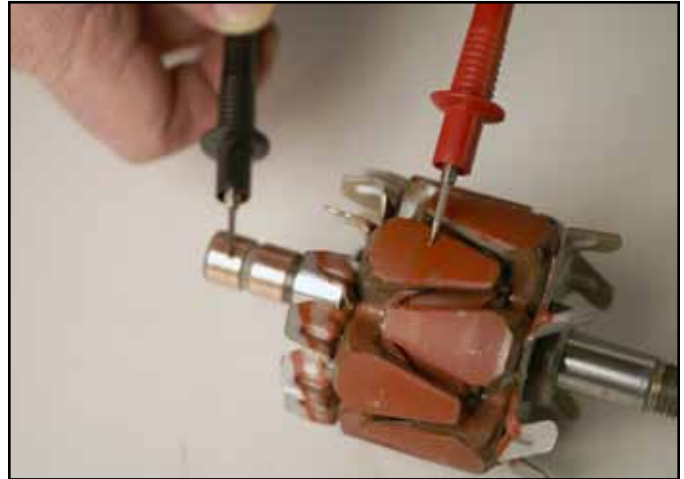


Fig 0688

PICT-8217a

4. If infinity is not indicated, replace the rotor.

Slip Ring



Fig 0689

PICT-8224a

1. Check the slip ring surface for scoring.
2. If scored, correct with an emery paper or on a lathe.
3. Measure the OD of the slip ring with vernier calipers.
4. If the measurement is less than .551" (14.0mm), replace the rotor.

Brush Wear

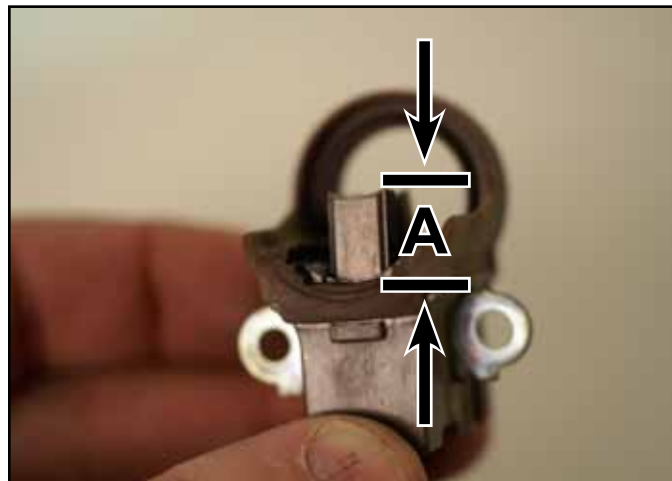


Fig 0690

PICT-8222

A. .331" (8.4mm)

1. Measure the brush length with vernier calipers (Fig. 0000).
2. If the measurement is less than .331" (8.4mm), replace the brush assembly.
3. If the brush does not move smoothly in the brush holder, replace the brush assembly.

ENGINE

Rectifier

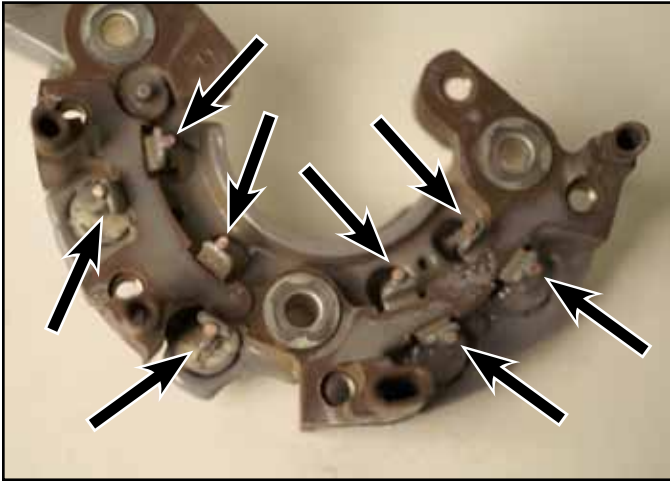


Fig 0691

PICT-8210



Fig 0692

PICT-8211

1. Check the continuity across each diode (8) of the rectifier with the resistance range setting on a circuit tester.
2. The rectifier is normal if the diode in the rectifier conducts in one direction and does not conduct in the reverse direction.

IC Regulator



Fig 0693

PICT-8213

1. Check the continuity across the B terminal and the F terminal of IC regulator with resistance range of circuit tester.
2. The IC regulator is normal if resistance is measured in one direction and an open circuit is measured in the reverse direction (Fig. 0694).

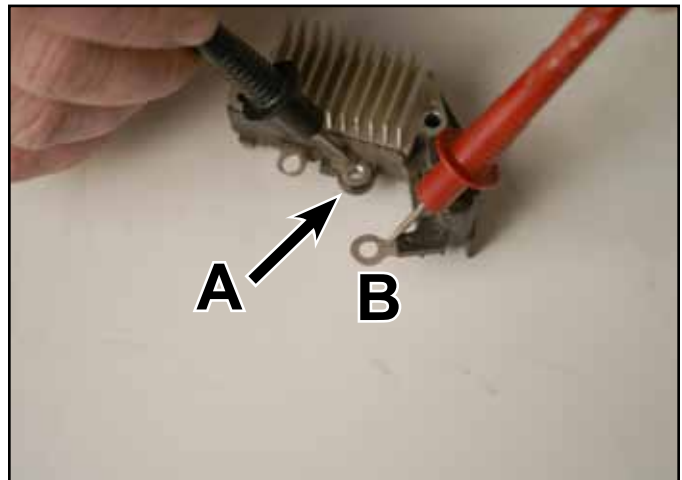


Fig 0694

PICT-8214a

A. F Terminal

B. B Terminal

Alternator Reassembly

1. Slide a washer onto the slip ring end of the rotor shaft (Fig. 0695).
2. Press a bearing (smaller OD than the drive end frame bearing) onto the slip ring end of the rotor shaft (Fig. 0696 and Fig. 0697).



Fig 0695

PICT-8225a



Fig 0696

PICT-8227



Fig 0697

PICT-8230a

ENGINE

3. Install a bearing cover onto the rotor shaft over the bearing (Fig. 0698 and Fig. 0699).



Fig 0698

PICT-8229a

4. Slide a wave washer onto the slip ring end of the rotor shaft (Fig. 0700).

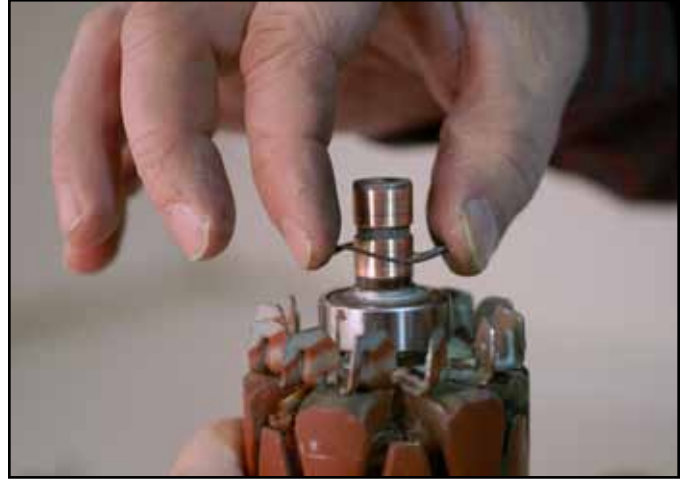


Fig 0700

PICT-8231a



Fig 0699

PICT-8230a

5. Install the slip ring shaft end of the rotor assembly into the rear end frame (Fig. 0701).



Fig 0701

PICT-8232a

6. Install the bearing into the drive end frame (Fig. 0702 and Fig. 0703).



Fig 0702

PICT-8233

7. Position the retainer plate into the drive end frame over the bearing with the retainer plate tabs facing toward the bearing (Fig. 0704).

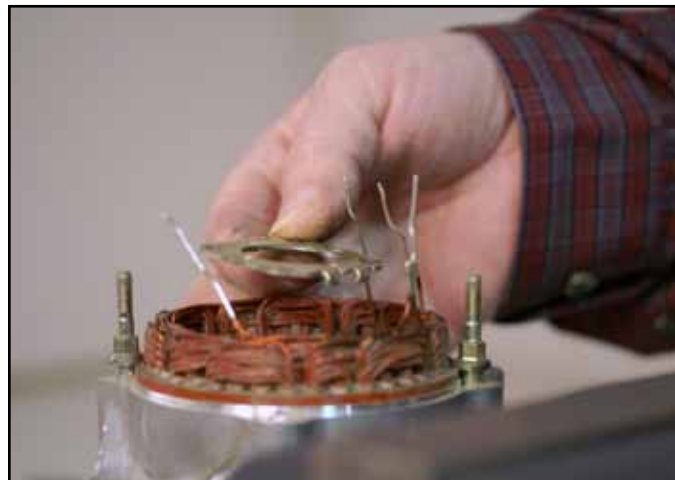


Fig 0704

PICT-8236a



Fig 0703

PICT-8234a

8. Using a Philips screwdriver, install 4 screws to secure the retainer plate to the inside of the drive end frame (Fig. 0705).



Fig 0705

PICT-8238

ENGINE

9. Slide the rear end frame/rotor assembly into the drive end frame assembly (Fig. 0706 and Fig. 0707).



Fig 0706

PICT-8239

10. Using an 8mm socket, install 2 nuts and 2 bolts securing the rear end frame to the drive end frame assembly (Fig. 0708).

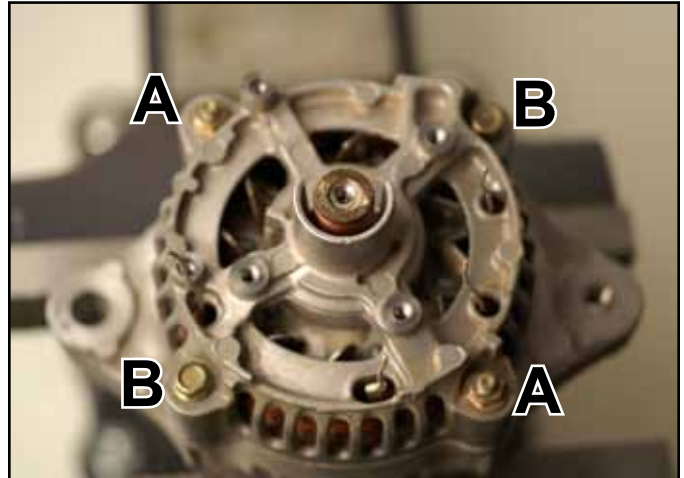


Fig 0708

PICT-8242

A. Nuts (2)

B. Bolts (2)



Fig 0707

PICT-8240

11. Position the rectifier onto the alternator assembly so the 4 stator leads feed through the 4 holes that are next to each of the screw holes in the rectifier (Fig. 0709 and Fig. 0710).



Fig 0709

PICT-8243

12. Coil each of the 4 stator leads that are threaded through the rectifier so that they each coil around the threaded screw holes (Fig. 0711).

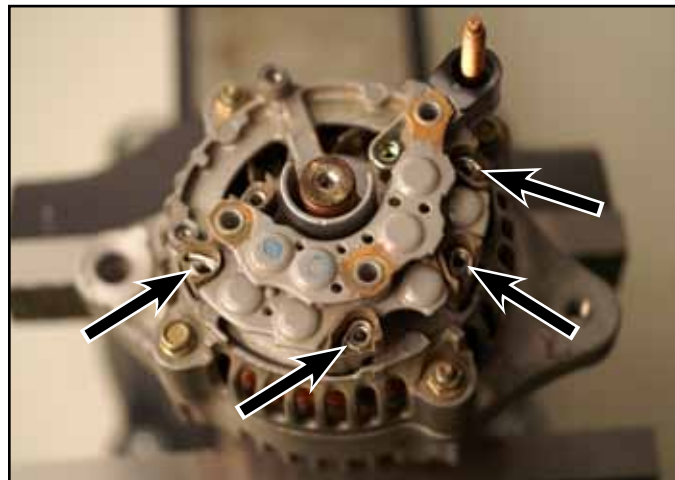


Fig 0711

PICT-8247



Fig 0710

PICT-8245

13. Install 4 screws securing the stator coil leads and rectifier to the alternator assembly (Fig. 0712).

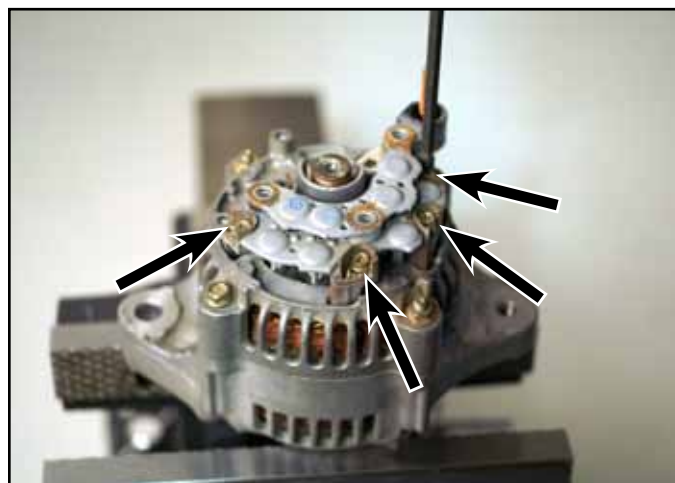


Fig 0712

PICT-8249a

ENGINE

14. Position the regulator assembly to the alternator (Fig. 0713).



Fig 0713

PICT-8250

16. Position the brush holder onto the alternator assembly (Fig. 0715).

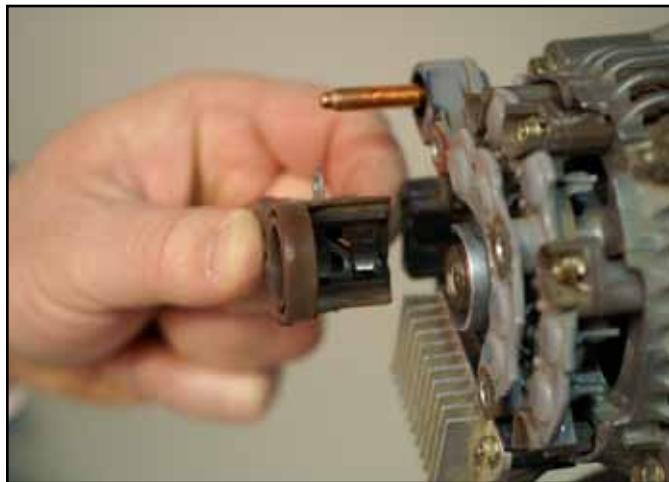


Fig 0715

PICT-8255

15. Install 3 screws to secure the regulator assembly to the alternator (Fig. 0714).

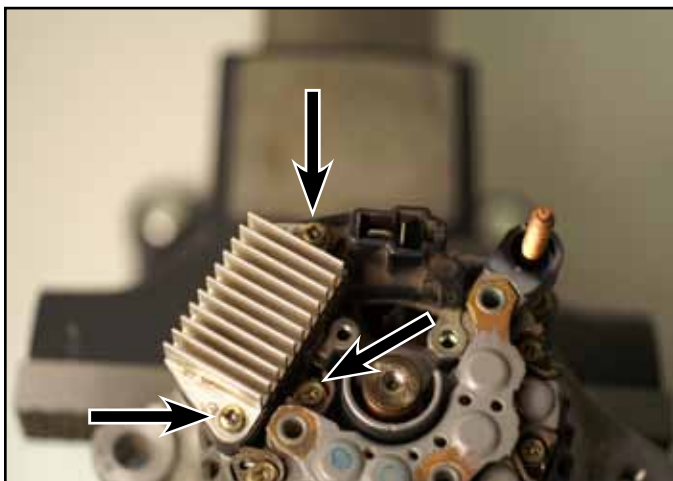


Fig 0714

PICT-8253

17. Install 2 screws securing the brush holder to the alternator assembly (Fig. 0716).

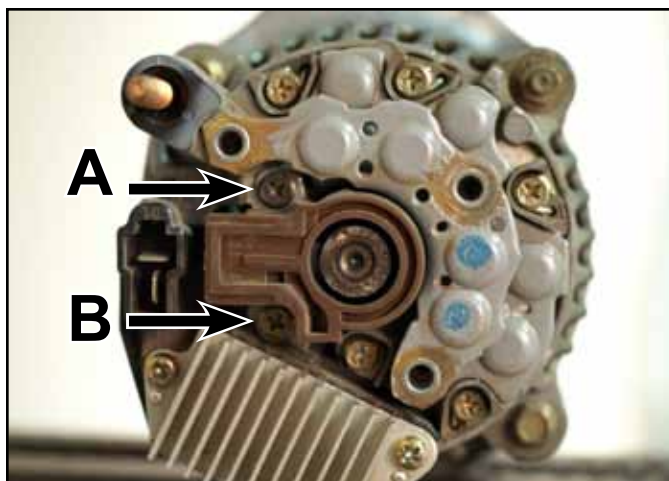


Fig 0716

PICT-8178

A. Longer screw

B. Shorter screw

18. Slide the end cover onto the alternator (Fig. 0717).

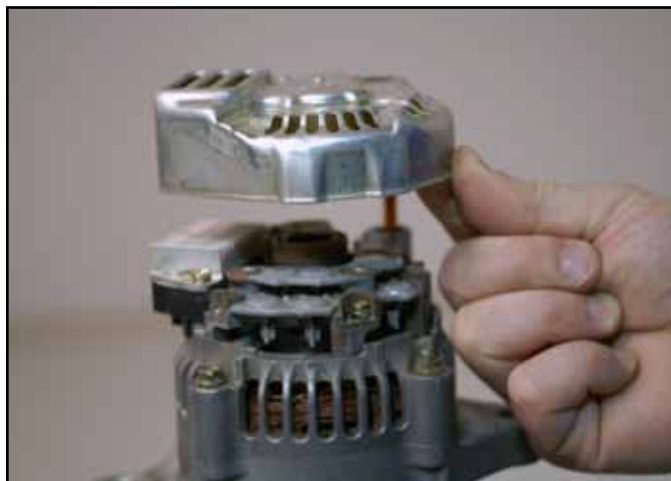


Fig 0717

PICT-8260a

20. Slide the insulation bushing onto the battery post (Fig. 0719).



Fig 0719

PICT-8263a

19. Using a 7mm socket, install 3 bolts to secure the end cover to the alternator (Fig. 0718).



Fig 0718

PICT-8261a

21. Using a 10mm socket, install the battery post nut (Fig. 0720).



Fig 0720

PICT-8265a

ENGINE

22. Slide a collar onto the alternator shaft (Fig. 0721).



Fig 0721

PICT-8267a

24. Using a 22mm socket and a strap wrench, install a nut onto the alternator shaft to secure the pulley. Torque the nut to 43.0 to 58.2 ft-lbs. (58.3 to 78.9 Nm) (Fig. 0723).



Fig 0723

PICT-8270a

23. Slide the pulley onto the alternator shaft (Fig. 0722).



Fig 0722

PICT-8268a

Starter Assembly Teardown

1. Secure the starter in a vise (Fig. 0724).

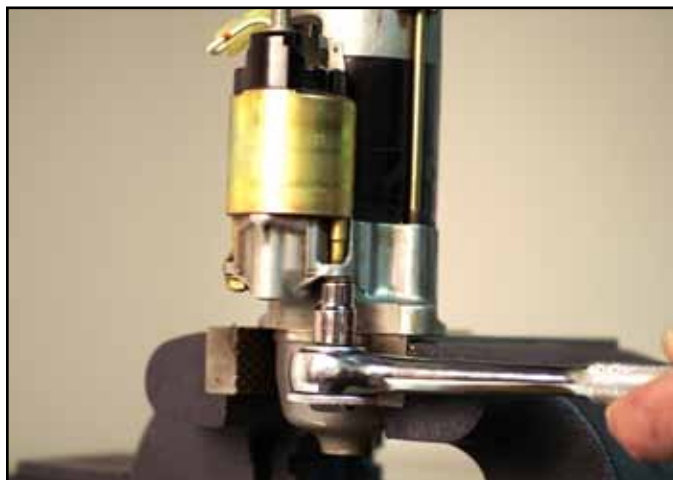


Fig 0724

PICT-8018a

3. Remove the jumper wire ring terminal and the starter wire from the magnetic switch terminal (Fig. 0726 and Fig. 0727).



Fig 0726

PICT-8022a

2. Using a 12mm socket, remove the nut from the magnetic switch terminal (Fig. 0725).



Fig 0725

PICT-8019a



Fig 0727

PICT-8024a

ENGINE

4. Using a 10mm socket, remove the nuts from the mounting bolts securing the magnetic switch assembly to the starter (Fig. 0728).

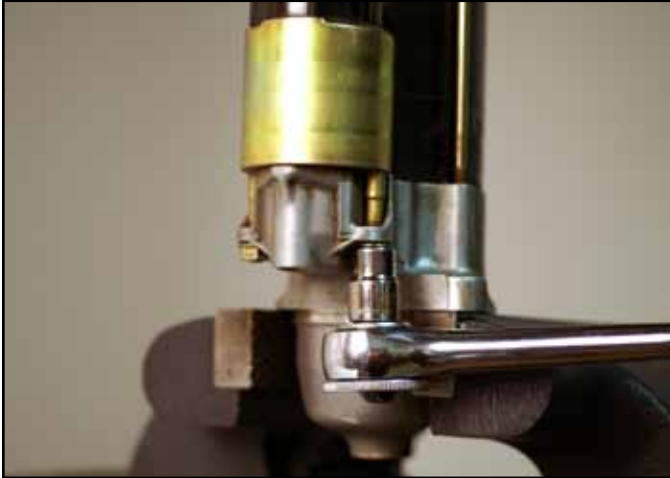


Fig 0728

PICT-8027a

6. Using a Phillips screw driver, remove the 2 screws securing the frame assembly to the brush spring (Fig. 0730).



Fig 0730

PICT-8032a

5. Remove the magnetic switch assembly from the starter by sliding it out of the drive lever and away from the starter (Fig. 0729).



Fig 0729

PICT-8028a

7. Using an 8mm socket, remove the 2 through bolts from the starter assembly (Fig. 0731).



Fig 0731

PICT-8033a

8. Remove the cover from the frame assembly (Fig. 0732).



Fig 0732

PICT-8144

9. Remove the frame assembly from the starter assembly (Fig. 0733).



Fig 0733

PICT-8034a

10. Pull the springs back and slide the 2 positive brushes out of the spring holder assembly (Fig. 0734).

Note: The positive brushes have leads attached to the yoke.



Fig 0734

PICT-8040

11. Slide the brush holder off the yoke assembly (Fig. 0735).

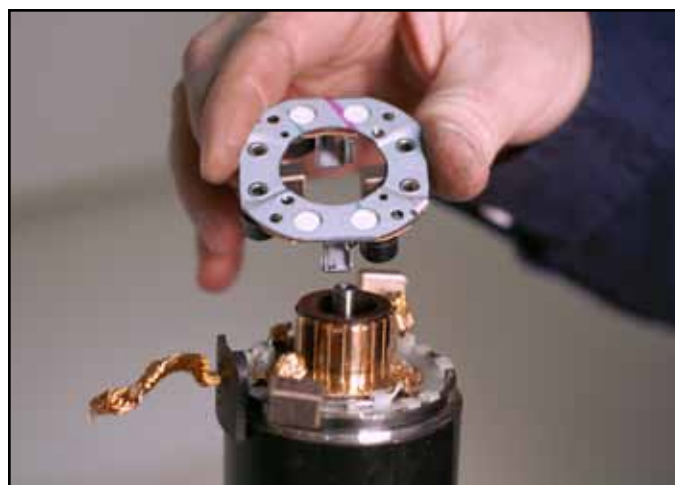


Fig 0735

PICT-8041a

ENGINE

12. Slide the yoke assembly off of the armature (Fig. 0736).



Fig 0736

PICT-8042a

14. Remove the plate from the starter (Fig. 0738).



Fig 0738

PICT-8044a

13. Remove the armature assembly (Fig. 0737).



Fig 0737

PICT-8043a

15. Remove the 3 gears from on top of the starter shaft assembly (Fig. 0739).



Fig 0739

PICT-8046

16. Draw out the shaft assembly with the drive lever and the overrunning clutch from the housing (Fig. 0740).



Fig 0740

PICT-8045a

18. Using a 12mm socket, drive the collar off the circlip on the shaft assembly (Fig. 0742).



Fig 0742

PICT-8048a

17. Remove the starter housing from the vise and clamp the shaft assembly into the vise with the clutch assembly facing up (Fig. 0741).



Fig 0741

PICT-8047a

19. Remove the circlip from the shaft assembly (Fig. 0743).



Fig 0743

PICT-8050a

ENGINE

20. Remove the collar from the shaft (Fig. 0744).



Fig 0744

PICT-8107a

22. While supporting the shaft, remove the snap ring (Fig. 0746).



Fig 0746

PICT-8056a

21. Remove the clutch assembly from the shaft (Fig. 0745).



Fig 0745

PICT-8051a

23. While supporting the shaft, remove the washer from the shaft (Fig. 0747).



Fig 0747

PICT-8057a

24. Remove the shaft from the gear/bearing assembly (Fig. 0748).



Fig 0748

PICT-8058

26. Inspect:
Gears (3) (Fig. 0750):



Fig 0750

PICT-8101a

25. Remove the gear from the bearing assembly (Fig. 0749).



Fig 0749

PICT-8059a

Shaft (Fig. 0751):



Fig 0751

PICT-8093a

ENGINE

Ring gear (Fig. 0752):



Fig 0752

PICT-8098a

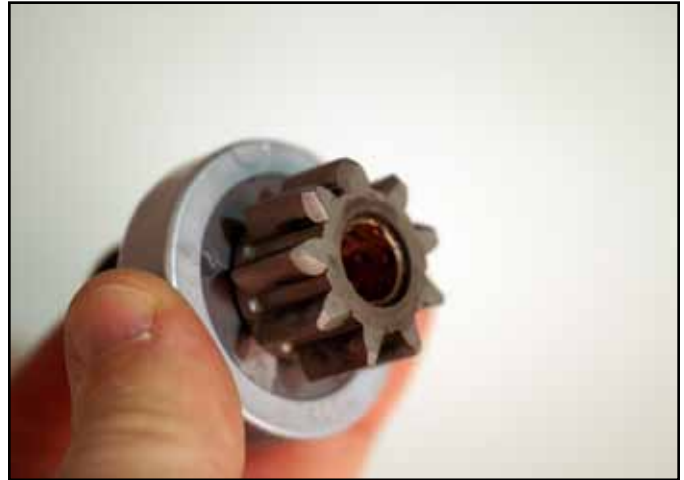


Fig 0754

PICT-8096a

Collar (Fig. 0755):

Clutch assembly (Fig. 0753 and Fig. 0754):



Fig 0753

PICT-8094a



Fig 0755

PICT-8099a

Lever (Fig. 0756):



Fig 0756

PICT-8102a

27. Inspect the armature commutator and mica (Fig. 0757):

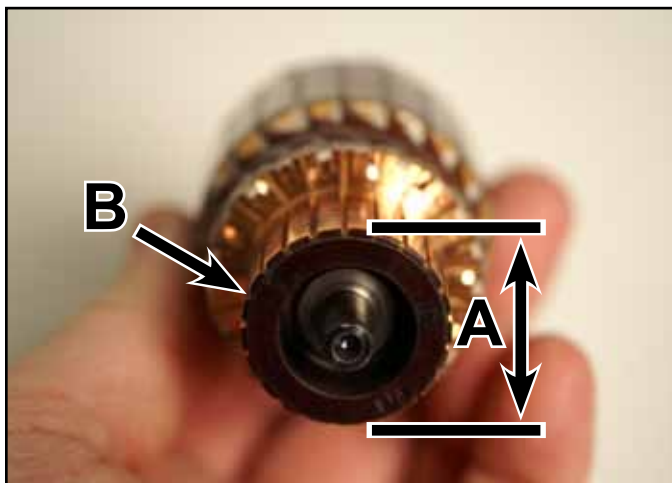


Fig 0757

PICT-8077

A. Commutator OD

B. Mica undercut

- Check the commutator bar for wear. Polish the commutator with very fine emery paper if it is slightly worn (mica undercut must be thoroughly cleaned of emery dust).
- Measure the commutator OD with an outside micrometer at several points.
- If the minimum OD is less than the allowable limit of 1.142" (29.0mm), replace the armature.
- If the difference of the ODs exceeds the allowable limit of .0020" (.05mm), correct the commutator on a lathe to the factory specification of .0008" (.02mm).
- Measure the mica undercut.
- If the under cut is less than the allowable limit of .0079" (.20mm), correct it with a saw blade and chamfer the edges.

	Factory Spec.	Allowable Limit
Commutator OD	1.181" (30.0mm)	1.142" (29.0mm)
Difference of ODs	.0008" (.02mm)	.0020" (.05mm)
Mica undercut	.0197" to .0315" (.50 to .80mm)	.0079" (.20mm)

28. Test the field coil, brush holder, armature coil, brush wear. Refer to "Starter Assembly Testing" on page 4-188.

ENGINE

Starter Assembly Rebuild

1. Slide the shaft into the gear (Fig. 0758).



Fig 0758

PICT-8085a

2. Secure the bearing assembly in a vise.
3. Insert the shaft/gear assembly into the bearing assembly (Fig. 0759).

Note: There is a tab on the gear and bearing for alignment.



Fig 0759

PICT-8088

4. While supporting the shaft, slide a washer onto the shaft (Fig. 0760).



Fig 0760

PICT-8090a

5. While supporting the shaft, install a snap ring (Fig. 0761).



Fig 0761

PICT-8092a

6. Slide the clutch assembly onto the shaft (Fig. 0762).



Fig 0762

PICT-8105a

8. Install a circlip into the groove of the shaft assembly (Fig. 0764).



Fig 0764

PICT-8108

7. Slide the collar onto the shaft (Fig. 0763).



Fig 0763

PICT-8107a

9. Press the collar onto the installed circlip (Fig. 0765).



Fig 0765

PICT-8110

ENGINE

10. Remove the shaft assembly from the vise and clamp the starter housing into the vise.
11. Slide the lever onto the shaft assembly between the washer and the clutch (Fig. 0766).

Note: There is a notch in the bottom of the bearing assembly (Fig. 0768) that fits into the groove inside the housing (Fig. 0769). The notch and groove must be lined up to fully seat the bearing assembly in the housing.



Fig 0766

PICT-8112a



Fig 0768

PICT-8116

12. Insert the shaft/lever assembly into the starter housing (Fig. 0767).



Fig 0767

PICT-8114



Fig 0769

PICT-8115

13. Apply lithium grease to the gear teeth and the 3 gear posts on the shaft assembly (Fig. 0770).



Fig 0770

PICT-8117

15. Apply a light coat of lithium grease to the 3 gears (Fig. 0772).



Fig 0772

PICT-8121

14. Install 3 gears onto the shaft assembly gear posts (Fig. 0771).



Fig 0771

PICT-8119

16. Install the plate into the bearing assembly (Fig. 0773).

Note: There is a tab on the plate that must align with the groove inside the bearing.

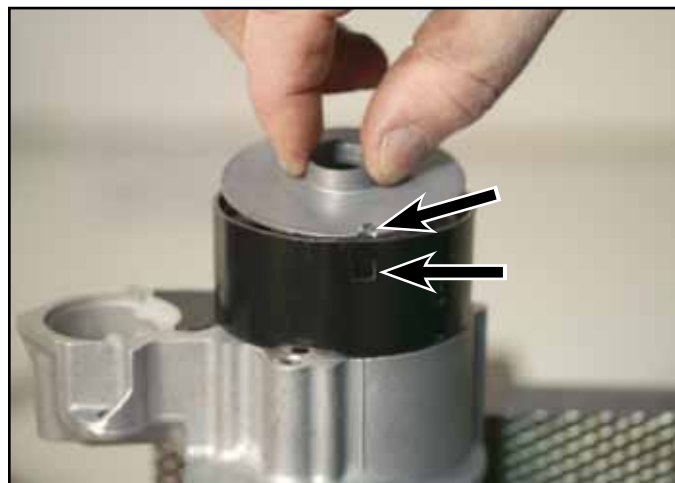


Fig 0773

PICT-8124a

ENGINE

17. Slide the armature assembly into the starter assembly (Fig. 0774).



Fig 0774

PICT-8125a

19. Pull back on the brush holder springs. Slide the brushes outward so that the springs are holding the brushes out (Fig. 0776).

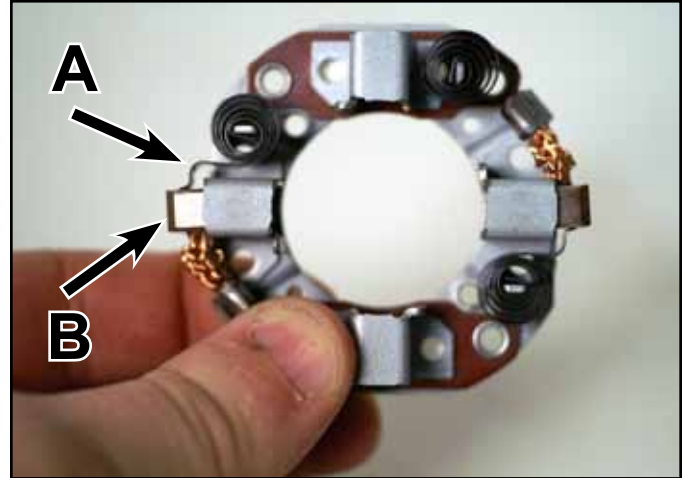


Fig 0776

PICT-8129a

18. Slide the yoke assembly onto the armature (Fig. 0775).

Note: There is a tab on the yoke that lines up with a groove in the armature.



Fig 0775

PICT-8126a

20. Slide the brush holder onto the yoke assembly. The open brush slots should line up with the positive brushes on the yoke (Fig. 0777).

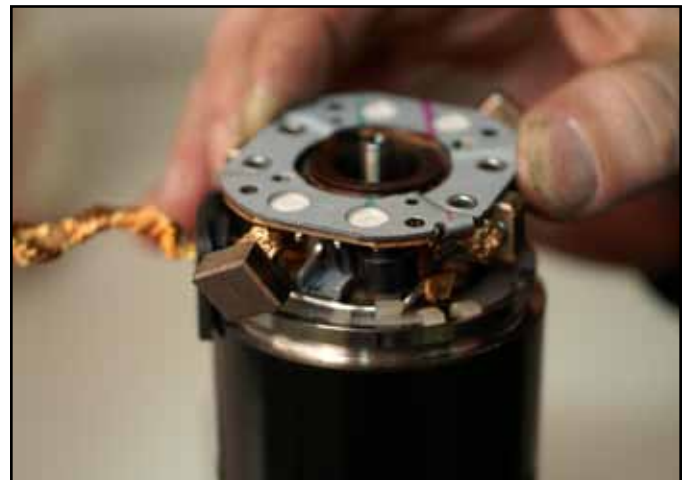


Fig 0777

PICT-8130

21. Lift the springs back and slide the 2 positive brushes into the open slots on the spring holder assembly. Release the springs (Fig. 0778).

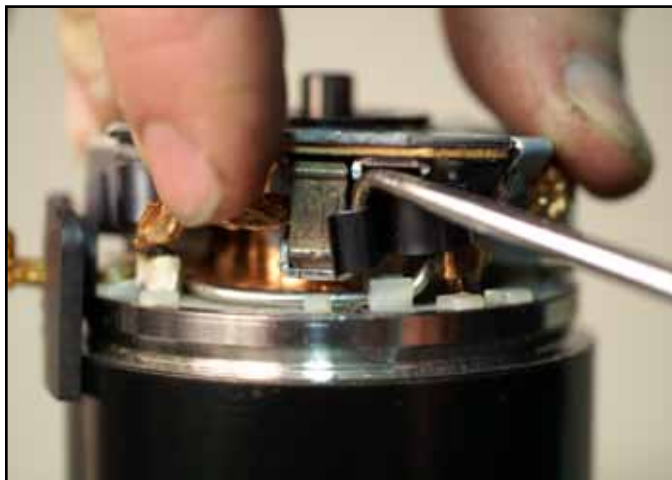


Fig 0778

PICT-8135

23. Slide the frame assembly onto the starter assembly aligning the notch in the frame with the grommet on the yoke (Fig. 0780).



Fig 0780

PICT-8141a

22. Lift the springs back and slide the 2 fixed brushes into the brush holder. Release the springs (Fig. 0779).



Fig 0779

PICT-8137

24. Insert the cover into the frame assembly (Fig. 0781).



Fig 0781

PICT-8145a

ENGINE

25. Using a Phillips screw driver, install 2 screws securing the frame assembly to the brush spring (Fig. 0782).



Fig 0782

PICT-9119a

26. Using an 8mm socket, install 2 through bolts securing the frame assembly to starter assembly (Fig. 0783).



Fig 0783

PICT-9121a

27. Position the magnetic switch onto the starter with the short terminal positioned closest to the starter.

Magnetic Switch Terminals (Fig. 0784)

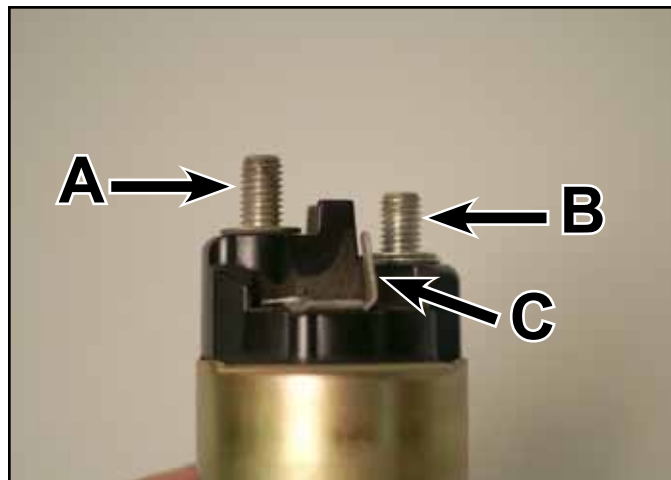


Fig 0784

PICT-8149a

- A. Tall terminal
B. Short terminal (closest to the starter)
C. Spade plug

Note: The end of the solenoid being inserted into the starter housing must engage with the starter lever (Fig. 0785).

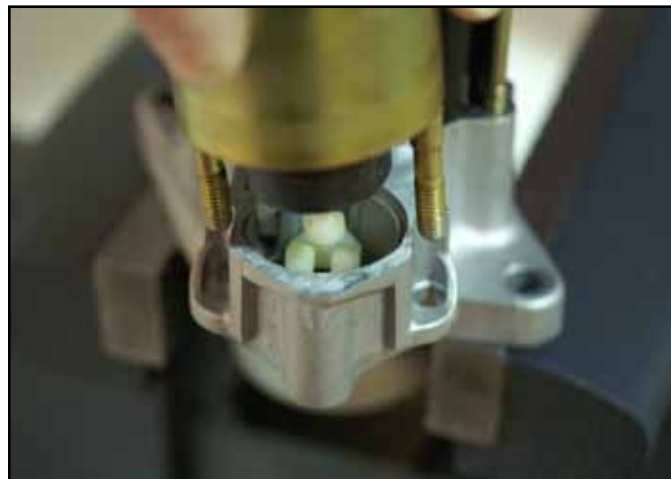


Fig 0785

PICT-8156

28. Using a 10mm socket, install 2 nuts onto the magnetic switch mounting bolts securing it to the starter (Fig. 0786).



Fig 0786

PICT-8158a

30. Slide the jumper wire ring terminal onto the short terminal on the magnetic switch (Fig. 0788).



Fig 0788

PICT-8163

29. Slide the starter wire onto the short terminal on the magnetic switch (Fig. 0787).



Fig 0787

PICT-8159

31. Using a 12mm socket, install a nut onto the magnetic switch short terminal to secure the wires (Fig. 0789).



Fig 0789

PICT-8164

ENGINE

Starter Assembly Testing

Brush Wear

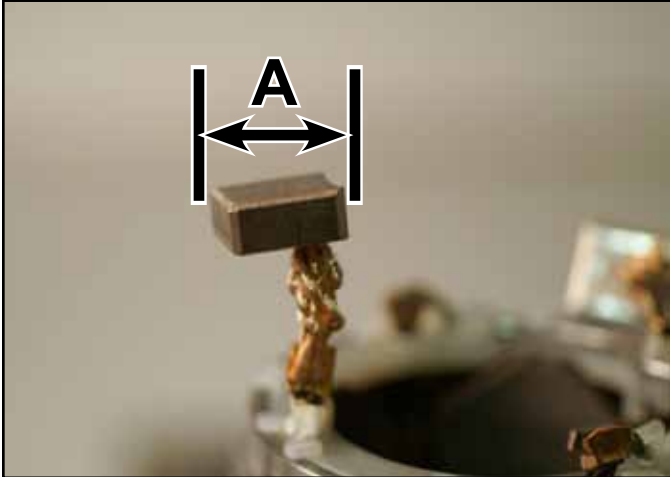


Fig 0790

PICT-8063a

A. .354" (9.0mm)

1. If the connecting face of the brush is dirty or dusty, clean it with emery paper.
2. Measure the brush length (A) with vernier calipers.
3. If the length is less than the allowable limit of .354" (9.0mm), replace the yoke assembly and the brush holder.

Brush Holder

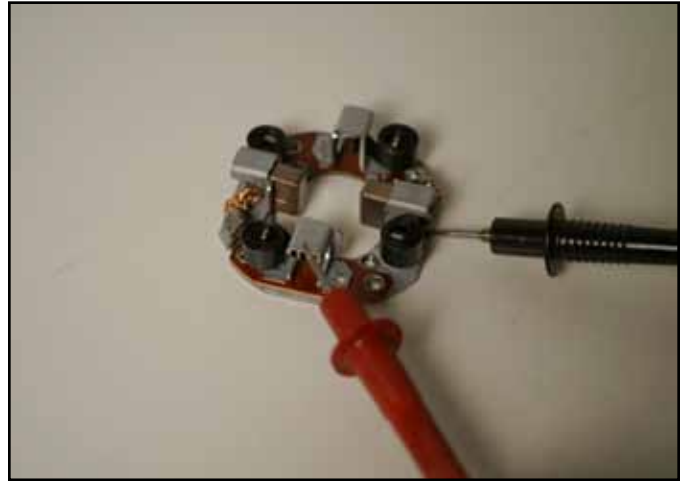


Fig 0791

PICT-8069a

1. Check the continuity across the brush holder and the holder support with a circuit tester.
2. If it conducts, replace the brush holder.

Armature Coil

1. Check the continuity across the commutator and armature coil core with a resistance range circuit tester (Fig. 0792).



Fig 0792

PICT-8070

2. If it conducts, replace the armature.
3. Check the continuity across the segments of the commutator with a resistance range circuit tester (Fig. 0793).



Fig 0793

PICT-8071

4. If it does not conduct, replace the armature.

Field Coil

1. Check the continuity across the lead and brush with a circuit tester (Fig. 0794).



Fig 0794

PICT-8072

2. If it does not conduct, replace the yoke assembly.
3. Check the continuity across the brush and yoke with a circuit tester (Fig. 0795).



Fig 0795

PICT-8073

4. If it conducts, replace the yoke assembly.

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Electrical

Many of the electrical components are located inside the control panel. To access them, remove the heat shield.

Heat Shield Removal

1. Raise the hood.
2. Remove the hairpin cotter from the hood rod (Fig. 0796).



Fig 0796

PICT-5256

3. Remove the hood rod (Fig. 0797).



Fig 0797

PICT-5257a

4. Using a 3/16" Allen wrench, remove the top 2 screws securing the heat shield to the tower. Using a 1/2" socket, remove the bottom 2 screws securing the heat shield to the tower (Fig. 0798).

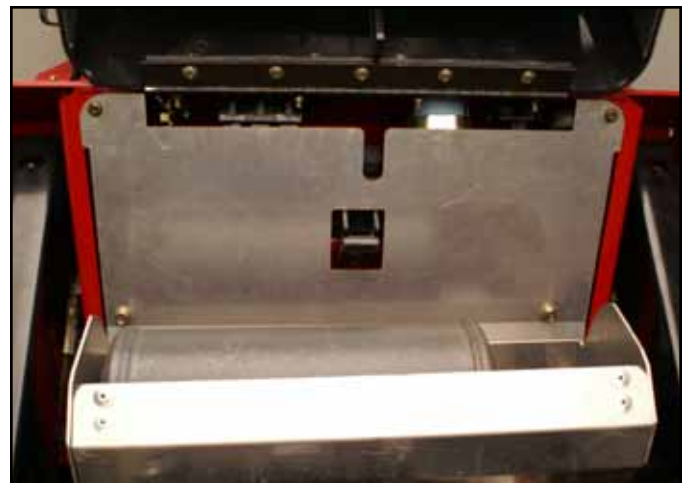


Fig 0798

PICT-5258

ELECTRICAL

5. Remove the heat shield (Fig. 0799).

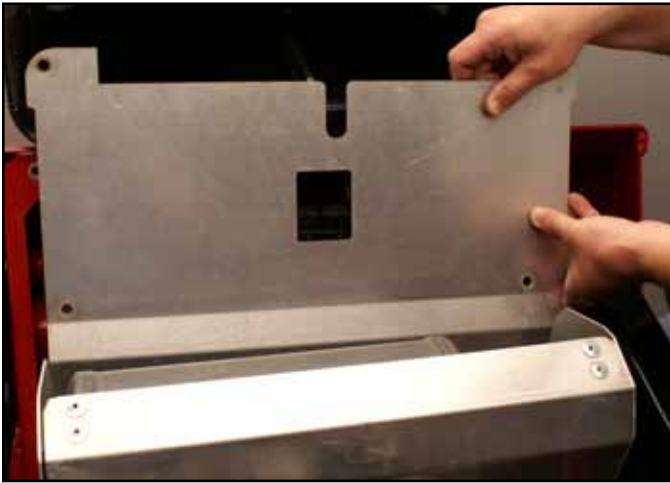


Fig 0799

PICT-5259

Ignition Switch

Purpose

This component provides the proper switching for the starter, ignition, accessories, and safety circuits.

Location

The ignition switch is mounted on the left side of the control panel (Fig. 0800).



Fig 0800

PICT-5260

How It Works

Detents inside the ignition 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.

Testing

- 1. Disconnect the switch from the wiring harness.
- 2. Verify that continuity exists between the terminals listed for the START and RUN switch positions. Verify that there is NO continuity between the terminals in the OFF switch position (Fig. 0801).

Position	Condition
OFF	No continuity
START	B + I + S
RUN	B + I + A and X + Y

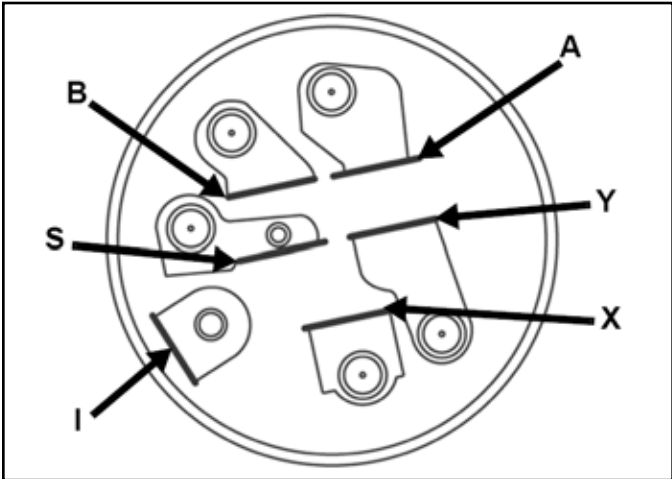


Fig 0801

MVC-166 art

Hour Meter

Purpose

The hour meter displays the number of hours of operation that have been logged on the traction unit.

Location

The hour meter is mounted in the control panel to the left of the ignition switch (Fig. 0802).



Fig 0802

PICT-5269

ELECTRICAL

How It Works

The digital hour meter is an electrical clock. It is not repairable and can not be reset.

Testing

The digital hour meter should be replaced if any of the functions do not work properly. Prior to replacing the hour meter, check the continuity of the signal wire, using a VOM multi-meter (ohm setting) connected between the ground wire, the pink wire at the battery charge indicator and the hour meter. If there is continuity, replace the hour meter.

Fuel Gauge

Purpose

The fuel gauge indicates the fuel level in the fuel tank.

Location

The fuel gauge is located in the center of the control panel (Fig. 0803).



Fig 0803

PICT-5274

How It Works

The meter moves in proportion to the amount of resistance provided by the fuel sender located in the fuel tank. The movement is dampened to compensate for movement of the fuel inside the tank.

Testing

1. Check the 10 amp fuse.
2. With the gauge still connected to the harness, turn the key to the ON position.
3. Using a VOM, set scale capable of reading 12 volts DC. Connect the negative lead to the ground terminal (G) and the other lead to the positive terminal (S) (Fig. 0804) to verify the conditions in the table below.
4. Replace the gauge if the fuel sender tests correctly but voltage/fuel level indication does not.



Fig 0804

IMG-6971

Terminal	Reading
G	0 Volts - Ground
I	12 Volts (B+ from Ignition switch)
S	2.5 Volts tank full*
S	7.5 Volts tank empty*

*All voltage readings should be within 20%. (Typical values)

Relay

Purpose

The TX525 uses three relays to direct current flow to different areas of the machine. The three relays are the kill relay, the start relay and the glow plug relay.

Location

The three relays are located inside the tower assembly (Fig. 0805).

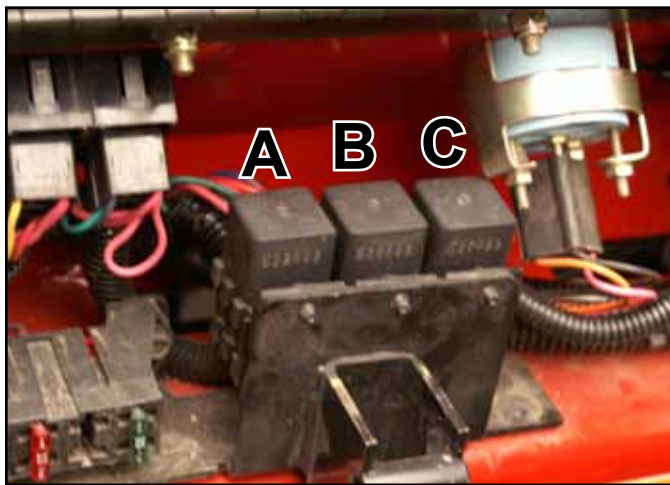


Fig 0805

PICT-5279

A. Interlock Relay
B. Start Relay

C. 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. 0806).

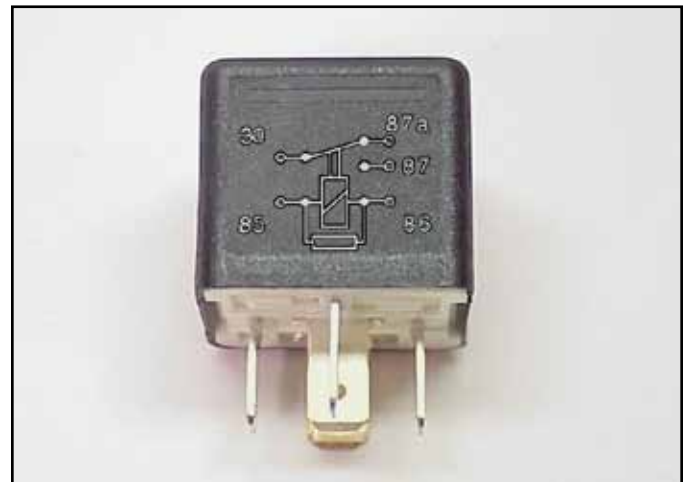


Fig 0806

MVC-0671

ELECTRICAL

Testing

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 (Fig. 0807).

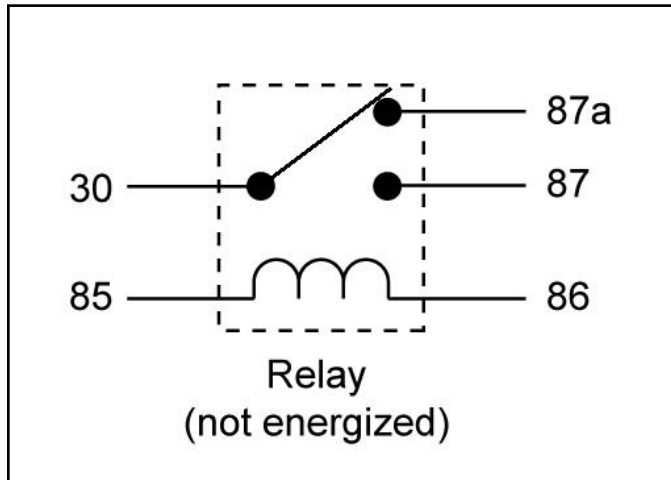


Fig 0807

xl relay

3. Connect the multimeter (ohms setting) leads to relay terminals 30 and 87. Ground terminal 86 and apply +12 VDC to terminal 85. The relay should make and break continuity between terminals 30 and 87 as 12 VDC is applied and removed from terminal 85 (Fig. 0000 above).
4. Connect the multimeter (ohms setting) leads to relay terminals 30 and 87a. Apply +12 VDC to terminal 85. With terminal 86 still grounded, the relay should break and make continuity between terminals 30 and 87a as 12 VDC is applied and removed from the terminal (Fig. 0000 above).
5. Disconnect voltage and multimeter leads from relay terminals.

Engine Oil Pressure and Battery Charge Indicator Light Cluster

Purpose

The engine oil pressure indicator light notifies the operator that the engine oil pressure is too low.

The battery charge indicator light notifies the operator that the battery charge has become too low.

Location

The Engine Oil Pressure/Battery Charge Indicator light cluster is located in the center of the control panel (Fig. 0808).



Fig 0808

PICT-5282

- A. Engine Oil Pressure Light
- B. Battery Charge Indicator Light

How It Works

If the engine oil pressure gets too low, the engine oil pressure light illuminates and an audible alarm sounds.

If the battery charge becomes too low, the battery charge indicator light illuminates.

Testing - Oil Pressure Light

Disconnect the wire harness plug from the light cluster. Connect 12v (+) to the "1A" terminal and connect ground (-) to the "1B" terminal. If the light does not illuminate replace the light assembly (Fig. 0809).

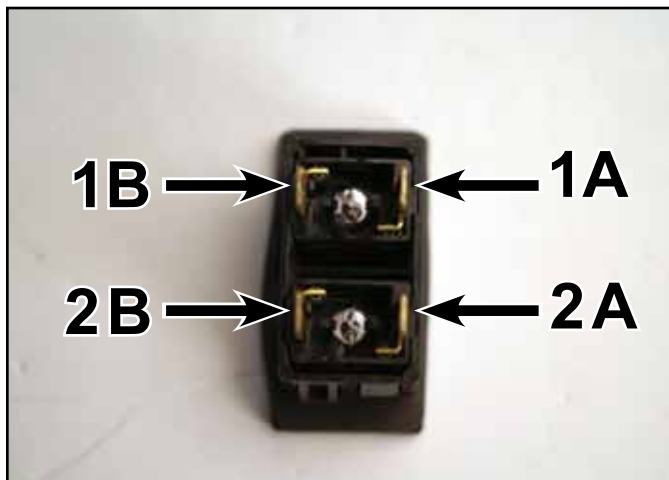


Fig 0809

PICT-5294a

1A-1B: Engine oil pressure light terminals

2A-2B: Battery charge light terminals

Testing - Battery Charge Light

Connect 12v (+) to the "2A" terminal and connect ground (-) to the "2B" terminal. If the light does not illuminate replace the light assembly (Fig. 0809).

If indicator lights test OK, check the circuit wiring and Oil Pressure Switch. The green wire from the voltage regulator needs to have battery voltage to keep the light from illuminating.

Water Temperature and Glow Plug Indicator Light Cluster

Purpose

The water temperature indicator light notifies the operator when the engine coolant gets too hot. An audible alarm will also sound.

The glow plug indicator light notifies the operator while the glow plugs are warming the pre-cumbustion chamber.

Location

The Water Temperature and Glow Plug Indicator Light Cluster is located in the center of the control panel (Fig. 0810).

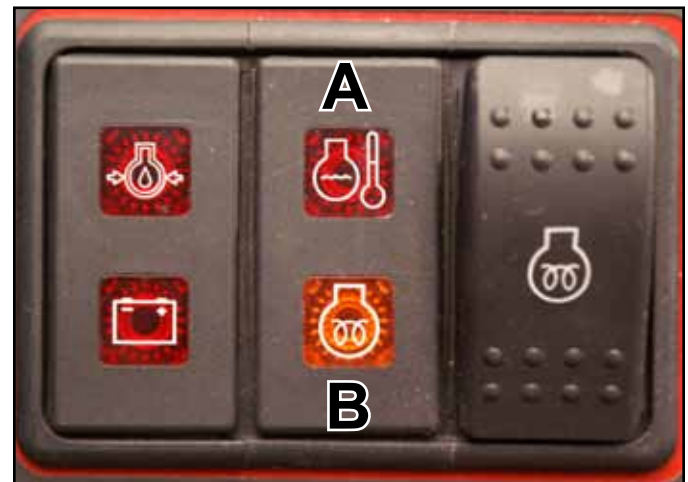


Fig 0810

PICT-5296

- A. Water Temperature Light
- B. Glow Plug Indicator Light

ELECTRICAL

How It Works

If the engine coolant gets too hot, the water temperature light illuminates and an audible alarm sounds.

If the glow plugs are receiving power, the indicator light illuminates.

Testing - Water Temperature Light

Disconnect the wire harness plug from the lights. Connect 12v (+) to the "1A" terminal and connect ground (-) to the "1B" terminal. If the light does not illuminate replace the light assembly (Fig. 0811).

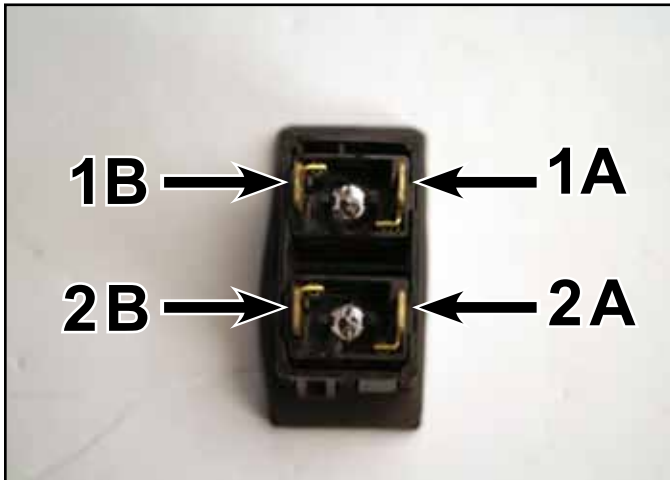


Fig 0811

PICT-5294a

1A-1B: Water Temperature Indicator Light

2A-2B: Glow Plug Indicator Light

Testing - Glow Plug Light

Connect 12v (+) to the "2A" terminal and connect ground (-) to the "2B" terminal. If the light does not illuminate replace the light assembly (Fig. 0811).

If indicator lights test OK, check the circuit wiring, Temperature Sender, Glow Plug Switch and Relay.

Glow Plug Switch

Purpose

The glow plug switch activates the glow plug relay which powers the glow plugs in addition to turning the glow plug indicator light on.

Location

The glow plug switch is located in the center of the control panel (Fig. 0812).



Fig 0812

PICT-5301

How It Works

The glow pug switch is manually depressed and held in place for 10 seconds. This activates the relay that closes the circuit which sends current to the glow plug.

Testing

Only terminals 1 and 2 are used in this application. The switch can be tested with an ohmmeter. There should be no continuity between terminals 1 and 2 except when the switch is depressed (Fig. 0813).

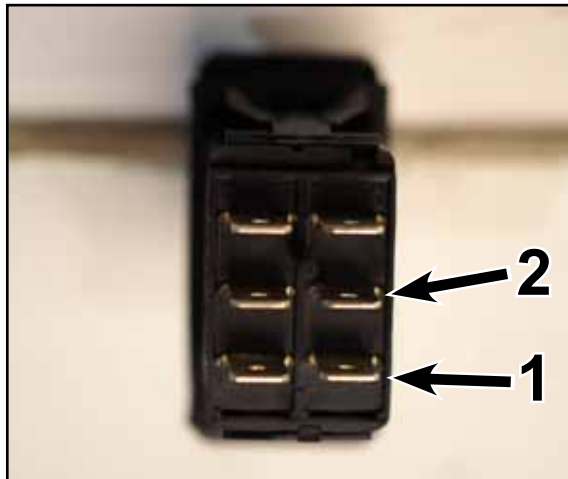


Fig 0813

PICT-4176

Water Temperature Sender

Purpose

The water 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 light, which indicates a higher temperature.

Location

The water temperature sender is located below the cooling system thermostat (Fig. 0814).



Fig 0814

PICT-5307

ELECTRICAL

How It Works

When the water temperature reaches an excessive operating temperature the switch closes and connects the high temperature audible alarm and indicator light to ground. The alarm sounds and the indicator light illuminates.

Testing

It is not practical to test the water temperature switch in a shop environment. Ground the lead connected to the switch to ensure the alarm sounds and the indicator light illuminates.

Oil Pressure Switch

Purpose

The oil pressure switch indicates low oil pressure and activates the oil light on the dash and the audible alarm.

Location

The oil pressure switch is located on the left side of the engine under the alternator (Fig. 0815).



Fig 0815

PICT-5312

Oil Pressure (Factory Specifications)

- Idle speed - 7 psi
- Rated speed - 28-64 psi
- Allowable - 21 psi

How It Works

When the engine oil pressure builds the oil switch opens which removes the ground to the oil light and the indicator light goes out.

Testing

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

Neutral Proximity (Magnetic) Switch

Purpose

The neutral proximity switch ensures the traction control lever is in the neutral/stop position when starting the unit. It is a magnetic type switch and it must be in close proximity to the traction control lever bolt to close the contacts (Fig. 0816).



Fig 0816

CLR MVC-878X

Location

The neutral proximity switch is located under the center panel of the control panel. The drive handle and the center panel must be removed to access the neutral switch (Fig. 0817).



Fig 0817

PICT-5610

How It Works

The neutral proximity switch has a sense zone which is the magnetic portion on the switch. A bolt located on the traction control lever aligns with the sense zone in the neutral/stop position to magnetically close the contacts in the switch (Fig. 0818).



Fig 0818

CLR MVC-885X

ELECTRICAL

Testing

1. Before electrically testing the switch, check the location of the switch and bolt, to make sure they are meeting in the sense zone on the switch. Both the switch and the bolt are adjustable and the air gap between them should be $1/8"$ to $1/4"$ (3.2 to 6.4mm).
2. Disconnect the switch from the wiring harness and remove it from the unit.
3. Using a multimeter (ohms setting), check the continuity of the switch at the wire terminals. There should be NO continuity (switch open).
4. Using the steel blade of a screw driver (a stainless steel blade will not activate switch), or similar object, touch the blade of the screw driver against the sense zone of the switch. There should be continuity (switch closed) (Fig. 0819).

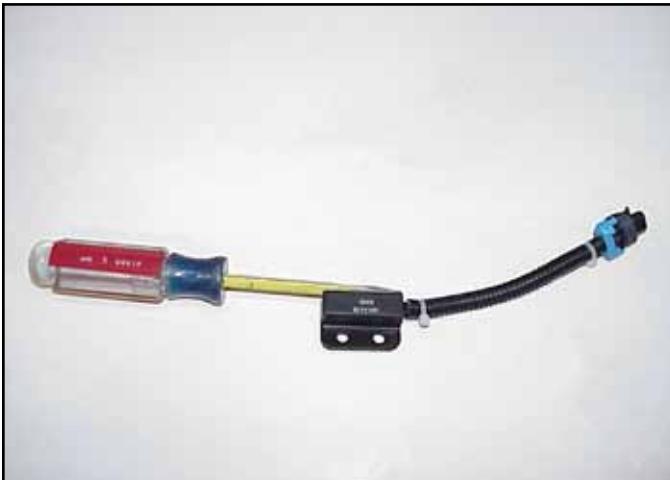


Fig 0819

CLR MVC-879X

Fuel Sender

Purpose

This electrical component sends a varying voltage to the control panel gauge corresponding to the fuel level in the tank.

Location

The fuel sender is mounted on the right side of the top surface of the fuel tank (Fig. 0820).



Fig 0820

PICT-5607

How It Works

A float is attached to a pivoting lever. The pivoting lever rotates a potentiometer (a device similar to the volume control on a stereo) to vary resistance. The resistance should vary from 33 to 240 ohms.

Testing

Disconnect the two wires and remove the mounting screws. Remove the sender from the fuel tank. Place the VOM negative lead on the negative terminal and the positive lead on the center stud. Refer to the chart below for proper resistance depending on float position.

Float Position	Resistance
Full	33 ohms + 20 ohms
Empty	240 ohms \pm 6 ohms

Alarm, Low Engine Oil

Purpose

The audible alarm produces a pulsating loud tone to alert the operator of high engine temperature.

Location

The audio alarm is located in the control panel under the left control panel cover (Fig. 0821).

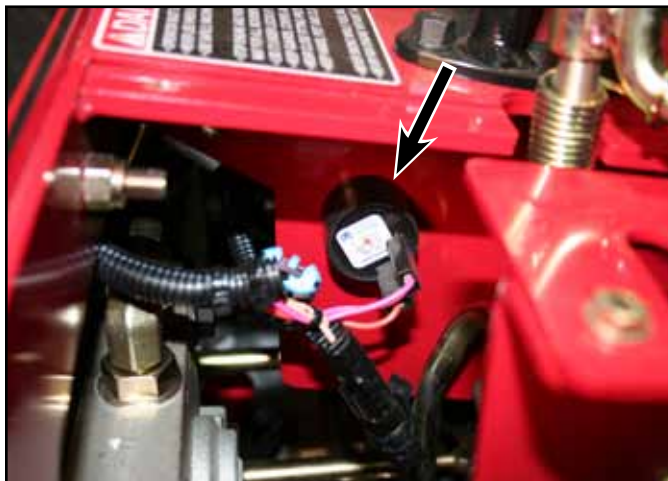


Fig 0821

IMG-6937

How It Works

There is +12VDC applied to the audio alarm when the key is in the ON or RUN positions. The Water Temperature Light provides a ground for the light and the audio alarm.

Testing

Ground the negative terminal (-) on the alarm. Apply 12 volts to the positive terminal (+) on the alarm. If the alarm does not sound, replace the alarm. If the alarm does sound test the electrical circuit (Fig. 0822).



Fig 0822

IMG-6969a

ELECTRICAL

Fuses

Purpose

Fuses are used in the circuits to limit damage in the event of excessive current flow. If a fuse fails, look for a short circuit, a corroded/poor connection, or any component that appears to have been overheated. A failed fuse is a sign of a problem in that circuit.

Location

Fuses are located under the hood, mounted to the tower assembly (Fig. 0823).

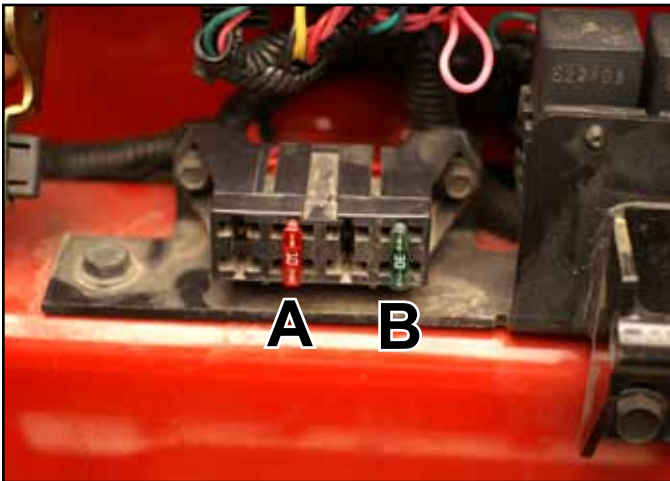


Fig 0823

PICT-5611

- A. 10 amp = glow plug heat switch, light cluster, gauges, fuel pump
- B. 30 amp = start circuit

How It Works

If the circuit the fuse is protecting draws too much current, the metal conductor in the fuse melts in two, opening the circuit.

Testing

A failed fuse will often be discolored or melted. Please note that not all fuse failures are easy to see. A fuse can be checked with a continuity tester if there is doubt. If there is no continuity between the fuse terminals, replace the fuse, even if it appears good.

Fusible Link

Purpose

The fusible link is a specially fabricated wire that acts as a high-current fuse to protect the circuit from excessive current draw.

Location

There are 2 fusible links on the TX525.

Shut down solenoid (Fig. 0824) .8mm fusible link:



Fig 0824

PICT-5612a

Start circuit (Fig. 0825) 2.0mm fusible link:



Fig 0825

PICT-5613a

How It Works

When current flow in the circuit exceeds that of the fusible link, the wire melts and interrupts the circuit.

Testing

2.0mm fusible link:

Check for a failure of the 30 amp fuse first. Check for 12 volts at the solenoid stud. Remove the heat shrink from the splice. Use a test light to check for power at the terminal end and of the splice. If power is present at one end and not the other, then the fusible link is bad.

Testing the fusible link with an ohmmeter:

Attach the ohmmeter leads to each side of the link. If it is good, you will get a reading on the meter. If not, it will read open. A fusible link that has seen excessive current will also have brittle or melted insulation.

.8mm fusible link:

Remove the heat shrink from the splice. Use a test light to check for power at the starter solenoid terminal end of the splice. If power is present at one end and not the other, then the fusible link is bad.

Testing the fusible link with an ohmmeter:

Disconnect the wire from the starter solenoid. Attach the ohmmeter leads to each side of the link. If it is good, you will get a reading on the meter. If not, it will read open. A fusible link that has seen excessive current will also have brittle or melted insulation.

ELECTRICAL

Glow Plug

Purpose

Glow plugs are a starting aid that preheats the pre-combustion chamber for the initial cold engine start and for cold weather starts.

Location

The glow plug is located on the top of the engine between the injectors and the valve cover. There is one glow plug for each cylinder (Fig. 0826).



Fig 0826

PICT-5456

How It Works

When the ignition key is in the ON position and the glow plug switch is pressed, 12VDC activates a relay which provides 12VDC to the common power rail (buss bar) connecting the glow plugs. The glow plugs are threaded into the head which provides the ground to the glow plug. The glow plug center element heats to a glowing red temperature to pre-heat the air in the pre-combustion chamber.

Testing

Remove the glow plug from the engine. Check the resistance between the terminal stud and the housing. If the resistance value is 5 ohms or lower the glow plug is good.

It is recommended to replace all glow plugs if one is found defective (Fig. 0827).



Fig 0827

PICT-6767

Battery

Purpose

A battery supplies the energy source required to activate the starter motor to spin the engine so it will start. It also supplies the energy required to power the various electrical circuits in addition to the alternator.

Location

The battery is located inside the rear frame cover on the right side (Fig. 0828).



Fig 0828

PICT-5624

How It Works

The battery is the main power source for the electrical system. The typical battery is made up of plates of lead and separate plates of lead oxide which are submerged into a electrolyte solution of 35% sulfuric acid and 65% water. This causes a chemical reaction that releases electrons which flow to produce electricity.

Testing

You must first have the battery fully charged prior to any test. The surface charge must be removed before testing. To remove surface charge the battery must experience a load of 20 amps for 3 plus minutes.

No-load battery testing is done with a hydrometer/refractometer or digital voltmeter. A calibrated (numerical) hydrometer is more accurate than the floating ball type. The hydro-meter/refractometer indicates the battery state of charge by measuring the specific gravity of the electrolyte. The voltmeter indicates the open circuit voltage of the battery, another indication of the battery's state of charge.

The reading on the digital voltmeter should be the voltage shown in the following table. If you have voltage readings in the 10.5 volts range on a charged battery, that indicates a shorted cell.

State of Charge	Specific Gravity	Voltage 12V
100%	1.265	12.7
75%	1.225	12.4
50%	1.190	12.2
25%	1.155	12.0
Discharged	1.120	11.9

The no-load tests do not tell you the capacity of the battery - that is, how many amps it can deliver over a period of time for this, a load tester must be used. A load tester removes amps from a battery much like starting an engine would. The battery may have a label with the amp load for testing and/or a Cold Cranking Amp (CCA) rating. The load test number is 1/2 of the CCA rating. For example, a 500 CCA battery would load test at 250 amps for 15 seconds. A load test can only be performed if the battery is near or at full charge.

If you have a maintenance free battery, the only ways to test are with a voltmeter and/or a load test.

ELECTRICAL

Storage

Batteries in equipment stored for some portion of the year will self-discharge. Sulfation between the battery plates can occur and shorten the life of the battery. It is important to periodically charge the battery during storage to prevent damage due to sulfation.

Alternator

Purpose

The alternator charges the battery to operate the electrical components and accessories.

Location

The alternator is located on the front left side of the engine (Fig. 0829).



Fig 0829

PICT-5620a

How It Works

The alternator is belt driven from the engine crankshaft pulley. The alternator generates AC (alternating current) using a rotor made up of north and south pole magnets staggered around the field windings that spins inside of the stator. When the rotor spins it creates a magnetic field that induces voltage into the stator. Brushes and slip rings on each end of the rotor shaft conduct current to the rotor field windings. The diode (rectifier) converts the AC power to DC (direct current). A solid state voltage regulator (internal to the alternator) determines how much charging current is needed by the battery.

Testing



Fig 0830

PICT-8769

1. Clean and inspect both battery terminals and cables.

Using a voltmeter set to DC power:

2. Touch the red voltmeter lead to the positive battery terminal.
3. Touch the black voltmeter lead to the ground.
4. Start the engine at 1/2 throttle.
 - The voltage should read 13.8 volts to 14.8 volts.
5. Place a load onto the electrical system.
 - The voltage should read around 13.8 volts to 14.8 volts.
 - A reading of 12 volts or less would indicate the alternator is not working to specification.

Starter

Purpose

The starter motor turns the engine over to start the engine combustion process.

Location

The starter is located on the left side of the engine under the exhaust (Fig. 0831).



Fig 0831

PICT-5623

How It Works

The starter motor and solenoid work together to crank the engine over. The solenoid works as an electric switch that connects the battery with the starter motor. When the ignition key is turned to the start position battery voltage activates the solenoid that energizes the starter motor and pushes the starter gear forward. The starter gear meshes with the engine flywheel to crank the engine.

Testing

1. Clean and inspect the battery cables and terminal ends for damage.
2. Use a voltmeter to check the battery voltage at the positive cable post on the starter solenoid.
 - The voltage should not read less than 12 volts. If 12 volts is not present, charge the battery and inspect battery cable and connections.
3. If the voltage is good at the positive starter post then proceed to the next step.
4. Turn the ignition key to the START position.
5. Use a voltmeter to check for 12 volts at the starter solenoid blue wire terminal.
 - If 12 volts is not present then test the start relay, blue wire, battery cables and connections.
 - If 12 volts is present then remove and replace starter solenoid and starter motor.

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HYDRAULIC SYSTEM

2 Spool Loader Valve Replacement

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

Upon removal, all seals, o-rings, and gaskets should be replaced. During installation, lightly lubricate all seals, o-rings, and gaskets with clean petroleum jelly prior to assembly.

Protect the inner diameter of seals and o-rings from damage during assembly by covering the shaft machined features with plastic wrap or equivalent.

2. Using a 3/8" socket, remove the 3 self-tapping screws that secure the top right panel to the control panel assembly. Using a 3/8" socket and a 7/16" socket, remove the bolt and nut securing the lower left corner to the control panel assembly (Fig. 0833).

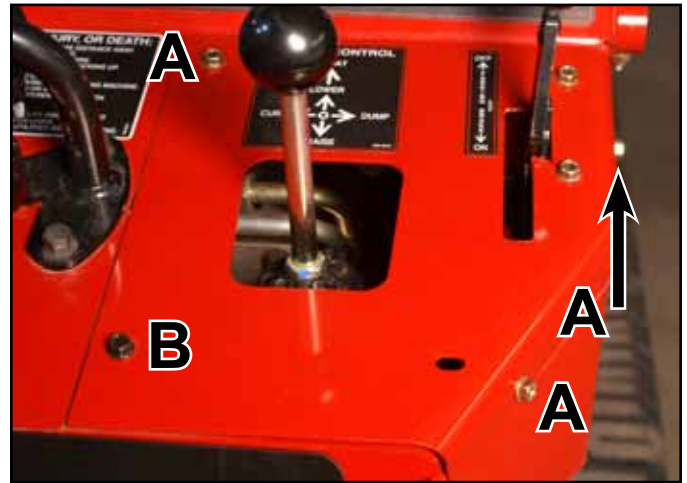


Fig 0833

PICT-4341

- A. Self-tapping screw (3) B. Bolt and nut

2 Spool Loader Valve Removal

1. Remove the knob from the brake handle (Fig. 0832).



Fig 0832

PICT-4342

3. Remove the right panel from the control panel assembly (Fig. 0834).



Fig 0834

PICT-4343a

HYDRAULIC SYSTEM

4. Remove the rear access panel (Fig. 0835).



Fig 0835

PICT-4505a

5. Using a 3/8" socket, remove the 3 screws securing the right hand side support bracket to the tower. Remove the right hand side support bracket (Fig. 0836).

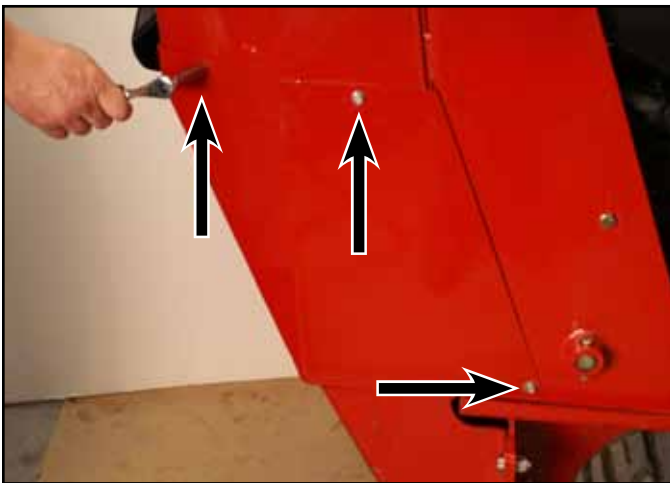


Fig 0836

PICT-4504

6. Mark the 2 spool valve fittings and hydraulic line nuts with the letters A – F as follows (Fig. 0837):

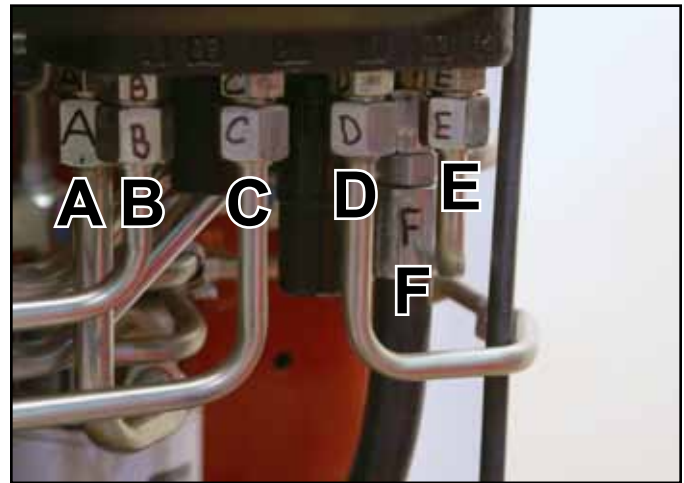


Fig 0837

PICT-4876a

- | | |
|-----------------------------|------------------------------|
| A. Hydraulic oil inlet line | D. Hydraulic oil return line |
| B. Tilt cylinder line | E. Lift cylinder line |
| C. Lift cylinder line | F. Tilt cylinder line |

7. Using a 15/16" wrench, disconnect the hydraulic line marked F from the 2 spool loader valve fitting (Fig. 0838).



Fig 0838

PICT-4879

HYDRAULIC SYSTEM

8. Using a 13/16" wrench, disconnect the hydraulic line marked E from the 2 spool loader valve (Fig. 0839).



Fig 0839

PICT-4880a

10. Using a 13/16" wrench, disconnect the hydraulic line marked C from the 2 spool loader valve (Fig. 0841).



Fig 0841

PICT-4882a

9. Using a 13/16" wrench, disconnect the hydraulic line marked D from the 2 spool loader valve (Fig. 0840).



Fig 0840

PICT-4881a

11. Using a 13/16" wrench, disconnect the hydraulic line marked B from the 2 spool loader valve (Fig. 0842).



Fig 0842

PICT-4884a

HYDRAULIC SYSTEM

12. Using a 15/16" offset wrench, disconnect the hydraulic line marked A from the 2 spool loader valve fitting (Fig. 0843).



Fig 0843

PICT-4886

14. Remove the 2 spool loader valve from the control panel assembly (Fig. 0845).

Note: Cap all the hydraulic lines and fittings so that debris does not enter the system.



Fig 0845

PICT-4896

13. Using a 1/2" wrench and socket, remove the 3 mounting bolts and lock washers that secure the 2 spool loader valve to the control panel (Fig. 0844).

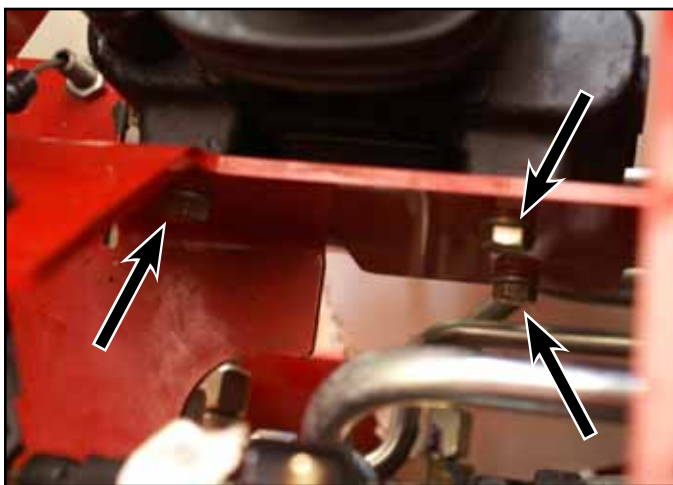


Fig 0844

PICT-4888

- 2 Spool Loader Valve (Fig. 0846).



Fig 0846

PICT-1749a

HYDRAULIC SYSTEM

15. Remove the handle from the valve and transfer it to the replacement valve (Fig. 0847).



Fig 0847

PICT-2584a

16. Transfer all fittings and the handle over to the replacement 2 spool loader valve.

2 Spool Loader Valve Installation

1. Remove the protective caps from the hydraulic lines and fittings.
2. Position the 2 spool loader valve into the control panel (Fig. 0848).



Fig 0848

PICT-4896

3. Use a 1/2" socket and wrench, install the 3 mounting bolts and lockwashers to secure the 2 spool loader valve to the control panel (Fig. 0849).

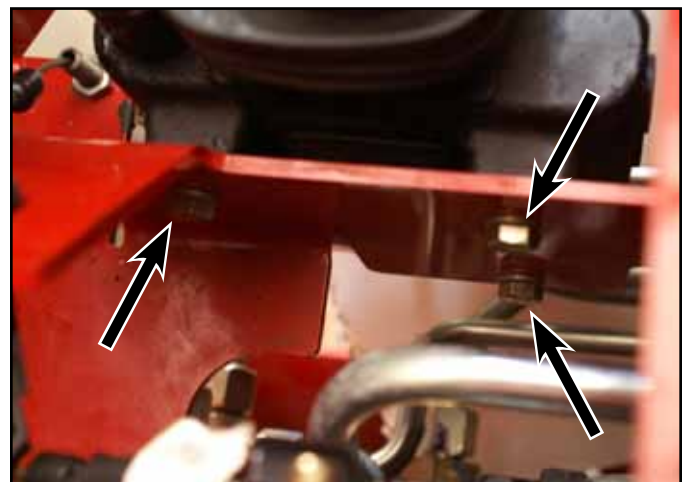


Fig 0849

PICT-4888

HYDRAULIC SYSTEM

4. Using a 15/16" offset wrench, connect the hydraulic line marked A to the 2 spool loader valve fitting marked A (Fig. 0850).



Fig 0850

PICT-4886

6. Using a 13/16" wrench, connect the hydraulic line marked C to the 2 spool loader valve fitting marked C (Fig. 0852).



Fig 0852

PICT-4882a

5. Using a 13/16" wrench, connect the hydraulic line marked B to the 2 spool loader valve fitting marked B (Fig. 0851).



Fig 0851

PICT-4884a

7. Using a 13/16" wrench, connect the hydraulic line marked D to the 2 spool loader valve fitting marked D (Fig. 0853).



Fig 0853

PICT-4881a

HYDRAULIC SYSTEM

8. Using a $\frac{13}{16}$ " wrench, connect the hydraulic line marked E to the 2 spool loader valve fitting marked E (Fig. 0854).



Fig 0854

PICT-4880a

9. Using a $\frac{15}{16}$ " wrench, connect the hydraulic line marked F to the 2 spool loader valve fitting marked F (Fig. 0855).



Fig 0855

PICT-4879

10. Position the right panel onto the control panel assembly (Fig. 0856).



Fig 0856

PICT-4343

11. Using a $\frac{3}{8}$ " socket, install 3 self-tapping screws that secure the right panel to the control panel assembly. Using a $\frac{3}{8}$ " socket and a $\frac{7}{16}$ " socket, install a bolt and nut securing the lower left corner of the right panel to the control panel assembly (Fig. 0857).

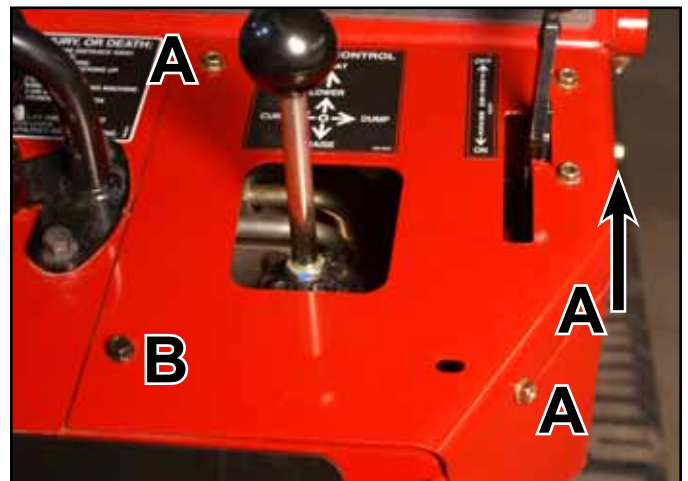


Fig 0857

PICT-4341

A. Self-tapping screw (3)

B. Bolt and nut

HYDRAULIC SYSTEM

12. Apply thread locking compound (Loctite 416 or equivalent) to brake handle threads (Fig. 0858).



Fig 0858

PICT-5526

13. Install the knob onto the brake handle (Fig. 0859).



Fig 0859

PICT-4342

14. Purge air from the hydraulic system. Refer to "Purging Air Procedure", on page 9-19. Check for any leaks in the hydraulic fittings and hydraulic hoses.

15. Position the right hand rear cover support panel to the tower. Using a 3/8" socket, install 3 screws to secure the right rear cover support panel to the tower assembly (Fig. 0860).

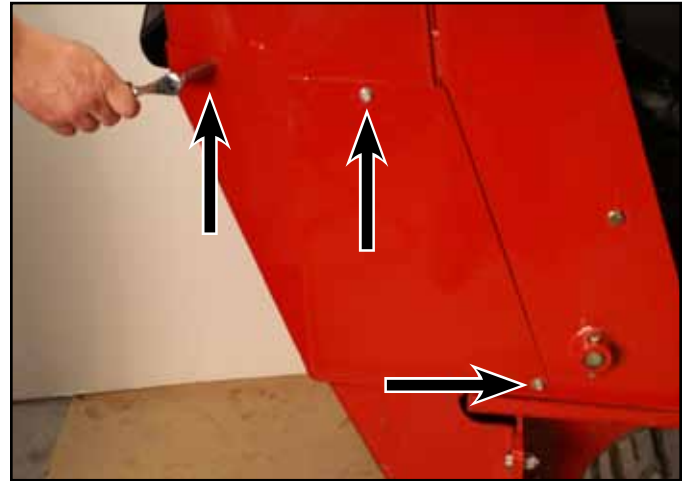


Fig 0860

PICT-4504

16. Install the rear access panel (Fig. 0861).



Fig 0861

PICT-4505a

HYDRAULIC SYSTEM

Auxiliary Valve Replacement

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

Upon removal, all seals, o-rings, and gaskets should be replaced. During installation, lightly lubricate all seals, o-rings, and gaskets with clean petroleum jelly prior to assembly.

Protect the inner diameter of seals and o-rings from damage during assembly by covering the shaft machined features with plastic wrap or equivalent.

Auxiliary Valve Removal

1. Park on a level surface and set the park brake.
2. Remove the rear access panel (Fig. 0862).



Fig 0862

PICT-4505a

3. Using a 3/8" socket remove the 3 screws from left side panel. Remove panel (Fig 0863).

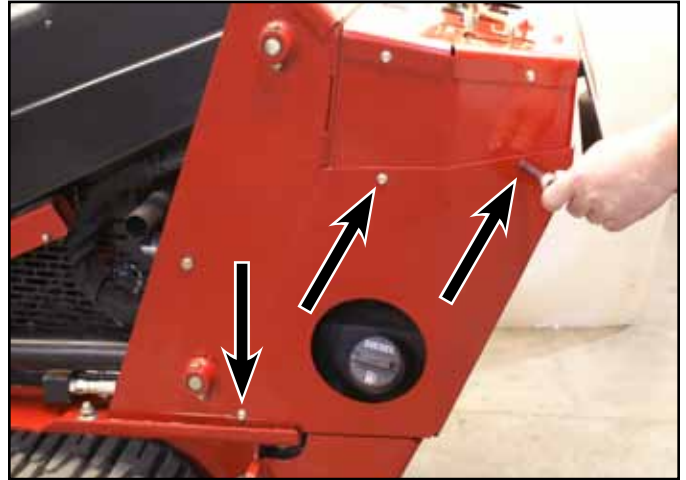


Fig 0863

PICT-4256

4. Using a 3/8" socket remove the 4 screws from top left panel (Fig. 0864).

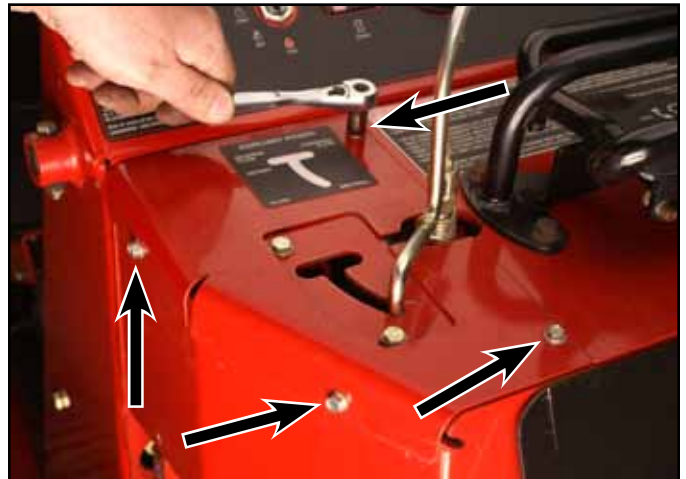


Fig 0864

PICT-4600

HYDRAULIC SYSTEM

5. Remove the top left panel (Fig. 0865).



Fig 0865

PICT-4601

7. Remove stop plate (Fig. 0867).



Fig 0867

PICT-4899

6. Using a 7/16" socket and wrench remove the 2 bolts, washers and nuts from stop plate (Fig. 0866).



Fig 0866

PICT-4898a

8. Mark each auxiliary valve hydraulic line and fitting (Fig. 0868):

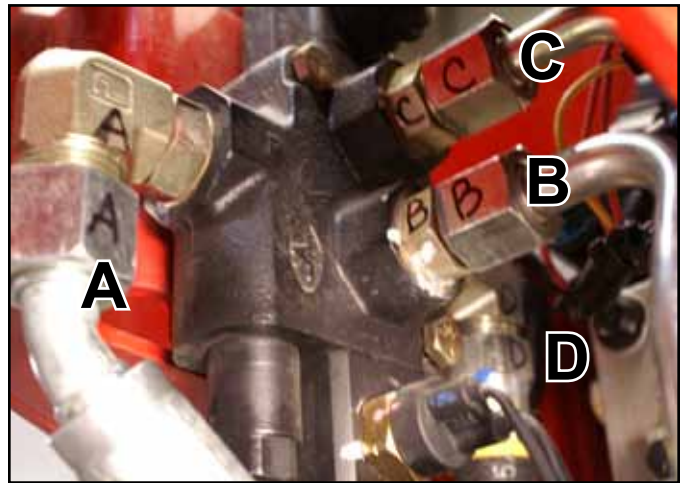


Fig 0868

PICT-4902

- A. Inlet line from the tandem pump
- B. Output line to the female coupler
- C. Output line to the male coupler
- D. Return oil to hydraulic oil cooler

HYDRAULIC SYSTEM

9. Using a 1-1/8" wrench, remove the hydraulic line marked A from the auxiliary valve fitting (Fig. 0869).



Fig 0869

PICT-4903a

11. Using a 15/16" wrench, remove the hydraulic line marked C from the auxiliary valve fitting (Fig. 0871).



Fig 0871

PICT-4906

10. Using a 15/16" wrench, remove the hydraulic line marked B from the auxiliary valve fitting (Fig. 0870).



Fig 0870

PICT-4904a

12. Using a 1-1/8" wrench, remove the hydraulic line marked D from the auxiliary valve fitting (Fig. 0872).



Fig 0872

PICT-4909

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

HYDRAULIC SYSTEM

13. Disconnect the safety switch from the wire harness (Fig. 0873).



Fig 0873

PICT-4910

14. Using a 1/2" socket and wrench, remove the 2 auxiliary valve mounting bolts and nuts (Fig. 0874).

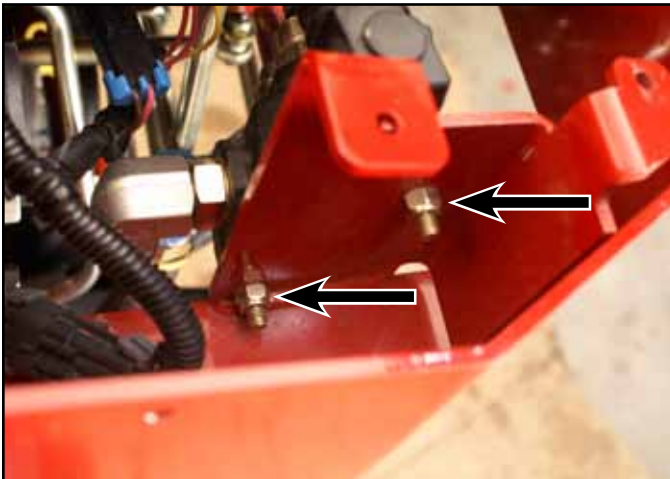


Fig 0874

PICT-4912

15. Lift the valve out of the frame (Fig. 0875).



Fig 0875

PICT-4913a

16. Using two 7/16" wrenches, remove the top nut and washer securing the handle to the hiflo spacer (Fig. 0876).



Fig 0876

PICT-1779a

HYDRAULIC SYSTEM

17. Remove the handle from the hiflo spacer (Fig. 0877).



Fig 0877

PICT-1774a

19. Using a 7/16" wrench, remove the spacer from the valve cap screw (Fig. 0879).



Fig 0879

PICT-1777a

18. Rotate the spring and remove it from the hiflo spacer (Fig. 0878).



Fig 0878

PICT-1775a

20. Using a 1/2" wrench, remove the screw from the valve cap (Fig. 0880).



Fig 0880

PICT-1778

HYDRAULIC SYSTEM

21. Using a 7/8" wrench, remove the switch from valve (Fig. 0881).

Note: Replace o-ring on the switch.



Fig 0881

PICT-1780a

Auxiliary Valve Installation

1. Using a 7/8" wrench, install the switch into the valve (Fig. 0883).



Fig 0883

PICT-1780a

22. If the valve is to be rebuilt, refer to "Auxiliary Valve Rebuild" on page 6-57.
23. If a new valve is being installed, transfer all fittings and markings to the new valve (Fig. 0882).

Note: Replace all o-rings on the fittings prior to installing into the replacement valve.



Fig 0882

CLR DSC-3653

2. Use a 1/2" wrench, thread the spacer mounting bolt into the valve cap (Fig. 0884).



Fig 0884

PICT-1778

HYDRAULIC SYSTEM

3. Apply thread locking compound to the spacer mounting bolt (Fig. 0885).



Fig 0885

PICT-4916a

5. Slide the spring over the hiflo spacer and hook the spring under valve cap screw (Fig. 0887).



Fig 0887

PICT-1775a

4. Using a 7/16" wrench, install the hiflo spacer onto valve cap bolt (Fig. 0886).



Fig 0886

PICT-1777a

6. Install the handle onto the hiflo spacer and hook the spring onto the handle (Fig. 0888).



Fig 0888

PICT-1774a

HYDRAULIC SYSTEM

7. Using two 7/16" wrenches, install the top washer and nut securing the handle to the hiflo spacer (Fig. 0889).



Fig 0889

PICT-1779a

9. Using a 1/2" socket and wrench, install 2 mounting bolts and nuts securing the valve to the control panel frame (Fig. 0891).

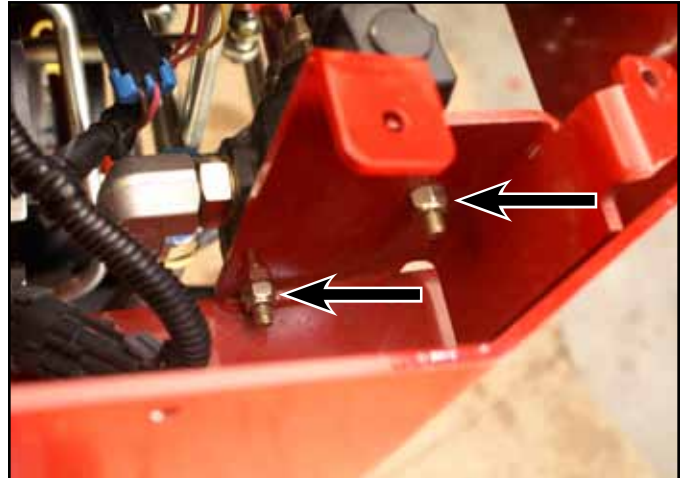


Fig 0891

PICT-4912

8. Lower the valve into the frame (Fig. 0890).



Fig 0890

PICT-4913a

10. Plug the safety switch into the wire harness (Fig. 0892).

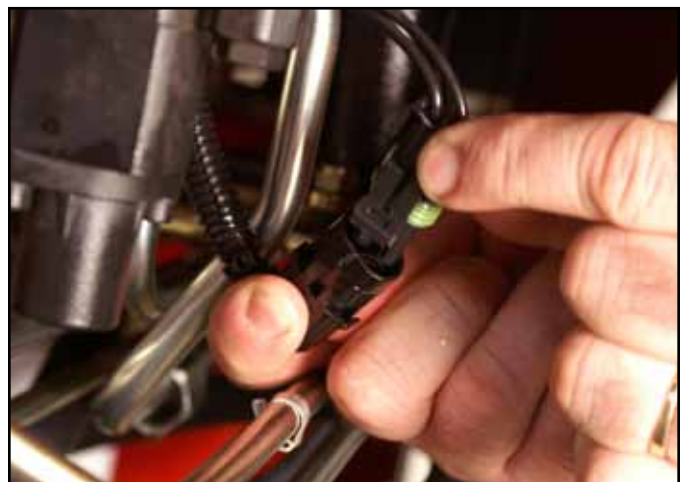


Fig 0892

PICT-4910

HYDRAULIC SYSTEM

11. Remove the protective caps from the hydraulic lines and fittings.

12. Using a 1-1/8" wrench, install the hydraulic line marked with a D to the valve fitting marked with a D (Fig. 0893).



Fig 0893

PICT-4909

13. Using a 15/16" wrench, install the hydraulic line nut marked with a C onto the valve fitting marked with a C (Fig. 0894).



Fig 0894

PICT-4906

14. Using a 15/16" wrench, install hydraulic line nut marked with a B onto the valve fitting marked with a B (Fig. 0895).



Fig 0895

PICT-4904a

15. Using a 1-1/8" wrench, install the hydraulic line marked with an A to the hydraulic fitting marked with an A (Fig. 0896).



Fig 0896

PICT-4903a

HYDRAULIC SYSTEM

16. Disengage the park brake and start the unit. Follow the procedures for "Purging Air Procedure" on page 9-19. Check for any leaks at the hydraulic fittings and in the hydraulic hoses.
17. If a new valve has been installed, perform a pressure test. Refer to "Auxiliary Circuit Pressure Test" on page 9-4.
18. Position the stop plate over the auxiliary valve (Fig. 0897).



Fig 0897

PICT-4899

19. Using a 7/16" socket and wrench, install 2 bolts, washers and nuts to secure the stop plate to the control panel (Fig. 0898).



Fig 0898

PICT-4898a

20. Position the left side support panel. Using a 3/8" socket, install 3 screws securing the left side support panel to the tower assembly (Fig. 0899).



Fig 0899

PICT-4256

21. Position the top left panel onto the control panel (Fig. 0900).



Fig 0900

PICT-4601

HYDRAULIC SYSTEM

22. Using a 3/8" socket, install 4 screws securing the top left panel to the control panel (Fig. 0901).



Fig 0901

PICT-4600

23. Install the rear access panel (Fig. 0902).



Fig 0902

PICT-4505a

Tandem Pump / Engine Coupling Assembly Replacement

Coupling Removal

1. Remove the Hydraulic Tandem Pump. Refer to "Hydraulic Tandem Pump Removal" on page 6-30.
2. Raise the hood and remove the left side grill (Fig. 0903).

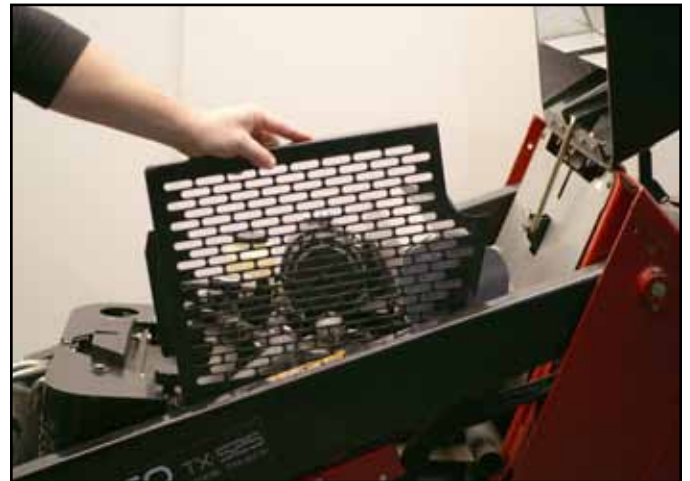


Fig 0903

PICT-6962a

HYDRAULIC SYSTEM

3. Secure the flywheel to keep it from turning. You can do this by sliding a length of 5/16" diameter rod stock in between the fan mount pulley and fan mount spacer. The rod stock should be inserted so it runs on top of the fan mount pulley screw. The rod stock should be at least 16" long so that it rests on the left hand loader arm lift cylinder (Fig. 0904).



Fig 0904

PICT-4840

4. Remove the 4 bolts securing the hub sleeve to the flywheel (Fig. 0905).

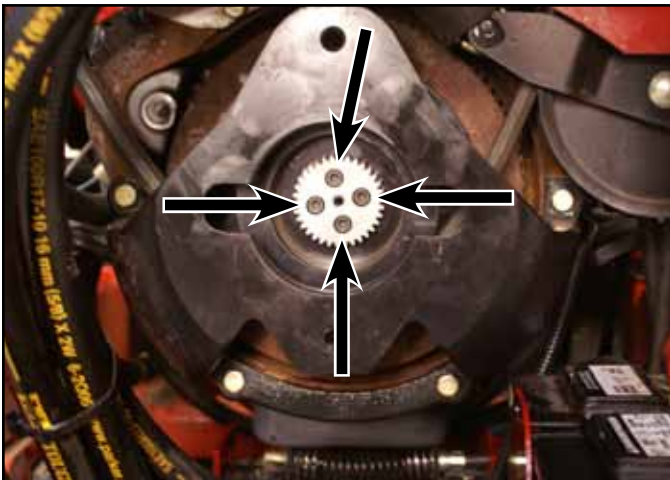


Fig 0905

PICT-4863

5. Remove the hub sleeve (Fig. 0906).



Fig 0906

PICT-4828a

Coupling Installation

1. Raise the hood and remove the left side grill (Fig. 0907).

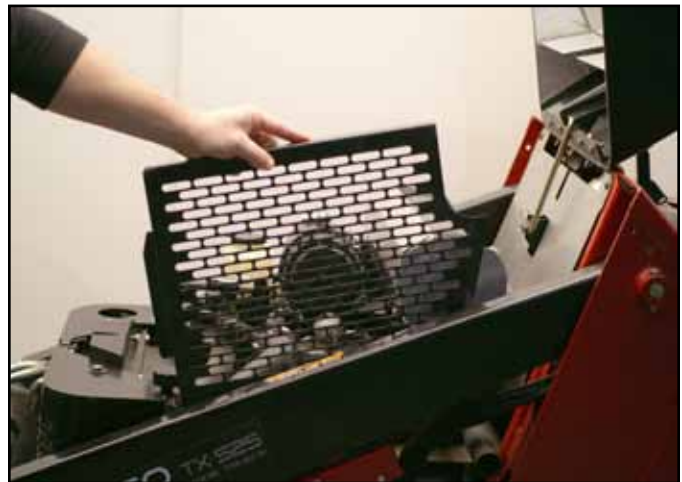


Fig 0907

PICT-6962a

HYDRAULIC SYSTEM

2. Secure the flywheel to keep it from turning. You can do this by sliding a length of 5/16" diameter rod stock in between the fan mount pulley and fan mount spacer. The rod stock should be inserted so it runs on top of the fan mount pulley screw. The rod stock should be at least 16" long so that it rests on the left hand loader arm lift cylinder (Fig. 0908).



Fig 0908

PICT-4840

3. Slide the hub sleeve onto the engine pulley (Fig. 0909).



Fig 0909

PICT-4828a

4. Install 4 bolts securing the hub sleeve to the flywheel (Fig. 0910).

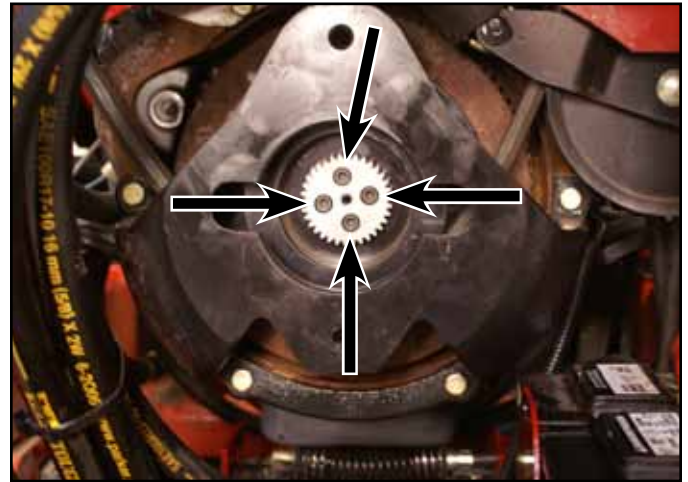


Fig 0910

PICT-4863

5. Torque the hub sleeve mounting bolts to 110 ± 10 in-lbs. (12.4 ± 1.1 Nm) (Fig. 0911).



Fig 0911

PICT-4864

6. Install the Hydraulic Tandem Pump. Refer to "Hydraulic Tandem Pump Installation" on page 6-37.

HYDRAULIC SYSTEM

Hydraulic Oil Filter Head Replacement

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

Upon removal, all seals, o-rings, and gaskets should be replaced. During installation, lightly lubricate all seals, o-rings, and gaskets with clean petroleum jelly prior to assembly.

Protect the inner diameter of seals and o-rings from damage during assembly by covering the shaft machined features with plastic wrap or equivalent.

- Using a 3/8" socket, remove the 3 self-tapping screws that secure the top right panel to the control panel assembly. Using a 3/8" socket and a 7/16" socket, remove the bolt and nut securing the lower left corner of the top right panel to the control panel assembly (Fig. 0913).

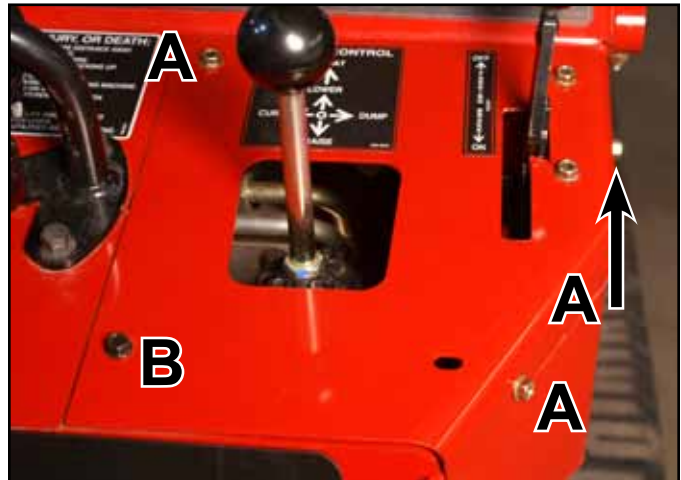


Fig 0913

PICT-4341

- A. Self-tapping screw (3) B. Bolt and nut

Hydraulic Oil Filter Head Removal

- Raise the machine and set it on jack stands. Refer to "Lifting the Machine for Service" on page 7-1.
- Place the brake handle in the "OFF" position.
- Remove the knob from the brake handle (Fig. 0912).



Fig 0912

PICT-4342

- Remove the right panel from the control panel assembly (Fig. 0914).



Fig 0914

PICT-4343a

HYDRAULIC SYSTEM

6. Using a 15/16" wrench, remove the hydrostatic pump return line from the T-fitting on the right hand pump (Fig. 0915).



Fig 0915

PICT-4922

8. Using a 3/8" socket, remove the 3 screws that secure the right rear cover support panel to the tower assembly. Remove the panel (Fig. 0917).

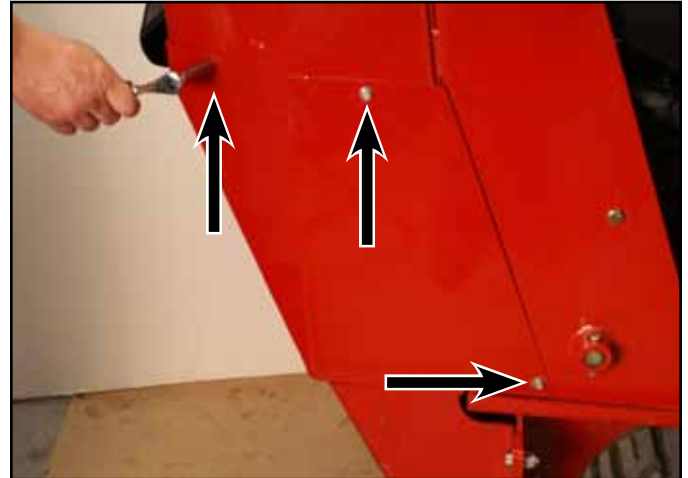


Fig 0917

PICT-4504

7. Remove the rear access panel (Fig. 0916).



Fig 0916

PICT-4505

9. Place absorbent cloth over the battery area to soak up the hydraulic fluid that will drain from the filter and filter head.

10. Using a filter wrench, remove the hydraulic oil filter (Fig. 0918).



Fig 0918

PICT-4918

HYDRAULIC SYSTEM

11. Using a 1-3/8" wrench, remove the hydraulic reservoir return line from the filter head T-fitting (Fig. 0919).



Fig 0919

PICT-4919

13. Using a 1/2" wrench, remove the 2 bolts and washers securing the filter head to the mounting bracket (Fig. 0921).

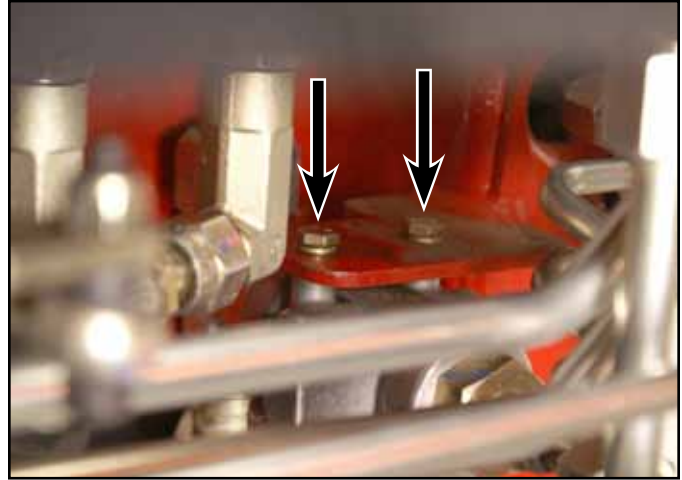


Fig 0921

PICT-4924a

12. Using a 15/16" wrench, remove the loader valve hydraulic return line from the filter head fitting (Fig. 0920).



Fig 0920

PICT-4923

14. Remove the filter head assembly (Fig. 0922).



Fig 0922

PICT-4926a

HYDRAULIC SYSTEM

15. Place the filter head assembly in a vise to secure.
16. Using a 1-3/8" wrench, loosen the T-fitting nut from the filter head. Remove the T-fitting and hydraulic line (Fig. 0923).



Fig 0923

PICT-4927a

18. Inspect the bypass, filter threads, and gasket sealing surface. The bypass should move freely in and out. The filter threads and sealing surface should be free of damage. Replace the filter head if damaged (Fig. 0925).



Fig 0925

PICT-4930a

17. Using a 1-1/4" wrench, remove the loader valve return fitting from the filter head (Fig. 0924).



Fig 0924

PICT-4929

Hydraulic Oil Filter Head Installation

1. Place the filter head assembly into a vise to secure.
2. Using a 1-1/4" wrench, install the loader valve return fitting into the filter head (Fig. 0926).



Fig 0926

PICT-4929

HYDRAULIC SYSTEM

3. Thread the T-fitting into the filter head – leave the fitting nut loose (Fig. 0927).



Fig 0927

PICT-4938a

5. Install 2 bolts and washers securing the filter head assembly to the mounting bracket (Fig. 0929).

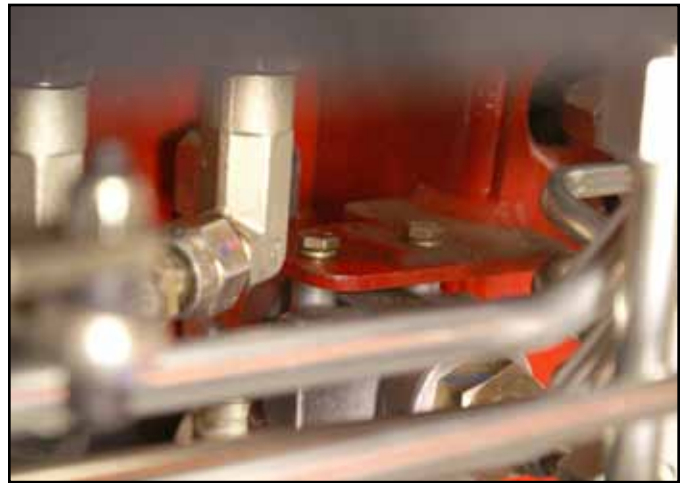


Fig 0929

PICT-4924a

4. Position the filter head assembly into the machine so that the flow arrow points toward the front of the machine (Fig. 0928).



Fig 0928

PICT-4940a

6. Using a 15/16" wrench, install the loader valve hydraulic return line to the filter head (Fig. 0930).



Fig 0930

PICT-4923

HYDRAULIC SYSTEM

7. Using a 1-3/8" wrench, install the hydraulic reservoir return line to the filter head T-fitting (Fig. 0931).



Fig 0931

PICT-4919

9. Using a 1-3/8" wrench, tighten the T-fitting nut securing the T-fitting to the filter head assembly (Fig. 0933).



Fig 0933

PICT-4941

8. Using a 15/16" wrench, install the hydrostatic pump return line to the T-fitting on the right hand pump (Fig. 0932).



Fig 0932

PICT-4922

10. Apply hydraulic fluid to the gasket of the new hydraulic filter (Fig. 0934).



Fig 0934

PICT-4942

HYDRAULIC SYSTEM

11. Install the new hydraulic oil filter onto the filter head:
Turn the filter until the gasket contacts the filter head
then tighten an additional 3/4 turn (Fig. 0935).



Fig 0935

PICT-4943a

13. Using a 3/8" socket, install 3 self-tapping screws that secure the right panel to the control panel assembly. Using a 3/8" socket and a 7/16" socket, install a bolt and nut securing the lower left corner of the right panel to the control panel assembly (Fig. 0937).

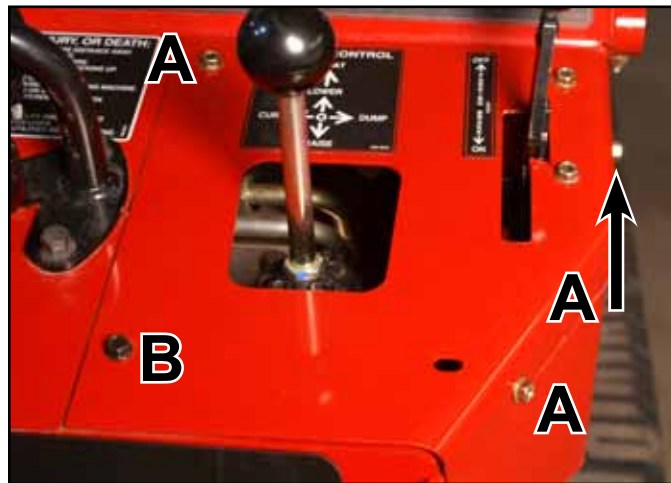


Fig 0937

PICT-4341

12. Position the right panel onto the control panel assembly (Fig. 0936).



Fig 0936

PICT-4343a

- A. Self-tapping screw (3) B. Bolt and nut

14. Apply thread locking compound (Loctite 416 or equivalent) to brake handle threads (Fig. 0938).



Fig 0938

PICT-5526

HYDRAULIC SYSTEM

15. Install the knob onto the brake handle (Fig. 0939).



Fig 0939

PICT-4342

18. Install the rear access panel (Fig. 0941).



Fig 0941

PICT-4505

16. Purge air from the hydraulic system. Refer to “Purging Air Procedure”, page 9-19. Check for any leaks in the hydraulic fittings and hydraulic hoses.

17. Position the right hand rear cover support panel to the tower. Using a 3/8” socket, install 3 screws to secure the right rear cover support panel to the tower assembly (Fig. 0940).



Fig 0940

PICT-4504

19. Lower the machine.

HYDRAULIC SYSTEM

Hydraulic Tandem Pump Replacement

Hydraulic Tandem Pump Removal

1. Raise the machine and set it on jack stands. Refer to "Lifting the Machine for Service" on page 7-1.
2. Remove the rear access panel (Fig. 0942).



Fig 0942

PICT-4505

3. Using a 3/8" socket, remove the 6 screws that secure the left and right rear cover support panels to the tower assembly (3 screws per panel). Remove the panels (Fig. 0943).

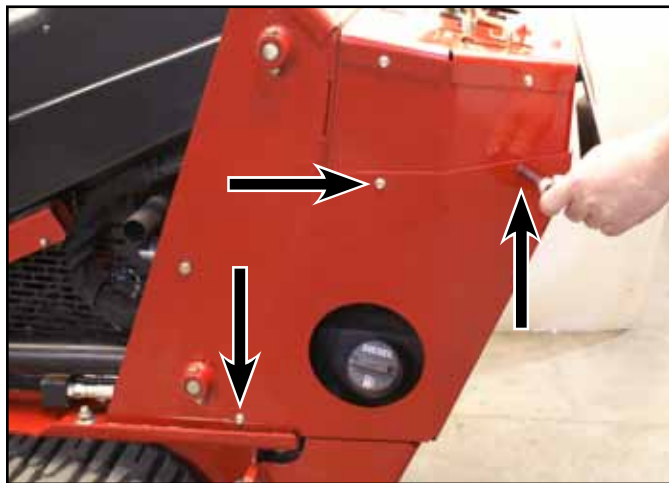


Fig 0943

PICT-4256

4. Using 3/4" and 1/2" sockets, remove the 7 bolts and nuts securing the rear frame cover to the frame and fuel tank bracket. Remove the rear frame cover (Fig. 0944).

Note: The rear of the machine may have to be lifted to reposition the jack stands so that the rear frame cover can be removed.

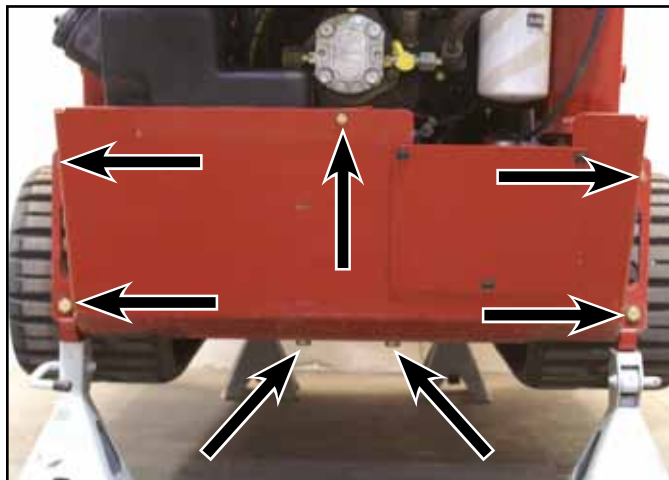


Fig 0944

PICT-4259

HYDRAULIC SYSTEM

5. Disconnect the two wires (black and orange) from the fuel sending unit located on the top of the fuel tank (Fig. 0945).



Fig 0945

PICT-4262a

7. Slide the 2 fuel hose clamps down the fuel line away from the fuel tank fittings (Fig. 0947).



Fig 0947

PICT-4264

6. Mark the suction fuel line and tank fitting with an "S" and the return fuel line and tank fitting with an "R" (Fig. 0946):
S - Fuel suction line
R - Fuel return line



Fig 0946

PICT-4263

8. Slide the 2 fuel lines off the fuel tank fittings. Remove the fuel tank. (Fig. 0948).



Fig 0948

PICT-4265

HYDRAULIC SYSTEM

9. Mark the tandem pump lines and fittings as follows:

A. Pump pressure line to loader valve (Fig. 0949)



Fig 0949

PICT-4765

C. Suction line from the tank (smaller fitting)

D. Suction line from the tank (larger fitting) (Fig. 0951)



Fig 0951

PICT-4767

B. Pump pressure line to auxiliary valve (Fig. 0950)



Fig 0950

PICT-4766a

10. Using a 15/16" wrench, remove the pump pressure line marked with an A from the hydraulic tandem pump (Fig. 0952).



Fig 0952

PICT-4768a

HYDRAULIC SYSTEM

11. Using a 1-1/8" wrench, remove the pump pressure line marked with a B from the hydraulic tandem pump (Fig. 0953).



Fig 0953

PICT-4770a

13. Slide the suction hoses, marked C and D, off the suction fittings (Fig. 0955).



Fig 0955

PICT-4775a

12. Loosen the two suction hose clamps (Fig. 0954).



Fig 0954

PICT-4773a

14. Loosen the pump pressure line fittings:

15. Pump pressure line fitting marked A using a 15/16" wrench (Fig. 0956).



Fig 0956

PICT-4782a

HYDRAULIC SYSTEM

16. Pump pressure line fitting marked B using a 1-1/8" wrench (Fig. 0957).



Fig 0957

PICT-4783a

18. Suction hose fitting marked D using a 1-1/4" wrench (Fig. 0959).



Fig 0959

PICT-4785a

17. Suction hose fitting marked C using a 1" wrench (Fig. 0958).



Fig 0958

PICT-4784a

19. Using a 5/8" socket, remove the 2 bolts securing the pump mount plate to the pump mount (Fig. 0960).

Note: Support the pump as the 2 bolts are being removed.

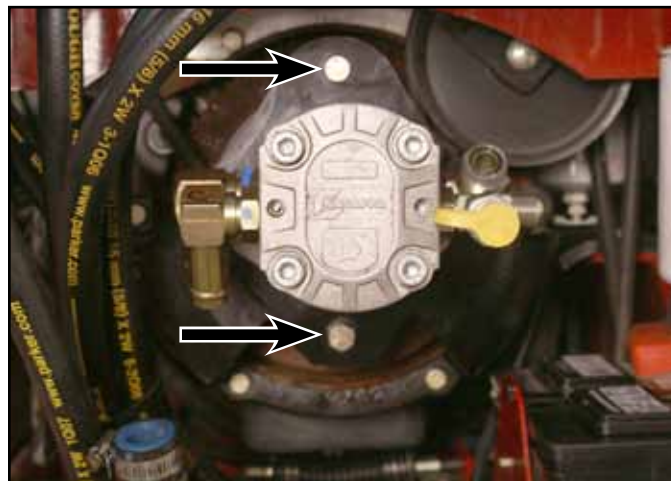


Fig 0960

PICT-4777a

HYDRAULIC SYSTEM

20. Remove the pump assembly (Fig. 0961).



Fig 0961

PICT-4779a

22. Using a 1/8" Allen wrench, loosen the set screw securing the coupler gear to the pump shaft (Fig. 0963).

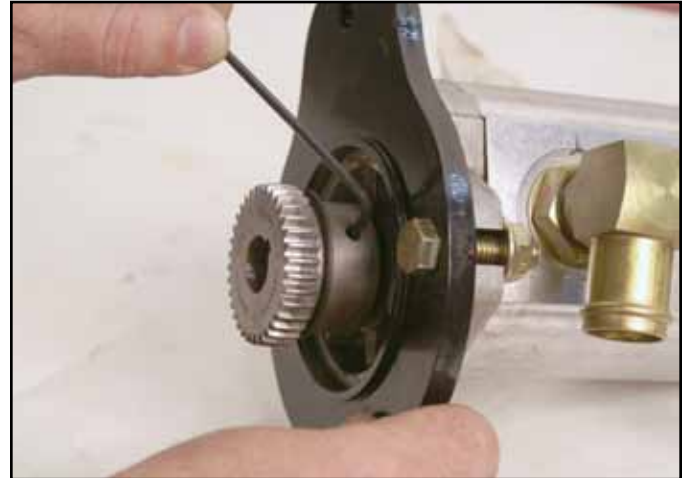


Fig 0963

PICT-4786a

21. The coupler sleeve may come off with the pump, or stay on the engine side of the coupler. Remove the coupler sleeve (Fig. 0962).



Fig 0962

PICT-4781a

23. Remove the key from the pump shaft keyway (Fig. 0964).



Fig 0964

PICT-4788a

HYDRAULIC SYSTEM

24. Using a 5/8" wrench and a 11/16" socket, remove the 2 bolts and nuts securing the pump mount plate to the pump (Fig. 0965).



Fig 0965

PICT-4789a

26. Inspect the pump shaft coupler gear, the coupler sleeve and the crankshaft coupler gear. Replace if worn or damaged (Fig. 0967, Fig. 0968 and Fig. 0969).

Pump shaft coupler gear:



Fig 0967

PICT-4796a

25. Remove the pump mount plate (Fig. 0966).



Fig 0966

PICT-4792a

Coupler sleeve:



Fig 0968

PICT-4797a

HYDRAULIC SYSTEM

Crankshaft coupler gear:



Fig 0969

PICT-4798

27. If the engine side of the coupling is damaged, remove it and replace it. Refer to "Tandem Pump / Engine Coupling Assembly Replacement" on page 6-19.
28. For tandem pump rebuild procedures, see "Hydraulic Tandem Pump Rebuild" on page 6-42.
29. If a new tandem pump is being installed, transfer all markings and fittings to the new tandem pump (Fig. 0970).



Fig 0970

PICT-4794a

Hydraulic Tandem Pump Installation

1. Slide the plate onto the tandem pump (Fig. 0971).

Note: Shoulder on pump plate faces away from pump.



Fig 0971

PICT-4803a

2. Using 5/8" and 11/16" wrenches, install 2 bolts and nuts securing the pump mount plate to the pump (Fig. 0972).



Fig 0972

PICT-4805

HYDRAULIC SYSTEM

3. Apply anti-seize compound to the pump shaft (Fig. 0973).



Fig 0973

PICT-4806

5. Slide the coupler gear onto the pump shaft so that it seats against the shoulder on the shaft (Fig. 0975).



Fig 0975

PICT-4811

4. Install the key into the pump shaft keyway (Fig. 0974).



Fig 0974

PICT-4808

6. Using a 1/8" Allen wrench, tighten the set screw securing the coupler gear to the pump shaft (Fig. 0976).



Fig 0976

PICT-4814a

HYDRAULIC SYSTEM

7. Slide the coupler sleeve onto the engine side of the coupler gear (Fig. 0977).



Fig 0977

PICT-4870a

9. Install the tandem pump hoses as follows:
 - a. Slide the suction hoses onto the suction fittings (Fig. 0979).



Fig 0979

PICT-4775a

8. Position the tandem pump to the engine. Insert the coupler gear into the white coupler sleeve. Using a 5/8" socket, install 2 bolts to secure the pump plate to the pump mounting plate (Fig. 0978).

Note: The tandem pump should be fully seated into the coupler sleeve prior to installing the mounting bolts. Do not draw the pump into the coupler sleeve by using the mounting bolts.

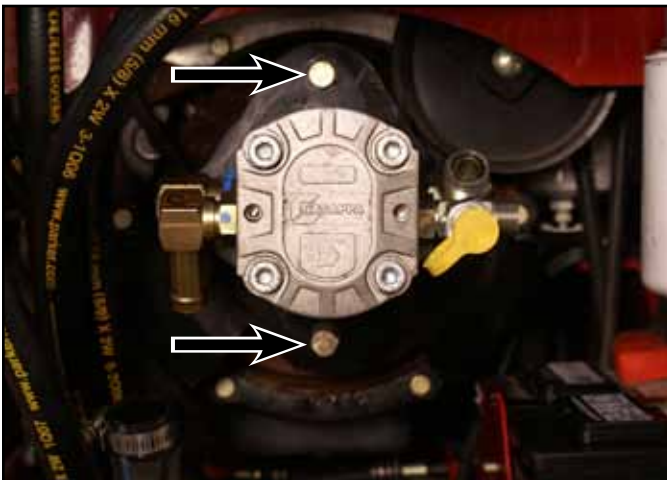


Fig 0978

PICT-4776a

- b. Position the hose clamps and tighten to secure the suction hoses to the fittings (Fig. 0980).

Note: The "C" fitting should be at 8:30 o'clock position.



Fig 0980

PICT-4773a

HYDRAULIC SYSTEM

- c. Using a 1-1/8" wrench, install the pump pressure line (marked B) to the pump fitting marked B (Fig. 0981).



Fig 0981

PICT-4770a

- d. Using a 15/16" wrench, install the pump pressure line (marked A) to the pump fitting marked A (Fig. 0982).



Fig 0982

PICT-4768a

10. Slide the 2 fuel lines onto the fuel tank fittings. Note the location markings (Fig. 0983).
S - Fuel suction line
R - Fuel return line

Note: Before installing the fuel tank in the unit, disengage the park brake and start the unit. Refer to "Purging Air Procedure" on page 9-19. Check for any leaks at the hydraulic fittings and hoses.



Fig 0983

PICT-4265

HYDRAULIC SYSTEM

11. Position the 2 fuel hose clamps and tighten to secure the fuel lines to the fuel tank fittings (Fig. 0984).



Fig 0984

PICT-4264

12. Position the fuel tank into the rear of the frame. Connect the two wires (black and orange) to the fuel sending unit located on the top of the fuel tank (Fig. 0985).

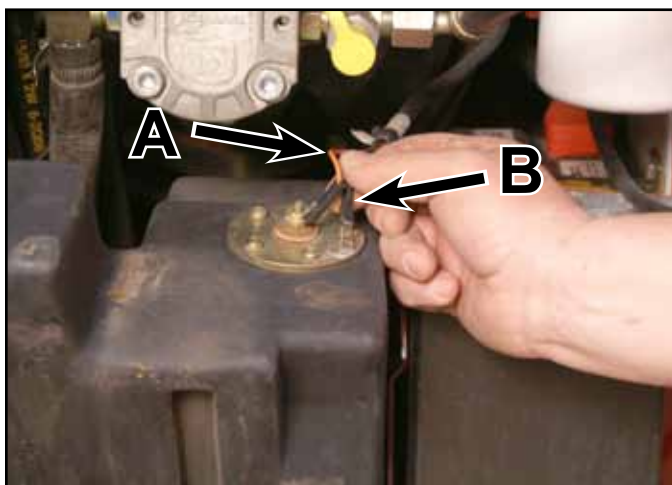


Fig 0985

PICT-4262a

- A. Center terminal (orange wire)
B. Outside terminal (black wire)

13. Position the rear frame cover to the rear of the frame. Using 3/4" and 1/2" sockets, install 7 bolts and nuts to secure the rear frame cover to the frame and fuel tank bracket (Fig. 0986).

Note: The rear of the machine may have to be lifted to reposition the jack stands so that the rear frame cover can be installed.

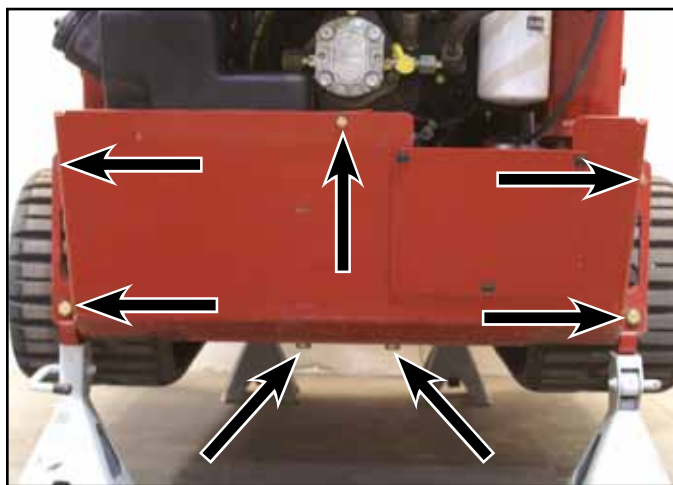


Fig 0986

PICT-4259

14. Position the left hand rear cover support panel to the tower. Using a 3/8" socket, install 3 screws to secure the left rear cover support panel to the tower assembly. Repeat to install the right hand rear cover support panel (Fig. 0987).

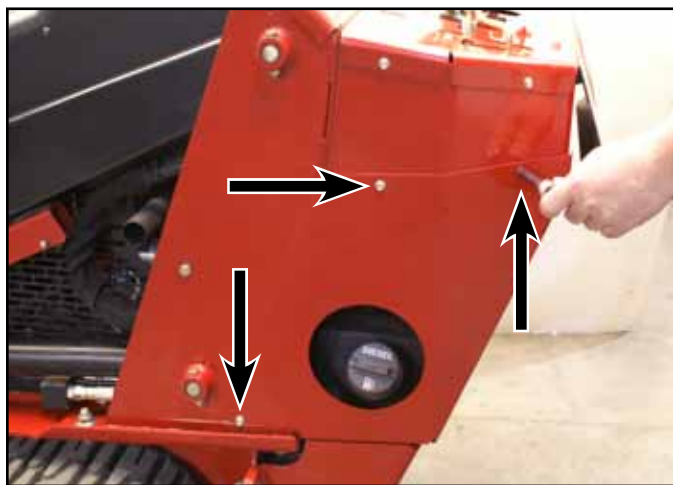


Fig 0987

PICT-4256

HYDRAULIC SYSTEM

15. Install the rear access panel (Fig. 0988).



Fig 0988

PICT-4505

16. Lower the machine.

Hydraulic Tandem Pump Rebuild

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

Upon removal, all seals, o-rings, and gaskets should be replaced. During installation, lightly lubricate all seals, o-rings, and gaskets with clean oil prior to assembly.

1. Remove the key from the keyway of the pump shaft (Fig. 0989).



Fig 0989

PICT-2823a

HYDRAULIC SYSTEM

2. Secure the pump in a vise.
3. Mark the casing of the pump with a "V" that crosses over all sections of the pump (Fig. 0990).



Fig 0990

PICT-2824a

4. Using a 7mm Allen wrench, loosen and remove the 4 bolts and washers securing the pump sections (Fig. 0991).



Fig 0991

PICT-2825a

5. Remove the cover from the pump assembly (Fig. 0992).

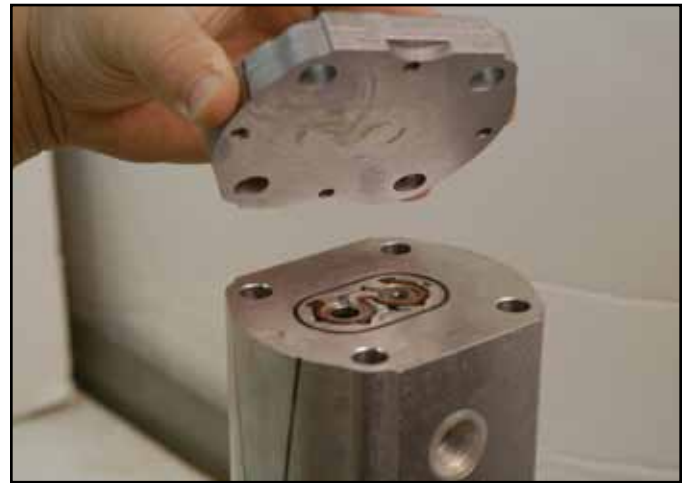


Fig 0992

PICT-2826a

6. Remove the cap gasket from the pump housing (Fig. 0993).



Fig 0993

PICT-2828

HYDRAULIC SYSTEM

6 gpm Pump Disassembly

1. Mark the bushing assembly with a single line that extends out onto the pump housing (Fig. 0994).

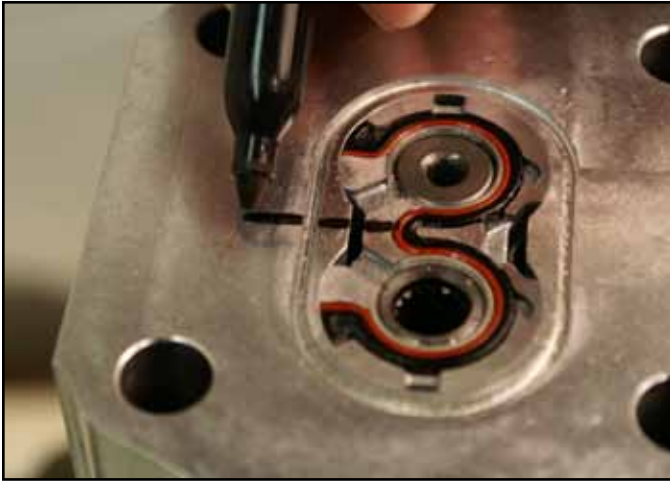


Fig 0994

PICT-2829

2. Using a needle nose pliers, grab the center of the small bushing and lift the bushing from the pump housing assembly (Fig. 0995).



Fig 0995

PICT-2830a

3. Remove the driven gear from the pump assembly (Fig. 0996).



Fig 0996

PICT-2832a

4. Remove the drive gear from the pump assembly (Fig. 0997).



Fig 0997

PICT-2833a

HYDRAULIC SYSTEM

5. Using a needle nose pliers grab the center of the inner small bushing and lift it partially out of the pump housing (Fig. 0998).



Fig 0998

PICT-2834a

7. Lift the inner small bushing out of the pump housing (Fig. 1000).

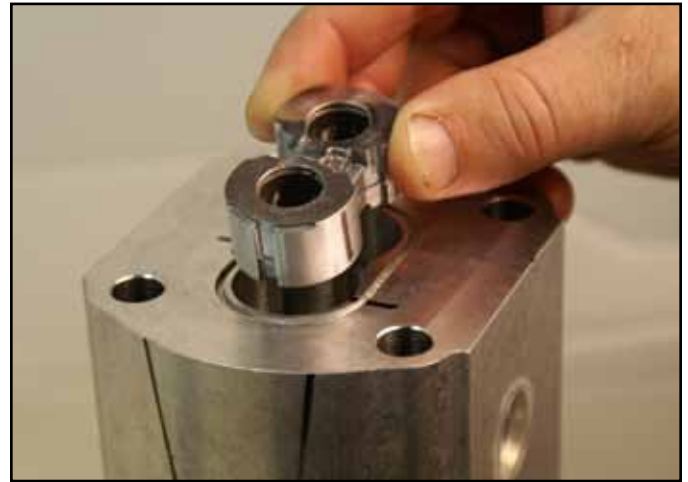


Fig 1000

PICT-2836

6. Mark the inner small bushing assembly with a line that extends out onto the pump housing. This line should be on the opposite side as the previous marking (Fig. 0999).



Fig 0999

PICT-2835

14 gpm Pump Disassembly

1. Lift the pump housing off the 14 gpm pump housing (Fig. 1001).



Fig 1001

PICT-2838a

HYDRAULIC SYSTEM

2. Remove the o-ring from the housing (Fig. 1002).

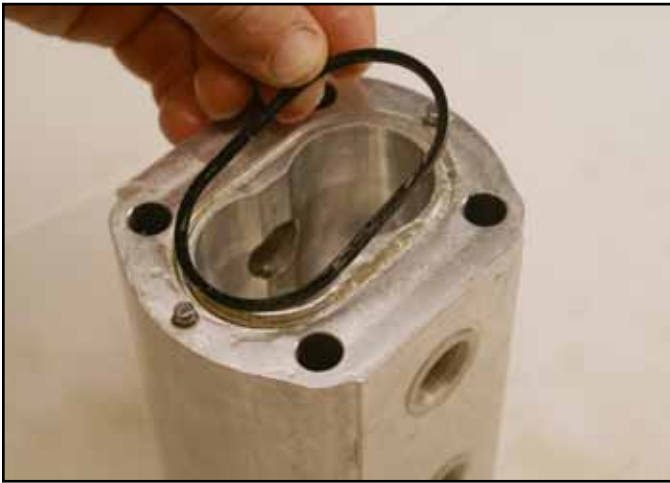


Fig 1002

PICT-2882a

4. Mark the large pump bushing assembly with a "V" all the way down onto the pump shaft cover (Fig. 1004).



Fig 1004

PICT-2840

3. Remove the drive link from the drive gear (Fig. 1003).



Fig 1003

PICT-2839a

5. Remove the large pump bushing assembly from the pump shaft cover (Fig. 1005).



Fig 1005

PICT-2841a

HYDRAULIC SYSTEM

6. Using a snap ring pliers, remove the snap ring from the pump cover (Fig. 1006).



Fig 1006

PICT-2842a

8. Install a new shaft seal in the pump cover so that the spring side of the seal is facing the housing side of the pump cover (Fig. 1008).



Fig 1008

PICT-2844a

7. With the cover secured so the inside of the cover is facing up, remove the shaft seal from the inside of the pump cover (Fig. 1007).



Fig 1007

PICT-2843a

9. Carefully drive the seal into the cover until it is seated (Fig. 1009).



Fig 1009

PICT-2846a

HYDRAULIC SYSTEM

10. Install the snap ring into the pump cover (Fig. 1010).



Fig 1010

PICT-2848a

2. Remove the driven gear from the bushing (Fig. 1012).



Fig 1012

PICT-2850a

14 gpm Pump Assembly

Note: Lubricate all surfaces on reassembly.

1. Remove the bushing from the drive gear and driven gear shafts (Fig. 1011).



Fig 1011

PICT-2849a

3. Remove the drive gear from the bushing (Fig. 1013).



Fig 1013

PICT-2851a

HYDRAULIC SYSTEM

4. Inspect the gear surface of both of the bushings for damage (Fig. 1014).



Fig 1014

PICT-2853a

6. Remove the back-up ring from the top and bottom bushings (Fig. 1016).

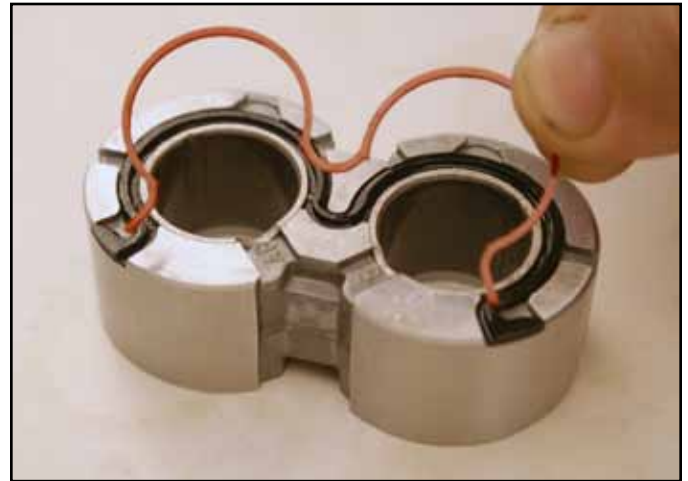


Fig 1016

PICT-2855a

5. Inspect the drive gear and driven gear surfaces for damage (Fig. 1015).



Fig 1015

PICT-2854a

7. Remove the gear seal from the top and bottom bushings (Fig. 1017).



Fig 1017

PICT-2856a

HYDRAULIC SYSTEM

8. Install the gear seal with the lip side of the gasket facing away from the groove of the bushing (Fig. 1018).



Fig 1018

PICT-2861

9. Install the back-up ring into the bushing so that it rests in the lip of the gear seal (Fig. 1019).



Fig 1019

PICT-2862a

10. Repeat the previous 2 steps for the second bushing, gear seal and back-up ring.

11. Making note of the markings on the bushing assembly, install the drive gear into the bushing (Fig. 1020).



Fig 1020

PICT-2863a

12. Install the driven gear into the bushing (Fig. 1021).



Fig 1021

PICT-2864a

HYDRAULIC SYSTEM

13. Install the second bushing onto the 2 gears (Fig. 1022).



Fig 1022

PICT-2865a

2. Remove the driven gear (Fig. 1024).

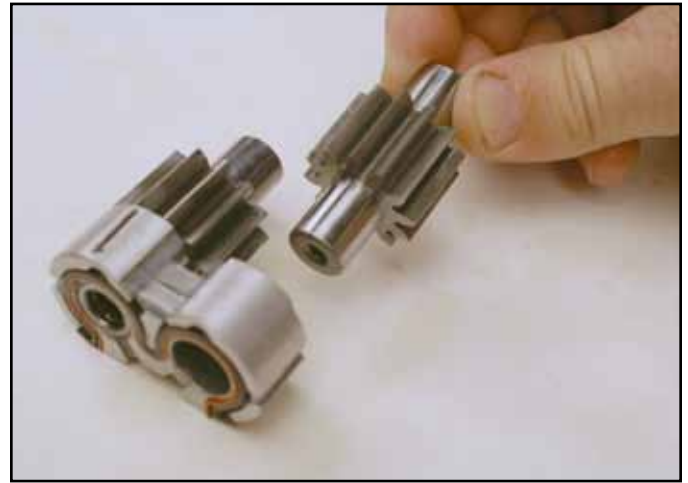


Fig 1024

PICT-2867a

6 gpm Pump Assembly

Note: Lubricate all surfaces on reassembly.

1. Remove one of the bushings (Fig. 1023).

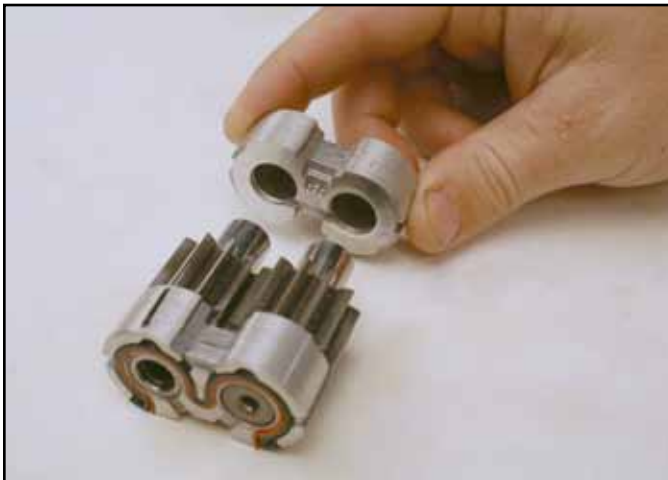


Fig 1023

PICT-2866a

3. Remove the drive gear (Fig. 1025).



Fig 1025

PICT-2868a

HYDRAULIC SYSTEM

4. Inspect the gear surfaces of both the bushings for damage (Fig. 1026).



Fig 1026

PICT-2870a

6. Remove the back-up ring from both of the bushings (Fig. 1028).

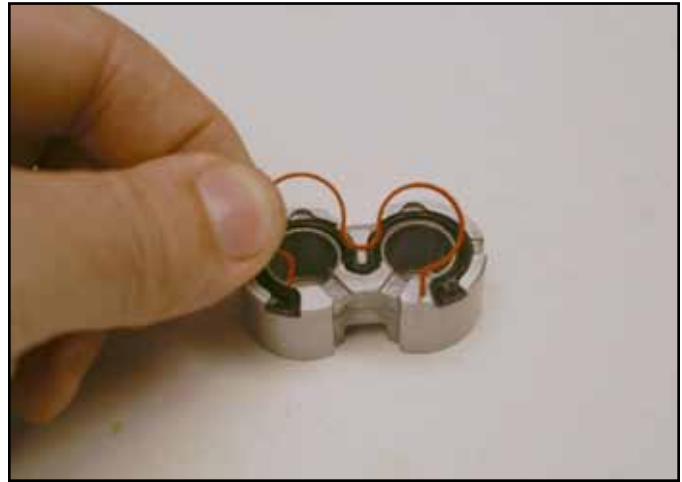


Fig 1028

PICT-2874a

5. Inspect the drive and driven gears for damage (Fig. 1027).



Fig 1027

PICT-2876a

7. Remove the gear seal from the both of the bushings (Fig. 1029).



Fig 1029

PICT-2875a

HYDRAULIC SYSTEM

8. Install the gear seal with the lip side of the gasket facing away from the groove of the bushing (Fig. 1030).



Fig 1030

PICT-2877a

9. Install the back-up ring into the bushing so that it rests in the lip of the gear seal (Fig. 1031).



Fig 1031

PICT-2878a

10. Repeat the above 2 steps for the second bushing, gear seal and back-up ring.

11. Making note of the markings on the bushing assembly, install the drive gear into the bushing (Fig. 1032).



Fig 1032

PICT-2879a

12. Install the driven gear onto the bushing (Fig. 1033).



Fig 1033

PICT-2880a

HYDRAULIC SYSTEM

13. Install the second bushing onto the 2 gears (Fig. 1034).



Fig 1034

PICT-2881a

14. Inspect the drive link for damage (Fig. 1035).



Fig 1035

PICT-2884a

Hydraulic Tandem Pump Assembly

1. Making note of the marks on the 14 gpm pump, slide the drive gear shaft of the 14 gpm pump assembly onto the mounting flange (Fig. 1036).



Fig 1036

PICT-2885a

2. Install the drive link onto the drive gear of the 14 gpm pump assembly (Fig. 1037).



Fig 1037

PICT-2886a

HYDRAULIC SYSTEM

3. Install the mounting flange o-ring into the housing groove (Fig. 1038).



Fig 1038

PICT-2882a

4. Making note of the markings on the housing and mounting flange, install the pump housing over the 14 gpm pump assembly and onto the mounting flange (Fig. 1039).



Fig 1039

PICT-2890a

5. Making note of the markings on the 6 gpm pump assembly, slide the 6 gpm pump assembly into the housing (Fig. 1040).

Note: The pump shaft may have to be rotated to seat the 6 gpm pump onto the drive link.



Fig 1040

PICT-2892a

6. Install the cover o-ring into the housing (Fig. 1041).

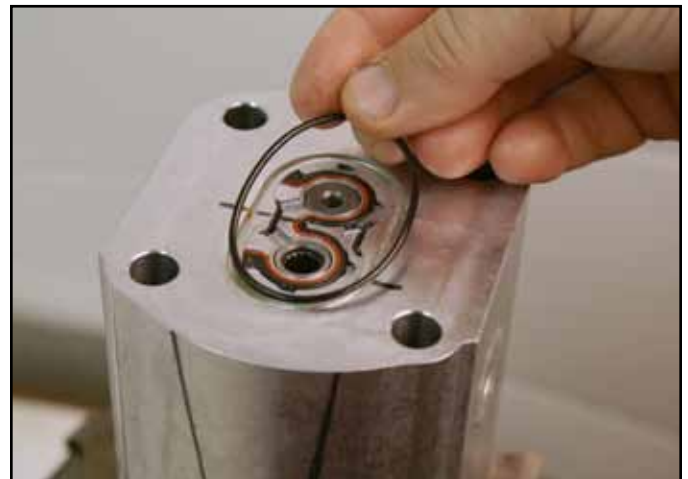


Fig 1041

PICT-2894a

HYDRAULIC SYSTEM

7. Install the housing cover onto the housing (Fig. 1042).



Fig 1042

PICT-2895a

9. Install the key into the keyway on the pump shaft (Fig. 1044).



Fig 1044

PICT-2898a

8. Using a 7mm Allen wrench, install the 4 bolts that secure the housing cover to the housing (Fig. 1043). Torque to 19 - 23 ft-lbs. (25.8 - 31.2 Nm).



Fig 1043

PICT-2896a

HYDRAULIC SYSTEM

Auxiliary Valve Rebuild

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

Upon removal, all seals, o-rings, and gaskets should be replaced. During installation, lightly lubricate all seals, o-rings, and gaskets with clean petroleum jelly prior to assembly.

Protect the inner diameter of seals and o-rings from damage during assembly by covering the shaft machined features with plastic wrap or equivalent.

1. Using a 7/8" wrench, remove the safety switch from the valve (Fig. 1046).



Fig 1046

PICT-2677a

Auxiliary Valve

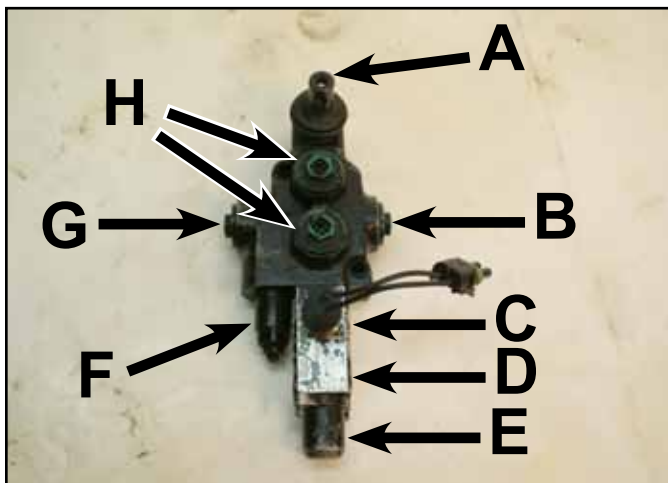


Fig 1045

PICT-2674a



Fig 1047

PICT-2678a

- | | |
|-----------------------|----------------------|
| A. Operator lever | E. Return spring cap |
| B. Inlet | F. Relief |
| C. Safety switch port | G. Return |
| D. Detent cap | H. Directional ports |

HYDRAULIC SYSTEM

3. Remove the return spring cap (Fig. 1048).



Fig 1048

PICT-2679a

6. While compressing the steel ball, slowly slide the steel collar up off the detent spring assembly (Fig. 1050).



Fig 1050

PICT-2681a

4. Clamp the auxiliary valve in a vise to secure in place.
5. Using a punch, compress the steel ball in the detent assembly (Fig. 1049).



Fig 1049

PICT-2680a

7. Using a magnet, remove the 4 small steel balls from the spring retainer (Fig. 1051).



Fig 1051

PICT-2683a

HYDRAULIC SYSTEM

8. Using a magnet, remove the large ball from the spring retainer (Fig. 1052).



Fig 1052

PICT-2684a

10. Remove the spring retainer block from the valve (Fig. 1054).



Fig 1054

PICT-2686a

9. Remove the spring from inside the spring retainer (Fig. 1053).



Fig 1053

PICT-2685a

11. Using a 13mm wrench, loosen the spring retainer from the valve (Fig. 1055).



Fig 1055

PICT-2687a

HYDRAULIC SYSTEM

12. Remove the spring retainer from the valve assembly (Fig. 1056).



Fig 1056

PICT-2688a

14. Using a 4mm Allen wrench, remove 2 screws from the switch block assembly (Fig. 1058).



Fig 1058

PICT-2690a

13. Remove the spring and retainers from the valve (Fig. 1057).



Fig 1057

PICT-2689a

15. Remove the switch block from the valve assembly (Fig. 1059).

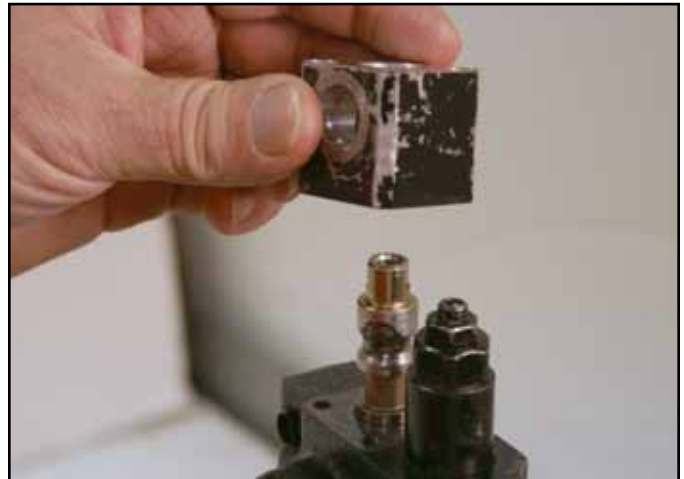


Fig 1059

PICT-2691a

HYDRAULIC SYSTEM

16. Using a 19mm wrench, loosen the relief (Fig. 1060).

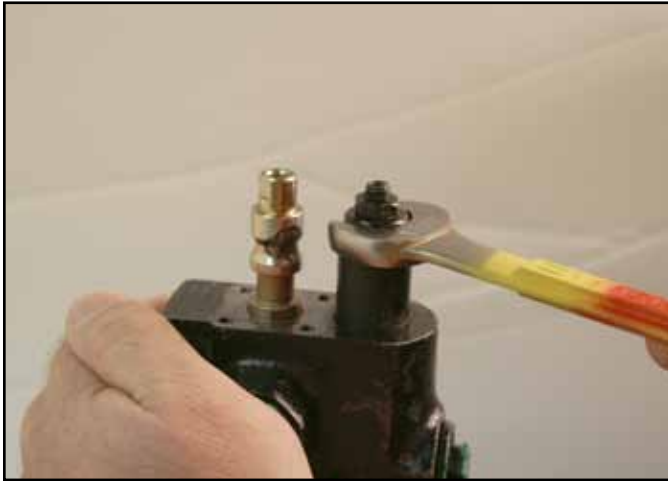


Fig 1060

PICT-2693a

19. Remove the operator lever block from the valve assembly (Fig. 1062).



Fig 1062

PICT-2741a

17. Remove the valve from the vise.

18. Using a 4mm Allen wrench, remove the 2 screws retaining the operator lever spool cap from the valve (Fig. 1061).



Fig 1061

PICT-2694

20. Remove the gasket from the valve assembly (Fig. 1063).



Fig 1063

PICT-2740

HYDRAULIC SYSTEM

21. Remove the spool from the valve assembly (Fig. 1064).

Note: Inspect the spool and valve body bore. Replace the auxiliary valve assembly if damaged or there are scratches deep enough to catch a fingernail.



Fig 1064

PICT-2696a

22. Remove both spool o-rings from the valve body (Fig. 1065).



Fig 1065

PICT-2697

23. Using a 19mm wrench, continue loosening the relief (Fig. 1066).



Fig 1066

PICT-2699a

24. Remove the relief from the valve (Fig. 1067).



Fig 1067

PICT-2700a

HYDRAULIC SYSTEM

25. Remove the seat from the relief port (Fig. 1068).



Fig 1068

PICT-2702a

27. Remove the adjusting screw from the relief barrel (Fig. 1070).



Fig 1070

PICT-2704a

26. Using a 4mm Allen wrench and a 13mm wrench, loosen the adjusting screw from the relief (Fig. 1069).

Note: Changing the position of the adjusting screw changes the relief pressure setting, which must be checked after the auxiliary valve is installed in the traction unit.



Fig 1069

PICT-2703a

28. Using a punch, push the plunger out of the relief barrel (Fig. 1071).



Fig 1071

PICT-2705a

HYDRAULIC SYSTEM

29. Remove the plunger from the relief (Fig. 1072).



Fig 1072

PICT-2706a

Relief Assembly

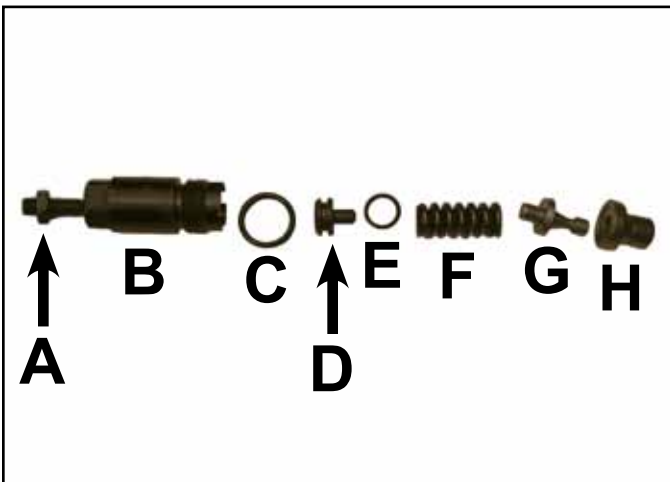


Fig 1073

PICT-2743a

- | | |
|--------------------------|------------------------|
| A. Adjusting screw & nut | E. Plunger O-ring |
| B. Body | F. Spring |
| C. Body O-ring | G. Relief plunger seat |
| D. Plunger | H. Plunger body |

Spool Assembly

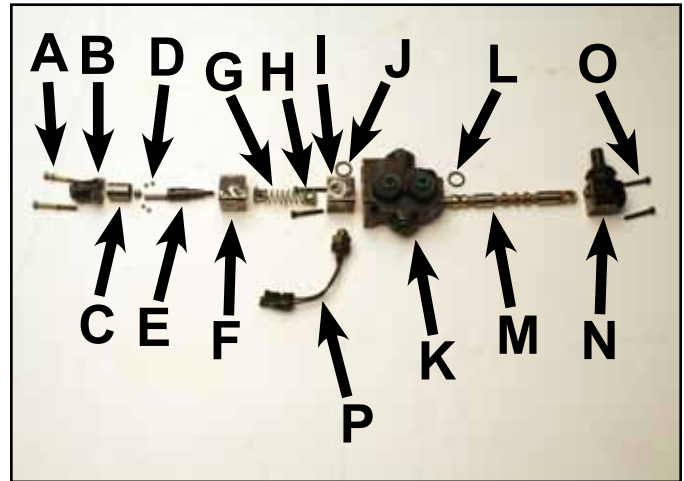


Fig 1074

PICT-2708a

- | | |
|------------------------|----------------------|
| A. Spring cap screws | I. Switch block |
| B. Spring cap | J. Spool O-ring |
| C. Detent collar | K. Valve body |
| D. Detent balls | L. Spool O-ring |
| E. Detent plunger | M. Spool |
| F. Spring block | N. Handle cap |
| G. Spring & retainers | O. Handle cap screws |
| H. Switch block screws | P. Detent switch |

Auxiliary Valve Assembly

1. Install the both spool o-rings into the valve body (Fig. 1075).

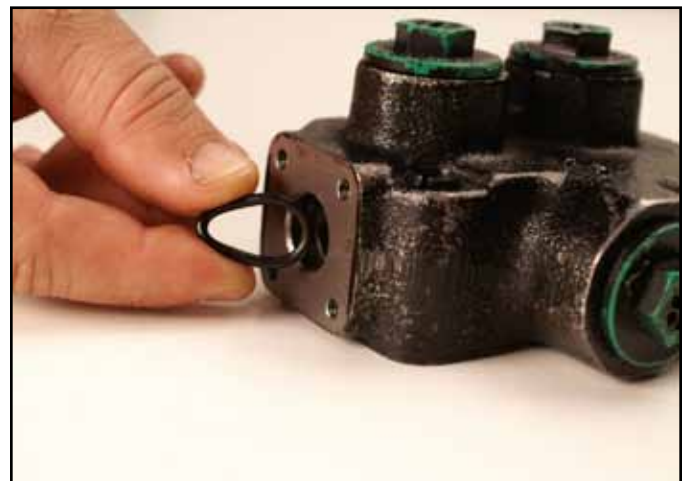


Fig 1075

PICT-2711

HYDRAULIC SYSTEM

2. Lubricate the spool and o-rings with oil. Install the spool into the valve body. Turning the spool as it is being installed to prevent o-ring damage (Fig. 1076).



Fig 1076

PICT-2712a

4. Install the two threaded screws into the switch block and tighten with 4mm Allen wrench (Fig. 1078).



Fig 1078

PICT-2714a

3. Place the valve into a vise. Install the switch block to the valve assembly. The thicker offset on the switch block is assembled toward the valve (Fig. 1077).



Fig 1077

PICT-2713a

5. Install the spring with both spring retainers over the end of the spool (Fig. 1079).



Fig 1079

PICT-2689a

HYDRAULIC SYSTEM

6. Install and thread the spring retainer into the spool (Fig. 1080).



Fig 1080

PICT-2715a

8. Position the spring block over the spring (Fig. 1082).



Fig 1082

PICT-2729a

7. Place a punch into the spool opening and tighten the spring retainer with a 13mm wrench (Fig. 1081).

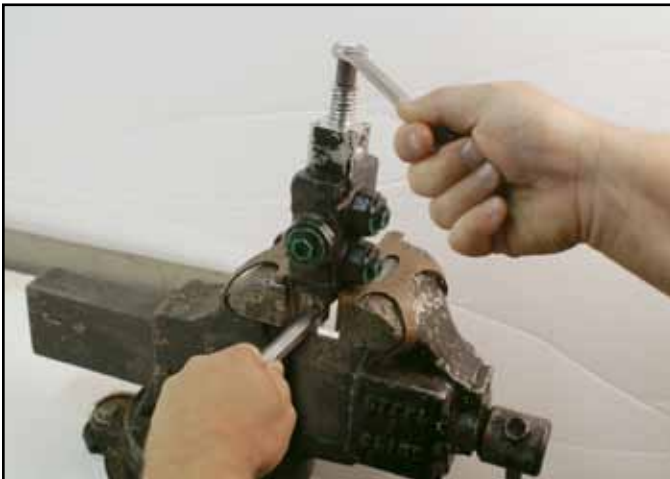


Fig 1081

PICT-2716a

9. Place the spring into the spring retainer (Fig. 1083).



Fig 1083

PICT-2732a

HYDRAULIC SYSTEM

10. Place a small amount of grease to the center opening of the spring retainer (Fig. 1084).



Fig 1084

PICT-2730a

12. Place the steel collar over a punch with the shoulder of the collar downward (Fig. 1086).



Fig 1086

PICT-2726a

11. Place a small amount of grease at each of the outer openings of the spring retainer (Fig. 1085).



Fig 1085

PICT-2731a

13. Install the steel ball into the center retainer opening and onto the spring (Fig. 1087).



Fig 1087

PICT-2733a

HYDRAULIC SYSTEM

14. Hold the steel collar onto the punch and push down on the center ball with the punch until the center ball is below the four holes in the spring retainer (Fig. 1088).



Fig 1088

PICT-2737a

16. Slide the steel collar over the spring retainer and slowly release the pressure from the center ball (Fig. 1090).



Fig 1090

PICT-2735a

15. Continue holding down the center ball with the punch and insert the four small steel balls into the spring retainer (Fig. 1089).



Fig 1089

PICT-2734a

17. Install the spring cap with the 2 screws by pushing down on the cap and evenly threading and tightening the two screws with a 4mm Allen wrench (Fig. 1091).



Fig 1091

PICT-2738a

HYDRAULIC SYSTEM

18. Remove the valve from the vise. Grease the swivel ball in the handle cap (Fig. 1092).



Fig 1092

PICT-2739

20. Place the handle cap onto the spool gasket. Make sure the swivel ball in the cap is placed in the opening of the spool (Fig. 1094).



Fig 1094

PICT-2741a

19. Place the gasket onto the valve body (Fig. 1093).



Fig 1093

PICT-2740

21. Install the two bolts to secure the handle cap onto the valve. Tighten the bolts using a 4mm Allen wrench (Fig. 1095).



Fig 1095

PICT-2742a

HYDRAULIC SYSTEM

22. Lubricate the plunger and then slide the plunger into the relief body (Fig. 1096).



Fig 1096

PICT-2744a

24. Slide the steel plunger into the relief body (Fig. 1098).



Fig 1098

PICT-2748a

23. Slide the spring onto the plunger in the relief body (Fig. 1097).



Fig 1097

PICT-2745a

25. Slide the steel plunger cap onto the plunger in the relief body (Fig. 1099).



Fig 1099

PICT-2749a

HYDRAULIC SYSTEM

26. Thread the adjusting screw and nut into the top of the relief body (Fig. 1100).



Fig 1100

PICT-2752

28. Tighten the relief assembly using a 19mm wrench (Fig. 1102).



Fig 1102

PICT-2756a

27. Thread the relief assembly into the valve body (Fig. 1101).



Fig 1101

PICT-2755a

29. Thread the safety switch into the switch block. Tighten using a 7/8" wrench (Fig. 1103).



Fig 1103

PICT-2757a

HYDRAULIC SYSTEM

Loader Valve Rebuild

1. Before disassembly of any hydraulic component, use a clean, dirt-free work surface and clean solvent to prevent system contamination (Fig. 1104).

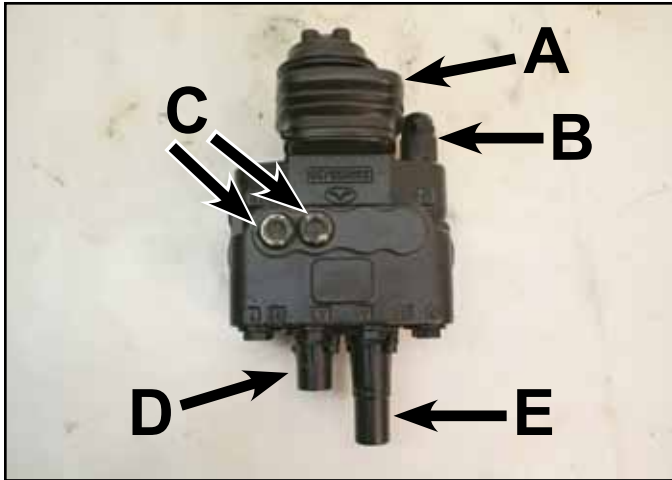


Fig 1104

PICT-2583

- | | |
|-------------------------|----------------------|
| A. Rubber Bellows | D. Spring Cap |
| B. System relief | E. Detent spring cap |
| C. Work port relief (2) | |

1. Remove the cable tie from around the rubber bellows (Fig. 1105).



Fig 1105

PICT-2588a

2. Remove the rubber bellows from the valve assembly (Fig. 1106). Wipe the excess grease from the joystick.



Fig 1106

PICT-2589a

HYDRAULIC SYSTEM

- Using a 6mm Allen wrench, loosen the 3 hex head screws and spring lock washers (Fig. 1107).



Fig 1107

PICT-2591a

- Remove the articulated holder, screws and washers from the valve assembly (Fig. 1108).



Fig 1108

PICT-2592a

- Pictured below are the joystick joints (Fig. 1109).

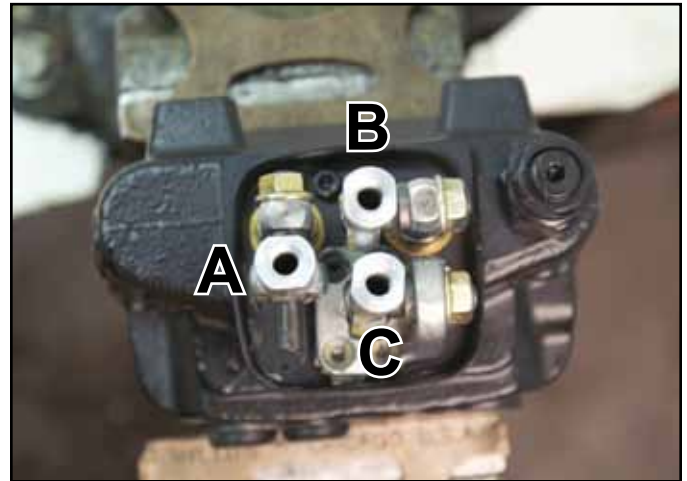


Fig 1109

PICT-2593a

- A. Tilt Cylinder operation
- B. Loader Lift Cylinder operation
- C. Pivot for Lift and Tilt operation

- Slide the end rod off the pin of the joystick joint for the tilt cylinder (Fig. 1110).



Fig 1110

PICT-2601a

HYDRAULIC SYSTEM

7. Using a 13mm socket and wrench, remove the nut holding the joystick joint and then remove the pivot for the lift and tilt operation (Fig. 1111).



Fig 1111

PICT-2596a

9. Remove the joystick pivot from the valve assembly (Fig. 1113).



Fig 1113

PICT-2598a

8. Turn the loader lift joystick joint. Using a 3mm Allen wrench, remove the 2 hex head screws securing the joystick pivot to the valve assembly (Fig. 1112).



Fig 1112

PICT-2597

Joystick Assembly Installation

1. Apply thread locking compound on the threads of both screws that secure the pivot to the valve assembly (Fig. 1114).



Fig 1114

PICT-2599a

HYDRAULIC SYSTEM

2. Position the joystick pivot on the valve assembly (Fig. 1115).



Fig 1115

PICT-2598a

4. Position the lift and tilt joystick joint onto the pivot and install the nut (Fig. 1117).



Fig 1117

PICT-2600a

3. Using a 3mm Allen wrench, install the 2 hex head screws that secure the joystick pivot (Fig. 1116).



Fig 1116

PICT-2597

5. Using a 13mm wrench and socket, tighten the nut securing the joystick joint to the pivot for the lift and tilt operation (Fig. 1118).



Fig 1118

PICT-2596a

HYDRAULIC SYSTEM

- Slide the end of the joystick joint onto the pin for the tilt cylinder (Fig. 1119).



Fig 1119

PICT-2601a

- Torque the 3 bolts to 17.7 ft-lbs. (24 Nm) (Fig. 1121).



Fig 1121

PICT-2603a

- Position the articulated holder with 3 hex head screws and lock washers onto the valve assembly and thread the 3 bolts onto the joystick joints (Fig. 1120).



Fig 1120

PICT-2602a

- Lubricate all of the articulated parts inside the mechanical joystick area with synthetic base grease grade NLGI2 (Fig. 1122).



Fig 1122

PICT-2655

HYDRAULIC SYSTEM

10. Position the rubber bellows over the base plate and install the tie strap in the groove of the rubber bellows (Fig. 1123).

Note: When installing the rubber bellows, there is an offset in the bellows. Ensure proper installation.



Fig 1123

PICT-2605a

Spool Removal

Note: To disassemble and assemble the valve, it is best to hold the valve in a bench vise.

1. Remove the cable tie from around the rubber bellows (Fig. 1125).



Fig 1125

PICT-2588a

11. Install the lift/tilt handle (Fig. 1124).



Fig 1124

PICT-2584a

2. Remove the rubber bellows from the valve assembly (Fig. 1126). Wipe the excess grease from the joystick.



Fig 1126

PICT-2589a

HYDRAULIC SYSTEM

- Using a 6mm Allen wrench, loosen the 3 hex head screws and spring lock washers (Fig. 1127).



Fig 1127

PICT-2591a

- Remove the articulated holder, screws and washers from the valve assembly (Fig. 1128).



Fig 1128

PICT-2592a

- Pictured below are the joystick joints (Fig. 1129).

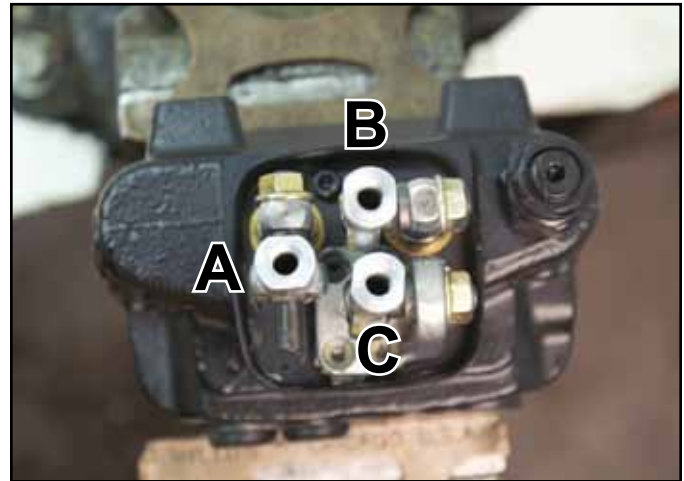


Fig 1129

PICT-2593a

- A. Tilt Cylinder operation
- B. Loader Lift Cylinder operation
- C. Pivot for Lift and Tilt operation

- Slide the end rod off the pin of the joystick joint for the tilt cylinder (Fig. 1130).



Fig 1130

PICT-2601a

HYDRAULIC SYSTEM

7. Using a 13mm socket and wrench, remove the nut securing the joystick pin and then remove the pin (Fig. 1131).

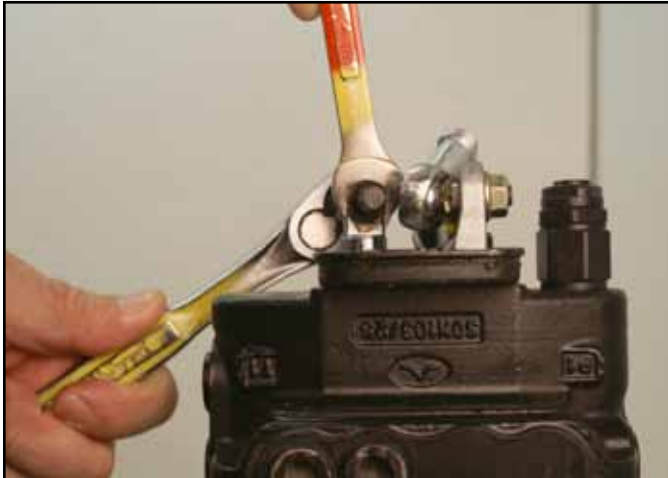


Fig 1131

PICT-2607a

9. Turn the lift pivot. Using a 13mm socket and wrench, remove the nut holding the joystick pivot joint and then remove the joint from the lift and tilt spool (Fig. 1133).



Fig 1133

PICT-2609a

8. Using a 13mm socket and wrench, remove the nut holding the joystick pivot joint and then remove the pivot for the lift and tilt operation (Fig. 1132).



Fig 1132

PICT-2608a

10. Using a 3mm Allen wrench, remove the two hex head bolts securing the joystick pivot to the valve assembly (Fig. 1134).



Fig 1134

PICT-2611

HYDRAULIC SYSTEM

11. Using a 4mm Allen wrench, remove the 2 hex head bolts that secure the joystick base plate to the valve assembly (Fig. 1135).



Fig 1135

PICT-2612

12. Remove the joystick base plate from the valve assembly (Fig. 1136).



Fig 1136

PICT-2613

13. Remove the gasket from the valve (Fig. 1137).



Fig 1137

PICT-2641a

14. Turn the valve assembly over. Using a 4mm Allen wrench, remove the two hex head bolts that secure each spring cap to the valve assembly (Fig. 1138).



Fig 1138

PICT-2614

HYDRAULIC SYSTEM

15. Remove both caps from the valve assembly (Fig. 1139).



Fig 1139

PICT-2616

17. Remove the detent spring from the valve assembly (Fig. 1141).



Fig 1141

PICT-2618a

16. Using a drift punch to hold the top end of the spool, use a 6mm wrench to remove the detent spring assembly from the bottom of the spool (Fig. 1140).



Fig 1140

PICT-2617

18. Using a drift punch to hold the top end of the spool, use a 5mm wrench to remove the spring valve assembly from the bottom of the spool (Fig. 1142).



Fig 1142

PICT-2620a

HYDRAULIC SYSTEM

19. Turn the valve in the vise sideways. Remove the tilt spool by twisting and pulling the spool from the top of the valve (Fig. 1143).



Fig 1143

PICT-2621a

Before replacing the spool, clean and inspect the inner bore for damage. Check the condition of the o-rings, particularly for metallic particles embedded in the o-ring surface. Damage to o-ring grooves, particularly on the sealing surface, is unacceptable. In the event that an unacceptable condition occurs, the valve needs to be replaced (Fig. 1145).

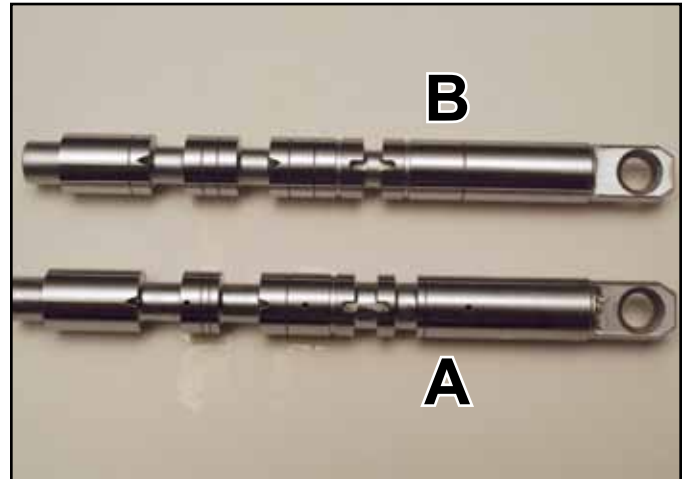


Fig 1145

PICT-2624a

20. Remove the lift spool by twisting and pulling the spool from the valve (Fig. 1144).

Note: Visually inspect spool outside surfaces for scratches. Deep scratches are unacceptable and the spool needs to be replaced. Scratches that are deep enough to catch the fingernail are also unacceptable, and the spool needs to be replaced.



Fig 1144

PICT-2622a

- A. Lift Spool with small relief holes
B. Tilt Spool

21. Using a tool with a 90° angle, (for example, a snap ring pliers with 90° tips) remove both the spool valve seals located at the top of the valve (Fig. 1146).



Fig 1146

PICT-2628

HYDRAULIC SYSTEM

22. Remove the two o-rings located at the bottom of the valve; a small dental pick works to help remove the o-rings (Fig. 1147).



Fig 1147

PICT-2626

1. Lubricate the two o-rings located at the bottom of the valve and install (Fig. 1149).



Fig 1149

PICT-2630

Spool Assembly

Replace all seals and o-rings with new parts. Lubricate the valve, o-rings, and spool with 10W-30 oil prior to installation (Fig. 1148).

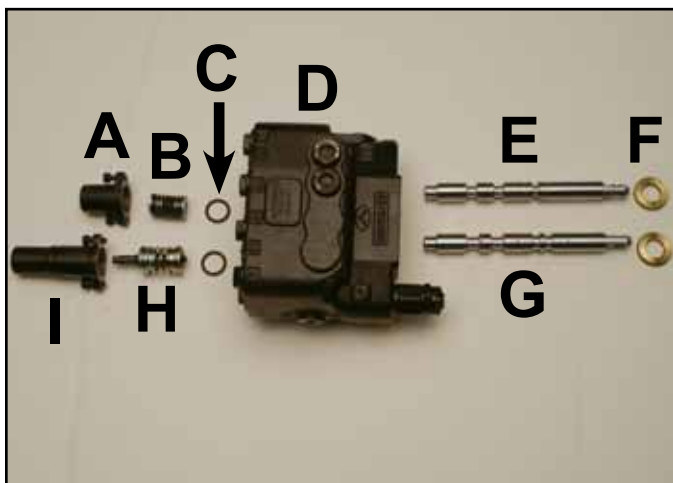


Fig 1148

PICT-2629

2. Lubricate and install the spool valve seals in the top of the valve (Fig. 1150).

Note: The thin wall of the seal goes into the valve body first.



Fig 1150

PICT-2631

- | | |
|----------------|-------------------------|
| A. Spring Cap | F. Spool Valve Seal (2) |
| B. Tilt Spring | G. Lift Spool |
| C. O-ring (2) | H. Detent Spring |
| D. Valve Body | I. Detent Cap |
| E. Tilt Spool | |

HYDRAULIC SYSTEM

3. Lubricate the tilt spool. Install the spool in the port furthest away from the relief; twist and push gently, so you do not damage the o-ring (Fig. 1151).



Fig 1151

PICT-2632a

5. Install the spring valve assembly with a 5mm hex wrench and torque to 5 ft-lbs. (6.8 Nm) (Fig. 1153).



Fig 1153

PICT-2635

4. Lubricate and install the lift spool in the port closest to the relief, twist and push gently, so you do not damage the o-ring (Fig. 1152).



Fig 1152

PICT-2634a

6. Lubricate the spring with synthetic base grease grade NLGI2 (Fig. 1154).



Fig 1154

PICT-2636

HYDRAULIC SYSTEM

7. Install the detent spring assembly and torque to 5 ft-lbs. (6.8 Nm) (Fig. 1155).



Fig 1155

PICT-2637

9. Install the spool caps over the detent and spring valve (Fig. 1157).



Fig 1157

PICT-2639

8. Lubricate the spring with synthetic base grease grade NLGI2 (Fig. 1156).



Fig 1156

PICT-2638

10. Tighten and torque the cap screws to 5 ft-lbs. (6.8 Nm) (Fig. 1158).



Fig 1158

PICT-2640

HYDRAULIC SYSTEM

11. Rotate the valve in the bench vise. Install the gasket over the spools and onto the valve assembly (Fig. 1159).



Fig 1159

PICT-2641a

13. Secure the base plate with 2 cap screws and tighten using a 4mm Allen wrench (Fig. 1161).



Fig 1161

PICT-2644

12. Position the joystick base plate over the spools and onto the gasket (Fig. 1160).



Fig 1160

PICT-2643a

14. Apply thread locking compound to the 2 screws that will secure the pivot to the valve (Fig. 1162).



Fig 1162

PICT-2599a

HYDRAULIC SYSTEM

15. Position the pivot onto the base plate and install the 2 screws, using a 3mm Allen wrench, to secure the pivot to the base plate. Torque the 2 screws to 7 ft-lbs. (9.5 Nm) (Fig. 1163).



Fig 1163

PICT-2646

17. Position the loader lift joystick joint into the lift spool and install the nut. Torque the nut to 31 ft-lbs. (42 Nm) (Fig. 1165).



Fig 1165

PICT-2649a

16. Apply thread locking compound to the threads of the loader lift joystick joint (Fig. 1164).



Fig 1164

PICT-2648a

18. Apply thread locking compound to the threads of the pivot joystick joint (Fig. 1166).



Fig 1166

PICT-2650a

HYDRAULIC SYSTEM

19. Position the pivot joystick joint into the pivot and install the nut. Torque the nut to 31 ft-lbs. (42 Nm) (Fig. 1167).



Fig 1167

PICT-2651a

21. Position the joint pin into the tilt spool and install the nut. Torque the nut to 31 ft-lbs. (42 Nm) (Fig. 1169).



Fig 1169

PICT-2653a

20. Apply blue thread locking material to the threads of the joystick pin (Fig. 1168).



Fig 1168

PICT-2652a

22. Install the end rod onto the joystick pin (Fig. 1170).



Fig 1170

PICT-2654

HYDRAULIC SYSTEM

23. Position the articulated holder with 3 hex head screws and lock washers onto the valve assembly and thread the 3 bolts onto the joystick joints (Fig. 1171).



Fig 1171

PICT-2602a

24. Torque the 3 bolts to 17.7 ft-lbs. (24 Nm) (Fig. 1172).



Fig 1172

PICT-2603a

25. Lubricate all of the articulated parts inside the mechanical joystick area with synthetic base grease grade NLGI2 (Fig. 1173).



Fig 1173

PICT-2655

26. Position the rubber bellows over the base plate and install the tie strap in the groove of the rubber bellows (Fig. 1174).

Note: When installing the rubber bellows, there is an offset in the bellows. Ensure proper installation.



Fig 1174

PICT-2605a

HYDRAULIC SYSTEM

27. Install the lift/tilt handle (Fig. 1175).



Fig 1175

PICT-2584a

2. Using a 24mm wrench, remove the main relief valve from the valve assembly (Fig. 1177).



Fig 1177

PICT-2656

Main Relief Valve

Pressure relief is designed to prevent internal fluid pressure from rising above a pre-determined maximum pressure.

1. Using a 24mm socket and wrench, loosen the body of the main relief valve from the main relief valve bonnet (Fig. 1176).



Fig 1176

PICT-2658a

3. Remove the main relief valve assembly from the valve (Fig. 1178).



Fig 1178

PICT-2657a

HYDRAULIC SYSTEM

4. Disconnect the body of the main relief valve from the main relief valve bonnet (Fig. 1179).



Fig 1179

PICT-2661a

5. Connect the body of the main relief valve to the main relief valve bonnet (Fig. 1181).



Fig 1181

PICT-2661a

The relief valve is used to adjust to the specified system pressure (2400 ± 50 psi or 165.47 ± 3.45 bar) by increasing or decreasing the load on the spring against the disc. Loosen the lock nut; turn screw inward to increase the pressure or outward to decrease the pressure (Fig. 1180).

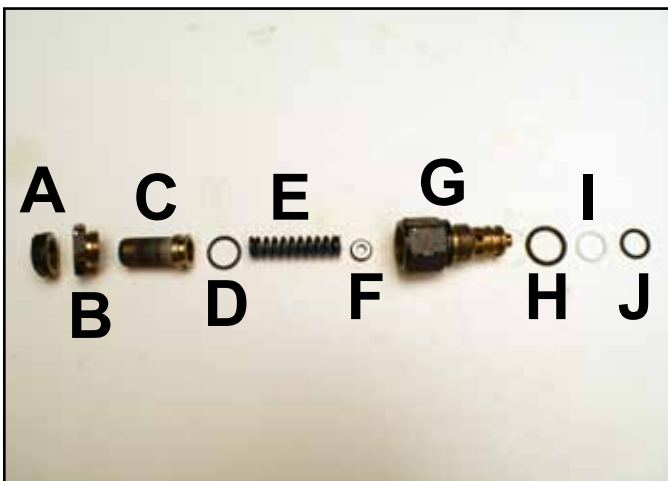


Fig 1180

PICT-2659a

6. Using a 24mm wrench, install the main relief valve into the valve assembly (Fig. 1182).



Fig 1182

PICT-2657a

- | | |
|-----------------------|-------------------|
| A. Bonnet | F. Spring spacer |
| B. Set screw lock nut | G. Body |
| C. Set screw | H. Body o-ring |
| D. Set screw o-ring | I. Back up o-ring |
| E. Spring | J. O-ring |

HYDRAULIC SYSTEM

7. Using a 24mm socket and wrench, tighten the body of the main relief valve onto the main relief valve bonnet (Fig. 1183).



Fig 1183

PICT-2658

1. Using a 10mm Allen wrench, remove the 2 work port relief plugs (Fig. 1185 and Fig. 1186).



Fig 1185

PICT-2663

Work Port Relief

The work relief ports relieve the fluid spikes when the Lift and Tilt Cylinders are being actuated.

These ports are non-adjustable. Port relief setting is 2030 psi (140 bar) (Fig. 1184).



Fig 1184

PICT-2664



Fig 1186

PICT-2668a

HYDRAULIC SYSTEM

2. Install both seats and reliefs into the valve work ports (Fig. 1187).



Fig 1187

PICT-2667

4. Install both work port relief plugs. Tighten using a 10mm Allen wrench (Fig. 1189).



Fig 1189

PICT-2663

3. Install both springs into the valve work ports (tapered end of the spring goes in first) (Fig. 1188).



Fig 1188

PICT-2671

Note: There are 3 “blank” ports on the valve that have plugs with o-rings inserted into them (Fig. 1190).

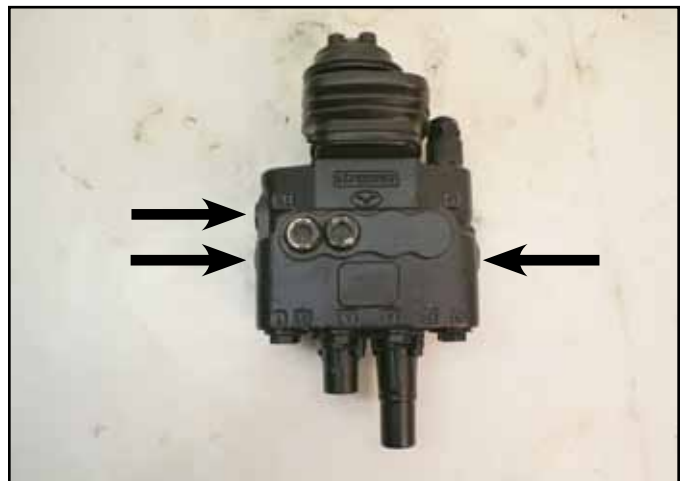


Fig 1190

PICT-2583

Note: Port reliefs are set at 3050 psi (210 bar). Port reliefs relieve static pressure from the tilt cylinder.

HYDRAULIC SYSTEM

Lift Cylinder Assembly Rebuild

1. Extend the ram of the tilt cylinder out approximately 6" to 12" (15.24 to 30.48cm).
2. Clean all dirt and other foreign substance from the openings, particularly at the head of the hydraulic cylinder.
3. Clamp the tilt cylinder in a vise so that the locking ring slot is facing up.
4. Clean out all material from the locking slot (Fig. 1191).



Fig 1191

PICT-3034

Note: If excessive wear due to side-loads or binding is a possibility, mark or note the piston and head relationship to the rod and tube. This condition will usually show up as a highly polished surface on the piston and head 90° to the pin rotation axis (Fig. 1192).



Fig 1192

PICT-3035

5. Using a spanner wrench installed in the holes provided, rotate the head counterclockwise until the edge of the retaining ring appears in the milled opening of the tube. Insert a flat blade screwdriver between the beveled edge of the retaining ring and the cylinder barrel to start the retaining ring through the opening (Fig. 1193).



Fig 1193

PICT-3036

HYDRAULIC SYSTEM

6. Continue to rotate the head counter-clockwise until the retaining ring is completely removed (Fig. 1194).



Fig 1194

PICT-3037

7. Pull out on the rod to remove the piston and head assembly from the barrel (Fig. 1195).



Fig 1195

PICT-3038a

8. Remove the barrel from the vise.

INSPECT ROD: There should be no scratches or pits deep enough to catch the fingernail. Pits that go to the base metal are unacceptable. Scratches that catch the fingernail but are not to the base metal, less than 0.5" long (1.27cm) and primarily in the circumferential direction are acceptable provided they cannot cut the rod seal. Chrome should be present over the entire surface of the rod and the lack thereof is unacceptable. In the event that an unacceptable condition occurs, the cylinder should be replaced.

INSPECT HEAD: Visually inspect the inside bore for scratches or polishing. Deep scratches are unacceptable. Polishing indicates uneven loading and when this occurs, the bore should be checked for out-of-roundness. If out-of-roundness exceeds 0.007" (.18mm), this is unacceptable. Check the condition of the dynamic seals, looking particularly for metallic particles embedded in the piston seal surface. Remove the seals. Damage to the seal grooves, particularly on the sealing surfaces, is unacceptable. In the event that an unacceptable condition occurs, the cylinder should be replaced.

HYDRAULIC SYSTEM

INSPECT TUBE ASSEMBLY: Visually inspect the inside bore for scratches and pits. There should be no scratches or pits deep enough to catch the fingernail. Scratches that catch the fingernail but are less than 0.5" long (1.27cm) and primarily in the circumferential direction are acceptable provided they cannot cut the piston seal. In the event that an unacceptable condition occurs, the cylinder should be replaced (Fig. 1196).

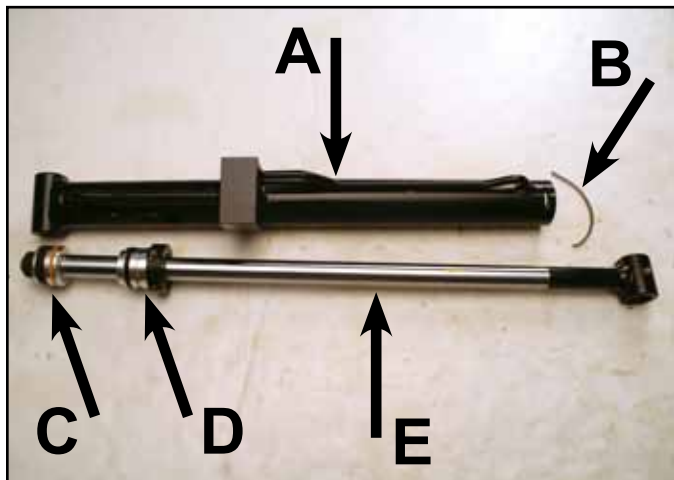


Fig 1196

PICT-3039a

- | | |
|-------------------|---------|
| A. Barrel | D. Head |
| B. Retaining Ring | E. Ram |
| C. Piston | |

Lift Cylinder Disassembly

1. Remove the wear ring from the piston (Fig. 1197).



Fig 1197

PICT-3040

2. Remove the piston seal from the ram assembly (Fig. 1198).



Fig 1198

PICT-3041a

HYDRAULIC SYSTEM

3. Remove the back-up piston seal from the ram assembly (Fig. 1199).



Fig 1199

PICT-3042a

4. Using a 1-1/8" socket, remove the nut from the ram assembly (Fig. 1200).



Fig 1200

PICT-3043a

5. Slide the piston off the end of the ram (Fig. 1201).



Fig 1201

PICT-3045a

6. Remove the inner o-ring from the inside of the piston (Fig. 1202).



Fig 1202

PICT-3046a

HYDRAULIC SYSTEM

7. Remove the o-ring from the head on the ram assembly (Fig. 1203).



Fig 1203

PICT-3047a

9. Slide the head off the end of the ram (Fig. 1205).



Fig 1205

PICT-3049a

8. Remove the flat back-up ring from the head on the ram assembly (Fig. 1204).



Fig 1204

PICT-3048a

10. Remove the wiper seal from inside the head (Fig. 1206).



Fig 1206

PICT-3050a

HYDRAULIC SYSTEM

11. Remove the wear seal from inside the head (Fig. 1207).



Fig 1207

PICT-3051

12. Thoroughly rinse the inside of the head with a clean solvent. Rinse and clean all internal components of any foreign material with a lint-free rag.
13. Visually inspect for material defects and contamination. All seals and o-rings must be replaced with new parts.

Head Assembly (Fig. 1208):

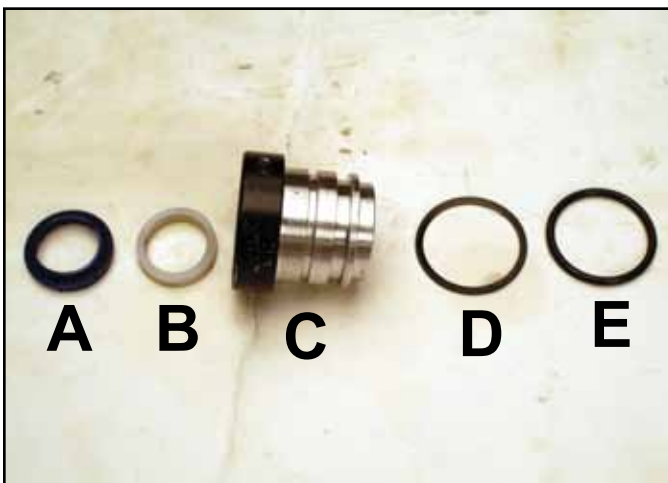


Fig 1208

PICT-3052

- | | |
|--------------|-------------------|
| A. Wiper | D. Static Back-up |
| B. Wear Seal | E. Static O-Ring |
| C. Head | |

Piston Assembly (Fig. 1209):



Fig 1209

PICT-3056a

- | | |
|------------------------|--------------|
| A. Piston Inner O-ring | D. Piston |
| B. Backup Piston Seal | E. Wear Ring |
| C. Piston Seal | F. Locknut |

14. Lubricate the head and all seals with 10W-30 oil prior to installation. Twist the wear seal into a "C" shape and allow it to snap into the groove (Fig. 1210).

Note: The groove of the seal faces toward the barrel side of the head.

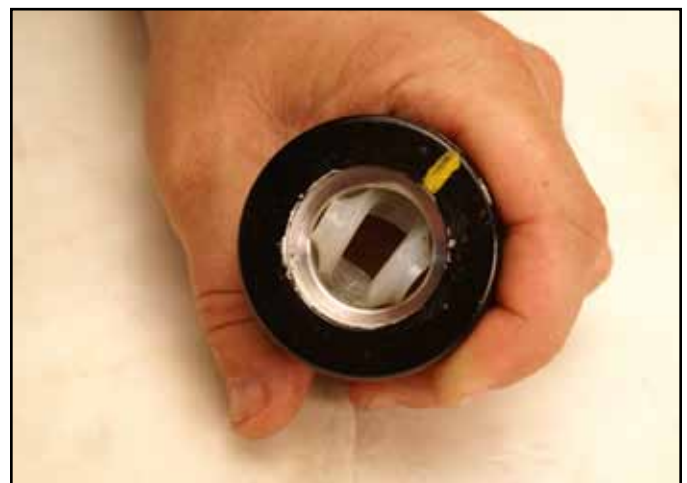


Fig 1210

PICT-3057

HYDRAULIC SYSTEM

15. Install the wiper seal so that the lip of the seal is installed in the groove inside the head (Fig. 1211).



Fig 1211

PICT-3058

16. Install the flat back-up ring into the head. The flat back-up seal is installed up against the ram side of the groove (Fig. 1212).



Fig 1212

PICT-3059a

17. Install the o-ring into the groove next to the flat back-up ring. The o-ring is installed on the barrel side of the groove (Fig. 1213).

Note: If possible, the head/seal assembly should sit for at least one hour to allow the seals to normalize.



Fig 1213

PICT-3060a

18. Install the back-up ring into the piston (Fig. 1214).



Fig 1214

PICT-3061a

HYDRAULIC SYSTEM

19. Install the piston seal on top of the back-up ring (Fig. 1215).



Fig 1215

PICT-3062a

20. Install the wear ring onto the piston (Fig. 1216).



Fig 1216

PICT-3063a

Lift Cylinder Assembly

Note: Lubricate all parts during assembly.

1. Secure the cylinder ram into a vise.
2. Protect the threads of the ram and then slide the o-ring onto the ram shaft and into the groove (Fig. 1217).



Fig 1217

PICT-3064a

3. Remove the thread protection material.
4. Slide the head onto the cylinder ram (Fig. 1218).



Fig 1218

PICT-3065a

HYDRAULIC SYSTEM

5. Slide the piston onto the cylinder ram (Fig. 1219).



Fig 1219

PICT-3066a

6. Install the nut onto the end of the ram. Using a 1-1/8" socket, torque the nut to 100 - 120 ft-lbs. (135.6 - 162.7 Nm) (Fig. 1220).



Fig 1220

PICT-3067a

7. Remove the ram from the vise and secure the cylinder barrel into the vise.

8. Install the ram assembly into the cylinder barrel by rotating the piston assembly while pushing the piston into the barrel (Fig. 1221).



Fig 1221

PICT-3068a

9. Rotate the head until the ring hole in the ring groove is within the slot on the barrel (Fig. 1222).



Fig 1222

PICT-3070a

HYDRAULIC SYSTEM

10. Insert the end of the ring through the notch in the barrel and into the hole in the groove. Place the spanner wrench onto the head assembly (Fig. 1223).



Fig 1223

PICT-3071

11. Begin rotating the spanner wrench so that the head pulls the ring inside the barrel. Continue rotating until the ring is completely installed inside the barrel on the head assembly (Fig. 1224).



Fig 1224

PICT-3073

Tilt Cylinder Assembly Rebuild

1. Extend the ram of the tilt cylinder out approximately 6" to 12" (15.24 to 30.48cm).
2. Clean away all dirt and foreign substance from openings, particularly at the head of the hydraulic cylinder.
3. Clamp the tilt cylinder in a vise so that the locking ring slot is facing up.
4. Clean out all material from the locking slot (Fig. 1225).



Fig 1225

PICT-2954

HYDRAULIC SYSTEM

Note: If excessive wear due to side-loads or binding is a possibility, mark or note the piston and head relationship to the rod and tube. This condition will usually show up as a highly polished surface on the piston and head 90° to the pin rotation axis (Fig. 1226).



Fig 1226

PICT-2953

5. Using a spanner wrench installed in the holes provided, rotate the head clockwise until the beveled edge of the retaining ring appears in the milled opening of the tube. Insert a flat blade screwdriver between the beveled edge of the retaining ring and the cylinder barrel to start the retaining ring and the cylinder barrel to start the retaining ring through the opening (Fig. 1227).



Fig 1227

PICT-2956

6. Continue to rotate the head counter-clockwise until the retaining ring is completely removed (Fig. 1228).



Fig 1228

PICT-2957

7. Pull out on the rod to remove the piston and head assembly from the barrel (Fig. 1229).



Fig 1229

PICT-2958a

HYDRAULIC SYSTEM

8. Remove the barrel from the vise.

INSPECT ROD: There should be no scratches or pits deep enough to catch the fingernail. Pits that go to the base metal are unacceptable. Scratches that catch the fingernail but are not to the base metal, less than 0.5 inch long (1.27cm) and primarily in the circumferential direction are acceptable provided they cannot cut the rod seal. Chrome should be present over the entire surface of the rod and the lack thereof is unacceptable. In the event that an unacceptable condition occurs, the cylinder should be replaced.

INSPECT HEAD: Visually inspect the inside bore for scratches or polishing. Deep scratches are unacceptable. Polishing indicates uneven loading and when this occurs, the bore should be checked for out-of-roundness. If out-of-roundness exceeds 0.007" (.18mm), this is unacceptable. Check the condition of the dynamic seals, looking particularly for metallic particles embedded in the piston seal surface. Remove the seals. Damage to the seal grooves, particularly on the sealing surfaces, is unacceptable. In the event that an unacceptable condition occurs, the cylinder should be replaced.

INSPECT TUBE ASSEMBLY: Visually inspect the inside bore for scratches and pits. There should be no scratches or pits deep enough to catch the fingernail. Scratches that catch the fingernail but are less than 0.5 inch long (1.27cm) and primarily in the circumferential direction are acceptable provided they cannot cut the piston seal. In the event that an unacceptable condition occurs, the cylinder should be replaced (Fig. 1230).

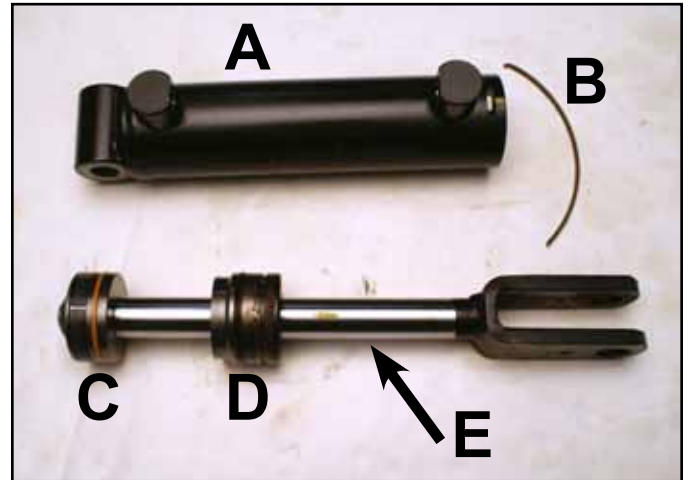


Fig 1230

PICT-2959a

- | | |
|-------------------|---------|
| A. Barrel | D. Head |
| B. Retaining Ring | E. Ram |
| C. Piston | |

HYDRAULIC SYSTEM

Tilt Cylinder Disassembly

1. Remove the piston wear ring from the ram assembly (Fig. 1231).



Fig 1231

PICT-2961

2. Carefully remove the seal from the ram assembly (Fig. 1232).



Fig 1232

PICT-2962

3. Remove the back-up piston seal from the ram assembly (Fig. 1233).



Fig 1233

PICT-2963a

4. Using a 1-1/2" socket, remove the nut from the ram assembly (Fig. 1234).



Fig 1234

PICT-2964a

HYDRAULIC SYSTEM

5. Slide the piston off the end of the ram (Fig. 1235).



Fig 1235

PICT-2965a

7. Remove the o-ring from the head on the ram assembly (Fig. 1237).



Fig 1237

PICT-2967a

6. Remove the o-ring from the ram (Fig. 1236).



Fig 1236

PICT-2966a

8. Remove the flat back-up ring from the head on the ram assembly (Fig. 1238).



Fig 1238

PICT-2968a

HYDRAULIC SYSTEM

9. Slide the head off the end of the ram (Fig. 1239).



Fig 1239

PICT-2969a

11. Remove the seal from inside the head (Fig. 1241).



Fig 1241

PICT-2971

10. Remove the wiper seal from inside the head (Fig. 1240).



Fig 1240

PICT-2970

12. Turn the head over and remove the wear ring from inside of head. (Fig. 1242).



Fig 1242

PICT-2972a

HYDRAULIC SYSTEM

13. Thoroughly rinse the inside of the tube with a clean solvent. Rinse and clean all internal components of foreign material with a lint-free rag.
14. Visually inspect for material defects and contamination. All seals and o-rings must be replaced with new parts.

Head Assembly (Fig. 1243):

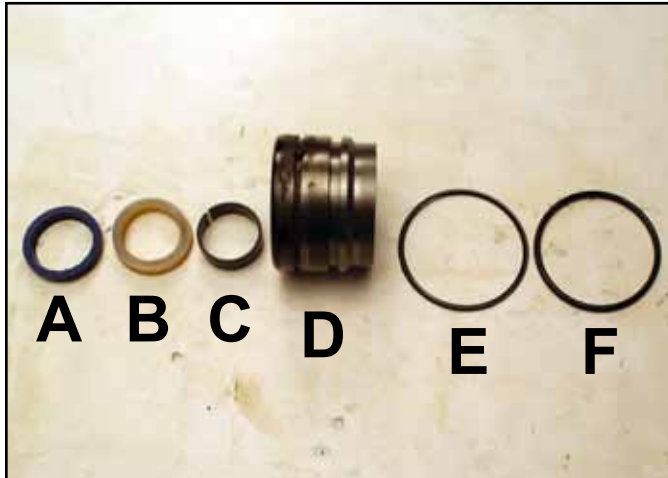


Fig 1243

PICT-2973a

- | | |
|---------------|----------------|
| A. Wiper Seal | D. Head |
| B. Seal | E. Backup Ring |
| C. Wear Ring | F. O-Ring Seal |

Piston Assembly (Fig. 1244):



Fig 1244

PICT-2974a

15. Lubricate the head and all seals with 10W-30 oil prior to installation.
16. From the bottom of the head install the wear ring (Fig. 1245).



Fig 1245

PICT-2975a

HYDRAULIC SYSTEM

17. Turn the head over and twist the wear seal into a "C" shape and allow it to snap into the groove (Fig. 1246).

Note: The groove of the seal faces toward the barrel side of the head.



Fig 1246

PICT-2976

18. Install the wiper seal so that the lip of the seal is installed in the groove inside the head (Fig. 1247).



Fig 1247

PICT-2977

19. Install the flat back-up ring into the deepest groove in the head. The flat back-up seal is installed up against the ram side of the groove (Fig. 1248).



Fig 1248

PICT-2978a

20. Install the o-ring into the deepest groove in the head. The o-ring is installed on the barrel side of the groove (Fig. 1249).

Note: If possible, the head/seal assembly should sit for at least one hour to allow the seals to normalize.



Fig 1249

PICT-2979

HYDRAULIC SYSTEM

21. Install the wear ring into the widest groove on the piston (Fig. 1250).



Fig 1250

PICT-2980a

23. Install the seal ring into the narrowest groove on the piston covering the back up ring. (Fig. 1252).



Fig 1252

PICT-2982a

22. Install the backup ring into the narrowest groove on the piston (Fig. 1251).



Fig 1251

PICT-2981a

24. Wrap a protector over the threads of the ram. Install the o-ring onto the ram. Remove the o-ring protector from the threads (Fig. 1253).



Fig 1253

PICT-2983a

HYDRAULIC SYSTEM

Tilt Cylinder Assembly

Note: Lubricate all parts during assembly.

1. Secure the cylinder ram into a vise.
2. Slide the head onto the cylinder ram (Fig. 1254).



Fig 1254

PICT-2984a

3. Slide the piston onto the cylinder ram (Fig. 1255).



Fig 1255

PICT-2985a

4. Install the nut onto the end of the ram. Using a 1-1/2" socket, torque the nut to 110 - 120 ft-lbs. (149.1 - 162.7 Nm) (Fig. 1256).



Fig 1256

PICT-2986a

5. Remove the ram from the vise and secure the cylinder barrel into the vise.
6. Install the ram assembly into the cylinder barrel by rotating the head assembly while pushing the head into the barrel (Fig. 1257).



Fig 1257

PICT-2987a

HYDRAULIC SYSTEM

7. Rotate the head until the ring hole in the ring groove is within the slot on the barrel (Fig. 1258).



Fig 1258

PICT-2988

9. Begin rotating the spanner wrench so that the head pulls the ring inside the barrel. Continue rotating until the beveled edge of ring is completely installed inside the barrel on the head assembly (Fig. 1260).



Fig 1260

PICT-2994

8. Insert the bent end of the ring through the notch in the barrel and into the hole in the groove. Place the spanner wrench onto the head assembly (Fig. 1259).



Fig 1259

PICT-2991

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DRIVE SYSTEM

Lifting the Machine for Service

1. Place two pieces of approximately 2" (5.08cm) thick wood blocks directly behind both tracks (Fig. 1261).



Fig 1261

PICT-4245

2. Back the machine up onto the wood blocks.
3. Place a hydraulic floor jack under the rear frame of the machine (Fig. 1262).



Fig 1262

PICT-4247

4. Raise the rear of the machine, remove the two wood blocks and place a jack stand under each corner of the frame (Fig. 1263).



Fig 1263

PICT-4248

5. Raise the hydraulic floor jack approximately 15" (38.10cm) and position it at the front of the machine (Fig. 1264).



Fig 1264

PICT-4249

DRIVE SYSTEM

6. Start the machine and raise the loader arm enough to clear the hydraulic floor jack. Place the floor jack directly below the mount plate and lower the loader arm onto the hydraulic floor jack. Continue lowering the loader arm to raise the tracks off the ground (Fig. 1265).



Fig 1265

PICT-4250

8. Lower the hydraulic floor jack so the machine rests on the jack stands. Lower the loader arms to the resting position (Fig. 1267).



Fig 1267

PICT-4253

7. Place two jack stands under the front frame (Fig. 1266).



Fig 1266

PICT-4251

9. Make sure the machine is securely supported by the jack stands.

Track Guide Alignment

Alignment Tool (Toro p/n: 110-0069) (Fig. 1268):



Fig 1268

DSC-0624

- Wide track models only: Slide a washer/tensioner wheel assembly onto the tensioner arm wheel shaft. Install a nut to secure (Fig. 1270).



Fig 1270

PICT-4483

- Remove the track. Refer to "Wide Track Removal" on page 7-68 or "Narrow Track Removal" on page 7-72.
- Loosen the 4 bolts securing the track guide to the mainframe (Fig. 1269).

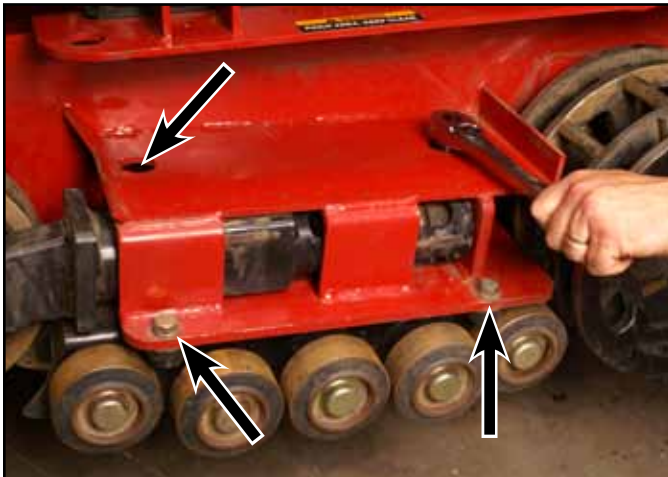


Fig 1269

PICT-4482

- Insert the notched end of the alignment tool into the drive wheel spacer (Fig. 1271).



Fig 1271

PICT-4485

DRIVE SYSTEM

5. Secure the notched end with the pin (Fig. 1272).



Fig 1272

PICT-4484

7. Torque the 4 track guide mounting bolts to 75 ft-lbs. (102 Nm) (Fig. 1274).



Fig 1274

PICT-4493

6. Rotate the tool and move the track guide as necessary until the tool fits into the track guide channel. Secure the end of the alignment tool with a strap (Fig. 1273).



Fig 1273

PICT-4488a

8. Remove the alignment tool.
9. Wide track models only: Remove the nut and washer/tensioner wheel assembly from the tensioner arm wheel shaft (Fig. 1275).



Fig 1275

PICT-4483

10. Install the track. Refer to "Wide Track Installation" on page 7-70, or "Narrow Track Installation" on page 7-73.

Belt Replacement

Belt Removal

1. Position the traction unit on a flat surface.
2. Remove the ignition key.
3. Apply the parking brake.
4. Raise the hood.
5. Remove the hairpin cotter from the hood prop rod (Fig. 1276).
6. Support the hood and remove the prop rod (Fig. 1277).



Fig 1276

Belt 001



Fig 1277

Belt 003

7. Using a 1/2" wrench, remove the 2 lower heat shield screws (Fig. 1278).



Fig 1278

Belt 002

DRIVE SYSTEM

8. Using a 3/16" Allen wrench, remove the 2 upper heat shield screws (Fig. 1279).



Fig 1279

Belt 004

10. Using a spring tool, remove the idler spring from its post (Fig. 1281).



Fig 1281

Belt 007

9. Remove the heat shield (Fig. 1280).



Fig 1280

Belt 005

11. Remove the belt from the right and left hydraulic traction pump pulleys (Fig. 1282).



Fig 1282

Belt 008

DRIVE SYSTEM

12. Remove the rear access cover (Fig. 1283).



Fig 1283

Belt 006

14. Remove the gas tank hold down bracket (Fig. 1285).



Fig 1285

Belt 010

13. Using a 1/2" wrench and 1/2" socket combination, remove the gas tank hold down bracket bolt and nut (Fig. 1284).



Fig 1284

Belt 009

15. Using a 5/8" socket combination, remove the 2 hydraulic pump mount plate bolts (Fig. 1286).

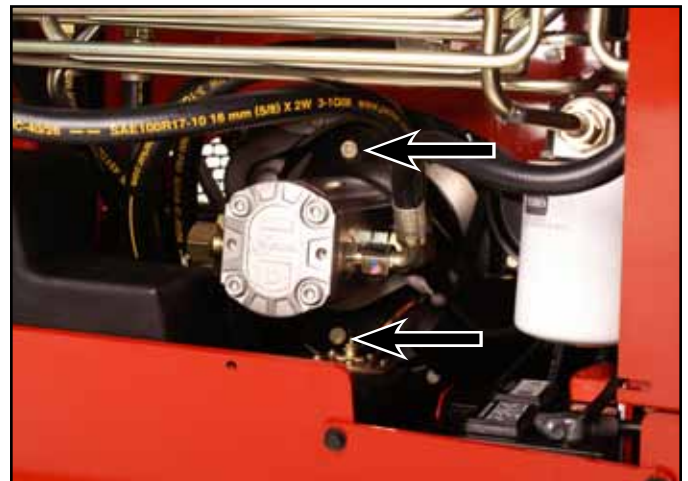


Fig 1286

Belt 013

DRIVE SYSTEM

16. Rotate the hydraulic pump clockwise and pull the hydraulic pump outward to separate the coupling sleeve and the hub sleeve. This will permit belt removal (Fig. 1287).



Fig 1287

Belt 012

Belt Installation

1. Pull the hydraulic pump outward to create enough clearance between the coupling sleeve and the hub sleeve to allow for belt installation (Fig. 1289).



Fig 1289

Belt 015

17. Remove the belt (Fig. 1288).



Fig 1288

Belt 015

2. Install the belt onto the engine pulley and the right and left hydraulic traction pump pulleys (Fig. 1290).

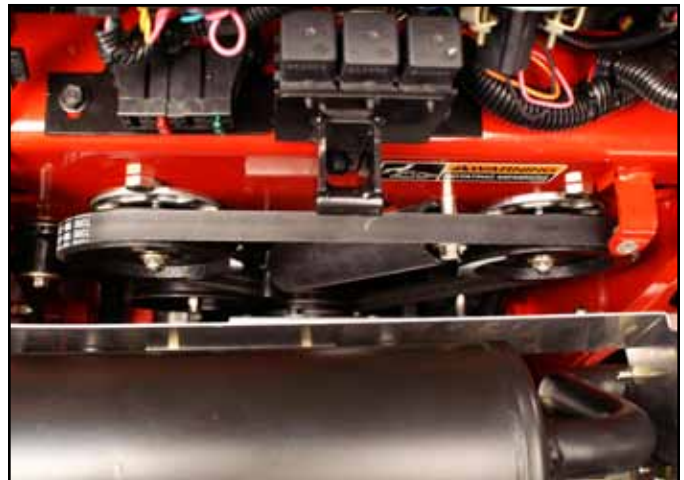


Fig 1290

Belt 014

DRIVE SYSTEM

3. Using a spring tool, install the idler spring onto its post (Fig. 1291).



Fig 1291

Belt 007

4. Rotate and push the hydraulic pump by hand until the coupling sleeve properly meshes with the hub sleeve recessed in the engine pulley (Fig. 1293).

Note: Do not use the hydraulic pump mount plate bolts to draw the coupling sleeve into the hub sleeve. Doing so could result in the snap ring sliding out of its groove on the hub coupling. This will result in the loss of hydraulics.



Fig 1293

Belt 012

Belt Routing (rear view) (Fig. 1292):

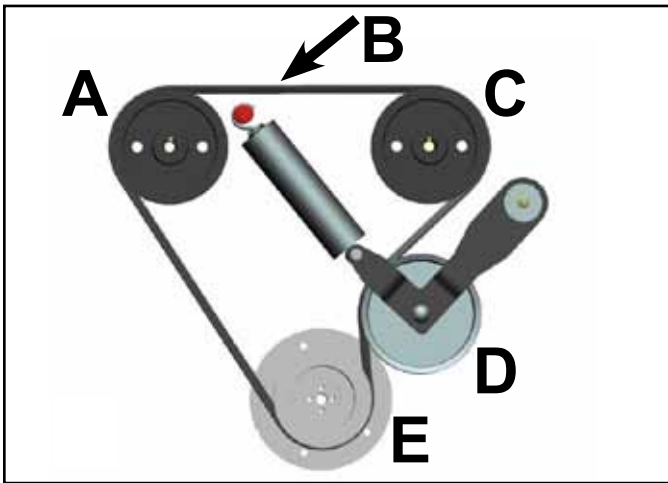


Fig 1292

TX525 belt routing

- | | |
|-------------------|------------------|
| A. LH pump pulley | D. Idler pulley |
| B. Drive belt | E. Engine pulley |
| C. RH pump pulley | |

DRIVE SYSTEM

5. Using a 5/8" socket, install and torque the 2 hydraulic pump mount plate bolts to 50 ft-lbs. (67.8 Nm) (Fig. 1294).



Fig 1294

Belt 018

7. Install the rear access cover (Fig. 1296).



Fig 1296

Belt 006

6. Using a 1/2" wrench and socket, install the gas tank hold down bracket (Fig. 1295).



Fig 1295

Belt 009

8. Position the heat shield (Fig. 1297).



Fig 1297

Belt 005

DRIVE SYSTEM

9. Using a 3/16" Allen wrench, install and tighten the 2 upper heat shield screws (Fig. 1298).



Fig 1298

Belt 004

11. Support the hood and install the prop rod (Fig. 1300).



Fig 1300

Belt 003

10. Using a 1/2" wrench, install and tighten the 2 lower heat shield screws (Fig. 1299).



Fig 1299

Belt 002

12. Install the hairpin cotter (Fig. 1301).



Fig 1301

Belt 001

DRIVE SYSTEM

Idler Arm Replacement

Idler Arm Removal

1. Shut engine off, apply parking brake, and remove ignition key.
2. Lift the engine hood assembly.
3. Remove the hairpin cotter from the prop rod (Fig. 1302).



Fig 1302

Belt 001

4. Remove the prop rod (Fig. 1303).



Fig 1303

Belt 003

5. Using a 3/16" Allen wrench, remove the top 2 screws. Using a 1/2" socket, remove the bottom 2 screws securing the heat shield to the tower (Fig. 1304).

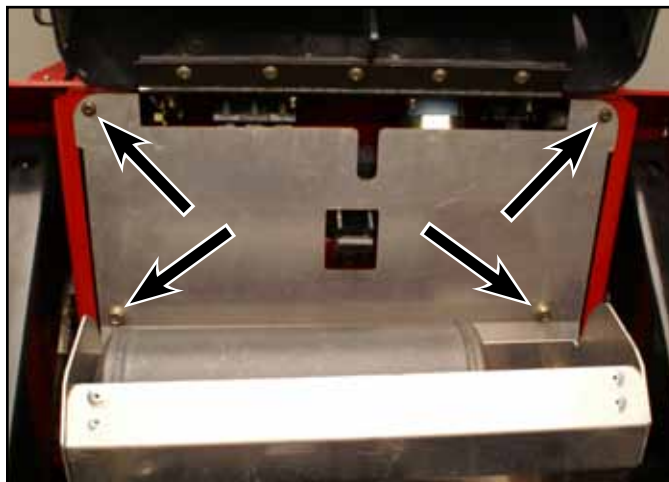


Fig 1304

PICT-5258

6. Remove the heat shield (Fig. 1305).



Fig 1305

Belt 005

DRIVE SYSTEM

7. Remove the rear access panel (Fig. 1306).



Fig 1306

PICT-4505a

9. Using a spring tool, remove the idler spring from its post (Fig. 1308).



Fig 1308

PICT-5360

8. Using a 3/8" socket, remove the 3 screws securing the right hand support panel to the tower assembly. Remove the right hand support panel (Fig. 1307).

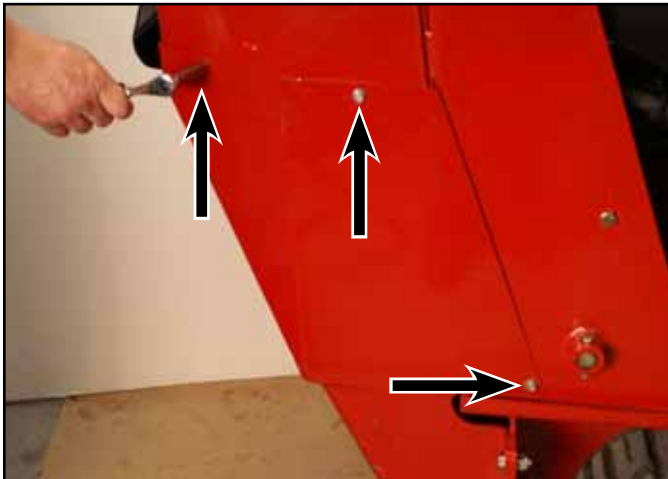


Fig 1307

PICT-4504

10. Using a 1/2" socket and wrench, remove the nut securing the idler arm assembly to the tower (Fig. 1309).

Note: The nut is located on the back side of the tower behind the loader valve.

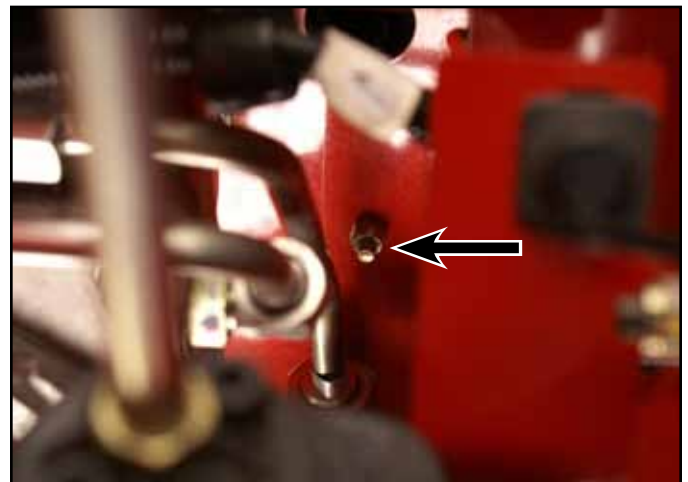


Fig 1309

PICT-5370

DRIVE SYSTEM

11. Remove the idler arm assembly from the unit (Fig. 1310).



Fig 1310

PICT-5371

13. Inspect the idler pulley bearing and the two flange bushings. Replace if worn or damaged (Fig. 1312).

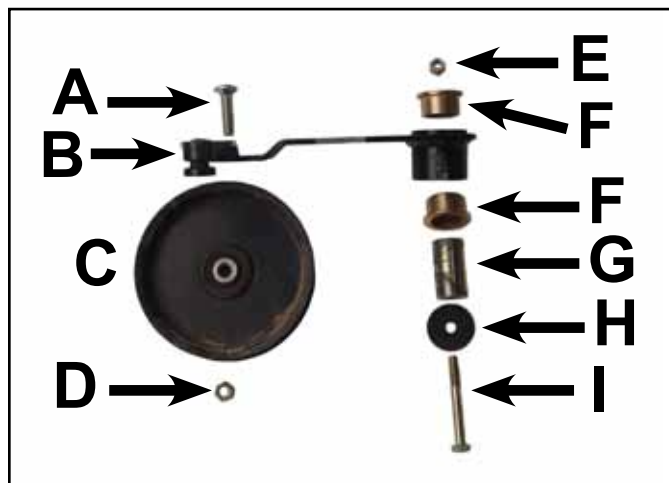


Fig 1312

CLR DSC-3321

12. Remove the spring and rubber spring retainer from the idler assembly and slide the rubber spring retainer off the spring (Fig. 1311).



Fig 1311

PICT-5374a

- | | |
|-----------------------|------------------------|
| A. Carriage bolt | F. Flange bushings (2) |
| B. Idler arm assembly | G. Mounting spacer |
| C. Pulley | H. Washer |
| D. Nut | I. Bolt |
| E. Nut | |

DRIVE SYSTEM

Idler Arm Assembly Installation

1. Position the idler arm assembly in the unit so the drive belt is routed between the pulley and the idler arm spring post (Fig. 1313).



Fig 1313

PICT-5373

2. Slide the idler arm down and position it against the tower, inserting the idler mounting bolt through the mounting hole in the tower. Using a 1/2" socket and wrench, install a nut onto the idler assembly bolt securing it to the tower. Ensure the idler arm rotates freely (Fig. 1314).

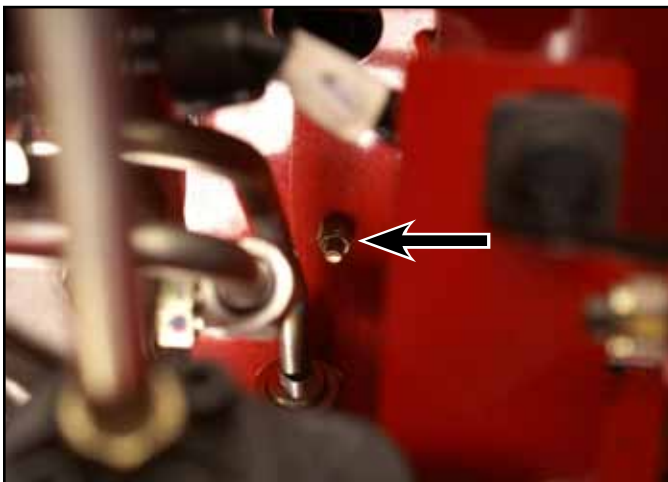


Fig 1314

PICT-5370

3. Slide a spring tool through the rubber spring retainer. Hook the idler spring to the spring tool (Fig. 1315).



Fig 1315

PICT-5376a

4. Pull the idler spring approximately half way into the rubber spring retainer (Fig. 1316).



Fig 1316

PICT-5377a

DRIVE SYSTEM

5. Hook the idler spring to the idler arm spring post (Fig. 1317).



Fig 1317

PICT-5378

8. Position the right hand support panel to the tower. Using a 3/8" socket, install 3 screws to secure the right hand support panel to the tower assembly (Fig. 1319).

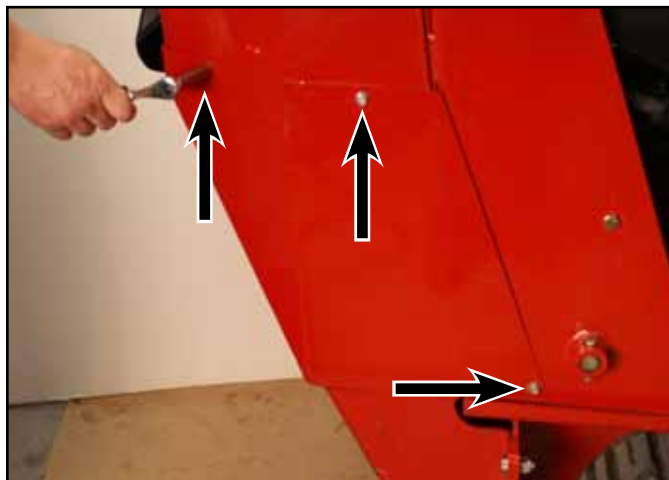


Fig 1319

PICT-4504

6. Align the belt with the idler pulley.
7. Using a spring tool, install the idler spring onto its post (Fig. 1318).



Fig 1318

PICT-5379

9. Install the rear access panel (Fig. 1320).



Fig 1320

PICT-4505a

DRIVE SYSTEM

10. Position the heat shield (Fig. 1321).



Fig 1321

Belt 005

12. Install the prop rod (Fig. 1323).



Fig 1323

Belt 003

11. Using a 3/16" Allen wrench, install the top 2 screws. Using a 1/2" socket, install the bottom 2 screws securing the heat shield to the tower (Fig. 1322).



Fig 1322

PICT-5258

13. Install a hairpin cotter into the prop rod (Fig. 1324).



Fig 1324

Belt 001

DRIVE SYSTEM

Right Hydrostatic Pump Replacement

Right Hydrostatic Pump Removal

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

Upon removal, all seals, o-rings, and gaskets should be replaced. During installation, lightly lubricate all seals, o-rings, and gaskets with clean petroleum jelly prior to assembly.

Protect the inner diameter of seals and o-rings from damage during assembly by covering the shaft machined features with plastic wrap or equivalent.

1. Raise the machine and set it on jack stands. Refer to "Lifting the Machine for Service" on page 7-1.
2. Remove the rear access panel (Fig. 1325).



Fig 1325

PICT-4505

3. Using a 3/8" socket, remove the 6 screws that secure the left and right rear cover support panels to the tower assembly (3 screws per panel). Remove the panels (Fig. 1326).

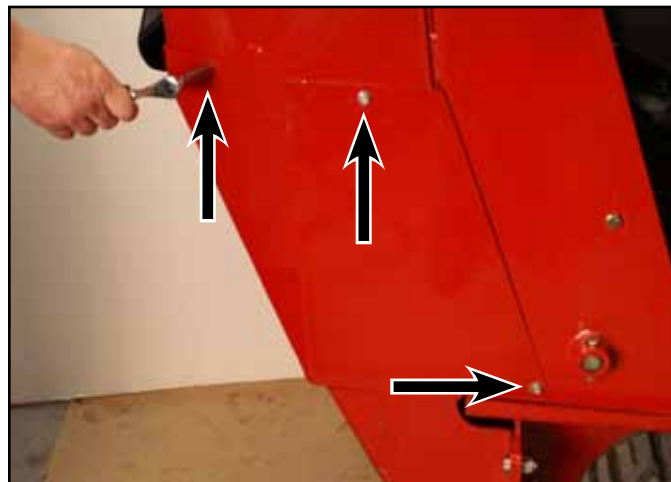


Fig 1326

PICT-4504

4. Using 3/4" and 1/2" sockets, remove the 7 bolts and nuts securing the rear frame cover to the frame and fuel tank bracket. Remove the rear frame cover (Fig. 1327).

Note: The rear of the machine may have to be lifted to reposition the jack stands so that the rear frame cover can be removed.

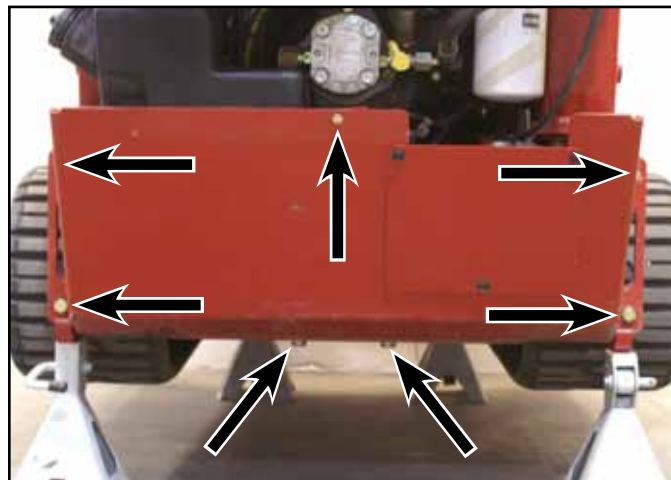


Fig 1327

PICT-4259

DRIVE SYSTEM

5. Remove the fuel tank bracket (Fig. 1328).



Fig 1328

PICT-5626

6. Disconnect the two wires (black and orange) from the fuel sending unit located on the top of the fuel tank (Fig. 1329).



Fig 1329

PICT-4262a

7. Mark the suction fuel line and tank fitting with an "S" and the return fuel line and tank fitting with an "R" (Fig. 1330):
S - Fuel suction line
R - Fuel return line



Fig 1330

PICT-4263

8. Slide the 2 fuel hose clamps down the fuel lines away from the fuel tank fittings (Fig. 1331).



Fig 1331

PICT-4264

DRIVE SYSTEM

9. Slide the 2 fuel lines off the fuel tank fittings. Remove the fuel tank (Fig. 1332).



Fig 1332

PICT-4265

11. Remove the left hand panel from the control panel assembly (Fig. 1334).



Fig 1334

PICT-4601

10. Using a 3/8" socket, remove the 4 self-tapping screws securing the left hand panel to the control panel assembly (Fig. 1333).



Fig 1333

PICT-4600

12. Using a 3/8" socket, remove the 3 self-tapping screws that secure the right panel to the control panel assembly. Using a 3/8" socket and a 7/16" socket, remove the bolt and nut securing the lower left corner of the right panel to the control panel assembly (Fig. 1335).

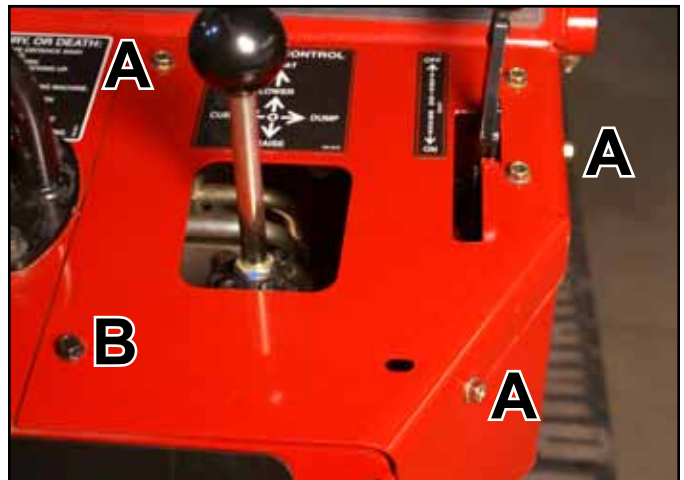


Fig 1335

PICT-4341

- A. Self-tapping screw (3) B. Bolt and nut

DRIVE SYSTEM

13. Remove the right hand panel from the control panel assembly (Fig. 1336).



Fig 1336

PICT-4269

14. Mark the hydrostatic pump fittings and lines as follows:

- A. Inlet line from the left hand hydrostatic pump (Fig. 0000).
- B. Inlet line from the hydraulic oil filter (Fig. 1337).



Fig 1337

PICT-4637

- C. Case drain line (Fig. 1338).



Fig 1338

PICT-4639a

- D. Right hand wheel motor port (Fig. 1339).

- E. Left hand wheel motor port (Fig. 1339).



Fig 1339

PICT-4640

DRIVE SYSTEM

15. Mark the hydraulic pump wheel motor hoses and fittings with the letters D and E (Fig. 1340).



Fig 1340

PICT-4747

17. Mark the tandem pump, T-fitting and hose with the letter "G" (Fig. 1342).



Fig 1342

PICT-4737

16. Mark the tandem pump, hose and fitting running to the 2 spool valve with a letter "F" (Fig. 1341).

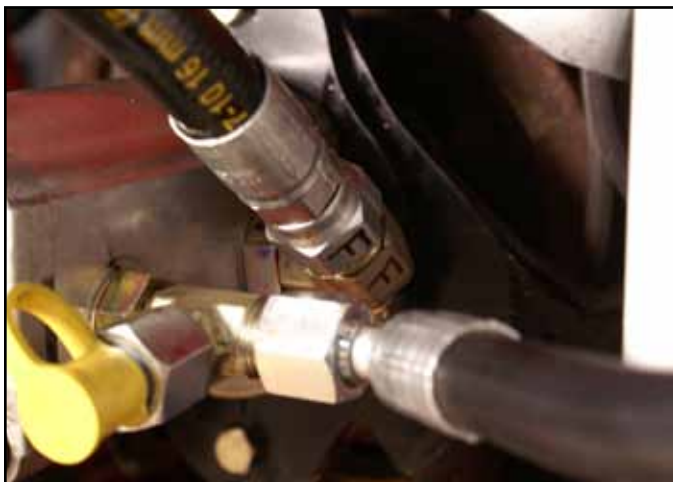


Fig 1341

PICT-4736

18. Mark the tandem pump test port fitting with the letter "H" (Fig. 1343).



Fig 1343

PICT-4740a

DRIVE SYSTEM

19. Using a 15/16" wrench, disconnect the right hand hydrostatic pump lines (just marked) as follows:

A. Inlet line from the hydraulic oil filter (Fig. 1344).



Fig 1344

PICT-4636

B. Inlet line to the left hand hydrostatic pump (Fig. 1345).



Fig 1345

PICT-4641

C. Case drain line (Fig. 1346).



Fig 1346

PICT-4643a

D. Hydraulic hose running from the "D" port on the right hand hydrostatic pump to the upper fitting on the left wheel motor (Fig. 1347).



Fig 1347

PICT-4644

DRIVE SYSTEM

- E. Hydraulic hose running from the “E” port on the hydrostatic pump to the lower fitting on the left wheel motor (Fig. 1348).



Fig 1348

PICT-4645

21. Using a 15/16” wrench, remove the wheel motor hose fittings marked “E” from the right hand hydraulic pump (Fig. 1350).

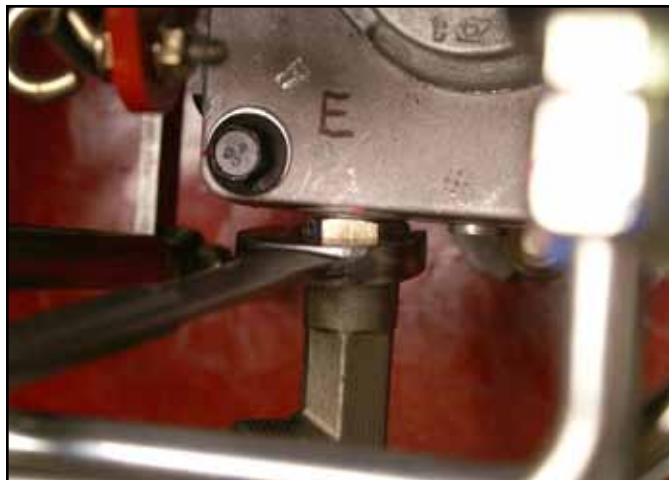


Fig 1350

PICT-4751a

20. Using a 15/16” wrench, remove the wheel motor hose fittings marked “D” from the right hand hydraulic pump (Fig. 1349).

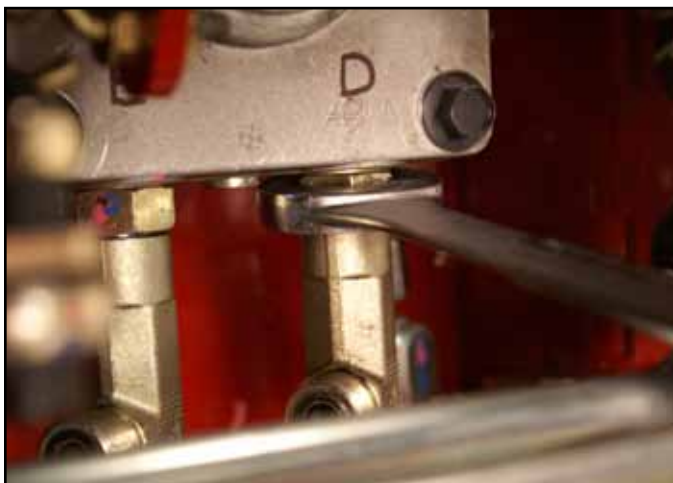


Fig 1349

PICT-4750

22. Using a 1-1/8” wrench, remove the hydraulic hose marked “F” from the tandem pump fitting (Fig. 1351).



Fig 1351

PICT-4734

DRIVE SYSTEM

23. Using a 15/16" wrench, remove the hose from the T-fitting marked "G" on the tandem pump (Fig. 1352).



Fig 1352

PICT-4738a

25. Remove the T-fitting marked "G" from the tandem pump (Fig. 1354).

Note: Cap all hydraulic lines and fittings to prevent debris from entering system.



Fig 1354

PICT-4742a

24. Using a 15/16" wrench, remove the test port fitting "H" from the T-fitting marked "G" (Fig. 1353).



Fig 1353

PICT-4741a

26. Using a 1/2" socket and wrench, remove the nut and bolt securing the steering linkage to the right hand pump control arm (Fig. 1355).



Fig 1355

PICT-4752

DRIVE SYSTEM

27. Raise the hood.

28. Remove the hairpin cotter from the hood prop rod (Fig. 1356).



Fig 1356

Belt 001

29. Support the hood and remove the prop rod (Fig. 1357).



Fig 1357

Belt 003

30. Using a 1/2" wrench, remove the 2 lower heat shield screws (Fig. 1358).



Fig 1358

Belt 002

31. Using a 3/16" Allen wrench, remove the 2 upper heat shield screws (Fig. 1359).



Fig 1359

Belt 004

DRIVE SYSTEM

32. Remove the heat shield (Fig. 1360).



Fig 1360

Belt 005

34. Remove the belt from the right and left hydraulic traction pump pulleys (Fig. 1362).



Fig 1362

Belt 008

33. Using a spring tool, remove the idler spring from its post (Fig. 1361).



Fig 1361

Belt 007

35. Secure the pulley. Using a 5/8" socket, remove the center nut and washer retaining the pulley to the right hand hydrostatic pump shaft (Fig. 1363).

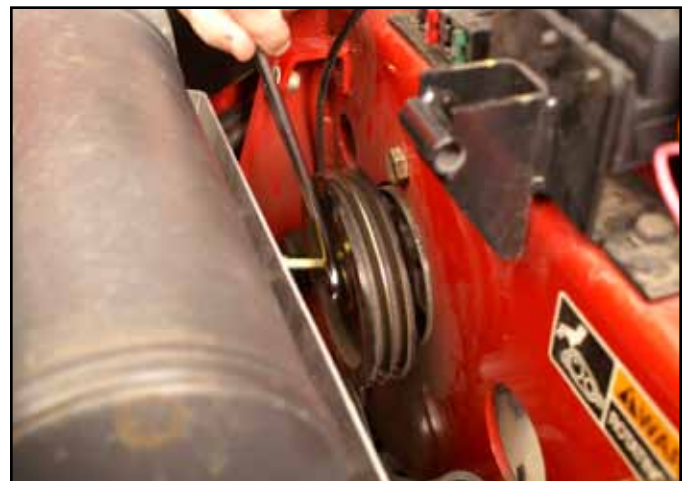


Fig 1363

PICT-4647

DRIVE SYSTEM

36. Install a special pulley puller (Toro p/n: 112-2557) onto the right hand hydrostatic pulley (Fig. 1364).



Fig 1364

PICT-4593a

38. Remove the key from the hydrostatic pump shaft keyway (Fig. 1366).



Fig 1366

PICT-4650

37. Remove the right hand pulley from the hydrostatic pump shaft (Fig. 1365).

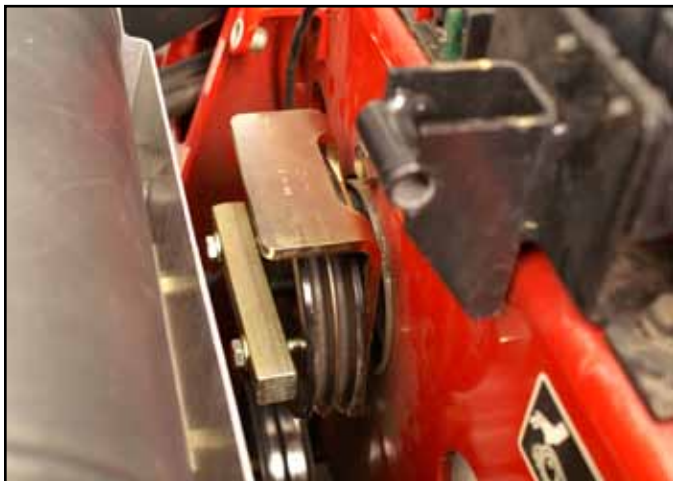


Fig 1365

PICT-4648

39. Using a 3/4" socket and wrench, remove the top bolt and nut securing the right hand hydrostatic pump to the tower frame. Loosen the lower nut and bolt securing the right hand hydrostatic pump to the tower frame (Fig. 1367).



Fig 1367

PICT-8900

40. Remove the right hand hydrostatic pump from the tower frame (Fig. 1368).



Fig 1368

PICT-4753

41. If replacing the pump, transfer all markings and fittings to the new pump (Fig. 1369).



Fig 1369

PICT-4754a

42. If repairing/rebuilding the pump, refer to the Hydro-Gear BDP-10A/16A/21L Hydrostatic Pumps Service and Repair Manual (Toro Form No. 492-4789).

Right Hydrostatic Pump Installation

1. With the lower pump mounting bolt and nut loosely installed in the tower frame, position the right hand hydrostatic pump so the pump shaft is inserted through the frame (Fig. 1370).



Fig 1370

PICT-4753

2. Using a 3/4" socket and wrench, install the top bolt and nut. Tighten the lower bolt and nut securing the right hand hydrostatic pump to the tower frame (Fig. 1371).



Fig 1371

PICT-8900

DRIVE SYSTEM

3. Install a key into the hydrostatic pump shaft keyway (Fig. 1372).



Fig 1372

PICT-4650

4. Slide the pulley onto the right hand hydrostatic pump shaft with the thicker flange side facing toward the pump (Fig. 1374).



Fig 1374

PICT-4758

Note: The pulley has a tapered through hole and a thicker flange on one side than the other (Fig. 1373).



Fig 1373

PICT-4662a

5. Slide a washer onto the pump shaft (Fig. 1375).



Fig 1375

PICT-4760

DRIVE SYSTEM

6. Install a nut to secure the pulley to the right hand hydrostatic pump shaft (Fig. 1376).



Fig 1376

PICT-4761

7. Torque the nut to 260 ± 40 in-lbs. (29.38 ± 4.5 Nm) (Fig. 1377).



Fig 1377

PICT-4763

8. Route the belt around the engine pulley and the right and left hydrostatic pump pulleys (rear view) (Fig. 1378).

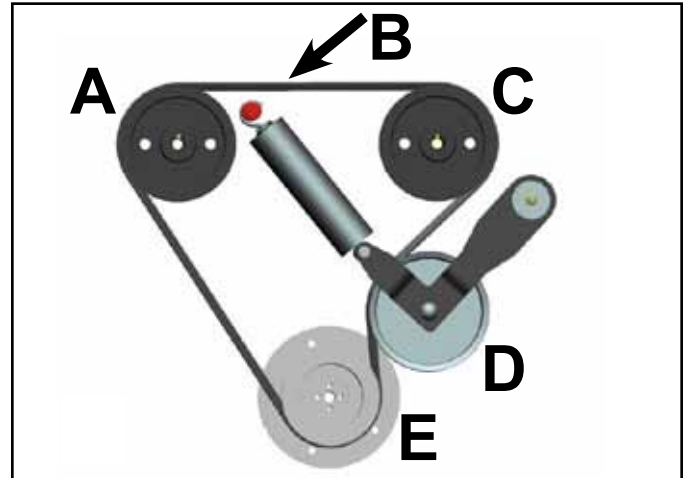


Fig 1378

TX525 belt routing

- | | |
|-------------------|------------------|
| A. LH pump pulley | D. Idler pulley |
| B. Drive belt | E. Engine pulley |
| C. RH pump pulley | |

9. Install the idler spring onto its post (Fig. 1379).



Fig 1379

Belt 007

DRIVE SYSTEM

10. Position the heat shield (Fig. 1380).



Fig 1380

Belt 005

12. Using a 1/2" wrench, install the 2 lower heat shield screws (Fig. 1382).



Fig 1382

Belt 002

11. Using a 3/16" Allen wrench, install the 2 upper heat shield screws (Fig. 1381).



Fig 1381

Belt 004

13. Support the hood and install the prop rod (Fig. 1383).



Fig 1383

Belt 003

DRIVE SYSTEM

14. Install the hairpin cotter (Fig. 1384).



Fig 1384

Belt 001

17. Install the T-fitting marked "G" into the tandem pump (Fig. 1386).



Fig 1386

PICT-4742a

15. Lower the hood.

16. Using a 1/2" socket and wrench, install the nut and bolt securing the steering linkage to the right hand pump control arm (Fig. 1385).



Fig 1385

PICT-4752

18. Using a 15/16" wrench, install the test port fitting "H" onto the T-fitting marked "G" (Fig. 1387).



Fig 1387

PICT-4741a

DRIVE SYSTEM

19. Using a 15/16" wrench, install the hose marked "G" onto the T-fitting marked "G" on the tandem pump (Fig. 1388).



Fig 1388

PICT-4738a

21. Loosely install the wheel motor hose fittings marked "D" and "E" into the right hand hydraulic pump ports marked "D" and "E" so they are positioned at approximately 8:00 (D) and 9:00 (E) clock positions (Fig. 1390).

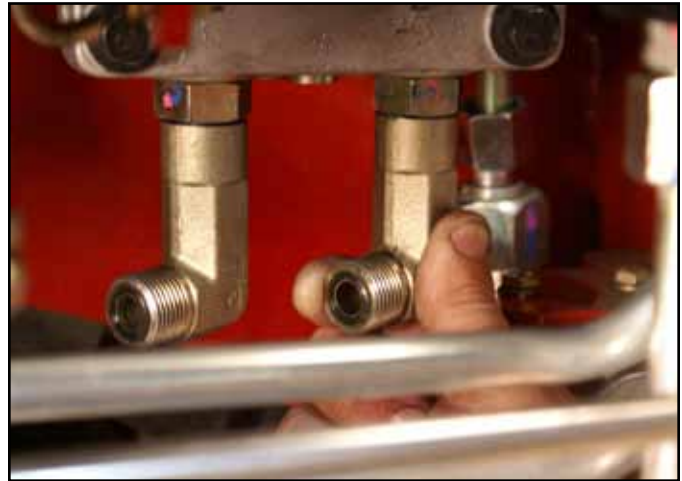


Fig 1390

PICT-4755

20. Using a 1-1/8" wrench, install the hydraulic hose marked "F" onto the tandem pump fitting (Fig. 1389).



Fig 1389

PICT-4734

22. Using a 15/16" wrench, connect the right hand hydrostatic pump lines as follows:
E. Wheel motor hose marked "E" to the fitting marked "E" (Fig. 1391).



Fig 1391

PICT-4645

DRIVE SYSTEM

- D. Wheel motor hose marked "D" to the fitting marked "D" (Fig. 1392).



Fig 1392

PICT-4644

- B. Inlet line from the left hand hydrostatic pump marked "B" to the fitting marked "B" (Fig. 1394).



Fig 1394

PICT-4641

- C. Case drain line marked "C" to the fitting marked "C" (Fig. 1393).



Fig 1393

PICT-4643a

- A. Inlet line from the hydraulic oil filter marked "A" to the fitting marked "A" (Fig. 1395).



Fig 1395

PICT-4636

DRIVE SYSTEM

23. With the fitting secured, tighten the pump fitting nuts on the fittings marked "D" and "E" to the hydraulic pump (Fig. 1396).

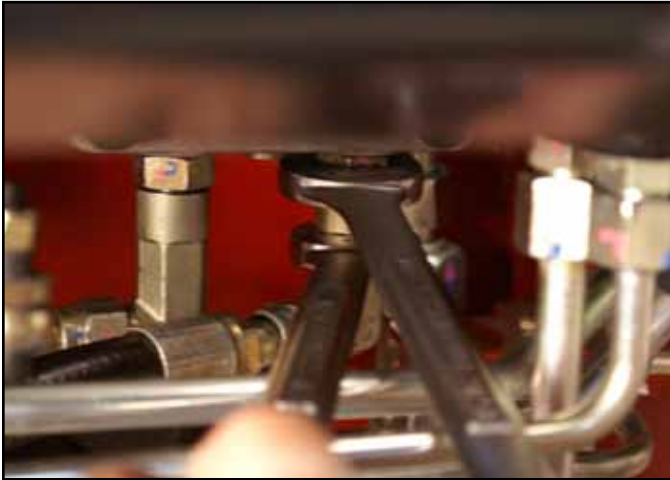


Fig 1396

PICT-4756

24. Using a 3/8" socket, install 3 self-tapping screws that secure the right panel to the control panel assembly. Using a 3/8" socket and a 7/16" socket, install a bolt and nut securing the lower left corner of the right panel to the control panel assembly (Fig. 1397).

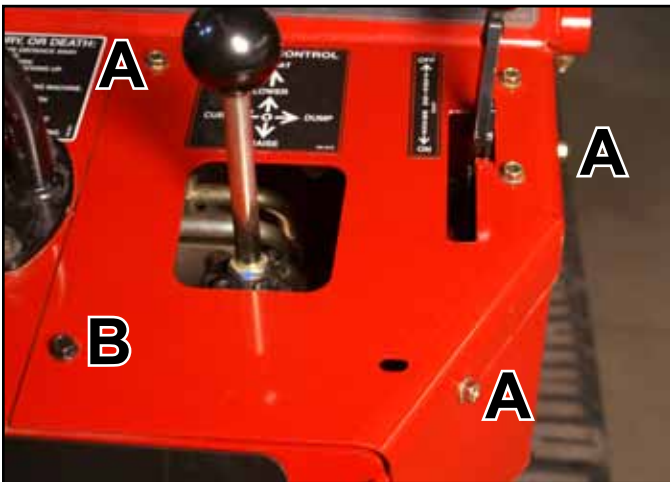


Fig 1397

PICT-4341

- A. Self-tapping screw (3) B. Bolt and nut

25. Position the left hand panel onto the control panel assembly (Fig. 1398).



Fig 1398

PICT-4601

26. Using a 3/8" socket, install 4 self-tapping screws securing the left hand panel to the control panel assembly (Fig. 1399).



Fig 1399

PICT-4600

DRIVE SYSTEM

27. Slide the 2 fuel lines onto the fuel tank fittings. Note the location markings (Fig. 1400).
S - Fuel suction line
R - Fuel return line

Note: Before installing the fuel tank in the unit, disengage the park brake and start the unit. Refer to “Purging Air Procedure”, page 9-19, and check for any leaks in the hydraulic fittings and hydraulic hoses.



Fig 1400

PICT-4265

28. Position the 2 fuel hose clamps to secure the fuel lines to the fuel tank fittings (Fig. 1401).



Fig 1401

PICT-4264

29. Position the fuel tank into the rear end of the frame. Connect the two wires (black and orange) to the fuel sending unit located on the top of the fuel tank (Fig. 1402).

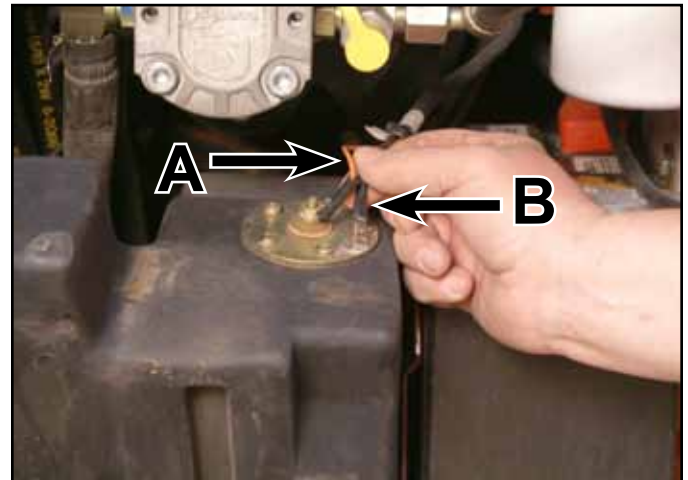


Fig 1402

PICT-4262a

- A. Center terminal (orange wire)
B. Outside terminal (black wire)

30. Position the fuel tank bracket onto the fuel tank (Fig. 1403).



Fig 1403

PICT-5626

DRIVE SYSTEM

31. Position the rear frame cover to the rear end of the frame. Using 3/4" and 1/2" sockets, install 7 bolts and nuts to secure the rear frame cover to the frame and fuel tank bracket (Fig. 1404).

Note: The rear of the machine may have to be lifted to reposition the jack stands so that the rear frame cover can be installed.

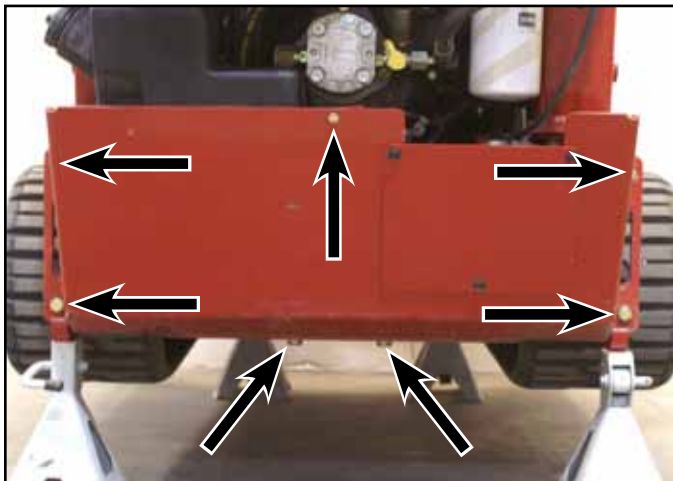


Fig 1404

PICT-4259

32. Position the left hand rear cover support panel to the tower. Using a 3/8" socket, install 3 screws to secure the left rear cover support panel to the tower assembly. Repeat to install right hand rear cover support panel (Fig. 1405).



Fig 1405

PICT-4256

33. Install the rear access panel (Fig. 1406).



Fig 1406

PICT-4505

34. Lower the machine.

Left Hydrostatic Pump Replacement

Left Hydrostatic Pump Removal

1. Raise the machine and set it on jack stands. Refer to "Lifting the Machine for Service" on page 7-1.
2. Remove the rear access panel (Fig. 1407).



Fig 1407

PICT-4505

3. Using a 3/8" socket, remove the 6 screws that secure the left and right rear cover support panels to the tower assembly (3 screws per panel). Remove the panels (Fig. 1408).

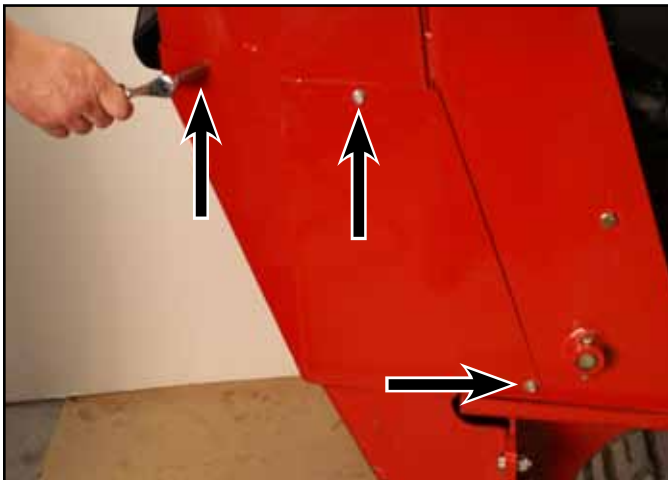


Fig 1408

PICT-4504

4. Using 3/4" and 1/2" sockets, remove the 7 bolts and nuts securing the rear frame cover to the frame. Remove the rear frame cover (Fig. 1409).

Note: The rear of the machine may have to be lifted to reposition the jack stands so that the rear frame cover can be removed.

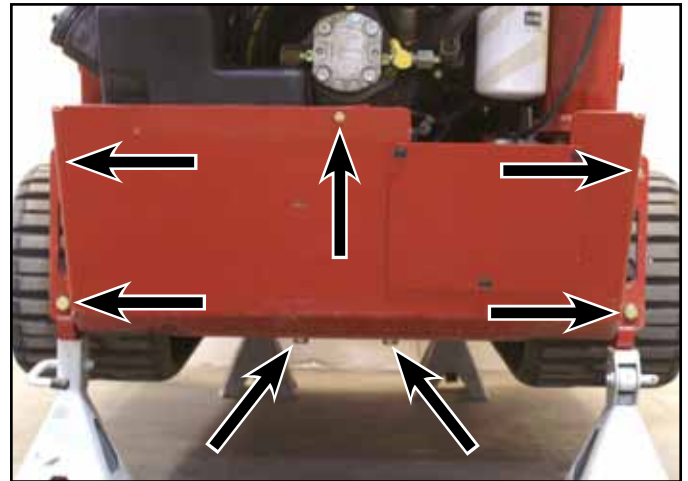


Fig 1409

PICT-4259

5. Remove the fuel tank bracket (Fig. 1410).



Fig 1410

PICT-5626

DRIVE SYSTEM

6. Disconnect the two wires (black and orange) from the fuel sending unit located on the top of the fuel tank (Fig. 1411).



Fig 1411

PICT-4262a

8. Slide the 2 fuel hose clamps down the fuel lines away from the fuel tank fittings (Fig. 1413).



Fig 1413

PICT-4264

7. Mark the suction fuel line and tank fitting with an "S" and the return fuel line and tank fitting with an "R" (Fig. 1412):
S - Fuel suction line
R - Fuel return line



Fig 1412

PICT-4263

9. Slide the 2 fuel lines off the fuel tank fittings. Remove the fuel tank (Fig. 1414).



Fig 1414

PICT-4265

DRIVE SYSTEM

10. Using a 3/8" socket, remove the 4 self-tapping screws securing the left hand panel to the control panel assembly (Fig. 1415).



Fig 1415

PICT-4600

12. Mark the hydrostatic pump fittings and lines as follows:
A. Hydraulic oil inlet from the filter (Fig. 1417).



Fig 1417

PICT-4603

11. Remove the left hand panel from the control panel assembly (Fig. 1416).



Fig 1416

PICT-4601

- B. Right pump case drain line and,
C. Case drain line returning to the hydraulic oil tank (Fig. 1418).



Fig 1418

PICT-4606

DRIVE SYSTEM

- D. Hydraulic hose running to the lower port on the right hand wheel motor and,
- E. Hydraulic hose running to the upper port on the right hand wheel motor (Fig. 1419).

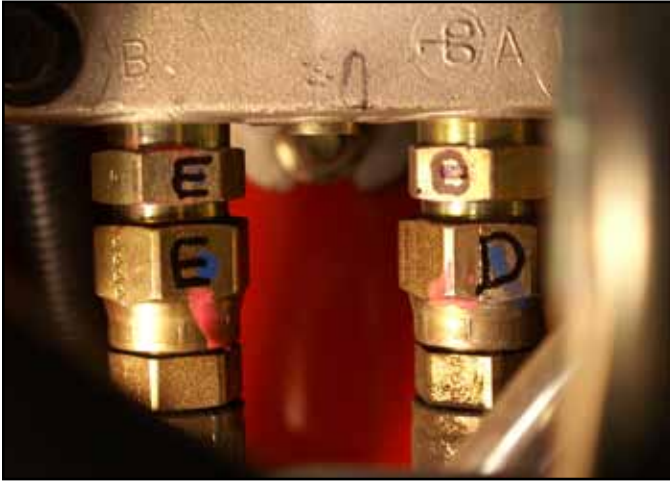


Fig 1419

PICT-4608

- F. Hydraulic hose running to the lower port on the left hand wheel motor and
- G. Hydraulic hose running to the upper port on the left hand wheel motor (Fig. 1420).



Fig 1420

PICT-4609

- 13. Using a 15/16" wrench, disconnect the left hand hydraulic pump lines (just marked) as follows:
 - A. Hydraulic oil inlet from the filter (Fig. 1421).



Fig 1421

PICT-4612

- B. Right pump case drain line (Fig. 1422).

Note: A 7/8" wrench may be used to hold the fitting while loosening the hydraulic line.



Fig 1422

PICT-4613

DRIVE SYSTEM

- C. Case drain line returning to the hydraulic oil tank (Fig. 1423).

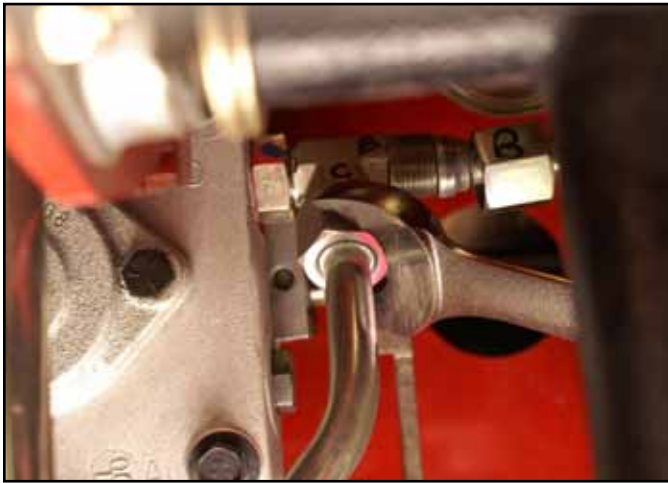


Fig 1423

PICT-4614

- E. Hydraulic hose running from the “E” port on the hydrostatic pump to the lower fitting on the right wheel motor (Fig. 1425).

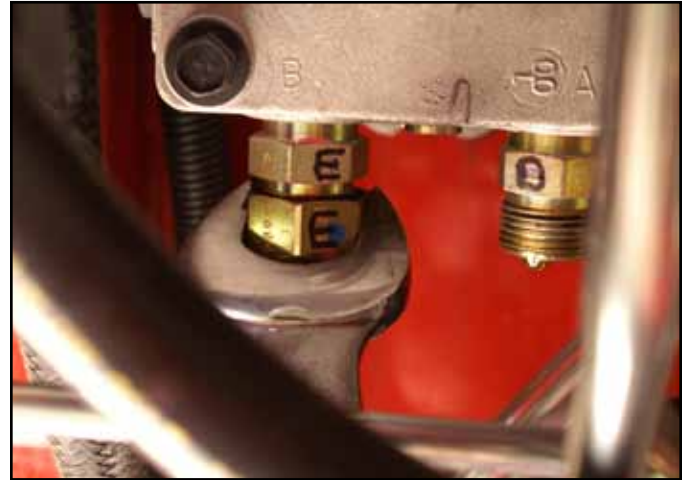


Fig 1425

PICT-4616

14. Using a 1-1/8” wrench, disconnect the remaining left hand hydrostatic pump lines (just marked) as follows:

- D. Hydraulic hose running from the “D” port on the pump to the upper fitting on the right wheel motor (Fig. 1424).

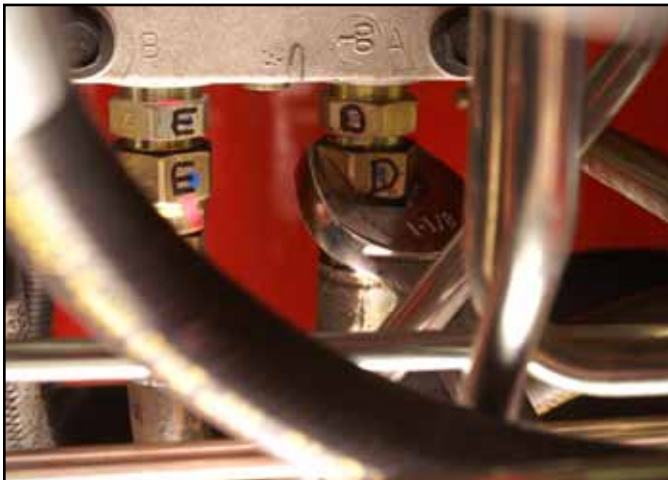


Fig 1424

PICT-4615

- F. Hydraulic hose running to the lower port on the left hand wheel motor (Fig. 1426).



Fig 1426

PICT-4621

DRIVE SYSTEM

- G. Hydraulic hose running to the upper port on the left hand wheel motor (Fig. 1427).

Note: Cap all hydraulic lines and fittings to prevent debris from entering system.



Fig 1427

PICT-4623

16. Raise the hood.

17. Remove the hairpin cotter from the hood prop rod (Fig. 1429).



Fig 1429

Belt 001

15. Remove the nut and bolt securing the drive linkage to the left hand hydrostatic pump (Fig. 1428).



Fig 1428

PICT-4618

18. Support the hood and remove the prop rod (Fig. 1430).



Fig 1430

Belt 003

DRIVE SYSTEM

19. Using a 1/2" wrench, remove the 2 lower heat shield screws (Fig. 1431).



Fig 1431

Belt 002

21. Remove the heat shield (Fig. 1433).



Fig 1433

Belt 005

20. Using a 3/16" Allen wrench, remove the 2 upper heat shield screws (Fig. 1432).



Fig 1432

Belt 004

22. Using a spring tool, remove the idler spring from its post (Fig. 1434).



Fig 1434

Belt 007

DRIVE SYSTEM

23. Remove the belt from the right and left hydraulic traction pump pulleys (Fig. 1435).



Fig 1435

Belt 008

25. Install a pulley puller (Toro p/n: 112-2557) onto the left hand hydrostatic pump pulley (Fig. 1437).

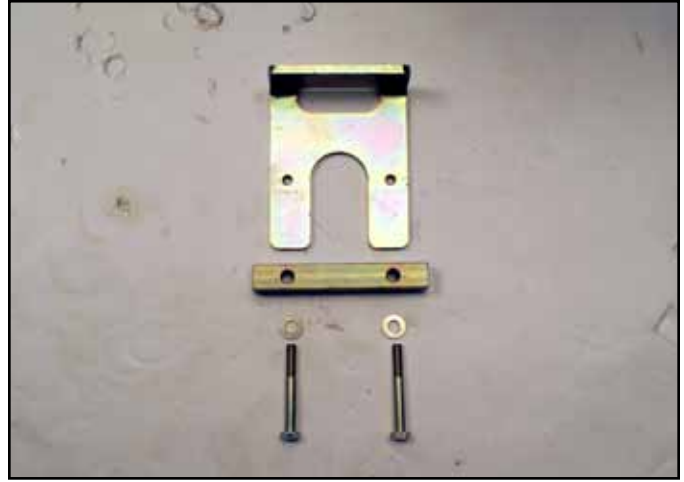


Fig 1437

PICT-4593a

24. Secure the pulley. Using a 5/8" socket, remove the center nut and washer retaining the pulley to the left hand hydrostatic pump shaft (Fig. 1436).



Fig 1436

PICT-4592

26. Remove the left hand pulley from the hydrostatic pump shaft (Fig. 1438).



Fig 1438

PICT-4596

DRIVE SYSTEM

27. Remove the key from the hydrostatic pump shaft keyway (Fig. 1439).



Fig 1439

PICT-4598

29. Remove the left hand hydrostatic pump from the tower frame (Fig. 1441).



Fig 1441

PICT-4627

28. Using a 3/4" socket and wrench, remove the top bolt and nut securing the left hand hydrostatic pump to the tower frame. Loosen the lower nut and bolt (Fig. 1440).



Fig 1440

PICT-4619

30. If replacing the pump, transfer all markings and fittings to the new pump (Fig. 1442).

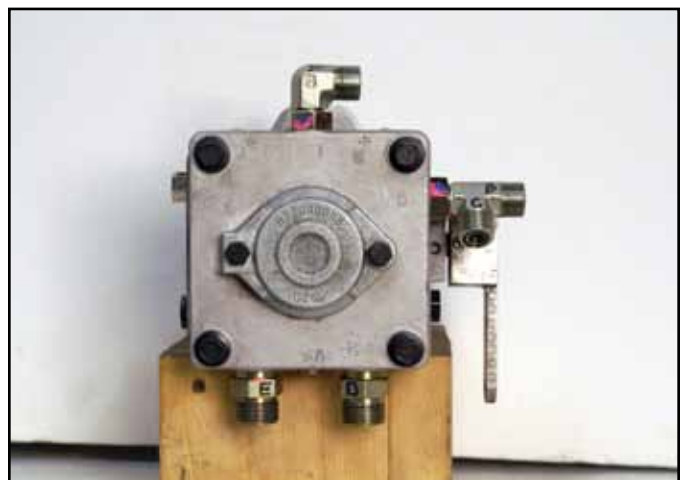


Fig 1442

PICT-4626a

31. If repairing/rebuilding the pump, refer to the Hydro-Gear BDP-10A/16A/21L Hydrostatic Pumps Service and Repair Manual (Toro Form No. 492-4789).

DRIVE SYSTEM

Left Hydrostatic Pump Installation

1. With the lower bolt and nut loosely installed in the tower frame, position the left hand hydrostatic pump so the pump shaft is inserted through the frame (Fig. 1443).



Fig 1443

PICT-4627

3. Install a key into the hydrostatic pump shaft keyway (Fig. 1445).



Fig 1445

PICT-4598

2. Using a 3/4" socket and wrench, install the top bolt and nut. Tighten the lower bolt and nut securing the left hand hydrostatic pump to the tower frame (Fig. 1444).



Fig 1444

PICT-4619

4. The pulley has a tapered through hole and a thicker flange on one side (Fig. 1446).



Fig 1446

PICT-4659

DRIVE SYSTEM

5. Slide the left hand pulley onto the hydrostatic pump shaft with the thicker flange side facing toward the pump (Fig. 1447).



Fig 1447

PICT-4632

7. Install a nut to secure the pulley to the left hand hydrostatic pump shaft (Fig. 1449).



Fig 1449

PICT-4634

6. Slide a washer onto the pump shaft (Fig. 1448).



Fig 1448

PICT-4633

8. Torque the nut to 260 ± 40 in-lbs. (29.38 ± 4.5 Nm) (Fig. 1450).



Fig 1450

PICT-4635

DRIVE SYSTEM

9. Route the belt around the engine pulley and the right and left hydrostatic pump pulleys (rear view) (Fig. 1451).

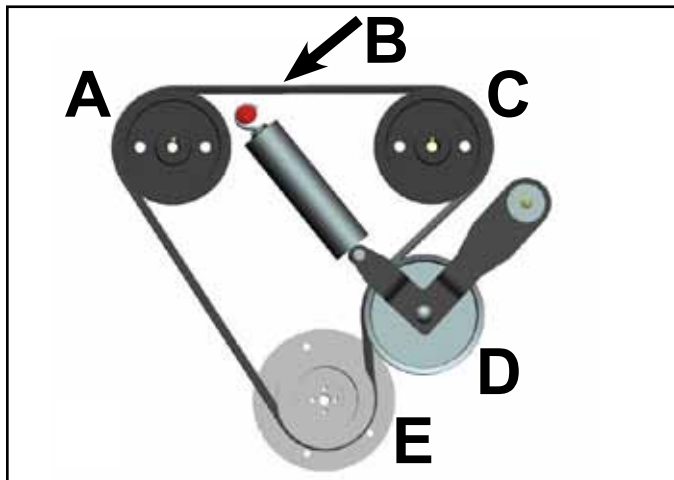


Fig 1451

TX525 belt routing

- A. LH pump pulley
B. Drive belt
C. RH pump pulley

- D. Idler pulley
E. Engine pulley

10. Using a spring tool, install the idler spring onto its post (Fig. 1452).



Fig 1452

Belt 007

11. Position the heat shield (Fig. 1453).



Fig 1453

Belt 005

12. Using a 3/16" Allen wrench, install the 2 upper heat shield screws (Fig. 1454).



Fig 1454

Belt 004

DRIVE SYSTEM

13. Using a 1/2" wrench, install the 2 lower heat shield screws (Fig. 1455).



Fig 1455

Belt 002

14. Support the hood and install the prop rod (Fig. 1456).



Fig 1456

Belt 003

15. Install the hairpin cotter (Fig. 1457).



Fig 1457

Belt 001

16. Using a 1-1/8" wrench, install the left hand hydrostatic pump lines as follows:
G. Hydraulic hose coming from the upper port on the left hand wheel motor (Fig. 1458).



Fig 1458

PICT-4623

DRIVE SYSTEM

- F. Hydraulic hose coming from the lower port on the left hand wheel motor (Fig. 1459).



Fig 1459

PICT-4621

- D. Hydraulic hose coming from the lower port on the right hand wheel motor (Fig. 1461).

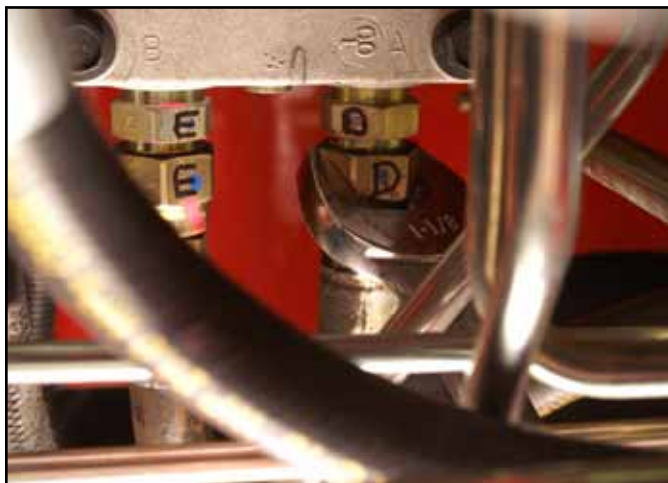


Fig 1461

PICT-4615

- E. Hydraulic hose coming from the upper port on the right hand wheel motor (Fig. 1460).



Fig 1460

PICT-4616

17. Using a 15/16" wrench, connect the left hand hydrostatic pump lines as follows:
C. Case drain line returning to the hydraulic oil tank (Fig. 1462).



Fig 1462

PICT-4614

DRIVE SYSTEM

- B. Right pump case drain line (Fig. 1463).

Note: A 7/8" wrench may need to be used to hold the fitting while tightening the hydraulic line.

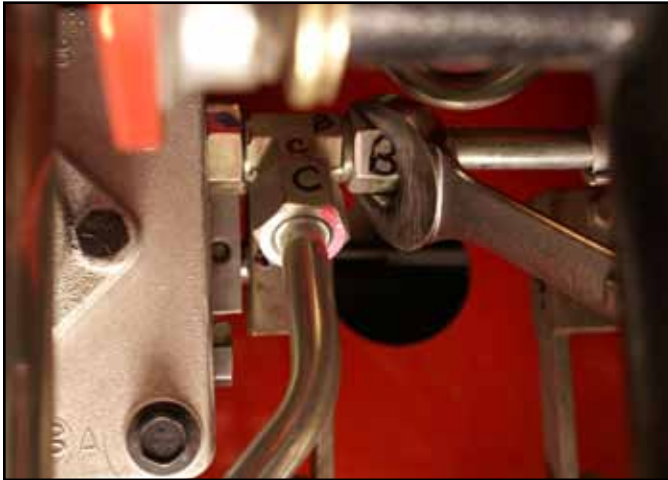


Fig 1463

PICT-4613

- A. Hydraulic oil inlet from the filter (Fig. 1464).



Fig 1464

PICT-4612

18. Position the right hand panel onto the control panel assembly (Fig. 1465).



Fig 1465

PICT-4269

19. Using a 3/8" socket, install 3 self-tapping screws that secure the right panel to the control panel assembly. Using a 3/8" socket and a 7/16" socket, install a bolt and nut securing the lower left corner of the right panel to the control panel assembly (Fig. 1466).

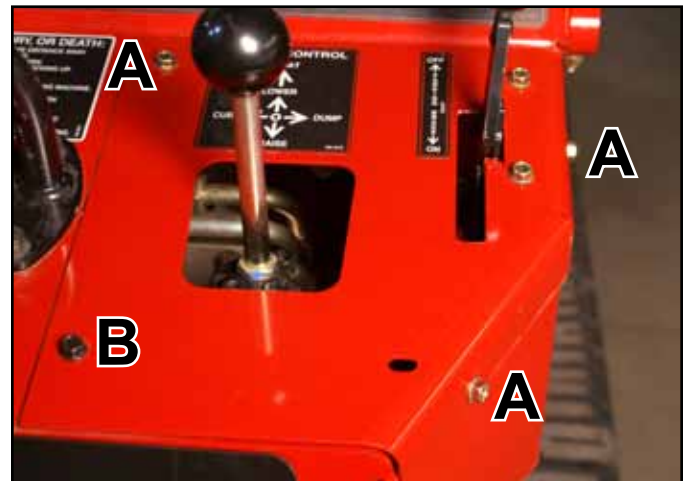


Fig 1466

PICT-4341

- A. Self-tapping screw (3) B. Bolt and nut

DRIVE SYSTEM

20. Position the left hand panel onto the control panel assembly (Fig. 1467).



Fig 1467

PICT-4601

21. Using a 3/8" socket, install 4 self-tapping screws securing the left hand panel to the control panel assembly (Fig. 1468).



Fig 1468

PICT-4600

22. Slide the 2 fuel lines onto the fuel tank fittings. Note the location markings (Fig. 1469).

S - Fuel suction line

R - Fuel return line

Note: Before installing the fuel tank into the unit, disengage the park brake and start the unit. Refer to "Purging Air Procedure", page 9-19, and check for any leaks in the hydraulic fittings and hydraulic hoses.



Fig 1469

PICT-4265

DRIVE SYSTEM

23. Position the 2 fuel hose clamps to secure the fuel lines to the fuel tank fittings (Fig. 1470).



Fig 1470

PICT-4264

25. Position the fuel tank bracket onto the fuel tank (Fig. 1472).



Fig 1472

PICT-5626

24. Position the fuel tank into the rear end of the frame. Connect the two wires (black and orange) to the fuel sending unit located on the top of the fuel tank (Fig. 1471).

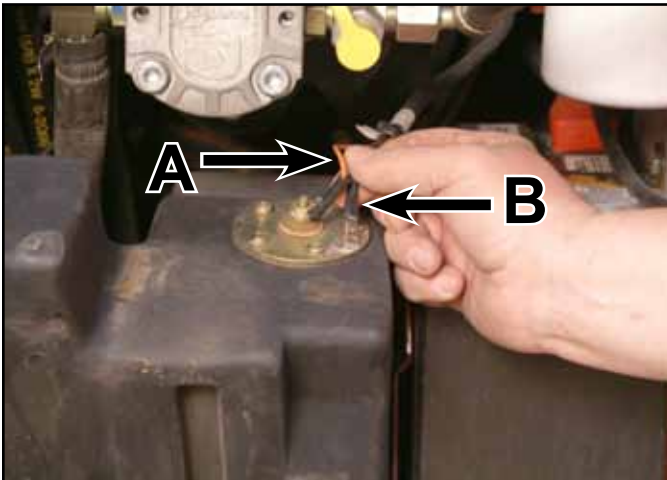


Fig 1471

PICT-4262

- A. Center terminal (orange wire)
B. Outside terminal (black wire)

26. Position the rear frame cover to the rear end of the frame. Using 3/4" and 1/2" sockets, install 7 bolts and nuts to secure the rear frame cover to the frame and fuel tank bracket (Fig. 1473).

Note: The rear of the machine may have to be lifted to reposition the jack stands so that the rear frame cover can be installed.

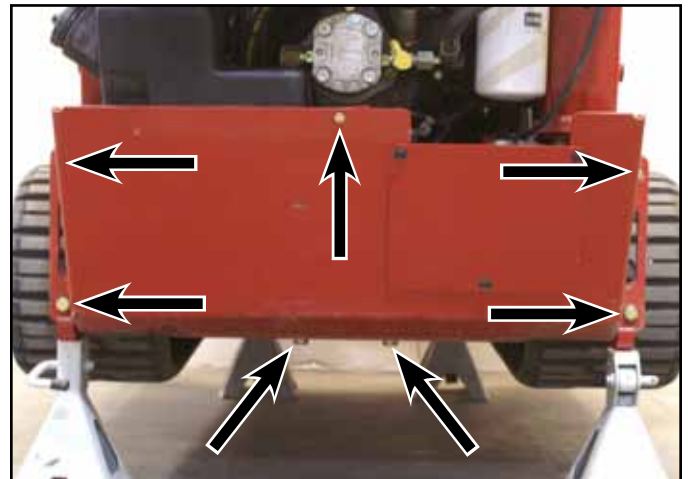


Fig 1473

PICT-4259

DRIVE SYSTEM

27. Position the left hand rear cover support panel to the tower. Using a 3/8" socket, install 3 screws to secure the left rear cover support panel to the tower assembly. Repeat to install right hand rear cover support panel (Fig. 1474).

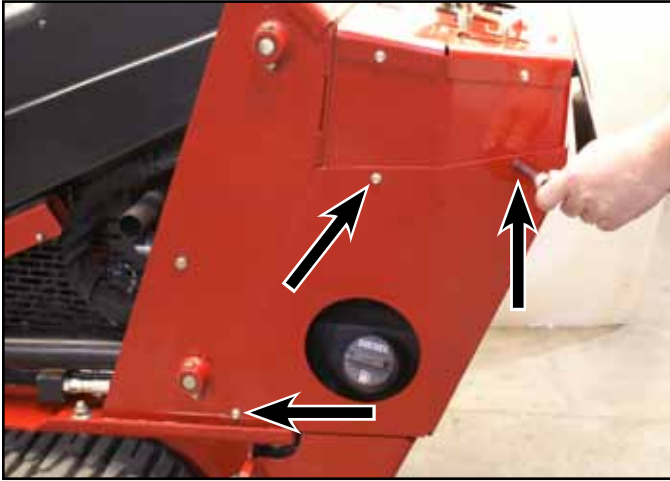


Fig 1474

PICT-4256

28. Install the rear access panel (Fig. 1475).



Fig 1475

PICT-4505

29. Lower the machine.
30. Lower the hood.

Wheel Motor Replacement

The following procedures can be followed for right or left wheel motor removal. When removing the right wheel motor, the battery has to be removed. Those steps are labeled "For right hand wheel motor removal only:" and "For right hand wheel motor installation only:" respectively.

Wheel Motor Removal

1. Lift the Machine. Refer to "Lifting the Machine for Service" on page 7-1.
2. Remove the track. Refer to "Wide Track Removal" on page 7-68, or "Narrow Track Removal" on page 7-72.
3. Set the parking brake.
4. Using a 1-3/4" socket, loosen the nut securing drive wheel to the wheel motor shaft. Leave the nut threaded onto the wheel motor shaft to retain the drive sprocket upon its removal (Fig. 1476).

Note: The nut securing the drive sprocket to the wheel motor shaft is a patch-lock nut and needs to be replaced when removed.



Fig 1476

PICT-4448

DRIVE SYSTEM

5. Using a wheel puller, break the drive sprocket free from the wheel motor shaft (Fig. 1477).



Fig 1477

PICT-4450

7. Remove the drive sprocket from the wheel motor shaft (Fig. 1479).



Fig 1479

PICT-4452

6. Remove the patch lock nut from the wheel motor shaft (Fig. 1478).



Fig 1478

PICT-4451

8. Remove the key from the wheel motor shaft keyway (Fig. 1480).



Fig 1480

PICT-4457

DRIVE SYSTEM

9. Remove the rear access panel (Fig. 1481).



Fig 1481

PICT-4505

11. Using 3/4" and 1/2" sockets, remove the 7 bolts and nuts securing the rear frame cover to the frame and fuel tank bracket (Fig. 1483).



Fig 1483

PICT-4456

10. Using a 3/8" socket, remove the 6 screws that secure the left and right rear cover support panel to the tower assembly. Remove the panel (Fig. 1482).

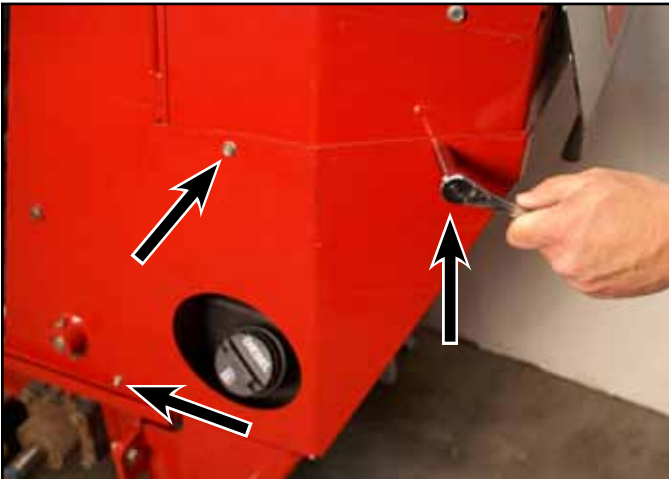


Fig 1482

PICT-4454

12. Remove the rear frame cover (Fig. 1484).

Note: The rear of the machine may have to be lifted to reposition the jack stands so that the rear frame cover can be removed.



Fig 1484

PICT-4458

DRIVE SYSTEM

13. Remove the fuel tank bracket (Fig. 1485).



Fig 1485

PICT-5626

14. Disconnect the two wires (black and orange) from the fuel sending unit located on the top of the fuel tank (Fig. 1486).



Fig 1486

PICT-4262a

15. Mark the suction fuel line and tank fitting with an "S" and the return fuel line and tank fitting with an "R" (Fig. 1487):
S - Fuel suction line
R - Fuel return line



Fig 1487

PICT-4263

16. Slide the 2 fuel hose clamps down the fuel line away from the fuel tank fittings (Fig. 1488).



Fig 1488

PICT-4264

DRIVE SYSTEM

17. Slide the 2 fuel lines off the fuel tank fittings. Remove the fuel tank. (Fig. 1489).



Fig 1489

PICT-4265

18. For right hand wheel motor removal only: Remove the bolt, washer and nut securing the battery clamp to the frame. Remove the battery clamp (Fig. 1490).



Fig 1490

PICT-4310a

19. For right hand wheel motor removal only: Slide the battery partially out of the battery mount. Disconnect the negative battery cable from the battery. Slide the battery out of the battery mount further to access the positive battery cable terminal. Disconnect the positive battery cable and remove the battery and battery guard from the battery mount (Fig. 1491).



Fig 1491

PICT-4312a

20. Before disconnecting the hydraulic lines from the wheel motor, mark or tag one of the hydraulic lines; this will ensure the hydraulic lines are reinstalled correctly (Fig. 1492).



Fig 1492

PICT-4459

DRIVE SYSTEM

21. Place a drain pan under the wheel motor that is being removed. Using a 1-1/8" 15°/60° offset open end wrench, disconnect the two hydraulic lines running to the wheel motor. Install protective caps on the hydraulic lines (Fig. 1493).



Fig 1493

PICT-4461

22. Using a 1-1/16" socket, remove the two hydraulic fittings from the wheel motor. Insert caps into the wheel motor ports (Fig. 1494).



Fig 1494

PICT-4463

23. Remove the 4 bolts, and lock washers retaining the wheel motor to the frame (Fig. 1495).



Fig 1495

PICT-4464

24. Remove the wheel motor mounting plate (Fig. 1496).



Fig 1496

PICT-4465

DRIVE SYSTEM

25. Rotate the wheel motor 90° so the ports are facing upward, this will allow the raised portion of the wheel motor to fit through the notch in the frame. Remove the wheel motor (Fig. 1497).



Fig 1497

PICT-4466

26. For wheel motor service, Refer to the Parker / Ross Wheel Motor Service Manual (Toro p/n: 492-4753).

Wheel Motor Installation

1. Insert the wheel motor into the frame with the ports facing up. After the wheel motor is inside the frame, rotate the wheel motor 90° clockwise so the hydraulic ports are facing to the rear (Fig. 1498).



Fig 1498

PICT-4471

2. Wheel motor mounting plates have a wide side and narrow side. The wide side faces up when installing the wheel motor (Fig. 1499).

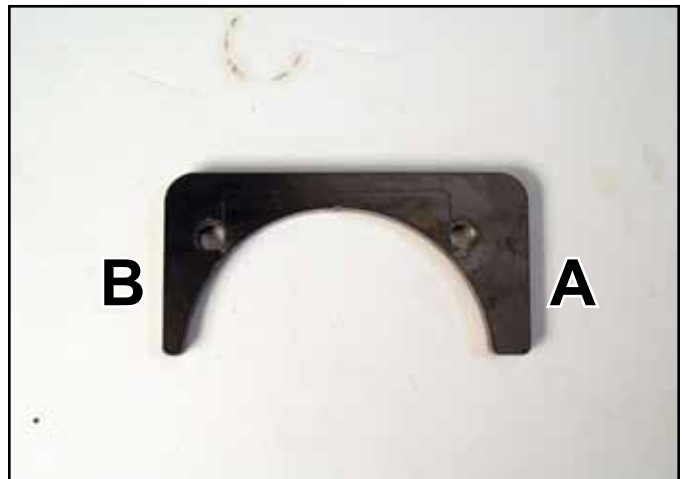


Fig 1499

PICT-4473a

A. Wide Side

B. Narrow Side

DRIVE SYSTEM

3. Position the wheel motor mounting plate on the inside of the frame with the wide side positioned toward the rear of the machine (Fig. 1500).



Fig 1500

PICT-4477

5. Install the 4 mounting bolts and lock washers through the wheel motor housing and frame. The top 2 mounting bolts will also thread into the mounting plate. Torque the 4 mounting bolts to 75 ± 8 ft-lbs. (102 ± 11 Nm) (Fig. 1502).



Fig 1502

PICT-4479

4. Apply a thread locking compound to the threads of the wheel motor mounting bolts (Fig. 1501).



Fig 1501

PICT-4474a

6. Remove protective caps.
7. With a 1-1/16" socket, install the hydraulic fittings into the wheel motor (Fig. 1503).



Fig 1503

PICT-4463

DRIVE SYSTEM

8. Install the two hydraulic lines to the wheel motor using a 1-1/8" 15°/60° offset open end wrench (Fig. 1504).

Note: To ease installation, connect the bottom hydraulic line first.



Fig 1504

PICT-4461

9. For right hand wheel motor installation only: Slide the battery partially into the battery mount. Install the positive battery cable to the positive battery terminal. Slide the battery further into the battery mount. Install the negative battery cable to the negative battery terminal. Slide the battery guard in between the battery and the frame so that the hole in the guard lines up with the battery clamp mounting hole in the frame (Fig. 1505).



Fig 1505

PICT-4330

10. For right hand wheel motor installation only: Position the battery clamp into the slot on the battery mount and line up the mounting hole with the hole in the frame. Install a bolt, washer and nut to secure the battery clamp to the frame (Fig. 1506).



Fig 1506

PICT-4310a

DRIVE SYSTEM

11. Connect the fuel lines to the fuel tank fittings. Note the location markings. Secure the fuel lines with hose clamps (Fig. 1507).

S - Fuel suction line
R - Fuel return line

Note: Before installing the fuel tank in the unit, disengage the park brake and start the unit. Refer to “Purging Air Procedure” on page 9-19. Check for any leaks in the hydraulic fittings and hydraulic hoses.



Fig 1507

PICT-4265

12. Position the fuel tank into the rear end of the frame. Connect the two wires (black and orange) to the fuel sending unit located on the top of the fuel tank (Fig. 1508).

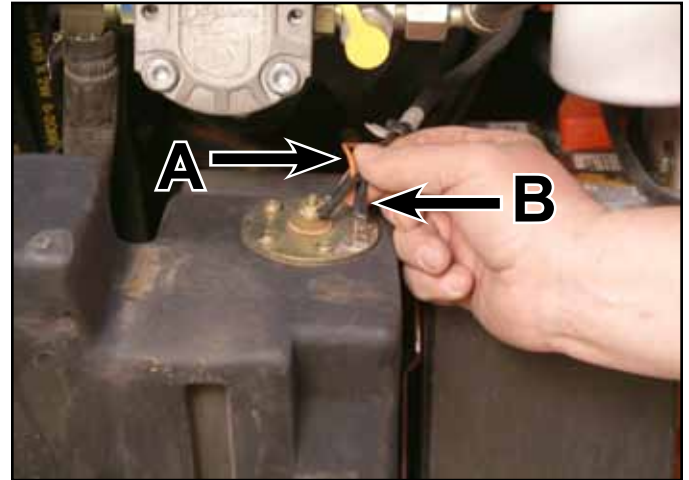


Fig 1508

PICT-4262a

- A. Center terminal (orange wire)
B. Outside terminal (black wire)

13. Position the fuel tank bracket onto the fuel tank (Fig. 1509).



Fig 1509

PICT-5626

DRIVE SYSTEM

14. Position the rear frame cover to the rear end of the frame. Using 3/4" and 1/2" sockets, install 7 bolts and nuts to secure the rear frame cover to the frame and fuel tank bracket (Fig. 1510).

Note: The rear of the machine may have to be lifted to reposition the jack stands so that the rear frame cover can be installed.



Fig 1510

PICT-4456

15. Position the left and right hand rear cover support panels to the tower. Using a 3/8" socket, install 3 screws each to secure the left and right rear cover support panels to the tower assembly. (Fig. 1511).



Fig 1511

PICT-4454

16. Install the rear access panel (Fig. 1512).



Fig 1512

PICT-4505

17. Insert the key into the wheel motor shaft keyway (Fig. 1513).



Fig 1513

PICT-4480

DRIVE SYSTEM

18. Slide the drive sprocket onto the wheel motor shaft (Fig. 1514).



Fig 1514

PICT-4452

20. With the parking brake on, torque the patch lock nut to $300 + 100/-0$ ft-lbs. ($406.7 + 135.5$ Nm) (Fig. 1516).



Fig 1516

PICT-4481

19. Thread a new patch lock nut onto the wheel motor shaft (Fig. 1515).



Fig 1515

PICT-4451

21. Install the track. Refer to "Wide Track Installation" on page 7-70, or "Narrow Track Installation" on page 7-73.

DRIVE SYSTEM

Track Replacement

Wide Track Removal

1. Lift the machine. Refer to "Lifting the Machine for Service" on page 7-1.
2. Stop the engine, and remove the key.
3. Set the parking brake to the ON position.
4. Remove the locking bolt, spacer and nut (Fig. 1517).



Fig 1517

PICT-4440

5. Using a 1/2" drive ratchet, release the drive tension by turning the tensioner bolt clockwise until the tensioning nut contacts the tensioner bolt head. Push the tension wheel toward the rear of the unit (Fig. 1518).



Fig 1518

PICT-4441

7. Using a 1-1/2" socket, remove the nut securing the outer tension wheel (Fig. 1519).



Fig 1519

PICT-4442

DRIVE SYSTEM

8. Remove the outer washer, tensioner wheel and inner washer (Fig. 1520).



Fig 1520

PICT-4443

10. Remove the track from the rear drive sprocket (Fig. 1522).



Fig 1522

PICT-4447

9. Remove the track from the front tensioner wheel (Fig. 1521).



Fig 1521

PICT-4446

DRIVE SYSTEM

Wide Track Installation

Important: Before installing the track, use the **Alignment Tool, Toro P/N 110-0069**, for proper alignment between the drive sprocket and the front tensioner wheel. Refer to “Track Guide Alignment” on page 7-3.

1. Install the track, ensuring that the lugs in the track fit between the spacers in the middle of the drive sprocket (Fig. 1523).



Fig 1523

PICT-4495

2. Install the track over the inside tensioner wheel (Fig. 1524).



Fig 1524

PICT-4496

3. Ensure old grease and dirt are cleaned out of the area between the two washers and the bearings on the outside tensioner wheel. Fill the area on one side of the wheel with grease (Fig. 1525).



Fig 1525

PICT-4497

4. Install the large washer onto the wheel over the grease (Fig. 1526).



Fig 1526

PICT-4498

DRIVE SYSTEM

5. Slide the outer tensioner wheel onto the tensioner wheel shaft with the installed washer side going on first (Fig. 1527).



Fig 1527

PICT-4499

7. Slide the second washer over the tensioner wheel shaft and into the wheel over the grease (Fig. 1529).



Fig 1529

PICT-4501

6. Apply grease to the bearing area on the outside of the tensioner wheel (Fig. 1528).



Fig 1528

PICT-4500

8. Using a 1-1/2" socket, install a nut securing the tensioner wheel. Torque the nut to 300 ft-lbs. (407 Nm) (Fig. 1530).



Fig 1530

PICT-4502

DRIVE SYSTEM

9. Turn the tensioning screw counter-clockwise until the distance between the tension nut and the back of the tension arm is 2-3/4" (7cm) (Fig. 1531).

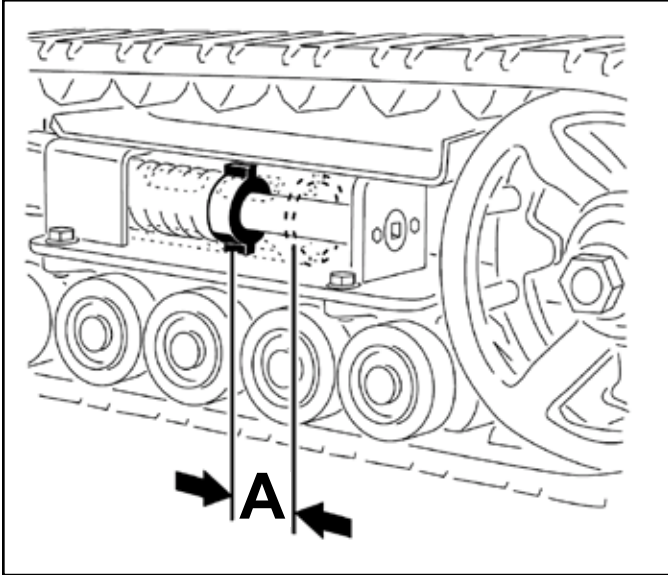


Fig 1531

fig. 33 m-4775

A. 2-3/4" (7cm)

10. Align the closest notch in the tension screw to the locking bolt hole and secure the screw with the locking bolt, spacer and nut (Fig. 1532).



Fig 1532

PICT-4440

11. Lower the traction unit to the ground.

Narrow Track Removal

1. Lift the machine. Refer to "Lifting the Machine for Service" on page 7-1.
2. Raise the loader arms approximately 12" (30.48cm).
3. Stop the engine and remove the key.
4. Using a 7/16" socket and wrench, remove the locking bolt and nut (Fig. 1533).



Fig 1533

PICT-5340

5. Using a 1/2 inch drive ratchet, release the drive tension by turning the tensioning screw clockwise (Fig. 1534).



Fig 1534

PICT-5341

DRIVE SYSTEM

6. Push the tension wheel toward the rear of the unit to move the tension arm against the frame (Fig. 1535). (If it does not touch the frame, continue turning the tensioning screw until it does.)



Fig 1535

PICT-5342

8. When the track is off of the tension wheel, remove it from the road wheel and drive sprocket (Fig. 1537).



Fig 1537

PICT-5346

7. Begin removing the track at the top of the tension wheel, prying it off of the wheel while rotating the track forwards (Fig. 1536).



Fig 1536

PICT-5344

Narrow Track Installation

Important: Before installing the track, use the **Alignment Tool Toro P/N 110-0069** for proper alignment between the drive sprocket and the front tension wheel. Refer to "Track Guide Alignment" on page 7-3.

1. Beginning at the drive sprocket, coil the track around the sprocket, ensuring that the lugs on the track fit between the spacers on the sprocket (Fig. 1538).



Fig 1538

PICT-5345

DRIVE SYSTEM

2. Push the track under and between the road wheels. Starting at the bottom of the tension wheel, install the track around the wheel by rotating the track rearward while pushing the lugs into the wheel (Fig. 1539).



Fig 1539

PICT-5358

4. Align the closest notch in the tension screw to the locking bolt hole and secure the screw with the locking bolt and nut (Fig. 1541).



Fig 1541

PICT-5340

3. Turn the tensioning screw counter-clockwise until the distance between the tension nut and the back of the tension arm is 2-3/4" (7cm) (Fig. 1540).

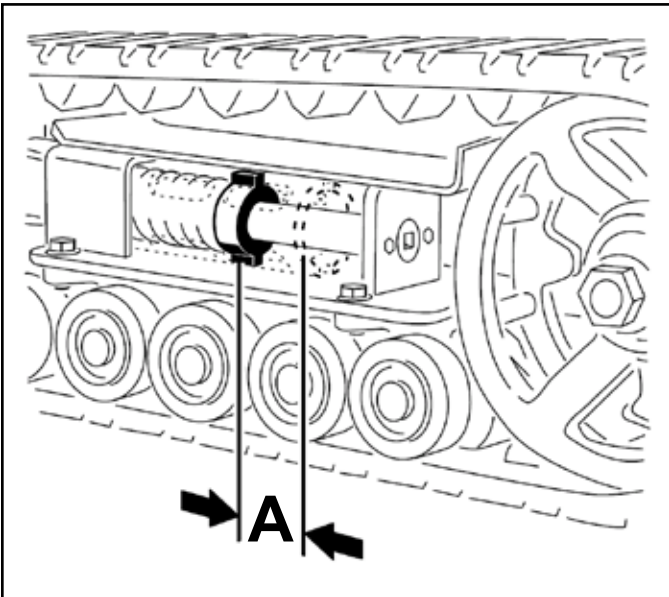


Fig 1540

fig. 37 G004201

5. Lower the traction unit to the ground.

A. 2-3/4" (7cm)

Track Guide Replacement

Track Guide Removal

1. Lift the machine, refer to “Lifting the Machine for Service” on page 7-1.
2. Remove the track. Refer to “Wide Track Removal” on page 7-68, or “Narrow Track Removal” on page 7-72.
3. Raise the loader arm approximately 12” (30cm). Secure the loader arms.
4. Slide the tensioner arm out of the mainframe (Fig. 1542).



Fig 1542

PICT-4520

5. Install a hydraulic floor jack and a suitable board under the track guide for support (Fig. 1543).



Fig 1543

PICT-4521

6. Using a 3/4” socket, remove the 4 bolts and lock washers holding the track guide to the mainframe (Fig. 1544).



Fig 1544

PICT-4522

DRIVE SYSTEM

7. Using the floor jack, lower the track guide from the frame (Fig. 1545).



Fig 1545

PICT-4523

Note: The track guide end with the step, is mounted toward the drive sprocket (Fig. 1547).



Fig 1547

PICT-4545

Track Guide Installation

1. Place a suitable board onto a hydraulic floor jack. Place the track guide on top of the floor jack.
2. Position the track guide to the frame (Fig. 1546).
3. Using a 3/4" socket, loosely install 4 bolts and lock washers to secure the track guide to the mainframe (Fig. 1548).



Fig 1546

PICT-4523



Fig 1548

PICT-4522

4. Remove the hydraulic jack and board.
5. Raise the loader arm approximately 12" (30cm). Secure the loader arms.
6. Slide the tensioner arm into the mainframe (Fig. 1549).



Fig 1549

PICT-4520

7. Align the track guide. Refer to "Track Guide Alignment" on page 7-3.
8. Install the track. Refer to "Wide Track Installation" on page 7-70, or "Narrow Track Installation" on page 7-73.

Road Wheel Replacement

For inner road wheel replacement: To replace the inner road wheels, the track guide assembly must be removed from the machine. Refer to "Track Guide Removal" on page 7-75.

For this procedure, the track guide has been removed from the machine for photo purposes.

Road Wheel Removal

1. Remove the snap ring securing the wheel bearing cap to the road wheel (Fig. 1550).



Fig 1550

PICT-4524

DRIVE SYSTEM

2. Remove the wheel bearing cap (Fig. 1551).



Fig 1551

PICT-4525

4. Remove the road wheel bolt (Fig. 1553).



Fig 1553

PICT-4527

3. Remove the bogie gasket (Fig. 1552).



Fig 1552

PICT-4526

5. Slide the road wheel off the track guide (Fig. 1554).



Fig 1554

PICT-4529

Road Wheel Rebuild

1. Secure the road wheel assembly in a vise.
2. Drive the road wheel bearing out of the road wheel (Fig. 1555).



Fig 1555

PICT-4530a

3. Turn the road wheel over in the vise and drive the grease seal out of the road wheel (Fig. 1556).



Fig 1556

PICT-4532a

4. Clean the road wheel of all debris. Inspect and replace if damaged.

Road Wheel Assembly (Fig. 1557)



Fig 1557

PICT-4534a

- | | |
|----------------|-------------------|
| A. Grease seal | E. Bogie Gasket |
| B. Road wheel | F. Cap |
| C. Bearing | G. Retaining ring |
| D. Bolt | |

5. Press a new grease seal into the road wheel (Fig. 1558).



Fig 1558

PICT-4536a

DRIVE SYSTEM

6. Press a new bearing into the road wheel so that the bearing shoulder is facing the grease seal (Fig. 1559).



Fig 1559

PICT-4535a

7. Apply grease to the grease seal lip (Fig. 1560).

Important: Take care that no grease gets on the inside diameter of the road wheel bearing.



Fig 1560

PICT-4537

Road Wheel Installation

1. Clean the track guide of all debris.
2. Slide the road wheel onto the track guide (Fig. 1561).



Fig 1561

PICT-4529

3. Apply thread locking compound to the road wheel bolt (Fig. 1562).



Fig 1562

PICT-4539a

DRIVE SYSTEM

4. Install the road wheel bolt (Fig. 1563).



Fig 1563

PICT-4527

6. Install the bogie gasket over the bolt head, inside the outer cap ring of the road wheel (Fig. 1565).



Fig 1565

PICT-4526

5. Torque the road wheel bolt to 150 ± 15 ft-lbs. (203 ± 20 Nm) (Fig. 1564).



Fig 1564

PICT-4540a

7. Apply grease to the cavity in the road wheel bearing cap (Fig. 1566).



Fig 1566

PICT-4542a

DRIVE SYSTEM

8. Install the road wheel bearing cap (Fig. 1567).



Fig 1567

PICT-4525

9. Install the snap ring securing the wheel bearing cap to the road wheel so that the flat side of the snap ring is facing away from the road wheel (Fig. 1568).



Fig 1568

PICT-4524

Tensioner Arm Replacement - Wide Track

Tensioner Arm Removal - Wide Track

1. Lift the machine, refer to "Lifting the Machine for Service" on page 7-1.
2. Remove the Track. Refer to "Wide Track Removal" on page 7-68.
3. Raise the loader arms approximately 12" (7cm).
4. Slide the tensioner arm assembly out of the mainframe (Fig. 1569).



Fig 1569

PICT-4568

5. Remove the spring from the tensioner arm (Fig. 1570).



Fig 1570

PICT-4569

6. Remove the tensioner bolt and tensioner block from the mainframe (Fig. 1571).



Fig 1571

PICT-4570

Tensioner Arm Rebuild - Wide Track

1. Rotate the tensioner arm so the bottom of the tensioner arm is facing up and slide it back into the mainframe so that the square portion of the tensioner arm is inserted into the mainframe (Fig. 1572).



Fig 1572

PICT-4571

2. Using a 1-1/2" socket, remove the nut securing tensioner wheel to the tensioner arm shaft (Fig. 1573).



Fig 1573

PICT-4572

DRIVE SYSTEM

3. Remove the outer washer from the tensioner wheel (Fig. 1574).



Fig 1574

PICT-4574

5. Remove the inner washer from the tensioner wheel (Fig. 1576).



Fig 1576

PICT-4576

4. Remove the tensioner wheel from the tensioner arm shaft (Fig. 1575).



Fig 1575

PICT-4575

6. Slide the tensioner arm out of the mainframe (Fig. 1577).



Fig 1577

PICT-4577

DRIVE SYSTEM

Tensioner Arm and Wheel Assembly (Fig. 1578 and Fig. 1579)

Welded, non-replaceable style (serial #270000001 - 270999999):

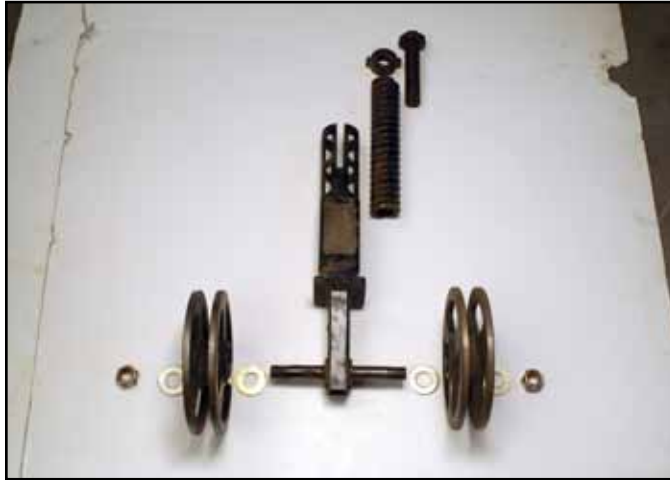


Fig 1578

PICT-4566a

7. Secure the tensioner arm into a vise with the bottom side facing up.
8. Drive the roll pin out of the shaft end of the tensioner arm (Fig. 1580).



Fig 1580

PICT-4549a

Cast, replaceable style (serial #280000001 & up):



Fig 1579

PICT-4567a

9. Press the tensioner arm shaft out of the tensioner arm (Fig. 1581).



Fig 1581

PICT-4550

DRIVE SYSTEM

10. Make an alignment marking on the tensioner arm through hole and tensioner arm shaft roll pin slot (Fig. 1582):
- A. Place a mark on the tensioner arm shaft dividing the roll pin slot in half
 - B. Place a mark on the tensioner arm through-hole (non-shoulder side) dividing the through-hole in half.

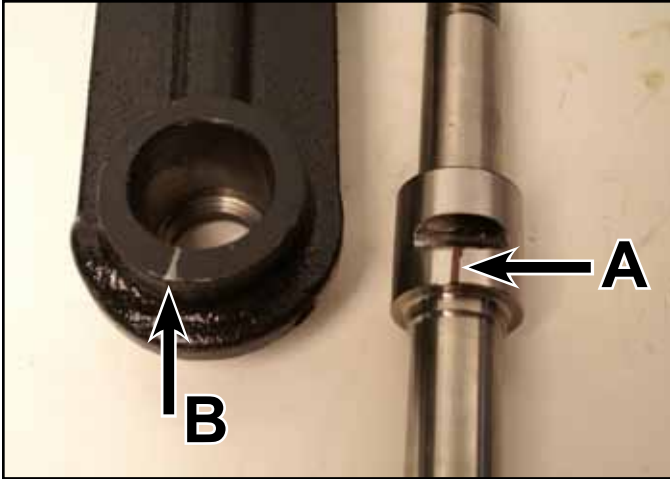


Fig 1582

PICT-4557

11. Insert the tensioner arm shaft into the tensioner arm through-hole observing alignment marks (Fig. 1583):
- A. The thicker shoulder on shaft matches up with wider shoulder on tensioner arm.
 - B. Align the center of the shaft roll pin groove with the center of the tensioner arm through-hole.

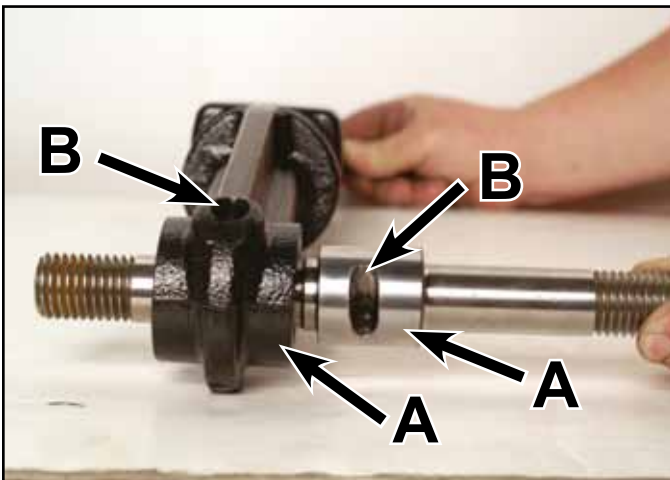


Fig 1583

PICT-4556a

12. Press the tensioner arm shaft into the tensioner arm ensuring the center of the shaft roll pin groove aligns with the center of the tensioner arm through-hole (Fig. 1584).



Fig 1584

PICT-4561

13. Secure the tension arm in a vise with the bottom side facing up.

14. Drive the roll pin into the tensioner arm (Fig. 1585).



Fig 1585

PICT-4563a

DRIVE SYSTEM

Tensioner Arm Installation - Wide Track

1. With the bottom side facing up, slide the tensioner arm far enough into the mainframe so that the squared portion of the tensioner arm is inserted into the mainframe (Fig. 1586).



Fig 1586

PICT-4578

2. Apply grease to the inside of the tensioner wheel bore (Fig. 1587).



Fig 1587

PICT-4497

3. Place a washer into the greased wheel bore (Fig. 1588).



Fig 1588

PICT-4498

4. Slide the tensioner wheel, washer side facing in, onto the tensioner arm shaft (Fig. 1589).



Fig 1589

PICT-4579

DRIVE SYSTEM

5. Apply grease to the inside of the tensioner wheel bore (Fig. 1590).



Fig 1590

PICT-4580

7. Using a 1-1/2" socket, install a nut securing the tensioner wheel to the tensioner arm shaft. Torque the nut to 300 ft-lbs. (407 Nm) (Fig. 1592).



Fig 1592

PICT-4583

6. Place a washer into the greased wheel bore (Fig. 1591).



Fig 1591

PICT-4581

8. Slide the tensioner arm assembly out of the main-frame (Fig. 1593).



Fig 1593

PICT-4584

DRIVE SYSTEM

9. Slide the tensioner spring into the tensioner arm (Fig. 1594).



Fig 1594

PICT-4585

11. Rotate the tensioner arm so the top is facing up for proper installation and slide it back into the main-frame (Fig. 1596).



Fig 1596

PICT-4590

10. Slide the tensioner bolt and nut into the tensioner arm (Fig. 1595).



Fig 1595

PICT-4587

12. Install the track. Refer to "Wide Track Installation" on page 7-70.

13. Lower the loader arm.

14. Lower the machine to the ground.

DRIVE SYSTEM

Tensioner Arm Wheel Bearing Replacement - Wide Track

Tensioner Arm Wheel Bearing Removal - Wide Track

1. Lift the machine. Refer to "Lifting the Machine for Service" on page 7-1.
2. Set the parking brake to the ON position.
3. Remove the locking bolt, spacer and nut (Fig. 1597).



Fig 1597

PICT-4440

4. Using a 1/2" drive ratchet, release the drive tension by turning the tensioner screw clockwise until the tensioning nut contacts the tensioner bolt head. Push the tension wheel toward the rear of the unit (Fig. 1598).



Fig 1598

PICT-4441

To replace the wheel bearing on the outer tensioner wheel continue on. To replace the wheel bearing on the inner tension wheel, go to step 12.

Outer tensioner wheel bearing removal:

5. Remove the nut securing the outer tensioner wheel (Fig. 1599).



Fig 1599

PICT-4442

DRIVE SYSTEM

6. Remove the outer washer, tensioner wheel and inner washer (Fig. 1600).



Fig 1600

PICT-4443

9. Turn the wheel over and drive the second bearing out using a punch and hammer (Fig. 1602).



Fig 1602

PICT-4513a

7. Secure the tensioner wheel in a vise.
8. Drive one of the bearings out using a punch and hammer (Fig. 1601).



Fig 1601

PICT-4510a

DRIVE SYSTEM

10. Clean the tensioner arm wheel of all grease and debris. Replaced if damaged or worn.

Inner tensioner wheel bearing removal:

11. Raise the loader arm approximately 12" (30.48cm).
12. Remove the track. Refer to "Wide Track Removal" on page 7-68.
13. Rotate the tensioner arm so the bottom of the tensioner arm is facing up and slide it back into the mainframe so that the square portion of the tensioner arm is inserted into the mainframe (Fig. 1603).



Fig 1603

PICT-4571

14. Using a 1-1/2" socket, remove the nut securing the inner tensioner wheel to the tensioner arm shaft (Fig. 1604).



Fig 1604

PICT-4572

15. Remove the outer washer from the tensioner wheel (Fig. 1605).



Fig 1605

PICT-4574

DRIVE SYSTEM

16. Remove the tensioner wheel from the tensioner arm shaft (Fig. 1606).



Fig 1606

PICT-4575

18. Position the tensioner wheel in a vise to secure.

19. Drive one of the bearings out using a punch and hammer (Fig. 1608).



Fig 1608

PICT-4510a

17. Remove the inner washer from the tensioner wheel or tensioner arm shaft (Fig. 1607).



Fig 1607

PICT-4576

20. Turn the wheel over and drive the second bearing out using a punch and hammer (Fig. 1609).



Fig 1609

PICT-4513a

21. Clean the tensioner arm wheel of all grease and debris. Replaced if damaged or worn.

DRIVE SYSTEM

Tensioner Arm Wheel Bearing Installation - Wide Track

Tension Arm Wheel and Bearings (Fig. 1610):



Fig 1610

PICT-4517a

1. Install the tensioner arm wheel into a vise to secure.
2. Press a bearing into the wheel bore with the longer flange of the bearing facing inward (Fig. 1611).



Fig 1611

PICT-4518a

3. Turn the wheel over in the vise. Drive a second bearing into the wheel bore with the longer flange of the bearing facing inward (Fig. 1612).



Fig 1612

PICT-4519

To install the inner tensioner wheel, continue on. To install the outer tensioner wheel, go to step 16.

4. The loader arms should be to be raised approximately 12" (30.4cm).
5. With the bottom side facing up, slide the tensioner arm far enough into the mainframe so that the squared portion of the tensioner arm is inserted into the mainframe (Fig. 1613).



Fig 1613

PICT-4578

DRIVE SYSTEM

6. Apply grease to the inside of the tensioner wheel bore (Fig. 1614).



Fig 1614

PICT-4497

8. Slide the tensioner wheel onto the tensioner arm shaft (Fig. 1616).



Fig 1616

PICT-4579

7. Place a washer into the greased wheel bore (Fig. 1615).



Fig 1615

PICT-4498

9. Apply grease to the inside of the tensioner wheel bore (Fig. 1617).



Fig 1617

PICT-4580

DRIVE SYSTEM

10. Place a washer into the greased wheel bore (Fig. 1618).



Fig 1618

PICT-4581

12. Slide the tensioner arm assembly out of the main-frame (Fig. 1620).



Fig 1620

PICT-4584

11. Using a 1-1/2" socket, install a nut securing the tensioner wheel to the tensioner arm shaft. Torque the nut to 300 ft-lbs. (407 Nm) (Fig. 1619).



Fig 1619

PICT-4583

13. Slide the tensioner spring into the tensioner arm (Fig. 1621).



Fig 1621

PICT-4585

14. Slide the tensioner bolt and nut into the tensioner arm (Fig. 1622).



Fig 1622

PICT-4587

15. Rotate the tensioner arm so the top is facing up for proper installation and slide it back into the main-frame (Fig. 1623).



Fig 1623

PICT-4590

16. Install the track. Refer to "Wide Track Installation" on page 7-70.
17. Lower the loader arm.

Tensioner Wheel Bearing Replacement - Narrow Track

Tensioner Wheel Bearing Removal - Narrow Track

1. Raise the machine. Refer to "Lifting the Machine for Service" on page 7-1.
2. Raise the loader arm.
3. Remove the track. Refer to "Narrow Track Removal" on page 7-72.
4. Slide the tensioner arm out to access the bolt head on the inner side of the tensioner wheel. Using a 1" socket and wrench, remove the tensioner wheel axle bolt, washers and nut (Fig. 1624).



Fig 1624

PICT-5347

DRIVE SYSTEM

5. Remove the tensioner wheel from the tensioner arm (Fig. 1625).



Fig 1625

PICT-5348

6. Support the tensioner wheel so there is a space under it for bearing removal. Using a hammer, drive the upper bearing down to create a gap between spacer and bearing, then use a drift punch to hammer the lower bearing out. The spacer will fall out when the bearing is removed. Turn the tensioner wheel over and drive out the other bearing. Inspect the tensioner wheel housing and spacer (Fig. 1627).



Fig 1627

CLR DSC-0808

Tensioner Wheel Assembly (Fig. 1626):

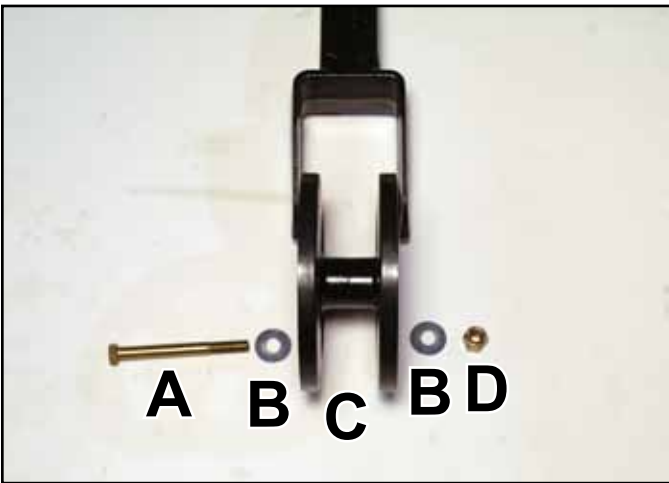


Fig 1626

PICT-5354a

- | | |
|---------------|--------------------|
| A. Bolt | C. Tensioner wheel |
| B. Washer (2) | D. Nut |

Tensioner Wheel Bearing Installation - Narrow Track

Note: The raised inner race of the bearing should be facing outward on both bearings on the tensioner wheel (Fig. 1628).



Fig 1628

CLR DSC-0810

1. Press the first bearing in so the outer bearing race is flush with the center hub.
2. Turn the tensioner wheel over and install the spacer centered on the inner race (tensioner wheel bolt can be used to keep the spacer centered to the bearing inner race) and press the second bearing in until the spacer is captured between the bearings.

Important: Press on outer bearing race only, otherwise bearing damage could occur.

Note: The outer race of each bearing is flush with the center hub of the tensioner wheel (Fig. 1629).



Fig 1629

CLR DSC-0811

DRIVE SYSTEM

3. Reassemble the tensioner wheel to the tension arm.

Tensioner Wheel Assembly (Fig. 1630):

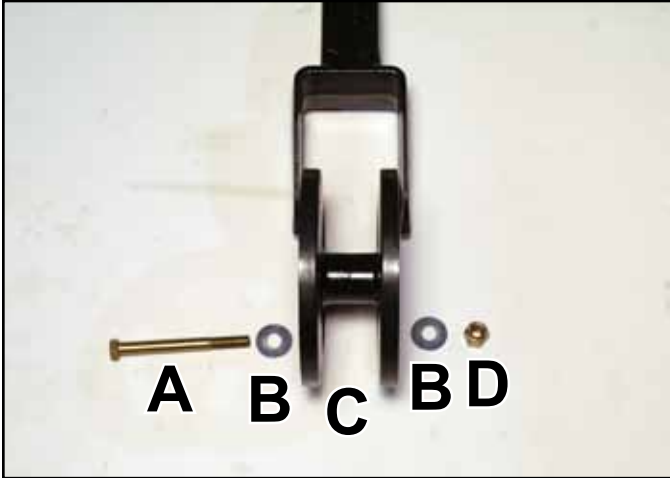


Fig 1630

PICT-5354a

- | | |
|---------------|--------------------|
| A. Bolt | C. Tensioner wheel |
| B. Washer (2) | D. Nut |

4. Insert the tensioner wheel axle bolt through the inside of the tensioner wheel arm. Slide a greased washer onto the axle bolt (Fig. 1631).



Fig 1631

PICT-5349

5. Position the tensioner wheel and slide the axle bolt partially through the wheel (Fig. 1632).



Fig 1632

PICT-5350

6. Position a greased washer between the tensioner wheel and the tension arm and continue sliding the axle bolt through (Fig. 1633).



Fig 1633

PICT-5352

7. Install a nut onto the tensioner wheel axle bolt.
Torque to 150 ± 15 ft-lbs. (203 ± 20 Nm) (Fig. 1634).



Fig 1634

PICT-5356

8. Install the track. Refer to “Narrow Track Installation” on page 7-73.
9. Lower the loader arm.

DRIVE SYSTEM

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Parking Brake Assembly Replacement

Brake Assembly Removal 270000100 - 270000999

1. Raise the machine and set it on jack stands. Refer to "Lifting the Machine for Service" on page 7-1.
2. Place the brake handle in the "OFF" position.
3. Remove the rear access panel (Fig. 1635).



Fig 1635

PICT-4505

4. Using a 3/8" socket, remove the 6 screws that secure the left and right rear cover support panels to the tower assembly (3 screws per panel). Remove the panels (Fig. 1636).

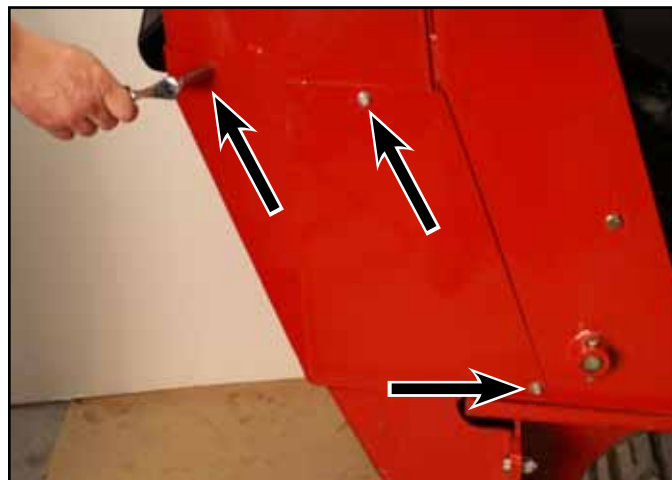


Fig 1636

PICT-4504

5. Using 3/4" and 1/2" sockets, remove the 7 bolts and nuts securing the rear frame cover to the frame and fuel tank bracket. Remove the rear frame cover (Fig. 1637).

Note: The rear of the machine may have to be lifted to reposition the jack stands so that the rear frame cover can be removed.

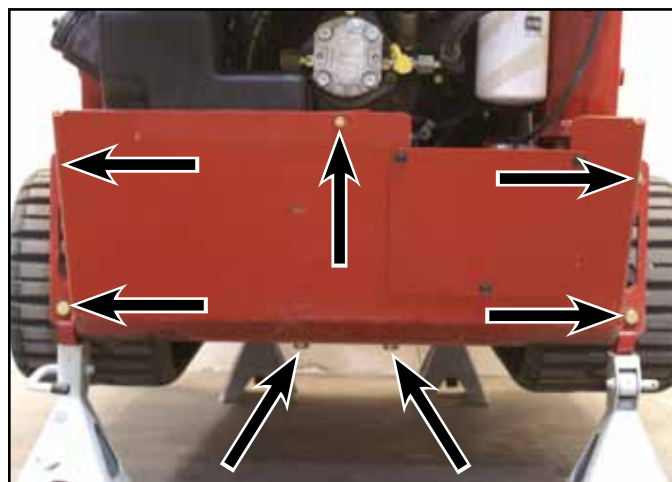


Fig 1637

PICT-4259

BRAKES

6. Remove the fuel tank bracket (Fig. 1638).



Fig 1638

PICT-5626

7. Disconnect the two wires (black and orange) from the fuel sending unit located on the top of the fuel tank (Fig. 1639).



Fig 1639

PICT-4262

8. Mark the suction fuel line and tank fitting with an "S" and the return fuel line and tank fitting with an "R" (Fig. 1640):
S - Fuel suction line
R - Fuel return line



Fig 1640

PICT-4263

9. Slide the 2 fuel hose clamps down the fuel line away from the fuel tank fittings (Fig. 1641).



Fig 1641

PICT-4264

10. Slide the 2 fuel lines off the fuel tank fittings. Remove the fuel tank. (Fig. 1642).



Fig 1642

PICT-4265

11. Using a 1/2" socket and wrench, remove the bolt, washer and nut securing the battery clamp and battery guard to the frame. Remove the battery clamp (Fig. 1643).



Fig 1643

PICT-4310a

12. Slide the battery partially out of the battery mount. Disconnect the negative battery cable from the battery. Slide the battery out to access the positive battery cable terminal. Disconnect the positive battery cable and remove the battery and battery guard from the battery mount (Fig. 1644).



Fig 1644

PICT-4312a

13. Using two 7/16" sockets, remove the 2 bolts and nuts holding the right hand brake plate to the brake mounting bracket (the socket/ratchet on the nut should have a long handle) (Fig. 1645).



Fig 1645

PICT-4320

BRAKES

14. Using two 7/16" sockets, remove the 2 bolts and nuts holding the left hand brake plate to the brake mounting bracket (the socket/ratchet on the bolt head should be 1/4" drive to clear the oil pan) (Fig. 1646).



Fig 1646

PICT-4325

16. Position the brake handle in the ON position.

17. Using a 3/8" socket, remove the 4 bolts that secure the top right panel to the control panel assembly (Fig. 1648).



Fig 1648

PICT-4268

15. Push the 2 brake plates outward toward the drive wheels (Fig. 1647).

Note: The drive wheels may have to rotate to permit the brake plates to extend fully outward.



Fig 1647

PICT-4327

18. Remove the right panel from the control panel assembly (Fig. 1649).



Fig 1649

PICT-4269

BRAKES

19. Using a 1/2" wrench, loosen the bottom nut on the brake cable (Fig. 1650).



Fig 1650

PICT-4272

21. Using a 9/16" socket and wrench, remove the nut from the shoulder bolt securing the brake handle to the brake switch support bracket (Fig. 1652).



Fig 1652

PICT-4284

20. Slide the rubber boot up the brake cable and unthread the top nut (Fig. 1651).



Fig 1651

PICT-4283

22. Remove the brake handle, shoulder bolt and 2 spring washers. (Fig. 1653).



Fig 1653

PICT-4285

BRAKES

23. Remove the cotter pin from the clevis pin that secures the brake cable to the brake handle (Fig. 1654).



Fig 1654

PICT-4286

25. Pull down on the brake cable and slide the threaded portion of the brake cable assembly out of the slot (Fig. 1656).



Fig 1656

PICT-4289

24. Support the brake handle and remove the clevis pin. Remove the brake handle (Fig. 1655).



Fig 1655

PICT-4288a

26. Pull the brake cable down through the hydraulic lines (Fig. 1657).



Fig 1657

PICT-4292a

27. Route the brake cable out of the frame and remove the brake assembly from the machine (Fig. 1658).

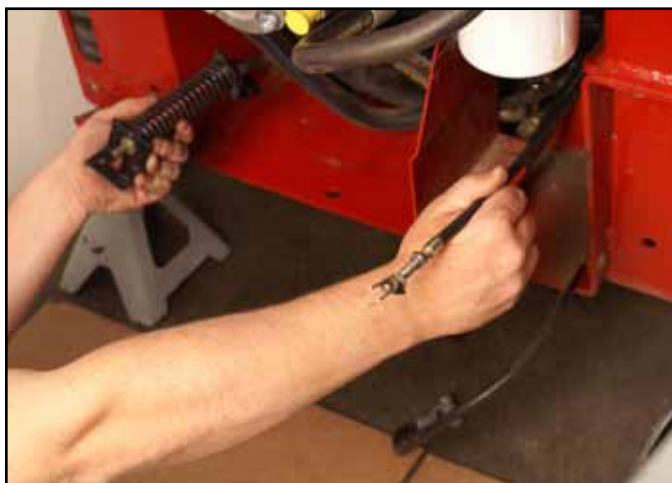


Fig 1658

PICT-4328

3. Slide the spring back to expose the tube guide and set screw. Hold the spring back by placing the spring in the slot on the tube guide (Fig. 1660).



Fig 1660

PICT-1697a

Brake Cable Replacement 270000100 - 270000999

1. Remove the brake assembly from the frame. Refer to "Brake Assembly Removal 270000100 - 270000999" on page 8-1.
2. Remove the convoluted tube from the brake cable (Fig. 1659).



Fig 1659

PICT-4299a

4. Using a 3/32" hex wrench, loosen the set screw that secures the tube guide to the brake cable assembly (Fig. 1661).



Fig 1661

PICT-1699a

BRAKES

5. Slide the tube guide away from the bracket (Fig. 1662).



Fig 1662

PICT-1700a

7. Slide the spring off the brake cable (Fig. 1664).



Fig 1664

PICT-1702a

6. Remove the bracket from the brake cable (Fig. 1663).



Fig 1663

PICT-1701a

8. Using a 3/32" hex wrench, remove the set screw retaining the second tube guide to the brake cable (Fig. 1665).



Fig 1665

PICT-1703a

9. Remove the second bracket from the brake cable (Fig. 1666).

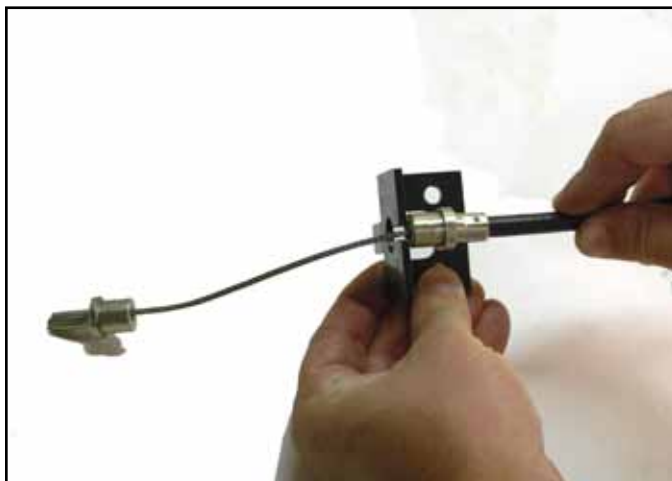


Fig 1666

PICT-1704a

11. Using a 3/32" hex wrench, tighten the tube guide set screw onto the brake cable so that the bracket is secure (Fig. 1668).

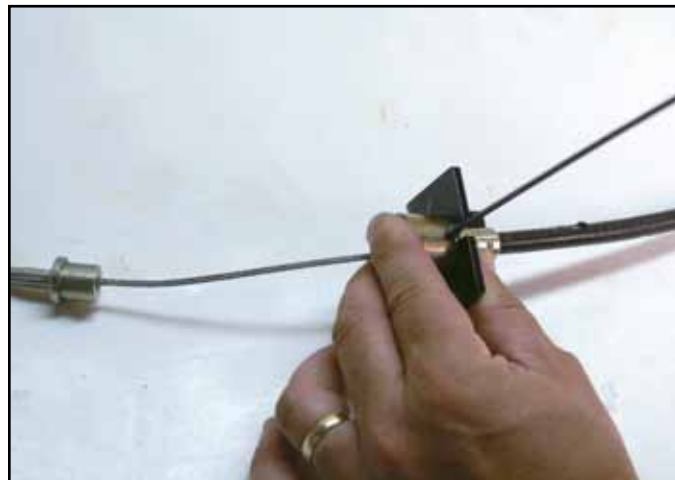


Fig 1668

PICT-1705a

10. Install a bracket and tube guide onto the new brake cable (Fig. 1667).

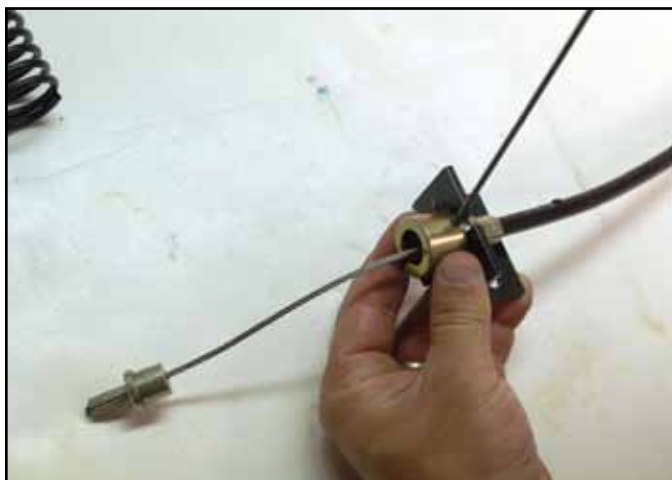


Fig 1667

PICT-1703a

12. Slide the spring onto the brake cable and up to the bracket (Fig. 1669).



Fig 1669

PICT-1706a

BRAKES

13. Slide the second bracket onto the brake cable (Fig. 1670).



Fig 1670

PICT-1707a

15. Using a 3/32" hex wrench, tighten the tube guide set screw onto the brake cable so that the bracket is secure (Fig. 1672).

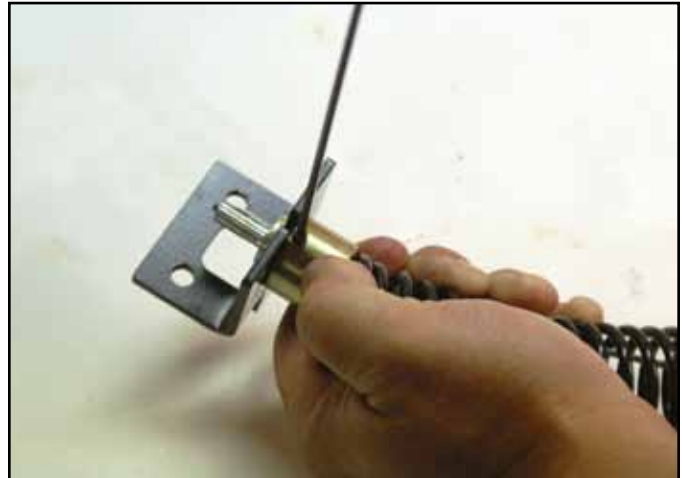


Fig 1672

PICT-1709a

14. Pull the spring back and install the tube guide onto the brake cable (Fig. 1671).

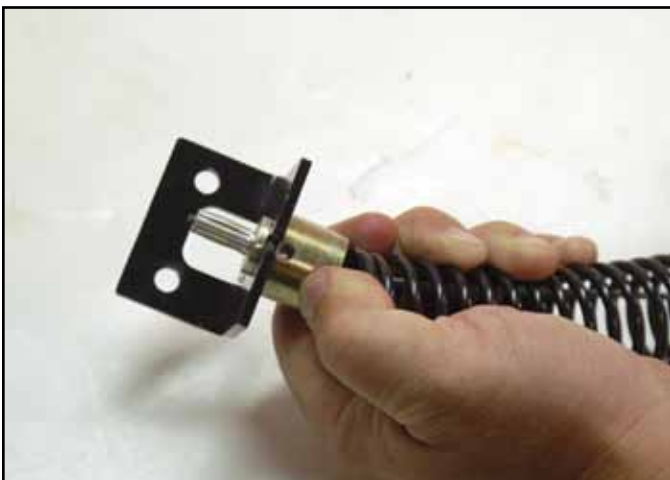


Fig 1671

PICT-1708a

16. Apply the convoluted tube to the brake cable and slide it up to the brake cable tube guide (Fig. 1673).



Fig 1673

PICT-4299a

Brake Assembly Installation 270000100 - 270000999

1. Route the brake cable as follows:

a. Through the frame brake bracket (Fig. 1674).



Fig 1674

PICT-4295

b. over the top of the negative battery cable

c. behind the hydraulic filter return line

d. between the hydraulic filter and the frame

2. Install the brake assembly into the frame so that the tabs on the two brake plate mounting brackets are pointing down (Fig. 1675).



Fig 1675

PICT-4300

3. Route the brake cable up through the hydraulic lines and into the control panel assembly (Fig. 1676).



Fig 1676

PICT-4292a

BRAKES

4. Secure the brake cable to the brake handle with a clevis pin. Install the cotter pin into the clevis pin (Fig. 1677).



Fig 1677

PICT-4304

6. Thread the upper nut onto the threaded portion of the brake cable down to the control panel slot (Fig. 1679).



Fig 1679

PICT-4306

5. Pull down on the cable and slide the threaded portion of the brake cable assembly into the slot in the control panel (Fig. 1678).



Fig 1678

PICT-4305

7. Install the shoulder bolt and 2 spring washers through the handle. (Fig. 1680).

Note: A spring washer is installed on each side of the brake handle.



Fig 1680

PICT-4307

8. Insert the shoulder bolt through the brake support bracket (Fig. 1681).



Fig 1681

PICT-4308

10. Position the right panel onto the control panel assembly (Fig. 1683).



Fig 1683

PICT-4269

9. Using a 9/16" socket and wrench, install the nut onto the shoulder bolt securing the brake handle to the brake support bracket (Fig. 1682).



Fig 1682

PICT-4309

11. Using a 3/8" socket, install 4 bolts securing the top right panel to the control panel assembly (Fig. 1684).



Fig 1684

PICT-4268

BRAKES

12. Position the brake handle in the OFF position.

Note: If the handle does not rest at the back of the OFF slot, the brake cable adjustment nuts should be threaded further onto the brake cable adjustment threads.

13. Push the 2 brake plates inward toward the brake plate mounting brackets (Fig. 1685).



Fig 1685

PICT-4327

14. Using two 7/16" sockets, install 2 bolts and nuts to secure the left hand brake plate to the brake mounting bracket (the socket/ratchet on the bolt head should be a 1/4" drive to clear the oil pan) (Fig. 1686).



Fig 1686

PICT-4325

15. Using two 7/16" sockets, install 2 bolts and nuts to secure the right hand brake plate to the brake mounting bracket (the socket/ratchet on the nut should have a long handle) (Fig. 1687).



Fig 1687

PICT-4320a

16. Check the placement of the brake plates. Each brake plate should be flush with the frame (Fig. 1688).



Fig 1688

PICT-4332

17. Tighten the two jam nuts. Slide the rubber boot over the end of the brake cable adjustment threads (Fig. 1690).



Fig 1690

PICT-4340

Note: If the brake plates extend out past the frame, the brake cable adjustment nuts should be adjusted upward on the brake cable adjustment threads (Fig. 1689).



Fig 1689

PICT-4340

18. Slide the battery partially into the battery mount. Install the positive battery cable to the positive battery terminal. Slide the battery farther into the battery mount. Install the negative battery cable to the negative battery terminal. Slide the battery guard in between the battery and the frame so that the hole in the guard lines up with the battery clamp mounting hole in the frame (Fig. 1691).



Fig 1691

PICT-4330

BRAKES

19. Position the battery clamp into the slot on the battery mount and line up the mounting hole with the hole in the frame. Using a 1/2" socket and wrench, install a bolt, washer and nut to secure the battery clamp to the frame (Fig. 1692).



Fig 1692

PICT-4310a

20. Slide the 2 fuel lines onto the fuel tank fittings. Note the location markings (Fig. 1693).
S - Fuel suction line
R - Fuel return line



Fig 1693

PICT-4265

21. Position the 2 fuel hose clamps to secure the fuel lines to the fuel tank fittings (Fig. 1694).



Fig 1694

PICT-4264

22. Position the fuel tank into the rear end of the frame. Connect the two wires (black and orange) to the fuel sending unit located on the top of the fuel tank (Fig. 1695).

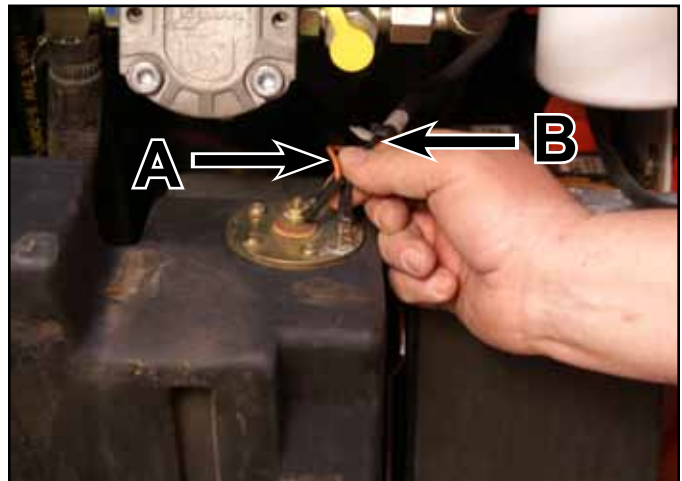


Fig 1695

PICT-4262

- A. Center terminal (orange wire)
B. Outside terminal (black wire)

23. Position the fuel tank bracket onto the fuel tank (Fig. 1696).



Fig 1696

PICT-5626

24. Position the rear frame cover to the rear end of the frame. Using 3/4" and 1/2" sockets, install 7 bolts and nuts to secure the rear frame cover to the frame and fuel tank bracket (Fig. 1697).

Note: The rear of the machine may have to be lifted to reposition the jack stands so that the rear frame cover can be installed.

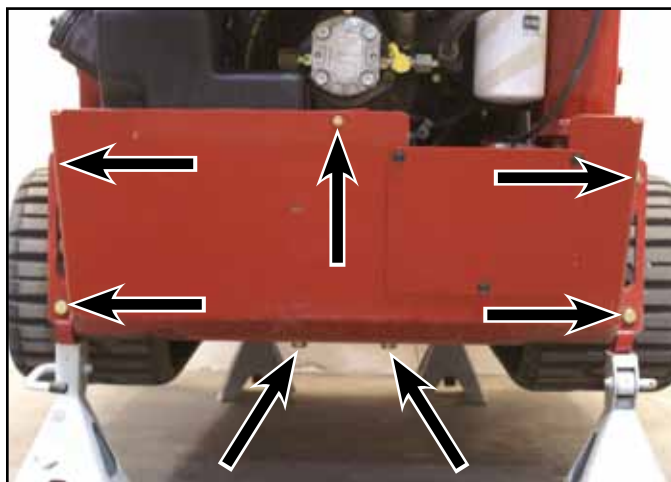


Fig 1697

PICT-4259

25. Position the left hand rear cover support panel to the tower. Using a 3/8" socket, install 3 screws to secure the left rear cover support panel to the tower assembly. Repeat to install right hand rear cover support panel (Fig. 1698).



Fig 1698

PICT-4256

26. Install the rear access panel (Fig. 1699).



Fig 1699

PICT-4505

27. Lower the machine.

BRAKES

Brake Assembly Removal 280000100 & higher

1. Raise the machine and set it on jack stands. Refer to "Lifting the Machine for Service" on page 7-1.
2. Place the brake handle in the "OFF" position.
3. Remove the rear access panel (Fig. 1700).



Fig 1700

PICT-4505

4. Using a 3/8" socket, remove the 6 screws that secure the left and right rear cover support panels to the tower assembly (3 screws per panel). Remove the panels (Fig. 1701).

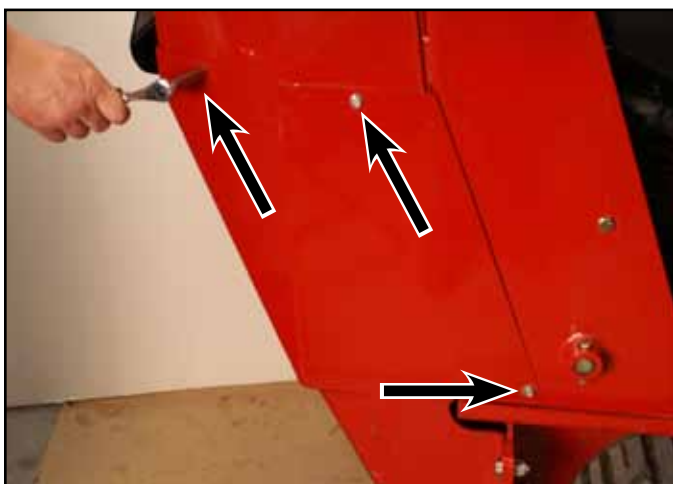


Fig 1701

PICT-4365a

5. Using 3/4" and 1/2" sockets, remove the 7 bolts and nuts securing the rear frame cover to the frame and fuel tank bracket. Remove the rear frame cover (Fig. 1702).

Note: The rear of the machine may have to be lifted to reposition the jack stands so that the rear frame cover can be removed.

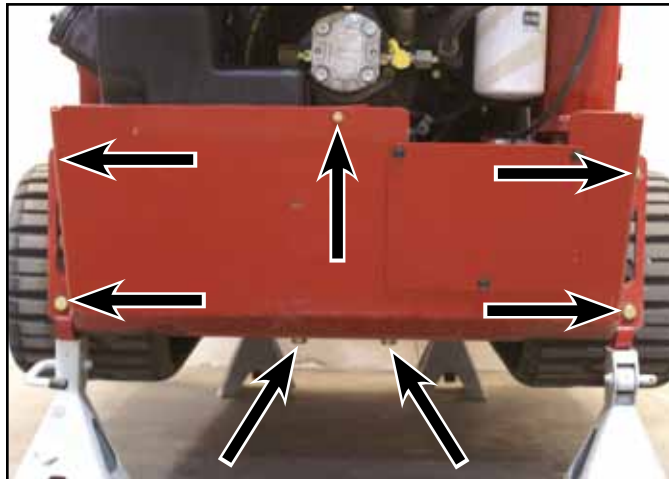


Fig 1702

PICT-4259

6. Remove the fuel tank bracket (Fig. 1703).



Fig 1703

PICT-5626

7. Disconnect the two wires (black and orange) from the fuel sending unit located on the top of the fuel tank (Fig. 1704).



Fig 1704

PICT-4262

8. Mark the suction fuel line and tank fitting with an "S" and the return fuel line and tank fitting with an "R" (Fig. 1705):
S - Fuel suction line
R - Fuel return line

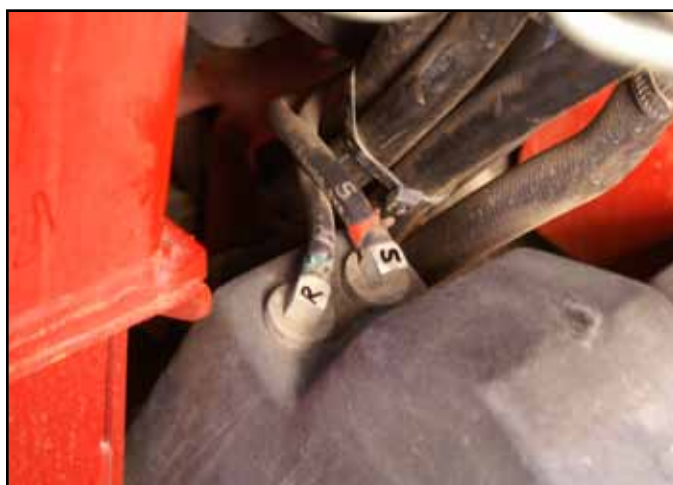


Fig 1705

PICT-4263

9. Slide the 2 fuel hose clamps down the fuel line away from the fuel tank fittings (Fig. 1706).



Fig 1706

PICT-4264

10. Slide the 2 fuel lines off the fuel tank fittings. Remove the fuel tank (Fig. 1707).



Fig 1707

PICT-4265

BRAKES

11. Using a 1/2" socket and wrench, remove the bolt, washer and nut securing the battery clamp to the frame. Remove the battery clamp (Fig. 1708).



Fig 1708

PICT-4310a

12. Slide the battery partially out of the battery mount. Disconnect the negative battery cable from the battery. Slide the battery out to access the positive battery cable terminal. Disconnect the positive battery cable. Remove the battery and battery guard from the battery mount (Fig. 1709).



Fig 1709

PICT-4312a

13. Remove the knob from the brake handle (Fig. 1710).



Fig 1710

PICT-4342

14. Using a 3/8" socket, remove the 3 self tapping screws that secure the right panel to the control panel assembly. Using a 3/8" socket and a 7/16" socket, remove the bolt and nut securing the lower left corner of the right panel to the control panel assembly (Fig. 1711).

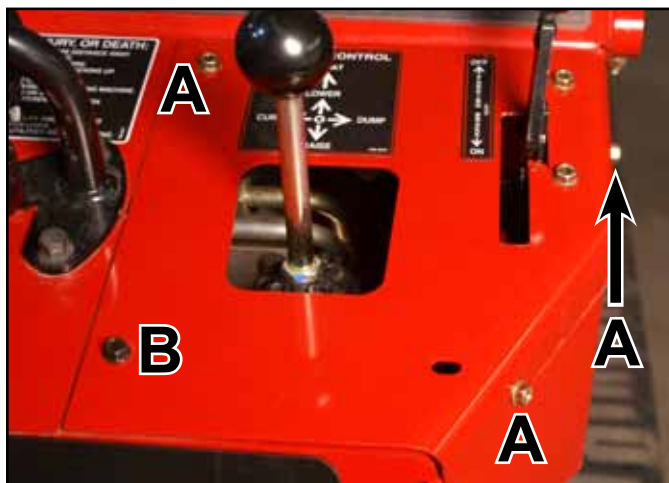


Fig 1711

PICT-4341

A. Self-tapping screw (3)

B. Bolt and nut

15. Remove the right panel from the control panel assembly (Fig. 1712).



Fig 1712

PICT-4343a

17. Support the brake handle and remove the clevis pin that retains the brake cable to the brake handle (Fig. 1714).



Fig 1714

PICT-4347

16. Remove the cotter pin from the clevis pin attaching the brake cable to the brake handle (Fig. 1713).



Fig 1713

PICT-4345

18. Using a 1/2" wrench, loosen the bottom nut on the brake cable (Fig. 1715).



Fig 1715

PICT-4348

BRAKES

19. Slide the rubber boot up onto the brake cable and remove the top nut from the threaded portion of the brake cable (Fig. 1716).



Fig 1716

PICT-4350

21. Pull the brake cable down through the hydraulic lines (Fig. 1718).



Fig 1718

PICT-4352a

20. Pull down on the cable and slide the threaded portion of the brake cable assembly out of the slot (Fig. 1717).



Fig 1717

PICT-4351

22. Using a 1/2" socket, remove the 2 bolts holding the right brake plate to the right brake mounting bracket (Fig. 1719).



Fig 1719

PICT-4355a

23. Using a 1/2" socket, remove the 2 bolts holding the left brake plate to the left brake mounting bracket (Fig. 1720).



Fig 1720

PICT-4365a

24. Push the 2 brake plates outward toward the drive wheels (Fig. 1721).

Note: The drive wheels may have to rotate to permit the brake plates to extend fully outward.



Fig 1721

PICT-4367

25. Using a 1/2" socket, remove the 2 bolts securing the brake bar support to the frame (Fig. 1722).



Fig 1722

PICT-4371

26. Remove the brake cable assembly from the machine (Fig. 1723).



Fig 1723

PICT-4373a

BRAKES

Brake Assembly (Fig. 1724)

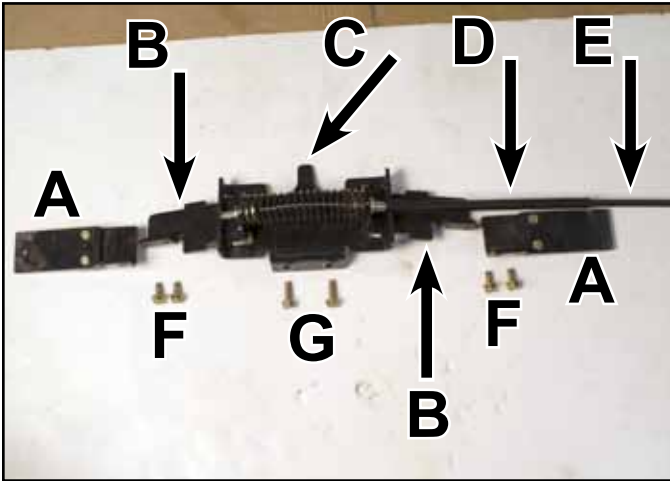


Fig 1724

PICT-4377a

- | | |
|--|---|
| A. Brake plate assembly (2) (included for photo purposes only) | D. Convoluted tube |
| B. Brake mounting bracket (2) | E. Brake cable assembly |
| C. Brake bar support | F. Brake plate mounting bolts (4) |
| | G. Brake bar support mounting bolts (2) |

Brake Cable Replacement 280000100 & higher

1. Remove the Brake Assembly from the machine. Refer to "Brake Assembly Removal 280000100 & higher" on page 8-18.
2. Remove the convoluted tube from the brake cable (Fig. 1725).



Fig 1725

PICT-4376a

3. Place the brake and cable assembly into a bench vise.
4. Using a 3/32" Allen wrench, loosen the set screws on both tube guides (Fig. 1726).



Fig 1726

IMG_7508a

6. Place the new cable through the right hand brake support bracket and place a tube guide (tube guide set screw toward the bracket side) over the cable and tighten tube guide set screw with 3/32" Allen wrench (Fig. 1728).

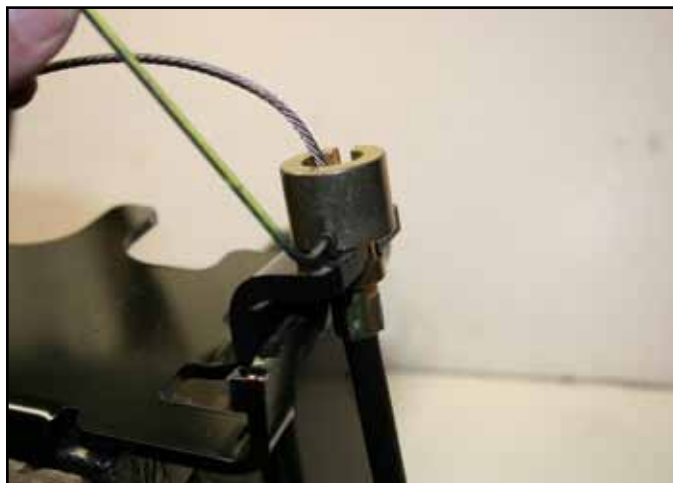


Fig 1728

IMG_7516

5. Support the spring and tube guides and remove the cable from the brake mounting bracket (Fig. 1727).



Fig 1727

IMG_7518

7. Slide the spring over the cable (Fig. 1729).



Fig 1729

IMG_7520

BRAKES

8. Place the cable end into the opening in the left hand brake mounting bracket. Pull back on the spring enough to allow the tube guide to be installed. Install the tube guide onto the cable end and tighten the set screw with 3/32" Allen wrench (Fig. 1730).

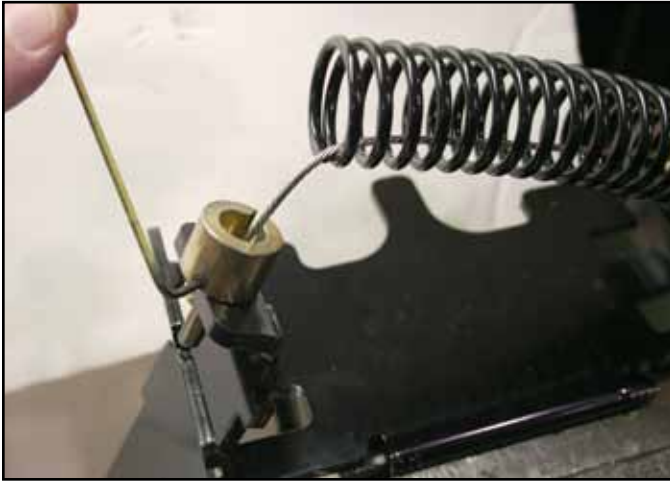


Fig 1730

IMG_7508a

9. Apply the convoluted tube to the brake cable. Butt the end of the convoluted tube up to the brake cable collar (Fig. 1731).



Fig 1731

PICT-4376a

10. Install the brake assembly. Refer to "Brake Assembly Installation", following.

Brake Assembly Installation 280000100 & higher

1. Route the brake cable into the machine as follows:
 - a. under the positive and negative battery cables
 - b. along the right side of the tower frame (eventually will be located between the battery guard and the tower frame)
 - c. up through the hydraulic lines and into the control panel
2. Position brake assembly onto the frame bracket. Using a 1/2" socket, install 2 bolts to secure the brake bar support to the frame (Fig. 1732).



Fig 1732

PICT-4371

3. Push the 2 brake plates inward so the brake plate brackets line up with the brake mounting brackets (Fig. 1733).



Fig 1733

PICT-4367

5. Using a 1/2" socket, install 2 bolts to secure the right brake plate bracket to the right brake mounting bracket (Fig. 1735).



Fig 1735

PICT-4355a

4. Using a 1/2" socket, install 2 bolts to secure the left brake plate bracket to the left brake mounting bracket (Fig. 1734).



Fig 1734

PICT-4365a

6. Secure the brake cable to the brake handle with a clevis pin. Install a cotter pin into the clevis pin (Fig. 1736).



Fig 1736

PICT-4438a

BRAKES

7. Pull down on the cable and slide the threaded portion of the brake cable assembly into the slot (Fig. 1737).



Fig 1737

PICT-4414

9. Slide the rubber boot down over the end of the threaded portion of the brake cable (Fig. 1739).



Fig 1739

PICT-4420

8. Thread the upper nut onto the threaded portion of the brake cable and tighten (Fig. 1738).



Fig 1738

PICT-4419a

10. Position the right panel onto the control panel assembly (Fig. 1740).



Fig 1740

PICT-4343a

11. Using a 3/8" socket, install 3 self-tapping screws that secure the right panel to the control panel assembly. Using a 3/8" socket and a 7/16" socket, install the bolt and nut securing the lower left corner of the right panel to the control panel assembly (Fig. 1741).

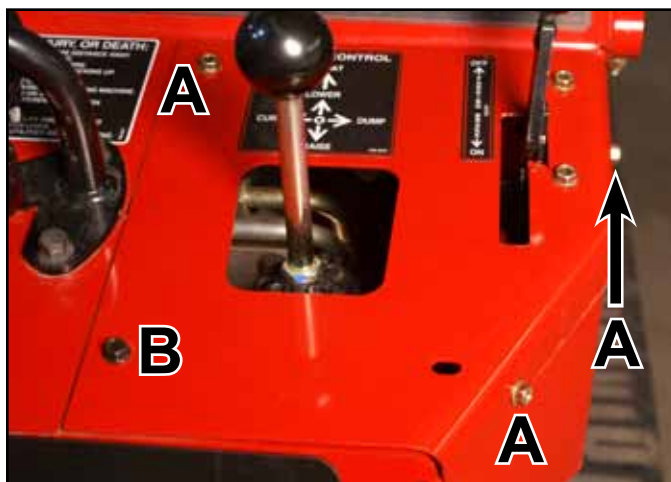


Fig 1741

PICT-4341

- A. Self-tapping screw (3) B. Bolt and nut

12. Apply thread locking compound (Loctite 416 or equivalent) to brake handle threads (Fig. 1742).



Fig 1742

PICT-5526

13. Install the knob onto the brake handle (Fig. 1743).



Fig 1743

PICT-4342

Note: If the brake plates extend out past the frame, the brake cable adjustment nuts should be adjusted upward on the brake cable adjustment threads (Fig. 1744).



Fig 1744

PICT-4340

BRAKES

14. Slide the battery partially into the battery mount. Install the positive battery cable to the positive battery terminal. Slide the battery farther into the battery mount. Install the negative battery cable to the negative battery terminal. Slide the battery guard in between the battery and the frame so that the hole in the guard lines up with the battery clamp mounting hole in the frame (Fig. 1745).



Fig 1745

PICT-4330

15. Position the battery clamp into the slot on the battery mount and line up the mounting hole with the hole in the frame. Using a 1/2" socket and wrench, install a bolt, washer and nut to secure the battery clamp to the frame (Fig. 1746).



Fig 1746

PICT-4310a

16. Slide the 2 fuel lines onto the fuel tank fittings. Note the location markings (Fig. 1747).
S - Fuel suction line
R - Fuel return line



Fig 1747

PICT-4265

17. Position the 2 fuel hose clamps to secure the fuel lines to the fuel tank fittings (Fig. 1748).



Fig 1748

PICT-4264

18. Position the fuel tank into the rear end of the frame. Connect the two wires (black and orange) to the fuel sending unit located on the top of the fuel tank (Fig. 1749).

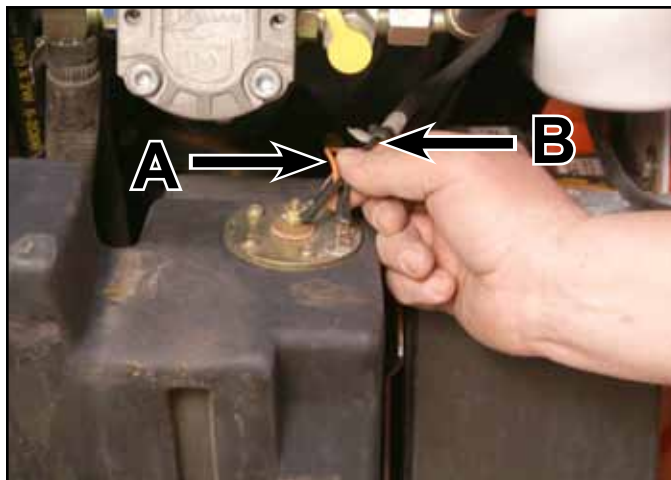


Fig 1749

PICT-4262a

- A. Center terminal (orange wire)
B. Outside terminal (black wire)

20. Position the rear frame cover to the rear end of the frame. Using 3/4" and 1/2" sockets, install 7 bolts and nuts to secure the rear frame cover to the frame and fuel tank bracket (Fig. 1751).

Note: The rear of the machine may have to be lifted to reposition the jack stands so that the rear frame cover can be installed.

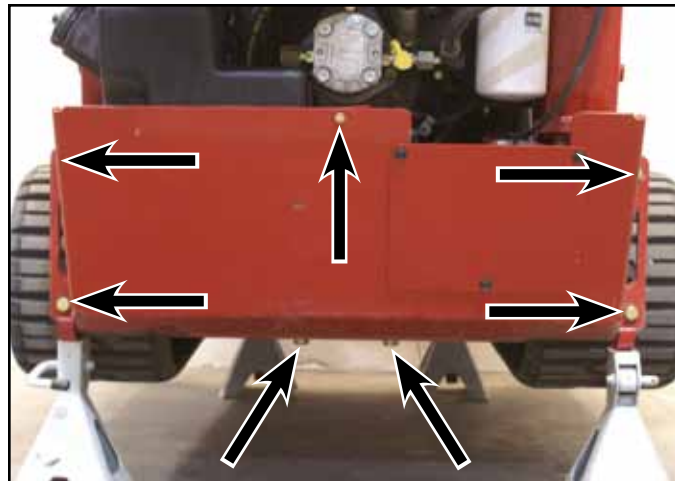


Fig 1751

PICT-4259

19. Position the fuel tank bracket onto the fuel tank (Fig. 1750).



Fig 1750

PICT-5626

BRAKES

21. Position the left hand rear cover support panel to the tower. Using a 3/8" socket, install 3 screws to secure the left rear cover support panel to the tower assembly. Repeat to install right hand rear cover support panel (Fig. 1752).

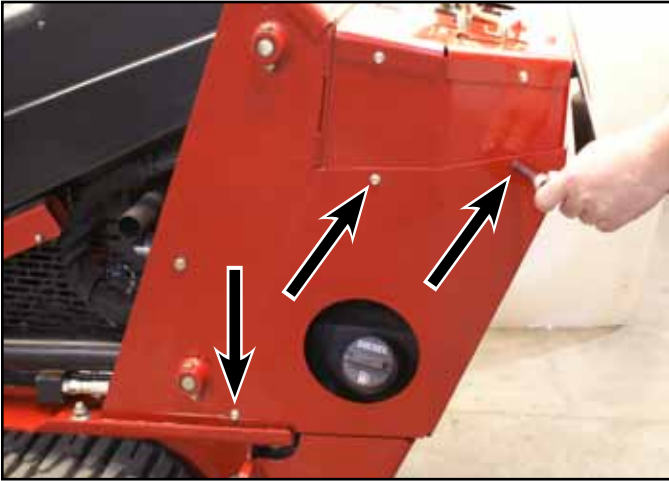


Fig 1752

PICT-4256

22. Install the rear access panel (Fig. 1753).



Fig 1753

PICT-4505

23. Lower the machine.

Brake Plate Replacement 280000100 & higher

The following procedures show removal and installation of the left hand brake plate assembly. The procedure is the same for removal and install of the right hand brake plate assembly.

Brake Plate Removal

1. Raise the machine and set it on jack stands. Refer to "Lifting the Machine for Service" on page 7-1.
2. Place the brake handle in the "OFF" position.
3. Remove the rear access panel (Fig. 1754).



Fig 1754

PICT-4505

4. Using a 3/8" socket, remove the 6 screws that secure the left and right rear cover support panels to the tower assembly (3 screws per panel). Remove the panels (Fig. 1755).

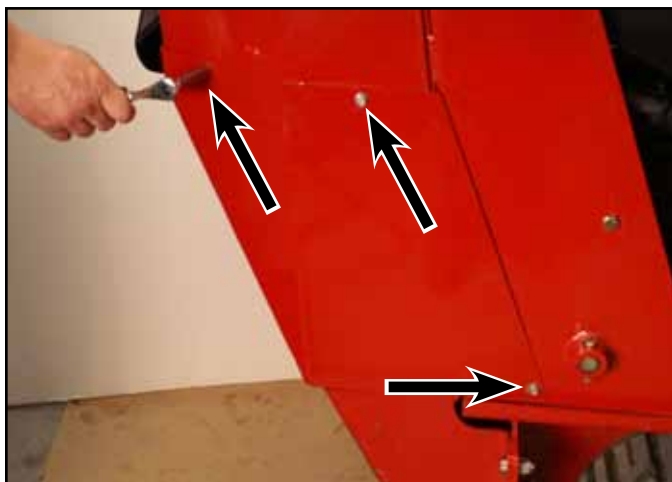


Fig 1755

PICT-4504

5. Using 3/4" and 1/2" sockets, remove the 7 bolts and nuts securing the rear frame cover to the frame and fuel tank bracket. Remove the rear frame cover (Fig. 1756).

Note: The rear of the machine may have to be lifted to reposition the jack stands so that the rear frame cover can be removed.

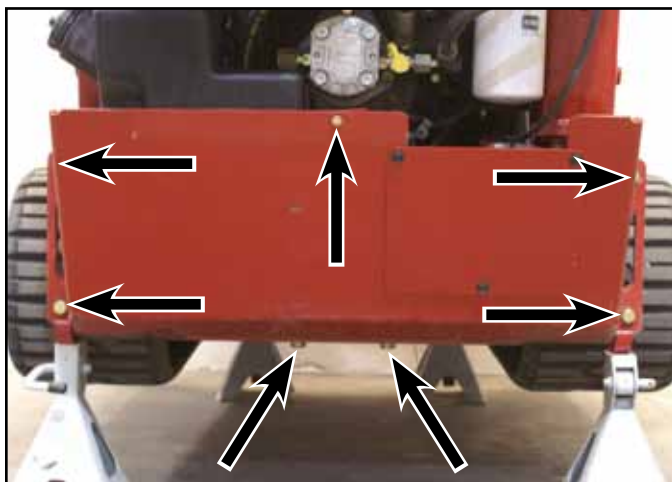


Fig 1756

PICT-4259

6. Remove the fuel tank bracket (Fig. 1757).



Fig 1757

PICT-5626

7. Disconnect the two wires (black and orange) from the fuel sending unit located on the top of the fuel tank (Fig. 1758).



Fig 1758

PICT-4262

BRAKES

8. Mark the suction fuel line and tank fitting with an "S" and the return fuel line and tank fitting with an "R" (Fig. 1759):
S - Fuel suction line
R - Fuel return line



Fig 1759

PICT-4263

9. Slide the 2 fuel hose clamps down the fuel line away from the fuel tank fittings (Fig. 1760).



Fig 1760

PICT-4264

10. Slide the 2 fuel lines off the fuel tank fittings. Remove the fuel tank (Fig. 1761).



Fig 1761

PICT-4265

11. Using a 1/2" socket and wrench, remove the bolt, washer and nut securing the battery clamp to the frame. Remove the battery clamp (Fig. 1762).



Fig 1762

PICT-4310a

12. Slide the battery partially out of the battery mount. Disconnect the negative battery cable from the battery. Slide the battery out to access the positive battery cable terminal. Disconnect the positive battery cable. Remove the battery and battery guard from the battery mount (Fig. 1763).



Fig 1763

PICT-4312a

13. Using a 1/2" socket, remove the 2 bolts holding the brake plate to the brake mounting bracket (Fig. 1764).



Fig 1764

PICT-4365a

14. Push the brake plate outward toward the drive wheel (Fig. 1765).



Fig 1765

PICT-4367

15. With the brake handle in the off position, slide the brake plate assembly out of the frame (Fig. 1766).



Fig 1766

PICT-4387a

BRAKES

16. Using a 7/16" socket and wrench, remove the 2 bolts and nuts securing the brake plate to the brake link bar (Fig. 1767).



Fig 1767

PICT-4379a

Brake Plate Installation

1. Align the brake plate with the brake link bar. Using a 7/16" socket and wrench, install 2 bolts and nuts securing the brake plate to the brake link bar (Fig. 1769).



Fig 1769

PICT-4379a

Brake Plate Assembly (Fig. 1768)

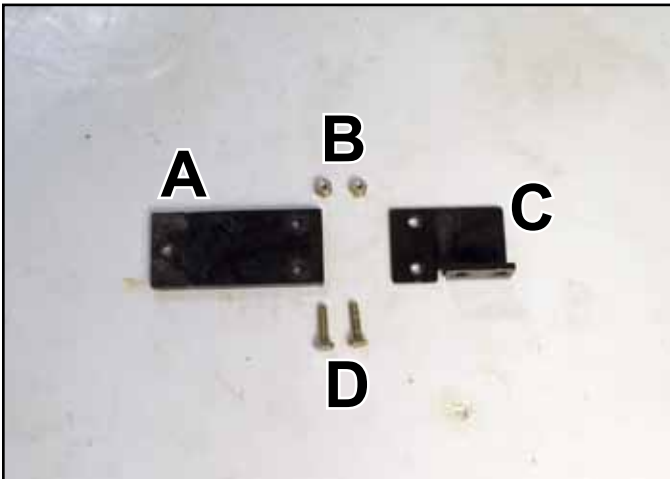


Fig 1768

PICT-4380a

- | | |
|----------------|-------------------|
| A. Brake Plate | C. Brake link bar |
| B. Nut (2) | D. Bolt (2) |



Fig 1770

PICT-4387a

3. Push the brake plate inward aligning the brake link bar with the brake mounting bracket (Fig. 1771).



Fig 1771

PICT-4367

4. Using a 1/2" socket, install 2 bolts to secure the brake plate to the brake mounting bracket (Fig. 1772).



Fig 1772

PICT-4365a

5. Slide the battery partially into the battery mount. Install the positive battery cable to the positive battery terminal. Slide the battery farther into the battery mount. Install the negative battery cable to the negative battery terminal. Slide the battery guard in between the battery and the frame so that the hole in the guard lines up with the battery clamp mounting hole in the frame (Fig. 1773).



Fig 1773

PICT-4330

6. Position the battery clamp into the slot on the battery mount and line up the mounting hole with the hole in the frame. Using a 1/2" socket and wrench, install a bolt, washer and nut to secure the battery clamp to the frame (Fig. 1774).



Fig 1774

PICT-4310a

BRAKES

7. Slide the 2 fuel lines onto the fuel tank fittings. Note the location markings (Fig. 1775).
S - Fuel suction line
R - Fuel return line



Fig 1775

PICT-4265

9. Position the fuel tank into the rear end of the frame. Connect the two wires (black and orange) to the fuel sending unit located on the top of the fuel tank (Fig. 1777).

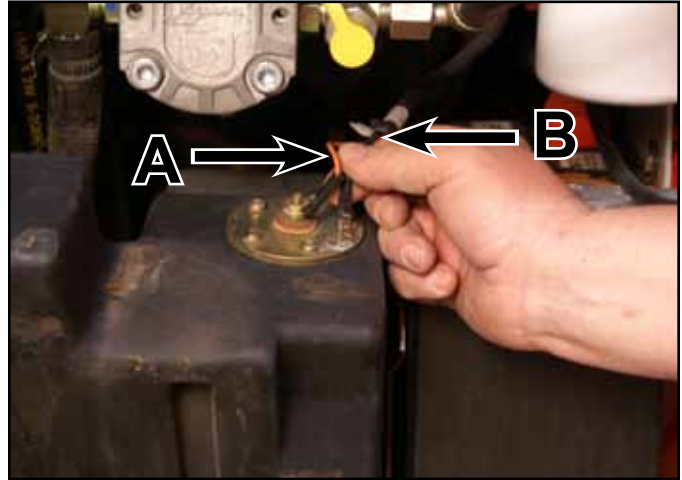


Fig 1777

PICT-4262

8. Position the 2 fuel hose clamps to secure the fuel lines to the fuel tank fittings (Fig. 1776).



Fig 1776

PICT-4264

10. Position the fuel tank bracket onto the fuel tank (Fig. 1778).



Fig 1778

PICT-5626

11. Position the rear frame cover to the rear end of the frame. Using 3/4" and 1/2" sockets, install 7 bolts and nuts to secure the rear frame cover to the frame and fuel tank bracket (Fig. 1779).

Note: The rear of the machine may have to be lifted to reposition the jack stands so that the rear frame cover can be installed.

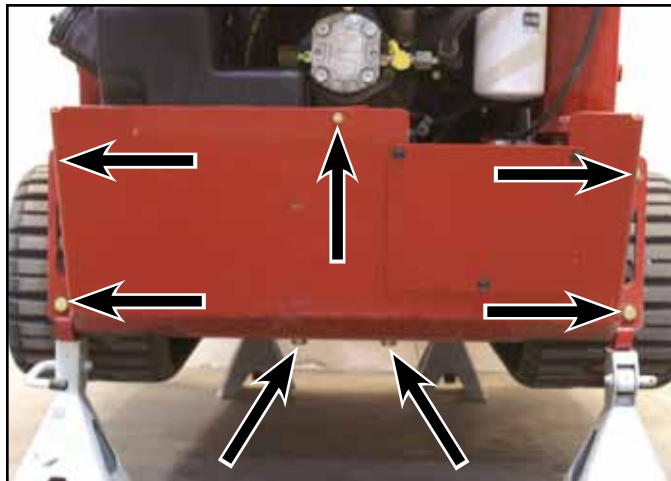


Fig 1779

PICT-4259

12. Position the left hand rear cover support panel to the tower. Using a 3/8" socket, install 3 screws to secure the left rear cover support panel to the tower assembly. Repeat to install right hand rear cover support panel (Fig. 1780).



Fig 1780

PICT-4256

13. Install the rear access panel (Fig. 1781).



Fig 1781

PICT-4505

14. Lower the machine.

BRAKES

Brake Handle Spring Bracket Assembly Replacement 280000100 & higher

Note: 2007 models have a brake switch located in the brake handle support bracket inside the control panel. 2008 and later models do not have a brake switch located in the brake handle support bracket inside the control panel. The following procedure was performed on a 2008 model (no switch).

Brake Handle Spring Bracket Assembly Removal

1. Remove the rear access panel (Fig. 1782).



Fig 1782

PICT-4505a

2. Remove the right hand side support panel (Fig. 1783).

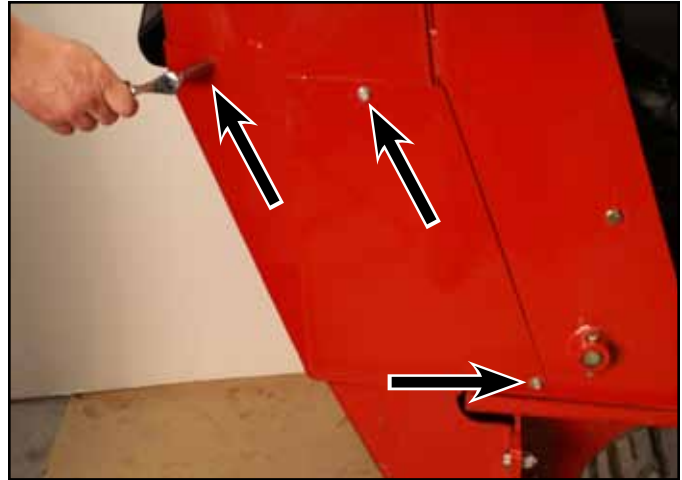


Fig 1783

PICT-4504

3. Remove the knob from the brake handle (Fig. 1784).



Fig 1784

PICT-4342

4. Using a 3/8" socket, remove the 3 self-tapping screws that secure the top right panel to the control panel assembly. Using a 3/8" socket and a 7/16" socket, remove the bolt and nut securing the lower left corner of the top right panel to the control panel assembly (Fig. 1785).

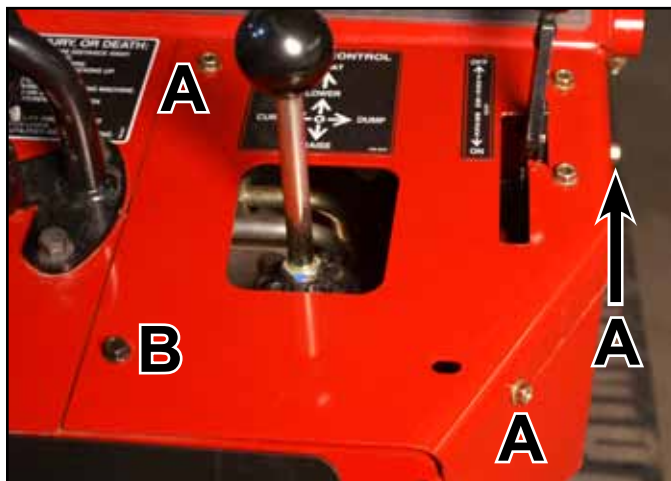


Fig 1785

PICT-4341

- A. Self-tapping screw (3) B. Bolt and nut

5. Remove the right panel from the control panel assembly (Fig. 1786).



Fig 1786

PICT-4343a

6. Remove the cotter pin from the clevis pin attaching the brake cable to the brake handle (Fig. 1787).



Fig 1787

PICT-4345

7. Support the brake handle and remove the clevis pin that retains the brake cable to the brake handle (Fig. 1788).



Fig 1788

PICT-4347

BRAKES

8. Slide the rubber boot up off the threaded end of the brake cable. Loosen the lower nut securing the brake cable to the spring bracket (Fig. 1789).



Fig 1789

PICT-4390

10. Using a 9/16" wrench and socket, remove the nut from the bolt securing the spring bracket assembly to the inside of the control panel (Fig. 1791).



Fig 1791

PICT-4393

9. Remove the top nut from the threaded portion of the brake cable and remove the brake cable from the spring bracket (Fig. 1790).

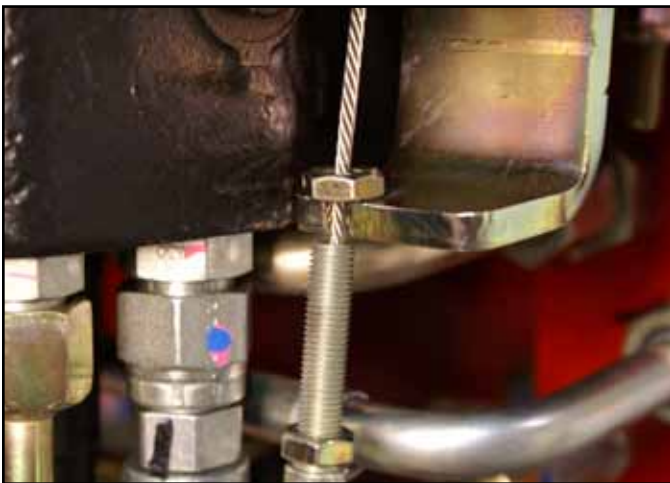


Fig 1790

PICT-4414

11. Remove the bolt, washer, and spring from the spring bracket (Fig. 1792).



Fig 1792

PICT-4394

12. Remove the spacer from the spring bracket (Fig. 1793).



Fig 1793

PICT-4395

13. Remove the spring bracket (Fig. 1794).



Fig 1794

PICT-4397

Brake Handle Spring Bracket Assembly Installation

Brake Handle Spring Bracket Assembly (Fig. 1795)

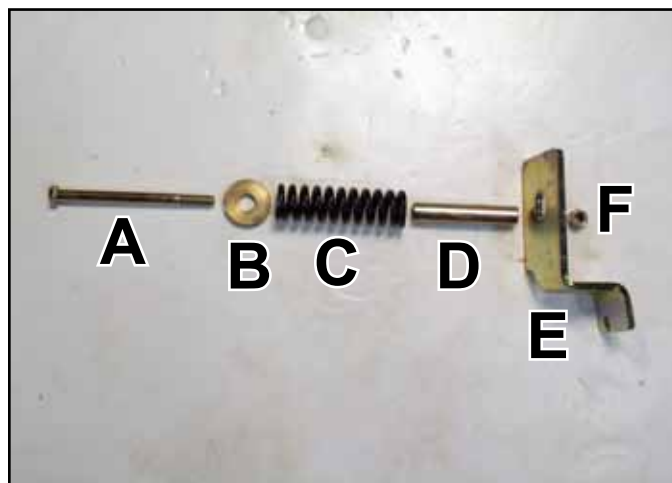


Fig 1795

PICT-4398a

- | | |
|-----------|-------------------|
| A. Bolt | D. Spacer |
| B. Washer | E. Spring Bracket |
| C. Spring | F. Nut |

1. Position the spring bracket into the control panel (Fig. 1796).



Fig 1796

PICT-4401

BRAKES

2. Position the spacer with the lower end placed inside the spring bracket slot (Fig. 1797).



Fig 1797

PICT-4409

4. With the washer on the bolt, install the bolt into the spacer and through the control panel bracket (Fig. 1799).



Fig 1799

PICT-4411

3. Slide the spring down over the spacer (Fig. 1798).



Fig 1798

PICT-4408

5. Using a 9/16" wrench and socket, install a nut onto the bolt securing the spring bracket assembly to the inside of the control panel (Fig. 1800).



Fig 1800

PICT-4393

Note: There should be approximately 3/4" (1.9cm) of exposed thread past the nut (Fig. 1801).



Fig 1801

PICT-4413

7. Slide the rubber boot onto the threaded portion of the brake cable (Fig. 1803).



Fig 1803

PICT-4420

6. Slide the threaded portion of the brake cable into the slot of the spring bracket so that the bottom nut is on the underside of the bracket. Thread the top nut onto the brake cable and tighten (Fig. 1802).



Fig 1802

PICT-4419a

8. Support the brake handle, align the brake cable retainer with the brake handle and install a clevis pin (Fig. 1804).



Fig 1804

PICT-4421

BRAKES

9. Install a cotter pin into the clevis pin attaching the brake cable to the brake handle (Fig. 1805).



Fig 1805

PICT-4422

10. Position the top right panel onto the control panel assembly (Fig. 1806).



Fig 1806

PICT-4343a

11. Using a 3/8" socket, install 3 self-tapping screws that secure the top right panel to the control panel assembly. Using a 3/8" socket and a 7/16" socket, install the bolt and nut securing the lower left corner of the top right panel to the control panel assembly (Fig. 1807).

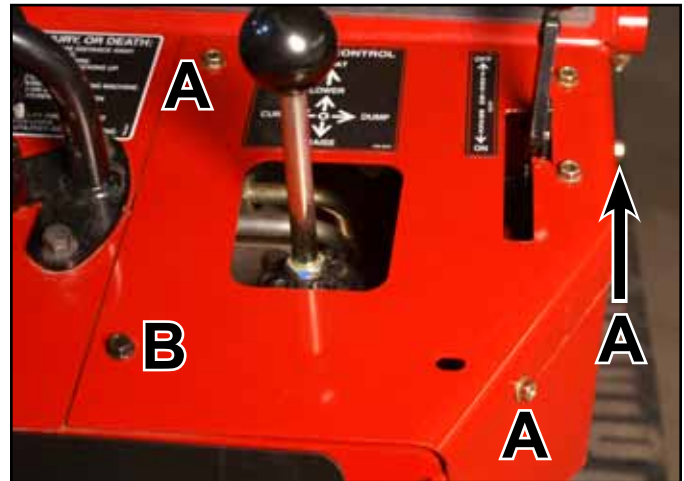


Fig 1807

PICT-4341

- A. Self-tapping screw (3) B. Bolt and nut

12. Apply thread locking compound (Loctite 416 or equivalent) to brake handle threads (Fig. 1808).



Fig 1808

PICT-5526

13. Install the knob onto the brake handle (Fig. 1809).



Fig 1809

PICT-4342

14. Position the right hand side support bracket. Using a 3/8" socket, install 3 self-tapping screws to secure (Fig. 1811).

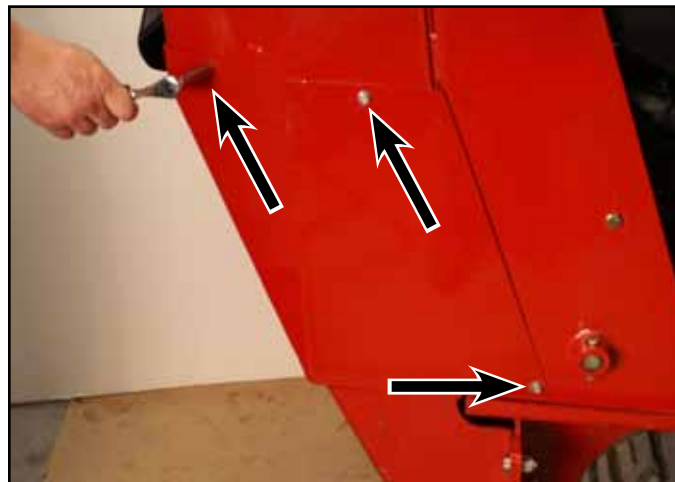


Fig 1811

PICT-4504

Note: If the brake plates extend out past the frame, the brake cable adjustment nuts should be adjusted upward on the brake cable adjustment threads (Fig. 1810).



Fig 1810

PICT-4340

15. Install the rear access panel (Fig. 1812).



Fig 1812

PICT-4505a

BRAKES

Brake Handle Replacement

Note: 2007 models have a brake switch located in the brake handle support bracket inside the control panel. 2008 and later models do not have a brake switch located in the brake handle support bracket inside the control panel. The following procedure was performed on a 2008 model (no switch).

Brake Handle Removal

1. Remove the rear access panel (Fig. 1813).



Fig 1813

PICT-4505a

2. Remove the knob from the brake handle (Fig. 1814).



Fig 1814

PICT-4342

3. Using a 3/8" socket, remove the 3 self tapping screws that secure the top right panel to the control panel assembly. Using a 3/8" socket and a 7/16" socket, remove the bolt and nut securing the lower left corner of the top right panel to the control panel assembly (Fig. 1815).

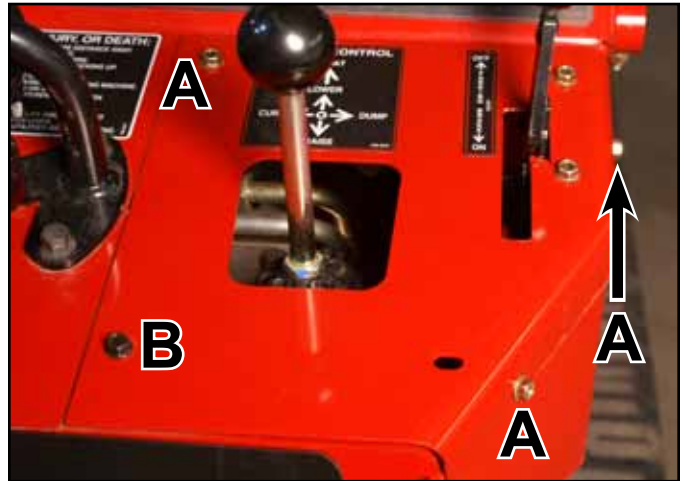


Fig 1815

PICT-4341

- A. Self-tapping screw (3) B. Bolt and nut

4. Remove the right panel from the control panel assembly (Fig. 1816).



Fig 1816

PICT-4343a

6. Support the brake handle and remove the clevis pin that retains the brake cable to the brake handle (Fig. 1818).



Fig 1818

PICT-4425

5. Remove the cotter pin from the clevis pin attaching the brake cable to the brake handle (Fig. 1817).



Fig 1817

PICT-4424

7. Using a 9/16" socket and wrench, remove the nut from the shoulder bolt securing the brake handle to the control panel bracket (Fig. 1819).



Fig 1819

PICT-4426a

BRAKES

8. Remove the bolt, bushing, brake handle and leaf spring (Fig. 1820).

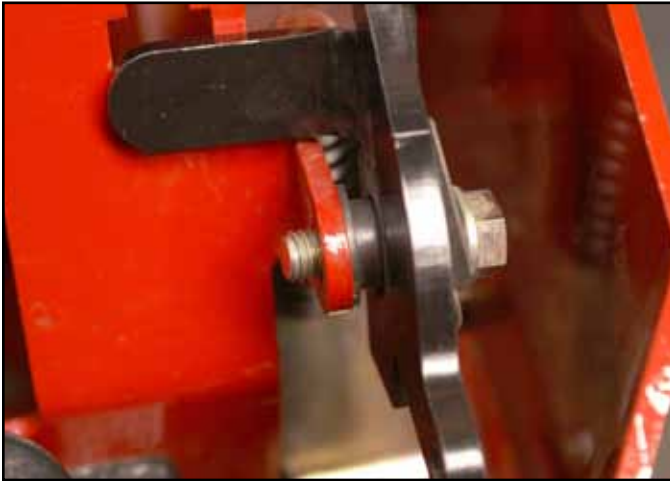


Fig 1820

PICT-4428a

- d. Replace the leaf spring if there is an air gap between the center portion of the spring and the straight edge (Fig. 1822).

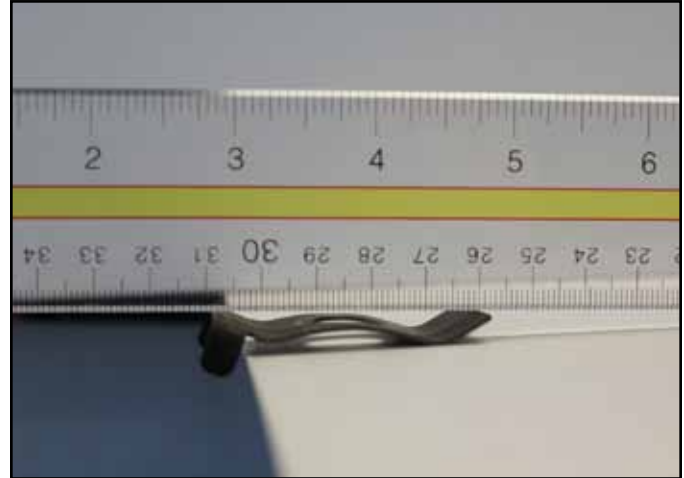


Fig 1822

PICT-2155

9. Inspect the leaf spring and bushing:

Leaf Spring

- a. Lay the leaf spring on a flat surface.
- b. Place a straight edge across the spring through the center of the bolt hole.
- c. The center portion of the leaf spring must be even with or slightly above the bottom edge of the straight edge (Fig. 1821).

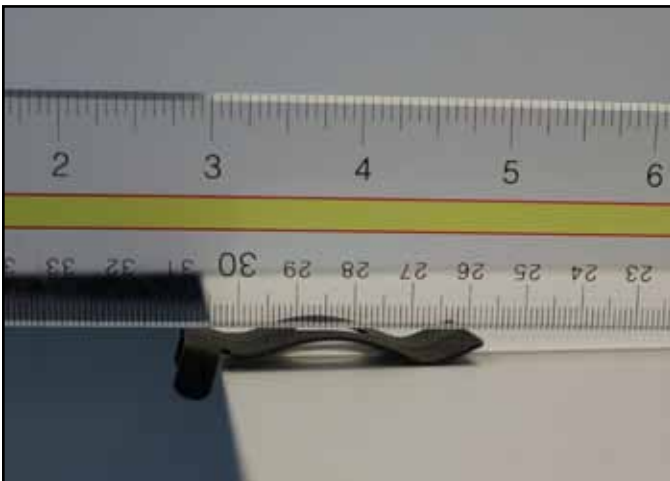


Fig 1821

PICT-2156

Bushing

Inspect the bushing OD and ID and the hole in the handle where the bushing mounts. If worn or out of round, replace (Fig. 1823).



Fig 1823

PICT-4431a

Brake Handle Installation

Brake Handle Assembly (Fig. 1824)

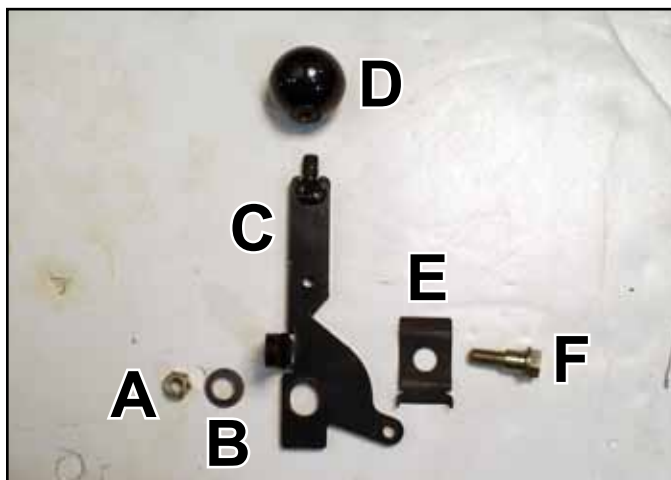


Fig 1824

PICT-4429a

- | | |
|------------|------------------|
| A. Nut | D. Knob |
| B. Bushing | E. Leaf spring |
| C. Handle | F. Shoulder bolt |

1. Slide the leaf spring onto the shoulder bolt (Fig. 1825).



Fig 1825

PICT-4433a

2. Slide the brake handle onto the bolt/leaf spring. Position the leaf spring onto the handle as shown (Fig. 1826):



Fig 1826

PICT-4434a

3. Install the bushing over the bolt and into the handle (Fig. 1827).



Fig 1827

PICT-4435

BRAKES

4. Install the brake handle assembly into the control panel bracket (Fig. 1828).



Fig 1828

PICT-4428a

6. Support the brake handle and install a clevis pin securing the brake cable to the brake handle (Fig. 1830).



Fig 1830

PICT-4425

5. Using a 9/16" socket and wrench, install a nut onto the shoulder bolt (Fig. 1829).



Fig 1829

PICT-4426a

7. Install a cotter pin onto the clevis pin (Fig. 1831).



Fig 1831

PICT-4424

8. Position the right panel onto the control panel assembly (Fig. 1832).



Fig 1832

PICT-4343a

10. Apply thread locking compound (Loctite 416 or equivalent) to brake handle threads (Fig. 1834).



Fig 1834

PICT-5526

9. Using a 3/8" socket, install 3 self-tapping screws securing the top right panel to the control panel assembly. Using a 3/8" socket and a 7/16" socket, install the bolt and nut securing the lower left corner of the top right panel to the control panel assembly (Fig. 1833).

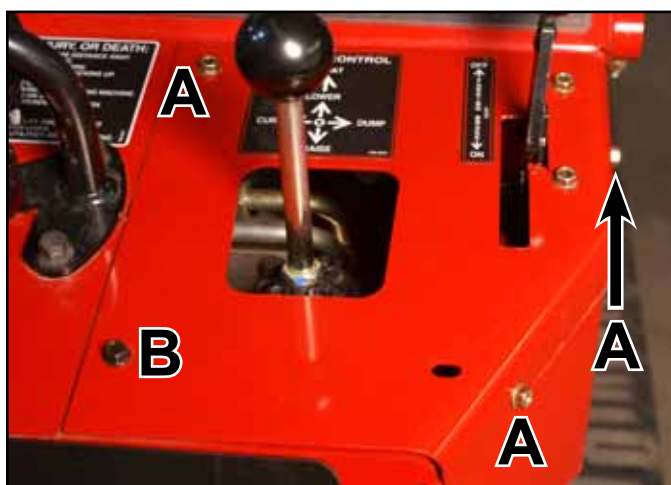


Fig 1833

PICT-4341

- A. Self-tapping screw (3) B. Bolt and nut

11. Install the knob onto the brake handle (Fig. 1835).



Fig 1835

PICT-4342

BRAKES

12. Install the rear access panel (Fig. 1836).



Fig 1836

PICT-4505a

HYDRAULIC TESTING

TX525

Introduction

Due to the many types and manufacturers of test equipment, the test hoses and fittings needed will vary. Refer to the connection information at each hydraulic test location.

Test hose specifications must exceed maximum system flow and pressure and must be compatible with the type of fluid in the hydraulic system.

Flow Testing

The five components listed A, B, C, D and E are the primary testing locations for the TX models (Fig. 1837).

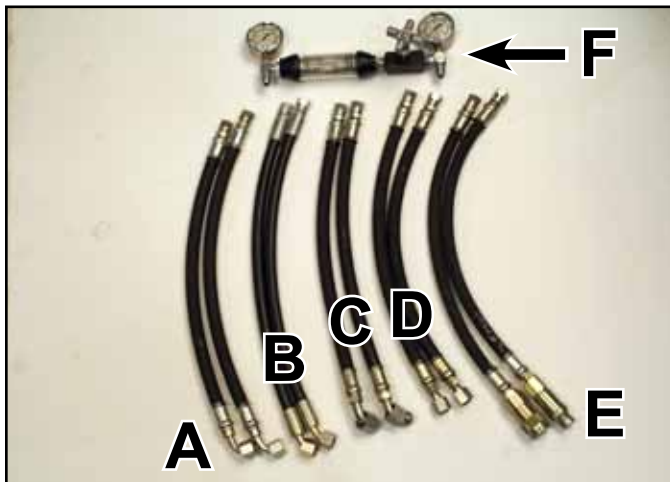


Fig 1837

PICT-4310a

- | | |
|---------------------------------------|-----------------------|
| A. 2-Spool loader valve - 90° fitting | C. LH Hydrostat |
| B. 2-Spool loader valve - 45° fitting | D. RH Hydrostat |
| | E. Flush face coupler |
| | F. Flow meter |

A. & B. 2-Spool Valve Hose Fitting and Coupler (Fig. 1838)

- Valve Hose Fitting - 13/16" - 16 ORFS 90° & 45°
- Valve Hose Fitting Coupler - 13/16" - 16 x 13/16" ORFS

Note: ORFS = O-ring Face Seal



Fig 1838

PICT-3521a

C. LH Drive Hydrostat Pump

Pump Fitting – 1" - 14 ORFS – 90° Female (Fig. 1839)



Fig 1839

DSC-0576a

HYDRAULIC TESTING

D. RH Drive Hydrostat Pump

Pump Fitting – 13/16” - 16 ORFS – Straight Female (Fig. 1840)



Fig 1840 DSC-0579a

E. Couplers

Coupler End – 7/8” - 14 UNF-2B O-ring Seal (Fig. 1841)



Fig 1841 DSC-0580a

Test Gauge – 3/4”-16 – 37° Female (Fig. 1842)



Fig 1842 DSC-0577a

Test hoses:

Diameter	Length	PSI Rated
#8	3' (91.4cm)	5000

E. Flow Tester (Fig. 1843)

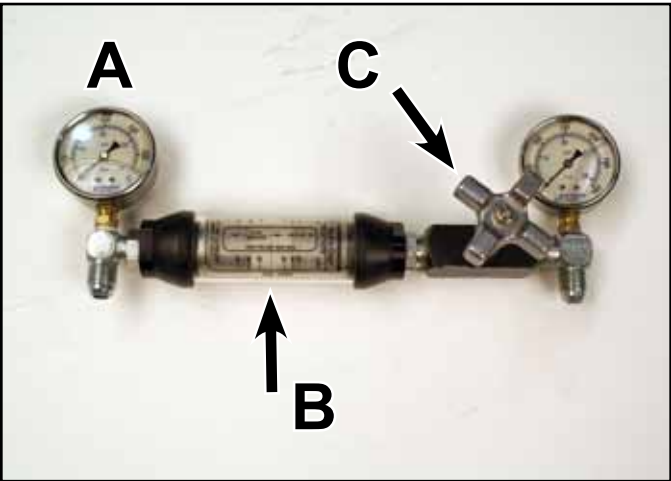


Fig 1843 PICT-3520a

- A. Pressure gauge
- B. Flow gauge
- C. Restriction valve

Hydraulic Testing

Hydraulic testing needs to be done in a systematic manner with a basic understanding of the hydraulic system and functions. It is recommended that you have the hydraulic schematic for the model and serial number being tested. Schematics can be obtained from this service manual or from the Toro Operator Manual or Parts Catalog provided with the unit.

The TX525 hydraulic system utilizes a dual gear pump to push oil to all the hydraulic components of the unit. The TX525 hydraulic systems can be separated into three circuits: loader, auxiliary and drive. These hydraulic systems are open circuit systems that allow oil to flow when the valves and hydrostatic pumps are in neutral position.

The dual gear pump draws the oil from the hydraulic tank and pushes the oil through the hydraulic lines, hoses and valves. The pump creates the flow [gallons per minute (gpm)]. The auxiliary and loader circuits are separate circuits which operate at their own pressure and flow. Return line oil from the loader circuit is used to supply oil to the two drive system hydrostatic pumps.

The recommended flow (gpm) and pressure (psi) values for each of the different circuits are located in the specification section of this manual. Refer to those values to properly troubleshoot each circuit. The tests in the following section need to be done at various locations to determine which component(s) may not be functioning correctly.

Loader Circuit

Oil is drawn from the hydraulic tank by the front section of the dual gear pump (farthest from engine) and flows into the loader valve. The loader valve relief restricts the hydraulic oil which creates system pressure (psi). When the loader valve is moved forward or back from neutral position it directs the hydraulic oil to the lift cylinder. When the loader valve is moved left and right it directs hydraulic oil to the tilt cylinder.

Auxiliary Circuit

Oil is drawn from the hydraulic tank by the rear section of the dual gear pump (closest to the engine) and flows into the auxiliary valve. The auxiliary valve relief restricts the hydraulic oil which creates system pressure (psi). The auxiliary valve directs the hydraulic oil to the couplers. When the auxiliary lever is moved toward the drive handle the female coupler is pressurized, which runs the attachment in forward drive. When the auxiliary lever is moved away from drive handle the male coupler is pressurized and the attachment runs in reverse drive.

Drive Circuit

The drive system uses two hydrostatic pumps and two wheel motors. The hydrostatic pumps are supplied with low pressure oil returned from the loader valve. This oil is filtered and then fed to the hydrostat pumps. (A 5 psi (0.34 bar) check valve on the return hose between the filter and tank is used to ensure a constant supply of oil to the hydrostatic pumps). When the drive handle is moved out of the neutral position, hydraulic oil is pumped to the wheel motors that drive the tracks.

Hydrostatic Testing Procedures

WARNING:

Certain procedures require the vehicle engine to be operated and the vehicle to be raised off the ground. To prevent possible injury to the servicing technician and/or bystanders, ensure the vehicle is properly secured.

WARNING:

Do not attempt any adjustments with the engine running. Use extreme caution while working in or around all vehicle linkage! Follow all safety procedures outlined in the Operators Manual.

The purpose of the flow test is to isolate and determine if there is a problem with either the hydrostatic pump or the wheel motor.

CAUTION:

Ensure all fittings and hoses are attached securely. This test is being completed on the vehicle's high pressure lines. Failure to perform this test properly could result in bodily injury.

HYDRAULIC TESTING

Auxiliary Circuit Pressure Test

Note: Make sure the engine RPM is checked and set properly prior to any hydraulic testing.

This test checks the auxiliary circuit system pressure. The components involved in this test are: gear pump, auxiliary valve, auxiliary couplers and hoses.

A pressure test can be done by using a flow type or a non-flow type tester. Each tester has its own advantages and disadvantages.

Flow Type

Advantages of a flow type tester are that pressure and flow can be obtained with this one tester and the hydraulic load can be applied slowly to compare the relativity between pressure and flow. Restrictor on flow meter can be adjusted prior to activating the hydraulic valve for pressure testing.

Disadvantages of flow type tester are the expense and the hydraulic load is slowly applied so engine rpm can be overcome prior to reaching recommended system pressure.

Non-Flow Type

Advantages of a non-flow type tester are they are simpler, less expensive and fewer steps to obtain test results. The hydraulic load is applied quickly and system pressure can be obtained prior to engine rpm being overcome.

Disadvantage of non-flow type tester is it can only be used for pressure testing.

This manual will be using a flow type tester for the hydraulic testing. A non-flow tester can also be used to obtain hydraulic pressure readings.

1. Cycle the hydraulic oil until warm.
2. Park the unit on level ground.
3. Set the park brake.
4. Shut the engine off.
5. Cycle the auxiliary valve to relieve any pressure from the circuit.
6. Wipe the couplers clean.
7. Push the pressure gauge male coupler into the female coupler on the traction unit (Fig. 1844).



Fig 1844

PICT-3401

8. Start the engine and run at full throttle.
9. Activate the auxiliary valve handle and hold. View the pressure gauge and take a reading.
10. Specification is 3000 psi (206.8 bar).

HYDRAULIC TESTING

Removal of Pressure Gauge

1. Let the engine and hydraulic oil cool.
2. Cycle the auxiliary valve to relieve any pressure in the circuit.
3. Push back on the female coupler locking collar to separate the fittings (Fig. 1845).



Fig 1845

PICT-3402

4. Release the park brake.

Prior to adjusting pressure relief, flow test should be done. If adjustment of the auxiliary pressure relief valve is required, continue on. If not, skip to step 8.

- a. Unlatch and open the rear access panel (Fig. 1846).



Fig 1846

PICT-1026

- b. Using a 13mm wrench, loosen the jam nut on the auxiliary valve pressure adjustment screw (Fig. 1847).



Fig 1847

PICT-4315a

HYDRAULIC TESTING

- c. Using a 4mm Allen wrench, adjust the pressure adjustment screw (Fig. 1848):
 - Turn the screw clockwise to increase the pressure.
 - Turn the screw counter-clockwise to decrease the pressure.



Fig 1848

PICT-4316a

- d. After achieving the recommended 3000 psi (206.89 bar), tighten the jam nut to lock the pressure adjustment screw in place (Fig. 1849).



Fig 1849

PICT-4315a

- e. If pressure can not be adjusted to the recommended specification, replace or rebuild the valve or valve relief.

HYDRAULIC TESTING

Auxiliary Circuit Flow Test

This test checks the system flow of the auxiliary circuit. The components involved in this test are: gear pump, auxiliary valve, auxiliary couplers and hoses. When the traction unit tests to the recommendation the attachment may be at fault.

Auxiliary Flow Testing

1. Cycle the hydraulic oil until warm.
2. Park the unit on level ground.
3. Set the park brake.
4. Shut the engine off.
5. Cycle the auxiliary valve to relieve any pressure from the circuit.
6. Wipe the couplers clean.
7. Plug the flow meter couplers into the TX couplers (Fig. 1850).



Fig 1850

PICT-3400a

8. Start the engine and run at full rpm.
9. Activate the auxiliary valve handle and hold. View the flow (gpm) gauge, take reading.
10. Flow specification is 14 gpm (53 lpm).
11. Lower engine rpm.
12. Shut the engine off.

Troubleshooting

If the gpm does not meet the specification then replace the hydraulic pump.

Flow Meter Removal

1. Let the engine and hydraulic oil cool.
2. Cycle the auxiliary valve to relieve any pressure in the circuit.
3. Push back on the female coupler locking collars to separate fittings (Fig. 1851).



Fig 1851

PICT-3400a

4. Release the park brake.

HYDRAULIC TESTING

Loader Circuit Flow Testing

This test determines the flow output of the gear pump. The components involved in this test are: hydraulic line and pump. If the gear pump flow test meets specifications, then the loader valve or hydraulic line may be at fault.

1. Cycle the hydraulic oil until warm.
2. Park the unit on level ground.
3. Set the park brake.
4. Cycle the loader valve to relieve any pressure from the circuit.

Note: One hydraulic fitting adaptor needs to be purchased at a local hydraulic supplier. (Parker part number 8HLO = 13/16-16 ORFS x 13/16-16 ORFS)

5. Remove the rear access panel.
6. Place absorbent towels(s) below hydraulic pump.
7. Using a 15/16" wrench, disconnect the hydraulic hose from the pump fitting (Fig. 1852).



Fig 1852

PICT-3403

8. Thread a flow meter hydraulic hose to the hydraulic pump fitting and tighten with a 15/16" wrench (Fig. 1853).



Fig 1853

PICT-3404

9. Thread the adaptor fitting to the other flow meter hydraulic hose. Tighten using a 15/16" wrench on the flow meter hose and a 7/8" wrench on the adaptor fitting (Fig. 1854).



Fig 1854

PICT-3405

HYDRAULIC TESTING

10. Thread the hydraulic pump hose previously removed from the pump fitting onto the adaptor on the flow meter hose. Tighten the hose using a 15/16" wrench and 7/8" wrench on the adaptor fitting (Fig. 1855).



Fig 1855

PICT-3406

11. Using a 7/8" wrench, tighten both hoses to the flow gauge (Fig. 1856).



Fig 1856

PICT-3407

12. Start the engine and run at full rpm.
13. Take the flow reading from the gauge (Fig. 1857).



Fig 1857

PICT-3408

14. With no restriction, the flow specification is 5.5 gpm (20.8 lpm).
15. Slowly turn the restrictor on the flow meter to simulate a hydraulic load on the circuit.

Note: Watch the flow gpm as the load increases (psi increases), the engine rpm and gpm should slowly decrease as load increases (psi increases). If a sudden drop in flow results, the pump should be replaced. Do not increase the load (psi) beyond 2400 ± 50 psi (165 ± 3.4 bar).

16. Slowly turn restrictor out until the psi on the gauge reads zero. Shut the engine off.

HYDRAULIC TESTING

Flow Gauge Removal

1. Let the engine and hydraulic oil cool prior to loosening any hydraulic fittings.
2. Cycle the loader valve handle to relieve any pressure in the system.
3. Place an oil drain pan under the flow meter hydraulic connections.
4. Disconnect the hydraulic pump hose from the adaptor fitting using a 7/8" wrench on the adaptor fitting and a 15/16" wrench on the pump hose (Fig. 1858).



Fig 1858

PICT-3406

5. Using a 15/16" wrench on the hose and a 7/8" wrench on the adaptor, remove the adaptor from the flow meter hose (Fig. 1859).



Fig 1859

PICT-3405

6. Using a 15/16" wrench, disconnect the flow meter hose from the hydraulic pump (Fig. 1860).



Fig 1860

PICT-3404

HYDRAULIC TESTING

7. Using a 15/16" wrench, connect the hydraulic hose to the hydraulic pump (Fig. 1861).



Fig 1861

PICT-3403

8. Start the engine and cycle the loader valve. Inspect for leaks.
9. Release the park brake.
10. Properly discard all oily towels.

HYDRAULIC TESTING

Loader Circuit Pressure Test

This test determines if the loader valve relief is properly set or working correctly. The components involved in this test are: gear pump, hydraulic lines, loader valve and test port fitting. If the pressure can not be adjusted to meet specification then the loader valve or relief valve will need to be repaired or replaced. If the pressure meets specification the loader valve is not the problem. The lift or tilt cylinder could be at fault.

System flow test should be completed to assure proper flow from the pump is obtained.

1. Cycle the hydraulic oil until warm.
2. Park the unit on level ground.
3. Set the park brake.
4. Cycle the loader valve to relieve any pressure from the circuit.

Note: There is no hydraulic test port for the drive or loader circuits. Test port fittings need to be purchased at a local hydraulic supplier.

Pressure Test

1. Listed below are the Parker Hydraulics part numbers to make the test port for hydraulic pressure testing (Fig. 1862).

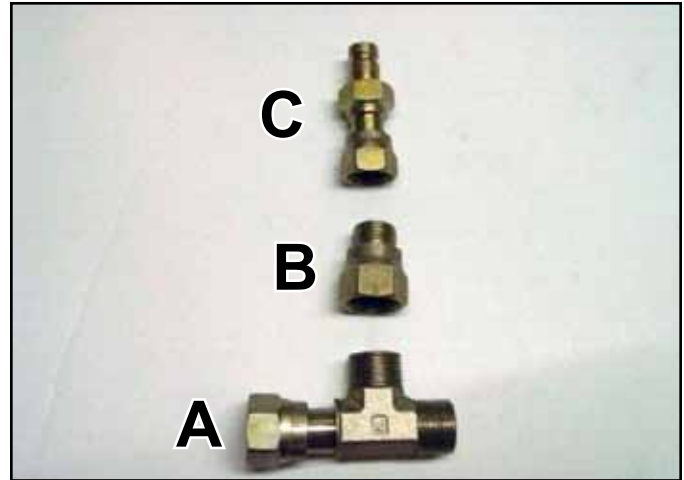


Fig 1862

PICT-3409c

- A. 8R6LO-S Tee fitting o-ring faced
- B. 8-6TRLON-S Adaptor
- C. PD36BTL Fitting

Pressure Tester (Fig. 1863):



Fig 1863

PICT-3523a

HYDRAULIC TESTING

2. Remove the rear access panel.
3. Place absorbent towel(s) below the hydraulic pump.
4. Using a 15/16" wrench, remove the hydraulic hose from the pump fitting (Fig. 1864).



Fig 1864

PICT-3403

6. Thread the hydraulic hose (previously removed) onto the test port fitting and tighten using a 15/16" wrench (Fig. 1866).



Fig 1866

PICT-3411

5. Thread the test port fitting onto the hydraulic pump and tighten using a 15/16" wrench (Fig. 1865).



Fig 1865

PICT-3410



Fig 1867

PICT-3412

HYDRAULIC TESTING

8. Start the engine and run at full rpm.
9. Move the loader arm handle so the tilt cylinder is retracted into the cylinder barrel. Hold the handle and take the pressure (psi) reading from the gauge (Fig. 1868).



Fig 1868

PICT-3413

10. Recommended specification is 2400 ± 50 psi (165 ± 3.4 bar).
11. Release the handle on the loader valve and shut engine off.

If adjustment is needed:

- a. Remove the RH control panel cover.
- b. Using a 19mm wrench and a 5mm Allen wrench, adjust the pressure adjustment screw (Fig. 1869 and Fig. 1870):
 - Turn the screw clockwise to increase the pressure
 - Turn the screw counter-clockwise to decrease the pressure.



Fig 1869

PICT-4326



Fig 1870

PICT-4327

HYDRAULIC TESTING

- c. If the recommended pressure specification can not be reached, replace or rebuild the valve.
 - d. Install the RH control panel cover.
12. Check hydraulic fluid and add as needed.
 13. Start unit and check for leaks.
 14. Release park brake.
 15. Shut engine off.

HYDRAULIC TESTING

Test Gauge Removal

1. Let the engine and hydraulic oil cool prior to loosening any hydraulic fittings.
2. Cycle the loader valve handle to relieve any pressure in the system.
3. Using a 15/16" wrench, disconnect the test gauge from the test port fitting (Fig. 1871).



Fig 1871

PICT-3412

4. Using a 15/16" wrench, loosen and remove the hydraulic hose from the test port (Fig. 1872).



Fig 1872

PICT-3411

5. Using a 15/16" wrench, remove the test port fitting from the hydraulic pump (Fig. 1873).



Fig 1873

PICT-3410

6. Connect the hydraulic hose to the hydraulic pump and tighten with a 15/16" wrench (Fig. 1874).



Fig 1874

PICT-3403

7. Start the engine, cycle the loader valve and inspect for leaks.
8. Release the park brake.
9. Properly discard all oily towels.

Traction Control Tracking Adjustment, Full Forward Position

If the traction unit does not drive straight when you hold the traction control against the reference bar, complete the following procedure:

Note: Whenever an adjustment is made, check to make sure the set screws contact stops in the full forward position.

1. Drive the traction unit with the traction control against the reference bar, noting in which direction the traction unit veers.
2. Release the traction control.

Note: When the traction control is stroked fully forward and the unit has severe pull to the left or right, a problem with the pump control linkage or a hydraulic component is indicated.

Note: When the traction control is stroked fully and a gradual pull happens, the tracking adjustment can be made. A very slight tracking error is considered normal.

3. If the traction unit veers left, loosen the right jam nut and adjust the tracking set screw on the rear of traction control (Fig. 1875).

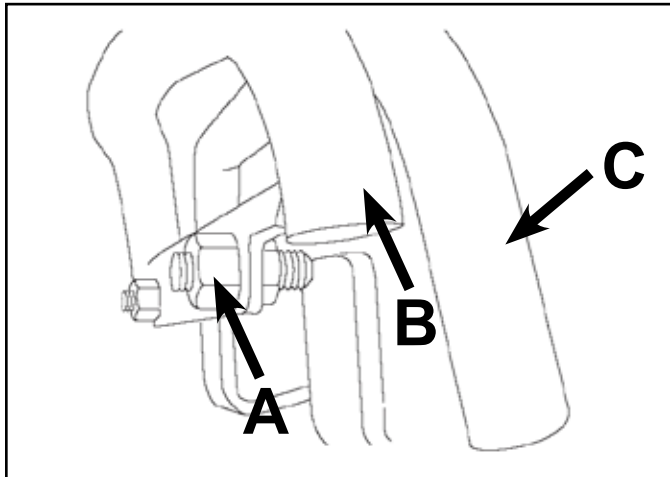


Fig 1875

fig. 38a

- A. Right jam nut B. Operator handle
C. Reference bar

4. If the traction unit veers right, loosen the left jam nut and adjust the tracking set screw on front of the traction control (Fig. 1876).

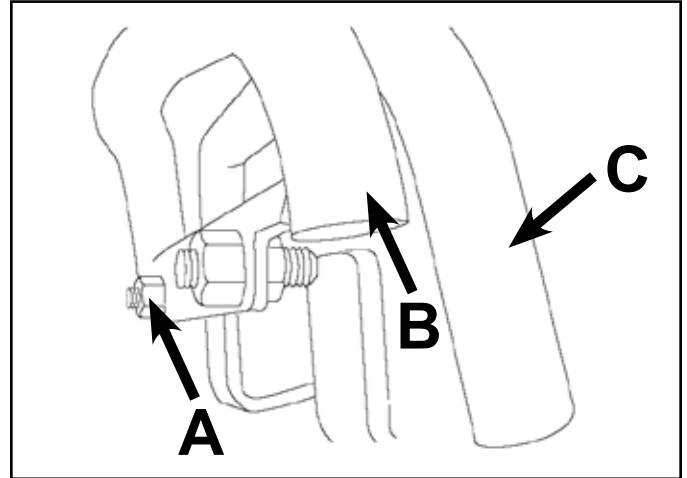


Fig 1876

fig. 38a

- A. Left jam nut B. Operator handle
C. Reference bar

5. Repeat steps 1 through 4 until the traction unit drives straight in the full forward position.

HYDRAULIC TESTING

Traction Control Neutral Adjustment

If the traction unit creeps forward or backward when the traction control is in neutral (and the unit is fully warmed up), make the neutral adjustment:

1. Park the traction unit on a flat surface and lower the loader arm.
2. Stop the engine and remove the key.
3. Lift/support the traction unit so that both tracks are off of the ground. Refer to "Lifting Unit for Service" on page 7-1.
4. Open the rear access cover (Fig. 1877).

Note: Slight creeping of tracks in the forward or reverse drive with tracks off the ground can be a normal condition.



Fig 1877

PICT-1026

5. Loosen the jam nuts on the traction rods, under the control panel (Fig. 1878).

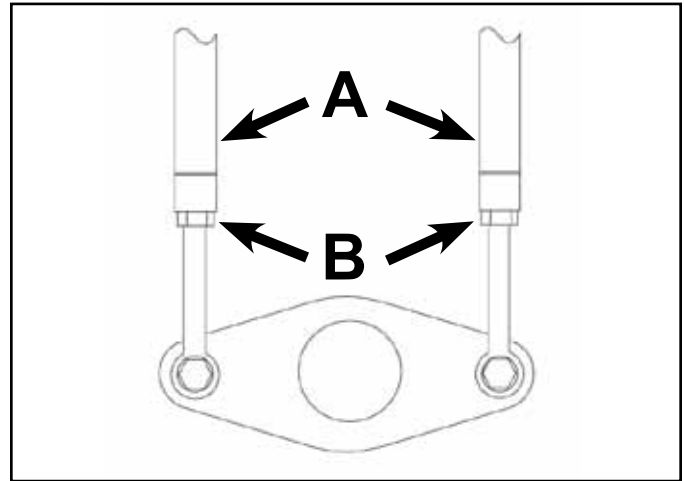


Fig 1878

fig. 37a

- A. Traction rods
 - B. Jam nuts
6. Start the traction unit and set the engine throttle to 1/3 engine throttle speed.
 7. If the left track moves, lengthen or shorten the right traction rod until the track stops moving.
 8. If the right track moves, lengthen or shorten the left traction rod until the track stops moving.
 9. Tighten the jam nuts.
 10. Close the rear access cover.
 11. Stop the engine and lower the traction unit to the ground.
 12. Test for proper operation.

HYDRAULIC TESTING

Purging Air Procedure

Due to the effects air has on efficiency in hydrostatic drive applications, it is critical that air is purged from the system.

These purge procedures should be implemented any-time a hydrostatic system or hydraulic line has been opened to facilitate maintenance or any additional oil has been added to the system.

Air creates inefficiency because it has compression and expansion rates that are higher than that of oil.

Trapped air in the oil may cause the following symptoms:

1. Noisy operation.
2. Lack of power or drive after short-term operation.
3. High oil temperature and excessive expansion of oil.

Before starting, make sure the reservoir is at the proper oil level. If it is not, fill to the vehicle specifications, refer to the "Hydraulic Reservoir Tank, Checking the Hydraulic Fluid" section on page 3-4.

The following procedures should be performed with the vehicle drive tracks off the ground, and then repeated under normal operating conditions.

1. Lift/support the unit so that both tracks are off the ground and free to rotate. Refer to "Lifting Unit for Service" on page 7-1.
2. Start the engine and run it at slow idle engine speed for about 20 seconds.
3. Push the traction control to the full forward position and hold. The tracks should begin to slowly rotate. Once the tracks begin to rotate smoothly, run for 20 more seconds. Pull the traction control to the full reverse position and hold. Again, the tracks should begin to slowly rotate in reverse. Once the tracks begin to rotate smoothly, allow to run for 30 more seconds.
4. Raise and lower the loader arm 4 complete cycles. Raise the loader arm and put it into the float position. The loader arm should drop.
5. Cycle the dump cylinder 4 complete cycles.
6. Stop the engine and check the oil level in the reservoir. Add as necessary.
7. It may be necessary to repeat steps 2 through 6 until all the air is completely purged from the system.

HYDRAULIC TESTING

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TX525 Service Manual