



Service Manual

Topdresser 1800 and 2500

Preface

The purpose of this publication is to provide the service technician with information for troubleshooting, testing and repair of major systems and components on the Topdresser 1800 and 2500.

REFER TO THE OPERATOR'S MANUAL FOR OPERATING, MAINTENANCE AND ADJUSTMENT INSTRUCTIONS. Space is provided in Chapter 2 of this book to insert the Operator's Manual and Parts Catalog for your machine. A replacement Operator's Manual is available on the internet at www.toro.com or by sending complete Model and Serial Number to:

The Toro Company
Attn. Technical Publications
8111 Lyndale Avenue South
Minneapolis, MN 55420

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



This safety symbol means DANGER, WARNING, or CAUTION, PERSONAL SAFETY INSTRUCTION. When you see this symbol, carefully read the instructions that follow. Failure to obey the instructions may result in personal injury.

NOTE: A **NOTE** will give general information about the correct operation, maintenance, service, testing or repair of the machine.

IMPORTANT: The **IMPORTANT** notice will give important instructions which must be followed to prevent damage to systems or components on the machine.



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Safety

Product Records and Maintenance

Hydraulic System

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Safety Instructions

The Topdresser is designed and tested to offer safe service when operated and maintained properly. Although hazard control and accident prevention partially are dependent upon the design and configuration of the machine, these factors are also dependent upon the awareness, concern and proper training of the personnel involved in the operation, transport, maintenance and storage of the machine. Improper use or maintenance of the machine can result in injury or death. To reduce the potential for injury or death, comply with the following safety instructions.



Before Operating

1. Read and understand the contents of the Operator's Manual before starting and operating the machine. Become familiar with the controls and know how to stop the Topdresser quickly. A replacement Operator's Manual is available on the Internet at www.Toro.com or by sending the complete model and serial number to:

The Toro Company
Attn. Technical Publications
8111 Lyndale Avenue South
Bloomington, Minnesota 55420-1196

2. Keep all shields, safety devices and decals in place. If a shield, safety device or decal is defective, illegible or damaged, repair or replace it before operating the machine. Also tighten any loose nuts, bolts or screws to ensure machine is in safe operating condition.

3. Make sure that the tow vehicle is carefully selected to assure the best performance and safe operation of the Topdresser.

4. Make sure that operator is familiar with tow vehicle and Topdresser operation.

While Operating

1. Operator should be in the operators position when operating the tow vehicle and Topdresser. Stay away from the Topdresser when the brush and conveyor are engaged.

2. When using the Topdresser 2500, make sure that hitch pin is properly positioned in tow vehicle and Topdresser. Hitch pin should be secured with hairpin clip.

3. Do not run tow vehicle engine in a confined area without adequate ventilation. Exhaust fumes are hazardous and could possibly be deadly.

4. Do not touch tow vehicle engine, muffler or exhaust pipe while engine is running or soon after it is stopped. These areas could be hot enough to cause burns.

5. If abnormal vibration is detected, stop operation of the Topdresser immediately and determine source of vibration. Correct problems before resuming the use of the Topdresser.

6. While operating, the Topdresser may exceed noise levels of 85dB(A) at the operator position. Hearing protection is recommended for prolonged exposure to reduce the potential of permanent hearing damage.

7. Before leaving the operator's position of the tow vehicle/Workman:

A. Move equipment control to stop Topdresser brush and conveyor movement. On Topdresser 2500, move hand control switch to the OFF position. On Topdresser 1800, move the remote hydraulic lever to the OFF position.

B. Ensure that vehicle traction lever is in neutral, set parking brake, stop engine and remove key from ignition switch.

8. Park on level surface, empty hopper and chock Topdresser wheels before disconnecting the Topdresser 2500 from tow vehicle.

Maintenance and Service

1. Before servicing or making adjustments, empty hopper and position Topdresser on a level surface. If Topdresser is attached to tow vehicle, engage tow vehicle parking brake, stop engine and remove key from the ignition switch. On Topdresser 2500, chock wheels to prevent it from moving.
2. Make sure machine is in safe operating condition by keeping all nuts, bolts and screws tight.
3. Make sure all hydraulic line connectors are tight and all hydraulic hoses and lines are in good condition before applying pressure to the hydraulic system.
4. Keep body and hands away from pin hole leaks in hydraulic lines that eject high pressure hydraulic fluid. Use cardboard or paper to find hydraulic leaks. Hydraulic fluid escaping under pressure can penetrate skin and cause injury. Hydraulic fluid accidentally injected into the skin must be surgically removed within a few hours by a doctor familiar with this form of injury or gangrene may result.
5. Before disconnecting any hydraulic component or performing any work on the hydraulic system, all pressure in system must be relieved. See Relieving Hydraulic System Pressure in the General Information section of Chapter 3 – Hydraulic System.
6. On Topdresser 2500, disconnect electrical power harness from tow vehicle before servicing the machine.
7. If major repairs are ever needed or assistance is desired, contact an Authorized Toro Distributor.
8. At the time of manufacture, the machine conformed to all applicable safety standards. To assure optimum performance and continued safety certification of the machine, use genuine Toro replacement parts and accessories. Replacement parts and accessories made by other manufacturers may result in non-conformance with the safety standards, and the warranty may be voided.
9. When changing tires or performing other service on the Topdresser 2500, use correct hoists and jacks. Make sure machine is parked on a solid level surface such as a concrete floor with the hopper empty. Have Topdresser attached to towing vehicle, engage vehicle parking brake, stop engine and remove key from the ignition switch. Always chock or block wheels. Use appropriate jack stands to support the raised machine. If the machine is not properly supported, the machine may move or fall, which may result in personal injury (see Jacking Instructions).

Jacking Instructions (Topdresser 2500)



CAUTION

When changing tires or performing other service, use correct hoists or jacks to support the Topdresser. Make sure machine is parked on a solid level surface such as a concrete floor. Always chock or block wheels. Use appropriate jack stands to support the raised machine. If the machine is not properly supported, the machine may move or fall, which may result in personal injury.



Figure 1

1. Skid

1. Position Topdresser on a level surface with hopper empty. Have Topdresser attached to towing vehicle, engage vehicle parking brake, stop engine and remove key from the ignition switch. Chock Topdresser wheels to prevent it from moving.
2. Position jack securely under the skids (Fig. 1). Do not use the axle as a jacking point.
3. Carefully jack machine off the ground.
4. Position jack stands under the skids to support the Topdresser.

Securing Topdresser 2500 to Tow Vehicle

While operating or servicing the Topdresser 2500, make sure that hitch pin is properly positioned in tow vehicle hitch and Topdresser tongue. Hitch pin should be secured with hairpin clip (Fig. 2).

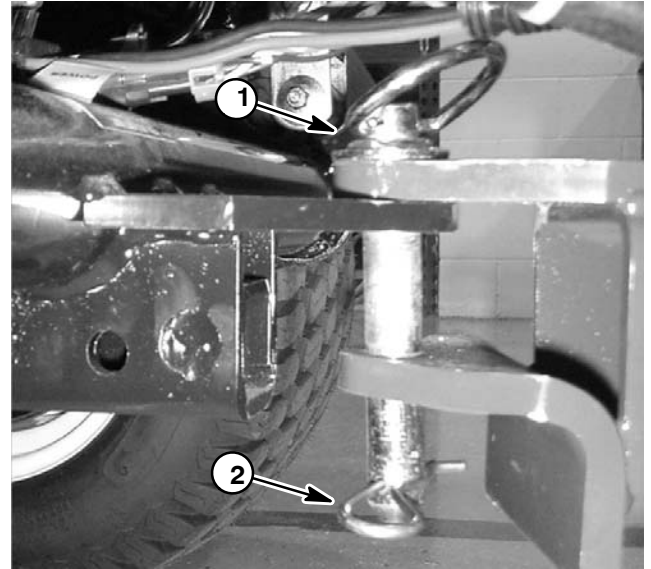


Figure 2

1. Hitch pin

2. Hairpin clip

Safety and Instruction Decals

Numerous safety and instruction decals are affixed to the Topdresser. If any decal becomes illegible or damaged, install a new decal. Part numbers for replacement decals are listed in your Parts Catalog. Order replacement decals from your Authorized Toro Distributor.

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Product Records and Maintenance

Product Records and Maintenance

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Product Records

Insert Operator’s Manual and Parts Catalog for your Topdresser at the end of this chapter. Additionally, if any optional equipment or accessories have been installed to your machine, insert the Installation Instructions, Operator’s Manuals and Parts Catalogs for those options at the end of this chapter.

Maintenance

Maintenance procedures and recommended service intervals for the Topdresser are covered in the Operator’s Manual. Refer to that publication when performing regular equipment maintenance.

Equivalents and Conversions

Decimal and Millimeter Equivalents

Fractions	Decimals	mm	Fractions	Decimals	mm
	1/64	0.015625	—	0.397	
	1/32	0.03125	—	0.794	
	3/64	0.046875	—	1.191	
1/16	—	0.0625	—	1.588	
	5/64	0.078125	—	1.984	
	3/32	0.09375	—	2.381	
	7/64	0.109275	—	2.778	
1/8	—	0.1250	—	3.175	
	9/64	0.140625	—	3.572	
	5/32	0.15625	—	3.969	
	11/64	0.171875	—	4.366	
3/16	—	0.1875	—	4.762	
	13/64	0.203125	—	5.159	
	7/32	0.21875	—	5.556	
	15/64	0.234375	—	5.953	
1/4	—	0.2500	—	6.350	
	17/64	0.265625	—	6.747	
	9/32	0.28125	—	7.144	
	19/64	0.296875	—	7.541	
5/16	—	0.3125	—	7.938	
	21/64	0.328125	—	8.334	
	11/32	0.34375	—	8.731	
	23/64	0.359375	—	9.128	
3/8	—	0.3750	—	9.525	
	25/64	0.390625	—	9.922	
	13/32	0.40625	—	10.319	
	27/64	0.421875	—	10.716	
7/16	—	0.4375	—	11.112	
	29/64	0.453125	—	11.509	
	15/32	0.46875	—	11.906	
	31/64	0.484375	—	12.303	
1/2	—	0.5000	—	12.700	
1 mm = 0.03937 in.			0.001 in. = 0.0254 mm		

U.S. to Metric Conversions

	To Convert	Into	Multiply By
Linear Measurement	Miles	Kilometers	1.609
	Yards	Meters	0.9144
	Feet	Meters	0.3048
	Feet	Centimeters	30.48
	Inches	Meters	0.0254
	Inches	Centimeters	2.54
	Inches	Millimeters	25.4
Area	Square Miles	Square Kilometers	2.59
	Square Feet	Square Meters	0.0929
	Square Inches	Square Centimeters	6.452
	Acre	Hectare	0.4047
Volume	Cubic Yards	Cubic Meters	0.7646
	Cubic Feet	Cubic Meters	0.02832
	Cubic Inches	Cubic Centimeters	16.39
Weight	Tons (Short)	Metric Tons	0.9078
	Pounds	Kilograms	0.4536
	Ounces (Avdp.)	Grams	28.3495
Pressure	Pounds/Sq. In.	Kilopascal	6.895
	Pounds/Sq. In.	Bar	0.069
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 Flow	Gallons/Minute	Liters/Minute	3.785
Temperature	Fahrenheit	Celsius	1. Subtract 32°
			2. Multiply by 5/9

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 this 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 this Service Manual. The following factors shall be considered when applying torque: cleanliness of the fastener, use of a thread sealant (e.g. Loctite), degree of lubrication on the fastener, presence of a prevailing torque feature, hardness of the surface underneath the fastener's head or similar condition which affects the installation.

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

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

Fastener Identification

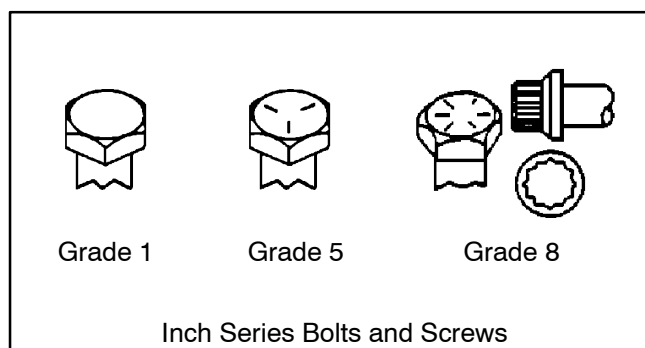


Figure 1

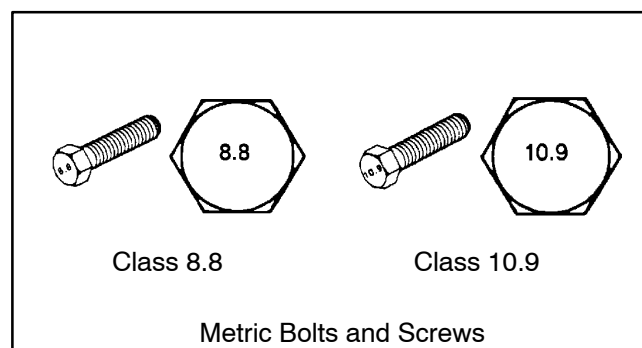


Figure 2

Using a Torque Wrench with an Offset Wrench

Use of an offset wrench (e.g. crowfoot wrench) will affect torque wrench calibration due to the effective change of torque wrench length. When using a torque wrench with an offset wrench, multiply the listed torque recommendation by the calculated torque conversion factor (Fig. 3) to determine proper tightening torque. Tightening torque when using a torque wrench with an offset wrench will be lower than the listed torque recommendation.

Example: The measured effective length of the torque wrench (distance from the center of the handle to the center of the square drive) is 18".

The measured effective length of the torque wrench with the offset wrench installed (distance from the center of the handle to the center of the offset wrench) is 19".

The calculated torque conversion factor for this torque wrench with this offset wrench would be $18 / 19 = 0.947$.

If the listed torque recommendation for a fastener is from 76 to 94 ft-lb, the proper torque when using this torque wrench with an offset wrench would be from 72 to 89 ft-lb.

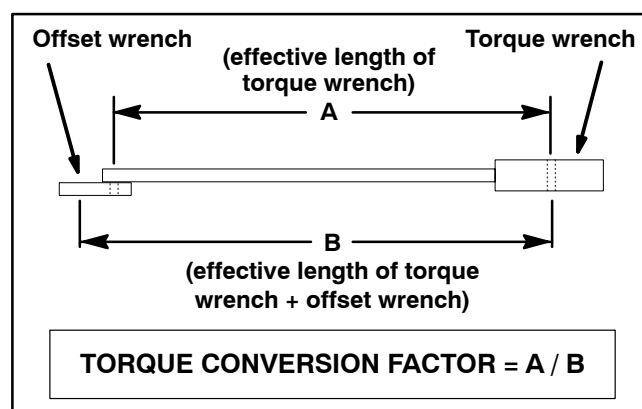


Figure 3

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 5 or Stronger Nuts)	
	in-lb	in-lb	N-cm	in-lb	N-cm	in-lb	N-cm
# 6 – 32 UNC	10 ± 2	13 ± 2	147 ± 23	15 ± 2	169 ± 23	23 ± 3	262 ± 34
# 6 – 40 UNF				17 ± 2	192 ± 23	25 ± 3	282 ± 34
# 8 – 32 UNC	13 ± 2	25 ± 5	282 ± 56	29 ± 3	328 ± 34	41 ± 5	463 ± 56
# 8 – 36 UNF				31 ± 4	350 ± 45	43 ± 5	486 ± 56
# 10 – 24 UNC	18 ± 2	30 ± 5	339 ± 56	42 ± 5	475 ± 56	60 ± 6	678 ± 68
# 10 – 32 UNF				48 ± 5	542 ± 56	68 ± 7	768 ± 79
1/4 – 20 UNC	48 ± 7	53 ± 7	599 ± 79	100 ± 10	1130 ± 113	140 ± 15	1582 ± 169
1/4 – 28 UNF	53 ± 7	65 ± 10	734 ± 113	115 ± 12	1299 ± 136	160 ± 17	1808 ± 192
5/16 – 18 UNC	115 ± 15	105 ± 15	1186 ± 169	200 ± 25	2260 ± 282	300 ± 30	3390 ± 339
5/16 – 24 UNF	138 ± 17	128 ± 17	1446 ± 192	225 ± 25	2542 ± 282	325 ± 33	3672 ± 373
	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 ± 5	58 ± 7
3/8 – 24 UNF	17 ± 2	18 ± 2	24 ± 3	35 ± 4	47 ± 5	50 ± 6	68 ± 8
7/16 – 14 UNC	27 ± 3	27 ± 3	37 ± 4	50 ± 5	68 ± 7	70 ± 7	95 ± 9
7/16 – 20 UNF	29 ± 3	29 ± 3	39 ± 4	55 ± 6	75 ± 8	77 ± 8	104 ± 11
1/2 – 13 UNC	30 ± 3	48 ± 7	65 ± 9	75 ± 8	102 ± 11	105 ± 11	142 ± 15
1/2 – 20 UNF	32 ± 4	53 ± 7	72 ± 9	85 ± 9	115 ± 12	120 ± 12	163 ± 16
5/8 – 11 UNC	65 ± 10	88 ± 12	119 ± 16	150 ± 15	203 ± 20	210 ± 21	285 ± 28
5/8 – 18 UNF	75 ± 10	95 ± 15	129 ± 20	170 ± 18	230 ± 24	240 ± 24	325 ± 33
3/4 – 10 UNC	93 ± 12	140 ± 20	190 ± 27	265 ± 27	359 ± 37	375 ± 38	508 ± 52
3/4 – 16 UNF	115 ± 15	165 ± 25	224 ± 34	300 ± 30	407 ± 41	420 ± 43	569 ± 58
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 ± 48	644 ± 65	667 ± 66	904 ± 89

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 engine oil or thread sealant such as Loctite.

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

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

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

Thread Size	Class 8.8 Bolts, Screws and Studs with Regular Height Nuts (Class 8 or Stronger Nuts)		Class 10.9 Bolts, Screws and Studs with Regular Height Nuts (Class 10 or Stronger Nuts)	
M5 X 0.8	57 ± 6 in-lb	644 ± 68 N-cm	78 ± 8 in-lb	881 ± 90 N-cm
M6 X 1.0	96 ± 10 in-lb	1085 ± 113 N-cm	133 ± 14 in-lb	1503 ± 158 N-cm
M8 X 1.25	19 ± 2 ft-lb	26 ± 3 N-m	28 ± 3 ft-lb	38 ± 4 N-m
M10 X 1.5	38 ± 4 ft-lb	52 ± 5 N-m	54 ± 6 ft-lb	73 ± 8 N-m
M12 X 1.75	66 ± 7 ft-lb	90 ± 10 N-m	93 ± 10 ft-lb	126 ± 14 N-m
M16 X 2.0	166 ± 17 ft-lb	225 ± 23 N-m	229 ± 23 ft-lb	310 ± 31 N-m
M20 X 2.5	325 ± 33 ft-lb	440 ± 45 N-m	450 ± 46 ft-lb	610 ± 62 N-m

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

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

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

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 & finish must be considered when determining specific torque values. All torque values are based on non-lubricated fasteners.

Conversion Factors

$$\text{in-lb} \times 11.2985 = \text{N-cm}$$

$$\text{ft-lb} \times 1.3558 = \text{N-m}$$

$$\text{N-cm} \times 0.08851 = \text{in-lb}$$

$$\text{N-m} \times 0.7376 = \text{ft-lb}$$



Hydraulic System

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Specifications

Item	Description
Brush Motor Displacement (per revolution)	Eaton orbital rotor motor, A Series 2.3 Cubic Inches (38 cc)
Conveyor Motor Displacement (per revolution)	Eaton orbital rotor motor, 2000 Series 29.8 Cubic Inches (488 cc)
Wheel Motor (Pump) (Topdresser 2500) Displacement (per revolution)	White Hydraulics orbital rotor motor, HB Series 5.4 Cubic Inches (89 cc)
System Relief Pressure (Topdresser 2500)	1500 PSI (103 bar) (Before Serial Number 240000000) 1325 PSI (91 bar) (After Serial Number 240000000)
Charge Motor/Pump (Topdresser 2500) Motor Displacement (per revolution) Pump Displacement (per revolution)	Haldex–Barnes gear motor/charge pump 0.831 Cubic Inches (13.6 cc) 0.232 Cubic Inches (3.8 cc)
Charge Relief Pressure (Topdresser 2500)	80 PSI (5.5 bar) (Before Serial Number 240000000) 100 PSI (6.9 bar) (After Serial Number 240000000)
Hydraulic Tank Capacity (Topdresser 2500)	2.5 Gal. U.S. (9.5 L)
Hydraulic Filter (Topdresser 2500)	Spin–on cartridge type
Hydraulic Oil	See Operator’s Manual

Hydraulic Schematics

The hydraulic schematics for Topdresser machines are located in Chapter 6 – Foldout Diagrams.

General Information

Operator's Manual

The Operator's Manual provides information regarding the operation, general maintenance and maintenance intervals for your Topdresser machine. Refer to that publication for additional information when servicing the machine.

Securing Topdresser 2500 to Tow Vehicle

While servicing the Topdresser 2500, make sure that the hitch pin is properly positioned in tow vehicle hitch and Topdresser tongue. The hitch pin should be secured with a hairpin clip (Fig. 1).

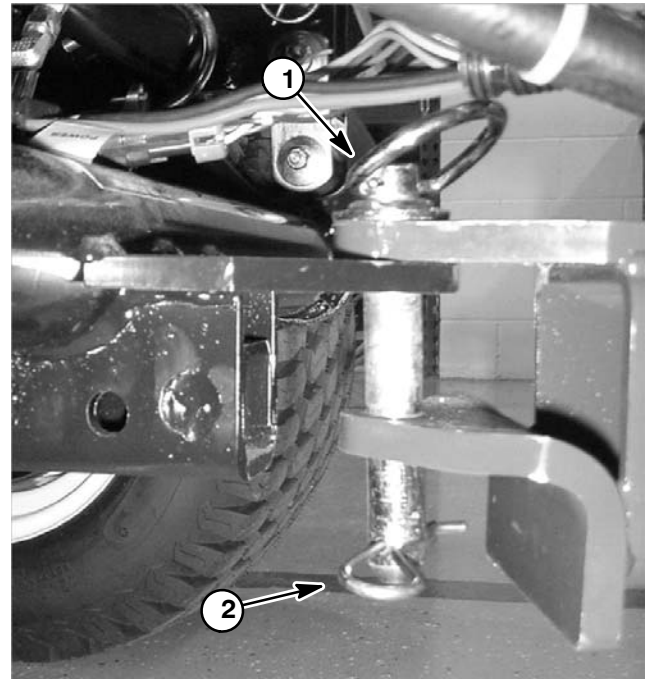



Figure 1

1. Hitch pin

2. Hairpin clip

Relieving Hydraulic System Pressure

**CAUTION**

Operate all machine hydraulic controls to relieve system pressure and to avoid injury from pressurized hydraulic oil.

Before disconnecting or performing any work on the Topdresser hydraulic system, all pressure in the hydraulic system must be relieved.

To relieve hydraulic system pressure on Topdresser 1800 machines, turn tow vehicle key switch to OFF (engine not running) and place the remote hydraulic valve handle in the float position.

For Topdresser 2500 machines, turn tow vehicle key switch to OFF and allow engine to stop. Make sure that Topdresser control handle switch is in the OFF position to relieve system pressure.

Hydraulic Hoses

Hydraulic hoses are subject to extreme conditions such as pressure differentials during operation and exposure to weather, sun, chemicals, very warm storage conditions or mishandling during operation and maintenance. These conditions can cause hose damage and deterioration. Some hoses are more susceptible to these conditions than others. Inspect all machine hydraulic hoses frequently for signs of deterioration or damage:

Hard, cracked, cut, abraded, charred, leaking or otherwise damaged hose.

Kinked, crushed, flattened or twisted hose.

Blistered, soft, degraded or loose hose cover.

Cracked, damaged or badly corroded hose fittings.

When replacing a hydraulic hose, be sure that the hose is straight (not twisted) before tightening the fittings. This can be done by observing the imprint (layline) on the hose. Use two wrenches; hold the hose straight with one wrench and tighten the hose swivel nut onto the fitting with the other wrench (See Hydraulic Hose and Tube Installation in this section). If the hose has an elbow at one end, tighten the swivel nut on that end before tightening the nut on the straight end of the hose.

For additional hydraulic hose information, refer to Toro Service Training Book, Hydraulic Hose Servicing (Part Number 94813SL).



WARNING

Before disconnecting or performing any work on hydraulic system, relieve all pressure in system (see Relieving Hydraulic System Pressure in this section).

Keep body and hands away from pin hole leaks or nozzles that eject hydraulic fluid under high pressure. Use paper or cardboard, not hands, to search for leaks. Hydraulic fluid escaping under pressure can have sufficient force to penetrate the skin and cause serious injury. If fluid is injected into the skin, it must be surgically removed within a few hours by a doctor familiar with this type of injury. Gangrene may result from such an injury.

Hydraulic Hose and Tube Installation (O-Ring Face Seal Fitting)

1. Make sure threads and sealing surfaces of the hose/tube and the fitting are free of burrs, nicks, scratches or any foreign material.

2. As a preventative measure against leakage, it is recommended that the face seal O-ring be replaced any time the connection is opened. Make sure the O-ring is installed and properly seated in the fitting groove. Lightly lubricate the O-ring with clean hydraulic oil.

3. Place the hose/tube against the fitting body so that the flat face of the hose/tube sleeve fully contacts the O-ring in the fitting.

4. Thread the swivel nut onto the fitting by hand. While holding the hose/tube with a wrench, use a torque wrench to tighten the swivel nut to the recommended installation torque shown in Figure 4. This tightening process will require the use of an offset wrench (e.g. crowfoot wrench). Use of an offset wrench will affect torque wrench calibration due to the effective length change of the torque wrench. Tightening torque when using a torque wrench with an offset wrench will be lower than the listed installation torque (see Using a Torque Wrench with an Offset Wrench in the Torque Specifications section of Chapter 2 – Product Records and Maintenance).

5. If a torque wrench is not available or if space at the swivel nut prevents use of a torque wrench, an alternate method of assembly is the Flats From Wrench Resistance (F.F.W.R.) method (Fig. 2).

A. Using a wrench, tighten the swivel nut onto the fitting until light wrench resistance is reached (approximately 30 in-lb).

B. Mark the swivel nut and fitting body. Hold the hose/tube with a wrench to prevent it from turning.

C. Use a second wrench to tighten the nut to the correct Flats From Wrench Resistance (F.F.W.R.). The markings on the nut and fitting body will verify that the connection has been properly tightened.

Size	F.F.W.R.
4 (1/4 in. nominal hose or tubing)	1/2 to 3/4
6 (3/8 in.)	1/2 to 3/4
8 (1/2 in.)	1/2 to 3/4
10 (5/8 in.)	1/2 to 3/4
12 (3/4 in.)	1/3 to 1/2
16 (1 in.)	1/3 to 1/2

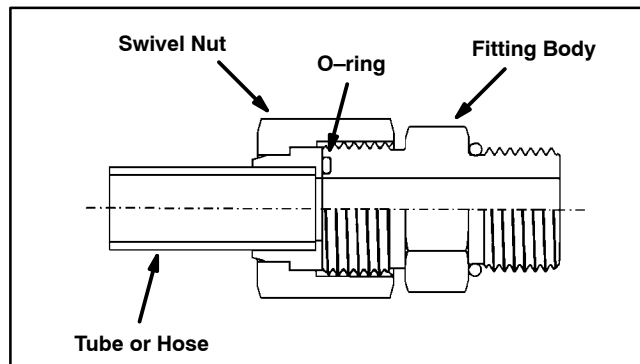


Figure 2

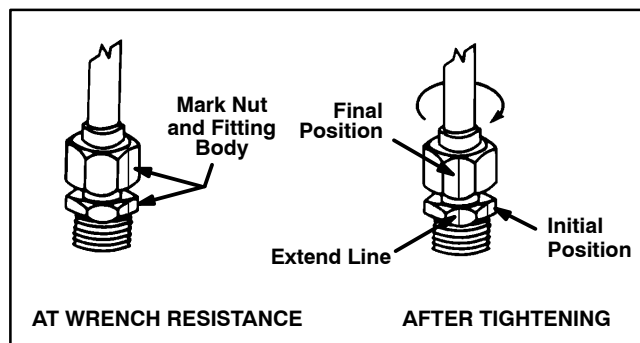


Figure 3

Fitting Dash Size	Hose/Tube Side Thread Size	Installation Torque
4	9/16 – 18	18 to 22 ft-lb (25 to 29 N-m)
6	11/16 – 16	27 to 33 ft-lb (37 to 44 N-m)
8	13/16 – 16	37 to 47 ft-lb (51 to 63 N-m)
10	1 – 14	60 to 74 ft-lb (82 to 100 N-m)
12	1 3/16 – 12	85 to 105 ft-lb (116 to 142 N-m)
16	1 7/16 – 12	110 to 136 ft-lb (150 to 184 N-m)
20	1 11/16 – 12	140 to 172 ft-lb (190 to 233 N-m)

Figure 4

Hydraulic Fitting Installation (SAE Straight Thread O-ring Face Seal Fitting into Component Port)

Non-Adjustable Fitting (Fig. 5)

1. Make sure all threads and sealing surfaces of fitting and component port are free of burrs, nicks, scratches or any foreign material.
2. As a preventative measure against leakage, it is recommended that the O-ring be replaced any time the connection is opened.
3. Lightly lubricate the O-ring with clean hydraulic oil. Fitting threads should be clean with no lubricant applied.

IMPORTANT: Before installing fitting into port, determine port material. If fitting is to be installed into an aluminum port, installation torque is reduced.

4. Install the fitting into the port. Then, use a torque wrench and socket to tighten the fitting to the recommended installation torque shown in Figure 6.

NOTE: Use of an offset wrench (e.g. crowfoot wrench) will affect torque wrench calibration due to the effective length change of the torque wrench. Tightening torque when using a torque wrench with an offset wrench will be less than the recommended installation torque. See Using a Torque Wrench with an Offset Wrench in the Torque Specifications section of Chapter 2 – Product Records and Maintenance to determine necessary conversion information.

5. If a torque wrench is not available, or if space at the port prevents use of a torque wrench, an alternate method of assembly is the Flats From Finger Tight (F.F.F.T.) method.

A. Install the fitting into the port and tighten it down full length until finger tight.

B. If port material is steel, tighten the fitting to the listed F.F.F.T. If port material is aluminum, tighten fitting to 60% of listed F.F.F.T.

Size	F.F.F.T.
4 (1/4 in. nominal hose or tubing)	1.00 ± 0.25
6 (3/8 in.)	1.50 ± 0.25
8 (1/2 in.)	1.50 ± 0.25
10 (5/8 in.)	1.50 ± 0.25
12 (3/4 in.)	1.50 ± 0.25
16 (1 in.)	1.50 ± 0.25

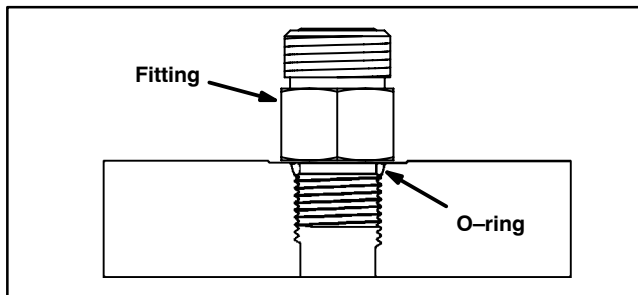


Figure 5

Fitting Dash Size	Fitting Port Side Thread Size	Installation Torque Into Steel Port	Installation Torque Into Aluminum Port
4	7/16 – 20	15 to 19 ft-lb (21 to 25 N-m)	9 to 11 ft-lb (13 to 15 N-m)
5	1/2 – 20	18 to 22 ft-lb (25 to 29 N-m)	11 to 15 ft-lb (15 to 20 N-m)
6	9/16 – 18	34 to 42 ft-lb (47 to 56 N-m)	20 to 26 ft-lb (28 to 35 N-m)
8	3/4 – 16	58 to 72 ft-lb (79 to 97 N-m)	35 to 43 ft-lb (48 to 58 N-m)
10	7/8 – 14	99 to 121 ft-lb (135 to 164 N-m)	60 to 74 ft-lb (82 to 100 N-m)
12	1 1/16 – 12	134 to 164 ft-lb (182 to 222 N-m)	81 to 99 ft-lb (110 to 134 N-m)
14	1 3/16 – 12	160 to 196 ft-lb (217 to 265 N-m)	96 to 118 ft-lb (131 to 160 N-m)
16	1 5/16 – 12	202 to 248 ft-lb (274 to 336 N-m)	121 to 149 ft-lb (165 to 202 N-m)
20	1 5/8 – 12	247 to 303 ft-lb (335 to 410 N-m)	149 to 183 ft-lb (202 to 248 N-m)

Figure 6

Adjustable Fitting (Fig. 7)

1. Make sure all threads and sealing surfaces of fitting and component port are free of burrs, nicks, scratches or any foreign material.
2. As a preventative measure against leakage, it is recommended that the O-ring be replaced any time the connection is opened.
3. Lightly lubricate the O-ring with clean hydraulic oil. Fitting threads should be clean with no lubricant applied.
4. Turn back the lock nut as far as possible. Make sure the back up washer is not loose and is pushed up as far as possible (Step 1 in Figure 8).

IMPORTANT: Before installing fitting into port, determine port material. If fitting is to be installed into an aluminum port, installation torque is reduced.

5. Install the fitting into the port and tighten finger tight until the washer contacts the face of the port (Step 2).
6. To put the fitting in the desired position, unscrew it by the required amount, but no more than one full turn (Step 3).
7. Hold the fitting in the desired position with a wrench and use a torque wrench to tighten the fitting to the recommended installation torque shown in Figure 6. This tightening process will require the use of an offset wrench (e.g. crowfoot wrench). Use of an offset wrench will affect torque wrench calibration due to the effective length change of the torque wrench. Tightening torque when using a torque wrench with an offset wrench will be lower than the listed installation torque (see Using a Torque Wrench with an Offset Wrench in the Torque Specifications section of Chapter 2 – Product Records and Maintenance).
8. If a torque wrench is not available, or if space at the port prevents use of a torque wrench, an alternate method of assembly is the Flats From Finger Tight (F.F.F.T.) method. Hold the fitting in the desired position with a wrench and, if port material is steel, tighten the lock nut with a second wrench to the listed F.F.F.T (Step 4). If port material is aluminum, tighten fitting to 60% of listed F.F.F.T.

Size	F.F.F.T.
4 (1/4 in. nominal hose or tubing)	1.00 ± 0.25
6 (3/8 in.)	1.50 ± 0.25
8 (1/2 in.)	1.50 ± 0.25
10 (5/8 in.)	1.50 ± 0.25
12 (3/4 in.)	1.50 ± 0.25
16 (1 in.)	1.50 ± 0.25

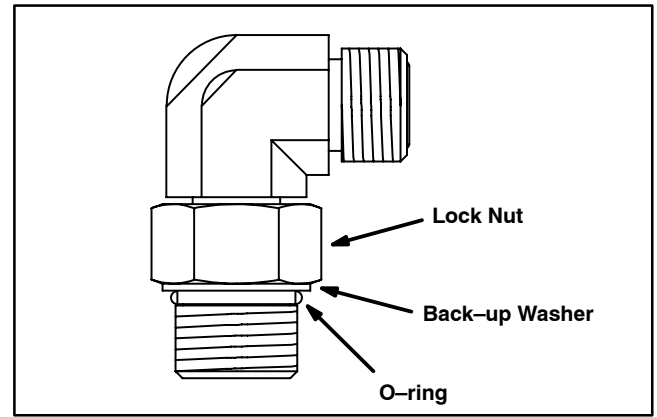


Figure 7

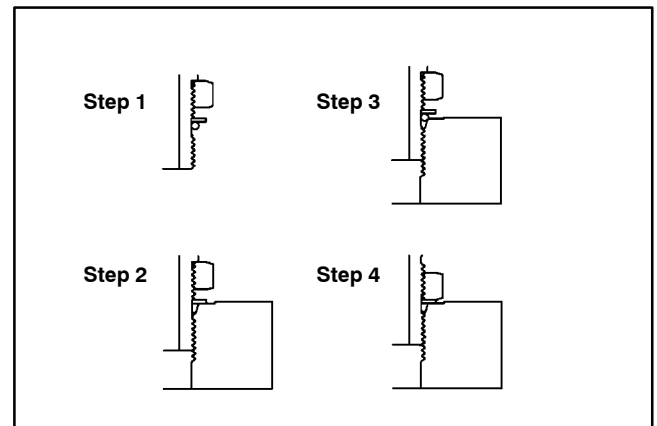
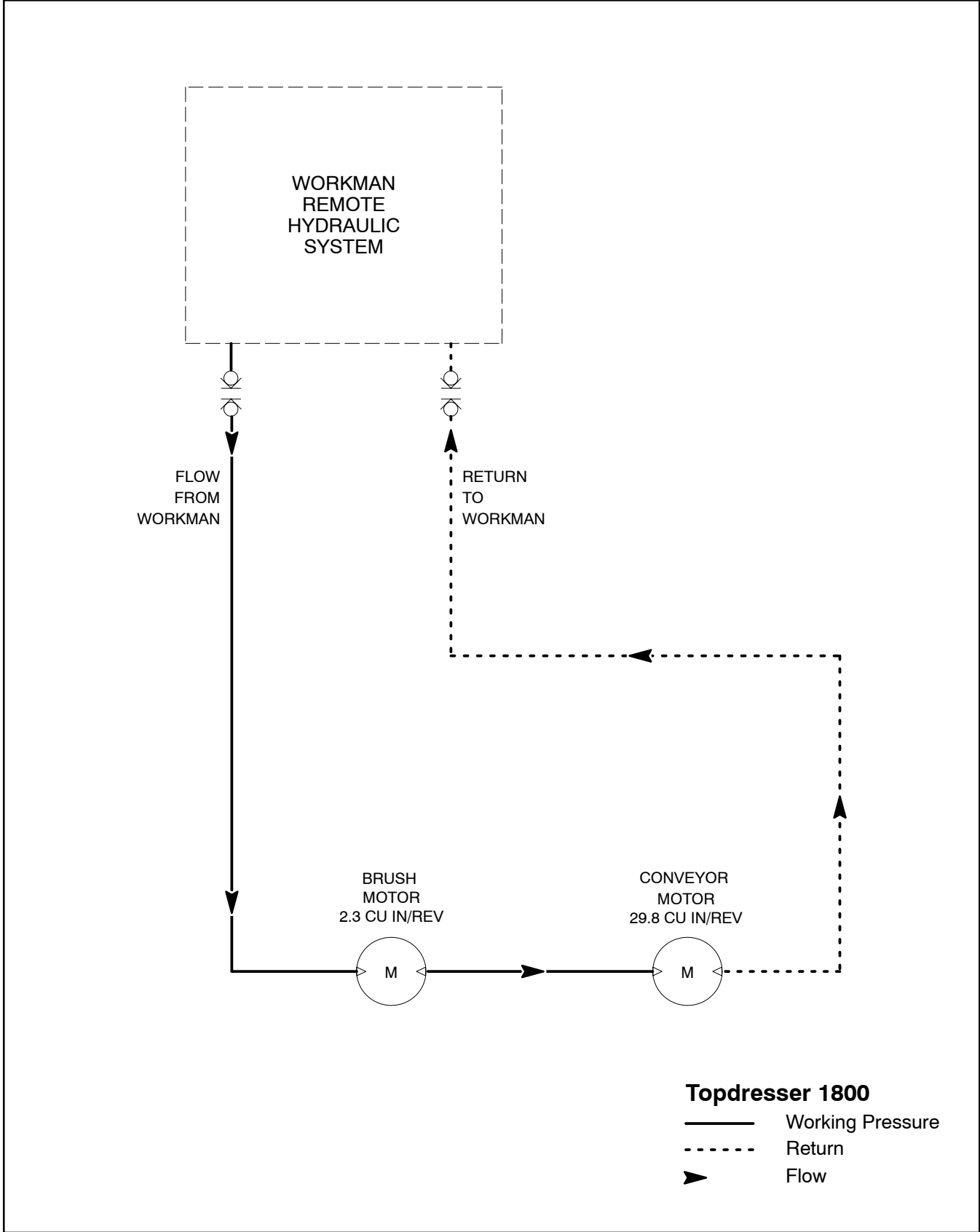


Figure 8

Hydraulic Flow Diagrams



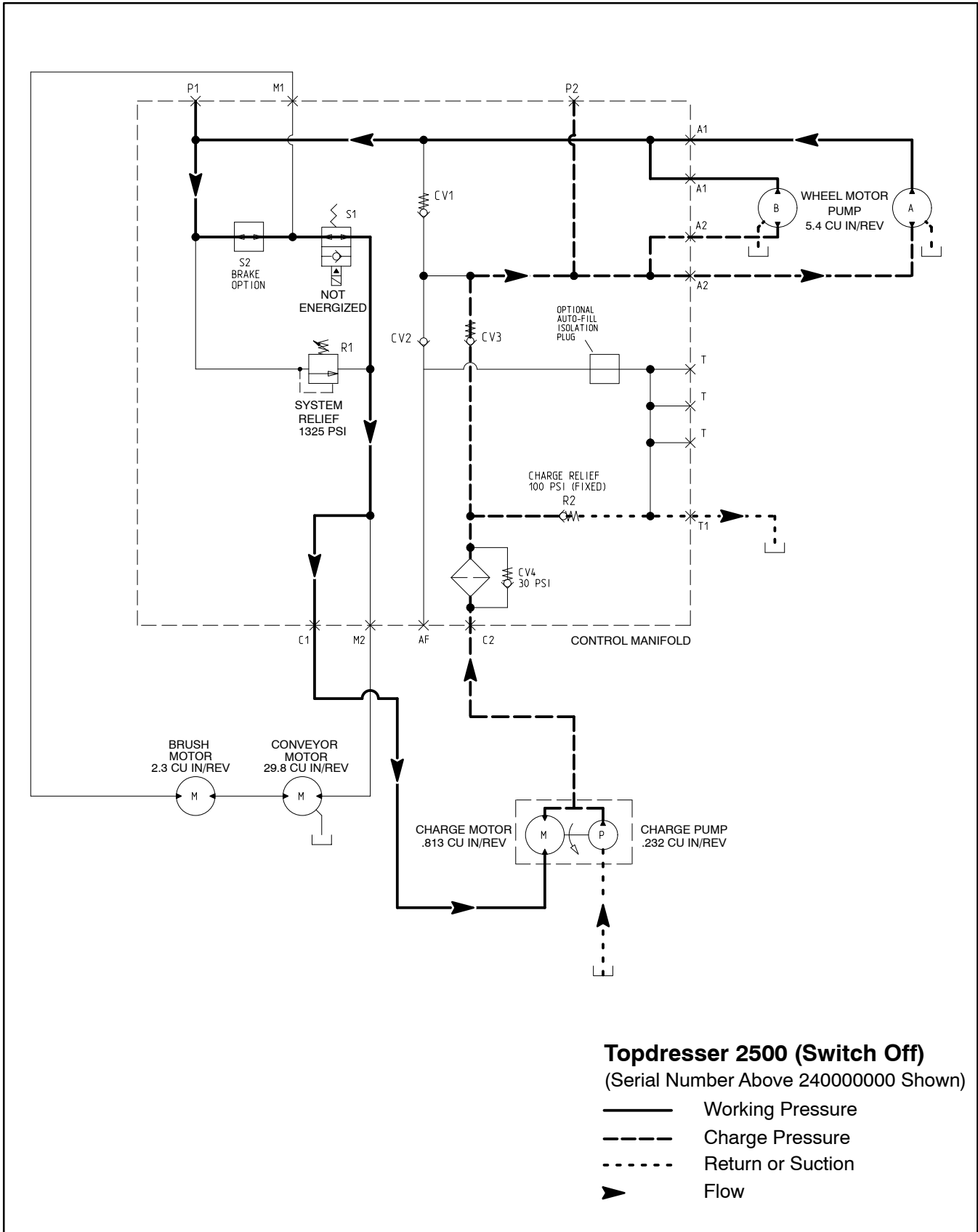
Topdresser 1800 Operation

Hydraulic flow for the Topdresser 1800 is provided by the Workman remote hydraulic system. Hydraulic flow (GPM/LPM) and relief pressure, therefore, are determined by the Workman.

When the Workman hydraulic control is in the OFF position, no flow is directed to the Topdresser so there is no operation of the brush or conveyor motors.

When the Workman hydraulic control is moved to the RUN position, flow from the Workman is directed to the Topdresser brush motor and then to the conveyor motor. Hydraulic flow causes rotation of both the brush motor and the conveyor motor which are connected in series. Oil from the Topdresser returns back to the Workman.

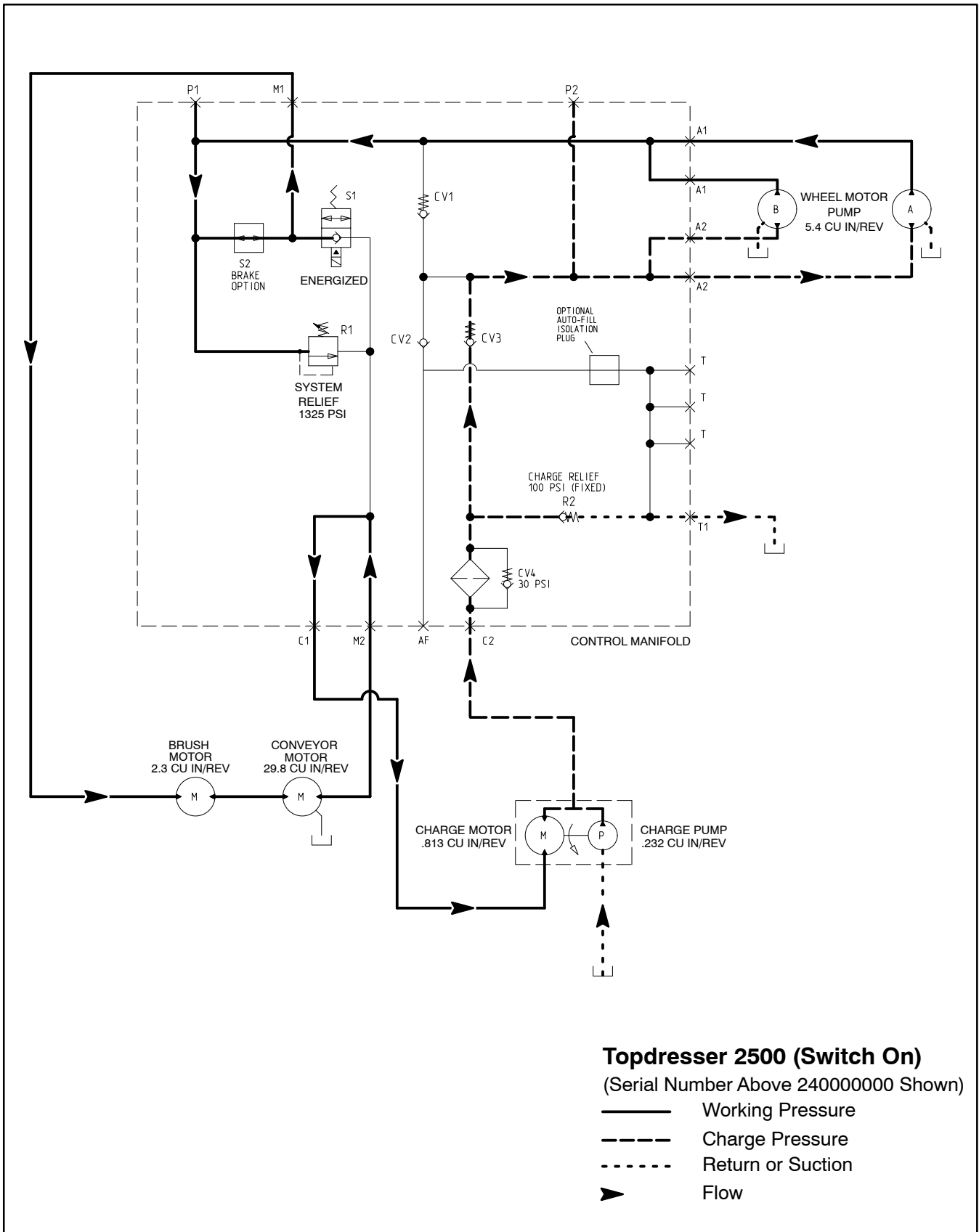
The brush is driven directly by the hydraulic brush motor. The conveyor belt is driven by the hydraulic conveyor motor with a chain reduction.



Topdresser 2500 Operation: Switch Off

While being towed in the forward direction with the Topdresser control handle switch in the OFF position, the wheel motors act as pumps to provide hydraulic flow for the system. This flow from the wheel motors is directed through the control manifold and solenoid valve S1 (not energized) to bypass the brush and conveyor motors. Flow is then directed to the charge motor/pump assembly causing the charge motor to rotate. The charge motor rotation in turn rotates the charge pump which provides charge flow to fill the hydraulic system to the wheel motors. Charge pressure is limited by the charge relief valve (R2) located in the control manifold.

If the Topdresser is towed in the reverse direction, flow from the wheel motors will reverse. Check valves CV3 and CV1, however, are placed in the hydraulic manifold to prevent reverse flow through the hydraulic system.



Topdresser 2500 Operation: Switch On

While being towed in the forward direction with the Topdresser control handle switch in the ON position, the wheel motors act as pumps to provide hydraulic flow for the system. Flow from the wheel motors is directed to the control manifold (through two ports A1). Energized solenoid cartridge valve (S1) diverts flow from the manifold (out port M1) to the brush motor and then to the conveyor motor.

Hydraulic flow causes rotation of both the brush motor and the conveyor motor which are connected in series. The brush is driven directly by the hydraulic brush motor. The conveyor belt is driven by the hydraulic conveyor motor with a chain reduction. Operating pressure is limited by the system relief valve (R1) located in the control manifold.

Flow from the conveyor motor is directed to the charge motor/pump assembly causing the charge motor to rotate. The charge motor rotation in turn rotates the charge pump which provides charge flow to fill the hydraulic system to the wheel motors. Charge pressure is limited by the charge relief valve (R2) located in the control manifold.

Because hydraulic flow is developed by the wheel motors, the hydraulic system automatically compensates for changes in ground speed to produce even application rates even though ground speed fluctuations may occur.

An optional brake kit is available for the Topdresser 2500 that uses a solenoid cartridge valve (S2) to cause hydraulic flow to bypass the brush and conveyor motors when the brakes are applied. Oil flow is directed to the main relief valve causing a pressure increase to slow the wheel motors and, therefore, the machine when braking.

Special Tools

Order special tools from your Toro Distributor.

Hydraulic Pressure Test Kit

Part Number: **TOR47009**

Use to take various pressure readings for diagnostic tests. Quick disconnect fittings provided attach directly to mating fittings on machine test ports without tools. A high pressure hose is provided for remote readings. The Pressure Test Kit contains one each: 1000 PSI (70 Bar), 5000 PSI (350 Bar) and 10000 PSI (700 Bar) gauges. Use gauges as recommended in the Testing Section of this chapter.



Figure 9

Hydraulic Tester (Pressure and Flow)

Toro Part Number: **TOR214678**

This tester requires O-ring Face Seal (ORFS) adapter fittings for use on this machine.

1. **INLET HOSE:** Hose connected from the system circuit to the inlet side of the hydraulic tester.
2. **LOAD VALVE:** A simulated working load is created in the circuit by turning the valve to restrict flow.
3. **LOW PRESSURE GAUGE:** Low range gauge to provide accurate reading at low pressure: 0 to 1000 PSI.

A protector valve cuts out when pressure is about to exceed the normal range for the gauge. The cutout pressure is adjustable.

4. **HIGH PRESSURE GAUGE:** High range gauge which accommodates pressures beyond the capacity of the low pressure gauge: 0 to 5000 PSI.
5. **FLOW METER:** This meter measures actual oil flow in the operating circuit with a gauge rated at 15 GPM.
6. **OUTLET HOSE:** A hose from the outlet side of the hydraulic tester connects to the hydraulic system circuit.



Figure 10

Hydraulic Test Fitting Kit

Toro Part Number: **TOR4079**

This kit includes a variety of O-ring face seal fittings to enable connection of test gauges to the system.

The kit includes: tee's, unions, reducers, plugs, caps and male test fittings.








TORO TEST FITTING KIT (TOR4079)			
FITTING	TOOL NUMBER	FITTING	TOOL NUMBER
	Swivel Nut Run Tee (2 ea.) Size Toro No. No. 4 TOR4079-3 No. 6 TOR4079-12 No. 8 TOR4079-4 No. 10 TOR4079-5		Union (1 ea.) Size Toro No. No. 6 to No. 8 TOR4079-8 No. 10 to No. 8 TOR4079-2 No. 6 to No. 8 TOR4079-6
	Plug (2 ea.) Size Toro No. No. 4 TOR4079-13 No. 6 TOR4079-14 No. 8 TOR4079-15 No. 10 TOR4079-16		Reducer (1 ea.) Size Toro No. No. 10 to No. 8 TOR4079-7 No. 12 to No. 8 TOR4079-0
	Cap (2 ea.) Size Toro No. No. 4 TOR4079-17 No. 6 TOR4079-18 No. 8 TOR4079-19 No. 10 TOR4079-20		Test Cap Fitting (2 ea.) Size Toro No. No. 4 TOR4079-10 No. 6 TOR4079-11 No. 8 TOR4079-21 No. 10 TOR4079-1
			Test Fitting (2 ea.) Size Toro No. 7/16-20 ORB TOR4079-22 1/8" Pipe Thd. TOR4079-23

Figure 11

O-ring Kit

Part Number: **16-3799**

The O-ring kit includes O-rings in a variety of sizes for face seal and port seal hydraulic connections. As a preventative measure against leakage, it is recommended that an O-ring be replaced any time a hydraulic connection is opened.



Figure 12

Troubleshooting

The cause of an improperly functioning hydraulic system is best diagnosed with the use of proper testing equipment and a thorough understanding of the complete hydraulic system.

A hydraulic system with an excessive increase in heat or noise has a potential for failure. Should either of these conditions be noticed, immediately stop the machine, turn off the tow vehicle engine, locate the cause of the trouble and correct it before allowing the machine to be used again. Continued use of an improperly functioning hydraulic system could lead to extensive hydraulic component damage.

The charts that follow contain information to assist in troubleshooting. There may possibly be more than one cause for a machine malfunction.

NOTE: The Workman vehicle hydraulic system is used to operate the Topdresser 1800. When troubleshooting a hydraulic problem on the Topdresser 1800, inspect the Workman hydraulic system if both brush motor and conveyor motor are malfunctioning. If only one of the motors appears to be malfunctioning, check that motor.

Problem	Possible Cause
Hydraulic oil leaks.	Hydraulic fitting(s) or hose(s) are loose or damaged. O-ring(s) or seal(s) are missing or damaged.
Foaming hydraulic fluid.	Hydraulic oil level in hydraulic reservoir is low. Hydraulic system has wrong kind of oil. Hydraulic system on Workman vehicle is malfunctioning (Topdresser 1800).
Hydraulic system operates hot.	Hydraulic oil level in hydraulic reservoir is low. Excessive dirt and debris on hydraulic components. Hydraulic oil is contaminated or too light. Brush or conveyor motor is worn or damaged. Hydraulic system on Workman vehicle is malfunctioning (Topdresser 1800). Optional hydraulic brakes are activated continuously (Topdresser 2500).

<p>Neither brush motor nor conveyor motor will rotate.</p>	<p>Hydraulic hose(s) to Workman vehicle are not connected (Topdresser 1800).</p> <p>Hydraulic system on Workman vehicle is malfunctioning (Topdresser 1800).</p> <p>Control manifold solenoid (S1) is not being energized or cartridge is faulty (Topdresser 2500).</p> <p>Electrical problem exists (Topdresser 2500) (see Chapter 4 – Electrical System).</p> <p>Wheel motors are not turning due to chain drive problem (Topdresser 2500).</p> <p>Wheel motors are worn or damaged (Topdresser 2500).</p>
<p>Brush motor and/or conveyor motor rotate in wrong direction.</p>	<p>Hydraulic hoses to Workman vehicle are reversed (Topdresser 1800).</p> <p>Hydraulic hoses to brush motor and/or conveyor motor are reversed.</p> <p>Hydraulic hoses reversed at control manifold or wheel motors (Topdresser 2500).</p>

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Testing


The most effective method for isolating problems in the hydraulic system is by using hydraulic test equipment such as pressure gauges in the circuits during various operational checks (see the Special Tools section in this Chapter).


NOTE: The Workman vehicle remote hydraulic system is used to operate the Topdresser 1800. Therefore, when troubleshooting a hydraulic problem on the Topdresser 1800, perform hydraulic tests on the Workman vehicle.


Before Performing Hydraulic Tests

IMPORTANT: All obvious areas such as oil supply, oil filter, binding linkages, loose fasteners or improper adjustments must be checked before assuming that a hydraulic component is the source of a hydraulic system problem.


Precautions for Hydraulic Testing

	CAUTION
Failure to use gauges with expected pressure (psi) rating as listed in test procedures could result in damage to the gauge and possible personal injury from leaking hot oil.	

	CAUTION
All testing should be performed by two (2) people. One person should be in the seat to operate the machine and the other should read and record test results.	

	WARNING
Keep body and hands away from pin hole leaks or nozzles that eject hydraulic fluid under high pressure. Do not use hands to search for leaks; use paper or cardboard. Hydraulic fluid escaping under pressure can have sufficient force to penetrate the skin and cause serious injury. If fluid is injected into the skin, it must be surgically removed within a few hours by a doctor familiar with this type of injury. Gangrene may result from such an injury.	

1. Clean machine thoroughly before disconnecting or disassembling any hydraulic component. Always keep in mind the need for cleanliness when working on hydraulic equipment. Contamination can cause excessive wear or binding of hydraulic components.
2. Review all test steps before starting the test procedure.
3. Before testing, check all control linkages for improper adjustment, binding or broken parts.
4. All hydraulic tests should be made with the hydraulic oil at normal operating temperature.

	WARNING
Before disconnecting or performing any work on the hydraulic system, all pressure in the system must be relieved. See Relieving Hydraulic System Pressure in the General Information section of this chapter.	

5. Put metal caps or plugs on any hydraulic lines left open or exposed during testing.
6. Install hydraulic fittings finger tight and far enough to make sure that they are not cross-threaded before tightening them with a wrench.
7. Position tester hoses to prevent rotating machine parts from contacting and damaging the hoses or tester.
8. After connecting test equipment, check oil level in the hydraulic tank to make sure that oil level is correct.
9. When conducting tests on the hydraulic system, wear eye protection.

Charge Pressure Test

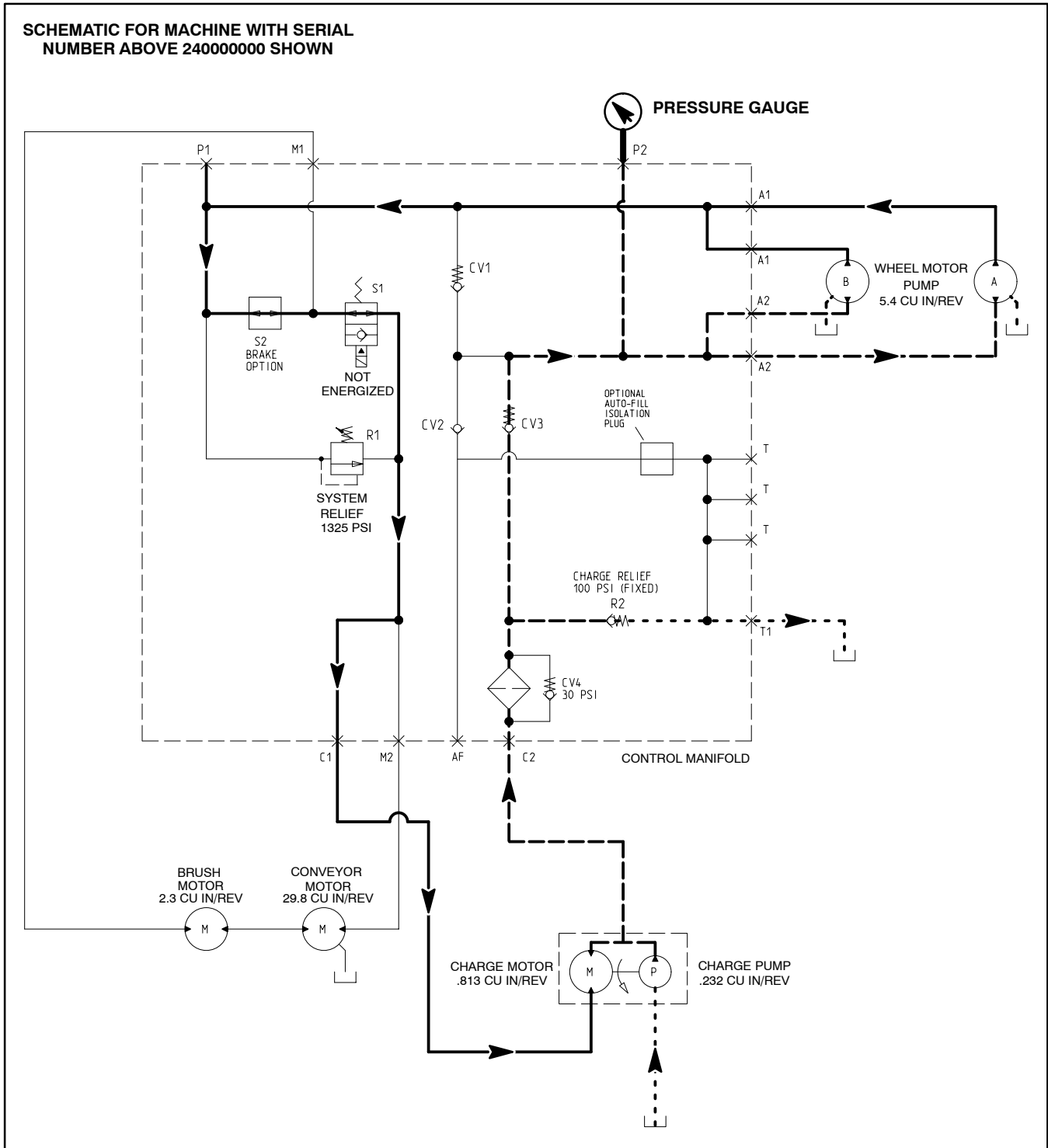


Figure 13

NOTE: The Charge Pressure Test pertains only to Topdresser 2500 machines.

Procedure for Charge Pressure Test:

1. Make sure hydraulic oil is at normal operating temperature by operating the machine for approximately 10 minutes.
2. Park machine on a level surface. Make sure tow vehicle engine is off and that the parking brake is applied.
3. Read and follow Precautions for Hydraulic Testing.

IMPORTANT: Make sure to thoroughly clean around all hydraulic connections that will be disassembled.

4. Locate and remove plug from the P2 port on the hydraulic control manifold (Figs. 14 and 15).

5. Connect pressure gauge with a hydraulic hose attached to the P2 port on the hydraulic control manifold. Make sure hose is long enough so the operator can read the gauge while driving the tow vehicle.

6. Start engine on tow vehicle and tow the Topdresser at a minimum of **3 MPH**. Leave the Topdresser control handle switch in the OFF position.

7. The pressure gauge will display system charge pressure and should read at least **50 PSI (3.4 bar)**. Record test results.

8. Stop tow vehicle, shut off engine and record test results.

9. If charge pressure specification is not met, inspect, repair or replace charge relief valve (R2) in hydraulic control manifold. Also, consider a clogged oil filter, air in the hydraulic system or a worn charge motor/pump.

10. Remove pressure gauge from hydraulic manifold and install plug into manifold port P2. Torque plug **19 ft-lb (25.7 N-m)**.

11. After testing is completed, make sure hydraulic tank is full.

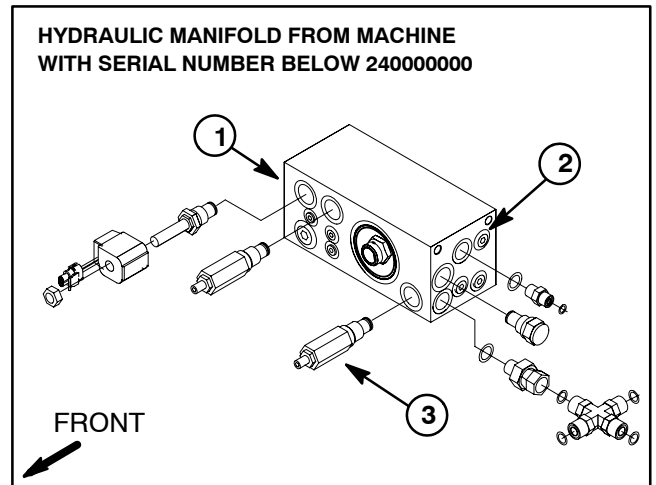


Figure 14

1. Hydraulic manifold
2. P2 port
3. Charge relief valve R2

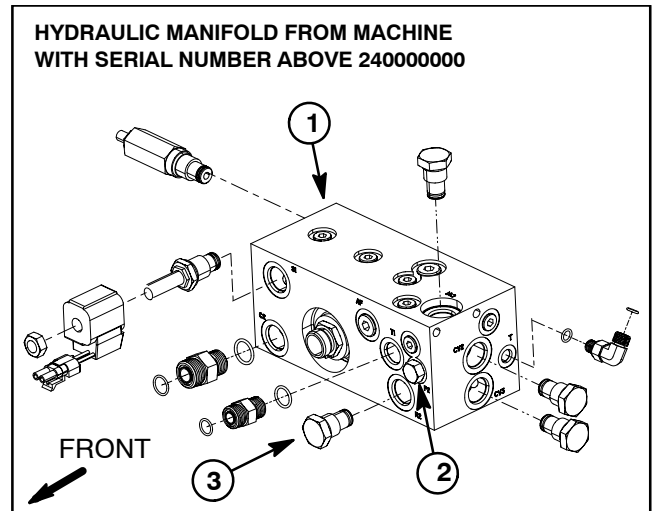


Figure 15

1. Hydraulic manifold
2. P2 port
3. Charge relief valve R2

System Relief Valve (R1) Pressure Test

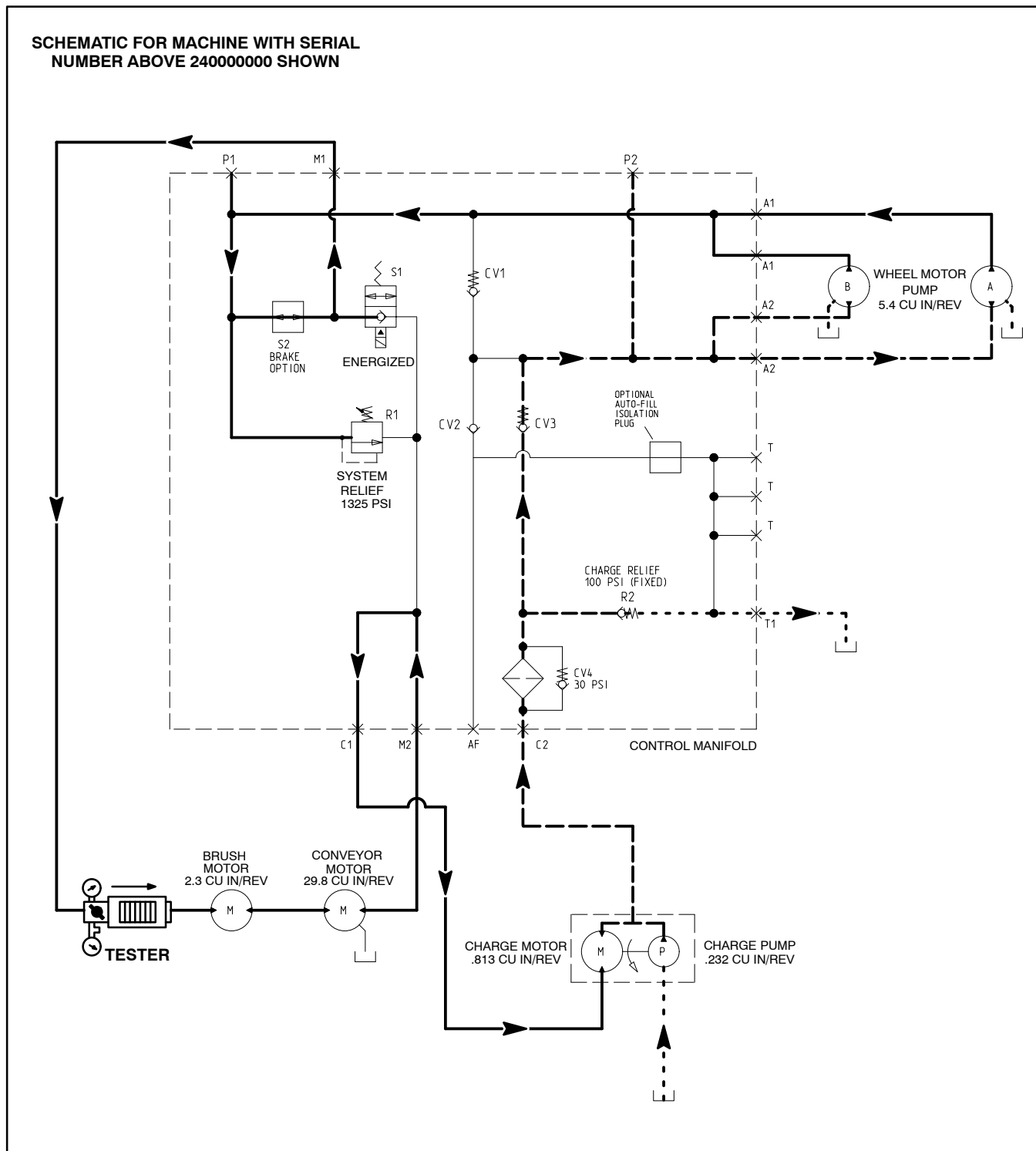


Figure 16

NOTE: The System Relief Valve (R1) Pressure Test pertains only to Topdresser 2500 machines.

Procedure for System Relief Valve (R1) Pressure Test:

1. Make sure hydraulic oil is at normal operating temperature by operating the machine for approximately 10 minutes.
2. Park machine on a level surface. Make sure tow vehicle engine is off and that the parking brake is applied.
3. Read and follow Precautions for Hydraulic Testing.

NOTE: If machine is equipped with optional brake kit, system relief pressure can be measured with a pressure gauge installed in manifold port (P1). While towing the machine with the brakes applied (minimum of **3 MPH**), system relief pressure will be displayed on the pressure gauge (see step 7 below).

IMPORTANT: Make sure to thoroughly clean around all hydraulic connections that will be disassembled.

4. Disconnect hydraulic hose from 45° hydraulic fitting on the brush motor to allow hydraulic tester (flow meter) installation (Fig. 17).
5. Install hydraulic tester (flow meter) between disconnected hose and fitting. Make sure that tester flow arrow points from the hose and into the fitting. **Fully close the flow control valve on the tester.**
6. Make sure hydraulic tank is full.
7. Start engine on tow vehicle and move the Topdresser control handle switch to the ON position. Tow the Topdresser at a minimum of **3 MPH** while monitoring the pressure gauge on the hydraulic tester.
8. Once system pressure builds to relief setting, the pressure gauge will display system relief pressure:

For machines with **serial number below 240000000**, system relief pressure should be approximately **1500 PSI (103 bar)**.

For machines with **serial number above 240000000**, system relief pressure should be approximately **1325 PSI (91 bar)**.

9. Stop tow vehicle, shut off engine and record test results.
10. If relief pressure specification is not met, inspect, repair or adjust charge relief valve (R1) in hydraulic control manifold (Figs. 18 and 19). Also, consider air in the hydraulic system, a leaking hydraulic manifold check valve (CV1) or worn wheel motors.
11. When testing is complete, remove hydraulic tester. Connect hydraulic hose to fitting on brush motor. Make sure hydraulic tank is full.

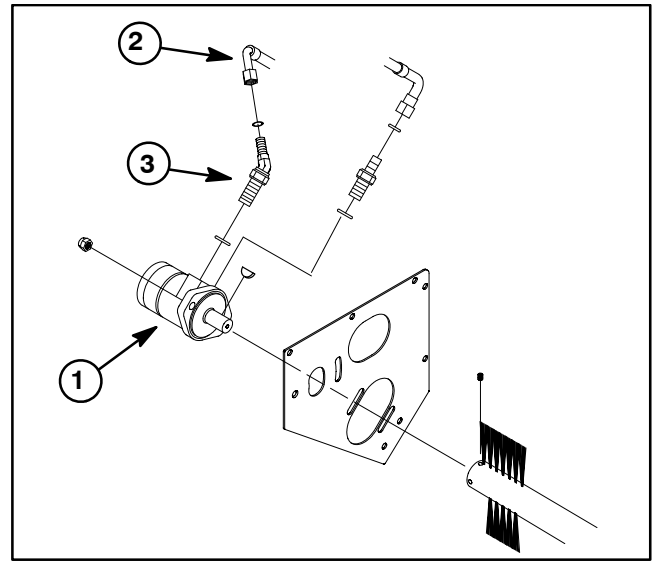


Figure 17

1. Brush motor
2. Hydraulic hose
3. 45° hydraulic fitting

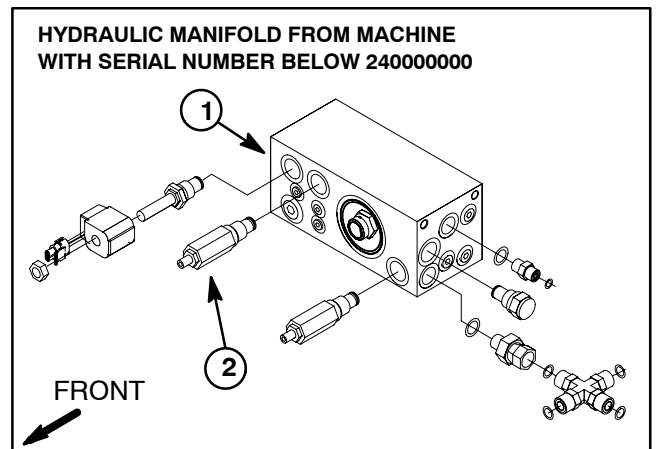


Figure 18

1. Hydraulic manifold
2. Charge relief valve R2

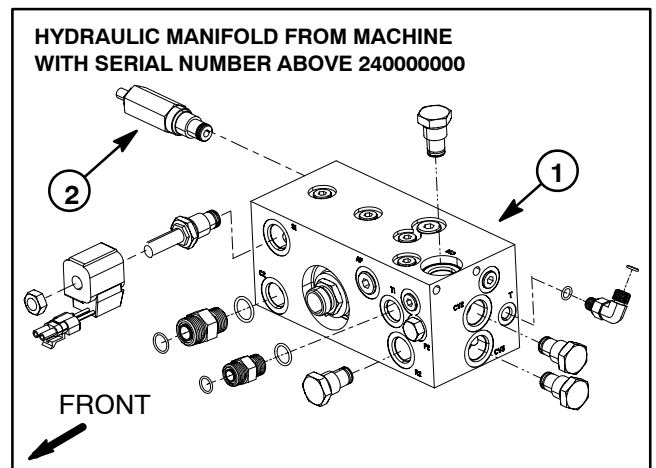


Figure 19

1. Hydraulic manifold
2. Charge relief valve R2

System Flow Test

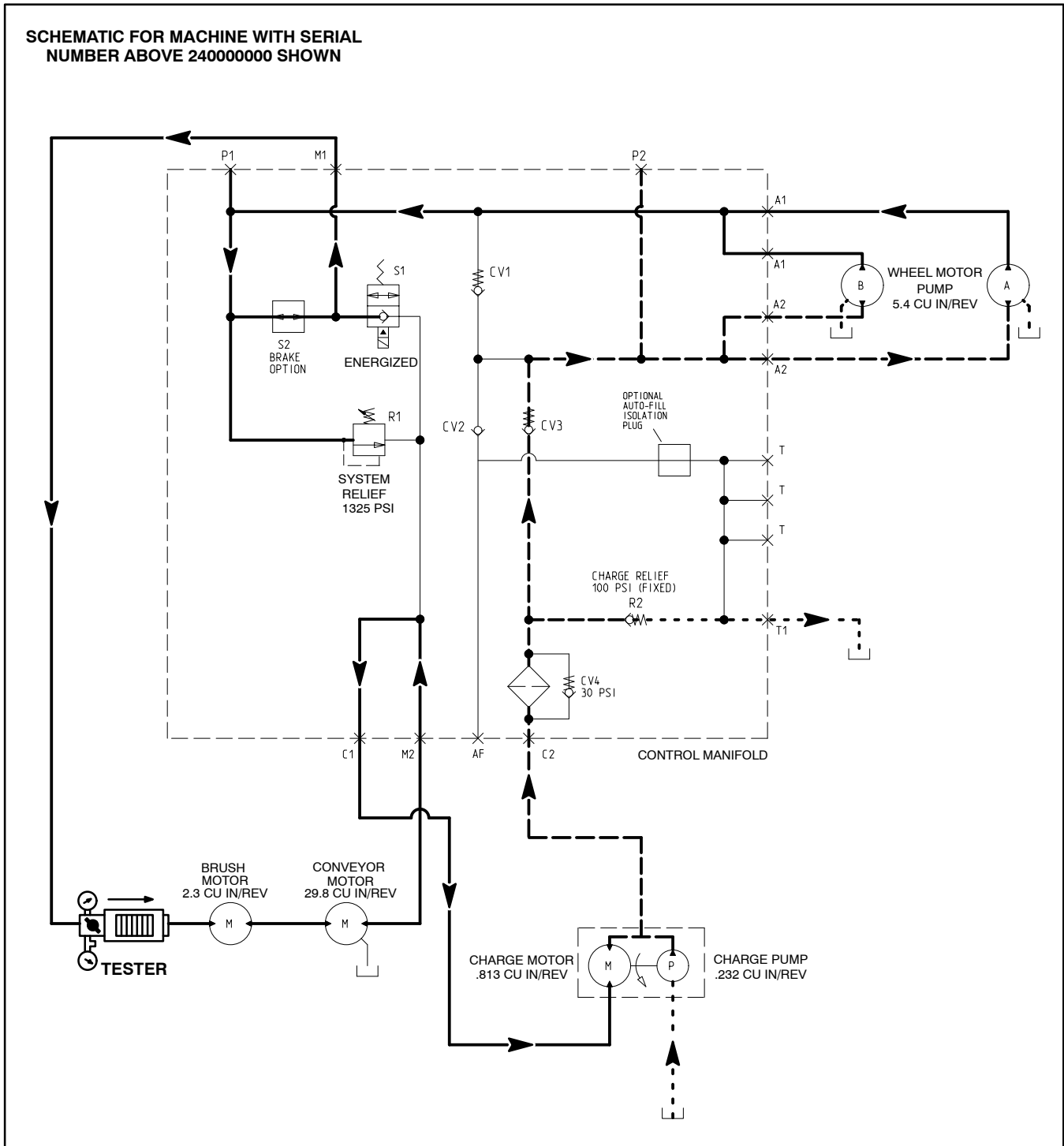


Figure 20

NOTE: The System Flow Test pertains only to Top-dresser 2500 machines.

Procedure for System Flow Test:

1. Make sure hydraulic oil is at normal operating temperature by operating the machine for approximately 10 minutes.
2. Park machine on a level surface. Make sure tow vehicle engine is off and that the parking brake is applied.
3. Read and follow Precautions for Hydraulic Testing.

IMPORTANT: Make sure to thoroughly clean around all hydraulic connections that will be disassembled.

4. Disconnect hydraulic hose from 45° hydraulic fitting on the brush motor to allow hydraulic tester (flow meter) installation (Fig. 17).

5. Install hydraulic tester (flow meter) between disconnected hose and fitting. Make sure that tester flow arrow points from the hose and into the fitting. **Make sure the flow control valve on the tester is fully open.**

6. Start engine on tow vehicle and tow the Topdresser. Turn the Topdresser control handle switch to the ON position. While operating the machine, monitor the vehicle speed and the hydraulic tester flow gauge. System Flow is dependant on ground speed and should be as shown in the chart to the right (Fig. 22).

7. If system flow is less than specified, consider that one or both of the wheel motors are worn or inefficient. It should be noted that if system flow is low, operation of both the brush motor and the conveyor motor would be affected.

8. When testing is complete, remove hydraulic tester (flow meter) and connect hose to brush motor fitting. Make sure hydraulic tank is full.

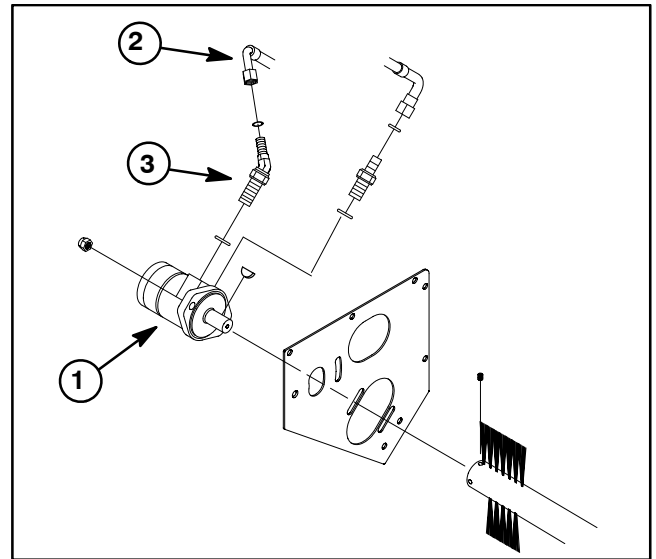


Figure 21

1. Brush motor
2. Hydraulic hose
3. 45° hydraulic fitting

Ground Speed	System Flow
2 MPH (3.2 KPH)	1.8 GPM (6.8 LPM)
3 MPH (4.8 KPH)	2.7 GPM (10.2 LPM)
4 MPH (6.4 KPH)	3.6 GPM (13.6 LPM)
5 MPH (8.0 KPH)	4.5 GPM (17.0 LPM)

Figure 22

Brush Motor Efficiency Test

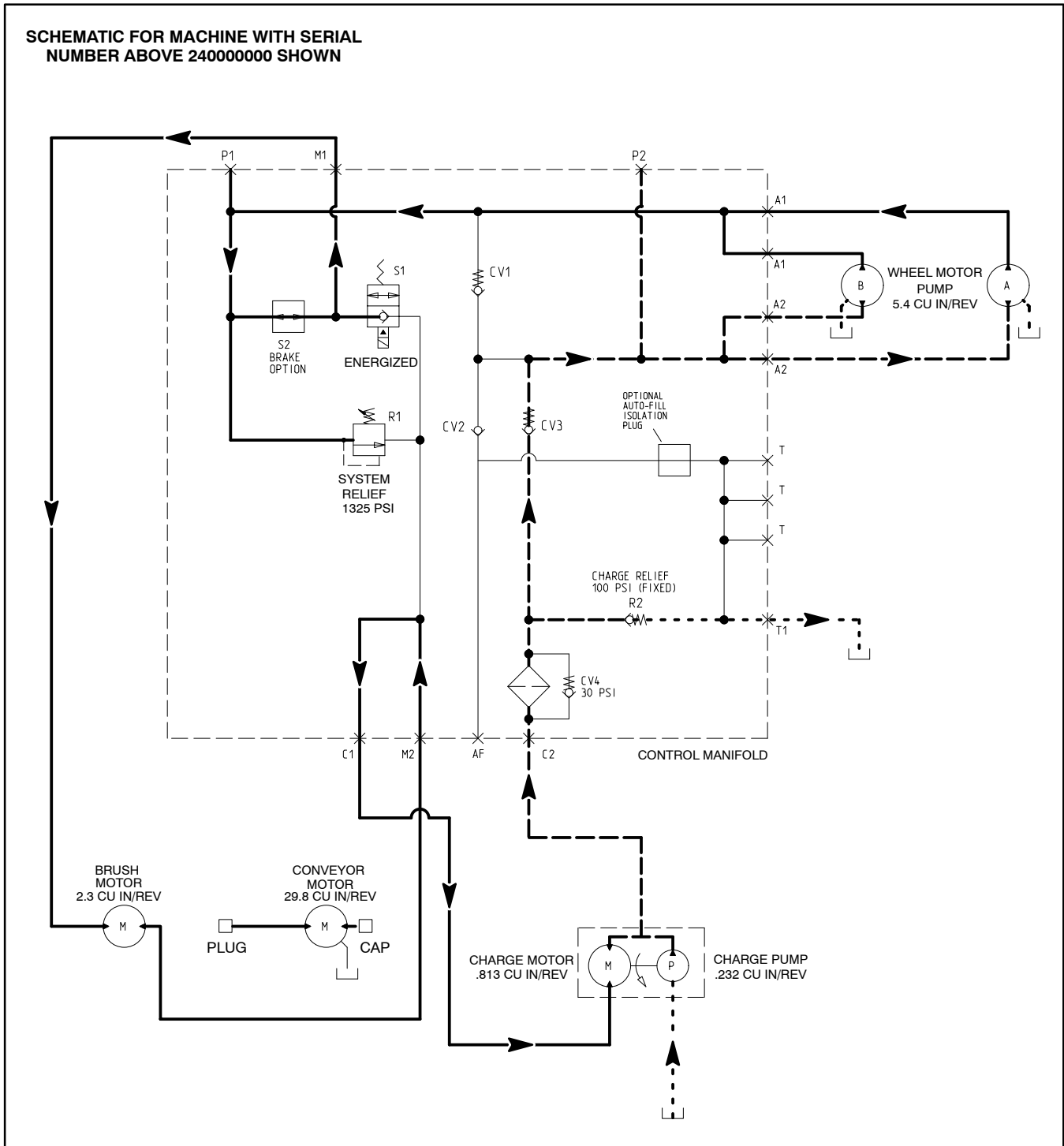


Figure 23

NOTE: The Brush Motor Efficiency Test pertains only to Topdresser 2500 machines.

Rotation speed of the Topdresser brush can be measured with a rotating contact RPM indicator to see if brush motor performance is correct. Before performing this test, the System Flow Test should be completed to make sure that hydraulic flow from the wheel motors is correct.

NOTE: The brush motor rotation speed will be affected by brush bearing condition and/or binding of the brush assembly. Make sure that these items are checked before proceeding with this test procedure.

Procedure for Brush Motor Efficiency Test:

1. Perform System Flow Test to make sure that wheel motor output (flow) is correct.

IMPORTANT: Make sure to thoroughly clean around all hydraulic connections that will be disassembled.

2. Remove conveyor motor from the hydraulic system to allow accurate testing of the brush motor:

A. Disconnect hydraulic hose from the straight hydraulic fitting on the brush motor (Fig. 24). Install a clean steel plug into disconnected hose end.

B. Disconnect hydraulic hose from the longer elbow fitting on the conveyor motor (Fig. 25). Install a clean steel cap onto the fitting.

C. Pull hose that was disconnected from conveyor motor through hole in frame. Connect this hose to the open fitting on brush motor to allow a complete hydraulic circuit for brush motor operation. Make sure that hose is safely positioned away from the brush and other rotating machine parts.

3. Start engine on tow vehicle and tow the Topdresser. Turn the Topdresser control handle switch to the ON position.

4. While operating the machine, monitor the vehicle speed and the brush rotational speed using a rotating contact RPM indicator. Brush speed is dependant on ground speed and should be as shown in the chart to the right (Fig. 26).

5. If system flow is correct and brush RPM is low, consider that the brush motor is worn or leaking internally.

NOTE: If system flow and brush RPM are correct and conveyor is not operating correctly, thoroughly inspect conveyor rollers and bearings for wear or damage. If conveyor components are found to be in good condition, consider that the conveyor motor needs repair.

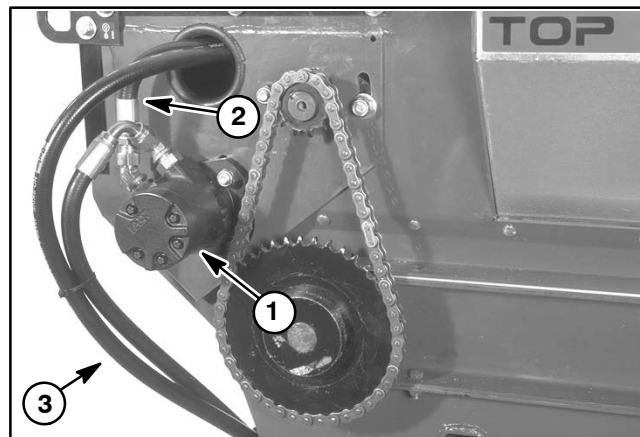


Figure 24

- 1. Brush motor
- 2. Hose (supply) to conveyor motor
- 3. Hose (return) to hydraulic manifold

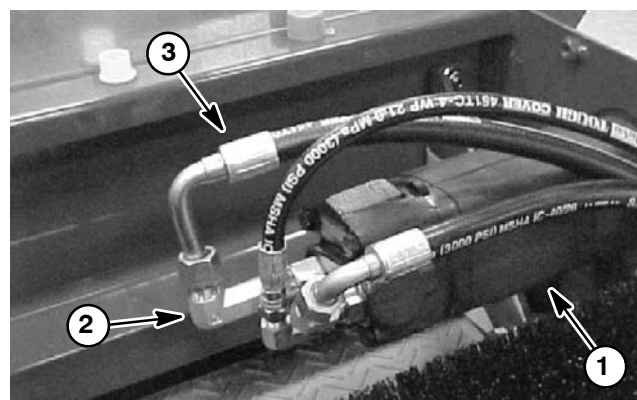


Figure 25

- 1. Conveyor motor
- 2. Longer elbow fitting
- 3. Hose (return) to hydraulic manifold

Ground Speed	Brush RPM
2 MPH (3.2 KPH)	160–180 RPM
3 MPH (4.8 KPH)	245–270 RPM
4 MPH (6.4 KPH)	325–360 RPM
5 MPH (8.0 KPH)	405–450 RPM

Figure 26

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Service and Repairs

General Precautions for Removing and Installing Hydraulic System Components

Before Repair or Replacement of Components

1. Before removing any parts from the hydraulic system, empty Topdresser hopper and position machine on a level surface.
2. On Topdresser 2500 machines, chock Topdresser wheels to prevent machine from moving while repairing machine. If attached to tow vehicle, engage tow vehicle parking brake, stop engine and remove key from the ignition switch.
3. Thoroughly clean Topdresser before disconnecting, removing or disassembling any hydraulic components. Make sure hydraulic components, hoses, connections and fittings are cleaned thoroughly. Always keep in mind the need for cleanliness when working on hydraulic equipment.
4. Put caps or plugs on any hydraulic lines, hydraulic fittings or hydraulic components left open or exposed to prevent hydraulic system contamination.
5. Put labels on disconnected hydraulic lines and hoses for proper installation after repairs are completed.
6. Note the position of hydraulic fittings (especially elbow fittings) on hydraulic components before removal. Mark parts if necessary to make sure they will be aligned properly when reinstalling hydraulic hoses.

After Repair or Replacement of Components

1. If component failure was severe or if hydraulic system is contaminated, drain entire hydraulic system. Drain and flush all hoses and components. Also, change oil filter.
2. Lubricate O-rings and seals with clean hydraulic oil before installing hydraulic components.
3. Make sure caps or plugs are removed from the hydraulic hoses, hydraulic fittings and components before reconnecting.
4. Use proper tightening methods when installing hydraulic hoses and fittings (see Hydraulic Fitting Installation in the General Information section of this chapter).
5. After hydraulic repairs are completed, but before operating the Topdresser, check oil level in the hydraulic reservoir and add correct oil if necessary.
6. After disconnecting or replacing any hydraulic component, operate machine functions slowly until air is out of system. If an air lock has occurred (maybe caused by partial drainage during disassembly), it may be necessary to crack open the highest point hydraulic line near the brush motor, while slowly operating the unit, to purge air from the closed circuit.
7. Check for hydraulic oil leaks and correct leaks if found.

Check Hydraulic Lines and Hoses



WARNING

Keep body and hands away from pin hole leaks or nozzles that eject hydraulic fluid under high pressure. Use paper or cardboard, not hands, to search for leaks. Hydraulic fluid escaping under pressure can have sufficient force to penetrate the skin and cause serious injury. If fluid is injected into the skin, it must be surgically removed within a few hours by a doctor familiar with this type of injury. Gangrene may result from such an injury.

Check hydraulic hoses daily for leaks, kinked lines, loose mounting supports, wear, loose fittings, weather deterioration and/or chemical deterioration. Make all necessary repairs before operating the Topdresser.

Brush Motor

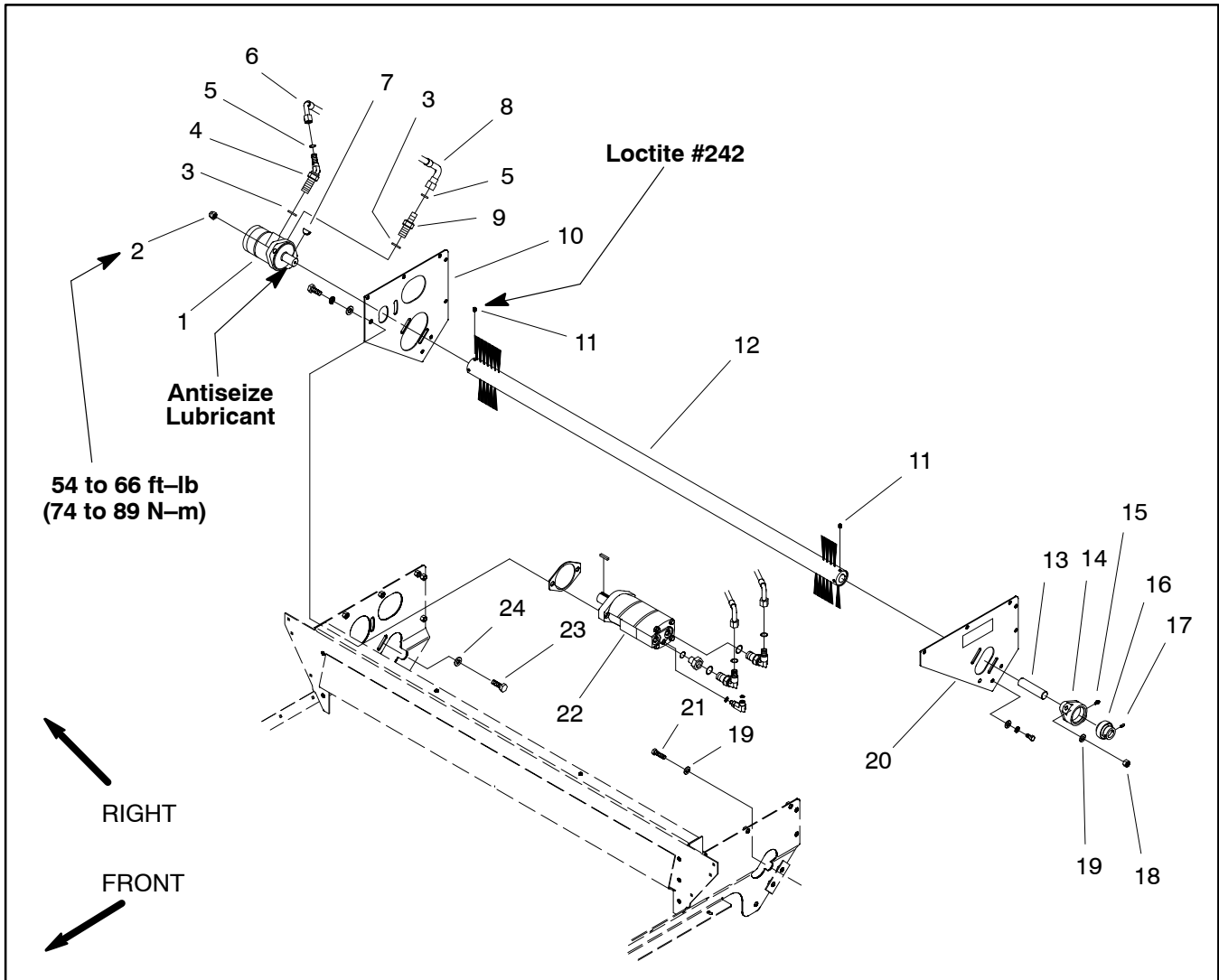


Figure 27

- 1. Hydraulic brush motor
- 2. Lock nut (2 used)
- 3. O-ring
- 4. 45° hydraulic fitting
- 5. O-ring
- 6. Hydraulic hose
- 7. Woodruff key
- 8. Hydraulic hose

- 9. Hydraulic fitting
- 10. RH motor brace
- 11. Set screw (4 used)
- 12. Brush
- 13. Brush shaft
- 14. Flange bearing
- 15. Grease fitting
- 16. Locking collar

- 17. Set screw
- 18. Lock nut (2 used)
- 19. Flat washer (4 used)
- 20. LH motor brace
- 21. Cap screw (2 used)
- 22. Hydraulic conveyor motor
- 23. Cap screw (2 used)
- 24. Flat washer (2 used)

Removal (Fig. 27)

1. Empty Topdresser hopper and position machine on a level surface. Chock wheels to prevent machine from moving. If Topdresser is attached to tow vehicle, engage tow vehicle parking brake, stop engine and remove key from the ignition switch.
2. Remove brush guard from machine to gain access to brush motor (see Brush Guard Removal in the Service and Repairs section of Chapter 5 – Chassis).
3. Read the General Precautions for Removing and Installing Hydraulic System Components at the beginning of the Service and Repairs section of this chapter.
4. Label all hydraulic connections for assembly purposes. Thoroughly clean hydraulic hoses and fittings prior to loosening hydraulic lines at brush motor.
5. Disconnect hydraulic lines from hydraulic fittings on brush motor. Allow hydraulic oil to drain from lines into a suitable container. Put caps or plugs on open hydraulic lines and fittings to prevent contamination. Remove and discard O-rings.
6. Support brush to prevent it from shifting during brush motor removal.
7. Loosen two (2) set screws (item 11) that secure brush shaft to brush motor shaft.
8. Support brush motor to prevent it from shifting. Remove two (2) cap screws (item 23), flat washers (item 24) and lock nuts (item 2) that secure motor to frame. Slide brush motor from the brush shaft and remove from machine. Locate and retrieve woodruff key from motor shaft.
9. If required, remove hydraulic fittings and O-rings from the brush motor. Discard O-rings.

Installation (Fig. 27)

1. If removed, install hydraulic fittings with new O-rings into the brush motor ports (see Hydraulic Fitting Installation in the General Information section of this chapter).
2. Apply antiseize lubricant to motor shaft. Position woodruff key into motor shaft keyway.
3. Align motor shaft with brush shaft. Slide motor shaft into brush shaft and secure brush motor to frame with two (2) cap screws (item 23), flat washers (item 24) and lock nuts (item 2). Torque lock nuts from **54 to 66 ft-lb (74 to 89 N-m)**.
4. Apply Loctite #242 (or equivalent) to threads of set screws (item 11). Secure brush shaft to motor shaft by tightening set screws.
5. Remove caps or plugs that were put on any hydraulic lines and fittings during disassembly.
6. Lubricate new O-rings with clean hydraulic oil and position on fittings. Using labels made during removal, correctly connect and secure hydraulic hoses to hydraulic fittings on brush motor.
7. Check brush adjustment. Brush should be adjusted evenly across belt area with light bristle contact at top of belt cleats. If necessary, adjust brush.
8. Install brush guard to machine (see Brush Guard Installation in the Service and Repairs section of Chapter 5 – Chassis).

Brush Motor Service

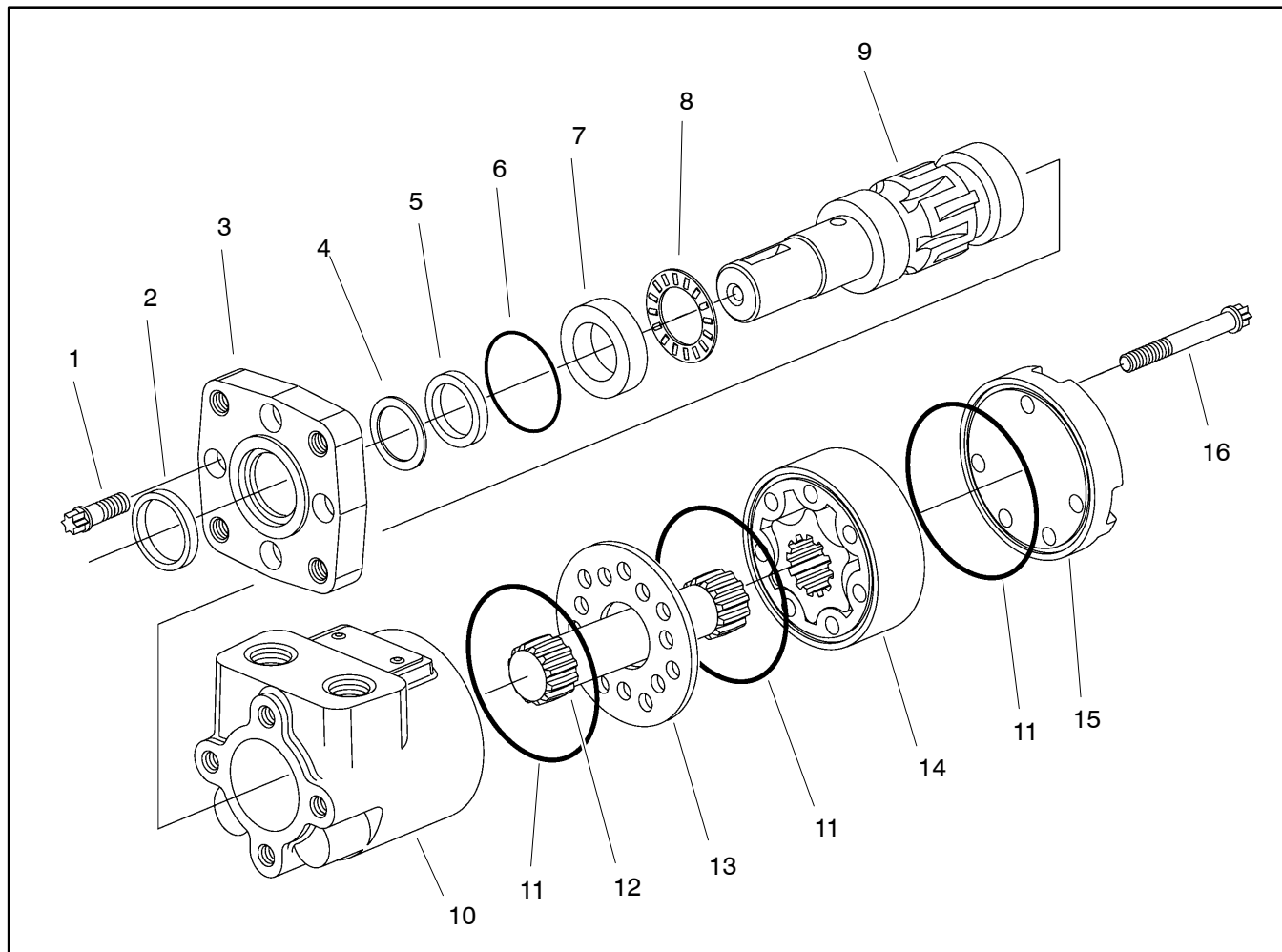


Figure 28

- 1. Cap screw (4 used)
- 2. Exclusion seal
- 3. Mounting flange
- 4. Backup washer
- 5. Pressure seal
- 6. Seal

- 7. Bearing race
- 8. Thrust bearing
- 10. Housing
- 11. Seal (3 used)

- 12. Drive
- 13. Spacer plate
- 14. Gerotor assembly
- 15. End cap
- 16. Cap screw (5 used)

NOTE: For service of the hydraulic brush motor, see the Eaton (Char-Lynn) A-Series General Purpose Gerotor Motor Repair Information at the end of this chapter.

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Conveyor Motor

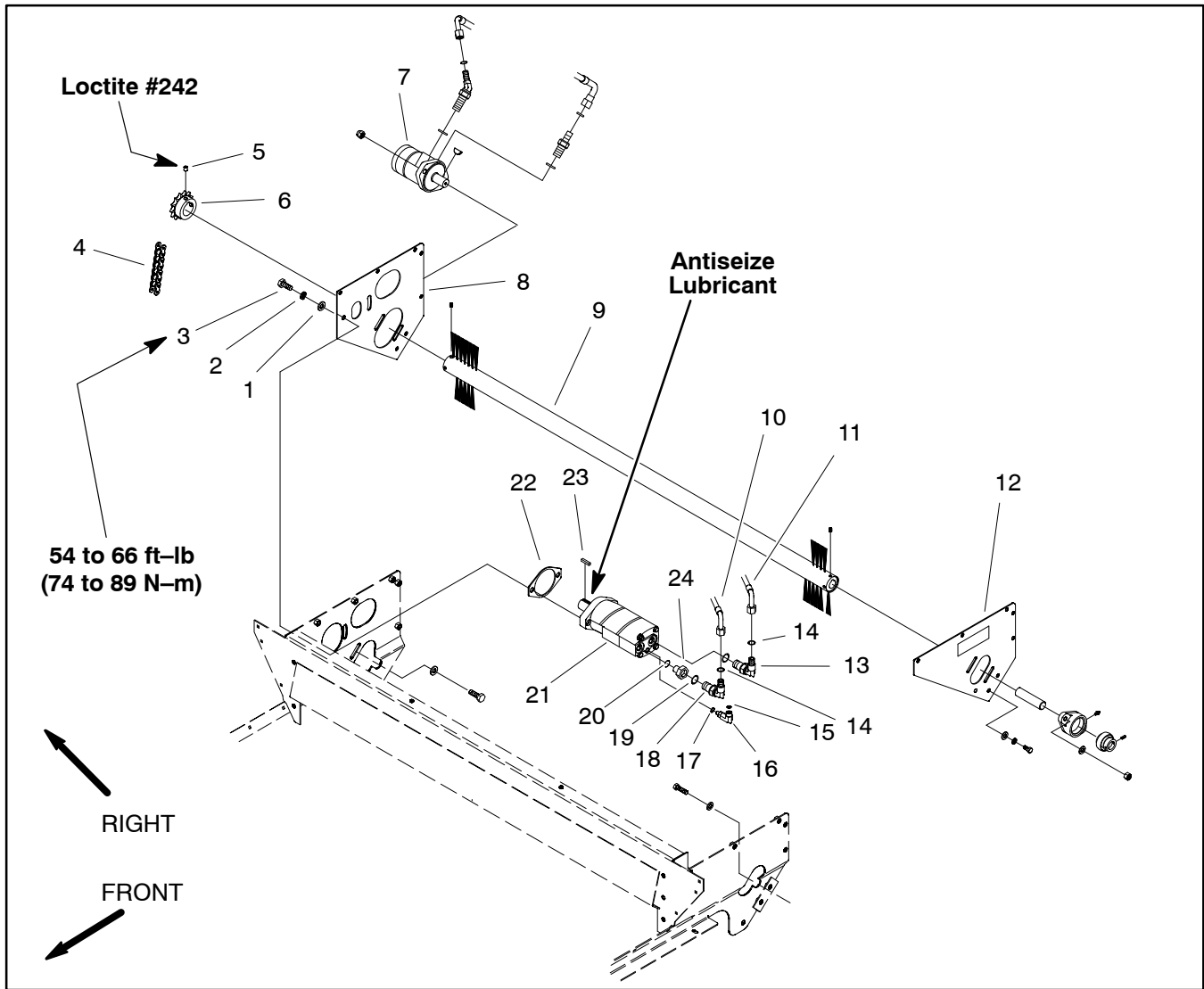


Figure 29

- | | | |
|--------------------------|---------------------------|------------------------------|
| 1. Flat washer (2 used) | 9. Brush | 17. O-ring |
| 2. Lock washer (2 used) | 10. Hydraulic hose | 18. 90° hydraulic fitting |
| 3. Cap screw (2 used) | 11. Hydraulic hose | 19. O-ring |
| 4. Roller chain | 12. LH motor brace | 20. O-ring (2 used) |
| 5. Set screw (2 used) | 13. 90° hydraulic fitting | 21. Hydraulic conveyor motor |
| 6. Sprocket | 14. O-ring (2 used) | 22. Spacer plate |
| 7. Hydraulic brush motor | 15. O-ring | 23. Square key |
| 8. RH motor brace | 16. 90° hydraulic fitting | 24. Hydraulic fitting |

Removal (Fig. 29)

1. Empty Topdresser hopper and position machine on a level surface. Chock wheels to prevent machine from moving. If Topdresser is attached to tow vehicle, engage tow vehicle parking brake, stop engine and remove key from the ignition switch.

2. Remove brush guard from machine to gain access to conveyor motor (see Brush Guard Removal in the Service and Repairs section of Chapter 5 – Chassis).

3. Remove chain guard from outside of frame (Figs. 30 and 31).

4. Loosen but do not remove two (2) cap screws (item 3), lock washers (item 2) and flat washers (item 1) that secure conveyor motor to frame.

5. Locate and remove roller chain master link. Position chain away from conveyor motor sprocket.

6. Loosen two (2) set screws (item 5) that secure sprocket to conveyor motor shaft.

7. Slide sprocket from conveyor motor shaft. Locate and retrieve square key from motor shaft.

8. Read the General Precautions for Removing and Installing Hydraulic System Components at the beginning of the Service and Repairs section of this chapter.

9. Label all hydraulic connections for assembly purposes. Thoroughly clean hydraulic hoses and fittings prior to loosening hydraulic lines at conveyor motor.

10. Disconnect hydraulic lines from fittings on conveyor motor. Allow hydraulic oil to drain from lines into a suitable container. Put caps or plugs on open hydraulic lines and fittings to prevent contamination. Remove and discard O-rings.

11. Support conveyor motor to prevent it from shifting. Remove two (2) cap screws (item 3), lock washers (item 2) and flat washers (item 1) that secure motor to frame. Remove conveyor motor from the machine. Remove spacer plate from between motor and frame.

12. If required, remove hydraulic fittings and O-rings from the conveyor motor. Discard O-rings.

Installation (Fig. 29)

1. If removed, install hydraulic fittings with new O-rings into the conveyor motor ports (see Hydraulic Fitting Installation in the General Information section of this chapter).

2. Position spacer plate and conveyor motor to frame. Install two (2) cap screws (item 3), lock washers (item 2) and flat washers (item 1) that secure motor to frame. Do not fully tighten fasteners at this time.

3. Apply antiseize lubricant to motor shaft. Position square key into motor shaft slot.

4. Slide sprocket onto motor shaft. Make sure that hub on sprocket gear goes in toward frame.

5. Position roller chain around conveyor motor sprocket and connect roller chain ends with master link.

6. Slide conveyor motor sprocket on shaft to align it with driven sprocket on conveyor roller. Apply Loctite #242 (or equivalent) to threads of set screws (item 11) and secure sprocket to conveyor motor shaft with two (2) set screws.

7. Rotate conveyor motor to take slack out of chain, but not so tight that binding occurs on sprockets. Torque cap screws from **54 to 66 ft-lb (74 to 89 N-m)** to secure conveyor motor to frame.

8. Check that chain has 0.125" (3.2 mm) deflection at mid-span between the sprockets. If necessary, reposition conveyor motor to allow correct chain deflection.

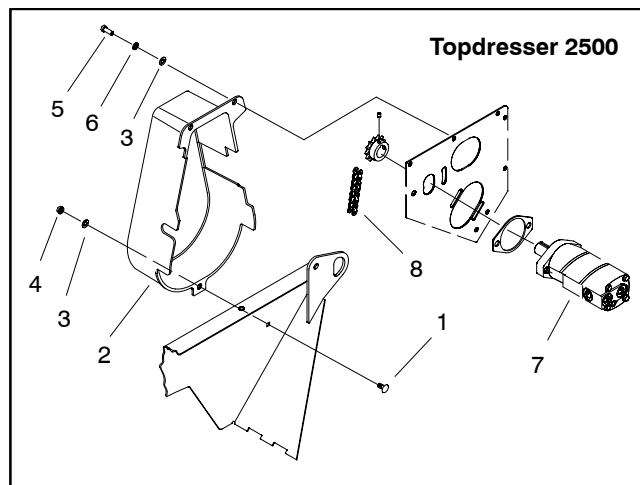


Figure 30

- | | |
|-------------------|-----------------------|
| 1. Carriage screw | 5. Cap screw |
| 2. Chain guard | 6. Lock washer |
| 3. Flat washer | 7. Hyd conveyor motor |
| 4. Lock nut | 8. Drive chain |

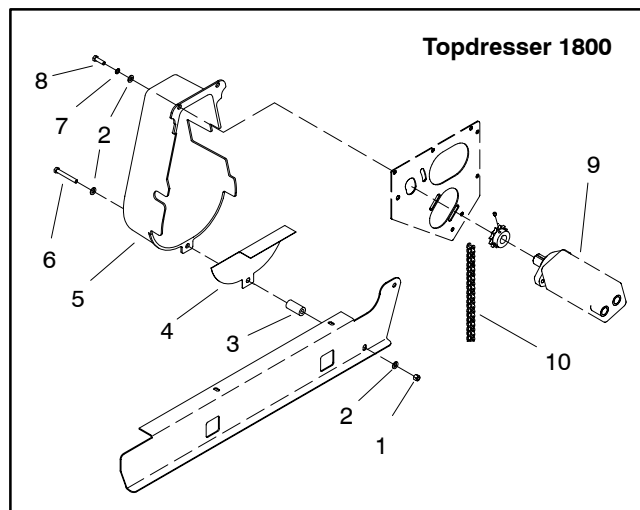


Figure 31

- | | |
|----------------|-----------------------|
| 1. Lock nut | 6. Cap screw |
| 2. Flat washer | 7. Lock washer |
| 3. Spacer | 8. Cap screw |
| 4. Guard | 9. Hyd conveyor motor |
| 5. Chain guard | 10. Drive chain |

9. Remove caps or plugs that were put on any hydraulic lines and fittings during disassembly.

10. Lubricate new O-rings with clean hydraulic oil and position on fittings. Using labels made during removal, correctly connect and secure hydraulic hoses to hydraulic fittings on conveyor motor.

11. Install brush guard to machine (see Brush Guard Installation in the Service and Repairs section of Chapter 5 – Chassis).

12. Install chain guard to outside of frame (Figs. 30 and 31).

Conveyor Motor Service

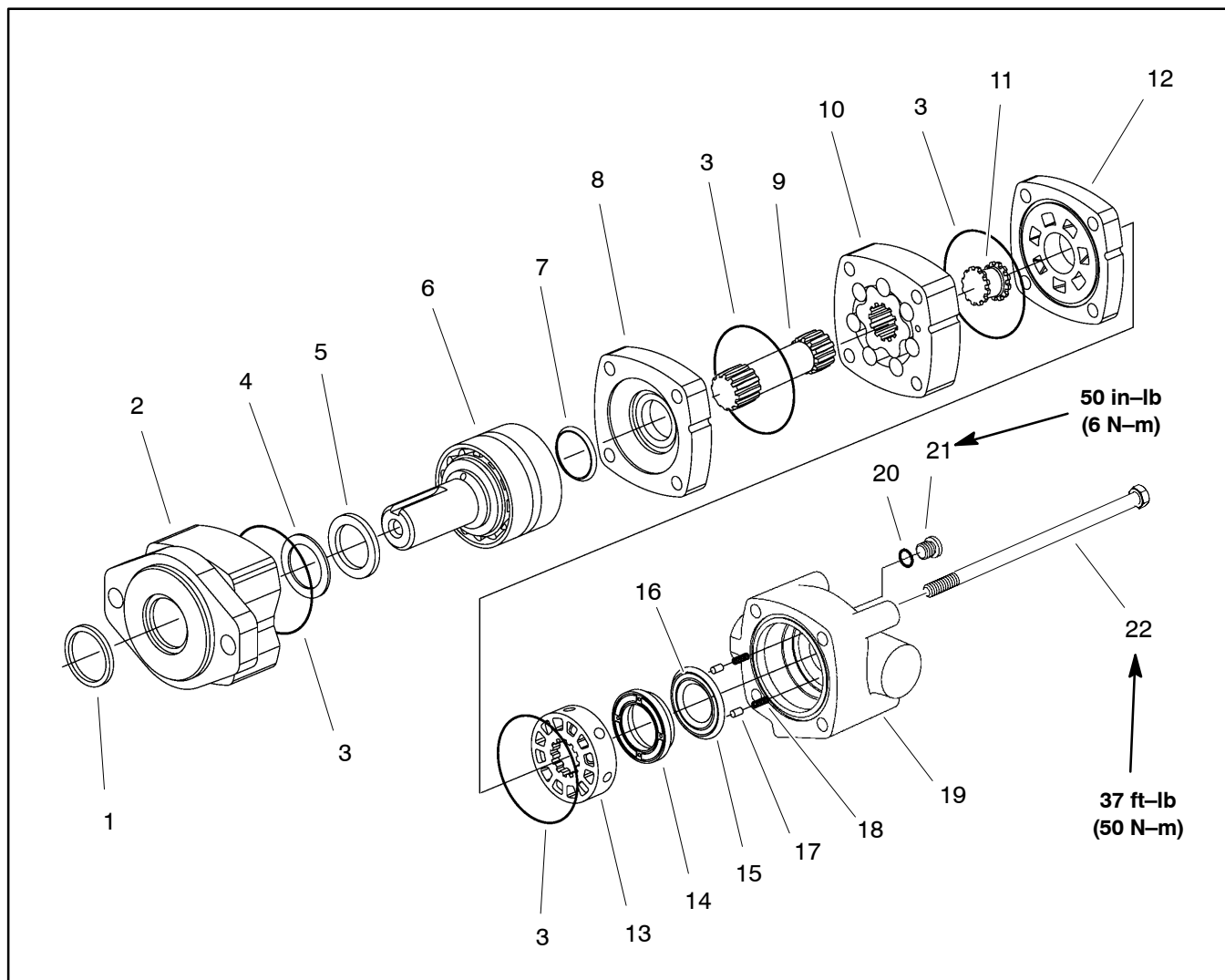


Figure 32

- | | | |
|--------------------------|----------------------|---------------------------------|
| 1. Exclusion seal | 9. Main drive | 16. Inner face seal |
| 2. Bearing housing | 10. Geroler assembly | 17. Balance ring pin (2 used) |
| 3. Seal | 11. Valve drive | 18. Compression spring (2 used) |
| 4. Back-up ring | 12. Valve plate | 19. Valve housing |
| 5. Shaft seal | 13. Valve | 20. O-ring |
| 6. Shaft and bearing kit | 14. Balance ring | 21. Plug |
| 7. Shaft face seal | 15. Outer face seal | 22. Cap screw (4 used) |
| 8. Wear plate | | |

NOTE: For service of the hydraulic conveyor motor, see the Eaton (Char-Lynn) 2000 Series Disc Valve Geroler Motor Repair Information at the end of this chapter.

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Wheel Motor (Topdresser 2500)

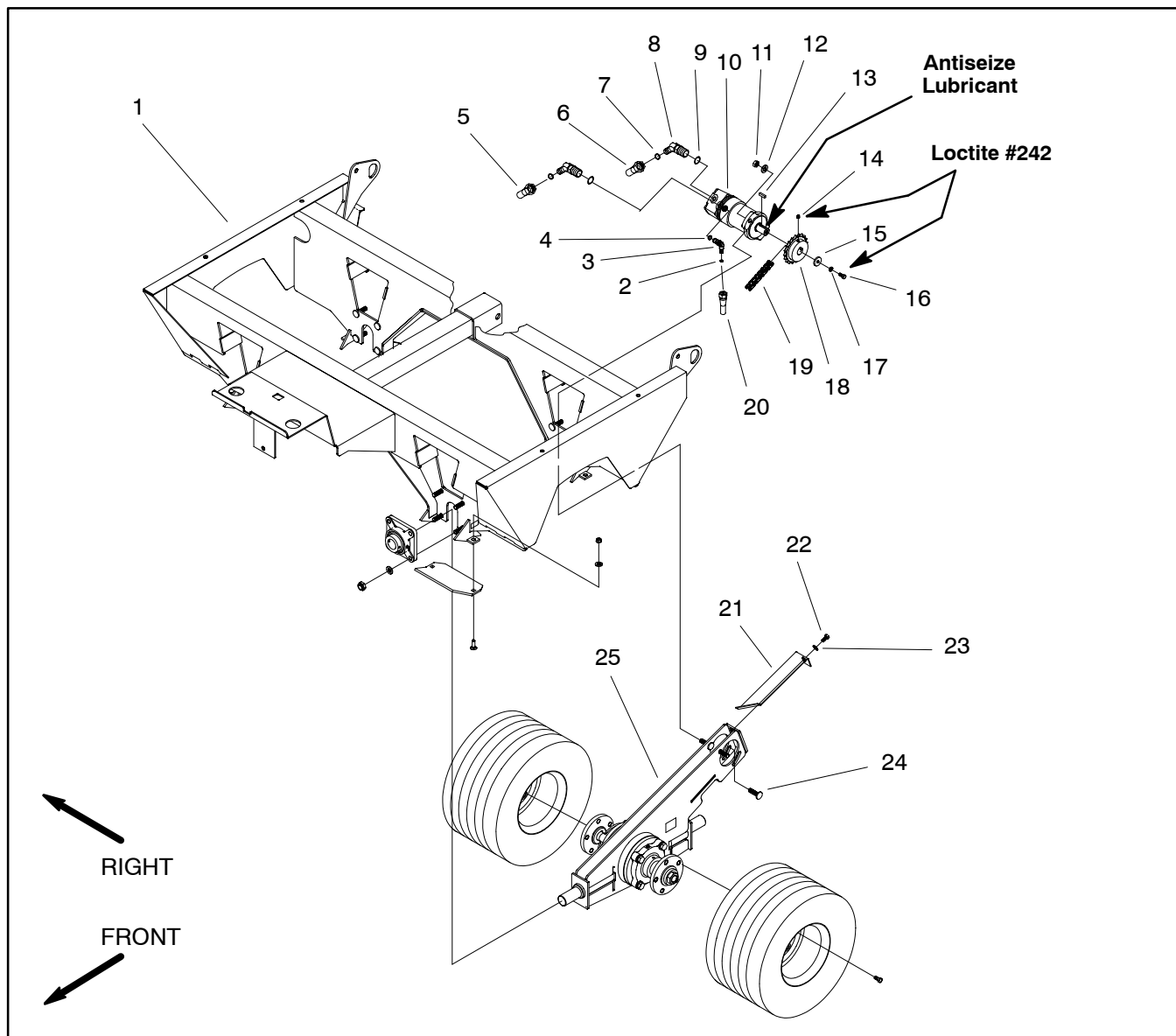


Figure 33

- | | | |
|-----------------------------------|------------------------------|-----------------------------------|
| 1. Frame | 10. Hydraulic motor (2 used) | 18. Sprocket |
| 2. O-ring | 11. Lock nut (2 used) | 19. Roller chain with master link |
| 3. 45° hydraulic fitting | 12. Flat washer (2 used) | 20. Hydraulic hose |
| 4. O-ring | 13. Square key | 21. Cradle cover |
| 5. Hydraulic hose | 14. Set screw (2 used) | 22. Cap screw |
| 6. Hydraulic hose | 15. Flat washer | 23. Flat washer |
| 7. O-ring | 16. Cap screw | 24. Carriage bolt |
| 8. 45° hydraulic fitting (2 used) | 17. Lock washer | 25. Cradle assembly |
| 9. O-ring | | |

Removal (Fig. 33)

1. Empty Topdresser hopper and position machine on a level surface. Chock wheels to prevent machine from moving. If Topdresser is attached to tow vehicle, engage tow vehicle parking brake, stop engine and remove key from the ignition switch.
2. Loosen but do not remove two (2) lock nuts (item 11) that secure wheel motor to frame.
3. Remove cap screw (item 16), lock washer (item 17) and flat washer (item 15) from wheel motor shaft.
4. Loosen two (2) set screws (item 14) that secure sprocket to wheel motor shaft.
5. Read the General Precautions for Removing and Installing Hydraulic System Components at the beginning of the Service and Repairs section of this chapter.
6. Label all hydraulic connections for assembly purposes. Thoroughly clean hydraulic hoses and fittings prior to loosening hydraulic lines at wheel motor.
7. Disconnect hydraulic lines from fittings on wheel motor. Allow hydraulic oil to drain from lines into a suitable container. Put caps or plugs on open hydraulic lines and fittings to prevent contamination. Remove and discard O-rings.
8. Support wheel motor to prevent it from shifting. Remove two (2) lock nuts (item 11) and flat washers (item 12) that secure motor to machine.
9. Slide wheel motor from sprocket and machine. While sliding wheel motor from sprocket, insert dowel into sprocket bore to support sprocket and chain in cradle assembly. Locate and retrieve square key from motor shaft.
10. If required, remove hydraulic fittings and O-rings from the wheel motor. Discard O-rings.

Installation (Fig. 33)

1. If removed, install hydraulic fittings with new O-rings into the wheel motor ports (see Hydraulic Fitting Installation in the General Information section of this chapter).
2. Apply antiseize lubricant to wheel motor shaft. Position square key into motor shaft slot.
3. Make sure that roller chain is positioned around wheel motor sprocket and that hub of sprocket is away from wheel motor position.
4. Make sure that carriage screw is placed in cradle hole.

5. Slide wheel motor shaft into sprocket while removing the dowel in sprocket bore that was placed during the removal process. Align motor mounting holes with carriage bolt and stud on frame. Place flat washer (item 12) and lock nut (item 11) on carriage bolt and stud but do not fully tighten.
6. Apply Loctite #242 (or equivalent) to threads of set screws (item 14). Center sprocket in cradle and secure in position with two (2) set screws. Make sure that sprocket does not contact head of carriage bolt (item 24).
7. Apply Loctite #242 (or equivalent) to threads of cap screw (item 16). Install cap screw, lock washer (item 17) and flat washer (item 15) into wheel motor shaft.
8. Rotate wheel motor to take slack out of chain, but not so tight that binding occurs on sprockets. Tighten lock nuts to secure motor to cradle.
9. Check that chain has 0.125" (3.2 mm) deflection at mid-span between sprockets. If necessary, reposition wheel motor to allow correct chain deflection.
10. Remove caps or plugs that were put on any hydraulic lines and fittings during disassembly.
11. Lubricate new O-rings with clean hydraulic oil and position on fittings. Using labels made during removal, correctly connect and secure hydraulic hoses to hydraulic fittings on wheel motor.

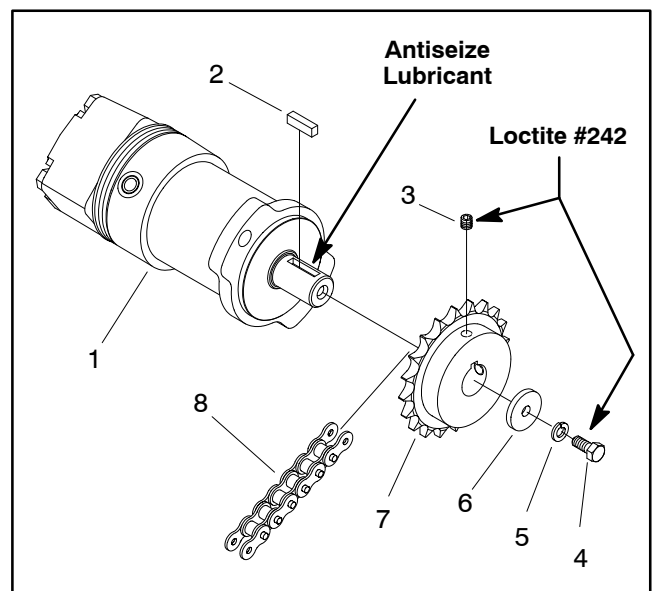


Figure 34

- | | |
|-----------------------|----------------|
| 1. Hydraulic motor | 5. Lock washer |
| 2. Square key | 6. Flat washer |
| 3. Set screw (2 used) | 7. Sprocket |
| 4. Cap screw | 8. Drive chain |

Wheel Motor Service (Topdresser 2500)

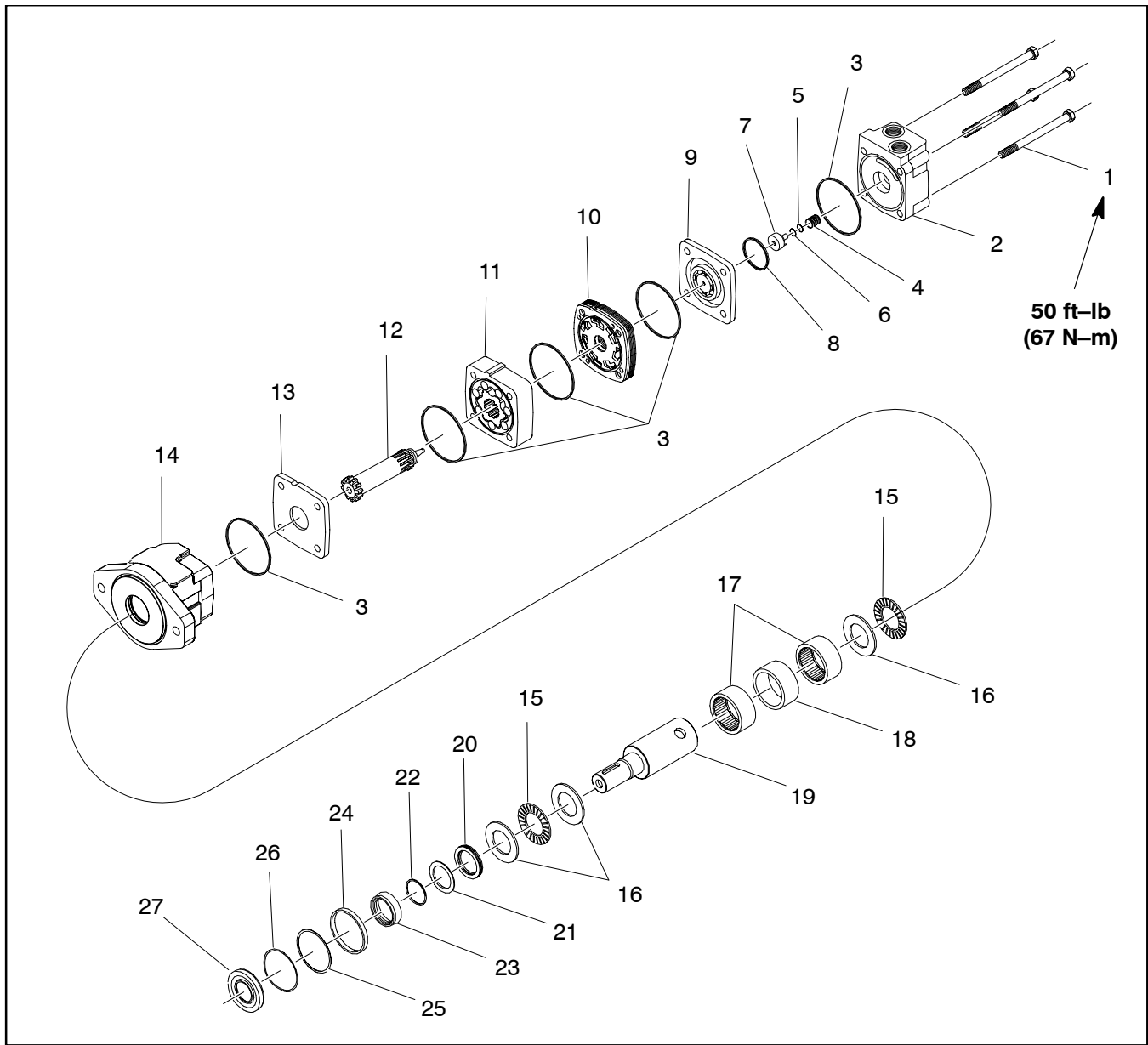


Figure 35

- 1. Screw (4 used)
- 2. End cover
- 3. Body seal
- 4. Piston spring
- 5. Backup seal
- 6. O-ring seal
- 7. Piston
- 8. Commutator seal
- 9. Commutator assembly

- 10. Manifold
- 11. Rotor assembly
- 12. Drive link
- 13. Wear plate
- 14. Housing
- 15. Thrust bearing
- 16. Thrust washer
- 17. Bearing
- 18. Bearing spacer

- 19. Shaft
- 20. Shaft seal
- 21. Backup seal
- 22. Metal backup shim
- 23. Seal carrier
- 24. High pressure seal
- 25. Metal backup shim
- 26. Wire ring
- 27. Dust seal

Disassembly (Fig. 35)

1. Thoroughly clean exterior of wheel motor. To aid in assembly, use a marker to draw a V shaped set of lines from end cover to housing (Fig. 36).

2. With shaft facing down, secure motor in a vise by clamping on the housing.

3. Loosen and remove four (4) screws (item 1).

IMPORTANT: Prevent damage when clamping the motor in a vise; clamp on the housing only.

4. Remove end cover taking care to not drop piston. Using needle nose pliers, lift piston (item 7) from end cover. Remove and discard backup seal (item 5) and O-ring seal (item 6) from piston.

5. Remove piston spring (item 4) from end cover.

IMPORTANT: When removing commutator seal (item 8), be careful not to scratch or damage commutator assembly.

6. Lift commutator assembly (item 9) from motor. Place commutator on a flat, clean surface with the seal facing up. Place the tip of a small screwdriver on the seal and gently tap the seal until the opposite side of the seal lifts from the groove in the commutator. Remove and discard the commutator seal.

7. Lift manifold (item 10), rotor assembly (item 11) and wear plate (item 13) from motor. Make sure that rollers do not drop from rotor as it is removed.

8. Remove drive link (item 12), thrust bearing (item 15) and then thrust washer (item 16) from motor housing.

9. From front of housing, gently tap shaft (item 19) upwards and remove from rear of housing.

10. Remove housing from vise and place on flat, clean surface with dust seal facing up. Using a small thin screwdriver, carefully pry dust seal (item 27) from the seal carrier. Discard removed seal.

11. Using an arbor press and appropriate sleeve, press the seal carrier (item 23) down into the housing approximately 0.250" (6.4 mm) to allow access to wire ring groove in housing.

12. Using a small thin screwdriver, carefully pry the wire ring (item 26) from the housing groove. Then pry the metal backup shim (item 25) and high pressure seal (item 24) from the groove.

13. Remove the seal carrier from the housing. Carefully pry the shaft seal (item 20), backup seal (item 21) and metal backup shim (item 22) from the seal carrier. Discard seals and shim.

14. Remove two (2) thrust washers (item 16) and thrust bearing (item 15) from housing.



15. Wash all parts in solvent. Dry parts with compressed air.

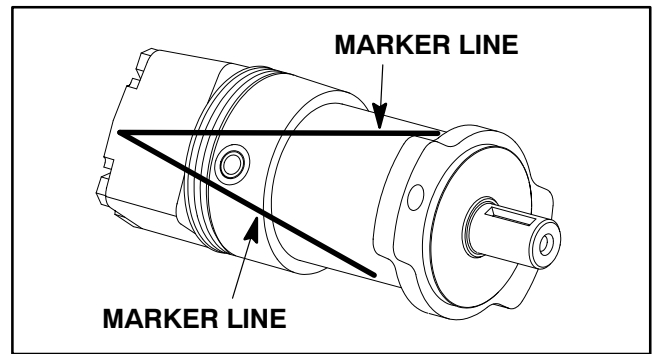


Figure 36

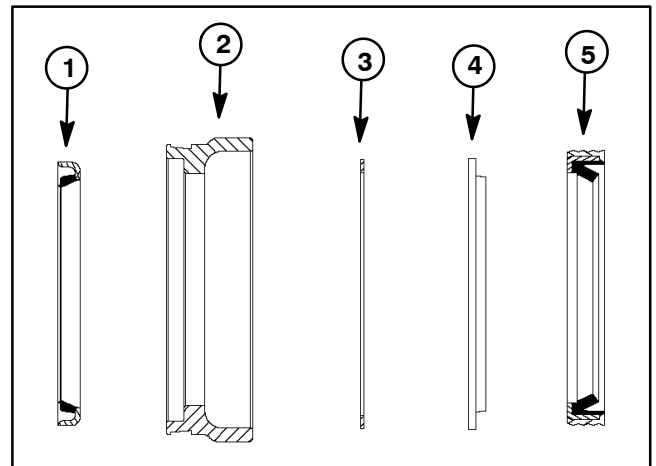


Figure 37

- | | |
|----------------------|----------------|
| 1. Dust seal | 4. Backup seal |
| 2. Seal carrier | 5. Shaft seal |
| 3. Metal backup shim | |

Assembly (Fig. 35)

1. Coat new seals with clean hydraulic oil.
2. Assemble seal components to seal carrier:
 - A. Install metal backup shim (item 22), backup seal (item 21) and shaft seal (item 20) into seal carrier (item 23) noting orientation shown in Figure 37.
 - B. Place seal side of carrier on flat surface and press carrier down to seat seals in seal carrier.
 - C. Install dust seal (item 27) into seal carrier noting orientation shown in Figure 37.
 - D. Make sure that dust seal and shaft seal are coated with clean hydraulic oil to provide start-up lubrication.
3. With the flange side of the housing facing up, place one thrust washer, the thrust bearing and then the second thrust washer against the bearing in the housing.
4. Install the seal carrier assembly into the housing making sure that the large OD of the seal carrier faces down.

5. Install high pressure seal (item 24) into the housing groove.

6. Install the backup shim (item 25) into the housing:

A. Slightly squeeze the shim between thumb and forefinger to bow the shim.

B. While maintaining the bow in the shim, start the shim into the housing groove.

C. Use a small screwdriver to carefully push the shim fully into the groove.

7. Install the wire ring (item 26) into the housing groove making sure that the ring ends are butted.

8. Place the housing in an arbor press with the mounting flange facing down. Press down on the rear housing bearing until it is from 0.164" to 0.205" (4.2 to 5.2 mm) below the housing surface. This allows room for the thrust washer and thrust bearing to be installed later in the assembly process.

9. Insert shaft up through housing and then press seal carrier assembly down into housing until the carrier is against the installed wire ring in the housing.

10. Remove shaft from housing and make sure that there is from 0.080" and 0.100" (2.0 to 2.5 mm) clearance between the rear thrust washer in the housing and the front bearing (Fig. 38). If not enough clearance exists, bearing must be repositioned in the housing before continuing with assembly process.

IMPORTANT: Prevent damage when clamping the motor in a vise; clamp on the housing only.

11. Mount the housing in a vise with the mounting flange facing down. Coat shaft with clean hydraulic oil and then carefully insert shaft down through housing taking care to not damage the seals in the housing.

12. Place thrust washer (item 16) against the shaft end and then install thrust bearing (item 15) onto washer.

13. Place a body seal (item 3) into the groove in the rear face of the housing.

14. Insert the drive link (item 12) into the shaft with the tapered end of the drive link facing up.

15. Using the marker lines placed before disassembly (Fig. 36) for orientation, place the wear plate (item 13) over the drive link and onto the housing.

16. Place a body seal (item 3) into the groove in the face of the rotor assembly (item 11).

17. Align the splines of the drive link and the rotor assembly and lower the seal side of the rotor assembly to the wear plate.

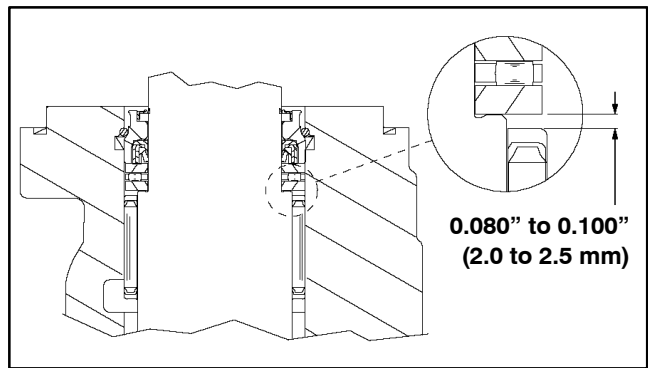


Figure 38

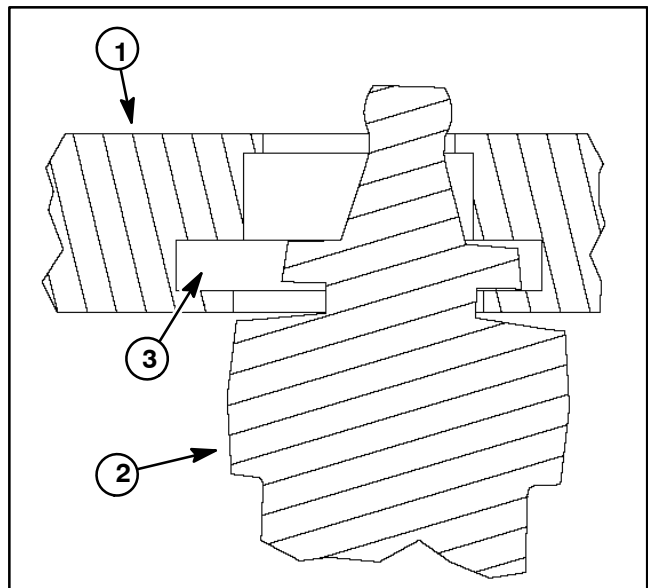


Figure 39

- 1. Manifold
- 2. Drive link
- 3. Manifold groove

18. Place a body seal (item 3) into the groove in each face of the manifold (item 10).

19. Install manifold:

A. Lift the drive link approximately 0.100" (2.5 mm) and place the tip of a small screwdriver under the disk shaped portion of the drive link to hold it up.

B. With the side of the manifold with the largest holes down, align the notch in the manifold with the notch in the rotor. Lower the manifold toward the rotor and engage the disk shaped portion of the drive link into the manifold groove (Fig. 39).

C. Remove the screwdriver from the drive link and fully lower the manifold to the rotor.

D. Make sure that the end of the drive link protrudes above the surface of the manifold. If not, the drive link disk is not engaged in the manifold groove and the motor will not operate. Repeat manifold installation steps if necessary.

20. Make sure that marker lines (Fig. 36) on installed components are aligned. Also, make sure that bolt holes through components are aligned. If parts need re-alignment, make sure that drive link end still protrudes above the surface of the manifold.

21. With the metal side of the commutator seal (item 8) facing up, use finger pressure to press the commutator seal down into the commutator. The seal should be flush with the commutator surface.

22. Place the commutator container onto the manifold and then place the commutator onto the protruding end of the drive link making sure that the seal side faces up.

23. Install the final body seal (item 3) into the groove in the face of the end cover.

24. Install the piston spring (item 4), backup seal (item 5) and then O-ring seal (item 6) into the end cover.

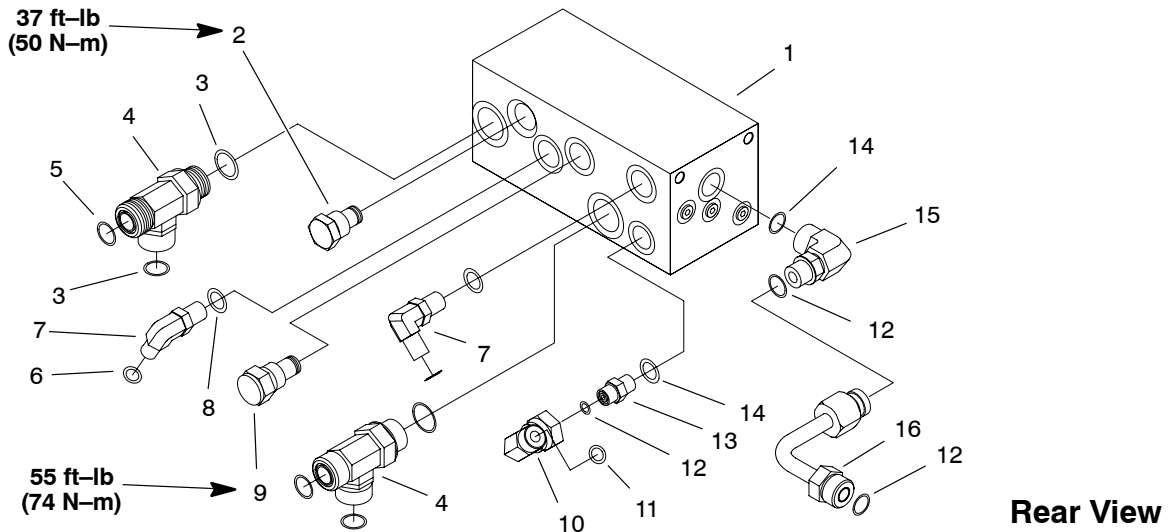
25. Line up the piston alignment pin and then press piston (item 7) into the end cover.

26. Lower the end cover assembly onto the motor taking care to keep piston in end cover.

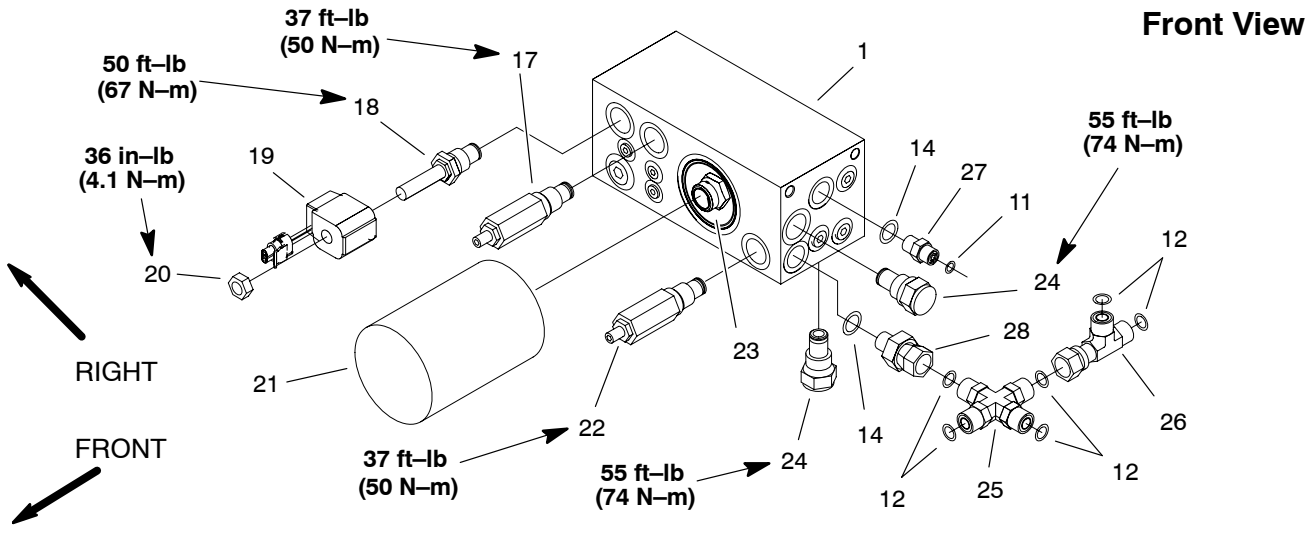
27. Install four (4) screws to secure the motor assembly. Torque screws 10 ft-lb (13.6 N-m) to seat all components. Then torque screws in a crossing pattern to **50 ft-lb (67 N-m)**.

Hydraulic Control Manifold (Topdresser 2500)

Serial Number Below 240000000



Rear View

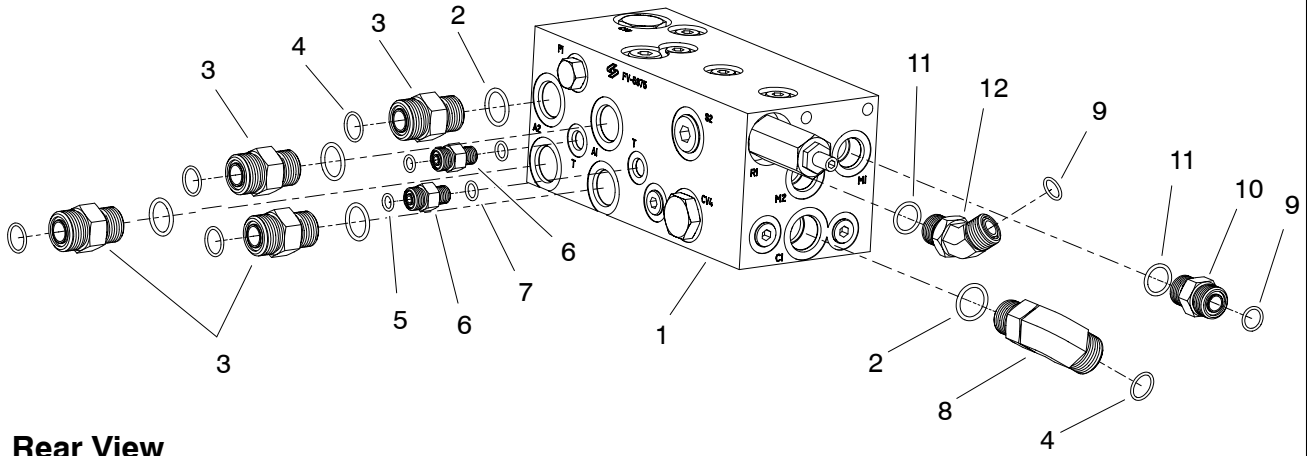


Front View

Figure 40

- | | | |
|--|---------------------------------|-------------------------------------|
| 1. Hydraulic manifold | 11. O-ring | 20. Nut |
| 2. Check valve (port CV2) | 12. O-ring | 21. Oil filter |
| 3. O-ring | 13. Hydraulic fitting (port M1) | 22. Relief valve (port R2) |
| 4. Hydraulic fitting (ports A1 and A2) | 14. O-ring | 23. Filter adapter fitting |
| 5. O-ring | 15. Hydraulic fitting (port M2) | 24. Check valve (ports CV1 and CV3) |
| 6. O-ring | 16. Hydraulic tube | 25. Hydraulic adapter |
| 7. Hydraulic adapter (ports C1 and C2) | 17. Relief valve (port R1) | 26. Hydraulic T-fitting |
| 8. O-ring | 18. Solenoid valve (port S1) | 27. Hydraulic adapter (port AF) |
| 9. Check valve (port CV4) | 19. Solenoid coil | 28. Hydraulic adapter (port T1) |
| 10. Hydraulic fitting | | |

Serial Number Above 24000000



Rear View

Front View

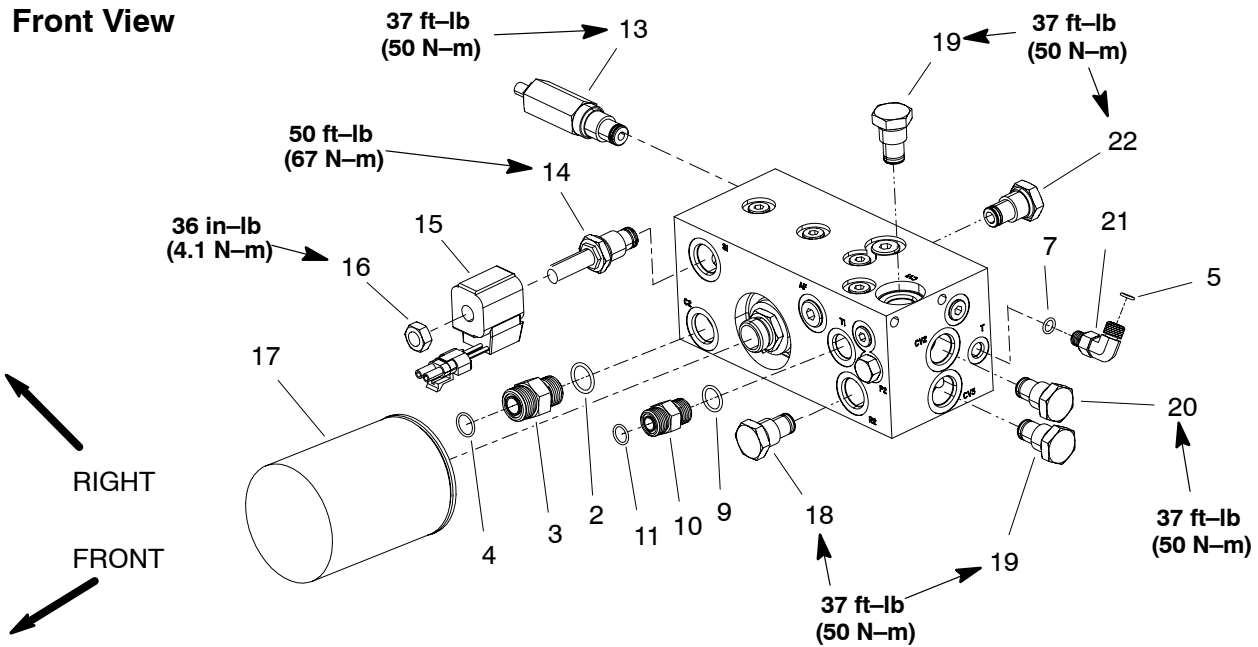



Figure 41

- | | | |
|-------------------------------|--------------------------------|-------------------------------------|
| 1. Hydraulic manifold | 9. O-ring | 16. Nut |
| 2. O-ring | 10. Hydraulic fitting (2 used) | 17. Oil filter |
| 3. Hydraulic fitting (5 used) | 11. O-ring | 18. Check (relief) valve (port R2) |
| 4. O-ring | 12. 45° hydraulic fitting | 19. Check valve (ports CV1 and CV3) |
| 5. O-ring | 13. Relief valve (port R1) | 20. Check valve (port CV2) |
| 6. Hydraulic fitting (2 used) | 14. Solenoid valve (port S1) | 21. 90° hydraulic fitting |
| 7. O-ring | 15. Solenoid coil | 22. Check valve (port CV4) |
| 8. 90° hydraulic fitting | | |

Manifold Removal (Figs. 40 and 41)

1. Empty Topdresser hopper and position machine on a level surface. Chock wheels to prevent machine from moving. If Topdresser is attached to tow vehicle, engage tow vehicle parking brake, stop engine and remove key from the ignition switch.



CAUTION

Operate all sweeper hydraulic controls to relieve system pressure and to avoid injury from pressurized hydraulic oil. See Relieving Hydraulic System Pressure in the General Information section of this chapter.

2. Relieve sweeper hydraulic system pressure.

NOTE: The ports on the control manifold are marked to identify hydraulic connections. Example: R1 is the system relief valve port (See Hydraulic Schematic in Chapter 6 – Foldout Diagrams to identify the function of the hydraulic lines and cartridge valves at each manifold port location).

3. Label all control manifold electrical and hydraulic connections for assembly purposes.

4. Disconnect wire harness electrical connector from solenoid valve on control manifold.

5. Clean control manifold and manifold hydraulic connections. Disconnect hydraulic hoses from manifold fittings.

6. Allow disconnected hydraulic lines to drain into a suitable container. Put caps or plugs on disconnected hoses and fittings to prevent contamination. Discard any removed O-rings.

7. Support control manifold to prevent it from falling. Remove four (4) cap screws and flat washers that secure hydraulic manifold to the machine frame.


8. Remove hydraulic manifold from the machine.

9. Remove hydraulic fittings from manifold as needed. Discard any removed O-rings.

Hydraulic Manifold Service (Figs. 40 and 41)

1. Make sure the control manifold is clean before removing any cartridge valve.

2. If solenoid cartridge is being serviced, remove nut securing solenoid to the cartridge valve. Carefully slide solenoid off the valve.

**CAUTION**

Operate all sweeper hydraulic controls to relieve system pressure and to avoid injury from pressurized hydraulic oil. See Relieving Hydraulic System Pressure in the General Information section of this chapter.

IMPORTANT: Use care when handling the cartridge valve. Slight bending or distortion of the stem tube can cause binding and malfunction.

3. Remove cartridge valve with a deep socket wrench. Note correct location for O-rings, sealing rings and backup rings. Remove and discard seal kit from valve.

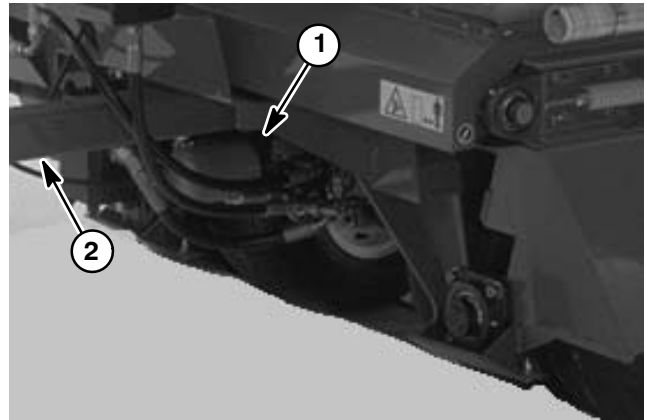


Figure 42


- 1. Hydraulic manifold
- 2. Drawbar

4. Visually inspect the manifold port for damage to the sealing surfaces, damaged threads and contamination.

5. Visually inspect cartridge valve for damaged sealing surfaces and contamination.

A. Contamination may cause valves to stick or hang up. Contamination can become lodged in small valve orifices or seal areas causing malfunction.

B. If valve sealing surfaces appear pitted or damaged, the hydraulic system may be overheating or there may be water in the system.

**CAUTION**

Use eye protection such as goggles when using compressed air for cartridge valve cleaning.

**CAUTION**

Abrupt movement of internal spools can cause stored fluid to be released suddenly.

6. Clean cartridge valve by submerging valve in clean mineral spirits to flush out contamination. Particles as fine as talcum powder can affect the operation of high pressure hydraulic valves. If cartridge design allows, use a wood or plastic probe to push the internal spool in and out 20 to 30 times to flush out contamination. Be extremely careful not to damage cartridge. Use compressed air for cleaning.

7. Reinstall the cartridge valve into control manifold:

A. Lubricate new seal kit components with clean hydraulic oil and install on valve. The O-rings, sealing rings and backup rings must be arranged properly on the cartridge valve for proper operation and sealing.

IMPORTANT: Use care when handling the valve cartridge. Slight bending or distortion of the stem tube can cause binding and malfunction.

B. Thread cartridge valve carefully into correct manifold port. The valve should go in easily without binding.

C. Torque cartridge valve using a deep socket to valves identified in Figures 40 and 41.

8. If solenoid cartridge was removed, carefully install solenoid coil onto the cartridge valve. Install nut and torque nut to **36 in-lb (4.1 N-m)**.

9. After assembly, if problems still exist, remove valve and clean again or replace valve.

Manifold Installation (Figs. 40 and 41)

1. Lightly oil new O-rings for all removed hydraulic fittings. Install hydraulic fittings to control manifold (see Hydraulic Fitting Installation in the General Information section of this chapter).

2. Position hydraulic manifold to the frame mounting bracket. Install four (4) cap screws and flat washers to secure manifold to machine.

3. Make sure all hydraulic connections, ports and fittings are clean.

4. Remove caps or plugs that were put on hydraulic lines or fittings during disassembly.

5. Lightly oil new O-rings for hydraulic fitting and hose locations.

6. Using labels placed during the removal process, correctly connect hydraulic lines to the manifold. Properly tighten all hydraulic connections (see Hydraulic Fitting Installation in the General Information section of this chapter).

7. Connect wire harness electrical connector to solenoid valve.

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Electrical System

General Information

The Topdresser 1800 uses no electrical components. Information in this chapter pertains only to Topdresser 2500 machines.

Electrical power to the Topdresser 2500 is provided by the tow vehicle battery. Three (3) wire harnesses are used on the Topdresser 2500 (Fig. 1). The battery wire harness attaches to the tow vehicle battery. The switch wire harness connects the control handle to the battery wire harness. The third harness, the trailer wire harness, resides on the Topdresser and provides electrical power to the hydraulic manifold solenoids.

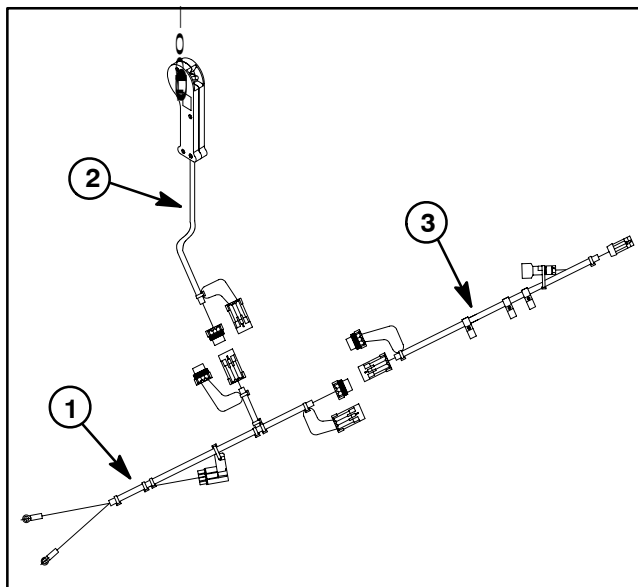


Figure 1

- 1. Battery wire harness
- 2. Switch wire harness
- 3. Trailer wire harness

Electrical Diagrams

The electrical schematic and wire harness drawings for Topdresser 2500 machines are located in Chapter 6 – Foldout Diagrams.

Special Tools

Multimeter

The multimeter can test electrical components and circuits for current (amps), resistance (ohms) or voltage.

NOTE: Toro recommends the use of a DIGITAL Volt–Ohm–Amp multimeter when testing electrical circuits. The high impedance (internal resistance) of a digital meter in the voltage mode will make sure that excess current is not allowed through the meter. This excess current can cause damage to circuits not designed to carry it.

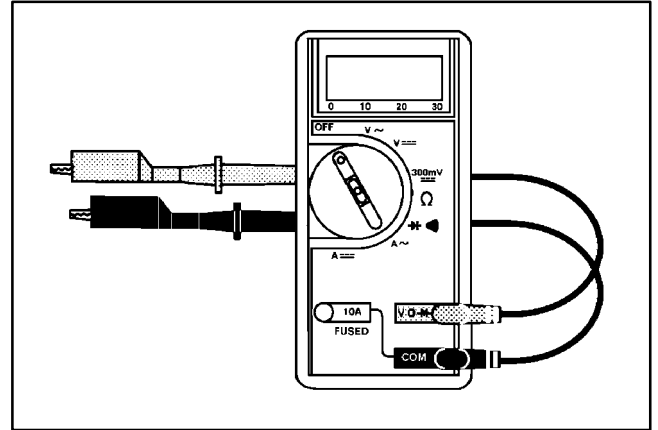


Figure 2

Troubleshooting




CAUTION

Remove all jewelry, especially rings and watches, before doing any electrical troubleshooting or testing. Disconnect the trailer wire harness from the tow vehicle unless the test requires battery voltage.

Problem	Possible Causes
Brush and conveyor do not rotate when control handle switch is turned to the ON position.	Problem with power or ground from vehicle. Fuse (5 Amp) is faulty. Trailer, switch and/or battery wire harnesses are not connected or are faulty. Control handle switch or circuit wiring is faulty. Solenoid valve coil (S1) or circuit wiring is faulty. Hydraulic problem exists (see Chapter 3 – Hydraulic System).

Component Testing

For accurate resistance and/or continuity checks, electrically disconnect the component being tested from the circuit (e.g. disconnect the switch connectors before doing a continuity check on switch).

**CAUTION**

When testing electrical components for continuity with a multimeter (ohms setting), make sure that power to the circuit has been disconnected.

Control Handle Switch

The control handle switch is used to activate the Topdresser 2500 brush and conveyor by energizing solenoid valve coil (S1) on the hydraulic manifold. When the control handle switch is in the OFF position, the solenoid is not energized, allowing hydraulic flow to bypass the brush and conveyor motors.

On machines with serial numbers below 250000000, the control handle switch is a toggle switch (Fig. 3). On machines with serial numbers above 250000000, the control handle switch is a rocker switch (Fig. 4). The function of either switch type is identical.

Testing

1. Make sure the Topdresser switch wire harness is unplugged from the battery harness.
2. Disassemble control handle to gain access to control handle switch.
3. With the use of a multimeter (ohms setting), determine whether continuity exists between the switch terminals.
 - A. When the switch is in the ON position, there should be continuity between the two switch terminals.
 - B. When in the OFF position, there should be no continuity between the switch terminals.
4. Replace switch if necessary. Assemble handle.
5. Connect switch wire harness to battery harness.

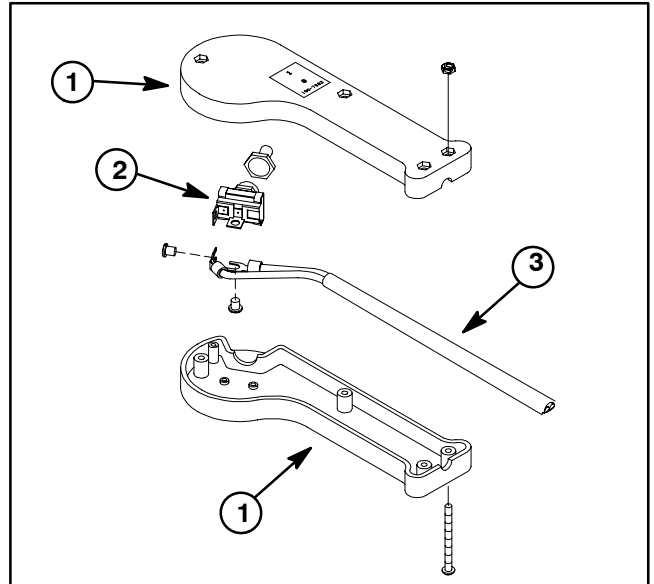


Figure 3

1. Handle
2. Toggle switch
3. Switch harness

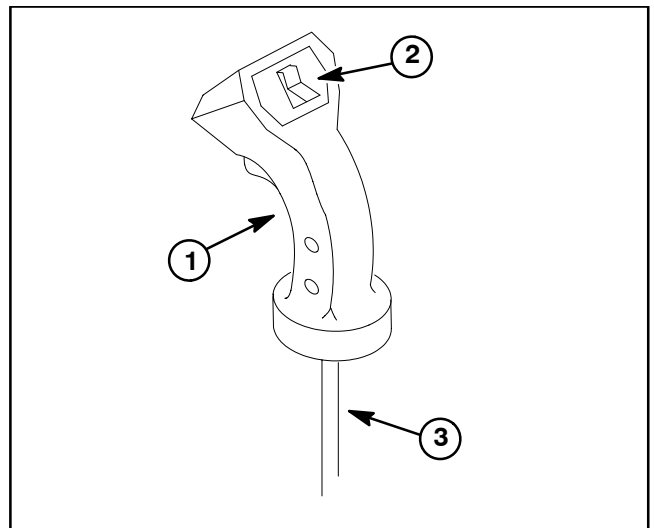


Figure 4

1. Handle
2. Rocker switch
3. Switch harness

Fuse

The Topdresser 2500 uses a single 5 amp fuse for circuit protection. The fuse holder is located in the battery wire harness (Fig. 5).

Testing

Remove fuse from the fuse holder for testing. Fuse should have continuity between fuse terminals.

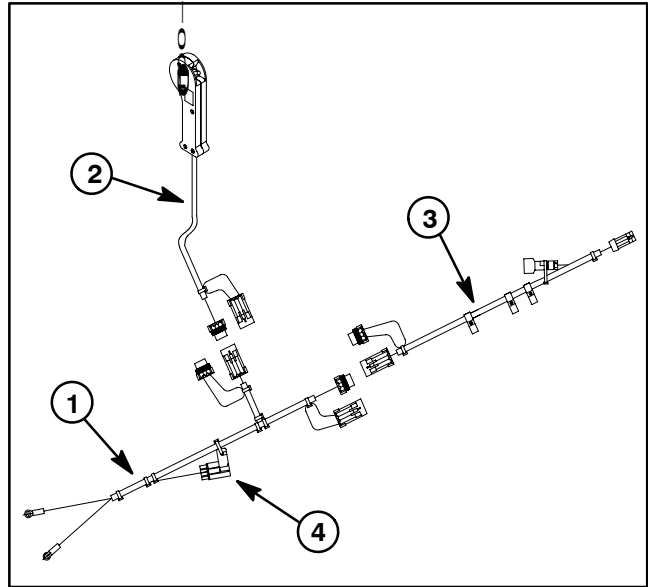


Figure 5

- | | |
|-------------------------|-------------------------|
| 1. Battery wire harness | 3. Trailer wire harness |
| 2. Switch wire harness | 4. Fuse |

Diode Assembly

A diode assembly (Fig. 6) is used in the Topdresser 2500 trailer wire harness (see wire harness drawings in Chapter 6 – Foldout Diagrams). The diode is used for circuit protection from voltage spikes that occur when the hydraulic solenoid is de-energized.

NOTE: If the Topdresser 2500 is equipped with the optional brake kit, a second diode assembly will be used and is located in the brake kit wire harness.

Testing

1. Make sure the trailer wire harness is unplugged from the battery harness.
2. Locate diode assembly and remove cable tie that secures diode to wire harness.
3. Unplug the diode from the wire harness for testing. The diode (Fig. 6) can be tested using a digital multimeter (diode test or ohms setting) and the table to the right (Fig. 7).
4. After testing is complete, make sure that diode is fully installed into harness connector and secured to harness with cable tie.
5. Connect trailer wire harness to battery harness.

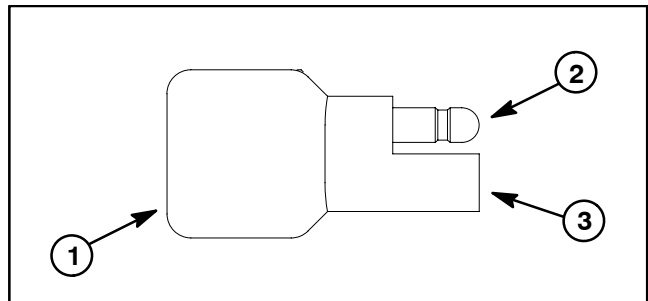


Figure 6

- | | |
|------------------|--------------------|
| 1. Diode | 3. Female terminal |
| 2. Male terminal | |

Multimeter Red Lead (+) on Terminal	Multimeter Black Lead (-) on Terminal	Continuity
Female	Male	YES
Male	Female	NO

Figure 7

Solenoid Valve Coil

The hydraulic system on the Topdresser 2500 uses a solenoid valve coil on the hydraulic control manifold at port S1 (Fig. 8 and 9). The coil is energized when the control handle switch is in the ON position.

NOTE: If the Topdresser 2500 is equipped with the optional brake kit, a second solenoid valve coil will be included on the hydraulic control manifold at port S2.

Testing

NOTE: The solenoid does not have to be removed from the cartridge valve for testing.

1. Make sure the Topdresser trailer wire harness is unplugged from battery harness.

2. Unplug solenoid valve coil electrical connector from wire harness connector.

NOTE: Prior to taking small resistance readings with a digital multimeter, short the test leads together. The meter will display a small resistance value (usually 0.5 ohms or less). This resistance is due to the internal resistance of the meter and test leads. Subtract this value from the measured value of the component you are testing.

3. Measure resistance between the two coil connector terminals. Resistance of the solenoid coil should be approximately **10.4 ohms**.

4. If solenoid coil needs replacement, see Solenoid Valve Coil in the Service and Repairs section of this chapter.

5. Reconnect harness electrical connector to the solenoid valve coil.

6. Connect trailer wire harness to battery harness.

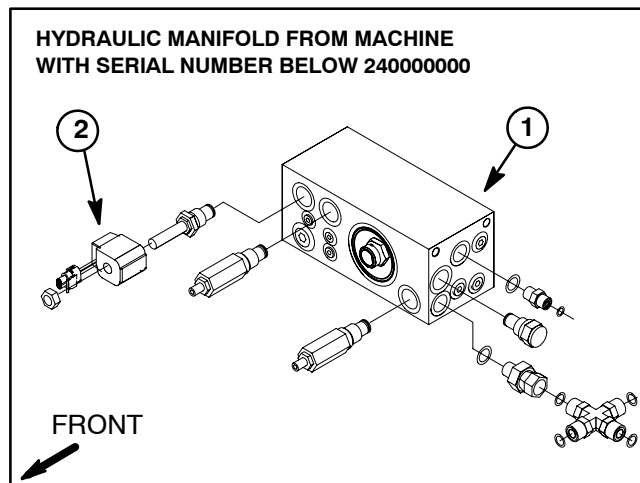


Figure 8

1. Hydraulic manifold 2. Solenoid coil (S1)

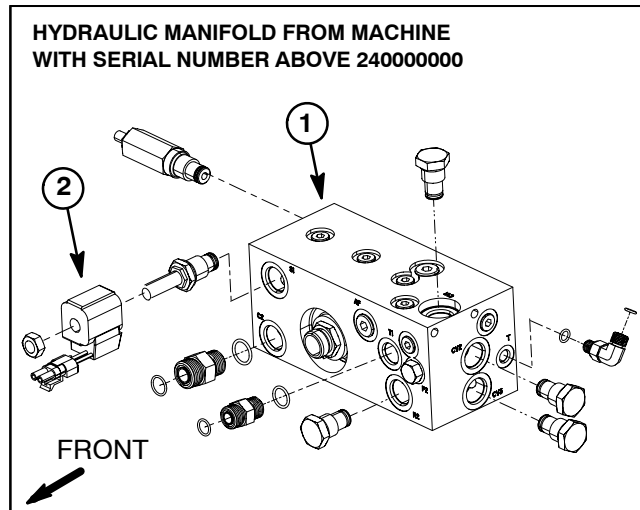


Figure 9

1. Hydraulic manifold 2. Solenoid coil (S1)

Service and Repairs

Solenoid Valve Coil

The solenoid valve coil (S1) on the Topdresser 2500 hydraulic control manifold (Fig. 10 and 11) can be replaced without opening the hydraulic system.

NOTE: If the Topdresser 2500 is equipped with the optional brake kit, a second solenoid valve coil will be included on the hydraulic control manifold at port S2.

Removal

1. Position machine on a level surface and chock wheels to prevent machine movement. If Topdresser is attached to towing vehicle, engage vehicle parking brake, stop engine and remove key from the ignition switch.
2. Make sure that the Topdresser switch is in the OFF position.
3. Disconnect the wire harness electrical connector from the solenoid coil.
4. Remove the nut from the hydraulic valve.
5. Slide the coil assembly from the valve.
6. Clean all corrosion or dirt from the spool assembly.

Installation

1. Slide coil assembly onto the hydraulic valve.
2. Install the nut onto the spool assembly and torque nut **36 in-lb (4.1 N-m)** (do not over-tighten).
3. Connect the wire harness electrical connector to the solenoid coil.

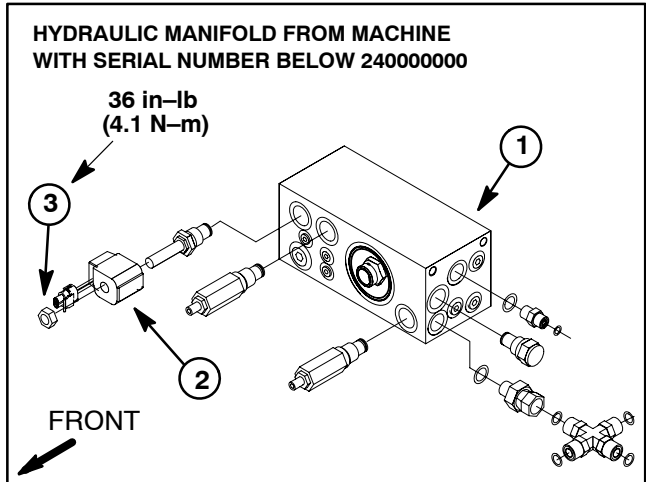


Figure 10

1. Hydraulic manifold
2. Solenoid coil (S1)

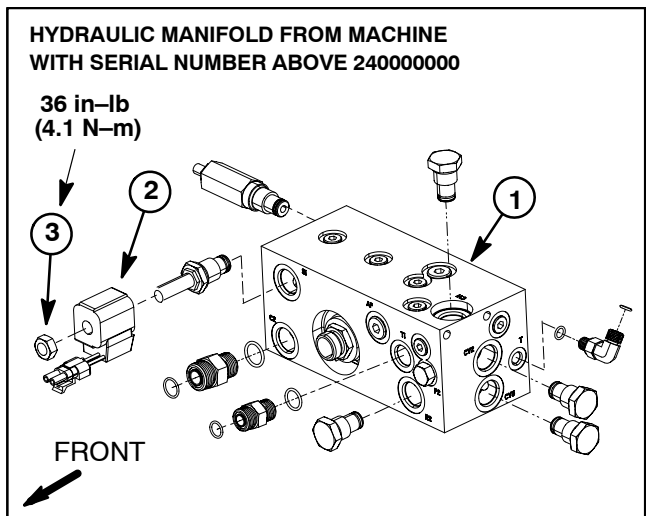


Figure 11

1. Hydraulic manifold
2. Solenoid coil (S1)



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Specifications

Item	Description
Tires (Topdresser 2500) Size (Before Serial Number 250000000) Size (After Serial Number 250000000) Pressure	18 x 10.5 – 8, 4 Ply, Tubeless 18 x 9.5 – 8, 4 Ply, Tubeless 20 to 30 PSI (138 to 206 kPa)
Wheel Lug Nut Torque (Topdresser 2500)	70 to 90 ft-lb (95 to 122 N-m)

General Information

Operator's Manual

The Operator's Manual provides information regarding the operation, general maintenance and maintenance intervals for your Topdresser machine. Refer to that publication for additional information when servicing the machine.

Securing Topdresser 2500 to Tow Vehicle

While operating or servicing the Topdresser 2500, make sure that hitch pin is properly positioned in tow vehicle hitch and sweeper tongue. Hitch pin should be secured with hairpin clip (Fig. 1).

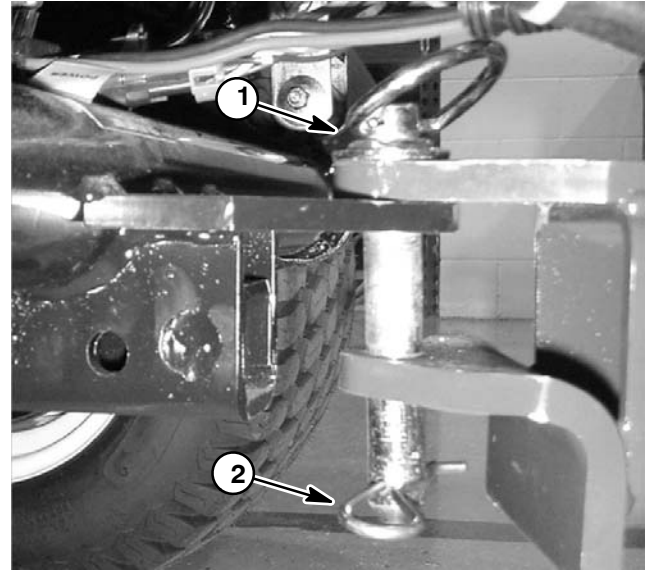


Figure 1

1. Hitch pin

2. Hairpin clip

Service and Repairs

Brush Guard

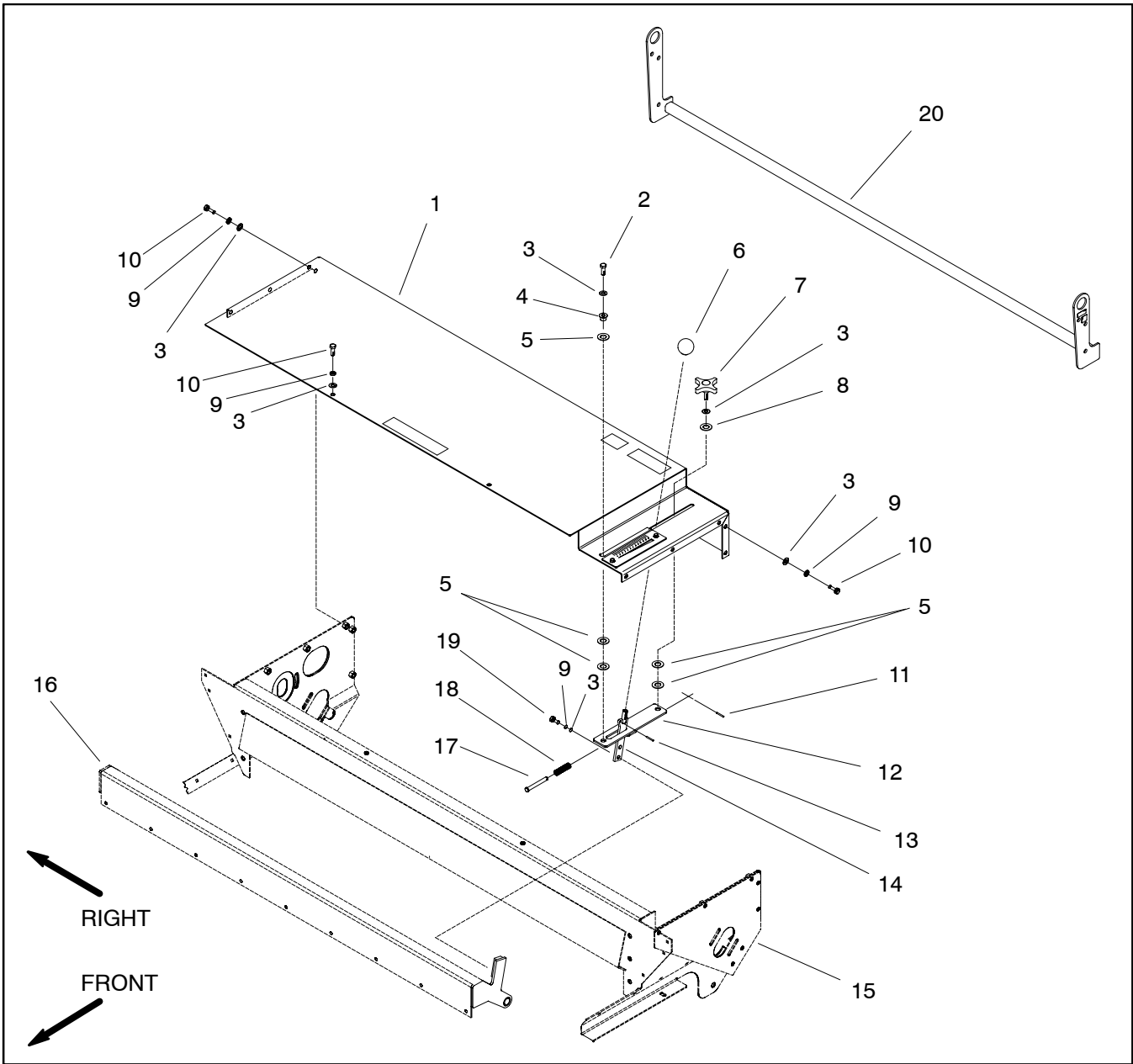


Figure 2

- | | | |
|----------------------|-----------------------|------------------------------|
| 1. Brush guard | 8. Nylon washer | 15. Hopper frame assembly |
| 2. Socket head screw | 9. Lock washer | 16. Gate |
| 3. Flat washer | 10. Cap screw | 17. Clevis pin |
| 4. Flange bushing | 11. Spring pin | 18. Spring |
| 5. Slide washer | 12. Slide block plate | 19. Cap screw (2 used) |
| 6. Knob | 13. Spring pin | 20. Bumper (Topdresser 1800) |
| 7. Knob | 14. Gate handle | |

Removal (Fig. 2)

1. Position Topdresser on a level surface with hopper empty. Chock Topdresser wheels to prevent machine from moving.
2. Remove knob (item 6) from gate handle (item 14).
3. Push spring pin (item 13) from gate handle taking care to not damage handle.
4. Remove twelve (12) cap screws, lock washers and flat washers that secure brush guard to frame.

NOTE: On Topdresser 1800 machines, a bumper (not shown) is attached to the brush guard.

5. Lift brush guard from machine.

Installation (Fig. 2)

1. Lower brush guard to machine frame making sure that gate handle (item 14) is positioned in slide block plate mounted on brush guard.
2. On Topdresser 1800 machines, place bumper (not shown) to brush guard.
3. Secure brush guard to frame with twelve (12) cap screws, lock washers and flat washers.
4. Push spring pin (item 13) into gate handle taking care to not damage handle. End of spring pin should be flush with the inside of the handle.
5. Install knob (item 6) onto gate handle.

Brush

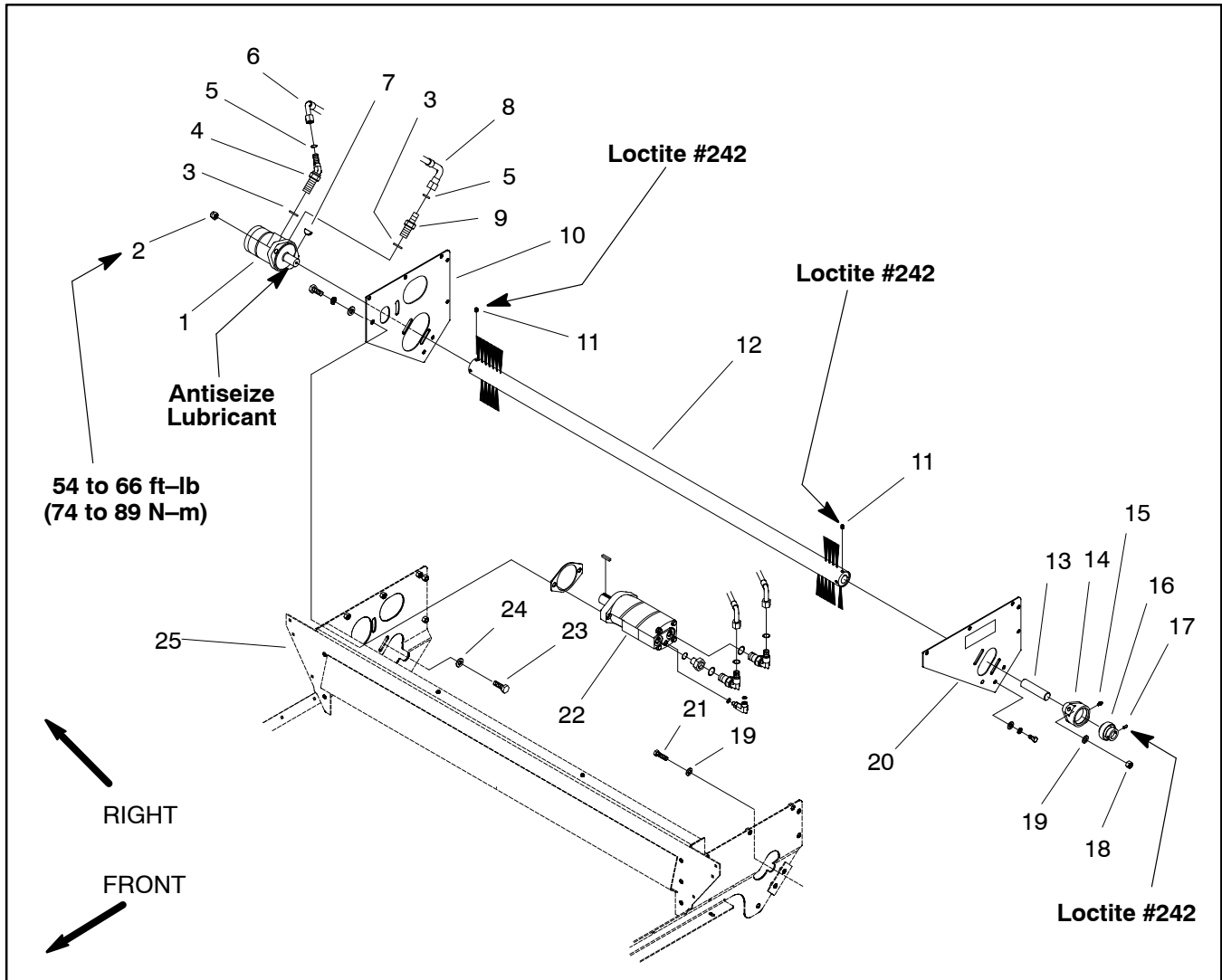


Figure 3

- | | | |
|---|---|---|
| <ul style="list-style-type: none"> 1. Hydraulic brush motor 2. Lock nut (2 used) 3. O-ring 4. 45° hydraulic fitting 5. O-ring 6. Hydraulic hose 7. Woodruff key 8. Hydraulic hose 9. Hydraulic fitting | <ul style="list-style-type: none"> 10. RH motor brace 11. Set screw (4 used) 12. Brush 13. Brush shaft 14. Flange bearing 15. Grease fitting 16. Locking collar 17. Set screw | <ul style="list-style-type: none"> 18. Lock nut (2 used) 19. Flat washer (4 used) 20. LH motor brace 21. Cap screw (2 used) 22. Hydraulic conveyor motor 23. Cap screw (2 used) 24. Flat washer (2 used) 25. Hopper frame |
|---|---|---|



CAUTION

To prevent personal injury, make sure that brush is supported as it is removed from the machine. Brush weighs approximately 26 pounds (11.8 kg).

Removal (Fig. 3)

1. Position Topdresser on a level surface with hopper empty. Chock Topdresser wheels to prevent machine from moving.

2. Remove brush guard from machine (see Brush Guard Removal in this section).

3. Loosen two (2) lock nuts that secure hydraulic brush motor to hopper frame. Do not fully remove lock nuts from cap screws.

NOTE: Normal brush rotation is counter-clockwise as viewed from left side of Topdresser (Fig. 4).

4. Loosen set screw (item 17) that secures bearing locking collar to brush shaft. Using a punch and hammer, rotate locking collar clockwise (opposite direction of normal brush rotation) to loosen collar.

5. Loosen and remove four (4) set screws (item 11) from brush.

6. Support brush to prevent it from shifting.

7. While supporting brush, pull brush shaft (item 13) from brush.

8. Carefully slide brush motor shaft from brush until brush can be removed from brush motor shaft. Remove brush from machine. Retrieve square key from brush motor shaft.

9. If necessary, remove flange bearing assembly from hopper frame.

Installation (Fig. 3)

1. If removed, install flange bearing to hopper frame with cap screws, flat washers and lock nuts. Place cap screws from the inside of the hopper frame to the outside. Make sure that bearing grease fitting is orientated up and locking collar is fitted to bearing.

2. Clean brush shaft (item 13) and apply antiseize lubricant to shaft.

3. Apply antiseize lubricant to shaft of brush motor. Place square key in brush motor shaft.

4. Position brush assembly to hopper frame.

5. Slide brush motor shaft into brush. Make sure that square key remains in motor shaft and that the key is aligned with slot in brush.

6. Slide brush shaft (item 13) through flange bearing assembly and into brush until end of brush shaft is flush with bearing locking collar. Do not tighten set screw in locking collar at this time.

7. Tighten fasteners to secure hydraulic brush motor to hopper frame. Torque lock nuts from **54 to 66 ft-lb (74 to 89 N-m)**.

8. Center brush in hopper frame.

9. Check that brush is adjusted evenly across conveyor belt. There should just be contact with brush bristles at top of belt cleats. If necessary, loosen and change position of brush motor and/or flange bearing to obtain proper brush adjustment.

10. Apply Loctite #242 (or equivalent) to threads of set screws (item 11). Secure brush to motor shaft and brush shaft with four (4) set screws.

NOTE: Normal brush rotation is counter-clockwise as viewed from left side of Topdresser (Fig. 4).

11. Using a punch and hammer, rotate bearing locking collar counter-clockwise (direction of normal brush rotation) to tighten collar onto brush shaft.

12. Apply Loctite #242 (or equivalent) to locking collar set screw. Secure bearing locking collar to brush shaft with set screw.

13. Install brush guard to machine (see Brush Guard Installation in this section).

14. Lubricate grease fitting on flange bearing.

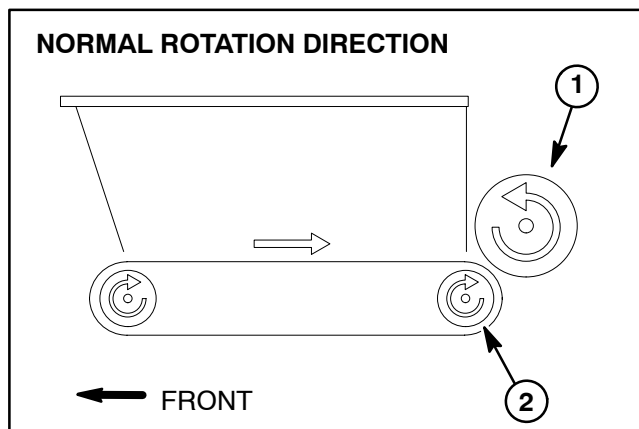


Figure 4

1. Brush

2. Rear conveyor roller

Rollers

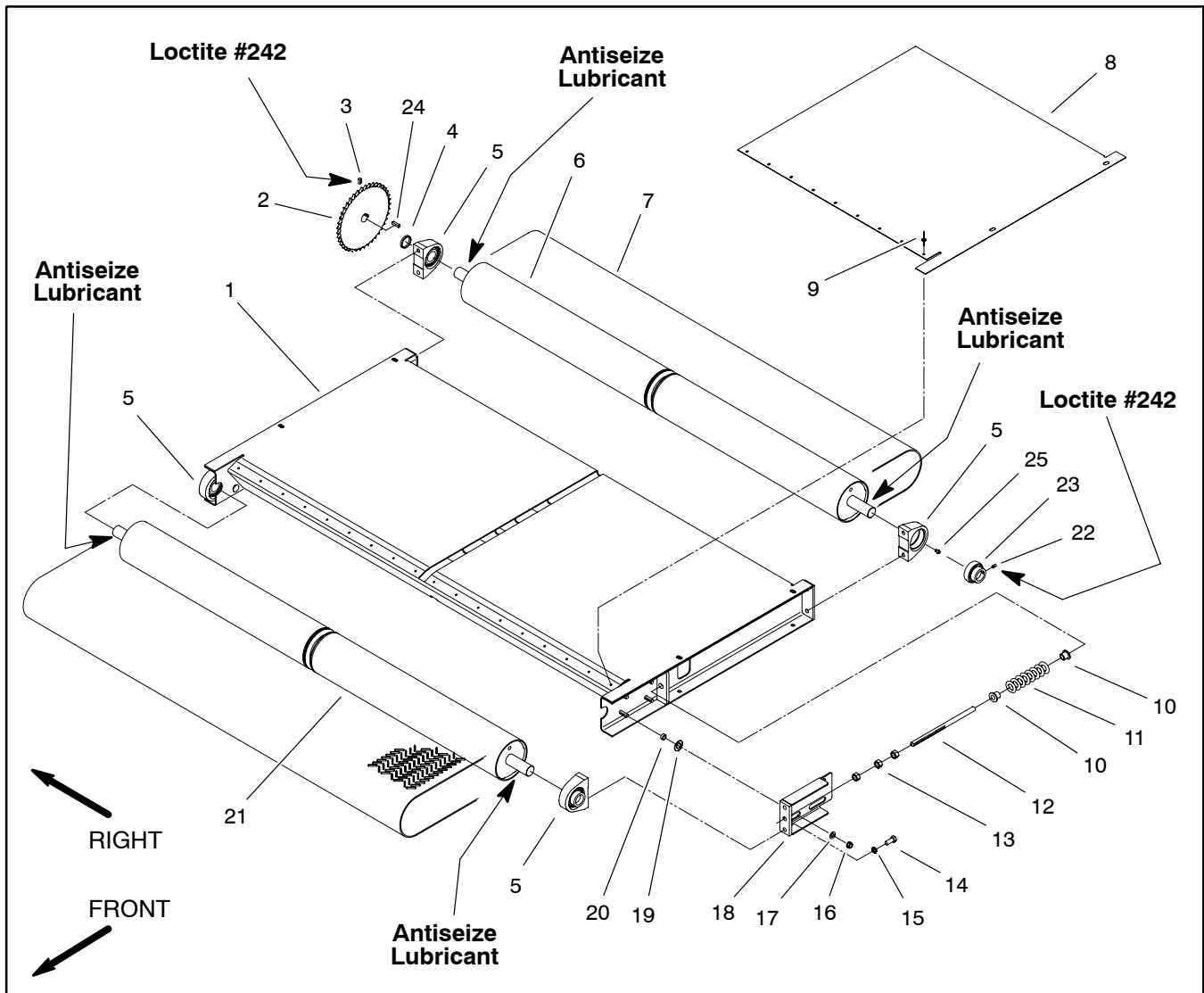


Figure 5

- | | | |
|------------------------|--------------------------------------|---|
| 1. Slider bed frame | 10. Spring holder (2 used per side) | 18. Spring plate (2 used) |
| 2. Driven sprocket | 11. Compression spring (2 used) | 19. Slide washer (4 used per side) |
| 3. Set screw (2 used) | 12. Spring pin (2 used) | 20. Spacer (4 used per side) |
| 4. Sprocket spacer | 13. Hex nut (3 used per side) | 21. Front roller |
| 5. Bearing | 14. Screw (2 used per bearing) | 22. Set screw (1 used per bearing) |
| 6. Rear roller | 15. Lock washer (2 used per bearing) | 23. Locking collar (1 used per bearing) |
| 7. Conveyor belt | 16. Lock nut (4 used per side) | 24. Square key |
| 8. Wear plate (2 used) | 17. Flat washer (4 used per side) | 25. Grease fitting (1 used per bearing) |
| 9. Pop rivet (18 used) | | |



CAUTION

To prevent personal injury, make sure that rollers are well supported as they are removed from the machine. Front roller weighs approximately 65 pounds (29.5 kg). Rear roller weighs approximately 73 pounds (33.1 kg).

Removal (Fig. 5)

1. Position Topdresser on a level surface with hopper empty. Chock Topdresser wheels to prevent machine from moving.

2. Remove conveyor belt from machine (see Operator's Manual):

A. Remove conveyor chain guard and disconnect drive chain (Figs. 6 and 7).

B. Remove fasteners that secure hopper to frame. Pivot hopper rearward and lean against wall or post (Fig. 8). Do not allow hopper to rest against rear of machine as damage may result to brush or other components.

IMPORTANT: Make sure hopper is pivoted beyond center and secured to wall or post to prevent it from accidentally falling on work area (Fig. 8).

C. Loosen jam nuts that tension conveyor belt.

D. On right side of machine, loosen fasteners that secure slider bed to frame. On left side of machine, remove fasteners that secure slider bed to frame.

E. Remove conveyor belt from machine.

NOTE: Normal roller rotation is clockwise as viewed from left side of machine (Fig. 9).

3. Loosen set screw (item 22) that secures bearing locking collar to roller shaft. Using a punch and hammer, rotate locking collar in the opposite direction of normal roller rotation to loosen collar.

4. Support roller to prevent it from shifting.

5. Remove four (4) screws and lock washers that secure bearings to frame. Remove roller assembly from machine.

6. If rear roller was removed, remove two (2) set screws that secure sprocket to roller. Remove sprocket, square key and sprocket spacer from roller.

7. Slide bearings from roller shaft.

8. Inspect conveyor belt, hopper seals and gate edge for wear or damage. Replace worn or torn components to insure proper operation of machine.

Installation (Fig. 5)

1. Clean roller shaft ends and apply antiseize lubricant to shaft ends. Slide bearing assembly onto each end of roller shaft. Make sure that locking collar is orientated toward the end of the roller. Do not tighten set screws in locking collars.

Topdresser 1800 & 2500

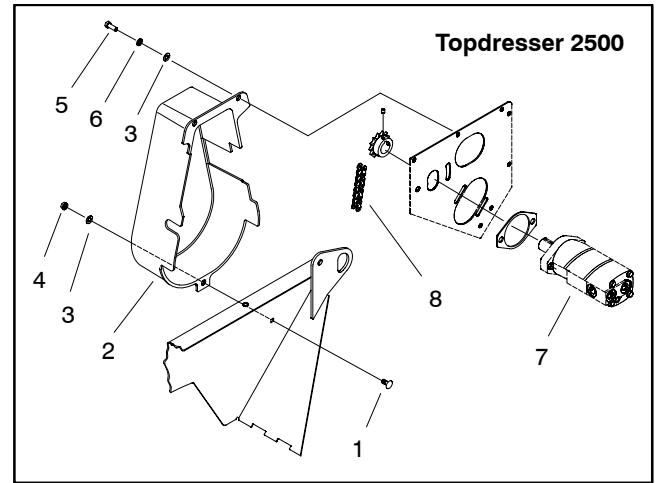


Figure 6

- | | |
|-------------------|-----------------------|
| 1. Carriage screw | 5. Cap screw |
| 2. Chain guard | 6. Lock washer |
| 3. Flat washer | 7. Hyd conveyor motor |
| 4. Lock nut | 8. Drive chain |

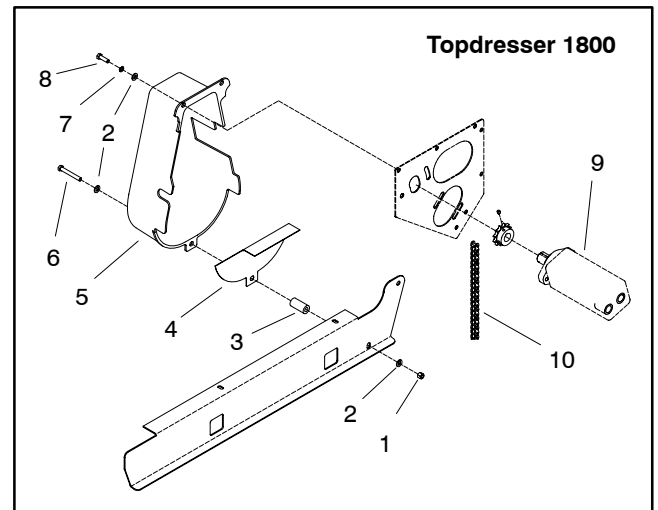


Figure 7

- | | |
|----------------|-----------------------|
| 1. Lock nut | 6. Cap screw |
| 2. Flat washer | 7. Lock washer |
| 3. Spacer | 8. Cap screw |
| 4. Guard | 9. Hyd conveyor motor |
| 5. Chain guard | 10. Drive chain |

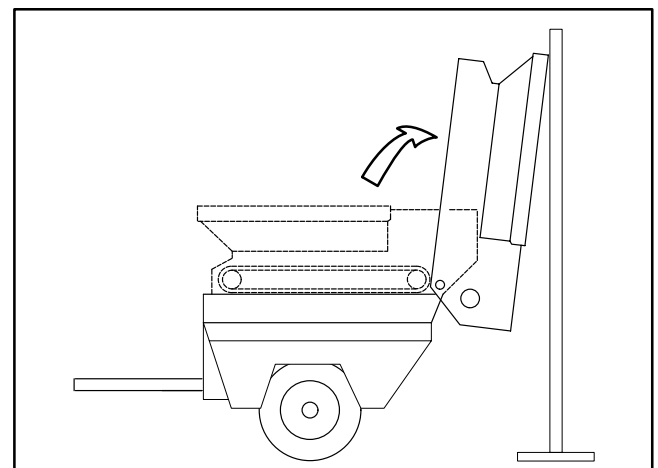


Figure 8

NOTE: The rear roller has a textured surface and has a key slot for the drive sprocket.

2. Position roller to frame. Secure bearings to frame with four (4) screws and lock washers.

3. Center roller between bearings. Also, make sure that pulley groove in roller aligns with slot in slider bed.

NOTE: Normal roller rotation is clockwise as viewed from left side of machine (Fig. 9).

4. Using a punch and hammer, rotate bearing locking collars in the direction of normal roller rotation to tighten collars.

5. Apply Loctite #242 (or equivalent) to threads of locking collar set screws (item 22). Install and tighten set screws to secure locking collars to roller shaft.

6. Check that roller is free to rotate and no binding exists.

7. If rear roller was removed, install sprocket spacer, square key and then sprocket to roller shaft. Make sure that hub side of sprocket is outward (away from frame) and that sprocket is tight against spacer and roller. Apply Loctite #242 (or equivalent) to threads of set screws (item 3). Install set screws to secure sprocket to roller shaft.

8. Install conveyor belt to machine (see Operator's Manual):

A. Install conveyor belt to machine. Make sure that the guide on the underside of the belt is positioned in both roller grooves and also is routed in the slider bed frame cut-out.

B. Tighten fasteners that secure slider bed to frame.

C. Pivot hopper down to slider bed and secure with removed fasteners.

D. Connect conveyor drive chain to sprockets. Check that conveyor drive chain has 0.125" (3.2 mm) deflection at mid-span between sprockets. If necessary, reposition conveyor motor to allow correct chain deflection.

E. Install chain guard (Figs. 6 and 7).

F. Adjust tension on conveyor belt.

9. Lubricate grease fittings on roller bearings.

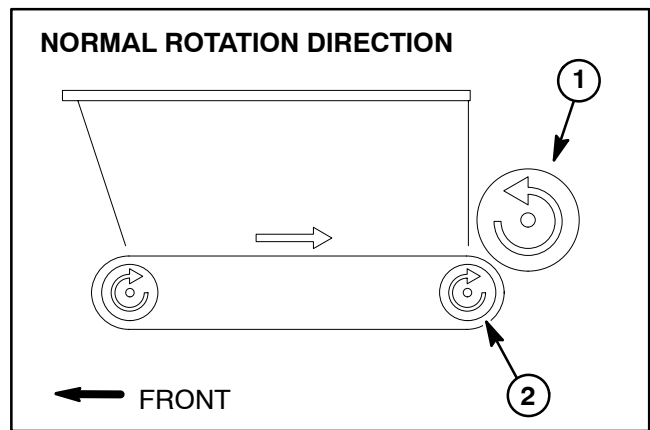


Figure 9

1. Brush

2. Rear conveyor roller

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Wheels (Topdresser 2500)

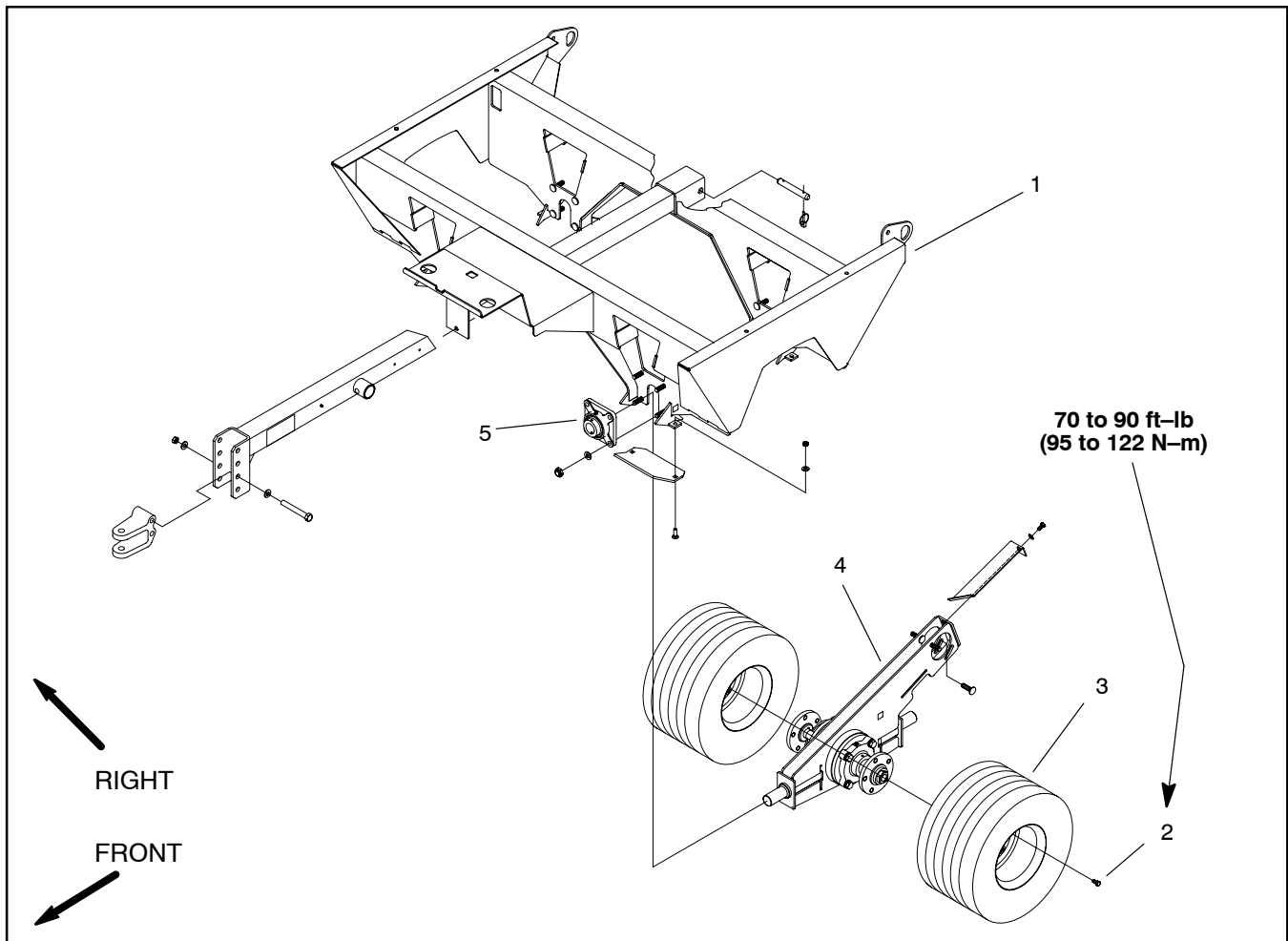


Figure 10

1. Trailer frame
2. Lug bolt (5 used per wheel)

3. Wheel assembly (4 used)
4. Cradle assembly (2 used)

5. Flange bearing (2 used per cradle)

Wheel Removal (Fig. 10)

1. Position Topdresser on a level surface with hopper empty. Have Topdresser attached to towing vehicle, engage vehicle parking brake, stop engine and remove key from the ignition switch. Chock Topdresser wheels to prevent it from moving.
2. Jack or hoist sweeper from ground and support machine with blocking or jack stands (see Operator's Manual and Jacking Instructions in Chapter 1 – Safety).
3. Loosen and remove five (5) lug bolts from wheel to be removed.
4. Pull wheel from machine.

Wheel Installation (Fig. 10)

1. Position wheel to wheel hub on cradle. Make sure that the valve stem is facing out (away from wheel hub).
2. Secure wheel to sweeper with five (5) lug bolts.
3. Lower machine to ground.



WARNING

Failure to maintain proper lug bolt torque could result in failure or loss of wheel and may result in personal injury.

4. Alternately torque bolts from **70 to 90 ft-lb (95 to 122 N-m)**.

Cradle Axle (Topdresser 2500)

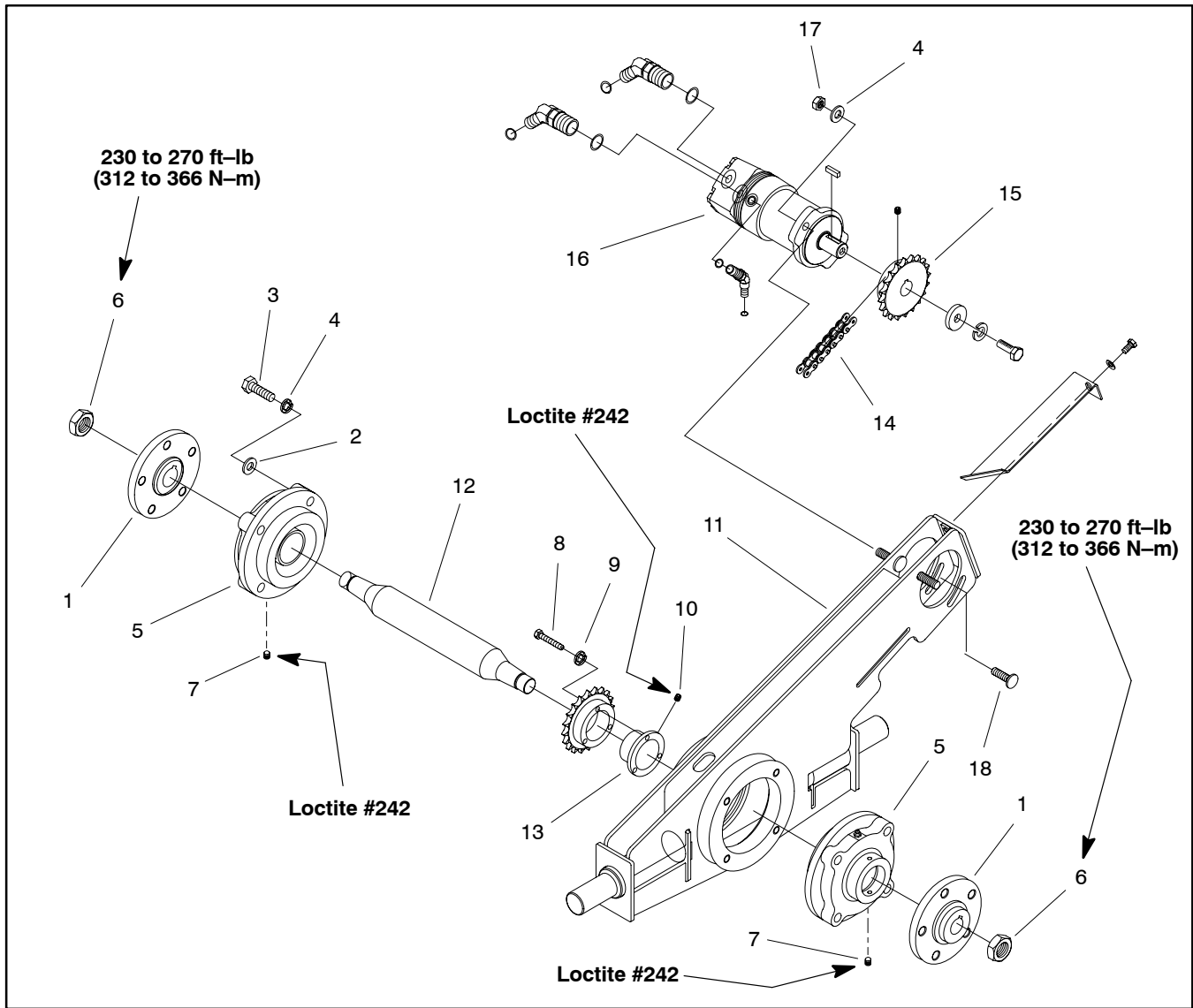


Figure 11

- | | | |
|---------------------------------------|-------------------------------------|----------------------------------|
| 1. Wheel hub | 7. Set screw | 13. Taper lock bushing |
| 2. Flat washer (4 used per bearing) | 8. Cap screw (3 used per bushing) | 14. Drive chain with master link |
| 3. Cap screw (4 used per bearing) | 9. Lock washer (3 used per bushing) | 15. Sprocket |
| 4. Lock washer (4 used per bearing) | 10. Set screw | 16. Wheel motor |
| 5. Flange bearing (2 used per cradle) | 11. Cradle assembly (2 used) | 17. Lock nut (2 used per motor) |
| 6. Lock nut | 12. Cradle axle | 18. Carriage screw |

Removal (Fig. 11)

1. Position Topdresser on a level surface with hopper empty. Have Topdresser attached to towing vehicle, engage vehicle parking brake, stop engine and remove key from the ignition switch. Chock Topdresser wheels to prevent machine from moving.

2. Jack or hoist sweeper from ground and support machine with blocking or jack stands (see Operator's Manual and Jacking Instructions in Chapter 1 – Safety).

3. Remove both wheels from cradle assembly to be serviced (see Wheel Removal in this section).

4. Loosen lock nuts that secure wheel motor to cradle. Rotate motor to obtain slack in drive chain.

5. Rotate axle until master link is located in recessed area of cradle near wheel motor. Remove master link from drive chain.

6. Remove lock nuts that secure wheel hubs to cradle axle. Use puller to remove hubs from axle.

7. Loosen and remove set screw from the locking collar on both flange bearings.
8. Remove four (4) cap screws, lock washers and flat washers that secure flange bearings to cradle. Slide bearing assemblies from cradle and axle.
9. Remove chain from axle sprocket and pull axle assembly from cradle.
10. If necessary, remove sprocket and taper lock bushing from axle:
 - A. Remove three (3) cap screws and lock washers that secure sprocket to bushing. Remove sprocket from bushing.
 - B. Remove set screw that secures bushing to axle. Slide bushing from axle.
11. Clean all parts thoroughly. Replace all parts found to be worn or damaged.

Installation (Fig. 11)

1. During the assembly procedure, apply antiseize lubricant to all bearing bores, hubs and axle shaft prior to installing components.
2. If sprocket and taper lock bushing were removed from axle:
 - A. Slide taper lock bushing onto axle. Position flange of bushing from 6.735" to 6.765" (17.11 to 17.18 cm) from end of shaft (Fig. 12).
 - B. Apply Loctite #242 (or equivalent) to threads of bushing set screw. Install set screw into bushing to secure bushing to axle. After tightening set screw, make sure that bushing is still correctly positioned on axle.
 - C. Slide sprocket onto bushing. Install three (3) cap screws and lock washers to secure sprocket to bushing.
3. Install axle assembly into cradle.
4. Slide bearing assemblies to axle and cradle. Secure bearings to cradle with four (4) cap screws, lock washers and flat washers. Do not secure bearing locking collars to axle at this time.
5. Fit chain to cradle axle sprocket and install master link to secure chain. Make sure that cradle gusset (near wheel motor) is between upper and lower chain run.
6. Position cradle axle in bearings so sprocket is centered in cradle. Check sprocket alignment and if necessary, adjust position of sprocket(s).

7. Apply Loctite #242 (or equivalent) to threads of locking collar set screw. Install set screw into locking collar to secure collar to cradle axle. After tightening set screw, make sure that sprocket is still centered in cradle and sprocket alignment is correct.
8. Rotate wheel motor to take slack out of chain, but not so tight that binding occurs on sprockets. Tighten lock nuts to secure motor to cradle.
9. Check that chain has 0.125" (3.2 mm) deflection at mid-span between sprockets. If necessary, reposition wheel motor to allow correct chain deflection.
10. Lubricate grease fittings on bearing assemblies.
11. Secure wheel hubs to cradle axle with lock nuts. After starting both lock nuts on axle threads, retain one lock nut with socket and torque second lock nut from **230 to 270 ft-lb (312 to 366 N-m)**. Following this procedure, both lock nuts should be properly tightened. Check torque on both lock nuts after tightening.



WARNING

Failure to maintain proper lug bolt torque could result in failure or loss of wheel and may result in personal injury.

12. Install wheel assemblies (see Wheel Installation in this section).
13. Carefully lower machine to ground.
14. Lubricate grease fittings on flange bearings.

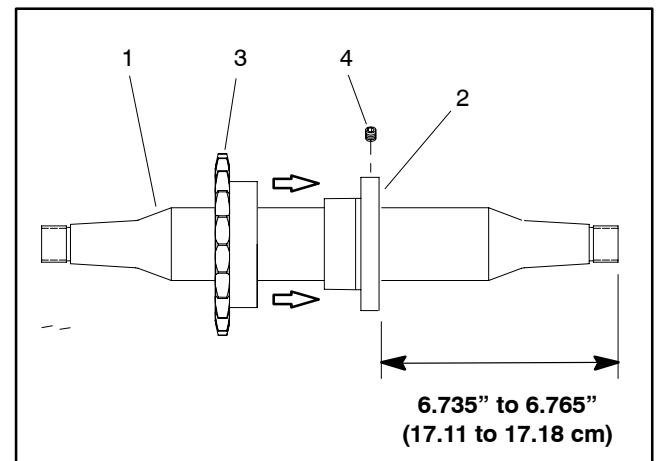


Figure 12

- | | |
|-----------------------|--------------|
| 1. Cradle axle | 3. Sprocket |
| 2. Taper lock bushing | 4. Set screw |

Cradle Assembly (Topdresser 2500)

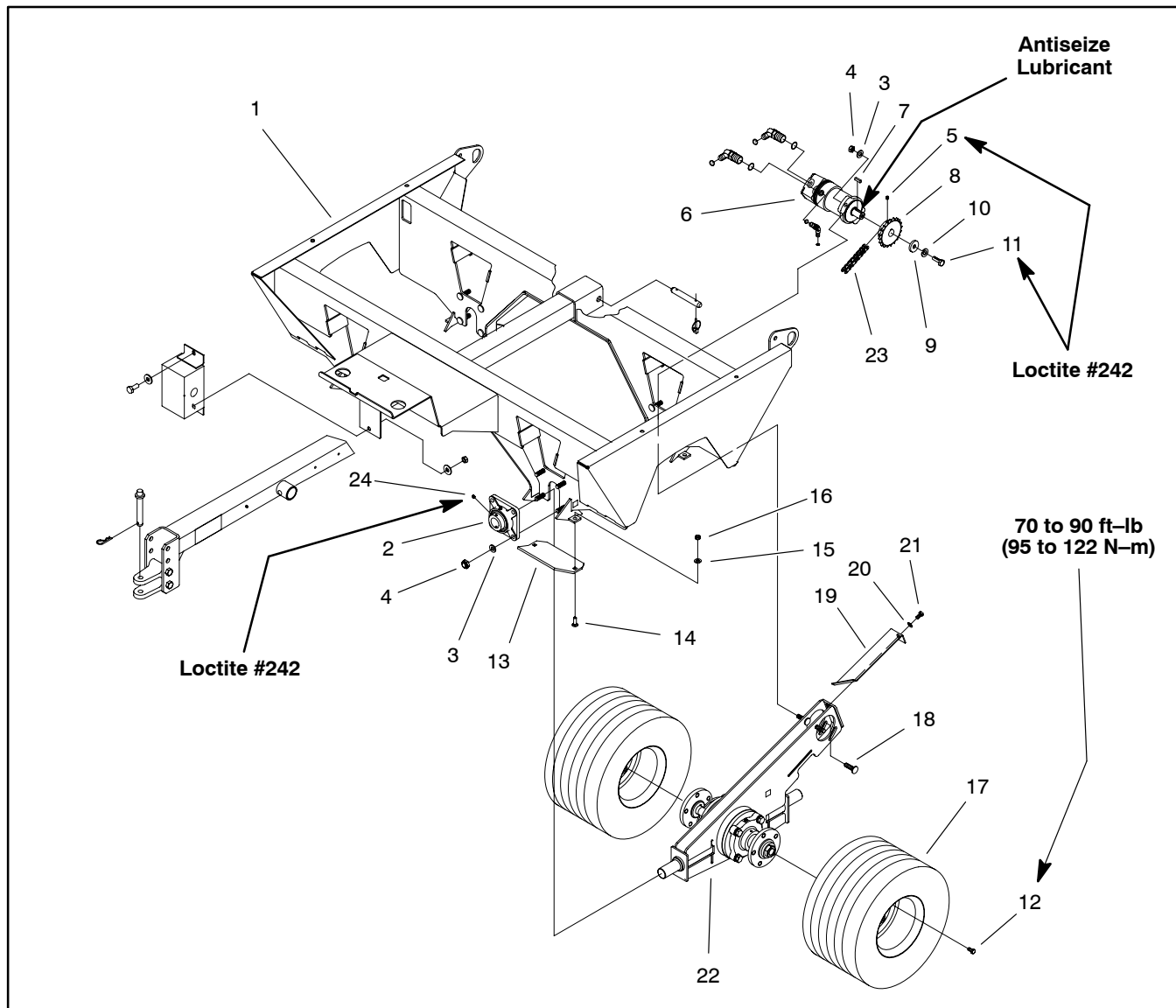


Figure 13

- | | | |
|---------------------------------------|--------------------------------------|----------------------------------|
| 1. Frame | 9. Flat washer | 17. Wheel (4 used) |
| 2. Flange bearing (2 used per cradle) | 10. Lock washer | 18. Carriage screw |
| 3. Flat washer | 11. Cap screw | 19. Cradle cover |
| 4. Lock nut | 12. Lug bolt (5 used per wheel) | 20. Flat washer |
| 5. Set screw | 13. Skid (4 used) | 21. Cap screw |
| 6. Wheel motor (pump) | 14. Carriage screw (2 used per skid) | 22. Cradle assembly (2 used) |
| 7. Square key | 15. Flat washer (2 used per skid) | 23. Drive chain with master link |
| 8. Sprocket | 16. Lock nut (2 used per skid) | 24. Set screw |

Removal (Fig. 13)

1. Position Topdresser on a level surface with hopper empty. Have Topdresser attached to towing vehicle, engage vehicle parking brake, stop engine and remove key from the ignition switch. Chock Topdresser wheels to prevent machine from moving.
2. Jack or hoist sweeper from ground and support machine with blocking or jack stands (see Operator's Manual and Jacking Instructions in Chapter 1 – Safety).
3. Remove both wheels from cradle assembly to be removed (see Wheel Removal in this section).
4. Remove wheel motor from cradle assembly (see Wheel Motor Removal in the Service and Repairs section of Chapter 3 – Hydraulic System).
5. Remove both skid plates from the frame.
6. Loosen and remove set screw from locking collar of both flange bearings.
7. Support cradle assembly to keep it from shifting.
8. Remove four (4) lock nuts and flat washers that secure both flange bearings to frame.
9. Slide both flange bearings from cradle assembly pivot and studs on frame.
10. Lower cradle assembly from frame and remove from machine.
11. Remove components from cradle assembly as necessary (see Cradle Axle Removal in this section).

Installation (Fig. 13)

1. Install all removed components to cradle assembly (see Cradle Axle Installation in this section).
2. Position cradle assembly under frame. Raise cradle to frame and place both flange bearings to cradle assembly pivot and studs on frame.
3. Secure flange bearings to frame with four (4) lock nuts and flat washers.
4. Center cradle assembly in frame between bearings. Tighten bearing collar set screws to secure cradle assembly in frame.
5. Install wheel motor to cradle assembly (see Wheel Motor Installation in the Service and Repairs section of Chapter 3 – Hydraulic System). After wheel motor installation, make sure that drive chain is properly tensioned.
6. Secure both skid plates to the frame.
7. Install wheel assemblies (see Wheel Installation in this section).
8. Carefully lower machine to ground.
9. Lubricate grease fittings on flange bearings.

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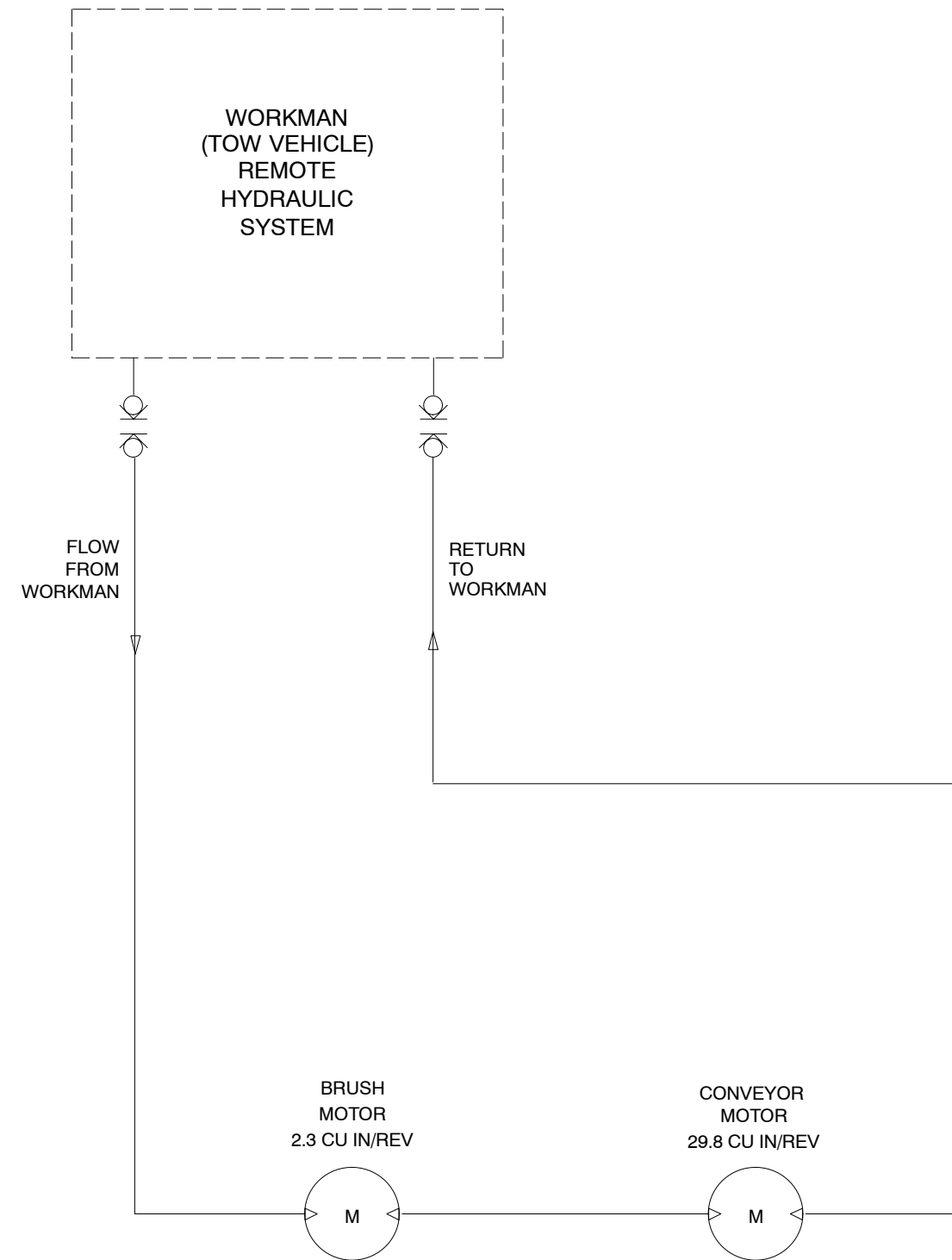
Foldout Diagrams

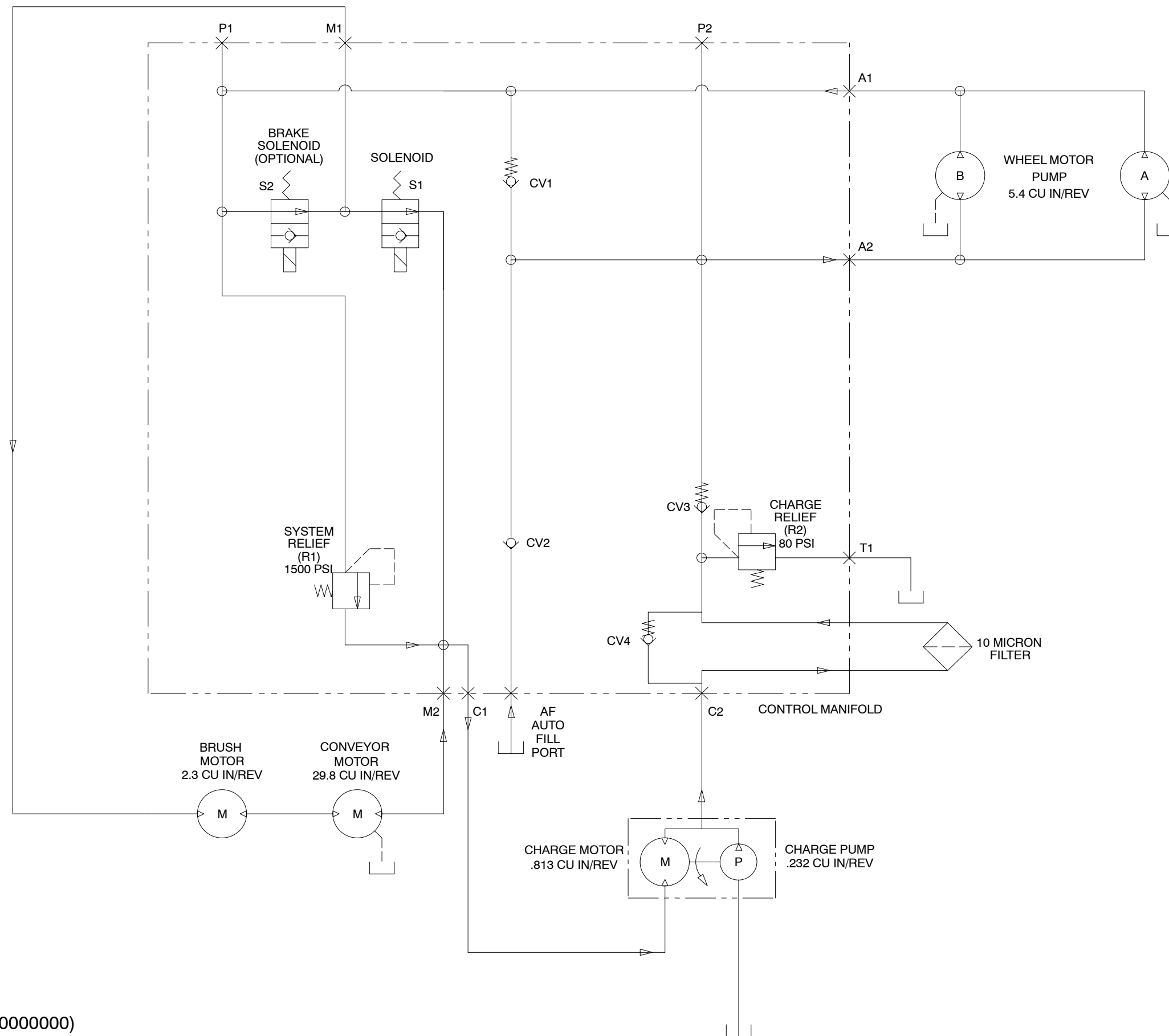
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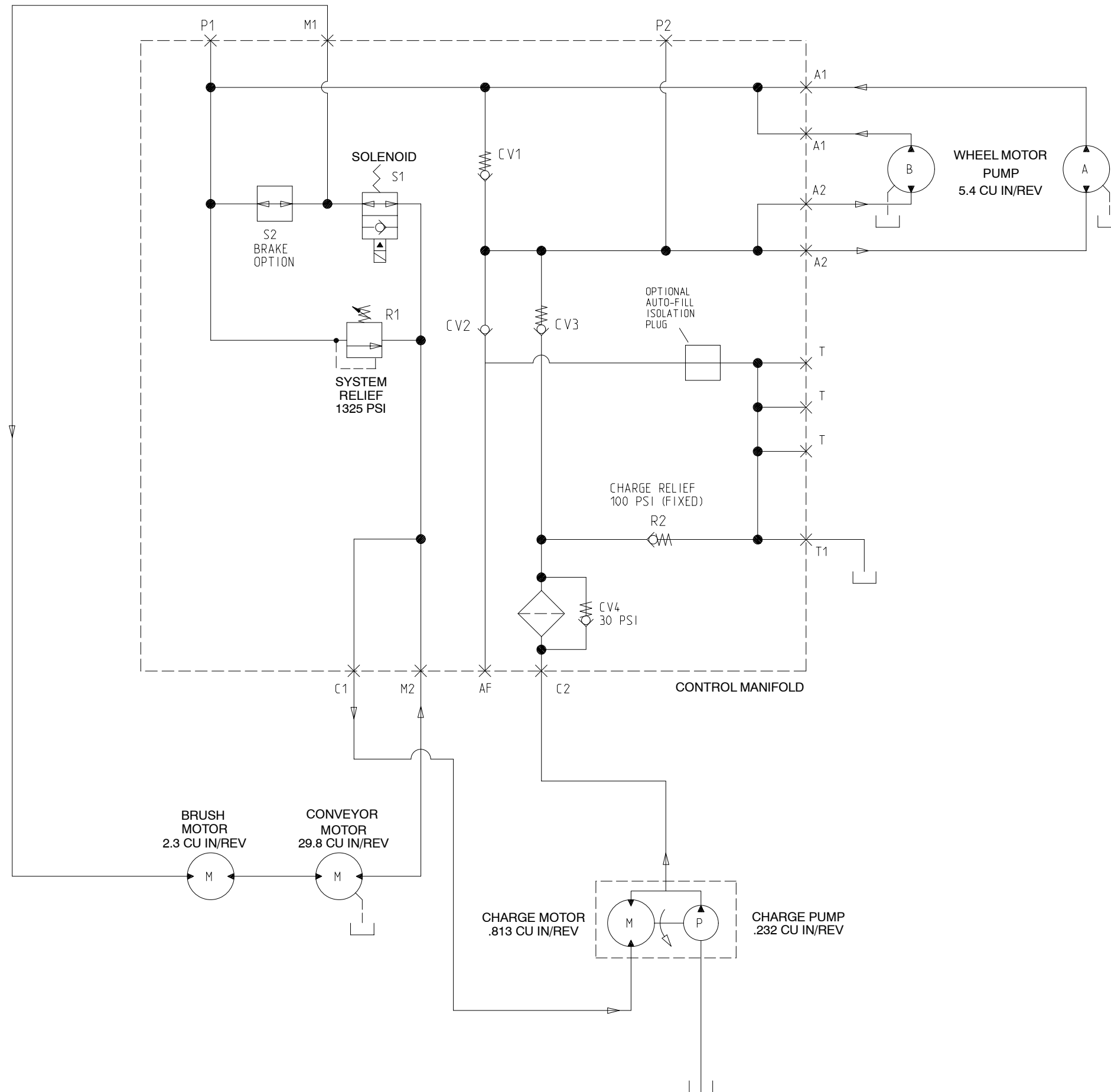
Foldout
Diagrams

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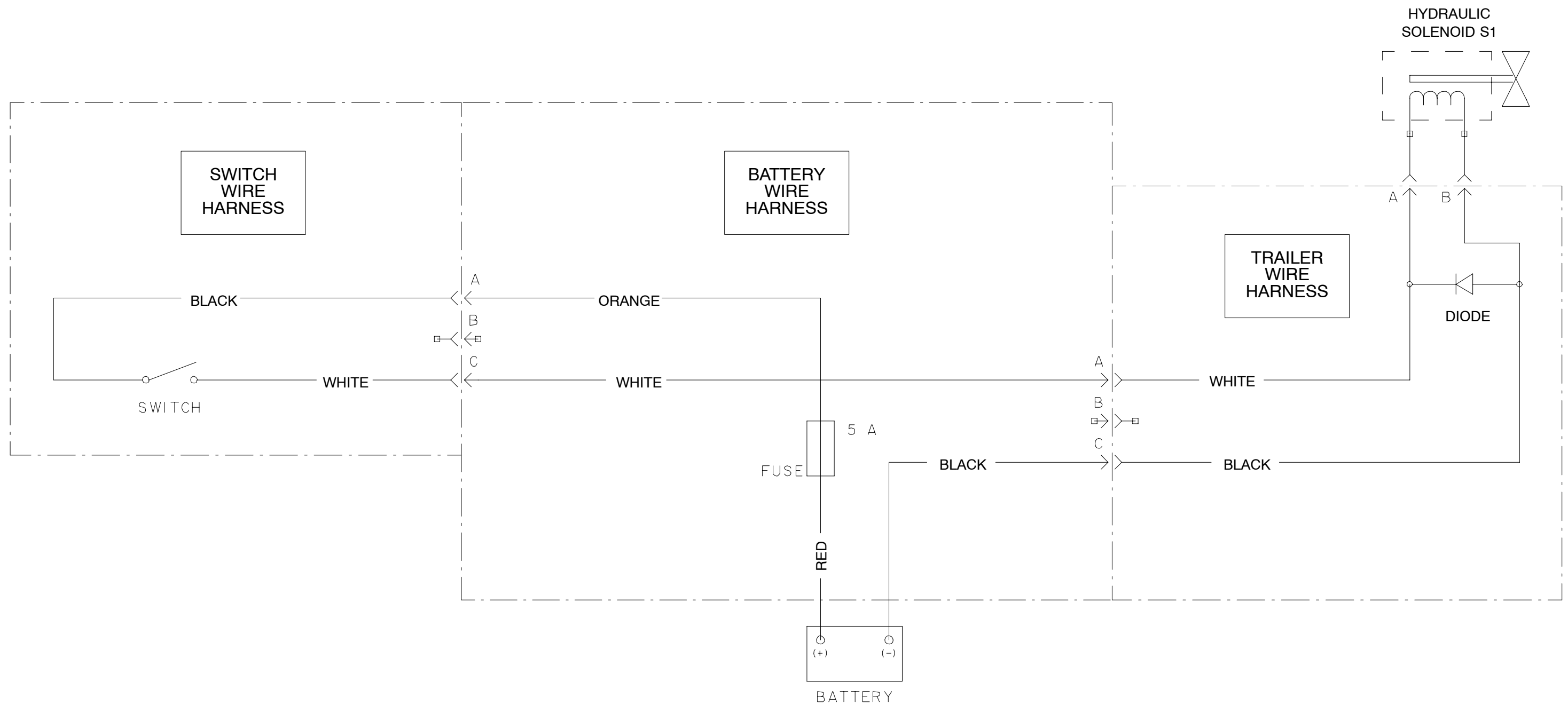




Topdresser 2500
Hydraulic Schematic
 (Serial Number Below 240000000)

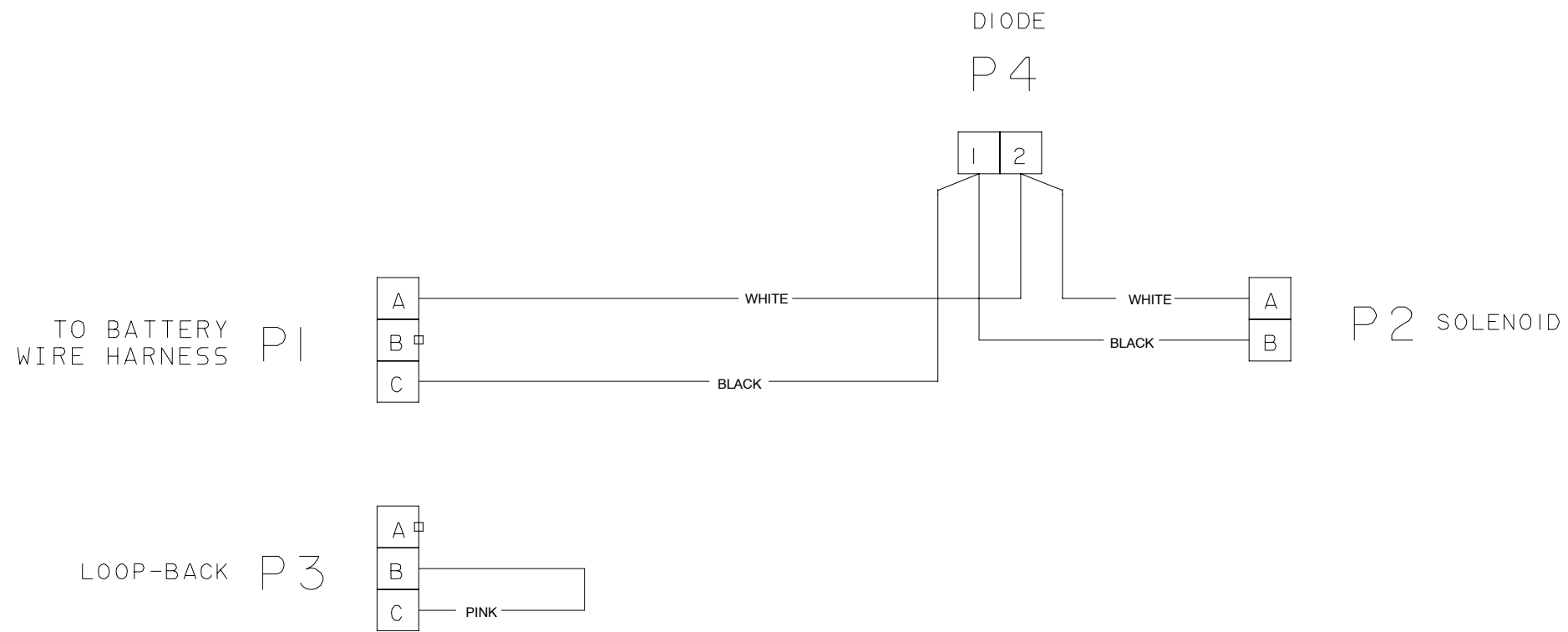
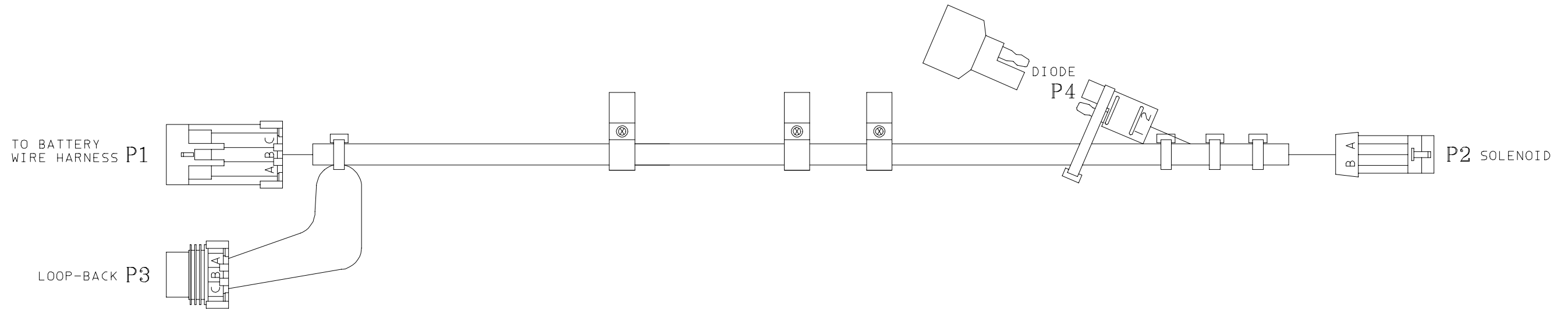


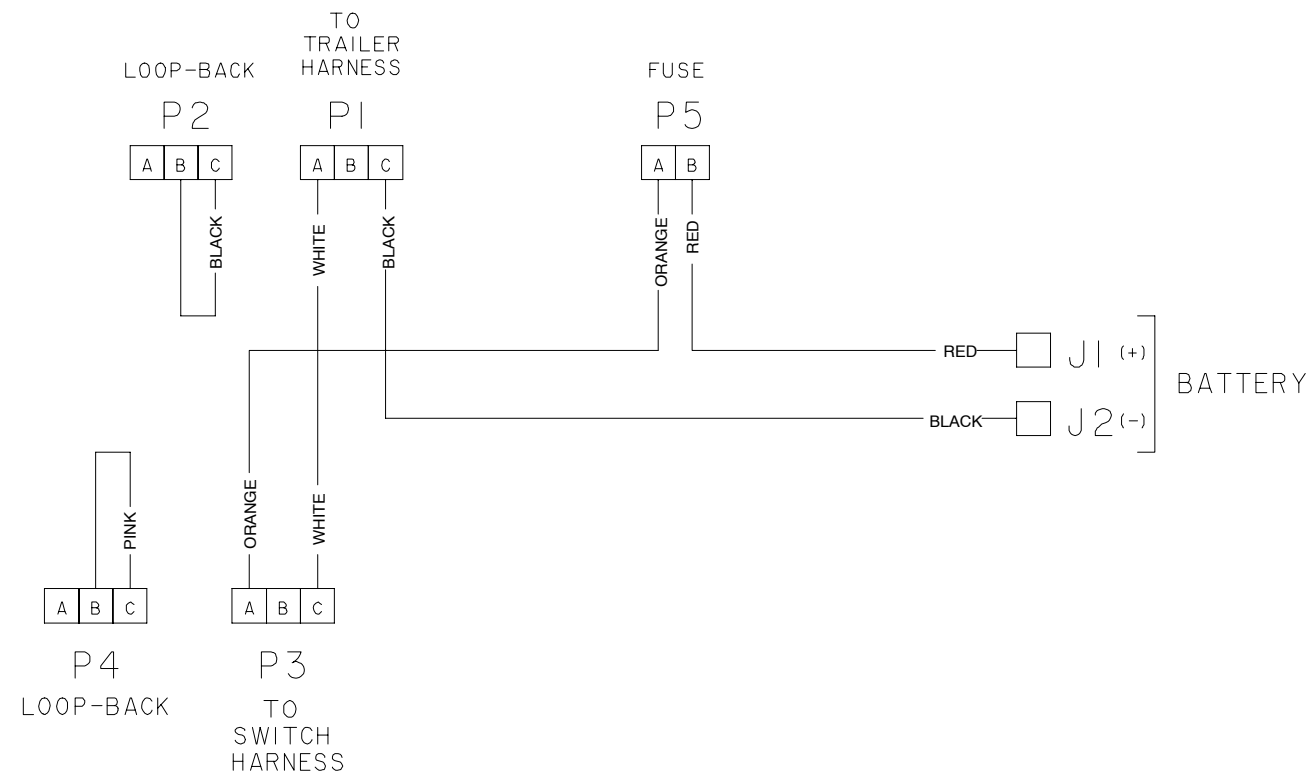
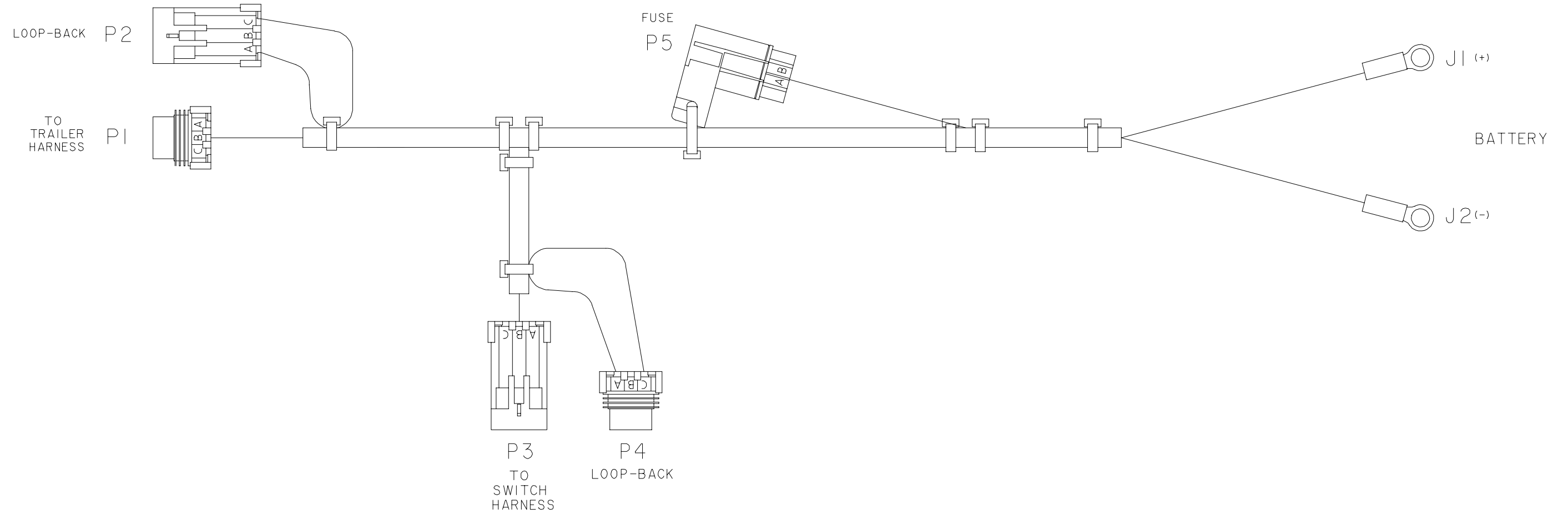
Topdresser 2500
Hydraulic Schematic
 (Serial Number Above 240000000)



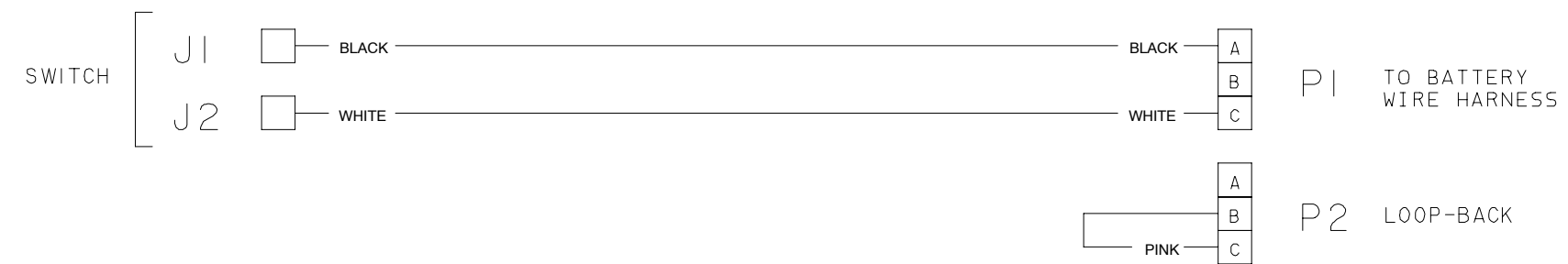
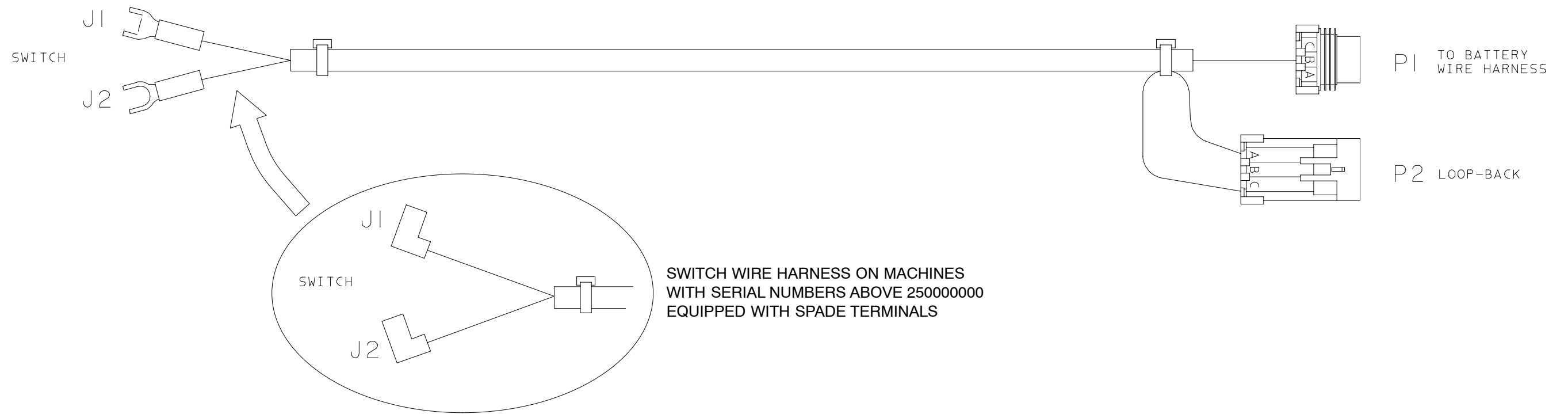
Topdresser 2500
Electrical Schematic

All ground wires are black.





Topdresser 2500
Battery Wire Harness



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