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TORO®

Count on it.

Service Manual

ProCore® Processor

Original Instructions (EN)

Revision History

Revision	Date	Description
--	2008	Initial Issue.
A	02/2018	Added revision history.

Reader Comments

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NOTES

Part No. 08156SL (Rev. A)

Service Manual

ProCore® Processor

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 ProCore Processor.

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:

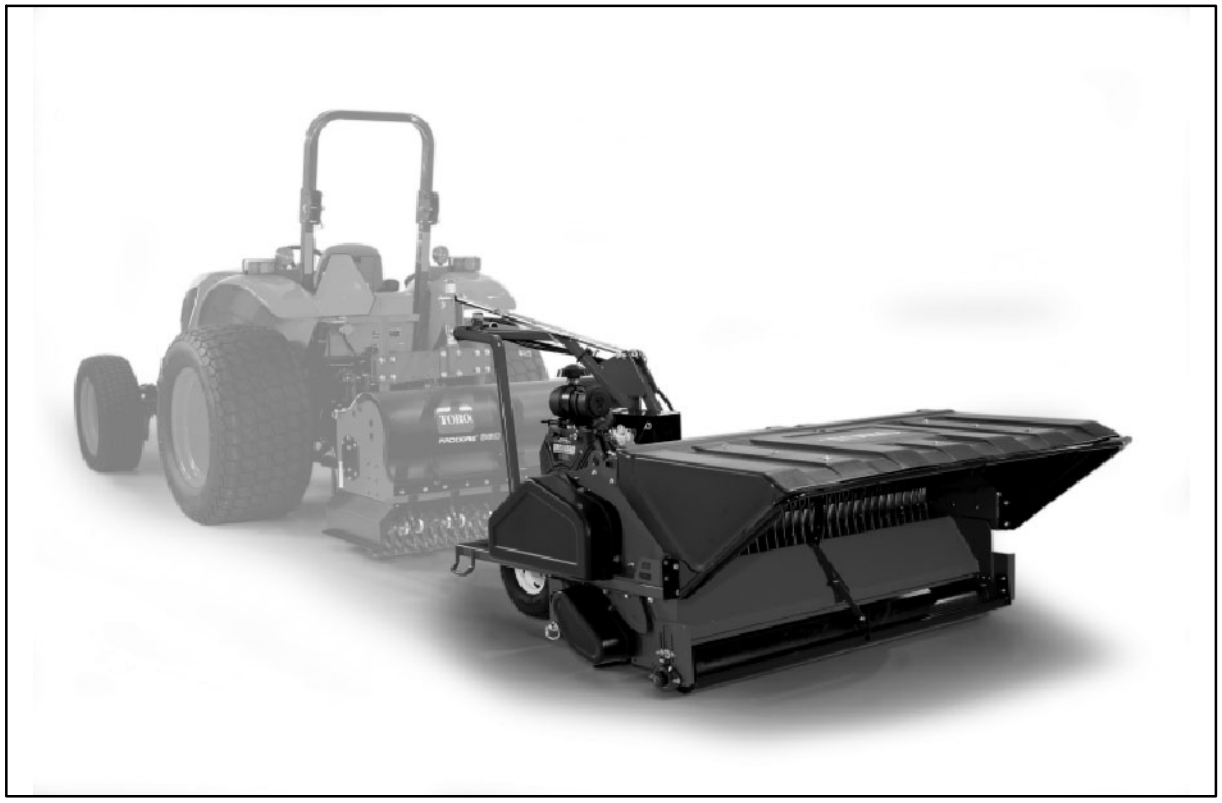
The Toro Company
Attn. Technical Publications
8111 Lyndale Avenue South
Minneapolis, MN 55420

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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Chapter 1

Safety

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Safety Instructions

The ProCore Processor 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.

WARNING

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 and Operator Training DVD before starting and operating the machine. Become familiar with the controls and know how to stop the machine 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 ProCore Processor.

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

5. Make sure that the ProCore Processor is properly attached to tow vehicle before operating.

While Operating

1. Operator should be in the tow vehicle operators position when operating the ProCore Processor. Stay away from the Processor when it is operating.

2. Do not run ProCore Processor engine in a confined area without adequate ventilation. Exhaust fumes are hazardous and could possibly be deadly.

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

4. If abnormal vibration is detected, stop tow vehicle and ProCore Processor immediately and determine source of vibration. Correct problems before resuming the use of the Processor.

5. During operation of the ProCore Processor, noise levels may exceed 85dB(A) at the operator position. Hearing protection is recommended for prolonged exposure to reduce the potential of permanent hearing damage.

6. Before leaving the operator's position of the tow vehicle:

   A. Park on level surface and stop ProCore Processor engine. Make sure that all machine motion has stopped.

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

Maintenance and Service

1. Before servicing or making adjustments, position ProCore Processor on a level surface and stop engine. Chock wheels to prevent it from moving. If machine is attached to tow vehicle, engage tow vehicle parking brake, stop engine and remove key from the ignition switch.

2. Make sure machine is in safe operating condition by keeping all nuts, bolts and screws tight.

3. Before disconnecting ProCore Processor from tow vehicle, park Processor on a hard, level surface and chock wheels to prevent machine movement.

4. 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.

5. 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.

6. Before disconnecting any hydraulic component or performing any work on the hydraulic system, relieve hydraulic system pressure.

7. To reduce potential fire hazard, keep engine area free of excessive grease, grass, leaves and dirt.

8. If engine must be running to perform maintenance or to make an adjustment, keep hands, feet, clothing and other parts of the body away from moving parts on the ProCore Processor. Keep bystanders away.

9. Do not overspeed the engine by changing governor setting. To assure safety and accuracy, check maximum engine speed with a tachometer.

10. Shut ProCore Processor engine off before checking or adding oil to the crankcase.

11. Disconnect battery before servicing the machine. Disconnect negative battery cable first and positive cable last. If battery voltage is required for troubleshooting or test procedures, temporarily connect the battery. Reconnect positive battery cable first and negative cable last.

12. Battery acid is poisonous and can cause burns. Avoid contact with skin, eyes and clothing. Protect your face, eyes and clothing when working with a battery.

13. Battery gases can explode. Keep cigarettes, sparks and flames away from the battery.

14. When changing tires or performing other service, use correct blocks, hoists and jacks. Make sure machine is parked on a solid level surface such as a concrete floor. Always chock or block wheels. Use suitable jack stands to support the raised machine. If the machine is not properly supported by suitable jack stands, the machine may move or fall, which may result in personal injury (see Jacking Instructions in this chapter).

15. If major repairs are ever needed or assistance is desired, contact an Authorized Toro Distributor.

16. 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.

Jacking Instructions

CAUTION

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

1. Position ProCore Processor on a level surface with machine attached to tow vehicle. Engage vehicle parking brake, stop engine and remove key from the ignition switch. Make sure that ProCore Processor engine is off. Chock Processor wheels to prevent the machine from moving.

2. Secure lift axle to frame with hitch pin and lynch pin to prevent lift axle from shifting (Fig. 1).

3. Position jack securely under the main frame. Do not use the lift axle as a jacking point.

4. Carefully jack machine off the ground.

5. Position jack stands under the main frame to support the ProCore Processor.

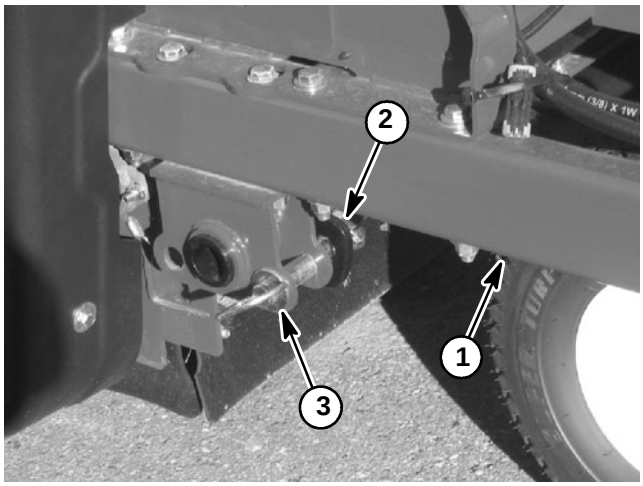

Figure 1

1. **Main frame**
2. **Lift axle bracket**
3. **Hitch pin**

Securing ProCore Processor to Tow Vehicle

While operating or servicing the ProCore Processor, make sure that ProCore Processor is properly secured to tow vehicle. Refer to your Operator's Manual and Hitch Installation Instructions for the correct procedure for attaching Processor to tow vehicle.

Safety and Instruction Decals

Numerous safety and instruction decals are affixed to the ProCore Processor. 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.

Chapter 2

Product Records and Maintenance

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Product Records

Insert Operator's Manual and Parts Catalog for your ProCore Processor 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 ProCore Processor 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	33/64	0.515625	— 13.097
1/32	0.03125	— 0.794	17/32	0.53125	— 13.494
3/64	0.046875	— 1.191	35/64	0.546875	— 13.891
1/16	0.0625	— 1.588	9/16	0.5625	— 14.288
5/64	0.078125	— 1.984	37/64	0.578125	— 14.684
3/32	0.09375	— 2.381	19/32	0.59375	— 15.081
7/64	0.109275	— 2.778	39/64	0.609375	— 15.478
1/8	0.1250	— 3.175	**5/8**	0.6250	— 15.875
9/64	0.140625	— 3.572	41/64	0.640625	— 16.272
5/32	0.15625	— 3.969	21/32	0.65625	— 16.669
11/64	0.171875	— 4.366	43/64	0.671875	— 17.066
3/16	0.1875	— 4.762	11/16	0.6875	— 17.462
13/64	0.203125	— 5.159	45/64	0.703125	— 17.859
7/32	0.21875	— 5.556	23/32	0.71875	— 18.256
15/64	0.234375	— 5.953	47/64	0.734375	— 18.653
1/4	0.2500	— 6.350	**3/4**	0.7500	— 19.050
17/64	0.265625	— 6.747	49/64	0.765625	— 19.447
9/32	0.28125	— 7.144	25/32	0.78125	— 19.844
19/64	0.296875	— 7.541	51/64	0.796875	— 20.241
5/16	0.3125	— 7.938	13/16	0.8125	— 20.638
21/64	0.328125	— 8.334	53/64	0.828125	— 21.034
11/32	0.34375	— 8.731	27/32	0.84375	— 21.431
23/64	0.359375	— 9.128	55/64	0.859375	— 21.828
3/8	0.3750	— 9.525	**7/8**	0.8750	— 22.225
25/64	0.390625	— 9.922	57/64	0.890625	— 22.622
13/32	0.40625	— 10.319	29/32	0.90625	— 23.019
27/64	0.421875	— 10.716	59/64	0.921875	— 23.416
7/16	0.4375	— 11.112	15/16	0.9375	— 23.812
29/64	0.453125	— 11.509	61/64	0.953125	— 24.209
15/32	0.46875	— 11.906	31/32	0.96875	— 24.606
31/64	0.484375	— 12.303	63/64	0.984375	— 25.003
1/2	0.5000	— 12.700	**1**	1.000	— 25.400

1 mm = 0.03937 in. **0.001 in. = 0.0254 mm**

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. Subract 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

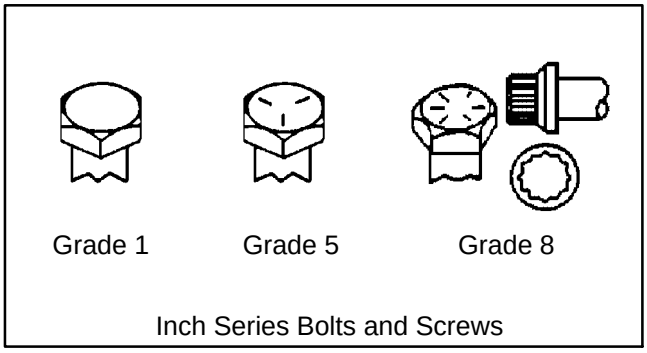

Figure 1

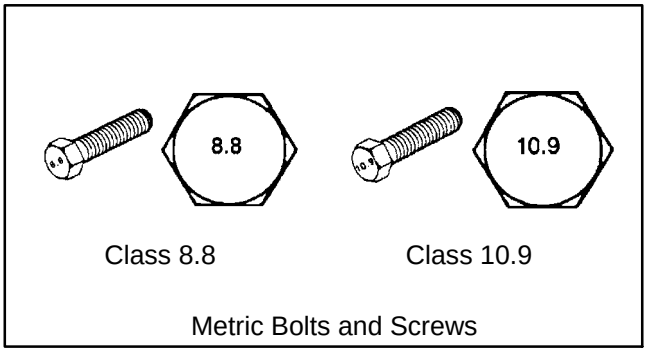

Figure 2

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.

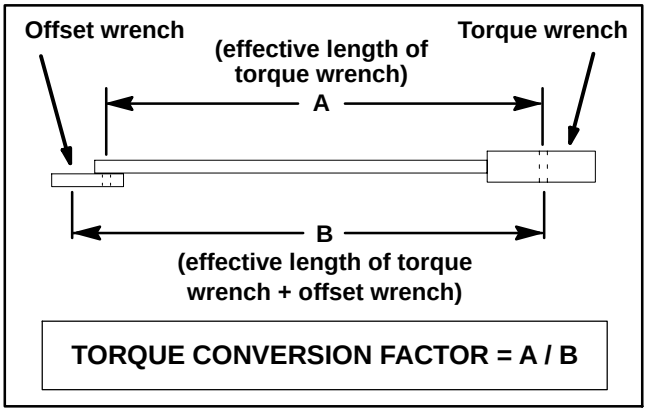

Figure 3

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

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

N–cm X 0.08851 = in–lb
N–m X 0.7376 = ft–lb

Chapter 3

Engine

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Specifications

Item	Description
Make / Designation	Briggs and Stratton, 4–cycle, V–Twin cylinder, OHV, air cooled, gasoline engine, Model 613477
Bore x Stroke	3.366” x 3.405” (85.5 mm x 86.5 mm)
Total Displacement	60.59 in^3 (993 cc)
Compression Ratio	8.25:1
Governor	Mechanical
Low Idle Speed (no load)	1550 $\pm$ 100 RPM
High Idle Speed (no load)	3600 $\pm$ 100 RPM
Carburetor	Float feed, 2 barrel, fixed main jet
Fuel Pump	Mechanical
Fuel	Unleaded, regular grade gasoline
Air Cleaner	Cyclonic, multi–stage
Lubrication System	Pressure lubrication
Oil Capacity	2.5 U.S. qt (2.3 l)
Engine Oil	See Operator’s Manual
Ignition System	Flywheel magneto, twin electronic armatures with ignition advance
Spark Plug	Champion RC12YC
Spark Plug Gap	0.030” (0.76 mm)
Starter	12 VDC, solenoid shift
Alternator	12 VDC / 20 Amps
Dry Weight	132 lbs (60 kg)

General Information

This Chapter gives information about specifications, maintenance, troubleshooting, testing and repair of the gasoline engine used in the ProCore Processor.

Most repairs and adjustments require tools which are commonly available in many service shops. Special tools are described in the BRIGGS & STRATTON VANGUARD V-TWIN, OHV REPAIR MANUAL that is included at the end of this Chapter. The use of some specialized test equipment is explained. However, the cost of the test equipment and the specialized nature of some repairs may dictate that the work be done at an engine repair facility.

Service and repair parts for Briggs and Stratton engines are supplied through your local Toro distributor. Be prepared to provide your distributor with the Toro model and serial number.

Operator's Manual

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

Special Tools

Order special tools from your Toro Distributor.

Centrifugal Clutch Puller

The centrifugal clutch puller should be used to remove the clutch from the engine crankshaft.

Toro Part Number: **114-7730**

To use the clutch puller (Fig. 1):

1. To protect the engine crankshaft, place thick washer on end of crankshaft and lightly grease the end of the rotator pin.

2. Thread puller stator base (item 2) into bore of centrifugal clutch.

3. Tighten puller rotator pin (item 1) until it is snug with washer on engine crankshaft.

4. Support clutch to prevent it from falling. Using a hammer, strike end of puller rotator pin to loosen clutch from tapered engine crankshaft.

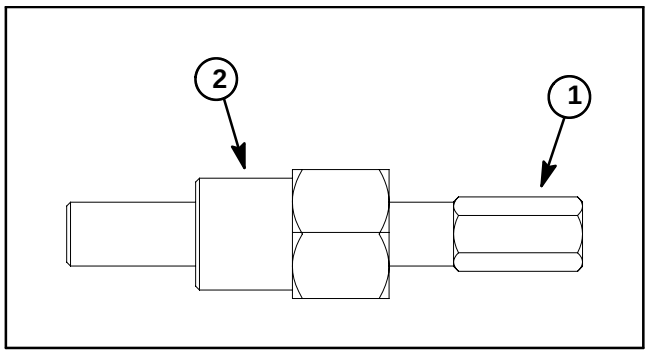


Figure 1

1. Rotator pin **2. Stator base**

Cooling System

IMPORTANT: The engine that powers the ProCore Processor is air-cooled. Operating the engine with dirty or plugged cooling fins or a plugged or dirty blower housing will result in engine overheating and damage.

1. Park machine on a level surface. Make sure engine is OFF. Remove key from ignition switch. Carefully remove spark plug wires from the spark plugs to prevent the engine from starting unexpectedly.

IMPORTANT: Never clean engine with pressurized water. Water could enter and contaminate the fuel system.

2. Remove front panel (Fig. 2) to allow cleaning around intake manifold, fuel pump, carburetor and governor linkage.

3. Clean blower housing of dirt and debris (Fig. 2). Remove blower housing from engine if necessary.

4. Clean cooling fins on cylinder and cylinder head. Remove engine cylinder shrouds from engine for more thorough cleaning (Fig. 3).

IMPORTANT: Never operate engine without the blower housing installed. Overheating and engine damage will result.

5. Make sure blower housing and/or engine cylinder shrouds are installed to the engine if removed. Make sure that electrical wires are not pinched between engine covers during installation.

6. Attach spark plug wires to spark plugs.

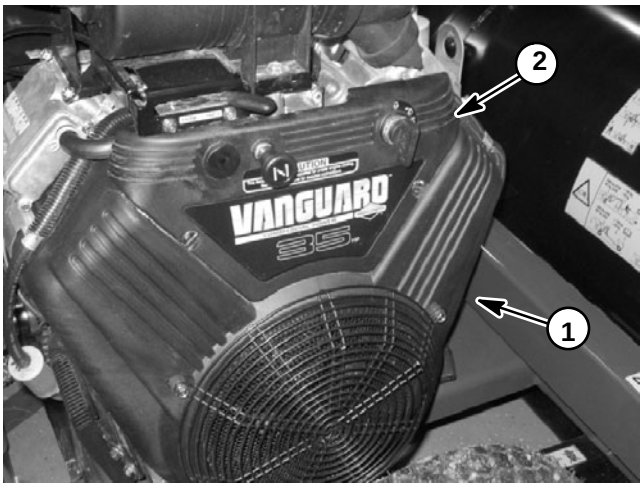


Figure 2

1. Blower housing **2. Front panel**

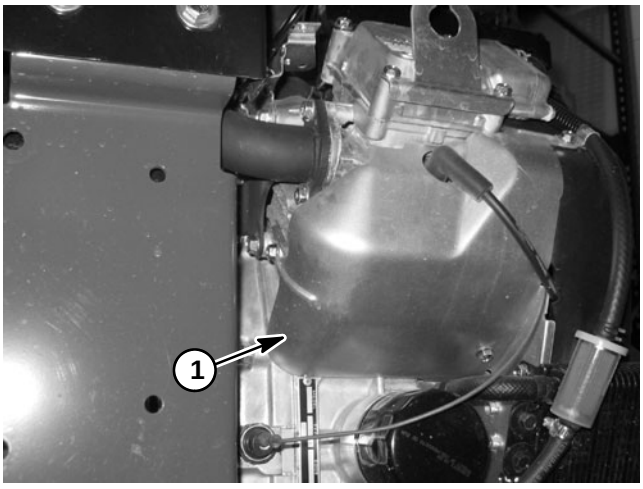


Figure 3

1. Engine cylinder shroud

Air Cleaner

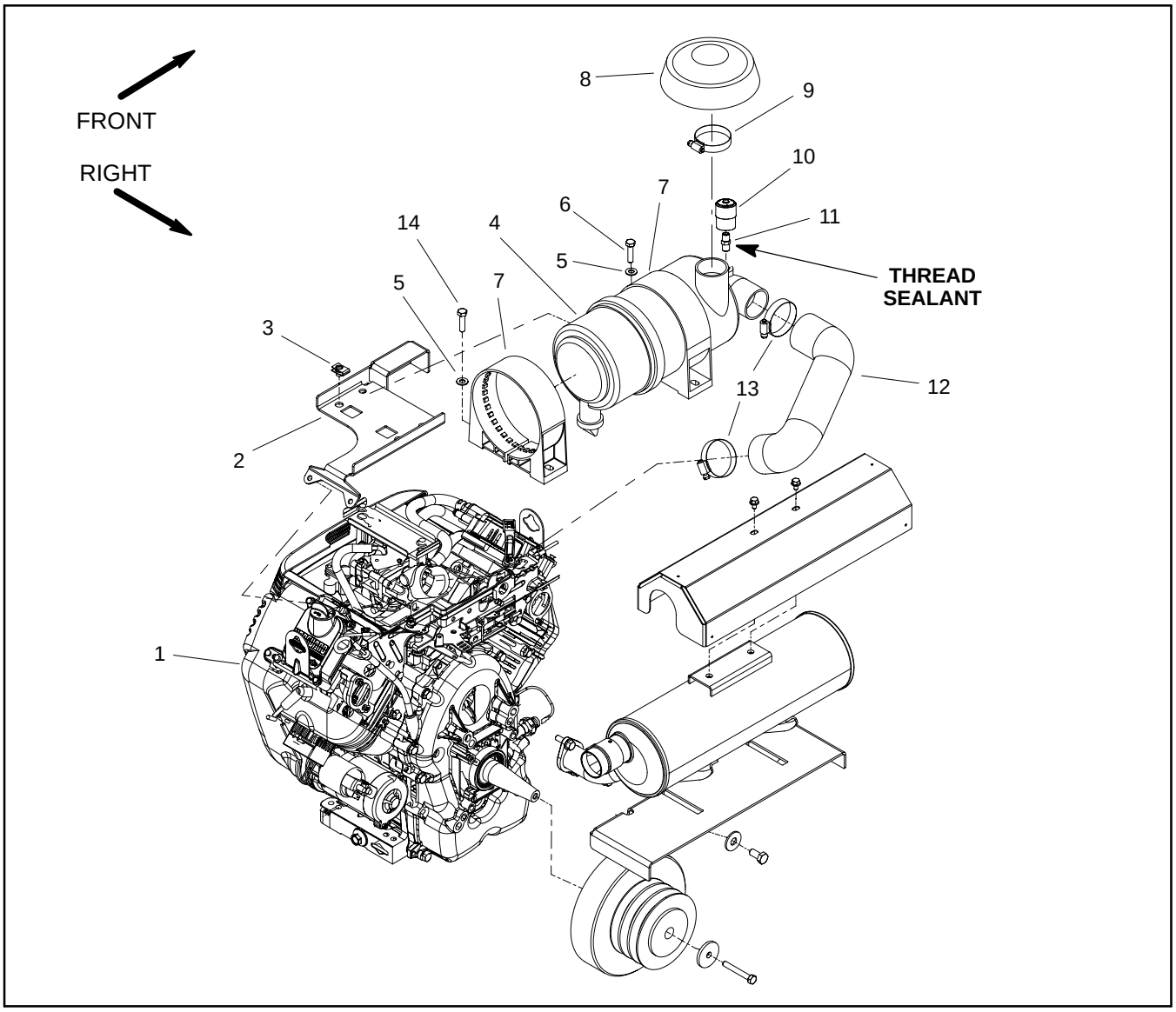


Figure 4

1. **Engine assembly**
2. **Air filter mount plate**
3. **Tinnerman nut (2 used)**
4. **Air cleaner assembly**
5. **Flat washer (4 used)**
6. **Cap screw (6 mm) (2 used)**
7. **Air cleaner bracket (2 used)**
8. **Air cleaner cap**
9. **Clamp**
10. **Service indicator**
11. **Nipple**
12. **Air intake hose**
13. **Hose clamp (2 used)**
14. **Cap screw (5/16”) (2 used)**

Removal (Fig. 4)

1. Make sure machine is parked on a level surface with the engine OFF. Remove key from ignition switch.

2. Thoroughly clean junction of air intake hose, intake manifold on engine and air cleaner assembly. Loosen hose clamps (item 11) and remove air intake hose from machine.

3. Remove air cleaner components as needed using Figures 4 and 5 as guides.

Installation (Fig. 4)

IMPORTANT: Any leaks in the air filter system will allow dirt into engine and will cause serious engine damage. Make sure that all air cleaner components are in good condition and are properly secured during assembly.

1. Assemble all removed air cleaner components using Figures 4 and 5 as guides.

   A. If service indicator (item 8) was removed from air cleaner housing, apply thread sealant to nipple threads before installing indicator.

   B. Make sure that vacuator valve is pointed down after assembly.

2. Install air intake hose to intake manifold on engine and air cleaner assembly. Secure intake hose with hose clamps (item 11).

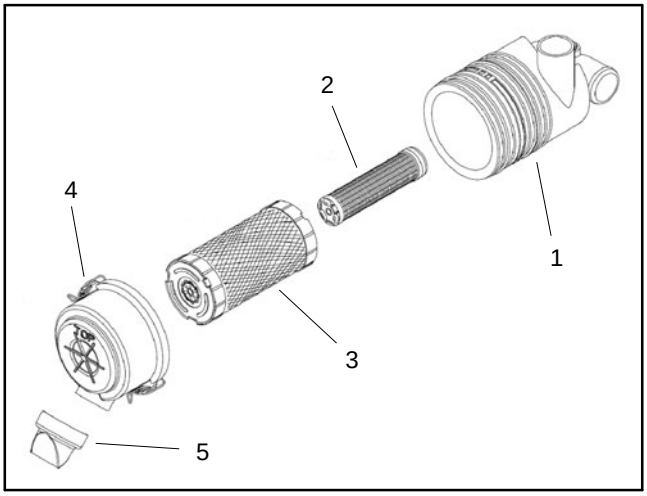


Figure 5

1. Air cleaner housing
2. Safety filter
3. Air filter
4. Air cleaner cover
5. Vacuator valve

Fuel Tank

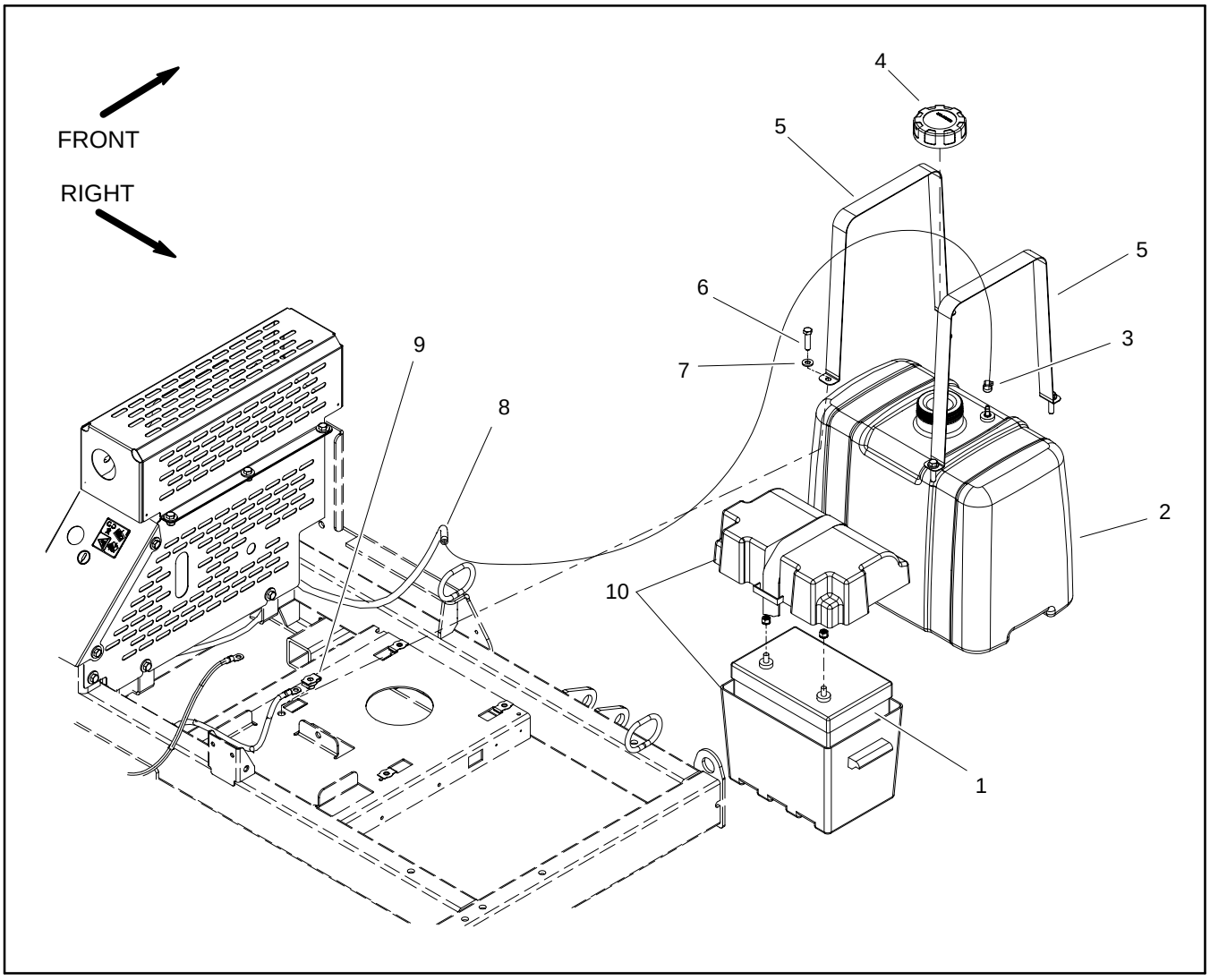


Figure 6

1. **Battery**
2. **Fuel tank**
3. **Worm clamp**
4. **Fuel cap**
5. **Tank strap (2 used)**
6. **Cap screw (4 used)**
7. **Flat washer (4 used)**
8. **Fuel hose**
9. **Tinnerman nut (4 used)**
10. **Battery box**

DANGER

Because gasoline is highly flammable, use caution when storing or handling it. Do not smoke while filling the fuel tank. Do not fill fuel tank while engine is running, hot, or when machine is in an enclosed area. Always fill fuel tank outside and wipe up any spilled fuel before starting the engine. Store fuel in a clean, safety-approved container and keep cap in place. Use gasoline for the engine only; not for any other purpose.

Check Fuel Lines and Connections

Check fuel lines and connections periodically as recommended in the Operator's Manual. Check fuel lines for deterioration, damage or leaking connections. Replace hoses, clamps and connections as necessary.

Drain and Clean Fuel Tank

Drain and clean the fuel tank periodically as recommended in the Operator's Manual. Also, drain and clean the fuel tank if the fuel system becomes contaminated or if the machine is to be stored for an extended period.

To clean fuel tank, flush tank out with clean solvent. Make sure tank is free of all contaminates and debris.

Fuel Tank Removal (Fig. 9)

1. Make sure machine is parked on a level surface with the engine OFF. Remove key from ignition switch. Remove spark plug wires from the spark plugs to prevent the engine from starting unexpectedly.

2. Use a fuel transfer pump to remove fuel from the fuel tank and into a suitable container.

3. Disconnect fuel hose from the stand pipe fitting on top of tank.

4. Remove four (4) cap screws and flat washers that secure tank straps to machine. Remove straps. Make sure that tinnerman nuts remain positioned correctly on frame brackets for assembly purposes.

5. Lift fuel tank from machine.

6. Remove stand pipe and bushing from fuel tank if necessary (Fig. 7). Discard bushing if removed.

Fuel Tank Installation (Fig. 9)

1. If removed, install new bushing and stand pipe into fuel tank (Fig. 7).

2. Position fuel tank and tank straps to machine frame.

3. Secure straps and fuel tank with four (4) cap screws and flat washers.

4. Connect fuel hose to the stand pipe fitting on top of tank. Secure hose with worm clamp.

5. Connect spark plug wires to spark plugs.

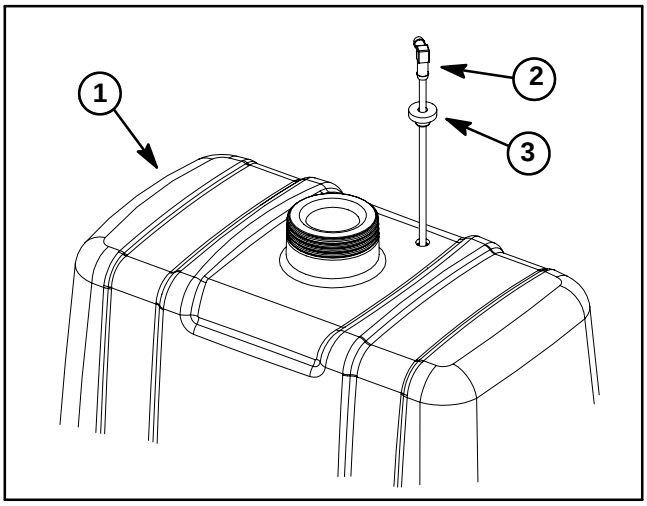


Figure 7

1. **Fuel tank**
2. **Stand pipe**
3. **Bushing**

Centrifugal Clutch

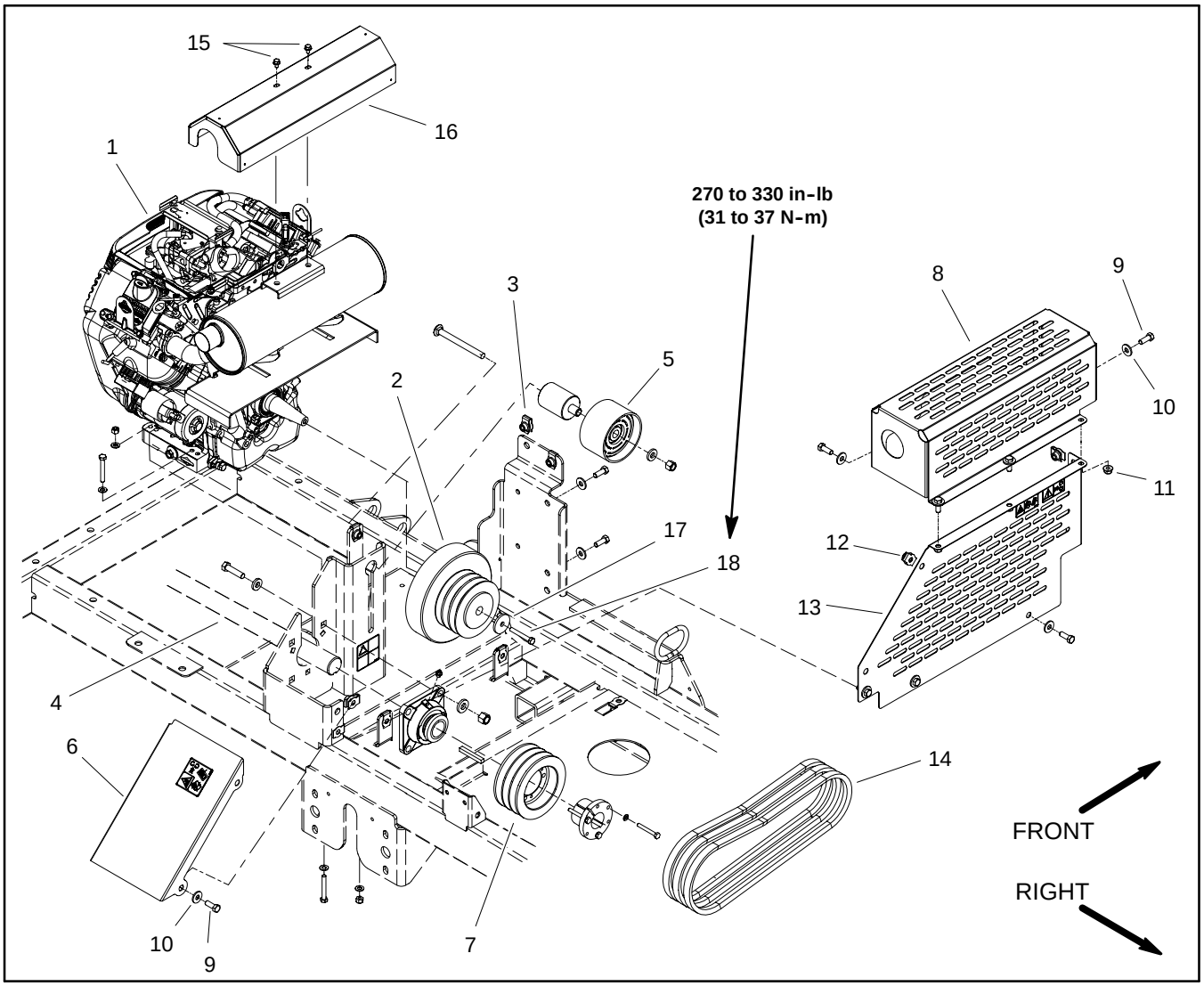


Figure 8

1. **Engine assembly**
2. **Centrifugal clutch**
3. **Tinnerman nut**
4. **Jack shaft**
5. **Idler pulley**
6. **Belt cover**
7. **Jack shaft pulley**
8. **Muffler guard**
9. **Cap screw (12 used)**
10. **Flat washer (12 used)**
11. **Flange nut (3 used)**
12. **Tinnerman nut**
13. **Belt guard**
14. **Belt set**
15. **Flange head screw (2 used)**
16. **Heat shield**
17. **Flat washer**
18. **Cap screw**

Removal (Fig. 8)

1. Make sure machine is parked on a level surface with the engine OFF. Remove key from ignition switch. Chock wheels to prevent movement of machine. Remove spark plug wires from the spark plugs to prevent the engine from starting unexpectedly.

2. Disconnect cables from the battery terminals. Remove negative battery cable first and then the positive cable.

CAUTION

The muffler and exhaust manifold may be hot. Avoid possible burns, allow exhaust system to cool before removing the clutch.

3. Remove muffler guard, belt guard and belt cover to allow access to centrifugal clutch on engine crankshaft (see Drive Belt Covers in the Service and Repairs section of Chapter 6 – Chassis).

4. Loosen straps that secure fuel tank to machine frame (see Fuel Tank Removal in this section). Shift tank position toward right side of machine to allow access to upper lift cylinder pivot pin.

5. Remove shoulder bolt and pivot pin that secure upper clevis of lift cylinder to frame. Rotate top of lift cylinder to allow access to centrifugal clutch.

6. Remove cap screw (item 18) and flat washer (item 17) that secure clutch to engine crankshaft.

7. Loosen drive belt tension and remove drive belts from centrifugal clutch pulley.

IMPORTANT: To protect the engine crankshaft during clutch removal, place thick washer on end of crankshaft and lightly grease end of clutch puller.

8. Remove clutch from engine crankshaft with clutch puller (see Special Tools in this Chapter).

Installation (Fig. 8)

1. Thoroughly clean tapers on engine crankshaft and centrifugal clutch bore.

2. Slide centrifugal clutch onto engine crankshaft.

3. Secure clutch to engine crankshaft with cap screw and flat washer. Torque cap screw from **270 to 330 in-lb (31 to 37 N-m)**.

4. Install drive belts to centrifugal clutch and jack shaft pulley.

5. Adjust drive belt idler pulley to achieve proper tension on drive belts (see Operator's Manual).

IMPORTANT: After adjusting belt tension, check that distance from idler pulley face to the faces of the clutch drive pulley and jack shaft driven pulley is correct (Fig. 9). This distance is necessary to ensure that idler pulley is correctly aligned to drive belts. If necessary, either adjust position of engine on machine frame or the driven pulley on jack shaft (see Jack Shaft Assembly in the Service and Repairs section of Chapter 6 - Chassis) to allow correct distance.

IMPORTANT: When securing lift cylinder pivot pin to frame, there should be clearance between the shoulder bolt head and pivot pin. Do not overtighten shoulder bolt.

6. Align upper lift cylinder clevis to frame. Secure cylinder clevis with shoulder bolt and pivot pin.

7. Position fuel tank correctly on frame and secure tank to machine frame (see Fuel Tank Removal in this section).

8. Install muffler guard, belt guard and belt cover (see Drive Belt Covers in the Service and Repairs section of Chapter 6 – Chassis). Make sure that fuel line is not pinched between belt guard and machine frame.

9. Connect cables to battery terminals. Connect positive battery cable first and then negative cable.

10. Install spark plug wires to spark plugs.

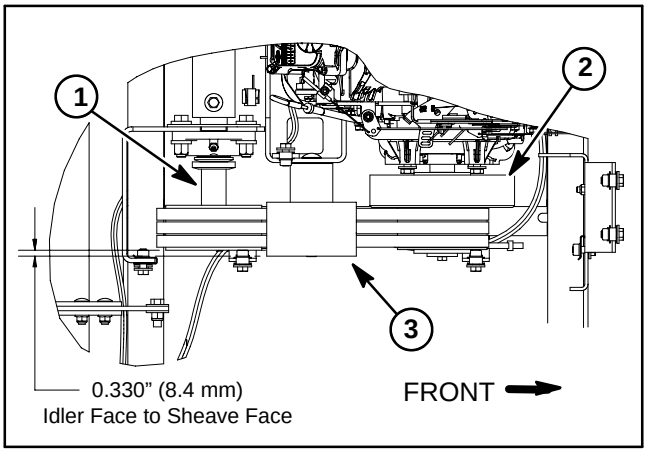


Figure 9

1. **Jack shaft**
2. **Centrifugal clutch**
3. **Idler pulley**

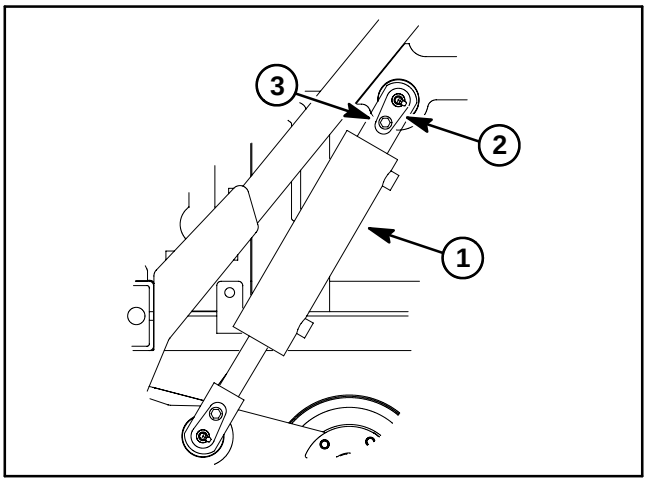


Figure 10

1. **Lift cylinder**
2. **Pivot pin**
3. **Shoulder bolt**

Engine

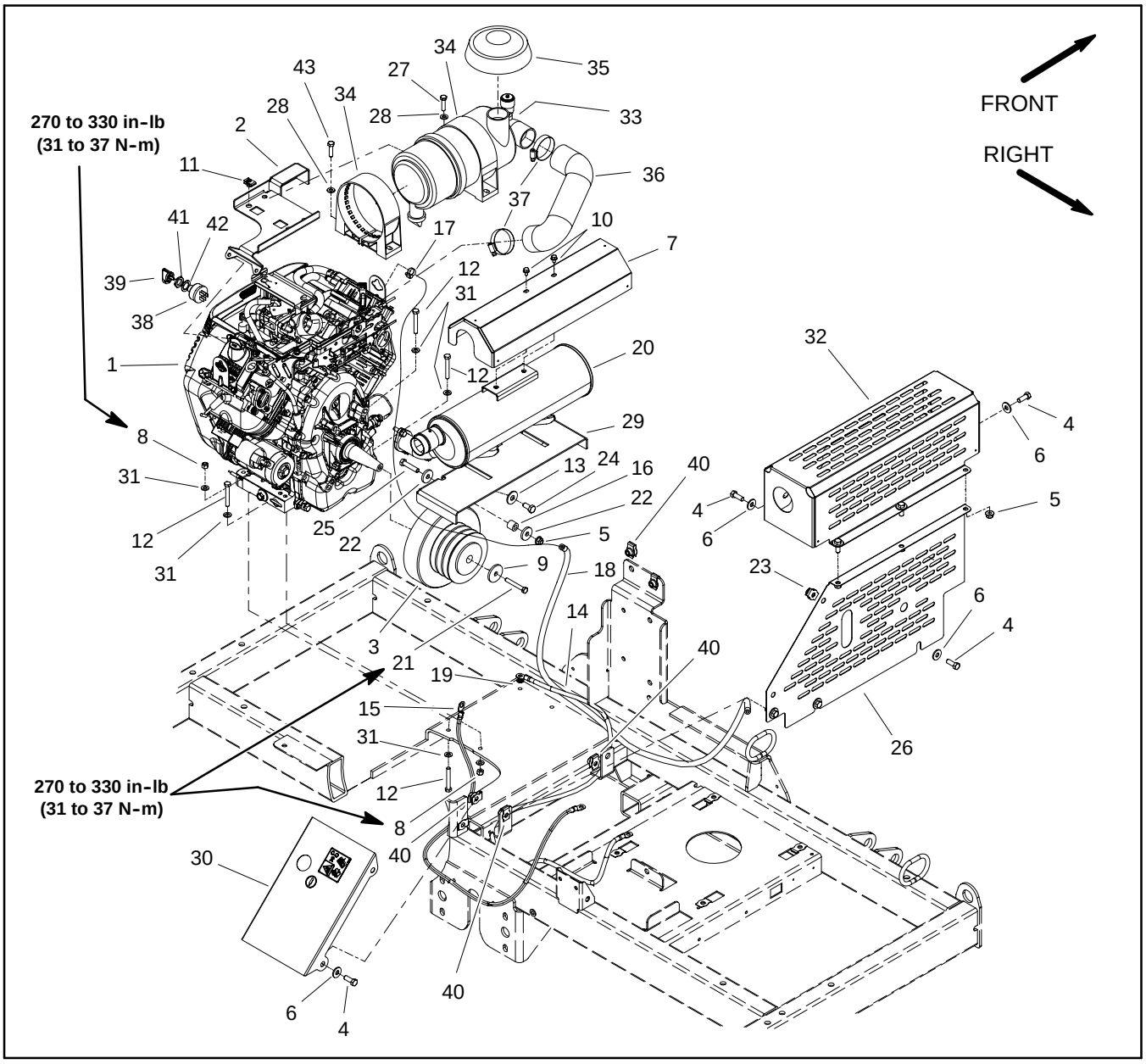


Figure 11

1. Engine assembly
2. Air filter mount plate
3. Centrifugal clutch
4. Cap screw (12 used)
5. Flange nut (4 used)
6. Flat washer (12 used)
7. Heat shield
8. Lock nut (4 used)
9. Flat washer
10. Flange head screw (2 used)
11. Tinnerman nut (2 used)
12. Cap screw (4 used)
13. Flat washer (2 used)
14. Negative battery cable
15. Positive battery cable
16. Spacer
17. Worm clamp
18. Fuel hose
19. Lock washer
20. Muffler
21. Cap screw
22. Flat washer (2 used)
23. Tinnerman nut
24. Cap screw (2 used)
25. Cap screw
26. Belt guard
27. Cap screw (6 mm) (2 used)
28. Flat washer (4 used)
29. Muffler mount
30. Belt cover
31. Flat washer (8 used)
32. Muffler guard
33. Air cleaner assembly
34. Air cleaner bracket (2 used)
35. Air cleaner cap
36. Air intake hose
37. Hose clamp (2 used)
38. Ignition switch
39. Ignition key
40. Tinnerman nut (7 used)
41. Nut
42. Lock washer
43. Cap screw (5/16”) (2 used)

Engine Removal (Fig. 11)

1. Make sure machine is parked on a level surface with the engine OFF. Remove key from ignition switch. Chock wheels to prevent movement of machine. Remove spark plug wires from the spark plugs to prevent the engine from starting unexpectedly.

CAUTION

The exhaust system may be hot. Avoid possible burns, allow exhaust to cool before removing the engine.

2. If engine is to be disassembled, it may be easier to drain oil from engine before removing engine from machine.

3. Disconnect cables from the battery terminals. Remove negative battery cable first and then the positive cable.

4. Unplug engine electrical harness connector from machine wire harness (Fig. 13).

5. Disconnect positive cable and fusible link from the starter motor (Fig. 13).

6. Disconnect wire harness connector from ignition switch on engine.

7. Loosen screw that secures harness clamp to engine (Fig. 13). Position machine wire harness away from engine.

8. Loosen hose clamp that secures fuel hose to fuel filter inlet (Fig 12). Remove fuel hose from fuel filter. Plug fuel hose to prevent leakage and contamination. Make sure to clean up any spilled fuel. Position disconnected fuel hose away from engine.

9. If necessary, remove air cleaner from engine (see Air Cleaner Removal in this section).

10. Remove muffler guard (item 32), belt guard (item 26) and belt cover (item 30) (see Drive Belt Covers in the Service and Repairs section of Chapter 6 – Chassis). Make sure that tinnerman nuts (items 23 and 40) remain positioned correctly for assembly purposes.

11. Loosen drive belt idler pulley. Carefully remove drive belts from centrifugal clutch and jack shaft pulley.

12. If necessary, remove centrifugal clutch from engine crankshaft (see Centrifugal Clutch Removal in this section).

13. Remove four (4) cap screws, eight (8) flat washers and lock nuts that secure engine to machine. Note that negative battery cable and wire harness ground wire are secured with the front, left corner screw (Fig 12). Also, at that location, retrieve internal lock washer from between engine and wire connectors.

IMPORTANT: Make sure to not damage the engine, fuel hoses, electrical harness or other parts while removing the engine.

CAUTION

To prevent personal injury, make sure that engine is properly supported as it is removed from the machine. Engine weighs approximately 132 pounds (60 kg).

14. Carefully remove the engine from machine.

15. Remove engine parts and attachments as necessary to repair the engine.

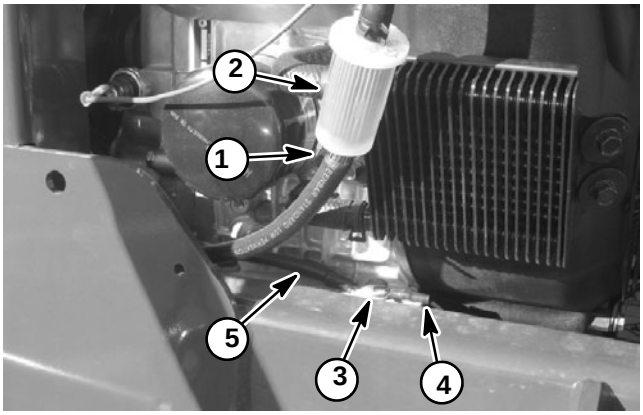


Figure 12

1. **Hose clamp (filter inlet)**
2. **Fuel filter**
3. **Cap screw**
4. **Wire harness ground**
5. **Negative battery cable**

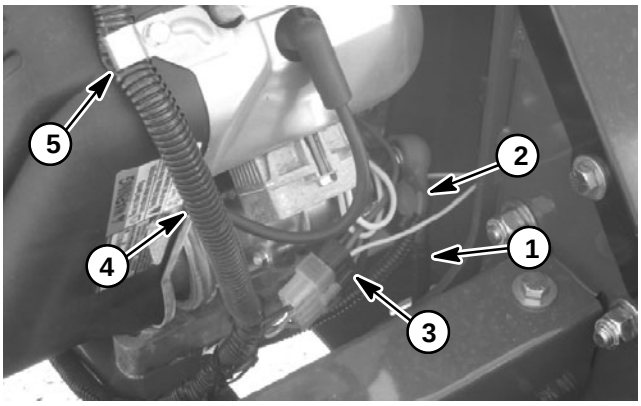


Figure 13

1. **Positive battery cable**
2. **Fusible link**
3. **Engine connector**
4. **Wire harness**
5. **Harness clamp**

Engine Installation (Fig. 11)

1. Position machine on a level surface. Make sure that spark plug wires are not connected to engine spark plugs.

2. Make sure that all parts removed from the engine during maintenance or rebuilding are properly installed to the engine.

IMPORTANT: Make sure to not damage the engine, fuel hoses, electrical harness or other parts while installing the engine.

3. Carefully position engine on machine frame.

4. Install cap screws with washers through the inner engine mounting holes and frame. Install flat washer and lock nut on cap screws. Do not fully tighten lock nuts at this time.

A. Make sure that negative battery cable, wire harness ground wire and internal lock washer are installed with the front, left corner screw (Fig 12).

B. The rear, left corner screw should be installed up through frame and engine. The other three (3) screws should be installed down through engine and frame.

5. If centrifugal clutch was removed from crankshaft, install clutch (see Centrifugal Clutch Installation in this section).

6. Install drive belts to centrifugal clutch and jack shaft pulley. Make sure that belts are properly positioned in driven pulley on jack shaft.

7. Using a straight edge across the lower face of the centrifugal clutch pulley, verify drive belt alignment across clutch and jack shaft driven pulleys. Adjust position of engine so that drive belt and straight edge are aligned indicating correct position of engine. Once the pulleys are aligned, fully tighten the engine mounting fasteners. Torque fasteners from **270 to 330 in-lb (31 to 37 N-m)**.

8. Adjust drive belt idler pulley to achieve proper belt tension (see Operator's Manual).

IMPORTANT: After adjusting belt tension, check that distance from idler pulley face to the faces of the clutch drive pulley and jack shaft driven pulley is correct (Fig. 14). This distance is necessary to ensure that idler pulley is correctly aligned to drive belts. If necessary, re-adjust positions of drive and driven pulleys to allow correct distance (see Jack Shaft Assembly in the Service and Repairs section of Chapter 6 - Chassis).

9. Make sure that tinnerman nuts (items 23 and 40) are correctly positioned at frame brackets.

10. Install muffler guard, belt guard and belt cover (see Drive Belt Covers in the Service and Repairs section of Chapter 6 – Chassis). Make sure that fuel line is not pinched between belt guard and machine frame.

11. Plug engine electrical harness connector into machine wire harness (Fig. 13).

12. Connect positive cable and fusible link to starter motor (Fig. 13).

13. Connect wire harness connector to ignition switch on engine.

14. Position wire harness under harness clamp on engine and secure in place with screw (Fig. 13).

15. Remove plug installed in fuel hose during engine removal process. Connect fuel hose to the fuel filter inlet and secure with hose clamp (Fig 12).

IMPORTANT: Any leaks in the air filter system will allow dirt into engine and will cause serious engine damage. Make sure that all air cleaner components are in good condition and are properly secured during engine installation.

16. If removed, install air cleaner assembly (see Air Cleaner Installation in this section).

17. Check and adjust engine oil level as needed.

18. Connect cables to the battery terminals. Connect positive battery cable first and then the negative cable. Tighten nuts that secure battery cables from **10 to 15 ft-lb (14 to 20 N-m)**.

19. Attach spark plug wires to the spark plugs.

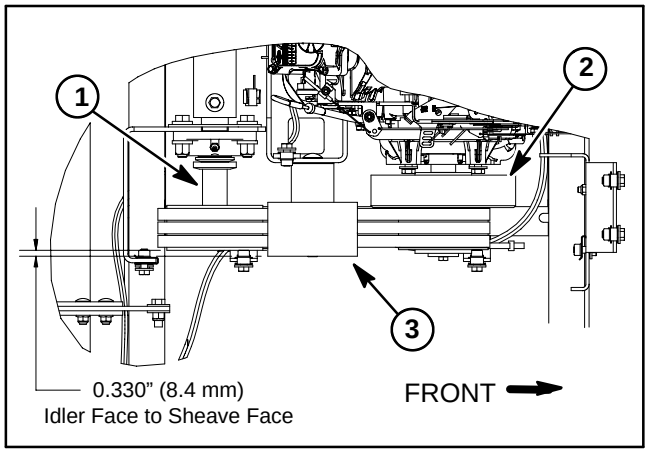


Figure 14

1. **Jack shaft**
2. **Centrifugal clutch**
3. **Idler pulley**

Chapter 4

Hydraulic System

Table of Contents

General Information

Operator's Manual

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

Securing ProCore Processor to Tow Vehicle

While operating or servicing the ProCore Processor, make sure that the Processor is properly secured to the tow vehicle. Refer to your Operator's Manual and Hitch Installation Instructions for the correct procedure for attaching the ProCore Processor to the tow vehicle.

Hydraulic Supply

Hydraulic flow and relief pressure for the ProCore Processor are determined by the tow vehicle. Refer to your Operator's Manual for recommendations concerning the tow vehicle hydraulic system.

IMPORTANT: When changing tow vehicles or tractors, make sure that the tow vehicle hydraulic fluid is compatible with the ProCore Processor fluid. If the fluids are not compatible, any fluid remaining in the core processor must be removed.

Relieving Hydraulic System Pressure

CAUTION

Before opening the ProCore Processor hydraulic system, operate all hydraulic controls to relieve system pressure and to avoid injury from pressurized hydraulic oil.

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

To relieve system pressure, position lift axle so that both the roller and both lift axle wheels are supporting the Processor. Secure lift axle to machine frame by placing hitch pin through front bearing tube hole and lift axle bracket (Fig. 1). Make sure that tow vehicle engine is not running and move hydraulic control lever to both the raise and lower position to relieve ProCore Processor hydraulic system pressure.

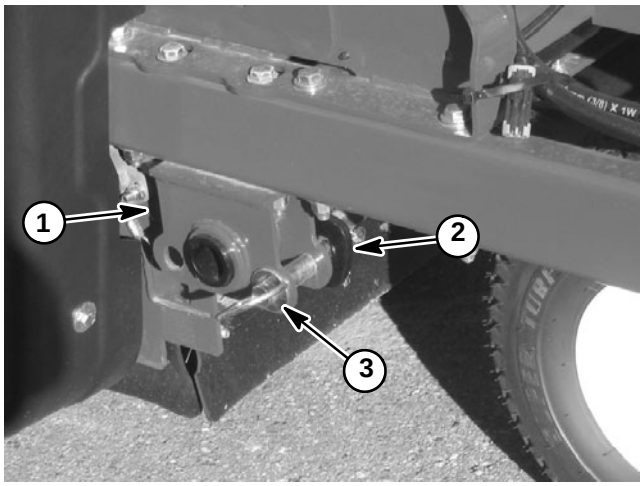


Figure 1

1. **Bearing tube (RH shown)**
2. **Lift axle bracket**
3. **Hitch pin**

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

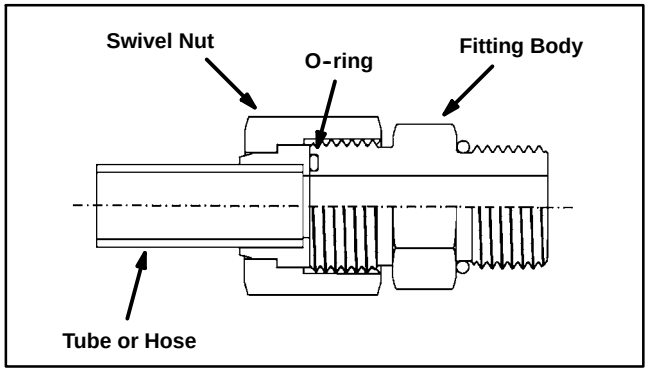


Figure 2

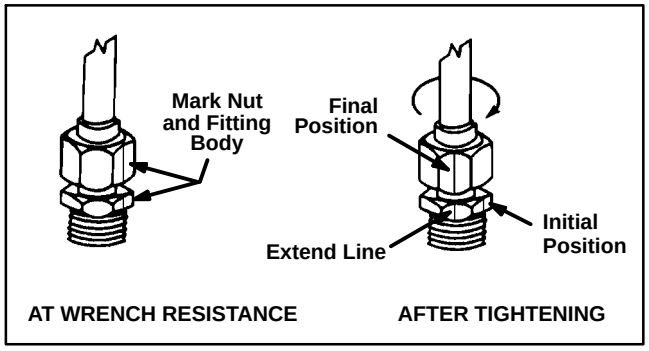


Figure 3

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

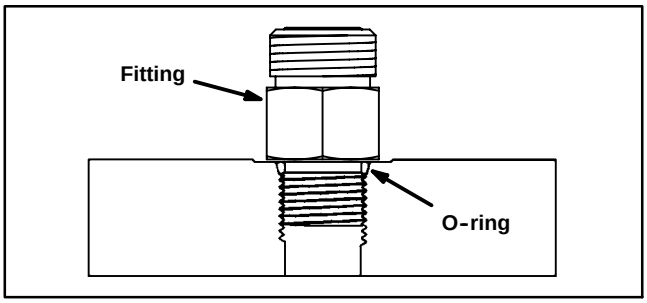


Figure 5

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

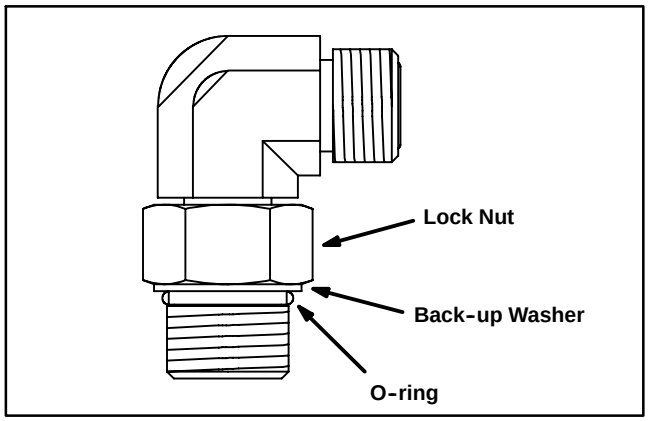


Figure 7

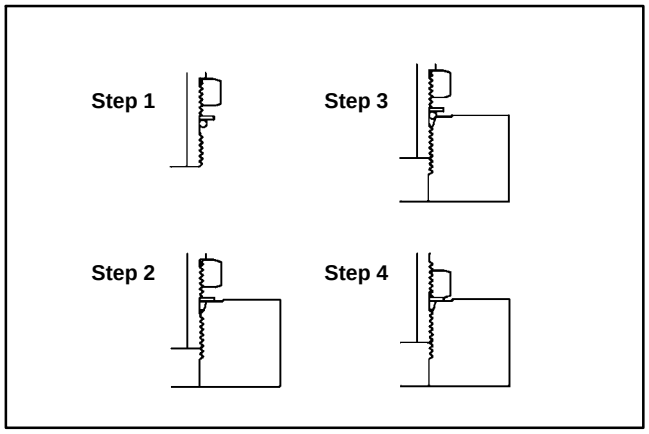


Figure 8

Special Tools

Order these 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. 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 Test Fitting Kit

Part Number: **TOR4079**

This kit includes a variety of O−ring Face Seal fittings to enable connection of test gauges to the ProCore Processor hydraulic system.

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

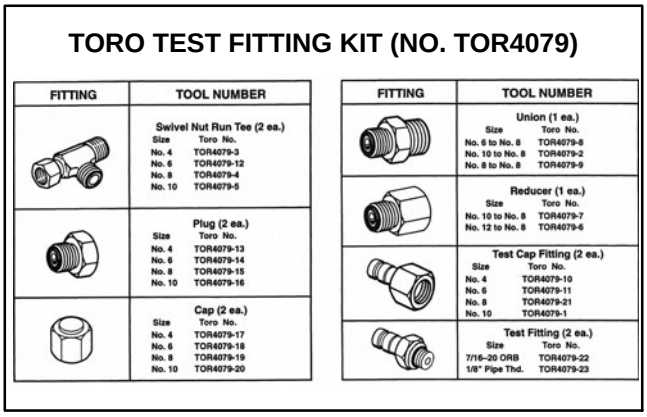
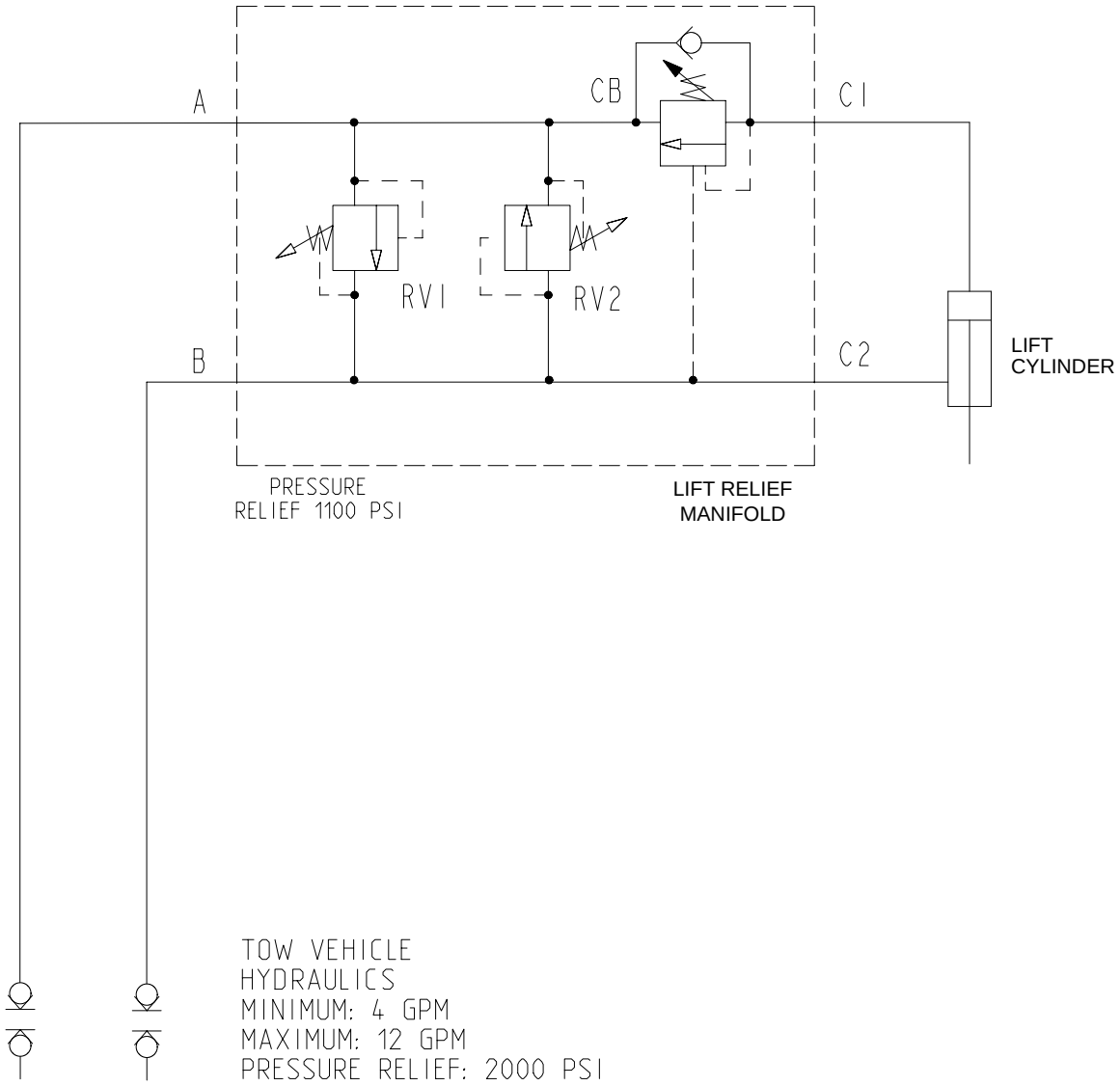


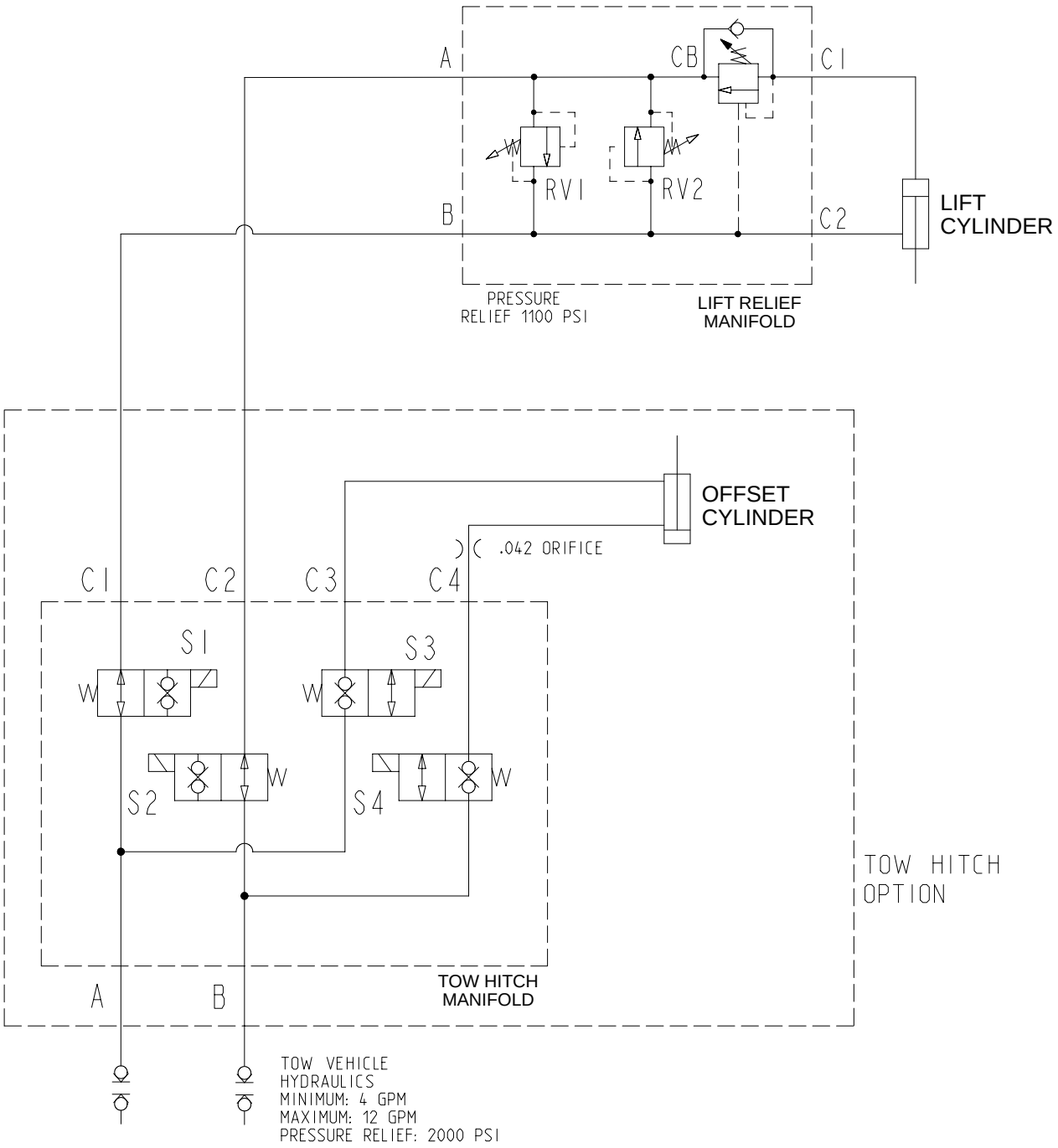
Figure 10

Hydraulic Schematics



NOTE: For identification purposes, the hydraulic hose to lift relief manifold port A is equipped with a cable tie at the Core Processor quick coupler.

ProCore Processor
Hydraulic Schematic



ProCore Processor
Hydraulic Schematic
With Tow Hitch Kit

All solenoids are shown as de-energized

NOTE: For identification purposes, the hydraulic hose to lift relief manifold port A is equipped with a cable tie at the Core Processor quick coupler.

Hydraulic Flow Diagrams

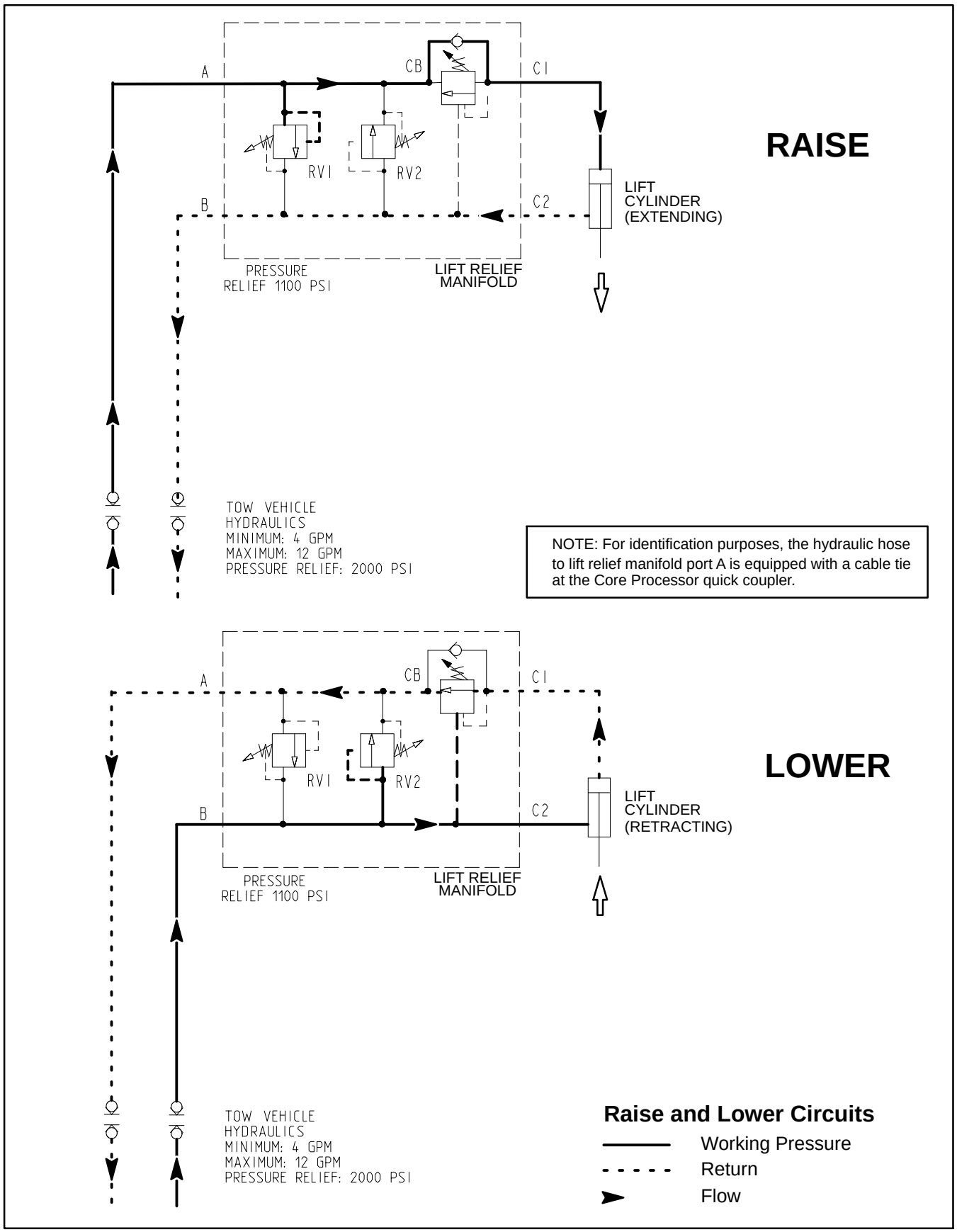


Figure 11

Raise and Lower Circuits

NOTE: On machines equipped with the Tow Hitch Kit, the remote control handle switch needs to be in the lift position in order for the raise and lower circuits to operate.

Raise (Fig. 11)

When the tow vehicle control is positioned to raise the ProCore Processor, oil flows from the tow vehicle hydraulic system, to the ProCore Processor lift relief manifold port A, through the CB cartridge check valve, out manifold port C1 and then to the barrel end of the Processor lift cylinder. Hydraulic pressure against the lift cylinder piston extends the cylinder. As the lift cylinder extends, the lift axle rotates the Processor wheels to the ground and causes the ProCore Processor to raise. Oil displaced from the extending lift cylinder returns through the lift relief manifold (ports C2 and B) to the tow vehicle hydraulic system.

Maximum circuit pressure as the ProCore Processor is raised is limited to 1100 PSI (76 Bar) by the raise relief valve (RV1) in the lift relief manifold.

Lower (Fig. 11)

When the tow vehicle control is positioned to lower the ProCore Processor, oil flows from the tow vehicle hydraulic system, through the ProCore Processor lift relief manifold (port B and C2) and to the rod end of the Processor lift cylinder. Circuit pressure through the manifold causes cartridge valve CB to shift which provides an oil return path from the lift cylinder. Hydraulic pressure against the lift cylinder piston retracts the cylinder. As the lift cylinder retracts, the lift axle rotates the Processor wheels away from the ground and causes the ProCore Processor to lower onto the roller. Oil displaced from the retracting lift cylinder returns to the tow vehicle hydraulic system through manifold port C1, shifted valve CB and manifold port A.

Maximum circuit pressure as the ProCore Processor is lowered is limited to 1100 PSI (76 Bar) by the lower relief valve (RV2) in the lift relief manifold.

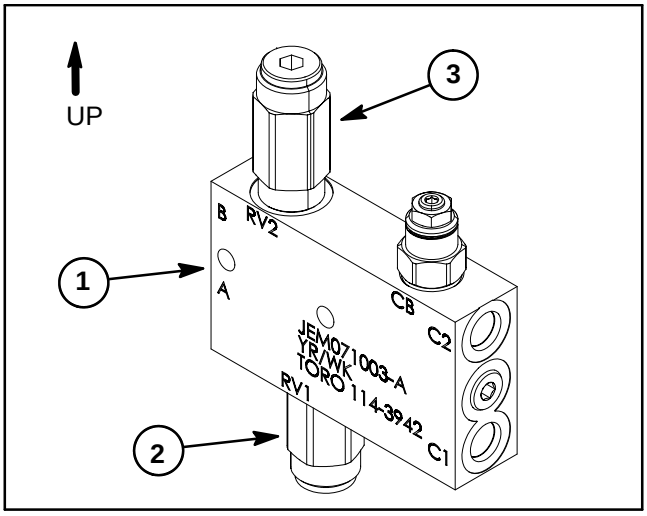


Figure 12

1. **Lift relief manifold**
2. **Raise relief valve (RV1)**
3. **Lower relief valve (RV2)**

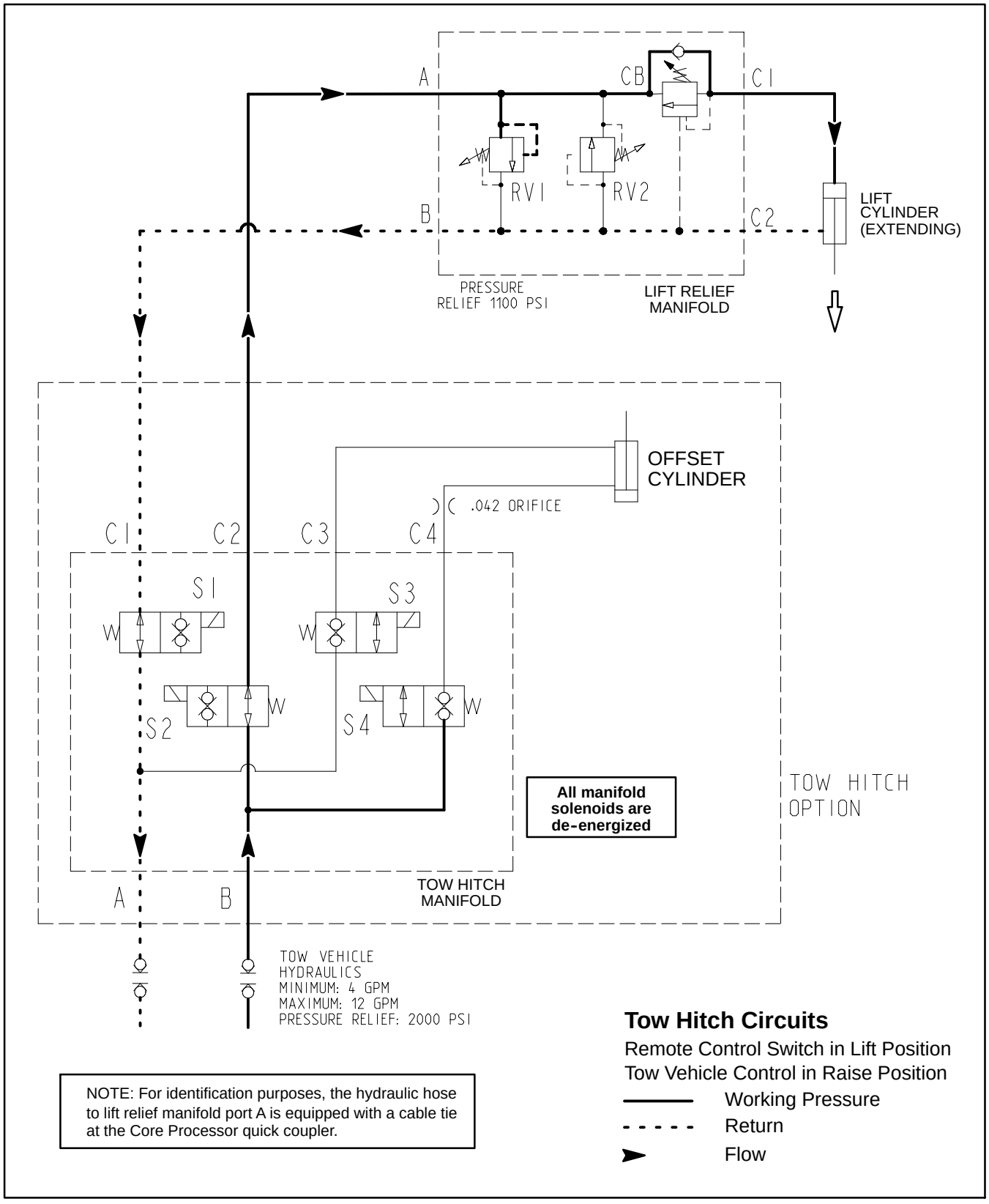

A
CB
C1
RV1
RV2
B
C2
LIFT
CYLINDER
(EXTENDING)
PRESSURE
RELIEF 1100 PSI
LIFT RELIEF
MANIFOLD
OFFSET
CYLINDER
.042 ORIFICE
C1
C2
C3
C4
S1
S3
S2
S4
W
All manifold
solenoids are
de-energized
TOW HITCH
OPTION
TOW HITCH
MANIFOLD
A
B
TOW VEHICLE
HYDRAULICS
MINIMUM: 4 GPM
MAXIMUM: 12 GPM
PRESSURE RELIEF: 2000 PSI
Tow Hitch Circuits
Remote Control Switch in Lift Position
Tow Vehicle Control in Raise Position
Working Pressure
Return
Flow
NOTE: For identification purposes, the hydraulic hose to lift relief manifold port A is equipped with a cable tie at the Core Processor quick coupler.

Figure 13

Tow Hitch Circuits (When Equipped With the Tow Hitch Kit)

Raise and Lower (Fig. 13)

When the remote control handle lift/offset switch is in the lift position, all four (4) of the solenoid valves in the tow hitch manifold are de-energized. In this position, hydraulic oil flow from the tow vehicle is available for the ProCore Processor raise and lower circuits via solenoid valves S1 and S2. Hydraulic flow to the tow hitch offset cylinder is blocked by solenoid valves S3 and S4. See Raise and Lower Circuit Operation in this section for raise and lower circuit information.

Hitch Offset (Fig. 14)

When the remote control handle lift/offset switch is in the offset position, all four (4) of the solenoid valves in the tow hitch manifold are energized. In this position, hydraulic oil flow from the tow vehicle is available for the ProCore Processor hitch offset function via solenoid valves S3 and S4. Hydraulic flow to the lift cylinder is blocked by solenoid valves S1 and S2. A fixed orifice in the hydraulic fitting at tow hitch manifold port C4 controls the offset speed by providing a restriction for the flow to or from the offset cylinder. Maximum hitch offset circuit pressure is limited by the pressure relief valve of the tow vehicle.

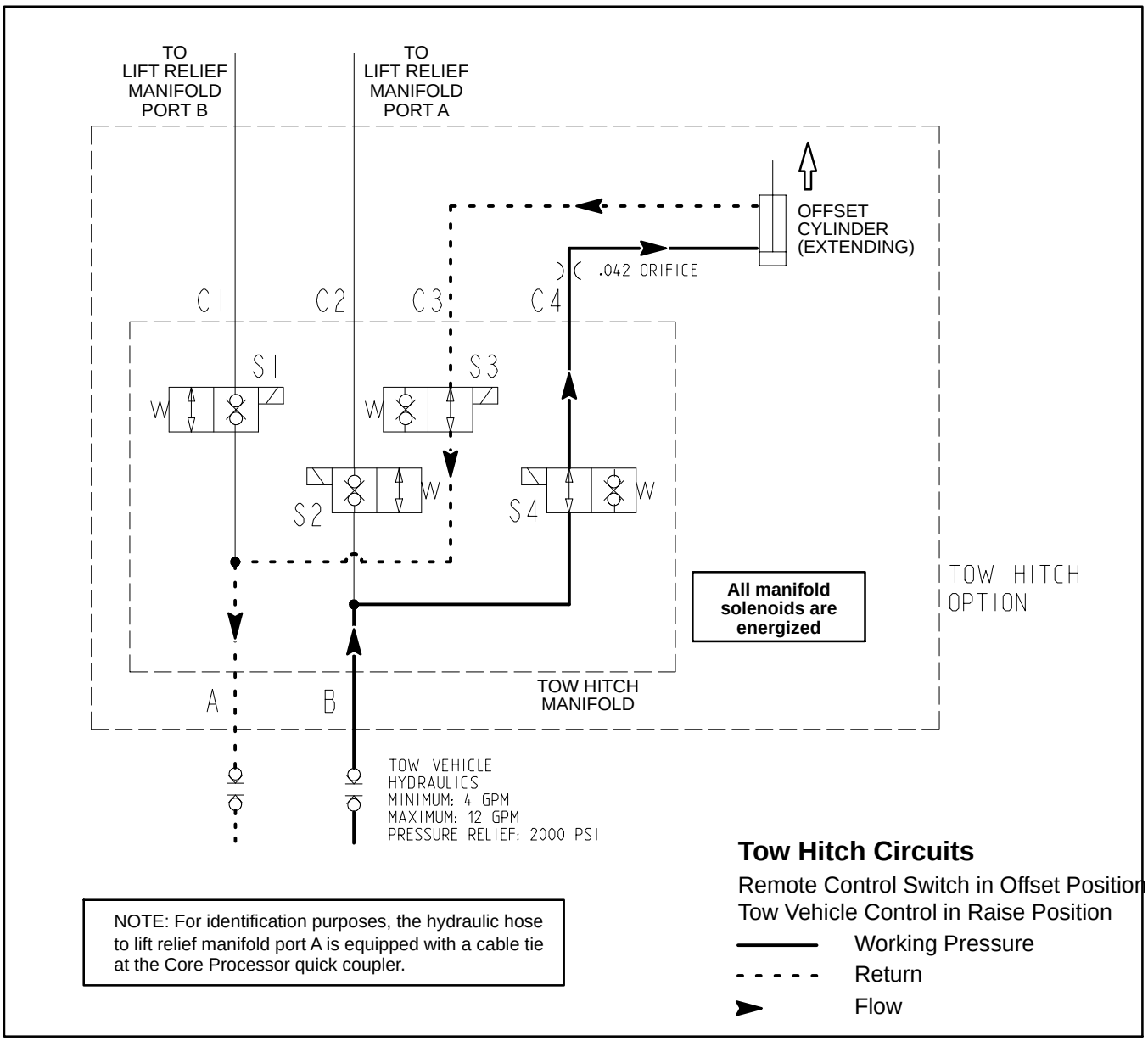


Figure 14

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 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 chart below contains information to assist in troubleshooting. There may possibly be more than one cause for a machine malfunction.

The successful operation of the ProCore Processor depends on the hydraulic system of the tow vehicle. When troubleshooting a ProCore Processor hydraulic problem, make sure that the tow vehicle hydraulic system is evaluated as well.

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 tow vehicle reservoir is low. Hydraulic system has wrong kind of oil. Hydraulic system on tow vehicle is malfunctioning.
Hydraulic system operates hot.	Hydraulic oil level in tow vehicle reservoir is low. Excessive dirt and debris on hydraulic components. Hydraulic oil is contaminated or too light. Hydraulic system on tow vehicle is malfunctioning.
ProCore Processor will not raise or raises slowly.	Hydraulic hose(s) to tow vehicle is (are) not connected. Hydraulic oil level in tow vehicle reservoir is low. ProCore Processor has excessive debris buildup. If machine is equipped with the Tow Hitch Kit, remote control lift offset switch is in offset position. Hydraulic lift cylinder is binding. ProCore Processor lift axle components are binding. Relief valve in hydraulic lift relief manifold is not seating or is damaged (NOTE: The two manifold relief valves are identical and can be reversed for testing purposes). Counterbalance valve in hydraulic lift relief manifold is faulty. If machine is equipped with the Tow Hitch Kit, solenoid valves in hydraulic tow hitch manifold are faulty. Hydraulic system on tow vehicle is malfunctioning.

Problem	Possible Cause
ProCore Processor raises, but will not stay up.	Counterbalance valve in lift relief manifold is faulty. Hydraulic lift cylinder leaks internally. Hydraulic system on tow vehicle is malfunctioning.
ProCore Processor Tow Hitch offset not operating (machines with Tow Hitch).	Remote control lift offset switch is not in offset position. An electrical problem exists (see Chapter 5 – Electrical System). Solenoid valves in hydraulic tow hitch manifold are faulty. Hydraulic offset cylinder leaks internally. Hydraulic system on tow vehicle is malfunctioning (ProCore Processor Raise and Lower functions also affected).

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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 Special Tools section in this Chapter).

CAUTION

Failure to use gauges with recommended pressure (PSI/bar) rating as listed in test procedures could result in damage to gauge and possible personal injury from leaking hot oil.

Before Performing Hydraulic Tests

All obvious areas such as oil supply, filter, binding linkage, loose fasteners, incorrect adjustments or improper operation must be checked before assuming that a hydraulic component is the source of the problem being experienced.

Precautions For Hydraulic Testing

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.

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 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. Thoroughly clean the machine before disconnecting or disassembling any hydraulic components. Always keep in mind the need for cleanliness when working on hydraulic equipment. Hydraulic system contamination will cause excessive wear of hydraulic components.

2. Put caps or plugs on any hydraulic lines left open or exposed during testing or removal of hydraulic components.

3. Hydraulic flow and relief pressure for the ProCore Processor are determined by the tow vehicle. Make sure that the hydraulic system of the tow vehicle is considered when troubleshooting hydraulic performance problems with the ProCore Processor.

4. Install hydraulic fittings finger tight, far enough to insure that they are not cross–threaded, before tightening with a wrench.

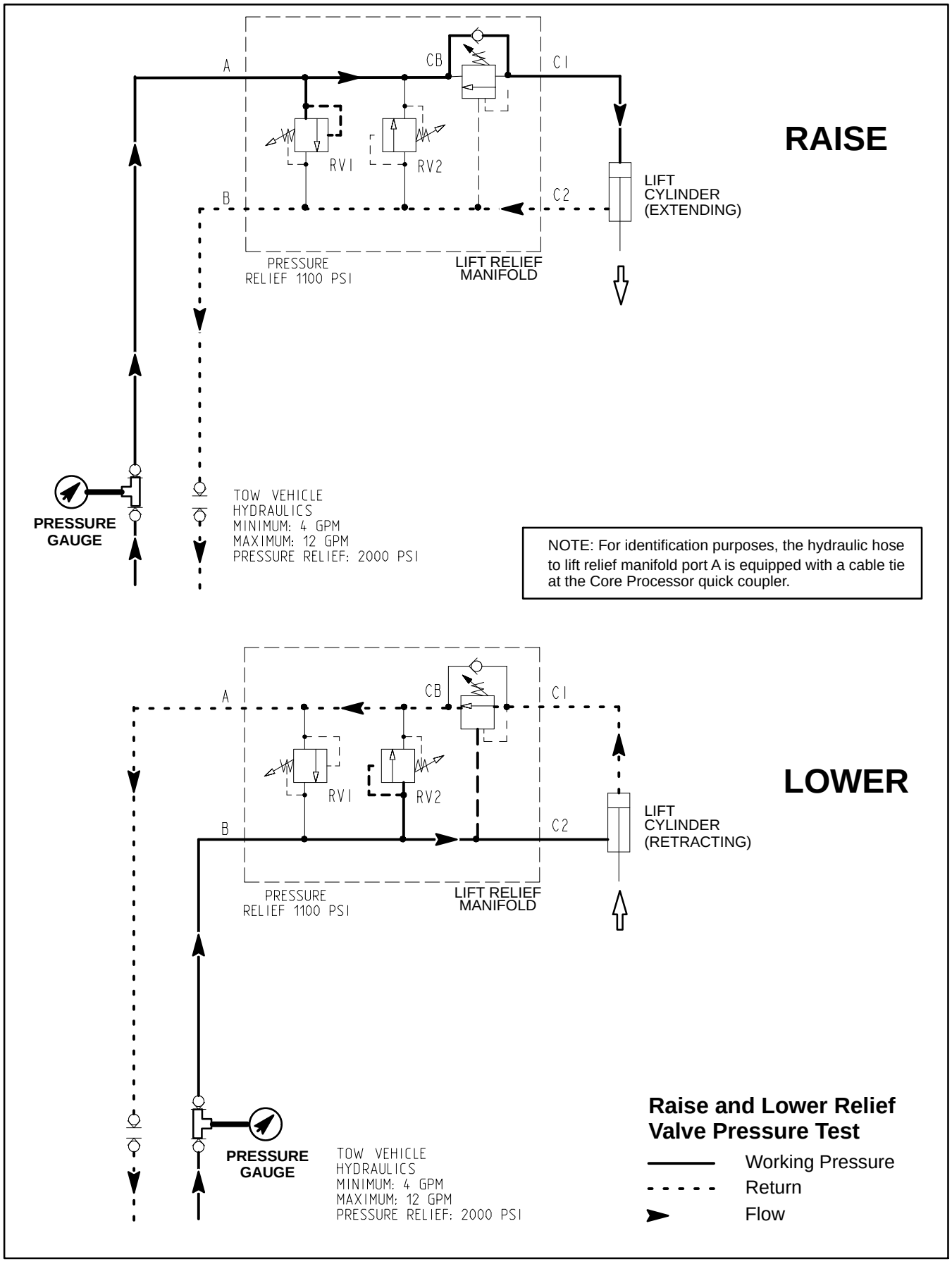
5. To prevent hose or tester damage, position the tester hoses so that moving machine parts will not make contact with them.

6. Check and adjust the oil level in the reservoir of the tow vehicle after connecting hydraulic test equipment.

7. Check the hydraulic control components on the tow vehicle for improper adjustment, binding or broken parts. Make sure controls are functioning properly before conducting hydraulic tests.

8. All hydraulic tests should be made with the hydraulic oil at normal operating temperature.

Raise/Lower Relief Valve Pressure Test



The lift relief valve pressure test should be performed to make sure that the lift circuit relief pressure is correct. The relief pressure for both raise and lower is the same.

Procedure for Raise/Lower Relief Valve Pressure Test

1. Make sure hydraulic oil is at normal operating temperature by operating the machine for approximately 10 minutes.

2. Have ProCore Processor attached to tow vehicle and park machines on a level surface. Engage tow vehicle parking brake, stop engine and remove key from the ignition switch. Make sure that Processor engine is off. Chock wheels to prevent movement of either machine.

3. Secure Processor lift axle to frame with hitch pin and lynch pin to prevent lift axle from shifting.

4. Read Precautions For Hydraulic Testing in this section.

CAUTION

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

5. Thoroughly clean ProCore Processor hydraulic hose quick couplers at the junction to the tow vehicle. Disconnect hydraulic hose quick coupler for the direction (raise or lower) to be tested (Fig. 15). Connect a T−connector and 5000 PSI (350 bar) pressure gauge between the disconnected Processor hose and tow vehicle outlet coupler.

6. After installing pressure gauge, start tow vehicle engine and run at idle speed. Check for any hydraulic leakage from test connections and correct before proceeding with test.

7. Move tow vehicle throttle to full speed.

IMPORTANT: While performing this test, hold tow vehicle lift lever in the raise/lower position only long enough to get a relief pressure reading. Holding the lever in the raise/lower position for an extended period may damage system components.

8. Move tow vehicle lift lever in the direction being tested to pressurize lift circuit. While holding lever, watch pressure gauge carefully. As the lift relief valve lifts, system pressure should be:

Approximately 1100 PSI (76 bar)

9. After relief pressure is obtained, return the tow vehicle lift lever to the neutral position and stop the tow vehicle engine. Record relief pressure.

10. If measured relief pressure is incorrect, relieve hydraulic system pressure (see Relieving Hydraulic System Pressure in the General Information section of this chapter) and remove relief valve on lift relief manifold (Fig. 16). Clean or replace relief valve (see Lift Relief Manifold in the Service and Repairs section of this chapter). Also, if relief pressure is low, consider a problem with the tow vehicle hydraulic system. Internal lift cylinder leakage could also cause low circuit pressure.

NOTE: Adjustment of lift relief valves is NOT recommended.

11. After testing is completed, make sure that tow vehicle engine is stopped, then relieve hydraulic system pressure (see Relieving Hydraulic System Pressure in the General Information section of this chapter). Remove pressure gauge and connect hydraulic couplers. Remove lynch pin and hitch pin from lift axle before using ProCore Processor.

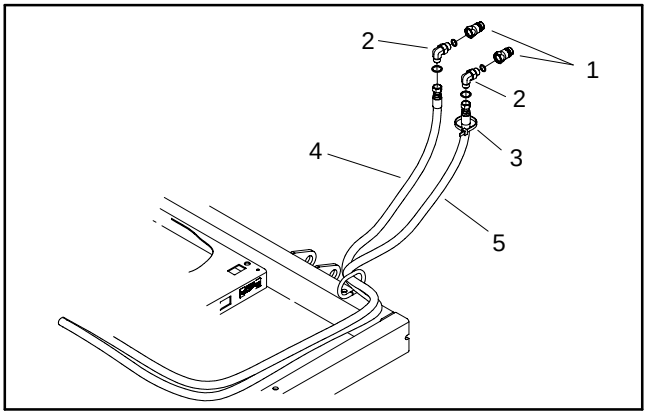


Figure 15

1. Quick coupler
2. 90º hydraulic fitting
3. Cable tie
4. Hose to manifold port B
5. Hose to manifold port A

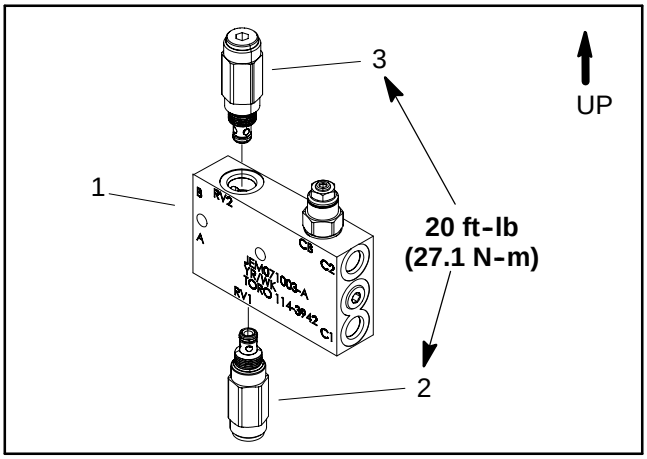


Figure 16

1. Lift relief manifold
2. Raise relief valve (RV1)
3. Lower relief valve (RV2)

General Precautions for Removing and Installing Hydraulic System Components

Before Repair or Replacement of Components

1. Before removing any parts from the hydraulic system, position ProCore Processor on a level surface. Chock machine wheels to prevent machine from moving. Make sure that ProCore Processor engine is off. Remove key from ignition switch. If ProCore Processor is attached to tow vehicle, engage tow vehicle parking brake, stop tow vehicle engine and remove key from the ignition switch.

2. Clean machine 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 components.

CAUTION

Operate all machine 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.

3. Put caps or plugs on any hydraulic lines, hydraulic fittings or hydraulic components left open or exposed to prevent hydraulic system contamination.

4. Put labels on disconnected hydraulic lines and hoses for proper installation after repairs are completed.

5. 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, drain and refill tow vehicle hydraulic system reservoir and 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 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 repairs are completed, but before operating the ProCore Processor, check oil level in the hydraulic reservoir of the tow vehicle and add correct oil if necessary.

6. After disconnecting or replacing any hydraulic component, operate machine functions slowly until air is out of Core Processor hydraulic system.

7. Check for hydraulic oil leaks. Shut off tow vehicle engine and correct leaks if necessary. Check oil level in hydraulic reservoir and add correct oil if necessary.

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

Lift Relief Manifold

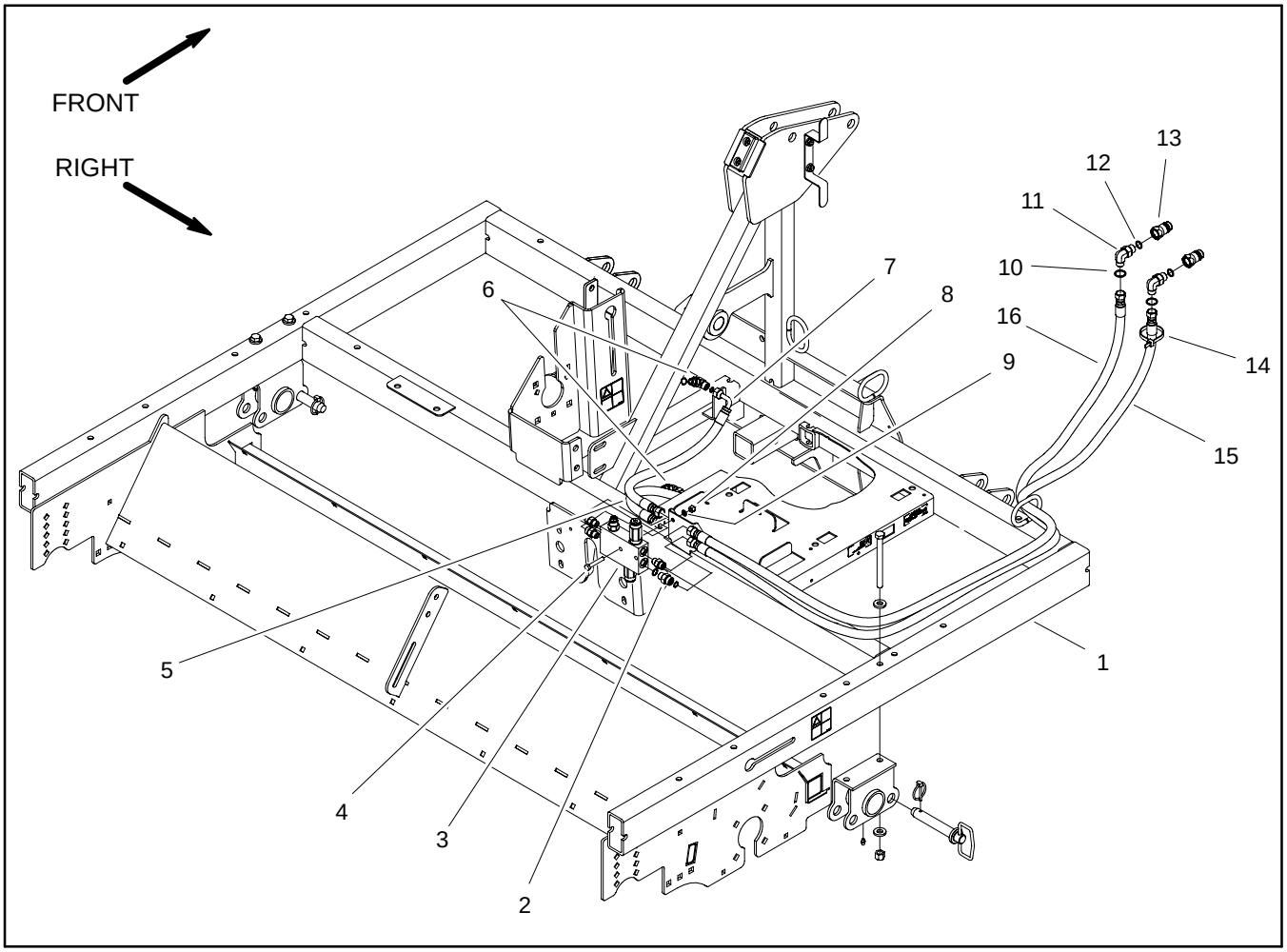


Figure 17

1. **Frame**
2. **Hydraulic fitting (4 used)**
3. **Lift relief manifold**
4. **Cap screw (2 used)**
5. **Hydraulic hose**
6. **90º hydraulic fitting (2 used)**
7. **Hydraulic hose**
8. **Lock nut (2 used)**
9. **Flat washer (2 used)**
10. **O–ring**
11. **90º hydraulic fitting (2 used)**
12. **O–ring**
13. **Quick coupler (2 used)**
14. **Cable tie**
15. **Hydraulic hose to manifold port A**
16. **Hydraulic hose to manifold port B**

Manifold Removal (Fig. 17)

1. Have ProCore Processor attached to tow vehicle and park both machines on a level surface. Secure lift axle to frame with hitch pin and lynch pin to prevent lift axle from shifting. Engage vehicle parking brake, stop engine and remove key from the ignition switch. Make sure that ProCore Processor engine is off. Chock wheels to prevent movement of either machine.

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

CAUTION

Before opening hydraulic system, operate all hydraulic controls to relieve system pressure and avoid injury from pressurized hydraulic oil.

3. Relieve hydraulic system pressure.

4. Label all hydraulic connections for assembly purposes. Thoroughly clean hydraulic connections prior to loosening hydraulic hoses.

5. Disconnect hydraulic hoses from fittings in lift relief manifold. Allow hoses to drain into a suitable container. Remove and discard O−rings from fittings.

6. Put caps or plugs on disconnected hoses and fittings to prevent contamination.

7. Remove two (2) cap screws, flat washers and lock nuts that secure lift relief manifold to machine frame.

8. Remove lift relief manifold from machine.

9. If necessary, remove hydraulic fittings from manifold (Fig. 18). Discard any removed O−rings.

Manifold Service (Fig. 18)

NOTE: Adjustment of lift relief valves is NOT recommended.

1. Make sure the manifold is thoroughly cleaned before removing any of the cartridge valves.

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

2. Using a deep socket, remove cartridge valves from manifold. Note correct location of all sealing and backup rings. Remove and discard sealing and backup rings from valves.

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

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

4. Clean cartridge valves by submerging valve in clean mineral spirits to flush out contamination. Particles as fine as talcum powder can affect the operation of the valve. Be extremely careful to not damage cartridge. Use compressed air for cleaning.

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

6. Thread cartridge valves carefully into correct manifold port. The valves should go in easily without binding. Using a deep socket, torque cartridge valves to values identified in Figure 18.

Manifold Installation (Fig. 17)

1. If fittings were removed from lift relief manifold, lubricate and place new O−rings to fittings. Install fittings into manifold and torque fittings from **60 to 74 ft−lb (82 to 100 N−m)** (see Hydraulic Fitting Installation in the General Information section of this chapter).

2. Position lift relief manifold to frame. Install two (2) cap screws, flat washers and lock nuts but do not fully tighten.

3. Remove caps and plugs from disconnected hoses and fittings.

4. Lubricate and install new O−rings on manifold fittings. Connect hydraulic hoses to fittings on manifold. Properly tighten all connections (see Hydraulic Hose and Tube Installation in the General Information section of this chapter).

5. Secure lift relief manifold to frame by fully tightening two (2) lock nuts.

6. Operate machine hydraulic functions slowly until air is out of Core Processor hydraulic system.

7. Check oil level in tow vehicle hydraulic reservoir and add correct oil if necessary.

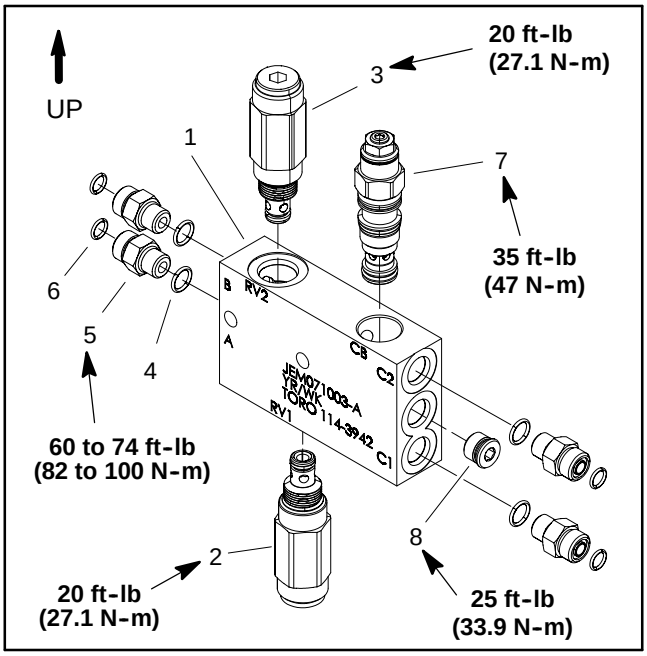


Figure 18

1. Lift relief manifold
2. Raise relief valve
3. Lower relief valve
4. O−ring
5. Fitting (4 used)
6. O−ring
7. Counterbalance valve
8. Plug with O−ring

Hydraulic Lift Cylinder

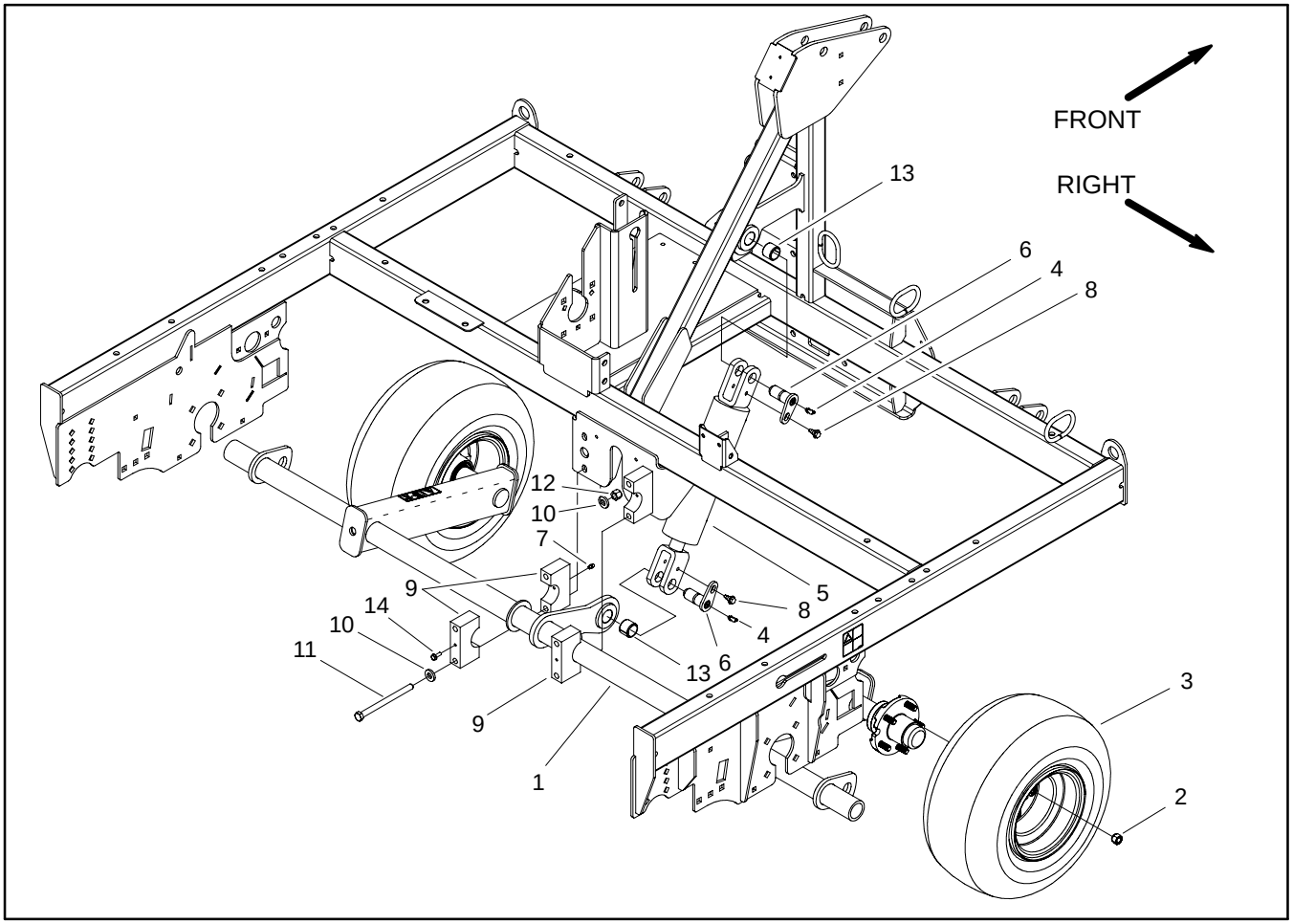


Figure 19

1. **Lift axle**
2. **Lug nut (5 used per wheel)**
3. **Wheel assembly**
4. **Grease fitting**
5. **Lift cylinder**
6. **Pivot pin**
7. **Grease fitting (2 used)**
8. **Shoulder bolt**
9. **Axle block (4 used)**
10. **Flat washer (8 used)**
11. **Cap screw (4 used)**
12. **Lock nut (4 used)**
13. **Bushing**
14. **Screw (2 used)**

Removal (Fig. 19)

1. Have ProCore Processor attached to tow vehicle and park both machines on a level surface. Secure lift axle to frame with hitch pin and lynch pin to prevent lift axle from shifting.

2. Engage vehicle parking brake, stop engine and remove key from the ignition switch. Make sure that ProCore Processor engine is off. Chock wheels to prevent movement of either machine.

3. Loosen straps that secure fuel tank to machine frame (see Fuel Tank Removal in the Service and Repairs section of Chapter 3 – Engine). Shift tank position toward right side of machine to allow access to lift cylinder pivot pins, fittings and hydraulic hoses.

CAUTION

Operate all 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.

4. Relieve hydraulic system pressure.

5. Label hydraulic hose positions for assembly purposes.

6. Disconnect hydraulic hoses from hydraulic fittings on lift cylinder (Fig. 20). Locate and discard O–ring from between hoses and fittings. Allow hoses to drain into a suitable container.

7. Plug disconnected hoses and fittings to prevent contamination.

8. Remove shoulder bolts (item 8) that are used to retain lift cylinder pivot pins (item 6) to machine frame.

9. Support lift cylinder and slide pivot pins from the lift cylinder and machine frame.

10. Remove lift cylinder from the machine.

11. If needed, remove fittings and O–rings from the lift cylinder (Fig. 20). Discard O–rings.

12. Inspect bushing in axle and frame (item 13) for wear or damage. Replace bushing if necessary. If bushing replacement is necessary, position bushing as follows:

A. Bushing in frame position should be installed so bushing split is orientated toward front of frame.

B. Bushing in lift axle position should be installed so bushing split is orientated toward lift axle.

Installation (Fig. 19)

1. If removed, install fittings with new O–rings into lift cylinder ports (see Hydraulic Fitting Installation in the General Information section of this chapter).

2. Position lift cylinder to the machine mounting points. Make sure the lift cylinder fittings face the front of the machine.

IMPORTANT: When securing pivot pins to frame, do not overtighten shoulder bolts. There should be clearance between the shoulder bolt head and pivot pin.

3. Align lift cylinder mounting holes with frame mounts. Install pivot pins. Secure pivot pins to frame with shoulder bolts.

4. Remove plugs from disconnected hoses and fittings.

5. Connect hydraulic hoses with new O–rings to hydraulic fittings on lift cylinder. Tighten hose connections (see Hydraulic Hose and Tube Installation in the General Information section).

6. Return fuel tank to correct position and secure to frame with straps and fasteners (see Fuel Tank Installation in the Service and Repairs section of Chapter 3 – Engine).

7. Lubricate grease fittings on lift cylinder pivot pins.

8. Operate machine functions slowly until air is out of Core Processor hydraulic system.

9. Check oil level in tow vehicle hydraulic reservoir and add correct oil if necessary.

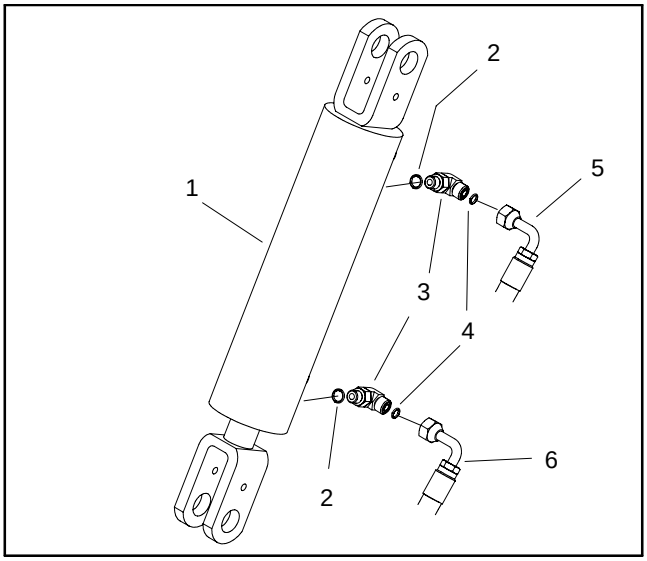


Figure 20

1. **Lift cylinder**
2. **O–ring**
3. **90º hydraulic fitting**
4. **O–ring**
5. **Hydraulic hose**
6. **Hydraulic hose**

Hydraulic Offset Cylinder (Tow Hitch Kit)

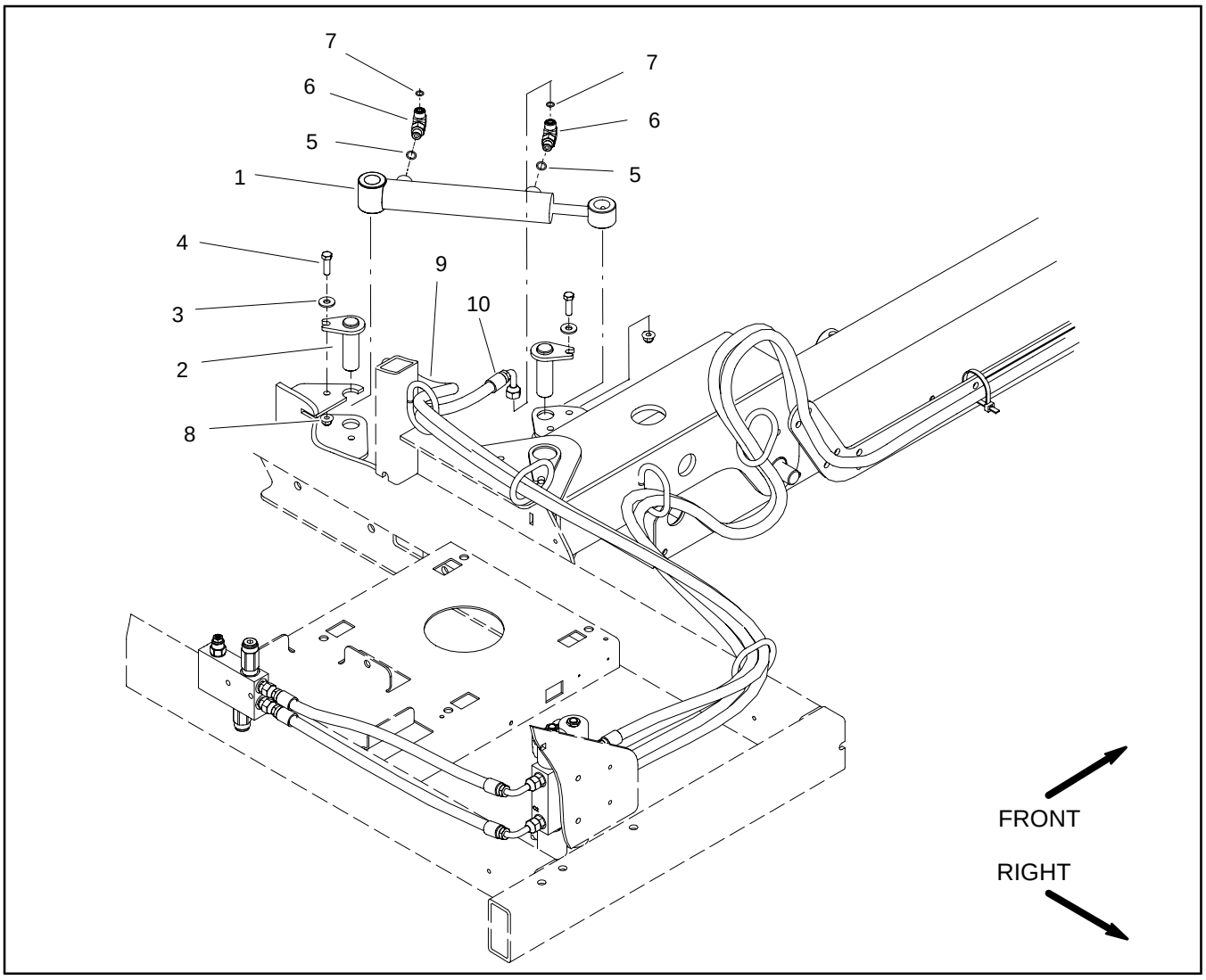


Figure 21

1. **Hydraulic offset cylinder**
2. **Cylinder pin (2 used)**
3. **Flat washer (2 used)**
4. **Cap screw (2 used)**
5. **O-ring (2 used)**
6. **Hydraulic fitting (2 used)**
7. **O-ring (2 used)**
8. **Flange nut (2 used)**
9. **Hose (from manifold port C4)**
10. **Hose (from manifold port C3)**

Removal (Fig. 21)

1. Park ProCore Processor on a level surface. Secure machine lift axle to frame with hitch pin and lynch pin to prevent lift axle from shifting. Make sure that ProCore Processor engine is off. Remove key from the ignition switch. Chock wheels to prevent movement of machine.

CAUTION

Operate all 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. Make sure that Core Processor hydraulic system pressure has been relieved before proceeding with offset cylinder removal.

3. Label hydraulic hose positions for assembly purposes.

4. Disconnect hydraulic hoses from hydraulic fittings on offset cylinder. Locate and discard O−ring from between hoses and fittings. Allow hoses to drain into a suitable container.

5. Plug disconnected hoses and fittings to prevent contamination.

6. Remove cap screws, flat washers and flange nuts that are used to retain cylinder pins (item 2) to machine frame.

7. Support offset cylinder and slide cylinder pins from the offset cylinder and machine frame.

8. Remove offset cylinder from the machine.

9. If needed, remove fittings and O−rings from the offset cylinder. Discard O−rings.

Installation (Fig. 21)

1. If removed, install fittings with new O−rings into offset cylinder ports (see Hydraulic Fitting Installation in the General Information section of this chapter).

2. Position offset cylinder to the machine mounting points. Make sure the offset cylinder fittings face the front of the machine.

IMPORTANT: When securing pivot pins to frame, do not overtighten shoulder bolts. There should be clearance between the shoulder bolt head and pivot pin.

3. Align offset cylinder mounting holes with frame mounts. Install pivot pins. Secure pivot pins to frame with shoulder bolts.

4. Remove plugs from disconnected hoses and fittings.

5. Connect hydraulic hoses with new O−rings to hydraulic fittings on offset cylinder. Tighten hose connections (see Hydraulic Hose and Tube Installation in the General Information section).

6. Lubricate grease fittings on offset cylinder.

7. Operate machine functions slowly until air is out of Core Processor hydraulic system.

8. Check oil level in tow vehicle hydraulic reservoir and add correct oil if necessary.

Hydraulic Cylinder Service

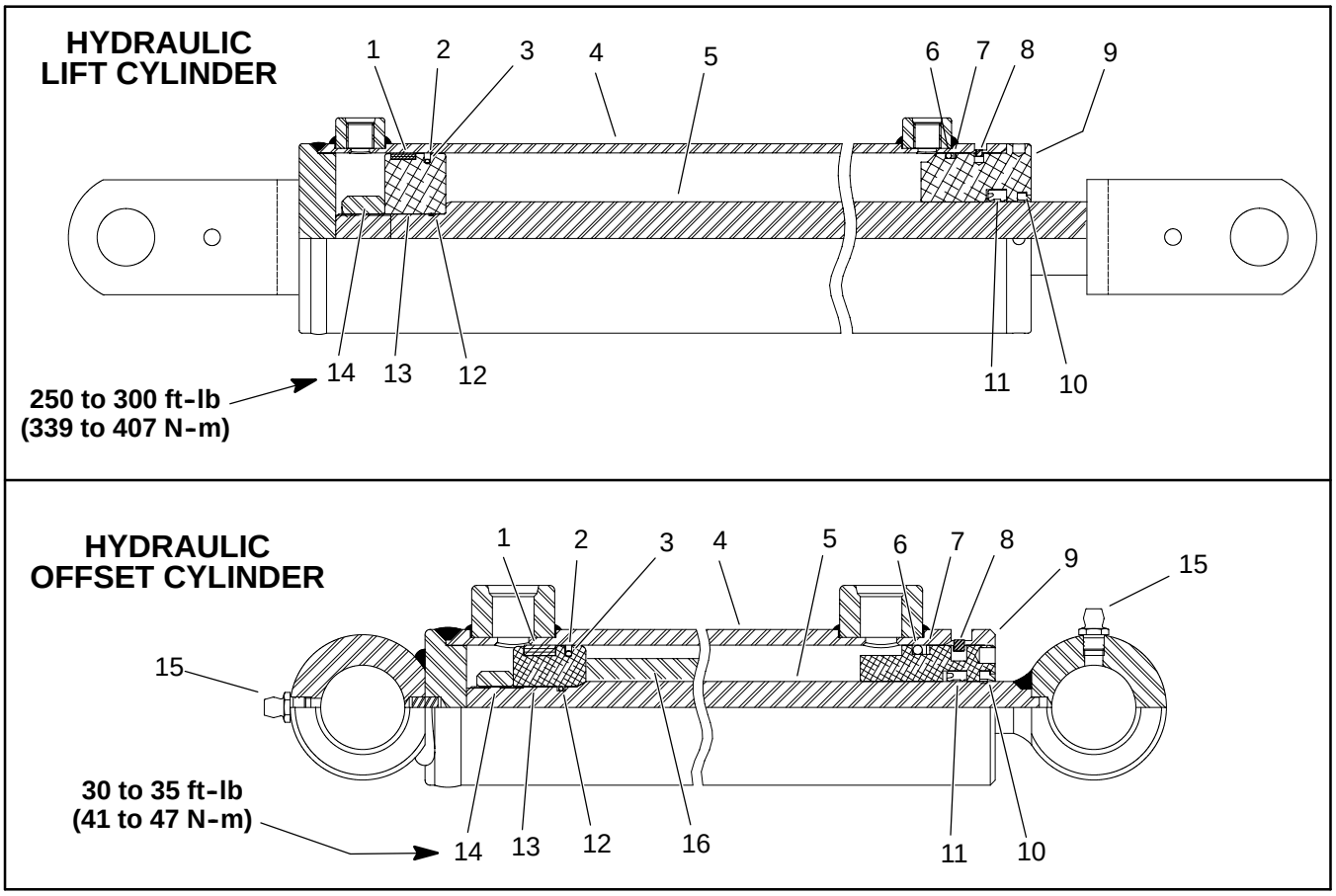


Figure 22

1. Wear ring
2. Seal
3. O-ring
4. Tube
5. Rod
6. O-ring
7. Backup ring
8. Retaining ring
9. Head
10. Wiper
11. Seal
12. O-ring
13. Piston
14. Lock nut
15. Grease fitting
16. Spacer (offset cylinder)

NOTE: The service procedure for the ProCore Processor lift cylinder and offset cylinder is the same.

Disassembly (Fig. 22)

1. Remove oil from the lift cylinder into a drain pan by **slowly** pumping the cylinder rod. Plug ports and clean the outside of the lift cylinder.

IMPORTANT: Prevent damage when clamping the lift cylinder into a vise; clamp on the pivot only.

2. Mount lift cylinder in a vise so that the shaft end tilts up slightly.

3. Using a spanner wrench, rotate head (item 9) clockwise until the edge of the retaining ring (item 8) appears in the tube opening. Insert a screwdriver under the beveled edge of the retaining ring to start the retaining ring through the tube opening. Rotate the head counter-clockwise to remove retaining ring (Fig. 23).

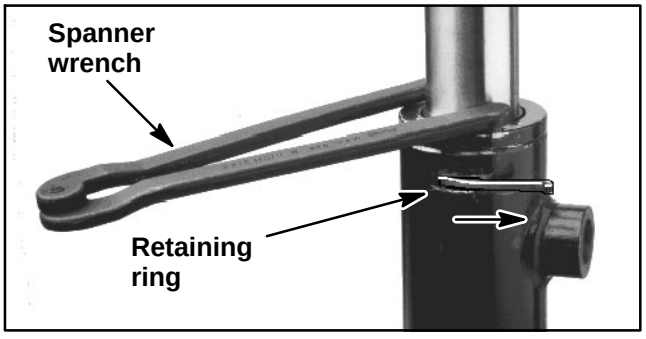


Figure 23

4. Grasp end of rod; extract rod and head assembly by carefully twisting and pulling on the rod.

IMPORTANT: Do not clamp vise jaws against rod surface. Protect rod surface before mounting in vise.

5. Mount rod securely in a vise by clamping vise on the flats of the pivot. Remove lock nut (item 14) and carefully slide piston and head from the rod. On offset cylinder, remove spacer (item 16) from rod.

IMPORTANT: When removing seal components, be careful not to scratch or damage piston or head.

6. Remove and discard wear ring (item 1), seal (item 2) and O−rings (items 3 and 12) from piston.

7. Remove and discard O−ring (item 6), backup ring (item 7), wiper (item 10) and seal (item 11) from the head.

Inspection

CAUTION

Use eye protection such as goggles when using compressed air

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

2. Inspect internal surface of tube for deep scratches, out−of−roundness and bending. Replace if worn or damaged.

3. Inspect rod, piston and head for excessive pitting, scoring or wear. Replace any worn or damaged parts.

Assembly (Fig. 22)

1. Coat new backup ring, wiper, seals and O−rings with clean hydraulic oil.

IMPORTANT: When installing seal components, be careful not to scratch or damage piston or head.

2. Install backup ring (item 7), O−ring (item 6), seal (item 11) and wiper (item 10) to the head.

3. Install O−rings (items 3 and 12), seal (item 2) and wear ring (item 1) to piston.

IMPORTANT: Do not clamp vise jaws against rod surface. Protect rod surface before mounting in vise.

4. Mount rod securely in a vise by clamping vise on the pivot end of the shaft. On offset cylinder, slide spacer (item 16) onto rod. Carefully slide head assembly and piston assembly onto the rod.

5. Thread lock nut (item 14) onto rod. Torque lock nut to value shown in Figure 22.

6. Remove rod assembly from vise.

IMPORTANT: Prevent damage when clamping the tube into a vise; clamp on the pivot end only.

7. Mount tube in a vise so that the rod end tilts up slightly.

IMPORTANT: When installing the head into the tube, pay careful attention to the retaining ring slot in the tube to insure that the backup ring does not lodge in the slot.

8. Coat all internal lift cylinder parts with a light coating of clean hydraulic oil. Slide rod assembly into tube being careful not to damage the seals.

9. Secure head in tube by installing retaining ring (item 8):

A. Align retaining ring hole in the head with the access slot in the tube.

B. Insert the retaining ring hook into the hole and rotate head clockwise until the retaining ring is completely pulled into the tube and the ends are covered.

C. Fill retaining ring slot in cylinder tube with silicone sealant after retaining ring is installed.

Tow Hitch Manifold (Tow Hitch Kit)

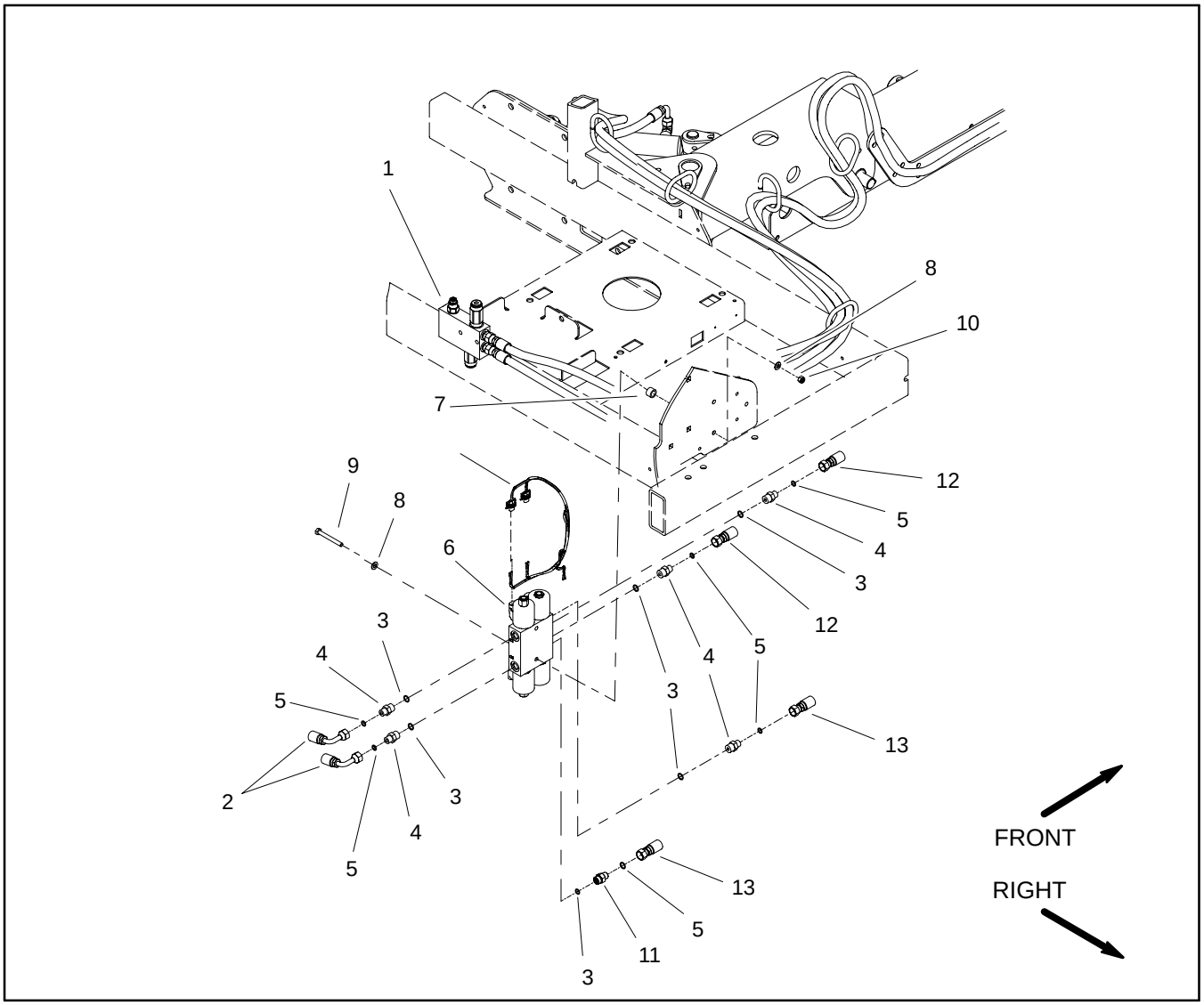


Figure 24

1. **Lift relief manifold**
2. **Hydraulic hose (to relief manifold)**
3. **O-ring**
4. **Hydraulic fitting (5 used)**
5. **O-ring**
6. **Tow hitch manifold**
7. **Spacer (2 used)**
8. **Flat washer (4 used)**
9. **Cap screw (2 used)**
10. **Lock nut (2 used)**
11. **Hydraulic fitting with orifice (.042)**
12. **Hydraulic hose (to tow vehicle)**
13. **Hydraulic hose (to offset cylinder)**

Manifold Removal (Fig. 24)

1. Park ProCore Processor on a level surface. Secure machine lift axle to frame with hitch pin and lynch pin to prevent lift axle from shifting. Make sure that ProCore Processor engine is off. Remove key from the ignition switch. Chock wheels to prevent movement of machine.

CAUTION

Operate all 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. Make sure that Core Processor hydraulic system pressure has been relieved before proceeding with tow hitch manifold removal.

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 connections prior to loosening hydraulic hoses.

5. Disconnect hydraulic hoses from fittings in manifold. Allow hoses to drain into a suitable container. Remove and discard O−rings from fittings.

6. Put caps or plugs on disconnected hoses and fittings to prevent contamination.

7. Disconnect wire harness connectors from solenoid valve coils.

8. Remove two (2) cap screws, flat washers and lock nuts that secure manifold to machine frame. Locate two (2) spacers used between manifold and frame.

9. Remove tow hitch manifold from machine.

IMPORTANT: The hydraulic fitting in manifold port C4 is an orificed fitting and is different than the fittings in other manifold ports.

10. If necessary, remove hydraulic fittings from manifold. Discard any removed O−rings.

Manifold Installation (Fig. 24)

1. If fittings were removed from manifold, lubricate and place new O−rings to fittings. Install fittings into manifold ports (see Hydraulic Fitting Installation in the General Information section of this chapter).

2. Position tow hitch manifold to frame. Install two (2) cap screws, flat washers and lock nuts but do not fully tighten.

3. Remove caps and plugs from disconnected hoses and fittings.

4. Lubricate and install new O−rings on manifold fittings. Connect hydraulic hoses to fittings on manifold. Properly tighten all connections (see Hydraulic Hose and Tube Installation in the General Information section of this chapter).

5. Secure tow hitch manifold to frame by tightening two (2) lock nuts.

6. Connect wire harness connectors to solenoid valve coils.

7. Operate machine functions slowly until air is out of Core Processor hydraulic system.

8. Check oil level in tow vehicle hydraulic reservoir and add correct oil if necessary.

Tow Hitch Manifold Service (Tow Hitch Kit)

1. Make sure the manifold is thoroughly cleaned before removing any of the solenoid valves.

2. Remove nut that secures solenoid coil to solenoid valve. Slide coil from valve.

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

3. Using a deep socket, remove valves from manifold. Note correct location of sealing and backup rings. Remove and discard sealing and backup rings from valves.

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

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

5. Clean valves by submerging valve in clean mineral spirits to flush out contamination. Particles as fine as talcum powder can affect the operation of the valve. Be extremely careful not to damage cartridge. Use compressed air for cleaning.

6. Lubricate new valve seal kit components with clean hydraulic oil and install on valves. The sealing and backup rings must be arranged properly on the valves for proper operation and sealing.

7. Thread valves carefully into correct manifold port. The valves should go in easily without binding. Using a deep socket, torque hydraulic valves to **25 ft-lb (33.9 N-m)**.

8. If solenoid coil was removed, slide coil onto solenoid valve. Secure coil with nut. Torque nut **60 in-lb (6.8 N-m)**.

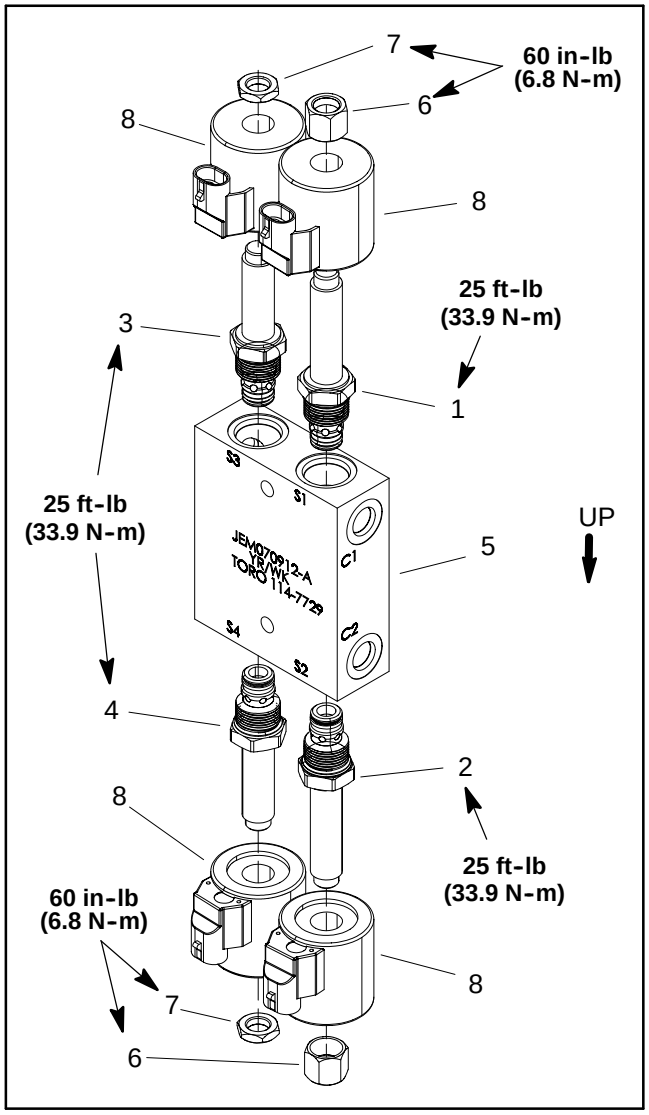


Figure 25

1. Solenoid valve S1
2. Solenoid valve S2
3. Solenoid valve S3
4. Solenoid valve S4
5. Tow hitch manifold
6. Nut
7. Nut
8. Solenoid coil

Chapter 5

Electrical System

Table of Contents

Electrical Diagrams

The electrical schematic and wire harness drawings for the ProCore Processor are located in Chapter 7 – Electrical Diagrams.

Special Tools

Order special tools from your Toro Distributor. Some tools may also be available from a local supplier.

Multimeter

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

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.

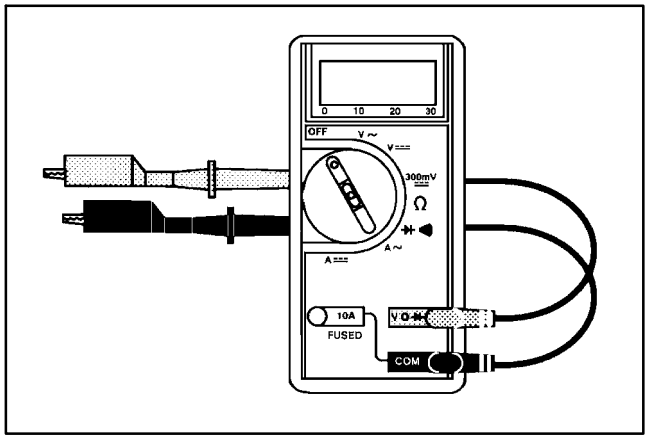


Figure 1

Skin–Over Grease

Special non–conductive grease which forms a light protective skin to help waterproof electrical switches and contacts.

Toro Part Number: **505–165**

Figure 2

Battery Terminal Protector

Aerosol spray that should be used on battery terminals to reduce corrosion problems. Apply terminal protector after the battery cable has been secured to the battery terminal.

Toro Part Number: **107–0392**

Figure 3

Battery Hydrometer

Use the Battery Hydrometer when measuring specific gravity of battery electrolyte. Obtain this tool locally.

Figure 4

Troubleshooting

CAUTION

Remove all jewelry, especially rings and watches, before doing any electrical trouble-shooting or testing. Disconnect the battery cables unless the test requires battery voltage.

For effective troubleshooting and repairs, you must have a good understanding of the electrical circuits (see Chapter 7 – Electrical Diagrams) and components used on this machine.

Starting Problems

Problem	Possible Causes
Starter solenoid clicks, but starter will not crank.	Battery is discharged. Battery cables are loose or corroded. Battery ground to frame is loose or corroded. Wiring at starter is faulty. Starter solenoid is faulty. Starter is faulty.
Nothing happens when start attempt is made.	Battery is discharged. Wiring to the start circuit components is loose, corroded or damaged (see Wiring Schematic in Chapter 7 – Electrical Diagrams). Battery cables are loose or corroded. Battery ground to frame is loose or corroded. Main fuse (25 amp) is loose or faulty. Fusible link is faulty. Ignition switch is faulty. Starter solenoid is faulty.
Engine cranks, but does not start.	The ignition switch is faulty. Remote control engine stop switch is faulty. Engine or fuel system is malfunctioning (see Chapter 3 – Engine). Engine and fuel may be too cold.

General Run Problems

Problem	Possible Causes
Battery does not charge.	Wiring to the charging circuit components is loose, corroded or damaged (see Wiring Schematic in Chapter 7 – Electrical Diagrams). Voltage regulator is not properly grounded to engine. Voltage regulator is faulty. Ignition switch is faulty. Alternator stator or engine flywheel is faulty. Battery is faulty.
Engine kills during operation.	Ignition switch is faulty. Remote control engine stop switch is faulty. Wiring to the run circuit components is broken or disconnected (see Wiring Schematic in Chapter 7 – Electrical Diagrams). Engine or fuel system is malfunctioning (see Chapter 3 – Engine).

Electrical System Quick Checks

Battery Test (Open Circuit Test)

Use a digital multimeter to measure the battery voltage.

Set the multimeter to the DC volts setting. The battery should be at a temperature of 60° to 100° F (16° to 38° C). The ignition switch should be in the OFF position and all accessories turned off. Connect the positive (+) multimeter lead to the positive battery post and the negative (–) multimeter lead to the negative battery post. Record the battery voltage.

NOTE: This test provides a relative condition of the battery. Load testing of the battery will provide additional and more accurate information (see Battery Service in the Service and Repairs section).

Voltage Measured	Battery Charge Level
12.68 volts	Fully charged (100%)
12.45 volts	75% charged
12.24 volts	50% charged
12.06 volts	25% charged
11.89 volts	0% charged

Charging System Test

This is a simple test used to determine if a charging system is functioning. It will tell you if the charging system has an output, but not its capacity.

Use a digital multimeter set to DC volts. Connect the positive (+) multimeter lead to the positive battery post and the negative (–) multimeter lead to the negative battery post. Keep the test leads connected to the battery posts and record the battery voltage.

NOTE: When cranking the engine, the battery voltage will drop and then should increase once the engine is running.

NOTE: Depending upon the condition of the battery charge and battery temperature, the battery voltage will increase at different rates as the battery charges.

Start the engine and run at high idle **(3600 RPM)**. Allow the battery to charge for at least 3 minutes. Record the battery voltage.

After running the engine for at least 3 minutes, battery voltage should be at least 0.50 volt higher than initial battery voltage.

An example of a charging system that is functioning:

At least 0.50 volt over initial battery voltage.	
Initial Battery Voltage	= 12.30 v
Battery Voltage after 3 Minute Charge	= 12.85 v
Difference	= +0.55 v

Component Testing

For accurate resistance and/or continuity checks, electrically disconnect the component being tested from the circuit (e.g. unplug the wire harness switch connector from switch 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.

Ignition Switch

The ignition (key) switch has three positions (OFF, RUN, and START) (Fig. 5). The switch terminals are positioned as shown in Figure 6.

Testing

1. Make sure that Processor ignition switch is in the OFF position. Remove key from the ignition switch.

2. Unplug wire harness connectors from switch and verify continuity between switch terminals. The circuitry of the ignition switch is shown in the chart below. With the use of a multimeter (ohms setting), the switch functions may be tested to determine whether continuity exists between the various terminals for each switch position.

3. Reconnect the harness connectors to the switch after testing.

POSITION	CIRCUIT
OFF	G + M + A
RUN	B + L + A
START	B + L + S

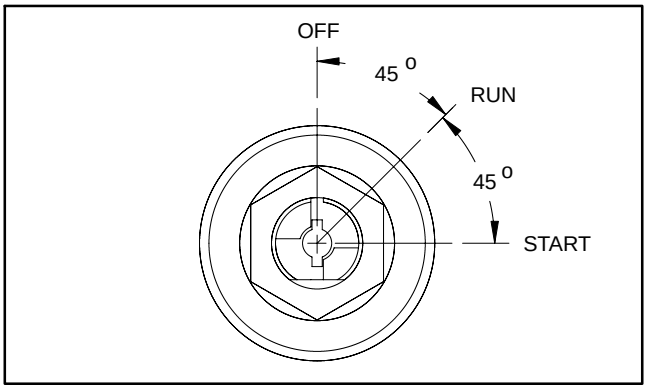


Figure 5

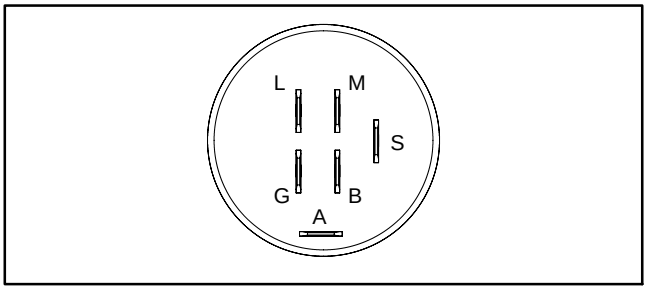


Figure 6

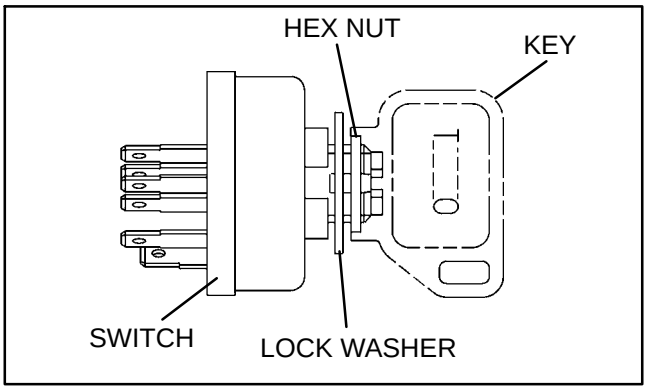


Figure 7

Remote Control Handle Switches

The remote control handle includes two (2) switches: the engine stop switch and the lift/offset switch (Fig. 8).

The engine stop switch is a momentary switch that allows the operator to shut the ProCore Processor engine off from the tow vehicle. When this switch is depressed and held, the engine magneto ignition system is grounded to cause the engine to stop running.

The lift/offset switch is a two position switch that is used to control the optional tow hitch. When this switch is in the normal, lift position, the tow hitch hydraulic manifold solenoids are not energized allowing tow vehicle hydraulic flow to be available for operation of the Processor lift cylinder. If the switch is moved to the alternate, offset position, the tow hitch hydraulic manifold solenoids are energized allowing tow vehicle hydraulic flow to be available for operation of the tow hitch hydraulic offset cylinder.

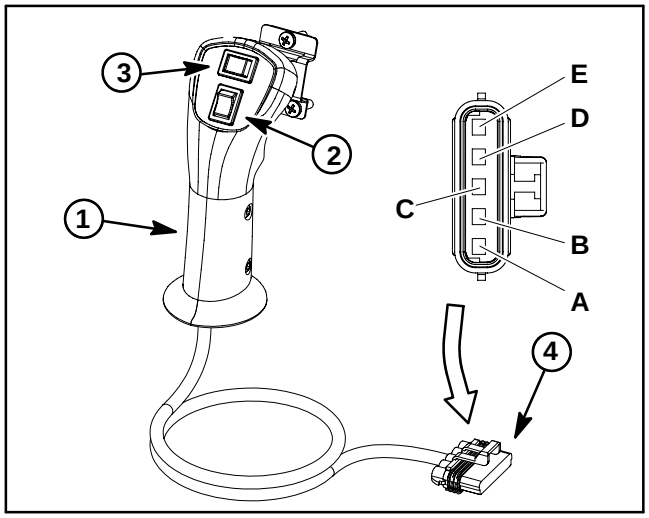


Figure 8

1. **Remote control handle**
2. **Engine stop switch**
3. **Lift/offset switch**
4. **Harness connector**

Testing

1. Make sure that Processor ignition switch is in the OFF position. Remove key from the ignition switch.

2. The switches and remote control handle wire harness can be checked by unplugging the handle wire harness from the main wire harness of the ProCore Processor. Using a Multimeter set to ohms, test continuity of the switches and remote handle wire harness as follows (Fig. 8):

   A. When the engine stop switch is in the normal position (not depressed), there **should not** be continuity between handle wire harness connector terminals B and E.

   B. When the engine stop switch is depressed, there **should** be continuity between connector terminals B and E.

   C. When the lift/offset switch is in the lift position, there **should not** be continuity between connector terminals A and C.

   D. When the lift/offset switch is in the offset position, there **should** be continuity between connector terminals A and C.

3. If necessary, disassemble remote control handle (Fig. 9) and test switch continuity using information above at switch terminals (Fig. 10). Replace switch(es) if necessary. Assemble remote control handle after switch testing is completed.

4. Connect remote control handle wire harness to the main wire harness of the ProCore Processor.

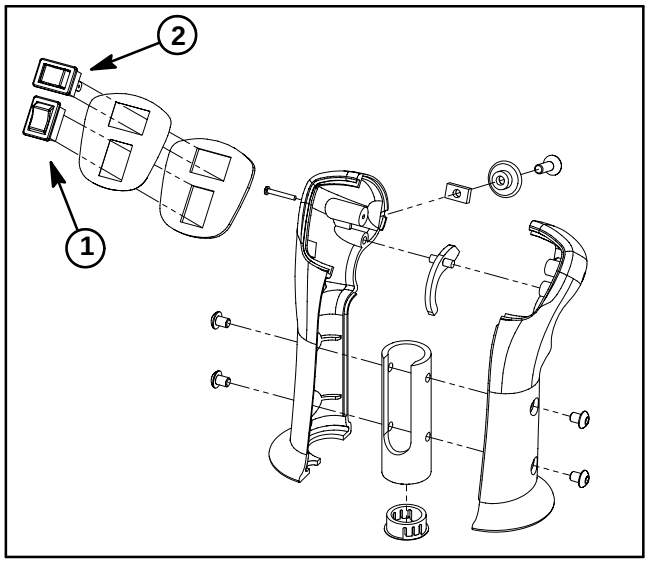


Figure 9

1. **Engine stop switch**
2. **Lift/offset switch**

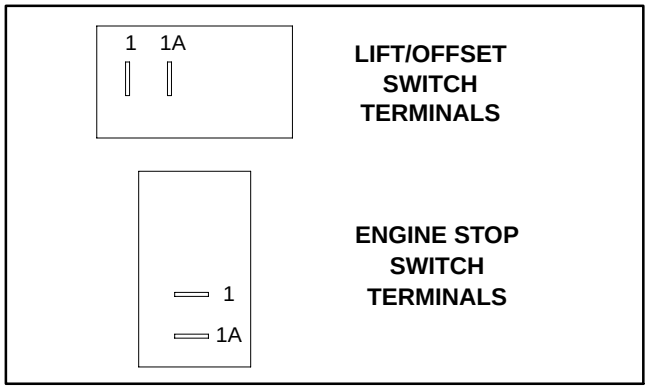


Figure 10

Hour Meter

The hour meter used on the machine records the amount of time that the ignition switch is in the RUN position.

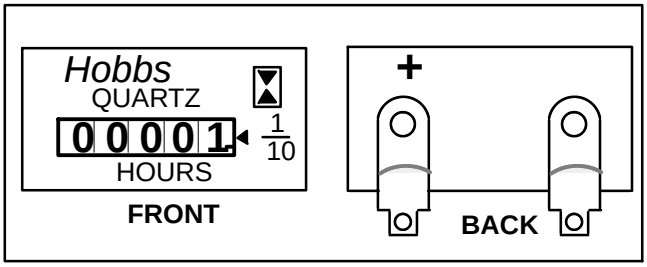


Figure 11

Testing

1. Make sure that Processor ignition switch is in the OFF position. Remove key from the ignition switch. Locate wire harness connector at rear of hour meter. Unplug harness connector from hour meter.

2. Connect the positive (+) terminal of a 12 VDC source to the positive (+) terminal of the hour meter.

3. Connect the negative (–) terminal of the voltage source to the other terminal of the hour meter.

4. The hour meter should move 1/10 of an hour in six minutes.

5. Disconnect the voltage source from the hour meter.

6. Replace the hour meter if necessary.

7. Connect wire harness connector to hour meter.

Fuses

The ProCore Processor uses two (2) fuses for circuit protection. The fuse holders for these fuses are located next to the engine (Fig. 12).

Main Fuse (25 Amp): Protects main power supply. The main fuse can be identified by an orange and a pink harness wire.

Run Fuse (10 Amp): Protects power supply to run machine components (fuel solenoid, hour meter and optional hitch coil). The run fuse can be identified by a green and a gray harness wire.

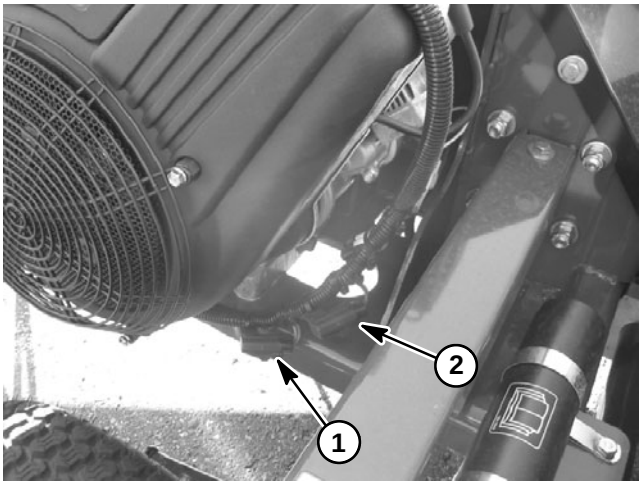


Figure 12

1. Main fuse **2. Run fuse**

Testing

Make sure that Processor ignition switch is in the OFF position. Remove key from the ignition switch. Remove fuse from the fuse holder for testing. Fuse should have continuity between fuse terminals.

Fusible Link

The ProCore Processor uses a fusible link for circuit protection. This fusible link connects the main wire harness to the starter B+ terminal and positive battery cable (Fig. 13). If the link should fail, current to the machine will cease. Refer to electrical schematic and wire harness drawings in Chapter 9 – Electrical Diagrams for additional fusible link information.

Testing

Make sure that ignition switch is OFF and disconnect the negative battery cable from the battery terminal. Then disconnect the positive cable from battery (see Battery Service in the Service and Repairs section of this chapter). Locate and unplug fusible link connector from machine wire harness. Use a multimeter to make sure that continuity exists between the disconnected fusible link connector and the link terminal at the starter motor (Fig. 14). If the fusible link is open (no continuity), replace the fusible link harness.

After testing is complete, make sure that fusible link harness connectors are securely attached to starter and machine wire harness. Connect positive battery cable to battery terminal first and then connect negative cable to battery.

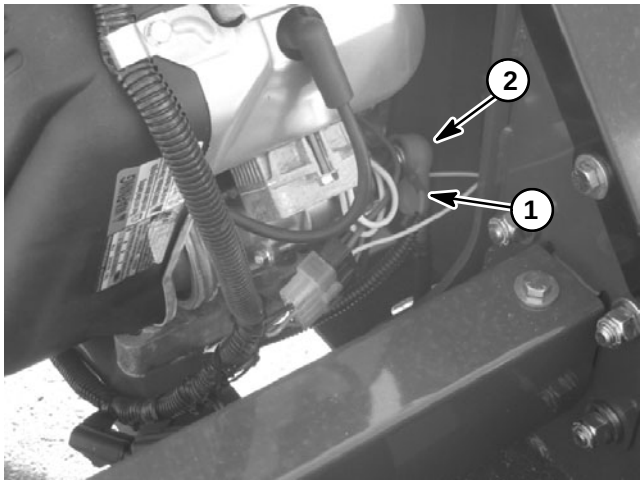


Figure 13

1. Fusible link **2. Starter B+ terminal**

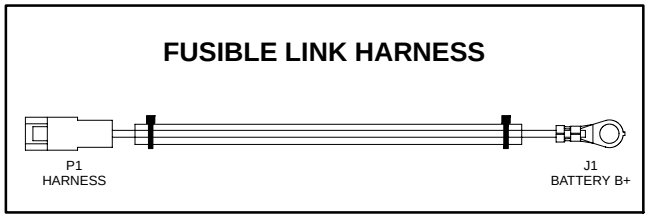


Figure 14

Solenoid Valve Coil (Tow Hitch Kit)

The ProCore Processor tow hitch kit uses four (4) solenoid valve coils on the hydraulic tow hitch manifold (Fig. 15). When the solenoid valve coils are energized, tow vehicle hydraulic flow can be directed to the tow hitch hydraulic offset cylinder to change the position of the ProCore Processor behind the tow vehicle.

NOTE: The four (4) tow hitch manifold solenoid valve coils are identical and can be reversed for testing purposes.

Testing

NOTE: A solenoid coil does not have to be removed from the cartridge valve or manifold for testing.

1. Make sure that Processor ignition switch is in the OFF position. Remove key from the ignition switch.

2. Disconnect wire harness electrical connector from the solenoid valve coil that is to be tested.

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 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 7.1 ohms.

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

5. After testing, reconnect wire harness electrical connector to the solenoid valve coil.

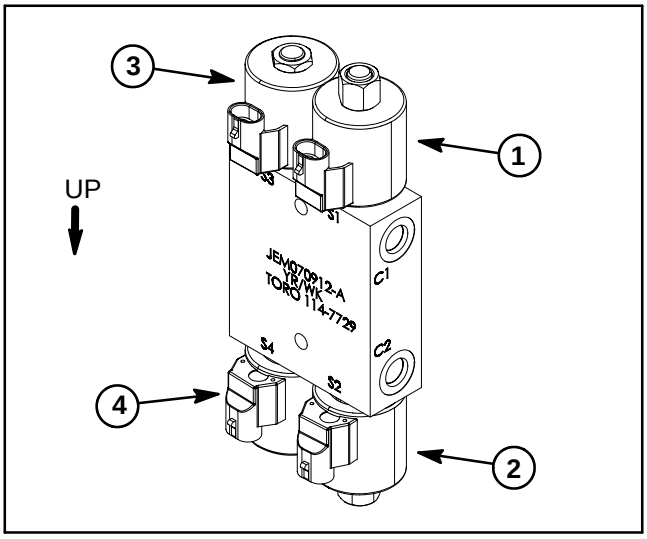


Figure 15

1. **Solenoid coil S1**
2. **Solenoid coil S2**
3. **Solenoid coil S3**
4. **Solenoid coil S4**

Service and Repairs

NOTE: See the Briggs & Stratton Repair Manual for 4-cycle, V-twin Cylinder, OHV Head Engines for engine electrical component repair information.

Battery Storage

If the machine will be stored for more than 30 days:

1. Remove the battery from the machine and charge it fully (see Battery Service).

2. Either store battery on a shelf or on the machine.

3. Leave cables disconnected if the battery is stored on the machine.

4. Store battery in a cool atmosphere to avoid quick deterioration of the battery charge.

5. To help prevent the battery from freezing, make sure it is fully charged (see Battery Service).

Battery Care

1. Battery electrolyte level must be properly maintained. The top of the battery must be kept clean. If the machine is stored in a location where temperatures are extremely high, the battery will discharge more rapidly than if the machine is stored in a location where temperatures are cool.

CAUTION

Wear safety goggles and rubber gloves when working with electrolyte. Charge battery in a well ventilated place so gasses produced while charging can dissipate. Since the gases are explosive, keep open flames and electrical sparks away from the battery; do not smoke. Nausea may result if the gases are inhaled. Unplug charger from electrical outlet before connecting or disconnecting charger leads to or from battery posts.

IMPORTANT: Do not remove battery fill caps while cleaning.

2. Check battery condition weekly or after every 50 hours of operation. Keep terminals and entire battery case clean because a dirty battery will discharge slowly.

   A. Clean battery by washing entire case with a solution of baking soda and water. Rinse with clear water.

   B. Coat battery posts and cable connectors with Battery Terminal Protector (Toro Part No. 107–0392) or petroleum jelly to prevent corrosion.

3. Battery cables must be tight on terminals to provide good electrical contact.

CAUTION

Connecting battery cables to the wrong battery post could result in personal injury and/or damage to the electrical system.

4. If corrosion occurs at battery terminals, disconnect cables. Always disconnect negative (–) cable first. Clean clamps and terminals separately. Reconnect cables to battery with positive (+) cable first. Coat battery posts and cable connectors with Battery Terminal Protector (Toro Part No. 107–0392) or petroleum jelly to prevent corrosion.

5. Periodically (at least every 50 operating hours) check battery electrolyte level. Check electrolyte level every 30 days if machine is in storage.

6. Maintain battery cell level with distilled or demineralized water. Do not fill battery cells above the fill line.

Battery Service

The battery is the heart of the electrical system. With regular and proper service, battery life can be extended. Additionally, battery and electrical component failure can be prevented.

CAUTION

When working with batteries, use extreme caution to avoid splashing or spilling electrolyte. Electrolyte can destroy clothing and burn skin and eyes. Always wear safety goggles and a face shield when working with batteries.

Electrolyte Specific Gravity
Fully charged: 1.265 corrected to 80ºF (26.7ºC)
Discharged: less than 1.240

Battery Specifications
BCI Group Size 28
535 CCA at 0º F (–18º C)
Reserve Capacity of 110 minutes at 80ºF (27ºC)

Dimensions (including terminal posts)

Length	10.3 inches (262 mm)
Width	6.8 inches (173 mm)
Height	9.5 inches (241 mm)

Removal and Installation (Fig. 16)

1. Make sure that Processor ignition switch is in the OFF position. Remove key from the ignition switch. Loosen strap and remove battery box cover.

2. Loosen and remove negative cable from battery. After negative cable has been removed, loosen and remove positive cable from battery.

3. Carefully remove battery from machine.

4. Install battery in reverse order making sure to connect and tighten positive cable to battery before connecting negative cable. Tighten nuts that secure battery cables from **10 to 15 ft–lb (14 to 20 N–m)**.

NOTE: Before connecting the negative (ground) cable to the battery, connect a digital multimeter (set to DC Amps) between the negative battery post and the negative (ground) cable connector. The reading should be less than 0.1 amp. If the reading is 0.1 amp or more, the machine's electrical system should be tested for short circuits or faulty components and repaired.

5. Install battery box cover and secure with strap.

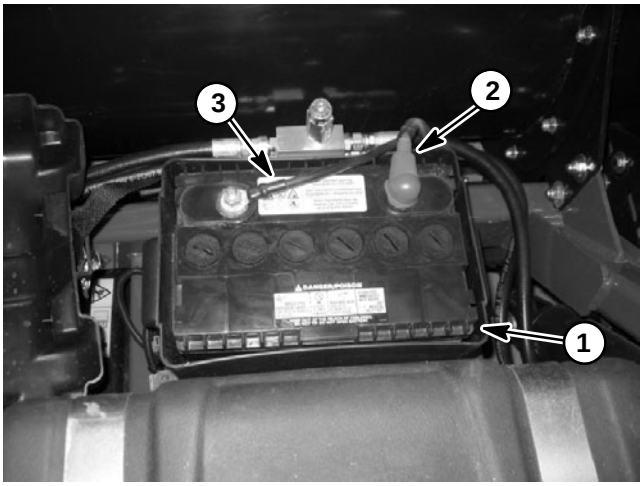


Figure 16

1. **Battery**
2. **Positive battery cable**
3. **Negative battery cable**

Inspection, Maintenance and Testing

1. Perform the following inspections and maintenance:

   A. Check battery case for cracks. Replace battery if cracked or leaking.

   B. Check battery terminals for corrosion. If corrosion occurs at terminals, disconnect cables. Always disconnect negative (–) cable first. Clean cable clamps and battery terminals separately. Reconnect cables with positive (+) cable first. Coat battery posts and cable connectors with Battery Terminal Protector (Toro Part No. 107–0392) or petroleum jelly to prevent corrosion.

   IMPORTANT: Before cleaning the battery, tape or block vent holes to the filler caps and make sure the caps are on tightly.

   C. Check for signs of wetness or leakage on the top of the battery which might indicate a loose or missing filler cap, overcharging, loose terminal post or overfilling. Also, check battery case for dirt and oil. Clean the battery with a solution of baking soda and water, then rinse it with clean water.

   D. Check that the cover seal is not broken away. Replace the battery if the seal is broken or leaking.

   E. Check the electrolyte level in each cell. If the level is below the tops of the plates in any cell, fill all cells with **distilled water** between the minimum and maximum fill lines. Charge at 15 to 25 amps for 15 minutes to allow sufficient mixing of the electrolyte.

2. Conduct a hydrometer test of the battery electrolyte.

IMPORTANT: Make sure the area around the cells is clean before opening the battery caps.

A. Measure the specific gravity of each cell with a hydrometer. Draw electrolyte in and out of the hydrometer barrel prior to taking a reading to warm-up the hydrometer. At the same time take the temperature of the cell.

B. Temperature correct each cell reading. For each 10°F (5.5°C) above 80°F (26.7°C) add 0.004 to the specific gravity reading. For each 10°F (5.5°C) below 80°F (26.7°C) subtract 0.004 from the specific gravity reading.

Example: Cell Temperature	100°F
Cell Gravity	1.245
100°F minus 80°F equals 20°F	
(37.7°C minus 26.7°C equals 11.0°C)	
20°F multiply by 0.004/10°F equals 0.008	
(11°C multiply by 0.004/5.5°C equals 0.008)	
ADD (conversion above)	0.008
Correction to 80°F (26.7°C)	1.253

C. If the difference between the highest and lowest cell specific gravity is 0.050 or greater or the lowest cell specific gravity is less than 1.225, charge the battery. Charge at the recommended rate and time given in **Charging** or until specific gravity of all cells is 1.225 or greater with the difference in specific gravity between the highest and lowest cell less than 0.050. If these charging conditions can not be met, replace the battery.

3. Perform a high-discharge test with an adjustable load tester.

This is one of the most reliable means of testing a battery as it simulates the cold-cranking test. A commercial battery load tester is **required** to perform this test.

CAUTION

Follow the battery load tester manufacturer's instructions when using a battery load tester.

A. Check the voltage across the battery terminals prior to testing the battery. If the voltage is less than 12.4 VDC, recharge the battery.

B. If the battery has recently been charged, remove the battery surface charge before performing the load test. Disconnect the engine fuel stop solenoid to prevent the engine from starting. Engage the starter motor for 10 seconds to remove battery surface charge. Reconnect the fuel stop solenoid.

C. Make sure battery terminals are free of corrosion.

D. Measure the temperature of the center battery cell.

E. Connect a battery load tester to the battery terminals **following the load tester manufacturer's instructions**. Connect a digital multimeter to the battery terminals.

F. Apply a test load of 270 amps (one half the Cranking Performance rating of the battery) for 15 seconds.

G. Take a voltage reading after 15 seconds, then remove the load.

H. Using the table below, determine the minimum voltage for the cell temperature reading:

Minimum Voltage	Battery Electrolyte Temperature	
9.6	70°F (and up)	21.1°C (and up)
9.5	60°F	15.6°C
9.4	50°F	10.0°C
9.3	40°F	4.4°C
9.1	30°F	-1.1°C
8.9	20°F	-6.7°C
8.7	10°F	-12.2°C
8.5	0°F	-17.8°C

I. If the test voltage is below the minimum, replace the battery. If the test voltage is at or above the minimum, return the battery to service.

Charging

To minimize possible damage to the battery and allow the battery to be fully charged, the slow charging method is presented here. This charging method can be accomplished with a constant current battery charger which is commonly available.

CAUTION

Follow the battery charger manufacturer's instructions when using a battery charger.

NOTE: Using specific gravity of the battery cells is the most accurate method of determining battery condition.

1. Determine the battery charge level from either its specific gravity or open circuit voltage.

Battery Charge Level	Specific Gravity	Open Circuit Voltage
100%	1.265	12.68
75%	1.225	12.45
50%	1.190	12.24
25%	1.155	12.06
0%	1.120	11.89

2. Determine the charging time and rate **using the battery charger manufacturer's instructions** or the following table:

Battery Reserve Capacity (Minutes)	Battery Charge Level (Percent of Fully Charged)			
	75%	50%	25%	0%
80 or less	3.8 hrs @ 3 amps	7.5 hrs @ 3 amps	11.3 hrs @ 3 amps	15 hrs @ 3 amps
81 to 125	**5.3 hrs @ 4 amps**	**10.5 hrs @ 4 amps**	**15.8 hrs @ 4 amps**	**21 hrs @ 4 amps**
126 to 170	5.5 hrs @ 5 amps	11 hrs @ 5 amps	16.5 hrs @ 5 amps	22 hrs @ 5 amps
171 to 250	5.8 hrs @ 6 amps	11.5 hrs @ 6 amps	17.3 hrs @ 6 amps	23 hrs @ 6 amps
above 250	6 hrs @ 10 amps	12 hrs @ 10 amps	18 hrs @ 10 amps	24 hrs @ 10 amps

CAUTION

Do not charge a frozen battery because it can explode and cause injury. Let the battery warm to 60° F (15.5° C) before connecting to a charger.

Charge the battery in a well-ventilated place to dissipate gases produced from charging. These gases are explosive; keep open flame and electrical spark away from the battery. Do not smoke. Nausea may result if the gases are inhaled. Unplug the charger from the electrical outlet before connecting or disconnecting the charger leads from the battery posts.

3. **Following the battery charger manufacturer's instructions**, connect the charger cables to the battery. Make sure a good connection is made.

4. Charge the battery **following the battery charger manufacturer's instructions**.

5. Occasionally check the temperature of the battery electrolyte. If the temperature exceeds 125ºF (51.6ºC) or the electrolyte is violently gassing or spewing, the charging rate must be lowered or temporarily stopped.

6. Three hours prior to the end of the charging, measure the specific gravity of a battery cell once per hour. The battery is fully charged when the cells are gassing freely at a low charging rate and there is less than a 0.003 change in specific gravity for three consecutive readings.

Solenoid Valve Coil (Tow Hitch Kit)

Removal (Fig. 17)

1. Make sure that Processor ignition switch is in the OFF position. Remove key from the ignition switch.

2. Disconnect wire harness electrical connector from the solenoid valve coil that is to be removed.

3. Remove nut that secures solenoid coil to solenoid valve.

4. Slide solenoid coil from valve.

Installation (Fig. 17)

1. Clean valve stem and solenoid coil bore.

2. Slide coil onto solenoid valve.

3. Secure coil with nut. Torque nut **60 in-lb (6.8 N-m)**.

4. Connect wire harness electrical connector to the solenoid valve coil.

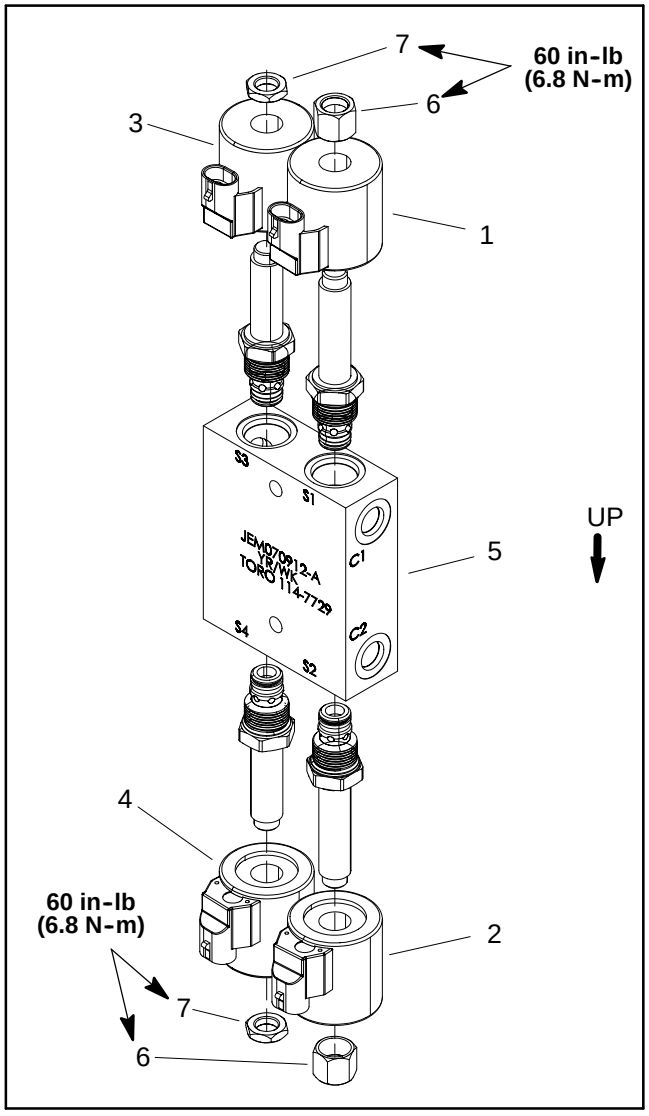


Figure 17

1. **Solenoid coil S1**
2. **Solenoid coil S2**
3. **Solenoid coil S3**
4. **Solenoid coil S4**
5. **Offset manifold**
6. **Nut**
7. **Nut**

Chapter 6

Chassis

Table of Contents

Specifications

Item	Description
Transport Tires Size Pressure	 18 x 9.5 – 8, 6 Ply, Tubeless 36 PSI (248 kPa)
Wheel Lug Nut Torque	70 to 90 ft–lb (95 to 122 N–m)
Brush (Fig. 1) Bristle Length: New Bristle Length: Replace	 4.500” (114.3 mm) 3.500” (88.9 mm)

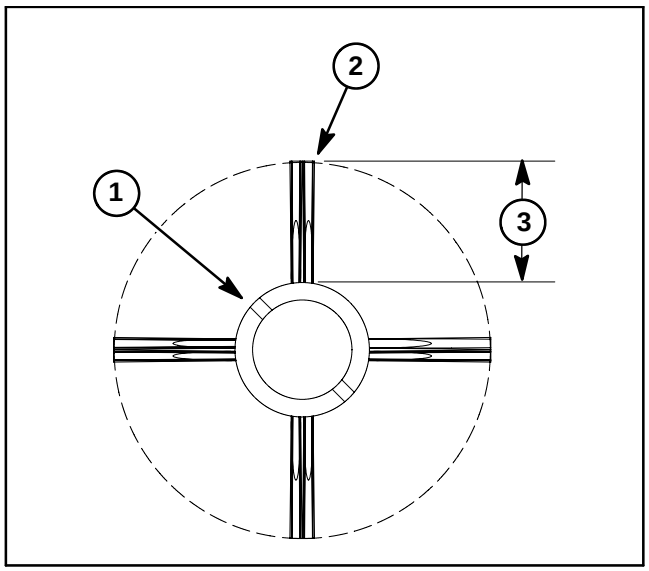


Figure 1

1. **Brush hub**
2. **Brush bristle**
3. **Bristle length**

General Information

Operator's Manual

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

Securing ProCore Processor to Tow Vehicle

While operating or servicing the ProCore Processor, make sure that the Processor is properly secured to the tow vehicle. Refer to your Operator's Manual and Hitch Installation Instructions for the correct procedure for attaching the ProCore Processor to the tow vehicle.

Wheels

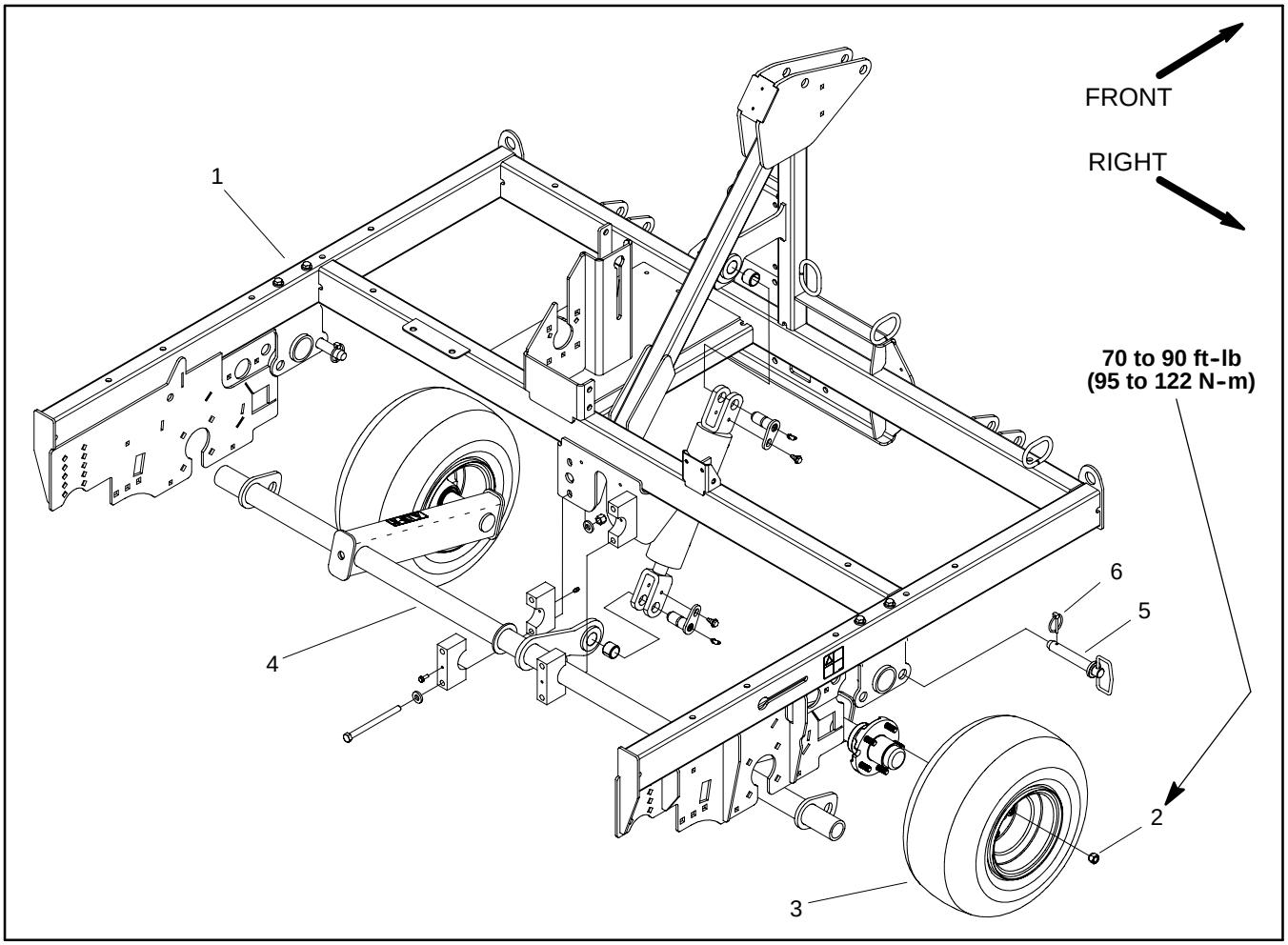


Figure 2

1. **Main frame**
2. **Lug nut (5 used per wheel)**
3. **Wheel and tire assembly**
4. **Lift axle**
5. **Hitch pin**
6. **Lynch pin**

Wheel Removal (Fig. 2)

1. Have ProCore Processor attached to tow vehicle and park machines on a level surface. Engage vehicle parking brake, stop engine and remove key from the ignition switch. Make sure that Processor engine is off. Chock wheels to prevent movement of either machine.

2. Secure lift axle to frame with hitch pin and lynch pin to prevent lift axle from shifting.

3. Loosen but do not remove five (5) lug nuts that secure wheel to be removed.

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

5. Remove lug nuts and pull wheel from Processor wheel hub.

Wheel Installation (Fig. 2)

1. Position wheel to wheel hub on raised machine.

2. Secure wheel to ProCore Processor with five (5) lug nuts.

WARNING

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

3. Lower machine to ground. Alternately torque lug nuts from **70 to 90 ft–lb (95 to 122 N–m)**.

4. Remove lynch pin and hitch pin from lift axle before using ProCore Processor.

Wheel Hubs and Bearings

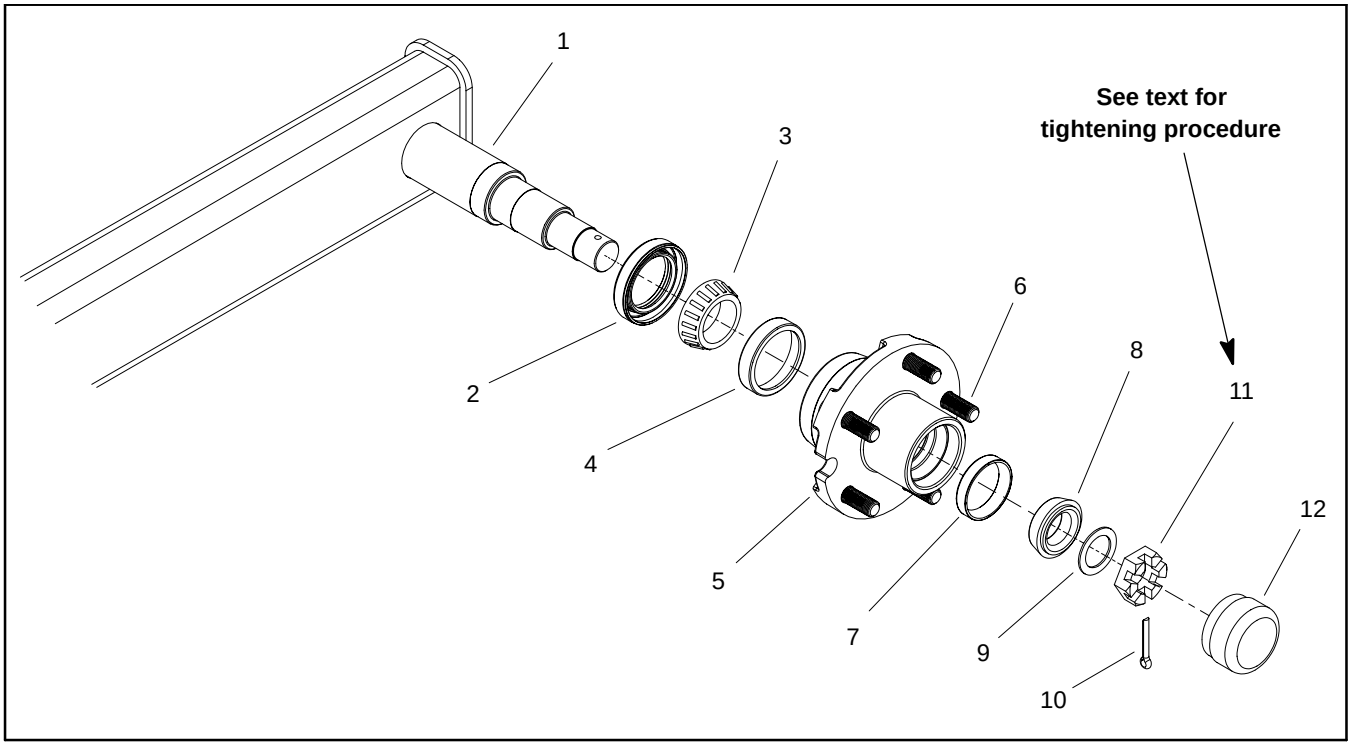


Figure 3

1. **Lift axle**
2. **Grease seal**
3. **Inner bearing cone**
4. **Inner bearing cup**
5. **Wheel hub**
6. **Lug screw (5 used)**
7. **Outer bearing cup**
8. **Outer bearing cone**
9. **Washer**
10. **Cotter pin**
11. **Slotted hex nut**
12. **Dust cup**

Removal (Fig. 3)

1. Have ProCore Processor attached to tow vehicle and park machines on a level surface. Engage vehicle parking brake, stop engine and remove key from the ignition switch. Make sure that Processor engine is off. Chock wheels to prevent movement of either machine.

2. Secure lift axle to frame with hitch pin and lynch pin to prevent lift axle from shifting.

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

4. Remove wheel assembly (see Wheel Removal in this section).

5. Carefully pry dust cap from wheel hub.

6. Straighten cotter pin and remove from axle spindle.

7. Remove slotted hex nut and washer that secure wheel hub to spindle. Slide wheel hub with bearings from spindle.

8. Disassemble wheel hub:

   A. Remove grease seal from the wheel hub taking care to not damage the hub bore. Discard seal.

   B. Remove bearing cones from both sides of wheel hub. Clean bearings in solvent. Clean inside of hub.

   C. If necessary, remove bearing cups from hub.

   D. Inspect wheel bearings. Check the bearing cones and bearing cups for wear, pitting or other damage. Replace worn or damaged parts.

Installation (Fig. 3)

1. Thoroughly clean all parts before assembly.

2. Assemble wheel hub:

   A. If bearing cups were removed from the wheel hub, press inner and outer cups into the hub until they seat against the hub shoulder.

   B. Fill hub approximately 50% full of grease.

   C. Pack both bearing cones with grease. Install greased inner bearing cone into the cup on inboard side of the wheel hub.

   IMPORTANT: The grease seal must be pressed in so it is flush with the end of the hub. The lip of the seal must face the inner bearing.

   D. Lubricate the inside of new grease seal and press it into the wheel hub.

3. Install the wheel hub onto the axle spindle taking care to not damage grease seal in hub.

4. Install greased outer bearing cone, washer and slotted hex nut onto spindle shaft.

5. While rotating the wheel hub by hand, torque the slotted hex nut from **75 to 180 in-lb (8.5 to 20.3 N-m)** to seat bearings. Loosen nut until it is away from washer and hub has end play. Finally, while rotating hub, tighten slotted hex nut from **15 to 20 in-lbs (1.7 to 2.3 N-m)**.

6. Install cotter pin to secure slotted hex nut. Install dust cap to hub.

WARNING

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

7. Install wheel assembly (see Wheel Installation in this section).

8. Carefully lower machine to ground. Make sure to properly torque lug nuts from **70 to 90 ft-lb (95 to 122 N-m)**.

9. Remove lynch pin and hitch pin from lift axle before using ProCore Processor.

Drive Belt Covers

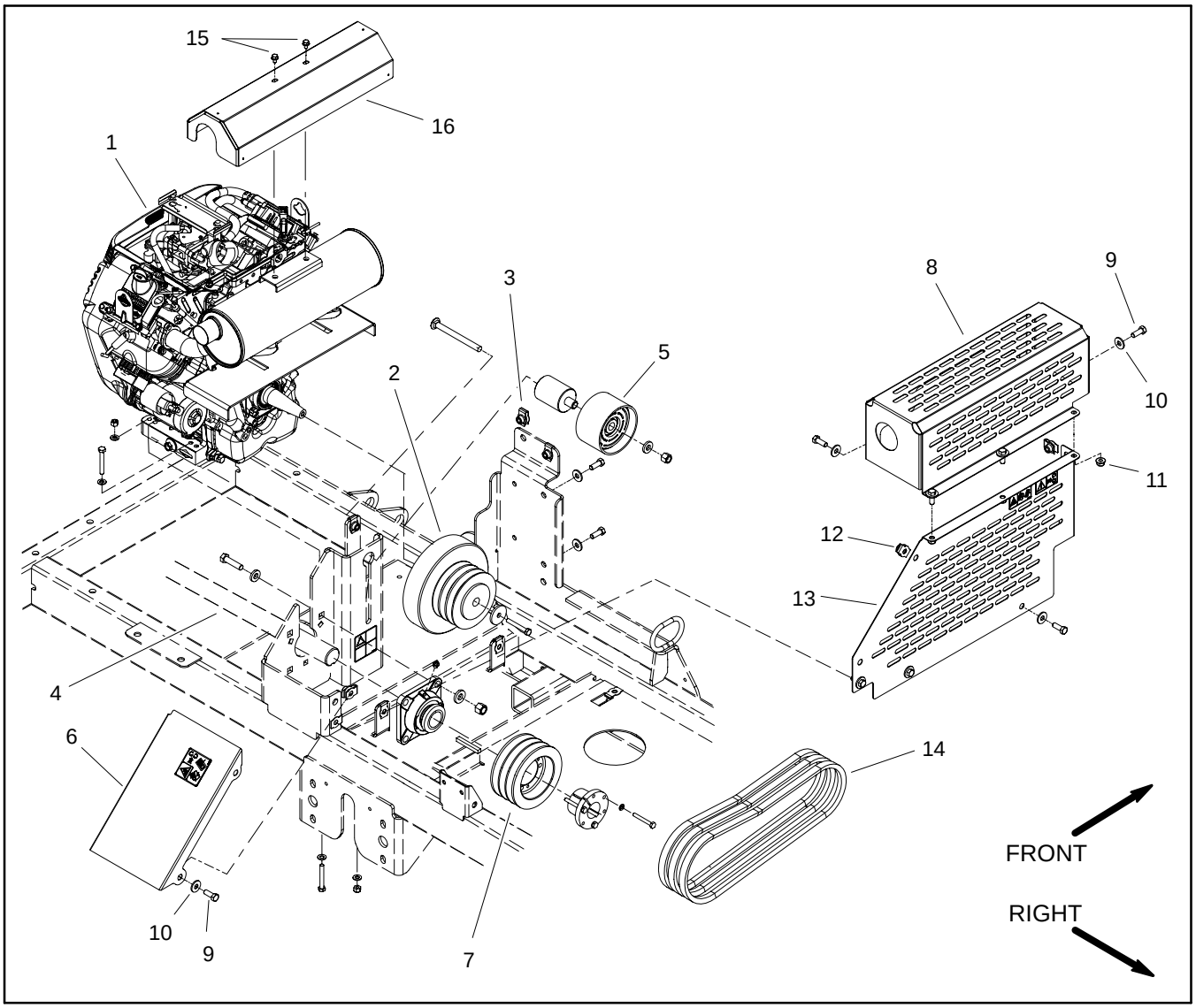


Figure 4

1. **Engine assembly**
2. **Centrifugal clutch**
3. **Tinnerman nut (7 used)**
4. **Jack shaft**
5. **Idler pulley**
6. **Belt cover**
7. **Jack shaft pulley**
8. **Muffler guard**
9. **Cap screw (12 used)**
10. **Flat washer (12 used)**
11. **Flange nut (3 used)**
12. **Tinnerman nut**
13. **Belt guard**
14. **Belt set**
15. **Flange head screw (2 used)**
16. **Heat shield**

Removal (Figs. 4, 5 and 6)

1. Park ProCore Processor on a level surface with the Processor fully lowered. Make sure that Processor engine is off. Remove key from the ignition switch. Chock wheels to prevent movement of the machine.

2. Remove drive belt cover to gain access to drive belt and other drive components. Make sure that tinnerman nuts remain positioned correctly on frame brackets for assembly purposes.

Installation (Figs. 4, 5 and 6)

1. Position belt cover to machine and secure with removed fasteners.

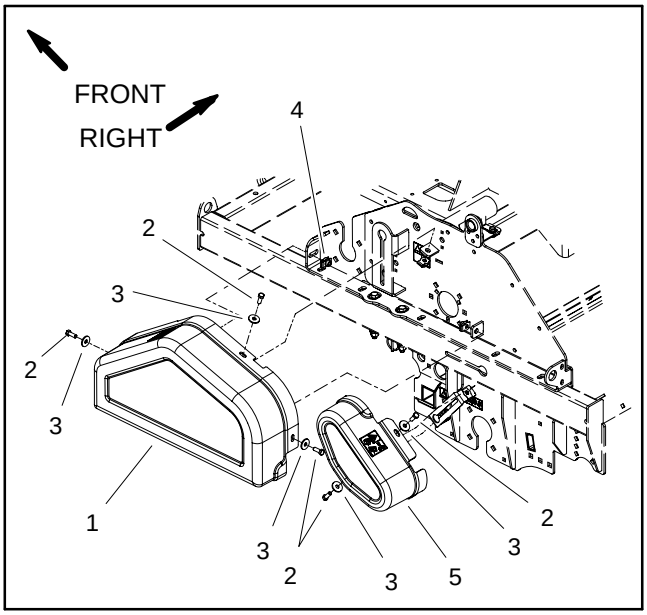


Figure 5

1. **Chopper drive belt cover**
2. **Cap screw**
3. **Washer**
4. **Tinnerman nut**
5. **Corner shaft belt cover**

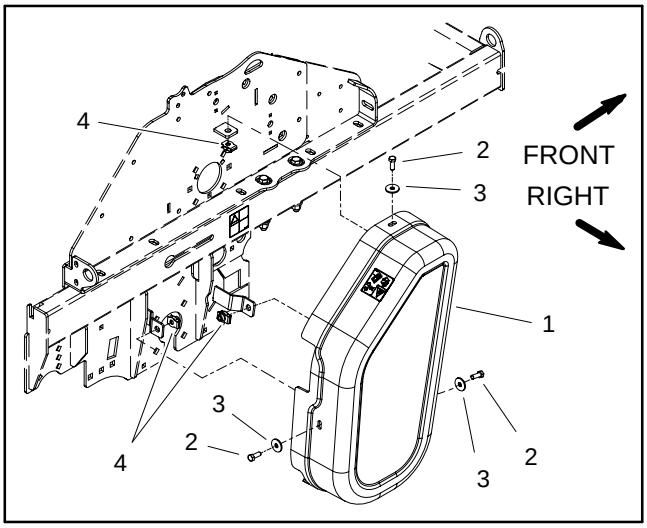


Figure 6

1. **Brush drive belt cover**
2. **Cap screw**
3. **Washer**
4. **Tinnerman nut**

Pulley Assembly Service

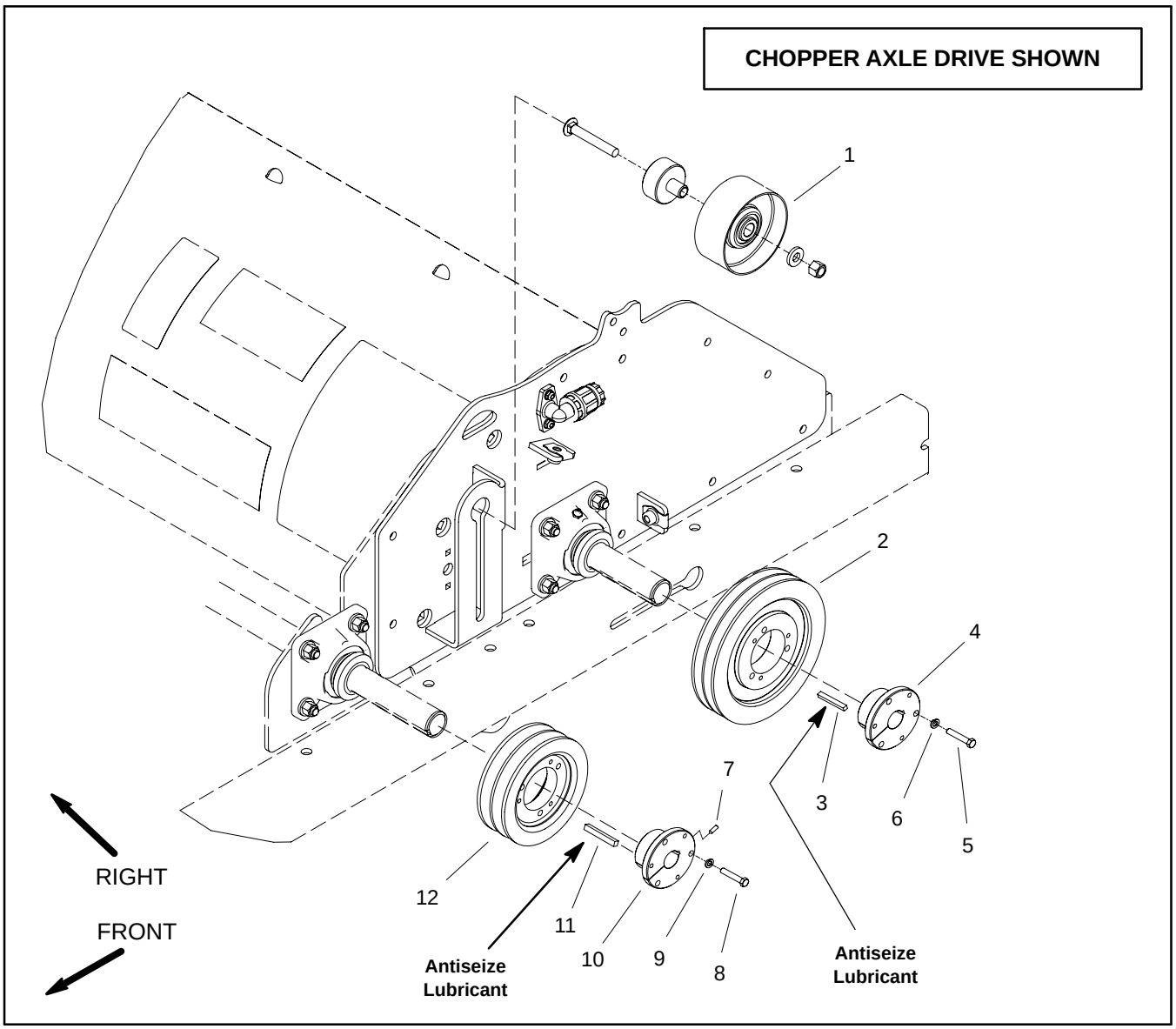


Figure 7

1. **Idler pulley**
2. **Pulley**
3. **Square key**
4. **Taper lock bushing**
5. **Cap screw (3 used)**
6. **Lock washer (3 used)**
7. **Set screw (if equipped)**
8. **Cap screw (3 used)**
9. **Lock washer (3 used)**
10. **Taper lock bushing**
11. **Square key**
12. **Pulley**

The ProCore Processor uses several pulley assemblies to drive the jack shaft, chopper axle, brush shaft and rotating corner shaft. Service of these pulley assemblies requires similar procedures.

Due to pulley design, the location of the pulley assembly on a shaft is adjustable. Before loosening the pulley assembly, measure the distance from the end of the shaft to the bushing location. During the assembly procedure, use this measurement to provide the initial location of the pulley assembly on the shaft. Final pulley location should be determined after the drive belt is installed on the pulleys by carefully aligning the drive and driven pulleys. Position of drive and driven pulleys is also dependant on idler pulley location.

Disassembly (Fig. 7)

1. Remove drive belt from pulley(s) to be serviced (refer to service information for specific drive assembly that exists later in this section).

2. Remove three (3) cap screws and lock washers that secure taper lock bushing to pulley.

IMPORTANT: When loosening taper lock bushing, tighten cap screws progressively and evenly. Excessive or unequal pressure on the cap screws can break the taper lock bushing flange.

3. Insert removed cap screws into threaded removal holes of the bushing. Tighten screws progressively and evenly until the pulley is loose on the bushing.

4. If bushing is equipped with a set screw, loosen set screw that secures taper lock bushing to shaft.

5. Remove bushing and pulley from the shaft.

6. Locate and retrieve square key that locates bushing on shaft.

Assembly (Fig. 7)

1. Clean shaft that pulley is to be installed. Apply anti-seize lubricant to square key and place key into shaft slot.

2. Make sure that tapered surfaces of pulley and taper lock bushing are thoroughly clean (no oil, grease, dirt, rust, etc.).

3. Slide pulley and taper lock bushing onto shaft. The pulley should be positioned to the inside of the taper lock bushing. Make sure that tapered surfaces of pulley and bushing align.

4. Align threaded holes of pulley with non-threaded holes of bushing. Loosely install three (3) cap screws with lock washers to bushing and pulley assembly.

IMPORTANT: DO NOT fully tighten taper lock bushing cap screws until after the drive belt is installed and the pulleys are properly aligned.

5. Install drive belt to drive and driven pulleys.

6. Using a straight edge across the face of the drive pulley, verify drive belt alignment across drive and driven pulleys. Move pulley being installed so that drive belt and straight edge are aligned indicating correct position of pulley on shaft.

IMPORTANT: When tightening taper lock bushing cap screws, tighten in three (3) equal steps and in a circular pattern to prevent bushing flange damage.

7. Tighten three (3) cap screws in three (3) equal steps and in a circular pattern to secure pulley and taper lock bushing to shaft.

   A. Torque 1/4 - 20 cap screws from **80 to 88 in-lb (9.1 to 9.9 N-m)**.

   B. Torque 5/16 - 18 cap screws from **182 to 198 in-lb (20.6 to 22.3 N-m)**.

   C. Torque 3/8 - 16 cap screws from **333 to 387 in-lb (38 to 43 N-m)**.

8. Using a straight edge, check that belt alignment is still correct. If needed, loosen taper lock bushing and adjust pulley location on shaft.

9. If bushing is equipped with a set screw, tighten set screw.

10. Make sure that drive belt is properly tensioned and that idler pulley alignment to drive belt is checked (refer to service information for specific drive assembly that exists later in this section).

Flange Bearing Service

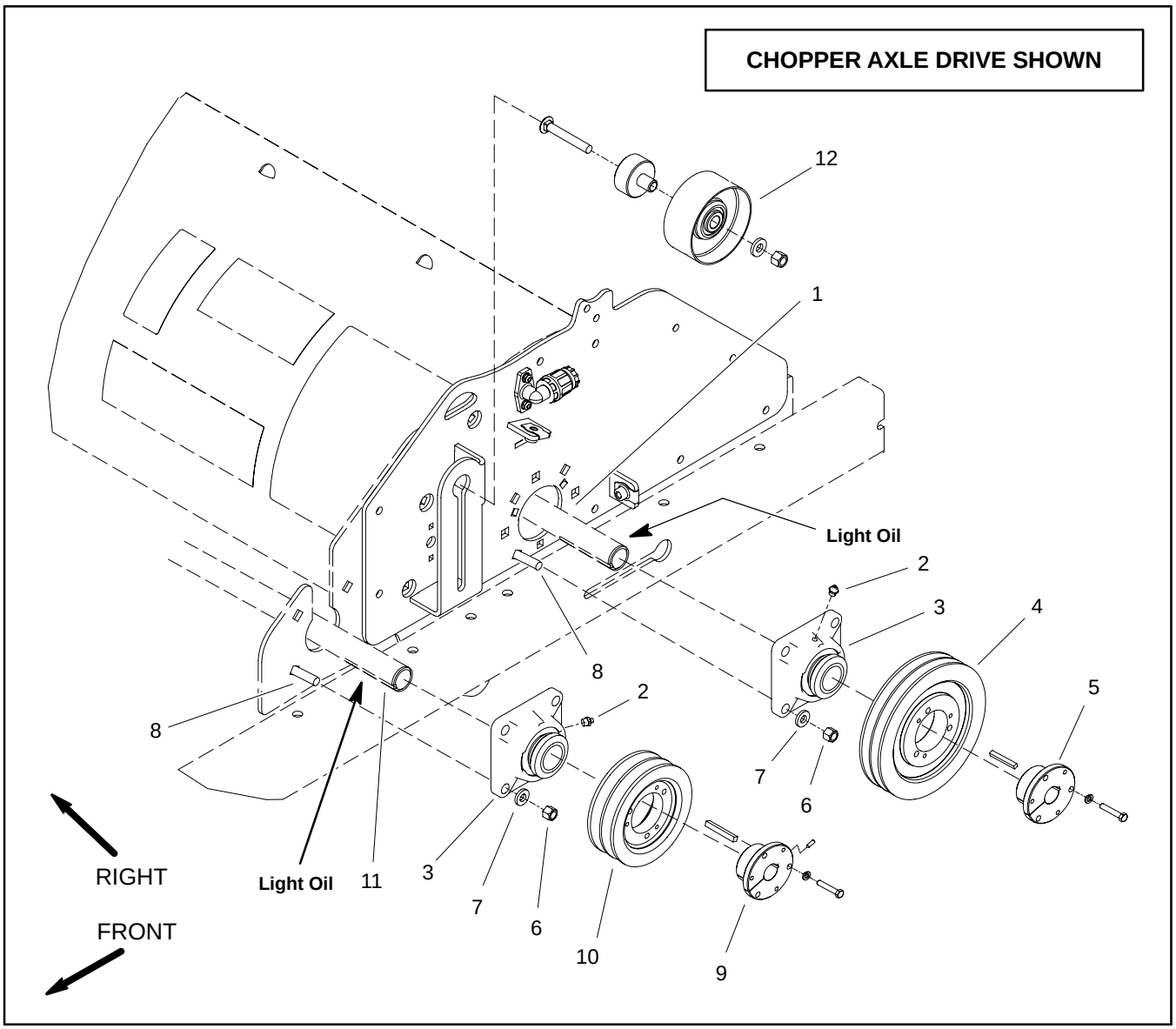


Figure 8

1. **Shaft (chopper axle shown)**
2. **Grease fitting**
3. **Flange bearing**
4. **Pulley**
5. **Taper lock bushing**
6. **Lock nut (4 used per bearing)**
7. **Flat washer (4 used per bearing)**
8. **Screw (4 used per bearing)**
9. **Taper lock bushing**
10. **Pulley**
11. **Shaft (jack shaft shown)**
12. **Idler pulley**

The ProCore Processor jack shaft, chopper axle and brush shaft all use two (2) of the same flange bearings for support. Removal and installation of these bearings requires the same procedure.

Flange Bearing Removal (Fig. 8)

1. Remove drive belt and pulley from shaft (refer to service information for specific drive assembly that exists later in this section).

2. Loosen three (3) set screws that secure flange bearing collar to shaft.

3. Note location of grease fitting so bearing can be properly orientated during installation.

4. Remove four (4) lock nuts, flat washers and screws that secure bearing to machine frame.

5. Slide flange bearing from shaft.

Flange Bearing Installation (Fig. 8)

1. Thoroughly clean shaft surface. If necessary, remove nicks or burrs on shaft with emery cloth or fine file.

2. Lubricate the shaft surface with light oil.

3. Slide bearing onto shaft. Position bearing so grease fitting is properly orientated.

4. Tighten three (3) set screws in bearing so that they are finger tight. Bearing should slide on shaft with some resistance.

5. Secure bearing to machine frame with removed fasteners.

6. Position the bearing collar so that a set screw is directly opposite the split in the sleeve (Fig. 9). Tighten three (3) bearing set screws using the following steps:

   A. Starting with the set screw that is opposite from the split in the sleeve, tighten set screws 1/4 turn.

   B. Again, starting with the set screw that is opposite from the split in the sleeve, tighten set screws an additional 1/4 turn.

   C. Finally, starting with the set screw that is opposite from the split in the sleeve, torque set screws **66 in-lb (7.5 N-m)**.

NOTE: A replacement flange bearing includes an allen wrench and torque indicator that can be used to properly torque bearing set screws (Fig. 9). When tightening set screws, the torque is correct when the long end of the allen wrench contacts the torque indicator.

7. Install pulley and drive belt to shaft (refer to service information for specific drive assembly that exists later in this section).

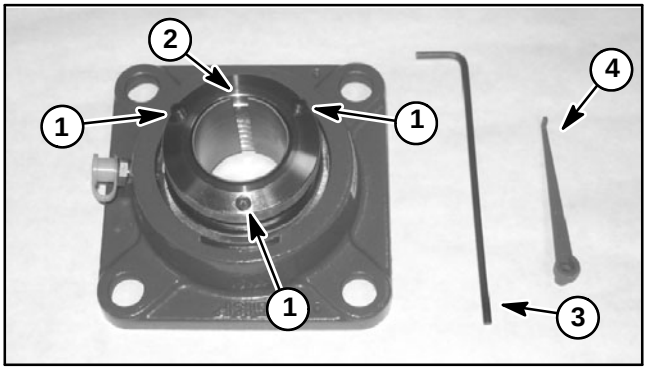


Figure 9

1. **Set screw**
2. **Split in sleeve**
3. **Allen wrench**
4. **Torque indicator**

Jack Shaft Assembly

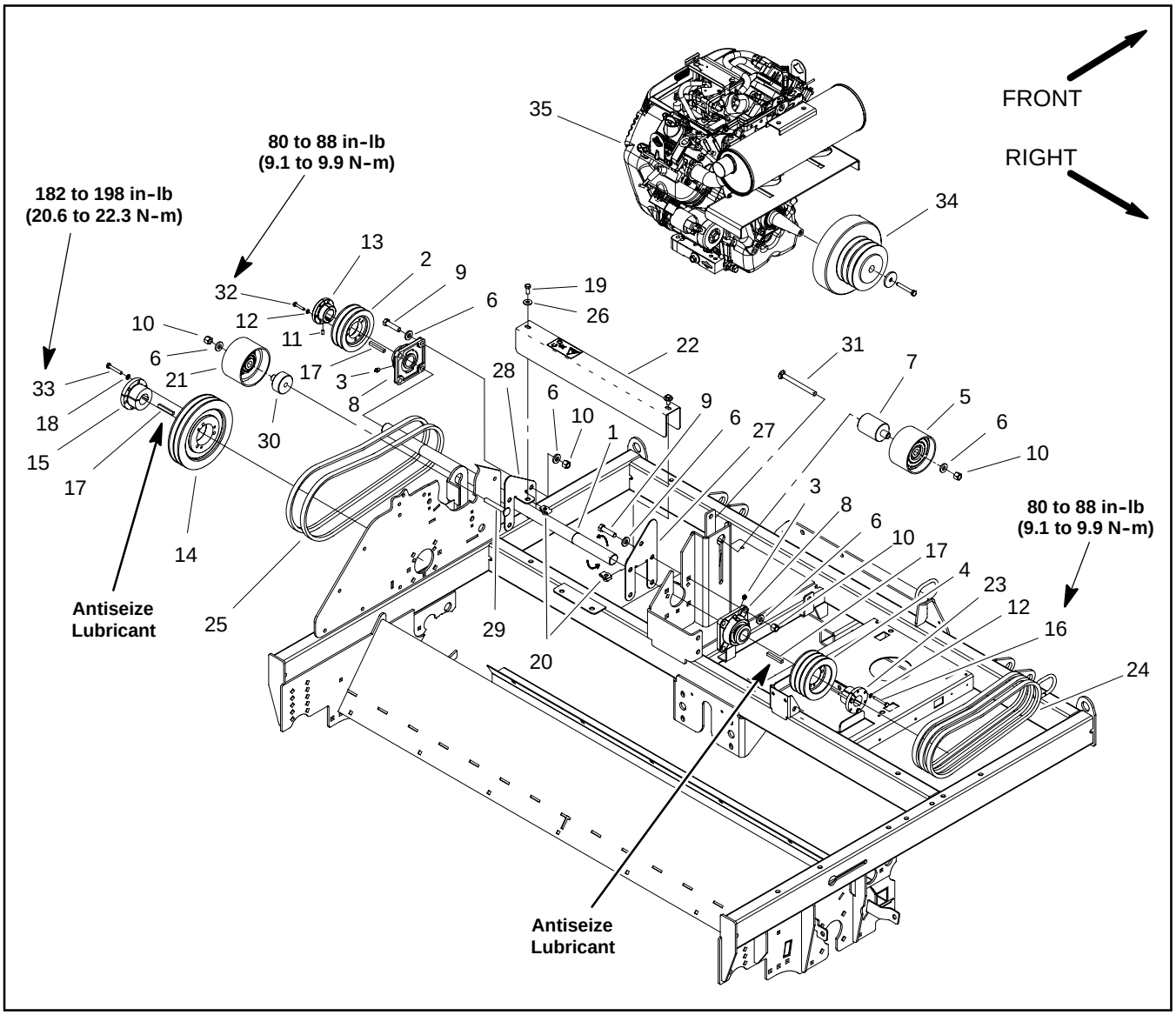


Figure 10

1. Jack shaft
2. Pulley
3. Grease fitting
4. Pulley
5. Idler pulley
6. Flat washer
7. Standoff
8. Flange bearing
9. Cap screw (8 used)
10. Lock nut
11. Set screw
12. Lock washer (3 used per bushing)
13. Taper lock bushing
14. Pulley
15. Taper lock bushing
16. Cap screw (3 used per bushing)
17. Square key
18. Lock washer (3 used per bushing)
19. Cap screw (2 used)
20. Tinnerman nut
21. Idler pulley
22. Jack shaft cover
23. Taper lock bushing
24. Drive belt set
25. Drive belt set
26. Flat washer (2 used)
27. RH cover mount
28. LH cover mount
29. Carriage screw
30. Standoff
31. Carriage screw
32. Cap screw (3 used per bushing)
33. Cap screw (3 used per bushing)
34. Centrifugal clutch
35. Engine

Drive for the jack shaft is delivered from the engine mounted centrifugal clutch to a three sheave pulley on the jack shaft. A matched set of three (3) B-section belts drives the jack shaft. The jack shaft drives the chopper axle with a matched set of two (2) B-section drive belts. Adjustable idler pulleys maintain belt tension.

Removal (Fig. 10)

1. Park ProCore Processor on a level surface with the Processor fully lowered. Make sure that Processor engine is off. Remove key from the ignition switch. Chock wheels to prevent movement of the machine.

2. Remove belt covers from both sides of jack shaft (see Drive Belt Covers in this section).

3. On both ends of jack shaft, remove drive belts from pulleys:

   A. Loosen lock nut that secures drive belt idler pulley. Position idler pulley away from drive belts.

   B. Carefully remove drive belts from pulley on jack shaft.

4. Remove pulley and taper lock bushing from both ends of jack shaft (see Pulley Assembly Service in this section).

5. Remove jack shaft cover (item 22) from machine. Make sure that tinnerman nuts remain positioned correctly on cover mount brackets for assembly purposes.

6. Support jack shaft to prevent it from shifting or falling.

7. On both ends of jack shaft, remove bearing:

   A. Loosen three (3) set screws that secure bearing collar to jack shaft.

   B. Note location of grease fitting on jack shaft bearing so bearing can be properly orientated during installation.

   C. Remove four (4) cap screws, eight (8) flat washers and four (4) lock nuts that secure jack shaft flange bearing to frame. Remove cover mount (items 27 and 28).

   D. Slide bearing from jack shaft.

8. Remove jack shaft from machine.

NOTE: If centrifugal clutch removal is necessary, refer to Centrifugal Clutch Removal in the Service and Repairs section of Chapter 3 – Engine.

Installation (Fig. 10)

1. Clean both ends of jack shaft and apply a light film of oil to shaft ends.

2. Position jack shaft to machine frame.

3. Slide flange bearing onto each end of jack shaft. Do not tighten set screws in bearings.

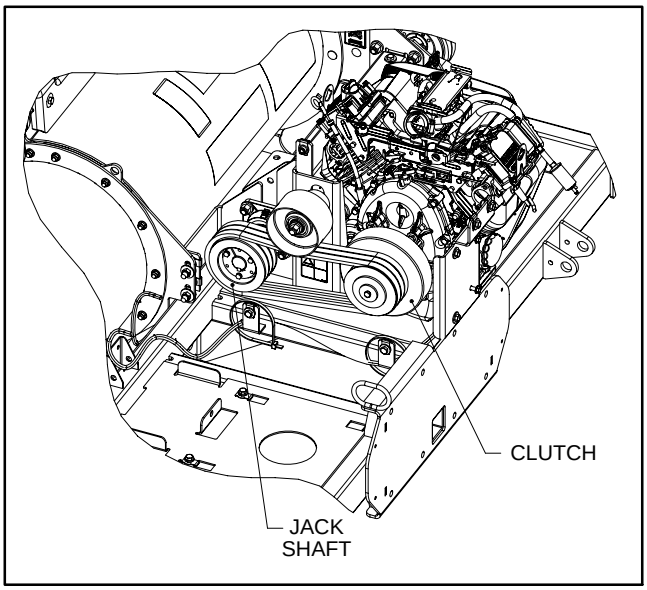


Figure 11

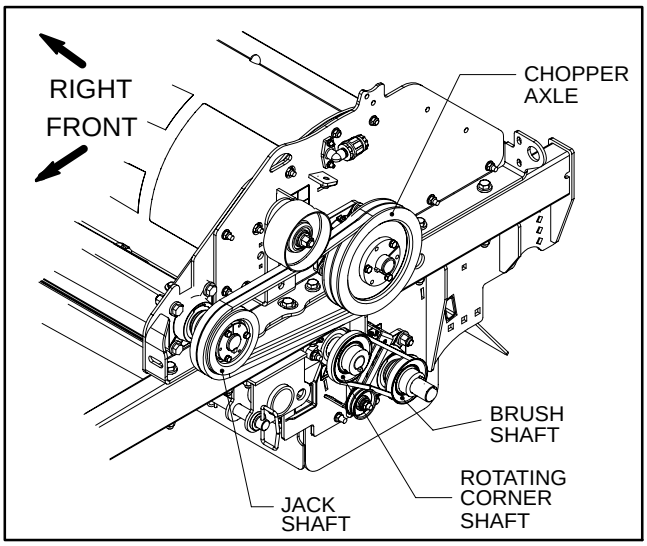


Figure 12

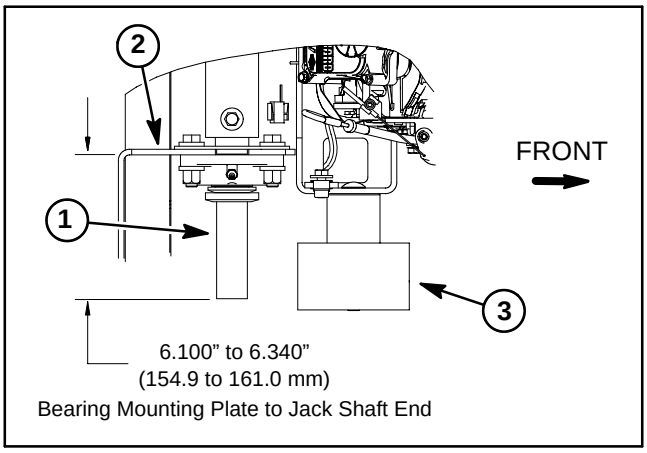


Figure 13

1. **Jack shaft**
2. **Bearing mounting plate**
3. **Idler pulley**

4. Position cover mounts (items 27 and 28) to frame. Align bearing flanges and cover mounts to frame. Secure bearings and mounts to frame with four (4) cap screws, eight (8) flat washers and four (4) lock nuts.

5. Rotate jack shaft a few times to align bearings. Position jack shaft so that end of jack shaft on drive side (clutch side) extends 6.100” to 6.340” (154.9 to 161.0 mm) from bearing mounting plate (Fig. 13).

6. Secure jack shaft in bearings (see Flange Bearing Service in this section).

IMPORTANT: When installing pulleys and drive belts, make sure to properly align drive, driven and idler pulleys.

NOTE: When installing pulley on right end of jack shaft (driven side), align pulley and drive belt with drive pulley on centrifugal clutch. When installing pulley on left end of jack shaft (drive side), align pulley and drive belt with driven pulley on chopper axle.

7. Install square key, pulley, taper lock bushing and drive belt to both ends of jack shaft (see Pulley Assembly Service in this section).

8. Adjust drive belt idler pulleys to achieve proper tension on drive belts (see Operator’s Manual).

IMPORTANT: After adjusting belt tension, check that distance from idler pulley face to the faces of the drive and driven pulleys is correct (Figs. 14 and 15). This distance is necessary to ensure that idler pulley is correctly aligned to drive belts. If necessary, re-adjust positions of drive and driven pulleys to allow correct distance.

9. Secure jack shaft cover (item 22) to machine.

10. Install belt covers (see Drive Belt Covers in this section).

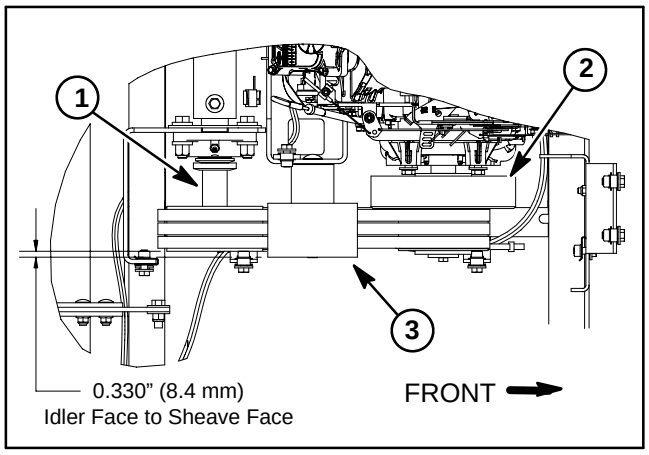


Figure 14

1. **Jack shaft**
2. **Centrifugal clutch**
3. **Idler pulley**

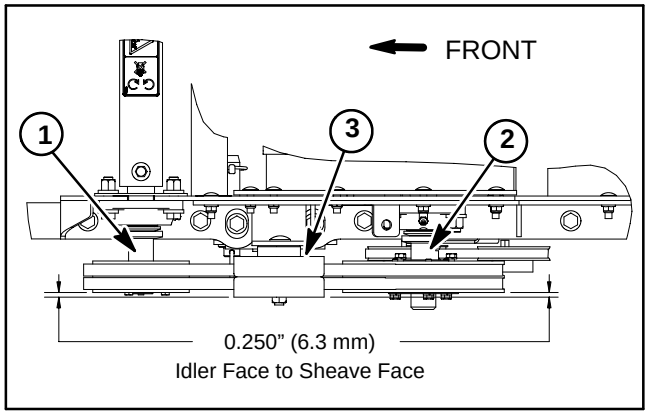


Figure 15

1. **Jack shaft**
2. **Chopper axle**
3. **Idler pulley**

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Chopper Axle Service

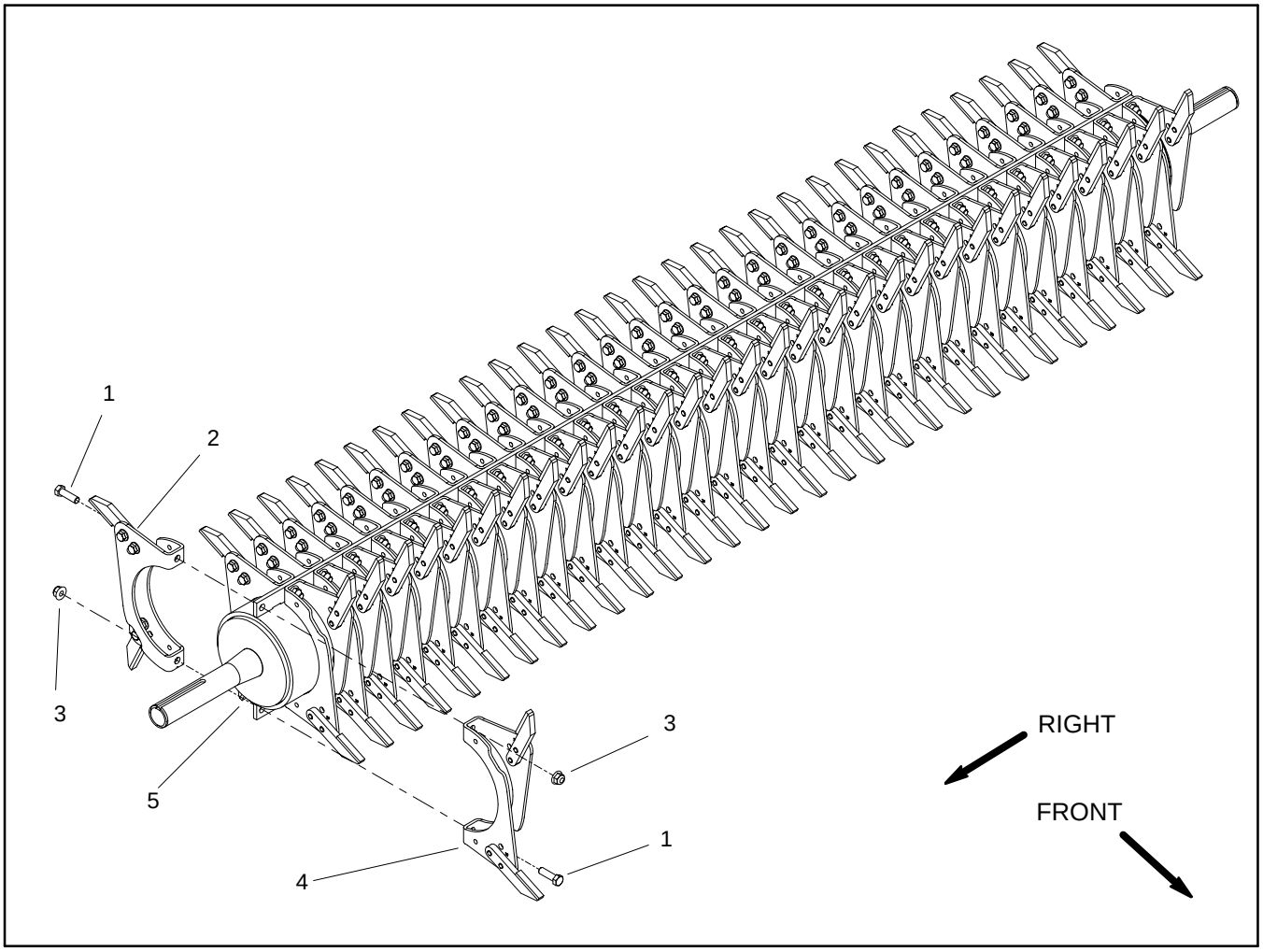

Figure 16

1. **Cap screw (62 used)**
2. **LH blade assembly (31 used)**
3. **Lock nut (62 used)**
4. **RH blade assembly (31 used)**
5. **Chopper axle**

Chopper tips and blade assemblies can be removed and installed with the chopper axle mounted in the machine.

Disassembly (Figs. 16 and 17)

1. Park ProCore Processor on a level surface with the Processor fully lowered. Make sure that Processor engine is off. Remove key from the ignition switch. Chock wheels to prevent movement of the machine.

NOTE: The RH and LH blade assembly use the same blade but differ in which holes are used to mount the chopper tip to the blade (Fig. 18). Blades that have the chopper tips mounted toward the right side of the machine are RH assemblies. Blades that have the chopper tips mounted toward the left side of the machine are LH assemblies (shown in Fig. 17). Before removing chopper tip from blade, note which blade holes are used for proper attachment of chopper tip.

NOTE: The screws used to secure chopper tip to blade have a patch lock. To ease screw removal, apply heat to thread area of chopper tip while removing screw.

NOTE: If a screw used to secure chopper tip to blade has broken, remove chopper blade from chopper axle. Make a slot in the screw end that protrudes beyond the chopper tip. Apply heat to thread area of chopper tip and use a flat blade screwdriver to remove the broken screw.

2. To remove chopper tip(s) from blade, use a ratcheting box wrench to remove two (2) screws that secure tip to blade.

3. To remove chopper blades from chopper axle, remove two (2) cap screws and lock nuts that secure right and left blade assemblies to axle. Remove blade assemblies. Note that notch on both blades align (Fig. 18).

Assembly (Figs. 16 and 17)

1. Inspect threads of chopper tip(s). If necessary, clean threads in tip(s) with a 5/16 – UNC tap.

IMPORTANT: Due to the patch lock feature of the screws used to secure the chopper tips to the blade, it is recommended to replace the screws after disassembly. An alternative would be to apply Loctite #242 (or equivalent) to the threads of the original screws before assembly.

2. Secure chopper tip(s) to correct holes of chopper blade with two (2) screws. Torque screws from **270 to 330 in-lb (31 to 37 N-m)**.

3. If blades were removed from axle, secure RH and LH chopper blades to chopper axle with two (2) cap screws and lock nuts. Make sure that notch on both blades align (Fig. 18).

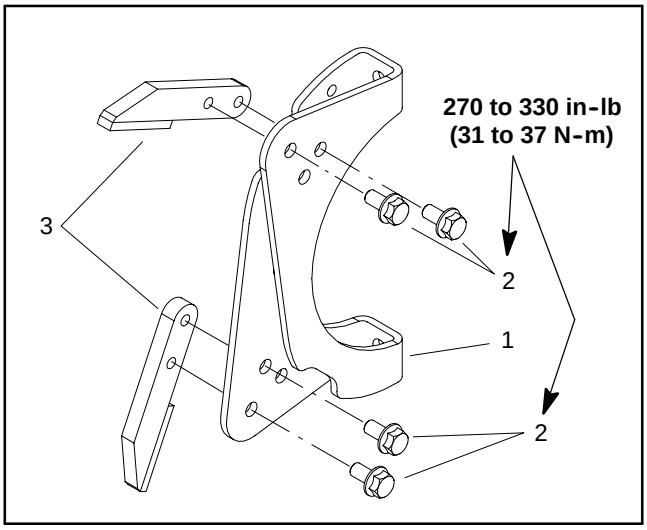

Figure 17

1. **Blade (LH shown)**
2. **Screw with patch lock**
3. **Chopper tip**

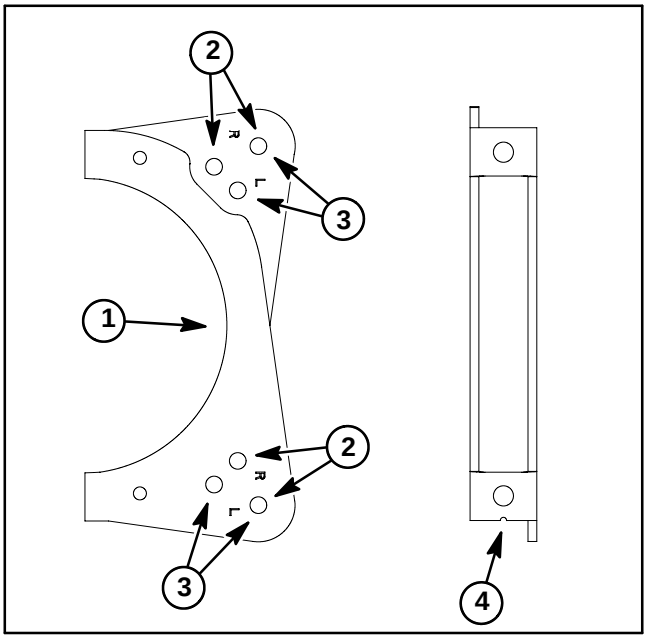

Figure 18

1. **Blade**
2. **Holes for RH blade**
3. **Holes for LH blade**
4. **Alignment notch**

Chopper Axle Assembly

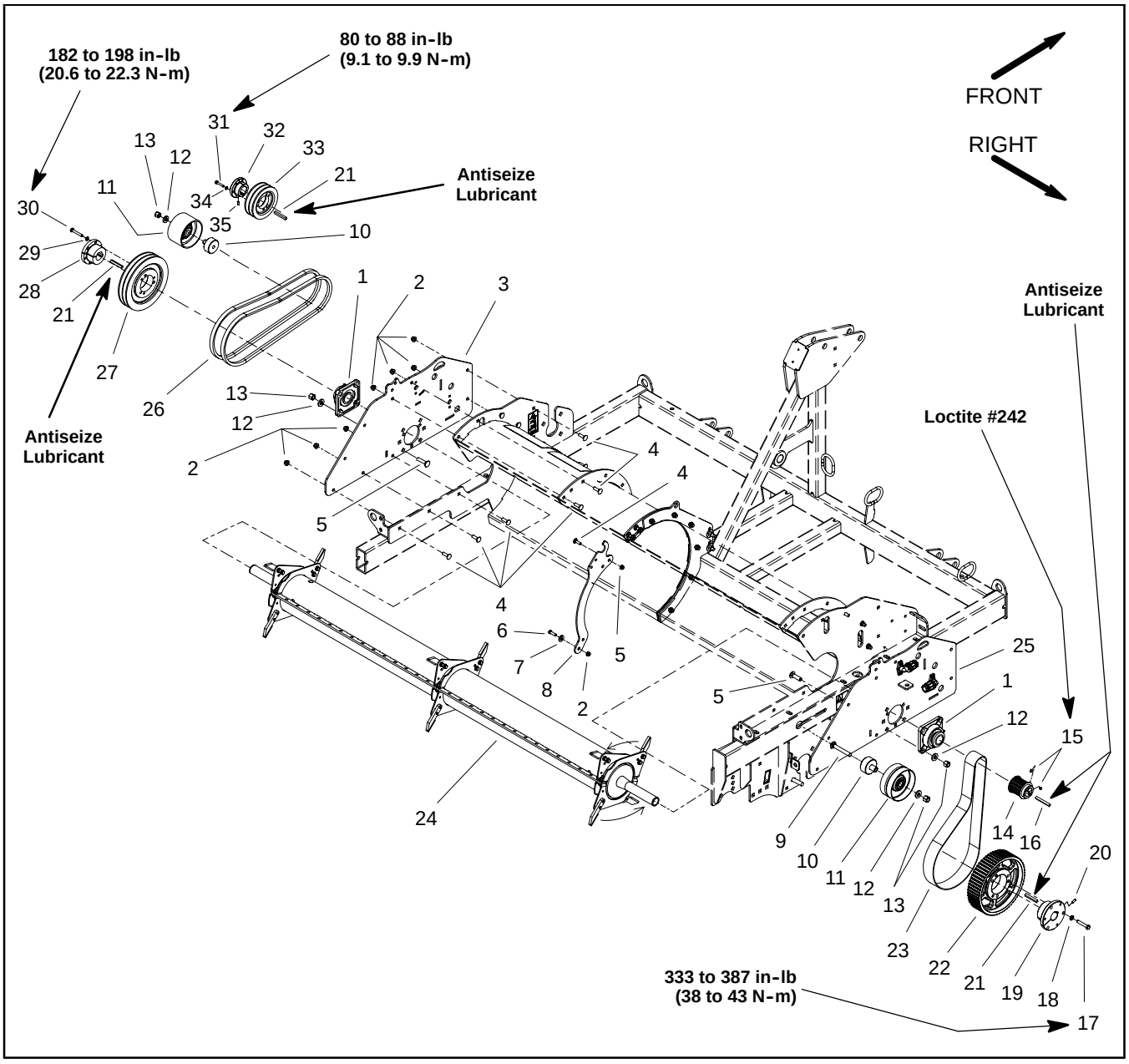

Figure 19

1. Flange bearing
2. Flange nut
3. LH end plate
4. Carriage screw
5. Carriage screw (4 used per bearing)
6. Cap screw (2 used)
7. Flat washer (2 used)
8. Reinforcing ring
9. Carriage screw
10. Standoff
11. Idler pulley
12. Flat washer
13. Lock nut
14. Pulley
15. Set screw
16. Square key
17. Cap screw (3 used)
18. Lock washer (3 used)
19. Taper lock bushing
20. Set screw
21. Square key
22. Pulley
23. Drive belt
24. Chopper axle
25. RH end plate
26. Drive belt set
27. Pulley
28. Taper lock bushing
29. Lock washer (3 used)
30. Cap screw (3 used)
31. Cap screw (3 used)
32. Taper lock bushing
33. Pulley
34. Lock washer (3 used)
35. Set screw

Drive for the chopper axle is delivered on the left side of the machine from the jack shaft by a matched set of two (2) B-section drive belts. The right end of the chopper axle drives the brush shaft with a toothed belt. Adjustable idler pulleys maintain belt tension on the drive belts.

Removal (Fig. 19)

1. Park ProCore Processor on a level surface with the Processor fully lowered. Make sure that Processor engine is off. Remove key from the ignition switch. Chock wheels to prevent movement of the machine.

2. Remove rear cover from machine (see Rear Cover Removal in this section).

3. Remove belt covers from both sides of chopper axle (Figs. 20 and 21) (see Drive Belt Covers in this section).

4. On both sides of machine, remove drive belts from chopper axle pulleys:

   A. Loosen lock nut that secures drive belt idler pulley. Position idler pulley away from drive belt(s).

   B. Carefully remove drive belt(s) from pulley on chopper axle.

5. Remove pulley and taper lock bushing from left end of chopper axle (see Pulley Assembly Service in this section).

6. Remove two (2) set screws that secure pulley (item 14) to right end of chopper axle. Slide pulley from shaft. Locate and retrieve square key (item 16).

7. Remove four (4) screws, washers and lock nuts that secure reinforcing ring (item 8) to chopper housing (Fig. 22). Remove reinforcing ring.

CAUTION

To prevent personal injury, make sure that chopper assembly is properly supported as it is removed from the machine. Chopper assembly weighs approximately 125 pounds (57 kg).

8. Support chopper assembly to prevent it from shifting or falling.

9. On both sides of machine, remove bearing and endplate:

   A. Loosen three (3) set screws that secure bearing collar to chopper axle.

   B. Remove seven (7) carriage screws and flange nuts that secure endplate to machine frame.

   C. Slide bearing and endplate from chopper axle and frame.

   D. If necessary, remove bearing from bearing plate.

10. Label right and left side of the chopper assembly for installation purposes. Remove chopper assembly from machine by lifting it up and toward the rear of the machine.

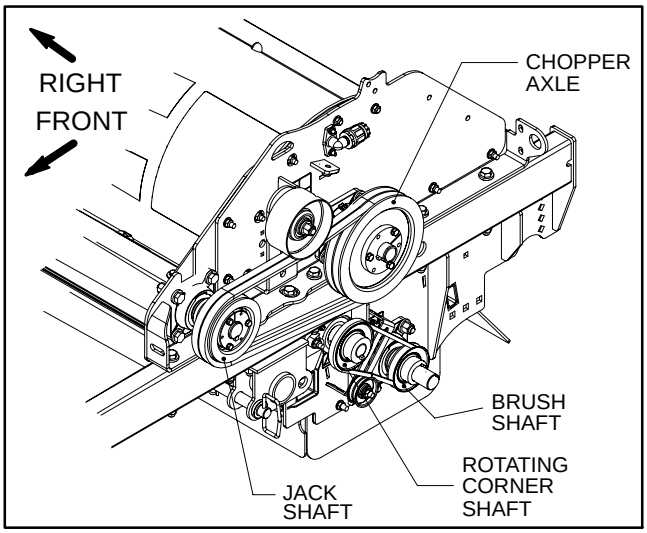

Figure 20

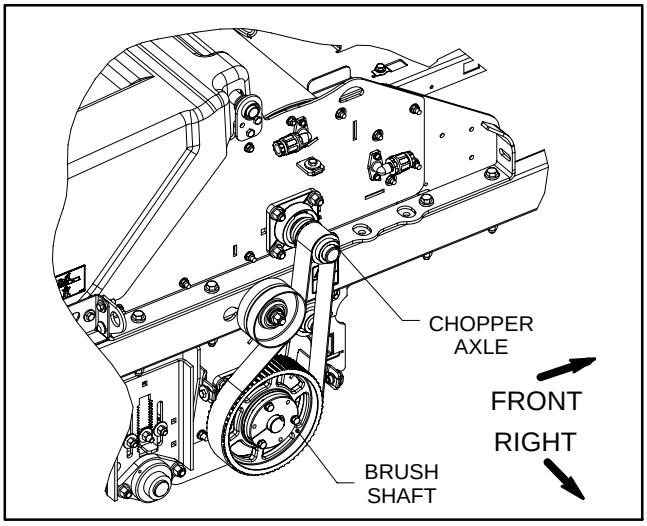

Figure 21

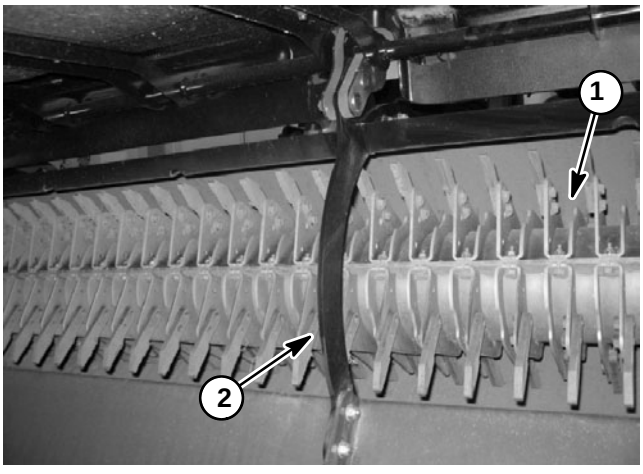

Figure 22

1. Chopper axle
2. Reinforcing ring

Installation (Fig. 19)

CAUTION

To prevent personal injury, make sure that chopper assembly is properly supported as it is installed to the machine. Chopper assembly weighs approximately 125 pounds (57 kg).

1. Install chopper assembly into machine from the rear of the machine. Clean chopper axle ends and apply a light film of oil to shaft ends.

2. On both sides of machine, install bearing and endplate:

   A. If removed, attach bearing to endplate with four (4) carriage screws, flat washers and lock nuts.

   B. Slide endplate with bearing onto chopper axle.

   C. Align holes in endplate and machine frame. Secure endplate in position with seven (7) carriage screws and flange nuts.

3. Rotate chopper assembly a few times and center chopper between bearings. Secure chopper axle in bearings (see Flange Bearing Service in this section).

4. Position reinforcing ring (item 8) to chopper housing and secure with removed fasteners (Fig. 22).

IMPORTANT: When installing pulleys and drive belts, make sure to properly align drive, driven and idler pulleys.

NOTE: When installing pulley on left end of chopper axle, align pulley and drive belts with drive pulley on jack shaft.

5. Install square key, pulley, taper lock bushing and drive belts to left end of chopper axle (see Pulley Assembly Service in this section).

6. Install square key, sprocket and drive belt to right end of chopper axle:

   A. Apply antiseize lubricant to square key and place key in chopper axle slot.

   B. Slide sprocket onto chopper axle. Do not tighten set screws in sprocket.

IMPORTANT: Make sure that brush shaft and chopper axle are properly aligned as drive belt is installed (Fig. 23). Improper alignment will decrease machine performance and may lead to increased debris buildup in Processor that can cause accelerated component wear and damage.

C. Rotate chopper axle so that a row of chopper tips is aligned with the brush housing corner. Rotate brush shaft so that one of the brush tips is aligned with the rotating corner shaft (Fig. 23).

D. After positioning chopper axle and brush shaft, install drive belt to sprocket on chopper axle and driven pulley on brush shaft. Keep shafts properly aligned as drive belt is installed.

NOTE: When positioning pulley onto the right end of chopper axle, align pulley and belt with driven pulley on brush shaft.

E. Using a straight edge across the face of the brush shaft driven pulley, move sprocket on chopper axle so that drive belt and straight edge are aligned indicating correct position of sprocket.

F. Apply Loctite #242 (or equivalent) to threads of set screws (item 15). Install and tighten set screws into sprocket to secure sprocket to chopper axle.

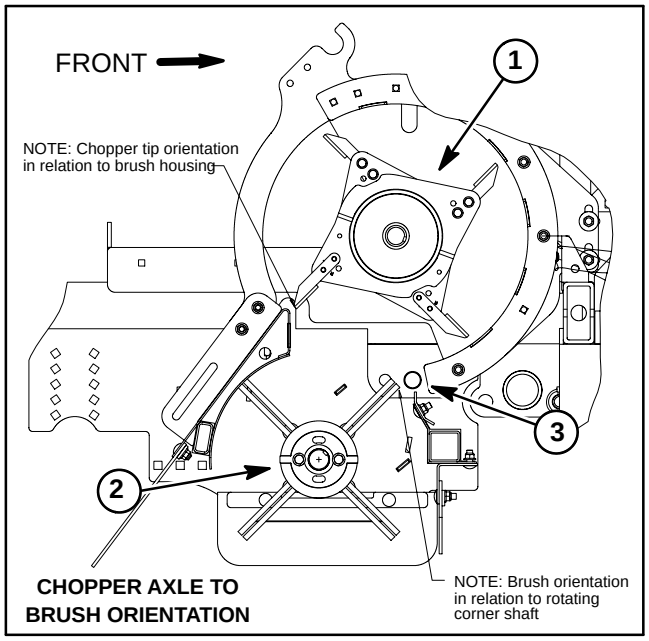

Figure 23

1. **Chopper axle**
2. **Brush shaft**
3. **Rotating corner shaft**

7. Adjust drive belt idler pulleys to achieve proper tension on drive belts (see Operator's Manual). After adjustment, make sure that chopper axle and brush shaft are still properly aligned (Fig. 23).

IMPORTANT: After adjusting belt tension, check that distance from idler pulley face to the faces of the drive and driven pulleys is correct (Figs. 24 and 25). This distance is necessary to ensure that idler pulley is correctly aligned to drive belts. If necessary, re-adjust positions of drive and driven pulleys to allow correct distance.

8. Install belt covers (see Drive Belt Covers in this section).

9. Install rear cover to machine (see Rear Cover Installation in this section).

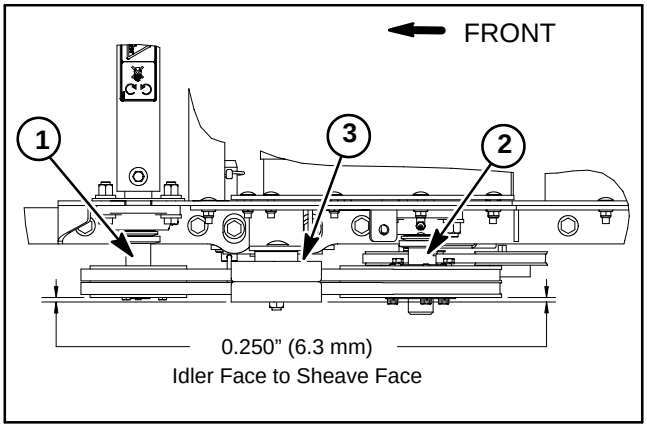

Figure 24

1. **Jack shaft**
2. **Chopper axle**
3. **Idler pulley**

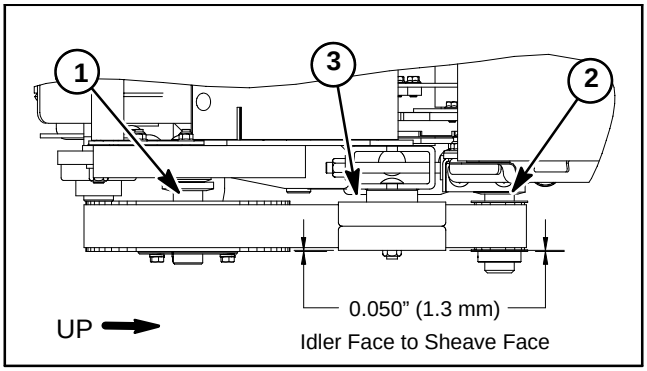

Figure 25

1. **Brush shaft**
2. **Chopper axle**
3. **Idler pulley**

Brush Assembly

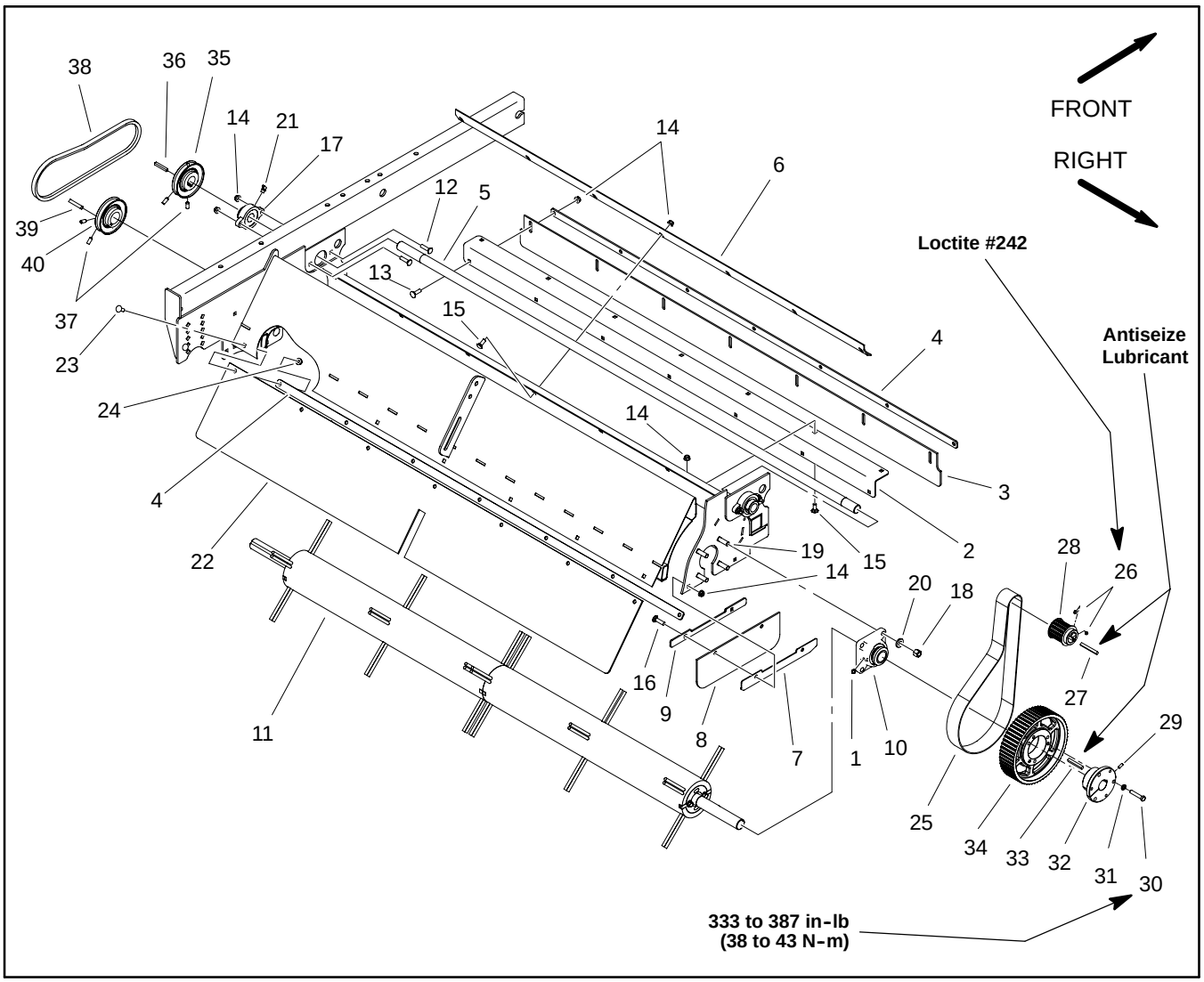

Figure 26

1. Grease fitting
2. Front angle
3. Front rubber shield
4. Skirt plate
5. Rotating corner shaft
6. Scraper plate
7. Angle plate (2 used)
8. Side shield (2 used)
9. Side skirt plate (2 used)
10. Flange bearing (2 used)
11. Brush assembly
12. Carriage screw (2 used per bearing)
13. Carriage screw (7 used)
14. Flange nut (29 used)
15. Carriage screw (14 used)
16. Carriage screw (4 used)
17. Bearing (2 used)
18. Lock nut (4 used per bearing)
19. Carriage screw (4 used per bearing)
20. Flat washer (4 used per bearing)
21. Grease fitting
22. Rubber scraper cover
23. Carriage screw (7 used)
24. Flange nut (7 used)
25. Drive belt
26. Set screw
27. Square key
28. Pulley (chopper axle)
29. Set screw
30. Cap screw (3 used)
31. Lock washer (3 used)
32. Taper lock bushing
33. Square key
34. Pulley
35. Pulley (rotating corner shaft)
36. Square key
37. Set screw (2 used per pulley)
38. Drive belt
39. Square key
40. Pulley (brush shaft)

Drive for the brush shaft is delivered on the right side of the machine from the chopper axle by a toothed belt. The left end of the brush shaft drives the rotating corner shaft with an A–section drive belt. Adjustable idler pulleys maintain belt tension.

Removal (Fig. 26)

1. Have ProCore Processor attached to tow vehicle and park machines on a level surface with the Processor fully lowered. Engage vehicle parking brake, stop engine and remove key from the ignition switch. Make sure that ProCore Processor engine is off. Chock wheels to prevent movement of either machine.

2. Remove belt covers from both sides of brush shaft (Figs. 27 and 28) (see Drive Belt Covers in this section).

3. On both sides of machine, remove drive belts from brush shaft pulleys:

A. Loosen lock nut that secures drive belt idler pulley. Position idler pulley away from drive belt.

B. Carefully remove drive belt from pulley on brush shaft.

4. Remove pulley and taper lock bushing from both ends of brush shaft (see Pulley Assembly Service in this section).

5. On both sides of machine, remove two (2) flange nuts and carriage screws that secure side shield (item 8) to frame. Remove shield, angle plate (item 7) and side skirt plate (item 9) from both sides of machine.

6. Support brush to prevent it from shifting or falling.

7. Note location of grease fitting on brush shaft bearings so bearings can be properly orientated during installation. On each side of machine, remove four (4) carriage screws (item 19), flat washers (item 20) and lock nuts (item 18) that secure brush shaft flange bearing to brush housing.

8. Raise Processor while allowing brush assembly to remain on the ground. Support Processor to prevent it from lowering.

9. Remove brush assembly from under machine.

10. Loosen three (3) set screws that secure each flange bearing to brush shaft. Slide bearings from brush shaft.

11. Disassemble brush using Figure 29 as a guide.

Installation (Fig. 26)

1. Assemble brush using Figure 29 as a guide. Apply Permatex Blue Gel threadlocker to lower threads of cap screws (Fig. 29, item 4).

2. Clean both ends of brush shaft and apply a light film of oil to shaft ends.

3. Place brush assembly under raised Processor.

4. Slowly lower Processor to position brush assembly to brush housing.

5. Slide flange bearing onto each end of brush shaft. Do not tighten set screws in bearings.

6. Align bearing flanges to brush housing and secure with four (4) carriage screws (item 19), flat washers (item 20) and lock nuts (item 18).

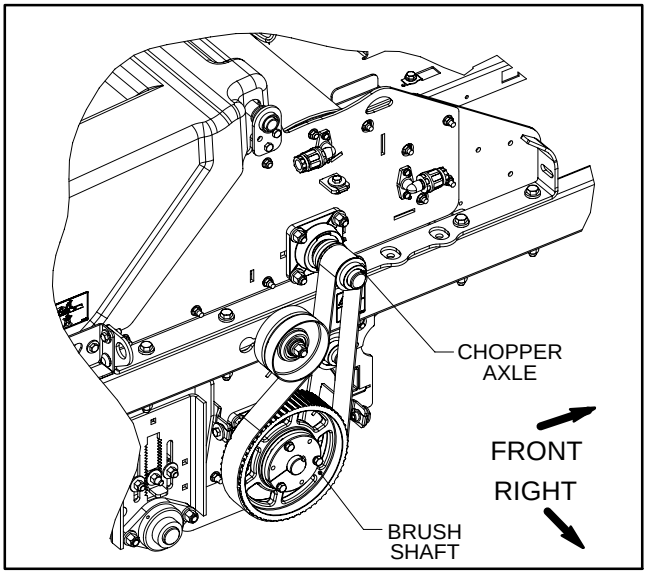

Figure 27

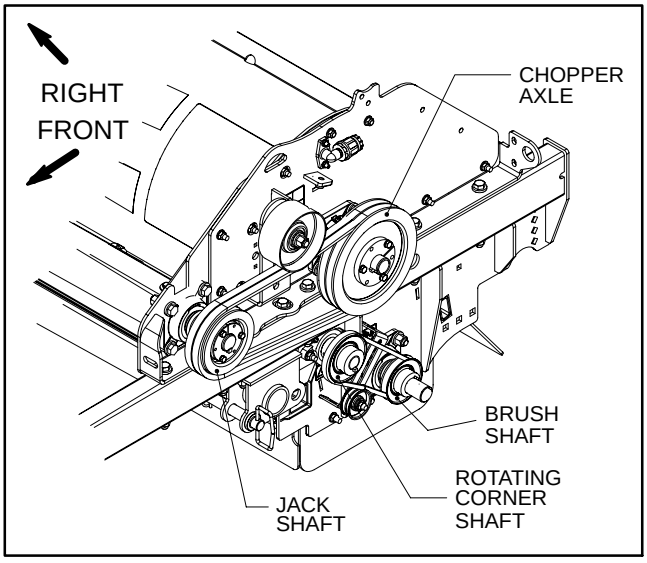

Figure 28

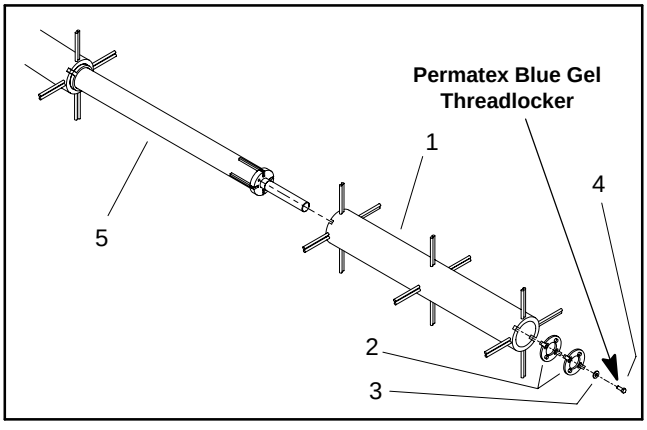

Figure 29

1. **Brush (2 used)**
2. **Brush drive (4 used)**
3. **Washer (4 used)**
4. **Cap screw (4 used)**
5. **Brush axle**

7. Raise Processor so that brush is slightly off ground. Rotate brush a few times and center brush in frame.

8. Secure brush shaft in bearings (see Flange Bearing Service in this section).

9. Rotate chopper axle so that a row of chopper tips is aligned with the brush housing corner. Rotate brush shaft so that one of the brush tips is aligned with the rotating corner shaft (Fig. 30).

IMPORTANT: When installing pulleys and drive belts, make sure to properly align drive, driven and idler pulleys.

NOTE: When installing pulley on right end of brush shaft, align pulley and drive belt with drive pulley on chopper axle.

IMPORTANT: Make sure that brush shaft and chopper axle are properly aligned as drive belt is installed on right end of brush shaft (Fig. 30). Improper alignment will decrease machine performance and may lead to increased debris buildup in Processor that can cause accelerated component wear and damage.

10. Install square key, pulley, taper lock bushing and drive belt to right end of brush shaft (see Pulley Assembly Service in this section).

NOTE: When installing pulley on left end of brush shaft, align pulley and drive belt with driven pulley on rotating corner shaft.

11. Install square key, pulley, taper lock bushing and drive belt to left end of brush shaft (see Pulley Assembly Service in this section).

12. Adjust drive belt idler pulleys to achieve proper tension on drive belts (see Operator's Manual). After adjustment, make sure that chopper axle and brush shaft are still properly aligned (Fig. 30).

IMPORTANT: After adjusting belt tension, check that distance from idler pulley face to the faces of the drive and driven pulleys is correct (Figs. 31 and 32). This distance is necessary to ensure that idler pulley is correctly aligned to drive belts. If necessary, re-adjust positions of drive and driven pulleys to allow correct distance.

13. Secure side shield (item 8), angle plate (item 7) and side skirt plate (item 9) to each side of machine with two (2) flange nuts and carriage screws.

14. Install belt covers (see Drive Belt Covers in this section).

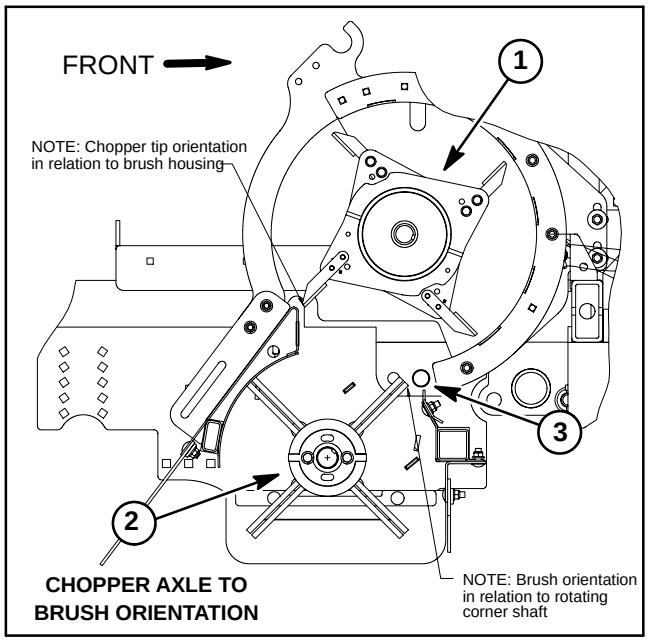

Figure 30

1. **Chopper axle**
2. **Brush shaft**
3. **Rotating corner shaft**

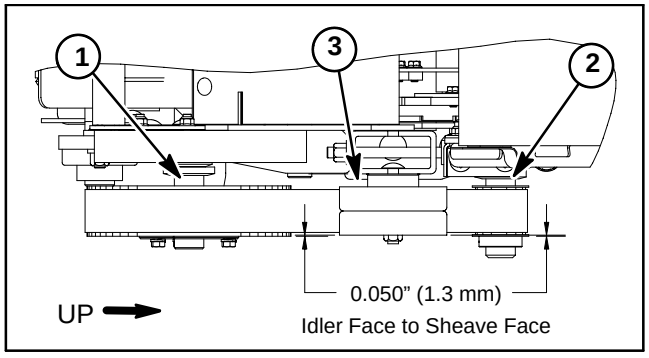

Figure 31

1. **Brush shaft**
2. **Chopper axle**
3. **Idler pulley**

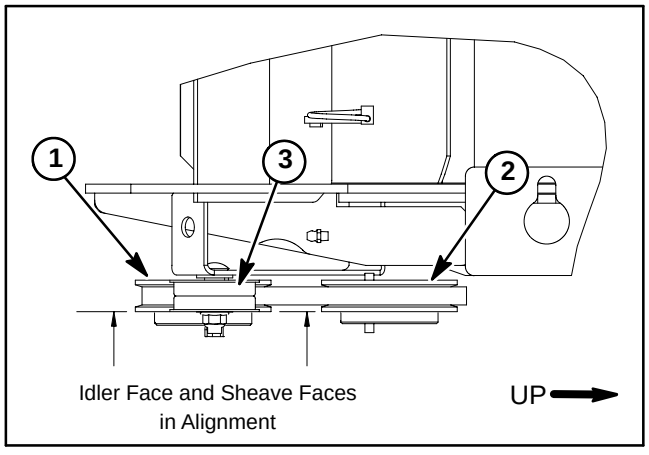

Figure 32

1. **Brush shaft**
2. **Rotating corner shaft**
3. **Idler pulley**

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Rotating Corner Shaft Assembly

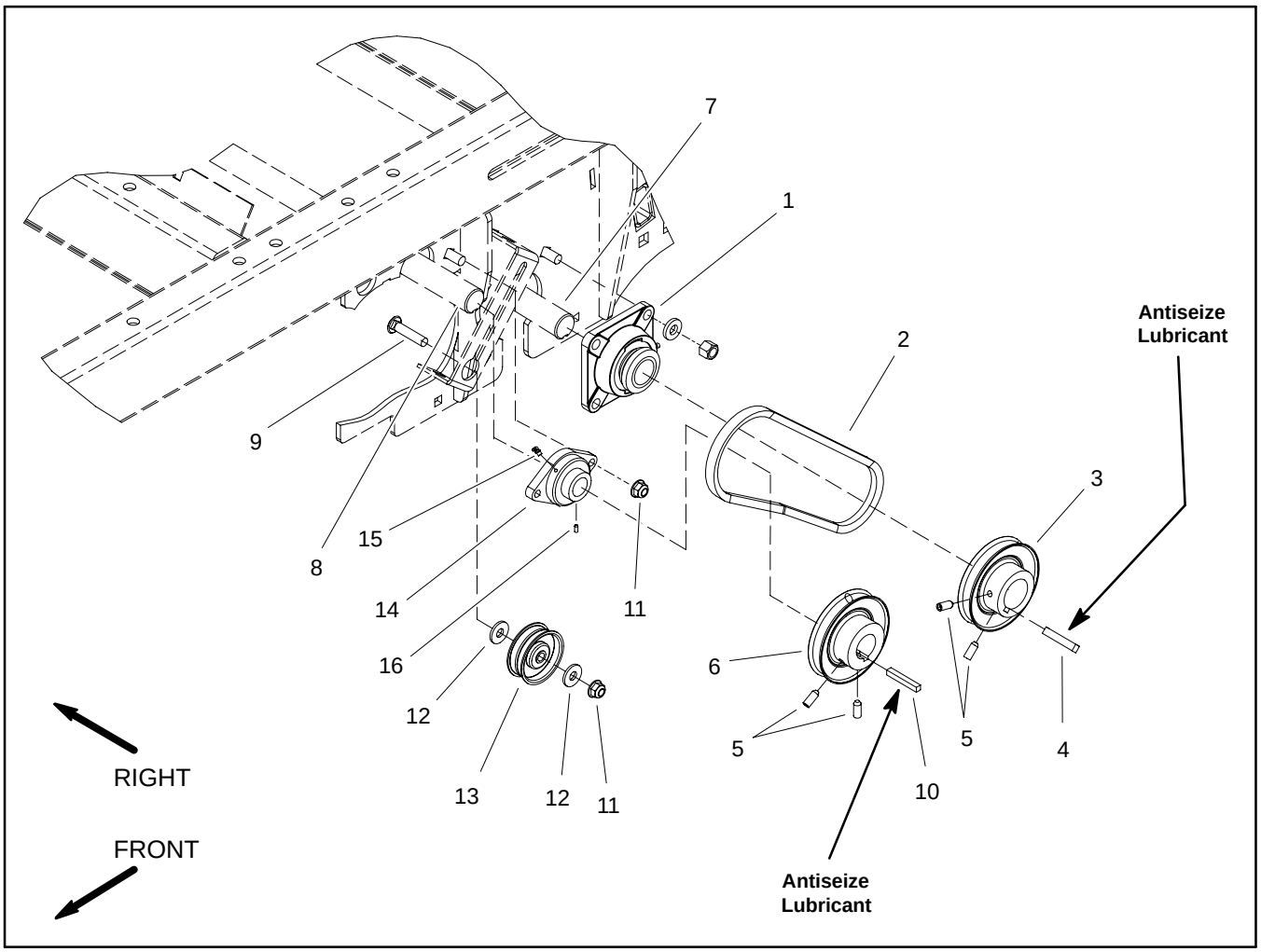

Figure 33

1. **Flange bearing**
2. **Drive belt**
3. **Pulley**
4. **Square key**
5. **Set screw**
6. **Pulley**
7. **Brush shaft**
8. **Rotating corner shaft**
9. **Carriage screw (2 used per bearing)**
10. **Square key**
11. **Flange nut (2 used per bearing)**
12. **Flat washer**
13. **Idler pulley**
14. **Flange bearing (2 used)**
15. **Grease fitting**
16. **Set screw**

The rotating corner shaft prevents core material from accumulating in the corner of the brush housing. An adjustable scraper plate exists in the brush housing to prevent debris buildup on the corner shaft.

Drive for the rotating corner shaft is delivered on the left side of the machine from the brush shaft by an A section belt. An adjustable idler pulley maintains belt tension.

Removal (Fig. 33)

1. Park ProCore Processor on a level surface with the Processor fully lowered. Make sure that Processor engine is off. Remove key from the ignition switch. Chock wheels to prevent movement of the machine.

2. Remove rotating corner shaft drive belt cover from left side of machine and brush drive belt cover from right side of machine (see Drive Belt Covers in this section).

3. On left side of machine, remove drive belt from rotating corner shaft pulley:

   A. Loosen lock nut that secures drive belt idler pulley. Position idler pulley away from drive belt.

   B. Carefully remove drive belt from pulley on rotating corner shaft.

4. Loosen two (2) set screws that secure pulley to left end of rotating corner shaft. Slide pulley from corner shaft.

5. Support corner shaft to keep it from shifting or falling.

NOTE: Corner shaft rotates counterclockwise as viewed from right side of machine.

6. Loosen set screw that secures both flange mount bearing locking collars to rotating corner shaft. Using the blind hole in bearing collar as a striking point, unlock collars from corner shaft by rotating the collar in the opposite direction of shaft rotation with a punch.

7. Remove two (2) flange nuts and carriage screws that secure flange bearings to machine frame. Slide flange bearings from corner shaft.

8. Remove rotating corner shaft from machine.

Installation (Fig. 33)

1. Clean both ends of rotating corner shaft and apply antiseize lubricant to shaft ends. Install rotating corner shaft into frame holes.

2. Slide flange mount bearings onto both ends of corner shaft.

3. Secure both bearings to machine with two (2) carriage screws, flat washers and flange nuts.

4. Rotate corner shaft a few times. Position corner shaft in bearings so right end of shaft is 1.960" (49.8 mm) from side of machine frame (Fig. 35).

NOTE: Corner shaft rotates counterclockwise as viewed from right side of machine.

5. Using the blind hole in flange mount bearing locking collars as a striking point, lock collars to corner shaft by rotating the collars with a punch in the direction of corner shaft rotation. Tighten set screw to secure each bearing locking collar to corner shaft.

6. Apply antiseize lubricant to square key and place key into corner shaft slot.

IMPORTANT: When installing pulley and drive belt, make sure to properly align drive, driven and idler pulleys.

NOTE: When installing pulley on rotating corner shaft, align pulley and drive belt with drive pulley on brush shaft.

7. Slide pulley onto corner shaft with pulley flange toward end of shaft.

IMPORTANT: DO NOT tighten pulley set screws until after the drive belt is installed and the pulleys are properly aligned.

8. Install drive belt to drive and driven pulleys.

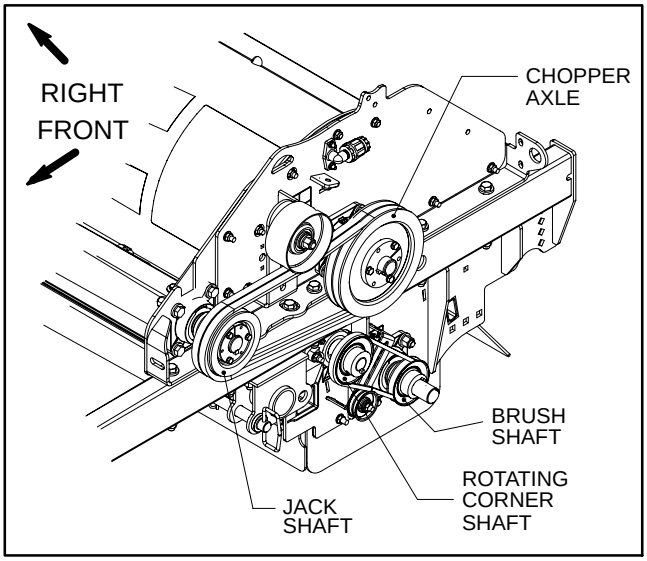

Figure 34

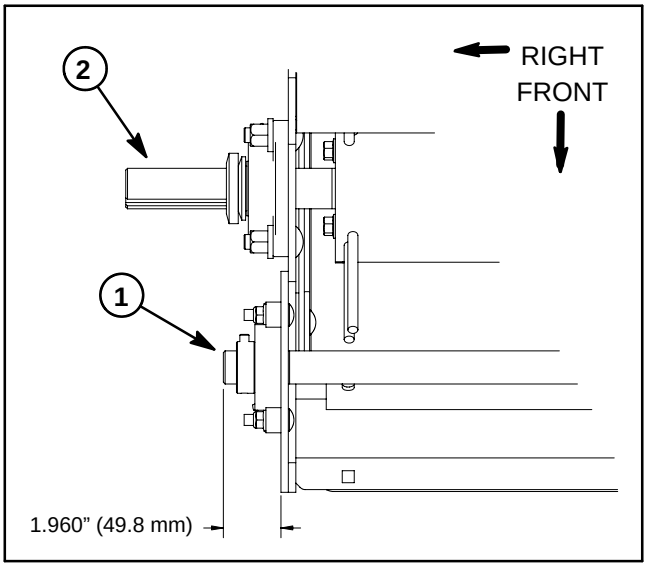

Figure 35

1. Rotating corner shaft **2. Brush shaft**

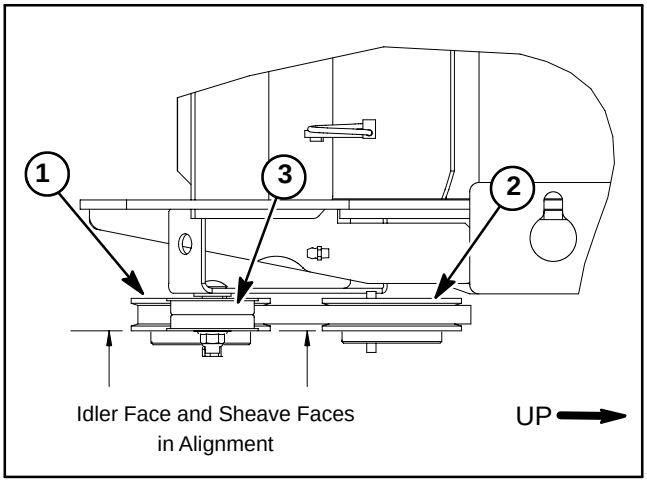

Figure 36

1. Brush shaft **3. Idler pulley**
2. Rotating corner shaft

9. Using a straight edge across the face of the drive pulley on brush shaft, verify drive belt alignment across drive and driven pulleys. Move corner shaft pulley so that drive belt and straight edge are aligned indicating correct position of pulley on corner shaft.

10. Tighten two (2) set screws to secure pulley to rotating corner shaft.

11. Using a straight edge, check that belt alignment is still correct. If needed, re-adjust pulley location on corner shaft.

12. Adjust drive belt idler pulley to achieve proper tension on drive belt (see Operator's Manual).

IMPORTANT: After adjusting belt tension, check that the faces of the idler, drive and driven pulleys are all in alignment (Fig. 36). This is necessary to ensure that idler pulley is correctly aligned to drive belt. If necessary, re-adjust positions of drive and driven pulleys to allow correct alignment.

13. Check that the distance from the rotating corner shaft to the scraper plate is from 0.180" to 0.240" (4.6 to 6.0 mm) across the entire corner shaft (Fig. 37). If necessary, loosen fasteners that secure scraper plate to machine and adjust scraper plate location.

14. Install belt covers to machine (see Drive Belt Covers in this section).

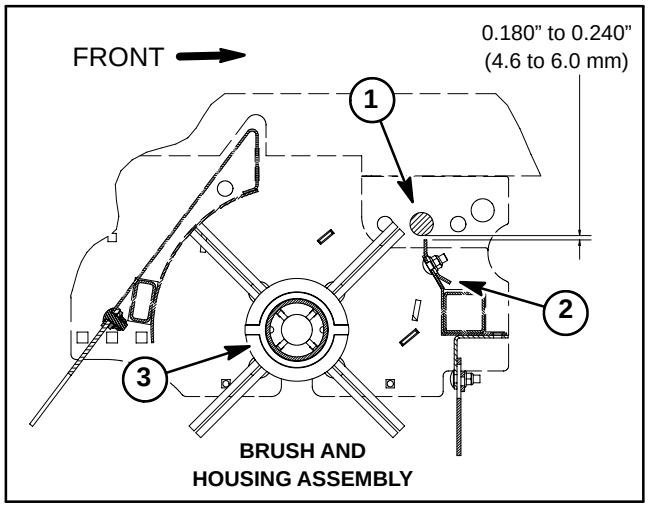

Figure 37

1. **Rotating corner shaft**
2. **Scraper plate**
3. **Brush**

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Roller

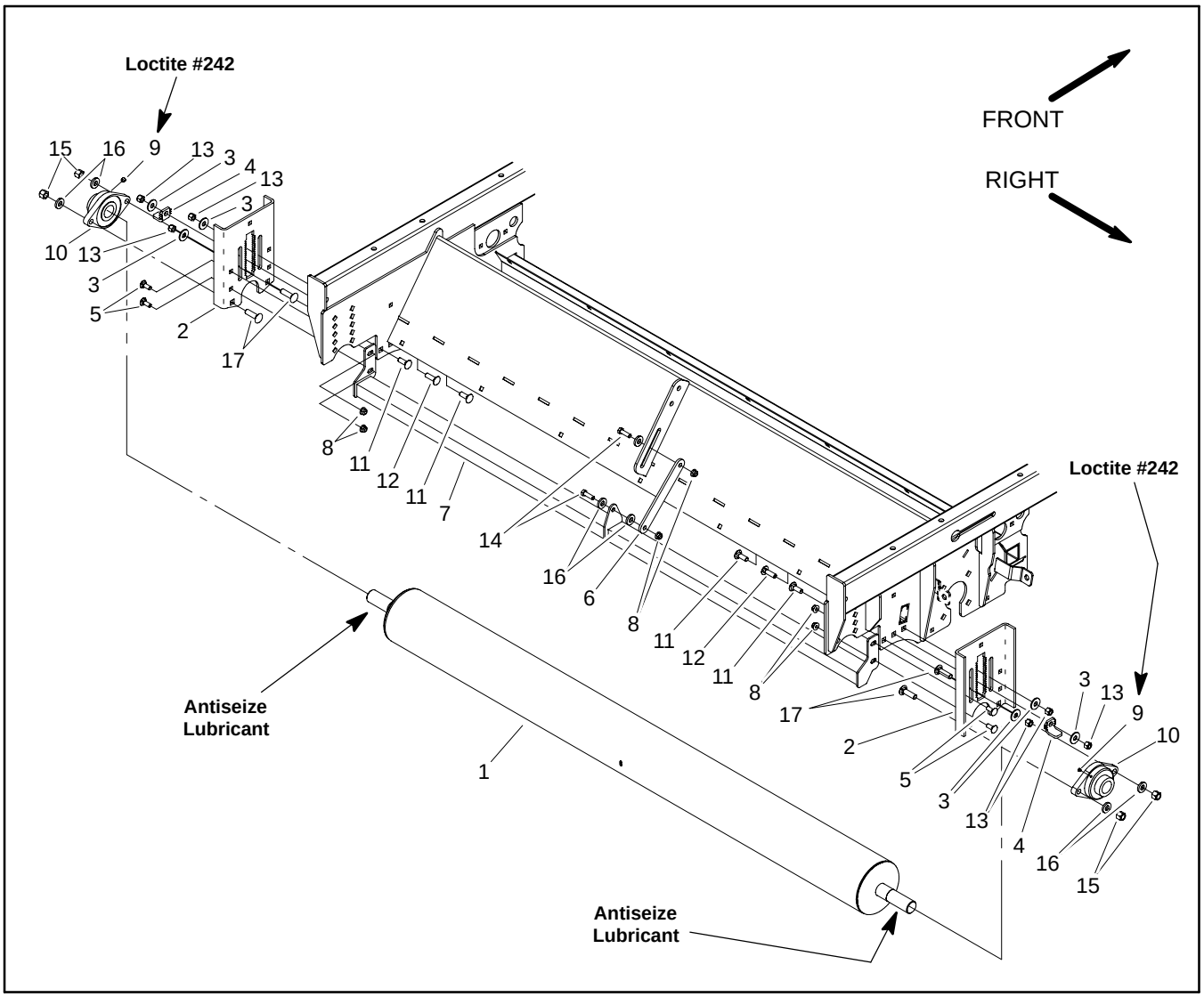

Figure 38

1. **Roller**
2. **Adjuster plate**
3. **Flat washer (6 used)**
4. **Adjuster key**
5. **Carriage screw (4 used)**
6. **Connector strap**
7. **Roller scraper**
8. **Flange nut (6 used)**
9. **Set screw**
10. **Flange mount bearing (2 used)**
11. **Carriage bolt (4 used)**
12. **Carriage screw (2 used)**
13. **Lock nut (6 used)**
14. **Cap screw (2 used)**
15. **Lock nut (4 used)**
16. **Flat washer (7 used)**
17. **Carriage screw (4 used)**

Removal (Fig. 38)

1. Have ProCore Processor attached to tow vehicle and park machines on a level surface with the Processor fully lowered. Engage vehicle parking brake, stop engine and remove key from the ignition switch. Make sure that Processor engine is off. Chock wheels to prevent movement of either machine.

2. Loosen flange nuts and carriage screws that secure roller scraper to brush housing. Position roller scraper away from roller.

CAUTION

To prevent personal injury, make sure that roller is supported as it is removed from the machine. Roller weighs approximately 110 pounds (49 kg).

3. Support roller to prevent it from shifting.

4. Loosen and remove set screw (item 9) that secures each flange mount bearing locking collar to roller shaft. Using the blind hole in bearing collar as a striking point, unlock collar from roller shaft by rotating the collar with a punch in the opposite direction of normal roller rotation.

5. On each side of machine, remove two (2) carriage screws (item 17), flat washers (item 16) and lock nuts (item 15) that secure bearing to adjuster plate.

6. Slowly raise Processor while allowing roller to remain on the ground. Support Processor to prevent it from lowering.

7. Remove roller from machine.

8. Slide bearings from roller shaft.

9. If necessary, remove roller adjuster plates and adjuster keys from frame:

   A. Note location of adjustment plates and adjuster keys for assembly purposes.

   B. Remove flange nuts, flat washers and carriage screws that secure roller adjustment plates and adjuster keys to frame.

Installation (Fig. 38)

1. If adjustment plates and adjuster keys were removed from frame, secure them to frame with carriage screws, flat washers and flange nuts to location noted during removal.

2. Clean roller shaft ends and apply antiseize lubricant to shaft ends. Place bearing onto each end of roller shaft. Do not install bearing set screws at his time.

3. Position roller assembly under raised machine.

4. Slowly lower ProCore Processor to correctly position roller assembly to frame.

5. Align mounting holes in bearings and frame. Secure bearings to frame with carriage screws (item 17), flat washers (item 16) and lock nuts (item 15).

6. Raise Processor so that roller is slightly off ground.

7. Rotate roller a few times and center roller between bearings.

8. Using the blind hole in flange mount bearing locking collars as a striking point, lock collars to roller shaft by rotating the collars with a punch in the direction of normal roller rotation.

9. Apply Loctite #242 (or equivalent) to threads of bearing set screws (item 9). Install set screws into bearing housings to secure bearings to roller shaft.

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

11. Adjust position of roller scraper to allow 0.060" (1.5 mm) between scraper and roller. Secure roller scraper with carriage screws and flange nuts.

12. Check roller height and roller scraper clearance. Adjust if necessary (see Operator's Manual).

Lift Axle

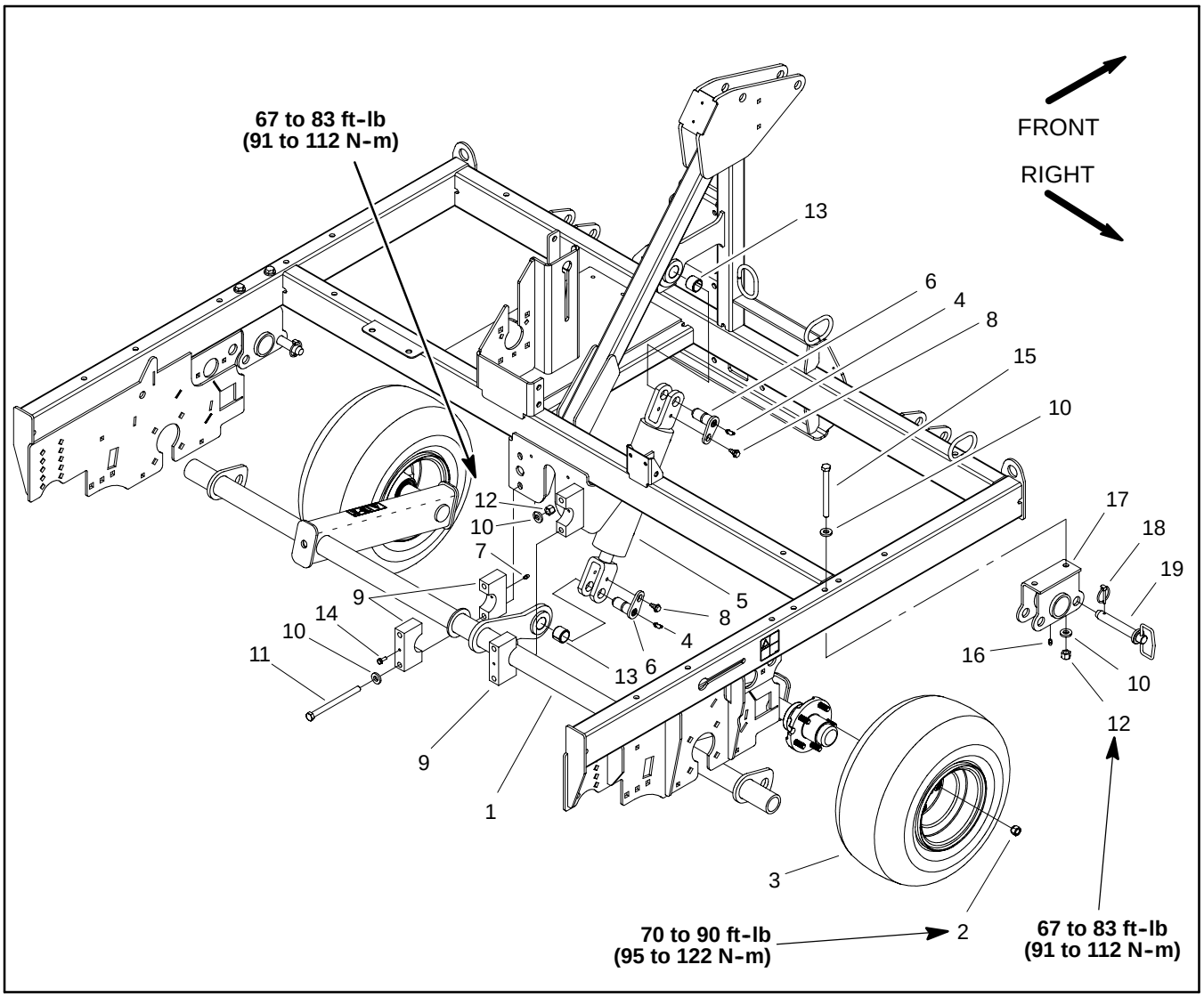

Figure 39

1. **Lift axle**
2. **Lug nut (5 used per wheel)**
3. **Wheel and tire assembly**
4. **Grease fitting**
5. **Lift cylinder**
6. **Pivot pin**
7. **Grease fitting (2 used)**
8. **Shoulder bolt**
9. **Axle block (4 used)**
10. **Flat washer**
11. **Cap screw (4 used)**
12. **Lock nut**
13. **Bushing (2 used)**
14. **Screw (2 used)**
15. **Cap screw (4 used)**
16. **Grease fitting (2 used)**
17. **Bearing tube (2 used)**
18. **Lynch pin (2 used)**
19. **Hitch pin (2 used)**

Removal (Fig. 39)

1. Have ProCore Processor attached to tow vehicle and park machines on a level surface with the Processor fully lowered. Engage vehicle parking brake, stop engine and remove key from the ignition switch. Make sure that ProCore Processor engine is off. Chock wheels to prevent movement of either machine.

2. Secure lift axle to frame with hitch pin and lynch pin to prevent lift axle from shifting.

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

4. Remove both wheel assemblies (see Wheel Removal in this section).

5. Support lift axle to prevent it from shifting.

6. At lower clevis of lift cylinder, remove shoulder bolt that secures pivot pin to lift cylinder. Slide pivot pin from lift cylinder and lift axle bracket. Separate lift cylinder clevis from axle bracket.

7. Remove lock nuts (item 12), flat washers (item 10) and cap screws (item 15) that secure bearing tubes (item 17) to machine frame.

8. Remove lock nuts (item 12), flat washers (item 10) and cap screws (item 11) that secure axle blocks (item 9) to machine frame. Remove axle bearings.

9. Lower lift axle and remove from the machine.

10. Remove lynch pin and hitch pin that secures each bearing tube to lift axle. Slide bearing tubes from lift axle.

11. If wheel hub service is necessary, see Wheel Hubs and Bearings in this section.

Installation (Fig. 39)

NOTE: Bearing tubes should be installed on lift axle with bracket flange toward end of lift axle tube.

1. Slide bearing tubes onto lift axle. Secure each bearing tube to lift axle with hitch pin and lynch pin.

2. Position lift axle under machine.

3. Raise lift axle and align bearing tubes (item 17) to machine frame. Install cap screws (item 15), flat washers (item 10) and lock nuts (item 12) to frame and bearing tubes. Do not fully tighten fasteners at this time.

4. Align axle blocks (item 9) to lift axle and frame. Install cap screws (item 11), flat washers (item 10) and lock nuts (item 12) to frame and axle blocks. Do not fully tighten fasteners at this time.

5. Center lift axle in axle blocks and bearing tubes. Tighten fasteners that secure bearing tubes (item 17) first and then tighten fasteners that secure axle blocks (item 9). Torque fasteners from **67 to 83 ft-lb (91 to 112 N-m)**.

IMPORTANT: When securing lift cylinder pivot pin to frame, do not overtighten shoulder bolt. There should be clearance between the shoulder bolt head and pivot pin.

6. Install pivot pin to lower lift cylinder clevis and lift axle bracket. Secure pivot pin to lift cylinder with shoulder bolt.

WARNING

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

7. Install wheel assemblies (see Wheel Installation in this section).

8. Carefully lower machine to ground. Make sure to properly torque lug nuts from **70 to 90 ft-lb (95 to 122 N-m)**.

9. Lubricate grease fittings on lift axle pivot points.

10. Remove lynch pin and hitch pin from lift axle before using ProCore Processor.

Rear Cover

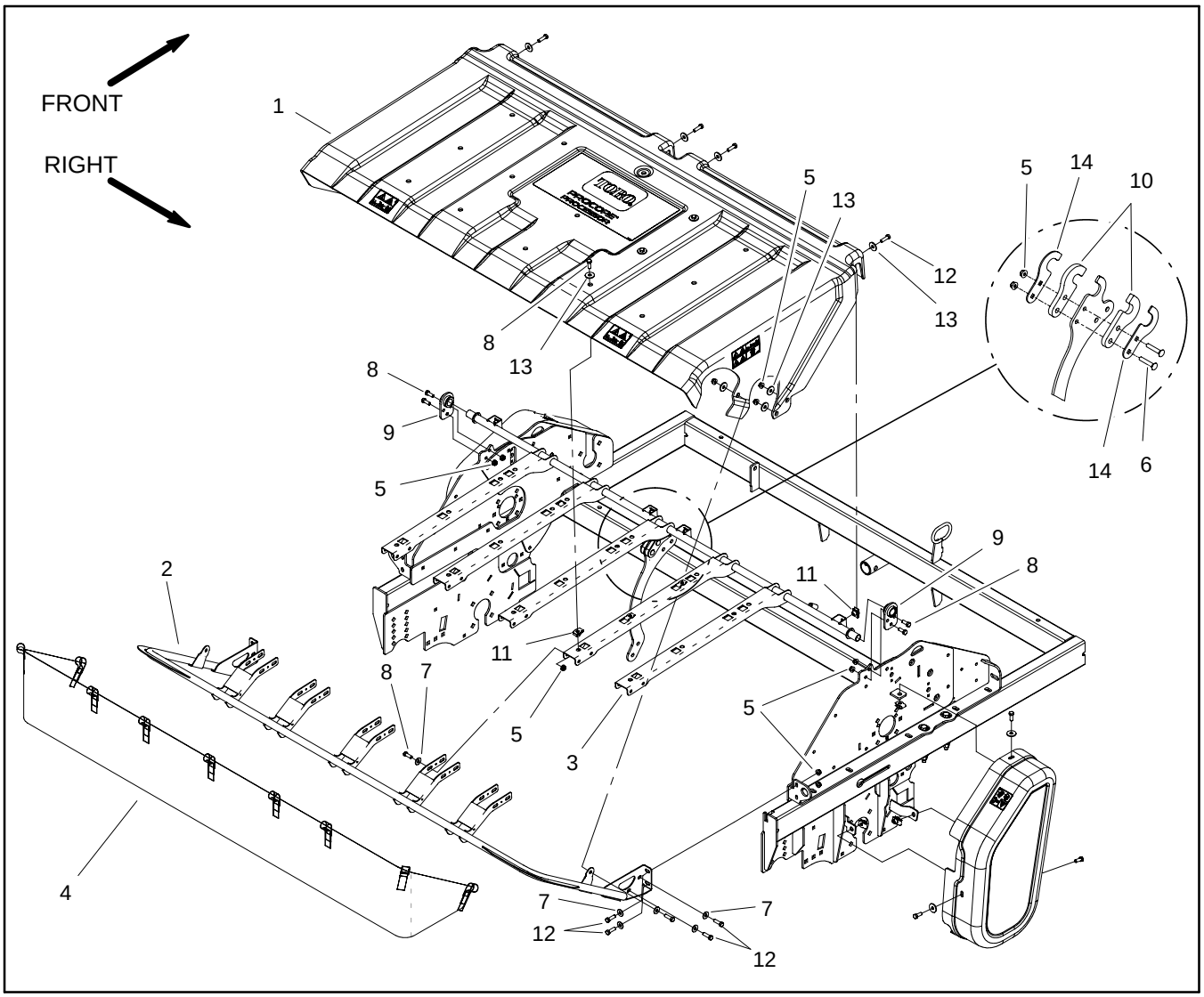

Figure 40

1. **Rear cover**
2. **Subframe hoop**
3. **Subframe pivot**
4. **Curtain**
5. **Flange nut (36 used)**
6. **Carriage screw (2 used)**
7. **Flat washer (30 used)**
8. **Cap screw (47 used)**
9. **Pivot (2 used)**
10. **Pivot (2 used)**
11. **Tinnerman nut (19 used)**
12. **Cap screw (14 used)**
13. **Flat washer (33 used)**
14. **Backing plate hook (2 used)**

Removal (Fig. 38)

1. Park ProCore Processor on a level surface with the Processor fully lowered. Make sure that Processor engine is off. Remove key from the ignition switch. Chock wheels to prevent movement of machine.

2. On both sides of machine, remove two (2) cap screws and flange nuts that secure pivot (item 9) to machine frame. Slide pivot from rear cover subframe pivot.

3. On both sides of machine, remove two (2) cap screws, flat washers and flange nuts that secure rear cover subframe hoop (item 2) to machine frame.

4. Remove two (2) carriage screws and flange nuts that secure rear cover pivot components (items 10 and 14) to chopper housing.

5. Lift rear cover assembly from machine.

6. Disassemble rear cover assembly as necessary using Figure 38 as a guide.

Installation (Fig. 38)

1. Assemble rear cover using Figure 38 as a guide.

2. Position rear cover assembly to machine.

3. Secure rear cover to machine:

   A. Secure rear cover pivot components (items 10 and 14) to chopper housing with two (2) carriage screws and flange nuts (Fig. 41).

   NOTE: The pivot (item 9) includes a flange bushing. Make sure that when pivot is installed to machine, the bushing flange is orientated toward center of machine (Fig. 42).

   B. On both sides of machine, slide pivot (item 9) onto rear cover subframe pivot and secure pivot to frame with two (2) cap screws and flange nuts.

   C. On both sides of machine, secure rear cover subframe hoop (item 2) to machine frame with two (2) cap screws, flat washers and flange nuts.

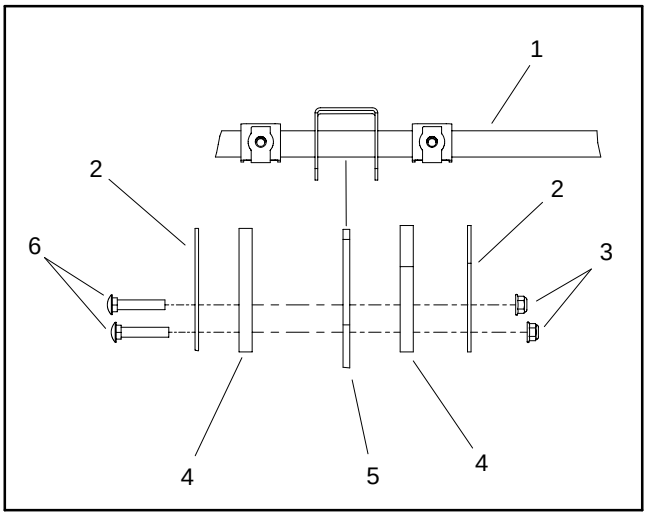

Figure 41

1. Subframe pivot
2. Backing plate hook
3. Flange nut
4. Pivot
5. Chopper housing
6. Carriage screw

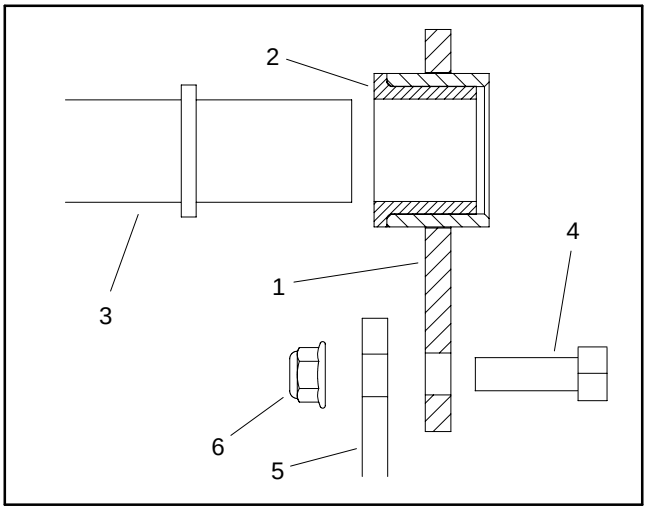

Figure 42

1. Pivot (RH shown)
2. Bushing flange
3. Subframe pivot
4. Cap screw (2 used)
5. Endplate
6. Flange nut

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Chapter 7

Electrical Diagrams

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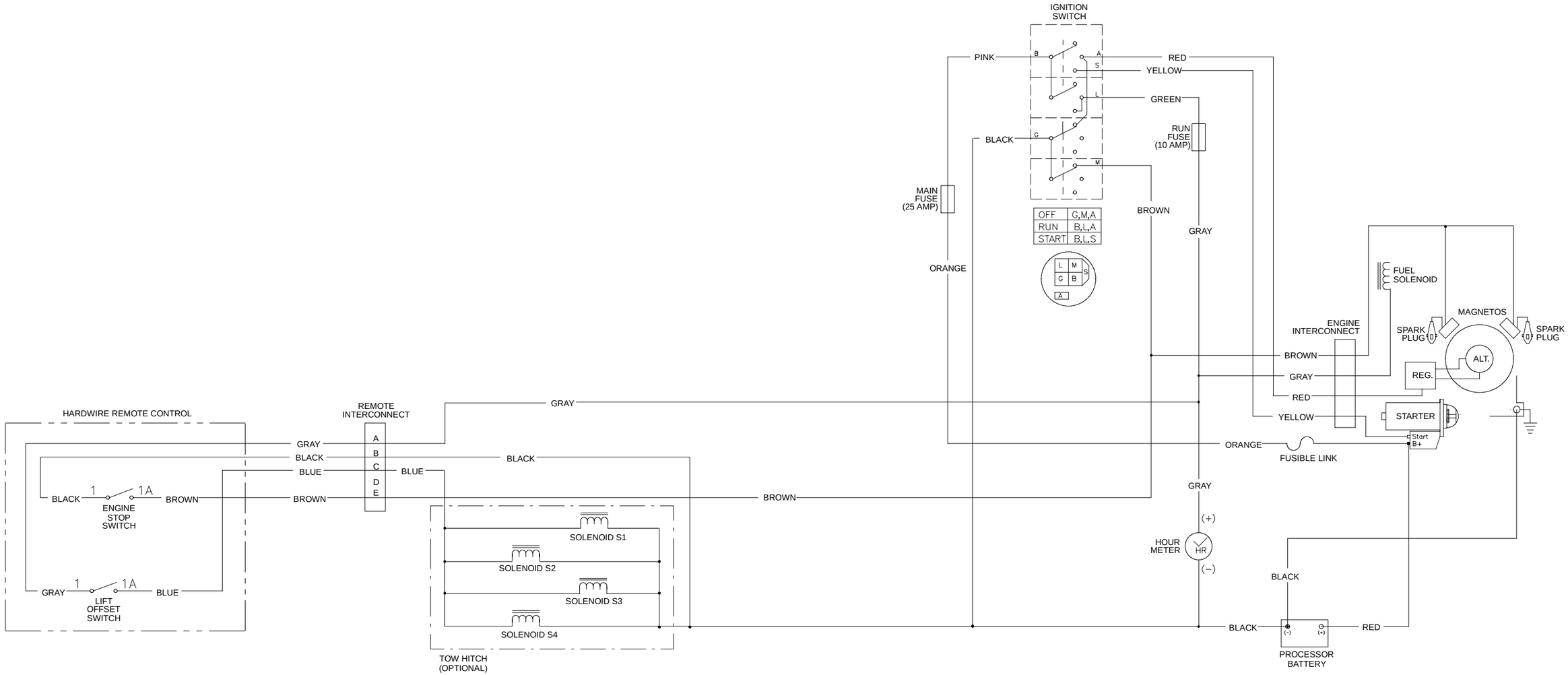
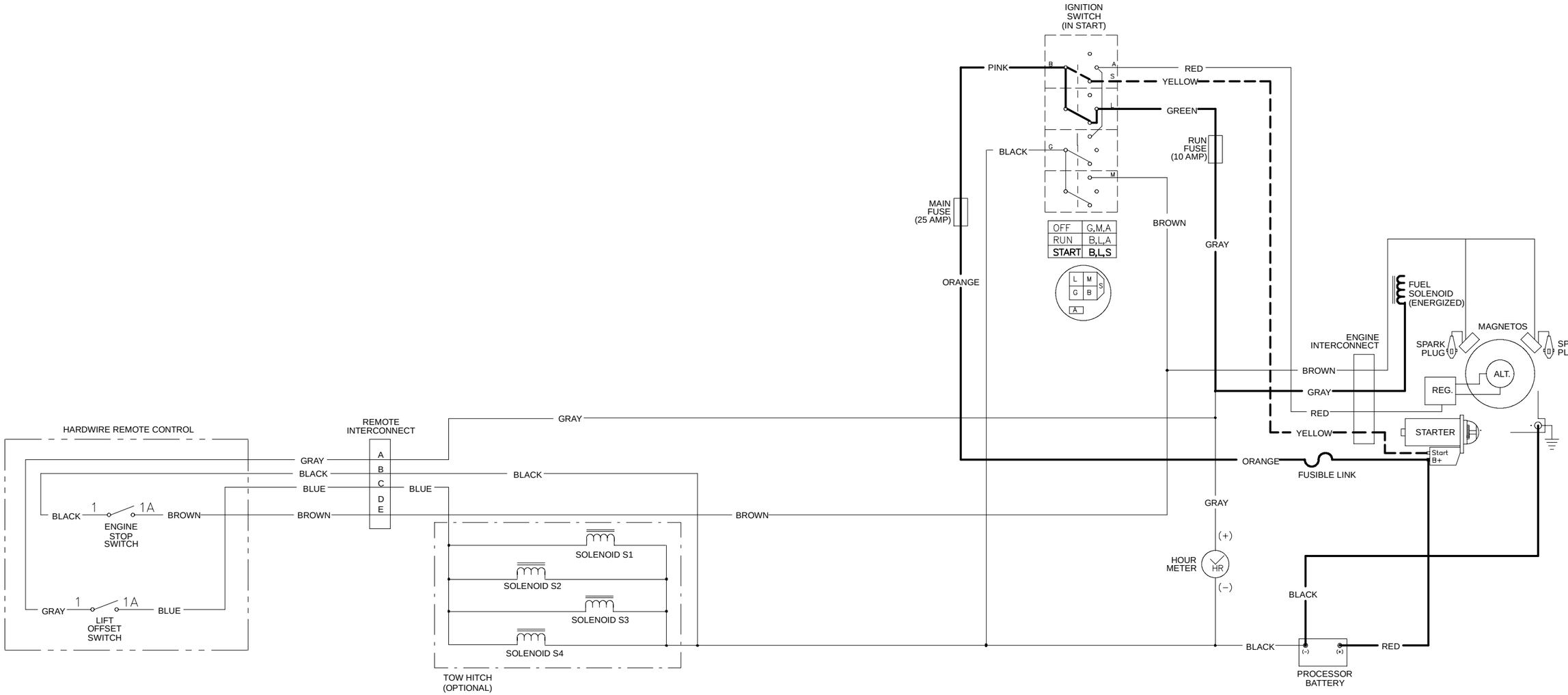


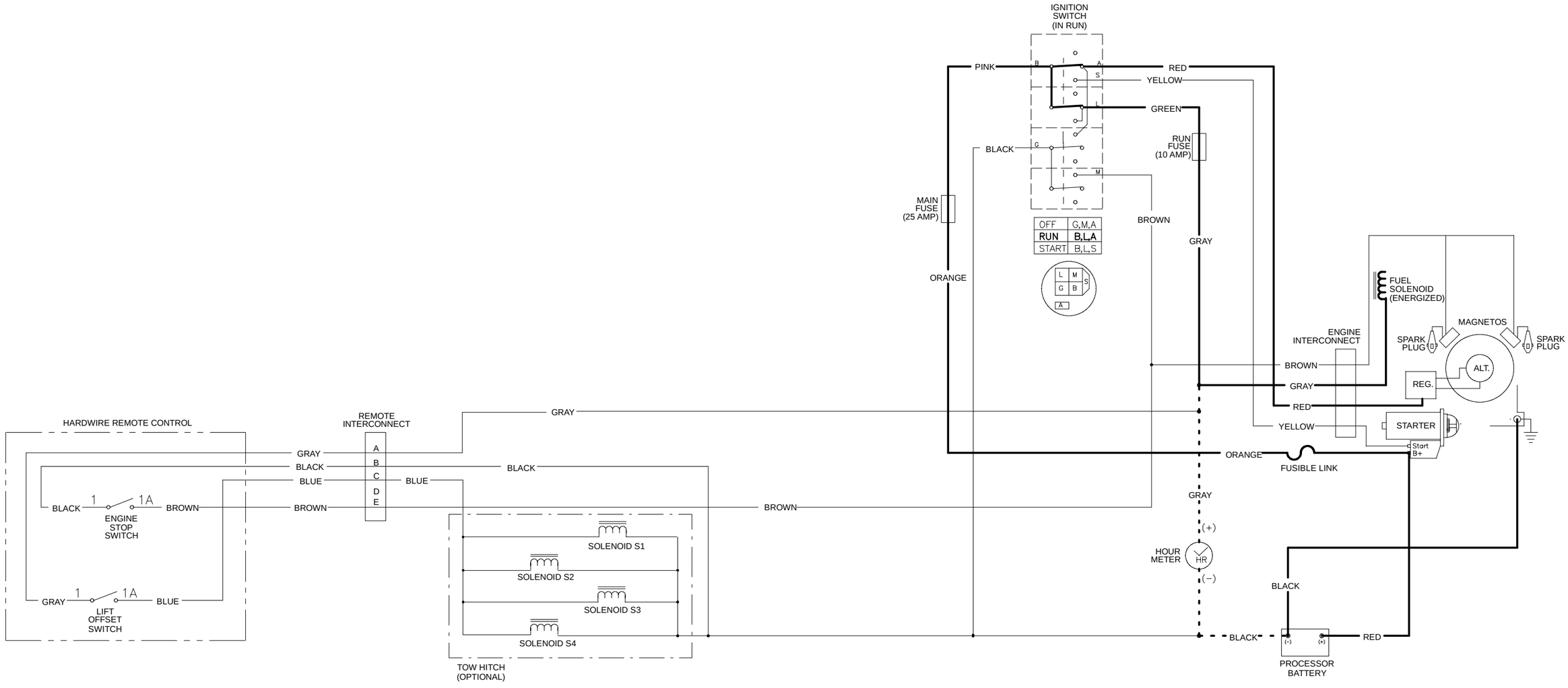
ProCore Processor
Electrical Schematic

All ground wires are black.



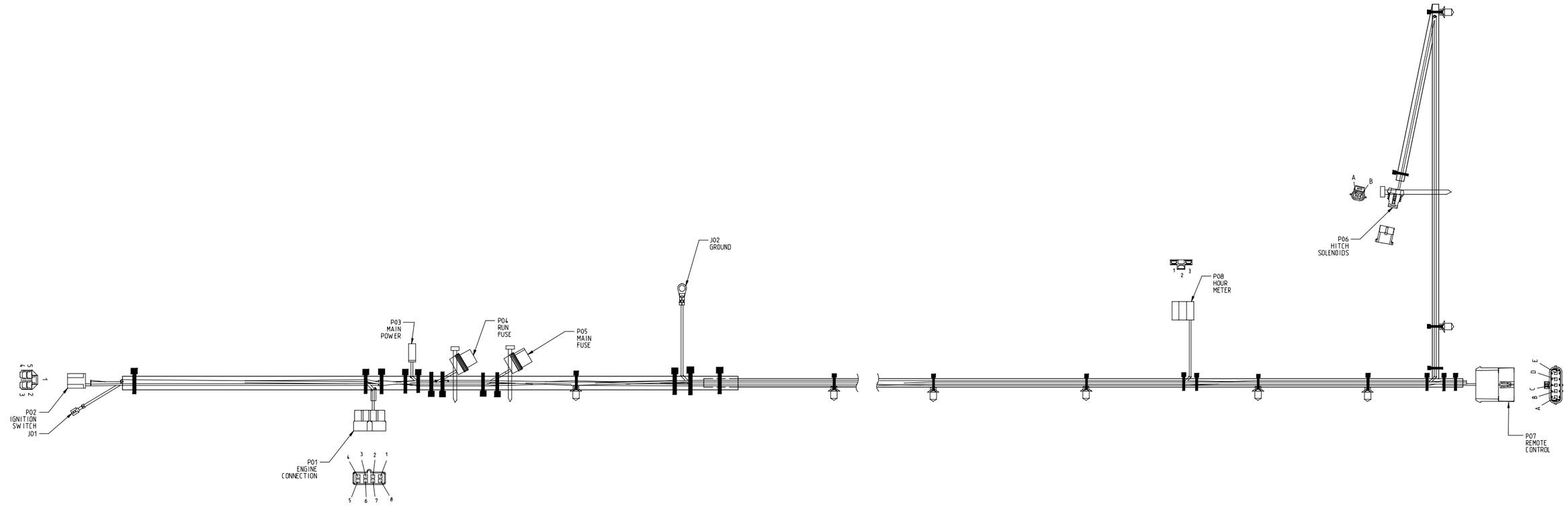
ProCore Processor
Crank Circuits

- Power Current
- Control Current
- Indicator Current

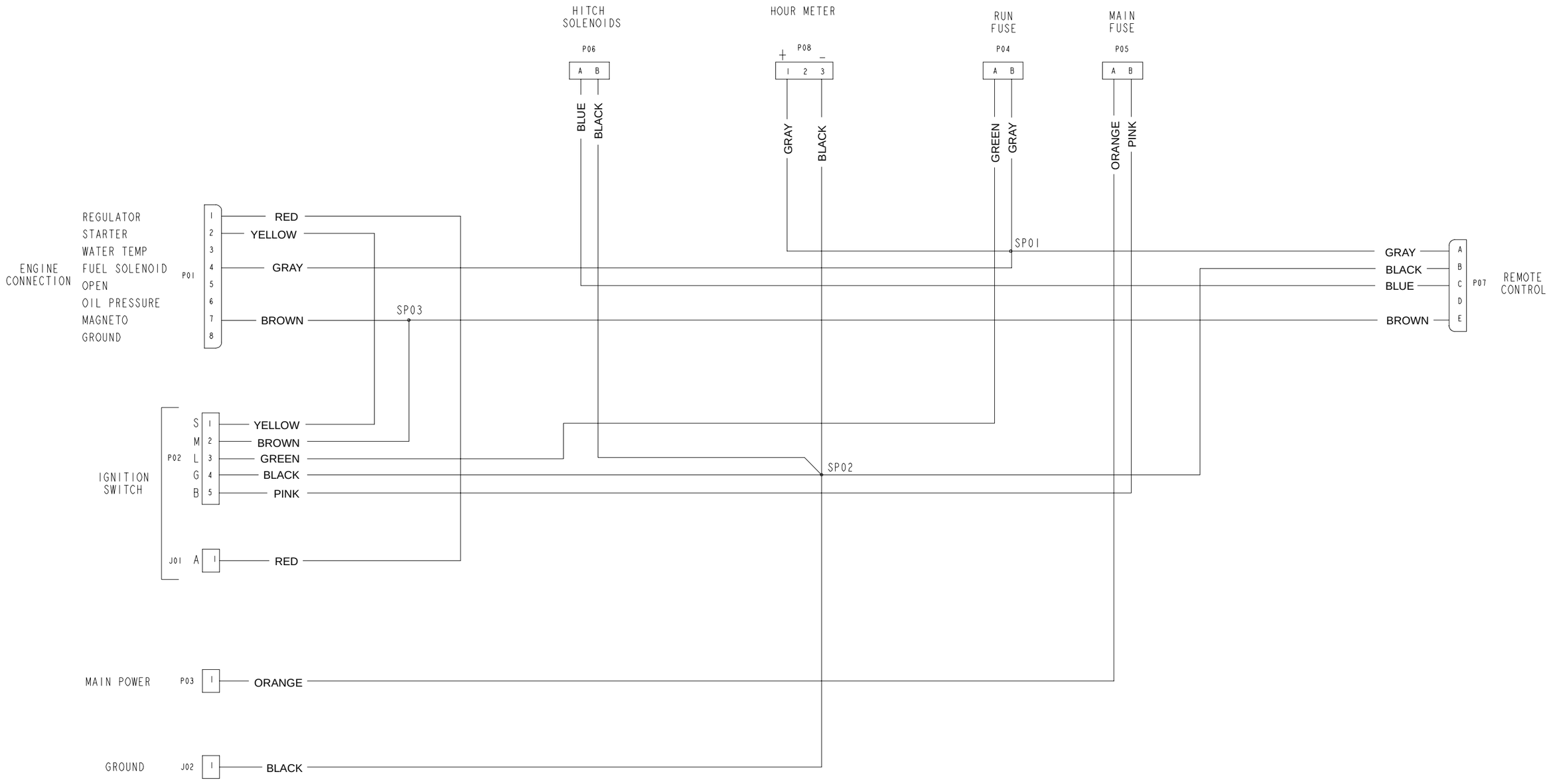


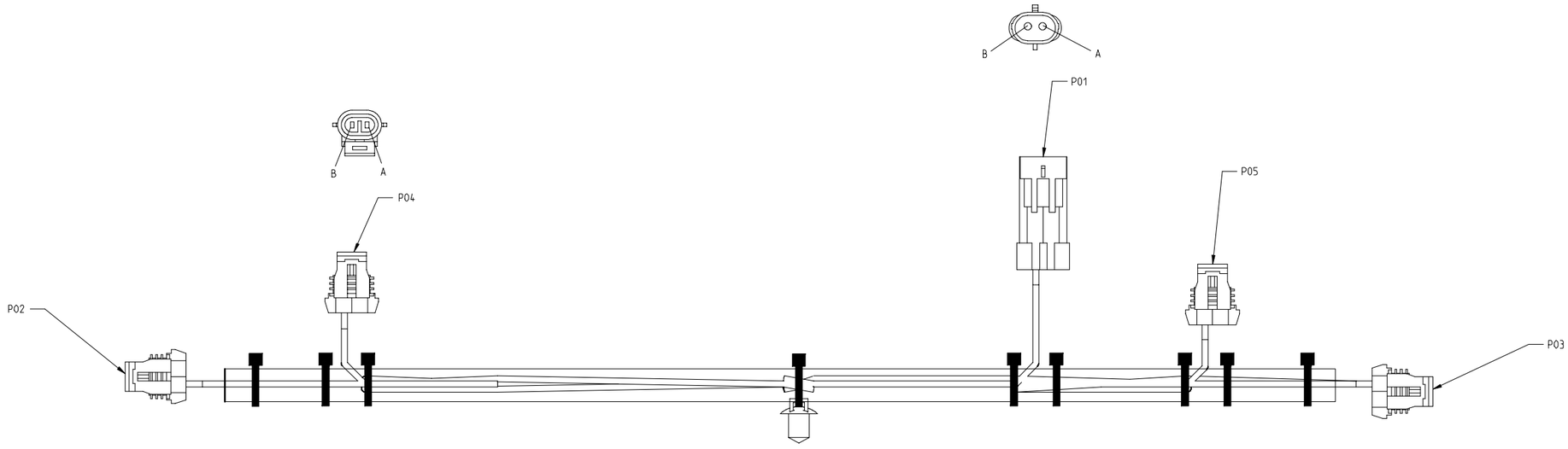
ProCore Processor
Run Circuits

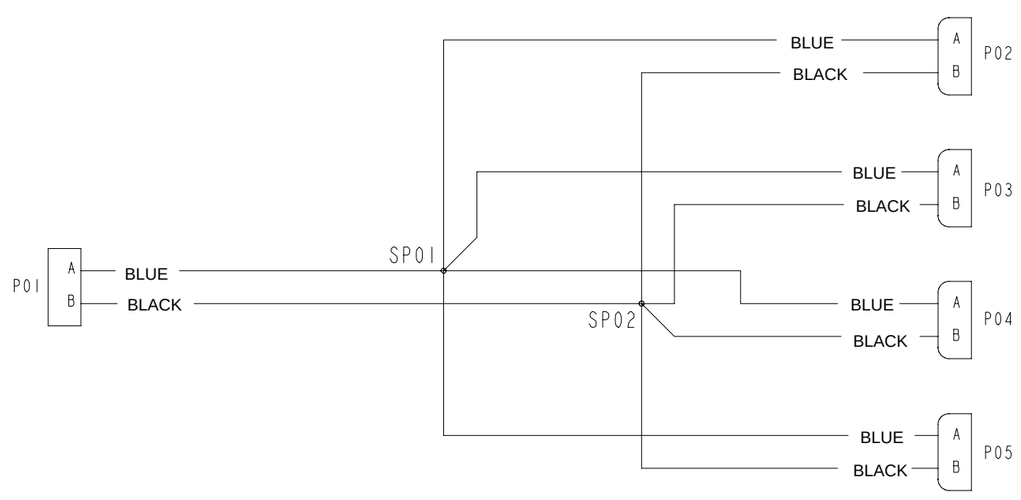
Power Current
Control Current
Indicator Current



ProCore Processor
Wire Harness Drawing


HITCH SOLENOIDS
HOUR METER
RUN FUSE
MAIN FUSE
P06
P08
P04
P05
A B
+ 1 2 3 −
BLUE
BLACK
GRAY
BLACK
GREEN
GRAY
ORANGE
PINK
ENGINE CONNECTION
REGULATOR
STARTER
WATER TEMP
FUEL SOLENOID
OPEN
OIL PRESSURE
MAGNETO
GROUND
P01
1 2 3 4 5 6 7 8
RED
YELLOW
GRAY
BROWN
SP01
SP03
SP02
GRAY
BLACK
BLUE
BROWN
A B C D E
P07
REMOTE CONTROL
IGNITION SWITCH
P02
S M L G B
1 2 3 4 5
YELLOW
BROWN
GREEN
BLACK
PINK
J01 A 1
RED
MAIN POWER
P03
1
ORANGE
GROUND
J02
1
BLACK





ProCore Processor
Tow Hitch Kit Wire Harness