

Product: 2011 TORO Multi ProR 1200/1250 Sprayers Service Repair Workshop Manual

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-1200-1250-sprayers-service-repair-workshop-manual/



Service Manual

(Serial Number Above 310000000)

Multi Pro[®] 1200/1250

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 Multi Pro 1200 and Multi Pro 1250 sprayers with a serial number above 310000000.

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. Additional copies of the Operator's Manual and Parts Catalog are available on the internet at www.Toro.com.

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



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

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

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



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Safety

Product Records
and Maintenance

Kohler
Gasoline Engine

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Safety Instructions

The Multi Pro 1200 and Multi Pro 1250 Turf Sprayers are designed and tested to offer safe service when operated and maintained properly. Although hazard control and accident prevention are partially dependent upon the design and configuration of the machine, these factors are also dependent upon the awareness, concern and proper training of the personnel involved in the operation, transport, maintenance and storage of the machine. Improper use or maintenance of the machine can result in injury or death. To reduce the potential for injury or death, comply with the following safety instructions.



Before Operating

1. Read and understand the contents of the Operator's Manual before starting and operating the machine. Become familiar with the controls and know how to stop the machine and engine quickly. Additional copies of the Operator's Manual are available on the internet at www.Toro.com.
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. Assure interlock switches are adjusted correctly so engine cannot be started unless range selector is in NEUTRAL.
4. Since gasoline is highly flammable, handle it carefully:
 - A. Store fuel in containers specifically designed for this purpose.
 - B. Do not remove machine fuel tank cap while engine is hot or running.
 - C. Do not smoke while handling fuel.
 - D. Fill fuel tank outdoors and only to within an inch of the top of the tank, not the filler neck. Do not overfill the fuel tank.
 - E. Wipe up any spilled fuel.

While Operating

1. Sit on the seat when starting and operating the machine.
2. Before starting the engine:
 - A. Engage the parking brake.
 - B. Make sure range selector is in NEUTRAL and the pump switch is OFF.
3. Do not run engine in a confined area without adequate ventilation. Exhaust fumes are hazardous and could possibly be deadly.
4. Do not touch engine, muffler, exhaust pipe or drive system components while engine is running or soon after it is stopped. These areas could be hot enough to cause burns.
5. Before getting off the seat:
 - A. Ensure that range selector is in neutral.
 - B. Set parking brake.
 - C. Turn pump switch OFF.
 - D. Stop engine and remove key from ignition switch.
 - E. Do not park on slopes unless wheels are chocked or blocked.
6. Follow chemical manufacturer's recommendations for handling precautions, necessary protective equipment, mixing proportions and clean up procedures.

Maintenance and Service

1. Before servicing or making adjustments, turn spray pump off, put range selector in neutral, stop engine, set parking brake and remove key from the switch.
2. Prior to servicing sprayer components, determine what chemical(s) have been used in the sprayer. Follow precautions and recommendations printed on chemical container labels or Material Safety Data Sheets when servicing sprayer components. Use appropriate protective equipment: protective clothing, chemical resistant gloves and eye protection.
3. Make sure machine is in safe operating condition by keeping all nuts, bolts and screws tight.
4. Never store the machine or fuel container inside where there is an open flame, such as near a water heater or furnace.
5. Make sure all hydraulic line connectors are tight and all hydraulic hoses and lines are in good condition before applying pressure to the system.
6. 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. 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.
7. Before disconnecting or performing any work on the hydraulic system, all pressure in system must be relieved. To relieve system pressure, rotate steering wheel in both directions after the key switch has been turned off.
8. If major repairs are ever needed or assistance is desired, contact an Authorized Toro Distributor.
9. To reduce potential fire hazard, keep engine area free of excessive grease, grass, leaves and dirt. Clean protective screen on machine frequently.
10. If engine must be running to perform maintenance or an adjustment, keep hands, feet, clothing and other parts of the body away from moving parts. Keep bystanders away.
11. Do not overspeed the engine by changing governor setting. To assure safety and accuracy, check maximum engine speed.
12. Shut engine off before checking or adding oil to the crankcase.
13. 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 cable first and negative cable last.
14. 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.
15. Battery gases can explode. Keep cigarettes, sparks and flames away from the battery.
16. To assure optimum performance and continued safety 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.
17. When changing attachments, tires or performing other service, use correct jacks, hoists and jack stands. Make sure machine is parked on a solid level surface such as a concrete floor. Prior to raising the machine, remove any attachments that may interfere with the safe and proper raising of the machine. Always chock or block wheels. Use 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 (see Jacking Instructions in this chapter).

Jacking Instructions



CAUTION

When changing attachments, tires or performing other service, use appropriate jacks and supports. Make sure machine is parked on a solid, level surface such as a concrete floor. Prior to raising machine, remove any attachments that may interfere with the safe and proper raising of the machine. Always chock or block wheels. Use appropriate 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.

IMPORTANT: Before raising the sprayer, it is recommended to empty the spray tank. If the spray tank is not emptied, consider the extra weight of spray tank contents when choosing appropriate jacks, hoists and jack stands for raising and supporting the machine.

Jacking the Front End

1. Set parking brake and chock both rear tires to prevent the machine from moving.
2. Position jack securely under the A-arms, just to the inside of the front tire (Fig. 1).
3. Jack front of machine off the ground.
4. Position jack stands under the A-arms as close to the wheel as possible to support the machine.

Jacking the Rear End

1. Set parking brake and chock both front tires to prevent the machine from moving.
2. Place jack securely under the rear most frame supports between the angle welds (Fig. 2).
3. Jack rear of machine off the ground.
4. Position jack stands under the frame to support the machine.

Safety and Instruction Decals

Numerous safety and instruction decals are affixed to the Multi Pro 1200 and Multi Pro 1250. If any decal becomes illegible or damaged, install a new decal. Decal part numbers are listed in your Parts Catalog. Order replacement decals from your Authorized Toro Distributor.

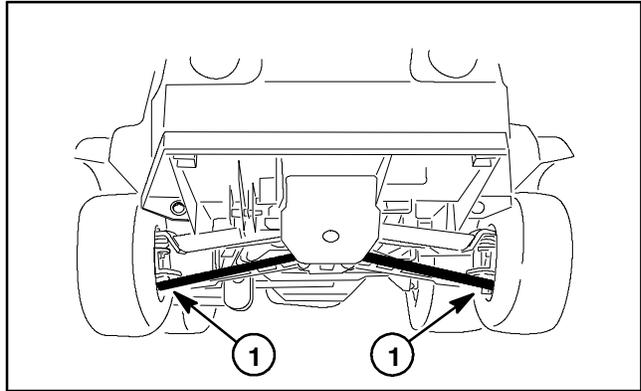


Figure 1

1. Front jacking points

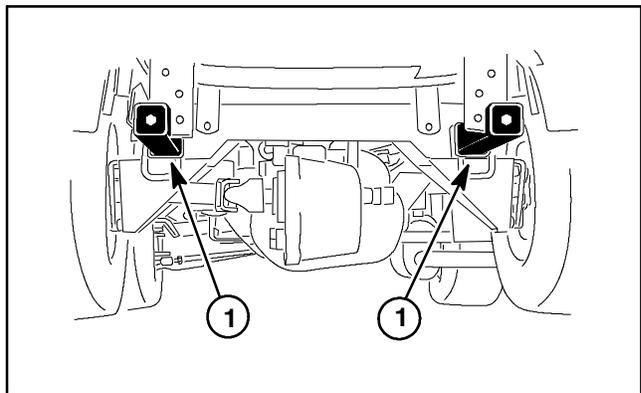


Figure 2

1. Rear jacking points



Product Records and Maintenance

Product Records and Maintenance

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Product Records

Insert Operator’s Manual and Parts Catalog for your Multi Pro 1200 and 1250 at the end of this chapter. Refer to Operator’s Manual for recommended maintenance intervals. Additionally, insert Installation Instructions, Operator’s Manuals and Parts Catalogs for any accessories that have been installed on your Multi Pro at the end of this chapter.

Maintenance

Maintenance procedures and recommended service intervals for the Multi Pro 1200 and Multi Pro 1250 are covered in the Operator’s Manual. Refer to that publication when performing regular equipment maintenance. Several maintenance procedures have break-in intervals identified in the Operator’s Manual. Refer to the Engine Operator’s Manual for additional engine specific maintenance procedures.

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. Subtract 32°
			2. Multiply by 5/9

Torque Specifications

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

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

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

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

Fastener Identification

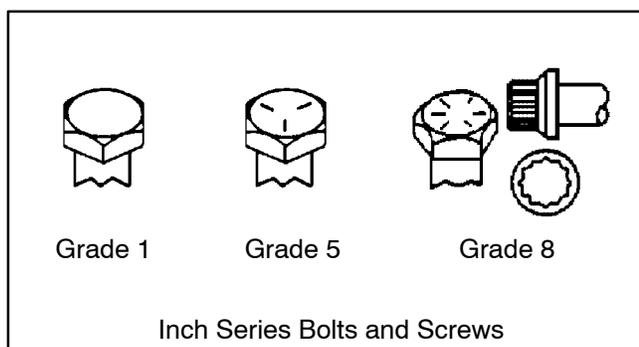


Figure 1

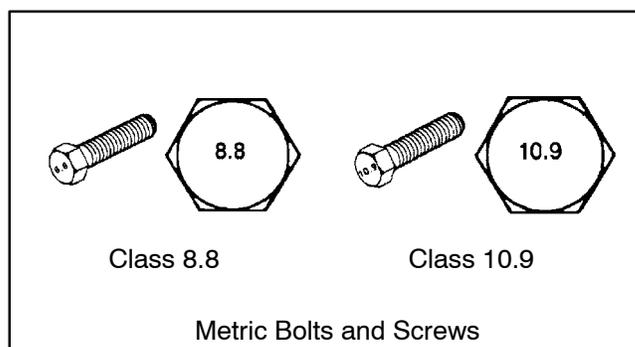


Figure 2

Using a Torque Wrench with an Offset Wrench

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

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

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

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

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

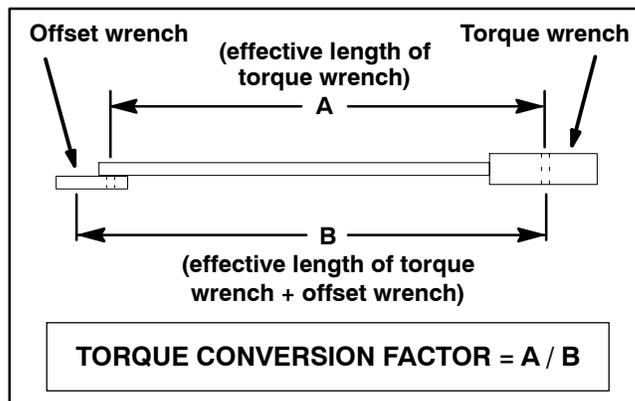


Figure 3

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

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	170 ± 20	23 ± 2	260 ± 20
# 6 - 40 UNF				17 ± 2	190 ± 20	25 ± 2	280 ± 20
# 8 - 32 UNC	13 ± 2	25 ± 5	282 ± 30	29 ± 3	330 ± 30	41 ± 4	460 ± 45
# 8 - 36 UNF				31 ± 3	350 ± 30	43 ± 4	485 ± 45
# 10 - 24 UNC	18 ± 2	30 ± 5	339 ± 56	42 ± 4	475 ± 45	60 ± 6	675 ± 70
# 10 - 32 UNF				48 ± 4	540 ± 45	68 ± 6	765 ± 70
1/4 - 20 UNC	48 ± 7	53 ± 7	599 ± 79	100 ± 10	1125 ± 100	140 ± 15	1580 ± 170
1/4 - 28 UNF	53 ± 7	65 ± 10	734 ± 113	115 ± 10	1300 ± 100	160 ± 15	1800 ± 170
5/16 - 18 UNC	115 ± 15	105 ± 17	1186 ± 169	200 ± 25	2250 ± 280	300 ± 30	3390 ± 340
5/16 - 24 UNF	138 ± 17	128 ± 17	1446 ± 192	225 ± 25	2540 ± 280	325 ± 30	3670 ± 340
	ft-lb	ft-lb	N-m	ft-lb	N-m	ft-lb	N-m
3/8 - 16 UNC	16 ± 2	16 ± 2	22 ± 3	30 ± 3	41 ± 4	43 ± 4	58 ± 5
3/8 - 24 UNF	17 ± 2	18 ± 2	24 ± 3	35 ± 3	47 ± 4	50 ± 4	68 ± 5
7/16 - 14 UNC	27 ± 3	27 ± 3	37 ± 4	50 ± 5	68 ± 7	70 ± 7	95 ± 9
7/16 - 20 UNF	29 ± 3	29 ± 3	39 ± 4	55 ± 5	75 ± 7	77 ± 7	104 ± 9
1/2 - 13 UNC	30 ± 3	48 ± 7	65 ± 9	75 ± 8	102 ± 11	105 ± 10	142 ± 14
1/2 - 20 UNF	32 ± 3	53 ± 7	72 ± 9	85 ± 8	115 ± 11	120 ± 10	163 ± 14
5/8 - 11 UNC	65 ± 10	88 ± 12	119 ± 16	150 ± 15	203 ± 20	210 ± 20	285 ± 27
5/8 - 18 UNF	75 ± 10	95 ± 15	129 ± 20	170 ± 15	230 ± 20	240 ± 20	325 ± 27
3/4 - 10 UNC	93 ± 12	140 ± 20	190 ± 27	265 ± 25	359 ± 34	375 ± 35	508 ± 47
3/4 - 16 UNF	115 ± 15	165 ± 25	224 ± 34	300 ± 25	407 ± 34	420 ± 35	569 ± 47
7/8 - 9 UNC	140 ± 20	225 ± 25	305 ± 34	430 ± 45	583 ± 61	600 ± 60	813 ± 81
7/8 - 14 UNF	155 ± 25	260 ± 30	353 ± 41	475 ± 45	644 ± 61	660 ± 60	895 ± 81

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

NOTE: Torque values may have to be reduced when installing fasteners into threaded aluminum or brass. The specific torque value should be determined based

on the fastener size, the aluminum or base material strength, length of thread engagement, etc.

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

Standard Torque for Dry, Zinc 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 ± 5 in-lb	640 ± 60 N-cm	78 ± 7 in-lb	885 ± 80 N-cm
M6 X 1.0	96 ± 9 in-lb	1018 ± 100 N-cm	133 ± 13 in-lb	1500 ± 150 N-cm
M8 X 1.25	19 ± 2 ft-lb	26 ± 3 N-m	27 ± 2 ft-lb	36 ± 3 N-m
M10 X 1.5	38 ± 4 ft-lb	52 ± 5 N-m	53 ± 5 ft-lb	72 ± 7 N-m
M12 X 1.75	66 ± 7 ft-lb	90 ± 10 N-m	92 ± 9 ft-lb	125 ± 12 N-m
M16 X 2.0	166 ± 15 ft-lb	225 ± 20 N-m	229 ± 22 ft-lb	310 ± 30 N-m
M20 X 2.5	325 ± 33 ft-lb	440 ± 45 N-m	450 ± 37 ft-lb	610 ± 50 N-m

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

NOTE: Torque values may have to be reduced when installing fasteners into threaded aluminum or brass. The specific torque value should be determined based

on the fastener size, the aluminum or base material strength, length of thread engagement, etc.

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

Other Torque Specifications

SAE Grade 8 Steel Set Screws

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

Wheel Bolts and Lug Nuts

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

** For steel wheels and non-lubricated fasteners.

Thread Cutting Screws (Zinc Plated Steel)

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

Thread Cutting Screws (Zinc Plated Steel)

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

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

Conversion Factors

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

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

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

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



Kohler Gasoline Engine

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SERVICE AND REPAIRS	5	Engine Removal	14
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Fuel System	6	KOHLER ENGINE SERVICE MANUAL	

Introduction

This chapter gives information about specifications and repair of the Kohler engine used in the Multi Pro 1200 and 1250.

General maintenance procedures are described in your Operator's Manual. Information on engine troubleshooting, testing, disassembly and reassembly is identified in the Kohler Engine Service Manual that is included at the end of this section.

Most repairs and adjustments require tools which are commonly available in many service shops. Special tools are described in the Kohler Engine Service Manual. 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 Kohler engines are supplied through your Toro Distributor or a local Kohler Dealer.

Kohler Gasoline Engine

Specifications

Item	Description
Make / Designation	Kohler, CH640, 4-stroke, V-Twin Air Cooled, OHV
Number of Cylinders	2
Bore x Stroke	3.03 in x 2.64 in (77 mm x 67 mm)
Total Displacement	38 in ³ (624 cc)
Compression Ratio	8.5:1
Fuel	Unleaded, Regular Gasoline (Minimum 87 Octane)
Fuel Tank Capacity	5 U.S. gal (18.9 liters)
Governor	Mechanical
Low Idle Speed (no load)	800 to 950 RPM
High Idle Speed (no load)	3275 to 3425 RPM
Engine Oil	API SF or SG (see Operator's Manual for viscosity)
Oil Pump	Gear driven trochoid type
Crankcase Oil Capacity	2 U.S. qt (1.9 liters) with filter
Starter	12 VDC
Alternator/Regulator	12 VDC 25 AMP
Dry Weight (approximate)	90 lb (41 kg)

Adjustments

Adjust Engine Speed

1. Allow engine to reach operating temperature before checking or adjusting engine speed. Park machine on a level surface, shift range selector to neutral and engage parking brake.

2. Raise seat to gain access to engine speed control (Fig. 1).

3. With engine running, move accelerator pedal to **FAST** position.

4. Using a tachometer, check that engine is operating from **3275 to 3425 RPM**.

5. If high idle speed is incorrect, adjust high speed screw on control bracket (Fig. 2).

A. Loosen jam nut on high speed screw.

B. Adjust high speed screw to obtain **3275 to 3425 RPM**.

C. Tighten lock nut. Recheck high speed.

6. Allow accelerator pedal to return to **SLOW** position.

7. Using a tachometer, check that engine is operating at **800 to 950 RPM**.

8. If low speed is incorrect, adjust low speed screw (Fig. 2).

A. Loosen jam nut on slow speed screw.

B. Adjust slow speed screw to obtain **800 to 950 RPM**.

C. Tighten jam nut. Recheck low speed.

NOTE: When the engine returns to idle speed, the drive clutch should fully disengage. Idle speed may have to be reduced to ensure complete clutch disengagement.

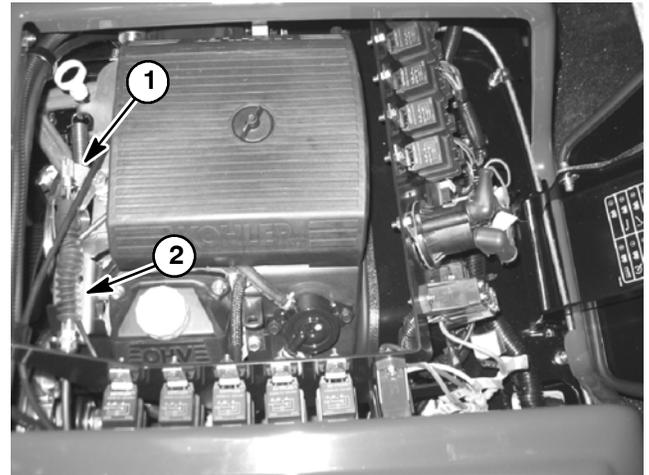


Figure 1

1. Engine speed control 2. Accelerator cable

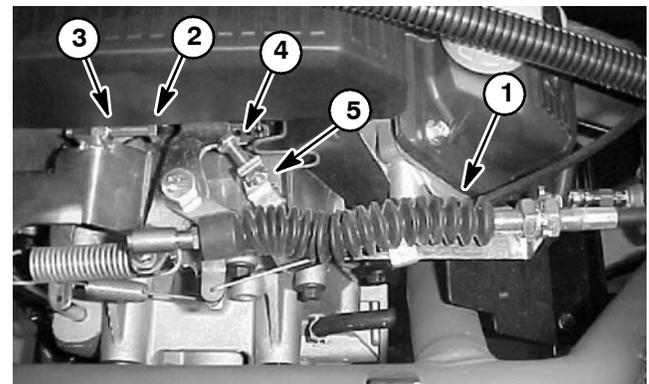


Figure 2

1. Accelerator cable 4. Low speed screw
2. High speed screw 5. Jam nut
3. Jam nut

Adjust Choke Cable

1. Park machine on a level surface, stop engine, engage parking brake and remove key from the ignition switch.

2. Remove air cleaner cover and air filter from engine (see Operator's Manual).

3. Move choke control on control panel while watching choke plate in carburetor.

A. Choke plate should be fully open when choke control is pushed in.

B. Choke plate should be fully closed when choke control is pulled out.

4. If cable adjustment is needed, loosen cap screw and nut that secure choke cable clamp. Reposition cable to allow correct choke operation. Secure choke cable clamp.

5. Reassemble air cleaner.

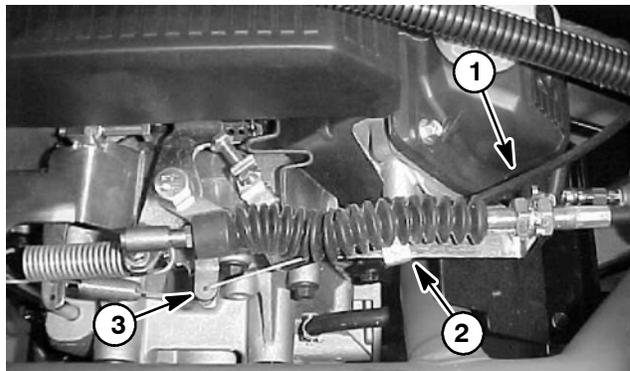


Figure 3

1. Choke cable
2. Cable clamp

3. Choke lever

Service and Repairs

Cooling System

To ensure proper engine cooling, make sure the grass screen, cooling fins and other external surfaces of the engine are kept clean at all times.

NOTE: Perform this maintenance procedure at the interval specified in the Operator's Manual.

IMPORTANT: The engine that powers the Multi Pro is air-cooled. Operating the engine with dirty or plugged cooling fins, a blocked grass screen, or a dirty or plugged blower housing will result in engine overheating and engine damage.

1. Park machine on a level surface, stop engine, engage parking brake and remove key from the ignition switch.

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

2. Clean cooling fins on both cylinder heads.

3. Clean grass screen and blower housing of dirt and debris (Fig. 4). Remove screen and housing if necessary.

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

4. Make sure grass screen and blower housing are re-installed to the engine if removed.

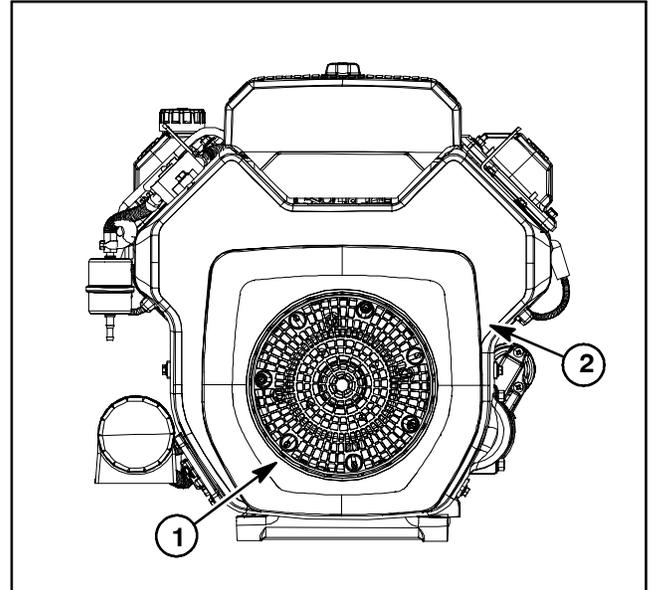


Figure 4

1. Grass screen

2. Blower housing

Fuel System

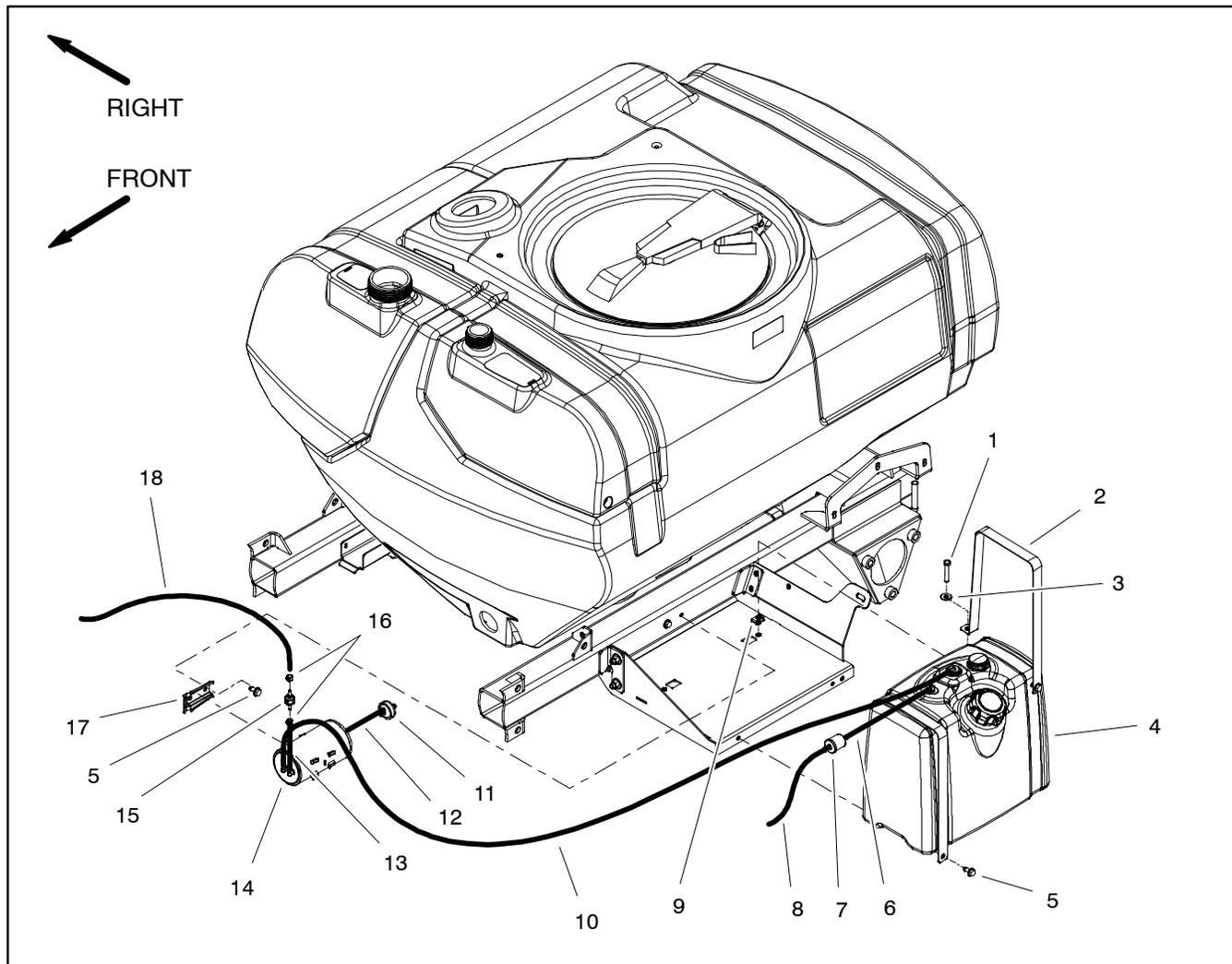


Figure 5

- | | | |
|--------------------------------------|-------------------------------------------|-------------------------|
| 1. Cap screw (2 used) | 7. Fuel filter | 13. Fuel hose |
| 2. Fuel tank strap (2 used) | 8. Fuel supply hose (fuel pump to filter) | 14. Carbon cannister |
| 3. Flat washer (2 used) | 9. U-nut (2 used) | 15. Vacuum check valve |
| 4. Fuel tank assembly | 10. Fuel hose | 16. Hose clamp (8 used) |
| 5. Flange head screw (4 used) | 11. Fuel filter | 17. Cannister bracket |
| 6. Fuel supply hose (filter to tank) | 12. Fuel hose | 18. Fuel hose |



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 lines for deterioration, damage, leaks or loose connections. Replace hoses, clamps and connections as necessary.

Drain and Clean Fuel Tank

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 contaminants and debris.

Fuel Tank Removal

1. Park machine on a level surface, stop engine, engage parking brake and remove key from the ignition switch.
2. Use a fuel transfer pump to remove fuel from the fuel tank and into a suitable container.
3. Note routing of fuel hoses for installation purposes. Disconnect fuel hoses from fuel standpipe and rollover valve. Plug fuel hoses to prevent leakage or contaminant entry.
4. Remove fuel tank from machine using Figure 5 as a guide.
5. Remove components from fuel tank as needed using Figure 6 as a guide.

Fuel Tank Installation

1. Install all removed components to fuel tank using Figure 6 as a guide.
2. Install fuel tank to machine using Figure 5 as a guide.
3. Remove plugs placed in fuel hoses during fuel tank removal. Connect fuel hoses to fuel standpipe and rollover valve. Secure fuel hoses with hose clamps.
4. Fill fuel tank.

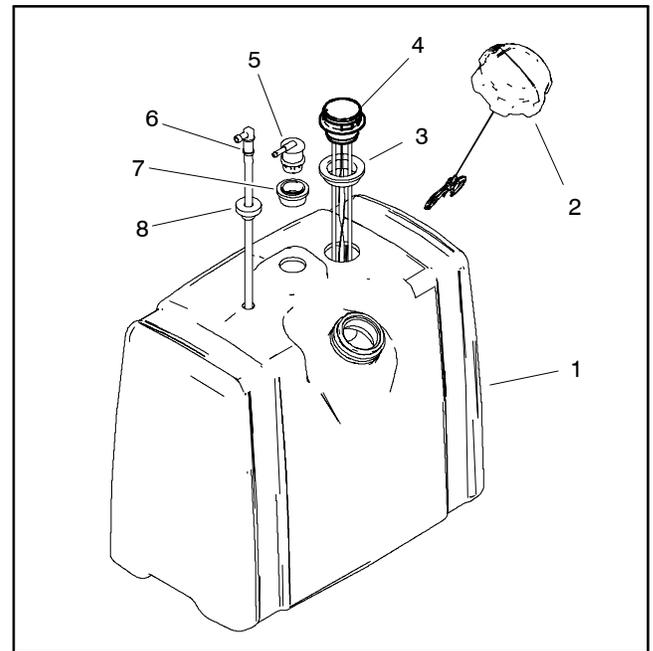


Figure 6

- | | |
|------------------|-------------------|
| 1. Fuel tank | 5. Rollover valve |
| 2. Fuel tank cap | 6. Standpipe |
| 3. Grommet | 7. Grommet |
| 4. Fuel gauge | 8. Bushing |

Exhaust System

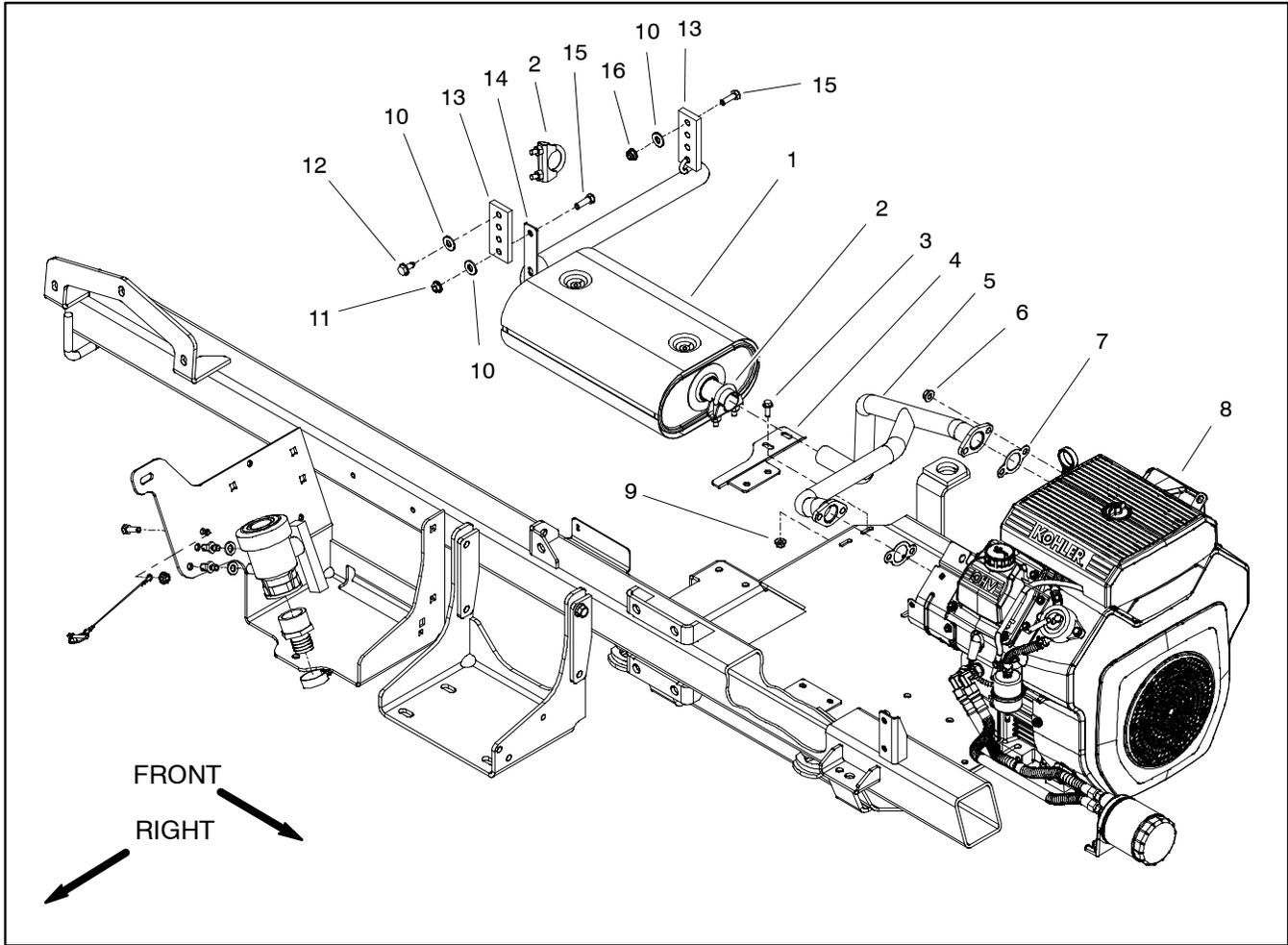


Figure 7

- | | | |
|-------------------------------|----------------------------|-----------------------------|
| 1. Muffler | 7. Exhaust gasket (2 used) | 12. Flange head screw |
| 2. Muffler clamp (2 used) | 8. Engine | 13. Muffler hanger (2 used) |
| 3. Flange head screw (2 used) | 9. Flange nut (2 used) | 14. Muffler hanger bracket |
| 4. Exhaust support bracket | 10. Flat washer (3 used) | 15. Cap screw (2 used) |
| 5. Exhaust manifold | 11. Flange nut | 16. Flange nut |
| 6. Flange nut (4 used) | | |

Removal (Fig. 7)



1. Park machine on a level surface, stop engine, engage parking brake and remove key from the ignition switch.
2. Gaining access from below machine, remove the muffler from the machine:
 - A. Support muffler to prevent it from unexpectedly shifting.
 - B. Remove muffler clamp (item 2) that secures muffler inlet to exhaust manifold and exhaust support bracket (item 4).
 - C. Remove fasteners that secure two (2) muffler hangers (item 13) to machine frame.
 - D. Slide muffler from exhaust manifold and remove from machine.
 - E. If necessary, remove remaining mounting components from muffler using Figure 7 as a guide.
3. Remove four (4) flange nuts from the exhaust studs on engine. Remove exhaust manifold from the engine.
4. Remove and discard exhaust gaskets from engine.

Installation (Fig. 7)

NOTE: Make sure engine and exhaust manifold sealing surfaces are free of debris or damage that may prevent a tight seal.

IMPORTANT: Finger tighten all exhaust system fasteners before securing so there is no preload on exhaust components.

1. Place new exhaust gaskets on the exhaust studs on engine. Position exhaust manifold to the engine and install four (4) flange nuts.
2. Install the muffler:
 - A. Install all removed mounting components to muffler using Figure 7 as a guide.
 - B. Slide muffler inlet onto exhaust manifold.
 - C. Secure muffler hangers (item 13) to machine frame with removed fasteners.
 - D. Install muffler clamp (item 2) to muffler inlet and exhaust support bracket (item 4).
3. Tighten fasteners to secure exhaust system:
 - A. Four (4) flange nuts to secure exhaust manifold to engine.
 - B. Fasteners to secure muffler hangers (item 13) to machine frame. Muffler hangers should be perpendicular to frame after tightening.
 - C. Two (2) nuts on muffler clamp to secure muffler inlet to exhaust support bracket and exhaust manifold.

Engine Mounting Plate Assembly

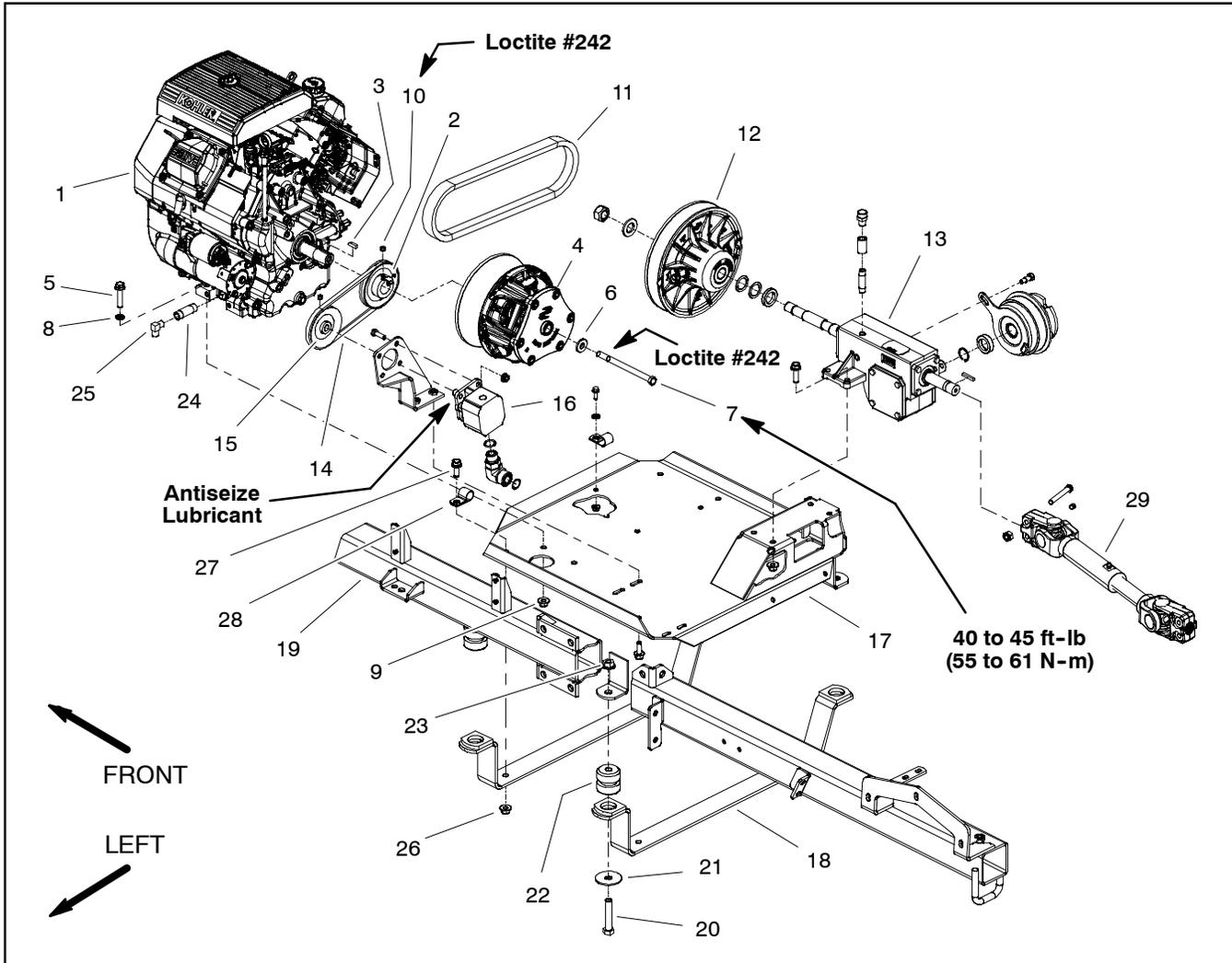


Figure 8

- | | | |
|-------------------------------|-----------------------------------|------------------------------------|
| 1. Engine | 11. CVT drive belt | 21. Washer (4 used) |
| 2. Pump pulley | 12. Driven clutch | 22. Engine mount assembly (4 used) |
| 3. Key | 13. Pump drive gearbox | 23. Flange nut (4 used) |
| 4. Drive clutch | 14. Steering pump drive belt | 24. Oil drain nipple |
| 5. Flange head screw (4 used) | 15. Steering pump pulley | 25. Oil drain elbow |
| 6. Stepped washer | 16. Hydraulic steering pump | 26. Flange nut (4 used) |
| 7. Cap screw | 17. Engine mounting plate | 27. Flange head screw (4 used) |
| 8. Lock washer | 18. Engine support strap (2 used) | 28. R-clamp (3 used) |
| 9. Flange nut (4 used) | 19. Machine frame | 29. Transaxle driveshaft |
| 10. Set screw (2 used) | 20. Cap screw (4 used) | |

NOTE: For easiest service access to the engine, removal of the spray tank is recommended (see Spray Tank Removal in the Service and Repairs section of Chapter 6 - Spray System). As an alternative, the engine mounting plate can be lowered from the machine to access the engine. The hydraulic hoses to the steering pump and the fuel hoses to the engine do not need to be disconnected unless the mounting plate is to be completely removed from the machine.



CAUTION

The engine, exhaust system and drive components may be hot. To avoid possible burns, allow all components to cool before working on the engine mounting plate assembly.

Removal (Fig. 8)

1. Park machine on a level surface, stop engine and remove key from the ignition switch. Chock wheels to keep the machine from moving.

2. Disconnect negative (-) and then positive (+) battery cables at the battery.

3. Remove muffler section of the exhaust system (see Exhaust System Removal in this section).

4. Remove accelerator cable from engine (Figs. 9 and 10).

A. Slide the sleeve back on the cable ball joint and lift accelerator cable from the ball stud.

B. Loosen one of the two cable jam nuts that secures accelerator cable to control bracket.

C. Remove accelerator cable from the engine speed control bracket and position away from the engine.

5. Remove choke cable from the engine speed control bracket (Figs. 9 and 10).

6. Gaining access from under operator seat, loosen two (2) flange head screws and flange nuts that secure oil filter adapter to right hand frame rail (Fig. 11). Slide adapter with oil filter away from frame.

7. Disconnect engine electrical connections. Position unplugged wires away from engine.

A. Unplug engine wire harness from machine wire harness.

B. Remove nut on starter solenoid stud. Remove fusible link connector and positive (+) battery cable from solenoid stud.

C. Remove flange head screw and nut under starter motor that secures engine and negative (-) cable to engine mounting plate (Fig. 12).

8. Remove transaxle drive shaft from pump drive gearbox (see Pump Drive Gearbox in the Service and Repairs Section of Chapter 7 - Drive Train). Locate and retrieve key.

9. Disconnect spray pump coupler from pump drive electric clutch. Unplug clutch wiring connector from machine harness (see Pump Drive Electric Clutch in the Service and Repairs Section of Chapter 6 - Spray System).

10. If the mounting plate is being removed from machine, disconnect fuel hose from fuel pump on engine. Pull fuel line from R-clamps on mount plate and position disconnected fuel line away from engine.

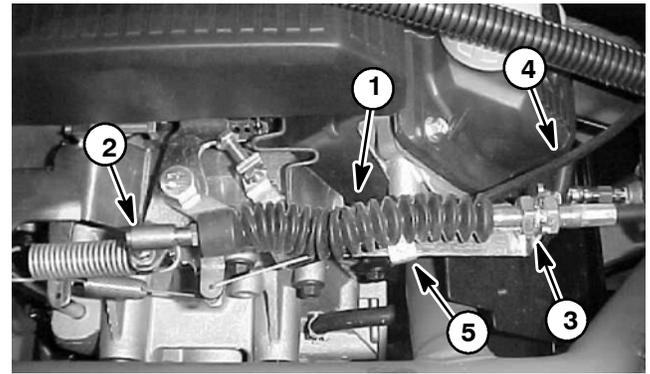


Figure 9

- | | |
|----------------------|----------------------|
| 1. Accelerator cable | 4. Choke cable |
| 2. Cable ball joint | 5. Choke cable clamp |
| 3. Cable jam nut | |

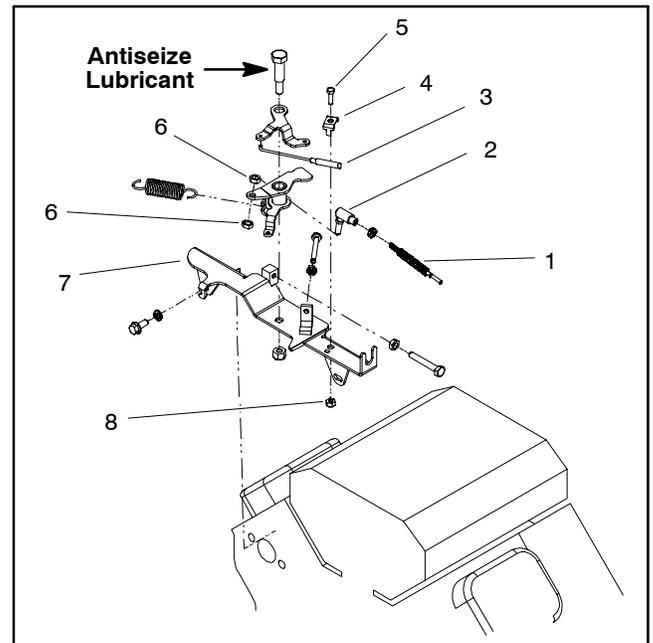


Figure 10

- | | |
|----------------------|--------------------------|
| 1. Accelerator cable | 5. Cap screw |
| 2. Cable ball joint | 6. Ball joint jam nut |
| 3. Choke cable | 7. Speed control bracket |
| 4. Choke cable clamp | 8. Hex nut |

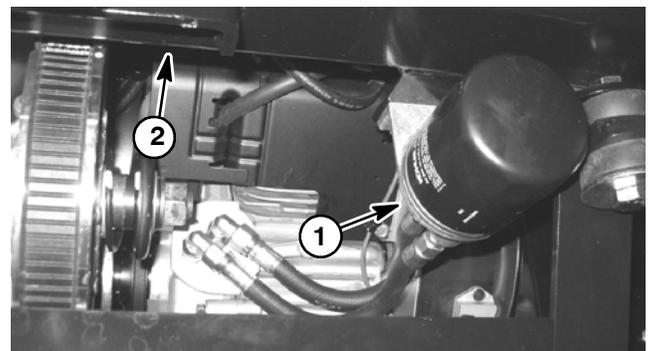


Figure 11

- | | |
|-----------------------|------------------|
| 1. Oil filter adapter | 2. RH frame rail |
|-----------------------|------------------|



CAUTION

Rotate steering wheel to relieve hydraulic system pressure and avoid injury from pressurized hydraulic oil.

11. If the mounting plate assembly is being removed from machine, label all hydraulic connections for reassembly purposes. Clean hydraulic hose ends prior to disconnecting the hoses. Remove hydraulic hoses from steering pump. Cap or plug openings of pump and hoses to prevent contamination.

12. Remove engine mounting plate assembly from machine (Figs. 8 and 12):

A. Support the engine mounting plate assembly from below to prevent it from falling.

B. Remove four (4) cap screws, washers and flange nuts that secure the engine support straps to the frame.

IMPORTANT: Make sure to not damage the engine, fuel hoses, hydraulic lines, electrical harness or other parts while lowering the engine mounting plate assembly.

C. Carefully lower engine mounting plate assembly from machine.

Installation (Fig. 8)

1. Place machine on a level surface with key removed from the ignition switch. Chock wheels to keep the machine from moving.

2. Reinstall engine mounting plate assembly to machine (Figs. 8 and 12):

A. Make sure that engine mounts are correctly assembled to mounting straps (Fig. 13). Position engine mounting plate assembly under machine.

IMPORTANT: Make sure to not damage the engine, fuel hoses, hydraulic lines, electrical harness or other parts while raising the engine mounting plate assembly.

B. Carefully raise engine mounting plate assembly to machine frame.

C. Secure engine mounting plate assembly to frame with four (4) cap screws, washers and flange nuts.

3. Position key in pump drive gearbox shaft. Install transaxle drive shaft to pump drive gearbox (see Pump Drive Gearbox in the Service and Repairs Section of Chapter 7 - Drive Train).

Kohler Gasoline Engine

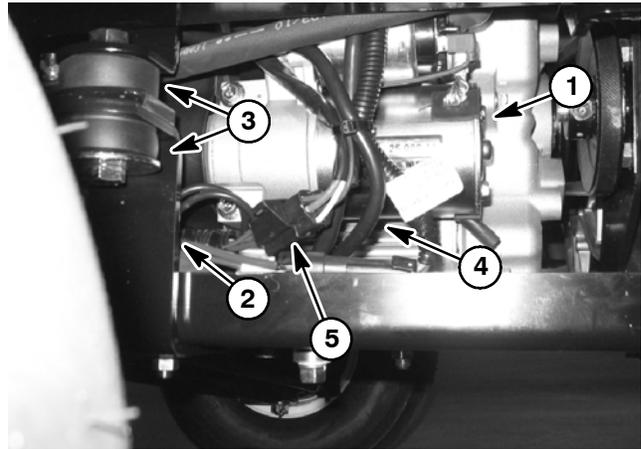


Figure 12

- | | |
|-------------------------|---------------------------|
| 1. Engine starter motor | 4. Negative battery cable |
| 2. Engine support strap | 5. Engine wire harness |
| 3. Engine mount | |

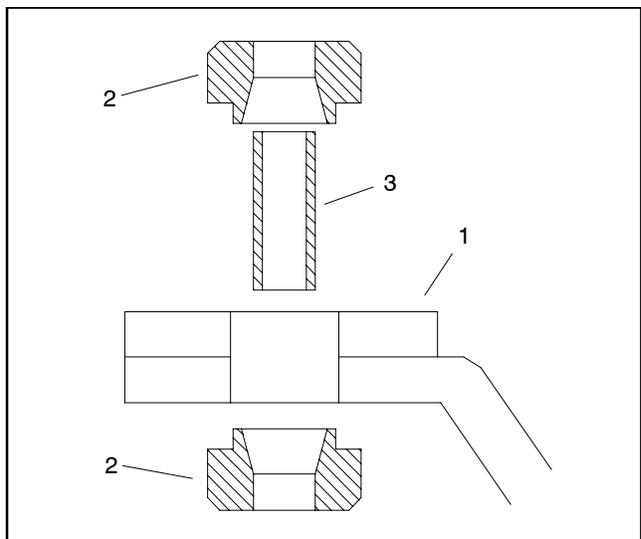


Figure 13

- | | |
|-------------------------|----------------------|
| 1. Engine support strap | 3. Engine mount tube |
| 2. Engine mount cushion | |

4. Connect spray pump coupler to pump drive electric clutch. Plug clutch wiring connector into machine harness (see Pump Drive Electric Clutch in the Service and Repairs Section of Chapter 6 - Spray System).

5. Reconnect engine electrical connections.

A. Pull wire harness into position, keeping harness away from any moving components.

B. Secure fusible link connector and positive (+) battery cable to starter solenoid stud with nut.

C. Connect engine wire harness to main wire harness.

D. From below, install flange head screw and nut under starter motor that secures engine and negative (-) cable (Fig. 12).

6. Install choke cable to engine and secure with cable clamp (Figs. 9 and 10). Check choke cable adjustment (see Adjust Choke Cable in the Adjustments Section of this chapter).
7. Reconnect accelerator cable to engine (Figs. 9 and 10).
 - A. Position accelerator cable to the engine speed control bracket.
 - B. Slide the sleeve back on the cable ball joint and place cable ball joint on ball stud. Release the sleeve so it slides over the stud to secure cable.
 - C. Tighten cable jam nuts that secure accelerator cable to control bracket.
8. If fuel line was removed, route fuel line through R-clamps on mounting plate. Connect fuel line to the fuel pump and secure with clamp.
9. Position oil filter adapter with oil filter to the right hand frame rail. Install two (2) flange head screws and flange nuts and secure oil filter adapter to machine (Fig. 11).
10. Reinstall the muffler section of the exhaust system (see Exhaust System Installation in this section).
11. If hydraulic hoses were disconnected, make sure hydraulic hoses and pump ports are clean. Remove plugs and caps from pump and hoses that were placed during disassembly. Install hydraulic hoses to steering pump.
12. Check engine oil level and transaxle/hydraulic fluid level (see Operator's Manual).
13. Connect positive (+) and then negative (-) battery cables to the battery.
14. Check engine speed (see Adjust Engine Speed in the Adjustments Section of this chapter).

Engine

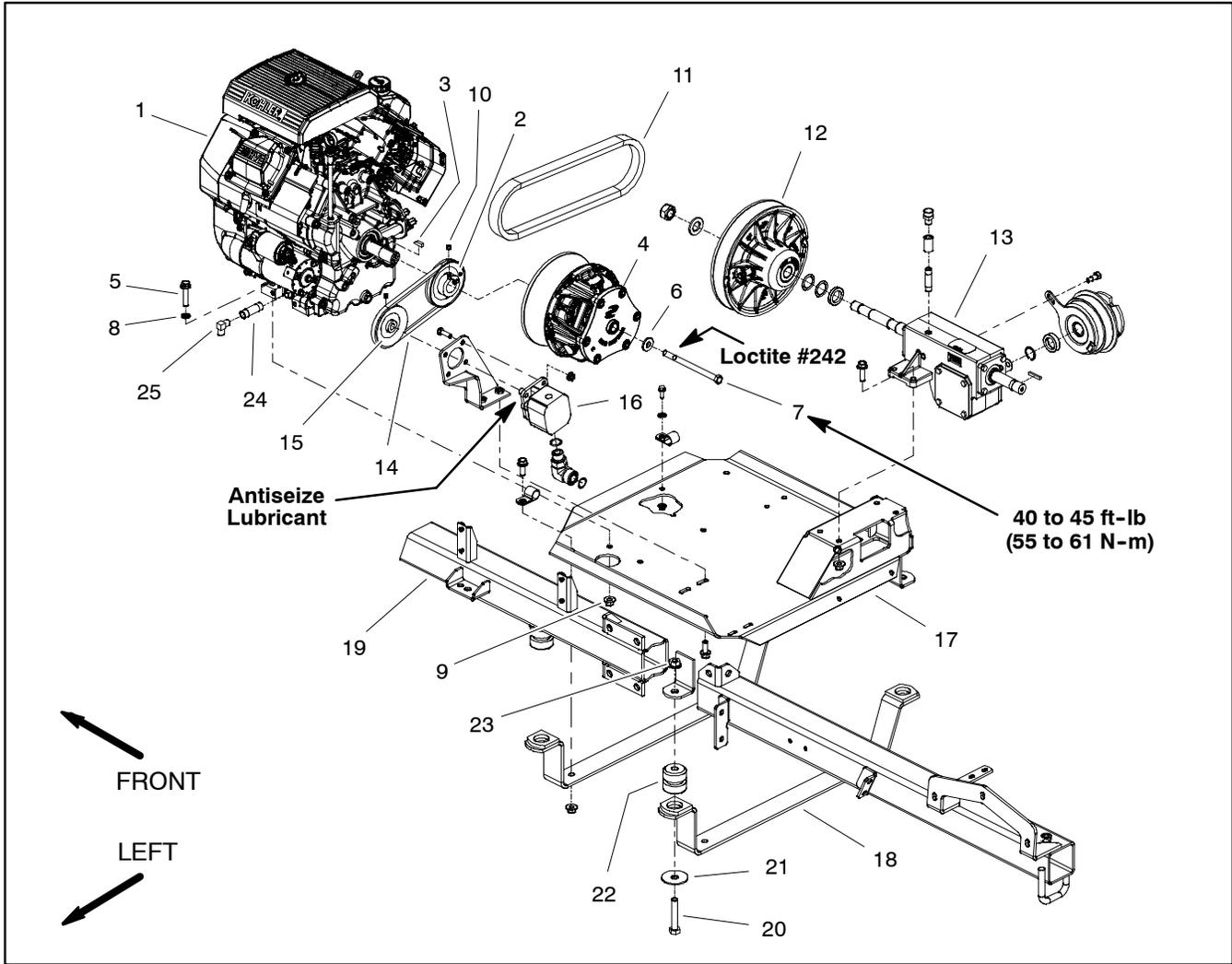


Figure 14

- | | | |
|--------------------------------|------------------------------|------------------------------------|
| 1. Engine | 10. Set screw (2 used) | 18. Engine support strap (2 used) |
| 2. Pump pulley | 11. CVT drive belt | 19. Machine frame |
| 3. Key | 12. Driven clutch | 20. Cap screw (4 used) |
| 4. Drive clutch | 13. Pump drive gearbox | 21. Washer (4 used) |
| 5. Flange head screw (4 used) | 14. Steering pump drive belt | 22. Engine mount assembly (4 used) |
| 6. Stepped washer | 15. Steering pump pulley | 23. Flange nut (4 used) |
| 7. Cap screw | 16. Hydraulic steering pump | 24. Oil drain nipple |
| 8. Lock washer (for grounding) | 17. Engine mounting plate | 25. Oil drain elbow |
| 9. Flange nut (4 used) | | |

Engine Removal (Fig. 14)



CAUTION

The engine, exhaust system and drive components may be hot. To avoid possible burns, allow all components to cool before removing engine from the machine.

1. Park machine on a level surface, stop engine and remove key from the ignition switch. Check wheels to keep the machine from moving.

2. Remove the spray tank from machine to access engine (see Spray Tank Removal in the Service and Repairs section of Chapter 6 - Spray System).

3. Disconnect negative (-) and then positive (+) battery cables at the battery.

4. Remove exhaust system (see Exhaust System Removal in this section).

5. Disconnect fuel supply hose from fuel pump on engine and position disconnected fuel line away from engine.