FORM NO. 87-705-ST

TORO®

MODEL NUMBER 30790, 30793, AND CUTTING UNITS

SERVICE AND OVERHAUL MANUAL

GROUNDSMASTER® 62/220/217-D

Preface

This Service and Overhaul Manual was written to give the service technician information about the TORO GROUNDSMASTER® 62/220/217-D mowers. This manual contains information for all models produced since 1983.

This manual is not designed to teach component theory. The purpose of this manual is to provide the service technician with a working guide for safe maintenance, troubleshooting, test, repair, and overhaul procedures.

The Toro Company has made every effort to make this service manual a useful and lasting addition to every service facility. To assure proper and effective service, and to provide the best performance for the life of the machine, you should read this manual carefully.

Read the complete sequence of instructions (example: steps 1-6) before performing a procedure.

The Toro Company reserves the right to change product specifications or this manual 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.

Table of Contents

Table of Contents

Chapter 13 - CUTTING UNITS

Chapter 14 - CLEANING AND SEASONAL STORAGE

SAFETY INSTRUCTIONS

Chapter 1

Read and understand the following safety instructions before operating, maintaining, testing, servicing, or repairing the GROUNDSMASTER® mowers.

The GROUNDSMASTER® 62/220/217-D Mowers have been tested and verified for compliance with the B71.4 specifications of the American National Standards Institute (ANSI) at the time of manufacture for that model. However, improper use or maintenance by the owner or operator of the machine can result in personal injury. Failure to operate the machine in accordance with the following Safety Instructions MAY RESULT IN PERSONAL INJURY.

Before Operating

1. Read and understand the Operator's Manual before starting, operating, or repairing the machine. Become familiar with all controls and know how to stop the machine quickly. Additional Operator's Manuals are available through:

The Toro Company
Publications Department
8111 Lyndale Avenue South
Minneapolis, MN 55420

Use the model number and serial number when referring to your machine. If you have questions about this Service and Repair Manual please contact:

The Toro Company
Service Department
8111 Lyndale Avenue South
Minneapolis, MN 55420

2. Never allow children or adults unfamiliar with operation of these machines operate them. Keep everyone, especially children and pets, away from the area of operation.

3. Remove all debris or other objects that might be picked up and thrown by the cutting unit blades or other attached implements. Keep all bystanders away from the area of operation.

4. Keep all shields and safety devices in place. If a shield, safety device or decal is missing, defective or damaged, repair or replace it before operating. Make sure the machine is in safe operating condition. Tighten any loose nuts, bolts, and screws.

5. Always wear long pants and sturdy shoes. Do not operate the machine while wearing sandals, tennis shoes, sneakers, or short pants. Do not wear loose clothing. Loose clothing can get caught in moving parts. Wearing safety glasses, safety shoes, and a helmet is recommended and also required by some local ordinances and insurance regulations.

6. Make sure that all the interlock switches operate correctly so the engine cannot be started unless the traction pedal is released (NEUTRAL position) and the P.T.O lever is in the DISENGAGED position. Replace any failed switch before operating the machine.

7. Fill the fuel tank before starting the engine. Avoid spilling any fuel. Gasoline and diesel fuel is flammable. Handle fuel carefully. DO NOT SMOKE.

   A. Use an approved fuel container.

   B. Do not fill the fuel tank when the engine is hot or running.

   C. Do not smoke while handling fuels or lubricants.

   D. Fill the tank to one inch (25 mm) from the BOTTOM of the filler neck. Do not overfill.

   E. Wipe up any spilled fuel. Install the fuel container cap and the machine fuel tank cap securely before starting the engine.

While Operating

8. Do not run the engine in a confined area without adequate ventilation. EXHAUST FUMES CAN KILL.

9. Before staring the engine:

A. Engage the parking brake.

B. Make sure the traction pedal is in the NEUTRAL position and the P.T.O. lever is in the DISENGAGED position.

C. After the engine is started, release the parking brake and keep your foot off the traction pedal. The machine must not move. If the machine moves, the neutral return mechanism must be adjusted. Turn the engine OFF and adjust the neutral return mechanism so the machine does not move when the engine is running and the traction pedal is released. (See CHAPTER 6 - HYDRAULIC SYSTEM.)

10. Sit on the seat when starting the engine and operating the machine.

11. The maximum recommended seating capacity is one person. Never carry passengers.

12. Be alert when operating. To prevent loss of control:

A. Operate only in daylight or when there is good artificial light.

B. Watch for holes or other hidden hazards.

C. Do not drive close to sand traps, ditches, creeks, or other hazardous areas.

D. Reduce speed when making sharp turns and when turning on hill sides.

E. Avoid sudden stops and starts.

F. Before backing up, look to the rear to make sure no people or obstacles are behind the machine.

G. Watch out for traffic when near or going across roads. Always yield the right of way.

13. Go across slopes carefully. Do not start or stop suddenly when traveling uphill or downhill.

14. The grass deflector must always be installed on the cutting unit. If the cutting unit discharge area ever plugs, disengage the P.T.O. and turn the engine OFF. Use an object with a long handle to remove the obstruction..

15. Never raise the cutting unit or other attached implement while the blades or other parts are rotating.

16. If the cutting blades or other implement components strike a solid object, or if the machine vibrates abnormally, disengage the P.T.O. lever, move the throttle to SLOW, set the parking brake, and turn the engine OFF. Remove the key from the ignition switch (all models) and disconnect the high tension wires from the spark plugs (gasoline engine models) to prevent the possibility of accidental starting. Check the cutting unit or other implement and traction unit for damage and defective parts. Repair any damage before restarting the engine and operating the cutting unit or other implement. Be sure the cutting unit blades are in good condition and the blade bolts are tightened to the correct torque.

17. Do not touch the engine, muffler, or muffler shroud while the engine is running or soon after it has stopped. These areas could be hot enough to cause a burn.

18. Lower the cutting unit or other attached implement to the ground and remove the key from the ignition switch when the machine is left unattended.

19. Before getting off the seat:

A. Move the traction pedal to the NEUTRAL POSITION and remove your foot from the pedal.

B. Move the throttle to the SLOW position.

C. Engage the parking brake and move the P.T.O. lever to the DISENGAGED position.

D. Turn the engine OFF and remove the key from the ignition switch. Wait for all movement to stop before getting off the seat.

While Performing Maintenance

20. Remove the key from the ignition switch and disconnect the positive (+) cable from the battery. Secure the cable off to the side. This will prevent accidental starting of the engine when servicing, cleaning, adjusting, or storing the machine.

Safety Instructions

21. If major repairs are ever needed, or assistance is desired, contact an Authorized TORO Distributor or Dealer.

22. To reduce potential fire hazards, keep the engine free of excessive grease, grass, leaves, and accumulation of dirt.

23. Be sure the machine is in good operating condition. Keep nuts, bolts, and screws tight. Check all cutting blade mounting bolts frequently for the proper torque; 75 to 100 ft.lbs (10.4 to 13.8 KgM).

24. If the engine must be running to perform maintenance or an adjustment, use extreme caution. Keep hands, feet, clothing, and other body parts away from the P.T.O. shaft, cutting unit blades, and other moving parts.

25. Do not overspeed the engine by changing the governor settings. The maximum engine speed (with no load and engine coupled to the transmission) is listed in CHAPTER 3 - ONAN ENGINE SYSTEMS, and CHAPTER 4 - MITSUBISHI ENGINE SYSTEMS

26. The engine must be stopped before checking the oil level or adding oil to the crankcase.

27. At the time of manufacture, the GROUNDSMASTER® 62/220/217-D mowers conformed to safety standards in effect for riding mowers. To assure optimum performance and safety of the machine, always use genuine TORO replacement parts and accessories. NEVER USE "WILL FIT" REPLACEMENT PARTS AND ACCESSORIES MADE BY OTHER MANUFACTURERS. Using unapproved replacement parts and accessories could void the warranty of your TORO mower.

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	0.9375	- 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	- 7.541	13/16	0.8125	- 20.638
21/64	0.328125	- 8.334	53/64	0.828125	- 21.034
11/32	0.34375	- 8.731	27/32	0.84375	- 21.431
23/64	0.359375	- 9.128	55/64	0.859375	- 21.828
3/8	0.3750	- 9.525	7/8	0.8750	- 22.225
25/64	0.390625	- 9.922	57/64	0.890625	- 22.622
13/32	0.40625	- 10.319	29/32	0.90625	- 23.019
27/64	0.421875	- 10.716	59/64	0.921875	- 23.416
7/16	0.4375	- 11.112	15/16	0.9375	- 23.812
29/64	0.453125	- 11.509	61/64	0.953125	- 24.209
15/32	0.46875	- 11.906	31/32	0.96875	- 24.606
31/64	0.484375	- 12.303	63/64	0.984375	- 25.003
1/2	0.5000	- 12.700	1	1.000	- 25.400

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

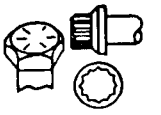
U.S to Metric Conversions

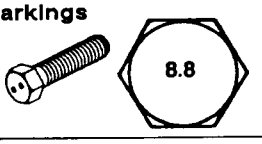
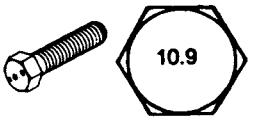
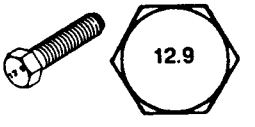
	To Convert	Into	Multiply By
Linear Measurement	Miles	Kilometers	1.609
	Yards	Meters	0.9144
	Feet	Meters	0.3048
	Feet	Centimeters	30.48
	Inches	Meters	0.0254
	Inches	Centimeters	2.54
	Inches	Millimeters	25.4
Area	Square Miles	Square Kilometers	2.59
	Square Feet	Square Meters	0.0929
	Square Inches	Square 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
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

Use these torque values when specific torque values are not given. DO NOT use these values in place of specified values.

The torque values listed below are for lubricated threads. Plated threads are considered to be lubricated.

Capscrew Markings and Torque Values - U.S. Customary								
SAE Grade Number	5				8			
Capscrew Head Markings								
Capscrew Body Size	Capscrew Torque - Grade 5				Capscrew Torque - Grade 8			
	Cast Iron		Aluminum		Cast Iron		Aluminum	
	ft-lb	Nm	ft-lb	Nm	ft-lb	Nm	ft-lb	Nm
1/4-20	7	9	6	8	11	15	9	12
-28	9	12	7	9	13	18	10	14
5/16-18	15	20	12	16	22	30	18	24
-24	17	23	14	19	24	33	19	25
3/8-16	30	40	20	25	40	55	30	40
-24	30	40	25	35	45	60	35	45
7/16-14	45	60	35	45	65	90	50	65
-20	50	65	40	55	70	95	55	75
1/2-13	70	95	55	75	95	130	75	100
-20	75	100	60	80	110	150	90	120
9/16-12	100	135	80	110	140	190	110	150
-18	110	150	85	115	155	210	125	170
5/8-11	135	180	110	150	190	255	150	205
-18	155	210	120	160	215	290	170	230
3/4-10	240	325	190	255	340	460	270	365
-16	270	365	210	285	380	515	300	410
7/8-9	360	490	280	380	550	745	440	600
-14	390	530	310	420	610	825	490	660
1-8	530	720	420	570	820	1100	660	890
-14	590	800	480	650	890	1200	710	960

Capscrew Markings and Torque Values - Metric												
Commercial Steel Class	8.8				10.9				12.9			
Capscrew Head Markings												
Thread Diameter mm	Capscrew Torque - Class 8.8				Capscrew Torque - Class 10.9				Capscrew Torque - Class 12.9			
	Cast Iron		Aluminum		Cast Iron		Aluminum		Cast Iron		Aluminum	
	ft-lb	Nm	ft-lb	Nm	ft-lb	Nm	ft-lb	Nm	ft-lb	Nm	ft-lb	Nm
6	5	9	4	7	9	14	7	11	9	14	7	11
7	9	14	7	11	14	18	11	14	18	23	14	18
8	18	25	14	18	23	32	18	25	27	36	21	28
10	30	40	25	30	45	60	35	45	50	70	40	55
12	55	70	40	55	75	105	60	80	95	125	75	100
14	85	115	65	90	120	160	95	125	145	195	110	150
16	130	180	100	140	175	240	135	190	210	290	165	220
18	170	230	135	180	240	320	185	250	290	400	230	310

Service Interval Chart

Groundsmaster® 62 / 220

Date												
Hour Meter Reading												
SERVICE INTERVAL	▼	10	25	50	100	150	200	250	300	350	400	450
Blower Screen, Clean	Daily											
Oil Level, Check, Engine	Daily											
Oil Level, Check, Hydraulic	Daily											
Safety Interlock, Check	Daily											
Transmission Filter, Replace, Initial	5											
Brake Pedal Travel, Check, Initial	10											
Tighten any Loose Fasteners, Initial	10											
Front Wheel Lug Nuts, Tighten, Initial	10											
Engine Oil, Replace, Initial	25											
Lubrication, Grease/Oil	25											
Tire Pressure, Check 12 psi (83 kPa)	25											
Hydraulic Hoses, Lines, Fittings & Pump, Check for Leaks or Damage	25											
Engine Oil & Filter, Replace, Routine (More when cond. are hot or dirty)	50											
Battery, Check	50											
PTO Belt Tension, Check	50											
Air Cleaner (Dust Cup and Baffle) (More when conditions are dirty)	50											
Engine Cooling Fins, Clean	50											
Front Wheel Lug Nuts, Tighten, Initial	100											
Brakes, Check	100											
Spark Plug, Check	100											
Transmission Oil and Filter, Replace	250											
Fuel System, Check	250											
Fuel Filter, Replace	250											
Points, Replace	250											
Condenser, Replace	250											
Timing, Check	250											
Valves, Adjust	250											
Engine rpm, Check	250											
Air Cleaner (Filter) Service	250											
Combustion Chamber, Clean (Leaded Fuel)	250											
Breather Valve, Clean	250											
Steering, Check	250											
Rear Wheel Toe-In, Check	250											
Front Wheel Lug Nuts, Tighten, Routine	250											
Rear Wheel Bearings, Repack and Adjust	500											
Transmission By-Pass Pins, Grease	500											
Combustion Chamber, Clean (Unleaded Fuel)	500											
Interlock Switches, Replace All (2 years)	1000											

Service Interval Chart

Groundsmaster® 62 / 220

Date												
Hour Meter Reading												
SERVICE INTERVAL	➧	**500**	**550**	**600**	**650**	**700**	**750**	**800**	**850**	**900**	**950**	**1000**
Blower Screen, Clean	Daily											
Oil Level, Check, Engine	Daily											
Oil Level, Check, Hydraulic	Daily											
Safety Interlock, Check	Daily											
Transmission Filter, Replace, Initial	5											
Brake Pedal Travel, Check, Initial	10											
Tighten any Loose Fasteners, Initial	10											
Front Wheel Lug Nuts, Tighten, Initial	10											
Engine Oil, Replace, Initial	25											
Lubrication, Grease/Oil	25											
Tire Pressure, Check 12 psi (83 kPa)	25											
Hydraulic Hoses, Lines, Fittings & Pump, Check for Leaks or Damage	25											
Engine Oil & Filter, Replace, Routine (More when cond. are hot or dirty)	50											
Battery, Check	50											
PTO Belt Tension, Check	50											
Air Cleaner (Dust Cup and Baffle) (More when conditions are dirty)	50											
Engine Cooling Fins, Clean	50											
Front Wheel Lug Nuts, Tighten, Initial	100											
Brakes, Check	100											
Spark Plug, Check	100											
Transmission Oil and Filter, Replace	250											
Fuel System, Check	250											
Fuel Filter, Replace	250											
Points, Replace	250											
Condenser, Replace	250											
Timing, Check	250											
Valves, Adjust	250											
Engine rpm, Check	250											
Air Cleaner (Filter) Service	250											
Combustion Chamber, Clean (Leaded Fuel)	250											
Breather Valve, Clean	250											
Steering, Check	250											
Rear Wheel Toe-In, Check	250											
Front Wheel Lug Nuts, Tighten, Routine	250											
Rear Wheel Bearings, Repack and Adjust	500											
Transmission By-Pass Pins, Grease	500											
Combustion Chamber, Clean (Unleaded Fuel)	500											
Interlock Switches, Replace All (2 years)	1000											

Service Interval Chart

Groundsmaster® 217-D

Date												
Hour Meter Reading												
SERVICE INTERVAL	▼	10	25	50	100	150	200	250	300	350	400	450
Oil Level, Engine, Check	Daily											
Oil Level, Transmission, Check	Daily											
Safety Interlock, Check	Daily											
Water Separator, Check	Daily											
Radiator and Coolant, Check (More when conditions are dirty)	Daily											
Transmission Filter, Replace, Initial	5											
Brake Pedal Travel, Check, Initial	10											
Tighten any Loose Fasteners, Initial	10											
Front Wheel Lug Nuts, Tighten, Initial	10											
Lubrication, Grease/Oil	25											
Tire Pressure, Check 12 psi (83 kPa)	25											
Hydraulic Hoses, Lines, Fittings & Pump, Check for Leaks or Damage	25											
Engine Oil Filter, Replace, Initial	50											
Engine Oil, Replace (More often in dirty conditions)	50											
Battery, Check	50											
PTO Belt Tension, Check	50											
Air Cleaner (Dust Cup and Baffle) (More when conditions are dirty)	50											
Valve Clearance, Check, Intital	50											
Engine Oil Filter, Replace, Routine	100											
Engine Fan and Alternator Belts, Check	100											
Front Wheel Lug Nuts, Tighten, Initial	100											
Brakes, Check	100											
Transmission Oil and Filter, Replace	250											
Engine rpm, Check	250											
Air Cleaner (Filter) Service	250											
Steering, Check	250											
Rear Wheel Toe-in, Check	250											
Front Wheel Lug Nuts, Tighten, Routine	250											
Fuel Filter, Replace	400											
Fuel Pump Filter, Replace	400											
Fuel Lines and Connections, Check	400											
Fuel Tank, Drain and Clean	400											
Valve Clearance, Check, Routine	400											
Rear Wheel Bearings, Repack and Adjust	500											
Transmission By-Pass Pins, Grease	500											
Interlock Switches, Replace All (2 years)	1000											
Cooling System, Drain and Flush (2 years)	1000											

Service Interval Chart

Groundsmaster® 217-D

Date												
Hour Meter Reading												
SERVICE INTERVAL	➧	500	550	600	650	700	750	800	850	900	950	1000
Oil Level, Engine, Check	Daily											
Oil Level, Transmission, Check	Daily											
Safety Interlock, Check	Daily											
Water Separator, Check	Daily											
Radiator and Coolant, Check (More when conditions are dirty)	Daily											
Transmission Filter, Replace, Initial	5											
Brake Pedal Travel, Check, Initial	10											
Tighten any Loose Fasteners, Initial	10											
Front Wheel Lug Nuts, Tighten, Initial	10											
Lubrication, Grease/Oil	25											
Tire Pressure, Check 12 psi (83 kPa)	25											
Hydraulic Hoses, Lines, Fittings & Pump, Check for Leaks or Damage	25											
Engine Oil Filter, Replace, Initial	50											
Engine Oil, Replace (More often in dirty conditions)	50											
Battery, Check	50											
PTO Belt Tension, Check	50											
Air Cleaner (Dust Cup and Baffle) (More when conditions are dirty)	50											
Valve Clearance, Check, Intital	50											
Engine Oil Filter, Replace, Routine	100											
Engine Fan and Alternator Belts, Check	100											
Front Wheel Lug Nuts, Tighten, Initial	100											
Brakes, Check	100											
Transmission Oil and Filter, Replace	250											
Engine rpm, Check	250											
Air Cleaner (Filter) Service	250											
Steering, Check	250											
Rear Wheel Toe-In, Check	250											
Front Wheel Lug Nuts, Tighten, Routine	250											
Fuel Filter, Replace	400											
Fuel Pump Filter, Replace	400											
Fuel Lines and Connections, Check	400											
Fuel Tank, Drain and Clean	400											
Valve Clearance, Check, Routine	400											
Rear Wheel Bearings, Repack and Adjust	500											
Transmission By-Pass Pins, Grease	500											
Interlock Switches, Replace All (2 years)	1000											
Cooling System, Drain and Flush (2 years)	1000											

Service Interval Chart

Cutting Units

Date												
Hour Meter Reading												
SERVICE INTERVAL	➧	**10**	**25**	**50**	**100**	**150**	**200**	**250**	**300**	**350**	**400**	**450**
Deck, Remove Covers and Wash	Daily											
Blades and Fastener Torque, Check	Daily											
Caster Arm Bushings, Lubricate	Daily											
Caster Wheel Bearings, Lubricate	Daily											
Pneumatic Caster Tires, Check Pressure 12 psi (83 kPa)	25											
Grease Fittings, Lubricate	50											
Cutting Unit, Clean	50											
Blade Drive Belts, Check	50											
Gear Box Oil, Check	50											
Gear Box Oil, Replace	500											

Date												
Hour Meter Reading												
SERVICE INTERVAL	➧	**500**	**550**	**600**	**650**	**700**	**750**	**800**	**850**	**900**	**950**	**1000**
Deck, Remove Covers and Wash	Daily											
Blades and Fastener Torque, Check	Daily											
Caster Arm Bushings, Lubricate	Daily											
Caster Wheel Bearings, Lubricate	Daily											
Pneumatic Caster Tires, Check Pressure 12 psi (83 kPa)	25											
Grease Fittings, Lubricate	50											
Cutting Unit, Clean	50											
Blade Drive Belts, Check	50											
Gear Box Oil, Check	50											
Gear Box Oil, Replace	500											

ONAN ENGINE

Chapter 3

Introduction

This chapter gives specifications, maintenance, troubleshooting and repair instructions for the engine used in the GROUNDSMASTER® 62 and 220 mowers.

The engine used in the gasoline powered mower is manufactured by Onan. Identify your engine by referring to the MODEL and SPEC. NO. as shown on the engine name plate. (See Engine Model Reference in the GENERAL INFORMATION section of the Onan Service Manual.) Always use this number and the serial number when referring to your engine for service or parts. The Onan Service Manual for this engine is provided at the end of this chapter.

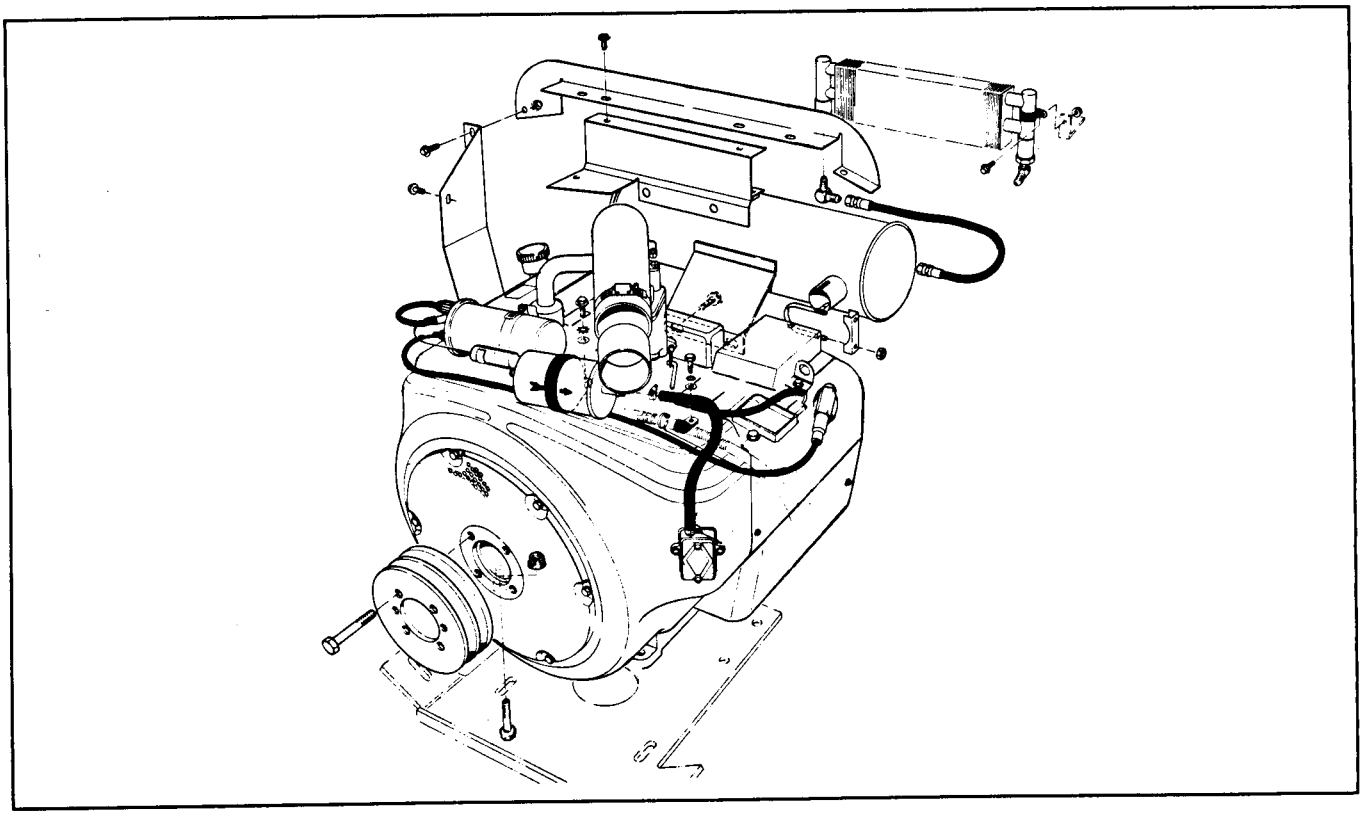


Figure 1

Maintenance

Filling the Fuel Tank With Gasoline

The Toro Company strongly recommends the use of clean, fresh UNLEADED regular gasoline in Toro gasoline powered products. Unleaded gasoline burns cleaner, extends engine life, and promotes good starting by reducing the build-up of combustion chamber deposits. Leaded gasoline can be used if unleaded is not available.

To assure volatility, do not buy more than a 30 day supply of gasoline.

IMPORTANT: Never use METHANOL, gasoline containing methanol, gasohol containing more than 10% ethanol, gasoline additives, premium gasoline, or white gas. Engine or fuel system damage could result.

DANGER

Because gasoline is flammable, caution must be used when storing or handling it. Do not fill the fuel tank while the engine is running, hot or when the machine is in an enclosed area. Vapors may build up and be ignited by a spark or flame source many feet away. DO NOT SMOKE while filling the fuel tank to prevent the possibility of an explosion. Always fill the fuel tank outside and wipe up any spilled gasoline before starting the engine. Use a funnel or spout to prevent spilling gasoline before starting the engine. Fill the tank to approximately 1 inch (25 mm) below the bottom of the filler neck. Store gasoline in a clean safety-approved container and keep the cap in place on the container. Keep gasoline in a cool, well-ventilated place; never in an enclosed area such as a hot storage shed. Gasoline is a fuel for internal combustion engines. Do not use it for any other purpose. Since many children like the smell of gasoline, keep it out of their reach. Gasoline fumes are explosive and dangerous to inhale.

1. Tip the seat forward and prop it so it cannot fall accidentally. Use a clean rag to clean the area around the fuel tank cap (Fig. 2).

2. Remove the cap from the fuel tank and fill the tank to 1 inch (25 mm) below the bottom of the filler neck with gasoline. Install the fuel tank cap securely. The capacity of the fuel tank is 6 gallons (22.7 liters).

3. Wipe up any gasoline that may have spilled to prevent a fire hazard. Remove the support from under the seat and allow the seat to pivot down to its normal position.

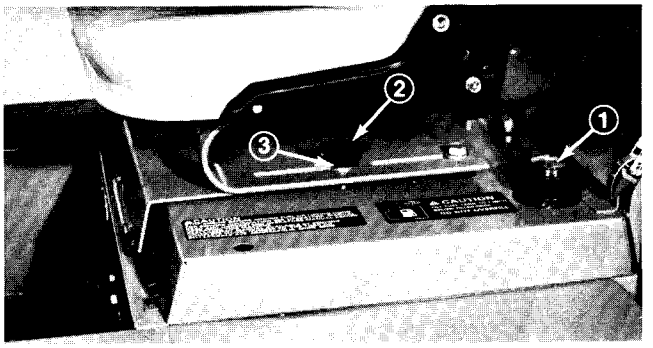


Figure 2

1. Fuel tank cap

Checking Oil Level

Check the engine crankcase oil level before every day of operation. Check more often if necessary.

NOTE: If checking the oil level after the engine has been running, allow a minimum of 10 minutes after stopping the engine for the oil to flow down to the sump before checking.

1. Put the machine on a level surface. Stop the engine (see NOTE above).

2. Disengage the hood latches and open the hood.

3. Clean the area around the dipstick and filler neck. Unscrew the dipstick and wipe it with a clean rag. Screw the dipstick into the filler neck and make sure it is seated fully. Unscrew the dipstick out of the filler neck and check the level of the oil (Fig. 3). If the oil level is low, add enough oil to raise the level to the FULL (upper) mark on the dipstick.

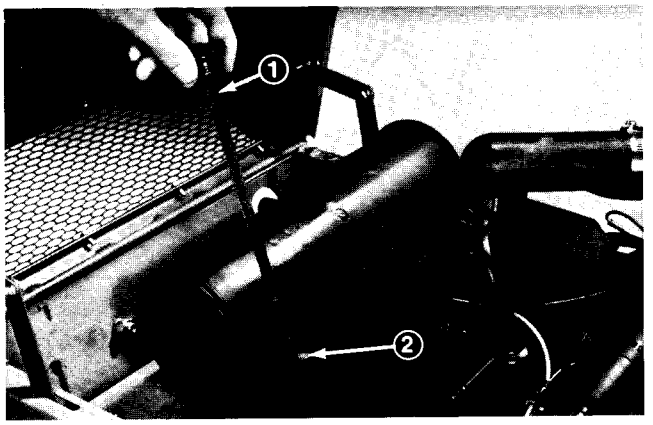


Figure 3

1. Dipstick *2. Filler neck*

NOTE: If the the oil level is at the ADD (lower) mark on the dipstick, add 1 pint (0.47 L) of oil to raise the level to FULL. Do not overfill.

4. Pour the oil into the filler neck until the level is at the FULL (upper) mark on the dipstick. The Onan engine uses high-quality detergent motor oil having the American Petroleum Institute (API) classification SF. Oil viscosity (weight) must be selected according to anticipated ambient temperatures (Fig. 4).

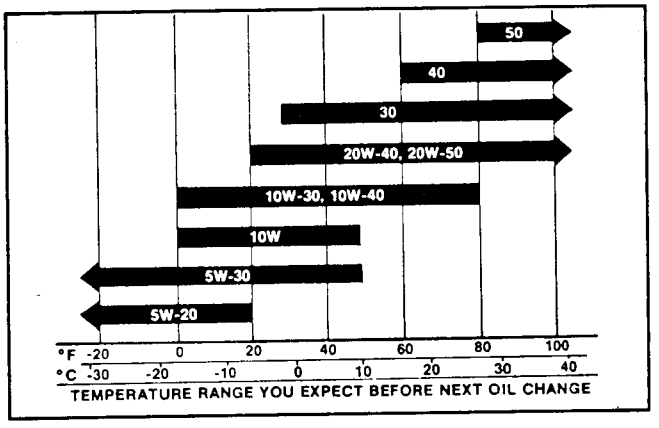


Figure 4

5. Install the dipstick. Make sure the dipstick is seated tightly in the filler neck to prevent oil leakage.

General Air Cleaner Maintenance

Inspect the air cleaner and hose periodically to maintain maximum engine protection and service life.

1. Make sure the hose between the air cleaner and carburetor is clamped securely. Replace the hose if it is cracked or punctured.

2. Check the air cleaner body for dents and other damage which could possibly cause an air leak. Replace a damaged air cleaner body.

3. Make sure the dust cup is sealing around the bottom of the air cleaner body.

4. Mounting screws and nuts holding the air cleaner in place must be tight.

5. The inlet cap must be free of obstructions.

Servicing Air Cleaner Dust Cup and Baffle

Inspect the dust cup and rubber baffle after every 50 hours of operation or once a week. Daily or more frequent inspection is required when operating conditions are extremely dusty and dirty. Never allow dust to build up closer than one inch (25 mm) from the rubber baffle.

NOTE: If conditions are extremely dusty and dirty, begin by checking the dust cup and baffle after each day of operation. Use this information to find out how long it takes before the dust cup should be emptied. Closer maintenance intervals for emptying the dust cup may be necessary when a rear discharge cutting unit is being used.

1. Loosen the thumb screw until the dust cup and baffle can be removed (Fig. 5). Separate the dust cup and baffle (Fig. 5).

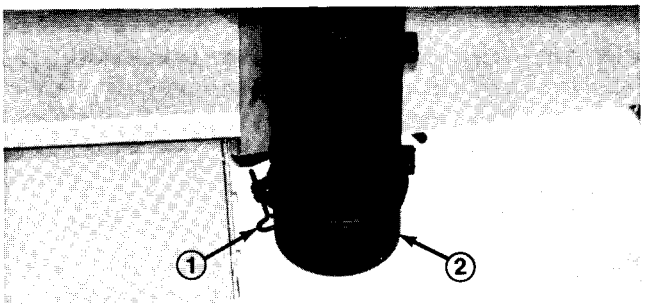


Figure 5

1. Thumb screw *2. Dust cup*

2. Dump the dust out of the dust cup. After cleaning the dust cup and baffle, assemble and reinstall both parts.

Maintenance

Servicing Air Cleaner Filter

Service the air cleaner filter after each 250 hours of operation. Service more frequently in extreme dusty or dirty conditions. Replace the element after every six cleanings, 1500 hours of operation, or annually, whichever comes first.

1. Remove and service the dust cup. (See Dust Cup and Baffle in this chapter of the book.)

2. Remove the wing nut with gasket. Pull the filter element out of the air cleaner body (Fig. 6).

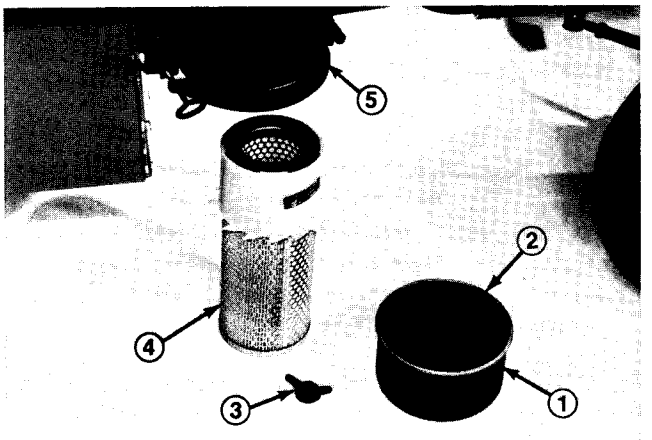


Figure 6

1. Dust cup
2. Baffle
3. Wing nut w/gasket
4. Filter element
5. Air cleaner body

3. Clean the element by the washing method or compressed air method.

NOTE: The compressed air method is recommended when the element must be used immediately after servicing because a washed element must be dried before it is used. The washing method is a more thorough method of cleaning. The filter MUST be washed when exhaust soot is plugging the filter pores.

Washing Method:

IMPORTANT: Do not attempt to remove the plastic fin assembly or the filter will be damaged. Washing removes dust from beneath fins.

A. Prepare a solution of of filter cleaner (Toro Part No. 27-7720) and water. Soak the filter element approximately 15 minutes. Refer to the directions on the filter cleaner carton for complete information.

CAUTION

The filter cleaner may cause burns and is harmful if swallowed. Keep out of reach of children. Contains sodium metasilicate. Follow manufacturer's instructions.

B. After soaking the filter for 15 minutes, rinse it with clear water. Maximum water pressure must not exceed 40 psi (276 kPa) to prevent damage to the filter element.

C. Allow the element to air dry, or dry the filter element using warm, flowing air (160° F (71° C) maximum). Do not use compressed air or a light bulb to dry the filter element. This will damage the element. Inspect the element after dust and dirt are removed. (See Inspecting Air Cleaner Filter Element in this section of the book.)

Compressed Air Method:

IMPORTANT: Do not attempt remove the plastic fin assembly or the filter will be damaged. Back-blowing with compressed air removes dust from beneath the fins.

A. Blow compressed air from the inside to the outside of the dry filter element. Do not exceed 100 psi (689 kPa) to prevent damage to the element.

CAUTION

Warn other personnel in the area before using compressed air. To prevent injury, wear safety glasses, goggles or a face shield.

B. Keep the air hose nozzle at least one inch (25 mm) away from the pleated paper. Move the nozzle up and down while rotating the filter element. Inspect the element after dust and dirt are removed. (See Inspecting Air Cleaner Filter Element in this section of the book.)

4. Wipe the inside of the air cleaner body with a damp cloth to remove excess dust. Slide the filter into the air cleaner body. Install the wing nut and gasket.

5. Install the dust cup and baffle. Move the thumb screw to a position behind the air cleaner body and tighten it securely.

Inspecting Air Cleaner Filter Element

1. Put a bright light inside the filter element.

2. Rotate the filter element slowly while checking for cleanliness, ruptures, holes and tears. Replace the element if it is damaged.

3. Check the fin assembly, gasket and screen for damage. Replace the element if any of these parts are damaged.

Changing Oil and Filter

Change the oil and oil filter after every 50 hours of operation. Change the oil and filter more frequently when the engine is operated in dusty or dirty conditions.

1. Operate the engine until it is at operating temperature. This will suspend contaminants in the oil and allow the oil to flow more easily when draining. Put the machine on a level surface and stop the engine.

2. Disengage the hood latch and open the hood. Put a drain pan under the engine crankcase drain plug (Fig. 7).

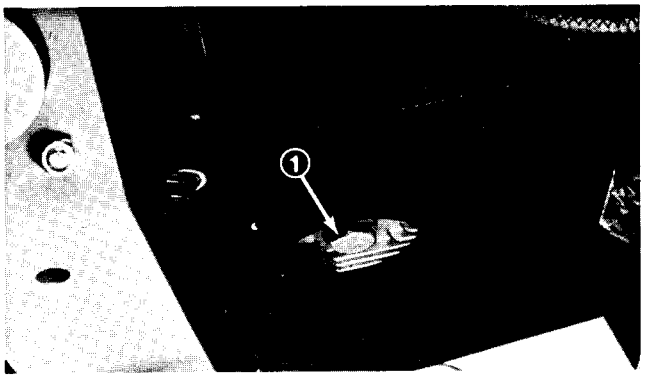


Figure 7

1. Oil drain plug

3. Clean the area around the drain plug and filter.

CAUTION

Hot crankcase oil can cause burns if it spilled or splashed on skin. Keep fingers and hands away from hot oil when removing the oil drain plug.

4. Remove the oil drain plug and let the oil flow into the drain pan. Remove and discard the oil filter (Fig. 8).

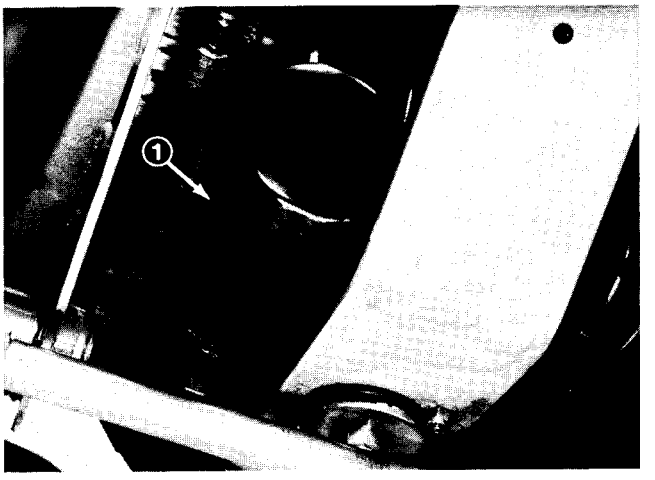


Figure 8

1. Engine oil filter

5. Clean the filter mounting surface. Apply a thin film of oil to the gasket on the new filter. Install the element by hand until the gasket just touches the mounting surface, then turn down an additional 1/4 to 1/2 turn. Do not over tighten.

6. After the oil is drained, install the plug.

7. Fill the crankcase with the correct oil. Engine oil capacity is 1.8 qt. (1.7 L). (See Checking Oil Level in this section of the book.)

Cleaning Cylinder Head Fins

To avoid overheating and possible engine damage, clean the cooling fins on the engine cylinder head after every 50 hours of operation if necessary. A shorter maintenance intereval may be required in dusty or dirty conditions.

1. Open the hood. Pull the high tension wires off the spark plugs.

2. Remove the self tapping screw retaining the top of the sheet metal housing on the right side of the engine (Fig. 9).

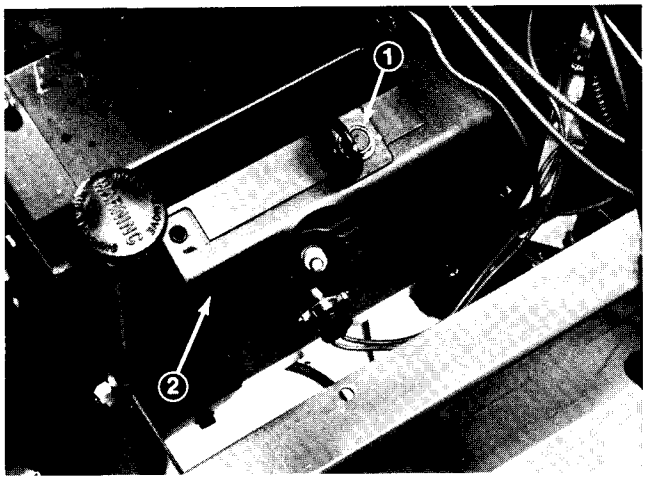


Figure 9

1. Self tapping screw
2. Right engine housing

3. Pull the housing away from the engine and clean dirt, grass and chaff from the outside of the cylinder head and cylinder head fins (Fig. 10).

Figure 10

1. Cylinder fins

4. Reinstall the engine housing with the self tapping screws.

5. Remove the self tapping screw securing the voltage regulator to the sheet metal housing on the left side of the engine (Fig. 11). Move the voltage regulator to allow acess into the cylinder fin area.

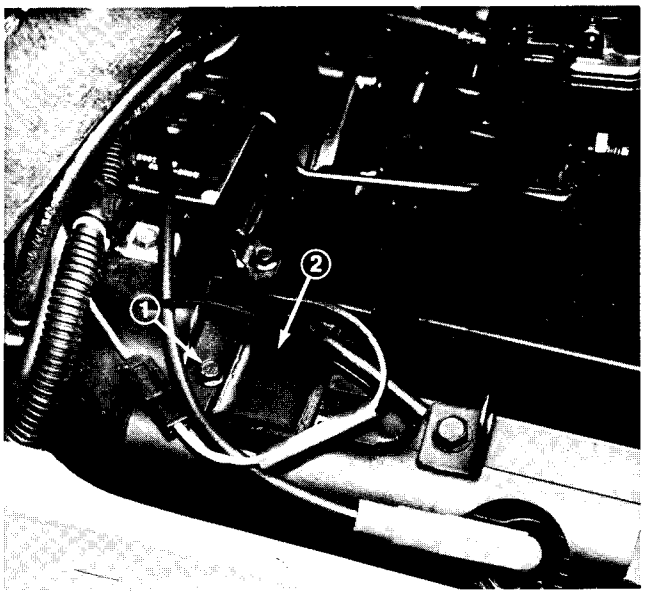


Figure 11

1. Self tapping screw
2. Voltage regulator

6. Clean dirt, grass and chaff from the outside of the cylinder and cylinder head fins through the opening (Fig. 12). The sheet metal housing may be removed for easier access.

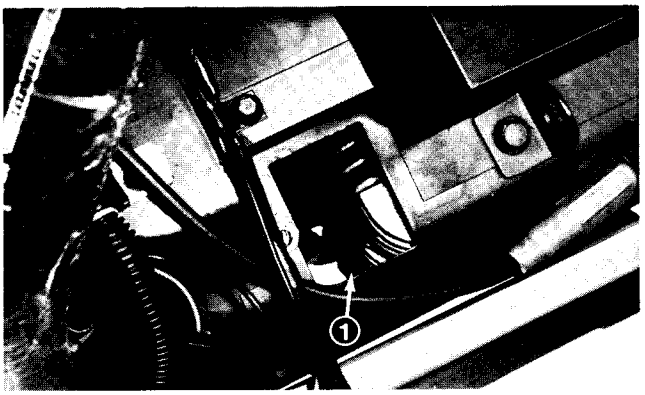


Figure 12

1. Cylinder fins

7. Reinstall the voltage regulator with the self tapping screw.

Cleaning Combustion Chamber

Clean the combustion chamber after every 250 hours of operation if regular leaded gasoline is used, or every 500 hours of operation if unleaded gasoline is used. (See CYLINDER HEADS in the Engine Disassembly section of the Onan Service Manual.)

A gradual buildup of carbon and lead deposits will form in the combustion chamber causing the the valves to not seat properly. The engine will lose power. Periodic cleaning will lengthen valve life and make sure the engine is reliable.

While Engine is Removed

Cleaning the combustion chamber will require engine removal. (See Removing the Engine in the Repairs section of this chapter.) The valves and seats should be inspected when the combustion chamber is cleaned. If your engine is equipped with an inertia type starter, clean the starter motor drive pinion and lubricate with GE Versilube while the engine is removed. Build up of debris could prevent the inertia type starter drive from engaging or disengaging. The inertia type starter can be replaced with a solenoid shift type starter.

Replacing Fuel Filter

Replace the fuel filter after every 250 hours of operation or every year, whichever comes first.

1. Clamp both fuel lines that connect to the fuel filter (Fig. 13) so gasoline cannot drain when the lines are removed from the filter.

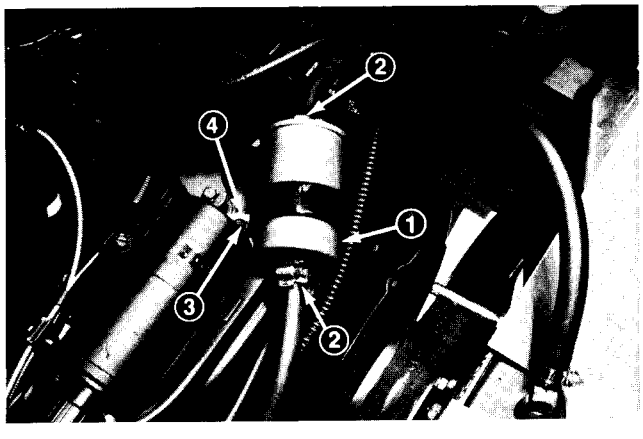


Figure 13

1. Fuel filter
2. Hose clamp
3. Capscrew and lockwasher
4. Clamp

2. Loosen the hose clamps (Fig. 13) at both ends of the filter and pull the fuel lines off the filter.

3. Remove the capscrew and lockwasher holding the filter clamp to the engine (Fig. 13). Slide the filter out of the clamp.

4. Slide the new filter into the clamp and mount it in place with the capscrew and lockwasher. Be sure the arrow on the side of the filter points toward the fuel pump.

5. Slide the hose clamps onto the ends of the fuel lines. Push the fuel lines onto the fuel filter and secure them with the hose clamps.

Checking and Replacing Spark Plugs

Since air gap between center and side electrodes increases gradually during normal engine operation, check the condition of the electrode after every 100 hours of operation. The correct spark plugs are Champion RS-14YC or equivalent. Correct air gap is 0.025 in. (0.64 mm).

1. Clean the area around the spark plugs so dirt does not fall into the cylinder when the plugs are removed.

2. Pull the high tension wires (Fig. 14) off the spark plugs. Remove the spark plugs from the cylinder head.

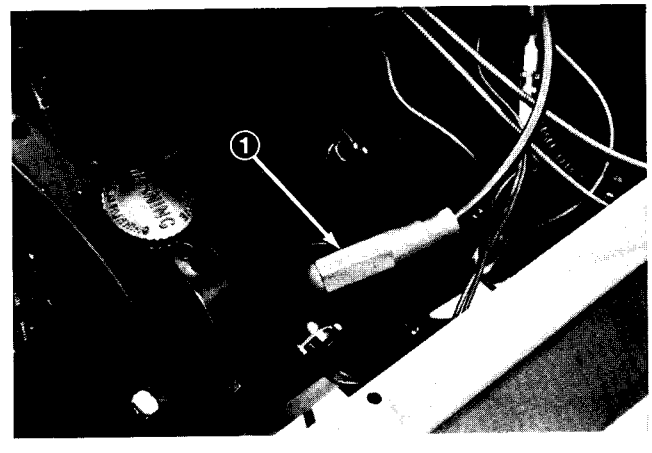


Figure 14

1. High tension wire (right side)

3. Check the condition of the center and side electrodes to determine the operating temperature of the engine.

A. Light brown insulator tip indicates correct spark plug and heat range.

B. Black or oily insulator tip indicates an excessively rich fuel mixture, possibly caused by a dirty air cleaner element or a carburetor that is set too rich.

C. Light gray or blistered-white insulator indicates overheating caused by a lean carburetor setting or incorrect spark plug (heat range too high).

IMPORTANT: A cracked, fouled, or dirty spark plug must be replaced. Do not sandblast, scrape or clean electrodes by using a wire brush. Grit may release from the plug and enter the combustion chamber causing engine damage.

4. After setting air gap (Fig. 15) at 0.025 in. (.064 mm), install the spark plugs in the cylinder head. Tighten the spark plugs to a torque of 22 ft-lb (30 Nm). Push the high tension wires onto the spark plugs.

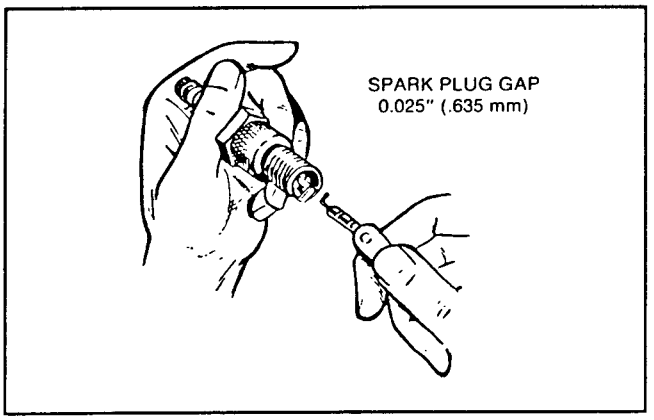


Figure 15

Servicing Breaker Points and Condenser

NOTE: For maximum engine efficiency, it is recommended that the breaker points and condenser be replaced with new parts every 250 hours of operation.

Since breaker point gap controls engine timing, set the gap at 0.020 in. (0.508 mm) whenever the points are replaced or serviced (Fig. 16). If not replacing the points, clean the points with a carborundum contact point stone. Insert a hard finished card or piece of paper between the points, Close and open the points so the paper absorbs any dirt or filings on the points.

Replace points that are burned or excessively pitted. (See BREAKER POINTS in the Ignition and Battery Charging section of the Onan Service Manual for replacement and adjustment information.)

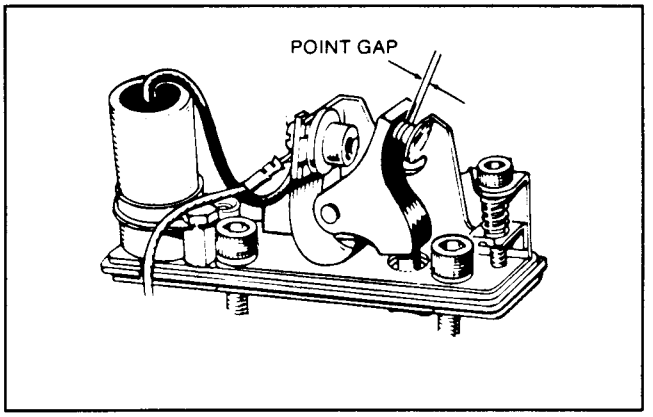


Figure 16

Servicing Crankcase Breather

If the crankcase becomes pressurized as indicated by oil leaks at the seals, clean the pack and valve in solvent. Check and clean the valve and baffle after every 250 hours of operation (Fig. 17)

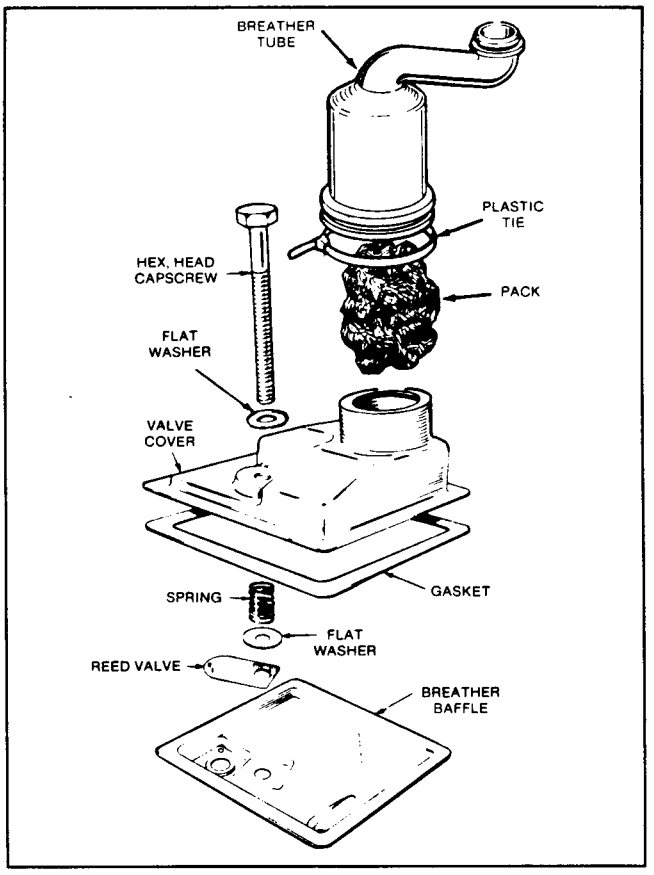


Figure 17