

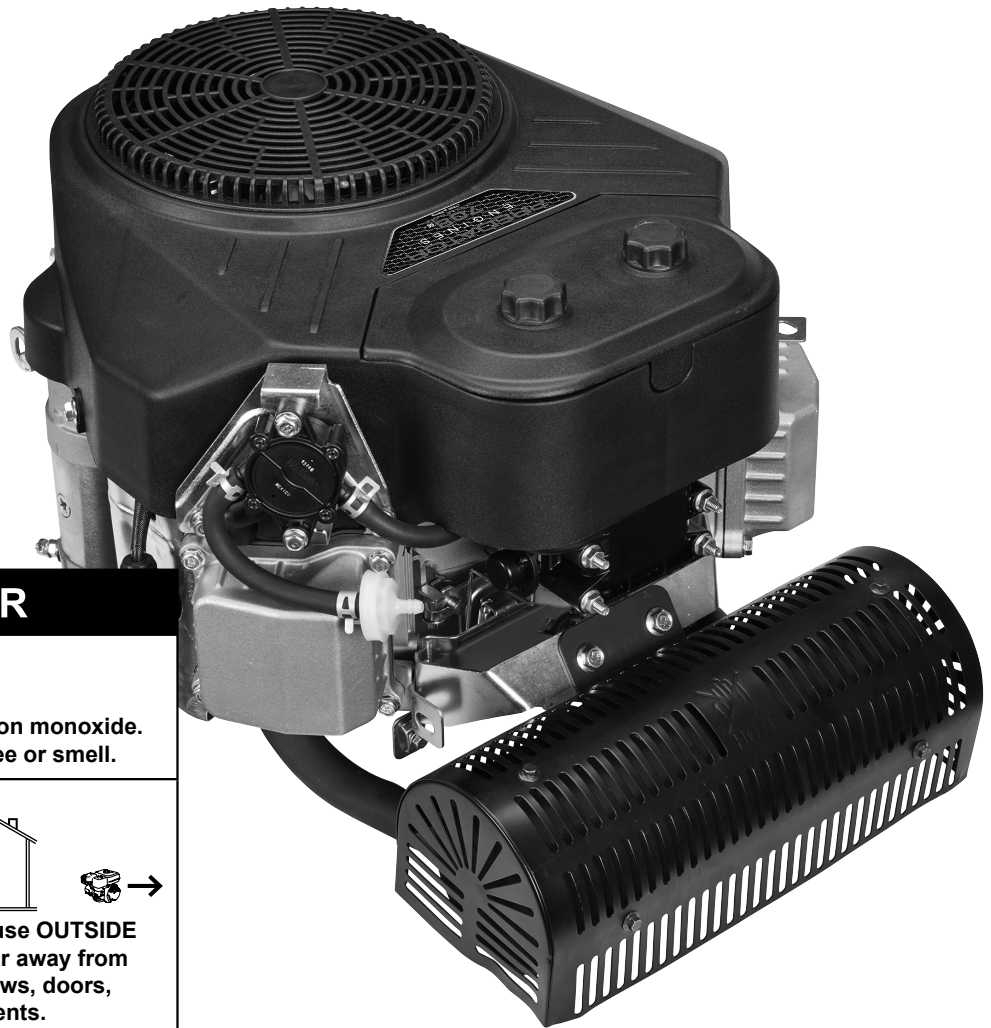
# Owner's Manual & Safety Instructions

**Save This Manual** Keep this manual for the safety warnings and precautions, assembly, operating, inspection, maintenance and cleaning procedures. Write the product's serial number in the back of the manual near the assembly diagram (or month and year of purchase if product has no number). Keep this manual and the receipt in a safe and dry place for future reference.

17e

## PREDATOR<sup>®</sup> E N G I N E S

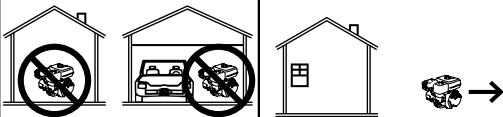
### 708cc V-Twin Vertical Engine



#### **⚠ DANGER**

Using an engine indoors  
**CAN KILL YOU IN MINUTES.**

Engine exhaust contains carbon monoxide.  
This is a poison you cannot see or smell.



**NEVER** use inside  
a home or garage,  
**EVEN IF** doors and  
windows are open.

Only use **OUTSIDE**  
and far away from  
windows, doors,  
and vents.

Visit our website at: <http://www.harborfreight.com>

Email our technical support at: [predator@harborfreight.com](mailto:predator@harborfreight.com)

62879

When unpacking, make sure that the product is intact and undamaged. If any parts are missing or broken, please call 1-888-866-5797 as soon as possible.

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No portion of this manual or any artwork contained herein may be reproduced in any shape or form without the express written consent of Harbor Freight Tools. Diagrams within this manual may not be drawn proportionally. Due to continuing improvements, actual product may differ slightly from the product described herein. Tools required for assembly and service may not be included.

#### **⚠ WARNING**

**Read this material before using this product.  
Failure to do so can result in serious injury.  
SAVE THIS MANUAL.**

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### Specifications






Displacement		708cc
Engine Type		Vertical Double Cylinder 4-stroke
Cooling System		Forced air cooled
Fuel	Type	87+ octane stabilizer treated unleaded gasoline
Engine Oil	Type	SAE 10W-30 above 32° F SAE 5W30 at 32° F or below
	Capacity	1.8 Liters
Sound Level at 3 feet		88 dB
Bore x Stroke		77 mm x 76 mm
Compression Ratio		8.7:1
Rotation viewed from PTO <small>(power takeoff - the output shaft)</small>		Counterclockwise
Oil Filter Compatibility		STP S4967 Fram PH4967
Spark Plugs	Type	Champion® RN9YC
	Gap	0.029"
Valve Clearance	Intake	0.003"–0.005"
	Exhaust	0.005"–0.007"
Speed	Idle	1800 ±150 RPM
	Maximum	3600 ±100 RPM
Shaft	Shaft	Ø1" x 3.156"
	Keyway	1/4"
	End Tapped	7/16"–20 UNF

The emissions control system for this Engine is warranted for standards set by the U.S. Environmental Protection Agency and by the California Air Resources Board (also known as CARB). For warranty information, refer to the last pages of this manual.




# PREDATOR<sup>®</sup>




## E N G I N E S

## WARNING SYMBOLS AND DEFINITIONS

	This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.
	Indicates a hazardous situation which, if not avoided, will result in death or serious injury.
	Indicates a hazardous situation which, if not avoided, could result in death or serious injury.
	Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
	Addresses practices not related to personal injury.

## Symbol Definitions

Symbol	Property or Statement
<b>RPM</b>	Revolutions Per Minute
<b>HP</b>	Horsepower
	WARNING marking concerning Risk of Eye Injury. Wear ANSI-approved safety goggles with side shields.
	Read the manual before set-up and/or use.
	WARNING marking concerning Risk of Hearing Loss. Wear hearing protection.

Symbol	Property or Statement
	WARNING marking concerning Risk of Respiratory Injury. Operate engine OUTSIDE and far away from windows, doors, and vents.
	WARNING marking concerning Risk of Fire while handling fuel. Do not smoke while handling fuel.
	WARNING marking concerning Risk of Fire. Do not refuel while operating. Keep flammable objects away from engine.

## IMPORTANT SAFETY INSTRUCTIONS



**WARNING! Read all instructions.**

**Failure to follow all instructions listed below may result in fire, serious injury and/or DEATH.**

The warnings and precautions discussed in this manual cannot cover all possible conditions and situations that may occur. It must be understood by the operator that common sense and caution are factors which cannot be built into this product, but must be supplied by the operator.

**SAVE THESE INSTRUCTIONS**


# Set up Precautions

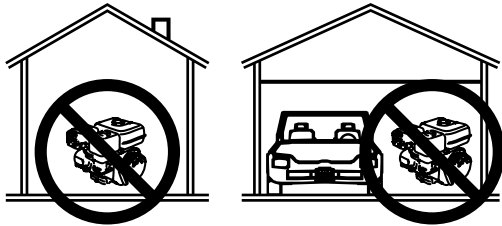
SAFETY

1. Gasoline fuel and fumes are flammable, and potentially explosive. Use proper fuel storage and handling procedures. Do not store fuel or other flammable materials nearby.
2. Have multiple ABC class fire extinguishers nearby.
3. Operation of this equipment may create sparks that can start fires around dry vegetation. A spark arrestor may be required. The operator should contact local fire agencies for laws or regulations relating to fire prevention requirements.
4. Set up and use only on a flat, level, well-ventilated surface.
5. Wear ANSI-approved safety goggles, heavy-duty work gloves, and dust mask/respirator during set up.
6. Use only lubricants and fuel recommended in the Specifications chart of this manual.
7. **Fuel tank must be designed specifically for containing gasoline and must be mounted to a stable mounting frame.** Some areas may have specific gasoline vapor containment requirements; comply with local, state, and federal laws.
8. Fuel lines and fittings must be properly assembled and must not leak.
9. All wiring, including safety switches and engine shut-off components, must be properly assembled and functional.

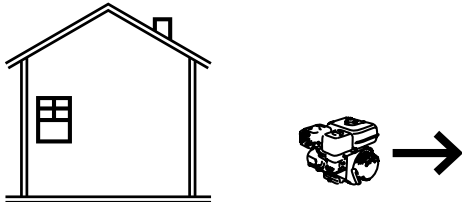
# Operating Precautions

SETUP

1.  **CARBON MONOXIDE HAZARD**  
**Using an engine indoors CAN KILL YOU IN MINUTES.**  
Engine exhaust contains carbon monoxide. This is a poison you cannot see or smell.



NEVER use inside a home or garage, EVEN IF doors and windows are open.



Only use OUTSIDE and far away from windows, doors, and vents.

2. Keep children away from the equipment, especially while it is operating.
3. Keep all spectators at least six feet from the Engine during operation.
4. Fire Hazard! Do not fill fuel tank while engine is running. Do not operate if gasoline has been spilled. Clean spilled gasoline before starting engine. Do not operate near pilot light or open flame.
5. Do not touch engine during use. Let engine cool down after use.
6. Never store fuel or other flammable materials near the engine.
7. Only use a suitable means of transport and lifting devices with sufficient weight bearing capacity when transporting the engine.
8. Secure the engine on transport vehicles to prevent it from rolling, slipping, and tilting.
9. Industrial applications must follow OSHA requirements.
10. Do not leave the engine unattended when it is running. Turn off the engine (and remove safety keys, if available) before leaving the work area.
11. The engine can produce high noise levels. Prolonged exposure to noise levels above 85 dBA is hazardous to hearing. Wear ear protection when operating the engine or when working nearby while it is operating.
12. Wear ANSI-approved safety glasses and hearing protection during use.
13. People with pacemakers should consult their physician(s) before use. Electromagnetic fields in close proximity to a heart pacemaker could cause pacemaker interference or pacemaker failure. Caution is necessary when near the engine's magneto or recoil starter.
14. Use only accessories that are recommended by Harbor Freight Tools for your model. Accessories that may be suitable for one piece of equipment may become hazardous when used on another piece of equipment.
15. Do not operate in explosive atmospheres, such as in the presence of flammable liquids, gases, or dust. Gasoline-powered engines may ignite the dust or fumes.
16. Stay alert, watch what you are doing and use common sense when operating this engine. Do not use while tired or under the influence of drugs, alcohol or medication.
17. Dress properly. Do not wear loose clothing or jewelry. Keep hair, clothing and gloves away from moving parts. Loose clothes, jewelry or long hair can be caught in moving parts.

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18. Parts, especially exhaust system components, get very hot during use. Stay clear of hot parts.
19. Do not cover the engine during operation.
20. Keep the engine and surrounding area clean at all times.
21. Do not smoke, or allow sparks, flames, or other sources of ignition around the equipment, especially when refuelling.
22. Use the equipment, accessories, etc., in accordance with these instructions and in the manner intended for the particular type of equipment, taking into account the working conditions and the work to be performed. Use of the equipment for operations different from those intended could result in a hazardous situation.
23. Do not operate the equipment with known leaks in the engine's fuel system.
24. When spills of fuel or oil occur, they must be cleaned up immediately. Dispose of fluids and cleaning materials as per any local, state, or federal codes and regulations. Store oil rags in a bottom-ventilated, covered, metal container.
25. Keep hands and feet away from moving parts. Do not reach over or across equipment while operating.
26. Before use, check for misalignment or binding of moving parts, breakage of parts, and any other condition that may affect the equipment's operation. **If damaged, have the equipment serviced before using.** Many accidents are caused by poorly maintained equipment.
27. Use the correct equipment for the application. Do not modify the equipment and do not use the equipment for a purpose for which it is not intended.

## Service Precautions

1. **Before service, maintenance, or cleaning:**
    - a. **Turn the engine switch to its "OFF" position.**
    - b. **Allow the engine to completely cool.**
    - c. **Then, remove the spark plug caps from the spark plugs.**
  2. Keep all safety guards in place and in proper working order. Safety guards include muffler, air cleaner, mechanical guards, and heat shields, among other guards.
  3. **Do not alter or adjust any part of the equipment or its engine that is sealed by the manufacturer or distributor. Only a qualified service technician may adjust parts that may increase or decrease governed engine speed.**
  4. Wear ANSI-approved safety goggles, heavy-duty work gloves, and dust mask/respirator during service.
  5. Maintain labels and nameplates on the equipment. These carry important information. If unreadable or missing, contact Harbor Freight Tools for a replacement.
  6. Have the equipment serviced by a qualified repair person using only identical replacement parts. This will ensure that the safety of the equipment is maintained. Do not attempt any service or maintenance procedures not explained in this manual or any procedures that you are uncertain about your ability to perform safely or correctly.
  7. Store equipment out of the reach of children.
  8. Follow scheduled engine and equipment maintenance.
- Refueling:**
1. Do not refill the fuel tank while the engine is running or hot.
  2. Do not smoke, or allow sparks, flames, or other sources of ignition around the equipment, especially when refuelling.
  3. **Do not fill fuel tank to the top.** Leave a little room for the fuel to expand as needed.
  4. Refuel in a well-ventilated area only.
  5. Wipe up any spilled fuel and allow excess to evaporate before starting engine. **To prevent FIRE, do not start the engine while the smell of fuel hangs in the air.**



**SAVE THESE INSTRUCTIONS.**

## Set Up



Read the **ENTIRE IMPORTANT SAFETY INFORMATION** section at the beginning of this manual including all text under subheadings therein before set up or use of this product.

### **WARNING**

**TO PREVENT SERIOUS INJURY:**

Operate only with proper spark arrestor installed.



Operation of this equipment may create sparks that can start fires around dry vegetation. A spark arrestor may be required.

The operator should contact local fire agencies for laws or regulations relating to fire prevention requirements.

**WARNING! DO NOT INSTALL THIS ENGINE ON A VEHICLE. MAY BE USED ON RIDE-ON LAWN MOWERS.**

**WARNING! INSTALL THIS ENGINE ACCORDING TO EQUIPMENT INSTRUCTIONS BEFORE USE.**

## Installation

1. Mount Engine, Shaft-side down, to equipment platform. Secure with Bolts. See Figure A.

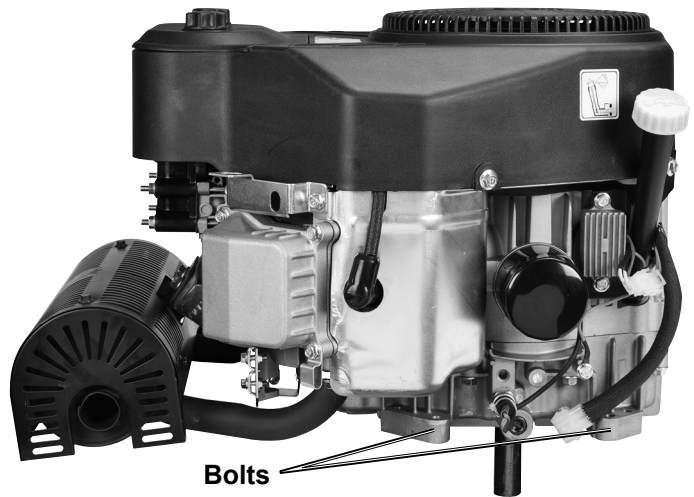


Figure A

2. Run choke and throttle cables (neither included) through Engine loops. Pass both through the Group Loop, then the choke cable through Loop A and the throttle cable through Loop B. See Figure B.

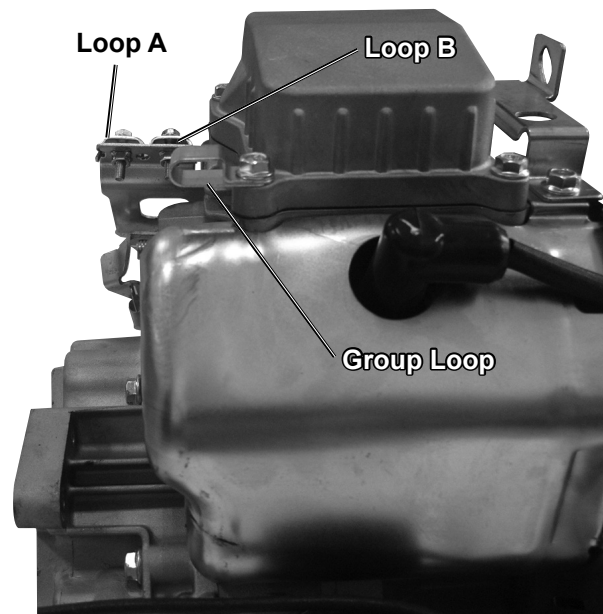


Figure B

3. Hook cables to Choke and Throttle. For some cable types, additional hardware (not included) may be required. See Figure C.
4. Tighten loops.

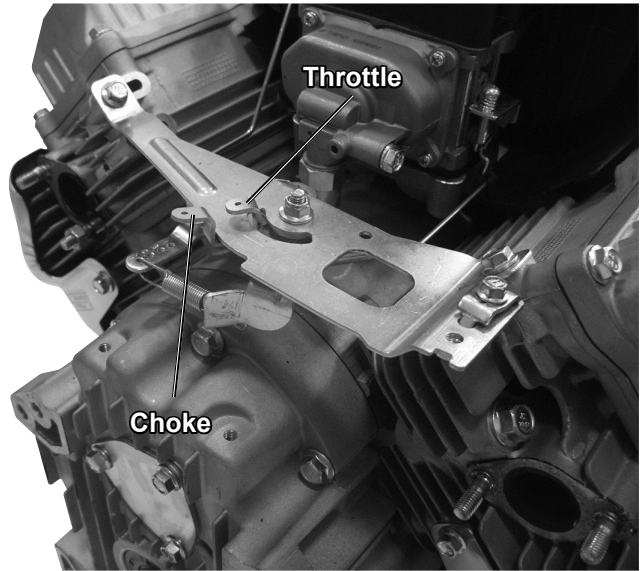


Figure C

5. Plug equipment electrical hookup to engine wiring harness. See Figure D.

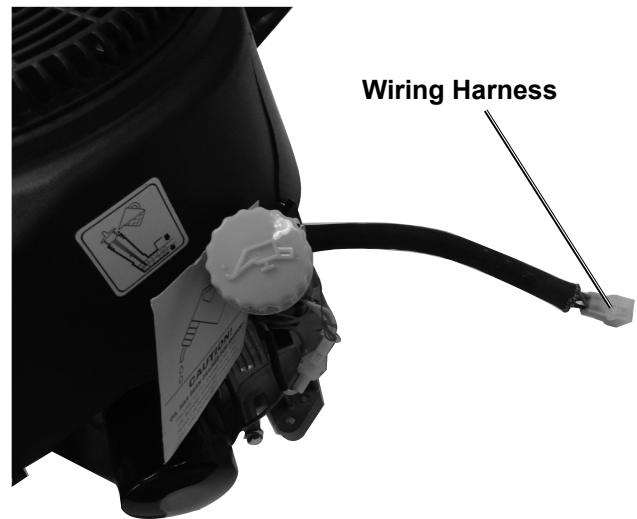


Figure D

**Note:** Connect equipment according to the Wiring Harness diagram. See Fuel Tank Setup Instructions.

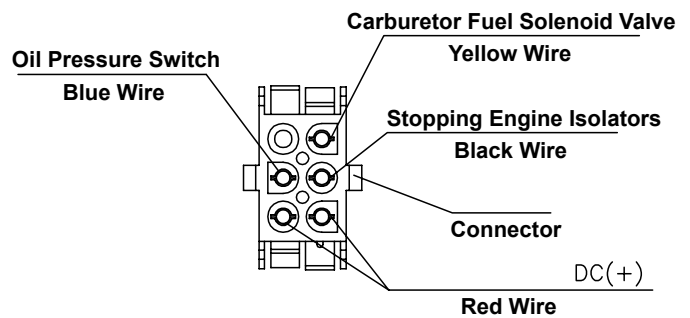


Figure E: Wiring Harness

## Fuel Tank Setup Instructions

SAFETY

**WARNING!** Fuel tank (not included) must be CARB compliant and designed specifically for containing gasoline or voids warranty. The tank must be mounted to a stable mounting frame.

1. Connect a fuel hose (not included) from the fuel tank to the Fuel Hose Connector, and secure it in place with a hose clamp. See Figure F. If possible, incorporate a fuel shutoff valve (not included) on the fuel hose.

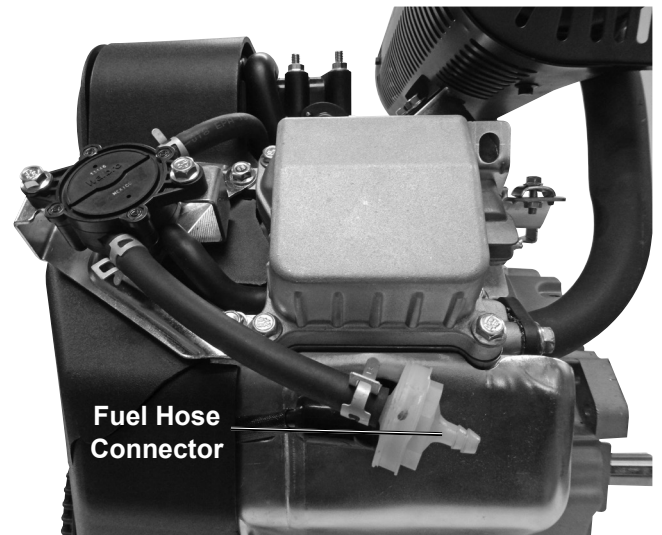


Figure F: Fuel Hose Connector

2. Connect a hose to the Fuel Vapor Inlet on the Air Intake to contain gasoline vapors. See Figure G.

**WARNING!** The end user is responsible for complying with all applicable CARB and EPA evaporative emissions requirements for the fuel system. Some areas may have specific gasoline vapor containment requirements; comply with local, state, and federal laws.

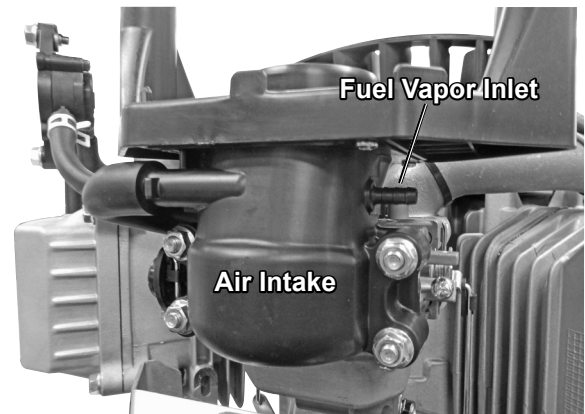


Figure G: Fuel Vapor Inlet

SETUP

OPERATION

## Battery Setup Instructions

1. Equipment should include a fully charged, lead-acid 12 volt, 36 Ah battery (not included)
2. To connect equipment solenoid to Engine Starter, only use cables sized to match their length according to Table A.

Cable Gauge (lower gauge numbers mean thicker cables)	Maximum Cable Length
6	5'
4	7'
2	12'

Table A: Minimum Cable Diameters

3. Attach the positive cable from the positive battery terminal to the outer terminal on the Starter. Connect cable securely to prevent disconnection and short circuits. See Figure H.

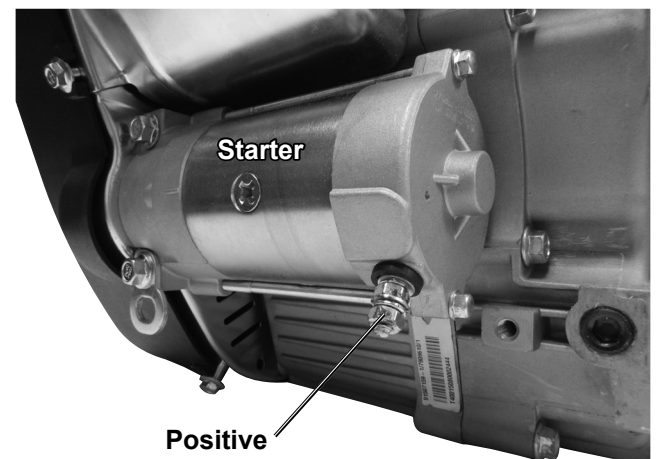


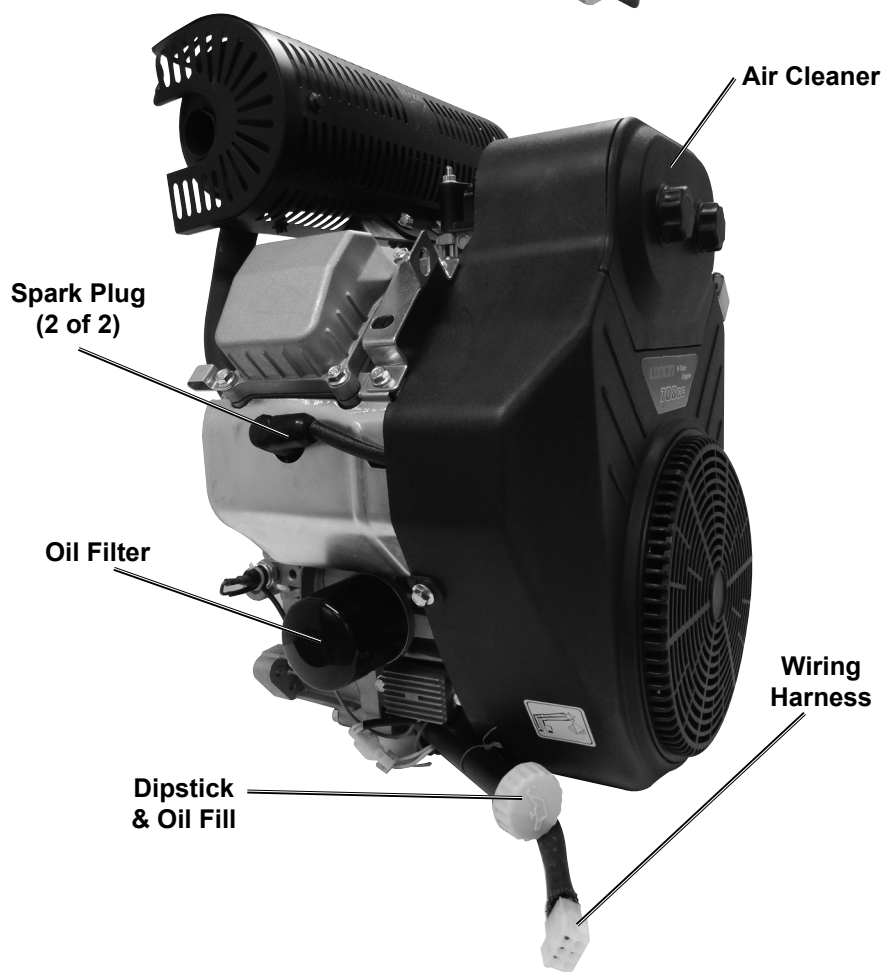
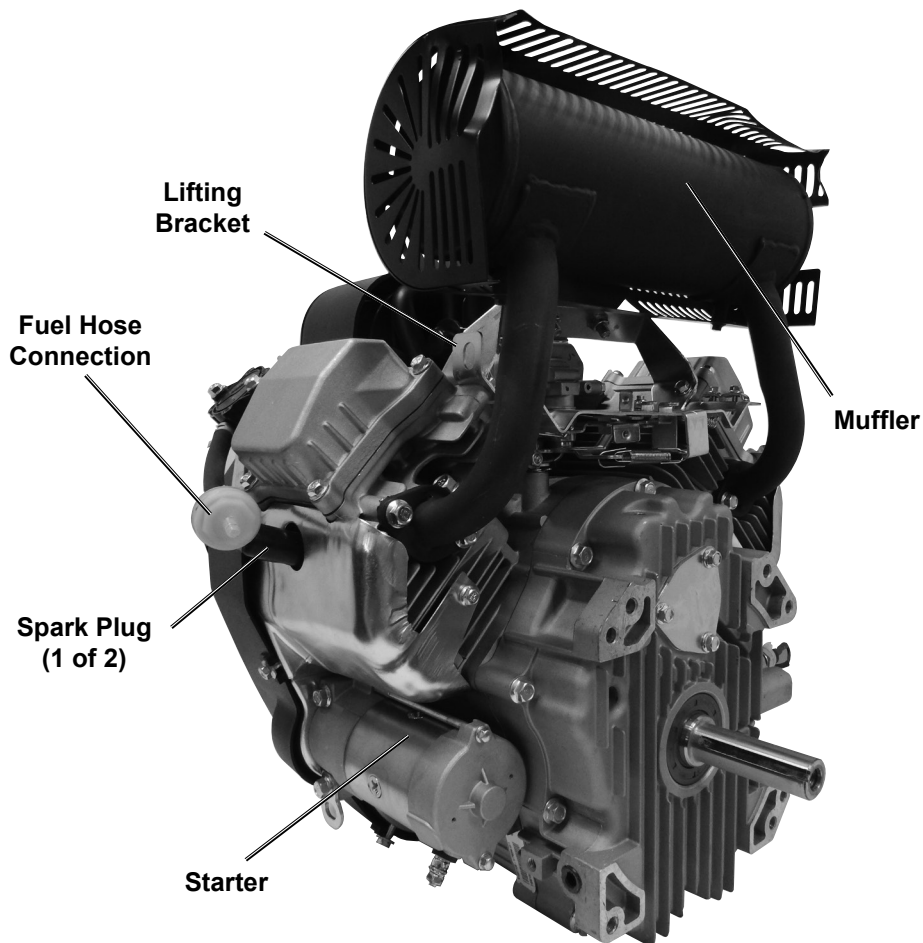
Figure H

4. Connect the negative cable securely to one of the engine mounting bolts. Connect cable securely to prevent disconnection and short circuits.
5. Coat the terminals and cable ends with a corrosion-preventive coating.

MAINTENANCE



# Components and Controls



SAFETY

SETUP

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# High Altitude Operation Above 3000 feet

SAFETY

## ⚠️WARNING! TO PREVENT SERIOUS INJURY FROM FIRE:

Follow instructions in a well-ventilated area away from ignition sources.

If the engine is hot from use, shut the engine off and wait for it to cool before proceeding. Do not smoke.

**NOTICE:** Warranty void if necessary adjustments are not made for high altitude use.

At high altitudes, the engine's carburetor, governor (if so equipped), and any other parts that control the fuel-air ratio will need to be adjusted by a qualified mechanic to allow efficient high-altitude use and to prevent damage to the engine and any other devices used with this product. The fuel system on this engine may be influenced by operation at higher altitudes. Proper operation can be ensured by installing an altitude kit at altitudes higher than 3000 ft. above sea level. At elevations above 8000 ft, the engine may experience decreased performance, even with the proper main jet. Operating this engine without the proper altitude kit installed may increase the engine's emissions and decrease fuel economy and performance. The kit should be installed by a qualified mechanic.

## High Altitude Kit Parts List - A

Part	Description	Qty
A1	Main Jet 3000-6000 ft.	2
A2	Main Jet 6000-8000 ft.	2
B1	Outer Bowl O-ring (replacement)	1

Part	Description	Qty
B2	Inner Bowl O-ring (replacement)	1
5	Gasket, Ex, Pipe	1

SETUP

## Disassembly

1. Turn off the engine.
2. Close the fuel valve, if equipped. If no fuel valve is equipped, clamp the fuel hose closed right before the filter. Be careful to avoid damaging the fuel hose.
3. Place the Engine on its back, with the Muffler on top. See Figure I.
4. Remove the two M8x20 Flange Bolts that hold the Muffler in place on the Muffler Bracket. See Figure J.

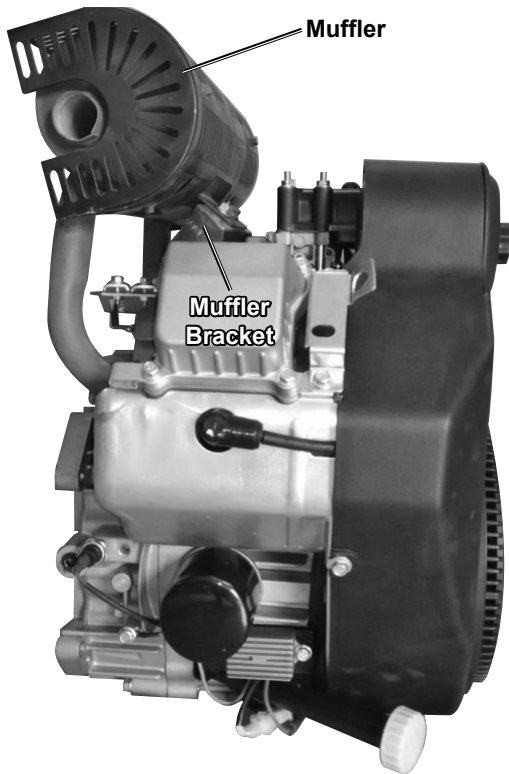


Figure I

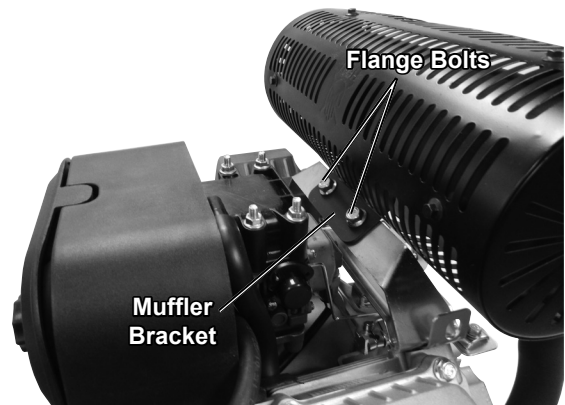


Figure J

5. Remove the four M8x20 Flange Bolts that attach the Muffler Exhaust Pipes to the Cylinder Heads and remove the Muffler. Refer to Figure K.

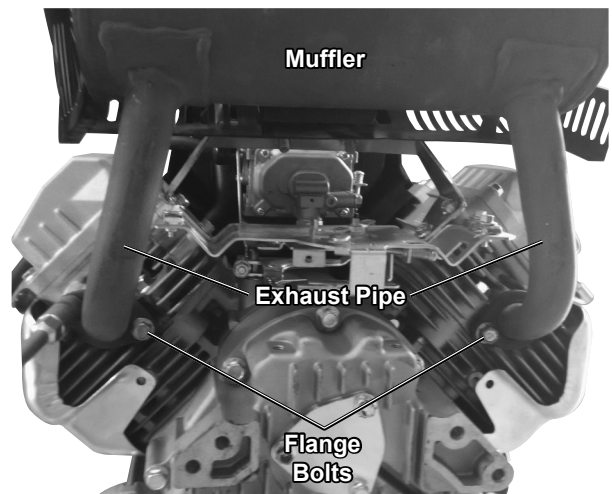
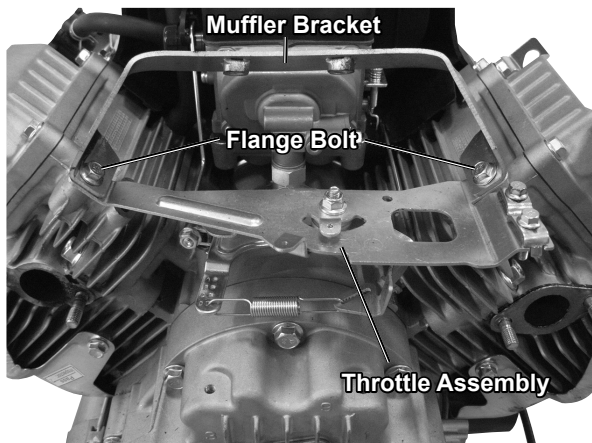


Figure K

OPERATION

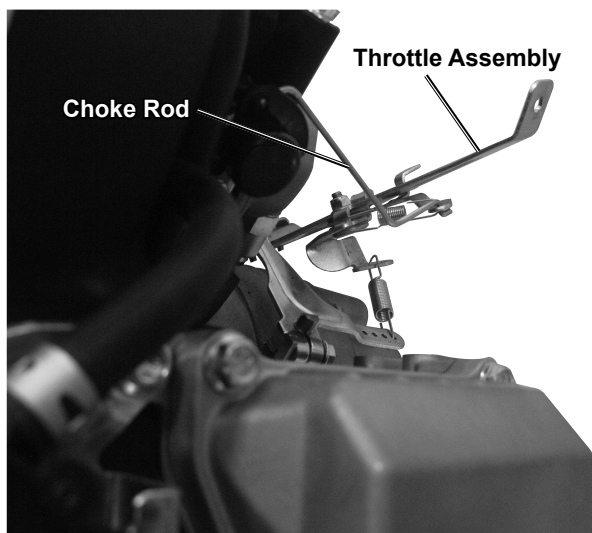
MAINTENANCE

- Remove the M6x16 Flange Bolts (2) that attach the Muffler Bracket and Throttle Assembly (69) to the Engine. See Figure L.



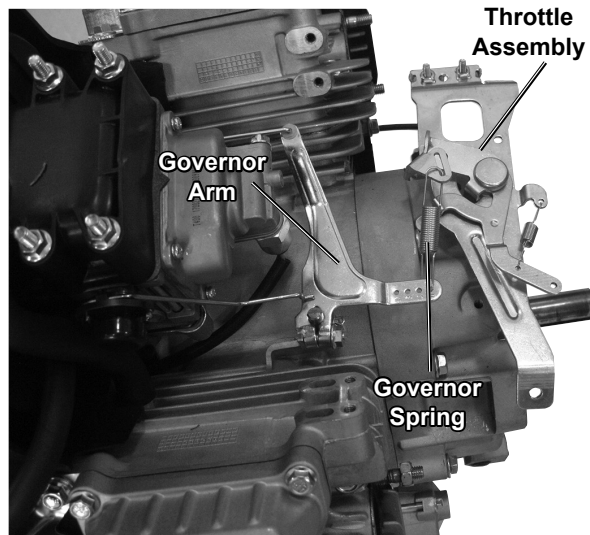
**Figure L**

- Remove the Muffler Bracket.
- Unhook the Choke Rod from the Throttle Assembly. See Figure M.



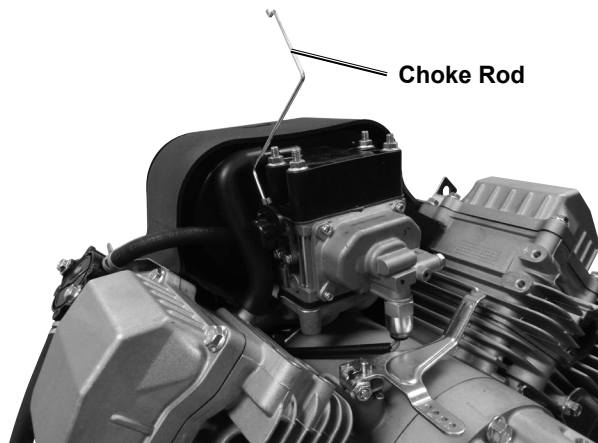
**Figure M**

- Remove the Throttle Assembly and lay it back against the Engine. Remove the Governor Springs from hole D in the Governor Arm. See Figure N.



**Figure N**

- Rotate the Choke Rod into an upward facing position. See Figure O.



**Figure O**

11. **WARNING! TO PREVENT SERIOUS INJURY FROM FIRE, BEFORE CONTINUING:**

- Make sure that the work area is well-ventilated and that there are no ignition sources.
- Have multiple class ABC fire extinguishers available.
- Double-check that fuel hose leading from fuel tank to Fuel Filter is clamped or fuel valve is closed.
- Use a safe, proper means to clean up all fuel spills immediately.



12. Return the Engine to its feet, and remove the Fuel Drain Bolt from the Carburetor Bowl. See Figure P.

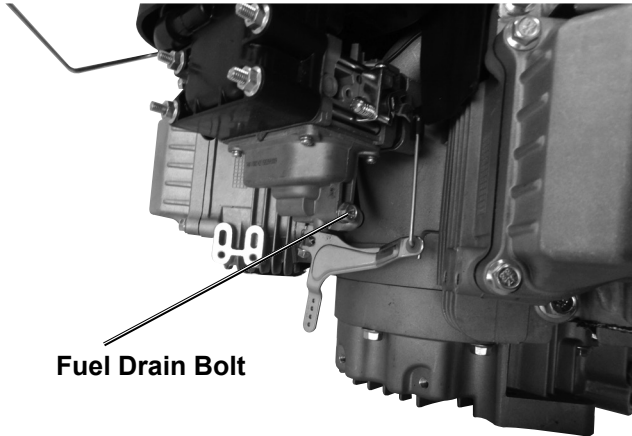


Figure P

- Drain the Carburetor and allow it to dry.
- Mount the Fuel Drain Bolt back onto the Carburetor Bowl. Torque the Fuel Drain Bolt to 4-6 ft.lb.
- Turn the Engine back onto its back.
- Remove the four Carburetor Bowl Screws (137b) and remove the Carburetor Bowl (137c). See Figure Q.

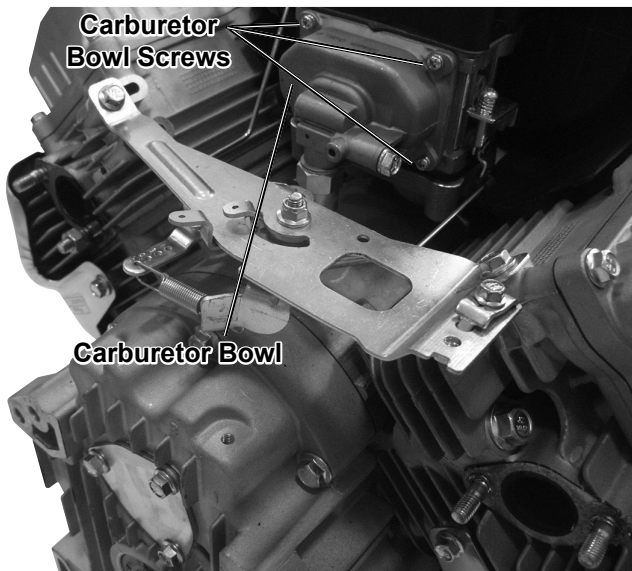


Figure Q

17. Place the Carburetor Bowl to the side of the Carburetor. See Figure R.

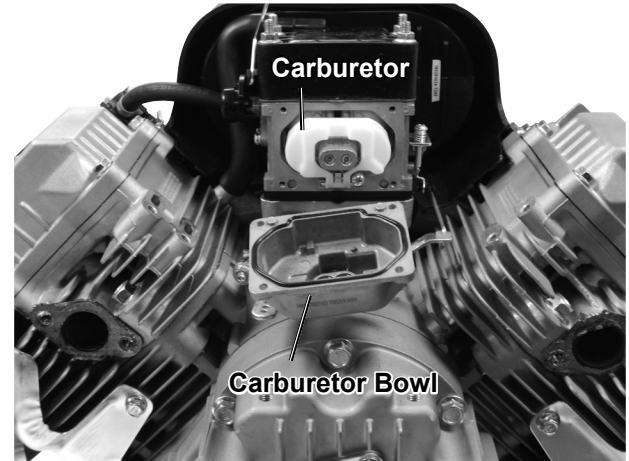


Figure R

18. Use a carburetor screwdriver (sold separately) to remove the Main Left Jet and replace it with the replacement Main Left Jet (A1 or A2) appropriate to the altitude. See Figure S: Main Jets.

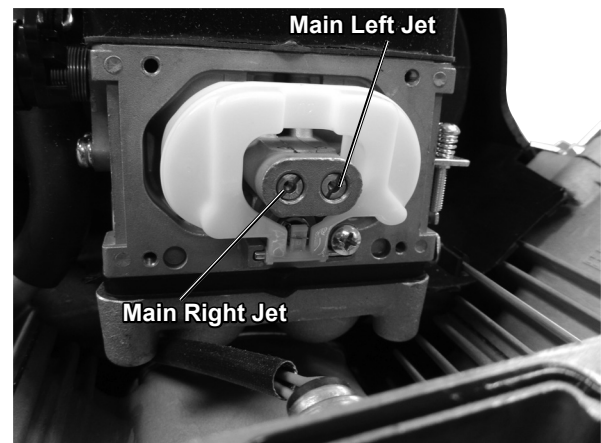


Figure S: Main Jets

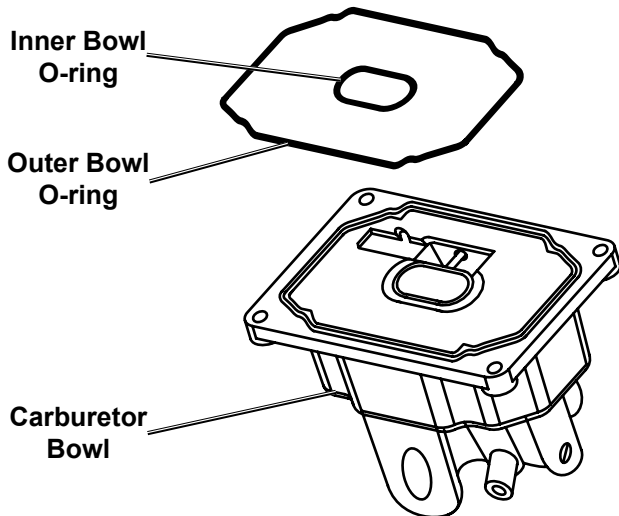
19. Use a carburetor screwdriver (sold separately) to remove the Main Right Jet and replace it with the replacement Main Right Jet (A1 or A2) appropriate to the altitude.

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## Reassembly

**Note:** Reassembly step references shown in brackets.

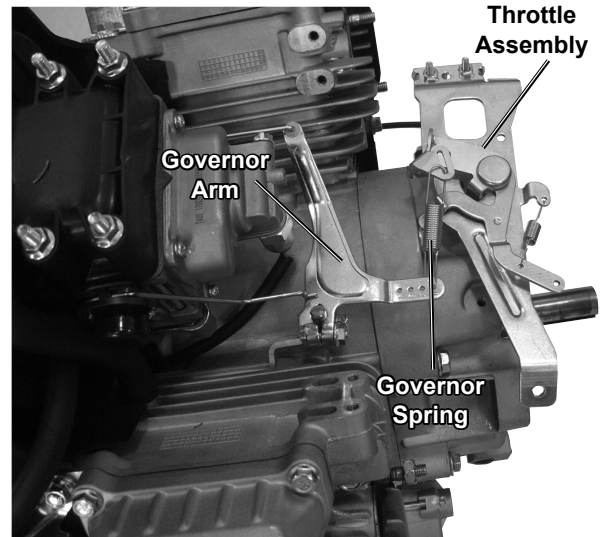
1. Replace the Outer and Inner Bowl O-rings (B1, B2) with the replacements from the altitude kit. Do not reuse existing O-rings.



**Figure T: Replace Bowl O-rings**

2. Assemble the Carburetor Bowl using four Carburetor Bowl Bolts (11). Torque the Fuel Drain Bolt to 4.4-6.6 ft.lb.

3. Reattach Governor Spring to Governor Arm hole D.



**Figure U**

4. Rehook the Choke Rod (10) to the Throttle Assembly (6).
5. Reattach the Exhaust Gasket (5) and re-mount the Muffler (3) to the Engine using M8x20 Bolts (4)
6. Return the Engine to its feet.
7. Once all connections are secure, open fuel valve/unclamp fuel hose.
8. Wipe up any spilled fuel and allow excess to evaporate before starting engine. To prevent FIRE, do not start the engine while the smell of fuel hangs in the air.

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## Operation



Read the **ENTIRE IMPORTANT SAFETY INFORMATION** section at the beginning of this manual including all text under subheadings therein before set up or use of this product.

## Pre-Start Checks

Inspect engine and equipment looking for damaged, loose, and missing parts before set up and starting. If any problems are found, do not use equipment until fixed properly.

### Checking and Filling Engine Oil

**NOTICE:** Your Warranty is VOID if the engine's crankcase is not properly filled with oil before each use. Before each use, check the oil level.

1. Make sure the engine is stopped and is level.
2. Close the Fuel Valve, if equipped.
3. Clean the top of the Dipstick and the area around it. Pull the Dipstick out, and wipe it off with a clean, lint free rag.
4. Reinsert the Dipstick and remove it to check the oil level. The oil level should be up to the upper mark on the dipstick.
5. If the oil level is at or below the low mark, remove the Oil Fill Plug and add the appropriate type of oil until the oil level is at the proper level. SAE 10W-30 oil is recommended for general use. (Table B: SAE Viscosity Grade on page 17 in the Maintenance section shows other viscosities to use in different average temperatures.) Replace the Oil Fill Plug.
6. Insert the Dipstick back into the housing.

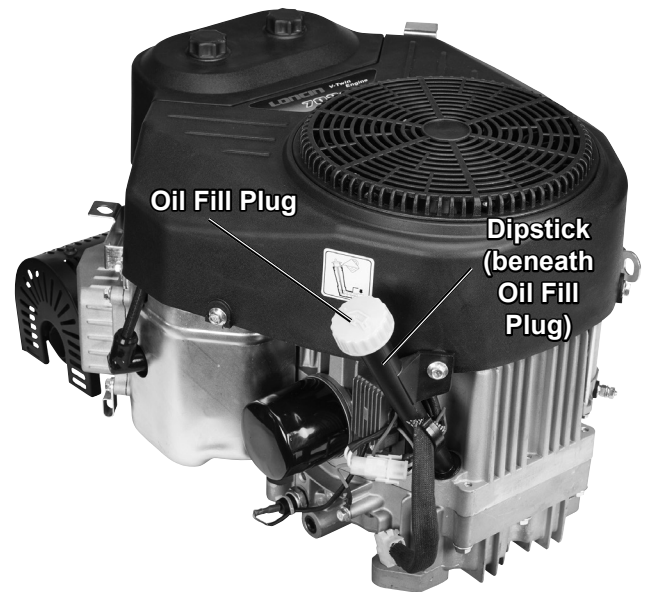


Figure V: Oil Fill and Dipstick

### Checking and Filling Fuel

**Note:** Fuel tank is not included. Before filling, connect fuel tank properly as per fuel tank manufacturer's instructions.



**WARNING! TO PREVENT SERIOUS INJURY FROM FIRE:**

Fill the fuel tank in a well-ventilated area away from ignition sources. If the engine is hot from use, shut the engine off and wait for it to cool before adding fuel. Do not smoke.

1. Clean the Fuel Cap and the area around it.
2. Unscrew and remove the Fuel Cap.
3. Remove the Strainer and remove any dirt and debris. Then replace the Strainer.

**Note:** Do not use gasoline containing more than 10% ethanol (E10). Do not use E85 ethanol. Add fuel stabilizer to the gasoline or the Warranty is VOID.

**Note:** Do not use gasoline that has been stored in a metal fuel container or a dirty fuel container. It can cause particles to enter the carburetor, affecting engine performance and/or causing damage.

4. If needed, fill the Fuel Tank to about 1 inch under the fill neck of the Fuel Tank with 87 octane or higher unleaded gasoline that has been treated with a fuel stabilizer additive. Follow fuel stabilizer manufacturer's recommendations for use.
5. Then replace the Fuel Cap.
6. Wipe up any spilled fuel and allow excess to evaporate before starting engine. To prevent FIRE, do not start the engine while the smell of fuel hangs in the air.

# Starting the Engine



## Before starting the engine:

- a. Follow the Set Up Instructions in this manual to prepare the engine.
- b. Follow the Set Up Instructions in the equipment manual to prepare the equipment.
- c. Inspect the equipment and engine.
- d. Fill the engine with the proper amount and type of both stabilizer-treated unleaded gasoline and oil.
- e. Read the Equipment Operation section in the equipment manual.

**NOTICE:** Engine is not equipped with its own starting controls. Use equipment controls to start engine.

1. To start a cold engine, position the choke at the START position.  
To restart a warm engine, position the choke at the RUN position.
2. Open the fuel valve, if equipped.
3. Slide the throttle or speed control to 1/3 away from the SLOW position.

**Note:** Some tools have speed control located elsewhere on the tool which functions the same as the throttle. Use the speed control in place of the throttle when the tool is so equipped.

4. Engage the start control until the Engine starts, no more than a few seconds. Release the start control when the Engine starts.

**Note:** If the engine does not start after 5 seconds, release the start control and wait at least 10 seconds before trying again.

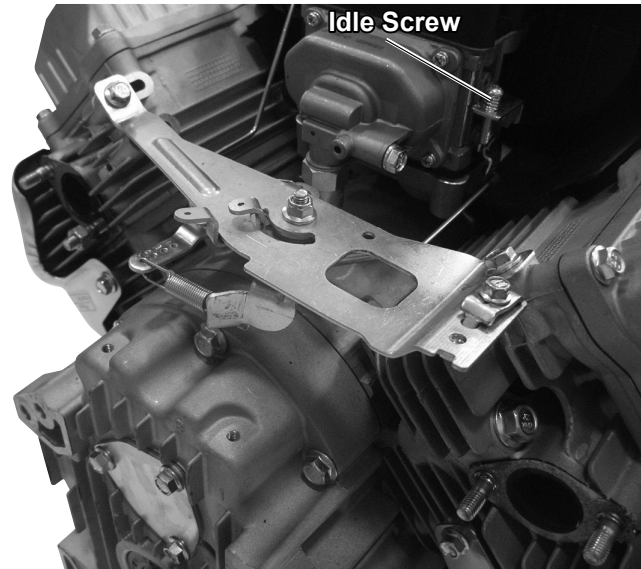
5. Allow the Engine to run for several seconds. Then, if the choke is in the START position, move the Choke very slowly to its RUN position.

**Note:** Moving the Choke too fast could stall the engine.

**IMPORTANT:** Allow the engine to run at no load for five minutes after each start-up so that the engine can stabilize.

6. Adjust the Throttle as needed.

**Note:** Adjust idle speed with the Idle Screw, located underneath the Air Cleaner. See Figure V.



**Figure W: Idle Screw**

Actual idle speed depends on application. Refer to equipment manufacturer's recommendations. Running idle speed too low may result in performance issues, including excessive engine wear.

## **Break-in Period:**

- a. Breaking-in the engine will help to ensure proper equipment and engine operation.
- b. The operational break-in period will last about 3 hours of use. During this period:
  - Do not apply a heavy load to the equipment.
  - Do not operate the engine at its maximum speed.
- c. The maintenance break-in period will last about 20 hours of use.
  - Change the engine oil after this period.

Under normal operating conditions subsequent maintenance follows the schedule explained in the MAINTENANCE section.

# Stopping the Engine

1. To stop the engine in an emergency, turn the start control to OFF.
2. Under normal conditions, use the following procedure:
  - a. Slide the throttle or speed control to SLOW (the "turtle").
  - b. Turn the start control to OFF.
  - c. Close the Fuel Valve, if equipped.

## **NOTICE**

**Drain fuel at end of season or warranty is void.**

See Storage on page 19 for complete storage instructions.

**⚠ WARNING**

**TO PREVENT SERIOUS INJURY FROM ACCIDENTAL STARTING:**

Turn the Power Switch of the equipment to its “OFF” position, wait for the engine to cool, and disconnect the spark plug caps before performing any inspection, maintenance, or cleaning procedures.

**TO PREVENT SERIOUS INJURY FROM EQUIPMENT FAILURE:**

Do not use damaged equipment. If abnormal noise, vibration, or excess smoking occurs, have the problem corrected before further use.

Follow all service instructions in this manual. The engine may fail critically if not serviced properly.



Many maintenance procedures, including any not detailed in this manual, will need to be performed by a qualified technician for safety. If you have any doubts about your ability to safely service the equipment or engine, have a qualified technician service the equipment instead.

**Cleaning, Maintenance, and Lubrication Schedule**

**Note:** This maintenance schedule is intended solely as a general guide. If performance decreases or if equipment operates unusually, check systems immediately. The maintenance needs of each piece of equipment will differ depending on factors such as duty cycle, temperature, air quality, fuel quality, and other factors.

**Note:** The following procedures are in addition to the regular checks and maintenance explained as part of the regular operation of the engine and equipment.

Procedure	Before Each Use	Monthly or every 20 hr. of use	Every 3 mo. or 50 hr. of use	Every 6 mo. or 100 hr. of use	Yearly or every 300 hr. of use	Every 2 Years
Brush off outside of engine	✓	✓	✓	✓	✓	✓
Check engine oil level	✓	✓	✓	✓	✓	✓
Check air cleaner			✓	✓	✓	✓
Change engine oil and oil filter		✓		✓	✓	✓
Clean/replace air filter			✓*	✓	✓	✓
1. Check and clean spark plugs 2. Replace fuel filter.				✓	✓	✓
1. Check/adjust idle speed 2. Check/adjust valve clearance 3. Clean fuel tank, strainer and carburetor 4. Clean carbon build-up from combustion chambers					✓**	✓**
Replace fuel line if necessary						✓**

\*Service more frequently when used in dusty areas.

\*\*These items should be serviced by a qualified technician.



## Checking and Filling Fuel

**Note:** Fuel tank is not included. Before filling, connect fuel tank properly as per fuel tank manufacturer's instructions.



### **⚠️WARNING! TO PREVENT SERIOUS INJURY FROM FIRE:**

Fill the fuel tank in a well-ventilated area away from ignition sources. If the engine is hot from use, shut the engine off and wait for it to cool before adding fuel. Do not smoke.

1. Clean the Fuel Cap and the area around it.
2. Unscrew and remove the Fuel Cap.
3. Remove the Strainer and remove any dirt and debris. Then replace the Strainer.

**Note:** Do not use gasoline containing more than 10% ethanol (E10). Do not use E85 ethanol. Add fuel stabilizer to the gasoline or the Warranty is VOID.

## Engine Oil Change

**⚠️CAUTION!** Oil is very hot during operation and can cause burns. Wait for engine to cool before changing oil.

1. Make sure the engine is stopped and is level.
2. Close the fuel valve, if equipped.
3. Place a drain pan (not included) underneath the crankcase's Oil Drain Plug.
4. Remove the Oil Drain Plug and, if possible, tilt the crankcase slightly to help drain the oil out. Recycle used oil.
5. Replace the Oil Drain Plug and tighten it.
6. Move the drain pan underneath the Oil Filter.
7. Unthread and remove the Oil Filter. Allow the oil to drain out of the filter completely before disposal. Dispose of oil properly or recycle it.
8. Install a new Oil Filter of the same size and type, either STP S4967 or Fram PH4967.
9. Clean the top of the Dipstick and the area around it. Pull the Dipstick out, and wipe it off with a clean, lint free rag.
10. Remove the Oil Fill Plug and add the appropriate type of oil until the oil level is at the proper level. SAE 10W-30 oil is recommended for general use. The SAE Viscosity Grade chart shows other viscosities to use in different average temperatures. Replace the Oil Fill Plug.
11. Insert the Dipstick back into the housing.

**Note:** Do not use gasoline that has been stored in a metal fuel container or a dirty fuel container. It can cause particles to enter the carburetor, affecting engine performance and/or causing damage.

4. If needed, fill the Fuel Tank to about 1 inch under the fill neck of the Fuel Tank with 87 octane or higher unleaded gasoline that has been treated with a fuel stabilizer additive. Follow fuel stabilizer manufacturer's recommendations for use.
5. Then replace the Fuel Cap.
6. Wipe up any spilled fuel and allow excess to evaporate before starting engine. To prevent FIRE, do not start the engine while the smell of fuel hangs in the air.

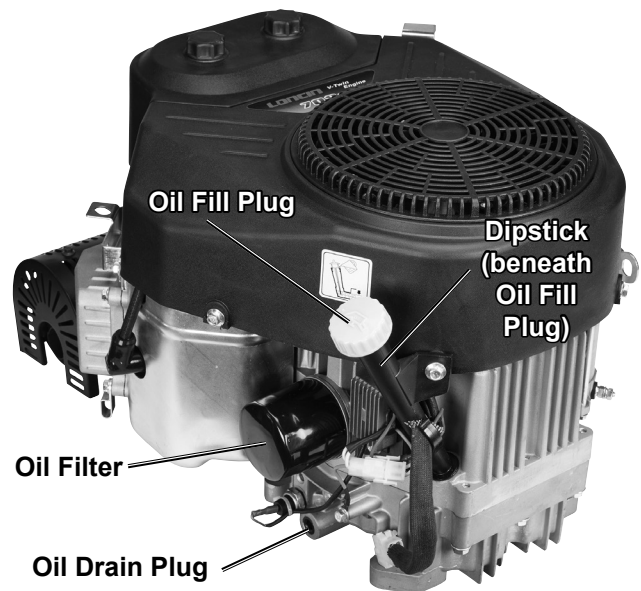


Figure X: Oil Drain and Oil Filter Location

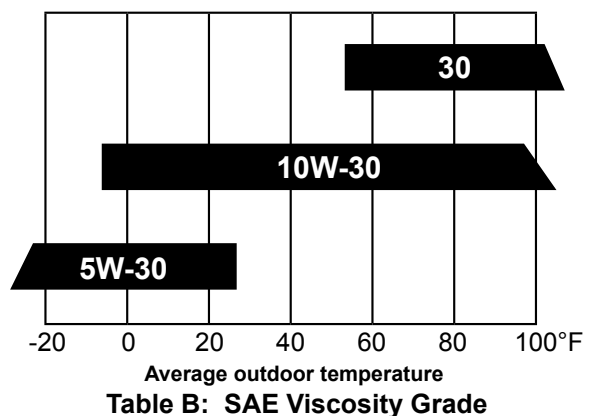
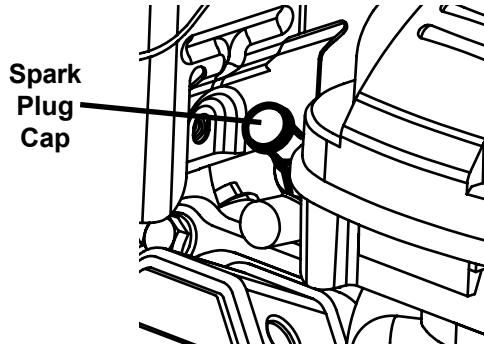


Table B: SAE Viscosity Grade

## Air Filter Maintenance

1. Remove the Air Cleaner Top Cover and the air filter elements and check for dirt. Clean as described below.
2. Clean Paper Air Filter:  
To prevent injury from dust and debris, wear ANSI-approved safety goggles, NIOSH-approved dust mask/respirator, and heavy-duty work gloves. In a well-ventilated area away from bystanders, use pressurized air to blow dust out of the Filter.
3. Clean Foam Air Filter:  
Wash the Filter in warm water and mild detergent several times. Rinse. Squeeze out excess water and allow it to dry completely. Soak the Filter in lightweight oil briefly, then squeeze out the excess oil.
4. Use a moist rag to wipe dirt from the inside of the Air Cleaner body.
5. Install the cleaned filter. Secure the Air Cleaner Top Cover before use.

## Spark Plug Maintenance



1. Disconnect spark plug caps from ends of plugs. Clean out debris from around spark plugs.
2. Using a spark plug wrench, remove the spark plugs.
3. Inspect the spark plugs:  
If the electrode(s) is oily, clean it using a clean, dry rag. If the electrode(s) has deposits on it, polish it using emery paper. If the white insulator is cracked or chipped, the spark plug needs to be replaced.

Recommended Spark Plugs	
TORCH®	F5RTC
NGK®	BPR5ES
CHAMPION®	RN9YC

**Note:** Some areas may require resistor spark plugs.

**NOTICE:** Using an incorrect spark plug may damage the engine.

4. When installing a new spark plug(s), adjust the plug's gap to the specification on the Specifications chart. Do not pry against the electrode, the spark plug can be damaged.
5. Install the new spark plug(s) or the cleaned spark plug(s) into the engine.

• **Gasket-style:**

Finger-tighten until the gasket contacts the cylinder head, then tighten about 1/2-2/3 turn more.

• **Non-gasket-style:**

Finger-tighten until the plug contacts the cylinder head, then tighten about 1/16 turn more.

**NOTICE:** Tighten the spark plugs properly.

**If loose,** the spark plugs will cause the engine to overheat.

**If overtightened,** the threads in the engine block will be damaged.

6. Apply dielectric spark plug boot protector (not included) to the end of the spark plugs and reattach the wires securely.

# Storage

When the equipment is to remain idle for longer than 20 days, prepare the Engine for storage as follows:

1. **CLEANING:**

Wait for Engine to cool, then clean Engine with dry cloth. **NOTICE: Do not clean using water.** The water will gradually enter the Engine and cause rust damage. Apply a thin coat of rust preventive oil to all metal parts.

2. **FUEL:**

To protect the fuel tank during storage, fill the tank with gasoline that has been treated with a fuel stabilizer additive. Follow fuel stabilizer manufacturer's recommendations for use. Refer to *Checking and Filling Fuel* on page 14.



**⚠️ WARNING! TO PREVENT SERIOUS INJURY FROM FIRE:**

Fill tank in a well-ventilated area away from ignition sources. If the engine is hot from use, shut the engine off and wait for it to cool before adding fuel. Do not smoke.

3. **LUBRICATION:**

- a. Change engine oil.
- b. Clean out area around spark plug.  
Remove spark plug and pour one tablespoon of engine oil into cylinder through spark plug hole.

- c. Replace spark plug, but leave spark plug cap disconnected.
- d. Pull Starter Handle to distribute oil in cylinder. Stop after one or two revolutions when you feel the piston start the compression stroke (when you start to feel resistance).

4. **BATTERY:**

Disconnect battery cables (if equipped). Recharge batteries monthly while in storage.

5. **STORAGE AREA:**

Cover and store in a dry, level, well-ventilated area out of reach of children. Storage area should also be away from ignition sources, such as water heaters, clothes dryers, and furnaces.

**NOTICE:** During extended storage periods the Engine must be started every 3 months and allowed to run for 15–20 minutes or the Warranty is VOID.

6. **AFTER STORAGE:**

Before starting the Engine during or after storage, keep in mind that untreated gasoline will deteriorate quickly. Drain the fuel tank and change to fresh fuel if untreated gasoline has been sitting for a month, if treated gasoline has been sitting beyond the fuel stabilizer's recommended time period, or if the Engine does not start.

# Troubleshooting

SAFETY

SETUP

OPERATION

MAINTENANCE

Problem	Possible Causes	Probable Solutions
Engine will not start	<b>FUEL RELATED:</b> <ol style="list-style-type: none"> <li>No fuel in tank or fuel valve closed.</li> <li>Choke not in START position, cold engine.</li> <li>Gasoline with more than 10% ethanol used. (E15, E20, E85, etc.)</li> <li>Low quality or deteriorated, old gasoline.</li> <li>Carburetor not primed.</li> <li>Dirty fuel passageways.</li> <li>Carburetor needle stuck. Fuel can be smelled in the air.</li> <li>Too much fuel in chamber. This can be caused by the carburetor needle sticking.</li> <li>Clogged Fuel Filter.</li> </ol>	<b>FUEL RELATED:</b> <ol style="list-style-type: none"> <li>Fill fuel tank with fresh 87+ octane stabilizer-treated unleaded gasoline and open fuel valve. <b>Do not use gasoline with more than 10% ethanol (E15, E20, E85, etc.).</b></li> <li>Move Choke to START position.</li> <li>Clean out ethanol rich gasoline from fuel system. Replace components damaged by ethanol. Use fresh 87+ octane stabilizer-treated unleaded gasoline only. <b>Do not use gasoline with more than 10% ethanol (E15, E20, E85, etc.).</b></li> <li>Use fresh 87+ octane stabilizer-treated unleaded gasoline. <b>Do not use gasoline with more than 10% ethanol (E15, E20, E85, etc.).</b></li> <li>Pull on Starter Handle to prime.</li> <li>Clean out passageways using fuel additive. Heavy deposits may require further cleaning.</li> <li><b>Gently</b> tap side of carburetor float chamber with screwdriver handle.</li> <li>Turn Choke to RUN position. Remove spark plug and pull the start handle several times to air out the chamber. Reinstall spark plug and set Choke to START position.</li> <li>Replace Fuel Filter.</li> </ol>
	<b>IGNITION (SPARK) RELATED:</b> <ol style="list-style-type: none"> <li>Spark plug cap not connected securely.</li> <li>Spark plug electrode wet or dirty.</li> <li>Incorrect spark plug gap.</li> <li>Spark plug cap broken.</li> <li>Circuit breaker tripped.</li> <li>Incorrect spark timing or faulty ignition system.</li> </ol>	<b>IGNITION (SPARK) RELATED:</b> <ol style="list-style-type: none"> <li>Connect spark plug cap properly.</li> <li>Clean spark plug.</li> <li>Correct spark plug gap.</li> <li>Replace spark plug cap.</li> <li>Reset circuit breaker. Check wiring and starter motor if breaker continues to trip.</li> <li>Have qualified technician diagnose/repair ignition system.</li> </ol>
	<b>COMPRESSION RELATED:</b> <ol style="list-style-type: none"> <li>Cylinder not lubricated. Problem after long storage periods.</li> <li>Loose or broken spark plug. (Hissing noise will occur when trying to start.)</li> <li>Loose cylinder head or damaged head gasket. (Hissing noise will occur when trying to start.)</li> <li>Engine valves or tappets mis-adjusted or stuck.</li> </ol>	<b>COMPRESSION RELATED:</b> <ol style="list-style-type: none"> <li>Pour tablespoon of oil into spark plug hole. Crank engine a few times and try to start again.</li> <li>Tighten spark plug. If that does not work, replace spark plug. If problem persists, may have head gasket problem, see #3.</li> <li>Tighten head. If that does not remedy problem, replace head gasket.</li> <li>Have qualified technician adjust/repair valves and tappets.</li> </ol>



Follow all safety precautions whenever diagnosing or servicing the equipment or engine.

Problem	Possible Causes	Probable Solutions
Engine misfires	<ol style="list-style-type: none"> <li>1. Spark plug cap loose.</li> <li>2. Incorrect spark plug gap or damaged spark plug.</li> <li>3. Defective spark plug cap.</li> <li>4. Old or low quality gasoline.</li> <li>5. Incorrect compression.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check cap and wire connections.</li> <li>2. Re-gap or replace spark plug.</li> <li>3. Replace spark plug cap.</li> <li>4. Use only fresh 87+ octane stabilizer-treated unleaded gasoline. <b>Do not use gasoline with more than 10% ethanol (E15, E20, E85, etc.).</b></li> <li>5. Diagnose and repair compression. (Use <b>Engine will not start: COMPRESSION RELATED</b> section.)</li> </ol>
Engine stops suddenly	<ol style="list-style-type: none"> <li>1. Fuel tank empty or full of impure or low quality gasoline.</li> <li>2. Defective fuel tank cap creating vacuum, preventing proper fuel flow.</li> <li>3. Faulty magneto.</li> <li>4. Disconnected or improperly connected spark plug cap.</li> </ol>	<ol style="list-style-type: none"> <li>1. Fill fuel tank with fresh 87+ octane stabilizer-treated unleaded gasoline. <b>Do not use gasoline with more than 10% ethanol (E15, E20, E85, etc.).</b></li> <li>2. Test/replace fuel tank cap.</li> <li>3. Have qualified technician service magneto.</li> <li>4. Secure spark plug cap.</li> </ol>
Engine stops when under heavy load	<ol style="list-style-type: none"> <li>1. Dirty air filter</li> <li>2. Engine running cold.</li> </ol>	<ol style="list-style-type: none"> <li>1. Clean element.</li> <li>2. Allow engine to warm up prior to operating equipment.</li> </ol>
Engine knocks	<ol style="list-style-type: none"> <li>1. Old or low quality gasoline.</li> <li>2. Engine overloaded.</li> <li>3. Incorrect spark timing, deposit buildup, worn engine, or other mechanical problems.</li> </ol>	<ol style="list-style-type: none"> <li>1. Fill fuel tank with fresh 87+ octane stabilizer-treated unleaded gasoline. <b>Do not use gasoline with more than 10% ethanol (E15, E20, E85, etc.).</b></li> <li>2. Do not exceed equipment's load rating.</li> <li>3. Have qualified technician diagnose and service engine.</li> </ol>
Engine backfires	<ol style="list-style-type: none"> <li>1. Impure or low quality gasoline.</li> <li>2. Engine too cold.</li> <li>3. Intake valve stuck or overheated engine.</li> <li>4. Incorrect timing.</li> </ol>	<ol style="list-style-type: none"> <li>1. Fill fuel tank with fresh 87+ octane stabilizer-treated unleaded gasoline. <b>Do not use gasoline with more than 10% ethanol (E15, E20, E85, etc.).</b></li> <li>2. Use cold weather fuel additives to prevent backfiring.</li> <li>3. Have qualified technician diagnose and service engine.</li> <li>4. Check engine timing.</li> </ol>
After sudden impact, engine will run, but equipment will not operate	Shaft key or other shear pin broken by impact to disconnect engine and limit damage.	Have qualified technician check and replace broken shaft key or other shear pins.



**Follow all safety precautions whenever diagnosing or servicing the equipment or engine.**

## Limited 90 Day Warranty (Retail)

Harbor Freight Tools Co. makes every effort to assure that its products meet high quality and durability standards, and warrants to the original purchaser that this product is free from defects in materials and workmanship for the period of 90 days from the date of purchase. This warranty does not apply to damage due directly or indirectly, to misuse, abuse, negligence or accidents, repairs or alterations outside our facilities, criminal activity, improper installation, normal wear and tear, or to lack of maintenance. We shall in no event be liable for death, injuries to persons or property, or for incidental, contingent, special or consequential damages arising from the use of our product. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation of exclusion may not apply to you. THIS WARRANTY IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING THE WARRANTIES OF MERCHANTABILITY AND FITNESS, EXCEPT FOR THE EMISSIONS CONTROL SYSTEM WARRANTY BELOW.

To take advantage of this warranty, the product or part must be returned to us with transportation charges prepaid. Proof of purchase date and an explanation of the complaint must accompany the merchandise. If our inspection verifies the defect, we will either repair or replace the product at our election or we may elect to refund the purchase price if we cannot readily and quickly provide you with a replacement. We will return repaired products at our expense, but if we determine there is no defect, or that the defect resulted from causes not within the scope of our warranty, then you must bear the cost of returning the product.

This warranty gives you specific legal rights and you may also have other rights which vary from state to state.

## Emissions Control System Warranty

The California Air Resources Board and Harbor Freight Tools (HFT) are pleased to explain the emissions control system warranty on your 2017 Small Off-Road Engine. In California, new equipment that uses small off-road engines must be designed, built, and equipped to meet the State's stringent anti-smog standards. HFT must warrant that the emissions control system on your engine will be free from defects in material and workmanship for two (2) years, provided there has been no abuse, neglect, or improper maintenance of your engine. HFT also warrants that the emissions control system on your engine is designed, built, and equipped so that it conforms to the United States Environmental Protection Agency's (EPA) emissions requirements in effect at the time of manufacture.

Your emissions control system may include parts such as the carburetor or fuel-injection system, the ignition system, catalytic converter, fuel lines, valves, canisters, vapor hoses, clamps, connectors, and other emissions-related assemblies.

Where a warrantable condition exists, HFT will repair or replace, at our option, your engine if at no cost to you, including diagnosis, parts and labor.

### MANUFACTURER'S WARRANTY COVERAGE

This emissions control system is warranted for two years. If any emission-related part on your engine is defective, the part will be repaired or replaced by HFT.

### OWNER'S WARRANTY RESPONSIBILITIES

As the engine owner, you are responsible for the performance of the required maintenance listed in your Owner's Manual.

As the engine owner, you should however be aware that HFT may deny you warranty coverage if your engine or a part has failed due to abuse (including failure to follow the fuel use instructions contained in this manual), neglect, improper maintenance, or unapproved modifications.

You are responsible for contacting HFT as soon as the problem exists in order to obtain warranty repair or replacement, by doing either of the following: (a) contact HFT product support at 1-888-866-5797 or predator@harborfreight.com; or (b) bring the to your nearest Harbor Freight Tools retail store. The nearest Harbor Freight Tools retail store can be found on the internet at <http://www.harborfreight.com>. The warranty repairs or replacement should be completed in a reasonable amount of time, not to exceed 30 days. If you have a question regarding your warranty coverage, you should contact HFT product support at 1-888-866-5797 or predator@harborfreight.com.

## GENERAL EMISSIONS WARRANTY COVERAGE

- a) The warranty period begins on the date the engine or equipment is delivered to an ultimate purchaser. The warranty period is two years.
- b) HFT warrants to the initial owner and each subsequent owner that the engine is:
1. Designed, built, and equipped so as to conform with all applicable regulations adopted by the Air Resources Board; and
  2. Free from defects in materials and workmanship that causes the failure of a warranted part for a period of two years.
- c) The warranty on emissions-related parts is as follows:
1. Any warranted part that is not scheduled for replacement as required maintenance in the written instructions provided, is warranted for the warranty period stated above. If any such part fails during the period of warranty coverage, it will be repaired or replaced HFT. Any such part repaired or replaced under the warranty will be warranted for the remaining warranty period.
  2. Any warranted part that is scheduled only for regular inspection in the written instructions is warranted for the warranty period stated above. A statement in the written instructions to the effect of "repair or replace as necessary" does not reduce the period of warranty coverage. Any such part repaired or replaced under warranty will be warranted for the remaining warranty period.
  3. Any warranted part that is scheduled for replacement as required maintenance in the written instructions will be warranted for the period of time prior to the first scheduled replacement point for that part. If the part fails prior to the first scheduled replacement, the part will be repaired or replaced by HFT. Any such part repaired or replaced under warranty will be warranted for the remainder of the period prior to the first scheduled replacement point for the part.
  4. Repair or replacement of any warranted part under the warranty will be performed at no charge to the owner at a retail store or by HFT paying for shipping the product for repair.
  5. Notwithstanding the provisions herein, warranty services or repairs will be provided at all retail stores or by contacting HFT product support at 1-888-866-5797 or predator@harborfreight.com.
  6. The owner will not be charged for diagnostic labor that leads to the determination that a warranted part is in fact defective, provided that such diagnostic work is performed at a retail store.
  7. HFT is liable for damages to other engine components proximately caused by a failure under warranty of any warranted part.
  8. Throughout the emissions warranty period stated above, HFT will maintain a supply of warranted parts sufficient to meet the expected demand for such parts.
  9. Any replacement part may be used in the performance of any warranty maintenance or repairs and will be provided without charge to the owner. Such use will not reduce the warranty obligations of HFT.
  10. Add-on or modified parts that are not approved by HFT may not be used. The use of any non-exempted add-on or modified parts will be grounds for disallowing a warranty claim. HFT is not liable to warrant failures of warranted parts caused by the use of a non-exempted add-on or modified part.
- d) Emission Warranty Parts List.
- |  |   |
|--|---|
| 1. Fuel Metering System  | 4. Catalyst System (if so equipped)   |
| a. Carburetor and its internal parts (and/or pressure regulator or fuel injection system). | a. Exhaust pipe stud/exhaust manifold.  |
| b. Cold start enrichment system.   | b. Thermal reactor.   |
| c. Air/fuel ratio feedback and control system.   | c. Catalytic converter (if so equipped).  |
| 2. Air Induction System  | 5. Particulate Controls   |
| a. Controlled hot air intake system.   | a. Traps, filters, precipitators, and any other device used to capture particulate emissions. |
| b. Intake manifold.  | 6. Miscellaneous Items Used in Above Systems  |
| c. Air filter.   | a. Vacuum, temperature and time sensitive valves and switches.                                |
| 3. Ignition System   | b. Hoses, belts, connectors, and assemblies.  |
| a. Spark plugs.  |   |
| b. Magneto ignition system.  |   |
| c. Spark advance/retard system.  |   |

HFT provides with each product written instructions for the maintenance and use of the product by the owner.

Parts List

SAFETY

SETUP

OPERATION

MAINTENANCE

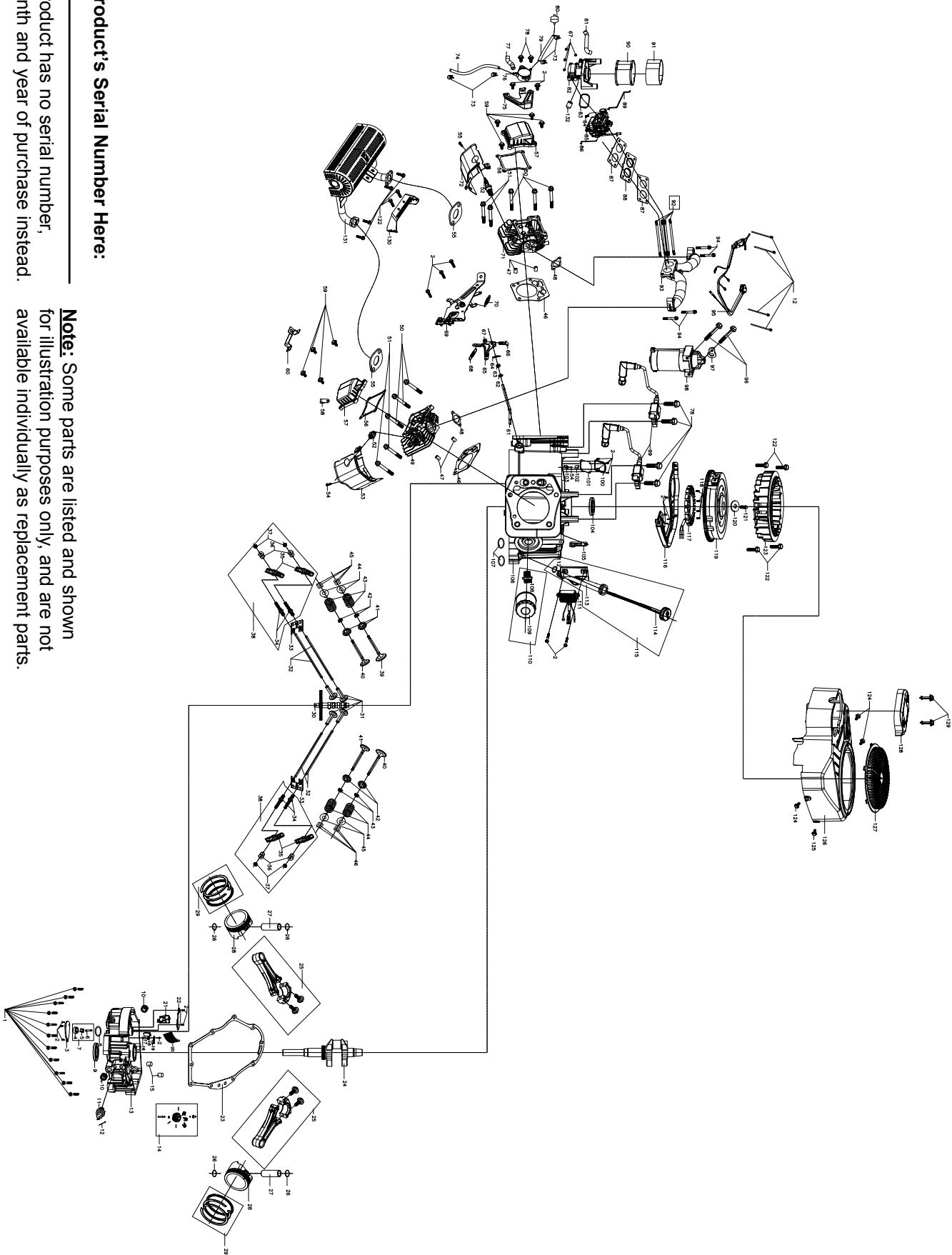
Part	Description	Qty	Part	Description	Qty	Part	Description	Qty
1	Flange Bolt	10	45	Valve Keeper	8	89	Throttle Rod	1
2	Flange Bolt	23	46	Cylinder Gasket	2	90	Air Filter	1
3	Oil Pump Cover	1	47	Pin	4	91	Air Filter	1
4	Outer Rotor	1	48	Carburetor Packing	2	92	Bolt	4
5	Inner Rotor	1	49	Cylinder Head Comp	1	93	Intake	1
6	Shaft Oil Pump	1	50	Flange Bolt	6	94	Flange Bolt	4
7	Pump Oil	1	51	Flange Bolt	4	95	Line	1
8	Seal Ring Oil Pump	1	52	Spark Plug	2	96	Flange Bolt	2
9	Oil Seal	1	53	Shroud Comp	1	97	Lug	1
10	Drain Plug Bolt	2	54	Flange Bolt	3	98	Start	1
11	Oil Annunciator	1	55	Gasket Expipe	2	99	Ignition Coil	2
12	Cuff	5	56	Cylinder Gasket	2	100	Cap Breather Chamber	1
13	Case Cover	1	57	Cylinder Cover	2	101	Breather Packing	1
14	Governor Assembly	1	58	Clamps	1	102	Filter	1
15	Pin	2	59	Flange Bolt	8	103	Reed Valve	1
16	Ball	1	60	Lug	1	104	Oil Seal	1
17	Rubber Oil Deflector	1	61	Governor Arm Shaft	1	105	Clamps	1
18	Spring	1	62	Washer	1	106	Crank Case Comp	1
19	Oil Baffle Plate	1	63	Oil Seal	1	107	O-Ring	2
20	Oil Strainer	1	64	Pin Lock	1	108	Oil Filter Connector	1
21	Oil Baffle Plate	1	65	Governor Arm	1	109	Oil Filter Body	1
22	Oil Strainer Plate	1	66	Governor Arm Bolt	1	110	Oil Filter	1
23	Seal	1	67	Nut	5	111	Rectifier	1
24	Crankshaft Comp	1	68	Spring	1	112	Seal	1
25	Rod	2	69	Control Assembly	1	113	Extension	1
26	Piston Pin Clip	4	70	Spring	1	114	Oil Filler Cap	1
27	Piston Pin	2	71	Head Comp Cylinder	1	115	Cap Assembly	1
28	Piston	2	72	Shroud Comp	1	116	Engine Shroud	1
29	Ring Set	2	73	Tube	4	117	Charge Coil Assembly	1
30	Camshaft Combination	1	74	Oil Pipeline	1	118	Bolt	4
31	Holder	4	75	Stent Fuel Pump	1	119	Filwheel Comp	1
32	Tappet Combination	4	76	Fuel Pump	1	120	Washer	1
33	Limit Plate	2	77	Pipeline	1	121	Flange Bolt	1
34	Bolt	4	78	Bolt Flange	6	122	Flange Bolt	10
35	Rocker Arm	4	79	Oil Pipeline	1	123	Cooling Fan	1
36	Pivot Rocker Arm	4	80	Fuel Filters	1	124	Hex Bolt	3
37	Pivot Adjusting Nut	4	81	Pipeline	1	125	Hex Bolt	1
38	Rocker Arm	4	82	Air Base	1	126	Cover Comp. Fan	1
39	Valve In.	2	83	Seal	1	127	Starter Shroud	1
40	Valve Ex.	2	84	Rod Choke Lock Clamp	1	128	Ait Cleaner Cover	1
41	Valve Spring Seat	4	85	Carburetor	1	129	Air Cleaner Nut	1
42	Valve Stem Seal	4	86	Governor Rod	1	130	Muffler Stent	1
43	Valve Spring	4	87	Carburetor Packing	2	131	Muffler	1
44	Valve Spring Seat	4	88	Carburetor Packing	1	132	Cap	1

PLEASE READ THE FOLLOWING CAREFULLY

THE MANUFACTURER AND/OR DISTRIBUTOR HAS PROVIDED THE PARTS LIST AND ASSEMBLY DIAGRAM IN THIS MANUAL AS A REFERENCE TOOL ONLY. NEITHER THE MANUFACTURER OR DISTRIBUTOR MAKES ANY REPRESENTATION OR WARRANTY OF ANY KIND TO THE BUYER THAT HE OR SHE IS QUALIFIED TO MAKE ANY REPAIRS TO THE PRODUCT, OR THAT HE OR SHE IS QUALIFIED TO REPLACE ANY PARTS OF THE PRODUCT. IN FACT, THE MANUFACTURER AND/OR DISTRIBUTOR EXPRESSLY STATES THAT ALL REPAIRS AND PARTS REPLACEMENTS SHOULD BE UNDERTAKEN BY CERTIFIED AND LICENSED TECHNICIANS, AND NOT BY THE BUYER. THE BUYER ASSUMES ALL RISK AND LIABILITY ARISING OUT OF HIS OR HER REPAIRS TO THE ORIGINAL PRODUCT OR REPLACEMENT PARTS THERETO, OR ARISING OUT OF HIS OR HER INSTALLATION OF REPLACEMENT PARTS THERETO.



# Assembly Diagram



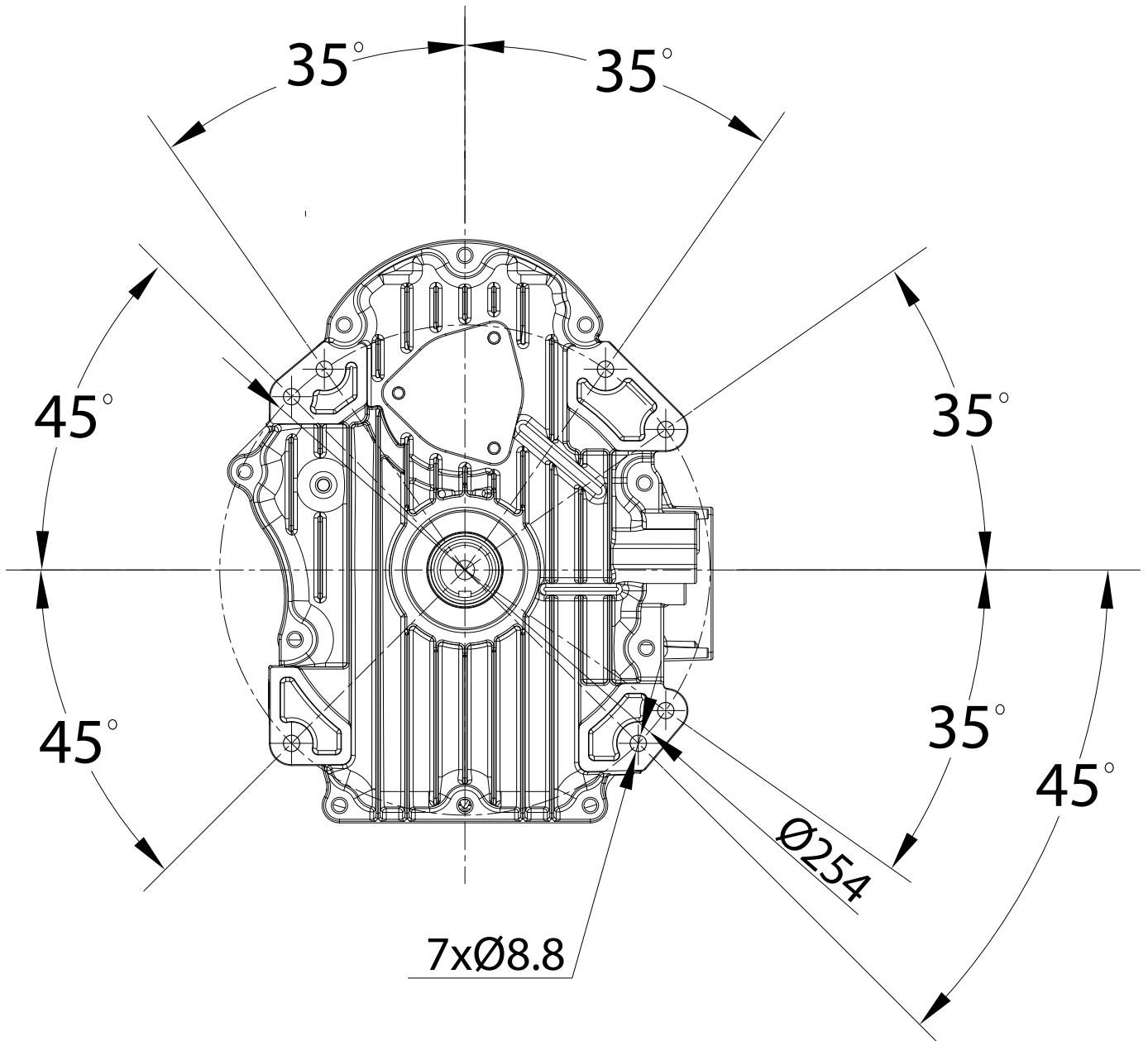
Record Product's Serial Number Here:

**Note:** If product has no serial number, record month and year of purchase instead.

**Note:** Some parts are listed and shown for illustration purposes only, and are not available individually as replacement parts.

# Mounting Hole Diagram

**Note:** Not to scale.



**PREDATOR**  
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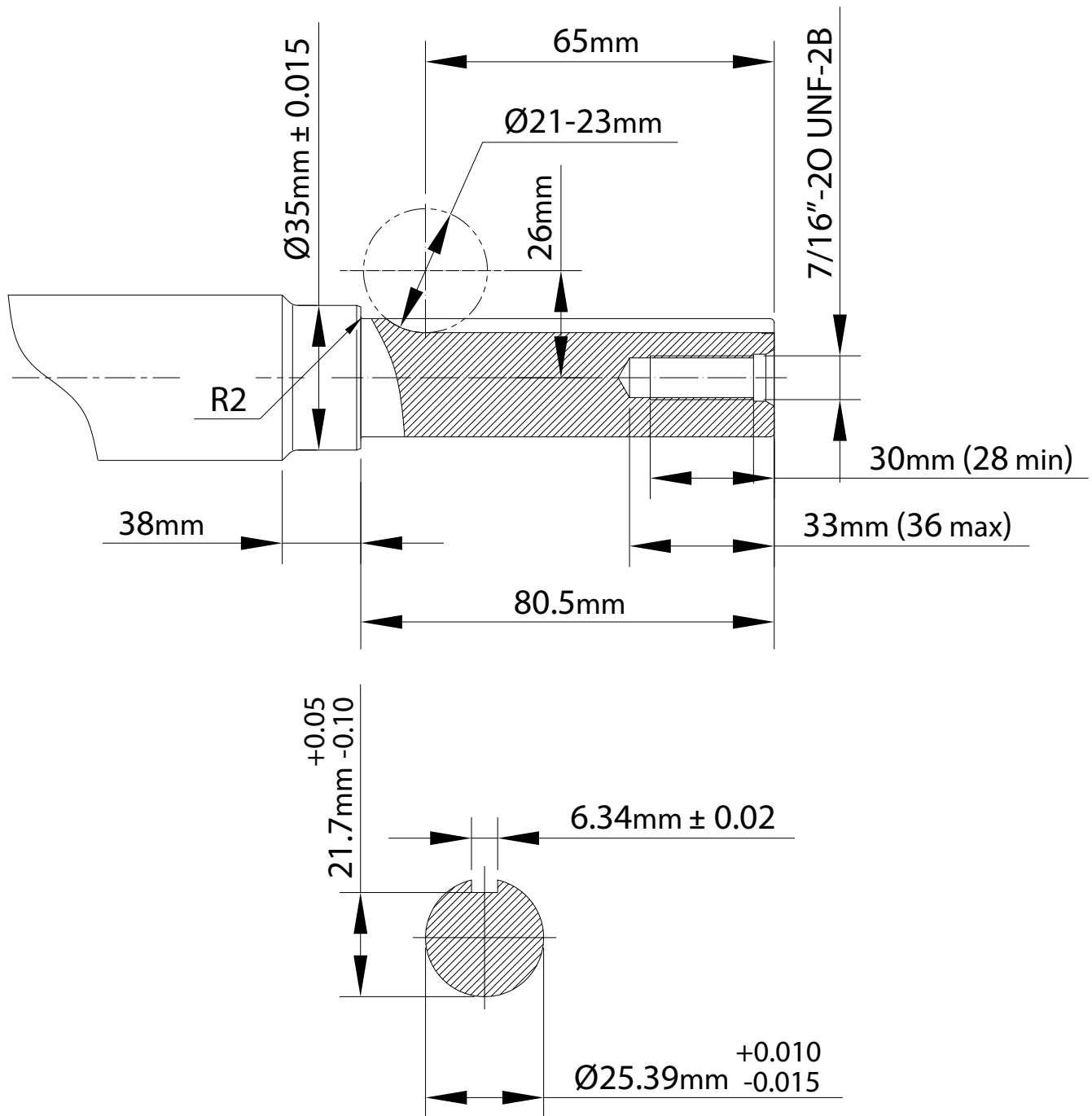
SETUP

OPERATION

MAINTENANCE

# Spindle Diagram

**Note:** Not to scale.



**PREDATOR**  
E N G I N E S

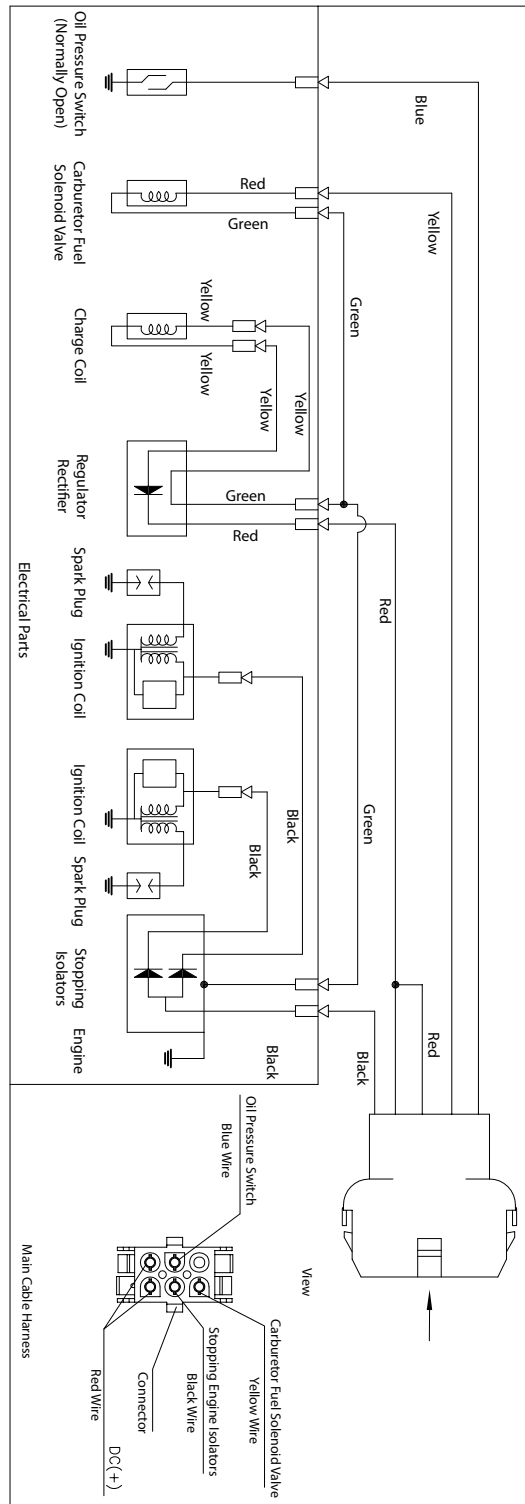
SAFETY

SETUP

OPERATION

MAINTENANCE

# Wiring Diagram



# PREDATOR<sup>®</sup>

## ENGINES

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