



# 2.5 HP HORIZONTAL OHV GASOLINE ENGINE

**Model 97964**

## SET UP, OPERATING, AND SERVICING INSTRUCTIONS



### **⚠ 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>



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

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**For technical questions or replacement parts, please call 1-800-444-3353.**

Manual Revised 09i

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## SAVE THIS MANUAL

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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.

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## IMPORTANT SAFETY INFORMATION

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In this manual, on the labeling, and all other information provided with this product:



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.

### **DANGER**

**DANGER** indicates a hazardous situation which, if not avoided, will result in death or serious injury.

### **WARNING**

**WARNING** indicates a hazardous situation which, if not avoided, could result in death or serious injury.

### **CAUTION**

**CAUTION**, used with the safety alert symbol, indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

### **NOTICE**

**NOTICE** is used to address practices not related to personal injury.

### **CAUTION**

**CAUTION**, without the safety alert symbol, is used to address practices not related to personal injury.



**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**

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 Engine 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. Mount and use the Engine securely and 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 oil and fuel recommended in the "Specifications" section of this manual.
4. Wear ANSI-approved safety goggles and hearing protection during use.
5. 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.

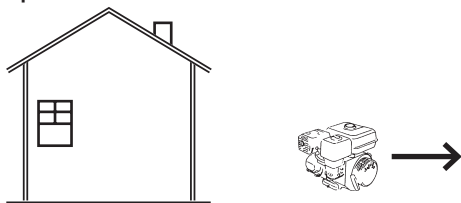
## **OPERATING PRECAUTIONS**

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 Engine, especially while it is operating.
3. Do not leave the Engine unattended when it is running. Turn off the Engine before leaving the work area.
6. Use only accessories that are recommended by Harbor Freight Tools for your model. Accessories that may be suitable for one Engine may become hazardous when used on another piece of Engine.
7. 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.
8. Stay alert, watch what you are doing and use common sense when operating this Engine. Do not use this Engine while tired or under the influence of drugs, alcohol or medication.
9. Do not overreach. Keep proper footing and balance at all times. This enables better control of the Engine in unexpected situations.
10. 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.
11. Parts, especially exhaust system components, get very hot during use. Stay clear of hot parts.
12. Do not cover the Engine during operation.

13. Keep the Engine and surrounding area clean at all times.
14. Use the Engine in accordance with these instructions and in the manner intended for the particular type of Engine, taking into account the working conditions and the work to be performed. Use of the Engine for operations different from those intended could result in a hazardous situation.
15. Do not operate the Engine with known leaks in the Engine's fuel system.
16. This product contains or, when used, produces a chemical known to the State of California to cause cancer and birth defects or other reproductive harm. (California Health & Safety Code § 25249.5, *et seq.*)
17. 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.
18. Keep hands and feet away from moving parts. Do not reach over or across the Engine while operating.
19. Before use, check for misalignment or binding of moving parts, breakage of parts, and any other condition that may affect the Engine's operation. **If damaged, have the Engine serviced before using.** Many accidents are caused by poorly maintained engines.
20. Use the correct Engine for the application. Do not modify the Engine and do not use the Engine for a purpose for which it is not intended.

## **SERVICE PRECAUTIONS**

1. **Before service, maintenance, or cleaning:**
  - a. **Turn the Power Switch (94) to its "OFF" position.**
  - b. **Allow the Engine to completely cool.**
  - c. **Then, remove the Spark Plug Wire from the Spark Plug.**
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 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 Engine. These carry important information. If unreadable or missing, contact Harbor Freight Tools for a replacement.
6. Have the Engine serviced by a qualified repair person using only identical replacement parts. This will ensure that the safety of the Engine 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 the Engine out of the reach of children.
8. Follow scheduled engine maintenance.

## **REFUELING PRECAUTIONS:**

1. Do not smoke, or allow sparks, flames, or other sources of ignition around the Engine, especially when refuelling.
2. Do not refill the fuel tank while the Engine is running or hot.
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.



**SAVE THESE INSTRUCTIONS.**

## **BASIC SPECIFICATIONS**

Fuel	Type	89+ octane unleaded gasoline
	Capacity	.42 Gal. (1.4 liters)
Engine Oil	Type	SAE 30W (above 32° F) SAE 5W-30 (at 32° F or below)
	Capacity	13.5 Oz. (0.4 liters)

**Note:** Additional specifications found in the TECHNICAL ENGINE SPECIFICATIONS chart in this manual.

The emission 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.

At high altitudes, the Engine's carburetor, governor 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.

## **UNPACKING**

When unpacking, check to make sure that the item is intact and undamaged. If any parts are missing or broken, please call Harbor Freight Tools at the number shown on the cover of this manual as soon as possible.

## **SET UP INSTRUCTIONS**



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**

**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 wire(s) before assembling or making any adjustments to the equipment.

### **⚠ 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.

**Note:** For additional information regarding the parts listed in the following pages, refer to the Assembly Diagram near the end of this manual.

**Note:** See Mounting Base Layout Diagram and Engine Shaft Layout Diagram on page 10.

1. The tapered Crankshaft (55) is 5/8" at its thickest diameter. Therefore, the Belt Pulley or Sprocket Pulley (neither included) attached to the Crankshaft must have a 5/8" inside diameter. The Belt/Sprocket Pulley and Belt/Chain used **must** have proper guards (not included) attached for safety purposes.
2. Make sure to mount the Engine on a sturdy equipment surface capable of supporting the weight of the Engine and the equipment itself.
3. The equipment to which the Engine will be attached must have matching bolt hole patterns and be attached using the proper size bolts (not included).

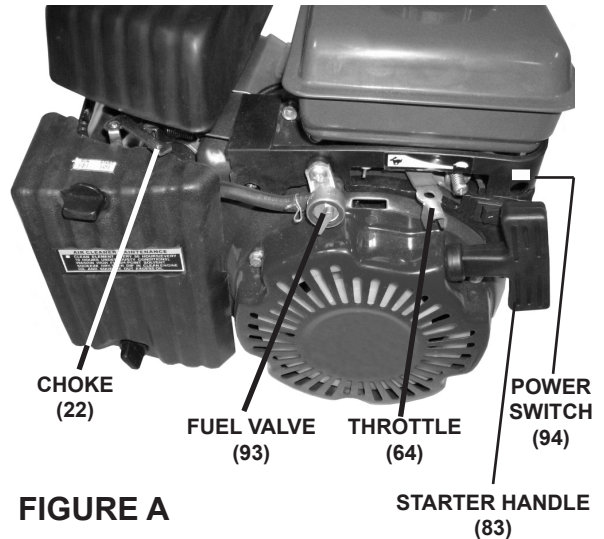
## **OPERATING INSTRUCTIONS**



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.

### **Engine Controls**



**FIGURE A**

### **Starting the Engine**



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

### **Checking and Filling Engine Oil**

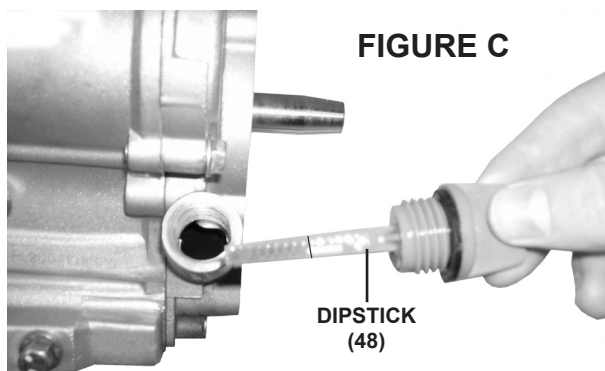
**CAUTION!** Your Warranty is VOID if the Engine's crankcase is not properly filled with oil before each use. Before each use, check the oil level. Do not run the Engine with low or no engine oil. Running the Engine with no or low engine oil WILL permanently damage the Engine.

**FIGURE B**



DIPSTICK  
(48)

1. Remove the Dipstick and wipe it off with a clean rag. (See Figure B.)



**FIGURE C**

DIPSTICK  
(48)

2. Reinsert the Dipstick completely and remove it to check the oil level. The oil level should be between the high and low marks on the Dipstick. (See Figure C.)
3. If the oil level is below the low mark add the appropriate type of oil until the oil level is between the high and the low marks.

**Oil type:**

32° F or above = SAE 30W  
Below 32° F = SAE 5W-30

4. Replace the Oil Dipstick. (See Figure B.)

**CAUTION!** Do not run the Engine with too little or too much oil. The Engine will be permanently damaged.

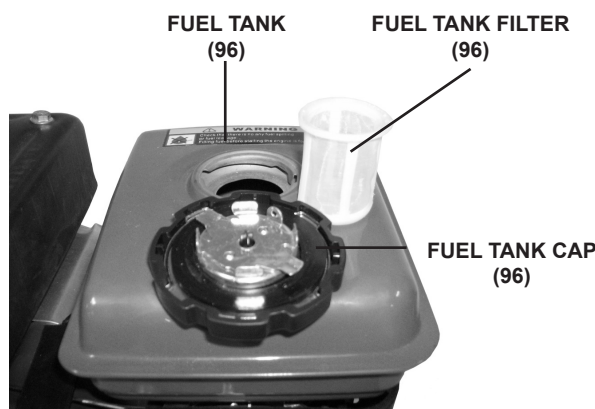
**Checking and Filling Fuel**



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

Fill the Fuel Tank in a well-ventilated area away from ignition sources. Do not smoke.

**FIGURE D**



1. To fill the Fuel Tank (96), first wipe off the Fuel Tank Cap (96) and the surrounding area. (See Figure D.)
2. Unscrew, and remove the Fuel Tank Cap (96). (See Figure D.)
3. Mix fuel stabilizer (not included) with 89 octane (or better) unleaded gasoline according to fuel stabilizer directions.
4. Fill the Fuel Tank (96) to about 1 inch under the fill neck of the Fuel Tank with the stabilized unleaded gasoline mixture. (See Figure D.)
5. Then replace the Fuel Tank Cap (96). (See Figure D.)



6. NOTE: Always check the Fuel Tank Filter (96) for excess dirt and debris before each use. If necessary, remove and clean the Fuel Tank Filter. Then re-install the Filter in the Fuel Tank (96) and replace the Fuel Tank Cap (96). **(See Figure D.)**

### **Start Procedure**



#### **Before starting the Engine:**

- a. Follow the Set Up Instructions to prepare the Engine.
- b. Inspect the Engine.
- c. Fill the Engine with the proper amount and type of fuel and oil.

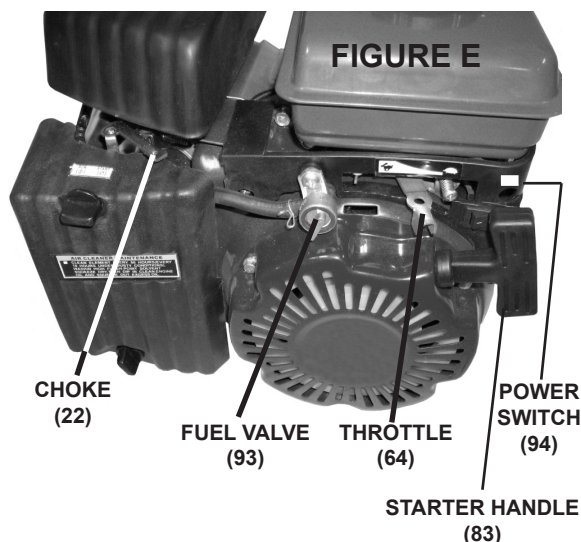
**Note:** This engine includes an automatic low oil shutdown sensor that disables the engine if the oil level is too low.

#### **d. Read the Equipment Operation section that follows.**

1. Turn the Engine Fuel Valve (93) to its "OPEN" position. **(See Figure E.)**
2. Turn the Engine Power Switch (94) to its ON position. **(See Figure E.)**
3. Then, turn the Engine Choke Lever (22) to its "CHOKE" position. Set the Choke Lever in the "RUN" position when starting a warm Engine. **(See Figure E.)**
4. Grasp the Starter Handle (83), and pull slowly until resistance is felt. While holding the Handle, allow the Starter Rope to rewind slowly. Then, pull the Starter Handle with a rapid, full arm stroke. Repeat as necessary, until the Engine starts. **(See Figure E.)**
5. After the Engine starts and warms up, slowly move the Choke Lever to

its "RUN" position. Then adjust the Throttle (64) to the desired Engine speed (RPM). **(See Figure E.)**

6. IMPORTANT: Allow the Engine to run at no load until warm (1-5 minutes) with no load after each start-up to allow the Engine to stabilize.

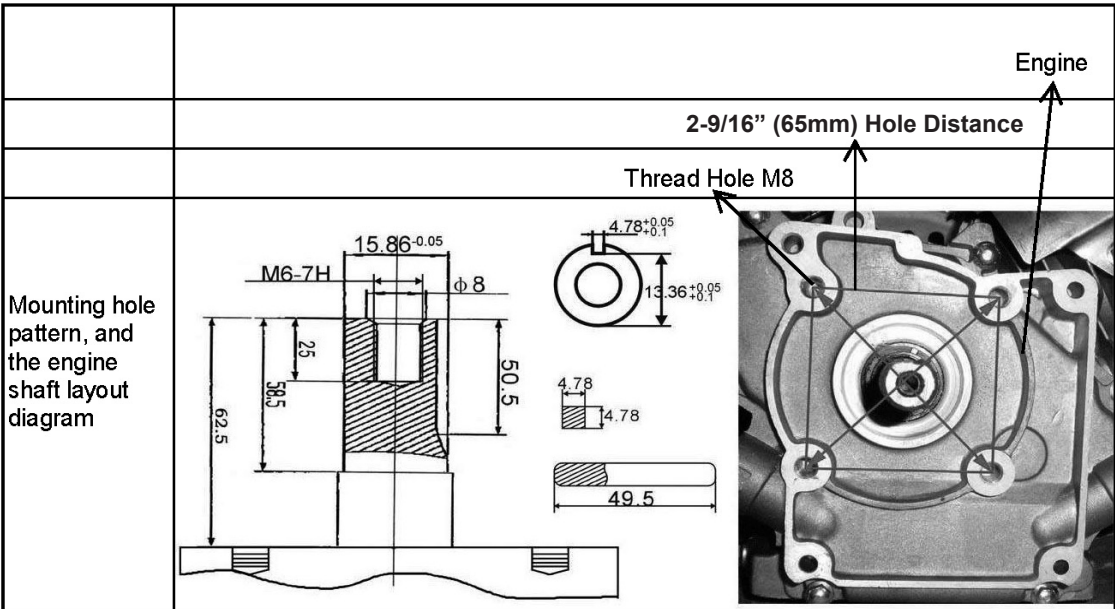


### **Break-in Period**

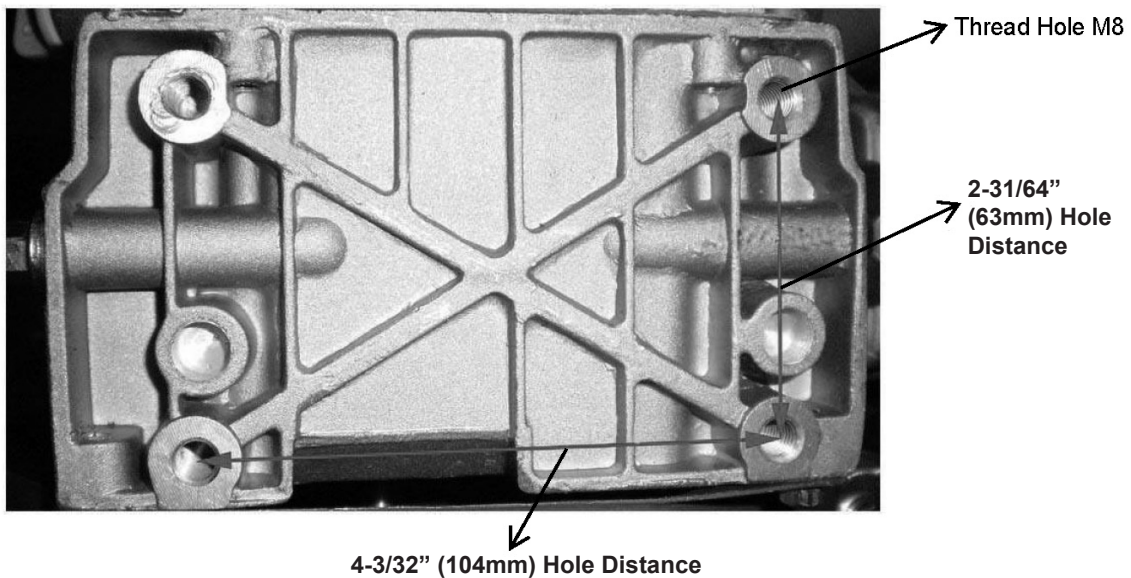
1. Breaking-in the Engine will help to ensure proper equipment and Engine operation, and will extend the Engine's lifespan. The warranty is void if the Engine is not broken in properly. The first 20 hours of operation is the break-in period.
2. During the first 3 hours of use:
  - Do not apply a heavy load to the Engine.
  - Do not operate the Engine at its maximum speed.
3. Change the engine oil after the first 20 hours of use.
4. Under normal operating conditions subsequent maintenance follows the schedule explained in the "MAINTENANCE AND SERVICING" section.

REV 091

### ENGINE SHAFT LAYOUT DIAGRAM



### MOUNTING BASE LAYOUT DIAGRAM



## TECHNICAL SPECIFICATIONS

Engine Type	2.5 HP OHV Single Cylinder	
Bore x Stroke	52mm x 38mm	
Displacement	79cc	
Maximum Engine RPM	3600	
Engine Model	152F	
Engine Family	8YAMS.0791ST	
Engine Shaft Direction	Horizontal	
Rotation viewed from PTO (power takeoff - the output shaft)	Counterclockwise Facing the Shaft	
Shaft Size/Type	5/8" diameter Keyed	
Fuel	Type	89+ octane unleaded gasoline
	Capacity	.42 Gal. (1.4 liters)
Engine Oil	Type	SAE 30W (above 32° F) SAE 5W-30 (at 32° F or below)
	Capacity	13.5 Oz. (0.4 liters)
Spark Plug	Type	E6TC or Denso - W20FP-U
	Gap	0.027" to 0.031"

## SERVICING

### **⚠ WARNING** TO PREVENT SERIOUS INJURY

#### FROM ACCIDENTAL STARTING:

Turn the Power Switch (94) of the Engine to its "OFF" position, wait for the Engine to cool, and disconnect the Spark Plug Wire before performing any inspection, maintenance, or cleaning procedures.

### **⚠ WARNING** TO PREVENT SERIOUS INJURY

#### FROM EQUIPMENT FAILURE:

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

## Maintenance Procedures



Many maintenance procedures, including those 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 Engine have a qualified technician service the Engine instead.

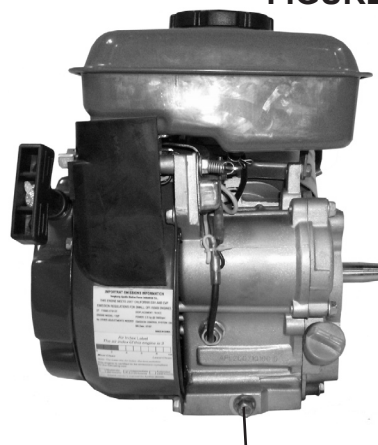
**Note:** Warranty is void if proper maintenance and servicing procedures are not followed.

### Engine Oil Change

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

1. Place a drain pan (not included) underneath the Crankcase's Drain Plug Bolt (68). (See Figure F.)

FIGURE F

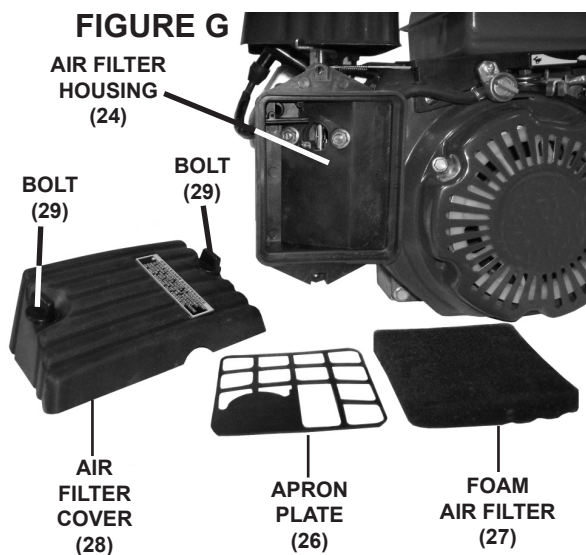


DRAIN PLUG BOLT (68)  
DRAIN PLUG WASHER (69)

2. Remove the Drain Plug Bolt (68) and, if possible, tilt the Crankcase slightly to help drain the oil out. Recycle used oil. (See Figure F.)

3. Replace the Drain Plug Bolt and Drain Plug Washer (69). Replace the washer, if damaged. Tighten the plug. **(See Figure F.)**
4. Refill the oil to the proper level following the instructions under the “*Starting the Engine*” section.

### **Air Filter Element Maintenance**

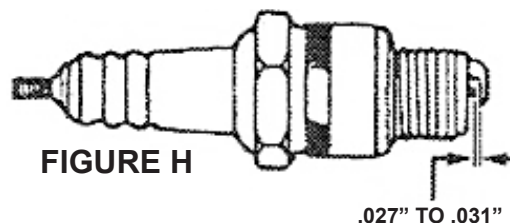


1. Wipe off the Air Filter Cover (28). **(See Figure G.)**
2. The Air Filter Cover (28) is held in place by two Bolts (29). Unscrew and remove the two Bolts.
3. Remove the Foam Air Filter (27). Then remove the Apron Plate (26). **(See Figure G.)**
4. Wash the Foam Air Filter (27) and Apron Plate (26) in warm water and mild detergent several times. Rinse. Squeeze out excess water from the Filter and allow it to dry completely. Soak the Filter in lightweight oil briefly, then squeeze out the excess oil. **(See Figure G.)**

5. Install the cleaned Apron Plate (26) and Foam Air Filter (27). Secure the Air Filter Cover (28) with the two Bolts (29) before use. **(See Figure G.)**

### **Spark Plug Maintenance**

1. Disconnect Spark Plug Wire from end of the Spark Plug. Clean out debris from around Spark Plug.
2. Using the provided Spark Plug Wrench, remove the Spark Plug.
3. Inspect the Spark Plug:  
If the electrode is oily, clean it using a clean, dry rag.  
If the electrode has deposits on it, polish it using emery paper.  
If the white insulator is cracked or chipped, the Spark Plug needs to be replaced.



4. When installing a new Spark Plug, adjust the plug's gap to the specification on the “*Technical Specification*” chart. Do not pry against the electrode or the insulator, the Spark Plug can be damaged. **(See Figure H.)**
5. Install the new Spark Plug or the cleaned Spark Plug 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 head, then about 1/16 turn more.



## **INSPECTION, MAINTENANCE, AND CLEANING SCHEDULE**

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

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

### **After Initial 20 Operation Hour Period:**

- a. Change engine oil.

### **Every 25 Operation Hours Thereafter:**

- a. Clean/replace Foam Air Filter (27).
- b. Inspect/clean Spark Plug.

### **Every 50 Operation Hours:**

- a. Change engine oil.

### **Every 100 Operation Hours:**

- a. Replace Spark Plug.
- b. Replace Foam Air Filter.

**Note:** All maintenance procedures scheduled for 25, 50, and 100 operation hours should be performed at least yearly.

### **Every 300 Operation Hours:**

- a. Clean Fuel Tank (96) and Carburetor (22).
- b. Clean carbon build-up from combustion chamber.

## **Storage**

1. Wait for Engine to cool, then wipe Engine with clean cloth.
2. When the Engine is to remain idle for longer than 20 days, prepare the Engine for storage as follows:
  - a. Change engine oil and empty Fuel Tank (96).
  - b. Either leave Fuel Tank (96) empty or refill Fuel Tank with fresh unleaded gasoline mixed with a fuel stabilizer intended for long term Engine storage (not included). After filling, run Engine for about 1 to 2 minutes to circulate the treated gasoline through the Carburetor (22). Wait for Engine to cool before proceeding.
  - c. Clean out area around Spark Plug. Remove Spark Plug and pour one tablespoon of engine oil into cylinder through Spark Plug hole.
  - d. Reinstall Spark Plug, but leave Spark Plug Wire disconnected.
  - e. Pull Recoil Starter once 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).
3. Apply a thin coat of rust preventive oil to all uncoated metal parts.
4. Cover and store in a dry, well-ventilated area out of reach of children.
5. Before starting the Engine 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 properly.

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**PLEASE READ THE  
FOLLOWING CAREFULLY**

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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.



<b>Troubleshooting</b>		
<b>Problem</b>	<b>Possible Cause</b>	<b>Possible Solution</b>
<b>Engine will not start</b>	<b>FUEL RELATED:</b> <ol style="list-style-type: none"> <li>1. No fuel in tank or fuel valve closed.</li> <li>2. Choke not in start position, especially with cold engine.</li> <li>3. Low quality or deteriorated, old gasoline.</li> <li>4. Carburetor not primed.</li> <li>5. Dirty fuel passageways blocking fuel flow.</li> <li>6. Carburetor needle stuck. Fuel can be smelled in the air.</li> <li>7. Too much fuel in chamber. This can be caused by the carburetor needle sticking.</li> </ol>	<b>FUEL RELATED:</b> <ol style="list-style-type: none"> <li>1. Fill fuel tank and open fuel valve.</li> <li>2. Move choke to start position if engine is cold.</li> <li>3. Use only fresh 89+ octane unleaded gasoline.</li> <li>4. Prime carburetor by pressing priming bulb specified number of times (if equipped). Replace broken or damaged bulb.</li> <li>5. Clean out passageways using fuel additive. Heavy deposits may require further cleaning.</li> <li>6. Gently tap side of carburetor float chamber with screwdriver handle.</li> <li>7. 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> </ol>
	<b>IGNITION (SPARK) RELATED:</b> <ol style="list-style-type: none"> <li>1. Spark plug wire not connected securely.</li> <li>2. Spark plug electrode wet or dirty.</li> <li>3. Incorrect spark plug gap.</li> <li>4. Spark plug wire or spark plug broken.</li> <li>5. Incorrect spark timing or faulty ignition system.</li> </ol>	<b>IGNITION (SPARK) RELATED:</b> <ol style="list-style-type: none"> <li>1. Connect spark plug wire properly.</li> <li>2. Clean spark plug.</li> <li>3. Correct spark plug gap.</li> <li>4. Replace spark plug wire and/or spark plug.</li> <li>5. Have qualified technician diagnose/repair ignition system.</li> </ol>
	<b>COMPRESSION RELATED:</b> <ol style="list-style-type: none"> <li>1. Cylinder not lubricated. This can be a problem after long storage periods.</li> <li>2. Loose or broken spark plug. (Hissing noise will occur when trying to start.)</li> <li>3. Loose cylinder head or damaged head gasket. (Hissing noise will occur when trying to start.)</li> <li>4. Engine valves or tappets misadjusted or stuck.</li> </ol>	<b>COMPRESSION RELATED:</b> <ol style="list-style-type: none"> <li>1. Pour tablespoon of oil into spark plug hole. Crank engine a few times and try to start again.</li> <li>2. Tighten spark plug. If that does not work, replace spark plug. If problem persists, may have head gasket problem, see #3.</li> <li>3. Tighten head. If that does not remedy problem, replace head gasket.</li> <li>4. Adjust valve clearance. If that does not work, clean or replace valves/tappets.</li> </ol>



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

<b>Troubleshooting</b>		
<b>Problem</b>	<b>Possible Cause</b>	<b>Possible Solution</b>
<b>Engine misfires</b>	<ol style="list-style-type: none"> <li>1. Spark plug wire loose.</li> <li>2. Incorrect spark plug gap or damaged spark plug.</li> <li>3. Defective spark plug wire.</li> <li>4. Old or low quality gasoline.</li> <li>5. Incorrect compression.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check wire connections.</li> <li>2. Re-gap or replace spark plug.</li> <li>3. Replace spark plug wire.</li> <li>4. Use only fresh 89+ octane unleaded gasoline.</li> <li>5. Diagnose and repair compression. (Use <b>Engine will not start: COMPRESSION RELATED</b> section.)</li> </ol>
<b>Engine stops suddenly</b>	<ol style="list-style-type: none"> <li>1. Low oil shutdown.</li> <li>2. Fuel tank empty or full of impure or low quality gasoline.</li> <li>3. Defective fuel tank cap creating vacuum, preventing proper fuel flow.</li> <li>4. Improper idle speed.</li> <li>5. Faulty magneto, incorrect timing, or clogged carburetor.</li> </ol>	<ol style="list-style-type: none"> <li>1. Fill engine oil to proper level. Check engine oil before EVERY use.</li> <li>2. Fill fuel tank with fresh 89+ octane unleaded gasoline.</li> <li>3. Test/replace fuel tank cap.</li> <li>4. Properly adjust idle speed.</li> <li>5. Have qualified technician diagnose and service engine.</li> </ol>
<b>Engine knocks</b>	<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 89+ octane unleaded gasoline.</li> <li>2. Do not exceed equipment's load rating.</li> <li>3. Have qualified technician diagnose and service engine.</li> </ol>
<b>Engine backfires</b>	<ol style="list-style-type: none"> <li>1. Impure or low quality gasoline.</li> <li>2. Engine too cold.</li> <li>3. Choke not open after engine warm.</li> <li>4. Engine not properly adjusted for high altitude operation.</li> <li>5. Intake valve stuck, choke stuck, incorrect timing, clogged carburetor, or overheated engine.</li> </ol>	<ol style="list-style-type: none"> <li>1. Fill fuel tank with fresh 89+ octane unleaded gasoline.</li> <li>2. Use cold weather fuel and oil additives to prevent backfiring.</li> <li>3. Move choke to run position after engine warms up.</li> <li>4. Qualified technician must adjust engine at altitudes greater than 5,000 feet above sea level.</li> <li>5. Have qualified technician diagnose and service engine.</li> </ol>

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

**Record Product's Serial Number Here:** \_\_\_\_\_

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

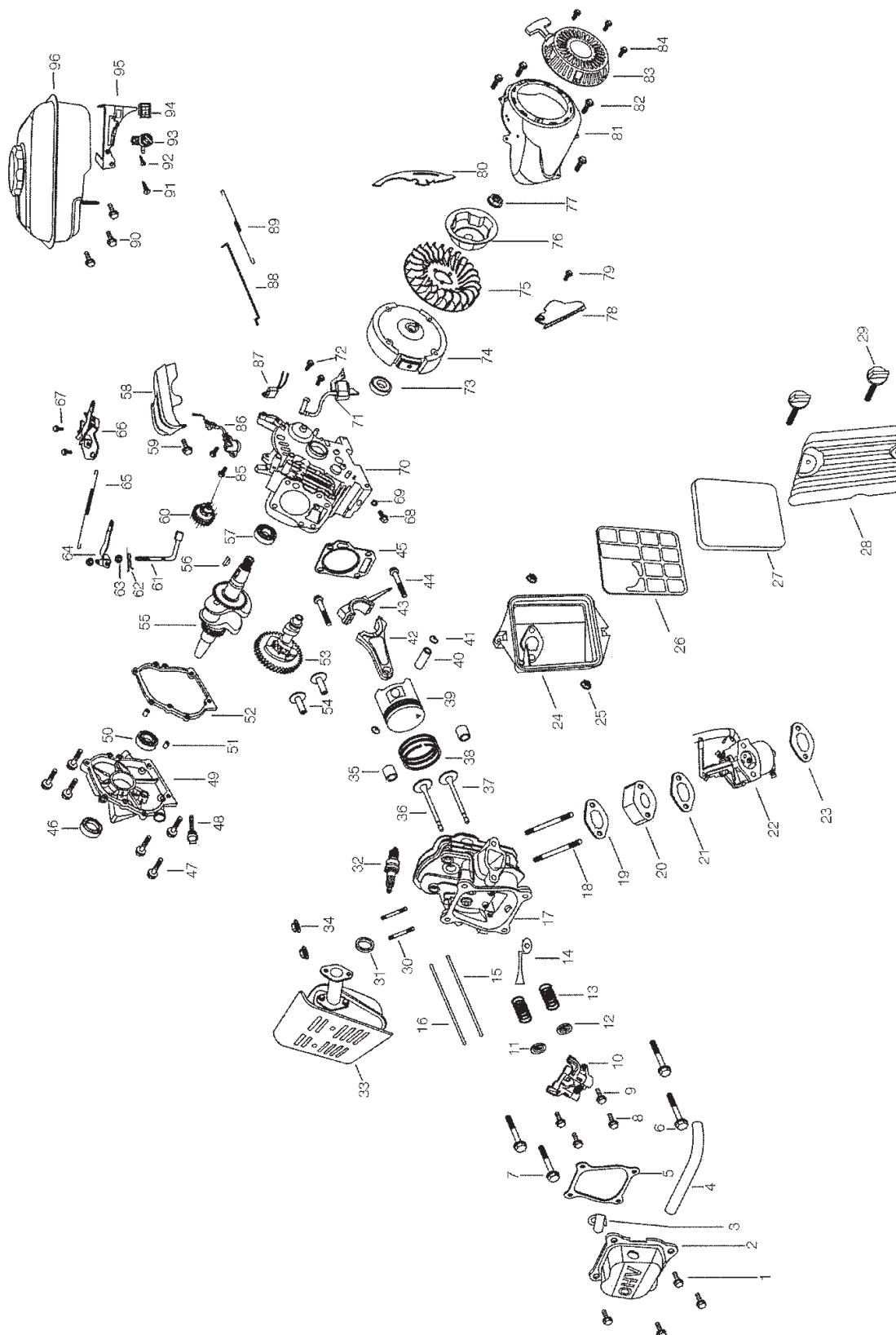
**Note:** Some parts are listed and shown for illustration purposes only, and are not available individually as replacement parts.

## PARTS LIST

ITEM	DESCRIPTION	QTY
1	FLANGE BOLT (M6×12)	4
2	HEAD COVER COMP.	1
3	APRON PLATE	1
4	TUBE, BREATHER	1
5	HEAD COVER PACKING	1
6	FLANGE BOLT (M8×55)	2
7	FLANGE BOLT (M8×55)	2
8	FLANGE BOLT (M6×16)	2
9	FLANGE BOLT (M6×16)	2
10	ROCKER ASSEMBLY	1
11	EX. VALVE SPRING RETAINER	1
12	IN. VALVE SPRING RETAINER	1
13	VALVE SPRING	2
14	APRON PLATE	1
15	PUSH ROD	1
16	PUSH ROD	1
17	CYLINDER HEAD COMP.	1
18	CARBURETOR STUD BOLT	2
19	INTAKE PIPE GASKET	1
20	CARBURETOR INSULATING PLATE	1
21	CARBURETOR PAPER GASKET	1
22	CARBURETOR W/CHOKE	1
23	CARBURETOR SPACER	1
24	HOUSING, AIR FILTER	1
25	FLANGE NUT (M6)	2
26	APRON PLATE	1
27	FOAM, AIR FILTER	1
28	COVER, AIR FILTER	1
29	BOLT	2
30	EXHAUST PIPE STUD BOLT	2
31	MUFFLER GASKET	1
32	SPARK PLUG (LD NGK)	1
33	MUFFLER	1
34	FLANGE NUT (M8)	2
35	DOWEL PIN (8×14)	1
36	EXHAUST VALVE	1
37	INTAKE VALVE	1
38	PISTON RING SET	1
39	PISTON	1
40	PISTON PIN	1
41	PISTON PIN CLIP (18mm)	2
42	CONNECTING ROD ASSY.	1
43	CONNECTING ROD ASSY.	1
44	CONNECTING ROD ASSY.	2
45	CYLINDER HEAD GASKET	1
46	OIL SEAL	1
47	FLANGE BOLT (M8×25)	6
48	DIPSTICK	1

ITEM	DESCRIPTION	QTY
49	CRANKCASE COVER ASSY.	1
50	BALL BEARING (6303)	1
51	DOWEL PIN (8×14)	2
52	CASE COVER	1
53	CAMSHAFT ASSY.	1
54	VALVE LIFTER	2
55	CRANKSHAFT COMP.	1
56	SEMICIRCLE KEY	1
57	BALL BEARING (6203)	1
58	SHROUD	1
59	FLANGE BOLT (M6×12)	1
60	GOVERNOR GEAR ASSY.	1
61	ROCKER	1
62	LOCK PIN (8mm)	1
63	FLANGE NUT (M6)	2
64	THROTTLE	1
65	GOVERNOR SPRING	1
66	CONTROL ASSY.	2
67	FLANGE BOLT (M6×8)	2
68	DRAIN PLUG BOLT	1
69	DRAIN PLUG WASHER (10.2mm)	1
70	CRANK CASE	1
71	IGNITION COIL ASSY.	1
72	FLANGE BOLT (M6×20)	2
73	CRANKCASE COVER ASSY.	1
74	FLYWHEEL COMP.	1
75	COOLING FAN	1
76	STARTER PULLEY	1
77	FLYWHEEL NUT (M14×1.25)	1
78	FLYWHEEL SIDE PLATE	1
79	FLANGE BOLT (M6×12)	1
80	FLYWHEEL SIDE PLATE	1
81	FAN COVER	1
82	FLANGE BOLT (M6×12)	4
83	RECOIL STARTER ASSY.	1
84	FLANGE BOLT (M6×10)	3
85	FLANGE BOLT (M6×12)	2
86	OIL LEVEL SWITCH ASSY.	1
87	AMPLIFIER	1
88	GOVERNOR ROD	1
89	THROTTLE RETURN SPRING	1
90	FLANGE BOLT (M6×12)	3
91	SCREW (4×16)	1
92	SCREW (5×16)	1
93	FUEL VALVE	1
94	POWER SWITCH	1
95	SMALL PANEL	1
96	FUEL TANK	1

# ASSEMBLY DIAGRAM



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## LIMITED 1 YEAR / 90 DAY WARRANTY

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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 for a period of ninety days from date of purchase that the engine/motor, the belts (if so equipped), and the blades (if so equipped) are free of defects in materials and workmanship. Harbor Freight Tools also warrants to the original purchaser, for a period of one year from date of purchase, that all other parts and components of the product are free from defects in materials and workmanship (90 days if used by a professional contractor or if used as rental equipment). This warranty does not apply to damage due directly or indirectly, to misuse, abuse, negligence or accidents, repairs or alterations outside our facilities, 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.**

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.

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444-3353**

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## EMISSION CONTROL SYSTEM WARRANTY

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### **California and United States Emission Control Defects Warranty Statement**

The California Air Resources Board (herein CARB), the United States Environmental Protection Agency (herein EPA), and Harbor Freight Tools (herein HFT) are pleased to explain the emission control system warranty on your 1995 and later Small Off-Road Engine (herein engine). In California, the engine must be designed, built and equipped to meet the State's stringent anti-smog standards. Elsewhere within the United States, new off-road, spark-ignition engines certified for model year 1997 and later, must meet similar standards set forth by the EPA. HFT must warrant the emission control system on your engine for the periods of time described below, provided there has been no abuse, neglect or improper maintenance of your engine.

Your emission control system may include parts such as the carburetor or fuel-injection system, and the ignition system. Also included may be hoses, belts, connectors and other emission-related assemblies.

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

### **Manufacturer's Warranty Coverage**

The 1995 and later engines are warranted for two (2) years. If any emission-related part on your engine is defective, the part will be repaired or replaced by HFT.

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### **Harbor Freight Tools Emission Control Defects Warranty Coverage**

Engines are warranted for a period of two (2) years relative to emission control parts defects, subject to the provisions set forth below. 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. HFT recommends that you retain all receipts covering maintenance on your engine, but HFT cannot deny warranty solely for the lack of receipts or for your failure to ensure the performance of all scheduled maintenance.
- 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, neglect, improper maintenance, or unapproved modifications.
- You are responsible for shipping your engine to a HFT warranty station as soon as a problem exists. Contact the HFT Customer Service department at the number below to make shipping arrangements. The warranty repairs should be completed in a reasonable amount of time, not to exceed 30 days.

If you have any questions regarding your warranty rights and responsibilities, you should contact the Harbor Freight Tools Customer Service Department at 1-800-444-3353.

### **Harbor Freight Tools Emission Control Defects Warranty Provisions**

#### **1. Length of Coverage**

HFT warrants to a first retail purchaser and each subsequent purchaser that the engine is free from defects in materials and workmanship that cause the failure of warranted parts for a period of two (2) years after the date of delivery to the first retail purchaser.

#### **2. No Charge Repair or Replacement**

Repair or replacement of any warranted part will be performed at no charge to the owner if the work is performed through a warranty station authorized by HFT. For emissions warranty service, contact the HFT Customer Service Department at 1-800-444-3353.

#### **3. Consequential Damages Coverage**

Coverage under this warranty shall also extend to the failure of any engine components caused by the failure of any warranted part while it is still covered under this warranty.

#### **4. Coverage Exclusions**

Warranty claims shall be filed in accordance with the provisions of the HFT warranty policy explained in the box at the top of the previous page. HFT shall not be liable for any loss of use of the engine, for any alternative usage, for any damage to goods, loss of time, or inconvenience. Warranty coverage shall also be excluded for any part which fails, malfunctions, or is damaged due to failure to follow the maintenance and operating instructions set forth in the Owner's Manual including, but not limited to:

- a. Use of parts which are not authorized by HFT
- b. Improper installation, adjustment or repair of the engine or of any warranted part unless performed by an authorized warranty center
- c. Failure to follow recommendations on fuel use contained in the Owner's Manual
- d. Improper or inadequate maintenance of any warranted parts
- e. Repairs performed outside of the authorized warranty service dealers
- f. Alterations by changing, adding to or removing parts from the engine.

### **5. Service and Maintenance**

Component parts which are not scheduled for replacement as required maintenance or are scheduled only for regular inspection to the effect of "repair or replace as necessary" are warranted for the warranty period. Any warranted part which is scheduled for replacement as required maintenance is warranted for the period of time up to the first scheduled replacement point for that part. Any replacement part, provided it is equivalent in durability and performance, may be used in performance of maintenance or repairs. The owner is responsible for commissioning a qualified technician/mechanic to perform all required maintenance, as outlined in the Inspection, Cleaning, and Maintenance section in this manual.

### **6. Warranted Parts**

1. Fuel Metering System
  - i. Carburetor and its internal parts.
  - ii. Fuel pump (if so equipped).
  - iii. Cold start enrichment system.
2. Air Induction System
  - i. Intake pipe/manifold.
  - ii. Air cleaner.
3. Ignition System
  - i. Spark plug.
  - ii. Magneto ignition system.
4. Catalyst System (if so equipped)
  - i. Exhaust pipe stud.
  - ii. Muffler.
  - iii. Catalytic converter (if so equipped).
5. Miscellaneous Items Used in Above Systems
  - i. Vacuum, temperature and time sensitive valves and switches.
  - ii. Hoses, belts, connectors, and assemblies.