

# ONAN Engine Model Number: P224

This information has been extracted out of the Onan engine operators manual No. 965-0182. For additional information see the complete Onan Manual.

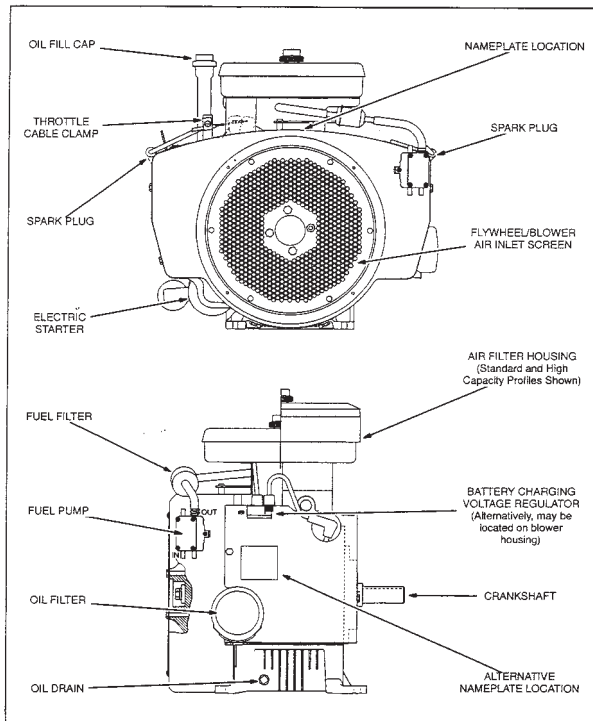


FIGURE 2. TYPICAL ENGINE CONFIGURATION

## FUEL RECOMMENDATIONS

**⚠ WARNING** Gasoline and LPG are highly flammable fuels and can cause severe personal injury or death. Do not smoke if you smell gas or gasoline or are near fuel tanks or fuel-burning equipment or are in an area sharing ventilation with such equipment. Keep flames, sparks, pilot lights, electrical arcs and arc-producing equipment and all other sources of ignition well away. Keep a type ABC fire extinguisher nearby.

### Gasoline Models

Use clean, fresh unleaded gasoline having a minimum octane rating (Anti-Knock Index) of 87.

During some times of the year only mandated “oxygenated” gasolines may be available. These are acceptable for use, but not preferable. Leaded gasoline may be used but will result in the extra maintenance required for removing combustion chamber and spark plug deposits. Do not use gasoline or gasoline additives (de-icers) containing methanol because methanol can be corrosive to fuel system components.

**⚠ CAUTION** Do not use gasoline or gasoline additives containing methanol because methanol can be corrosive to fuel system components.

Avoid using highly leaded gasolines and lead additives because of the extra engine maintenance that will be required.

### LPG Models

Use clean, fresh HD-5 grade liquified petroleum gas (LPG) or equivalent product consisting of at least 90 percent propane. Commercial LPG may contain more than 2.5 percent butane which can result in poor fuel vaporization and poor engine starting in low ambient temperatures (below 32° F (0° C)).

### Natural Gas Models

Use commercially available natural gas fuel.

## ENGINE OIL RECOMMENDATIONS

Use premium quality motor oil. Look for the API (American Petroleum Institute) classification and use Class SG or SH oil (also SG/CD, SG/CE, SH/CD or SH/CE). Also look for the SAE (Society of Automotive Engineers) viscosity grade. Referring to Table 1, choose the viscosity grade appropriate for the ambient temperatures expected during the period of time until the next scheduled oil change.

Single-grade SAE 30 oil is preferable when temperatures are consistently above freezing. Multigrade oils are better when wide temperature variations are expected.

TABLE 1. OIL VISCOSITY VS. TEMPERATURE

EXPECTED AMBIENT TEMPERATURES	SAE VISCOSITY GRADE
32° F (0° C) and higher	30
10° F to 100° F (-12° C to 38° C)	15W-40 (OnaMax)
0° F to 80° F (-18° C to 27° C)	10W-30 10W-40
-20° F to 50° F (-28° C to 10° C)	5W-30

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TABLE 2. PERIODIC ENGINE MAINTENANCE SCHEDULE

MAINTENANCE OPERATION	MAINTENANCE FREQUENCY								
	Break-in After First 24 Hours	After First 50 Hours	Every Day or Every 8 Hours	Every 50 Hours	Every Month	Every 100 Hours	Every 200 Hours	Every 500 Hours	Every 1,000 Hours
Inspect Engine			x <sup>1</sup>						
Check Oil Level			x						
Clean Air Cleaner Foam Wrapper				x <sup>2</sup>					
Clean Cylinder Cooling Fins				x <sup>2</sup>					
Check Starting Battery					x <sup>4</sup>				
Change Engine Oil—Standard (Low Profile) Base	x			x <sup>2, 3</sup>					
Change Engine Oil—Medium and High Capacity Bases	x					x <sup>2, 3</sup>			
Change Engine Oil Filter	x					x <sup>2, 3</sup>			
Replace Fuel Filter (if so equipped)							x		
Replace Air Cleaner Element							x <sup>2</sup>		
Replace Spark Plugs								x	
Adjust Engine Valve Clearance (Model P224 only)		x <sup>5</sup>						x <sup>5</sup>	
Adjust Engine Valve Clearance (Models P216, P218 and P220)									x <sup>5</sup>
Clean Cylinder Heads of Deposits									x <sup>5, 5</sup>

1. Check for oil, fuel and exhaust leaks, loose parts and unusual noises and vibrations.  
 2. Perform more often when operating in dusty conditions.  
 3. Perform more often when operating in hot conditions.  
 4. See instructions for battery care provided by the equipment or battery manufacturer.  
 5. Must be performed by a qualified mechanic according to the engine Service Manual.  
 6. Clean more often when using leaded fuel or running the engine continuously under light load. Onan 4C carburetor and combustion cleaner is recommended every 200 hours of operation.

## DAILY (8 HOUR) MAINTENANCE

The operator should check the following before the first start of the day and after every eight hours of operation:

1. Inspect fuel lines and fittings for leaks. Repair leaks immediately.
2. Look and listen for exhaust system leaks while the engine is running. Look for cracks and severe rusting in the muffler and tailpipe. Have all leaks repaired before continuing to operate the equipment.

**⚠ WARNING** *Hot exhaust parts can cause severe burns. Allow the engine time to cool before servicing the exhaust system.*

3. Check the engine for dirt and debris and clean the flywheel air inlet screen and cylinder cooling fins as necessary.

**⚠ CAUTION** *A clogged flywheel air inlet screen or dirty cooling fins can cause overheating and engine damage. Keep the cooling fins and air inlet screen clean.*

4. Check the engine oil level. The equipment must be parked on a level surface and the engine stopped. To get an accurate reading, wait a minute or so to allow the oil to settle in the crankcase if the engine has been running.

**⚠ WARNING** *Crankcase pressure can blow hot engine oil out the fill tube causing severe burns. Always stop the engine before removing the oil fill cap.*

Turn the oil fill cap (Figure 3) counterclockwise and then lift it from the fill tube. Wipe the dipstick clean and push it back into the oil fill tube until the cap seats and then withdraw it to check the oil level.

If the oil level is low, add API Class SG or SH oil (also SG/CD, SG/CE, SH/CD or SH/CE) having an SAE viscosity grade appropriate for the expected temperatures, as indicated by Table 1.

DO NOT FILL TO A LEVEL ABOVE THE FULL MARK ON THE DIPSTICK. Drain the excess oil if too much has been added.

**⚠ CAUTION** *Too much oil can cause high oil consumption, high operating temperatures and oil foaming. Too little oil can cause severe engine damage. Keep the oil level between the Full and Add marks on the dipstick.*

Reinstall the dipstick and cap after checking or adding oil, turning it clockwise until it is secure.

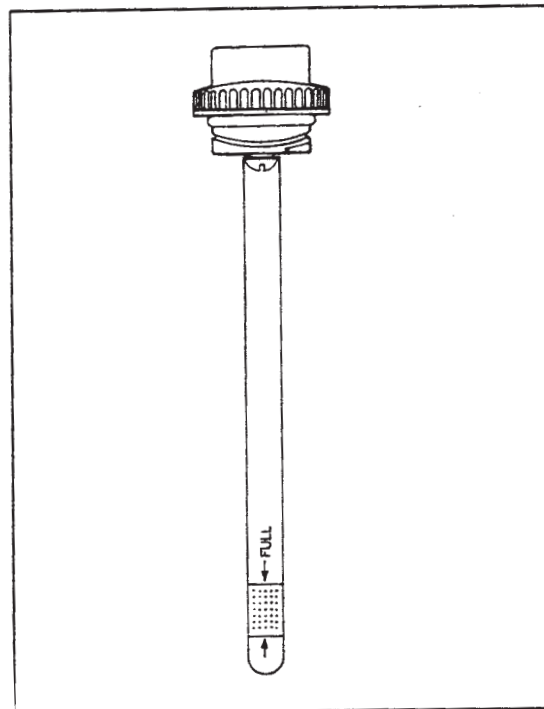


FIGURE 3. OIL FILL CAP AND DIPSTICK

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## AIR CLEANER MAINTENANCE

Refer to Table 2 for scheduled foam wrapper maintenance and air cleaner element replacement.

### Foam Wrapper Maintenance

See Figure 4. When performing maintenance on the foam wrapper only, do not remove the inner air cleaner cover. Remove and wash the foam wrapper in water and detergent. Squeeze the foam wrapper dry like a sponge. Rinse with clean water and allow it to dry. Coat the wrapper evenly with one tablespoon (14 grams) of SAE 30 engine oil. Knead the oil into the wrapper and wring out the excess oil.

Failure to adequately wring out excess oil from the wrapper may cause a drop in engine power due to a restriction of inlet air.

Install the foam wrapper over the paper air cleaner element by stretching it over the inner cover. Completely cover all exposed paper pleats on the air cleaner paper element. Replace the foam wrapper when it becomes torn or stretched.

### Air Cleaner Element Replacement

To keep anything from entering the carburetor and engine while the air cleaner element is off, pull the choke knob to the full-choke position to close the choke plate in the carburetor. Remove the outer cover and wipe away loose dust and debris from the air cleaner assembly. Remove the inner air cleaner mounting nut and cover. Remove the air filter paper element and foam wrapper from the engine. Wipe off dust and debris from the air cleaner base.

Install the new paper element and secure it with the inner cover and mounting nut. Reinstall the foam wrapper and outer cover.

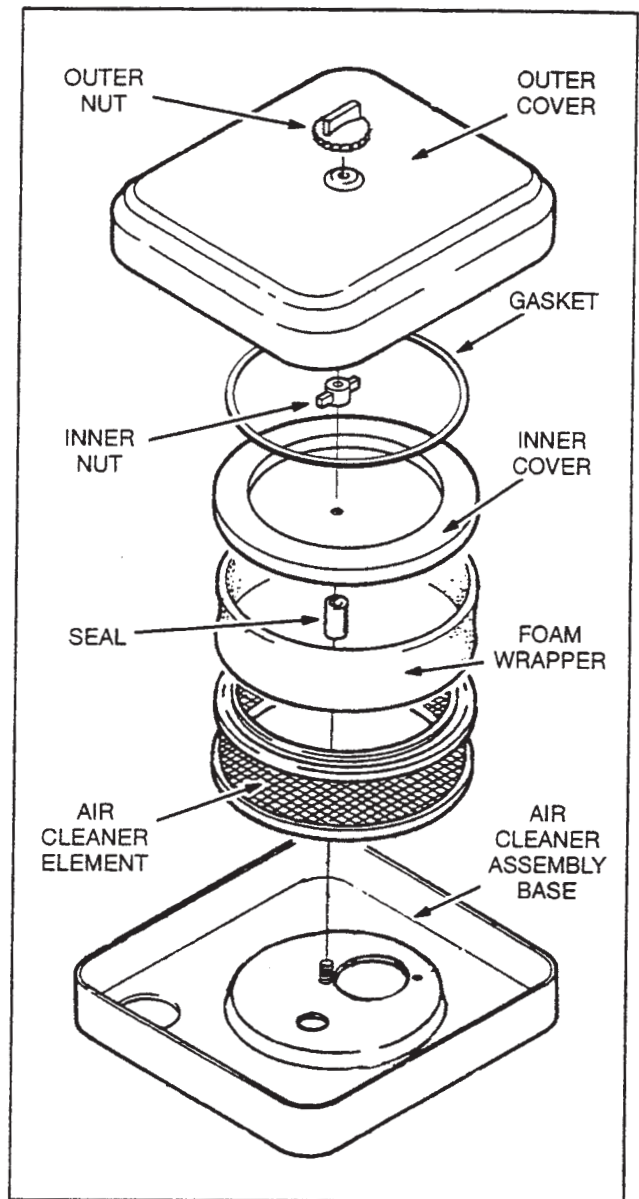


FIGURE 4. AIR CLEANER ASSEMBLY

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## ENGINE OIL AND FILTER CHANGE

**⚠ WARNING** *State and federal agencies have determined that contact with used engine oil can cause cancer or reproductive toxicity. Take care to limit skin contact and breathing of vapors as much as possible. Use rubber gloves and wash exposed skin.*

Refer to Table 2 for scheduled oil change and filter replacement. See Figure 2 on Page 3 for oil filter and oil drain locations.

1. Run the engine until it is warm. Stop the engine and disconnect the spark plug and, if so equipped, the battery (negative [-] cable).

**⚠ WARNING** *Accidental starting of the engine can result in severe personal injury or death. Always disconnect the spark plug and the battery (negative [-] cable) before changing oil.*

2. Remove the oil fill cap.

**⚠ WARNING** *Crankcase pressure can blow hot engine oil out the fill opening causing severe burns. Always stop the engine before removing the oil fill cap.*

3. Place a pan under the oil drain opening and remove the oil drain plug. Reinstall the plug securely after the oil has drained completely.
4. Spin off the oil filter canister, drain the oil and discard the filter according to local regulations.

5. Thoroughly wipe off the filter mounting surface.
6. Make sure the gasket is in place on the filter canister and apply a thin film of oil to the gasket.
7. Spin on the new filter canister by hand until the gasket just touches the mounting pad and then turn it an additional 1/2 to 3/4 turn. Do not over-tighten.
8. Refill with API Class SG or SH oil (also SG/CD, SG/CE, SH/CD or SH/CE) having an SAE viscosity grade appropriate for the expected temperatures, as indicated by Table 1. See *Specifications* for the oil capacity.

DO NOT FILL TO A LEVEL ABOVE THE FULL MARK ON THE DIPSTICK. Drain the excess oil if too much has been added.

**⚠ CAUTION** *Too much oil can cause high oil consumption, high operating temperatures and oil foaming. Too little oil can cause severe engine damage. Keep the oil level between the Full and Add marks on the dipstick.*

9. Reconnect the spark plug and battery.
10. Start the engine and run it for a short time while checking for oil leaks around the drain plug and oil filter. Do not overtighten: tighten only as necessary to eliminate leaks.
11. Used oil is harmful to the environment. Pour the used oil into a sealed container and deliver it to the nearest recycling center.