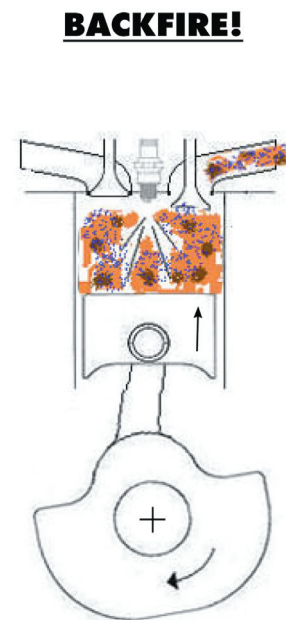


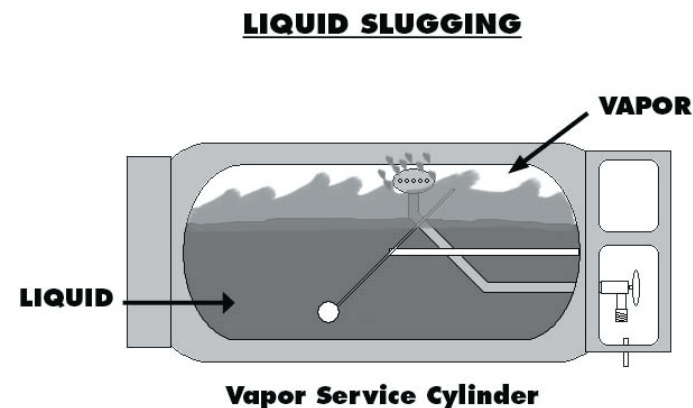
Backfiring

1. Backfiring may be caused by a mechanical problem with a valve or rocker arm. Check them.
2. Backfiring may also be due to an overheated spark plug caused by an improperly adjusted air-fuel mixture. Check and adjust the mixture.
3. Backfiring at idle may be due to mechanical failure.
4. Backfiring under load may be caused by an overheated or worn spark plug.
5. Backfiring through the intake valve is not common. It is usually caused by a failed rocker arm or push rod.
6. Backfiring during deceleration is due to an over-rich fuel mixture from a clogged air filter. Check the filter and service as needed.



Liquid Slugging

1. Slugging only occurs in vapor fuel systems. If a mower is operated on an extreme incline, liquid fuel may enter the regulator from the vapor withdrawal tube.
2. Check that the fuel cylinder is a vapor-service cylinder.
3. Check the orientation of the fuel cylinder (locator pin in neck ring locator hole).
4. If a strong odor of propane exists, the pressure regulator may be frosted. This is a strong indication of liquid slugging.
5. If slugging occurs, shut off the mower, close the cylinder service valve, and allow the fuel to dissipate.



Propane Odor

1. If the operator smells propane, there is a leak. Propane smells the same as natural gas, because the same odorant compound is added to both fuels.
2. Close the cylinder service valve and check for leaks.
3. Use a propane leak detector or an approved liquid leak-check solution that acts like a soapy water solution.
4. If odor is present at all times, check the cylinder, valves and connectors for leaks. If odor is present only while engine is running, then the regulator diaphragm is defective. Rebuild or replace the regulator.
5. If the cylinder service valve is defective, have a propane supplier check the valve, pump down the cylinder and replace. Do not try to replace the valve due to the pressure in the cylinder (typically 100-200 psi). Do not try to transfer the fuel to another cylinder. Your propane supplier has special equipment to evacuate a cylinder.

6. If so equipped, check the hydraulic lines to the vaporizer for the correct connection.
7. If the fuel cylinder is the correct type and slugging persists, substitute a fuel cylinder that is known to be good and re-check operation.

For More Information

Propane Safety: www.propanesafety.com

National Standards: National Fire Protection Association 58, *Liquefied Petroleum Gas Code*, 2011 ed. (NFPA 58). Chapters 5 and 11 cover component specifications and engine-fuel applications. To view or order copies, visit www.nfpa.org.

State and Local Codes: State and local laws may exceed or supersede NFPA standards. Contact the authority having jurisdiction in your area for requirements applicable to propane or propane-fueled equipment.

INTRODUCTION TO PROPANE-FUELED MOWERS

AND

TROUBLESHOOTING PROPANE-FUELED MOWERS



INTRODUCTION TO PROPANE-FUELED MOWERS

Key Differences From a Gasoline Mower

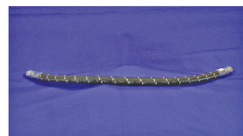


- The propane fuel supply must be turned on when the mower is started and turned off when it is shut down, using a manual valve on the cylinder.
- Propane is stored as a liquid under moderate pressure (100-200 psi). The propane fuel cylinder is a sealed pressure vessel that must match the type of fuel system (vapor or liquid service) installed on the mower.
- Propane vapor fuel systems include an electrical lockoff, a pressure regulator, and a propane mixer that replaces the gasoline carburetor. All components of a propane fuel system are propane-specific and must be approved for use with propane.

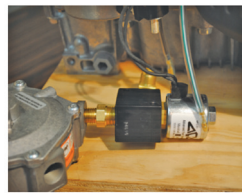
Components of a Propane Vapor Fuel System



Vapor Fuel Supply Cylinder



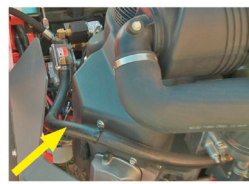
High-Pressure Hose



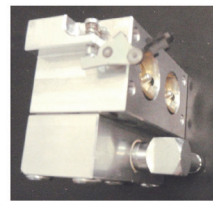
Fuel Lockoff



Pressure Regulator

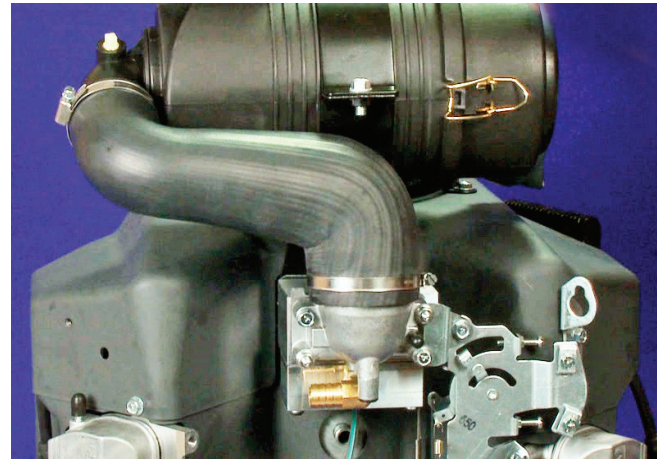


Low-Pressure Fuel Line



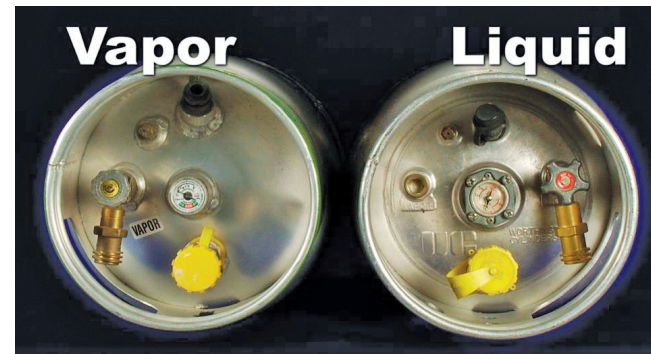
Propane Mixer (Carburetor)

Propane Conversion



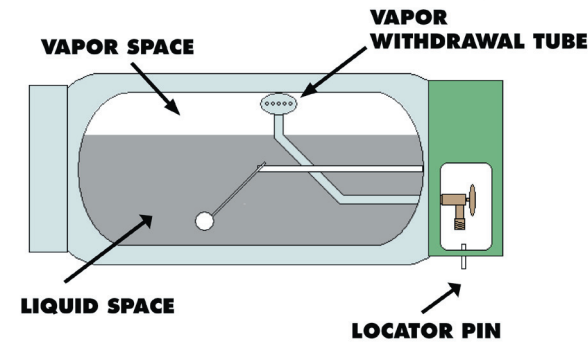
1. Disconnect the mower's electrical system.
2. Remove the gasoline tanks, fuel lines, air filter assembly, fuel pump, throttle, fuel filter and carburetor.
3. Retain the gasoline tanks if they are to be used for mounting mower controls.
4. Pre-assemble the propane regulator, fuel line connections and mixer according to the manufacturer's instructions.
5. Install the regulator on the chassis.
6. Install the mixer and air-filter assembly on the engine.
7. Mount the fuel-supply cylinder securely on the chassis with the locator pin in the hole on the neck ring to ensure correct orientation.

Propane System Inspection



1. Check cylinder type—vapor or liquid service. Vapor and liquid service cylinders are not interchangeable.
2. Inspect the cylinder for damage.
3. Check cylinder position—locator pin in hole on neck ring.
4. Check cylinder mounting—cylinder secured firmly in place. If the straps are broken, replace them.
5. Check cylinder requalification date. If the month and year on the cylinder is more than 12 years earlier than the current month and year, replace or requalify the cylinder.

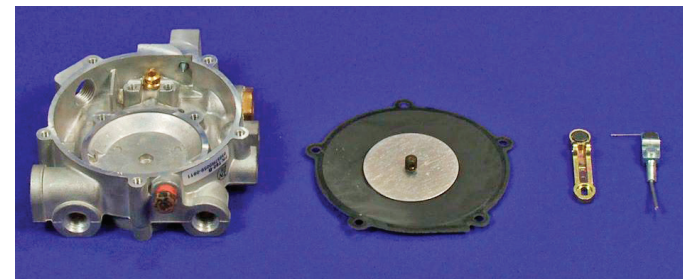
DOT VAPOR SERVICE CYLINDER



6. If you are approved by U.S. DOT to re-qualify cylinders, follow DOT procedures and recordkeeping requirements. Remove the cylinder from the mower, inform the owner and record the cylinder serial number and date.
7. Inspect fuel lines for damage (UV deterioration, abrasion, oil soaking). Route lines away from sharp edges, moving parts and hot surfaces.
8. Heating hoses (if equipped) – inspect for leaks and proper routing. Replace any damaged hoses or hose clamps.

TROUBLESHOOTING A PROPANE MOWER

No Start



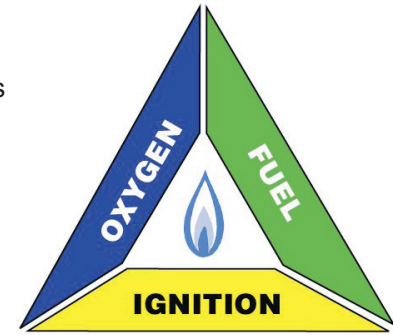
1. Check for fuel in the cylinder by opening the fixed liquid level gauge.
2. Check that the fuel lockoff is energized and the ground wire is connected.
3. Check the pressure regulator for failed internal parts. Remove regulator and disassemble on a bench; inspect the internal valves and seats. Repair or replace as necessary. If the regulator is tamper-proof, replace the regulator assembly.

Loss of Power

1. Check that the engine can rev to full speed with no load. Adjust throttle cable if necessary.
2. Apply a light load to see if the engine can power up to full speed. If it can't, check the air filter.
3. Check the maximum gas flow control on systems that are so equipped. If provided, adjust for proper full-throttle power and emissions.

Engine Quits

1. An engine that quits lacks either air, fuel or spark.
2. Lack of air: Disassemble air filter; inspect and clean.
3. Lack of fuel: Check fuel lockoff. The lockoff is wired in series with the chassis safety switches.
4. Check fuel filter (if present). Propane can pick up red rust from storage tanks that can plug a filter.
5. Lack of spark: Ignition failure is typically not due to propane fuel. Check the engine manufacturer's service manual.



Overheating

1. Overheating is usually not fuel-related.
2. Check for lawn debris blocking cooling fins. Check for damaged cooling shroud or damaged fan.
3. Use compressed air (not a power wash) to clean the engine, approximately every 100 hours.
4. In rare cases, overheating may be due to an air-fuel mixture that is significantly out of adjustment. Usually this condition is associated with a strong exhaust odor and poor performance. Adjust the air-fuel mixture and repair or replace the regulator, if possible. Most air-fuel mixtures are not adjustable.
5. If so equipped, check the maximum gas flow control to see if it has become loose or gone out of adjustment.

Misfiring

1. Misfiring is typically caused by an ignition fault.
2. Check the spark plug, spark plug wire, and ignition coil.
3. Check the vapor hose to the mixer (carburetor) for cracks.
4. If misfiring occurs at idle, then check the air-fuel mixture. If adjustable, adjust according to the manufacturer's specifications.
5. If the unit has a sealed mixture control with tamper-proof screws, then replace the regulator.



DAMAGED SPARK PLUG