

Fuel Filters: Gasoline. Replace every 1,500 hrs. or 1 year.
Propane. Replace every 1,500 hrs. or 1 year.

Propane filter replacement procedure:

1. Close service valve at tank.
2. Run engine until it stalls.
3. Replace filter.
4. Open service valve.
5. Leak test connections.

Injector Flush: Gasoline only. Zenith does not recommend a set period to flush the injector with an injection cleaner, but does allow it if a build up of gum and sludge occurs in the system. This depends on the quality of the gasoline used.

If the propane injector is contaminated by gum and sludge, it must be removed and cleaned with a gum and sludge cleaner.

Clean Throttle Plate: It is not necessary to remove gum and sludge from the ZEEMS throttle plate to maintain a quality idle. Cleaning the shaft and fly assembly with carburetor cleaners will not damage the system. **Do not immerse throttle body into solvent.**

DUAL Fuel: Periodically operate engine on the alternative fuel. Check system for fuel leaks and operational integrity.

Note: Gasoline has a shelf life, stale gasoline can cause poor starting any other operational problems.

Check Exhaust Emissions: With the increased emphasis on air quality by regulatory authorities, it is important to understand the proper procedure to test exhaust emissions. Although the carbon monoxide (CO) level in the exhaust is very important, it should not be the only exhaust constituent monitored during an exhaust emission test. Zenith recommends using a quality four or five gas analyzer for testing exhaust emissions. By monitoring carbon monoxide (CO),

A brief explanation of what CO, HC, O₂ are:

Carbon Monoxide is a indicator of how rich or lean air / fuel mixtures are. It is formed as a result of imperfect combustion. When hydrocarbon fuels burn completely, carbon dioxide and water vapor form.

MAINTENANCE PROCEDURES

NOTES

When they burn incompletely, due to insufficient oxygen, CO and other chemicals are formed. Most repair grade analyzers measure CO in percent (%) by volume. 1% CO means 1% of the total exhaust gas consists of carbon monoxide (CO).

Hydrocarbons (HC) are an indicator of how complete the combustion process is. Hydrocarbons are low when the air / fuel mixture is correct. It will rise if the mixture is too rich, causing incomplete combustion or too lean, causing partial misfire and incomplete combustion.

It can also give an indication of ignition system performance and engine mechanical condition. HC is measured in parts per million (ppm) by volume.

Oxygen (O₂) in the exhaust is a indicator of how lean the air / fuel mixtures are. O₂ will increase in proportion with the air fuel ratio. As fuel mixtures richen, O₂ readings are low and CO readings are high. A lean condition will show high O₂ and low CO. Like CO, it is measured in percent (%) by volume.

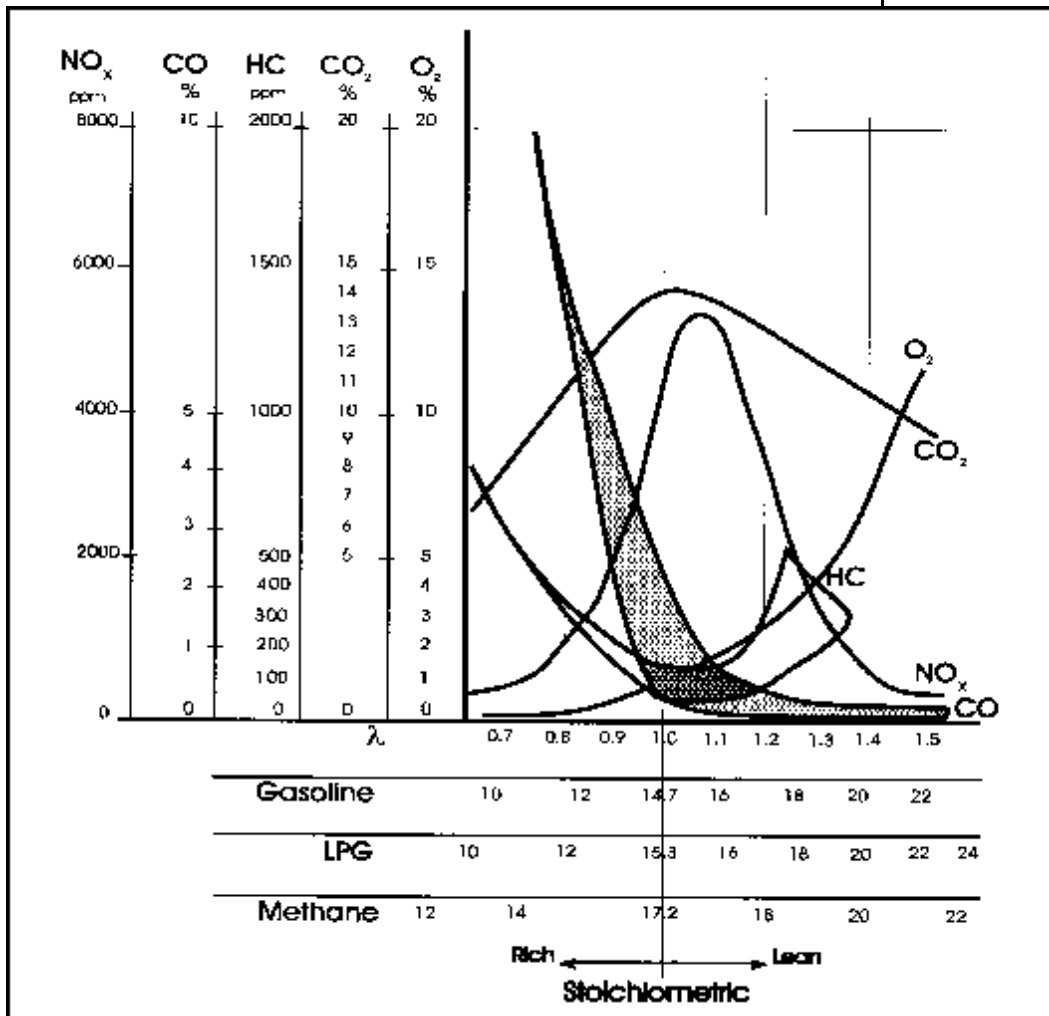


FIG. 6: 1

Testing procedure:

1. Machine must be in a well ventilated area or exhaust piped to the outside.
2. Gas analyzer must be correctly calibrated and warmed up.
3. Engine must be at operating temperature.
4. Readings should be made at idle, high idle and load.

Correcting out-of-range Air/fuel mixtures:

The fuel injection calibration tables are not field adjustable; If emission readings do not meet the manufacturers specification, the following checks can be made.

1. Check ignition timing.
2. Check fuel pressure (adjustments can be made to emission levels by adjusting the fuel pressure regulator).
3. Check air cleaner restriction.
4. Check ignition system.
5. Check PCV valve.
6. Check vacuum leaks.
7. Check valve clearances.

Note: Do not run engine with serial communication jumper port connector disconnected.

	Hydro-Carbons (HC)	Carbon Monoxide (CO)	Oxygen (O2)
Ignition misfire	↑	↘	↗
Very rich	↗	↑	↘
Very lean	↗	↓	↗
Timing retarded	↘	↗	→
Timing advanced	↗	↘	→

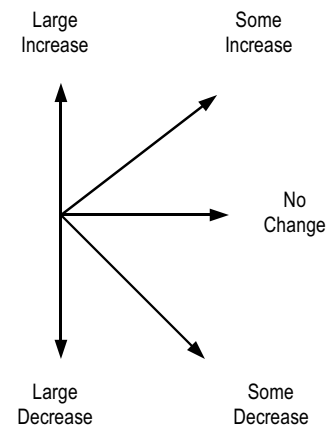


FIG. 6: 2