Owner’s Manual

Compressed Natural Gas (CNG) Fuel System
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INTRODUCTION

Congratulations on your purchase of an IMPCO Automotive bi-fuel system. Your vehicle is now equipped to operate on either gasoline or Compressed Natural Gas (CNG). The IMPCO Automotive bi-fuel is an advanced, state-of-the-art CNG gaseous fuel injection system designed to work in conjunction with the OEM engine management system and provide seamless performance on either gasoline or CNG.

![CAUTION!]

As the operator of this alternative fuel vehicle, you should familiarize yourself with the unique features and operation of this CNG system.

CNG is a colorless and odorless vapor or gas. For safety reasons, a distinct odorant, with a sulfur-like or rotten egg smell, is added to alert the operator and passengers of a possible leak in the CNG system. Read and understand all safety information before operating the vehicle. Other than the necessary components to enable the vehicle to run on CNG, your vehicle has the same features as the standard gasoline only version.
SAFETY INFORMATION

Never take safety for granted. This alternative fuel system conforms to all applicable safety standards and specifications in force at time of manufacture. However, it is up to you, the owner and operator to understand and follow the precautions for safe handling and operation of your vehicle. The information provided in this Owner's Guide is provided for your information and safety. Please read them and observe them at all times.

The CNG fuel system is equipped with a manual shut-off valve (refer to page 8) which houses the excess flow safety valve and serves two functions:

1) In normal operation, it allows fuel from the tank to flow through the fuel lines to the engine.

2) In the event of an accident where a fuel line is disconnected or ruptured, the rapid discharge of fuel from the tank will cause the excess flow safety valve to close, shutting off the flow of fuel. If frost or ice develops on the shut-off valve, it means the excess flow safety valve has been activated. To reset the excess flow valve, turn the shut-off valve clockwise (closed) and wait for approximately 15 seconds. Then, open the valve SLOWLY to prevent a fuel surge which could trip the excess flow valve again.

![WARNING!]

CNG in its gaseous form is lighter than air. Leaking gases can collect in overhead ceilings or other confined areas. If the gases contact an ignition source, a fire or explosion could result. Exit the area immediately if CNG gases have leaked from the fuel system into a confined area. Failure to follow this warning may result in bodily injury or death.
GENERAL SAFETY PRECAUTIONS:
The following are some general safety precautions about CNG fuel systems and CNG fuel system servicing:

- Repair of the CNG fuel system should only be done by qualified service technicians.
- All service work on the CNG fuel system should be done in a well-ventilated work area.
- Never perform repairs on a CNG fuel cylinder that still has fuel in it.
- Never cut or weld a CNG fuel cylinder.
- Leak check your CNG fuel cylinder using only an approved leak detector. NEVER check for leaks with a flame or spark.
- Do not tamper with or modify the valves or fittings on the CNG system.
- If the CNG tank will be disconnected from service for an extended period of time, cap or plug all the fittings and keep the tank shutoff valve closed.
- Know the odor of CNG. It has a distinctive sulfur-like or rotten egg smell.
- Know how to open the tank cover valve access door (if equipped).
- Never operate the vehicle with the CNG fuel cylinder cover removed. The cover is designed to protect the CNG fuel cylinder from damage.
- Know where the manual shutoff valve is located in case of an emergency.
- Do not install a camper, camper shell or any type of cover on the pickup bed that may possibly trap flammable CNG vapors. Such an installation may prevent proper CNG cylinder ventilation.
- Never over pressurize the CNG fuel cylinder or use illegal adapters to exceed the rated fill pressure.
GENERAL SAFETY PRECAUTIONS (CONTINUED):

- Do not paint the CNG fuel cylinder or the cylinder cover.
- If the vehicle is repainted, the CNG fuel cylinder must be removed by a qualified technician before the vehicle is placed in a paint bake oven (refer to *Painting Your Vehicle* section on page 25).
- Make sure all cylinder and vehicle markings and labels are clean and intact. If replacement labels are required, contact your original installer.

**WARNING!**

Failure to follow the above bulleted safety precautions could result in bodily injury or death.

**CAUTION!**

In order to protect engine components, an automatic switch over to gasoline may occur under certain conditions. Maintain an adequate gasoline level to prevent stalling in the event of fuel switch-over.
Failure to follow these warnings may result in bodily injury or death.

**IN CASE OF A CNG LEAK:**
1) If driving, pull off the road immediately and park the vehicle in an open, well-ventilated area.
2) Shut the engine off and exit the vehicle.
3) Close the manual shutoff valve.
4) Eliminate all potential sources of ignition such as burning cigarettes, sparks, etc.
5) Call emergency response personnel.

**IN CASE OF FIRE:**
1) Stop the flow of gas as soon as possible. Never attempt to put out the flame unless the gas can be stopped. A spark or other source of ignition could cause an explosion.
2) Evacuate the immediate area of all people and animals and call the fire department.
SAFETY INFORMATION

VEHICLE OPERATION:

WARNING!

Failure to follow these warnings may result in bodily injury or death.

Natural Gas is extremely flammable. If ignited, you could be badly burned. Keep sparks flames and smoking material away from natural gas. Do not smoke if you are near natural gas vapors or refueling your vehicle.

The CNG system is under high pressure. A sudden escape of CNG can cause injury. Never disconnect a fuel line or remove a fuel system component. Service and repair of the system should only be performed by a trained CNG certified service technician with the proper knowledge and tools.

Do not start and operate the vehicle in an enclosed area such as a garage. Exhaust fumes contain deadly carbon monoxide. Always open the garage door BEFORE starting the engine. If you detect a strong smell of CNG before starting the engine or hear a hissing sound DO NOT start the engine. Close the manual shutoff valve and ventilate the area. Contact emergency response personnel. Do start the vehicle until the leak can be located and corrected by a qualified CNG technician.
Typical Fuel Selector Switch Location:

Fuse Location:
The IMPCO Automotive bi-fuel system has two fuses incorporated into the wiring harness (5 and 25 amp). Both fuses are in a plastic fuse holder that is mounted inside the engine compartment (usually near the battery). Location may vary by vehicle.
Typical CNG Fuel Cylinder and Manual Shutoff Valve Locations:

The CNG fuel system is equipped with a manual shutoff valve. Turning this valve ¼ turn (or 90 degrees) will shut off the flow of fuel from the tank. The valve is typically located on the driver’s side below the door and should be labeled “Manual Shutoff Valve.” Be sure to familiarize yourself with its location and use.
Fuel Selector Switch:
The Fuel Selector Switch is always mounted within easy access of the driver. The switch has two positions: CNG and Gasoline. Fuel selection is performed with the key in the ON position and the engine running or OFF. Also, the switch housing incorporates the Fuel Operation Indicator Lamp and the CNG Fuel Level Indicator Lamps.

Gasoline Operation:
When the Fuel Selector Switch is in the gasoline position (the CNG fuel operation lamp is illuminated red), the engine will start and run on gasoline. If the switch is moved to gasoline from CNG while driving, the engine will automatically switch over to gasoline operation.
CNG Operation:

When the Fuel Selector Switch is in the CNG position (the CNG fuel operation lamp is illuminated green), the engine will start and run on CNG. If the engine is started in CNG mode and the ambient temperature is below a predetermined level, the engine will start on gasoline and (after certain operating conditions have been met) will automatically switch over to CNG operation. If the switch is moved to CNG from gasoline while driving, the engine will automatically switch over to CNG operation. If the CNG fuel cylinder runs out of fuel, the system will automatically switch over to gasoline operation and the beeper will sound (refer to CNG Fuel Cylinder Level Indicator Lamps).

Fuel Operation Indicator Lamp:

The Fuel Operation Indicator Lamp changes color to indicate the current fuel mode and the fuel transition mode (switch-over to the selected fuel). The colors are as follows:

- **RED**: Vehicle is currently operating on gasoline.
- **GREEN**: Vehicle is currently operating on CNG.
- **AMBER**: Fuel is transitioning to the selected fuel.
**System Malfunction Indicator Lamp:**
The Fuel Operation Indicator Lamp also functions as a System Malfunction Indicator. If a malfunction in the IMPCO Automotive bi-fuel system occurs, the CNG Fuel Operation Indicator Lamp will begin flashing, a beeper will sound three times every 20 seconds and the vehicle will switch over to gasoline operation. Depressing the Fuel Selector Switch will cancel the beeper. However, the Fuel Operation Indicator Lamp will continue flashing until the problem is corrected. If this occurs, drive your vehicle to the nearest IMPCO Automotive bi-fuel servicing dealer at your earliest convenience.
CNG Fuel Cylinder Level Indicator Lamps:
The four CNG Fuel Cylinder Level Indicator Lamps illuminate to indicate how much fuel is in the CNG fuel cylinder. The lamps illuminate as follows:

- 4 lamps illuminated: Tank full
- 3 lamps illuminated: Tank ¾ full
- 2 lamps illuminated: Tank ½ full
- 1 lamp illuminated: Tank ¼ full
- 1 lamp flashing: Tank on reserve
- 1 lamp illuminated and beeper sounding: CNG cylinder empty and the system has reverted back to gasoline operation. To cancel the beeper, push on the fuel selector switch once. The sound will stop and the fuel operation LED will illuminate RED.

Four lamps flashing indicates the CNG cylinder maybe overfilled. Drive the vehicle to the nearest CNG repair center for inspection and repair.
Minimum Gasoline Tank Level:
It is very important you do not run the gasoline tank out of fuel and maintain a minimum level of ¼ full tank. In order to protect engine components, an automatic switch over to gasoline may occur under certain conditions. The system will not switch to CNG operation in the event of an engine stall while running on gasoline. Also, the gasoline fuel pump could be damaged if the vehicle is operated without fuel in the gasoline tank.

Vehicle Storage:
Refer to the *Storing Your Vehicle* section on page 24.

Towing Capacities:
Refer to the vehicle manufacturer owner’s guide for towing capacity information.

New Engine Break-In Procedure:
New or rebuilt engines should have the break-in procedure performed with gasoline only. Consult the vehicle manufacturer owner's guide for new engine break-in procedure information.
STARTING THE ENGINE

The IMPCO Automotive bi-fuel system installed on your vehicle has been designed to start on either gasoline or CNG based on the Fuel Selector Switch position (red Fuel Indicator Lamp, gasoline; green Fuel Indicator Lamp, CNG). Because both systems utilize fuel injection systems, you should start the vehicle the same as you would any other gasoline powered, fuel injected engine (refer to the vehicle manufacturer owner’s guide for more information).

COLD WEATHER STARTING:
When the engine is started in CNG mode and the ambient temperature is below a predetermined level, the engine will start on gasoline and (after certain operating conditions have been met) will automatically switch over to CNG operation. Refer to the vehicle manufacturer’s base owner’s guide for gasoline cold starting information.
CNG FUEL CYLINDER/REGULATOR INSPECTION

WARNING!

Failure to follow these warnings may result in bodily injury or death.

- Ensure the CNG Fuel Cylinder mounted on your truck conforms to the safety standards applicable to motor vehicles. For additional questions or details, contact your original installer. The tank should be inspected annually by a trained technician for any damage, wear or corrosion or whenever your truck is serviced. Other periodic inspection and testing may be required for the tank, mounting brackets and hardware. If your vehicle is involved in a fire, accident or if the CNG tank is struck by an object, the system must be inspected immediately. Use the CNG Fuel Cylinder Inspection Records on page 30 to record inspections of the tank.

- The fuel pressure hoses, pressure regulator and pressure relief device should be inspected annually by a trained technician for signs of wear, damage or corrosion.
ADDING AFTERMARKET ACCESSORIES

**WARNING!**

Failure to follow these warnings may result in bodily injury or death.

- During the addition of the CNG package to your vehicle, fuel lines and other components have been installed under the vehicle. Before installing an aftermarket accessory, verify that the accessory will not affect the operation of the CNG fuel system components. Never install an accessory that will restrict or prohibit access to the manual shutoff valve or the CNG fuel cylinder.
ROADSIDE EMERGENCIES

If Your Vehicle Needs a Jump-Start:

![WARNING!]

Before attempting to jump-start your vehicle, check carefully for the smell of CNG. A spark may cause an explosion and fire. If you smell the odor of CNG or hear a hissing sound, turn off the manual shutoff valve. Do not attempt to jump-start the vehicle. Contact an authorized repair facility and have a trained technician test or repair the possible leak. Failure to follow this warning may lead to bodily injury or death. Refer to the section on jump-starting in your vehicle manufacturer owner’s guide for the proper procedures.

If You Need to Jack Up the Vehicle:

Refer to the section on changing a tire in your vehicle manufacturer owner’s guide for proper procedures. During the addition of the CNG package to your vehicle, fuel lines and other components have been installed under the vehicle.

![WARNING!]

Use only those jacking points indicated in the vehicle manufacturer owner’s guide. Use of unapproved jacks and jacking points may damage the fuel lines and valves and create a hazardous condition that may lead to personal injury.
ROADSIDE EMERGENCIES

If You Need to Have Your Vehicle Towed:
Refer to the section on towing your vehicle in your vehicle manufacturer owner’s guide for the proper procedures. During the addition of the CNG package to your vehicle, fuel lines and other components have been installed under the vehicle.

![WARNING!]

Use only those towing points indicated in the vehicle manufacturer owner’s guide. The use of unapproved lifts and towing points may damage the fuel lines and valves, creating a hazardous condition which may cause personal injury.
IF YOU HAVE A SERVICE PROBLEM

If a Malfunction Indicator Lamp (also known as a “Check Engine Light”) is displayed, a system error has been detected, requiring inspection and/or service. In the event this occurs or if you have other problems or concerns, contact your vehicle manufacturer’s customer assistance number (located in the owner’s manual) for qualified servicing.

If you experience any problems or concerns while driving on CNG, contact your installing dealer. You may also find a list of IMPCO Automotive Certified Installation Partners on www.impco-asap.com website.
SERVICING YOUR VEHICLE

Be especially careful when inspecting or servicing your alternative fuel vehicle. Below are some additional warnings to those listed in your vehicle manufacturer owner’s guide.

![WARNING!]

Failure to follow these warnings may result in bodily injury or death.

- Keep all cigarettes, smoking materials and sources of ignition away from the fuel system components of your vehicle. This applies especially to the CNG system parts.

- Use particular caution around the fuel lines. Do not pinch or crimp the lines when raising or working under the vehicle.

- When working on your vehicle, close the manual shutoff valve. Start and run the engine on CNG until it switches over to gasoline to evacuate the CNG fuel system.

- Although CNG is non-toxic, the vapors are lighter than air and can cause oxygen depletion if they are enclosed in a confined space. Make sure you have adequate ventilation and use extreme caution when working under the vehicle. Service work on the CNG system should be performed in an open, well-ventilated area and only by individuals trained on CNG fuel and CNG fuel systems.
REFUELING THE FUEL CYLINDERS

Fuels and Fuel Quality:
Your vehicle is equipped with a standard gasoline fuel tank and a CNG fuel cylinder. The CNG is stored in a cylinder, usually located in the truck bed (the location may vary). A distinctive, sulfur-like or rotten egg odorant is added to CNG for safety.

E85 Flex-Fuel Vehicles:
Flex-fuel vehicles utilizing the IMPCO Automotive bi-fuel system MUST be operated on gasoline with a maximum 10% alcohol content. Failure to adhere to this criterion may cause the engine to run rough, have a lack of power during CNG operation and/or increase exhaust emissions levels over the legal limit illuminating the vehicle manufacturer’s “Check Engine” lamp.

Filling Your Fuel Cylinders:
Before filling either fuel, shut off the engine and set the parking brake. The gasoline tank is filled in the usual way through a standard filler pipe (refer to your vehicle manufacturer owner’s guide for information on refueling the gasoline tank).

The CNG fuel cylinder installed in your vehicle meets all U.S. and Canadian safety standards in effect at the time of production.

Note: Failure to service your system in accordance to the maintenance schedule may result in voiding the warranty.
REFUELING THE CNG FUEL CYLINDER

Filling Your Fuel Cylinders (continued):
Filling the CNG fuel cylinder requires extra caution. Follow the warnings and procedures shown below.

![WARNING!]

Failure to follow these warnings may result in bodily injury or death.
- DO NOT SMOKE.
- Always wear approved safety attire and eye protection during the CNG transfer.
- Never fill a CNG fuel cylinder that is damaged and/or shows signs of leakage and/or corrosion.
- Never overfill a CNG fuel cylinder. Refill fuel cylinders to recommended capacity only.
- Never fill your CNG fuel cylinder from another CNG bottle. Always fill from an approved refueling station.
- Never transfer CNG within 50 feet (15m) of a potential source of ignition. Extinguish or turn off all sources or potential sources of ignition.

Follow these steps when refueling the CNG fuel cylinder:
1) Turn off the engine, set the parking brake and make sure all passengers are out of the vehicle.
2) Visually inspect the fill port O-ring. If the O-ring if missing or damaged, consult your authorized vehicle manufacturer or CNG certified technician for replacement prior to filling CNG.
3) Always observe and follow the safety guidelines and filling instructions of the fill station.
REFUELING THE CNG FUEL CYLINDER

If You Experience Very Slow Fill Rates
If it takes much longer than usual to fill the CNG cylinder, your Fuel Fill Filter may be clogged. Contact your CNG certified service technician for inspection and/or replacement.

If You Run Out of CNG Fuel:
If your vehicle runs out of CNG fuel, it will automatically switch over to gasoline operation. For normal CNG operation, fill the CNG fuel cylinder until the fuel indicator lamps indicate at least ¼ full.

If You Run Out of Gasoline:
It is very important not to run the gasoline tank out of fuel. The system does not switch over to CNG operation in the event of an engine stall while running on gasoline. Also, the gasoline fuel pump could be damaged if the vehicle is operated without fuel in the gasoline tank.
STORING YOUR VEHICLE

If you plan on storing your vehicle for an extended period of time (60 days or more), refer to the vehicle manufacturer owner’s guide for OEM recommendations.
Failure to follow these warnings may result in bodily injury or death. In the event your vehicle should require painting, the CNG fuel cylinder must be removed by an authorized service technician from the vehicle before placing the vehicle in the paint oven. Exposing the CNG fuel cylinder to the high temperatures that occur during the paint baking process could activate the pressure relief valve on the CNG fuel cylinder, creating a hazardous condition.
The maintenance items listed below are specific to the CNG system. These are required in addition to the regular maintenance items listed in your vehicle manufacturer owner’s guide. Regular maintenance is essential for the proper operation, safety and performance of your vehicle.

Along with the information recorded in the vehicle manufacturer’s maintenance booklet, the material in this section will form a record of the services performed on this vehicle. Please keep it with the vehicle.

There are two maintenance schedules. One is for NORMAL driving conditions, which covers most everyday driving situations.

The SEVERE DUTY schedule should be followed if one or more of the following conditions occur frequently:

- Operating in severe dust conditions.
- Extensive idling, as in door-to-door deliveries.
- Off-road operation.
- Short trips of less than 10 miles (16km) when outside temperatures remain below 0°F (18°C).

**NOTE:** Extensive idling will accumulate more hours of use on your vehicle than is indicated on the odometer. Change the oil and filter at an interval equivalent to 200 engine hours of operation. You may have to approximate this time since most engines are not equipped with hour meters.
Normal and Severe Driving Conditions:

In addition to the maintenance listed in your vehicle manufacturer owner’s guide maintenance schedule, perform the following:

Every 7,500 MILES (10,000 KILOMETERS)*
- Visually inspect all vacuum lines and fittings.
- Visually inspect CNG fuel hoses, lines and fittings.
- Visually inspect fuel receptacle O-ring.
- Visually inspect Fuel Fill Filter.
- Visually inspect the entire air intake assembly for vacuum leaks.

Every 15,000 MILES (24,000 KILOMETERS)*
- Replace the CNG High-Pressure fuel filter.

Every 30,000 MILES (48,000 KILOMETERS)*
- Check the condition of all wiring.

Severe Duty Conditions:

Follow the SEVERE DUTY schedule in your vehicle manufacturer’s maintenance schedule booklet.

*Vehicle miles/kilometers accrued after the installation of the IMPCO Automotive bi-fuel fuel system.
# MAINTENANCE RECORDS

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*Vehicle miles/kilometers accrued after the installation of the IMPCO Automotive bi-fuel fuel system.*
CHANGE OF ADDRESS/OWNERSHIP CARD

If you sell your vehicle or move, go to www.impco-asap.com and click on the warranty tab.

Or, mail the information to:

IMPCO Automotive
Attn: Warranty Service Department
1274 South State Road 32
Union City, IN 47390
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WARRANTY INFORMATION

IMPCO Warranty Period
2011 and Older Vehicles - **24 months or 24,000 miles** whichever comes first. (PARTS ONLY)

2012 and Newer Vehicles - **36 months or 36,000 miles** whichever comes first. (PARTS & LABOR ONLY) **NO EXCEPTIONS TO THE LABOR TIME GUIDE.**

Vehicles that exceed 25,000 miles are not authorized for CNG conversion unless prior approval is provided in writing by IMPCO Automotive. Any vehicle converted that exceeds this mileage will not be covered under any warranty by IMPCO Automotive & IMPCO Technologies, Inc. Warranty coverage is transferable; however, a copy of the Purchase agreement between the seller and the owner must be provided to IMPCO Automotive Warranty Administration.

For more Warranty Information please refer to the Warranty Policy and Procedures.

**Maintenance**
For all maintenance or other work not covered by warranty, within and outside of the warranty period of the vehicle, IMPCO **strongly recommends** that all maintenance be performed by an IMPCO-authorized technician and/or someone who has been trained and certified on CNG and CNG vehicular fuel systems.

**Gasoline Fuel System Maintenance and Warranty**
The vehicle manufacturer’s original equipment warranty applies to parts, systems and subsystems of the gasoline engine, emission system and vehicle. Refer to the vehicle manufacturer Owner’s Manual.

Vehicle maintenance for the gasoline fuel system does not change. Service and warranty of the gasoline fuel system is to be performed through normal vehicle manufacturer’s dealer channels.