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Introduction

ABOUT THIS SUPPLEMENT

This booklet supplements your Owner's Guide and is part of the owner's portfolio. It describes the operation of your **Bi-fuel** vehicle and how it differs from a standard gasoline powered vehicle. Therefore it is very important that you read this guide and thoroughly familiarize yourself and others operating the vehicle with this information.

Some of the information in this supplement replaces certain instructions in the Owner's Guide. Please read this supplement carefully and completely. Refer to the Owner's Guide for complete vehicle information.

WARNINGS

Warnings remind you to be especially careful in those areas of the vehicle where carelessness can cause damage to your vehicle or possible personal injury to yourself, your passengers or others. Please read all warnings carefully.

- **Warnings are identified by this symbol** 

ABOUT THE WARRANTIES

The normal vehicle warranties will apply to your **Bi-fuel** vehicle. For further information, refer to your Warranty Information Booklet in the owner's portfolio.

Specified maintenance procedures must be followed. Repairs must be made by trained personnel.

It is important that your **Bi-fuel** vehicle be properly maintained by qualified Ford service technicians. If a concern occurs, it is important that properly trained personnel diagnose and repair the cause. If the concern relates to the fuel system, proper part replacement is imperative to keep your vehicle operating correctly. **Bi-fuel** components and standard fuel components are not interchangeable. If your **Bi-fuel** vehicle is not maintained in accordance with approved service procedures, damage may occur and your warranty may be invalidated.

GASEOUS FUEL INJECTION

Your **Bi-fuel** vehicle is equipped with two fuel injection systems, an unleaded gasoline fuel system and a gaseous fuel injection system.

Two types of gaseous fuel injection systems are available:

- **Compressed Natural Gas (CNG)**
- **Liquefied Petroleum Gas (LPG)**

The two available gaseous fuel injection systems operate in somewhat similar manners. However, differences in operating pressures and gaseous fuel properties make it **important** that you understand which system you are using.

If you are unsure as to which fuel system you have, contact your dealer.

Your new Gaseous Fuel Injection System is a result of years of research and technical experience. It employs the latest solid state electronics to provide excellent driveability, emissions control and fuel economy.

Compressed natural gas (CNG)

Compressed natural gas (CNG) is a mixture of hydrocarbon gases with a high concentration of methane that is stored under high pressure.

Abundant reserves of natural gas in the United States and Canada allow natural gas to be used as a very cost-efficient fuel. Natural gas is a clean burning fuel, making it a highly suitable fuel to meet automotive emission standards.

The CNG fuel system is rated at a pressure of 24 800 kPa (3 600 psi) at 21°C (70°F). The CNG fuel system's pressure rating is listed on a label by the CNG fueling point.

- Look for one of these labels (depending on application).

Service Pressure: 24800 kPa (3600 psig)	
CNG FUELED VEHICLE/VÉHICULE À GNC	
System Pressure @ 70°F: Pressure des system à 21°C:	Cylinder Expiration Date: Date d'expiration des cylindres:
24800 kPa (3600 psig)	
Total Cylinder Water Volume: Volume total d'eau les cylindres:	Next Inspection Date: Date d'inspection des cylindres:
Liters: <input type="text"/>	<input type="text"/>
<small>L1-088A</small>	

Introduction

Use caution when servicing or maintaining any of the components of the CNG fuel system. Failure to provide adequate ventilation could result in gas vapor build up over time potentially resulting in a combustible mixture.



Service to CNG fuel system must be conducted only at qualified dealerships by qualified technicians. Failure to do so may cause damage to components or cause bodily harm.

Liquefied petroleum gas (LPG)

Liquefied Petroleum Gas (LPG) is a mixture of hydrocarbon gases consisting mostly of propane with smaller amounts of ethane and butane, which when under low pressure, are stored in a liquefied state.

LPG is a clean burning fuel, making it a highly suitable fuel to meet automotive emission standards.

Automotive grade LPG is typically referred to as HD-5 Propane (HD-10 Propane in California) and contains at least 90% propane.

Use caution when servicing or maintaining any of the components of the LPG fuel system. Failure to provide adequate ventilation could result in gas vapor build up over time potentially resulting in a combustible mixture.



Service to LPG fuel system components must be conducted only at qualified dealerships by qualified technicians. Failure to do so may cause damage to components or cause bodily harm.

PRECAUTIONARY INFORMATION

In certain localities, local authorities have established guidelines and regulations that directly affect the operation and storage of your **Bi-fuel** vehicle.

These established guidelines and regulations include:

- refueling.
- underground parking.
- operating your vehicle under bridges or in tunnels.

More information on established guidelines and regulations are available from your qualified Ford dealership.

Introduction



Breathing hydrocarbon gases (CNG or LPG) or air which lacks oxygen due to the presence of hydrocarbon gases can result in headache, dizziness and weakness in the arms and legs. In severe cases, prolonged breathing of hydrocarbon gases can cause suffocation. In the event of illness due to inhaling hydrocarbon gases, immediately move the victim to fresh air and contact medical emergency personnel.

Use caution when servicing or maintaining any of the components of your Gaseous Fuel Injection System.



Do not modify the gaseous fuel injection system configuration or components. Do not replace the gaseous fuel injection system components with parts not designed for use with your Bi-fuel vehicle. Components designed for use in your CNG or LPG Bi-fuel vehicle consist of special materials and are calibrated especially for your vehicle. Failure to use the correct components may cause damage to the engine and fuel system or possible personal injury.



Service to the gaseous fuel injection system components must be conducted only at qualified dealerships by qualified service technicians. Failure to do so may cause damage to the engine and fuel system components or possible personal injury.

Any modification to your Gaseous Fuel Injection System voids the Ford New Vehicle Limited Warranty.

Do not use liquefied natural gas (LNG) or a CNG that is derived from a process such as flashing (heating LNG). Failure to use the correct type of fuel may cause damage to the engine and fuel system components.

If the vehicle is involved in an accident or fire that damages any portion of the gaseous fuel injection system, the damaged components MUST be replaced and the complete system tested by a qualified service technician before the vehicle is operated again.

Introduction

If your **Bi-fuel** vehicle is to be painted, the CNG or propane fuel tank(s) and fuel lines must be emptied before the vehicle is placed in a heated room, known as a “paint oven”, for the new paint to cure. These “paint ovens” typically operate at temperatures up to 60° C (140° F). The high temperatures in the “paint oven” could cause the fuel in the fuel tanks to expand, which may cause an overpressure condition within the fuel tanks that can be hazardous to personal safety and property. Contact your qualified Ford dealership for assistance.



Do not use paint drying ovens for propane-fueled vehicles. The heat of paint drying ovens will increase the pressure in the fuel tanks. This could cause venting of propane fuel vapor into the oven and result in a fire from the heat or sparks in the electrical equipment. If the fuel is confined inside an oven, an explosion may occur. When refinishing the body panels of a propane-fueled vehicle, use spot painting and drying methods.



Failure to empty (vent) the CNG or propane fuel tank(s) and fuel lines prior to vehicle being placed in a “paint oven” may cause an overpressure condition within the fuel tanks that can be hazardous to personal safety and property.

On F-Series Bi-fuel vehicles, do not modify or replace the cargo bed with any non-OEM components. Should the cargo bed need to be removed for service or replacement, it should be done at a qualified dealership using qualified service technicians. Do not sit, stand or place heavy loads on the in-bed fuel tank cover. Any cap added to the cargo bed on this vehicle must be vented to the outside (consult your local regulations). Failure to provide adequate ventilation could result in gas vapor build up over time, potentially resulting in a combustible mixture.

VEHICLE IDENTIFICATION AND LABELING

Your **Bi-fuel** vehicle has several labels to identify it as a CNG or LPG fueled vehicle (depending upon application) and to help identify areas of special attention.

- It is important that you and others that operate your **Bi-fuel** vehicle identify the label locations and understand the information on the labels.
- Specific labels are shown within this supplement when applicable.

This label is located on the driver's side door frame and lists the date your gaseous fuel injection system was installed.

This vehicle was altered by GFI Control Systems, Inc.	
in _____,	_____
<small>MONTH</small>	<small>YEAR</small>
and as altered it conforms to all applicable Federal Motor Vehicle Safety Standards affected by the alteration and in effect	
in _____,	_____
<small>MONTH</small>	<small>YEAR</small>
Net A.R.C. Weight	
Total:	_____ lbs.
Front Axle:	_____ lbs.
<small>L1-106</small>	

This label is located on the dashboard to remind you to operate your vehicle regularly using unleaded gasoline. This helps prevent premature wear on the components of the gasoline fuel system.

**THIS VEHICLE MUST BE OPERATED ON
UNLEADED GASOLINE A MINIMUM OF
ONE TANK EVERY 60 DAYS**

Introduction

These two labels are located in the engine compartment and contain diagnostic information for your gaseous fuel injection system.

VACUUM HOSE DIAGRAM / SCHEMA DU CONDUIT DÉPRESSIF

The diagram shows a vacuum source on the left connected to a GFI MAP line. This line leads to a GFI MAP sensor. A rubber MAP sensor nipple is also connected to the GFI MAP line. The diagram is labeled with 'BASE VEHICULE VACUUM SOURCE / ARBRE A DEPRESSION DE L.E.O.', 'GFI MAP LINE / TUBULURE DE PAC DE GFI', 'GFI MAP SENSOR / DETECTEUR DE PAC', 'RUBBER MAP SENSOR NEPPLE / RACCORDE EN CAOUTCHOUC DU DETECTEUR DE PAC', and 'METERING VALVE'.

EMISSIONS

The GFI system does not affect vehicle emissions when running in gasoline mode. The GFI system is transparent to the OEM system. Emission control devices are neither removed or affected by the GFI system.

ÉMANATIONS

Le système GFI n' affecte pas les émanations du véhicule lorsqu'il fonctionne en mode d'essence. Le système GFI n'exerce aucune action sur le système d'équipement d'origine. Les dispositifs dépolluants ne sont ni ôtés ni affectés par le système GFI.

L1-183

NOTICE (diagnosis testing):

DO NOT perform the following diagnostic tests while operating in Alternate Fuel Mode:
KOER (Key On - Engine Running) or
KOE0 (Key On - Engine Off)

Test equipment will display:
"- UNABLE TO PERFORM TEST/FUNCTION
- CONDITIONS NOT CORRECT
- CHECK SHOP MANUAL FOR PROPER
TEST/FUNCTION REQUIREMENTS."

when performed in Alternate Fuel mode. This is **NOT** an indication of a malfunction. Tests must be performed in gasoline mode. Fuel selector switch must be set to gasoline.

Compressed natural gas (CNG)

This label is located on the right rear of your vehicle and identifies the vehicle as using compressed natural gas (CNG) as a fuel.



This label (required only in California) is located on the dashboard and identifies your vehicle as using CNG as a fuel.

NATURAL GAS Fueled Vehicle LT-106

This warning label is located in the engine compartment to help ensure safe and proper maintenance of the CNG fuel system.

**ALL CNG COMPONENTS MUST
BE SERVICED BY AUTHORIZED
TECHNICIANS ONLY**

This label is located in the engine compartment and on the CNG tank(s) and lists the inspection and expiration dates for the CNG fuel tank(s).

CNG FUELED VEHICLE

System Identification:

Model: Serial:

No. of Cylinders Installed:

System Pressure @ 70° F:

Total Cylinder Water Volume:

Cu. In.: Liters:

Next Inspection Date:

Cylinder Expiration Date:

GFI Control Systems, Inc.
100 Hollinger Crescent, Kitchener
Ontario, Canada L4Z 2Z3

LT-106

Introduction

Liquefied petroleum gas (LPG)

This label is located on the right rear of your vehicle and identifies the vehicle as using liquefied petroleum gas (LPG) as a fuel.



This warning label is located on either the driver's side sun visor or on the dashboard to help inform you of cold weather operating conditions when using LPG as a fuel.

WARNING: This bi-fuel vehicle may automatically switch to gasoline mode on cold days (below 20° F / - 7° C), even if started on LPG. To maintain engine operation at these temperatures, an adequate gasoline fuel level is required.

L1-233

This warning label is located in the engine compartment to help ensure safe and proper maintenance of the LPG fuel system.

**ALL PROPANE GAS COMPONENTS
MUST BE SERVICED BY AUTHORIZED
TECHNICIANS ONLY**

GASEOUS FUEL COMPONENT IDENTIFICATION

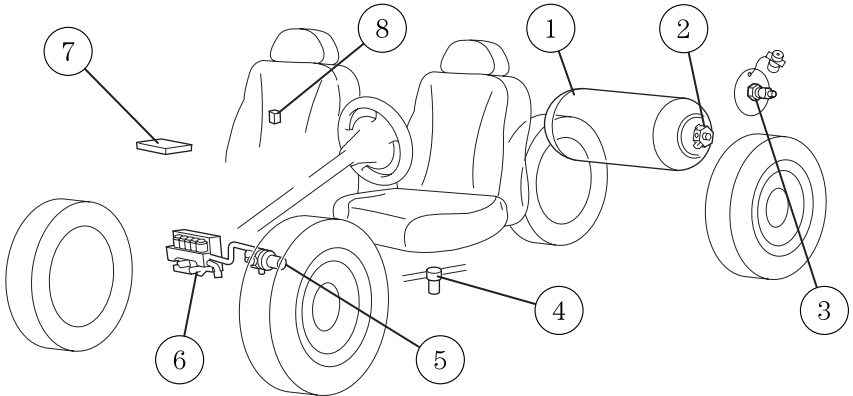
The following illustrations show the major unique gaseous fuel injection system components of your **Bi-fuel** vehicle. All of these unique components are constructed of special materials to withstand the effects of CNG or LPG use (depending upon application). **NEVER** replace a unique **Bi-fuel** vehicle component with a standard vehicle component or any aftermarket components.



Do not modify the gaseous fuel injection system configuration or components. Do not replace the gaseous fuel injection system components with parts not designed for use with your Bi-fuel vehicle. Components designed for use in your CNG or LPG Bi-fuel vehicle consist of special materials and are calibrated especially for your vehicle. Failure to use the correct components may cause damage to the engine and fuel system or possible personal injury.

Compressed natural gas (CNG)

- Typical compressed natural gas (CNG) fuel system shown.

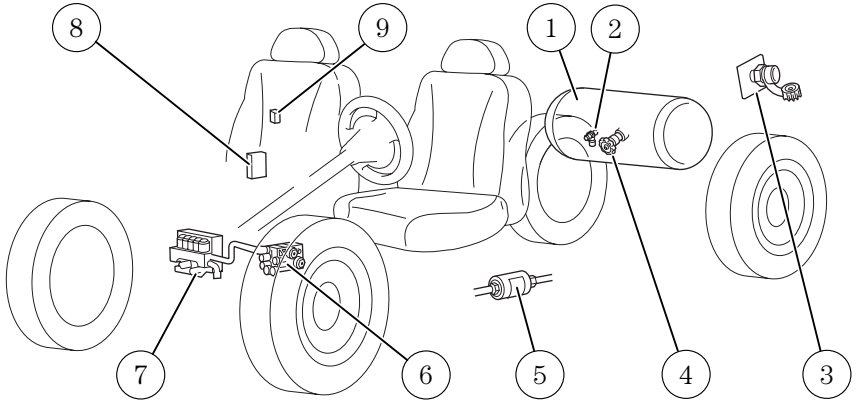


1. **Fuel tank** —CNG fuel cylinder. Depending upon application, more than one fuel tank may be used.
2. **Solenoid tank valve** —One electronically-actuated (normally closed) solenoid valve that will automatically stop the flow of CNG from the fuel tank(s) when the engine is turned off.
3. **CNG fueling point** —Allows refueling of the CNG fuel tank(s) using standard automotive natural gas dispensing equipment.
4. **Coalescent fuel filter** —Removes impurities from the natural gas before it enters the high pressure fuel regulator.
5. **High pressure fuel regulator** —Reduces fuel pressure from the fuel tank(s) to 690 kPa (100 psi).
6. **Computer and metering valve assembly (Comp valve)** —Controls the quantity of natural gas being delivered to the engine as vehicle speed and load requirements demand.
7. **Fuse and relay module** —Contains the necessary electrical fuses and relays required to operate your Gaseous Fuel Injection System.
8. **Fuel selector switch** —Allows you to select the fuel you want to use (CNG or unleaded gasoline).

Introduction

Liquefied petroleum gas (LPG)

- Typical liquefied petroleum gas (LPG) fuel system shown.



1. **Fuel tank** —LPG fuel cylinder.
2. **Outage valve** —80% outage valve prevents overfilling of the LPG fuel tank(s).
3. **LPG fueling point** —Allows refueling of the LPG fuel tank(s) using standard automotive LPG dispensing equipment.
4. **Supply valve** —Some applications are equipped with fuel tank(s) that have a manually-actuated supply valve which can be used to stop the flow of LPG to the engine, if necessary.
5. **Fuel filter** —Removes impurities from the LPG fuel before it enters the fuel vaporizer/regulator.
6. **Fuel vaporizer/regulator** —Helps convert the LPG from a liquid to a gaseous state. Provides gaseous propane at a constant operating pressure to the Compuvalve.
7. **Computer and metering valve assembly (Compuvalve)** —Controls the quantity of gaseous propane being delivered to the engine as vehicle speed and load requirements demand.
8. **Fuse and relay module** —Contains the necessary electrical fuses and relays required to operate your Gaseous Fuel Injection System.
9. **Fuel selector switch** —Allows you to select the fuel you want to use (LPG or unleaded gasoline).

Instrumentation and controls

FUEL SELECTOR SWITCH

This booklet supplements your Owner's Guide and is part of the owner's portfolio. It describes the operation of your **Bi-fuel** vehicle and how it differs from a standard gasoline powered vehicle. Therefore it is very important that you read this guide and thoroughly familiarize yourself and others operating the vehicle with this information.

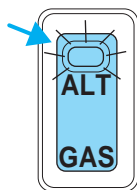
The fuel selector switch allows you to select which fuel your **Bi-fuel** vehicle will operate on.

The fuel selector switch only operates when the vehicle is at a stop with the ignition in the OFF position. If the fuel selector switch is moved while the vehicle is running, the gaseous fuel injection system will NOT automatically change fuel modes and no damage to the vehicle will occur. Except for vehicles equipped with the LPG extended-range fuel tank system, the fuel selector switch will allow you to switch between the two LPG fuel tanks while you are driving.

Prior to starting the vehicle (with the ignition in the OFF position), determine which fuel you would like to use and press the rocker switch located on the dash panel.

When the selector switch is placed in the ALT position, your engine will operate in the gaseous fuel mode, running on CNG or LPG (depending upon application).

- A green indicator light will illuminate on the fuel selector switch to indicate that the vehicle is operating in the gaseous fuel mode (CNG or LPG, depending upon application).
- The green indicator light operates independently of the fuel selector switch and is controlled by the comp valve.



Instrumentation and controls

When the selector switch is placed in the GAS position, your engine will operate in the unleaded gasoline mode.



If the CNG or LPG (depending upon application) runs low during the operation of the vehicle in the gaseous fuel mode, the gaseous fuel injection system will automatically change to the unleaded gasoline operating mode. The green indicator light on the fuel selector switch will turn off to show the vehicle has changed to the unleaded gasoline operating mode.

The vehicle's fuel system will NOT automatically change to the gaseous fuel mode (CNG or LPG, depending upon application), if the level of the unleaded gasoline runs low.

FUEL GAUGE

The fuel gauge in your CNG or LPG **Bi-fuel** vehicle (depending upon application) behaves similarly to a standard gasoline fuel gauge. The fuel gauge will provide a linear reading from Full down to Empty.

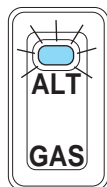
- Fuel gauge operation for a **LPG Bi-fuel** vehicle is based on a float type sensor measuring the level of the liquid propane in the fuel tank(s).
- Fuel gauge operation for a **CNG Bi-fuel** vehicle is based on the pressure and temperature of the natural gas in the fuel tank(s). Depending upon the application, a full fuel gauge reading will occur at a pressure of approximately 20 700 kPa (3 000 psi) or 24 800 kPa (3 600 psi) at a temperature of approximately 21°C (70°F). For more information on fuel gauge performance during the fast-fill method of CNG fueling, refer to *Refueling your Bi-fuel vehicle* in the *Maintenance and care* chapter of this supplement.

Instrumentation and controls

WARNING LIGHTS

With the engine running, the “Check Engine/Service Engine Soon” indicator light (depending upon application) will illuminate on the instrument cluster when the On Board Diagnostics System and/or the Gaseous Fuel Injection System detects a malfunction in one of the engine’s emission controls. For more information, refer to *Warning light and chimes* in the *Instrumentation* chapter of your Owner’s Guide and this supplement.

If a malfunction of the Gaseous Fuel Injection System is detected with the engine running in the gaseous fuel mode, the green indicator light on the fuel selector switch will flash on and off.



The warning lights may illuminate or flash on and off (depending upon application) without a driveability concern being noted. The vehicle will usually be drivable and will not require towing. Contact a qualified Ford dealership at the first available opportunity.

Starting

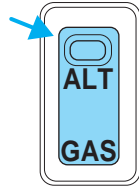
STARTING THE ENGINE

Before you start your **Bi-fuel** vehicle, read and understand all information found in the *Starting* chapter of your Owner's Guide and this supplement.

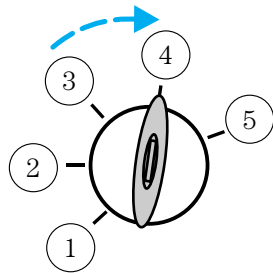
Use the following procedure to start your **Bi-fuel** vehicle in the gaseous fuel mode:

1. Place the fuel selector switch in the (ALT) position.

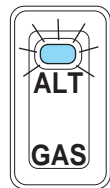
- If equipped with the extended-range LPG fuel system, select which LPG fuel tank you would like to use.



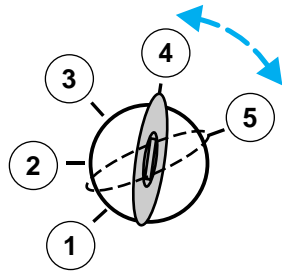
2. Turn the ignition to position 4 (ON).



3. Wait until the green gaseous fuel mode indicator light becomes illuminated (1–5 seconds).



4. Turn the ignition to position 5 (START) without pressing on the accelerator pedal.
5. As soon as the engine starts, release the ignition. The ignition will automatically return to position 4 (ON).



It is normal for the vehicle to experience longer crank times (the amount of time the engine cranks before it starts) when started in the gaseous fuel mode (CNG or LPG, depending upon application).

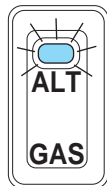
If your **Bi-fuel** vehicle operates on LPG, under very cold conditions (below -7°C [20°F]) the gaseous fuel injection system may, as indicated by the label on the dashboard or sun visor, automatically change to the unleaded gasoline operating mode. For more information, refer to *Engine operation* in the *Driving* chapter of this supplement.

Driving

ENGINE OPERATION

Before you drive your **Bi-fuel** vehicle, read and understand all information found in the *Driving* chapter of your Owner's Guide and this supplement.

The green indicator light will be illuminated on the fuel selector switch when the vehicle is operating in the gaseous fuel mode (CNG or LPG, depending upon application).



The fuel selector switch only operates when the vehicle is at a stop with the ignition in the OFF position. If the fuel selector switch is moved while the vehicle is running, the gaseous fuel injection system will NOT automatically change fuel modes and no damage to the vehicle will occur. Except for vehicles equipped with the LPG extended-range fuel tank system, the fuel selector switch will allow you to switch between the two LPG fuel tanks while you are driving.

If the CNG or LPG (depending upon application) runs low during the operation of the vehicle in the gaseous fuel mode:

- the gaseous fuel injection system will automatically change to the unleaded gasoline operating mode.
- the operator may temporarily notice a slight hesitation.
- the green indicator light on the fuel selector switch will go off.

The vehicle's fuel system will NOT automatically change to the gaseous fuel mode (CNG or LPG, depending upon application), if the level of the unleaded gasoline runs low.

To avoid damage to the unleaded gasoline fuel injection system of your Bi-fuel vehicle, operate your vehicle at least every 60 days using unleaded gasoline. Use a minimum of one full tank of unleaded fuel every 60 days.

The characteristics of LPG are unique from those of CNG, unleaded gasoline and diesel fuel. If your **Bi-fuel** vehicle operates on LPG, the gaseous fuel injection system may, as indicated by the label on the dashboard or the sun visor, automatically change to the unleaded gasoline operating mode under certain conditions in very cold temperatures (below -7°C [20°F]).

If you expect to operate your LPG Bi-fuel vehicle in very cold temperatures, be sure to maintain an adequate supply of unleaded gasoline in the fuel tank.

TRAILER TOWING WITH YOUR BI-FUEL VEHICLE

Refer to *Towing a trailer* in the *Driving* chapter of the Owner's Guide for trailer towing procedures.

Roadside emergencies

EMERGENCY PROCEDURES

Be sure to read and understand all information found in the *Roadside emergency* chapter of your Owner's Guide and this supplement.



Do not modify the gaseous fuel injection system configuration or components. Do not replace the gaseous fuel injection system components with parts not designed for use with your Bi-fuel vehicle. Components designed for use in your CNG or LPG Bi-fuel vehicle consist of special materials and are calibrated especially for your vehicle. Failure to use the correct components may cause damage to the engine and fuel system or possible personal injury.



Service to gaseous fuel injection system components must be conducted only at qualified dealerships by qualified service technicians. Failure to do so may cause damage to the engine and fuel system components or possible personal injury.



Any modification to your Gaseous Fuel Injection System voids the Ford New Vehicle Limited Warranty.

If a CNG fuel leak is suspected or detected, switch operation to the unleaded gasoline mode and have the complete gaseous fuel injection system tested by a qualified service technician immediately.

If the vehicle is involved in an accident or fire that damages any portion of the gaseous fuel injection system, the damaged components MUST be replaced and the complete system tested by a qualified service technician before the vehicle is operated again.

The fuel selector switch only operates when the vehicle is at a stop with the ignition in the OFF position. If the fuel selector switch is moved while the vehicle is running, the gaseous fuel injection system will NOT automatically change fuel modes and no damage to the vehicle will occur. Except for vehicles equipped with the LPG extended-range fuel tank system, which allows you to switch between the two LPG fuel tanks while you are driving.

Roadside emergencies

If the engine cranks but does not start after a collision, the fuel pump shut-off switch may have been activated. Refer to the Roadside emergencies section of the Owner Guide for instructions on how to reset the switch.

JACKING YOUR BI-FUEL VEHICLE

Your **Bi-fuel** vehicle may be lifted with the emergency jack as described in *Changing the tires* in the *Roadside emergencies* chapter of the Owner's Guide.

When lifting your **Bi-fuel** vehicle, follow these additional steps:

- SHUT OFF the gaseous fuel injection system as outlined in *Gaseous fuel injection system shutoff* in the *Maintenance and care* chapter of this supplement.
- DO NOT use the gaseous fuel injection system components (e.g. tanks, brackets, valves, covers and fuel lines) as a lifting or contact point.
- DO NOT allow lifting of vehicle to twist or distort the fuel lines of your gaseous fuel injection system.

TOWING YOUR BI-FUEL VEHICLE

Refer to *Wrecker towing* in the *Roadside emergencies* chapter of the Owner's Guide for towing procedures, except Econoline with the optional fuel tank package which **must** be flat-bed towed.

When towing your **Bi-fuel** vehicle, follow these additional steps:

- SHUT OFF the gaseous fuel injection system as outlined in *Gaseous fuel injection system shutoff* in the *Maintenance and care* chapter of this supplement.
- DO NOT attach tow bars, tow chains, tow straps or safety chains to the gaseous fuel injection system components (e.g. tanks, brackets, valves, covers and fuel lines).
- DO NOT allow tow bars, tow chains, tow straps or safety chains to rest or rub on components of your gaseous fuel injection system.

Maintenance and care

SERVICE RECOMMENDATIONS

Before you service your **Bi-fuel** vehicle, read and understand all information found in the *Maintenance and care* chapter of your Owner's Guide and this supplement.

Refer to your scheduled maintenance guide for service requirements and intervals.



Do not modify the gaseous fuel injection system configuration or components. Do not replace the gaseous fuel injection system components with parts not designed for use with your Bi-fuel vehicle. Components designed for use in your CNG or LPG Bi-fuel vehicle consist of special materials and are calibrated especially for your vehicle. Failure to use the correct components may cause damage to the engine and fuel system or possible personal injury.



Service to gaseous fuel injection system components must be conducted only at qualified dealerships by qualified service technicians. Failure to do so may cause damage to the engine and fuel system components or possible personal injury.



Any modification to your Gaseous Fuel Injection System voids the Ford New Vehicle Limited Warranty.

GASEOUS FUEL INJECTION SYSTEM SHUTOFF

When in the gaseous fuel mode under normal operating procedures, the flow of CNG or LPG (depending upon application) is stopped when the ignition is turned to the OFF position. The electrically operated control valve(s) only allow the flow of fuel when the ignition is in the ON position, with the engine running.

Liquefied petroleum gas (LPG)

If equipped with the manually-actuated supply valve(s), the flow of LPG to the engine can be stopped by closing the supply valve located on the LPG fuel tank(s).

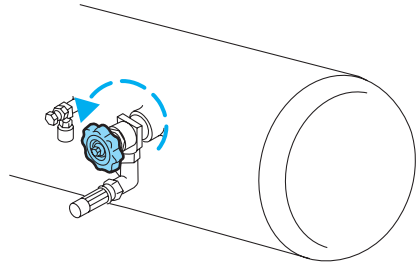
If equipped, the manually-actuated supply valve(s) must be in the full OPEN position for the engine to run on LPG.

Maintenance and care

Depending upon application, it may be necessary to remove an access panel to close or open the supply valve(s).

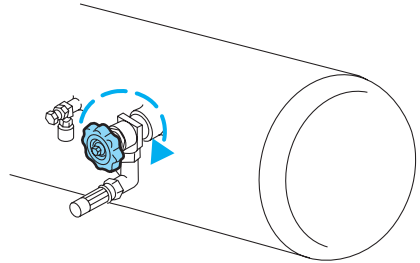
1. Turn counterclockwise very slowly to the full OPEN position, if equipped. Turning the supply valve quickly may activate the excess flow valve. For more information, refer to *Charging the fuel lines of your LPG fuel system* in this chapter.

- F-150



2. Turn clockwise to the full CLOSED position, if equipped.

- F-150



FUEL QUALITY

Use of poor quality fuel may result in:

- component failure.
- leakage from the fueling point.
- poor vehicle operation.

Use of poor quality fuel may also result in your warranty being invalidated.

Maintenance and care

Compressed natural gas (CNG)

Use only a CNG fuel that meets the specification of NFPA-52 and SAE J1616 in your **CNG Bi-fuel** vehicle. Specifications NFPA-52 and SAE J1616 place limits on particulate contamination and moisture content to ensure a quality CNG fuel.

The use of a CNG fuel that does not meet specifications NFPA-52 and SAE J1616 is **not recommended** and may cause engine damage.

Liquefied petroleum gas (LPG)

Use only an automotive grade LPG in your **LPG Bi-fuel** vehicle. Automotive grade LPG is typically referred to as HD-5 Propane and contains at least 90% propane. Strict limits are placed on the amount of other hydrocarbon gases which can be introduced into automotive grade propane.

The use of an LPG fuel that does not meet the specification for HD-5 Propane (HD-10 Propane in California) is **not recommended** and may cause engine damage.

REFUELING YOUR BI-FUEL VEHICLE

Refueling your **CNG or LPG Bi-fuel** vehicle, with a few exceptions, is very similar to refueling a standard unleaded gasoline powered vehicle.

Before refueling your **CNG or LPG Bi-fuel** vehicle, be sure to read and understand *Important safety precautions* in the *Maintenance and care* chapter of your Owner's Guide and this supplement.

For safety reasons, use the same care and caution when refueling the gaseous fuel injection system as you would when refueling the unleaded gasoline fuel system. In particular, the engine **must always be turned off** when refueling.



DO NOT refuel your vehicle with the engine running or with the ignition in the ON position. Failure to do so can be hazardous to personal safety and property.

Some localities mandate a sticker be displayed showing the date of the next required inspection. In localities requiring this sticker, refueling station technicians are **not allowed** to refill your gaseous fuel tank(s) if the sticker is not visible or if the date has expired. For more information, refer to *Tank inspection and replacement* in the *Maintenance and care* chapter of this supplement.

Many localities have restrictions on refueling CNG and LPG fueled vehicles. In these localities, only qualified technicians at designated refueling stations are allowed to refuel your vehicle. Refer to your local authorized Ford dealer for more information.

Fuel fill procedure — compressed natural gas (CNG)

Two methods for filling the CNG fuel tank(s) are available to **CNG Bi-fuel** vehicle owners:

- The fast-fill method — available at many of the commercial and privately owned CNG refueling stations.
- The slow-fill method — available for purchase or lease from a number of commercial or natural gas utility companies.

“Fast-filling” a **CNG Bi-fuel** vehicle involves rapidly raising the pressure in the vehicle’s tank(s) by a “fast-fill” refueling station (typical fill time: 3–5 minutes). “Fast-filling” a **CNG Bi-fuel** vehicle provides the greatest convenience to the driver in terms of time spent refueling.

“Fast-fill” refueling technology does not presently allow a **CNG Bi-fuel** vehicle to be completely refueled to its maximum rated capacity. Therefore, “fast-filling” results in a reduced driving range and an initial fuel gauge reading of Full. However, within approximately 10 minutes, the fuel gauge of a **CNG Bi-fuel** vehicle that has been “fast-filled” will drop about 1/8th of a tank lower to reflect the reduced amount of fuel that was actually added.

“Slow-filling” a **CNG Bi-fuel** vehicle involves slowly raising the pressure in the vehicle’s tank(s) by a “slow-fill” refueling station (typical fill rate: 6–8 hours). “Slow-filling” a **CNG Bi-fuel** vehicle usually is done overnight and allows the greatest amount of CNG fuel to be added to a **CNG Bi-fuel** vehicle. A properly functioning “slow-fill” refueling station will fill the CNG fuel tank(s) to a fuel gauge reading of Full at a temperature of 21°C (70°F).

The CNG fueling point, or fuel receptacle is located on the driver’s side of the vehicle.

The profiles of both the CNG fueling point and the fuel station nozzle are specified by ANSI/AGA NGV1-1994, CGA NGV1-M94. These profiles are specified for CNG vehicles and fuel stations for safety purposes. Three separate adapter profiles are available. P24, P30 and P36 respectively, are specified for the three different service pressures of 16 500 kPa (2 400 psi), 20 700 kPa (3 000 psi) and 24 800 kPa (3 600 psi).

Maintenance and care

Your vehicle's service pressure will be 24 800 kPa (3 600 psi).

Your vehicle's fuel system is rated at 24 800 kPa (3 600 psi); it can be refueled using a P30 or a P36 nozzle only

Adapters for other types or styles of dispensing equipment **must not** be used.

When refueling, the engine **must** be shut off.



Use caution when refueling your vehicle. Make sure the engine is turned off and all flammable material is extinguished. Observe all Dispensing Equipment Safety Standards and Operating Procedures.

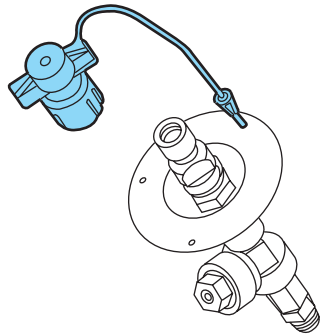
Use this procedure for both “fast-fill” and “slow-fill” CNG refueling.

1. Open the fuel filler door. Refer to the label on the inside of the fuel filler door for the pressure rating of your vehicle's CNG fuel system.

- Look for one of these labels (depending on application).

Service Pressure: 24800 kPa (3600 psig)	
CNG FUELED VEHICLE/VÉHICULE À GNC	
System Pressure @ 70°F: Pressure des system à 21 C:	Cylinder Expiration Date: Date d'expiration des cylindres:
24800 kPa (3600 psig)	
Total Cylinder Water Volume: Volume total d'eau les cylindres:	Next Inspection Date: Date d'expiration des cylindres:
Liters: <input type="text"/>	<input type="text"/>
<small>L1-286A</small>	

2. Remove the protective cap from the vehicle's CNG fueling point. Remove any debris that may be present.



Maintenance and care

3. Follow the CNG fueling procedures provided by the natural gas dealer and dispense the CNG until the fuel tank(s) are full or until the flow of CNG stops.
4. When refueling is complete, follow the natural gas dispensing equipment's operating procedures to shut the flow of natural gas off.
5. Remove the CNG dispensing connector and put the protective cap on the vehicle's CNG fueling point. Close the fuel filler door.

CNG refill capacities — gasoline equivalent

F-Series	
Fueling method	Standard
Slow-fill	47.3L (12.5 gallons)
Fast-fill	40.1L (10.6 gallons)

Fuel fill procedure — liquefied petroleum gas (LPG)

Refueling a **LPG Bi-fuel** vehicle involves filling the vehicle's LPG fuel tank(s) to the maximum limit of 80%. Refueling your LPG gaseous fuel injection system is similar in terms of time spent refueling your unleaded gasoline fuel system.

Your LPG Bi-fuel vehicle is equipped with an automatic stop-fill device to limit the maximum LPG level in the fuel tank(s) to less than 80%. Use of the 80% outage valve is required to prevent overfilling of the LPG fuel tank(s).



Do not attempt to fill the LPG fuel tank(s) without opening the outage valve. Use of the 80% outage valve is required to prevent overfilling the LPG fuel tank(s). Failure to follow this warning may cause damage to the engine and fuel system or possible personal injury.

The LPG fueling point, or fuel receptacle is located on the driver's side of the vehicle.

When refueling, the engine **must** be shut off.



Use caution when refueling your vehicle. Make sure the engine is turned off and all flammable material is extinguished. Observe all Dispensing Equipment Safety Standards and Operating Procedures.

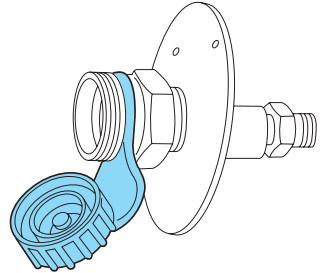
Use the following procedure when refueling your **LPG Bi-fuel** vehicle.

Maintenance and care

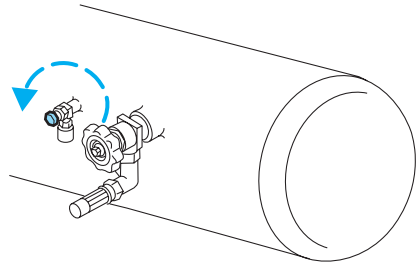
NOTE: LPG vehicles are typically fueled by the propane gas dealer not the vehicle operator.

1. Locate and remove the protective cap from the vehicle's LPG fueling point.

2. Remove any debris that may be present at the fueling point.



3. Open the outage valve. Depending upon application, it may be necessary to remove an access panel to reach the outage valve.

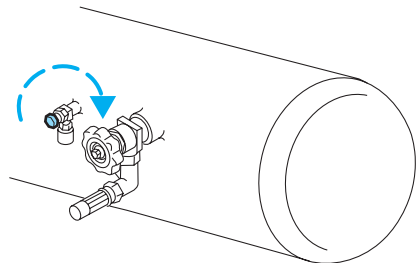


Wear protective gloves when operating the outage valve to protect your hands from possible freeze burns.

4. Follow the LPG fueling procedures provided by the propane gas dealer and dispense the LPG until the fuel tank(s) are full or until liquid propane spits out of the outage valve.

5. When refueling is complete, follow the propane gas dispensing equipment's operating procedures to shut the propane gas flow off.

6. Close the outage valve. If removed, replace the access panel.



Wear protective gloves when operating the outage valve to protect your hands from possible freeze burns.

Maintenance and care

7. Remove the LPG dispensing connector and put the protective cap on the vehicle's LPG fueling point.

Charging the fuel lines of your LPG fuel system

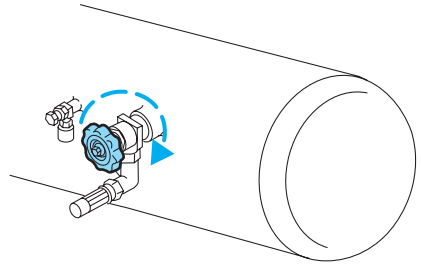
The following procedure applies only to vehicles that are equipped with LPG fuel tank(s) which have a manually-actuated supply valve.

If the fuel lines of your LPG fuel system have become empty due to service or running out of LPG fuel, it may be necessary to “charge” the fuel lines in order for the LPG fuel system to operate correctly.

Use the following procedure to “charge” the LPG fuel lines using the manually-actuated supply valve(s), if equipped.

1. Turn the supply valve(s) clockwise to the fully CLOSED position.

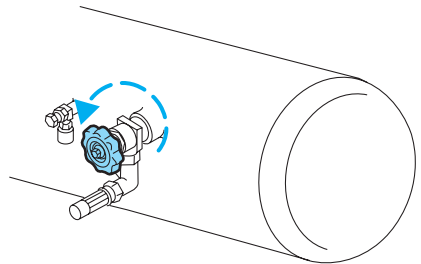
- F-150



2. Wait for ten seconds for the excess flow valve (part of supply valve) to reset.

3. Slowly turn the supply valve(s) counterclockwise to the fully OPEN position and allow the fuel lines to fill with LPG.

- F-150



If the flow of LPG slows or stops before the fuel lines can be “charged”, repeat the complete procedure.

Maintenance and care

LPG refill capacities — gasoline equivalent

F-150	
Single in-bed tank	Dual in-bed tanks
127.7L (33.7 gallons)	107.5L (28.4 gallons) - Regular Cab
	97.0L (25.6 gallons) - SuperCab

FUEL DISPENSING EQUIPMENT

Most dispensing equipment will have a digital indicator that displays the cost and amount of fuel delivered to your vehicle. Fuel delivery to the vehicle is stopped when the amount of fuel stored on the vehicle reaches the maximum refill pressure or quantity (depending upon application).

Certain noises can be expected during the refueling process and may vary depending on the type of fuel dispensing equipment and your proximity to the fuel compression and storage equipment. At the beginning of refueling you might hear the rushing noise of gas entering the vehicle through the station hose and tubing. At the end of refueling, the fuel receptacle on the vehicle may make a high pitched noise or chatter. This is another indication that refueling is nearly complete. Also, the station dispensing equipment compressor may turn on at any time during the refueling process.

REFUELING STATIONS

To obtain a directory of all CNG refueling stations in the United States, contact the American Gas Association (AGA) at 1-703-841-8400. In Canada, contact Union Gas at 1-800-265-5277. For information on LPG refueling stations, contact the U.S Dept of Energy Alternative Fuels Data Center at 1-800-423-1DOE (423-1363).

TANK INSPECTION AND REPLACEMENT

The fuel tank(s) of the Gaseous Fuel Injection System (CNG or LPG, depending upon application) must be inspected and tested on a regular basis to verify the condition of the tank(s).

Refer to your scheduled maintenance guide in your owner's portfolio for fuel tank inspection intervals.

Maintenance and care

Inspection and testing of the fuel tank(s) must be done by a qualified Ford service technician, or by the local authority governing the enforcement of gaseous fuel regulations in the jurisdiction of which you refuel.

Some localities mandate a sticker be displayed showing the date of the next required inspection. In localities requiring this sticker, refueling station technicians are **not allowed** to refill your gaseous fuel tank(s) if the sticker is not visible or if the date has expired.

Refer to the following for more information regarding gaseous fuel tank inspection and replacement requirements.



Compressed natural gas (CNG)

For your protection, the CNG fuel tanks require visual inspection every three years or 48 000 kilometers (30 000 miles), whichever comes first. The purpose of the inspection is to check for damage to the fuel tank(s) or tank wrap which may shorten the tank(s) usable life span.

CNG fuel tanks that leak or show serious damage **must** be repaired or replaced.

The expiration date for the tank replacement is stated on each tank label. See instructions on fuel container for inspection and service life.

Inspection and expiration dates for the CNG fuel tank(s) are listed on this label. Depending upon application this label can be located in the engine compartment, on the fuel filler door and on the fuel tank(s).

CNG FUELED VEHICLE	
System Identification:	
Model: <input type="text"/>	Serial: <input type="text"/>
No. of Cylinders Installed: <input type="text"/>	
System Pressure @ 70° F: <input type="text"/>	
Total Cylinder Water Volume: <input type="text"/>	
Cu. In.: <input type="text"/>	Liters: <input type="text"/>
Next Inspection Date: <input type="text"/>	
Cylinder Expiration Date: <input type="text"/>	
 <small>AGA REGISTRATION 148</small>	
	
GFI Control Systems, Inc. 100 Hollinger Crescent, Kitchener Ontario, Canada L4Z 2Z3	
L1-106	

Maintenance and care

Liquefied petroleum gas (LPG)

For your protection, the LPG fuel tanks **should** be visually inspected every three years or 48 000 kilometers (30 000 miles) whichever comes first. The purpose of the inspection is to check the tank(s) for damage or excessive corrosion which may shorten the tank(s) usable life span.

All LPG fuel tank(s) used in Canada may require visual inspection every five years. Contact the local authority governing the enforcement of gaseous fuel regulations in the jurisdiction of which you refuel.

LPG fuel tanks that leak, show serious damage or excessive corrosion **must** be repaired or replaced.

FUEL FILTER

Your **Bi-fuel** vehicle is equipped with a separate fuel filter for the gaseous fuel injection system. Its primary function is to remove contaminants from the CNG or LPG fuel and trap it in the filter.

The fuel filter must be drained and/or replaced on a regular basis. Refer to your scheduled maintenance guide for service requirements and intervals.



Do not modify the gaseous fuel injection system configuration or components. Do not replace the gaseous fuel injection system components with parts not designed for use with your Bi-fuel vehicle. Components designed for use in your CNG or LPG Bi-fuel vehicle consist of special materials and are calibrated especially for your vehicle. Failure to use the correct components may cause damage to the engine and fuel system or possible personal injury.



Service to the gaseous fuel injection system components must be conducted only at qualified dealerships by qualified service technicians. Failure to do so may cause damage to the engine and fuel system components or possible personal injury.