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## Introduction

### California Proposition 65 Warning



**WARNING:** Engine exhaust, some of its constituents, and certain vehicle components contain or emit chemicals known to the State of California to cause cancer and birth defects or other reproductive harm. Certain fluids contained in vehicles and certain products of components contain or emit chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.

Your new diesel engine will feel, drive and function somewhat differently than a gasoline engine. Therefore it is very important that you read and thoroughly familiarize yourself and others operating the vehicle with this guide.

This guide will acquaint you with the 6.0L Power Stroke diesel engine. It provides recommendations on engine care and operating procedures. For complete vehicle information, also refer to the *Owner's Guide* included with the vehicle. It also describes equipment and gives specifications for equipment that was in effect when this guide was approved for printing, and should be considered a permanent part of the vehicle.

**Some aftermarket products may cause severe engine and/or transmission damage; refer to the "What is not covered" section in "The new vehicle limited warranty for your vehicle" chapter of your vehicle's "Warranty Guide" for more information. Your vehicle's Powertrain Control Systems can detect and store information about vehicle modifications that increase horsepower and torque output. This information cannot be erased and will stay in the system's memory even if the modification is removed. The Information can be retrieved by Ford Motor Company, Ford of Canada, and service and repair facilities when servicing your vehicle. This information may be used to determine if repairs will be covered by warranty.**

Ford may discontinue models or change specifications without any notice and without incurring obligations.


### IMPORTANT NOTICE

Ford vehicles are suitable for producing ambulances only if equipped with the Ford ambulance preparation package. In addition, Ford urges ambulance manufacturers to follow the recommendation of the *Ford Incomplete Vehicle Manual*, *Ford Truck Body Builder's Layout Book* (and pertinent supplements) and the *Qualified Vehicle Modifiers*

## Introduction

*Guidelines.* Using a Ford vehicle without the Ford ambulance preparation package to produce an ambulance voids the Ford warranty and could result in elevated underbody temperatures, fuel overpressurization and the risk of fuel expulsion and fires. To determine whether the vehicle is equipped with the Ford ambulance preparation package, inspect the information plate on the driver's side door pillar. Contact the manufacturer of your vehicle to determine whether the ambulance manufacturer's followed Ford's recommendations.

### **WARNINGS**

Throughout this guide, you will find warnings identified by the symbol . Warnings remind you to be especially careful to reduce the risk of personal injury.

### **NEW VEHICLE BREAK-IN**

Your vehicle does not need an extensive break-in. Try not to drive continuously at the same speed for the first 1,000 miles (1,600 km) of new vehicle operation. Vary your speed to allow parts to adjust themselves to other parts.

Drive your new vehicle at least 500 miles (800 km) before towing a trailer.

Do not add friction modifier compounds or special break-in oils during the first few thousand miles (kilometers) of operation, since these additives may prevent piston ring seating. See *Engine oil* in the *Maintenance and Specifications* chapter of this supplement for more information on oil usage.

### **DIESEL ENGINE INFORMATION**

The Diesel engine fuel system consists of:

- **On F-Super Duty and Excursion vehicles**, a frame-mounted Horizontal Fuel Conditioner Module (HFCM)
- **On E-Series vehicles**, a Fuel Conditioner Module (FCM) mounted on the driver-side of the transmission case
- an engine-mounted secondary fuel filter
- a unit injector for each cylinder

The FCM/HFCM acts as a primary fuel filter/water separator which removes both water and impurities from the fuel. The engine-mounted fuel filter and the FCM/HFCM filter should be changed at the recommended service interval. Refer to the *scheduled maintenance information* in this supplement for more information.

## Introduction

The FCM/HFCM should be drained at regular intervals or when the WATER IN FUEL light illuminates in the instrument cluster.



The fuel injectors are located in the center of the combustion chambers in the cylinder head between the rocker arm assemblies. The glow plug system and fuel injection system are controlled through the Powertrain Control Module (PCM) and Fuel Injection Control Module (FICM).

Fuel is drawn from the fuel tank by a frame-mounted electric fuel pump. The fuel pump provides pressurized fuel to the engine and is electronically controlled by the fuel pump PCM relay. The fuel pump contains a pressure relief valve for overpressure protection in the event of restricted flow.

### Lubrication system

It is important to change the engine oil at the recommended service intervals, because oil viscosity is important in maintaining the oil pressure required to actuate the fuel injectors. Extended oil change intervals can negatively affect engine performance, fuel economy and engine life. Refer to the engine oil specification chart located under *Engine oil specifications* in the *Maintenance and Specifications* chapter of this supplement.

### Fast start glow plug system

The glow plug system consists of:

- eight glow plugs
- the glow plug control module (GPCM)
- engine oil temperature (EOT) sensor
- barometric pressure (BARO) sensor

The glow plug system is electronically controlled by the PCM. The GPCM energizes the glow plugs immediately after the ignition is placed in the ON position, then determines how long the glow plugs will be on according to the EOT and BARO sensors. The required time for the glow plugs to be energized decreases as the engine oil temperature and barometric pressure increase.



## Introduction

### **Engine cooling system**

The cooling system contains an engine oil cooler which is mounted in the center valley of the engine. The cooler's function is to regulate engine oil temperature.

### **Engine governed speed**

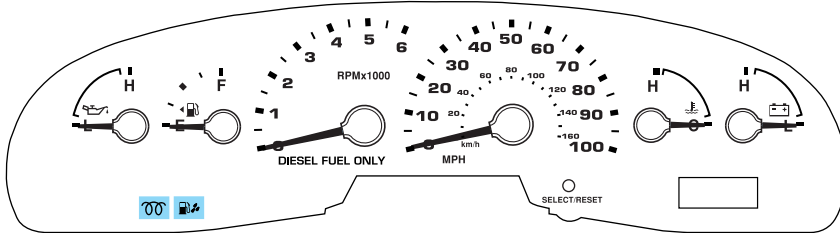
The engine governor is controlled by the PCM. The PCM controls fuel input to limit maximum engine speed. It will not, however, prevent engine overspeeding resulting from downshifting at high vehicle speed or by descending steep grades at too high a vehicle speed for the selected transmission gear.

**On F-Super Duty vehicles equipped with a manual transmission,** refer to *Manual transmission shift speeds* in the *Driving* chapter of your *Owner's Guide* for maximum vehicle speed in various gears. Do not exceed 3,600 rpm. Maximum engine governed speed is 4,000 rpm depending on engine load. Excessive rpm can only be achieved by manually downshifting at too high of a vehicle speed.

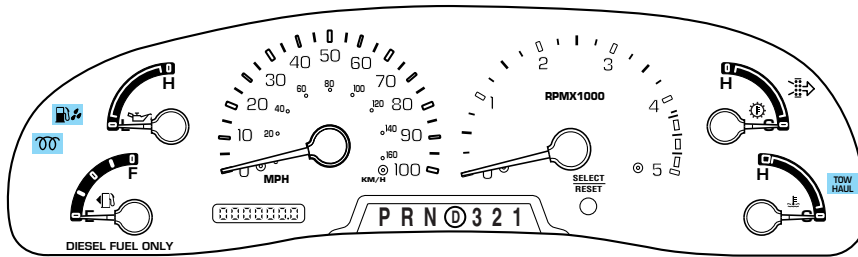
**Operating the engine beyond the governed speed can cause severe engine damage.**

# Instrumentation

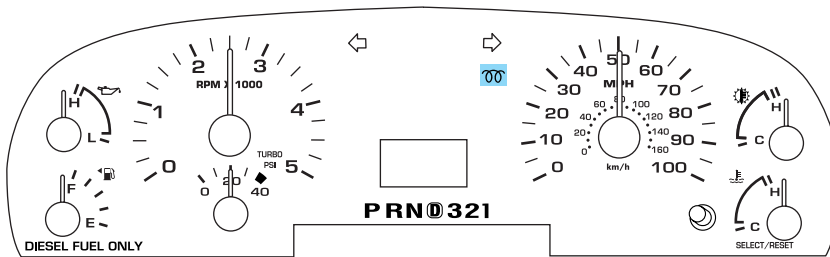
## E-SERIES



## EXCURSION

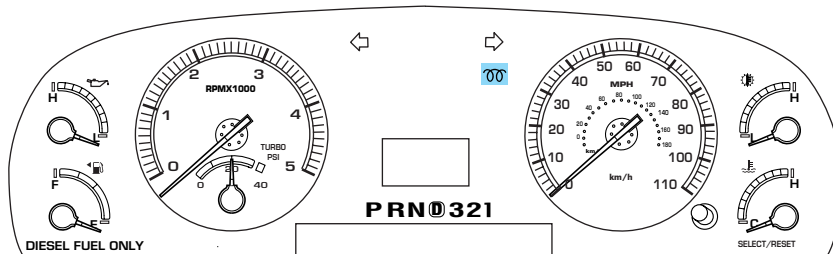


## F-SUPER DUTY CLUSTER (EXCEPT HARLEY-DAVIDSON)




## Instrumentation

### F-SUPER DUTY HARLEY-DAVIDSON



#### Glow plug pre-heat indicator

With the key in the ON position, the  light will illuminate if glow plug heat is necessary as a starting aid. Wait until the light goes off before starting. The light should always illuminate briefly, when the ignition key is in the ON position. If the light does not illuminate, there may be a problem. Refer to *Cold weather starting* in the *Driving* chapter of this supplement. After the engine starts, the light should remain off. The light should always illuminate at least momentarily when the engine is cold and the ignition is turned to ON. If it does not illuminate, the glow plug system should be checked and repaired promptly to avoid difficulty in cold starting.



#### Water in fuel

During refueling, it is possible for water-contaminated diesel fuel to be pumped into your tank. Your vehicle fuel system is equipped with a fuel filter/water separator to remove water from the fuel. The WATER IN FUEL light will illuminate when the ignition is turned to START (as part of the light function check) and when the FCM/HFCM has a significant quantity of water in it.

#### Type A



## Instrumentation

### Type B



### Type C



If the light illuminates when the engine is running, stop the vehicle as soon as safely possible, shut off the engine, then drain the FCM/HFCM. Refer to *Draining the FCM/HFCM and changing the fuel filters* in the *Maintenance and Specifications* chapter of this supplement for the drain procedure. Allowing water to stay in the system could result in extensive damage to, or failure of, the fuel injection system.

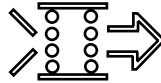


Do not drain the water separator while the engine is running. Fuel may ignite if the separator is drained while the engine is running or the vehicle is moving.

### Engine air filter (if equipped)

The engine air filter warning light illuminates when the air filter restriction gauge reaches the CHANGE FILTER mark.

### Type A



### Type B



### Type C



The condition should be verified by inspecting the underhood air filter restriction gauge; the warning light is only a secondary indicator. Always use the underhood air filter restriction gauge to determine when the air filter element needs to be changed.



## Instrumentation

The vehicle may be driven with the engine air filter warning light illuminated/or when the underhood air filter restriction gauge has moved to the CHANGE FILTER mark for up to 250 miles (400 km) without damaging the engine or related components. However, the air filter element must be replaced at the earliest opportunity. Refer to *Air filter restriction gauge (if equipped)* in this section of the supplement for more information.

**Transmission Tow/Haul Feature  
(if equipped):**

Illuminates when the Tow/Haul feature has been selected. Refer to the *Driving*

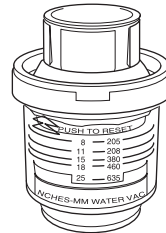
chapter for transmission function and operation. If the light flashes steadily or does not illuminate, have the transmission serviced soon, or damage may occur.

**TOW  
HAUL**

## Instrumentation

### Air filter restriction gauge (if equipped)

The restriction gauge, located on the upper housing of the air cleaner assembly, measures the vacuum inside the air cleaner. The more the air cleaner is restricted (dirty, clogged), the higher the vacuum reading



Check the air filter restriction gauge whenever the hood is raised to perform general engine maintenance at least every 7,500 miles (12,000 km). If the vehicle is operated in extremely dusty conditions, check the gauge at least every 500 miles (800 km), or two weeks, whichever comes first.

Change the air filter when the gauge reads 25 inches (635 mm). Engine performance and fuel economy are adversely affected when the maximum restriction is reached.

**Blowing-out the air filter element with compressed air is not recommended as the compressed air may damage the filter paper.**

**Note:** It is not possible to determine the level of filter clogging by visual appearance alone. A filter which appears to be dirty may actually have several thousand miles (kilometers) of life remaining.

**Always use the underhood air filter restriction gauge to determine when the air filter element needs to be changed. The warning light on the instrument cluster should not be used exclusively for determining when the air filter element needs changing.**

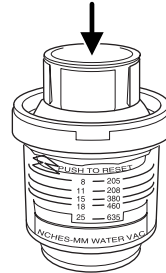
## Instrumentation

After installation of the new filter element, reset the gauge by pressing the reset button on top of the gauge.

**Note:** If the vehicle is operated in a heavy snow storm, in blowing snow or the vehicle is equipped with a snowplow, the engine air filter element may become partially clogged with snow and/or ice. If this occurs, the engine may experience a significant reduction in power output. The vehicle may be driven under these conditions for up to 100 miles (160 km) without damage to the engine or related components.

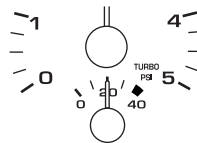
At the earliest opportunity, clear all snow and ice from the air induction system and reset the restriction gauge by pressing the button on the end of the gauge. If the air filter restriction gauge reads 25 inches (635 mm) after clearing snow and/or ice, then replace the filter. Reset filter restriction gauge after changing the air filter element.

The air filter warning light on the instrument cluster may be used, in addition to the underhood restriction gauge, to monitor the condition of the air filter element. Refer to the *Engine air filter* warning light in this chapter of the supplement.



### Engine boost gauge (if equipped)

Indicates the amount of pressure in the engine. Driving with your pointer continuously at the high end of the scale may damage the engine.



## Driving

### STARTING THE ENGINE

Read all starting instructions carefully before you start your vehicle.

For temperatures below 32°F (0°C), the use of the correct grade engine oil is essential for proper operation.

**If your vehicle is equipped with a manual transmission,** make sure the parking brake is set fully before you turn the key. Depress the clutch pedal and place the gearshift in the neutral position. The clutch must be fully depressed in order to operate the starter. Do not press the accelerator during starting.

**If your vehicle is equipped with an automatic transmission,** ensure the gearshift lever is in P (Park) and the parking brake is set before you turn the key. Do not press the accelerator during starting.

### Cold weather starting

The engine block heater must be used for starting when the temperature is -20°F (-29°C) or colder. Refer to *Using the engine block heater (if equipped)* in the *Driving* chapter of the *Owner's Guide*.

When operating in cold weather, use a minimum of 45 Cetane Diesel fuel or use Cetane Index improvers from a reputable manufacturer.


Do not crank the engine for more than 30 seconds as starter damage may occur. If the engine fails to start, turn the key to 3 (OFF) and wait 30 seconds before trying again.

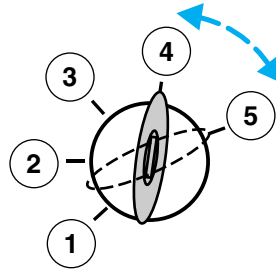



Do not use starting fluid, such as ether, in the air intake system (see air cleaner decal). Such fluid could cause immediate explosive damage to the engine and possible personal injury.

**Note:** Do not add gasoline, gasohol or alcohol to diesel fuel. This practice creates a serious fire hazard and causes engine performance problems.

## Driving

1. Turn the key to 4 (ON) without turning the key to 5 (START). **Do not start the engine** until the glow-plug pre-heat indicator  turns off.



2. When the glow plug pre-heat indicator turns off, turn the key to 5 (START), then release the key as soon as the engine starts. The glow plugs will continue to be activated for two minutes after the glow plug pre-heat indicator  has turned off. If the engine is not started before the glow plug activation time ends, the glow plugs will need to be reset by turning the key to 3 (OFF).



3. After the engine starts, allow it to idle for about 15 seconds. Do not increase engine speed until the oil pressure gauge indicates normal pressure.

### STOPPING THE ENGINE

Turn the ignition to 3 (OFF). To prolong engine life (after extended high speed or maximum GVW operation), it is recommended that a hot engine be allowed to operate at low idle for about 7–10 minutes which would allow sufficient time for the turbocharged engine to cool down.

### COLD WEATHER OPERATION

Changing to a lighter grade engine oil also makes starting easier under these conditions. Refer to *Engine oil specifications* in the *Maintenance and Specifications* chapter of this supplement.

At temperatures below 20°F (-7°C), Number 2-D diesel fuel may thicken enough to clog the fuel filter. Your vehicle is equipped with either an FCM (E-Series) or an HFCM (F-Super Duty and Excursion) which acts as a fuel filter/heater/water separator to keep the wax melted which will help prevent fuel filter clogging. However, if the engine starts but stalls after a short time and will not restart, the fuel filter(s) may be clogged. For best results in cold weather, use Number 1-D diesel fuel or “winterized” Number 2-D diesel fuel which has an additive to minimize wax formation.

## Driving

Your vehicle is also equipped with a bypass relief valve, located on the fuel control module, which provides fuel flow to the engine if the fuel pickup should become plugged by ice or wax. To allow this bypass valve to function and avoid engine fuel starvation, it is recommended that, during cold weather operation 32°F (0°C) or below, the fuel level in your tank should not be allowed to drop below ¼ full. This will help prevent air from entering the fuel system and stalling the engine.

In cold weather below 32°F (0°C) your diesel engine will slowly increase to a higher idle speed if left idling in P (Park). As the engine warms-up, the engine sound level will decrease due to the activation of PCM-controlled sound reduction features.

If your vehicle is operated in a heavy snow storm or blowing snow conditions, the engine air induction may become partially clogged with snow and/or ice. If this occurs, the engine may experience a significant reduction in power output. At the earliest opportunity, clear all the snow and/or ice away from the air induction inlet.

### Operation in snow

Vehicle operation in heavy snowfall or in dry loose snow that may swirl around the front of the vehicle may feed excessive amounts of snow into the air intake system. This could plug the air cleaner with snow and cause the engine to stall and/or lose power.

Refer to *Air filter restriction gauge* and *Engine air filter* in the *Instrument Cluster* chapter of this supplement for more information.

### Operation in standing water

Ingestion of water into the diesel engine can result in immediate and severe damage to the engine. If driving through water, slow down to avoid splashing water into the intake. If the engine stalls, and ingestion of water into the engine is suspected, do not try to restart the engine. Consult your dealer for service immediately.

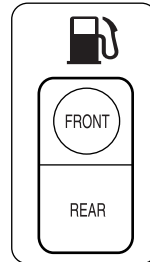
### Engine block heater (if equipped)

Refer to the *Driving* chapter in the *Owner's Guide*.

## Driving

### DUAL FUEL TANK SELECTOR CONTROL (IF EQUIPPED)

If your vehicle is equipped with dual fuel tanks, you will have a selector control, located to the right of the steering wheel, which allows you to draw fuel from either tank. Your fuel gauge will display the amount of fuel in the currently selected tank.



Fuel level indication is delayed for several minutes when the tank selector switch is actuated. Fuel level indication can be obtained immediately by turning off and restarting the engine.

### TRAILER TOWING

Refer to your *Owner's Guide* for full details on towing a trailer.

#### Trailer towing tables - E-Series

Engine	Rear axle ratio	Maximum GCWR - lbs. (kg)	Maximum trailer weight - lbs. (kg)
<b>E-350 Regular Van (9500 GVWR)</b>			
6.0L	3.55	16000 (7257)	9700 (4400)
6.0L	4.10	20000 (9072)	10000 (4536)
<b>E-350 Regular Van (Crew) (9500 GVWR)</b>			
6.0L	3.55	16000 (7257)	9400 (4264)
6.0L	4.10	20000 (9072)	10000 (4536)
<b>E-350 Extended Van (9400 GVWR)</b>			
6.0L	3.55	16000 (7257)	9500 (4309)
6.0L	4.10	20000 (9072)	10000 (4536)
<b>E-350 Extended Van (Crew) (9400 GVWR)</b>			
6.0L	3.55	16000 (7257)	9300 (4218)
6.0L	4.10	20000 (9072)	10000 (4536)

## Driving

Engine	Rear axle ratio	Maximum GCWR - lbs. (kg)	Maximum trailer weight - lbs. (kg)
<b>E-350 Regular Wagon (7-passenger) (8700 GVWR)</b>			
6.0L	3.55	16000 (7257)	9200 (4173)
6.0L	4.10	20000 (9072)	10000 (4536)
<b>E-350 Regular Wagon (8-passenger) (8700 GVWR)</b>			
6.0L	3.55	16000 (7257)	9200 (4173)
6.0L	4.10	20000 (9072)	10000 (4536)
<b>E-350 Regular Wagon (12-passenger) (8700 GVWR)</b>			
6.0L	3.55	16000 (7257)	9200 (4173)
6.0L	4.10	20000 (9072)	10000 (4536)
<b>E-350 Extended Wagon (12-passenger) (9300 GVWR)</b>			
6.0L	3.55	16000 (7257)	9000 (4082)
6.0L	4.10	20000 (9072)	10000 (4536)
<b>E-350 Extended Wagon (15-passenger) (9400 GVWR)</b>			
6.0L	3.55	16000 (7257)	9000 (4082)
6.0L	4.10	20000 (9072)	10000 (4536)
<b>E-350 Cutaway 138" wheelbase, single rear wheel) (9600 GVWR)</b>			
6.0L	4.10	20000 (9072)	10000 (4536)
<b>E-350 Cutaway 138" wheelbase, dual rear wheel) (10700 GVWR)</b>			
6.0L	4.10	20000 (9072)	10000 (4536)
<b>E-350 Cutaway 158" wheelbase, dual rear wheel) (11500 GVWR)</b>			
6.0L	4.10	20000 (9072)	10000 (4536)
<b>E-350 Cutaway 176" wheelbase, dual rear wheel) (11500 GVWR)</b>			
6.0L	4.10	20000 (9072)	10000 (4536)
<b>E-450 Cutaway 158" wheelbase) (14050 GVWR)</b>			
6.0L	4.10	20000 (9072)	10000 (4536)
<b>E-350 Cutaway 176" wheelbase) (14050 GVWR)</b>			
6.0L	4.10	20000 (9072)	10000 (4536)



## Driving

### Trailer towing tables - Excursion & F-Super Duty

#### Excursion

Engine	Rear axle ratio	Maximum GCWR - lbs. (kg)	Maximum trailer weight - lbs. (kg)
<b>4x2</b>			
6.0L	3.73	20000 (9072)	11000 (4988)
<b>4x4</b>			
6.0L	3.73	20000 (9072)	11000 (4988)

#### F-Super Duty

Maximum GCWR - lbs (kg.)			
Engine	Rear axle ratio	Manual transmission	Automatic transmission
<b>F-250/F-350 Single Rear Wheel (SRW)</b>			
6.0L	3.73	23000 (10433)	23000 (10433)
<b>F-350 Dual Rear Wheel (DRW)</b>			
6.0L	3.73	23500 (10659)	23500 (10659)
	4.10	23500 (10659)	23500 (10659)
	4.30	—	26000 (11793)
<b>F-450</b>			
6.0L	4.30/4.88	26000 (11793)	26000 (11793)
6.0L*	4.88	28000 (12701)	30000 (13608)
<b>F-550</b>			
6.0L	4.30/4.88	26000 (11793)	26000 (11793)
6.0L*	4.88	28000 (12701)	33000 (14969)
*With high capacity trailer tow package, see rear axle label to identify actual vehicle content.			

## Driving


### Integrated hitch rating

The standard integrated hitch has two ratings depending on mode of operation:

- **Weight carrying** - requires a draw bar and hitch ball. The draw bar supports all the vertical tongue load of the trailer.
- **Weight distributing** - requires an aftermarket weight distributing system which includes draw bar, hitch ball, spring bars and snap-up brackets. The vertical tongue load of the trailer is distributed between the truck and the trailer by this system.

### F-Super Duty

	Hitch Type	Maximum Gross Trailer Weight — lb. (kg)	Maximum Tongue Weight — lb. (kg)
6.0L DRW Pick—ups 2.5” ID without adapter (requires 2.5” drawbar)	Weight carrying	6000 (2721)	600 (272)
	Weight distributing	15000 (6804)	1500 (680)
6.0L DRW Pick—ups 2.5” ID with adapter (requires 2” drawbar)	Weight carrying	5000 (2268)	500 (227)
	Weight distributing	12500 (5670)	1250 (567)
All SRW Pick—ups 2” receiver	Weight carrying	5000 (2268)	500 (227)
	Weight distributing	12500 (5670)	1250 (567)

 Towing trailers beyond the maximum tongue weight exceeds the limit of the towing system and could result in vehicle structural damage, loss of vehicle control and personal injury.

## Roadside emergencies

### JUMP STARTING YOUR VEHICLE (E-SERIES ONLY)

**F-Super Duty and Excursion vehicles equipped with the 6.0L diesel engine can be jump started using the same procedure as a gasoline engine; refer to your *Owner's guide* for the jump starting procedure.**



The gases around the battery can explode if exposed to flames, sparks, or lit cigarettes. An explosion could result in injury or vehicle damage.



Batteries contain sulfuric acid which can burn skin, eyes and clothing, if contacted.

**Do not attempt to push-start your vehicle. Automatic transmissions do not have push-start capability; doing so may damage the catalytic converter.**

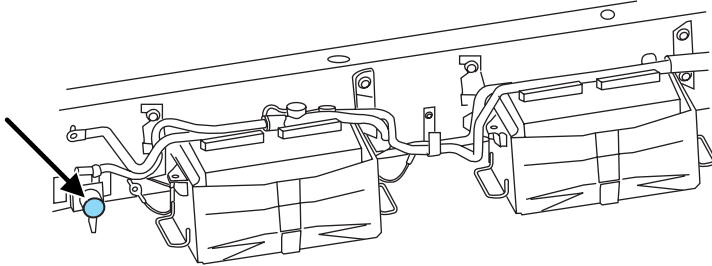
### Preparing your vehicle

When the batteries are disconnected or new batteries are installed, the transmission must relearn its shift strategy. As a result, the transmission may have firm and/or soft shifts. This operation is considered normal and will not affect function or durability of the transmission. Over time, the adaptive learning process will fully update transmission operation

1. **Use only a 12-volt supply to start your vehicle.**
2. Do not disconnect the batteries of the disabled vehicle as this could damage the vehicle's electrical system.
3. Park the booster vehicle close to the passenger side of the disabled vehicle making sure the two vehicles **do not** touch. Set the parking brake on both vehicles.

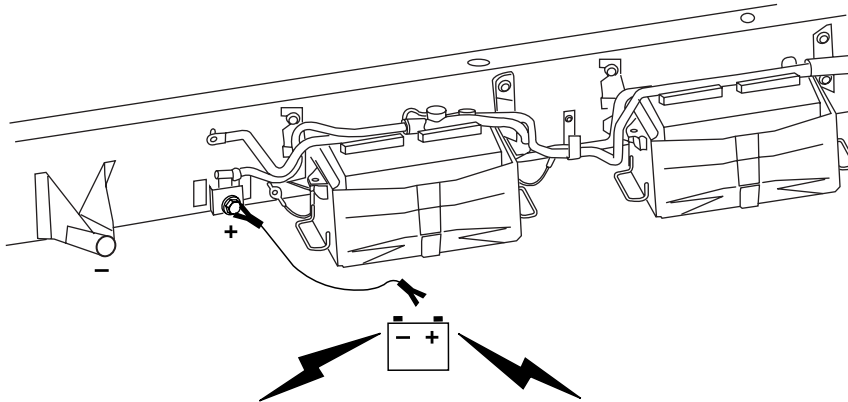
**Note:** This vehicle has two frame-mounted batteries located on the passenger side frame rail, behind the front passenger door. A battery positive (+) jumper stud is located on the frame rail behind the rear most battery box.

## Roadside emergencies



- Location of positive (+) jumper stud; remove the cap to access the jumper stud.
4. Check the assisting vehicle battery terminals and the positive (+) jumper stud and remove any excessive corrosion before you attach the battery cables. Ensure that accessible vent caps are tight and level.
  5. Turn the heater fan on in both vehicles to protect any electrical surges. Turn all other accessories off.

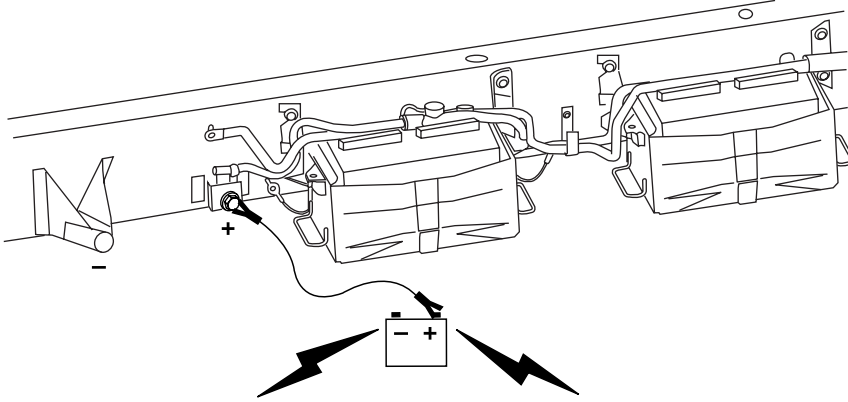
### Connecting the jumper cables



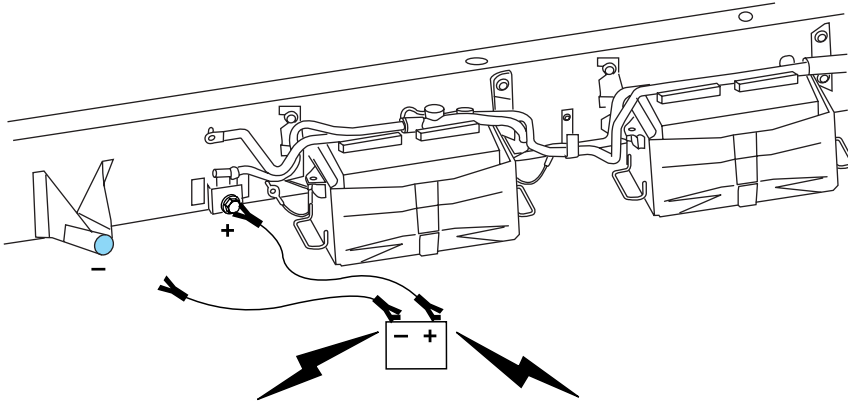
1. Connect the positive (+) jumper cable to the positive (+) jumper stud located on the passenger side frame rail of the disabled vehicle.

**Note:** In the illustrations, *lightning bolts* are used to designate the assisting (boosting) battery.

## Roadside emergencies

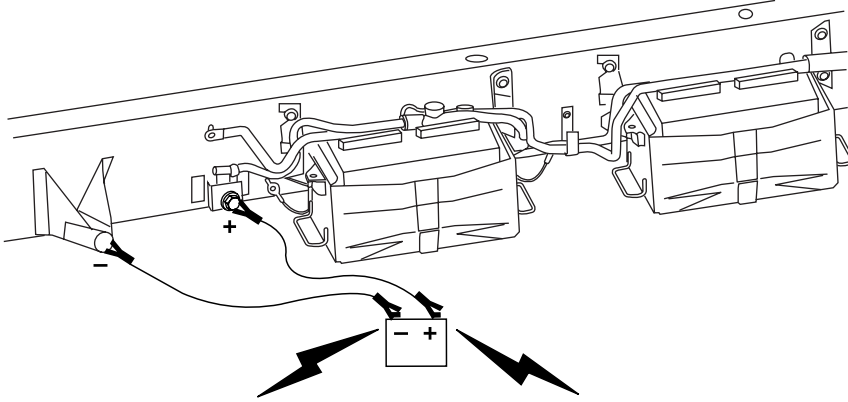


2. Connect the other end of the positive (+) cable to the positive (+) terminal of the assisting battery.



3. Connect the negative (-) cable to the negative (-) terminal of the assisting battery.

## Roadside emergencies



4. Make the final connection of the negative (-) cable to an exposed metal part of the disabled vehicle's frame or chassis, away from the batteries. **Do not** use fuel lines, brake lines, exhaust components or the battery trays as *grounding* points.



Do not connect the end of the second cable to the negative (-) terminal of the battery to be jumped. A spark may cause an explosion of the gases that surround the battery.

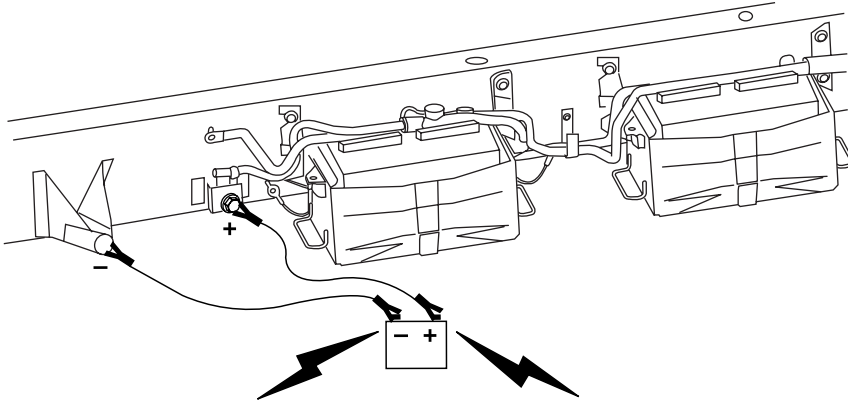
5. Ensure that the cables are clear of moving parts or any fuel delivery system, brake system or exhaust system parts.

### Jump starting

1. Start the engine of the booster vehicle and run the engine at moderately increased speed.
2. Start the engine of the disabled vehicle.
3. Once the disabled vehicle has been started, run both engines for an additional three minutes before disconnecting the jumper cables.

## Roadside emergencies

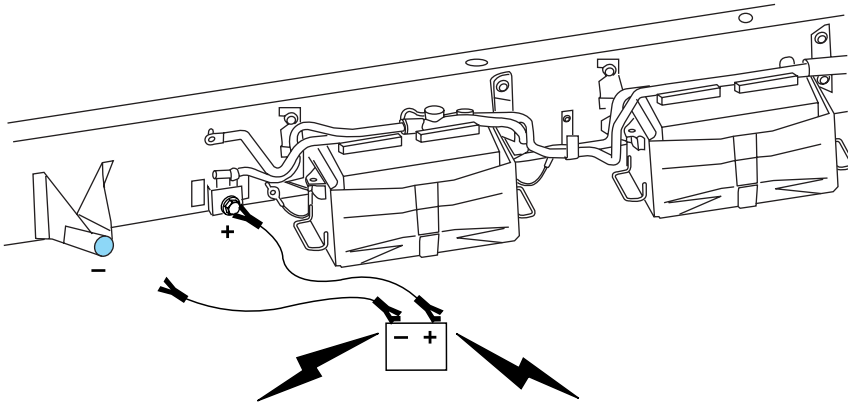
### Removing the jumper cables



**Remove the jumper cables in the reverse order that they were connected.**

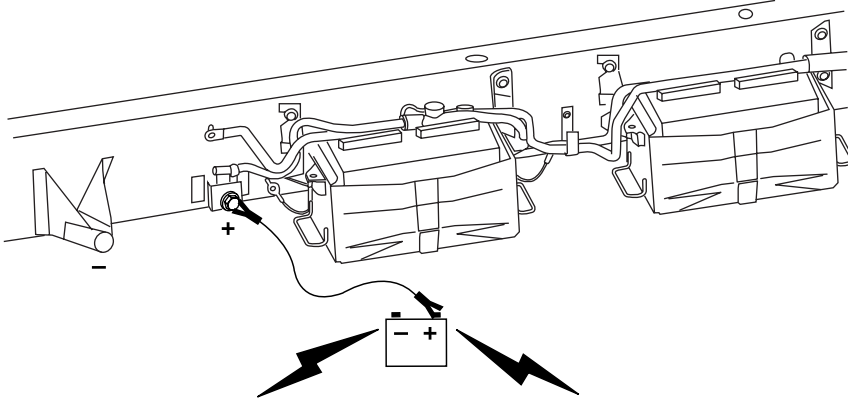
1. Remove the jumper cable from the *ground* metal surface.

**Note:** In the illustrations, *lightning bolts* are used to designate the assisting (boosting) battery.

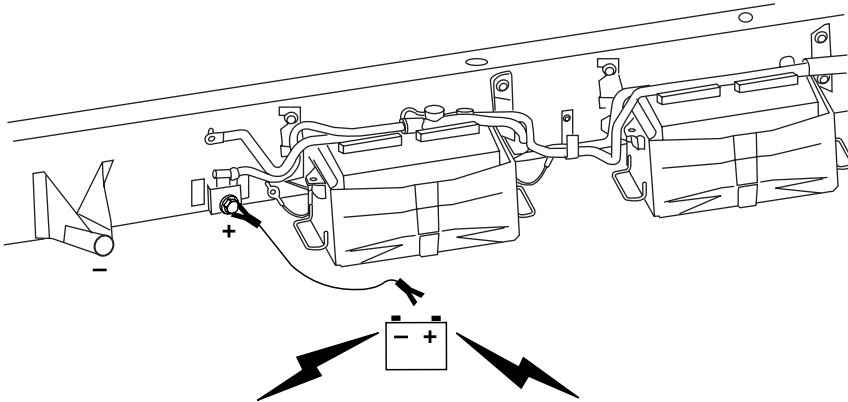


2. Remove the jumper cable on the negative (-) connection of the booster vehicle's battery.

## Roadside emergencies



3. Remove the jumper cable from the positive (+) terminal of the booster vehicle's battery.



4. Remove the jumper cable from the positive (+) jumper stud of the disabled vehicle. Reinstall the cap onto the jumper stud.

After the disabled vehicle has been started and the jumper cables removed, allow it to idle for several minutes so the engine computer can *relearn* its idle conditions.

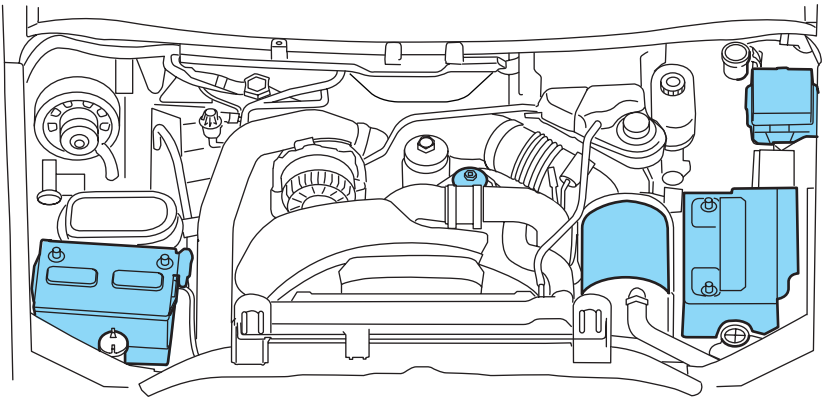


## Cleaning

### ENGINE

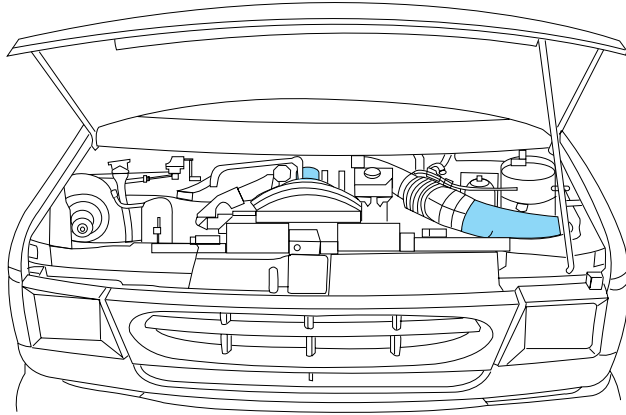
Engines are more efficient when they are clean because grease and dirt buildup keep the engine warmer than normal. When washing:

- Take care when using a power washer to clean the engine. The high-pressure fluid could penetrate the sealed parts and cause damage.
- Do not spray a hot engine with cold water to avoid cracking the engine block or other engine components.
- Spray Motorcraft Engine Shampoo and Degreaser (ZC-20) on all parts that require cleaning and pressure rinse clean.
- Never wash or rinse the engine while it is running; water in the running engine may cause internal damage.
- Cover the highlighted areas to prevent water damage when cleaning the engine.



- **F-Super Duty and Excursion**

## Cleaning

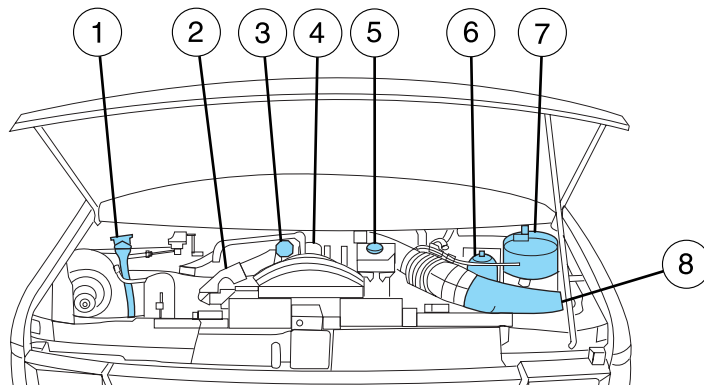


- **E-Series**

## Maintenance and Specifications

### IDENTIFYING COMPONENTS IN THE ENGINE COMPARTMENT

#### E-Series

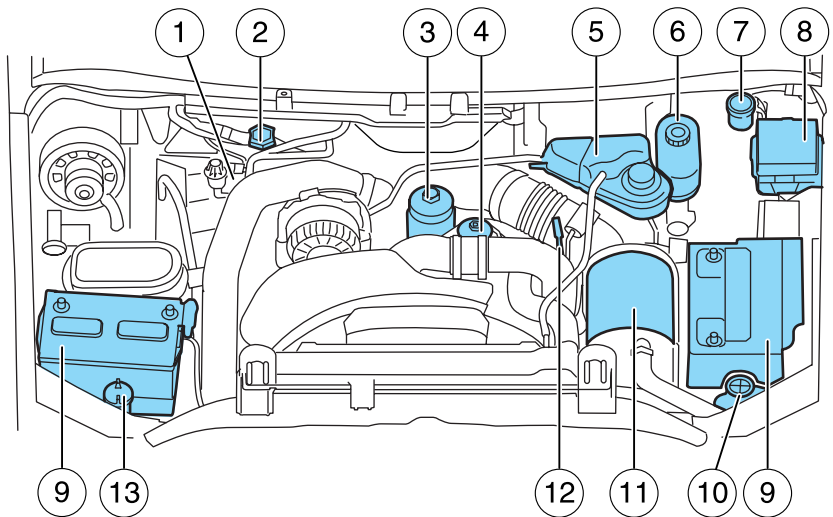


1. Windshield washer fluid reservoir
2. Automatic transmission dipstick
3. Engine oil filler cap
4. Secondary fuel filter assembly
5. Power steering fluid reservoir
6. Brake fluid reservoir
7. Engine coolant reservoir
8. Air filter assembly

The Fuel Conditioner Module (FCM) is located on the driver-side of the vehicle next to the transmission case.

## Maintenance and Specifications

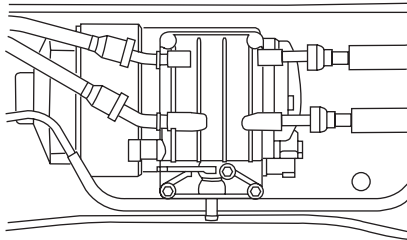
### F-Super Duty/Excursion



1. Automatic transmission dipstick (if equipped)
2. Engine oil fill
3. Engine oil filter
4. Engine-mounted fuel filter assembly
5. Engine coolant reservoir
6. Brake fluid reservoir
7. Clutch fluid reservoir (if equipped)
8. Underhood relay box
9. Battery (dual batteries shown)
10. Power steering fluid reservoir
11. Air filter assembly
12. Engine oil dipstick
13. Windshield washer fluid reservoir

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## Maintenance and Specifications



The Horizontal Fuel Conditioner Module (HFCM) is located on the frame-rail under the driver-side floorboard near the transmission.

### **SCHEDULED MAINTENANCE**

The scheduled maintenance services in the *scheduled maintenance information* of this supplement are required because they are considered essential to the life and performance of your vehicle.

Use only recommended fuel, lubricants, fluids and service parts conforming to Ford specifications. Motorcraft parts are designed and built for best performance in your vehicle.

### **FUEL REQUIREMENTS**

#### **Choosing the right fuel**

The engine is designed to use low sulfur number 1-D or 2-D Diesel fuel only. At temperatures below 20°F (-7°C), number 1-D or winter blend number 2-D fuel is recommended. (See *Cold weather operation* in the *Driving* chapter of this supplement.) Diesel fuel containing no more than 5% of biodiesel may be used. Biodiesel fuel is a product derived from renewable fuel sources such as vegetable oil, animal fat and cooking oil.

**Do not use home heating oil or any diesel fuel not intended for highway use. Red dye is used to identify fuels intended for agricultural and non-highway use. Damage to the fuel injection system, engine and exhaust catalyst can occur if an improper fuel is used. Do not add gasoline, gasohol or alcohol to diesel fuel. This practice creates a serious fire hazard and engine performance problems.**

#### **Fuel quality**

It should not be necessary to add any aftermarket additives to your fuel tank if you use a properly formulated diesel fuel that meets the ASTM D

## Maintenance and Specifications

975 industry specification. Aftermarket additives can damage the injector system or engine. Repairs to correct the effects of using an aftermarket product in your fuel may not be covered by your warranty.

**Do not blend used engine oil with diesel fuel under any circumstances.** Blending used oil with the fuel will significantly increase your vehicle's exhaust emissions and reduce engine life due to increased internal wear.

Many of the world's automakers approved the World-wide Fuel Charter that recommends diesel fuel specifications to provide improved performance and emission control system protection for your vehicle. Diesel fuel that meets the World-wide Fuel Charter should be used when available. Ask your fuel supplier about fuel that meets the World-wide Fuel Charter.

### **Fueling tips**

If the engine fails to start in 30 seconds, turn the key to the OFF position and wait 30 seconds before trying again.

Truck stops have pumps and nozzles designed for larger, heavy-duty trucks. When refueling at truck stops: if the nozzle shuts off repeatedly when refueling, wait 5–10 seconds; then use a slower rate of flow (don't depress the nozzle trigger as far).

If air is allowed to enter the fuel system (during fuel filter change or if you run out of fuel) the engine will purge the trapped air as it runs. The engine may run rough and produce white smoke while air is in the system. This is normal and should correct itself in a short time.

An engine that suddenly becomes noisy or operates poorly after a fuel fill could be using substandard fuel (i.e., high water content, low cetane rating or gasoline in the fuel). Diesel fuel should be purchased from a reputable station which sells a large amount of diesel fuel.

Care should be taken whenever diesel fuel is stored. Use only clean, approved containers which will prevent the entry of dirt or water.

Diesel fuel must not be stored in a galvanized container. The fuel will dissolve the zinc in a galvanized container. The zinc will then remain in solution until it is run through the engine where it will be deposited in the fuel injectors causing expensive-to-repair damage.

### **Diesel fuel dispensing nozzle fill rate**

This truck is equipped with a fuel fill pipe which is able to accept fuel up to 20 gallons per minute from an 1 1/8 inch fuel dispensing nozzle. Pumping fuel at greater flow rates may result in premature nozzle shut-off or spitback.

## Maintenance and Specifications

### FUEL CONDITIONER MODULE (FCM - E-SERIES)/HORIZONTAL FUEL CONDITIONING MODULE (HFCM - F-SUPER DUTY/EXCURSION) - FUEL FILTER/WATER SEPARATOR

#### HFCM - F-Super Duty/Excursion

The vehicle is equipped with a Horizontal Fuel Conditioning Module (HFCM) located on the frame-rail under the driver-side floorboard near the transmission.

Water should be drained from the module assembly whenever the warning light comes on. The WATER IN FUEL light will come on when approximately 0.2 pints (100 cc) of water accumulates in the module.



Replace the fuel filters with Ford Part No. FD-4604. This part number includes filters and seals for both the engine-mounted and frame-mounted filters.

#### FCM - E-Series

The vehicle is equipped with a Fuel Conditioning Module (FCM) located on the driver-side of the vehicle next to the transmission case.

Water should be drained from the module assembly whenever the warning light comes on. The WATER IN FUEL light will come on when approximately 0.2 pints (100 cc) of water accumulates in the module.



Replace the fuel filters with Ford Part No. FD-4604. This part number includes filters and seals for both the engine-mounted filter and the FCM filter.


#### DRAINING THE FCM/HFCM AND CHANGING THE FUEL FILTERS

Your vehicle is equipped with two fuel filters; one is mounted on top of the engine. **On F-Super Duty, and Excursion vehicles**, the second filter, inside the HFCM, is mounted inside the frame rail under the driver-side floorboard near the transmission. **On E-Series vehicles**, the second filter, inside the FCM, is mounted on the driver-side of the vehicle next to the transmission case. **On all vehicles**, both filters should be replaced at the same time. The Motorcraft part number for the replacement filters is FD-4604.

#### FCM/HFCM drain procedure

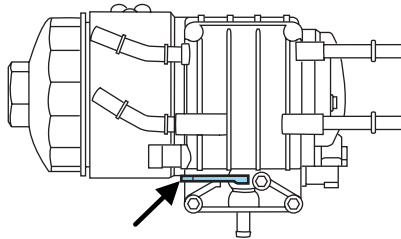
1. Stop the vehicle and **shut off** the engine.

## Maintenance and Specifications

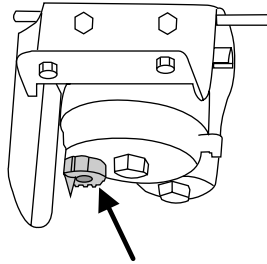
 The vehicle must be stopped with the engine off when draining the HFCM/FCM. Fuel may ignite if the separator is drained while the engine is running or vehicle is moving.

2. Locate the HFCM and place an appropriate container under the drain port (see illustration).

- **F-Super Duty /Excursion**



- **E-Series**



3. Rotate drain lever to the outward position. Allow the HFCM/FCM to drain for approximately 25 seconds or until clean fuel is observed. Rotate the lever towards the housing until it is firmly seated.

4. Verify that the drain valve is closed and latched, then remove the container from under the vehicle.

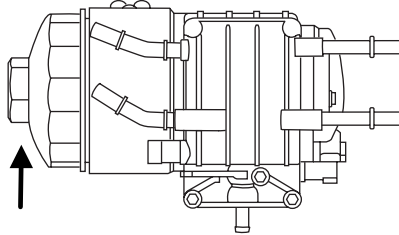
5. Restart the engine and check WATER IN FUEL indicator light; it should not be illuminated. If it continues to illuminate, have the fuel system checked and repaired.



## Maintenance and Specifications

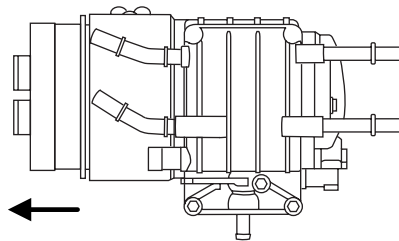
### Removal - HFCM filter (F-Super Duty/Excursion)

1. Remove the fuel filter cap by turning counterclockwise.



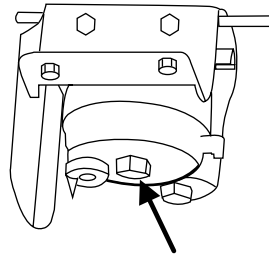
2. Remove and discard the old fuel filter element.

3. Carefully clean the mating surfaces.



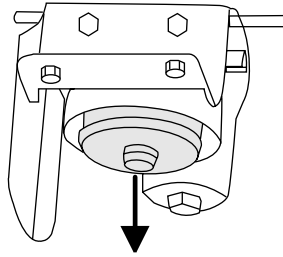
### Removal - FCM filter (E-Series)

1. Remove the fuel filter cap by turning counterclockwise.



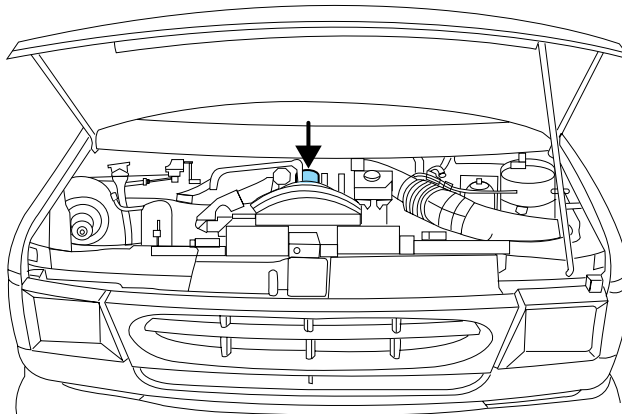
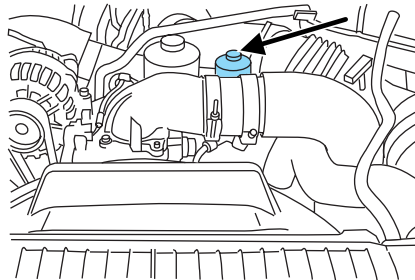
## Maintenance and Specifications

2. Remove and discard the old fuel filter element.
3. Carefully clean the mating surfaces.



### Removal - Engine-mounted fuel filter

- F-Super Duty/Excursion



- E-Series
1. Remove the fuel filter cap by turning counterclockwise.

## Maintenance and Specifications

2. Remove and discard the old fuel filter element.
3. Carefully clean the mating surfaces.

### Installation - both

**The engine will not run properly if the fuel filter is not installed in housing.**

1. Install the new fuel filter and cap seal (from Ford Part No. FD-4604) into the fuel filter housing.
2. Tighten cap onto fuel filter housing slowly, allowing fuel to soak into the fuel filter element. Tighten cap until it contacts the housing.

**After replacing the fuel filter, the engine will purge the trapped air as it runs. The engine may run roughly and smoke until the air is completely eliminated.**

**Using a fuel which has more than average impurities may require the fuel filter to be replaced more frequently than the service interval specifies.**

### ENGINE OIL

#### Checking the engine oil level

Because it is normal to add some oil between oil changes, check your engine oil level each time you stop for fuel. To check the engine oil level consistently and accurately, the following procedure is recommended:

1. Have engine at normal operating temperature (at least into the NORMAL range on the engine coolant temperature gauge).
2. Park the vehicle on a level surface, then turn off the engine and open the hood.
3. Allow at least **20 minutes** after engine shutdown to assure that the oil contained in the upper parts of the engine has returned to the oil pan.
4. Protecting yourself from engine heat, pull out the dipstick, wipe it clean and reinsert fully.
5. Read oil level on both sides of dipstick and use highest level (reading) for the actual engine oil level.
6. Maintain the oil level between ADD and OPERATING RANGE on the dipstick by adding oil as required. The distance from ADD to OPERATING RANGE on the dipstick represents 2.0 quarts (1.9L). Do not overfill. If the oil level exceeds OPERATING RANGE, oil consumption may result.

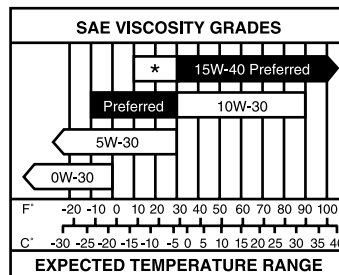
## Maintenance and Specifications

### Engine oil specifications

To help achieve proper engine performance and durability, it is important that only engine lubricating oils of the proper quality are used in your diesel engine and that the engine oil is changed **no later** than the recommended interval. Diesel engines require specially formulated oil to resist contamination. Proper quality oils also provide maximum efficiency of the crankcase ventilating system which reduces air pollution.

For normal or severe service, use Motorcraft oil or an equivalent oil conforming to Ford Specification WSS-M2C171-D or API Service categories CI-4, CI-4/SL or DHD-1. If CI-4 oil is not available, CH-4 is acceptable.

Engine oils with improved fuel economy properties (energy conserving) are currently available. If you use an energy conserving oil, be sure it meets the recommended Ford Specification, *API* service categories and SAE viscosity grades listed in the Lubricant and Maintenance Materials Specifications chart. Some energy conserving oils *do not* meet the requirements necessary for your diesel engine.

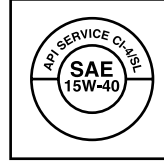


\* Heavy duty trailer towing with ambient temperatures above 50°F (10°C) requires 15W-40 engine oil.

The use of correct oil viscosities for diesel engines is important for satisfactory operation. Determine which oil viscosity best suits the temperature range you expect to encounter for the next service interval.

## Maintenance and Specifications

A symbol has been developed by the American Petroleum Institute (API) to help you select the proper engine oil. It will be included on the oil container you purchase. The top section of the symbol shows the oil performance by the API designation.



This should match the owner guide recommendation. The center section will show the SAE viscosity grade. The lower section will state energy conserving if the oil has proven fuel saving capabilities.

### Changing engine oil and filter

Change your oil and filter according to the *scheduled maintenance information* in this supplement. Change more frequently if your vehicle operation includes extended periods of idling or low-speed operation, driving for a long time in cold temperatures or driving short distances. See the following section *Engine lubrication for severe service operation* for all severe duty restrictions.

Use Ford Engine Oil Filter Part No. 3C3Z-6731-AA (FL-2016) or equivalent. These filters protect your engine by filtering harmful, abrasive or sludge particles. The FL-2016 filters particles significantly smaller than most available “will-fit” filters.

To replace the filter,

1. Unscrew the oil filter cap and wait a few seconds for the oil to drain through the built-in drain valve. **Note:** The filter should be changed before reinstalling the oil pan drain plug.
2. Reinstall and tighten the oil filter cap.



Do not handle a hot oil filter with bare hands.



Continuous contact with USED motor oil has caused cancer in laboratory mice. Protect your skin by washing with soap and water.

### Engine lubrication for severe service operation

The following severe service operating conditions require unique engine maintenance procedures:

- towing a trailer over 1,000 miles (1,600 km)

## Maintenance and Specifications

- sustained, high speed driving at Gross Vehicle Weight Rating (maximum loaded weight for vehicle operation during hot weather-above 90°F [32°C]).
- frequent or extended idling (over 10 minutes per hour of normal driving).
- operating in severe dust conditions.
- frequent, short trips of 10 miles (16 km) or less during freezing weather

If you are operating your vehicle under any of these conditions, observe the following service procedures:

- Change engine oil and filter every 5,000 miles (8,000 km).
- Use Motorcraft oil or an equivalent oil conforming to Ford Specification WSS-M2C171-D or API categories CI-4, CI-4/SL, CI-4 PLUS or DHD-1. If CI-4 oil is not available, CH-4 is acceptable.

For more information refer the *scheduled maintenance information* section of this supplement.

### AIR FILTER

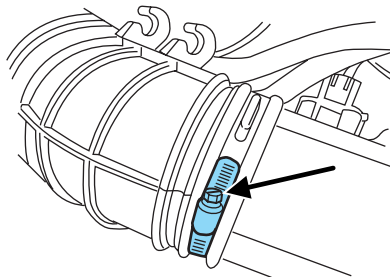
When replacing the air filter element, use the Motorcraft air filter element listed. Refer to the *Motorcraft part numbers* chart in this chapter.

Note: Do not start your engine with the air cleaner removed and do not remove it while the engine is running.

**Failure to use the correct air filter element may result in severe engine damage.**

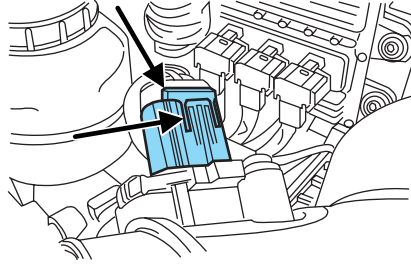
- **E-series air filter element:**

1. Disconnect the hoses from the air cleaner outlet tube.
2. Loosen the clamp and disconnect the air cleaner outlet tube.



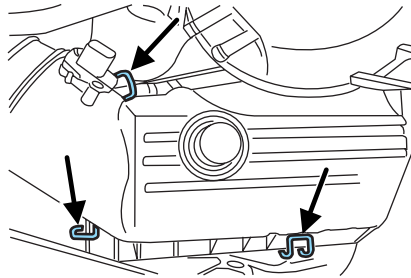
## Maintenance and Specifications

3. Disconnect the mass air flow (MAF) sensor electrical connector. (Slide out the red lock, press tab and remove the electrical connector.)



4. Disconnect the three latches and remove the air cleaner cover

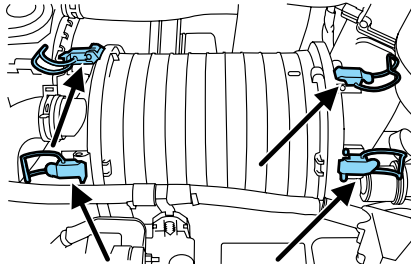
5. Remove the air cleaner element.



6. To install, reverse the removal procedure.

• **F-Super Duty air filter element:**

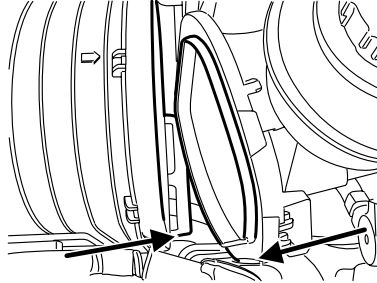
1. Release and flip the toggle clamps back.



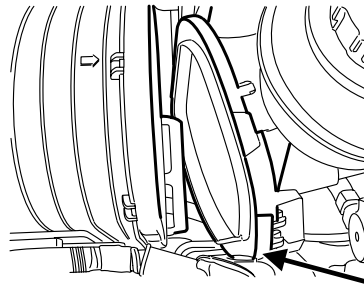
## Maintenance and Specifications

2. Remove the rear cover (the cover near the coolant reservoir) from the filter element by pushing it back and pulling up to disengage the tabs on the cover from the slots on the filter element.

**Rear cover tabs must be disengaged from the slots before pushing it or damage to the air cleaner element will occur.**

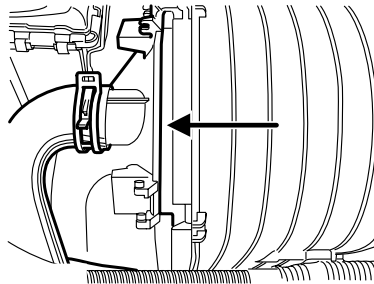


3. Push the cover to the rear under the coolant reservoir and behind the slots on the filter element.



4. Remove the front cover from the filter element by pulling the cover forward and pulling up to disengage the tabs on the cover from the slots on the filter element while pulling up on the rear of the filter element.

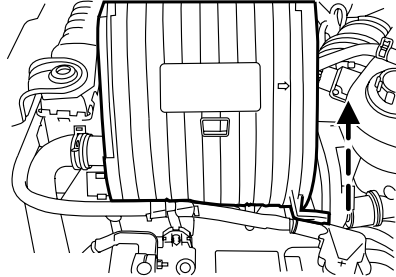
**Front cover tabs must be disengaged from the slots before pulling it or damage to the air cleaner element will occur.**





## Maintenance and Specifications

5. Pull up on the filter element to remove it.
6. Installation is reverse of removal.



**When servicing the air filter, always be sure that the auxiliary hose is not kinked or obstructed and that it is placed back into the hole in the front cowl near the back of the headlamp. Check all hose and wiring positions. Failure to do so may result in severe engine damage when driving through deep water and/or encountering unusually heavy precipitation conditions.**

### ENGINE COOLANT

#### Checking engine coolant

The concentration and level of engine coolant should be checked at the mileage intervals listed in the *scheduled maintenance information*. The coolant concentration should be maintained at 50/50 coolant and distilled water, which equates to a freeze point of  $-34^{\circ}\text{F}$  ( $-36^{\circ}\text{C}$ ). Coolant concentration testing is possible with a hydrometer or antifreeze tester (such as the Rotunda Battery and Antifreeze Tester, 014-R1060). The level of coolant should be maintained at the “FULL COLD” level or within the “COLD FILL RANGE” in the coolant reservoir. If the level falls below, add coolant per the instructions in the *Adding engine coolant* section of this supplement.

Your vehicle was factory-filled with a 50/50 engine coolant and water concentration. If the concentration of coolant falls below 40% or above 60%, the engine parts could become damaged or not work properly. **A 50/50 mixture of coolant and water provides the following:**

- **Freeze protection down to  $-34^{\circ}\text{F}$  ( $-36^{\circ}\text{C}$ ).**
- **Boiling protection up to  $265^{\circ}\text{F}$  ( $129^{\circ}\text{C}$ ).**
- **Protection against rust and other forms of corrosion.**
- **Enables calibrated gauges to work properly.**

When the engine is cold, check the level of the engine coolant in the reservoir.

## Maintenance and Specifications

- The engine coolant should be at the “FULL COLD” level or within the “COLD FILL RANGE” as listed on the engine coolant reservoir (depending upon application).
- Refer to the *General Owner’s Information* for service interval schedules.
- Be sure to read and understand *Precautions when servicing your vehicle* in your *Owner’s Guide*.

If the engine coolant has not been checked at the recommended interval, the engine coolant reservoir may become low or empty. If the reservoir is low or empty, add engine coolant to the reservoir. Refer to *Adding engine coolant* in this section of this supplement.

**Note:** Automotive fluids are not interchangeable; do not use engine coolant, antifreeze or windshield washer fluid outside of its specified function and vehicle location.

### Adding engine coolant

When adding coolant, make sure it is a 50/50 mixture of engine coolant and distilled water. Add the mixture to the coolant reservoir, **when the engine is cool**, until the appropriate fill level is obtained.



Do not add engine coolant when the engine is hot. Steam and scalding liquids released from a hot cooling system can burn you badly. Also, you can be burned if you spill coolant on hot engine parts.



Do not put engine coolant in the windshield washer fluid container. If sprayed on the windshield, engine coolant could make it difficult to see through the windshield.

- **Add Motorcraft Premium Gold Engine Coolant (yellow-colored), VC-7-A (U.S., except CA, OR and NM), VC-7-B (CA, OR and NM), meeting Ford Specification WSS-M97B51-A1.**

**Note:** Use of Motorcraft Cooling System Stop Leak Pellets, VC-6, may darken the color of Motorcraft Premium Gold Engine Coolant from yellow to golden tan.

- **Do not add/mix an orange-colored, extended life coolant such as Motorcraft Specialty Orange Engine Coolant, VC-2 and VC-3 (US) or CXC-209 (Canada), meeting Ford specification WSS-M97B44-D with the factory-filled coolant.** Mixing Motorcraft

## Maintenance and Specifications

Specialty Orange Engine Coolant or any orange-colored extended life product with your factory filled coolant can result in degraded corrosion protection.

- A large amount of water without engine coolant may be added, in case of emergency, to reach a vehicle service location. In this instance, the cooling system must be drained and refilled with a 50/50 mixture of engine coolant and distilled water as soon as possible. Water alone (without engine coolant) can cause engine damage from corrosion, overheating or freezing.
- **Do not use alcohol, methanol, brine or any engine coolants mixed with alcohol or methanol antifreeze (coolant).** Alcohol and other liquids can cause engine damage from overheating or freezing.
- **Do not add extra inhibitors or additives to the coolant.** These can be harmful and compromise the corrosion protection of the engine coolant.

For vehicles with overflow coolant systems with a non-pressurized cap on the coolant recovery system, add coolant to the coolant recovery reservoir when the engine is cool. Add the proper mixture of coolant and water to the “FULL COLD” level. For all other vehicles which have a coolant degas system with a pressurized cap, or if it is necessary to remove the coolant pressure relief cap on the radiator of a vehicle with an overflow system, follow these steps to add engine coolant.



To reduce the risk of personal injury, make sure the engine is cool before unscrewing the coolant pressure relief cap. The cooling system is under pressure; steam and hot liquid can come out forcefully when the cap is loosened slightly.

1. Before you begin, turn the engine off and let it cool.
2. When the engine is cool, wrap a thick cloth around the coolant pressure relief cap on the coolant reservoir (a translucent plastic bottle). Slowly turn cap counterclockwise (left) until pressure begins to release.
3. Step back while the pressure releases.
4. When you are sure that all the pressure has been released, use the cloth to turn it counterclockwise and remove the cap.
5. Fill the coolant reservoir slowly with the proper coolant mixture (see above), to within the “COLD FILL RANGE” or the “FULL COLD” level on the reservoir. If you removed the radiator cap in an overflow system, fill the radiator until the coolant is visible and radiator is almost full.

## Maintenance and Specifications

6. Replace the cap. Turn until tightly installed. (Cap must be tightly installed to prevent coolant loss.)

After any coolant has been added, check the coolant concentration (refer to *Checking engine coolant*). If the concentration is not 50/50 (protection to  $-34^{\circ}\text{F}/-36^{\circ}\text{C}$ ), drain some coolant and adjust the concentration. It may take several drains and additions to obtain a 50/50 coolant concentration.

Whenever coolant has been added, the coolant level in the coolant reservoir should be checked the next few times you drive the vehicle. If necessary, add enough 50/50 concentration of engine coolant and distilled water to bring the liquid level to the proper level.

If you have to add more than 1.0 quart (1.0 liter) of engine coolant per month, have your dealer check the engine cooling system. Your cooling system may have a leak. Operating an engine with a low level of coolant can result in engine overheating and possible engine damage.

### Recycled engine coolant

Ford Motor Company does NOT recommend the use of recycled engine coolant in vehicles originally equipped with Motorcraft Premium Gold Engine Coolant since a Ford-approved recycling process is not yet available.



Used engine coolant should be disposed of in an appropriate manner. Follow your community's regulations and standards for recycling and disposing of automotive fluids.

### Coolant refill capacity

To find out how much fluid your vehicle's cooling system can hold, refer to *Refill capacities* in this section.

Fill your engine coolant reservoir as outlined in *Adding engine coolant* in this section.

### Severe climates

If you drive in extremely cold climates (less than  $-34^{\circ}\text{F}$  [ $-36^{\circ}\text{C}$  ]):

- **It may be necessary to increase the coolant concentration above 50%.**
- **NEVER increase the coolant concentration above 60%.**
- **Increased engine coolant concentrations above 60% will decrease the overheat protection characteristics of the engine coolant and may cause engine damage.**

## Maintenance and Specifications

- **Refer to the chart on the coolant container to ensure the coolant concentration in your vehicle will provide adequate freeze protection at the temperatures in which you drive in the winter months.**

If you drive in extremely hot climates:

- **It is still necessary to maintain the coolant concentration above 40%.**
- **NEVER decrease the coolant concentration below 40%.**
- **Decreased engine coolant concentrations below 40% will decrease the corrosion protection characteristics of the engine coolant and may cause engine damage.**
- **Decreased engine coolant concentrations below 40% will decrease the freeze protection characteristics of the engine coolant and may cause engine damage.**
- **Refer to the chart on the coolant container to ensure the coolant concentration in your vehicle will provide adequate protection at the temperatures in which you drive.**

Vehicles driven year-round in non-extreme climates should use a 50/50 mixture of engine coolant and distilled water for optimum cooling system and engine protection.

### EMISSION CONTROL SYSTEM(S) LAWS

Federal law prohibits vehicle manufacturers, dealers and other persons engaged in the business of repairing, servicing, selling, leasing or trading motor vehicles as well as fleet operations from unknowingly removing or rendering emission control system(s) inoperative. Further, modifications of the emission control system(s) could create liability on the part of the individual owners under the laws of some states. In Canada, modifications of the emission control system(s) could create liability under applicable Federal or Provincial laws.

Do not remove or alter the original equipment floor covering or insulation between it and the metal floor of the vehicle. The floor covering and insulation protect occupants of the vehicle from the engine and exhaust system heat and noise. On vehicles with no original equipment floor covering insulation, do not carry passengers in a manner that permits prolonged skin contact with the metal floor. Provide adequate insulation.

## Maintenance and Specifications

### **NOISE EMISSIONS WARRANTY, PROHIBITED TAMPERING ACTS AND MAINTENANCE**

On January 1, 1978, Federal regulation became effective governing the noise emission on trucks over 10,000 lbs. (4,536 kg) GVWR (Gross Vehicle Weight Rating). The following statements concerning prohibited tampering acts and maintenance, and the noise warranty found in the Warranty Facts Booklet, are applicable to complete chassis cabs over 10,000 lbs. (4,536 kg) GVWR.

#### **Tampering with noise control system prohibited**

Federal law prohibits the following acts or the causing thereof: (1) The removal or rendering inoperative by any person other than for purposes of maintenance, repair or replacement of any device or element of design incorporated into any new vehicle for the purpose of noise control prior to its sale or delivery to the ultimate purchaser or while it is in use, or (2) the use of the vehicle after such device or element of design has been removed or rendered inoperative by any person.

Among those acts which the U.S. Environmental Protection Agency may presume to constitute tampering are the acts listed below:

- Removal of hood blanket, fender apron absorbers, fender apron barriers, underbody noise shields or acoustically absorptive material.
- Tampering or rendering inoperative the engine speed governor, so as to allow engine speed to exceed manufacturer's specifications.

The complexity of the diesel engine makes it so the owner is discouraged from attempting to perform maintenance other than the services described in this supplement.

If you experience difficult starting, rough idling, excessive exhaust smoke, a decrease in engine performance or excess fuel consumption, perform the following checks:

- a plugged air inlet system or engine air filter element.
- water in the fuel filter/water separator.
- a clogged fuel filter.
- contaminated fuel.
- air in the fuel system, due to loose connections.
- an open or pinched sensor hose.
- low engine oil level.
- wrong fuel or oil viscosity for climactic conditions.

## Maintenance and Specifications

If these checks do not help you correct the engine performance problem you are experiencing, consult an authorized dealer.

### FUELING



Do not use starting fluid such as ether or gasoline in the diesel air intake system. Such fluids can cause immediate explosive damage to the engine and possible personal injury.

If you fuel your vehicle at a truck stop, you may notice that the fuel nozzle may shut off every 5–10 seconds. This is due to the flow rates being designed for larger heavy duty trucks. You may have to fuel at a slower rate (don't depress the nozzle trigger fully).

Do not run your diesel vehicle out of fuel as this will allow air to enter the fuel system which will make restarting difficult. Longer engine cranking time may be required once air is in the fuel system. If air enters the fuel system (either through running the fuel tank(s) empty or during a fuel filter change), the engine will self-purge the trapped air once it starts running. The engine may run roughly and produce white smoke while air is in the fuel system; this is normal and should stop after a short time.

### MINOR TROUBLESHOOTING GUIDE

#### If the engine won't crank

Turn on the headlights. If the lights are dim, do not go on at all or if when the ignition is turned to 5 (START) the lights become dim or go out, the battery connections may be loose or corroded, or the battery may be discharged. If there is a clicking or stuttering sound coming from the engine compartment when you turn the key to 5 (START), this may also indicate a loose or corroded battery connection.

Check the battery connections at the battery posts, cable connection to the engine grounding point and at the starter connection.

If a discharged battery is suspected, have it checked and corrected.



Battery posts, terminals and related accessories contain lead and lead compounds. **Wash hands after handling.**

- **For vehicles with manual transmissions**, the clutch pedal **must** be fully depressed in order for the starter to operate.
- **For vehicles with automatic transmissions**, the gearshift lever must be in P (Park) or N (Neutral) in order for the starter to operate.

## Maintenance and Specifications

- Try operating the starter switch several times. Should the switch be corroded, this operation may clean the contacts or make the switch temporarily operable until you can reach the dealer.
- If all electrical connections are tight and you need assistance to start, refer to *Jump starting* in the *Roadside Emergencies* chapter of your *Owner's Guide* (F-Super Duty and Excursion) or refer to the *Jump starting* section in the *Roadside Emergencies* chapter of this supplement (E-Series).

### If engine cranks but won't start

Prolonged starter cranking (in excess of 30 seconds) could cause damage to the starter motor.

- Check the fuel gauge. You may be out of fuel. If the gauge shows that there is fuel in the tank, the trouble may be in the electrical system or the fuel system. If equipped with an auxiliary tank, be sure that the tank control switch is set for the tank with fuel and not on an empty tank.
- Leaving the ignition key turned to 4 (ON) for over two minutes without starting may make starting difficult because the glow plugs will cease activation. Reset the system by turning the ignition key to 3 (OFF) and then back to 4 (ON) again.

### If the engine runs hot

The following could cause the engine to overheat:

- Lack of coolant.
- Dirty cooling system.
- Plugged radiator fins, charge air cooler, A/C condenser and/or oil cooler.
- Driving with frozen coolant.
- Sticking thermostat.
- Overloading or pulling heavy trailers during hot weather.
- Grill or radiator air blockage.
- Slipping or missing drive belt.
- Plugged or very dirty air cleaner element.

### If fuses burn out

Burned-out or blown fuses usually indicate an electrical short-circuit, although a fuse may occasionally burn out from vibration. Insert a second



## Maintenance and Specifications

fuse. If this fuse immediately burns out and you cannot locate the cause, return your vehicle to your dealer for a circuit check.



Replacement fuses and circuit breakers must always be the same rating as the original equipment shown. Never replace a fuse or circuit breaker with one of a higher rating. Higher rated fuses or circuit breakers could allow circuit overloading in the event of a circuit malfunction, resulting in severe vehicle damage or personal injury due to fire.

Refer to the *Owner's Guide* for replacement of fuses.

### MOTORCRAFT PART NUMBERS

Item	Ford Part Number
Engine Oil Filter (Use this filter Only)	3C3Z-6731-AA (FL-2016)
Air Filter – Super Duty <sup>1</sup>	4C3Z-9601-AA
Air Filter – E-series <sup>1</sup>	4C2Z-9601-AA
Battery (2 Required)	BXT-65-750

<sup>1</sup> Always use the authorized Motorcraft air filter listed. **Failure to use the correct air filter may result in severe engine damage.**

### REFILL CAPACITIES

Component	Capacity
Cooling system <sup>1</sup>	27.5 quarts (26.0L)
Engine oil <sup>2</sup>	15.0 quarts (14.2L)
Fuel tank (F-250/350/450/550)	Refer to your <i>Owner's Guide</i>
Fuel tank (Excursion)	44.0 gallons (166.6L)
Fuel tank (E-Series)	Refer to your <i>Owner's Guide</i>
Radiator cap	16 psi (110 kPa)
Manual transmission <sup>3</sup>	5.8 quarts (5.5L)
Automatic transmission	Refer to your <i>Owner's Guide</i>

<sup>1</sup>Includes heater and 5.0 quarts (4.7L) in coolant recovery.

<sup>2</sup>Includes 1 quart (1.0L) in engine oil filter.

<sup>3</sup>Use Motorcraft MERCON® ATF, Motorcraft part number XT-2-QDX, meeting Ford specification MERCON®.

## Maintenance and Specifications

### BULB SPECIFICATIONS

Lamp description	Number of bulbs required	Trade number
Wait to Start Light	1	194
Water-in-Fuel Light	1	194
Engine Temp. Light	1	194

### LUBRICANT SPECIFICATIONS

Item	Ford Part Name	Ford Part Number	Ford Specification
Engine Oil	Motorcraft Motor Oil 15W40 Super Duty, 10W30 Super Duty <sup>1</sup>	XO-15W40-QSD, XO-10W30-QSD	WSS-M2C171-D
Engine coolant	Motorcraft Premium Gold Engine Coolant (yellow-colored)	VC-7-A (U.S., except CA, OR and NM), VC-7-B (CA, OR and NM)	WSS-M97B51-A1
Manual Transmission	Motorcraft MERCON® ATF	XT-2-QDX	MERCON®
Automatic transmission	Refer to Owner's Guide		

<sup>1</sup>Refer to the engine oil specification chart located under *Engine oil specifications* in this chapter.

## Scheduled Maintenance Information

### GENERAL OWNER'S INFORMATION

Vehicle Identification Number (VIN):

Owner Name:

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Address:

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### GENERAL MAINTENANCE INFORMATION

#### Why maintain your vehicle?

This guide describes the scheduled maintenance required for your vehicle. Carefully following this schedule helps protect against major repair expenses resulting from neglect or inadequate maintenance and may also help to increase the value of your vehicle when you sell or trade it.

It is your responsibility to see that all recommended scheduled maintenance is performed and that the materials used meet Ford engineering specifications. Failure to perform scheduled maintenance in this guide will invalidate warranty coverage on parts affected by the lack of maintenance. Be sure receipts for completed maintenance are kept with the vehicle and confirmation of the work performed is always recorded in this guide.

Your Ford or Lincoln Mercury dealer, or Ford or Lincoln Mercury Quality Care Center has factory trained technicians who can perform the required maintenance using genuine Ford parts. They are committed to meeting your service needs and to assuring your continuing satisfaction.

#### Protecting your investment

Maintenance is an investment that will pay dividends in the form of improved reliability, durability and resale value. To ensure the proper performance of your vehicle and its emission control systems, it is imperative that scheduled maintenance be completed at the designated intervals.

## Scheduled Maintenance Information

Ford strongly recommends the use of genuine Ford replacement parts. Parts other than Ford, Motorcraft or Ford authorized remanufactured parts that are used for maintenance replacement or for the service of components affecting emission control must be equivalent to genuine Ford Motor Company parts in performance and durability. It is the owner's responsibility to determine the equivalency of such parts. Please consult your *Warranty Guide* for complete warranty information.

### **Engine Emissions label**

Emissions information appears on the Engine Emissions label on the engine valve cover. This decal identifies engine displacement and provides certain engine specifications.

Any modification of the emissions control system could create liability under federal law (U.S.) if made prior to sale and registration, under the laws of some states if made thereafter. Further, federal law prohibits vehicle manufacturers, dealers and other persons engaged in the business of repairing, servicing, selling, leasing or trading motor vehicles as well as fleet operations from knowingly removing or rendering an emissions control system inoperative after sale and delivery to an ultimate purchaser. In Canada, modifications of the emissions control system could create liability under applicable federal or provincial laws.

### **Genuine Ford Parts and Service**

When planning your maintenance services, consider your Ford and Lincoln Mercury dealership for all your vehicle's needs.

### **Get the most from your service and maintenance visits**

There are a lot of reasons why your Ford and Lincoln Mercury dealership is a great way to help keep your vehicle running great.

### **Convenience**

To make your service visit even more convenient, in many cases, you'll find extended evening hours and Saturday hours. How's that for quality service?

### **Factory-trained Technicians**

Ford and Lincoln Mercury service technicians participate in extensive factory-sponsored training to help them become the experts on the operation of your vehicle. Many participate in Ford-sponsored training to become certified. Ask your dealer about the training and certification their technicians have received.

### **Genuine Ford and Motorcraft Replacement Parts**

Ford and Lincoln Mercury dealerships stock Ford and Motorcraft branded replacement parts. These parts meet or exceed Ford Motor

## Scheduled Maintenance Information

Company's specifications, and we stand behind them. Maintenance parts installed at your Ford or Lincoln Mercury dealership carry a nationwide, 12 months, 12,000 mile (19,500 km) parts and labor limited warranty. Your dealer can give you details.

### **Value Shopping for Your Vehicle's Maintenance Needs**

Your dealership recognizes the competitive landscape of maintenance and light repair automotive services. With factory-trained technicians, and one-stop service from routine maintenance like oil changes and tire rotations to repairs like brake service, check out the value your Ford and Lincoln Mercury dealers can offer.

### **WHICH MAINTENANCE SCHEDULE SHOULD YOU FOLLOW?**

#### **Owner Checks and Services**

#### **Refer to Mileage Intervals for Additional Checks and Services**

Certain basic maintenance checks and inspections should be performed by the owner or a service technician at the intervals indicated. Service information and supporting specifications are provided in the *Owner's Guide*.

Any adverse condition should be brought to the attention of your dealer or qualified service technician as soon as possible for the proper service advice. The owner maintenance service checks are generally not covered by warranties so you may be charged for labor, parts or lubricants used.

#### **Maximum Oil Change Interval:**

Normal Schedule: 7,500 miles (12,000 km) or 6 months, whichever occurs first.

Special Operating Conditions: 5,000 miles (8,000 km), 6 months or 200 hours of engine operation, see appropriate schedule.

#### **Check every month:**

- Check function of all interior and exterior lights
- Check tires for wear and adjust air pressure (including spare tire)
- Check engine oil level
- Check windshield washer fluid level
- Check and drain fuel filter/water separator

#### **Check every six months:**

- Check lap/shoulder belts and seat latches for wear and function

## Scheduled Maintenance Information

- Check that externally-mounted spare tire is tight (see *Owner's Guide*)
- Check power steering fluid level
- Check washer spray, wiper operation and clean all wiper blades (replace as necessary)
- Check parking brake for proper operation
- Check and lubricate all hinges, latches and outside locks
- Check and lubricate door rubber weatherstrips
- Check and clean body and door drain holes
- Check safety warning lamps (brake, ABS, air bag, safety belt) for operation
- Check cooling system fluid level and coolant strength
- Check battery connections and clean if necessary
- Check clutch fluid level, if equipped

### Multi-point Inspection

In order to keep your vehicle running right, it is important that you have the systems on your vehicle checked regularly. This can help identify any potential issue before there are any problems. Ford Motor Company suggests the following multi-point inspection to be performed at every scheduled maintenance as the way to ensure your vehicle keeps running right.

#### Multi-point inspection - Recommended at every visit

- Check and top up fluid levels: brake, coolant recovery reservoir, manual and automatic transmission, power steering and window washer.
- Inspect tires for wear and check air pressure, including spare.
- Check exhaust system for leaks, damage, loose parts and foreign materials.
- Check battery performance.
- Check operation of horn, exterior lamps, turn signals and hazard warning lights.
- Check radiator, coolers and heater and air conditioning hoses.
- Inspect windshield washer spray and wiper operation.
- Check windshield for cracks, chips and pitting.

## Scheduled Maintenance Information

- Inspect for oil and fluid leaks.
- Inspect air cleaner filter.
- Check shocks and struts and other suspension components for leaks and damage.

### **NORMAL SCHEDULED MAINTENANCE AND LOG**

The following section contains the “Normal Schedule.” This schedule is presented at specific mileage intervals with exceptions noted.

#### ***Additional information available on the Web***

To learn more about the importance of routine and dealer-performed maintenance on your vehicle, please visit the Ford Customer Service website. You’ll also find important warranty information, customer assistance, technical expertise, frequently asked questions and much more. The website location is at: [www.ford.com/](http://www.ford.com/)

Then go to the vehicles and service pick at the web site.

#### ***7,500 miles (12,000 km)***

- Change engine oil and replace oil filter
- Perform multi-point inspection (recommended)
- Inspect tires for wear and rotate
- Inspect air filter restriction gauge, replace filter as required

<b>Date:</b>	<b>Dealer’s Stamp:</b>
<b>Odometer reading:</b>	
<b>R.O.#</b>	

#### ***15,000 miles (24,000 km)***

- Change engine oil and replace oil filter
- Replace engine- and frame-mounted fuel filters
- Perform multi-point inspection (recommended)
- Inspect tires for wear and rotate
- Inspect air filter restriction gauge, replace filter as required
- Inspect and lubricate steering linkage, ball joints, suspension, driveshaft and u-joints

## Scheduled Maintenance Information

- Inspect engine cooling system and hoses
- Inspect brake pads, shoes, rotors, drums, brake lines and hoses and parking brake system.
- Inspect exhaust system and heat shields
- Check wheels for end play and noise
- Inspect and lubricate 4x4 front axle u-joints

<b>Date:</b>	<b>Dealer's Stamp:</b>
<b>Odometer reading:</b>	
<b>R.O.#</b>	

### **22,500 miles (36,000 km)**

- Change engine oil and replace oil filter
- Perform multi-point inspection (recommended)
- Inspect tires for wear. Rotation recommended for optimal tire life.
- Inspect air filter restriction gauge, replace filter as required

<b>Date:</b>	<b>Dealer's Stamp:</b>
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### **30,000 miles (48,000 km)**

- Change engine oil and replace oil filter
- Replace engine- and frame-mounted fuel filters
- Change automatic transmission fluid and external filter element
- Perform multi-point inspection (recommended)
- Inspect tires for wear and rotate
- Inspect air filter restriction gauge, replace filter as required
- Inspect and lubricate steering linkage, ball joints, suspension, driveshaft and u-joints
- Inspect engine cooling system and hoses
- Inspect brake pads, shoes, rotors, drums, brake lines and hoses and parking brake system.



## Scheduled Maintenance Information

- Inspect exhaust system and heat shields
- Check wheels for end play and noise
- Inspect and lubricate 4x4 front axle u-joints

<b>Date:</b>	<b>Dealer's Stamp:</b>
<b>Odometer reading:</b>	
<b>R.O.#</b>	

### **37,500 miles (60,000 km)**

- Change engine oil and replace oil filter
- Perform multi-point inspection (recommended)
- Inspect tires for wear. Rotation recommended for optimal tire life.
- Inspect air filter restriction gauge, replace filter as required

<b>Date:</b>	<b>Dealer's Stamp:</b>
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<b>R.O.#</b>	

### **45,000 miles (72,000 km)**

- Change engine oil and replace oil filter
- Replace engine- and frame-mounted fuel filters
- Perform multi-point inspection (recommended)
- Inspect tires for wear and rotate
- Inspect air filter restriction gauge, replace filter as required
- Inspect and lubricate steering linkage, ball joints, suspension, driveshaft and u-joints
- Inspect engine cooling system and hoses
- Inspect brake pads, shoes, rotors, drums, brake lines and hoses and parking brake system
- Inspect exhaust system and heat shields
- Check wheels for end play and noise
- Inspect and lubricate 4x4 front axle u-joints

## Scheduled Maintenance Information

<b>Date:</b> <b>Odometer reading:</b> <b>R.O.#</b>	<b>Dealer's Stamp:</b>
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### **52,500 miles (84,500 km)**

- Change engine oil and replace oil filter
- Perform multi-point inspection (recommended)
- Inspect tires for wear. Rotation recommended for optimal tire life.
- Inspect air filter restriction gauge, replace filter as required

<b>Date:</b> <b>Odometer reading:</b> <b>R.O.#</b>	<b>Dealer's Stamp:</b>
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### **60,000 miles (96,500 km)**

- Change engine oil and replace oil filter
- Replace engine- and frame-mounted fuel filters
- Change automatic transmission fluid and external filter element
- Change manual transmission fluid
- Lubricate 4x4 front hub needle bearings (Excursion only)
- Lubricate 4x2 front wheel bearings, adjust wheel bearings and replace grease seals (if non-sealed bearings)
- Perform multi-point inspection (recommended)
- Inspect tires for wear and rotate
- Inspect air filter restriction gauge, replace filter as required
- Inspect and lubricate steering linkage, ball joints, suspension, driveshaft and u-joints
- Inspect engine cooling system and hoses
- Inspect brake pads, shoes, rotors, drums, brake lines and hoses and parking brake system.
- Inspect exhaust system and heat shields
- Check wheels for end play and noise

## Scheduled Maintenance Information

- Inspect and lubricate 4x4 front axle u-joints

<b>Date:</b> <b>Odometer reading:</b> <b>R.O.#</b>	<b>Dealer's Stamp:</b>
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### **67,500 miles (108,000 km)**

- Change engine oil and replace oil filter
- Perform multi-point inspection (recommended)
- Inspect tires for wear. Rotation recommended for optimal tire life.
- Inspect air filter restriction gauge, replace filter as required

<b>Date:</b> <b>Odometer reading:</b> <b>R.O.#</b>	<b>Dealer's Stamp:</b>
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### **75,000 miles (121,000 km)**

- Change engine oil and replace oil filter
- Replace engine- and frame-mounted fuel filters
- Perform multi-point inspection (recommended)
- Inspect tires for wear and rotate
- Inspect air filter restriction gauge, replace filter as required
- Inspect and lubricate steering linkage, ball joints, suspension, driveshaft and u-joints
- Inspect engine cooling system and hoses
- Inspect brake pads, shoes, rotors, drums, brake lines and hoses and parking brake system.
- Inspect exhaust system and heat shields
- Check wheels for end play and noise
- Inspect and lubricate 4x4 front axle u-joints

## Scheduled Maintenance Information

<b>Date:</b> <b>Odometer reading:</b> <b>R.O.#</b>	<b>Dealer's Stamp:</b>
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### **82,500 miles (133,000 km)**

- Change engine oil and replace oil filter
- Perform multi-point inspection (recommended)
- Inspect tires for wear. Rotation recommended for optimal tire life.
- Inspect air filter restriction gauge, replace filter as required

<b>Date:</b> <b>Odometer reading:</b> <b>R.O.#</b>	<b>Dealer's Stamp:</b>
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### **90,000 miles (145,000 km)**

- Change engine oil and replace oil filter
- Replace engine- and frame-mounted fuel filters
- Change automatic transmission fluid and external filter element
- Perform multi-point inspection (recommended)
- Inspect tires for wear and rotate
- Inspect air filter restriction gauge, replace filter as required
- Inspect and lubricate steering linkage, ball joints, suspension, driveshaft and u-joints
- Inspect engine cooling system and hoses
- Inspect brake pads, shoes, rotors, drums, brake lines and hoses and parking brake system.
- Inspect exhaust system and heat shields
- Check wheels for end play and noise
- Inspect and lubricate 4x4 front axle u-joints

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## Scheduled Maintenance Information

<b>Date:</b>  <b>Odometer reading:</b>  <b>R.O.#</b>	<b>Dealer's Stamp:</b>
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### **97,500 miles (157,000 km)**

- Change engine oil and replace oil filter
- Change rear axle lubricant (E-450, F-450 and F-550 equipped with DANA axles only)
- Perform multi-point inspection (recommended)
- Inspect tires for wear. Rotation recommended for optimal tire life.
- Inspect air filter restriction gauge, replace filter as required
- Inspect accessory drive belt(s)

<b>Date:</b>  <b>Odometer reading:</b>  <b>R.O.#</b>	<b>Dealer's Stamp:</b>
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### **105,000 miles (170,000 km)**

- Change engine oil and replace oil filter
- Replace engine- and frame-mounted fuel filters
- Change engine coolant (see Motorcraft Premium Gold Coolant Change Record)
- Perform multi-point inspection (recommended)
- Inspect tires for wear and rotate
- Inspect air filter restriction gauge, replace filter as required
- Inspect and lubricate steering linkage, ball joints, suspension, driveshaft and u-joints
- Inspect engine cooling system and hoses
- Inspect brake pads, shoes, rotors, drums, brake lines and hoses and parking brake system.
- Inspect exhaust system and heat shields
- Check wheels for end play and noise

## Scheduled Maintenance Information

- Inspect and lubricate 4x4 front axle u-joints

<b>Date:</b> <b>Odometer reading:</b> <b>R.O.#</b>	<b>Dealer's Stamp:</b>
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### **112,500 miles (181,000 km)**

- Change engine oil and replace oil filter
- Perform multi-point inspection (recommended)
- Inspect tires for wear. Rotation recommended for optimal tire life.
- Inspect air filter restriction gauge, replace filter as required

<b>Date:</b> <b>Odometer reading:</b> <b>R.O.#</b>	<b>Dealer's Stamp:</b>
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### **120,000 miles (193,000 km)**

- Change engine oil and replace oil filter
- Replace engine- and frame-mounted fuel filters
- Change automatic transmission fluid and external filter element
- Change manual transmission fluid
- Lubricate 4x4 front hub needle bearings (Excursion only)
- Lubricate 4x2 front wheel bearings, adjust wheel bearings and replace grease seals (if non-sealed bearings)
- Perform multi-point inspection (recommended)
- Inspect tires for wear and rotate
- Inspect air filter restriction gauge, replace filter as required
- Inspect and lubricate steering linkage, ball joints, suspension, driveshaft and u-joints
- Inspect engine cooling system and hoses
- Inspect brake pads, shoes, rotors, drums, brake lines and hoses and parking brake system.

## Scheduled Maintenance Information

- Inspect exhaust system and heat shields
- Check wheels for end play and noise
- Inspect and lubricate 4x4 front axle u-joints

<b>Date:</b>	<b>Dealer's Stamp:</b>
<b>Odometer reading:</b>	
<b>R.O.#</b>	

### **127,500 miles (205,000 km)**

- Change engine oil and replace oil filter
- Perform multi-point inspection (recommended)
- Inspect tires for wear. Rotation recommended for optimal tire life.
- Inspect air filter restriction gauge, replace filter as required

<b>Date:</b>	<b>Dealer's Stamp:</b>
<b>Odometer reading:</b>	
<b>R.O.#</b>	

### **135,000 miles (217,000 km)**

- Change engine oil and replace oil filter
- Replace engine- and frame-mounted fuel filters
- Perform multi-point inspection (recommended)
- Inspect tires for wear and rotate
- Inspect air filter restriction gauge, replace filter as required
- Inspect and lubricate steering linkage, ball joints, suspension, driveshaft and u-joints
- Inspect engine cooling system and hoses
- Inspect brake pads, shoes, rotors, drums, brake lines and hoses and parking brake system.
- Inspect exhaust system and heat shields
- Check wheels for end play and noise
- Inspect and lubricate 4x4 front axle u-joints

## Scheduled Maintenance Information

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### **142,500 miles (229,000 km)**

- Change engine oil and replace oil filter
- Perform multi-point inspection (recommended)
- Inspect tires for wear. Rotation recommended for optimal tire life.
- Inspect air filter restriction gauge, replace filter as required

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### **150,000 miles (241,000 km)**

- Change engine oil and replace oil filter
- Replace engine- and frame-mounted fuel filters
- Replace accessory drive belt(s)
- Change Premium Gold coolant (see Motorcraft Premium Gold Coolant Change Record)
- Change automatic transmission fluid and external filter element
- Change rear wheel drive (RWD) axle fluid - DANA axles **not** using synthetic fluid only
- Change front axle lubricant (4x4 only)
- Change transfer case fluid (see Special Operating Conditions)
- Replace 4x2 front wheel bearings, adjust wheel bearings and replace grease seals (if non-sealed bearings)
- Perform multi-point inspection (recommended)
- Inspect tires for wear and rotate
- Inspect air filter restriction gauge, replace filter as required
- Inspect and lubricate steering linkage, ball joints, suspension, driveshaft and u-joints



## Scheduled Maintenance Information

- Inspect engine cooling system and hoses
- Inspect brake pads, shoes, rotors, drums, brake lines and hoses and parking brake system.
- Inspect exhaust system and heat shields
- Check wheels for end play and noise
- Inspect and lubricate 4x4 front axle u-joints

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### Exceptions

In addition, there are several exceptions to the Normal Schedule. They are listed below:

#### **Normal vehicle axle maintenance**

Rear axles and power take-off (PTO) units containing synthetic lubricant and light duty trucks equipped with Ford-design axles are lubricated for life. These lubricants are not to be checked or changed unless a leak is suspected, service is required or the axle assembly has been submerged in water. The axle and PTO lubricant should be changed anytime the axle and PTO have been submerged in water. Non-synthetic rear axle lubricants should be replaced every 3,000 miles (5,000 km) or 3 months, whichever occurs first, during extended trailer tow operation above 70°F (21°C) ambient and wide open throttle for extended periods above 45 mph (72 km/h). The 3,000 mile (5,000 km) lube change interval may be waived if the axle was filled with 75W140 synthetic gear lubricant meeting Ford specification WSL-M2C192-A, part number F1TZ-19580-B or equivalent. Add four ounces (118 mL) of additive friction modifier C8AZ-19B546-A (EST-M2C118-A) or equivalent for complete refill of Traction-Lok rear axles. The axle lubricant should be changed anytime an axle has been submerged in water.

#### **E-450, F-450 and F-550 Series axle maintenance**

Replace rear axle lubricant every 100,000 miles (160,000 km) under normal driving conditions on all F-450 and F-550 commercial applications. For F-450 and F-550 trucks operated at or near maximum Gross Vehicle Weights, the rear axle lubricant should be replaced every

## Scheduled Maintenance Information

50,000 miles (80,000 km). In addition, this 50,000 mile (80,000 km) schedule should be observed when the vehicles are operated under the Special Operating Conditions, where noted.

### SPECIAL OPERATING CONDITIONS

#### Towing a trailer or using a camper or car-top carrier

**Every 5,000 miles (8,000 km) or 6 months:** Change engine oil and replace filter

**Every 5,000 miles (8,000 km):** Check air filter restriction gauge (replace air filter as required or when air filter restriction gauge indicates)

**Every 30,000 miles (48,000 km):** Lubricate 4x4 front hub needle bearings (Excursion only)

**Every 60,000 miles (96,000 km):** Change transfer case fluid

**As required:** Change manual transmission fluid

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See corresponding mileage in maintenance schedule for services performed.

#### Extensive idling and/or low-speed driving for long distances as in heavy commercial use such as delivery, taxi, patrol or livery

**Every 5,000 miles (8,000 km), 6 months or 200 hours of engine operation (whichever comes first):** Change engine oil and replace filter

**Every 5,000 miles (8,000 km):** Check air filter restriction gauge (replace air filter as required or when air filter restriction gauge indicates)

**Every 5,000 miles (8,000 km):** Inspect brake system. Inspect and lubricate 4x2 ball joints and steering idler arms

**30,000 miles (48,000 km) and 90,000 miles (144,000 km):** Lubricate 4x2 wheel bearings. Replace wheel bearing grease seal.

**Every 60,000 miles (96,000 km):** Change transfer case fluid

## Scheduled Maintenance Information

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See corresponding mileage in maintenance schedule for services performed.

### Operating in dusty conditions such as unpaved or dusty roads

**Every 5,000 miles (8,000 km) or 6 months:** Change engine oil and replace filter

**Every 5,000 miles (8,000 km):** Check air filter restriction gauge (replace air filter as required or when air filter restriction gauge indicates)

**Every 15,000 miles (24,000 km):** Inspect and lubricate 4x2 ball joints and steering idler arms and linkage

**Every 60,000 miles (96,000 km):** Change transfer case fluid

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See corresponding mileage in maintenance schedule for services performed.

### Off-road operation

**Every 5,000 miles (8,000 km) or 6 months:** Change engine oil and replace filter

**Every 5,000 miles (8,000 km):** Check air filter restriction gauge (replace air filter as required or when air filter restriction gauge indicates)

**Every 5,000 miles (8,000 km):** Inspect and lubricate, as required, steering linkage, ball joints with Zerk fittings and u-joints

**Every 15,000 miles (24,000 km):** Lubricate 4x4 front hub needle bearings (Excursion only)

**Every 50,000 miles (80,000 km):** Check front axle lubricant (4x4 only)

**Every 50,000 miles (80,000 km):** Change rear axle lubricant (E-450, F-450 and F-550 only)

## Scheduled Maintenance Information

**Every 60,000 miles (96,000 km):** Change transfer case fluid

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See corresponding mileage in maintenance schedule for services performed.

### Short trip in cold operating conditions

**Every 5,000 miles (8,000 km):** Inspect and lubricate 4x2 ball joints and steering idler arms

**Every 60,000 miles (96,000 km):** Change transfer case fluid

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See corresponding mileage in maintenance schedule for services performed.

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See corresponding mileage in maintenance schedule for services performed.

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See corresponding mileage in maintenance schedule for services performed.

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See corresponding mileage in maintenance schedule for services performed.

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See corresponding mileage in maintenance schedule for services performed.

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See corresponding mileage in maintenance schedule for services performed.

### MAINTENANCE AND SERVICE RECORD

#### See an authorized dealer

This section of the guide is designed to allow your Ford or Lincoln Mercury dealer, or Ford or Lincoln Mercury Auto Care service center or other qualified service technician to record that the recommended service was completed at the appropriate mileage intervals. Be sure to ask your service provider to record the type of service rendered (Normal or Special Operating Conditions - SOC) each time service is performed.

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See corresponding mileage in maintenance schedule for services performed.

### MOTORCRAFT PREMIUM GOLD COOLANT CHANGE RECORD

#### Premium Gold coolant

- 5 years or 105,000 miles (170,000 km) - change Premium Gold coolant (whichever comes first)
- After initial change - change Premium Gold coolant every 3 years or 45,000 miles (72,000 km)



