INTRODUCTION

Ford Motor Company welcomes you to the growing number of people who have chosen the fuel economy of a diesel-powered Ford truck. 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 2.2 liter diesel engine. It provides recommendations on engine care and operating procedures. For complete vehicle information, refer to the 1983 Truck Owner's Guide also included with the vehicle.

This guide should be considered a permanent part of the vehicle and remain with the vehicle, if sold, to provide the next owner with engine operating and maintenance information.

All information and illustrations presented are based on the latest information available at the time of printing. The right is reserved to make changes at any time without notice.

CAUTIONS AND WARNINGS

Throughout this guide, you will find CAUTIONS and WARNINGS. WARNINGS remind you to be especially careful to avoid personal injury. CAUTIONS are given to prevent you from making an error which could damage the vehicle and possibly cause personal injury.

WARRANTY INFORMATION (U.S. and Canada Only)

The warranties covering this vehicle are stated in detail in the Warranty Facts Booklet.

- Vehicle Warranty Coverage
- Component Warranty Coverage
- Emission Control Systems Warranties

You should read the Warranty Facts Booklet carefully; it contains a basic statement of your rights and responsibilities.

WARRANTY INFORMATION

If you lose or misplace the Warranty Facts Booklet that came with your new vehicle, a replacement copy may be obtained free of charge from any Ford or Lincoln-Mercury dealer, or the nearest Ford Parts and Service Division District office listed elsewhere in this guide. You may also contact the Ford Parts and Service Division in Dearborn, Michigan by calling (313) 337-6950 or writing to: Ford Parts and Service Division, P.O. Box 1805, Dearborn, Michigan 48121.

FORD'S EXTENDED SERVICE PLAN (U.S. and Canada Only)

FORD MOTOR COMPANY DEALERS OFFER "OUR ULTIMATE OPTION" — YOUR KEY TO FUTURE COST PROTECTION

Many Ford Motor Company dealers offer the optional Ford Extended Service Plan contract for buyers of new Ford Motor Company vehicles. The Ford Extended Service Plan, covering specified major components, provides longer service protection for your investment than the vehicle's basic warranty.

If you did not take advantage of the Ford Extended Service Plan at the time of vehicle purchase, YOU STILL MAY BE ELIGIBLE. See your dealer at once for details of our "Ultimate Option" in extra protection.

DIESEL ENGINE INFORMATION

The engine serial number is located on the left front side of the engine block under the intake manifold.

Fuel System

The diesel engine fuel system consists of a fuel sedimenter, an engine fuel filter, an integral fuel pump/fuel injection pump, fuel injection lines and an injection nozzle for each cylinder. The fuel sedimenter removes large foreign particles and water, and the engine fuel filter removes the finer particles. The engine fuel filter is the spin-on type and requires replacement at regular intervals. The fuel sedimenter should be drained at regular intervals or whenever the WATER IN FUEL light comes on and stays on. For recommended intervals, see Scheduled Maintenance Charts on pages 27-28.

DIESEL ENGINE INFORMATION

Lubrication System

Diesel engine lubrication is the pressure regulated type. The system consists of an oil pump, a primary (full-flow) oil filter (at the left rear of the engine), and a by-pass oil filter (at the right front of the engine).

Cooling System

The engine cooling system consists of a belt-driven water pump and a dual acting thermostat which regulates coolant temperature.

Engine Governor

The engine governor is located in the fuel injection pump. The governor controls fuel input to limit maximum engine speed. Between idle and maximum speeds, fuel input is controlled directly by the driver through the accelerator pedal.

Fast Start Glow Plug System

The 2.2L diesel engine utilizes an electric glow plug system to aid starting the engine.

The system consists of four glow plugs (one for each cylinder), control switch, power relay, after glow relay, wait lamp and a wiring harness which incorporates two fusible links in the wiring harness. The system is activated when the ignition switch is in the ON position.

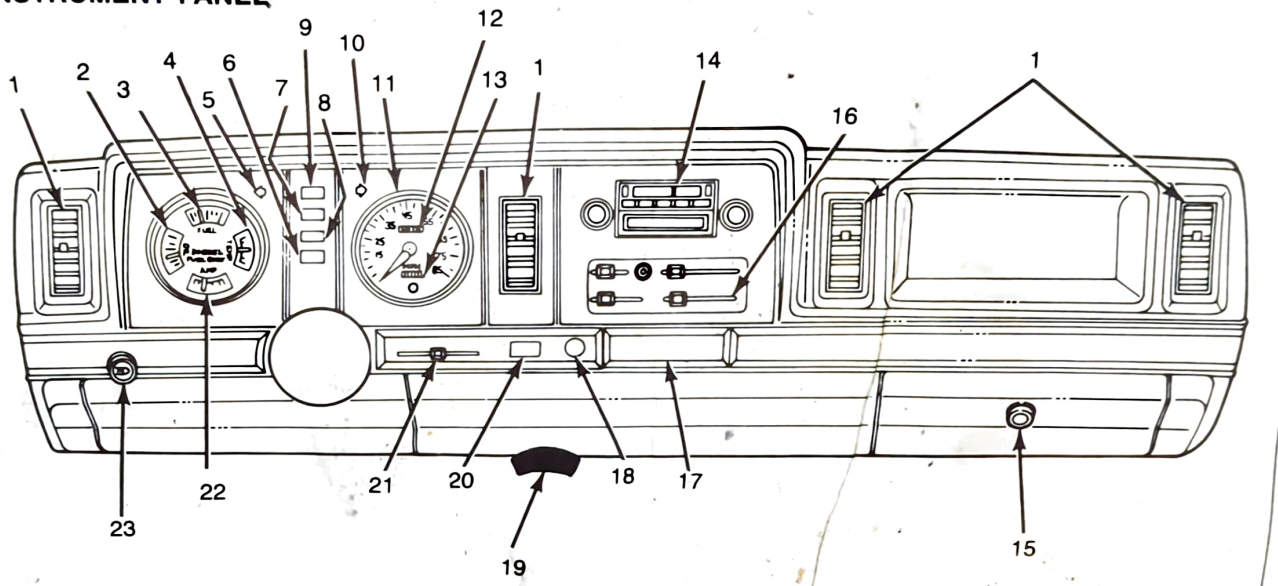
Power Brakes

Power for the vacuum booster brakes is obtained from a belt-driven vacuum pump which operates when the engine is running. This acts to multiply the force applied to the brake pedal so that very little effort is required to operate the brakes while the engine is running. Brakes will operate with the engine off, but more effort is required. All instructions regarding standard brakes also apply to power brakes.

If there is a loss of vacuum below normal operating vacuum, (i.e., vacuum system leak, drive belt or vacuum pump failure) the brake warning light will glow and remain on. Have the brake system checked immediately.

NOTE: A much greater force on the brake pedal will be required if a major vacuum loss occurs.

INSTRUMENT PANEL



INSTRUMENT PANEL

1. Instrument Panel Register
2. Engine Oil Pressure Gauge
3. Fuel Gauge
4. Engine Coolant Temperature Gauge
5. Left Turn Signal Indicator
6. Water in Fuel Warning Light
7. Seatbelt Warning Light
8. Brake Warning Light
9. High Beam Indicator Light
10. Right Turn Signal Indicator
11. Speedometer (MPH-km/h — U.S.; KM/H-mph — Canada)
12. Odometer (Miles — USA/Kilometers — Canada) with Optional Cluster shown
13. Trip Odometer (Miles — USA/Kilometers — Canada) — Optional or Odometer (Miles — USA/Kilometers — Canada) — Standard
14. Radio
15. Glove Box
16. Heater/Air Conditioner Controls
17. Ashtray
18. Cigar Lighter
19. Cold Start Knob
20. Wait to Start Indicator Light
21. Dual Fuel Tank Selector Switch (Optional)
22. Battery Charge Indicator Gauge
23. Light Switch

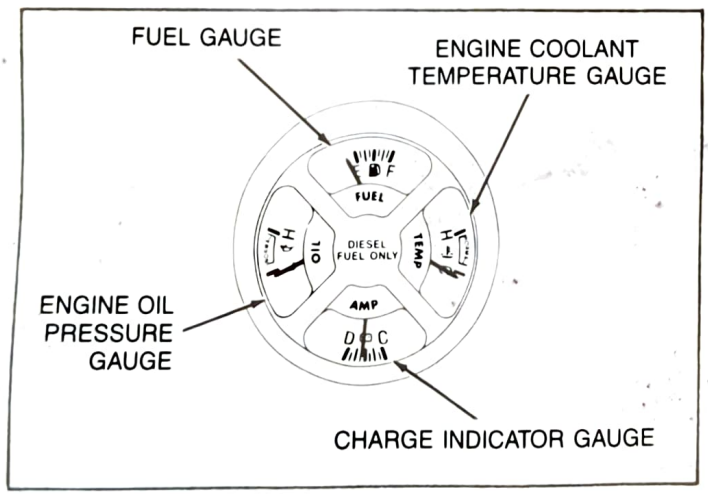
Wait To Start (Glow Plug Indicator) Light

With the key in the ON position, the WAIT TO START indicator will light. Wait until the light goes off before starting. Refer to "Starting and Operating the Diesel Engine" for further explanation.

Water In Fuel Warning Light

During refueling it is possible for water as well as diesel fuel to be pumped into your fuel tank. Your vehicle's fuel system is equipped with a fuel sedimenter to remove water and solid contaminants from the fuel. The WATER IN FUEL light will glow when the fuel sedimenter has a significant quantity of water. If the light glows red while the engine is running, stop the vehicle as soon as safely possible, shut off the engine and drain the sedimenter. (Refer to procedure on pages 19-20.) Allowing water to stay in the fuel sedimenter could result in extensive damage to, or failure of the fuel injection system.

The light will also glow when the ignition key is turned to the START position to indicate that the light is functioning properly. If it does not glow, have the electrical system checked as soon as possible.



Engine Oil Pressure Gauge

This gauge (OIL) indicates the engine's oil pressure. The position of the pointer will vary within the normal operating band. Do not increase engine speed until the oil pressure gauge indicates normal. Shut engine down if oil pressure does not register on gauge within 20 seconds. If the pointer drops below the normal operating band when the engine is running, there is a loss of pressure. If this occurs, stop your vehicle as soon as safely possible, shut off the engine and check oil level.

CAUTION — Do not continue to operate your engine as long as the pointer is below the normal operating band. Otherwise your engine may be severely damaged.

Engine Temperature Gauge

The temperature (TEMP) gauge indicates the temperature of the engine coolant. Normally the pointer will move to the NORMAL band when the engine is warm. Under certain conditions, such as heavy traffic or stop-and-go driving in hot weather, the pointer may read at the very top of the NORMAL band. There is no danger to the engine unless the pointer moves out of the NORMAL band towards the H (HOT) position. If it does, the engine is overheating and engine damage may occur. Safely pull off the road, turn off the engine and let it cool. Check the coolant level following instructions under Engine Coolant.

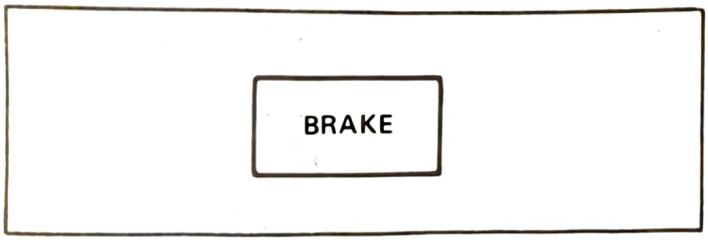
CAUTION — If the engine continues to overheat, have the cooling system checked and repaired.

Brake System Warning Light

The brake system warning light should glow when the ignition lock cylinder is in the START position. The light will continue to glow until system vacuum builds to normal levels.

CAUTION — If the brake system warning light fails to glow momentarily when you start the engine, have the electrical system checked immediately.

WARNING — If the BRAKE light glows other than momentarily with the ignition lock cylinder in the START position, the braking system should be checked immediately.



Your vehicle has vacuum booster brakes, and a dual braking hydraulic system. The warning light glows if:

- There is a loss of vacuum below normal operating level, or
- There is a loss of hydraulic pressure in either portion of the brake system when the brakes are applied.

When properly adjusted, the remaining brake system is still capable of stopping the vehicle, however, the stopping distance and/or pedal effort will be increased. Have the brake system checked immediately if the light comes on other than when the ignition lock cylinder is in the START position.

NEW VEHICLE BREAK-IN

Your new vehicle does not need an extensive break-in. Try not to drive continuously at the same speed as parts tend to better adjust themselves to other parts if various speeds are used during the first 1000 miles (1600 km).

New vehicles should be driven 500 miles (800 km) before towing a trailer.

Don't add antifriction compounds or special break-in oils during the first few thousand miles of operation, since these additives may prevent piston ring seating. See Engine Oil for information on oil usage.

DIESEL ENGINE STARTING OPERATION

The ON position on the ignition lock cylinder is used to start the glow plug preheating sequence. The START position is used to crank the engine.

CAUTION — Do not crank the starter continuously for more than 30 seconds at a time. The starter could overheat or be seriously damaged. After cranking the starter for 30 seconds, wait for another 30 seconds before cranking the starter again. As soon as the engine fires, release the key from the START position to avoid damaging the starter.

WARNING — Do not use any starting fluids such as ether in the air intake system (See Air Cleaner Decal). Such fluids can cause immediate explosive damage to the engine and possible personal injury.

CAUTION — Do not add gasoline, gasohol or alcohol to diesel fuel. Damage to the fuel injection system may result.

Starting Procedures 2.2L Diesel Engine

Climate conditions and other factors play a large part in deciding how you should go about starting your vehicle. Read all the starting instructions carefully so you'll be aware of these factors when you start your vehicle. For low ambient temperatures (below 32°F/0°C) the use of the correct SAE viscosity (thickness) grade oil is essential for proper operation.

NOTE — A sudden increase in engine noise level soon after a fuel fill may be caused by substandard fuel.

The START position on the ignition lock cylinder is used to crank the engine.

WARNING — Before turning the key, make sure the parking brake has been set fully. Depress the clutch pedal and place the gearshift lever in the NEUTRAL position. The starter will operate while the lever is in any gear, and the vehicle could lurch forward or backward if the clutch is not depressed.

Cold Engine

1. Be sure your headlights are off while you start the engine. This will reduce the electrical load on your batteries and allow all the power to go to the glow plugs and starter motor.
2. Pull the Cold Start Knob out fully and turn clockwise to lock it.
3. Turn ignition switch to the ON position.
4. When the Wait to Start light goes out, turn the ignition switch to the START position and hold until the engine starts. Do not crank the engine for more than 30 seconds.

   In temperatures above 32°F (0°C), do not depress the accelerator pedal. In temperatures below 32°F (0°C), depress the accelerator pedal fully and hold until the engine starts.
5. Release the key when the engine starts. If the engine fails to start, wait 30 seconds then repeat the procedure.

6. After the engine starts, release the Cold Start Knob after approximately 30 seconds by rotating counterclockwise 90° and then pushing it in fully. Release the parking brake, engage the transmission and drive away.

In subzero temperatures, the engine may require extended cranking times and several attempts to start. Under continuous extreme cold overnight conditions, use of the standard engine block heater is recommended.

WARNING — Do not use starting fluids such as ether in the air intake system. (See Air Cleaner Decal.) Such fluids can cause immediate explosive damage to the engine and possible personal injury.

CAUTION — Do not add gasoline, gasohol or alcohol to diesel fuel. Damage to the fuel injection system may result.

For cold weather operation, the Cold Start Knob may be used to assist engine operation during the first mile of driving.

Engine Block Heater

The engine block heater is used to warm the engine coolant which improves starting, provides for faster engine warm-up and results in quicker response from heater-defroster system. It is recommended for use whenever the outside temperature is 0°F or below (−18°C or below). The heater is plugged into a grounded 110 volt outlet (household system) and consumes 400 watts of power. For best results the heater should be plugged in at least three hours prior to starting. The block heater power cord should be disconnected and safely stowed before vehicle is started.

Warm Engine

1. Turn ignition switch to ON position with accelerator pedal at idle position.
2. When the Wait to Start light goes out, turn the ignition switch to the START position and hold until the engine starts. Do not crank the engine for more than 30 seconds.

3. Release the key when the engine starts. Release the parking brake, engage the transmission and drive away.

If Your Vehicle Does Not Start

If your vehicle cannot be started normally, a push from another vehicle will usually get it going. Since a sudden forward surge often occurs when the engine starts, having your vehicle towed to start the engine is not advisable.

Place the shift lever in low gear before being pushed. Depress the clutch pedal fully and turn the ignition switch to the ON position. When the vehicle's speed reaches 10 mph (16 km/h) slowly release the clutch pedal and press the accelerator pedal halfway down until the engine starts.

Cold Weather Operation

When parking your vehicle overnight, leaving it inside a garage, even if not heated, will make morning starting much easier. Changing to a lighter grade engine oil also makes starting easier under these conditions.

Whenever possible, let the engine run for a few minutes to warm up before driving. When you drive away, take it easy at first to give transmission and axle lubricants time to circulate.

At temperatures below 20°F (−7°C), Number 2-D diesel fuel may thicken and clog the fuel filter. This is usually caused by the naturally-occurring paraffin in diesel fuel turning to wax as it gets colder. Your engine is equipped with an in-line fuel heater to help prevent low temperature wax formation and fuel filter clogging. However, if the engine starts but stalls out after a short time and will not re-start, the fuel filter 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.

WARNING — Do not use starting fluids such as ether in the diesel air intake system. (See Air Cleaner Decal.) Such fluids can cause immediate explosive damage to the engine and possible personal injury.

CAUTION — Do not add gasoline, gasohol or alcohol to diesel fuel. Damage to the fuel injection system may result.

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 engine air intake system. This could plug the air cleaner with snow and cause the engine to stall. If the engine does stall, temporary operation of the vehicle can be obtained by removing the connector tube from between the air cleaner and the engine. This will allow the engine to draw air from the engine compartment area. As soon as possible, the plugged air cleaner should be serviced and re-connected to prevent engine damage.

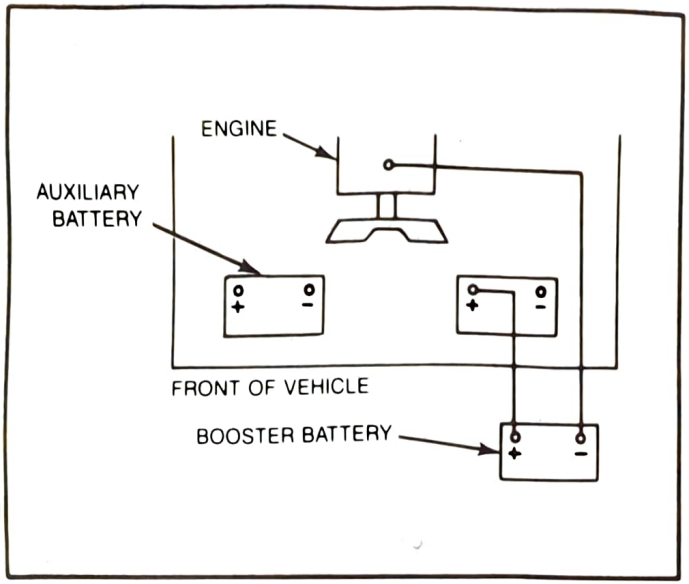
EMERGENCY STARTING PROCEDURES

Use of Jumper Cables

WARNING — To avoid harm to yourself or damage to your vehicle or battery, follow these directions in order. If in doubt, call for road service.

- Use only a 12-volt jumper system with negative ground. You can damage a 12-volt starting motor and glow plug system beyond repair by connecting it to a 24-volt power supply (two 12-volt batteries in series or a 24-volt motor generator set).
- The glow plug power relay is located on the engine compartment dash panel directly behind the engine. Do *not* attach jumper cables to this relay. The glow plugs and glow plug control module will be severely damaged.
- Do not disconnect the battery of the vehicle to be started. Disconnecting the battery could damage the vehicle's electrical system.
- Make sure the vehicles do not touch one another. Set the parking brake fully on each. Stay clear of the engine cooling fan.
- Turn on the climate control system fan of the vehicle to be started. This helps protect the electrical system from power surges when the booster battery is connected and disconnected. Turn off all other switches and lights on both vehicles.
- Make jumper cable connections. (See illustration.)

NOTE — For optimum power and safety, connect booster battery cables to battery on driver's side of vehicle to be started. Do not jump start through auxiliary battery on passenger's side. Damage to vehicle electrical system will result. See warning label on the radiator support near the battery. Also, a cover is supplied on the passenger side battery positive terminal to discourage jump starting at this battery.



WARNING — Do not use starting fluids such as ether in the air intake system. (See Air Cleaner Decal.) Such fluids can cause immediate explosive damage to the engine and possible personal injury.

CAUTION — Do not add gasoline, gasohol or alcohol to diesel fuel. Damage to the fuel injection system may result.

— Connect one end of the first jumper cable to positive (+) terminal of the dead battery, then the other end to the positive (+) terminal of the booster battery.

— Connect one end of the second jumper cable to negative (−) terminal of the booster battery, and then the other end to an engine bolthead or good metallic contact spot on the engine of the vehicle to be started. Do not attach the other end to the negative (−) battery terminal, because a spark could occur and cause explosion of gases normally present around the battery.

- Make sure the jumper cables are not in the way of moving engine parts.
- Start the engine of the vehicle with the booster battery. Run the engine at a moderate speed.
- Start the engine of the vehicle with the dead battery.
- Leave all switches off except fan switch and reduce engine speed to idle on both vehicles to prevent possible damage to the vehicle's electrical system.
- Remove cables in reverse order.
  - — Remove the (−) negative end of the jumper cable from the engine of the vehicle with the dead battery.
  - — Remove the end of the jumper cable from the negative (−) terminal of the booster battery.
  - — Remove the end of the jumper cable from the positive (+) terminal of the booster battery.
  - — Remove the end of the jumper cable from the positive (+) terminal of the dead battery.

DIESEL ENGINE DRIVING TIPS

- Avoid overspeeding of the engine when going down long and steep grades. The engine's governor has no control over engine speed when it is being pushed by the loaded or unloaded vehicle. Operate in a gear that will not permit engine overspeed.

CAUTION — Operating the engine beyond the governed speed can cause severe damage.

RECOMMENDED SHIFT SPEEDS — MANUAL TRANSMISSION (2.2L DIESEL ENGINE)	
UPSHIFTS: NORMAL ACCELERATION	
Gear Change	**Shift Speed**
First to Second	12 mph (19 km/h)
Second to Third	20 mph (32 km/h)
Third to Fourth	30 mph (48 km/h)
UPSHIFTS: CRUISING CONDITIONS (RECOMMENDED FOR BEST FUEL ECONOMY)	
Gear Change	**Shift Speed**
First to Second	9 mph (14 km/h)
Second to Third	15 mph (24 km/h)
Third to Fourth	26 mph (42 km/h)
MAXIMUM DOWNSHIFT SPEEDS	
Gear Change	**Shift Speed**
Fourth to Third	45 mph (72 km/hr)
Third to Second	30 mph (48 km/hr)
Second to First	15 mph (24 km/hr)

Refer to Owner's Guide for manual transmission operating instructions and precautions.

Flood Areas

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.

NOTICE TO VEHICLE OWNERS ON MISFUELING

- Your warranties may be invalidated if malfunction or damage to your vehicle is due to use of the wrong fuel.

CAUTION — Your vehicle is equipped with long-life, plastic fuel lines which provide improved fuel cleanliness and freedom from corrosion. Care should be taken when servicing your vehicle to prevent damage to these lines.

If lines should require repair or replacement, only Ford-approved parts should be used. These fuel lines are made of a specially selected, fuel compatible, plastic material. Use of alternate materials may be hazardous.

GENERAL MAINTENANCE INFORMATION

The Scheduled Maintenance Services listed on pages 27-28 in this section 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. Using these parts for replacement is your assurance that Ford-Built quality stays in your vehicle.

Service and Maintenance

This section of the guide covers only those service and maintenance items that are unique to the diesel engine. For more complete service and maintenance information, consult the owner's guide.

Washing the Diesel Engine

CAUTION — Ford Motor Company does not recommend washing the diesel engine. However, if you must wash the engine, do so only when the engine is cold. Never wash the engine when it is warm, hot or running. Spraying water or other cleaning fluids on a warm engine can seriously damage the engine's fuel system.

Fuel Requirements

- The 2.2L diesel engine is designed to use number 1-D or 2-D diesel fuel only. At temperatures below 20°F (−7°C) number 2-D fuel may cause operating problems. (See diesel engine Cold Weather Operation on pages 12-13.)

CAUTION — Do not add gasoline, gasohol or alcohol to diesel fuel. Damage to the fuel injection system may result.

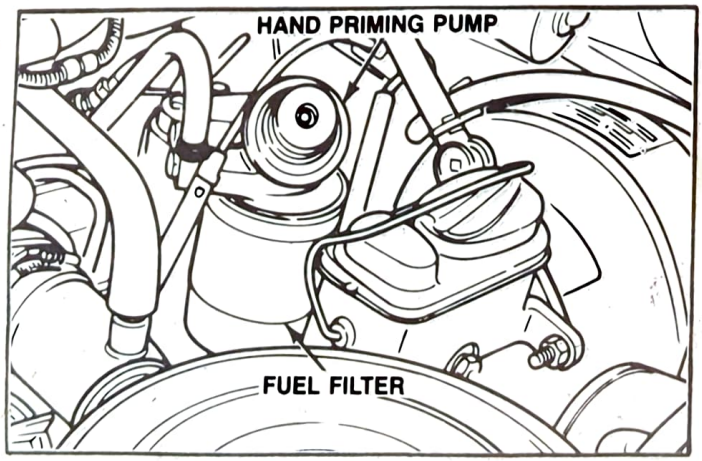
- Take care not to run your diesel vehicle out of fuel. This will allow air to enter the fuel system and will make restarting difficult. Longer than normal cranking time may be required.

- If you do run out of fuel, starting will be easier if the air is first purged from the fuel filter. (Refer to Changing Engine Fuel Filter on pages 18-19.) When re-starting, do not crank the engine for more than 30 seconds at a time and allow the starter to cool for 30 seconds between attempts.

NOTE: An engine that suddenly becomes noisy after a fuel fill could be using substandard fuel. (i.e., high water content or low cetane rating or gasoline in the fuel.) Whenever possible, 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 pump or injection nozzles causing expensive-to-repair damage.

Changing Engine Fuel Filter

The engine fuel filter is the paper element type and the filter housing includes a hand priming pump to bleed air from the fuel line.



1. Remove spin-on filter by turning counterclockwise (when viewed from bottom of filter) with hands or suitable tool.
2. Clean filter mounting pads.
3. Coat the gasket of the new spin-on, throw-away filter with clean diesel fuel.
4. Tighten until gasket touches filter header.
5. Tighten an additional 1/2 turn.

NOTE — To avoid fuel contamination do not add fuel directly to the new filter.

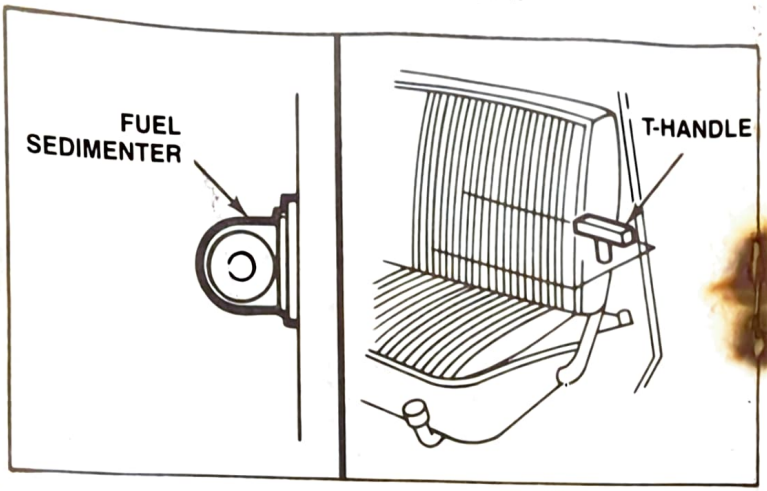
To purge air from the filter, loosen the air vent plug on the priming pump fitting and pump the plunger until fuel flows from the air vent plug hole free of bubbles. Pumping the plunger is performed by placing the heel of your hand on the pump plunger, pushing in and releasing the plunger button in a slow, steady rhythm. (See illustration.) Hold the pump at the bottom of the last stroke and tighten the air vent plug. Start the engine and check for leaks.

NOTE — The spin-on, throw-away fuel filter externally resembles the primary oil filter. Internally, however, there is no similarity. The use of either as a substitute for the other may cause operating problems or serious engine damage.

Fuel Sedimenter

Water should be drained from the fuel sedimenter whenever the warning light comes on or every 5,000 miles. More frequent drain intervals may be required depending on fuel quality and vehicle usage.

The instrument panel warning light (WATER IN FUEL) will glow when approximately 0.5 liter of water has accumulated in the sedimenter. When the warning light glows, shut off the engine as soon as safely possible. A suitable drain pan or container should be placed under the sedimenter, which is mounted inside the frame rail, underneath the driver's side of the cab. To drain the fuel sedimenter, pull up on the T-handle (located on the cab floor behind the driver's seat) until resistance is felt. Turn the ignition switch to the ON position so the warning light glows and hold T-handle up for approximately 45 seconds after light goes out.



To stop draining fuel, release T-handle and inspect sedimenter to verify that draining has stopped. Discard drained fluid suitably.

If the light continues to glow after draining according to above procedure, have the fuel system checked and repaired.

The fuel sedimenter should also be drained at 5,000 mile intervals according to the Scheduled Maintenance. At this service interval, if the warning light is not glowing, look at the draining fluid to determine when clear diesel fuel is flowing. Stop draining the sedimenter as soon as clear diesel fuel appears.

Engine Oil

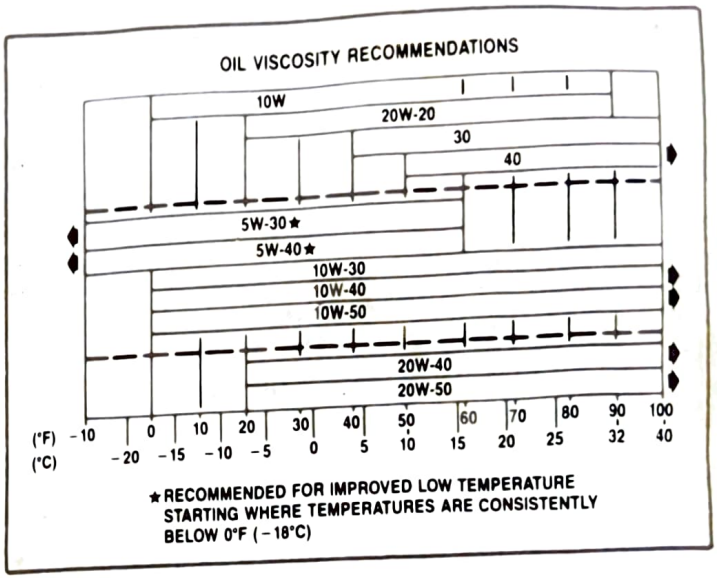
Oil Quality

To help achieve proper engine performance and durability, use only engine lubricating oils of the proper quality. These oils also help provide maximum engine efficiency which reduces air pollution.

Use Motorcraft Super Duty, Premium, or Single Weight oil or equivalent that meets API Service Specifications SF/CC or SF/CD.

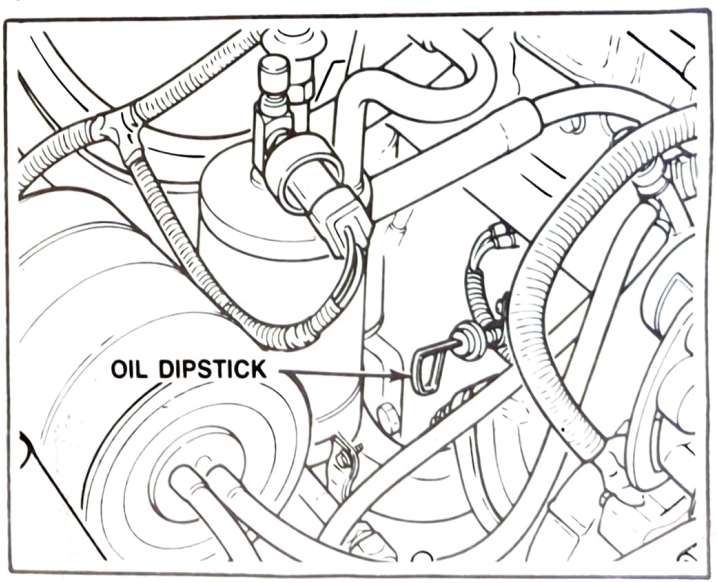
Oil Viscosity (Thickness)

When you change or add oil, select oil with the proper viscosity. Check the accompanying table and select the oil which most closely matches the temperature range you expect during the service interval.



Checking Oil Level

It is normal to add some oil between oil changes. Have your engine oil level checked or check it yourself at 500 mile intervals. To check the engine oil level, park your vehicle on level ground and turn engine off. Protecting yourself from engine heat, pull out the dipstick. Wipe it clean and reinsert fully. Pull the dipstick out and check level. Keep the oil level within the SAFE range or above the ADD mark on the dipstick by adding oil as required. Do not overfill.

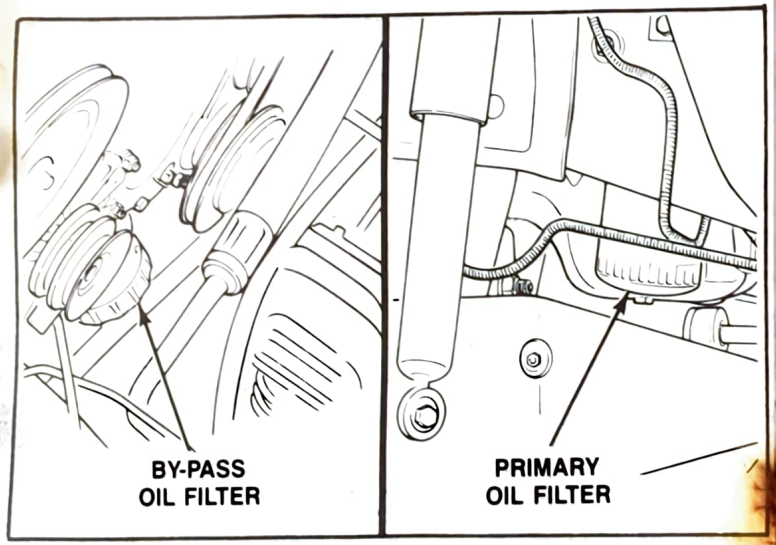


Changing Oil and Filter

Change engine oil and filters according to the Scheduled Maintenance Charts. Change more frequently if your vehicle operation includes extended periods of idling or low-speed operation, towing trailers, driving for a long time in cold temperatures or driving short distances.

Use Motorcraft FL-786 Long-Life oil filter or equivalent which meets Ford Specification ES-E1ZE-6714-AA. These filters protect your vehicle's engine by filtering harmful particles without clogging up or blocking the flow of oil to vital engine parts.

To replace either filter, unscrew the primary (full-flow) filter at the left rear of the engine and the by-pass filter at the right front of the engine from the adapter fitting using an oil filter wrench. Turn horizontally and let excess oil drain off and remove.



Clean the engine block mounting areas. Lightly coat the gasket surface of the new filter with engine oil and hand tighten until gasket touches base. Tighten using filter wrench if required: *Full flow filter* — another 3/4 turn, *by-pass filter* — another 1-1/4 turn. Fill the crankcase and run the engine to check for leaks.

WARNING — Do not handle a hot oil filter with bare hands.

Replacing Air Cleaner Filter

The Motorcraft air cleaner filter element must be replaced at regular intervals as outlined in the Maintenance Section of this guide.

Engine Cooling System

The cooling system is of the coolant recovery type. Coolant in the system expands with heat and overflows into the expansion reservoir. When the system cools down, coolant is drawn back into the radiator.

Walter C. Avrea, the owner of patents 3,601,181 and RE 27,965 has granted Ford Motor Company rights with respect to cooling systems covered by these patents.

Checking Coolant Level

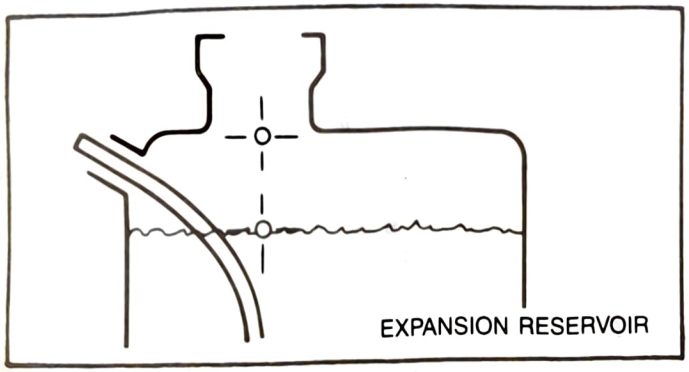
Check the coolant level in the radiator and expansion reservoir at least once a month, only when the engine is cool.

WARNING — Failure to follow these instructions could result in serious personal injury from hot coolant or steam blow out and/or damage to the cooling system or engine. Never remove the radiator cap under any circumstances while the engine is operating. Switch off the engine and wait until it has cooled. Even then use extreme care when removing the cap from the radiator. Wrap a thick cloth around the cap and turn it slowly to the first stop. Step back while the pressure is released from the cooling system. When you are sure all the pressure has been released, press down on the cap — still with a cloth — turn and remove it. Stand clear of the radiator opening. Hot coolant may splash out.

On a full system, it is normal to have coolant in the coolant expansion reservoir.

Whenever coolant level checks are made, check condition of radiator cap rubber seal. Make sure it is clean and free of any dirt particles. Rinse off with water if necessary. When replacing cap on radiator, also make sure radiator filler neck seat is clean. Check that overflow hose is not kinked and is connected to the radiator filler neck and coolant reservoir.

If you have to add coolant more than once a month, or if you have to add more than one quart at a time, have your dealer check the system for leaks.



Coolant

Whenever you add coolant to the radiator, use equal parts of water and Ford Cooling System Fluid or equivalent that meet Ford specifications.

Plain water may be used in an emergency, but replace it with the specified coolant as soon as possible to avoid damage to the system. With only water in the system, do not let the engine run hot.

Freezing Protection

The factory-installed solution of Ford Cooling System Fluid and water will protect your vehicle to −20°F (−29°C) or −35°F (−37°C) in some northern districts of U.S., Alaska and Canada.

Check the freezing protection rating of the coolant at least once a year, just before winter. Maintain a protection rating of at least −20°F (−29°C) to prevent engine damage as a result of freezing and to assure proper engine operating temperature.

Replacing Coolant

After the engine cooling system is drained, the following procedure should be used to insure a complete fill:

- Fill radiator, when cold, to a level 1-1/2" below the filler neck seat with a 50/50 mixture of coolant concentrate and water.
- Reinstall the radiator cap to the pressure relief position by installing the cap to the fully-installed position and then backing off to the first stop.
- Start and idle engine until the radiator upper hose is warm.
- Shut off engine. Cautiously remove radiator cap and add coolant (50/50 mixture of coolant concentrate and water) until radiator is full. Reinstall radiator cap securely.
- Add coolant (50/50 mixture of coolant concentrate and water) to reservoir, until filled to "Cold Fill Level."
- After engine has cooled, refill expansion reservoir to "Cold Fill Level."
- Upon subsequent engine operation to normal operating temperatures, coolant will normally be at a level higher than the "Cold Fill Level" line on the expansion reservoir and later return to a level near the "Cold Fill Level" line after the engine has cooled.
- Maintain level in the coolant expansion reservoir to Cold Fill Level line. Coolant above Cold Fill Level line does not have to be removed from coolant expansion reservoir.
- Check coolant level in radiator/expansion reservoir at least once a month, only when the engine is cool. Fill to specified level as required with a 50/50 percent mixture of coolant concentrate and water.

Coolant Specification

Use only a permanent-type coolant that meets Ford Specification. Do not use alcohol or methanol antifreeze or mix them with the specified coolant.

CAUTION — Use of the wrong coolant may cause radiator and/or engine damage.

Plain water may be used in an emergency, but replace it with the specified coolant as quickly as possible to avoid damage to the system. Do not let the engine run hot with only water in the system.

Checking Hoses

Inspect all engine and heater system hoses for deterioration, leaks and loose hose clamps as specified in the maintenance schedule only when the engine is cool. Repair or replace with Motorcraft hoses or equivalent as necessary.

Washing the Diesel Engine

CAUTION — Ford Motor Company does not recommend washing the diesel engine. However, if you must wash the engine, do so only when the engine is cold. Never wash the engine when it is warm, hot or running. Spraying water or other cleaning fluids on a warm engine can seriously damage the fuel system.

Emission Control System 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 operators, from knowingly removing or rendering an emissions control device or system inoperative. Further, modifications of the emissions control system could create liability on the part of individual owners under the laws of some states. In Canada, modifications of the emissions control system could create liability under applicable Federal or Provincial laws.

Vehicle Emissions Control Information (VECI)

Emissions information appears on the VECI decal located on the center of the radiator support at the front of the engine compartment. This decal identifies engine displacement and provides certain tune-up specifications.

Scheduled Maintenance Services

The following charts detail the maintenance services which are to be performed at the indicated intervals, following the procedures in the 1983 Ford Ranger Shop Manual. Maintenance service adjustments must conform to specifications contained in this shop manual, those published in the 1982 Special Specifications Issue of the Ford Motor Company's Technical Service Bulletin and those shown on the decal described above. Refer to your Warranty Facts Booklet for complete warranty information.

1983 SCHEDULED MAINTENANCE — 2.2 Liter Diesel Engine

MAINTENANCE OPERATION	SERVICE INTERVAL Miles or kilometers in thousands, or at months, whichever occurs first. Note — Scheduled maintenance beyond 50,000 miles (80,000 km) should be continued at the same interval as before except as noted.									
MILES	5	10	15	20	25	30	35	40	45	50
KILOMETERS	8	16	24	32	40	48	56	64	72	80
Change Engine Oil ① 6 months	X	X	X	X	X	X	X	X	X	X
Replace Engine Oil Filters 6 months ① Full Flow Filter ③	X	X	X	X	X	X	X	X	X	X
Bypass Filter ④		X		X		X		X		X
Check Coolant Condition and Protection	Annually									
Check Cooling System/Hoses/Clamps	Annually									
Replace Coolant Every 36 Months										X
Check Drive Belt Tension			X			X			X	
Adjust Engine Valve Clearance			X			X			X	
Replace Air Cleaner Element ①						X				
Inspect Engine Air Cleaner Hoses ⑥						X				
Replace Secondary Fuel Filter						X				
Drain Water from Fuel Sedimenter ②	X	X	X	X	X	X	X	X	X	X

1983 SCHEDULED MAINTENANCE — 2.2 Liter Diesel Engine (Cont'd.)										
MAINTENANCE OPERATION	SERVICE INTERVAL Miles or kilometers in thousands, or at months, whichever occurs first. Note — Scheduled maintenance beyond 50,000 miles (80,000 km) should be continued at the same intervals as before except as noted.									
MILES	5	10	15	20	25	30	35	40	45	50
KILOMETERS	8	16	24	32	40	48	56	64	72	80
Check Wheel Lug Nut Torque	X	X	X	X	X	X	X	X	X	X
Inspect disc brake system						X				
Check Clutch Reservoir Fluid Level						X				
Inspect Front Wheel Bearings and Lubrication						X				
Lubricate Driveshaft Slip Yoke and U-Joint If Equipped With Grease Fitting						X				
Inspect Exhaust System For Leaks, Damage or Loose Parts						X				

①SEVERE SERVICE such as extensive idling, frequent short trips of 10 miles (16 km) or less when the temperature remains below +10°F (−12°C) for 60 days or more, sustained high speed driving during hot weather (+90°F, +32°C), towing a trailer for long distances, driving in severe dust conditions — the following maintenance intervals apply:
Engine Oil Filter — Change every 3 months or 3,000 miles (4800 km) whichever occurs first.
Air Cleaner Filter — Change every 3 months or 3,000 miles (4800 km) whichever occurs first. If operating in severe dust conditions, ask your dealer for proper replacement intervals.

②More frequent intervals (as indicated by the instrument panel warning light) may be required depending upon fuel quantity and vehicle usage.

③Located on left rear side of engine.

④Located on right front side of engine.

⑤More often if operated in severe service or dust conditions.

MINOR TROUBLESHOOTING GUIDE

Most operating troubles that might be encountered with a new or well-maintained vehicle will be of a minor nature. Therefore, if you have trouble, look for some simple causes rather than malfunction of a major component. For instance:

Loose or corroded battery connections are more likely than a battery malfunction.

In many cases, operating troubles are coupled with outside factors, such as climate conditions, road conditions, a change of servicing or fueling source, or change of drivers.

Although the diesel engine is more technically complex than the gasoline engine, it is also relatively more trouble-free. The owner is discourged from attempting to perform maintenance other than that described in this Operator's Guide.

Many difficulties in engine performance can be corrected by checking for any of the following conditions:

- Plugged air inlet system
- Water in fuel sedimenter
- Clogged fuel filter
- Air in fuel system
- Improper use or malfunction of manual Cold Start device

You may wish to check for any of these problems if your vehicle suffers from difficult starting, rough idling, excessive exhaust smoke, a decrease in performance or excess fuel consumption.

If these checks do not correct a problem, consult an authorized dealer.

If Engine Won't Crank

- Switch on the headlights. If lights are dim or do not go on, or if when ignition key is turned to START, the lights become dim or go out, the battery cable connections may be loose or corroded, or the battery may be discharged.

- Another indication of loose battery connections or low battery charge is a stuttering or clicking noise from the engine compartment when the ignition lock cylinder is turned to START. Check connections at battery posts, cable connection to engine ground point, and at starter relay terminals. If starter relay clicks (no stuttering), but starter does not crank, check connections at starter terminal. If a discharged battery is suspected, have it checked and corrected.
- 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, see Emergency Starting Procedures.

If Engine Cranks But Won't Start

CAUTION — 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/glow plug system or the fuel system. If equipped with an auxiliary tank, be sure the tank control switch is set for the tank with fuel and not at an empty tank.

Check to see if the electrical connection to the fuel supply cut-off solenoid on the fuel injection pump is not loose or corroded.

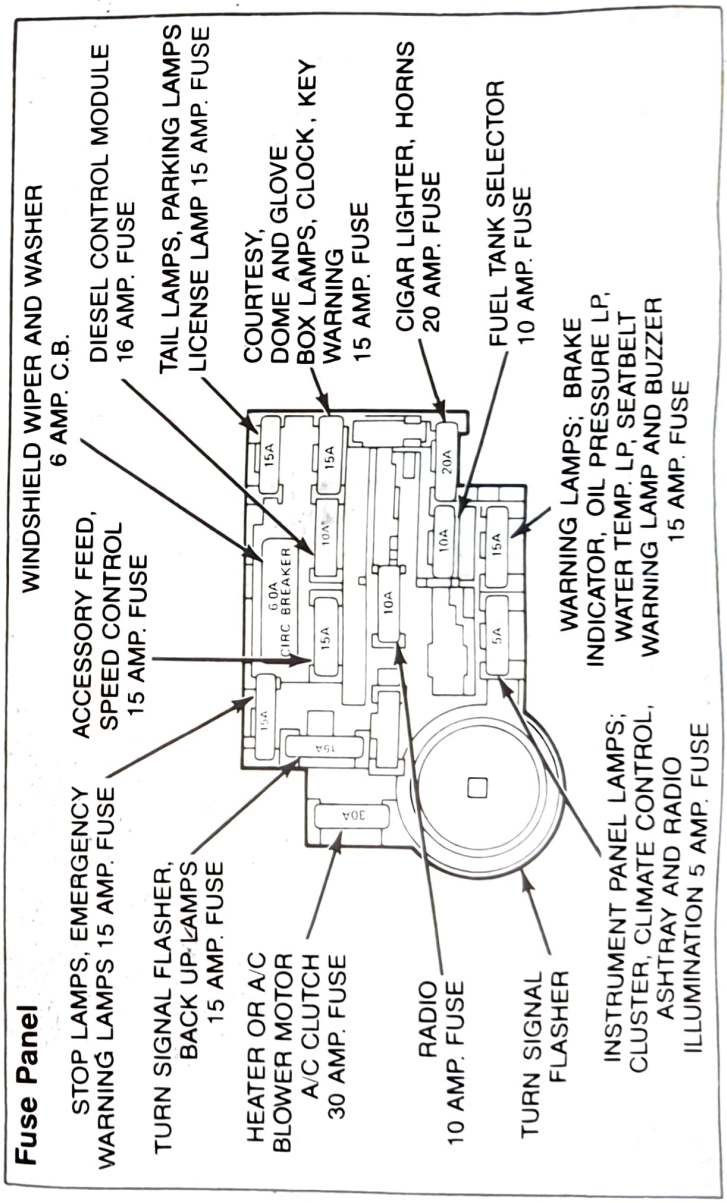
Engine Runs Hot

The following items could cause the engine to overheat:

- Loose fan belt or lack of coolant.
- Dirty cooling system.
- Driving with frozen coolant.
- Prolonged idling, low idle speed.
- Sticking thermostat.
- Overloading or pulling heavy trailers during hot weather.

If Fuses Burn Out

Burned-out fuses usually indicate an electrical short-circuit, although a fuse may occasionally burn out from vibration. Insert a second fuse. If this fuse immediately burns out and you cannot locate the cause, return your vehicle to your dealer for a circuit check.



Light Bulb Specifications

Lamp Description	Number of Bulbs Required	Trade Number
Water in Fuel Light	1	194
Diesel Wait to Start Light	1	①

①Entire assembly must be replaced if bulb burns out. See your Ford dealer.

Engine Lubricant Specifications

Item	Ford Part Name	Ford Part Number	Ford Specification
Engine Oil 2.2L Diesel	Motorcraft Motor Oil: 10W30 Premium 20W40 Premium SAE-30 Single Wt.	XO-10W30-QP XO-20W40-QP XO-30-Q	ESR-M2C127-B (API SF/CC)
	15W40 Super Duty SAE-30 Super Duty	XO-15W40-QSD XO-30-QSD	ESR-M2C171-A (API SF/CD)

Engine Oil Refill Capacities①

Engine	U.S. Quarts	Imperial Quarts	Liters
2.2L Diesel	7.0	5.9	6.6

①Includes 0.9 U.S. quart for full-flow filter replacement and 0.6 U.S. quart for bypass filter replacement.

Filter Specifications

Item	Ford Part Name	Ford Part Number	Ford Specification
Engine Full-Flow Oil Filter	Motorcraft	E37A-6714-BA FL-786	ES-E1ZE-6714-AA
Engine Bypass Oil Filter	Motorcraft	E3TZ-6731-B FL-785	
Engine Fuel Filter	Motorcraft	E3TZ-9155-B FD-812	
Air Filter	Motorcraft	E3TZ-9601-D FA-747	ES-D4A-9601-AA

→ Baldwin – B-201

→ Baldwin – B-202

Engine Cooling System Refill Capacities

Engine	Equipment	Approximate Capacities		
		U.S. Qts.	Imperial Qts.	Liters
2.2L Diesel	Without Air Conditioning	10.0	8.3	9.5
	With Air Conditioning	10.7	8.9	10.1

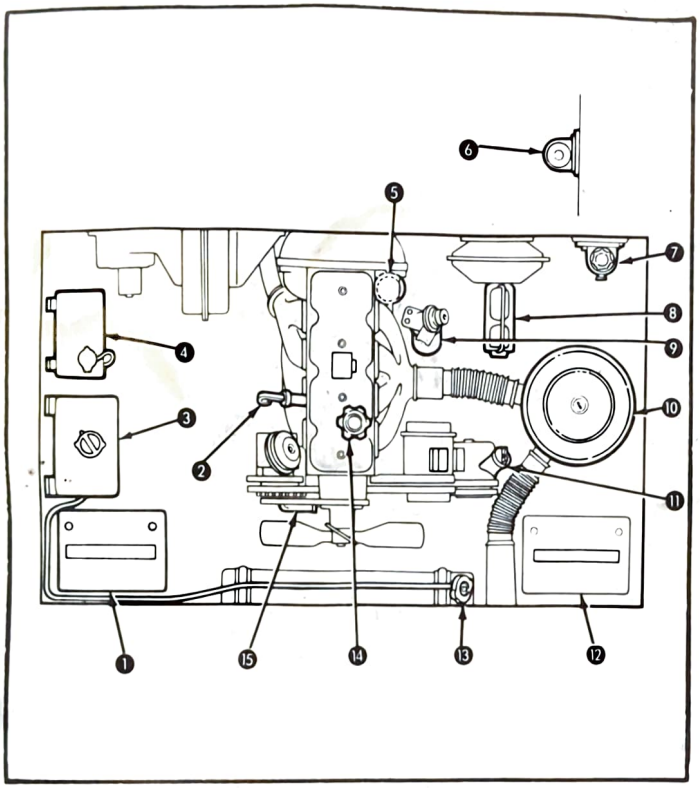
Coolant Specification

Engine	Ford Part Number	Specification
2.2 L Diesel	E2FZ-19549-A	ESE-M97B18-C

Fuel Tank Refill Capacities

Tank	Mounting	Approximate Capacity		
		U.S. Gal.	Imp. Gal.	Liters
Standard Short Wheelbase	Midship	15.2	12.6	57.5
Standard Long Wheelbase	Midship	17.0	14.1	64.3
Optional Auxiliary	Aft of Axle	13.0	10.8	49.2

2.2 Liter Diesel Engine Service Points



Service Points

❶AUXILIARY BATTERY
❷ENGINE OIL DIPSTICK
❸COOLANT EXPANSION RESERVOIR
❹WINDSHIELD WASHER RESERVOIR
❺FULL-FLOW OIL FILTER (UNDER STARTER MOTOR)
❻FUEL SEDIMENTER (LOCATED INSIDE FRAME RAIL UNDER CAB)*
❼CLUTCH FLUID RESERVOIR
❽BRAKE MASTER CYLINDER
❾FUEL FILTER AND HAND PRIMING PUMP
❿AIR CLEANER
⓫POWER STEERING PUMP
⓬MAIN BATTERY
⓭RADIATOR FILL CAP
⓮ENGINE OIL CAP
⓯BYPASS OIL FILTER (UNDER ALTERNATOR)

*TO DRAIN WATER, T-HANDLE LOCATED ON CAB FLOOR BEHIND THE DRIVER'S SEAT. (SEE PAGES 19-20.)

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Oil Filters

AC PF-2 Does Not Work

Dix Oil By Pass To Small

Baldwyn Filters

Oil B-202

Pass B-201