Table of Contents

Introduction 4

Safety and environment protection 5
Symbol glossary 8

Vehicle Inspection Guide 11

Instrument Cluster 22

Warning lights and chimes 22
Gauges 27

Entertainment Systems 32

AM/FM stereo 32
AM/FM stereo cassette with CD 38
AM/FM stereo with in-dash six CD 43

Climate Controls 49

Heater only 49
Manual heating and air conditioning 50

Lights 52

Headlamps 52
Turn signal control 53
Interior lamps 54
Bulb replacement 54

Driver Controls 58

Windshield wiper/washer control 58
Steering wheel adjustment 58
Power windows 59
Mirrors 61
Speed control 63

Locks and Security 67

Keys 67
Locks 67

Table of Contents

Seating and Safety Restraints	**68**
Seating	68
Safety restraints	74
Child restraints	83
Driving	**91**
Starting	91
Brakes	99
Air suspension	119
Transmission operation	121
Vehicle loading	134
Roadside Emergencies	**140**
Hazard flasher switch	141
Fuses and relays	141
Jump starting	148
Wrecker towing	152
Customer Assistance	**156**
Getting assistance outside the U.S. and Canada	158
Ordering additional owner's literature	159
Reporting safety defects (U.S. only)	159
Cleaning	**160**
Cleaning your vehicle	160
Repairing paint chips	160
Underbody preservation	163
Maintenance and Specifications	**165**
Hood	173
Engine oil	176
Battery	179
Engine Coolant	181
Fuel information	189
Lubricant specifications	214
Refill capacities	227

Table of Contents

Scheduled Maintenance Guide	**231**
Motorcraft Premium Gold Coolant Change Record	269
Index	**271**

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. In addition, certain fluids contained in vehicles and certain products of component wear contain or emit chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.

CONGRATULATIONS

Congratulations on acquiring your new Ford. Please take the time to get well acquainted with your vehicle by reading this handbook. The more you know and understand about your vehicle, the greater the safety and pleasure you will derive from driving it.

For more information on Ford Motor Company and its products visit the following website:

- In the United States: www.ford.com
- In Canada: www.ford.ca
- In Mexico: www.ford.com.mx
- In Australia: www.ford.com.au

Additional owner information is given in separate publications.

This *Owner's Guide* describes every option and model variant available and therefore some of the items covered may not apply to your particular vehicle. Furthermore, due to printing cycles it may describe options before they are generally available.

Remember to pass on the *Owner's Guide* when reselling the vehicle. It is an integral part of the vehicle.

SAFETY AND ENVIRONMENT PROTECTION

Warning symbols in this guide

How can you reduce the risk of personal injury and prevent possible damage to others, your vehicle and its equipment? In this guide, answers to such questions are contained in comments highlighted by the warning triangle symbol. These comments should be read and observed.

Warning symbols on your vehicle

When you see this symbol, it is imperative that you consult the relevant section of this guide before touching or attempting adjustment of any kind.

Protecting the environment

We must all play our part in protecting the environment. Correct vehicle usage and the authorized disposal of waste cleaning and lubrication materials are significant steps towards this aim. Information in this respect is highlighted in this guide with the tree symbol.

Introduction

SPECIAL NOTICES

Emission warranty

The New Truck Limited Warranty includes Basic Coverage, Corrosion Coverage, Frame Coverage, Federal Emissions Defect Warranty and California Defects Warranty. For a detailed description of what is covered and what is not covered, refer to the *Warranty Guide* that is provided to you along with your *Owner's Guide*.

Special instructions

For your added safety, your vehicle is fitted with sophisticated electronic controls.

Service Data Recording

Service data recorders in your vehicle are capable of collecting and storing diagnostic information about your vehicle. This potentially includes information about the performance or status of various systems and modules in the vehicle, such as engine, throttle, steering or brake systems. In order to properly diagnose and service your vehicle, Ford Motor Company, Ford of Canada, and service and repair facilities may access vehicle diagnostic information through a direct connection to your vehicle when diagnosing or servicing your vehicle.

Event Data Recording

Other modules in your vehicle - event data recorders - are capable of collecting and storing data during a crash or near crash event. The recorded information may assist in the investigation of such an event. The modules may record information about both the vehicle and the occupants, potentially including information such as:

- how various systems in your vehicle were operating;
- whether or not the driver and passenger seatbelts were buckled;
- how far (if at all) the driver was depressing the accelerator and/or the brake pedal;
- how fast the vehicle was traveling; and
- where the driver was positioning the steering wheel.

To access this information, special equipment must be directly connected to the recording modules. Ford Motor Company and Ford of Canada do not access event data recorder information without obtaining consent, unless pursuant to court order or where required by law enforcement, other government authorities or other third parties acting with lawful authority. Other parties may seek to access the information independently of Ford Motor Company and Ford of Canada.

Cell phone use

The use of Mobile Communications Equipment has become increasingly important in the conduct of business and personal affairs. However, drivers must not compromise their own or others' safety when using such equipment. Mobile Communications can enhance personal safety and security when appropriately used, particularly in emergency situations. Safety must be paramount when using mobile communications equipment to avoid negating these benefits.

Mobile Communication Equipment includes, but is not limited to cellular phones, pagers, portable email devices, in-vehicle communications systems, telematics devices and portable two-way radios.

A driver's first responsibility is the safe operation of the vehicle. The most important thing you can do to prevent a crash is to avoid distractions and pay attention to the road. Wait until it is safe to operate Mobile Communications Equipment.

VEHICLE SYMBOL GLOSSARY

These are some of the symbols you may see on your vehicle.

Safety Alert		See Owner's Guide	
Fasten Safety Belt		Air Bag-Front	
Air Bag-Side		Child Seat	
Child Seat Installation Warning		Child Seat Lower Anchor	
Child Seat Tether Anchor		Brake System	
Anti-Lock Brake System		Brake Fluid - Non-Petroleum Based	
Powertrain Malfunction		Speed Control	
Master Lighting Switch		Hazard Warning Flasher	
Fog Lamps-Front		Fuse Compartment	
Fuel Pump Reset		Windshield Wash/Wipe	
Windshield Defrost/Demist		Rear Window Defrost/Demist	
Power Windows Front/Rear		Power Window Lockout	

Child Safety Door Lock/Unlock		Interior Luggage Compartment Release Symbol	
Panic Alarm		Engine Oil	
Engine Coolant		Engine Coolant Temperature	
Do Not Open When Hot		Battery	
Avoid Smoking, Flames, or Sparks		Battery Acid	
Explosive Gas		Fan Warning	
Power Steering Fluid		Maintain Correct Fluid Level	
Emission System		Engine Air Filter	
Passenger Compartment Air Filter		Jack	
Check Fuel Cap		Low Tire Pressure Warning	

FEDERAL HIGHWAY ADMINISTRATION REGULATION

Regulations such as those issued by the Federal Highway Administration or issued pursuant to the Occupational Safety and Health Act (OSHA), and/or state and local laws and regulations may require additional equipment for the way you intend to use the vehicle. It is the responsibility of the registered owner to determine the applicability of such laws and regulations to your intended use for the vehicle, and to arrange for the installation of required equipment. Your dealer has information about the availability of equipment which may be ordered for your vehicle.

ENTERING, EXITING AND/OR CLIMBING ON THIS VEHICLE

You must be careful and deliberate to minimize the possibility of personal injury from a slip and fall when entering, exiting and/or climbing on this vehicle. Always use the steps and assist handles before climbing. Do not skip any steps or assist handles. Use three point contact at all times with at least two feet and one hand or two hands and one foot firmly placed during all phases of entering, exiting and/or climbing. Always keep your shoe soles and hands clean. Keep the steps and assist handles free of snow, ice, oil, grease, substances or debris. Be sure to use extra care in bad weather. Avoid wearing thick gloves. Always perform trailer hook-up while standing on the ground.

Do not carry items while entering, exiting, and/or climbing. Make sure you keep a firm grip. Always FACE the VEHICLE STEP and HANDLE SYSTEM while climbing up and down. Do not climb behind the cab unless you have three point contact with a step and handle system at all times.

To be sure your vehicle is ready to operate, conduct a pre-trip inspection at the beginning of each work period. Follow the steps listed in this section to ensure a proper vehicle inspection procedure. The pages in this section may be produced locally and used on a regular basis.

VEHICLE INSPECTION INFORMATION

Note: Always make sure the parking brake is applied before starting the engine.

Engine compartment (with engine stopped)	
Engine oil level:	Use the engine oil dipstick to verify that the engine oil level is between the ADD and OPERATING RANGE marks.
Engine coolant level:	Look through the plastic reservoir or the clear sight glass on the reservoir, depending upon vehicle equipment, and make sure the fluid is within the minimum and maximum fluid level range as marked on the reservoir. **Do not remove pressure cap until the coolant has cooled.**
Power steering fluid:	Verify that the fluid level is between the proper operating range Refer to *Power steering fluid* in the *Maintenance and Specifications* chapter.
Brake fluid (master cylinder):	Remove the master cylinder caps and inspect the fluid level. The full mark is at the bottom of the opening of the port ring.
Hydraulic clutch fluid:	Check for adequate amount of hydraulic clutch fluid. Fluid level should be at the step of the reservoir; refer to *Clutch fluid/linkage adjustments* in the *Maintenance and Specifications* chapter.
Belts (Fan, alternator, water pump and A/C compressor):	Check for glazing, fraying or cracking. There should be no more than five - seven cracks per rib per inch.

Vehicle Inspection Guide

Engine compartment (with engine stopped)	
Any leaks:	Check for signs of fluid puddles, dripping fluid on the ground under the engine or the underside of the engine.
HVAC air inlet:	Check for debris, leaves, etc. that may have collected on the HVAC air inlet grille or inside the exterior module as this may cause reduced system performance.
HVAC fresh air filter (if equipped):	Periodically check the HVAC fresh air filter for cleanliness.

Exercise great caution when working on vehicle equipped with an automatic fan clutch. The fan starts in motion only after the engine coolant reaches a predetermined temperature or the refrigerant pressure (if equipped with air conditioning) reaches a predetermined setting. The fan will start at this point with no advance warning. Never reach near, or permit objects to protrude into, the fan blade radius while the engine is running as this could result in vehicle damage, personal injury or death.

Engine starting (parking brake applied)	
Safety/Emergency equipment:	Prior to entering the cab, verify that the vehicle is equipped with spare electrical fuses (if used), three red reflective triangles, a properly charged and rated fire extinguisher and wheel chocks. Walk around the vehicle and check that all steps and grab handles, inside and out as well as behind, are tight and clean. Use extreme caution and a three-point stance at all times. Check door latches for positive closing, latching and locking.
Starting the engine:	Verify the parking brake is set. Depress the clutch (if equipped with a manual transmission) and verify the transmission is in neutral. Vehicles equipped with an automatic transmission should be in N (Neutral). When the WAIT TO START indicator light in the instrument cluster turns off, turn the key to START.
Oil pressure builds:	Make sure engine oil pressure is building to normal operating range.
Air chime sounds (if equipped with air compressor):	The low air pressure warning chime should sound immediately after the engine starts but before the compressor has built up pressure. The low air pressure warning chime should stop when the air pressure reaches 70 psi (483 kPa) (or more). Let the air pressure build to governed cut-out pressure, which should occur between 115–130 psi (793–896 kPa).
Accelerator:	Depress the accelerator and verify that it operates smoothly without any binding or irregular feel. Remove your foot from the pedal and make sure the engine returns to idle speed immediately.

Engine starting (parking brake applied)	
Ammeter/Voltmeter:	Check the gauge to see if the alternator is charging.
Steering linkage free play:	Check for excessive free play in the steering linkages. The steering wheel should have less than two inches (five cm) of free play at rim of steering wheel.
Hydraulic brake check:	When the engine is off, the pump will turn on if the brake pedal is applied, or if the ignition is turned to the ON position.
Air brake check:	Check the air brakes in the following manner (Chock the wheels, if necessary. Push in the parking brake and on tractors, also push in the tractor parking brake knob):
	1. Check the air compressor or governor cut-out pressure (approximately 120 psi [827 kPa]).
	2. Cut-off the engine and turn the key back to ON, without starting the engine.
	3. Without the brake pedal applied, note the air pressure drop for one minute. It should be less than 2 psi (14 kPa) for single vehicle and 3 psi (21 kPa) for combination vehicles.
	4. Depress and hold the brake pedal with 90 psi (621 kPa) or more and make sure there is no more than a 3 psi (21 kPa) per minute leak. For combination vehicles, no more than 4 psi (28 kPa) per minute.
	5. Pump the brake pedal to deplete the system air pressure. The warning light and chime should activate 57 psi (393 kPa).
	6. Pump the brake pedal and make sure the parking brake and trailer parking brake knobs pop out at 20 psi (138 kPa) or higher.

Engine starting (parking brake applied)	
Parking brake:	Check that the parking brake will hold the vehicle by gently trying to pull forward with the parking brake applied.
Automatic transmission fluid:	With the engine idling at normal operating temperature and the parking brake applied, check the automatic transmission fluid. If fluid needs to be added, place the transmission in the appropriate gear as specified in the transmission operator's manual and refer to *Transmission fluid* in the *Maintenance and Specifications* chapter.

Front of vehicle	
Lights:	Make sure all lights illuminate and are clean. Make sure headlights function on both high and low beams. Make sure reflectors are clean and unbroken and of proper color (red on rear, amber elsewhere). Make sure the running lights are also clean and unbroken.
Steering gear:	Look for missing or loose fasteners, power steering fluid leaks and damage to power steering hoses.
Steering linkage:	Make sure connecting links, arms and rods are not worn or cracked; joints, sockets and boot seals are not worn or loose and that there are no loose or missing cotter keys, nuts or bolts.
Tow hooks:	Front and rear tow hooks should be inspected for damage or loose mounting. This is particularly important on vehicles where tow hooks are frequently used.

Front suspension	
Spring:	Inspect for missing, broken or shifted leaves or leaves that are in contact, or nearly contacting a tire, rim, brake drum, frame or body components.
Spring mount:	Inspect spring hangers, bolts, bushings, axle mounting bolts and nuts for cracks, breaks, wear, damage and tightness.
Shock absorber:	Inspect for cracks, leaks and missing or broken bolts or bushings.

Note: Never apply grease to spring pads.

Do not operate the vehicle if any suspension conditions listed in the *Front suspension* chart are evident. Loss of steering or suspension could result in property damage, personal injury or death.

Front brakes	
Hoses:	Check for cracked, worn or frayed hoses. Make sure all couplings are secured.
Chambers:	Make sure brake chambers are not cracked or dented and that they are securely mounted.
Slack adjuster:	Check for broken, loose or missing parts; the angle between the push rod and adjuster arm should be approximately 90° when the brakes are applied. When pulled by hand, the push rod should not move more than approximately one inch (2.5 cm).
Drum:	Make sure there are no cracks, dents or holes and no loose or missing bolts. Make sure brake linings are not worn or dangerously thin or contaminated by lubricant.

Front wheels	
Rims:	Check for damaged or bent rims. Rims should not have welding repairs and no rust trails that indicate it is loose on the wheel.
Lug nuts:	Make sure all lug nuts are present and not loose (look for rust trails around the lug nuts). There should be no cracks radiating from the lug bolt holes or distortion of the bolt holes.
Hub oil seal:	Check wheel hub oil seal for leaks, and if sight glass if present, check to see that the oil level is adequate.
Oil-lubricated front wheel bearing:	If the hubcap has a transparent window, check for proper lubrication level. If the hubcap does not have a transparent window, remove the rubber fill-plug and check for proper level.

If a wheel must be changed, obtain expert tire service help. Mounting and un-mounting of tires should only be performed by a qualified technician using necessary safety procedures and equipment, otherwise the result could be property damage, personal injury or death.

Driver/Fuel area	
Fuel tank:	Make sure the fuel tank and caps are secure. Make sure there is no damage to the tank.
Leaks:	Check for any leaks from the fuel tanks.

Underbody of vehicle	
Driveshaft:	Make sure that the driveshaft is not bent or cracked. Ensure all driveshaft couplings are secure.
Exhaust system:	Make sure the outside visible parts are securely mounted. Make sure there are no cracks, holes or severe dents.

Vehicle Inspection Guide

Underbody of vehicle	
Frame:	Check for cracks or bends in longitudinal frame members. Make sure there are no loose, cracked, bent, broken or missing crossmembers or crossmember fasteners.

Maintain adequate clearance between all parts of the exhaust system and all hoses, wires and lines for engine cooling, brake system, fuel system, power steering system and electrical system, Heat damage to hoses, wires or lines may cause vehicle malfunction that could result in property damage, personal injury or death.

Rear of vehicle	
Air/Electric lines:	Make sure that air hoses are not cut, cracked, chafed or worn. Listen for audible air leaks, Make sure air and electrical lines are not tangled, crimped or pinched or being dragged against any truck parts. Electrical line insulation should not be cut, cracked, chafed or worn. None of the air or electrical line should be spliced or taped. Check for corrosion on pins and in electrical sockets to ensure continuity and reduced heat build-up potential.
Deck plate:	Make sure deck plate is clean, securely bolted to the frame and clear of loose objects.
Signal/Brake lights:	Make sure both brake lights illuminate when the brake pedal is applied. Also, make sure each signal flashes. Make sure that four-way flashers work properly.

Rear of vehicle	
Lights, reflectors:	Make sure all lights illuminate and are clean. Make sure headlights function on both high and low beams. Make sure reflectors are clean and unbroken and of proper color (red on rear, amber elsewhere). Make sure the running lights are also clean and unbroken. Rear running lights must be checked separately from signal, flasher and brake lights.

Tractor - coupling system	
Mounting bolts:	Check for loose or missing mounting brackets, clamps, bolts or nuts. Both fifth wheel and slide mounting must be solidly attached.
Platform:	Check for cracks or breaks in the platform structure.
Safety latch:	Make sure safety latch is engaged.
Release arm:	Make sure safety latch is in the engaged position and that any safety latch is in place.
Kingpin/Apron:	Make sure kingpin is not bent or worn. Also make sure that the apron lies flat on the fifth wheel skid plate and that the visible part of the apron is not bent, worn, cracked or broken.

Rear springs	
Springs:	Check for broken or shifted leaves or leaves that are in contact, or nearly contacting a tire, rim, brake drum, frame or body components. Check for missing or broken leaves in the leaf spring.
Spring mounts:	Check for cracked or broken spring hangers, broken, missing or loose bolts, missing or damaged bushings, broken, loose or missing axle mounting parts.

Rear springs	
Torsion, shocks:	Make sure torsion arm is not cracked, broken or missing. Check the shock absorber for cracks or leaks; there should be no missing or broken mounting bolts or worn bushings.

Rear brakes	
Hoses:	Checked for cracked, worn or frayed hoses. Make sure all couplings are secured.
Chambers:	Make sure brake chambers are not cracked or dented and that they are securely mounted.
Slack adjuster:	Check for broken, loose or missing parts; the angle between the push rod and adjuster arm should be approximately 90° when the brakes are applied. When pulled by hand, the push rod should not move more than approximately one inch (2.5 cm).
Drum:	Make sure there are no cracks, dents or holes and no loose or missing bolts. Make sure brake linings are not worn or dangerously thin or contaminated by lubricant.

Rear wheels	
Spacers:	Make sure dual wheels are evenly separated and that tires are not touching one another.
Rims:	Check for damaged or bent rims. Rims should not have welding repairs and no rust trails that indicate it is loose on the wheel.
Lug nuts:	Make sure all lug nuts are present and not loose (look for rust trails around the lug nuts). There should be no cracks radiating from the lug bolt holes or distortion of the bolt holes.

Trailer

If you are pulling a trailer, an inspection of the trailer similar to that of the tractor should be done. Such an inspection should follow trailer manufacturer recommendation and should include at a minimum: general condition, landing gear, doors, sides, lights, reflectors, suspension, brakes, tires, wheels, cargo placement, stability and tie-downs.

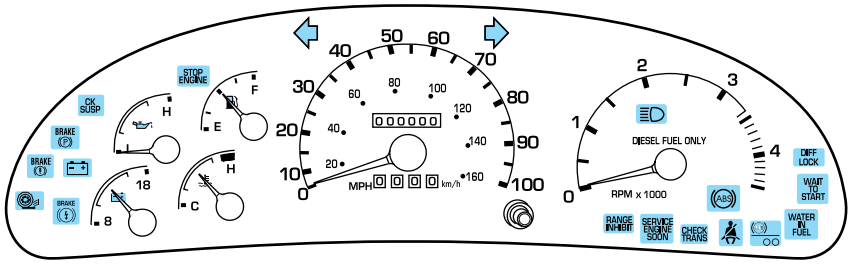
Transmission

If your vehicle is equipped with an automatic transmission, regularly check the transmission's neutral start switch. The engine should only start in the N (Neutral) or P (Park) positions.

If the unit starts in gear and/or the neutral start switch is not functioning correctly, the vehicle may inadvertently move which could result in property damage, personal injury or death.

Check the transmission fluid level and shift linkage for proper operation.

WARNING LIGHTS AND CHIMES



Warning lights and gauges can alert you to a vehicle condition that may become serious enough to cause expensive repairs. A warning light may illuminate when a problem exists with one of your vehicle's functions. Many lights will illuminate when you start your vehicle to make sure the bulb works. If any light remains on after starting the vehicle, have the respective system inspected immediately.

Some of the warning lights shown are optional based on vehicle equipment; your vehicle may not have some of the warning lights shown in this section.

Service engine soon: If this light illuminates while driving, it is a possible indication that one of the engine's emission control systems has failed.

SERVICE ENGINE SOON

Check suspension: Illuminates when there is a fault in the electronic subsystem of the air suspension.

CK SUSP

Stop engine: This light is used in conjunction with the electronic engine control.

Refer to the Engine Operator's Manual for specific information regarding this feature.

If the engine shuts down, it can be restarted and operated for 30 seconds at a time or until the problem is corrected. Refer to *Engine shutdown system* in the *Driving* chapter.

Drivers of electronically controlled engines should know the extent of warning engine shutdown system before operating the vehicle. This information can be obtained from your dealer.

Brake reserve system warning: Illuminates to indicate normal Hydromax booster reserve system activation when the engine is OFF and the service brake pedal is applied.

This light may also illuminate momentarily if the engine is running and the driver turns the steering wheel fully in one direction while braking.

If the light remains on while the engine is running, this indicates inadequate hydraulic booster pressure or reserve pump system failure. Stop the vehicle safely as soon as possible and seek service immediately.

Brake system warning light: To confirm the brake system warning light is functional, this light will momentarily illuminate when the ignition is turned to the ON position when the engine is not running. If the brake system warning light does not illuminate at this time, seek service immediately from your dealership. Illumination after starting the vehicle indicates a pressure differential in the master cylinder and the brake system should be inspected immediately by your dealership.

If equipped with an air brake system, the warning light stays on until the air pressure builds up to 60 psi (414 kPa). If the air pressure drops below 60 psi (414 kPa) during operation, the remaining brake system is still operational but the stopping distance will be greater.

Driving a vehicle with the brake system warning light on is dangerous. A significant decrease in braking performance may occur. It will take you longer to stop the vehicle. Have the vehicle checked by your dealer immediately.

Wait to start: Indicates the air

intake heater is in operation and special starting procedures are required. Refer to the *Driving* chapter.

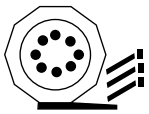
If equipped with an air intake heater, DO NOT use ether or any other starting fluids. The use of starting fluids (ether) in an engine equipped with an air intake heater could result in damage and/or personal injury.

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 fuel filter/water separator has a significant quantity of water in it.

If the light illuminates when the engine is running, stop the vehicle as soon as safely possible, shut off the engine, then drain the fuel filter/water separator. Refer to *Fuel filter/water separator* in the *Maintenance and Specifications* section 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 water separator while engine is running. Fuel may ignite if separator is drained while engine is running or vehicle is moving.

Traction control (if equipped): Illuminates and flashes slowly if the Off Road mode is selected and flashes rapidly during a traction control event.

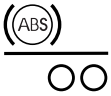


Differential lock: Illuminates when the main differential is locked (engaged).

Parking brake warning: Momentarily illuminates when the ignition is turned to the ON position and the engine is off. Also illuminates when the parking brake is engaged. If the brake warning lamp does not illuminate at these times, seek service immediately.

Vehicles equipped with the Power Park (air-operated parking brake) option: If after setting the parking brake on your vehicle the park brake warning lamp begins to blink, this may indicate a failure in the parking brake system. Seek service from your dealer immediately.

Trailer ABS brake system: Illuminates briefly when the engine is powered-up and only when a PLC trailer or a PLC diagnostic tool is connected. If the light remains on after the vehicle is started, continues to flash or fails to illuminate, have the system serviced immediately.



Anti-lock brake system: If the ABS light stays illuminated or continues to flash, a malfunction has been detected, have the system serviced immediately. Normal braking is still functional unless the brake warning light also is illuminated.

Check trans (Allison automatic transmission only): The lamp will illuminate for several seconds after the ignition is turned to the ON position. Illumination of this light indicates that a problem has been detected and shifting may be restricted. Depending upon the severity of the problem, the read-out digit on the shifter display may be blank. Operation may continue in order to reach service assistance. The ECU may not respond to shift selector requests, since operating limitations are being placed on the transmission, i.e. upshifts and downshifts may be restricted. Direction changes will not occur.

CHECK TRANS

Refer to the *Transmission Operator's Manual* for more information.

Safety belt: Reminds you to fasten your safety belt.

Range inhibit: Illuminates when the transmission is not engaged in the selected gear. The warning light will go off when the gearshift lever is adjusted in to the appropriate gear.

RANGE INHIBIT

Refer to the *Transmission Operator's Manual* for more information.

Charging system: Illuminates when the battery is not charging properly.

Turn signal: Illuminates when the left or right turn signal or the hazard lights are turned on. If the indicators stay on or flash faster, check for a burned out bulb.

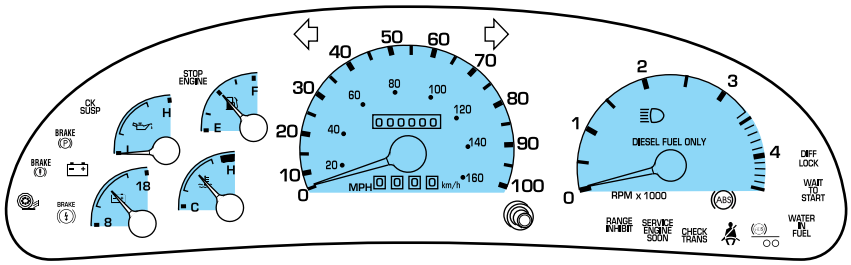
High beams: Illuminates when the high beam headlamps are turned on.

Safety belt warning chime: Sounds when the key is in the ignition and the driver's safety belt is not fastened.

Key-in-ignition warning chime: Sounds when the key is left in the ignition in the OFF/LOCK or ACC position and the driver's door is opened.

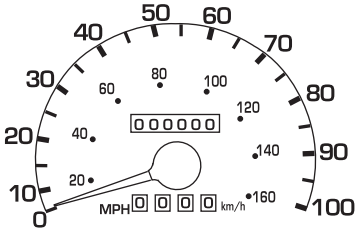
Headlamps on warning chime: Sounds when the headlamps or parking lamps are on, the ignition is off (and the key is not in the ignition) and the driver's door is opened.

GAUGES

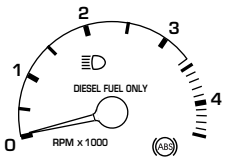


Some of the gauges shown are optional based on vehicle equipment; your vehicle may not have some of the gauges shown in this section.

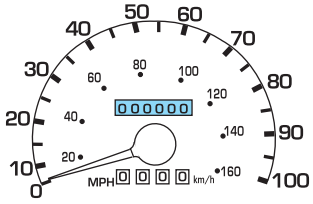
Speedometer: Indicates the current vehicle speed.



Tachometer: Indicates the engine speed in revolutions per minute. Driving with your tachometer pointer continuously at the top of the scale may damage the engine.

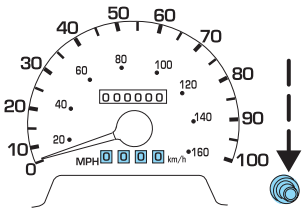


Odometer: Registers the total miles (kilometers) of the vehicle.

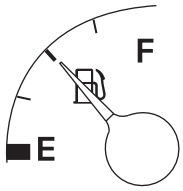


Instrument Cluster

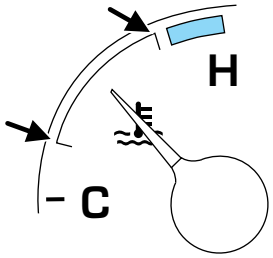
Trip odometer: Registers the miles (kilometers) of individual journeys. To reset, depress the control.



Fuel gauge: Indicates approximately how much fuel is left in the fuel tank (when the ignition is in the on position). If your vehicle is equipped with dual fuel tanks, the engine will draw fuel from the passenger-side fuel tank only. With dual fuel tanks, the vehicle will be equipped with a fuel transfer pump system that will draw fuel from the driver-side fuel tank and send fuel to the passenger-side fuel tank. The passenger-side fuel tank must have fuel in it at all times otherwise the vehicle may stall and may be difficult to re-start. The fuel gauge reads the fuel level only from the passenger-side fuel tank.

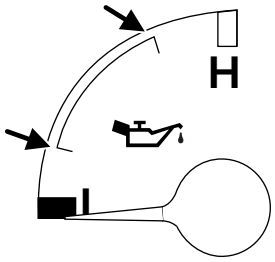


Engine coolant temperature gauge: Indicates engine coolant temperature. At normal operating temperature, the needle will be in the normal range (between “H” and “C”). **If it enters the red section, the engine is overheating. Stop the vehicle as soon as safely possible, switch off the engine and let the engine cool.**



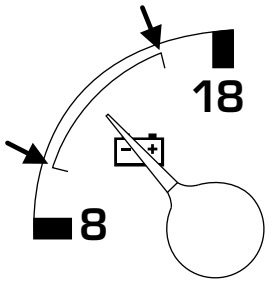
Never remove the coolant reservoir cap while the engine is running or hot.

Engine oil pressure gauge:

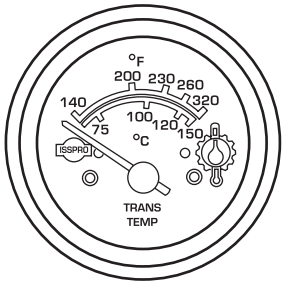


Indicates engine oil pressure. The needle should stay in the normal operating range (as indicated by the arrows). If the needle falls below the normal range, stop the vehicle, turn off the engine and check the engine oil level. Add oil if needed. If the oil level is correct, have your vehicle checked at your dealership or by a qualified technician.

Battery voltage gauge: Indicates the battery voltage when the ignition is in the ON position. If the pointer moves and stays outside the normal operating range (as indicated by arrows), have the vehicle's electrical system checked as soon as possible.

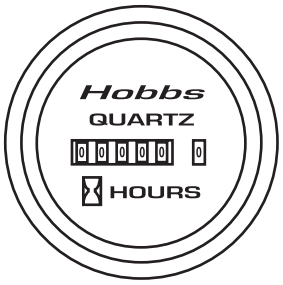


Transmission temperature gauge (if equipped, automatic transmission only):

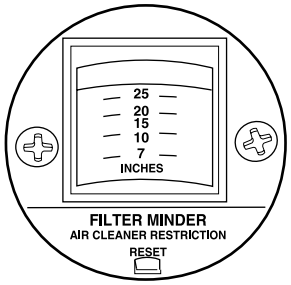


Indicates the temperature of the transmission fluid. The normal temperature range is 150°–230°F (65°–110°C). Readings of 230°–250°F (110°–121°C) are satisfactory for intermittent operation and are not cause for alarm. Operation above 250°F (121°C) can cause the fluid to break down and will result in component damage.

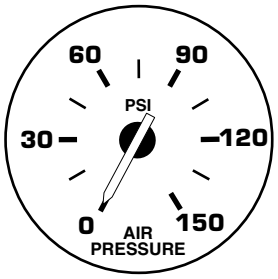
Hourmeter (if equipped):
Registers the hours the engine has been operating.



Air filter restriction gauge:
Measures the vacuum inside the air cleaner. The more the air cleaner is restricted (dirty, clogged), the higher the vacuum reading. Change the air filter when the gauge reads 25 inches. After installation of the new filter element, reset the gauge to 0.



Air pressure gauge: All vehicles equipped with air brakes have a dual-pointer air gauge to indicate the pressure in each brake circuit. The green pointer indicates the air pressure in the primary system and the red pointer indicates the air pressure in the secondary system. When the pressure is too low for normal brake operation (less than 60 psi [414 kPa]) and the ignition is on:



- a warning buzzer will sound and
- a warning light will illuminate in the instrument cluster

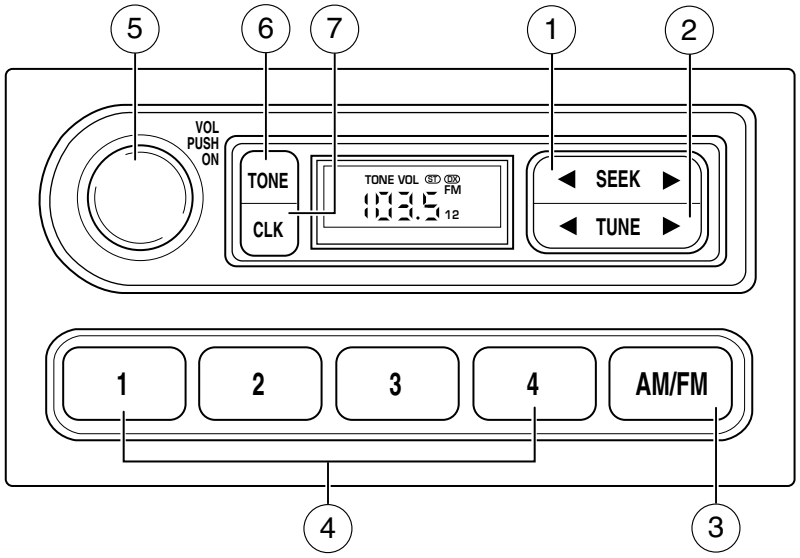
Do not drive the vehicle when the low air pressure buzzer is sounding or the warning light is lit. These warnings indicate there is not enough air pressure for the brake or suspension system to operate properly.

Vehicles equipped with hydraulic brakes and an air compressor have a single-pointer air gauge.

Note: This system does **not** have a low air pressure warning buzzer or a low air pressure warning light.

AUDIO SYSTEMS

AM/FM stereo (if equipped)



1. **SEEK:** Press ◀ /▶ to find the next strong station down/up the frequency band.

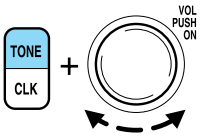
2. **TUNE:** Press ◀ /▶ to manually change radio frequency down/up.

3. **AM/FM:** Press to choose a frequency band in radio mode.

4. **Memory preset buttons:** To set a station: Select frequency band AM/FM; tune to a station, press and hold a preset button until sound returns.

5. **Power/Volume:** Press to turn ON/OFF; turn to increase or decrease volume levels.

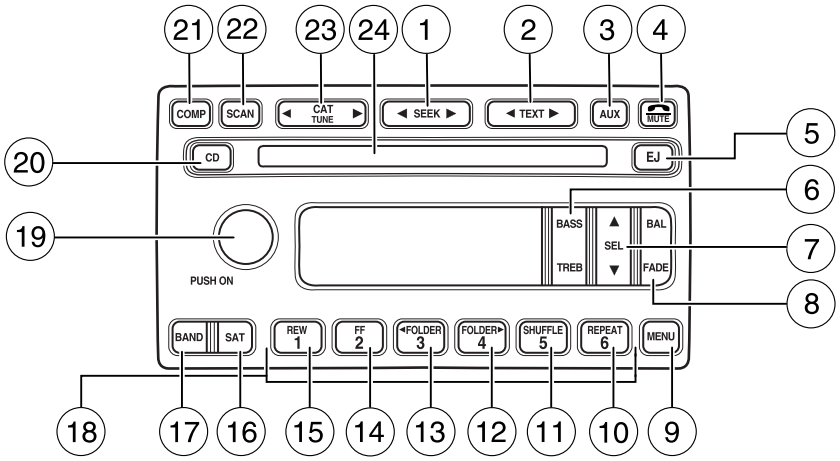
6. **TONE:** Press TONE until the desired level — Bass, Treble, Fade appears on the display. Turn the volume control to raise/lower the levels, or to move the audio sound from the right to left or the front to back (if equipped).



7. **CLK (Clock):** To set the hour, press and hold CLK until CLOCK SET appears in the display. Press SEEK to decrease ◀ or increase ▶ the hours.

To set the minute, press and hold CLK until CLOCK set appears in the display. Press TUNE to decrease ◀ or increase ▶ the minutes.

Satellite Compatible AM/FM Stereo In-Dash Single CD/MP3 Radio (if equipped)



1. **SEEK:** Press and release SEEK ◀ / ▶ for previous/next strong station or track.

2. **TEXT:** The filename (Fi), song title (So), artist text (Ar) or album text (AL) may be viewed while playing an MP3 selection. When MP3 selection text is shown on the message display, its corresponding text indicator (Fi, So, Ar, or AL) is shown in the elapsed time display. Press TEXT to scroll through the text fields. The display will scroll through all of the text in the current field before changing to the next field. (TEXT must be pressed within 3 seconds of the previous press to proceed to the next/last text display. The last text field shown on the display will become the new display message default.

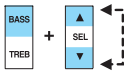
TEXT is also available when equipped with Satellite radio. Your radio comes equipped with Satellite ready capability. The kit to enable Satellite reception is available through your dealer. Detailed Satellite instructions are included with the dealer installed kit.
Dealer installed satellite kit only available in the continental United States.

3. **AUX:** This function is not operational.

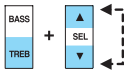
4. **MUTE:** Press to MUTE playing media; press again to return to playing media.

5. **EJ:** Press to eject a CD.

6. **Bass:** Press BASS; then press SEL ▼ / ▲ to decrease/increase the bass output.

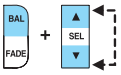


Treble: Press TREB; then press SEL ▼ / ▲ to decrease/increase the treble output.

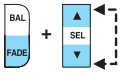


7. **Select:** Use with Bass, Treble, Balance, Fade and other menu selections.

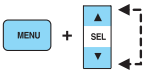
8. **Balance:** Press BAL; then press SEL ▼ / ▲ to shift sound to the left/right speakers.



Fade: Press FADE; then press SEL ▼ / ▲ to shift sound to the rear/front speakers.



9. **Menu:** Press MENU and SEL to access AUTOSET and Setting the clock.



Autoset: Press MENU until AUTOSET appears in the display. Press SEL to toggle ON/OFF. Allows you to set the strongest local radio stations without losing your original manually set preset stations for AM/FM1/FM2. When the six strongest stations are filled, the station stored in preset 1 will begin playing. If there are less than six strong stations, the system will store the last one in the remaining presets.
Setting the clock: Press MENU until SELECT HOUR or SELECT MINUTE is displayed. Use SEL to manually increase (▲) or decrease (▼) the hours/minutes.

Folder/Track mode: In MP3 mode, press MENU until MODE appears in the display. Use SEL to toggle between FOLDER (only tracks within selected folder are accessible) or TRACK (all tracks on disc are accessible) MODE.

10. **REPEAT:** Repeats the current CD/MP3 track when active (ON). Press to show repeat status. Press again to toggle status.

11. **SHUFFLE:** Plays CD/MP3 tracks in random order when active (ON). Press to show shuffle status. Press again to toggle status.

12. **FOLDER▶** : Press to access the next MP3 directory.

13. **FOLDER◀** : Press to access the previous MP3 directory.

14. **FF**(Fast forward): In CD/MP3 mode, press until desired selection is reached.

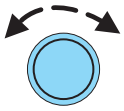
15. **REW**(Rewind): In CD/MP3 mode, press until desired selection is reached.

16. **SAT (if equipped):** Your radio comes equipped with Satellite Ready capability. The kit to enable the Satellite reception is available through your dealer. Detailed satellite instructions are included with the dealer installed kit.
Dealer installed satellite kit only available in the continental United States.

17. **BAND:** Press to toggle between AM/FM1/FM2 frequency band.

18. **Memory presets:** To set a station: Select frequency band; tune to a station, press and hold a preset button until sound returns.

19. **Power/volume:** Press to turn ON/OFF; turn to increase or decrease volume levels.



20. **CD:** Press to enter CD mode.

CD units are designed to play commercially pressed 4.75 in (12 cm) audio compact discs only. Due to technical incompatibility, certain recordable and re-recordable compact discs may not function correctly when used in Ford CD players. Irregular shaped CDs, CDs with a scratch protection film attached, and CDs with homemade paper (adhesive) labels should not be inserted into the CD player. The label may peel and cause the CD to become jammed. It is recommended that homemade CDs be identified with permanent felt tip marker rather than adhesive labels. Ballpoint pens may damage CDs. Please contact your dealer for further information.

21. **COMP**(Compression): Brings soft and loud CD passages together for a more consistent listening level when in CD mode. Press COMP to turn the feature ON/OFF.

22. **Scan:** Press SCAN to hear a brief sampling of radio stations or CD/MP3 tracks. Press again to stop.

23. **CAT/Tune:** Press ◀ or ▶ to

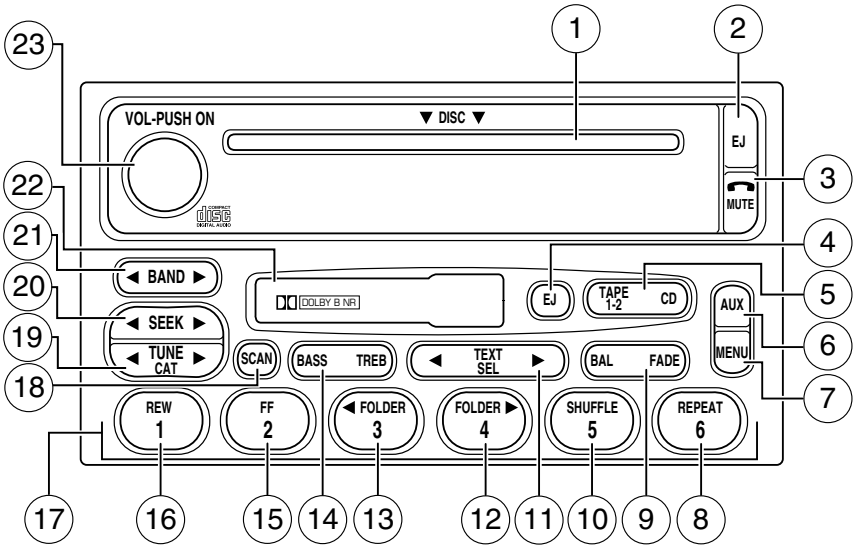
manually tune down/up the radio frequency band.

CAT: CAT is only available when equipped with Satellite Radio. Your radio comes equipped with Satellite ready capability. The kit to enable Satellite reception is available through your dealer. Detailed Satellite instructions are included with the dealer installed kit.
Dealer installed satellite kit only available in the continental United States.

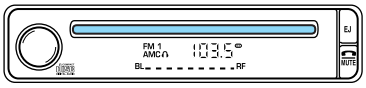
For information regarding SIRIUS Satellite Radio, please call toll-free 888-539-SIRIUS (888-539-7474) or visit the SIRIUS website at www.siriusradio.com

24. **CD slot:** Insert a CD with the label side up.

Premium Satellite Compatible AM/FM Stereo/Cassette/Single CD/MP3 — late availability (if equipped)



1. **CD slot:** Insert a CD with the label side up.



CD units are designed to play commercially pressed 4.75 in (12 cm) audio compact discs only. Due to technical incompatibility, certain recordable and re-recordable compact discs may not function correctly when used in Ford CD players. Irregular shaped CDs, CDs with a scratch protection film attached, and CDs with homemade paper (adhesive) labels should not be inserted into the CD player. The label may peel and cause the CD to become jammed. It is recommended that homemade CDs be identified with permanent felt tip marker rather than adhesive labels. Ballpoint pens may damage CDs. Please contact your dealer for further information.

2. **CD Eject:** Press to eject a CD. The radio will resume playing.

3. **Mute:** Press to MUTE playing media; press again to return to the playing media.

4. **Tape Eject:** Press to eject the cassette. The radio will resume playing.

5. **Tape 1–2/CD:** Press to begin tape play. If a cassette is already playing, press to change playing sides.

CD: If a CD is loaded in the radio, pressing CD will cause the CD to begin playing.

6. **AUX:** This function is not operational.

7. **MENU:** Press to access the following functions:

Clock: Press MENU until HOURS or MINUTES is displayed. Press TEXT/SEL to decrease/ increase hours or minutes.

Compression: In CD mode, compression brings soft and loud passages together for a more consistent listening level. Press MENU until COMPRESS is displayed. Use TEXT/SEL to toggle on/off.

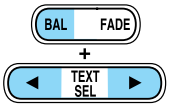
Dolby: In tape mode, press MENU until DOLBY B XX appears in the display. Press TEXT/SEL to toggle ON/OFF. The Dolby noise reduction system is manufactured under license from Dolby Laboratories Licensing Corporation. Dolbyt and the double-D symbol are registered trademarks of Dolby Laboratories Licensing Corporation.

Folder/Track Mode: In MP3 mode, press MENU until MODE appears in the display. Use TEXT/SEL to toggle between FOLDER (only tracks within selected folder are accessible) or TRACK (all tracks on disk are accessible) MODE.

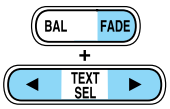
Autoset: Press MENU until AUTOSET appears in the display. Press TEXT/SEL to toggle on/off. Allows you to set the strongest local stations without losing your original memory preset stations for AM/FM1/FM2. When the six strongest stations are filled, the station stored in preset 1 will begin playing. If there are less than six strong stations, the system will store the last one in the remaining presets.

8. **REPEAT:** Repeats current CD/MP3 track when active (ON). Press to show repeat status. Press again to toggle status.

9. **Balance:** Press BAL; then press SEL ◀ / ▶ to shift sound to the left/right speakers.



Fade: Press FADE; then press SEL ◀ / ▶ to shift sound to the rear/front speakers.



10. **SHUFFLE:** Plays CD/MP3 tracks in random order when active (ON). Press to show shuffle status. Press again to toggle status.

11. **TEXT/SEL:** The filename, song title, artist or album text may be viewed while playing an MP3 selection. Press TEXT to scroll through the text fields. The display will scroll through all of the text in the current field before changing to the next field. (TEXT must be pressed within three seconds of the previous button press to proceed to the next/last text display.) The last text field shown on the display will become the new display message default.

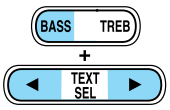
TEXT is also available when equipped with Satellite radio. Your radio comes equipped with Satellite ready capability. The kit to enable Satellite reception is available through your dealer. Detailed Satellite instructions are included with the dealer installed kit. *Dealer installed satellite kit only available in the continental United States.*

Select: Use with Bass, Treble, Balance, Fade and other menu selections.

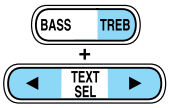
12. **FOLDER ▶** : Press to access the next MP3 directory folder.

13. **FOLDER ◀** : Press to access the previous MP3 directory folder.

14. **Bass:** Press BASS; then press SEL ◀ / ▶ to decrease/increase the bass output.



Treble: Press TREB; then press SEL ◀ / ▶ to decrease/increase the treble output.



15. **Fast Forward (FF):** In CD mode, press and hold to fast forward. In tape mode, press to activate fast forward. Press FF again to return to play.

16. **Rewind (REW):** In CD mode, press and hold to reverse CD. In tape mode, press to rewind. Press REW again to return to play.

17. **Memory preset buttons:** To set a station: Press BAND to select the frequency band (AM/FM1/FM2), tune to a station, press and hold a preset button until sound returns.

18. **Scan:** Press to hear a brief sampling of all listenable stations, tape selections or CD tracks. Press again to stop.

19. **Tune/CAT:** TUNE: Works in radio mode only. Press TUNE ◀ / ▶ to change frequency down/up.

CAT: CAT is only available when equipped with Satellite Radio. Your radio comes equipped with Satellite ready capability. The kit to enable Satellite reception is available through your dealer. Detailed Satellite instructions are included with the dealer installed kit. *Dealer installed satellite kit only available in the continental United States.*

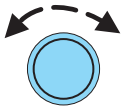
For information regarding SIRUS Satellite Radio, please call toll-free 888–539–SIRIUS (888–539–7474) or visit the SIRIUS website at www.siriusradio.com.

20. **Seek:** Press and release SEEK ◀ / ▶ for previous/next strong station, tape selection or CD track.

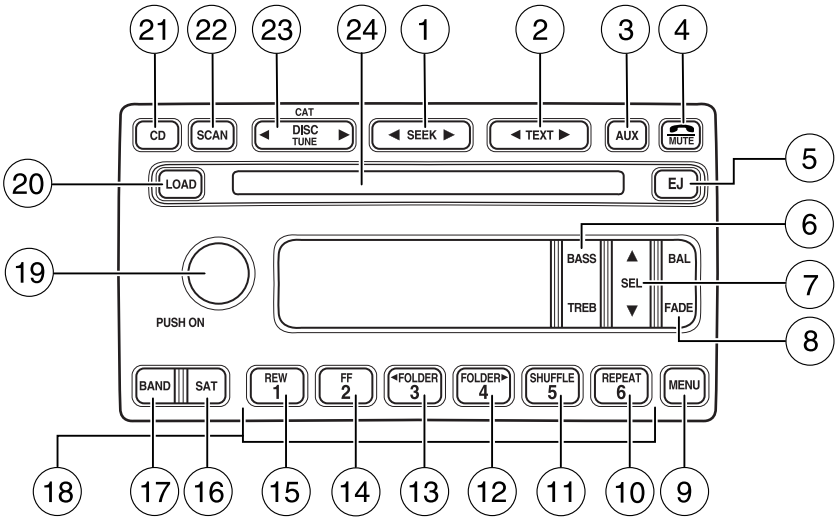
21. **BAND:** Press to toggle through AM/FM1/FM2 frequency bands.

22. **Cassette door:** Insert the cassette with the opening to the right.

23. **Power/volume:** Press to turn ON/OFF; turn to increase/decrease volume.



Premium Satellite Compatible AM/FM Stereo In-Dash Six CD/MP3 Radio (if equipped)



1. **SEEK:** Press and release SEEK ◀ / ▶ for previous/next strong station or track.

2. **TEXT:** The filename (Fi), song title (So), artist text (Ar) or album text (AL) may be viewed while playing an MP3 selection. When MP3 selection text is shown on the message display, its corresponding text indicator (Fi, So, Ar, or AL) is shown in the elapsed time display. Press TEXT to scroll through the text fields. The display will scroll all of the text in the current field before changing to the next field. (TEXT must be pressed within 3 seconds of the previous button press to proceed to the next/last text display.)

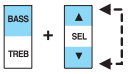
TEXT is also available when equipped with Satellite radio. Your radio comes equipped with Satellite ready capability. The kit to enable Satellite reception is available through your dealer. Detailed Satellite instructions are included with the dealer installed kit. *Dealer installed satellite kit only available in the continental United States.*

3. **AUX:** Press to toggle between the current playing media and DVD (if equipped).

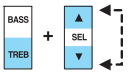
4. **MUTE:** Press to MUTE playing media; press again to return to playing media

5. **EJ:** Press to eject a CD. Press EJ and a memory preset to eject a specific disc. Press and hold to eject all loaded discs.

6. **Bass:** Press BASS; then press SEL ▼ / ▲ to decrease/increase the bass output.

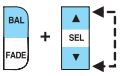


Treble: Press TREB; then press SEL ▼ / ▲ to decrease/increase the treble output.

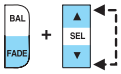


7. **Select:** Use with Bass, Treble, Balance, Fade and other menu functions.

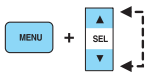
8. **Balance:** Press BAL; then press SEL ▼ / ▲ to shift sound to the left/right speakers.



Fade: Press FADE; then press SEL ▼ / ▲ to shift sound to the rear/front speakers.



9. **Menu:** Press to access the following functions:



Compression: Brings soft and loud CD passages together for a more consistent listening level when in CD mode. Press MENU until compression status is displayed. Press the SEL control to enable the compression feature when COMPRESS OFF is displayed. Press the SEL control again to disable the feature when COMPRESS ON is displayed.

Autoset: Press MENU until AUTOSET appears in the display. Press SEL to toggle ON/OFF. Allows you to set the strongest local radio stations without losing your original manually set preset stations for AM/FM1/FM2. When the six strongest stations are filled, the station stored in preset 1 will begin playing. If there are less than six strong stations, the system will store the last one in the remaining presets.

Setting the clock: Press MENU until SELECT HOUR or SELECT MINUTE is displayed. Use SEL to manually increase (▲) or decrease (▼) the hours/minutes. Press MENU again to disengage clock mode.

Folder/Track Mode: In MP3 mode, press MENU until MODE appears in the display. Use SEL to toggle between FOLDER (only tracks within selected folder are accessible) or TRACK (all tracks on disc are accessible) MODE.

10. **REPEAT:** Press to repeat the current CD/MP3 track. Press again to disable.

11. **SHUFFLE:** Press play the CD/MP3 tracks on the current disc in random order. Press again to disable.

12. **FOLDER** ▶ : Press to access the next MP3 directory.

13. **FOLDER** ◀ : Press to access the previous MP3 directory

14. **FF**(Fast forward): In CD/MP3 mode, press until desired selection is reached.

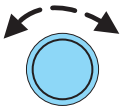
15. **REW**(Rewind): In CD/MP3 mode, press until desired selection is reached.

16. **SAT (if equipped):** Your radio comes equipped with Satellite Ready capability. The kit to enable the Satellite reception is available through your dealer. Detailed satellite instructions are included with the dealer installed kit. *Dealer installed satellite kit only available in the continental United States.*

17. **BAND:** Press to toggle between AM/FM1/FM2 frequency band.

18. **Memory presets:** To set a station: Select frequency, tune to a station, press and hold a preset button until sound returns.

19. **Power/volume:** Press to turn ON/OFF; turn to increase or decrease volume levels.



20. **Load:** Press to load a CD. Press LOAD and a memory preset to load to a specific disc slot. Press and hold to load up to six discs.

21. **CD:** Press to enter CD mode.

CD units are designed to play commercially pressed 4.75 in (12 cm) audio compact discs only. Due to technical incompatibility, certain recordable and re-recordable compact discs may not function correctly when used in Ford CD players. Irregular shaped CDs, CDs with a scratch protection film attached, and CDs with homemade paper (adhesive) labels should not be inserted into the CD player. The label may peel and cause the CD to become jammed. It is recommended that homemade CDs be identified with permanent felt tip marker rather than adhesive labels. Ballpoint pens may damage CDs. Please contact your dealer for further information.

22. **Scan:** Press SCAN to hear a brief sampling of radio stations or CD/MP3 tracks. Press again to stop.

23. **Disc/Tune:** Press ◀ or ▶ to manually tune down/up the radio frequency band, or to listen to the previous/next CD.

CAT: CAT is only available when equipped with Satellite Radio. Your Audiophile radio comes equipped with Satellite ready capability. The kit to enable Satellite reception is available through your dealer. Detailed Satellite instructions are included with the dealer installed kit. *Dealer installed satellite kit only available in the continental United States.*

For information regarding SIRIUS Satellite Radio, please call toll-free 888-539-SIRIUS (888-539-7474) or visit the SIRIUS website at www.siriusradio.com

24. **CD slot:** Insert a CD, label side up.

GENERAL AUDIO INFORMATION

Radio frequencies

AM and FM frequencies are established by the Federal Communications Commission (FCC) and the Canadian Radio and Telecommunications Commission (CRTC). Those frequencies are:

AM - 530, 540–1700, 1710 kHz

FM- 87.7, 87.9–107.7, 107.9 MHz

Radio reception factors

There are three factors that can effect radio reception:

- Distance/Strength: The further you travel from an FM station, the weaker the signal and the weaker the reception.
- Terrain: Hills, mountains, tall buildings, power lines, electric fences, traffic lights and thunderstorms can interfere with your reception.
- Station overload: When you pass a broadcast tower, a stronger signal may overtake a weaker one and play while the weak station frequency is displayed.

Cassette/player care

Do:

- Use only cassettes that are 90 minutes long or less.

- Tighten very loose tapes by inserting a finger or pencil into the hole and turning the hub.
- Remove loose labels before inserting tapes.
- Allow tapes which have been subjected to extreme heat, humidity or cold to reach a moderate temperature before playing.
- Clean the cassette player head with a cassette cleaning cartridge after 10–12 hours of play to maintain good sound/operation.

Don't:

- Expose tapes to direct sunlight, extreme humidity, heat or cold.
- Leave tapes in the cassette player for a long time when not being played.

CD/CD player care

Do:

- Handle discs by their edges only. Never touch the playing surface.
- Inspect discs before playing. Clean only with an approved CD cleaner and wipe from the center out.

Don't:

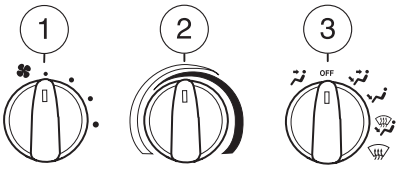
- Expose discs to direct sunlight or heat sources for extended periods of time.
- Insert more than one disc into each slot of the CD changer magazine.
- Clean using a circular motion.

CD units are designed to play commercially pressed 4.75 inch (12 cm) audio compact discs only. Due to technical incompatibility, certain recordable and re-recordable compact discs may not function correctly when used in Ford CD players. Irregular shaped CDs, CDs with a scratch protection film attached, and CDs with homemade paper (adhesive) labels should not be inserted into the CD player. The label may peel and cause the CD to become jammed. It is recommended that homemade CDs be identified with permanent felt tip marker rather than adhesive labels. Ball point pens may damage CDs. Please contact your dealer for further information.

Audio system warranty and service

Refer to the *Warranty Guide* for audio system warranty information. If service is necessary, see your dealer or qualified technician.

HEATER ONLY SYSTEM (IF EQUIPPED)



1. **Fan speed adjustment:** Controls the volume of air circulated in the vehicle.

2. **Temperature selection:** Controls the temperature of the airflow in the vehicle.

3. **Air flow selections:** Controls the direction of the airflow in the vehicle. See the following for a brief description on each control.

: Distributes outside air through the instrument panel vents.

OFF: Outside air is shut out and the fan will not operate.

: Distributes outside air through the instrument panel vents and the floor vents.

: Distributes outside air through the floor vents.

: Distributes outside air through the windshield defroster vents and floor vents.

: Distributes outside air through the windshield defroster vents.

Operating tips

- To reduce fog build up on the windshield during humid weather, place the air flow selector in the position.
- To reduce humidity build up inside the vehicle during cold or warm weather, do not drive with the air flow selector in the OFF position.
- Under normal weather conditions, do not leave the air flow selector in OFF when the vehicle is parked. This allows the vehicle to “breathe” using the outside air inlet vents.
- Do not put objects under the front seats that will interfere with the air flow to the back seats.
- Remove any snow, ice or leaves from the air intake area at the base of the windshield.

To aid in side window defogging/demisting in cold weather:

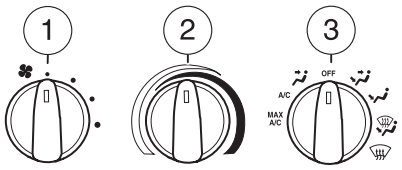
1. Select
2. Set the temperature control to full heat
3. Set the fan speed to its highest speed

4. Direct the outer instrument panel vents towards the side windows

To increase airflow to the outer instrument panel vents, close the vents located in the middle of the instrument panel.

Do not place objects on top of the instrument panel as these objects may become projectiles in a collision or sudden stop.

MANUAL HEATING AND AIR CONDITIONING SYSTEM (IF EQUIPPED)



1. **Fan speed adjustment:** Controls the volume of air circulated in the vehicle.

2. **Temperature selection:** Controls the temperature of the airflow in the vehicle.

3. **Air flow selections:** Controls the direction of the airflow in the vehicle. See the following for a brief description on each control.

MAX A/C: Uses recirculated air to cool the vehicle. Air flows from the instrument panel vents only.

A/C: Uses outside air to cool the vehicle. Air flows from the instrument panel vents only.

: Distributes outside air through the instrument panel vents.

OFF: Outside air is shut out and the fan will not operate.

: Distributes outside air through the instrument panel vents and the floor vents.

: Distributes outside air through the floor vents.

: Distributes outside air through the windshield defroster vents and floor vents.

: Distributes outside air through the windshield defroster vents.

Operating tips

- To reduce fog build up on the windshield during humid weather, place the air flow selector in the  position.
- To reduce humidity build up inside the vehicle: do not drive with the air flow selector in the OFF or MAX A/C position.
- Under normal weather conditions, do not leave the air flow selector in MAX A/C or OFF when the vehicle is parked. This allows the vehicle to “breathe” using the outside air inlet vents.
- Do not put objects under the front seats that will interfere with the airflow to the back seats.
- Remove any snow, ice or leaves from the air intake area at the base of the windshield.

To aid in side window defogging/demisting in cold weather:

1. Select 
2. Select A/C
3. Modulate the temperature control to maintain comfort.
4. Set the fan speed to its highest speed
5. Direct the outer instrument panel vents towards the side windows

To increase airflow to the outer instrument panel vents, close the vents located in the middle of the instrument panel.

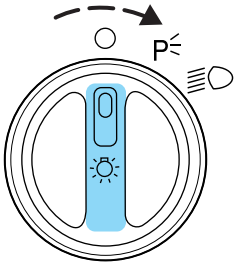
Do not place objects on top of the instrument panel as these objects may become projectiles in a collision or sudden stop.

HEADLAMP CONTROL

Turns the lamps off.

Turns on the parking lamps, instrument panel lamps, license plate lamps and tail lamps.

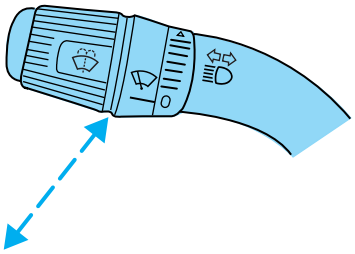
Turns the headlamps on.



High beams/Flash-to-pass

Push the lever toward the instrument panel to activate the high beams. Pull the lever towards you to deactivate.

Pull toward you slightly to activate flash-to-pass. Release to deactivate.



Daytime Running Lamps (DRL) (if equipped)

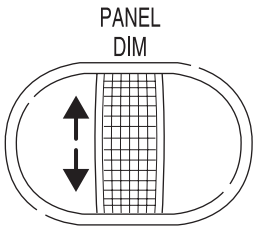
Turns the headlamps on with a reduced output.

To activate:

- the ignition must be in the ON position and
- the headlamp control is in the OFF, parking lamp or autolamp position.

Always remember to turn on your headlamps at dusk or during inclement weather. The Daytime Running Lamp (DRL) system does not activate your tail lamps and generally may not provide adequate lighting during these conditions. Failure to activate your headlamps under these conditions may result in a collision.

PANEL DIMMER CONTROL



Use to adjust the brightness of the instrument panel and all applicable switches in the vehicle during headlamp and parklamp operation.

Move the control to the full upright position, past the detent, to turn on the interior lamps.

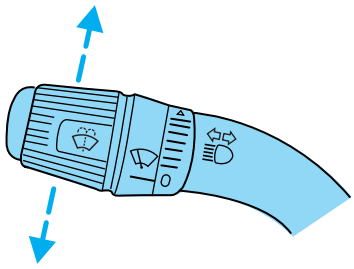
Move the control to the full down position, past the detent, to prevent the interior lights from illuminating when the doors are opened.

AIMING THE HEADLAMPS

The headlamps on your vehicle are properly aimed at the assembly plant. If your vehicle has been in an accident the alignment of your headlamps should be checked by a qualified service technician.

TURN SIGNAL CONTROL

- Push down to activate the left turn signal.
- Push up to activate the right turn signal.

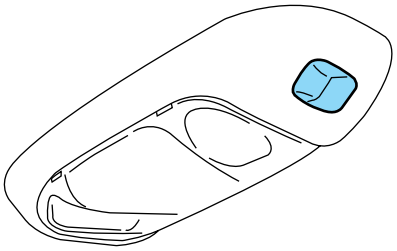


If your vehicle is a tractor, the turn signals may not shut off when a turn is completed; this is normal. Please see your dealer if there are any questions on the options your vehicle has been equipped with.

INTERIOR LAMPS

Map lamps (if equipped)

To turn on the map lamps, press the control next to each lamp.



EXTERIOR BULBS

Bulb inspection

It is a good safety practice to check operation of headlamps, parking lamps, turn signals, clearance and marker lamps, instrument panel and control lamps each day.

Using the right bulbs

Function	Number of bulbs	Trade number
Headlamps	2	4652
Front turn signal lamps	2	1157
Front sidemarker/Park lamps	2 (amber)	194
Brake/Tail/Stop/Rear turn signal/License lamps	4	2057
Back-up lamps	2	1156
Front clearance and identification lamps	5	168
Dome lamp	1	105
To replace all instrument panel lights - see your dealer		

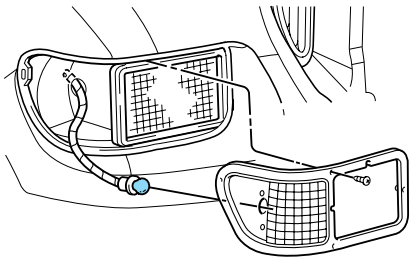
Bulb replacement

Replacing headlamp bulbs

To remove the headlamp bulbs:

1. Make sure the headlamp control is in the ○ position.

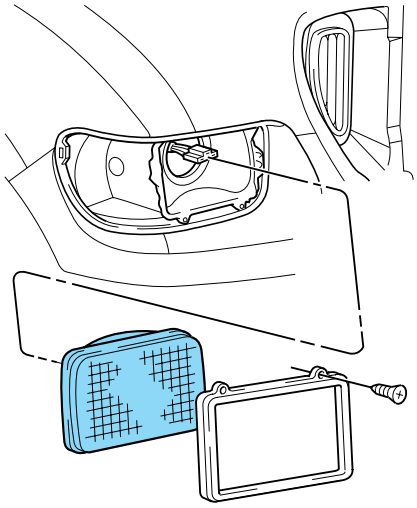
2. Remove the four screws and move the parking lamp assembly away from the headlamp bulb.



3. Remove the four screws and the retaining bracket from the headlamp bulb.

4. Pull the headlamp bulb out of the housing, disconnect the electrical connector and remove the headlamp bulb.

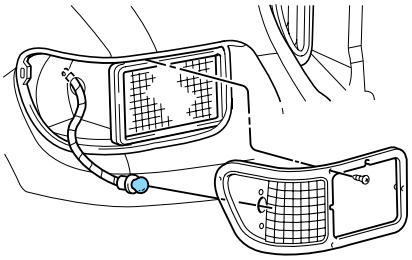
5. To complete installation, follow the removal procedure in reverse order.



Replacing front parking lamp/turn signal/side marker bulbs

To remove the parking lamp/turn signal bulbs:

1. Make sure the headlamp control is in the ◯ position and the turn signals are off.

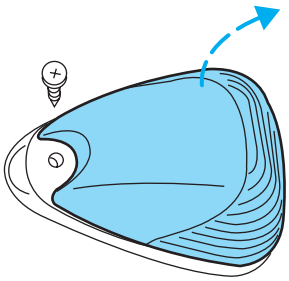


2. Remove the four screws from the lamp assembly.
3. Carefully lower the lamp assembly and pull the bulb socket straight out of the lamp assembly.
4. Carefully pull the bulb straight out of the socket and push in the new bulb.
5. To complete installation, follow the removal procedure in reverse order.

Replacing front clearance and identification lamp bulbs

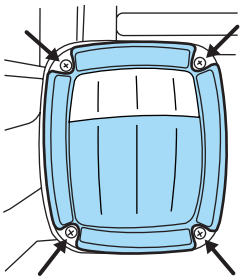
To change the cab marker bulbs:

1. Make sure the headlamp control is in the ◯ position, then remove the screw and lens from the lamp assembly.



2. Carefully pull the bulb straight out of the socket and push in the new bulb.
3. Install the lens on lamp assembly with screw.

Replacing brake/tail/rear turn signal/back-up/license plate lamp bulbs



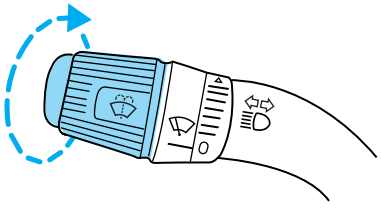
The brake/tail/turn signal/back-up/license plate lamp bulbs are located in the same portion of the tail lamp assembly. Follow the same steps to replace any of these bulbs:

1. Make sure the headlamp control is in the ○ position and the turn signals are off, then remove the four screws and the lamp lens from lamp assembly.
2. Carefully pull the bulb straight out of the socket and push in the new bulb.
3. Install the lens on the lamp assembly with the four screws.

MULTI-FUNCTION LEVER

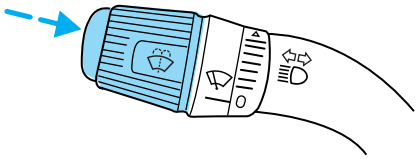
Windshield wiper/washer controls

Rotate the windshield wiper control to the desired interval, low or high speed position.



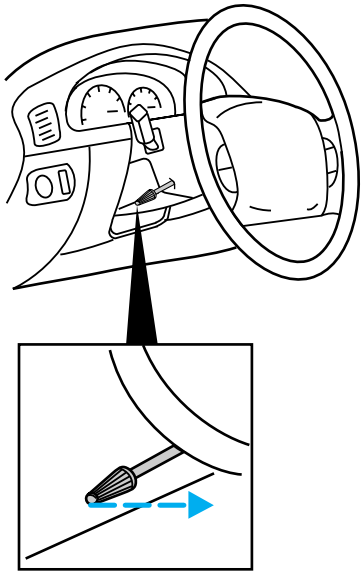
The bars of varying length are for intermittent wipers. When in this position rotate the control upward for fast intervals and downward for slow intervals.

Push the control on the end of the stalk to activate washer. Push and hold for a longer wash cycle. The washer will automatically shut off after ten seconds of continuous use.



TILT STEERING

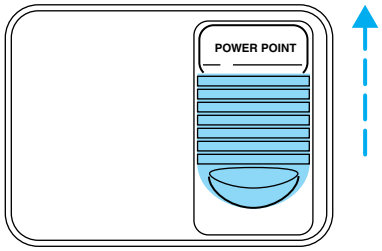
Pull the tilt steering control toward you to move the steering wheel up or down. Hold the control while adjusting the wheel to the desired position, then release the control to lock the steering wheel in position.



Never adjust the steering wheel when the vehicle is moving.

AUXILIARY POWER POINT

Power points are designed for accessory plugs only. Do not hang any type of accessory or accessory bracket from the plug. Improper use of the power point can cause damage not covered by your warranty.



The auxiliary power point is located on the instrument panel.

Do not plug optional electrical accessories into the cigarette lighter. Use the power point.

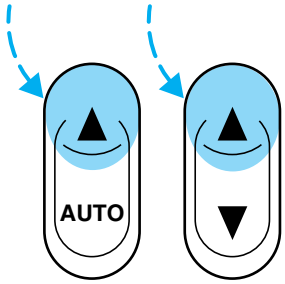
POWER WINDOWS (IF EQUIPPED)

Do not leave children unattended in the vehicle and do not let children play with the power windows. They may seriously injure themselves.

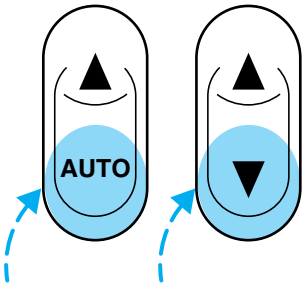
When closing the power windows, you should verify they are free of obstructions and ensure that children and/or pets are not in the proximity of the window openings.

Press and hold the rocker switches to open and close windows.

- Press the top portion of the rocker switch to close.

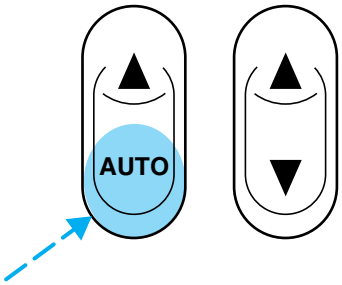


- Press the bottom portion of the rocker switch to open.



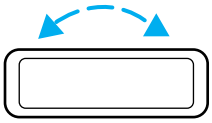
One touch down

- Press AUTO completely down and release quickly. The driver's window will open fully. Depress again to stop window operation.



Window lock

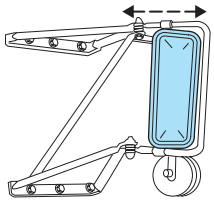
The window lock feature allows only the driver to operate the power windows.



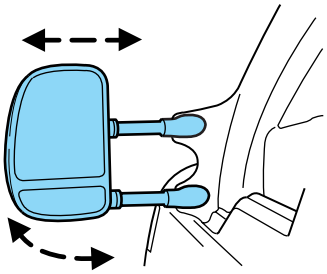
To lock out all the window controls except for the driver's press the left side of the control. Press the right side to restore the window controls.

EXTERIOR MIRRORS

With the doors closed and the seat adjusted for proper comfort, move the mirrors to maximize rear viewing area by adjusting the western mirrors left or right as required.



Adjust the auxiliary convex mirrors. Convex mirrors are a ball-stud design for precise adjustment to maximize viewing area.

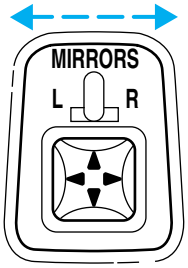


Power side view mirrors (if equipped)

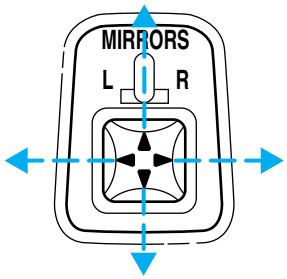
The ignition can be in any position to adjust the power side view mirrors.

To adjust your mirrors:

1. Select L to adjust the left mirror or R to adjust the right mirror.



2. Move the control in the direction you wish to tilt the mirror.



3. Return to the center position to lock mirrors in place.

4. Adjust spotter mirrors (if equipped) manually.

Heated mirrors (if equipped)

Both main mirrors are heated automatically to remove ice, mist and fog and are automatically activated when the vehicle is started.

Note: The mirrors may be **hot** to the touch but will not burn. This is a normal condition.

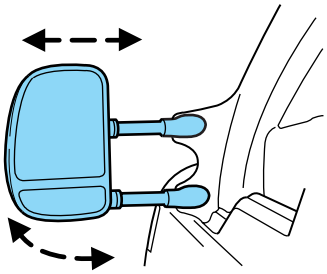
Do not remove ice from the mirrors with a scraper or attempt to readjust the mirror glass if it is frozen in place. These actions could cause damage to the glass and mirrors.

The mirror heating elements are designed to operate regardless of the geographic location of the vehicle. There is no switch to turn on, or other operator involvement required other than to start the vehicle.

The spotter mirror, below the main mirror, is not heated and must be adjusted manually.

Fold-away mirrors

The mirrors can be manually folded forward or backwards for narrow spaces like driving through an automatic car wash or backing out of a garage with the trailer tow mirror.

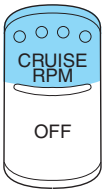


The telescoping feature (if equipped) allows the mirror to extend approximately three inches (76 mm). This feature is especially useful to the driver when towing a trailer.

SPEED CONTROL (IF EQUIPPED)

To turn speed control on

Press CRUISE RPM. If the vehicle is moving, speed control will be enabled; if the vehicle is stationary, engine RPM can be controlled.



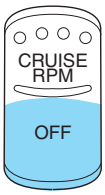
Do not use the speed control in heavy traffic or on roads that are winding, slippery, or unpaved.

Do not shift the gearshift lever into N (Neutral) with the speed control on.

To turn speed control off

Press OFF or turn off the ignition.

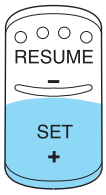
Once speed control is switched off, the previously programmed engine RPM will be erased.



Do not use the speed control in heavy traffic or on roads that are winding, slippery, or unpaved.

To set a speed

Press SET +. If the vehicle is moving, this will set the vehicle speed. If the vehicle is stationary, this will set the vehicle idle RPM.



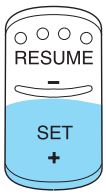
If you drive up or down a steep hill, your vehicle speed may vary momentarily slower or faster than the set speed; this is normal.

Speed control cannot reduce the vehicle speed if it increases above the set speed on a downhill. If your vehicle speed is faster than the set speed while driving on a downhill, you may want to shift to the next lower gear or apply the brakes to reduce your vehicle speed.

If the vehicle speed falls below 30 mph (48 km/h) or engine RPM falls below 1,000 RPM, your speed control will disengage; this is normal. Pressing RESUME - will re-engage it.

Do not use the speed control in heavy traffic or on roads that are winding, slippery, or unpaved.

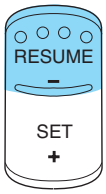
To set a higher set speed



Press and hold SET +. If the vehicle is moving, this will increase vehicle speed; if the vehicle is stationary, this will increase engine RPM. Release the control when the desired vehicle speed/engine RPM is reached.

Press and release SET + to operate the tap-up function. Each press will increase the set speed by 1 mph (1.6 km/h) or engine RPM in idle mode.

To set a lower set speed

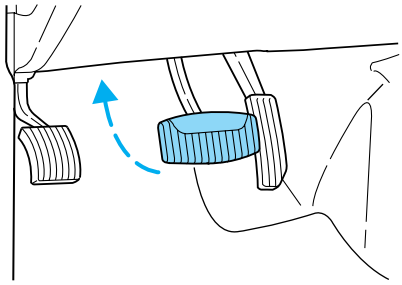


Press and hold RESUME -. If the vehicle is moving, this will decrease vehicle speed; if the vehicle is stationary, this will decrease engine RPM. Release the control when the desired vehicle speed/engine RPM is reached.

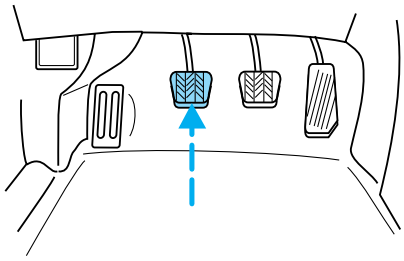
Press and release RESUME - to operate the tap-down function. Each press will decrease the set speed in increments of 1 mph (1.6 km/h) or engine RPM in idle mode.

To disengage speed control

- Depress the brake pedal or

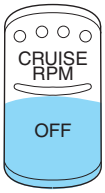


- Depress the clutch pedal (if equipped).



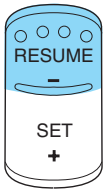
Disengaging the speed control will not erase the previously programmed set speed or engine RPM.

Pressing OFF will erase the previously programmed engine RPM.



To return to a previously set speed

Press RESUME -. For RESUME - to operate, the vehicle speed must be above 30 mph (48 km/h) or engine speed must be above 1,000 RPM.



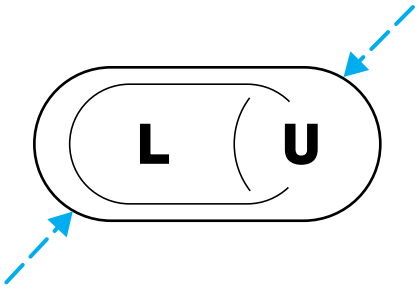
KEYS

The key operates all locks on your vehicle. In case of loss, replacement keys are available from your dealer.

You should always carry a second key with you in a safe place in case you require it in an emergency.

POWER DOOR LOCKS (IF EQUIPPED)

Press U to unlock all doors and L to lock all doors.



SEATING

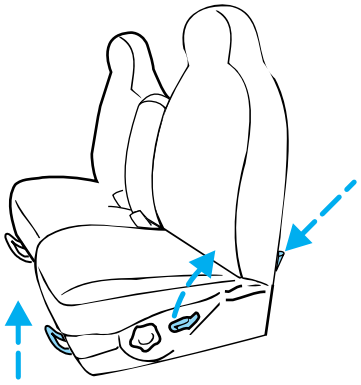
Notes:

Reclining the seatback can cause an occupant to slide under the seat's safety belt, resulting in severe personal injuries in the event of a collision.

Do not pile cargo higher than the seatbacks to reduce the risk of injury in a collision or sudden stop.

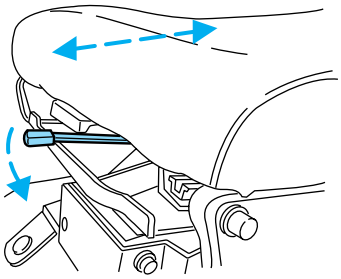
40/20/40 split bench seat (if equipped)

- Lift the track release bar to move the seat forward or backward. Ensure the seat is re-latched into place.
- Pull the handle on the side of the seat up to recline the seat.
- Push down the lever located at the bottom of the seatback to quickly fold the seatback forward.

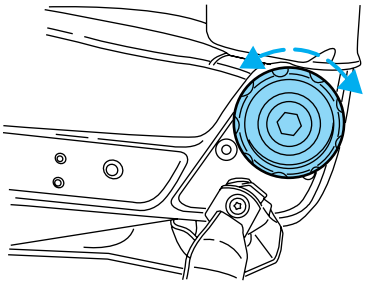


Recline seat (if equipped)

Move handle to the left to move seat forward or backward.



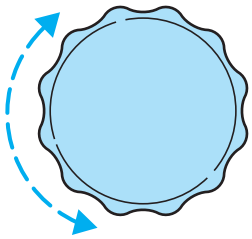
Rotate control to adjust seatback.



Using the manual lumbar support

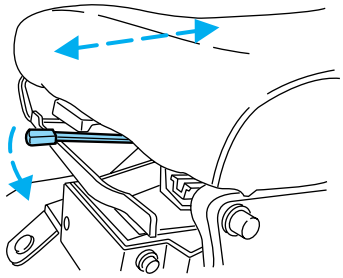
For more lumbar support, turn the lumbar support control toward the front of the vehicle.

For less lumbar support, turn the lumbar support control toward the rear of the vehicle.

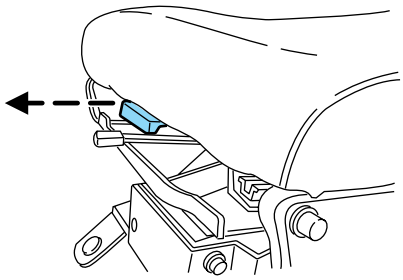


Easy-Aire seat (if equipped)

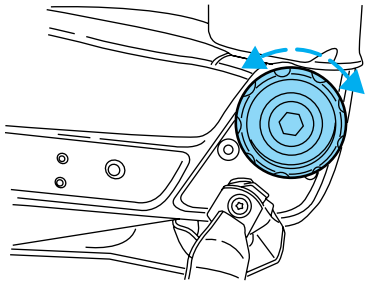
Move handle to the left to move seat forward or backward.



Pull handle out to move the seat cushion forward or backward.

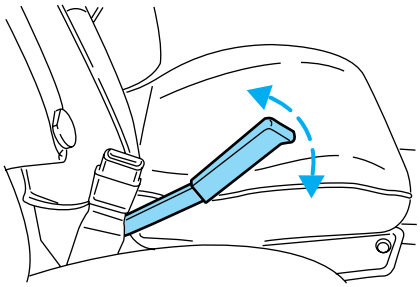


Rotate control to adjust seatback.



Pump handle to raise seat height.

Push handle full down to lower.

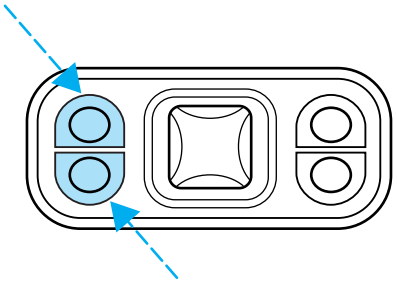


To reduce the risk of excess slack in the belt system, always adjust the seat height before fastening the seat belt.

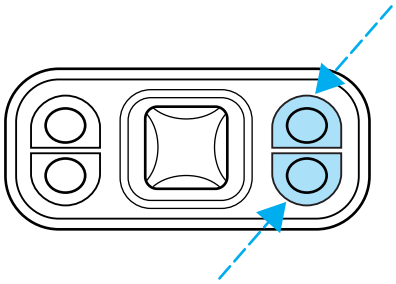
Adjusting the front power seat (if equipped)

The control is located on the outboard side of the seat cushion.

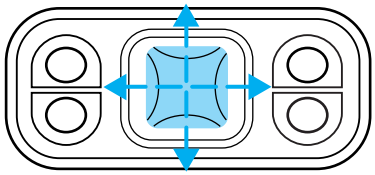
Press to raise or lower the front portion of the seat cushion.



Press to raise or lower the rear portion of the seat cushion.

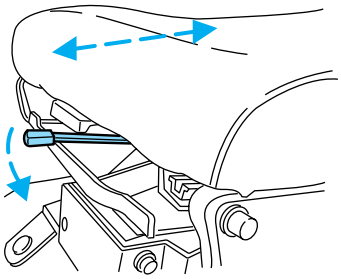


Press the control to move the seat forward, backward, up or down.

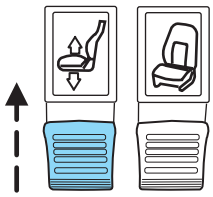


Air-Ride seat (if equipped)

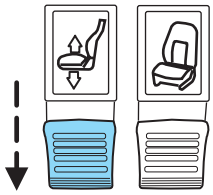
Move handle to the left to move seat forward or backward.



Push up on the switch to raise the seat height.

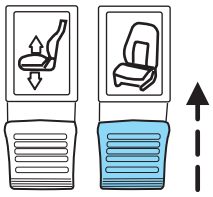


Press down on the switch to lower the seat height.

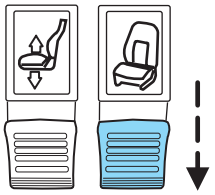


To reduce the risk of excess slack in the belt system, always adjust the seat height before fastening the seat belt.

Press up on the switch to increase the firmness (lumbar support) of the seatback.



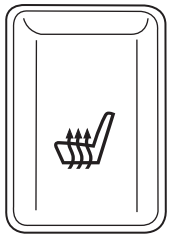
Press down on the switch to reduce the firmness (lumbar support) of the seatback.



Heated seats (if equipped)

To operate the heated seats:

- Push control to activate.
- Push again to deactivate.

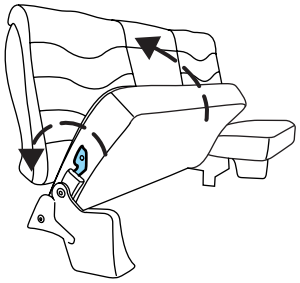


REAR FLIP-UP SEAT (IF EQUIPPED)

Flipping-up the seat

The rear seatback has a split 60/40 seat. Each seat cushion can be flipped-up into the seatback position.

1. Pull the control to release the seat cushion.
2. Rotate the seat cushion up until it locks into the vertical storage position.



Returning the seat to horizontal position

Always latch the vehicle seat to the floor, whether the seat is occupied or empty. If not latched, the seat may cause injury during a sudden stop.

Make sure the safety belts are accessible and not trapped behind the seat when the seat is returned to its horizontal position.

Before returning the seatback to its original position, make sure that cargo or any objects are not trapped underneath the seatback. After returning the seatback to its original position, pull on the seatback to ensure that it has fully latched. An unlatched seat may become dangerous in the event of a sudden stop or collision.

1. Pull the control on the side of the seat to release the seat cushion from its storage position.
2. Push the seat cushion down until it locks into the horizontal position.

SAFETY RESTRAINTS

Safety restraints precautions

Always drive and ride with your seatback upright and the lap belt snug and low across the hips.

To reduce the risk of injury, make sure children sit where they can be properly restrained.

All occupants of the vehicle, including the driver, should always properly wear their safety belts.

Never let a passenger hold a child on his or her lap while the vehicle is moving. The passenger cannot protect the child from injury in a collision.

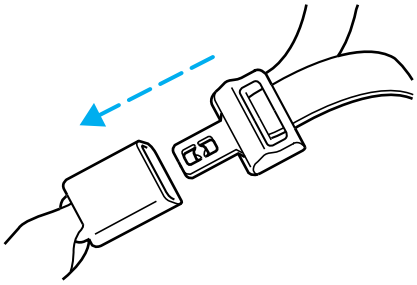
It is extremely dangerous to ride in a cargo area, inside or outside of a vehicle. In a collision, people riding in these areas are more likely to be seriously injured or killed. Do not allow people to ride in any area of your vehicle that is not equipped with seats and safety belts. Be sure everyone in your vehicle is in a seat and using a safety belt properly.

In a rollover crash, an unbelted person is significantly more likely to die than a person wearing a safety belt.

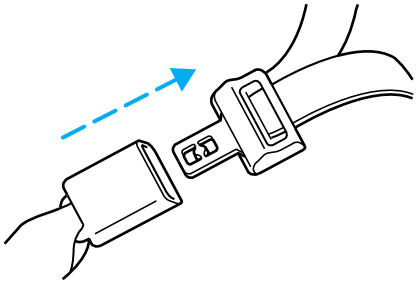
Each seating position in your vehicle has a specific safety belt assembly which is made up of one buckle and one tongue that are designed to be used as a pair. 1) Use the shoulder belt on the outside shoulder only. Never wear the shoulder belt under the arm. 2) Never swing the safety belt around your neck over the inside shoulder. 3) Never use a single belt for more than one person.

Combination lap and shoulder belts

1. Insert the belt tongue into the proper buckle (the buckle closest to the direction the tongue is coming from) until you hear a snap and feel it latch. Make sure the tongue is securely fastened in the buckle.



2. To unfasten, push the release button and remove the tongue from the buckle.

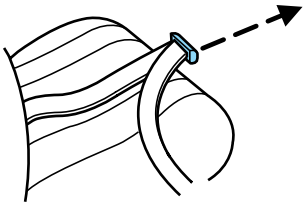


The front and rear outboard safety restraints in the vehicle are combination lap and shoulder belts. The front and rear seat passenger outboard safety belts have vehicle sensitive emergency locking retractors.

Lap belts

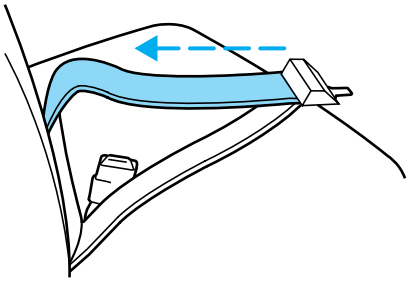
The front center and rear center lap belts do not adjust automatically.

The lap belt should fit snugly and as low as possible around the hips, not across the waist.



Insert the tongue into the correct buckle (the buckle closest to the direction the tongue is coming from). To lengthen the belt, turn the tongue at a right angle to the belt and pull across your lap until it reaches the buckle. To tighten the belt, pull the loose end of the belt through the tongue until it fits snugly across the hips.

Shorten and fasten the belt when not in use.



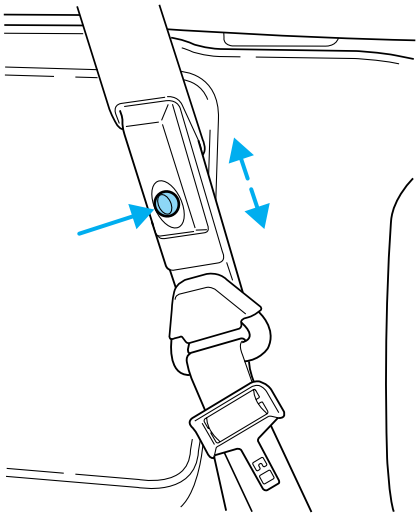
Vehicle sensitive mode

The vehicle sensitive retractor allows free shoulder belt length adjustment to your movements and locks in response to vehicle movement. For example, if the driver brakes suddenly or turns a corner sharply, or the vehicle receives an impact of approximately 5 mph (8 km/h) or more, the combination safety belts will lock to help reduce forward movement of the driver and passengers.

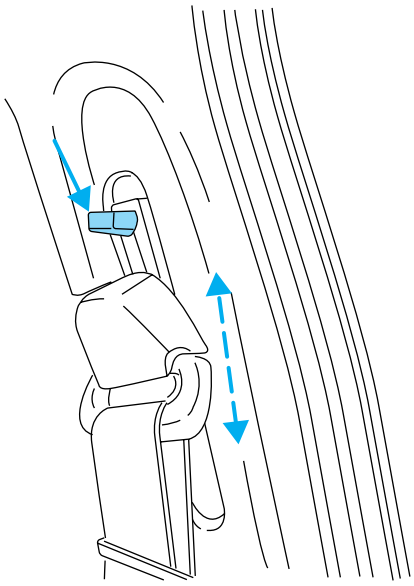
Front safety belt height adjustment

SuperCab and Crew Cab vehicles have safety belt height adjustments for the driver and front passenger. Adjust the height of the shoulder belt so the belt rests across the middle of your shoulder.

- SuperCab



- Crew Cab



To lower the shoulder belt height, push the button and slide the height adjuster down. To raise the height of the shoulder belt, slide the height adjuster up. Pull down on the height adjuster to make sure it is locked in place.

Position the safety belt height adjusters so that the belt rests across the middle of your shoulder. Failure to adjust the safety belt properly could reduce the effectiveness of the seat belt and increase the risk of injury in a collision.

Safety belt extension assembly

If the safety belt is too short when fully extended, there is an eight inch (20 cm) safety belt extension assembly that can be added (part number 611C22). This assembly can be obtained from your dealer at no cost.

Use only extensions manufactured by the same supplier as the safety belt. Manufacturer identification is located at the end of the webbing on the label. Also, use the safety belt extension only if the safety belt is too short for you when fully extended.

Do not use extensions to change the fit of the shoulder belt across the torso.

Safety belt maintenance

Inspect the safety belt systems periodically to make sure they work properly and are not damaged. Inspect the safety belts to make sure there are no nicks, tears or cuts. Replace if necessary. All safety belt assemblies, including retractors, buckles, front seat belt buckle assemblies, buckle support assemblies (slide bar-if equipped), shoulder belt height adjusters (if equipped), shoulder belt guide on seatback (if equipped), child safety seat tether anchors, and attaching hardware, should be inspected after a collision.

Ford Motor Company recommends that all safety belt assemblies used in vehicles involved in a collision be inspected for proper function and replaced, if necessary. Safety belt assemblies not in use during a collision should also be inspected and replaced if either damage or improper operation is noted.

Failure to inspect and if necessary replace the safety belt assembly under the above conditions could result in severe personal injuries in the event of a collision.

Refer to *Interior* in the *Cleaning* chapter.

Safety belt warning light and indicator chime

The safety belt warning light illuminates in the instrument cluster and a chime sounds to remind the occupants to fasten their safety belts.

Conditions of operation

If...	Then...
The driver's safety belt is not buckled before the ignition switch is turned to the ON position...	The safety belt warning light illuminates 1-2 minutes and the warning chime sounds 4-8 seconds.
The driver's safety belt is buckled while the indicator light is illuminated and the warning chime is sounding...	The safety belt warning light and warning chime turn off.
The driver's safety belt is buckled before the ignition switch is turned to the ON position...	The safety belt warning light and indicator chime remain off.

BeltMinder

The BeltMinder feature is a supplemental warning to the safety belt warning function. This feature provides additional reminders to the driver that the driver's safety belt is unbuckled by intermittently sounding a chime and illuminating the safety belt warning lamp in the instrument cluster.

If...	Then...
The driver's safety belt is not buckled before the vehicle has reached at least 3 mph (5 km/h) and 1-2 minutes have elapsed since the ignition switch has been turned to ON...	The BeltMinder feature is activated - the safety belt warning light illuminates and the warning chime sounds for 6 seconds every 30 seconds, repeating for approximately 5 minutes or until safety belt is buckled.
The driver's safety belt is buckled while the safety belt indicator light is illuminated and the safety belt warning chime is sounding...	The BeltMinder feature will not activate.
The driver's safety belt is buckled before the ignition switch is turned to the ON position...	The BeltMinder feature will not activate.

The following are reasons most often given for not wearing safety belts: (All statistics based on U.S. data)

Reasons given...	Consider...
"Crashes are rare events"	**36700 crashes occur every day.** The more we drive, the more we are exposed to "rare" events, even for good drivers. *1 in 4 of us will be seriously injured in a crash during our lifetime.*
"I'm not going far"	**3 of 4** fatal crashes occur within **25** miles of home.
"Belts are uncomfortable"	We design our safety belts to enhance comfort. If you are uncomfortable - try different positions for the safety belt upper anchorage and seatback which should be as upright as possible; this can improve comfort.

Reasons given...	Consider...
"I was in a hurry"	**Prime time for an accident.** BeltMinder reminds us to take a few seconds to buckle up.
"Seat belts don't work"	**Safety belts,** when used properly, **reduce risk of death** to front seat occupants by **45% in cars,** and by **60% in light trucks.**
"Traffic is light"	**Nearly 1 of 2 deaths occur in single-vehicle crashes,** many when no other vehicles are around.
"Belts wrinkle my clothes"	Possibly, but a serious crash can do much more than wrinkle your clothes, particularly if you are unbelted.
"The people I'm with don't wear belts"	Set the example, teen deaths occur 4 times more often in vehicles with TWO or MORE people. Children and younger brothers/sisters imitate behavior they see.
"I have an air bag"	Air bags offer greater protection when used with safety belts. Frontal air bags are not designed to inflate in rear and side crashes or rollovers.
"I'd rather be thrown clear"	Not a good idea. **People** who are **ejected are 40 times more likely to DIE.** Safety belts help prevent ejection, WE CAN'T "PICK OUR CRASH".

Do not sit on tope of a buckled safety belt or insert a latchplate into the buckle to avoid the BeltMinder® chime. To do so may adversely affect the performance of the vehicle's air bag system

One-time disable

Any time the safety belt is buckled and then unbuckled during an ignition ON cycle, BeltMinder will be disabled for that ignition cycle only.

Deactivating/Activating the BeltMinder feature

Read Steps 1 - 9 thoroughly before proceeding with the deactivation/activation programming procedure.

The BeltMinder feature can be deactivated/activated by performing the following procedure:

Before following the procedure, make sure that:

- The parking brake is set.
- The gearshift is in P (Park) (automatic transmission) or the neutral position (manual transmission).
- The ignition switch is in the OFF position.
- All vehicle doors are closed.
- The driver's safety belt is unbuckled.
- The headlamp control is in the ◯ position.

While the design allows you to deactivate your BeltMinder®, this system is designed to improve your chances of being safely belted and surviving an accident. We recommend you leave the BeltMinder® system activated for yourself and others who may use the vehicle. To reduce the risk of injury, do not deactivate/activate the BeltMinder® feature while driving the vehicle.

BeltMinder activation and deactivation procedure

1. Turn the ignition switch to the RUN (or ON) position. (DO NOT START THE ENGINE.)

2. Wait until the safety belt warning light turns off. (Approximately 1–2 minutes.)

- Steps 3–5 must be completed within 60 seconds or the procedure will have to be repeated.

3. Buckle then unbuckle the safety belt three times, ending with the safety belt unbuckled. This can be done before or during BeltMinder warning activation.

4. Turn on the parklamps/headlamps, turn off the parklamps/headlamps.

5. Buckle then unbuckle the safety belt three times, ending with the safety belt unbuckled.

- After step 5 the safety belt warning light will be turned on for three seconds.

6. Within seven seconds of the safety belt warning light turning off, buckle then unbuckle the safety belt.

- This will disable BeltMinder if it is currently enabled, or enable BeltMinder if it is currently disabled.

7. Confirmation of disabling BeltMinder is provided by the safety belt warning light flashing four times per second for three seconds.

8. Confirmation of enabling BeltMinder is provided by:

- The safety belt warning light flashing four times per second for three seconds.
- Followed by three seconds with the safety belt warning light off.
- Once again, the safety belt warning light will flash four times per second for three seconds.

9. After receiving confirmation, the deactivation/activation procedure is complete.

SAFETY RESTRAINTS FOR CHILDREN

Important child restraint precautions

You are required by law to use safety restraints for children in the U.S. and Canada. If small children (generally children who are four years old or younger and who weigh 40 lb. [18 kg] or less) ride in your vehicle, you must put them in safety seats made especially for children. Many states require that children use approved booster seats until they are eight years old. Check your local and state or provincial laws for specific requirements regarding the safety of children in your vehicle. When possible, always place children under age 12 in the rear seat of your vehicle. Accident statistics suggest that children are safer when properly restrained in the rear seating positions than in the front seating position.


Never let a passenger hold a child on his or her lap while the vehicle is moving. The passenger cannot protect the child from injury in a collision.

Always follow the instructions and warnings that come with any infant or child restraint you might use.

Children and safety belts

If the child is the proper size, restrain the child in a safety seat.

Children who are too large for child safety seats (as specified by your child safety seat manufacturer) should always wear safety belts.

Follow all the important safety restraint precautions that apply to adult passengers in your vehicle.

If the shoulder belt portion of a combination lap and shoulder belt can be positioned so it does not cross or rest in front of the child's face or neck, the child should wear the lap and shoulder belt. Moving the child closer to the center of the vehicle may help provide a good shoulder belt fit.

Do not leave children, unreliable adults, or pets unattended in your vehicle.

Safety belts and seats can become hot in a vehicle that has been closed up in sunny weather; they could burn a small child. Check seat covers and buckles before you place a child anywhere near them.

Child booster seats

Children outgrow a typical convertible or toddler seat when they weigh 40 lb. (18 kg) and are around 4 years of age. Although the lap/shoulder belt will provide some protection, these children are still too small for lap/shoulder belts to fit properly, which could increase the risk of serious injury.

To improve the fit of both the lap and shoulder belt on children who have outgrown child safety seats, Ford Motor Company recommends use of a belt-positioning booster.

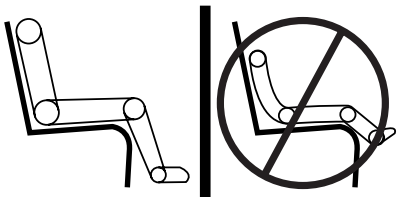
Booster seats position a child so that safety belts fit better. They lift the child up so that the lap belt rests low across the hips and the knees bend comfortably. Booster seats also make the shoulder belt fit better and more comfortably for growing children.

When children should use booster seats

Children need to use booster seats from the time they outgrow the toddler seat until they are big enough for the vehicle seat and lap/shoulder belt to fit properly. Generally this is when they weigh about 80 lb. (36 kg) (about 8 to 12 years old).

Booster seats should be used until you can answer YES to ALL of these questions:

- Can the child sit all the way back against the vehicle seat back with knees bent comfortably at the edge of the seat without slouching?



- Does the lap belt rest low across the hips?
- Is the shoulder belt centered on the shoulder and chest?
- Can the child stay seated like this for the whole trip?

Types of booster seats

There are two types of belt-positioning booster seats:

- Those that are backless.

  If your backless booster seat has a removable shield, remove the shield and use the lap/shoulder belt. If a seating position has a low seat back and no head restraint, a backless booster seat may place your child's head (top of ear level) above the top of the seat. In this case, move the backless booster to another seating position with a higher seat back and lap/shoulder belts.

- Those with a high back.

  If, with a backless booster seat, you cannot find a seating position that adequately supports your child's head, a high back booster seat would be a better choice.

Both can be used in any vehicle in a seating position equipped with lap/shoulder belts if your child is over 40 lb. (18 kg).

The shoulder belt should cross the chest, resting snugly on the center of the shoulder. The lap belt should rest low and snug across the hips, never up high across the stomach.

If the booster seat slides on the vehicle seat, placing a rubberized mesh sold as shelf or carpet liner under the booster seat may improve this condition.

The importance of shoulder belts

Using a booster without a shoulder belt increases the risk of a child's head hitting a hard surface in a collision. For this reason, you should never use a booster seat with a lap belt only. It is best to use a booster seat with lap/shoulder belts in the back seat- the safest place for children to ride.

Follow all instructions provided by the manufacturer of the booster seat.

Never put the shoulder belt under a child's arm or behind the back because it eliminates the protection for the upper part of the body and may increase the risk of injury or death in a collision.

Never use pillows, books, or towels to boost a child. They can slide around and increase the likelihood of injury or death in a collision.

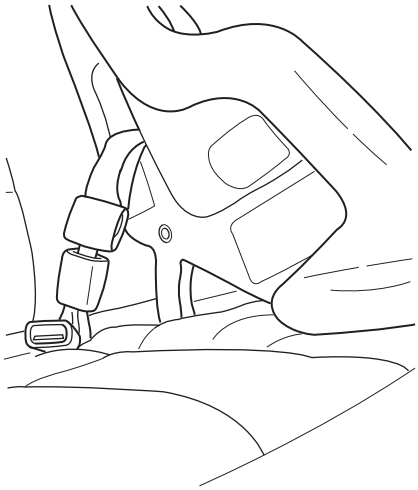
SAFETY SEATS FOR CHILDREN

Child and infant or child safety seats

Use a safety seat that is recommended for the size and weight of the child. Carefully follow all of the manufacturer's instructions with the safety seat you put in your vehicle. If you do not install and use the safety seat properly, the child may be injured in a sudden stop or collision.

When installing a child safety seat:

- Use the correct safety belt buckle for that seating position.
- Insert the belt tongue into the proper buckle until you hear a snap and feel it latch. Make sure the tongue is securely fastened in the buckle.
- Keep the buckle release button pointing up and away from the safety seat, with the tongue between the child seat and the release button, to prevent accidental unbuckling.



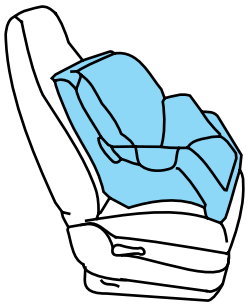
- Place seat back in upright position.

Ford recommends the use of a child safety seat having a top tether strap. Install the child safety seat in a seating position with a tether anchor. For more information on top tether straps and anchors, refer to *Attaching safety seats with tether straps*.

Carefully follow all of the manufacturer's instructions included with the safety seat you put in your vehicle. If you do not install and use the safety seat properly, the child may be injured in a sudden stop or collision.

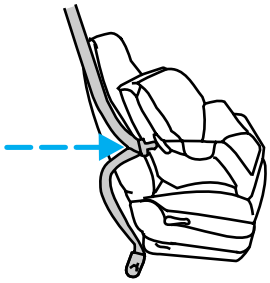
Installing child safety seats with combination lap and shoulder belts

1. Position the child safety seat in a seat with a combination lap and shoulder belt.

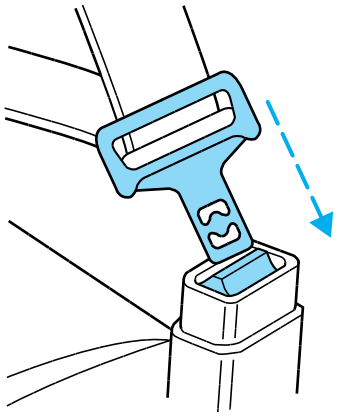


Children under 12 are safer when properly restrained in the rear seat, to the extent this is possible.

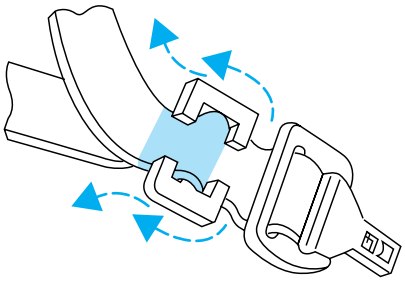
2. While holding the shoulder and lap belt portions together, route the tongue through the child seat according to the child seat manufacturer's instructions. Be sure the belt webbing is not twisted.



3. Buckle the seat belt. Push down on the child seat and pull on the shoulder portion of the belt to snug the lap belt. Hold the lap and shoulder belts next to the tongue and unbuckle the belt.



4. Install a locking clip over both lap and shoulder belt portions next to the sliding tongue. Rebuckle the belt. Obtain the locking clip kit (part number FO3Z-5461248–A) at no charge from an authorized Ford or Lincoln Mercury dealer.



5. Before placing the child in the seat, forcibly tilt the seat forward and back to make sure the seat is securely held in place. To check this, grab the seat at the belt path and attempt to move it side to side and forward and back. There should be no more than one inch of movement for proper installation.

6. If the child seat is not tight enough, unbuckle the seat belt, move the tongue and locking clip to shorten the lap portion and push down hard on the child seat while you rebuckle the belt.

7. Check to make sure the child seat is properly secured before each use.

Attaching safety seats with tether straps

Most forward-facing child safety seats include a tether strap which goes over the back of the seat and hooks to an anchoring point. The F-650/750 vehicles are not equipped with an anchoring point. Tether straps are available as an accessory for many older safety seats. Contact the manufacturer of your child safety seat for information about ordering a tether strap.

Tether anchorage hardware

A tethered seat can be installed in the front seat. Put the tether strap over the seatback and attach it to an anchor bracket.

An anchor bracket can be installed to the inside of the back panel of your vehicle.

The anchor bracket must be installed using the instructions provided with the tether anchorage hardware kit.

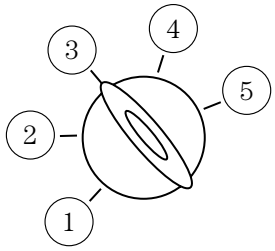
Tether anchorage hardware kits (part number 613D74) including instructions, may be obtained at no charge from any Ford or Lincoln Mercury dealer.

If you have a SuperCab or Crew Cab, Ford recommends you attach tether safety seats in the rear seating position (if possible) with the tether strap attached to the tether anchorage bracket as shown in the instructions provided with the tether anchor kit.

Tighten the anchor according to specifications. Otherwise, the safety seat may not be properly secured and the child may be injured in a sudden stop or collision.

STARTING

Positions of the ignition



1. ACCESSORY, allows the electrical accessories such as the radio to operate while the engine is not running.

2. LOCK, locks the steering wheel, automatic transmission gearshift lever and allows key removal. For vehicles equipped with a manual transmission, you must depress the ignition release lever to release the key.

3. OFF, shuts off the engine and all accessories without locking the steering wheel. This position also allows the automatic transmission shift lever to be moved from the P (Park) position without the brake pedal being depressed.

4. ON, all electrical circuits operational. Warning lights illuminated. Key position when driving.

5. START, cranks the engine. Release the key as soon as the engine starts.

Starting the engine

Operation of a diesel engine near flammable vapors in the air may cause the engine speed to increase uncontrollably and over speed. If this situation occurs, mechanical damage, fire, explosion, personal injury or death could result. *Turning off the ignition key will not slow or stop the engine due to uncontrollable fueling of the engine through flammable vapors being drawn into the engine air inlet.* Operation of components such as starter, alternator, electric motors, etc. and static electricity could also ignite flammable vapors. Do not operate the truck in the possible presence of flammable vapors unless both a complete hazard analysis is performed and necessary additional safety processes and/or equipment such as vapor testing, air intake shutoff devices, ventilation, etc. are utilized. The operator is responsible for using those processes and/or equipment to ensure that the diesel engine and all other components on the truck can be operated safely under the specific conditions and hazards that may be encountered.

Note: When starting the engine, do not press the accelerator as engine damage may result.

1. Ensure headlamps and all accessories are turned off, the parking brake is applied and the transmission is in the neutral position (or P [Park] for Allison 2200 transmissions).

2. Turn the key to ON, but do not start the engine. In cooler weather, the air intake heater may activate the WAIT TO START light in the instrument cluster.

If the WAIT TO START light illuminates, **do not** crank the engine until the light goes off.

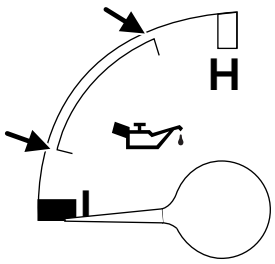
If equipped with an air intake heater, DO NOT use ether or any other starting fluids. The use of starting fluids (ether) in an engine equipped with an air intake heater could cause an explosion and result in property damage and/or personal injury.

3. When the WAIT TO START light turns off, turn the key to START; when the engine starts, release the key.

If the engine does not start after 30 seconds of cranking, allow two minutes for the starter to cool before trying again. Excessive cranking may damage the starter.

After the engine starts:

- On some engines, the WAIT TO START light should illuminate after the engine starts. Allow the engine to idle about three minutes or until the engine coolant temperature gauge begins to rise. Maintain idle speed until the WAIT TO START light cycles off to indicate the air intake heater has shut off (approximately six minutes). Operating the engine at higher speeds will reduce the effectiveness of the air inlet heater.



- Do not increase engine speed until the oil pressure gauge indicates normal pressure; this should be indicated on the gauge within 15 seconds after starting.
- Idle the engine for three to five minutes before operating with a full load.
- Try to limit engine idle to 10 minutes. Excessive idling reduces fuel economy.
- When starting a cold engine, increase the engine speed (RPM) slowly to make sure adequate lubrication is available to the bearings.

Cold weather operation

Do not use volatile starting aids such as ether, propane or gasoline in the engine air intake system. Glow plugs may ignite vapors which can cause engine damage or personal injury.

In order to operate the engine in temperatures of 32°F (0°C) or lower, read the following instructions:

- Make sure that the batteries are of sufficient size and are fully charged. Check other electrical components to make sure they're in optimum condition.
- Use a permanent-type engine coolant solution to protect the engine against damage from freezing.
- If your vehicle is equipped with a water-fuel separator, drain it daily. Fill the fuel tank at the end of daily operation to prevent condensation in the fuel system.
- Make sure you use proper cold weather engine oil and that it is at its proper level.
- At temperatures of –4°F (–20°C) or below, it is recommended that you use a crankcase-mounted coolant heater to improve cold engine starting.
- If operating in arctic temperatures of –20°F (–29°C) or lower, consult your truck dealer for information about special cold weather equipment and precautions.

Note: Idling in cold weather will not heat the engine to its normal operating temperature. Long periods of idling in cold weather can cause a buildup of heavy deposits of carbon and rust on valve stems causing them to stick which, in turn, can cause valvetrain damage.

The following cold weather idling guidelines must be followed:

- Avoid idling the engine for more than 10 minutes at a time.
- Use a minimum of 45 Cetane Diesel fuel or use Cetane Index improvers from a reputable manufacturer.
- Maintain a minimum idle of 1250 RPM by using the hand throttle. Always make sure that the parking brake is applied and the transmission is in neutral before applying the hand throttle.
- Maintain the engine cooling system properly.
- Do not shut the engine down after an extensive idling period (10 minutes or more). Drive the vehicle under load for several miles at normal operating temperatures to burn off any accumulated carbon and varnish.
- Consider using an engine block heater, approved winter fronts and/or radiator shutters where conditions warrant.

Winter fronts

The use of winter fronts, or other air-restrictive devices mounted in front of the radiator on vehicles with chassis-mounted charge air coolers, are not recommended unless extremely cold weather conditions exist. Air flow restriction can cause high exhaust temperatures, power loss, excessive fan usage and a reduction in fuel economy. If you must use a winter front, the device should have a permanent opening of at least 120 sq in. (774 sq. cm) directly in line with the fan hub.

Hot weather operation

- Keep the engine cooling system filled with a clean, permanent coolant solution to protect against damage from overheating.
- Fill the fuel tank at the end of daily operation to prevent condensation in the fuel system.
- Keep external surfaces of the engine, radiator, charge air cooler, A/C condenser and accessories clean to avoid dirt build-up.

Above normal coolant temperatures could be experienced while driving in a transmission gear ratio which lugs the engine. To correct this problem, engine speed should be increased by downshifting in to the next lower gear to increase engine RPM.

Starting a turbocharged engine with the vehicle on a steep grade

When starting a diesel engine when the loaded vehicle is on a grade, the engine RPM will start to fall slightly when the clutch is engaged; do not disengage the clutch and try to increase engine RPM as this may damage driveline components. The engine will recover as the vehicle begins moving.

Engine shutdown

Allow the engine to idle for three to five minutes before shutting it down. The larger the engine, the greater the need for this idling period. However, do not let the engine idle for more than 10 minutes.

Restarting after running out of fuel

The fuel system may need to be purged of air, refer to *Running out of fuel* in the *Maintenance and Specifications* chapter.

GENERAL OPERATING INSTRUCTIONS

- Avoid extended and unnecessary idling.
- Start the vehicle in motion by using the highest gear speed in the transmission that will let the engine easily start the load without slipping the clutch.
- Accelerate smoothly and evenly; rapid acceleration increases fuel consumption without increasing engine performance.
- When approaching a hill, depress the accelerator smoothly to start the incline at full power, then shift down as needed to maintain vehicle speed.
- When going down a hill, or long steep grades, prevent over-speeding of the engine. The engine governor has no control over engine speed when it is being pushed by a loaded vehicle.
- Always shift to a lower gear at high altitudes to prevent engine smoking.
- Operate in a gear that will permit an engine speed not in excess of the maximum governed speed or high-idle RPM (no load).
- Normally, choose the same gear to descend the hill that you would use to ascend the hill.

All vehicles have blind spots. To reduce the risk of severe injury or property damage, never move your vehicle to the side or rear or change lanes without being sure your way is clear on both sides and to your rear.

Backing up

To reduce the risk of the possibility of personal injury while backing the vehicle, always be sure your vehicle's path is clear.

Before backing your vehicle, be sure you can do so safely. If anything behind the cab limits your view, do not rely on mirrors alone to ensure that your intended path is clear. If other people are in the vicinity, have someone standing well behind your vehicle and outside of your intended path (visible through an exterior mirror) guide you as you back up.

Although OSHA or some governmental regulations may require the use of an electrical or mechanical back-up alarm to warn bystanders, such an alarm does not ensure that the intended path is clear. When in doubt, get out of the vehicle and visually check the intended path is clear; back-up slowly as to allow others time to move, if necessary.

If an electrical back-up alarm is installed, it should be connected to the back-up lamp circuit.

Parking your vehicle

Always use the parking brake. When parking on a grade, block the wheels and turn the front wheels to one side so that if the vehicle rolls, the front tires will act against the curb to stop the vehicle. The front wheels will be more effective at stopping a rolling vehicle than the rear wheels.

When parking your vehicle, do not leave the transmission in gear; if the key is in the ON position and the vehicle rolls, the engine could start. Failure to follow these instructions could result in an unattended vehicle moving, possibly causing personal injury or property damage.

Driving through water

If driving through deep or standing water is unavoidable, proceed very slowly especially if the depth is not known. Never drive through water that is higher than the bottom of the hubs (for trucks) or the bottom of the wheel rims (for cars). Traction or brake capability may be limited and your vehicle may stall. Water may also enter your engine's air intake and severely damage your engine, drive axles or the transmission (through the breather ports).

Once through the water, always dry the brakes by moving your vehicle slowly while applying light pressure on the brake pedal. Wet brakes do not stop the vehicle as quickly as dry brakes.

ENGINE AUTOMATIC SHUTDOWN WARNING LIGHT OR CHIME (IF EQUIPPED)

Your vehicle may be equipped with an automatic shutdown feature that stops the engine in the event of high coolant temperature, low engine oil pressure or low engine coolant level. A warning light in the instrument cluster and a warning chime will indicate high engine coolant temperature or low engine oil pressure. If the temperature and/or pressure becomes too high or too low, the engine will automatically shut down.

Vehicles that are equipped with an override feature, allow the operator to restart the engine so the vehicle can be moved; the engine should not be operated any longer than necessary. A decal located in front of the operator provides instructions on how the override should be operated.

Do not attempt to use this restarting feature to drive the vehicle very far as serious engine damage could result.

In the event of engine shutdown, make sure the vehicle is safely off the road and the problem is remedied prior to returning to the road. Failure to remove the vehicle from the road could result in an accident, causing serious injury or death.

GENERAL BRAKE INFORMATION

All standard equipment brakes are designed to be self-adjusting. Automatic adjustment, when required, occurs whenever the brakes are applied and released during forward or reverse operation. Refer to the *Scheduled Maintenance Guide* chapter for scheduled maintenance.

Occasional brake noise is normal and often does not indicate a performance concern with the vehicle's brake system. In normal operation, automotive brake systems may emit occasional or intermittent squeal or groan noises when the brakes are applied. Such noises are usually heard during the first few brake applications in the morning; however, they may be heard at any time while braking and can be aggravated by environmental conditions such as cold, heat, moisture, road dust, salt or mud. If a "metal-to-metal," "continuous grinding" or "continuous squeal" sound is present while braking, the brake linings may be worn-out and should be inspected by a qualified service technician.

Know the required stopping distances for all driving conditions that may be encountered. For longer brake lining life, take full advantage of engine braking power when coming to a stop.

Do not drive with your foot resting on the brake pedal. This will result in abnormally high brake temperatures, excessive lining wear and increased stopping distances.

Before descending a long or steep hill, shift to a lower gear and avoid continuous application of the brakes. Normally, choose the same gear to descend the hill that you would use to ascend the hill.

Continuous application of the brakes will cause the brakes to overheat, resulting in a temporary loss of braking.

If brakes do not grip well

- If you have been driving through deep water, gently apply the brakes several times while the vehicle is moving slowly.
- Let the brakes cool if you have been using them excessively, as in mountain driving or after several fast, high speed stops.
- Check brake adjustment.
- Check brake linings for excessive wear.
- Check system air pressure. (Air brakes only)

HYDRAULIC BRAKES (IF EQUIPPED)

HydroMax brake booster system

The HydroMax systems receive fluid pressure from the power steering pump to provide power assist during braking.

The HydroMax booster receives back-up pressure from the reserve system electric pump whenever the fluid in the power steering system is not flowing. When the engine is off, the pump will turn on if the brake pedal is applied, or if the ignition is turned to the ON position.

The sound of the pump operating or fluid flowing through the booster may be heard; this is a normal characteristic of the system and should be no reason for concern.

The reserve system provides reduced braking power, so the vehicle should be operated under these conditions with caution, and only to seek service repair and remove the vehicle from the roadway.

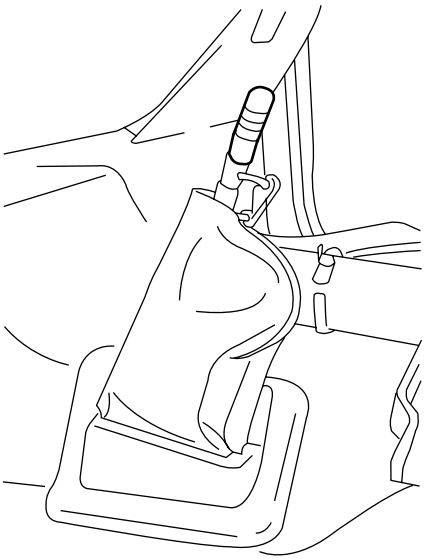
If braking performance or pedal response becomes very poor, even when the pedal is strongly applied, this may indicate the presence of air in the hydraulic system or fluid leakage. Stop the vehicle safely as soon as possible and seek service immediately.

If the red BRAKE warning lamp in the instrument cluster remains illuminated after engine start up, this indicates a system failure in the master cylinder of the brake system. Stop the vehicle safely as soon as possible and seek service immediately.

If the yellow BRAKE RESERVE (E-motor) warning light remains on while the engine is running, this indicates inadequate hydraulic booster pressure or reserve pump system failure. Stop the vehicle safely as soon as possible and seek service immediately.

Parking brake

Apply the parking brake whenever the vehicle is parked. To set the parking brake, pull handle up until it snaps into the locked position.



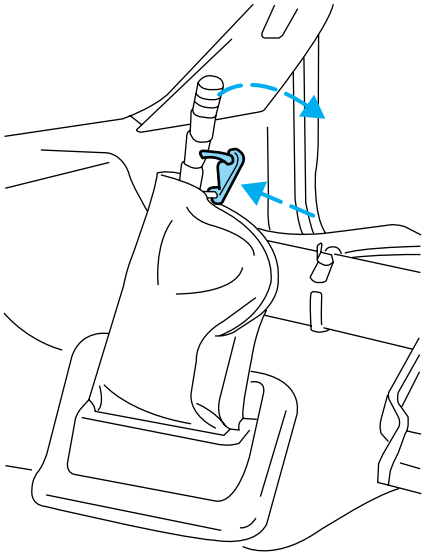
Do not use the gearshift selector in place of the parking brake. Always set the parking brake fully AND make sure the gearshift selector is in R (Reverse) for vehicles equipped with manual transmission, P (Park) **(if equipped)** or N (Neutral) for vehicles with automatic transmission. Use of wheel chocks is also recommended in hilly or off-road usage.

Unexpected and possible sudden vehicle movement may occur if these precautions are not taken.

When the parking brake is out of adjustment, seek service immediately.

The parking BRAKE warning lamp in the instrument cluster illuminates and will remain illuminated (when the ignition is turned on) until the parking brake is released.

Push the palm release lever on the parking brake handle and push down as far as possible to release the brake. Driving with the parking brake on will cause the brakes to wear out quickly and reduce fuel economy.



If the parking brake is fully released but the parking brake warning lamp remains illuminated, the brakes may not be working properly. See your dealer or a qualified service technician.

The parking brake is not recommended to stop a moving vehicle. However, if the normal brakes fail, the parking brake can be used to stop your vehicle in an emergency. Since the parking brake only applies retardation to the rear wheels, the vehicle's stopping distance will increase greatly and the handling of your vehicle will be adversely affected.

POWER PARK (AIR-OPERATED PARKING BRAKE) OPTION (IF EQUIPPED)

This feature uses a brake chamber mounted on the chassis to power a spring-applied, air-released driveline parking brake. It is controlled by a yellow, dash-mounted parking brake knob.

Applying the parking brake

To apply the parking brake, pull the yellow, dash-mounted parking brake knob. A red light on the dash panel should illuminate indicating that the parking brake has been successfully set.

Note: If the park brake indicator light blinks and a warning chime sounds when the control knob is pulled, the parking brake is not functioning properly; seek immediate service from your dealer. Refer to the *Parking Brake Warning System* section.

Releasing the parking brake

Note: Read and understand the following steps and perform them whenever you prepare to drive the vehicle.

Note: The parking brake will not disengage unless sufficient system air pressure is available.

For vehicles with automatic transmissions - dash-mounted push button (Allison 3000 Series) and steering column-mounted (Allison 2200 and 2500) gear selection:

1. With the engine running, depress and hold the service brake pedal.
2. Wait until system air pressure is above 100 psi (690 kPa).
3. Select the appropriate drive gear.
4. Push the yellow, dash-mounted parking brake knob.

For vehicles with manual transmissions - (TTC 7–speed, Eaton/Fuller 5–speed and 6–speed):

1. With the engine running, depress and hold the service brake pedal.
2. Wait until system air pressure is above 100 psi (690 kPa).
3. Depress and hold the clutch pedal.
4. Select the appropriate drive gear.
5. Push the yellow, dash-mounted parking brake knob.

Hold the brake pedal down while moving the gearshift lever from position to position. If the brake pedal is not held down, the vehicle may move unexpectedly resulting in property damage, personal injury or death.

Parking brake light illumination due to low air pressure

If at any time during vehicle operation air pressure is too low, the parking brake may apply and the parking brake light will turn on.

If the parking brake is applied due to low air pressure, immediate service is required to the parking brake system.

Parking brake warning system

If the park brake light blinks and a chime sounds when pulling the yellow control knob out, this indicates the parking brake is not functioning properly; seek service for the parking brake immediately.

The light will blink and the chime will sound until the yellow control knob is pushed in or approximately eight minutes have passed. If the

yellow control knob is pulled out again, the light will blink and the chime will sound as a reminder that immediate service is required to the parking brake system.

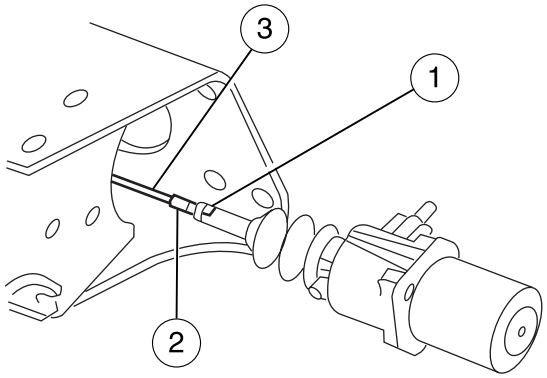
Releasing spring manually

Do not attempt to disassemble the parking brake chamber under any circumstances. The high spring load may cause serious injury.

If air pressure is released from the spring brake chamber the power spring applies the brake and, unless air pressure can be re-established, the spring brake must be released as follows in order to move the vehicle.

Block the wheels to help prevent the vehicle from moving.

Unexpected and possibly sudden vehicle movement may occur if these precautions are not taken.



Loosen the jam nut (1) and un-thread the adjustment rod (2) from the chamber to reduce tension on the cable (3). Continue to un-thread the adjustment rod all the way and remove it from the chamber. The nut and shaft are metric.

AIR BRAKES (IF EQUIPPED)

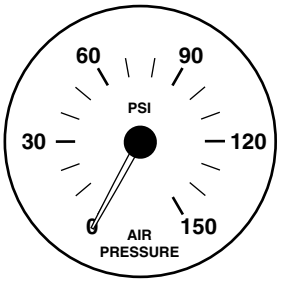
General air brake information

After starting the engine, give the air compressor time to build up the air pressure to 60 psi (414 kPa) before moving the vehicle.

Do not drive or continue to drive if the low air pressure buzzer is sounding or the brake warning light is lit. These warnings indicate that air pressure is not to normal operating level. Continued use of the vehicle could result in loss of braking ability.

Avoid repeated light application of the brake pedal. This will deplete air pressure faster and could result in loss of braking capability.

Periodically check the air pressure gauge while driving. Pressure should range between approximately 100–125 psi (690–862 kPa). The air compressor governor cut-in and cut-out pressure settings are preset at the factory and are not adjustable.



When air pressure is insufficient (below 60 psi [414 kPa]), a warning light illuminates and a buzzer sounds when the ignition is in the ON position.

This condition may be caused by excessive brake applications depleting the system air pressure. If this condition occurs, stop driving the vehicle until the compressor has fully recharged the air system.

Do not move the vehicle when the air pressure is insufficient because the brake system may be inoperative.

Select a gear ratio to help slow your vehicle before descending grades. Supplement with brakes as required to safely slow the vehicle and avoid overspeeding the engine.

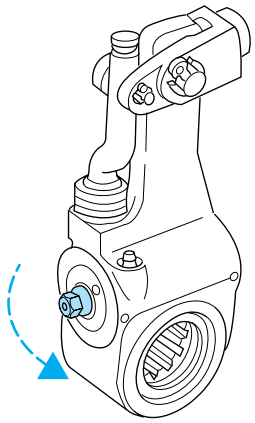
Air chamber stroke indication

Air chamber push rods have orange stroke indicator markers that warn when the braking system requires adjustment or repair. The orange stripe is painted on the air chamber push rod at the slack adjuster stroke dimension which requires service when visible during brake application.

Air brake inspection and adjustment or repairs should be performed by a qualified service technician in accordance with the instructions in the service manual.

Cam brakes - automatic slack adjusters

Standard air brakes (cam) are equipped with automatic brake adjusters. Automatic adjustment occurs during brake applications. Inspect brakes for proper adjustment at the intervals listed in the *Scheduled Maintenance Guide* chapter.



Do not manually adjust the automatic slack adjusters to correct excessive pushrod stroke as it may result in reduced brake effectiveness and a vehicle crash. Excessive pushrod stroke indicates that a problem exists with the automatic adjuster, with the installation of the adjuster, or with foundation brake components that manual adjustment will not remedy. Seek service from a qualified facility for excessive pushrod stroke.

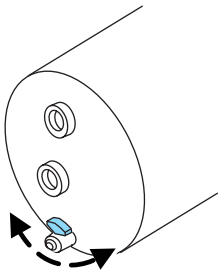
Emergency air brake

All vehicles are equipped with a dual brake system. In the unlikely event of a failure of one system, the second system will function for emergency stopping. These systems are all controlled by the brake pedal in the same manner as for normal stops.

Do not continue to operate the vehicle with a failure of one of the systems. Take the vehicle to your dealer for service immediately.

Air brake reservoir draining

Failure to drain air brake reservoirs can result in a reduction or loss of braking ability due to fluid accumulation in the reservoir and/or possible freeze-up during cold weather.



Drain all the air brake reservoirs daily, completely to 0 psi/kPa, by opening the draincock at the ends of the tanks (where accessible. Pull-chains are used when the drains are undercab or otherwise inaccessible). Close draincock after complete draining. Air tanks equipped with automatic moisture ejector valves may also be drained manually as required to maintain a dry air system. Contact your dealer if you are unsure of the air reservoir locations or the draining procedure.

Parking brake

Do not use the gearshift selector in place of the parking brake; unexpected and possible sudden vehicle movement may occur if these precautions are not taken. Always set the parking brake fully AND make sure the gearshift selector is in R (Reverse) for vehicles equipped with manual transmission, N (Neutral) for vehicles with automatic transmission (except Allison 2200 transmission) or P (Park) (Allison 2200 transmission).

If the service brakes should fail to operate while the vehicle is in motion, you can make an emergency stop with the parking brake. Since the parking brake only applies stopping power to the rear wheels, the vehicle's stopping distance will greatly increase and the handling of the vehicle will be adversely affected. Repairs should be made immediately to an inoperative air brake system circuit.

Parking brake control (knob)

Pull the yellow parking brake knob out to apply the parking brake. Push the knob in to release the parking brake.

This control is used for parking only. Do not leave the vehicle unattended after setting the parking brake without placing the transmission in R (Reverse) for manual transmission, N (Neutral) for automatic transmission (except Allison 2200 transmission) or P (Park) (Allison 2200 transmission). Use of wheel chocks is also recommended in hilly or off-road usage.

The parking BRAKE warning lamp in the instrument cluster illuminates and remains illuminated (when the ignition is turned ON) until the parking brake is released.

Releasing spring brake with air pressure

The air system in all vehicles with spring-actuated rear wheel parking brakes is equipped with a tank valve located on the supply or service air tank for connection to an outside air supply. The valve permits the system to be recharged with air from an outside source, releasing the spring-actuated parking brakes. The vehicle may then be towed in an emergency.

An outside air source can be used only if the protected system is in operating condition. If air pressure cannot be restored in the protected air system, the spring-actuated brakes must be released manually.

Releasing spring brake manually

Do not attempt to disassemble the parking brake chamber under any circumstances. The high spring load may cause serious injury if the chamber clamps are removed.

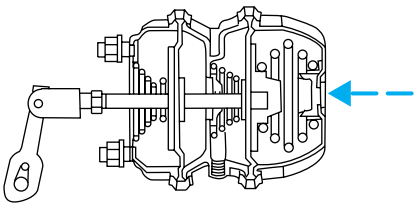
If air pressure is released from the spring brake chamber the power spring applies the brake and, unless air pressure can be re-established, the spring brake must be released as follows in order to move the vehicle.

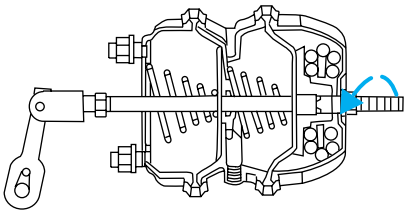
Block the wheels to help prevent the vehicle from moving.

Unexpected and possibly sudden vehicle movement may occur if these precautions are not taken.

Impact wrenches should not be used as they may damage the piston and prevent proper caging of the spring. Do not apply more than 50 lb. ft. (68 N•m) torque to the release bolt nut.

1. Remove the stud tool and nut from the carrying pocket on the brake chamber assembly.
2. Remove the access plug from the end of the spring chamber.
3. Insert the release stud through the opening in the chamber and into the spring pressure plate.



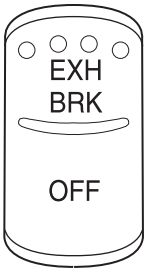


4. Turn the release stud one-quarter turn to engage the stud tangs with the slot in the pressure plate. Keep the stud engaged and install the nut on the release stud.

5. Tighten the nut until the spring is fully caged and the brakes are released. Do not loosen or remove the release stud and nut unless the brake chamber is completely assembled and is securely clamped.

6. When the air pressure is restored, unscrew and remove the release stud and install in the carrying pocket. Install the access plug.

EXHAUST BRAKE (IF EQUIPPED)

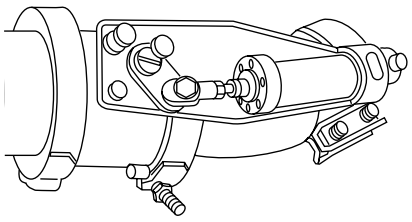


Note: The exhaust brake is a retarding device intended to help control vehicle speed; it is not a vehicle stopping device.

An exhaust brake is an optional auxiliary braking system that assists, but does not replace, the primary service brake system. An on-off switch on the instrument panel, in combination with the accelerator and clutch pedal switches, allows the operator to make maximum use of the exhaust brake in the following conditions:

- off-highway driving
- mountain driving
- heavy traffic
- high speed highway driving

Note: The exhaust brake should be turned off when the engine is left idling for an extended period of time (longer than three minutes).

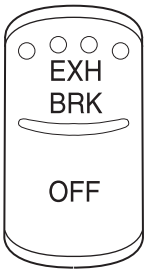


The exhaust brake is a butterfly type valve mounted in the exhaust pipe. When the operator's foot is not on the accelerator pedal and the exhaust brake switch is in the ON position, an air cylinder shuts the butterfly valve, restricting the flow of exhaust gases and retarding the engine. This retarding action is carried through the engine and drivetrain, slowing the vehicle and reducing the need for frequent service brake applications.

Exhaust brakes are not intended for use as the primary braking system during vehicle operation.

Operation

Push the rocker switch up to turn the exhaust brake on. The switch will illuminate in the ON position. Push the switch down to turn the brake off.



Starting engine

Before starting the engine, make sure that the exhaust brake switch is in the OFF position. Do not turn the exhaust brake on until the engine has reached normal operating temperatures.

Driving downhill

While approaching a steep grade, make sure that the exhaust brake switch is in the ON position. The exhaust brake actuates as soon as you remove your foot from the accelerator pedal. While going down the grade, use a low enough gear to descend safely with a minimum application of the service brakes. As a general guideline, use the same gear as you would to ascend the hill.

Before descending a hill or steep grade always select the proper gear. If the transmission is taken out of gear while descending it is possible that you will not be able to select another gear because of maximum RPM being governed.

Note: Maximum exhaust brake performance is related to the type of transmission your vehicle is equipped with.

Note: Manual transmissions should be downshifted to the lowest gear possible, without exceeding the maximum RPM limit of the engine. This will maximize the exhaust brake's retarding effect.

Note: Exhaust brakes will operate effectively with automatic transmission, but performance will vary with engine speed and the gear selected by the transmission.

Make sure the engine speed does not exceed the maximum allowable engine RPM. Exceeding the maximum allowable engine RPM will result in damage to the engine. Apply the service brakes to reduce the engine RPM or make a slower descent by using a lower gear.

Note: Engine speed has a major influence of retarding performance. When engine speed is maintained at the maximum allowable level, the exhaust brake will operate at peak performance.

The exhaust brake is not recommended for use on slippery or low traction road surfaces. Under these conditions a loss of vehicle control could occur.

Exhaust brake operating characteristics

When you remove your feet from both the accelerator and clutch pedals and the exhaust brake switch is in the ON position, the exhaust brake is activated. The following conditions should exist if the brake is operating properly:

- A slight change in the sound of the engine when the exhaust brake is activated.
- Exhaust smoke appears normal.
- Engine temperature remains in the normal operating range.
- Road speed usually decreases when the exhaust brake is applied during a descent, except when the vehicle is carrying a heavy load or the grade is extremely steep. In these instances, you may need to apply the service brakes occasionally.
- During a descent, the tachometer usually shows a drop in RPM depending on the grade and the vehicle load.
- Do not expect a retarding effect similar to sudden hard application of the service brakes. The exhaust brake retards the vehicle with a smooth braking effect.

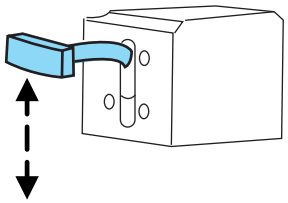
- Depending on the grade and vehicle load, you may or may not feel the retarding force acting against your body when the brake is applied. The brake's retarding force is actually preventing the vehicle from going much faster.
- Engine speed has a major effect on retarding performance, with higher engine speeds permitting greater retarding ability.
- Engine brake performance is closely related to the type of transmission your vehicle is equipped with. Downshifting of manual transmission to the lowest gear possible, without exceeding the maximum engine RPM limit, will maximize retarding performance. Exhaust brakes will operate effectively with automatic transmissions, but performance will vary with engine speed and the gear selected by the transmission.

Make sure the exhaust brake is turned off before shutting off the engine.

Note: Installing an exhaust or auxiliary brake does not necessarily protect the engine from exceeding maximum governed speed. The primary brakes should be used to never allow the engine to exceed maximum governed speed under any conditions.

TRAILER BRAKE HAND CONTROL (IF EQUIPPED)

The hand control, located on the right-hand side of the instrument panel, is used to apply the trailer service brakes which are independent of the truck or tractor service brakes.



The hand control should never be used to apply the brakes when the tractor and trailer are parked unattended. Air may leak from the system and the vehicle could possibly move, resulting in possible property damage, personal injury or death.

The hand control operates a valve that provides gradual control of air pressure applied; when the valve is only partially applied, the trailer brakes can be overridden by pressing fully on the brake pedal.

To apply the trailer brakes using the hand control, move the lever downward. The further the lever is pushed downward, the greater the air pressure is applied to the brakes. The lever will remain in place until manually moved.

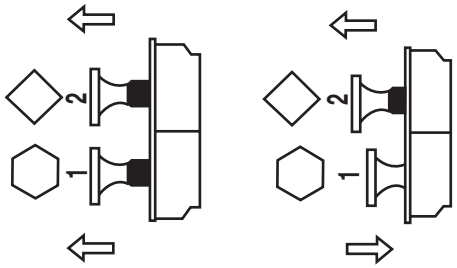
To release the trailer brakes, move the lever upward completely.

TRAILER AIR SUPPLY AND PARKING BRAKE MODULAR CONTROLS (IF EQUIPPED)

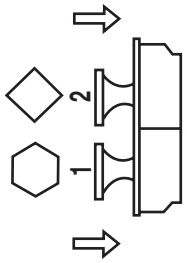
The trailer air supply valve delivers air to the trailer supply and will automatically pop out, shutting off the trailer supply if pressure is decreased to approximately 35 psi (249 kPa).

The parking brake controls the spring brakes on the tractor. When the knob is pulled out it causes the trailer supply valve to pop out, applying both the tractor and trailer parking brakes. The trailer brakes may be independently released by pushing only the trailer air supply valve in.

Initial charge

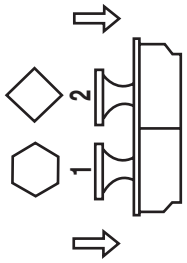


With the air system completely discharged, both knobs (1 and 2) will be out. When the air pressure reaches 70 psi (483 kPa) the trailer air supply (1 – red knob) may be pushed in and should stay in charging the trailer air system and releasing the trailer brakes.



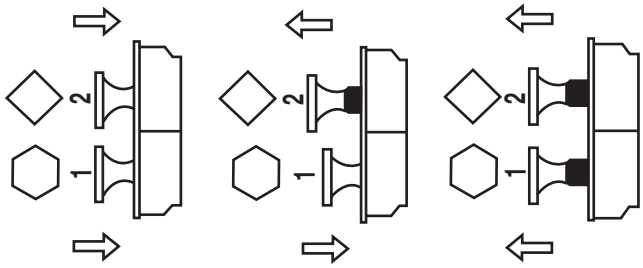
The parking brake (2–yellow knob) can now be pushed in and supply air to the tractor spring brakes, releasing them.

Normal driving position



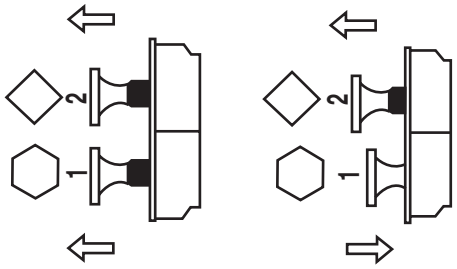
With both knobs pushed in, air is then supplied to both trailer and tractor spring brakes, and all brakes are released.

System park



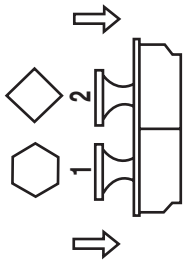
With both knobs pushed in (normal driving position), the parking brakes for both the tractor and trailer can be applied by pulling the parking brake knob (2) out, exhausting air from the tractor spring brakes, simultaneously causing the trailer air supply valve to pop out, applying the trailer brakes.

Trailer charge



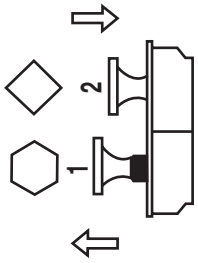
If both knobs are out, and you want to recharge the trailer while leaving the tractor spring brakes applied, the trailer air supply (1) can be pushed in to recharge the trailer air supply line. This mode may also be used to park a combination vehicle with tractor spring brakes.

Automatic application



If both knobs are pushed in and the brake system air pressure is reduced to approximately 35 psi (249 kPa), the trailer air supply (1) knob will automatically pop out applying the emergency or parking brakes on the trailer. If the trailer air supply (1) knob is manually held in and the air pressure is reduced to approximately 30 psi (207 kPa), a tripper piston within the valve will move, exhausting the trailer air supply, applying the trailer brakes. Further reduction of air pressure, while holding the trailer air supply knob in, will cause the parking brake knob to pop out at 25 psi (172 kPa).

Actuation of trailer park (emergency) or tractor bobtail position

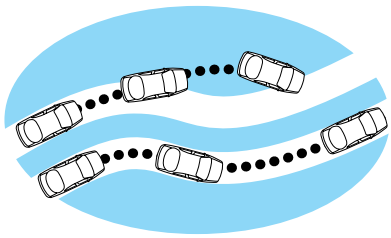


To actuate the trailer brakes only, pull out the trailer air supply knob (1). The trailer brakes are now applied whether emergency or spring brakes are used on the trailer.

This mode is also used when the tractor or truck with trailer is used during bobtail operation.

ANTI-LOCK BRAKE SYSTEM (ABS)

A noise from the hydraulic pump motor and pulsation in the pedal may be observed during ABS braking events. Pedal pulsation coupled with noise while braking under panic conditions or on loose gravel, bumps, wet or snowy roads is normal and indicates proper functioning of the vehicle's ABS. If the vehicle has continuous vibration or shudder in the steering wheel while braking, the vehicle should be inspected by a qualified service technician.



The ABS operates by detecting the onset of wheel lockup during brake applications and compensating for this tendency. The wheels are prevented from locking even when the brakes are firmly applied. The accompanying illustration depicts the advantage of an ABS equipped vehicle (on bottom) to a non-ABS equipped vehicle (on top) during hard braking with loss of front braking traction.

ABS warning lamp

The (ABS) warning lamp in the instrument cluster momentarily illuminates when the ignition is turned on and the engine is off. If the light does not illuminate momentarily at start up, remains on after the vehicle reaches 5–10 mph (10–15 km/h), or continues to flash, the ABS needs to be serviced.

With the ABS light on, the anti-lock brake system is disabled and normal braking is still effective unless the brake warning light also remains illuminated. (If your parking brake warning lamp illuminates, have your vehicle serviced immediately).

Using ABS

- In an emergency or when maximum efficiency from the ABS is required, apply continuous full force on the brake. The ABS will be activated immediately, thus allowing you to retain full steering control of your vehicle and, providing there is sufficient space, will enable you to avoid obstacles and bring the vehicle to a controlled stop.
- The ABS does not decrease the time necessary to apply the brakes or always reduce stopping distance. Always leave enough room between your vehicle and the vehicle in front of you to stop.
- We recommend that you familiarize yourself with this braking technique. However, avoid taking any unnecessary risks.

TRACTION CONTROL™ (IF EQUIPPED)

Your vehicle may be equipped with a Traction Control™ system. This system helps you maintain the stability and steerability of your vehicle, especially on slippery road surfaces such as snow- or ice-covered roads and gravel roads, by reducing engine power and/or selectively applying the rear brakes. The system will allow your vehicle to make better use of available traction in these conditions.

Note: The traction control system will not apply the brakes when the vehicle speed is above 25 mph (40 km/h).

During Traction Control™ operation, the traction control light in the instrument cluster will flash rapidly and the engine will not “rev-up” when you push further on the accelerator. This is normal system behavior and should be no reason for concern. If the traction control light does not flash during a traction control event or stays illuminated, the system is not functioning properly, take your vehicle to your dealer for service.

When the Traction Control™ switch, located on the instrument panel, is activated standard Traction Control™ will change to Off Road traction mode, the traction control light will be illuminated and flash slowly. If a traction event occurs, in either mode the traction control light will flash rapidly. The standard Traction Control™ can be selected by pushing the Traction Control™ switch again or will be automatically selected at next ignition cycle.

If you should become stuck in snow or ice or on a very slippery road surface, try switching to the Off Road Traction Control™ mode. This may allow excess wheel spin to "dig" the vehicle out and enable a successful "rocking" maneuver.

Aggressive driving in any road conditions can cause you to lose control of your vehicle increasing the risk of severe personal injury or property damage. The occurrence of a Traction Control™ event is an indication that at least some of the tires have exceeded their ability to grip the road; this may lead to an increased risk of loss of vehicle control, vehicle rollover, personal injury and death. If you experience a severe road event, SLOW DOWN.

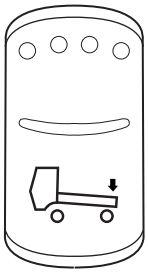
AIR SUSPENSION (IF EQUIPPED)

Note: The vehicle must not be operated without air in the suspension springs. Operating the vehicle without air in the air suspension springs will damage the suspension, degrade ride performance and may cause property damage.

The suspension system automatically adjusts to different loads to maintain a constant frame height. The system allows for ease of vehicle loading and provides improved vehicle ride and increased driver comfort.

Air suspension dump switch (if equipped)

The system is controlled by a switch located on the instrument panel. The switch will operate only when the ignition is in the ACC (Accessory) or IGNITION positions and the air tanks have sufficient pressure to fill the air springs. When the ignition is turned off, the suspension will remain in whatever state it was last set.



Note: The suspension will dump air when the ignition is in the ACC or IGNITION position, but will only fill when the ignition is in the IGNITION position.

When the upper portion of the switch is pressed and the vehicle speed is below 5 mph (8 km/h), air supplied to the air spring is exhausted, lowering the frame for loading. Pressing the lower portion of the switch causes air to fill the air springs so the vehicle will remain at normal ride height.

Tractor-trailer connections

To reduce the risk of personal injury, use extreme caution when making brake and light connections. Inclement weather and accumulated road contamination deposits on handhold and stepping surfaces require extra care to avoid slip and falls. Provide adequate lighting of working areas.

Do not climb on the back of the tractor unless it has been provided with a deck plate and handholds. Use a three-point stance when climbing up and down from a deck plate. Do not jump from the vehicle. Whenever possible, make all connections while standing on the ground.

Connecting and disconnecting a trailer with air suspension

When connecting to a trailer:

- Press the lower portion of the switch and air will exhaust from the air suspension system.
- After making the connection to the trailer, press the upper portion of the switch, then raise the landing gear.

When disconnecting the trailer:

- Lower the landing gear, then press the lower portion of the switch.
- Disconnect the brake hoses, trailer-side and rear light connectors, then pull the release lever on the fifth wheel.

The upper portion of the switch must be pressed before operating with a trailer or operating in the bobtail mode.

Suspension conversions

It is not recommended, or approved, that suspension conversions be performed. However, it is understood that, on occasion, aftermarket add-on suspensions are installed by others on the truck chassis which allow operator control for weight transfer from other axles (i.e., air lift axles).

When operating a loaded vehicle, the driver must keep all adjustable axles on the ground at all times, supporting their share of the vehicle's load. Failure to do so can overload other axles, tires, wheels, springs, steering components, brakes and frames, resulting in early component failure, loss of vehicle control, possible property damage and personal injury.

AUTOMATIC TRANSMISSION OPERATION (IF EQUIPPED)

Main transmission, auxiliary transmission, transfer case and power take-off (PTO) control shift patterns can be found on a placard or decal on the driver's sun visor, on the instrument panel or on the shift control itself.

The main transmission control is used to select the various gear ratios or speeds of the transmission. Selecting D (Direct Drive), does not change the transmission gear ratio, but is used where the gear ratios in the main transmission are adequate to handle the vehicle operation.

If the transmission fails to shift properly, check the inline 10A fuse located in the battery cables above the battery.

Hold the brake pedal down while you move the gearshift lever between positions. If you don't hold the brake pedal down, your vehicle may move unexpectedly and cause property damage, personal injury or death.

Allison 2200 automatic transmission with park pawl feature

Note: For Allison automatic transmission-equipped vehicles, also refer to the separate Allison Transmission Operator's Manual.

A parking pawl effectively grounds the transmission's output shaft preventing rotation of the driveline. If the vehicle is stationary, selecting the P (Park) position places the transmission in neutral and engages the parking pawl (always use the parking brake, also).

Note: If the P (Park) position is selected when the vehicle is in motion, the parking pawl mechanism will ratchet and **NOT** hold the truck.

Always set the parking brake fully. Do not use the gearshift in place of the parking brake.

To avoid sudden, unexpected vehicle movement and possible personal injury or death:

1. Bring the vehicle to a complete stop.
2. Shift the transmission into P (Park). Slowly lift your foot from the brake pedal to engage the transmission parking pawl mechanism.
3. Apply the parking brake and make sure it is holding properly. Do not rely solely on the parking mechanism of the transmission.)
4. Turn the engine off when you leave the vehicle. **Never leave the vehicle unattended when the engine is running.**

Allison 2500 automatic transmission

This transmission is available with a column-mounted gearshift lever. The gear positions are displayed on the RNDL in the instrument cluster.

To avoid sudden, unexpected vehicle movement and possible personal injury or death:

1. Bring the vehicle to a complete stop.
2. Shift the transmission into N (Neutral).
3. Apply the parking brake and make sure it is holding properly.
4. Turn the engine off when you leave the vehicle. **Never leave the vehicle unattended when the engine is running.**

Allison 3000 Series automatic transmission

Two modes are available for the Allison 3000 Series: Performance and Economy. Performance mode will give you the best all-around transmission operation; Economy provides operation at lower engine

RPM while maintaining adequate performance. The transmission will automatically default to Performance mode when you start the engine. Pressing MODE on the shifter will activate the Economy mode; this will also illuminate the Mode ON lamp.

If the engine speed is above idle when a gear is selected using the shifter, the vehicle will not move. To move the vehicle, the shifter must be moved to re-select a gear after the engine speed returns to idle.

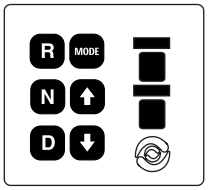
Note: For more information regarding the Allison 3000 Series, refer to the separate Allison 3000 Series Operator's Manual.

Torque lock

If your vehicle is parked on an incline and P (Park) is not properly engaged (The parking brake is not applied before the transmission is shifted into P [Park]), the weight of the vehicle may generate an excessive amount of torque on the park pawl. In this situation, it may be difficult to shift the transmission out of P (Park). Hold the brake pedal down while shifting out of P (Park), then release the parking brake.

Allison 3000 Series push-button shifter

To shift the transmission into R (Reverse) or D (Drive), depress the brake pedal, then press R or D, then release the brake pedal. To select a lower range when in D (Drive), press the down-arrow button. To select a higher range when in D (Drive), press the up-arrow button. To place the transmission in N (Neutral), press N.



Automatic transmission operating temperatures

Allison 2200/2500 – The sump/fluid reservoir temperatures should not exceed 250°F (120°C). The converter temperature should not exceed 300°F (144°C).

CLUTCH (IF EQUIPPED)

Do not ride or slip the clutch as this will cause unnecessary heat and wear. Maintain the specified clutch adjustment to prolong its life and regularly inspect the clutch control linkage for tightness. Refer to the *Scheduled Maintenance Guide* chapter for other maintenance information. When adjustment of the clutch is necessary, it is very

important that the work be performed properly or early clutch failure may result and a costly clutch overhaul may become necessary. Clutch work should only be performed by a qualified technician.

Engaging the clutch

- **Always start in the proper gear.** An empty vehicle can start in a higher gear than a fully loaded vehicle. Starting in too high a gear can cause clutch slippage and excessive heat and wear on the clutch. A gear that will start the vehicle moving at idle speed is the correct gear. If the engine has to be revved to get the vehicle going, the gear selection is too high.
- **Do not shift until the vehicle has reached the proper speed.** Upshifting before the vehicle has reached the proper speed can cause clutch slippage and excessive heat and wear on the clutch.
- **Never hold a vehicle on a grade with the clutch.** This will cause the clutch to slip and can actually burn up the clutch.
- **Never coast with the clutch disengaged.** The high RPM (sometimes over 10,000), can actually burst the facing material of the clutch.
- **Never engage the clutch while coasting.** Re-engaging the clutch after coasting may not only cause a great shock to the clutch, but the whole drivetrain. Internal engine damage and/or clutch and flywheel failure can result from this.

If your vehicle's transmission is equipped with a ceramic clutch, you must start the vehicle moving in first gear and engage the clutch before pressing the accelerator at idle. Also, don't try to slip the clutch by raising engine RPM and riding or feathering the clutch pedal since the vehicle will experience erratic engagement. Erratic engagement can cause the engine stalling and potential serious damage to the vehicle's driveline components.

Clutch brake (vehicles equipped with a non-synchronized transmission) - Vehicle stationary

A clutch brake is used to stop the transmission input shaft rotation so that the initial 1 (First) or R (Reverse) gear selection can be accomplished when the vehicle is stationary and the engine is running at idle speed. Clutch brake application occurs in the last inch (25 mm) of clutch pedal travel.

When using the clutch brake, fully depress the clutch pedal and shift the transmission into 1 (First) or R (Reverse). If the transmission won't go

into one of these gears, slowly release the clutch pedal while applying light pressure on the transmission shift lever until it shifts into gear.

Note: After engagement of 1 (First) gear, **do not** use the clutch brake for upshifting or downshifting. If you do, clutch brake life will shorten and gear selection shift efforts may increase.

Double-clutch procedures - vehicles equipped with a non-synchronized transmission

In order to properly upshift or downshift, perform the following steps:

1. Depress the clutch pedal to disengage the clutch.
2. Shift the transmission into neutral.
3. Release the clutch pedal.

If upshifting, wait until the engine speed matches the transmission speed of the gear you are selecting.

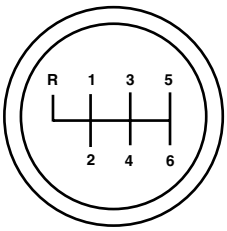
If downshifting, accelerate the engine until the engine speed matches the input speed of the gear you are selecting. Depress the clutch pedal immediately and shift into the desired gear, then release the clutch pedal.

MANUAL TRANSMISSION OPERATION (IF EQUIPPED)

Note: Continued use of a damaged or worn clutch, prolonged clutch slippage or downshifting at excessive speeds can result in a failure of the engine, transmission or clutch components.

Note: To avoid premature clutch wear and failure, do not drive with your foot resting on the clutch pedal or use it to hold the vehicle at a standstill on an upgrade as when waiting for a traffic light.

Manual transmission shift patterns are displayed on either the shift lever knob or the sun visor.



Study this information carefully before you drive the vehicle even though you may be familiar with similar units. Do not attempt to drive the vehicle without knowing the exact shift pattern of the transmission. Consult your authorized dealer if any questions exist as to the shifting instructions posted in your vehicle.

Do not coast the vehicle with the clutch pedal depressed or with the transmission in neutral. This practice could result in loss of vehicle control.

Driving hints

The following driving hints are provided as a brief, general guide in operating the different manual transmissions used in your vehicle.

- When shifting into 1 (First) or R (Reverse) with vehicle standing still, quickly release and depress the clutch pedal (if necessary to complete gear engagement).
- Always use the lowest (or most appropriate) gear to start the vehicle.
- Always use a gear ratio low enough to allow the engine to operate above the minimum engine operation speed range.
- Do not lug the engine.
- Do not slam or jerk the gearshift lever into gear.
- When more power is required, shift to a lower gear and accelerate the engine near the governed speed.

Shifting with a synchronized transmission

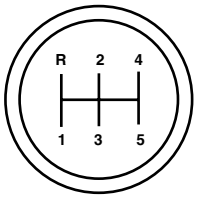
With the clutch pedal depressed, use 2 (Second) gear synchronizer to stop the clutch disc rotation; this allows smooth engagement of 1 (First) or R (Reverse) To complete the gear engagement, it may be necessary to apply light pressure to the gearshift lever during initial engagement of the clutch. It takes a second or two to match gear speeds; steady pressure on the gearshift lever will help the synchronizer perform its job more quickly. If the gearshift lever is forced into position, this action defeats the purpose of the synchronizer by causing gear clash.

Shifting with a non-synchronized transmission

Refer to *Clutch brake* and *Double clutch procedures* in the *Clutch* section of this chapter.

Operating the Eaton FS-5205A 5–speed transmissions

The 5-speed transmission is equipped with five forward gears and one reverse. The 2nd, 3rd, 4th and 5th gears are synchronized. The shift pattern is embossed on the gear shift knob.



Do not shift the transmission into R (Reverse) while the vehicle is moving as this could damage the transmission.

To go forward

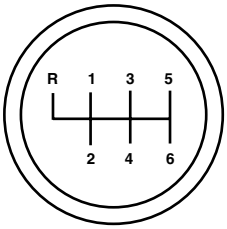
With the engine idling, depress the clutch pedal and shift into 1 (First). Engage the clutch while pressing the accelerator to start forward. Operate the clutch and upshift as required by driving conditions.

To go backward

Reverse is obtained by putting the gearshift lever in R (Reverse) and engaging the clutch while pressing lightly on the accelerator.

Operating the Eaton FS–5406A, FS–5406N, FS–6406A and FSO–6406A 6-speed transmissions

These 6-speed transmissions are equipped with six forward gears and one reverse. All the forward gears are synchronized. The shift pattern is embossed on the gear shift knob.



Do not shift the transmission into 1 (First) or R (Reverse) while the vehicle is moving as this could damage the transmission.

To go forward

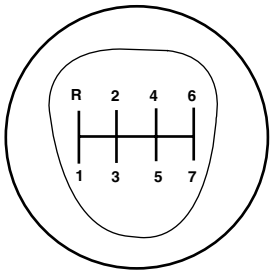
With the engine idling, depress the clutch pedal and shift into 1 (First). Engage the clutch while pressing the accelerator to start forward. Operate the clutch and upshift as required by driving conditions.

To go backward

Reverse is obtained by putting the gearshift lever in R (Reverse) and engaging the clutch while pressing lightly on the accelerator.

Operating the Spicer ES56-7B and ES066-7B 7-speed transmissions

These 7-speed transmissions are equipped with seven forward gears and one reverse. The 2nd, 3rd, 4th, 5th, 6th and 7th gears are synchronized. The shift pattern is embossed on the gear shift knob.



Do not shift the transmission into 1 (First) or R (Reverse) while the vehicle is moving as this could damage the transmission.

To go forward

With the engine idling, depress the clutch pedal and shift into 1 (First). Engage the clutch while pressing the accelerator to start forward. Operate the clutch and upshift as required by driving conditions.

To go backward

Reverse is obtained by putting the gearshift lever in R (Reverse) and engaging the clutch while pressing lightly on the accelerator.

POWER TAKE-OFF (PTO) OPERATION

Vehicles equipped with an Allison automatic transmission (except 3000 Series applications and vehicles equipped with a Caterpillar engine)

The PTO can be operated while the vehicle is standing or moving. To engage the PTO, apply the brakes and shift to any gear other than N (Neutral), then engage the PTO.

If engagement is prevented by the gear teeth not meshing properly, release the brakes and allow the vehicle to creep slightly or shift the selector to N (Neutral) and then back into gear. The PTO should never be engaged by clashing the gear teeth as this may damage the PTO unit and the transmission PTO drive gear teeth. This could result in further damage to the transmission and PTO.

PTO operation with vehicle stationary

Stop the vehicle, idle the engine and set the parking brake. Make sure the gear selector is in any forward drive range, then engage the PTO.

After the PTO is engaged, move the range selector to N (Neutral). Increase the engine speed until the desired power take-off operation speed is obtained. To disengage the PTO after operation with the vehicle standing, release the throttle, allow the drive equipment to come to a stop, and then disengage the PTO.

When the PTO is operated with the vehicle stationary, the transmission must be placed in N (Neutral) with the parking brake set. If the transmission is not in N (Neutral) and is equipped with a remote throttle control, an increase in engine speed can overpower the parking brake and cause the vehicle to move, possibly resulting in personal injury and/or property damage.

PTO operation while vehicle is moving

After the PTO is engaged for driven vehicle operation, shift to the desired range and drive the vehicle. The speed of the PTO, during this period of operation, will always maintain direct relation to vehicle speed. PTO speed will decrease in relation to vehicle (transmission output) speed as shifts to a higher gear occur. When operating the PTO while the vehicle is moving, the PTO may be disengaged whenever it is no longer required. When there is no load on the PTO gear, it can be pulled out of engagement.

Vehicles equipped with an Allison 3000 Series automatic transmission

The PTO drive gear is engine driven and provides direct engine power. The PTO can be operated when the vehicle is either stationary or moving.

The PTO gear is in constant mesh with the drive gear in the torque converter housing. A friction clutch or constant drive is used to transmit power to the PTO.

Vehicles equipped with a Caterpillar engine

The PTO will only operate if the transmission is in N (Neutral). This feature can be overridden by a special service tool; see your dealer or service representative for more information.

Vehicles equipped with a manual transmission

Transmission-mounted PTO units are available for local installation on your vehicle. See your *Body Builder's Layout Book* for restrictions on use and installation of PTO units.

To engage the PTO unit, stop the vehicle and place the transmission in N (Neutral). Depress the clutch and allow the gears to stop rotating, then

engage the PTO unit. The PTO can also be selected with the transmission in gear as long as the clutch is depressed.

When operating the PTO with the vehicle stationary, first set the parking brake (chock the wheels if the vehicle is on a hill or another uneven surface).

REAR AXLE INFORMATION

Axle operating temperature normally will not exceed 100°F (38°C). If the operating temperature exceeds 230°F (110°C), the rate of axle lubrication oxidation will increase and shorten the life of the lubricant and seals, requiring axle lubrication changes to become more frequent to preserve the axle. Extreme Pressure (EP) lubricants should not be run consistently above 230°F (110°C).

Gross axle weight

Your truck has gross axle weight, gross vehicle weight and gross combination weight ratings. Do not exceed these ratings.

Exceeding these ratings by overloading can cause component failure resulting in property damage, personal injury or death.

Rear axles with locking or limited-slip differentials

If your vehicle is equipped with a locking or limited-slip differential, note the following:

- Power will be transmitted to the opposite wheel should one of the wheels begin to slip.
- Both wheels must be raised off the ground should it be necessary to operate one wheel with the vehicle stationary.

If both wheels are not raised off the ground, the one wheel that is not raised may pull the vehicle off its support, possibly resulting in personal injury

Driver-controlled differential lock

To prevent the vehicle from moving when servicing the wheels, tires or brakes, turn the engine off and raise all drive wheels of the locker differential axle. Axles equipped with NoSPIN Detroit Locker differentials deliver power to both wheels even when only one wheel is on the ground.

Failure to raise all drive wheels with this type of differential could cause the vehicle to move unexpectedly, resulting in property damage, personal injury or death.

Care should be taken to avoid sudden accelerations when both drive wheels are on a slippery surface.

Sudden accelerations on slippery surfaces could cause the wheels to spin, the vehicle to turn sideways on a crowned road surface or in a turn, possibly resulting in loss of vehicle control and personal injury.

Some Dana/Spicer drive axles have a driver-controlled differential lock. The differential lock can lock or unlock the differential when the vehicle is moving or stopped. When extra traction is required, the differential lock will provide full power to both axles.

When the differential is locked, the vehicle's turning radius will increase (vehicle will "under-steer")

The differential can be locked or unlocked when the vehicle is moving at a constant speed of less than 25 mph (40 km/h) and while the wheels are not slipping. The differential must not be locked when the vehicle is traveling down steep grades and traction is minimal.

Note: Never use the differential lock at vehicle speeds above 25 mph (40 km/h).

Note: The driver-controlled differential lock function will vary with some transmissions.

- **Vehicles equipped with an Allison 3000 Series transmission:** The differential lock and differential lock light will automatically disengage at speeds above 25 mph (40 km/h). The differential lock will remain off until either the vehicle is restarted or the differential lock switch is turned off then back on.
- **Vehicles equipped with a 5–speed, 6–speed or 7–speed manual:** The differential lock and differential lock light will automatically disengage at speeds above 25 mph (40 km/h). The differential lock will remain off until either the vehicle is restarted or the differential lock switch is turned off then back on.

Axle conversions

It is not recommended, or approved, for axle conversions to be performed. However, it is understood that, on occasion, aftermarket

add-on axles are installed by others on the truck chassis which allow operator control for weight transfer from other axles (i.e., air lift axles).

When operating a loaded vehicle, the driver must keep all adjustable axles on the ground at all times, supporting their share of the vehicle's load. Failure to do so can overload other axles, tires, wheels, springs, steering components, brakes and frames, resulting in early component failure, loss of vehicle control, possible property damage and personal injury.

TWO-SPEED REAR AXLE (IF EQUIPPED)

A two-speed rear axle allows the driver to select a LO range for greater pulling power and a HI range for greater road speed and fuel economy. These ranges can also be used to provide additional steps between transmission shifts when driving on steep grades and/or fuel economy may be factors.

Note: Do not shift between ranges when the speed control is on.

Never shift a two-speed axle when descending a steep grade as this may cause loss of vehicle control and result in personal injury.

Axle shifting

Manual transmissions:

- **To downshift,** select the next lower gear, release and depress the accelerator pedal rapidly, or while holding the accelerator pedal down, release and engage the clutch rapidly. **Note:** The clutch method is recommended when driving at slower speeds.
- **To upshift,** keep the accelerator pedal down, select the next higher gear, release the accelerator and pause until the axle upshifts. **Note:** De-clutch for smoother axle upshifts when driving at slower speeds.

Automatic transmissions:

- Use LO range for when you drive a fully loaded vehicle on a severe grade or in congested traffic. To activate LO range, press the upper portion of the switch.
- Use HI range for all normal driving conditions with a lightly loaded or partially loaded vehicle. To activate HI range, press the lower portion of the switch.

Note: You cannot split-shift with an automatic transmission. Also, downshifting above 40 mph (64 km/h) may result in transmission or axle damage.

Shifting the axle from LO to HI range - vehicle stopped

Place the transmission in N (Neutral), then press the lower part of the switch.

Shifting the axle from LO to HI range - vehicle moving

Accelerate to approximately 35 mph (56 km/h), press the lower part of the switch while the transmission is in N (Neutral), then release and apply the accelerator.

Shifting the axle from HI to LO range - vehicle stopped

Place the transmission in N (Neutral), then press the upper part of the switch.

Note: Do not shift the axle to LO range with the vehicle in motion.

Split-shifting (combined axle and transmission shift - manual transmissions only)

Split-shift sequence											
Ratio combination	1	2	3	4	5	6	7	8	9	10	11
Transmission gear	1st	1st	2nd	2nd	3rd	3rd	4th	4th	5th	6th	6th
Axle range	LO	HI	LO	HI	LO	HI	LO	HI	LO	LO	HI

To downshift the axle to a slower ratio and shift the transmission, shift the transmission and move the control switch to the lower ratio before the clutch is re-engaged.

To upshift the axle and shift the transmission, move the control switch to a faster ratio and make the transmission shift in the usual manner.

Ratio extender use

Low End

A two-speed axle can be used as a ratio-extender when split shifting is not necessary. For low end use, just shift the axle into LO to start out, and shift to HI when the extra torque is no longer needed.

Transmission (5-speed)	1st	1st	2nd	3rd	4th	5th	6th
Two-speed Axle	Axle Low	Axle High					

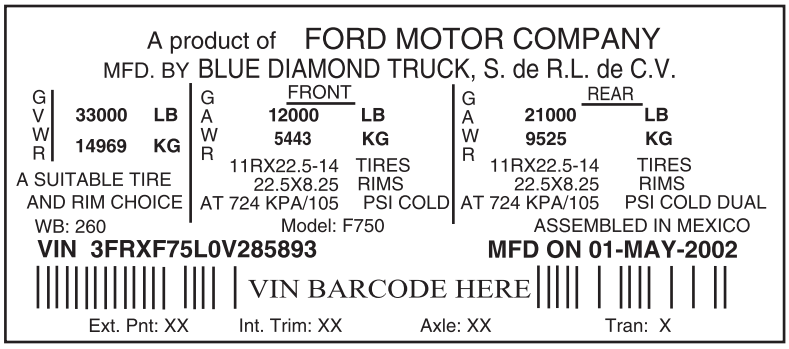
High End

To use the two-speed axle as a high end ratio-extender, stay in the LO range for normal upshifts and only shift the axle to HI on the freeway for greater road speed.

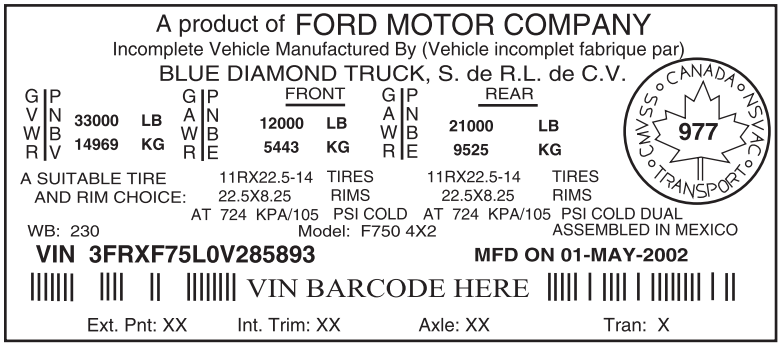
Transmission (5-speed)	1st	2nd	3rd	4th	5th	6th Speed
Two-Speed Axle	Low for Gradeability					Axle High

MAXIMUM VEHICLE LOADING

Every vehicle manufactured by Ford Motor Company is supplied with information on the Vehicle Rating Decal listing the maximum loading for the vehicle (GVWR), and its axle systems (GAWR) at the tire to ground interface.



- U.S.



- Canada

Under no circumstances should your vehicle be loaded in excess of the GVWR or GAWR. It is the operator's responsibility to ensure that neither the axle capacities, spring capacities, tire capacities nor the vehicle rated GVWR is exceeded. For tire capacities, refer to *Maintenance and Specifications* chapter.

Unloaded or lightly loaded vehicles

The braking system has been designed to safely stop your vehicle when fully loaded to its GVWR.

When operating empty or lightly loaded, sudden or hard braking may induce wheel lockup with loss of vehicle control and the possibility of accident and serious injury, especially on wet or slippery road surfaces.

TRAILER TOWING

Towing a trailer places an additional load on your vehicle's engine, transmission, axle, brakes, tires and suspension. Inspect these components carefully prior to and after any towing operation.

Your vehicle's load capacity is designated by weight, not by volume, so you cannot necessarily use all available space when loading a vehicle. 2nd unit bodies are not included in maximum trailer weight ratings. The weight of the additional "body" must be subtracted from the maximum trailer weight.

Note: Do not exceed the GVWR or the GAWR specified on the certification label.

Towing trailers beyond the maximum recommended gross trailer weight exceeds the limit of the vehicle and could result in engine damage, transmission damage, structural damage, loss of vehicle control, vehicle rollover and personal injury.

Model	Maximum GVWR - lb. (kg)	Maximum GCWR - lb. (kg)*
F-650 Regular/Super/Crew Cab	26000 (11793)	40000 (18143)
F-750 Regular/Super/Crew Cab	30000 (13608)	45000 (20412)
F-750 Regular/Super/Crew Cab	33000 (14969)	60000 (27216)
* Figures shown are the maximum available for each model. Actual ratings may be less, depending on your transmission. Check with your sales consultant for the exact rating on your vehicle.		

Preparing to tow

Use the proper equipment for towing a trailer and make sure it is properly attached to your vehicle. See your dealer or a reliable trailer dealer if you require assistance.

Hitches

Do not use hitches that clamp onto the vehicle's bumper or attach to the axle. You must distribute the load in your trailer so that 10–15% of the total weight of the trailer is on the tongue.

Safety chains

Always connect the trailer's safety chains to the frame or hook retainers of the vehicle hitch. To connect the trailer's safety chains, cross the chains under the trailer tongue and allow slack for turning corners.

If you use a rental trailer, follow the instructions that the rental agency gives to you.

Do not attach safety chains to the bumper.

Trailer brakes

Electric brakes and manual, automatic or surge-type trailer brakes are safe if installed properly and adjusted to the manufacturer's specifications. The trailer brakes must meet local and Federal regulations.

Do not connect a trailer's hydraulic brake system directly to your vehicle's brake system. Your vehicle may not have enough braking power and your chances of having a collision greatly increase.

Trailer lamps

Trailer lamps are required on most towed vehicles. Your vehicle may be equipped with one of two possible trailer wiring designs. Make sure all running lights, brake lights, turn signals and hazard lights are working. See your dealer or trailer rental agency for proper instructions and equipment for hooking up trailer lamps.

Driving while you tow

When towing a trailer:

- Keep your speed no faster than 70 mph (112 km/h) during the first 500 miles (800 km) of towing a trailer, and don't make full throttle starts.
- Turn off the speed control. The speed control may shut off automatically when you are towing on long, steep grades.
- Consult your local motor vehicle speed regulations for towing a trailer.
- To eliminate excessive transmission shifting, use a lower gear. This will also assist in transmission cooling.
- Anticipate stops and brake gradually.
- Do not exceed the GCWR rating or transmission damage may occur.

Servicing after towing

If you tow a trailer for long distances, your vehicle will require more frequent service intervals. Refer to your *Scheduled Maintenance Guide* for more information.

Trailer towing tips

- Practice turning, stopping and backing up before starting on a trip to get the feel of the vehicle trailer combination. When turning, make wider turns so the trailer wheels will clear curbs and other obstacles.
- Allow more distance for stopping with a trailer attached.
- If you are driving down a long or steep hill, shift to a lower gear. Do not apply the brakes continuously, as they may overheat and become less effective.

- The trailer tongue weight should be 10–15% of the loaded trailer weight.
- If you will be towing a trailer frequently in hot weather, hilly conditions, at GCW, or any combination of these factors, consider refilling your rear axle with synthetic gear lube if not already so equipped. Refer to *Lubricant specifications* in the *Maintenance and Specifications* chapter for the lubricant specification. Remember that regardless of the rear axle lube used, do not tow a trailer for the first 500 miles (800 km) of a new vehicle, and that the first 500 miles (800 km) of towing be done at no faster than 70 mph (112 km/h) with no full throttle starts.
- After you have traveled 50 miles (80 km), thoroughly check your hitch, electrical connections and trailer wheel lug nuts.
- To aid in engine/transmission cooling and A/C efficiency during hot weather while stopped in traffic, place the gearshift lever in P (Park) (if available on your automatic transmission) or N (Neutral) (manual transmissions and automatic transmissions without a P [Park] position).
- Vehicles with trailers should not be parked on a grade. If you must park on a grade, place wheel chocks under the trailer's wheels.

FIFTH WHEEL OPERATION

Failure to follow the fifth wheel manufacturer's instructions for hooking and unhooking as well as sliding the fifth wheel could result in an accident, personal injury or death.

When the tractor and trailer are parked unattended, the trailer brake hand control should never be used to apply the brake, since air may leak from the system, allowing vehicle movement, resulting in possible property damage, personal injury or death.

Before hook-up, make sure:

- The fifth wheel jaws are fully opened.
- The fifth wheel is fully tilted back to prevent body damage when the tractor is backed under a trailer.
- The trailer wheels are blocked and the trailer spring brakes are adjusted and applied. Never chase a trailer.
- The brake hoses and light cords are clear of the fifth wheel.

Hook-up

1. Back the tractor squarely under the trailer, engaging the fifth wheel jaws on the kingpin. Always back-up slowly, making sure the trailer is neither too high nor too low. Avoid backing under the trailer from an angle.

2. Connect the service and emergency brake hoses and trailer light connector. Refer to *Tractor-trailer connection* in this chapter, adhering to the warning and using the three-point stance while connecting and disconnecting the trailer.

3. Inspect the jaws of the fifth wheel to be sure they have fully closed on the trailer kingpin and the trailer plate is resting securely on the fifth wheel.

4. Be sure the coupler release lever is in the locked position.

5. Charge the trailer brake system. Set the trailer brakes, either with the hand valve or tractor protection valve. Pull against the trailer for an additional check of proper hook-up. Do not pull hard enough to damage or strain the equipment.

6. Set the tractor parking brakes and fully raise the trailer landing gear. Refer to *Brakes* in this chapter for proper operation of the parking brake and trailer brakes.

7. Check the operation of all trailer lights and correct any lights that may be faulty.

Un-hook

1. Try to keep the tractor and trailer in a straight line.

2. Apply the parking brakes.

3. Lower the trailer landing gear, making sure it is on solid, level ground. The weight of the trailer is to be on the landing gear.

4. Block the trailer wheels.

5. Disconnect the brake hoses and light cords. Be sure hoses and cords are clear.

6. Pull coupler release lever to disengage the fifth wheel jaws.

7. Release the tractor parking brakes.

8. Pull out from the trailer slowly, allowing the landing gear to take the load gradually.

GETTING ROADSIDE ASSISTANCE

To fully assist you should you have a vehicle concern, Ford offers a complimentary roadside assistance program. This program is separate from the New Vehicle Limited Warranty and is not applicable to vehicles sold in Canada. The service is available:

- 24–hours, seven days a week
- for the New Vehicle Limited Warranty period (U.S.) of two years (unlimited miles)

Roadside assistance will cover:

- battery jump start.
- lock out assistance (key replacement is customer responsibility).
- towing – Ford/Mercury/Lincoln eligible vehicle towed to the nearest authorized dealer within 35 miles (56.3 km) of the disablement location or to the nearest authorized dealer. If a member requests to be towed to the nearest authorized dealer more than 35 miles (56.3 km) from the disablement location, the member shall be responsible for any mileage costs in excess of 35 miles (56.3 km).

Trailers shall be covered up to $100 if the disabled Eligible Vehicles requires service at the nearest authorized dealer. If the trailer is disabled, but the towing vehicle is operational, the trailer does not qualify for any Roadside services.

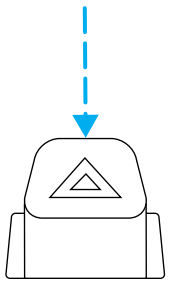
Using roadside assistance

Complete the roadside assistance identification card and place it in your wallet for quick reference. This card is found in the Owner Guide portfolio in the glove compartment.

To receive roadside assistance in the United States, call 1-800-241-3673.

If you need to arrange roadside assistance for yourself, Ford will reimburse a reasonable amount. To obtain information about reimbursement, call 1-800-241-3673.

HAZARD FLASHER



The hazard flasher control is located on the steering column, just behind the steering wheel. The hazard flashers will operate when the ignition is off.

Push in the flasher control and all front and rear direction signals will flash. Press the flasher control again to turn them off. Use it when your vehicle is disabled and is creating a safety hazard for other motorists.

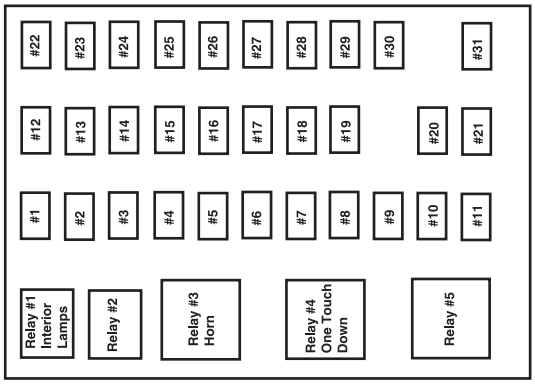
Note: With extended use, the flasher may run down your battery.

FUSING

If electrical components in the vehicle are not working, a fuse may have blown. Blown fuses are identified by a broken wire within the fuse. Check the appropriate fuses before replacing any electrical components.

Note: Always replace a fuse with one that has the specified amperage rating. Using a fuse with a higher amperage rating can cause severe wire damage and could start a fire.

Passenger compartment fuse panel



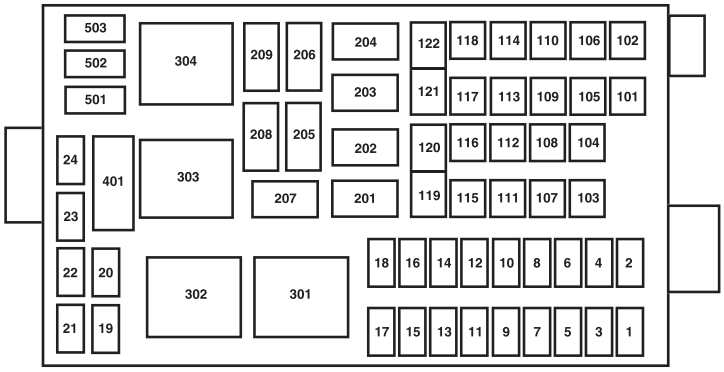
Fuse/Relay Location	Fuse Amp Rating	Fuse Description
1	20A	Horn
2	15A	Turn/Hazard lamps
3	20A	Cigar lighter
4	10A	Diagnostic connectors, Power park brake chime
5	15A	Back-up lamps, DRL relays, Blend door actuator, Heated seat module, Trailer ABS relay, Exhaust brake, Climate mode switch
6	—	Not used
7	—	Not used
8	5A	Radio, GEM
9	5A	Switch illumination (Headlamp, Power windows, Power door locks), Power window relay
10	15A	Heated/Lighted mirrors
11	5A	Wiper motor, Washer pump relay

Fuse/Relay Location	Fuse Amp Rating	Fuse Description
12	10A	Stoplamp switch (Hydraulic brake vehicles only)
13	20A	Radio, Cluster
14	10A	Interior lamps
15	10A	GEM, Interior lamp relay, Map lamps
16	15A	High beams
17	—	Not used
18	5A	Headlamp switch
19	15A	Engine ECM (Caterpillar and Cummins engines)
		Engine ECM, Accel, Crank (6.0L Power Stroke engine only)
20	5A	Starter relay
21	10A	Daytime Running Lamps (DRL)
22	15A	Air solenoid 4–pack (Air horn, Air suspension dump, Differential lock axle and Two-speed axle)
23	10A	Electronic flasher
24	15A	Vacuum pump, Air dryer, ABS, Fuel heater/Fuel transfer pump relay, Heated drain valve, 6.0L Power Stroke Water In Fuel (WIF) module
25	10A	Blower motor relay
26	10A	RH low beam headlamp
27	—	Not used
28	10A	LH low beam headlamp
29	10A	Cluster (Power, Warning lamps), Hydraulic ABS relay, Air traction control, GEM, Hourmeter, Transmission temp
30	15A	Allison transmissions
31	15A	Not used
Relay 1	—	Interior lamps

Fuse/Relay Location	Fuse Amp Rating	Fuse Description
Relay 2	—	Not used
Relay 3	—	Horn
Relay 4	—	One-touch down window
Relay 5	—	Not used

Power distribution box

Always disconnect the battery before servicing high current fuses.



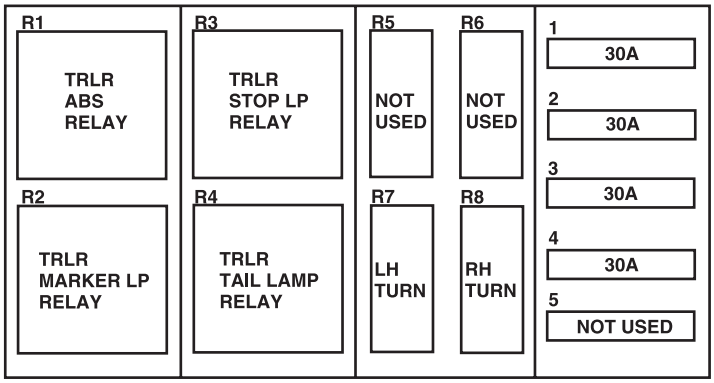
Fuse/Relay Location	Fuse Amp Rating	Fuse Description
1	15A*	Park lamps, Roof lamps
2	30A*	Power seat (driver)
3	30A*	Power seat (passenger)
4	15A*	Washer pump
5	-	Not used
6	15A*	Air intake heater (Caterpillar engine only)
7	15A*	Stoplamps (Air brake vehicles only)

Fuse/Relay Location	Fuse Amp Rating	Fuse Description
8	25A*	Fuel heater (Caterpillar engine only)
	20A*	Fuel heater (6.0L Power Stroke engine only)
9	20A*	Crank inhibit relay, Engine ECM, Cluster, Transmission TCM, CJB Start, CJB Run
10	15A*	Heated drain valve
11	30A*	Electric trailer brake
12	20A*	Daytime Running Lamps (DRL), Blend door actuator, Climate mode, Back-up, Heated seats, Trailer ABS, Exhaust brake
13	—	Not used
14	—	Not used
15	7.5A*	Body builder prep/trailer socket stop (6.0L Power Stroke engine only)
16	5A*	ABS Run feed
17	—	Not used
18	10A*	Fuel transfer pump (duel fuel tanks only)
19	—	Not used
20	10A*	Engine ECM power relay (6.0L Power Stroke engine only)
21	10A*	Hydromax motor input to GEM
22	10A*	Engine IDM2 logic power (6.0L Power Stroke engine only)
23	—	Not used
24	—	Not used
101	30A**	Bendix Air ABS relay (Air brake vehicles only)
		WABCO ABS modulator relay (Hydraulic brake vehicles only)
102	20A**	Body builder prep Run feed
103	20A**	Ignition switch (Junction box fuses 8, 9, 10, 11, 19, 29, 30)
104	20A**	Power point

Fuse/Relay Location	Fuse Amp Rating	Fuse Description
105	20A**	Power door locks
106	30A**	Headlamps
107	50A**	Junction box battery feed (1, 2, 3, 4, 12, 13, 14, 15)
108	40A**	Fuel heater (Cummins engine only)
109	40A**	Power windows
110	30A**	Wiper power relay (Park, Low/High speed)
111	30A**	Body builder prep - park lamps
112	40A**	Blower motor
113	30A**	Heated seats
114	25A**	WABCO ABS battery feed (Hydraulic brake vehicles only)
115	20A**	Ignition switch, Central Junction Box fuses 8, 9, 10, 11, Starter motor relay
116	30A**	Body builder prep - left/right turn relays, Back-up lamps
117	20A**	Body builder prep/trailer socket stop (Caterpillar and Cummins engines only)
118	60A**	Hydraulic brake trailer tow fuse block
119/120	60A**	Hydraulic brake trailer tow fuse block
		Air brake trailer tow fuse block
121/122	60A**	HydroMax motor
		Air brake trailer tow fuse block
201	—	Washer pump relay
202	—	Wiper speed relay
203	—	Wiper run/park relay
204	—	Wiper power relay
205	—	RH stop/turn relay
206	—	LH stop/turn relay
207	—	Hydraulic ABS event relay
208	—	Back-up lamps relay

Fuse/Relay Location	Fuse Amp Rating	Fuse Description
209	—	Stoplamps relay (Caterpillar and Cummins)
		ECM ISO relay (V8 engines)
301	—	Fuel heater/Fuel transfer pump relay
302	—	Park lamps relay
303	—	Blower motor relay
304	—	Air ABS relay
		Hydraulic modulator relay
401	—	Not used
501	—	Not used
502	—	Not used
503	—	Not used
* Mini fuse **Maxi fuse		

Trailer tow relays (if equipped)



Fuse/Relay Location	Fuse Amp Rating	Description
1	30A*	Trailer tow ABS feed
2	30A*	Trailer tow park/marker lamps

Fuse/Relay Location	Fuse Amp Rating	Description
3	30A*	Trailer tow stop lamps
4	30A*	Trailer tow turn/stop lamps (combined)
		Trailer tow turn lamps (separate)
5	—	Not used
R1	—	Trailer tow ABS relay
R2	—	Trailer tow park/marker lamp relay
R3	—	Trailer tow stop lamp relay
R4	—	Trailer tow tail lamp relay
R5	—	Not used
R6	—	Not used
R7	—	Trailer tow left turn/stop lamp relay (combined)
		Trailer tow left turn lamp relay (separate)
R8	—	Trailer tow right turn/stop lamp relay (combined)
		Trailer tow right turn lamp relay (separate)
*Maxi fuse		

Inline fuses

Your vehicle has two inline fuses located in/on the battery cables by the battery. A 10A fuse for the transmission control module and a 40A fuse for the engine control module. Refer to *Automatic transmission* in the *Driving* chapter and *Battery* in the *Maintenance and Specifications* chapter for more information.

JUMP STARTING

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 automatic transmission vehicle. Automatic transmissions do not have push-start

capability. Attempting to push-start a vehicle with an automatic transmission may cause transmission damage.

Before connecting a fast-charger, booster battery or installing a new battery, make sure the ground polarities of the fast-charger, booster battery or alternator (when installing a battery) are matched to the ground polarity of the vehicle battery. Improper usage of the fast-charger, hook-up of booster battery or installation of a new battery can cause damage to the electrical system or to the alternator. Do not attempt to polarize the alternator.

Preparing your vehicle

1. **Use only a 12–volt supply to start your vehicle.** Do not attach the jumper cables to the glow plug relay as this could severely damage the glow plugs, injector driver module and PCM.

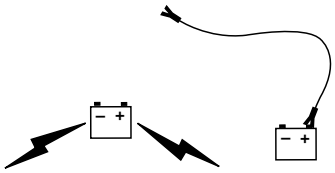
2. Do not disconnect the battery of the disabled vehicle as this could damage the vehicle's electrical system.

3. Park the booster vehicle close to the hood of the disabled vehicle making sure the two vehicles **do not** touch. Set the parking brake on both vehicles and stay clear of the engine cooling fan and other moving parts.

4. Check all battery terminals and remove any excessive corrosion before you attach the battery cables. Ensure that vent caps are tight and level.

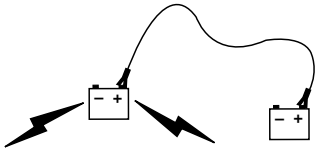
5. Turn the heater fan on in both vehicles to protect any electrical surges. Turn all other accessories off.

Connecting the jumper cables

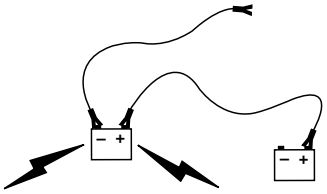


1. Connect the positive (+) jumper cable to the positive (+) terminal of the discharged battery.

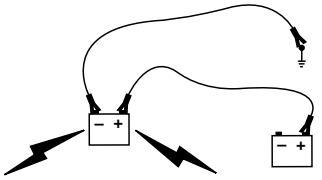
Note: In the illustrations, *lightning bolts* are used to designate the assisting (boosting) battery.



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.



4. Make the final connection of the negative (-) cable to an exposed metal part of the stalled vehicle's engine, away from the battery and the carburetor/fuel injection system. **Do not** use fuel lines, engine rocker covers or the intake manifold 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 fan blades, belts, moving parts of both engines, or any fuel delivery system parts.

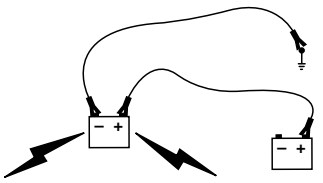
Jump starting

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.

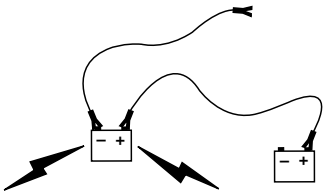
Removing the jumper cables



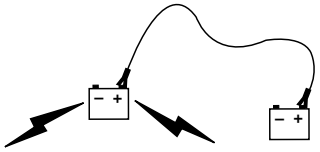
Remove the jumper cables in the reverse order that they were connected.

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

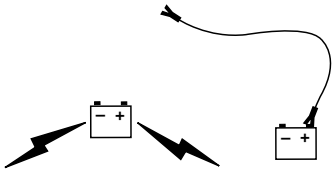
Note: In the illustrations, *lightning bolts* are used to designate the assisting (boosting) battery.



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



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



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

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.

WRECKER TOWING INSTRUCTIONS

Before moving the towed vehicle, check for adequate road clearance of vehicle components. It is recommended the towed vehicle be unloaded prior to being towed to reduce any abnormal load to the vehicle components resulting from the towing procedures. Before towing, be sure to fully release the parking brake. The spring-actuated type parking brake can be reset by recharging the air system with at least 64 psi (441 kPa) of air. If the brake system will not retain air pressure, then the spring brakes must be released manually. Refer to *Parking brake* in the *Driving* chapter

Note: For towing, make sure the vehicle is securely connected to the tow vehicle and the tow vehicle parking brakes are applied before releasing the disabled vehicle's spring brakes.

To reduce the risk of personal injury or property damage when manually releasing the spring brakes, be sure to block the wheels so the vehicle cannot move once the brakes are released.

Towing the vehicle with the front wheels suspended

When it is necessary to tow a vehicle with the front wheels suspended, extra precautions must be taken to avoid transmission or differential damage. Proceed as follows:

- Remove the axle shafts from the axle assembly to prevent the wheels from driving the differential and the transmission.
- The wheel hub ends must be covered to prevent loss of axle lubricant and entrance of other contaminants. If the axle shafts are not removed, removal of the propeller shaft is required.

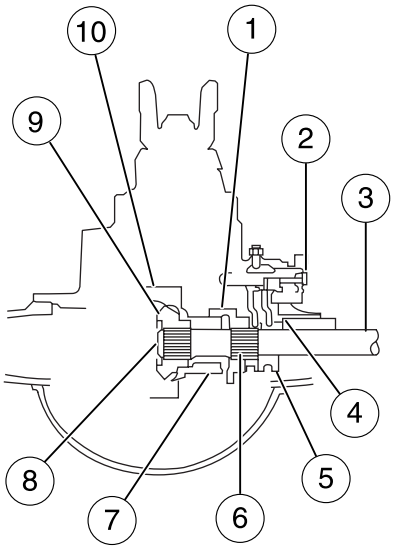
Note: To avoid transmission damage, vehicles should not be towed even a short distance without suspending rear wheels or removing the axle shaft or propeller shaft.

Note: In the event the chassis is equipped with a tandem axle and the vehicle is to be towed from the front, the forward rear axle may be raised to clear the road surface and secured to the frame by chains or U-bolts, allowing only the rear rear axle to contact the road surface. Axle shafts must be removed from the rear rear axle assembly. The wheel hub ends must be covered to prevent loss of axle lubricant and entrance of contaminants. Use extreme care in securing the chains or U-bolts to avoid possible damage to the brake lines, hoses or other components.

Towing vehicles equipped with a driver-controlled differential lock

Note: If the vehicle must be towed to a service facility with the drive axle wheels on the ground, it is necessary to remove the axle shafts before the vehicle is towed.

1. Shift collar in the locked position
2. Actuator assembly and shift fork
3. Axle shaft
4. Interference between the shift collar and housing
5. Shift collar in the unlocked position
6. Outer splines - axle shaft to collar
7. Shift collar and differential case splines
8. Inner splines - axle shaft to side gear
9. Side gear
10. Differential (plain) case half



Removing axle shafts before towing

1. Shift the main differential to the unlocked (disengaged) position. The differential lock light will turn off.

2. Remove the capscrews and washers or stud nuts and washers from flanges of both axle shafts.

3. Loosen the tapered dowels in the flanges of both axle shafts by holding a 1½ inch diameter brass drift or hammer against the axle shaft center and hitting it with a five or six pound hammer. **Note:** Do not use a chisel or wedge to loosen the axle shafts and dowels. Use of a chisel or wedge can damage the hub, axle shafts and oil seals.

4. Remove the tapered dowels and both axle shafts from the axle assembly.

5. Assemble a cover over openings of both wheels ends to prevent loss of lubricant and keep dirt away from the wheel bearing cavities.

Note: One of the axle shafts has two sets of splines. One set to engage with the differential side gear and one set to engage with the shift collar for the differential lock. It may be necessary to rotate the shaft slightly to align the gear spline teeth with the shift collar teeth in order to remove the axle shaft.

Installing the axle shafts

1. Remove the covers from the wheel ends

2. Shift the differential lock to the unlocked position (disengaged) position.

3. Install the axle shafts

- Place the gaskets on the wheel hub studs.
- Push the right-hand axle shaft and gasket into the wheel end and housing until the shaft stops against the differential shift collar.
- Push down and in on the axle shaft flange and rotate the shaft until the splines of the shaft and shift collar are engaged.
- Push the axle shaft further into the housing until the shaft stops against the differential side gear.
- Push down on the axle shaft flange and rotate the shaft until the splines of the shaft and side gear are engaged.
- Push the axle shaft completely into the housing until the axle shaft flange and the gasket are flush against the wheel hub.
- Install the left-hand axle shaft and gasket into the wheel end.

4. If tapered dowels are required, install them at each stud and into the flange of the axle shaft. Use a punch or drift and hammer, if needed.

5. Install the fasteners and tighten to correct torque value. Refer to the Service Manual.

Towing the vehicle with the rear wheels suspended

Note: To avoid damage to the cab roof or air deflector when towing the vehicle backward (rear wheels suspended) the air deflector must be removed.

Whenever possible, it is preferable to tow a disabled vehicle from the rear by raising the rear of the chassis. When towing a vehicle with the rear of the chassis suspended the front wheels must be locked in the straight-ahead position.

Vehicles equipped with a manual-shift transmission must have at least 1.0 pint (0.5L) of transmission fluid drained from the case. This will prevent the transmission fluid from entering the clutch housing and fluid saturating the clutch discs. Make sure that the transmission fluid is replaced before the vehicle is returned to service.

GETTING THE SERVICES YOU NEED

At home

Ford Motor Company and Ford of Canada have authorized dealerships to service your vehicle. It is preferred that you return to the authorized dealer where your vehicle was purchased when warranty repairs are needed. However, you may also take your vehicle to another Ford Motor Company or Ford of Canada dealership authorized for warranty repairs. Please note that certain warranty repairs require special training and/or equipment, so not all dealers are authorized to perform all warranty repairs. That means that depending on the warranty repair needed, the vehicle may need to be taken to another dealer. If a particular dealership cannot assist you, then contact the Commercial Vehicle Hotline.

If you have questions or concerns, or are unsatisfied with the service you are receiving, follow these steps:

1. Contact your Sales Representative or Service Advisor at your selling/servicing dealership.

2. If your inquiry or concern remains unresolved, contact the Sales Manager or Service Manager at the dealership.

3. If the inquiry or concern cannot be resolved at the dealership level, please contact the Ford Commercial Vehicle Hotline.

Away from home

If you own a F-650 or F-750 and need more help than the dealership can provide after following the steps provided above call the Ford Fleet and Commercial Vehicle Hotline.

In the United States:

Ford Motor Company
Commercial Vehicle Hotline
1655 Fairlane Circle
Allen Park, MI 48101
800-782-8627 (option #3)
(TDD for the hearing impaired: 1-800-232-5952)
www.fleet.ford.com

In Canada:
Customer Relationship Centre
Ford Motor Company of Canada, Limited
P.O. Box 2000
Oakville, Ontario L6J 5E4
1-800-565-3673 (FORD)
www.ford.ca

In order to help you service your Ford vehicle, please have the following information available when contacting the Commercial Vehicle Hotline:

- Your telephone number (home and business)
- The name of the dealer and the city where the dealership is located
- The year and make of your vehicle
- The date of vehicle purchase
- The current odometer reading
- The vehicle identification number (VIN)

Additional assistance

If you still have a complaint involving a warranty dispute, you must directly notify Ford in writing before pursuing remedies under your state's warranty laws. Ford is also allowed a final repair attempt in some states.

IN CALIFORNIA (U.S. ONLY)

California Civil Code Section 1793.2(d) requires that, if a manufacturer or its representative is unable to repair a motor vehicle to conform to the vehicle's applicable express warranty after a reasonable number of attempts, the manufacturer shall be required to either replace the vehicle with one substantially identical or repurchase the vehicle and reimburse the buyer in an amount equal to the actual price paid or payable by the consumer (less a reasonable allowance for consumer use). The consumer has the right to choose whether to receive a refund or replacement vehicle.

California Civil Code Section 1793.22(b) presumes that the manufacturer has had a reasonable number of attempts to conform the vehicle to its applicable express warranties if, within the first 18 months of ownership of a new vehicle or the first 18,000 miles (29,000 km), whichever occurs first:

1. Two or more repair attempts are made on the same nonconformity likely to cause death or serious bodily injury OR

2. Four or more repair attempts are made on the same nonconformity (a defect or condition that substantially impairs the use, value or safety of the vehicle) OR

3. The vehicle is out of service for repair of nonconformities for a total of more than 30 calendar days (not necessarily all at one time)

In the case of 1 or 2 above, the consumer must also notify the manufacturer of the need for the repair of the nonconformity at the following address:

Ford Motor Company
16800 Executive Plaza Drive
Mail Drop 3NE-B
Dearborn, MI 48126

GETTING ASSISTANCE OUTSIDE THE U.S AND CANADA

Before exporting your vehicle to a foreign country, contact the appropriate foreign embassy or consulate. These officials can inform you of local vehicle registration regulations and where to find unleaded fuel.

If you cannot find unleaded fuel or can only get fuel with an anti-knock index lower than is recommended for your vehicle, contact a regional office or owner relations/customer relationship office.

The use of leaded fuel in your vehicle without proper conversion may damage the effectiveness of your emission control system and may cause engine knocking or serious engine damage. Ford Motor Company/Ford of Canada is not responsible for any damage caused by use of improper fuel. In the United States, using leaded fuel may also result in difficulty importing your vehicle back into the U.S.

If your vehicle must be serviced while you are traveling or living in Central or South America, the Caribbean, or the Middle East, contact the nearest Ford dealership. If the dealership cannot help you, write or call:

FORD MOTOR COMPANY
WORLDWIDE DIRECT MARKET OPERATIONS
1555 Fairlane Drive
Fairlane Business Park #3
Allen Park, Michigan 48101
U.S.A.
Telephone: (313) 594-4857
FAX: (313) 390-0804

If you are in another foreign country, contact the nearest Ford dealership. If the dealership employees cannot help you, they can direct you to the nearest Ford affiliate office.

If you buy your vehicle in North America and then relocate outside of the U.S. or Canada, register your vehicle identification number (VIN) and new address with Ford Motor Company Worldwide Direct Market Operations.

ORDERING ADDITIONAL OWNER'S LITERATURE

To order the publications in this portfolio, contact Helm, Incorporated at:

HELM, INCORPORATED
P.O. Box 07150
Detroit, Michigan 48207

Or call:

For a free publication catalog, order toll free: 1-800-782-4356

Monday-Friday 8:00 a.m. - 6:00 p.m. EST

Helm, Incorporated can also be reached by their website: www.helminc.com.

(Items in this catalog may be purchased by credit card, check or money order.)

Obtaining a French owner's guide

French Owner's Guides can be obtained from your dealer or by writing to Ford Motor Company of Canada, Limited, Service Publications, P.O. Box 1580, Station B, Mississauga, Ontario L4Y 4G3.

REPORTING SAFETY DEFECTS (U.S. ONLY)

If you believe that your vehicle has a defect which could cause a crash or could cause injury or death, you should immediately inform the National Highway Traffic Safety Administration (NHTSA) in addition to notifying Ford Motor Company.

If NHTSA receives similar complaints, it may open an investigation, and if it finds that a safety defect exists in a group of vehicles, it may order a recall and remedy campaign. However, NHTSA cannot become involved in individual problems between you, your dealer, or Ford Motor Company.

To contact NHTSA, you may call the Vehicle Safety Hotline toll-free at 1–888–327–4236 (TTY: 1–800–424–9153); go to *http://www.safercar.gov;* or write to:

NHTSA
400 Seventh Street, SW.
Washington, D.C. 20590

You can also obtain other information about motor vehicle safety from *http://www.safercar.gov.*

Cleaning

WASHING THE EXTERIOR

Wash your vehicle regularly with cool or lukewarm water and a neutral pH shampoo, such as Motorcraft Detail Wash (ZC-3–A), which is available from your dealer.

- Never use strong household detergents or soap, such as dish washing or laundry liquid. These products can discolor and spot painted surfaces.
- Never wash a vehicle that is “hot to the touch” or during exposure to strong, direct sunlight.
- Always use a clean sponge or car wash mitt with plenty of water for best results.
- Dry the vehicle with a chamois or soft terry cloth towel in order to eliminate water spotting.
- It is especially important to wash the vehicle regularly during the winter months, as dirt and road salt are difficult to remove and cause damage to the vehicle.
- Immediately remove items such as gasoline, diesel fuel, bird droppings and insect deposits because they can cause damage to the vehicle’s paintwork and trim over time.
- Remove any exterior accessories, such as antennas, before entering a car wash.
- **Suntan lotions and insect repellents can damage any painted surface; if these substances come in contact with your vehicle, wash off as soon as possible.**

WAXING

Applying a polymer paint sealant to your vehicle every six months will assist in reducing minor scratches and paint damage.

- Wash the vehicle first.
- Do not use waxes that contain abrasives.
- Do not allow paint sealant to come in contact with any non-body (low-gloss black) colored trim, such as grained door handles, roof racks, bumpers, side moldings, mirror housings or the windshield cowl area. The paint sealant will “gray” or stain the parts over time.

PAINT CHIPS

Your dealer has touch-up paint and sprays to match your vehicle’s color. Take your color code (printed on a sticker in the driver’s door jam) to your dealer to ensure you get the correct color.

- Remove particles such as bird droppings, tree sap, insect deposits, tar spots, road salt and industrial fallout before repairing paint chips.
- Always read the instructions before using the products.

ALUMINUM WHEELS AND COVERS

- Clean with Motorcraft Wheel and Tire Cleaner (ZC-37–A), which is available from your dealer.
- Never apply any cleaning chemical to hot or warm wheel rims or covers.
- Some automatic car washes may cause damage to the finish on your wheel rims or covers. Chemical-strength cleaners, or cleaning chemicals, in combination with brush agitation to remove brake dust and dirt, could wear away the clearcoat finish over time.
- Do not use hydrofluoric acid-based or high caustic-based wheel cleaners, steel wool, fuels or strong household detergent.
- To remove tar and grease, use Motorcraft Bug and Tar Remover (ZC-42), available from your dealer.

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.

Note: To prevent damage to the engine control module, never spray-wash it directly. Never spray any connector.

- 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.

PLASTIC (NON-PAINTED) EXTERIOR PARTS

Use only approved products to clean plastic parts. These products are available from your dealer.

- For routine cleaning, use Motorcraft Detail Wash (ZC-3–A).
- If tar or grease spots are present, use Motorcraft Bug and Tar Remover (ZC-42).

Cleaning

WINDOWS AND WIPER BLADES

The windshield, rear and side windows and the wiper blades should be cleaned regularly. If the wipers do not wipe properly, substances on the vehicle's glass or the wiper blades may be the cause. These may include hot wax treatments used by commercial car washes, tree sap, or other organic contamination. To clean these items, please follow these tips:

- The windshield, rear windows and side windows may be cleaned with a non-abrasive cleaner such as Motorcraft Ultra Clear Spray Glass Cleaner (ZC-23), available from your dealer.
- Do not use abrasives, as they may cause scratches.
- Do not use fuel, kerosene, or paint thinner to clean any parts.
- Wiper blades can be cleaned with isopropyl (rubbing) alcohol or windshield washer solution. Be sure to replace wiper blades when they appear worn or do not function properly.

INSTRUMENT PANEL AND CLUSTER LENS

Clean the instrument panel with a damp cloth, then dry with a dry cloth.

- Avoid cleaners or polish that increase the gloss of the upper portion of the instrument panel. The dull finish in this area helps protect the driver from undesirable windshield reflection.
- Be certain to wash or wipe your hands clean if you have been in contact with certain products such as insect repellent and suntan lotion in order to avoid possible damage to the painted surfaces.

INTERIOR TRIM

- Clean the interior trim areas with a damp cloth, then dry by wiping with a dry, soft, clean cloth.
- Do not use household or glass cleaners as these may damage the finish.

INTERIOR

For fabric, carpets, cloth seats and safety belts:

- Remove dust and loose dirt with a vacuum cleaner.
- Remove light stains and soil with Motorcraft Professional Strength Carpet and Upholstery Cleaner (ZC-54).
- If grease or tar is present on the material, spot-clean the area first with Motorcraft Spot and Stain Remover (ZC-14).
- Never saturate the seat covers with cleaning solution.

- Do not use household cleaning products or glass cleaners, which can stain and discolor the fabric and affect the flame retardant abilities of the seat materials.

Do not use cleaning solvents, bleach or dye on the vehicle's seat belts, as these actions may weaken the belt webbing.

LEATHER SEATS (IF EQUIPPED)

Your leather seating surfaces have a clear, protective coating over the leather.

- To clean, use a soft cloth with Motorcraft Deluxe Leather and Vinyl Cleaner (ZC-11–A). Dry the area with a soft cloth.
- To help maintain its resiliency and color, use the Motorcraft Deluxe Leather Care Kit (ZC-11–D), available from your authorized dealer.
- Do not use household cleaning products, alcohol solutions, solvents or cleaners intended for rubber, vinyl and plastics, or oil/petroleum-based leather conditioners. These products may cause premature wearing of the clear, protective coating.

UNDERBODY

Flush the complete underside of your vehicle frequently. Keep body and door drain holes free from packed dirt.

FORD CAR CARE PRODUCTS

Your vehicle's dealer has many quality products available to clean your vehicle and protect its finishes. These quality products have been specifically engineered to fulfill your automotive needs; they are custom designed to complement the style and appearance of your vehicle. Each product is made from high quality materials that meet or exceed rigid specifications. For best results, use the following products or products of equivalent quality:

Motorcraft Bug and Tar Remover (ZC-42)

Motorcraft Car Care Kit (ZC-26)

Motorcraft Car Wash (Canada only) (CXC-21)

Motorcraft Custom Bright Metal Cleaner (ZC-15)

Motorcraft Custom Clear Coat Polish (ZC–8–A)

Motorcraft Custom Vinyl Protectant (U.S. only) (ZC-40-A)

Motorcraft Dash and Vinyl Cleaner (ZC-38–A)

Cleaning

Motorcraft Deluxe Leather and Vinyl Cleaner (U.S. only) (ZC-11–A)
Motorcraft Detail Wash (ZC-3–A)
Motorcraft Dusting Cloth (ZC-24)
Motorcraft Engine Shampoo and Degreaser (U.S only) (ZC-20)
Motorcraft Engine Shampoo (Canada only) (CXC-66-A)
Motorcraft One Step Wash and Wax Concentrate (ZC-6-A)
Motorcraft Paint Sealant (ZC-45)
Motorcraft Premium Car Wash Concentrate (U.S. only) (ZC-17-B)
Motorcraft Premium Glass Cleaner (Canada only) (CXC-100)
Motorcraft Premium Liquid Wax (ZC-53–A)
Motorcraft Professional Strength Carpet & Upholstery Cleaner (ZC-54)
Motorcraft Spot and Stain Remover (U.S. only) (ZC-14)
Motorcraft Tire Clean and Shine (ZC-28)
Motorcraft Triple Clean (U.S. only) (ZC-13)
Motorcraft Ultra-Clear Spray Glass Cleaner (ZC-23)
Motorcraft Vinyl Cleaner (Canada only) (CXC-93)
Motorcraft Wheel and Tire Cleaner (ZC-37–A)

GENERAL SERVICING GUIDELINES AND PRECAUTIONS

As with any machine, care should be taken to avoid being injured when performing maintenance, repairs or system checks. Improper or incomplete service could result in the vehicle not working properly which, in turn, may result in personal injury or damage to the vehicle or equipment. It is the operator's responsibility to see that the vehicle receives proper care and maintenance. If you have any questions about performing some service, have the service done by a qualified technician.

Servicing guidelines

When servicing your vehicle, always:

- turn off the ignition unless the particular procedure calls for the engine to be running.
- set the parking brake or chock the wheels.
- use support stands, not a jack, whenever you must be under a raised vehicle.
- do not smoke.
- wear safety glasses for eye protection.
- operate the engine in a well-ventilated area
- do not work on the brakes or the clutch unless the proper precautions are taken to avoid inhaling friction material dust.
- do not wear loose-fitting clothing, hanging jewelry, watches or rings.
- avoid contact with hot metal parts. Allow the hot components to cool before working with, or around them.

Quality service parts are available through your dealer. If dealer parts are not used, the owner must make sure that the parts that are being used are equivalent quality to dealer parts.

The use of inferior parts can adversely affect the quality and reliability of your vehicle which, in turn, can result in property damage, personal injury or death.

Note: To avoid damage to the vehicle's electrical components, disconnect the positive (+) and negative (-) battery cables prior to electric welding. Attach the welder ground cable as close as possible to the part being welded. If it is necessary to weld close to an electrical component, it is recommended that the electronic component be temporarily removed.

Maintenance and Specifications

Follow the periodic lubrication procedures and regular inspection intervals as outlined. Have your dealer or service center inspect your vehicle at least once a year. Remember that regular maintenance and replacement of worn components will usually prevent serious problems from developing later.

Making modifications to various parts, components and systems of the vehicle, such as brake and steering systems can adversely affect the quality, reliability and operation of your vehicle and could result in property damage, personal injury or death. Such modifications must be avoided.

The lubrication intervals present a good opportunity to inspect the vehicle. It is suggested that the various points listed herein be checked at the lubrication or other recommended intervals.

Failure to properly perform maintenance and servicing procedures could result in vehicle damage, personal injury or death.

If the owner/operator of the vehicle is a skilled technician and intends on performing the vehicle maintenance and service, he is strongly urged to purchase a service manual.

Take care when performing any maintenance, system check or service on your vehicle. Some of the materials may also be hazardous if used, serviced or handled improperly and could result in property damage, personal injury or death.

Air conditioning system checks

Have your air conditioning system checked each spring. The refrigerant charge, cleanliness of the condenser-evaporator cores and belt condition are essential to air conditioning performance.

When the air conditioning system is being used daily, remove the fresh air filter (if equipped) once each season and check for dirt, lint, etc. Replace the filter if necessary. Vehicles operating in unusually dusty conditions may require inspecting and replacing the fresh air filter more often.

Front axle - general service information

Maintaining the front axle alignment to specifications is very important and should only be performed by a qualified technician. Toe-in adjustment is particularly important with radial tires.

Check to make sure that the axle mounting U-bolt nuts, attaching or mounting bolts and nuts are securely tightened. Regularly check front axle for damage, binding, worn parts and adequate lubrication.

At regular intervals, or during other scheduled maintenance, (tire rotation/service, wheel bearing service, alignment, etc.) the kingpins should be checked for excessive wear. Refer to the service manual for proper procedures.

Toe-in setting - general inspection

Inspecting steer axle tires in the first 3,000–10,000 service miles (4,800–16,000 service km) will generally show if tires are wearing normally.

Rapid outside shoulder wear on both tires indicates too much toe-in. Rapid inside shoulder wear on both tires indicates too much toe-out. In P&D-type service, left-to-right steer tire tread life differentials up to 40% can be observed depending on routes and other variables.

Follow the tire manufacturer's recommended cold inflation pressure for the tire size, load range (ply rating) and steer axle loading typical for their operation (each steer axle tire will equal ½ steer axle loading).

Special applications may warrant a setting based on past experience with the type of tire operating loads and conditions. Radial tires are more sensitive to toe-in setting than bias ply tires. While not insensitive to vehicle alignment, fine tuning school bus alignment to line-haul truck standards will not drastically improve tire tread life.

It is essential that correct toe-in and tire pressure be maintained for optimum tire wear.

Rear axle - general inspection

Check to make sure that the axle mounting U-bolts, attaching or mounting bolts and nuts are securely tightened. Refer to *U-bolt nut torque* in this chapter. Regularly check the rear axle for damaged, binding or worn parts.

NoSpin Detroit Locker positive locking differential

Vehicles equipped with this type differential have the operator's manual supplied with the vehicle. Refer to this manual for maintenance checks.

Brake system - general inspection

Your vehicle is equipped with non-asbestos brake linings. However, exposure to excessive amounts of brake material (whether asbestos or non-asbestos, fiberglass, mineral wool, aramid or carbon) may be a potentially serious health hazard.

Note: Persons handling brake linings should follow all precautions listed below:

1. Always wear a respirator approved by the National Institute of Occupational Studies of Health (NIOSH) or Mine Safety and Appliance (MSA) during all brake service procedures. Wear the respirator from removal of the wheels through assembly.
2. **Never** use compressed air or dry brushing to clean brake parts or assemblies.
3. Clean brake parts and assemblies in open air. During assembly, carefully place all parts on the floor to avoid getting dust in the air. Use an industrial vacuum cleaner with a HEPA filter system to clean dust from the brake drums, backing plates and other brake parts. After using the vacuum, remove any remaining dust with a rag soaked in water and wrung until nearly dry.
4. **Never** use compressed air or dry sweeping to clean the work area. Use an industrial vacuum cleaner with a HEPA filter system and rags soaked in water until wrung until nearly dry. Dispose of used rags with care to avoid getting dust in the air. Use an approved respirator when emptying vacuum cleaners and handling used rags.
5. **Worker clean-up:** Wash your hands before eating, drinking or smoking. Vacuum your work clothes after use and then launder them separately, without shaking them, to prevent fiber dust getting into the air.

Air brakes - inspection and adjustment

A regular schedule for periodic cleaning, lubrication, adjustment and inspection should be established based on the type of vehicle operation. It is difficult to predetermine an exact maintenance interval (time or mileage), since vehicles will be used in a wide variety of applications and conditions. If you are uncertain of the proper schedule and procedures for your vehicle, contact your dealer.

Periodic checking of push rod travel or brake adjustment is essential for effective braking. Push rod travel should be checked every service interval to determine if adjustment is necessary. Brake chamber push rods on original equipment chambers now incorporate a stroke indicator to aid in adjustment checks; an orange paint marker near the base of the push rod. If the push rod is clean and the brakes require adjustment, the orange marker can be seen protruding from the chamber when the brakes are applied.

Do not manually adjust the automatic slack adjusters to correct excessive pushrod stroke as it may result in reduced brake effectiveness and a vehicle crash. Excessive pushrod stroke indicates that a problem exists with the automatic adjuster, with the installation of the adjuster, or with foundation brake components that manual adjustment will not remedy. Seek service from a qualified facility for excessive pushrod stroke.

Inspect the brake lining every maintenance interval. When brake lining or blocks are worn to within 1/16 inch (1.6 mm) of rivets, brake lining must be replaced. This inspection or adjustment should only be performed by a qualified technician and must be in accordance with instructions provided by the service manual.

Do not back off or disconnect the front brakes so that they are less effective, letting the rear brakes do all the stopping of the vehicle. Do not overlook the brakes on the trailer, either. Brake condition on the trailer is just as important as the tractor. Proper brake balance on trucks and tractor-trailers is essential for effective braking.

Once a year, the entire brake system must be inspected. Check the following:

- Any rubber as it may deteriorate whenever used. Rubber brake components should be inspected by a qualified technician and replaced as necessary. Replacement intervals vary according to the severity and length of vehicle service.
- Condition of brake drums, brake chambers and slack adjusters.
- System for air leaks.
- Hose or pipes for rust, damage and deterioration.
- Operation of service and parking brakes.

Some parts such as air brake chamber diaphragm, air compressor and air cleaner should be inspected periodically and replaced if considered unserviceable.

Air brakes - air dryer

Performance of desiccant or after-cooler type air dryers is dependent on climatic conditions in which your vehicle is operating. Maintenance schedules must be established for each specific operation.

The use of an air dryer on a vehicle does not eliminate the need to periodically drain the air reservoirs.

Air brakes - desiccant air dryer

Inspect for moisture in the air system by opening reservoirs, drain cocks or valves and checking for presence of water. The presence of small amounts of water due to condensation is normal and should not be considered as an indication that the dryer is not functioning properly.

The desiccant cartridge should be replaced or rebuilt when it has been determined that the desiccant is contaminated and does not have adequate water absorption capacity. The desiccant change interval may vary; it is generally recommended that the desiccant be replaced every 12 months (yearly). If experience has shown that extended or shortened life has resulted for a particular installation, then the yearly interval can be increased or decreased accordingly.

Hydraulic brakes - inspection and adjustment

A regular schedule for periodic cleaning, lubrication, adjustment and inspection should be established based on the type of vehicle operation. It is difficult to predetermine an exact maintenance interval (time or mileage), since vehicles will be used in a wide variety of applications and conditions. If you are uncertain of the proper schedule and procedures for your vehicle, contact your dealer.

Inspect the brake lining every maintenance interval. Establish inspection intervals that provide for lining replacement before damage to the disc occurs. Excessive lining wear may expose the backing plate to the disc causing scoring of the disc faces.

This inspection should be performed by a qualified technician and must be in accordance with instructions provided by the service manual.

Note: Hydraulic brake system are power assisted. Braking capabilities will be greatly reduced without engine assist.

Hydraulic brakes - fluid level

Fluid level should be at the bottom edge of the ring on each reservoir fill port. Do not fill the master cylinder to the top of the reservoir.

Note: If brake fluid requires attention to maintain a proper master cylinder level, this is an indication of either severe operation (pad wear) or fluid system leakage. A more frequent and thorough brake inspection will be required.

Hydraulic brakes - fluid precautions

The HydroMax brake system consists of two completely separate hydraulic systems operating with two different and incompatible fluids;

power steering fluid and hydraulic brake fluid. Failure to observe precautions preventing the contamination of either system with fluid from the other will result in swelling and deterioration of rubber parts leading to reduced brake performance and eventual brake failure.

To avoid fluid contamination, the following should always be observed:

1. Use only fluids specified (or equivalent) and properly identified.
2. Add fluids only to the following locations:

- Power steering fluid to the power steering fluid pump reservoir
- Brake fluid to the brake master cylinder

Hydraulic brakes - brake lines, hoses and fittings

Inspect these components every 4,000 miles (6,000 km).

- Check lines for kinks, dents, corrosion or rupture.
- Check hoses for abrasions, kinks, soft spots or rupture, collapse, cracks, twists or loose frame supports. When replacing a hose, be sure there is adequate clearance to the hose to avoid an abrasion to the new hose.
- Examine all connections for leaks.
- Repair or replace brake line tubes, hoses or fittings as required.

Driveline parking brake

Parking brake adjustment should only be performed by a qualified technician, and in accordance with the instructions in the service manual.

Use wheel chocks and exercise caution when inspecting under the vehicle. A vehicle roll-away could result in property damage, personal injury or death.

Catalytic converter

If your diesel engine is equipped with a catalytic converter, it is important to review the maintenance schedule to ensure proper functioning of the catalytic converter. Also, take precautions not to damage the catalytic converter when servicing your engine or storing your vehicle.

Note: If your vehicle is equipped with a catalytic converter/muffler, **do not** blend waste oil with Diesel fuel. Operate only on low sulfur (less than 500 parts per million sulfur) diesel fuel with a cetane value of 45 or higher.

Note: If your vehicle is equipped with a vertical exhaust pipe, it is very important to have and maintain a rain cap on the exhaust pipe to prevent water from entering the exhaust system and catalytic converter. Any water entering the catalytic converter may damage the catalyst and affect the function of the converter.

Air induction system

Once each year, perform a complete inspection of the air induction system. In areas where road salt is used, the inspection consists of disassembling the joints of each aluminum component and inspecting for salt build-up, presence of chlorine that can cause aluminum particles to flake off and enter the engine combustion chambers.

If evidence of corrosion is found (usually at the pipe connections), use a wire brush to clean the inside of the pipes and inside the rubber hoses.

If the intake pipes are pitted at the joint ends, use Motorcraft Silicone Gasket and Sealant TA-30 to seal the joints. Be certain that no excess material is on the inside of the pipes that can be pulled into the engine. If the service condition of the pipes, hoses or clamps is questionable, replace the defective part(s).

Be sure that prior to reassembly all dust and debris has been cleaned out of the pipes and couplings with a clean, damp rag.

When performing maintenance to any turbocharged engine with engine air inlet piping disconnected, keep loose clothing, jewelry and long hair away from the engine air inlet piping. A turbocharger compressor air inlet protective shield should be installed over the turbocharger air inlet to reduce the risk of personal injury or death.

Cummins B and Caterpillar engines

Refer to the respective engine operator manual for air filter replacement procedure.

Steering - general inspection

- Ask your service technician to examine the steering mechanism. Only minor adjustments may be necessary.
- Check tie rod, drag link end clamp bolts and ball joints. They must be tight.
- Check for installation and spread of cotter pins and tightness of nuts at both ends of the tie rod and drag link.

- Check that pitman arm (steering arm at steering gear) mounting is tight and locked. Check system for leaks or hose chafing. Repair at once.
- Maintain proper steering gear and power steering pump lubricant levels.
- Regularly inspect steering column joint bolts and steering linkage, particularly for body-to-chassis clearance.

Note: Have any steering problems corrected at once by a qualified service technician.

Failure to maintain the steering system in proper condition can cause reduced steering ability resulting in property damage, personal injury or death.

Tightening steering column joint bolts

As a good maintenance practice, it is recommended that steering column joint bolts be checked for tightness every 60,000 miles (96,000 km) or annually, whichever occurs first. DO NOT OVERTIGHTEN.

Power steering

Whenever the power steering's hydraulic system has been drained and refilled for any reason, air must be bled from the system before returning the vehicle to service. Failure to properly bleed the hydraulic system can result in degradation of power system performance.

Consult your dealer who is aware of the proper procedures for filling and bleeding the system.

OPENING THE HOOD

The hood and fenders are held in position by a latch located on each fender.

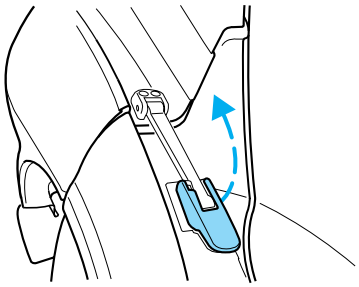
The parking brake must be fully set before opening the hood or possible personal injury may occur.

To reduce the risk of the possibility of personal injury, never stand beneath the hood when it is being raised or lowered.

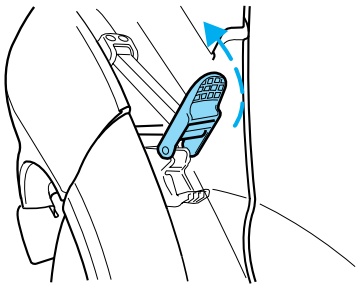
If you must leave the engine running while checking under the hood, do not allow any loose clothing, jewelry, hair or other items to get near moving engine components or possible personal injury may occur.

To open the hood:

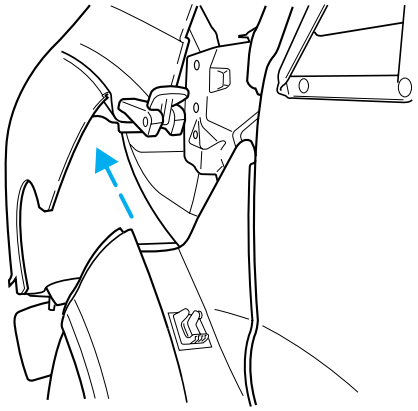
1. Set the parking brake, shift into N (Neutral) (automatic transmission) or 1 (First) (manual transmission) and turn the engine off.
2. Lift upward on the bottom of each latch.



3. Pull the bottom of each latch away from the fender.



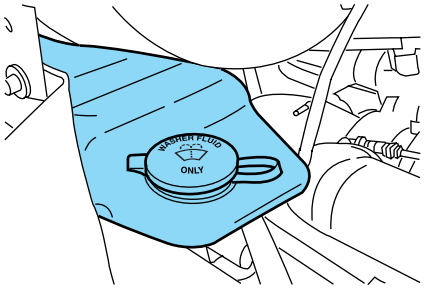
4. Tilt the hood forward until stopped by the retaining cables.



To lower the hood:

1. Push the hood rearward at the top center of the hood above the grille until closed.
2. Engage the latch on each fender.
3. Push down on the bottom of each latch until locked.

WINDSHIELD WASHER FLUID



The reservoir capacity is 4.0 quarts (3.8L); use windshield washer fluid that meets the Ford specification listed. Refer to *Lubricant specifications* in this chapter.

Inspect the fluid level in the washer reservoir when insufficient fluid is sprayed.

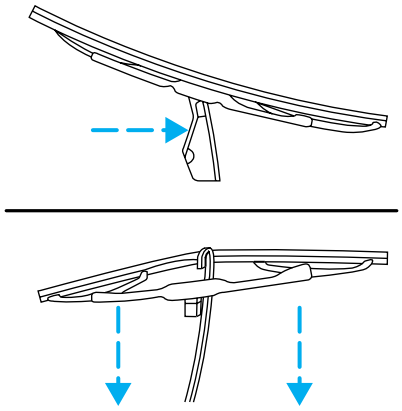
State or local regulations on volatile organic compounds may restrict the use of methanol, a common windshield washer antifreeze additive. Washer fluids containing non-methanol antifreeze agents should be used only if they provide cold weather protection without damaging the vehicle's paint finish, wiper blades or washer system.

Do not put engine coolant in the washer fluid reservoir. Engine coolant can severely reduce visibility if sprayed on the windshield.

CHANGING THE WIPER BLADES

To replace the wiper blades:

1. Pull the wiper arm away from the windshield and lock into the service position.
2. Turn the blade at an angle from the wiper arm. Push the lock pin manually to release the blade and pull the wiper blade down toward the windshield to remove it from the arm.
3. Attach the new wiper to the wiper arm and press it into place until a click is heard.



ENGINE OIL

Checking the engine oil

Refer to the *Scheduled Maintenance Guide* chapter for the appropriate intervals for checking the engine oil. Check the engine oil level consistently and accurately.

If your vehicle is equipped with a Cummins or Caterpillar engine, refer to the appropriate engine operator's manual for information on the engine oil.

If your vehicle is equipped with the 6.0L Power Stroke engine, perform the following procedure:

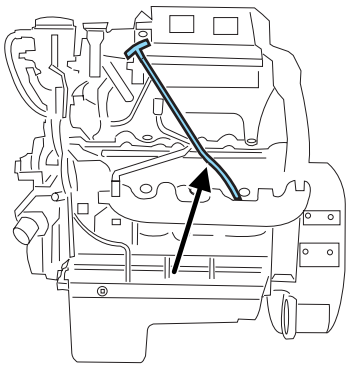
1. Start the engine and let it run until it reaches normal operating temperature (the engine coolant temperature gauge indicator will be near the center of the normal area between H and C).
2. Park the vehicle on level ground.
3. Set the parking brake and shift into N (Neutral) (automatic transmission) or 1 (First) (manual transmission).

4. Turn off the engine and wait a few minutes for the oil to drain completely into the oil pan.

5. Open the hood.

6. Locate and carefully remove the engine oil dipstick.

7. Wipe the dipstick clean. Insert the dipstick fully, then remove it again.



- If the oil level is **between ADD and OPERATING RANGE,** the oil level is acceptable. **DO NOT ADD OIL.**
- 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).
- Oil levels above OPERATING RANGE may cause engine damage. Some oil must be removed from the engine by a qualified service technician.

8. Put the dipstick back into the engine and ensure it is fully seated.

Engine oil and filter recommendations

If your vehicle is equipped with a Cummins or Caterpillar engine, refer to the appropriate engine operator's manual for information on the engine oil.

If your vehicle is equipped with the 6.0L Power Stroke engine, see the following information.

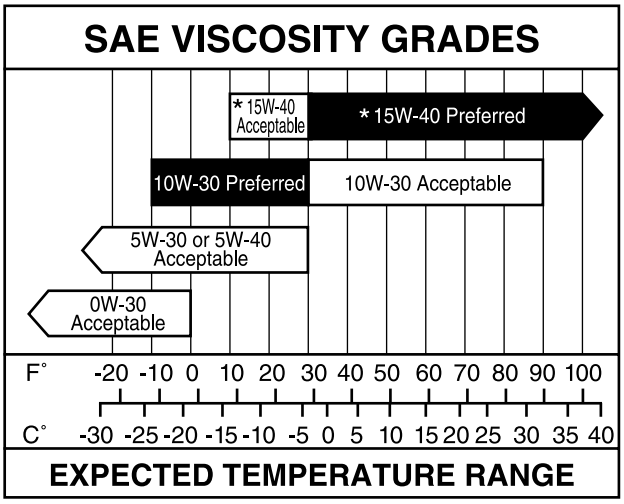
To help achieve proper engine performance and durability, it is important that you:

- Use only engine lubricating oils and oil filters of the proper quality.
- Change the engine oil and filter **no later** than the recommended service interval. Refer to the *Scheduled Maintenance Guide* chapter for the appropriate intervals for changing the engine oil and filter.
- Change your engine oil and filter more frequently if your vehicle operation includes extended periods of idling or low-speed operation, driving for a long time in cold temperatures or short driving distances.

Diesel engines require specially formulated oil to resist contamination. Proper quality oils also provide maximum efficiency of the crankcase ventilation 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 PLUS, CI-4/SL or DHD-1. If CI-4 PLUS oil is not available, CH-4 is acceptable.

Diesel engine oils with improved fuel economy properties (energy conserving) are currently available. If you use an energy conserving oil, be sure it meets Ford specification WSS-M2C171–D or API service category designation CI-4/SL and is of the proper viscosity grade for the temperature range in which you expect to operate your vehicle. 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.

Using the chart, determine which SAE viscosity grade best suits the temperature range in which you expect to operate your vehicle. The use of the correct oil viscosity grade for diesel engines is important for satisfactory engine operation.

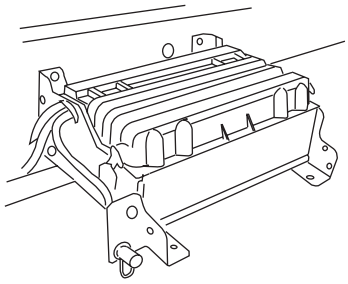
A symbol has been developed by the American Petroleum Institute (API) to help you select the proper engine oil. It will be included on the oil container you purchase. The top section of the symbol shows the oil performance by the API designation. This should match the owner guide recommendation. The center section will show the SAE viscosity grade. The lower section will state energy conserving if the oil has proven fuel saving capabilities.

Use a Ford engine oil filter, part number FL-1995 or equivalent. This filter protects your engine by filtering harmful, abrasive or sludge particles.

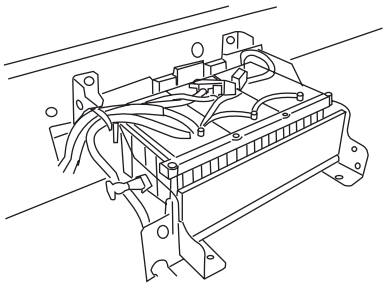
BATTERY

Your vehicle is equipped with two or three maintenance-free batteries which are mounted in a covered tray and located on the left frame rail. The covered battery tray, depending upon application, may also have one or two steps attached.

- Covered battery tray shown. Battery tray with steps similar. The two rubber straps on top of the cover must be pulled up and moved to the side of the battery in order to remove the lid.



- Battery tray with cover removed.



Maintenance-free batteries do not normally require adding additional water.

Make sure the battery cover/shield is reinstalled after the battery has been cleaned or replaced.

For longer, trouble-free operation, keep the top of the batteries clean and dry. Also, make certain the battery cables are always tightly fastened to the battery terminals.

If you see any corrosion on the battery or terminals, remove the cables from the terminals and clean with a wire brush. You can neutralize the acid with a solution of baking soda and water.

It is recommended that the negative battery cable terminal be disconnected from the battery if you plan to store your vehicle for an extended period of time. This will minimize the discharge of your battery during storage.

If the engine cranks but does not start, remove the battery box cover and check the 40A inline fuse located on the battery cable above the battery.

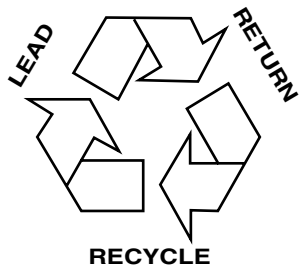
Batteries normally produce explosive gases which can cause personal injury. Therefore, do not allow flames, sparks or lighted substances to come near the battery. When working near the battery, always shield your face and protect your eyes. Always provide proper ventilation.

When lifting a plastic-cased battery, excessive pressure on the end walls could cause acid to flow through the vent caps, resulting in personal injury and/or damage to the vehicle or battery. Lift the battery with a battery carrier or with your hands on opposite corners.

Keep batteries out of reach of children. Batteries contain sulfuric acid. Avoid contact with skin, eyes or clothing. Shield your eyes when working near the battery to protect against possible splashing of acid solution. In case of acid contact with skin or eyes, flush immediately with water for a minimum of 15 minutes and get prompt medical attention. If acid is swallowed, call a physician immediately.

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

Always dispose of automotive batteries in a responsible manner. Follow your local authorized standards for disposal. Call your local authorized recycling center to find out more about recycling automotive batteries.



ENGINE COOLANT

If your vehicle is equipped with a Caterpillar or Cummins engine, refer to your engine operator's manual for engine coolant check and adding instructions as well as fluid specifications and capacities.

Checking engine coolant

The concentration and level of engine coolant should be checked twice a year to ensure proper glycol/ water concentrations. The coolant concentration should be maintained at 50/50 coolant and distilled water, which equates to a freeze point of -34°F (-36°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 mark in the coolant reservoir. If the level falls below, add coolant per the instructions in the *Adding engine coolant* section.

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°F (-36°C).**
- **Boiling protection up to 265°F (129°C).**
- **Protection against rust and other forms of corrosion.**
- **Enables calibrated gauges to work properly.**

The engine coolant should be at the full mark as shown on the engine coolant reservoir (depending upon application).

Refer to the *scheduled maintenance information* for service interval schedules.

Be sure to read and understand *Precautions when servicing your vehicle* in this chapter.

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 chapter.

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 - 6.0L Power Stroke

Note: The engine coolant reservoir requires air space for expansion volume. The proper fill level is identified on the reservoir; do not overfill the reservoir.

Note: If the coolant should get extremely low and the engine very hot, let the engine cool for approximately 15 minutes before adding coolant. After the engine has cooled, start the engine and add coolant slowly. Adding coolant to a hot engine may crack the cylinder head or crankcase. Never use only water to fill the cooling system.

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.

The cooling system in your vehicle is filled with yellow-colored Motorcraft Premium Gold Engine Coolant meeting Ford Specification WSS-M97B51–A1.

Note: Add the coolant type originally equipped in your vehicle.

- **Add Motorcraft Premium Gold Engine Coolant, VC-7–B (yellow-colored).**

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 extended life coolants such as Motorcraft Specialty Orange Engine Coolant, VC-3 (U.S.) or CXC-209 (Canada), meeting Ford specification WSS-M97B44–D, with the factory-fill coolant, Motorcraft Premium Gold Coolant meeting Ford Specification WSS-M97B51–A.** Mixing Motorcraft Specialty Orange Engine Coolant or any equivalent extended life engine coolant with this factory-fill 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 or 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.
- **Do not mix with recycled coolant unless from a Ford-approved recycling process (see** *Use of Recycled Engine Coolant* **section).**


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 (an opaque plastic bottle). Slowly turn cap counterclockwise 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). If you removed the radiator cap in an overflow system, fill the radiator until the coolant is visible and radiator is almost full.

6. Replace the cap. Turn until tightly installed to prevent coolant loss.

After any coolant has been added, check the coolant concentration (refer to *Severe climates* later in this chapter). If the concentration is not 50/50 (protection to –34°F [–36°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 (1.0L) of engine coolant per month, have your dealer check the engine cooling system for leaks. 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.

Engine coolant capacities and part numbers

For cooling system capacities, refer to *Refill capacities* in this chapter. For coolant part numbers, refer to *Lubricant specifications* in this chapter.

Severe climates

If you drive in extremely cold climates (less than –34°F [–36°C]):

- **It may be necessary to increase the coolant concentration above 50%.**
- **NEVER increase the coolant concentration above 60%.**
- **Engine coolant concentrations above 60% will decrease the overheat protection characteristics of the engine coolant and may cause engine damage.**
- **If available, 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%.**
- **Engine coolant concentrations below 40% will decrease the corrosion protection characteristics of the engine coolant and may cause engine damage.**
- **Engine coolant concentrations below 40% will decrease the freeze protection characteristics of the engine coolant and may cause engine damage.**
- **If available, 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.

Fan clutches

Your vehicle's cooling system is equipped with a viscous fan clutch.

- The fan clutch helps control cooling, increase performance, improve fuel economy and reduce noise.
- The fan clutch is controlled by bimetallic spring sensors. Do not tamper with these sensors as this may change their calibration or keep the fan clutch from operating at all.

Stay clear of the fan/fan area while the engine is running or possible personal injury may occur.

FUEL FILTER/WATER SEPARATOR

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

The fuel filter/water separator removes any contaminated particles and/or water from the fuel before the fuel enters the engine.

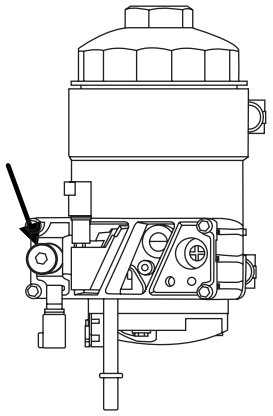
The fuel filter/water separator should be drained as recommended in the *Scheduled Maintenance Guide* chapter.

Draining the fuel filter/water separator – 6.0L Power Stroke engine

Water should be drained whenever the warning light comes on or every 5,000 miles (8,000 km).

WATER IN FUEL

1. Stop the vehicle and **shut off** the engine.
2. Locate the drain valve and place a suitable container at the end of the drain tube.



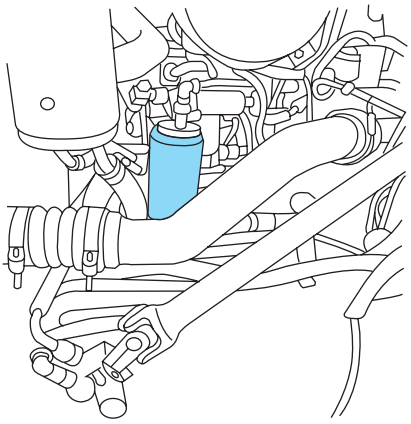
3. Turn the drain valve to the drain position and allow water to drain out.
Note: Drain until the water/fuel mixture becomes only fuel.
4. Turn the drain valve to the closed position.
5. Restart the engine and check WATER IN FUEL indicator light; it should not be illuminated. If it continues to illuminate, have the fuel system checked and repaired.

Draining the fuel filter/water separator - Cummins B engine

Refer to your engine operator's manual for service procedures.

Draining the fuel filter/water separator - Caterpillar engine

1. With the engine off, open the drain valve located at the bottom of the fuel filter/water separator by turning it counterclockwise.

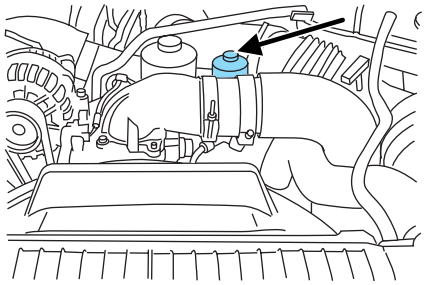


2. Drain the filter until clear fuel is visible.
3. Turn the drain valve clockwise to close the valve. Do not overtighten the drain valve as this could cause damage to the fuel filter/water separator.

Fuel filter replacement - 6.0L Power Stroke engine

Removal

1. Remove the fuel filter cap by turning counterclockwise.
2. Remove and discard the old fuel filter element.
3. Carefully clean the mating surfaces.



Installation

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

1. Install new fuel filter 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.

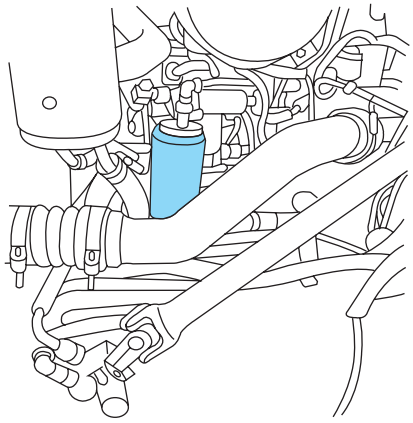
Using a fuel which has more than average impurities may require the fuel filter to be replaced more frequently than the service interval specifies.

Fuel filter replacement - Cummins B engine

Refer to your engine operator's manual for service intervals and procedures.

Fuel filter replacement - Caterpillar engine

The fuel filter/water separator is located on the left side of the engine. Replace the fuel filter/water separator as recommended in the *Scheduled Maintenance Guide* chapter, or sooner if it becomes plugged. Vehicles operated on fuel with more than average impurities may require replacement of the fuel filter more frequently. The spin-on filter has a water drain valve built into the bottom of the filter canister.



Removal

1. Using an oil filter wrench, remove the filter.
2. Carefully clean the mating surfaces.

Installation

1. Fill the filter with clean, fresh diesel fuel.
2. Coat the filter seal with clean, fresh diesel fuel.
3. Hand-tighten the filter until it seats firmly against the mount, then tighten (by hand) an additional ⅓ to ½ turn.
4. Start the engine and check for fuel leaks.

FUEL INFORMATION

Important safety precautions

Do not overfill the fuel tank. The pressure in an overfilled tank may cause leakage and lead to fuel spray and fire.

The fuel system may be under pressure. If the fuel cap is venting vapor or if you hear a hissing sound, wait until it stops before completely removing the cap.

Automotive fuels can cause serious injury or death if misused or mishandled.

Observe the following guidelines when handling fuel:

- Extinguish all smoking materials and any open flames before fueling your vehicle.
- Always turn off the vehicle before fueling.
- Automotive fuels can be harmful or fatal if swallowed. If fuel is swallowed, call a physician immediately, even if no symptoms are immediately apparent. The toxic effects of fuel may not be visible for hours.
- Avoid inhaling fuel vapors. Inhaling too much fuel vapor of any kind can lead to eye and respiratory tract irritation. In severe cases, excessive or prolonged breathing of fuel vapor can cause serious illness and permanent injury.
- Avoid getting fuel liquid in your eyes. If fuel is splashed in the eyes, remove contact lenses (if worn), flush with water for 15 minutes and seek medical attention. Failure to seek proper medical attention could lead to permanent injury.
- Fuels can also be harmful if absorbed through the skin. If fuel is splashed on the skin and/or clothing, promptly remove contaminated clothing and wash skin thoroughly with soap and water. Repeated or prolonged skin contact with fuel liquid or vapor causes skin irritation.

If you must replace the fuel filler cap, replace it with a genuine Ford or Motorcraft part. The customer warranty may be void for any damage to the fuel tank or fuel system if a genuine Ford or Motorcraft fuel filler cap is not used.

If you do not use the proper fuel filler cap, excessive pressure or vacuum in the fuel tank may damage the fuel system or cause the fuel cap to disengage in a collision, which may result in possible personal injury.

Choosing the right fuel

The engine is designed to use low sulfur number 1D or 2D diesel fuel only. At temperatures below –20°F (–7°C), number 1D or winter blend number 2D fuel is recommended. (See *Cold weather operation* in the *Driving* section.) 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.

Use low sulfur (less than 0.05% by weight) fuel as required by the EPA for emission compliance.

Do not mix diesel fuel with gasoline, gasohol or alcohol. This could cause an explosion resulting in personal injury.

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

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 ASTM D 975 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 meet the World-wide Fuel Charter should be used when available. Ask your fuel supplier about fuel that meet the World-Wide Fuel Charter.

Running out of fuel

Avoid running out of fuel as this will allow air to enter the fuel system, which will make restarting the vehicle difficult.

If you have run out of fuel:

- **If your vehicle is equipped with dual fuel tanks,** add at least 4–5 gallons (15–19 liters) of fuel to each tank before attempting to restart the engine.
- **If your vehicle is equipped with a Caterpillar engine,** the fuel system must be primed before attempting to restart the engine. Refer to the engine operator's manual for instructions on priming the engine.
- **Use caution not to overheat and damage the starter** by cranking the engine for an excessive period of time. You may need to crank the engine for a longer time than normal. If the engine fails to start in 30 seconds, turn the ignition to the OFF position and wait for two minutes before cranking the engine again.
- Any remaining trapped air will self-purge from the fuel system once the engine starts running.
- The engine may run rough and produce white smoke while air is in the fuel system. This is normal and should stop after a short period of time.

FUEL CONSUMPTION IMPROVEMENT MEASURES

There are two important factors you can control to improve fuel economy: the mechanical condition of your vehicle and how you drive it.

A properly maintained vehicle will deliver better performance than a neglected vehicle. Always follow your maintenance schedule to keep your vehicle in top operating condition.

Also, your driving habits have a significant influence on use of fuel. By following these suggestions, you can stretch your fuel use:

- Avoid changes in speed as much as possible.
- Anticipate changing traffic conditions. Sudden stops and fast acceleration waste fuel.

- Avoid extensive idling.
- Do not drive with your foot resting on the brake pedal.

Essentials of good fuel economy

Measuring techniques

Your best source of information about actual fuel economy is you, the driver. You must gather information as accurately and consistently as possible. Fuel expense, frequency of fill-ups or fuel gauge readings are NOT accurate as a measure of fuel economy. We do not recommend taking fuel economy measurements during the first 1,000 miles (1,600 km) of driving (engine break-in period). You will get a more accurate measurement after 2,000–3,000 miles (3,000–5,000 km).

The advertised fuel capacity of the fuel tank(s) on your vehicle is equal to the rated refill capacity of the fuel tank(s) as listed in *Fuel tanks* in this chapter. The advertised capacity is the amount of the Indicated Capacity and the Empty Reserve combined. Indicated Capacity is the difference in the amount of fuel in a full tank and a tank when the fuel gauge indicates empty. Empty Reserve is the small amount of usable fuel remaining in the fuel tank after the fuel gauge indicates empty.

The amount of Empty Reserve varies and should not be relied upon to increase driving range. When refueling your vehicle after the fuel gauge indicates empty, you might not be able to refuel the full amount of the advertised capacity of the fuel tank due to the empty reserve still present in the tank.

Filling the tank

For consistent results:

- Use the same fill rate setting (low - medium - high) each time during filling.
- Allow three automatic click-offs when filling.
- Always use fuel of a known quality, preferably a national brand.
- Have the vehicle loading and distribution the same every time.
- When refueling a vehicle equipped with dual fuel tanks, if the two tanks are not filled equally, the fuel gauge reading may fluctuate slightly until the fuel level between the two tanks balance out and become equal.

Your results will be most accurate if your filling method is consistent.

Note: For vehicles equipped with dual fuel tanks, engine performance may degrade if fuel is not added to both tanks when refueling.

Calculating fuel economy

1. Fill the fuel tank(s) completely and record the initial odometer reading (in miles or kilometers).

2. Each time you fill the tank(s), record the amount of fuel added (in gallons or liters).

3. After at least three to five tank fill-ups, fill the fuel tank(s) and record the current odometer reading.

4. Subtract your initial odometer reading from the current odometer reading.

5. Follow one of the simple calculations in order to determine fuel economy:

- Divide total miles traveled by total gallons used.
- Multiply liters used by 100, then divide by total kilometers traveled.

Keep a record for at least one month and record the type of driving (city or highway). This will provide an accurate estimate of the vehicle's fuel economy under current driving conditions. Additionally, keeping records during summer and winter will show how temperature impacts fuel economy. In general, lower temperatures give lower fuel economy.

Driving style - good driving and fuel economy habits

Give consideration to the lists that follow and you may be able to change a number of variables and improve your fuel economy.

Habits

- Smooth, moderate operation can yield up to 10% savings in fuel.
- Steady speeds without stopping will usually give the best fuel economy.
- Anticipate stopping; slowing down may eliminate the need to stop.
- Sudden or hard accelerations may reduce fuel economy.
- Slow down gradually.
- Driving at reasonable speeds (traveling at 55 mph [88 km/h] uses 15% less fuel than traveling at 65 mph [105 km/h]).
- Using the air conditioner or defroster may reduce fuel economy.
- Resting your foot on the brake pedal while driving may reduce fuel economy.

Conditions

- Carrying unnecessary weight may reduce fuel economy.

- Fuel economy may decrease with lower temperatures during the first 8–10 miles (12–16 km) of driving.
- Flat terrain driving improves fuel economy over hilly roads.
- Transmissions give their best fuel economy when operated in the top cruise gear and with steady pressure on the accelerator.
- Close windows for highway driving.

NOISE EMISSIONS – EXTERIOR

In order to comply with the federal exterior noise regulations, your vehicle may be equipped with noise emission items. Depending on the vehicle configuration, it may have all or some of the following items:

Air Intake System

- **Air Cleaner:** should be inspected and its location should not be altered. Do not alter inlet and outlet piping.

Body

- **Wheel Well:** splash shields, cab shields and under-hood insulation should be inspected for deterioration, dislocation, and orientation.

Cooling System

- Check the fan for damage to blades; replace, if damaged, with the recommended parts. Inspect for fan to shroud interference, and any damage to shroud such as cracks and holes.
- The fan ratio should not be changed and the fan spacer dimensions and positions should not be altered.
- Inspect the fan clutch for proper operation, make sure that the fan is disengaged when cooling of the engine is not required.
- Check for proper operation of radiator shutters, if equipped. The shutters should be open during normal operating temperatures.

Engine and Driveline System

- **Transmission Enclosure:** inspect for cracks, holes, and tears. Clean any deposits such as oil, dirt, and stones.
- Engine valve covers and block covers are made to damp out engine mechanical noise and, if needed, should be replaced with recommended parts. Check for mechanical isolations.

Exhaust System

- Inspect the exhaust system for leaks at various joint connections and tighten the clamps.

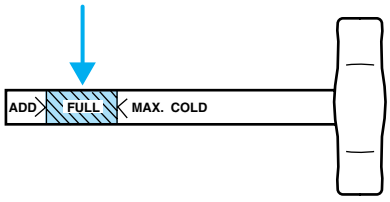
- Do a visual inspection for cracks or holes in the muffler and tail pipe.
- Always use the recommended parts when items need to be replaced.
- The tail pipe elbow or offset tail pipe orientation must not be changed from the standard position as originally received.
- To avoid abnormal changes in vehicle sound levels, it is necessary for the owner to perform inspections and necessary maintenance at the intervals shown in the *Scheduled Maintenance Guide* chapter.

POWER STEERING FLUID

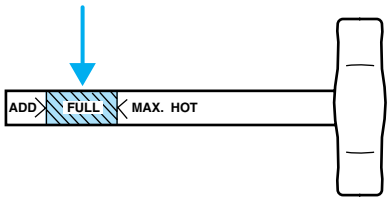
Check the power steering fluid level using the following procedure. If adding fluid is necessary, refer to *Lubricant Specifications* in this chapter for the proper fluid type. Refer to the *Scheduled Maintenance Guide* chapter for the recommended service intervals.

1. Set the parking brake, shift into N (Neutral) (automatic transmission) or 1 (First) (manual transmission) and turn the engine off.
2. Open the hood.
3. Clean the top of the power steering fluid reservoir.
4. Remove the dipstick from the reservoir and wipe the dipstick clean.
5. Reinstall the dipstick. Remove it again and check the fluid level.

- If the fluid temperature is at approximately 68°-120°F (20°-49°C) (**fluid cool or warm to the touch**), check the COLD side of the dipstick. The fluid level should be within the FULL range



- If the fluid level is below the ADD line, add fluid in small amounts, continuously checking the level until it reaches the proper level.
- If the fluid temperature is at approximately 176°–230°F (80°-110°C) (**fluid too hot to touch**), check the HOT side of the dipstick. The fluid level should be within the FULL range.



- If the fluid level is below the ADD line, add fluid in small amounts, continuously checking the level until it reaches the proper level.

Note: The fluid level may also be checked by looking at the see-through plastic reservoir. Make sure that the fluid is within the minimum and maximum fluid range as marked on the reservoir.

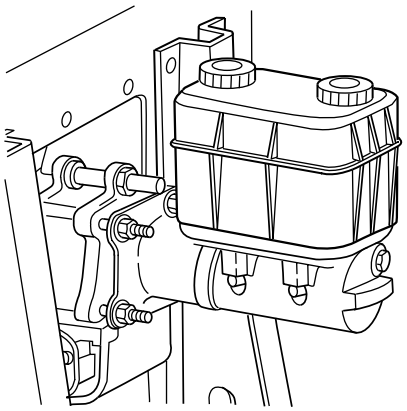
A low fluid level may indicate a leak in the power steering system. Inspect the power steering system and repair the leak. If necessary, see your dealer or a qualified service technician.

To avoid damage to the power steering system, **do not** operate the vehicle with a low power steering fluid level.

Whenever the dipstick is installed, make sure it is properly seated and tightened securely.

BRAKE FLUID

Check and refill the HydroMax brake fluid reservoir using the following procedure. Refer to the *Scheduled Maintenance Guide* chapter for the service interval.



1. Clean the reservoir caps before removal to prevent dirt or water from entering the reservoir.
2. Visually inspect the fluid level; the level should be at the bottom of the fill ports.
3. If necessary, add brake fluid from a clean unopened container until the level reaches the bottom of the fill ports. Do not fill above this line.
4. Use only a DOT 3 brake fluid certified to meet manufacturer specifications. Refer to *Lubricant specifications* in this chapter.

Brake fluid is toxic. If brake fluid contacts the eyes, flush eyes with running water for 15 minutes. Seek medical attention if irritation persists. If taken internally, drink water and induce vomiting. Seek medical attention immediately.

If you use a brake fluid that is not DOT 3, you will cause permanent damage to your brakes.

Do not let the reservoir for the master cylinder run dry. This may cause the brakes to fail.

CLUTCH FLUID/LINKAGE ADJUSTMENTS

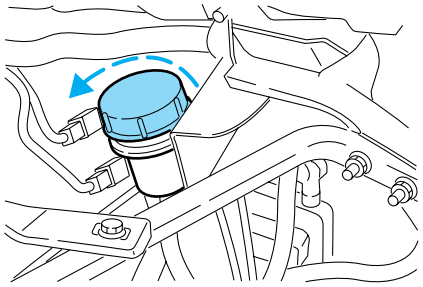
Clutch fluid (if equipped)

Check the clutch fluid level. Refer to the *Scheduled Maintenance Guide* chapter for the service interval schedules.

During normal operation, the fluid level in the clutch reservoir should remain constant. If the fluid level drops, maintain the fluid level at the step in the reservoir.

Use only a DOT 3 brake fluid designed to meet manufacturer specifications. Refer to *Lubricant specifications* in this chapter.

Carefully read cautionary information on product label. For additional information see product Material Safety Data Sheet (MSDS). For 24-hour MEDICAL EMERGENCY INFORMATION on Ford-Motorcraft products call: 1-800-959-3673 (FORD). Failure to follow these instructions may result in personal injury



1. Set the parking brake, shift into 1 (First) and turn the engine off.
2. Open the hood.
3. Clean the reservoir cap before removal to prevent dirt and water from entering the reservoir.
4. Remove cap and rubber diaphragm from reservoir.
5. Add fluid until the level reaches the step in the reservoir.
6. Reinstall rubber diaphragm and cap onto reservoir.

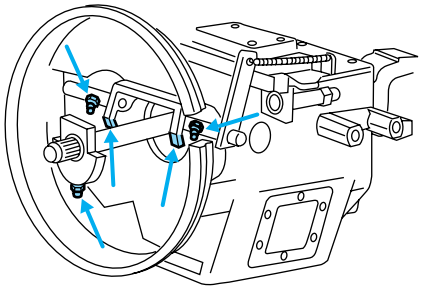
Clutch linkage (if equipped)

Lubricate the clutch linkage using the following procedure. Refer to the *Scheduled Maintenance Guide* chapter for the service interval schedules.

Use a grease which meets manufacturer specifications. Refer to *Lubricant specifications* in this chapter.

1. Set the parking brake, shift into 1 (First) and turn the engine off.
2. Remove the inspection cover from the clutch housing.

- **Transmission and clutch removed for clarity.**



3. With a grease gun, lubricate the clutch release bearing (at one location) and the clutch release shaft (at two locations) using the grease fittings provided.
4. Lubricate clutch release wear pads at the two locations where they contact the clutch release bearing using a brush or similar tool.
5. Install the inspection cover onto the clutch housing.

TRANSMISSION FLUID

Always dispose of used automotive fluids in a responsible manner. Follow your community's standards for disposing of these types of fluids. Call your recycling center to find out about recycling automotive fluids.

Automatic transmission fluid

Refer to your Allison Automatic Transmission Operator's Manual for scheduled intervals for transmission fluid checks and changes. Your transmission does not consume fluid. However, the fluid level should be checked if the transmission is not working properly, i.e., if the transmission slips or shifts slowly or if you notice some sign of fluid leakage.

Automatic transmission fluid expands when warmed. To obtain an accurate fluid check, drive the vehicle until it is warmed up (approximately 20 miles [30 km]). If your vehicle has been operated for an extended period at high speeds, in city traffic or during hot weather, the vehicle should be turned off for about 30 minutes to allow fluid to cool before checking.

1. Drive the vehicle 20 miles (30 km) or until it reaches normal operating temperature.

2. Park the vehicle on a level surface and engage the parking brake.

3. With the parking brake engaged and your foot on the brake pedal, start the engine and move the gearshift lever through all of the gear ranges. Allow sufficient time for each gear to engage.

4. Place the gearshift lever in N (Neutral) or P (Park) and leave the engine running.

5. Remove the dipstick, wiping it clean with a clean, dry lint free rag.

6. Install the dipstick making sure it is fully seated in the filler tube.

7. Remove the dipstick and inspect the fluid level.

If you must add transmission fluid, make sure the correct type of fluid is being used. The type of fluid used is indicated in your Allison Automatic Transmission Operator's Manual.

Fluid levels above the safe range may result in transmission failure; an overfill condition of transmission fluid may cause shift and/or engagement concerns and/or possible damage.

Use of a non-approved automatic transmission fluid may cause internal transmission component damage.

Manual transmission fluid

Refer to the *Scheduled Maintenance Guide* chapter for transmission fluid level checks and fluid change intervals.

Your manual transmission may be filled with an optional synthetic fluid which allows the use of extended service intervals. A tag on the filler plug will identify the use of the synthetic fluid.

Use only fluid that meets manufacturer specifications (refer to *Lubricant specifications* in this chapter.

Use of a non-approved transmission fluid may cause internal transmission component damage.

Check your transmission fluid level using the following procedure:

1. Park the vehicle on level ground.

2. Set the parking brake and shift into 1 (First) and turn the engine off.

3. Clean any dirt from around the filler plug.

4. Remove the filler plug and inspect the fluid level.

5. The fluid level should be up to the bottom of the filler plug opening.

6. If necessary, add enough fluid through the filler plug opening so that the fluid level is at the bottom of the opening.

7. Clean and install the filler plug securely.

Drain and refill your transmission fluid using the following procedure:

1. Drain the transmission while the fluid is warm.
2. Park the vehicle on level ground.
3. Set the parking brake and shift into 1 (First) and turn the engine off.
4. Clean any dirt from around the filler and drain plugs.
5. Remove the filler and drain plugs and drain the fluid into a suitable container. Dispose all used automotive fluids in a responsible manner following your local authorized standards.
6. Clean and install the drain plug securely.
7. Add enough fluid through the filler plug opening so that the fluid level is up to the bottom of the opening.
8. Clean and install the filler plug securely.

CHASSIS-MOUNTED CHARGE AIR COOLER

Inspect charge air cooler daily

With the engine off, visually inspect the charge air cooler core assembly for debris and clogging of external fins. Prior to engine operation, remove any debris blocking the core.

- Turbocharger-to-charge air cooler
- Charge air cooler-to-intake manifold pipe
- Mounting bracket
- Chassis-mounted charge air cooler core

Inspect air intake piping

- Check for accumulation of salt deposits (where applicable). If present, disassemble and clean the complete air intake piping system. If the intake piping is pitted, use Motorcraft Silicone Gasket and Sealant TA-30 to seal joints against leakage.
- Check for loose hoses and clamps.
- Check for ruptured or collapsed hoses.
- Check air cleaner housing for cracks.

ELECTRICAL SYSTEM INSPECTIONS

Periodically inspect electrical connectors on the outside of the cab, on the engine and frame for corrosion and tightness. Exposed terminals such as the fuel sender, cranking motor, alternator and feed-through studs should be cleaned and re-coated with a lubricant sealing grease such as Motorcraft Silicone Brake Caliper Grease and Dielectic Compound XG-3, or equivalent. This should include the ground cable connector for batteries, engine and cab as well as the jump starting stud.

Accessory feed connections

Vehicle electrical systems are complex and often include electronic components such as engine and transmission controls, instrument panels, ABS, etc. While most systems operate on battery voltage (12 volts), some systems can be as high as 90 volts or as low as five volts. Refer to the Electrical Circuit Diagram Manuals, available from your vehicle's manufacturer, to ensure that any additional body lights and accessories are connected to circuits that are both appropriate and not overloaded. No modification should be made to any vehicle control system without first contacting your dealer.

SUSPENSION INSPECTION

Note: Do not adjust air suspension height to any setting other than the specified setting. Altering the height setting will change the driveline angle and may result in unwarrantable component damage, such as transmission component damage.

Verify drive axle air suspension height and height control valve performance at engine lube oil change intervals.

Periodically:

- Check condition of spring leaves for evidence of fatigue, bending or breakage.
- Check condition of suspension mounting brackets and bushings.
- Check that torque rod mounting fasteners are tight.
- Check to be sure the suspension alignment is maintained at all times.
- Check U-bolts after the chassis has been operating under load for 1,000 miles (1,600 km) or six months, whichever comes first, the U-Bolt nuts must be re-torqued. The U-Bolt nuts thereafter must be re-torqued every 36,000 miles (58,000 km). The U-Bolt and nut threads and seats should be cleaned and lubricated to ensure a "like new" condition when re-torquing.

Note: See the *U-Bolt Nut Torque* chart later in this section.

Supporting your vehicle for service

When performing service repairs on your vehicle, first prepare the vehicle by doing the following:

1. Park the vehicle on a level concrete floor.

2. Set the parking brake and block the wheels to prevent the vehicle from moving.

3. Select a jack with a rated capacity sufficient to lift and hold up the vehicle.

4. Raise the vehicle with the jack applied to the axle(s). DO NOT use the bumper as a lifting point.

5. Support the vehicle with floor stands under the axle(s). If the axle or the suspension are being serviced, support the vehicle with floor stands under the frame side-members, preferably between the axles.

Do not use a jack when working under a vehicle. It may give way, causing the vehicle to fall and result in property damage, personal injury or death. Always use floor stands to support the vehicle.

FRAME AND TOW HOOKS

Your vehicles chassis is manufactured with frame rails of either HSLA steel or heat-treated steel. Each must be handled in a specific manner to ensure maximum service life. Before attempting frame repair or modification, consult the service manual or your dealer.

It is important, particularly on vehicles where the tow hooks are used frequently to inspect the front and rear tow hooks for damage or a loose mounting.

U-BOLT NUT TORQUE

U-bolt diameter (nominal) (all spring suspensions)	U-bolt diameter (nominal)	
	Ft. lb.	N•m
IROS Air w/15,500 lb. axles and less	260–300	353–407
IROS Air w/greater than 15,500 lb. axles	370–400	502–542
Hendrickson 23,000 lb. axle	370–400	502–542

Air suspension U-bolt checks and re-torquing procedures

1. Inspect the threads of the U-bolt and nut for rust and debris. Clean the threads if contaminated.

2. Using a torque wrench, determine if any nuts can be turned with a force below the specified torque.

3. Using the lowest discovered torqued nut as a starting point, retighten the nuts using the sequence listed under *Air suspension U-bolt and U-bolt nut installation*.

Air suspension U-bolt and U-bolt nut installation

1. Inspect the threads of the U-bolt and nut for rust and debris. Clean the threads if contaminated.

2. Install the U-bolts and nuts and torque the nuts to 15 ft. lb. (20 N•m), using a diagonal pattern.

3. Re-torque the nuts to 100 ft. lb. (136 N•m), using a diagonal pattern.

4. Re-torque the nuts to 200 ft. lb. (271 N•m), using a diagonal pattern.

5. Re-torque the nuts to 400 ft. lb. (542 N•m), using a diagonal pattern. (For vehicles equipped with 14ACC, 14 ADN and 14ADP axles, do not use Step 6.)

6. Re-torque the nuts to 425 ft. lb (576 N•m), using a diagonal pattern. (For vehicles equipped with 14ACC, 14 ADN and 14ADP axles.)

7. Use the same diagonal pattern with each U-bolt nut re-torque.

Spring U-bolt checks

Check U-bolt nuts and re-torque every 36,000 miles (58,000 km) after initial 1,000 miles (1,600 km) re-torque. The U-bolt and nut threads and seats should be cleaned and lubricated to ensure peak condition when re-torqued.

PROPELLER SHAFT

At the regular lubrication interval, check the universal joints for any evidence of wear or looseness. Should propeller shaft vibrations occur, stop the vehicle immediately to avoid possible hazardous consequences or damage to other components.

REAR AXLE LUBRICANT

Refer to the *Scheduled Maintenance Guide* chapter for rear axle lubricant level checks and lubricant change intervals.

Your rear axle may be filled with an optional synthetic lubricant which allows the use of extended service intervals. A tag on the filler plug will identify the use of the synthetic lubricant.

Use only a lubricant that meets manufacturer specifications (refer to *Lubricant specifications* in this chapter).

Use of a non-approved rear axle lubricant may cause internal axle component damage.

Checking the rear axle lubricant level

1. Park the vehicle on level ground.
2. Set the parking brake and shift into N (Neutral) (automatic transmission) or 1 (First) (manual transmission) and turn the engine off.
3. Clean any dirt from around the rear axle filler plug.
4. Remove the filler plug and inspect the lubricant level.
5. The lubricant level should be up to the bottom of the filler plug opening.
6. If necessary, add enough lubricant through the filler plug opening so that the lubricant level is at the bottom of the opening.
7. Clean and install the filler plug securely.

Draining and refilling the rear axle lubricant

1. Drain the rear axle while the lubricant is warm.
2. Park the vehicle on level ground.
3. Set the parking brake and shift into N (Neutral) (automatic transmission) or 1 (First) (manual transmission) and turn the engine off.
4. Clean any dirt from around the rear axle filler and drain plugs.
5. Remove the filler and drain plugs and drain the lubricant into a suitable container. Dispose of all used automotive fluids in a responsible manner following your local authorized standards.
6. Clean and install the drain plug securely.
7. Add enough lubricant through the filler plug opening so that the lubricant level is up to the bottom of the opening.
8. Clean and install the filler plug securely.

WHEELS

General

Wheel bearings should be inspected, lubricated and adjusted at regular intervals. This is especially important if operating in deep sand, mud, or water. Refer to *Lubricant specifications* in this chapter.

When installing wheel balance weights, they must be mounted on the dome-side of the wheel only. Failure to do so may result in loss of wheel weight and/or damage to brakes or wheels.

Important: Remember to replace the wheel air valves when the road tires are replaced at the end of their useful life.

Oil lubricated front wheel bearings

During normal vehicle duty cycle, the lube and air inside the hub/wheel cavity expands and if not vented, causes pressure build-up that could cause accelerated seal wear.

There are two venting methods:

- a slit or small hole in the rubber check vent or
- the window

You can use either of these methods to prevent pressure build-up.

Normal maintenance

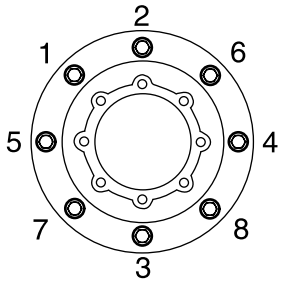
Over a period of time, if not routinely cleaned, a slight film of oil can collect dirt around the rubber fill plug and face, which could appear to be a leak. Routine cleaning ensures that the lube level can be easily observed through the clear window as intended. In situations where the window is clean on the outside but discolored on the inside, the lube level may be checked by inserting a finger through the rubber check vent hole.

The specified lube level for a clear window type hubcaps is from the minimum line to + 5/16 inch above the minimum line.

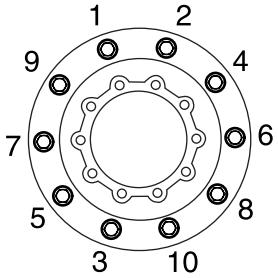
If the lube level should suddenly drop dramatically below the minimum level, see the Service Manual for diagnostic procedure.

Installation, tightening and alignment

8–lug wheel



10–lug wheel



When installing wheels, be certain that the threads on studs and nuts are clean to permit correct torquing of nuts. The mounting surfaces of rims, wheels, spacer rings and clamps must be free of dirt, rust, lubricants or damage.

Use a wire brush to clean the mounting contact surfaces. Do not use lubricant on threads.

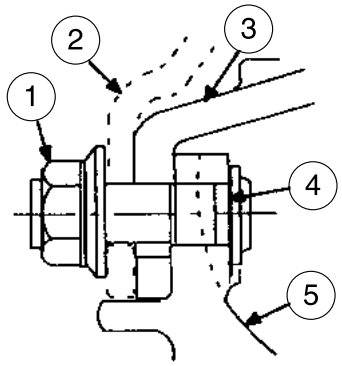
After the rim or wheel has been properly tightened, it should be checked for alignment. Rotate the wheel with a piece of chalk attached to a steady, firm surface, and placed to just barely clear the outside surface of the tire bead seat. This procedure will point out the high spot. A high spot does not necessarily mean that the lug nuts have been unevenly tightened. This condition or misalignment could be caused by a bent wheel.

Checking the alignment of the wheel/rim installation is more important on cast spoke rims since the rims can be drawn out of alignment when improperly tightened. Use the following installation procedures.

Disc wheel with flange nuts (hub-piloted)

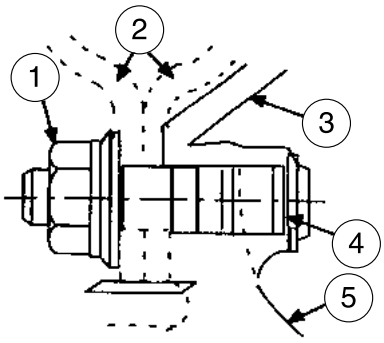
Front wheel mounting of flange nut system

1. Flange nut
2. Wheel(s)
3. Brake drum
4. Wheel stud (22 mm)
5. Wheel hub



Rear wheel mounting of flange nut system

1. Flange nut
2. Wheel(s)
3. Brake drum
4. Wheel stud (22 mm)
5. Wheel hub



1. Slide inner rear or front tire and wheel in position over studs and push it back as far as possible. Use care so that the threads on studs are not damaged.

2. Position the outer rear tire and wheel in place over the studs and push it back as far as possible. Use care so that the threads on studs are not damaged.

3. Run the nuts on the studs until they contact the wheel(s). Rotate the wheel assembly a half-turn to permit the parts to seat.

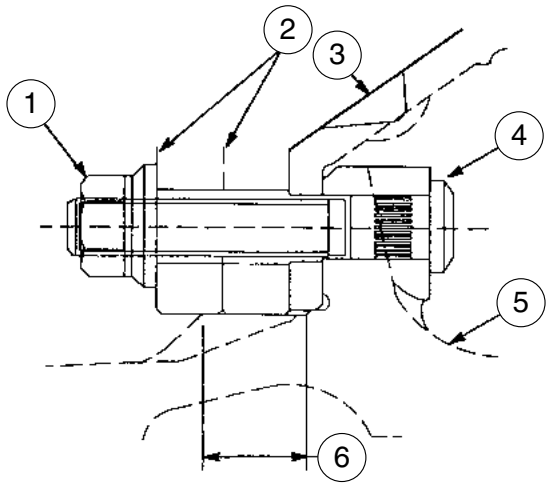
4. Draw up the nuts alternately following the crisscross sequence illustrated under *Installation, tightening and alignment*. Do not fully tighten the nuts. This will allow uniform seating of the nuts and ensure even face-to-face contact of the wheel and hub.

5. Continue tightening the nuts to the torque specifications in the torque chart using the same crisscross sequence shown.

6. After operating the vehicle approximately 50 miles (80 km), check the nuts for tightness. Some natural seating of parts may be encountered and the torque on the nuts will drop. Retighten all nuts to specifications.

Once a week, inspect and retighten the wheel stud nuts.

Aluminum rear disc wheel with flange nuts (hub-piloted)



1. Flange nut
2. Wheel(s)
3. Brake drum
4. Wheel stud (22 mm)
5. Wheel hub
6. Wheel locator pad

Prior to re-installing rear aluminum hub-piloted wheels, clean each wheel locator pad on the hub from all dirt, rust and foreign material. Apply a

light coat of chassis grease, never-seize or disc brake corrosion control grease, only to the wheel locator pad.

When installing the tire and rim assembly on disc-brake equipped axles, make sure the tire valve stem clears the brake caliper. The use of a tire manufacturer's stem forming tool is the only acceptable method of obtaining clearance when necessary.

Note: Always observe the following instructions:

Failure to follow these instructions could result in property damage, personal injury or death

- Always loosen rim clamps before complete removal of nut from stud (cast spoke wheels). With loosened nuts on stud, strike clamps with a heavy hammer and be sure each clamp is loose.
- Always deflate tires completely before removing locks or side rings.
- Always inflate tires in a safety cage.
- Never mix rim side rings or lock rings of different types, manufacturers or sizes.
- Never use cracked, bent or badly rusted parts.
- Never re-inflate flat tires on-vehicle; use the spare tire.
- Never add air until each side ring or lock ring is fully seated.
- Never hammer side ring or lock ring on a partially- or fully-inflated tire.

Proper torque

It is important to tighten and maintain wheel and rim mounting nuts to the proper torque. Loose nuts or over-tightened nuts can lead to premature wear and possible failure of the wheel and/or mounting hardware.

Changing wheel types

Consult your dealer or wheel/rim distributor before attempting any wheel or fastener changes.

Use only the same type and style wheels and mounting hardware to replace original parts. Failure to do so may result in an assembly that looks fine, but does not fit together properly. This could possibly cause wheel or fastener failures which could result in property damage, personal injury or death.

Note: Do not attempt to mix stud-piloted wheels or fasteners with hub-piloted wheels or fasteners.

Note: Do not change from aluminum wheels to steel wheels or vice-versa without changing the mounting hardware required or, with flange-nut mounting systems, changing the hub and stud assembly.

WHEEL NUT TORQUE

Size	Nut mounting	Torque	
		Ft. lb.	N•m
22 mm	Flange	450–500	610–678

Note: Do not use lubrication on dry threads. Where excessive corrosion exists, a light coat of lubricant on the first three threads of the stud bolt is permitted. Keep lubricant away from:

- Hex nut and rim clamp contact surfaces.
- Cap nut ball face and ball seat on the disc wheel.
- Flange nut washer surface and flat on the disc wheel.

TIRE/WHEEL RIM SELECTION AND INFLATION PRESSURES

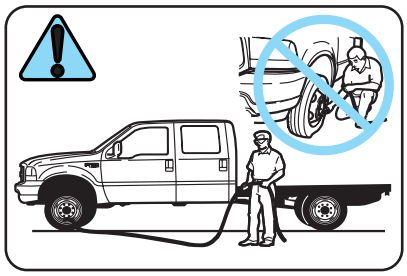
Tire size	Load range	Approved rim widths	Axle capacity	
			Front - lb. (kg)/psi (kPa)	Rear - lb. (kg)/psi (kPa)
225/70R19.5	F	6.00, 6.75	7280 (3302) / 95 (655)	13660 (6196) / 95 (655)
245/70R19.5	F	6.75, 7.50	8160 (3701) / 85 (586)	15440 (7003) / 85 (586)
245/70R19.5	G	6.75, 7.50	9090 (4123) / 100 (690)	17640 (8001) / 100 (690)
265/70R19.5	G	6.75	10000 (4536) / 115 (793)	19440 (8817) / 115 (793)
		7.50, 8.25	10710 (4858) / 120 (827)	20280 (9199) / 120 (827)
9R22.5	F	6.75, 7.50	9080 (4118) / 105 (724)	17200 (7801) / 105 (724)

Tire size	Load range	Approved rim widths	Axle capacity	
			Front - lb. (kg)/psi (kPa)	Rear - lb. (kg)/psi (kPa)
10R22.5	F	6.75	10000 (4536) / 100 (690)	19760 (8963) / 100 (690)
		7.50	10410 (4722) / 100 (690)	19760 (8963) / 100 (690)
10R22.5	G	6.75	10000 (4536) / 115 (793)	20000 (9072) / 115 (793)
		7.50	11350 (5148) / 115 (793)	21420 (9716) / 115 (793)
11R22.5	G	7.50, 8.25	12350 (5602) / 105 (724)	23000 (10432) / 105 (724)
11R22.5	H	7.50, 8.25	13220 (5996) / 120 (827)	23800 (10795) / 110 (758)
12R22.5	H	8.25	14400 (6531) / 120 (827)	27120 (12301) / 120 (827)
		9.00	14780 (6704) / 120 (827)	27120 (12301) / 120 (827)
245/75R22.5	G	6.75, 7.50	9350 (4241) / 110 (758)	17640 (8001) / 110 (758)
255/70R22.5	H	6.75	10000 (4536) / 115 (793)	19660 (8917) / 115 (793)
		7.50, 8.25	11020 (4998) / 120 (827)	20280 (9199) / 120 (827)
265/75R22.5	G	7.50, 8.25	10410 (4722) / 110 (758)	19220 (8718) / 100 (690)
275/70R22.5	H	7.50	13220 (5996) / 120 (827)	24800 (11249) / 120 (827)
		8.25	13460 (6105) / 120 (827)	24800 (11249) / 120 (827)
275/80R22.5	G	7.50, 8.25	12350 (5602) / 110 (758)	22700 (10296) / 110 (758)

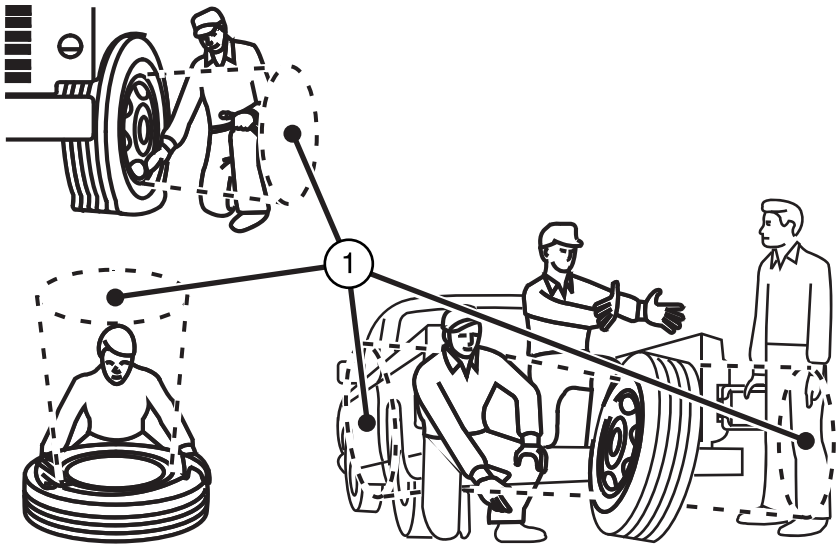
Tire size	Load range	Approved rim widths	Axle capacity	
			Front - lb. (kg)/psi (kPa)	Rear - lb. (kg)/psi (kPa)
295/75R22.5	G	8.25, 9.00	12350 (5602) / 110 (758)	23900 (10841) / 100 (690)
295/80R22.5	H	8.25	14400 (6531) / 120 (827)	27760 (12591) / 120 (827)
		9.00	14780 (6704) / 120 (827)	27760 (12591) / 120 (827)

Tire inflation information

All tires with Steel Carcass Plies (if equipped):
This type of tire utilizes steel cords in the sidewalls. As such, they cannot be treated like normal light truck tires. Tire service, including adjusting the air pressure, must be performed by personnel trained, supervised and equipped according to Federal Occupational Safety and Health Administration (OSHA) regulations. For example, during any procedure involving tire inflation, the technician or individual must utilize a remote inflation device, and ensure that all persons are clear of the trajectory area.



WARNING An inflated tire and rim can be very dangerous if improperly used, serviced or maintained. To avoid serious injury, never attempt to re-inflate a tire which has been run flat or seriously under-inflated without first removing the tire from the wheel assembly for inspection. Do not attempt to add air to tires or replace tires or wheels without first taking precautions to protect persons and property.



Stay out of the trajectory as indicated in the illustration. Under some circumstances, the trajectory may deviate from the suspected path.

LUBRICANT SPECIFICATIONS

Component	Lubrication type	Viscosity / Ambient temperature / Notes	Equivalent Ford part name / number
Non-driving front axle			
Eaton-Spicer axle (generic) - front axle wheel bearing oil	Multipurpose EP gear lube of API GL-5 quality meeting MIL-PRF-2105E specifications including synthetic lubricants. **Do not mix conventional and synthetic lubricants.**	SAE 75W: –40°F to –15°F (–40°C to –26°C)	Motorcraft SAE 75W-140 Motorcraft Synthetic Rear Axle Lubricant / XY–75W140–QL
		SAE 75W-80: -40°F to 80°F (–40°C to 27°C)	
		SAE 75W-140: –40°F to 100°F (–40°C to 38°C)	
		SAE 75W-140: –40°F and above (–40°C and above)	Motorcraft SAE 75W-140 Motorcraft Synthetic Rear Axle Lubricant / XY–75W140–QL
		SAE 80W-90: –15°F to 100°F (–26°C to –38°C)	Motorcraft SAE 80W-90 Premium Rear Axle Lubricant / XY–80W90–QL
		SAE 80W-140: –15°F and above (–26°C and above)	Motorcraft SAE 75W-140 Motorcraft Synthetic Rear Axle Lubricant / XY–75W140–QL
		SAE 85W-140: 10°F and above (–12°C and above)	

Component	Lubrication type	Viscosity / Ambient temperature / Notes	Equivalent Ford part name / number
Spicer axle - front axle wheel bearing oil	Multipurpose EP gear lube of API GL-5 quality meeting MIL-PRF-2105E specifications including synthetic lubricants. **Do not mix conventional and synthetic lubricants.**	SAE 75W: –40°F to 32°F (–40°C to 0°C)	Motorcraft SAE 75W-140 Motorcraft Synthetic Rear Axle Lubricant / XY–75W140–QL
		SAE 75W-140: –40°F to 100°F (–40°C to 38°C)	
		SAE 80W: –15°F to 70°F (–26°C to 21°C)	Motorcraft SAE 80W-90 Premium Rear Axle Lubricant / XY–80W90–QL
		SAE 90W: 10°F to 100°F (–12°C to 38°C)	SAE 90 Hypoid Gear Oil / C6AZ–19580–E
		SAE 75W-140: –40°F and above (–40°C and above)	Motorcraft SAE 75W-140 Motorcraft Synthetic Rear Axle Lubricant / XY–75W140–QL
		SAE 80W-140: –15°F and above (–26°C and above)	
		SAE 85W-140: 10°F and above (–12°C and above)	
		SAE 140W: 40°F and above (4°C and above)	

Component	Lubrication type	Viscosity / Ambient temperature / Notes	Equivalent Ford part name / number
Eaton-Spicer axle, Spicer axle - Front axle wheel bearing grease, tie rod ends, drag link, kingpin and bushing	EP2 Lithium complex-based moly grease (or equivalent) GC/LB NLGI #2 multi-purpose lithium complex grease	**Note:** Eaton-Spicer and Meritor Easy Steer axles: With chassis load on axle, force grease through thrust bearings; then with axle lifted clear of the floor, force grease between kingpin and bushing surfaces.	Motorcraft Premium Long Life Grease / XG-1-C
Steering			
Power steering fluid	MERCON® ATF	—	MERCON® Multi-Purpose Automatic Transmission Fluid, XT-2–QDX
Steering gear Ross TAS - Output Seal	GC/LB NLGI #2 lithium complex-based moly grease or multi-purpose lithium complex grease	—	Motorcraft Premium Long Life Grease / XG-1-C

Component	Lubrication type	Viscosity / Ambient temperature / Notes	Equivalent Ford part name / number
Steering column U-joints / slip joint	GC/LB NLGI #2 lithium complex-based moly grease or multi-purpose lithium complex grease	—	Motorcraft Premium Long Life Grease / XG-1-C
Propeller shaft			
U-joint	GC/LB NLGI #2 lithium complex-based moly grease or multi-purpose lithium complex grease	—	Motorcraft Premium Long Life Grease / XG-1-C
Clutch			
Release bearing / shafts / fork	GC/LB NLGI #2 lithium complex-based moly grease or multi-purpose lithium complex grease	—	Motorcraft Premium Long Life Grease / XG-1-C
Reservoir	DOT 3, ESA-M6C25–A or WSS-M6C62–A	—	Motorcraft High Performance DOT 3 Motor Vehicle Brake Fluid, PM-1 or PM-1–C

Component	Lubrication type	Viscosity / Ambient temperature / Notes	Equivalent Ford part name / number
Cooling system			
Engine coolant - 6.0L Power Stroke engine (1)	WSS-M97B51-A1	—	Motorcraft Premium Gold Engine Coolant / VC-7-B
Engine coolant - Cummins B and Caterpillar engines	Refer to engine operator manual		
Windshield washer			
Washer fluid	WSB-M8B16-A2	—	Motorcraft Premium Windshield Washer Concentrate / ZC-32-A
Transmission			
Eaton-Fuller	Petroleum oil: Engine oil API-SL or API-CF (MIL-L-2104E or MIL-L-46152E)	SAE 50: above 10°F (–12°C)	—
		SAE 40: below 10°F (–12°C)	—
	Mineral gear oil: API-GL-1 (rust and oxidation inhibited)	SAE 80W–90: above 10°F (–12°C)	—
		SAE 75W: below 10°F (–12°C)	—
	Synthetic oil: Eaton®, Roadranger® synthetic CD-50 transmission fluid	CD SAE 50: All temperatures	—

Component	Lubrication type	Viscosity / Ambient temperature / Notes	Equivalent Ford part name / number
Spicer (non-synchronized) (lubricants are listed in order of preference)	Petroleum oil: Engine oil API-SL or API-CF (MIL-L-2104E or MIL-L-46152E)	SAE 50: above 0°F (–18°C)	—
		SAE 40: below 0°F (–18°C)	—
	Mineral gear oil: API-GL-1 (rust and oxidation inhibited) (EP gear oils are not acceptable)	SAE 90: above 0°F (–18°C)	—
		SAE 80: below 0°F (–18°C)	—
	Synthetic oil: Synthetic Engine Oil meeting MIL-L-2104E or MIL-L-46152E, API-SL or API-CF	CD SAE 50: All temperatures	—

Component	Lubrication type	Viscosity / Ambient temperature / Notes	Equivalent Ford part name / number
Spicer (synchronized) (lubricants are listed in order of preference)	Petroleum oil: Engine oil API-SL or API-CF (MIL-L-2104E or MIL-L-46152E)	SAE 50: above 10°F (–12°C)	—
		SAE 40: below 10°F (–12°C)	—
	Mineral gear oil: API-GL-1 (rust and oxidation inhibited)	SAE 90: above 10°F (–12°C)	—
		SAE 80W: below 10°F (–12°C)	—
	Synthetic oil: Synthetic Engine Oil meeting MIL-L-2104E or MIL-L-46152E, API-SL or API-CF	SAE 50: All temperatures	—

Component	Lubrication type	Viscosity / Ambient temperature / Notes	Equivalent Ford part name / number
Meritor	Petroleum oil: Heavy Duty Engine Oil MIL-L-2104E or API-SL or API-CF (previous API designations acceptable)	SAE 50: above 10°F (–12°C)	—
		SAE 40: above 10°F (–12°C)	—
		SAE 30: below 10°F (–12°C)	Motorcraft SAE 30 Super Duty Motor Oil / XO-30-QSD
	Mineral gear oil with rust and oxidation inhibitor API-GL-1 **Do not use multi-weight and GL-5 EP gear oils; they may cause transmission failure or damage.**	SAE 90: above 10°F (–12°C)	—
		SAE 80: below 10°F (–12°C)	—
	Synthetic oil: MIL-L-2104E or MIL-L-46152D **Do not use multi-weight and GL-5 EP gear oils; they may cause transmission failure or damage.**	SAE 50: All temperatures	—
Allison	Refer to transmission manual	—	—

Component	Lubrication type	Viscosity / Ambient temperature / Notes	Equivalent Ford part name / number
Rear axle			
Eaton-Spicer - two-speed axle	RHEOLUBE 362 (or equivalent) (Eaton part number 113741)	—	—
Eaton - single-speed axle	Generic lubricant	SAE 75W: –40°F to –15°F (–40°C to –26°C)	Motorcraft SAE 75W-140 Motorcraft Synthetic Rear Axle Lubricant / XY–75W140–QL
		SAE 75W-80: –40°F to 80°F (–40°C to 27°C)	
		SAE 75W-140: –40°F to 100°F (–40°C to 38°C)	
		SAE 80W-90: –15°F to 100°F (–26°C to 38°C)	Motorcraft SAE 80W-90 Premium Rear Axle Lubricant / XY-80W90-QL
		SAE 75W-140: –40°F and above (–40°C and above)	Motorcraft SAE 75W-140 Motorcraft Synthetic Rear Axle Lubricant / XY–75W140–QL
		SAE 80W-140: –15°F and above (–26°C and above)	
		SAE 85W-140: 10°F and above (–12°C and above)	

Component	Lubrication type	Viscosity / Ambient temperature / Notes	Equivalent Ford part name / number
Spicer - single-speed axle	Multipurpose EP gear lube of API GL-5 quality meeting MIL-PRF-2105E specifications including synthetic lubricants	SAE 75W: –40°F to 32°F (–40°C to 0°C)	Motorcraft SAE 75W-140 Motorcraft Synthetic Rear Axle Lubricant / XY–75W140–QL
		SAE 75W-140: –40°F to 100°F (–40°C to 38°C)	
		SAE 80W: –15°F to 70°F (–26°C to 21°C)	
		SAE 75W-140: –40°F and above (–40°C and above)	Motorcraft SAE 75W-140 Motorcraft Synthetic Rear Axle Lubricant / XY–75W140–QL
		SAE 80W-140: –15°F and above (–26°C and above)	
		SAE 85W-140: 10°F and above (–12°C and above)	
		SAE 140W: 40°F and above (4°C and above)	
		SAE 90W: 10°F to 100°F (–12°C to 38°C)	SAE 90 Hypoid Gear Oil / C6AZ-19580-E

Component	Lubrication type	Viscosity / Ambient temperature / Notes	Equivalent Ford part name / number
Meritor - single-speed axle	Fill at the factory with Synthetic SAE 75W-140, will have a tag attached to fill plug that reads as follows: "Filled with synthetic lube. Do not mix."	—	—
	Multipurpose EP gear lube of API GL-5 quality meeting MIL-PRF-2105E specifications including synthetic lubricants. **Do not mix conventional and synthetic lubricants.**	SAE 75W-140: Above –40°F (Above –40°C)	Motorcraft SAE 75W-140 Motorcraft Synthetic Rear Axle Lubricant / XY–75W140–QL
		SAE 85W-140: above 10°F (–12°C)	
		SAE 85W-140: above –15°F (–26.1°C)	
		SAE 80W-90: above –15°F (–26.1°C)	Motorcraft SAE 80W-90 Premium Rear Axle Lubricant / XY-80W90-QL
		SAE 75W maximum outside temperature (35°F (1.6°C); Above –40°F (–40°C)	Motorcraft SAE 75W-140 Motorcraft Synthetic Rear Axle Lubricant / XY–75W140–QL

Component	Lubrication type	Viscosity / Ambient temperature / Notes	Equivalent Ford part name / number
Cab components			
Hydraulic lift pump fluid	Dexron III	—	Motorcraft MERCON® Multi-Purpose (ATF) Transmission Fluid / XT-2-QDX
Cab latch and lock levers	Mobile SHC 32 Low Temperature Lubricant (or equivalent)	—	—
Cab latch pivots; Door check, hinges, latches and strikers; Seat adjuster slides	GC/LB NLGI #2 lithium complex-based moly grease (or equivalent) or multi-purpose lithium complex grease	—	Motorcraft Premium Long Life Grease / XG-1-C
Cab latch pivot pins	Light engine oil	—	Motorcraft SAE 5W-30 Super Premium Motor Oil / XO-5W30-QSP
Door lock cylinders	Lock oil	—	Motorcraft Penetrating and Lock Lubricant / XL-1

Component	Lubrication type	Viscosity / Ambient temperature / Notes	Equivalent Ford part name / number
Door window regulators	NGLI #2 multipurpose lithium complex grease	—	Motorcraft Multi-Purpose Grease Spray / XL-5 or Motorcraft Multi-Purpose Grease / XG-4
Weatherstripping	Silicone lubricant	—	Motorcraft Silicone Spray / XL-6
Engine oil			
6.0L Power Stroke engine	API CI-4/SL	SAE 15W–40 above 10°F (–12°C)	Motorcraft SAE 15W-40 Super Duty Motor Oil / XO-15W40-QSD
		SAE 10W-30 –10°F to 90°F (–23°C to 32°C)	Motorcraft SAE 10W-30 Super Duty Motor Oil / XO-10W30-QSD
		SAE 0W–30 below 0°F (–18°C)	Motorcraft SAE 0W-30 Super All Season Motor Oil / XO-0W30-LAS
Cummins B and Caterpillar engines	Refer to engine operator manual		
Brake fluid			
Master cylinder	DOT 3, ESA-M6C25–A or WSS-M6C62–A	—	Motorcraft High Performance DOT 3 Motor Vehicle Brake Fluid, PM-1 or PM-1–C

(1) Add the coolant type originally equipped in your vehicle.

REFILL CAPACITIES

Rear axle

Axle code	Weight capacity - lb. (kg)	Description	Fluid capacity - pints (liters)[1,2]
S135–S	13500 (6123)	Single rear axle, single reduction	24.5 (11.6)
4S150–S	15500 (7031)	Single rear axle, single reduction	24.5 (11.6)
17060S	17500 (7938)	Single rear axle, single reduction	28.0 (13.2)
19055T	17500 (7938)	Single rear axle, two-speed	28.0 (13.2)
M190–T	19000 (8618)	Single rear axle, two-speed	35.0 (17.0)
19060S	19000 (8618)	Single rear axle, single reduction	28.0 (13.2)
21060S	21000 (9525)	Single rear axle, single reduction	28.0 (13.2)
21060D	21000 (9525)	Single rear axle, single reduction with driver-controlled locking differential	28.0 (13.2)
M210T	21000 (9525)	Single rear axle, two-speed	16.0 (33.0)
23090S	23000 (10432)	Single rear axle, single reduction	39.0 (18.5)
23090D	23000 (10432)	Single rear axle, single reduction with driver-controlled locking differential	39.0 (18.5)
23082T	23000 (10432)	Single rear axle, two-speed	37.0 (17.5)

[1] Quantities listed are approximate. Fill axle until the lubricant level is at the bottom of the filler hole, with the vehicle on level ground.

[2] If hubs are removed, add an additional 1.6 pints (0.75L) of axle lubricant. Add lubricant through the axle vent.

Engine coolant and oil

Engine type	Engine coolant (approximate capacity)(1)	Engine oil (approximate capacity)
6.0L Power Stroke	54.4 pints (25.7L)	19.0 quarts (18.0L)
Caterpillar	60.0 pints (28.4L)	Refer to the engine operator manual for engine oil refill capacities.
Cummins B	48.8 pints (23.1L)	

(1) Add the coolant originally equipped in your vehicle.

Power steering system

Steering gear	Power steering fluid volume
TAS40	17.6 pints
TAS66	18.4 pints

Transmission

Description	Pints (Liters)
Allison 3000/3500 5–speed and 6–speed automatics	58.0 (27.4)*
2200/2500 Series 5–speed automatic	38.0 (18.0)*
FS-5205A 5–speed manual	12.5 (5.9)
FS-5406A/5406N and FS-6406A/FSO–6406A 6–speed manuals	19.5 (9.2)
ES56–7B/ES066–7B 7–speed manual	22.0 (10.4)
*Total fluid capacity (dry transmission and torque converter).	

Air conditioner refrigerant - r134a

Lb. (Kg)	Oz.
2.25 (1.02)	36

Note: This system uses PAG-type refrigerant oil.

Refrigerant fitting torque

Captured washer nut: 170–190 inch lb. (19–21 N•m)

Note: This system uses mineral based refrigerant oil to lubricate o-rings and fittings.

Fuel tanks

Standard tanks are listed as such; all other tanks available for your vehicle are optional equipment.

Vehicle	Tank type	Gallons (Liters)
F-650 Low Profile (standard), F-650 Dock Height	Single, steel rectangular	35 (132)
F-650 Low Profile, F-650 Dock Height (standard), F-750 Pick-up and Delivery (standard), F-750 Severe Service (standard)	Single, steel rectangular	45 (170)
F-650 Dock Height, F-750 Pick-up and Delivery, F-750 Severe Service	Single, steel rectangular	50 (189)
F-650–Low Profile, F-650 Dock Height, F-750 Pick-up and Delivery, F-750 Severe Service	Single, steel rectangular	65 (246)
F-650 Dock Height, F-750 Pick-up and Delivery, F-750 Severe Service	Single, steel D-style	65 (246)
F-650 Dock Height, F-750 Pick-up and Delivery, F-750 Severe Service	Single, steel D-style	80 (302)

Vehicle	Tank type	Gallons (Liters)
F-650 Low Profile, F-650 Dock Height, F-750 Pick-up and Delivery, F-750 Severe Service	Dual, steel rectangular	25(LH)/45(RH) (95[LH]/170[RH])
F-650 Low Profile, F-650 Dock Height	Dual, steel rectangular	35(RH)/45(LH) (132[RH]/170[LH])
F-650 Low Profile, F-650 Dock Height, F-750 Pick-up and Delivery, F-750 Severe Service	Dual, steel rectangular	45/45 (170/170)
F-650 Dock Height, F-750 Pick-up and Delivery, F-750 Severe Service	Dual, steel D-style	50/50 (189/189)
F-650 Low Profile, F-650 Dock Height, F-750 Pick-up and Delivery, F-750 Severe Service	Dual, steel rectangular	45(RH)/65(LH) (170[RH]/246[LH])
F-650 Low Profile, F-650 Dock Height, F-750 Pick-up and Delivery, F-750 Severe Service	Dual, steel rectangular	65/65 (246/246)
F-650 Dock Height, F-750 Pick-up and Delivery, F-750 Severe Service	Dual, steel D-style	65/65 (246/246)
F-650 Dock Height, F-750 Pick-up and Delivery, F-750 Severe Service	Dual, steel D-style	65(LH)/80(RH) (246[LH]/302[RH])
F-650 Dock Height, F-750 Pick-up and Delivery, F-750 Severe Service	Dual, steel D-style	80/80 (302/302)

VEHICLE IDENTIFICATION NUMBER (VIN)

The VIN is printed on the Vehicle Rating Decal attached to the vehicle. The VIN also serves as the warranty number. If you ever find it necessary to communicate with Ford Motor Company about your vehicle, always include the VIN in your communication.

GENERAL MAINTENANCE INFORMATION

The general maintenance services listed in this section are required because they are considered essential to the life and performance of your vehicle. Refer to the “Daily Owner Checks” chart and the “Check every oil change” chart (if your vehicle is equipped with the 6.0L Power Stroke engine) for important maintenance items.

Ford Motor Company recommends you perform the owner maintenance services listed in this section. These services are matters of day-to-day care that are important to the proper operation of your vehicle. In addition to the conditions described in owner maintenance, be alert for any unusual noise, vibration or other indication that your vehicle may need service and attend to it promptly.

Your vehicle is very sophisticated and built with multiple complex performance systems. Every manufacturer develops these systems using different specifications and performance features. That’s why it’s important to rely upon your Ford dealership to properly diagnose and repair your vehicle.

Use only recommended fuels, 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.

Non-Ford approved chemicals or additives are not required for factory recommended maintenance. In fact, Ford Motor Company recommends against the use of such additive products unless specifically recommended by Ford for a particular application.

SCHEDULED MAINTENANCE

Ford Motor Company has recommended maintenance intervals for various parts and component systems based upon engineering testing. Ford Motor Company relies upon this testing to determine the most appropriate mileage for replacement of oils and fluids to protect your vehicle at the lowest overall cost to you and recommends against maintenance schedules that deviate from the scheduled maintenance information.

The maintenance or replacement of the emission control devices (or systems) in your new Ford Motor Company vehicle (or engine) may be performed at your expense. These services may be performed by any automotive repair establishment or individual using automotive parts equivalent to those with which your vehicle or engine was originally

equipped. If any parts other than Ford, Motorcraft, or Ford authorized, remanufactured parts are used for maintenance replacements (or for the service) of components effecting the emission control, the owner should be ensured that such parts are warranted by their manufacturer to be equivalent to genuine Ford Motor Company Parts in performance and durability. Please consult your warranty information booklet for complete warranty information.

Authorized dealer maintenance

Your authorized dealer specializes in knowing all about Ford Motor Company vehicles rather than knowing a little about all makes.

There are Ford or Ford of Canada dealer service shops ready to serve you wherever you drive in the U.S. or Canada. They stock Ford and Motorcraft parts, and Ford Chemicals and lubricants. You can be confident that these meet the same exacting design and quality standards as those used to build the vehicle originally. Dealer Service Technicians have available training in the latest product developments and service techniques.

Oils, Fluids and Flushing

In many cases, fluid discoloration is a normal operating characteristic of the chemical compound and in itself does not demonstrate that a fluid needs to be changed. Oils and fluids identified in the *Scheduled Maintenance Guide* chapter should be changed at the specified interval or in conjunction with a repair. Flushing is a viable way to change fluid for many vehicle sub-systems during scheduled maintenance and should only be done using the same fluid required to finish the maintenance procedure, or a Ford approved flushing chemical.

OWNER MAINTENANCE

You can do much of the maintenance your vehicle requires yourself, if you have the time and a reasonable amount of mechanical ability. If you prefer to have this work done professionally, your authorized dealer stands ready to help you.

All mechanical components and attachments are important in that they could affect the performance of vital components and systems. If replacement becomes necessary, they must be replaced with parts having the same part number or with equivalent parts. Torque values of the attaching parts must be used as specified during any reassembly procedure to ensure proper retention.

FACTORY AUTHORIZED SYSTEMS CHECKS

In the event that your vehicle experiences a component related concern, please contact your Ford dealership. The Ford Motor Company Trained Technicians who work at Ford dealerships are specifically trained to understand your vehicle.

A proper repair begins with a thorough system check. A Factory Authorized Systems Check can ONLY be found at a Ford dealership. In some circumstances, the technician may need to request your authorization to perform additional operations to determine the final diagnosis. The technician's goal is to ensure that your vehicle is fixed right the first time, at the best value to you.

The following list represents several of the Factory Authorized Systems Checks available at a participating Ford dealers:

- Air Conditioning
- Check Engine Light
- All Wheel Drive and 4 X 4
- Automatic Transmission
- Engine Cooling and Cabin Heating
- Steering and Suspension
- Charge/Start/Battery
- Wheel Alignment
- Anti-Lock Brake System

EMISSIONS CONTROL SYSTEM

To ensure the emissions control systems operate effectively, you should have the services listed in the maintenance schedule performed at the specified time and mileage/km intervals. You should avoid running out of fuel or turning off the ignition while the vehicle is in motion, especially at high speeds.

Because of high engine compartment and exhaust system temperatures resulting from emissions equipment, do not park, idle or operate your vehicle in dry grass or other dry ground cover where the possibility of ground fire exists.

Do not make unauthorized modifications to the engine or vehicle. Modifications causing increased amounts of unburned fuel to reach the exhaust system can significantly increase the temperature of the engine compartment and/or the exhaust system.

Avoid driving your vehicle if it does not operate properly. If the engine diesels (more than five seconds of engine run-on after shut-off), misfires, surges, stalls or backfires, see your dealer. Be alert for fluid leakage, odor, smoke, loss of oil pressure, or charge indicator or over temperature warning.

Do NOT use diesel fuel blended with waste oil in engines equipped with a catalytic converter-muffler. Waste lube oil blending in fuel will plug the catalytic converter-muffler, resulting in a significant loss of engine power.

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

NOISE EMISSIONS WARRANTY, PROHIBITED TAMPERING ACTS AND MAINTENANCE

On January 1, 1978, Federal regulations became effective governing the noise emissions on trucks over 10,000 lb. (4,536 kg) GVWR. The following statements concerning prohibited tampering acts and maintenance and the noise warranty are found in the Warranty Guide, and are applicable to completed trucks.

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 presumed to constitute tampering are the following acts listed:

Vehicle System	Acts
Acoustical Shielding	Removal of noise shields, hood blanket, tunnel liner or acoustical absorptive material.
Engine	Removal or rendering inoperative the engine speed governor so as to allow engine speed to exceed manufacturer specifications. Removal of engine mounted noise shield or oil pan enclosure.
Engine Air Induction System	Removal of the air duct, silencer, air cleaner, and/or air cleaner element and baffle in air cleaner; re-indexing of air cleaner.
Exhaust System	Removal or rendering inoperative exhaust system components including the catalytic converter - muffler assembly, inlet pipe, outlet pipe, resonator and flexpipe. Rotation of horizontal exhaust system directional outlet pipe to cause the exhaust to be emitted in a direction other than the orientation the vehicle was originally produced with.
Engine Cooling System	Removal or rendering inoperative the fan clutch. Removal or modification of the fan shroud. Replacing a fixed fan with a fan of increased diameter, different number of blades or different pitch width.

Scheduled Maintenance Guide

MAINTENANCE

Instructions for maintenance and service of the noise control system have been included in the required maintenance services and in the general maintenance section. To further help minimize noise emissions degradation throughout the life of the vehicle, Ford Motor Company recommends that this vehicle should be operated in the manner described within this Owner Guide. Caution should be exercised by the owner when installing replacement parts to be sure that a tampering act (as outlined above) is not committed. Note any inspection and service performed in the Maintenance Record.

EMISSIONS INFORMATION LABEL

Emissions information appears on the Important Engine Information decal located on or near the engine.

SCHEDULED MAINTENANCE SERVICES

Maintenance service adjustments must conform to specifications contained in this manual, and those shown on the Important Engine Information decal. The following services are to be performed at scheduled intervals because they are considered essential to the life and performance of your vehicle. Ford recommends that you perform maintenance on all designated items to achieve best vehicle operation.

Maintenance intervals are provided for three types of general vehicle environments: On-Highway, City and Severe Service. In all applications, the actual interval is determined by monitoring kilometers (miles) and time and when the engine is due for an oil change. When the engine oil change is required prior to the truck lubrication interval, it is recommended that the lubrication be performed at the same time in order to reduce your vehicle's time out of service.

- **On-Highway:** 60,000 miles (96,000 km) or more annually.
- **City:** 60,000 miles (96,000 km) or less annually.
- **Severe Service:** 20,000 miles (32,000 km) or less annually on/off road in dirty conditions.

Scheduled maintenance beyond 100,000 miles (160,000 km) should be continued as before 100,000 miles (160,000 km).

AIR BRAKE ADJUSTMENT

Failure to maintain proper air brake adjustment can result in reduction or loss of braking ability.

Air brake inspection and adjustment or repairs should be performed by a qualified service technician in accordance with the instructions in the service manual.

Cam brakes - automatic slack adjusters

Inspect standard air brakes equipped with automatic slack adjusters for proper brake adjustment every four months or 20,000 miles (32,000 km) whichever occurs first.

However, more frequent inspection is required if your vehicle's brakes are subjected to heavy use or adverse operating conditions such as:

- Frequent brake applications while fully loaded.
- Operation on hilly or mountainous terrain.
- Frequent operation on dirt, gravel or mud.

Some aftermarket brake linings also require more frequent inspections.

Do not manually adjust the automatic slack adjusters to correct excessive pushrod stroke as it may result in reduced brake effectiveness and a vehicle crash. Excessive pushrod stroke indicates that a problem exists with the automatic adjuster, with the installation of the adjuster, or with foundation brake components that manual adjustment will not remedy. Seek service from a qualified facility for excessive pushrod stroke.

SCHEDULED MAINTENANCE GUIDE

MAINTENANCE SERVICES AND RECORD RETENTION

The maintenance record form which follows is for your convenience. In addition to recording the services performed, you should retain copies of your receipts for the services. You also should keep records of any emission control systems maintenance services performed on your vehicle.

Maintenance Record

Warranty Start Date _____ Engine Displacement _____

Vehicle Identification Number _____ Owner Name _____

IMPORTANT — This document should remain with the vehicle at all times.

Daily owner checks	
Engine	Check the air filter restriction gauge.
	Check the engine oil.
	Inspect the coolant level (6.0L Power Stroke engine; Caterpillar and Cummins engines, refer to the Owner's Manual).
Brake system	Check the air brake system reservoir automatic drain valve operation.
	Drain the air brake system reservoir - manual valve.
Transmission system	Visually check the automatic transmission for fluid leakage.
Steering system	Check the power steering pump fluid level and check the system for leaks.
	Check the entire vehicle for evidence of fluid leaks.
U.S. Department of Transportation, Federal Highway Administration requirements (ensure that the entire system is functioning properly)	Check the service brakes.
	Check the parking brake.
	Check the steering mechanism.
	Check the lighting devices and reflectors.
	Check the tires.
	Check the horn.
	Check the windshield wipers.
	Check the rear vision mirrors.
	Check the wheels and rims.
	Check the emergency equipment.

Check every oil change (Oil change interval for the 6.0L Power Stroke engine is 10,000 miles [16,000 km]; (refer to the Caterpillar and Cummins service manuals for instructions and information)	
Engine system	Check the engine cooling system - hoses, clamps and protection*.
	Inspect the drive belts.
Exhaust system	Inspect the entire exhaust system (including the inlet pipe(s), muffler(s), outlet pipe(s), clamps and fasteners) for holes, leakage, breakage, corrosive damage and separation from other components. Adjust, service or replace with the same or the equivalent part. (Also a noise emission control service).
Suspension system	Tighten the front and rear spring U-bolts to the specified torque.
Driveline and rear axle system	Lubricate the U-joints and the slip yoke.
Brake system	Lube the air brake foot control valve, hinge and roller.
	Inspect the drum brake linings through the inspection holes.
	Lubricate the brake camshafts (air brakes only).
	Lubricate the brake slack adjuster (air brakes only).
	Lubricate rear caliper slide rails.
	Inspect the disc brake pads and the piston boots (hydraulic brakes only).
Clutch system	Lubricate the clutch release cross shaft and all linkages.
	Check the clutch fluid.

Check every oil change (Oil change interval for the 6.0L Power Stroke engine is 10,000 miles [16,000 km]; (refer to the Caterpillar and Cummins service manuals for instructions and information)	
Fuel system	Drain the accumulated water or sediment from the fuel tank(s).
Steering system	Lubricate the steering shaft(s), U-joints and splines when equipped with grease fittings.
	Lubricate the front axle spindle pins.
	Lubricate the steering linkage when equipped with grease fittings.
	Grease the power steering gear output shaft.
* Coolant protection checks should be made just prior to the onset of freezing weather, where applicable. If coolant is dirty or rusty in appearance, the system should be drained, flushed and refilled with the prescribed solution of cooling system fluid and water. Use only permanent type coolant that meets Ford specifications WSS-M97B51-A1. See the engine manufacturer's operating guide for supplemental corrosion inhibitor specifications.	

In addition to the items to be performed daily or at each oil change, the following need to be completed as specified:

GENERAL MAINTENANCE SERVICES

The following are vehicle checks that should be made periodically either by the owner or a qualified technician. It is recommended that deficiencies be brought to the attention of your dealer or another qualified service outlet as soon as possible in order that advice regarding the need for service or replacement can be obtained.

Maintenance Operation	Frequency - Observation
Inspect the automatic slack adjuster function	Insufficient power shown in loaded practice stop.
Check the operation of the brakes, the clutch, and the steering (1),(2)	Vehicle handling qualities not up to par.
Inspect the vehicle for missing, damaged, or mislocated noise shields	Excessive noise emanates from under the cab or engine compartment.
Check the engine performance and the engine governor	Excessive engine noise.
Inspect the fan, the fan shroud, and the fan clutch	Engine overheats, fan runs at high speed constantly, excessive fan noise, or fan wobble due to worn bearings.
Check for operation of ABS warning lamp	At each engine start up.
Inspect the entire exhaust system (including inlet pipe, muffler, outlet pipe and all exhaust clamps and fasteners) for holes, leakage, breakage, looseness and corrosive damage	Excessive noise or the smell of fumes is experienced.
Inspect the engine air induction system (including the air ducts and the air filter) for loose fitting, damaged or missing components	Excessive noise emanates from the engine compartment.
Inspect the tires and check the air pressure (3)	Poor steering, wandering or excessive tire wear.
Balance the wheels and the tires	Vibration or abnormal tire wear indicates imbalance.
Check the front end alignment (3)	Poor steering, wandering or excessive tire wear.
Check the transmission and engine mountings (2)	Hard shifting or excessive vibration.

Maintenance Operation	Frequency - Observation
Check and adjust transmission controls [2]	High effort to shift or noisy transmission.
Check fuel pump pressure	Insufficient full-throttle power or backfiring.
Clean radiator cap seal. Clean and inspect the cap surface on the radiator	When the cap does not hold pressure.
Check the battery terminals for corrosion	Whenever electrical power supply has diminished.
Tighten the wheel mounting nuts to the specified torque. Refer to *Servicing your wheels and tires* in the *Maintenance and Specifications* chapter	Required initially at 500 and 1000 miles (800 and 1600 km). Perform again at 500 and 1000 mile (800 and 1600 km) intervals after each tire removal/replacement.
Clean body/door drain holes	At least twice annually.
Clean windshield wiper blades	As required.
Replace windshield wiper blades	If wiping the blades with a clean cloth and mild detergent and washing with a cleaner does not restore a clean wipe.
Lubricate body lock cylinders	Noisy or difficult to operate.
Check headlamp alignment	Lamp beams in wrong position when vehicle operating loaded.
Check windshield washer fluid level; add fluid if required	If washes do not spray when operated.
[1] - During maintenance and repair, protect the fuel tube and the hose assemblies, the power steering lines, and the brake lines from the external heat, the acids and the abrasion that could damage the lines.	
[2] - Check for (free) linkage action and ensure that (return) spring force is adequate to maintain pedal free play.	
[3] - Adjust, repair or replace as required with the same or equivalent parts.	

Component	On-Highway (60,000 miles [96,000 km] or more annually) - Miles, kilometers or months - whichever occurs first													
Miles (x 1000)	**15**	**30**	**45**	**60**	**75**	**90**	**105**	**120**	**135**	**150**
Kilometers (x 1000)	**24**	**48**	**72**	**96**	**120**	**144**	**168**	**192**	**216**	**240**
Months	**3**	**6**	**9**	**12**	**15**	**18**	**21**	**24**	**27**	**30**
Non-driving front axle										
Wheel bearing - oil type - check level	•	•	•	•	•	•	•	•	•	•
Wheel bearing - oil type - change oil						•				
Wheel bearing - grease type - repack		•		•		•		•		•
Tie rod ends - lubricate	•	•	•	•	•	•	•	•	•	•
Drag link - lubricate	•	•	•	•	•	•	•	•	•	•
King pin and bushing - lubricate	•	•	•	•	•	•	•	•	•	•
Brake system - air										
Slack adjusters - lubricate				•				•		
S-cam - lubricate	•	•	•	•	•	•	•	•	•	•
Brake system - hydraulic										
Master cylinder - check level	•	•	•	•	•	•	•	•	•	•
Park brake relay lever / linkage - lubricate				•				•		
Steering										
Power steering fluid - check level	•	•	•	•	•	•	•	•	•	•
Power steering fluid - change fluid						•				
Power steering filter - replacement	Five years or 500,000 miles (800,000 km)									
Steering gear Ross TAS - output shaft - lubricate			•			•			•	
Steering column u-joints / slip joint - lubricate	•	•	•	•	•	•	•	•	•	•

Component	On-Highway (Continued) (60,000 miles [96,000 km] or more annually) - Miles, kilometers or months - whichever occurs first												
Miles (x 1000)	**15**	**30**	**45**	**60**	**75**	**90**	**105**	**120**	**135**	**150**
Kilometers (x 1000)	**24**	**48**	**72**	**96**	**120**	**144**	**168**	**192**	**216**	**240**
Months	**3**	**6**	**9**	**12**	**15**	**18**	**21**	**24**	**27**	**30**
Propeller shaft SPL										
U-joint - lubricate	•		•		•		•		•	
Propeller shaft non-SPL										
U-joint and slip joint - lubricate	•	•	•	•	•	•	•	•	•	•
Clutch										
Release bearing / shafts / forks - lubricate	•	•	•	•	•	•	•	•	•	•
Cooling system										
Coolant - check level	•	•	•	•	•	•	•	•	•	•
Coolant - check freeze protection	•	•	•	•	•	•	•	•	•	•
Extended life coolant - add extender	See engine manufacturer's recommendation									
Extended life coolant - replace	See engine manufacturer's recommendation									
Engine - Refer to engine manual for Caterpillar and Cummins. 6.0L Power Stroke - see 6.0L Engine section at end of chart										
Transmission										
Automatic and Auto-shift transmissions	Refer to transmission operator's manual									
Manual transmission - check fluid level	•	•	•	•	•	•	•	•	•	•
Eaton-Fuller manual transmission - petroleum oil change				•				•		

Component	On-Highway (Continued) (60,000 miles [96,000 km] or more annually) - Miles, kilometers or months - whichever occurs first													
Miles (x 1000)	**15**	**30**	**45**	**60**	**75**	**90**	**105**	**120**	**135**	**150**
Kilometers (x 1000)	**24**	**48**	**72**	**96**	**120**	**144**	**168**	**192**	**216**	**240**
Months	**3**	**6**	**9**	**12**	**15**	**18**	**21**	**24**	**27**	**30**
Eaton-Fuller manual transmission - synthetic oil change	Factory fill w/synthetic at 500,000 miles (800,000 km); Converted to synthetic at 250,000 miles (400,000 km)									
Rear axle										
Fluid level - check	•	•	•	•	•	•	•	•	•	•
Eaton / Dana / Spicer petroleum oil - change				•				•		
Eaton / Dana / Spicer synthetic oil - change	Factory fill w/synthetic at 500,000 miles (800,000 km); Converted to synthetic at 250,000 miles (400,000 km) or three years									
Cab components										
Door hinges / Latches / Strikers - lubricate, check link				•				•		
Door lock cylinders - lubricate				•				•		
Seat adjuster slides - lubricate				•				•		

Component	On-Highway (60,000 Miles [96,000 km] or more annually) - Miles, kilometers or months - whichever occurs first												
Miles (x 1000)	**165**	**180**	**195**	**210**	**225**	**240**	**255**	**270**	**285**	**300**			
Kilometers (x 1000)	**264**	**288**	**312**	**336**	**360**	**384**	**408**	**432**	**456**	**480**			
Months	**33**	**36**	**39**	**42**	**45**	**48**	**51**	**54**	**57**	**60**			
Non-driving front axle													
Wheel bearing - oil type - check level	•	•	•	•	•	•	•	•	•	•			
Wheel bearing - oil type - change oil		•						•					
Wheel bearing - grease type - repack		•		•		•		•		•			
Tie rod ends - lubricate	•	•	•	•	•	•	•	•	•	•			
Drag link - lubricate	•	•	•	•	•	•	•	•	•	•			
King pin and bushing - lubricate	•	•	•	•	•	•	•	•	•	•			
Brake system - air													
Slack adjusters - lubricate		•				•				•			
S-cam - lubricate	•	•	•	•	•	•	•	•	•	•			
Brake system - hydraulic													
Master cylinder - check fluid level	•	•	•	•	•	•	•	•	•	•			
Park brake relay level / linkage - lubricate		•				•							
Steering													
Power steering fluid - check level	•	•	•	•	•	•	•	•	•	•			
Power steering fluid - change level		•						•					
Power steering filter - replacement	Five years or 500,000 miles (800,000 km)												
Steering gear Ross TAS - output seal - lubricate		•			•			•					
Steering column u-joints / slip joint - lubricate	•	•	•	•	•	•	•	•	•	•			

Component	On-Highway (Continued) (60,000 Miles [96,000 km] or more annually) - Miles, kilometers or months - whichever occurs first												
Miles (x 1000)	**165**	**180**	**195**	**210**	**225**	**240**	**255**	**270**	**285**	**300**			
Kilometers (x 1000)	**264**	**288**	**312**	**336**	**360**	**384**	**408**	**432**	**456**	**480**			
Months	**33**	**36**	**39**	**42**	**45**	**48**	**51**	**54**	**57**	**60**			
Propeller shaft SPL													
U-joint - lubricate	•		•		•		•		•				
Propeller shaft non-SPL													
U-joint and slip joint - lubricate	•	•	•	•	•	•	•	•	•	•			
Clutch													
Release bearing / shafts / fork - lubricate	•	•	•	•	•	•	•	•	•	•			
Cooling system													
Coolant - check level	•	•	•	•	•	•	•	•	•	•			
Coolant - check freeze protection	•	•	•	•	•	•	•	•	•	•			
Extended life coolant - add extender	See engine manufacturer's recommendation												
Extended life coolant - replace	See engine manufacturer's recommendation												
Engine - Refer to engine manual for Caterpillar and Cummins. 6.0L Power Stroke - see 6.0L Engine section at end of chart													
Transmission													
Automatic and Auto-shift transmissions	Refer to transmission operator's manual												
Manual transmission - check fluid level	•	•	•	•	•	•	•	•	•	•			
Eaton-Fuller manual transmission - petroleum oil change		•				•				•			

Component	On-Highway (Continued) (60,000 Miles [96,000 km] or more annually) - Miles, kilometers or months - whichever occurs first												
Miles (x 1000)	**165**	**180**	**195**	**210**	**225**	**240**	**255**	**270**	**285**	**300**
Kilometers (x 1000)	**264**	**288**	**312**	**336**	**360**	**384**	**408**	**432**	**456**	**480**
Months	**33**	**36**	**39**	**42**	**45**	**48**	**51**	**54**	**57**	**60**
Eaton-Fuller manual transmission - synthetic oil change	Factory fill w/synthetic at 500,000 miles (800,000 km); Converted to synthetic at 250,000 miles (400,000 km)									
Rear axle										
Fluid level - check	•	•	•	•	•	•	•	•	•	•
Eaton / Dana / Spicer petroleum oil - change		•				•				•
Eaton / Dana / Spicer synthetic oil - change	Factory fill w/synthetic at 500,000 miles (800,000 km); Converted to synthetic at 250,000 miles (400,000 km) or three years									
Cab components										
Door hinges / Latches / Strikers - lubricate, check link		•				•				•
Door lock cylinders - lubricate		•				•				•
Seat adjuster slides - lubricate		•				•				•

Component	City (60,000 Miles [96,000 km] or less annually) - Miles, kilometers or months - whichever occurs first													
	Miles (x 1000)	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**			
	Kilometers (x 1000)	**16**	**32**	**48**	**64**	**80**	**96**	**112**	**128**	**144**	**160**			
	Months	**3**	**6**	**9**	**12**	**15**	**18**	**21**	**24**	**27**	**30**			
Non-driving front axle														
Wheel bearing - oil type - check level		•	•	•	•	•	•	•	•	•	•			
Wheel bearing - oil type - change oil					•				•					
Wheel bearing - grease type - repack					•				•					
Tie rod ends - lubricate		•	•	•	•	•	•	•	•	•	•			
Drag link - lubricate		•	•	•	•	•	•	•	•	•	•			
King pin and bushing - lubricate		•	•	•	•	•	•	•	•	•	•			
Brake system - air														
Slack adjusters - lubricate					•				•					
S-cam - lubricate		•	•	•	•	•	•	•	•	•	•			
Brake system - hydraulic														
Master cylinder - check fluid level		•	•	•	•	•	•	•	•	•	•			
Park brake relay lever / linkage - lubricate				•			•			•				
Steering														
Power steering fluid - check level		•	•	•	•	•	•	•	•	•	•			
Power steering fluid - change fluid					•				•					
Power steering filter - replacement	Five years or 50,000 miles (80,000 km)													
Steering gear Ross TAS - output seal - lubricate				•			•			•				
Steering column u-joints / slip joint - lubricate		•	•	•	•	•	•	•	•	•	•			

Component	City (Continued) (60,000 Miles [96,000 km] or less annually) - Miles, kilometers or months - whichever occurs first												
	Miles (x 1000)	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**
	Kilometers (x 1000)	**16**	**32**	**48**	**64**	**80**	**96**	**112**	**128**	**144**	**160**
	Months	**3**	**6**	**9**	**12**	**15**	**18**	**21**	**24**	**27**	**30**
Propeller shaft SPL											
U-joint - lubricate		•		•		•		•		•	
Propeller shaft non-SPL											
U-joint and slip joint - lubricate		•	•	•	•	•	•	•	•	•	•
Clutch											
Release bearing / shafts / fork - lubricate		•	•	•	•	•	•	•	•	•	•
Cooling system											
Coolant - check level		•	•	•	•	•	•	•	•	•	•
Coolant - check freeze protection		•	•	•	•	•	•	•	•	•	•
Extended life coolant - add extender		See engine manufacturer's recommendation									
Extended life coolant - replace		See engine manufacturer's recommendation									
Engine - refer to engine manual for Caterpillar and Cummins. 6.0L Power Stroke, see 6.0L engine section at end of charts											
Transmission											
Automatic and Auto-shift transmissions		Refer to transmission operator's manual									
Manual transmission - check fluid level		•	•	•	•	•	•	•	•	•	•
Eaton-Fuller manual transmission - petroleum oil change						•					•

Component	City (Continued) (60,000 Miles [96,000 km] or less annually) - Miles, kilometers or months - whichever occurs first												
	Miles (x 1000)	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**
	Kilometers (x 1000)	**16**	**32**	**48**	**64**	**80**	**96**	**112**	**128**	**144**	**160**
	Months	**3**	**6**	**9**	**12**	**15**	**18**	**21**	**24**	**27**	**30**
Rear axle											
Fluid level - check		•	•	•	•	•	•	•	•	•	•
Eaton / Dana / Spicer petroleum oil - change						•					•
Cab components											
Door hinges / latches / strikers - lubricate, check link				•			•			•	
Door lock cylinders - lubricate				•			•			•	
Seat adjuster slides - lubricate				•			•			•	

Component	City (60,000 Miles [96,000 km] or less annually) - Miles, kilometers or months - whichever occurs first														
	Miles (x 1000)	**110**	**120**	**130**	**140**	**150**	**160**	**170**	**180**	**190**	**200**				
	Kilometers (x 1000)	**176**	**192**	**208**	**224**	**240**	**256**	**272**	**288**	**304**	**320**				
	Months	**33**	**36**	**39**	**42**	**45**	**48**	**51**	**54**	**57**	**60**				
Non-driving front axle															
Wheel bearing - oil type - check level		•	•	•	•	•	•	•	•	•	•				
Wheel bearing - oil type - change oil			•				•				•				
Wheel bearing - grease type - repack			•				•				•				
Tie rode ends - lubricate		•	•	•	•	•	•	•	•	•	•				
Drag link - lubricate		•	•	•	•	•	•	•	•	•	•				
King pin and bushing - lubricate		•	•	•	•	•	•	•	•	•	•				
Brake system - air															
Slack adjusters - lubricate			•				•				•				
S-cam - lubricate		•	•	•	•	•	•	•	•	•	•				
Brake system - hydraulic															
Master cylinder - check fluid level		•	•	•	•	•	•	•	•	•	•				
Park brake relay lever / linkage - lubricate			•			•			•						
Steering															
Power steering fluid - check level		•	•	•	•	•	•	•	•	•	•				
Power steering fluid - change fluid			•				•				•				
Power steering filter - replacement		Five years or 50,000 miles (80,000 km)													
Steering gear Ross TAS - output seal - lubricate			•			•			•						
Steering column u-joints / slip joint - lubricate		•	•	•	•	•	•	•	•	•	•				

Component	City (Continued) (60,000 Miles [96,000 km] or less annually) - Miles, kilometers or months - whichever occurs first												
	Miles (x 1000)	**110**	**120**	**130**	**140**	**150**	**160**	**170**	**180**	**190**	**200**
	Kilometers (x 1000)	**176**	**192**	**208**	**224**	**240**	**256**	**272**	**288**	**304**	**320**
	Months	**33**	**36**	**39**	**42**	**45**	**48**	**51**	**54**	**57**	**60**
Propeller shaft SPL											
U-joint - lubricate		•		•		•		•		•	
Propeller shaft non-SPL											
U-joint and slip joint - lubricate		•	•	•	•	•	•	•	•	•	•
Clutch											
Release bearing / shafts / fork - lubricate		•	•	•	•	•	•	•	•	•	•
Cooling system											
Coolant - check level		•	•	•	•	•	•	•	•	•	•
Coolant - check freeze protection		•	•	•	•	•	•	•	•	•	•
Extended life coolant - add extender		See engine manufacturer's recommendation									
Extended life coolant - replace		See engine manufacturer's recommendation									
Engine - refer to engine manual for Caterpillar and Cummins. 6.0L Power Stroke, see 6.0L engine section at end of charts											
Transmission											
Automatic and Auto-shift transmission		Refer to transmission operator's manual									
Manual transmission - check fluid level		•	•	•	•	•	•	•	•	•	•
Eaton-Fuller manual transmission - petroleum oil change						•					•

Component	City (Continued) (60,000 Miles [96,000 km] or less annually) - Miles, kilometers or months - whichever occurs first													
	Miles (x 1000)	**110**	**120**	**130**	**140**	**150**	**160**	**170**	**180**	**190**	**200**
	Kilometers (x 1000)	**176**	**192**	**208**	**224**	**240**	**256**	**272**	**288**	**304**	**320**
	Months	**33**	**36**	**39**	**42**	**45**	**48**	**51**	**54**	**57**	**60**
Eaton-Fuller manual transmission - synthetic oil change		•									
Rear axle											
Fluid level - check	•	•	•	•	•	•	•	•	•	•	•
Eaton / Dana / Spicer petroleum oil - change					•						•
Eaton / Dana / Spicer synthetic oil - change		•									
Cab components											
Door hinges / latches / strikers - lubricate, check link		•			•				•		
Door lock cylinders - lubricate		•			•				•		
Seat adjuster slides - lubricate		•			•				•		

Component	Severe Service (On/Off Road in dirty conditions or 20,000 miles [32,000 km] or less annually) - Miles, kilometers or months - whichever occurs first													
Miles (x 1000)	**5**	**10**	**15**	**20**	**25**	**30**	**35**	**40**	**45**	**50**				
Kilometers (x 1000)	**8**	**16**	**24**	**32**	**40**	**48**	**56**	**64**	**72**	**80**				
Months	**3**	**6**	**9**	**12**	**15**	**18**	**21**	**24**	**27**	**30**				
Non-driving front axle														
Wheel bearing - oil type - check level	•	•	•	•	•	•	•	•	•	•				
Wheel bearing - oil type - change oil				•				•						
Wheel bearing - grease type - repack				•				•						
Tie rod ends - lubricate	•	•	•	•	•	•	•	•	•	•				
Drag link - lubricate	•	•	•	•	•	•	•	•	•	•				
King pin and bushing - lubricate	•	•	•	•	•	•	•	•	•	•				
Brake system - air														
Slack adjusters - lubricate				•				•						
S-cam - lubricate	•	•	•	•	•	•	•	•	•	•				
Brake system - hydraulic														
Master cylinder - check fluid level	•			•		•								
Park brake relay lever / linkage - lubricate			•			•			•					
Steering														
Power steering fluid - check fluid level	•	•	•	•	•	•	•	•	•	•				
Power steering fluid - change fluid				•				•						
Steering gear Ross TAS - output seal - lubricate			•			•			•					
Steering column u-joints / slip joints - lubricate	•	•	•	•	•	•	•	•	•	•				

Component	Severe Service (Continued) (On/Off Road in dirty conditions or 20,000 miles [32,000 km] or less annually) - Miles, kilometers or months - whichever occurs first												
Miles (x 1000)	**5**	**10**	**15**	**20**	**25**	**30**	**35**	**40**	**45**	**50**
Kilometers (x 1000)	**8**	**16**	**24**	**32**	**40**	**48**	**56**	**64**	**72**	**80**
Months	**3**	**6**	**9**	**12**	**15**	**18**	**21**	**24**	**27**	**30**
Propeller shaft - SPL										
Slip joint - inspect boot	•	•	•	•	•	•	•	•	•	•
U-joint - lubricate	•	•	•	•	•	•	•	•	•	•
Propeller shaft - non-SPL										
U-joint and slip joint - lubricate	•	•	•	•	•	•	•	•	•	•
Clutch										
Release bearing / shafts / forks	•	•	•	•	•	•	•	•	•	•
Cooling system										
Coolant - check level	•	•	•	•	•	•	•	•	•	•
Coolant - check freeze protection	•	•	•	•	•	•	•	•	•	•
Extended life coolant - add extender	See engine manufacturer's recommendation									
Extended life coolant - replace	See engine manufacturer's recommendation									
Engine - refer to engine manual for Caterpillar and Cummins. 6.0L Power Stroke see 6.0L engine section at end of charts										
Transmission										
Automatic and Auto-shift transmissions	Refer to transmission operator's manual									
Manual transmission - check fluid level	•	•	•	•	•	•	•	•	•	•
Eaton-Fuller manual transmission - petroleum oil change				•				•		

Component	Severe Service (Continued) (On/Off Road in dirty conditions or 20,000 miles [32,000 km] or less annually) - Miles, kilometers or months - whichever occurs first												
Miles (x 1000)	**5**	**10**	**15**	**20**	**25**	**30**	**35**	**40**	**45**	**50**
Kilometers (x 1000)	**8**	**16**	**24**	**32**	**40**	**48**	**56**	**64**	**72**	**80**
Months	**3**	**6**	**9**	**12**	**15**	**18**	**21**	**24**	**27**	**30**
Rear axle										
Fluid level - check	•	•	•	•	•	•	•	•	•	•
Eaton / Dana / Spicer - petroleum oil change				•				•		•
Eaton / Dana / Spicer - synthetic oil change				•				•		
Cab components										
Door hinges / latches / strikers - lubricate, check link				•				•		
Door lock cylinders - lubricate				•				•		
Seat adjuster slides - lubricate				•				•		

Component	Severe Service (On/Off Road in Dirty Conditions or 20,000 miles [32,000 km] or less annually) - Miles, kilometers or months - whichever occurs first													
Miles (x 1000)	**55**	**60**	**65**	**70**	**75**	**80**	**85**	**90**	**95**	**100**
Kilometers (x 1000)	**88**	**96**	**104**	**112**	**120**	**128**	**136**	**144**	**152**	**160**
Months	**33**	**36**	**39**	**42**	**45**	**48**	**51**	**54**	**57**	**60**
Non-driving front axle										
Wheel bearing - oil type - check level	•	•	•	•	•	•	•	•	•	•
Wheel bearing - oil type - change oil		•				•				•
Wheel bearing - grease type - repack		•				•				•
Tie rod ends - lubricate	•	•	•	•	•	•	•	•	•	•
Drag link - lubricate	•	•	•	•	•	•	•	•	•	•
King pin and bushing - lubricate	•	•	•	•	•	•	•	•	•	•
Brake system - air										
Slack adjusters - lubricate		•				•				•
S-cam - lubricate	•	•	•	•	•	•	•	•	•	•
Brake system - hydraulic										
Master cylinder - check fluid level	•	•	•	•	•	•	•	•	•	•
Park brake relay lever / linkage - lubricate		•			•			•		
Steering										
Power steering fluid - check level	•	•	•	•	•	•	•	•	•	•
Power steering fluid - change fluid		•				•				•
Power steering filter - replacement		•								
Steering gear Ross TAS - output seal - lubricate		•			•			•		
Steering column u-joints / slip joint - lubricate	•	•	•	•	•	•	•	•	•	•

Component	Severe Service (Continued) (On/Off Road in Dirty Conditions or 20,000 miles [32,000 km] or less annually) - Miles, kilometers or months - whichever occurs first												
Miles (x 1000)	**55**	**60**	**65**	**70**	**75**	**80**	**85**	**90**	**95**	**100**
Kilometers (x 1000)	**88**	**96**	**104**	**112**	**120**	**128**	**136**	**144**	**152**	**160**
Months	**33**	**36**	**39**	**42**	**45**	**48**	**51**	**54**	**57**	**60**
Propeller shaft SPL										
Slip joint - inspect boot	•	•	•	•	•	•	•	•	•	•
U-joint - lubricate	•	•	•	•	•	•	•	•	•	•
Propeller shaft non-SPL										
U-joint and slip joint - lubricate	•	•	•	•	•	•	•	•	•	•
Clutch										
Release bearing / shafts / fork - lubricate	•	•	•	•	•	•	•	•	•	•
Cooling system										
Coolant - check level	•	•	•	•	•	•	•	•	•	•
Coolant - check freeze protection	•	•	•	•	•	•	•	•	•	•
Extended life coolant - add extender	See engine manufacturer's recommendation									
Extended life coolant - replace	See engine manufacturer's recommendation									
Engine - refer to engine manual for Caterpillar and Cummins. 6.0L Power Stroke see 6.0L engine section at end of charts										
Transmission										
Automatic and Auto-shift transmissions	Refer to transmission operator's manual									
Manual transmission - check fluid level	•	•	•	•	•	•	•	•	•	•
Eaton-Fuller manual transmission - petroleum oil change		•				•				•

Component	Severe Service (Continued) (On/Off Road in Dirty Conditions or 20,000 miles [32,000 km] or less annually) - Miles, kilometers or months - whichever occurs first													
Miles (x 1000)	**55**	**60**	**65**	**70**	**75**	**80**	**85**	**90**	**95**	**100**				
Kilometers (x 1000)	**88**	**96**	**104**	**112**	**120**	**128**	**136**	**144**	**152**	**160**				
Months	**33**	**36**	**39**	**42**	**45**	**48**	**51**	**54**	**57**	**60**				
Eaton-Fuller manual transmission - synthetic oil change		•				•								
Rear axle														
Fluid level - check	•	•	•	•	•	•	•	•	•	•				
Eaton / Dana / Spicer petroleum oil - change		•				•				•				
Eaton / Dana / Spicer synthetic oil - change		•				•								
Cab components														
Door hinges / latches / strikers - lubricate, check link		•				•				•				
Door lock cylinders - lubricate		•				•				•				
Seat adjuster slides - lubricate		•				•				•				

Date: Odometer reading: R.O.#	Dealer's Stamp:

Date: Odometer reading: R.O.#	Dealer's Stamp:

Date: Odometer reading: R.O.#	Dealer's Stamp:

Date: Odometer reading: R.O.#	Dealer's Stamp:

Date: Odometer reading: R.O.#	Dealer's Stamp:

Date: Odometer reading: R.O.#	Dealer's Stamp:

Date: Odometer reading: R.O.#	Dealer's Stamp:

Date: Odometer reading: R.O.#	Dealer's Stamp:

Date: Odometer reading: R.O.#	Dealer's Stamp:

Date: Odometer reading: R.O.#	Dealer's Stamp:

Date: Odometer reading: R.O.#	Dealer's Stamp:

Date: Odometer reading: R.O.#	Dealer's Stamp:

Date: Odometer reading: R.O.#	Dealer's Stamp:

Date: Odometer reading: R.O.#	Dealer's Stamp:

Date: Odometer reading: R.O.#	Dealer's Stamp:

Date: Odometer reading: R.O.#	Dealer's Stamp:

Date: Odometer reading: R.O.#	Dealer's Stamp:

Date: Odometer reading: R.O.#	Dealer's Stamp:

Date: **Odometer reading:** **R.O.#**	**Dealer's Stamp:**

Date: **Odometer reading:** **R.O.#**	**Dealer's Stamp:**

6.0 Power Stroke Engine																			
Component	Miles (x 1000)	10	20	30	40	50	60	70	80	90	100	110	120
	Kilometers (x 1000)	16	32	48	64	80	96	112	128	144	160	176	192
	Hours	350	700	1050	1400	1750	2100	2450	2800	3150	3500	3850	4200
	Months	6	12	18	24	30	36	42	48	54	60	66	72
Change engine oil and filter[1]		•	•	•	•	•	•	•	•	•	•	•	•
Inspect belt		•	•	•	•	•	•	•	•	•	•	•	•
Clean fuel filter pre-strainer[2]		•	•	•	•	•	•	•	•	•	•	•	•
Change fuel filter[2,3]			•		•		•		•		•		•
Measure air intake restriction[4,5]			•		•		•		•		•		•
Service the cooling system											•		
Inspect electrical system (Every 12 months, 100,000 miles [160,000 km] or 3,800 hours)			•		•		•		•		•		•
Pressurize air induction system (every 12 months)			•		•		•		•		•		•

6.0 Power Stroke Engine																		
Component	Miles (x 1000)	130	140	150	160	170	180	190	200	210	220	230	250					
	Kilometers (x 1000)	208	224	240	256	272	288	304	320	336	352	368	384					
	Hours	4550	4900	5250	5600	5950	6300	6650	7000	7350	7700	8050	8400					
	Months	78	84	90	96	102	108	114	120	126	132	138	144					
Change engine oil and filter[1]		•	•	•	•	•	•	•	•	•	•	•	•					
Inspect belt		•	•	•	•	•	•	•	•	•	•	•	•					
Clean fuel filter pre-strainer[2]		•	•	•	•	•	•	•	•	•	•	•	•					
Change fuel filter[2,3]			•		•		•		•		•		•					
Measure air intake restriction[4,5]			•		•		•		•		•		•					
Service the cooling system				•					•				•					
Inspect electrical system (Every 12 months, 100,000 miles [160,000 km] or 3,800 hours)			•		•		•		•		•		•					
Pressurize air induction system (every 12 months)			•		•		•		•		•		•					

[1]If fuel is more than 0.05% but less than 1.0% sulfur, change oil at 75% of regular interval. If 1.0% or higher, change oil at 50% of scheduled interval.

[2]If refueling source is prone to water contamination, also clean the fuel filter pre-strainer.

[3]Change according to transfer pump minimum specifications.

[4]Service air filter as required.

[5]Refer to PCED manual for specification.

SPECIAL OPERATING CONDITIONS

If your driving habits **frequently** include one or more the following conditions:

- Short trips of **less** than 10 miles (16 km) when outside temperatures remain below freezing.
- Operating during **hot weather** in stop-and-go “rush hour” traffic.
- Operating in severe dust conditions.
- Extensive idling, or low speed operation such as door-to-door delivery service.
- High speed operation with a fully loaded vehicle (maximum GVW).
- Snowplowing.

Perform the following:

- Change engine oil and oil filter every three months, 5,000 miles (8,000 km) or 125 hours of engine service.
- If the vehicle is used for stationary use, change engine oil and filter every three months, 5,000 miles or 200 hours of engine operation, whichever comes first.
- If operating in severe dust conditions, replace the air filter more often than regular intervals as determined by the air filter restriction gauge. Make sure that the air filter restriction gauge is in good working order.
- Lube the manual transmission and the rear axle every 30,000 miles (48,000 km) or six months, whichever comes first.
- See the Allison, Cummins and Caterpillar Operator’s Manual.

Date: Odometer reading: R.O.#	Dealer's Stamp:

See corresponding mileage in maintenance schedule for services performed.

Date: Odometer reading: R.O.#	Dealer's Stamp:

See corresponding mileage in maintenance schedule for services performed.

Date: Odometer reading: R.O.#	Dealer's Stamp:

See corresponding mileage in maintenance schedule for services performed.

Date: Odometer reading: R.O.#	Dealer's Stamp:

See corresponding mileage in maintenance schedule for services performed.

MOTORCRAFT PREMIUM GOLD COOLANT CHANGE RECORD

The charts below will help you calculate your next service interval for your engine coolant change. Your first engine coolant change should occur at six years or 105,000 miles (170,000 km), whichever comes first. After the first coolant change the coolant should be changed every three years or 45,000 miles (72,000 km) whichever comes first.

Current mileage goes here =>		**Dealer Stamp**
Add 45,000 miles to the current miles	+ 45,000	
Next change due at this mileage =>		
Or		
Today's date goes here =>		
Add 3 years	+ 00 / 00 / 03	
Date of next change =>		**P & A CODE**
whichever comes first		**R.O.#**

Current mileage goes here =>		**Dealer Stamp**
Add 45,000 miles to the current miles	+ 45,000	
Next change due at this mileage =>		
Or		
Today's date goes here =>		
Add 3 years	+ 00 / 00 / 03	
Date of next change =>		**P & A CODE**
whichever comes first		**R.O.#**

Current mileage goes here =>		**Dealer Stamp**
Add 45,000 miles to the current miles	+ 45,000	
Next change due at this mileage =>		
Or		
Today's date goes here =>		
Add 3 years	+ 00 / 00 / 03	
Date of next change =>		**P & A CODE**
whichever comes first		**R.O.#**

Current mileage goes here =>		**Dealer Stamp**
Add 45,000 miles to the current miles	+ 45,000	
Next change due at this mileage =>		
Or		
Today's date goes here =>		
Add 3 years	+ 00 / 00 / 03	
Date of next change =>		**P & A CODE**
whichever comes first		**R.O.#**

A

Air conditioning 50
manual heating and air conditioning system 50
Air suspension 119–120
Anti-lock brake system (see Brakes) 117
Audio system (see Radio) 32, 34, 38, 43
Automatic transmission 121
fluid, adding 198
fluid, checking 198
fluid, refill capacities 228
fluid, specification 214
Auxiliary power point 59
Axle 130, 167, 204
lubricant specifications 214
refill capacities 227

B

Battery 179
charging system warning light 22
jumping a disabled battery 148
servicing 268
voltage gauge 27
BeltMinder® 79
Brakes 99, 104, 168
adjustment 170
anti-lock 117–118
anti-lock brake system (ABS) warning light 22, 118
brake warning light 22
fluid, checking and adding 170, 196
fluid, specifications 214
parking 100, 106, 171
Bulbs 54

C

Catalytic converter (see Emission control) 171
CD-single premium 32
Cell phone use 7
Child safety restraints 84
child safety belts 84
Child safety seats 86
attaching with tether straps 90
in front seat 88
in rear seat 88
tether anchorage hardware 90
Child safety seats - booster seats 84
Cleaning your vehicle
chrome and aluminum parts 161
engine compartment 161
exterior 163
instrument panel 162
interior 162
interior trim 162
plastic parts 161
washing 160
waxing 160
wheels 161
Climate control (see Air conditioning or Heating) 49–50
Clutch 123, 197
adjusting 197
fluid 197
operation while driving 124
specifications 214
Controls
power seat 71
Coolant 181
checking and adding 181–182
disposal 184

recovery reservoir 181
refill capacities 228
specifications 214
temperature gauge 27
Cruise control
(see Speed control) 63
Customer Assistance 140, 156
Ford accessories for your vehicle 163
Getting assistance outside the U.S. and Canada 156, 158
Getting roadside assistance ...140
Getting the service you need 156
Ordering additional owner's literature 159

D

Daytime running lamps
(see Lamps) 52
Defects, reporting 159
Defrost 49–50
windshield 49–50
with heating and air conditioning system 50
with standard heating system 49
Doors
lubricant specifications 214
Driving under special conditions
through water 96

E

Emergencies, roadside
jump-starting 148
Emission control system ..194, 233
catalytic converter 171
Engine
cleaning 161
coolant 181
lubrication specifications 214
Engine fan 185
Engine oil 176
checking and adding 176
oil pressure gauge 27
recommendations 177
refill capacities 228
specifications 214

F

Fan, Engine Cooling 185
Flashers, hazard 141
Fuel 189
calculating fuel economy 191–192
capacity 229
choosing the right fuel 190
filling your vehicle with fuel ..189
filter,
specifications 185, 187–188
gauge 27
improving fuel economy 191–192
running out of fuel 95, 191
safety information relating to automotive fuels 189
Fuses 141, 148

G

Gas mileage
(see Fuel economy) 191–192
Gauges 27
battery voltage gauge 27
engine coolant temperature gauge 27

engine oil pressure gauge 27
fuel gauge 27
odometer 27
speedometer 27
tachometer 27
trip odometer 27

H

Hazard flashers 141
Headlamps 52
aiming 53
daytime running lights 52
high beam 52
warning chime 22
Heating 49–50
heater only system 49
manual heating and air conditioning system 50
Hood 173

I

Ignition 91
chime 22
Infant seats
(see Safety seats) 86
Instrument panel
cleaning 162
lighting up panel and interior 53

J

Jump-starting your vehicle 148

K

Keys
key in ignition chime 22
positions of the ignition 91

L

Lamps
bulb replacement specifications chart 54
cargo lamps 53
daytime running light 52
headlamps 52
high beams 52
instrument panel, dimming 53
interior lamps 54
replacing bulbs 54–57
Lane change indicator
(see Turn signal) 53
Lights, warning and indicator 22
air suspension 22
anti-lock brakes (ABS) 22, 118
brake 22
charging system 22
safety belt 22
service engine soon 22
traction control off 22
turn signal indicator 22
Lubricant specifications 214

M

Manual transmission 125
lubricant specifications 214
Mirrors 61
fold away 63
heated 62
side view mirrors (power) 61

O

Odometer 27

P

Paint chips, repairing 160

Parking brake 100, 106
warning light 22
Power door locks 67
Power mirrors 61
Power point 59
Power steering 173
fluid, checking and adding 195
fluid, refill capacity 228
fluid, specifications 214
Power Take-Off (PTO)
operation 128
Power Windows 59

R

Radio 32, 34, 38, 43
Relays 142
Remote entry system
locking/unlocking doors 67
Roadside assistance 140

S

Safety belts
(see Safety restraints) 74–76
Safety defects, reporting 159
Safety restraints 74–76
BeltMinder® 79
cleaning the safety belts 78
extension assembly 78
for adults 75–76
for children 83–84
lap belt 76
warning light and chime 22, 79
Safety seats for children 86
Scheduled Maintenance
Guide 231
Coolant Change Record 269
General Maintenance
Information 231
Seat belts
(see Safety restraints) 74
Seats 68
child safety seats 86
heated 73
Special notice 6
Specification chart,
lubricants 214
Speed control 63
Speedometer 27
Starting your vehicle 91
jump starting 148
preparing to start your
vehicle 91
Steering 172
Steering wheel
controls 58, 63
tilting 58
Suspension 119–120, 201

T

Tachometer 27
Temperature control
(see Climate control) 49–50
Tires
checking the pressure 210
Towing
wrecker 152
Traction control
off light 22
Transmission 121, 125
automatic operation 121
fluid, checking and adding
(automatic) 198

fluid, checking and adding (manual) 199
fluid, refill capacities 228
lubricant specifications 214
manual operation 125
Turn signal 53

V

Vehicle loading 134–135
Voltmeter (see Battery voltage gauge) 27

W

Warning chimes 22
Warning lights (see Lights) 22
Warranty coverage 6
Washer fluid 175
Washing your vehicle 160
Water, Driving through 96
Waxing your vehicle 160
Wheels 205
Windows
power 59
Windshield
defrosting 49–50
Windshield washer fluid and wipers 58
checking and cleaning 162
operation 58
replacing wiper blades 176
Wrecker towing 152