



GVW A GVW Holdings Company

forward control chassis
P & W series chassis

W0006485A

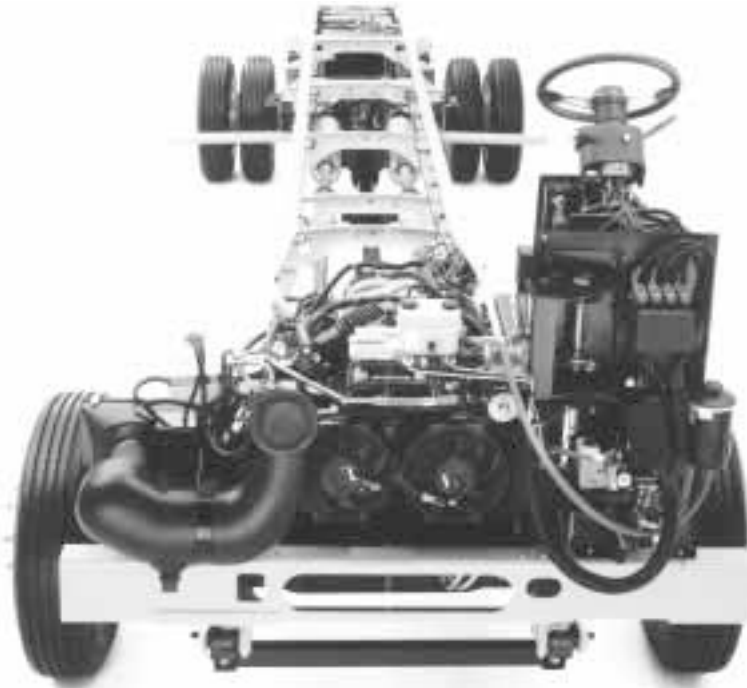


GVW A GVW Holdings Company

Owner's Manual

forward control chassis
P & W series chassis

Workhorse Custom Chassis



“W” Series Chassis

Workhorse Custom Chassis



“P” Series Chassis

Workhorse Custom Chassis Forward Control Vehicle Owner's Manual

Introduction ii

This section explains the safety warnings, cautions and vehicle symbols used in this manual and identifies the model reference information.

Section 1 – Features and Controls 1-1

This section explains how to start and operate your vehicle.

Section 2 – Your Driving and the Road 2-1

Here you will find helpful information and tips about the road and how to drive under different conditions.

Section 3 – Problems on the Road 3-1

This section tells you what to do if you have a problem while driving, such as a flat tire or overheated engine, etc.

Section 4 – Service Information 4-1

Here the manual tells you how to keep your vehicle running properly.

Section 5 – Scheduled Maintenance

Services 5-1

This section tells you when to perform vehicle maintenance and what fluids and lubricants to use.

Section 6 – Customer Assistance &

Warranty Information 6-1

This section explains your warranty coverage, tells you how to contact Workhorse Custom Chassis for assistance and how to obtain service, owner publications, and owner assistance.

Index 8-1

This is an alphabetical listing of almost every subject in this manual. You can use it to quickly find something you want to read.

W0006485A



GVW - A GVW Holdings Company

WORKHORSE CUSTOM CHASSIS, L.L.C.,
Workhorse Emblem are a registered trademark of
Workhorse Custom Chassis.

This Manual includes the latest information at the
time of printing. Workhorse reserves the right to
make changes to this product after printing, without
further notice.

Keep this manual in your vehicle so it will be
available for use if needed. If you sell the vehicle,
please leave the manual in the vehicle for the
new owner.



Workhorse is proud to be ISO 9001:2000 Certified.
NSF-ISR (a subsidiary of NSF International) has
found WORKHORSE to be in compliance to the
ISO 9001:2000 Standards.

Initial Registration and Certification was obtained on
September 23, 2000.

Certificate Number: 83591-3

Classification:

IAF: 22

SIC: 3714

NACE: DM 34

© Copyright Workhorse Custom Chassis 2005
All Rights Reserved
Printed in USA

INDEX

A good place to look for what you need is the Index in back of the manual. It is an alphabetical list of what is in the manual, and the page number where you will find it.

SAFETY WARNINGS AND SYMBOLS

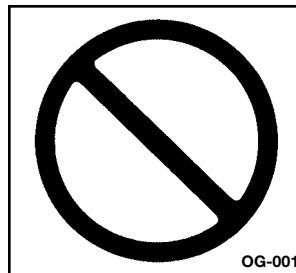
You will find a number of safety cautions in this book. We use a box and the word CAUTION to tell you about things that could hurt you if you were to ignore the warning.



CAUTION

These mean there is something that could hurt you or other people.

In the caution area, we tell you what the hazard is. Then we tell you what to do to help avoid or reduce the hazard. Please read these cautions. If you do not, you or others could be hurt.



You will also find a circle with a slash through it in this book. This safety symbol means “Do not,” “Do not do this” or “Do not let this happen.”

VEHICLE DAMAGE WARNINGS

Also, in this book you will find these Notices:

NOTICE
These mean there is something that could damage your vehicle.























In the notice area, we tell you about something that can damage your vehicle. Many times, this damage would not be covered by your warranty, and it could be costly. But the notice will tell you what to do to help avoid the damage.

When you read other manuals, you might see CAUTION and NOTICE warnings in different colors or in different words.

You will also see warning labels on your vehicle. They use the same words, CAUTION or NOTICE.

VEHICLE SYMBOLS

These are some of the symbols you may find on your vehicles instrument panel.

<p>For example, these symbols are used on an original battery:</p>	<p>These symbols are important for you and your passengers whenever your vehicle is driven:</p>	<p>These symbols have to do with your lamps:</p>	<p>These symbols are used on some of your controls:</p>
<p>CAUTION POSSIBLE INJURY</p> 	<p>DOOR LOCK UNLOCK</p> 	<p>MASTER LIGHTING SWITCH</p> 	<p>WINDSHIELD WIPER</p> 
<p>PROTECT EYES BY SHIELDING</p> 	<p>FASTEN SEAT BELTS</p> 	<p>TURN SIGNALS</p> 	<p>WINDSHIELD WASHER</p> 
<p>CAUSTIC BATTERY ACID COULD CAUSE BURNS</p> 	<p>POWER WINDOW</p> 	<p>PARKING LAMPS</p> 	<p>WINDSHIELD DEFROSTER</p> 
<p>AVOID SPARS OR FLAMES</p> 	<p>AIR BAG</p> 	<p>HAZARD WARNING FLASHER</p> 	<p>REAR WINDOW DEFOGGER</p> 
<p>SPARK OR FLAME COULD EXPLODE BATTERY</p> 		<p>DAYTIME RUNNING LAMPS</p> 	<p>VENTILATING FAN</p> 
		<p>FOG LAMPS</p> 	<p>CRUISE CONTROL</p> 
		<p>HIGH BEAMS</p> 	

These symbols are used on warning and indicator lights:

ENGINE
COOLANT
TEMP



ANTI-LOCK
BRAKES



BATTERY
CHARGING
SYSTEM



TRANSMISSION
FAILURE



BRAKE FAIL
AND PARKING
BRAKE



TIRE PRESSURE
MONITORING



COOLANT



SERVICE
ENGINE SOON



ENGINE OIL
PRESSURE



RANGE
INHIBIT



GRADE
BRAKING



Here are some other symbols you may see:

FUSE :



SPEAKER



LIGHTER



FUEL GAUGE
(GAS)



HORN

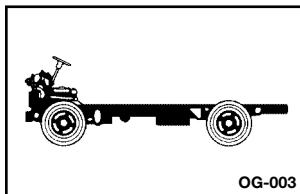


FUEL GAUGE
(DIESEL)



MODEL REFERENCE

This manual covers:



Light and Medium
Duty Forward
Control Chassis
(WORKHORSE
Commercial,
Motor Home, and
Shuttle Bus)

Since Workhorse chassis models are finished in a variety of ways by a number of companies, you will probably find other manuals in your finished vehicle. These manuals are put there by the companies that have added components and equipment to the Workhorse chassis model. Read all these materials (as well as this manual) carefully, to get all the information regarding your vehicle.

This table shows WORKHORSE model numbers and their corresponding chassis type as they are referenced in this manual.

Model Number

P300 42

P300 32

W300 22

W300 24

W300 52

F300 22

Chassis Type

P42 — Commercial

P32 — Motor Home

W22/W20 — Motor Home*

W24 — Motor Home

W52 — Commercial

FE20 — Shuttle Bus

***Note:** all references to the W22 chassis type, throughout this manual, includes the W20 model as well.

NOTES

Here you can learn about the many standard and optional features on your vehicle, and information on starting, shifting and braking. Also explained are the instrument panel and the warning systems that tell you if everything is working properly — and what to do if you have a problem.

New Vehicle “Break-In”	1-2	Parking Over Things That Can Burn	1-36
Ignition Positions	1-2	Engine Exhaust	1-36
Key Release Lever (Manual Transmission)	1-4	Running Your Engine While You Are Parked (Automatic Transmission)	1-37
Starting Your Gasoline Engine	1-5	Horn	1-38
Starting Your Diesel Engine	1-7	Tilt Wheel	1-38
Engine Coolant Heater (If Equipped)	1-10	Turn Signal/Multifunction Lever	1-39
Driving in Snow (Diesel Engines)	1-11	Exterior Lamps	1-49
Automatic Transmission Operation	1-11	I/P Backlighting Adjustments	1-49
Column Shift	1-11	Daytime Running Lamps (DRL)	1-50
Grade Braking (W22, W24, FE20)	1-15	Instrument Panel Cluster Typical	1-51
Electronic Control - Transmission Shifter (ECS)	1-16	Warning Lights, Gauges and Indicators	1-54
Range Inhibit Warning Light (Allison Transmission)	1-24	Instrument Panel Cluster - Typical Gasoline Engines	1-73
Manual Transmission Operation (5.7L and 6.5L Engines)	1-24	Instrument Panel Cluster - Typical Export Gasoline Engine	1-74
Parking Brakes	1-27	Instrument Panel Cluster-Icon Descriptions	1-75
Shifting Into Park (P) (Automatic Transmission)		Warning Light Descriptions	1-76
Column Shift	1-30	Instrument Panel Cluster Model Options Gasoline Engines	1-79
Electronic Control - Transmission Shifter (ECS)	1-32	Cluster Diagnostics	1-82
Shifting Out of Park (P) (Automatic Transmission)		Instrument Cluster Panel - Cummins Diesel Engine	1-94
Column Shift	1-33		
Electronic Control - Transmission Shifter (ECS)	1-34		
Parking Your Vehicle (Manual Transmission)	1-35		

NEW VEHICLE “BREAK-IN”

NOTICE

Your vehicle does not need an elaborate “break-in.” But it will perform better in the long run if you follow these guidelines:

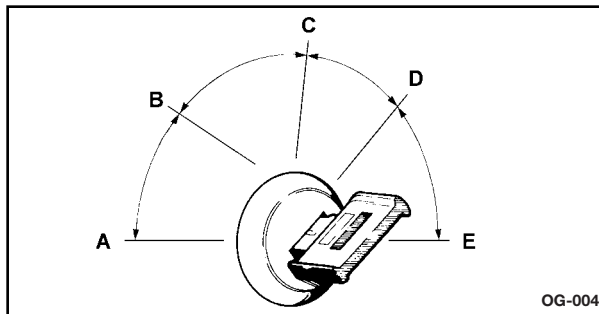
- **Keep your speed at 55 mph (88 km/h) or less for the first 500 miles (805 km).**
- **Do not drive at any one speed — fast or slow — for the first 500 miles (805 km). Do not make full-throttle starts.**
- **Avoid making hard stops for the first 200 miles (322 km) or so. During this time your new brake linings are not yet broken in. Hard stops with new linings can mean premature wear and earlier replacement. Follow this breaking-in guideline every time you get new brake linings.**

IGNITION POSITIONS

**CAUTION**

Leaving children in a vehicle with the key in the ignition is dangerous for many reasons. A child or others could be injured or even killed. They could operate power windows or other controls or even make the vehicle move. Do not leave the keys in the vehicle with children.

Use your ignition key to start your vehicle. The ignition key lets you turn the ignition switch to five different positions.



ACCESSORY (A): This position lets you use accessories when the engine is off. To get into ACCESSORY, push in the key and turn it toward you. Your steering wheel will remain locked, just as it was before you inserted the key.

NOTICE

Extended use of accessories in the ACCESSORY position could drain your battery and prevent you from starting your vehicle.

LOCK (B): This position locks your ignition, steering wheel and transmission. You will only be able to remove your key when the ignition is turned to LOCK.

OFF (C): This position lets you turn off the engine but still turn the steering wheel. Use OFF if you must have your vehicle in motion while the engine is off (for example, if your vehicle is being pushed).

NOTE: *With the key in the off position, the PRNDL Lamp will illuminate to show current gear position. If the key is left in this position, a discharged battery may result.*

RUN (D): This is the position for driving.

START (E): This starts your engine.

If you have a manual transmission, your ignition switch may have a key release lever.

You must press the lever before you can turn your key to the LOCK position. Then you can remove the key from the ignition switch.

**CAUTION**

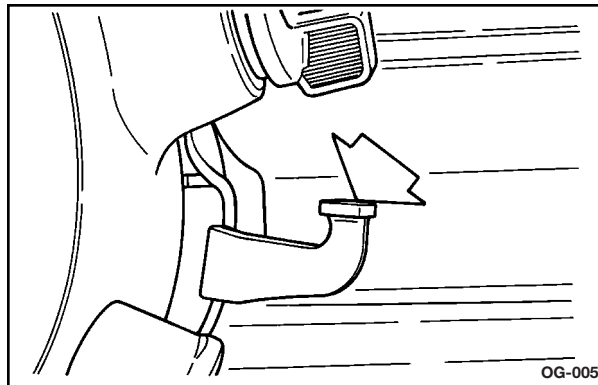
On manual transmission vehicles, turning the key to **LOCK** will lock the steering column and result in a loss of ability to steer the vehicle. This could cause a collision. If you need to turn the engine off while the vehicle is moving, turn the key only to **OFF**. Do not move the key release lever while the vehicle is moving.

NOTICE

If your key seems stuck in **LOCK** and you can not turn it, be sure you are using the correct key; if so, is it all the way in? If it is, then turn the steering wheel left and right while you turn the key hard. But turn the key only with your hand. Using a tool to force it could break the key or the ignition switch. If none of this works, then your vehicle needs service.

NOTICE

Trying to start your vehicle by pushing or pulling it could damage your vehicle, even if you have a manual transmission. And, if you have an automatic transmission, it will not start that way.

**KEY RELEASE LEVER
(MANUAL TRANSMISSION)**

STARTING YOUR GASOLINE ENGINE

If you have a diesel engine, see “Starting Your Diesel Engine” in the Index.

Automatic Transmission

Move your shift lever to PARK (P) or NEUTRAL (N). Where equipped with Electronic Control - Transmission Shifter (ECS), push button (P) on the PBSS for PARK or (N) for NEUTRAL. Your engine will not start in any other position — that is a safety feature. To restart when you are already moving, use NEUTRAL (N) only.

NOTICE

Do not try to shift to PARK (P) if your vehicle is moving. If you do, you could damage the transmission. Shift to PARK (P) only when your vehicle is stopped.

NOTE: If your vehicle is equipped with the Auto-Apply Park Brake, see “Auto-Apply Parking Brake” in the Index.

Manual Transmission

The gear selector should be in NEUTRAL and the parking brake engaged. Hold the clutch pedal to the floor and start the engine. Your vehicle will not start if the clutch pedal is not all the way down — that is a safety feature.

How to Start Your Engine

1. Without pushing the accelerator pedal, turn your ignition key to START. When the engine starts, let go of the key. The idle speed will go down as your engine gets warm.

NOTICE

Holding your key in START for longer than 15 seconds at a time will cause your battery to be drained much sooner. And the excessive heat can damage your starter motor. Wait about 15 seconds between each try to help avoid draining your battery or damaging your starter.

2. If it does not start right away, hold your key in START. If it does not start in 10 seconds, push the accelerator pedal all the way down for five more seconds, unless it starts sooner.

NOTICE

Your vehicle may be wired for “Crank Assist”. This function keeps the starter engaged if the engine has not started when the ignition key is released from the Crank Position. This is to facilitate starting the engine. “Crank Assist” will only keep the starter engaged if All of the following conditions are true:

- 1) The key must have been in the Crank approximately 0.4 seconds.
- 2) Time since crank started is less than approximately 2 seconds. This time varies per engine and ambient temperature.
- 3) The engine has not started at the time the key is released.
- 4) The key is not turned to the “Off” position when it is released from the Crank position, and
- 5) More than 20 seconds has elapsed after the ignition was last turned off. “Crank Assist” requires 20 seconds, after the ignition was turned off, to reset and be re-enabled.

3. If your engine still will not start (or starts but then stops), wait 15 seconds and start over.

When the engine starts, let go of the key and the accelerator pedal.

NOTICE

Your engine is designed to work with the electronics in your vehicle. If you add electrical parts or accessories, you could change the way the engine operates. Before adding electrical equipment, check with your dealer. If you do not, your engine might not perform properly.

If you ever have to have your vehicle towed, see the part of this manual that tells how to do it without damaging your vehicle. (See “Towing Your Vehicle” in the Index).

STARTING YOUR DIESEL ENGINE

Your diesel engine starts differently than a gasoline engine.

Automatic Transmission

Move your shift lever to PARK (P) or NEUTRAL (N). Your engine will not start in any other position — that is a safety feature. To restart when you are already moving, use NEUTRAL (N) only.

NOTICE

Do not try to shift to PARK (P) if your vehicle is moving. If you do, you could damage the transmission. Shift to PARK (P) only when your vehicle is stopped.

Manual Transmission

Move your shift lever to NEUTRAL (N) and hold the clutch pedal to the floor while starting the engine. Your vehicle will not start if the clutch pedal is not all the way down — that is a safety feature.

Starting Your Engine

1. Turn your ignition key to RUN.
Observe the WAIT TO START light. (This light may not come on if the engine is hot.)
2. As soon as the WAIT TO START light goes off, IMMEDIATELY turn the ignition key to START.
When the engine starts, let go of the key.

NOTICE

Holding your key in START for longer than 15 seconds at a time will cause your battery to be drained much sooner. And the excessive heat can damage your starter motor.

NOTICE

If the WAIT TO START light stays on, it means that your vehicle could have one of several problems, so you should have it serviced right away.

3. If the engine does not start after 15 seconds of cranking, turn the ignition key to OFF. Wait one minute for the starter to cool, then try the same steps again.

If you are trying to start your engine after you have run out of fuel, follow the steps in “Running Out of Fuel” (see “Diesel Fuel Requirements and Fuel System” in the Index).

When your engine is cold, let it run for a few minutes before you move your vehicle. This lets oil pressure build up. Your engine will sound louder when it is cold.

NOTICE

If you are not in an idling vehicle and the engine overheats, you would not be able to see the coolant temperature gauge. This could damage your vehicle. Do not let your engine run when you are not in your vehicle.

Cold Weather Starting (Diesel Engine)

The following tips will help you in cold weather.

Use the recommended engine oil when the outside temperature drops below freezing. (See “Engine Oil” in the Index). When the outside temperature drops below 0°F (-18°C), use your engine coolant heater.

If you park your vehicle in a garage, you should not need to use the coolant heater until the garage temperature goes below 0°F (-18°C), no matter how cold it is outside. If you experience longer cranking times, notice an unusual amount of exhaust smoke or are at higher altitudes (over 7,000 ft. or 2,135 m), you may use your engine coolant heater. (See “Engine Coolant Heater” in the Index).

See “Diesel Fuel Requirements and Fuel System” in the Index for information on what fuel to use in cold weather.

If Your Diesel Engine Will Not Start

If you have run out of fuel, look at “Running Out of Fuel” (see “Diesel Fuel Requirements and Fuel System” in the Index).

If you are not out of fuel, and your engine will not start, try the following:

Turn your ignition key to RUN. IMMEDIATELY after the WAIT TO START light goes off, turn the ignition key to START while you push the accelerator pedal down.

If the light does not go off, wait a few seconds, then try starting your engine again. See your dealer as soon as you can for a starting system check.

If the light comes on and then goes off and you know your batteries are charged, but your engine still will not start, your vehicle needs service.

If the light does not come on when the engine is cold, your vehicle needs service.

If your batteries do not have enough charge to start your engine, see “Battery” in the Index.

Be sure you have the right oil for your engine, and that you have changed the oil at the proper times. If you use the wrong oil, your engine may be harder to start.

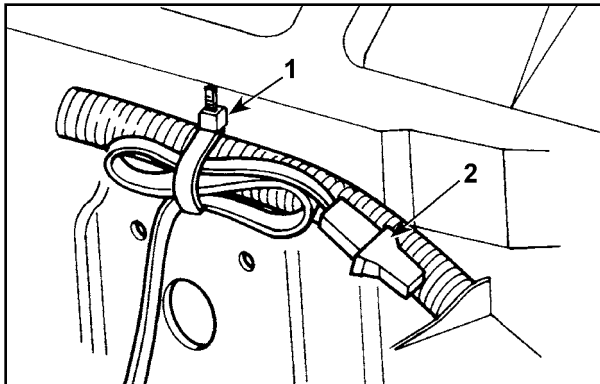
If the engine starts, runs a short time, then stops, your vehicle needs service.



CAUTION

Do not use gasoline or starting “aids,” such as ether in the air intake. They could damage your engine. There could also be a fire, which could cause serious personal injury.

ENGINE COOLANT HEATER (IF EQUIPPED)



1. Cord Strap
2. Cord Cap

The engine coolant heater is located either on the driver's side engine compartment frame rail or is clipped onto the driver's side radiator support.

In very cold weather, 0°F (-18°C) or colder, the engine coolant heater can help. You will get easier starting and better fuel economy during engine warm-up. Usually, the coolant heater should be plugged in a minimum of four hours prior to starting your vehicle.

To Use the Engine Coolant Heater

1. Turn off the engine.
2. Open the hood and unwrap the electrical cord.
3. Plug it into a normal, grounded 110-volt AC outlet.



CAUTION

Plugging the cord into an ungrounded outlet could cause an electrical shock. Also, the wrong kind of extension cord could overheat and cause a fire. You could be seriously injured. Plug the cord into a properly grounded three-prong 110-volt AC outlet. If the cord will not reach, use a heavy-duty three-prong extension cord rated for at least 15 amps.

4. Before starting the engine, be sure to unplug and store the cord as it was before to keep it away from moving engine parts. If you do not, it could be damaged.

In order to know how long your Engine Coolant Heater should be plugged in, please contact your dealer in the area where you will be parking your vehicle. Times may vary depending on the weather conditions and the type of fluids used in your vehicles' engine. The dealer can give you the best advice for that particular area.

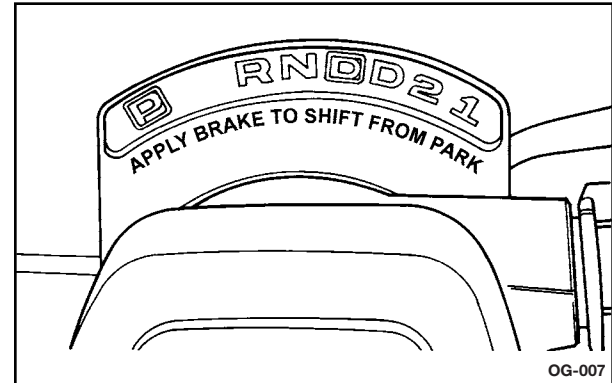
DRIVING IN SNOW (DIESEL ENGINES)

When driving in a heavy snowstorm or in swirling snow with a diesel engine, snow can get into the air intake system. If you keep driving in these conditions, the air cleaner may get plugged causing black smoke and loss of power. In an emergency, if the air cleaner gets plugged with snow, you can remove the air cleaner. Then, drive to a place of safety as soon as possible and put the air cleaner back on.

AUTOMATIC TRANSMISSION OPERATION

There are two different shift options: Column Shift and Electronic Control –Transmission Shifter (ECS).

COLUMN SHIFT



**P32 Motor Home and
P42 and W52 Commercial**

PARK (P): This position locks your rear wheels. It is the best position to use when you start your engine.

Ensure the shift lever is fully in PARK (P) before starting the engine. Your vehicle has a brake-transmission shift interlock. You have to fully apply your regular brakes before you can shift from PARK (P) when the ignition key is in RUN. If you cannot shift out of PARK (P), ease pressure on the shift lever and push the shift lever all the way into PARK (P) as you maintain brake application. Then move the shift lever into the gear you wish. (See “Shifting Out of Park” in the index).

In the event of a shift interlock solenoid malfunction, turn the key to OFF, pull the shift selector lever into NEUTRAL (N) and start the engine. Make sure to set the parking brake before starting the engine.



CAUTION

It is dangerous to get out of your vehicle if the shift lever is not fully in PARK (P) with the parking brake firmly set. Your vehicle can roll.

Do not leave your vehicle when the engine is running. If you leave the engine running, the vehicle can move suddenly. You or others could be injured. To be sure your vehicle will not move, even when you are on fairly level ground, always set your parking brake and move the shift lever to PARK (P).

See “Shifting into PARK” in the Index.

If you have a P32 motor home with a Gross Vehicle Weight Rating (GVWR) of 16,000 lbs. (7 258 kg) through 18,000 lbs. (8 165 kg), or a W24 motor home with a GVWR of 24,000 lbs. (10 866 kg), your transmission does not lock when in PARK (P). For these models an automatic parking brake will apply whenever your shift lever is moved to PARK (P). Wait five or six seconds for the parking brake to fully apply, then release the brake pedal. When your shift lever is moved from PARK (P), the automatic parking brake will release.

The W22 motor homes that are below a GVWR of 24,000 lbs. (10 866 kg), W52 commercial, and FE20 Shuttle Bus vehicles, have a transmission parking position that locks when in PARK (P).

For models with manual transmissions, a foot apply or hand lever parking brake must be engaged to prevent the vehicle from rolling.

REVERSE (R): Use this gear to back up.

NOTICE

Shifting to REVERSE (R) while your vehicle is moving forward could damage your transmission. Shift to REVERSE (R) only after your vehicle is stopped.

To rock your vehicle back and forth to get out of snow, ice or sand without damaging your transmission, see “Stuck in Sand, Mud, Ice or Snow” in the Index.

NEUTRAL (N): In this position, your engine is not connected with the wheels. To restart when you’re already moving, use NEUTRAL (N) only. Also, use NEUTRAL (N) when your vehicle is being towed.


NOTE: *If your vehicle is equipped with the Auto-Apply Park Brake, see “Auto-Apply Parking Brake” in the index.*

**CAUTION**

Shifting out of **PARK (P)** or **NEUTRAL (N)** while your engine is “racing” (running at high speed) is dangerous. Unless your foot is firmly on the brake pedal, your vehicle could move very rapidly. You could lose control and hit people or objects. Do not shift out of **PARK (P)** or **NEUTRAL (N)** while your engine is racing.


NOTICE

Damage to your transmission caused by shifting out of **PARK (P)** or **NEUTRAL (N)** with the engine racing is not covered by your warranty.

AUTOMATIC OVERDRIVE : This position is for normal driving. If you need more power for passing, and you are:

- Going less than about 35 mph (55 km/h), push your accelerator pedal about halfway down.
- Going more than 35 mph (55 km/h), push the accelerator pedal all the way down.

The transmission will shift into the next gear and provide more power.

The W22 motor home, W52 Commercial and FE20 Shuttle Bus vehicles, have a five-speed Allison transmission, four gears of which can be selected with the shift lever. These are overdrive, third, second, and first. When overdrive is enabled, overdrive and drive (W52) or 3 (W22/FE20) correspond to fifth and third gears respectively. When overdrive is disabled with the “O/D OFF” switch, an indicator light on the cluster will light up to indicate that overdrive is disabled. The  on the indicator now corresponds to fourth gear. This switch thus enables you to manually select fourth gear. This feature should be used when driving on steep hills or heavy towing. For the four-speed automatic transmission (P32) the driver should select third gear to provide this same functionality.

Fourth gear position on the five-speed can be used for normal driving offering more power but lower fuel economy than AUTOMATIC OVERDRIVE \textcircled{D} . You should use fourth gear position on the five-speed transmission when driving on steep hills. Selecting lower gear positions increases power but lowers fuel economy and can be useful to control speed as you go down steep mountain roads, but you would also want to use your brakes off and on intermittently.

First gear position provides the most tractive effort but lowest fuel economy. You can use it on very steep hills or in mud or snow. If the selector lever is put in first, the transmission will not shift until the vehicle is going slow enough.

Forward Gears		
GEAR	5-SPEED	4-SPEED
Fifth	\textcircled{D}	—
Fourth	\textcircled{D} Switch "OFF"	\textcircled{D}
Third	3	D
Second	2	2
First	1	1



Grade Braking (W22, W24 and FE20)

This selectable feature uses the engine and transmission to control vehicle speed during certain downhill grades. This feature is enabled by switching the Grade Brake switch to the "ON" position. The switch is mounted by the body builder and should be in the driver dash area.

By monitoring the vehicle speed, acceleration, engine torque and brake pedal usage, the transmission control module (TCM) will control shifting to more effectively use the engine and transmission to slow the vehicle and minimize wear of the service brakes.

When the Grade Brake switch is "ON", the instrument panel will display a green illuminated icon.

ELECTRONIC CONTROL - TRANSMISSION SHIFTER (ECS)

Front View of the Push Button Shift Selector (PBSS) for the 1000 and 2100 Series Transmission



PBSS for the 1000 and 2100 Series Transmission

A Brief Description of the Arens ECS System

The Arens Controls' ECS is a state of the art control developed for use with Allison 1000 and 2100 Series Transmissions. This shift selector has been designed to provide for easier driver operation, and features:

- Push-button operation
- Integrated safety features
- Diagnostic capabilities
- Solid state construction for reliable, extended life operation

The system consists of two major components:

1. Push Button Shift Selector (PBSS) is a compact, solid-state shift selector available for PARK, PARK BRAKE and NON-PARK transmission applications. The shift selector is mounted in a convenient location near the vehicle operator. The shift selector is a self-contained electronic control that contains the push button system, Interface Control Module, and Actuator Control Module. The push button pad provides quick, easy operation of the system functions. The Interface Module

communicates electronically with Allison TCM and the Neutral Start/Back Up (NSBU) switch. The Actuator Control communicates with the Arens 12VDC actuator and the integrated Position Sensor.

2. The Shift by Wire Actuator is a 12VDC powered shift actuator mounted on the Allison transmission. The actuator shifts the transmission as directed by commands from the shift selector and within the operating guidelines of the Allison transmission. The Arens ECS system works in conjunction with the Allison “adaptive shifting” electronic control system to provide optimized shift quality. The ECS system components also have a unique redundant electronic system, which prevents single point electrical failures in the system and ensures long life, trouble free operation of the ECS system and the Allison transmission.

SELECT DISPLAY: A LED Character shows what gear has been selected.



MONITOR DISPLAY: A LED character shows what gear the transmission is actually in.



MODE: The MODE button activates the function identified by the label above it and may vary from vehicle to vehicle. A light will illuminate in the corner of the button when the MODE is on. (This function is optional).



PARK (P): If you have a W24 with a Gross Vehicle Weight Rating (GVWR) of 24,000 lbs (10,866 kg), your transmission does not lock when in PARK (P). For this model, a parking brake will apply automatically whenever the PARK (P) button is selected on the PBSS. Wait five or six seconds for the parking brake to fully apply, then release the brake pedal.

Ensure the PBSS is fully in PARK (P) before starting the engine. You have to fully apply your regular brakes before you can shift from PARK (P) when the ignition key is in RUN.

**CAUTION**

It is dangerous to get out of your vehicle if the PBSS is not fully in PARK (P) with the parking brake firmly set. Your vehicle can roll.

Do not leave your vehicle when the engine is running. If you leave the engine running, the vehicle can move suddenly. You or others could be injured. To be sure your vehicle will not move, even when you are on fairly level ground, always set your parking brake and select PARK (P) on the PBSS.

See “Shifting into PARK” in the Index.



If the vehicle is equipped with an Allison 2100 Transmission (W24) and a



PARK-BRAKE System,

this button shifts the transmission into Neutral and will engage the PARK-BRAKE. If the vehicle is equipped with an Allison 1000 Transmission (W22) the park pawl will engage when the “P” is selected. The foot apply park brake should then be applied to ensure the motorhome is safely parked.

NOTE: If the vehicle is equipped with a Brake Transmission Shift Interlock (B.T.S.I.) system, it may require that the service brake pedal be depressed before another gear (e.g.: DRIVE (D), REVERSE (R)) can be selected.

**CAUTION**

If Park is selected, and “P” does not display on the Monitor, the Manual Parking Brake must be set to prevent the vehicle from moving unexpectedly. The system should be checked and serviced.


**CAUTION**

On Park or Park Brake equipped transmissions, if the ignition is turned OFF without shifting to PARK (P); a buzzer will sound and the display panel will illuminate and show the gear currently engaged. Shifting to “P” will engage the Park Pawl or the Park Brake and turn off the display and buzzer.

NOTE: On PARK or PARK-BRAKE equipped transmissions, If the vehicle engine is off, the ignition on, and the park Pawl or Park-Brake is not engaged (see Allison Transmission's Operator's Manual for park Pawl information), the MONITOR will display "N" and a buzzer will sound regardless of the operator's selection. Shifting to "P" will engage Park and turn off the system.

REVERSE (R): Use this gear to back up.


NOTICE
Shifting to REVERSE (R) while your vehicle is moving forward could damage your transmission. Shift to REVERSE (R) only after your vehicle is stopped.

 This button shifts the transmission into REVERSE (R).




To rock your vehicle back and forth to get out of snow, ice or sand without damaging your transmission, see "Stuck in Sand, Mud, Ice or Snow" in the Index.

NEUTRAL (N): In this position, your engine isn't connected with the wheels. To restart when you're already moving, use NEUTRAL (N). Also use NEUTRAL (N) when your vehicle is being towed. (See "Towing" in the Index).

 This button shifts the transmission to NEUTRAL. NEUTRAL (N) can be used to start the vehicle.



	CAUTION
If the transmission is in "N" and the operator leaves the driver's station, the vehicle Manual Parking Brake must be set to prevent the vehicle from rolling.	

**CAUTION**

Shifting out of **PARK (P)** or **NEUTRAL (N)** while your engine is “racing” (running at high speed) is dangerous. Unless your foot is firmly on the brake pedal, your vehicle could move very rapidly. You could lose control and hit people or objects. Do not shift out of **PARK (P)** or **NEUTRAL (N)** while your engine is racing.

NOTICE

Damage to your transmission caused by shifting out of **PARK (P)** or **NEUTRAL (N)** with the engine racing is not covered by your warranty.

AUTOMATIC DRIVE (D):

This position is for normal driving. If you need more power for passing, and you are:

- Going less than about 35 mph (55 km/h), push your accelerator pedal about halfway down.
- Going more than 35 mph (55 km/h), push the accelerator pedal all the way down.

The transmission will shift into the next gear and provide more power.

The W22 and W24 motor home fitted with ECS has a five-speed Allison transmission. Five (5) gears of which can be selected with the PBSS. These are drive, fourth, third, second and first. DRIVE “D” corresponds with overdrive. Lower gear positions on the five-speed transmission can be selected by the Manual Down and Up Gear selector buttons on the PBSS.



This button shifts the transmission into Drive and allows the transmission to

automatically shift through the full range of 1st through 5th gears. When Drive is initially selected, the Select and Monitor displays read “D1” indicating that Drive has been selected and the transmission is in 1st gear. As the transmission automatically upshifts or downshifts, the Select/Monitor Display will show which gear the transmission is actually in - D1, D2, D3, D4, or D5.

Fourth gear position on the five-speed can be used for normal driving offering more power but lower fuel economy than AUTOMATIC DRIVE (D). You should use fourth gear position on



the five-speed transmission when driving on steep hills. Selecting lower gear positions increases power but lowers fuel economy and can be useful to control speed as you go down steep mountain roads, but you would also want to use your brakes off and on intermittently.

First gear position provides the most tractive effort but lowest fuel economy. You can use it on very steep hills or in mud or snow. If first gear is selected, the transmission will not shift until the vehicle is going slow enough.

Forward Gears

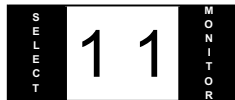
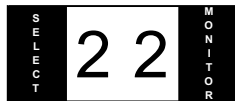
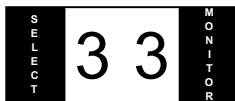
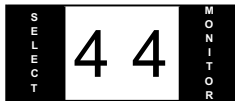
GEAR	5-SPEED
Fifth	D
Fourth	4
Third	3
Second	2
First	1



Manual Gear Selector - Down:

When the transmission is in DRIVE, the ↓

button allows the operator to manually downshift one gear at a time - 5th thru 1st. The Select Display will show what gear range has been selected; the Monitor Display will show the actual gear range the transmission is using.



NOTE: The transmission will not upshift beyond the gear range selected. When DRIVE is selected the full range automatic shift capability is restored.

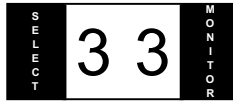
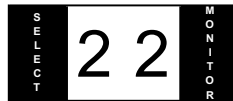
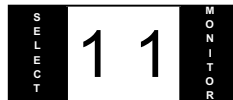
NOTE: Selecting DRIVE at any time during the downshift sequence cancels the manual-shifting function and allows the transmission to shift automatically.



Manual Gear Selector - UP:

When the transmission is in 11,22,33, or 44,

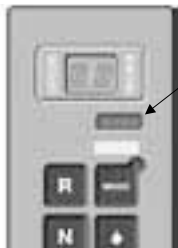
depressing the ↑ button manually upshifts the transmission one gear at a time until “D” is selected. The Selector Display shows what gear has been selected, the Monitor Display will show what gear the transmission is actually using.



NOTE: The transmission will not upshift beyond the gear range selected. When **DRIVE** is selected the full range automatic capability is restored.

NOTE: Selecting **DRIVE** at any time during the upshift sequence cancels the manual shifting function and allows the transmission to shift automatically.

SERVICE: If the SERVICE display illuminates there is a fault in the ECS system. A qualified technician should inspect the system as soon as possible.



Flashing Display: This indicates that the transmission (rather than the ECS) has inhibited the selected transmission operation; this could occur for a variety of reasons. (Refer to the Allison Transmission's Operator's Manual for more information).

Monitor and Buzzer Sounding: This indicates that the engine was shut-off without shifting the transmission to PARK (PARK or PARK-BRAKE equipped Transmissions Only). The display will stay illuminated and show the gear that is currently in use. In addition, a warning buzzer will sound. Selecting PARK will turn off the panel and engage the Park Pawl or Park Brake.



CAUTION

Operation with the Service light illuminated may indicate a loss of safety back-up systems, and the operator should use extra caution when shifting to insure that the transmission is performing properly.



CAUTION

Operation with the Service light illuminated may indicate a loss of safety back-up systems and the operator should use extra caution when shifting to insure that the transmission is performing properly.

RANGE INHIBIT WARNING LIGHT (ALLISON TRANSMISSION)

RANGE INHIBIT

This light comes on when the gear selected by the driver cannot be engaged (see the Allison transmission manual for more information).

NOTICE

If your rear wheels can not rotate, do not try to drive. This might happen if you are stuck in very deep sand or mud or are up against a solid object. You could damage your transmission.

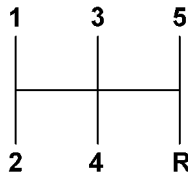
If you stop when going uphill, do not hold your vehicle with only the accelerator pedal. This could overheat and damage the transmission. Use your brakes to hold your vehicle in position on a hill.

MANUAL TRANSMISSION OPERATION (DIESEL ENGINES)



CAUTION

If you skip more than one gear when you downshift, you could lose control of your vehicle. You could injure yourself or others. Do not shift down more than one gear at a time when you downshift.



OG-008

If you have a five-speed manual transmission with low gear, this is your shift pattern.

How to operate your transmission:

LOW (1): Press the clutch pedal and shift into LOW (1). Then, slowly let up on the clutch pedal as you press the accelerator pedal. Shift into LOW (1) only when the vehicle speed is below 5 mph (8 km/h). If you try to shift into LOW (1) at excessive vehicle speeds, the shift lever will not move into the LOW (1) position until vehicle speed is reduced. LOW (1) is intended only for heavy loads and is not recommended for normal driving conditions.

FIRST (2): Use this gear to start your vehicle moving under normal driving conditions. Press the clutch pedal and shift into FIRST (2). Then, slowly let up on the clutch pedal as you press the accelerator pedal.

You can shift into FIRST (2) when you are going less than 20 mph (32 km/h). If you have come to a complete stop and it is hard to shift into FIRST (2), put the shift lever in NEUTRAL (N), let up on the clutch then press the clutch pedal back down. Then shift into FIRST (2). If you try to shift into FIRST (2) at excessive vehicle speeds, the shift lever will not move into the FIRST (2) position until vehicle speed

is reduced.

SECOND (3): Press the clutch pedal as you let up on the accelerator pedal and shift into SECOND (3). Then, slowly let up on the clutch pedal as you press the accelerator pedal.

THIRD (4) and FOURTH (5): Shift into the higher forward gears the same way you do for SECOND (3). Slowly let up on the clutch pedal as you press the accelerator pedal.

To stop your vehicle, let up on the accelerator pedal and press the brake pedal. Just before the vehicle stops, press the clutch pedal and the brake pedal, and shift to NEUTRAL (N).

NEUTRAL (N): Use this position when you start or idle your engine.

REVERSE (R): To back up, first press down the clutch pedal. Wait about five seconds for the internal parts to stop spinning and then shift into REVERSE (R). Let up on the clutch pedal slowly while pressing the accelerator pedal.

NOTICE

Shift to REVERSE (R) only after your vehicle is stopped. Shifting to REVERSE (R) while your vehicle is moving could damage your transmission.

Use REVERSE (R), along with the parking brake, when turning off your engine and parking your vehicle.

Manual Transmission Shift Speeds

If your speed drops below 20 mph (32 km/h), or if the engine is not running smoothly, you should downshift to the next lower gear. You may have to downshift two or more gears to keep the engine running smoothly or for good performance.

NOTICE

If you skip more than one gear when you downshift, or if you race the engine when you downshift, you can damage the clutch or transmission.

Operating Precautions

- When you are stopped uphill, do not hold the vehicle in place using the accelerator and clutch pedals. Use the regular brakes or the parking brake.
- Shift to the next lower gear for very hard pulls at low road speeds.
- Shift the gears smoothly to let the gears engage.
- Do not ride the clutch pedal; this will damage the clutch.
- Downshift one or two gears from the high gear when you are driving at slow speeds (less than 30 mph or 50 km/h), in stop-and-go traffic, and when going down steep hills.
- Do not coast with the transmission in NEUTRAL (N).
- Set the parking brake firmly before you leave the vehicle.

PARKING BRAKES

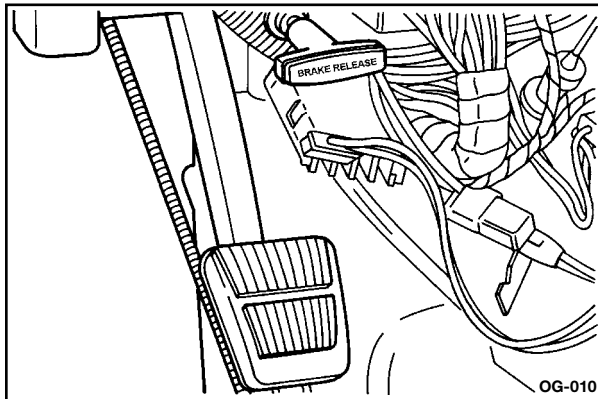
The parking brake should always be set when parking your vehicle. Always release the parking brake before driving off.

NOTICE

Driving with the parking brake “ON” can cause your parking brakes to overheat. You may have to replace them, and you could also damage other parts of your vehicle.

Pedal and Lever Parking Brake

The parking brake is applied by either a pedal, pull button or lever assembly. Motor home and Shuttle Bus models use a pedal assembly or pull button and commercial models use a pedal or a lever assembly. The pedal assembly is foot-actuated and the lever assembly is hand-actuated.

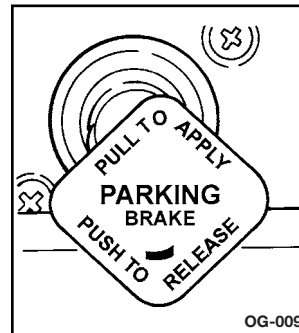


Foot Pedal Park Brake

Pull-Button Apply Parking Brake

NOTICE

The P32 motor home has the J72 auto-apply park brake option. Check the vehicle specification to determine if you have a J72 park brake option. The W24 motor homes have only J72 option of auto-apply park brake.



If you have a P32 motor home with a Gross Vehicle Weight Rating (GVWR) of 16,000 lbs. (7 258 kg) through 18,000 lbs. (8 165 kg) or a W24 with a GVWR of 24,000 lbs (10 886 kg) you have a pull-button parking brake switch on the instrument panel to the left or right of the

steering column (depending on the model).

The pull button is used to apply the parking brake in any gear other than PARK (P). Pull the button to apply the parking brake and the AUTO PARK warning light and the BRAKE light will both come on. Push the button back in to release the parking brake.

NOTICE

Although the park brake can be applied using the pull-button during driving, it is strongly advised not to apply the parking brake while driving. Application of the park brake while the vehicle is in motion may result in damage to the park brake or other components of the vehicle.

When the vehicle is stationary and the button is pulled to apply the parking brake, the BRAKE warning light will come on. To release the parking brake, push the button back in and the BRAKE warning light will go off.

Auto-Apply Parking Brake

If you have a P32 motor home with a Gross Vehicle Weight Rating (GVWR) of 16,000 lbs (7 258 kg) through 18,000 lbs (8 165 kg) or a W24 with a GVWR of 24,000 lbs (10 886 kg) you have an auto-apply parking brake. The auto-apply parking brake will be activated when placing the transmission shifter into the PARK (P) position or selecting the PARK (P) button using the PBSS (if equipped). This activates the auto-apply parking brake through the PARK/NEUTRAL position switch circuit.

To activate the auto-apply parking brake, press the regular brake pedal and shift the transmission shifter into PARK (P) or select the PARK (P) button using the PBSS (if equipped). Hold the regular brake pedal for about five seconds after shifting/switching into PARK (P) to allow the auto-apply parking brake to fully apply, then release the regular brake. This will cause the AUTO APPLY warning light to come on, but the BRAKE warning light will not come on, unless the pull button is applied as well (pull out position).

The auto-apply function is released when the transmission shifter is moved out of the PARK (P) position or in the case of the PBSS (if equipped) another button, such as D (Drive), R (Reverse) or N (Neutral) is selected. Subsequently, the AUTO PARK warning light will go off.



CAUTION

If your vehicle is in motion, **NEVER** turn the ignition key to the **OFF** position. This will cause the parking brake to apply rapidly and the damage to your vehicle can occur and/or loss of control. If the vehicle is moving and the engine stalls, immediately shift the transmission shifter into N (Neutral) or select the N (Neutral) button on the PBSS (if equipped) and use your regular brakes to stop the vehicle.

NOTICE

In vehicles equipped with the automatically applied park brake, you may feel a slight jolt when you shift from PARK (P) into Reverse (R) or Drive (D). This is a normal condition and is caused by the release of drive energy to the driveline due to the park brake releasing after the transmission selects range.

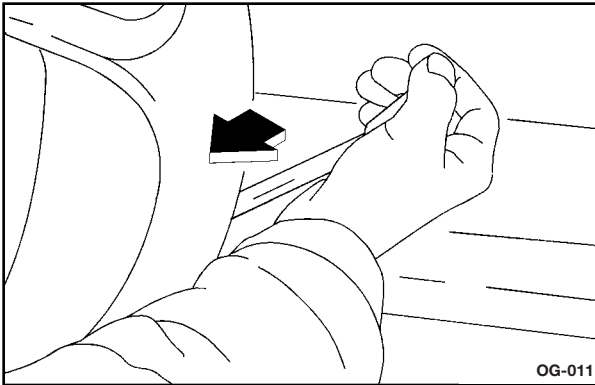
SHIFTING INTO PARK (P) (AUTOMATIC TRANSMISSION)

COLUMN SHIFT

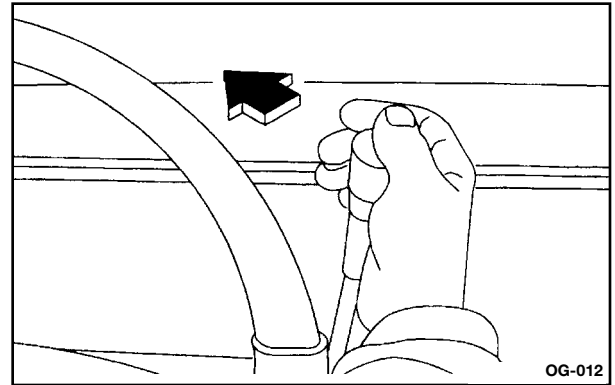


CAUTION

It can be dangerous to get out of your vehicle if the shift lever is not fully in PARK (P) with the parking brake firmly set, or if the PBSS, (if equipped) is not set to PARK (P). Your vehicle can roll. If you leave the engine running, the vehicle can move suddenly. You or others could be injured. To be sure your vehicle will not move, even when you are on fairly level ground, use the steps that follow.



1. Shift into PARK (P) by holding the brake pedal down and setting the parking brake. Then, move the shift lever into PARK (P) like this:
 - Pull the lever toward you.
 - Move the lever up as far as it will go.



2. Move the ignition key to LOCK, remove the key and take it with you. If you can leave your vehicle with the ignition key in your hand, your vehicle is in PARK (P).

Leaving Your Vehicle With the Engine Running (Automatic Transmission)



CAUTION

It can be dangerous to leave your vehicle with the engine running. Your vehicle could move suddenly if the shift lever is not fully in **PARK (P)** with the parking brake firmly set. And, if you leave the vehicle with the engine running, it could overheat and even catch fire. You or others could be injured. Don't leave your vehicle with the engine running unless you have to.

If you have to leave your vehicle with the engine running, be sure your vehicle is in **PARK (P)** and your parking brake is firmly set before you leave it. After you have moved the shift lever into **PARK (P)**, or selected the **PARK (P)** on the **PBSS**, (if equipped), hold the regular brake pedal down. Then, see if you can move the shift lever away from

PARK (P) without first pulling it toward you. If you can, it means that the shift lever was not fully locked into **PARK (P)**. If your vehicle is equipped with **Electronic Control - Transmission Shifter**, ensure that the **PBSS** display shows the letter "**P**".

ELECTRONIC CONTROL - TRANSMISSION SHIFTER (ECS) SYSTEM

1. Shift into **PARK (P)** by selecting "**P**" on the **PBSS**.
2. Move the ignition key to **LOCK**, remove the key and take it with you. If you can leave your vehicle with the ignition key in your hand, your vehicle is in **PARK (P)**.



Torque Lock (Vehicles with Automatic Transmission and Park Pawl)

If you are parking on a hill and you do not shift your transmission into PARK (P) properly, the weight of the vehicle may put too much force on the parking pawl in the transmission. You may find it difficult to pull the shift lever out of PARK (P). This is called “Torque Lock.” To prevent torque lock, set the parking brake and then shift into PARK (P) properly before you leave the driver’s seat. To find out how, see “Shifting into PARK” in the Index.

When you are ready to drive, move the shift lever out of PARK (P) before you release the parking brake.

If torque lock does occur, you may need to have another vehicle push yours a little uphill to take some of the pressure from the parking pawl in the transmission, so you can pull the shift lever out of PARK (P).

SHIFTING OUT OF PARK (P) (AUTOMATIC TRANSMISSION)

COLUMN SHIFT

Your vehicle has a Brake-Transmission Shift Interlock (B.T.S.I.). You have to fully apply your regular brake before you can shift from PARK (P) when the ignition is in the RUN position.

If you cannot shift out of PARK (P), ease pressure on the shift lever and push the shift lever all the way into PARK (P) as you maintain brake application. Then move the shift lever into the gear you want.

If you ever hold the brake pedal down but still can not shift out of PARK (P), try the following:

1. Turn the ignition key to OFF.
2. Apply and hold the brake until the end of Step 4.
3. Shift to NEUTRAL (N).
4. Start the vehicle and then shift to the drive gear you want.
5. Have the vehicle serviced as soon as possible.



CAUTION

Always make sure you have fully applied your regular brake before you select any gear. Not doing this could result in vehicle roll or others could be injured.

ELECTRONIC CONTROL - TRANSMISSION SHIFTER (ECS)

Your vehicle has a brake-transmission shift interlock. You have to fully apply your regular brake before you can shift from PARK (P) when the ignition is in the RUN position.

If you cannot shift out of PARK (P) the following can be done:

1. The brake switch could be faulty. As an emergency procedure, unplug the two point brake switch on top of the brake pedal. Make sure to unplug the switch with the dark green and white wires. This procedure

will break the circuit and you should be able to select the gears. Have the vehicle serviced as soon as possible.

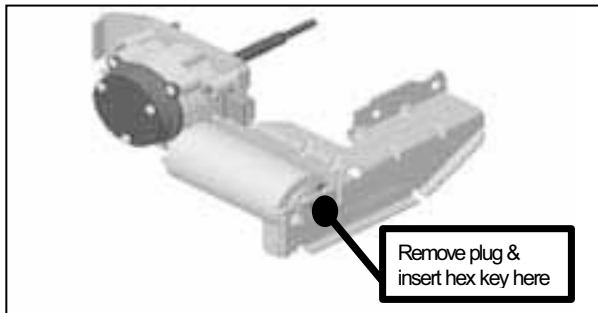
2. Emergency removal from PARK (P), if ECS is faulty.

In the event that a vehicle must be towed, and the ECS system cannot be activated to move the vehicle's transmission out of PARK (P), the following must be done:

- Connect tow vehicle to disabled vehicle in such a manner that the disabled vehicle cannot move in either direction when it is removed from PARK (P).
- Set the tow vehicle's brakes.
- Chock the tow vehicle's wheels.
- Set the disabled vehicle's brakes.
- Chock the disabled vehicle's wheels.
- Remove plug from rear of SBW actuator.

- Insert a 3/16 inch hex key (allen wrench) into the rear of the SBW actuator and turn in a clockwise direction until the transmission comes out of park.
- Be sure to replace the moisture protection plug.

NOTE: Vehicle can be returned to **PARK (P)** with this feature.



SBW Actuator

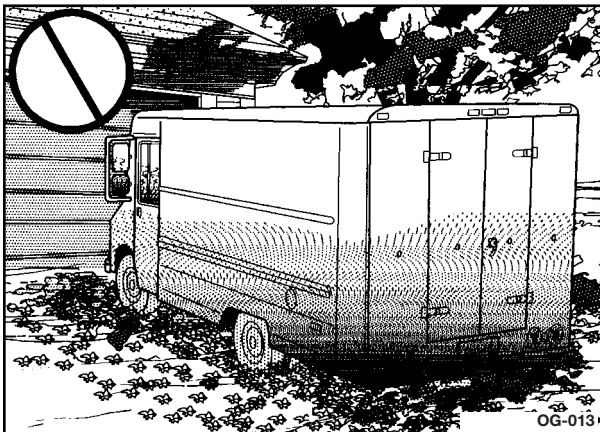


CAUTION

When performing this operation all of the steps must be done in the proper order to prevent possible injury from unexpected movement of the tow or disabled vehicles.

PARKING YOUR VEHICLE (MANUAL TRANSMISSION)

Before you get out of your vehicle, put your manual transmission in REVERSE (R) and firmly apply the parking brake.

PARKING OVER THINGS THAT CAN BURN**CAUTION**

Things that can burn could touch hot exhaust parts under your vehicle and ignite. Do not park over papers, leaves, dry grass or other things that can burn.

ENGINE EXHAUST**CAUTION**

Engine exhaust can kill. It contains the gas Carbon Monoxide (CO), which you can not see or smell. It can cause unconsciousness and death.

You might have exhaust coming in if:

- Your exhaust system sounds strange or different.
- Your vehicle gets rusty underneath.
- Your vehicle was damaged in a collision.
- Your vehicle was damaged when driving over high points on the road or over road debris.
- Repairs were not done correctly.
- Your vehicle or exhaust system had been modified improperly.

If you ever suspect exhaust is coming into your vehicle:

- Drive it only with all the windows down to blow out any CO gas; and
- Have your vehicle serviced immediately.

RUNNING YOUR ENGINE WHILE YOU ARE PARKED (AUTOMATIC TRANSMISSION)

It is better not to park with the engine running. But if ever you have to, here are some things to know.



CAUTION

Idling the engine with the climate control system off could allow dangerous exhaust into your vehicle (see the earlier Caution under “Engine Exhaust”).

Idling in a closed-in place can let deadly carbon monoxide (CO) gas into your vehicle even if the fan switch is at the highest setting. One place this can happen is a garage. Exhaust — with CO gas — can come in easily. **NEVER** park in a garage with the engine running.

Another closed-in place can be a blizzard.



CAUTION

It can be dangerous to get out of your vehicle if the shift lever is not fully in **PARK (P)** with the parking brake firmly set. Your vehicle can roll. Do not leave your vehicle when the engine is running. If you leave the engine running, the vehicle can move suddenly. You or others could be injured. To be sure your vehicle will not move, even when you are on fairly level ground, always set your parking brake and move the shift lever to **PARK (P)**.

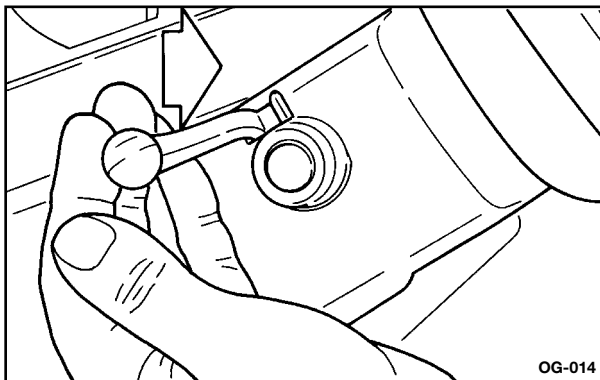
Follow the proper steps to be sure your vehicle won't move. (See “Shifting into PARK” in the Index).

HORN

Press the pad in the center of the steering wheel to sound the horn.

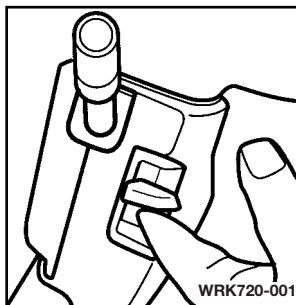
TILT WHEEL

A tilt steering wheel allows you to adjust the steering wheel before you drive.



P32 / P42 / W52

You can also raise it to the highest level to give your legs more room when you exit and enter the vehicle.

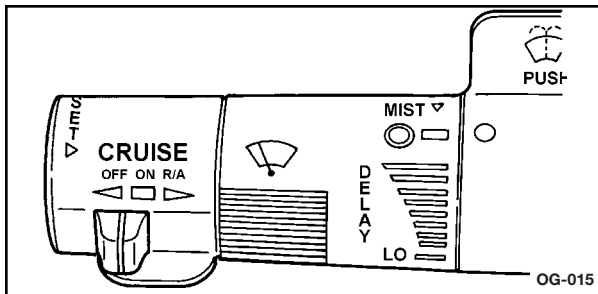


W22 / W24 / FE20

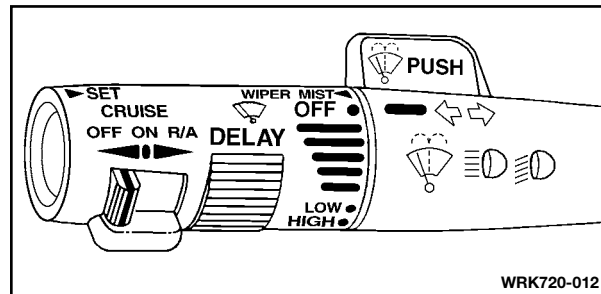
To tilt the wheel, hold the steering wheel and pull the lever.

Move the steering wheel to a comfortable level, then release the lever to lock the wheel in place.

TURN SIGNAL/MULTIFUNCTION LEVER



P32 / P42 / W52



W22 / W24 / FE20

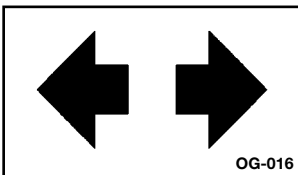
The lever on the left side of the steering column includes your:

- Turn Signal and Lane Changer
- Headlamp High/Low Beam Changer
- Windshield Wipers
- Windshield Washer
- Cruise Control (if equipped)

Turn Signal and Lane Change Indicator

The turn signal has two upward (for right) and two downward (for left) positions. These positions allow you to signal a turn or a lane change.

To signal a turn, move the lever all the way up or down. When the turn is finished, the lever will return automatically.



An arrow on the instrument panel will flash in the direction of the turn or lane change.

To signal a lane change, just raise or lower the lever until the arrow starts to flash. Hold it there until you complete your lane change. The lever will return by itself when you release it.

As you signal a turn or a lane change, if the arrows do not flash but just stay on, a signal bulb may be burned out and other drivers will not see your turn signal.

If a bulb is burned out, replace it to help avoid an accident. If the arrows do not go on at all when you signal a turn, check the fuse (see “Fuses and Circuit Breakers” in the Index) and for burned-out bulbs.

Headlamp High/Low Beam Changer

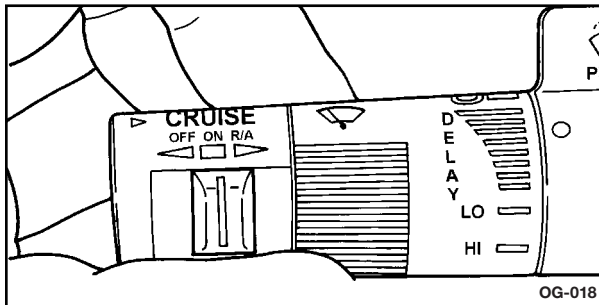
To change the headlamps from low beam to high beam, or high to low, pull the turn signal lever all the way toward you, then release it.



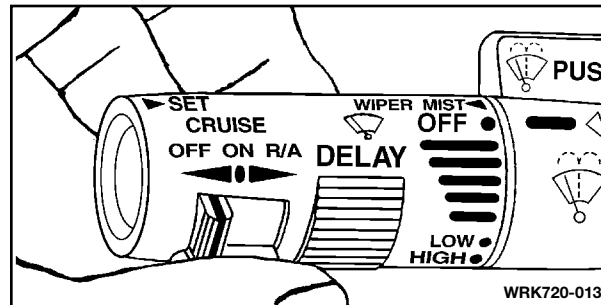
When the high beams are on, this light on the instrument panel will also be on.

Windshield Wipers

The windshield wipers are controlled by turning the band with the wiper symbol on it.



**P32 / P42 / W52
(Pulse Wiper)**



W22 / W24 / FE20

For a single wiping cycle, turn the band to MIST. Hold it there until the wipers start, then let go. The wipers will stop after one cycle. If you want more cycles, hold the band on MIST longer.

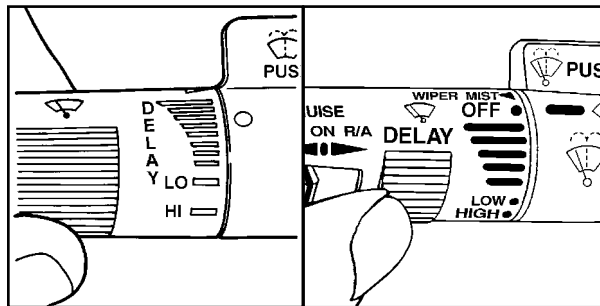
For steady wiping at low speed, turn the band away from you to LO/LOW. For high-speed wiping, turn the band further, to HI/HIGH. To stop the wipers, move the band to OFF.

Remember that damaged wiper blades may prevent you from seeing well enough to drive safely. To avoid damage, be sure to clear ice and snow from the wiper blades before using them. If they are frozen to the windshield, carefully loosen or thaw them. If your blades do become damaged, get new blades or blade inserts.

Heavy snow or ice can overload your wiper system. Clear away snow or ice to prevent an overload.

Low-Speed Delay Wipers

You can set the wiper speed for a long or short delay between wipes. This can be very useful in light rain or snow. Turn the band to choose the delay time. The closer to LO/LOW, the shorter the delay.



**All Vehicles
(with Pulse Wiper)**

W22 / W24 / FE20

Windshield Washer

At the top of the multifunction lever there is a paddle with the word PUSH on it. To spray washer fluid on the windshield, push the paddle.



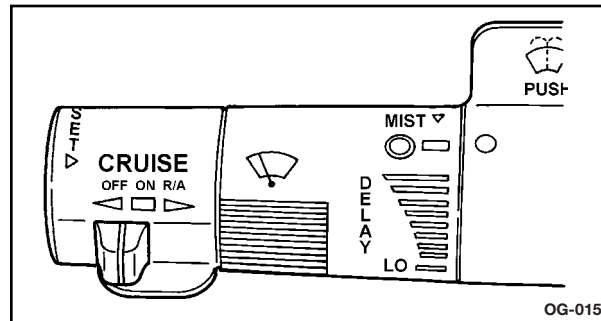
CAUTION

In freezing weather, do not use your washer until the windshield is warmed. Otherwise the washer fluid can form ice on the windshield, blocking your vision.

If you have the standard wipers, the wipers will keep going in LO/LOW until you turn the wiper control to OFF.

If you have the low-speed delay option, the wipers will clear the window and then either stop or return to your preset speed.

Cruise Control (Optional)



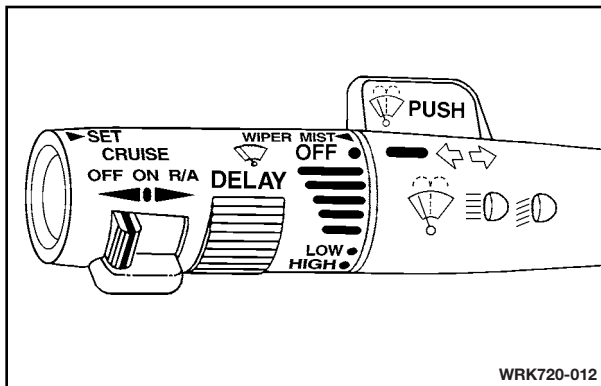
Cruise Control (P32 / P42 / W52)

Cruise Control (Optional)

With cruise control, you can maintain a speed of about 25 mph (40 km/h) or more without keeping your foot on the accelerator. Cruise control does not work at speeds below about 25 mph (40 km/h), or above the set vehicle speed limit.

A warning light on the cluster will light up when the cruise control is controlling the vehicle speed.

When you apply your brakes, the cruise control shuts off.



WRK720-012

W22 / W24 / FE20



CAUTION

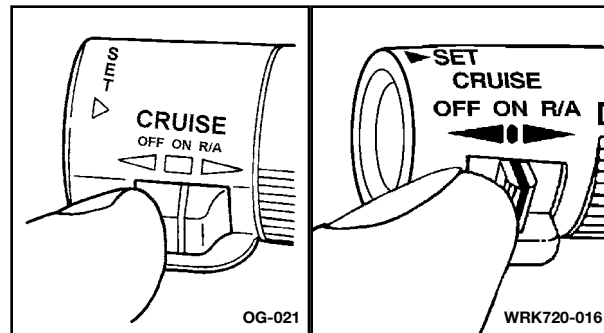
- **Cruise control can be dangerous where you can not drive safely at a steady speed. Do not use your cruise control on winding roads or in heavy traffic.**
- **Cruise control can be dangerous on slippery roads. On such roads, fast changes in tire traction can cause needless wheel spinning, and you could lose control. Do not use cruise control on slippery roads.**

Setting Cruise Control



CAUTION

If you leave your cruise control switch “ON” when you are not using cruise, you might hit a button and go into cruise when you do not want to. You could be startled and even lose control. Keep the cruise control switch “OFF” until you want to use it.



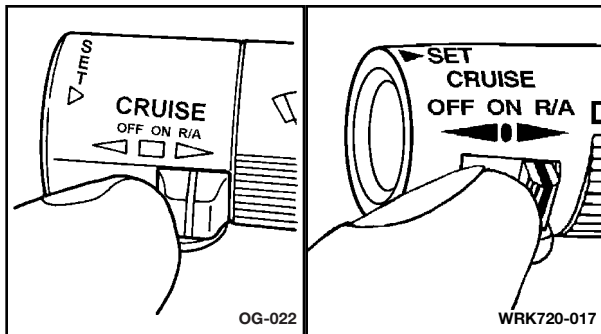
P32 / P42 / W52

W22 / W24 / FE20

1. Move the cruise control switch to ON.
2. Get up to the speed you want.
3. Push in the SET button at the end of the lever and release it.
4. Take your foot off the accelerator pedal.

Resuming a Set Speed

Suppose you set your cruise control at a desired speed and then you apply the brake. This shuts off the cruise control, but you do not need to reset it.



P32 / P42 / W52

W22 / W24 / FE20

Once you are going about 25 mph (40 km/h) or more, you can move the cruise control switch from ON to R/A for less than half a second.

Your vehicle will return to your chosen speed and stay there.

If you hold the switch at R/A longer than a second the vehicle will keep going faster until you release the switch or apply the brake. So unless you want to go faster, do not hold the switch at R/A.

Increasing Speed While Using Cruise Control

There are two ways to go to a higher speed:

- Use the accelerator pedal to get to the higher speed. Push the “SET” button at the end of the lever, then release the button and the accelerator pedal. You will now cruise at the higher speed.
- Move the switch from ON to R/A. Hold it there until you get up to the speed you want, and then release the switch. To increase your speed in very small amounts, move the switch to R/A for less than a second and then release it. Each time you do this, your vehicle will go about 1 mph (1.6 km/h) faster.

Reducing Speed While Using Cruise Control

Push in the button at the end of the lever until you reach the lower speed you want, then release it.

To slow down in very small amounts, push the button for less than half a second. Each time you do this, you will go 1 mph (1.6 km/h) slower.

Passing Another Vehicle While Using Cruise Control

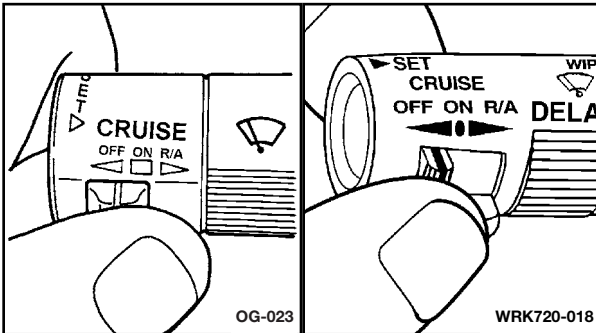
Use the accelerator pedal to increase your speed. When you take your foot off the pedal, your vehicle will slow down to the speed you set earlier.

Using Cruise Control on Hills

How well your cruise control will work on hills depends upon your speed, load and the steepness of the hills. When going up steep hills, you may have to step on the accelerator pedal to maintain your speed. When going downhill, you may have to brake or shift to a lower gear to keep your speed down. Applying the brake takes you out of cruise control. Many drivers find this to be too much trouble and do not use cruise control on steep hills.

Ending Cruise Control

There are two ways to turn off the cruise control:



P32 / P42 / W52

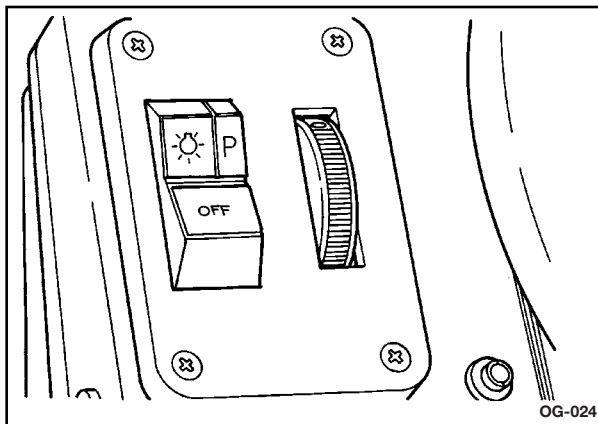
W22 / W24 / FE20

- Step lightly on the brake pedal; or push the clutch pedal, if you have a manual transmission.
- Move the cruise switch to OFF.

Erasing Speed Memory

When you turn off the cruise control or the ignition, your cruise control set speed memory is erased.

EXTERIOR LAMPS



Your lamp switches are usually on the left side of the instrument panel.

Press the switch marked "P" to turn on:

- Parking Lamps
- Sidemarker Lamps
- Tail lamps
- Instrument Panel Lights

Press the switch with the master lamp symbol to turn on all the lamps listed as well as the headlamps. The lamp switch may also control any other lamps or lights provided by the body manufacturer.

Press the bottom switch marked OFF to turn off all your lamps.

I/P BACKLIGHTING ADJUSTMENTS

Backlighting can not be adjusted if the lamp switch is in the OFF position. Move the thumbwheel, located next to the main lamp switch, up to brighten your instrument panel lights. If you move the switch all the way up until it clicks, your interior lamps will come on if the body manufacturer wired your switch to these lamps. Move the thumbwheel down to dim your instrument panel lights.

If the thumbwheel is on the brightest setting but the instrument panel still appears dim, adjust the thumbwheel to the dimmest position and slowly readjust to the desired brightness.

NOTE: *The thumbwheel may be speed sensitive.*

A circuit breaker protects your headlamps. If you have an electrical overload, your headlamps will flicker on and off. Have your headlamp wiring checked right away if this happens.

DAYTIME RUNNING LAMPS (DRL)

Daytime Running Lamps (DRL) can make it easier for others to see the front of your vehicle during the day (taillamps and marker lamps remain off). DRL can be helpful in many different driving conditions, but they can be especially helpful in the short periods after dawn and before sunset.

NOTE: Daytime running lamps are optional on some models.

Your headlamps will come on at reduced brightness in daylight when:

- The ignition is on,
- the headlamp switch is off and
- the parking brake is released.

When you turn on your headlamps, the DRL will switch off and the exterior lamps will come on. (This feature may differ on Workhorse Custom Chassis RV models per Coach Motor Homes.) When you turn off the headlamps, the exterior lamps will go out and the headlamps will switch to the reduced brightness of DRL again.

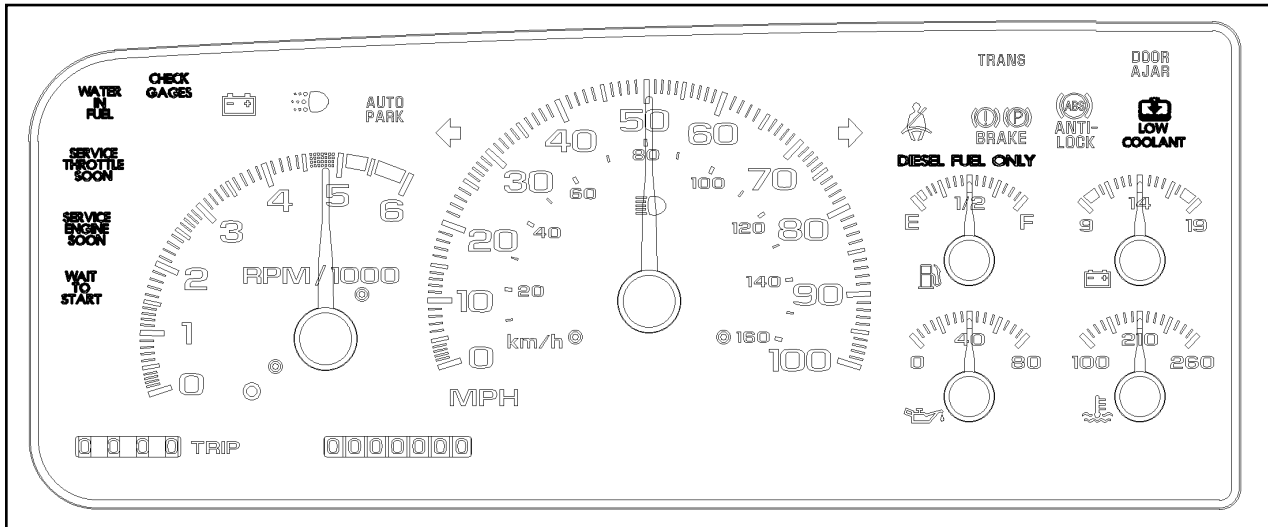
To idle your vehicle with the DRL off, set the parking brake. The DRL will stay off until you release the parking brake.

On motor home chassis vehicles with a 16,000 lb. (7 258 kg) through 18,000 lb. (8 165 kg) GVWR, the DRL will also turn off when you shift the transmission into PARK (P), which applies the parking brake. The DRL will remain off until the transmission is shifted out of PARK (P), the manual parking brake is fully released, and the parking brake warning light goes out.

As with any vehicle, you should turn on the regular headlamp system when you need it.

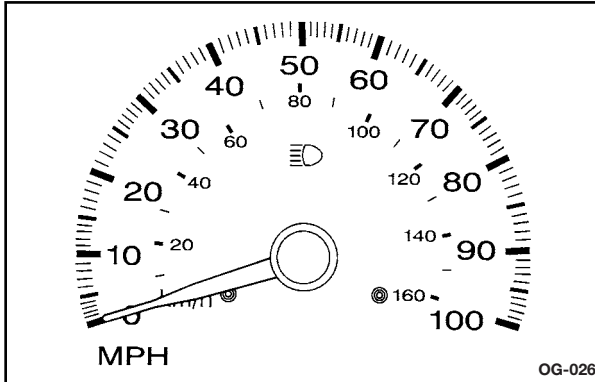
NOTE: Rear tail lamps and marker lamps are not lit when DRL are on.

INSTRUMENT PANEL CLUSTER — TYPICAL



Your instrument cluster is designed to let you know at a glance how your vehicle is running. You will know how fast you are going, how much fuel you are using, and many other things you will need to know to drive safely and economically.

Speedometer



Your speedometer lets you see your speed in both miles per hour (mph - United States) and kilometers per hour (Km/h - Export).

Tamper Resistant Odometer

Your odometer shows how far your vehicle has been driven, in either miles (United States) or kilometers (Export).

Your odometer is tamper resistant. The odometer will show silver lines between the numbers if someone tries to turn it back.

You may wonder what happens if your vehicle needs a new odometer installed. If the new one can be set to the mileage total of the old odometer, then it must be. But if it can not, then it is set at zero, and a label must be put on the driver's door to show the old mileage reading when the new odometer was installed.

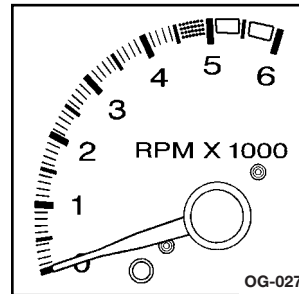
The trip odometer can be used to record mileage on a short term basis and can be reset to zero by pushing the trip odometer reset button.

Road-Speed Limiter

On the gas engine, the top speed is limited by the Electronic Throttle Control (ETC). The ETC controls the throttle valve to maintain the vehicle at the preset speed limit. The fuel will be cut off at a slightly higher speed if the vehicle manages to exceed the ETC controlled limiter on a steep downhill. The engines display a warning in the message center on the I/P cluster when the preset road speed limit has been reached or exceeded.

NOTE: Exceeding the posted speed limit is not condoned.

Tachometer



This gauge shows the engine speed in revolutions per minute (rpm).

WARNING LIGHTS, GAUGES AND INDICATORS (Except 3.9L Diesel)

This part describes the warning lights and gauges that may be on your vehicle. The pictures on the following pages will help you locate them.

Warning lights and gauges can signal that something is wrong before it becomes serious enough to cause an expensive repair or replacement. Paying attention to your warning lights and gauges could also save you or others from injury.

Warning lights come on when there may be or is a problem with one of your vehicle's functions. As you will see in the details on the next few pages, some warning lights come on briefly when you start the engine just to let you know they are working. If you are familiar with this section, you should not be alarmed when this happens.

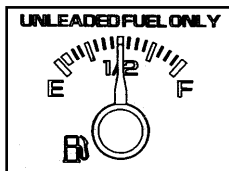
Gauges can indicate when there may be or is a problem with one of your vehicle's functions. Often gauges and warning lights work together to let you know when there is a problem with your vehicle.

When one of the warning lights comes on and stays on when you are driving, or when one of the gauges shows there may be a problem, check the section that tells you what to do about it. Please follow this manual's advice. Waiting to do repairs can be costly — and even dangerous. So please get to know your warning lights and gauges. They are a big help.

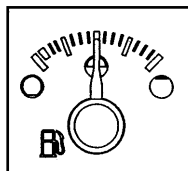
Fuel Gauge

The fuel gauge tells you about how much fuel you have left, when the ignition is on. When the gauge first indicates empty, you still have a little fuel left, but you should get more fuel soon. (Export vehicles will not have the unleaded fuel label.)

If your fuel gauge indicates full at all times (gasoline engines only), the fuel gauge reading may be suspect. Have your vehicle serviced immediately.

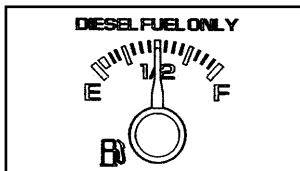


United States



Export

Diesel Engines

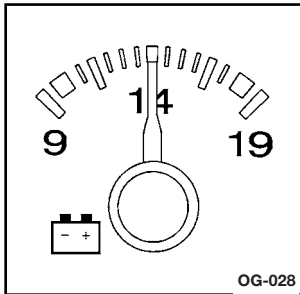


Here are four things some owners ask about. None of these show a problem with your fuel gauge.

- At the gas station, the gas pump shuts off before the gauge reads full.
- The fuel tank will take either a little more or less fuel to fill up than the fuel gauge shows.
- The gauge moves a little when you turn a corner or speed up.
- The gauge does not go back to empty when you turn off the ignition.

For your fuel tank capacity, see “Fuel Capacity” in the Index.

Voltmeter



When your engine is not running, but the ignition is “ON” (in RUN), the gauge shows your battery’s state of charge in DC volts. When the engine is running, the gauge shows the condition of the charging system.

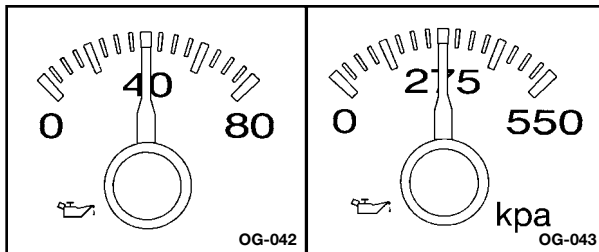
Readings between low and high warning zones indicate the normal operating range.

Readings in the low warning zone may occur when a large number of electrical accessories are operating in the vehicle and the engine is left at an idle for an extended period. This condition is normal since the charging system is not able to provide full power at engine idle. As engine speeds are increased, this condition should correct itself as higher engine speeds allow the charging system to create maximum power.

You can only drive for a short time with the readings in either warning zone. If you must drive, turn off all unnecessary accessories.

Readings in either warning zone may also indicate a possible problem in the electrical system. Have the vehicle serviced as soon as possible.

Engine Oil Pressure Gauge



United States

Export

The oil pressure gauge shows the engine oil pressure in psi (pounds per square inch) or with export vehicles in kPa (kilopascal) when the engine is running.

Oil pressure may vary with engine speed, outside temperature and oil viscosity, but readings above the low pressure zone indicate the normal operating range. The gauge is in the lower right corner of the instrument cluster.

A reading in the low pressure zone may be caused by a dangerously low oil level or other problems causing low oil pressure. If your engine is idling, a lower pressure is normal.



CAUTION

Do not keep driving if the oil pressure is low. If you do, your engine can become so hot that it catches fire. You or others could be burned. Check your oil as soon as possible and have your vehicle serviced.

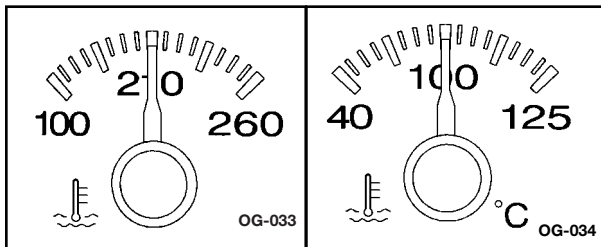
NOTICE

Damage to your engine from neglected oil problems can be costly and is not covered by your warranty.

Engine Coolant Temperature Gauge

These gauges show the engine coolant temperature. If the gauge pointer moves into the red area, it means that your engine coolant has overheated.

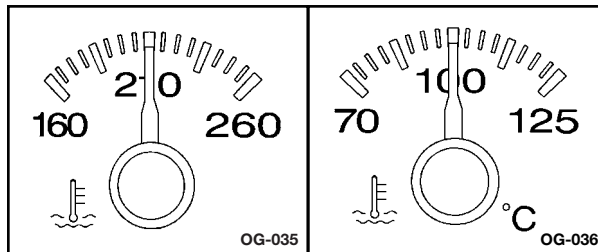
Gasoline Engines



United States

Export

Diesel Engines



United States

Export

If you have been operating your vehicle under normal driving conditions, you should pull off the road, stop your vehicle and turn off the engine as soon as possible.

The “Problems on the Road,” section of this manual shows what to do. (See “Engine Overheating” in the Index.)

Battery Charging System Warning Lamp



This light is used by the charging system to warn that the system is not charging the battery. It will be on when the ignition is "ON" and the engine is not running. If this light comes on when driving, turn off as many electrical loads as possible, specifically the air conditioning system. If the battery was fully charged when the light came on and the air conditioning system, radio, fan motors and etc., are turned off immediately, the vehicle might be capable of being driven for up to another hour, at highway speeds, before the engine will cut out due to a lack of electrical power. **Drive to the nearest Workhorse service center to have the charging system serviced, or if the distance to the nearest Workhorse service center is too great, contact Workhorse roadside assistance at 877-946-7731.**



CAUTION

If you continue to drive after the light comes on, keep a close eye on the engine coolant temperature gauge. The belt which drives the alternator also drives the engine water pump. If the temperature starts to rise after the light comes on, pull off of the road immediately. Continued driving with the light on and the temperature rising, will cause the engine to overheat. This can cause serious damage to the engine. The high temperature in the engine compartment might cause a fire.

On some vehicles an optional warning buzzer may also sound to indicate that the charging system voltage is too high, too low or that the charging system has failed. The buzzer will sound for 3 seconds or until the trip reset button is pressed, depending on the severity of the fault.

Auto Park Brake Light**AUTO
PARK**

OG-029

If you have P32 motor home with a GVWR of 16,000 lbs. (7 258 kg) through 18,000 lbs. (8 165 kg) or a W24 motor home with a GVWR of 24,000 lbs.

(10 866 kg), you will have this light on your instrument cluster.

NOTICE

The P32 motor home may have the J72 auto-apply park brake option. Check the vehicle specification to determine if you have a J72 park brake option. The W24 motor homes have only J72 option of auto-apply park brake.

It should come on as you start the vehicle and stay on when your transmission is in PARK (P). The light will also stay on while the system is building pressure to release the parking brake. If it does not come on then, have it serviced so it will be ready to warn you if there is a problem. If the light comes on frequently (less than 15 minute intervals) while driving, see your dealer for service on your auto-apply park brake system.

**CAUTION**

This applies only to the P32 and the W24 motor homes equipped with J72 parking brake system. If this light starts flashing simultaneously with the BRAKE warning light and the audible tone alarm sounds when the vehicle is in motion, it may indicate the malfunction of the parking brake system. It is strongly recommended to abort driving and pull over to the side of the road. If the warning lights change from flashing to continuous and the audible alarm is off do not continue driving, call for the Roadside Assistance.

NOTICE

This applies only to the P32 and the W24 motor homes with J72 parking brake system. If the parking brake is set to apply by using the pull button while the vehicle is in motion and the speed is greater than 0.5 mph (.8km/h), then this light will flash simultaneously with the BRAKE warning light to warn you that the speed of the vehicle is too high for the safe application of the parking brake. If the pull button is not reset to its original position within approximately 4 seconds the brake will apply.

**CAUTION**

If your vehicle is in motion, **NEVER** turn the ignition key to the **OFF** position. This will cause the parking brake to apply rapidly and the damage to your vehicle can occur and/or loss of control. If the vehicle is moving and the engine stalls, immediately shift the transmission shifter into **N (Neutral)** or select the **N (Neutral)** button on the **PBSS** (if equipped) and use your regular brakes to stop the vehicle.

Brake Failure Warning Light

Your vehicle's hydraulic brake system is divided into two parts. If one part is not working, the other part can still work and stop you. For good braking, you need both parts working well.



United States



Export

This light should come on briefly when you turn the ignition key to **RUN**.

If it does not come on then, have it serviced so it will be ready to warn you if there is a problem. If this warning light stays on after you start the engine there could be a brake problem. Have your brake system inspected right away.

If the light comes on while you are driving, pull off the road and stop carefully. You may notice that

the pedal is harder to push. Or, the pedal may go closer to the floor. It may take longer to stop.

On the P32 motor home and P42 commercial vehicles this light will come on if there is a difference in pressure between the front and rear systems. On the W22/FE20 and W52 the light will also come on when the brake fluid level in the master cylinder is low and if there is no flow of hydraulic fluid in the brake boost system.

If the light is still on after you stop, have the vehicle towed for service. (See “Towing Your Vehicle” in the Index.)

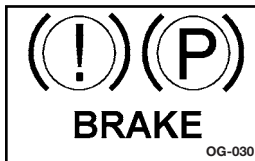


CAUTION

Your brake system may not be working properly if the brake warning light is on. Driving with the brake warning light on can lead to an accident. If the light is still on after you have pulled off the road and stopped carefully, have the vehicle towed for service.

NOTE: If the ABS light is “ON” and the regular brake light is “OFF”, the vehicle can be driven but you must adjust your driving accordingly.

Parking Brake Indicator Light



United States



Export

When the ignition is “ON”, this light will come on when you set your parking brake. The light will stay on if your parking brake does not release fully.

This light should also come on when you turn the ignition key to START. If it does not come on then, have it serviced so it will be ready to remind you if the parking brake is applied or has not released fully.

NOTICE

The P32 motor home may have the J72 auto-apply park brake option. Check the vehicle specification to determine if you have a J72 park brake option. The W24 motor homes have only J72 option of auto-apply park brake.

On the P32 motor home with a 16,000 lb. (7 258 kg) through 18,000 lb. (8 165 kg) GVWR or a W24 motor home with a GVWR of 24,000 lbs. (10 866 kg), equipped with the J72 parking brake system, this light will come on and stay on when you set the parking brake with the pull button pulled out. The light should go off when the pull button is pushed in. This light will come on and a tone alarm will sound if the parking brake system requires service.

On the P32 and the W24 motor homes with the J72 parking brake system, if the parking brake is set to apply by using the pull button while the vehicle is in motion and the speed is greater than 0.5 mph (0.8 Km/h), then this light will flash simultaneously with

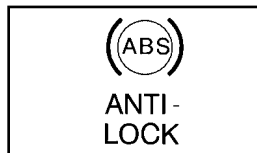
AUTO PARK to warn you that the speed of the vehicle is too high for the safe application of the parking brake. If the pull button is not reset to its original position within approximately 4 seconds, the brake will apply. This can result in damage to the vehicle.

NOTICE

Application of the parking brake while the vehicle is in motion may result in damage to the parking brake or other systems of the vehicle.

NOTICE

This applies only to the P32 and W24 motor homes with J72 parking brake system. If this light starts flashing simultaneously with the AUTO PARK warning light and the audible tone alarm sounds when the vehicle is in motion, it may indicate the malfunction of the parking brake system. It is strongly recommended to abort driving and pull over to the side of the road. If the warning lights change from flashing to continuous and the audible alarm is off, do not continue driving, call for Roadside Assistance.

Anti-Lock Brake System Warning Light

United States



Export

With the anti-lock brake system, this light will come on when you start your engine and may stay on for several seconds. That is a normal function for this light.

If the light stays on, or comes on when you are driving, your vehicle needs service. If the regular brake system warning light is not on, you still have brakes, but you do not have anti-lock brakes. If the regular brake system warning light is also on, you do not have anti-lock brakes and there is a problem with your regular brakes. See “Brake System Warning Light” earlier in this section.

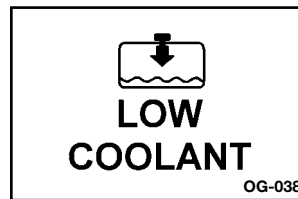
The anti-lock brake system warning light should come on briefly when you turn the ignition key to RUN. If the light does not come on then, have it serviced so it will be ready to warn you if there is a problem.

Transmission Light



Indicates problem with the Transmission, and the vehicle should be taken to dealer promptly.

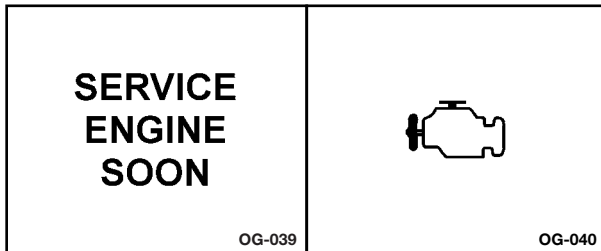
Low Coolant Warning Light (Diesel Engines)



If you have a diesel engine, you have a LOW COOLANT warning light. You will see this light for a few seconds when you start your engine.

If this light ever comes on when the engine is running, even briefly, your system is low on coolant and the engine may overheat. Have your vehicle serviced as soon as possible. (See “Engine Coolant” in the Index).

Service Engine Soon Light



United States

Export

Your vehicle is equipped with a computer which monitors operation of the fuel, ignition and emission control systems.

This system is called On-Board Diagnostics-First Generation, (OBD I for Federal) and On Board Diagnostics Second Generation (OBD II for California less than 14,000 lb. GVWR), and is intended to assure that emissions are at acceptable levels for the life of the vehicle, helping to produce a cleaner environment. The SERVICE ENGINE SOON light comes on to indicate that there is a problem

and service is required. Malfunctions often will be indicated by the system before any problem is apparent. This may prevent more serious damage to your vehicle. This system is also designed to assist your service technician in correctly diagnosing any malfunction.

If this light comes on or flashes while you are driving, two things may happen. First, you will not notice any difference in engine performance, but your tail pipe emissions may increase. Second, your engine may not run properly or may stall without warning. If either of these things happen, drive or tow your vehicle to your dealer for service.

NOTICE

If you keep driving your vehicle with this light on, after a while, your emission controls may not work as well, your fuel economy may not be as good and your engine may not run as smoothly. This could lead to costly repairs that may not be covered by your warranty.

NOTICE

Modifications made to the engine, transmission, exhaust or fuel system of your vehicle or the replacement of the original tires with other than those of the same Tire Performance Criteria (TPC) can affect your vehicle's emission controls and may cause the SERVICE ENGINE SOON light to come on. Modifications to these systems could lead to costly repairs not covered by your warranty. This may also result in a failure to pass a required Emission Inspection/Maintenance test.

This light should come on, as a check to show you it is working, when the ignition is on and the engine is not running. If the light does not come on, have it repaired. This light will also come on during a malfunction in one of two ways:

- **Light Flashing** — A misfire condition has been detected. A misfire increases vehicle emissions and may damage the emission control system on your vehicle. Dealer or qualified service center diagnosis and service may be required.
- **Light On Steady** — An emission control system malfunction has been detected on your vehicle. Dealer or qualified service center diagnosis and service may be required.

If the Light Is Flashing

The following may prevent more serious damage to your vehicle:

- Reducing vehicle speed.
- Avoiding hard accelerations.
- Avoiding steep uphill grades.
- If you are towing a trailer, reduce the amount of cargo being hauled as soon as it is possible.

If the light stops flashing and remains on steady, see “If the Light Is On Steady” next in this section.

If the light continues to flash, when it is safe to do so, *stop the vehicle*. Find a safe place to park your vehicle. Turn the key “OFF”, wait at least 10 seconds and restart the engine. If the light remains on steady, see “If the Light Is On Steady”. If the light is still flashing, follow the previous steps, and drive the vehicle to your dealer or qualified service center for service.

If the Light Is On Steady

You may be able to correct the emission system malfunction by considering the following:

Did you recently put fuel into your vehicle?

If so, reinstall the fuel cap, making sure to fully install the cap. (See “Filling Your Tank” in the Index). The diagnostic system can determine if the fuel cap has been left off or improperly installed. A loose or missing fuel cap will allow fuel to evaporate into the atmosphere. A few driving trips with the cap properly installed should turn the light off.

Did you just drive through a deep puddle of water?

If so, your electrical system may be wet. The condition will usually be corrected when the electrical system dries out. A few driving trips should turn the light off.

Are you low on fuel?

As your engine starts to run out of fuel, your engine may not run as efficiently as designed since small amounts of air are sucked into the fuel line causing

a misfire. The system can detect this. Adding fuel should correct this condition. Make sure to install the fuel cap properly. (See “Filling Your Tank” in the Index). It will take a few driving trips to turn the light off.

Have you recently changed brands of fuel?

If so, be sure to fuel your vehicle with quality fuel (see “Fuel” in the Index). Poor fuel quality will cause your engine not to run as efficiently as designed. You may notice this as stalling after start-up, stalling when you put the vehicle into gear, misfiring, hesitation on acceleration or stumbling on acceleration. (These conditions may go away once the engine is warmed up.) This will be detected by the system and cause the light to turn on.

If you experience one or more of these conditions, change the fuel brand you use. It will require at least one full tank of the proper fuel to turn the light off.

If none of the above steps have made the light turn off, have your dealer or qualified service center check the vehicle. Your dealer has the proper test

equipment and diagnostic tools to fix any mechanical or electrical problems that may have developed.

Malfunction Indicator Lamp (Service Engine Soon Light)

Your vehicle comes equipped with a computer which monitors operation of the fuel, timing and emission control systems.

This system is called On-Board Diagnostics-Second Generation (OBD II for California less than 14,000 lb GVWR), and is intended to assure that emissions are at acceptable levels for the life of the vehicle, helping to produce a cleaner environment. The SERVICE ENGINE SOON light comes on to indicate when service is required. Malfunctions often will be indicated by the system before any problem is apparent. This may prevent more serious damage to your vehicle. This system is also designed to assist your service technician in correctly diagnosing any malfunction.

NOTICE

If you keep driving your vehicle with this light ON, after a while, your emission controls may not work as well, your fuel economy may not be as good and your engine may not run as smoothly. This could lead to costly repairs that may not be covered by your warranty.

NOTICE

Modifications made to the engine, transmission, exhaust or fuel system of your vehicle or the replacement of the original tires with other than those of the same Tire Performance Criteria (TPC) can affect your vehicle's emission controls and may cause the light to come on. Modifications to these systems could lead to costly repairs not covered by your warranty. This may also result in a failure to pass a required Emission Inspection/Maintenance test.

If the Light Comes On

This light should come on, as a check to show you it is working, when the ignition is ON and the engine is not running. If it does not, have it repaired. This light will also come on if an emission control system malfunction has been detected on your vehicle. Dealer or qualified service center diagnosis and service may be required.

You also may be able to correct the emission system malfunction by considering the following:

Did you just drive through a deep puddle of water?

If so, your electrical system may be wet. The condition will usually be corrected when the electrical system dries out. A few driving trips should turn the light off.

Are you low on fuel?

As your engine starts to run out of fuel, your engine may not run as efficiently as designed since small amounts of air are sucked into the fuel line. The system can detect this. Adding fuel should correct this condition. It will take a few driving trips to turn the light off.

If none of the above steps have made the light turn off, have your dealer or qualified service center check the vehicle. Your dealer has the proper test equipment and diagnostic tools to fix any mechanical or electrical problems that may have developed.

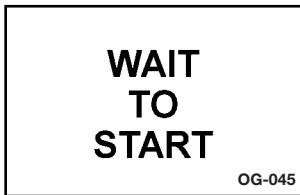
Service Throttle Soon Light - (Diesel Engine)



On the diesel engines a computer monitors the operation of the electronic accelerator.

This light should come on when the ignition is on but the engine is not running, as a check to show you it is working. If it does not come on at all, have it serviced right away. If the light stays on after the engine starts or comes on while you are driving, the computer is indicating that you have a problem. You should take your vehicle in for service soon.

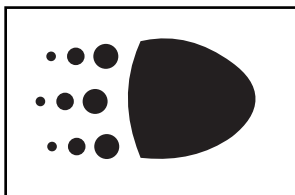
Wait to Start Light (Diesel Engines)



Your diesel engine has a special starting system. When the WAIT TO START light goes off, your engine is ready to be started.

For more details, see “Starting Your Diesel Engine” in the Index.

Daytime Running Lamp (DRL) Indicator Light



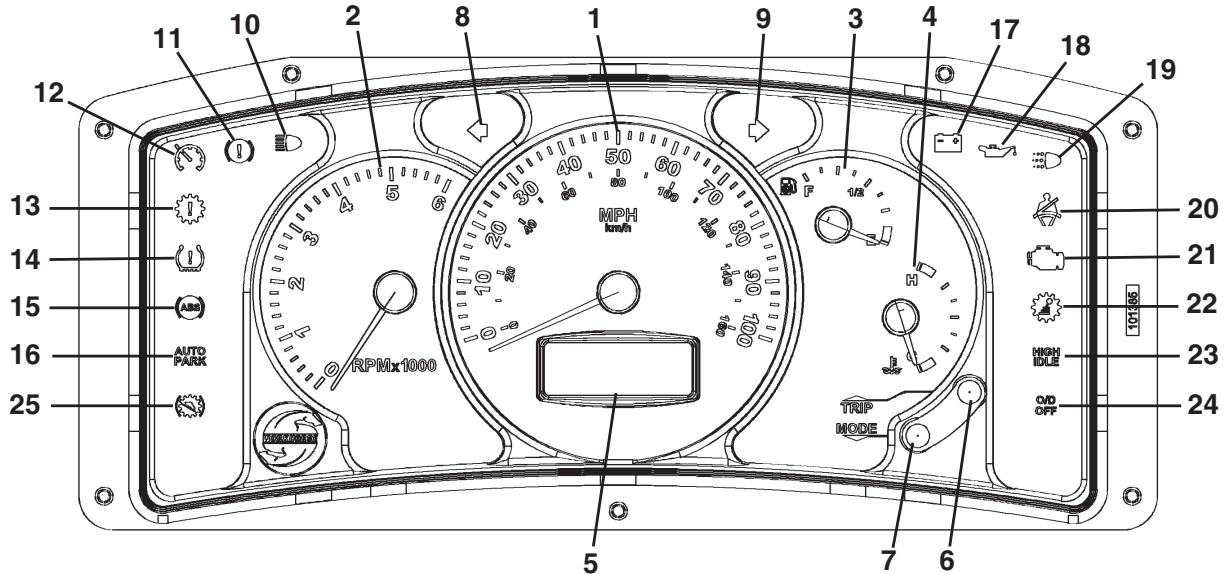
The DRL indicator is on whenever the ignition is on and the headlamp switch and parking brake are off. This light tells you that your DRL are on.

Water In Fuel Light (Diesel Engines)

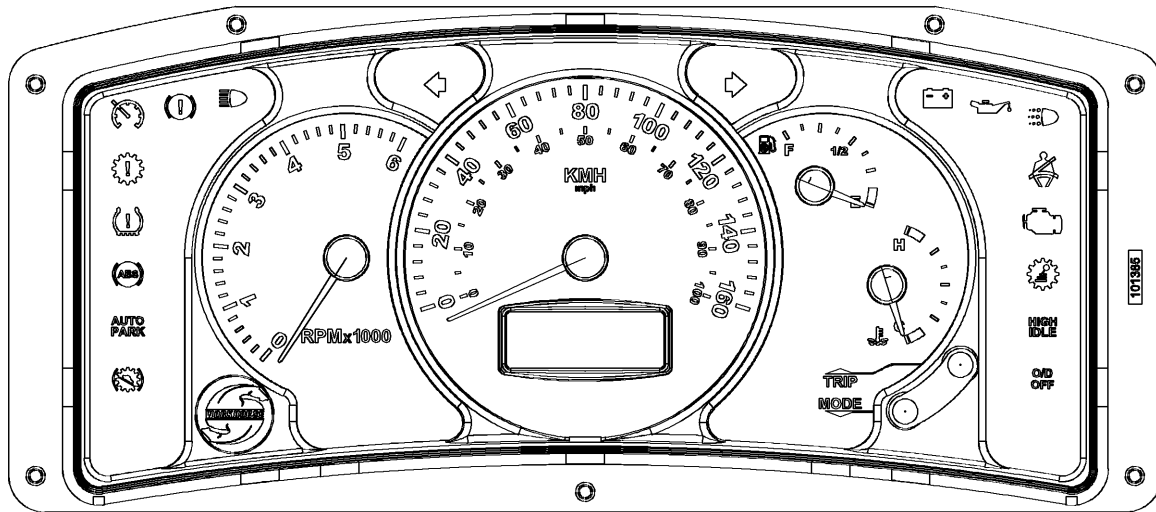


This light will come on to warn you if there is water in the diesel fuel system. For more information on how this light works, see “Diesel Engine Fuel Requirements and Fuel System” in the Index.

INSTRUMENT PANEL CLUSTER - TYPICAL GASOLINE ENGINES



INSTRUMENT PANEL CLUSTER - TYPICAL EXPORT GASOLINE ENGINES



INSTRUMENT PANEL CLUSTER – ICON DESCRIPTIONS

1	Speedometer	13	Transmission Fail Warning Light
2	Tachometer	14	Tire pressure monitoring telltale
3	Fuel Gauge	15	Anti-lock Brake System Warning Light
4	Engine Coolant Temperature Gauge	16	Auto Park Brake Engaged Warning Light
5	LCD Screen	17	Battery Charging System Warning Light
6	Trip Button	18	Engine Oil Pressure Warning Light
7	Mode Button	19	Daytime Running Lamps On Warning Light
8	Turn signal LH turn active	20	Seat Belt Reminder Warning Light
9	Turn signal RH turn active	21	Service Engine Warning Light
10	Headlight High Beam On Warning Light	22	Transmission Range Inhibit On Warning Light
11	Brake fail and Park Brake Warning Light	23	High Idle Enabled On Warning Light
12	Cruise Control Active Warning Light	24	Overdrive Off Warning Light
		25	Grade Braking

WARNING LIGHT DESCRIPTIONS

The following warning lights are applicable to the gasoline engines, except where noted.

Cruise Control

This light comes on when the vehicle speed is actively controlled by the Cruise Control system.

High Idle

This light comes on when the High Idle is activated by “press-and-release” of the High Idle dash mount switch, while the vehicle is in PARK (P) or NEUTRAL

(N). The light will turn off when the High Idle switch is deactivated by “press-and-release” of the High Idle switch.

NOTICE

Your vehicle may not be fitted with a high idle switch, which has to be installed by the body builder.

Engine Oil Pressure

This light will come on when the Engine Oil Pressure is too low.

Seat Belt

This light comes on when the ignition is turned “ON” and will stay on until the seat belt is fastened, or for 60 seconds after the vehicle is started. The functionality depends on if the body builder installed a seat belt switch.

Parking Brake / Brake Failure

When the ignition is on, this light will come on when you set the Parking Brake. If your vehicle’s hydraulic brake system fails or needs service, the Brake Failure light will come on.

Daytime Running Lamps (DRL)

This light comes on whenever the ignition is “ON” and the Headlamp Switch and Parking Brake are off. This light tells you that your DRL are on.

Overdrive Off (Allison Transmission only)



This light comes on when the overdrive gear is disabled. The dash mount switch is used to select 4th gear when the range selector is in Overdrive D by disabling Overdrive (5th) gear.

Tire Pressure Monitor



If your vehicle is fitted with a Tire Pressure Monitoring System, the Tire Pressure Monitoring (Check Tires) warning light will warn you when one or more of the tires on the vehicle or towed vehicle (if the towed vehicle system is integrated with the tow vehicle) is under inflated. Low tire pressure may cause tire failure, which may lead to an accident.

Anti-Lock Brake System



This light comes on when you start your engine and may stay on for several seconds, which is normal. If the light stays on or comes on when you are driving, your vehicle needs service.

Auto Park Brake



This light will come on as you start the vehicle and stay on when your transmission is in PARK (P). The light will also stay on while the system is building pressure to release the Parking Brake. If it does not come on then, have it serviced. If the light comes on frequently (less than 15 minute intervals) while driving, see your dealer for service on your Auto-Apply Park Brake system.

Grade Braking



You can enable this feature by switching the GRADE BRAKE switch (located on the dash panel) to the "ON" position. When the Grade Brake switch is on, the instrument panel will display this icon in green.

Transmission Failure



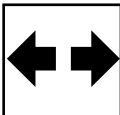
When this light comes on, it indicates a problem with the transmission. You should take your vehicle to the nearest dealer and have it serviced immediately.

High Beams



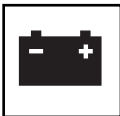
When the High Beams are on, the light on the instrument panel will also be on, usually blue in color.

Turn Signals



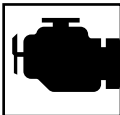
An arrow on the instrument panel will flash in the direction of the turn or lane change.

Battery Charging System



This light is used by the charging system to warn that the system is not charging the battery. It will be on when the ignition is on and the engine is not running.

Service Engine Soon



This light comes on to indicate that there is a problem in the Engine and service is required.

Range Inhibit



This light comes on when the transmission controller does not allow the selected gear.

INSTRUMENT PANEL CLUSTER MODEL OPTIONS (Gasoline Engines)

The instrument cluster is available in two models:

- **Base Instrument Cluster**
- **Base Instrument Cluster with Trip Computer (CTC)**

The hardware features of both the instrument cluster options are the same, and for this reason the Base Instrument Cluster function is described in detail. Additional features and functions of the Trip Computer option are described in that section.

Base Instrument Cluster Features

The instrument cluster is equipped with the following listed features (Refer to the illustration).

Trip Button:

- Selects and resets the trip 1 and 2 odometers.
- Scrolls upwards in the menu display.
- Is used with the Mode button to select menu choices and toggle between Metric and US units.

- Displays the odometer reading when ignition is "OFF".
- Acknowledges the sounding of the buzzer and chimes.

Mode Button:

- Selects inquiry mode (only available if equipped with PRND321 display).
- Scrolls downward in the menu display.
- Is used with the Trip Button to select menu choices and toggle between Metric and US units.
- Displays the odometer reading when ignition is "OFF".
- Is used to enter the cluster diagnostic mode.

Liquid Crystal Display (LCD) Screen:

- Indicates transmission gear selection on vehicles equipped with an automatic transmission (if the steering column is not equipped with a gear selection indicator).
- Odometer with maximum mileage accumulated to 999999.9 miles / km.

- Trip odometer 1 and 2 (independent functions).
- Battery voltage.
- Oil Pressure or PRND321 (depends on the user selection).
- Warning messages to provide more detail if the vehicle condition monitoring system detects a fault (this will interrupt monitoring data displayed).

Odometer display with the ignition "OFF":

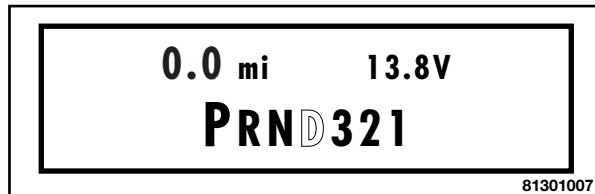
- Switch vehicle headlights to "ON". The odometer can be read until the lights are switched "OFF",
- or
- Press the Trip or Mode button to view the odometer.

Self-testing Feature:

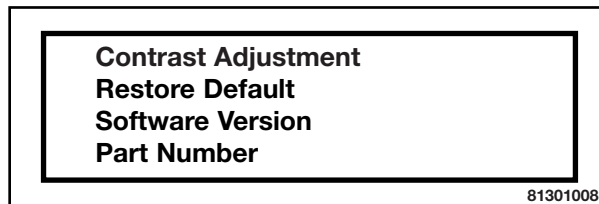
- Insert key into the ignition and switch to "ON". The instrument cluster will automatically perform a self-test and display any errors found on the LCD screen.

Default LCD Screen Layout:

The default settings of the LCD Screen layouts for the Base Instrument Cluster are described below. (The tables are a representation of the LCD Screen divided into quarters or four separate sections).



Factory Default LCD Screen Layout



Cluster Diagnostic Menu

Base Cluster with transmission gear selection displayed on steering column

Left half of screen	Right half of the screen
ODOMETER / TRIP ODOMETER	Battery Voltage
OIL PRESSURE	

Base Cluster with transmission gear selection displayed on instrument cluster LCD Screen

Left half of the screen	Right half of the screen
ODOMETER / TRIP ODOMETER	PRND321 / Battery Voltage
OIL PRESSURE / PRND321	

Accessing Menu's and changing the default LCD screen display

The default screen display can be changed as follows:

- **Step 1** — Press the Mode button to enter the Inquiry Menu
 - **Step 2** — Highlight choice by scrolling up or down with the Trip or Mode button.
 - **Step 3** — Make selections automatically by waiting 3 seconds or press and release both the Trip and Mode buttons simultaneously.
- The selection is highlighted.
 - The Trip button scrolls up and the Mode button scrolls down.
 - Pressing the Trip and Mode button and releasing them at the same time selects the item, or selection can be made automatically by waiting 3 seconds.

Changing Units

Press and release both the Trip and Mode buttons simultaneously to toggle between Metric and US units while in the default LCD screen.

CLUSTER DIAGNOSTICS

Diagnostic Menus

On-board diagnostic functions are displayed in the message center. They can be accessed if the vehicle transmission is in PARK (P) or NEUTRAL (N) or if the vehicle PARK BRAKE is set and the MODE (m) button is pressed and held for at least eight (8) seconds. To exit diagnostics, select “EXIT MENU” or turn the vehicle ignition OFF then back ON.

Diagnostic Mode

The cluster enters the Diagnostic Mode when a start diagnostic request is made.

The start diagnostic request is sent either by a diagnostic tool through the CAN data link or by selecting the Diagnostic option on the message display menu.

Turn On Test

When the ignition voltage is first applied to the cluster, all the tell-tales (except turn signals) will turn ON for two (2) seconds, and then turn OFF. Simultaneously, all of the gauges reference themselves and then go to the position corresponding to their current reading.

Ignition Mode

The Ignition Mode is active when the ignition switch is ON.

The Ignition Mode is the normal operation mode of the cluster.

When the ignition switch is turned OFF, the following current settings of the cluster will be stored in non-volatile memory:

- Accumulated odometer, Trip1 and Trip2 values
- The user selection of US or Metric Units on the message display
- The last message selection being displayed on the second line of the message display.

After storing these settings, the cluster goes into Sleep Mode after a delay of three (3) seconds.

Key in Ignition Reminder Mode

When the ignition goes from ON to OFF and the key is left in the ignition, for a 60 second period, the chime will sound if the Door Ajar input is low (door open). The chime will continue to sound until either the driver's door is closed or the key is removed from the ignition or the 60-second period has elapsed (during the 60-second period the odometer is visible).

Menu Operation

Menus have four (4) lines. To make a selection, a line must first be highlighted. To highlight a line, the TRIP (t) button is used to scroll up and the MODE (m) button is used to scroll down (the highlighted line is shown in reverse video). Once highlighted, the line can be selected in either of two (2) ways. Depressing and then releasing both the TRIP and MODE buttons at the same time chooses the line. Or, after three (3) seconds of inactivity, the line shown in reverse video is automatically chosen. The display exits from the menu to the previous display or screen.

This is a summary of all menu lines available in self-diagnostic mode.

Contrast Adjustment
Part Number
Software version
Restore Default
Engine hours
Max Engine RPM
Max Vehicle Speed
Engine Oil Life
Cluster Testing
 Gauge Test
 Warning Light Test
 LCD Test
 Backlighting Test
 Speaker Test
 Switch Inputs
 Analog Inputs
 Frequency Inputs
 Exit Menu
Exit Menu

On-board diagnostic functions can be initiated and executed with the TRIP and MODE buttons.

Part Number

Displays the Part Number programmed into the micro controller.

Pressing the MODE (m) button exits to the diagnostic menu. (The message “m to exit” appears on the screen).

Software Version

Displays the Software part number and Version programmed into the micro controller.

Pressing the MODE (m) button exits to the diagnostic menu. (The message “m to exit” appears on the screen).

Restore Default

This routine allows the user to restore the settings of the dimmer and the contrast to the original factory settings.

Engine Hours

Displays the calculated total Engine Hours based on when the engine is running. Pressing the MODE (m) button exits to the diagnostic menu. (The message “m to exit” appears on the screen).

Max Engine RPM

Displays the Maximum Engine RPM that was sustained for at least three (3) seconds.

Pressing the MODE (m) button exits to the diagnostic menu. (The message “m to exit” appears on the screen).

Max Vehicle Speed

Displays the Maximum Vehicle Speed that was sustained for at least five (5) seconds.

Pressing the MODE (m) button exits to the diagnostic menu. (The message “m to exit” appears on the screen).

Engine Oil Life

Gasoline Engines will display this value in percentage (%) from 0 to 100%. Pressing the MODE (m) button exits to the diagnostic menu. (The message “m to exit” appears on the screen).

Cluster Testing

Gauge Test

This routine takes each Gauge pointer through three (3) points. This display indicates the position of the Gauge pointer during the test. Each Gauge pointer will be checked. The test can be stopped, at any time, by pressing the MODE (m) button.

Warning Lamp Test

This routine tests each Warning Lamp by turning it ON then OFF. The display indicates the lamp being tested and its status during the test. The test can be stopped, at any time, by pressing the MODE (m) button.

LCD Test

This routine tests the LCD screen using test patterns. The test automatically stops after three (3) cycles or if the MODE (m) button is pressed.

Backlighting Test

This routine sets the Backlighting through three (3) points. The display indicates the percentage of backlighting during the test. The test automatically stops after three (3) cycles or if the MODE (m) button is pressed.

Speaker Test

This routine tests the Speakers using two (2) tones. The test automatically stops after three (3) cycles or if the MODE (m) button is pressed.

Switch Inputs

This routine tells the operator the status of each Switch Input. The display indicates the Switch Input by descriptive name and the status level (ON/OFF) at the pin. Four (4) inputs are shown per screen. The level status reflects the active state of the input. For example, if an input is active to ground, and the input level is 0 volts, then the status will be ON.

Gasoline Vehicle Input List:

Day Light	Antenna-Jacks
Buzzer Call	Door Ajar
Check Tires	Over Drive Off
Auto Park	Key In Ign
High Idle	High Beam
Service	Head Light
Grade Braking	Right Turn
Seat Belt	Left Turn
Park Brake	

Analog Inputs

The Analog Inputs are displayed in the function of the engine type.

This routine tells the operator the status of each Analog Input. The display indicates the Analog Input by descriptive name and the voltage at the pin. Four (4) inputs are shown per screen.

Gasoline Vehicle Input List:

Fuel Level	Ignition
Dimmer	ABS
External Temperature	Brake Fail

Frequency Inputs

This routine tells the operator the status of each Frequency Input. The display indicates the Frequency Input by the descriptive name and the frequency at the pin (Vehicle Speed frequency is *not* used on diesel engines).

Contrast Adjustment Feature

Enter the Cluster Diagnostic menu by pressing the Mode button and holding for 5 seconds. The cluster will enter the Diagnostic menu with Contrast Adjustment as the first item. The Diagnostic menu will time-out after 3 seconds and enter the Contrast menu. (Both the Mode and Trip buttons can also be used to enter the Contrast menu). Use the Trip button to increase the contrast and the Mode button to decrease the contrast.

After the Contrast Adjustment is made, the menu will time-out after 3 seconds. Scroll to the Exit menu and leave to time-out again to the default LCD screen.

NOTICE

Your vehicle should be in park or the park brake must be set to enter the Diagnostic Mode.

NOTE: If the LCD screen is blank, the contrast setting may be too low. Press the Mode button for 5 seconds, with the park brake set or the transmission in the PARK (P) position, release the Mode button and wait 3 seconds. Press the Trip button repeatedly until the contrast is set to your preference. If the LCD screen does not change, turn off the ignition, wait 10 seconds and retry from the start.

NOTE: If the LCD screen appears black, the contrast setting may be too high. Use the same sequence of steps as for a too low contrast, but use the Mode button instead of the Trip button to adjust the contrast setting. Contrast cannot be adjusted outside the range of visibility.

Trip Odometer Resets

- Select the Trip Odometer you want to reset by pressing the Trip button.
- Press and hold the Trip button for at least 2 seconds to reset it.

Warning Message Feature

- If the vehicle condition monitoring system detects a fault, a message will be displayed on the LCD screen. A warning light may come on accompanied by a buzzer or chime.
- The fault message will take priority and interrupt the bottom line of the LCD display screen, accompanied by a buzzer or chime. The transmission gear selection indicator (PRND321) will move to the upper right hand (RH) corner of the LCD display screen, where applicable.

- If more than one fault is detected, each message will be displayed for three seconds, one after the other.
- A message is displayed until the fault is corrected or the user acknowledges the fault by pressing the Trip button.

NOTE: If the ignition is switched "OFF" with an active fault, the message will be displayed again once the ignition is switched "ON".

Message Meanings

- Door Ajar — This message will be displayed when a door is not in the fully closed position.

NOTICE

The body builder may not have implemented the Door Ajar feature on your vehicle.

- Vehicle Speed Limit — This message will be displayed if the pre-set maximum speed of the vehicle is reached.

- Fuel Level Low — This message is displayed when the fuel level in the tank reaches 20% remaining.

NOTICE

Full engine performance cannot be guaranteed below the warning level under prolonged wide-open throttle (WOT) maneuvers.

- Oil Pressure Low — This message will be displayed if the engine oil pressure drops too low.
- Check Engine Oil Level — This message will be displayed if the engine oil level drops below the minimum level (if available).
- Check Engine Temperature — This message will be displayed if the engine temperature is too high.
- Check Transmission Temperature — This message will be displayed if the transmission temperature is too high (only with automatic transmissions).

- **Check Coolant Temperature** — This message will be displayed if the engine coolant temperature is too high.
- **Reduced Engine Power** — This message will be displayed if the engine controller detects a fault condition in the electronic throttle. If this happens, stop the vehicle, turn off the ignition, wait approximately 20 seconds, and restart the engine. If the message and warning light stay on after the restart, have the vehicle serviced (only available on 4.8L, 6.0L and 8.1L gasoline engines).
- **Check Battery** — This message will be displayed if the battery voltage drops below or exceeds the safe margin set.

The instrument cluster is equipped with a tone generator to draw the users attention to specific warning conditions. These conditions will be displayed on the LCD screen as messages, or on the warning lamps. The tone generator will either sound the buzzer for serious conditions or the chime as a reminder.

Buzzer Warning Conditions

- **High Engine Coolant Temperature** — The buzzer sounds for 3 seconds or until the user acknowledges the warning by pressing the trip-reset button accompanied with either a "Check Coolant Temperature" or "Check Engine Temperature" message.
- **Low Oil Pressure** — The buzzer sounds until the user acknowledges the warning by pressing the trip-reset button accompanied with a "Low Oil Pressure" message.

- **Low Fuel** — The buzzer sounds for 3 seconds or until the user acknowledges the warning by pressing the trip-reset button when the fuel tank is at or below 20% of usable capacity.

NOTICE

Full engine performance cannot be guaranteed below the warning level under prolonged wide-open throttle (WOT) maneuvers.

- **Low Engine Coolant** — The buzzer sounds until the user acknowledges the warning by pressing the trip-reset button with engine running accompanied with a "Low Coolant" message (not available on gasoline engines).
- **High Transmission Fluid Temperature** — The buzzer sounds for 3 seconds or until the user acknowledges the warning by pressing the trip-reset button (Automatic Transmissions).
- **Low Voltage** — The buzzer sounds until the user acknowledges the warning by pressing the trip-reset button with engine running and the battery voltage dropping below 10.5 V for a continuous period of 30 seconds.

- **High Voltage** — The buzzer sounds until the user acknowledges the warning by pressing the trip-reset button with engine running and the battery voltage exceeding 16 V for a continuous period of 5 seconds.
- **Charging Problem** — The buzzer sounds for 3 seconds or until the user acknowledges the warning by pressing the trip-reset button with the "Battery Charge" warning light on.
- **Brake System Failure** — The buzzer sounds until the user acknowledges the warning by pressing the trip-reset button with the "Brake System Failure" warning light on.

Chime Reminder Conditions

- **Park Brake Reminder** — The chime will sound when the park brake is applied and vehicle speed is above 3 mph (4.8km/h). In the case of an automatic transmission, with the engine running, the park brake applied for longer than 3 seconds and the transmission out of PARK (P), the chime sounds until it is acknowledged by pressing the

trip-reset button or the park brake is released or the transmission range selector is moved to PARK (P) or the engine stops running.

- **Seat Belt Reminder** — When the driver's seat belt is not fastened, the chime will sound. If the seat belt is buckled during this 8-second period, the audible warning turns off. (If the body builder implemented a seat belt switch).
- **Turn Signal Reminder** — The chime will sound at the turn signal flasher rate, if the vehicle is in motion with the hazard switch off, and the left or right turn signal switch is activated and remains activated for more than a 3/4 mile (1.21 Km).
- **Headlights On Reminder** — If the ignition is switched "OFF" and the headlights are left on, the chime will sound until the headlight switch is turned off, or the dimmer control is turned to the dome lamp position, or the trip reset button is pressed.
- **Key-In Ignition Reminder** — The chime will sound when the key is left in the ignition with the ignition "OFF" and the driver's door is opened. The chime

will continue to sound for 60 seconds or until the driver's door is closed. The availability of this feature is dependent on body-builder wiring. Also see "Door Ajar" message.

Engine Oil change reminder message reset:

Method 1

- Perform oil change as normal.
- Turn ignition switch to "ON" position, but do not start engine.
- Fully press and release the accelerator pedal three times within 5 seconds, and turn ignition "OFF" for at least 10 seconds.
- The oil life counter on the engine controller will be reset to start a new cycle.

Method 2

- Perform oil change as normal at a certified Workhorse Service Center (Service Center will reset the message).

Base Instrument Cluster with Trip Computer (CTC - Optional)

In addition to all the features as described for the Base Instrument Cluster, this option of the instrument cluster has additional functionality added in the form of a Trip Computer (CTC).

The user can select one of the following to be displayed on the LCD Screen (lower line) from the list below:

- **Instantaneous Fuel Consumption (liters per hour)** — Selecting this menu option will display the instantaneous fuel consumption, but will read "---" when the vehicle is stationary.
- **Average Fuel Consumption** — Selecting this menu option will display the average fuel consumption, based on the instantaneous fuel consumption over the last 50 miles (80 km).
- **Fuel Range** — Selecting this menu option will display the available fuel range, based on the remaining fuel capacity and the average fuel consumption over the last 50 miles (80 km). The display will read "---" below 5% of usable fuel capacity.
- **Average Vehicle Speed** — Selecting this menu option will display the average vehicle speed based on the time and distance traveled since the last reset.
- **Outside Temperature** — Selecting this menu option will display the outside temperature.
(Subject to body manufacturer installation specifications.)

Selection of the LCD lower line display.

The Trip Computer allows the user to select the function to be displayed from the menu by the following method:

- **Step 1** — Press the Mode button to enter Inquiry Menu.
- **Step 2** — Highlight Trip Computer by scrolling up or down with the Trip or Mode buttons.
- **Step 3** — Make selection automatically by waiting 3 seconds or pressing and releasing both Trip and Mode buttons simultaneously.

The LCD Screen layouts are described with the different options of the Base Instrument Cluster with Trip Computer (CTC) as follows. (The tables are a representation of the LCD Screen divided into quarters or four separate sections).

Base Cluster with CTC and transmission gear selection displayed on steering column

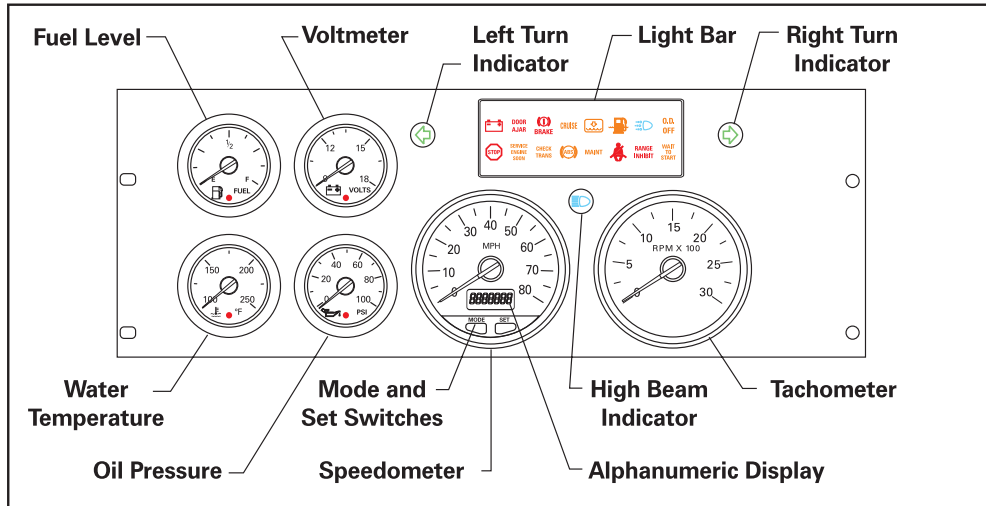
Left half of the screen	Right half of the screen
ODOMETER / TRIP ODOMETER	Battery Voltage
OIL PRESSURE /Trip Computer option selected	

Base Cluster with CTC and transmission gear selection displayed in instrument cluster LCD Screen

Left half of the screen	Right half of the screen
ODOMETER / TRIP	PRND321 / Battery Voltage
OIL PRESSURE / Trip Computer option selected / PRND321	

INSTRUMENT CLUSTER PANEL – CUMMINS DIESEL ENGINE

The purpose of the instrumentation is to display the operational status of the vehicle. In addition to the gauges and light bars, the instrumentation contains an alphanumeric display that lets the driver know when a condition or event occurs that requires attention.



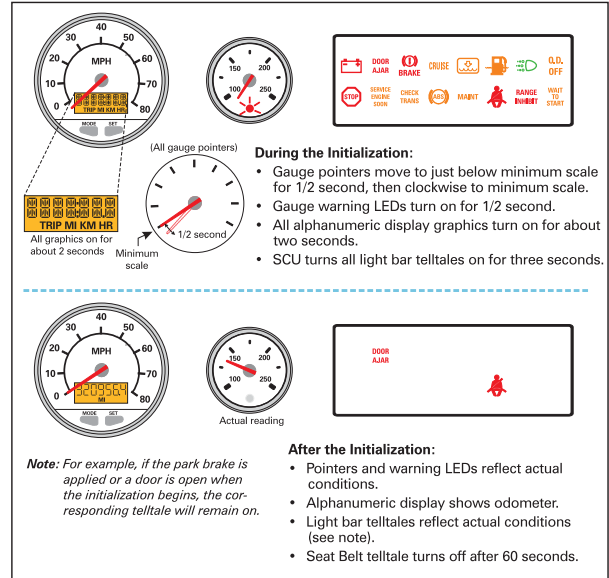
Panel Layout

Ignition Key On Position

Turning the ignition to the ON position, activates the instrumentation and starts an initialization sequence. This sequence gives the operator a chance to verify correct operation of the gauges and indicators.

Your vehicle will require service if any of the following conditions occur after the initialization sequence:

- A telltale does not light, or is always on.
- A 2-inch gauge's pointer stays at minimum scale and its warning LED flashes slowly, indicating the gauge is not receiving data from the vehicle data bus.
- A 2-inch gauge's pointer goes to full or minimum scale and its warning LED flashes rapidly, indicating the gauge has received invalid or out-of-range data.



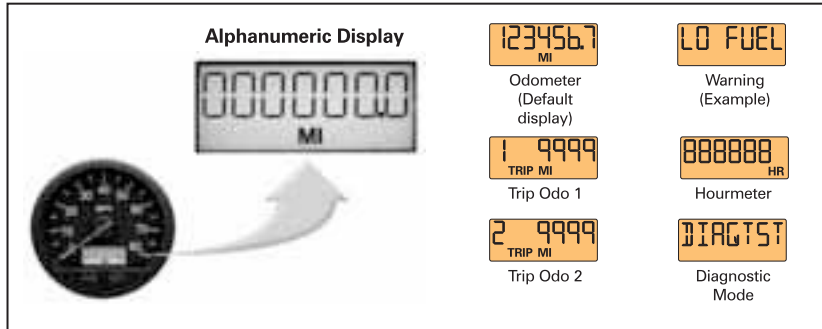
"Ignition Key On" System Initialization

Mode and Set Switches

The mode and set switches are buttons in the speedometer that allow you to select, set, and reset displays in the Alphanumeric Display. They also allow you to scroll through active system warning messages.

Alphanumeric Display

Turning the ignition to the ON position activates the Alphanumeric Display in the speedometer. When the ignition is off, turning on the backlighting or pressing the mode or set switch activates the display for 10 seconds, allowing one to use the display without an ignition key.



Normal Operation Displays

Normal Operating Mode

After the initialization sequence, the Alphanumeric Display goes into its normal operating mode. First it displays all unacknowledged messages (if they exist), then it displays the odometer. The non-resettable odometer displays up to 999999.9 miles or kilometers. After that, it displays 1000000 to 9999999 without a decimal point.

The following displays are also available by pressing the mode switch.

- **Trip Odometers** - Two independently resettable trip odometers are available, each with a maximum display of 9999.9 miles or kilometers.
- **Hourmeter** - The non-resettable hourmeter displays up to 999999 hours.

In addition to these displays, the Alphanumeric Display can be used to view fault codes and up to the last six warning messages.

System Diagnostic Test Mode

The System Diagnostic Test mode offers three functions:

- **Auto** - a fully automatic test of all modules, displays and telltales.
- **Manual** - manual selection of individual modules and telltales to test.
- **Faults and Warnings** - recalls up to 128 device faults and the six most recently acknowledged warning messages.

To access the System Diagnostic Test mode, turn the ignition to the ON position and press the mode switch until "*DIAGTST*" appears in the display. Then press the set switch to enter the System Diagnostic Test mode "*AUTO*" will be displayed.

Auto Test Mode

During the Auto Test mode, the I/P generates its own pointer positioning and warning LED data. If the instrumentation passes the Auto test, everything in the instrumentation display (except the input circuits) is functioning properly. Thus if the instrumentation fails during normal operation and passes the Auto Test, the failure is due to either the I/P itself or the vehicle's inputs to the I/P.

Manual Test Mode

The Manual Test mode is the same as the Auto Test mode except that individual modules, displays, and telltales can be isolated and tested.

Faults and Warning Messages

Fault Codes

When the engine Electronic Control Module (ECM) detects a fault, it can set an active fault code. The active fault code describes a specific type of failure (for

example, Low Oil Pressure). Each fault code is accompanied by a **Device Fault Code** identifying the device that detected the fault. If the user presses the Set Switch when "FAULTS" is displayed, the I/P displays "POLLING". After all the active fault codes have been received, the ECM displays the Device Fault Codes one-at-a-time in 3-second intervals. Pressing the Mode or Set Switch during this time exits the Fault Mode.

Warning Messages

When a problem exists with the vehicle, an active fault code will set. Examples of potential problems are low oil pressure, high coolant temperature and high transmission temperature. When an active fault code exists, a warning message will display, the buzzer will sound and a warning LED will display in the appropriate gauge.

Acknowledged Warning Messages

Unless otherwise stated, the user can acknowledge an unacknowledged message by pressing the Set Switch when the message is visible. The I/P will turn the buzzer off and display either the odometer or the next unacknowledged message if one exists.

The I/P stores the six most recent messages for later viewing. If more than six messages have been acknowledged, the oldest one will be deleted.

Messages can be viewed and acknowledged using the mode and set switches. The last message to be acknowledged will be the first message to be displayed. If the mode switch is not pressed for 15 seconds, the I/P will display the odometer (or the next unacknowledged message, if one exists).

Gauge Warning LEDs

When a I/P detects that the data received for a particular gauge is out of range the gauge LED will rapidly flash and the pointer will indicate zero (input is too low) or full scale (input is too high). This indicates that although the I/P is receiving data for the gauge, the input is out of range.

Slow Flashing LED

If the I/P does not receive any input at all for a particular gauge, it will flash that gauge's warning LED slowly (about once per second) and position its pointer to zero.

Engine Oil Pressure Gauge LED

If the I/P receives an active fault code, it turns on the LED in the Oil Pressure gauge, displays "OIL P LO" in the Alphanumeric Display, and sounds the buzzer.

Coolant Temperature Gauge LED

When a High Coolant Temperature condition exists, the LED in the Coolant Temperature gauge, displays "H2OT HI" in the Alphanumeric Display, and sounds the buzzer.

Voltmeter Gauge LED

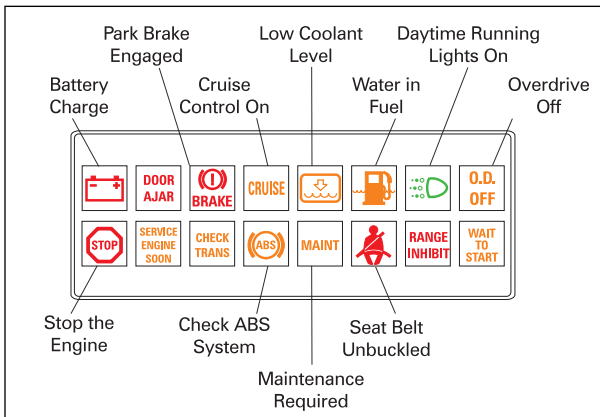
When the battery voltage is less than 10 volts or more than 17 volts, the I/P turns on the warning LED in the Voltmeter gauge and the Battery telltale in the light bar. It does not turn the buzzer on, nor does it display a message in the Alphanumeric Display.

Fuel Level Gauge LED

When the I/P detects the fuel level is less than 1/8 tank, it turns on the warning LED in the Fuel Level Gauge. It does not turn the buzzer on, nor does it display a message in the Alphanumeric Display.

Light Bar Telltales

The Light Bar contains the telltales shown below. Some of the telltales are controlled by direct inputs from switches while others are controlled by the ECM.



Light Bar Telltales

Battery Charge - When the battery voltage is below or above safe margin setting.

Door Ajar - When a door is not in a fully closed position.

Brake - Park Brake is applied.

Cruise - Vehicle cruise is engaged.

Low Coolant Level - Engine Coolant is low.

Water in Fuel - The system has detected water in the fuel. ***The engine power and speed will be reduced.***

Daytime Running Lights On -The headlights are illuminated for safety.

Overdrive Off - Operator has selected to operate the vehicle in all ranges except Overdrive.

Stop Engine - The Engine ECM has detected that a Critical Engine Operation Condition exists. The Engine ECM will shut down the engine if the condition is not repaired immediately.

Service Engine Soon - The Engine ECM has detected that a Engine Operation Condition is out of range. ***The engine power and speed will be reduced.***

Check Trans - The Transmission ECM has detected that a transmission operation/condition is out of range. Therefore transmission operation may be restricted.

ABS - The Anti Lock Brake System has detected a fault.

Maintenance - The Engine ECM indicates that certain Routine Maintenance procedures need to be performed.

Seat Belt - A seat belt is not latched. Light will remain on for 60 seconds.

Range Inhibit - The Transmission ECM has prevented a range selected by the operator.

Wait to Start - The engine Pre-heat system has been activated. Wait until the light goes off before engaging the starter.

NOTE: This vehicle's standard Electronic Engine Calibration is for an automatic engine idle shut down after 5 minutes without driver input.

NOTES

Here you will find information about driving on different kinds of roads and in varying weather conditions. We have also included many other useful tips on driving.

Control of a Vehicle	2-2	Operating Your Vehicle While	
Braking	2-3	Trapped in Snow	2-8
Steering	2-5	Recreational Vehicle Towing	2-9
Hill and Mountain Roads	2-5	Loading Your Vehicle	2-10
Grade Braking	2-6		



CAUTION

Drinking and then driving is very dangerous. Your reflexes, perceptions, attentiveness and judgment can be affected by even a small amount of alcohol. You can have a serious — or even fatal — collision if you drive after drinking. Please do not drink and drive or ride with a driver who has been drinking. Ride home in a cab; or if you are with a group, designate a driver who will not drink.



CAUTION

For high GVWR vehicles, operating above 12,000 lbs. (5 400 kg), your vehicle may handle differently than a typical passenger car or light truck. That is because of the increased forces created by high weight and a higher center of gravity. This requires driver sensitivity while using the brakes for stopping distances, slowing of the vehicle on down grades and cornering.

CONTROL OF A VEHICLE

You have three systems that make your vehicle go where you want it to go. They are the brakes, the steering and the accelerator. All three systems have to do their work at the places where the tires meet the road.

Sometimes, as when you are driving on snow or ice, it is easy to ask more of those control systems than the tires and road can provide. That means you can lose control of your vehicle.

BRAKING

Braking action involves *perception time* and *reaction time*.

First, you have to decide to push on the brake pedal. That's *perception time*. Then you have to bring up your foot and do it. That is *reaction time*.

Average reaction time is about 3/4 of a second. But that is only an average. It might be less with one driver and as long as two or three seconds or more with another. Age, physical condition, alertness, coordination and eyesight all play a part. So do alcohol, drugs and frustration. But even in 3/4 of a second, a vehicle moving at 60 mph (100 km/h) travels 66 feet (20 m). That could be a lot of distance in an emergency, so keeping enough space between your vehicle and others is important.

1. Actual stopping distances vary greatly with the surface of the road (whether it is pavement or gravel); the condition of the road (wet, dry, icy); tire tread; the condition of your brakes; the weight of the vehicle and the amount of brake force applied.
2. Avoid needless heavy braking. Some people drive in spurts of heavy acceleration followed by heavy braking rather than keeping pace with traffic. Your brakes may not have time to cool between hard stops. Your brakes will wear out much faster if you do a lot of heavy braking. If you keep pace with the traffic and allow realistic following distances, you will eliminate a lot of unnecessary braking. That means better braking and longer brake life.
3. If your engine stops while driving a P32 motor home and P42 commercial, brake normally but do not pump your brakes. If you do, the pedal may get harder to push down. If your engine stops, you will still have some power brake assist. But you will use it when you brake. Once the power assist is used up, it may take longer to stop and the brake pedal will be harder to push.
4. If your engine stops while driving a W22/W24 motor home, W52 commercial or a FE20 Shuttle Bus vehicle, the brake system will continue to perform normally.

Anti-Lock Brakes (ABS)

Your vehicle has anti-lock brakes (ABS). ABS is an advanced electronic braking system that will help prevent a braking skid.

When you start your engine and begin to drive away, your anti-lock brake system will check itself. You may hear a momentary motor or clicking noise while this test is going on. This is normal.



If there is a problem with the anti-lock brake system, this warning light will stay on. See “Anti-Lock Brake System Warning Light” in the Index.

Here is how anti-lock works. Let us say the road is wet. You are driving safely. Suddenly an animal jumps out in front of you.

You slam on the brakes. Here is what happens with ABS.

A computer senses that wheels are slowing down. If one of the wheels is about to stop rolling, for the P32 motor home and P42 commercial models, the computer will separately work the brakes at each front wheel and at both rear wheels. For the W22/W24 motor home, W52 commercial or a FE20 Shuttle Bus vehicle, the computer will separately work the brakes at each wheel.

The anti-lock system can change the brake pressure faster than any driver could. The computer is programmed to make the most of available tire and road conditions.

You can steer around the obstacle while braking hard.

As you brake, your computer keeps receiving updates on wheel speed and controls braking pressure accordingly.

Remember: Anti-lock does not change the time you need to get your foot up to the brake pedal or always decrease stopping distance. If you get too close to the vehicle in front of you, you will not have time to apply your brakes if that vehicle suddenly slows or stops. Always leave enough room up ahead to stop, even though you have anti-lock brakes.

Using Anti-Lock

Don't pump the brakes. Just hold the brake pedal down firmly and let anti-lock work for you. You may feel the brakes vibrate, or you may notice some noise, but this is normal.

Braking in Emergencies

With anti-lock, you can steer and brake at the same time. In many emergencies, steering can help you more than even the very best braking.

STEERING

Power Steering

If you lose power steering assist because the engine stops or the system is not functioning, you can steer but it will take much more effort.

It is more difficult to steer the vehicle when it is stopped. To make it easier to steer, release the brakes slightly and allow the vehicle to move in slow motion.



CAUTION

Wet brakes can cause accidents. They will not work as well in a quick stop and may cause pulling to one side. You could lose control of the vehicle.

After driving through a large puddle of water or a vehicle wash, apply your brake pedal lightly until your brakes work normally.

HILL AND MOUNTAIN ROADS

As a general rule, you should go down a hill in the same gear required to go up the hill in order to prevent powertrain/brake system damage while maintaining a safe speed. This allows the engine to do a major part of the braking (Engine Braking).

NOTICE

Bring the vehicle down to a reasonable speed before approaching a long steep downgrade.

This will prevent engine over spin (RPM) during downshifting. Manual downshifting is accomplished by shifting out of overdrive to a lower gear(s).

Grade Braking Feature (W20, W22 and W24)

The W20, W22, and W24 chassis are equipped with the “Grade Braking” feature with the Allison 1000MH and 2100MH transmissions. This feature aids in maintaining speed down significant grades. Switching the “Grade Brake” switch to the “on” position and depressing the brake pedal enables this feature.

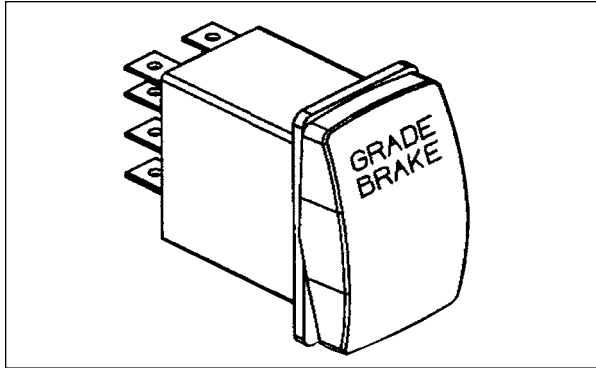
The grade-braking feature’s primary purpose is to utilize engine braking to slow a heavy vehicle on steep grades in order to reduce wear on the

traditional braking system. The method used to slow the vehicle is by overriding the PRNDL position, effectively pre-selecting the next lower gear range automatically. Because the transmission is electronically controlled and there is no mechanical linkage that needs to be moved for a pre-select downshift, implementation of this feature can be done completely in software with no hardware modifications.

This control feature takes into consideration several factors before commanding a pre-select downshift. These are the primary inputs to the Transmission Control Module (TCM)

- Throttle position
- Service brake state
- Vehicle acceleration/deceleration
- Grade/load
- Vehicle Speed

These factors are continually calculated to determine when a preselect downshift is commanded.



The downshift will always be to the next lower range, it will not 'skip' ranges. In Tow/Haul mode, grade braking can command downshifts to 2nd range, while in Normal mode, grade braking will not command downshifts below 4th range.

There is no 'fixed' shift point for a 'grade braking downshift', however, the shift will never occur such that the engine speed following the shift exceeds guidelines,. Also, the shift will never occur without depressing the brake pedal.



CAUTION

If you do not shift down, your brakes could get so hot that they would not work well. You would then have poor braking or even none going down a hill. You could crash. Shift down to let your engine assist your brakes on a steep downhill slope.

OPERATING YOUR VEHICLE WHILE TRAPPED IN SNOW



CAUTION

Snow can trap exhaust gases under your vehicle. This can cause deadly carbon monoxide (CO) gas to get inside. The CO gas could overcome you and kill you. You can not see it or smell it, so you might not know it is in your vehicle. Clear away snow from around the base of your vehicle, especially any that is blocking your exhaust pipe. And check around again from time to time to be sure snow does not collect there. Open a window just a little on the side of the vehicle that is away from the wind. This will help keep CO gas out.

Run your engine only as long as you must. This saves fuel. When you run the engine, make it go a little faster than just idle. That is, push the accelerator slightly. This uses less fuel for the heat that you get and it keeps the battery (or batteries) charged. You will need a well-charged battery (or batteries) to restart the vehicle, and possibly for signaling later on with your headlamps. Let the heater run for a while.

If you have a diesel engine, you may have to run it at a higher speed to get enough heat. Then, shut the engine off and close the window almost all the way to preserve the heat. Start the engine again and repeat this only when you feel really uncomfortable from the cold. But do it as little as possible. Preserve the fuel as long as you can. To help keep warm, you can get out of the vehicle and do some fairly vigorous exercises every half hour or so until help comes.

RECREATIONAL VEHICLE TOWING

Gross Vehicle Weight Rating (GVWR) is the maximum permissible weight of this fully loaded Motorhome. Gross Combination Weight Rating (GCWR) means the maximum allowable loaded weight of this Motorhome and any towed trailer or towed vehicle. Gross Combination Weight Rating (GCWR) is usually greater than the Gross Vehicle Weight Rating (GVWR). Towing capability will be determined by considering the five factors below:

1. The weight imposed on the towing vehicle's rear axle (combination weight on rear axle from towing vehicle and tongue load from towed load) shall not exceed the Gross Rear Axle Weight Rating as specified by the final stage manufacturer.
2. When the towed weight exceeds 1,000 pounds (454 kg), the towing system must be equipped with a separate brake system for the towed load and be activated by the braking application of the towing vehicle.

3. Do not exceed the capacity limits of any towing equipment and follow the final stage manufacturer's equipped hitch limits, recommendations and guidelines. Also, ensure that individual components installed separately be rated equal to or higher than any towed load.
4. The total towed weight when added to the operating weight of the towing vehicle cannot exceed the Gross Combination Weight Rating (GVWR) of the towing vehicle as identified by the final stage manufacturer.
5. All state and federal requirements must be adhered to.

IMPORTANT: All five of the above criteria must be met if the vehicle is used for towing. Failure to adhere to these criteria will affect safe vehicle operation and could void manufacturer validations and warranties.

LOADING YOUR VEHICLE

SAFARI SAFARI SAFARI

GVWR GAWR FRT GAWR RR LBS/KG

TIRE RIM PSI/KPA (COLD)

PAYLOAD =

SEE OWNER'S MANUAL FOR ADDITIONAL INFORMATION

OG-051

The Certification/Tire Label in your vehicle will look similar to this example. Because the label is furnished by the final body manufacturer, there may be some differences between the example and the actual label on your vehicle.

The Certification/Tire Label location is also determined by the body manufacturer. See that company's manual to find out where it is on your vehicle or contact them directly.

The label shows the size of your original tires and the inflation pressures needed to obtain the gross weight capacity of your vehicle.

This is called the Gross Vehicle Weight Rating (GVWR). The GVWR includes the weight of the vehicle, all occupants, fuel and cargo. This information is also on the Incomplete Vehicle Document (IVD).

The Certification/Tire Label also tells you the maximum weight for the front and rear axles, called the Gross Axle Weight Rating (GAWR). To find out the actual loads on your front and rear axles, you need to go to a weigh station and weigh your vehicle. Your dealer can help you with this. Be sure to spread out your load equally on both sides of the centerline.

Never exceed the GVWR for your vehicle, or the GAWR for either the front or rear axle.

If you do have a heavy load, you should spread it out equally.



CAUTION

Do not load your vehicle any heavier than the GVWR, or either the maximum front or rear GAWR. Do not load your vehicle unevenly from side to side. If you do, parts on your vehicle can break, and it can change the way your vehicle handles. These could cause you to lose control and crash. Overloading can shorten the life of your vehicle.

Using heavier suspension components to get added durability might not change your weight ratings. Ask your dealer to help you load your vehicle the right way.

NOTICE

Your warranty does not cover parts or components that fail because of overloading.

Suspension Air Cylinders

All P32 motor home and some commercial models (with IFS) have front suspension air cylinders. You can increase and decrease the air pressure to level the vehicle. The cylinders are inside the coil springs of your front suspension. There is an air valve on the bottom of each cylinder. The W22/W24 motor homes, W52 commercial and FE20 Shuttle Bus vehicles do not use air cylinders but leaf springs.

Before loading the vehicle, inflate both suspension air cylinder bags to the maximum pressure of 90 psi (excluding commercial units which have maximum pressure of 50 psi). After loading, decrease the air cylinder pressure as needed to level the vehicle. Reduce air pressure to no less than the minimum pressure listed for your vehicle.

Check the air pressure in the cylinders monthly. Specifications should be as follows if loaded to the maximum Gross Axle Weight Rating (GAWR):

- 50 psi (345 kPa) for 4,300 to 5,000 lb. (1 950 to 2 270 kg) front suspension/axle.
- 90 psi (620 kPa) for 5,500 lb. (2500 kg)/ 6,000 lbs (2722 kg) front suspension/axle.

**CAUTION**

Things you put inside your vehicle can strike and injure people in a sudden stop or turn, or in a crash.

- **When putting things in the cargo area of your vehicle. Try to spread the weight evenly.**
- **Never stack heavier things, like suitcases, inside the vehicle so that some of them are above the tops of the seats.**
- **Do not leave an unsecured child restraint in your vehicle.**
- **When you carry something inside the vehicle, secure it whenever you can.**

Here you will find what to do about some problems that can occur on the road.

Hazard Warning Flashers	3-2	Cooling System (Gasoline Engines)	3-14
Other Warning Devices	3-3	Cooling System (Diesel Engines)	3-19
Jump Starting	3-3	Engine Fan Noise	3-24
Emergency Release of Parking Brake	3-9	If a Tire Goes Flat	3-24
Towing Your Vehicle	3-10	Changing a Flat Tire	3-25
Engine Overheating	3-11	If You are Stuck: In Sand, Mud, Ice or Snow	3-27

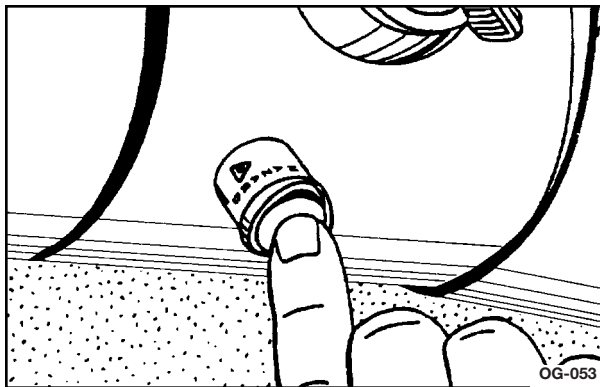
HAZARD WARNING FLASHERS

Your hazard warning flashers let you warn others. They also let police know you have a problem. Your front and rear turn signal lamps will flash on and off.

Your hazard warning flashers work no matter what position your key is in, and even if the key is not in.

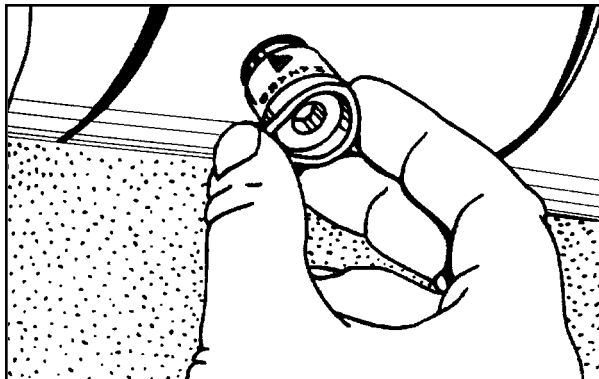
The hazard warning flashers will not flash if you are braking. Also, when the hazard warning flashers are on, your turn signals will not work.

On all models, except W22, W24, and FE20, your hazard warning flashers button is on the steering column below the ignition switch.



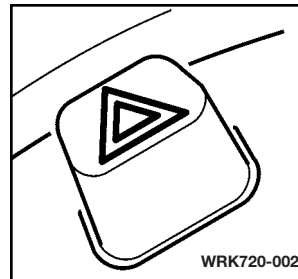
P32 Motor Home Shown

Press the button in to make your front and rear turn signals flash on and off.



P32 Motor Home Shown

To turn off the flashers, pull out on the collar.



W22 / W24 / FE20

On W22 and W24 motor homes and FE20 Shuttle Bus, your hazard warning flashers button is located on top of the steering column.

Press the button in to turn on your flashers.

To turn them off press the button again.

OTHER WARNING DEVICES

If you carry reflective triangles, you can set one up at the side of the road about 300 feet (100 m) behind your vehicle.

JUMP STARTING

If your battery (or batteries) has run down, you may want to use another vehicle and some jumper cables to start your vehicle. But use the following steps listed to do it safely.

**CAUTION**

Batteries can hurt you. They can be dangerous because:

- They contain acid that can burn you.
- They contain gas that can explode or ignite.
- They contain enough electricity to burn you.

If you do not follow these steps exactly, some or all of these things can hurt you.

NOTICE

Ignoring these steps could result in costly damage to your vehicle that would not be covered by your warranty.

The battery in your vehicle has a built-in hydrometer. Do not charge, test or jump start the battery if the hydrometer looks clear or light yellow. Replace the battery when there is a clear or light yellow hydrometer and a cranking complaint.

Trying to start your vehicle by pushing or pulling it will not work, and it could damage your vehicle.

1. Check the other vehicle. It must have a 12-volt battery with a negative ground system.

NOTICE

If the other system is not a 12-volt system with a negative ground, both vehicles can be damaged.

NOTICE

With a diesel engine, do not apply more than the nominal 12 volts to the electrical system during charging or jump starting. Glow plug system failure may result.

If you have a diesel engine with two or more batteries, you should know before you begin that, especially in cold weather, you may not be able to get enough power from a single battery in another vehicle to start your diesel engine.

If your vehicle has more than one battery, use the battery that is closest to the starter — this will reduce electrical resistance.

2. Get the vehicles close enough so the jumper cables can reach, but be sure the vehicles are not touching each other. If they are, it could cause a ground connection you do not want. You would not be able to start your vehicle, and the bad grounding could damage the electrical systems.



CAUTION

If your vehicle has air conditioning, the auxiliary electric fan under the hood can start up even when the engine is not running and can injure you. Keep hands, clothing and tools away from any underhood electric fan.

3. Set the parking brake firmly on each vehicle. Put an automatic transmission in PARK (P) or a manual transmission in NEUTRAL (N).
4. Turn off the ignition on both vehicles. Turn off all lamps that are not needed and both radios. This will avoid sparks and help save both batteries. It could also save your radio.

5. Open the hoods and locate the batteries. Find the positive (+) and negative (-) terminals on each battery.



CAUTION

Using a match near a battery can cause battery gas to explode. People have been hurt doing this, and some have been blinded. Use a flashlight if you need more light.

Be sure the batteries have enough water. You do not need to add water to the battery (or batteries) installed in every new vehicle. But if a battery has filler caps, be sure the right amount of fluid is there. If it is low, add water to take care of that first. If you do not, explosive gas could be present.

Battery fluid contains acid that can burn you. Do not get it on you. If you accidentally get it in your eyes or on your skin, flush the place with water and get medical help immediately.

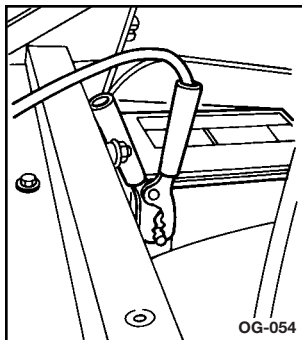
6. Check that the jumper cables do not have loose or missing insulation. If they do, you could get a shock and the vehicles could be damaged.

Before you connect the cables, here are some basic things you should know. Positive (+) will go to positive (+) and negative (-) will go to a metal engine part or some other well-grounded part. Do not connect positive (+) to negative (-) or you will get a short that would damage the battery and maybe other parts as well.

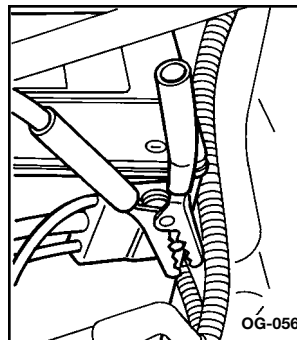


CAUTION

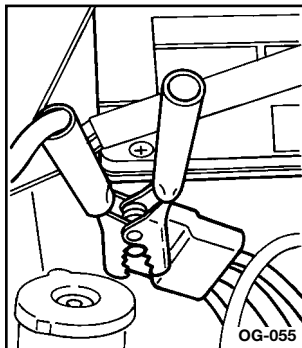
Fans or other moving engine parts can injure you. Keep your hands away from moving parts once the engine is running.



7. Connect the red positive (+) cable to the positive (+) terminal of the vehicle with the dead battery. Use a remote positive (+) terminal if the vehicle has one.

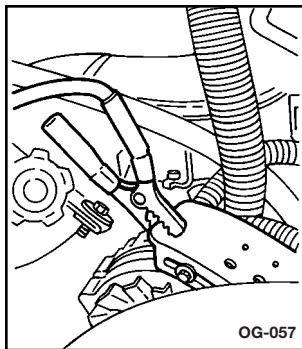


9. Now connect the black negative (-) cable to the good battery's negative (-) terminal. Do not let the other end touch anything until the next step. The other end of the negative (-) cable does not go to the dead battery.



8. Do not let the other end touch metal. Connect it to the positive (+) terminal of the good battery. Use a remote positive (+) terminal if the vehicle has one.

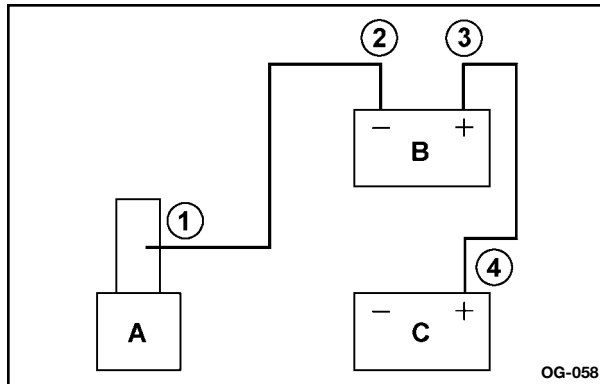
It goes to a heavy, unpainted metal part of the vehicle with the dead battery.



10. Attach the cable at least 18 inches (45 cm) away from the dead battery. This will allow for a good electrical connection and lessen the chance of sparks.

11. Now start the vehicle with the good battery and run the engine for one to two minutes.
12. Try to start the vehicle with the dead battery. If it will not start after a few tries, it probably needs service.

13. Remove the cables in reverse order to prevent electrical shorting, (refer to illustration OG-058). Take care that they do not touch each other or any other metal.



Removal Order

- A. Heavy Metal Engine Part
 B. Good Battery
 C. Dead Battery

EMERGENCY RELEASE OF PARKING BRAKE — P32 MOTOR HOME OR W24 MOTOR HOME CHASSIS

If your transmission is in PARK (P) and the vehicle will not start, and you need to release the automatic parking brake, do the following:

1. Apply the manual parking brake and turn the ignition to RUN.
2. Push and hold the regular brake pedal down and shift the transmission to NEUTRAL (N).

When the AUTO PARK brake warning light goes out, the electric AUTO PARK brake is released. The key must be left in RUN to keep the AUTO PARK brake released. If the battery is dead, you will need to jump start your vehicle (see “Jump Starting” earlier in this section).



CAUTION

If you are not holding the regular brake pedal down and the parking brake releases, the vehicle could roll. You or others could be injured.

NOTICE

The P32 motor home may have the J72 auto-apply park brake option. Check the vehicle specificatin to determine if you have a J72 park brake option. The W24 motor homes only have the J72 option of the auto-apply park brake

3. Release the manual parking brake. The AUTO PARK warning light will go out at this time.

The J72 parking brake is a spring applied-hydraulic release type of brake. There is no mechanical connection (cable) between the actuator and the brake. Therefore, it is not possible to mechanically de-activate the park brake when the ignition is switched off. If the vehicle needs to be moved for service and/or towing, when ignition is off, it is recommended to disconnect the rear propshaft.

**CAUTION**

The Auto-Apply parking brake system is a complex system containing mechanical, electrical and hydraulic components. Only trained and authorized professionals must service this system. Any repairs or alterations to the Auto-Apply parking brake system, done by unauthorized persons, can result in bodily injuries or vehicle damage.

TOWING YOUR VEHICLE**CAUTION**

To help avoid serious personal injury to you or others:

- Never let passengers ride in a vehicle that is being towed.
- Never tow faster than safe or posted speeds.
- Never tow with damaged parts not fully secured.
- Never get under your vehicle after it has been lifted by the tow truck.
- Always secure the vehicle on each side with separate safety chains when towing it.
- Use only the correct hooks.

NOTICE

Two wheel drive vehicles should not be towed on the drive wheels, if possible. If this is unavoidable, the vehicle can be towed forward for a maximum of 50 miles (80.47 km) at a maximum speed of 35 mph (56.33 km/h).

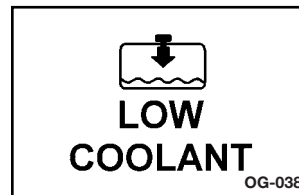
NOTICE

Use the proper towing equipment to avoid damage to the bumper, fascia or fog lamp areas of the vehicle.

With current trends in automotive styles and design, it is essential that the correct towing equipment is used to tow a vehicle. Your vehicle can be towed with wheel-lift or car carrier equipment.

Consult your dealer or a professional towing service if you need to have your vehicle towed. (See “Roadside Assistance” in the Index).

ENGINE OVERHEATING



You will find a coolant temperature gauge on your vehicle's instrument panel. If you have a diesel engine, you will also have a LOW COOLANT warning light.

If Steam Is Coming From Your Engine



CAUTION

Steam from an overheated engine can burn you, even if you just open the hood. Stay away from the engine if you see or hear steam coming from it. Just turn it off and get everyone away from the vehicle until it cools down. Wait until there is no sign of steam or coolant before you open the hood.

If you keep driving when your engine is overheated, the liquids in it can catch fire. You or others could be burned. Stop your engine if it overheats, and get out of the vehicle until the engine is cool.

NOTICE

If your engine catches fire because you keep driving with no coolant, your vehicle can be damaged. The costly repairs would not be covered by your warranty.

If No Steam Is Coming From Your Engine

If you get an engine overheat warning but see or hear no steam, the problem may not be too serious. Sometimes the engine can get a little too hot when you:

- Climb a long hill on a hot day.
- Stop after high-speed driving.
- Idle for long periods in traffic.

If you get the overheat warning with no sign of steam, try this for a minute or so:

1. If you have an air conditioner and it is on, turn it off.
2. Turn on your heater to full hot at the highest fan speed and open the window as necessary.
3. If you are in a traffic jam, shift to **NEUTRAL (N)**; otherwise, shift to the highest forward gear while driving **AUTOMATIC OVERDRIVE (O)** or **DRIVE (D)** for automatic transmissions.

If you no longer have the overheat warning, you can drive the vehicle. Just to be safe, drive slower for about 10 minutes. If the warning lamp does not come back on, you can resume normal driving.

If the warning continues, pull over, stop, and park your vehicle right away.

If there is still no sign of steam, push down the accelerator until the engine speed is about twice as fast as normal idle speed for at least three minutes while you are parked.

NOTE: If you still have the warning, turn off the engine and get everyone out of the vehicle until it cools down.

On most P42 step vans, opening the hood can help reduce cooling time.

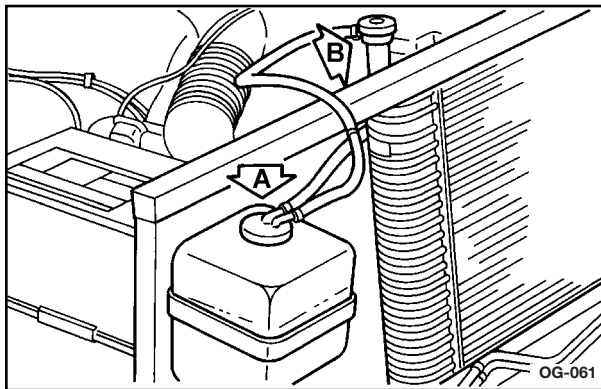
NOTICE

If overheating reoccurs, have your vehicle serviced immediately.

COOLING SYSTEM (GASOLINE ENGINES)

When you decide it is safe to lift the hood, here is what you will see:

- A. Coolant Recovery Tank (mounted by the body manufacturer)
- B. Radiator Pressure Cap



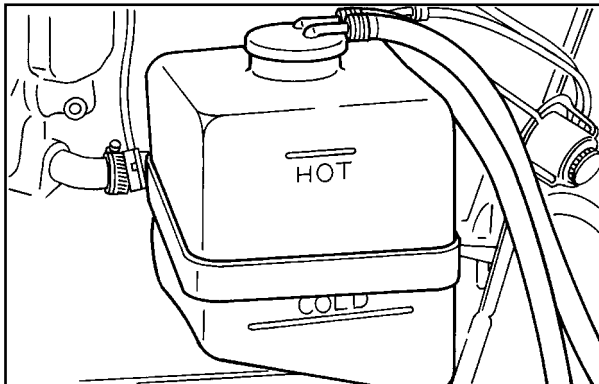
CAUTION

If your vehicle has air conditioning, the auxiliary electric engine cooling fan under the hood can start up even when the engine is not running and can injure you. Keep hands, clothing and tools away from any underhood electric fan.

NOTICE

The addition of bug screens/shields in the area of the coaches radiator inlet or front grill can greatly reduce air flow and cause potential engine overheating and raise underhood temperatures. Failure to adhere to this notice can cause serious engine or underhood component damage.

If the coolant inside the coolant recovery tank is boiling, do not do anything else until it cools down.



The coolant level should be at or above the **HOT** mark. If it is not, you may have a leak in the radiator hoses, heater hoses, radiator, water pump or somewhere else in the cooling system.



CAUTION

Heater and radiator hoses, and other engine parts, can be very hot. Do not touch them. If you do, you can be burned.

Do not run the engine if there is a leak. If you run the engine, it could lose all coolant. That could cause an engine fire, and you could be burned. Get any leak serviced before you drive the vehicle.

NOTICE

Engine damage from running your engine without coolant is not covered by your warranty.

NOTICE

When adding coolant, it is important that you use only DEX-COOL® (silicate-free) coolant. If coolant other than DEX-COOL is added to the system, premature engine, heater core or radiator corrosion may result. In addition, the engine coolant will require change sooner — at 30,000 miles (50 000 km) or 24 months, whichever occurs first. Damage caused by the use of coolant other than DEX-COOL® is not covered by your new vehicle warranty.

If there seems to be no leak, start the engine again. See if the engine cooling fan speed increases when idle speed is doubled by pushing the accelerator pedal down. If it does not, your vehicle needs service. Turn off the engine.

How to Add Coolant to the Coolant Recovery Tank (Gasoline Engines)

If you have not found a problem yet, but the coolant level is not at **HOT**, add a 50/50 mixture of *clean, drinkable water* and DEX-COOL® engine coolant at the coolant recovery tank (See “Engine Coolant” in the Index for more information).

**CAUTION**

Adding only plain water to your cooling system can be dangerous. Plain water, or some other liquid like alcohol, can boil before the proper coolant mixture will. Your vehicle's coolant warning system is set for the proper coolant mixture. With plain water or the wrong mixture your engine could get too hot but you would not get the overheat warning. Your engine could catch fire and you or others could be burned. Use a 50/50 mixture of clean, drinkable water and approved coolant.

NOTICE

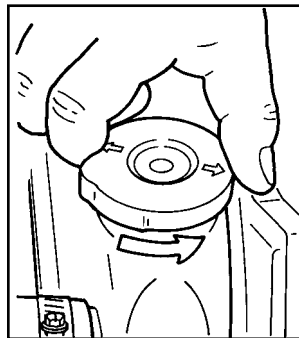
In cold weather, water can freeze and crack the engine, radiator, heater core and other parts. Use the recommended coolant and the proper coolant mixture.

**CAUTION**

You can be burned if you spill coolant on hot engine parts. Coolant contains ethylene glycol and it will burn if the engine parts are hot enough. Do not spill coolant on a hot engine.

When the coolant in the coolant recovery tank is at the **HOT** mark, start your vehicle.

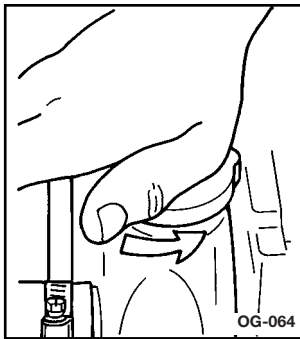
If the overheat warning continues, there is one more thing you can try. You can add the proper coolant mixture directly to the radiator, but be sure the cooling system is cool before you do it.

**How to Add Coolant to the Radiator
(Gasoline Engines)**

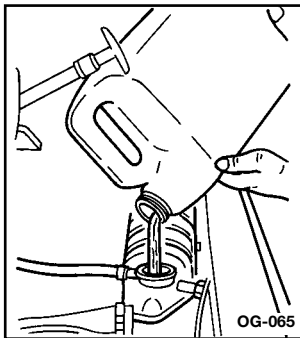
1. You can remove the radiator pressure cap when the cooling system, including the radiator pressure cap and upper radiator hose, is no longer hot.

Turn the pressure cap slowly counterclockwise until it first stops. (Do not press down while turning the pressure cap.)

If you hear a hiss, wait for that to stop. A hiss means there is still some pressure left.

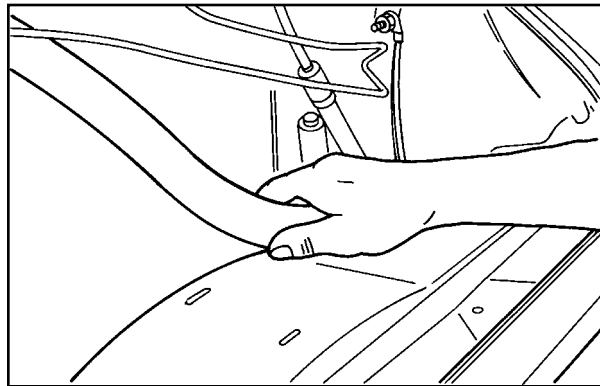


2. Then keep turning the pressure cap, but now push down as you turn it. Remove the pressure cap.



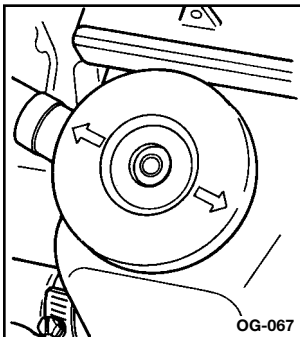
3. Fill the radiator with the proper coolant mixture, up to the base of the filler neck. (See “Engine Coolant” in the Index for more information about the proper coolant mixture.) Avoid fluid spills into engine air intakes.

4. Then fill the coolant recovery tank to the **COLD** mark.
5. Put the cap back on the coolant recovery tank, but leave the pressure cap off.



6. Start the engine and let it run until you can feel the upper radiator hose getting hot. Watch out for the engine cooling fan.

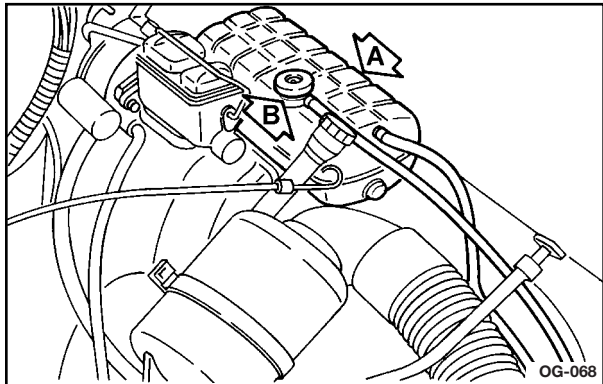
7. By this time, the coolant level inside the radiator filler neck may be lower. If the level is lower, add more of the proper coolant mixture through the filler neck until the level reaches the base of the filler neck.



8. Then replace the pressure cap. At any time during this procedure if coolant begins to flow out of the filler neck, reinstall the pressure cap. Be sure the arrows on the pressure cap line up like this.

COOLING SYSTEM (DIESEL ENGINES)

When you decide it is safe to lift the hood, here is what you will see:



- A. Coolant Surge Tank
B. Coolant Surge Tank Pressure Cap

You will also find engine cooling fans at the front of the engine, behind the radiator.

If the coolant inside the coolant surge tank is boiling, do not do anything else until it cools down.

The coolant level should be at or above the FULL COLD mark. If it is not, you may have a leak in the radiator hoses, heater hoses, radiator, water pump or somewhere else in the cooling system.



CAUTION

Heater and radiator hoses, and other engine parts, can be very hot. Do not touch them. If you do, you can be burned.

Do not run the engine if there is a leak. If you run the engine, it could lose all coolant. That could cause an engine fire, and you could be burned. Get any leak serviced before you drive the vehicle.

NOTICE

Engine damage from running your engine without coolant is not covered by your warranty.

If there seems to be no leak, start the engine again. See if the fan speed increases when idle speed is doubled by pushing the accelerator pedal down. If it does not, your vehicle needs service. Turn off the engine.

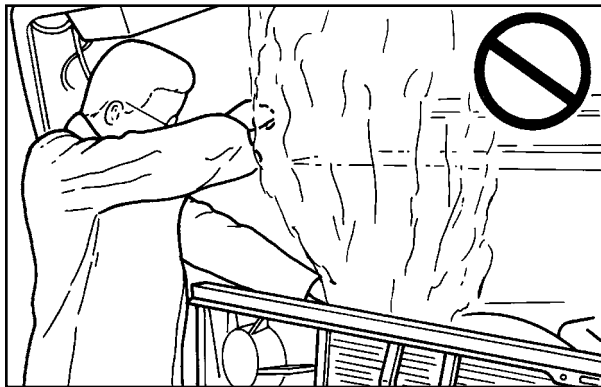
How to Add Coolant to the Coolant Surge Tank (Diesel Engines)

If you have not found a problem yet, but the coolant level is **NOT** at **FULL COLD**, add a 50/50 mixture of *clean, drinkable water* and coolant at the coolant surge tank, but be sure the cooling system, including the coolant surge tank pressure cap, is cool before you do it (See “Engine Coolant” in the Index for more information).



CAUTION

Steam and scalding liquids from a hot cooling system can blow out and burn you. They are under pressure, and if you turn the coolant surge tank pressure cap — even a little — they can come out at high speed. Never turn the cap when the cooling system, including the coolant surge tank pressure cap, is hot. Wait for the cooling system and coolant surge tank pressure cap to cool if you ever have to turn the pressure cap.



NOTICE

Adding coolant that is less than the operating temperature of your engine may cause engine damage. Never add coolant to an overheated engine. Always allow an overheated engine ample time to cool before adding coolant.

**CAUTION**

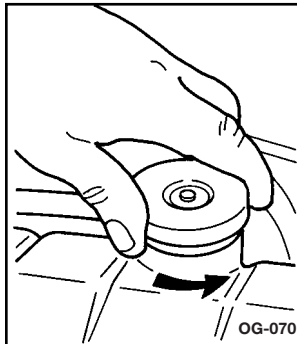
Adding only plain water to your cooling system can be dangerous. Plain water, or some other liquid like alcohol, can boil before the proper coolant mixture will. Your vehicle's coolant warning system is set for the proper coolant mixture. With plain water or the wrong mixture, your engine could get too hot but you would not get the overheat warning. Your engine could catch fire and you or others could be burned. Use a 50/50 mixture of clean, drinkable water and coolant.

NOTICE

In cold weather, water can freeze and crack the engine, radiator, heater core and other parts. So use the recommended coolant.

**CAUTION**

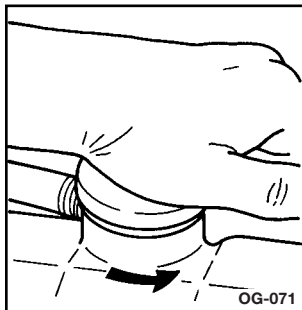
You can be burned if you spill coolant on hot engine parts. Coolant contains ethylene glycol and it will burn if the engine parts are hot enough. Do not spill coolant on a hot engine.



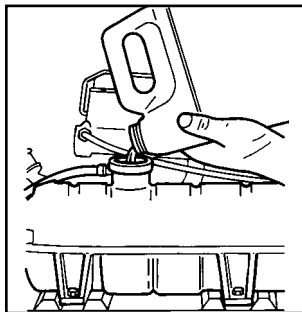
1. You can remove the coolant surge tank pressure cap when the cooling system, including the coolant surge tank pressure cap and upper radiator hose, is no longer hot.

Turn the pressure cap slowly counterclockwise (left) until it first stops. (Do not press down while turning the pressure cap).

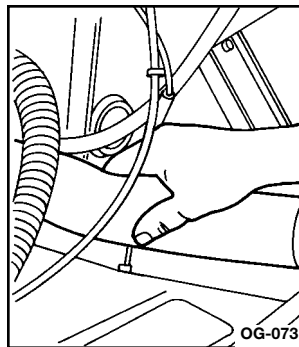
If you hear a hiss, wait for that to stop. A hiss means there is still some pressure left.



2. Then keep turning the cap, but now push down as you turn it. Remove the pressure cap.

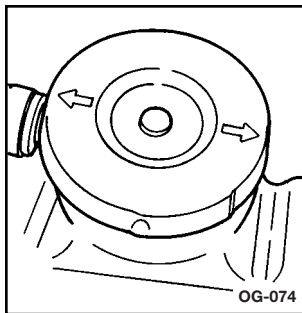


3. Then fill the coolant surge tank with the proper mixture, to the **FULL COLD** mark.



4. With the coolant surge tank pressure cap off, start the engine and let it run until you can feel the upper radiator hose getting hot. Watch out for the engine cooling fan(s).

5. By this time, the coolant level inside the coolant surge tank may be lower. If the level is lower, add more of the proper mixture to the coolant surge tank until the level reaches the **FULL COLD** mark.



6. Then replace the pressure cap. Be sure the arrows on the pressure cap line up like this.

ENGINE FAN NOISE

Your vehicle has a clutched engine cooling fan. When the clutch is engaged, the fan spins faster to provide more air to cool the engine. In most every day driving conditions, the clutch is not fully engaged. This improves fuel economy and reduces fan noise.

NOTE: Under heavy vehicle loading, trailer towing and/or high outside temperatures, the fan speed increases as the clutch more fully engages, so you may hear an increase in fan noise.

This is normal and should not be mistaken as the transmission slipping or making extra shifts. It is merely the cooling system functioning properly. The fan will slow down when additional cooling is not required and the clutch disengages.

You may also hear this fan noise when you start the engine. It will go away as the fan clutch disengages.

IF A TIRE GOES FLAT

It is unusual for a tire to “blow out” while you are driving, especially if you maintain your tires properly. If air goes out of a tire, it is much more likely to leak out slowly. But if you should ever have a “blow out,” here are a few tips about what to expect and what to do:

- If a front tire fails, the flat tire will create a drag that pulls the vehicle toward that side. Take your foot off the accelerator pedal and grip the steering wheel firmly. Steer to maintain lane position, and then gently brake to a stop well out of the traffic lane.

- A rear blowout, particularly on a curve, acts much like a skid and may require the same correction you would use in a skid. In any rear blowout, remove your foot from the accelerator pedal. Get the vehicle under control by steering the way you want the vehicle to go. It may be very bumpy and noisy, but you can still steer. Gently brake to a stop — well off the road if possible.

If a tire goes flat, the next part tells you what to do.

If a jack and jacking tools were supplied with your vehicle, see the body manufacturer's information for jacking instructions.

CHANGING A FLAT TIRE

A flat or damaged tire can be a major roadside problem. You are very likely to have to go for help. Few drivers of these vehicles have the necessary equipment aboard to be able to change a flat tire safely. For example, you have to have a truck jack that can lift several thousand pounds and a torque wrench that can generate several hundred foot-pounds (newton-meters) of twisting force.

If you are stopped somewhere by a flat or damaged tire or wheel, you should get expert help right then.

If the correct equipment is available, here is the procedure to follow:

- Does the tire still seem to have air under pressure in it? If so, stand to the side. Look at the wheel to see if it looks like another wheel on the vehicle. If so, go on to the next step. If it does not, or even if you can not be sure, stop and get expert help.



CAUTION

Tire-rim assemblies can explode. If you work on a pressurized tire mounted on a damaged wheel, the assembly can expand with explosive force without warning. You and others nearby can be injured. Do not work around a tire that has air under pressure in it when its wheel is or might be damaged.

- Does the wheel look normal? If you can not be sure, stop and get expert help.
- Let the air out of the tire. You can do this by taking out the valve core.
- If you have the correct equipment, put on the spare wheel and tire assembly.



CAUTION

Rust or dirt on the wheel, or on the parts to which it is fastened, can make the wheel nuts become loose after a time. The wheel could come off and cause an accident. When you change a wheel, remove any rust or dirt from the places where the wheel attaches to the vehicle. In an emergency, you can use a cloth or a paper towel to do this; but be sure to use a scraper or wire brush later, if you need to, to get all the rust or dirt off.



CAUTION

Never use oil or grease on studs or nuts. If you do, the nuts might come loose. Your wheel could fall off, causing a serious accident.



CAUTION

There are many ways to be hurt, or be killed, while you are trying to change a truck tire and rim. Follow all of the safety precautions on the truck jack and other equipment.

If you try to put air back into a tire that has run flat, or even a tire that was quite low on air, without first finding out why it was low or flat, the tire can have a sudden air-out. This could cause you to lose control of the vehicle and have a serious crash. Do not refill a flat or very low tire with air without first having the tire taken off the wheel and checked for damage.

- Use a clip-on chuck and hose extension when you add air to your tires. You will need an accurate truck tire pressure gauge. Stand to one side and add the air. Use inflation pressure as shown on the Certification/Tire Label.
- All wheel nuts, and other tire and wheel fasteners, must be properly tightened (See “Tightening the Wheel Nuts” in the Index).



CAUTION

Incorrect wheel nuts or improperly tightened wheel nuts can cause the wheel to become loose and even come off. This could lead to an accident. Be sure to use the correct wheel nuts. If you have to replace them, be sure to get new original equipment wheel nuts.

Stop somewhere as soon as you can and have the nuts tightened with a torque wrench. See “Tightening the Wheel Nuts” in the Index for the proper torque for your particular wheel.

NOTICE

Improperly tightened wheel nuts can lead to brake pulsation and rotor damage. To avoid expensive brake repairs, evenly tighten the wheel nuts in the proper sequence and to the proper torque specification.

IF YOU ARE STUCK: IN SAND, MUD, ICE OR SNOW

In order to free your vehicle when it is stuck, you will need to spin the wheels, but you do not want to spin your wheels too fast. The method known as “rocking” can help you get out when you are stuck, but **you must use caution.**

**CAUTION**

If you let your tires spin at high speed, they can explode, and you or others could be injured. And the transmission or other parts of the vehicle can overheat. That could cause an engine compartment fire or other damage. When you are stuck, spin the wheels as little as possible. Do not spin the wheels above 35 mph (55 km/h) as shown on the speedometer.

NOTICE

Spinning your wheels can destroy parts of your vehicle as well as the tires. If you spin the wheels too fast while shifting your transmission back and forth, you can overheat and destroy your transmission.

For information about using tire chains on your vehicle, see “Tire Chains” in the Index.

Rocking Your Vehicle To Get It Out

First, turn your steering wheel left and right. That will clear the area around your front wheels. Then shift back and forth between **REVERSE (R)** and a forward gear (or with a manual transmission, between **FIRST (1)** or **SECOND (2)** and **REVERSE (R)**, spinning the wheels as little as possible. Release the accelerator pedal while you shift, and press lightly on the accelerator pedal when the transmission is in gear. By slowly spinning your wheels in the forward and reverse directions, you will cause a rocking motion that may free your vehicle. If that does not get you out after a few tries, you may need to be towed out. If you do need to be towed out, see “Towing Your Vehicle” in the Index.

Here you will find information about the care of your vehicle. This section begins with service and fuel information, and then it shows how to check important fluid and lubricant levels. There is also technical information about your vehicle.

Service	4-2	Surge Tank Pressure Cap (Diesel Engines) ..	4-39
Fuel (Gasoline Engine)	4-3	Thermostat	4-39
Diesel Fuel Requirements and Fuel System ..	4-4	Engine Coolant	4-40
Fuels in Foreign Countries		Power Steering Fluid	4-44
(Gasoline Engines)	4-17	Windshield Washer Fluid	4-47
Filling Your Tank	4-17	Brakes	4-48
Filling a Portable Fuel Container	4-18	Auto Park Brake System (Electric Pump) ..	4-52
Checking Things Under the		Chassis Lubrication	4-53
Engine Compartment Cover	4-19	Battery	4-56
Noise Control System	4-20	Front Wheel Bearings with Oil-Filled Hubs	
Engine Oil (Gasoline Engine)	4-21	(If Equipped)	4-57
Engine Oil (Diesel Engines)	4-26	Tires	4-58
Engine Air Cleaner/Filter	4-30	Cleaning Tires	4-67
Automatic Transmission Fluid — Allison ..	4-31	Underbody Maintenance	4-67
Automatic Transmission Fluid —		Vehicle Identification Number (VIN)	4-68
Hydra-Matic	4-31	Service Parts Identification (SPID) Label ..	4-68
Manual Transmission Fluid	4-34	Electrical System	4-69
Hydraulic Clutch	4-35	Capacities and Specifications	4-92
Rear Axle	4-36	Air Conditioning Refrigerants	4-98
Radiator Pressure Cap (Gasoline Engines) ..	4-38		

SERVICE

Your dealer knows your vehicle best and wants you to be happy with it. We hope you will go to your dealer for all your service needs.

Doing Your Own Service Work

If you want to do some of your own service work, you will want to use the proper service manual. It tells you much more about how to service your vehicle than this manual can. To order the proper service manual, see “Service and Owner Publications” in the Index.

You should keep a record with all parts receipts and list the mileage and the date of any service work you perform. (See “Maintenance Record” in the Index).



CAUTION

You can be injured and your vehicle could be damaged if you try to do service work on a vehicle without knowing enough about it.

- **Be sure you have sufficient knowledge, experience, the proper replacement parts and tools before you attempt any vehicle maintenance task.**
- **Be sure to use the proper nuts, bolts and other fasteners. “English” and “metric” fasteners can be easily confused. If you use the wrong fasteners, parts can later break or fall off. You could be hurt.**

FUEL (GASOLINE ENGINE)

If your vehicle has a diesel engine, see “Diesel Fuel Requirements and Fuel System” in this Section. For vehicles with gasoline engines, please read this.

Be sure the posted octane is at least 87. If the octane is less than 87, you may get a heavy knocking noise when you drive. If it is bad enough, it can damage your engine.

If you are using fuel rated at 87 octane or higher and you hear heavy knocking, your engine needs service. But do not worry if you hear a little pinging noise when you are accelerating or driving up a hill. That is normal, and you do not have to buy a higher octane fuel to get rid of pinging. It is the heavy, constant knock that means you have a problem.

If your vehicle is certified to meet California Air Resources Board (CARB), (indicated on the underhood emission control label), it is designed to operate on fuels that meet California Specifications. If such fuels are not available in states adopting California Emissions Standards, your vehicle will

operate satisfactorily on fuels meeting Federal Specifications, but emission control system performance may be affected. The malfunction indicator lamp on your instrument panel may turn on and/or your vehicle may fail a smog-check test (See “Malfunction Indicator Lamp” in the Index). If this occurs, return to your authorized dealer for diagnosis to determine the cause of failure. In the event it is determined that the cause of the condition is the type of fuels used, repairs may not be covered by your warranty.

Some gasolines that are not reformulated for low emissions may contain an octane-enhancing Additive called Methylcyclopentadienyl Manganese Tricarbonyl (MMT); ask your service station operator whether or not the fuel contains MMT. Workhorse does not recommend the use of such gasolines. If fuels containing MMT are used, spark plug life may be reduced and your emission control system performance may be affected. The malfunction indicator lamp on your instrument panel may turn on. If this occurs, return to your authorized dealer for service.

To provide cleaner air, all gasolines in the United States are now required to contain additives that will help prevent deposits from forming in your engine and fuel system, allowing your emission control system to function properly. Therefore, you should not have to add anything to the fuel. In addition, gasolines containing oxygenates, such as ethers and ethanol, and reformulated gasolines may be available in your area to contribute to clean air.

NOTICE

Your vehicle was not designed for fuel that contains methanol. Do not use it. It can corrode metal parts in your fuel system and also damage plastic and rubber parts. That damage would not be covered under your warranty.

NOTICE

The presence of dirt and/or debris in the fuel will restrict the flow of fuel through the filter and may eventually affect the performance of the fuel system. Only clean fuel should be used and avoid contamination of the fuel tank by any reasonable means.

DIESEL FUEL REQUIREMENTS AND FUEL SYSTEM

Some states and provinces have restrictions on the purchase of diesel fuel for light-duty vehicles and require you to buy permits or pay special taxes. Some of these restrictions apply only to residents, and others apply to both residents and visitors. These restrictions can change. To learn the current restrictions in any state or province, contact your auto club, the police or other officials.

Diesel Engine Fuel

NOTICE

Diesel fuel or fuel additives not recommended in this manual could damage your fuel system and engine. Your warranty would not cover this damage. And:

- **Diesel fuel that has been mixed with engine oil could damage your engine and emission controls. Check with the service station operator to make sure the diesel fuel has not been mixed with engine oil.**
- **If you ever run out of diesel fuel, it can be difficult to restart your engine. “Running Out of Fuel,” later in this section, tells you how to get it started again. To avoid all this, never let your tank get empty.**

What Fuel to Use

In the United States, for best results use Number 2-D diesel fuel year-round (above and below freezing conditions) as oil companies blend Number 2-D fuel to address climate differences. Number 1-D diesel fuel may be used in very cold temperatures (when it stays below 0°F or -18°C); however, it will produce a power and fuel economy loss. The use of Number 1-D diesel fuel in warm or hot climates may result in stalling, poor starting when the engine is hot and may damage the fuel injection system.

At a minimum, the diesel fuel you use should meet specifications ASTM D975-94 (Grade Low Sulfur) in the United States. In addition, the Engine Manufacturers Association (EMA) has identified properties of an improved diesel fuel for better engine performance and durability. Diesel fuels corresponding to the EMA description could provide better starting, less noise and better vehicle performance. If there are questions about the fuel you are using, please contact your fuel supplier.

Diesel fuel may foam when you fill your tank. This can cause the automatic pump nozzle to shut off, even though your tank is not full. If this happens, just wait for the foaming to stop and then continue to fill your tank.



CAUTION

Heat coming from the engine may cause the fuel to expand and force the fuel out of your tank. If something ignites the fuel, a fire could start and people could be burned. To help avoid this, fill your fuel tank only until the automatic nozzle shuts off. Do not try to “top it off.”

What Fuel to Use in Canada

Canadian fuels are blended for seasonal changes. Diesel Type “A” fuel is blended for better cold weather starting (below 0°F or -18°C); however, you may notice some power and fuel economy loss. If Type “A” fuel is used in warmer temperatures,

stalling and hard starting may occur. Diesel Type “B” fuel is blended for temperatures above 8°F (-18°C). The emission control system requires the use of diesel fuel with low-sulfur (.05% by weight) content. Both low and higher-sulfur fuels will be available in Canada. Only low-sulfur diesel fuels are available in the United States. It is important that diesel-powered trucks are refueled only with low-sulfur fuel. Use of fuels with higher-sulfur content will affect the function of the emission components and may cause reduced performance, excessive smoke and unpleasant odor.

At a minimum, the diesel fuel you use should meet specifications CAN/CGSB-3.517-93 (Low Sulfur Diesel) in Canada. In addition, the Engine Manufacturers Association (EMA) has identified properties of an improved diesel fuel for better engine performance and durability. Diesel fuels corresponding to the EMA description could provide better starting, less noise and better vehicle performance. If there are questions about the fuel you are using, please contact your fuel supplier.

Very Cold Weather Operation

Follow the instructions listed previously under the heading “What Fuel to Use.”

NOTICE

Never use home heating oil or gasoline in your diesel engine. They can cause engine damage.

In cold weather, your fuel filter may become clogged (waxed). To unclog it, move the vehicle to a warm garage area and warm the filter to between 32°F and 50°F (0°C to 10°C). You will not need to replace it. Additional information on the fuel filter follows.

NOTICE

The presence of dirt and/or debris in the fuel will restrict the flow of fuel through the filter and may eventually affect the performance of the fuel system. Only clean fuel should be used and avoid contamination of the fuel tank by any reasonable means.



CAUTION

Diesel fuel containing water is still flammable. You could be burned. If you ever try to drain water from your fuel, keep sparks, flames and smoking materials away from the mixture.

NOTICE

If there is water in your diesel fuel and the weather is warm or humid, fungus and bacteria can grow in the fuel. They can damage your fuel system. You will need a diesel fuel biocide to sterilize your fuel system. Your dealer can advise you if you ever need this.

If your fuel tank needs to be purged to remove water, see your dealer or a qualified technician. Improper purging can damage your fuel system.

Sometimes, water can be pumped into your fuel tank along with your diesel fuel. This can happen if a service station does not regularly inspect and clean its fuel tanks, or if it gets contaminated fuel from its suppliers.

If this happens, a WATER IN FUEL light will come on. If it does, the water must be drained. Your dealer can show you how to do this.

**WATER
IN
FUEL**

OG-049

This light also should come on briefly when you start your engine, as a check. If it does not, have it fixed so it will be there to let you know if you ever do get water in your fuel.

NOTICE

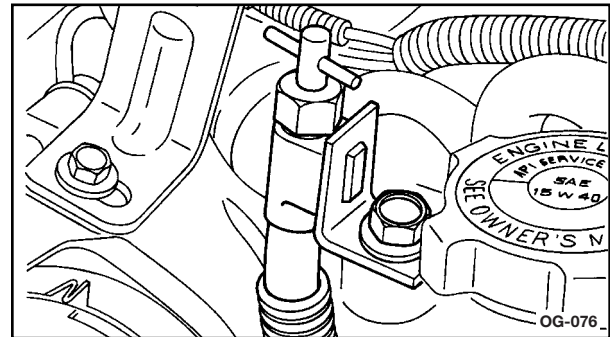
If you drive when this warning light is on, you can damage your fuel injection system and your engine. If the light comes on right after you refuel, it means water was pumped into your fuel tank. Turn off your engine immediately. Then, have the water drained at once.

If the light comes on at any other time, use this chart.

Problem	Recommended Action
1. Light comes on intermittently.	Drain water from fuel filter.
2. Light stays on:	
— At temperatures above freezing.	Drain fuel filter immediately. If no water can be drained and light stays on, see your dealer for assistance.
— At temperatures may be below freezing.	Drain fuel filter immediately. If no water can be drained, water may be frozen in the water drain system. Open the air bleed valve to check for fuel pressure. If no fuel pressure is present, water may be frozen in the fuel lines. Move the vehicle to a warm location to thaw out.
— Immediately after refueling.	A large amount of water may have been pumped into fuel tank. Fuel tank purging is required; see your dealer for assistance.

To drain water 6.5L Diesel Engines:

1. Stop and park the vehicle in a safe place. Turn off the engine and apply the parking brake.
2. Remove the fuel cap.
3. Place a fuel-resistant container under the filter drain hose. The filter drain hose is located on the front of the engine and is connected to the water drain valve.



4. With the engine off, open the water drain valve two to three turns. The valve is located to the left of the engine oil fill cap, when standing in front of the vehicle.

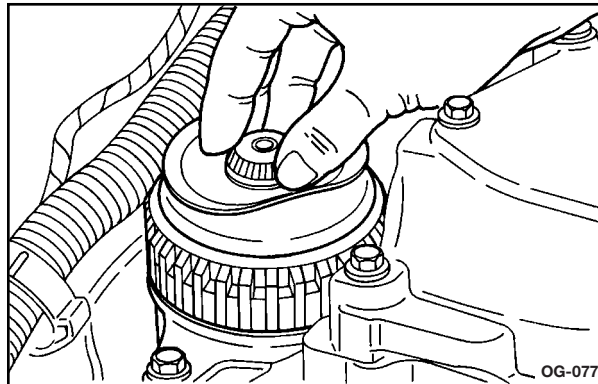
5. Start the engine and allow it to idle until clear fuel is observed. If no liquid comes out, your vehicle needs service.
6. Stop the engine and close the water drain valve.
7. Remove the fuel-resistant container and properly dispose of the contaminated fuel. To find out how to properly dispose of contaminated diesel fuel, see “Engine Oil, Used” in the Index.
8. Install the fuel cap.

If the WATER IN FUEL light comes on again after driving a short distance or the engine runs rough or stalls — a large amount of water has probably been pumped into the fuel tank. The fuel tank should be purged.

Hard starting, hesitation or “flat” performance at high speed or hard acceleration may be an indication of premature fuel filter plugging due to dirty or contaminated fuel. The filter element may need to be changed if this happens. (See “Fuel, Filter Diesel” in the Index).

Running Out of Fuel (Diesel Engines)

If the engine stalls and you think that you have run out of fuel, do this:



First, open the fuel filter air bleed valve. Briefly crank the engine and have someone watch the bleed valve. If air comes out of the bleed valve, then you are probably out of fuel.

**CAUTION**

Diesel fuel is flammable. It could start a fire if it gets on hot engine parts. You could be burned. Do not let too much fuel flow from the air bleed valve, and wipe up any spilled fuel with a cloth.

To restart your engine:

1. If you are parked on a level surface, add at least two gallons of fuel. However, if you are parked on a slope, you may need to add up to five gallons of fuel.
2. With the air bleed valve open, turn your ignition key to START for 10 to 15 seconds, to crank (but not start) your engine. Wait one minute between intervals of cranking to allow the starter motor to cool. Overheating the starter motor could damage it. Keep doing this until you can just see some clear fuel at the air bleed valve. (If, during this step, the engine starts, turn the ignition off and close the valve before restarting.)
3. Close the air bleed valve.
4. Turn the ignition key to START for 10 to 15 seconds at a time, until your engine starts.

3.9L Cummins Diesel Only**Problem**

— At temperatures below freezing.

Recommended Action

Drain fuel-water separator immediately. If no water can be drained, water may be frozen in the water drain system. Water may also be frozen in the fuel lines. Move the vehicle to a warm location to thaw out.

— Immediately after refueling tank.

A large amount of water may have been pumped into fuel tank. Fuel tank purging is required; see your dealer for assistance

Fuel-Water Separator

Your 3.9L Cummins diesel engine comes equipped with a fuel-water separator. The fuel-water separator is located along the left frame rail, near the back of the transmission.

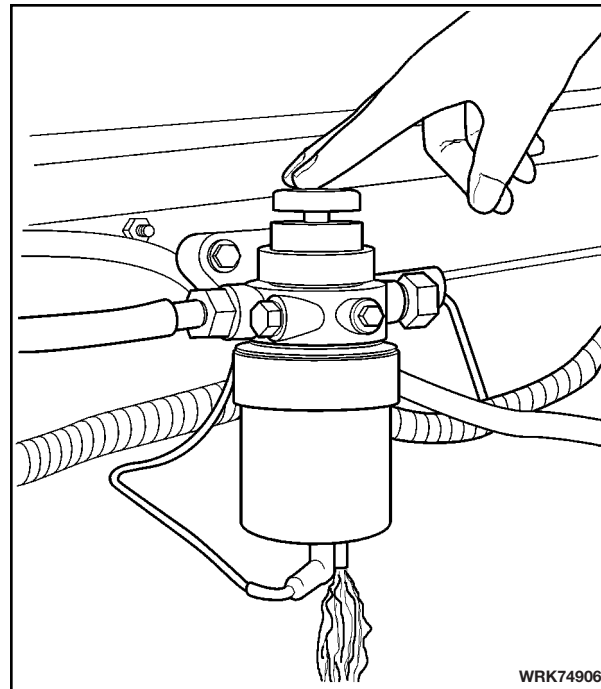
**CAUTION**

The water and sediment drained from the separator can contain hazardous petroleum products. Please consult your local environmental agency for recommended disposal guidelines.

Drain the water and sediment from the separator daily. Drain the water-contaminated fuel into an appropriate container, and dispose of it in accordance with local environmental regulations.

To Drain Water (3.9L Cummins Diesel):

1. Stop and park the vehicle in a safe place. Turn off the engine and apply the parking brake.
2. Remove the fuel cap.
3. Place a fuel-resistant container under the fuel-water separator. With the engine off, open the valve at the bottom of the fuel-water separator, and drain the water and sediment. If no liquid comes out, your vehicle needs service.
4. Remove the fuel-resistant container and properly dispose of the contaminated fuel. To find out how to properly dispose of contaminated diesel fuel, see "Engine Oil, Used" in the Index.
5. Install the fuel cap.
6. Close the valve at the bottom of the fuel-water separator.
7. Push the button on top of the fuel-water separator several times until you feel a high resistance pressure, and the fuel system is primed.



WRK74906

If the **WATER IN FUEL** light comes on again after driving a short distance or the engine runs rough or stalls — a large amount of water has probably been pumped into the fuel tank. The fuel tank should be purged.

Hard starting, hesitation, or “flat” performance at high speed or hard acceleration may be an indication of premature fuel filter plugging due to dirty or contaminated fuel. The filter element may need to be changed if this happens. (See “Fuel, Filter Diesel” in the Index).

Running Out of Fuel (3.9L Cummins Diesel Engines)

The fuel system on the 3.9L Cummins diesel engine is self-priming. If the engine stalls, and you think that you have run out of fuel, add fuel, and restart the engine. If you are parked on a level surface, add at least two gallons of fuel. However, if you are parked on a slope, you may need to add up to five gallons of fuel.

Fuel Filter Replacement (3.9L Cummins Diesel Engines)

The 3.9L Cummins diesel engine uses a spin-on type fuel filter. Refer to the Cummins Operation and Maintenance Manual, ISB (4 cylinder) and ISB^e (4 and 6 cylinder) Series Engines.

Fuel Filter Replacement (Diesel Engines)

If you want to change the fuel filter yourself, here is how to do it:



CAUTION

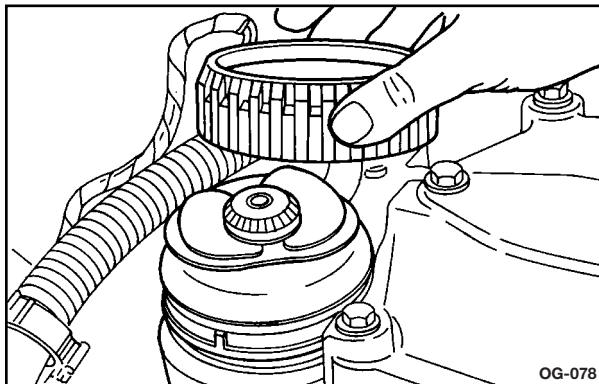
Diesel fuel is flammable. It could start a fire if something ignites it, and you could be burned. Do not let it get on hot engine parts, and keep matches or other ignition sources away.

First, drain any water from the filter following the procedure for draining water listed previously.

Your vehicle's engine should be off until the end of the following procedure.

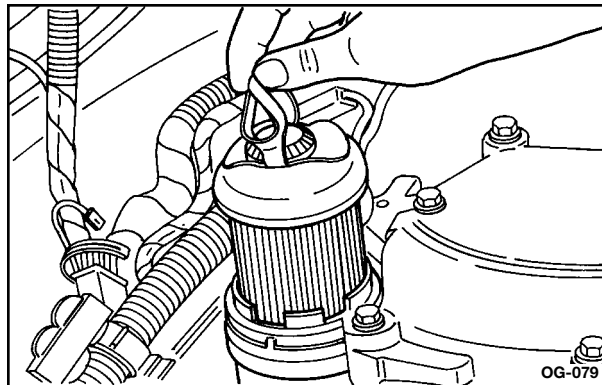
The fuel filter is located at the rear of the engine

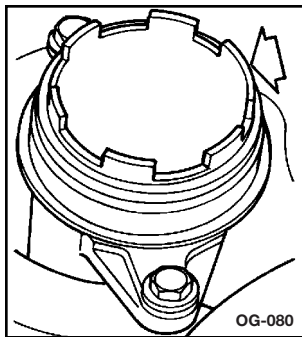
1. Apply the parking brake.
2. Take off the fuel cap. This releases vacuum or pressure in the tank.



3. Unscrew and remove the ring nut from the top of the filter head.

4. Lift the element out of the filter head using the pull tab attached to the top of the filter. If there is any dirt on the element sealing surface of the filter head, clean it off.





5. Line up the widest slot in the top of the new element with the widest key on the top of the filter head.

The word "**FRONT**" on the filter should face the front of the vehicle. Push the element in until the mating surfaces touch. Be sure that the seal has not been dislodged from the new element during installation.

6. Connect a 5/16 inch (8 mm) inside diameter hose or tube to the top of the air vent valve and lead hose into a fuel-resistant container.

7. Replace and tighten the ring nut to the top of the filter head.

8. With the air bleed valve open, turn your ignition key to **START** for 10 to 15 seconds. Wait one minute for your starter to cool. Do this until you can see clear fuel coming from the air bleed valve. If no liquid comes out, your vehicle needs service.

9. Close the air bleed valve and replace the fuel cap.

10. Start your engine and let it idle for five minutes. Check your fuel filter and air bleed valve for leaks.

FUELS IN FOREIGN COUNTRIES (GASOLINE ENGINES)

If you plan on driving in another country outside the United States or Canada, the proper fuel may be hard to find. Never use leaded gasoline or any other fuel not recommended in the previous text on fuel. Costly repairs caused by use of improper fuel would not be covered by your warranty.

To check on fuel availability, ask an auto club, or contact a major oil company that does business in the country where you will be driving.

FILLING YOUR TANK



CAUTION

Gasoline vapor is highly flammable. It burns violently, and that can cause very bad injuries. Do not smoke if you are near gasoline or refueling your vehicle. Keep sparks, flames and smoking materials away from gasoline.

To remove the cap, turn it slowly to the left (counterclockwise).



CAUTION

If you get gasoline on yourself and then something ignites it, you could be burned. Gasoline can spray out on you if you open the fuel filler cap too quickly. This spray can happen if your tank is nearly full, and is more likely in hot weather. Open the fuel filler cap slowly and wait for any “hiss” noise to stop. Then unscrew the cap all the way.

When you put the cap back on, turn it to the right (clockwise) until you hear a clicking sound. Make sure you fully install the cap. The diagnostic system can determine if the fuel cap has been left off or improperly installed. This would allow fuel to evaporate into the atmosphere. (See “Malfunction Indicator Lamp” in the Index).

NOTICE

If you need a new cap, be sure to get the right type. Your dealer can get one for you. If you get the wrong type, it may not fit properly. This may cause your malfunction indicator lamp to light and your fuel tank and emissions system may be damaged. (See “Malfunction Indicator Lamp” in the Index).

FILLING A PORTABLE FUEL CONTAINER



CAUTION

Never fill a portable fuel container while it is in your vehicle. Static electricity discharge from the container can ignite the gasoline vapor. You can be badly burned and your vehicle damaged if this occurs. To help avoid injury to you and others:

- **Dispense gasoline only into approved containers.**
- **Do not fill a container while it is inside a vehicle, in a vehicle’s trunk, pickup bed or on any surface other than the ground.**
- **Bring the fill nozzle in contact with the inside of the fill opening before operating the nozzle. Contact should be maintained until the filling is complete.**
- **Do not smoke while pumping gasoline.**

CHECKING THINGS UNDER THE ENGINE COMPARTMENT COVER

To open the hood, see the body manufacturer's information.



CAUTION

If your vehicle has air conditioning, the auxiliary engine fan under the hood can start up and injure you even when the engine is not running. Keep hands, clothing and tools away from any underhood electric fan.



CAUTION

Things that burn can get on hot engine parts and start a fire. These include liquids like gasoline or diesel fuel, oil, coolant, brake fluid, windshield washer and other fluids, and plastic or rubber. You or others could be burned. Be careful not to drop or spill things that will burn onto a hot engine.

Before closing the hood, be sure all the filler caps are on properly.

Cleaning Your Diesel Engine

NOTICE

If you spray or pour water or any other liquid on your engine when it is warm or hot, or when it is running, you could cause serious damage to it. If you ever clean the engine, clean it only when it is cold.

NOISE CONTROL SYSTEM

The following information relates to compliance with Federal Noise Emission Standards for vehicles with a Gross Vehicle Weight Rating (GVWR) of more than 10,000 lbs. (4 536 kg). The Maintenance Schedule provides information on maintaining the noise control system to minimize degradation of the noise emission control system during the life of your vehicle. The noise control system warranty is given in your Warranty section.

These standards apply only to vehicles sold in the United States.

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 acts listed on the next page.

Insulation:

- Removal of the noise shields or any underhood insulation.

Engine:

- Removal or rendering engine speed limiter (if equipped) inoperative so as to allow engine speed to exceed manufacturer specifications.

Fan and Drive:

- Removal of fan clutch (if equipped) or rendering clutch inoperative.
- Removal of the fan shroud (if equipped).

Air Intake:

- Removal of the air cleaner silencer.
- Reversing the air cleaner cover.

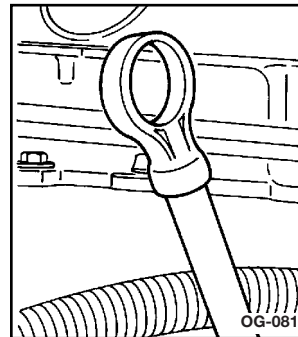
Exhaust:

- Removal of the muffler and/or resonator.
- Removal of the exhaust pipes and exhaust pipe clamps.

ENGINE OIL (GASOLINE ENGINE)

If your vehicle has a diesel engine, see “Engine Oil (Diesel Engine)” later in this section.

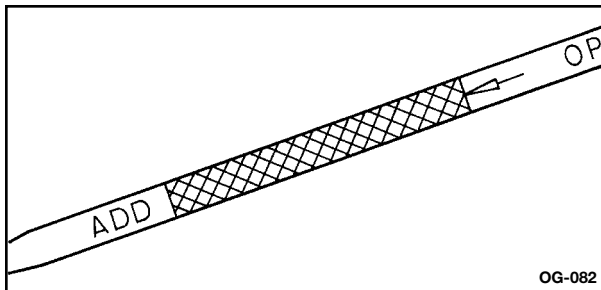
It is a good idea to check your engine oil every time you get fuel. In order to get an accurate reading, the oil must be warm and the vehicle must be on level ground.



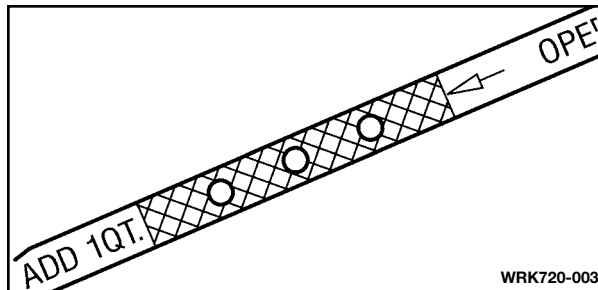
Turn off the engine and give the oil several minutes to drain back into the oil pan. If you do not, the oil dipstick might not show the actual level.

Checking Engine Oil

Pull out the dipstick and clean it with a paper towel or cloth, then push it back in all the way. Remove it again, keeping the tip down, and check the level.



All Models (Except 8.1L Engines)



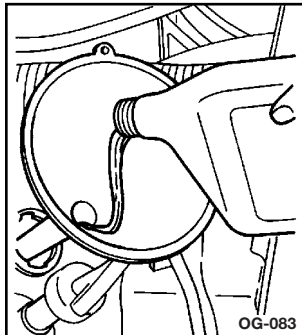
8.1L Engines

When to Add Engine Oil

If the oil is at or below the ADD line, then you will need to add at least one (1) quart (0.95 liters) of oil. But you must use the right kind. This part explains what kind of oil to use. For crankcase capacity, see "Capacities and Specifications" in the Index.

NOTICE

Do not add too much oil. If your engine has so much oil that the oil level gets above the cross-hatched area that shows the proper operating range, your engine could be damaged.



Be sure to fill it enough to put the level somewhere in the proper operating range. Push the dipstick all the way back in when you are through. Avoid fluids spills into engine air intakes.

What Kind of Engine Oil to Use

Oils recommended for your vehicle can be identified by looking for the “Starburst” symbol. This symbol indicates that the oil has been certified by the American Petroleum Institute (API). Do not use any oil which does not carry this Starburst symbol.

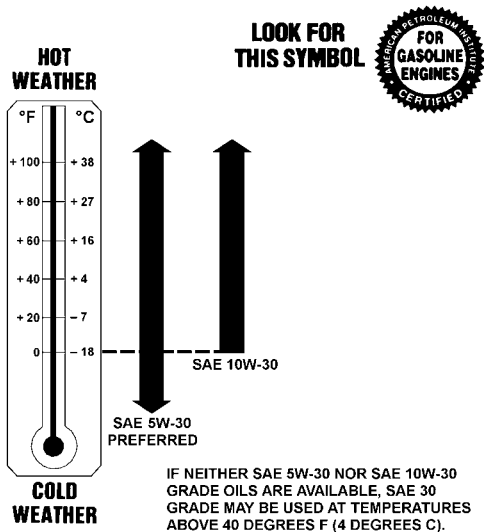


If you change your own oil, be sure you use oil that has the Starburst symbol on the front of the oil container. If you have your oil changed for you, be sure the oil put into your engine is API certified for gasoline engines.

You should also use the proper viscosity oil for your vehicle, as shown in the following chart:

RECOMMENDED SAE VISCOSITY GRADE ENGINE OILS

FOR BEST FUEL ECONOMY AND COLD STARTING, SELECT THE LOWEST SAE VISCOSITY GRADE OIL FOR THE EXPECTED TEMPERATURE RANGE.



DO NOT USE SAE 10W-40, SAE 20W-50 OR ANY OTHER GRADE OIL NOT RECOMMENDED

OG-085

As shown in the chart, SAE 5W-30 is best for your vehicle. However, you can use SAE 10W-30 if it is going to be 0°F (-18°C) or above. These numbers on an oil container show its viscosity, or thickness. Do not use other viscosity oils, such as SAE 20W-50.

NOTICE

Use only engine oil with the American Petroleum Institute (API) Certified for Gasoline Engines “Starburst” symbol. Failure to use the recommended oil can result in engine damage not covered by your warranty.

If you are in an area where the temperature falls below -20°F (-29°C), consider using either an SAE 5W-30 synthetic oil or an SAE 5W-30 oil. Both will provide easier cold starting and better protection for your engine at extremely low temperatures.

Engine Oil Additives

Do not add anything to your oil. Your dealer is ready to advise if you think something should be added.

When to Change Engine Oil

If any one of these is true for you, use the short trip/city maintenance schedule:

- Most trips are less than 5 to 10 miles (8 to 16 km). This is particularly important when outside temperatures are below freezing.
- Most trips include extensive idling (such as frequent driving in stop-and-go traffic).
- Most trips are through dusty areas.
- The vehicle is used for delivery service, commercial or RV/motorhome application.

Driving under these conditions causes engine oil to break down sooner. If any one of these is true for your vehicle, then you need to change your oil and filter every 3,000 miles (5 000 km) or 3 months, whichever occurs first.

If none of them is true, use the long trip/highway maintenance schedule. Change the oil and filter every 7,500 miles (12 500 km) or 12 months, whichever occurs first. Driving a vehicle with a fully

warmed engine under highway conditions causes engine oil to break down slower.

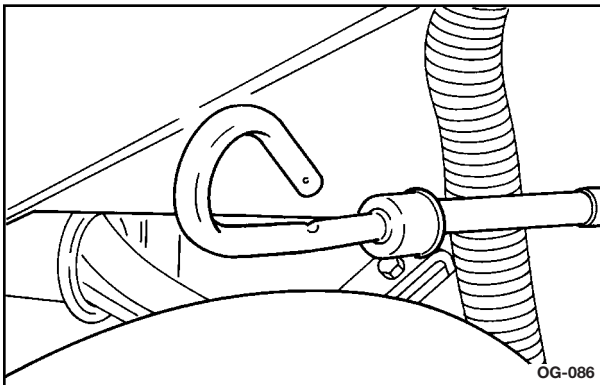
What to do with Used Oil

Did you know that used engine oil contains certain elements that may be unhealthy for your skin and could even cause cancer? Do not let used oil stay on your skin for very long. Clean your skin and nails with soap and water, or a good hand cleaner. Wash or properly throw away clothing or rags containing used engine oil (see the manufacturer's warnings about the use and disposal of oil products).

Used oil can be a real threat to the environment. If you change your own oil, be sure to drain all free-flowing oil from the filter before disposal. Do not ever dispose of oil or oil filter by putting it in the trash, pouring it on the ground, into sewers, or into streams or bodies of water. Recycle by taking them to a place that collects used oil. If you have a problem properly disposing of your used oil, ask your dealer, a service station or a local recycling center for help.

ENGINE OIL (DIESEL ENGINES)

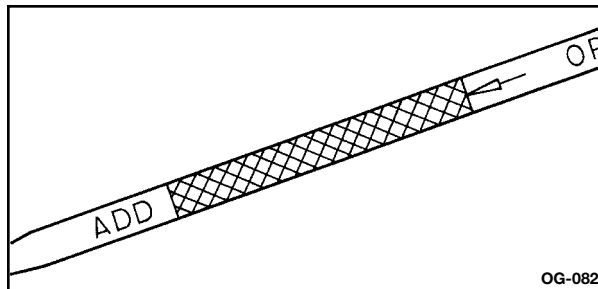
It is a good idea to check your engine oil level every time you get fuel. In order to get an accurate reading, the oil must be warm and the vehicle must be on level ground.



Turn off the engine and give the oil a few minutes to drain back into the oil pan. If you do not, the oil dipstick might not show the actual level.

Checking Engine Oil

Pull out the dipstick and clean it with a paper towel or a cloth, then push it back in all the way. Remove it again, keeping the tip down.



When to Add Engine Oil

If the oil is at or below the **ADD** line, then you will need to add at least one (1) quart (0.95 liters) of oil. But you must use the right kind. This part explains what kind of oil to use. For crankcase capacity, see “Capacities and Specifications” in the Index.

NOTICE

Do not add too much oil. If your engine has so much oil that the oil level gets above the proper operating range, your engine could be damaged.

Be sure to fill it enough to put the level somewhere in the proper operating range. Push the dipstick all the way back in when you are through.

What Kind of Engine Oil to Use

Look for these two things:

- CG-4
Oils designated as API CG-4 are best for your vehicle. The CG-4 designation may appear either alone, or in combination with other API designations, such as API CG-4/SH, CG-4/SJ, SH/CG-4 or SJ/CG-4.

These letters show American Petroleum Institute (API) levels of quality.

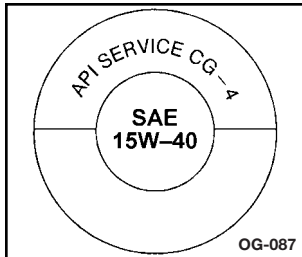
NOTICE

If you use oils that do not have one of these designations, you can cause engine damage which is not covered by your warranty.

- SAE 15W-40

As shown in the viscosity chart, SAE 15W-40 is best for your vehicle. However, you can use SAE 10W-30 if it is going to be colder than 32°F (0°C) before your next oil change. When it's very cold, below 0°F (-18°C), you should use SAE 10W-30 to improve cold starting. Also, SAE 30 may be used at temperatures above freezing, 32°F (0°C).

These numbers on the oil container show its viscosity, or thickness. Do not use other viscosity oils such as SAE 10W-40 or SAE 20W-50.

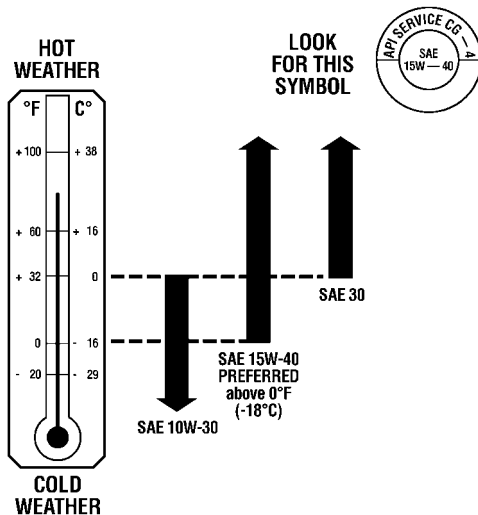


This doughnut-shaped logo (symbol) is used on most oil containers to help you select the correct oil. It means that the oil has been certified by the API.

You should look for this on the oil container, and use *only* those oils that display the logo.

RECOMMENDED SAE VISCOSITY GRADE ENGINE OILS

SELECT THE SAE GRADE OIL BASED ON THE EXPECTED TEMPERATURE RANGE BEFORE NEXT OIL CHANGE



DO NOT USE SAE 20W-50 OR ANY OTHER GRADE OIL NOT RECOMMENDED

WRK720-020

Engine Oil Additives

Do not add anything to your oil. Your dealer is ready to advise if you think something should be added.

When to Change Engine Oil

If any one of these is true for you, use the short trip/city maintenance schedule:

- Most trips are less than 5 to 10 miles (8 to 16 km). This is particularly important when outside temperatures are below freezing.
- Most trips include extensive idling (such as frequent driving in stop-and-go traffic).
- Most trips are through dusty areas.
- You frequently tow a trailer or use a carrier on top of your vehicle.
- If the vehicle is used for delivery service, commercial or RV/motorhome application.

Driving under these conditions causes engine oil to break down sooner. If any of these is true for your vehicle, then you need to change your oil and filter every 2,500 miles (4 000 km) or 3 months, whichever occurs first.

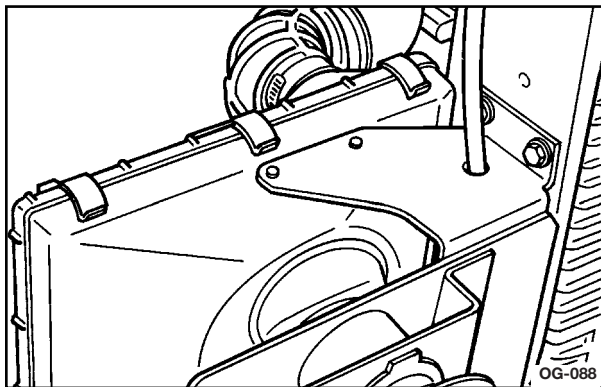
If none of them is true, use the long trip/highway

maintenance schedule. Change the oil and filter every 5,000 miles (8 000 km) or 12 months, whichever occurs first. Driving a vehicle with a fully warmed engine under highway conditions causes engine oil to break down slower.

What to do with Used Oil

Did you know that used engine oil contains certain elements that may be unhealthy for your skin and could even cause cancer? Do not let used oil stay on your skin for very long. Clean your skin and nails with soap and water, or a good hand cleaner. Wash or properly throw away clothing or rags containing used engine oil, (See the manufacturer's warnings about the use and disposal of oil products).

Used oil can be a real threat to the environment. If you change your own oil, be sure to drain all free-flowing oil from the filter before disposal. Do not ever dispose of oil by putting it in the trash, pouring it on the ground, into sewers, or into streams or bodies of water. Recycle it by taking it to a place that collects used oil, If you have a problem properly disposing of your used oil, ask your dealer, a service station or a local recycling center for help.

ENGINE AIR CLEANER/FILTER**All Engines (Except 3.9L Cummins Diesel)**

To remove the air cleaner cover, remove the metal clips that hold the cover on. Remove the cover and lift out the air filter.

Insert a new air filter, then replace the air cleaner cover. Move the metal clips to hold the cover in place.

To avoid the possibility of unfiltered air being drawn into the engine, make sure the air cleaner cover is on straight and the metal clips are properly in place. Ensure that the evacuator valve is checked frequently for debris blockage on all vehicles with the 8.1L Engine.

To remove the air cleaner cover on the 3.9L Cummins Diesel Engine, remove the wing nuts that hold the cover on. Remove the cover and lift out the air filter. Insert new air filter, then replace the air cleaner cover. Refasten the cover with the wing nuts.

If the vehicle is fitted with an optional air restriction indicator, change the air filter only when indicated.

**CAUTION**

Gasoline Engines Only: Operating the engine with the air cleaner/filter off can cause you or others to be burned. The air cleaner not only cleans the air, it stops flame if the engine backfires. If it is not there, and the engine backfires, you could be burned. Do not drive with it off, and be careful working on the engine with the air cleaner/filter off.

NOTICE

Gasoline Engines Only: If the air cleaner/filter is off, a backfire can cause a damaging engine fire. Dirt can easily get into your engine, which will damage it. Always have the air cleaner/filter in place when you are driving.

AUTOMATIC TRANSMISSION FLUID — ALLISON

See your Allison Automatic Transmission Operator's Manual to find out when to change your transmission fluid and filters.

AUTOMATIC TRANSMISSION FLUID — HYDRA-MATIC**When to Check and Change**

A good time to check your automatic transmission fluid level is when the engine oil is changed.

Change both the fluid and filter every 50,000 miles (83 000 km). See "Scheduled Maintenance Services" in the Index.

How to Check

Because this operation can be a little difficult, you may choose to have this done at the dealership service department.

If you do it yourself, be sure to follow all the instructions, or you could get a false reading on the dipstick.



CAUTION

Too much or too little fluid can damage your transmission. Too much can mean that some of the fluid could come out and fall on hot engine parts or exhaust system parts, starting a fire. Be sure to get an accurate reading if you check your transmission fluid.

Wait at least 30 minutes before checking the transmission fluid level if you have been driving; or any of the following applies:

- When outside temperatures are above 90°F (32°C).
- At high speed for quite a while.
- In heavy traffic — especially in hot weather.
- While pulling a trailer.

To get the right reading, the fluid should be at normal operating temperature, which is 180°F to 200°F (82°C to 93°C).

Get the vehicle warmed up by driving about 15 miles (24 km) when outside temperatures are above 50°F (10°C). If it is colder than 50°F (10°C), drive the vehicle in **DRIVE (D)** until the engine temperature gauge moves and then remains steady for 10 minutes.

Checking Transmission Fluid Cold

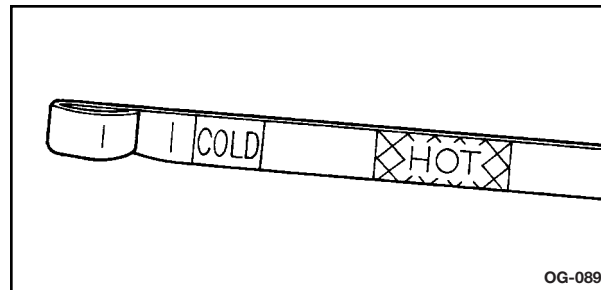
A cold check is made after the vehicle has been sitting for eight hours or more with the engine off and is used only as a reference. Let the engine run at idle for five minutes if outside temperatures are 50°F (10°C) or more. If it is colder than 50°F (10°C), you may have to idle the engine longer. Should the fluid level be low during a cold check, you *must* perform a hot check before adding fluid. This will give you a more accurate reading of the fluid level.

Checking the Fluid Level

- Park your vehicle on a level place. Keep the engine running.
- With the parking brake applied, place the shift lever in **PARK (P)**.
- With your foot on the brake pedal, move the shift lever through each gear range, pausing for about three seconds in each range. Then, position the shift lever in **PARK (P)**.
- Let the engine run at idle for three minutes or more.

Then, without shutting off the engine, follow these steps:

1. Pull out the dipstick and wipe it with a clean rag or paper towel.
2. Push it back in all the way, wait three seconds and then pull it back out again.



3. Check both sides of the dipstick, and read the lower level. The fluid level must be in the **COLD** area for a cold check or in the **HOT** area or cross-hatched area for a hot check.
4. If the fluid level is in the acceptable range, push the dipstick back in all the way.

How to Add Fluid

Refer to the Maintenance Schedule to determine what kind of transmission fluid to use. (See “Recommended Fluids and Lubricants” in the Index).

Add fluid only after checking the transmission fluid while it is hot. (A cold check is used only as a reference.) If the fluid level is low, add only enough of the proper fluid to bring the level up to the HOT area for a hot check. It does not take much fluid, generally less than one (1) pint (0.5 L). *Do not overfill.* Avoid fluid spills into engine air intakes.

NOTICE

We recommend you use only fluid labeled DEXRON®-III, because fluid with that label is made especially for your automatic transmission. Damage caused by fluid other than DEXRON®-III is not covered by your new vehicle warranty.

- After adding fluid, recheck the fluid level as described under “How to Check”.
- When the correct fluid level is obtained, push the dipstick back in all the way.

MANUAL TRANSMISSION FLUID

When to Check

A good time to have it checked is when the engine oil is changed. However, the fluid in your manual transmission does not require changing.

How to Check

Because this operation can be a little difficult, you may choose to have this done at your dealer Service Department.

If you do it yourself, be sure to follow all the instructions here, or you could get a false reading.

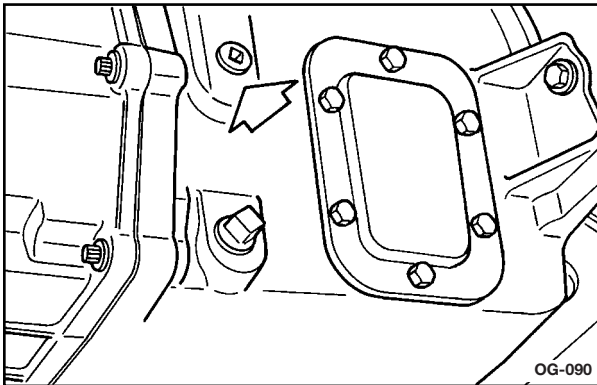


CAUTION

Too much or too little fluid can damage your transmission. Too much can mean that some of the fluid could come out and fall on hot engine parts or exhaust system parts, starting a fire. Be sure to get an accurate reading if you check your transmission fluid.

Check the fluid level only when your engine is off, the vehicle is parked on a level place and the transmission is cool enough for you to rest your fingers on the transmission case.

Then, follow these steps:



1. Remove the filler plug.
2. Check that the lubricant level is up to the bottom of the filler plug hole.

3. If the fluid level is good, install the plug and be sure it is fully seated. If the fluid level is low, add more fluid as described in the next steps.

How to add Fluid

Here is how to add fluid. Refer to the Maintenance Schedule to determine what kind of fluid to use. See “Recommended Fluids and Lubricants” in the Index.

1. Remove the filler plug.
2. Add fluid at the filler plug hole. Add only enough fluid to bring the fluid level up to the bottom of the filler plug hole.
3. Install the filler plug. Be sure the plug is fully seated.

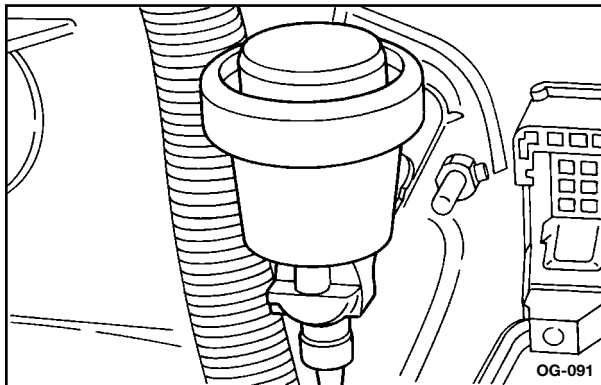
HYDRAULIC CLUTCH

The hydraulic clutch system in your vehicle is self-adjusting. A slight amount of play (1/4 inch to 1/2 inch or 6 mm to 12 mm) in the pedal is normal.

It is not a good idea to “top off” your clutch fluid. Adding fluid will not correct a leak. A fluid loss in this system could indicate a problem. Have the system inspected and repaired.

When to Check and What to Use

Refer to the Maintenance Schedule, to determine how often you should check the fluid level in your clutch master cylinder reservoir and for the proper fluid. (See “Owner Checks and Services” and “Recommended Fluids and Lubricants” in the Index).



How to Check

The proper fluid should be added if the level does not reach the bottom of the diaphragm when it's in place in the reservoir. See the instructions on the reservoir cap.

REAR AXLE

When to Check and Change Lubricant

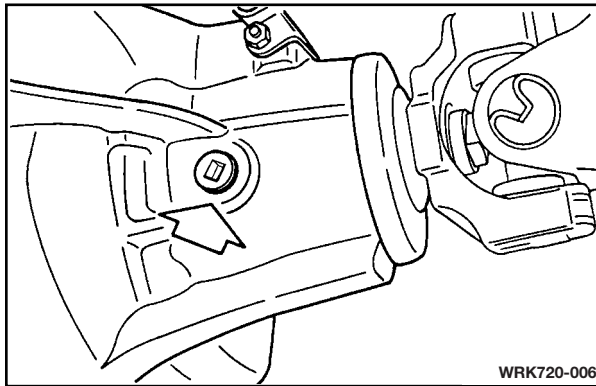
Refer to the Maintenance Schedule to determine how often to check the lubricant and when to change it. (See “Scheduled Maintenance Services” in the Index).

NOTICE

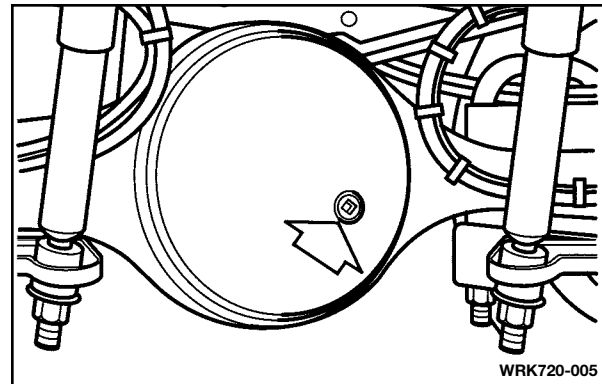
The rear axle of your coach has several large turning gears that can emit resonating noises which may be a normal operating characteristic, depending on vehicle load or vehicle speed.

How to Check Lubricant

If the level is below the bottom of the filler plug hole, you will need to add some lubricant. Add enough lubricant to raise the level to the bottom of the filler plug hole.



P32 and P42

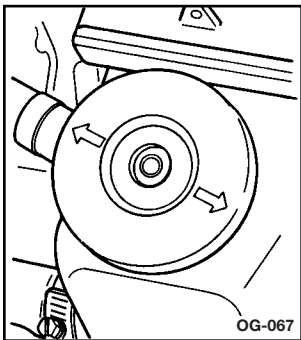


W22 / W24 / W52 / FE20

What to Use

Refer to the Maintenance Schedule to determine what kind of lubricant to use. (See “Recommended Fluids and Lubricants” in the Index).

RADIATOR PRESSURE CAP (GASOLINE ENGINES)



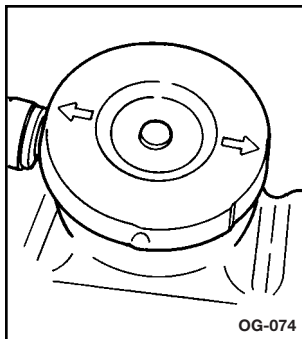
The radiator pressure cap must be tightly installed with the arrows on the cap lined up with the overflow tube on the radiator filler neck.

NOTICE

Your radiator pressure cap is a 15 psi (105 kPa) pressure-type cap and must be tightly installed to prevent coolant loss and possible engine damage from overheating. Be sure the arrows on the cap line up with the overflow tube on the radiator filler neck.

When you replace your radiator pressure cap, an ACDelco® cap is recommended.

SURGE TANK PRESSURE CAP (DIESEL ENGINES)



The surge tank pressure cap must be tightly installed with the arrows on the cap lined up with the top tube of the coolant surge tank.

NOTICE

Your surge tank pressure cap is a unique 15 psi (105 kPa) pressure-type cap for use with surge tank cooling systems only. It must be tightly installed to prevent coolant loss and possible engine damage from overheating. Be sure the arrows on the cap line up with the top tube of the coolant surge tank.

THERMOSTAT

Engine coolant temperature is controlled by a thermostat in the engine coolant system. The thermostat stops the flow of coolant through the radiator until the coolant reaches a preset temperature.

When you replace your thermostat, an ACDelco® thermostat is recommended.

ENGINE COOLANT

The cooling system in your vehicle is filled with DEX-COOL® engine coolant. This coolant is designed to remain in your vehicle for 5 years or 150,000 miles (240 000 km), whichever occurs first, if you add only DEX-COOL® extended life coolant.

The following explains your cooling system and how to add coolant when it is low. If you have a problem with engine overheating, see “Engine Overheating” in the Index.

A 50/50 mixture of clean, drinkable water and DEX-COOL® coolant will:

- Give freezing protection down to -34°F (-37°C).
- Give boiling protection up to 265°F (129°C).
- Protect against rust and corrosion.
- Help keep the proper engine temperature.
- Let the warning lights and gauges work as they should.

NOTICE

When adding coolant, it is important that you use only DEX-COOL® (silicate-free) coolant. If coolant other than DEX-COOL is added to the system, premature engine, heater core or radiator corrosion may result. In addition, the engine coolant will require change sooner — at 30,000 miles (50,000 km) or 24 months, whichever occurs first. Damage caused by the use of coolant other than DEX-COOL® is not covered by your Workhorse warranty.

What to Use

Use a mixture of one-half *clean, drinkable water* and one-half DEX-COOL® coolant which will not damage aluminum parts. If you use this coolant mixture, you do not need to add anything else.

**CAUTION**

Adding only plain water to your cooling system can be dangerous. Plain water, or some other liquid like alcohol, can boil before the proper coolant mixture will. Your vehicle's coolant warning system is set for the proper coolant mixture. With plain water or the wrong mixture, your engine could get too hot but you would not get the overheat warning. Your engine could catch fire and you or others could be burned. Use a 50/50 mixture of clean, drinkable water and DEX-COOL® coolant.

NOTICE

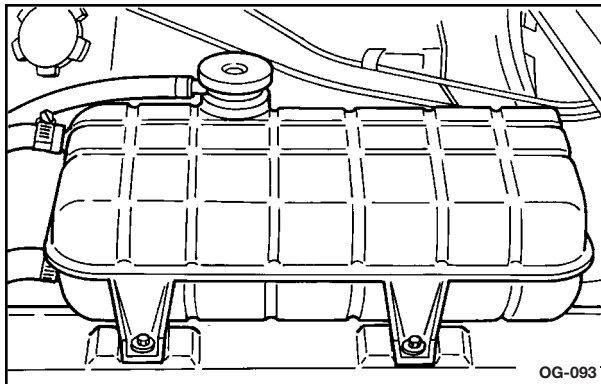
If you use an improper coolant mixture, your engine could overheat and be damaged. The repair cost would not be covered by your warranty. Too much water in the mixture can freeze and crack the engine, radiator, heater core and other parts.

If you have to add coolant more than four times a year, have your dealer check your cooling system.

NOTICE

If you use the proper coolant, you do not have to add extra inhibitors or additives, which claim to improve the system. These can be harmful.

Checking Coolant — Diesel Engines



If your vehicle has a diesel engine, it has a see-through surge tank mounted on top of the radiator.

**CAUTION**

Turning the surge tank pressure cap when the engine and radiator are hot can allow steam and scalding liquids to blow out and burn you. Never turn the surge tank pressure cap — even a little — when the engine and radiator are hot.

The vehicle must be on a level surface. When your engine is cold, the coolant level should be at the FULL COLD mark.



**LOW
COOLANT**

OG-038

If the LOW COOLANT light comes on and stays on, it means you are low on engine coolant.

Adding Coolant

If you need more coolant, add the proper DEX-COOL® coolant mixture *at the surge tank*, but only when the engine is cool.

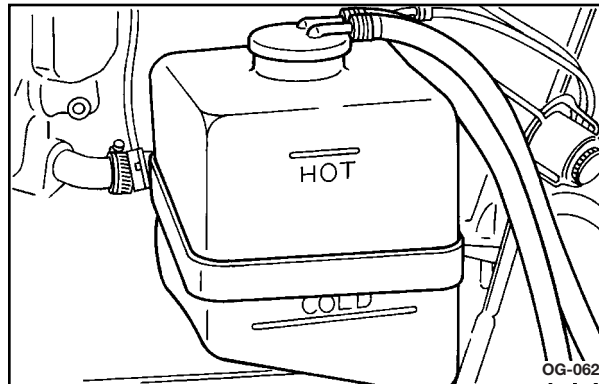


CAUTION

You can be burned if you spill coolant on hot engine parts. Coolant contains ethylene glycol, and it will burn if the engine parts are hot enough. Do not spill coolant on a hot engine.

When replacing the pressure cap, make sure it is hand-tight.

Checking Coolant — Gasoline Engines



If your vehicle has a gasoline engine, it has a see-through coolant recovery tank, mounted by the body manufacturer.

The vehicle must be on a level surface. When your engine is cold, the coolant level should be at **FULL COLD**, or a little higher. When your engine is warm, the level should be up to **FULL HOT**, or a little higher.

Adding Coolant

If you need more coolant, add the proper DEX-COOL® coolant mixture *at the coolant recovery tank*.



CAUTION

Turning the radiator pressure cap when the engine and radiator are hot can allow steam and scalding liquids to blow out and burn you. With the coolant recovery tank, you will almost never have to add coolant at the radiator. Never turn the radiator pressure cap — even a little — when the engine and radiator are hot.

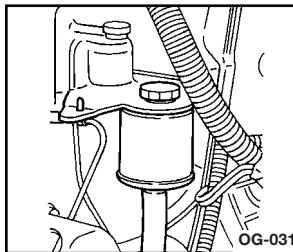
Add coolant mixture at the recovery tank, but be careful not to spill it.



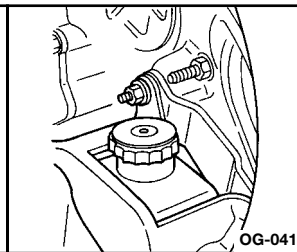
CAUTION

You can be burned if you spill coolant on hot engine parts. Coolant contains ethylene glycol, and it will burn if the engine parts are hot enough. Do not spill coolant on a hot engine.

POWER STEERING FLUID



Remote Reservoir



Integral Reservoir

NOTICE

Always turn the engine off before checking or adding power steering fluid. The power steering cap is close to the fan and other moving parts.

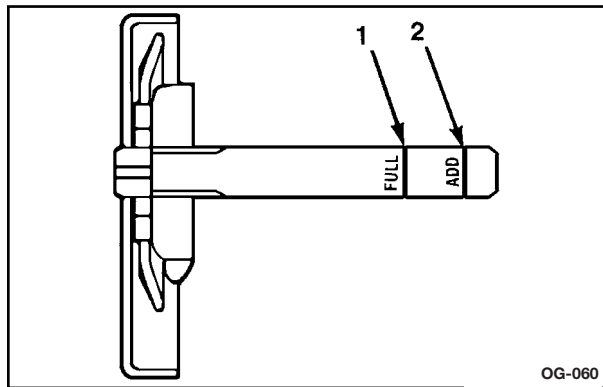
When to Check Power Steering Fluid

It is not necessary to regularly check power steering fluid unless you suspect there is a leak in the system or you hear an unusual noise. A fluid loss in this system could indicate a problem. Have the system inspected and repaired.

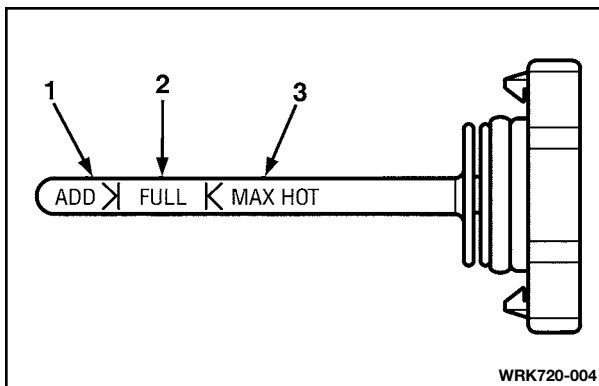
How to Check Power Steering Fluid

When the engine compartment is cool, wipe the cap and the top of the reservoir clean, then unscrew the cap and wipe the dipstick with a clean rag. Replace the cap and completely tighten it. Then remove the cap again and look at the fluid level on the dipstick.

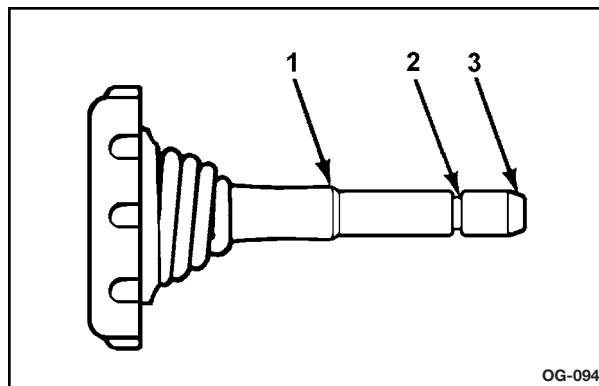
The level should be at the FULL COLD mark. If necessary, add only enough fluid to bring the level up to the mark.

**Remote Reservoir (P32 and P42)**

1. FULL
2. ADD

**Remote Reservoir (W22 / W24 / W52 / FE20)**

1. ADD
2. FULL
3. MAX HOT

**Integral Reservoir**

1. HOT
2. COLD
3. ADD

What to Use

To determine what kind of fluid to use, see “Recommended Fluids and Lubricants” in the Index. Always use the proper fluid. Failure to use the proper fluid can cause leaks and damage hoses and seals.

WINDSHIELD WASHER FLUID

What to Use

When you need windshield washer fluid, be sure to read the manufacturer’s instructions before use. If you will be operating your vehicle in an area where the temperature may fall below freezing, use a fluid that has sufficient protection against freezing.

Adding Washer Fluid

The windshield washer fluid bottle is mounted by the body manufacturer. Avoid fluid spills into engine air intakes.

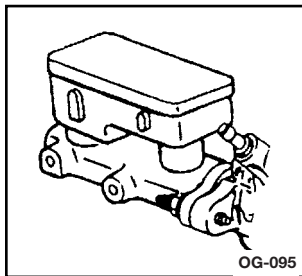
Open the cap labeled WASHER FLUID ONLY. Add washer fluid until the tank is full.

NOTICE

- **When using concentrated washer fluid, follow the manufacturer’s instructions for adding water.**
- **Do not mix water with ready-to-use washer fluid. Water can cause the solution to freeze and damage your washer fluid tank and other parts of the washer system. Water does not clean as well as washer fluid.**
- **Fill your washer fluid tank only three-quarters full when it is very cold. This allows for expansion if freezing occurs, which could damage the tank if it is completely full.**
- **Do not use engine coolant (antifreeze) in your windshield washer. It can damage your washer system and paint.**

BRAKES

Brake Fluid



Your brake master cylinder reservoir is filled with DOT-3 brake fluid.

The reservoir is located in the front engine compartment access. On the P32 Chassis, the reservoir can be accessed through the

drivers side wheel well housing

There are only two reasons why the brake fluid level in the reservoir might go down. The first is that the brake fluid goes down to an acceptable level during normal brake lining wear. When new linings are put in, the fluid level goes back up. The other reason is that fluid is leaking out of the brake system. If it is leaking, you should have your brake system fixed, since a leak means that sooner or later your brakes will not work well, or will not work at all.

It is not a good idea to “top off” your brake fluid. Adding brake fluid will not correct a leak. If you add fluid when your linings are worn, you will have too much fluid when you get new brake linings. You should add (or remove) brake fluid, as necessary, only when work is done on the brake hydraulic system. Avoid fluid spills into engine air intakes.



CAUTION

If you have too much brake fluid, it can spill on the engine. The fluid will burn if the engine is hot enough. You or others could be burned, and your vehicle could be damaged. Add brake fluid only when work is done on the brake hydraulic system.

Refer to the Maintenance Schedule to determine when to check your brake fluid. (See “Periodic Maintenance Inspections” in the Index). On W22 motor homes and FE20 Shuttle bus, the brake system warning light will come on when the fluid level becomes too low.

Checking Brake Fluid

If you have the see-through reservoir with outside markings, you can check the brake fluid without taking off the cap.

Just look at the brake fluid reservoir. The fluid level should be above **MIN**. If it is not, have your brake system checked to see if there is a leak.

After work is done on the brake hydraulic system, make sure the level is above the **MIN** but not over the **MAX** mark.

With the metallic reservoir, you have to take the cap off to check the brake fluid. Always clean the cap and the area around the cap before removing it. The fluid levels should not be more than 3/4 inch (18 mm) below the top of the reservoir. If they are, have your brake system checked to see if there is a leak.

After work is done on the brake hydraulic system, make sure the levels are at the minimum fill marks.

What to Add

When you do need brake fluid, **use only DOT-3 brake fluid**. (Refer to “Recommended Fluids and Lubricants” in the Index). Use new brake fluid from a sealed container only.

Always clean the brake fluid reservoir cap and the area around the cap before removing it. This will help keep dirt from entering the reservoir.



CAUTION

With the wrong kind of fluid in your brake system, your brakes may not work well, or they may not work at all. This could cause an accident. Always use the proper brake fluid.

NOTICE

- **Using the wrong fluid can damage brake system parts. Just a few drops of mineral-based oil, such as engine oil, in your brake system can damage brake system parts so that they will have to be replaced. Do not let someone put in the wrong kind of fluid.**
- **If you spill brake fluid on your vehicle's painted surfaces, the paint finish can be damaged. Be careful not to spill brake fluid on your vehicle. If you do, wash it off immediately.**

Brake Wear

Unless you have the four-wheel disc brake option, your vehicle has front disc brakes and rear drum brakes.

Disc brake pads have built-in wear indicators that make a high-pitched warning sound when the brake pads are worn and new pads are needed. The sound may come and go or be heard all the time

your vehicle is moving (except when you are pushing on the brake pedal firmly).

**CAUTION**

The brake wear warning sound means that soon your brakes will not work well. That could lead to an accident. When you hear the brake wear warning sound, have your vehicle serviced.

NOTICE

Continuing to drive with worn-out brake pads could result in costly brake repair.

NOTICE

Lubricate brake caliper slides and brake pedal linkage if the coach is in storage for periods of 6 months or greater.

Some driving conditions or climates may cause a brake squeal when the brakes are first applied or lightly applied. This does not mean something is wrong with your brakes.

Properly torqued wheel nuts are necessary to help prevent brake pulsation. When tires are rotated, inspect brake pads for wear and evenly torque wheel nuts in the proper sequence to Workhorse specifications (See “Wheel, Nut Torque” in the Index).

If you have rear drum brakes, they do not have wear indicators, but if you ever hear a rear brake rubbing noise, have the rear brake linings inspected immediately. The rear brake drums should be removed and inspected each time the tires are removed for rotation or changing. When you have the front brake pads replaced, have the rear brakes inspected as well.

Brake linings should always be replaced as complete axle sets.

See “Brake System Inspection” in the Index.

Brake Pedal Travel

See your dealer if the brake pedal does not return to normal height, or if there is a rapid increase in pedal travel. This could be a sign of brake trouble.

Brake Adjustment

Every time you make a brake stop, your disc brakes adjust for wear.

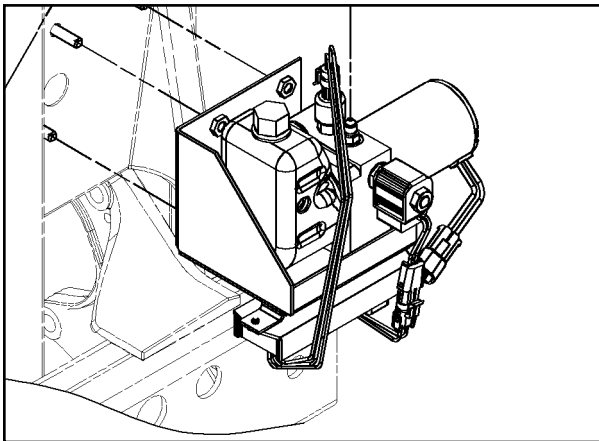
If your brake pedal goes down farther than normal, your rear drum brakes may need adjustment. Adjust them by backing up and firmly applying the brakes a few times.

Replacing Brake System Parts

The braking system on a vehicle is complex. Many parts have to be of top quality and work well together if the vehicle is to have really good braking. Your vehicle was designed and tested with top quality brake parts. When you replace parts of your braking system — for example, when your brake linings wear down and you have to have new ones put in — be sure you get new approved replacement parts. If you do not, your brakes may no longer work properly. For example, if someone puts in brake linings that are wrong for your vehicle,

the balance between your front and rear brakes can change—for the worse. The braking performance you have come to expect can change in many other ways if someone puts in the wrong replacement brake parts.

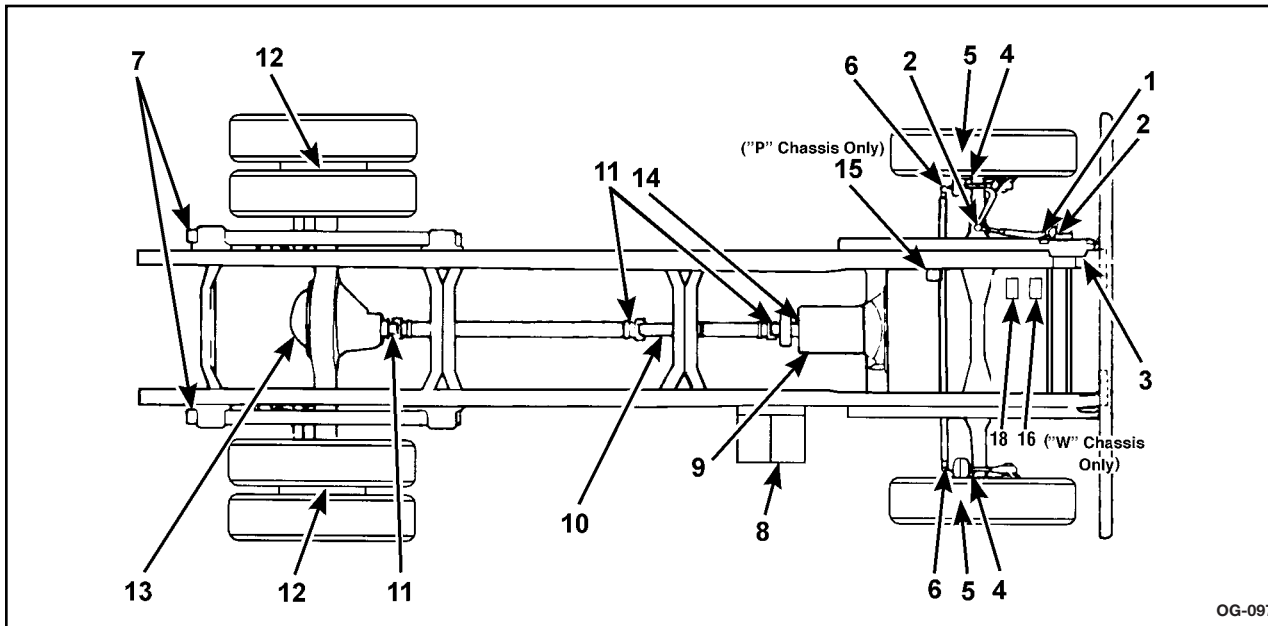
AUTO PARK BRAKE SYSTEM (ELECTRIC PUMP)



The P32 motor homes with a GVWR of 16,000 lbs. (7 258 kg) through 18,000 lbs.(8 165 kg) with the 8.1L engine, or W24 with the GVWR of 24,000 lb. (10 866 kg), equipped with an auto-applied parking brake, the fluid reservoir is located in front and to the right of the radiator.

This system uses Automatic Transmission Fluid (DEXRON®-III). Use the same specification fluid as used for the automatic transmission. Fluid should be checked with the vehicle in PARK (P) and should have a reading between the minimum and maximum markings. Clean the cap prior to adding fluid. **Do Not Overfill.**

CHASSIS LUBRICATION - TYPICAL



OG-097

NOTICE: Wipe all Zerk (grease) fitting clean of all dirt before applying grease.

ITEM NO.	ITEM	REMARKS
1	Steering Column Slip Joint**	One fitting. (P32 and P42 only)
2	Steering Drag Link Ends	One fitting each end.
3	Steering Column U-Joints	One fitting each joint. (P32 and P42 only)
4	Front Steering Knuckles	One fitting each side, lower bushing. NOTICE: King Pins on W Chassis & P42 Chassis (Hand-operated grease gun only.) Hand-pack upper bearing. (P32 and P42 only)
4B	Upper and Lower Ball Joints	One fitting each side (Hand-operated grease gun only)
5	Front Wheel Bearings*	Hand-pack or lubricate. (W22 / W24 / W52 and FE20 oil lubricated.)
6	Steering Tie Rod Ends	One fitting each end.
7	Spring Slip Pads** ("P" Chassis Only)	Apply chassis lubricant. (Multi-Leaf Only)
8	Battery Terminal (except "ST" type)	Keep coated with petroleum jelly.
9	Parking Brake Bell Crank**, †	One fitting.

ITEM NO.	ITEM	REMARKS
10	Propshaft Slip Joints	One fitting each joint; lubricate with Grade 1 Wheel Bearing Lubricant.***
11	Propshaft U-Joints	One fitting each joint (1350, 1410, 1480 and 1550 Series); lubricate with Grade 1 Wheel Bearing Lubricant.***
12	Rear Wheel Bearings*	Hand-pack or lubricate. (W22 / W24 / W52 and FE20 oil lubricated.)
13	Rear Axle*	Fill to level of filler plug.
14	Parking Brake Clevis Pin†	Apply chassis lubricant.
15	Master Cylinder† ("P" Chassis Only)	Fill 1/4" (6 mm) below opening. (P32 and P42 only)
16	Master Cylinder† ("W" Chassis Only)	Fill to bottom of notched rings, visible through the openings (W22 / W24 / W52 and FE20)
17	Parking Brake Lever Pivot**†	Apply chassis lubricant. (Parking brake lever in cab)
18	System Brake Relay Lever Pivot†	Apply chassis lubricant (Apply grease under regular chassis lubrication intervals***)

* Refer to your Maintenance Schedule.

** Applies to some vehicles.

*** See specification chart (under Scheduled Maintenance Services)

† Applies to hydraulic brakes only.

BATTERY**CAUTION**

Batteries have acid that can burn you and gas that can explode. You can be hurt if you are not careful. See “Jump Starting” in the Index for tips on working around a battery without getting hurt.

Vehicle Storage

If you are not going to drive your vehicle for 25 days or more, remove the black, negative (-) cable from the battery. This will help keep your battery from running down.

If the vehicle is to be stored for extended periods of 60 days or more, it is recommended to keep the battery charged by connecting it to a trickle charger, in a safe place — because of emitted hydrogen during battery charging. This will extend the life of the battery.

NOTICE

Damaged batteries from improper storage include frozen and dead batteries. This is NOT covered by your Workhorse warranty.

The idle control learned variables might need to be re-learned by the engine controller after the battery is reconnected. Consult your local dealer or service manual for the “Idle Learn” procedure. It is a procedure, which does not require any tools and can be easily done by yourself. This procedure is not absolutely necessary, since the engine controller will teach new values every time your engine returns to idle speed. The engine may not idle smoothly until the idle control variables are relearned.

Contact your dealer to learn how to prepare your vehicle for longer storage periods.

Gasoline Vehicle Storage

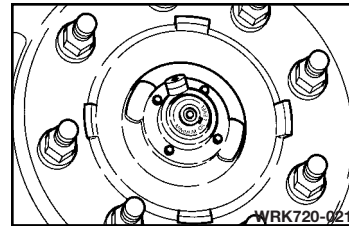
Extended periods of vehicle storage (over 60 days) can result in deterioration of gasoline fuel due to oxidation. A commercially available fuel stabilizer (“STA-BIL” or equivalent) should be added prior to gasoline fill whenever the anticipated storage period is over 60 days. The manufacturer’s instructions included with the product should be followed. Operate the vehicle for 10 minutes at idle speed to distribute the stabilizer throughout the fuel system. Moisture condensation will be minimized by filling the fuel tank.

NOTICE

If your coach is stored for a long duration of time (6 months or longer) there are areas of your vehicle that may be susceptible to corrosion due to moisture. Moisture corrosion can magnify if the coach is stored outside on grass, dirt and or concrete. It is very important to have your coach inspected at your authorized Workhorse Custom Chassis Dealer when it is recommissioned for service/usage. This will help verify if there are any component(s) that have been effected by moisture.

FRONT WHEEL BEARINGS WITH OIL-FILLED HUBS (IF EQUIPPED)

Some vehicles have oil-lubricated front hubs.



If your vehicle has these, check to see if they have enough oil. You can tell by simply looking into the sight glass on the front wheel hubs to see if there is oil there.

If oil is low, remove the fill cap, and be careful not to allow any dirt or water to get into the oil. Add enough oil to bring it up to the level mark on the sight glass.

Your Maintenance Schedule will tell you what oil to use. (See “Recommended Fluids and Lubricants” in the Index).

When you fill the hub, check the glass again after driving a short distance. It may take a while for the oil

to flow through the system, and you may need to add a little more to fill it to the proper level.

TIRES

Your new vehicle comes with high-quality tires made by a leading tire manufacturer. If you ever have questions about your tire warranty and where to obtain service, see your Warranty section for details.

NOTICE

To reduce the potential of flat spots in your tires during storage, park the coach with each tire on a 1/2 inch (13.7mm) piece of plywood. This will help evenly disperse the load on the tires during storage.



CAUTION

Poorly maintained and improperly used tires are dangerous.

- **Overloading your tires can cause overheating as a result of too much friction. You could have an air-out and a serious accident. (See “Loading Your Vehicle” in the Index).**
- **Underinflated tires pose the same danger as overloaded tires. The resulting accident could cause serious injury. Check all tires frequently to maintain the recommended pressure. Tire pressure should be checked when your tires are cold.**
- **Overinflated tires are more likely to be cut, punctured or broken by a sudden impact — such as when you hit a pothole. Keep tires at the recommended pressure.**
- **Worn, old tires can cause accidents. If your tread is badly worn, or if your tires have been damaged, replace them.**

Inflation — Tire Pressure

The Certification/Tire Label, which is located somewhere on your vehicle (check with your body manufacturer or on the Incomplete Vehicle Document), shows the correct inflation pressures for your tires when they are cold. “Cold” means your vehicle has been sitting for at least three hours or driven no more than 1 mile (1.6 km).

NOTICE

Do not let anyone tell you that underinflation or overinflation is all right. It is not. If your tires do not have enough air (underinflation), you can get the following:

- **Too much flexing**
- **Too much heat**
- **Tire overloading**
- **Bad wear**

NOTICE (Continued)**NOTICE (Continued)**

- **Bad handling**
- **Bad fuel economy.**

If your tires have too much air (overinflation), you can get the following:

- **Unusual wear**
- **Bad handling**
- **Rough ride**
- **Needless damage from road hazards.**

When to Check

Check your tires once a month or more.

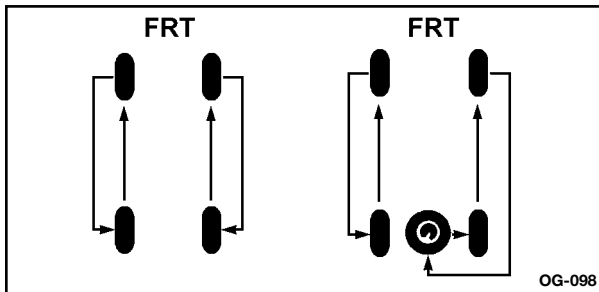
How to Check

Use a good quality pocket-type gauge to check tire pressure. You can not tell if your tires are properly inflated simply by looking at them. Radial tires may look properly inflated even when they are underinflated.

Be sure to put the valve caps back on the valve stems. They help prevent leaks by keeping out dirt and moisture.

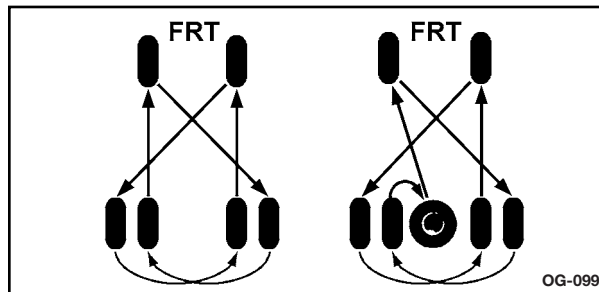
Tire Inspection and Rotation

Tires should be rotated every 6,000 to 8,000 miles (10 000 to 13 000 km). Any time you notice unusual wear, rotate your tires as soon as possible and check wheel alignment. Also check for damaged tires or wheels. See “When It Is Time for New Tires” and “Wheel Replacement” later in this section for more information. If your vehicle has dual rear wheels, also see “Dual Tire Operation” later in this section.



The purpose of regular rotation is to achieve more uniform wear for all tires on the vehicle. The first rotation is the most important. (See “Scheduled Maintenance Services” in the Index for scheduled rotation intervals).

If your vehicle has single rear wheels, always use one of the correct rotation patterns shown on previous page when rotating your tires.



**Same Load Range and Tread Pattern
Front and Rear**

If your vehicle has dual rear wheels, always use one of the correct rotation patterns shown here when rotating your tires.

When you install dual wheels, be sure the vent holes in the inner and outer wheels on each side are lined up.

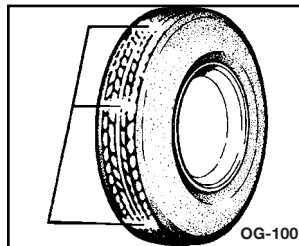
After the tires have been rotated, adjust the front and rear inflation pressures as shown on the Certification/Tire Label. Make certain that all wheel nuts are properly tightened. (See “Wheel, Nut Torque” in the Index).



CAUTION

Rust or dirt on a wheel, or on the parts to which it is fastened, can make wheel nuts become loose after a time. The wheel could come off and cause an accident. When you change a wheel, remove any rust or dirt from places where the wheel attaches to the vehicle. In an emergency, you can use a cloth or a paper towel to do this; but be sure to use a scraper or wire brush later, if you need to, to get all the rust or dirt off. (See “Changing a Flat Tire” in the Index).

When It Is Time for New Tires



One way to tell when it is time for new tires is to check the treadwear indicators, which will appear when your tires have only 1/16 inch (1.6 mm) or less of tread remaining.

Some commercial truck tires may not have treadwear indicators. Some larger tires, such as 19 1/2 inch tires, do not have treadwear indicators.

You need a new tire if any of the following statements are true:

- You can see the indicators at three or more places around the tire.
- You can see cord or fabric showing through the tire's rubber.
- The tread or sidewall is cracked, cut or snagged deep enough to show cord or fabric.
- The tire has a bump, bulge or split.
- The tire has a puncture, cut or other damage that can't be repaired well because of the size or location of the damage.

Dual Tire Operation

When the vehicle is new, or whenever a wheel, wheel bolt or wheel nut is replaced, check the wheel nut torque after 100, 1,000 and 6,000 miles (160, 1600 and 10 000 km) of driving. For proper torque, see "Wheel, Nut Torque" in the Index.

The outer and inner tire on a dual wheel set up will wear differently. Your tires will wear more evenly and last longer if you rotate the tires periodically. If you are going to be doing a lot of driving on high-crown roads, you can reduce tire wear by adding 5 psi (35 kPa) to the tire pressure in the outer tires. Be sure to return to the recommended pressures when no longer driving under those conditions. (See "Changing a Flat Tire" in the Index).

**CAUTION**

If you operate your vehicle with a tire that is badly underinflated, the tire can overheat. An overheated tire can lose air suddenly or catch fire. You or others could be injured. Be sure all tires (including the spare, if any) are properly inflated.

Buying New Tires

To find out what kind and size of tires you need, look at the Certification/Tire Label.

The tires installed on your vehicle when it was new may have had a Tire Performance Criteria Specification (TPC Spec) number on each tire's sidewall. When you get new tires, get ones with that same TPC Spec number. That way your vehicle will continue to have tires that are designed to give proper endurance, handling, speed rating, traction, ride and other things during normal service on your vehicle. If your tires have an all-season tread design, the TPC number will be followed by an "MS" (for mud and snow).

If you ever replace your tires with those not having a TPC Spec number, make sure they are the same size, load range, speed rating and construction type (bias, bias-belted or radial) as your original tires.

**CAUTION**

Mixing tires could cause you to lose control while driving. If you mix tires of different sizes or types (radial and bias-belted tires), the vehicle may not handle properly, and you could have a crash. Using tires of different sizes may also cause damage to your vehicle. Be sure to use the same size and type tires on all wheels.

**CAUTION**

If you use bias-ply tires on your vehicle, the wheel rim flanges could develop cracks after many miles of driving. A tire and/or wheel could fail suddenly, causing a crash. Use only radial-ply tires with the wheels on your vehicle.

Wheel Alignment and Tire Balance

The wheels on your vehicle were aligned and balanced carefully at the factory to give you the longest tire life and best overall performance.

Scheduled wheel alignment and wheel balancing are not needed. If you notice unusual tire wear or your vehicle pulling one way or the other, the alignment may need to be reset. If you notice your vehicle vibrating when driving on a smooth road, your wheels may need to be rebalanced.

Wheel Replacement

Replace any wheel that is bent, cracked, or badly rusted or corroded. If wheel nuts keep coming loose, the wheel, wheel bolts and wheel nuts should be replaced. If the wheel leaks air, replace it (except some aluminum wheels, which can sometimes be repaired). See your dealer if any of these conditions exist.

Your dealer will know the kind of wheel you need.

Each new wheel should have the same load-carrying capacity, diameter, width, offset and be mounted the same way as the one it replaces.

If you need to replace any of your wheels, wheel bolts or wheel nuts, replace them only with new original equipment parts. This way, you will be sure to have the right wheel, wheel bolts and wheel nuts for your vehicle.



CAUTION

Using the wrong replacement wheels, wheel bolts or wheel nuts on your vehicle can be dangerous. It could affect the braking and handling of your vehicle, make your tires lose air and make you lose control. You could have a collision in which you or others could be injured. Always use the correct wheel, wheel bolts and wheel nuts for replacement.

NOTICE

The wrong wheel can also cause problems with bearing life, brake cooling, speedometer or odometer calibration, headlamp aim, bumper height, vehicle ground clearance and tire or tire chain clearance to the body and chassis.

Whenever a wheel, wheel bolt or wheel nut is replaced on a dual wheel setup, check the wheel nut torque after 100, 1,000 and 6,000 miles (160, 1600 and 10 000 km) of driving. For proper torque, see “Wheel, Nut Torque” in the Index.

See “Changing a Flat Tire” in the Index for more information.

Used Replacement Wheels



CAUTION

Putting a used wheel on your vehicle is dangerous. You can not know how it has been used or how far it has been driven. It could fail suddenly and cause an accident. If you have to replace a wheel, use a new original equipment wheel.

Tire Chains

NOTICE

Use tire chains only where legal and only when you must. Use chains that are the proper size for your tires. Install them on the tires of the rear axle. Tighten them as tightly as possible with the ends securely fastened. Drive slowly and follow the chain manufacturer's instructions. If you can hear the chains contacting your vehicle, stop and retighten them. If the contact continues, slow down until it stops. Driving too fast or spinning the wheels with chains on will damage your vehicle.

Before using any tire chains, check with your body manufacturer to be sure there is enough clearance between the tires and the wheel well.

CLEANING TIRES

To clean your tires, use a stiff brush with a tire cleaner.

NOTICE

When applying a tire dressing always take care to wipe off any overspray or splash from all painted surfaces on the body or wheels of the vehicle. Petroleum-based products may damage the paint finish and tires.

UNDERBODY MAINTENANCE

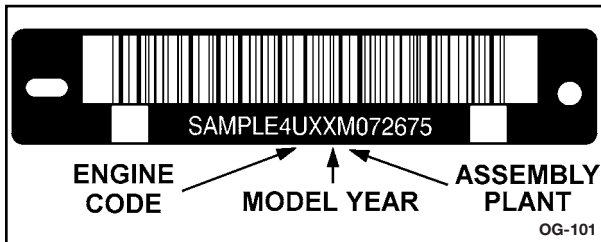
Chemicals used for ice and snow removal and dust control can collect on the underbody. If these are not removed, accelerated corrosion (rust) can occur on the underbody parts such as fuel lines, frame, floor pan and exhaust system even though they have corrosion protection.

At least every spring, flush these materials from the underbody with plain water. Clean any areas where mud and other debris can collect. Dirt packed in closed areas of the frame should be loosened before being flushed. Your dealer or an underbody vehicle washing system can do this for you.

NOTE: Allow vehicle to properly air dry after flushing procedure has been completed. This is particularly important before storage.

VEHICLE IDENTIFICATION NUMBER (VIN)

This is the legal identifier for your vehicle. It appears on the radiator support panel. The VIN also appears on the Vehicle Certification and Service Parts labels and the certificates of title and registration.



Engine Identification

The 8th character in your VIN is the engine code. This code will help you identify your engine, specifications and replacement parts.

SERVICE PARTS IDENTIFICATION (SPID) LABEL

You will find this label somewhere on your vehicle — final label location is determined by the body manufacturer. However, a good place to look for the label is on the right front inside hood or engine access panel. It's very helpful if you ever need to order parts. On this label is:

- your VIN,
- the model designation,
- a list of all production options and special equipment.

BE SURE THAT THIS LABEL IS NOT REMOVED FROM THE VEHICLE.

ELECTRICAL SYSTEM

Add-On Electrical Equipment

NOTICE

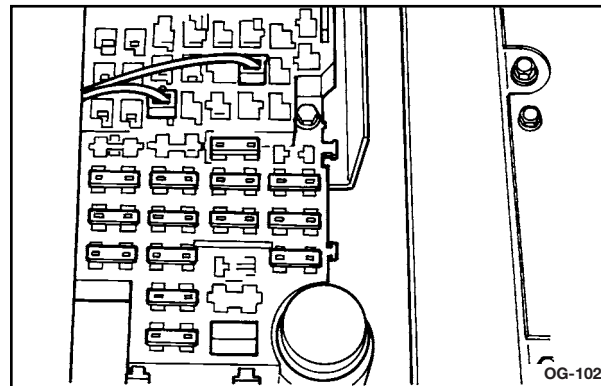
Do not add anything electrical to your vehicle unless you check with your dealer first. Some electrical equipment can damage your vehicle and the damage would not be covered by your warranty. Some add-on electrical equipment can keep other components from working as they should.

Fuses and Circuit Breakers

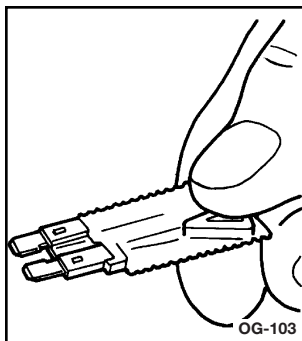
The wiring circuits in your vehicle are protected from short circuits by a combination of fuses, circuit breakers and fusible thermal links in the wiring itself. This greatly reduces the chance of fires caused by electrical problems.

Fuse Block

The fuse block is mounted by the body manufacturer.



Only 4.3L, 5.7L Gas and 6.5L Diesel Engines

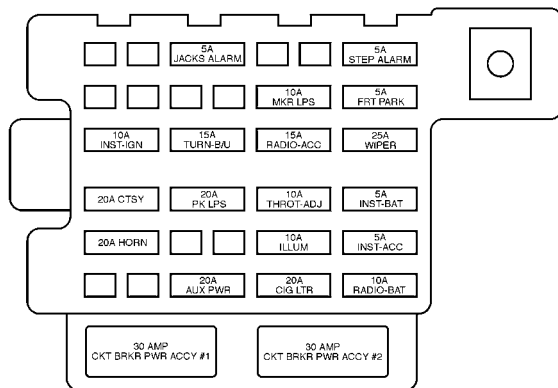


You can remove fuses with a fuse extractor.

Be sure to use the correct fuse. If you ever have a problem on the road and do not have a spare fuse, you can borrow one of the correct value. Just pick some feature of your vehicle that you can get along without and use its fuse. Replace it as soon as you can. (See “Fuses and Circuit Breakers” in the Index).

Fuses and Circuit Breakers — W22 / W24 / FE20 Motor Home

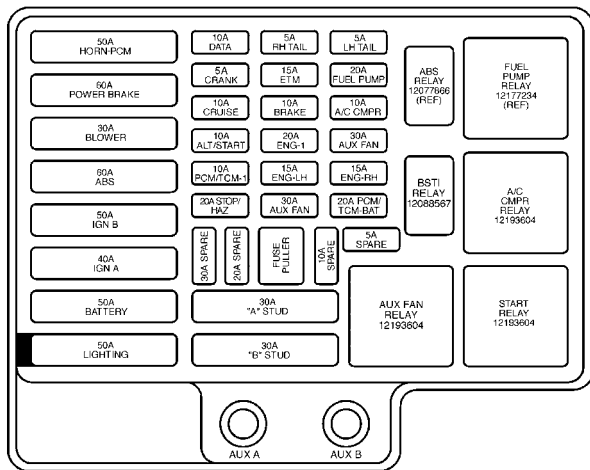
Name	Circuits Protected
HORN	Horn Relay
CTSY	Dome & Courtesy Lamps (Body Builder)
INST — IGN	DRL Relay, DRL Control Module, Cluster, Audio Alarm, Check Tire
AUX PWR	Body Builder



Internal Fuse Block

WRK720-010

Name	Circuits Protected
PK LPS	Headlamp Switch (Park, Marker and Tail Lamps)
TURN — B/U	Turn Signal Switch, Park/Neutral Position & B/U Lamps
JACKS ALARM	Jacks Alarm
CIG LTR	Cigarette Lighter (Body Builder)
ILLUM	Instrument Panel Cluster, Audio Alarm, Body Builder Feed
RADIO — ACC MKR LPS	Body Builder Radio License Lamps, Body Builder Marker Lamps
RADIO — BAT	Body Builder Radio
WIPER	Body Builder Wipers
FRT PARK	Front Park Lamps
STEP ALARM	Step Alarm
PWR ACCY #1	Body Builder
PWR ACCY #2	Body Builder
INST — BAT	Cluster, Check Tire
INST — ACC	Cluster
THROT — ADJ	Throttle Adjust



External Fuse Block

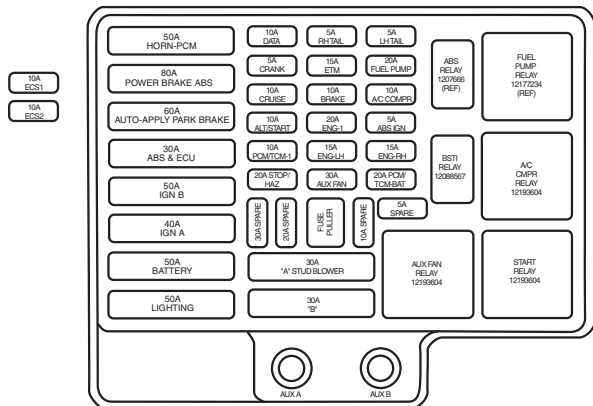
WRK720-011

Fuses and Circuit Breakers — W22 Motor Home

Name	Circuits Protected
PCM/TCM — BAT	Powertrain Control Module, Transmission Control Module
AUX FAN	Auxiliary Fan
STOP/HAZ	ABS Brake Switch, Turn Signal Switch
ENG — RH	Cylinder 2,4,6,8 Injectors and Coils
ENG — LH	Cylinder 1,3,5,7 Injectors and Coils
PCM/TCM — 1	Powertrain Control Module, Transmission Control Module
ENG -1	EVAP Canister Sol, Mass Air, Oxygen Sensors
ALT/START	Alternator, Park/Neutral Position & B/U Lamps
A/C CMPR	A/C Compressor Relay

Name	Circuits Protected	Name	Circuits Protected
BRAKE	ABS Module, ABS Brake Switch	LIGHTING	I/P External Fuseblock, Headlamp Switch, Data Link Fuse (Eng)
CRUISE	Cruise Control Switch	BATTERY	I/P External Fuse Block, Stop/Hazard Fuse (Eng)
FUEL PMP	Fuel Pump Relay	IGN A	Ignition Switch Starter Relay
ETM	Electronic Throttle Module	IGN B	Ignition Switch
CRANK	Crank Request to PCM	ABS	ABS Module
LH TAIL	LH Tail Lamps	Blower	HVAC Blower
RH TAIL	RH Tail Lamps	PWR BRK	Power Brake
DATA	Data Link	Horn — PCM	Eng Fuse Block, Horn Fuse (I/P External)
“B” STUD	Body Builder		
“A” STUD	Body Builder		

Fuses and Circuit Breakers - W24 Motor Home / FE20 Shuttle Bus with ECS and Auto Apply Park Brake Options



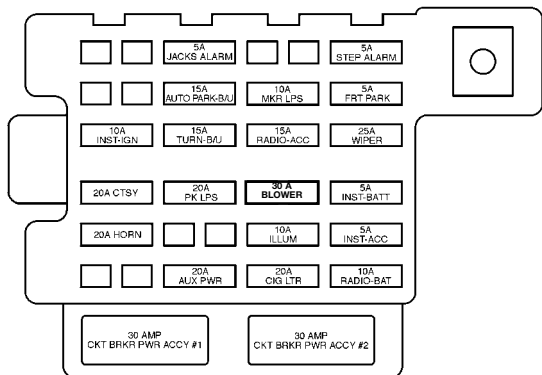
External Fuse Block

Name	Circuits Protected
PCM/TCM –	Powertrain Control Module
BAT	Transmission Control Module
AUX FAN	Auxiliary Fan
STOP/HAZ	ABS Brake Switch, Turn Signal Switch
ENG – RH	Cylinder 2,4,6,8 Injectors and Coils
ENG – LH	Cylinder 1,3,5,7 Injectors and Coils
PCM/TCM – 1	powertrain Control Module, Transmission Control Module Auto Apply Park Brake
ENG – 1	EVAP Canister Sol, Mass Air, Oxygen Sensors
ALT/START	Alternator, park/neutral Position & B/U Lamps
A/C CMPR	A/C Compressor Relay

Name	Circuits Protected	Name	Circuits Protected
BRAKE	ABS Module, ABS Brake Switch	LIGHTING	I/P External Fuseblock Headlamp Switch, Data Link Fuse (Eng)
CRUISE	Cruise Control Switch	IGN A	Ignition Switch Starter Relay
FUEL PMP	Fuel Pump Relay	IGN B	Ignition Switch
ETM	Electronic Throttle Module	ABS IGN	ABS Module
CRANK	Crank Request to PCM	PWR BRK/ABS	Power Brake and ABS
LH TAIL	LH Tail Lamps	HORN – PCM	Eng Fuse Block, Horn Fuse (I/P External)
RH TAIL	RH Tail Lamps	ABS & ECU	Electronic Control Unit J72 Brake Module
DATA	Data Link	AUTO-APPLY P/B	Auto Apply Module, Pump and Motor
“B” STUD	Body Builder	ECS1 & 2	Electronic Control Transmission Shifter
“A” STUD	Body Builder/Blower		

Fuses and Circuit Breakers — P32 Motor Home with Auto-Apply Park Brake

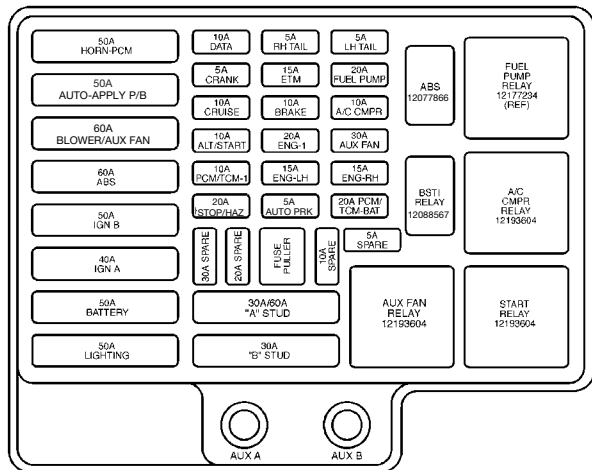
Name	Circuits Protected
HORN	Horn Relay
CTSY	Dome & Courtesy Lamps (Body Builder)
INST — IGN	DRL Relay, DRL Control Module Cluster, Audio Alarm, Check Tire
AUX PWR	Body Builder



Internal Fuse Block

WRK720-009

Name	Circuits Protected
PK LPS	Headlamp Switch (Park, Marker and Tail Lamps)
TURN — B/U Lamps	Turn Signal Switch, & B/U
JACKS ALARM	Jacks Alarm
CIG LTR	Cigarette Lighter (Body Builder)
ILLUM	Instrument Panel Cluster, Audio Alarm, Body Builder Feed
RADIO — ACC	Body Builder Radio
MKR LPS	License Lamps, Body Builder Marker Lamps
RADIO — BAT	Body Builder Radio
WIPER	Body Builder Wipers
FRT PARK	Front Park Lamps
STEP ALARM	Step Alarm
CKT BRKR PWR ACCY #1	Body Builder
CKT BRKR PWR ACCY #2	Body Builder
INST — BAT	Cluster, Check Tire
INST — ACC	Cluster
AUTO PARK — B/U	Auto Park Brake, Park/Neutral Positions, B/U Lamps



WRK720-007

External Fuse Block

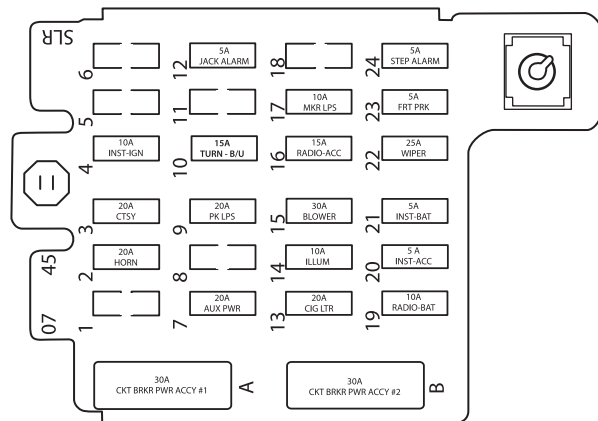
Fuses and Circuit Breakers — P32 Motor Home with Auto-Apply Park Brake

Name	Circuits Protected
PCM/TCM — BAT	Powertrain Control Module, Transmission Control Module
STOP/HAZ	ABS Brake Switch, and Turn Signal Switch
ENG — RH	Cylinder 2,4,6,8 Injectors and Coils
ENG — LH	Cylinder 1,3,5,7 Injectors and Coils
PCM/TCM — 1	Powertrain Control Module, Transmission Control Module
AUX FAN	Auxiliary Fan
ENG — 1	EVAP Canister Solenoid, Mass Air Sensor, Oxygen Sensor
ALT/START	Alternator, Park/Neutral Position & B/U Lamps
A/C CMPR	A/C Compressor Relay

Continued

Name	Circuits Protected	Name	Circuits Protected
BRAKE	ABS Module, ABS Brake Switch	LIGHTING	I/P External Fuseblock, Headlamp Switch, Data Link Fuse (Eng)
CRUISE	Cruise Control Switch		
FUEL PMP	Fuel Pump Relay	BATTERY	I/P External Fuse Block, Stop/Hazard Fuse (Eng)
ETM	Electronic Throttle Module	IGN A	Ignition Switch Starter Relay
CRANK	Crank Request to PCM	IGN B	Ignition Switch
LH TAIL	LH Tail Lamps		
RH TAIL	RH Tail Lamps		
DATA	Data Link	ABS	ABS Module
“B” STUD	Body Builder	BLOWER/AUX FAN	HVAC Blower and Auxiliary Fan
“A” STUD	Body Builder	PWR BRK	Auxiliary Fan
		HORN — PCM	Engine Fuse Block, Horn Fuse (I/P External)
		AUTO APPLY P/B	Park Brake Module, Pump and Motor
		AUTO PRK	Body Builder Interface

Fuses and Circuit Breakers P32 without Auto Apply Park Brake

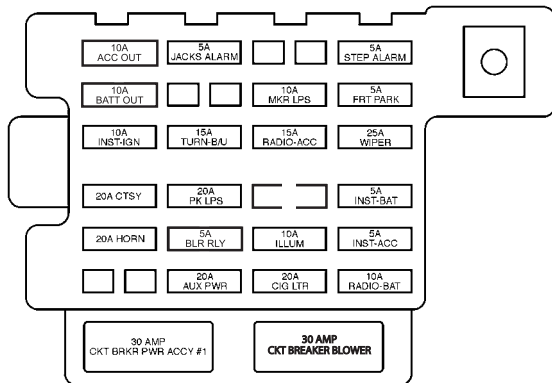


Name	Circuits Protected
HORN	Horn Relay
CTSY	Dome & Courtesy Lamps (Body Builder)
INST-IGN	DRL Relay, DRL Control Module Cluster, Audio Alarm

AUX PWR	Body Builder
PK LPS	Headlamp Switch (Park, Marker, & Tail Lamps)
TURN-B/U	Turn Signal Switch & Back Up Lamps
JACK ALARM	Jack Alarm
CIG LTR	Cigarette Lighter (Body Builder)
ILLUM	Instrument Panel (I/P) Cluster, Audio Alarm, Body Builder Feed
BLOWER	HVAC Blower
RADIO-ACC	Body Builder Radio
MKR LPS	License Lamps, Body Builder Marker Lamps
RADIO-BAT	Body Builder Radio Cluster
INST-ACC	Cluster
INST-BAT	Cluster
WIPER	Body Builder Wiper
FRT PARK	Front Park Lamps
STEP ALARM	Step Alarm
CKT BRKR PWR ACCY #1	Body Builder
CKT BRKR PWR ACCY #2	Body Builder

Fuses and Circuit Breakers — P42 Commercial 4.8L and 6.0L

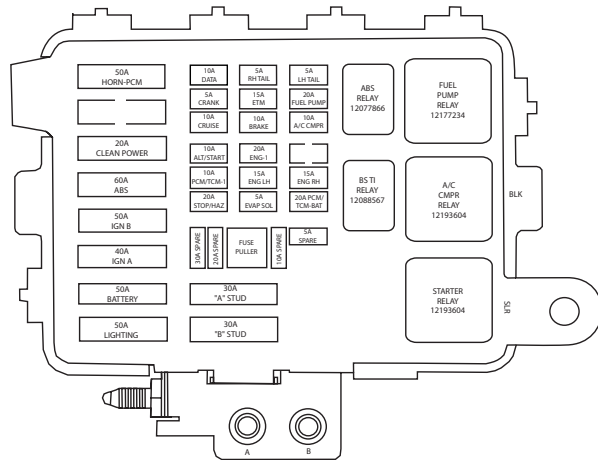
Name	Circuits Protected
HORN	Horn Relay
CTSY	Dome & Courtesy Lamps (Body Builder)
INST — IGN	DRL Relay, DRL Control Module, Cluster, Audio Alarm, Check Tire
AUX PWR	Body Builder



Internal Fuse Block

WRK720-010

Name	Circuits Protected
PK LPS	Headlamp Switch (Park, Marker and Tail Lamps)
TURN — B/U	Turn Signal Switch, Park/Neutral Position & B/U Lamps
JACKS ALARM	Jacks Alarm
CIG LTR	Cigarette Lighter (Body Builder)
ILLUM	Instrument Panel Cluster, Audio Alarm, Body Builder Feed
RADIO — ACC MKR LPS	Body Builder Radio License Lamps, Body Builder Marker Lamps
RADIO — BAT	Body Builder Radio
WIPER	Body Builder Wipers
FRT PARK	Front Park Lamps
STEP ALARM	Step Alarm
CKT BRKR PWR ACCY #1	Body Builder
INST — BAT	Cluster, Check Tire
INST — ACC	Cluster
ACC OUT	Accessory Out in Convenience Center
BATT OUT	Battery out in Convenience Center
BLR RLY	Blower Relay
BLOWER	HVAC Blower

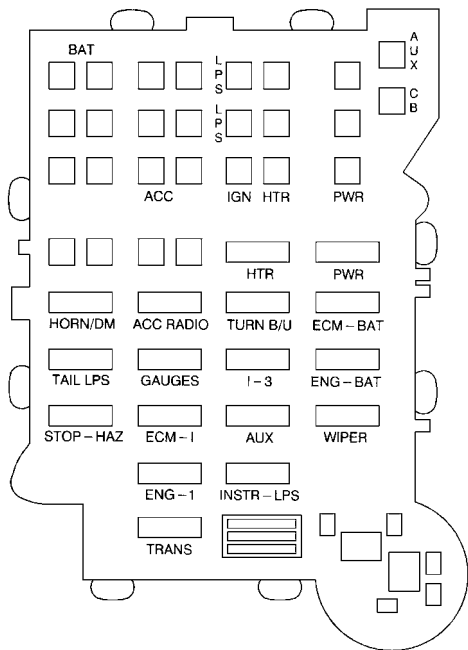


External Fuse Box

**Fuses and Circuit Breakers—P42 Commercial
4.8L and 6.0L**

Name	Circuits Protected
PCM/TCM – BAT	Powertrain Control Module, Transmission Control Module
STOP/HAZ	ABS Brake Switch Turn Sign Switch Audio Alarm
ENG – RH	Cylinder 2,4,6,8, Injectors and Coils
ENG – LH	Cylinder 1,3,5,7 Injectors and Coils
PCM/TCM – 1	Powertrain Control Module, Transmission Control Module
AUX FAN	Auxiliary Fan
ENG – 1	EVAP Canister Sol, Mass Air Oxygen Sensors
ALT/START	Alternator, Park/Neutral Position ¶ B/U Lamps
A/C CMPR	A/C Compressor Relay
CLEAN POWER	Clean Power Provisions
EVAP SOL	Evaporative Emissions Solenoid

Name	Circuits Protected	Name	Circuits Protected
BRAKE	ABS Module ABS Brake Switch	LIGHTING	I/P External Fuseblock, Headlamp Switch, Data Link Fuse (Eng)
CRUISE	Cruise Control Switch	BATTERY	I/P External Fuse Block, Stop/Hazard Fuse (Eng)
FUEL PMP	Fuel Pump Relay	IGN A	Ignition Switch Starter Relay
ETM	Electronic Throttle Module	IGN B	Ignition Switch
CRANK	Crank Request to PCM	ABS	ABS Module
LH TAIL	LH Tail Lamps	BLOWER	HVAC Blower
RH TAIL	RH Tail Lamps	PWR BRK	Power Brake
DATA	Data Link	HORN – PCM	Eng. Fuse Block Horn Fuse (I/P External)
“B” STUD	Body Builder		
“A” STUD	Body Builder		



Internal Fuse Block

OG-105

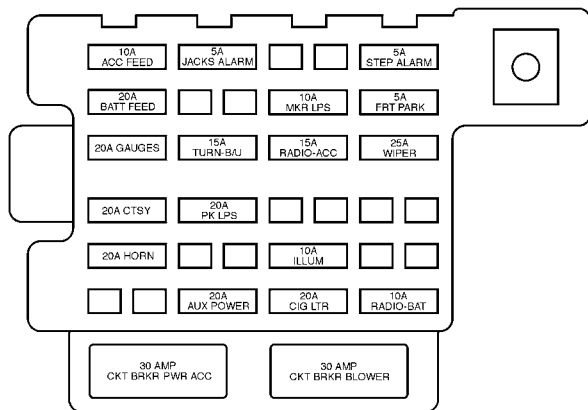
**Fuses and Circuit Breakers — P42 Commercial
(4.3L Gasoline Engine)**

Name	Circuits Protected
HTR	To Be Determined By Body Builder
PWR	To Be Determined By Body Builder
HORN/DM	Horn Relay, Dome Lamp, Audio Alarm
ACC RADIO	To Be Determined By Body Builder
TURN-B/U	Turn Signal Flasher, B/U Lamps
PARK/NEUTRAL	(Automatic and Manual)
ECM-BAT	Fuel Pump Relay, Engine Oil Pressure Indicator Sensor, Vehicle Control Module
TAIL LPS	Headlamp Switch, Park Brake Switch/Alarm/Indicator Lamp
GAUGES	Daytime Running Lamps Relay, Daytime Running Lamps Control Module, Air Conditioner Compressor Relay, Instrument Panel Cluster, Audio Alarm, Alternator, Body Builder Ignition

Name	Circuits Protected	Name	Circuits Protected
I-3	Vehicle Control Module, Stop Lamp/TCC Switch, ABS Module, Engine Alarm	AUX	To Be Determined By Body Builder
ENG-BAT	Air Conditioner Compressor Relay, Data Link	WIPER	Body Builder Windshield Wiper System
STOP-HAZ	Hazard Lamp Flasher, Stop Lamp Switch	ENG-1	Heated Oxygen Sensors, Secondary Oxygen Sensors, Mass Air Flow Sensor, Camshaft Position Sensor, Evaporative Emissions Canister, Purge Valve Solenoid, Canister Vent Sensor, Fuel Heater, Water in Fuel Sensor, Glowplug Control, Fan Control Relay
ECM-1	Fuel Injectors, Ignition Coil, Electronic Ignition Control Module, Vehicle Control Module, Crankshaft Position Sensor, Instrument Panel Cluster, Powertrain Control	INSTR-LPS	Audio Alarm, PRNDL Lamp, Instrument Panel Cluster, Body Builder Instrument Lamps
Module,	Vehicle Speed Sensor Calibrator, Engine Control Harness, Fuel Injector Pump Shutoff Solenoid, Transmission Control Module, Fuel Pump Relay	TRANS	Transmission

Fuses and Circuit Breakers — P42 Commercial (with 3.9L Cummins Diesel Engine)

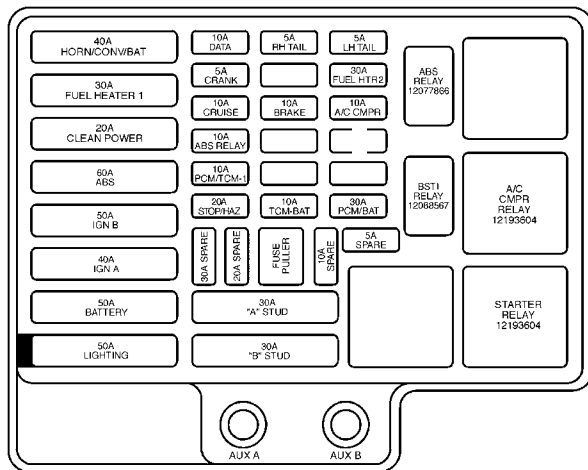
Name	Circuits Protected
HORN	Horn Relay
CTSY	Dome & Courtesy Lamps (Body Builder)
GAGES	DRL Relay, DRL Control Module, Cluster, Audio Alarm



Internal Fuse Block

WRK77901

Name	Circuits Protected
BATT FEED	Body Builder Battery Feed
ACC FEED	Body Builder Accessory Feed
AUX PWR	Body Builder, Cluster Power
PK LPS	Headlamp Switch (Park, Marker and Tail Lamps)
TURN — B/U	Turn Signal Switch, Park/Neutral Position & B/U Lamp Switch
JACKS ALARM	Jacks Alarm
CIG LTR	Cigarette Lighter (Body Builder)
ILLUM	Instrument Panel Cluster, Audio Alarm, Body Builder Feed
RADIO — ACC	Body Builder Radio
MKR LPS	License Lamps, Body Builder Marker Lamps
RADIO — BAT	Body Builder Radio
WIPER	Body Builder Wipers
FRT PARK	Front Park Lamps
STEP ALARM	Step Alarm
BLOWER	Body Builder Blower
PWR ACC	Body Builder



External Fuse Block

Fuses and Circuit Breakers — P42 Commercial (with 3.9L Cummins Diesel Engine)

Name	Circuits Protected
PCM — BAT	Powertrain Control Module
TCM — BAT	Transmission Control Module
STOP/HAZ	ABS Brake Switch, Turn Signal Switch, Audio Alarm
PCM/TCM — 1	Powertrain Control Module, Transmission Control Module
ABS RELAY	Anti-Lock Brake System
A/C CMPR	A/C Compressor Relay
BRAKE	ABS Module, ABS Brake Switch
CRUISE	Cruise Control Switch
CRANK	Crank Request to PCM
LH TAIL	LH Tail Lamps
RH TAIL	RH Tail Lamps
DATA	Data Link
“B” STUD	Body Builder

81304001

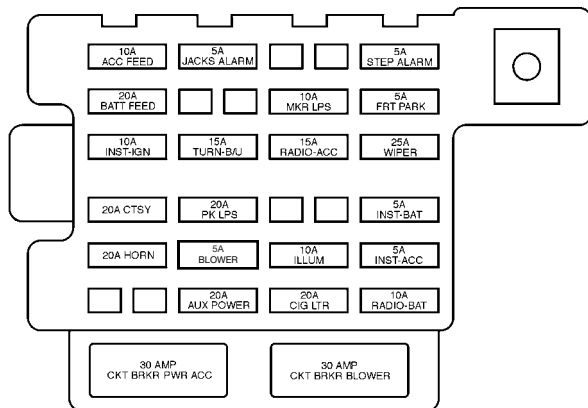
Continued

Name	Circuits Protected	Name	Circuits Protected
"A" STUD	Body Builder	IGN B	Ignition Switch
LIGHTING	I/P External Fuseblock, Headlamp Switch, Data Link Fuse (Eng)	ABS	ABS Module
BATTERY	I/P External Fuse Block, Stop/Hazard Fuse (Eng)	CLEAN POWER	Clean Power
IGN A	Ignition Switch Starter Relay	HORN/CONV/BAT	Eng Fuse Block, Horn Fuse (I/P External)
		FUEL HEATER 1	Fuel Heater Number 1
		FUEL HEATER 2	Fuel Heater Number 2

Fuses and Circuit Breakers — W52 Commercial

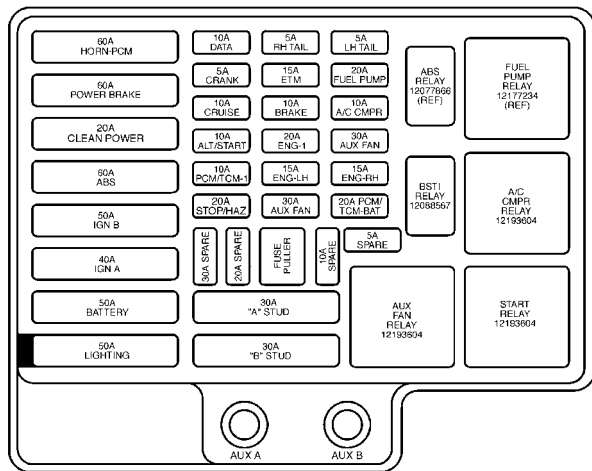
Name	Circuits Protected
HORN	Horn Relay
CTSY	Dome & Courtesy Lamps (Body Builder)
INST — IGN	DRL Relay, DRL Control Module, Cluster, Audio Alarm, Check Tire
BATT FEED	Body Builder Battery Feed

Name	Circuits Protected
ACC FEED	Body Builder Accessory Feed
AUX PWR	Body Builder
PK LPS	Headlamp Switch (Park, Marker and Tail Lamps)
TURN — B/U	Turn Signal Switch, Park/Neutral Position & B/U Lamps
JACKS ALARM	Jacks Alarm
CIG LTR	Cigarette Lighter (Body Builder)
ILLUM	Instrument Panel Cluster, Audio Alarm, Body Builder Feed
RADIO — ACC MKR LPS	Body Builder Radio License Lamps, Body Builder Marker Lamps
RADIO — BAT WIPER	Body Builder Radio Body Builder Wipers
FRT PARK	Front Park Lamps
STEP ALARM	Step Alarm
BLOWER	Body Builder Blower
PWR ACC	Body Builder
INST — BAT	Cluster, Check Tire
INST — ACC	Cluster



Internal Fuse Block

81304002



External Fuse Block

WRK77902

Fuses and Circuit Breakers — W52 Commercial Name Circuits Protected

PCM/TCM — BAT	Powertrain Control Module, Transmission Control Module
AUX FAN	Auxiliary Fan
STOP/HAZ	ABS Brake Switch, Turn Signal Switch, Audio Alarm
ENG — RH	Cylinder 2,4,6,8 Injectors and Coils
ENG — LH	Cylinder 1,3,5,7 Injectors and Coils
PCM/TCM — 1	Powertrain Control Module, Transmission Control Module
AUX FAN	Auxiliary Fan
ENG -1	EVAP Canister Sol, Mass Air, Oxygen Sensors
ALT/START	Alternator, Park/Neutral Position & B/U Lamps
A/C CMPR	A/C Compressor Relay

Name	Circuits Protected	Name	Circuits Protected
BRAKE	ABS Module, ABS Brake Switch	LIGHTING	I/P External Fuseblock, Headlamp Switch, Data Link Fuse (Eng)
CRUISE	Cruise Control Switch	BATTERY	I/P External Fuse Block, Stop/Hazard Fuse (Eng)
FUEL PMP	Fuel Pump Relay	IGN A	Ignition Switch Starter Relay
ETM	Electronic Throttle Module	IGN B	Ignition Switch
CRANK	Crank Request to PCM	ABS	ABS Module
LH TAIL	LH Tail Lamps	CLEAN POWER	Clean Power
RH TAIL	RH Tail Lamps	PWR BRK	Power Brake
DATA	Data Link	HORN — PCM	Eng Fuse Block, Horn Fuse (I/P External)
“B” STUD	Body Builder		
“A” STUD	Body Builder		

CAPACITIES AND SPECIFICATIONS

These specifications are for information only. If you have any questions, see the Service Manual for the chassis or refer to the body manufacturer's publications.

Engine Identification — Gasoline Engines

Engine Type	4.3L	4.8L	6.0L	8.1L V8
VIN Code	W	V	U	G
Fuel System	SCPI*	SPFI**	SPFI**	SPFI**

* Sequential Central Port Fuel Injection

** Sequential Port Fuel Injection

Engine Identification — Diesel Engines

Engine Type	3.9L L4	6.5L V8	6.5L V8
VIN Code	P	Y	F
Fuel System	EFI**	IEFI*	IEFI* Turbo

* Indirect Electronic Fuel Injection

** Electronic Fuel Injection

Crankcase Capacity

Engine	Quarts (Liters)
3.9L Cummins Diesel*	13.7 (13.0)
4.3L	4.5 (4.3)
4.8L	5.0 (4.7)
5.7L	5.0 (4.7)
6.0L	5.0 (4.7)
6.5L	8.0 (7.6)
8.1L	6.4 (6.0)

All quantities are approximate. After refill, the level MUST be checked. (See "Engine Oil and Filter Recommendations" in the Index).

*Refer to the Cummins Operation and Maintenance Manual, ISB (4 cylinder) and ISB^e (4 and 6 cylinder) Series Engines.

Fuel Tank Capacity

Model	Gallons(Liters)
Commercial	
— Standard, P42, W52	40 (151)
— Optional, P42 3.9L Cummins Diesel	30 (113)

P32 Motor Home

— Standard	40 (151)
— Optional	60 (227)
— Optional (178, 190, 208 or 228 inch wheel base)	75 (284)

W22/W24 Motor Home and

FE20 Shuttle Bus

— Standard	75 (284)
------------	----------

All above quantities are approximate.

Cooling System Capacity

Engine	Quarts (Liters)
3.9L Cummins Diesel*	19.0 (18.0)
4.3L	13.8 (13.1)
4.8L	24.7 (23.4)
6.0L	24.7 (23.4)
6.5L	
— P32	24.7 (23.4)
— P42 Commercial	25.0 (23.5)
8.1L	23.5 (22.2)

All quantities are approximate. After refill, the level MUST be checked. (See “Engine Cooling System” in the Index).

* Refer to the Cummins Operation and Maintenance Manual, ISB (4 cylinder) and ISB^e (4 and 6 cylinder) Series Engines.

Allison Transmission Fluid Capacity

	Quarts (Liters)
Standard Oil Pan	15.0 (14.0)
Dry	19.0 (18.0)

Includes the fluid capacity of the torque converter, transmission cooler lines and transmission oil cooler.)
Transmission oil pan/filter service (fluid) quantity is 9.0-9.5 quarts (8.5 - 9.0 Liters).

NOTICE

After a transmission fluid service, the fluid level must be checked several times on flat level ground to insure proper level.

Hydra-Matic 4L80-E / 4L85-E Fluid Capacity

	Quarts (Liters)
Standard Oil Pan	7.7 (7.3) (Oil pan removal)
Dry	13.5 (12.8) (Dry Transmission)

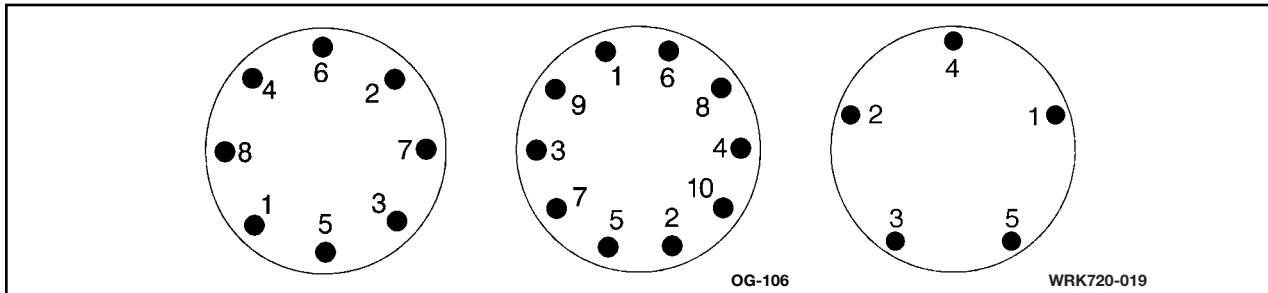
Service Replacement Part and Filter Recommendations

Replacement part numbers, listed in this section, are based on the latest information available at the time of printing and are subject to change. If a part listed in this manual is not the same as the part used in your vehicle when it was built, or if you have any questions, please contact your Workhorse dealer.

Engine — Gasoline	4.3L	4.8L	6.0L	8.1L
Spark Plug	W8000535	W8800465	W8800472	W8800473
— Gap	0.06in. (1.52mm)	0.06in. (1.52 mm)	0.06in. (1.52 mm)	0.06in. (1.52 mm)
Oil Filter	W8800480	W8800462	W8800470	W8800470
PCV Valve	W8800467	W8800463	W8800471	N/A
Air Cleaner Filter	W8800481	W8800464	W8800464	W8800464
Fuel Filter	W8800482	W0004996	W0004996	W0004996
Radiator Cap	W8800752	W8800752	W8800752	W8800752
Automatic Transmission — Allison				Allison Part #
Spin-On Fluid Filter	—	—	—	29537268

Service Replacement Part and Filter Recommendations (Continued)

Engine — Diesel	3.9L	6.5L (L65/L57)
Oil Filter	W8800475	W8800474
Air Cleaner Filter	W0001317	W8800464 (L65) W8800476 (L57)
Fuel Filter	W8000208	W8800477
Radiator Cap	W8800752	W8800752



Wheel Nut Torque

Model	GVW Range lbs.	(kg)	Number of Wheel Bolts	Torque lb-ft (N•m)
P42 Commercial	8,600 - 9,400	(3 901 - 4 264)	8	120 lb-ft (163 N•m)
P42 Commercial	10,000 - 11,000	(4 536 - 4 990)	8	140 lb-ft (190 N•m)
P42 Commercial	12,000 - 16,000	(5 443 - 7 258)	5 Front, 10 Rear	175 lb-ft (237 N•m)
P32 Motor Home	12,300	(5 579)	8	140 lb-ft (190 N•m)
P32 Motor Home	14,800 - 18,000	(6 713 - 8 165)	5 Front, 10 Rear	175 lb-ft (237 N•m)
W22 Motor Home	20,700 - 22,000	(9 390 - 9 979)	8	475 lb-ft (644 N•m)
W24 Motor Home	24,000	(10 886)	8	475 lb-ft (644 N•m)
W52 Commercial	19,500	(8845)	8	475 lb-ft (644 N•m)
FE20 Shuttle Bus	19,500	(8845)	8	475 lb ft (644 N•m)

Review the certification for the Gross Vehicle Weight Rating (GVWR) label, which is located on your vehicle.

Lamp and Bulb Data

Before replacing any bulbs, be sure that all lamps are off and the engine is not running.

We recommend that you use an AC-type bulb whenever you need to replace one.

Some exterior lamps are supplied by the body manufacturer. Consult the body manufacturer's information for light bulb use.

AIR CONDITIONING REFRIGERANTS

If the air conditioning system in your vehicle needs refrigerant, be sure the proper refrigerant is used. The proper refrigerant for your vehicle is R134A.

This section covers the maintenance required for your vehicle. Your vehicle needs these services to retain its safety, dependability and emission control performance.

Introduction	5-2	Long Trip Maintenance Checklist	
How This Section is Organized	5-3	Diesel Engines	5-64
Part A: Scheduled Maintenance Services	5-4	Maintenance Schedule —	
Short Trip/City - Long Trip/Highway Scheduled		Cummins ISB (4 Cylinder) and	
Maintenance — Gasoline Engines	5-5	ISB (4 and 6 Cylinder) Diesel Engines ..	5-82
Short Trip/City - Long Trip/Highway Scheduled		Part B: Owner Checks and Services	5-87
Maintenance — Diesel Engines	5-7	Part C: Periodic Maintenance Inspections ..	5-91
Short Trip Maintenance Checklist		Part D: Recommended Fluids and	
Gasoline Engines	5-11	Lubricants	5-93
Long Trip Maintenance Checklist		Part E: Maintenance Record	5-95
Gasoline Engines	5-29		
Short Trip Maintenance Checklist			
Diesel Engines	5-40		

INTRODUCTION

Your Vehicle and the Environment

Proper vehicle maintenance not only helps to keep your vehicle in good working condition, but also helps the environment. All recommended maintenance procedures are important. Improper vehicle maintenance can even affect the quality of the air we breath. Improper fluid levels or the wrong tire inflation can increase the level of emissions from your vehicle. To help protect our environment, and to keep your vehicle in good condition, please maintain your vehicle properly.

NOTICE

To help protect the environment, never dump or discard in the trash used engine oil or oil filters. Please return all used engine oil and oil filters to an approved collection center.

**IMPORTANT:
KEEP ENGINE OIL
AT THE PROPER
LEVEL AND CHANGE AS
RECOMMENDED**

OG-107

HOW THIS SECTION IS ORGANIZED

This maintenance schedule is divided into five parts:

Part A: Scheduled Maintenance Services shows what to have done and how often. Some of these services can be complex, so unless you are technically qualified and have the necessary equipment, you should let your dealer's service department or another qualified service center do these jobs.



CAUTION

Performing maintenance work on a vehicle can be dangerous. In trying to do some jobs, you can be seriously injured. Do your own maintenance work only if you have the required know-how and the proper tools and equipment for the job. If you have any doubt, have a qualified technician do the work.

If you are skilled enough to do some work on your vehicle, you will probably want to get the service information. (See "Service and Owner Publications" in the Index).

Part B: Owner Checks and Services tells you what should be checked and when. It also explains what you can easily do to help keep your vehicle in good condition.

Part C: Periodic Maintenance Inspections explains important inspections that your dealer's service department or another qualified service center should perform.

Part D: Recommended Fluids and Lubricants lists some recommended products to help keep your vehicle properly maintained. These products, or their equivalents, should be used whether you do the work yourself or have it done.

Part E: Maintenance Record provides a place for you to record the maintenance performed on your vehicle. Whenever any maintenance is performed, be sure to write it down in this part. This will help you determine when your next maintenance should be done. In addition, it is a good idea to keep your maintenance receipts. They may be needed to qualify your vehicle for warranty repairs.

PART A: SCHEDULED MAINTENANCE SERVICES

Using Your Maintenance Schedule

We at Workhorse want to help you keep your vehicle in good working condition. But, we do not exactly know how you will drive it. You may drive very short distances only a few times a week. Or you may drive long distances all the time in very hot, dusty weather. You may use your vehicle in making deliveries. Or you may drive it to work, to do errands or in many other ways.

Because of all the different ways people use their vehicles, maintenance requirements vary. You may need more frequent checks and replacements. Please read the following and note how you drive. If you have any questions on how to keep your vehicle in good condition, see your dealer.

This part tells you the maintenance services you should have done and when you should schedule them. If you go to your dealer for your service needs, you will know that trained service people will perform the work using genuine Workhorse replacement parts.

The proper fluids and lubricants to use are listed in Part D, of this section. Make sure whoever services your

vehicle uses the recommended fluids and lubricants. All parts should be replaced and all necessary repairs done before you or anyone else drives the vehicle.

These schedules are for vehicles which:

- carry passengers and cargo within recommended limits. You will find these limits on your vehicle's Certification/Tire Label. (See "Loading Your Vehicle" in the Index).
- are driven on reasonable road surfaces within legal driving limits.
- use the recommended fuel. (See "Fuel" in the Index).

If your vehicle has an Allison transmission, see your Allison Automatic Transmission Operator's Manual for scheduled maintenance.

Selecting the Right Schedule

First you will need to decide which of the two schedules is right for your vehicle. Here is how to decide which schedule to follow:

- Gasoline engine vehicles and diesel engine vehicles have different maintenance requirements. If you have a diesel engine, follow a schedule designated for diesel engine vehicles only.

Short Trip/City Definition — Gasoline Engines

Follow the Short Trip/City Scheduled Maintenance if any one of these conditions is true for your vehicle:

- Most trips are less than 5 to 10 miles (8 to 16 km). This is particularly important when outside temperatures are below freezing.
- Most trips include extensive idling (such as frequent driving in stop-and-go traffic).
- Most trips are through dusty areas.
- If the vehicle is used for delivery service, commercial or RV/motorhome application.

One of the reasons you should follow this schedule if you operate your vehicle under any of these conditions is these conditions cause engine oil to break down sooner.

Every 3,000 Miles (5 000 km): Engine Oil and Filter Change (or 3 months, whichever occurs first). Chassis Lubrication (or 3 months, whichever occurs first). Drive Axle Service (or 3 months, whichever occurs first).

Short Trip/City Intervals — Gasoline Engines

At 3,000 Miles (5 000 km) and 30,000 Miles (48 000km) – Then Every 30,000 Miles (48 000 km): Inspect/adjust auto apply parking brake system (if equipped).

Every 6,000 Miles (10 000 km): Tire Rotation.

Every 15,000 Miles (25 000 km): Air Cleaner Filter Inspection, if driving in dusty conditions. Shields and Underhood Insulation Inspection. Front Wheel Bearing Repack (or at each brake relining, whichever occurs first).

Every 30,000 Miles (50 000 km): Air Cleaner Filter Replacement. Fuel Filter Replacement.

Every 50,000 Miles (83 000 km): Automatic Transmission Service.

Every 60,000 Miles (100 000 km): Engine Accessory Drive Belt Inspection. Fuel Tank, Cap and Lines Inspection. Exhaust Gas Recirculation System Inspection. Evaporative Control System Inspection.

Short Trip/City Intervals — Gasoline Engines

Every 100,000 Miles (166 000 km): Spark Plug Wire Inspection. Spark Plug Replacement. Positive Crankcase Ventilation (PCV) Valve Inspection.

Every 150,000 Miles (240 000 km): Cooling System Service (or every 60 months, whichever occurs first).

These intervals only summarize maintenance services. Be sure to follow the complete scheduled maintenance on the following pages.

Long Trip/Highway Definition — Gasoline Engines

Follow this scheduled maintenance *only* if none of the conditions from the Short Trip/City Scheduled Maintenance is true. Do not use this schedule if the vehicle is used for trailer towing, driven in a dusty area or used off paved roads. Use the Short Trip/City schedule for these conditions.

Driving a vehicle with a fully warmed engine under highway conditions causes engine oil to break down slower.

Long Trip/Highway Intervals — Gasoline Engines

NOTICE

Change engine oil and filter at the first 3,000 mile (5 000 km) interval to ensure contaminants/metal (from the break-in period) have been removed. This needs to be followed for either the Long or Short schedule.

At 5,000 Miles (8 000 km) and 30,000 Miles (48 000km) – Then Every 30,000 Miles (48 000 km): Inspect/adjust Auto-Apply parking brake system (if equipped).

Every 7,500 Miles (12 500 km): Engine Oil and Filter Change (or every 6 months, whichever occurs first). Chassis Lubrication (or every 12 months, whichever occurs first). Drive Axle Service. Tire Rotation.

Every 15,000 Miles (25 000 km): Shields and Underhood Insulation Inspection.

Long Trip/Highway Intervals — Gasoline Engines

Every 30,000 Miles (50 000 km): Fuel Filter Replacement. Air Cleaner Filter Replacement. Front Wheel Bearing Repack (or at each brake relining, whichever occurs first).

Every 50,000 Miles (83 000 km): Automatic Transmission Service.

Every 60,000 Miles (100 000 km): Engine Accessory Drive Belt Inspection. Fuel Tank, Cap and Lines Inspection. Exhaust Gas Recirculation System Inspection. Evaporative Control System Inspection.

Every 100,000 Miles (166 000 km): Spark Plug Wire Inspection. Spark Plug Replacement. Positive Crankcase Ventilation (PCV) Valve Inspection.

Every 150,000 Miles (240 000 km): Cooling System Service (or every 60 months, whichever occurs first).

These intervals only summarize maintenance services. Be sure to follow the complete scheduled maintenance on the following pages.

Short Trip/City Definition — Diesel Engines

NOTE: For vehicles equipped with the 3.9L (Cummins ISB) engine refer to “Maintenance Schedule — Cummins ISB Diesel Engines”.

Follow the Short Trip/City Scheduled Maintenance if any one of these conditions is true for your vehicle:

- Most trips are less than 5 to 10 miles (8 to 16 km). This is particularly important when outside temperatures are below freezing.
- Most trips include extensive idling (such as frequent driving in stop-and-go traffic).
- You operate your vehicle in dusty areas or off-road frequently.
- You frequently tow a trailer with your vehicle.
- If the vehicle is used for delivery service, commercial or RV/motorhome application.

One of the reasons you should follow this schedule if you operate your vehicle under any of these conditions is these conditions cause engine oil to break down sooner.

Short Trip/City Intervals — Diesel Engines

Every 2,500 Miles (4 000 km): Engine Oil and Filter Change (or every 3 months, whichever occurs first). Chassis Lubrication (or every 3 months, whichever occurs first). Drive Axle Service.

At 5,000 Miles (8 000 km) and 30,000 Miles (48 000 km) — Then Every 30,000 Miles (48 000 km): Engine Idle Speed Adjustment (Engine Code Y only). Inspect and adjust Auto Apply parking brake system (if equipped).

Every 7,500 Miles (12 000 km): Tire Rotation. Inspect and adjust Auto-Apply parking brake system (if equipped).

Every 10,000 Miles (16 000 km): Shields and Underhood Insulation Inspection. Thermostatically Controlled Engine Cooling Fan Check (or every 12 months, whichever occurs first). Air Intake System Inspection.

Every 15,000 Miles (24 000 km): Air Cleaner Filter Inspection, if driving in dusty conditions. Front Wheel

Short Trip/City Intervals — Diesel Engines

Bearing Repack (or at each brake relining).

Every 25,000 Miles (40 000 km): Fuel Cap Replacement, if driving in dusty conditions.

Every 30,000 Miles (48 000 km): Air Cleaner Filter Replacement. Fuel Filter Replacement.

Every 50,000 Miles (80 000 km): Automatic Transmission Service.

Every 60,000 Miles (96 000 km): Crankcase Depression Regulator Valve (CDRV) System Check (VIN Code Y engine only). Engine Accessory Drive Belt Inspection.

Every 150,000 Miles (240 000 km): Cooling System Service (or every 60 months, whichever occurs first).

These intervals only summarize maintenance services. Be sure to follow the complete scheduled maintenance on the following pages.

Long Trip/Highway Definition — Diesel Engines

NOTE: For vehicles equipped with the 3.9L (Cummins ISB) engine refer to “Maintenance Schedule — Cummins ISB Diesel Engines”.

Follow this scheduled maintenance only if none of the conditions from the Short Trip/City Scheduled Maintenance is true. Do not use this schedule if the vehicle is used for trailer towing, driven in a dusty area or used off paved roads. Use the “Short Trip/City Schedule” for these conditions.

Driving a vehicle with a fully warmed engine under highway conditions causes engine oil to break down slower.

Long Trip/Highway Intervals — Diesel Engines

Every 5,000 Miles (8 000 km): Engine Oil and Filter Change (or every 12 months, whichever occurs first). Chassis Lubrication (or every 12 months, whichever occurs first). Drive Axle Service.

Long Trip/Highway Intervals — Diesel Engines

At 5,000 Miles (8 000 km) and 30,000 Miles (48 000 km) — Then Every 30,000 Miles (48 000 km): Engine Idle Speed Adjustment (Engine Code Y only). Inspect and adjust Auto Apply parking brake system (if equipped).

At 5,000 Miles (8 000 km) — Then Every 10,000 Miles (16 000 km): Tire Rotation.

Every 10,000 Miles (16 000 km): Shields and Underhood Insulation Inspection. Air Intake System Inspection. Thermostatically Controlled Engine Cooling Fan Check (or every 12 months, whichever occurs first).

Every 30,000 Miles (48 000 km): Front Wheel Bearing Repack (or at each brake relining). Fuel Filter Replacement. Air Cleaner Filter Replacement.

Every 50,000 Miles (80 000 km): Automatic Transmission Service.

Every 60,000 Miles (96 000 km): Crankcase Depression Regulator Valve (CDRV) System

Inspection (VIN Code Y engine only). Engine Accessory Drive Belt Inspection.

Every 150,000 Miles (240 000 km): Cooling System Service (or every 60 months, whichever occurs first).

These intervals only summarize maintenance services. Be sure to follow the complete scheduled maintenance on the following pages.

The services shown in this schedule up to 100,000 miles (166 000 km) should be performed after 100,000 miles (166 000 km) at the same intervals. The services shown at 150,000 miles (240 000 km) should be performed at the same interval after 150,000 miles (240 000 km). (See “Owner Checks and Services” and “Periodic Maintenance Inspections” later in this section).

Footnotes

† The U.S. Environmental Protection Agency or the California Air Resources Board has determined that the failure to perform this maintenance item will not nullify the emission warranty or limit recall liability prior to the completion of the vehicle’s useful life. We, however, urge to have all recommended maintenance services

be performed at the indicated intervals and the maintenance be recorded.

Lubricate the front suspension, kingpin bushings, steering linkage, automatic transmission shift linkage, parking brake cable guides, propshaft splines, universal joints, brake pedal springs, front wheel bearings and auto-apply park brake cam and linkage.

+ A good time to check your brakes is during tire rotation. (See “Brake System Inspection” under “Periodic Maintenance Inspections” in this section).

** Drive axle service (see “Recommended Fluids and Lubricants” in the Index for proper lubricant to use):

- Standard Differential — Check fluid level and add fluid as needed at every oil change. If driving in dusty areas or towing a trailer, drain fluid and refill every 15,000 miles (25 000 km).
- More frequent lubrication may be required for heavy duty use.
- Dana 70/80/S135 Series — Check fluid level and add fluid as needed at every oil change. If driving in dusty, sandy or wet conditions or towing a trailer, change lubricant every 25,000 miles (42 000 km) or 6 months (whichever occurs first).

Short Trip / City Scheduled Maintenance — Gasoline Engines

3,000 Miles (5 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first).
An Emission Control Service.
- Lubricate chassis components (or every 3 months, whichever occurs first).
(See footnote #.)
- Check axle fluid level and add fluid as needed. (See footnote **)
- Inspect/adjust auto apply parking brake system (if equipped).

DATE	
ACTUAL MILEAGE	SERVICED BY:

6,000 Miles (10 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first).
An Emission Control Service.
- Lubricate chassis components (or every 3 months, whichever occurs first).
(See footnote #.)
- Check axle fluid level and add fluid as needed. (See footnote **.)
- Rotate tires. See “Tire Inspection and Rotation” in the Index for proper rotation pattern and additional information. (See footnote +.)

DATE	
ACTUAL MILEAGE	SERVICED BY:

9,000 Miles (15 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first).
An Emission Control Service.

DATE	
ACTUAL MILEAGE	SERVICED BY:

Short Trip / City Scheduled Maintenance — Gasoline Engines

9,000 Miles (15 000 km) Continued

- Lubricate chassis components (or every 3 months, whichever occurs first).
(See footnote #.)
- Check axle fluid level and add fluid as needed, (See footnote **.)

12,000 Miles (20 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first).
An Emission Control Service.
- Lubricate chassis components (or every 3 months, whichever occurs first).
(See footnote #.)
- Check axle fluid level and add fluid as needed. (See footnote **.)
- Rotate tires. See "Tire Inspection and Rotation" in the Index for proper rotation pattern and additional information. (See footnote +.)

DATE	
ACTUAL MILEAGE	SERVICED BY:

15,000 Miles (25 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first).
An Emission Control Service.
- Lubricate chassis components (or every 3 months, whichever occurs first).
(See footnote #.)

DATE	
ACTUAL MILEAGE	SERVICED BY:

Short Trip / City Scheduled Maintenance — Gasoline Engines

15,000 Miles (25 000 km) Continued

- Inspect air cleaner filter if you are driving in dusty conditions. Replace filter if necessary.
An Emission Control Service.
- Check axle fluid level and add fluid as needed. (See footnote **.)
- Clean and repack the front wheel bearings (or at each brake relining, whichever occurs first).
- Inspect shields and underhood insulation for damage or looseness. Adjust or replace as required.
This is a Noise Emission Control Service. Applicable only to vehicles sold in the United States.

18,000 Miles (30 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first).
An Emission Control Service.
- Lubricate chassis components (or every 3 months, whichever occurs first).
(See footnote #.)
- Check axle fluid level and add fluid as needed. (See footnote **.)
- Rotate tires. See “Tire Inspection and Rotation” in the Index for proper rotation pattern and additional information. (See footnote +.)

DATE	
ACTUAL MILEAGE	SERVICED BY:

Short Trip / City Scheduled Maintenance — Gasoline Engines

21,000 Miles (35 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first).
An Emission Control Service.
- Lubricate chassis components (or every 3 months, whichever occurs first).
(See footnote #.)
- Check axle fluid level and add fluid as needed. (See footnote **.)

DATE	
ACTUAL MILEAGE	SERVICED BY:

24,000 Miles (40 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first).
An Emission Control Service.
- Lubricate chassis components (or every 3 months, whichever occurs first).
(See footnote #.)
- Check axle fluid level and add fluid as needed. (See footnote **.)
- Rotate tires. See "Tire Inspection and Rotation" in the Index for proper rotation pattern and additional information. (See footnote +.)

DATE	
ACTUAL MILEAGE	SERVICED BY:

27,000 Miles (45 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first).
An Emission Control Service.

DATE	
ACTUAL MILEAGE	SERVICED BY:

Short Trip / City Scheduled Maintenance — Gasoline Engines

27,000 Miles (45 000 km) Continued

- Lubricate chassis components (or every 3 months, whichever occurs first).
(See footnote #.)
- Check axle fluid level and add fluid as needed. (See footnote **.)

30,000 Miles (50 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first).
An Emission Control Service.
- Lubricate chassis components (or every 3 months, whichever occurs first).
(See footnote #.)
- Check axle fluid level and add fluid as needed. (See footnote **.)
- Clean and repack the front wheel bearings (or at each brake relining, whichever occurs first).
- Replace fuel filter.
An Emission Control Service.
- Replace air cleaner filter.
An Emission Control Service.
- Inspect shields and underhood insulation for damage or looseness. Adjust or replace as required.
This is a Noise Emission Control Service. Applicable only to vehicles sold in the United States.
- Inspect/adjust auto apply parking brake system. (if equipped)

DATE	
ACTUAL MILEAGE	SERVICED BY:

Short Trip / City Scheduled Maintenance — Gasoline Engines

30,000 Miles (50 000 km) Continued

- Rotate tires. See “Tire Inspection and Rotation” in the Index for proper rotation pattern and additional information. (See footnote +.)

33,000 Miles (55 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first).
An Emission Control Service.
- Lubricate chassis components (or every 3 months, whichever occurs first).
(See footnote #.)
- Check axle fluid level and add fluid as needed. (See footnote **.)

DATE	
ACTUAL MILEAGE	SERVICED BY:

36,000 Miles (60 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first).
An Emission Control Service.
- Lubricate chassis components (or every 3 months, whichever occurs first).
(See footnote #.)
- Rotate tires. See “Tire Inspection and Rotation” in the Index for proper rotation pattern and additional information. (See footnote +.)
- Check axle fluid level and add fluid as needed. (See footnote **.)

DATE	
ACTUAL MILEAGE	SERVICED BY:

Short Trip / City Scheduled Maintenance — Gasoline Engines

39,000 Miles (65 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first).
An Emission Control Service.
- Lubricate chassis components (or every 3 months, whichever occurs first).
(See footnote #.)
- Check axle fluid level and add fluid as needed. (See footnote **.)

DATE	
ACTUAL MILEAGE	SERVICED BY:

42,000 Miles (70 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first).
An Emission Control Service.
- Lubricate chassis components (or every 3 months, whichever occurs first).
(See footnote #.)
- Check axle fluid level and add fluid as needed. (See footnote **.)
- Rotate tires. See “Tire Inspection and Rotation” in the Index for proper rotation pattern and additional information. (See footnote +.)

DATE	
ACTUAL MILEAGE	SERVICED BY:

45,000 Miles (75 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first).
An Emission Control Service.

DATE	
ACTUAL MILEAGE	SERVICED BY:

Short Trip / City Scheduled Maintenance — Gasoline Engines

45,000 Miles (75 000 km) Continued

- Lubricate chassis components (or every 3 months, whichever occurs first).
(See footnote #.)
- Check axle fluid level and add fluid as needed. (See footnote **.)
- Clean and repack the front wheel bearings (or at each brake relining, whichever occurs first).
- Inspect air cleaner filter if you are driving in dusty conditions. Replace filter if necessary.
An Emission Control Service.
- Inspect shields and underhood insulation for damage or looseness. Adjust or replace as required.
This is a Noise Emission Control Service. Applicable only to vehicles sold in the United States.

48,000 Miles (80 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first).
An Emission Control Service.
- Lubricate chassis components (or every 3 months, whichever occurs first).
(See footnote #.)
- Check axle fluid level and add fluid as needed. (See footnote **.)
- Rotate tires. See “Tire Inspection and Rotation” in the Index for proper rotation pattern and additional information. (See footnote +.)

DATE	
ACTUAL MILEAGE	SERVICED BY:

Short Trip / City Scheduled Maintenance — Gasoline Engines

50,000 Miles (83 000 km)

- Change automatic transmission fluid and filter. Manual transmission fluid doesn't require change.

DATE	
ACTUAL MILEAGE	SERVICED BY:

51,000 Miles (85 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first). *An Emission Control Service.*
- Lubricate chassis components (or every 3 months, whichever occurs first). (See footnote #.)
- Check axle fluid level and add fluid as needed. (See footnote **.)

DATE	
ACTUAL MILEAGE	SERVICED BY:

54,000 Miles (90 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first). *An Emission Control Service.*
- Lubricate chassis components (or every 3 months, whichever occurs first). (See footnote #.)
- Check axle fluid level and add fluid as needed. (See footnote **.)
- Rotate tires. See "Tire Inspection and Rotation" in the Index for proper rotation pattern and additional information. (See footnote +.)

DATE	
ACTUAL MILEAGE	SERVICED BY:

Short Trip / City Scheduled Maintenance — Gasoline Engines

57,000 Miles (95 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first).
An Emission Control Service.
- Lubricate chassis components (or every 3 months, whichever occurs first).
(See footnote #.)
- Check axle fluid level and add fluid as needed. (See footnote **.)

DATE	
ACTUAL MILEAGE	SERVICED BY:

60,000 Miles (100 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first).
An Emission Control Service.
- Lubricate chassis components (or every 3 months, whichever occurs first).
(See footnote #.)
- Check axle fluid level and add fluid as needed. (See footnote **.)
- Clean and repack the front wheel bearings (or at each brake relining, whichever occurs first).
- Inspect shields and underhood insulation for damage or looseness. Adjust or replace as required.
This is a Noise Emission Control Service. Applicable only to vehicles sold in the United States.
- Inspect engine accessory drive belt.
An Emission Control Service.
- Inspect/adjust auto apply parking brake system. (if equipped)

DATE	
ACTUAL MILEAGE	SERVICED BY:

Short Trip / City Scheduled Maintenance — Gasoline Engines

60,000 Miles (100 000 km) (Continued)

- Replace fuel filter.
An Emission Control Service.
- Conduct Exhaust Gas Recirculation (EGR) system inspection as described in the service manual.
An Emission Control Service.
- Conduct evaporative control system inspection. Check all fuel and vapor lines and hoses for proper hook-up, routing and condition. Check that the purge valve works properly (if equipped). Replace as needed.
An Emission Control Service. (See footnote †.)
- Replace air cleaner filter.
An Emission Control Service.
- Inspect fuel tank, cap and lines for damage or leaks. Inspect fuel cap gasket for any damage. Replace parts as needed.
An Emission Control Service. (See footnote †.)
- Rotate tires. See “Tire Inspection and Rotation” in the Index for proper rotation pattern and additional information. (See footnote +.)

63,000 Miles (105 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first).
An Emission Control Service.

DATE	
ACTUAL MILEAGE	SERVICED BY:

Short Trip / City Scheduled Maintenance — Gasoline Engines

63,000 Miles (105 000 km) Continued

- Lubricate chassis components (or every 3 months, whichever occurs first).
(See footnote #.)
- Check axle fluid level and add fluid as needed. (See footnote **.)

66,000 Miles (110 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first).
An Emission Control Service.
- Lubricate chassis components (or every 3 months, whichever occurs first).
(See footnote #.)
- Check axle fluid level and add fluid as needed. (See footnote **.)
- Rotate tires. See “Tire Inspection and Rotation” in the Index for proper rotation pattern and additional information. (See footnote +.)

DATE	
ACTUAL MILEAGE	SERVICED BY:

69,000 Miles (115 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first).
An Emission Control Service.
- Lubricate chassis components (or every 3 months, whichever occurs first).
(See footnote #.)

DATE	
ACTUAL MILEAGE	SERVICED BY:

Short Trip / City Scheduled Maintenance — Gasoline Engines

69,000 Miles (115 000 km) Continued

- Check axle fluid level and add fluid as needed. (See footnote **.)

72,000 Miles (120 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first).
An Emission Control Service.
- Lubricate chassis components (or every 3 months, whichever occurs first).
(See footnote #.)
- Check axle fluid level and add fluid as needed. (See footnote **.)
- Rotate tires. See “Tire Inspection and Rotation” in the Index for proper rotation pattern and additional information. (See footnote +.)

DATE	
ACTUAL MILEAGE	SERVICED BY:

75,000 Miles (125 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first).
An Emission Control Service.
- Lubricate chassis components (or every 3 months, whichever occurs first).
(See footnote #.)
- Clean and repack the front wheel bearings (or at each brake relining, whichever occurs first).
- Inspect air cleaner filter if you are driving in dusty conditions. Replace filter if necessary.
An Emission Control Service.

DATE	
ACTUAL MILEAGE	SERVICED BY:

Short Trip / City Scheduled Maintenance — Gasoline Engines

75,000 Miles (125 000 km) Continued

- Check axle fluid level and add fluid as needed. (See footnote **.)
- Inspect shields and underhood insulation for damage or looseness. Adjust or replace as required.
This is a Noise Emission Control Service. Applicable only to vehicles sold in the United States.

78,000 Miles (130 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first).
An Emission Control Service.
- Lubricate chassis components (or every 3 months, whichever occurs first).
(See footnote #.)
- Check axle fluid level and add fluid as needed. (See footnote **.)
- Rotate tires. See “Tire Inspection and Rotation” in the Index for proper rotation pattern and additional information. (See footnote +.)

DATE	
ACTUAL MILEAGE	SERVICED BY:

81,000 Miles (135 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first).
An Emission Control Service.
- Lubricate chassis components (or every 3 months, whichever occurs first).
(See footnote #.)
- Check axle fluid level and add fluid as needed. (See footnote **.)

DATE	
ACTUAL MILEAGE	SERVICED BY:

Short Trip / City Scheduled Maintenance — Gasoline Engines

84,000 Miles (140 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first).
An Emission Control Service.
- Lubricate chassis components (or every 3 months, whichever occurs first).
(See footnote #.)
- Check axle fluid level and add fluid as needed. (See footnote **.)
- Rotate tires. See “Tire Inspection and Rotation” in the Index for proper rotation pattern and additional information. (See footnote +.)

DATE	
ACTUAL MILEAGE	SERVICED BY:

87,000 Miles (145 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first).
An Emission Control Service.
- Lubricate chassis components (or every 3 months, whichever occurs first).
(See footnote #.)
- Check axle fluid level and add fluid as needed. (See footnote **.)

DATE	
ACTUAL MILEAGE	SERVICED BY:

90,000 Miles (150 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first).
An Emission Control Service.
- Inspect/adjust auto apply parking brake system. (if equipped)

DATE	
ACTUAL MILEAGE	SERVICED BY:

Short Trip / City Scheduled Maintenance — Gasoline Engines

90,000 Miles (150 000 km) Continued

- Lubricate chassis components (or every 3 months, whichever occurs first).
(See footnote #.)
- Check axle fluid level and add fluid as needed. (See footnote **.)
- Clean and repack the front wheel bearings (or at each brake relining, whichever occurs first).
- Replace fuel filter.
An Emission Control Service.
- Replace air cleaner filter.
An Emission Control Service.
- Rotate tires. See “Tire Inspection and Rotation” in the Index for proper rotation pattern and additional information. (See footnote +.)
- Inspect shields and underhood insulation for damage or looseness. Adjust or replace as required.
This is a Noise Emission Control Service. Applicable only to vehicles sold in the United States.

93,000 Miles (155 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first).
An Emission Control Service.
- Lubricate chassis components (or every 3 months, whichever occurs first).
(See footnote #.)

DATE	
ACTUAL MILEAGE	SERVICED BY:

Short Trip / City Scheduled Maintenance — Gasoline Engines

93,000 Miles (155 000 km) Continued

- Check axle fluid level and add fluid as needed. (See footnote **.)

96,000 Miles (160 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first).
An Emission Control Service.
- Lubricate chassis components (or every 3 months, whichever occurs first).
(See footnote #.)
- Check axle fluid level and add fluid as needed. (See footnote **.)
- Rotate tires. See “Tire Inspection and Rotation” in the Index for proper rotation pattern and additional information. (See footnote +.)

DATE	
ACTUAL MILEAGE	SERVICED BY:

99,000 Miles (165 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first).
An Emission Control Service.
- Lubricate chassis components (or every 3 months, whichever occurs first).
(See footnote #.)
- Check axle fluid level and add fluid as needed. (See footnote **.)

DATE	
ACTUAL MILEAGE	SERVICED BY:

Short Trip / City Scheduled Maintenance — Gasoline Engines

100,000 Miles (166 000 km)

- Inspect spark plug wires.
An Emission Control Service.
- Replace spark plugs.
An Emission Control Service.
- Change automatic transmission fluid and filter. Manual transmission fluid doesn't require change.
- Inspect Positive Crankcase Ventilation (PCV) valve.
An Emission Control Service.

DATE	
ACTUAL MILEAGE	SERVICED BY:

150, 000 Miles (240 000 km)

- Drain, flush and refill cooling system (or every 60 months since last service, whichever occurs first). See "Engine Coolant" in the Index for what to use. Inspect hoses. Clean radiator, condenser, pressure cap and neck. Pressure test cooling system and pressure cap.
An Emission Control Service.
- Inspect/adjust auto apply parking brake system. (if equipped)

DATE	
ACTUAL MILEAGE	SERVICED BY:

Long Trip / Highway Scheduled Maintenance — Gasoline Engines

The services shown in this schedule up to 100,000 miles (166 000 km) should be performed after 100,000 miles (166 000 km) at the same intervals. The services shown at 150,000 miles (240 000 km) should be performed at the same interval after 150,000 miles (240 000 km). (See “Owner Checks and Services” and “Periodic Maintenance Inspections” in this section).

Footnotes

† The U.S. Environmental Protection Agency or the California Air Resources Board has determined that the failure to perform this maintenance item will not nullify the emission warranty or limit recall liability prior to the completion of the vehicle’s useful life. We, however, urge that all recommended maintenance services be performed at the indicated intervals and the maintenance be recorded.

Lubricate the front suspension, kingpin bushings, steering linkage, automatic transmission shift linkage, parking brake cable guides, propshaft splines, universal joints, brake pedal springs, front wheel bearings and auto park brake cam and linkage.

+ A good time to check your brakes is during tire rotation. (See “Brake System Inspection” under “Periodic Maintenance Inspections” in this Section).

** Drive axle service (see “Recommended Fluids and Lubricants” in the Index for proper lubricant to use):

- Standard Differential — Check fluid level and add fluid as needed at every engine oil change.
- Dana 70/80/S110/S130/S135/S150 Series — Check fluid level and add fluid as needed at every engine oil change.

Long Trip / Highway Scheduled Maintenance — Gasoline Engines

7,500 Miles (12 500 km)

- Change engine oil and filter (or every 12 months, whichever occurs first).
An Emission Control Service.
- Lubricate chassis components (or every 12 months, whichever occurs first).
(See footnote #.)
- Check axle fluid level and add fluid as needed. (See footnote **.)
- Rotate tires. See “Tire Inspection and Rotation” in the Index for proper rotation pattern and additional information. (See footnote +.)
- Inspect/adjust auto apply parking brake system (if equipped).

DATE	
ACTUAL MILEAGE	SERVICED BY:

15,000 Miles (25 000 km)

- Change engine oil and filter (or every 12 months, whichever occurs first).
An Emission Control Service.
- Lubricate chassis components (or every 12 months, whichever occurs first).
(See footnote #.)
- Check axle fluid level and add fluid as needed. (See footnote **.)
- Inspect shields and underhood insulation for damage or looseness. Adjust or replace as required.
This is a Noise Emission Control Service. Applicable only to vehicles sold in the United States.
- Rotate tires. See “Tire Inspection and Rotation” in the Index for proper rotation pattern and additional information. (See footnote +.)

DATE	
ACTUAL MILEAGE	SERVICED BY:

Long Trip / Highway Scheduled Maintenance — Gasoline Engines

22,500 Miles (37 500 km)

- Change engine oil and filter (or every 12 months, whichever occurs first).
An Emission Control Service.
- Lubricate chassis components (or every 12 months, whichever occurs first).
(See footnote #.)
- Check axle fluid level and add fluid as needed. (See footnote **.)
- Rotate tires. See “Tire Inspection and Rotation” in the Index for proper rotation pattern and additional information. (See footnote +.)

DATE	
ACTUAL MILEAGE	SERVICED BY:

30, 000 Miles (50 000 km)

- Change engine oil and filter (or every 12 months, whichever occurs first).
An Emission Control Service.
- Lubricate chassis components (or every 12 months, whichever occurs first).
(See footnote #.)
- Check axle fluid level and add fluid as needed. (See footnote **.)
- Clean and repack the front wheel bearings (or at each brake relining, whichever occurs first).
- Rotate tires. See “Tire Inspection and Rotation” in the Index for proper rotation pattern and additional information. (See footnote +.)
- Inspect/adjust auto apply parking brake system. (if equipped)

DATE	
ACTUAL MILEAGE	SERVICED BY:

Long Trip / Highway Scheduled Maintenance — Gasoline Engines

30, 000 Miles (50 000 km) Continued

- Replace fuel filter.
An Emission Control Service
- Replace air cleaner filter.
An Emission Control Service.
- Inspect shields and underhood insulation for damage or looseness. Adjust or replace as required.
This is a Noise Emission Control Service. Applicable only to vehicles sold in the United States.

37,500 Miles (62 500 km)

- Change engine oil and filter (or every 12 months, whichever occurs first).
An Emission Control Service.
- Lubricate chassis components (or every 12 months, whichever occurs first).
(See footnote #.)
- Check axle fluid level and add fluid as needed. (See footnote **.)
- Rotate tires. See “Tire Inspection and Rotation” in the Index for proper rotation pattern and additional information. (See footnote +.)

DATE	
ACTUAL MILEAGE	SERVICED BY:

45,000 Miles (75 000 km)

- Change engine oil and filter (or every 12 months, whichever occurs first).
An Emission Control Service.

DATE	
ACTUAL MILEAGE	SERVICED BY:

Long Trip / Highway Scheduled Maintenance — Gasoline Engines

45,000 Miles (75 000 km) Continued

- Lubricate chassis components (or every 12 months, whichever occurs first).
(See footnote #.)
- Check axle fluid level and add fluid as needed. (See footnote **.)
- Inspect shields and underhood insulation for damage or looseness. Adjust or replace as required.
This is a Noise Emission Control Service. Applicable only to vehicles sold in the United States.
- Rotate tires. See “Tire Inspection and Rotation” in the Index for proper rotation pattern and additional information. (See footnote +.)

50,000 Miles (83 000 km)

- Change automatic transmission fluid and filter. Manual transmission fluid doesn't require change.

DATE	
ACTUAL MILEAGE	SERVICED BY:

52,500 Miles (87 500 km)

- Change engine oil and filter (or every 12 months, whichever occurs first).
An Emission Control Service.
- Lubricate chassis components (or every 12 months, whichever occurs first).
(See footnote #.)

DATE	
ACTUAL MILEAGE	SERVICED BY:

Long Trip / Highway Scheduled Maintenance — Gasoline Engines

52,500 Miles (87 500 km) Continued

- Check axle fluid level and add fluid as needed. (See footnote **.)
- Rotate tires. See “Tire Inspection and Rotation” in the Index for proper rotation pattern and additional information. (See footnote +.)

60,000 Miles (100 000 km)

- Change engine oil and filter (or every 12 months, whichever occurs first).
An Emission Control Service.
- Lubricate chassis components (or every 12 months, whichever occurs first).
(See footnote #.)
- Check axle fluid level and add fluid as needed. (See footnote **.)
- Clean and repack the front wheel bearings (or at each brake relining, whichever occurs first).
- Rotate tires. See “Tire Inspection and Rotation” in the Index for proper rotation pattern and additional information. (See footnote +.)
- Inspect engine accessory drive belt.
An Emission Control Service.
- Replace fuel filter.
An Emission Control Service.
- Inspect/adjust auto apply parking brake system. (if equipped)

DATE	
ACTUAL MILEAGE	SERVICED BY:

Long Trip / Highway Scheduled Maintenance — Gasoline Engines

60,000 Miles (100 000 km) Continued

- Replace air cleaner filter.
An Emission Control Service.
- Inspect fuel tank, cap and lines for damage or leaks. Inspect fuel cap gasket for any damage. Replace parts as needed.
An Emission Control Service. (See footnote †.)
- Inspect shields and underhood insulation for damage or looseness. Adjust or replace as required.
This is a Noise Emission Control Service. Applicable only to vehicles sold in the United States.
- Inspect Exhaust Gas Recirculation (EGR) system as described in the service manual.
An Emission Control Service.
- Inspect Evaporative Control System. Check all fuel and vapor lines and hoses for proper hook-up, routing and condition. Check that the purge valve works properly, if equipped. Replace as needed.
An Emission Control Service. (See footnote †.)

67,500 Miles (112 500 km)

- Change engine oil and filter (or every 12 months, whichever occurs first).
An Emission Control Service.
- Lubricate chassis components (or every 12 months, whichever occurs first).
(See footnote #.)

DATE	
ACTUAL MILEAGE	SERVICED BY:

Long Trip / Highway Scheduled Maintenance — Gasoline Engines

67,500 Miles (112 500 km) Continued

- Check axle fluid level and add fluid as needed. (See footnote **.)
- Rotate tires. See “Tire Inspection and Rotation” in the Index for proper rotation pattern and additional information. (See footnote +.)

75,000 Miles (125 000 km)

- Change engine oil and filter (or every 12 months, whichever occurs first).
An Emission Control Service.
- Lubricate chassis components (or every 12 months, whichever occurs first).
(See footnote #.)
- Check axle fluid level and add fluid as needed. (See footnote **.)
- Inspect shields and underhood insulation for damage or looseness. Adjust or replace as required.
This is a Noise Emission Control Service. Applicable only to vehicles sold in the United States.
- Rotate tires. See “Tire Inspection and Rotation” in the Index for proper rotation pattern and additional information. (See footnote +.)

DATE	
ACTUAL MILEAGE	SERVICED BY:

82,500 Miles (137 500 km)

- Change engine oil and filter (or every 12 months, whichever occurs first).
An Emission Control Service.

DATE	
ACTUAL MILEAGE	SERVICED BY:

Long Trip / Highway Scheduled Maintenance — Gasoline Engines

82,500 Miles (137 500 km) Continued

- Lubricate chassis components (or every 12 months, whichever occurs first).
(See footnote #.)
- Check axle fluid level and add fluid as needed. (See footnote **.)
- Rotate tires. See “Tire Inspection and Rotation” in the Index for proper rotation pattern and additional information. (See footnote +.)

90,000 Miles (150 000 km)

- Change engine oil and filter (or every 12 months, whichever occurs first).
An Emission Control Service.
- Lubricate chassis components (or every 12 months, whichever occurs first).
(See footnote #.)
- Check axle fluid level and add fluid as needed. (See footnote **.)
- Clean and repack the front wheel bearings (or at each brake relining, whichever occurs first).
- Replace fuel filter.
An Emission Control Service.
- Replace air cleaner filter.
An Emission Control Service.
- Inspect/adjust auto apply parking brake system. (if equipped)

DATE	
ACTUAL MILEAGE	SERVICED BY:

Long Trip / Highway Scheduled Maintenance — Gasoline Engines

90,000 Miles (150 000 km) Continued

- Inspect shields and underhood insulation for damage or looseness. Adjust or replace as required.
This is a Noise Emission Control Service. Applicable only to vehicles sold in the United States.
- Rotate tires. See “Tire Inspection and Rotation” in the Index for proper rotation pattern and additional information. (See footnote +.)

97,500 Miles (162 500 km)

- Change engine oil and filter (or every 12 months, whichever occurs first).
An Emission Control Service.
- Lubricate chassis components (or every 12 months, whichever occurs first).
(See footnote #.)
- Check axle fluid level and add fluid as needed. (See footnote **.)
- Rotate tires. See “Tire Inspection and Rotation” in the Index for proper rotation pattern and additional information. (See footnote +.)

DATE	
ACTUAL MILEAGE	SERVICED BY:

Long Trip / Highway Scheduled Maintenance — Gasoline Engines

100,000 Miles (166 000 km)

- Inspect spark plug wires.
An Emission Control Service.
- Replace spark plugs.
An Emission Control Service.
- Change automatic transmission fluid and filter. Manual transmission fluid doesn't require change.
- Inspect Positive Crankcase Ventilation (PCV) valve.
An Emission Control Service.

DATE	
ACTUAL MILEAGE	SERVICED BY:

150,000 Miles (240 000 km)

- Drain, flush and refill cooling system (or every 60 months since last service, whichever occurs first). See "Engine Coolant" in the Index for what to use. Inspect hoses. Clean radiator, condenser, pressure cap and neck. Pressure test the cooling system and pressure cap.
An Emission Control Service.
- Inspect/adjust auto apply parking brake system. (if equipped)

DATE	
ACTUAL MILEAGE	SERVICED BY:

Short Trip/City Scheduled Maintenance — Diesel Engines

The services shown in this schedule up to 100,000 miles (160 000 km) should be performed after 100,000 miles (160 000 km) at the same intervals. The services shown at 150,000 miles (240 000 km) should be performed at the same interval after 150,000 miles (240 000 km). (See “Owner Checks and Services” and “Periodic Maintenance Inspections” in this section).

Footnotes

Lubricate the front suspension, kingpin bushings, steering linkage, automatic transmission shift linkage, parking brake cable guides, propshaft splines, universal joints, brake pedal springs, front wheel bearings and auto apply park brake cam and linkage.

* When the vehicle is operated in extreme dust and dirt conditions (off-road), the air cleaner filter may need to be checked as often as every 300 miles (500 km) and replaced as necessary.

+ A good time to check your brakes is during tire rotation. (See “Brake System Inspection” under “Periodic Maintenance Inspections” in this section).

** Drive axle service (see “Recommended Fluids and Lubricants” in the Index for proper lubricant to use):

- Standard Differential — Check fluid as needed at every engine oil change. If driving in dusty areas or towing a trailer, drain fluid and refill every 15,000 miles (24 000 km).
- More frequent lubrication may be required for heavy-duty use.
- Dana 70/80/S135 Series — Check fluid level and add fluid as needed at every oil change. If driving in dusty, sandy or wet conditions or towing a trailer, change lubricant every 25,000 miles (40 000 km) or 6 months, (whichever occurs first).

Short Trip/City Scheduled Maintenance — Diesel Engines

2,500 Miles (4 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first).
An Emission Control Service.
- Lubricate chassis components (or every 3 months, whichever occurs first).
(See footnote #.)
- Inspect/adjust auto apply parking brake system (if equipped).

DATE	
ACTUAL MILEAGE	SERVICED BY:

5,000 Miles (8 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first).
An Emission Control Service.
- Lubricate chassis components (or every 3 months, whichever occurs first).
(See footnote #.)
- Engine Code Y only: Adjust engine idle speed to specifications shown on the underhood label using calibrated test equipment. Check that the idle stop solenoid or dashpot works properly (if equipped).
- Check axle fluid level and add fluid as needed. (See footnote **.)

DATE	
ACTUAL MILEAGE	SERVICED BY:

7,500 Miles (12 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first).
An Emission Control Service.
- Lubricate chassis components (or every 3 months, whichever occurs first).
(See footnote #.)

DATE	
ACTUAL MILEAGE	SERVICED BY:

Short Trip/City Scheduled Maintenance — Diesel Engines

7,500 Miles (12 000 km) Continued

- Rotate tires. See “Tire Inspection and Rotation” in the Index for proper rotation pattern and additional information. (See footnote +.)

10,000 Miles (16 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first).
An Emission Control Service.
- Lubricate chassis components (or every 3 months, whichever occurs first).
(See footnote #.)
- Inspect shields and underhood insulation for damage or looseness. Adjust or replace as required.
This is a Noise Emission Control Service. Applicable only to vehicles sold in the United States.
- Check the air intake system installation to assure gaskets are properly sealed and all hose connections, fasteners and other components are tight. Also check to be sure the air cleaner housing is properly seated and the cover fits tightly. Tighten connections and fasteners or replace damaged parts as necessary.
This is a Noise Emission Control Service. Applicable only to vehicles sold in the United States.
- If your engine has a thermostatically controlled cooling fan, inspect all hoses and ducts for proper hook-up (or every 12 months, whichever occurs first). Be sure the valve works properly. *This is a Noise Emission Control Service. Applicable only to vehicles sold in the United States.*
- Check axle fluid level and add fluid as needed. (See footnote **.)

DATE	
ACTUAL MILEAGE	SERVICED BY:

Short Trip/City Scheduled Maintenance — Diesel Engines

12,500 Miles (20 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first).
An Emission Control Service.
- Lubricate chassis components (or every 3 months, whichever occurs first).
(See footnote #.)

DATE	
ACTUAL MILEAGE	SERVICED BY:

15,000 Miles (24 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first).
An Emission Control Service.
- Lubricate chassis components (or every 3 months, whichever occurs first).
(See footnote #.)
- Inspect air cleaner filter if you are driving in dusty conditions. Replace filter if necessary.
An Emission Control Service. (See footnote *.)
- Rotate tires. See “Tire Inspection and Rotation” in the Index for proper rotation pattern and additional information. (See footnote +.)
- Clean and repack the front wheel bearings (or at each brake relining, whichever occurs first).
- Check axle fluid level and add fluid as needed. (See footnote **.)

DATE	
ACTUAL MILEAGE	SERVICED BY:

Short Trip/City Scheduled Maintenance — Diesel Engines

17,500 Miles (28 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first).
An Emission Control Service.
- Lubricate chassis components (or every 3 months, whichever occurs first).
(See footnote #.)

DATE	
ACTUAL MILEAGE	SERVICED BY:

20,000 Miles (32 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first).
An Emission Control Service.
- Lubricate chassis components (or every 3 months, whichever occurs first).
(See footnote #.)
- Inspect shields and underhood insulation for damage or looseness. Adjust or replace as required.
This is a Noise Emission Control Service. Applicable only to vehicles sold in the United States.
- Check the air intake system installation to assure gaskets are properly sealed and all hose connections, fasteners and other components are tight. Also check to be sure the air cleaner housing is properly seated and the cover fits tightly. Tighten connections and fasteners or replace damaged parts as necessary.
This is a Noise Emission Control Service. Applicable only to vehicles sold in the United States.
- If your engine has a thermostatically controlled cooling fan, inspect all hoses and ducts for proper hook-up (or every 12 months, whichever occurs first), Be sure the valve works properly. *This is a Noise Emission Control Service, Applicable only to vehicles sold in the United States.*

DATE	
ACTUAL MILEAGE	SERVICED BY:

Short Trip/City Scheduled Maintenance — Diesel Engines

20,000 Miles (32 000 km) Continued

- Check axle fluid level and add fluid as needed. (See footnote **.)

22,500 Miles (36 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first).
An Emission Control Service.
- Lubricate chassis components (or every 3 months, whichever occurs first).
(See footnote #.)
- Rotate tires. See “Tire Inspection and Rotation” in the Index for proper rotation pattern and additional information. (See footnote +.)

DATE	
ACTUAL MILEAGE	SERVICED BY:

25,000 Miles (40 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first).
An Emission Control Service.
- Lubricate chassis components (or every 3 months, whichever occurs first).
(See footnote #.)
- Check axle fluid level and add fluid as needed. (See footnote **.)
- Replace fuel filler cap if driving in dusty conditions.
An Emission Control Service.

DATE	
ACTUAL MILEAGE	SERVICED BY:

Short Trip/City Scheduled Maintenance — Diesel Engines

27,500 Miles (44 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first).
An Emission Control Service.
- Lubricate chassis components (or every 3 months, whichever occurs first).
(See footnote #.)

DATE	
ACTUAL MILEAGE	SERVICED BY:

30,000 Miles (48 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first).
An Emission Control Service.
- Lubricate chassis components (or every 3 months, whichever occurs first).
(See footnote #.)
- Replace air cleaner filter.
An Emission Control Service. (See footnote *.)
- Rotate tires. See "Tire Inspection and Rotation" in the Index for proper rotation pattern and additional information. (See footnote +.)
- Clean and repack the front wheel bearings (or at each brake relining, whichever occurs first).
- Replace fuel filter.
- Inspect shields and underhood insulation for damage or looseness. Adjust or replace as required.
This is a Noise Emission Control Service. Applicable only to vehicles sold in the United States.

DATE	
ACTUAL MILEAGE	SERVICED BY:

Short Trip/City Scheduled Maintenance — Diesel Engines

30,000 Miles (48 000 km) Continued

- Check the air intake system installation to assure gaskets are properly sealed and all hose connections, fasteners and other components are tight. Also check to be sure the air cleaner housing is properly seated and the cover fits tightly. Tighten connections and fasteners or replace damaged parts as necessary. *This is a Noise Emission Control Service. Applicable only to vehicles sold in the United States.*
- If your engine has a thermostatically controlled cooling fan, inspect all hoses and ducts for proper hook-up (or every 12 months, whichever occurs first). Be sure the valve works properly. *This is a Noise Emission Control Service. Applicable only to vehicles sold in the United States.*
- Engine Code Y only: Adjust engine idle speed to specifications shown on the underhood label using calibrated test equipment. Check that the idle stop solenoid or dashpot works properly (if equipped).
- Check axle fluid level and add fluid as needed. (See footnote **.)
- Inspect/adjust auto apply parking brake system. (if equipped)

32,500 Miles (52 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first). *An Emission Control Service.*
- Lubricate chassis components (or every 3 months, whichever occurs first). (See footnote #.)

DATE	
ACTUAL MILEAGE	SERVICED BY:

Short Trip/City Scheduled Maintenance — Diesel Engines

35,000 Miles (56 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first).
An Emission Control Service.
- Lubricate chassis components (or every 3 months, whichever occurs first).
(See footnote #.)
- Check axle fluid level and add fluid as needed. (See footnote **.)

DATE	
ACTUAL MILEAGE	SERVICED BY:

37,500 Miles (60 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first).
An Emission Control Service.
- Lubricate chassis components (or every 3 months, whichever occurs first).
(See footnote #.)
- Rotate tires. See "Tire Inspection and Rotation" in the Index for proper rotation pattern and additional information. (See footnote +.)

DATE	
ACTUAL MILEAGE	SERVICED BY:

40,000 Miles (64 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first).
An Emission Control Service.

DATE	
ACTUAL MILEAGE	SERVICED BY:

Short Trip/City Scheduled Maintenance — Diesel Engines

40,000 Miles (64 000 km) Continued

- Lubricate chassis components (or every 3 months, whichever occurs first).
(See footnote #.)
- Inspect shields and underhood insulation for damage or looseness. Adjust or replace as required.
This is a Noise Emission Control Service. Applicable only to vehicles sold in the United States.
- Check the air intake system installation to assure gaskets are properly sealed and all hose connections, fasteners and other components are tight. Also check to be sure the air cleaner housing is properly seated and the cover fits tightly. Tighten connections and fasteners or replace damaged parts as necessary.
This is a Noise Emission Control Service. Applicable only to vehicles sold in the United States.
- If your engine has a thermostatically controlled cooling fan, inspect all hoses and ducts for proper hook-up (or every 12 months, whichever occurs first). Be sure the valve works properly. *This is a Noise Emission Control Service. Applicable only to vehicles sold in the United States.*
- Check axle fluid level and add fluid as needed. (See footnote **.)

42,500 Miles (68 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first).
An Emission Control Service.
- Lubricate chassis components (or every 3 months, whichever occurs first).
(See footnote #.)

DATE	
ACTUAL MILEAGE	SERVICED BY:

Short Trip/City Scheduled Maintenance — Diesel Engines

45,000 Miles (72 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first).
An Emission Control Service.
- Lubricate chassis components (or every 3 months, whichever occurs first).
(See footnote #.)
- Inspect air cleaner filter if you are driving in dusty conditions. Replace filter if necessary.
An Emission Control Service. (See footnote *.)
- Rotate tires. See “Tire Inspection and Rotation” in the Index for proper rotation pattern and additional information. (See footnote +.)
- Clean and repack the front wheel bearings (or at each brake relining, whichever occurs first).
- Check axle fluid level and add fluid as needed. (See footnote **.)

DATE	
ACTUAL MILEAGE	SERVICED BY:

47,500 Miles (76 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first).
An Emission Control Service.
- Lubricate chassis components (or every 3 months, whichever occurs first).
(See footnote #.)

DATE	
ACTUAL MILEAGE	SERVICED BY:

Short Trip/City Scheduled Maintenance — Diesel Engines

50,000 Miles (80 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first).
An Emission Control Service.
- Lubricate chassis components (or every 3 months, whichever occurs first).
(See footnote #.)
- Change automatic transmission fluid and filter. Manual transmission fluid doesn't require change.
- Inspect shields and underhood insulation for damage or looseness. Adjust or replace as required.
This is a Noise Emission Control Service. Applicable only to vehicles sold in the United States.
- Check the air intake system installation to assure gaskets are properly sealed and all hose connections, fasteners and other components are tight. Also check to be sure the air cleaner housing is properly seated and the cover fits tightly. Tighten connections and fasteners or replace damaged parts as necessary.
This is a Noise Emission Control Service. Applicable only to vehicles sold in the United States.
- If your engine has a thermostatically controlled cooling fan, inspect all hoses and ducts for proper hook-up (or every 12 months, whichever occurs first). Be sure the valve works properly. *This is a Noise Emission Control Service. Applicable only to vehicles sold in the United States.*
- Check axle fluid level and add fluid as needed. (See footnote **.)
- Replace fuel filler cap if driving in dusty conditions.
An Emission Control Service.

DATE	
ACTUAL MILEAGE	SERVICED BY:

Short Trip/City Scheduled Maintenance — Diesel Engines

52,500 Miles (84 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first).
An Emission Control Service.
- Lubricate chassis components (or every 3 months, whichever occurs first).
(See footnote #.)
- Rotate tires. See “Tire Inspection and Rotation” in the Index for proper rotation pattern and additional information. (See footnote +.)

DATE	
ACTUAL MILEAGE	SERVICED BY:

55,000 Miles (88 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first).
An Emission Control Service.
- Lubricate chassis components (or every 3 months, whichever occurs first).
(See footnote #.)
- Check axle fluid level and add fluid as needed. (See footnote **.)

DATE	
ACTUAL MILEAGE	SERVICED BY:

57,500 Miles (92 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first).
An Emission Control Service.
- Lubricate chassis components (or every 3 months, whichever occurs first).
(See footnote #.)

DATE	
ACTUAL MILEAGE	SERVICED BY:

Short Trip/City Scheduled Maintenance — Diesel Engines

60,000 Miles (96 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first).
An Emission Control Service.
- Lubricate chassis components (or every 3 months, whichever occurs first).
(See footnote #.)
- Replace air cleaner filter. *An Emission Control Service.* (See footnote *.)
- Rotate tires. See “Tire Inspection and Rotation” in the Index for proper rotation pattern and additional information. (See footnote +.)
- Clean and repack the front wheel bearings (or at each brake relining, whichever occurs first).
- Check the crankcase depression regulator valve system for any worn, plugged or collapsed hoses.
See service manual. *An Emission Control Service.*
- Replace fuel filter.
- Check the EGR System (if equipped) (except Code F engine) as described in the service manual.
An Emission Control Service.
- Inspect accessory drive (serpentine) belt for cracks, fraying and wear and check belt for proper tension.
Replace belt as needed. *An Emission Control Service.*
- Inspect shields and underhood insulation for damage or looseness. Adjust or replace as required.
This is a Noise Emission Control Service. Applicable only to vehicles sold in the United States.

DATE	
ACTUAL MILEAGE	SERVICED BY:

Short Trip/City Scheduled Maintenance — Diesel Engines

60,000 Miles (96 000 km) Continued

- Check the air intake system installation to assure gaskets are properly sealed and all hose connections, fasteners and other components are tight. Also check to be sure the air cleaner housing is properly seated and the cover fits tightly. Tighten connections and fasteners or replace damaged parts as necessary. *This is a Noise Emission Control Service. Applicable only to vehicles sold in the United States.*
- If your engine has a thermostatically controlled cooling fan, inspect all hoses and ducts for proper hook-up (or every 12 months, whichever occurs first). Be sure the valve works properly. *This is a Noise Emission Control Service. Applicable only to vehicles sold in the United States.*
- Engine Code Y only: Adjust engine idle speed to specifications shown on the underhood label using calibrated test equipment. Check that the idle stop solenoid or dashpot works properly (if so equipped).
- Check axle fluid level and add fluid as needed. (See footnote **.)
- Inspect/adjust auto apply parking brake system. (if equipped)

62,500 Miles (100 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first). *An Emission Control Service.*
- Lubricate chassis components (or every 3 months, whichever occurs first). (See footnote #.)

DATE	
ACTUAL MILEAGE	SERVICED BY:

Short Trip/City Scheduled Maintenance — Diesel Engines

65,000 Miles (104 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first).
An Emission Control Service.
- Lubricate chassis components (or every 3 months, whichever occurs first).
(See footnote #.)
- Check axle fluid level and add fluid as needed. (See footnote **.)

DATE	
ACTUAL MILEAGE	SERVICED BY:

67,500 Miles (108 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first).
An Emission Control Service.
- Lubricate chassis components (or every 3 months, whichever occurs first).
(See footnote #.)
- Rotate tires. See “Tire Inspection and Rotation” in the Index for proper rotation pattern and additional information. (See footnote +.)

DATE	
ACTUAL MILEAGE	SERVICED BY:

70,000 Miles (112 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first).
An Emission Control Service.

DATE	
ACTUAL MILEAGE	SERVICED BY:

Short Trip/City Scheduled Maintenance — Diesel Engines

70,000 Miles (112 000 km) Continued

- Lubricate chassis components (or every 3 months, whichever occurs first). (See footnote #.)
- Inspect shields and underhood insulation for damage or looseness. Adjust or replace as required.
This is a Noise Emission Control Service. Applicable only to vehicles sold in the United States.
- Check the air intake system installation to assure gaskets are properly sealed and all hose connections, fasteners and other components are tight. Also check to be sure the air cleaner housing is properly seated and the cover fits tightly. Tighten connections and fasteners or replace damaged parts as necessary.
This is a Noise Emission Control Service. Applicable only to vehicles sold in the United States.
- If your engine has a thermostatically controlled cooling fan, inspect all hoses and ducts for proper hook-up (or every 12 months, whichever occurs first). Be sure the valve works properly. *This is a Noise Emission Control Service. Applicable only to vehicles sold in the United States.*
- Check axle fluid level and add fluid as needed. (See footnote **.)

72,500 Miles (116 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first).
An Emission Control Service.
- Lubricate chassis components (or every 3 months, whichever occurs first).
(See footnote #.)

DATE	
ACTUAL MILEAGE	SERVICED BY:

Short Trip/City Scheduled Maintenance — Diesel Engines

75,000 Miles (120 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first).
An Emission Control Service.
- Lubricate chassis components (or every 3 months, whichever occurs first).
(See footnote #.)
- Inspect air cleaner filter if you are driving in dusty conditions. Replace filter if necessary.
An Emission Control Service. (See footnote *.)
- Rotate tires. See “Tire Inspection and Rotation” in the Index for proper rotation pattern and additional information. (See footnote +.)
- Clean and repack the front wheel bearings (or at each brake relining, whichever occurs first).
- Check axle fluid level and add fluid as needed. (See footnote **.)
- Replace fuel filler cap if driving in dusty conditions.
An Emission Control Service.

DATE	
ACTUAL MILEAGE	SERVICED BY:

77,500 Miles (124 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first).
An Emission Control Service.
- Lubricate chassis components (or every 3 months, whichever occurs first).
(See footnote #.)

DATE	
ACTUAL MILEAGE	SERVICED BY:

Short Trip/City Scheduled Maintenance — Diesel Engines

80,000 Miles (128 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first). *An Emission Control Service.*
- Lubricate chassis components (or every 3 months, whichever occurs first). (See footnote #.)
- Inspect shields and underhood insulation for damage or looseness. Adjust or replace as required. *This is a Noise Emission Control Service. Applicable only to vehicles sold in the United States.*
- Check the air intake system installation to assure gaskets are properly sealed and all hose connections, fasteners and other components are tight. Also check to be sure the air cleaner housing is properly seated and the cover fits tightly. Tighten connections and fasteners or replace damaged parts as necessary. *This is a Noise Emission Control Service. Applicable only to vehicles sold in the United States.*
- If your engine has a thermostatically controlled cooling fan, inspect all hoses and ducts for proper hook-up (or every 12 months, whichever occurs first). Be sure the valve works properly. *This is a Noise Emission Control Service. Applicable only to vehicles sold in the United States.*
- Check axle fluid level and add fluid as needed. (See footnote **.)

DATE	
ACTUAL MILEAGE	SERVICED BY:

82,500 Miles (132 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first). *An Emission Control Service.*

DATE	
ACTUAL MILEAGE	SERVICED BY:

Short Trip/City Scheduled Maintenance — Diesel Engines

82,500 Miles (132 000 km) Continued

- Lubricate chassis components (or every 3 months, whichever occurs first). (See footnote #.)
- Rotate tires. See “Tire Inspection and Rotation” in the Index for proper rotation pattern and additional information. (See footnote +.)

85,000 Miles (136 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first).
An Emission Control Service.
- Lubricate chassis components (or every 3 months, whichever occurs first).
(See footnote #.)
- Check axle fluid level and add fluid as needed. (See footnote **.)

DATE	
ACTUAL MILEAGE	SERVICED BY:

87,500 Miles (140 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first).
An Emission Control Service.
- Lubricate chassis components (or every 3 months, whichever occurs first).
(See footnote #.)

DATE	
ACTUAL MILEAGE	SERVICED BY:

Short Trip/City Scheduled Maintenance — Diesel Engines

90,000 Miles (144 000 km)

- | DATE | |
|----------------|--------------|
| ACTUAL MILEAGE | SERVICED BY: |
| | |
- Change engine oil and filter (or every 3 months, whichever occurs first).
An Emission Control Service.
 - Lubricate chassis components (or every 3 months, whichever occurs first).
(See footnote #.)
 - Inspect shields and underhood insulation for damage or looseness. Adjust or replace as required.
This is a Noise Emission Control Service. Applicable only to vehicles sold in the United States.
 - Check the air intake system installation to assure gaskets are properly sealed and all hose connections, fasteners and other components are tight. Also check to be sure the air cleaner housing is properly seated and the cover fits tightly. Tighten connections and fasteners or replace damaged parts as necessary.
This is a Noise Emission Control Service. Applicable only to vehicles sold in the United States.
 - If your engine has a thermostatically controlled cooling fan, inspect all hoses and ducts for proper hook-up (or every 12 months, whichever occurs first). Be sure the valve works properly.
This is a Noise Emission Control Service. Applicable only to vehicles sold in the United States.
 - Check axle fluid level and add fluid as needed. (See footnote **.)
 - Replace air cleaner filter.
*An Emission Control Service. (See footnote **.)*
 - Rotate tires. See “Tire Inspection and Rotation” in the Index for proper rotation pattern and additional information. (See footnote +.)

Short Trip/City Scheduled Maintenance — Diesel Engines

90,000 Miles (144 000 km) Continued

- Clean and repack the front wheel bearings (or at each brake relining, whichever occurs first).
- Replace fuel filter.
- Engine Code Y only: Adjust engine idle speed to specifications shown on the underhood label using calibrated test equipment. Check that the idle stop solenoid or dashpot works properly (if equipped).
- Inspect/adjust auto apply parking brake system. (if equipped)

92,500 Miles (148 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first).
An Emission Control Service.
- Lubricate chassis components (or every 3 months, whichever occurs first).
(See footnote #.)

DATE	
ACTUAL MILEAGE	SERVICED BY:

95,000 Miles (152 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first).
An Emission Control Service.
- Lubricate chassis components (or every 3 months, whichever occurs first).
(See footnote #.)
- Check axle fluid level and add fluid as needed. (See footnote **.)

DATE	
ACTUAL MILEAGE	SERVICED BY:

Short Trip/City Scheduled Maintenance — Diesel Engines

97,500 Miles (156 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first).
An Emission Control Service.
- Lubricate chassis components (or every 3 months, whichever occurs first).
(See footnote #.)
- Rotate tires. See “Tire Inspection and Rotation” in the Index for proper rotation pattern and additional information. (See footnote +.)

DATE	
ACTUAL MILEAGE	SERVICED BY:

100,000 Miles (160 000 km)

- Change engine oil and filter (or every 3 months, whichever occurs first).
An Emission Control Service.
- Lubricate chassis components (or every 3 months, whichever occurs first).
(See footnote #.)
- Inspect shields and underhood insulation for damage or looseness. Adjust or replace as required.
This is a Noise Emission Control Service. Applicable only to vehicles sold in the United States.
- Check the air intake system installation to assure gaskets are properly sealed and all hose connections, fasteners and other components are tight. Also check to be sure the air cleaner housing is properly seated and the cover fits tightly. Tighten connections and fasteners or replace damaged parts as necessary.
This is a Noise Emission Control Service. Applicable only to vehicles sold in the United States.

DATE	
ACTUAL MILEAGE	SERVICED BY:

Short Trip/City Scheduled Maintenance — Diesel Engines

100,000 Miles (160 000 km) Continued

- If your engine has a thermostatically controlled cooling fan, inspect all hoses and ducts for proper hook-up (or every 12 months, whichever occurs first). Be sure the valve works properly. *This is a Noise Emission Control Service. Applicable only to vehicles sold in the United States.*
- Check axle fluid level and add fluid as needed. (See footnote **.)
- Change automatic transmission fluid and filter. Manual transmission fluid doesn't require change.
- Replace fuel filler cap if driving in dusty conditions.
An Emission Control Service.

150,000 Miles (240 000)

- Drain, flush and refill the cooling system with new coolant (or every 60 months, whichever occurs first). See "Engine Coolant" in the Index for what to use. *An Emission Control Service.*

Also inspect the hoses and replace them if they are cracked, swollen or deteriorated. Tighten all hose clamps (except constant tension clamps). Remove debris and clean the outside of the radiator and air conditioning condenser. Wash the radiator neck. To ensure proper operation, pressure test the radiator and cap.

- Inspect/adjust auto apply parking brake system (if equipped).

DATE	
ACTUAL MILEAGE	SERVICED BY:

Long Trip / Highway Scheduled Maintenance — Diesel Engines

The services shown in this schedule up to 100,000 miles (160 000 km) should be performed after 100,000 miles (160 000 km) at the same intervals. The services shown at 150,000 miles (240 000 km) should be performed at the same interval after 150,000 miles (240 000 km). (See “Owner Checks and Services” and “Periodic Maintenance Inspections” in this section).

Footnotes

Lubricate the front suspension, kingpin bushings, steering linkage, automatic transmission shift linkage, parking brake cable guides, propshaft splines, universal joints, brake pedal springs, front wheel bearings and auto apply park brake cam and linkage.

+ A good time to check your brakes is during tire rotation. (See “Brake System Inspection” under “Periodic Maintenance Inspections” in this section).

** Drive axle service (see “Recommended Fluids and Lubricants” in the Index for proper lubricant to use):

- Standard Differential — Check fluid level and add fluid as needed at every engine oil change.
- Dana 70/80/S135 Series — Check fluid level and add fluid as needed at every oil change.

Long Trip / Highway Scheduled Maintenance — Diesel Engines

5,000 Miles (8 000 km)

- Change engine oil and filter (or every 12 months, whichever occurs first).
An Emission Control Service.
- Lubricate chassis components (or every 12 months, whichever occurs first).
(See footnote #.)
- Rotate tires. See “Tire Inspection and Rotation” in the Index for proper rotation pattern and additional information. (See footnote +.)
- Engine Code Y only: Adjust engine idle speed to specifications shown on the underhood label using calibrated test equipment. Check that the idle stop solenoid or dashpot works properly (if equipped).
- Check axle fluid level and add fluid as needed. (See footnote **.)
- Inspect/adjust auto apply parking brake system (if equipped).

DATE	
ACTUAL MILEAGE	SERVICED BY:

10,000 Miles (16 000 km)

- Change engine oil and filter (or every 12 months, whichever occurs first).
An Emission Control Service.
- Lubricate chassis components (or every 12 months, whichever occurs first).
(See footnote #.)
- Inspect shields and underhood insulation for damage or looseness. Adjust or replace as required.
This is a Noise Emission Control Service. Applicable only to vehicles sold in the United States.

DATE	
ACTUAL MILEAGE	SERVICED BY:

Long Trip / Highway Scheduled Maintenance — Diesel Engines

10,000 Miles (16 000 km) (Continued)

- Check the air intake system installation to assure gaskets are properly sealed and all hose connections, fasteners and other components are tight. Also check to be sure the air cleaner housing is properly seated and the cover fits tightly. Tighten connections and fasteners or replace damaged parts as necessary. *This is a Noise Emission Control Service. Applicable only to vehicles sold in the United States.*
- If your engine has a thermostatically controlled cooling fan, inspect all hoses and ducts for proper hook-up (or every 12 months, whichever occurs first). Be sure the valve works properly. *This is a Noise Emission Control Service. Applicable only to vehicles sold in the United States.*
- Check axle fluid level and add fluid as needed. (See footnote **.)

15,000 Miles (24 000 km)

- Change engine oil and filter (or every 12 months, whichever occurs first). *An Emission Control Service.*
- Lubricate chassis components (or every 12 months, whichever occurs first). (See footnote #.)
- Rotate tires. See "Tire Inspection and Rotation" in the Index for proper rotation pattern and additional information. (See footnote +.)
- Check axle fluid level and add fluid as needed. (See footnote **.)

DATE	
ACTUAL MILEAGE	SERVICED BY:

Long Trip / Highway Scheduled Maintenance — Diesel Engines

20,000 Miles (32 000 km)

- Change engine oil and filter (or every 12 months, whichever occurs first).
An Emission Control Service.
- Lubricate chassis components (or every 12 months, whichever occurs first).
(See footnote #.)
- Inspect shields and underhood insulation for damage or looseness. Adjust or replace as required.
This is a Noise Emission Control Service. Applicable only to vehicles sold in the United States.
- Check the air intake system installation to assure gaskets are properly sealed and all hose connections, fasteners and other components are tight. Also check to be sure the air cleaner housing is properly seated and the cover fits tightly. Tighten connections and fasteners or replace damaged parts as necessary.
This is a Noise Emission Control Service. Applicable only to vehicles sold in the United States.
- If your engine has a thermostatically controlled cooling fan, inspect all hoses and ducts for proper hook-up (or every 12 months, whichever occurs first). Be sure the valve works properly. *This is a Noise Emission Control Service. Applicable only to vehicles sold in the United States.*
- Check axle fluid level and add fluid as needed. (See footnote **.)

DATE	
ACTUAL MILEAGE	SERVICED BY:

25,000 Miles (40 000 km)

- Change engine oil and filter (or every 12 months, whichever occurs first).
An Emission Control Service.

DATE	
ACTUAL MILEAGE	SERVICED BY:

Long Trip / Highway Scheduled Maintenance — Diesel Engines

25,000 Miles (40 000 km) Continued

- Lubricate chassis components (or every 12 months, whichever occurs first). (See footnote #.)
- Rotate tires. See "Tire Inspection and Rotation" in the Index for proper rotation pattern and additional information. (See footnote +.)
- Check axle fluid level and add fluid as needed. (See footnote **.)

30,000 Miles (48 000 km)

- Change engine oil and filter (or every 12 months, whichever occurs first).
An Emission Control Service.
- Lubricate chassis components (or every 12 months, whichever occurs first).
(See footnote #.)
- Replace air cleaner filter.
An Emission Control Service.
- Clean and repack the front wheel bearings (or at each brake relining, whichever occurs first).
- Replace fuel filter.
- Inspect shields and underhood insulation for damage or looseness. Adjust or replace as required.
This is a Noise Emission Control Service. Applicable only to vehicles sold in the United States.
- Inspect/adjust auto apply parking brake system. (if equipped)

DATE	
ACTUAL MILEAGE	SERVICED BY:

Long Trip / Highway Scheduled Maintenance — Diesel Engines

30,000 Miles (48 000 km) Continued

- Check the air intake system installation to assure gaskets are properly sealed and all hose connections, fasteners and other components are tight. Also check to be sure the air cleaner housing is properly seated and the cover fits tightly. Tighten connections and fasteners or replace damaged parts as necessary. *This is a Noise Emission Control Service. Applicable only to vehicles sold in the United States.*
- If your engine has a thermostatically controlled cooling fan, inspect all hoses and ducts for proper hook-up (or every 12 months, whichever occurs first). Be sure the valve works properly. *This is a Noise Emission Control Service. Applicable only to vehicles sold in the United States.*
- Check axle fluid level and add fluid as needed. (See footnote **.)
- Engine Code Y only: Adjust engine idle speed to specifications shown on the underhood label using calibrated test equipment. Check the idle stop solenoid or dashpot works properly (if equipped).

35,000 Miles (56 000 km)

- Change engine oil and filter (or every 12 months, whichever occurs first). *An Emission Control Service.*
- Lubricate chassis components (or every 12 months, whichever occurs first). (See footnote #.)
- Rotate tires. See “Tire Inspection and Rotation” in the Index for proper rotation pattern and additional information. (See footnote +.)
- Check axle fluid level and add fluid as needed. (See footnote **.)

DATE	
ACTUAL MILEAGE	SERVICED BY:

Long Trip / Highway Scheduled Maintenance — Diesel Engines

40,000 Miles (64 000 km)

- Change engine oil and filter (or every 12 months, whichever occurs first).
An Emission Control Service.
- Lubricate chassis components (or every 12 months, whichever occurs first).
(See footnote #.)
- Inspect shields and underhood insulation for damage or looseness. Adjust or replace as required.
This is a Noise Emission Control Service. Applicable only to vehicles sold in the United States.
- Check the air intake system installation to assure that gaskets are properly sealed and that all hose connections, fasteners and other components are tight. Also check to be sure that the air cleaner housing is properly seated and the cover fits tightly. Tighten connections and fasteners or replace damaged parts as necessary. *This is a Noise Emission Control Service. Applicable only to vehicles sold in the United States.*
- If your engine has a thermostatically controlled cooling fan, inspect all hoses and ducts for proper hook-up (or every 12 months, whichever occurs first). Be sure the valve works properly.
This is a Noise Emission Control Service. Applicable only to vehicles sold in the United States.
- Check axle fluid level and add fluid as needed. (See footnote **.)

45,000 Miles (72 000 km)

- Change engine oil and filter (or every 12 months, whichever occurs first).
An Emission Control Service.

DATE	
ACTUAL MILEAGE	SERVICED BY:

Long Trip / Highway Scheduled Maintenance — Diesel Engines

45,000 Miles (72 000 km) Continued

- Lubricate chassis components (or every 12 months, whichever occurs first).
(See footnote #.)
- Rotate tires. See “Tire Inspection and Rotation” in the Index for proper rotation pattern and additional information. (See footnote +.)
- Check axle fluid level and add fluid as needed. (See footnote **.)

50,000 Miles (80 000 km)

- Change engine oil and filter (or every 12 months, whichever occurs first).
An Emission Control Service.
- Lubricate chassis components (or every 12 months, whichever occurs first).
(See footnote #.)
- Change automatic transmission fluid and filter. Manual transmission fluid doesn’t require change.
- Inspect shields and underhood insulation for damage or looseness. Adjust or replace as required.
This is a Noise Emission Control Service. Applicable only to vehicles sold in the United States.
- Check the air intake system installation to assure gaskets are properly sealed and all hose connections, fasteners and other components are tight. Also check to be sure the air cleaner housing is properly seated and the cover fits tightly. Tighten connections and fasteners or replace damaged parts as necessary.
This is a Noise Emission Control Service. Applicable only to vehicles sold in the United States.

DATE	
ACTUAL MILEAGE	SERVICED BY:

Long Trip / Highway Scheduled Maintenance — Diesel Engines

50,000 Miles (80 000 km) Continued

- If your engine has a thermostatically controlled cooling fan, inspect all hoses and ducts for proper hook-up (or every 12 months, whichever occurs first). Be sure the valve works properly.
This is a Noise Emission Control Service. Applicable only to vehicles sold in the United States.
- Check axle fluid level and add fluid as needed. (See footnote **).

55,000 Miles (88 000 km)

- Change engine oil and filter (or every 12 months, whichever occurs first).
An Emission Control Service.
- Lubricate chassis components (or every 12 months, whichever occurs first).
(See footnote #.)
- Rotate tires. See “Tire Inspection and Rotation” in the Index for proper rotation pattern and additional information. (See footnote +.)
- Check axle fluid level and add fluid as needed. (See footnote **.)

DATE	
ACTUAL MILEAGE	SERVICED BY:

Long Trip / Highway Scheduled Maintenance — Diesel Engines

60,000 Miles (96 000 km)

- Change engine oil and filter (or every 12 months, whichever occurs first).
An Emission Control Service.
- Lubricate chassis components (or every 12 months, whichever occurs first).
(See footnote #.)
- Replace air cleaner filter.
An Emission Control Service.
- Clean and repack the front wheel bearings (or at each brake relining, whichever occurs first).
- Check the crankcase depression regulator valve system for any worn, plugged or collapsed hoses. See service manual. *An Emission Control Service.*
- Replace fuel filter.
- Inspect accessory drive (serpentine) belt for cracks, fraying and wear and check belt for proper tension. Replace belt as needed. *An Emission Control Service.*
- Inspect shields and underhood insulation for damage or looseness. Adjust or replace as required.
This is a Noise Emission Control Service. Applicable only to vehicles sold in the United States.
- Check the air intake system installation to assure gaskets are properly sealed and all hose connections, fasteners and other components are tight. Also check to be sure the air cleaner housing is properly seated and the cover fits tightly. Tighten connections and fasteners or replace damaged parts as necessary.
This is a Noise Emission Control Service. Applicable only to vehicles sold in the United States.

DATE	
ACTUAL MILEAGE	SERVICED BY:

Long Trip / Highway Scheduled Maintenance — Diesel Engines

60,000 Miles (96 000 km) Continued

- If your engine has a thermostatically controlled cooling fan, inspect all hoses and ducts for proper hook-up (or every 12 months, whichever occurs first). Be sure the valve works properly.
This is a Noise Emission Control Service. Applicable only to vehicles sold in the United States.
- Engine Code Y only: Adjust engine idle speed to specifications shown on the underhood label using calibrated test equipment. Check the idle stop solenoid or dashpot works properly (if equipped).
- Check axle fluid level and add fluid as needed. (See footnote **.)
- Inspect/adjust auto apply parking brake system. (if equipped)

65,000 Miles (104 000 km)

- Change engine oil and filter (or every 12 months, whichever occurs first).
An Emission Control Service.
- Lubricate chassis components (or every 12 months, whichever occurs first).
(See footnote #.)
- Rotate tires. See “Tire Inspection and Rotation” in the Index for proper rotation pattern and additional information. (See footnote +.)
- Check axle fluid level and add fluid as needed. (See footnote **.)

DATE	
ACTUAL MILEAGE	SERVICED BY:

Long Trip / Highway Scheduled Maintenance — Diesel Engines

70,000 Miles (112 000 km)

- Change engine oil and filter (or every 12 months, whichever occurs first).
An Emission Control Service.
- Lubricate chassis components (or every 12 months, whichever occurs first).
(See footnote #.)
- Inspect shields and underhood insulation for damage or looseness. Adjust or replace as required.
This is a Noise Emission Control Service. Applicable only to vehicles sold in the United States.
- Check the air intake system installation to assure gaskets are properly sealed and all hose connections, fasteners and other components are tight. Also check to be sure the air cleaner housing is properly seated and the cover fits tightly. Tighten connections and fasteners or replace damaged parts as necessary.
This is a Noise Emission Control Service. Applicable only to vehicles sold in the United States.
- If your engine has a thermostatically controlled cooling fan, inspect all hoses and ducts for proper hook-up (or every 12 months, whichever occurs first). Be sure the valve works properly.
This is a Noise Emission Control Service. Applicable only to vehicles sold in the United States.
- Check axle fluid level and add fluid as needed. (See footnote **.)

DATE	
ACTUAL MILEAGE	SERVICED BY:

Long Trip / Highway Scheduled Maintenance — Diesel Engines

75,000 Miles (120 000 km)

- Change engine oil and filter (or every 12 months, whichever occurs first).
An Emission Control Service.
- Lubricate chassis components (or every 12 months, whichever occurs first).
(See footnote #.)
- Rotate tires. See “Tire Inspection and Rotation” in the Index for proper rotation pattern and additional information. (See footnote +.)
- Check axle fluid level and add fluid as needed. (See footnote **.)

DATE	
ACTUAL MILEAGE	SERVICED BY:

80,000 Miles (128 000 km)

- Change engine oil and filter (or every 12 months, whichever occurs first).
An Emission Control Service.
- Lubricate chassis components (or every 12 months, whichever occurs first).
(See footnote #.)
- Inspect shields and underhood insulation for damage or looseness. Adjust or replace as required.
This is a Noise Emission Control Service. Applicable only to vehicles sold in the United States.

DATE	
ACTUAL MILEAGE	SERVICED BY:

Long Trip / Highway Scheduled Maintenance — Diesel Engines

80,000 Miles (128 000 km) Continued

- Check the air intake system installation to assure gaskets are properly sealed and all hose connections, fasteners and other components are tight. Also check to be sure the air cleaner housing is properly seated and the cover fits tightly. Tighten connections and fasteners or replace damaged parts as necessary.
This is a Noise Emission Control Service. Applicable only to vehicles sold in the United States.
- If your engine has a thermostatically controlled cooling fan, inspect all hoses and ducts for proper hook-up (or every 12 months, whichever occurs first). Be sure the valve works properly.
This is a Noise Emission Control Service. Applicable only to vehicles sold in the United States.
- Check axle fluid level and add fluid as needed. (See footnote **.)

85,000 Miles (136 000 km)

- Change engine oil and filter (or every 12 months, whichever occurs first).
An Emission Control Service.
- Lubricate chassis components (or every 12 months, whichever occurs first).
(See footnote #.)
- Rotate tires. See “Tire Inspection and Rotation” in the Index for proper rotation pattern and additional information. (See footnote +.)
- Check axle fluid level and add fluid as needed. (See footnote **.)

DATE	
ACTUAL MILEAGE	SERVICED BY:

Long Trip / Highway Scheduled Maintenance — Diesel Engines

90,000 Miles (144 000 km)

- Change engine oil and filter (or every 12 months, whichever occurs first).
An Emission Control Service.
- Lubricate chassis components (or every 12 months, whichever occurs first).
(See footnote #.)
- Replace air cleaner filter.
An Emission Control Service.
- Clean and repack the front wheel bearings (or at each brake relining, whichever occurs first).
- Replace fuel filter.
- Inspect shields and underhood insulation for damage or looseness. Adjust or replace as required.
This is a Noise Emission Control Service. Applicable only to vehicles sold in the United States.
- Check the air intake system installation to assure gaskets are properly sealed and all hose connections, fasteners and other components are tight. Also check to be sure the air cleaner housing is properly seated and the cover fits tightly. Tighten connections and fasteners or replace damaged parts as necessary.
This is a Noise Emission Control Service. Applicable only to vehicles sold in the United States.
- If your engine has a thermostatically controlled cooling fan, inspect all hoses and ducts for proper hook-up (or every 12 months, whichever occurs first). Be sure the valve works property.
This is a Noise Emission Control Service. Applicable only to vehicles sold in the United States.
- Inspect/adjust auto apply parking brake system. (if equipped)

DATE	
ACTUAL MILEAGE	SERVICED BY:

Long Trip / Highway Scheduled Maintenance — Diesel Engines

90,000 Miles (144 000 km) Continued

- Engine Code Y only: Adjust engine idle speed to specifications shown on the underhood label using calibrated test equipment. Check that the idle stop solenoid or dashpot works properly (if equipped).
- Check axle fluid level and add fluid as needed. (See footnote **.)

95,000 Miles (152 000 km)

- Change engine oil and filter (or every 12 months, whichever occurs first).
An Emission Control Service.
- Lubricate chassis components (or every 12 months, whichever occurs first).
(See footnote #.)
- Rotate tires. See “Tire Inspection and Rotation” in the Index for proper rotation pattern and additional information. (See footnote +.)
- Check axle fluid level and add fluid as needed. (See footnote **.)

DATE	
ACTUAL MILEAGE	SERVICED BY:

100,000 Miles (160 000 km)

- Change engine oil and filter (or every 12 months, whichever occurs first).
An Emission Control Service.
- Lubricate chassis components (or every 12 months, whichever occurs first).
(See footnote #.)

DATE	
ACTUAL MILEAGE	SERVICED BY:

Long Trip / Highway Scheduled Maintenance — Diesel Engines**100,000 Miles (160 000 km) Continued**

- Change automatic transmission fluid and filter. Manual transmission fluid doesn't require change.
- Inspect shields and underhood insulation for damage or looseness. Adjust or replace as required.
This is a Noise Emission Control Service. Applicable only to vehicles sold in the United States.
- Check the air intake system installation to assure gaskets are properly sealed and all hose connections, fasteners and other components are tight. Also check to be sure the air cleaner housing is properly seated and the cover fits tightly. Tighten connections and fasteners or replace damaged parts as necessary.
This is a Noise Emission Control Service. Applicable only to vehicles sold in the United States.
- If your engine has a thermostatically controlled cooling fan, inspect all hoses and ducts for proper hook-up (or every 12 months, whichever occurs first). Be sure the valve works properly.
This is a Noise Emission Control Service. Applicable only to vehicles sold in the United States.
- Check axle fluid level and add fluid as needed. (See footnote **.)

Long Trip / Highway Scheduled Maintenance — Diesel Engines

150,000 Miles (240 000 km)

- Drain, flush and refill the cooling system with new coolant (or every 60 months, whichever occurs first). See “Engine Coolant” in the Index for what to use. *An Emission Control Service.*
- Also inspect the hoses and replace them if they are cracked, swollen or deteriorated. Tighten all hose clamps (except constant tension clamps). Remove debris and clean the outside of the radiator and air conditioning condenser. Wash the radiator neck. To ensure proper operation, pressure test the radiator and cap.
- Inspect/adjust auto apply parking brake system (if equipped).

DATE	
ACTUAL MILEAGE	SERVICED BY:

Maintenance Schedule — Cummins ISB (4 and 6 Cylinder) Diesel Engines

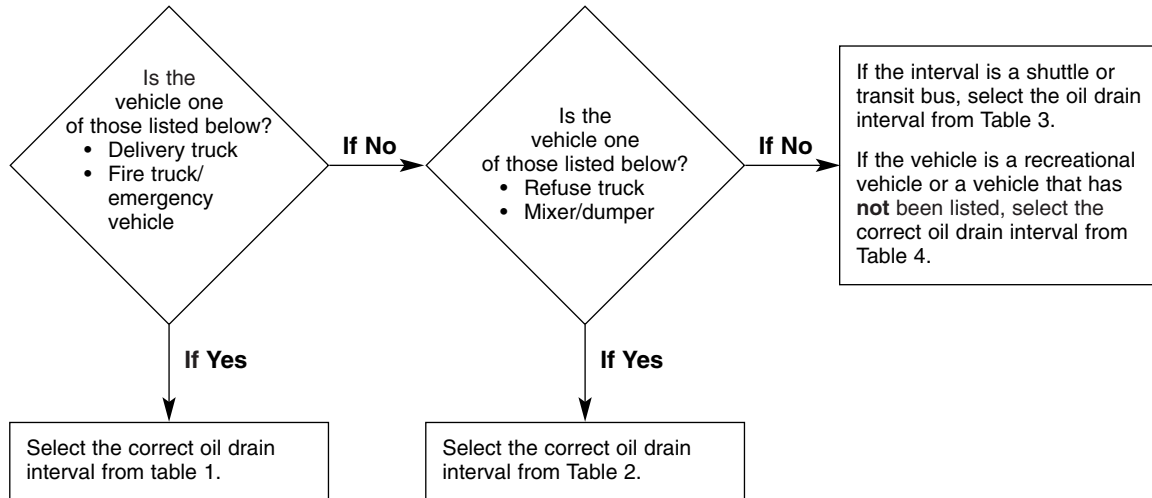
Daily or Refueling	Every 7500 mi (12,000 km), 250 Hours, or 3 Months (3)	Every 15,000 mi (24,000 km), 500 Hours, or 6 Months (3)
Maintenance Check	Check/Inspect	Change/Replace/Inspect
<ul style="list-style-type: none"> • Check and correct <ul style="list-style-type: none"> — Engine oil level — Coolant level • Check air intake piping • Drain fuel-water separator • Inspect cooling fan • Inspect engine • Check crankcase breather tube • Drain air tanks and reservoirs 	<ul style="list-style-type: none"> • Mounting hardware <ul style="list-style-type: none"> — Injection pump — Air compressor • Check air intake piping • Check charge air cooler • Check air cleaner restriction 	<ul style="list-style-type: none"> • Check antifreeze (2) • Change fuel filter • Change lubricating oil (1) • Change lubricating oil filter (1)
<ol style="list-style-type: none"> 1. The lubricating oil and lubricating oil filter interval can be adjusted based on application, fuel consumption, gross vehicle weight, and idle time. Refer to “Oil Drain Intervals”. (Found in Table 3 later in this section.) 2. Antifreeze check interval is every oil change or 15,000 mi (24,000 km), 500 hours, or 6 months, whichever occurs first. Must use a heavy-duty year round antifreeze that meets the chemical composition of GM6038M. The antifreeze change interval is 2 years or 200,000 mi (320,000 km), whichever comes first. Antifreeze is essential for freeze, overheat, and corrosion protection. 3. Follow the manufacturer’s recommended maintenance procedures for the starter, alternator, generator, batteries, electrical components, exhaust brake, charge air cooler, radiator, air compressor, air cleaner, freon compressor, and fan clutch. Refer to the Workhorse Service Manual Supplement. 		

Maintenance Schedule — Cummins ISB (4 and 6 Cylinder) Diesel Engines

Every 30,000 mi (48,000 km), 1000 Hours, or 1 Year (2)	Every 60,000 mi (96,000 km), 2000 Hours, or 2 Years (2)	Every 150,000 mi (241,500 km), 5000 Hours, or 4 Years (2)
Maintenance Check	Check/Inspect/Replace	Change/Inspect
<ul style="list-style-type: none"> • Fan Hub • Belt Tensioner • Drive belts 	<ul style="list-style-type: none"> • Vibration Damper • Replace antifreeze (1) • Radiator hoses 	<ul style="list-style-type: none"> • Overhead valve lash (3)
<ol style="list-style-type: none"> 1. Antifreeze check interval is every oil change or 15,000 mi (24,000 km), 500 hours, or 6 months, whichever occurs first. Must use a heavy-duty year round antifreeze that meets the chemical composition of GM6038M. The antifreeze change interval is 2 years or 200,000 mi (320,000 km), whichever comes first. Antifreeze is essential for freeze, overheat, and corrosion protection. 2. Follow the manufacturer's recommended maintenance procedures for the starter, alternator, generator, batteries, electrical components, exhaust brake, charge air cooler, radiator, air compressor, air cleaner, freon compressor, and fan clutch. Refer to the Workhorse Service Manual Supplement. 3. Reset valves to nominal values if outside specification. Lash specification is 0.006 to 0.015 in (0.152 to 0.381 mm) for intake valve lash and 0.015 to 0.030 in (0.381 to 0.762 mm) for exhaust valve lash. Measure valve lash every 50,000 mi (81,000 km) after the first valve lash check. 		

Maintenance Schedule — Cummins ISB (4 and 6 Cylinder) Diesel Engines**Oil Drain Intervals**

Refer to the following flowchart to determine the maximum recommended oil change and filter change intervals in kilometers, miles, hours, or months, whichever comes first.



Maintenance Schedule — Cummins ISB (4 and 6 Cylinder) Diesel Engines

Table 1, Maximum Oil Drain Intervals

(A) Severe-Duty (If the vehicle meets any of these conditions)	(B) Normal Duty (If the vehicle meets both of these conditions)
Average fuel economy is less than 7.0 mpg [2.998 km/liter], or idle time is 40 percent or greater, or vehicle operates in dusty areas, or gross vehicle weight is greater than 46,000 lb [20,865 kg].	Average fuel economy is greater than 7.0 mpg [2.998 km/liter], or idle time is 40 percent or less, or vehicle operates in dusty areas, or gross vehicle weight is greater than 46,000 lb [20,865 kg].
Vehicle uses the severe-duty oil drain interval (A).	Vehicle uses the normal-duty oil drain interval (B).
(A) Severe-Duty 9000 mi [14,500 km], 500 hours, 6 months, or 2000 gal [7571 liters] of fuel, whichever comes first.	(B) Normal-Duty (C) 15,000 mi (24,000 km), 500 hours, 6 months, or 2000 gal [7571 liters] of fuel, whichever comes first.

Table 2, Oil Drain Intervals

Refuse Truck, Mixer, or Dump Truck	Miles	Kilometers	Hours	Months
Below 10-mph average	3000	4850	500	6
10- to 15-mph average	6000	9650	500	6
15- to 20-mph average	8500	13,770	500	6
20- to 25-mph average	9000	14,500	500	6
Higher than 25-mph average	12,000	19,000	500	6

Maintenance Schedule — Cummins ISB (4 and 6 Cylinder) Diesel Engines
Table 3, Oil Drain Intervals

Shuttle or Transit Bus	Miles	Kilometers	Hours	Months
2- to 4-mph average	1500	2400	500	6
4- to 6-mph average	3000	4850	500	6
6- to 8-mph average	4000	6450	500	6
8- to 10-mph average	5000	8050	500	6
10- to 15-mph average	6000	9650	500	6

Table 4, Oil Drain Intervals

Vehicle/Equipment	Miles	Kilometers	Hours	Months
Recreational vehicle	15,000	24,000	500	12
Truck crane	9000	14,500	500	6
Yard spotter	9000	14,500	500	6
All others	9000	14,500	500	6

PART B: OWNER CHECKS AND SERVICES

Listed in this part are owner checks and services which should be performed at the intervals specified to help ensure the safety, dependability and emission control performance of your vehicle.

Be sure any necessary repairs are completed at once. Whenever any fluids or lubricants are added to your vehicle, make sure they are the proper ones, as shown in Part D.

At the First 100, 1,000 and 6,000 Miles (160, 1 600 and 10 000 km)

For vehicles with dual wheels, check dual wheel nut torque. For proper torque, see “Wheel Nut Torque” in the Index.

At Each Fuel Fill

It is important for you or a service station attendant to perform these underhood checks at each fuel fill.

Engine Oil Level Check

Check the engine oil level and add the proper oil if necessary. (See “Engine Oil” in the Index for further details).

Engine Coolant Level Check

Check the engine coolant level and add DEX-COOL® coolant mixture if necessary. (See “Engine Coolant” in the Index for further details).

Tire Inflation Check

Check tire inflation cold. Make sure tires are inflated to the pressures specified on the Certification/Tire Label. (See “Tires” in the Index for further details).

At Least Twice a Year

Manual Transmission Check

Check the transmission fluid level; add if needed. (See “Manual Transmission Fluid” in the Index). Check for leaks. A fluid loss may indicate a problem. Have the system inspected and repaired, if needed.

Automatic Transmission Check

Check the transmission fluid level; add if needed. (See “Automatic Transmission Fluid” in the Index). A fluid loss may indicate a problem. Check the system and repair if needed.

Hydraulic Clutch System Check

Check the fluid level in the clutch reservoir. (See “Hydraulic Clutch” in the Index). A fluid loss in this system could indicate a problem. Have the system inspected and repaired at once.

At Least Once a Year

Starter Switch Check



CAUTION

When you are doing this check, the vehicle could move suddenly. If it does, you or others could be injured. Follow the listed steps.

1. Before you start, be sure you have enough room around the vehicle.
2. Firmly apply both the parking brake (see “Parking Brake” in the Index, if necessary) and the regular brake.

NOTE: Do not use the accelerator pedal, and be ready to turn off the engine immediately if it starts.

3. On automatic transmission vehicles, try to start the engine in each gear. The starter should work only in **PARK (P)** or **NEUTRAL (N)**. If the starter works in any other position, your vehicle needs service.

On manual transmission vehicles, put the shift lever in **NEUTRAL (N)**, push the clutch down halfway and try to start the engine. The starter should work only when the clutch is pushed down all the way to the floor. If the starter works when the clutch is not pushed all the way down, your vehicle needs service.

Brake-Transmission Shift Interlock (BTSI) Check (Automatic Transmission)



CAUTION

When you are doing this check, the vehicle could move suddenly. If it does, you or others could be injured. Follow the steps below.

1. Before you start, be sure you have enough room around the vehicle. It should be parked on a level surface.
2. Firmly apply the parking brake (see “Parking Brake” in the Index, if necessary).

NOTE: *Be ready to apply the regular brake immediately if the vehicle begins to move.*

3. With the engine off, turn the key to the RUN position, but do not start the engine. Without applying the regular brake, try to move the shift lever, or **PBSS**, (where fitted with ECS), out of **PARK (P)** with normal effort. If the shift lever or **PBSS** moves out of **PARK (P)**, your vehicle's **BTSI** needs service.

Ignition Transmission Lock Check

While parked, and with the parking brake set, try to turn the ignition key to **LOCK** in each shift lever position.

- With an automatic transmission, the key should turn to **LOCK** only when the shift lever or **PBSS** is in **PARK (P)**.
- With a manual transmission, the key should turn to **LOCK** when the shift lever is in any gear position.

On vehicles with a key release lever, try to turn the key to **LOCK** without pressing the lever. The key should turn to **LOCK** only when you press the key lever.

On all vehicles, the key should come out only in **LOCK**.

Parking Brake and Automatic Transmission PARK (P) Mechanism Check



CAUTION

When you are doing this check, your vehicle could begin to move. You or others could be injured and property could be damaged. Make sure there is room in front of your vehicle in case it begins to roll. Be ready to apply the regular brake at once should the vehicle begin to move.

Park on a fairly steep hill, with the vehicle facing downhill. Keeping your foot on the regular brake, set the parking brake.

- To check the parking brake's holding ability: With the engine running and transmission in **NEUTRAL (N)**, slowly remove foot pressure from the regular brake pedal. Do this until the vehicle is held by the parking brake only.

- To check the **PARK (P)** mechanism's holding ability: With the engine running, shift to **PARK (P)**. Then release all brakes.
- To check the parking brake's holding ability if fitted with an Auto-Apply Parking Brake: with the engine running and the transmission in **PARK (P)**, slowly remove foot pressure from the regular brake pedal. Do this until the vehicle is held by the parking brake only.

Underbody Flushing Service

At least every spring, use plain water to flush any corrosive materials from the underbody. Take care to clean thoroughly any areas where mud and other debris can collect.

NOTE: *Allow vehicle to dry in open area, letting air circulate underneath coach before storage.*

PART C: PERIODIC MAINTENANCE INSPECTIONS

Listed in this part are inspections and services which should be performed at least twice a year (for instance each spring and fall). *You should let your dealer's service department or other qualified service center perform these services. Make sure any necessary repairs are completed at once.*

Proper procedures to perform these services may be found in a service manual. (See "Service and Owner Publications" in the Index).

Steering and Suspension Inspection

Inspect the front and rear suspension and steering system for damaged, loose or missing parts, signs of wear or lack of lubrication (u-bolts, spring shackles, shock bolts etc. to specified torque value). Inspect the power steering lines and hoses for proper hook-up, binding, leaks, cracks, chafing, etc.

Exhaust System Inspection

Inspect the complete exhaust system. Inspect the body near the exhaust system. Look for broken, damaged, missing or out-of-position parts as well as open seams, holes, loose connections or other conditions which could cause a heat build-up in the floor pan or could let exhaust fumes into the vehicle. (See "Engine Exhaust" in the Index).

Engine Cooling System Inspection

Inspect the hoses and have them replaced if they are cracked, swollen or deteriorated. Inspect all pipes, fittings and clamps; replace as needed. Clean the outside of the radiator and air conditioning condenser. To help ensure proper operation, a pressure test of the cooling system and pressure cap is recommended at least once a year.

Throttle System Inspection

Inspect the throttle system for interference or binding, and for damaged or missing parts. Replace parts as needed. Replace any components which have high effort or excessive wear. Do not lubricate accelerator and cruise control cables.

Rear Axle Service

Check the gear lubricant level in the rear axle and add, if needed. (See “Rear Axle” in the Index). A fluid loss may indicate a problem. Check the axle and repair it, if needed.

Brake System Inspection

Inspect the complete system. Inspect brake lines and hoses for proper hook-up, binding, leaks, cracks, chafing, etc. Inspect disc brake pads for wear and rotors for surface condition. For vehicles with rear drum brakes, also inspect drum brake linings for wear and cracks. Inspect other brake parts, including drums, wheel cylinders, calipers, parking brake, etc. Check parking brake adjustment. You may need to have your brakes inspected more often if your driving habits or conditions result in frequent braking.

PART D: RECOMMENDED FLUIDS AND LUBRICANTS

NOTE: Fluids and lubricants identified below by name, part number or specification may be obtained from your dealer.

USAGE	FLUID/LUBRICANT
Engine Oil (Gasoline Engine)	Engine Oil with the American Petroleum Institute Certified For Gasoline Engines “Starburst” symbol of the proper viscosity. To determine the preferred viscosity for your vehicle’s engine, see “Engine Oil” in the Index.

USAGE	FLUID/LUBRICANT
Engine Oil (Diesel Engine)	Engine Oil with the letters CG-4 is best for your vehicle. The CG-4 designation may appear either alone, or in combination with other API designations, such as API CG-4/SH, CG-4/SJ, SH/CG-4 or SJ/CG-4. These letters show American Petroleum Institute (API) levels of quality. To determine the preferred viscosity for your vehicle’s diesel engine, see “Engine Oil” in the Index.
Engine Coolant	50/50 mixture of clean, drinkable water and use DEX-COOL®. See “Engine Coolant” in the Index.

Section 5

Scheduled Maintenance Services

USAGE	FLUID/LUBRICANT
Hydraulic Brake System	Delco Supreme 11® Brake Fluid or equivalent DOT-3 Brake Fluid.
Hydraulic Clutch System	Delco Supreme 11® Brake Fluid or equivalent DOT-3 Brake Fluid.
Electric Hydraulic Auto Parking Brake	DEXRON®-III Automatic Transmission Fluid.
Parking Brake Cable Guides	Chassis Lubricant meeting requirements of NLGI # 2, Category LB or GC-LB.
Park Brake Cam Switch and Linkage	Chassis Lubricant meeting requirements of NLGI # 2, Category LB or GC-LB.
Power Steering System	Power Steering Fluid

USAGE	FLUID/LUBRICANT
Manual Transmission (5-Speed with Low Gear)	Synthetic Manual Transmission Fluid SAE 75W-90 GL-4 Gear Oil.
Automatic Transmission	DEXRON®-III Automatic Transmission Fluid.
Chassis Lubrication	Chassis Lubricant meeting requirements of NLGI # 2, Category LB or GC-LB.
Front Wheel Bearings	Wheel Bearing Lubricant meeting requirements of NLGI # 2, Category GC or GC-LB.
Front Wheel Bearings with Oil Filled Hubs	SAE 90W GL-5 Gear Oil.
Differential, Rear Axle	Synthetic Rear Axle Fluid SAE 75W-90 GL-5 Gear Oil.
Propshaft Splines and Universal Joints	Chassis Lubricant meeting requirements of NLGI # 2, Category LB or GC-LB.

PART E: MAINTENANCE RECORD

After the scheduled services are performed, record the date, odometer reading and who performed the service in the boxes provided after the maintenance interval.

Any additional information from “Owner Checks and Services” or “Periodic Maintenance” can be added on the following record pages. Also, you should retain all maintenance receipts. Your owner information portfolio is a convenient place to store them.

MAINTENANCE RECORD			
DATE	ODOMETER READING	SERVICED BY	MAINTENANCE PERFORMED

This section tells you how to contact Workhorse if you need assistance with your Workhorse chassis. In this section you will also find information about your Workhorse Limited Warranty, including information about coverage for your Workhorse chassis' emissions control systems.

Table Of Contents

Part A – Owner Information	6-2	Part G – DISCLAIMER OF ALL	6-22
Part B – Customer Assistance and	6-3	OTHER WARRANTIES	
Roadside Assistance		Part H – Things You Should Know About Your Workhorse	
Part C – Customer Satisfaction Procedures	6-5	Limited Warranty	6-23
Part D – Introduction to the Limited	6-6	Part I – Workhorse Participation in the	6-28
Warranty on Your Workhorse Chassis		BBB Autoline Program	
Part E – Chassis Operation and Care	6-8	Part J – State Warranty Laws	6-29
Part F – Your Workhorse Limited Warranty	6-9	Part K – Reporting Safety-Related Concerns	6-30
What is Covered	6-9	Part L – Workhorse Service Publications	6-31
What is Not Covered.....	6-18		

Part A – OWNER INFORMATION

Owner's Name: _____

Street Address: _____

City & State: _____

Vehicle Identification Number (VIN): _____

Warranty Start Date and Mileage*: _____

Date of Purchase/Delivery: _____

Coach/Body Manufacturer: _____

Selling Dealer: _____

****Note: Ask your selling dealer if you are eligible for a Delayed Warranty Start (see Part H of this Section). Your warranty start date will be the date Workhorse shipped your Workhorse chassis from the factory, unless a Delayed Warranty Start form is completed and submitted by your selling dealer and approved by Workhorse. This is necessary for first and subsequent owners.***

Part B – CUSTOMER ASSISTANCE AND ROADSIDE ASSISTANCE

Workhorse Custom Chassis, LLC
Customer Relations
850 Stephenson Highway, Suite #510
Troy, MI 48083-1174

I. CUSTOMER ASSISTANCE

Your complete satisfaction with your Workhorse chassis is our goal. If you have any questions or concerns with your Workhorse chassis, please take the following steps:

- A. Contact your sales representative or service department at the dealership where you purchased your Workhorse chassis.
- B. If your inquiry is not resolved to your satisfaction, contact the sales manager or service manager at the dealership.
- C. If your inquiry is not resolved with the sales manager or service manager at the dealership, please contact Workhorse Customer Relations at 1-877-946-7731, or to write to us at the following address:

II. ROADSIDE ASSISTANCE

Workhorse provides, at no charge to you, roadside assistance for three years or 36,000 miles (57,600 kilometers), whichever occurs first. If you experience any problems with your Workhorse chassis while you are on the road, you should contact roadside assistance 24 hours a day, 365 days a year, by calling 1-877-946-7731. By calling this toll-free number, you can obtain over-the-phone assistance with any minor problems you may experience with your Workhorse chassis. If your problems cannot be resolved by telephone, our representatives can guide you to a nationwide network of service providers.

The following services are available through roadside assistance:

- Towing for warranty repairs
- Basic over-the-phone technical advice
- References to dealer services (for example: locksmith, glass repair, etc.)

For prompt, efficient assistance when calling, please have the following information available:

- Vehicle Identification Number (VIN)
- License plate number
- Vehicle type (recreational vehicle, step van, etc.)
- Vehicle location
- Telephone number where you can be reached
- Vehicle mileage
- Description of the problem

Workhorse roadside assistance uses a network of high quality independent service providers that will provide you with priority service. Any payment obligations you may incur for non-warranty repairs from these service providers

should be explained to you by the roadside assistance advisors.

After the expiration of three years or 36,000 miles (57,600 kilometers), whichever occurs first, you may continue to contact Workhorse roadside assistance at the toll-free number if you require assistance with your Workhorse chassis while on the road; however, all repair and related services will be at your expense.

Part C – CUSTOMER SATISFACTION PROCEDURES

Your satisfaction is important to Workhorse and your dealer. Any concerns that you may have with the purchase or operation of your Workhorse chassis should first be brought to the attention of your dealer's sales or service departments. If your concern has not been resolved to your satisfaction, please take the following steps:

- I. Discuss your concern with a member of your dealer's management. If the matter has already been reviewed with a member of your dealer's management, contact the owner of the dealer facility.
- II. If your concern cannot be resolved by your dealer, call Workhorse Customer Relations Department toll-free at 1877946-7731.

Please have the following information available:

- Vehicle Identification Number (VIN). This is a 17 digit number starting with a 5 and can be found on your vehicle registration or title or the plate above the left top of the instrument panel
- Dealer name and location
- Vehicle delivery date and present mileage

- III. Both Workhorse and your Workhorse dealer are committed to ensuring that you are completely satisfied with your Workhorse chassis. However, if you remain unsatisfied after following the "Customer Satisfaction Procedure," you may file a complaint with the BBB Autoline Program as set forth Part I of in this Section.

Part D – INTRODUCTION TO THE LIMITED WARRANTY ON YOUR WORKHORSE CHASSIS**I. Workhorse’s Commitment to You**

Thank you for your purchase of your Workhorse chassis. Workhorse stands committed, along with your Workhorse dealer, to assuring your complete satisfaction with your Workhorse chassis.

II. Purpose of Section

This Section explains in detail the limited warranty coverage that applies to your Workhorse chassis (Workhorse Limited Warranty), as well as coverage that applies to your Workhorse chassis’ emissions control systems warranties (Emissions Warranties).

III. Warranty Repairs

All warranty repairs that may be required on your Workhorse chassis must be performed by an authorized Workhorse service facility (except

as set forth under “Emergency Repairs” below in this Part).

Your selling dealer would like to complete the repairs, but you may also take your vehicle to any other authorized Workhorse service facility. Please note that certain warranty repairs require special training, so not all dealers are authorized to perform all warranty repairs. If your selling dealer is unable to complete your warranty repairs, contact Workhorse Customer Relations at 1-877-946-7731.

IV. Who Pays for Warranty Repairs

You will not be charged for any warranty repairs on your Workhorse chassis if the repairs are covered under your Workhorse Limited Warranty and the repairs are made during your applicable warranty period.

Some states and/or local governments may assess a tax on some warranty repairs performed on your Workhorse chassis. Where applicable law provides, the tax must be paid by you, the owner of the vehicle.

V. Where Your Workhorse Limited Warranty Applies

Your Workhorse Limited Warranty and the Emissions Warranties apply to any covered warranty repair on your Workhorse chassis while operated within the United States and Canada.

VI. Emergency Repairs

If your vehicle requires an emergency repair, and an authorized Workhorse service facility is not reasonably available, you may have warranty repairs performed on your Workhorse chassis by any available vehicle service or repair establishment.

Workhorse may reimburse you for emergency repairs to your Workhorse chassis that are covered under the Workhorse Limited Warranty in an amount not to exceed the manufacturer's suggested retail price for all warranted parts and components replaced and for labor charges based on Workhorse's recommended time allowance and rates for warranty repairs. To obtain reimbursement, contact Workhorse Customer Relations at 1-877-946-7731. You

will be required to submit all receipts that were incurred in connection with your repair.

VII. Your Recreational Vehicle or Commercial Vehicle

Your recreational or commercial vehicle is composed of two major components supplied by two different manufacturers: your Workhorse chassis and your coach/body. When you chose your Workhorse chassis, Workhorse supplied the chassis to your coach/body manufacturer, and your coach/body manufacturer completed the vehicle by installing the coach/body onto your Workhorse chassis.

Having two major manufacturers of your vehicle, you have two separate warranties: Workhorse provides a warranty for your Workhorse chassis, and your coach/body manufacturer provides a warranty for the completed vehicle and the coach/body. If you have any questions regarding the warranty coverage for your vehicle, contact your selling dealer or authorized Workhorse service facility. You may also contact Workhorse Customer Relations at 1-877-946-7731.

Part E – CHASSIS OPERATION AND CARE

I. Maintenance

Proper maintenance of your Workhorse chassis is vital to its continued operation. Proper maintenance guards against major repair expenses and may help increase the resale value of your vehicle.

It is your responsibility to make sure that all scheduled maintenance is performed on your Workhorse chassis and that the parts and components used during maintenance are genuine Workhorse parts. **Failure to perform scheduled maintenance on your Workhorse chassis as specified in your Owner's Manual will invalidate your Workhorse Limited Warranty.** Should you have any questions on how to keep your Workhorse chassis in good working condition, ask your Workhorse dealer.

II. Maintenance Records

You should retain all receipts for regular

maintenance performed on your Workhorse chassis. These receipts can be very important if a question arises as to whether a malfunction in your Workhorse chassis is caused by lack of maintenance or a defect in materials or workmanship. Workhorse recommends that you retain your receipts in your glove box literature portfolio. In addition, Workhorse has provided a Maintenance Record form in the Maintenance Schedule section of your Owner's Manual, for recording services performed.

III. Owner Assistance

Your authorized Workhorse service facility is best equipped to provide all of your regular maintenance needs.

Part F – YOUR WORKHORSE LIMITED WARRANTY

I. WHAT IS COVERED

Your Workhorse Limited Warranty begins on the date that your Workhorse chassis is first delivered from Workhorse and continues for three years or 36,000 miles (57,600 kilometers), whichever occurs first. During this coverage period, authorized Workhorse service facilities will repair, replace or adjust all Workhorse supplied parts and components installed by Workhorse on your Workhorse chassis that are defective in materials or workmanship. Your Workhorse Limited Warranty covers your Workhorse chassis frame, axle, engine, transmission, brakes, steering, suspension and chassis electrical components, unless those components are warranted by their own manufacturer (for example, a Cummins engine or an Allison transmission, which have their own warranties).

Your Workhorse Limited Warranty includes costs (up to \$450) that you may incur to tow your vehicle to your nearest authorized Workhorse service facility.

A. 6.5L Diesel Engine Coverage

You are provided extended warranty coverage on the parts and components of the 6.5L Diesel Engine listed below. The extended warranty coverage on these parts and components begins on the date that your Workhorse chassis is first delivered from Workhorse and continues for five years or 100,000 miles (160,000 kilometers), whichever occurs first. During this period, authorized Workhorse service facilities will repair, replace or adjust any of these parts and components that are defective in materials or workmanship. A \$100 deductible per repair visit may apply to repairs to these parts and components after your Workhorse chassis has been in use for three years or 36,000 miles (57,600 kilometers), whichever occurs first.

- Cylinder block and heads and all internal parts, intake and exhaust manifolds, timing gears, timing gear chain and cover, fly wheel, harmonic balancer, valve covers, oil pan, oil pump, water pump, seals and gaskets

- Diesel fuel metering system (injection pump, nozzles, high pressure lines and high pressure sealing devices)
- Glow plug control system (control/glow plug assembly, glow plugs, cold advance relay and ECM)

B. Emissions Control Systems Warranties

1. Emissions Control Systems Defect Warranty Coverage

Workhorse provides warranty coverage for your Workhorse chassis' heavy-duty emissions control systems in accordance with the United States Federal Clean Air Act. Your heavy duty emissions control system warranty begins on the date your Workhorse chassis is delivered to you and continues for a period of either (i) 5 years or 50,000 miles, whichever occurs first (for all heavy duty gasoline chassis greater than 8,500 pounds GVWR and on diesel chassis up to 19,500 pounds GVWR) or (ii) 5 years or 100,000 miles, whichever occurs first (for all diesel chassis over 19,500 pounds GVWR).

During this coverage period, Workhorse warrants that your Workhorse chassis (i) is designed, equipped and built to meet the emissions regulations of the United States Environmental Protection Agency (EPA) in effect at the time you purchased your Workhorse chassis; and (ii) is free from defects in Workhorse supplied materials or workmanship that could prevent it from conforming with the applicable EPA regulations.

2. Emissions Control Systems Performance Warranty Coverage

If your vehicle is registered in a state where the state or local government has an EPA approved inspection and maintenance program, you may also be eligible for additional emissions control systems warranty coverage if you are able to meet all of the following conditions:

- a. Your vehicle has been maintained and operated in accordance with the instructions for proper maintenance and use set forth in your Owner's Manuals.

- b. Your vehicle fails an EPA approved inspection/maintenance test or otherwise fails to conform with the applicable EPA regulations during your applicable emissions warrant period.
- c. This failure results, or will result, in you having to bear a penalty or other sanction (including the denial of the right to use your vehicle) under local, state, or federal law.

If all these conditions exist, Workhorse will replace, repair or adjust to Workhorse specifications, at no charge to you, any of the parts and components listed below in this Part in the Emissions Warranties Parts List, which may be necessary to cause your Workhorse chassis to conform to the applicable emissions control standards.

C. Emissions Warranties Parts List

The following parts and components are covered under the Emissions Warranties:

Powertrain Control System

Barometric Pressure Sensor
Brake Switch
Camshaft Position Sensor
Coolant Fan Control Relay
Coolant Level Sensor
Crankshaft Position Sensor
Data Link Connector
Electric Throttle Control (ETC) Motor
Engine Control Module (ECM)
Engine Coolant Temperature Sensor
Fast Idle Solenoid
Intake Air Temperature Sensor
Malfunction Indicator Lamp
Manifold Absolute Pressure Sensor
Mass Air Flow Sensor
Oxygen Sensors
Park/Neutral Position Switch
Powertrain Control Module (PCM)
Programmable Read Only Memory (PROM)
Throttle Position Sensor
Throttle Position Switch
Torque Converter Clutch Solenoid Valve
Transmission Speed Sensors
Vehicle Control Module (VCM)
Vehicle Speed Sensor

Fuel Management System

Altitude Fuel Limiter (diesels)
Diesel Fuel Injection Pump
Diesel Fuel Injection Pump Timing Adjuster
Fuel Injectors
Fuel Pressure Regulator
Fuel Rail Assembly
Diesel Glow Plugs

Air Management System

Air Cleaner (except for filter element)
Air Cleaner Diaphragm Motor
Air Cleaner Resonator
Air Cleaner Temperature Compensator Valve
Air Flow Meter
Air Intake Ducts
Charge Air Control Actuator
Charge Air Control Solenoid Valve
Charge Air Control Valve
Charge Air Cooler
Charge Air Cooler Fan
Charge Air System
Idle Air Control Valve

Idle Speed Control Motor
Intake Manifold
Throttle Body Assembly
Throttle Body Heater
Throttle Closing Dashpot
Turbocharger
Turbocharger Oil Separator
Turbocharger Thermo Purge Switch

Ignition System

Ignition Coil
Ignition Control Module
Ignition Timing Adjustment
Knock Sensor System
Spark Plug Wires
Spark Plugs

Catalytic Converter System

Catalytic Converter
Exhaust Manifold
Exhaust Pipes and/or Mufflers (when located between converter and exhaust manifold)

Positive Crankcase Ventilation System

Diesel Crankcase Depression Regulator Valve
Oil Filler Cap
PCV Filter
PCV Oil Separator
PCV Valve

Exhaust Gas Re-circulation System

EGR Control Valves
EGR Passages
EGR Temperature Sensor
EGR Thermal Vacuum Valve
EGR Vacuum Pump (diesels)
EGR Valve
EGR Valve and Exhaust Pressure Regulator
Solenoid Valve (diesels)
EGR Valve Relay
Exhaust Backpressure Transducer
Exhaust Pressure Regulator Valve and Actuator
(diesels)

Evaporative Emissions Control System (Gasoline Engines)

Canister
Canister Vent Solenoid
Canister Purge Solenoid Valve
Fuel Feed and Return Pipes and Hoses
Fuel Filler Cap
Fuel Tank Filler Pipe (with restrictor)
Fuel Tank Pressure Control Valve
Fuel Tanks
Fuel Tank Vacuum Sensor or Pressure Sensor
Purge Line
Fuel Limiter Vent Valve

Miscellaneous Items Used in Above Systems

Actuators
Hoses
Sealing Devices
Belts
Housings
Sensors
Clamps
Mounting
Springs
Connectors
Hardware
Switches
Ducts
Pipes
Tubes
Fittings
Pulleys
Valves
Gaskets
Relays
Wiring
Grommets

D. California Emissions Control Systems Warranty

The California Air Resources Board and Workhorse are pleased to explain the emissions control systems warranties on your Workhorse chassis. This additional warranty is available only if your vehicle is registered and certified for sale in California or in another state which has adopted California's emissions and warranty regulations. (As of January 1, 2005, states which have adopted California's emissions and warranty regulations are California, Maine, Massachusetts, New York and Vermont).

In California, new chassis must be designed, equipped and built to meet the state's stringent anti-smog standards. Workhorse will warrant your Workhorse chassis' emissions control systems as set forth below, provided there has been no abuse, neglect or improper maintenance of your Workhorse chassis. Your Workhorse

chassis' emissions control systems may include parts and components such as the fuel injection system, ignition system, catalytic converter and engine computer. Also included are hoses, belts, connectors and other emissions-related assemblies. Your applicable warranty period shall begin on the date your vehicle is delivered to you.

Workhorse will repair your Workhorse chassis at no cost to you, including diagnosis, parts and components, and labor as follows:

Emissions Control Systems Warranty Coverage for California Medium Duty Vehicles – 8,500-14,000 pounds (3,855-6,350 kilograms) GVWR

1. For 3 years or 50,000 miles, whichever occurs first:
 - If your Workhorse chassis fails a smog check inspection, Workhorse will make all necessary repairs and adjustments to ensure that your Workhorse chassis passes the inspection. This is your chassis emissions control system performance warranty.
2. For 7 years or 70,000 miles, whichever occurs first, if any of the following parts or components are defective, Workhorse will repair or replace it: Engine Control Module (ECM), Mass Air Flow Sensor, Powertrain Control Module (PCM), Vehicle Control Module (VCM), Intake Manifold, Throttle Body Assembly, Turbocharger, Ignition Control Module, Catalytic Converter, Exhaust Manifold, Fuel Tanks, Fuel Limiter Vent Valve. This is your long-term emissions control systems defects warranty.

Emissions Control Systems Warranty
Coverage for California Heavy Duty Vehicles
– Over 14,000 pounds (6,350 kilograms)
GVWR

1. For heavy duty gasoline engine chassis, your emissions control systems warranty period is 5 years or 50,000 miles, whichever comes first.
2. For heavy duty diesel engine chassis, your emissions control systems warranty period is 5 years or 100,000 miles, or 3,000 hours of operation, whichever comes first.
3. If any emissions-related part or component on your Workhorse chassis is defective, Workhorse will repair or replace it. This is your emissions control systems defects warranty.

You are responsible for the performance of the required maintenance in your Owner's Manuals. Workhorse recommends that you retain all receipts for maintenance on your vehicle, but Workhorse cannot deny

warranty coverage solely for the lack of receipts or for your failure to ensure the performance of all scheduled maintenance.

You are responsible for presenting your vehicle to an authorized Workhorse repair facility as soon as a problem exists. The warranty repairs should be completed in a reasonable amount of time, not to exceed 30 days.

You should be aware that Workhorse may deny you warranty coverage if the vehicle or a part or component has failed due to abuse, neglect, improper maintenance or unapproved modifications.

If you have any questions regarding your warranty rights and responsibilities, or if you want to report what you believe to be violations of the terms of your California warranty, you may contact Workhorse Customer Relations at 1-877-946-7731 or the California Air Resources Board at:

State of California Air Resources Board
Mobile Source Operations Division
P.O. Box 8001
El Monte, California 91731-2990

E. Noise Emissions Warranty

Workhorse warrants to the first person who purchases your Workhorse chassis for purposes other than resale and to each subsequent purchaser that your Workhorse chassis as manufactured by Workhorse was designed, built and equipped to conform at the time it left Workhorse's control with all applicable U.S. EPA Noise Control Regulations.

This warranty covers your Workhorse chassis as designed, built and equipped by Workhorse and is not limited to any particular part, component or system of the vehicle manufactured by Workhorse. Defects in design, assembly or in any part, component or system of your Workhorse chassis as manufactured by Workhorse which, at the time it left Workhorse's control, caused noise emissions to exceed

Federal standards, are covered by this warranty for the life of your Workhorse chassis.

WORKHORSE IS NOT RESPONSIBLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES OR EXPENSES YOU MAY CLAIM AS A RESULT OF YOUR USE OF YOUR WORKHORSE CHASSIS, INCLUDING BUT NOT LIMITED TO THE COST OF ALTERNATIVE TRANSPORTATION OR LODGING, INCONVENIENCE OR LOSS OF USE.

The noise emissions warranty does not apply to any vehicle which is not covered by the United States EPA Medium and Heavy Trucks Noise Emission Standards (40 C.F.R. Part 205, Subpart B).

II. WHAT IS NOT COVERED

A. Quick Reference

The following is a list of what is not covered under your Workhorse Limited Warranty:

1. Any part or component that is warranted by its own manufacturer, including but not limited to the engine, transmission, tires and any non-Workhorse parts or components
2. Damage to your Workhorse chassis caused by:
 - Alteration of your Workhorse chassis
 - Installation of non-Workhorse parts or components on your Workhorse chassis
 - Addition of aftermarket suspension, engine or transmission equipment or modifications to your Workhorse chassis
 - Tampering with your Workhorse chassis' emissions control systems
 - Driving your Workhorse chassis through deep water
 - Overloading or uneven weight distribution
 - on your Workhorse chassis
3. Odometer alteration
4. Vehicles titled as salvaged, scrapped, junked or totaled
5. Front suspension alignment
6. Damage or corrosion due to environment, chemical treatments or aftermarket products
7. Damage caused by insufficient or improper maintenance
8. Periodic maintenance
9. Damage caused by contaminated fuel
10. Economic loss or other expenses
11. Damage to or loss of personal property contained in vehicle
- Accidents, collisions, fires, thefts, freezing, vandalism, riots, explosions or objects striking your Workhorse chassis
- Misuse or inappropriate operation of your Workhorse chassis
- Improper or extended storage

B. Detailed Information About What is Not Covered by Your Workhorse Limited Warranty

1. Any Part or Component that is Warranted by its Own Manufacturer, Including but not Limited to the Engine, Transmission, Tires and any Non-Workhorse Parts or Components

Your Workhorse Limited Warranty does not cover parts and components of your Workhorse chassis that are manufactured and warranted by other manufacturers, including but not limited to non-chassis electrical components, the coach or other body installed on your Workhorse chassis, the engine, the transmission, the tires and non-Workhorse parts or components. Please review the separate part or component manufacturers' owner's manuals and warranties or consult their distributors for any warranty coverage of those parts or components. You can also contact Workhorse Customer Relations at 1-877-946-7731 for assistance.

2. Damage Caused by Accident, Misuse or Alteration

Your Workhorse Limited Warranty does not cover damage to your Workhorse chassis that is caused by any of the following:

- Cutting, welding, stretching, disconnecting, shrinking or otherwise altering your Workhorse chassis' wheelbase, suspension, frame rails, driveline or axle, as well as any alteration or modification performed upon your Workhorse chassis or its original components after your Workhorse chassis left Workhorse's control. IF THE COACH OR BODY MANUFACTURER THAT ASSEMBLED YOUR VEHICLE ALTERED YOUR WORKHORSE CHASSIS IN ANY WAY, THEN THIS WARRANTY NO LONGER COVERS ANY PORTION OF YOUR WORKHORSE CHASSIS THAT HAS BEEN SO ALTERED, AND WORKHORSE WILL NOT COVER ANY

REPAIRS THAT MAY BE REQUIRED ON THIS ALTERED PORTION OF YOUR WORKHORSE CHASSIS OR ON ANY PORTION OF THE CHASSIS AFFECTED BY THE ALTERATIONS.

- Installation of any non-Workhorse parts, components, accessories or other materials.
- Addition of aftermarket suspension equipment on your Workhorse chassis, including but not limited to tag axles, springs or spring helpers, spacer blocks or air springs.
- Addition of aftermarket engine and transmission modifications on your Workhorse chassis, including but not limited to superchargers, turbochargers, exhaust brakes, exhaust systems, air induction systems, computers, software or hardware modifications, governors, gear splitters or electric braking devices.
- Tampering with your Workhorse chassis or your Workhorse chassis' emissions control systems or with parts or components that affect your

Workhorse chassis or emissions control systems.

- Your Workhorse chassis being driven through water deep enough to be ingested into your vehicle's engine.
- Chassis overloading or uneven weight distribution.
- Accidents, collisions, fires, thefts, freezing, vandalism, riots, explosions or objects striking your Workhorse chassis.
- Misuse of your Workhorse chassis such as driving over curbs, overloading or racing or other competition.
- Improper or extended storage, including but not limited to corrosion and battery damage due to inadequately maintained charge.

3. Odometer Alteration

Your Workhorse Limited Warranty will be void if your odometer has been disconnected, its reading has been altered or if mileage cannot be determined.

4. Vehicles Titled as Salvaged, Scrapped, Junked or Totaled

Your Workhorse Limited Warranty does not cover your Workhorse chassis if it is currently or was previously titled as salvaged, scrapped, junked or totaled.

5. Front Suspension Alignment

Your Workhorse Limited Warranty does not cover your Workhorse chassis' front suspension alignment.

6. Damage or Corrosion Caused by Environment, Chemical Treatments or Aftermarket Products

Your Workhorse Limited Warranty does not cover damage caused by airborne fallout (chemicals, tree sap, salt spray, etc.), stones, hail, earthquake, water, flood, windstorm, lightning or the application of chemicals or sealants.

7. Damage Caused by Insufficient or

Improper Maintenance

Your Workhorse Limited Warranty does not cover damage caused by your failure to follow the recommended Maintenance Schedule on your Workhorse chassis or your failure to use or maintain fluids, fuel, lubricants or refrigerant in your Workhorse chassis as recommended in your Owner's Manual.

8. Periodic Maintenance

Your Workhorse Limited Warranty does not cover periodic maintenance on your Workhorse chassis, including but not limited to lubrication, cleaning and replacement of items due to use, wear and tear or exposure.

9. Damage Caused by Contaminated Fuel

Your Workhorse Limited Warranty does not cover damage or failures caused by contaminated fuel provided to your vehicle, included but not limited to injector

plugging, fuel filters clogging, fuel pump damage, tank cleaning and towing.

10. Economic Loss or Other Expenses

Your Workhorse Limited Warranty does not cover any economic loss or expenses suffered by you as a result of your Workhorse chassis requiring warranty or other repairs, including but not limited to loss of use, inconvenience, storage, lost time or pay, rental expense, lodging, meals or other travel costs.

11. Damage to or Loss of Personal Property Contained in Vehicle

Your Workhorse Limited Warranty does not cover damage to or loss of any personal property that is contained in your vehicle, including but not limited to perishables contained in refrigerators, freezers or cupboards, at any time, including but not limited to when your vehicle is located at an authorized Workhorse service facility.

Part G – DISCLAIMER OF ALL OTHER WARRANTIES

YOUR WORKHORSE LIMITED WARRANTY IS THE ONLY EXPRESS WARRANTY PROVIDED BY WORKHORSE FOR YOUR WORKHORSE CHASSIS. WORKHORSE ASSUMES NO OTHER OBLIGATION OR LIABILITY IN CONNECTION WITH YOUR WORKHORSE CHASSIS OR YOUR VEHICLE. WORKHORSE DOES NOT AUTHORIZE YOUR SELLING DEALER, YOUR COACH OR BODY MANUFACTURER OR ANY OTHER PERSON OR ENTITY TO ALTER, AMEND OR OTHERWISE CHANGE THE WORKHORSE LIMITED WARRANTY IN ANY MANNER.

WORKHORSE IS NOT RESPONSIBLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES OR EXPENSES YOU MAY CLAIM AS A RESULT OF YOUR USE OF YOUR WORKHORSE CHASSIS, INCLUDING BUT NOT LIMITED TO THE COST OF ALTERNATIVE TRANSPORTATION OR LODGING, INCONVENIENCE OR LOSS OF USE.

YOU MAY HAVE SOME IMPLIED WARRANTIES ON YOUR WORKHORSE CHASSIS, SUCH AS AN IMPLIED WARRANTY OF MERCHANTABILITY OR AN IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE. THESE IMPLIED WARRANTIES ARE LIMITED, TO THE EXTENT ALLOWED BY LAW, TO THE TIME PERIOD COVERED BY THE WORKHORSE LIMITED WARRANTY.

Some States do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to you.

Some States do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you.

The Workhorse Limited Warranty gives you specific legal rights, and you may also have other rights which vary from State to State.

Part H – THINGS YOU SHOULD KNOW ABOUT YOUR WORKHORSE LIMITED WARRANTY

I. Component Exchanges

Workhorse may offer exchange service on some of your chassis components. This service is intended to reduce the amount of time your vehicle is unavailable for use due to repairs. Components used in exchange may be new, remanufactured, reconditioned or repaired, depending on the component involved.

All exchange components meet Workhorse quality standards and are warranted the same as new components. Examples of the types of components that might be exchanged include engine and transmission assemblies, instrument cluster assemblies and powertrain control modules.

II. Recycled Materials

EPA guidelines require the capture, purification and reuse of automotive air conditioning refrigerant gases and engine coolant. As a result, any repairs that your authorized Workhorse service facility may make to your Workhorse chassis may involve the installation of purified reclaimed refrigerant or coolant.

III. Air-Conditioning Systems

Workhorse does not design, test, certify, assemble or install dash or roof-mounted air conditioning systems. Your Workhorse Limited Warranty does not cover any of these systems.

Your Workhorse Limited Warranty covers Workhorse installed air conditioning system parts and components such as the compressor and condenser. Your coach or body manufacturer supplies and installs most other parts and components of your air conditioning systems, including but not limited to the evaporator, controls, ductwork and blower fan. Final assembly and functional testing is completed by the coach or body manufacturer.

Parts/Components/Repairs Covered by Workhorse Limited Warranty:

- Compressor mounting
- Compressor drive belt
- Compressor clutch installation including electrical
- Compressor failure not resulting from system malfunction
- Condenser mounting
- Condenser leaks not caused by damage
- Condenser fan failure not caused by damage nor resulting from system malfunction
- System leaks caused by defective Workhorse parts or components
- Dryer leaks not caused by damage
- Dryer failure not resulting from system malfunction
- Hose or compressor-outlet-to-condenser-inlet leaks not caused by damage or faulty installation by coach or body manufacturer
- Hose or compressor-outlet-to-condenser-inlet failure not caused by system malfunction

Parts/Components/Repairs NOT Covered by Workhorse Limited Warranty:

- Testing of air conditioning systems
- Damaged parts or components
- Added performance kits
- Air conditioning systems performance
- System leaks not caused by defective Workhorse parts or components
- Leaks at Schrader valves
- Leaks at any hose connections
- Damage due to low or overfilled refrigerant
- Controls inside vehicle
- Ductwork
- Blower fan
- All electrical except compressor clutch
- Clutch failure caused by excessive head pressure
- Evaporator

IV. Extensions

A. Time Extensions

Your Workhorse Limited Warranty may be

extended one day for each day beyond the first 24-hour period your vehicle is at an authorized Workhorse service facility for warranty service under your Workhorse Limited Warranty. Workhorse reserves the right to require you to show the repair orders performed on your Workhorse chassis to verify the period of time your warranty is to be extended. Your extension rights may also vary depending on state law.

B. Mileage Extensions

Prior to delivery, your Workhorse chassis may be driven during testing at Workhorse's assembly plant, during shipping and while at the coach or body manufacturer's or dealer's facility. Your dealer records this mileage at the beginning of this Section. This mileage, up to a maximum of 1,000 miles, will be added to the mileage limits of your Workhorse Limited Warranty. You will not receive a mileage extension if you purchased a used chassis, dealer-owned used chassis or dealer demonstrator chassis.

V. Delayed Warranty Start

If your Workhorse Chassis was originally sold by Workhorse to a coach or body manufacturer prior to your purchase of the vehicle, you may be eligible for a “delayed warranty start.” Contact Workhorse Customer Relations at 1-877-946-7731 if you have any questions as to whether you are eligible for a delayed warranty start.

If you are eligible for a delayed warranty start, subject to the limitations set forth below, your Workhorse Limited Warranty will commence on the earlier of the date and mileage that your chassis was sold by the coach or body manufacturer’s dealer to you or the first retail purchaser of your vehicle. Your Workhorse Limited Warranty may only be delayed as follows:

A. Chassis originally sold for commercial use may be delayed for a maximum extension of 12 months or 4,000 miles, whichever comes first.

B. Chassis originally sold for recreational use may be delayed for a maximum extension of 24 months or 6,000 miles, whichever comes first.

Workhorse chassis used in a demonstrator vehicle are not eligible for a delayed warranty start. All delayed warranty starts must be approved by Workhorse.

NOTE: Your warranty start date will be the date Workhorse shipped your Workhorse chassis from the factory, unless a Delayed Warranty Start form is completed and submitted by your selling dealer and approved by Workhorse. This is necessary for first and subsequent owners.

VI. Production Changes

Workhorse reserves the right to make changes in chassis built and/or sold by Workhorse at any time without incurring any obligation to make the same or similar changes on your Workhorse chassis.

VII. THINGS YOU SHOULD KNOW ABOUT YOUR EMISSIONS SYSTEMS WARRANTIES

A. Replacement Parts and Components

The emissions control systems of your Workhorse chassis were designed, built, and tested with Workhorse parts and components. Workhorse recommends that any replacement parts or components used for maintenance or repair of emissions control systems be genuine Workhorse parts or components; however, your Emissions Warranties' coverage is not dependent upon the use of any particular brand of replacement parts or components. You may elect to use non-Workhorse parts; however, the use of non-Workhorse parts may impair the effectiveness of emissions control systems.

B. Claims Procedure

Take your vehicle to any authorized

Workhorse repair facility to obtain service under your Workhorse chassis' Emissions Warranties. This should be done as soon as possible after failing an EPA approved I/M test or a California Smog Check test, or at any time you suspect a defect in a part or component. For further information or to report violations of the Emissions Warranties, you may contact the following:

Field Operations and Support Division
Environmental Protection Agency
401 "M" Street S.W.
Washington, DC 20460 or

State of California Air Resources Board
Mobile Source Operations Division
P.O. Box 8001
El Monte, CA 91731-2990

Part I – WORKHORSE PARTICIPATION IN THE BBB AUTOLINE PROGRAM

The **BBB Autoline Program** is an out-of-court program administered by the Council of Better Business Bureaus to settle consumer disputes regarding warranty coverage and repairs to automotive and related products, such as your Workhorse chassis. This informal dispute resolution program is free to you. If you do not agree with the decision of the BBB in your case, you may reject it and seek any other relief available to you.

Workhorse currently participates in the BBB program in 28 states. Your eligibility to participate in the BBB program is limited by your vehicle's age, mileage and other factors. Workhorse reserves the right to change eligibility requirements or to discontinue its participation in the BBB program.

You may be required to resort to the BBB Autoline Program before exercising rights or seeking remedies created by the Magnuson-Moss Warranty Act (the "Act"). If you choose to seek redress by

pursuing rights and remedies not created by the Act, resort to the BBB Autoline Program would not be required by the Act.

Name and Address of BBB Autoline Program

You may contact the BBB as follows:

BBB Autoline Program
Council of Better Business Bureaus, Inc.
4200 Wilson Boulevard, Suite 800
Arlington, VA 22203-1804
1-800-955-5100
<http://www.dr.bbb.org/autoline/index.asp>

Brief Description of BBB Autoline Program Procedures, Time Limits and Information Required

Your case is officially filed with BBB Autoline once you provide them with the following required information:

- Your name and address
- The Vehicle Identification Number (VIN) of your vehicle
- The make, model and year of your vehicle
- A description of the problem with your vehicle

Upon receipt of the information about your case, a representative from Workhorse may contact you to discuss settlement options. In some cases, a pre-hearing settlement conference may be held by telephone. If the case is not settled, it proceeds to arbitration, an informal process in which the parties present their views of the dispute to an impartial third party, an arbitrator, who will decide how the dispute will be resolved. Your case will generally be heard within 40 days.

Part J – STATE WARRANTY LAWS

Laws in some states permit you under certain circumstances to obtain (i) a replacement of your Workhorse chassis or (ii) a refund of your purchase price for your Workhorse chassis. These laws vary from state to state. Some state laws require that you use the BBB Autoline Program prior to filing any claim in a state court. To the extent allowed by state law, Workhorse requires that you first provide workhorse with (a) written notice of your claim, and (b) an opportunity to make any needed repairs on your Workhorse chassis, before you are eligible for the remedies provided by these state laws. Your written notice should be sent to:

**Workhorse Custom Chassis, LLC
Customer Relations
850 Stephenson Highway, Suite #510
Troy, MI 48083-1174
1-877-946-7731**

Part K – REPORTING SAFETY-RELATED CONCERNS

If you believe that your Workhorse chassis has a defect which could result in an injury or death, you should immediately inform the following parties:

Workhorse Custom Chassis, LLC
Customer Relations
850 Stephenson Highway, Suite #510
Troy, MI 48083-1174
1-877-946-7731

In the US:
National Highway Traffic Safety Administration
(NHTSA)
U.S. Department of Transportation
Washington, D.C. 2-590
1-800-424-9393

In Canada:
Transport Canada
330 Sparks Street, Tower C
Ottawa, Canada K1A 0N5

Part L – WORKHORSE SERVICE PUBLICATIONS

free number or to write to us at:

Service Manuals

Service manuals have diagnosis and repair information on engines, transmissions, axles, suspensions, brakes, electrical systems, steering, etc.

Owner's Information

Your Owner's Manual is written specifically for owners and provides basic operation information about your Workhorse chassis. Your Owner's Manual includes the maintenance schedule for all models.

Ordering Information

Information on ordering all service publications, including pricing, shipping and payment options, can be obtained by calling toll-free, 1-800-686-6980 (Monday-Friday, 9 AM-5 PM EST).

If you have any questions about your Workhorse chassis, Workhorse encourages you to call our toll-

**Workhorse Custom Chassis, LLC
Customer Relations
850 Stephenson Highway, Suite #510
Troy, MI 48083-1174
1-877-946-7731**

-
- A**ir Conditioning Refrigerants 4-98
Alignment and Balance, Tire 4-64
Anti-Lock Brakes (ABS) 2-4
Auto-Apply Parking Brake 1-29
Auto Park Brake Light 1-60
Auto Park Brake System 4-52
Automatic Transmission
 Automatic Overdrive 1-14
 Brake Transmission Shift Interlock (BTSI) Check 5-89
 Check 5-88
 Fluid 4-31
 Hydra-matic Fluid 4-31
 Neutral 1-13
 Operation Column Shift 1-11
 Operation Electronic Control Transmission Shifter 1-16
 Park 1-12
 Park Mechanism Check 5-90
 Reverse 1-13
 Shifting Into Park 1-30
 Starting Your Diesel Engine 1-7
Axle, Rear 4-36
- B**acklighting Adjustments 1-49
Base Instrument Cluster Features 1-79
 with Trip Computer 1-92
Battery 4-56
 Charging System Warning Lamp 1-59
 Jump Starting 3-3
 Warnings 3-4
BBB (Better Business Bureau) Auto Line 6-28
Brake System Inspection 5-92
Brake Failure Warning Light 1-61, 2-4
Brakes
 Adjustment 4-51
 Anti-Lock 2-4
 Auto-Apply 1-29
 Auto Park Brake System 4-52
 Brake Fluid 4-48
 Emergency Release 3-9
 Master Cylinder 4-48
 Parking 1-27
 Pedal and Lever 1-28
 Pedal Travel 4-51
 Pull Button Apply 1-28
 Replacing System Parts 4-51
 Wear 4-50
-

Brake-Transmission Shift Interlock (BTSI) Check	5-89
Braking	2-3
“Break-In”, New Vehicle	1-2
Buying new tires	4-63
C apacities and Specifications	4-92
Caps	
Gas	4-17
Radiator, Pressure	4-38
Surge Tank	4-39
Carbon Monoxide	1-36
Certification/Tire Label	2-10
Changing a Flat Tire	3-25
Chassis Lubrication	4-53
Chassis Operation and Care	6-8
Circuit Breakers and Fuses	4-69
Cleaner/Filter, Engine Air	4-30
Cleaning	
Tires	4-67
Your Diesel Engine	4-20
Clutch, Hydraulic	4-35
Cluster Diagnostics	1-82

Cold Weather Starting	1-8
Computer, Trip	1-92
Control of a Vehicle	2-2
Coolant	
Recovery Tank	3-16
Level Check	5-87
Cooling System (gasoline engines)	3-14
(diesel engines)	3-19
Coverage at a Glance, Warranty	7-6
Cruise Control (optional)	1-43
Cummins 3.9L Diesel Engine	1-94 to 1-101
Customer Assistance and Warranty Information	6-1
Customer Assistance and Roadside Assistance	6-3
Customer Satisfaction Procedure	6-5
D aytime Indicator Light	1-49
Daytime Running Lamp	1-50
Indicator Light	1-72
Dead Battery/Jump Starting	3-3
Diesel Engine	
Adding Oil	4-27
Checking Oil	4-26
Cleaning	4-20
Cooling System	3-19

-
- | | | | |
|--------------------------------------|------|--|------------|
| Engine Oil | 4-27 | Coolant Heater | 1-10 |
| Fuel | 4-5 | Coolant Level Check | 5-87 |
| Fuel Requirements and Fuel System | 4-4 | Fan Noise | 3-24 |
| Oil Pressure | 1-57 | Identification | 4-68, 4-92 |
| Running Out of Fuel | 4-10 | Oil Level Check | 5-89 |
| Starting | 1-7 | Overheating | 3-11 |
| Surge Tank Pressure Cap | 4-39 | Running While Parked (Auto Transmission) | 1-37 |
| Voltmeter | 1-56 | Specifications | 4-92 |
| Warranty Coverage | 7-10 | Steam | 3-12 |
| Disclaimer of All Other Warranties | 6-22 | Engine Air Cleaner/Filter | 4-30 |
| Doing Your Own Service Work | 4-2 | Engine Compartment Cover | 4-19 |
| Driving | | Engine Coolant | 4-40 |
| Foreign Countries (Gasoline Engines) | 4-17 | Heater | 1-10 |
| Hill and Mountain Roads | 2-5 | Temperature Gauge | 1-58 |
| In Snow (Diesel Engines) | 1-11 | Engine Cooling System | 3-14, 3-19 |
| Drunken Driving | 2-2 | Engine Exhaust | 1-36 |
| E lectrical Equipment, Add-On | 4-69 | Engine Oil | |
| Electrical System | 4-69 | Adding | 4-22, 4-27 |
| Emergency Release of Parking Brake | 3-9 | Additives | 4-24, 4-29 |
| Engine | | Checking | 4-22, 4-26 |
| Capacities | 4-92 | Diesel Engines | 4-26 |
| Coolant | 4-40 | Filter Recommendations | 4-95 |
| | | Gasoline Engines | 4-21 |
-

Kind to Use	4-23, 4-27	Filling Your Tank	4-17
Pressure Gauge (Diesel Engines)	1-57	Filter (Diesel)	4-14
Used	4-25, 4-29	Foreign Countries	4-17
When to Change	4-25, 4-29	Gasoline Engine	4-3
Exterior Lamps	1-49	Methanol	4-3
F an Noise, Engine	3-24	Portable Container	4-18
Features and Controls	1-1	Running Out (Diesel Engines)	4-10, 4-14
Filling a Portable Fuel Container	4-18	United States	4-3, 4-5
Filling Your Tank	4-17	Very Cold Weather	4-7
Filter Recommendation	4-95	Fuel Capacity	4-92
Flashers, Hazard Warning	3-2	Fuel Gauge	1-55
Flat Tire, Changing	3-25	Fuse Block	4-69
Fluids, Automatic Transmission		Fuses and Circuit Breakers	4-69
Allison	4-31	G auges	
Hydra-Matic	4-31	Engine Coolant Temperature	1-58
Power Steering	4-44	Fuel (Diesel Engine)	1-55
Fluids and Lubricants	5-93	Oil Pressure	1-57
Foreign Countries, Fuel (Gasoline)	4-17	Speedometer	1-52
Fuel	4-3, 4-5	Tachometer	1-53
Canadian	4-6	Voltmeter (Diesel Engine)	1-56
Cummins Diesel Engine	4-12	Gas Cap	4-17
Diesel Engine	4-5	Gasoline Engine	

-
- Adding Oil 4-22
Checking Oil 4-22
Cooling System 3-14
Engine Oil 4-21
Filling Your Tank 4-17
Fuel 4-3
Starting 1-5
Grade Braking 2-6
Gross Axle Weight Rating (GAWR) 2-7
Gross Vehicle Weight Rating (GVWR) 2-7
- H**azard Warning Flashers 3-2
Headlamp High/Low Beam Changer 1-40
Hill and Mountain Roads 2-5
Horn 1-38
Hubs, Oil Filled 4-57
Hydraulic Clutch 4-35
Hydraulic Clutch System Check 5-88
- I**f Your Diesel Engine Will Not Start 1-9
Ignition Positions 1-2
Ignition Transmission Lock Check 5-89
Inflation, Tire Pressure 4-58
- Information, Warranty and Owner Assistance .6-3, 7-1
 Owner 7-3
 Better Business Bureau 7-2
- Inspections
 Brake System 5-92
 Engine Cooling System 5-91
 Exhaust Systems 5-91
 Rear Axle Service 5-92
 Steering 5-91
 Suspension 5-91
 Throttle System 5-92
- Instrument Panel Cluster
 Diesel Engines 1-51
 Gasoline Engines 1-73
 Cummins Diesel Engine 1-94
 Typical, Export 1-74
- Introduction i
Introduction to the Limited Warranty
 on Your Workhorse Chassis 6-6
- J**ump Starting 3-3
- K**ey Release Lever (Manual Transmission) 1-4
-

- L**abels
- Certification/Tire 2-10
 - Service Parts Identification (SPID) 4-68
 - Vehicle Identification Number (VIN) 4-68
- Lamp and Bulb Data 4-98
- Lamps, Daytime Running 1-50
- Lamps, Exterior 1-49
- Leaving Your Vehicle With the Engine Running . 1-32
- L**ights
- Anti-Lock Brake System Warning 1-64
 - Auto Park Brake 1-60
 - Brake System Warning 1-61
 - Daytime Running Lamp Indicator 1-72
 - Low Coolant Warning 1-65
 - Malfunction Indicator 1-69
 - Parking Brake Indicator 1-62
 - Service Engine Soon 1-66
 - Service Throttle Soon 1-71
 - Trans (Allison) 1-65
 - Wait to Start (Diesel Engine) 1-72
 - Water In Fuel 1-72, 1-94, 4-8
- Limited Warranty, Your Workhorse 6-9
- What is Covered 6-9
 - What is Not Covered 6-18
- Loading Your Vehicle 2-10
- Low Coolant Warning Light 1-65
- Lubricants and Fluids 5-93
- Lubrication, Chassis 4-53
- M**aintenance Record 5-95
- Maintenance Schedule 5-4
- Cumins Engine 5-82
 - Owner Checks and Services 5-87
 - Periodic Maintenance Inspections 5-91
 - Recommended Fluids and Lubricants 5-93
- Maintenance, Underbody 4-67
- Malfunction Indicator Lamp 1-69
- Manual Transmission
- Check 5-87
 - Fluid 4-34
 - How to operate 1-25
 - Operation 1-24
 - Operating Precautions 1-27
 - Parking Your Vehicle (Manual Transmission) . 1-35

-
- Reverse 1-26
Shift Speeds 1-26
Starting Your Diesel Engine 1-7
Starting Your Gasoline Engine 1-5
Methanol 4-3
Model Reference vi
Mountain Roads, Hills 2-5
Multifunction Lever 1-39
- N**ew Vehicle “Break-In” 1-2
Noise Control System 4-20
Nut, Wheel Torque 4-97
- O**dometer 1-52
Odometer, Trip 1-79
Oil, Engine 4-21, 4-26
Oil-Filled Hubs 4-57
Oil Pressure Gage 1-57
Operating Your Vehicle While Stuck in Snow 2-8
Ordering Owner and Service Publications 6-5
Overheating Engine 3-11
Owner Checks and Services 5-87
- Owner Information 6-2
- P**arking
- Brakes 1-27
 - Auto-Apply 1-29
 - Pedal and Lever 1-28
 - Pull-Button Apply 1-28
 - Brake Indicator Light 1-62
 - Emergency Release 3-9
 - Mechanism Check (Park) 5-90
 - Over Things That Can Burn 1-36
 - Your Vehicle (Manual Transmission) 1-35
- Periodic Maintenance Inspections 5-91
- Power
- Steering 2-5
 - Steering Fluid 4-44
- Problems on the Road 3-1
- Publications, Service and Owner 6-5
- R**adiator, Adding Coolant 3-17
Radiator Pressure Cap 4-38
Range Inhibit Warning Light 1-24
Rear Axle 4-36
-

Recommended Fluids and Lubricants	5-93	Service Replacement Part and Filter Recommendations	4-95
Recovery Tank, Coolant	3-16	Service Throttle Soon Light	1-71
Recreational Vehicle Towing	2-8	Service Work, Doing Your Own	4-2
Refrigerants, Air Conditioning	4-98	Shift Speeds (Manual Transmission)	1-26
Replacement		Shifting Into PARK	
Parts	4-95	Column Shift	1- 30
Used Wheels	4-66	Electronic Control Transmission Shifter (ECS) 1- 32	
Wheels	4-64	Shifting Out of PARK	
Reporting Safety Related Concerns	6-30	Column Shift	1-33
Roadside Assistance	6-3	Electronic Control Transmission Shifter (ECS) 1-34	
Road-Speed Limiter	1-53	Specifications and Capacities	4-92
Rotation, Tire	4-60	Speedometer	1-52
Running Out Of Fuel (Diesel)	4-10	Starter Switch Check	5-88
Running Your Engine While You Are Parked	1-37	Starting Your Diesel Engine	1-7
S afety Related Concerns, Reporting	6-30	Starting Your Gasoline Engine	1-5
Safety Warnings and Symbols	iii	State Warranty Laws	6-29
Scheduled Maintenance Services	5-1	Steam From Engine	3-12
Service	4-2	Steering, Power	2-5
Service Information	4-1	Storage, Vehicle	4-56
Service Publications	6-5	Stuck: In Sand, Mud, Ice or Snow	3-27
Service Engine Soon Light	1-66	Surge Tank, Adding Coolant	3-21
Service Parts Identification Label (SPID)	4-69	Surge Tank Pressure Cap (Diesel Engines)	4-39

-
- Suspension Air Cylinders 2-11
- Symbols, Vehicle v
- T**achometer 1-53
- Tamper Resistant Odometer 1-52
- Thermostat 4-39
- Things You Should Know About Your
 Workhorse Limited Warranty 6-23
- Tightening the Wheel Nuts 4-97
- Tilt Wheel 1-38
- Tire Chains 4-66
- Tires 4-58
- Alignment and Balance 4-64
- Buying New 4-63
- Changing a Flat 3-25
- Chains 4-66
- Checking 4-59
- Cleaning 4-67
- Dual Tire Operation 4-62
- Flat 3-24
- Inflation Pressure 4-59
- Inspection and Rotation 4-60
- Pressure 4-59
- Replacement 4-64
- Rotation 4-60
- When It Is Time for New 4-61
- Torque Lock 1-33
- Towing, RV 2-9
- Towing Your Vehicle 3-10
- Trans Light (Allison) 1-65
- Transmission Fluid
- Automatic 4-31
- Manual 4-34
- Trip Computer 1-79
- Trip Odometer 1-80
- Turn Signals 1-39
- U**nderbody Maintenance 4-67, 5-90
- Used Replacement Wheels 4-66
- V**ehicle
- Control 2-2
- Damage Warnings iv
- Identification Number (VIN) 4-68
- Loading 2-10
- Storage 4-56
-

Symbols	v	Replacement	4-64
Voltmeter	1-56	Used Replacement	4-66
W ait to Start Light (Diesel Engines)	1-72	When It Is Time for New Tires	4-61
Warning Devices	1-54, 3-3	Windshield	
Warning, Hazard Flashers	3-2	Delay Wipers	1-42
Warning Light Descriptions	1-76	Washer	1-43
Warranty and Owner Assistance Information	7-1	Washer Fluid	4-47
Warranty, Your Workhorse Limited	6-9	Wipers	1-41
Disclaimer of ALL Other Warranties	6-22	Workhorse Participation in BBB (Better Business Bureau) Autoline Program	6-28
State Warranty Laws	6-29	Workhorse Service Publications	6-31
Things You Should Know About		Wrecker Towing	3-10
Your Workhorse Limited Warranty	6-23	Y our Driving and the Road	2-1
What is Covered	6-9		
What is Not Covered	6-18		
Workhorse Participation in BBB (Better Business Bureau) Autoline Program	6-28		
Washer Fluid, Windshield	4-47		
Water In Fuel Light (Diesel Engine)	1-100, 4-8		
Wheel			
Alignment and Balance	4-64		
Front Wheel Bearings With Oil-Filled Hubs	4-57		
Nut Torque	4-97		