OPERATOR MANUAL

XC-21RDX

X-LINE COACH REAR DIESEL (B5.9)
SERIAL NO. 300000–
OM3085 Rev 0

OSHKOSH®

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OWNER ASSISTANCE INFORMATION

Owner's Name

Street Address

City, State and Zip Code

Vehicle Identification Number (Serial Number)

Delivery Date

Mileage At Delivery

WELCOME

This manual will familiarize you with operational, maintenance and safety information about the chassis of your new vehicle. It is supplemented by a Warranty Booklet which includes warranty information on the Oshkosh Chassis. We urge you to read all of these publications carefully and follow the recommendations to help assure enjoyable and safe operation of your new vehicle.

Vehicle manufacturers have the option of ordering chassis without many of components shown in this manual. If parts on your chassis differ from those shown, they may have been installed by the vehicle manufacturer and if so, are his service part responsibility. Some parts that may fall into this category are: instrument panel, steering wheel, cruise control, alternator, lighting system, air conditioning compressor, condenser, and fuel system (including tank).

When you require service, contact your dealer, who knows your vehicle best, has trained technicians, recommended special tools and genuine replacement parts and is dedicated to your complete satisfaction.

If you need special service assistance while traveling anywhere in the United States or Canada, refer to the Service Directory supplied with your chassis for information on how to obtain service. If your dealer does not perform chassis service work and is not familiar with a chassis service location in your area, or if you need service while traveling, consult your service directory for the nearest Authorized Distributor or Authorized Servicing Dealer. You may also call Oshkosh Chassis at the following number:

1–414–235–1726

NOTE: Telephone is staffed Monday – Friday, 7:00 a.m. to 6:00 p.m. Central Standard Time except holidays.

Because subsequent owners require this important information as well, these publications should remain with the vehicle when it is sold.

Installation of additional or non-standard components or attachments can adversely affect the safety or performance of your vehicle, or damage it. Be sure to observe the limitations and specifications set forth in your vehicle and chassis manuals, and consult your selling dealer before making alterations to your vehicle or its chassis.

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SAFETY PRECAUTION DESCRIPTIONS

All operators of this vehicle should carefully read this manual and the supplemental manuals. Learn how to operate the vehicle, and use the controls and instruments properly. Be especially attentive to the statements preceded by one of the following:

DANGER: Indicates an immediate hazard which, if not avoided, will result in death or serious injury risks.

WARNING: Indicates a potential hazard which, if not avoided could result in death or serious injury risks.

CAUTION: Indicates a potential hazard which, if not avoided, may result in minor or moderate injury risks or equipment damage.

SAFETY PRECAUTIONS

WARNING: In the event it becomes necessary to leave the vehicle, even momentarily, while the engine is running, be sure that the transmission is in Neutral, parking brake set and properly engaged, and the wheels are chocked. Unexpected and possibly sudden vehicle movement may occur if these precautions are not taken.

WARNING: Do not allow your vehicle to coast in Neutral. This practice can result in transmission damage. Also no engine braking is available in Neutral.

WARNING: Personal injury can result from a fan blade failure. Never pull or pry on the fan. This can damage the fan blade(s) and cause fan failure.

WARNING: Inflate and maintain the tires to the recommended specification shown on the Safety Certification Label.

Use replacement tires with the recommended load carrying capacity and of the proper size.

Do not attempt to mount a tire unless you have the proper equipment and experience. Have it done by your dealer or a qualified repair service.

SAFETY PRECAUTIONS – Continued

⚠ WARNING: DO NOT raise vehicle using bumper jack. Use only jack (or equivalent), supplied by vehicle builder with your vehicle. Position jack only at prescribed jacking points.

With one rear wheel lifted off the ground, park brake may not prevent vehicle from moving. Block wheel diagonally opposite wheel being raised.

DO NOT put any portion of your body under vehicle while vehicle is on a jack.

Never start engine while vehicle is on a jack.

SAFETY COMPLIANCE CERTIFICATION LABEL

You will also find the VIN and other important information on the Safety Compliance Certification Label. The label contains the name of the manufacturer, the month and year of manufacture, the certification statement, and the Vehicle Identification Number. The label also contains Gross Vehicle Weight Rating and Gross Axle Weight Ratings, wheel and tire data, and information codes for additional vehicle data.

This label is required by the National Highway Traffic Safety Administration, and is made of special material. If it is altered, tampered with, or removed, it will be destroyed or a series of diagonal lines will appear.

Your label shows the Chassis Vehicle Identification Number, Gross Vehicle Weight Rating (GVWR), and the front and rear Gross Axle Weight Ratings (GAWRs) for your vehicle. The label also shows the minimum acceptable replacement rim and tire size, and the recommended inflation pressures.

GVWR is the total permissible weight of the vehicle, including driver, passengers, the vehicle itself with all options, and the load it is carrying, including all liquids. The total weight must not exceed this rating. Also, the front and rear gross axle weight must not exceed the front and rear GAWRs.

On incomplete vehicles, the Safety Certification Label is affixed at a location determined by a subsequent stage manufacturer of the completed vehicle. In these cases, the completed vehicle is manufactured in two (or more) stages by two (or more) separate manufacturers, with the manufacture of the completed vehicle occurring at a later date than the manufacture of the incomplete vehicle (chassis). Consequently, the model year of the completed vehicle may be later than the model year of its chassis. See your vehicle operator's manual for the actual location of the label.

Always include the Chassis serial number (last six digits of the VIN) when communicating about your vehicle.

Refer to 20–4 for Vehicle Identification Number (VIN).

REPORTING SAFETY DEFECTS

If you believe that your vehicle has a defect which could cause a crash or could cause injury or death, you should immediately inform the National Highway Traffic Safety Administration (NHTSA) in addition to notifying Oshkosh Truck Corporation at 1-414-235-1726.

If NHTSA receives similar complaints, it may open an investigation, and if it finds that a safety defect exists in a group of vehicles, it may order a recall and remedy campaign. However, NHTSA cannot become involved in individual problems between you, your dealer, or Oshkosh Truck Corporation.

To contact NHTSA, you may either call the Auto Safety Hotline toll-free at 1-800-424-9393 (or 366-0123) in Washington, D.C. area) or write to: NHTSA, U.S. Department of Transportation, Washington, D.C. 20590. You can also obtain other information about motor vehicle safety from the Hotline.

To contact Oshkosh Truck Corporation, call 1-414-235-1726 or write to: Oshkosh Truck Corporation, P.O. Box 2508, 2201 Oregon St. Oshkosh Wi. 54903-2508.

CUMMINS DIESEL ENGINE

Operate and maintain your diesel engine as specified in the Cummins Operation and Maintenance Manual received with your vehicle.

You should read the Cummins Operation and Maintenance Manual carefully. It contains a basic statement of your rights and responsibilities.

If you lose or misplace the Cummins Operation and Maintenance Manual that came with your new vehicle, you may obtain a replacement copy from Cummins.

Write to: Cummins Engine Company, Inc.
Box 3005
Columbus, Indiana 47202-3005

Or Call: 1-800-343-7357
(DIESELS)

FEDERAL HIGHWAY ADMINISTRATION REGULATION AND OPERATION IN FOREIGN COUNTRIES

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

If you operate your vehicle in a foreign country, you must find out their regulations and what you must do to comply.

TIRES

The tires on your vehicle must be of the proper size and properly inflated for the load which you are carrying.

The Chassis Safety Compliance Certification Label shows the originally equipped tire size and recommended inflation pressures.

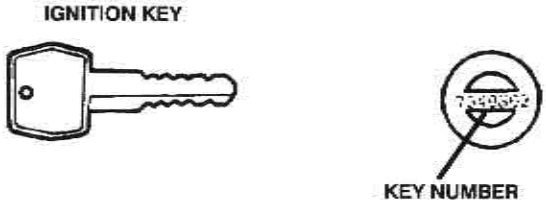
See your vehicle operator's manual for location of the label.

KEYS AND KEY RECORDS

Your vehicle has reversible keys that can be inserted up or down. The ring attached to the key set has keys identification numbers stamped on it. If you should lose your key, the numbers on the ring will enable your dealer or a locksmith to replace them more easily. Detach the ring and store it in a safe place.

COMBAT VEHICLE THEFT — ALWAYS REMOVE THE KEYS AND LOCK ALL DOORS WHEN LEAVING YOUR VEHICLE UNATTENDED.

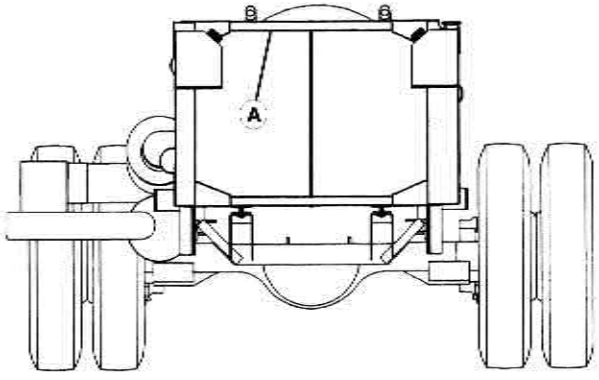
CAUTION: Purchase desired extra keys from a dealer to ensure that correct key blanks are used. Incorrect key blanks can result in damaged locks.



CHASSIS VEHICLE IDENTIFICATION NUMBER "(VIN)" – SERIAL NUMBER

The chassis vehicle identification (VIN) number is stamped on a metal plate (A), permanently attached to the vehicle. The plate is located at the rear of the chassis just above the radiator.

The last six digits designate the chassis serial number.



"SAMPLE"

OSHKOSH TRUCK CORPORATION
4CDR5BM25P2300000
OSHKOSH, WISCONSIN, USA

VEHICLE IDENTIFICATION NUMBER (VIN)

The Chassis Vehicle Identification Number (VIN) is stamped on a metal plate permanently attached to the vehicle. The last six digits designated the chassis serial number and are stamped into the frame itself. Below is a sampe VIN (for reference only):

1. DESIGNATES CHASSIS MANUFACTURER	4CD = OSHKOSH TRUCK CORPORATION	
2. DESIGNATES MODEL LINE	R=XC/COACH	
3. DESIGNATES GVWR (GROSS VEHICULAR WEIGHT RATING) IN POUNDS	6 = 19,501 – 26,000 LBS	
4. DESIGNATES WHEEL BASE	6 = 171" – 180" 7 = 181" – 190" 9 = 201" – 210"	B = 221" – 230" E = 251" – 260"

VEHICLE IDENTIFICATION NUMBER (VIN)

5. DESIGNATES ENGINE MANUFACTURER & MODEL	R = CUMMINS	6B5.9, 230 HP
6. DESIGNATES BRAKE SYSTEM	1 = AIR	
7. DESIGNATES CHECK DIGIT	CALCULATED	
8. DESIGNATES MODEL YEAR	R = 1994 S = 1995 T = 1996	

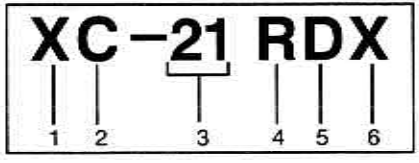
VEHICLE IDENTIFICATION NUMBER (VIN)

9. DESIGNATES MANUFACTURER PLANT LOCATION	2 = GAFFNEY, SC
10. DESIGNATES CHASSIS SERIAL NUMBER	X–LINE 300000 – 499999

CHASSIS MODEL NUMBER

Throughout Oshkosh publications, references to a chassis' model number are made. This Model number helps to identify a specific model within the various chassis lines.

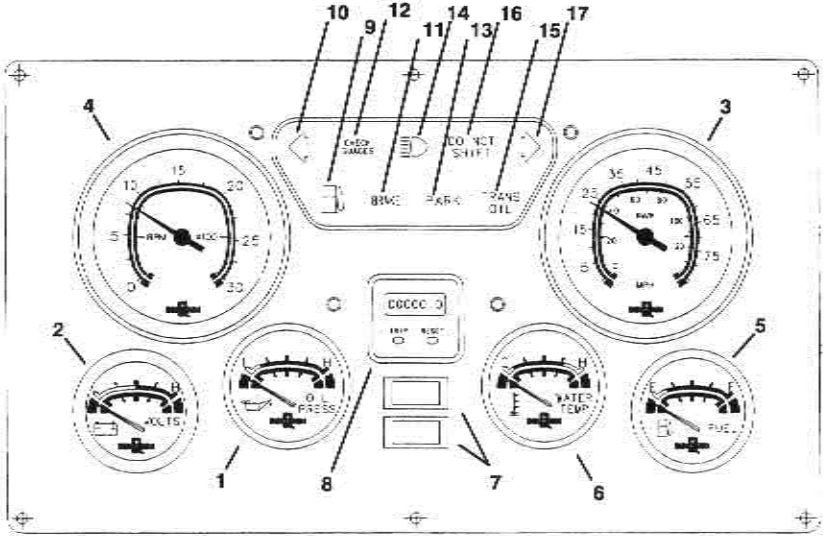
Below is a sample model number **(for reference only):**



1. Designates Model Line. — **X** = X-Line
2. Designates Application. — **C** = Coach/RV
3. Designates GVWR (Gross Vehicular Weight Rating in Thousands of Pounds). — 21 = 21,000 lbs
4. Designates Position of Engine. — **R** = Rear
5. Designates Engine Type. — **D** = Diesel
6. Designates Specific Model. — **X** = Extended Cab

INSTRUMENT PANEL

NOTE: These illustrations, and the following descriptions, show instrument panels supplied by Oshkosh as optional equipment. If the instrument panel in your vehicle differs from what is shown, refer to your body manufacturer's operator manual for more information.



1—Oil Pressure Gauge
2—Voltmeter
3—Speedometer
4—Tachometer
5—Fuel Gauge
6—Water Temperature Gauge
7—Manufacturer's Option
8—Electronic Odometer
9—Low Fuel Warning Light
10—Left Directional and Hazard Flasher Light
11—Brake Warning Light
12—Overall Gauge Warning Light
13—Parking Brake Warning Light
14—High Beam Indicator
15—Transmission Oil Temperature Warning Light
16—Do Not Shift Transmission Warning Light
17—Right Directional and Harzard Flasher Light

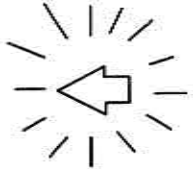
DIRECTIONAL AND HAZARD WARNING LIGHTS

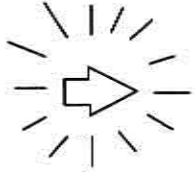
These lights are used to indicate the direction you have signaled to turn, and are also used to indicate the hazard lights have been turned on.

If either light continues to flash after completing a turn, manually return the turn signal lever to the center or "OFF" position.

If either light does not flash or remains on continuously when you signal a turn, the signaling system is malfunctioning. Have this condition corrected as soon as possible.

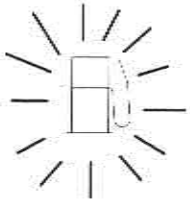
Both lights will flash when the hazard button is depressed.





LOW FUEL WARNING LIGHT

This light comes on when your fuel tank is almost empty. Your vehicle must be turned on for this light to come on. This light will either flicker or glow steadily.



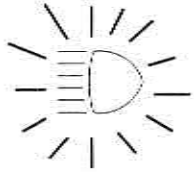
PARKING BRAKE WARNING LIGHT

This light tells you that the parking brake is on. The ignition key must be in the "ON" position for this light to operate.

The light will go off when the parking brake knob is pushed in (released).

If the "PARK" light fails to glow when the ignition key is in the "ON" position and the parking brake button is pulled out, have the electrical system checked.

HIGH BEAM INDICATOR LIGHT



This light comes on when the headlamps are turned to high beam or when you flash the lights.

With headlights on, pull turn signal lever toward you to change headlights from high to low or low to high beam. The headlights may also be flashed by pulling the turn signal lever toward you momentarily and then releasing. (Activates with headlamp switch on or off).

TRANSMISSION OIL TEMPERATURE WARNING LIGHT

This light tells you your transmission oil has exceeded the normal operating temperature. This light comes on briefly when you turn the ignition key to the "START" position, but normally goes off when the engine starts. If the light stays on or comes on while dirving the vehicle:

1. Pull off the road as soon as it is safely possible.
2. Turn off the engine.
3. Let the transmission cool.
4. Check the transmission fluid.
5. Add as much transmission fluid as needed. If the transmission continues to overheat, have the transmission serviced.

For instructions on checking and adding transmission fluid, see "Checking Automatic Transmission Fluid Level (MD Transmission)" section 70.

DO NOT SHIFT TRANSMISSION WARNING LIGHT

This light tells you that your transmission needs servicing. This light comes on briefly when you turn the ignition key to the "START" position, but normally goes off when the engine starts. If the light stays on or comes on while driving the vehicle, you may continue to operate the vehicle but your shifts may be restricted. You should have the vehicle serviced as soon as possible.

Refer to "Gear Selector Lever (MD Series Transmissions)" in section 30 for more information.

BRAKE SYSTEM WARNING LIGHT

CAUTION: If the "BRAKE" light glows, other than momentarily with the ignition in the "START" position, the braking system should be serviced immediately.

If the "BRAKE" light fails to glow momentarily when you start the engine, have the electrical system checked immediately.

This light tells you that your brake system needs servicing.

This light comes on briefly when you turn the ignition key to the "START" position, but it normally goes off when the engine starts. If the light stays on or comes on while driving, have the brake system serviced.

Your vehicle is equipped with a dual braking system. If there is a loss of pressure in either the front or rear brake system, the other will provide braking capability. If a malfunction occurs in either brake system allowing an imbalance in system pressure, the "BRAKE" light will glow when the brake pedal is depressed.

If the "Brake" light malfunctions and the air brake reservoir is completely empty, the service brake will still function momentarily to stop the vehicle.

AIR PRESSURE WARNING LIGHT/BUZZER

The light/buzzer tells you the air brake system air pressure is low. This light/buzzer will normally come on when you first start the engine but will go off when the air pressure in the air tanks reach approximately 60 psi.

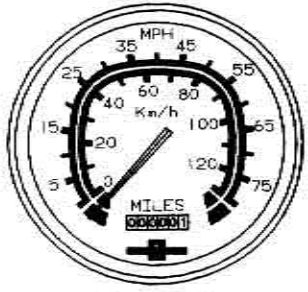
CAUTION: If this light/buzzer comes on any time other than at vehicle start up, there is a problem with the air system and you should pull over and have the vehicle serviced immediately.

NOTE: The parking brake will not disengage until air pressure has reached 60 psi.

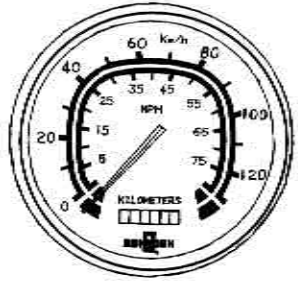
SPEEDOMETER/ODOMETER

The speedometer tells you how many miles (kilometers) per hour your vehicle is moving.

The odometer tells you the total number of miles (kilometers) your vehicle has been driven.



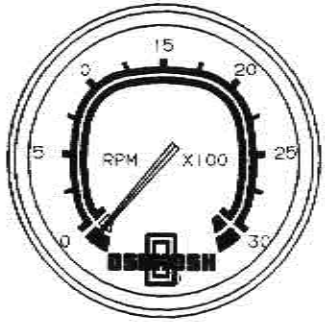
ENGLISH



METRIC

TACHOMETER

The tachometer shows the approximate engine revolutions per minute (RPM), or how fast the engine parts are moving.



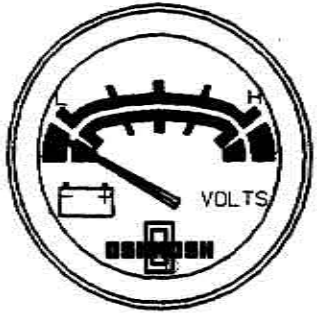
CAUTION: The engine is limited to 2800 RPM. Operating the engine beyond 2800 RPM can cause severe engine damage. When descending a steep grade, use a combination of transmission gears and engine or service brakes to control the vehicle and engine speed.

NOTE: Early model chassis may have had an hourmeter which shows the total number of hours the engine has been in operation.

VOLTMETER

With key switch on and engine stopped, pointer should reach left end of green band (12 volts). If it does not, batteries are undercharged.

With engine running, pointer should rise to approximate midpoint of green band, indicating normal systems.



FUEL GAUGE

The fuel gauge tells you approximately how much fuel you have in the fuel tank. The ignition key must be turned to "ON" for this gauge to operate.

The gauge pointer may move a little while you drive because the fuel in your tank moves, so wait until your vehicle is on level ground to get an accurate reading.

ENGINE OIL PRESSURE GAUGE

This gauge indicates the engine oil pressure. The position of the pointer will vary within the normal operating band. If the pointer drops below (toward the "L" mark) the normal operating band when the engine is running, there is a loss of pressure. If this occurs, a warning signal light will come on. Stop your vehicle immediately, shut off the engine and check the oil level. Add oil if necessary. Gauge readings consistently high or low, under normal operating conditions, may indicate lubrication system and/or engine malfunction.

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

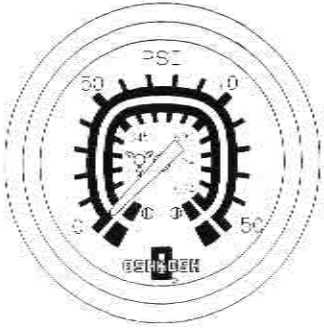
ENGINE WATER TEMPERATURE GAUGE

When the ignition is in the "ON" position, this gauge indicates the temperature of the engine coolant. The pointer will move through white zone to the NORMAL (green area of the gauge), zone as the engine warms up. Under certain conditions, such as heavy traffic or stop-and-go driving in hot weather, the pointer may read at beginning of second amber zone. If pointer continues to rise, a warning signal light will come on, indicating engine is beginning to overheat. The red zone indicates an "overheat" condition. Damage may result. Safely pull off the road, turn off the engine and let it cool. Check the coolant level following the instructions under Engine Coolant in the "Service" section of this manual.

Normal coolant operating temperature is between 180° F and 210° F. Cummins allows the coolant temperature to reach 230° F (red band on gauge) for short durations (under 50 hours per year).

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

AIR PRESSURE GAUGE



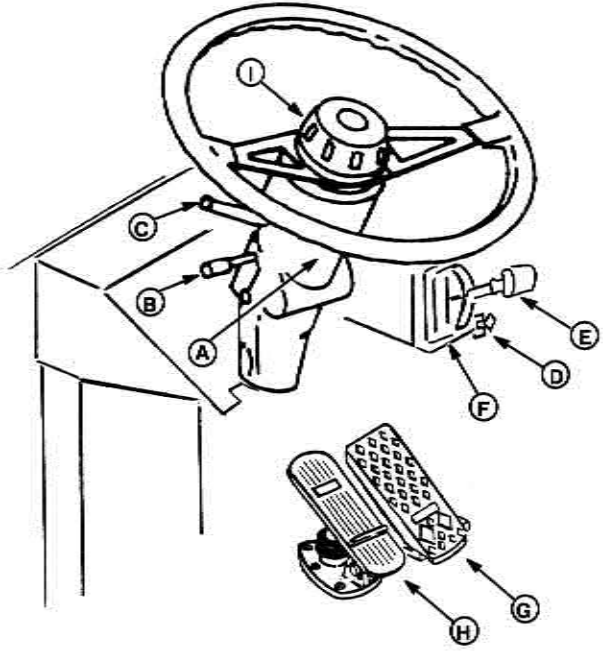
The gauge is a dual needle gauge, measuring pressure in both the front and rear brake systems. The red needle indicates the air pressure in the rear axle (primary) brake system, while the green needle indicates the air pressure in the front axle (secondary) brake system.

Normal operating range is 90 – 120 psi (621 – 827 kPa) before moving the vehicle.

CAUTION: If one needle suddenly drops pressure and stays below 65 psi (448 kPa), the other system can still safely stop the vehicle but it may take longer and the brakes can only be applied a limited number of times. Have the vehicle repair immediately if this occurs.

OPERATOR CONTROLS

A—Hazard Warning Flasher Switch (Top of Column)
B—Tilt Steering Release Lever
C—Direction Signal Lever and Headlight Dimmer Lever
D—Parking Brake Knob
E—Transmission Selector Lever
F—Transmission Selector Indicator
G—Accelerator
H— Brake Pedal
I— Horn Pad



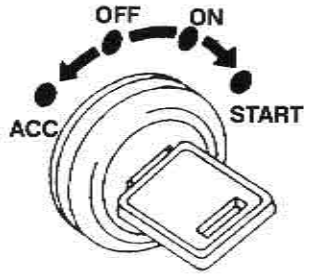
IGNITION SWITCH

ACC – Vehicle electrical system operates without (Accessory) ignition.

OFF – After engine is started, "OFF" position can be used to turn off engine.

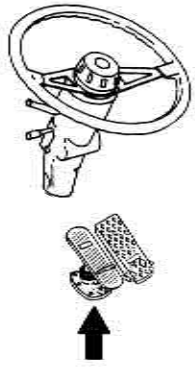
ON – Normal running position after engine is started.

START – Cranks the engine. Warning lights can be checked while key is in this position. Engine will only crank when transmission selector lever is in the "N" (NEUTRAL) position. Engine will crank until you release key. Key will return to the "ON" position.



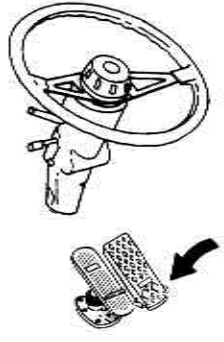
FOOT SERVICE BRAKE

Be alert for changes in braking action, such as repeated pulling to one side, unusual sounds when the brakes are applied or increased brake pedal travel. Check the brake system warning light when starting your vehicle. It should glow momentarily. If the light remains on, check the brake system immediately. Any of these items could indicate the need for brake system inspection and/or service. Check the brake system immediately.



ACCELERATOR

The accelerator pedal is located to the right of the foot service brake. Gentle and even pressure should be used for best fuel economy.

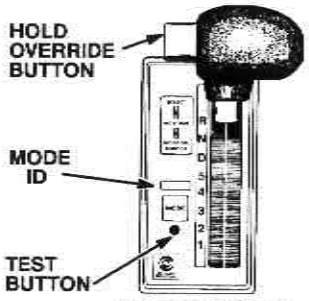


GEAR SELECTOR LEVER

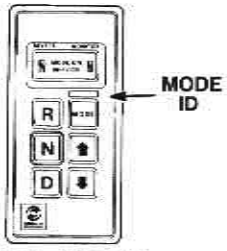
Your chassis is equipped with an MD Series transmission, and will have one of the two types of shifters shown on this page. The shifter is connected to an Electronic Control Unit (ECU), which processes signals from the shifter and in turn controls the transmission.

The push–button shift selector has snap dome-type switches. Each pad (**R, N, D, Up** or Down arrow) is a switch. Just push on the pad for the desired operation. A slight snap will be felt. The **SELECT** indicator displays the chosen operation (if the shift is acceptable), a "beep" tone will sound and the transmission will shift to the starting range as indicated on the **MONITOR** display. In **D**rive, selection of a specific gear range is accomplished with the Arrow Pads. Conditions resulting in the illumination of the **DO NOT SHIFT** light located on the instrument panel or near shift selector, will disable the pad and no beeps will be heard.

The lever selector is an electro-mechanical control. The pattern of positions can vary according to the shift selector installed. Positions (**R, N,** and **D**) are selected by pressing a hold override button and choosing the desired gear. It is possible to move between drive positions without pressing the hold override button.



LEVER SELECTOR



PUSH–BUTTON
SELECTOR

The **Mode** button is available to activate a second shift pattern. Under normal conditions (Mode Off), the transmission will shift in a "performance mode." In the "performance mode," the transmission shifts are delayed until a higher engine rpm is attained, which improves overall performance. By pressing the **Mode** button, the display will indicate "Mode On," and the transmission will be in an "economy mode." In the "economy mode," the transmission shifts sooner allowing for smoother shifts and improved fuel economy.

*NOTE: The **Mode** button can be pressed at any speed.*

GEAR SELECTOR LEVER – Continued

A system **Test** button is included on the lever selector. The capability is included on the push–button selector by using the correct combination of snap dome switches.

It is not necessary to select the right moment to upshift or downshift during the changing road and traffic conditions. The transmission does it for you. However, knowledge of the gear ranges and when to select them will make vehicle control and your job even easier.

WARNING: In the event it becomes necessary to leave the vehicle, even momentarily, while the engine is running, be sure that the transmission is in Neutral, parking brake set and properly engaged, and the wheels are chocked. Unexpected and possibly sudden vehicle movement may occur if these precautions are not taken.

(R) (Reverse) The vehicle must be completely stopped before shifting from Forward to Reverse or from Reverse to Forward. The Select indicator will display **R** and the Monitor will display **R** when Reverse is attained.

(N) (Neutral) Neutral is used to start the engine, check vehicle accessories, and for extended periods of engine idle operation. If the engine starts in any other selected gear, the start circuit should be serviced immediately. The Select indicator will display **Neutral** and the Monitor will display **Neutral**.

WARNING: Do not allow your vehicle to coast in Neutral. This practice can result in transmission damage. Also no engine braking is available in Neutral.

(D) (Drive) The vehicle will attain first gear when **D** is selected, and as the speed increases, the transmission will automatically upshift through each gear. As the vehicle slows down, the transmission will automatically downshift. The Select indicator will display the highest gear available and the Monitor will display the current operating gear.

(5, 4, 3, 2) (FIFTH, FOURTH, THIRD and SECOND) Occasionally, the road conditions, load, or traffic conditions will make it desirable to restrict the automatic shifting to a lower gear. These positions also provide progressively greater engine braking for going down grades (the lower the gear, the greater the braking effect).

GEAR SELECTOR LEVER – Continued

The push-button selector utilizes Arrow Buttons. Push the **Up** or **Down** arrow to the desired gear. The Select indicator will display your choice and the Monitor will display the selected gear when it is attained.

(1) (LOW) Use this gear when pulling through mud and deep snow, when maneuvering in tight spaces, or while driving up or down steep grades. Low gear provides the vehicle with its maximum driving power and maximum engine braking power.

The transmission incorporates a hold feature to prohibit upshifting above the gear selected during normal driving. For downhill operation, however, the transmission may upshift above the highest selected gear when the engine governed speed is exceeded and damaging engine overspeed is a possibility.

DO NOT SHIFT LIGHT

Every time the engine is started, the do not shift light comes on. It will go off after a few seconds. This momentary lighting is to show that the status light circuit is working properly. If the light does not come on during engine start, service should be requested immediately.

Illumination of this light, accompanied by eight seconds of short beeps from the shift selector, indicates that shifts are being restricted. The **SELECT** digit on the display will be blank. Operation may continue in order to reach service assistance. The ECU may not respond to shift selector requests since operating limitations are being placed on the transmission; i.e., upshifts and downshifts may be restricted. **Direction changes will not occur.** If the shift lever is moved while **DO NOT SHIFT** is indicated, a continuous alarm will be sounded. The alarm will stop when the lever is moved back to the previous position where **DO NOT SHIFT** was first indicated. For push-button shift selectors, the ECU will not respond to operator requests. The ECU will cause the transmission to shift to a safe gear and **Hold-In-Range and disengage the lockup clutch.**

RESETTING THE SHIFTER TO RESTORE OPERATION

When the do not shift light comes on, a reset procedure can be performed to clear the system. If necessary, continue to operate the vehicle and have the transmission checked at the earliest opportunity.

TO RESTORE OPERATION

LEVER SELECTOR

- Bring vehicle to a stop at a safe location
- Apply parking brakes, select **N**eutral
- Push **TEST** button one time
- Select **R**everse, select **N**eutral, return to operation*

PUSH-BUTTON SELECTOR

- Bring vehicle to a stop at a safe location
- Apply parking brake, select **N**eutral
- Simultaneously press the **R**everse and **U**p Arrow Buttons one time
- Select **N**eutral, return to operation*

* — If the condition is temporary, the do not shift light will not come back on and your vehicle will operate in a normal manner.

— If the condition is not temporary, the do not shift light will come back on and the transmission may stay in Neutral, operate in only the lower gears, or operate in a normal manner. The type of operation permitted by the ECU will depend on the type of condition.

— Have the transmission checked at the earliest opportunity.

JACOBS EXTARDER COMPRESSION BRAKE

the Jacobs Extarder only applies to vehicles equipped with the Allison MD-3060 six speed automatic transmission.

IMPORTANT: The Jacobs Extarder Compression Brake is a vehicle slowing device, not a vehicle stopping device. It is not a substitute for the vehicle service brakes. Use of the Extarder compression brake for vehicle downhill control and slowing down on level terrain will allow the service brakes to remain cool and ready for any emergency.

OPERATION: To get the best result from the Extarder compression brake, it is necessary to observe several simple operating principles.

The Extarder compression brake is activated when the following conditions are satisfied.

1. The Extarder dash ON/OFF switch is in the on position.
2. The engine is not being fueled.

The Allison MD-3060 (World Transmission) provides for optimum retarding downshift operation when the Extarder compression brake is selected. When the Extarder's dash switch is turned ON and your foot is removed from the throttle pedal, the transmission will immediately preselect a lower gear. The gear preselected is usually second gear, however, your vehicle may have been programmed for either third or fourth. The transmission then starts to downshift through the gears to reach the preselect gear. Downshifting occurs at a higher speed than is usually when the Extarder is not turned on. This allows the Extarder compression brake to provide the maximum retarding power.

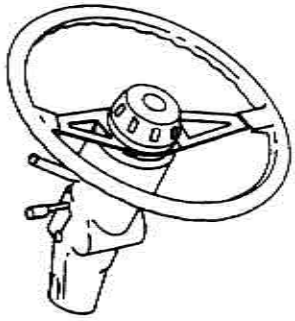
NOTE: If your transmission does not operate as described above, then it may need to be programmed. Contact your local dealer for details.

OPERATION ON WET OR ICY ROADS:

It is recommended that on wet and slippery or icy roads that the Extarder not be left in the automatic mode. The ON/OFF switch should be in the OFF position.

Operation of the Extarder compression brake is recommended only when you have good traction with the road surface. Operation on wet roads should be undertaken with extreme care and at the drivers discretion.

POWER STEERING



Power steering uses energy from your engine to assist you in steering the vehicle. When the engine is off, or if the power system becomes inoperative, the vehicle may still be steered manually, but requires increased driver effort.

Should you notice any change in effort required to steer during normal vehicle operation, have the power steering system checked. A hissing sound at full left or full right steering wheel position is normal.

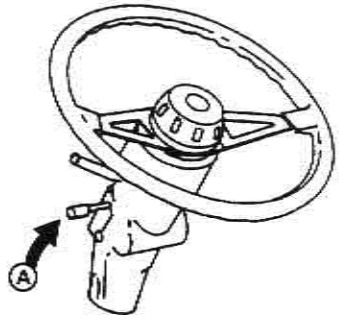
CAUTION: Never hold the steering wheel against the stops (extreme right or left turn) for more than five seconds. If you hold the wheel against the stops longer than five seconds, the power steering pump could be damaged.

NOTE: *After any severe impact such as striking large potholes, inadvertent sliding into curbs on icy roads, or a collision involving the front end, observe the steering wheel alignment. If the spokes of the wheel seem to be in a different position while going down the road, have the front suspension and steering checked for possible damage.*

TILT AND TELESCOPE STEERING COLUMN

To change position of your tilt steering wheel, pull lever (A) toward you and move steering wheel to desired position, then release lever. This permits individual selection of most comfortable positions for all driving conditions. Steering wheel can also be tilted up to provide easier exit and re-entry.

To telescope steering wheel push lever (A) and extend or retract steering wheel as desired.

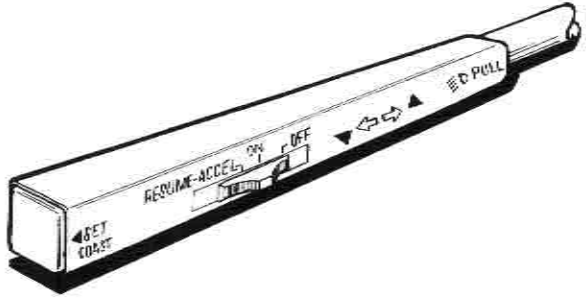


SPEED (CRUISE) CONTROL

The speed control allows you to automatically control the speed of your vehicle. Above 32 mph (50 km/h). The switches to operate the speed control are on the steering wheel. (See Illustration – next page.)

⚠ CAUTION: Do not shift to "N" (NEUTRAL) when using the speed control. This will cause the engine to over-speed.

ROSTRA/DANA CRUISE CONTROL



SPEED (CRUISE) CONTROL – Continued

ROSTRA/DANA CRUISE CONTROL

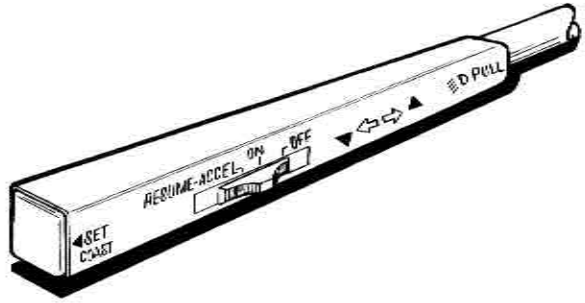
DO NOT use speed control on slippery roads or in congested traffic.

1. **SET SPEED** – On the control switch, move the slide button to the ON position and drive at any speed above 32 mph at which you want automatic control. Hold that speed with your foot while you press and release the SET/COAST button. One second after release, take your foot off the accelerator pedal.

   You can increase speed at any time with the accelerator pedal. When your release the pedal, the vehicle will return to the set speed.

2. **ACCELERATION** – Hold the slide button in the RESUME/ACCEL position and your vehicle will accelerate until you release it, then your vehicle will return to the set speed.

   To increase the set speed, accelerate to desired speed. Press and release SET/COAST button.



3. **COAST** – When the SET/COAST button is pressed, the set speed is erased from the regulator's memory and vehicle is allowed to coast. Just before you reach the set speed desired, release the button and the set speed will be held, providing it is above 32 mph.

4. **DISENGAGEMENT** – You can disengage the cruise control two different ways:
   - Step on the brake pedal (tap the pedal).
   - Move "On/Off" switch to the "Off" position.

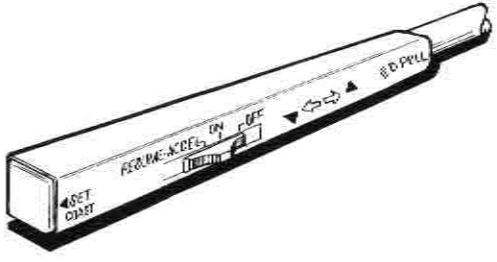
5. **RESUME** – When you disengage the system with the brake, you do not erase the set speed from the regulator's memory, even if you come to a complete stop. To return to your chosen speed, drive to a speed above 32 mph, move the slide button to the RESUME/ACCEL position and release. The Speed Control will return to the set speed.

   If the rate of acceleration is slower than you like, accelerate to desired speed, slide the button to the RESUME/ACCEL position and release it.

NOTE: The selected speed should stay within plus or minus 4 mph so long as grades do not exceed 7% (most interstate highways). Since the Speed Control is vacuum operated, this speed range will widen as you drive at higher altitudes.

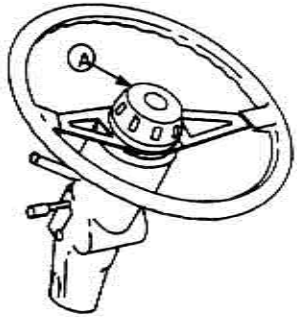
When you are pulling a heavy load, climbing a very steep hill, or bucking a severe head wind, bring the vehicle up to speed with the accelerator pedal and then let the Speed Control take over again.

If the cruise control does not work, refer vehicle to a servicing dealer to check the fuse link. The circuit is protected by fuse link wire. It is located on the steering column in the cruise control harness, 12 inches from connector to steering column harness.



HORN

The horn pad (A) is located in the center of the steering wheel and is sounded by pushing in on the pad. Regularly check the horn for proper operation.

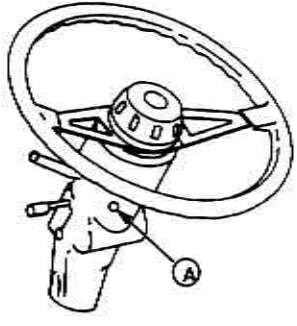


HAZARD WARNING FLASHER

The hazard warning flasher system serves as a warning to other drivers to exercise extreme caution in approaching, overtaking, or passing your vehicle. The flashers will not operate with the brake pedal depressed.

Push down and release to turn flashers on or off.

The flashers can be used with the ignition switch in any position. The lights will flash continuously for two hours (battery fully charged and in good condition) without discharging the battery excessively even though the engine is not running.

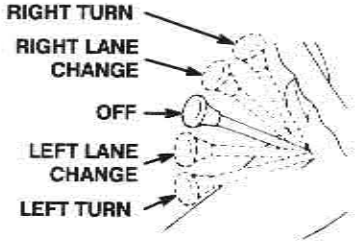


DIRECTION SIGNALS

To signal for a left turn, pull the turn-signal lever down until it holds. For a right turn, push it up. If the indicator continues to flash after making a turn, manually return the lever to center position.

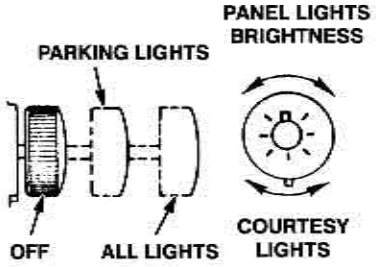
When you want to change lanes, you can flash your direction indicators without putting the lever in the "hold" position by moving the lever either up or down until the indicator flashes. When you release the lever it will return to the center position.

If the direction indicator light in the instrument panel does not flash or remains on continuously when you signal a turn, the signaling system is malfunctioning. Have this condition corrected as soon as possible. In the meantime, make sure that you use the accepted hand signals.



LIGHTS

The control knob for the headlights, taillights, parking lights, license lights, sidemarker lights, and instrument panel lights is located on the lower left of the instrument panel.



LIGHT SWITCH POSITIONS

- Fully in toward instrument panel all lights are off.
- Pulled out to the first stop parking lights — all lights are turned on except the headlights.
- Pulled fully out — all lights are turned on (bright or dim headlamp beam depends on the dimmer switch position.)
- Rotate the knob to adjust instrument panel light brightness.
- Rotate the knob fully counterclockwise (past the click stop) to operate the courtesy lights.

A circuit breaker in the light switch protects the headlight circuits. If the headlights begin to "flicker" on and off, have the headlamp wiring checked immediately.

BEFORE STARTING YOUR VEHICLE

Be sure you know how to use your vehicle and its equipment before operating it. Check the following before you start your vehicle:

1. Check the tires for proper pressure and inspect for damage.
2. Look for fluid leaks.
3. Check engine oil level. Add oil if needed.
4. Check transmission fluid level. Add fluid if needed.
5. Check coolant level in reservoir. Add fluid if needed.
6. Check hydraulic fluid level in reservoir. Add fluid if needed.
7. Check belts for wear or damage.
8. Check fuel water separator. Drain if necessary.
9. Check engine fan.
10. Turn the ignition to "RUN" and verify all warning lights on the dash are illuminated.
11. Verify fuel gauge and volts gauge are functioning properly.

Refer to section 70 in this manual for proper procedures on checking fluid levels.

See Vehicle Operator's Manual for additional items that may require checking. See your servicing dealer or distributor for related topics as will be found in the Service Manual or the Maintenance Schedule, especially if problems are found.

ENGINE EXHAUST GAS CAUTION (CARBON MONOXIDE)

CAUTION: Never idle engine in closed areas. Never sit in a parked or stopped vehicle for any extended amount of time with the engine running. Exhaust gases, particularly carbon monoxide, may build up. These gases are harmful and potentially lethal.

Carbon monoxide is colorless and odorless, but can be present with all other exhaust fumes. Therefore, if you ever smell exhaust fumes of any kind inside your vehicle, have it inspected immediately by your dealer and have the condition corrected. Do not drive with exhaust fumes present.

In order to guard against the possible entry of carbon monoxide into your vehicle, the exhaust system and body ventilation system should be properly inspected by a competent technician as follows:

Each time the vehicle is raised for service;

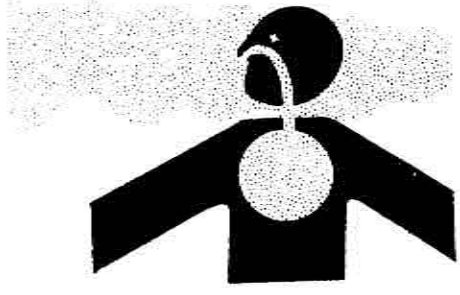
Whenever you detect a change in sounds from the exhaust system;

Whenever the vehicle has been damaged by impact with another vehicle, object and/or road obstruction.

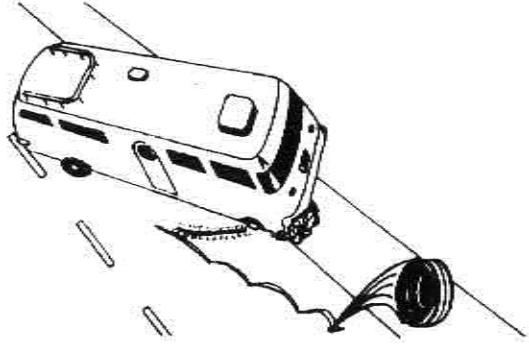
In order to afford proper ventilation, all air inlet vents should be kept clean of snow, leaves, and other debris.

If you run the engine while stopped (idle) in an unconfined area, open the windows at least 1 in. (25 mm), and adjust the heating or air conditioning to draw outside air into vehicle as follows:

1. If your vehicle has outside air control vents, open them fully.
2. HEATING — Set fan speed on medium or high, with function control lever on "HEAT" or "DEFROST", and the temperature control lever on any desired position.
3. AIR CONDITIONING — Set fan speed on "MEDIUM" or "HIGH", with function control lever on any position except "OFF" or "MAX", and the temperature control lever at mid-position.



NEW VEHICLE BREAK IN



Your new vehicle does not need an extensive break-in. Try not to drive continuously at the same speed — as parts tend to better adjust themselves to other parts if various speeds are used during the first 1000 miles (1600 km). Approximately 100 miles (160 km) of city driving or 1000 miles (1600 km) of highway driving is required to fully break in a new set of brake linings and achieve full steering and ride performance. Repeated heavy stops should be avoided during this period. New vehicles should be driven 500 miles (800 km) before being used for towing.

Do not add anti-friction compounds or special break-in oils during the first few thousand miles of operation, since these additives may prevent piston ring seating. (See Engine Oil for information on oil usage.)

⚠ CAUTION: Failure to retighten wheel lug nuts as required could allow the wheel to come off while the vehicle is in motion, causing loss of control, possible collision, and/or property damage.

Tighten wheel lug nuts to 450 lb–ft (678 Nm) at 50 miles (80 km) and again at 500 miles (800 km) of new vehicle operation according to the instructions found under "If You Get A Flat Tire".

FUEL REQUIREMENTS

CAUTION: Handle fuel with care; it is highly flammable. Do not refuel while smoking or when near open flame or sparks. Always stop engine when refueling.

Fill fuel tank outdoors.

If fuel is observed overflowing from cap, remove cap with caution. Internal pressure may cause fuel expulsion.

Use only good quality Grade No. 2-O or Grade No. 2-D climatized fuel as defined by ASTM Designation D975 for diesel fuels.

A cetane number should be no less than 40 to assure satisfactory starting and overall performance. At low temperatures and/or high altitude, a cetane number of more than 45 is recommended.

In many states only Blended Diesel Fuel (Dieselol) is available. This fuel should not exceed 10% alcohol of total volume. Contact your nearest Cummins Dealer to obtain the proper additive.

See your Cummins Operation and Maintenance Manual for more specific information.

WATER IN FUEL

During refueling, it is possible for water and other contaminants to be pumped into your fuel tank along with fuel. Fuel that is contaminated by water or dirt can cause severe damage to engine.

The engine can lose power due to restriction in the fuel filter/water separator. See section 70 for fuel filter/water separator draining.

IMPORTANT FACTS YOU SHOULD KNOW ABOUT FUEL ECONOMY AND HOW TO IMPROVE IT

How you drive, where you drive, and when you drive all affect how many miles/kilometers you can get from a gallon/liter of fuel. You can save fuel if you avoid "Jackrabbit" starts, maintain as constant a throttle position as traffic conditions allow once you have reached cruising speed, and avoid sudden stops which waste energy in the form of heat generated in braking. Frequent short trips, excessive idling and use of the air conditioner in cool weather (when "Vent" would provide adequate comfort), all can contribute to decreased fuel economy.

The careful attention you give your vehicle, as far as maintenance and repairs are concerned, will also help fuel economy. Proper engine and air cleaner maintenance, lubrication intervals, wheel alignment and tire inflation pressures, when closely adhered to, will pay dividends in improved fuel economy as well as longer vehicle life.

Your Heavy Duty Emission Class Vehicle engine is certified to meet all applicable emission requirements. See the fuel information given under "Fuel Requirements".

STARTING THE ENGINE

Climate conditions and other factors play a large part in deciding how you should go about starting your vehicle. Read all the starting instructions carefully before proceeding, so you will be aware of these factors when you start your vehicle.

See your Cummins Operation and Maintenance Manual for more specific information.

COLD WEATHER STARTING TIPS

If you plan ahead for cold weather, starting your vehicle should be no problem. Oil gets thicker as it gets colder, which slows down engine cranking speed. Your diesel engine runs through heat of compression to ignite the fuel, rather than through use of spark plugs as in a gasoline engine. So, your engine must crank faster than a gasoline engine before it will start.

To be sure engine can turn fast enough to start, use proper viscosity oil recommended by engine manufacturer. When prevailing temperatures drop below 32°F (0°C), engine block heater may be needed for starting. (See Engine Block Heater in this section.)

See your Cummins Operation and Maintenance Manual for more specific information.

COLD WEATHER OPERATION

Your vehicle's battery is your best friend in extremely cold weather. Have the battery terminal voltage checked at regular intervals. If terminal voltage is below 12.48, have the battery charged. If the vehicle is parked or sitting still for an extended period of time, turn off your headlights to prevent drain on the battery. Remember that the battery works overtime during the long hours of winter darkness. A little care will be more than repaid in satisfaction and reliability.

Changing to a lighter grade engine oil and use of an Engine Block Heater, also makes starting easier under cold weather conditions.

When you drive away, take it easy at first to give transmission and axle lubricants time to circulate.

Your new vehicle has antifreeze protection to −34°F (−37°C). If the radiator level is low, add coolant and water, as recommended in the "Servicing Your Vehicle" Section of this manual.

Check your antifreeze protection regularly as specified in the maintenance charts, and watch the engine temperature indicator. Any sudden rise in the temperature reading may indicate a freeze-up somewhere in the cooling system. If the temperature does not come up after a few miles/kilometers of driving, have your dealer check the thermostat.

⚠ CAUTION: Avoid extended or unnecessary idling. Extended idling of the engine (ten minutes or more), particularly at "high" engine speeds could produce excessive system temperatures that can damage your vehicle.

For additional information, see your Cummins Engine Operation and Maintenance Manual.

NORMAL STARTING PROCEDURE (ABOVE 0°C [32°F])

If your vehicle has just had its oil changed or the engine has been shut down for an extended period of time (more than 7 days), you need to follow steps 1 through 3 to ensure the engine receives the correct oil flow through the lubricating oil system. If you have not just had an oil change or the vehicle has not been shut down for more than 7 days, start this procedure at step 4.

1. Disconnect the electrical wire from the fuel pump solenoid valve.
2. Crank the engine with the starter motor by turning the ignition switch to the "START" position until oil pressure appears on the gauge, or the warning light on the dash goes out.
3. Connect the electrical wire to the fuel pump solenoid valve.
4. Be sure headlights are off. This will reduce electrical load on battery and allow all power to go to starter motor.
5. Place the gear selector in "P–B" (PARK–BRAKE) for vehicles equipped with four-speed transmissions and hydraulic brakes or "N" (NEUTRAL) for vehicles equipped with four-speed transmissions and air brakes or six-speed transmissions.
6. Engage parking brake.
7. Turn the ignition switch to the "ON" position.
8. Depress accelerator pedal half way to floor.
9. Turn key to "START" until engine starts, then release key.
10. If you are starting the vehicle for the first time after it has been shut down for an extended period of time and you have air conditioning, run the air conditioning for 1 to 2 minutes to reseal the system.

⚠ CAUTION: Do not crank starter continuously for more than 30 seconds at a time. Starter overheating and damage could result. If engine fails to start or falters in starting, wait 2 minutes before re-engaging starter.

As soon as engine fires, release key from START position and release the accelerator pedal allowing the engine to idle.

NORMAL STARTING PROCEDURE (ABOVE 0°C [32°F]) – Continued

Engine oil pressure must be indicated on the gauge within 15 seconds after starting.

Verify all warning lights on the dash panel go off.

Verify air pressure warning light and the low air pressure buzzer go off on vehicles equipped with air brakes.

When starting a cold engine, increase the engine speed (RPM) slowly to make sure adequate lubrication is available to the bearings.

CAUTION: Do not idle the engine for excessively long periods. Long periods of idling (more than 10 minutes) can damage an engine because combustion chamber temperatures drop so low the fuel will not burn completely. This will cause carbon to clog the injector spray holes and piston rings, and can cause the valves to stick. If the engine coolant temperature becomes too low (60°C [140°F]), raw fuel will wash the lubricating oil off the cylinder walls and dilute the crankcase oil; therefore, all moving parts of the engine will not receive the correct amount of lubrication.

Idle the engine 3 to 5 minutes at approximately 1,000 RPM **before** operating with a load.

IF ENGINE FAILS TO START AFTER NORMAL STARTING PROCEDURE:

1. If you tried "NORMAL STARTING PROCEDURE" and engine still did not start, then check your battery to see if it is sufficiently charged.
2. Be sure you have proper viscosity oil and that you have changed it at recommended intervals. Using oil of improper viscosity may make starting more difficult.
3. If your vehicle has run out of fuel, or there is air in the fuel lines, the fuel system must be manually bled.

   a. Open vent screw (8mm) as shown in Figure 1.

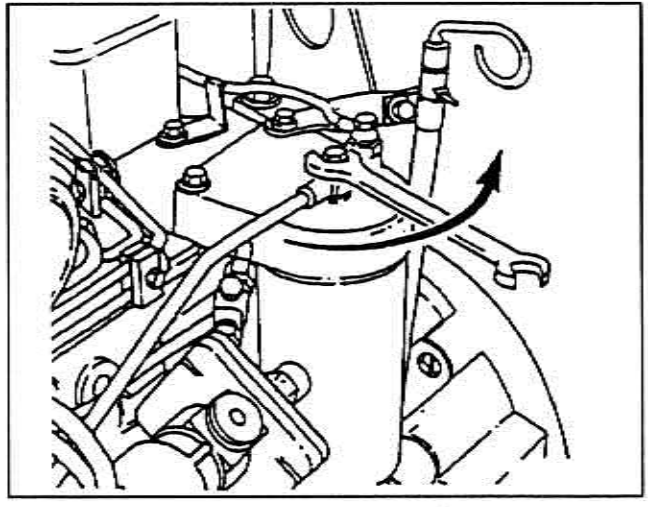


Figure 1. Low pressure lines

IF ENGINE FAILS TO START AFTER NORMAL STARTING PROCEDURE: – Continued

b. Operate the plunger on the fuel transfer pump, as shown in Figure 2, until the fuel flowing from the fitting is free of air.

c. Tighten bleed screw (torque to 7 ft-lb/9 N.m).

4. If engine starts, runs a short time then stops, wax forming in fuel could be plugging filter. This will happen if you use improper fuel at colder temperatures.

CAUTION: Do not crank starter continuously for more than 30 seconds at a time. Starter overheating and damage could result. If engine fails to start or falters in starting, wait 2 minutes before re-engaging starter.

For additional information, see your Cummins Operation and Maintenance Manual.

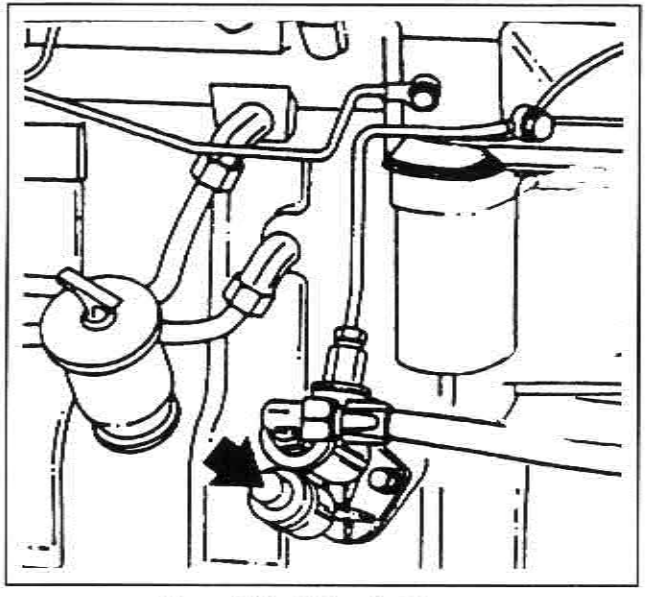


Figure 2. Fuel Transfer Pump

ENGINE BLOCK HEATER

An engine block heater can be used to warm engine coolant which will improve starting, provide for faster engine warm-up, and result in quicker response from heater-defroster system. It is recommended for use whenever outside temperature is below 32°F (0°C).

For best results, heater should be plugged in prior to starting for period of time indicated in chart.

NOTE: Times listed are minimum times. It will not harm block heater or engine to leave it plugged in longer than times stated.

ENGINE BLOCK HEATER USAGE

Temperature	Viscosity Grade Oil	Time Used	Battery Capacity
Above 32°F (Above 0°C)	15W40 or 20W40	Not needed	Standard
32° to 14°F (0° to −10°C)	15W40 or 20W40	2—3 Hours	Standard
14° to −10°F (−10° to −23°C)	10W30	8 Hours or Overnight	Extra Capacity Suggested
Below −10°F (Below −23°C)	Synthetic Oil	8 Hours or Overnight	Extra Capacity Required

USE OF JUMPER CABLES

CAUTION: Battery gas can explode. Keep sparks and flames away from batteries. Use a flashlight to check battery electrolyte level.

Never check battery charge by placing a metal object across the posts. Use a voltmeter or hydrometer.

Always remove grounded (−) battery clamp first and replace it last. If a metal object, such as a wrench, touches the ungrounded battery post and machine chassis at the same time, the heavy flow of current will produce a dangerous spark.

Do not jump start a battery that has completely or partially frozen electrolyte solution in it. Battery electrolyte can freeze in discharged batteries at +32° F. Batteries with frozen or partially frozen electrolyte solution can explode or have other component damage from jump start procedure.

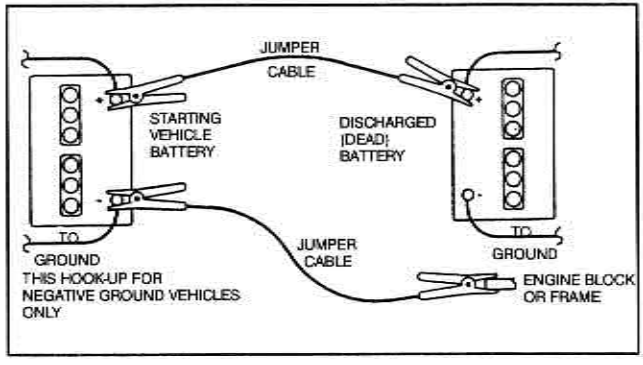
Check for evidence of freezing electrolyte solution. Some indications of a completely frozen solution would be a bulged, split battery case or snap−on covers popped loose. Partially frozen solution may need further checks such as to open snap−on covers and look for slushy liquid. Do not open a sealed maintenance−free battery. Do not jump start a battery if there is any doubt whether it has frozen electrolyte solution.

USE OF JUMPER CABLES — Continued

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

⚠ CAUTION: Use only a 12-volt jumper system. You can damage a 12-volt starting motor and ignition system and other electrical parts beyond repair by connecting it to a 24-volt power supply (two 12-volt batteries in series, or a 24-volt motor generator set).

1. Do not disconnect the battery of the vehicle to be started. Disconnecting the battery could damage the vehicle's electrical system.
2. Make sure vehicles do not touch one another. Set the park brake fully on each. Shift both transmissions to "Park" or "Neutral". Stay clear of the engine cooling fan.
3. Turn on the heater or A/C system fan of the vehicle to be started. Turn off all other switches and lights on both vehicles except when necessary for safety reasons.
4. Make jumper cable connections.



USE OF JUMPER CABLES — Continued

5. Be sure vent caps are tight and level on all batteries. Place a damp cloth over the vent caps of each battery making certain it is clear of all moving parts.

⚠ CAUTION: Always disconnect the negative terminal FIRST when disconnecting battery terminals. When connecting, always connect the negative (−), or ground terminal LAST.

The vehicle has a negative grounded system. The following steps, which must be performed in sequence, are for a negative grounded system only.

6. Connect the end of one cable to the positive (+) terminal on the dead battery that is wired to the starter.

7. Connect other end of cable to positive (+) terminal of booster battery.

8. Connect one end of the other cable to the negative (−) terminal of the booster battery.

9. Connect other end of cable to the frame of the vehicle with the discharged battery. It is not recommended to connect directly to discharged battery or sparks will result.

10. Make certain that all cables are clear of fan blades, belts and other moving parts of both engines and be sure everyone is standing away from vehicles.

11. Start the engine of the vehicle with the booster battery and run it for a few minutes.

12. Try to start the engine of the vehicle with the discharged battery. If the vehicle does not start after cranking for thirty seconds, STOP PROCEDURE. More than thirty seconds seldom starts the engine unless some mechanical adjustment is made. Refer vehicle to maintenance.

13. After starting, allow engine to return to idle speed.

14. Remove the cable connection at the vehicle frame.

15. Remove the other end of the same cable from the booster battery.

16. Remove the other cable by disconnecting at the discharged battery first.

17. Disconnect the opposite end from the booster battery last.

18. Discard the damp cloths that were placed over the battery vent caps.

STOPPING THE ENGINE

CAUTION: Idle engine 3 to 5 minutes before turning engine off to allow lubricating oil and coolant to carry heat away from combustion chamber, bearings, and shafts. Failure to idle engine after full load operation could cause engine damage.

Idle engine a few minutes before turning engine off.

CAUTION: Place selector lever in "N" (neutral), engage park brake, and turn off ignition when you leave vehicle, even momentarily. Never leave vehicle unattended while engine is running. Unexpected and possible sudden vehicle movement may occur if these precautions are not taken.

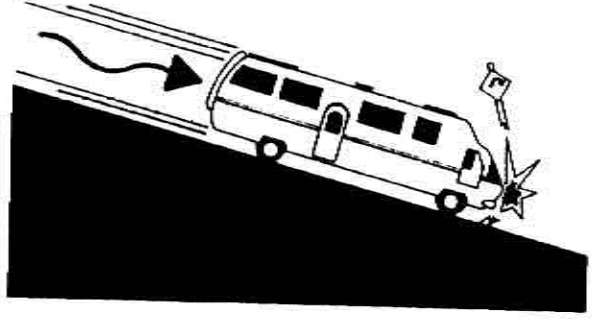
RUNNING OUT OF FUEL

If your vehicle runs out of fuel, the fuel system must be manually bled. Refer to "Fuel System Bleeding" in your engine operation and maintenance manual.

PUSHING OR PULLING TO START

Your vehicle has an automatic transmission, it cannot be started by pushing or pulling. Follow the directions under Use of Jumper Cables.

SPECIAL DRIVING INSTRUCTIONS



SLIPPERY SURFACES

CAUTION: To avoid skidding on slippery roads do not downshift into "1" (LOW) at speeds above 20 mph (32 km/h). DO NOT use Cruise Control on slippery roads.

On slippery surfaces, avoid quick movements of the steering wheel. Decrease your speed and allow for extra stopping distance required by these conditions. Apply the brakes by pumping the pedal steadily and evenly — to avoid wheel lockup and loss of vehicle control.

WHEEL SPIN

If the wheels spin during vehicle start up, reduce pressure on the accelerator pedal.

Move forward slowly and evenly.

ROCKING THE VEHICLE

CAUTION: Prolonged rocking, even at low speeds, may cause engine overheating, transmission, axle shaft, tires, drive line or differential ring and pinion damage or failure.

CAUTION: Do not overspeed the engine and/or spin the wheels in excess of an indicated 35 mph (56 km/h). Speeds above 35 mph (56 km/h) are capable of disintegrating a tire with explosive force which could result in injury to a bystander or occupant.

"Rocking" the vehicle is moving it forward and backward. If the vehicle is stuck, have it pulled out. Do not attempt to "rock" the vehicle.

DRIVING THROUGH WATER

CAUTION: Do not drive through standing water more than 8 in. (203 mm). If you do, or if you drive through water faster than 5 mph (10 km/h), water can be sucked into engine through air intake. This can result in immediate and extensive engine damage.

FLOODED AREAS

Avoid driving through flooded areas unless you are sure the water is no higher than the bottom of the wheel rims. Drive through slowly. Allow adequate stopping distance since wet brakes do not grip well. After driving through water, gently apply the brakes several times while vehicle is moving slowly to dry the brakes.

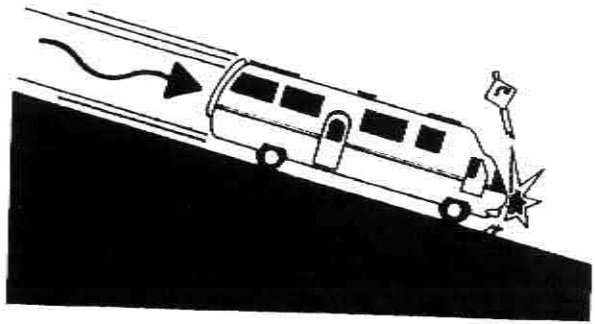
DESCENDING A GRADE

CAUTION: To reduce the risk of personal injury, before going down a steep or long grade, reduce speed and downshift the transmission. Do not hold the brake pedal down too long or too often while going down a steep or long grade. This could cause the brakes to overheat, reducing their effectiveness. As a result, the vehicle will not slow down at the usual rate. Failure to take these steps could result in loss of vehicle control.

When going downhill, brakes will always heat up. They are designed so brake pads rub against the brake discs to slow the vehicle, which creates heat. Brakes are designed to take a lot of heat. However, brakes can be made to fail from excessive heat by attempting to slow down from too high a speed too many times or too quickly. Brakes will fade (have less stopping power) when they get very hot, and they can get to the point where they will no longer slow the vehicle.

The right way to use your brakes for long downhill grades is to go slow enough that a fairly light use of the brakes will keep your speed from increasing. If you go slow enough the brakes will be able to get rid of the heat and they won't get too hot.

Some people believe that letting up on the brakes from time to time will allow them to cool enough so they don't become overheated. Tests have proven this is **not** true. Brake rotors cool very slowly, so the amount of cooling between applications is not enough to prevent overheating. This type of braking requires heavier brake pressures than steady application does. Heavy pressure on the brakes from time to time builds up more heat than light continuous pressure does. Therefore, select the right gear, go slow enough, and maintain a lighter, steadier use of the brakes.



IF BRAKES PULL

- Check tire pressure.
- If pull occurs during the first 500 miles (800 km), make 10 moderately fast stops from 40 mph (64 km/h). Repeat if required. This procedure may be necessary to properly seat new brake pads against the rotors.

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

When descending a long or steep hill, shift to a lower gear and avoid continuous application of the brakes. Continuous application will cause the brakes to overheat, resulting in a temporary loss of braking.

When front or rear brake shoes are replaced, it is essential that authorized service replacement or equivalent shoes be installed. This will assure that vehicle stopping distances are not adversely affected and will maintain the proper balance between front and rear wheel braking.

IF BRAKES DO NOT GRIP WELL

An occasional or intermittent brake squeal will not affect braking effectiveness. If squeal occurs continuously with every application, the brakes should be checked.

Stopping distances vary with different loads and driving conditions. Use caution when encountering new conditions and familiarize yourself with vehicle performance. For longer brake shoe life, take full advantage of engine braking power when slowing down.

SELF-ADJUSTING BRAKES

Front and rear brakes are self-adjusting.

ANTI-LOCK BRAKE SYSTEM (ABS)

Your vehicle is equipped with ABS (Anti-lock brake systems). This system helps you maintain stopping and steering control. It does this by helping to prevent the wheels from locking up and skidding.

The ABS system is always on and requires no special effort or driving technique. You will feel a slight vibration in the steering wheel, a light pulsation of the vehicle, and hear modal valve blow drown noises, when the ABS system activates.

The ABS warning lamp is mounted on the instrument panel. When you first turn on the ignition the lamp will come on, then go off, and immediately come back on again. This is normal operation. After your vehicle speed reaches six (6) mph (10 km/h) the lamp will go off and remain off as long as the ignition remains on.

The ABS is self-checking. If anything goes wrong, the ABS indicator on the instrument panel will stay on. This means the anti-lock function of the braking system has shut down. The brakes still work like a conventional system providing normal stopping ability. Have an authorized service center inspect your vehicle as soon as possible.

Activation varies with the amount of traction your tires have. On dry pavement, you will need to press on the brake pedal very hard before you feel the vibration that means the ABS has activated. However, you may feel the ABS activate immediately if you are trying to stop on snow or ice. Under all conditions, the ABS is helping to prevent the wheels from locking so you can retain steering control. You should continue to press on the brake pedal with the same force.

The ABS works by comparing the speed of the wheels. When replacing tires, use the same size originally supplied with the vehicle. Tire size and construction can affect wheel speed and may cause the system to work inconsistently.

ANTI-LOCK BRAKE SYSTEM (ABS) (Continued)

⚠ CAUTION: A vehicle equipped with ABS may require a longer distance to stop on loose or uneven surfaces than an equivalent vehicle without ABS. The ABS cannot make up for the road conditions or bad judgment. It is still your responsibility to drive at reasonable speeds for weather and traffic conditions, and to leave a margin of safety.

The ABS warning light will come on, and remain on, if there is a malfunction in the ABS or when the ignition switch is turned on with the engine not running. If the light comes on while driving, stop the car at a safe place and shut off the engine. If the light does not go out or lights again while driving, have the system checked by an authorized dealer as soon as possible.

NOTE: The light does not indicate a failure of the normal brake system. The light only indicates a malfunction in the ABS. In such a case, the ABS is automatically shut down but normal braking capability continues.

PARKING BRAKE

The parking brake is used to hold the vehicle in place when it is not being driven. To apply the parking brake, pull the yellow knob (A) on the dash panel. To release the parking brake, push the yellow knob (A) in.

The engine must be operating and the gear selector must be in the "N" (NEUTRAL) position.

NOTE: If the gear selector is not in the "N" (NEUTRAL) position and the parking brake is on, a buzzer will sound to let you know you should place the gear selector into "N" (NEUTRAL).

CHECKING PARKING BRAKE

Periodically check the holding ability of the parking brake by stopping on a steep hill and restraining the vehicle by using only the parking brake.

Pull parking brake button to apply parking brake. Place the transmission selector into the "N" (Neutral) position and release the service brakes.

If the parking brake does not hold the vehicle in place, have your dealer service the brake system.

EMERGENCY RELEASE OF PARKING BRAKE

If your engine will not start and it is desirable to release the parking brake, do the following: Block the wheels. Turn ignition switch on.

Use the ignition switch to turn the engine over several times with the gearshift selector in the neutral position and the parking brake knob in the released (pushed in) position.

NOTE: Emergency release will not work in all cases. System requires air pressure to provide pressure for procedure to work. Since system is pressurized when brake is released, parking brake will come back on in 10 minutes to several days depending on internal pressure.

TOWING THIS VEHICLE

If vehicle is inoperative, it must be towed. Pushing or pulling vehicle is not recommended.

When it is necessary to tow a disabled vehicle, certain precautions and procedures must be taken to prevent damage to the vehicle and/or components. Failure to use standard towing industry precautionary measures when lifting or towing a disabled vehicle could result in an unsafe operating condition.

⚠ CAUTION: If vehicle is to be towed, remove the driveshaft to the rear axle. Failure to do so could cause transmission damage due to lack of proper lubrication.

Only in extreme emergency may the vehicle be towed up to 1/2 mile (.80 km) at no more than 5 MPH (8.04 KPH) without first disconnecting drive shaft from transmission.

TOWING FROM THE FRONT OF VEHICLE

1. With engine off and parking brake applied, chock wheels.
2. Remove driveshaft.
3. Attach towing chains to the frame of chassis. Refer to coach manufacturer's manual for further instruction to prevent damage to coach during towing.
4. Lift the vehicle and secure safety towing chains and/or tow bar.
5. Connect the clearance lights, tail lights, and signal lights. Connect any special towing lights required by local towing regulations.

⚠ CAUTION: After general preparation for towing is complete and drive train components are disconnected, do not tow at speeds over 15 MPH (24.13 KPH).

6. Remove wheel chocks and proceed with towing.

TOWING FROM THE REAR OF VEHICLE

1. With engine off and parking brake applied, chock wheels.
2. Position front wheels straight forward and secure the steering wheel in this position.
3. Attach towing chains the frame of chassis. Refer to coach manufacturer's manual for further instruction to prevent damage to coach during towing.
4. Lift the vehicle and secure safety towing chains and/or tow bar.
5. Connect the clearance lights, tail lights, and signal lights. Connect any special towing lights required by local towing regulations.

CAUTION: After general preparation for towing is complete and drive train components are disconnected, do not tow at speeds over 15 MPH (24.13 KPH).

6. Remove wheel chocks and proceed with towing.

SPECIAL PRECAUTIONS

Before towing, it is important to examine the situation to determine the location of the problem, if possible. Further damage to the vehicle can be prevented by using proper towing precautions. The following towing precautions should be used if the problem is located in the driveline components.

If the transmission is inoperative, the driveshaft must be removed or disconnected at the rear axle differential carrier.

CAUTION: Failure to keep contaminants out of the wheel bearings and/or axle lubricant, could result in failure of the wheel bearings and/or differential carrier.

If the rear axle is inoperative, it is necessary to raise the rear wheels off the ground or remove the rear axle shafts and seal the ends of the wheel hubs to prevent entry of dirt. Disconnect driveshaft to prevent driving the transmission with no lubrication. Secure steering wheel if towing the vehicle backwards.

TOWING WITH YOUR VEHICLE

CAUTION: Towing a load puts additional strain on your vehicle's engine, drive train, brakes, tires and suspension. For your safety and the care of your vehicle, properly match the towed load to the vehicle as follows:

1. Never load the vehicle over the Gross Vehicle Weight Rating (GVWR). Considerable damage to the drive train may result if the vehicle is over it's GVWR. Check the GVWR certification plate (provided by final manufacturer) to find the GVWR.

2. Use the Gross Combined Weight Rating (GCWR) and Gross Vehicle Weight (GVW) to determine the towing capacity. Refer to the coach manufacturer for GCWR. If the GCWR is exceeded serious damage to the drive train may result. Loading past the GCWR may lead to unsafe operating conditions.

a. Subtract the GVW (which is the actual weight of the vehicle alone) from the GCWR (Which is the total weight this vehicle can safely motor) to determine the acceptable weight this vehicle can tow.

3. Make sure towing equipment is properly and safely attached to your vehicle.

Do not use this vehicle for towing during the first 500 miles (800 km) of vehicle operation as premature power train wear may occur.

When descending a steep grade, shift the transmission into the next lower gear to provide additional engine braking.

To avoid vehicle damage and handling difficulty, evenly distribute the trailer load. Always tie the load down securely.

TIRE PRESSURE FOR TOWING

Because of the added loads of towing, tires on the towing vehicle require special attention. Under-inflated tires get very hot and can lead to tire failures and possible loss of vehicle control. Over-inflated tires can cause uneven tire wear. They should be checked often for conformance to cold inflation pressures recommended on the Safety Compliance Certification Label for original equipment tires.

To avoid vehicle damage and handling difficulty, evenly distribute the trailer load. Always tie the load down securely.

HITCHES

Use a hitch and ball recommended by your vehicle manufacturer or your dealer, and make sure its location is compatible with that of the trailer. Use a good weight carrying hitch which uniformly distributes the trailer tongue loads through the bumper and frame. Do not exceed the gross vehicle weight rating (GVWR).

CAUTION: Always disconnect battery and engine electronic module before welding on chassis frame.

CAUTION: Do not use single-clamp bumper hitches or hitches which attach to the vehicle's bumper. However, multi-clamp bumper hitches for occasional use of a rental trailer are acceptable — if properly attached. Follow towing instructions of a reputable rental agency. Never attach safety chains to the bumper.

Whenever a trailer hitch is removed, be certain to have all mounting holes in the underbody properly sealed to prevent possible entry of exhaust fumes, dirt or water.

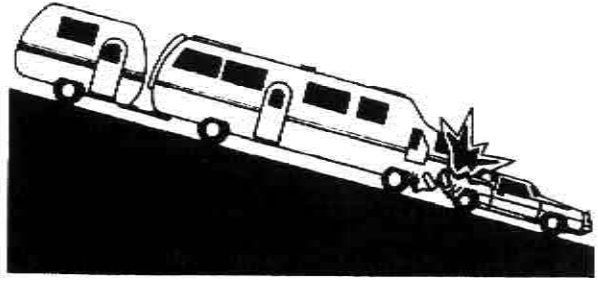
SAFETY CHAINS

Always use safety chains between your vehicle and trailer. This will avoid danger to road users if the hitch fails. Cross chains under the trailer tongue and allow enough slack for turning corners. Connect safety chains to the vehicle frame or hook retainers. Never attach safety chains to the bumper. For rental trailers, follow rental agency instructions for proper hookup.

TRAILER BRAKES

⚠ CAUTION: Do not couple a trailer brake system directly to the vehicle brake system. Doing so will result in inadequate braking and possible personal injury.

Separate trailer brakes are recommended and required on most trailers weighing over 1,500 lbs (680 kg). Be sure your trailer brakes conform to local and Federal regulations.



PARKING WITH TRAILER

⚠ CAUTION: Vehicles with trailers should not be parked on a grade. If you must park on a grade, place wheel chocks under trailer's wheels as follows:

1. Hold service brake and have another person place wheel chocks under trailer wheels.
2. Once wheel chocks are in place, release service brake, making sure chocks are holding vehicle and trailer.
3. Apply parking brake by shifting gear selector into "P–B" (PARK–BRAKE) on vehicles with four–speed transmissions and hydraulic brakes, or by pulling the yellow parking brake knob on vehicles with four–speed transmissions with air brakes or six–speed transmissions.

TO START, AFTER BEING PARKED ON A GRADE:

1. Apply foot service brake and hold.
2. Start the engine.
3. Release the parking brake on vehicles with four–speed transmissions and hydraulic brakes by shifting out of "P–B" (PARK–BRAKE) or by pushing in the yellow parking brake knob on vehicles with four–speed transmissions and air brakes or six–speed transmissions.
4. Release foot service brake and move vehicle uphill to free wheel chocks. Apply foot service brakes and hold, while another person retrieves chocks.

TRAILER LIGHTS

Make sure that your trailer is equipped with lights that conform to Federal and local regulations.

CAUTION: Before connecting a trailer lighting system directly to the lighting system of the vehicle, see your dealer or rental trailer agency for correct type of wiring and relays for your trailer and heavy duty flashers.

TRAILER TOWING TIPS

Before starting on a trip, practice turning, stopping, and backing in an area away from heavy traffic — to gain experience in handling the extra weight and length of the trailer. Take enough time to learn the "feel" of the vehicle/trailer combination before starting out on a trip.

Skillful backing requires practice. Back very slowly, with someone outside at the rear of the trailer to guide your efforts. Place your hand at the bottom of the steering wheel and move it in the direction you want the rear of the trailer to swing. Make small corrections instead of exaggerated ones — a slight movement of the steering wheel will result in much larger movement of the rear of the trailer.

TRAILER TOWING TIPS — Continued

Allow considerably more room for stopping when the trailer is attached. If you have a manual brake controller, "lead" with the trailer brakes when approaching a stop, if possible. Trailer brakes are also handy for correcting trailer side sway. Just touch them for a moment without using your vehicle brakes and the trailer should settle down and track steadily again.

To assist in attaining good handling of the vehicle trailer combination, it is important that the trailer tongue load be maintained at approximately 10—15% of the loaded trailer weight.

Check everything before starting out on the road, but do not be satisfied with that. After you have traveled about 50 miles (80 km), stop in a protected location and double-check your trailer hitch and electrical connections for security. Also, examine the trailer wheel lug nuts for tightness.

TURNING — Because trailer wheels will be closer than the towing vehicle wheels to the inside of the turn, drive slightly beyond the normal turning point.

PASSING — Allow extra distance for passing other vehicles. Downshift to a lower gear for better acceleration, if necessary.

FOLLOWING — Allow at least the equivalent of one vehicle and trailer length combined for each 10 mph (16 km/h) of speed.

HILL CLIMBING — If your vehicle begins to lose speed as you climb a hill, downshift to a lower gear for more power at the rear wheels.

DOWNGRADES — Before descending a steep grade, slow down and shift to a lower gear. The trailer adds weight to the downhill inertia. Driving with transmission in a lower gear will assist in reducing downhill speed. If the trailer should begin to sway, touch the trailer brakes (not the vehicle brakes) and the trailer should settle down.

Specifications and Capacities

GENERAL CHASSIS SPECIFICATION

Component	Description	Manufacturer
ENGINE:	B5.9 Liter Diesel 6–Cylinder 230 hp	Cummins
TRANSMISSION:	6-Speed Automatic MD3060	Allison
STEERING:		
Column:	Tilt	Douglas
Gearbox:	Power Assist 710 Box	Saginaw
Steering Pump:	Engine-Driven Hydraulic Pump (Same as Brake)	Vickers
AIR CONDITIONING:	R134 Refrigerant	Acme
ALTERNATOR:	100 AMP (Standard) 160 AMP (Optional)	Delco Delco
STARTER:	12 Volt	Delco
TIRES:	245/70R19.5 (PXZA)	Michelin

CAPACITIES

Component	Description	APPROXIMATE CAPACITY U.S.	Liters
Fuel Tank		90 gal	341
Engine Crankcase*		15 qt	14.2
When Replacing Filter*		16 qt	15.1
Transmission (Initial Fill)*	MD3060 (6-speed)	26 qt	24.6
Transmission (When Replacing Internal Filter(s)*	MD3060 (6-speed)	18 qt	17
Rear Axle	Rockwell	15 pts	7.2
Engine Coolant Capacity (Engine and	Radiator)	20 qt	19

(Additional heaters may be installed by the final manufacturer.)

***NOTE: Always use the dipsticks to determine ACTUAL fluid requirements. Check level at normal operating temperature. DO NOT OVERFILL.**

AUTHORIZED SERVICE PARTS

PART	OTC#	MANF.	MANF.#	FRAM#	FLTGUARD#	HASTINGS#	A.C.#
Engine Oil Filter	2FP507	Cummins	3908615	PH3976	LF3349	—	—
Air Cleaner Element	P103723	Farr	114810-003	CA6855	AH1193	—	—
Transmission Filter Kit* (2″ Sump Pan)	7HS292	Allison	29503829	—	—	—	—
Transmission Filter Kit* (4″ Sump Pan)	5JA384	Allison	29506337	—	—	—	—
Belt (Engine)	4JA950	Cummins	3911569	—	—	—	—
Belt (A/C)	P104813	Gates	XL-9430	—	—	—	—
Fuel Filter (Engine Mounted)	2FS934	Cummins	3903640	—	FF5052	—	—
Element (Engine Mounted Fuel/Water)	2DS383	—	—	—	FS1251	—	—
Filter (Remote Mounted Fuel/Water)	P103426	Raycor	S3201	—	FS1242	—	—

NOTE: Refer to Parts Catalog for complete service parts information.

**Includes two filters*

AUTHORIZED SERVICE PARTS (Continued)

PART	OTC#	MANF.	MANF.#	FRAM#	FLTGUARD#	HASTINGS#	A.C.#
Air Dryer Desiccant Cartridge And Coalescing Filter	7JA635	Midland	DQ6022	—	—	—	—
Air Dryer Coalescing Filter	7JA634	Midland	DQ6021	—	—	—	—

NOTE: Refer to Parts Catalog for complete service parts information.

LIGHT BULB SPECIFICATIONS (12 VOLTS)

LAMP DESCRIPTION	NO. OF BULBS	LAMP TRADE NO.
Automatic Transmission Gear Selector	1	53
Warning Panel Lights	AR	53, 161 or 194
Headlights (Hi Beam)	2	2A1
(Lo Beam)	2	1A1
Gauge Illumination	AR	53
Speedometer Illumination	1	194
Tachometer Illumination	1	194

FUSE SPECIFICATIONS

CAUTION: Always replace a blown fuse with the same rating as specified. Never replace with a higher amperage rating because severe wiring damage and possible fire can result.

The fuses for the fuse panel come in the amperes and colors as listed. (See Fuse Panel in Service section for locations.)

Rating	Color
5 amp	Tan
10 amp	Red
15 amp	Light Blue
20 amp	Yellow
25 amp	White
30 amp	Light Green

FLUID AND LUBRICANT SPECIFICATIONS

COMPONENT	FLUID USED	RECOMMENDED TYPE
Front Axle Spindle Pins, Tie Rods, Drag Link, Intermediate Steering Shaft, Front and Rear Wheel Bearings, Brake Shafts, and Universal Joints.	Multi-Purpose Long Life Lubricant	Multi-Purpose Grease NLG1 or Grade No. 2
Engine Oil	SAE 15W-40	SAE 15W-40
Automatic Transmission	Automatic Transmission Fluid	Dexron® III
Rear Axle Differential	Gear Lubricant	SAE 85W-140 Gear Lubricant
Hydraulic System Reservoir	Automatic Transmission Fluid	Dexron® III
Fuel	Diesel Fuel	Grade No. 2-0 or 2-D
Engine Coolant	Ethylene Glycol Base Antifreeze	50% Water, 50% Antifreeze
Air Conditioning System	Hydrofluorocarbon Refrigerant	HFC-134a

TIRE IDENTIFICATION

Tire Identification Chart Please note that the sizes in the chart below are typical for the type of tire. To determine what specific tire size your vehicle is equipped with, refer to the safety certification label on your vehicle.

Type of Tire	Description of Size Designation	Tire Size Designation
TRUCK TYPE RADIAL	ALPHA NUMERIC	8 R x 19.5 D
	METRIC	245/70 R x 19.5 PXZA

- 8 — Nominal section width in inches
- R — Indicates radial
- 19.5 — Rim diameter in inches
- D — Load range
- PXZA — Load range
- 19.5 — Rim diameter in inches
- R — Indicates radial
- 70 — Height to width ratio of tire
- 245 — Nominal section width in millimeters

ELECTRICAL CIRCUIT PROTECTION

Your vehicle's electrical system is protected from overload damage by two types of circuit disconnect devices: fuses and fuse links. Should an electrical component fail to operate, check the appropriate fuse.

CAUTION: Always replace a blown fuse with the same rating as specified. Never replace with a higher amperage rating because severe wiring damage and possible fire can result.

For your convenience, most of the replaceable fuses for the electrical system are on the fuse panel located at discretion of coach builder. (See illustration that follows.)

Fuses that open (blow) may be replaced, but will continue to open until the cause of the overload condition is corrected. If a fuse needs to be replaced, use only a new fuse, rated according to specifications.

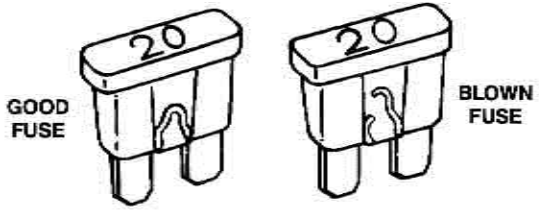
All circuits are protected by fuse link wires. Most of the fuse links are located to the left-hand side behind the engine. If blown, the fuse link must be removed and a new fuse link of the same size and length must be spliced in place. (See your dealer.)

CAUTION: Any addition of accessories which exceed the capacity of the electrical system, or any modification of the system — such as the installation of inverters to operate 110-volt electrical items on your 12-volt system, or bypassing a fuse, could cause premature failure of electrical components. Any such addition of accessories, or modifications may affect your rights under the warranty.

FUSE

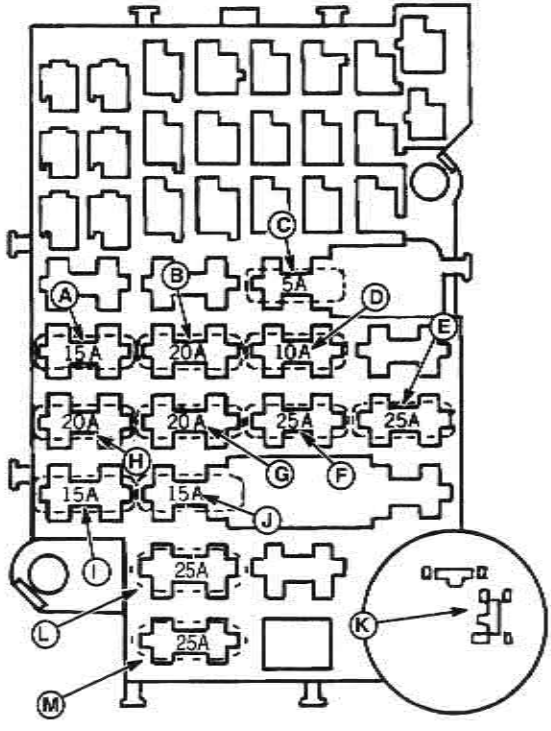
These are the fuse ratings and corresponding colors for the fuse panel. The fuse panel is located under the instrument panel near the steering column.

Rating	Color	Rating	Color
5 AMP	Tan	20 AMP	Yellow
10 AMP	Red	25 AMP	White
15 AMP	Light Blue	30 AMP	Light Green



FUSE PANEL

A— Horn/Dome
15 AMP — Light Blue
B— Ignition
20 AMP — Yellow
C— Instrument Lamps
5 AMP — Tan
D— Radio
10 AMP — Red
E— Wiper
25 AMP — White
F— Heater and/or A/C
25 AMP — White
G— Gauges
20 AMP — Yellow
H— Tail and Illum. Lamps
20 AMP — Yellow
I— Emergency Hazard Warning Flashers and Stop Light
15 AMP — Light Blue
J— Turn Signal and Back-up Lights
15 AMP — Light Blue
K— Hazard Flasher
L— Battery Auxillary
25 AMP — White
M— Ignition Auxillary
25 AMP — White



FUSE PANELS

The fuse panel in Fig. 1 is connected to the main fuse panel shown on the previous page and is located on the firewall on the driver's side.

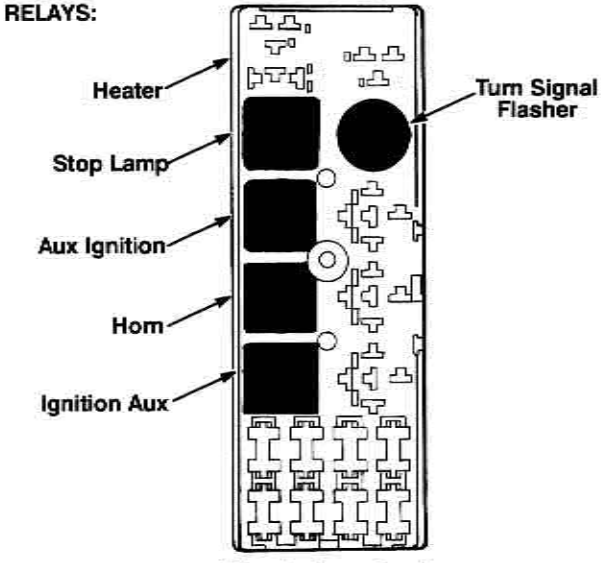


Fig. 1 Fuse Panel

The fuse panel in Fig. 2 is located on the firewall near the main fuse panel. This panel is used in conjunction with the electronic transmission. The relays and fuses are accessible by removing the 8 screws that hold the cover plate in place.

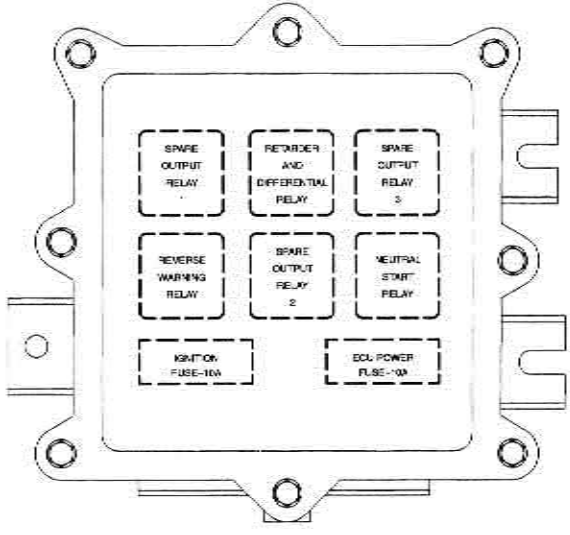


Fig. 2 Fuse Panel

FUEL TANK FILLER

NOTE: Refer to your vehicle operator's manual for filler locations.

⚠ CAUTION: Use of an aftermarket fuel filler cap other than an authorized service part or the equivalent is not recommended and could result in damage to the fuel system or cause improper system operation due to pressure or vacuum build-up, and may compromise the performance of the fuel system in the event of a collision.

You can prevent excessive condensation in the fuel tank by keeping it over half full.

Contact your local Oshkosh Servicing Dealer for genuine Oshkosh service parts. Call 1-414-235-1726 if you have any questions.

FUEL TANK FILLING

CAUTION: Handle fuel with care: it is highly flammable. Do not refuel the vehicle while smoking or when near open flame or sparks.

Always stop engine before refueling vehicle. Fill fuel tank outdoors.

Prevent fires by keeping vehicle clean of accumulated trash, grease, and debris. Always clean up spilled fuel.

CAUTION: If fuel is observed over-flowing from cap, remove cap with caution. Internal pressure may cause fuel expulsion.

If the fuel tank in your vehicle has been overfilled, expansion of fuel due to temperature increases may cause fuel overflow at the filler cap when the vehicle is standing or if the cap is removed. To avoid this, when filling, do not add fuel after the automatic pump shuts off. See Specifications and Capacities for the fuel tank refill capacities.

If your vehicle has two tanks, use some fuel from each tank shortly after fill-up to reduce fuel levels.

Do not spill fuel on the exterior surfaces of the vehicle. Any type of fuel, if spilled on painted surfaces, may dull or soften the paint.

WATER IN FUEL

During refueling, it is possible for water and other contaminants to be pumped into your fuel tank along with fuel. Fuel that is contaminated by water or dirt can cause severe damage to engine. The engine can lose power due to restriction in the filters (water and/or debris from fuel).

Refer to the Maintenance Schedule in this manual for maintenance intervals.

The vehicle is equipped with an engine mounted fuel filter/water separator. An in-line fuel filter or a remote mount fuel filter/water separator are available as options.

ENGINE MOUNTED FUEL FILTER/WATER SEPARATOR

The engine mounted fuel filter/water separator is located on the passenger side of the engine.

If your vehicle is equipped with a remote fuel filter/water separator, the engine mounted separator does not need to be drained. Refer to "Remote Mounted Fuel Filter/Water Separator" in this section.

DRAINING

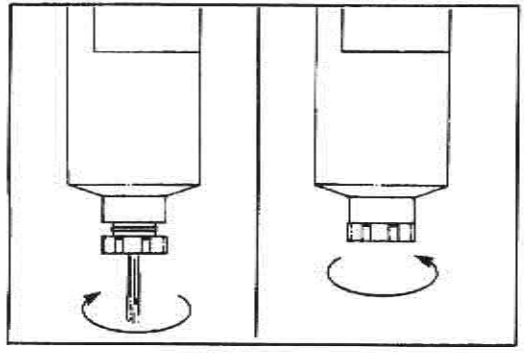
Shut off the engine. Turn the valve clockwise approximately 1/2 to 1 turn until draining occurs. Drain the filter sump of water until clear fuel is visible.

⚠ CAUTION: Do not overtighten the valve. Overtightening can damage the threads and seal.

Turn the valve counterclockwise to close the drain.

Refer to the maintenance schedule in this manual for maintenance schedule.

See your Cummins Operation and Maintenance Manual for maintenance guidelines.



REMOTE MOUNTED FUEL FILTER/WATER SEPARATOR

The remote fuel filter/water separator is mounted on the right bumper bracket at the rear of the vehicle. It should be checked on a daily basis and drained if necessary.

NOTE: The final manufacturer may relocate.

TO DRAIN WATER:

1. Loosen self venting drain to drain bowl of water.
2. Tighten drain. Run engine and check for leaks.

TO REPLACE ELEMENT:

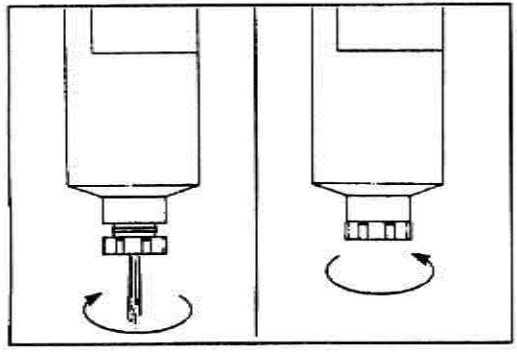
1. Loosen self venting drain and drain the unit.
2. Remove filter element from mounting head with bowl.
3. Remove bowl from filter element. Clean bowl and O–ring gland.

NOTE: Bowl is reusable, do not discard.

4. Lubricate O–ring with clean diesel fuel or motor oil and place in bowl gland.
5. Spin bowl onto new filter element snugly by hand.

⚠ CAUTION: Do not use tools to tighten.

6. Lubricate filter top seal with clean diesel fuel or motor oil.
7. Fill filter element/bowl assembly with clean diesel fuel and attach onto mounting head. Hand tighten an additional 1/3 to 1/2 turn after full seal contact is made.
8. Complete priming procedure by following engine manufacturer's recommendations.
9. Start engine and check that there are no leaks.

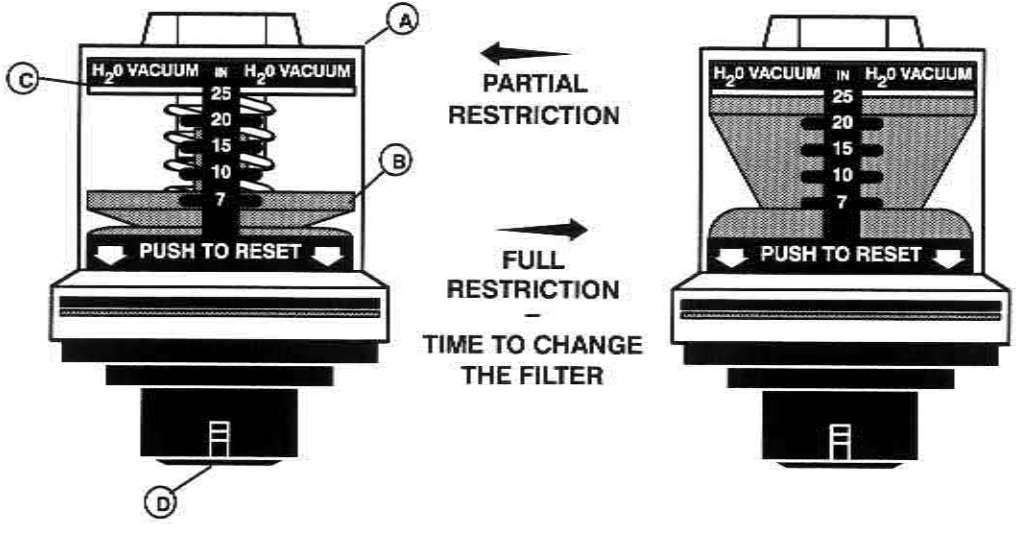


AIR RESTRICTION INDICATOR

The purpose of the air restriction indicator (A) is to notify you when to change your air cleaner.

Replace the air cleaner element when the yellow line (B) meets the red line (C) (25 in. or 635 mm of vacuum). After the air cleaner element is replaced, press the rubber button (D) on the bottom of the air restriction indicator to reset.

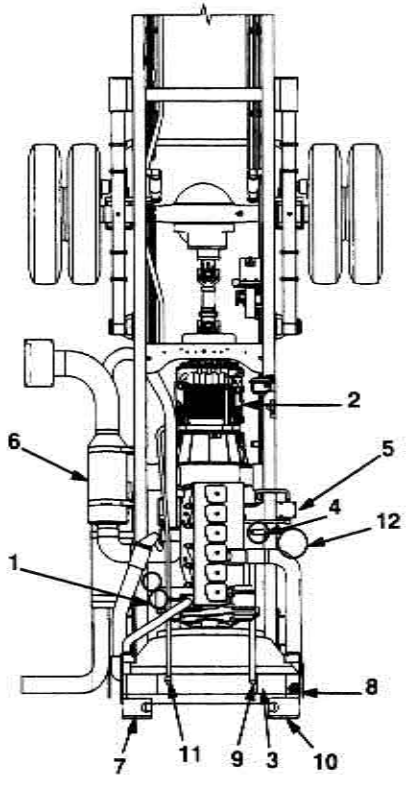
NOTE: The final manufacturer mounts the air restriction indicator. Refer to vehicle manufacturers owners manual for location of air restriction indicator.



ENGINE COMPARTMENT SERVICE POINTS

1—Engine Oil Filter
2—Internal Transmission Filter(s)
3—Engine Oil Dipstick
4—Fuel Filter
5—Remote Fuel Filter/Water Separator*
6—Air Cleaner*
7—Coolant Overflow Reservoir*
8—Radiator Filler Cap*
9—Remote Engine Oil Filler Tube*
10—Hydraulic System Reservoir*
11—Automatic Transmission Dipstick and Filler Tube
12—Air Dryer Filters
—Brake Master Cylinder (Located In Front Of Chassis)*
—Air Restriction Indicator*

* The vehicle manufacturer may choose to relocate certain components. If locations differ from those indicated, refer to vehicle operator's manual for actual location.



ENGINE COMPARTMENT SERVICE

CAUTION: Do not service the engine until the parking brake is applied. Unexpected and possible sudden vehicle movement may occur if these precautions are not taken.

To avoid the possibility of personal injury, you should always turn off the ignition and remove the key before working under the hood unless the particular procedure requires otherwise. If the procedure requires you to run the engine while working under the hood, do not permit any clothing, such as neckties or handkerchiefs, near the engine or radiator fan. They can become entangled in moving parts and result in damage to the vehicle and personal injury. Also remove watches, bracelets, and rings.

Periodically check the fan shroud to make sure that it is properly fastened and is not cracked or broken.

To avoid fire and personal injury, do not start the engine with the air cleaner removed.

CAUTION: FAN. Avoid fan blades with hands.

ENGINE OIL RECOMMENDATIONS/ SPECIFICATIONS

OIL PERFORMANCE RECOMMENDATIONS

The use of quality engine lubricating oils combined with appropriate oil drain and filter change intervals are critical factors in maintaining engine performance and durability

Cummins Engine Company, Inc. recommends the use of a high quality SAE 15W-40 heavy duty engine oil (such as Cummins Premium Blue) which meets the American Petroleum Institute (API) performance classification CE/SG.

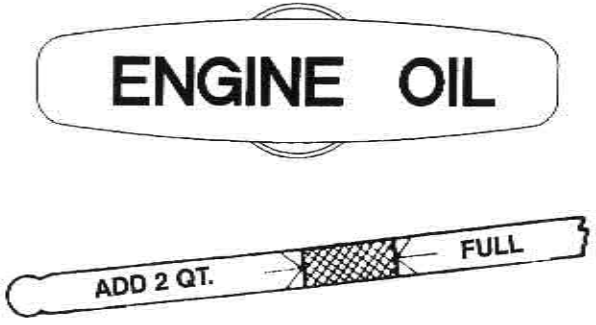
NOTE: CC/CD or CD/SF engine oils can be used in areas where CE oil is not yet available, but the oil change interval must be reduced to one half the interval given in the maintenance schedule.

OIL VISCOSITY RECOMMENDATIONS

The use of multi-viscosity lubricating oil has been found to improve oil consumption control and improve engine cranking in cold temperatures while maintaining lubrication at high operating temperatures.

CHECKING ENGINE OIL LEVEL

It is normal to add some oil between oil changes. Check your engine oil level before start-up or while refueling, or at least every 500 miles (800 km). To check the engine oil level, park your vehicle on level ground and turn engine off. Wait a few minutes for oil to drain back to oil pan. Protect yourself from engine heat, then pull out the dipstick. Wipe it clean and reinsert fully. Pull the dipstick out and check level. Keep the oil level above the ADD mark on the dipstick by adding oil as required. DO NOT OVERFILL.



CHANGING ENGINE OIL AND FILTER

CAUTION: Do not handle a hot oil filter with bare hands.

Change engine oil and filter according to the Maintenance Schedule.

See your Cummins Operation and Maintenance Manual for more specific information.

ENGINE COOLING SYSTEM

Coolant in the system expands with heat and overflows into the recovery tank. When the system cools down, coolant is drawn back into the radiator.

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

The cooling system was filled at the factory with a quality coolant that meets all specifications. It is important to use proper coolant to prevent damage to cooling system components. Use mixture of 50% water and 50% ethylene-glycol base antifreeze with a low silicate content (meeting General Motors Specification GM 1825-M) for operation above −34°F (−37°C). A mixture of 40% water and 60% antifreeze is recommended for temperatures below −34°F (−37°C). The cooling solution must be used year round to provide:

1. Freezing protection down to −34°F (−37°C).
2. Boiling protection up to 262°F (128°C).
3. Protection against rust and corrosion in the cooling system.
4. The proper engine temperature for efficient operation and emission control.
5. Proper operation of the coolant temperature light or gauge.

⚠ CAUTION: Do not add any carriers or other objects in front of the radiator grille which may inhibit the flow of air; thus, reducing the cooling capacity of the radiator — as this could result in premature failure of the engine and/or transmission.

FREEZING PROTECTION

Maintain cooling system freeze protection at −34°F (−37°C) to prevent damage as a result of freezing, as well as corrosion and boiling.

Since the coolant contains rust and corrosion inhibitors, you should leave it in the vehicle year round.

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

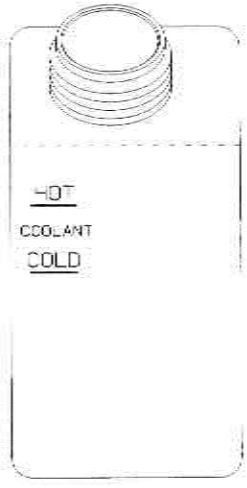
CHECKING COOLANT LEVEL

⚠ CAUTION: Never remove the radiator cap while the engine is operating or while the engine and radiator are still hot. Scalding fluid and steam can be blown out under pressure if the cap is taken off too soon. Failure to follow these precautions could result in serious personal injury from heated coolant spray.

Check the cooling system at regular intervals, such as during fuel stops. You usually do not need to remove the radiator cap to check the coolant level. Look at the "see through" coolant recovery tank. When the engine is cold, the coolant level should be at or slightly above the "Cold" mark on the recovery tank. When the engine has fully warmed up, the level should be at or slightly above the "Hot" mark on the recovery tank.

If the coolant level is low, remove the cap on the coolant recovery tank. Add to the recovery tank enough of a 50/50 mixture of water and antifreeze to bring the level up to the proper mark. Put the cap back on the recovery tank.

If you have to add coolant more than four times a year, see your dealer for a cooling system check.



SERVICING THE COOLING SYSTEM

CAUTION: FAN. Avoid fan blades with hands.

The cooling system should be serviced at the intervals specified in the Maintenance Schedule as follows:

1. Wash the radiator cap and filler neck with clean water.

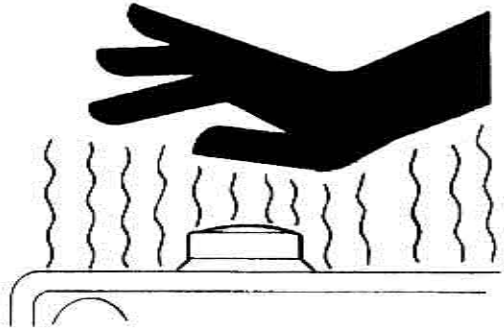
CAUTION: Check coolant level using the previous instructions. (Refer to Checking Coolant Level.)

2. Check the coolant level in the recovery tank or radiator and have it tested for freeze protection. Add antifreeze, if needed, to maintain freeze protection at −34°F (−37°C).
3. Have the cooling system and radiator cap tested for pressure capacity indicated on radiator cap. The pressure with the 15 psi (105 kPa) radiator cap can be anywhere from 14—16 psi (100—110 kPa). If a replacement cap is needed use an authorized or equivalent cap designed for coolant recovery systems and specified for your model. Be sure replacement cap is same pressure as cap you are replacing.
4. Tighten all radiator hose clamps and heater hose clamps and inspect all hoses. Replace hoses if they are swollen, cracked or otherwise worn.
5. Have your dealer check fan belt for proper tension.

REPLACING COOLANT

⚠ CAUTION: Never remove the radiator cap while the engine is operating or while the engine and radiator are still hot. Scalding fluid and steam can be blown out under pressure if the cap is taken off too soon. Failure to follow these precautions could result in serious personal injury and/or damage to the cooling system or engine.

⚠ CAUTION: FAN. Avoid fan blades with hands.



At the intervals specified in the Maintenance Schedule, or whenever the coolant becomes dirty, flush and refill the cooling system as follows:

1. When the engine is cool, remove the radiator cap:

Turn the cap slowly to the left until it reaches a "stop". Do not press down while turning the cap. Wait until any remaining pressure (indicated by a hissing sound) is relieved, then press down on the cap and continue turning it to the left.

2. When the cap is removed, run the engine until the upper radiator hose is hot. (This shows that the thermostat is open and the coolant is flowing through the system.)

REPLACING COOLANT — Continued

3. Stop the engine. Open the radiator drain valve to drain the coolant. Drainage may be speeded by removing plug in bottom of water inlet.
4. Close the radiator drain valve and replace plug in bottom of water inlet. Add water until the system is filled and run the engine until the upper radiator hose is hot again.
5. Repeat steps 3 and 4 several times until the drained liquid is nearly colorless.
6. Drain the system, then close the radiator and block drain valves.
7. If equipped, disconnect all hoses from the coolant recovery tank. Remove the recovery tank and pour out any fluid. Scrub and clean the inside of the recovery tank with soap and water. Flush it well with clean water, then drain it. Reinstall the recovery tank and hoses.
8. Close heater loop valves (2).
9. Open petcocks at radiator top (2) and heater loop outlet (at water pump [1]).
10. Fill radiator (3.5 GPM max) with a 50/50 mixture of antifreeze and water.
11. Close 2 petcocks at radiator.
12. Start engine. Run at idle for 10 seconds and then at high idle for 1 minute. Return to idle.
13. Open heater inlet valve (at thermostat).
14. Close petcock at heater loop outlet (at water pump) when it begins to flow a steady stream of coolant. Do not allow more than 1.5 quarts of coolant to escape.
15. Open heater loop outlet valve.
16. Top off radiator.
17. Install radiator cap.
18. Fill coolant reservoir to "HOT" mark.

INSPECT DRIVE BELT

CAUTION: Belt must be cool when checked.

Measure the belt deflection at the longest span of the belt (Figure 1), under medium hand pressure.

Maximum Deflection: 9.5 to 12.7 mm (3/8 to 1/2 inch).

Inspect belt for damage (Figure 2).

Transverse (across the belt width) cracks are acceptable.

Longitudinal (direction of belt length) cracks that intersect with transverse cracks are not acceptable.

Replace the belt if it has unacceptable cracks, is frayed or has pieces of material missing.

For additional information, see your Cummins Operation and Maintenance Manual.

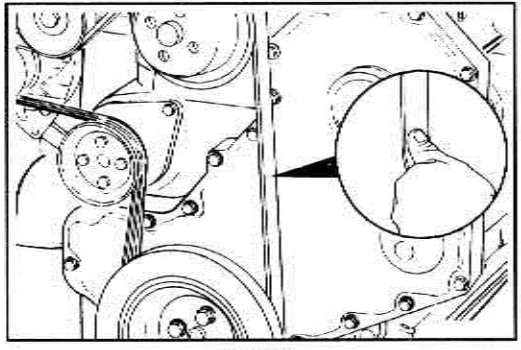


Figure 1

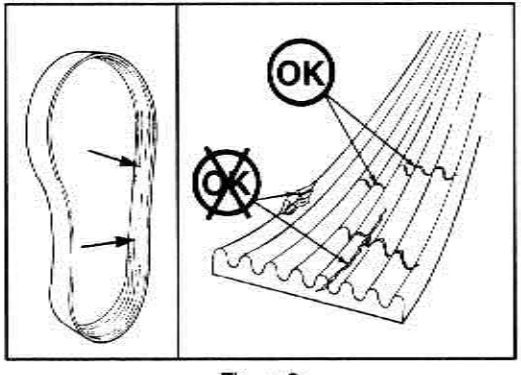


Figure 2

CHECKING TRANSMISSION FLUID LEVEL

The combination transmission fluid dipstick/fill tube (A) is located at the rear of the vehicle to the left of the radiator.

⚠ CAUTION: Clean the area around the dipstick handle before removing the dipstick. Any dirt or foreign matter could cause damage to the transmission parts or impair operation.

⚠ CAUTION: Proper transmission fluid level should be maintained at all times. Low fluid level causes transmission slippage while overfilling can cause overheating, foaming, loss of fluid or transmission malfunction.

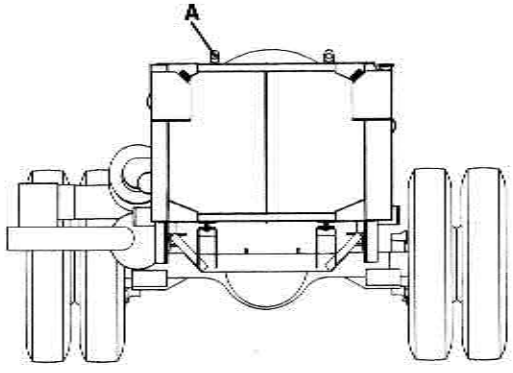
⚠ CAUTION: Ensure that a competent driver remains in the drivers seat during this check. Never leave vehicle unattended while engine is running. Unexpected and possible sudden vehicle movement may occur if these precautions are not taken.

COLD CHECK – The purpose of a cold check is to determine if the transmission has enough oil to be safely operated until a hot check can be made.

- If the engine has been shut down for an extended time, park the vehicle on a level surface and apply the parking brake.
- Run the engine for at least one minute. Shift to Drive and then Reverse to clear the oil system of air. Then shift to Neutral and allow the engine to idle.
- After wiping the dipstick clean, check the oil level. If the oil on the dipstick is within cross-hatched area (B), the level is satisfactory. If the oil level is not within this area, add or drain oil as necessary to bring the level into this area. See "Adding Transmission Fluid" in this section.
- Perform a Hot Check at the first opportunity after normal operating temperature (71°– 93°C; 160°–200°F) is reached.

CHECKING TRANSMISSION FLUID LEVEL – Continued

NOTE: An accurate oil level check cannot be made unless the engine is idling in Neutral or with the parking brake set, the transmission fluid is at the proper temperature, and the vehicle is on a level surface.

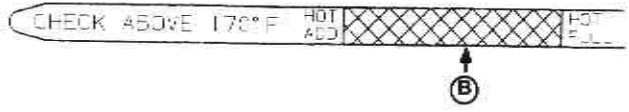


CHECKING TRANSMISSION FLUID LEVEL – Continued

HOT CHECK – The oil must be hot to ensure an accurate check. The oil level rises as the temperature increases.

- Be sure the oil has reached normal operating temperature (71° – 93°C; 160° – 200°F).
- Park the vehicle on a level surface and shift to Neutral or Park. Apply the parking brake and allow the engine to idle.
- After wiping the dipstick clean, check the oil level. The safe operating level is anywhere within the cross-hatched area below the word "HOT."
- If the level is not within the cross-hatched area (B), add or drain oil as necessary to bring the level into this area. See "Adding Transmission Fluid" in this section.

NOTE: Approximately two quarts (2 liters) of oil is required to raise the level from "HOT ADD" to "HOT FULL".

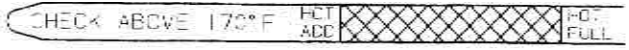


ADDING AUTOMATIC TRANSMISSION FLUID

If you have to add transmission fluid, add enough fluid through filler tube to bring level to correct point indicated on dipstick. DO NOT OVERFILL. If overfill occurs, remove excess fluid.

⚠ CAUTION: Overfilling transmission can cause fluid to foam and spill out through filler tube. Aerated fluid will cause transmission malfunction.

When necessary to add fluid, use only DEXRON®III or type C-4 (SAE 10W or SAE 30). Use type C-4 SAE 30 where ambient temperature is consistently above 86°F (30°C).



SIX-SPEED TRANSMISSION

AIR TANK DRAINING

Chassis equipped with air brakes have automatic heated air tank drains located on the bottom of the air reservoirs.

While you are operating your vehicle, the air tanks will automatically be drained each time there is a drop in air pressure of approximately 2 psi from maximum tank pressure.

NOTE: Under normal vehicle operation, you will not be able to hear the air tanks draining.

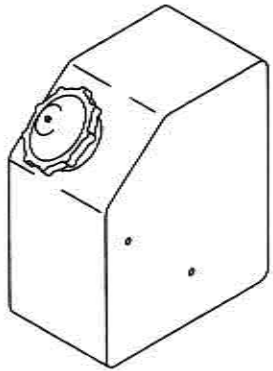
HYDRAULIC STEERING SYSTEM — FLUID LEVEL CHECK

Check the fluid level in the engine-driven hydraulic pump reservoir with the park brake applied and the engine shut off. Refer to your Vehicle Operator's Manual for location and access to reservoir. Proper fluid level is the area between "MIN" and "MAX" marks on reservoir.

If required, fill the reservoir with DEXRON® III Automatic Transmission Fluid or equivalent.

NOTE: During continuous cold weather operation (constant operation below 0°F (−18°C), fill the brake system with Exxon UNIVIS N-22 hydraulic oil or equivalent. DO NOT MIX WITH OTHER FLUIDS.

DO NOT continue to use Exxon UNIVIS N-22 when operating above 0°F (−18°C). Drain and refill the brake system with DEXRON III Automatic Transmission Fluid.



CAUTION: Do not operate the vehicle with a low power steering fluid level or severe damage to the power steering system will occur due to a lack of fluid.

INSPECTING FOR ROAD DAMAGE

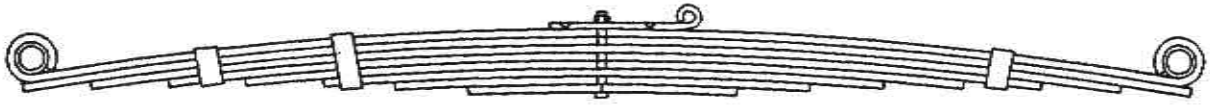
WHILE LUBRICATING CHASSIS

The suspension and steering linkage in your vehicle should be inspected periodically for abnormal looseness and damaged seals. Also be alert for any changes in steering action. Hard steering, excessive free play or unusual sounds when turning or parking indicate a need for inspection or servicing.

NOTE: After any severe impact such as striking large potholes, inadvertent sliding into curbs on icy roads, or a collision involving the front end, observe the steering wheel alignment. If the steering wheel spokes seem to be in a different position while going down the road, have the front suspension and steering checked for possible damage.

Periodically, check for broken springs or shock absorber mounts.

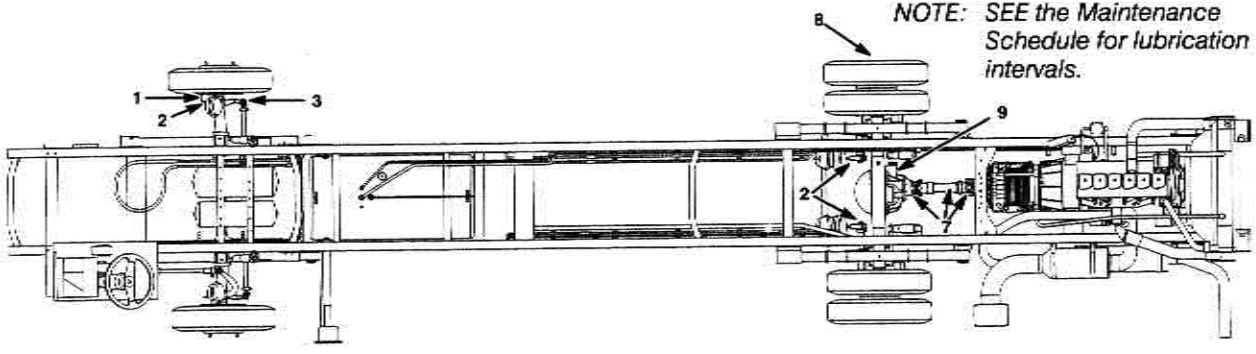
INSPECTING SPRINGS

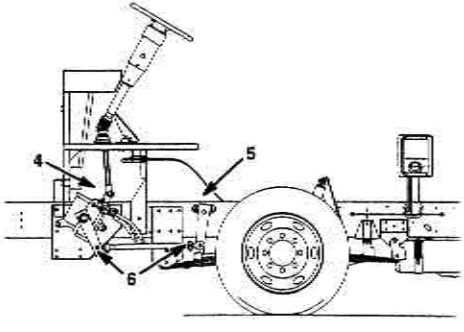


Some reverse bow in your suspension leaf springs is normal (as shown). Deflection in the springs is affected by carrying capacity of spring package furnished with your chassis and load applied. If your springs appear to bow considerably more than what is shown, have your servicing dealer check for broken springs, or possibility of adding heavier spring package.

CHASSIS LUBRICATION POINTS

NOTE: SEE the Maintenance Schedule for lubrication intervals.





1 – Kingpins (2 Fittings Each Side)
2 – Air Brake Camshaft
3 – Tie Rod (1 Fitting Each End)
4 – Steering Link
5 – Bellcrank
6 – Drag Link (1 Fitting Each End)
7 – Universal Joints and Slip Spline (3 Fittings)
8 – Rear Wheel Bearing (1 Each Side)
9 – Rear Axle Differential

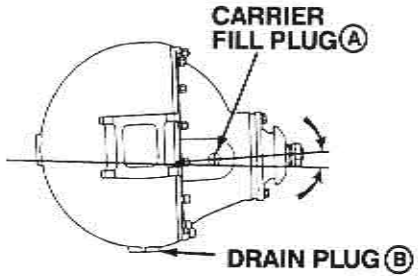
CHECKING REAR AXLE LUBRICANT LEVEL (ROCKWELL)

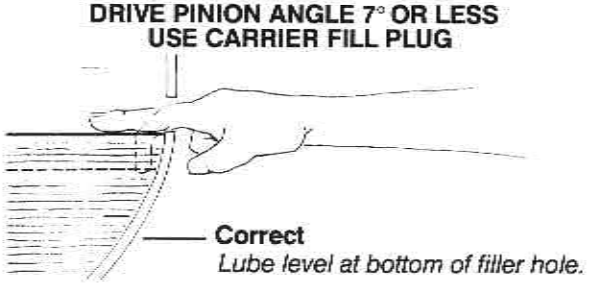
Clean area around filler plug (A) and remove plug. Lubricant should be level with the bottom of the hole.

⚠ CAUTION: Lube level close enough to the hole to be seen or touched is not sufficient. It must be level with the hole.

NOTE: When checking lubricant level, also check and clean housing breathers.

If lubricant needs to be added, GL-5, 80W-140 is recommended for most operating conditions. Use GL-5, 85W-140 for severe service.





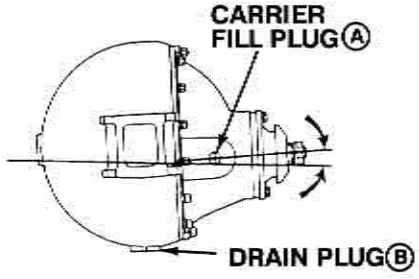
REPLACING REAR AXLE LUBRICANT (ROCKWELL)

Change lubricant after the first 1,000 miles of operation (before 3,000 miles), then change twice a year or every 25,000 miles, whichever comes first. If the vehicle does not accrue enough mileage to require a lubricant change, change the lubricant once yearly.

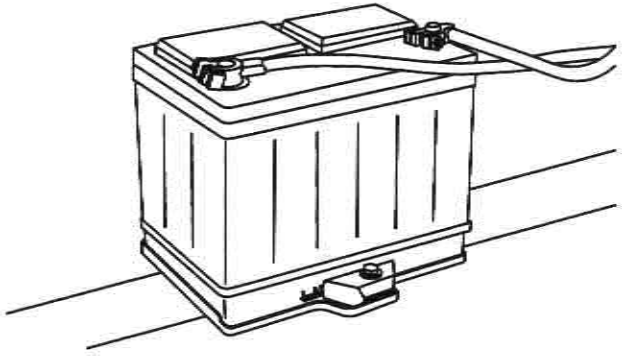
Drain when the lubricant is at normal operating temperature. It will flow freely and minimize the time necessary to fully drain the axle.

Unscrew the magnetic drain plug (A) on the underside of the axle housing bowl section and allow the lubricant to drain into a suitable container. Inspect drain plug for large quantities of metal particles. After initial oil change, these are signs of damage or extreme wear in the axle, and inspection of the entire unit may be necessary. Clean the drain plug and replace it after the lubricant has drained completely.

Remove the filler hole plug (B) from the axle housing bowl and fill the axle with approved lubricant until level with the bottom of the hole.



BATTERY CARE – MAINTENANCE FREE BATTERY



The maintenance-free battery supplied with the chassis does not require the addition of water during its normal service life. The vents are part of the cover and cannot be removed. Keep the top of the battery clean and dry. This will give you longer, trouble-free operation. Also, make certain the battery cables are tightly fastened to the battery terminals. If there is any corrosion on the battery cables or terminals, remove the cables and clean the cables and terminals with a wire brush. Neutralize the acid with a solution of baking soda and water. After installing cables, apply a small quantity of petroleum jelly to the top of each battery terminal to help prevent corrosion.

NOTE: If the vehicle is not going to be driven for 30 days or longer, disconnect the cable from the "—" (black) negative terminal of the battery to prevent discharge.

TIRE SERVICE

WARNING: Inflate and maintain the tires to the recommended specification shown on the Safety Certification Label.

Use replacement tires with the recommended load carrying capacity and of the proper size.

Do not attempt to mount a tire unless you have the proper equipment and experience. Have it done by your dealer or a qualified repair service.

TIRES AND TIRE CARE

ORIGINAL EQUIPMENT TIRES

⚠ CAUTION: For proper performance, safety, and maximum fuel economy, it is essential that you always maintain recommended inflation pressures, and stay within the load limits and weight distribution recommended for your vehicle.

Before driving each day, glance at all your tires. If one looks lower than the others, have the pressure of all tires checked. Otherwise, check pressure every few weeks. Check spare tire regularly.

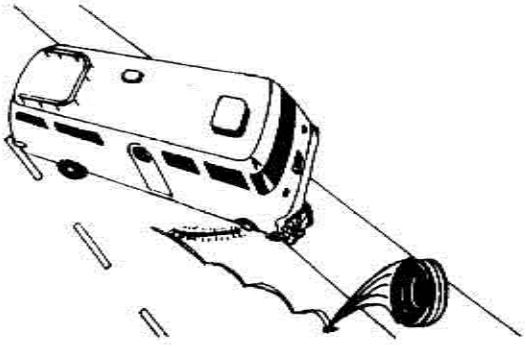
When loading your vehicle, the weight on each axle should be evenly distributed so that the weight on any wheel does not exceed 1/2 the GAWR (Gross Axle Weight Rating) for the axle on which that wheel is mounted.

TIRE INSPECTION AND MAINTENANCE

Inspect the tire treads, and remove stones, nails, glass, or other objects that may be wedged in the tread grooves. Check for holes or cuts that may permit air leakage from the tire, and make the necessary repairs.

Inspect the tire side walls for cuts, bruises, and other damage. If internal damage to the tire is suspected, have the tire demounted and inspected for need to repair or replace.

WHEEL INSPECTION AND MAINTENANCE



CAUTION: Whenever a wheel is removed and then reinstalled, always remove any corrosion that may be present on the mounting surface of the wheel and/or the surface of the hub, drum or rotor that contacts the wheel. Installing wheels without good metal-to-metal contact at the wheel mounting surface can cause the wheel lug nuts to loosen and could allow the wheel to come off while the vehicle is in motion, causing loss of control.

Check for damage that would affect the run out of the wheels. Wobble or shimmy will eventually damage the wheel bearings.

Front wheel bearings require periodic repacking and adjustment as specified in the Vehicle Maintenance section. Loose or worn front wheel bearings tend to let the vehicle wander or shimmy, and can eventually cause excessive tire wear.

SPARE TIRE

If your vehicle is equipped with a spare tire, check the spare tire inflation pressure at the same time as the other tires.

Check your vehicle operator's manual for spare tire location.

The spare tire and wheel should be of the same size and quality as the others on your vehicle.

TIRE AND WHEEL REPLACEMENT

CAUTION: When you replace tires, use only tire and wheel combinations as recommended on the Safety Compliance Certification Label decal attached to your vehicle. Refer to the Safety Certification Label to help determine what type of tire your vehicle has. The Tire Identification Chart will aid you in determining what the tire size designation means. Make sure that all tires and wheels are of the same size and load-carrying capacity. Never mix radial, bias-belted, or bias type tires. Use only wheels recommended for the tire size selected. Replacement of tires, with specifications (size, lead ranges, and in some cases, brands) other than what is specified may result in a reduction of GAWR and GVWR.

Failure to follow these precautions can adversely affect the safety and handling of your vehicle.

Tire sizes other than original equipment could affect speedometer/odometer accuracy. Consult your dealer about the need to change speedometer drive gears.

CAUTION: Use of after-market wheel assemblies that may not be compatible with your vehicle may result in equipment failure and possible injury. A wheel of the wrong size or type may adversely affect such things as load carrying capacity, wheel and bearing life, brake cooling, speedometer/odometer calibration, stopping ability, headlight aim, bumper height, vehicle ground clearance, steering stops, and tire or tire chain clearance to the body and chassis. Replacement with used wheels is not advised.

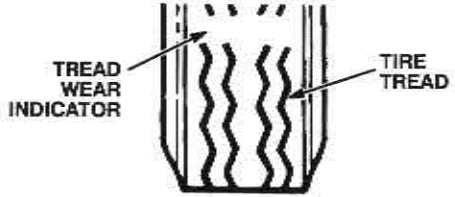
The use of wheels and/or tires with load carrying limits higher than the limits of the wheels/tires originally installed on your vehicle does not in itself increase the GAWR or the GVWR of the vehicle. Only wheel assemblies approved and released for your vehicle model should be used. Alterations to the vehicle suspension or steering can adversely affect vehicle handling and may lead to loss of vehicle control.

TIRE AND WHEEL REPLACEMENT — Continued

If the tire is worn evenly across the tread, a tread wear indicator will appear as a solid band across the tread. Replace the tire. Replacement of unevenly worn tires may be necessary before an indicator band appears across the entire tread.

Your wheels and tires are match mounted for improved ride. Prior to repairing a tire, mark the wheel and tire to ensure they are properly aligned during remounting to continue the same ride level.

NOTE: The original tires mounted on your chassis are constructed from a compound that is resistant to wear caused by frequent braking and lateral scrub caused by excessive turning. However, motorhomes typically travel in a straight line and are more susceptible to a condition called free rolling wear. Should this occur, first check the front-end alignment, correct if necessary, and rotate the tires from front to rear as needed to wear off the odd aspect on the steer tires.



INFLATION PRESSURE

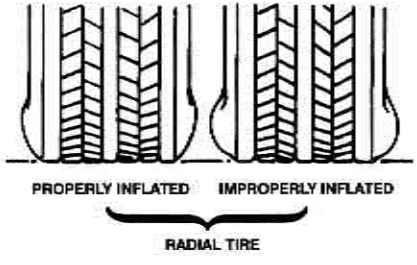
CAUTION: Over or under-inflated tires can affect vehicle handling and can fail suddenly, resulting in loss of vehicle control.

CAUTION: Failure to follow manufacturers recommended inflation pressure may result in premature tire failure.

Do not drive over posted speed limits or at excessive speeds. This vehicle is not equipped with high speed capability tires and should never be operated in excess of 74 mph (119 km/h) for even a short time. Doing so can result in tire failure, loss of control and possible injury.

The Safety Compliance Certification Label attached to this vehicle shows the recommended cold inflation pressures (psi — pounds per square inch) for your vehicle's original equipment tires. Refer to the sidewall of tire for maximum inflation pressure. The tire pressures should be checked after the vehicle has been parked for at least one hour. Do not let air out of warm tires to adjust pressure. It is normal for a warm tire to exceed the specified cold inflation pressure. Always maintain proper tire pressure. Also check spare tire regularly.

If your vehicle is driven at continuous speeds of 65 mph (105 km/h) to 74 mph (119 km/h) in an area where such speeds are permitted by law, the cold inflation pressure shown on the Safety Compliance Certification Label must be maintained.



VEHICLE JACKING POINTS

WARNING:DO NOT raise vehicle using bumper jack. Use only jack (or equivalent), supplied by vehicle builder with your vehicle. Position jack only at prescribed jacking points.With one rear wheel lifted off the ground, park brake may not prevent vehicle from moving. Block wheel diagonally opposite wheel being raised. DO NOT put any portion of your body under vehicle while vehicle is on a jack. Never start engine while vehicle is on a jack.

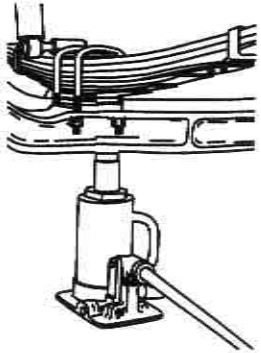
With one rear wheel lifted off the ground, park brake may not prevent vehicle from moving. Block wheel diagonally opposite wheel being raised.

DO NOT put any portion of your body under vehicle while vehicle is on a jack.

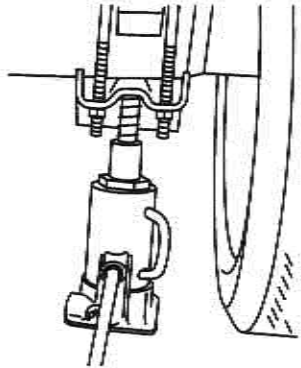
Never start engine while vehicle is on a jack.

The jacking point for the front wheels is directly under the axle.

The jacking point for the rear wheels is directly under the axle housing.



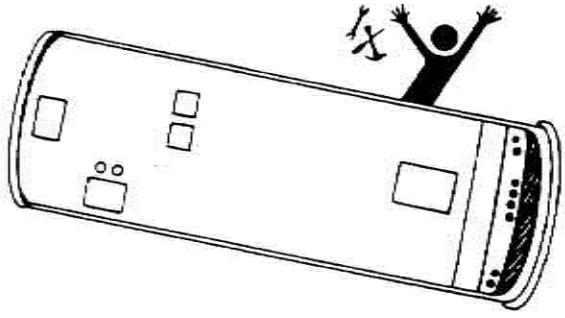
FRONT JACKING POINT



REAR JACKING POINT

IF YOU GET A FLAT TIRE

CAUTION: To minimize the risk of personal injury, do not put any portion of your body under the vehicle while the vehicle is on the jack. The jack is provided for emergency wheel and tire changing only. If you wish to service the vehicle, use jack stands. Never start the engine while the vehicle is on the jack.



IF YOU GET A FLAT TIRE — Continued

In case of sudden tire failure, avoid heavy brake application. Gradually decrease speed. Hold steering wheel firmly and move slowly to a safe, off-road place. Park on a level spot, place the transmission selector in "P–B" (PARK–BRAKE) on vehicles with 4-speed transmissions or "N" (NEUTRAL) on vehicles with 6-speed transmissions, set the parking brake, turn off the ignition, and turn on the hazard flasher system.

CAUTION: To prevent inadvertent vehicle movement while changing a tire, always block the wheel diagonally opposite the wheel being changed. Be sure park brake is engaged.

Make sure park brake is applied and holds vehicle from moving. Block wheel diagonally opposite wheel being changed.

Remove the spare wheel, jack, jack handle, and lug wrench from stowage.

CAUTION: Lug nuts are tightened to 450—500 lb-ft (610—680 N·m). This requires a long extension to your lug wrench to break lug nuts loose. Lug nuts should be broken loose before raising vehicle with jack. If your coach is not equipped with an extension, do not attempt to loosen nut; have a servicing dealer remove flat and install spare.

CAUTION: Do not raise the vehicle using a bumper jack. The bumper system components could be damaged. Also, jack slippage may occur which could cause personal injury.

Place the jack on a solid surface under the jacking points indicated in this manual.

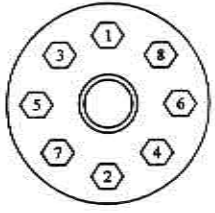
IF YOU GET A FLAT TIRE — Continued

⚠ CAUTION: Lug nuts on the right and left side of the vehicle have right-hand (turn clockwise to tighten) threads.

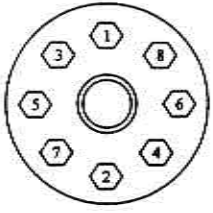
Raise the vehicle slightly, but DO NOT lift wheel and tire off the ground. Loosen the wheel lug nuts slightly, but do not remove them until the tire is raised off the ground.

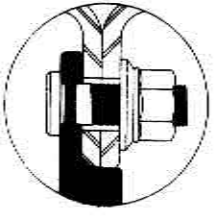
Raise the vehicle until the wheel is clear off the ground. Finish removing the wheel lug nuts and wheel.

FRONT

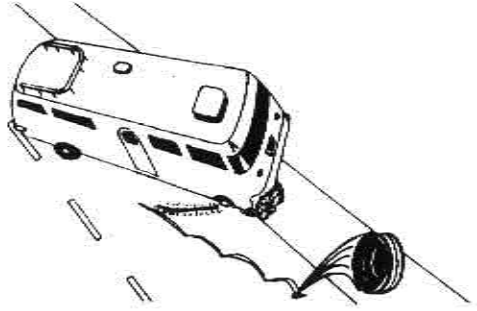


REAR DUAL





IF YOU GET A FLAT TIRE — Continued



CAUTION: Lug nuts must be retightened to proper torque specifications at 50 miles (80 km) and then at 500 miles (800 km) of new vehicle operation and at the intervals specified in the Maintenance Schedule.

Also retighten to proper torque specifications at 50 miles (80 km) and then 500 miles (800 km) after (1) any wheel change or (2) any other time the wheel lug nuts have been loosened.

Failure to retighten wheel lug nuts as required could allow wheels to come off while the vehicle is in motion, causing loss of control and possible collision.

Lower the vehicle until the tire touches the ground and securely tighten lug nuts to 450—500 lb-ft (610—678 N·m) in the same sequence.

Finish lowering the vehicle and install hub cap or wheel cover. Stow the jack, handle, wheel wrench, and spare tire as shown in your vehicle operator's manual.

Unblock the opposite wheel.

DEMOUNTING AND MOUNTING TIRES

⚠ WARNING: Inflate and maintain the tires to the recommended specification shown on the Safety Certification Label.

Use replacement tires with the recommended load carrying capacity and of the proper size.

Do not attempt to mount a tire unless you have the proper equipment and experience. Have it done by your dealer or a qualified repair service.

⚠ CAUTION: When remounting and inflating a tire, use only appropriate equipment and adhere to prescribed safety precautions to avoid damage to the tire and possible injury to yourself. If you are not equipped or experienced in this work, take the tire to a tire repair shop.

Be certain tires are completely deflated before removing the valve stem core.

If the tire is to be remounted, be certain the tire bead is not damaged by the removal equipment.

Be certain to clean all rust and scale from the mating areas of the wheel rim.

Be certain to use tire mounting lubricant to reduce the possibility of tire damage during mounting. Do not stand over tire. Use a clip-on chuck and extension hose.

Inflate the tires to 10 psi (69 kPa) over the recommended tire pressure, to insure proper seating of the tire bead to wheel rim.

REMINDER: After inflating to make sure tire bead is properly seated, adjust to the tire pressure shown on the Safety Compliance Certification Label attached to your vehicle.

TIRE ROTATION

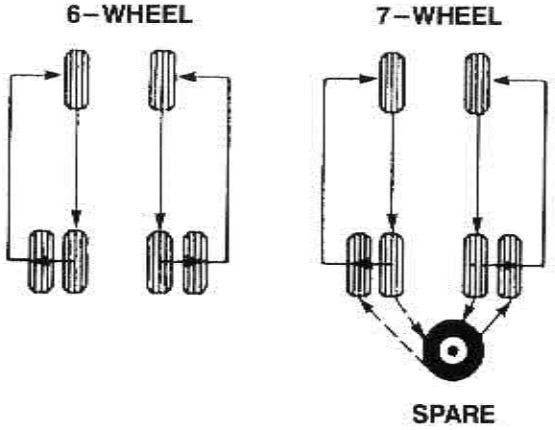
Check your tires periodically for wear. If you notice abnormal wear, find and correct the cause. Rotate the tires to allow more even wear. Use one of the rotation patterns illustrated that is best suited for your needs. After rotation, adjust individual tire pressure as specified on the Safety Compliance Certification Label.

If uneven outside shoulder wear is noted on the front radial tires in city operation involving frequent turning, tire life may be extended by remounting the front tires reversed on the rims (inboard to outboard).

The outer dual tire generally wears faster than the inner dual tire. If this occurs, reverse the position of the tires to equalize wear and get better tire life in addition to regular rotation practices.

NOTE: Your vehicle may not be equipped with a spare tire.

NOTE: Inner dual rim is assembled with a special bent valve stem to allow service air fill and check. When rotating tires, be sure to de-mount and install bent valve stem on inner dual.



—Alternate sides every other time when putting spare into rotation pattern.

EXTENDED VEHICLE STORAGE

Any time vehicle will be out of use over an extended period of time (60 days or more), the following steps should be taken to give it maximum protection:

1. Refer to engine operator's manual for engine storage service procedures.
2. Fill the fuel tank to minimize condensation problems.
3. Change engine oil as instructed in this section. Used oil does not give adequate protection.
4. Service air cleaner as instructed in this section.
5. Cooling system was initially protected with antifreeze to −34°F (−34°C). If colder temperatures are expected, adjust antifreeze mixture. If coolant has been in vehicle for 36 months or 30,000 miles (48,000 km), flush cooling system as instructed in this section. Fill system with mixture of antifreeze and softened water, and be sure coolant contains a rust inhibitor.
6. Remove and clean battery. Store it in a cool, dry place, and keep it charged.
7. Cover dash with opaque material.
8. Check and maintain recommended tire pressure. Protect tires from heat and sunlight.
9. Thoroughly clean vehicle. Touch up any painted surfaces that are scratched or chipped.
10. Lubricate all grease fittings. (See Maintenance Schedule.)

REACTIVATING VEHICLE AFTER EXTENDED STORAGE

Complete the steps listed in the "BEFORE STARTING YOUR VEHICLE" section in this manual.

- Check under hood and under vehicle for nesting creatures and evidence of leakage of oils or fluids or physical damage.
- Inflate tires to recommended pressure.
- Clean coach battery end of cables and install fully charged coach battery.
- Check rear axle lubricant level.
- Lubricate chassis, suspension and steering components.
- Check engine air filter assembly.

IF VEHICLE IS EQUIPPED WITH AIR CONDITIONING

- Disconnect the compressor clutch wires before attempting to start vehicle.
- Check to see if compressor hub and clutch driver can be turned by hand. If not, the unit should be broken loose by manually turning the shaft with a wrench on the shaft locknut on the clutch driver plate. A few "rocking" turns should be sufficient so that the shaft can be turned by hand.
- Reconnect coil wires and check belt tension.

Refer to "NORMAL STARTING PROCEDURE (ABOVE 0°C [32°F])" in this manual for instructions on starting the vehicle.

MAINTENANCE INFORMATION

All maintenance information for your vehicle is provided in the MAINTENANCE SCHEDULE. The scheduled maintenance services listed are required because they are considered essential to the life and performance of your vehicle.

It is recommended that you also perform the Owner Maintenance Checks listed in the MAINTENANCE SCHEDULE. These services are matters of day-to-day care that are important to the proper operation of your vehicle. In addition to the conditions described, be alert for any unusual noise, vibration, or other indication that your vehicle may need service. If you discover anything in need of service, attend to it promptly.

Use only recommended fuels, lubricants, fluids, and service parts. Recommended service parts are designed and built for best performance in your vehicle. Using these parts for replacement is your assurance that quality stays in your vehicle.

For more specific engine maintenance information, see your Cummins Operation and Maintenance Manual.

IN GENERAL, MAINTENANCE, REPLACEMENT, OR SERVICE OF THE EMISSIONS CONTROL DEVICES OR SYSTEMS IN YOUR VEHICLE OR ENGINE MAY BE PERFORMED AT YOUR EXPENSE BY ANY AUTOMOTIVE REPAIR ESTABLISHMENT OR INDIVIDUAL USING AUTOMOTIVE PARTS EQUIVALENT TO THOSE WITH WHICH YOUR VEHICLE OR ENGINE WAS ORIGINALLY EQUIPPED. IF PARTS, OTHER THAN ORIGINAL EQUIPMENT PARTS OR AUTHORIZED REMANUFACTURED PARTS, ARE USED FOR MAINTENANCE REPLACEMENTS OR FOR THE SERVICE OF COMPONENTS AFFECTING EMISSION CONTROL, THE OWNER SHOULD ASSURE HIMSELF THAT SUCH PARTS ARE WARRANTED BY THEIR MANUFACTURER TO BE EQUIVALENT TO ORIGINAL EQUIPMENT PARTS IN PERFORMANCE AND DURABILITY. PLEASE CONSULT THE WARRANTY BOOKLET SUPPLIED WITH YOUR CHASSIS FOR COMPLETE WARRANTY INFORMATION.

AUTHORIZED DEALER MAINTENANCE

There are many service shops ready to serve you wherever you drive in the U.S. or Canada. They stock many authorized parts, chemicals, and lubricants. You can be confident that these meet the same exacting design and quality standards as those used to build the vehicle originally. Dealer Service Technicians are trained in the latest product developments and service techniques.

⚠ CAUTION: Do not make unauthorized modifications to the engine or vehicle. Modifications causing increased amounts of unburned fuel to reach the exhaust system can significantly increase the temperature of the engine compartment and/or the exhaust system.

Avoid driving your vehicle if it does not operate properly. If the engine "diesels" (more than 5 seconds of engine run-on after shut-off), misfires, surges, stalls or backfires, see your dealer. Be alert for fluid leakage, odor, smoke, loss of oil pressure, or charge indicator, or over temperature warning.

EMISSION CONTROL SYSTEM LAWS

Federal laws prohibits vehicle manufacturers, dealers, and other persons engaged in the business of repairing, servicing, selling, leasing, or trading motor vehicles, as well as fleet operators from knowingly removing or rendering an emissions control device or system inoperaitve. Further modifications of the emissions control system could create liability on the part of individual owners under the laws of some states. In Canada, modification of the emissions control system could create liability under applicable Federal or Provincial laws.

See your Cummins Operation and Maintenance Manual for more specific information.

NOISE EMISSIONS WARRANTY, PROHIBITED TAMPERING ACTS AND MAINTENANCE

On January 1, 1978, Federal regulations became effective governing the noise emissions on vehicles over 10,000 lb (4,545 kg) GVWR. The following statements concerning prohibited tampering acts and maintenance, are applicable to completed vehicles over 10,000 lb (4,545 kg) GVWR.

Instructions for maintenance and service of the noise control system have been included in the Maintenance Schedule. It is recommended that this vehicle be operated in the manner described within this Operator's Manual to help increase the life of the noise emission system. Caution should be exercised by the owner when installing replacement parts to be sure that a tampering act (as outlined) is not committed. Note any inspection and service performed in the Maintenance Log.

TAMPERING WITH NOISE CONTROL SYSTEM PROHIBITED

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

Among those acts presumed to constitute tampering are the following listed acts:

- Removal of or rendering inoperative, the engine speed governor, so as to allow engine speed to exceed manufacturer's specifications.
- Removal of air duct, air cleaner and/or air cleaner element.
- Removal of or rendering inoperative exhaust system components including the inlet pipe, muffler, outlet pipe, resonator or diffuser.
- Removal of the fan shroud. Removal of or rendering inoperative the fan clutch.

GENERAL MAINTENANCE SCHEDULE INFORMATION

The Scheduled Maintenance Services listed are considered essential to the proper operation, safety, and performance of your vehicle. We recommend that you also perform the Owner Maintenance Checks listed. These services are matters of day-to-day care that are also important to the proper operation of your vehicle. The recommended lubricants, fluids, and service parts conforming to original specifications are available from your dealer.

THE USE OF GENUINE REPLACEMENT PARTS IS ALWAYS RECOMMENDED. YOU MAY, HOWEVER, ELECT TO HAVE MAINTENANCE, REPLACEMENT, OR REPAIR OF THE EMISSIONS CONTROL DEVICES AND SYSTEMS PERFORMED BY AN AUTOMOTIVE REPAIR ESTABLISHMENT OR INDIVIDUAL OTHER THAN AUTHORIZED SERVICE SHOP FOR SUCH MAINTENANCE OR REPAIR. IF OTHER THAN AUTHORIZED PARTS ARE USED FOR MAINTENANCE REPLACEMENTS, OR FOR THE SERVICE OF COMPONENTS AFFECTING EMISSIONS CONTROL, THE OWNER SHOULD ASSURE HIMSELF THAT SUCH PARTS ARE WARRANTED BY THEIR MANUFACTURER TO BE EQUIVALENT TO AUTHORIZED PARTS IN PERFORMANCE AND DURABILITY. PLEASE CONSULT THE WARRANTY BOOKLET SUPPLIED WITH YOUR CHASSIS FOR COMPLETE WARRANTY INFORMATION.

For specific maintenance information concerning your engine, see your Cummins Operation and Maintenance Manual.

MAINTENANCE SCHEDULE

NORMAL DRIVING SERVICE INTERVALS		Perform at the months or distances shown, whichever comes first																		
Maintenance Operations	Miles (Thousands)	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
	Kilometers (Thousands)	8	16	24	32	40	48	56	64	72	80	88	96	104	112	120	128	136	144	152	160
NOTE: Refer to the engine operation and maintenance manual for additional maintenance information.																					
Check fuel filter/water separator daily and drain if necessary																					
Inspect drive belt daily or when refueling																					
Check coolant level daily or when refueling and add coolant if necessary																					
Check engine oil level daily or when refueling																					
Check air restriction indicator when refueling – replace air cleaner element when indicator turns red																					
Change engine oil and filter every 6,000 miles (10,000 km) 6 months or 250 hours, whichever comes first*																					
Check air intake system for damage, cracked hoses, loose clamps— every 3 months **OR**		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Check steering box for leakage		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

*If the vehicle accumulates 8,000 miles/month or more, the oil and oil filter can be changed every 10,000 miles (17,000 km), 3 months or 250 hours, whichever comes first.

MAINTENANCE SCHEDULE – Continued

NORMAL DRIVING SERVICE INTERVALS	Perform at the months or distances shown, whichever comes first																		
Maintenance Operations — Miles (Thousands)	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
Maintenance Operations — Kilometers (Thousands)	8	16	24	32	40	48	56	64	72	80	88	96	104	112	120	128	136	144	152	160
Check hydraulic system fluid & hoses	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Check wheel lug nut torque—Note 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Check automatic transmission fluid level	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Check rear axle lubricant level	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Check hydraulic reservoir fluid level	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Lubricate steering linkage and drive shaft U-joints, air brake camshaft slip yoke & brake linkage	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Lubricate front axle king pins at 50,000 mile (80,500 kilometer) intervals (Easy-Steer Bushings)—Note 3										X									X	
Rotate tires		X		X		X		X		X		X		X		X		X		X
Replace fuel filter—every 12 months **OR**		X		X		X		X		X		X		X		X		X		X
Replace air dryer coalescing filter every 12 months																				
Inspect drive belts for condition & tension—every 6 months **OR**				X				X				X				X				X

MAINTENANCE SCHEDULE – Continued

NORMAL DRIVING SERVICE INTERVALS		Perform at the months or distances shown, whichever comes first																		
Maintenance Operations	Miles (Thousands)	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
	Kilometers (Thousands)	8	16	24	32	40	48	56	64	72	80	88	96	104	112	120	128	136	144	152	160
Inspect fan & fan shroud—every 12 months **OR**					X				X				X				X				X
Change belt tensioner bearing condition—every 12 months **OR**					X				X				X				X				X
Change automatic transmission internal filters every 24 months **OR**											X										X
Change automatic transmission fluid every 24 months **OR**											X										X
Change rear axle lubricant (Rockwell) – NOTE 2—every 6 months **OR**					X						X					X					X
Check belt tension—every 12 months **OR**					X				X				X				X				X
Check and add lubricate if necessary to front wheel bearings				X				X		X				X		X				X	
Inspect exhaust system for damage and operation							X						X						X		
Inspect parking brake system for damage and operation							X						X						X		
Check accelerator & external throttle controls							X						X						X		

MAINTENANCE SCHEDULE – Continued

NORMAL DRIVING SERVICE INTERVALS		Perform at the months or distances shown, whichever comes first																		
Maintenance Operations	Miles (Thousands)	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
	Kilometers (Thousands)	8	16	24	32	40	48	56	64	72	80	88	96	104	112	120	128	136	144	152	160
Check coolant condition and protection, hoses, and clamps		Semi-Annually — Prior to hot weather and prior to cold weather																		
Check vibration damper hub—every 24 months **OR**								X									X			
Replace air dryer desiccant cartridge every 24 months																				
Replace engine coolant—every 24 monts or 200,000 miles (320,000 Km)																				

NOTE 1: Wheel lug nuts must be retightened to proper torque specifications at 50 miles (80 km) and 500 miles (800 km) of (1) new vehicle operation, (2) any wheel change, or (3) any other time the wheel lug nuts have been loosened. Tighten at 5000 miles (8000 km) intervals thereafter. See the torque specification chart for proper torque specification.

NOTE 2: Drain and refill after first 1000 miles (before 3,000 miles) – drain and refill every 6 months thereafter or every 25,000 miles.

NOTE 3: Make sure the tires touch ground prior to lubrication. Lubricate the king pins through the grease fittings on the top and bottom of the knuckle. Apply lubricant (slowly) until new lubricant comes from the thrust bearing seal and the upper shim pack.

OWNER MAINTENANCE CHECKS

Listed are the vehicle checks that should be made periodically either by the owner or a qualified technician. It is recommended that deficiencies be brought to the attention of your dealer or another qualified service outlet as soon as possible in order that advice regarding the need for service or replacement can be obtained.

Maintenance Operation	Frequency—Observation
Check warning light operation.	At engine start-up.
Check operation of lights, horn, directional signals, windshield wipers, and washers, instruments, vent system, heater, and accessories.	As required.
Check for fuel, coolant, oil or other fluid leaks.	At frequent intervals.
Check engine oil level.	As required—at each fuel stop.
Check coolant level.	When performing other engine compartment checks.
Check air restriction indicator (if applicable) and replace air cleaner if needed. Reset after element is replaced.	When performing other engine compartment checks.
Inspect engine accessory drive belts and tighten (as required).	Squealing noise comes from the engine compartment.
Inspect fan and fan shroud for damage.	Excessive noise comes from engine compartment.
Inspect engine air induction system (including air duct, air cleaner, air cleaner element) for loose fitting, damaged or missing components.	Excessive noise comes from engine compartment.
Check automatic transmission fluid level.	When performing other engine compartment checks.

OWNER MAINTENANCE CHECKS — Continued

Maintenance Operation	Frequency—Observation
Check and adjust automatic transmission controls and shift operation.	When hard shifting is encountered, or when indicator is out of position.
Lubricate automatic transmission modulator linkage.	Abnormal accelerator pressure needed for forced downshift.
Check steering gear for leakage past seals.	When performing regular service maintenance on hoist.
Check fuel filter/water separator, drain if necessary.	Daily.
Check hydraulic reservoir fluid level. (Add fluid if required.)	Periodically and if fluid leakage is observed.
Adjust steering gear mesh load and/or front wheel bearings. Check suspension, steering, and frame for loose attachments.	Excessive steering wheel play or loose steering system.
Check the battery and recharge if necessary. Check connections for tightness. Clean corrosion from terminals and top of battery.	When starter turns engine slower than usual, or when headlights are brighter when engine is speeded up from idle.
Operate air conditioning system.	At least once a month.
Check air conditioning system for loss of HFC 134a.	Seasonal, or as required.
Inspect the entire exhaust system (including inlet pipe, muffler, outlet pipe, exhaust system clamps and fasteners) for holes, leakage, breakage, looseness, and corrosive damage.	Excessive noise or smell of fumes is experienced, and after any accident involving body or exhaust system damage.

OWNER MAINTENANCE CHECKS — Continued

Maintenance Operation	Frequency—Observation
NOTE: It is normal for a certain amount of moisture and staining to be present around the muffler seams. The presence of soot, light surface rust or moisture does not indicate a faulty muffler.	
Check the spring leaves for being evenly stacked and the spring clips or U-bolts, rear springs front eye bolt, and shackel bolts for being tight.	While the vehicle is hoisted for lubrication.
Tighten frame mounted fuel tank mounting bolts.	Driving conditions or inspection indicates looseness.
Remove excessive mud build-up from wheels, undercarriage, and steering linkage. Inspect for and correct any bent or damaged components.	At frequent intervals when operating off-highway or if front wheel shimmy is experienced.
Check the driveshaft for damage or looseness.	At frequent intervals when operating off-highway.
Flush complete underside of vehicle. Inspect all underbody components for damage or deterioration.	Several times annually.
Check battery electrolyte level (low maintenance replacement battery only).	At least every 24 months or 24,000 miles (38,620 km) in temperatures up to 90°F (32°C)—more often in temperatures above 90°F (32°C) —add water as required.

OWNER MAINTENANCE CHECKS — Continued

Maintenance Operation	Frequency—Observation
Check brake master cylinder reservoir fluid level (add fluid if required).	Periodically and if fluid leakage is observed.
Inspect and rotate tires and check tire pressure.	Poor handling characteristics and/or abnormal tire wear are experienced.
Check tires, wheel balance, and front wheel toe. (Caster and camber are preset and do not require adjustment).	Poor handling characteristics and/or abnormal tire wear are experienced.
Check headlight alignment.	Light beam appears too high or too low while driving.
Check alternator output.	Slow engine cranking, hard starting, headlights dim at engine idle speed, early or repeat electrical component malfunction.

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MAINTENANCE SERVICE AND RECORD RETENTION

The maintenance service record is for your convenience. Record the services performed on your vehicle in the record log. You should retain copies of your receipts for the services. You also should keep records of any emissions systems maintenance services performed on your vehicle. This record log should remain with the vehicle at all times.

Maintenance Performed	Date	Mileage/Km	Shop Name and Address

Maintenance Performed	Date	Mileage/Km	Shop Name and Address

Maintenance Performed	Date	Mileage/Km	Shop Name and Address

Maintenance Performed	Date	Mileage/Km	Shop Name and Address