

Every 15,000 mi / 24,000 km / Monthly ¹
Drum Brakes (All) - Brake Air System Check air lines and fittings for leaks. Adjust routing as required to prevent chafing. Check tank mounting and condition. (Refer to How to Check the Compressed Air System for Leaks for maintenance instructions.)
Hub, Drum, and Hubcap - Hubcaps Clean the sight window. Check the center plug, mounting flange, and fill plug for leaks and for proper installation. Replace broken or damaged parts. Check the lubricant level and add as required. (Refer to Wheels for maintenance instructions.)
Main and auxiliary Transmission - General (ON-HIGHWAY and CITY DELIVERY) - Inspect exterior for leaks. - Check the oil level: refill as required (See Transmission Maintenance for maintenance instructions). - Inspect exterior seals for damage, and replace as necessary.
Auxiliary Transmission - Cotta Transfer Case TR2205 Fabco Transfer Case TC142/TC143/ TC170/ TC270 Refer to Cotta or Fabco manual provided with your vehicle.
Marmon-Harrington Transfer Case MVG2000/ MVG2000SD Refer to the Marmon-Harrington manual provided with your vehicle.
Air Intake - Pre-Cleaner Inspect for cuts, irregular wear, missing lugs, sidewall damage, etc. (Refer to Air Intake System for maintenance instructions.)
Tires and Wheels - Tires Inspect the wheel disc for any cracks or surface irregularities. Inspect the rim edge and bead seat area for damage. Replace any damaged wheels - DO NOT ATTEMPT TO REPAIR. (Refer to Tires for maintenance instructions.)

Every 15,000 mi / 24,000 km / Monthly ¹
Tires and Wheels - Disc Wheels Inspect the mounting ring, rim gutter, side ring, and lock ring for damage: replace as required. (Refer to <u>Wheels</u> for maintenance instructions.)
Tires and Wheels - Demountable Rims Check the tightness of the fasteners and tighten the fasteners to the specified torque as required. (Refer to <u>Wheels</u> for maintenance instructions.)
Tires and Wheels - Wheel Nuts and Studs Inspect for damaged hex corners, stripped or damaged threads, and excessive corrosion: clean or replace as required. (Refer to <u>Wheels</u> for maintenance instructions.)
Power Steering - Reservoir Check the fluid level. (Refer to <u>Check Power Steering Fluid Level</u> for maintenance instructions.)
Power Steering - Power Assist Cylinder Lubricate (Chevron Delo EP NLGI-2 grease or equivalent.) (Refer to <u>Steering System</u> for maintenance instructions.)
Steering Components - Drag link and Tie Rod Arm Ball Sockets (OFF HIGHWAY or CITY DELIVERY) Lubricate (Chevron Delo EP NLGI-2 grease or equivalent). (Refer to <u>Steering System</u> for maintenance instructions.)
Fuel and Tanks - Fuel Tank Steps Check for snug fit of side plates against tank and tank straps. Check for damaged or broken steps, missing bolts, and missing grommet between tank and side plate. Replace missing or damaged parts and adjust for fit as required. (Refer to <u>Fuel Tank</u> for maintenance instructions.)
Driveshafts - Models SPL-90, 1710 and 1810 Slip Member and U-joints Lubricate²

Every 15,000 mi / 24,000 km / Monthly ¹
Driveshafts - Model SPL-100 Slip Member and U-joints Check the condition of the cables, cushion clamps, nylon tie straps, and routing. Replace a cushion clamp if the rubber has deteriorated. Repair or tighten terminals, and secure cables to prevent chafing. Replace damaged cables (cuts, cracks, or excessive wear.) (Refer to Batteries for maintenance instructions.)
Battery Boxes, Tool Boxes, and Steps - Battery Cables Battery Boxes, Tool Boxes, and Steps - Batteries (OFF-HIGHWAY) Check for cracks and damage, electrolyte level, condition of terminals, and tightness of hold downs. (Refer to Batteries for maintenance instructions.)
Battery Boxes, Tool Boxes, and Steps - Battery Box and Tray (OFF-HIGHWAY) Check the box integrity. Clean the drain tube and check for acid leaks. Check condition of all equipment mounted under the box. (Refer to Batteries for maintenance instructions.)
Battery Boxes, Tool Boxes, and Steps - Battery Cable Fasteners Check battery cable fasteners and tighten as necessary to 10-15 lb-ft (13.6-20.3 N·m) as specified on the battery label. (Refer to Batteries for maintenance instructions.)
Electrical and Lights - Warning Lights in Light Bar Check at the ignition start position to verify bulb check and systems check function. (Refer to Bulb Check for maintenance instructions.)
Electrical and Lights - Turn, Stop, Reverse Lights and Signals Visual check. (Refer to Daily Checks).
Electrical and Lights - Power Supply Harnesses (engine, transmission, etc.) Check for worn or damaged insulation, corroded terminals, frayed wires, and oil or fluid leaks on the connectors or wiring. (Refer to Electrical System for maintenance instructions.)

Every 15,000 mi / 24,000 km / Monthly ¹
Heating and Air Conditioning - Air Conditioner Operate the system. (Refer to Heater and Air Conditioner Maintenance for maintenance instructions.)
Heating and Air Conditioning - Cabin Fresh Air Filter (ON HIGHWAY) Inspect and clean, replace if necessary. (Refer to How to Replace Air Conditioner Filter for maintenance instructions.)
Heating and Air Conditioning - Cabin Fresh Air Filter (OFF-HIGHWAY) Inspect and clean, replace if necessary. (Refer to How to Replace Air Conditioner Filter for maintenance instructions.)
Aftertreatment System - System Check for leaks and proper support. (Refer to Noise and Emission Control for maintenance instructions.)

¹ Ensure that all maintenance intervals leading up to this point are repeated during this interval prior to the completion of those listed here.

² Use only Spicer Driveshaft approved lubricants when greasing Spicer U-joints.

2.5 Every 25,000 mi / 40,000 km / 6 Months

Every 25,000 mi / 40,000 km / 6 Months
Front Axle - Linehaul (PACCAR) - Kingpin Joint Grease/Tie Rod Ends Heavy-Duty Multipurpose Lithium Based: #1 or #2 Grade. (Refer to Front Axle and Suspension for maintenance instructions.)
Front Suspension - SOFTEK NXT (Hendrickson) - Shock Absorbers Refer to the Hendrickson manual provided with your vehicle.
Front Suspension - SOFTEK NXT (Hendrickson) - Spring Pins and Shackles Refer to the Hendrickson manual provided with your vehicle.

Every 25,000 mi / 40,000 km / 6 Months

Front Suspension - SOFTEK NXT (Hendrickson) - U-bolts

- Refer to the Hendrickson manual provided with your vehicle.

Front Axle - SOFTEK™ NXT (Hendrickson) - Axle Clamp Through Bolts

- Refer to the Hendrickson manual provided with your vehicle.

2.6 Every 30,000 mi / 48,000 km

Every 30,000 mi / 48,000 km¹

Front Suspension - Spring Pins

- Lubricate with approved grease. (Refer to [Front Axle and Suspension](#) for maintenance instructions.)

Drive Axle - Linehaul (PACCAR) - Axle Assembly

- Check oil level and inspect for leaks.
- Visually inspect for damage or leaks.

Drive Axle - Linehaul (PACCAR) - Breather

- Check the operation. If the cap doesn't rotate freely, replace.

Drive Axle - Vocational (PACCAR) - Axle Assembly

- Drain and replace MINERAL BASE lubricant. Drive Axle (Meritor Line Haul / ON HIGHWAY) - Axle Housing

Check the "cold" fill level at the differential carrier plug for a pinion angle of less than 7 degrees, or at the axle bowl plug for a pinion angle of greater than 7 degrees. Tighten the plug to 35-50 lb-ft (47-68 N·m.) (Refer to the Meritor manual provided with your vehicle.)

Visually inspect for damage or leaks. (Refer to the Meritor manual provided with your vehicle.)

Every 30,000 mi / 48,000 km¹
Drive Axle (Meritor Line Haul / ON HIGHWAY) - Breather Refer to the Meritor manual provided with your vehicle.
Drum Brakes (All) - Brake Treadle Valve Clean the area around the treadle, boot, and mounting plate. Check the pivot and mounting plate for integrity. Check the plunger boot for cracks. Lubricate roller pin, pivot pin, and plunger (NLGI #2 grease.) (Refer to Drum Brake Inspection for maintenance instructions.)
Drum Brakes (All) - Brake Lining Inspect: replace as required. (Refer to Drum Brake Inspection for maintenance instructions.)
Hub, Drum, and Hubcap - Hubs (non-LMS) Check the bearing endplay and adjust as required. (Refer to Wheels for maintenance instructions.)
Hub, Drum, and Hubcap - Hub Seals (all) Check for leaks: replace as required. (Refer to Wheels for maintenance instructions.)
Hub, Drum, and Hubcap - Brake Drums Inspect for visible cracks, heat checking, galling or scoring of the braking surface, and for severe corrosion on the outside surface. Check for out-of-round or oversize condition [0.080 in. (2 mm) more than the original diameter]. Replace as required. (Refer to Brake System for maintenance instructions.)
Main and Auxiliary Transmission (PACCAR TX-12/TX-18 transmission series) - Main and Auxiliary Transmission Check the oil level: refill as required. (Refer to Transmission Maintenance for maintenance instructions.)
Main and Auxiliary Transmission (PACCAR TX-12/TX-18 transmission series) - Main and Auxiliary Transmission and Transfer Case Check the drain plugs for tightness. (Refer to Transmission Maintenance for maintenance instructions.)

Every 30,000 mi / 48,000 km ¹
Main and Auxiliary Transmission (Eaton Endurant Transmission) - Main and Auxiliary Transmission Refer to the Eaton manual provided with your vehicle.
Main and Auxiliary Transmission (Eaton Endurant Transmission) - Main and Auxiliary Transmission and Transfer Case Refer to the Eaton manual provided with your vehicle.
Clutch - Clutch Release Bearing - Lubricate. (Refer to <u>Hydraulic Clutch</u> for maintenance instructions.) - Inspect and adjust when necessary (no adjustment required for SOLO type clutches.) (Refer to <u>Hydraulic Clutch</u> for maintenance instructions.)
Cooling - Extended Life Coolant (ELC) Check coolant/antifreeze condition. (Refer to <u>Cooling System Maintenance</u> for maintenance instructions.)
Steering Components - Steering Intermediate Shaft U-joints (OFF HIGHWAY or CITY DELIVERY) Lubricate [EP NLGI #2 HD grease, -10 to 325°F (-23 to 163°C) range]. (Refer to <u>Steering System</u> for maintenance instructions.)
Steering Components - Drag link and Tie Rod Arm Ball Sockets (ON HIGHWAY) Lubricate (Chevron Delo EP NLGI-2 grease or equivalent.) (Refer to <u>Steering System</u> for maintenance instructions.)
Fuel and Tanks - Fuel Tank Straps <u>Fuel Tank</u>
Electrical and Lights - Fuel and Diesel Exhaust Fluid Tank Sending Unit Check the mounting screws and electrical connections for worn or damaged wires and connectors.
Heating and Air Conditioning - Heater and Air Conditioner Perform the checks per <u>Heater and Air Conditioner Maintenance</u>

Every 30,000 mi / 48,000 km ¹
Air - Air Lines
Check condition and routing to prevent chafing (See Air Compressor for maintenance instructions).
Air - Air Dryer
Perform the checks listed; (Refer to Air Dryer Maintenance for maintenance instructions.)

¹ Ensure that all maintenance intervals leading up to this point are repeated during this interval prior to the completion of those listed here.

2.7 Every 60,000 mi / 96,000 km / 6 Months

Every 60,000 mi / 96,000 km / 6 Months ¹
Frame - Fifth Wheel
Inspect fifth wheel operation. (Refer to Fifth Wheel Monthly Maintenance for maintenance instructions.)
Frame - Engine Mounting
Inspect engine mounts every 60,000 miles (96,000 km.) (Refer to Engine Mounting for maintenance instructions.) Contact an authorized vehicle OEM dealership if engine mounts need servicing.
Front Axle - Vocational (PACCAR) - Steer Axle Wheel Ends: Oil Bath (Adjusted)
- Synthetic SAE 75W-140, SAE 50. - Mineral Oil SAE 75W, 75W-90, 75W-140, 80W-90, 85W-140. (Refer to Front Axle and Suspension for maintenance instructions.)
Front Axle - Vocational (PACCAR) - Steer Axle Semi-fluid (Adjusted)
Semi-Fluid Synthetic Grease: Delo SF, Mobil SCH 007. (Refer to Front Axle and Suspension for maintenance instructions.)
Front Axle - Vocational (PACCAR) - Steer Axle Grease Pack (Adjusted)
Heavy-Duty Multipurpose Lithium Base: #2 Grade. (Refer to Front Axle and Suspension for maintenance instructions.)

Every 60,000 mi / 96,000 km / 6 Months¹
Front Axle - SOFTEK™ NXT (Hendrickson) - Kingpin Bearings and Tie Rod Ends (LINE HAUL) Refer to the Hendrickson manual provided with your vehicle.
Front Axle - SOFTEK™ NXT (Hendrickson) - Axle Clamp Through Bolts Refer to the Hendrickson manual provided with your vehicle.
Front Suspension - Front Spring Inspect for cracked leaves, worn bushings, and excessive corrosion. (Refer to <u>Front Axle and Suspension</u> for maintenance instructions.)
Front Suspension - Spring Pins and Shackles Inspect for worn parts and excessive joint clearance. Shim or replace as required. (Refer to <u>Front Axle and Suspension</u> for maintenance instructions.)
Front Suspension - Shock Absorbers Inspect for leaking, body damage, and damaged or worn bushings. Replace as required. Check the shock mounting stud torque. (Refer to <u>Front Axle and Suspension</u> for maintenance instructions.)
Front Suspension U-bolts - U-bolts (ON HIGHWAY and VOCATIONAL) Check the general condition and the tightness of the nuts. Tighten the U-bolts using a calibrated torque wrench to the specified torque value. (Refer to <u>Suspension U-Bolts, Grade 8</u> for maintenance instructions.)
Front Suspension - SOFTEK™ NXT (Hendrickson) - Ride Height Refer to the Hendrickson manual provided with your vehicle.
Drive Axle - Linehaul (PACCAR) - Axle Assembly Drain and replace MINERAL BASE lubricant.

Every 60,000 mi / 96,000 km / 6 Months¹	
Drive Axle (Dana) - Axle Housing	Refer to the Dana manual provided with your vehicle.
Drive Axle (Dana) - Air Shift Unit	Refer to the Dana manual provided with your vehicle.
Drive Axle (Dana) - Lube Pump (OFF HIGHWAY)	Refer to the Dana manual provided with your vehicle.
Drive Axle (Dana) - Lube Filter (OFF HIGHWAY)	Refer to the Dana manual provided with your vehicle.
Drive Axle (Dana) - Magnetic Drain Plug and Breather (OFF HIGHWAY)	Refer to the Dana manual provided with your vehicle.
Drive Axle (SISU)	Refer to the SISU manual provided with your vehicle.
Rear Suspension - U-bolts	Check the torque. Tighten to specified torque value as required. (Refer to <u>Suspension U-Bolts, Grade 8</u> for maintenance instructions.)
Drum Brakes (All) - Brake Camshaft Bearing	Check for excessive camshaft play in the axial and radial directions. Max allowable play is 0.003 in. Lubricate (NLGI #2 grease.) (Refer to <u>Drum Brake Inspection</u> for maintenance instructions.)
Drum Brakes (All) - Brake Air System	Clean or replace the inline filters. (Refer to <u>Air System</u> for maintenance instructions.)

Every 60,000 mi / 96,000 km / 6 Months ¹
Disc Brakes (Bendix™) - Brake Pads Refer to the Bendix manual provided with your vehicle.
Disc Brakes (Bendix™) - Brake Disc/rotor Refer to the Bendix manual provided with your vehicle.
Disc Brakes (Bendix®) - Caliper Sliding Function Refer to the Bendix manual provided with your vehicle.
Disc Brakes (Bendix®) - Caliper Slide Pins Refer to the Bendix manual provided with your vehicle.
Disc Brakes (Bendix®) - System Operation Refer to the Bendix manual provided with your vehicle.
Hub, Drum, and Hubcap - LMS Hubs (Dana) Refer to the Dana manual provided with your vehicle.
Main and Auxiliary Transmission - Mounting Brackets and Fasteners Check the condition of the fasteners and their torque. Tighten to the specified torque value as required. Refer to Frame Fastener Torque Requirements for maintenance instructions.
Main and auxiliary Transmission - Oil Cooler Clean the fins (air-to-oil type) and body. Check the hose condition and for leaks: replace as required (See Cooling System Maintenance).
Main and Auxiliary Transmission (PACCAR TX-12/TX-18 transmission series) - Main and Auxiliary Transmission (OFF HIGHWAY) Drain lubricant while warm. Flush each unit with clean flushing oil. (Refer to Transmission Maintenance for maintenance instructions.)

Every 60,000 mi / 96,000 km / 6 Months ¹
Main and Auxiliary Transmission (Eaton Endurant Transmission) - Main and Auxiliary Transmission (OFF HIGHWAY) Refer to the Eaton manual provided with your vehicle.
Auxiliary Transmission - Cotta Transfer Case TR2205 Fabco Transfer Case TC142/TC143/ TC170/ TC270 Marmon-Harrington Transfer Case MVG2000/ MVG2000SD Refer to the Cotta, Fabco, or Marmon-Harrington manual provided with your vehicle.
Air Intake - Air Intake Piping, Mounting, and Charge Air Cooler Check the system for broken pipes, leaks, joint integrity, cleanliness, and proper support. (Refer to Air Intake System for maintenance instructions.)
Cooling - Hoses Check the radiator and heater hoses for leaks. (Refer to Cooling System Maintenance for maintenance instructions.)
Cooling - Fan Clutch Check for air leaks. Check the fan drive bearings (turn the sheave in both directions to check for worn hub bearings.) (Refer to Engine Fan for maintenance instructions.)
Cooling - Solenoid Valve Check the fan drive for proper engagement and disengagement. (Refer to Engine Fan for maintenance instructions.)
Power Steering - Reservoir (OFF HIGHWAY) Drain, replace the filter, and refill. (Refer to Check Power Steering Fluid Level for maintenance instructions.)

Every 60,000 mi / 96,000 km / 6 Months ¹
Power Steering - Steering Gear - Check the lash of the sector shaft: adjust as required. (Refer to Steering System for maintenance instructions.) - Grease the trunnion bearing (Chevron Delo EP NLGI-2 grease or equivalent.) (Refer to Steering System for maintenance instructions.) - Grease the input shaft seal (Chevron Delo EP NLGI-2 grease or equivalent.) (Refer to Steering System for maintenance instructions.)
Power Steering - Hoses and Tubes Check for leaks and chafing. (Refer to Steering System for maintenance instructions.)
Steering Components - Drag link Tube Clamp and Ball Socket Check the torque: tighten to specified torque value as required. (Refer to Steering System for maintenance instructions.)
Steering Components - Pitman Arm Clamp Bolt and Nut Check the torque: tighten to specified torque value as required. (Refer to Steering System for maintenance instructions.)
Steering Components - Steering Intermediate Shaft Check the torque on the pinch bolt and nut. (Refer to Steering Shaft Bolt Torque Specifications for maintenance instructions.)
Steering Components - Steering Intermediate Shaft U-joints (ON HIGHWAY) Lubricate [Chevron Delo EP NLGI-2 grease or equivalent]. (Refer to Steering System for maintenance instructions.)
Fuel and Tanks - Fuel Tanks Inspect tanks, brackets, hoses, and fittings for correct location, tightness, abrasion damage, and leaks: repair or replace as required. (Refer to Fuel Tank for maintenance instructions.)
Driveshafts - Models SPL- 140/140HD/170/170HD/250/250HD Slip Members and U- joints (ON HIGHWAY and LINEHAUL) Lubricate²

Every 60,000 mi / 96,000 km / 6 Months ¹
Battery Boxes, Tool Boxes, and Steps - Batteries (ON HIGHWAY and LINE HAUL) Check for cracks and damage, electrolyte level, condition of terminals, and tightness of hold downs. Refer to Batteries for maintenance instructions.
Battery Boxes, Tool Boxes, and Steps - Battery Box and Tray (ON HIGHWAY and LINE HAUL) Check the box integrity. Clean the drain tube and check for acid leaks. Check condition of all equipment mounted under the box. Check the drain tube and check for acid leaks. Check condition of all equipment mounted under the box. (Refer to Batteries for maintenance instructions.)
Electrical and Lights - Alternator - Check operation and output. (Refer to Alternator for maintenance instructions.) - Check tightness of the pulley nut. (Refer to Install Engine Belt for maintenance instructions.) - Check the tension of the drive belt. (Refer to Install Engine Belt for maintenance instructions.) - Check tightness of the terminal hex nuts. (Refer to Install Engine Belt for maintenance instructions.)
Electrical and Lights - Starter Check torque on hex nuts. (Refer to Electrical System for maintenance instructions.)
Electrical and Lights - ECM Connector Check the tightness of the ECM connector. (Refer to Electrical System for maintenance instructions.) for maintenance instructions.)
Electrical and Lights - Wheel Sensors Check for damaged sensors and connectors, and worn or frayed wires. (Refer to Electrical System for maintenance instructions.)
Electrical and Lights - Power Supply Harnesses (engine, Transmission, etc.) Check for worn or damaged insulation, corroded terminals, frayed. Wash to remove excess grease. (Refer to Electrical System for maintenance instructions.)
Cab Structure, Doors and Hoods - Body and Cab Hold down Bolts, Cab Structure, Doors and Hoods

Every 60,000 mi / 96,000 km / 6 Months¹
For Cab Structure, Doors, Hoods – Hinges and Latch (EXCLUDING door hinges)
Lubricate with silicone spray. (Refer to Cab Structure, Doors and Hoods for maintenance instructions.)
Heating and Air Conditioning - Condenser
Clear any debris from the front of the condenser. (Refer to Heater and Air Conditioner Maintenance for maintenance instructions.)
Air - System
Lubricate. (Refer to Air System for maintenance instructions.)
Air - Inline Filters
Replace elements or clean with solvent. (Refer to Replace Engine Air Filter for maintenance instructions.)

¹ Ensure that all maintenance intervals leading up to this point are repeated during this interval prior to the completion of those listed here.

² Use only Spicer Driveshaft approved lubricants when greasing Spicer U-joints.

2.8 Every 120,000 mi / 192,000 km / Annually

Every 120,000 mi / 192,000 km / Annually¹
Frame - Frame Fasteners
Check for tightness: tighten to the specified torque value as required. (Refer to Frame Fastener Torque Requirements for maintenance instructions.)
Frame - Crossmembers and Mounting Brackets
Inspect for cracks and loose fasteners. Replace or tighten to the specified torque value as required. (Refer to Frame Fastener Torque Requirements for maintenance instructions.)
Front Axle - Linehaul (PACCAR) - Steer Axle Wheel Ends: Oil Bath (Adjusted)
Synthetic SAE 75W-140, SAE 50W. (Refer to Front Axle and Suspension for maintenance instructions.)

Every 120,000 mi / 192,000 km / Annually ¹
Front Axle - Linehaul (PACCAR) - Steer Axle Wheel Ends: Oil Bath (Adjusted) Mineral Oil SAE 75W, 75W-90, 75W-140, 80W-90, 85W-140. (Refer to Front Axle and Suspension for maintenance instructions.)
Front Axle - Linehaul (PACCAR) - Steer Axle Semi-fluid (Adjusted) Semi-Fluid Synthetic Grease: Delo SF, Mobil SCH 007. (Refer to Front Axle and Suspension for maintenance instructions.)
Front Axle - Linehaul (PACCAR) - Steer Axle Grease Pack (Adjusted) Heavy-Duty Multipurpose Lithium Base: #2 Grade. (Refer to Front Axle and Suspension for maintenance instructions.)
Front Axle - Vocational (PACCAR) - Steer Axle Wheel Ends: Oil Bath LMS Synthetic SAE 75W-90. (Refer to Front Axle and Suspension for maintenance instructions.)
Drive Axle - Linehaul (PACCAR) - Axle Shaft Tighten the rear axle flange nuts to the specified torque value.
Drive Axle - Vocational (PACCAR) - Axle Shaft Tighten the rear axle flange nuts to the specified torque value.
Drive Axle (Dana) - Air Shift Unit Refer to the Dana manual provided with your vehicle.
Drive Axle (Dana) - Breather Refer to the Dana manual provided with your vehicle.
Drive Axle (Dana) - Lube Pump (ON HIGHWAY) Refer to the Dana manual provided with your vehicle.
Drive Axle (Dana) - Lube Filter (ON HIGHWAY) Refer to the Dana manual provided with your vehicle.

Every 120,000 mi / 192,000 km / Annually¹
Drive Axle (Dana) - Magnetic Drain Plug and Breather (ON HIGHWAY) Refer to the Dana manual provided with your vehicle.
Drive Axle (Meritor Line Haul / ON HIGHWAY) - Lubricant Filter Refer to the Meritor manual provided with your vehicle.
Drive Axle (Meritor Line Haul / ON HIGHWAY) - Input Shaft and Pinion Shaft Refer to the Meritor manual provided with your vehicle.
Drive Axle (Meritor Line Haul / ON HIGHWAY) - Axle Shaft Refer to the Meritor manual provided with your vehicle.
Drive Axle (Meritor Line Haul / ON HIGHWAY) - Interaxle Differential Refer to the Meritor manual provided with your vehicle.
Drive Axle (Meritor City Delivery / OFF HIGHWAY) - Lubricant Filter Refer to the Meritor manual provided with your vehicle.
Drive Axle (Meritor City Delivery / OFF HIGHWAY) - Input Shaft and Pinion Shaft Refer to the Meritor manual provided with your vehicle.
Drive Axle (Meritor City Delivery / OFF HIGHWAY) - Axle Shaft Refer to the Meritor manual provided with your vehicle.
Drive Axle (Meritor City Delivery / OFF HIGHWAY) - Interaxle Differential Refer to the Meritor manual provided with your vehicle.
Drive Axle (SISU) Refer to the SISU manual provided with your vehicle.

Every 120,000 mi / 192,000 km / Annually ¹
Rear Suspension - Frame and Crossmembers Bolts Check the torque. Tighten to specified torque value as required. (Refer to Rear Axle and Suspension for maintenance instructions.)
Rear Suspension - Mounting Brackets and Fasteners Check the condition and the fastener torque. Tighten to the specified torque value as required. (Refer to Suspension U-Bolts, Grade 8 for maintenance instructions.)
Hub, Drum, and Hubcap - Hubs (non-LMS) with Standard Seals Clean the components and check for excessive wear or damage. Change the oil and seal. (Refer to Wheels for maintenance instructions.)
Cooling - Extended Life Coolant (ELC) Perform lab analysis. If lab analysis shows coolant is unsuitable for continued use: Flush, drain, and refill. Add ELC Extender. (Contact your authorized PACCAR dealer to schedule a maintenance appointment.)
Power Steering - Reservoir (ON HIGHWAY) Drain, replace the filter, and refill. (Refer to Check Power Steering Fluid Level for maintenance instructions.)
Steering Components - Steering Linkage Check all joints for excessive lash: replace as required. (Refer to Steering System for maintenance instructions.)
Fuel and Tanks - Fuel Tank Breathers Check for proper function: clean the drain hoses. (Refer to Fuel Tank for maintenance instructions.)
Driveshafts - Models SPL-140XL/ 170XL/250XL Slip Members and U- joints (OFF HIGHWAY and CITY) Lubricate²
Cab Structure, Doors and Hoods - Body and Cab Hold down Bolts, Cab Structure, Doors and Hoods

Every 120,000 mi / 192,000 km / Annually ¹
Heating and Air Conditioning - Heater and Air Conditioner Full operational and diagnostic check. (Refer to Heater and Air Conditioner Maintenance for maintenance instructions.)
Heating and Air Conditioning - Sleeper Air Filter Inspect and clean, replace if necessary. (Refer to Sleeper HVAC Air Filter for maintenance instructions.)
Heating and Air Conditioning - Recirculation Cab Air Filter (ON HIGHWAY) Please contact an authorized dealer when the service interval is required to inspect the cabin recirculation air filter. (Refer to Replace the Recirculation Air Filter for maintenance instructions.)
Heating and Air Conditioning - Recirculation Cab Air Filter (OFF-HIGHWAY) Please contact an authorized dealer when the service interval is required to inspect the cabin recirculation air filter. (Refer to Replace the Recirculation Air Filter for maintenance instructions.)
Air - Air Dryer - Replace cartridge (See Air Dryer Maintenance). - Replace purge valve.

¹ Ensure that all maintenance intervals leading up to this point are repeated during this interval prior to the completion of those listed here.

² Use only Spicer Driveshaft approved lubricants when greasing Spicer U-joints.

2.9 Every 240,000 mi / 384,000 km

Every 240,000 mi / 384,000 km ¹
Drive Axle - Vocational (PACCAR) - Axle Assembly • Drain and replace SYNTHETIC BASE lubricant.
Hub, Drum, and Hubcap - Hubs (non-LMS) with Outrunner Seals • Clean the components and check for excessive wear or damage. Change the oil and seal. (Refer to <u>Wheels</u> for maintenance instructions.)

¹ Ensure that all maintenance intervals leading up to this point are repeated during this interval prior to the completion of those listed here.

2.10 Every 300,000 mi / 480,000 km / 6,750 Hours / 3 Years

Every 300,000 mi / 480,000 km / 6,750 Hours / 3 Years ¹
Cooling - Extended Life Coolant (ELC) • Replace blank water filter, if applicable. (Refer to <u>Cooling System Maintenance</u> for maintenance instructions.)
Hub, Drum, and Hubcap - LMS Hubs (Dana) with Mineral Lubricant • Refer to the Dana manual provided with your vehicle.

¹ Ensure that all maintenance intervals leading up to this point are repeated during this interval prior to the completion of those listed here.

2.11 Every 500,000 mi / 800,000 km / 5 years

Every 500,000 mi / 800,000 km / 5 years ¹
Front Axle - Linehaul (PACCAR) - Steer Axle Wheel Ends: Oil Bath LMS Synthetic SAE 75W-90. (Refer to <u>Front Axle and Suspension</u> for maintenance instructions.)
Drive Axle - Linehaul (PACCAR) - Axle Assembly Drain and replace SYNTHETIC BASE lubricant.
Hub, Drum, and Hubcap - LMS Hubs (Dana) with Synthetic Lubricant Refer to the Dana manual provided with your vehicle.

¹ Ensure that all maintenance intervals leading up to this point are repeated during this interval prior to the completion of those listed here.

2.12 Every 750,000 mi / 1,200,000 km/ 24,000 Hours / 8 years

Every 750,000 mi / 1,200,000 km/ 24,000 Hours / 8 years ¹
Cooling - Extended Life Coolant (ELC) Flush, drain, and refill with new coolant. (Refer to <u>Cooling System Maintenance</u> for maintenance instructions.)
Main and Auxiliary Transmission (including PACCAR TX-12/TX-18 transmission series) - Main and Auxiliary Transmission (ON HIGHWAY) Drain lubricant while warm. Flush each unit with clean flushing oil. (Refer to <u>Transmission Maintenance</u> for maintenance instructions.)
Main and Auxiliary Transmission (including Eaton Endurant Transmission) - Main and Auxiliary Transmission (ON HIGHWAY) Refer to the Eaton manual provided with your vehicle.

¹ Ensure that all maintenance intervals leading up to this point are repeated during this interval prior to the completion of those listed here.

3 LUBRICANTS

Schedule service more frequently if you are operating under severe conditions such as extreme heat or cold, with very heavy loads, off-road, etc. For any special service requirements, consult your service manuals and your lubricant supplier. Please remember: one key to keeping your truck running at top economy and prolonging its life is proper lubrication servicing. Neglecting this essential aspect of vehicle care can cost time and money in the long run.



WARNING

Handle lubricants carefully. Vehicle lubricants (oil and grease) can be poisonous and cause sickness. Failure to comply may result in death, personal injury, equipment damage, or property damage.



CAUTION

DO NOT mix different lubricant brands or different lubricant types, such as oil and grease. Before refilling or reapplying, drain or remove old lubricants from the component. Mixing different brands

or lubricant types may damage vehicle components. Failure to comply may result in equipment or property damage.

Engine

Proper engine lubrication depends on the outside temperatures where you will be driving. Use the oil recommended for the conditions you are most likely to be operating in. You will find a complete engine lubrication service guide in the Engine Operation Manual that came with your vehicle. The engine operator manual contains specific maintenance tasks that you or a qualified service technician need to perform to maintain the engine.



WARNING

DO NOT breathe engine exhaust. Engine exhaust fumes contain carbon monoxide, a poisonous, colorless, odorless gas. Exhaust fumes can enter the cab from a poorly maintained exhaust system or from nearby vehicles. Failure to comply may result in death, personal injury, equipment damage, or property damage.



WARNING

Routinely inspect and maintain your vehicle exhaust system. A poorly maintained, damaged, or corroded exhaust system can allow exhaust fumes to enter the cab. Engine exhaust fumes contain carbon monoxide, a poisonous, colorless, odorless gas. Failure to comply may result in death, personal injury, equipment damage, or property damage.



WARNING

Never idle your vehicle for prolonged periods of time if you sense that exhaust fumes are entering the cabin. Investigate the cause of the fumes and correct it as soon as possible. If the vehicle must be driven under these conditions, drive only with the windows open. Failure to comply may result in death, personal injury, equipment damage, or property damage.



NOTE

Keep the engine exhaust system and the vehicle's cab ventilation system

properly maintained. It is recommended that the vehicle's exhaust system and cab be inspected (1) By a competent technician every 15,000 miles (24,140 km); (2) Whenever a change is noticed in the sound of the exhaust system; or (3) Whenever the exhaust system, underbody, or cab is damaged.

i NOTE

Use only an exact replacement DPF in exhaust systems. Using a noncompliant DPF as a replacement could violate these standards and also void the emission system's warranty.

Oil Filter

Your engine is equipped with a oil filter that is designed to avoid contaminants and remove deposits from the oil that prolong an engine performance and life of internal components. You will find a complete filter lubrication service guide in the engine operator's manual that came with your vehicle. Please refer to the engine operator's manual for more details about the oil filter maintenance task.

Driveline Universal Joints

Refer to the Spicer Universal Joints and Driveshafts service manual and lubrication specifications.

Transmissions, Axles, and Hubs

See the manufacturer's operator's manual for recommended lubrication specifications and maintenance intervals.

4 CHECKING OIL LEVEL

For oil reservoir with side filler plugs (transmission, axles, steering gear boxes, transfer cases, etc.) the oil must be level with the filler opening. Use care when checking the oil level with a finger. Just because you can reach the oil level with a finger does not mean the oil level is correct.

Figure 59: Improper Oil Level



Figure 60: Correct Oil Level



5 AIR SYSTEM

5.1 Air System

The operation of the vehicle's braking system and many vehicle accessories depends on the storage and application of a high-pressure air supply.

! WARNING

DO NOT modify, alter, repair, or disconnect any air system component. Repairs or modifications to the air system, other than preventive maintenance, should only be performed by an authorized dealer. Failure to comply may result in death, personal injury, equipment damage, or property damage.


WARNING

Prior to the removal of any air system component, block and hold the vehicle by a secure means other than the vehicle brake. Depleting air system pressure may cause the vehicle to roll unexpectedly resulting in an accident. Failure to comply may result in death, personal injury, equipment or property damage.


WARNING

After completing any repairs to the air system, always test for air leaks, and check the brakes for safe operation before putting the vehicle in service. Failure to comply may result in death, personal injury, equipment damage, or property damage.


WARNING

Never connect or disconnect a hose or line containing air pressure. It may whip as air escapes. Never remove a component or pipe plug unless you are certain all system pressure has been depleted. Failure to comply may result in death,

personal injury, equipment damage, or property damage.


WARNING

Always wear safety glasses when working with pressurized air. DO NOT exceed the recommended air pressure limits, look into the air jets, or direct the air jets towards yourself or another individual. Failure to comply may result in death, personal injury, equipment damage, or property damage.


WARNING

Never attempt to install, remove, disassemble, or assemble a component until you have read and understood the recommended procedures. Some components contain powerful springs, and injury can result if not properly disassembled. Use only proper tools, and observe all precautions pertaining to use of those tools. Failure to comply may result in death, personal injury, equipment damage, or property damage.


WARNING

If it is necessary to temporarily bypass an air dryer, always adhere to the procedure provided by the manufacturer. Completely bypassing an air dryer will bypass the system pressure protection valves, which could lead to a loss of air pressure or damage the vehicle air system. A loss of vehicle air could unexpectedly engage the emergency brakes, resulting in an accident. Failure to comply may result in death, personal injury, equipment damage, or property damage.


WARNING

DO NOT install an air dryer brand or model different from the original without a full system review to ensure continued FMVSS 121 compliance. Incompatibility may impair air system performance and vehicle control. Failure to comply may result in death, personal injury, equipment damage, or property damage.



WARNING

If the air tanks are not drained at the recommended frequency, water could enter the air lines and valves. This could cause corrosion or blockage and compromise brake system performance, which could lead to an accident. Failure to comply may result in death, personal injury, equipment damage, or property damage.

Your vehicle's compressor takes outside air and compresses it, usually to 100 to 120 psi (6.89 to 8.27 bar/689 to 827 kPa). The compressed air then goes to the reservoirs to be stored until needed. When you operate your air brakes, the stored compressed air flows into the chambers where it is used to apply your truck and trailer brakes. That is why, when you push down on your brake pedal, you don't feel the same amount of pressure on the pedal that you do when you apply the brake on your car. All you are doing on your truck is opening an air valve to allow air to flow into the brake chambers. Contamination of the air supply system is the major cause of problems in air-operated components such as brake valves, and suspension height control valves. To

keep contaminants to the lowest possible level, follow these maintenance procedures.

Daily Checks

- Drain moisture from the supply and service air tanks.
- Operate air devices to circulate lubricant within the unit.

Periodically

- Clean filter screens ahead of the valves by removing the screens and soaking them in solvent. Blow dry with pressurized air before reinstalling them.

Twice a Year

- Maintain the air compressor to prevent excessive oil bypass. See your maintenance manual for details.
- Replace worn seals in valves and air motors as needed.

5.2 Air Gauges and Air Leaks

AIR GAUGES AND AIR LEAKS



WARNING

DO NOT operate the vehicle if leakage in the air system is detected. Contact an authorized dealer (or any other properly equipped service center) if a leak is detected. Failure to check the brakes or follow these procedures could cause a system failure, increasing the risk of an accident. Failure to comply may result in death, personal injury, equipment damage, or property damage.

If your vehicle is equipped with air brakes, it has two separate, additional air systems: Primary and Secondary. Each air system is monitored by a gauge indicating system pressure in either pounds per square inch (psi), and/or bar (bar).

The Primary gauge indicates pressure in the rear braking system:

Figure 61: Primary Air Pressure Gauge



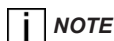
The Secondary gauge indicates pressure in the front braking system:

Figure 62: Secondary Air Pressure Gauge

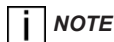


The Primary and Secondary Air Pressure gauges are shown in the Primary Gauges View on the Digital Display. Low cab forward right-hand stand-up model uses additional physical gauges for Primary and Secondary Air Pressure.

At start-up, the Primary and Secondary Air Pressure gauges may indicate red, and the Low Air System Pressure alarm may sound until the minimum operational pressure set-point of 65 psi (4.48 bar) is reached.



Low cab forward right-hand stand-up model also indicates low air pressure using a warning light in the physical gauges.



The Low Air System Pressure alarm is not active when the engine is off.

If the tanks are empty, this can take up to two minutes. If these gauges

- Remain red
- Turn red
- Indicate below 65 psi (4.48 bar)

Or the Low Air System Pressure Alarm

- Turns on
- Does not turn off

Do not attempt to drive the vehicle until the problem is found and fixed: system pressure is too low for normal brake operation.



Park brakes lock up at 60 psi (4.14 bar), the audible alarm will sound at 65 psi (4.48 bar).

HOW TO CHECK THE COMPRESSED AIR SYSTEM FOR LEAKS



DO NOT operate the vehicle if leakage in the air system is detected. Contact an authorized dealer (or any other prop-

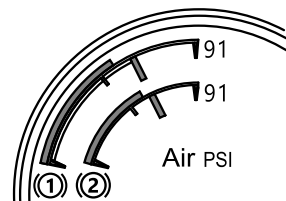
erly equipped service center) if a leak is detected. Failure to check the brakes or follow these procedures could cause a system failure, increasing the risk of an accident. Failure to comply may result in death, personal injury, equipment damage, or property damage.

Check the compressed air system for leaks:

- After maintenance
- When an air system component is replaced
- When a leak is suspected
- Periodically, to ensure system integrity

To check for Air System leaks

1. Start the engine if not already running.
2. **Scroll** to either the Basic or Enhanced View to monitor Primary and Secondary Air Pressures:



3. Build up air pressure in the system until the system cutout setpoint or until 120 psi (8.27 bar/827 kPa) is reached.
4. Turn the start switch to OFF (stopping the engine) and then back to the ON position, but don't start the engine.
The Basic or Enhanced View will appear.
5. Release the service brakes, and observe the rate of air pressure drop. This rate should not exceed 2 psi (0.14 bar/14 kPa) per minute.
6. Start the engine and build up air pressure again.
7. Turn the start switch to OFF (stopping the engine) and then back to the ON position, but don't start the engine.
8. Apply the brake fully, holding the pedal down for five minutes. The pressure drop should not exceed 3 psi (0.21 bar/21 kPa) per minute.
9. If you detect excessive leakage (air pressure loss greater than 3 psi (0.21 bar/21 kPa) after five minutes of brake application), a leakage test should be made at the air line connections and at all air brake control units. These tests should

determine where air is escaping.

5.3 Air Compressor

All compressors, regardless of make or model, run continuously while the engine is running. System pressure is controlled by the governor. The governor acts in conjunction with the unloading mechanism in the compressor cylinder block to start and stop compression of air. The compressor is unloaded when the system pressure reaches 130 psi (8.96 bar/896 kPa), and compression is reestablished when system pressure falls to 110 psi (7.58 bar/758 kPa).

Preventive Maintenance

The following service checks are provided for informational purposes, and should only be performed by a certified technician. Contact your dealer or the engine manufacturer's maintenance manual for further information on servicing air compressors. After completing any repairs to the air system, always test for air leaks, and check the brakes for safe operation before putting the vehicle in service. Below is a list of areas to maintain for the air compressor:

- Inspect compressor air filter element, if equipped, and replace element if

clogged. Check compressor mounting and drive for alignment and belt tension. Adjust if necessary.

- Remove compressor discharge valve cap nuts and check for presence of excessive carbon. If excessive carbon is found, clean or replace the compressor cylinder head. Also, check compressor discharge line for carbon, and clean or replace the discharge line if necessary.
- Disassemble compressor and thoroughly clean and inspect all parts. Repair or replace all worn or damaged parts, or replace compressor with a factory exchange unit.

5.4 Air Dryer Maintenance

AIR DRYER MAINTENANCE

NOTE

Because no two vehicles operate under identical conditions, maintenance and maintenance intervals will vary. Experience is a valuable guide in determining the best maintenance interval for any one particular operation.

NOTE

A small amount of oil in the system may be normal and should not, in itself, be considered a reason to replace the desiccant cartridge. Oil stained desiccant can function adequately.

Every 900 operating hours or 25,000 miles (40,000 km) or every 3 months check for moisture in the air brake system by opening air tanks, drain cocks, or valves and checking for presence of water.

A tablespoon of water found in the air tank would point to the need for a desiccant cartridge change. However, the following conditions can also cause water accumulation and should be considered before replacing the desiccant cartridge.

- Air usage is exceptionally high and not normal for a highway vehicle. This may be due to accessory air demands or some unusual air requirement that does not allow the compressor to load and unload (compressing and non-compressing cycle) in a normal fashion or it may be due to excessive leaks in the air system.
- In areas where more than a 30°F (17°C) range of temperature occurs

in one day, small amounts of water can accumulate in the air brake system due to condensation. Under these conditions, the presence of small amounts of moisture is normal and should not be considered as an indication that the dryer is not performing properly.

- An outside air source has been used to charge the air system. This air did not pass through the drying bed.

NOTE

Review the warranty policy before performing any maintenance procedures. An extended warranty may be voided if unauthorized maintenance is performed during this period.

NOTE

Each time the oil-coalescing desiccant cartridge is changed, the air dryer purge valve should be changed.

BENDIX® AD-HF SERIES AIR DRYER

Your vehicle may be equipped with a Bendix® AD-HF series air dryer. Any air dryer replacement should be made with an identical component.

Refer to the Bendix manual provided with your vehicle.

WARNING

DO NOT install an air dryer brand or model different from the original without a full system review to ensure continued FMVSS 121 compliance. Incompatibility may impair air system performance and vehicle control. Failure to comply may result in death, personal injury, equipment damage, or property damage.

The AD-HF Series air dryer has incorporated into its design various components that have typically been installed separately on the vehicle (see below for components/ areas affected):

- Pressure protection valves
- Safety valve
- Solenoid valves and plumbing
- Plumbing of the front and rear service

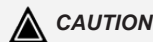
air tanks

- Plumbing to accessory systems

These components are required to meet the Federal Motor Vehicle Safety Standards (FMVSS 121 - Air Brake Systems). As the Warning above states, any other type of air dryer installed in the place of an AD-HF Series will require changes, modifications, and/or additions to your vehicle's air system to maintain compliance with FMVSS 121.

AIR DRYER OIL-COALESCEING CARTRIDGE

This vehicle's air system is equipped with an oil-coalescing air dryer. The air dryer's oil-coalescing cartridge must be replaced yearly, regardless of mileage.

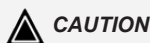


Replace the oil-coalescing desiccant air dryer cartridge annually, regardless of mileage. Use of a non-oil-coalescing cartridge or missing a maintenance interval can damage vehicle components and may void warranty coverage. Failure to comply may result in equipment or property damage.

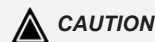
5.5 Air Tanks



If the air tanks are not drained at the recommended frequency, water could enter the air lines and valves. This could cause corrosion or blockage and compromise brake system performance, which could lead to an accident. Failure to comply may result in death, personal injury, equipment damage, or property damage.



If your vehicle is equipped with an air-actuated transmission, drain the transmission side of the air tank daily. Air-actuated transmissions will have two separate air supplies: vehicle air and transmission air. If the transmission air tank is not drained, transmission damage could occur. Failure to comply may result in equipment or property damage.



DO NOT use penetrating oil, alcohol, brake fluid, or wax-based oils in the air system. These fluids may cause severe damage to air system components. Failure to comply may result in equipment or property damage.

The air tanks must be drained daily. Operate air devices daily to circulate lubricants within the unit.

5.6 Dual Air System Function Test

Conduct this test at least every 3 months or if there is any indication of a potential problem.

Park the vehicle on level ground and block the wheels. Have an assistant open drain valves and, where required, observe brake action at the wheels. If a malfunction occurs during this test, do not move the vehicle until the problem has been corrected. Engine should be Off with the key switch to the ON or RUN position.

NOTE

Tractor air system must be connected to trailer.

exposed that can damage the brake drum and reduce brake efficiency. Failure to comply may result in death, personal injury, equipment damage, or property damage.

to retain compliance with FMVSS 121. Contact your dealer for more information. Failure to comply may result in death, personal injury, equipment damage, or property damage.

6 BRAKE SYSTEM

6.1 Brake System

To learn more about brakes, see the Index, under Brakes.

WARNING

DO NOT work on the brake system if the vehicle is not securely on a lift or jack stand, with the wheels and tires removed. If the vehicle is not properly secured to prevent movement, it could move unintentionally. Failure to comply may result in death, personal injury, equipment damage, or property damage.

WARNING

DO NOT use any replacement part in the brake system unless it conforms exactly to original specifications. A nonconforming part in the vehicle's brake system could cause a malfunction resulting in a loss of vehicle control, leading to an accident. Failure to comply may result in death, personal injury, equipment damage, or property damage.

WARNING

The air brake system of this vehicle was configured for ONE of the following operations: tractor or truck, and complies with the respective portions of FMVSS 121. A tractor shall not be operated or configured as a truck, nor shall a truck be operated or configured as a tractor, without significant modifications to the air brake system in order

Brake adjustment and brake balance must be set carefully to make the most efficient use of the forces available for braking and to allow equal stopping forces at all wheels. Once a brake system is set to specifications, changing any one of its components or any combination of components may cause the system to not work as well. All parts have to work together to perform as they should. Any replacement components in your brake system should be exactly equal to the original components. Any changes from the original specifications can affect the whole system. All of the following areas are interrelated and must conform to original specifications:

- Tire size
- Drum brakes
- Cam radius
- Wedge angle
- Drum radius
- Brake linings
- Brake chambers

WARNING

DO NOT use brake linings with a thickness below the specified minimum. Such linings will have lining rivets

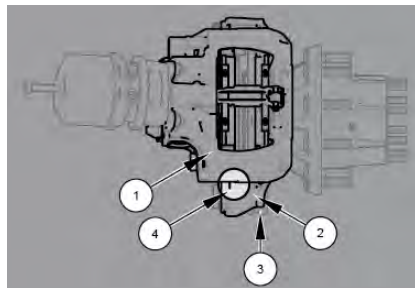
- Slack adjusters
- Disc brakes
- Disc rotors

All vehicle operators should check their brakes regularly.

6.2 Air Disc Brakes

AIR DISC BRAKES

This vehicle may have disc brakes instead of drum brakes.



1. Brake caliper
2. Caliper mounting flange
3. Brake rotor
4. Inspection notches

HOW TO INSPECT BRAKE PADS ON DISC BRAKES

To inspect the brake pads:

1. Park on level ground and chock the wheels.
2. Temporarily release the parking brake.
3. Looking from the ground up at the bottom of the caliper and rotor, compare the relative position of two notches; one located on the caliper and the other on the carrier.
4. Take a measurement from between these two notches and compare them to the specifications to determine if the pads need to be replaced.

Result:

Have a qualified mechanic perform a detailed inspection if the notches are not found. The pads and rotors should be measured and compared against the manufacturer's specifications located in the brake manufacturer's service manual.

INSPECT DISC BRAKE CALIPER FOR RUNNING CLEARANCE

Regularly inspect caliper for Running Clearance:

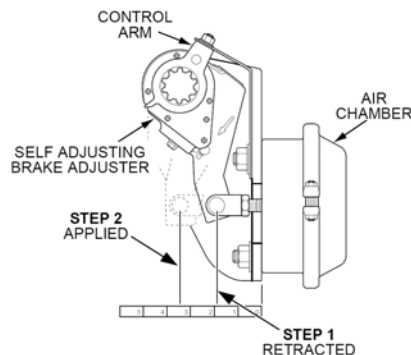
1. Stop the vehicle on level ground and let the brakes cool down. Hot brake calipers can burn skin on contact.
2. Chock the wheels.
3. Temporarily release the parking brake.
4. Grab the caliper and move it. This movement is Running Clearance.
5. Proper Running Clearance is 0.08 in. (2 mm) of movement of the brake caliper (approximately the thickness of a nickel) in the inboard/outboard direction.

Result:

Have a qualified mechanic provide further inspection if the caliper does not move or appears to move more than the specified clearance

6.3 Auto Slack Adjuster

The auto slack adjuster is a mechanism to maintain the correct amount of space between the braking surface and the friction material.



1. Retracted position, no brake pedal applied
2. Applied position, brake pedal engaged

6.4 Drum Brake Inspection

DRUM BRAKE INSPECTION

Have brake drum linings inspected by a qualified technician for wear at regular intervals according to the maintenance

schedule. In severe service or off-highway applications inspect the linings more frequently. In addition, periodically check the brake chamber stroke. Replace the slack adjuster if proper stroke cannot be maintained.

Operational checks of automatic slack adjusters

1. Start the vehicle and get the air system up to normal operating pressure. Do not apply the parking brake.
2. Apply pressure to the brake pedal and measure the distance the air chamber pushrod traveled.
3. Compare the results to the specification to determine if the automatic slack adjusters need replacing.

AUTOMATIC SLACK ADJUSTER STROKE SPECIFICATION

Chamber Type	Stroke
36 (rear brakes)	1.5-2.5 in. (38-63 mm)
30 (rear brakes)	1.5-2 in. (38-51 mm)
16, 20 and 24 (front brakes)	1-1.75 in. (25.4-44.4 mm)

7 CAB MAINTENANCE

7.1 Cab Maintenance

Cab exterior, interior, frame, and engine compartment components need maintenance to ensure longevity and safe operations. A clean vehicle also allows leaks to be detected easier.

WARNING

Always allow hot surfaces to cool down before attempting to work near them. Failure to comply may result in death, personal injury, equipment damage, or property damage.


WARNING

Handle cleaning agents carefully. Cleaning agents may be poisonous. Failure to comply may result in death, personal injury, equipment damage, or property damage.


WARNING

DO NOT use gasoline, kerosene, naphtha, nail polish remover, or other volatile cleaning fluids. They may be toxic, flammable, or hazardous in other ways. Failure to comply may result in death, personal injury, equipment damage, or property damage.


WARNING

DO NOT clean the underside of chassis, fenders, wheel covers, etc. without protecting your hands and arms. You may cut yourself on sharp edged metal parts. Failure to comply may result in death, personal injury, equipment damage, or property damage.


WARNING

Moisture, ice, and road salt on brakes may affect braking efficiency. Test the brakes carefully after each vehicle wash. Failure to comply may result in death, personal injury, equipment damage, or property damage.

Vehicle Cleaning

- Observe all caution labels
- Always read directions on the container before using any product
- Do not use any solution that can damage the body paint
- Most chemical cleaners are concentrates that require dilution
- Only use spot removing fluids in well ventilated areas
- Any vehicle is subjected to deterioration from multiple causes (i.e. industrial fumes, ice, snow, corrosive road salt, etc.)

Exterior and Engine Compartment

Corrosive materials used to remove ice, snow, and dust from the road can collect on the entire vehicle with concentrated accumulations throughout the underbody and

engine compartment. If these materials are not removed, accelerated corrosion (rust) can occur on underbody parts such as fuel lines, frame rails, floor pan, electrical and exhaust system, even though they have been provided with corrosion protection.

At least every spring, flush these materials from the entire vehicle, including the underbody and engine compartment, with plain water using light water pressure. On vehicles used in applications and/or areas that experience high usage of, or exposure to, corrosive materials, cleaning of the entire vehicle should be done more frequently. If desired, your dealer can do this service for you.


WARNING

DO NOT direct high pressure water onto electrical components, plug connectors, seals, or flexible hoses. High pressure water is more likely to affect components or be introduced into closed systems. This can accelerate corrosion, degrade electrical components, or contaminate system lubricants and fluids. Failure to comply may result in death, personal injury, equipment damage, or property damage.

To prevent rust, keep chromed parts clean and protected with wax at all times, especially in winter conditions when the roads are salted.

- If necessary, use a commercial chrome cleaner to remove light rust.
- Chrome surfaces are best cleaned with fresh water. Wipe dry to preserve their luster. A commercial chrome cleaner will remove light rust. After cleaning, wax flat surfaces and apply a thin coat of rust preventive lubricant around bolts or other fasteners.
- Clean aluminum wheels and bumpers with cool water. Tar-remover will get rid of heavy deposits of road grime. To prevent spotting, wipe aluminum surfaces dry after washing.
- Under corrosive conditions, such as driving on salted roads, clean aluminum parts with steam or high-pressure water from a hose. A mild automotive soap solution will help. Rinse thoroughly.

To maintain the tailpipe's quality finish, wash the tailpipe with a soft cloth, mild automotive soap, and water or glass cleaner. A non-abrasive chrome polish can be used sparingly on hard-to-clean areas. DO NOT clean your high-heat chrome

using scouring pads, abrasive chrome polish, highly acidic chemical cleaners or any other abrasive cleaners.

Even high quality stainless steel parts can rust under prolonged exposure to salt water, especially when the salt-laden moisture is held against the metal surface by road grime. It is important to frequently clean salty moisture and grime from stainless steel surfaces.

- If surface rust is encountered, wash the surface and use a commercial polishing compound to clean off the rust, followed by a coating of wax.
- Never use steel wool when cleaning stainless steel. Minute particles of the steel wool can become embedded in the surface of the stainless steel part and cause rust staining.

Weather Stripping

Frequent washing of the vehicle is required to remove road grime and contaminants that can stain and oxidize paint and accelerate corrosion of plated and polished metal surfaces. Waxing offers added protection against staining and oxidation. Do not apply wax in the hot sun and do not friction burn the paint with a buffing machine. Occasionally spray weather-stripping on doors and windows with silicone

compound to help preserve resiliency. This is especially useful in freezing weather to prevent doors and windows from sticking shut with ice.

NOTE

To allow enough time for your vehicle's finish to cure, wait at least thirty days after the date of manufacture before waxing.

Cleaning Interior Vinyl and Upholstery

NOTE

Strong cleaning agents such as hand sanitizer, solvents, paint thinners, window cleaner and gasoline/ diesel fuel must never be used on your vehicle's interior. Repeated exposure to chemicals such as sunscreen, insect repellents containing DEET, or brake fluid may cause accelerated wear, tackiness, or discoloration of interior surfaces.

Wipe vinyl upholstery and lining with a good commercial upholstery cleaner. Do not use acetone or lacquer thinner. Clean fabric upholstery with upholstery shampoo specially formulated for this purpose.

- First remove loose dirt, dust, or debris with a vacuum cleaner.
- Use a soft brush to loosen caked-on dirt before vacuuming it away.
- Wipe the fabric surface with a slightly damp cloth and dry the seat fabric thoroughly. If the fabric is still dirty, wipe using a mixture of mild soap and lukewarm water, then dry thoroughly.
- If the stain does not come out use an upholstery shampoo specially formulated for this purpose. Test the cleaner on a hidden place to make sure it does not harm the fabric. Follow the instructions on the container.

Other interior surfaces may be cleaned using a mixture of mild soap and lukewarm water, or an automotive interior cleaner, used on its intended surface (i.e. use leather conditioner on leather surfaces, etc.).

Avoid frequent or repeated use of the following products on interior surfaces:

- Alcohol-based cleaners (including hand sanitizer)

- Methanol-based cleaners
- Bleach
- Acetone
- Any other strong solvent
- Abrasive cleaners
- Sunscreen

7.2 How to Wash the Exterior of the Vehicle

Your dealer has a number of vehicle care products and can advise you on which ones to use for cleaning the exterior and interior of your vehicle.

WARNING

Handle cleaning agents carefully. Cleaning agents may be poisonous. Failure to comply may result in death, personal injury, equipment damage, or property damage.

WARNING

DO NOT use gasoline, kerosene, naphtha, nail polish remover, or other volatile cleaning fluids. They may be toxic, flam-

mable, or hazardous in other ways. Failure to comply may result in death, personal injury, equipment damage, or property damage.

WARNING

DO NOT clean the underside of chassis, fenders, wheel covers, etc. without protecting your hands and arms. You may cut yourself on sharp edged metal parts. Failure to comply may result in death, personal injury, equipment damage, or property damage.

WARNING

Moisture, ice, and road salt on brakes may affect braking efficiency. Test the brakes carefully after each vehicle wash. Failure to comply may result in death, personal injury, equipment damage, or property damage.

WARNING

DO NOT aim the water jet directly at a door lock or latch and tape over the key holes to prevent water from entering.

An occupant could become trapped in the vehicle if water seeps into the lock cylinder and freezes. Prevent locks from freezing in the winter by squirting glycerin or lock deicer into the lock cylinders. If water should seep in, remove it with compressed air. Failure to comply may result in death, personal injury, equipment damage, or property damage.



WARNING

DO NOT direct high pressure water onto electrical components, plug connectors, seals, or flexible hoses. High pressure water is more likely to affect components or be introduced into closed systems. This can accelerate corrosion, degrade electrical components, or contaminate system lubricants and fluids. Failure to comply may result in death, personal injury, equipment damage, or property damage.



NOTE

To allow enough time for your vehicle's finish to cure, wait at least thirty days

after the date of manufacture before waxing.

1. Begin by spraying water over the dry surface to remove all loose dirt before applying the car wash solution.
 - Do not wash the vehicle in direct sunshine.
 - Do not spray water directly into the cab vents.
2. Using soapy water, wash the vehicle with a clean soft cloth or a soft brush made for automotive cleaning.
 - Use cool water and a mild, automotive-type soap. Strong industrial detergents, cleaning agents and household-type soaps are not recommended and may damage the vehicle's paint.
 - Do not use stiff brushes, paper towels, steel wool, or abrasive cleaning compounds because they will scratch painted, plated, and polished metal surfaces.
3. Rinse painted surfaces with gentle water pressure frequently while washing to flush away dirt that might scratch the finishes during the washing operation.

4. Hose dirt and grime from the entire chassis.
5. Wipe everything dry with a chamois to avoid water spots. To prevent water spotting, dry off the cosmetic surfaces with a clean cloth or chamois.
6. Remove road tar with an automotive-type tar remover or mineral spirits.
7. After cleaning and drying the entire vehicle, apply a quality automotive wax to protect the vehicle's finish.

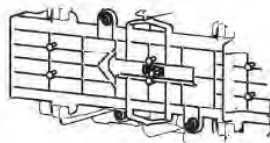
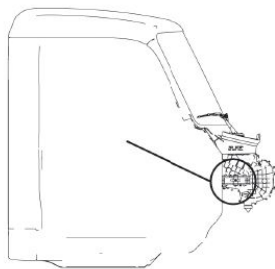
7.3 Cab HVAC Fresh Air Filter Replacement

The fresh air filter for the cab HVAC is located in the air intake housing that is mounted to the firewall in the passenger side rear corner of the engine compartment. The filter can be replaced without using any tools.

1. Tilt the hood open.
2. Locate the air intake housing at the passenger side rear corner of the engine bay, below the rain tray.
3. Locate the filter cover labeled "OPEN" with an arrow pointing towards the rear of the vehicle. Slide the filter cover

towards the rear of the vehicle, until you are able to remove the cover.

4. Remove and inspect the filter, referring to the maintenance interval schedule.
5. Install the new air filter into its housing, taking care to align the airflow direction indicated on the filter element with the airflow direction that's marked on the air intake housing.
6. Replace the filter cover on the air intake housing and slide the cover toward the front of the vehicle. An audible "snap" sound can be heard when the cover is correctly installed. If the snap feature is damaged there are two screw features that may be used to secure the cover.
7. Close and secure the vehicle's hood.



7.4 Cleaning Screen

CAUTION

DO NOT spray water or cleaning solution directly onto the screen. Liquid dripping or permeating through the edges of the screen can cause a short circuit, component breakdown, and lead to screen malfunction. Failure to comply may result in equipment or property damage

CAUTION

DO NOT use cleaners that contain alcohol or ammonia. These can strip protective coatings from the screen and cause cracking or yellowing. Failure to com-

ply may result in equipment or property damage.

To clean the screen, dampen a clean, soft, and lint-free cloth with water only. A mild glass cleaner that does not contain alcohol or ammonia may also be used. Cleaners that contain alcohol or ammonia will eventually dry out, crack, and "yellow" the screen. Wipe the screen back and forth gently. You can also use a commercial cleaner specially designed for LCD screens.

8 CAB STRUCTURE, DOORS AND HOODS

Lubricate the lower hood pivot (only if lube fittings are present.)

9 SAFETY RESTRAINT SYSTEM - INSPECTION

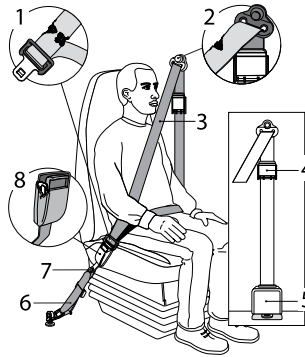
WARNING

Periodically inspect and maintain the safety restraint system. Safety restraint components can wear out and no longer protect the occupant in the event of an accident. Failure to comply may

result in death, personal injury, equipment damage, or property damage.

WARNING

All safety restraints and safety restraint systems on a vehicle that has been in an accident must be replaced, regardless of whether the safety restraint was in use at the time of the accident or the accident's severity. Visible and invisible damage or wear can prevent safety restraints from protecting the wearer. Failure to comply may result in death, personal injury, equipment or property damage.



1. Web cut or frayed or extremely worn at latch area
2. Web cut or frayed at D-loop web guide
3. Web for deterioration, due to exposure to the sun
4. Comfort Clip cracked or damaged
5. Retractor Web Storage for damage (located behind trim panel)
6. Tethers for web wear and proper tightness of mounting hardware
7. Mounting hardware for corrosion, proper tightness of bolts and nuts
8. Buckle casting broken

Factors contributing to reduced seat belt life:

- Heavy trucks typically accumulate twice as many miles as the average passenger car in a given time period.
- Seat and cab movement in trucks causes almost constant movement of the belt due to ride characteristics and seat design. The constant movement of the belt inside the restraint hardware and the potential for the belt to come in contact with the cab and other vehicle parts, contributes to the wear of the entire system.
- Environmental conditions, such as dirt and ultraviolet rays from the sun, will reduce the life of the seat belt system.

Due to these factors, the three-point seat belt system installed in your vehicle requires thorough inspection every 20,000 miles (32,000 km). If the vehicle is exposed to severe environmental or working conditions, more frequent inspections may be necessary. Any seat belt system that shows cuts, fraying, extreme or unusual wear, significant discoloration due to UV (ultraviolet) exposure, abrasion to the seat belt webbing, or damage to the buckle, latch plate, retractor hardware, or any other obvious problem should be replaced immediately, regardless of mileage.

Inspection Guidelines

Follow these guidelines when inspecting for cuts, fraying, extreme or unusual wear of the webbing, and damage to the buckle, retractor, hardware, or other factors. Damage to these areas indicates that seat belt system replacement is necessary.



WARNING

Replace the entire belt system (retractor and buckle side) if any part needs replacement. Hidden damage to components could prevent the system from functioning properly when needed. Failure to comply may result in death, personal injury, equipment damage, or property damage.

1. Check the web wear in the system. The webbing must be closely examined to determine if it is coming into contact with any sharp or rough surfaces on the seat or other parts of the cab interior. These areas are typical places where the web will experience cutting or abrasion. Cuts, fraying, or excessive wear would indicate the need for replacement of the seat belt system.
2. The pillar web guide (D-loop) is the area where almost constant movement of the seat belt webbing occurs because of relative movement between the seat and cab.
3. Check the Komfort Latch for cracks or possible damage and check for proper operation.
4. Check buckle and latch for proper operation and to determine if latch plate is worn, deformed, or damaged.
5. Inspect the retractor web storage device, which is mounted on the floor of the vehicle, for damage. The retractor is the heart of the occupant restraint system and can often be damaged if abused, even unintentionally. Check operation to ensure that it is not locked up and that it spools out and retracts webbing properly.
6. If tethers are used, be sure they are properly attached to the seat and, if adjustable, that they are adjusted in accordance with installation instructions. Tethers must also be inspected for web wear and proper tightness of mounting hardware.
7. Mounting hardware should be evaluated for corrosion, and for tightness of bolts and nuts.
8. Check web in areas exposed to ultraviolet rays from the sun. If the color

of the web in these areas is gray to light brown, the physical strength of the web may have deteriorated due to exposure to the sun's ultraviolet rays. Replace the system.

Once the need for replacement of the seat belt has been determined, be certain it is only replaced with an authorized PAC-CAR Parts replacement seat belt. If the inspection indicates that any part of the seat belt system requires replacement, the entire system must be replaced. An installation guide is attached to every replacement belt. Utilize the proper guide for your type of seat, and follow the instructions very closely. It is vitally important that all components be reinstalled in the same position as the original components that were removed and that the fasteners be torqued to specification. This will maintain the design integrity of the mounting points for the seat belt assembly. Contact your dealer if you have any questions concerning seat belt replacement.

10 COOLING SYSTEM MAINTENANCE

10.1 Cooling System Maintenance

The cooling system in your vehicle was factory filled with extended life coolant that meets or exceeds ASTM D6210, Cummins Engineering Standard 14603 for ISX and PX series engines, and MAT74002 Standard when equipped with an MX series engine. PACCAR recommends only using a 50/50 mixture of distilled water and ELC when cooling system service is required. A 50/50 mixture of ELC and distilled water will provide freeze protection down to -34°F (-36.7°C), which is adequate for most locations in North America. For extremely cold operating conditions, a 60/40 mixture (coolant/water ratio) can be used to provide freeze protection down to -62°F (-52.2°C).

Unless otherwise optioned, factory fill coolant is an ethylene glycol, nitrited organic acid technology (NOAT) extended life coolant (ELC) formulation at a 50:50 coolant-to-distilled water mixture. The factory fill meets or exceeds ASTM D6210 and Cummins Engineering Standard 14603 for ISX and PX engines, and MAT74002

for PACCAR MX-11 and MX-13 engine requirements. Maintaining coolant chemistry and freeze protection is critical to engine and cooling system component health and longevity.

Unless otherwise optioned, factory fill coolant is an ethylene glycol, nitrited organic acid technology (NOAT) extended life coolant (ELC) formulation at a 50:50 coolant-to-distilled water mixture. The factory fill meets or exceeds ASTM D6210 and Cummins Engineering Standard 14603 for ISX and PX engines, and MAT74002 for PACCAR MX series engine requirements. Maintaining coolant chemistry and freeze protection is critical to engine and cooling system component health and longevity.

WARNING

DO NOT touch, inhale, or consume antifreeze or coolant. If antifreeze/coolant comes into contact with eyes, rinse thoroughly with water for 15 minutes. If there is prolonged or repeated contact with skin, immediately wash skin with soap and water. If antifreeze/coolant is consumed, seek immediate medical attention. DO NOT induce vomiting. Failure to comply may result in

death, personal injury, equipment damage, or property damage.

CAUTION

The engine cooling system has very specific maintenance and inspection requirements. Failure to follow requirements can damage the engine. Engine damage can include but is not limited to freezing, boiling, corrosion, pitted cylinder liners. This information is found in the engine manufacturers owner's manual. It is the owner's responsibility to follow all requirements listed in the engine manufacturer's owner's manual. Failure to comply may result in engine damage.

CAUTION

The engine cooling system has specific maintenance and inspection requirements. Failure to follow these can cause engine damage, including freezing, boiling, corrosion, and pitted cylinder liners. Refer to the engine manufacturer's owner's manual for details. It is the owner's responsibility to follow all listed requirements to avoid

engine damage. Failure to comply may result in equipment or property damage.

CAUTION

Always use a genuine PACCAR coolant filter. Genuine PACCAR filters comply with component specifications and will optimize coolant system operation. Use of non-genuine PACCAR coolant filter can cause severe damage to vehicle components. Failure to comply may result in equipment or property damage.

NOTE

Coolant is harmful to the environment. Unused coolant must be stored as a toxic hazardous material in leak-proof containers. Used coolant must be processed as industrial chemical waste. Please follow HAZMAT guidelines with both used and unused coolants.

Concentration

Check the level of freeze/boil-over protection, which is determined by the glycol concentration. Use a glycol refractometer to determine glycol level. Add coolant to

obtain the coolant/water ratio required to provide the protection you need. A 50:50 mix of coolant and water is adequate for most applications. For extremely cold operating conditions, the ratio can be adjusted to a higher concentration of coolant.

NOTE

Maximum recommended ELC concentration is 60% ELC and 40% water by volume (a 60/40 coolant mixture). The minimum recommended concentration is 40% ELC and 60% water by volume (a 40/60 coolant mixture).

Table 16: Glycol Concentration Level

Level	Desired Coolant/ Water Ratio	Freeze Point °F (°C)
Recommended Levels	40%	-12 (-24)
	45%	-23 (-31)
	50%	-34 (-37)
	55%	-50 (-46)
	60%	-62 (-52)

Condition

Perform a visual inspection of the coolant. It should have no cloudiness or floating debris. Determine the chemical inhibitor concentration level by using an ELC specific test kit or test strips. Inhibitor concentration level determines corrosion protection. If you are concerned about possible coolant quality, contamination, or mechanical problems, submit a coolant sample for analysis. Improper maintenance may cause coolant degradation and could result in damage to the cooling system and engine components. Consult your dealer or the coolant manufacturer's representative for recommended ELC test kits, test strips, and laboratory sample procedures.

Coolant Extender

Add ELC extender, if necessary, according to the corrosion inhibitor concentration required. DO NOT add coolant extender to nitrite-free coolant.

Checking Coolant Level

Check the coolant level daily. When adding coolant, avoid mixing different brands and formulations. If the coolant is mixed with more than 25% of a different formulation, engine corrosion damage can occur. If mix-

ing exceeds 25% of total system volume, it is recommended to flush and refill the system completely with one type of coolant.

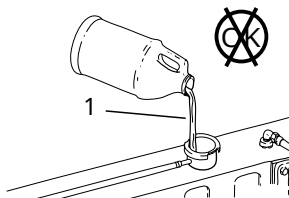
Coolant Filter

Your engine may be equipped with a coolant filter. It is a "blank filter" and does not contain chemicals or time-release additives. Replace it only with a blank filter at the interval specified in your engine's operator's manual. Never use filters that contain supplemental coolant additives (SCAs) in an ELC-filled system. Consult your engine operator's manual for information on the coolant filter and service procedures.

CAUTION

Always use a genuine PACCAR coolant filter. Genuine PACCAR filters comply with component specifications and will optimize coolant system operation. Use of non-genuine PACCAR coolant filter can cause severe damage to vehicle components. Failure to comply may result in equipment or property damage.

Cooling System Sealing Additives and Soluble Oils



- Do not use soluble oils or sealing additives.

CAUTION

The use of sealing additives or soluble oils in the cooling system can cause damage to the engine. These additives can plug various areas of the radiator, EGR system, and oil cooler. Plugging the cooling system can prevent or slow heat transfers, causing internal engine damage. DO NOT use sealing additives or soluble oils in the cooling system. The use of sealing additives can

- Build up in coolant low-flow areas
- Plug the radiator and oil cooler
- Damage the water pump seal
- Damage heat transfer surfaces

- Damage seals and hoses
- Corrode brass and copper

Failure to comply may result in equipment or property damage.

NOTE

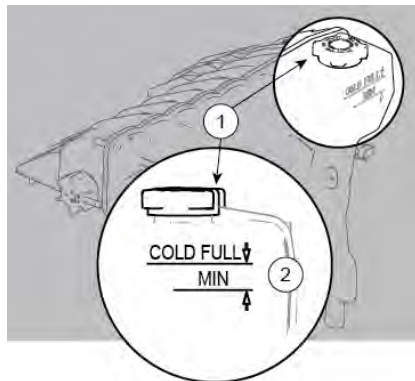
Octane engines require a specific organic acid technology (OAT) coolant (green color) compared to the nitrated organic technology (NOAT) coolant (red color) for natural gas and diesel engines.

10.2 Inspect Coolant Level

Inspect the vehicle's coolant surge tank for proper coolant level. Add coolant if the level in the tank is below the line marked **MIN**.

The minimum fluid level is determined by the line on the surge tank indicated by the letters "MIN." This indicator is located below the fill cap. The cooling system will need to be filled if the level is not above the "MIN" line, regardless of engine temperature.

Figure 63: Bulkhead Mounted Coolant Surge Tank



1. Fill location
2. Fill line

10.3 Radiator Hoses Inspection

Perform this procedure for radiator hoses inspection.

1. Check the following radiator hose conditions:
 - Deterioration/signs of leaking
 - Hose clamp torque

10.4 How to Add Coolant to the Cooling System

WARNING

DO NOT remove the radiator fill cap while the engine is hot. Scalding steam and fluid under pressure may escape. You could be badly burned. Failure to comply may result in death, personal injury, equipment damage, or property damage.

WARNING

Only use the fill port to fill the surge tank. DO NOT attempt to fill the tank using the pressure port. Scalding steam and fluid under pressure may escape and cause serious personal injuries. Failure to comply may result in death, personal injury, equipment damage, or property damage.

CAUTION

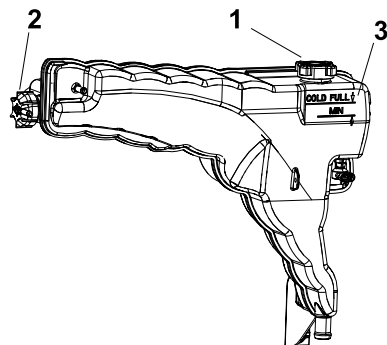
DO NOT overfill the cooling system. Excess coolant may overflow or result

in loss of antifreeze and reduced corrosion protection. Failure to comply may result in equipment or property damage.

NOTE

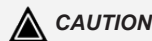
If frequent topping off is necessary and there are no visible signs of coolant leaks when the engine is cold, check for leaks with the engine operating at normal temperature.

Use a solution of half ethylene glycol antifreeze and half water for best heater performance. Do not use more than 60 percent concentration of antifreeze, as a shortened heater life will result.



1. Fill cap (service point)
 2. Pressure cap (never to be removed)
 3. Fill line
1. Turn off the engine and let it cool for a minimum of 20 minutes.
 2. If your cooling system is built with an air bleed valve in the upper engine coolant pipe, open the air bleed valve before filling the surge tank.
 3. Close any open coolant drain valves in the lower engine coolant pipe.

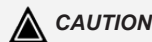
4.



Turning the key to ON allows the electric coolant pump for the 48V generator to run, purging air from the generator. Failure to comply may result in damage to the engine or 48V generator system

If equipped with MX-13 CARB Emission engine, set key to ON position.

5.



Turning the key to ON allows the electric coolant pump for the 48V generator to run, purging air from the generator. Failure to comply may result in damage to the engine or 48V generator system

If equipped with MX-13 CARB Emission engine, set key to ON position.

6. Remove the surge tank fill cap (1). DO NOT remove the surge tank pressure cap.
7. Fill the system with premixed coolant through the surge tank fill port. Pour coolant at a steady rate until it reaches the lower of the two lines

indicated by either "COLD MIN" or "MIN" on the surge tank. Wait for one minute after adding coolant. If the coolant level drops, add coolant until it returns to the lower line.

8. Close the air bleed valve if opened earlier in this procedure.



If equipped with MX-13 CARB Emission Engine, confirm no stop lamp is illuminated on dash due to coolant pump fault. If a stop lamp is illuminated, stop the procedure and call service.

9. Start the engine and maintain an idle at low rpm.
10. While the engine is idling air will purge from the cooling system via the surge tank's coolant fill port, which will lower the coolant level in the surge tank. Continue to fill the surge tank until the coolant level remains approximately 1/2 in. (13 mm) above the "MIN" line. This may take up to 2 minutes, depending on the outside temperature.
11. Maintain a low idle until the thermostat opens and the operating

temperature stabilizes. A sign that the thermostat has opened is when the upper coolant pipe gets hot on the bottom side indicating hot coolant is now running through it.

12. Add coolant to the surge tank until the coolant remains 1/2 in. (13 mm) above the "MIN" level.
13. Operate the engine at high idle for 10 minutes. Afterward, add coolant to the surge tank until the coolant remains 1/2 in. (13 mm) above the "COLD FULL" line.
14. Reinstall the surge tank fill cap.

Result:

Check the coolant level before and after each trip. Add coolant as necessary. Coolant may not immediately appear at the correct level after the radiator has been filled. Air may be trapped in the cooling system, which will affect the coolant level until the air is purged.

After servicing the cooling system, continue monitoring it for 3-5 days. The coolant level in the surge tank will lower when air trapped in the cooling system is purged. During each pre-trip inspection you should inspect recently serviced components of the cooling system for signs of coolant leaks.

NOTE

If the coolant frequently needs topping-up or there are any signs of coolant leakage, consult a PACCAR Service dealer.

11 DRIVER ASSISTANCE MAINTENANCE

11.1 Driver Assistance Maintenance

Cameras, radars, and sensors need maintenance to ensure longevity and safe operation. Clean components of the system allow the driver to operate the vehicle safely.

WARNING

Follow the daily maintenance tasks for the components of the driver assistance system to ensure a safe operation. Failure to comply may result in death, personal injury, equipment damage, or property damage.

11.2 FLC-25 Camera

- Inspect and keep the camera clean to ensure a clear view of the road ahead.
- Protect the camera lens whenever the inside of the windshield is cleaned. Within the viewing area of the camera the windshield has to be free of visible scratches and injuries.

11.3 FLC-25 Radar Sensor

- Inspect and keep the radar front and windshield clean and free of obstructions.
- Inspect for damage to the bumper and radar to ensure that the alignment has not been compromised. **Never use the radar unit as a step.**

WARNING

In cases where the bumper, radar and/or windshield have sustained any damage, are misaligned, or if the device is suspect for tampering, DO NOT use the active cruise control until the vehicle has been repaired and the radar realigned. In addition, an indicator on the dash typically will illuminate if the sys-

tem detects any of these conditions. Failure to comply may result in death, personal injury, equipment damage, or property damage.



CAUTION

The installation of aftermarket deer guards, bumper guards, snow plows, or similar potential obstructions is not recommended and could impair the operation of the radar. Failure to comply may result in equipment or property damage.

11.4 ECU - Bendix SDP5

- Refer to the Bendix manual provided with your vehicle.
- Protect the processor from damage and displacement from its set location in the overhead compartment.

12 ELECTRICAL SYSTEM

12.1 Electrical System



WARNING

Battery posts, terminals and related accessories contain lead and lead compounds, chemicals known to the State of California to cause cancer and reproductive harm. Wash hands after handling. Failure to comply may result in death, personal injury, equipment damage, or property damage.



WARNING

Remove all jewelry before working on the batteries or electrical system. If jewelry or other metal comes into contact with an electrical circuit, a dangerous short circuit may occur. Failure to comply may result in death, personal injury, equipment damage, or property damage.



CAUTION

DO NOT modify or attempt to repair the vehicle electrical system or power distribution box. All electrical repairs should be performed at an authorized dealership. Improper repair or modifications will void your warranty and/or cause serious damage to your vehicle. Failure to comply may result in equipment or property damage.

12.2 Engine Aftertreatment System Power Requirements



CAUTION

DO NOT disconnect battery power until at least 20 minutes have passed since turning the start switch OFF (emergencies are an exception). The Diesel Exhaust Fluid (DEF) system recirculates fluid to DEF injector to prevent overheating or heat damage. Failure to comply may result in equipment or property damage.



CAUTION

DO NOT use the 48 V cables or coolant lines attached to the 48 V generator as a support to perform an inspection or work under the vehicle. This will damage the cable connectors or coolant lines. Failure to comply may result in equipment or property damage.

For situations where the battery will be disconnected (for example, service or maintenance of the vehicle), please wait 20 minutes before disconnecting battery power.

12.3 Low Voltage Disconnect (LVD) (Option)

The Low Voltage Disconnect (LVD) may extend battery life and prevent the battery from being drained below the charge required to start the engine. It does this by shutting off non-vital battery loads.

When battery voltage drops below the LVD setting, LVD starts a two-minute countdown. If battery voltage remains below the LVD setting and the engine is not started, when the countdown ends, all non-vital bat-

tery loads (hotel loads) will be shut off. The LVD setting is adjusted in the Settings sub-menu of the Digital Display.

When battery voltage drops below the LVD setting

1. An amber LVD notification occurs, accompanied by an audible warning. This starts the two-minute countdown.
2. Thirty seconds before the countdown ends, the Battery Voltage indicator is replaced by the amber (or red) LVD telltale (on the 15 inch display, LVD telltale color depends on the severity of battery depletion). The LVD notification will turn red and will be accompanied by a continuous audible warning.
3. When the two-minute countdown has ended, the LVD "Hotel Loads Disconnected" notification appears, and LVD shuts off all loads connected through the LVD system.

Figure 64: Battery Voltage Indicator



The LVD condition will not clear until battery voltage increases above the LVD setting or the engine is started.

Electrical loads shut off by LVD

- Cab dome lamps
- Cab accessories
- Spare LVD wiring for customer added accessories



WARNING

DO NOT use the Spare Battery A and B circuits or other circuits that are controlled by the low voltage disconnect (LVD) to power electronic engine controls, ABS circuits, or safety/work related lighting. Before adding any device to the vehicle's electrical system, consult your nearest authorized dealer or read the contents of TMC RP136. Failure to comply may result in death, personal injury, equipment damage, or property damage.



NOTE

The determination of what circuits/loads that were connected to the LVD was based upon the recommendation from Technology and Maintenance Council (TMC) of the American Trucking Asso-

ciation. To review the recommended practice, see TMC RP-136.

NOTE

All LVD circuits are color-coded blue on the central electrical panel cover label.

12.4 Fuses, Circuit Breakers and Relays

Fuses, circuit breakers, and relays are located in the Power Distribution Center (PDC) to the left of the steering column, behind the clutch pedal. Additional fuses are located in the engine compartment (driver's side firewall) and also in the sleeper (driver's side of vehicle) under the bunk storage compartment. Refer to the fuse labels affixed at each fuse panel location (generally under the fuse panel cover) for information about the location and amp ratings of each circuit.

12.5 Altering the Electrical System

Refer to a wiring diagram for your chassis before adding electrical options to ensure proper electrical system performance.

WARNING

Only replace a fuse with one of the correct size and amperage rating. Installing a fuse of the wrong rating may cause serious electrical damage or result in a thermal event. Failure to comply may result in death, personal injury, equipment damage, or property damage.

WARNING

Never install a circuit breaker/polyswitch in a location indicated for "fuse only." Using a polyswitch (circuit breaker) in a fuse-only circuit may cause the circuit to overheat in the event of a short. Failure to comply may result in death, personal injury, equipment damage, or property damage.

CAUTION

Follow all manufacturers' circuit protection recommendations for added wires or components. Failure to comply may result in equipment or property damage.

NOTE

If you are unfamiliar with proper electrical repair practices and procedures, see your authorized dealer for assistance.

12.6 Vehicle CAN Bus

Your vehicle is equipped with a CAN bus electrical system. Because of how the electrical system is designed it is important that any accessories added after the vehicle is built are installed only on the K-CAN or the S-CAN. These dedicated CANs are provided on the driver's side of the cab, near to the interior fuse panel. Access to the K-CAN and S-CANs is provided by two RP1226 connectors. DO NOT tap into, connect to, tamper with, or splice into any CAN network other than the K-CAN or the S-CAN. Connecting to an unapproved CAN network may trigger CAN fault codes.

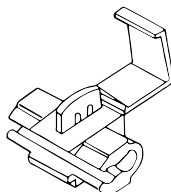
CAUTION

Connecting to an unapproved CAN network may trigger CAN fault codes. The manufacturer will not warrant failures or damage caused to CAN network components when the failure or damage is a result of improper connections to the CAN network. Failure to comply may result in equipment or property damage.

CAUTION

The use of scotch locks, scraped off insulation, or electrical tape are not approved CAN connection techniques. These are the sources of numerous CAN faults, short circuits, wiring failures, and malfunctioning connections. Failure to comply may result in equipment damage or property damage.

Figure 65: Scotch locks



12.7 Batteries

Regular attention to the charging system helps prolong the service life of the batteries.

WARNING

DO NOT ignore any safety procedure as the battery can overheat and catch fire or explode. Failure to comply may result in death, personal injury, equipment damage, or property damage.

WARNING

Never remove or tamper with battery caps. Ignoring this could allow battery acid to contact eyes, skin, fabrics, or painted surfaces. Failure to comply may result in death, personal injury, equipment damage, or property damage.

CAUTION

DO NOT store items (such as tools or equipment) in the battery box. Storing items in the battery box could damage the batteries or vehicle. Failure to com-

ply may result in equipment or property damage.

CAUTION

When reinstalling batteries, ensure the new battery cable routings are free from chafing, and DO NOT overtighten the battery tie-downs. Always replace the battery cover. Failure to comply may result in death, personal injury, equipment damage, or property damage.

CAUTION

DO NOT disconnect battery power until at least 20 minutes have passed since turning the start switch OFF (emergencies are an exception). The Diesel Exhaust Fluid (DEF) system recirculates fluid to DEF injector to prevent overheating or heat damage. Failure to comply may result in equipment or property damage.

Here are some common causes of battery failure:

- **Overcharge:** this condition results from improper voltage regulator adjustment. It results in overheating of the battery,

warped plates, and the evaporation of electrolyte.

- Undercharge: the voltage regulator is malfunctioning, the drive belt is slipping, or your vehicle has undergone long periods of idling or short distance driving. These conditions result in the battery plates becoming covered with a hard coating.
- Vibration: loose battery hold-downs may cause battery plate failure.
- Short Circuits: these discharge the battery by draining electricity.
- Dirty or Loose Connections: improper connections may stop the flow of electrical power to and from the battery.

Battery Charging



WARNING

Batteries can injure you severely. They contain acid, produce poisonous and explosive gases, and supply levels of electric current high enough to cause burns. A spark or flame near a battery on charge may cause it to explode with great force. Never remove or tamper with the battery caps. Failure to comply may result in death, personal injury,

equipment damage or property damage.

Only trickle charge the batteries to maintain battery condition. Have the batteries fully deep-charged by a qualified service facility. To help reduce the risk of personal injuries, follow these guidelines carefully when recharging a battery:

- Before attempting any service in the electrical installation, disconnect the battery negative cable.
- Allow no sparks or open flame anywhere near the charging area.
- Trickle charge a battery only in a well-ventilated area such as outdoors or in a fully open garage. No open flames, including pilot lights can be present. Allow explosive gases generated during the charging process to escape.
- Always make sure that the battery charger is OFF before connecting or disconnecting the cable clamps.
- Never store or rest metal tools like jumper cables close to the battery. Metal must not come in contact with the positive battery terminal while also touching any other metal on the vehicle. The vehicle's body and frame are the electrical systems ground.

Accidentally connecting the positive terminal directly to the frame or body could cause a short circuit and possibly an explosion.

Charging Reminders

- Use protective eyewear
- Keep all batteries away from children
- Never reverse battery poles
- Never attempt to place the vehicle in motion, or run the engine with the batteries disconnected
- Keep the battery clean and dry
- Look for any signs of damage
- Battery terminals must not be coated with improper grease. Use a commercially available, noncorrosive, non-conductive terminal coating, or petroleum jelly.
- Never use a fast charger as a booster to start the engine. This can seriously damage sensitive electronic components such as the relays, the radio, and battery charger. Fast charging a battery is dangerous and must only be attempted by a qualified technician with the proper equipment.

12.8 Under Cab Battery Access

The battery compartment is located on the left side of the vehicle, under the cab access steps.

1. Remove the six bolts that are located in the two cab access step plate.
2. Remove battery cover for access.

12.9 In Cab Battery Access

Your vehicle may be equipped with Absorbed Glass Mat (AGM) batteries located in the cab under the passenger's seat. The glass mat in AGM batteries are designed to absorb the battery acid inside the battery that can leak or spill out in conventional batteries. This design feature allows batteries to be positioned in any orientation without risk of leaking.

To access the batteries:

1. Enter the cab.
2. Remove six fasteners securing the passenger side seat base to the battery box assembly.
3. Remove the seat and seat base as one unit to gain access to the

batteries.

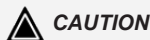
4. Installation is the reverse of removal.

12.10 Cranking Battery Specification

Category	Specification
Group	31
Stud Type	Threaded
Cold Crank Amps	650
Voltage	12 V
Reserve Capacity	160 minutes
General	Maintenance free

12.11 Removing Batteries

After accessing the batteries, follow these steps to remove them from the vehicle.



DO NOT disconnect battery power until at least 20 minutes have passed since turning the start switch OFF (emergencies are an exception). The Diesel Exhaust Fluid (DEF) system recircu-

lates fluid to DEF injector to prevent overheating or heat damage. Failure to comply may result in equipment or property damage.

1. Be sure all switches on the vehicle are turned OFF
2. Wait 20 minutes after turning ignition off before disconnecting the batteries
3. Disconnect negative (-) ground cable first
4. Disconnect positive (+) cable
5. Unscrew the holding plate bolts with an open end wrench

NOTE

Always dispose of automotive batteries in a safe and responsible manner. Contact your authorized dealer for disposal standards. Call your local authorized recycling center for information on recycling automotive batteries.

Result:

Follow the procedures below to reinstall batteries on the vehicle and replace parts removed for access.

12.12 Installing Batteries

Follow the procedure below to reinstall main batteries on the vehicle:



CAUTION

When reinstalling batteries, ensure the new battery cable routings are free from chafing, and DO NOT overtighten the battery tie-downs. Always replace the battery cover. Failure to comply may result in death, personal injury, equipment damage, or property damage.



NOTE

Always dispose of automotive batteries in a safe and responsible manner. Contact your authorized dealer for disposal standards. Call your local authorized recycling center for information on recycling automotive batteries.



NOTE

Make sure to reconnect the ground (negative) cable last.

1. Place batteries in vehicle and tighten bolt of holding plate
2. Reconnect positive cable
3. Reconnect ground (negative) ground cable

12.13 Replace Battery Box Cover



WARNING

Always reinstall steps before entering the cab or accessing the deck plate. Without steps you could slip and fall. Failure to comply may result in death, personal injury, equipment damage, or property damage.



WARNING

Fairings not installed properly could come loose and cause other motorists to have an injury accident. It is impor-

tant that fairings be installed properly. Failure to comply may result in death, personal injury, equipment or property damage.

1. Replace battery cover.
2. Install two bolts in step strut. Torque to 24-32 lb-ft (33-43 N·m).
3. Install fairing and install four bolts. Torque to 6-7 lb-ft (8-9 N·m).
4. Install steps by installing two bolts in each step. Torque to 24-32 lb-ft (33-43 N·m).

12.14 Slow Battery Charging



WARNING

Always connect the cables from positive to positive (+ to +) and negative to negative (- to -). Improperly attaching the cables could cause the battery to explode. Failure to comply may result death, personal injury, equipment damage, or property damage.



WARNING

Always make sure the battery charger is OFF before connecting or disconnecting the cable clamps to reduce the danger of explosions and resulting death or personal injury. DO NOT connect or disconnect charger cables while the charger is operating. Damage to the charging system may occur. Failure to comply may result in death, personal injury, equipment damage, or property damage.



NOTE

Some vehicles may have an ultra capacitor mounted in the battery box. These devices have a similar shape to a battery but have two positive posts and one negative post. Do not attach battery chargers to these devices to recharge the vehicles batteries. Connect directly to the conventional two post charging batteries to charge them.



NOTE

Follow the instructions that come with your battery charger.

1. Access the battery terminals.
2. Make sure that the battery charger is off.
3. Disconnect the battery cables.
4. Connect charger cables. Make sure that you connect positive to positive (+ to +) and negative to negative (- to -).
5. Start charging the battery at a rate not over 6 A. Normally, 10% of a battery rated capacity is the maximum for charging.
6. After charging, turn off the charger and disconnect the charger cables.

12.15 Alternator

Take the following precautions to avoid burning out alternator diodes:

- DO NOT start the engine with alternator disconnected (connections removed) from the circuit.
- Before welding, disconnect all electronic connections to the vehicle

batteries.

- Remove battery power cable and insulate it from the vehicle.
- DO NOT run the engine with the batteries disconnected.
- DO NOT disconnect the battery cables or alternator connection cables with the engine running
- Never turn the start key switch from the ON position to the START position with the engine running.
- When charging the battery (installed in the vehicle) disconnect the battery cables.
- DO NOT reverse the cables of the alternator, starter motor, or battery.
- DO NOT polarize the alternator. The alternator should not be polarized like a generator. To ensure correct polarity, use a test lamp or a voltmeter.

12.16 Remote Keyless Entry

REMOTE KEYLESS ENTRY

The system will lock or unlock cab doors with the key fob. The system will alert you with parking lights when the selected doors

are locked or unlocked. There are two key fobs provided with the system which provide secure rolling code technology that prevents someone from recording the entry signal.

If you have issues with a key fob, replace the battery and reprogram the key fob. In some situations, the key fob may need to be replaced and in others, a fuse may have failed that could render both key fobs inoperative. Contact your dealer for help if a key fob does not work and it is not because of a bad battery.

The key fob uses one CR2032, 3V battery. Batteries should last approximately three years, depending on use. Consistently reduced range is an indicator that the battery needs replacement. Batteries are available at most discount, hardware, and drug stores. The battery can be accessed by removing the cover of the key fob. After a new battery is installed, the key fob may need to be reprogrammed to pair with the vehicle.

Quantity	Type
1	CR2032

HOW TO REPLACE KEY FOB BATTERY

If the key fob will not unlock the doors, replace the battery.

1. Remove the cover of the key fob.
2. Replace the battery and dispose of the old battery.
3. Check to see if the key fob is still paired to the vehicle. If not, reprogram the key fob.

PROGRAMMING KEY FOBS

The key fob may need to be paired with the truck when the battery is replaced or when the key fob has not been used for an extended period of time.

1. Turn the start key switch to the ON position.
2. Open the driver and passenger doors.
3. Press and hold the passenger door's unlock button for 5 seconds, then release the button.
4. Within 3 seconds press and hold the passenger door's lock button for 5 seconds, then release the button. At this time you should hear the vehicle cycle the locking system by

unlocking, then relocking the doors. (This indicates that the door module has entered "learning mode.")

5. Within the next 10 seconds, press and hold the key fob's lock button for 5 seconds, (you should hear the vehicle lock the doors) then press and release the unlock button.
6. Once programming is complete (or the 10 seconds from Step 5 has passed), the vehicle will cycle the locking system twice (unlock, lock, unlock, lock). This process should be repeated for each fob to be paired with the module. A maximum of five key fobs may be paired to a single module.

13 ENGINE MAINTENANCE

13.1 Engine Maintenance

These topics relate to the operator maintenance tasks for the engine. Information provided here is in addition to information contained in the Engine Operator Manual supplied with the vehicle.


WARNING

DO NOT breathe engine exhaust. Engine exhaust fumes contain carbon monoxide, a poisonous, colorless, odorless gas. Exhaust fumes can enter the cab from a poorly maintained exhaust system or from nearby vehicles. Failure to comply may result in death, personal injury, equipment damage, or property damage.


WARNING

Never start or let the engine run in an enclosed, unventilated area. Engine exhaust fumes contain carbon monoxide, a colorless and odorless gas. Carbon monoxide can be fatal if inhaled. Failure to comply may result in death, personal injury, equipment damage, or property damage.


WARNING

Never idle your vehicle for prolonged periods of time if you sense that exhaust fumes are entering the cabin. Investigate the cause of the fumes and correct it as soon as possible. If the

vehicle must be driven under these conditions, drive only with the windows open. Failure to comply may result in death, personal injury, equipment damage, or property damage.


WARNING

Routinely inspect and maintain your vehicle exhaust system. A poorly maintained, damaged, or corroded exhaust system can allow exhaust fumes to enter the cab. Engine exhaust fumes contain carbon monoxide, a poisonous, colorless, odorless gas. Failure to comply may result in death, personal injury, equipment damage, or property damage.


NOTE

The crankcase ventilation (CCV) module of the engine is maintenance-free. Refer to your Engine Operator's Manual for more details.


NOTE

Keep the engine exhaust system and the vehicle's cab ventilation system properly maintained. It is recommended that the vehicle's exhaust system and cab be inspected (1) By a competent technician every 15,000 miles (24,140 km); (2) Whenever a change is noticed in the sound of the exhaust system; or (3) Whenever the exhaust system, underbody, or cab is damaged.

13.2 Check Engine Oil Level

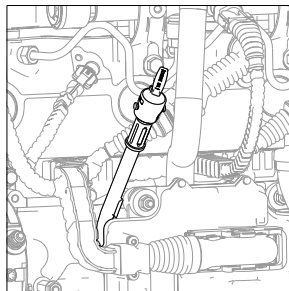

WARNING

DO NOT change hot engine oil as you could be burned. Let the engine cool down before changing the engine oil. Failure to comply may result in death, personal injury, equipment damage, or property damage.

NOTE

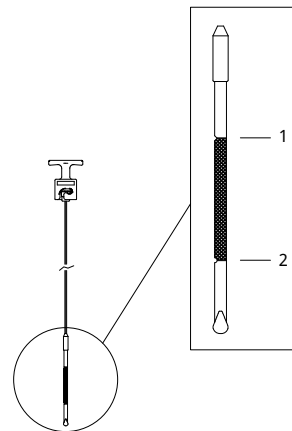
It takes approximately 15 minutes for all the oil to run into the sump when the engine is warm. If the level is checked immediately after switching off the engine, the dipstick will show a low oil level.

1. Make sure that the vehicle frame rail is standing on a flat and level surface.
2. Make sure that the vehicle is horizontal, both lengthwise and crosswise. Check this carefully on a vehicle with air suspension. Note that the engine may be inclined up to 4 degrees, depending on the vehicle model and wheelbase.
3. Twist the dipstick handle to unlock it, then pull the dipstick out of the holder.



4. Wipe the dipstick clean with a lint-free cloth.
5. Place the dipstick back into the holder.
6. Pull the dipstick out again and check the oil level. The oil level should always be between the two marks on the dipstick.

Engine Oil Dip Stick Markings

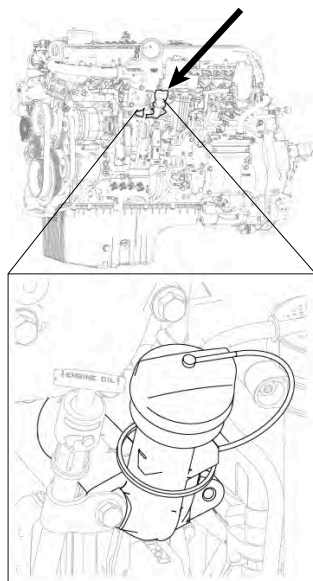


1. High Oil Level
2. Low Oil Level

7. Reinstall the dipstick and twist to lock it in place.

13.3 Topping Up the Engine Oil

The images below may not appear like the configuration of the vehicle. The procedure is still the same.



1. Top up with oil, if necessary, via the filler opening. Use the correct

grade in the correct quantity. For oil replacement, please see engine Operator's Manual included with this chassis.

2. After topping up, wait 1 minute and check the oil level again.
3. Reinstall the oil fill cap and twist to lock it in place.

13.4 Pipe and Hose Clamp Torque Values

Torque specifications for engine parts.

Application	Type of Clamp	lb-in.	N•m
Radiator and heat exchanger hoses	Constant torque CT-L	90-110	10.2-12.5
Heater hoses	Constant tension	Not required	Not required
Air intake pipes	HI torque HTM-L	100-125	11.3-14.2
Air intake pipes ¹	CT clamp	70-90	7.9-10.2
Plastic air intake pipes	Constant torque CT-L	88	10.0
Charge air intake hoses	Flex Seal™	70-100	7.9-11.3
	B9296	50-60	6-7
Air compressor suction hoses ²	Hose liner clamp	38-45	4.3-5.1
Fuel, oil and water heat exchangers (for hoses less than 9/16 in. diameter).	Miniature 3600L	10-15	1.1-1.7

¹ MX-10 engines only

² MX-10 engines only

13.5 Install Engine Belt

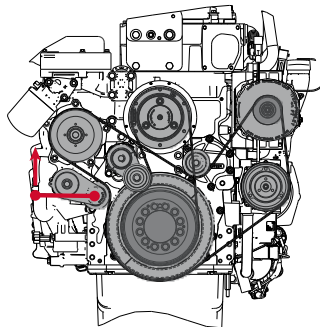
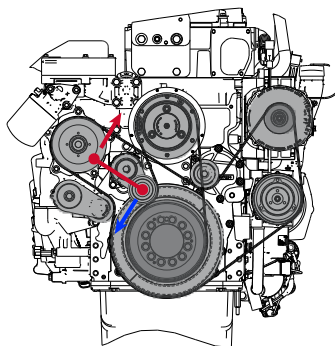
You can extend the reliability and service life of your vehicle's drive belts with proper attention to installation and maintenance. Neglect could cause belt failure. The result could be the loss of the electrical or air system as well as possible engine damage from overheating.

NOTE

See the engine manufacturer's operator's manual for further information on replacing engine drive belts.

The images below may not appear like the configuration of the vehicle. The procedure is still the same. Follow this procedure to install an accessory drive belt:

1. Route the new belt around the pulleys, and then rotate the automatic tensioner so that the idler pulley swings toward the belt routing. The following figure shows an example of the rotation direction to release the tensioner.



2. Slip the belt around the idler pulley attached to the automatic tensioner.
3. Release the automatic tensioner.
4. Check the belt alignment on each

pulley. The belt must fall between the flanges of each pulley.

13.6 Engine Fan

WARNING

DO NOT work on or near the engine fan while the engine is running. The fan can start at any time without warning, and anyone near the fan when it turns on could be injured. If the manual fan switch is set to MANUAL, the fan will turn on when the start key switch is turned to the ON position. If the switch is set to AUTO, it could engage suddenly at any time without warning. Before starting the engine or switching the manual fan switch from AUTO to MANUAL, make sure no one is near the fan. Failure to comply may result in death, personal injury, equipment damage or property damage.

Follow these guidelines to check your engine fan:

- With the engine shut off, check the fan hub bearings for looseness, loss of lubricant, and any abnormal conditions (e.g. fan belt misaligned or excessive wear/damage, etc.).

- With the engine idling and the hood open, stand at the front of the vehicle. Listen for any noises coming from the fan hub. Bearings that have lost lubricant and are dry will typically emit a squeal or a growl when the engine is at operating temperature and the fan clutch is engaged. If noise is detected, have the fan bearings inspected by an authorized dealership.

Engine Fan Blade

Verify that there is enough fan blade clearance with the fan shroud. The recommended distance around the fan shroud is 1 in. (25 mm) from front edge of any fan blade-to-radiator side member. Minimum clearance is 3/4 in. (19 mm).

- Rear edge of any blade must be no closer than 3/8 in. (9 mm) to the nearest engine component. If this cannot be obtained, the fan spacer or fan is incorrectly placed.
- The leading edge of any fan blade must be 1 in. (25 mm) from the inside edge of the shroud.

13.7 Air Intake System

Engine heat, vibration, and age combine to loosen air intake connections and cause cracks in the tubing and elbows. Leaks in the intake system allow abrasive dust to enter the engine and quickly cause expensive damage. During your daily walk-around inspection, carefully check all tubing, elbows, clamps, supports, and fasteners for condition and tightness.

Check the charge-air-cooler for air leaks annually. The air leaks can be caused by cracked tubes or header. For service see your authorized dealer.

CAUTION

DO NOT use air intake pipes and connections as a step or to pull yourself up. This could loosen the connections and open the system to unfiltered air which could damage the engine. Failure to comply may result in equipment or property damage.

13.8 Turbocharger

WARNING

DO NOT operate engine with turbocharger intake piping disconnected. A suction is created when the engine is running. This suction could draw your hand or anything else near it into the impeller fan. You could be injured. Always keep the intake piping connected when you will be running the engine. Failure to comply may result in death, personal injury, equipment damage, or property damage.

When servicing the air intake and exhaust systems on a turbocharged engine, check the items listed below:

Lubricating System

Check the oil lines, housing, and connections. Look for leaks, damage, or deterioration. Leaks could mean you have damaged oil lines or oil seals.

Manifold

With the engine operating, check for leaking manifold or flange gaskets.

High Frequency Vibration

Vibration may indicate turbo rotor imbalance. Have your dealer investigate this immediately. If you detect any deficiencies, take the vehicle to an authorized dealer for servicing. Delay could lead to severe and expensive damage to your vehicle.

13.9 How to Replace the Engine Air Filter



CAUTION

Use only PACCAR-branded (Donaldson) engine air filters when replacement is needed. Using a non-genuine PACCAR air filter decreases sealing strength and impacts correct alignment. Failure to comply may result in equipment or property damage.

Engine air filter replacement should be performed with the vehicle parked, the ignition **OFF**, and the parking brake set.

1. Open the hood to access the engine air cleaner, located on top of the engine.
2. Using a wrench, loosen to disengage the (4) bolts securing the filter

housing cap to the filter housing.

3. Pull the air filter housing cap away from the main enclosure to access the filter.
4. Visually inspect the filter housing, enclosure, and hardware for damage.
If damaged, replace the air cleaner.
5. Gently, pull filter directly out of the filter housing, taking care to not drop or tap filter on housing during removal.
Loose dirt and dust trapped in the filter can fall into the cleaner, which can lead to engine damage.
6. Inspect, and if necessary (and using **ONLY** a clean, damp cloth) clean out any debris inside the filter housing. Be careful to not push any contaminate into the engine inlet.
7. Visually inspect the new filter prior to installation. There should not be any damage to the filter media or gaskets, such as dents, dings, cracks, or holes.
8. Install new filter element, then inspect element for a good seal and proper alignment.
9. Install the filter housing cap and tighten the bolts to 88 in-lb (10 n·m)

max. DO NOT use the housing cap to drive the filter into position.

10. Verify housing cap is secure.

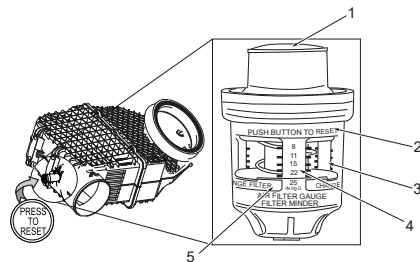
Result:

Close and secure hood.

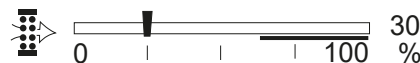
13.10 Air Filter Restriction Indicator (Option)

An Air Filter Restriction Indicator may be installed on the air filter housing or air induction piping for access to clean, filtered air.

As the filter plugs and restriction increases, a red indicator appears in a window on the indicator. When the indicator turns on, the air filter should be replaced. The indicator can be reset by pressing the button at the end of the indicator.

Figure 66: Air Filter Restriction Minder


- 1 Reset push button
- 2 Air filter restriction indicator housing
- 3 Measurement window
- 4 Measurement scale (H₂O Inches)
- 5 Red indicator scale (change filter)

Figure 67: Air Filter Restriction Indicator


The Single Air filter Restriction Gauge is an optional indicator, and represents the restriction specification in a single bar with the value of restriction in percentage (0 - 100 %) with the indicator, that is the restricted value of contaminated air entering into the engine system and indicates

how clean the air that is entering to the combustion is. The following are the main specifications this indicator represents:

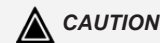
- Range: 0 - 100 %
- Warning Threshold: 60 - 100 %
- Data Error: N/A

13.11 Exhaust System

The exhaust system is part of the noise and emission control system. Periodically check the exhaust system for wear, exhaust leaks, and loose or missing parts. For details on how to maintain the emissions components in the exhaust system, see "Noise and Emission Control" in your vehicle operator's manual. Please refer to the engine operator's manual for more details on how to maintain the emissions components in the exhaust system.

If your vehicle is equipped with a 48 V generator, please refer to Engine Aftertreatment System Operator's Manual for more details.

13.12 Engine Mounting



DO NOT retorque or reuse existing flange head bolts. These bolts are factory set to the specified torque. If bolts are loose or damaged, they must be replaced with new bolts. Failure to comply may result in equipment or property damage.

Periodic Inspection: Inspect engine mounts every 60,000 miles (96,000 km).

Check for the following:

- Inspect both mount and leg fasteners. Check for loose or broken bolts. Replace as necessary.
- Check mount and leg for fractures, breaks or deformation. Replace as necessary.
- Check for complete insertion of motor mount. Replace as necessary.
- New leg to mount flange head bolts should be torqued to 210-230 lb-ft (284-311 N·m).

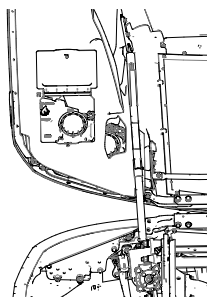
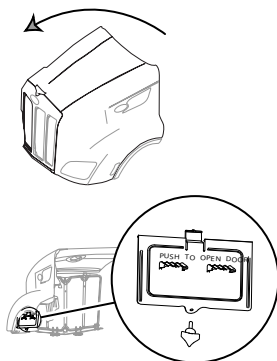
14 EXTERIOR LIGHTING

14.1 Replacing the Headlight Bulbs

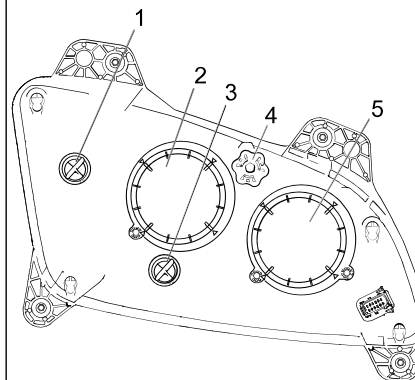
This procedure is for all halogen bulbs housed in the headlight assembly. Bulb replacements should be performed with the vehicle parked and the parking brake(s) set. See [Vehicle Light Bulb Specifications](#) for correct replacement bulbs.

i NOTE

LED headlights (option) are not serviceable. If you experience a LED headlight failure, contact your nearest dealer to have the problem corrected as soon as possible.



Headlight Assembly



1. Turn signal socket
2. Low beam bulb access cap
3. Daytime running light (DRL) and parking light socket
4. Adjustment knob (Dealer use ONLY)
5. High beam bulb access cap

CAUTION

When replacing a halogen bulb, DO NOT touch the globe with your fingers. Oils or other contaminants on the skin can result in early bulb failure. Failure

to comply may result in equipment or property damage.

1. Open the hood and secure it in the open position.
2. Locate and open the access panel on the inside of the fender liner (see Access Door graphic).
3. If replacing the low or high beam bulb, unscrew and remove the access cap covering that bulb: (2) or (5).
4. Unlock bulb from behind by turning socket (and its wired connector) a quarter-turn counterclockwise, then withdraw bulb and socket from seat.
5. Pull bulb from socket and insert replacement. Dispose of old bulb. Do not touch bulb globe with fingers.
6. Reinsert bulb and socket by lining up the tab on the socket with the slot in the headlight housing, then insert and turn clockwise to lock.
7. Replace access cap if removed earlier in this procedure.
8. Replace the access panel, then close and secure the hood.

Result:

Final Checks:

- After everything is reconnected, check the replaced light for operation.
- Have your headlights periodically checked for proper alignment by dealer.
- Keep your headlights clean using only mild soap and water (see Maintaining Headlight Performance). A dirty headlight reduces performance and creates glare.

14.2 Maintaining Headlight Performance

Bulb Replacement Considerations

WARNING

DO NOT install LED replacement light sources in PACCAR headlamps. Incorrect bulb types can overheat due to internal optics and may cause a fire. Failure to comply may result in death, personal injury, equipment damage, or property damage.

NOTE

Halogen, incandescent, and HID bulbs are brightest when they are new, and they dim over time. For optimal performance, replace your bulbs frequently. Keep a spare or lightly used bulb in the glove compartment and **never operate the vehicle with only one headlamp.**

NOTE

LED headlights (option) are not user serviceable. If you experience a LED headlight failure, contact your nearest dealer to correct the problem as soon as possible.

Know your vehicle headlamp type – Standard Incandescent, Halogen, or LED. See Vehicle Light Bulb Specifications on page 347 for headlight bulb replacement information.

- An unclear bulb indicates that it has overheated. It may perform poorly and/or be close to failure, and should be replaced as soon as possible.
- Bulbs should be replaced with a premium brand. Bulbs with the long life designation "LL" are recommended,

but not required.

- When replacing a bulb, do not touch the globe with your fingers. Oil from human skin can focus the light locally, resulting in early bulb failure.
- If the access caps or fender liner are removed during the bulb replacement, they must be re-installed to protect the headlight from high pressure water spray and gravel bombardment.

Lens and Body Considerations



CAUTION

DO NOT clean the headlamp lens with solvents, abrasive brushes or substances, or petroleum products. Improper cleaning methods can break down the lens coating, which could cloud or scratch the lens. This may result in a glare that reduces headlight performance. Failure to comply may result in equipment or property damage.

- Use a soft cloth with mild, particulate free dish soap and water to clean your headlamp lenses.
- Replace your headlamp if the lens is so worn that it is not completely clear.
- A headlamp lens should only be buffed

by a professional polishing service. To avoid stripping the lens of its protective coating, do not have the lens buffed more than twice in its lifetime.

- Do not hit or push on your headlamp lens, as it is only designed to withstand the force of wind.
- The headlamp assembly is equipped with filtered vents to keep out insects, allow for bulb cooling, and evacuate water vapor. Keep obstructions, or obstructing agents like mud, away from the vents. The filters are non-serviceable since the filter cap is destroyed when removed.

Alignment Considerations



WARNING

DO NOT operate the vehicle with mis-aimed headlamps. Misaimed headlamps may impact the driver's ability to see the road and other drivers. Failure to comply may result in death, personal injury, equipment damage, or property damage.



NOTE

Headlamp misalignment must be corrected by a trained technician. Please contact your nearest authorized dealership for next steps.

Headlamps are aimed according to safety standards before your truck leaves the factory. However, certain truck loads or trailer types may impact your vehicle's rake by offsetting the truck's weight distribution. This will misaim the headlamps. Some maintenance procedures can also affect headlamp alignment, such as:

- Headlamp assembly replacement
- Hood replacement

To check if your headlamps are properly aimed, park your truck on a level surface and direct the headlamps at a wall. If you notice that the focus of one light appears higher than the other, your headlamps are misaligned.

14.3 Final Checks

1. After everything is reconnected, turn on your headlights and check for operation.
2. Have your headlights periodically

checked for proper alignment by dealer.

3. Keep your headlights clean, using only clean soap and water. A dirty headlight reduces performance and creates glare.

15 FRAME

15.1 Frame



WARNING

DO NOT cut, splice, weld, or drill frame rails through the top or bottom frame rail flanges. These actions could affect frame rail strength, leading to its failure, and resulting in an accident. Failure to comply may result in death, personal injury, equipment damage, or property damage.



WARNING

Frame welding is NOT recommended. The high heat of welding nullifies the special heat treatment of the rails, greatly reducing the tensile strength of the frame rail. If a frame member becomes cracked from overloading,

fatigue, surface damage, or a collision, the only permanent repair is to replace the damaged frame member with a new part. Failure to comply may result in death, personal injury, equipment damage, or property damage.

Emergency Welding

In an emergency, a temporary repair may be performed. Observe the following precautions to protect electronic systems during welding operations. Emergency welding procedures are further explained in the maintenance manuals. Please refer to the ordering information on the back cover to obtain a maintenance manual.

In the event of emergency welding of a frame rail and when welding any other part of your truck or any component attached to your truck, observe the following precautions before welding:

- Disconnect all electronic devices. It is not possible to list all of the electronics that could be affected, but a few examples include the following: alternator, engine Electronic Control Unit (ECU), transmission ECU, ABS ECU, navigation devices, diagnostic devices, and monitoring devices.
- Disconnect battery cables and insulate

them from the vehicle.

- Do not use the ECU or engine ground stud for the ground of the welding probe.
- Ensure that the ground connection for the welder is as close to the weld point as possible. This ensures maximum weld current and minimum risk to damage of electrical components on the vehicle.

Painting

Do not electrostatically paint your truck or any component on your truck without first removing all of the electronic components from the truck. It is not possible to list all of the electronics that could be affected, but a few examples include the alternator, engine Electronic Control Unit (ECU), transmission ECU, ABS ECU, navigation devices, diagnostic devices, and monitoring devices.

15.2 Fifth Wheel Monthly Maintenance

- Refer to specific manufacturer's literature for any special instructions.
- Steam clean the fifth wheel.
- Check lock guard operation using a commercial lock tester.

- Clean and oil all moving parts.
- Lubricate the lock mechanism with a lithium-base grease.
- All grease fittings (especially those which grease the top surface of the fifth wheel).

15.3 Fifth Wheel Bi-Annual Maintenance

NOTE

Whenever possible, torque all frame fasteners on the nut end, not the bolt head.

- Refer to specific manufacturer's literature for any special instructions.
- Remove fifth wheel from vehicle. Refer to the Shop Manual, "Fifth Wheel Removal."
- Steam clean the fifth wheel and mounting brackets.
- Check all moving parts for excessive wear or damage. Replace all worn or broken parts.
- Complete two-month service procedure.

- Install fifth wheel. Refer to the Shop Manual, "Fifth Wheel Installation."

Tighten all frame fasteners with a torque wrench. See [Frame Fastener Torque Requirements](#).

15.4 Sliding Fifth Wheels

Lubricate bearing surface of support bracket through the grease fittings on the side of the fifth wheel plate. Use a water resistant lithium-base grease.

NOTE

The plate must be lifted up slightly to relieve the weight of the bracket while applying grease.

16 FUEL SYSTEM

16.1 Fuel System

Location of Fuel Shut-off Valves

Fuel shut-off valves for the fuel crossover line are on the bottom of the secondary fuel tank, at the crossover line connection. They are optional on the primary fuel tank.

Specification

Use only diesel fuel as recommended by engine manufacturers.

WARNING

DO NOT remove a fuel tank cap near sparks, flames, or smoking materials. Fuel in the presence of an ignition source could cause an explosion. A mixture of gasoline or alcohol with diesel fuel increases this risk of explosion. Use only the fuel or additives recommended for your engine. Failure to comply may result in death, personal injury, equipment damage, or property damage.

CAUTION

If the wrong fuel type is introduced into the fuel tank, drain the entire fuel system. Operating the vehicle will damage the fuel pump and engine. DO NOT try to dilute the gasoline by adding diesel fuel. Failure to comply may result in equipment or property damage.

Fuel Filters

See Engine Manufacturer's Operator Manual provided with this chassis.

16.2 Fuel Tank

Check the strap tightness. Tighten to proper torque value as required:

- Aluminum tank - 30 lb-ft (41 N·m)
- Cylindrical steel tank - 8 lb-ft (11 N·m)

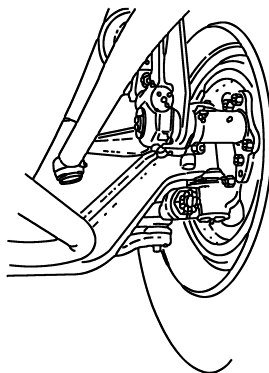
17 FRONT AXLE AND SUSPENSION

17.1 Front Axle and Suspension

Axle Lubrication

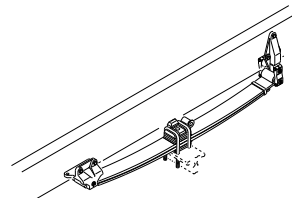
Refer to the axle manufacturer's operator's manual for lubrication specifications and service intervals.

Front Axle Knuckle Lubrication



Lubricate with approved lubricant. Lubricate knuckle thrust bearings, knuckle pins, and tie rod ends. Lack of lubrication causes premature wear and hard steering. Lubrication schedule may be shortened if necessary.

Suspension Lubrication



Each standard spring anchor pin has a grease fitting. Pressure lubricate spring pins as specified. At regular intervals, the spring leaves may be lubricated with a rust-inhibiting oil applied with a spray gun or brush. Depending on your suspension, lubricate all spring pins until grease flows out of both ends of the bushing. Look for signs of rust or water in the flushed grease. If a pin will not accept grease, it should be removed, cleaned, and inspected.

CAUTION

DO NOT spray the suspension with chemical products or mineral oil; it can cause damage to the bushings. Failure to comply may result in equipment or property damage.

Inspection

For all vehicles, mandatory maintenance procedures include retightening all U-bolts and inspecting the suspension for loose, damaged, or abnormally worn fasteners. Visually inspect the shock absorbers, the rubber bushings, the leaf springs, and that the suspension is aligned and functioning properly. Mono leaf spring suspensions should also have their rear shackle brackets checked for proper alignment.

Even with proper maintenance, however, the service life of leaf springs are affected by many factors: fatigue, vehicle gross weight, type of load, road conditions, and vehicle speed. Check for cracks, wear marks, splits, or other defects on the surface of the spring. Defective parts must be replaced. Because repaired springs cannot be fully restored to their original service life, replace the complete assembly if cracks or other defects are detected.

Wheel Alignment

For driving safety and comfort, and to prolong the life of your vehicle, it is important to have wheels correctly aligned. Check tire wear frequently. Uneven tire wear is a sign that the wheels may be misaligned. If you see uneven wear, take your vehicle to an authorized dealer familiar with aligning wheels on your vehicle.

Suspension U-Bolts

It is important that U-bolts remain tight. Severe use of your vehicle will cause them to loosen faster, and all vehicles need to have their U-bolts checked and tightened regularly. Be sure someone with the proper training and the right tools checks and tightens the U-bolts on your vehicle. New springs can settle in after service, relieving the tension on the U-bolts. Loose U-bolts can cause leaf spring breakage, axle misalignment, hard steering, and abnormal tire wear. All vehicles should have suspension U-bolts tightened after the first 500 miles (800 km) of operation. Re-torque the front spring pinch bolts and shackle pinch bolts.



WARNING

DO NOT operate the vehicle if the suspension U-bolts are not properly tightened. Improperly tightened (loose) suspension U-bolts can lead to an unsafe vehicle condition, including hard steering, axle misalignment, spring breakage, or abnormal tire wear. Failure to comply may result in death, personal injury, equipment damage, or property damage.

U-bolts are difficult to tighten unless you have the right equipment. If you cannot tighten them correctly yourself, be sure to have them checked and tightened regularly by an authorized technician. Tighten U-bolt nuts to the specified torque value with the vehicle loaded to its normal gross weight. See [Suspension U-Bolts, Grade 8](#) specifications for torque values applying to U-bolts and nuts.



WARNING

DO NOT replace U-bolts and nuts with common U-bolts or standard nuts. These parts are critical to vehicle safety. If the wrong U-bolts or nuts are used, the axle could loosen or separate from the vehicle and cause a serious accident. Use only PACCAR replacement parts. Failure to comply may result in death, personal injury, equipment damage, or property damage.

17.2 PACCAR FX-20 Front Axle Lubrication

Kingpins, Thrust Bearings, and Tie Rod Ends

Proper lubrication practices are important in maximizing the service life of the steer axle assembly.

On-Highway Applications - Standard

- Pressure lubricate every 6 months or 25,000 miles (40,000 km).
- A more frequent lubrication cycle is required for axles used in on/off-highway, refuse, or other severe service applications. Use heavy-duty, multipurpose lithium base (#2 grade) grease.

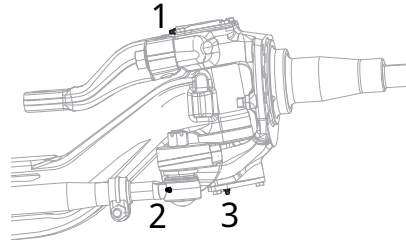


CAUTION

Only use lithium-based grease and DO NOT mix with sodium-based grease. Doing this could cause the grease mix to soften, reducing lubrication capacity and lowering protection against oxidation, corrosion, extreme temperatures, and water. Failure to comply may result

in equipment damage or property damage.

Figure 68: PACCAR FX-20 Front Axle Lube Points



1. Upper kingpin bearing
2. Tie rod end
3. Lower kingpin bearing



NOTE

If it is difficult to grease either the upper or lower bearing, try greasing the bearings with the vehicle jacked up and supported on axle stands to improve grease flow and flush contamination.

Oil Bath

Lubricate wheel end assembly with a drive axle lubricant that meets MIL-L-2105D specifications. Either SAE 80W-90 mineral based or 75W-90 synthetic gear oil is acceptable. Check the lubricant level at each greasing interval. Maintain the lubrication fluid level at centerline of axle or fill line on hub cap. Always check fluid level on flat ground.



CAUTION

Never mix oil bath and grease-packed wheel ends. Mixing oil and grease will reduce the effectiveness of both lubricants and may cause damage to the wheel ends. Failure to comply may result in equipment or property damage.

18 HEATER AND AIR CONDITIONER MAINTENANCE

18.1 Heater and Air Conditioner Maintenance

The combination heater-air conditioner provides comfort for those in the cab through accurate control of the cab environment in all weather conditions. Regular attention to the items below will help you keep the heater-air conditioner unit running well. Keep the vehicle's ventilation system, engine exhaust system, and cab joints properly maintained. It is recommended that the vehicle's exhaust system and cab be serviced by a competent technician as follows:

- Inspected every 15,000 miles
- Whenever a change is noticed in the sound of the exhaust system
- Whenever the exhaust system, vehicle underbody, or cab is damaged

To allow for proper operation of the vehicle ventilation system, proceed as follows:

- Keep the inlet grille at the base of the windshield clear of snow, ice, leaves,

and other obstructions at all times.

- Keep the exhaust pipe area clear to help reduce the buildup of exhaust gas under the vehicle.
- Check the drain tube of the fresh air inlet for trapped water before assuming that there is a leak in the heating system.

Special Precautions

WARNING

Never weld, solder, steam clean, or use a blow torch near any part of the air conditioning system. Excessive heat may cause the pressurized components of the air conditioning system to explode. Failure to comply may result in death, personal injury, equipment damage or property damage.

WARNING

Always wear personal protective equipment (PPE) when working with refrigerant, this includes safety goggles, a face shield, and nitrile gloves. Gas could escape from containers, hoses, or fittings, and exposure to R134a or R134aUV can result in frostbite or eye

damage. Failure to comply may result in death, personal injury, equipment damage, or property damage.

WARNING

R134a refrigerant is combustible. Store in a cool, well-ventilated area away from heat sources and direct sunlight to prevent fire or explosion. Failure to comply may result in death, personal injury, equipment damage, or property damage.

WARNING

Never allow large quantities of R134a refrigerant (concentrations higher than 1000 parts per million) to escape in a small, unventilated space. R134a is toxic and will also displace nearby oxygen, which can lead to asphyxiation. Failure to comply may result in death, personal injury, equipment damage, or property damage.

If a refrigerant leak develops in the presence of excessive heat or an open flame, hazardous gases may be generated. If you become aware of a refrigerant leak on your

vehicle have your system serviced immediately and observe the following precautions: Stay away from the hot engine until the exhaust manifold has cooled. Do not permit any open flame in the area. Even a match or a cigarette lighter may generate a hazardous quantity of poisonous gas. Do not smoke in the area. Inhaling gaseous refrigerant through a cigarette may cause violent illness.

Heater

CAUTION

During extreme cold weather, blowing hot defroster air onto a cold windshield can crack the glass. When the heater core is hot and the windshield is cold (such as idling the engine when the HVAC has been off), move the Temperature Control Dial to "COOL." Gradually increase the temperature as the windshield warms up. Failure to comply may result in equipment or property damage.

- Check all heater controls for full-range operation.
- Check hoses, connections, and heater core for condition and leaks.

Air Conditioner

WARNING

The air conditioning system is under pressure. If not handled properly during servicing, it could explode. Any servicing that requires depressurizing and recharging the air conditioning system must be conducted by a qualified technician in an approved facility. Failure to comply may result in death, personal injury, equipment damage, or property damage.

WARNING

Always wear safety glasses when working with pressurized air. DO NOT exceed the recommended air pressure limits, look into the air jets, or direct the air jets towards yourself or another individual. Failure to comply may result in death, personal injury, equipment damage, or property damage.

- Listen to the compressor and drive clutch for noise and vibration. If you find problems, have the system checked thoroughly. A malfunctioning clutch usually indicates trouble

elsewhere in the system.

- Check the evaporator core, filter, and condenser core for debris restricting air flow. Clean if necessary. Small particles may be removed with compressed air blown through the core in the opposite direction of normal air flow.
- Check the engine belt for condition and proper tension.
- Check all hoses for kinks, deterioration, chafing, and leaks. Adjust kinked or chafing hoses to eliminate restrictions and prevent further wear.
- Check all components and connections for refrigerant leaks. If you discover a leak, do not try to tighten a connection. Tightening a connection may cause a leak to worsen. Have a qualified technician correct the problem.

NOTE

A leaking evaporator or condenser core cannot be repaired; it must be replaced.

Have the air conditioning system fully serviced annually by your authorized dealer. Qualified service technicians will have to evacuate and recharge the system.

18.2 How to Replace Air Conditioner Filter

Inspect and clean cab air filter element every 3-6 months of service. Depending on the operating environment, if air flow from the air conditioner and heater is less efficient or windows fog easier, you may need to replace the cab air filter.

1. Tilt the hood open.
2. Locate air intake housing at passenger rear corner of vehicle under the rain tray.
3. Locate filter cover labeled "OPEN" with an arrow pointing rearward in vehicle. Slide filter cover rearward in vehicle until you are able to remove the cover.
4. Remove and inspect filter referring to maintenance interval schedule.
5. Replace filter in housing taking care to align the airflow direction that is indicated on the side of the side of the filter element with the airflow direction that is clearly marked on the air intake housing.
6. Replace the filter cover on the air intake housing and slide the cover forward in vehicle. An audible snap

sound can be heard when the cover is correctly in place. If the snap feature is damaged there are two screw features that may be utilized to retain the cover in place.

7. Close and secure hood of vehicle.

18.3 Replace the Recirculation Air Filter

Please contact an authorized dealer when the service interval is required to inspect the cabin recirculation air filter.

18.4 Sleeper HVAC Air Filter

1. Lift the sleeper bunk to expose the sleeper HVAC module.
2. Find the retention tab at the side of the filter element and move it to release the filter. Moving this tab will allow the filter to be removed in an upward direction.
3. Align the airflow direction that is indicated on the side of the filter element such that it points into the HVAC housing.
4. Insert the filter and make sure the

retention tab has re-engaged to secure the filter.

5. Close the bunk.

19 NOISE AND EMISSION CONTROL

19.1 Noise and Emission Control

There are specific components on the vehicle that are designed to meet certain Environmental Protection Agency (EPA) emissions and noise regulations. To maintain conformance with the regulations, these components need to be functional and properly maintained.

Noise Emission Warranty

Peterbilt warrants to the first person who purchases this vehicle for purposes other than resale and to each subsequent purchaser that this vehicle as manufactured by Peterbilt, was designed, built, and equipped to conform at the time it left Peterbilt's control with all applicable U.S. EPA Noise Control Regulations.

This warranty covers this vehicle as designed, built, and equipped by Peterbilt, and is not limited to any particular part,

component, or system of the vehicle manufactured by Peterbilt. Defects in design, assembly, or in any part, component, or system of the vehicle as manufactured by Peterbilt, which, at the time it left Peterbilt's control, caused noise emissions to exceed Federal standards, are covered by this warranty for the life of the vehicle.

Tampering with Noise Control System

Federal law prohibits the following acts or the causing thereof:

1. The removal or rendering inoperative by any person other than for purposes of maintenance, repair, or replacement, of any device or element of design incorporated into any new vehicle for the purpose of noise control prior to its sale or delivery to the ultimate purchaser or while it is in use, or
2. The use of the vehicle after such device or element of design has been removed or rendered inoperative by any person. Among those acts presumed to constitute tampering are the acts listed below:

Air Intake System Removing or rendering inoperative the air filter housing/silencers or intake piping

Engine Cooling System Removing or rendering the fan clutch inoperative
Removing the fan shroud

Engine Removing or rendering engine speed governor inoperative so as to allow engine speed to exceed manufacturer's specifications
Modifying ECU parameters

Exhaust System Removing or rendering inoperative exhaust system components

Fuel System Removing or rendering engine speed governor inoperative, allowing engine speed to exceed manufacturer's specifications
Removing of air signal attenuator on engines equipped with this device
Removing of diesel exhaust fluid tank and system

Inner Fender Shields and Cab Skirts Removing shield or skirts
Cutting away parts of shields, skirts or damaged or loose portions of shields or skirts

Noise Insulating Blankets Removing noise insulators from engine block or from around the oil pan
Cutting holes in, or cutting away part of noise insulators
Removing hood-mounted noise insulation

19.2 Inspecting Noise and Emission Components

If, during periodic inspection and maintenance of other systems and components, it is found that parts of the noise control system require attention, we recommend that those parts be inspected at more frequent intervals to assure adequate maintenance and performance.

The following instructions are based on inspection of the noise control system at regular intervals as indicated in the [Noise Control System - Maintenance Log](#).

Air Intake System

- Do all checks and maintenance procedures listed in this manual under engine air intake system and air filter housing.
- Check the induction tubing, elbow connections, clamps, brackets, and fasteners for deterioration, cracks, and security.
- If you find an air leak anywhere between the air filter housing and the engine, repair that leak immediately.



CAUTION

Air leaks cause excessive noise and may result in serious damage to the engine. If you do not repair them, the engine damage will not be covered by your warranty. Repair all air leaks as soon as you find them. Failure to comply may result in equipment or property damage.

Engine Mounted Noise Insulators

- Check condition. Is the insulator secure? How you do this will depend on the method of attaching the noise insulators on the engine and around the oil pan (bolts, snap fasteners, or straps). Tighten loose fasteners and repair or replace any worn or damaged fasteners.
- Check insulators around fasteners and stress points, especially where they may be affected by engine vibration. Repair any cracked or damaged mounting points. Use suitable reinforcing plates to ensure that the insulators will remain in position.

Exhaust System

- Check for exhaust leaks, which would indicate a leaking manifold gasket;

replace gasket if necessary.

- Check cap screws for tightness, including those at the flanges. Refer to the engine manufacturer's service manual for proper tightening sequence and torque values.

Joints and Clamps

- Check for leaks, and tighten as necessary. Check for deterioration or dents in pipes and clamps which could allow exhaust to escape.
- Replace any serviceable joints, flexible pipes and gaskets at the service intervals.

Selective Catalysts Reduction (SCR)

- Check SCR canister filter, clamps and mounting brackets. Tighten if necessary. Inspect SCR canister for signs of rust or corrosion.

Exhaust Piping

- Check exhaust piping for rust, corrosion, or damage. Replace deteriorated piping before holes appear. If piping is perforated at any point, temporary patching or lagging is acceptable until you can have permanent repairs made. On turbocharged engines, check joints at flanges and mounting brackets for

tightness.

Diesel Particulate Filter (DPF)

- Check DPF, clamps, and mounting brackets. Tighten if necessary. Inspect DPF for signs of rust or corrosion.
- Check internal baffling. You can do this by listening for rattling sounds while tapping on the (DPF with a rubber mallet or revving the engine up and down through its normal operating range.

DEF Tank (See Aftertreatment System manual)

Exhaust Tail Pipe

Engine Fan and Shroud

Hood Insulation Blanket

Inner Fenders Shields and Cab Skirts

19.3 Noise Control System - Maintenance Log

To ensure your vehicle's noise control requirements are maintained, record maintenance checks. Use the following log sheet and retain copies of documents regarding maintenance services performed and parts replaced on the vehicle.

Component	Recom- mended Inter- val (Miles)	Date & R.O. No.	Repair Facil- ity & Location	Work Per- formed	Date & R.O. No.	Repair Facil- ity & Location	Work Per- formed
Exhaust System Routing Integrity	25,000						
Shutters Shrouds	25,000						
Hood Insulation Blanket	10,000						
Engine Mounted Hose Insulators Fasteners	10,000						
Inner Fender Shields	50,000						
Cab Skirts Fasteners	50,000						
Air Intake System Integrity Element	5,000						
Clutch type Fan Drive	10,000						

20 REAR AXLE AND SUSPENSION

20.1 Rear Axle and Suspension

The vehicle's suspension, by design, requires a minimal amount of maintenance. However, suspensions in over-the-road operations require periodic inspection to ensure trouble-free performance.



WARNING

Prior to performing maintenance, do the following to prevent uncontrolled vehicle movement:

- Park the vehicle on a hard and level surface.
- Chock forward and rear wheels securely.

Failure to comply may result in death, personal injury, equipment damage, or property damage.



WARNING

DO NOT operate the vehicle if the suspension U-bolts are not properly tightened. Improperly tightened (loose) suspension U-bolts can lead to an unsafe vehicle condition, including hard steering, axle misalignment, spring breakage, or abnormal tire wear. Failure to comply may result in death, personal injury, equipment damage, or property damage.



WARNING

Failure to maintain the specified torque values or to replace worn parts can cause component failure, possibly resulting in an accident. Failure to comply may result in death, personal injury, equipment damage, or property damage.



CAUTION

DO NOT spray the suspension with chemical products or mineral oil; it can cause damage to the bushings. Failure

to comply may result in equipment or property damage.



NOTE

Failure to follow these recommendations could void warranty.

Visual Inspection

For all vehicles, mandatory maintenance procedures include retightening of U-bolts and complete inspection. Even with proper maintenance, however, many factors affect the service life of springs and suspension components: fatigue, vehicle gross weight, type of load, road conditions, and vehicle speed. All vehicles must have their U-bolts checked and tightened regularly. Severe use of the vehicle can cause them to loosen faster. It is important that U-bolts remain tight. Make sure that a technician with proper training and the right tools checks and tightens the U-bolts on the vehicle. After the first 500 miles (mi) (800 km) of operation, periodically inspect the suspension as noted below:

- Visually check for loose or missing fasteners, cracks in hanger, or axle connection brackets
- Check for centered springs in hangers

that are in good condition

- Check for cracks, wear marks, splits, or other defects on the surface of the spring
- Replace defective parts. It is impossible to restore springs to their original service life. Replace the complete assembly if cracks or other defects are detected
- After replacement of any part or discovery of loose components, check the torque of all fasteners
- New springs settle-in after the vehicle's initial service, causing the U-bolts to become loose

Rear Suspension Fasteners

To maintain the performance of the air suspension, check fastener torque values after the first 2,000 miles (mi) (3,200 km) of service and every 60,000 miles (mi) (96,000 km) after. Torque recommendations apply to fasteners supplied and installed by vehicle manufacture. The values listed at the back of this chapter (See [Suspension U-Bolts, Grade 8](#) and [Frame Fastener Torque Requirements](#)), are for cadmium plated or phosphate and oil fasteners only.

Rear Suspension U-bolts

U-bolts are difficult to tighten unless you have the right equipment. If you cannot tighten them correctly yourself, make sure to have them checked and tightened regularly by an authorized technician.



WARNING

DO NOT operate the vehicle if the suspension U-bolts are not properly tightened. Improperly tightened (loose) suspension U-bolts can lead to an unsafe vehicle condition, including hard steering, axle misalignment, spring breakage, or abnormal tire wear. Failure to comply may result in death, personal injury, equipment damage, or property damage.



NOTE

To ensure an accurate torque reading, use properly maintained and calibrated torque wrenches. Clean the nut and bolt. No dirt, grit, or rust should be present.



NOTE

Whenever possible, torque all frame fasteners on the nut end, not the bolt head.

Load the vehicle to its normal gross weight before tightening the U-bolts. Loading the vehicle ensures proper adjustment of the U-bolt and spring assembly.



WARNING

DO NOT replace U-bolts and nuts with common U-bolts or standard nuts. These parts are critical to vehicle safety. If the wrong U-bolts or nuts are used, the axle could loosen or separate from the vehicle and cause a serious accident. Use only PACCAR replacement parts. Failure to comply may result in death, personal injury, equipment damage, or property damage.

20.2 Rear Axle Lubrication

See the axle manufacturer's operator's manual for lubrication specifications and service intervals.

Check oil level with the vehicle parked on level ground and the fluid warm. The level should be even with the bottom of the filler hole.

20.3 Rear Axle Alignment

Continual road shock and load stresses may force the rear axles out of alignment. If you detect rapid tire wear on the rear axles, you may have misaligned axles. If you suspect rapid tire wear, have your rear axle alignment checked and adjusted by an authorized dealer.

Suspension alignment should be checked when any one of the following conditions exist:

- Total vehicle alignment required after a body has been installed on truck chassis.
- Discovery of loose suspension fasteners (loose defined as any torque below the recommended torque value)
- Discovery of elongated holes in a suspension component
- Bushing replacement
- Excessive or abnormal tire wear
- Immediately after post body installation (See First Day in the Maintenance Chapter)

20.4 Drive Axle - Dana

DRIVE AXLE - DANA

Refer to the Dana manual provided with your vehicle.

EATON/DANA AXLE LUBRICATION

Refer to the Eaton or Dana manual provided with your vehicle.

20.5 Drive Axle - Meritor

DRIVE AXLE - MERITOR

Refer to the Meritor manual provided with your vehicle.

MERITOR AXLE LUBRICATION

Refer to the Meritor manual provided with your vehicle.

20.6 Drive Axle - SISU Breather and Brakes

Refer to the SISU manual provided with your vehicle.

20.7 Drive Axle (SISU) Inspection

Refer to the SISU manual provided with your vehicle.

20.8 Drive Axle (SISU) Oil Servicing

Refer to the SISU manual provided with your vehicle.

20.9 Drive Axle - (SISU) Lube Filter

Refer to the SISU manual provided with your vehicle.

21 STEERING SYSTEM

21.1 Steering System



WARNING

DO NOT operate the vehicle if the steering system is not working properly. If the steering system is not in good

working condition, you could lose control of the vehicle, resulting in an accident. Failure to comply may result in death, personal injury, equipment damage, or property damage.



WARNING

Visually check the steering gear and components frequently. Frequent checks are important, especially after traveling over rough roads. Failure to comply may result in death, personal injury, equipment damage, or property damage.



WARNING

Adjustments or repairs made to any part of the steering system must be performed by an authorized dealer. Failure to comply may result in property damage, personal injury, or death.



WARNING

On chassis equipped with Electronic Stability Control (ESC), recalibrate the steering angle sensor when servicing,

removing, or replacing any part of the steering system. The steering system includes, but is not limited to the wheels, steering column, tie rods, steering rack, and the steering angle sensor itself. The sensor should also be recalibrated in the event of airbag deployment. An uncalibrated steering angle sensor could result in a loss of vehicle control. Failure to comply may result in death, personal injury, equipment damage, or property damage.

Hydraulic fluid (under low pressure) provides the power to operate the steering gear. It also serves to lubricate moving parts and remove heat. A loss of steering efficiency will occur if too much heat builds up in the system.

If the steering feels unbalanced from side-to-side while turning, check for the following possible causes:

- Unequal tire pressures
- Vehicle overloaded or unevenly distributed load
- Wheels out of alignment
- Wheel bearings improperly adjusted

If you cannot correct the problem, check with an authorized dealer.

Your vehicle is equipped with integral power steering. The system includes an engine-driven fluid pump, a fluid reservoir, the steering gear, and connecting hoses. Because of the hydraulic power assist, little effort is required to turn the steering wheel. When no input is applied through the steering wheel, the steering gear will return to the neutral position. If, for any reason, the power assist system goes out, steering the vehicle is still possible but it will require much greater effort.

Visually check the following parts:

- Crosstube: Is it straight?
- Drag link castle nut: Check for looseness or interference. (Refer to [Drag Link Castle Nut Torque](#) for specified torque).
- Ball joints and steering U-joints: Check for looseness
- Steering wheel for excessive free-play. Check the simplest probable causes first: (A) unequal tire pressures; (B) loose cap nuts; (C) bent crosstube; or (D) lack of lubrication

If these checks do not reveal the problem, or if you correct them and still have a steering problem, take your vehicle to an authorized dealer for evaluation.

21.2 Check Power Steering Fluid Level



CAUTION

When adding fluid, only use fluid of the same type. While many fluids have the same description and intended purpose, they may contain incompatible additives. Incompatible fluids may cause damage to power steering system components. Failure to comply may result in equipment or property damage.



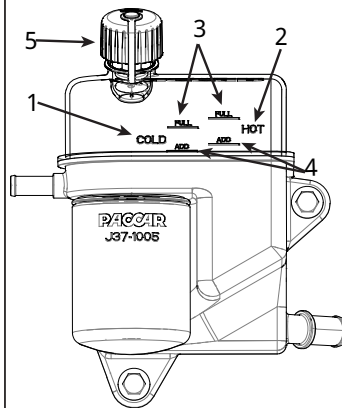
NOTE

Before removing reservoir cap, wipe the outside of the cap so that no dirt or debris falls into the reservoir.

Check the fluid level. Use the following procedure:

1. Park the vehicle on level ground and turn the engine off.
2. Open the hood.
3. Check the fluid level on the reservoir.

Power Steering Reservoir



1. Cold
2. Hot
3. Full
4. Add
5. Fill cap

Choose from:

- If you check the fluid with the engine and steering system COLD, the fluid level should be above the Add indicator level and should generally not exceed the middle point between the

Add and Full level indicators.

- If you check the fluid with the engine and steering system WARM, the fluid should NOT exceed the Full level indicator and should generally not drop below the middle point between the HOT Full and Add level indicators.
4. To add fluid, open the fill cap to the power steering reservoir and then add fluid until the fluid level is in the middle of the appropriate Minimum and Maximum level indicators.
 5. Reinstall the reservoir fill cap and close the hood.

21.3 Steering Shaft Bolt Torque Specifications

The steering (intermediate shaft) U-joint pinch bolt should be tightened on the first day or two of operation, then checked weekly (see Weekly Checks). The following are common torque specifications for most steering shafts.

Table 17: Steering U-joint Pinch Bolt

Fastener Size	Torque Spec. lb-ft (N•m)
7/16 -in.	37-43 (50-58)

Table 18: Pitman Arm Clamp Bolt

Fastener Size	Torque Spec. lb-ft (N•m)
3/4 -in.	300-320 (406-433)

WARNING

Any modification to a vehicle with Electronic Stability Control (ESC) may result in a loss of vehicle control or non-compliance with Federal Motor Vehicle Safety Standards. Modifications include but are not limited to changes to the vehicle's axle weight ratings, number of axles, front and rear suspension, wheel-base length or frame, steering controls, or intended body type and size. A modified vehicle with ESC must be evaluated by a qualified technician before it can be operated. Contact your authorized dealer for evaluations. Failure to comply may result in death, personal

injury, equipment damage, or property damage.

22 DRIVELINE

See the driveshaft manufacturer's operator manual for lubrication specifications and service intervals.

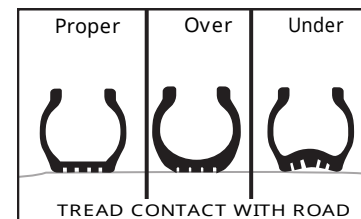
WARNING

Improper lubrication of U-joints can cause them to fail prematurely. The driveshaft could separate from the vehicle and result in an accident. Make sure lubricant is purged at all four ends of each U-joint and loosen caps if necessary. Also, regularly inspect U-joints for excessive wear or movement, and repair or replace as necessary. Failure to comply may result in death, personal injury, equipment damage, or property damage.

23 TIRES

23.1 Tires

Your tires are a very important part of your vehicle's whole braking system. How fast you can stop depends mostly on how much friction you get between the road and your tires. Keeping your tires in good condition is essential to the safe, efficient operation of your vehicle. Regular, frequent inspection and the right care will give you the assurance of safe and reliable tire operation. Here are some tips on maintaining your tires.



WARNING

All tire repairs should be performed by an expert. DO NOT repair damaged tires unless you are fully qualified and equipped to do so. Wheel and tire

assemblies cannot be worked on without proper tools and equipment. Failure to comply may result in death, personal injury, equipment damage, or property damage.

Checking Inflation Pressure

Low pressure is a tire's worst enemy. Underinflation allows tires to flex improperly, causing high temperatures to build up. Heat causes early tire damage such as flex break, radial cracks, and ply separation. Low pressure may affect control of your vehicle, especially at the front wheels. Most tire wear problems are caused by underinflation as the result of slow leaks, so check tire pressure regularly. Lower tire pressure does not provide better traction on ice or snow. Give your tires a visual test every day, and check inflation with a gauge every week:

- When checking tire pressure, inspect each tire for damage to sidewalls, cuts, cracks, uneven wear, rocks between duals, etc. If a tire appears underinflated, check for damage to the wheel assembly. Don't forget to check between dual wheels. If you find wheel damage, have an expert tire service repair it.
- Maximum tire pressure will be indicated

on the sidewall of a tire.

- Check pressure only when the tires are cool. Warm or hot tires cause pressure buildup and will give you an inaccurate reading. So never deflate a warm tire to the specified pressure.



WARNING

DO NOT operate a vehicle with underinflated tires. Underinflation (or low tire pressure) can create extra heat leading to sudden tire failure (such as a tire fire or blow out) or may affect control of the front wheels, both conditions possibly resulting in an accident. Keep your tires inflated to the manufacturer's recommended air pressure. Failure to comply may result in death, personal injury, equipment damage, or property damage.



WARNING

DO NOT install a damaged wheel assembly, and DO NOT install or inflate a tire that has been damaged or has been run flat. Always follow section 1910.177 of OSHA regulations. Truck wheels and tires should be serviced only by fully qualified and properly

equipped technicians authorized to do so. Failure to comply may result in death, personal injury, equipment damage, or property damage.



NOTE

Follow all warnings and cautions contained within the tire and wheel manufacturers literature.

Overloaded Tires

Overloading your truck is as damaging to your tires as underinflation. The following chart shows how neglect or deliberate abuse can affect the life of your tires.

Table 19: Effects of Load and Pressure on Tire Life

Vehicle Load	Tire Pressure	Expected Total Tire Mileage
Normal	Normal	Normal
20% over	20% low	70%
40% over	30% low	50%
60% over	35% low	40%

Table 19: Effects of Load and Pressure on Tire Life

Vehicle Load	Tire Pressure	Expected Total Tire Mileage
80% over	45% low	30%
100% over	55% low	25%

Overinflated Tires

Overinflating the tires reduces the tread contact area with the road surface, concentrating all of the vehicle weight on the center of the tread. This causes premature wear of the tire.

WARNING

Ensure all tires are inflated correctly according to the manufacturer's recommendations. Overinflated tires wear more quickly and are more subject to punctures, cracks, and other damage that can cause loss of vehicle control. Failure to comply may result in death, personal injury, equipment damage, or property damage.

Matching Tires

Be sure to buy matching tires for your vehicle, especially on the rear axles. Mismatched tires can cause stress between axles and cause the temperature of your axle lubricant to get too hot. Matched tires will help your driveline last longer and will give you better tire mileage.

WARNING

DO NOT mismatch or mix tires of different design such as steel belted radials and bias ply tires, etc. Mixing tire types and sizes will adversely affect the road-holding ability of both types of tires and can lead to loss of vehicle control. Failure to comply may result in death, personal injury, equipment damage, or property damage.

WARNING

DO NOT install regrooved or reinforcement repaired tires on steering axles. They could fail unexpectedly and cause loss of vehicle control. Failure to comply may result in death, personal injury, equipment damage, or property damage.

Replacing Tires

Front: Replace front tires when less than 4/32 -in. of tread remains. Check at three places equally spaced around the tire. Drive Axles or Trailers: Replace tires on drive axles or trailers when less than 2/32 -in. of tread depth remains in any major groove. Check at three places equally spaced around the tire.

WARNING

DO NOT replace original equipment tires with tires whose load ratings are less than the originals. Doing so could overload the tire and cause a failure resulting in a loss of vehicle control. Failure to comply may result in death, personal injury, equipment or property damage.

NOTE

To prolong your tires' life, have their radial and lateral run-out checked at your dealer. Anytime a tire is replaced or reinstalled, it should be balanced.

Tire Chains

The number of required tire chains may vary depending on your operating area. If tire chains are required, please review the area's regulations for more information.

NOTE

To prolong your tires' life, have their radial and lateral run-out checked at your dealer. Anytime a tire is replaced or reinstalled, it should be balanced.

Speed Restricted Tires

WARNING

Check each tire's sidewall and/or tire manufacture's data book for maximum rated speed. This vehicle is equipped with speed restricted tires and should not be operated at speeds in excess of maximum rated speed as this may cause sudden tire failure resulting in loss of control leading to an accident. Failure to comply may result in death, personal injury, equipment damage, or property damage.

23.2 Greenhouse Gas Certified Tires

NOTE

The tires installed on this vehicle at the factory as original equipment are certified for Greenhouse Gas and Fuel Efficiency regulations. Replacement tires must be of an equal or larger loaded drive tire size and an equal or lower rolling resistance level (TRRL or Crr). Consult with your tire supplier(s) for appropriate replacement tires.

In order to limit the rolling resistance of the tires and optimize fuel economy, the maintenance procedures specified by the tire manufacturer must be followed. Please see Vehicle Emissions Limited Express Warranty for warranty on greenhouse gas certified tires.

24 WHEELS

24.1 Wheels

After the vehicle travels about 50 to 100 miles (80 to 160 km), wheel mountings seat in and will lose some initial torque. Check hub/wheel mountings after this initial period and retighten. Threads should be clean and dry. Do not lubricate wheel nuts or studs.

WARNING

Never use oil or grease on studs or nuts. Lubricants will result in improper torque readings, which could cause improper wheel clamping and could lead to wheel failure. Failure to comply may result in death, personal injury, equipment damage, or property damage.

Wheel Replacement with Disc Brake Option

WARNING

Only use tires of the same wheel brand, size, and part number of those originally installed. A different wheel brand or size

could cause the valve stem to interfere with a brake component, which could lead to loss of vehicle control. Failure to comply may result in death, personal injury, equipment damage, or property damage.

Vehicles equipped with front disc brakes are fitted with wheels designed specifically for disc brake applications. If it ever becomes necessary to replace an original equipment wheel, the replacement wheel must be the same brand and size as the take-off wheel. On vehicles equipped with 22.5 in. disc wheels, installing the wrong replacement wheel could result in the wheel valve stem making contact with the disc brake assembly. When installing any replacement wheel, always inspect the tires/wheels to ensure there is adequate clearance between other vehicle components. With the hood open, check for clearance between the wheel and disc brake assembly. Use a hydraulic jack to raise the front of the vehicle off the ground to allow the wheel to spin freely. While rotating the wheel, check to ensure there is adequate clearance between the wheel and disc brake assembly.



WARNING

Follow the manufacturer's literature exactly when mounting and dismounting a wheel or tire. Improperly mounting or dismounting a wheel or tire could cause uneven tire wear, tire blowout, a loss of vehicle control, and lead to an accident. Failure to comply may result in death, personal injury, equipment damage, or property damage.



WARNING

Always ensure the hood lock has engaged whenever the hood is opened. If not properly locked open, the hood may close uncontrollably and without warning. Failure to comply may result in death, personal injury, equipment damage, or property damage.



WARNING

Always support the vehicle with appropriate safety stands if it is necessary to work underneath the vehicle. A jack is not adequate for this purpose. Failure to comply may result in death, personal

injury, equipment damage, or property damage.

Disc Wheels



WARNING

Use the correct components and tools when working on wheels. Using an incorrect tool or component could misalign or damage the wheel and cause a loss of vehicle control. Failure to comply may result in death, personal injury, equipment damage, or property damage.

The end of the wheel wrench must be smooth. Burrs on the end of the wrench can tear grooves in the disc. These grooves may lead to cracks in the disc, and can cause it to fail.

Wheel Bearings

Service the bearings, seals and oil. This interval may be different depending on the results of the regular inspection. 350,000 mi (560,000 km). For safe, reliable operation and adequate service life, your wheel bearings must be adjusted properly at

the recommended intervals. Contact your authorized dealer to make sure the wheel bearings are properly adjusted.

24.2 Tightening Wheel Cap Nuts



WARNING

Torque wheel cap nuts properly. If they are not properly torqued, the wheel nuts could loosen allowing the wheel to detach or fail while the vehicle is moving. Failure to comply may result in death, personal injury, equipment damage, or property damage.

Figure 69: Hub Piloted Disc Wheels

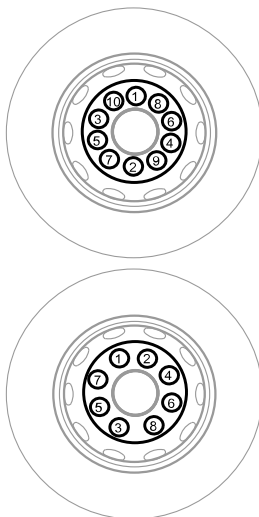
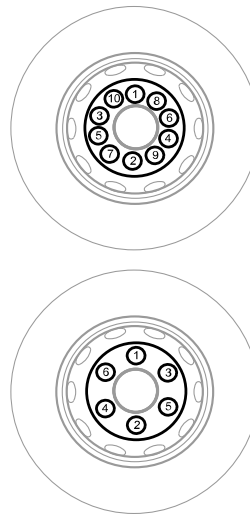


Figure 70: Stud Piloted Disc Wheels



Proper wheel torque can best be obtained on level ground. Install lug nuts and finger-tighten in the numerical sequence as shown below. This procedure will ensure that the wheel is drawn evenly against the hub. Contact an authorized dealer for information on the proper installation procedure for the wheels on your truck. This is a job you may not be able to do yourself. You need the right torquing equipment to do it.

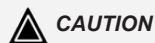
25 WINDSHIELD WIPER/WASHER

25.1 Windshield Wiper/Washer

The windshield wiper system is designed to be maintenance-free. Check wiper blades annually, every 60,000 miles (96,000 km), or when they begin to show signs of wear.

Check the washer reservoir water level daily, located in the engine compartment. If necessary, refill to the proper level.

25.2 How to Refill the Washer Fluid Reservoir



DO NOT use antifreeze or coolant in the windshield washer reservoir. These are harmful fluids to the seals and other components. Failure to comply may result in equipment or property damage.

1. Park the vehicle and apply the parking brake.
2. Open the hood and secure it in the

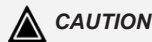
open position.

3. Locate the washer fluid reservoir located on the passenger side (RH) of the engine compartment, in front of the steer tire, and open the filler cap.
4. Fill the 2.4 Gallons (9 Liters) reservoir with windshield washer fluid and replace the cap.
5. Close and secure the hood.

26 TRANSMISSION MAINTENANCE

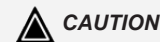
26.1 Transmission Maintenance

Refer to the transmission manufacturer's manual provided with your vehicle.



When adding oil, types and brands of oil should not be intermixed. Different oil brands or types might be incompatible, which could decrease lubrication effectiveness and cause component failure. Failure to comply may result in equipment or property damage.

Vehicles configured with the PACCAR TX-12/TX-18 series must maintain the oil coalescing desiccant cartridge of the air dryer as part of transmission maintenance.



Replace the oil-coalescing desiccant air dryer cartridge annually, regardless of mileage. Use of a non-oil-coalescing cartridge or missing a maintenance interval can damage vehicle components and may void warranty coverage. Failure to comply may result in equipment or property damage

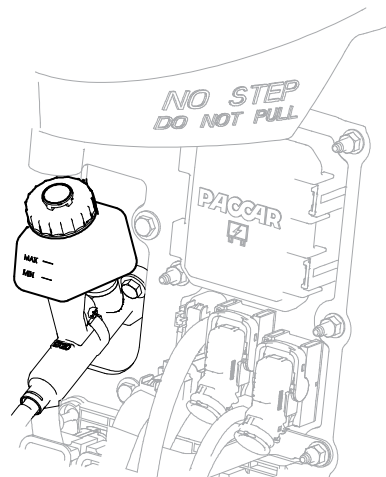
26.2 Allison Transmission Lubrication

- Refer to your transmission manual (furnished separately) for lubrication information.
- Refer to the Allison Transmission manual for servicing information.

27 HYDRAULIC CLUTCH

The clutch pedal position is factory set and does not require adjustment.

Clutch Hydraulic Fluid



Visually inspect the clutch fluid from the reservoir. There are molded lines with the letters MIN to indicate minimum fluid level and MAX to indicate the maximum fluid level recommended for proper operation. Be sure to maintain the fluid between the MIN and MAX levels indicated on the plastic reservoir. If the fluid level repeatedly goes below the MIN line, then it is time to have your clutch adjusted or the hydraulic system inspected for service. To replace the fluid, locate the drain fitting on the

air solenoid mounted to the transmission housing. Open this fitting and allow fluid to drain out of the system. Once all the fluid is drained out, close the fitting and fill the system through the master cylinder reservoir in the engine compartment. Once the system is full, then purge the system of air by simultaneously pressing on the pedal and opening the fitting to allow air to escape. Close the fitting when fluid starts coming out. Then refill the reservoir. Repeat this until all air has been purged from the system. Replace with the recommended fluid per Lubrication Specification Chart.

Clutch Adjustment

Some clutches are self-adjusting, however; there are manually adjusted clutches that will require the operator to know when to adjust the clutch. The clutch will need adjustment when your clutch pedal stroke seems to get longer and its effectiveness at a seamless shift becomes less. Another sign of the clutch needing adjustment is the level of the fluid in the reservoir. If the hydraulic fluid is not leaking, but the fluid level is getting lower, then the clutch may need to be adjusted. Please take the vehicle to an authorized dealership to have the clutch adjusted. See the clutch manufacturer's Service Manual for the proper adjustment procedures.

28 SPECIFICATION REFERENCE CHARTS

28.1 Pipe and Hose Clamp Torque Values

Torque specifications for engine parts.

Application	Type of Clamp	lb-in.	N•m
Radiator and heat exchanger hoses	Constant torque CT-L	90-110	10.2-12.5
Heater hoses	Constant tension	Not required	Not required
Air intake pipes	HI torque HTM-L	100-125	11.3-14.2
Air intake pipes ¹	CT clamp	70-90	7.9-10.2
Plastic air intake pipes	Constant torque CT-L	88	10.0
Charge air intake hoses	Flex Seal™	70-100	7.9-11.3
	B9296	50-60	6-7
Air compressor suction hoses ²	Hose liner clamp	38-45	4.3-5.1
Fuel, oil and water heat exchangers (for hoses less than 9/16 in. diameter).	Miniature 3600L	10-15	1.1-1.7

¹ MX-10 engines only

² MX-10 engines only

**28.2 Drag Link Castle Nut
Torque**

Ball Stud Fastener	Castle Nut Torque lb-ft (N•m)
7/8-14	120 to 170 (163 to 231)

28.3 Wheel Cap Nut Torque Specifications

At the first scheduled lube interval, have all wheel cap nuts torqued to their specified value. After that, check wheel cap nuts at least once a week.

Contact an authorized dealer for information on the proper installation procedure for the wheels on your vehicle. This is a job you may not be able to do yourself. You need the right torquing equipment to do it.

Wheel and Nut Configuration	Stud Size	Torque for Two Piece Flanged Cap Nuts	
		lb-ft	N•m
Hub-Piloted Disc-Type Wheel w/Two Piece Flanged Cap Nuts: Steel or Aluminum Wheel PHP-10; Budd Uni-Mount-10; WDH-8	M22-1.5	450-500	610-680
Stud Backnuts (when used)	3/4-16	175-200	240-270
	1-14	175-300	240-410
Cast Spoke Wheel Assembly Rim Clamp Nut Torque	1/2 in. Dia.	80-90	110-120
	5/8 in. Dia.	160-185	220-250
	3/4 in. Dia.	225-245	305-335

28.4 Lubrication Specification Chart

i NOTE

The responsibility for meeting these specifications, the quality of the product, and its performance in service rests with the lubricant supplier.

Consult manufacturer or lubricant supplier for special details.

Table 20: Component Lubrication Index

Application	Type
Steering Column	Multipurpose chassis grease
Alternator Bearing	High temperature ball bearing grease. Chevron SRI Mobile Grease HP, Texaco Multifax 2 (1)
Fan Hub	High temperature ball bearing grease. Chevron SRI Mobile Grease HP, Texaco Multifax 2 (1)
Power Steering Reservoir	MD3 or MERCON®-approved automatic transmission fluid
Steering Drag Link	Multipurpose chassis grease
Steering Knuckles	Multipurpose chassis grease
Spring Pins	Multipurpose chassis grease
Clutch Release Bearings	High temperature ball bearing grease. Chevron SRI Mobile Grease HP, Texaco Multifax 2
Brake Shoe Anchor Pins	High Temperature grease (Timken Spec. 0-616)
Brake Cam Bearings	High Temperature grease (Timken Spec. 0-616)
Slack Adjusters	Multipurpose chassis grease
Starter Bearings	Engine oil for severe requirements (MIL-L-2104B /MIL-L-45199B) w/ 1.85 % max. sulfated ash

Table 20: Component Lubrication Index

Application	Type
Water Pump	High temperature ball bearing grease. Chevron SRI Mobile Grease HP, Texaco Multifax 2 (1)
Suspension Fittings (other than threaded pins and bushings)	Extreme Pressure Lubricant (Lithium 12-hydroxystearate base NLGI 2)
Steering Axle: Grease Fittings on Steering Arm; Tie Rod Ends; Drag Link; King Pins	Extreme Pressure Lubricant (Lithium 12-hydroxystearate base NLGI 2)
Steering Shaft Grease Fittings	Extreme Pressure Lubricant (Lithium 12-hydroxystearate base NLGI 2)
Brake Treadle Hinge and Roller	Engine oil
Lock Cylinders	Lock lubricant
Door Hinges	Do not lubricate
Door Latches and Striker Plates	Polyethylene grease stick
Door Weatherstrip	Silicone lubricant
Hub-piloted Aluminum Wheels	Coat the wheel pilot or hub pads with Freylube #3 lubricant (light colored) or Chevron Zinc lube. Do not get lubricant on the face of the wheel or the hub.
Manual Transmission Hydraulic Clutch	DOT3 (Brake Fluid)
(1) Consult manufacturer or lubricant supplier for special details.	

28.5 Frame Fastener Torque Requirements



CAUTION

When torquing fasteners, always consider the following:

- Use a torque wrench for final tightening of a fastener. DO NOT use an impact gun. Bolts may over-torque and break.
- When torquing a frame fastener that is not captured, welded, or riveted, the nut must rotate slightly before achieving the torque value. If the nut does not rotate, the fastener is over-torqued and should be replaced.
- To achieve correct clamp loads with a frame fastener that is not captured, welded, or riveted, torque must be applied to the nut. The intended clamp load may not be achieved if the nut is held and torque is applied to the bolt.

Incorrectly tightening a fastener may result in clamp load or frame failures. Failure to comply may result in equipment or property damage.

28.6 Suspension U-Bolts, Grade 8

Tighten all U-bolts with a torque wrench. Torque requirements in the table below apply to PACCAR proprietary suspensions using Protect Torque/TEXO coated U-bolts, only. For all other suspensions, follow the manufacturer's recommended torque values. PACCAR proprietary suspension u-bolts must be tightened in a specific sequence. Take your vehicle to an authorized dealer to tighten the U-bolts on your vehicle.

Table 21: Torque for Grade 8 U-Bolts

Front Suspension U-bolts		
U-Bolt Size Diameter (-in.)	Torque (lb-ft)	Torque (N•m)
3/4	260-290	353-393
7/8	370-415	502-563
For all non-PACCAR suspension systems, see the manufacturer's operator's manual for torque specifications.		

Rear Suspension U-bolts		
Rear Suspension Type	U-Bolt Diameter	Torque lb-ft (N•m) ¹
Low Air Leaf (U-bolt, spring)	M22 x 1.5	375–475 (508–644)
Flex Air	M22 x 1.5	325–375 (440–508)
Tandem Low Air Leaf	M22 x 1.5	375–475 (508–644)
Air Leaf (U-bolt, spring)	1.0 - in. NF	450–550 (610–746)
Air-Trac	1.0 - in. NF	450–550 (610–746)
13.5K Taper Leaf (Axle U-bolt)	¾ -in. 16 UNF	275–320 (373–434)
18K Taper Leaf (Axle U-bolt)	¾ -in. 16 UNF	275–320 (373–434)

Rear Suspension U-bolts		
Rear Suspension Type	U-Bolt Diameter	Torque lb-ft (N•m) ¹
18K Air Leaf (Axle U-bolt)	¾ -in. 16 UNF	275–320 (373–434)
For all non-PACCAR suspension systems, see the manufacturer's operator's manual for torque specifications.		

¹ Torques listed are for primed (or non-oiled) U-bolts.

i NOTE
The values shown here are for suspension U-bolts and should not be applied to bolts and fasteners for the frame.

28.7 Rear Suspension Fasteners

AIR-TRAC FASTENER TORQUE VALUES

Fastener	Fastener Name	lb•ft (N•m)
M16	Tracking rod bolts	125–165 (170–224)
0.75 NF	Spring center bolt	165–210 (224–285) ¹
M16 0.75 NF	Radius rod bolts (forward)	155–195 (210–264)
	Radius rod bolts (at axle)	250–350 (339–475)
M16	Frame bracket bushing bolts	50–65 (68–88)
1.0 NF	U-bolt ²	Refer to section on Suspension U-Bolts, Grade 8.

Fastener	Fastener Name	lb•ft (N•m)
0.5 UNC	Air bag stud nut	40–50 (54–68)
M16	Tracking rod bolts	125–165 (170–224)

¹ Torque requirement applies at sub-assembly of air-spring support and leaf spring only.

² See owners manual for torque tightening sequence.

LOW AIR LEAF TORQUE VALUES

Low Air Leaf Torque values apply to both single and tandem axles.

Fastener	Fastener Name	Torque lb•ft (N•m)
M20 x 2.5	Bar pin bolts	325–425 (441–576)
M22 x 1.5	U-bolt, spring ¹	Refer to section on Suspension U-Bolts, Class 10.9.

Fastener	Fastener Name	Torque lb•ft (N•m)
0.5 UNC	Air bag stud nut	40–50 (54–68)
M16	Tracking rod bolts	125–165 (210–264)

¹ Contact your dealer for torque tightening procedure.

Fastener	Fastener Name	Torque lb•ft (N•m)
M20 x 2.5	Bar pin bolts	325–425 (441–576)
M22 x 1.5	U-bolt ¹ spring	Refer to section on Suspension U-Bolts, Class 10.9.
0.5 UNC	Air bag stud nut	40–50 (54–68)
M16	Tracking rod bolts	125–165 (210–264)

¹ Contact your dealer for torque tightening procedure.

FLEX AIR FASTENER TORQUE VALUES

Fastener	Fastener Name	Torque lb-ft (N•m)
M16	Drive bracket - frame bolts	125–165 (170–224)
	Drive bracket - link spring bolt	
	Drive bracket - radius rod bolt	
	Drive beam - shock bolt (lower)	
	Shock bracket - shock bolt (upper)	
	Tracking rod bolts (all)	
M10	Air spring support beam bolts	36–51 (49–69)

Fastener	Fastener Name	Torque lb-ft (N•m)
0.88 - 14 UNF	Drive beam - link spring bolt	380–460 (515–624)
0.88 - 14 UNF	Radius rod bracket bolt	380–460 (515–624)
M22 x 1.5	U-bolt ¹	Refer to section on Suspension U-Bolts, Class 10.9.
0.5 UNC	Air bag stud nut	40–50 (54–68)

¹ Contact your dealer for torque tightening procedure.

Fastener	Fastener Name	Torque lb-ft (N•m)
M16	Drive bracket - frame bolts	125–165 (170–224)
	Drive bracket - link spring bolt	
	Drive bracket - radius rod bolt	
	Drive beam - shock bolt (lower)	
	Shock bracket - shock bolt (upper)	
	Tracking rod bolts (all)	
M10	Air spring support beam bolts	36–51 (49–69)
0.88 - 14 UNF	Drive beam - link spring bolt	380–460 (515–624)

Fastener	Fastener Name	Torque lb-ft (N•m)
0.88 - 14 UNF	Radius rod bracket bolt	380–460 (515–624)
M22 x 1.5	U-bolt ¹	Refer to section on Suspension U-Bolts, Class 10.9.
0.5 UNC	Air bag stud nut	40–50 (54–68)

¹ Contact your dealer for torque tightening procedure.

28.8 Vehicle Light Bulb Specifications

Bulb Location	Type of Bulb	Notes
Low beam halogen	H11–LL: 12 volts, 55 Watts (SAE)	(Long life version not required)
Low beam LED	N/A	Non-serviceable
High beam halogen	HB3A – LL: 12 volts, 60 Watts (SAE)	(Long life version not required)

Bulb Location	Type of Bulb	Notes
High beam LED	N/A	Non-serviceable
Daytime running/position/turn signal	4157K: 12 volts 28.5 Watts (SAE)	N/A
LED Side marker	N/A	LED
Rear tail/turn signal	N/A	LED
Interior map/dome/indirect light	N/A	LED

29 OVER-THE-AIR (OTA) SOFTWARE UPDATES

When OTA system updates are available for selected Electronic Control Units (ECU), a message appears on the digital display. To install the updates, use the Steering Wheel Control pad.


WARNING

Performing an over-the-air (OTA) update has the potential to render the vehicle inoperable. Perform the OTA only in a safe location. Failure to comply can result in death, personal injury, equipment or property damage.

Before you begin:

- Find a safe location preferably in a town or city
- Stop the truck
- Set the parking brake
- Switch off the engine
- Place the key in the ON position
- The 12 V battery must show as "OK"

Using the Steering Wheel Control pad:

1. Select "Menu."
2. Select "Settings."
3. Select "Start Installation."
 - The message "System Update In Progress" appears.
 - If successful, "System Update Complete" appears.
4. Turn the key to the OFF position to exit updates.

Result:

NOTE

If the restore fails, "System Restore Failed" appears. **At this point, it is possible that the vehicle is inoperable.** The instructions now direct the driver to seek service immediately. (See Roadside Assistance).

- If unsuccessful, "System Update Failed" appears AND the system automatically starts restoring the previous software version. A message appears to inform the operator of the start of the restoration process.
- If the system restore succeeds, "System Restored" appears.

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1 CONSUMER INFORMATION

How To Order Replacement Parts

You can obtain replacement parts from an authorized dealership. When you order, it is **IMPORTANT** that you have the following information ready:

- Name and address
- Serial number of the vehicle
- The name of the part you need
- The name and number of the component for which the part is required
- The quantity (qty) of parts you need
- How you want the order shipped

National Highway Traffic and Safety Administration (NHTSA)

If you believe that the vehicle has a dangerous defect, you must immediately inform the National Highway Traffic Safety Administration (NHTSA). Also notify the vehicle manufacturer. If NHTSA receives similar complaints, it can open an investigation. If it finds that a safety defect exists in a group of vehicles, it can order a recall and remedy campaign. However, NHTSA cannot get involved in individual problems

between you, the dealer, and the vehicle manufacturer. Contacting NHTSA is possible through telephone, written mail, and email. NHTSA also has a website where you can input the comments directly to them on the Web. Use any of the four ways to contact NHTSA:

Ex: Toll Free 1-888-327-4236
(800-424-9153 TTY) 8:00 a.m. to 10:00 p.m. EST Monday-Friday

Mail: Office of Defects Investigations/
CRD NVS-216 1200 New Jersey Ave. SE
Washington, D.C. 20590

Website: www.safercar.gov

Email: nhtsa.webmaster@dot.gov

Transport Canada

Canadian customers must report a safety-related defect to Transport Canada, Defect Investigations and Recalls. You can reach them by telephone on the toll-free hotline at 1-800-333-0510. You can also contact Transport Canada by mail at:

Transport Canada, ASFAD Place de Ville
Tower C 330 Sparks St. Ottawa, ON K1A 0N5

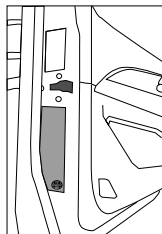
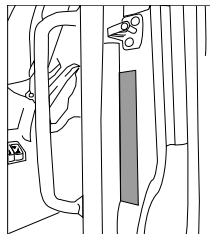
For additional road safety information, visit the Road Safety website at:

<http://www.tc.gc.ca>

2 VEHICLE IDENTIFICATION LABELS

Each vehicle completed by Peterbilt Motors Company uses a vehicle identification number (VIN) that contains the model year designation of your vehicle. The practice is in compliance with 49 CFR 565, Code of Federal Regulations.

The full, 17-digit VIN is located on the Weight Rating Data Label. The label is located on the driver's side door edge or on the driver's side door frame.



Chassis Number

The Chassis Number refers to the last six characters of the VIN. This number will allow your dealer to identify your vehicle. You will be asked for this number when you bring it in for service. Chassis Number Locations:

- Right frame rail, top flange, about 3 ft. from the front end
- Back of cab, left-hand rear panel, lower edge

- Tire, Rim, and Weight Rating Data label (truck)
- Components and Weights label
- Noise Emission label
- Paint Identification label

Certification Labels

Your vehicle information and specifications are documented on labels. As noted below, each label contains specific information pertaining to vehicle capacities and specifications that you should be aware of.

Components and Chassis Weight Label

The Components and Chassis Weight Label is located on either the driver's side door edge or on the driver's side door frame. It includes chassis number, chassis weight and gross weight, plus model information for the vehicle, engine, transmission, and axles.

Tire, Rim and Weight Rating Data Label

The Tire, Rim, and Weight Rating Data Label is located on the driver's side door edge or on the driver's side door frame. It contains the following information:

- GVWR - Gross Vehicle Weight Rating
- GAWR FRONT, INTERMEDIATE and REAR - Gross Axle Weight Ratings for Front, Intermediate and Rear Axle
- TIRE/RIM SIZES AND INFLATION PRESSURES - Tire/Rim Sizes and Cold Pressure Minimums
- VIN including CHASSIS NUMBER

The components of your vehicle are designed to provide satisfactory service, if the vehicle is not loaded in excess of either the gross vehicle weight rating (GVWR), or the maximum front and rear gross axle weight ratings (GAWRs).



WARNING

DO NOT exceed the specified load rating. Overloading can result in loss of vehicle control, either by causing component failures or by affecting vehicle handling. Exceeding load ratings can also shorten the service life of the vehicle. Failure to comply may result in death, personal injury, equipment damage, or property damage.

**NOTE**

GVW is the TOTAL SCALE WEIGHT the vehicle is designed to carry. This includes the weight of the empty vehicle, loading platform, occupants, fuel, and any load.

Noise Emission Label

The Noise Emission Label is located in the driver's side door frame. It contains information regarding U.S. noise emission regulations, chassis number, and date of manufacture.

Paint Identification Label

The Paint Identification Label contains the paint colors used by the factory to paint your vehicle. It lists frame, wheels, cab interior and exterior colors. This label is located inside the glove box.

Federal Safety Standard Certification Label

The NHTSA regulations require a label certifying compliance with Federal Safety Standards, for United States and U.S. Territories, be affixed to each motor vehicle and prescribe where such label may be located. This certification label, which indicates the date of manufacture and other pertinent information, is located on the driver's side door edge or on the driver's side door frame.

Component Identification

Each of the major components on your vehicle has an identification label or tag. For easy reference, record component numbers such as, model, serial, and assembly number.

Engine	For further information, please refer to the Engine Operation and Maintenance Manual.
Transmission	For all transmissions, the identification number is stamped on a tag affixed to the right rear side of the transmission case.
Clutch	Enclosed in clutch housing. Location depends on manufacturer.
Steer Axle	The front axle serial number is stamped on a plate located on the center of the axle beam.

Axle Specification Number	Usually stamped on the right rear side of the axle housing. This number identifies the complete axle.
Axle Housing Number	Usually located on the left forward side of the housing arm. This tag identifies the axle housing.
Axle Differential Carrier Identification	Usually located on the top side of the differential carrier. The following information is either stamped, or marked with a metal tag: Model No., Production Assembly No., Serial No., Gear Ratio, and Part Number.

3 CLEAN IDLE

To comply with CARB or EPA emissions requirements, the vehicle must have the Certified Clean Idle label. Some vehicles, however, are exempt from these requirements because of their configurations (for example: fire truck service).

The vehicle could display any of these labels. When present, they display prominently that its engine meets the strict low exhaust emission regulations instituted by CARB or EPA. It is important that you do not remove or deface this label. Do not block it from view. Contact the authorized dealership to see if you can replace the label. The dealership helps you to determine whether or not the vehicle's engine is a candidate for a Certified Clean Idle label. Certain vehicles that did not ship with the label are still eligible to display one.



Engine Shutdown System (ESS)

To meet CARB certification, the engine must have an ESS. An ESS provides both the "limited idle" and "low exhaust emissions" standards required by CARB (and some additional states.) These regulations require that the engine comes with an automatic system to restrict the idle time

on certain vehicles, under certain circumstances. If so equipped, the ESS shuts off the engine when:

- the vehicle idles for more than 5 minutes with the parking brake set and the transmission is in "Neutral" or "Park"

The shutoff timer extends to 15 minutes with the parking brake OFF. If the engine is in one of the following states, the ESS does NOT shut down the engine:

- operating in Power Take Off (PTO) mode
- when the engine coolant is below 60 degrees Fahrenheit
- while performing a regeneration while parked

When the ESS shutdown timer reaches the last 30 seconds, the check engine light alerts the driver. During these 30 seconds, it is possible to reset the idle time by pressing on the accelerator pedal. These 30 seconds are the ONLY time that it is possible for the driver to reset the idle time using this method. More detailed information is available in the Engine Operator's Manual provided with the vehicle.

4 GREENHOUSE GAS CERTIFIED CONFIGURATION

This vehicle includes Greenhouse Gas (GHG) regulated parameters and technologies. A Vehicle Emission Control Information label is located on the driver's door with codes that partially identify the vehicle's GHG certified configuration. In addition to the Vehicle Emission Control Information label, other technologies that reduce GHG emissions and regulated parameters included in the vehicle's GHG certified configuration are described in this section.

NOTE

Modifying a vehicle's certified configuration without good engineering judgment or PACCAR's approval may be a violation of the Clean Air Act and subject to fines and penalties. Please contact the vehicle manufacturer for further information about this vehicle's certified configuration.

Vehicle Emission Control Information Label Descriptions

Label Identifiers	Label Identifier Descriptions
Family Name	Describes the vehicle's certified manufacturer, regulatory category, and regulatory subcategory
Emission Controls	Describes regulated emission control devices installed on the vehicle
Compliance Statement	Describes the vehicle's compliance standards
Regulatory Subcategory	Describes the vehicle's certified regulatory subcategory
Emission Controls	Emission Control Descriptions
ARF	Aerodynamic roof fairing

ARFR	Adjustable height aerodynamic roof fairing
ATS	Aerodynamic side skirt and/or fuel tank fairing
AFF	Aerodynamic front fairing
AREF	Aerodynamic rear fairing
TGR	Gap reducing fairing
LRRA	Low rolling resistance tires (all)
LRRD	Low rolling resistance tires (drive)
LRRS	Low rolling resistance tires (steer)
VSL	Vehicle speed limiter
VSLS	Soft-top vehicle speed limiter
VSLE	Expiring vehicle speed limiter

VSLD	Vehicle speed limiter with both soft-top and expiration
IRT	Engine shutoff system
IRT5	Engine shutoff after 5 minutes or less of idling
IRTE	Expiring engine shutoff
ADVH	Vehicle includes advanced hybrid technology components
ADVO	Vehicle includes other advanced-technology components
INV	Vehicle includes innovative (off-cycle) technology
ATI	Automatic tire inflation system
TPMS	Tire pressure monitoring system

GHG Regulated Technology Not On the Emission Control Information Label

Technology	Compliance Requirements
Wheel-Related Weight Reduction	Wheel-related weight reduction benefits may be included in this vehicle's certified configuration. Changing aluminum wheels to steel wheels may be a violation of the Clean Air Act and subject to fines and penalties.

Non wheel-Related Weight Reduction	Non wheel-related weight reduction benefits may be included in this vehicle's certified configuration. Changing aluminum material to steel material may be a violation of the Clean Air Act and subject to fines and penalties.
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Other Technologies This vehicle may be equipped with factory installed automatic engine shut-down (AES), neutral idle, start-stop systems, intelligent controls (Predictive Cruise Control and Neutral Coast), or extended idle reduction systems (Engine Idle Shut-down Timer, Engine Auto Start, Sleeper APUs, Fuel-Fired Sleeper Heater System). Disabling or modifying any GHG regulated technology may be a violation of the Clean Air Act and subject to fines and penalties.

GHG Regulated Powertrain Parameters Not On the Vehicle Emission Control Information Label

Powertrain Components	Regulated Parameters
Engine	Engine idle speed, torque, horsepower, and governed RPM
Transmission	Lock up gear, number of gears, and torque converter
Axle	Configuration and drive axle ratio

GHG Regulated Aerodynamic Performance

The vehicle needs to stay in as-built aerodynamic performance unless good engineering judgment shows that the modification will improve safety or will not increase greenhouse gases.

GHG Regulated Certified Tires

i NOTE

The tires installed on this vehicle at the factory as original equipment are certi-

fied for Greenhouse Gas and Fuel Efficiency regulations. Replacement tires must be of an equal or larger loaded drive tire size and an equal or lower rolling resistance level (TRRL or Crr). Consult with your tire supplier(s) for appropriate replacement tires.

In order to limit the rolling resistance of the tires and optimize fuel economy, the maintenance procedures specified by the tire manufacturer must be followed. Please see Vehicle Emissions Limited Express Warranty for warranty on greenhouse gas certified tires.

GHG Regulated Air Conditioning Leakage Standards

Loss of refrigerant from the air conditioning systems may not exceed a total leakage rate of 11.0 grams per year or a percent leakage rate of 1.50 percent per year, whichever is greater. This vehicle was built to meet these air conditioning leakage standards. Any modification of the air conditioning system must comply with leakage rates defined in SAE J2727.

i NOTE

Modifying a vehicle's certified configuration without good engineering judgment or PACCAR's approval may be a violation of the Clean Air Act and subject to fines and penalties. Please contact the vehicle manufacturer for further information about this vehicle's certified configuration.

5 VEHICLE EMISSIONS LIMITED EXPRESS WARRANTY

Original Equipment Tires

Peterbilt warrants the tires installed as original equipment on this vehicle only against defects in materials and workmanship which cause the vehicle to fail to comply with applicable U.S. and Canadian greenhouse gas emission limits ("Warrantable Emissions Failures"). This vehicle emissions limited express warranty relating to original equipment tires is valid for two (2) years or 24,000 miles (38,000 km), whichever occurs first. YOUR SOLE AND EXCLUSIVE REMEDY AGAINST PETERBILT IS LIMITED TO THE REPAIR OR REPLACEMENT

OF ORIGINAL EQUIPMENT TIRES, SUBJECT TO PETERBILT'S TIME AND MILEAGE LIMITATIONS LISTED ABOVE. This Vehicle Emissions Limited Express Warranty relating to original equipment tires begins on the date of delivery of the vehicle to the first purchaser or lessee and accrued time and mileage is calculated when the vehicle is brought in for correction of the Warrantable Emissions Failures relating to the original equipment tires. PETERBILT MAKES NO OTHER VEHICLE EMISSIONS WARRANTIES RELATING TO THE ORIGINAL EQUIPMENT TIRES, EXPRESS OR IMPLIED. WHERE PERMITTED BY LAW, PETERBILT EXPRESSLY DISCLAIMS ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE RELATING TO VEHICLE EMISSIONS. PETERBILT AND THE SELLING DEALER SHALL NOT BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES INCLUDING, BUT NOT LIMITED TO: LOSS OF INCOME OR LOST PROFITS; VEHICLE DOWNTIME; COMMUNICATION EXPENSES; LODGING AND/OR MEAL EXPENSES; FINES; APPLICABLE TAXES OR BUSINESS COSTS OR LOSSES; ATTORNEY'S FEES; AND ANY LIABILITY YOU MAY HAVE IN RESPECT TO ANY OTHER PERSON OR

ENTITY RELATING TO WARRANTABLE EMISSIONS FAILURES. This Vehicle Emissions Limited Express Warranty relating to original equipment tires is limited to emissions compliance only. The tires are separately warranted by their manufacturer for defects in materials and workmanship other than those which cause non-compliance with U.S. and Canadian GHG regulations, subject to limitations and conditions contained within the tire manufacturer's warranty agreement. You are responsible for the safe operation and maintenance of the vehicle and its tires. Peterbilt does not warrant wear and tear of the tires.

Greenhouse Gas (GHG) Components Other Than Tires

This GHG vehicle Warranty applies to the vehicle (hereafter, vehicle) certified with the US Environmental Protection Agency.

Your Warranty Rights and Obligations

This vehicle is warranted for components that directly impact the manufacturers GHG certification with the US Environmental Protection Agency. Peterbilt must warrant these components for the periods of time listed below provided there has been no abuse, neglect or improper maintenance of the vehicle. If a GHG-related part on your

vehicle is found to have a defect in material or assembly, the part will be repaired or replaced by Peterbilt.

Manufacturer's Warranty Coverage

This emissions warranty coverage is provided for five years or 100,000 miles (160,000 km), whichever occurs first, from the date of delivery of the vehicle to the first purchaser or first lease. Where a Warrantable Condition exists, Peterbilt will diagnose and repair the vehicle, parts and labor included, at no cost to the first purchaser or first lessee and each subsequent purchaser or lessee. This warranty does not override any extended warranty purchased to cover specific vehicle components.

Owner's Warranty Responsibilities

You are responsible for performing required maintenance that is listed in your engine and vehicle Operator's Manuals. You are responsible for presenting the vehicle to a service location as soon as a problem exists. Any warranty repairs should be completed in a reasonable amount of time. You are responsible for ensuring that all manufacturer campaigns and federal recalls related to the Vehicle are complete.

Peterbilt recommends that you retain all receipts. This includes, but is not limited to, routine service checks, oil changes, tire rotations, and any other preventative maintenance tasks specified in the operator/owners manuals. Failure to provide preventative maintenance documentation may affect the validity of the warranty. Peterbilt reserves the right to require proof of compliance with maintenance requirements before processing a claim. Inadequate or missing documentation may result in the denial of warranty coverage for repairs or services related to the Vehicle. Peterbilt may deny warranty coverage if a vehicle component has failed due to abuse, neglect, improper maintenance, unapproved modifications (both physical components and computer programming) or using non-Original Equipment replacement parts. If there are any questions regarding these warranty rights and responsibilities, please contact the vehicle OEM manufacturer at the customer center telephone number provided with the vehicle operating instructions. Prior to the expiration of the applicable warranty, you must give notice of any warranted failure to an authorized Peterbilt dealer and deliver the vehicle to such facility for repair. You are responsible for incidental costs such as: communication expenses, meals, lodging incurred

by you or your employees as a result of a Warrantable Condition. You are responsible for downtime expenses, cargo damage, fines, all applicable taxes, all business costs, and other losses resulting from a Warrantable Condition. You are responsible for maintaining all emissions related engine and vehicle computer program settings in accordance with manufacturer specifications. This responsibility includes GHG specific settings that may not be altered before the GHG-related expiration mileage has been reached for each system. You are responsible for maintaining all physical parts related to GHG-regulations in the as-built configuration and in proper working order for the full regulatory useful life of 435,000 miles (700,000 km) or 10 years for Class 8 vehicles, 185,000 miles (300,000 km) or 10 years for Class 5-7.

Replacement Parts

Peterbilt recommends that any service parts used for maintenance, repair or replacement of GHG components be new or genuine approved rebuilt parts and assemblies. The use of non-genuine engine or vehicle replacement parts that are not equivalent to the Peterbilt engine or OEM vehicle manufacturer's original part specification as built from the factory may impair the engine and vehicle emissions

control system from working or functioning effectively, and may jeopardize your GHG warranty coverage. In addition, genuine vehicle or engine parts must be replaced with the same material and function as the part assembled on the vehicle from the factory. The owner may elect to have maintenance, replacement or repair of the emission control parts performed by a facility other than an authorized Peterbilt dealer and may elect to use parts other than new or genuine approved rebuilt parts and assemblies for such maintenance, replacement or repair; however, the cost of such service or parts and subsequent failures resulting from such service or parts may not be fully warranted if the manufacturer determines that the replacement part is not of similar material and function as the OEM part assembled to the vehicle at the factory.

Responsibilities

The warranty coverage begins when the vehicle is delivered to the first purchaser or first lessee. Repairs and service performed by any authorized Peterbilt dealer using new or genuine approved rebuilt parts and assemblies will utilize replacement parts that are selected and installed to support the GHG compliance certification. Peterbilt will repair parts found by Peterbilt to be defective without charge for parts or labor

(including diagnosis which results in determination that there has been a failure of a warranted part).

Warranty Limitations

Sole and exclusive remedy against Peterbilt and the Selling Dealer arising from the purchase and use of this vehicle is limited to the repair or replacement of "warrantable failures", for replacement parts that are similar in material and function to OEM specifications and subject to Peterbilt's time, mileage, and hour limitations of the greenhouse gas warranty. The maximum time, mileage and hour limitations of the warranty begin with the Date of Delivery to the first purchaser or first lessee. The accrued time, mileage, or hours is calculated when the vehicle is brought in for correction of warrantable failures. Peterbilt is not responsible for failures or damage resulting from what Peterbilt determines to be abuse, neglect or uncontrollable acts of nature, including, but not limited to: damage due to accident; operation without adequate coolants or lubricants; overfueling; overspeeding; lack of maintenance of cooling, lubricating or intake systems; improper storage, starting, warm-up, run-in or shutdown practices; unauthorized modifications to the vehicle and its components. In addition, Peterbilt is not

responsible for damage caused by any commodity, including but not limited to: damage from corrosive chemicals directly hauled by the vehicle or damage caused by driving the vehicle through specific work environments. Peterbilt is also not responsible for failures caused by incorrect oil, fuel or diesel exhaust fluid or by water, dirt or other contaminants in the fuel, oil or diesel exhaust fluid. Failure of replacement parts used in repairs due to the above non-warrantable conditions is not warrantable. This warranty is void if the vehicle is altered with parts that do not meet the material and functional specifications as manufactured from the factory. Any alterations to vehicle or engine computer settings will void GHG warranty and potentially cause the vehicle to become non-compliant with EPA Clean Air Act GHG regulations. Any alterations to GHG specific settings prior to the GHG related expiration mileage for each system will void GHG warranty and potentially cause the vehicle to become non-compliant with EPA Clean Air Act GHG regulations. This warranty is void if certain GHG components are not properly maintained and thus cannot perform to their designed capability. Peterbilt is not responsible for failures resulting from improper repair or the use of parts which are not genuine approved parts.

Peterbilt is not responsible for the material and labor costs of emission control parts and assemblies replaced during Scheduled Maintenance of the engine as specified in Peterbilt Operator's Manuals. THIS WARRANTY, TOGETHER WITH THE EXPRESS COMMERCIAL WARRANTIES ARE THE SOLE WARRANTIES MADE BY PETERBILT IN REGARD TO THIS VEHICLE. THIS LIMITED GHG WARRANTY IS THE SOLE WARRANTY MADE BY PETERBILT AND THE SELLING DEALER. EXCEPT FOR THE ABOVE LIMITED WARRANTY, PETERBILT AND THE SELLING DEALER MAKE NO OTHER WARRANTIES, EXPRESS OR IMPLIED. PETERBILT AND THE SELLING DEALER EXPRESSLY DISCLAIM ANY WARRANTY OF MERCHANTABILITY OR WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE. PETERBILT AND THE SELLING DEALER SHALL NOT BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES INCLUDING, BUT NOT LIMITED TO: LOSS OF INCOME OR LOST PROFITS; ENGINE OR VEHICLE DOWNTIME; THIRD PARTY DAMAGE, INCLUDING DAMAGE OR LOSS TO OTHER ENGINES, VEHICLES OR PROPERTY, ATTACHMENTS, TRAILERS AND CARGO; LOSS OR DAMAGE TO PERSONAL CONTENTS; COMMUNI-

CATION EXPENSES; LODGING AND/OR MEAL EXPENSES; FINES; APPLICABLE TAXES OR BUSINESS COSTS OR LOSSES; ATTORNEYS' FEES; AND ANY LIABILITY YOU MAY HAVE IN RESPECT TO ANY OTHER PERSON OR ENTITY.

6 TELEMATICS CONTROL UNIT FCC INFORMATION

General Information

Model	IC
TCU2 NA IP30	2AUXS-TCU2NAIP30A
TCU2 NA IP67	2AUXS-TCU2NAIP67A

NOTE

This device complies with Part 15 of the FCC Rules.

Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including

interference that may cause undesired operation.

NOTE

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

NOTE

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off

and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna
- Increase the separation between the equipment and receiver
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected
- Consult the dealer or an experienced radio/TV technician for help

Radiofrequency radiation exposure Information:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance of 8 in. (20 cm) between the radiator and your body. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Used Frequency Bands (+antenna)

Table 22: LTE

Band	MHz
7	2600
12 (incl. 17)	700
25 (incl. 2)	1900
26 (incl. 5)	850
66 (incl. 4)	1700
71	600

Table 23: Bluetooth™ and WiFi Frequencies

Bluetooth	2402 - 2480 MHz
Bluetooth, low energy	2402 - 2480 MHz
802.11b	2412 - 2742 MHz
802.11g	2412 - 2742 MHz

Table 23: Bluetooth™ and WiFi Frequencies

802.11n	2412 - 2742 MHz
	5180 - 5240 MHz
	5260 - 5320 MHz
	5500 - 5700 MHz
	5745 - 5825 MHz
802.11ac	5180 - 5240 MHz
	5260 - 5320 MHz
	5500 - 5700 MHz
	5745 - 5825 MHz

Canada-specific Information

Model	IC
TCU2 NA IP30	25847-TCU2NAIP30
TCU2 NA IP67	25847-TCU2NAIP67

Contains IC ID: 4441A-UMCSTD31BPN

**NOTE**

This device contains license-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:

- This device may not cause interference
- This device must accept any interference, including interference that may cause undesired operation of the device

any interference, including interference that may cause undesired operation

RF Exposure Information:

This equipment complies with Canada radiation exposure limits set forth for an uncontrolled environment. Install and operate this equipment with minimum distance of 8 inches (20 cm) between the radiator and your body.

Mexico-Specific Information

The operation of this equipment is subject to the following two conditions:

- This equipment or device may not cause harmful interference and
- This equipment or device must accept

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PETERBILT MOTORS COMPANY

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Do not remove the manual from vehicle.

Before operating vehicle study the manual carefully.

Read and understand all warnings, cautions and notes.



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