Introduction

This manual provides information needed to operate and understand the vehicle and its components. More detailed information is contained in the *Owner's Warranty Information for North America* booklet, and in the vehicle's workshop and maintenance manuals.

Custom-built Freightliner vehicles are equipped with various chassis and cab components. Not all of the information contained in this manual applies to every vehicle. For details about components in your vehicle, refer to the chassis specification pages included in all new vehicles and to the vehicle specification decal, located inside the vehicle.

For your reference, keep this manual in the vehicle at all times.

IMPORTANT: Descriptions and specifications in this manual were in effect at the time of printing. For the most up-to-date information visit **www-.freightliner.com** for the latest version of the driver's and maintenance manuals.

Freightliner Trucks reserves the right to discontinue models and to change specifications or design at any time without notice and without incurring obligation. Descriptions and specifications contained in this publication provide no warranty, expressed or implied, and are subject to revisions and editions without notice.

Environmental Concerns and Recommendations

Whenever you see instructions in this manual to discard materials, you should first attempt to reclaim and recycle them. To preserve our environment, follow appropriate environmental rules and regulations when disposing of materials.

Data Logging

This vehicle is equipped with a control module that performs data logging capabilities.

This vehicle is equipped with one or more devices that record specific vehicle data and may perform some of the same functionality as a regulated Event Data Recorder but the device(s) are not subject to, nor designed pursuant to, 49 C.F.R. Part 563.

The type and amount of data recorded varies depending on how the vehicle is equipped (such as the brand of engine, if an air bag is installed, or if the vehicle features a collision avoidance system, etc.). GPS location data, fault codes, and other technical data may be recorded.

This data may help provide a better understanding of the circumstances of a crash.

Personal data such as name, gender, and age are not recorded. However, other parties such as law enforcement, could combine the data logger's contents with the type of personally identifying data routinely acquired during a crash investigation.

Emissions and Fuel Efficiency Compliance

This vehicle must be regularly inspected and maintained as indicated in the *New Cascadia Maintenance Manual*, and in the *Pre- and Post-Trip Inspections and Maintenance* chapter in this manual, in order to continue satisfactory performance and ensure coverage of the vehicle under the manufacturer's warranty.

Many maintenance procedures ensure that the vehicle and engine continue to comply with applicable emissions standards. Maintenance procedures, using components engineered to comply with greenhouse gas emissions and fuel efficiency regulations, may be performed by an authorized Daimler Trucks North America dealer, an independent outlet, or the vehicle owner or operator.

The vehicle owner is responsible for determining the suitability of replacement components to maintain compliance with federal and local jurisdictional regulations. Components including, but not limited to, tires, cab/sleeper side extenders, chassis fairings, bumper, hood, vehicle speed limiters, and idle reduction timers are specifically designed and manufactured to exacting standards for regulatory fuel efficiency and greenhouse gas emissions compliance. It is important that these components are always replaced with components that meet or exceed the performance of the originally installed components.

STI-500-10 (10/20/2021)
Part Number STI-500
Printed in U.S.A.

Foreword

Customer Assistance Center

Having trouble finding service? Call the Customer Assistance Center at 1-800-385-4357 or 1-800-FTL-HELP. For dealer referrals and breakdown support, call night or day, weekdays or weekends. For specification requests and all other concerns and inquiries, the Customer Assistance Center is available 6:00 A.M. to 3:30 P.M. PST Monday through Friday. Our people are knowledgeable, professional, and committed to following through to help you keep your truck moving.

Reporting Safety Defects

Vehicles domiciled in the USA thought to have a defect that could cause a crash, injury, or death, should immediately be reported to the National Highway Traffic Safety Administration (NHTSA) and Daimler Trucks North America LLC.

If the NHTSA receives similar complaints, it may open an investigation; if it finds that a safety defect exists in a group of vehicles, it may order a recall and remedy campaign. However, NHTSA cannot become involved in individual problems between you, your dealer, or Daimler Trucks North America LLC.

To contact NHTSA, call the Vehicle Safety Hotline toll-free at 1-888-327-4236 (TTY: 1-800-424-9153).

To e-mail NHTSA, go to **www.safertruck.gov/**.

You can contact NHTSA by mail at: Administrator, NHTSA Headquarters, 1200 New Jersey Avenue SE, West Building, Washington, DC 20590.

For more information about motor vehicle safety, go to www.safertruck.gov/.

To contact Freightliner about a concern about a specific vehicle call the Customer Assistance Center at 1-800-385-4357 or complete a **Product Concern Form**.

Vehicles domiciled in Canada thought to have a defect that could cause a crash, injury, or death, should immediately be reported to Transport Canada and Daimler Trucks North America LLC.

If Transport Canada receives similar complaints, it may open an investigation; if it finds that a safety defect exists in a group of vehicles, it may order a recall and remedy campaign. However, Transport Canada cannot become involved in individual problems between you, your dealer, or Daimler Trucks North America LLC.

To contact Freightliner about a concern about a specific vehicle call the Customer Assistance Center at 1-800-385-4357 or complete a **Product Concern Form**.

To contact Transport Canada, call the Defect Investigations and Recalls Division toll-free in Canada at 1-800-333-0510 or 819-994-3328 in the Gatinuau-Ottawa area or internationally.

You can also contact Transport Canada by mail at: Transport Canada, 330 Sparks Street, Ottawa, Ontario, K1A 0N5 Canada.

The following websites contain more information on Canadian recalls:

English: www.tc.gc.ca/recalls.

French: www.tc.gc.ca/rappels.

For additional road safety information, please visit the Road Transportation website:

English: www.tc.gc.ca/en/services/road

French: www.tc.gc.ca/fr/services/routier

STI-500-10 (10/20/2021)
Part Number STI-500
Printed in U.S.A.

Contents

1

Vehicle Identification

Component Information Label

NOTE: Labels shown in this chapter are examples only. Actual specifications may vary from vehicle to vehicle.

The component information label lists the vehicle model, identification number, and major component models and serial numbers.

For vehicles domiciled in Mexico, this label will be in Spanish as shown in **Fig. 1.1.** Otherwise it will be printed in English as shown in **Fig. 1.2.**

FREIGHTLINER®

INFORMACION DE COMPONENTES

USE EL NUMERO DE IDENTIFICACION DE VEHICULO CUANDO ORDENE PARTES.

FABRICADO POR:	DAIMLER VEHICULOS COMERCIALES MEXICO				
MODELO:	MM106064S	MODELO BASE:	M2106	FECHA DE FABRIC:	06/20
NO. DE SERIE VEH:	3ALHCYD28MDMN5409	CLIENTE:	V83361	DIST. ENTRE EJE:	230
MOTOR:	DD8 7.7L 6 CYL SINGLE STAGE 280 HP / 220			MOTOR:	936913S0010863
TRANS PRINCIPAL:	ALLISON 3000 RDS AUTOMATIC TRANSMISSION			TRANSMISION:	6511714361
PTO:				PTO:	
EJE DELANTERO:	DETROIT DA-F-12.0-3 12,000# FF1 71.5 KPI			EJE DELANTERO:	739912B0165864
EJE INT. 1RO:	MT-40-14X 40,000# R-SERIES TANDEM REAR A			EJE INT. 1RO:	DRA21199653
EJE INT. 2DO:				EJE INT. 2DO:	
EJE INT. 3RO:				EJE INT. 3RO:	
EJE INT. 4TO:				EJE INT. 4TO:	
EJE INT. 5TO:				EJE INT. 5TO:	
EJE INT. 6TO:				EJE INT. 6TO:	
EJE TRASERO:	MT-40-14X 40,000# R-SERIES TANDEM REAR A			EJE TRASERO:	DRA21199652
PROVEEDOR DE PINTURA:	ELITE EY PAINT C			RELACION:	6.14
NO. DE PINTURA:	CAB COLOR A: L0006EY				

PARA INFORMACION COMPLETA DE PINTURA, VER HOJA DE ESPECIFICACIONES DE L VEHICULO.

09/29/2020 f080196s

Fig. 1.1, Component Information Label (Spanish)

FREIGHTLINER®

COMPONENT INFORMATION

SEE VEHICLE ID NO. WHEN ORDERING PARTS

MANUFACTURED BY:	DAIMLER TRUCKS NORTH AMERICA LLC				
MODEL:	PX113064S T	BASE MODEL:	CA113DC	DATE OF MFR:	07/15
VEHICLE ID NO:	1FUJGBDV4GLZZ9999	CUSTOMER:	N00000	WHEELBASE:	164
ENGINE MOD:	DETROIT DD13 12.8L 410 HP / 1800 RPM, 20			ENGINE NO:	999999S9999999
MAIN TRANS MOD:	DT12-DB-1450 HEAVY DUTY 12-SPEED DIRECT			TRANS NO:	99999999999999
PTO. MOD:				PTO. NO:	
FRONT AXLE MOD:	MFS-12-143A 12,000# FF1 SINGLE FRONT AXL			FRONT AXLE NO:	MON99999999
1ST INT AXLE MOD:	MT-40-14X 40,000# R-SERIES DUALTRAC 74-7			1ST INT AXLE NO:	FOR99999999
2ND INT AXLE MOD:				2ND INT AXLE NO:	
3RD INT AXLE MOD:				3RD INT AXLE NO:	
4TH INT AXLE MOD:				4TH INT AXLE NO:	
5TH INT AXLE MOD:				5TH INT AXLE NO:	
6TH INT AXLE MOD:				6TH INT AXLE NO:	
REAR AXLE MOD:	MT-40-14X 40,000# R-SERIES DUALTRAC 74-7			REAR AXLE NO:	FOR99999999
				RATIO:	2.47
PAINT MFR:	ELITE BC PAINT C				
PAINT CODE:	CAB COLOR A: L0306EB				

FOR COMPLETE PAINT INFORMATION SEE VEHICLE SPECIFICATION SHEET.

06/21/2016 f080196

Fig. 1.2, Component Information Label (English)

The component information label is attached to the outside of the ziplock document bag and the right-hand door. See **Fig. 1.3.**

Component GWR Label

NOTE: Vehicles manufactured for the Canada market will have a Canada Certification label instead of a component GWR label.

09/29/2020 f080212

Fig. 1.3, Component Information Label Location

The component GWR label (see **Fig. 1.4**) provides maximum GWR ratings for each component. For vehicles domiciled in Mexico, this label will be in Spanish as shown in **Fig. 1.5**.

The component GWR label is located on the right-hand B-pillar as shown in **Fig. 1.6**.

Federal Motor Vehicle Safety Standard Label

Tractors with or without fifth wheels manufactured for the U.S. are marked as certified by means of an FMVSS certification label which also lists suitable tire and rim combinations. See **Fig. 1.8** for an example of a FMVSS vehicle certification label.

This label is attached to the left-hand B-pillar. It is applied on the interior edge for vehicles domiciled in the United States or manufactured for U.S./Canada operation. See **Fig. 1.6**.

Tractors built without a fifth wheel for U.S. operations will have an incomplete FMVSS vehicle certification label. The incomplete vehicle documentation included with the vehicle will certify the vehicle conforms to all applicable regulations in effect on the date of

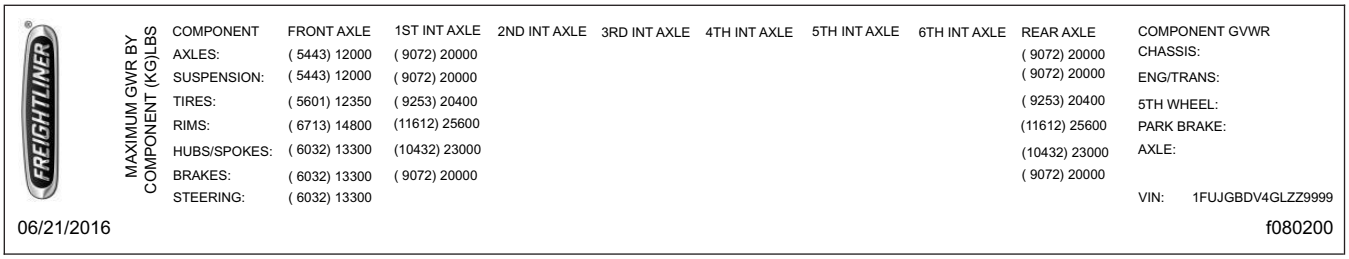


Fig. 1.4, Component GWR Label (English)

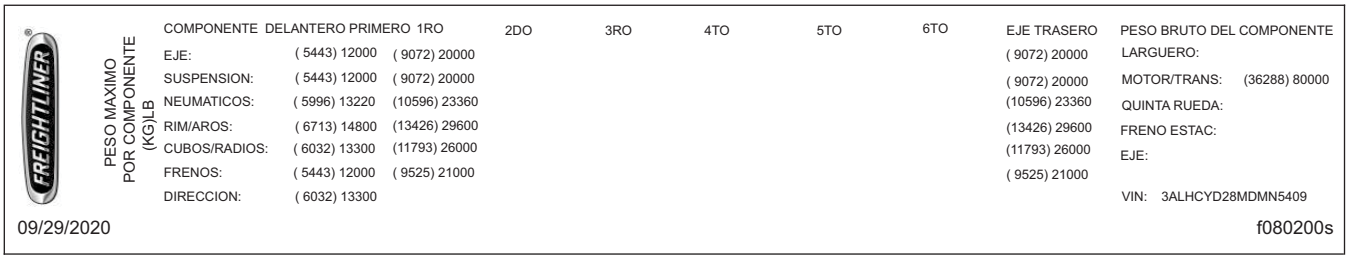


Fig. 1.5, Component GWR Label (Spanish)

completion. The final certification label must be attached by the final-stage manufacturer.

The FMVSS label is applied to the exterior edge of the B-pillar if paired with a Spanish weights and measurements label. See **Fig. 1.6**. Vehicles domiciled in Mexico are labeled with a Spanish weights and measurement label that lists suitable tire and rim combinations. See **Fig. 1.9**.

The tire and rim combinations listed on these labels are those that can be installed on the vehicle for the given gross axle weight rating. Tires and rims installed on the vehicle at the time of manufacture may have a higher load capacity than that certified by the tire and rim label. If the tires and rims currently on the vehicle have a lower load capacity than that shown on the tire and rim label, then the tires and rims determine the load limitations on each of the axles.

Canada Certification Label

Complete tractors with fifth wheels manufactured for Canada are marked with a Canada certification label attached to the left-hand B-pillar.

Complete tractors with fifth wheels manufactured for dual Canada/United States operations will have both a FMVSS certification label and Canada certification label. In this case the FMVSS certification label will be applied on the interior edge of the B-pillar and the Canada certification label will be applied on the exterior edge as show in **Fig. 1.6**.

See **Fig. 1.10** for an example of a Canada certification label.

Trucks built without a cargo body and tractors built without a fifth wheel that are intended for service in Canada will have an incomplete Canada vehicle certification label attached to the left-hand B-pillar. After completion of the vehicle, a complete Canada certification label must be attached by the final-stage manufacturer to certify that the vehicle conforms to all applicable vehicle safety regulations in effect on the date of completion.

Mexico Labeling

Mexico Certification Label

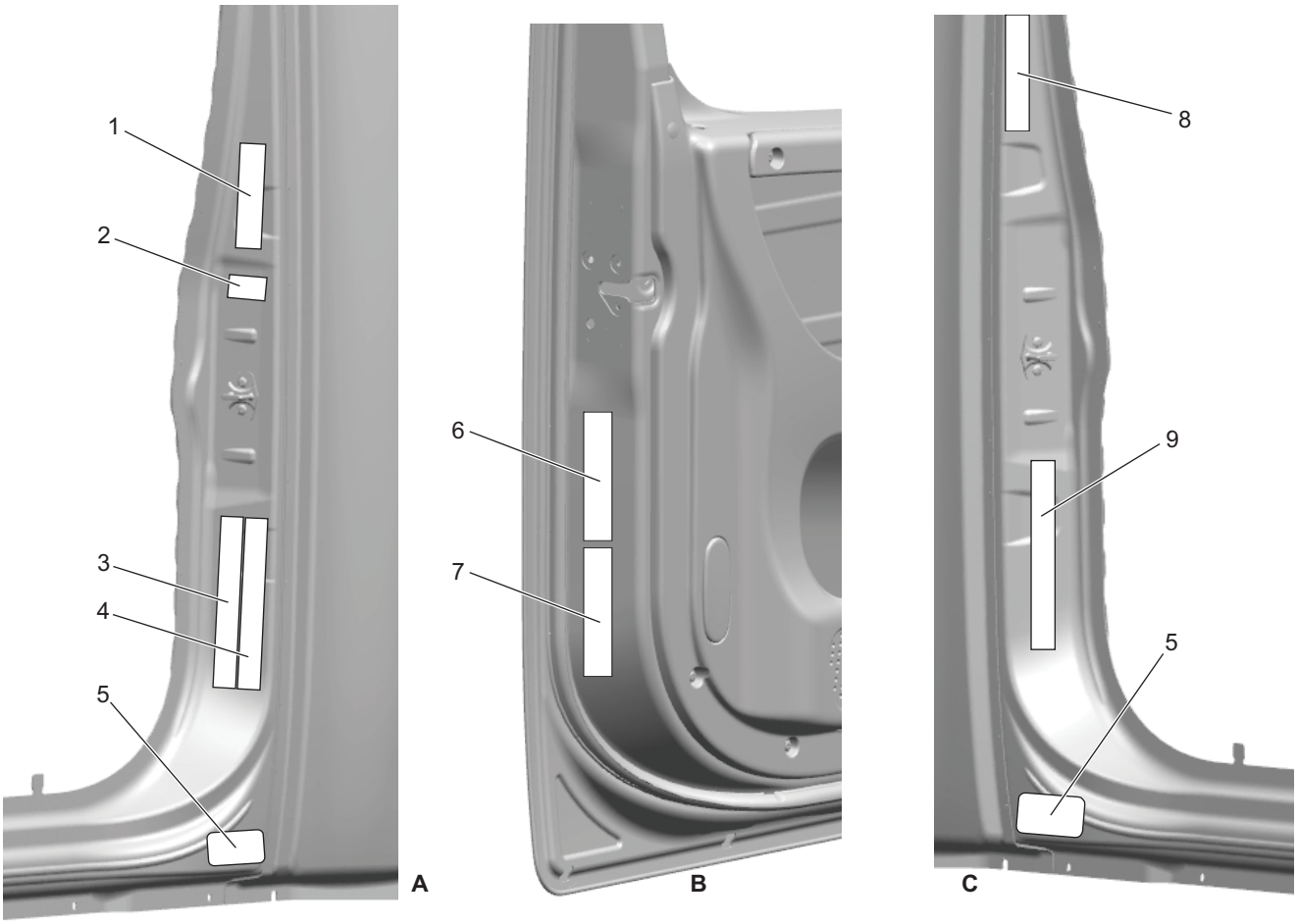
The Mexico certification label states that the vehicle complies with the Normas Oficiales Mexicanas (NOMs) standards in effect on the date the vehicle was manufactured. See **Fig. 1.11.**

Vehicles domiciled in Mexico will have a Mexico certification label applied to the right-hand B-pillar as show in **Fig. 1.6**.

Spanish Weights and Measures Label

Vehicles with a Mexico certification label will also have a Spanish weights and measures label. See **Fig. 1.9** for an example.

When both a United States Federal Motor Vehicle Safety Standard (FMVSS) label and a Spanish



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A. Left-Hand B-Pillar
1. Primary Noise Emission Control Label (Mexico or United States)
2. Customer Assistance Label (United States or Mexico)
3. FMVSS Certification Label or Spanish Weights and Measurement Label

B. Left-Hand Door
4. Canada Certification Label or FMVSS Certification Label
5. Entry/Exit Warning Decal
6. Vehicle Emission Control Information Label
7. Secondary Noise Emission Control Label (English)

C. Right-Hand B-Pillar
8. Mexico Certification Label
9. Component GWR Label (Spanish or English)

Fig. 1.6, Label Locations

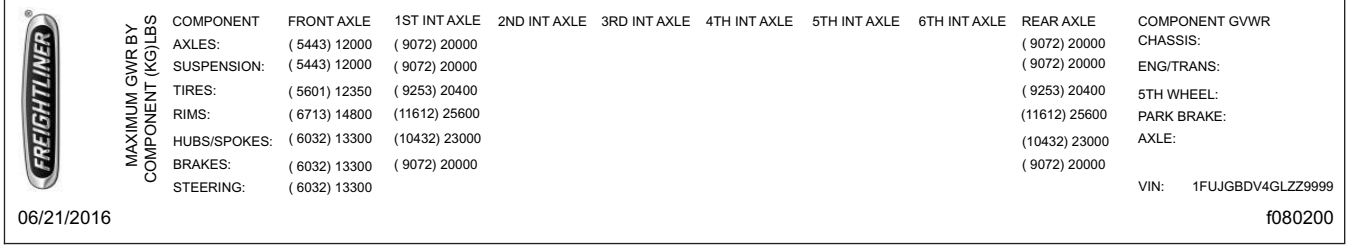


Fig. 1.7, Component GWR Label

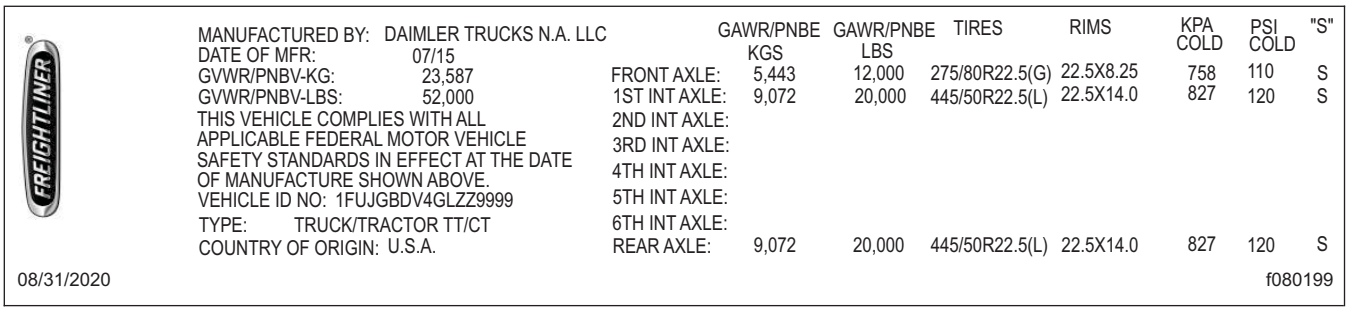


Fig. 1.8, FMVSS Vehicle Certification Label (complete vehicle)

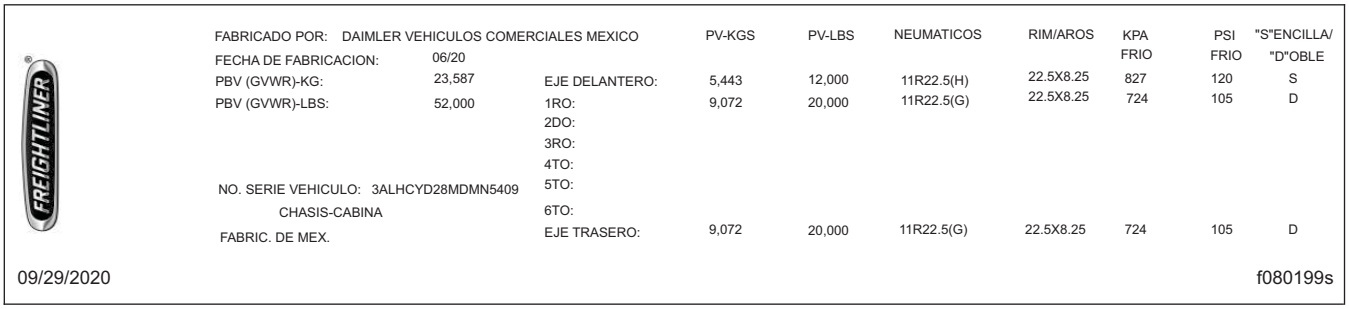


Fig. 1.9, Spanish Weights and Measures Label

Fig. 1.10, Canada Certification Label

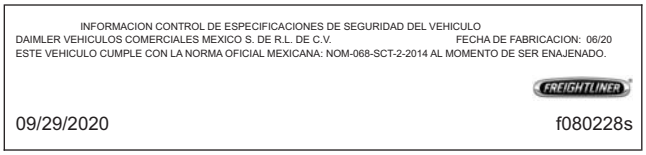


Fig. 1.11, Mexico Certification Label

weights and measures label are applied to the left-hand B-pillar, the Spanish label will be applied on the interior edge of the B-pillar and the FMVSS label will be applied on the exterior edge. See **Fig. 1.6.**

Emissions Labels

Aftertreatment System Indicators Label

Model year 2007 and later diesel engines in vehicles domiciled in the U.S. or Canada are required to meet all EPA exhaust gas emission regulations effective as per the applicable emission model year, and are equipped with an emission aftertreatment system (ATS).

Vehicles domiciled outside of the U.S. and Canada may not have aftertreatment equipment, depending upon local statutory emissions guidelines.

See **Table 1.1** and **Table 1.2** for additional information on what EPA and GHG regulations apply to different model years.

See **Fig. 1.12** for information on the driver's visor warning label for important warning indicators in the instrument cluster that pertain to the ATS.

EPA Regulations	
Regulation	**Emissions Components**
EPA07 (Reduction of nitrogen oxides (NOx) emissions to 1.1 g/bhp-hr, and particulate matter emissions to 0.01 g/bhp-hr)	Aftertreatment device (ATD) containing a diesel particulate filter that traps soot and ash.*
EPA10 (Reduction of NOx emissions to 0.2 g/bhp-hr)	EPA07-type ATD, with additional selective catalyst reduction (SCR) technology that utilizes diesel exhaust fluid (DEF) to convert NOx to nitrogen and water vapor.
GHG14 (Reduction of greenhouse gas emissions)	Fuel efficiency components including, but not limited to, engines, tires, aerodynamic components, vehicle speed limiters, and idle reduction timers specifically designed to meet regulatory fuel efficiency and greenhouse gas emissions standards.
GHG17	Fuel efficiency components including, but not limited to, engines, tires, aerodynamic components, vehicle speed limiters, and idle reduction timers specifically designed to meet regulatory fuel efficiency and greenhouse gas emissions standards.
GHG21	GHG14/17 components plus additional components including, but not limited to, transmissions, axles, predictive technologies, idle reduction technologies for vocational vehicles, and tire pressure monitoring systems.

* Cummins and Detroit ATD's are also equipped with a diesel oxidation catalyst to break down pollutants.

Table 1.1, EPA Regulations

Emission Regulations by Model Year		
Model Year	**Engine Regulation**	**Vehicle Regulation**
2007–2009	EPA07	N/A
2010–2012	EPA10	N/A
2013–2015	EPA10, GHG14	GHG14
2016	EPA10, GHG17	GHG14
2017–2020	EPA10, GHG17	GHG17
2021–and later	EPA10, GHG21	GHG21

Table 1.2, Emission Regulations by Model Year

It is a violation of U.S. federal law to alter exhaust plumbing, ATS, or other components in any way that would bring the engine/vehicle out of compliance with certification requirements [Ref: 42 U.S.C. S7522(a)(3)]. It is the owner's responsibility to maintain the vehicle so that it conforms to EPA regulations.

Vehicle Emission Control Information Label

Model year 2013 and later vehicles meet requirements as specified by GHG14, GHG17 and GHG21 regulations, respectively. These vehicles are equipped with components that increase fuel efficiency and reduce greenhouse gas (GHG) emissions. Components may include, but are not limited to, low-rolling resistance tires; aerodynamic devices such as hood, cab side extenders, and fuel tank fairings; vehicle speed limiters; and idle shutdown timers.

A Vehicle Emission Control Information Label is located on the left-hand door. See **Fig. 1.6**. Among other GHG relevant information the label indicates the emission model year of the vehicle. As this label is about meeting United States federal requirements, it is printed in English.

It is the owner's responsibility to maintain the vehicle so that it conforms to U.S. EPA and NHTSA regulations.

Noise Emission Control Labels

For vehicles manufactured for operation in the United States, an English language EPA noise emission control label is applied to attest that the vehicle conforms to United States EPA regulations for noise. See **Fig. 1.14**.

For vehicles manufactured for operation in Mexico, a Spanish language Normas Oficiales Mexicanas (NOM) vehicle noise emission control label attesting

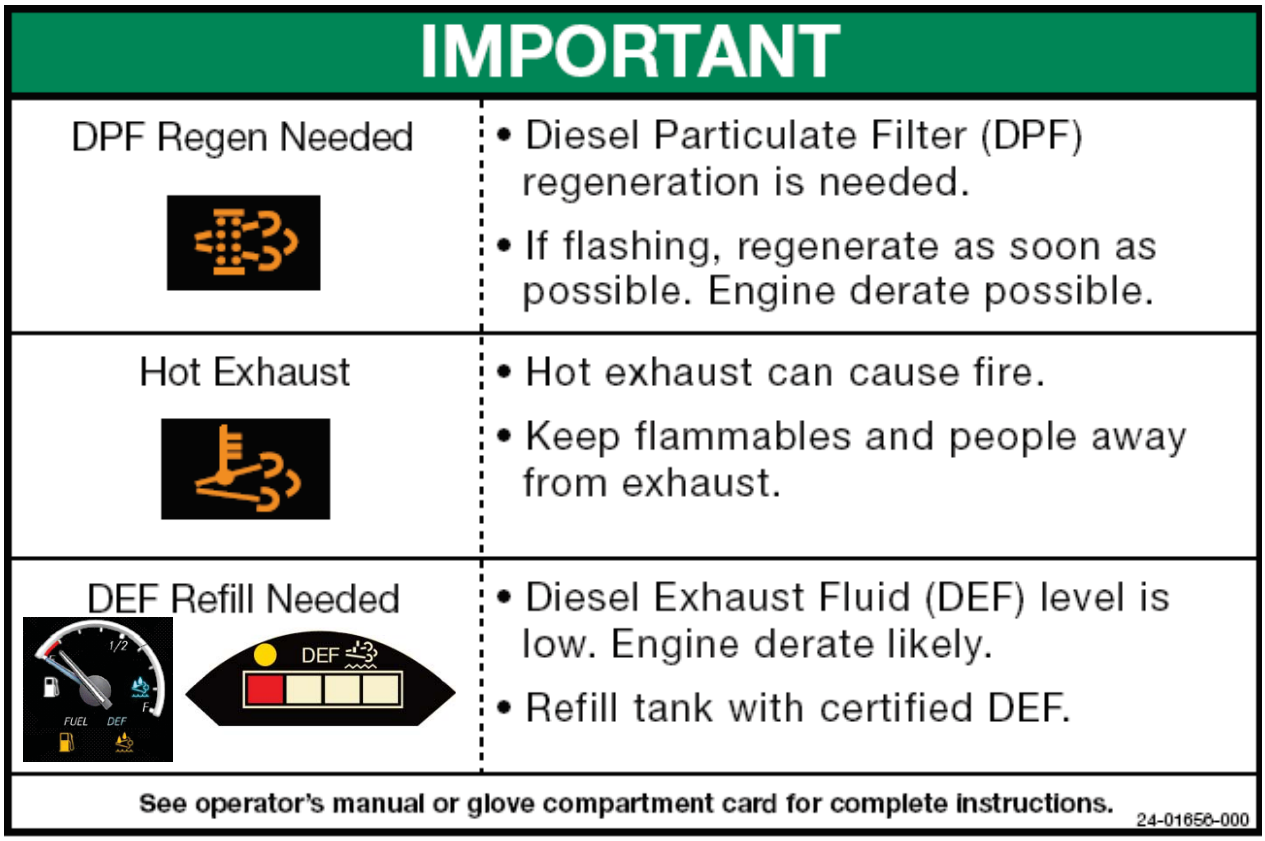


Fig. 1.12, ATS Indicators, EPA10 and Newer

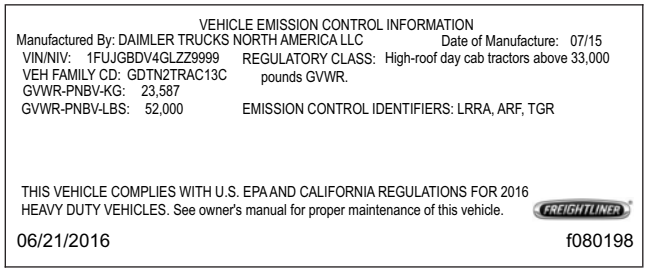


Fig. 1.13, Vehicle Emission Control Information Label

that the vehicle conforms to Mexican NOM regulations for noise is applied. See **Fig. 1.15**.

If only a single noise emission control label is applied, it will be located in the primary location on the left-hand B-pillar as show in **Fig. 1.6**.

For vehicles manufactured for dual Mexico/United States operation, both labels are applied. The NOM vehicle noise emission control label will be located in the primary location on the left-hand B-pillar and the EPA noise emission control label will be applied to the left-hand door as shown in **Fig. 1.6**.

It is the owner's responsibility to maintain the vehicle so it conforms to all applicable regulations (EPA, NOM).

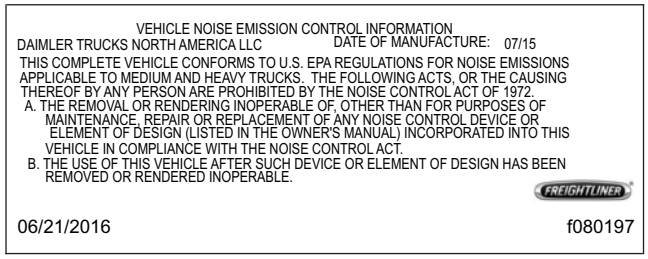


Fig. 1.14, EPA Vehicle Noise Emission Control Label (complete vehicle)

IMPORTANT: Certain Freightliner incomplete vehicles may be produced for the United States market with incomplete noise control hardware. Such vehicles will have an incomplete vehicle

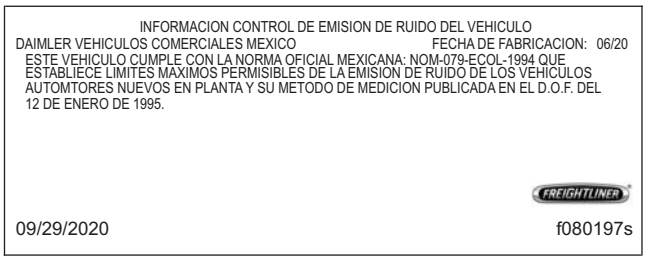


Fig. 1.15, NOM Vehicle Noise Emission Control Label (complete vehicle)

noise emission control information label. See **Fig. 1.16**. For such vehicles, it is the final-stage manufacturer's responsibility to complete the vehicle in conformity to the applicable regulations and label it for compliance.

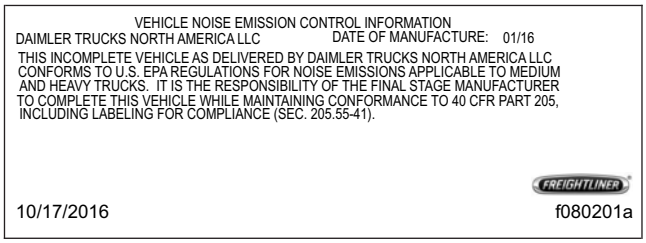


Fig. 1.16, EPA Vehicle Noise Emission Control Label (incomplete vehicle)

Certified Clean Idle Label

The California Air Resources Board (CARB) requires model year 2008 and newer heavy-duty diesel engines to meet CARB's Heavy-Duty Diesel Engine Idling Requirement in order to limit emissions of particulate matter and NOx.

Certified vehicles are equipped with a label placed near the bottom exterior edge of the left-hand door. See **Fig. 1.17**.

Customer Assistance Label

The customer assistance center telephone number is printed on the customer assistance label. The label also includes a QR code encoded with the VIN, readable by dealer apps, to bring up information about the vehicle.

For vehicles domiciled in Mexico this label will be in Spanish as shown in **Fig. 1.18**. For vehicles domiciled in the United States it will printed in English as shown in **Fig. 1.19**.

The customer assistance label is located on the left-hand B-pillar, as shown in **Fig. 1.6**.

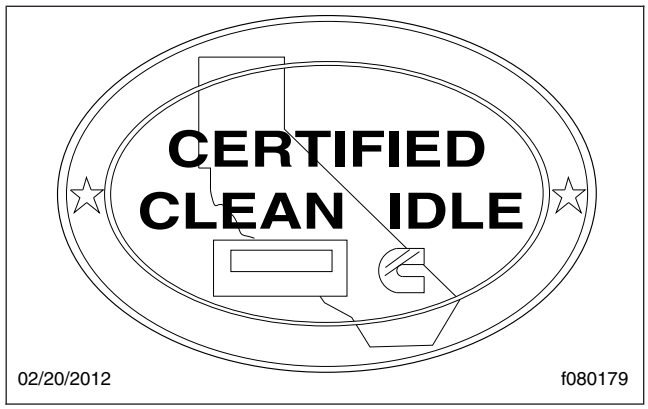


Fig. 1.17, CARB Clean Idle Label

Fig. 1.18, Customer Assistance Label, Spanish

Fig. 1.19, Customer Assistance Label, English

2

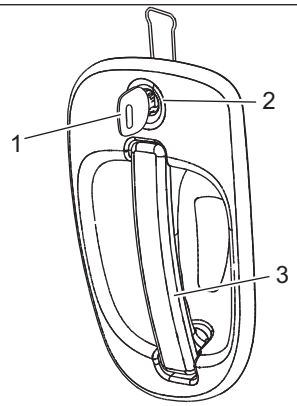
Vehicle Access

Door Locks and Handles

One common key operates the ignition switch and all of the door locks.

IMPORTANT: Each key is numbered. Record the number so a duplicate key can be made, if needed.

To unlock the driver's door from outside the cab, insert the key in the lockset and turn it one-quarter turn clockwise. See **Fig. 2.1**. To remove the key, turn it counterclockwise to the original position. Pull out on the door pull handle to open the door.



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1. Key
2. Lockset
3. Door Pull Handle

Fig. 2.1, Exterior Door Handle

To unlock the passenger's door from outside the cab, insert the key in the lockset and turn it one-quarter turn counterclockwise. Turn the key clockwise to the original position to remove it.

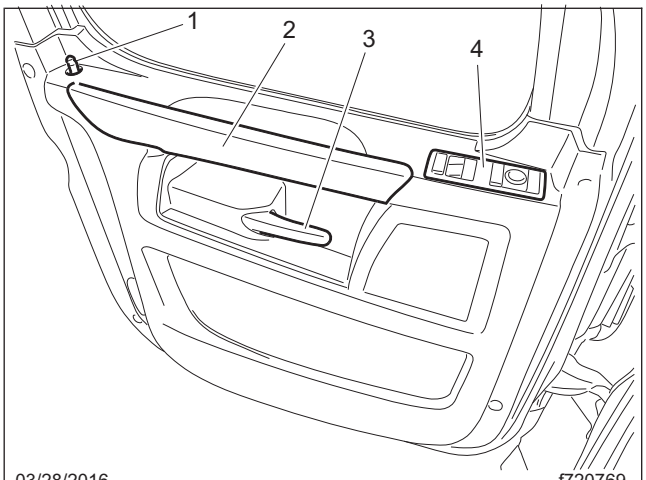
NOTE: The cab door locks can be operated when the doors are open.

To lock a door from outside the cab, insert the key in the lockset and turn it in the direction opposite to the unlocking direction (counterclockwise for the driver's door, clockwise for the passenger's door). Close the door if it is open.

To lock either door from inside the cab, push the lock button downwards. See **Fig. 2.2**.

To open the door from the inside, lift up on the door lever. This will unlatch the door whether or not it is locked.

To unlock the door without unlatching it, pull the lock button upwards.



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1. Lock Button
2. Integral Door Upper Grab Handle
3. Door Lever
4. Door Control Panel

Fig. 2.2, Door Interior

Remote Keyless Entry

Key Fob Use

⚠ DANGER

Do not ingest the key fob battery. The button cell battery in this key fob is a chemical burn hazard.

Always keep the key fob and button cell batteries away from children.

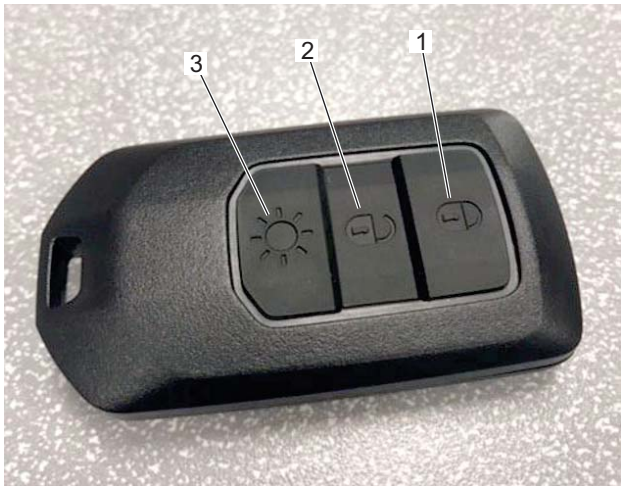
Always safely dispose of used batteries.

If the button cell battery in this key fob is swallowed, it can cause severe internal burns within two hours and can lead to death. If you think a battery might have been swallowed or otherwise placed inside any part of the body, seek immediate medical attention.

If the battery compartment does not close securely, stop using the key fob.

Keyless entry is optional on New Cascadia vehicles. The key fob can be used to transmit a signal to remotely lock and unlock the doors, start and end the pre-trip light check, and open the door windows. See **Fig. 2.3**.

- To lock both doors, press the lock button.
- To unlock both doors, press the unlock button.



1. Lock Button
2. Unlock Button
3. Lamp Check Button

Fig. 2.3, Key Fob

- To open the door windows, press the unlock button for three seconds.
- To start or end the pre-trip light check, press the lamp check button.

Key Fob Programming

A maximum of four fobs can be programmed to work on one vehicle. Whenever a new fob is needed, all existing fobs must be reprogrammed at the same time. Any existing fobs that were previously programmed will no longer work on the vehicle unless they are all reprogrammed at the same time.

To have the key fobs programmed, take the vehicle to an authorized Freightliner dealer or service facility.

Specifications

This system consists of a key fob that uses a radio frequency link for communication between the fob and the vehicle.

Grab Handles and Access Steps

For ease of entry and exit, there is a handle on both the A-pillar and the B-pillar. In addition, the steering wheel and door grab handle may be used to provide a secure handhold. There are at least two access steps to provide secure footholds.

CAUTION

Slipping or falling from the vehicle can result in personal injury or property damage.

Wet or dirty shoes greatly increase the chance of slipping or falling. If your shoes are wet or dirty, be especially careful when entering or exiting the vehicle.

Always maintain three-point contact with the vehicle when entering or exiting the cab. Three-point contact means both feet and one hand, or both hands and one foot.

When steps are mounted on battery box covers, make sure that the cover is latched and secure before using the steps.

Do not step on the fuel tank, battery box, frame, etc. unless adequate slip resistant surfaces and handholds are provided.

Do not jump from the vehicle.

Do not use parts of the vehicle as hand holds that are not designed for this purpose.

Entering the Driver Side

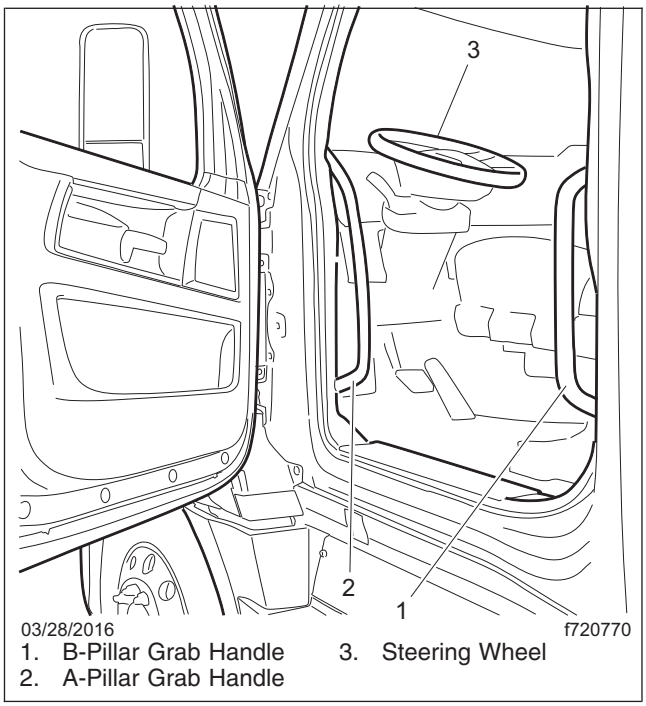
1. Open the driver-side door and place anything that you are carrying in the cab.
2. Facing the cab, grasp the B-pillar and A-pillar grab handles with your hands. See **Fig. 2.4**.
3. Step up on the bottom step with your right foot.
4. Step up on the top step with your left foot, grasping the grab handles higher as you move up.
5. Step into the cab with your right foot first, and grasp the steering wheel with your left hand.

Exiting the Driver Side

IMPORTANT: Do not attempt to exit the cab while carrying any items in your hands. Place them in an accessible location on the seat or cab floor and make sure they will not get in your way as you exit, then retrieve them after you have exited the cab.

CAUTION

Always face in when exiting the cab. Do not attempt to exit with your back to the cab, as you would going down a flight of stairs. It is easier to



1. B-Pillar Grab Handle
2. A-Pillar Grab Handle
3. Steering Wheel

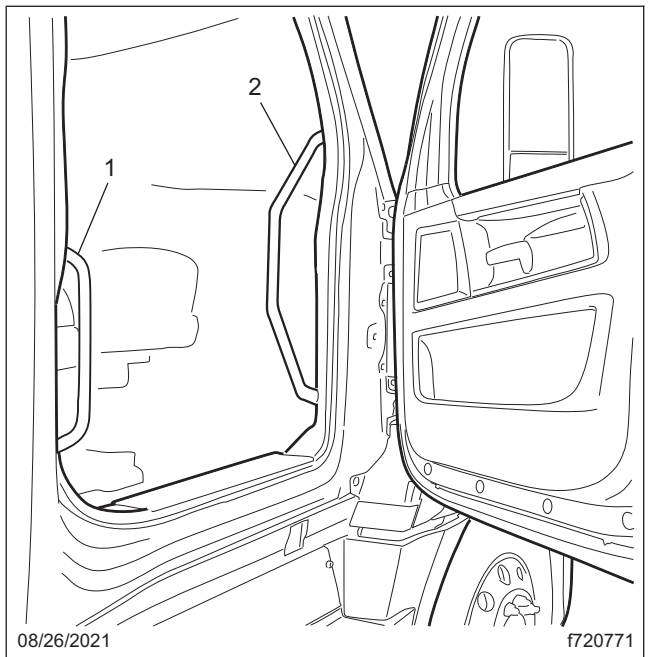
Fig. 2.4, Driver-Side Cab Access

slip or lose your balance. If you slip when exiting in this way, there is a greater likelihood of personal injury.

1. Grasp the steering wheel with your right hand and the A-pillar grab handle with your left hand, and place your left foot on the top step. See **Fig. 2.4**.
2. Face into the cab, and grasp the B-pillar grab handle with your right hand.
3. Step down on the bottom step with your right foot, grasping the grab handles lower as you move down.
4. Step to the ground with your left foot first.

Entering the Passenger Side

1. Open the passenger-side door and place anything that you are carrying in the cab.
2. Facing the cab, grasp the B-pillar and A-pillar grab handles with your hands. See **Fig. 2.5**.
3. Step up on the bottom step with your left foot.
4. Step up on the top step with your right foot, grasping the grab handles higher as you move up.



1. B-Pillar Grab Handle
2. A-Pillar Grab Handle

Fig. 2.5, Passenger-Side Cab Access

5. Step into the cab with your left foot first, while holding on to the grab handle with your right hand.

Exiting the Passenger Side

IMPORTANT: Do not attempt to exit the cab while carrying any items in your hands. Place them in an accessible location on the seat or cab floor and make sure they will not get in your way as you exit, then retrieve them after you have exited the cab.

⚠ CAUTION

Always face in when exiting the cab. Do not attempt to exit with your back to the cab, as you would going down a flight of stairs. It is easier to slip or lose your balance. If you slip when exiting in this way, there is a greater likelihood of personal injury.

1. Grasp the A-pillar grab handle with both hands, and place your right foot on the top step. See **Fig. 2.5**.
2. Face into the cab, and grasp the B-pillar grab handle with your left hand.

3. Step down on the bottom step with your right foot, grasping the grab handles lower as you move down.
4. Step to the ground with your left foot first.

Cab-to-Sleeper Access

To open the sleeper access on vehicles with vinyl sleeper curtains, unzip the sleeper curtains. If desired, unsnap the curtains all the way around the sides and top, and remove the curtains.

To open the sleeper access on vehicles with velour sleeper curtains, unfasten the snaps at one side, then push the curtain to the opposite side.

Sleeper Door

The sleeper door (**Fig. 2.6**, Ref. 1) is not intended for entry or exit. The door is intended only as a convenient means to stow or remove personal belongings in and from the sleeper area. To open the sleeper door from the inside, push down on the lever handle located inside the sleeper compartment aft of the door, or pull out on the upper lever located inside the cab door opening; see **Fig. 2.7**. To open the sleeper door from outside, open the cab door, then pull out on the upper lever located inside the cab door opening. To close the door, pull on the strap attached to the inside of the door, or push it closed from the outside, until it latches.

IMPORTANT: The sleeper doors have two-stage latching. When closing the doors, ensure that they are completely latched to prevent wind noise and water intrusion.

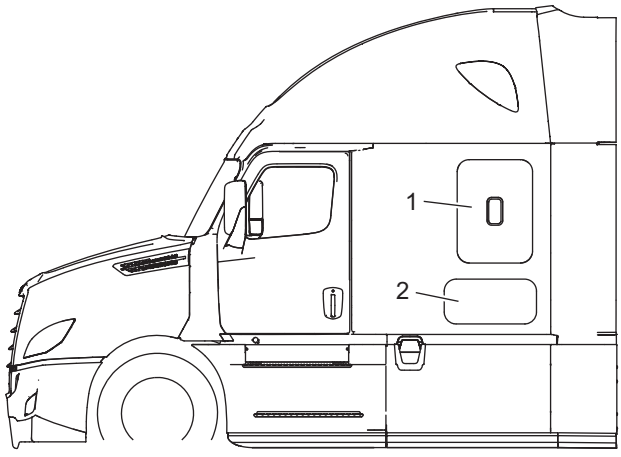
Sleeper Luggage Door

To open the sleeper luggage door (**Fig. 2.6**, Ref. 2), pull out on the lower lever located inside the cab door opening; see **Fig. 2.7**. To close the sleeper luggage door, push it closed until it latches.

Back-of-Cab Access

When trailer air and electrical connections cannot be reached conveniently from the ground, Federal Motor Carrier Safety Regulations require commercial carriers to provide back-of-cab access.

A grab handle is typically located on the back wall of the sleeper or cab. Steps are mounted on the frame rail, and a deck plate is mounted across the top of the frame rails. See **Fig. 2.8**.



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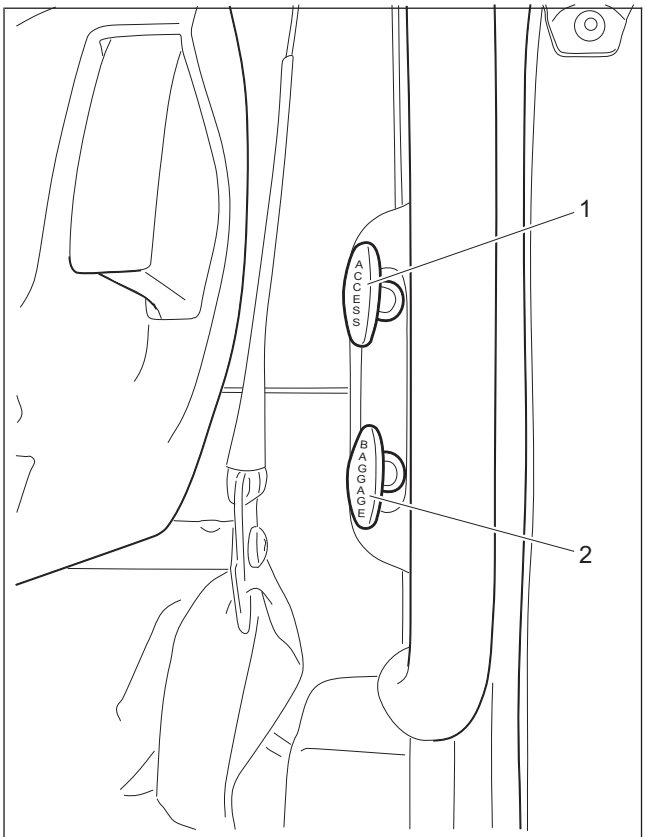
1. Sleeper Door
2. Luggage Compartment Door

Fig. 2.6, Sleeper Doors



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1. Sleeper Door Lever
2. Luggage Door Lever

Fig. 2.7, Sleeper Door Levers

⚠ CAUTION

Follow these rules for back-of-cab access. Failing to follow these rules could lead to a fall, and possible personal injury.

Never step on any exterior part unless it has a slip-resistant surface meant for safe stepping. If the surface is movable, such as a battery box cover with a slip-resistant surface, be certain it is firmly secured.

Be careful not to trip on items such as chains or air lines in the back-of-cab area.

Always follow safety procedures for back-of-cab access, maintaining three-point contact—both hands and one foot, or both feet and one hand—whenever moving around, and always face in toward the deck plate when climbing up or down.

Wet or dirty shoes, steps, or grab rails greatly increase the chance of slipping or falling. If your shoes or the contact areas are wet or dirty, clean and dry them as much as possible before accessing the back of cab area, and be especially careful when climbing or standing on the vehicle.

Never jump onto, or off of, a vehicle; doing so creates a very high likelihood of a fall and personal injury.

IMPORTANT: Climb onto, and down from, back-of-cab access facing in toward the vehicle, as you would on a ladder. Do not climb up or down facing out away from the vehicle.

Accessing Back-of-Cab Area

⚠ WARNING

External surfaces of the exhaust system remain hot after the engine has been shut down. When accessing the back of the cab or sleeper, do not touch any part of the exhaust system other than the exhaust-mounted grab handle, if equipped, or severe burns could occur.

1. Facing the deckplate, grasp the grab handle with both hands. Reach up as far as is comfortable.
2. Place one foot on the bottom step and pull yourself up.
3. Place your other foot on the top step.

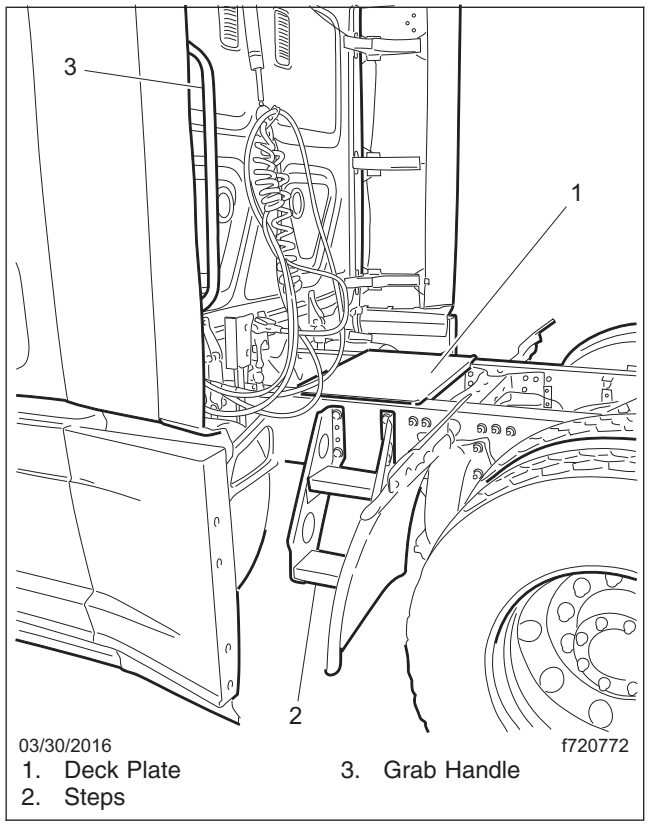


Fig. 2.8, Back-of-Cab Access

4. Move your lower hand to a higher position on the grab handle.
5. Step onto the deck plate.

Exiting Back-of-Cab Area

1. Facing toward the center of the vehicle, grasp the grab handle with both hands.
2. Step one foot at a time onto the top step.
3. Move your upper hand to a lower position on the grab handle.
4. Move one foot to the bottom step.
5. Step to the ground with your upper foot first.

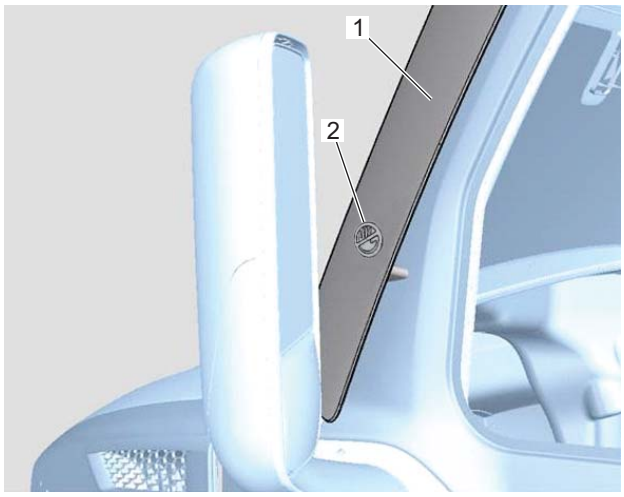
External Cab Access

A-Pillar Turning Vane

⚠ WARNING

When accessing the outside of the cab to clean the door's windows or windshield, do not grab or hold onto the A-pillar turning vane. This feature is not designed as a steadying device or hand-hold.

Misuse of the turning vane may result in injury to the operator or damage to the truck.



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1. A-Pillar Turning Vane
2. "Not a Handhold" Symbol

Fig. 2.9, A-Pillar Turning Vane

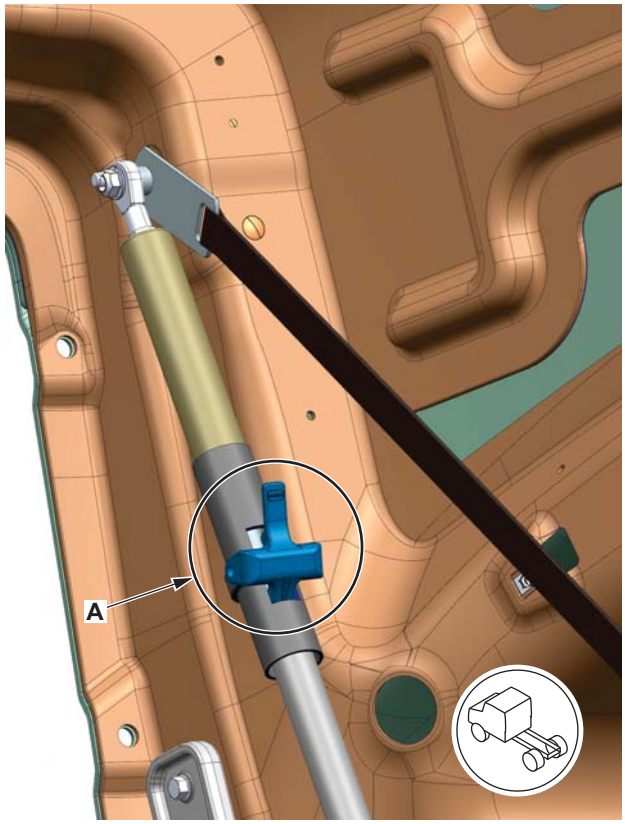
Hood Opening and Closing

The hood can be raised to a full-open position. Tilt-assist struts help to both raise the hood and lower it into the vehicle operating position.

In the vehicle operating position, the hood is secured to the cab-mounted cowl by a hold-down latch on each side.

Newer vehicles may be equipped with a right-hand locking hood strut. This strut locks automatically when the hood is fully opened. See **Fig. 2.10.**

To unlock the strut and lower the hood, flip the lever located midway on the strut downwards.



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A. Locking Lever

Fig. 2.10, Locking Right-Hand Hood Strut

Opening the Hood

1. Release both hood hold-down latches by pulling the handles outward.
2. Slowly tilt the hood with both hands on the grab handle.
3. As the hood starts to open, walk backwards as you pull. The hood will stop in the full-open position.

IMPORTANT: If equipped, check that the automatic locking hood strut is fully engaged before working on the vehicle.

Closing the Hood

1. If the vehicle is equipped with a locking hood-strut, disengage it by pushing the lever down.
2. Push on the top center of the hood, tilting it toward the closed position.

3. As the hood goes over center, allow it to settle on the rear supports.
4. Make sure the hood is flush with the cowl, then secure the hood by engaging both hood hold-down latches.

IMPORTANT: Make sure that both hood hold-down latches are fully engaged before operating the vehicle.

3

Instruments

Instrumentation Control Unit: ICUC

The instrumentation control unit (ICU) provides the driver with engine and vehicle information. A New Cascadia vehicle can be equipped with either an ICUC or ICC5. See **Fig. 3.1** for a typical ICUC layout.

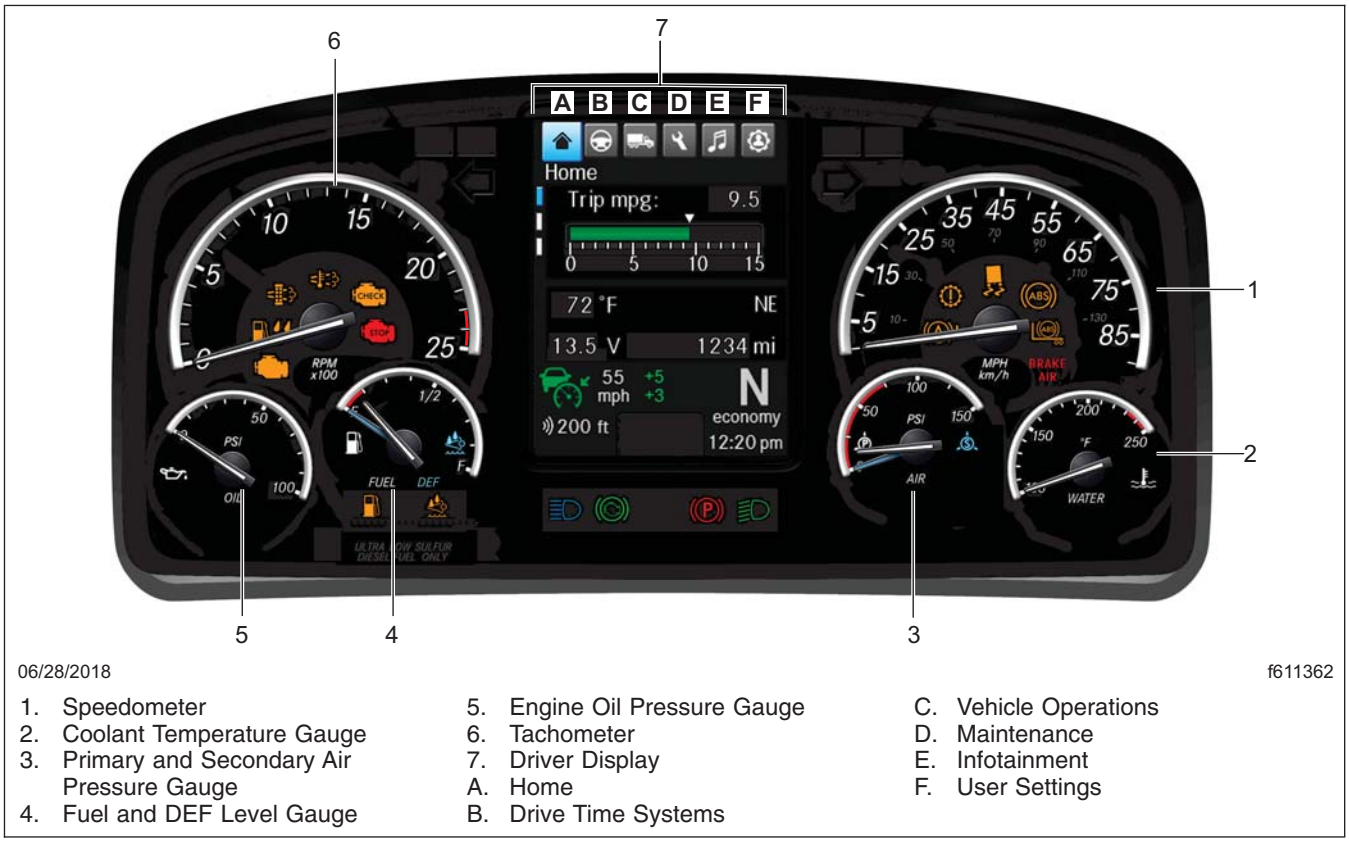
This section provides general system and operating instructions for ICUC components. Following sections provide more detailed information.

The driver display screen provides information on various vehicle systems as well as warnings, cautions, and notifications on systems status.

Ignition Sequence

When the ignition is turned on, the ICU runs a self-check. Observing the ignition sequence is a good way to ensure the ICU is functioning properly.

IMPORTANT: Do not crank the engine until the ICU self-check is complete.



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1. Speedometer
2. Coolant Temperature Gauge
3. Primary and Secondary Air Pressure Gauge
4. Fuel and DEF Level Gauge
5. Engine Oil Pressure Gauge
6. Tachometer
7. Driver Display
   - A. Home
   - B. Drive Time Systems
   - C. Vehicle Operations
   - D. Maintenance
   - E. Infotainment
   - F. User Settings

Fig. 3.1, Instrument Cluster Overview - ICUC

ICUC

The instrument cluster unit (common), or ICUC, is comprised of six physical gauges, indicator lamps (telltales), a six inch portrait driver display screen, steering wheel mounted switches, and audible warning systems. Warning and indicator lamps illuminate in red (warning), amber (caution), green (status on), or blue (high-beam headlights active).

ICUC

NOTE: Air gauges in the ICUC do not complete a sweep of their dials during the ignition sequence.

When the ignition is turned on, the following actions should occur in the ICUC:

- Freightliner and engine logo displays on the driver display until startup is complete

- Speedometer and tachometer complete a full sweep of their dials
- Warning and indicator lamps illuminate, then are extinguished (if not active)
- Audible alert sounds for any active faults
- Active alerts are displayed on the ICUC screen.

If the ICUC receives active fault codes, it displays them one after the other until the ignition is turned off. The alerts are displayed until they are acknowledged. If there are no active faults, the ICUC displays the home screen after the self-check completes.

IMPORTANT: If any red or amber warning and indicator lamps do not illuminate during the ICUC self-check or do not go out (if not active) after the self-check completes, take the vehicle to an authorized Freightliner service facility as soon as possible.

If active faults are present, take the action outlined in "Warnings, Indicators, and Messages" tables in this chapter, then take the vehicle to an authorized Freightliner service facility as soon as possible.

ICUC Screen Navigation

In the ICUC, the driver display screen is broken up into three areas: a navigable menu at the top of the screen, the display area (with a screen indicator if there is more than one page), and a static display at the bottom of the screen. See **Fig. 3.2**.

NOTE: To adjust the brightness of ICUC screen go to User Settings.

The ICUC top level menu categories allows a driver to quickly carry out common actions. Top level menu categories include Home, Drive Time Systems, Vehicle Operations, Maintenance, Infotainment, and User Settings. See **Fig. 3.1**.

The static menu display shows vehicle speed, transmission gear indicators, cruise control settings, and a clock. Soft telltales are also displayed in this area. See **Fig. 3.3**.

NOTE: Some optional features have icons in the static display area, for example, Optimized Idle status and Descent Control Mode.

1. Top Level Menu Categories
2. Static Menu
3. Current Screen Indicator

Fig. 3.2, ICUC Driver Display

If present, the screen indicator dashes communicate how many display screens are available in the current menu category. See **Fig. 3.2**.

To navigate the ICUC menus, use the Menu Right and Menu Left switches on the steering wheel to move between the top-level menus.

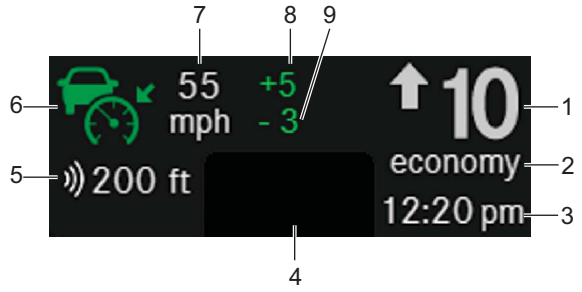
Use the Menu Up and Menu Down buttons to move from screen to screen within the selected category.

See **Fig. 3.4** for an overview of steering wheel mounted switches.

For Quick Access Systems menus press the Quick Access System Settings button in the right-hand switch pod. If Quick Access Systems menus are not available, the button will bring up the home screen.

Time and Date

Time and date are set automatically when the vehicle is equipped with a tachograph. When a vehicle is equipped with a tachograph only the time zone can be changed.



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1. Gear Indicator
2. Gear Mode
3. Clock
4. Soft Telltales
5. Adaptive Cruise Control and Tracked Vehicle Distance
6. Cruise Control Symbol (adaptive cruise control shown)
7. Cruise Control Set Speed
8. Cruise Control Overspeed
9. Cruise Control Underspeed

Fig. 3.3, ICUC Static Display

The correct time and date is required for the following ICU functions to work:

- Alarm clock
- Maintenance
- Prognostics

Software Updates

A software update consists of three steps:

1. Downloading the software.
2. Installing the software.
3. Activating the software by restarting the system.

A popup message will appear when an update is available. In addition, the software update option in the diagnostics menu will be active.

The vehicle must be in neutral gear, the parking brake set, and the engine off before a software update can start. Once started, a software update cannot be cancelled.

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1. Cruise Accelerate/Resume
2. Quick Access System Settings
3. Cruise Decelerate/Set
4. Phone Hang-Up/Reject
5. Marker Interrupt**
6. Phone Pick-Up
7. Headlamp Interrupt**
8. Cruise Cancel
9. Volume Increment Up
10. Menu Right
11. Volume Increment Down
12. Menu Down
13. Back Button
14. Menu Left
15. Menu Accept (OK)
16. Menu Up

** Not available in all markets

Fig. 3.4, ICUC Steering-Wheel-Mounted Switches

ICUC time and alarm clock settings are found under User Settings. See "Driver Display: ICUC" in this chapter for details.

During the software update process, progress messages will be provided. See **Fig. 3.5** for typical ICUC software update screens.

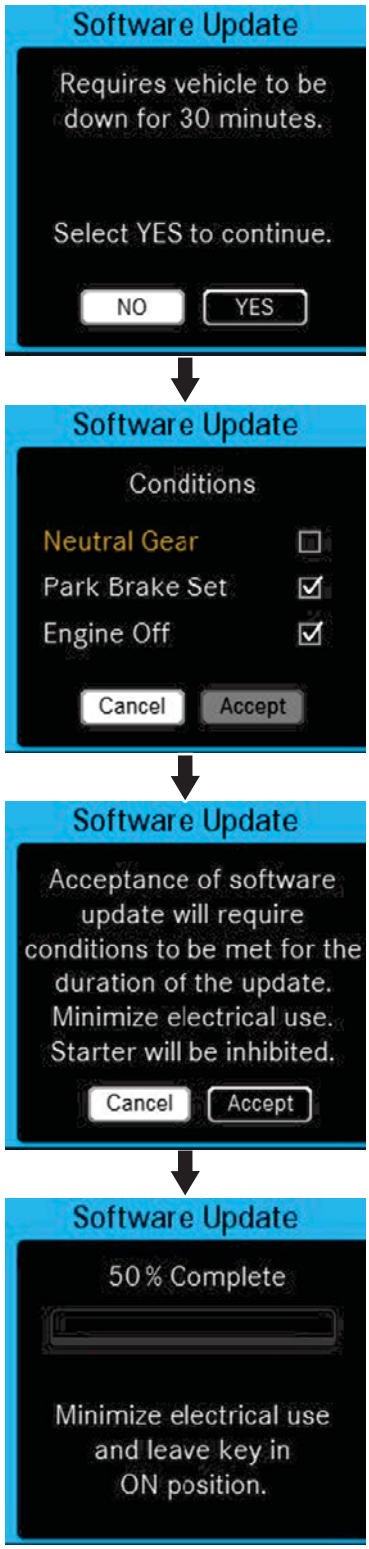

Fig. 3.5, Example ICUC Software Update Screens

If a software update is interrupted, the system will ask if you want to restart the process or inform you that the vehicle cannot be driven until the update is complete. If a software update fails, the system will attempt to revert to the previous version. A notification will appear when a software update has been successfully installed.

Failure to install software updates may make data less secure and/or mean vehicle systems are not operating at their best.

NOTE: An estimation of installation time will be given before the software update starts. Installation can take several minutes. During installation individual functions and controls will not be available or only available to a limited degree.

Driver Display Overview: ICUC

Below is an overview of ICUC driver display screens and functions.

ICUC Alert Messages

Alert messages are displayed when certain conditions occur. They include warnings, cautions, and notices that require the driver's attention. Not all alert messages are critical to the operation of the vehicle. More important messages take priority over less important messages. The header text and color indicates the priority of the on-screen message, listed from the highest to the lowest:

- Warning (red)
- Caution (amber)
- Status/Informational (blue, green, white, and grey)

Warnings alert the driver to situations or conditions that may pose a threat to control of the vehicle. Follow all instructions given in the message.

Cautions alert the driver to situations or conditions that may result in damage to vehicle components, or derating of engine power.

Status notices alert the driver to situations or conditions that may improve fuel efficiency or improve vehicle drivability.

See **Fig. 3.6** for typical alert messages.

ICUC Watch for Ice Popup

When ambient air temperature drops below 34°F (1°C), a Watch For ICE popup message will appear.

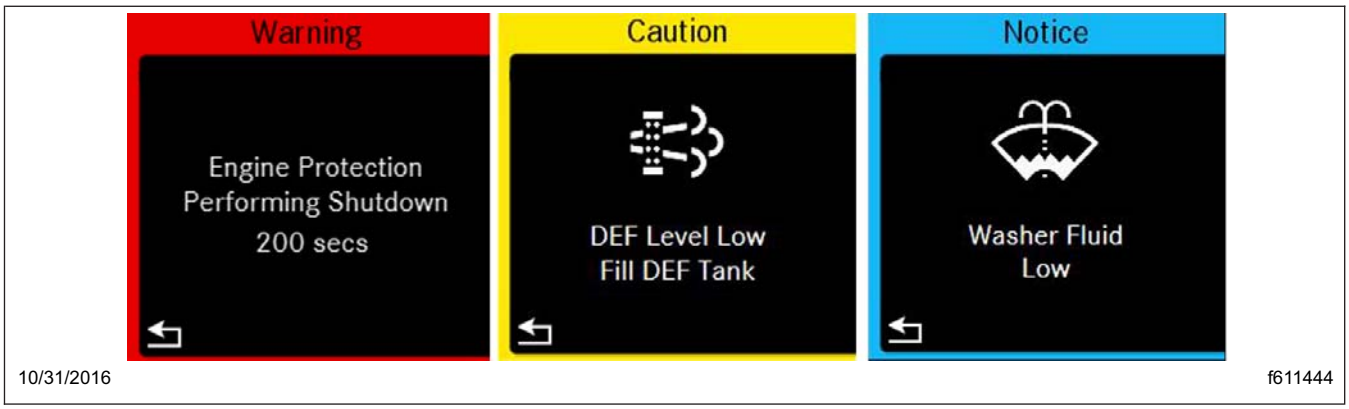

Fig. 3.6, Sample Alert Messages

See **Fig. 3.7**. Acknowledge and dismiss this message by pressing the back button in the left hand steering wheel switch pod.

Fig. 3.7, ICUC Watch for Ice Popup

An ambient air temperature below 34°F (1°C) will also cause a snowflake icon to appear next to the display temperature. The snowflake icon will display until the ambient air temperature rises to 37°F (3°C).

If the temperature drops below 34°F (1°C) after rising above 37°F (3°C), the Watch For ICE popup and snowflake will reappear.

ICUC Time and Alarm Settings

Time Settings: Display Format

NOTE: Local Time Offsets can also be viewed under this menu.

In the ICUC, time can be displayed in 12 or 24 hour format. Time format is set under Time Settings under User Settings.

1. Select the gear icon to open the User Settings menu. The last settings menu accessed will open.
2. If not on the Settings Options List Screen, use the Up arrow in the left-hand steering wheel switch pod to move to this screen.
3. Press OK to access the settings menus.
4. Use the Down arrow in the left-hand steering wheel switch pod to get to Time.
5. Press OK to access Time.
6. Use the Right arrow to navigate from 12h to 24h or 24h to 12h.
7. Press OK on the left-hand steering wheel switch pod to choose an option.

Setting An Alarm

In the ICUC, one alarm can be set under Alarms under the User Settings. See **Fig. 3.8**.

The alarm triggers a repeated chirping sound as well as a alarm pop-up. Both can be dismissed by pressing the back button on the left hand steering wheel switch pod.

1. Select the gear icon to open the User Settings menu. The last settings menu accessed will open.
2. If not on the Alarms screen, use the Down arrow in the left-hand steering wheel switch pod to move to this screen.
3. Press OK to access the alarm clock options.

Basic Information Screens

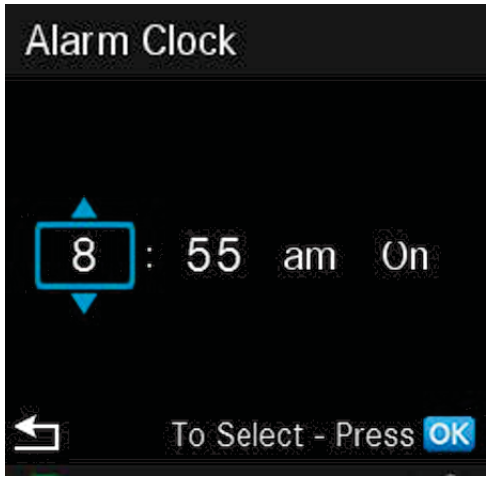

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Fig. 3.8, ICUC Alarm Clock Screens

4. Use the Up and Down arrow to choose hour, minute, and am/pm and alarm status.
5. Press OK to set the alarm.

ICUC Driver Display Screens

The six ICUC top-level menu categories are:

- Basic Information
- Drive Time Systems
- Vehicle Operations
- Maintenance
- Infotainment
- User Settings

Quick Access Systems are also available via the right-hand steering wheel Quick Access System Settings button.

NOTE: Screens will vary depending on vehicle options. Some screens are accessible only when the vehicle is parked and the parking brake is on.

There are currently three top-level menu options under Basic Information:

- Home
- Trip
- Leg

The Home screen displays a fuel consumption bar graph, the current outside temperature, the vehicle charging system voltage, compass direction of travel, and odometer. See **Fig. 3.9**.

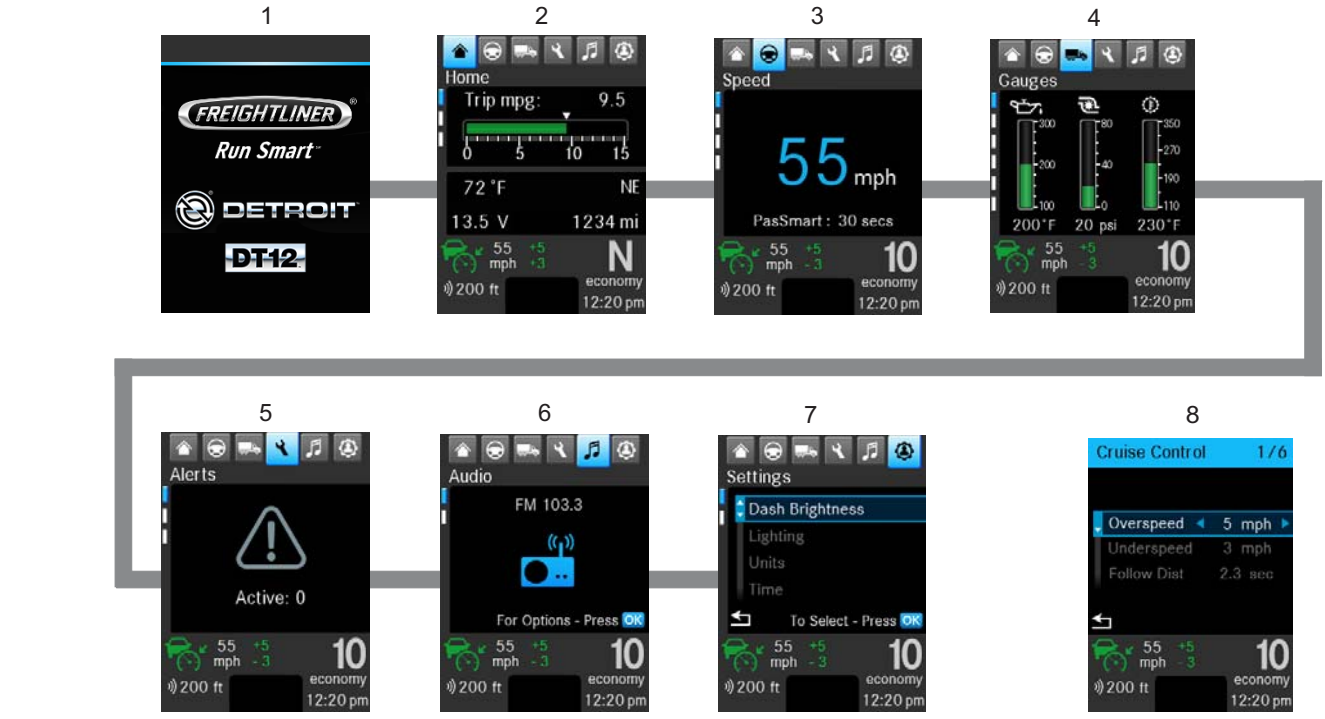
The Trip report screen displays calculations based on the engine run time such as trip mpg. See **Fig. 3.10**.

The trip Leg report screen which displays calculations based on engine run time such as length of trip leg, average speed, hours. See **Fig. 3.11**.

Drive Time Systems Screens

There are currently four menu options under Drive Time Systems:

- Speed
- Driving Assistance
- Eco Driver Feedback
- Video



NOTE: Navigate the top-level menu by using the Menu right and Menu left buttons on the steering wheel. Navigate to Quick Access Systems using the Quick Access Systems switch. When navigating the categories, the last-used menu screen in each category is displayed, which is not necessarily the screen shown in this illustration.

1. Startup
2. Basic Information
3. Drive Time Systems
4. Vehicle Operations
5. Maintenance
6. Infotainment
7. User Settings
8. Quick Access Systems (if available)

Fig. 3.9, ICUC Top-Level Menu Categories and Navigation

The Speed screen shows the current vehicle speed as well as temperature, odometer and PasSmart information. See **Fig. 3.9**

The Driving Assistance screens, depending on systems installed, show lane departure warnings, adaptive cruise control, active lane assist, traffic sign display, and/or side guard assist. See **Fig. 3.12**.

The Eco Driver Feedback screens display bar graphs measuring cruise control usage, smooth acceleration, and gentle braking. For fuller explanation, see the Digital Instruments: ICUC section.

Depending on systems installed, video is recorded when active safety systems are engaged or unsafe driving conditions are detected.

Vehicle Operations Screens

There are currently five top-level menu options under Vehicle Operations:

- Gauges
- Diesel Particulate Filter
- Tire Pressure Monitoring
- Locks
- Vehicle Settings

For information on gauge screens and Tire Pressure Monitoring see "Instruments and Systems: ICUC" in this chapter. Information on diesel particulate filter monitoring is covered in chapter **Chapter 14** Emissions and Fuel Efficiency. Information on Transmission Prognostics is covered in **Chapter 17** Automated and Automatic Transmissions. For information on Locks see **Chapter 19** Drive Axles.

The Vehicle Settings screen provides access to vehicle system settings such as cruise control, transmission, attention assist, and idle adjust. See **Fig. 3.13**

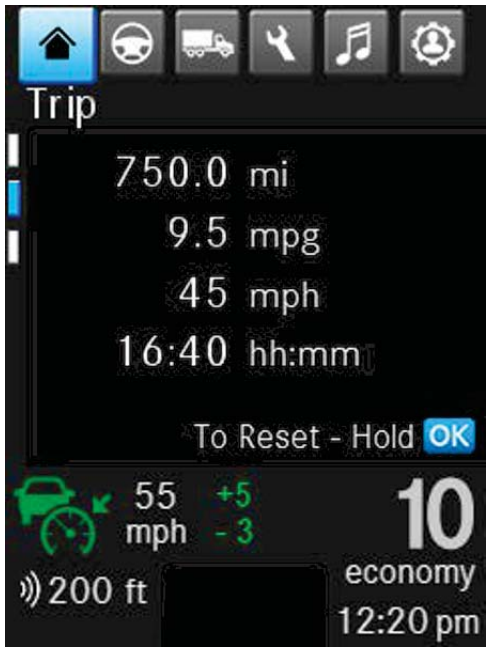


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Fig. 3.10, Basic Information: Trip Report

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Fig. 3.11, Basic Information: Trip Leg Report

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Fig. 3.12, Drive Time Systems: Driver Assistance

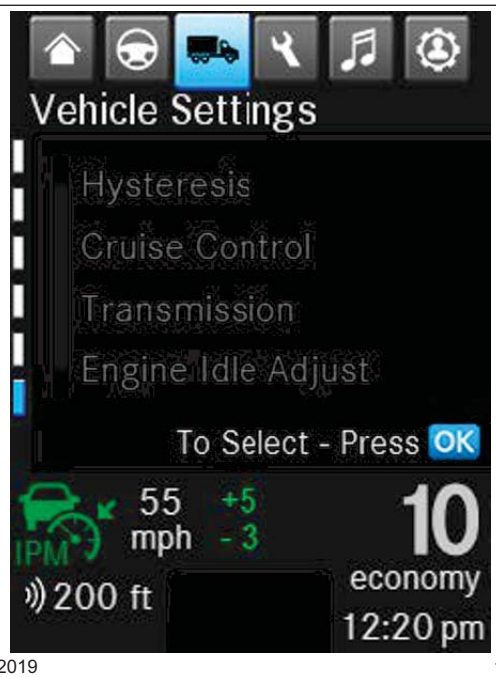

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Fig. 3.13, Vehicle Operations: Vehicle Settings

ICUC Maintenance Screens

There are currently five top-level menu options under Maintenance:

- Alerts
- Diagnostics
- Engine Maintenance
- Trans Prognostics
- Maintenance System

The maintenance screens are used to retrieve fault codes and other diagnostic and service information pertaining to the vehicle.

The Alerts screens show all active notices, cautions, and warnings. See **Fig. 3.14**.

Fault codes are color-coded to indicate the severity of the fault. Red indicates a condition that may pose a threat to control of the vehicle. Amber indicates a condition that may result in damage to vehicle components or derating of engine power. Blue, grey, and green are used to indicate component status.

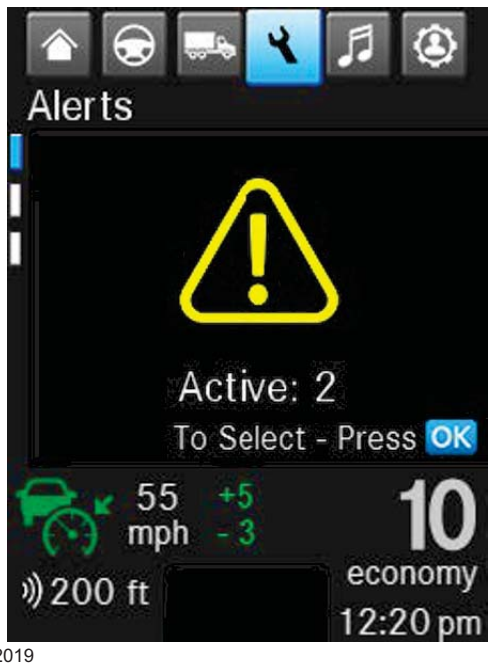


Fig. 3.14, Maintenance: Alerts

The Diagnostics screens show active diagnostic trouble codes and if a software update is available. See **Fig. 3.15**.

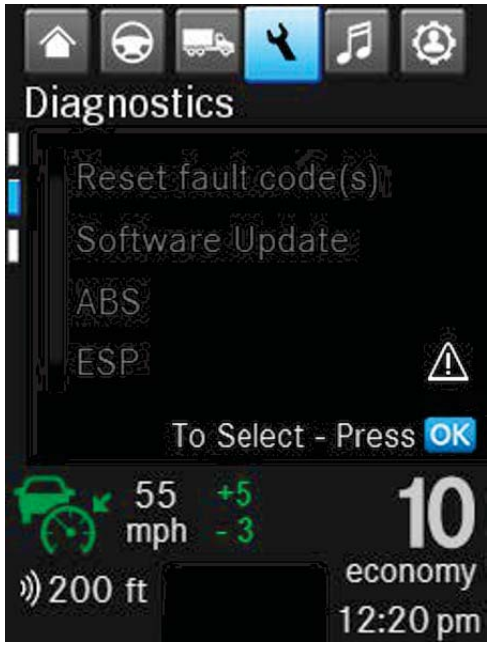


Fig. 3.15, Maintenance: Diagnostics

The Engine Maintenance screen shows engine hours. See **Fig. 3.16**.

The Maintenance System screens give information about when maintenance is required. See "Instruments and Systems: ICUC" in this chapter for more details.

ICUC User Settings Screens

The ICUC Setting Options List screens (see **Fig. 3.17**) allow the driver to choose the following:

- Dash Brightness
- Lighting Settings
- Units Settings
- Time Settings
- Gauge Settings
- Key Alert Settings
- Language Settings
- Safety System Settings

Dash Brightness allows for setting the brightness of the dashboard display.

Lighting Settings controls if the courtesy and entrance lights are on and how long they stay on.

Fig. 3.16, Maintenance: Engine Maintenance

Unit Settings controls the measurement values for speed, distance traveled, temperature, pressure, and following distance.

Time Settings controls the time display format (12h/24h) and local time zone offsets.

Gauge Settings allow the driver to change the order in which gauges are displayed on the gauge screens.

Key Alert Settings control if the key alerts is on or off.

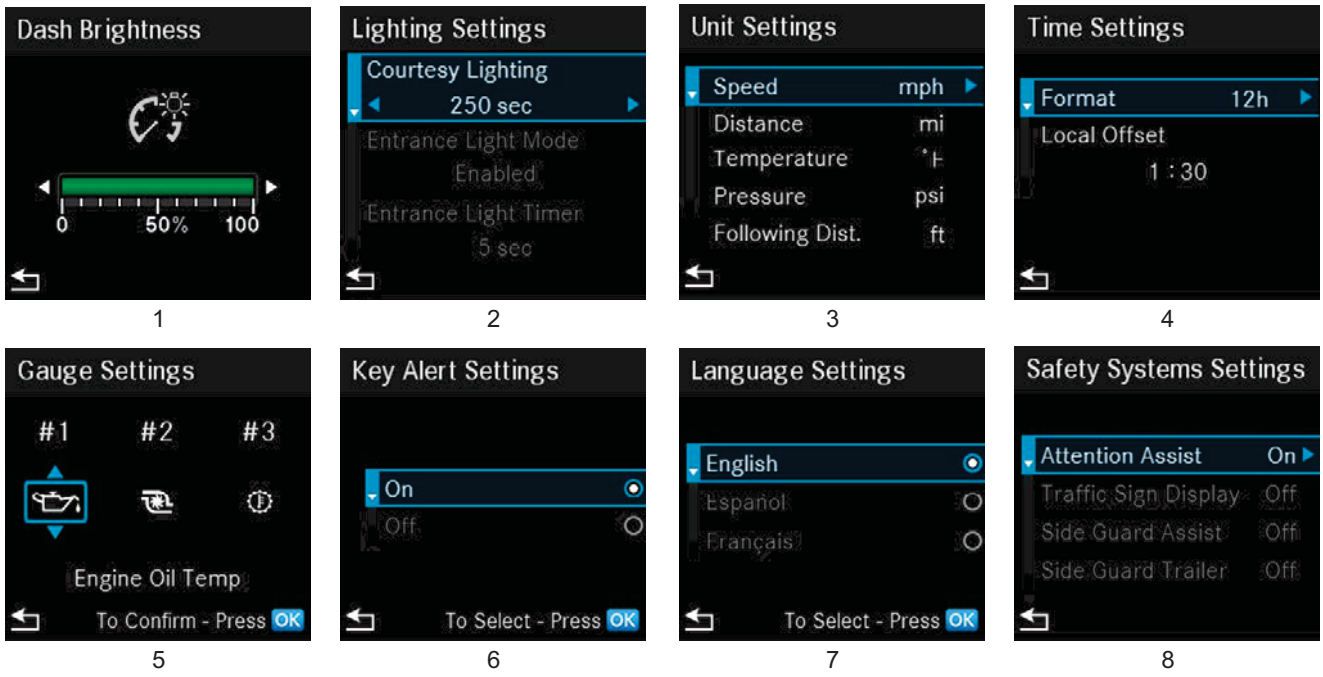
Language Settings allow the driver to set the ICU language to be in either English (American), Spanish (Mexican), or French (Canadian).

Safety System Settings allow the driver to turn safety features such as Attention Assist, Traffic Sign Display, Side Guard Assist, and Side Guard Trailer on or off.

ICUC Quick Access Systems Screens

Quick Access Screens are activated by a button on the right hand steering wheel pod. There are up to six top-level menu options:

- Hysteresis



1. Dash Brightness
2. Courtesy and Entrance Light Timing
3. Unit Settings
4. Time
5. Gauge Positioning
6. Key Alert
7. Language
8. Safety Systems

Fig. 3.17, ICUC User Settings Screens

- Cruise Control
- Transmission
- Engine Idle Adjust
- Power Take Off
- Optimized Idle

Hysteresis allows the driver to set the overspeed and underspeed in mph (km/h). See **Fig. 3.18**.

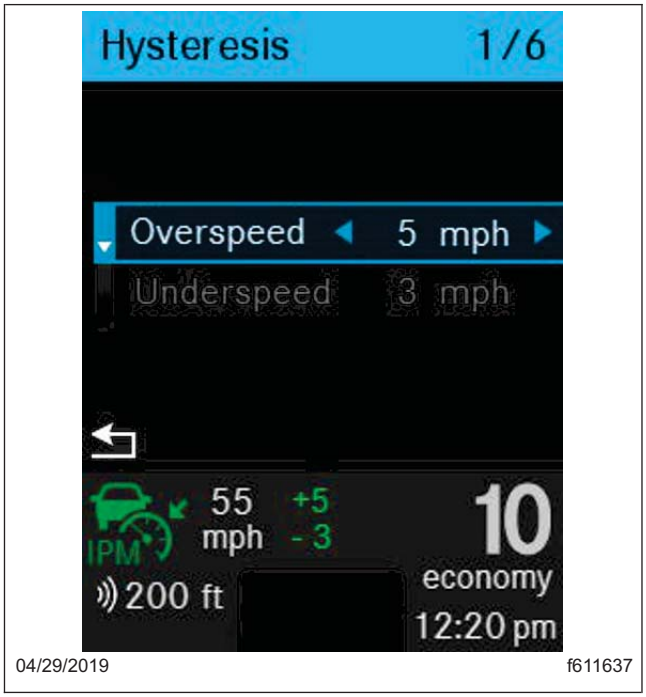


Fig. 3.18, Quick Access Screen: Hysteresis

Cruise Control allows the driver to control such features as active lane assist, lane position, and following distance. See **Fig. 3.19**. For more information see "Instruments and Systems: ICUC" in this chapter.

Transmission allows the driver to turn the creep mode or eCoast feature on or off. See **Fig. 3.20**. See "Instruments and Systems: ICUC" in this chapter for more information.

Engine Idle Adjust allows the driver to adjust or deactivate the engine idle. It is not available when the vehicle is in motion. See **Fig. 3.21**. For more information see "Instruments and Systems: ICUC" in this chapter.

Power Take Off allows the driver to customize the amount of power being transferred. See **Fig. 3.22**.

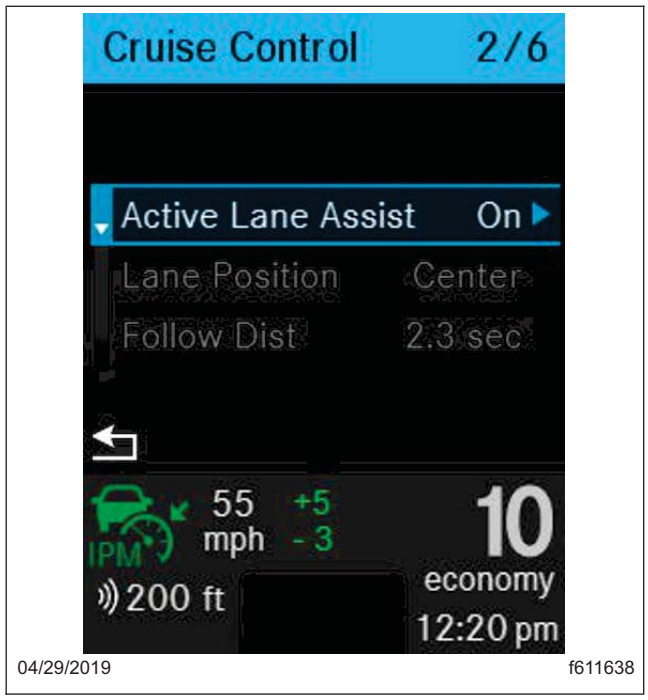


Fig. 3.19, Quick Access Screen: Cruise Control

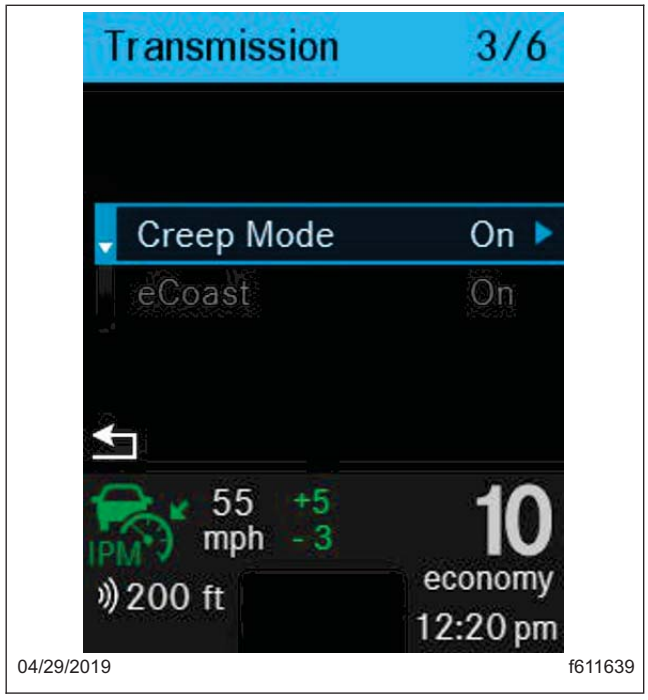


Fig. 3.20, Quick Access Screen: Transmission

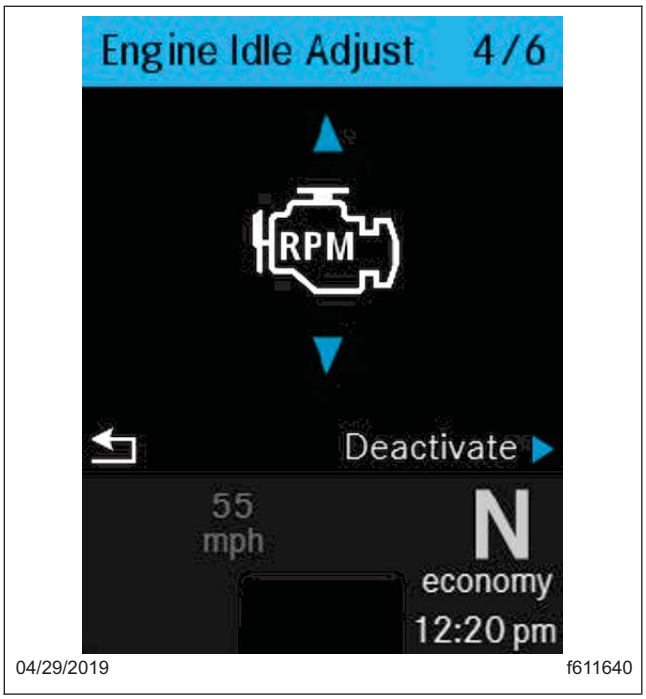


Fig. 3.21, Quick Access Screen: Engine Idle Adjust

Fig. 3.22, Quick Access Screen: Power Take Off (PTO)

The Optimized Idle screens allow the driver to choose the optimized idle mode and enable or disable the feature. For more information see "Instruments and Systems: ICUC" in this chapter

Digital Gauges and System Monitors: ICUC

ICUC Gauges

In the ICUC there are six digital gauges and three sets of system screens for the Diesel Particulate Filter (DPF), Eco Driver Feedback (EDF), and the Tire Pressure Monitoring System (TPMS).

The six digital gauges under the Vehicle Operations menu of the driver display are:

- Engine Oil Temperature
- Turbo Boost Pressure
- Transmission Oil Temperature
- Front Axle Oil Temperature
- Rear Axle Oil Temperature
- Application Air Pressure

In the ICUC, if a value measured by a digital gauge exceeds the normal range, an amber caution or red danger popup message will appear. However the bar graph color will remain green and the bar graph icons will remain white.

NOTE: The order of ICUC digital gauges and therefore the screen on which they display can be changed under Gauge Settings under Settings.

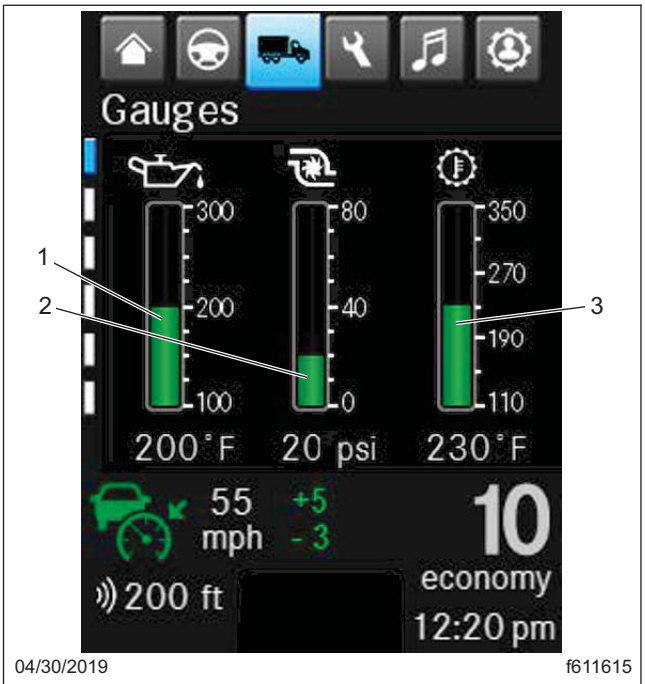
Engine Oil Temperature Gauge

NOTICE

A sudden increase in oil temperature that is not caused by a load increase may indicate mechanical failure. Bring the vehicle to a safe stop and investigate the cause to prevent further damage. Do not operate the engine until the cause has been determined and corrected.

During normal operation, the optional engine oil temperature gauge (**Fig. 3.23**) should read in the following temperature range:

- 200 to 260°F (93 to 126°C) for Detroit and Cummins engines



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1. Engine Oil Temperature
2. Turbo Boost Pressure
3. Transmission Oil Temperature

Fig. 3.23, Digital Oil and Pressure Gauges - ICUC

Under heavy loads, such as when climbing steep grades, temperatures that exceed the normal oil temperature range for a short period are not unusual. If the temperature returns to normal when the load decreases, there is no problem.

Turbocharger Boost Pressure Gauge

The turbocharger boost pressure gauge (**Fig. 3.23**) indicates the pressure in the intake manifold, in excess of atmospheric pressure, being created by the turbocharger.

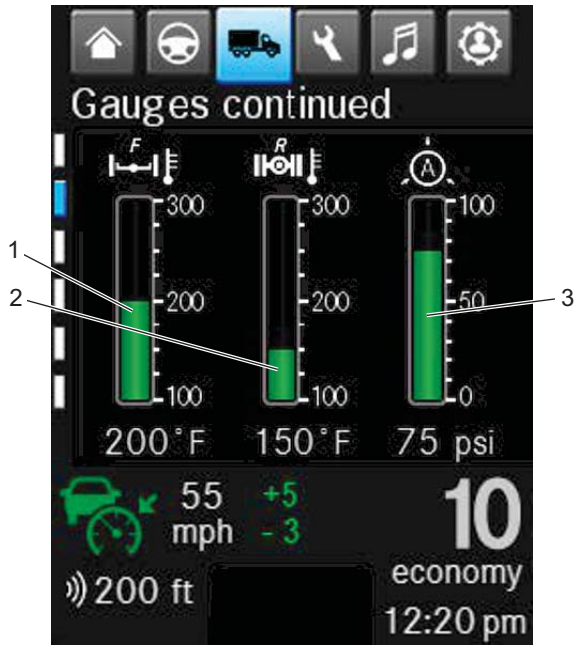
Transmission Oil Temperature Gauge

The transmission oil temperature gauge, (**Fig. 3.23**) measures the transmission lubricant operating temperature. Temperatures vary by application, but the transmission fluid temperature gauge reading should not exceed 250°F (121°C).

NOTICE

A sudden increase in transmission fluid temperature that is not caused by a load increase may indicate mechanical failure. Bring the vehicle to a safe stop and investigate the cause to prevent further damage. Do not operate the vehicle until the cause has been determined and corrected.

Under heavy loads, such as when climbing steep grades, temperatures that exceed the normal oil temperature range for a short period are not unusual. If the temperature returns to normal when the load decreases, there is no problem.



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1. Front Axle Oil Temperature
2. Rear Axle Oil Temperature
3. Application Air Pressure

Fig. 3.24, Digital Oil and Pressure Gauges - ICUC

Drive Axle Oil Temperature Gauges

NOTICE

A sudden increase in oil temperature that is not caused by a load increase may indicate mechanical failure. Bring the vehicle to a safe stop and investigate the cause to prevent further damage. Do not operate the vehicle until the cause has been determined and corrected.

During normal operation, drive axle oil temperature gauges (see **Fig. 3.24**) should read as follows:

- 160 to 220°F (71 to 104°C) for Detroit Classic Model 2, 4, and 6 axles.

- 160 to 329°F (71 to 165°C) for Detroit New Final Drive (NFD) axles.
- 160 to 220°F (71 to 104°C) for Meritor™ drive axles.
- 180 to 200°F (82 to 93°C) for Dana Spicer® drive axles.

Under heavy loads, such as when climbing steep grades, temperatures that exceed the normal oil temperature range for a short period are not unusual. If the temperature returns to normal when the load decreases, there is no problem.

Application Air Pressure Gauge

The application air pressure gauge (**Fig. 3.24**) registers the air pressure being used to apply the brakes. The gauge will not register air pressure until the foot brake pedal is depressed or the trailer hand brake is applied.

DEF and Diesel Particulate Filter Monitoring

See **Chapter 14** Emissions and Fuel Efficiency for details of Diesel Particulate Filter and DEF level monitoring.

Eco Driver Feedback

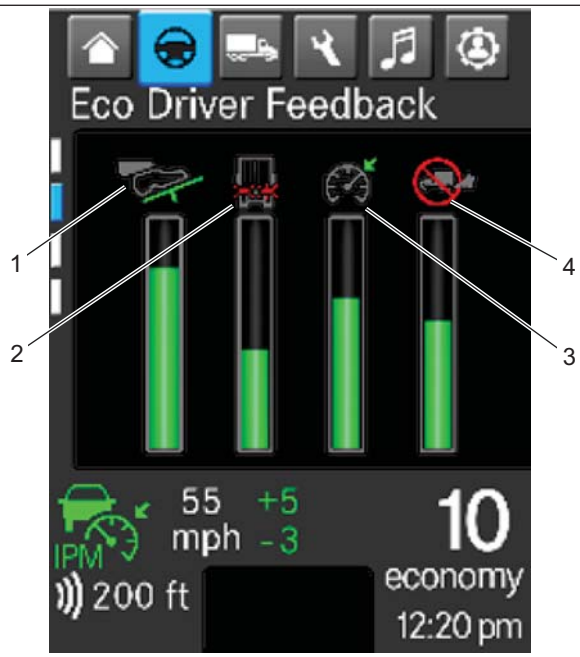
Eco Driver Feedback encourages a driver to make economical driving a habit with the goal of saving fuel and reducing wear.

Eco Driver Feedback gauges, located under the Drive Time Systems menu, display a driver's performance in four categories: gentle braking, smooth acceleration, cruise control usage, and time spent idling.

The ICU bar graphs display driver performance since the start of the vehicle. Performance values are newly calculated with each vehicle start. See **Fig. 3.25**.

Examples of driving behavior that increases or decreases the amount of green in each column are as follows:

- Time in cruise control increases the Cruise Control Usage value.
- Failure to engage cruise control after the Use Cruise Control popup appears decreases the Cruise Control Usage value



1. Cruise Control Usage
2. Smooth Acceleration
3. Gentle Braking

Fig. 3.25, Eco Driver Feedback Screen - ICUC

- Pumping the accelerator pedal decreases the Smooth Acceleration value.
- Keeping the speed steady with cruise control off increases the Smooth Acceleration value.
- Sudden braking outside of an urban environment decreases the Gentle Braking value.
- No incidences of sudden breaking over time increases the Gentle Braking value.

Tire Pressure Monitoring System

The Tire Pressure Monitoring System (TPMS) screens display tire pressure, temperature, and sensor battery status. See **Fig. 3.26**. Maintaining correct tire pressure increases fuel economy. Sustained high tire temperature can cause a tire to deteriorate, leading to tread separation and blowouts.

Tire pressure can be displayed in psi or bar units. Temperature can be displayed in °F or °C. Units of measure are set under Settings. Sensor battery status is displayed as a bar chart inside the outline of a battery.

The TPMS will change the color of the tire on the ICUC screen if the tire pressure or temperature is

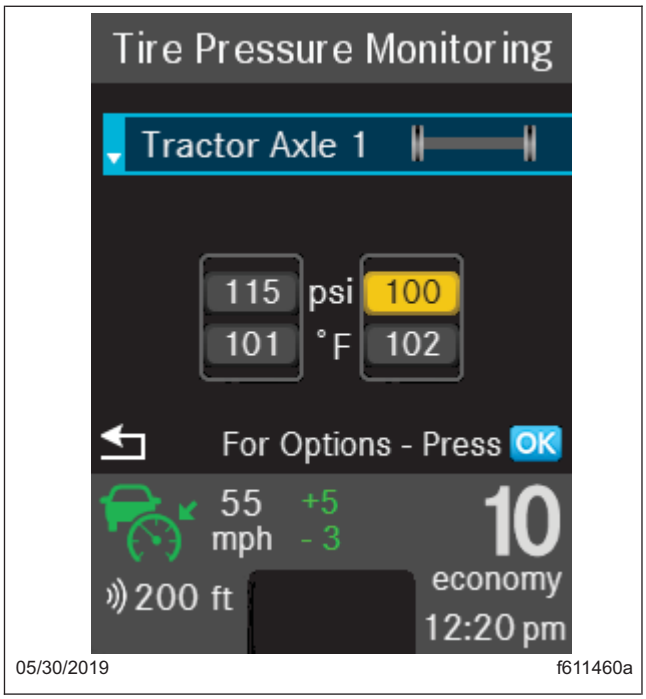


Fig. 3.26, Vehicle Operations: TPMS Axle Tire Pressure, Temperature, and Sensor Status

either too high or too low. See **Fig. 3.26**. It will also change the color of the sensor battery icon if the power levels are too low. Amber indicates a condition that may result in damage. Red indicates a condition that may pose a threat to the vehicle.

Tire pressure monitoring settings are part of the TPMS. Threshold temperatures and what triggers alerts can be set on this screen.

Other ICUC Gauges and Measurements

In addition to the two screens of gauges displayed under the Vehicle Operations menu described above, the ICUC driver display communicates a number of values related to vehicle operations. They are listed in alphabetical order below.

Alerts

The Alerts screen stores the current active alerts.

Alerts are color-coded to indicate severity. Red indicates a condition that may pose a threat to control of the vehicle. Amber indicates a condition that may result in damage to vehicle components or derating of engine power. Grey is used for notices.

Battery Voltage

The Home screen in the ICU displays the vehicle charging system voltage in the bottom left. By monitoring this number, the driver can stay aware of potential battery charging problems and have them fixed before the batteries discharge enough to create starting difficulties.

The Home screen will normally show approximately 13.7 to 14.1 volts when the engine is running. The voltage of a fully charged battery is 12.7 to 12.8 volts when the engine is off. Battery voltage under 12.0 volts is considered a low battery, and a completely discharged battery will produce only about 11.0 volts.

If the Home screen shows an undercharged or overcharged condition for an extended period, have the charging system and batteries checked at an authorized Freightliner service facility.

Diagnostics

The Diagnostics screen communicates fault codes and other diagnostic information about the vehicle.

Fault codes are color-coded to indicate the severity of the fault. Red indicates a condition that may pose a threat to control of the vehicle. Amber indicates a condition that may result in damage to vehicle components or derating of engine power. Grey indicates a condition that may affect fuel efficiency or vehicle handling.

Engine Maintenance

Shows the number of hours the engine has been operating.

Maintenance System

NOTE: the wrench icon is indicative of service, not of something that needs to be fixed.

Standard messaging is based on the number of miles (km) driven or time passed since the last service.

Predictive maintenance information is calculated based on these factors as well as engine and transmission load and oil temperature.

Currently, predictive maintenance information is given for engine oil, transmission oil, and axle oil changes. By taking driving conditions into account, predictive maintenance provides more accurate intervals for fluid changes.

Just before the service interval ends, a message that maintenance is due will appear. See **Fig. 3.27**.

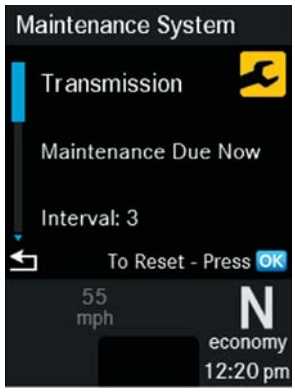


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Fig. 3.27, Maintenance System Status - ICUC

When the service interval is reached, a pop-up notice that maintenance is due will appear with every key cycle.

When the service interval is overdue, the color of the wrench icon on the maintenance screen will change from white to amber and the message will change to Maintenance Overdue. This cautionary pop-up will continue to appear with every key cycle.

Each service interval must be reset in the maintenance system when service is performed to provide for accurate future service intervals and to turn off pop-up messaging.

The reset button for maintenance system screens will not appear until the vehicle has been driven 6.2 miles and the engine has run for fifteen minutes.

Maintenance system information and service recommendations can also be viewed in the **Detroit Connect** portal. Information on the portal is updated every seven days.

Transmission Prognostics

The transmission prognostics screen is only available for Allison transmissions. It displays information on the transmission health status (oil filter status, oil level, and oil life). If transmission health falls below acceptable limits, a message will pop-up on the driver display.

NOTE: For a valid oil level measurement, the vehicle must be stopped on a level surface with the transmission in neutral (N).

Suspension Air Pressure

The ICUC may display four vehicle air suspension yellow caution alerts.

These include Suspension Lowered (**Fig. 3.28**) and Suspension Raised (**Fig. 3.29**) alerts indicating that the current rear suspension height is either below or above the normal ride height.

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Fig. 3.28, Suspension Lowered Alert - ICUC

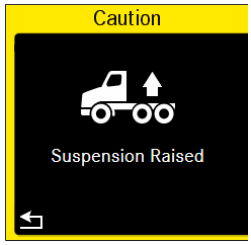

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Fig. 3.29, Suspension Raised Alert - ICUC

ECAS Problem Detected alert (**Fig. 3.30**) indicates the electronically controlled air suspension system has an active fault.

A flashing Load Transfer alert (**Fig. 3.31**) indicates the ECAS system is applying the maximum available vehicle load on the drive axle up to the maximum allowable limit determined by the gross axle weight rating (GAWR). Load transfer mode automatically deactivates when the vehicle reaches 45 mph (72 kmh).

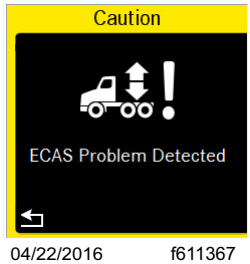

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Fig. 3.30, ECAS Problem Detected Alert- ICUC

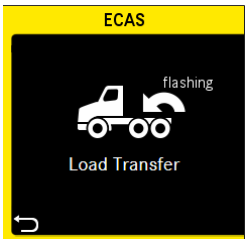

Fig. 3.31, Load Transfer Alert - ICUC

ICUC Vehicle Operations: Vehicle Settings

The ICUC Vehicle Operations menu has a submenu called Vehicle Settings. Settings and controls for features installed on the vehicle can be found here. These may include:

- Cruise Control
- Transmission
- Attention Assist
- Engine Idle Adjust
- Optimized Idle

Many of these may also be accessible under the Quick Access Systems menu.

Cruise Control

Settings for cruise control include setting the overspeed and underspeed in mph or kph and setting the following distance in seconds. For full instructions on standard Cruise Control, see **Chapter 7** Driver Assistance Features.

Transmission

The Transmission vehicle settings menu allows the driver to turn Creep Mode and eCoast on or off.

Creep mode is a DT12 Transmission feature that helps the driver move the vehicle at slow speeds by slipping the clutch to reduce torque to the wheels. It is designed to improve maneuverability in situations like parking, docking, and slow traffic.

To activate Creep mode for the first time within the current driving cycle, press the accelerator pedal to launch the vehicle, thereby fully engaging the clutch. Stopping the vehicle with the service brake will not cause the vehicle to exit Creep Mode. While in Creep Mode, a lower gear may be selected and the transmission can be upshifted or downshifted with the shifter stalk.

The eCoast feature is standard on DT12 engines. On a downslope the clutch will momentarily disengage so the vehicle maintains momentum while the engine idles. Engine rpms will drop to 600 in eCoast mode. Input from the driver will cause the vehicle to exit eCoast mode.

For a fuller coverage of Creep and eCoast mode see **Chapter 17** Automated and Automatic Transmissions.

Attention Assist

The Attention Assist feature is intended to support the driver by calling attention to drowsy driving behavior and thereby encouraging rest.

The Attention Assist feature estimates the driver's attention level based on lane keeping and steering behavior and activity levels in using turn signals, retarder, and kick down operations.

When attention levels drop below a certain threshold, an audible warning will sound, a visual warning will appear on the ICU, and lane departure warnings will be activated if previously disabled.

Engine Idle Adjust

This feature allows the increase or decrease of the base engine idle speed. Increasing the base engine idle might be necessary to generate enough power to operate accessories.

The following conditions must be met to the engine idle speed to be adjusted:

- Engine is running
- Vehicle is at a standstill
- Transmission is in neutral

Optimized Idle

Optimized Idle reduces idle time by automatically stopping and restarting the engine. Besides saving fuel, it helps keep the batteries charged while maintaining engine and cab temperature.

The following conditions must be met for the optimized idle to function:

- Vehicle in neutral gear
- Park brake set
- Hood latched

- Sleeper fan on

Optimized idle can be started with the engine running or the engine off.

With the key on, go to Vehicle Settings and scroll down to Optimized Idle. Press OK.

To enable optimized idle, press okay again. A screen will appear saying the default battery mode is on and interior comfort mode is off.

If you want to optimize the environment of the sleeper section, turn on comfort mode. Press the right hand arrow in the left hand switch pod to turn interior comfort mode on and then press OK.

The vehicle will go into standby mode, an under hood alarm will briefly sound, and the engine will crank and achieve 900 rpm. The ICUC screen will then state that it is in interior comfort mode and the engine and air conditioning/fan will run until it achieves the temperature requested by the driver. The engine will then shut down.

Optimized idle can be shut off by ICUC controls or pressing the brake. If the sleeper fan is turned off, optimized idle will not shut down but the engine will.

For a fuller description of Optimized Idle, see **Chapter 13** Optional Engine Systems.

Infotainment: ICUC

Safety Information

⚠ WARNING

There is a risk of distraction from operating integrated communication equipment while the vehicle is in motion.

A driver can be distracted from the traffic situation if operating communication equipment integrated in the vehicle when driving, possibly causing loss of control of the vehicle.

Only operate this equipment when the road and traffic situation permits, otherwise stop and operate the equipment with the vehicle stationary.

The driver must observe the legal requirements of the country the vehicle is driving through when operating the system.

Wearing polarized sunglasses may impair or limit your ability to read the display.

Navigation and Infotainment Reception

Features of both the navigation and infotainment system depend on cellular and satellite reception. In certain situations, such as driving through tunnels, mountains, or parked in multistory parking lots, reception may be impaired due to interference or there may be no reception at all.

General ICUC Infotainment Information

The ICUC infotainment system options consist of:

- AM/FM Radio
- Satellite Radio: SiriusXM®
- Weather Radio
- CD player
- USB & AUX input
- Smart phone Integration

ICUC Infotainment Screens

Use the Menu Up and Menu Down to navigate the infotainment screens:

1. Audio (AM/FM/Weather, SiriusXM, CD, USB, AUX). See **Fig. 3.32**.
2. Telephone, showing signal strength, battery level, phone number, and active call length. See **Fig. 3.33**.

ICUC Audio Features

Radio and Other Audio Sources

NOTE: It is a standard safety feature for the radio to mute during safety related events; starting in June 2021 Pana-Pacific/Aptiv radios installed in Freightliner vehicles will automatically mute when the vehicle is in reverse gear.

Radio stations, presets, and other audio sources can be accessed under Audio.

1. Select the single bar note icon to open the infotainment menu. The last infotainment menu accessed will open.
2. If not on the Audio screen, press the Up arrow in the left-hand steering wheel switch pod to move to this screen.

Fig. 3.32, Infotainment: Radio

3. Press OK on the left-hand steering wheel switch pod to access Audio Settings.
4. Use the Right and Left arrows to navigate from one audio source to another—from radio to USB for example.
5. Use the Up and Down arrows to navigate through an audio options list of choices. Choices can vary depending on the number of audio sources available and saved presets.
6. Press OK on the left-hand steering wheel switch pod to select an audio source. The audio source is selected.
7. Press the Back button to return to the main Audio screen.

Weather Radio (WX)

Weather Radio is an option under Audio.

Weather radio channels WX1 through WX7, corresponding to frequencies 162.400 MHz though 162.550 MHz, are the standard weather radio channels used by NOAA Weather Radio in the United States, Weatheradio Canada/Radiométéo Canada in Canada, and SARMEX in Mexico. Each system consists of a nationwide network of radio stations broadcasting official weather warnings, watches, advisories, forecasts and other non-weather related hazard information including news on natural disasters (earthquakes, avalanches, floods), environmental hazards (oil spills, chemical releases), and public safety messages (AMBER alerts, network outages). All services operate 24 hours a day, 7 days a week.

The average range for reception from a transmitter is approximately 40 miles (60 km). The National Weather Service operates more than 1000 transmitters.

Adjusting the Volume

Volume can be adjusted up using the VOL+ and down using the —VOL switches in the left-hand steering wheel switch pod.

ICUC Telephone Features

Telephone is the second screen under infotainment. The main telephone screen shows the connected phones current signal and battery strength. If a call is in progress it will show the phone number and call length.

Telephone Settings

Fig. 3.33, Infotainment: Active Call

Telephone settings displays the phone's call history, contacts, and any contact presets.

1. Select the single bar note icon to open the infotainment menu. The last infotainment menu accessed will open.
2. If not on the Telephone Screen, use the Down arrow in the left-hand steering wheel switch pod to move to this screen.
3. When on the Telephone screen, select OK on the left-hand steering wheel switch pod to access Telephone Settings.
4. Use the Right and Left arrows to navigate from one telephone setting to another—from contacts to missed calls for example.
5. Use the Up and Down arrows in the left-hand steering wheel switch pod to navigate through the current Telephone Settings list of choices.
6. Press OK on the left-hand steering wheel switch pod to choose an option.
7. Press the Back left-hand steering wheel switch pod to return to the main screen.

Analog Instruments

Physical instruments are listed here in alphabetical order. Some are optional and therefore not found in every vehicle. Digital instruments and gauges are described in their ICU section.

Air Intake Restriction Gauge

The air intake restriction gauge indicates the vacuum on the engine side of the air cleaner. On standard installations, it is mounted on the air intake duct in the engine compartment, and has a go/no-go restriction indicator without graduations. See **Fig. 3.34**. As an option, a graduated indicator (**Fig. 3.35**) on the air intake duct or, for easier viewing, a dash-mounted restriction gauge may be installed.

Air intake restriction vacuum is measured in inches of water (inH_2O). For vehicles equipped with a graduated indicator or a restriction gauge on the dash, check the gauge with the engine off. If the yellow signal stays locked in the red zone once the engine is shut down, or is at or above the values shown in **Table 3.1**, the air cleaner element needs to be replaced.

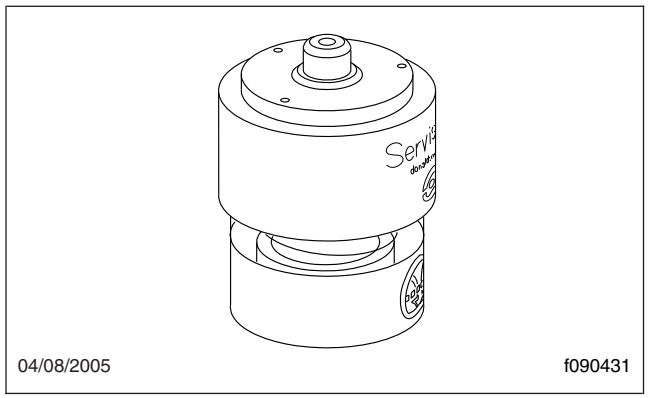

Fig. 3.34, Manual-Reset Air Restriction Indicator, Go/No-Go

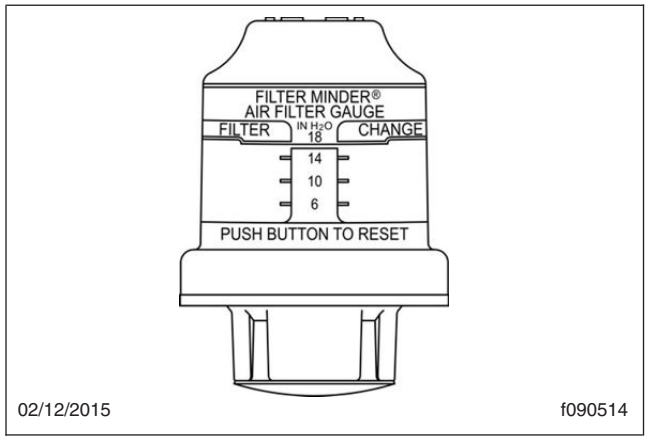

Fig. 3.35, Air Intake Restriction Indicator, Graduated

Air Intake Maximum Restriction Values (inH_2O)	
Engine Make	**GHG14, GHG17, and GHG21 Engines**
Cummins	25
Detroit	18

Table 3.1, Air Intake Maximum Restriction Values

NOTE: Rain or snow can wet the filter and cause a temporary high reading.

Application Air Pressure Gauge

An application air pressure gauge (**Fig. 3.36**) registers the air pressure being used to apply the brakes, and should be used for reference only. The gauge will not register air pressure until the foot brake pedal is depressed or the trailer hand brake is applied.

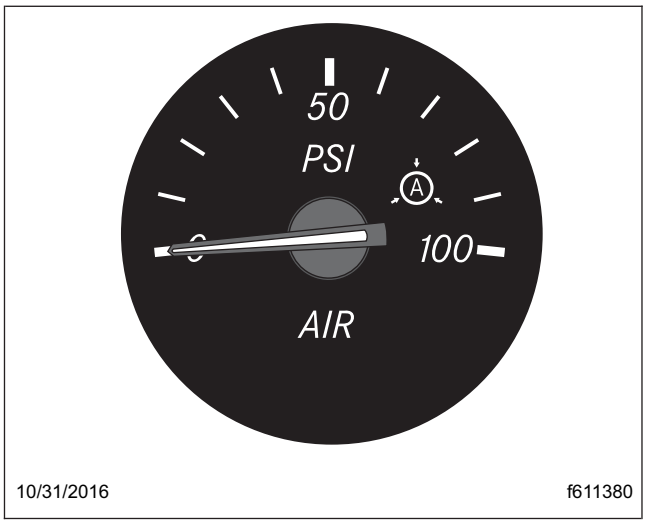

Fig. 3.36, Application Air Pressure Gauge

Coolant Temperature Gauge

NOTICE

A sudden increase in coolant temperature may indicate engine or cooling system failure. Bring the vehicle to a safe stop and investigate the cause to prevent further damage. Do not operate the engine until the cause has been determined and corrected.

During normal engine operation, the coolant temperature gauge should read 175 to 195°F (79 to 91°C). If the temperature remains below 160°F (71°C), inspect the cooling system to determine the cause. See **Fig. 3.37**.

For Detroit engines, if coolant temperature rises above the maximum temperature listed in **Table 3.2**, the CHECK engine lamp will illuminate. If the condition does not improve, the STOP engine lamp will also illuminate and an audible warning will sound. The engine will then derate or shut down, depending on the type of engine protection system installed.

For Cummins engines, the fan will come on when the coolant temperature reaches 215°F (101°C) and the check engine light will illuminate when coolant temperature rises above the maximum temperature listed in **Table 3.2**

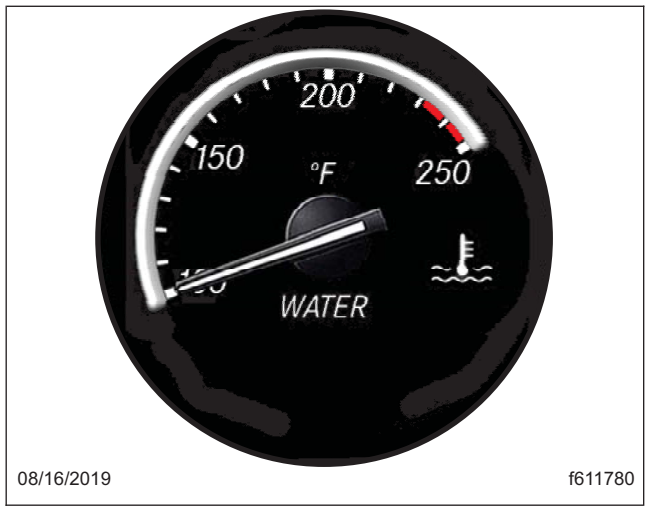

Fig. 3.37, Analog Coolant Temperature Gauge - ICUC

Maximum Coolant Temperature	
Engine Make	**Temperature: °F (°C)**
Cummins	221 (105)
Detroit DD13/DD15/ DD16	234 (112)

Table 3.2, Maximum Coolant Temperature

Drive Axle Oil Temperature Gauges

NOTICE

A sudden increase in oil temperature that is not caused by a load increase may indicate mechanical failure. Bring the vehicle to a safe stop and investigate the cause to prevent further damage. Do not operate the vehicle until the cause has been determined and corrected.

During normal operation, the drive axle oil temperature gauges should read as follows:

- 160 to 220°F (71 to 104°C) for Detroit Classic Model 2, 4, and 6 axles.
- 160 to 329°F (71 to 165°C) for Detroit New Final Drive (NFD) axles.
- 160 to 220°F (71 to 104°C) for Meritor™ drive axles.
- 180 to 200°F (82 to 93°C) for Dana Spicer® drive axles.

Under heavy loads, such as when climbing steep grades, temperatures that exceed the normal oil temperature range for a short period are not unusual. If

the temperature returns to normal when the load decreases, there is no problem. See **Fig. 3.38**.

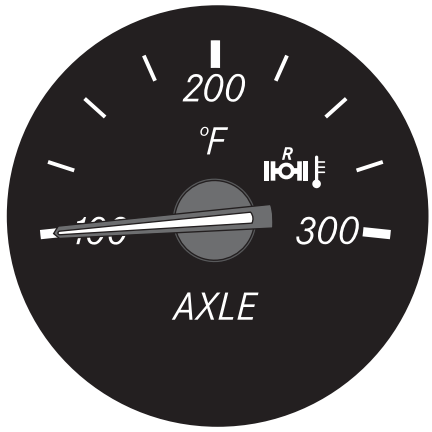

Fig. 3.38, Drive Axle Oil Temperature Gauge (rear drive axle gauge shown)

Engine Oil Pressure Gauge

NOTICE

A sudden decrease or absence of oil pressure may indicate mechanical failure. Bring the vehicle to a safe stop and investigate the cause to prevent further damage. Do not operate the engine until the cause has been determined and corrected.

Except for Detroit Gen 5 DD13 and DD15 engines, the engine oil pressure gauge displays the current engine oil pressure. If engine oil pressure falls below the minimum levels shown in **Table 3.3**, the CHECK engine lamp will illuminate. If the condition does not improve, the STOP engine lamp will also illuminate and an audible warning will sound. The engine will then derate or shut down, depending on the type of engine protection system installed.

Fig. 3.39, Analog Engine Oil Pressure Gauge - ICUC

Minimum Engine Oil Pressure*		
Engine Model	**At Idle Speed:† psi (kPa)**	**At Rated RPM:‡ psi (kPa)**
Cummins	15 (103)	35 (241)
Detroit Gen 5 DD13/DD15	50 (344)	50 (344)
All Other Detroit Engines	14 (97)	55 (350)

* Oil pressures are given with the engine at operating temperature. With the engine cold, oil pressure may be higher. Individual engines may vary from the listed pressures; observe and record pressures when the engine is new to create a guide for checking engine condition.

† Standard idle speed is 600 RPM. Actual engine idle speed can vary ±100 RPM depending on transmission type.

‡ All Detroit heavy-duty engines are rated at 1800 RPM.

Table 3.3, Minimum Engine Oil Pressure

For Detroit Gen 5 DD13 and DD15 engines, the gauge will read a steady 50 psi (344 kPa) with normal engine oil pressure. If the engine oil pressure is low, the CHECK lamp will illuminate and the oil pressure gauge will read 25 psi (172 kPa). If the condition does not improve, the STOP lamp will illuminate, an audible warning will sound, and the gauge will read 0 psi. The engine will then derate or shut down, depending on the type of engine protection system installed.

Engine Oil Temperature Gauge

NOTICE

A sudden increase in oil temperature that is not caused by a load increase may indicate mechanical failure. Bring the vehicle to a safe stop and investigate the cause to prevent further damage. Do not operate the engine until the cause has been determined and corrected.

During normal operation, the optional engine oil temperature gauge should read in the following temperature range:

- 200 to 260°F (93 to 126°C) for Detroit and Cummins engines

Under heavy loads, such as when climbing steep grades, temperatures that exceed the normal oil temperature range for a short period are not unusual. If the temperature returns to normal when the load decreases, there is no problem. See **Fig. 3.40**.

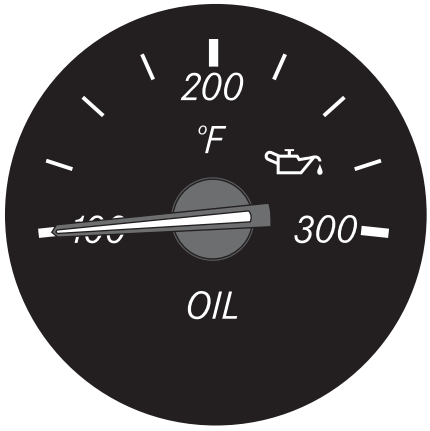

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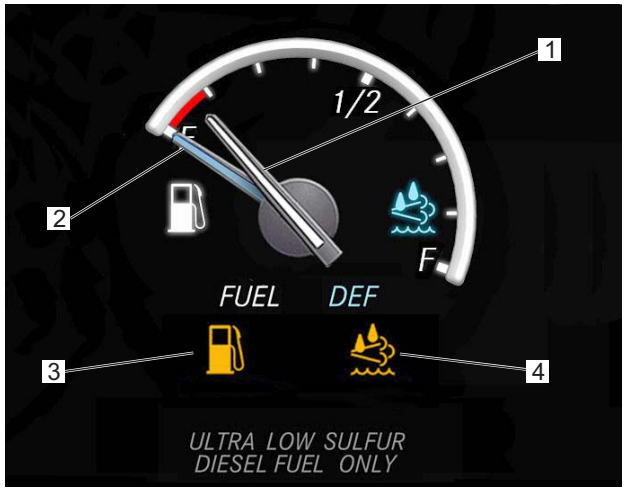
Fig. 3.40, Engine Oil Temperature Gauge

Fuel/Diesel Exhaust Fluid (DEF) Gauge

The fuel and DEF levels can be measured in a dual purpose fuel/DEF level gauge. See **Fig. 3.41**.

The diesel fuel and DEF levels are indicated on the gauge. A low fuel warning lamp illuminates amber when the diesel fuel level registers 1/8th of capacity. The low DEF warning lamp illuminates amber when the DEF level reaches 10% of capacity. See **Chapter 14** Emissions and Fuel Efficiency for details of the DEF gauge functions.



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1. Fuel Gauge Pointer
2. DEF Gauge Pointer
3. Low Fuel Warning Lamp
4. Low DEF Warning Lamp

Fig. 3.41, Fuel/DEF Gauge

Primary and Secondary Air Pressure Gauges

WARNING

If air pressure falls below minimum pressure, the braking ability of the vehicle will be limited. Slow the vehicle down and bring it to a gradual stop. Do not attempt to move the vehicle until air pressure has risen above the minimum level. Moving a vehicle without adequate braking power could cause an accident resulting in property damage, personal injury, or death.

Air pressure gauges register the pressure in the primary and secondary air systems. See **Fig. 3.42**. Normal pressure, with the engine running, is 100 to 120 psi (689 to 827 kPa) in both systems.

NOTE: The low-air warning buzzer only works when the park brake is released. The low-air warning buzzer is silenced when the park brake is set.

If air pressure drops below approximately 70 psi (483 kPa), a warning light illuminates and the driver display shows a warning. A low-air warning buzzer also sounds if the park brake is not set.

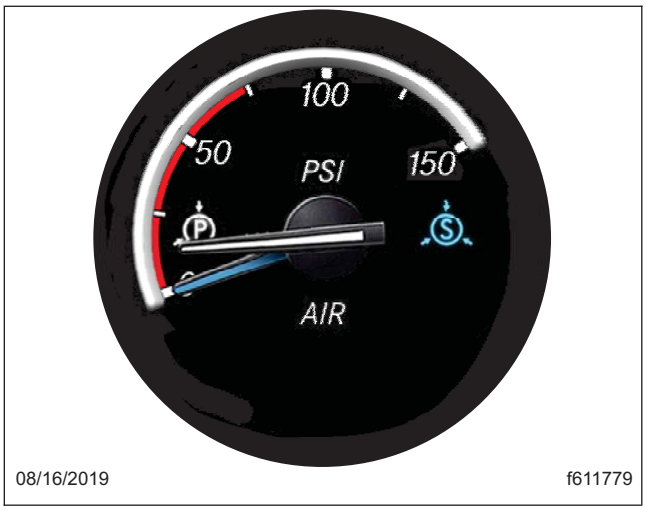

Fig. 3.42, Analog Combined Application Air Pressure Gauge - ICUC

NOTE: If the pressure in both air systems drops below 70 psi, the parking brakes will drag or apply.

Speedometer

Two physical speedometer options are available. The U.S. version of the speedometer (**Fig. 3.43**) registers speed in both miles per hour (mph) and kilometers per hour (km/h), with mph in larger numbers. The metric version of the speedometer face reverses this arrangement, with km/h in larger numbers.

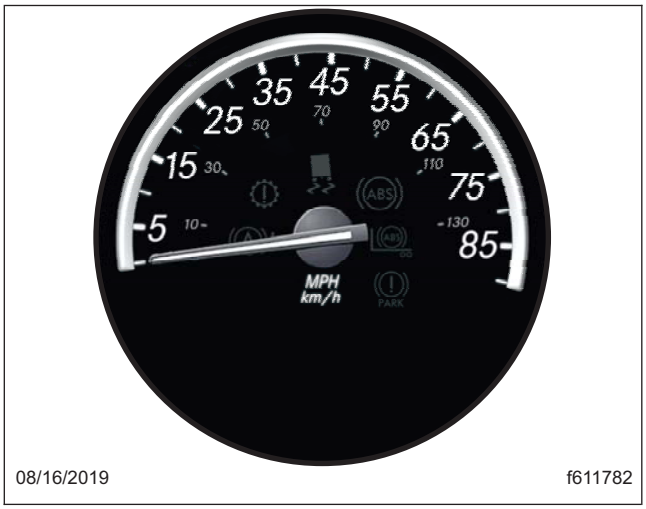

Fig. 3.43, Analog Speedometer - ICUC

Suspension Air Pressure Gauge

A suspension air pressure gauge (**Fig. 3.44**) registers the air pressure applied to the vehicle air suspension.

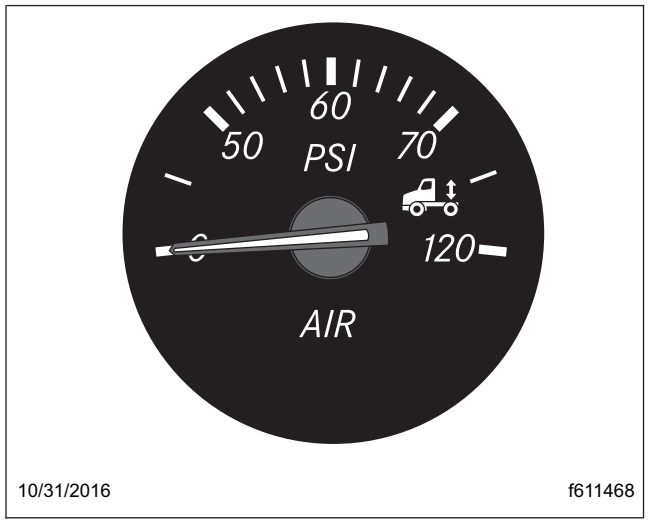

Fig. 3.44, Suspension Air Pressure Gauge

Tachometer

The tachometer or rev counter indicates engine speed in revutions per minute (rpm) and serves as a guide for shifting the transmission and keeping the engine in the appropriate rpm range. The tachometer has only one unit of measurement, 0-2500 rpm. For low idle and rated rpm, consult your vehicle's engine identification plate. See **Fig. 3.45**.

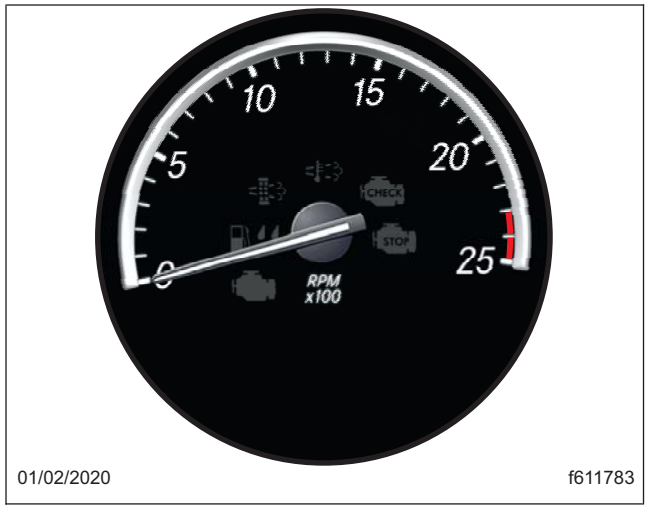

Fig. 3.45, Analog Tachometer - ICUC

Transmission Fluid Temperature Gauge

The transmission fluid temperature gauge, (**Fig. 3.46**) measures the transmission lubricant operating temperature. Temperatures vary by application, but the transmission fluid temperature gauge reading should not exceed 250°F (121°C).

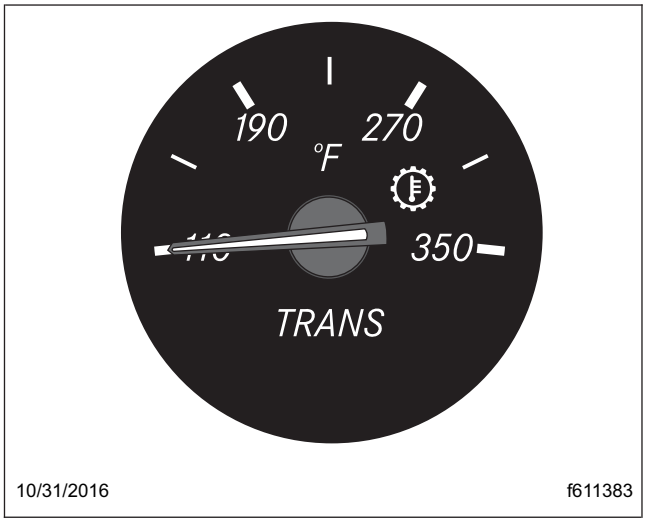

Fig. 3.46, Transmission Fluid Temperature Gauge

NOTICE

A sudden increase in transmission fluid temperature that is not caused by a load increase may indicate mechanical failure. Bring the vehicle to a safe stop and investigate the cause to prevent further damage. Do not operate the vehicle until the cause has been determined and corrected.

Under heavy loads, such as when climbing steep grades, temperatures that exceed the normal oil temperature range for a short period are not unusual. If the temperature returns to normal when the load decreases, there is no problem.

Turbocharger Boost Pressure Gauge

A turbocharger boost pressure gauge (**Fig. 3.47**) indicates the pressure in the intake manifold, in excess of atmospheric pressure, being created by the turbocharger.

Voltmeter

The voltmeter indicates the vehicle charging system voltage when the engine is running and the battery

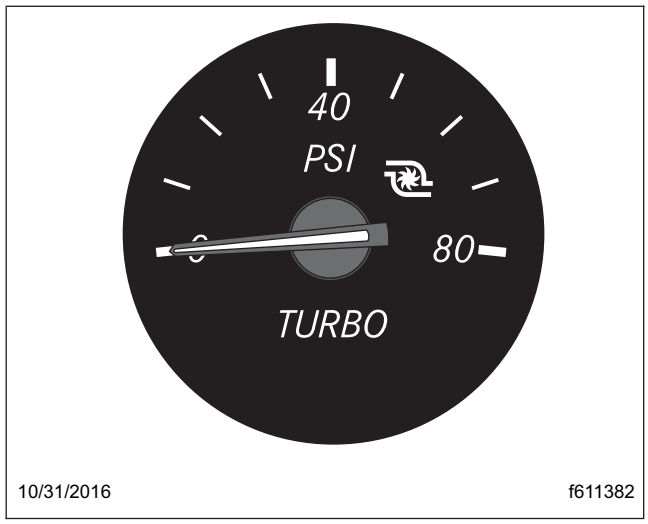

Fig. 3.47, Turbocharger Boost Pressure Gauge

voltage when the engine is off. By monitoring the voltmeter, the driver can stay aware of potential battery charging problems and have them fixed before the batteries discharge enough to create starting difficulties.

The voltmeter will normally show approximately 13.7 to 14.1 volts when the engine is running. The voltage of a fully charged battery is 12.7 to 12.8 volts when the engine is off. Battery voltage under 12.0 volts is considered a low battery, and a completely discharged battery will produce only about 11.0 volts.

If the voltmeter shows an undercharged or overcharged condition for an extended period, have the charging system and batteries checked at an authorized Freightliner service facility.

On a vehicle equipped with a battery isolator system, the voltmeter measures the average voltage of all the batteries when the engine is running. When the engine is off, the voltmeter shows only the isolated battery voltage and does not indicate the voltage of the engine-starting batteries.

Instrumentation Control Unit: ICC5

The instrumentation control unit (ICU) provides the driver with engine and vehicle information. A New Cascadia vehicle can be equipped with either an ICUC or ICC5. See **Fig. 3.48** for a typical ICC5 layout.

This section provides general system and operating instructions for ICC5 components. Following sections provide more detailed information.

06/28/2019 f611580b

1. A-Panel: Driver Display
2. B-Panel: Infotainment Display
3. USB2 Ports

Fig. 3.48, ICC5 Dual Display Screens and USB2 ports

ICC5

The Instrument Cluster Connect 5, or ICC5, has a driver display screen, an infotainment touch screen, a multimedia connection unit with two USB2 ports, optical finger navigation control (OFN) buttons on the steering wheel, and visual and audible warning systems.

The driver display, or A-panel, provides the driver with information about the vehicle status and vehicle systems. The infotainment display, or B-panel, provides access to phone, radio, navigation, and other controls. See "Driver Display: ICC5" in this chapter for details on the A-panel display features. See "Infotainment: ICC5" in this chapter for details on the B-panel display and multimedia connection unit.

Ignition Sequence

When the ignition is turned on, the ICU runs a self-check. Observing the ignition sequence is a good way to ensure the ICU is functioning properly.

IMPORTANT: Do not crank the engine until the ICU self-check is complete.

ICC5

NOTE: There is no Lane Departure Warning audible self-test.

When the ignition is turned on, the following actions should occur in the ICC5:

- The logos for the engine and transmission display on the infotainment screen.
- If installed, an Active Brake Assist (ABA) popup disclaimer appears on the driver display screen.
- If ignition status is set to Adaptive Cruise Control (ACC), the tripmeter and odometer values are shown on the driver display screen.

- If the ignition is set to ON, all ICC5 screens and options are available.

IMPORTANT: If any red or amber warnings do not go out after the self-check completes, take the action outlined in the **Warnings, Indicators, and Messages** section in this chapter, then take the vehicle to an authorized Freightliner service facility as soon as possible.

ICC5 Screen Navigation

NOTE: The brightness of the ICC5 display screens can be adjusted in Settings.

The ICC5 is equipped with two screens. The driver display screen in the dashboard in front of the driver and the infotainment screen.

The driver display screen provides basic vehicle and environmental information. Battery voltage, outside ambient air temperature, current time, and current compass direction are displayed across the top of the screen. Information such as fuel gauge, current speed, gear, odometer reading, and primary and secondary air pressure gauges display on the bottom of the screen. Telltales are displayed at both the top and bottom of the screen.

The driver display screen provides information in two different modes: a base screen layout and a pilot screen layout.

The base screen consists of a digital tachometer/speedometer in the center of the screen. See **Fig. 3.49**.

The pilot screen moves the speedometer and tachometer to the bottom of the screen to provide driving assistance information in the screen's center. See **Fig. 3.50**.

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Fig. 3.50, Driver Display Pilot Screen - ICC5

The infotainment screen is a touch screen and displays the standard gauges as well as information about the cab and chassis. It also serves as the navigation systems screen, provides access to lighting and radio controls, and manages the integration of phone, smart phone and media sources. Each corner of the ICC5 infotainment display is a quick access icon for commonly used features. For an overview of menu category icons on the infotainment screen as well as infotainment quick access icons, see **Fig. 3.51**.

NOTE: Screens may vary depending on vehicle options. Some screens are accessible only when the vehicle is parked.

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Fig. 3.49, Driver Display Base Screen - ICC5

1. Home
2. Status Line
3. Digital Switches
4. Saved Favorites
5. Settings

Fig. 3.51, Infotainment Menu Options, Icons, Status Line - ICC5

ICC5 Steering Wheel Buttons

To navigate features and screens, use the Optical Finger Navigation Control (OFN) buttons on the steering wheel. See **Fig. 3.52**.

The buttons in the left-hand pod control the driver display features. The buttons in the right-hand pod provide access to infotainment features and menus.

ICC5 Touch Screen Operation

IMPORTANT: All keyboard entries are locked when the parking brake is disengaged. Other touch screen options still function.

Tapping

Tap the touch screen to:

- Select a menu item, icon, or entry
- Enter characters with keyboard by tapping on a character buttons.

Single-Finger Swipe

Use a single-finger swipe to:

- Navigate in menus: swipe up, down, left or right.
- Scroll through screens.
- Select a menu item, icon, or entry.

Touching, Holding and Moving

Touch, hold, and move the finger to:

- Select the value on a slider control.

Time and Date

Time and date are set automatically when the vehicle is equipped with a tachograph. When a vehicle is equipped with a tachograph only the time zone can be changed.

ICC5 time and alarm clock settings can be found under the Settings menu. See the appropriate Driver Display section for details.

The correct time and date is required for the following ICC5 functions to work:

- Alarm clock
- Navigation guidance with time-dependent traffic routing
- Calculation of the expected time of arrival
- Maintenance

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A. Menu Buttons—The left Menu button accesses the driver display. The right Menu button accesses the infotainment screen.

1. Cruise Accelerate/Resume
2. Back Button
3. Quick Access System Settings
4. Marker Interrupt**
5. Cruise Cancel
6. Cruise Decelerate/Set
7. Phone Pick-Up
8. Back Button
9. Volume Increment Up
10. Volume Increment Down
11. Mute Button
12. Phone Hang-Up/Reject

** Not available in all markets.

Fig. 3.52, Steering-Wheel-Mounted Optical Finger Navigation Control (OFN) buttons - ICC5

- Prognostics

Software Updates

A software update consists of three steps:

1. Downloading the software.
2. Installing the software.
3. Activating the software by restarting the system.

A popup message and a blue folder will appear in one of the dynamic telltale locations on the driver display when an update is available. In addition the software update option in the diagnostics menu will be active.

The vehicle must be in neutral gear, the parking brake set, and the engine off before a software update can start. Once started, a software update cannot be cancelled.

During the software update process, progress messages will be provided.

If a software update is interrupted, the system will ask if you want to restart the process or inform you that the vehicle cannot be driven until the update is complete. If a software update fails, the system will attempt to revert to the previous version. A notification will appear when a software update has been successfully installed.

Failure to install software updates may make data less secure and/or mean vehicle systems are not operating at their best.

NOTE: An estimation of installation time will be given before the software update starts. Installation can take several minutes. During installation individual functions and controls will not be available or only available to a limited degree.

Driver Display Overview: ICC5

The ICC5 driver display (or A-panel display) is used to communicate information about the current vehicles status and environmental information. The battery voltage, outside ambient air temperature, current time, and current compass direction are displayed across the top of the screen. Information such as fuel gauge, current speed, odometer reading, current

gear, and primary and secondary air pressure gauges display on the bottom of the screen.

The driver display provides information in two different modes: a base screen layout (see **Fig. 3.49**) and a pilot screen layout (see **Fig. 3.50**). What screen displays depends on safety features installed and if the vehicle is in motion.

ICC5 Driver Display Screen

ICC5 Steering Wheel Buttons

To navigate features and screens, use the Optical Finger Navigation Control (OFN) buttons on the steering wheel.

The buttons in the left-hand pod control the driver display features. See **Fig. 3.54.** The buttons in the right-hand pod provide access to infotainment features and menus. See **Fig. 3.55.**

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1. Check Transmission
2. High Exhaust Temperature
3. DPF Status Approaching Full
4. Engine Malfunction
5. Check Engine
6. Stop Engine
7. Turn Indicator Left
8. Blue = High Beams On
9. Tire Pressure: Yellow = Low
10. Turn Indicator Right
11. Engine Brake Engaged
12. Automatic Traction Control (ATC) Active
13. Electronically Controlled Air Suspension (ECAS) Problem
14. Electronic Stability Control (ESC) Lamp
15. Lane Departure Warning (LDW)
16. Unfastened Seat Belt
17. *Dynamic:*Low Engine Oil Pressure
18. *Dynamic:* Software Update Available
19. *Dynamic:* Supplementary Restraint System (SRS) Error
20. *Dynamic:* Aerodynamic Height Control Active
21. Water in Fuel
22. Diesel Exhaust Fluid (DEF) Low
23. Lane Keep Assist (LKA) Active
24. Descent Control Mode Active
25. Gear Teach Mode In Process
26. Low Brake Air Pressure
27. Park Brake Applied
28. Anti-lock Braking System (ABS)
29. ABS Trailer
30. Active Brake Assist (ABA) Not Available
31 Hill Start Aid Active

Fig. 3.53, ICC5 Driver Display Telltale Locations

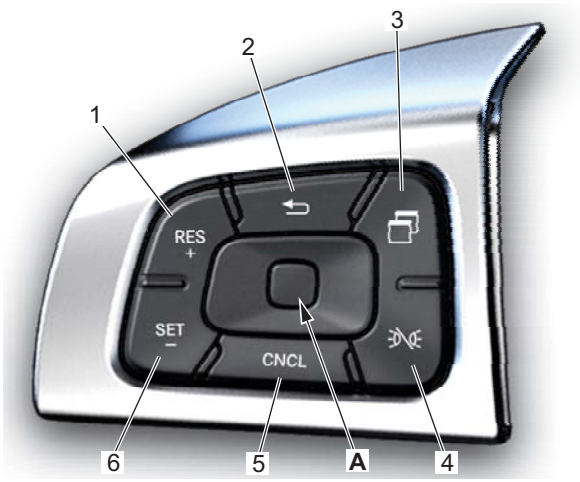
Each telltale has its screen location except for dynamic telltales which are displayed in positions 17-20 and sorted in priority order from right to left—meaning position 20 has the highest priority. See **Fig. 3.53.** If there are more that four dynamic telltales active, only the four highest priority ones are displayed.

For a full list of telltales and their meanings, see **Warnings, Indicators, and Messages** in this chapter.

Basic ICC5 Functions

ICC5 Alert Messages

Alert messages appear on the driver display when certain conditions occur. They include warnings, cautions, and notices that require the driver's attention. Not all alert messages are critical to the operation of the vehicle. More important messages take priority over less important messages. The header text and



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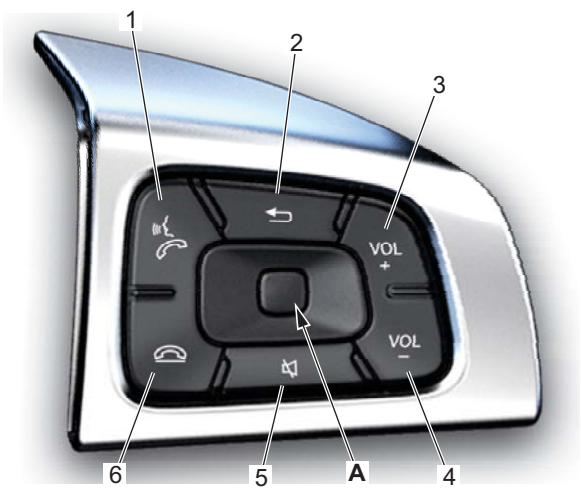
A. Menu Button—Press the button to access instrument panel menus. When the button is pressed, information appears on the driver display screen.
1. Cruise Accelerate/Resume
2. Back Button
3. Quick Access System Settings
4. Marker Interrupt
5. Cruise Cancel
6. Cruise Decelerate/Set

Fig. 3.54, Steering-Wheel-Mounted Left-Hand Switch Pod - ICC5



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A. Menu Button—Press the button to access instrument panel menus. When the button is pressed, information appears on the 10-inch head unit screen.
1. Phone Pick-Up
2. Back Button
3. Volume Increment Up
4. Volume Increment Down
5. Mute Button
6. Phone Hang-Up/Reject

Fig. 3.55, Steering-Wheel-Mounted Right-Hand Pod - ICC5

color indicates the priority of the on-screen message, listed from the highest to the lowest:

- Warning (red)
- Caution (amber)
- Status/Informational (blue, green, white, and grey)

Warnings alert the driver to situations or conditions that may pose a threat to control of the vehicle. Follow all instructions given in the message.

Cautions alert the driver to situations or conditions that may result in damage to vehicle components, or derating of engine power.

Status notices alert the driver to situations or conditions that may improve fuel efficiency or vehicle handling.

ICC5 Time and Date Settings

The following settings can be controlled under Time and Date: selecting a time zone, turning Automatic Summer Time on or off, turning Summer Time on or off, and setting the date and time format.

Automatic Summer Time is another name for automatic daylight saving time. If this is set to on then the controls for Summer Time are unavailable.

Dates can be displayed as: DD.MM.YYYY, MM/DD/YYYY, or YYYY/MM/DD. Selection is made using either/or radio buttons.

Time can be displayed in 12 AM/PM or 24 hour format.

ICC5 Alarm Settings

NOTE: The ability to set the alarm clock and timers is only available when the parking brake is engaged.

Alarm Clock Controls and Features:

- Time of Day
- Repeat

- Audio Source
- Light Alarm

Tapping on a bar at the bottom of the screen in the alarm clock menu switches between alarm clocks and the sleep timers. If alarms have been set, the corresponding icon in the bar indicates this with the number of active alarms shown inside a circle.

Up to fifteen alarms can be shown in a carousel view on the screen. They are sorted from the beginning of the day on the left and the end of the day on the right. If less than fifteen alarms have been set, a Add Alarm icon will be available in carousel display at the far right. If fifteen alarms have been created, the Add Alarm icon is not available.

New alarms are set to be On when created. Alarms can be toggled off and on by pressing on an alarm tile. An active alarm has a red line at the top of the alarm tile.

If an alarm has been set to repeat, the selected days of the week will be listed below the time.

The audio of an alarm can be set under Audio Source. Options include up to 15 preset alarm sounds and any available radio station.

If an alarm includes turning on lights, a light icon is shown on the alarm tile at the bottom right. Wake up lighting can be set to be turned on at 10% to 100% brightness.

Alarms can be edited by pressing on the pencil icon below the alarm tile. To delete an alarm, press on the edit pencil icon and choose Delete.

ICC5 Sleep Timer Settings

The sleep timer's function is to turn off the light(s) and/or music after a certain period of time. The default value is 30 minutes but the sleep timer can be set anywhere from 1 minute to 3 hours and 59 minutes.

ICCC5 Temperature

NOTE: Pay attention to road conditions when air temperatures are near freezing.

In the ICC5 the ambient air temperature displays at the top and slightly to the right on the driver display screen. See **Fig. 3.49.** The temperature can be set to display in °F or °C in Settings.

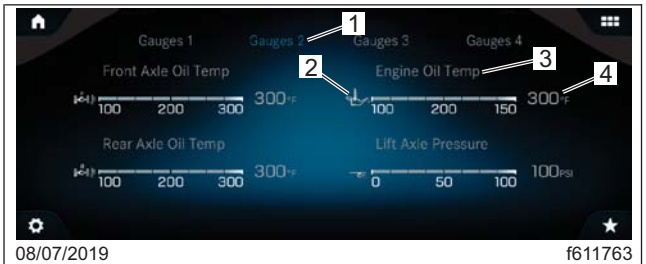
When ambient air temperature drops below 34°F (1°C), a snowflake icon will appear below the display temperature. The snowflake icon will display until the ambient air temperature rises to 37°F (3°C).

If the temperature drops below 34°F (1°C) after rising above 37°F (3°C), the snowflake will reappear.

Digital Gauges and System Monitors: ICC5

ICC5 Gauges

There are thirteen digital gauges under the Gauges menu on the B-panel or infotainment display. See **Fig. 3.56** for an example screen overview. Twelve are informational only; if active, Soot Level includes a button to start a regeneration.



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1. Gauge Screen Name
2. Gauge Icon
3. Gauge Name
4. Gauge Value

Fig. 3.56, Example Gauge Screen - ICC5

The default display order of gauges is as follows:

- Coolant Temperature
- Engine Oil Pressure
- Engine Oil Temperature
- Transmission Oil Temperature
- Front Axle Oil Temperature
- Rear Axle Oil Temperature
- Lift Axle Pressure
- Soot Level
- Application Air Pressure
- Suspension Air Pressure
- Trailer Application Air Pressure
- Trailer Suspension Air Pressure
- Turbo Boost Pressure

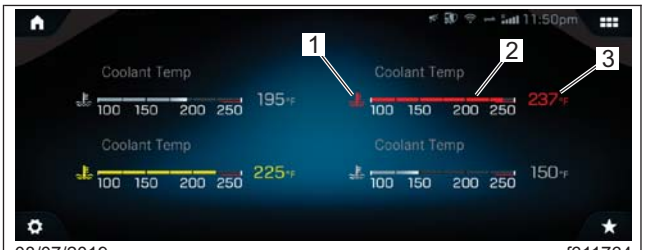
The default can be changed. Pressing on an existing gauge will cause a popup window to appear with the

option to either Remove or Replace the gauge. Choosing Replace will bring up a radio button list of all available gauges from which to choose; replacing a gauge will move the first gauge into a different screen placement. Removing a gauge removes the gauge from the gauge screens. A removed gauge can be added back by pressing the Add or plus sign button. Doing so will cause a radio button list to appear listing the gauges available to be added.

Gauge units of measurements are controlled under Settings which can be accessed under the Cab menu or by pressing the star menu icon in the lower left corner.

Moving between gauge screens can be accomplished by pressing the gauge screen name at the top of the screen.

In the ICC5, if a value measured by a digital gauge exceeds the normal range, the gauge icon, display bar graph color, and gauge value will change color to amber to indicate caution or red to indicate danger. See **Fig. 3.57**.



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1. Red Gauge Icon
2. Red Gauge Bar Graph
3. Red Gauge Value

Fig. 3.57, Gauge Caution & Warning Indicator Display - ICC5

Gauge information can also be viewed on the driver display. See **Fig. 3.60**.

Coolant Temperature Gauge

NOTICE

A sudden increase in coolant temperature may indicate engine or cooling system failure. Bring the vehicle to a safe stop and investigate the cause to prevent further damage. Do not operate the engine until the cause has been determined and corrected.

During normal engine operation, the coolant temperature gauge should read 175 to 195°F (79 to 91°C). If the temperature remains below 160°F (71°C), inspect the cooling system to determine the cause.

For Detroit engines, if coolant temperature rises above the maximum temperature listed in **Table 3.4**, the CHECK engine lamp will illuminate. If the condition does not improve, the STOP engine lamp will also illuminate and an audible warning will sound. The engine will then derate or shut down, depending on the type of engine protection system installed.

For Cummins engines, the fan will come on when coolant the temperature reaches 215°F (101°C) and the check engine light will illuminate when coolant temperature rises above the maximum temperature listed in **Table 3.4**.

Maximum Coolant Temperature	
Engine Make	**Temperature: °F (°C)**
Cummins	221 (105)
Detroit DD13/DD15/ DD16	234 (112)

Table 3.4, Maximum Coolant Temperature

Engine Oil Pressure Gauge

NOTICE

A sudden decrease or absence of oil pressure may indicate mechanical failure. Bring the vehicle to a safe stop and investigate the cause to prevent further damage. Do not operate the engine until the cause has been determined and corrected.

Except for Detroit Gen 5 DD13 and DD15 engines, the engine oil pressure gauge displays the current engine oil pressure. If engine oil pressure falls below the minimum levels shown in **Table 3.5**, the CHECK engine lamp on the driver display will illuminate. If the condition does not improve, the STOP engine lamp will also illuminate and an audible warning will sound. The engine will then derate or shut down, depending on the type of engine protection system installed.

Minimum Engine Oil Pressure*		
Engine Model	**At Idle Speed:† psi (kPa)**	**At Rated RPM:‡ psi (kPa)**
Cummins	15 (103)	35 (241)
Detroit Gen 5 DD13/DD15	50 (344)	50 (344)

Minimum Engine Oil Pressure*		
Engine Model	**At Idle Speed:† psi (kPa)**	**At Rated RPM:‡ psi (kPa)**
All Other Detroit Engines	14 (97)	55 (350)

* Oil pressures are given with the engine at operating temperature. With the engine cold, oil pressure may be higher. Individual engines may vary from the listed pressures; observe and record pressures when the engine is new to create a guide for checking engine condition.

† Standard idle speed is 600 RPM. Actual engine idle speed can vary ±100 RPM depending on transmission type.

‡ All Detroit heavy-duty engines are rated at 1800 RPM.

Table 3.5, Minimum Engine Oil Pressure

For Detroit Gen 5 DD13 and DD15 engines, the gauge will read a steady 50 psi (344 kPa) with normal engine oil pressure. If the engine oil pressure is low, the CHECK lamp will illuminate and the oil pressure gauge will read 25 psi (172 kPa). If the condition does not improve, the STOP lamp will illuminate, an audible warning will sound, and the gauge will read 0 psi. The engine will then derate or shut down, depending on the type of engine protection system installed.

Engine Oil Temperature Gauge

NOTICE

A sudden increase in oil temperature that is not caused by a load increase may indicate mechanical failure. Bring the vehicle to a safe stop and investigate the cause to prevent further damage. Do not operate the engine until the cause has been determined and corrected.

During normal operation, the optional engine oil temperature gauge should read in the following temperature range:

- 200 to 260°F (93 to 126°C) for Detroit and Cummins engines

Under heavy loads, such as when climbing steep grades, temperatures that exceed the normal oil temperature range for a short period are not unusual. If the temperature returns to normal when the load decreases, there is no problem.

Transmission Oil Temperature Gauge

The transmission fluid temperature gauge measures the transmission lubricant operating temperature. Temperatures vary by application, but the transmission fluid temperature gauge reading should not exceed 250°F (121°C).

NOTICE

A sudden increase in transmission fluid temperature that is not caused by a load increase may indicate mechanical failure. Bring the vehicle to a safe stop and investigate the cause to prevent further damage. Do not operate the vehicle until the cause has been determined and corrected.

Under heavy loads, such as when climbing steep grades, temperatures that exceed the normal oil temperature range for a short period are not unusual. If the temperature returns to normal when the load decreases, there is no problem.

Drive Axle Oil Temperature Gauges

NOTICE

A sudden increase in oil temperature that is not caused by a load increase may indicate mechanical failure. Bring the vehicle to a safe stop and investigate the cause to prevent further damage. Do not operate the vehicle until the cause has been determined and corrected.

During normal operation, drive axle oil temperature gauges should read as follows:

- 160 to 220°F (71 to 104°C) for Detroit Classic Model 2, 4, and 6 axles.
- 160 to 329°F (71 to 165°C) for Detroit New Final Drive (NFD) axles.
- 160 to 220°F (71 to 104°C) for Meritor™ drive axles.
- 180 to 200°F (82 to 93°C) for Dana Spicer® drive axles.

Under heavy loads, such as when climbing steep grades, temperatures that exceed the normal oil temperature range for a short period are not unusual. If the temperature returns to normal when the load decreases, there is no problem.

Lift Axle Pressure Gauge

The lift axle pressure gauge registers the air pressure applied to the lift axles.

DPF Soot Level Gauge

See **Chapter 14** Emissions and Fuel Efficiency for details of Diesel Particulate Filter and DEF level monitoring.

Application Air Pressure Gauge

An application air pressure gauge registers the air pressure being used to apply the brakes. The gauge will not register air pressure until the foot brake pedal is depressed or the trailer hand brake is applied.

Suspension Air Pressure Gauge

The suspension air pressure gauge registers the air pressure applied to the vehicle air suspension.

Trailer Application Air Pressure Gauge

The trailer application air pressure registers the applied air pressure in the brake circuit.

Trailer Suspension Air Pressure Gauge

The trailer suspension air pressure gauge registers the air pressure applied to the trailer air suspension.

Turbo Boost Pressure Gauge

The turbo boost pressure gauge registers the pressure in the intake manifold, in excess of atmospheric pressure, being created by the turbocharger.

Base ICC5 A-Panel Gauges

Outside of the gauges screen, the ICC5 offers a number of other digital gauges and instruments.

Battery Voltage

The ICC5 A-panel displays the vehicle charging system voltage in the upper left corner. By monitoring this number, the driver can stay aware of potential battery charging problems and have them fixed before the batteries discharge enough to create starting difficulties.

The driver display will normally show approximately 13.7 to 14.1 volts when the engine is running. The voltage of a fully charged battery is 12.7 to 12.8 volts when the engine is off. Battery voltage under 12.0 volts is considered a low battery, and a completely discharged battery will produce only about 11.0 volts.

If the driver display screen shows an undercharged or overcharged condition for an extended period, have the charging system and batteries checked at an authorized Freightliner service facility.

Speedometer and Tachometer

In the ICC5 the speedometer and tachometer are combined. On the driver display base screen the information is presented as a centered arch (see **Fig. 3.59**). On the driver display pilot screen, it becomes a split band near the bottom of the screen (see **Fig. 3.58**).

The speedometer registers the speed of the vehicle.

The tachometer indicates engine speed in revolutions per minute (rpm) and serves as a guide for shifting the transmission and keeping the engine in the appropriate rpm range. The tachometer has an overspeed zone, marked in red, from 2300 to 2500 rpms.

The speedometer and tachometer and measure miles per hour (mph) or kilometers per hour (km/h), depending on the option selected in the system settings.

Fuel Level Gauge

Fuel levels are indicated on a gauge in the lower left corner of the driver display screen above the DEF level gauge. The fuel pump icon to the right of the gauge will illuminate amber when the diesel fuel level registers 1/8th of capacity and stay amber until the fuel tank is refilled.

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1. Battery Voltage
2. Speedometer
3. Fuel Gauge
4. DEF Fluid Level Gauge
5. Odometer
6. Secondary Air Pressure Gauge
7. Primary Air Pressure Gauge
8. Tachometer

Fig. 3.58, Driver Display in Pilot Screen Mode - ICC5

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1. Speedometer
2. Tachometer

Fig. 3.59, Speedometer and Tachometer Base Driver Display Screen - ICC5

Diesel Exhaust Fluid (DEF) Level Gauge

The driver display screen shows a DEF level gauge in the lower left hand corner below the fuel gauge. When the DEF level reaches 1/8th of capacity, the low DEF icon and the remaining measurement bar illuminate amber. The bar will continue to remain amber as it decreases until the DEF tank is empty, at which point only the low DEF icon will remain lit. See **Chapter 14** Emissions and Fuel Efficiency for more details on the DEF level gauge.

Odometer

The odometer is located below the speed indicator at the bottom center of the screen. See **Fig. 3.58**. Depending on what values are chosen in the Settings menu, the odometer will display engine miles driven in mph or km. The display units can be changed at any time.

Primary and Secondary Air Gauges

Primary and secondary air gauges are stacked in the lower right corner of the A-panel display. See **Fig. 3.58**. When the air pressure drops too low, both the air pressure measurement and the air pressure icon will change color. A complete lack of air pressure will result in only the icon being either amber (caution) or red (danger).

Floating ICC5 A-Panel Gauges

Vehicle information can also be accessed on the driver display or A-panel screen by moving through versions of the base layout.

The gauge information available on the infotainment or B-panel screen shows up on the left side of the speedometer/tachometer. See **Fig. 3.60**.

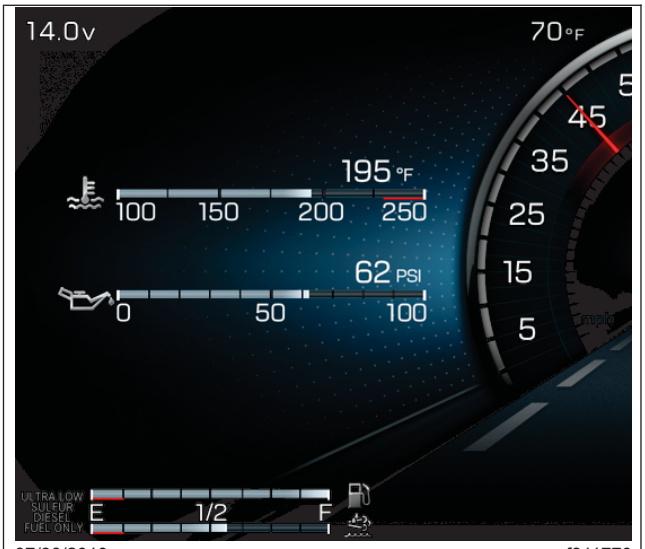

Fig. 3.60, Coolant Temperature & Engine Oil Pressure on Driver Display - ICC5

Safety feature graphics and pop-up screens appear in the center and feature related icons appear at bottom center of the screen.

Data such as trip information, fuel consumption, and eco driver feedback appear to the right of the speedometer/tachometer. See **Fig. 3.61**.

Eco Driver Feedback

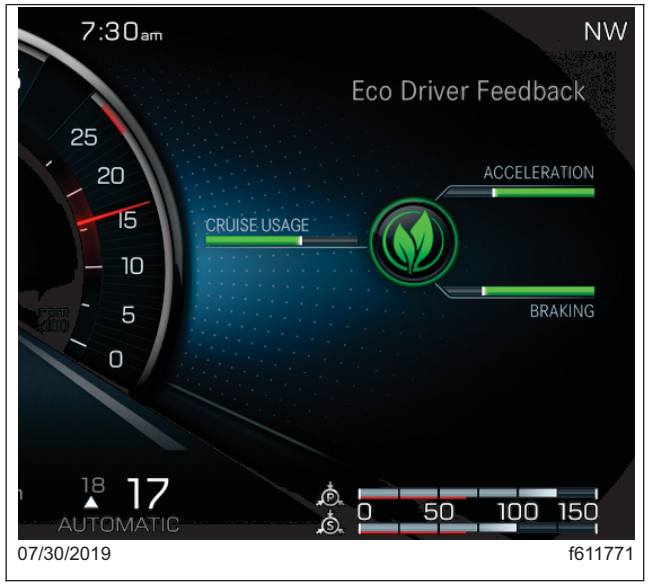

Fig. 3.61, Eco Driver Feedback on the Driver Display - ICC5

Eco Driver Feedback encourages a driver to make economical driving a habit with the goal of saving fuel and reducing wear. See **Fig. 3.61**.

Eco Driver Feedback gauges, displayed on the right-hand side of the driver display, show a driver's performance in three categories: gentle braking, smooth acceleration, and cruise control usage. Performance is newly calculated with each vehicle start.

Examples of driving behavior that increases or decreases the amount of green in each column are as follows:

- Time in cruise control increases the Cruise Control Usage value.
- Failure to engage cruise control after the Use Cruise Control popup appears decreases the Cruise Control Usage value
- Pumping the accelerator pedal decreases the Smooth Acceleration value.
- Keeping the speed steady with cruise control off increases the Smooth Acceleration value.
- Sudden braking outside of an urban environment decreases the Gentle Braking value.
- No incidences of sudden breaking over time increases the Gentle Braking value.

ICC5 B-Panel Chassis Status Information

In addition to controls and gauges, the ICC5 B-panel provides access to chassis status information:

- Tire Pressure Monitoring System
- Axles
- Maintenance System
- Diagnostics
- Active Driver Alerts

Tire Pressure Monitoring System (TPMS)

The tire pressure monitoring system displays tire pressure, temperature, and sensor status. Maintaining correct tire pressure increases fuel economy. Sustained high tire temperature can cause a tire to deteriorate, leading to tread separation and blowouts.

Tire Pressure has three submenu options: tire pressure, tire temperature, and sensor status. Selecting the tire icon image will display a vehicle image on the screen showing the tire pressure for each tire. Tire pressure can be displayed in psi or bar units. The unit of measure is displayed behind the rear left tire on the vehicle image. See **Fig. 3.62**. Units of measure are set under Settings.

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1. Set Pressure button
2. Tire Pressure Value
3. Units of Measurement
4. Submenu Screen Indicator

Fig. 3.62, TPMS: Tire Pressure - ICC5

Tires on the truck image will change color if tire pressure is too high or too low based on factory settings. Red indicates a condition that may pose a threat to the control of the vehicle. Amber indicates a condition that may result in damage. See **Fig. 3.63**,

The option to Set Pressure is available on the tire pressure screen. Selecting this option allows you to change default settings.

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1. Tire Temperature
2. Unit of Measurement
3. Screen Indicator

Fig. 3.63, TPMS: Tire Temperature- ICC5

Selecting the temperature icon will show an image of the vehicle on the screen showing the temperature of each tire. Tire temperature can be displayed in Fahrenheit or Celsius. The unit of measure is displayed behind the rear left tire on the vehicle image. Units of measure are set under Settings.

Tires on the truck image will change color if tire temperature is too high. Red indicates a condition that may pose a threat to the vehicle. Amber indicates a condition that may result in damage.

Selecting the battery icon will show the battery strength of each tire sensor.

If a sensor's battery life is low, both the tire and the sensor icon on the truck image will change color to amber. If sensor battery status is critically low they will become red. See **Fig. 3.64**.

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1. Sensor Battery Icon
2. Screen Indicator

Fig. 3.64, TPMS: Sensor Status - ICC5

Axles

This menu provides access to the axle locks status screen showing engaged locks.

For more information see **Chapter 19** Drive Axles.

Maintenance System

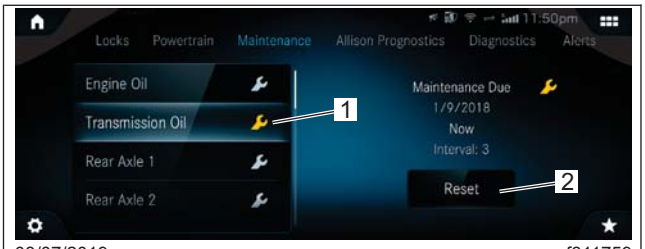
NOTE: the wrench icon indicates a need for maintenance, not something broken that needs to be fixed.

Standard messaging is based on the number of miles (km) driven or time passed since the last service.

Predictive maintenance information is calculated based on these factors as well as engine and transmission load and oil temperature.

Currently, predictive maintenance information is given for engine oil, transmission oil, and axle oil changes. By taking driving conditions into account, predictive maintenance provides more accurate intervals for fluid changes.

Just before the service interval ends, a message that maintenance is due will appear. See **Fig. 3.65**.



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1. Amber Wrench Indicating Maintenance is Overdue
2. Reset Button

Fig. 3.65, Example ICC5 Maintenance Screen - ICC5

When the service interval is reached, a pop-up notice that maintenance is due will appear with every key cycle.

When the service interval is overdue, the color of the wrench icon on the maintenance screen will change from white to amber and the message will change to Maintenance Overdue. This cautionary pop-up will continue to appear with every key cycle.

The color of the wrench icon on the maintenance screen will change from white to amber when a maintenance service is overdue.

A service interval countdown can be reset by pressing the reset button which will cause a confirmation pop-up message to appear. If the required maintenance has been carried out, click Yes. Resetting the maintenance system when service is performed creates accurate future service intervals.

The reset button for maintenance system screens will not appear until the vehicle has been driven 6.2 miles and the engine has run for fifteen minutes.

Maintenance system information and service recommendations can also be viewed in the **Detroit Connect** portal. Information on the portal is updated every seven days.

Diagnostics

The Diagnostics screen communicates fault codes and other diagnostic information about the vehicle.

Fault codes are color-coded to indicate the severity of the fault. Red indicates a condition that may pose a threat to control of the vehicle. Amber indicates a condition that may result in damage to vehicle components or derating of engine power. Grey indicates a condition that may affect fuel efficiency or vehicle handling.

Active Driver Alerts

The Active Driver Alerts screen stores the current active alerts.

Alerts are color-coded to indicate severity. Red indicates a condition that may pose a threat to control of the vehicle. Amber indicates a condition that may result in damage to vehicle components or derating of engine power. Grey is used for notices.

ICC5 B-Panel Controls

In addition to the features described above, the ICC5 B-panel provides a number of digital controls and environmental information. Under the Cab menu this includes:

- Digital Switches
- Optimized Idle
- Settings

Digital Switches

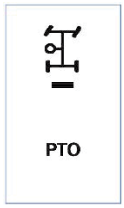
Example of Digital Switch Icons and Layout				
				
Lane Departure Warning	Inhibit Regeneration	Active Traction Control	Power Takeoff 1	Air Suspension Level Up
				
Lane Keep Assist Active	Regeneration Activation		Power Takeoff 2	Air Suspension Level Down

Table 3.6, Example of Digital Switch Icons and Layout

Digital switches can be used to turn different vehicle functions on or off. An indicator at the top of the digital button shows the status of the switch with a red line indicating On.

the arrangement of the switches depends on the features of the vehicle. In general switches are grouped into pairs stacked on top of each other. If a feature only has one switch or only one switch is available it will be displayed at the top of the two switch column.

Optimized Idle

Optimized Idle reduces idle time by automatically stopping and restarting the engine. Besides saving fuel, it helps keep the batteries charged while maintaining engine and cab temperature.

The following conditions must be met for the optimized idle to function:

- Vehicle in neutral gear
- Parking brake set
- Hood latched
- Sleeper fan on

Optimized idle has four unique operating modes: battery, cold startability (engine oil temperature), interior comfort mode, keyless.

- Battery mode: starts the engine when battery voltage is below a certain threshold.
- Engine oil temperature mode: starts the engine when the engine oil temperature is below a certain threshold.
- Comfort mode: starts the engine to maintain the driver's selected interior temperature
- Keyless mode: maintains any of the modes above without the key in the ignition switch.

Optimized idle can be started with the engine running or the engine off.

1. With the key on, go to the Cab menu and select Optimized Idle. A caution notice will popup.
2. Read the caution and press Enable.
3. A screen may appear to start Standby or another mode. If this is the only option, press Enable.
4. Otherwise a screen will appear with an Enable with Comfort button as an option. If you want to optimize the environment of the sleeper section, select the Enable with Comfort button.
5. The vehicle will go into standby mode, an under hood alarm will briefly sound, and the engine will crank and achieve 900 rpm. The screen will change to the selected mode. A Disable button will be present.
6. The engine and fan/air conditioning will run until it achieves the temperature requested by the driver. The engine will then shut down.

Optimized idle can be shut off by ICUC controls or pressing the brake. If the sleeper fan is turned off, optimized idle will not shut down but the engine will.

Settings

The settings menu allows you to choose system features such as display language, units of measurement, and sound levels.

Tap on the settings (gear) icon in the lower left hand corner of the infotainment screen to access Settings. Settings can also be accessed under the Cab menu.

NOTE: Settings options will change based on the features installed on the vehicle.

Settings: Display Style

Adaptive Cruise Display is the only current feature for which display options are available.

Settings: Language

Language options currently include English (American), Francçais (Canadian), and Español (Mexican).

Settings: Units

NOTE: Setting a Distance unit to either imperial (miles) or metric (kilometers) will auto-populate the Consumption to the same system of measurement.

Units refers to units of measurement and are selected using an either/or radio buttons in each category.

Units are set for Speed (km/h or mph), Fuel Consumption (1/100km or mpg), and Distance (kilometers or miles). Other units include:

- Following Distance: either distance or time
- Pressure: either kPa or PSI
- Temperature: either Celsius or Fahrenheit

Settings: Brightness

Brightness levels for the instrument display, infotainment display, and the dash can be adjusted here using touch-screen slider controls.

Settings: Key Alert

This setting turns the audible lock alert on or off.

Settings: Display Off and On

Selecting this setting turns the display off. Touching anywhere on the display screen turns it on again.

Settings: Controls

Controls provides the ability to change keyboards to accommodate different languages and scripts as well as change the sensitivity levels of touch controls. Touch control settings include slow, medium, and fast.

Audible system feedback controls can also be accessed here as well as under audio settings.

Settings: Audio

Audio Settings control the volume of navigation and traffic announcements, audible system feedback, and phone ringtone and speech volume.

Audible system feedback setting choices include normal, loud, and off. All other audio settings provide touch-screen slider controls to set volume.

Settings: Licence Activation

License Activation lists all activated software licences with activation and expiration dates.

Settings: Reset

The Reset option under Settings allows you to delete all data from the system.

Driving Assistance Settings

The Driving Assistance menu is only available if at least one driving assistant setting is available.

The Driving Assistance menu in Settings allows you to turn available features on or off and/or change setting parameters.

Possible Driving Assistance menu options include:

- Side Guard Assist
- Active Lane Assist
- Traffic Sign Display
- eCoast
- Attention Assist
- Creep Mode

Driving assistance features are described in **Chapter 7** Driver Assistance Features and **Chapter 13** Optional Engine Systems.

Lighting

The lighting menu provides controls for a set of interior and exterior lights using the touch screen.

Exterior lighting

The exterior lighting screen presents an image of the front of a New Cascadia vehicle showing lights and digital switches for those lights. Touching a switch lights up the switch, activates the lights on the image of the truck, and turns on that light on the truck itself; touching the switch again turns all these lights off.

Touching the intelligent high-beam headlights control at the bottom of the screen will change its status. For this switch the status of On is indicated by a lighted bar at the top of the icon.

When intelligent high-beam headlights are on, the high-beam headlights will switch to low-beam headlights when a vehicle approaches from the opposite direction. They will switch back to high-beam headlights when no vehicles are approaching from the opposite direction.

The intelligent headlights can also be controlled by using the headlight switch and turn signal lever; see **Chapter 4** Driver Controls for more information.

Touching the courtesy lighting icon will open a popup showing the current lighting duration and allowing the lighting duration to be adjusted.

Exterior lighting controlled by the rotary dial cannot be controlled through the exterior light screen.

If the fog lamp is turned on via the rotary dial, the fog lamp on the truck graphic will be shown as on.

Interior Lighting

The interior lighting menu shows an image of an interior of a New Cascadia truck. The digital switches for interior lighting allow for the control of overhead, foot well, and sleeper lights.

Touching any of the light icons on the screen will lights up the digital switch, activate the lights on the interior image of the truck, and turn on those lights in the truck itself.

All interior lights can be dimmed using the slider next to the light icon.

All available lights in the cab can be turned off and on by touching the Off button.

Entrance lighting can be controlled by the settings icon. Touching the settings icon will open a popup window where the entrance lighting can be toggled off or on and entrance light timing controls can be accessed. Choosing entrance light timing will be open a slider that allows modification of the length of time the entrance light is on.

All sleeper lights can be dimmed using the slider next to the light icon.

Climate Control Information

NOTE: See **Chapter 8** Climate Controls for detailed climate control panel operating instructions.

On vehicles equipped with the ICC5, climate control information will briefly appear on the B-panel display when physical climate controls are adjusted. The following controls should cause the climate bar to appear: recirculation settings, fan speed, air conditioning status, temperature setting, and blower selection.

If the cab is equipped with a sleeper and the sleeper override button is pressed, the sleeper override icon will also appear in the climate bar. In addition, changes to the climate control of the sleeper area will appear in a pop-up message.

Infotainment: ICC5

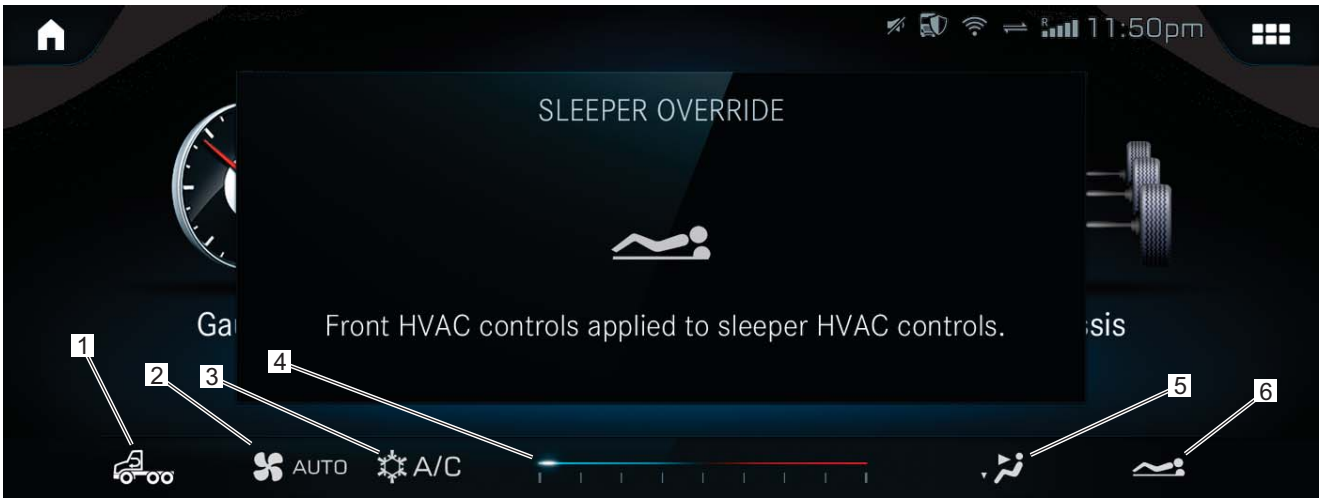
General ICC5 Infotainment Information

Information and controls available on the ICC5 infotainment (B-panel) display:

- Shortcut icons, statusline, and climate bar
- Gauges
- Cab
- Chassis
- Lighting
- Navigation
- Phone
- Radio
- Media
- Smartphone

System Settings

Select the gear icon to open the Settings menu. Settings is also available within the Cab menu.



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1. Recirculation Status
2. Fan Speed
3. Air Conditioning Status
4. Temperature Settings
5. Blower Selection
6. Sleeper Override

Fig. 3.66, Informational Climate Bar

System Settings lets you choose settings for driving assistance features, the system itself (language, units of measurement, etc.), and connectivity.

For more information see **Driver Display: ICC5** in this chapter.

Connectivity

Connectivity settings control the on or off status of the following features:

- Bluetooth
- NFC (Near Field Communication)
- Wi-Fi

Active and authorized devices will have an options menu (opened by selecting the three dots to the right of a device name) to manage device call logs, contacts, and deauthorization.

Up to two phones can be active and connected via Bluetooth.

Bluetooth

Bluetooth is a wireless technology standard for exchanging data over short distances, typically less than 33 feet (10 m).

A phone connected via Bluetooth will disconnect from the system when taken far enough away from the vehicle or turned off. It will automatically reconnect when in range of an active system if it has not been deauthorized.

Device Manager

Under the Device Manager menu you can:

- Connect a new device
- See a list of active and authorized devices
- Control transmission volume
- Control reception volume
- Deauthorize a device

The last three options can be accessed by selecting the three dots to right of the device name. Both the reception and transmission volume consist of a slider control with a range of -2 to 2.

Connecting and Disconnecting a Phone Using Bluetooth®

One can connect or authorize a mobile device such as a smartphone to interact with the ICC5 infotainment system through the Phone menu.

Up to fifteen mobile phones can be authorized at a time.

NOTE: The Smartphone menu is for connecting a device via MirrorLink®, Android Auto™ or Apple CarPlay™.

Requirements:

- Bluetooth® is activated on the mobile phone.
- The phone is visible to Bluetooth®.
- Bluetooth® is activated on the infotainment system.

Activating Bluetooth®

NOTE: An iPhone may be connected to the infotainment system via Apple CarPlay.

1. Open Settings by selecting the gear shortcut icon in the lefthand corner of the screen.
2. Select Connectivity.
3. Make sure Bluetooth is turned on.
4. Make sure Bluetooth is active on the phone and the phone is visible via Bluetooth.

Connecting a Phone Using Bluetooth®

Older phones may require that an authorization code be manually entered on the mobile phone and into the infotainment system.

1. Open the Device Manager.
2. Select Connect Device.
3. Select Connect New Device. The vehicle searches for the device.
4. If the connection fails, the message My Device Was Not Found will appear. Verify the Activating Bluetooth requirements have been met.
5. Select the My Device Was Not Found message or press the reload icon at the top right to have the vehicle rescan for devices.
6. When a device is found, the name of that device will appear on the screen in addition to the message My Device Was Not Found. Select the device name.
7. A pop-up will appear asking for verification of a passkey on the phone. Verify the passkey. The device is authorized and connected.

NOTE: The phone will automatically reconnect to the system when in range until deauthorized either in the ICC5 infotainment system or on the phone itself.

The Phone Menu

Once a phone is authorized and connected, a mobile phone menu for that phone is available.

In addition, the call list and contacts of the primary phone are loaded and accessible.

The phone menu provides a search function for the primary phone's contacts, a number pad for calling people not in the contact list, and access to Bluetooth and phone specific settings.

Connecting a Second Phone

Connecting a second phone follows the same process as connecting the initial phone, however the call list and contacts of the second phone are not loaded.

1. Open the Device Manager.
2. Select Connect Device.
3. Select Connect New Device. The vehicle searches for the device.
4. When a device is found, the name of that device will appear on the screen in addition to the message My Device Was Not Found. Select the device name.
5. A pop up will appear asking for verification of a passkey on the phone. Verify the passkey. The device is authorized and connected.

NOTE: The phone will now automatically reconnect to the system when in range until deauthorized either in the ICC5 infotainment system or on the phone itself.

Two Phone Mode

In two phone mode, the primary mobile phone can access the phone's contact and call list on the infotainment system and make outgoing calls and receive incoming calls; the secondary mobile phone can receive incoming calls.

Switching Primary and Secondary Phones

NOTE: When the secondary phone becomes the primary phone, that phone's contacts and call list are loaded into the system. The previous primary phone, now the secondary phone, has no data accessible on the system.

1. Open the Phone menu.

2. Select the icon showing two phones. The primary and secondary phone are switched.

Changing Phone Specific Settings

NOTE: You can only change phone functions on the primary mobile phone.

1. Open the Phone menu. The primary active phone's name should display in the upper left.
2. Select the gear icon to access the setting for the phone. The Options screen appears.
3. Choose which of the following options to change:
    - Synchronize Contacts Automatically
    - Synchronize contacts: this options is only available if Synchronize Contacts Automatically is turned off.
    - Delete Contacts: deletes all contacts downloaded from the active phone. Only available if Synchronize Contacts Automatically is turned off.
    - Delete Call List: deletes the call list downloaded from the active phone.
    - Name Format: names may be displayed as Last, First; Last First; or First Last.
    - Bluetooth: Access Device Manager to connect a new phone, deauthorize a phone, and control a phone's transmission and reception volume.

Disconnecting a Phone

A phone may disconnect from the system for the following reasons:

- It moves out of range
- It is shut off or otherwise loses power

The phone should automatically reconnect when on and in range of an active system it is authorized to connect to. To cancel this automatic pairing, the phone must be deauthorized either on the system or on the phone.

Reconnecting a Phone

If a phone does not automatically reconnect to an authorized vehicle, do the following:

1. Open the Phone menu.
2. Select Connect Device or, if this is not available, select the Bluetooth icon. The Bluetooth Devices menu opens.
3. Find the phone under Authorized Devices and select the phone name. The vehicle will connect with the phone.

NOTE: if the connection fails, double check that Bluetooth is active on the phone and the phone is visible to Bluetooth.

Replacing a Phone

Replacing a mobile phone is the same process as connecting a phone.

To deauthorize the mobile phone being replaced, see **Deauthorizing a Phone Through the Phone Menu** in this chapter.

Deauthorizing a Phone Through the Phone Menu

Deauthorizing a mobile phone, either the primary or secondary phone, can be done in via the Phone menu or through system Settings.

1. Open the Phone menu.
2. Select the Bluetooth icon at the bottom of the screen. The Bluetooth Devices menu opens showing a list of active and authorized phones.
3. If necessary, swipe down the screen to see a list of all authorized devices.
4. Select the three dots to the right of the phone to deauthorize. The list of options available for that phone displays.
5. Select Deauthorize. The system asks for verification.
6. Select Yes. The phone is deauthorized.

Deauthorizing a Phone Through Settings

Deauthorizing a mobile phone, either the primary or secondary phone, can be done in via the Phone menu or through Settings.

1. Open the Settings menu by selecting the shortcut icon of a gear in the lower left corner. The system settings menu opens.
2. Select Connectivity. The Wi-Fi & Bluetooth menu opens.

3. Select Device Manager. The Bluetooth Devices menu opens showing a list of active and authorized phones.
4. Select the three dots to the right of the phone to deauthorize. The list of options available for that phone opens.
5. Select Deauthorize. The system asks for verification.
6. Select Yes. The phone is deauthorized.

Using a Mobile Phone

General Phone Information

Calls may disconnect in the following situations:

- Insufficient network coverage
- Lack of free voice channels when you travel into a new transmitter/receiver area (cell)
- Phone SIM card is not compatible with the available network
- The second SIM card of a Twincard mobile phone is already logged onto the network

In addition, voice quality may fluctuate. The infotainment system supports high quality calls in HD Voice®, but this depends on HD Voice® being supported by both the mobile phone in use and the network.

Setting Reception and Transmission Volume

NOTE: A phone must be active to access these settings.

This setting helps ensure optimal speech reception and transmission quality.

1. Open the Phone menu.
2. Select the Bluetooth icon. The Bluetooth Devices menu opens.
3. Select the three dots to the right of the phone to access that phone's options.
4. Select Reception Volume and set the volume.
5. Select the back arrow.
6. Select Transmission Volume and set the volume.
7. Return to the main phone screen by pressing the back arrow or selecting the physical phone button at the bottom of the infotainment screen.

Searching for a Contact and Making a Call

NOTE: A phone must be active to access these settings.

1. Open the Phone menu.
2. Select the magnifying glass icon for Search. A keyboard opens.
3. Start entering the first or last name of a contact or a partial or full phone number. As you type a number will appear next to the icon for the results list showing how many phone contacts have that series of characters.
4. When the number is small enough, select the results list icon to the right of the search box. A results list appears.
5. Select the desired contact. The contact card appears.
6. Select the desired contact phone number. A call is placed.

Starting Phone Voice Recognition

NOTE: When in two phone mode, the phone voice recognition is only available on the primary phone.

Press and hold the Voice button on the right-hand OFN steering wheel pod for at least one second. Phone voice recognition is now available.

Ending Phone Voice Recognition

Press either the Mute Volume or End Call button on the right-hand OFN steering wheel pod. Mobile phone voice recognition has ended.

Making a Call

1. Open the Phone menu. The primary phone menu appears.
2. Select the number pad icon or select Contacts or Call List menu.
   - 2.1 If using the number pad, enter a number. Select the green phone receiver icon. The call is made.
   - 2.2 If using the Contact's menu, select a contact. The contacts information is shown. Select a phone number. The call is made.

2.3 If using the Call List menu, select the phone number. The call is made.

Accepting a Call

There are two ways to accept a call:

- Press the Accept Call button on the right-hand OFN steering wheel pod.
- Select the accept call button on the infotainment screen.

Ending or Rejecting a Call

There are two ways to end or reject a call:

- Press the End Call button on the right-hand OFN steering wheel pod.
- Press the end call button on the infotainment screen.

Putting an Active Call on Hold and Taking if Off Hold

NOTE: The function and behavior of taking calls on and off hold and accepting and rejecting waiting calls can vary depending on the phone, phone plan, and network provider. If functions and behavior vary from these directions, consult the manufacturer's operating instructions and provider information.

A call on hold can be ended by selecting the End Call button on either the right-hand OFN steering wheel pod or the infotainment screen.

1. Select the active call number. The call is put on hold.
2. Select the active call number. The call is taken off hold.

Accepting a Waiting Call in Single Phone Mode

If there is an incoming call while a call is being conducted, a screen notification is shown. Depending on the mobile phone and network provider, you may also hear a sound.

Tap on the Accept Call button on either the right-hand OFN steering wheel pod or the infotainment screen. The waiting call is now active. The previous call has been put on hold.

Accepting a Waiting Call in Two Phone Mode

If two phone mode is active and the second call is incoming on the secondary phone, you may hear a signal in addition to getting a screen notification and hearing a sound.

NOTE: Accepting a incoming waiting call on the secondary phone while in two phone mode with a call on hold on the primary phone, will end the active call on the secondary phone.

Tap on the Accept Call button on either the right-hand OFN steering wheel pod or the infotainment screen. The waiting call is now active. The previous call has been on hold

Switching Between Calls

If there is an active call and another call connection has been established, there are two ways to switch back and forth between calls:

- Select the Switch Calls icon of two arrows pointed in opposite directions on the infotainment screen.
- Select the waiting call. The active call is put on hold. The chosen call is active.

NOTE: On some mobile phones, ending the active call will automatically take the call waiting off hold.

Functions Available During a Call

The following functions are available during an active call:

- The microphone: selecting the microphone turns it on or off.
- The number pad: can be used to send Dual Tone Multiple Frequency (DTMF) tones.
- The Transfer to Phone icon: transfers an active hands-free call over to the phone.

Phone Contacts and Call List

Importing Phone Contacts

Phone contacts of the primary phone are automatically imported when a phone is initially connected to the system.

Deleting all contacts and turning off Synchronize Contacts Automatically without deauthorizing the

phone will cause the phone to reconnect to the system without re-importing the contacts list.

Changing the Format of Contacts' Names

This does not change the format of contacts' names on the phone.

1. Open the Phone menu.
2. Select the gear icon on the bottom of the primary phone's screen. The Options menu opens.
3. Select Name Format. Three name formats appear: Last Name, First Name; Last Name First Name; First Name Last Name.
4. Select the radio button for your choice of name format. The format of the names in the phone contact list is changed.

Turning Off Synchronizing Phone Contacts

Default system behavior is to have contacts on the primary phone automatically synchronize.

1. Open the Phone menu.
2. If in two phone mode, make sure the phone you want to synchronize is the primary phone.
3. Select the gear icon at the bottom of the phone screen. The Options menu opens.
4. Move the radio button to turn off Synchronize Contacts Automatically. Contacts will no longer be synchronized for this phone.

Deleting All Contacts for the Primary Phone

NOTE: A phone must be connected to the infotainment system to access these settings.

Deleting all contacts for the primary phone does not delete the contacts off the phone nor does it delete any of the contacts saved to Favorites. The contacts saved to Favorites can still be accessed and used from the Favorites menu as long as the phone is connected to the infotainment system.

Deauthorizing the phone also does not delete any contacts saved to the Favorites menu. They do, however, become unavailable for use.

Synchronize Contacts Automatically must be turned off to delete contacts. As long as Synchronize Contacts Automatically remains off, the phone can disconnect and reconnect to the system without contacts being reloaded.

1. Open the Phone menu.
2. Select the gear icon on the bottom of the screen for the connected phone. The Options menu opens.
3. Turn off Synchronize Contacts Automatically.
4. Select Delete Contacts. A message asking for verification appears.
5. Select Yes. All contact data for the primary phone is deleted off the infotainment system except for contacts saved to Favorites.

Deleting a Phone's Call List

NOTE: A phone must be connected to the infotainment system to access these settings.

Deleting the call list from the infotainment system does not delete the call list off the phone.

If a phone disconnects and then reconnects to the infotainment system, the phone call list will be reloaded.

1. Open the Phone menu.
2. Select the gear icon on the bottom of the screen for the connected phone. The Options menu opens.
3. Select Delete Call List. A message asking for verification appears.
4. Select Yes. The call list for the primary phone is deleted.

Saving a Contact as a Favorite

NOTE: A phone must be connected to the infotainment system to access these settings.

1. Open the Phone menu. The screen for the primary phone appears.
2. Open the Contacts. The phone's list of contacts appears.
3. Select the contact you want to add to the Favorites menu.
4. Press and hold on the phone number. The Options menu for the contact appears.
5. Select Create new favorite. A favorite is created.

Saving a Call List Number as a Favorite

1. Open the Phone menu. The screen for the primary phone appears.
2. Open the Call List. The phone's call list appears.
3. Press and hold the phone number you want to add to the Favorites menu. The Options menu for the number appears.
4. Select Create new favorite. A favorite is created.

Renaming a Phone Favorite

Favorites

1. Select the star shortcut icon to open the Favorites menu.
2. Press and hold on an individual favorite. The Options menu for the favorite will open.
3. Select Rename. A keyboard will appear.
4. Type in the new name for the favorite. Select OK. The favorite has been renamed.

Moving a Phone Favorite

The order of the favorites menu can be changed to place frequently accessed favorites on the first screen.

1. Select the star shortcut icon to open the Favorites menu.
2. Press and hold on an individual favorite. The Options menu for the favorite will open.
3. Select Move. The favorites screen will change appearance. A check mark will appear over the chosen favorite and arrows will appear on each side of it.
4. Press on the arrows to move the favorite to either the left or right until it's in the chosen position.
5. Select the check mark on top of the favorite. The favorite's new position is saved.

Deleting a Phone Favorite

1. Select the star shortcut icon to open the Favorites menu.
2. Press and hold on an individual favorite. The Options menu for the favorite will open.
3. Select Delete. The favorite is deleted.

Deleting All Phone Favorites

If you delete the phone's contact list, none of the contacts saved to the Favorites menu will be deleted. The only way to delete all phone contacts saved to the Favorites menu is to delete each phone contact favorite individually or reset the Favorites menu.

Radio

NOTE: It is a standard safety feature for the radio to mute during safety related events; starting in June 2021 Pana-Pacific/Aptiv radios installed in Freightliner vehicles will automatically mute when the vehicle is in reverse gear.

Opening the Radio icon opens the radio home screen with four options across the top: SiriusXM, FM, AM, and WX.

Searching for an AM/FM Radio Station

Searching for an AM/FM radio stations by name is not currently available.

1. Select either FM or AM at the top of the Radio menu.
2. Select the magnifying glass icon. A keyboard with a search bar opens.
3. Press the 123 to access the number pad. The keyboard changes to numbers and symbols.
4. Enter the first two or three digits of the desired station frequency ID. The number of results shows next to the results list icon to the right.
5. Select the results list icon. A list of radio frequencies displays, i.e. 89.0 MHz, 89.1 MHz, 89.2 MHz, etc.
6. Select the desired frequency. The radio is set to that frequency.

NOTE: Selecting the arrows to the left of the station icon identification or album artwork will page through the different stations available, in any, at this frequency.

SiriusXM® Radio

Search options include searching for a station by name, category, or browsing the complete list of available stations.

Searching for a SiriusXM® Satellite Radio Stations by Name

1. Select SiriusXM at the top of the Radio menu.
2. Select the magnifying glass icon. A keyboard with a search bar appears.
3. Start typing the name of a known station. The number of stations with that word appears to the right next the results list icon.
4. Select the results list icon. The list of results appears.
5. Select a station. The station starts playing.

Searching for a SiriusXM® Satellite Radio Station by Category

1. Select SiriusXM at the top of the Radio menu.
2. Select the list icon at the bottom of the screen. The SiriusXM menu opens.
3. Select Category. A list of station categories appears.
4. Select the desired category. The Category list of stations in that category appears.
5. Select a station. The station starts playing.

Browsing SiriusXM® Satellite Radio Stations

1. Select SiriusXM at the top of the Radio menu.
2. Select with the list icon at the bottom of the screen. The SiriusXM menu opens.
3. Select SiriusXM. A current station/channel list appears.
4. Select the desired station. The station starts playing.

Adding a Radio Channel to Favorites

Up to twenty different items can be saved to the Favorites menu.

1. Open the Radio icon.
2. Navigate to the desired radio station.
3. Press and hold on the station icon or current album artwork. The Options menu will open.
4. Select Save as Favorite. The station is now a favorite.

Deleting a Radio Station Favorite

While Global Favorites are created inside individual applications, they are deleted, moved, or renamed inside the Global Favorites menu. For directions, please see the **Favorites** section in this chapter.

Setting a Radio Station Preset

The infotainment system can save up to 12 radio presets.

1. Open the Radio icon.
2. Navigate to the desired radio station.
3. Press and hold on the station icon or current album artwork. The Options menu will open.
4. Select Add to presets. The station is now a preset.

Saving a Radio Station Preset as a Favorite

A radio station can be saved as both a preset and a favorite.

1. Open the Radio icon.
2. Use the arrows to the right and left of the screen to navigate to the desired preset.
3. Press and hold on the preset. The Options menu opens.
4. Select Save as Favorite. The preset is now also saved under the Favorites menu.

Moving a Radio Preset

Radio station presets can be reordered to move those more frequently accessed to the first screen.

1. Open the Radio icon.
2. Use the arrows to the right and left of the screen to navigate to the desired preset.
3. Press and hold on the preset. The Options menu opens.
4. Select Move. A checkmark appears over the preset with arrows to each side.
5. Press the arrows to move the preset into the desired order.
6. Select the checkmark over the preset. The preset is now saved in its new location.

Deleting a Radio Preset

1. Open the Radio icon.
2. Use the arrows to the right and left of the screen to navigate to the desired preset.
3. Press and hold on the preset. The Options menu opens.
4. Select Delete. The preset is now deleted.

Weather Radio (WX)

Weather Radio displays as WX in the top radio menu.

Weather radio channels WX1 through WX7, corresponding to frequencies 162.400 MHz though 162.550 MHz, are the standard weather radio channels used by NOAA Weather Radio in the United States, Weatheradio Canada/Radiométéo Canada in Canada, and SARMEX in Mexico. Each system consists of a nationwide network of radio stations broadcasting official weather warnings, watches, advisories, forecasts and other non-weather related hazard information including news on natural disasters (earthquakes, avalanches, floods), environmental hazards (oil spills, chemical releases), and public safety messages (AMBER alerts, network outages). All services operate 24 hours a day, 7 days a week.

The average range for reception from a transmitter is approximately 40 miles (60 km). The National Weather Service operates more than 1000 transmitters.

Displaying AM/FM/WX Emergency Warnings

1. Select the gear icon at the bottom of the AM, FM, or WX radio screen. The Options menu for that application opens.
2. Turn on or off Display Emergency Warnings.

Sound System Settings

Adjusting the Volume

Volume can be increased or decreased by pressing the —VOL or +VOL buttons below the infotainment screen or by using the VOL+ or VOL— buttons on the OFN steering wheel switch pod.

Muting and Unmuting the Radio

The global Radio menu has an icon of a speaker with a line through it. Press this icon to mute the radio. The radio mutes. The icon image changes to a speaker playing music.

To unmute the radio select the icon of the speaker playing music. The radio starts playing. The icon image changes to a speaker with a line through it.

Muting and Unmuting Media Devices

To mute or unmute audio playback from media devices you can increase or decrease the volume or halt media playback.

Play of media devices can me halted via the Media menu by selecting the pause button. Restarting media playback may be done by selecting the play button the Media menu.

Bluetooth streaming may require restarting playback on the connected device.

Accessing Sound Settings

Sound settings are global settings for all audio sources and provide access to the equalizer and balance controls as well as the on/off controls for automatic volume amplification.

1. Select the gear icon at the bottom of the screen in an audio application. The Options menu for that application opens.
2. Select Sound. The Sound menu opens.
3. Select the sound setting to manipulate. The Equalizer menu or Balance menu opens.
4. Select and move the control along the slider(s) available. The sound settings have been changed.

Favorites

The Favorites menu offers quick access to frequently used phone numbers and radio stations. It can be accessed by selecting the star shortcut icon at the bottom right of the infotainment screen.

Favorites are created from inside different applications. For directions on saving a phone contact to the Favorites menu, see **Saving a Contact as a Favorite** in this chapter. For directions on saving a radio station to the Favorites menu, see **Adding a Radio Channel to Favorites** in this chapter.

It is possible to create up to twenty favorites.

Renaming Favorites

1. Tap on the star shortcut icon to open the Favorites menu. Saved favorites are displayed.
2. Press and hold on the icon for a favorite. The Options menu appears.
3. Select Rename. A keyboard appears.
4. Enter the new name. Select OK. The favorite has been renamed.

Moving Favorites

Favorites can be reordered to move the most popular to the first screen of the Favorites menu.

1. Tap on the star shortcut icon to open the Favorites menu. Saved favorites are displayed.
2. Press and hold on the icon for a favorite. The Options menu appears.
3. Select Move. The selected favorite now has a checkmark over it and arrows at each side.
4. Press on either the right or left arrow to move the favorite into the desired position.
5. Select the checkmark. The favorite has been saved in its new position.

Deleting Favorites

1. Tap on the star shortcut icon to open the Favorites menu. Saved favorites are displayed.
2. Press and hold on the icon for a favorite. The Options menu appears.
3. Select Delete. The favorite is now deleted.

Deleting All Favorites

1. Tap on the star shortcut icon to open the Favorites menu. Saved favorites are displayed.
2. Select the word Reset at the bottom of the Favorites screen. The Reset verification pop-up will appear.
3. Select Yes. All favorites are deleted.

Media

The vehicle infotainment system is capable of playing music from a phone, USB drive, or other device. The vehicle has two USB2 ports to connect devices. Devices can also be connected to the system via Bluetooth.

If an authorized phone is connected to the system via Bluetooth when the Media menu is opened, the infotainment system should automatically start streaming that music.

Playing Audio Off a Phone or Other Device

Selecting a different audio source than the one active turns off the music. You may need to restart the music on the device when returning to the original audio source to get the music to play.

Bluetooth audio functions are not available if an Apple CarPlay, Android Auto, or MirrorLink session is active.

1. Open the Media menu.
2. Select the audio source: Bluetooth, USB1, or USB2.
3. If necessary, select the music to play. Music starts playing through the vehicle speakers.

Smartphone

NOTE: Apple CarPlay, Android Auto, and MirrorLink should **not** be used for navigation for a truck or bus as both lack the ability to take vehicle-based route restrictions into account.

Apple CarPlay™

Apple CarPlay allows a driver to use an iPhone to make calls, send and receive messages, listen to music, and get directions.

Apple CarPlay can connect to the system via a USB2 cable or Bluetooth.

Android Auto™

Android Auto allows the driver to use an Android phone to make calls, send and receive messages, get information, listen to music, and get directions.

Android Auto requires that a smartphone be connected to the system via a USB2 cable.

MirrorLink®

MirrorLink allows a driver to use any MirrorLink enabled smart phone to get directions, listen to music, and use smart phone applications.

MirrorLink uses huge icons that allow for the control of smart phone features without getting distracted from the task of driving.

Warnings, Indicators, and Messages

Audible Alerts: ICUC

An audible alert sounds whenever one of the following conditions exists:

- Engine oil pressure falls below the minimum preset value.
- Coolant temperature rises above the maximum preset value.
- Air pressure falls below approximately 70 psi (483 kPa).
- Parking brake is set with the vehicle moving faster than 2 mph (3 km/h).
- System voltage falls below 11.9 volts.
- Door is unlatched with the parking brake off.

Optional audible alert sounds whenever one of the following conditions exists:

- Driver seat occupancy sensor reads someone in the seat with the seat belt not fastened and the parking brake off.
- Key is in the ignition and the door is unlatched.

Audible Alerts: ICC5

An audible alert sounds whenever one of the following conditions exists:

- Engine oil pressure falls below the minimum preset value.
- Coolant temperature rises above the maximum preset value.
- Air pressure falls below approximately 70 psi (483 kPa).
- Parking brake is set with the vehicle moving faster than 2 mph (3 km/h).
- System voltage falls below 11.9 volts.
- Door is unlatched and the vehicle speed exceeds 5 mph (8 km/h).

Optional audible alert sounds whenever one of the following conditions exists:

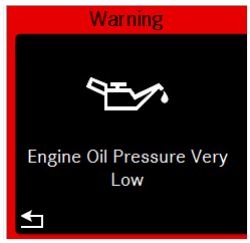
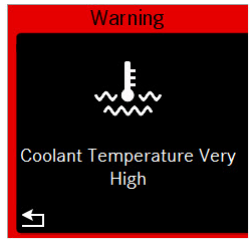
- Driver seat occupancy sensor reads someone in the seat with the seat belt not fastened and the parking brake off.
- Key is in the ignition and the door is unlatched.

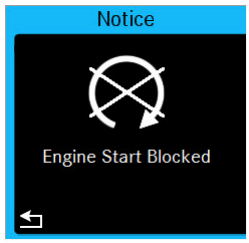
Warnings, Indicators, and Messages

Warning and indicator lights (telltales) with icon symbols are displayed on the physical dashboard and on ICU screens. The positions of the telltales and warnings vary, but most telltale symbols are standard. See the below tables for a listing of different warnings and telltales in addition to messages and popup screens.

The colors of telltales and warnings indicate the hazard level: red (warning), amber (caution), green and blue (active status), grey (passive status), white (informational). Blue is currently used to indicate an active phone call, that a software download is available, and that utility lamps and high beams are on.

IMPORTANT: Depending upon local jurisdictional emissions guidelines, vehicles and/or engines that are domiciled outside of the U.S. and Canada may not be compliant with EPA10 or GHG21 regulations. Noncompliant vehicles may not be equipped with all of the telltales shown in the below tables.

Warnings, Indicators, and Messages				
Engine System				
Telltale	**Color**	**Description**		**Related Messages**
	Red	Stop Engine*	Indicates a serious fault that requires engine shutdown immediately. The engine protection system will reduce the maximum engine torque and speed, and, if the condition does not improve, will shut down the engine within 30 to 60 seconds. Safely bring the vehicle to a stop on the side of the road and shut down the engine as soon as the red light is seen. **If the engine shuts down while the vehicle is in a hazardous location, turn the key to the OFF position for a few seconds, then restart the engine and move the vehicle to a safer location.**	Various
	Red	Engine Oil Level Warning		
	Red	Low Engine Oil Pressure	Indicates the engine oil pressure is below the minimum allowable pressure.	 04/22/2016 f611368 ICUC Warning
	Red	Engine Oil Temperature Warning		
	Red	Low Coolant Level		
	Red	High Coolant Temperature	Indicates the coolant temperature is above the maximum allowable temperature.	 04/22/2016 f611371 ICUC Warning

Warnings, Indicators, and Messages				
Engine System				
Telltale	**Color**	**Description**		**Related Messages**
	Amber	Check Engine*	Indicates an engine condition (low oil pressure, low coolant level, high coolant temperature, high DPF soot level, uncontrolled DPF regeneration, or battery voltage 11.9 volts or less) that requires correction. **Correct the condition as soon as possible. If the condition worsens, the STOP engine lamp will illuminate.**	Various
	Amber	Engine Malfunction Indicator Lamp (MIL)*	A steadily illuminated amber MIL lamp indicates an engine fault that effects emissions.	
	Amber	Engine Malfunction Indicator Lamp (MIL)*	Alternate Engine Malfunction Indicator lamp. A steadily illuminated amber MIL lamp indicates an engine fault that effects emissions.	
	Amber	Engine Oil Level Caution		
	Amber	Engine Oil Pressure Caution		
	Amber	Low Coolant Level Caution		
	Amber	High Coolant Temperature Caution		
	Amber	Start Blocked	Indicates that the system is preventing the starter from cranking. This can occur when the ignition switch is turned to START before the gauge sweep has completed. **NOTE: Display of the Start Blocked screen does not indicate a problem with the starter.** Turn the ignition switch back to ON, wait for the message to turn off, then turn the ignition switch to START again.	 04/22/2016 f611369 ICUC Notice
	Amber	Start Blocked	Alternative Telltale for Start Blocked.	
	Green	Start Engine		

Warnings, Indicators, and Messages				
Engine System				
Telltale	Color	Description		Related Messages
	Green	Optimized Idle Active	Indicates optimized idle is active.	

Table 3.7, Engine Related Indicators

*See **Chapter 14** Emissions and Fuel Efficiency for an explanation of the after treatment system (ATS) warning indicators, and actions required to avoid further engine protection steps.

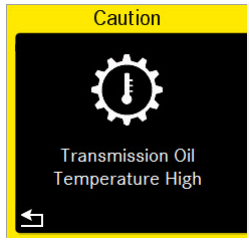
Telltales, Indicator Icons, and Messages				
Transmission				
Telltale	Color	Description		Related Messages
	Red	Transmission Fluid Level Warning	Indicates low transmission fluid level. **Safely bring the vehicle to a stop as soon as possible.**	
	Amber	Caution Check Transmission	Indicates an undesirable transmission condition.	
	Amber	Low Transmission Fluid Level Caution	Indicates low transmission fluid level.	
	Amber	High Transmission Temperature	Indicates transmission is overheating.	 04/22/2016 f611377 ICUC Caution

Table 3.8, Transmission Related Indicators

Telltales, Indicator Icons, and Messages				
Brakes				
Telltale	Color	Description		Related Messages
	Red	Low Brake Air Pressure (EPA10 and Newer)	Indicates air pressure in the primary or secondary reservoir has dropped below approximately 70 psi (483 kPa).	

Telltales, Indicator Icons, and Messages				
Brakes				
Telltale	Color	Description		Related Messages
BRAKE AIR	Red	Low Brake Air Pressure (EPA10 and Newer)	Alternate low brake air pressure telltale. Indicates air pressure in the primary or secondary reservoir has dropped below approximately 70 psi (483 kPa).	 06/30/2016 f611429 ICUC Warning
	Red	Parking Brake Engaged (EPA10 and Newer)	Indicates the parking brake is engaged.	
	Red	Parking Brake Engaged (EPA10 and Newer)	Alternative icon indicating the parking brake is engaged.	
	Amber	Hill Holder Assist Off		
	Amber	Hill Start Aid Engaged		
	Amber	Winch Brake Caution		
	Amber	Work Brake Caution		
	Green	Descent Control Mode Engaged		
	Green	Engine Brake Engaged	Indicates the engine brake is enabled.	

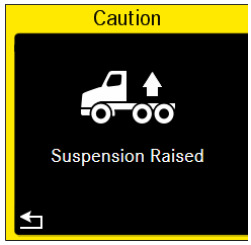
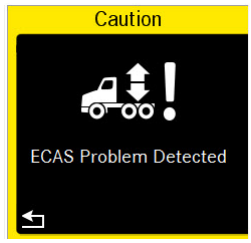
Table 3.9, Brake Related Indicators

Telltales, Indicator Icons, and Messages				
Driving Safety				
Telltale	**Color**	**Description**		**Related Messages**
	Amber	Electronic Stability Control (ESC) Active	Flashing indicates a stability event has been detected, and the ESC system is active. **Solid illumination indicates a problem with the stability system. Repair the ESC system immediately to ensure full stability capability.**	
	Amber	Electronic Stability Program Off		
	Amber	Tractor Anti-Lock Braking System (ABS)	Momentary illumination indicates the vehicle ABS is engaged. Solid illumination indicates a problem with the vehicle ABS. **Repair the ABS immediately to ensure full braking capability.**	
	Amber	Trailer Anti-Lock Braking System (ABS)	Momentary illumination indicates the trailer ABS is engaged. Solid illumination indicates a problem with the trailer ABS. **Repair the ABS immediately to ensure full braking capability.**	
	Amber	Active Brake Assist Active	Indicates Active Brake Assist is engaged.	
	Amber	Active Brake Assist Unavailable (GHG14 and newer)	Indicates the Active Brake Assist system is not available.	 04/22/2016 f611353 ICUC Caution
 ICC5 Telltale	Amber	Lane Departure Unavailable	Indicates that lane departure warning is disabled due to minimum speed, lack of lane markings, or system not being available. NOTE: Only on vehicles equipped with Detroit Assurance radar.	

Telltales, Indicator Icons, and Messages				
Driving Safety				
Telltale	**Color**	**Description**		**Related Messages**
 ICUC Telltale	Amber	Lane Departure Unavailable	Indicates that lane departure warning is disabled due to minimum speed, lack of lane markings, or system not being available. NOTE: Only on vehicles equipped with Detroit Assurance radar.	 06/28/2016 f611372 ICUC Caution
 ICC5 Telltale	Amber	Adaptive Cruise Control Not Available	Indicates that Adaptive Cruise Control (ACC) is not available NOTE: Only on vehicles equipped with a radar-based collision warning and mitigation system (CWS/CMS).	
 ICUC Telltale	Amber	Adaptive Cruise Control Not Available	Indicates that Adaptive Cruise Control (ACC) is not available NOTE: Only on vehicles equipped with a radar-based collision warning and mitigation system (CWS/CMS).	 04/22/2016 f611354 ICUC Caution If ACC is not available, Active Lane Assist (ALA) will not be available.
	Amber	IPPC Error		
	Green	Adaptive Cruise Control Active		
	Red	Adaptive Power Steering (APS) Error		An error with APS deactivates Active Lane Assist (ALA).
	Blue	Lane Keep Assist (LKA) Active	LKA is a component of Active Lane Assist (ALA) along with Lane Departure Protection (LDP). If Adaptive Cruise Control (ACC) is not available, ALA will not be available.	This is also the Switch icon
	Grey	Lane Keep Assist (LKA) on Standby		When LKA is OFF there is no steering wheel icon

Telltales, Indicator Icons, and Messages				
Driving Safety				
Telltale	**Color**	**Description**		**Related Messages**
	Amber	Gear Teach Mode in Progress		
	Green	AERO active	Indicates that aerodynamic height control (AERO) is active.	

Table 3.10, Driving Safety Related Icons

Telltales, Indicator Icons, and Messages				
Suspension				
Telltale	**Color**	**Description**		**Related Message**
	Amber	Suspension Higher than Normal Ride Height / Axle Lifted	Indicates the current rear suspension height is above the normal ride height.	 11/09/2016 f611471 ICUC Caution
	Amber	Suspension Lower Than Normal Ride Height / Axle Dropped	Indicates the current rear suspension height is below the normal ride height.	 06/29/2016 f611434 ICUC Caution
	Amber	Suspension Height		
	Amber	Electronically Controlled Air Suspension (ECAS) Error	Indicates Electronically Controlled Air Suspension (ECAS) active fault.	 04/22/2016 f611367 ICUC Caution

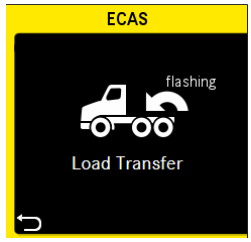
Telltales, Indicator Icons, and Messages				
Suspension				
Telltale	Color	Description		Related Message
	Amber	Load Transfer	Indicates the ECAS system is applying the maximum available vehicle load on the drive axle up to the maximum gross axle weight rating (GAWR).	 11/09/2016 f611472 ICUC Caution
	Amber	5th Wheel Adjust		

Table 3.11, Suspension Related Indicators

Telltales, Indicator Icons, and Messages				
Battery				
Telltale	Color	Description		Related Messages
	Red	Battery Critical		
	Red	Battery Failure		
	Amber	Battery Failure		

Table 3.12, Battery Related Indicators

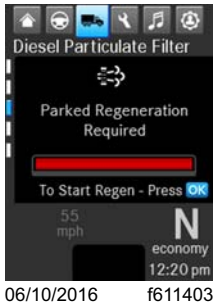
Telltales, Indicator Icons, and Messages				
Tire Related Indicators				
Telltale	Color	Description		Related Messages
	Red	Low Tire Pressure Warning	Indicates a notable loss of tire pressure in at least one tire.	If a tire monitoring system is available, the tire(s) with low pressure will be highlighted red.
	Amber	Low Tire Pressure Warning	Indicates low tire pressure in at least one tire.	If a tire monitoring system is available, the tire(s) with low pressure will be highlighted amber.
	Amber	Automatic Traction Control (ATC) Active	Flashing indicates a wheel spin event has been detected, and the ATC system is active.	

Telltales, Indicator Icons, and Messages				
Tire Related Indicators				
Telltale	**Color**	**Description**		**Related Messages**
	Amber	Automatic Traction Control (ATC) Deactivated	Indicates the ATC SPIN button has been pressed to allow wheel slip.	 ICUC Caution

Table 3.13, Tire Related Indicators

Telltales, Indicator Icons, and Messages				
Fuel				
Telltale	**Color**	**Description**		**Related Messages**
	Amber	Low Fuel	Indicates low fuel level. Refill the main fuel tank.	
	Amber	Water in Fuel Warning	Indicates the fuel may contain water. Drain any water collected in the fuel/water separators.	

Table 3.14, Fuel Related Indicators

Telltales, Indicator Icons, and Messages				
Diesel Exhaust Fluid (DEF) and Diesel Particulate Filter (DPF)				
Telltale	**Color**	**Description**		**Related Messages**
	Red	Diesel Particulate Filter Critical	Indicates a parked regen is required immediately.	 ICUC Warning

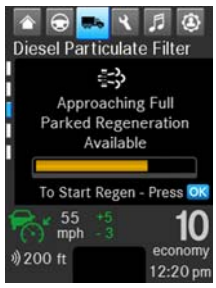
Telltales, Indicator Icons, and Messages				
Diesel Exhaust Fluid (DEF) and Diesel Particulate Filter (DPF)				
Telltale	**Color**	**Description**		**Related Messages**
	Amber	Diesel Particulate Filter (DPF) Status	Solid illumination indicates a regen is required. Change to a more challenging duty cycle (such as highway driving) to raise exhaust temperatures for at least twenty minutes, or perform a parked regen. Blinking indicates that a parked regen is required immediately. An engine derate and shutdown will occur.	 06/10/2016 f611401 ICUC Caution
	Amber	Diesel Particulate Filter Inhibited		
	Green	Diesel Particulate Filter Regeneration in Progress	Indicates a regen is in progress.	
	Amber	High Exhaust System Temperature (HEST)*	Slow (10-second) flashing indicates a regeneration (regen) is in progress. **IMPORTANT: When the HEST lamp is illuminated, do not park the vehicle near objects that can be harmed by high temperatures or flammable materials.** Solid illumination indicates high exhaust temperatures at the outlet of the tail pipe when speed is below 5 mph (8 km/h).	
	Amber	Low Diesel Exhaust Fluid	Indicates low diesel exhaust fluid. Fill the DEF tank.	See **Chapter 14** for an explanation of the after treatment system (ATS) warnings, and actions required to avoid further engine protection steps.
	Amber	Low Diesel Exhaust Fluid	Alternative icon to indicate Low Diesel Exhaust Fluid. Fill the DEF tank.	See **Chapter 14** for an explanation of the after treatment system (ATS) warnings, and actions required to avoid further engine protection steps.

Table 3.15, Diesel Exhaust Fluid (DEF) and Diesel Particulate Filter (DPF) Related Icons

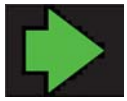
Telltales, Indicator Icons, and Messages				
Lamps				
Telltale	**Color**	**Description**		**Related Information**
	Green	Right-Turn Indicator On	Flashing indicates the outside right-turn signal lamps are activated.	
	Green	Left-Turn Indicator On	Flashing indicates the outside left-turn signal lamps are activated.	
	Blue	High-Beams On	Indicates the high-beam headlights are on.	
	Green	Low-Beams On	Indicates the low-beam headlights are on.	
	Blue	Automatic High-Beams On	Indicates the high-beam headlights have been set to automatic and are on.	
	Grey	Automatic High-Beams Off	Indicates the high-beam headlights have been set to automatic and are off.	
	Green	Automatic Low-Beams On	Indicates the low-beam headlights have been set to automatic and are on.	
	Grey	Automatic Low-Beams Off	Indicates the low-beam headlights have been set to automatic and are off.	
	Green	Daytime Running Lamps On	Indicates the daytime running lamps are on.	
	Blue	Auxiliary Drive Lamps On	Indicates the auxiliary drive lamps are on.	
	Blue	Utility Lamps On	Indicates the utility lamps are on.	
	Green	Taillights / Marker Lamps On	Indicates the taillights, aka marker lamps, are on.	

Table 3.16, Lamp Indicators

Telltales, Indicator Icons, and Messages				
Passenger Safety				
Telltale	**Color**	**Description**		**Related Message**
	Red	Unfastened Seat Belt	On some vehicles, activates with an audible alert when the system detects that the parking brake is off and the driver seat belt is not fastened. On vehicles with a seat occupancy sensor, the seat being occupied, seat belt not fastened, and parking brake off will cause this warning to activate. On other vehicles, this lamp illuminates for 15 seconds when the ignition is first turned on.	
	Amber	Supplemental Restraint System (SRS) Error	Indicates a malfunction has occurred in the restraint system and restraint system components may be triggered unintentionally or may not deploy as intended during an accident. **Have the restraint system checked and repaired immediately.**	

Table 3.17, Passenger Safety Indicators

Telltales, Indicator Icons, and Messages				
Weather				
Telltale	**Color**	**Description**		**Related Pop-Up Message**
	White	Snowflake	Indicates ambient air temperature has dropped below 34°F (1°C). Pay attention to road conditions and watch for ice.	 ICUC Caution

Table 3.18, Weather Related Indicator

Telltales, Indicator Icons, and Messages				
ICU Application Icons				
Telltale	**Color**	**Description**		**Related Information**
	Blue	Active Phone Call	Indicates a phone is connected to the ICU and a call is active.	The phone screen in the infotainment section of the ICU will also show an active call, including the number being called and call length.

Telltales, Indicator Icons, and Messages				
ICU Application Icons				
Telltale	Color	Description		Related Information
	Blue	Software Download Available	Indicates a software download is available. For reasons of security and optimal vehicle functioning, software updates should be quickly installed.	A pop-up message will also appear.

Table 3.19, ICU Application Icons

Telltales, Indicator Icons, and Messages				
Air Gauge Indicators				
Telltale	Color	Description		Related Messages
	Red	Primary Air Warning		
	Red	Secondary Air Warning		
	Red	Application Air Warning		
	Amber	Primary Air Caution		

Table 3.20, Air Gauge Indicators

Engine Protection System

⚠ WARNING

When the red STOP engine lamp illuminates, most engines are programmed to shut down automatically within 30 seconds. The driver must immediately move the vehicle to a safe location at the side of the road to prevent causing a hazardous situation that could cause bodily injury, property damage, or severe damage to the engine.

See **Chapter 14** Emissions and Fuel Efficiency for an explanation of the aftertreatment system (ATS) warning indicators, and actions required to avoid further engine protection steps.

The STOP engine lamp illuminates when the engine protection system is activated in one of two ways. On some engines, the engine protection system will derate the engine, allowing it to run at lower rpm and slower vehicle speed. Drive the vehicle to a safe location or to a service facility.

IMPORTANT: Safely bring the vehicle to a stop on the side of the road and shut down the engine as soon as the red light is seen. If the engine shuts down while the vehicle is in a hazardous location, turn the key to the OFF position for a few seconds, then restart the engine and move the vehicle to a safer location.

On other engines, the engine protection system will shut down the engine. It will first derate the engine, then shut it down completely 30 to 60 seconds after the indicator illuminates (depending on the critical fault type) if the condition does not improve. Bring the vehicle to a stop on the side of the road before the engine shuts down.

Some vehicles may have a shutdown-override switch, which may be used to momentarily override the shutdown sequence. See **Chapter 12** Engine

Starting, Operation, and Shutdown for detailed information regarding the shutdown process.

IMPORTANT: Do not attempt to restart the engine while the vehicle is moving. Bring the vehicle to a safe stop, then restart the engine.

To restart the engine, turn the ignition to OFF, leave it there a few seconds, then turn the ignition to START. The engine will run for a short period and shut down again if the condition does not improve.

4

Driver Controls

Ignition Switch

The ignition switch is located on the left-hand dash, below the headlight switch.

The ignition switch has four positions: OFF, ACC (accessory), ON, and START. See **Fig. 4.1**.

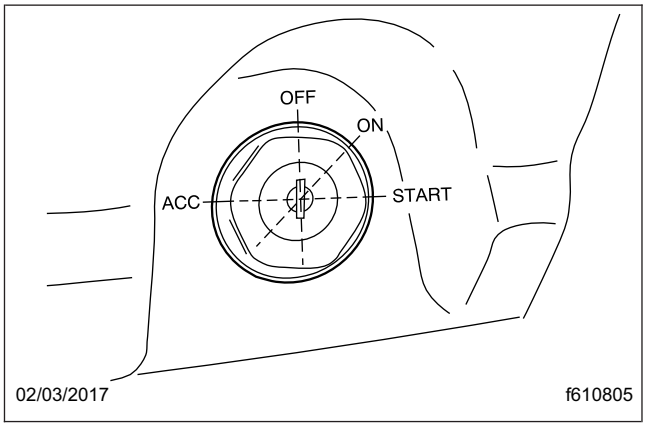


Fig. 4.1, Ignition Switch

In the OFF position, the ignition switch is vertical. The key can be inserted and removed only in the OFF position.

The following functions are operable when the ignition switch is in the OFF position (regardless of whether the key is inserted):

- low-beam headlights
- taillights
- brake lights
- road lights
- dome lights
- clearance lights
- hazard warning lights
- utility lights
- baggage compartment lights
- spotlights
- electric horn
- clock
- refrigerator
- CB radio
- power mirrors
- power receptacle
- fuel heater
- electric oil pan heater
- electric or diesel-fired engine coolant preheater

Turn the key counterclockwise to reach the ACC position. In addition to all the functions that are operable in the OFF position, the following functions are operable when the switch is in the ACC position:

- radio/stereo system
- heater and A/C fan
- mirror defog
- windshield fan
- ether start system
- air dryer
- backup lights

Turn the key clockwise past the OFF position to reach the ON position. With the switch in the ON position, all electrical systems become operable and the warning and indicator lamps illuminate. Wait for three seconds before starting the engine.

IMPORTANT: Do not crank the engine until the ICU self-check is complete.

Turn the key clockwise past the ON position to reach the START position to start the engine. Release the key the moment the engine starts. Do not operate the starter longer than thirty seconds, then allow the starter to cool between attempts. If the starter overheats, the starter protection system will prevent operation of the starter until it has cooled.

The ignition key also locks and unlocks the cab doors.

Lighting Controls

Unless otherwise noted below, press the upper half of the switch to turn the desired light(s) on or off.

Exterior Lighting Controls

Exterior light controls are listed here in alphabetical order. The ICC5 also provides some exterior light controls.

Automatic Headlights

If the vehicle is equipped with a rain-light sensor and the headlight switch is in the 'A' position, the low beam headlights and all exterior lights activate when the outside light decreases to a pre-set level. See **Fig. 4.2**.

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1. Fog Lights (optional)—Activate by pulling the switch out when the marker lights or headlights are on.
2. Automatic Headlights
3. Off
4. Marker Lights
5. Headlights

Fig. 4.2, Headlight Switch

Auxiliary High Beam Lights

If present, auxiliary high-beam lights are located in the front bumper. To activate the auxiliary high beam lights, press the upper part of the dash switch. The auxiliary high beam lights will illuminate only when the high-beam headlights are on. They will switch off temporarily when the low-beam headlights are on, until the high beams are on again. Press the upper half of the switch to deactivate the auxiliary high beam lights. See **Fig. 4.3**.

Backup Lights

Backup lights activate only when the vehicle is in reverse, and are designed to be used while backing up at night.

Daytime Running Lights

If the vehicle is equipped with daytime running lights (DRL), they are automatically activated when the ignition is switched on and the parking brake is released. The DRL turn off when the engine falls below 400 rpm, the parking brake is applied, or the headlights are turned on.

Daytime running lights are mandatory for vehicles domiciled in Canada. Vehicles domiciled in any other location may have an optional override switch (**Fig. 4.3**, ref. 3). This is a momentary switch that enables the driver to deactivate the DRL.

Fog Lights

Fog lights are designed to reduce glare in foggy conditions. The marker lights or headlights must be on in order to turn the fog lights on. Pull the headlight switch outward to activate the fog lights.

Hazard Warning Lights

The hazard warning light switch is located on the dash switch panel. See **Fig. 4.4**. The hazard lights can be activated regardless of the ignition switch position.

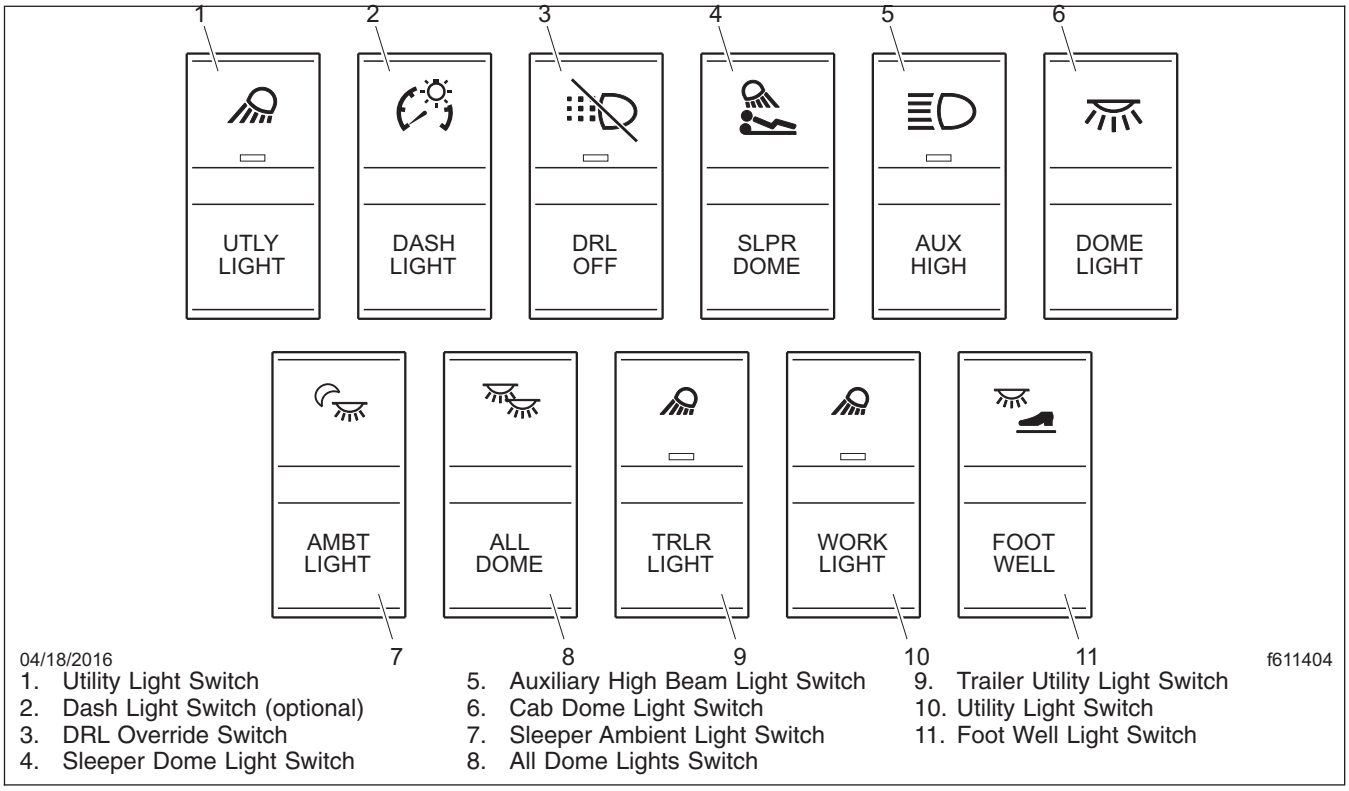
To activate the hazard lights, press the center of the switch once. The switch will blink at the same rate that the hazard lights flash. Press the switch again to turn them off. All the turn signals on the vehicle and trailer, as well as the turn signal indicators in the ICU, flash simultaneously when the hazard lights are activated.

Headlights & Follow Me Home Feature

The headlight switch is a rotary switch located to the left of the steering column, above the ignition switch. See **Fig. 4.2**.

If the Follow Me Home feature is activated, the low-beam headlights will remain on for nine seconds after the vehicle is parked, if the headlights were on prior to engine shutdown. This feature provides temporary lighting in the path of the headlights while walking to a building or other destination. If a vehicle door is opened or closed while this feature is active, the timer will add an additional 10 seconds of lighting. This feature can be temporarily disabled by turning the ignition switch on, or by cycling the headlight switch from the off position to one of the other two positions.

Some vehicles may have a feature that automatically turns on the headlights if the windshield wipers are on and the vehicle is moving faster than 10 mph (16 km/h). At speeds between 10 and 40 mph (16 to 64 km/h), cycling the headlight switch will turn the headlights off.



1. Utility Light Switch
2. Dash Light Switch (optional)
3. DRL Override Switch
4. Sleeper Dome Light Switch
5. Auxiliary High Beam Light Switch
6. Cab Dome Light Switch
7. Sleeper Ambient Light Switch
8. All Dome Lights Switch
9. Trailer Utility Light Switch
10. Utility Light Switch
11. Foot Well Light Switch

Fig. 4.3, Dash-Mounted and Sleeper-Control Light Switches

Fig. 4.4, Hazard Warning Switch

High-Beam Headlights

With the low-beam headlights on, push the turn-signal lever away from you to turn on the high-beam headlights. See **Fig. 4.5**. To turn off the high-beam headlights, pull the lever to the middle position.

With the low-beam headlights on, pull the lever towards you to flash the high-beam headlights momentarily.

When the high-beam headlights are on, a blue telltale illuminates on the instrument cluster.

NOTE: The ignition switch must be on for the high beams to work.

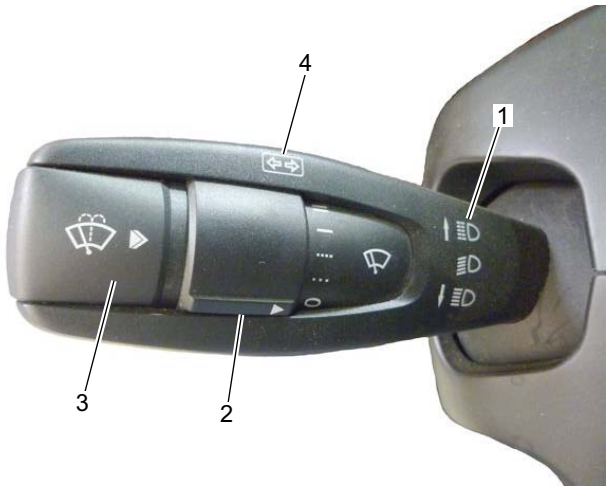
Intelligent High-Beam Headlights

The intelligent high-beam headlight feature activates when the headlight switch is in the 'A' position and the turn signal lever is pushed away from the driver in the high-beam position. See **Fig. 4.2** and **Fig. 4.5**.

When a vehicle approaches from the opposite direction, the high-beam headlights deactivate and the low-beam headlights activate. The high-beam headlights activate again when there are no vehicles approaching from the opposite direction.

Marker Lights

To turn the marker lights on, turn the headlight switch clockwise past the off position. See **Fig. 4.2**.



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1. Headlight Control Symbols
2. Windshield Wiper Switch
3. Windshield Washer Switch
4. Turn Signal Symbol

Fig. 4.5, Steering Column-Mounted Turn Signal Lever

Marker Interrupt

NOTE: This switch may not be available in all export markets.

The marker interrupt switch is located in the right-hand switch pod of the steering wheel for the ICUC system (see **Fig. 4.6**), and the left-hand button pod of the steering wheel for the ICC5 button (see **Fig. 4.7**). Pressing it temporarily flashes the marker lights.

Pretrip Light Test Switch

When the driver presses the pretrip light test switch, shown in **Fig. 4.8**, all exterior lights are activated so the driver can exit the vehicle and verify they are working properly. For additional information see **Chapter 25** Pre- and Post-Trip Inspections and Maintenance.

Spotlight

The spotlight switch is located on the pivoting handle of the spotlight. There may be a single spotlight assembly mounted above the driver's door, or one above each door.

Turn Signals

The turn-signal lever is mounted on the left-hand side of the steering column. Pulling the turn-signal

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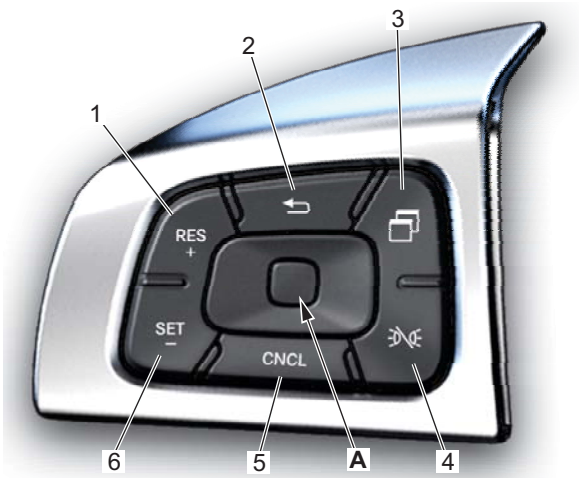
1. Cruise Accelerate/Resume
2. Quick Access System Settings
3. Cruise Decelerate/Set
4. Phone Hang-Up/Reject
5. Marker Interrupt**
6. Phone Pick-Up
7. Headlamp Interrupt**
8. Cancel Cruise Control

** Not available in all markets

Fig. 4.6, Steering-Wheel-Mounted Right-Hand Switch Pod - ICUC



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A. Menu Button—Press the button to access instrument panel menus. When the button is pressed, information appears on the driver display screen.

1. Cruise Accelerate/Resume
2. Back Button
3. Quick Access System Settings
4. Marker Interrupt
5. Cancel Cruise Control
6. Cruise Decelerate/Set

Fig. 4.7, Steering-Wheel-Mounted Left-Hand Pod - ICC5

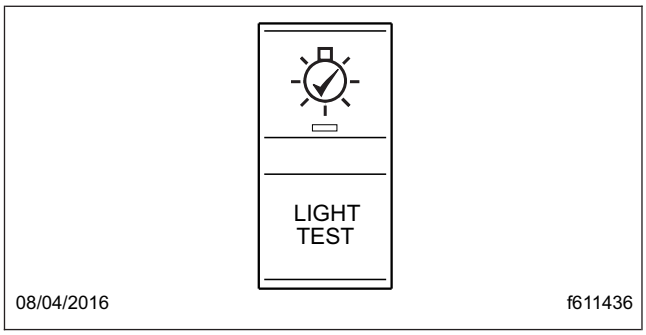


Fig. 4.8, Pretrip Light Test Switch

lever up activates the right-turn signal; pushing it down activates the left-turn signal. The lever is typically a non-canceling combination turn-signal, windshield wiper/washer switch, and high beam headlight control unit. See **Fig. 4.5**.

When a turn signal is activated, a green telltale light flashes on the instrument panel.

On a self-canceling turn signal lever, the lever automatically returns to the neutral position when the steering wheel returns to the straight-ahead position after a turn.

Utility Lights

Utility lights can be swivel-mounted on upper half of the cab, mounted on the exhaust support, or flush-mounted on the back of the cab or sleeper. Press the upper half of the switch to turn the utility lights on or off.

When activated, a red indicator light in the switch is illuminated.

Interior Lighting Controls

Interior light controls are listed here in alphabetical order.

The interior lights include panel lights, dome lights, reading lights, and courtesy lights.

Vehicles come pre-set from the factory with theater lighting, which ramps up lights from low power to full power when activated. See **Fig. 4.9**.

Sleepers have rear dome lights, ambient lights, reading lights, task lights, foot well lights, and baggage compartment lights.

Many interior lights have a dimming function. By holding down the switch, the lights can be cycled between bright and dim.

The ICC5 provides some digital interior light controls. See **Chapter 3** Instruments for more information.

Baggage Compartment Lights

Baggage compartment lights are located on the underside of the lower bunk, on both sides. Both lights turn on when either baggage compartment door is opened to illuminate the baggage compartment. The lights also come on when the lower bunk is raised.

Foot Well Lights

When the driver or passenger doors are opened, amber lights illuminate both foot wells. These lights can also be activated with the foot well light switch. See **Fig. 4.3**. Press the upper half of the switch to turn the foot well lights on or off.

Overhead Console Lights

The overhead console lights consist of two dome lights, two reading lights, and an amber lamp that provides ambient light for the center dash panel and the cup holders. The dome lights illuminate when a door opens, then stay on for a short time after both doors are closed. Press the lens of the reading light or dome light to activate each one independently of the others.

Dash Lights

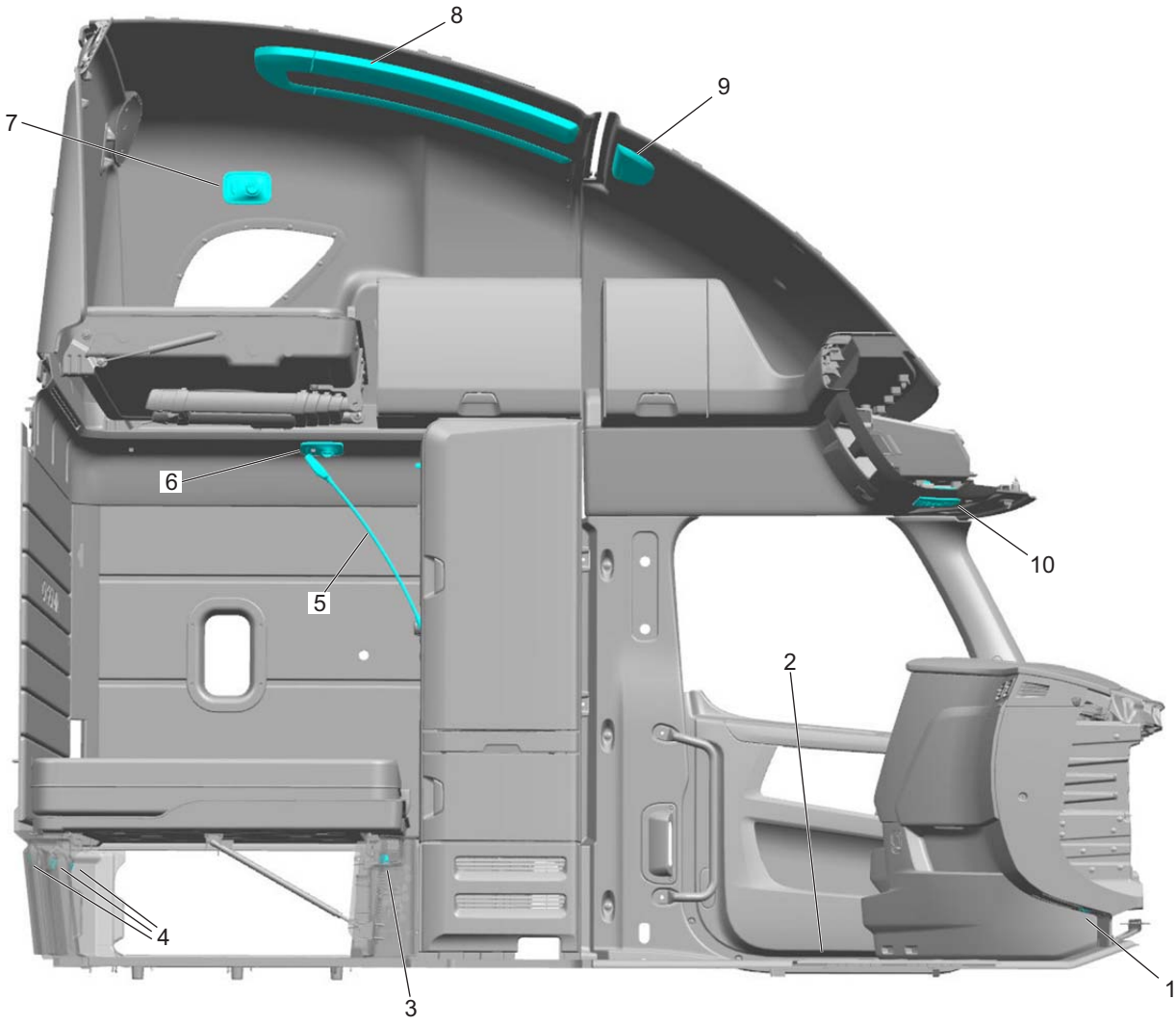
The dash lighting illuminates independently of the headlights. The brightness can be set to adjust automatically based on ambient lighting.

The brightness can also be adjusted in either the ICUC or ICC5 under the Settings menu or through the use of an optional dash switch.

When using the dash switch, the panel lights brighten and dim in 10% increments, depending on whether the upper half or the lower half of the switch is pressed. When the panel lights are turned on with the switch, they will default to the intensity that was last set.

Cab Dome Light

A rear cab dome light is located on the headliner, between the bunk and the cab on sleeper vehicles. The rear cab dome light will activate with the dome lights when a door is opened, then stay on for a short time after both doors are closed. The length of time this courtesy lighting stays on can be controlled via the settings menu in any ICU system as can the time the entrance light stays on.



1. Foot Well Lights
2. Door Entry Courtesy Lights
3. Sleeper Floor Lights
4. Baggage Compartment Lights
5. Sleeper Work Light
6. Sleeper Reading Lamp (lower bunk)
7. Sleeper Reading Lamp (upper bunk)
8. Sleeper Dome Light
9. Cab Dome Light
10. Overhead Console Lights

Fig. 4.9, Cab and Sleeper Interior Lighting

Use the dash-mounted switch or the switch in the sleeper panel to activate the rear cab dome light. See **Fig. 4.3**.

Sleeper Dome Light

The sleeper dome light has both direct and ambient lights, controlled by separate switches.

Sleeper Foot Well Lights

The sleeper foot well switch activates two lights that illuminate the sleeper floor.

Sleeper Reading Lights

Reading lights are mounted above bunks in the sleeper. To turn a reading light on or off, press the switch on the lamp.

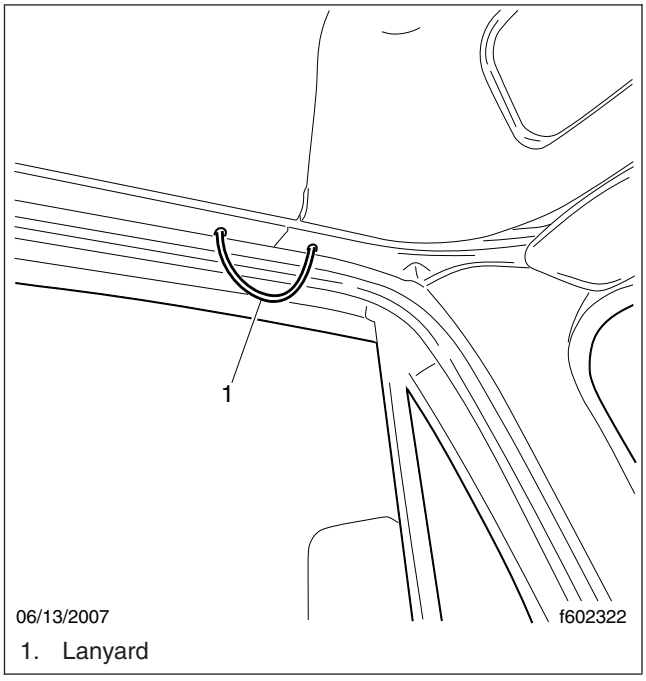
Theater Lighting

Some vehicles come pre-set with theater lighting. Theater lighting gradually illuminates the overhead and reading lights when they are turned on and a gradually dims these lights when they are turned off.

Horn Controls

Air Horn

Air horn(s) may be mounted on the roof of day cabs, or under the driver-side floor for sleeper cabs. The air horn is controlled by a wire lanyard that hangs down inboard by the driver's door. See **Fig. 4.10**. Pull downward on the lanyard to sound the air horn.



1. Lanyard

Fig. 4.10, Air Horn Control

Electric Horn

The electric horn is activated by pressing down on the top of the steering wheel center pad.

The horn will sound for the duration that the button is pressed, up to 60 seconds. The electric horn will operate regardless of the position of the ignition key.

Powertrain Controls

Aftertreatment System Regen Switches

NOTE: See **Chapter 14** Emissions and Fuel Efficiency for detailed information about the operation of the regeneration (regen) switches and the aftertreatment system (ATS).

Regen may be started manually with the optional digital switch in the ICU. See **Fig. 4.11**.

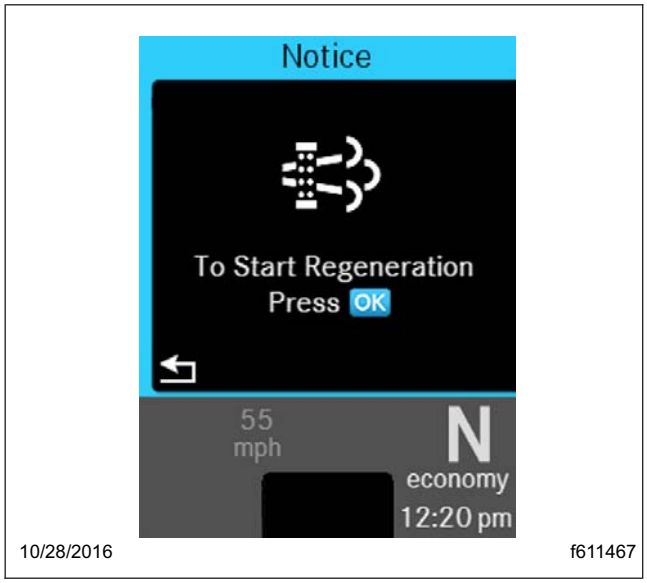


Fig. 4.11, Regen Start Digital Switch - ICUC

Some vehicles may be equipped with a regen inhibit switch. See **Fig. 4.12**. To stop a regen in progress or prevent the start of a regen, press the upper half of the switch. Regen will be delayed until the switch is no longer active.

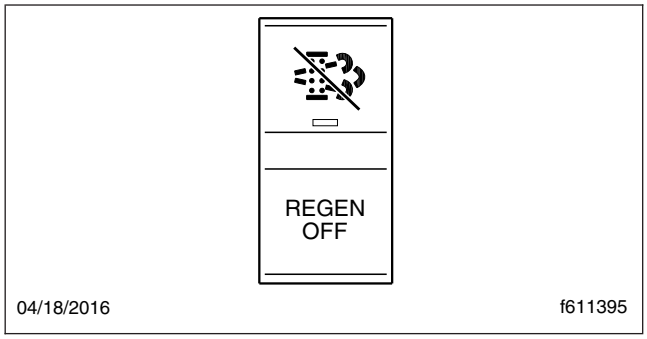
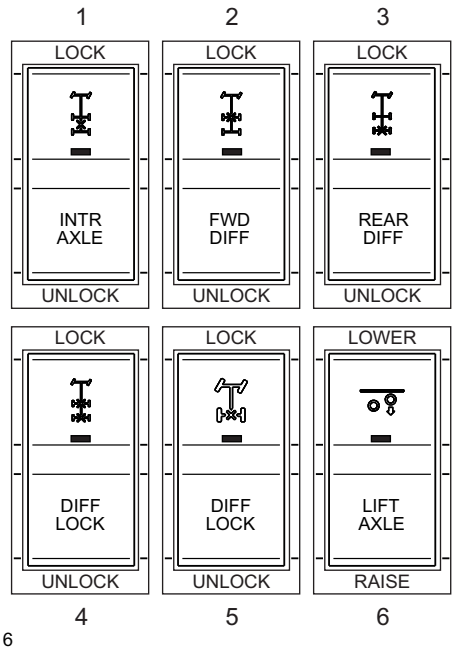


Fig. 4.12, Regen Inhibit Switch

Axle Switches

Some vehicles are equipped with an interaxle differential lock switch and/or a switch for each driver-controlled differential lock (DCDL). See **Fig. 4.13**.

For more information about differential locks and using them for traction control, see **Chapter 19** Drive Axles.



1. Interaxle Lock Switch
2. Forward Drive Axle Differential Lock Switch
3. Rear Drive Axle Differential Lock Switch
4. Differential Lock Switch, 6X4
5. Differential Lock Switch, 4X2
6. Lift Axle Switch

Fig. 4.13, Axle Switches

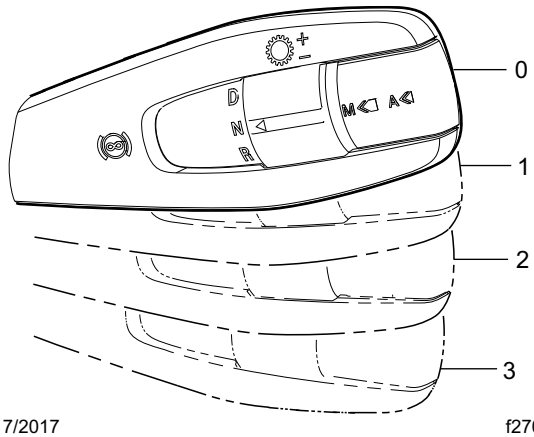
Engine Brake Switches

NOTE: See **Chapter 15** Brake Systems for detailed information about engine brake operation.

Whenever vehicle braking is required on good road conditions, the engine brake may be used in conjunction with the service brakes. There is no time limit for operation of the engine brake. However, an engine brake does not provide the precise control of, and is not a substitute for, service brakes.

The engine brake control is located on the right-hand steering-column-mounted lever. At the top position, the engine brake is off, and at the three lower positions, the brake is on and the intensity (low, medium, high) increases with each step down. See **Fig. 4.14**

NOTE: Cruise control and safety systems may activate the engine brake regardless of the lever position.



0. Off
1. Low
2. Medium
3. High

Fig. 4.14, Engine Brake Positions

Engine Fan Switch

The engine cooling fan can be turned on by the engine fan switch.

To turn the engine fan on, press the upper half of the switch. The fan will continue to operate for a set amount of time and then turn off unless the coolant temperature is high enough to continue fan operation. To turn the fan off before the set time period ends, press the lower half of the switch. See **Fig. 4.15**.

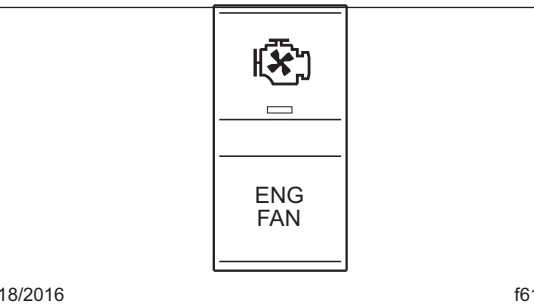


Fig. 4.15, Engine Fan Switch

Hill Start Aid Override Switch

Some vehicles are equipped with a Hill Start Aid (HSA) feature to prevent the vehicle from rolling while on steep grades and to allow for a controlled launch. HSA delays the release of the service brakes until enough torque is available to begin moving the vehicle forward, for a maximum of 3 seconds. HSA is "on" by default. It can be turned off by pressing and releasing the HSA override switch on the dash (see **Fig. 4.16**).

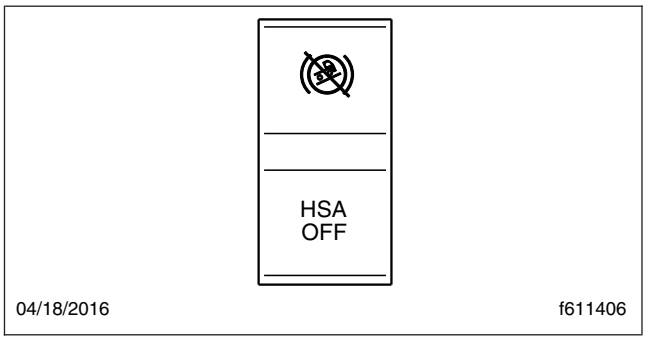


Fig. 4.16, Hill Start Aid Override Switch

Power Take-Off (PTO) Switch

To activate the PTO function, press the upper half of the switch. Press the lower half of the switch to deactivate the PTO function. See **Fig. 4.17**.

Power Take-Off may also be activated using the digital switch in the ICU.

⚠ WARNING

To avoid injury, do not install a PTO that is not Detroit Diesel approved onto a Detroit™ Transmission. Use of a non-Detroit Diesel approved PTO with a Detroit Transmission could result in unintended operation which could lead to severe personal injury.

Transmission Controls

Detroit™ Automated Transmissions

NOTE: See **Chapter 17** Automated and Automatic Transmissions for automated transmission operating instructions.

Vehicles with automated and automatic transmissions use the multifunction control shown in **Fig. 4.18**. This control moves in two directions and has two switches. It is used to request manual shifts, change shift mode, set engine brake levels, and control specialty engine brake functions.

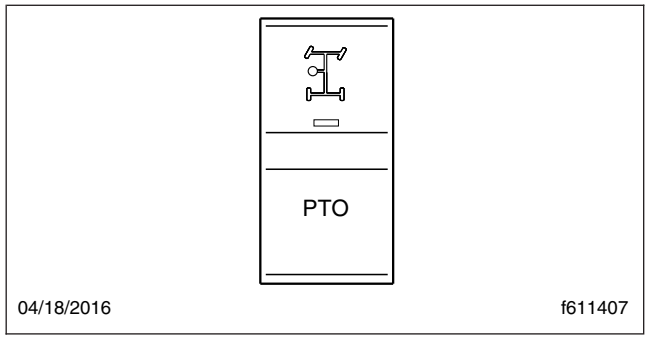


Fig. 4.17, PTO Switch

Manual Transmissions

NOTE: See **Chapter 18** Manual Transmissions and Clutch for manual transmission operating instructions.

If so equipped, the transmission range control and splitter valves are attached to the gear shift knob.

The range-preselection lever allows the selection of the low or high range for each transmission ratio. It is used once during an upshift sequence and once during a downshift sequence.

Dependent on the transmission model, some ratios can be split using the splitter-control button.

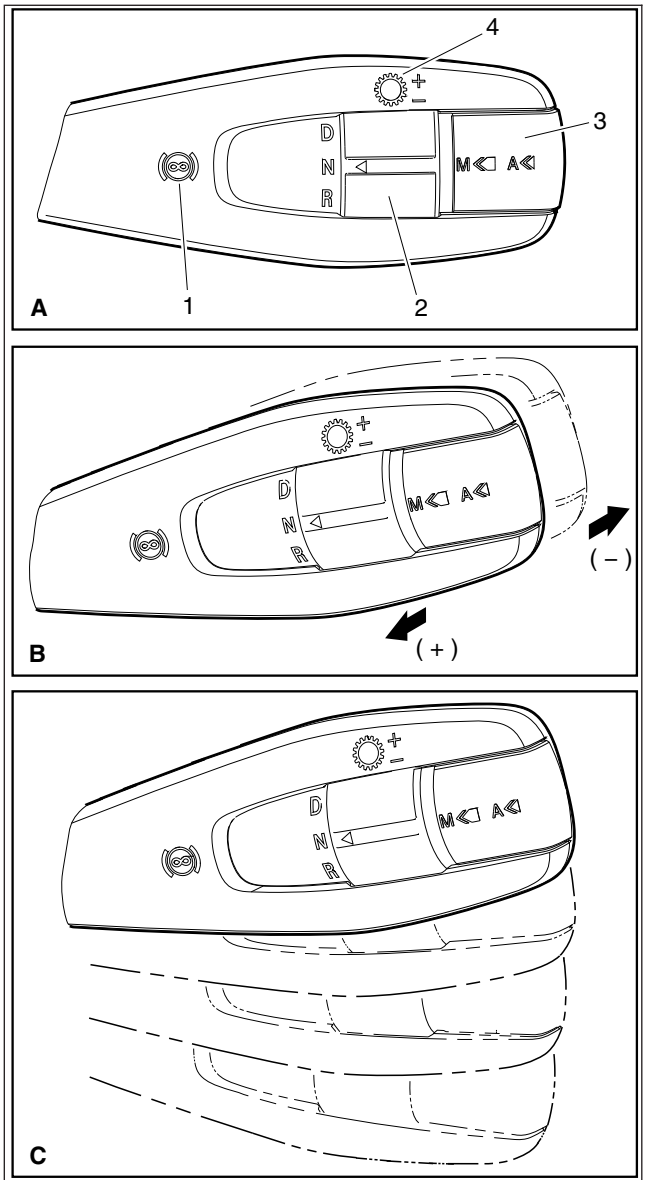
Dash-Mounted Brake Controls

NOTE: See **Chapter 15** Brake Systems for detailed information about brake systems.

Parking Brake Control Valve

The yellow diamond-shaped knob operates the parking brake valve. See **Fig. 4.19**. Pull the knob out to apply both the tractor and the trailer spring parking brakes. Push both the parking brake and the trailer air supply knobs in to release the tractor and trailer spring parking brakes. Before the spring parking brakes can be released, the air pressure in either air brake system must be at least 65 psi (447 kPa).

If the trailer is not equipped with spring parking brakes, pull the parking brake valve out to apply the tractor parking brakes and the trailer service brakes.



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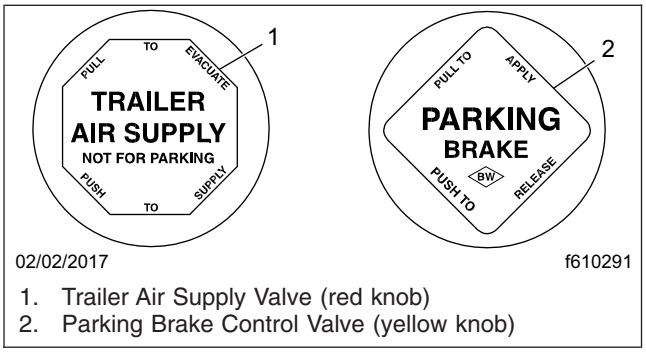
A. Front View
B. Shift Up/Down Requests
C. Four positions for engine brake settings

1. Engine Brake Symbol
2. Drive/Neutral/Reverse Switch
3. Shift Mode Switch (Economy/Performance/Manual)
4. Gear Shift Symbol

Fig. 4.18, Automated/Automatic Transmission Multifunction Control



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1. Trailer Air Supply Valve (red knob)
2. Parking Brake Control Valve (yellow knob)

Fig. 4.19, Brake Valve Control Knobs

Trailer Air Supply Valve

The red octagonal-shaped knob operates the trailer air supply valve, which charges the trailer air supply system and releases the trailer spring parking brakes. See **Fig. 4.19**.

After the vehicle and its air hoses are connected to a trailer and the pressure in the air system is at least 65 psi (447 kPa), push the trailer air supply valve knob in (and leave it in) to charge the trailer air supply system and release the trailer spring parking brakes. Pull the trailer air supply valve out before disconnecting a trailer or when operating a vehicle without a trailer.

Trailer Brake Lever

The trailer brake lever is used to apply the trailer service brakes without applying the truck or tractor service brakes. It is usually mounted on the right-hand control panel. Move the lever down to apply the trailer brakes; move the lever up to release the trailer brakes. The lever will automatically return to the up position when it is released. See **Fig. 4.20**. The lever can be partially or fully applied, but in any partially on position it will be overridden by a full application of the service brake pedal.

Antilock Braking System

The Meritor™ WABCO® Antilock Braking System (ABS) passively monitors vehicle wheel speed at all times, and controls wheel speed during emergency stops or wheel lock situations.

During emergency or reduced-traction stops, fully depress the brake pedal until the vehicle comes to a safe stop. *Do not pump the brake pedal*. With the brake pedal fully depressed, the ABS will control all wheels to provide steering control and a reduced braking distance.

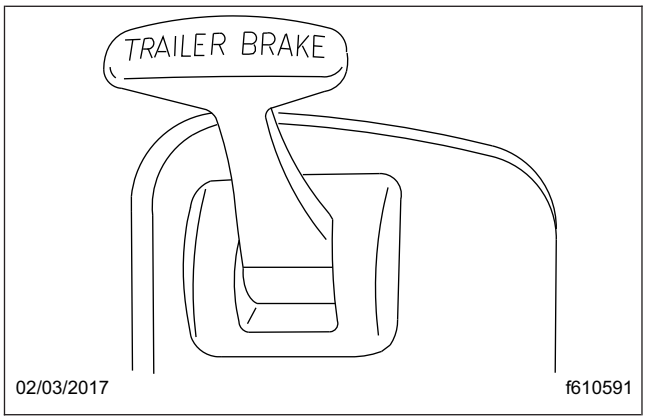


Fig. 4.20, Trailer Brake Lever

The ABS is designed to communicate with a trailer ABS, if they are compatible. Compatibility will result in the illumination of the trailer ABS lamp during vehicle start-up and fault detection. The trailer ABS lamp will not illuminate unless a compatible trailer is connected to the tractor.

Vehicles with ABS may have Automatic Traction Control (ATC). On these vehicles, the ATC system automatically limits wheel spin during reduced-traction situations. In normal braking applications, the standard air brake system is in effect.

Pressing the ATC SPIN switch (**Fig. 4.21**) shuts ATC off and allows drive wheel spin. Pressing the switch again, or cycling the ignition key, will cycle the system back to normal operation.

NOTICE

The ATC spin feature is intended to be used under specific slippery conditions that require momentary increased wheel spin. Using this option for an extended period of time may damage the vehicle brake system.

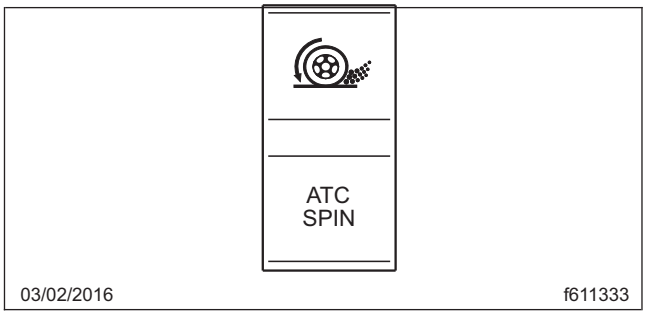


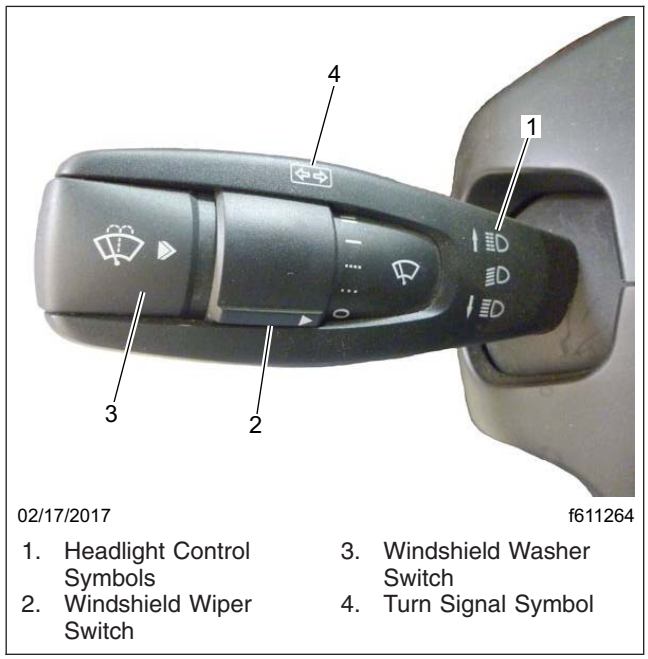
Fig. 4.21, ATC SPIN Switch

Windshield Wiper and Washer Controls

NOTICE

Do not attempt to manually move the windshield wiper arms. Wiper motor damage will occur if the arms are forcibly moved.

The windshield wipers and washer controls are on the multi-function turn signal lever on the left-hand side of the steering column. See **Fig. 4.22**.



1. Headlight Control Symbols
2. Windshield Wiper Switch
3. Windshield Washer Switch
4. Turn Signal Symbol

Fig. 4.22, Windshield Wiper/Washer Controls

Wiper Controls

The wipers are operated by a rotary switch on the turn signal lever. There are five settings: off, two intermittent settings, and two continuous speeds. Symbols mark each setting on the dial.

Turn the wipers on by rotating the rotary switch up. Rotate the switch further to increase the speed of the wipers through the two intermittent settings, then to continuous low and high speeds. Rotate the switch down to slow the wipers down. Rotate the switch as far down as it will go to turn the wipers off.

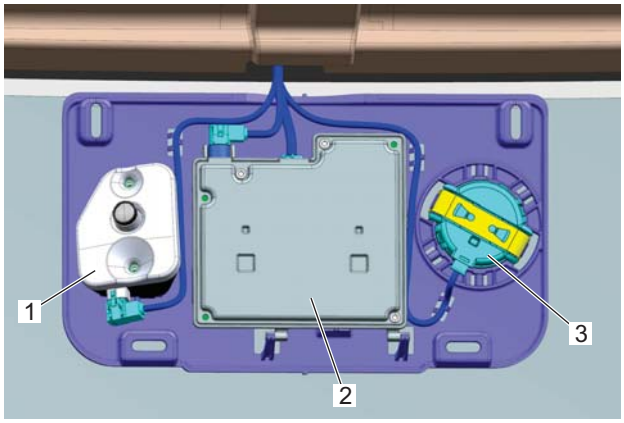
The default speeds for the two intermittent settings are 6 seconds and 1 second.

The first intermittent setting of 6 seconds is programmable from 1 to 25 seconds. To program the interval, rotate the switch from the first intermittent position to the OFF position, wait for the desired interval between wipes to lapse (between 1 and 25 seconds), and then move the switch back to the first intermittent position. If the switch is kept in the OFF position for more than 50 seconds, the interval changes back to the default of 6 seconds.

The second intermittent setting has an interval of 1 second, and is not programmable.

NOTE: Some vehicles may have a feature that automatically turns on the headlights if the windshield wipers are on and the vehicle is moving faster than 10 mph (16 km/h). At speeds between 10 and 40 mph (16 to 64 km/h), cycling the headlight switch will turn the headlights off.

Wipers and the Rain/Light Sensor



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1. Driver Facing Camera
2. Multipurpose Camera 2 (MPC2)
3. Rain/Light Sensor

Fig. 4.23, MPC2 Cameras and Rain/Light Sensor

If the vehicle is equipped with a rain/light sensor (see **Fig. 4.23**) and the wiper switch is in set to an intermittent setting, the wipers will start when the sensor detects rain or snow.

If the vehicle is moving faster than 40 mph (64 km/h) the wiper speed will automatically increase and decrease, dependent upon how much moisture builds up on the windshield between wipes.

If the wiper switch is set to a continuous speed (low or high), input from the rain/light sensor is ignored.

The behavior of the wipers based on the rain/light sensor input is independent of the headlamp switch position.

NOTE: If a rain/light sensor is installed in the MPC2 bracket, the lens area of the camera will appear shiny when viewed through the windshield because of the silicone gel between the lens and the windshield. If no rain/light sensor is installed, the plastic plug placed in the bracket will appear as a flat black circle.

A vehicle equipped with automatic headlights and an A option on the headlight switch (see **Fig. 4.2**) should be equipped with a rain/light sensor.

Windshield Washers

The windshield washer button is located at the end of the turn signal lever. Momentarily press the windshield washer button to initiate a single wipe without activating the washer pump. The wipers will swipe one full cycle and return to the inactive position.

To operate the windshield washers, press and hold the button in. After a short delay, the washer will pump windshield washer fluid onto the windshield for as long as the washer button is pressed. The windshield wipers will turn on at low speed while the washer button is pressed. After the button is released, the wipers will continue to operate for one to several wipe cycles, depending on how long the wash button was pressed initially.

Suspension Controls

Air Suspension Height Control Switch

NOTICE

Do not operate the vehicle over uneven ground such as ramps, speed bumps, curbs, etc. with the air springs deflated. Doing this may lead to air bag separation from the piston, preventing the suspension air springs from re-inflating.

The air suspension height control switch is used to adjust the vehicle height to aid in coupling or uncoupling from a trailer. See **Fig. 4.24**. Setting the switch to LOWER deflates the air springs to lower the rear of the vehicle. In the NORMAL position, the air springs inflate to raise the rear of the vehicle to normal ride height.

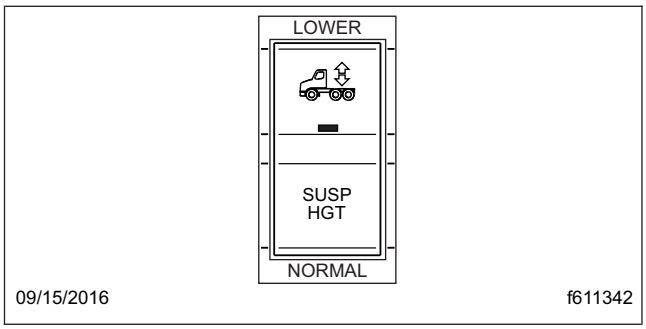

Fig. 4.24, Air Suspension Height Control Switch

NOTICE

Never exhaust air from the suspension while driving. When the air is exhausted, the suspension will not absorb road shocks, and components may be damaged.

A red LED in the switch is illuminated when the suspension is deflated.

Aerodynamic Height Control

NOTICE

The aerodynamic height control (AHC) switch should not be used to raise the vehicle in an attempt to drive over objects in the road, as doing so will result in vehicle damage.

AHC reduces ground clearance by approximately 1 inch (2.5 cm) at highway speed. If this reduction of ground clearance is determined to be problematic, such as a construction zone or poor road conditions, AHC may be disabled. Pressing the AHC switch, shown in **Fig. 4.25**, disables aerodynamic lowering of the vehicle. The switch should be activated well in advance in order to avoid potential vehicle damage in these types of road conditions.

ECAS Dash Switches

Vehicles with Electronically Controlled Air Suspension (ECAS) may be equipped with either dash switches or a remote control unit, not both. See **Figure 4.26** and **Table 4.1**.

LOAD XFER (Load Transfer)

This switch controls the ECAS manual load transfer function by adjusting suspension air pressure. Use this function to minimize wheel slippage in road conditions where traction may be a concern.

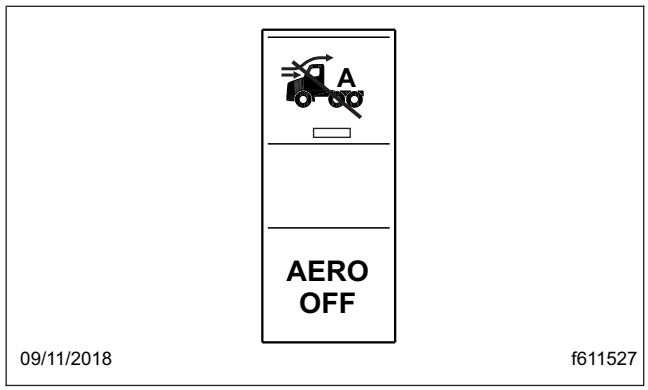

Fig. 4.25, Aerodynamic Height Control Switch

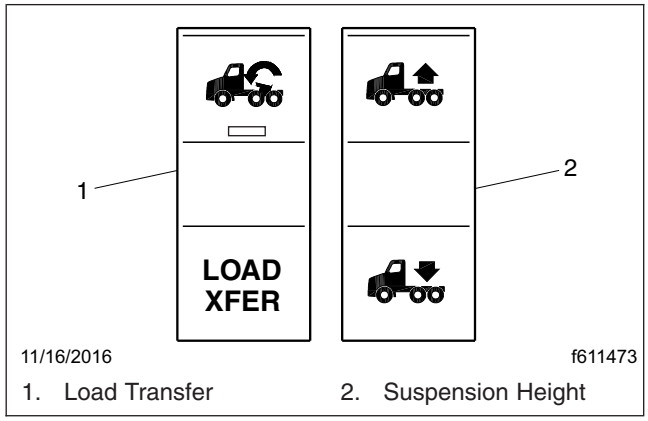

Fig. 4.26, ECAS Dash Switches

The ECAS load transfer feature applies the maximum available vehicle load on the drive axle, up to the maximum allowable limit, determined by the gross axle weight rating (GAWR). In bobtail or with a loaded trailer less than the GAWR, the tag axle supports a negligible load while the drive axle supports nearly the full weight. Above the GAWR, the drive axle is loaded with approximately the maximum allowable load and the tag supports the remainder.

Load transfer mode can be deactivated by holding up on the dash switch for 4 seconds. Load transfer mode will automatically deactivate when the vehicle reaches 45 mph (72 km/h).

For vehicles equipped with the ICU, when load transfer mode is active, "Load Transfer" will display in the message field of the driver display. See **Figure 4.27**.

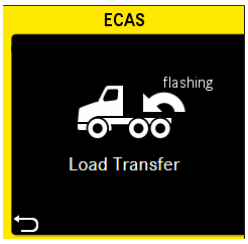

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Fig. 4.27, Load Transfer Notification - ICUC

Suspension Height

If the suspension is at normal height:

- each up press increases the suspension height an increment, unless the suspension is at maximum height
- a down press lowers the suspension to its lowest set-point (usually axle stops)

If the suspension is *below* normal height:

- an up press increases the suspension height to normal ride height
- a down press does nothing; the suspension is already at its lowest point

If the suspension is *above* normal height:

- each up press increases the suspension height an increment, unless the suspension is at maximum height
- a down press lowers the suspension to normal ride height

On vehicles equipped with the ICU, messages about the ride height status will display in the driver display. See **Figure 4.28**.

If the suspension is outside normal ride height (amber lamp on), the ECAS system will automatically return the suspension to normal ride height when vehicle speed reaches or exceeds a set speed (usually set to 5 mph).

ECAS Standby Mode, Dash Switch

Once the key is turned off, the ECAS will enter standby mode, remaining powered and adjusting to level and load changes for 1 hour. To cancel standby mode on vehicles with ECAS dash switches, turn the key from OFF to ON to OFF in less than 1.5 seconds. Confirm the deactivation of standby mode by pressing the suspension height switch, which should not adjust the suspension.

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Fig. 4.28, Example of Ride Height Message - ICUC

ECAS Remote Control Unit

Some vehicles equipped with Electronically Controlled Air Suspension (ECAS) have a remote control unit to lower and raise the rear suspension. See **Table 4.1** for keys and functions.

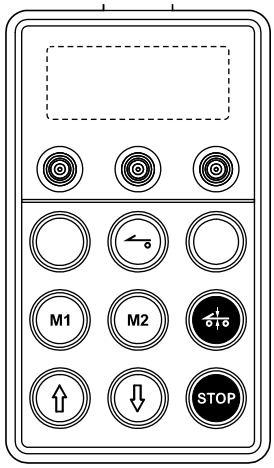
If the suspension is outside normal ride height (amber lamp on), the ECAS system will automatically return the suspension to normal ride height when vehicle speed reaches or exceeds a set speed (usually set to 5 mph).

Messages about the ride height status will display in the ICU driver display.

ECAS Standby Mode, Remote Control

Once the key is turned off, the ECAS will enter standby mode, remaining powered and adjusting to level and load changes for 1 hour. To cancel standby mode on vehicles with a remote control, turn on the remote control then hold the STOP key on the remote for 2 seconds. Confirm the deactivation of standby mode by attempting to turn the remote on and adjust the suspension, which should not be possible.

ECAS Remote Control Keys and Functions



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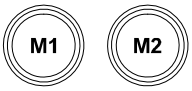
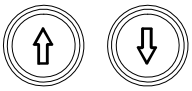
Key	Function
	Remote Control On/Off. The middle light will remain lit while the remote is active.
	Memory keys. Pressing the STOP key and a memory key simultaneously will store the current height. Once stored, pressing the key will adjust the vehicle to the stored height.
	Normal height key. This key will return the vehicle to normal ride height.
	Lift and lower keys. These keys will raise or lower the rear suspension height.
	The STOP key. Pressing the STOP key will interrupt and stop all adjustments being made by the remote control. When the key is off, holding the Stop key for 2 seconds will cancel the 1 hour Standby mode.

Table 4.1, ECAS Remote Control Keys and Functions

Fifth Wheel Controls

Fifth Wheel Slide Control Switch

NOTICE

Do not activate the fifth wheel slide control valve while the vehicle is in motion. To do so could cause damage to the fifth wheel member, the kingpin, the cab or trailer, and ultimately to the drivetrain.

The fifth wheel air slide switch permits repositioning of the sliding fifth wheel from inside the cab. See **Fig. 4.29**. Moving the air slide control valve switch to the lock position deactivates the control valve and locks the fifth wheel to the baseplate. Moving the switch to the SLIDE position activates the control valve and unlocks the fifth wheel slide mechanism, allowing changes to the total length of the tractor-trailer and changes to axle loads to comply with varying jurisdictional laws. For detailed operating instructions for fifth wheel slide, coupling, and uncoupling procedures, refer to **Chapter 20**.

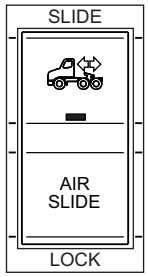


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Fig. 4.29, Fifth Wheel Slide Control Switch

Trailer Auxiliary Switch

The trailer auxiliary switch energizes an optional circuit that allows the trailer electrical system to draw power for functions such as internal lights and battery charging for lift gates.

Press the top of the switch to activate the trailer auxiliary function. Press the bottom of the switch to turn trailer auxiliary function off. See **Fig. 4.30**.

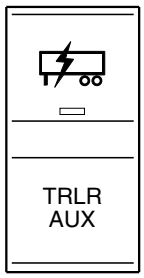

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Fig. 4.30, Trailer Auxiliary Switch

Adjustable Steering Column Controls

To unlock the steering column to adjust it, pull the steering column locking lever out and away from the column. See **Fig. 4.31**. With the column unlocked, the steering wheel can be adjusted up-and-down and tilted fore-and-aft. Once the wheel is in the desired position, lock the position by pushing the lever in toward the column until it goes no further and is parallel to the column itself.

⚠ WARNING

Make sure that the steering column is locked before driving the vehicle. Never attempt to adjust the column while driving the vehicle. Doing so could cause loss of vehicle control, personal injury, and property damage.

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A. Pull the steering column locking lever out and away from the column.

Fig. 4.31, Unlocking the Steering Column

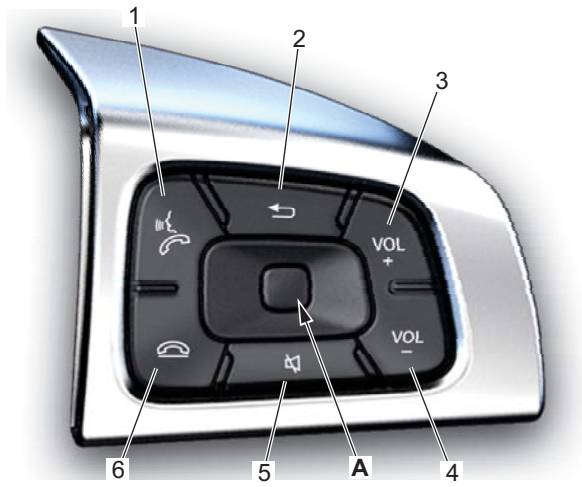
Radio Controls

Vehicle radio controls are a mix of both physical and electronic.

Physical radio volume controls are located on the steering wheel. ICUC volume up and down switches are on the left-hand switch pod. ICC5 volume up and down buttons are on the right-hand switch pod. See **Fig. 4.32**.

Other radio controls--muting the volume, choosing an audio source or radio station, or saving a station as a favorite can be done via the vehicle ICU.

For additional radio operating instructions, see the infotainment section in **Chapter 3** Instruments.



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A. Menu Button—Press the button to access instrument panel menus. When the button is pressed, information appears on the 10-inch head unit screen.
1. Phone Pick-Up
2. Back Button
3. Volume Increment Up
4. Volume Increment Down
5. Mute Button
6. Phone Hang-Up/Reject

Fig. 4.32, Steering-Wheel-Mounted Right-Hand Pod - ICC5

Climate Controls

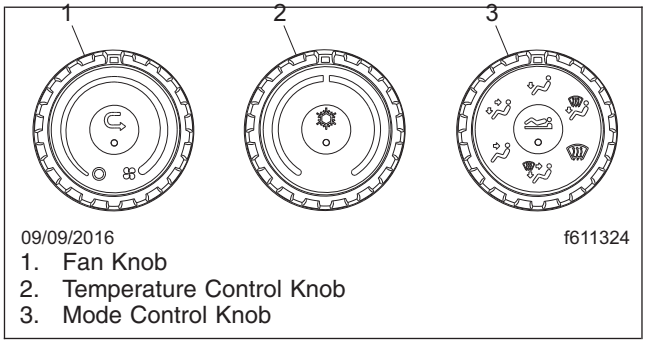
NOTE: See **Chapter 8** Climate Controls for detailed climate control panel operating instructions.

Cab Climate Control

NOTE: On vehicles equipped with the ICC5, the fan speed, set temperature, and ventilation mode temporarily appear on infotainment screen when these items are adjusted.

The climate control panel allows you to control the heating, ventilating, defrosting, and air conditioning (A/C) functions. The cab climate control panel has three knobs to control the functions of the cab temperature system; see **Fig. 4.33**:

- fan knob with recirculation button
- temperature control knob with A/C button
- mode control knob (with bunk-override button on sleeper cab only)



1. Fan Knob
2. Temperature Control Knob
3. Mode Control Knob

Fig. 4.33, Cab Climate Controls

The fan knob controls the fan speed, and forces fresh or recirculated air through the air outlets. To increase airflow, turn the knob clockwise to a higher number. To decrease airflow, turn the knob counterclockwise to a lower number.

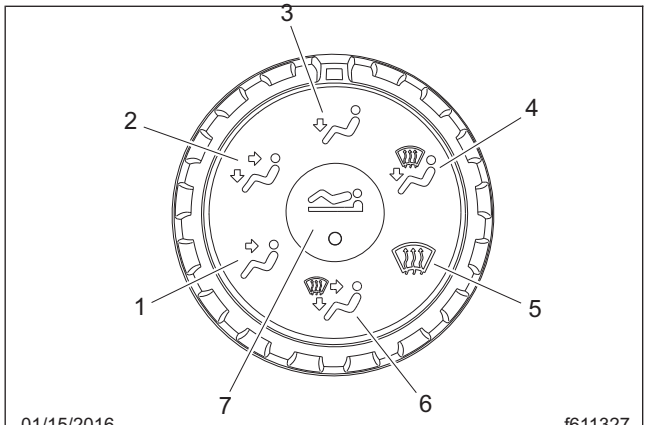
Recirculation mode limits the amount of outside air that enters the cab. Press the recirculation button to prevent dusty or smoky air from entering the cab.

NOTE: To prevent the buildup of odors and/or oxygen depletion inside the cab, the system switches from full recirculation mode to partial recirculation mode after 20 minutes.

The temperature control knob is used to select the desired temperature. Turn the knob clockwise to the red area for warm air. Turn the knob counterclockwise to the blue area for cool air.

The A/C cools and dehumidifies the air inside the cab. Press the A/C button, located in the center of the temperature control knob, to turn the A/C on and off.

The mode control knob allows the control of air flow through the face outlets, the floor outlets, the defrost (windshield) outlets, or a combination of these outlets. See **Fig. 4.34**.



NOTE: There are intermediate modes between each knob position.

1. Face Mode
2. Bi-Level Mode
3. Floor Mode
4. Floor/Defrost Mode
5. Defrost Mode
6. All Mode
7. Bunk Override Button (on sleeper-cabs only)

Fig. 4.34, Mode Control Knob With Bunk Override Button

Bunk-Override Button

The bunk-override button is located in the center of the cab air-selection knob (sleeper-cabs only). See **Fig. 4.34**. The bunk override button allows the driver to make the sleeper temperature and fan settings the same as the cab's.

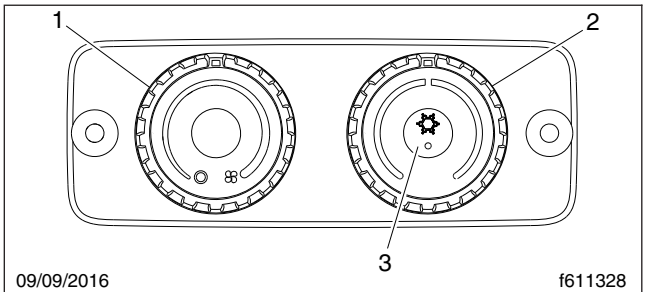
Press the bunk override button to copy the current cab HVAC temperature and fan settings to the sleeper HVAC. An amber indicator will illuminate when bunk override mode is activated. When in override mode, the sleeper climate control panel automatically conforms to the fan speed and temperature settings on the cab climate panel at the time the override mode is activated. Further changes of the cab climate control settings will not alter the settings of the sleeper climate control panel.

The override mode is disabled when the fan knob or temperature control knob on the sleeper climate control panel is manually set to a different setting. The override mode is also disabled when the bunk override button is pressed to the off position.

Sleeper Climate Control

The sleeper temperature can be controlled from the sleeper climate control panel or from the cab climate control panel if the bunk-override button is activated.

The fan knob controls the sleeper temperature fan speed. To increase airflow, turn the knob clockwise to a higher number. To decrease the airflow, turn the knob counterclockwise to a lower number. See **Fig. 4.35**.



1. Fan Knob
2. Temperature Control Knob
3. Air Conditioning Button

Fig. 4.35, Sleeper Climate Control Panel

The temperature control knob is used to select the desired temperature in the sleeper. Turn the knob clockwise to the red area for warm air. Turn the knob counterclockwise to the blue area for cool air.

Press the button in the center of the temperature control knob to activate the A/C.

Cancel the bunk-override mode, if activated, by changing the sleeper fan speed or temperature setting. The system will then operate from the sleeper controls.

Seat Controls

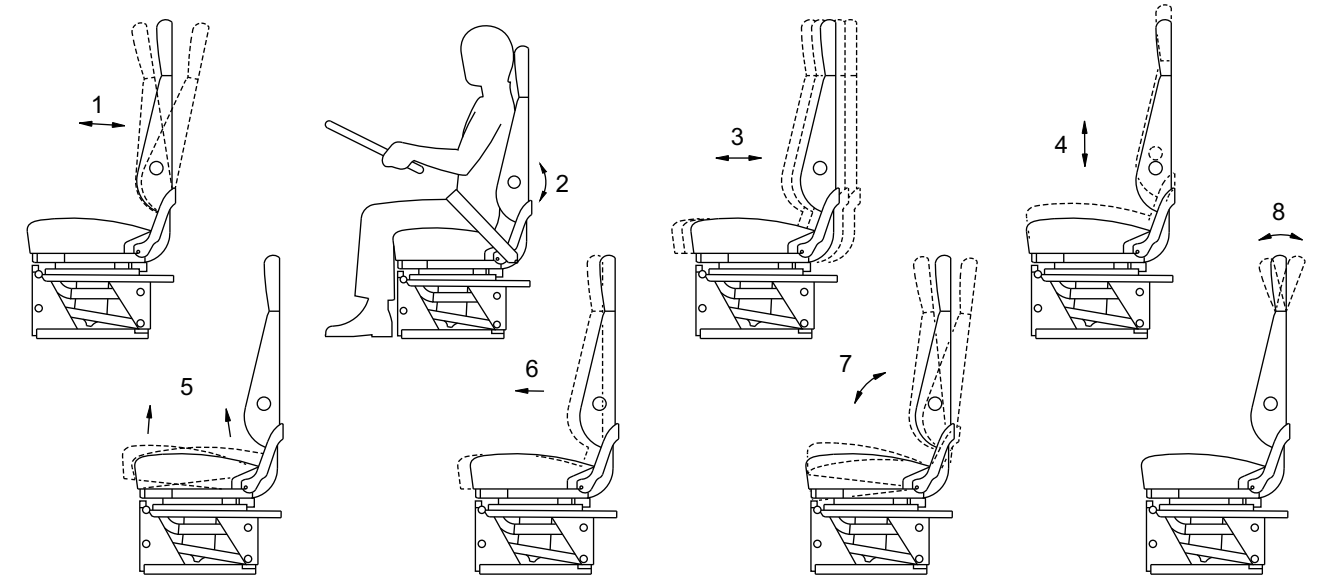
NOTE: See **Chapter 9** for detailed information about seat controls and adjustments.

⚠ WARNING

Keep hands, tools, and other objects away from the scissor points under the seats. Failure to do so could cause personal injury.

The following is a description of adjustments that can be made to various Freightliner seats. Not all seats have all of the adjustments listed below. See **Fig. 4.36**.

1. Backrest Tilt: This adjustment enables the backrest to pivot forward or backward.
2. Lumbar Support: Lumbar support changes the shape of the seat back to give more or less support to the occupant's lumbar (lower back) area. This adjustment is either mechanical or air controlled, depending on make and model of the seat.
3. Isolator: This feature reduces the amount of road shock by isolating the occupant from the motion of the vehicle, and allowing the upper seat to move in a simple pendulum motion. A lockout feature is used whenever the isolator is not desired.
4. Height Adjustment: This adjustment moves the entire seat up or down. The adjustment is either manually- or air-controlled, depending on the make of the seat.
5. Bottom Cushion Angle, or Fore-and-Aft Bottom Cushion Height: This adjustment enables the occupant to raise or lower the front or back of the bottom cushion. This adjustment is easier to perform when all weight is removed from the seat.
6. Fore-and-Aft Seat Slide, or Seat Track Adjustment: This adjustment moves the entire seat forward or backward on its track.
7. Seat Tilt: This adjustment allows the seat assembly (back and bottom cushions) to tilt forward or backward.
8. Headrest Adjustment: This adjustment changes the angle of the upper part of the backrest to provide head and upper back support.



1. Backrest Tilt
2. Lumbar Support
3. Isolator Feature
4. Height Adjustment
5. Bottom Cushion Angle (fore-and-aft cushion height)
6. Fore-and-Aft Seat Slide (seat track adjustment)
7. Seat Tilt
8. Headrest Adjustment

Fig. 4.36, General Seat Adjustments

5

Detroit Assurance 4.0

Detroit Assurance 4.0

Detroit Assurance 4.0 (DA 4.0) is a driver safety system that uses a bumper-mounted radar and an optional windshield mounted camera to communicate information to the vehicles's brakes, engine, and transmission.

The system can track vehicles up to 820 feet (250 meters) ahead, and, if necessary, will sound a warning and apply the brakes.

IMPORTANT: Do not mount any attachments in front of the radar distance sensor. See **Fig. 5.1.** Do not paint or affix items over the distance sensor cover. If attachments are mounted in front of the distance sensor, such as a crash guard, they can impair the operation of the distance sensor.

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Fig. 5.1, Forward Radar Location

To avoid malfunctions, clean the cover of the distance sensor regularly.

The windshield mounted forward-facing camera is required for DA 4.0 Lane Departure Warning (LDW). See **Fig. 5.2**.

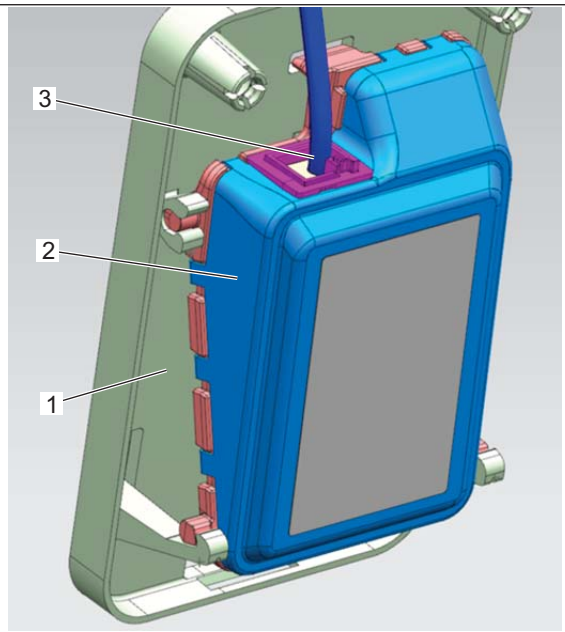
The windshield must be clean, unobstructed, and without damage for proper operation of the camera. Regularly clean the area of the windshield used by the camera to avoid incorrect lane detection by LDW. The driver should switch on the windshield wiper to clean the windshield and remove snow and ice from the windshield.

If the area of the windshield used by Lane Departure Warning is damaged, the windshield must be replaced.

Multipurpose Camera 1 (MPC1)

The camera detects the raised reflectors and reflective paint in lane markings.

If the vehicle is equipped with Bendix SafetyDirect, this camera records video of the trucks activity during severe collision mitigation events. In such situations a total of 20-30 seconds of recording is transmitted to the SafetyDirect web portal.



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1. Camera Mounting Bracket
2. Camera
3. Camera Cable

Fig. 5.2, Multipurpose Camera 1 Components

DA 4.0 Collision Mitigation System (CMS)

Driver Display

The driver display presents warnings and the status of adaptive cruise control (ACC) and/or lane departure warning. Refer to "Adaptive Cruise Control (ACC)" and "Lane Departure Warning (LDW)" in this chapter for more information.

To show distance, speed, and lane markings, navigate to the Quick Access menus using the steering

wheel switches. Refer to **Chapter 3** for more information on instruments and driver display controls.

Adaptive Cruise Control (ACC)

Overview

Adaptive cruise control controls speed and the distance from a detected vehicle in front to maintain a safe following distance.

When the vehicle is traveling above 10 mph (15 km/h) and there is no vehicle in front, ACC operates in the same way as standard cruise control by accelerating to the set speed.

The default following speed of adaptive cruise control is 3.6 seconds but can be adjusted in the range of 2.4 and 3.6 seconds.

When a vehicle in front is detected, the driver display shows the speed of the detected vehicle and the distance to the detected vehicle. See **Fig. 5.3**.

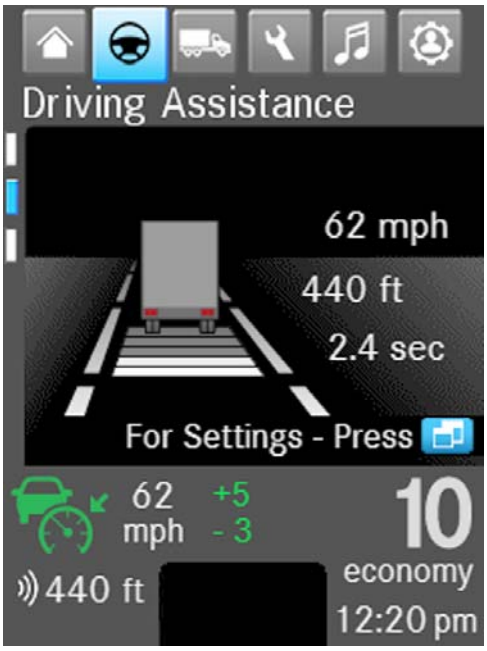

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Fig. 5.3, Adaptive Cruise Control Screen

Safety Information

WARNING

The Detroit Assurance system is intended solely as an aid for an alert and conscientious professional driver. It is not intended to be relied upon to operate a vehicle. Use the system in conjunction with rearview mirrors and other instruments to safely operate the vehicle.

The Detroit Assurance system is not a substitute for safe, normal driving procedures, nor will it compensate for any driver impairment such as drugs, alcohol, or fatigue.

Failure to drive safely and use the system properly could result in personal injury and/or death and severe property damage.

Operate a vehicle equipped with the Detroit Assurance system as if the vehicle were not equipped with a collision warning system.

Adaptive cruise control (ACC) may not detect narrow vehicles, like motorcycles, driving in front of the vehicle, or vehicles driving in a different lane.

In particular, be aware of the following situations:

- cornering, entering, and exiting bends;
- vehicles driving in a different lane;
- vehicles changing lanes;
- vehicles exiting the road;
- overtaking;
- winding stretches of road; and
- obstacles and stationary vehicles.

Adaptive cruise control does not compensate for inattentive driving, weather, or traffic conditions. Adaptive cruise control is only an aid. The driver is responsible for maintaining a safe distance from the vehicle in front, maintaining a safe vehicle speed, braking, and remaining in a lane.

ACC Controls

See **Fig. 5.4** and **Table 5.1** for a description of cruise control steering wheel switches.

Steering Wheel Controls	
Description	**Function**
–/SET	Sets the cruise speed while the vehicle is traveling at the desired speed. Pressing and and holding decreases the set cruise speed.
+/RES	Resumes the set speed. Pressing and holding increases the set cruise speed.

Steering Wheel Controls	
Description	**Function**
CNCL	Deactivates cruise control, but retains the set speed in memory.

Table 5.1, Steering Wheel Controls

- ABS is deactivated;
- there is a malfunction in the brake system or the electronic management system; or
- the distance sensor initialization is not yet complete.

1. Cruise Accelerate/Resume
2. Quick Access System Settings
3. Cruise Decelerate/Set
4. Phone Hang-Up/Reject
5. Marker Interrupt
6. Phone Pick-Up
7. Headlamp Interrupt
8. Cruise Cancel
9. Volume Increment Up
10. Menu Right
11. Volume Increment Down
12. Menu Down
13. Back Button
14. Menu Left
15. Menu Accept (OK)
16. Menu Up

Fig. 5.4, Steering-Wheel-Mounted Switches

Functions and Activation Conditions

If ACC detects a vehicle in front driving at a speed slower than the set cruise speed, the engine is derated, the engine brakes are activated, and the service brakes are applied, slowing the vehicle to maintain the minimum following distance. If the vehicle in front is no longer detected, the vehicle will accelerate to the set speed. The ACC will also slow the vehicle if it exceeds the set speed (on a downhill grade, for example).

Adaptive cruise control cannot be activated, or is automatically deactivated, if:

- the vehicle is traveling slower than 10 mph (15 km/h);
- the transmission is in neutral for more than 5 seconds;
- reverse gear is selected;

Activating Adaptive Cruise Control and Setting the Speed

Activate ACC by setting the cruise speed, using the controls on the steering wheel. See **Table 5.1** .

Drive at the desired speed, then press the –/SET switch. Adaptive cruise control will be activated and the set speed stored.

If the brake pedal is pressed, ACC is automatically deactivated.

If ACC is deactivated, the stored speed can be activated again by pressing the +/RES switch. The driver display will show the adaptive cruise control symbol and the set speed. Adaptive cruise control will automatically brake or accelerate the vehicle to maintain the set speed.

If ACC is, or becomes, unavailable, a message will be displayed that allows the driver to choose to use standard cruise control. See **Fig. 5.5**.

Fig. 5.5, ACC Unavailable

Increasing or Reducing Speed

The speed setting can only be set when driving.

Press –/SET to set the cruise speed while the vehicle is traveling at the desired speed. Press and hold to decrease the set cruise speed.

Setting the Distance to the Vehicle in Front

The ACC settings menu can be used to set the distance to the vehicle in front.

IMPORTANT: Make sure that the minimum distance is maintained to the vehicle in front required by law. Adjust the specified minimum distance to the vehicle in front if necessary.

Collision Warning

NOTE: If the accelerator pedal is pressed, or a turn is indicated, the collision avoidance system is suppressed.

In the event of a potential collision, a warning appears on the driver display screen and a double warning tone sounds. The warning screen is displayed for as long as the hazardous situation persists.

If a collision warning appears on the driver display screen, pay attention to the traffic situation and reduce the vehicle speed using the service brake.

Overtaking

NOTE: It is possible to exceed the set speed when overtaking.

The set speed can be exceeded using the accelerator pedal. When the accelerator pedal is released, the set speed will be resumed.

Deactivating the System

Press the CNCL switch, or, press the brake pedal to deactivate cruise control.

NOTE: The set speed remains stored when ACC is deactivated.

Tail Gate Warning

Tale Gate Warning uses the vehicle's bumper mounted radar to calculate a safe following distance at speeds greater than 20 mph (32 kp/h). The system will present a visual alert if the driver is following the vehicle in front too closely. The system warns the driver when:

- ACC is not activated;
- the vehicle is moving faster than 20 mph (32 kp/h); and
- the driver follows a vehicle for longer than 10 seconds at a distance that will be traversed in less than 2.6 seconds.

The system will not give warning when:

- the vehicle is moving slower than 20 mph (32 km/h);
- another vehicle cuts in front;
- the vehicle in front is moving away: or
- ACC is activated.

After the initial warning, the system will continue to warn the driver every 20 seconds if the gap between the vehicles does not increase.

Tail gate warning operates independently from active brake assist (ABA).

Once activated, Tailgate Warning will deactivate only at speeds less than 20mph (32 km/h).

Active Brake Assist (ABA)

Overview

Active Brake Assist is always on, automatically tracking the distance from the front of the tractor to other vehicles in its path using bumper-mounted radar.

The radar tracks stationary objects in the vehicle's path and has the capacity to engage full braking on these objects, such as a parked vehicle or stopped traffic.

The radar system can detect most pedestrians moving within the vehicle's path as long as they stay in motion; the system can act to help mitigate a collision at vehicle speeds below 25mph (40 km/h). If the system detects a pedestrian in motion within the radar system's parameters for potential danger, the vehicle will give a visual and auditory warning, and, if the driver doesn't respond, engage in partial braking.

The radar may not detect pedestrians in every possible situation, nor is it a substitute for cautious driving.

Safety Information

⚠ WARNING

Active Brake Assist (ABA) is intended only as an aid for a conscientious and alert driver. The driver is responsible for keeping a safe distance from the vehicle in front, for the vehicle speed, braking in good time, and remaining in lane.

ABA does not take road and weather conditions into account, nor the prevailing traffic situation. The driver should always adapt driving style to suit prevailing road and weather conditions.

ABA is not a substitute for safe driving procedures.

Operate a vehicle equipped with Detroit Assurance Collision Mitigation System as if the vehicle were not equipped with a collision mitigation system.

The Detroit Assurance Collision Mitigation System will not warn of hazards such as animals, oncoming vehicles, or cross traffic.

Failure to drive safely and use the system properly could result in personal injury and/or death and severe property damage.

If your vehicle is equipped with ABA, it can (within system limitations):

- react more quickly to an object in your path of travel;
- perform emergency braking; and
- react to moving people with a warning and partial braking.

Active brake assist can minimize the risk of a front-end collision with a moving or stationary vehicle. If ABA detects the risk of a front-end collision, it issues an audible and visual warning. If the risk persists, ABA automatically initiates partial braking of the vehicle. If the driver does not react to the warnings and partial brake application, ABA automatically initiates a full brake application.

Active brake assist may detect moving people within the vehicle's path and along the edge of the lane and can act to help mitigate a collision at speeds below 25mph (40 km/h).

Active brake assist may not detect narrow vehicles, like motorcycle, driving in front, or vehicles driving on a different lane.

Active brake assist does not automatically adapt to road and traffic conditions. Brake the vehicle using the service brake if:

- an event window with the warning symbol appears on the driver display screen;
- an intermittent warning tone sounds; or
- an intermittent warning tone sounds and automatic partial braking was initiated.

If no visual and/or acoustic warning is issued in a critical situation:

- Active brake assist has not recognized the danger of the situation; or
- Active brake assist is suppressed; or
- Active brake assist has failed.

Active brake assist-triggered emergency braking can be deactivated if the driver presses the accelerator pedal beyond the pressure point (kickdown).

IMPORTANT: If there is risk of a collision, adaptive cruise control (ACC) may warn the driver before active brake assist (ABA).

Collision Warning and Emergency Braking

If there is a risk of collision, ABA issues alerts on the driver display, sounds an audible warning, and illuminates the ABA indicator lamp on the dash. See Fig. 5.6. In addition, the radio and/or hands-free systems like Detroit Connect are muted. The ABA series of warnings is as follows:

- **Warning (ABA)**: An alert appears on the driver display and an intermittent warning tone sounds.
- **Partial Braking (ABA)**: If the driver does not respond, the system pulses the brakes while presenting a visual alert on the dash and sounding a solid warning tone. At this point ABA brakes the vehicle with around 50% of the vehicle's maximum braking power.
- **Emergency braking (ABA)**: If the driver does not react to the collision warnings or partial brake application, ABA automatically initiates emergency braking (full brake application). The warning message appears on the driver display, and a continuous warning tone sounds.

⚠ CAUTION

After emergency braking, the vehicle is held by the service brake for up to 5 seconds to prevent it from rolling away.

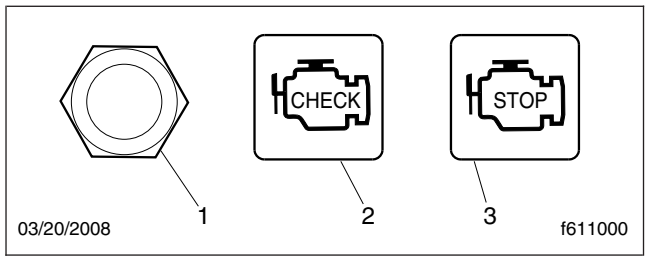


Fig. 5.6, ABA Indicator Lamp

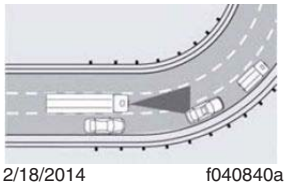
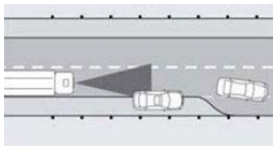
After an emergency braking maneuver has been performed, retake control of the vehicle as soon as possible and, paying attention to the traffic situation, remove the vehicle from the area of danger. Stop the engine and apply the parking brake. Inspect the vehicle to ensure it is in proper operating order and confirm the load is secured before resuming driving.

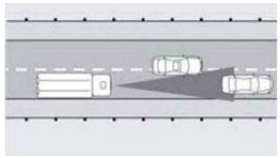
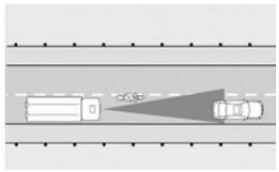
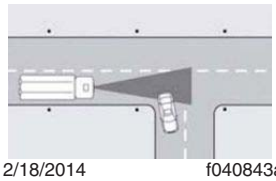
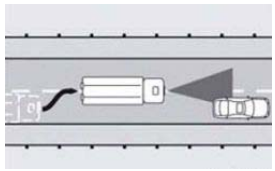
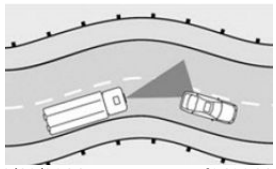
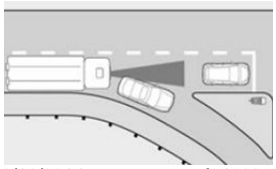
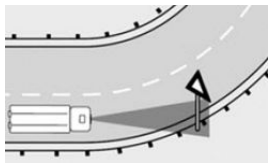
Always apply the parking brake upon shutting the engine off or prior to exiting the vehicle.

The driver can interrupt emergency braking by pressing the accelerator pedal beyond the point of resistance (kickdown).

Driving Situations

See Table 5.2 for a description of adaptive cruise control and active brake assist limitations in specific driving conditions.

Active Brake Assist Limitations		
Condition	**Visual**	**Description**
Cornering, entering and exiting bends	 12/18/2014 f040840a	The ability of ABA and ACC to detect vehicles on bends is limited. ABA and ACC may unexpectedly issue warnings or brake the vehicle. ACC may also accelerate the vehicle unexpectedly.
Driving in a different lane, and stationary vehicles	 12/18/2014 f040835a	The ability of ABA and ACC to detect vehicles driving in a different lane is limited. ABA and ACC may unexpectedly issue warnings or brake the vehicle. ACC may also accelerate the vehicle unexpectedly. With Active Brake Assist 4.0, the radar tracks stationary objects and has the capacity to engage full braking on these objects, such as a parked vehicle or stopped traffic in the vehicle's path.

Active Brake Assist Limitations		
Condition	**Visual**	**Description**
Other vehicles changing lane	 12/18/2014 f040836a	The ability of ABA and ACC to detect vehicles pulling into your lane without maintaining a safe distance is limited. The distance to the vehicle in front entering your lane may be too short. ABA may unexpectedly issue warnings or brake the vehicle.
	 12/18/2014 f040841a	The ability of ABA and ACC to detect vehicles pulling into your lane without maintaining a safe distance is limited. They do not detect vehicles until they are within the radar's detection range. If the vehicle is too narrow, ACC may accelerate unexpectedly. Brake the vehicle to increase the distance to the vehicle in front.
Vehicles turning off	 12/18/2014 f040843a	The ability of ABA and ACC to detect vehicles turning off is limited. ABA and ACC may unexpectedly issue warnings or brake your vehicle.
Overtaking	 12/18/2014 f040838a	When passing, ABA and ACC may unexpectedly issue warnings or brake your vehicle if your vehicle is too close to the vehicle in front and is in the same lane.
Winding stretches of road	 12/18/2014 f040844a	On winding stretches of road, ABA and ACC cannot detect which lane the vehicle in front is driving in. ABA and ACC may unexpectedly issue warnings or brake your vehicle. ACC may also accelerate the vehicle unexpectedly.
Obstacles and stationary vehicles in front of the tracked vehicle	 12/18/2014 f040837a	ABA and ACC cannot detect obstacles or stationary vehicles in front of the detected vehicle. ABA and ACC may unexpectedly issue warnings or brake your vehicle. ACC may also accelerate the vehicle unexpectedly.
Stationary objects	 12/18/2014 f040842a	ABA may unexpectedly issue warnings and brake the vehicle if it detects stationary objects like: • vehicles which have broken down • parked or stopped vehicles • signs • bridges

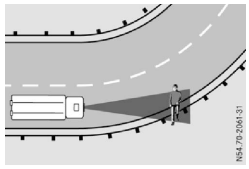
Active Brake Assist Limitations		
Condition	**Visual**	**Description**
Stationary people	 09/14/2016 f040847	ABA can react incorrectly to the following conditions: • stationary people • people or objects that quickly enter the field of detection of the sensor • people in a tunnel ABA can also react unexpectedly to people who are standing on the roadside in a curve.

Table 5.2, Active Brake Assist Limitations

Activating/Deactivating Active Brake Assist

The ABA system cannot be turned off. However, ABA is suppressed when the driver:

- uses the turn signal during an audible warning;
- rapidly presses the accelerator; or
- presses the accelerator pedal beyond the pressure point (kickdown).

If there is a system error, the indicator lamp will illuminate and an alert will be shown on the driver display. See **Fig. 5.7** and **Fig. 5.8**.

Fig. 5.7, ABA Unavailable Indicator Lamp

Fig. 5.8, ABA Alert Popup

DA 4.0 Lane Departure Warning (LDW)

NOTE: Lane departure warning is optional with Detroit Assurance 4.0.

Overview

Lane departure warning monitors the area in front of the vehicle with a camera on the top of the windshield. When lane departure warning is active and detecting lane markings on the road surface, it visually and audibly warns the driver if it thinks the vehicle may be leaving the lane unintentionally. Lane departure warning only needs one identifiable lane line to function.

⚠ WARNING

The lane departure warning system is intended only as an aid for a conscientious and alert driver. Do not rely on the system to safely operate the vehicle.

The system may not indicate lane departures under certain conditions. Read the information in this manual to understand the circumstances under which this system may not provide adequate lane departure warnings.

The system does not warn of all possible hazards. For example, the system cannot prevent an accident if the driver is impaired or not driving safely.

The lane departure warning system is not a substitute for safe driving procedures.

Failure to drive safely and use the system properly could result in personal injury and/or death and severe property damage.

Lane Departure Warning (LDW) Safety Notes

The system may be impaired or may not operate in the following situations:

- when there is low visibility due to insufficient road illumination, or due to snow, rain, fog or heavy spray
- when there is glare due to oncoming traffic, direct sunlight, or reflections from wet road surfaces
- when the windshield in the area of the camera is dirty, misted up, damaged or covered by a sticker
- when no lane markings or several varied lane markings are present, such as in a construction zone
- when the lane markings are worn, dark, or covered, such as by sand, dirt, or snow
- when the distance from the vehicle in front is too small and this prevents the lane markings from being detected
- when the lane markings change rapidly, when lanes branch off, or when they cross or merge
- when lanes are very narrow or winding
- when shade conditions on the road surface change greatly

The driver must adapt their driving style to current conditions. Lane departure warning cannot take the road and weather conditions into account, nor the prevailing traffic situation. The driver is responsible for the distance to the vehicle in front, for vehicle speed, braking in good time and remaining in the lane.

Lane Departure Warning (LDW) Functions and Activation Conditions

The Detroit Assurance LDW system is designed to warn the driver as the vehicle crosses the outer boundary of the lane marking. This may differ from other LDW systems which issue a warning as the driver approaches the inside of the lane marking. If the system warns at, or just beyond the outer edge of the lane marking, the system is performing as designed. If the warning does not occur, or occurs after an excessive lane departure, the system may not be operating properly.

In addition to acting as a warning, lane markings on the driver display screen show the status of lane departure warning. No lane markings or outlined lane markings indicate that LDW is off. Solid white or red lane markings indicate LDW is active.

Lane departure warning only issues warnings if the speed is above approximately 37 mph (60 km/h).

When driving over lane markings unintentionally, the volume of audio equipment like the radio and/or hands-free systems is muted and a direction-related "rumble-strip noise" sounds from either the left or right door speaker.

NOTE: While the LDW audio alert is expected to sound through the radio speakers on any unit with a properly installed system, the LDW alert will only mute the radio output if the radio is both capable of supporting a mute feature and is properly configured.

Lane departure warning does not issue a warning if:

- the turn signals are switched on;
- there is braking or acceleration; or
- a driving safety system such as Active Brake Assist (ABA), Stability Control, or Adaptive Cruise Control (ACC) intervenes.

Activating or Deactivating Lane Departure Warning (LDW)

NOTE: There is no audible self-test of the "rumble-strip noise" of the LDW when the key is turned on.

When the engine is turned on, LDW is automatically activated.

Pressing the LDW OFF switch will deactivate lane departure warning temporarily. See **Fig. 5.9.**

Lane departure warning is not active if:

- the driver presses the LDW OFF switch; or
- the system is searching for a lane.

If there is a system error, the LDW telltale will illuminate in the driver display. See **Fig. 5.10**.

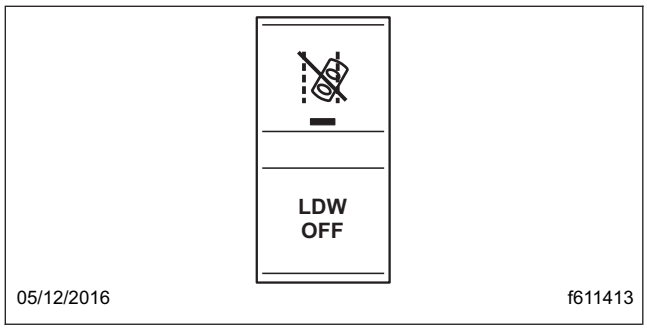


Fig. 5.9, LDW Switch

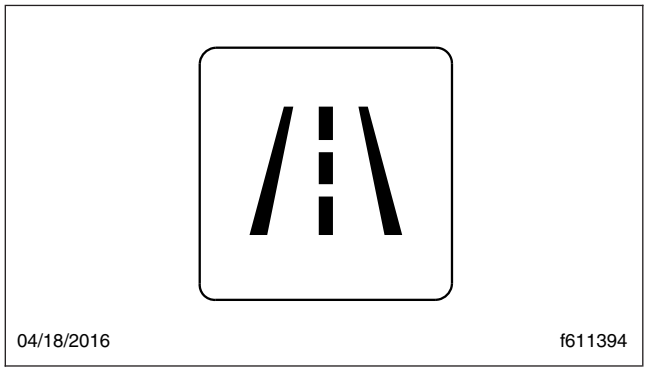


Fig. 5.10, LDW Telltale - ICUC

6

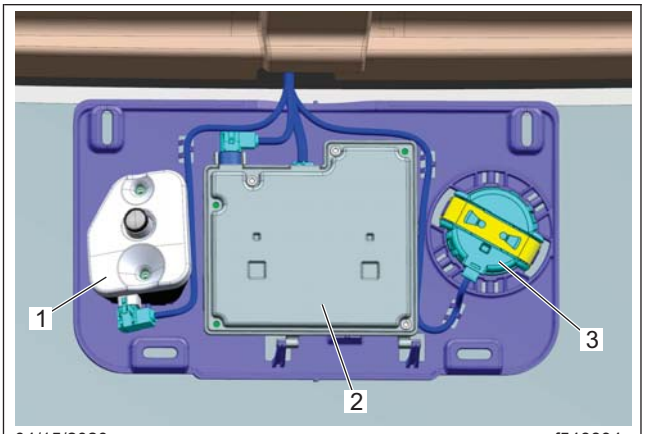
Detroit Assurance 5.0

DA 5.0 Vehicle Camera

IMPORTANT: The windshield must be clean, unobstructed, and without damage for proper operation of the multipurpose camera and rain/light sensor.

Multipurpose Camera 2 (MPC2)

The camera bracket that comes with Detroit Assurance 5.0 can hold a driver facing camera (DFC), multipurpose camera 2 (MPC2), and rain light sensor (RLS). The unit is mounted against the windshield. See **Fig. 6.1** .



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1. Driver Facing Camera
2. Multipurpose Camera 2
3. Rain Light Sensor

Fig. 6.1, Multipurpose Camera 2 Components

The MPC2 works with the radar system to support multiple features within DA 5.0. It is important for the driver to keep the windshield clean and unobstructed in order for the MPC2 to operate properly.

Driver Facing Camera

The DFC is in a self-contained housing of the main camera unit; it records the interior view with a video capture feature in the case of a safety critical event.

Rain Light Sensor

This sensor is used to detect rain, snow, or other precipitation on the windshield and determine the amount of ambient light. When precipitation is detected, wipers set to intermittent operation start clearing the windshield. When ambient light decreases to a preset level due to sunset, fog, or other event, and the headlight switch is set to the 'A' position, the low beam headlights and all exterior lights turn on.

For additional windshield wiper and headlight information, see **Chapter 4**.

DA 5.0 Collision Mitigation System (CMS)

The Detroit Assurance 5.0 Collision Mitigation System is a driver safety system that uses radar mounted on the front frame crossmember (see **Fig. 6.2**) and a windshield-mounted multipurpose camera to communicate information to the vehicles's brakes, engine, and transmission.

The system can track vehicles up to 820 feet (250 meters) ahead, and, if necessary, will sound a warning and apply the brakes.

11/11/2019 f547056

Fig. 6.2, Forward Radar Location

IMPORTANT: Do not mount any attachments in front of the radar distance sensor. Do not paint or affix items over the distance sensor cover. If attachments are mounted in front of the distance sensor, such as a crash guard, they can impair the operation of the distance sensor.

Driver Display

The driver display presents warnings and the status of Adaptive Cruise Control (ACC), Active Brake Assist (ABA), Tailgate Warning, and/or Lane Departure Warning (LDW). Refer to Adaptive Cruise Control (ACC), Active Brake Assist (ABA), Tailgate Warning,

and Lane Departure Warning (LDW) in this chapter for more information.

To show distance, speed, and lane markings, navigate to the Driver Assistance screen in the ICUC using the Quick Access System Settings switch on the right-hand steering wheel switch pod. See **Fig. 6.3**.

Adaptive Cruise Control (ACC)

⚠ WARNING

The Detroit Assurance Collision Mitigation System is intended solely as an aid for an alert and conscientious professional driver. It is not intended to be relied upon to operate a vehicle. Use the system in conjunction with rearview mirrors and other instruments to safely operate the vehicle.

The Detroit Assurance Collision Mitigation System is not a substitute for safe, normal driving procedures, nor will it compensate for any driver impairment such as drugs, alcohol, or fatigue.

Failure to drive safely and use the system properly could result in personal injury and/or death and severe property damage.

Adaptive Cruise Control Safety Information

Adaptive cruise control (ACC) may not detect vehicles driving in a different lane or narrow vehicles, like motorcycles, driving in front.

In particular, stay aware in the following situations:

- when cornering, entering, and exiting bends;
- when driving winding stretches of road;
- when overtaking;
- when there are vehicles driving in a different lane;
- when vehicles are changing lanes;
- when vehicles are exiting the road;
- when there are obstacles and stationary vehicles.

Adaptive cruise control (ACC) does not compensate for inattentive driving, weather, or traffic conditions. The adaptive cruise control is only an aid. The driver is responsible for maintaining a safe distance from the vehicle in front, maintaining a safe vehicle speed, braking, and remaining in a lane.

If adaptive cruise control does not detect a vehicle driving in front, the system will accelerate to the set speed.

Overview

See **Table 6.1** and **Fig. 6.3** for a description of cruise control steering wheel switches.

Steering Wheel Controls	
Description	**Function**
–/SET	Sets the cruise speed while the vehicle is traveling at the desired speed. Pressing and holding decreases the set cruise speed.
+/RES	Resumes the set speed. Pressing and holding increases the set cruise speed.
CNCL	Deactivates cruise control, but retains the set speed in memory.

Table 6.1, Steering Wheel Controls

08/14/2019 f611352e

1. Cruise Accelerate/Resume
2. Quick Access System Settings
3. Cruise Decelerate/Set
4. Phone Hang-Up/Reject
5. Marker Interrupt**
6. Phone Pick-Up
7. Headlamp Interrupt**
8. Cancel Cruise Control

** Not available in all markets

Fig. 6.3, Steering-Wheel-Mounted Right-Hand Switch Pod - ICUC

When a vehicle in front is detected, the driver display shows the speed of the detected vehicle and the distance and time to the detected vehicle. See **Fig. 6.4**.

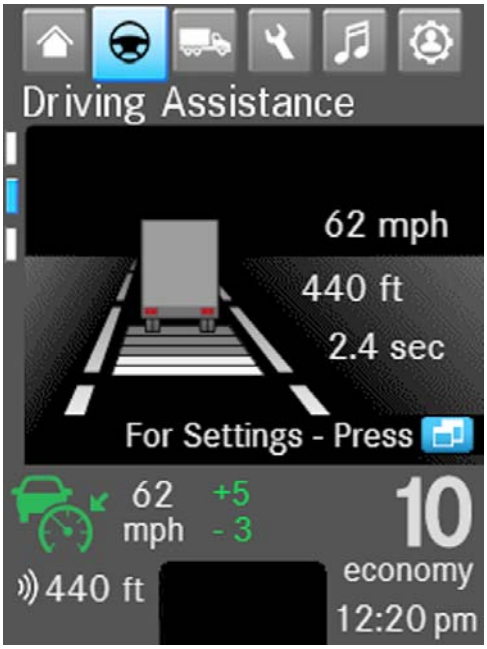


Fig. 6.4, Adaptive Cruise Control (ACC) Screen - ICUC

Functions and Activation Conditions

Adaptive Cruise Control (ACC) controls speed and the distance from a vehicle detected in front.

If there is no vehicle in front, ACC operates in the same way as cruise control when the vehicle is traveling above 10 mph (15 km/h).

If ACC detects a vehicle in front driving at a slower speed, the engine is defueled, the engine brakes are activated, and the service brakes are applied, slowing the vehicle to maintain the set following distance. The standard factory set following distance is 3.6 seconds; this can be adjusted under the Cruise Control menu under Vehicle Settings.

ACC allows the vehicle to operate in cruise all the way down to 0 mph (0km/h); as traffic in front of the vehicle slows and eventually stops, the vehicle will adjust with the traffic all the way to 0 mph (0km/h).

If the vehicle ahead is stopped for two seconds or less, ACC will resume when the vehicle ahead moves. If the vehicle ahead is stopped for more than two seconds, the driver—after carefully checking surrounding traffic—will need to press the resume button or tap the accelerator pedal to resume moving forward.

The ACC will also slow the vehicle if it exceeds the set speed (on a downhill grade, for example).

When a slower vehicle in front is no longer detected, the ACC will accelerate the vehicle to the set speed.

IMPORTANT: Nothing should be put between the driver and the seat, such as a heating pad, massage pad, or similar items. Doing so may keep the seat occupancy sensor from functioning correctly.

Adaptive Cruise Control cannot be activated, or is automatically deactivated, if:

- the driver is not in their seat to activate the seat occupancy sensor;
- the vehicle is traveling slower than 10 mph (15 km/h);
- the transmission is in neutral for more than 5 seconds;
- reverse gear is selected;
- the Anti-Lock Braking System (ABS) is deactivated;
- there is a malfunction in the brake system or the electronic management system; or
- the distance sensor initialization is not yet complete.

Activating Adaptive Cruise Control and Setting the Speed

Activate Adaptive Cruise Control (ACC) by setting the cruise speed, using the controls on the steering wheel. See **Table 6.1**.

When driving at the desired speed, press the –/SET switch on the steering wheel switch pod. ACC will be activated and the set speed stored.

If cruise control is deactivated, the stored speed can be activated again by pressing the +/RES switch on the steering wheel switch pod. When activated, the driver display will show the adaptive cruise control symbol and the set speed. ACC will automatically brake or accelerate the vehicle to maintain the set speed.

If the brake pedal is pressed, ACC is deactivated automatically.

If Adaptive Cruise Control becomes unavailable in vehicles equipped with Detroit Assurance 5.0, a pop-up message will inform the driver. If the vehicle is programmed to allow for standard cruise control, a

message will be displayed that allows the driver to choose to use Standard Cruise Control. See **Fig. 6.5**.

Fig. 6.5, Adaptive Cruise Control (ACC) Unavailable - ICUC

Increasing or Reducing Adaptive Cruise Control Speed

The Adaptive Cruise Control speed setting can only be set when driving.

Press the –/SET switch on the steering wheel switch pod to set the cruise speed when the vehicle is traveling at the desired speed. To decrease the set cruise speed, press and hold –/SET.

Setting the Adaptive Cruise Control Distance to the Vehicle in Front

The Adaptive Cruise Control settings menu under Vehicle Settings can be used to set the distance to the vehicle in front. Adjust the specified minimum distance to the vehicle in front if necessary.

IMPORTANT: Make sure that the minimum distance required by law is maintained.

Overtaking When Using Adaptive Cruise Control

NOTE: It is possible to exceed the set speed when overtaking.

The set speed of Adaptive Cruise Control (ACC) can be exceeded using the accelerator pedal. When the accelerator pedal is released, the ACC set speed will be resumed.

Deactivating Adaptive Cruise Control

To deactivate Adaptive Cruise Control (ACC), press the CNCL switch on the steering wheel switch pod or press the brake pedal.

NOTE: The set speed remains stored when ACC is deactivated.

Tailgate Warning

Tailgate Warning provides alerts when the vehicle in front is being followed too closely. The system gives warning when:

- Adaptive Cruise Control (ACC) is not active; and
- the vehicle is moving faster than 20 mph (32 km/h); and
- the driver follows a vehicle for longer than 10 seconds at a distance that will be traversed in less than 2.6 seconds.

The system will not give warning when:

- the vehicle is moving slower than 20 mph (32 km/h);
- another vehicle cuts in front;
- the vehicle in front is moving away; or
- Adaptive Cruise Control (ACC) is activated.

The system will continue to give warning every 20 seconds if the gap between the vehicles does not increase.

Active Brake Assist (ABA)

Overview

Active Brake Assist (ABA) is always on. ABA in DA 5.0 uses fused camera and radar signals for improved object recognition, enabling it, in some cases, to recognize potential hazardous situations faster than a driver. If the camera system becomes disabled, radar signals alone are used.

Active Brake Assist tracks both moving and stationary objects in the vehicle's path and engages in a cascade of actions: visual and auditory warnings, partial braking, and full braking. ABA has the capacity to engage full braking on moving pedestrians, parked vehicles, and stopped traffic.

The system may not detect pedestrians or objects in every situation, nor is it a substitute for cautious driving.

Safety Information

⚠ WARNING

Active Brake Assist (ABA) is intended only as an aid for a conscientious and alert driver. The driver is responsible for keeping a safe distance from the vehicle in front, for the vehicle speed, braking in good time, and remaining in lane.

ABA does not take road and weather conditions into account, nor the prevailing traffic situation. The driver should always adapt driving style to suit prevailing road and weather conditions.

ABA is not a substitute for safe driving procedures.

Operate a vehicle equipped with Detroit Assurance Collision Mitigation System as if the vehicle were not equipped with a collision mitigation system.

The Detroit Assurance Collision Mitigation System will not warn of hazards such as animals, oncoming vehicles, or cross traffic.

Failure to drive safely and use the system properly could result in personal injury and/or death and severe property damage.

If your vehicle is equipped with Active Brake Assist (ABA) 5.0, it can:

- react more quickly than a driver to an object in the vehicle's path of travel;
- perform emergency braking; and
- react to moving people with a warning and full braking.

The Detroit Assurance 5.0 version of ABA can minimize the risk of a front-end collision with a moving or stationary vehicle and pedestrians. If ABA detects the risk of a front-end collision, it issues an audible and visual warning. If the risk persists, ABA automatically initiates partial braking of the vehicle. If the driver does not react to the warnings and partial brake application, ABA automatically initiates a full brake application.

ABA may also detect people who are moving along the edge of the lane.

ABA may not detect vehicles driving in a different lane or narrow vehicles, like motorcycles, driving in front of the vehicle.

Brake the vehicle using the service brake if:

- an event window with the warning symbol appears on the driver display screen;
- an intermittent warning tone sounds; or
- an intermittent warning tone sounds and automatic partial braking is initiated.

ABA does not automatically adapt to road and traffic conditions. If no visual and/or acoustic warning is issued in a critical situation:

- ABA has not recognized the danger of the situation;
- ABA is suppressed; or
- ABA has failed.

ABA-triggered emergency braking can be deactivated if the driver presses the accelerator pedal beyond the pressure point (kickdown).

Activating/Deactivating Active Brake Assist (ABA)

The Active Brake Assist (ABA) system cannot be turned off. However, ABA is suppressed when the driver:

- uses the turn signal during an audible warning;
- rapidly presses the accelerator; or
- presses the accelerator pedal beyond the pressure point (kickdown).

If there is a system error, the indicator lamp will illuminate and an alert will be shown on the driver display. See **Fig. 6.6** and **Fig. 6.7**.

Fig. 6.6, Active Brake Assist (ABA) Indicator Lamp

Active Brake Assist (ABA) Collision Warning and Emergency Braking

If there is a risk of collision, Active Brake Assist (ABA) issues alerts on the driver display, illuminates

Fig. 6.7, Active Brake Assist (ABA) Alert - ICUC

the ABA indicator lamp, and sounds an audible warning. In addition, the radio and/or hands-free systems like Detroit Connect are automatically muted.

Active Brake Assist (ABA) engages in the following warning sequence:

- **Warning**: An alert appears on the driver display, the radio is muted, and an intermittent warning tone sounds.
- **Partial Braking**: ABA slows the vehicle with automatic partial braking. ABA brakes the vehicle with around 50% of the vehicle's maximum braking power.
- **Emergency Braking (ABA)**: If the driver does not react to the collision warnings or partial brake application, ABA automatically initiates emergency braking (full brake application). Warning messages continue to appear on the driver display, the radio stays muted, a continuous warning tone sounds, and ABA brakes the vehicle with 100% of the vehicle's maximum braking power.

CAUTION

After emergency braking, the "Emergency Braking Complete Brakes Releasing Soon" message appears in the event window on the driver display.

After an emergency braking maneuver has been performed, retake control of the vehicle as soon as possible and, paying attention to the traffic situation, remove the vehicle from the area of danger. Stop the engine and apply the parking brake.

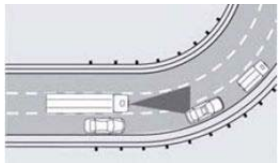
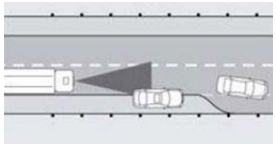
Inspect the vehicle to ensure it is in proper operating order and confirm the load is secured properly before resuming driving.

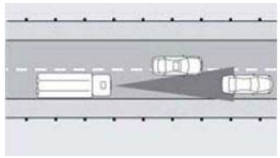
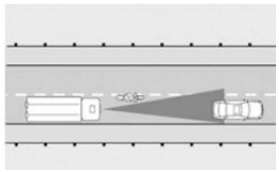
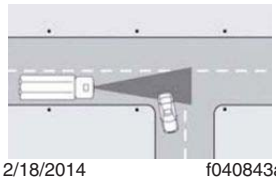
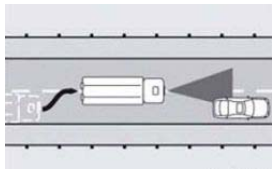
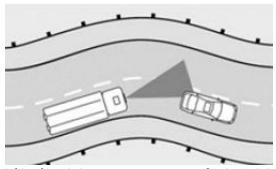
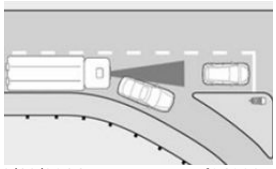
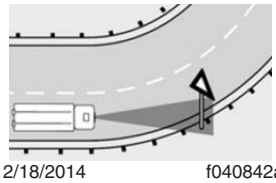
Always apply the parking brake upon shutting the engine off or prior to exiting the vehicle.

The driver can interrupt emergency braking by pressing the accelerator pedal beyond the point of resistance (kickdown).

ACC & ABA Driving Condition Limitations

See **Table 6.2** for a description of Adaptive Cruise Control (ACC) and Active Brake Assist (ABA) limitations in specific driving conditions.

Active Brake Assist Limitations		
Condition	**Visual**	**Description**
Cornering, entering and exiting bends	 12/18/2014 f040840a	The ability of ABA and ACC to detect vehicles on bends is limited. ABA and ACC may unexpectedly issue warnings or brake the vehicle. ACC may also accelerate the vehicle unexpectedly.
Driving in a different lane, and stationary vehicles	 12/18/2014 f040835a	The ability of ABA and ACC to detect vehicles driving in a different lane, or stationary vehicles is limited. ABA and ACC may unexpectedly issue warnings or brake the vehicle. ACC may accelerate unexpectedly.

Active Brake Assist Limitations		
Condition	**Visual**	**Description**
Other vehicles changing lane	 12/18/2014 f040836a	The ability of ABA and ACC to detect vehicles pulling into your lane is without maintaining a safe distance is limited. When a vehicle enters your lane the distance to it may be too short. Brake the vehicle to increase the distance to the vehicle in front.
	 12/18/2014 f040841a	The ability of ABA and ACC to detect vehicles pulling into your lane is limited. They do not detect vehicles until they are within the system's detection range. Brake the vehicle to increase the distance to the vehicle in front.
Vehicles turning off	 12/18/2014 f040843a	The ability of ABA and ACC to detect vehicles turning off is limited. ABA and ACC may unexpectedly issue warnings or brake your vehicle.
Overtaking	 12/18/2014 f040838a	While passing, ABA and ACC may unexpectedly issue warnings or brake your vehicle if the vehicle in front is too close and is in the same lane.
Winding stretches of road	 12/18/2014 f040844a	On winding stretches of road, ABA and ACC cannot detect which lane the vehicle in front is driving in. ABA and ACC may unexpectedly issue warnings or brake your vehicle. ACC may also accelerate the vehicle unexpectedly.
Obstacles and stationary vehicles	 12/18/2014 f040837a	ABA and ACC cannot detect obstacles or stationary vehicles in front of the detected vehicle. If the detected vehicle turns off, ABA and ACC may unexpectedly issue warnings or brake your vehicle. ACC may also accelerate the vehicle unexpectedly.
Stationary objects	 12/18/2014 f040842a	ABA can unexpectedly issue warnings and brake the vehicle if it detects stationary objects like: • vehicles which have broken down • signs • bridges

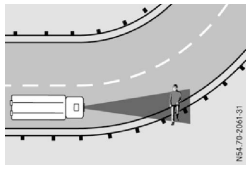
Active Brake Assist Limitations		
Condition	**Visual**	**Description**
Stationary people	 09/14/2016 f040847	ABA can react incorrectly to the following conditions: • stationary people • people or objects that quickly enter the field of detection of the sensor • people in a tunnel ABA can also react unexpectedly to people who are standing on the roadside in a curve.

Table 6.2, Adaptive Cruise Control (ACC) and Active Brake Assist (ABA) Limitations

DA 5.0 Lane Departure Warning (LDW)

⚠ WARNING

The Lane Departure Warning system is intended only as an aid for a conscientious and alert driver. Do not rely solely on the system to safely operate the vehicle.

The system may not indicate lane departures under certain conditions. Read the information in this manual to understand the circumstances under which this system may not provide adequate lane departure warnings.

The system does not warn of all possible hazards. The system cannot prevent an accident if the driver is impaired or not driving safely.

The Lane Departure Warning system is not a substitute for safe driving procedures.

Failure to drive safely and use the system properly could result in personal injury and/or death and severe property damage.

Safety Notes on Lane Departure Warning (LDW)

The system may be impaired or may not operate in the following situations:

- when there is low visibility due to insufficient road illumination, or due to snow, rain, fog, heavy spray, or other circumstances that limit visiblity.
- when there is glare due to oncoming traffic, direct sunlight, or reflections from wet road surfaces
- when the windshield in the area of the camera is dirty, misted up, damaged or covered by a sticker
- when no lane markings or several varied lane markings are present, such as in a construction zone
- when the lane markings are worn, dark, or covered, such as by sand, dirt, or snow
- when the distance from the vehicle in front is too small and this prevents the lane markings from being detected
- when the lane markings change rapidly, when lanes branch off, or when they cross or merge
- when lanes are very narrow or winding
- when shade conditions on the road surface change greatly

The driver must adapt their driving style to current conditions. Lane Departure Warning cannot take the road and weather conditions into account, nor the prevailing traffic situation. The driver is responsible for the distance to the vehicle in front, for vehicle speed, braking in good time and remaining in the lane.

Overview

Detroit Assurance 5.0 Lane Departure Warning (LDW) monitors the area in front of the vehicle using the multipurpose camera mounted on the top of the windshield. When lane departure warning is active and detecting lane markings, it visually and audibly warns the driver if it thinks the vehicle may be leaving the lane unintentionally. Lane Departure Warning only needs one identifiable lane line to function.

Functions and Activation Conditions for Lane Departure Warning (LDW)

The Detroit Assurance LDW system is designed to warn the driver as the vehicle crosses the outer boundary of the lane marking. This may differ from other LDW systems which issue a warning as the driver approaches the inside of the lane marking. If the system warns at, or just beyond the outer edge of the lane marking, the system is performing as designed. If the warning does not occur, or occurs after an excessive lane departure, the system may not be operating properly.

In addition to acting as a warning, lane markings on the driver display screen show the status of Lane Departure Warning. No lane markings or outlined lane markings indicate the Lane Departure Warning is off. Solid white or red lane markings indicate Lane Departure Warning is active.

LDW only issues warnings if the speed is above approximately 37 mph (60 km/h).

When driving over lane markings unintentionally, the volume of audio equipment like the radio and/or hands-free systems is muted and a direction-related "rumble-strip noise" sounds from either the left or right door speaker.

Lane Departure Warning does not issue a warning if:

- the turn signals are switched on;
- there is braking or acceleration; or
- a driving safety system such as Active Brake Assist (ABA), Stability Control, or Adaptive Cruise Control (ACC) intervenes.

Activating or Deactivating Lane Departure Warning (LDW)

When the engine is turned on, Lane Departure Warning (LDW) is automatically activated.

NOTE: There is no audible self-test of the "rumble-strip noise" of the LDW when the key is turned on.

Pressing the physical LDW OFF switch will deactivate Lane Departure Warning for fifteen minutes. See **Fig. 6.8**. When the LDW is deactivated, the switch will illuminate.

A driver might want to turn off Lane Departure Warning on winding roads or when driving through construction zones or other areas where lane markings are not clear.

NOTE: Vehicles equipped with D.A. 5.0 and an MPC2 camera, but no LDW system may have a permanently illuminated LDW OFF switch as LDW has been disabled.

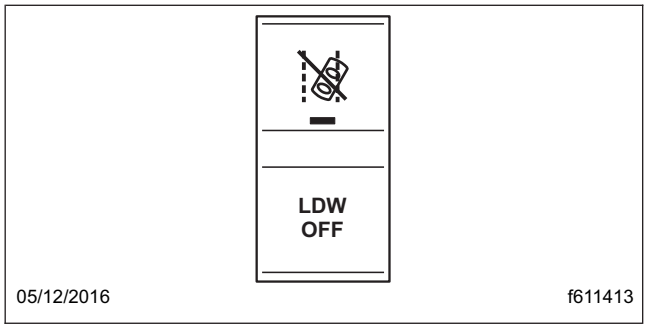


Fig. 6.8, Lane Departure Warning Alert Switch

LDW is not active if:

- the driver presses the LDW OFF switch; or
- the system is searching for a lane.

If there is a system error, the LDW telltale will illuminate in the driver display. See **Fig. 6.9**.

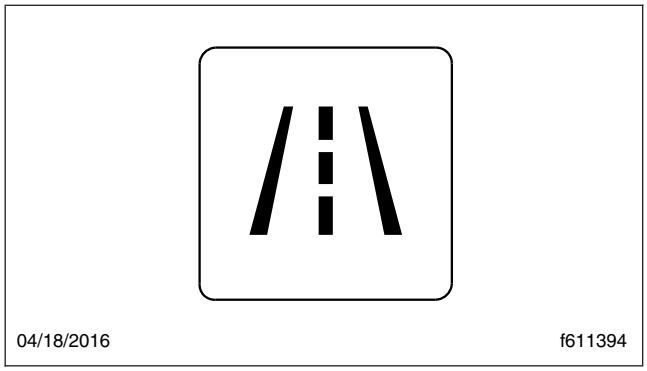


Fig. 6.9, LDW Telltale - ICUC

Cleaning the Windshield in the Area of the Camera

Make sure that the windshield is always kept clean and unobstructed in the area of the camera. The driver should switch on the windshield wiper to clean the windshield and remove snow and ice to avoid incorrect lane detection.

If the area of the windshield is damaged, Lane Departure Warning may not work as intended. If this happens, the windshield must be replaced.

DA 5.0 Side Guard Assist (SGA)

General Information

IMPORTANT: Side guard assist (SGA) is designed for use with one trailer attached to the tractor. SGA detects if a trailer is attached to the tractor, but it cannot detect whether or not multiple trailers are attached. If used with more than one trailer, SGA only considers objects or stationary obstacles in the range of the tractor and the first trailer. False-positive indications and warnings may occur with multiple trailers.

IMPORTANT: Side Guard Assist is not currently designed to work with non-ABS trailers or on trucks with lift axles.

In a left-hand drive vehicle, Detroit Assurance 5.0 Side Guard Assist (SGA) monitors the area to the right of the vehicle and trailer using two short range radar sensors. The radar sensors are mounted close to the rear of the right-hand footsteps. SGA provides assistance when turning right and changing lanes to the right. A yellow triangular warning lamp in the A-pillar lights up to inform the driver that an object has been detected in the monitored area. An additional warning tone sounds if there is a risk of collision.

SGA is not active while reversing.

The trailer monitoring of SGA is not active shortly after reversing or shortly after coupling up. It is not possible to switch SGA trailer monitoring on or off shortly after reversing or shortly after coupling up.

For a right-hand drive vehicle, SGA monitors the area to the left of the vehicle and trailer. The location of sensors and warning lamps on the ICU all shift to the left in this case. All other features remain the same.

Safety Information

⚠ WARNING

When detection is restricted, Side Guard Assist may issue a warning too late or not at all. The detection of obstacles can be impaired by the following situations:

- **dirty, icy or obscured sensors;**
- **very wide lanes;**
- **vehicles not driving in the middle of their lane;**
- **barriers or other road boundaries.**

There is a risk of an accident in these situations.

The driver must pay attention to the traffic situation and maintain a safe distance at the side of the vehicle.

Side Guard Assist is only an aid. It may fail to detect some objects and is not a substitute for attentive driving. Always ensure there is sufficient distance to the side for other vehicles, pedestrians, and obstacles.

IMPORTANT: If the sensors are dirty or Side Guard Assist malfunctions, an alert icon will display in the instrument panel. See the third icon in **Table 6.3**. Objects in the monitoring range are not tracked when this occurs.

If the sensors are dirty, pull off in a safe location to clean the SGA sensors.

If SGA malfunctions, have the function of the radar sensors checked at an authorized Freightliner dealer.

Before driving the vehicle, ensure the radar sensor cover is free from dirt, ice, or slush. See **Fig. 6.10.** The radar sensors must not be painted or covered by items such as stickers.

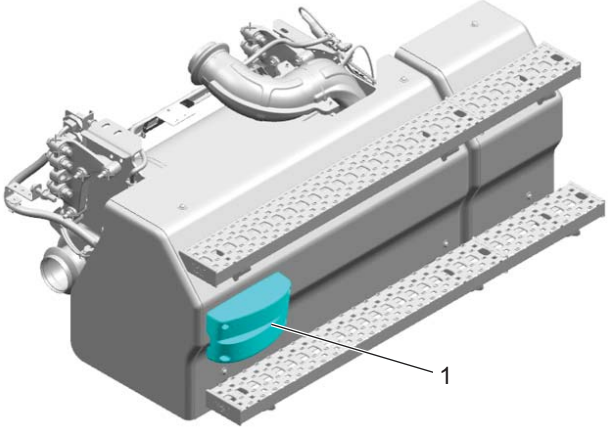
If the vehicle is involved in a severe accident or there is damage to the right-hand footsteps, have the function of the radar sensors checked at an authorized Freightliner dealer.

Monitoring Range of the Sensors

There is an angle of approximately 6 degrees between the vehicle and the area monitored by the sensor. See **Fig. 6.11**. Objects within this area are not detected.

Due to the nature of the system, warnings may be issued in error when driving close to barriers or other solid boundaries. Warnings may also be interrupted when driving alongside particularly long vehicles for a prolonged time.

Depending on the situation and on the trailer, Side Guard Assist may issue a warning prematurely or not issue a warning at all.



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Note: RH shown, LH similar.

Fig. 6.10, Radar Sensors with Covers

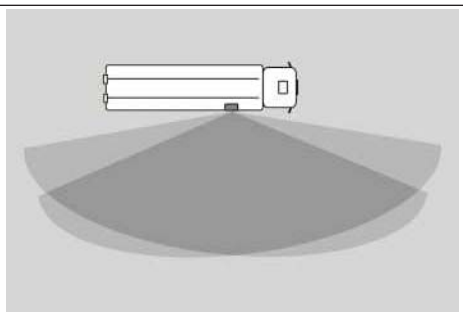

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Fig. 6.11, Sensor Monitoring Area

SGA Indicator Lamps

NOTE: Depending on the type of instrument panel installed in the vehicle, the indicators described as grey may be white.

Name	Indicator	Color
Side Guard Assist Initializing		Grey
Side Guard Assist Active		Grey
Side Guard Assist Error or Deactivation		Grey

Name	Indicator	Color
Side Guard Assist Trailer Monitoring Active		Grey
Side Guard Assist Trailer Monitoring Deactivated		Grey
Caution, Side Guard Assist		Amber
Caution, Side Guard Assist Trailer		Amber
Caution, Side Guard Assist Trailer Monitoring Deactivated		Amber
Warning, Side Guard Assist		Red
Warning, Side Guard Assist Trailer		Red
Warning, Side Guard Assist Trailer Monitoring Deactivated		Red

Table 6.3, Side Guard Assist (SGA) Lamps

Activation Conditions of Side Guard Assist

SGA is active when the ignition is turned on.

If a trailer is attached to the vehicle, a grey or white indicator lamp (a triangle and trailer) activates in the instrument panel display screen. See the fourth icon in **Table 6.3**.

If a trailer is not attached to the vehicle, a grey or white indicator lamp (triangle) activates in the instrument panel display screen. See the second icon in **Table 6.3**.

If the SGA trailer monitoring is turned off or in an error state the representative grey or white indicator lamp will appear on the instrument panel display screen. See the third and fifth icon in **Table 6.3**.

Warning When Turning Right

If there is a moving object in the SGA monitoring range, as shown in **Fig. 6.12**, a triangular yellow warning lamp lights up in the A-pillar and the instrument panel display screen will display an amber Caution, Side Guard Assist Trailer indicator.

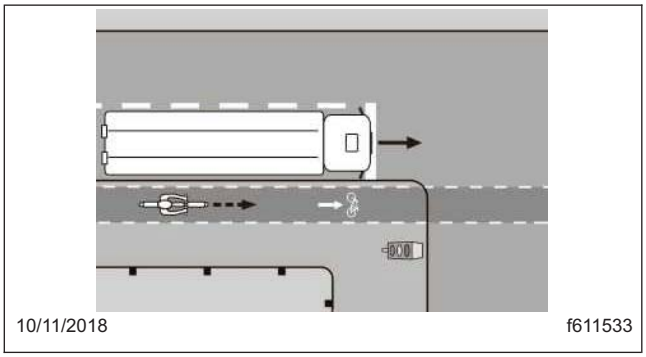

Fig. 6.12, A Moving Object in the SGA Monitoring Range

Side Guard Assist recognizes when the driver signals or steers to the right and there is a risk of collision. See **Fig. 6.13**. In this case the red warning lamp in the A-pillar will flash for approximately two seconds and a warning tone will sound. After two seconds, as long as there is a risk of a collision, the red warning lamp will stay on. In addition, the Warning, Side Guard Assist Trailer indicator will display in red on the instrument panel display screen.

If the vehicle is equipped with an ICC5 driver display screen, the side of the screen behind the Warning, Side Guard Assist Trailer indicator will change to red.

Warning When Changing Lanes

If there is a moving object in the SGA monitoring range when changing lanes, as shown in **Fig. 6.14**, a yellow warning lamp lights up in the A-pillar, and an amber Caution, Side Guard Assist Trailer indicator lights up on the instrument panel display screen.

When changing lanes and a moving object is located in the danger zone, as shown in **Fig. 6.15**, there is a risk of collision. If the driver signals or steers to the right, a red warning lamp in the A-pillar flashes for approximately two seconds and a warning tone sounds. After two seconds, as long as there is a risk

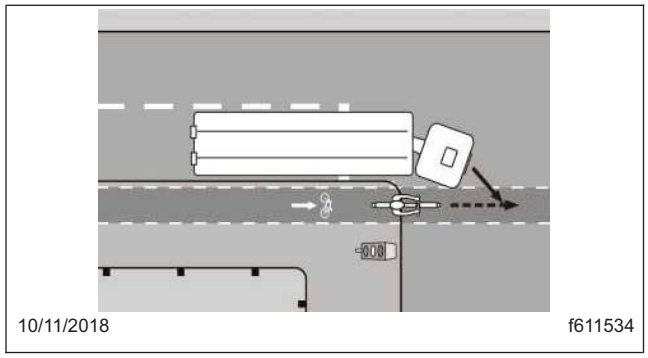

Fig. 6.13, A Moving Object in the SGA Monitoring Range When Turning Right

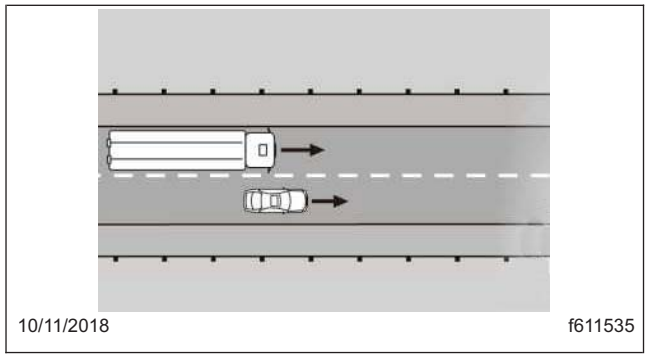

Fig. 6.14, A Moving Object in the SGA Monitoring Range When Changing Lanes

of a collision, the red warning lamp will stay on. In addition, the Warning, Side Guard Assist Trailer indicator will display in red on the instrument panel display screen.

If the vehicle is equipped with an ICC5 driver display screen, the side of the screen behind the Warning, Side Guard Assist Trailer indicator will change to red.

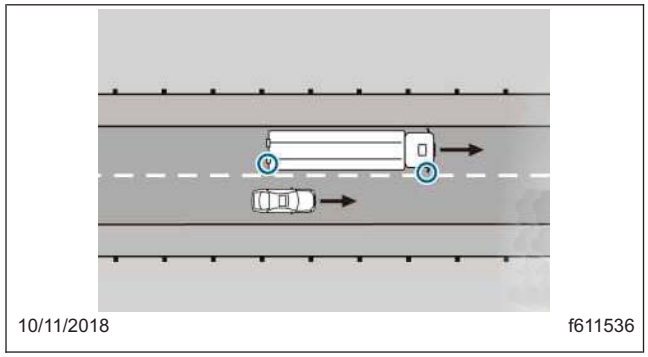

Fig. 6.15, A Moving Object in the Danger Zone When Changing Lanes

Right-Turn Warning for Stationary Obstacles

IMPORTANT: Side Guard Assist is only an aid. It may fail to detect some objects and is not a substitute for attentive driving. Always ensure that there is sufficient distance to the side for vehicles, pedestrians, and obstacles.

Side Guard Assist warns the driver about stationary obstacles in the vehicle's range of movement up to a maximum speed of 22 mph (35 km/h).

If there is a risk of collision with a stationary obstacle when turning right, the red warning lamp in the A-pillar flashes for approximately two seconds and a warning tone sounds. After two seconds, as long as there is a risk of a collision, the red warning lamp will stay on. In addition, the red Warning, Side Guard Assist Trailer indicator shown in **Table 6.3**, will display on instrument panel display screen.

If the vehicle is equipped with an ICC5 driver display screen, the side of the screen behind the Warning, Side Guard Assist Trailer indicator will change to red.

Activating or Deactivating Side Guard Assist

SGA is automatically activated when the engine is turned on. The driver can deactivate/activate SGA in the instrument panel Drive Time Systems menu.

DA 5.0 Traffic Sign Display

General Information

NOTE: the ICU will display up to two traffic signs at a time. If more than two signs are recognized by the system, the most safety critical signs will be displayed.

The Detroit Assurance 5.0 traffic sign recognition and display system increases road safety by making the driver aware of posted traffic signs. Traffic sign display uses video data from the multipurpose camera in combination with GPS map data to recognize USA and Canadian traffic signs and display them in the instrument panel. GPS information dictates the language and style of the ICU sign display.

Safety Information

Traffic sign recognition and display is only intended as an aid for a conscientious and alert driver. The system may not operate as designed under the following conditions:

- there is low visibility, due to insufficient road illumination or due to snow, rain, fog, or heavy spray;
- there is glare from oncoming traffic, the sun, or reflection from other vehicles when the road surface is wet;
- the windshield is dirty, misted up, damaged, or covered, for instance by a sticker in the vicinity of the camera;
- the traffic signs are partly or fully covered by other vehicles, bushes, or trees;
- the traffic signs are designed in a non-standardized form, with additional text, or as LED panels;
- the traffic signs are damaged, bent, twisted, stained, or scratched;
- the distance from the vehicle in front is too small and prevents the traffic signs from being detected in time;
- the traffic signs are posted on the far side of the road or very high above the road;
- the road is very wide, winding, or has sharp turns;
- there are variable shade conditions on the road surface;
- GPS satellite reception is limited for some reason, such geographical location;
- onboard map data is outdated due to recent changes in local traffic regulations or new road layout.

The traffic sign recognition system cannot take the road and weather conditions into account, nor the current traffic situation. The driver is responsible for the distance to the vehicle in front, for vehicle speed, braking in good time and remaining in the lane.

Traffic Sign Display Functionality

NOTE: Only three types of USA and Canadian traffic signs are currently detected:

- Speed Limit signs (from speeds 5 to 140)
- Passing signs
- Exclusion signs

See **Fig. 6.16** for currently recognized USA signs and **Fig. 6.17.** for Canadian signs.

3. Go to "Sign Recognition."

1. General Speed Limit
2. Truck Speed Limit
3. Night Speed Limit (only at night)
4. School Speed Limit
5. Do Not Pass
6. Pass With Care
7. No Trucks

Fig. 6.16, Recognized Traffic Signs, USA

1. General Speed Limit
2. Speed Limit Ends
3. No Overtaking
4. Overtaking Permitted
5. No Trucks

Fig. 6.17, Recognized Traffic Signs, Canada

When a traffic sign is recognized by the system, an image representing it appears in the instrument panel. See **Fig. 6.18** and **Fig. 6.19**. In order to operate, the traffic sign display feature must be activated in the instrument panel menu.

Activating or Deactivating

NOTE: When the ignition is turned on, traffic sign display restores the state of the system (either activated or deactivated) from the last ignition cycle.

Activating traffic sign display in the ICUC instrument panel:

1. Navigate to "Drive Time Systems."
2. Go to "Safety System Settings."
3. Go to "Sign Recognition."
4. Select "On."

Select 'Off' to deactivate traffic sign display.

Activating traffic sign recognition in the ICC5:

1. Press the center button in either of the steering wheel OFN control buttons
2. Select the "Settings" (gear) icon.
3. Select "Driving Assistance."
4. Go to "Traffic Sign Recognition."
5. Move the selector switch icon to the "On" position (a blue line will appear to the left).

Move the selector switch icon to the 'Off' position to deactivate traffic sign recognition and display

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A. Detected Speed Limit and Do Not Pass signs displayed.

Fig. 6.18, Traffic Sign Display - ICUC

DA 5.0 Active Lane Assist (ALA)

⚠ WARNING

The optional Active Lane Assist system is intended only as an aid for a conscientious and alert driver. Do not rely on the system to safely operate the vehicle.

The driver is responsible for keeping their hands on the wheel 100% of the time when ALA is active. ALA is intended only as an aid.

The system may not indicate lane departures under certain conditions. Read the information in this manual to understand the circumstances under which this system may not provide adequate lane departure warnings.

The system does not warn of all possible hazards.

Active Lane Assist cannot substitute for safe driving procedures.

Failure to drive safely and use the system properly could result in personal injury and/or death and severe property damage.

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A. Detected Speed Limit and Do Not Pass signs displayed.

Fig. 6.19, Traffic Sign Display - ICC5

Active Lane Assist Safety Information

Active Lane Assist (ALA) cannot always clearly identify lane markings. In such cases, ALA may go into passive mode.

Active Lane Assist may go into passive mode under the following conditions:

- there is low visibility, due to insufficient road illumination or due to snow, rain, fog, or heavy spray;
- there is glare from oncoming traffic, the sun, or reflection from other vehicles when the road surface is wet;
- the windshield is dirty, misted up, damaged, or covered in the vicinity of the camera;
- there are unclear lane markings present, such as a construction area;
- the lane markings are worn away, dark, or covered by dirt, sand, water, or snow;
- the distance to the vehicle in front is too small and the lane markings cannot be detected;
- the lane markings change quickly—for example lanes branch off, cross one another or merge;
- the road is narrow and winding;
- there are variable shade conditions on the road surface;
- an attachment (such as a snow plow) restricts the camera's view of the lane markings;
- there has been a significant change in load with the ignition switched on. Start the engine again after a significant change in load to have ALA be available without restrictions.

Active Lane Assist cannot take the road and weather conditions into account, nor the current traffic situation. The driver is responsible for the distance to the vehicle in front, for vehicle speed, braking in good time and remaining in the lane.

Keep the windshield clean and unobstructed in the area of the camera.

Active Lane Assist Overview

IMPORTANT: Adaptive Cruise Control (ACC) must be active for Active Lane Assist (ALA) to be active. Deactivation of ACC also deactivates ALA.

Detroit Assurance 5.0 Active Lane Assist consists of Lane Departure Protection (LDP), a feature that builds on Lane Departure Warning (LDW), and Lane Keep Assist (LKA).

When Active Lane Assist is on, it monitors the area in front of the vehicle with the multipurpose camera mounted at the top of the windshield. The LDW/LDP function of ALA detects lane markings on the road surface, warns the driver they may be leaving their lane unintentionally, and, if a driver does not respond to these warnings, moves the vehicle back to the center of the lane. The Lane Keep Assist (LKA) function of ALA monitors the driver's steering behavior and uses micro-steering adjustments to keep the vehicle in the driver's preferred lane position.

Active Lane Assist (ALA) Activation Conditions and Functions

Active Lane Assist is turned on each time the engine is turned on.

Lane Departure Protection (LDP) builds on Lane Departure Warning (LDW). As soon as the vehicle reaches 37 mph (60 km/h), both Lane Departure Warning (LDW) and Lane Departure Protection (LDP) are on.

Lane Departure Protection (LDP) requires both lane lines to be identifiable to function.

Active Lane Assist is ready to issue warnings:

- when the vehicle is moving above approximately 37 mph (60 km/h); and
- the driver display shows solid lane markings; and
- when the blue steering wheel indicator appears in the instrument panel.

When driving over the lane marking unintentionally:

- the relevant lane marking is shown in red on the driver display screen;
- the volume of the audio equipment and/or hands-free system is muted and a warning tone sounds from the loudspeaker on the corresponding side of the vehicle.

If a driver takes their hands off the steering wheel for fifteen seconds:

- a "Hands On" caution pop-up screen will appear.

Active Lane Assist does not issue a warning about going over lane markings if:

- the turn signals are switched on;
- the driver clearly and actively steers, brakes or accelerates;
- a driving safety system, such as Active Brake Assist intervenes.

Active Lane Assist will warn the driver when changing lanes if the turn signal is not used.

Lane Departure Protection will steer a vehicle back into the center lane position three times before going into a passive state and requiring a key cycle to reactivate.

Lane Keep Assist is in a passive state while the driver actively steers the vehicle.

The status of Lane Keep Assist—shown with the steering wheel indicator—is shown by the color of indicator:

- Blue steering wheel: LKA is active.
- Grey steering wheel: LKA is in passive mode.
- Red steering wheel: there is an error with the adaptive power steering (APS) which deactivates Active Lane Assist.
- When the LKA is off, no steering wheel icon shows on the driver display screen.

See **Fig. 6.20** and **Fig. 6.21** for examples of the LKA status in the driver display.

If the driver takes their hands off the steering wheel for fifteen seconds with Lane Keep Assist (LKA) active, an amber caution pop-up screen will appear (see **Fig. 6.22**) telling the driver to return their hands to the steering wheel. Doing so will cause the pop-up to disappear.

If the driver does not return their hands to the steering wheel within the next fifteen seconds, a red warning pop-up screen will appear and an acoustical warning will start to sound every five seconds. The warning pop-up will disappear and the acoustical warning will cease when the driver returns their hands to the wheel.

If the driver does not return their hands to the steering wheel, the warning pop-up remains. Starting at fifty-five seconds the acoustical warning will start to sound every second. At sixty-seconds this become a continuous audible warning and Lane Keep Assist will drop into passive mode. The warning pop-up will remain on the driver display screen until the driver places their hands on the steering wheel.

1. Active Lane Keep Assist Indicator
2. Active Adaptive Cruise Control Indicator

Fig. 6.20, Active Lane Assist - ICUC

While the driver's hands are on the steering wheel, Lane Keep Assist engages in micro-steering adjustments to keep the vehicle in the driver's preferred lane position. The preferred lane position can be set under the Drive Time Systems menu, under Driving Systems, under Settings. Options include: offset to the right, offset to the left, or center.

Active Lane Assist (ALA) Switches

There are three possible switches related to Active Lane Assist (ALA): one digital and two physical:

- A digital Active Lane Assist (ALA) switch in the ICU (see **Fig. 6.23**).
- A physical Lane Keep Assist (LKA) switch (see **Fig. 6.24**).
- A physical Lane Departure Warning (LDW) switch (see **Fig. 6.8**)

Selecting the ALA OFF switch turns off the Lane Keep Assist functionality of Active Lane Assist. The switch light will illuminated on the screen to show ALA is off. When ALA is off there will be no steering wheel icon on the screen. To turn ALA on again, select the ALA OFF switch or restart the vehicle.

10/16/2018 f611544

The LKA status indicator can appear as blue (active), grey (in passive mode; not shown), or red (an error with the adaptive power steering (APS) which deactivates ALA; not shown). The green Adaptive Cruise Control (ACC) indicator appears when the ALA feature is on.

1. Active Lane Keep Assist Indicator
2. Active Adaptive Cruise Control Indicator

Fig. 6.21, Active Lane Assist - ICC5

01/24/2020 f611805

Fig. 6.22, LKA Caution Popup Screen

10/16/2018 f611543

Fig. 6.23, Active Lane Assist Switch

08/20/2019 f611799

Fig. 6.24, Lane Keep Assist Switch

Pressing the LKA OFF switch turns off the Lane Keep Assist (LKA) functionality of Active Lane Assist for the key cycle. The switch light will come on to show that Lane Keep Assist is off. Pressing the switch or restarting the vehicle will turn Lane Keep Assist on.

Pressing the LDW OFF switch will turn off Lane Departure Warning and, by extension, Lane Departure Protection (LDP) for fifteen minutes. When the Lane Departure Warning is off, the light on the lane departure warning alert switch will come on. A driver might want to turn off Lane Departure Warning on winding roads or when driving through construction zones or other areas where lane markings are not clear.

DA 5.0 Attention Assist

General Information

Detroit Assurance 5.0 Attention Assist helps a driver by detecting typical indicators of fatigue or increasing lapses in concentration and suggesting taking a break.

Attention Assist is active at speeds above approximately 37 mph (60 km/h). When it detects indicators of fatigue, Attention Assist sounds a warning tone and displays a warning lamp on the instrument panel.

The Attention Assist warning is shown regardless of legally prescribed driving and rest periods.

Keep the windshield clean and unobstructed in the area of the camera to help ensure Attention Assist is working properly.

Safety Information

IMPORTANT: Attention Assist is only an aid. It cannot always detect fatigue or lapses in concentration reliably or in time. Attention Assist is not a substitute for a well-rested and attentive driver.

Attention Assist may not operate as designed under the following conditions:

- low visibility due to insufficient road illumination or due to snow, rain, fog, or heavy spray;
- if the windshield is dirty in the area of the camera, misted up, damaged, or covered by something such as a sticker;
- no lane markings or several ambiguous lane markings are present for a lane (near construction sites for example);
- the lane markings are worn, dark, or covered by dirt or snow;
- there is glare due to oncoming traffic, direct sunlight or reflections (from wet road surfaces for example);
- on winding roads;
- when the distance to the vehicle in front is too small for the lane markings to be detected;
- when attachments, such as a snow plough, restrict the camera's view of the road lane markings;
- after a significant change in load with the ignition turned on. Therefore, start the engine again after a significant change in load for Attention Assist to be available without any restrictions.

Attention Assist is restricted and a warning does not occur or is delayed:

- if the driver is predominantly driving slower than 37 mph (60 km/h);
- if the markings on the road are missing or difficult to distinguish;
- on winding roads.

Function and Activation Conditions

Attention Assist assesses the driver's level of fatigue or lapses in concentration by taking the following criteria into account:

- Driving characteristics, such as remaining in the lane and active steering.
- Trip related details such as the length of the drive.
- Use of turn signals.
- Use of the engine brake switch.
- Uncharacteristic changes in the accelerator pedal position.

If Attention Assist detects typical indicators of fatigue or increasing lapses in concentration on the part of the driver:

- a warning tone sounds;
- the instrument panel display screen shows an attention assist caution warning, see **Fig. 6.25** and **Fig. 6.26**;
- Active Lane Assist (ALA), if deactivated, is automatically reactivated.

Fig. 6.25, Attention Assist Warning Lamp - ICUC

Take regular breaks during long journeys.

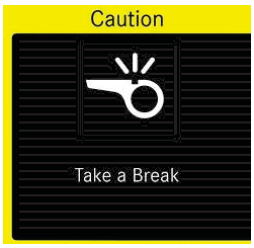


Fig. 6.26, Attention Assist Warning Lamp - ICUC

If the driver doesn't take a break when prompted, the soonest Attention Assist can issue another warning is 15 minutes.

When the engine is turned off or the vehicle is stationary for some time, Attention Assist will reset its detection sequence.

Activating or Deactivating

After starting the engine, Attention Assist is always activated.

To deactivate Attention Assist in the ICUC instrument panel, press the center button in either of the steering wheel pods and go to Safety System Settings, then Attention Assist and select Off. Select On to activate Attention Assist.

To deactivate Attention Assist in the ICC5 instrument panel, press the center button in either of the steering wheel pods and go to the Settings menu, then Driving Assistance, then Attention Assist and select Off. Select On to activate Attention Assist.

7

Driver Assistance Features

Touch Screen Operation

Tapping

IMPORTANT: All keyboard entries are locked when the parking brake is disengaged. Other touch screen options still function.

Tap the touch screen to:

- Select a menu item or entry: tap on a symbol or an entry.
- Increase the map scale: tap twice quickly with one finger.
- Reduce the map scale: tap with two fingers.
- Enter characters with the keyboard: tap on a button.

Single-Finger Swipe

Use a single-finger swipe to:

- Navigate in menus: swipe up, down, left or right.
- Move the digital map: swipe in any direction.

Two-Finger Swipe

Use a two-finger swipe to:

- Zoom in and out of the map: move two fingers together or apart.
- Turn the map: turn counterclockwise or clockwise using two fingers.

Touching, Holding and Moving

Touch, hold, and move the finger to:

- Move the map: touch the touchscreen and move the finger in any direction.
- Set the volume on a scale: touch the touchscreen and move the finger to the left or right.

Touching and Holding

Touch and hold to:

- Call up a global menu in the applications: touch the touchscreen and hold until the OPTIONS menu appears.

Navigation System: ICC5

Safety Information

⚠ WARNING

There is a risk of distraction from operating integrated communication equipment while the vehicle is in motion.

The driver can be distracted from the traffic situation if operating communication equipment integrated in the vehicle when driving, possibly causing loss of control of the vehicle.

Only operate this equipment when the traffic situation permits. Otherwise, stop the vehicle while paying attention to road and traffic conditions and operate the equipment while the vehicle is stationary.

The driver must observe the legal requirements of the country when operating the system.

The navigation system calculates the route to the destination *without* taking some of the below conditions into account:

- Traffic lights
- Stop signs and right-of-way signs
- Parking lot and stopping restrictions
- Road narrowing
- Other road, traffic controls, and regulations

The navigation system may provide incorrect navigation announcements if the surroundings do not correspond to the data on the digital map, for example: a route may have been diverted or the direction of a one-way street may have changed.

General information

The navigation system calculates the route to the destination and provides navigation announcements.

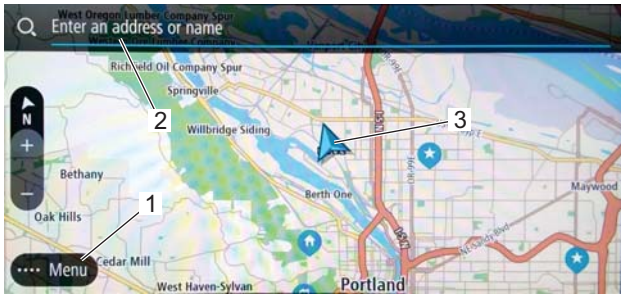
Global Positioning System (GPS) Reception

Position finding and route guidance take place using the Global Positioning System (GPS). Correct functioning of the navigation system depends, among other things, on GPS reception. In certain situations, GPS reception may be impaired due to interference or there may be no reception at all, for example in some places like tunnels or multistory parking lots.

Navigation Menu and Settings

Open Navigation and Select ····Menu. See **Fig. 7.1** for a map and see **Fig. 7.2** for the navigation menu.

NOTE: The route view appears on the screen as soon as the vehicle is moving.



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1. ····Menu
2. Address Input Line
3. Current Location

Fig. 7.1, Pre-Trip Planning Navigation Map - ICC5

The basic navigation map shows the current vehicle's location, presents a navigation address entry bar, and a ····Menu button. A known destination address may be entered here or the ····Menu button selected.

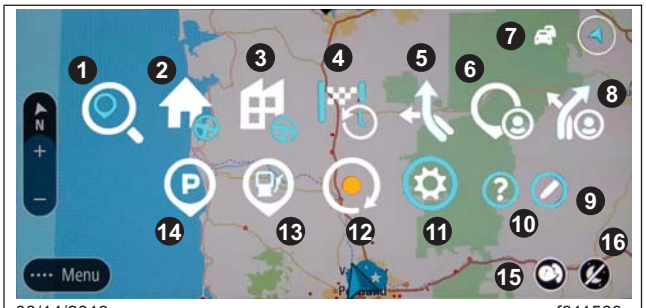
The ····Menu button will bring up the first of three screen of Navigation Menu Icons. Access the Settings menu to create a vehicle profile.

Creating a Vehicle Profile

Whenever possible, the vehicle profile will be taken into account during route calculation. When a chosen destination is not reachable via a route that takes your vehicle profile into account, the system will inform you that the route is calculated based on different vehicle profile.

Depending on local conditions, the navigation system may not always be able to include all selected settings for route calculation, avoiding toll roads for example.

1. Select ····Menu.
2. Select Settings.
3. Select My Vehicle.
4. Select Vehicle type. A list of possible types of vehicle appears.
    - Select a vehicle type from the list then press the back arrow in the upper left corner of the screen. The current settings of the type of vehicle appears.
    - If needed, select the values and adjust them to match the actual vehicle.
    - If you are transporting hazardous materials, add these to your vehicle profile.



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1. Search for Address or POI
2. Drive Home
3. Drive to Work
4. Drive to Recent Destination
5. Change Current Route
6. Display Saved Locations
7. Live Traffic On**
8. Display Saved Routes
9. Edit ····Menu
10. System Information
11. Settings
12. Record Current Route
13. Display Gas Stations
14. Display Parking Lots
15. Voice On/Off
16. Night Mode On/Off

** An X appears on the bottom right of this icon when the vehicle can't connect to the traffic system.

Fig. 7.2, Navigation Menu Icons - ICC5

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Fig. 7.3, My Vehicle Profile Screen - ICC5

Adding Hazardous Dangerous Goods to the Vehicle Profile

Hazardous materials includes, in part, explosives, gases, flammable liquids, flammable solids, oxidizers and organic peroxides, toxic and infectious substances, radioactive substances, and corrosive substances.

NOTE: The value 0 equals No Hazardous Materials and causes the system not to check for route restrictions.

1. Select My Vehicle
2. Select HAZMAT. A list of possible dangerous goods settings appears.
3. Select a class or classes of hazardous material by sliding the radio button to the right. The active radio button(s) will be highlighted in color.
4. Press the back arrow next to the Setup Hazardous Materials title on the screen. Check that the appropriate hazardous material icons have appeared on the My Vehicle screen.

Adjusting the Display

Turning On Automatic Switching to Night View

NOTE: Night View can be turned on or off by pressing the Night View icon located at the bottom right of the ····Menu screens.

When the setting is active, the display automatically switches to night view when dark.

1. Select ····Menu.
2. Select Settings.
3. Select Appearance.
4. Select Display.
5. Select Switch To Night Colors When Dark. The radio button is highlighted in color when the setting is active.

Adjusting Arrival Information on the Route Bar

The driver can set the type of arrival information to display on the route bar and whether the information is displayed for the final destination or for the next intermediate destination.

1. Select ····Menu.
2. Select Settings.
3. Select Appearance.
4. Select Route bar.
5. Select Arrival information.
6. Select a setting; the active setting is indicated by a dot highlighted in color.

Adjusting Route Information on the Route Bar

The driver can set the route information to display on the route bar, such as gas stations, parking lots, rest areas, toll zones, and ferries.

1. Select ····Menu.
2. Select Settings.
3. Select Appearance.
4. Select Route bar.
5. Select Route information.
6. Select desired setting(s); active settings are highlighted in color.

Displaying the Time

When this function is active, the current time appears at the bottom of the route bar.

1. Select ····Menu.
2. Select Settings.
3. Select Appearance.
4. Select Route bar.
5. Select or Deselect Show Current Time. If Show Current Time is on, the option is highlighted in color.

Displaying a Wider Route Bar

NOTE: Both map and route bar views can be enlarged to show more detail or zoomed out on to show less by using a two-finger swipe.

When Show Wide Route Bar If Possible is on, a wider route bar appears. The wider route bar contains additional route information, e.g. journey time and distance from a traffic jam.

1. Select ····Menu.
2. Select Settings.
3. Select Appearance.

4. Select Route Bar.
5. Select Show Wide Route Bar If Possible. If Show Wide Route Bar If Possible is on, the option is highlighted in color.

Adjusting the Route View

The following settings are available for adjusting the route view:

- Display current street names: when this setting is active, the name of the road the driver is currently driving on appears on the route bar.
- Route display style: set whether the route view is displayed in 2D (in direction of travel) or 3D.

1. Select ····Menu.
2. Select Settings.
3. Select Appearance.
4. Select Guidance view.
5. Select if the current street name should be displayed. If this setting is on, the radio button will be highlighted in color.
6. Select your guidance view style: 3D or 2D (in direction of travel). The selected mode will be highlighted in color.

Adjusting the Automatic Zoom

The following settings are available for Automatic Zoom:

- Zoom In To Next Turn. When this setting is active, all turns and intersections on the route will be zoomed in on along the route.
- Based On Road Type. When this setting is active, all turns and intersections on the route may or may not be zoomed in on, depending on the type of street.
- None. When this setting is active, turns and intersections are not zoomed in on.

1. Select ····Menu.
2. Select Settings.
3. Select Appearance.
4. Select Automatic Zoom.
5. Select a zoom option. The active setting will be highlighted in color.

Selecting a Voice for Spoken Messages

NOTE: If you choose a voice incompatible with the units of measurement selected, the system will ask you to verify your choice. In addition, certain voices may be unable to read warnings out loud, in which case the option to turn on that feature will be disabled until you select a compatible voice.

The default short voice list includes the following English and Spanish variations: New Zealand English, Irish English, Australian English, United States English, British English, Spanish, and Mexican Spanish.

The system also includes voices speaking the world's major languages outside of English and Spanish. They can be accessed by selected the All Voices button in the bottom right of the Choose a Voice screen.

1. Select ····Menu.
2. Select Settings.
3. Select Voices.
4. Select Choose a voice.
5. Select a voice with the desired language and accent; the active setting is indicated by a colored dot.

Voice Instruction Settings

Two instruction settings are available under the Voices menu: Read Arrival Time Out Loud and Read Early Instructions Out Loud.

When Read Arrival Time Out Loud is active, the projected arrival time is read by the selected voice. When Read Early Instructions Out Loud is active, instructions to exit or turn are given in advance such as "Ahead, turn left," and "After one mile take the right exit."

1. Select Settings.
2. Select Voices.
3. Select Choose a voice.
4. Select if you would like either or both of the vocal instruction settings turned on; an active setting is indicated by a radio switch highlighted in color.

Setting the Route Planning Type and Method

The following settings are available under route planning type:

- Fastest Route. The navigation calculates a route with the shortest possible journey time.
- Shortest Route. The navigation calculates a route with the shortest possible distance.

The following settings are available for choosing a faster route when travel is underway:

- Always Take the Fastest Route. When a faster route is available, navigation automatically recalculates the route.
- Ask Me So That I Can Choose. When a faster route is available, navigation asks whether the faster route should be used.
- Don't Ask Me. The navigation system does not look for faster routes.

1. Select ····Menu.
2. Select Settings.
3. Select Route Planning.
4. Select a route planning method; the active setting is indicated by a colored dot.
5. Select a route planning type (fastest or shortest). The active choice is highlighted in color.

Route Options, Avoiding Areas

Avoiding Ferries, Toll Roads, Carpool Lanes, Unpaved Roads, and Tunnels

1. Select ····Menu.
2. Select Settings.
3. Select Route Planning.
4. Swipe down to select the Avoid On Every Route option.
5. Select what features to avoid. The radio button is highlighted in color when a feature is selected.

NOTE: These route options are not available in every country. Also, the selected route options cannot always be taken into account. Therefore, a route may include a ferry, for instance, even though the avoid ferries option is active.

Sounds and Warnings

Some voices are not compatible with reading warnings out loud. If this if the case with the selected voice, notification will appear on the screen and the option to have warnings read out loud will not be available until you choose a different compatible voice.

The following settings are available to choose warning types:

- Read Out Loud. When this setting is active, spoken warnings and warning sounds are issued during the journey.
- Sounds. When this setting is active, only warning sounds are issued during the journey.
- Visual Only. When this setting is active, no spoken warnings or warning sounds are issued during the journey.

1. Select ····Menu.
2. Select Settings.
3. Select Sounds & Warnings.
4. Select Warning Type.
5. Select the desired warning type; the active setting is indicated by a colored dot.

Settings for Spoken Warnings

The navigation system can issue vocal warnings about traffic jams and other traffic issues as well as say when the vehicle has exceeded the speed limit.

1. Select ····Menu.
2. Select Settings.
3. Select Sounds & Warnings.
4. Swipe down to the bottom of the page. The following options are listed: Traffic Jam Ahead, When Speeding, and Read Traffic Warnings Out Loud. Move the radio button to the right for those warnings you want read aloud. An active choice will have the radio button highlighted in color.

Setting the Units

Unit settings include: Kilometers (km), miles & yards (mi/yd), miles & feet (mi/ft), and automatic.

1. Select ····Menu.
2. Select Settings.
3. swipe Select Units.

4. Select the desired units; the active setting is indicated by a dot highlighted in color.

Reordering Menu Options

The top level menu options—My Places, My Routes, Parking Lot, Gas Station, Report Safety Camera, Start Recording, and Settings—can be reordered to move the most used options to the first screen.

Reordering the Menu

1. Swipe right until you reach the end of the icon list.
2. Select the pencil icon. Each menu item with its corresponding icon will now outlined as if they have been turned into illustrations on a playing card.
3. Select the menu item and icon you want to move. It will be highlighted in color and two arrows will appear at the bottom.
4. Press either the right or left arrow to move the card over to the left or right until it's in the desired position.
5. If desired, select and move other cards.
6. Press the Done button when finished.

Navigation Menu

Destination Entry

NOTE: All the keyboard entries are locked when the parking brake is disengaged.

Enter a destination into the navigation system using the following options:

- Enter a named location.
- Enter a street address on the search line at the top of the map.
- Enter the longitude and latitude.
- Enter map codes.
- Zoom in on the map to find the desired location and press and hold to select.

Results matching the characters entered using the keyboard will appear on the address results list and the Point of Interest (POI) categories or POI results list.

Selecting a Destination From the Address

NOTE: The farther away the destination is from the current vehicle position, the longer it will take for the route to be calculated.

1. Open the navigation system.
2. Tap next to the magnifying glass Search icon.
3. Enter the desired address, see **Fig. 7.4**.

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1. Address Input Line
2. Address Results List
3. POI Results List
4. Scroll Bar
5. Selected Search Area
6. Switch to Map or Route View (Cancel Search)
7. Keyboard
8. Switch Between List (Lines) and Map (Circles) View

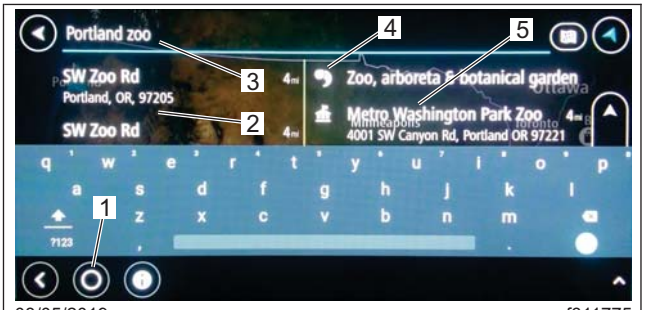
Fig. 7.4, Entering a Destination - ICC5

4. Select the desired location from the results lists.
5. Select Drive.
6. The My Vehicle type and configuration screen appears; verify the information by selecting the arrow at the bottom right. If necessary, update the information and then select the arrow at the bottom right to verify it.
7. Select Let's Go··· to start navigation guidance.

Selecting a Destination From Points of Interest (POI)

1. Select ····Menu.
2. Select Search option for input menu.

3. Enter a saved POI such as Home or a type of POI such as Gas Station or Zoo.



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1. Map View
2. Address Results
3. Address Input Line
4. POI Category List
5. POI List

Fig. 7.5, POI Results Lists - ICC5

4. Select POI or a POI type from the results list; the destination appears.
5. Select Drive.
6. The My Vehicle type and configuration screen appears; verify the information by selecting the arrow at the bottom right. If necessary, update the information and then select the arrow at the bottom right to verify it.
7. Select Let's Go··· to start navigation guidance.

Selecting a Destination From the Recent Destinations

1. Select ····Menu.
2. Select Recent Destinations to display a list of previous destinations.
3. Select a destination from the list.
4. Select Drive.
5. The My Vehicle type and configuration screen appears; verify the information by selecting the arrow at the bottom right. If necessary, update the information and then select the arrow at the bottom right to verify it.
6. Select Let's Go··· to start navigation guidance.

Selecting a Destination on the Map

1. Open the navigation system.
2. Search for a destination on the map by swiping and zooming.
3. Select the destination on the map by pressing and holding. The address nearest to the selected point appears.
4. Select Drive.
5. The My Vehicle type and configuration screen appears; verify the information by selecting the arrow at the bottom right. If necessary, update the information and then select the arrow at the bottom right to verify it.
6. Select Let's Go··· to start navigation guidance.

Selecting a Destination from Geo-Coordinates

1. Open the navigation system.
2. Either select the search bar at the top of the map or select the Search option under ····Menu.
3. Select the button to the right of the search input line to define the search area.
4. Select Latitude Longitude. An input menu appears.
5. Enter the geo-coordinates. The results appear in the results list.
6. Select a destination from the results list; a menu appears.
7. Select Drive.
8. The My Vehicle type and configuration screen appears; verify the information by selecting the arrow at the bottom right. If necessary, update the information and then select the arrow at the bottom right to verify it.
9. Select Let's Go··· to start navigation guidance.

Selecting a Destination from a Map Code

1. Open the navigation system.
2. Select the search bar at the top of the map. Make sure the correct search area is defined for your map code.
3. Enter a map code; the results are displayed in the results list.
4. Select a destination from the results list; a menu appears.
5. Select Drive.
6. The My Vehicle type and configuration screen appears; verify the information by selecting the

arrow at the bottom right. If necessary, update the information and then select the arrow at the bottom right to verify it.

7. Select Let's Go··· to start navigation guidance.

The following are the examples of map code entries:

- Edinburgh Castle, international map code - WH6SL. TR10
- Edinburgh Castle, country specific map code - GBR 8MH.51
- The Field Museum of Natural History, country specific map code - T821.1BFF
- The Field Museum of Natural History, state specific map code - WM.GO (Must have Illinois selected as search area for this code to resolve correctly.)
- The Field Museum of Natural History, alternatives - SY.FRQ or 9Q9.VOP

Selecting a Destination from Saved Destinations

1. Select ····Menu.
2. Select My Places a list of saved destinations appears.
3. Select a destination from the list; the destination appears on the map.
4. Select Drive.
5. The My Vehicle type and configuration screen appears; verify the information by selecting the arrow at the bottom right. If necessary, update the information and then select the arrow at the bottom right to verify it.
6. Select Let's Go··· to start route guidance.

Selecting a Destination from Saved Routes

1. Select ····Menu.
2. Select My Routes. If you have saved routes, a list of saved routes appears.
3. Select a route from the list.
4. The My Vehicle type and configuration screen appears; verify the information by selecting the arrow at the bottom right. If necessary, update the information and then select the arrow at the bottom right to verify it.
5. The route appears on the map. Select Drive to calculate the route.
6. Select Let's Go··· to start navigation guidance.

Searching for a Parking Lot Area

Fig. 7.6, Parking Lots Displayed - ICC5

NOTE: Navigation shows gas stations, parking lots, and other locations that may not be suitable for your vehicle's size and weight. Use caution when selecting locations and routes.

1. Select ····Menu.
2. Select Parking Lot.
   - 2.1 If a route is active, the map appears with parking lots near the destination.
   - 2.2 If a route is not active, the map appears with parking lots near the current vehicle location.
3. Select a parking lot area; the name of the parking lot area appears on the map.
4. Select Drive to recalculate the route to end at the chosen parking lot; the route to the destination appears.
5. The My Vehicle type and configuration screen appears; verify the information by selecting the arrow at the bottom right. If necessary, update the information and then select the arrow at the bottom right to verify it.
6. Select Let's Go··· to start the navigation guidance.

Searching for Gas Stations

NOTE: Navigation shows gas stations, parking lots, and other locations that may not be suitable for your vehicle's size and weight. Use caution when selecting locations and routes.

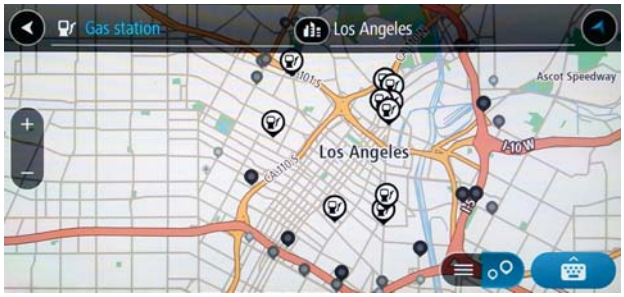


Fig. 7.7, Gas Stations Displayed - ICC5

1. Select ····Menu.
2. Select Gas station.
   - 2.1 When the route is active, the map appears with gas stations along the route.
   - 2.2 When the route is not active, gas stations appear on the map near the current vehicle location.
3. Select a gas station; the name of the gas station appears on the map.
4. Select Drive.
5. The My Vehicle type and configuration screen appears; verify the information by selecting the arrow at the bottom right. If necessary, update the information and then select the arrow at the bottom right to verify it.
6. Select Let's Go··· to start the navigation guidance.

Saving a Destination

My Places

In addition to saved destinations, My Places contains the following information:

- Home
- Recent destinations
- Work
- Marked locations

Saving a Destination Under My Places

1. Select ····Menu.
2. Select My Places.
3. Select Add.
4. Select a destination on the map or select Search and put in an address.
5. Select from the results list; the destination appears on the map.
6. Select Add to My Places to save the destination.
7. Give the destination a unique name or keep it as an address. Select the blue check mark to save the destination.
8. The destination is saved under My Places and marked with a star on the map.

Saving an Address as Home

Saving a second location and calling it Home will replace the original Home location with the second location address.

1. Select ····Menu.
2. Select My Places.
3. Select Add Home if no home address has been saved; if a home address has been saved, follow the directions above for Saving a Destination Under My Places to add a second home address. In either case, the map with the search bar appears.
4. Select home on the map or select Search and enter an address.
5. Select Set if choosing a point on the map; select from the results list if an address was entered then select Set Home Location.

NOTE: Home is marked with a house symbol on the list and on the map.

6. The home appears on the map and is saved as Home.

Saving an Address as a Workplace

Saving a second location and calling it Work will replace the original work location with the second location address.

1. Select ····Menu.
2. Select My Places.
3. Select Add Work. The map appears.
4. Select the workplace on the map or select Search and enter an address.

5. Select Set if choosing a point on the map; select from the results list if an address was entered, then select Set Work Location.
6. The workplace appears on the map and is saved as Work.

Deleting a Destination

Deleting a Destination from the List of Recent Destinations

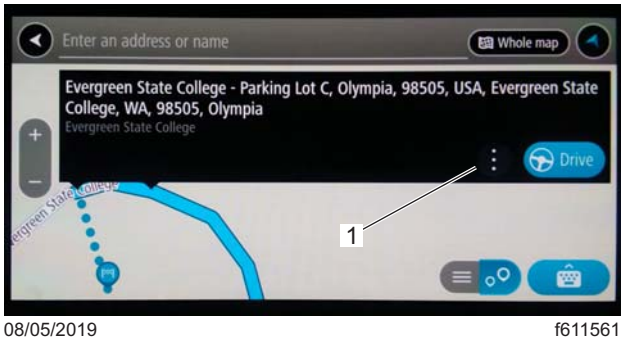
1. Select ····Menu.
2. Select My Places.
3. Select Recent Destinations.
4. Select Edit List.
5. Select a destination; a minus sign appears next to the destination.
6. Select Delete. The destination is deleted from the list of recent destinations.

NOTE: You can delete multiple destinations at the same time.

Planning a Route

Specifying a Starting Point

NOTE: For accurate results when selecting an address from the map, zoom in.



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1. Navigation Submenu Icon

Fig. 7.8, Navigation Submenu - ICC5

1. Open the navigation system.
2. Press and hold a fingertip on an area of the map, or enter an address and select from the results lists.
3. Select the circle with the three vertical dots next to the address name to access the submenu.

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Fig. 7.9, Navigation Submenu Displayed - ICC5

4. Select Use as a Starting Point. The location appears on the map.

Specifying a Destination

1. Open the navigation system.
2. Press and hold a fingertip on an area of the map, or enter an address and select from the results lists.
3. Select Drive.
4. The My Vehicle type and configuration screen appears; verify the information by selecting the arrow at the bottom right. If necessary, update the information and then select the arrow at the bottom right to verify it.
5. The route is calculated and appears on the map.
6. Select Let's Go··· to start the navigation guidance.

Select the Current Position as the Starting Point in the Middle of a Route

1. Select the starting point of the route.
2. Select the circle with the three vertical dots next to the address name to access the submenu.
3. Select Remove Starting Point. The route is recalculated with the current vehicle position as the starting point.

Specify an Intermediate Destination Using the Route Map

Add to Current Route adds an address to the route. Search Near Here accesses the point of interest (POI) menu.

1. Create a route map to the final destination.

2. Zoom in on that part of the route that contains the intermediate destination.
3. Press and hold a fingertip on the intermediate destination on the map.
4. An address will appear. Select the circle with three vertical dots to access the submenu. Choose Add to Currrent Route or continue searching by choosing Search Near Here.
   - 4.1 Choose the icon for a POI (a meal, a gas station) and select from the list of options.
   - 4.2 The address appears. Select the circle with the three vertical dots next to the address name to access the submenu and add the location to the route
5. When all intermediate destinations are added to the route, select Drive. The route is calculated.
6. Select Let's Go···

Saving a Route

Saving the Current Route

1. Select ····. or ····Menu.
2. Select Current Route.
3. Select Add to My Routes. An input menu appears.
4. Change the name of the route if desired.
5. Select the blue checkmark to save the route; the route is saved under My Routes.

Saving Changes to a Route

Options under Current Route include Skip Next Stop, Find Alternative, Avoid Blocked Road, Avoid Toll Roads and More, Show Instructions, Add Stop to Route, Add to My Routes and Change Route Type.

1. Create a route.
2. Select ····. or ····Menu.
3. Select Current Route.
4. Select the desired type of change to the route.

Deleting Intermediate Destinations

1. Select the route map view. Zoom in on the intermediate destination to be deleted.
2. Select the intermediate destination to be deleted.
3. Select the circle with the three vertical dots next to the address name to access the submenu.
4. Select Delete This Stop. The route is recalculated without the intermediate destination.

Deleting a Saved Route

1. Select ····. or ····Menu.
2. Select My Routes. The list of saved routes appears.
3. Select Edit List.
4. Select a route; a minus sign appears next to the route.
5. Select Delete the route is deleted.

NOTE: you can delete more than one saved route at a time.

Current Route

Cancelling the Active Route

NOTE: To exit the active route screen, select the arrow with the line through it.

1. Select ····. or ····Menu.
2. Select Current Route.
3. Select Clear Route. The active route is deleted and the map view appears.

Changing the Route Options

Changing the Order of Intermediate Destinations

1. Open the saved route with intermediate destinations.
2. Select ····. or ····Menu.
3. Select Current Route.
4. Select Reorder Stops; the starting point, destination and all intermediate destinations appear on the map.
5. Select the starting point.
6. Select the intermediate destinations one by one in the desired order; flags appear at the intermediate destinations.
7. Select the destination last; the new route is calculated.

Displaying Alternative Routes

1. Create a route.
2. Select ····. or ····Menu.
3. Select Current Route.
4. Select Find Alternative. A maximum of three alternative routes appear on the map. The difference between the driving time or distance compared to the original route is displayed for each route.
5. Select an alternative route by selecting the route shown on the map or selecting the icon displaying the difference in driving time or distance.
6. Select Let's Go··· to start navigation guidance. The route view appears.

Avoiding Closed Roads

1. Create a route.
2. Select ····. for ····Menu.
3. Select Current Route.
4. Select Avoid Blocked Road. If an alternative route excluding the closed road is available, the alternative route appears on the map. The difference between the driving time or distance compared to the original route is displayed for the route.
5. To select the alternative route select the route shown on the map or select the icon displaying the difference in driving time or distance.
6. Select Let's Go··· to start route guidance. The route view appears.

Displaying Navigation Instructions

1. Create a route.
2. Select ····. or ····Menu.
3. Select Current Route.
4. Select Show Instructions. A list of directions is shown starting with the current location.

The current vehicle position is shown with the following information:

- The symbol for the current vehicle position is displayed.
- The name of the road you are currently driving on is displayed.

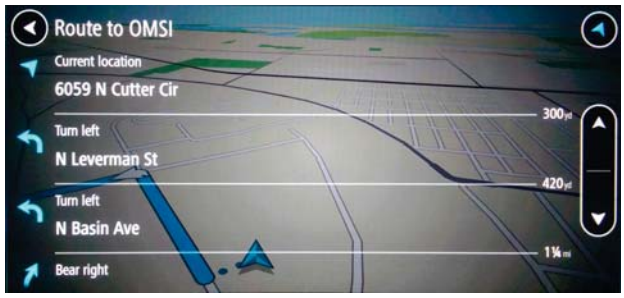


Fig. 7.10, Navigation Instructions - ICC5

- The road number of the road you are currently driving on is displayed.

Driving to the Starting Point of a Route

The driver can use this function to drive from the current vehicle position to the starting point of a saved route. The starting point is changed to an intermediate destination.

1. Select ····. for ····Menu.
2. Select Current Route.
3. Select Drive to Route.
4. Select Let's Go··· Route navigation begins.

Current Route

Changing the Route Planning Type.

Route types consist of Fastest and Shortest.

1. Create or open a route.
2. Select ····. for ····Menu.
3. Select Current Route.
4. Select Change Route Type.
5. Select a route type: fastest route or shortest route. The route is recalculated with the selected route type.

Avoiding Toll Roads and More Along the Current Route

NOTE: If there are no toll roads or other features (unpaved roads, carpool lanes) along the calculated route, these options will not be available to be selected.

1. Create or open a route.
2. Select ····. for ····Menu.

3. Select Current Route.
4. Select Avoid Toll Roads and More. The menu of features to avoid opens.
5. Select an option or options to avoid. Then select OK. The main navigation screen willl load.

During Route Guidance

Route Restrictions

When the vehicle type is set to Bus or Truck in the vehicle profile, route restrictions will be displayed in the route view during the journey. Streets with restricted access are marked in color on the route view. Streets with restricted access on the route appear as a dotted line on the map.

NOTE: Observe all the traffic signs at all times. Pay particular attention to signs with restrictions that refer to the dimensions and weight of the vehicle.

Route Overview

When a route has been calculated, the complete route appears on the map.

Overview of the Complete Route and Route Bar

When the vehicle is moving, the 3D display will show the vehicle's speed and the name of the road the vehicle is currently on at the bottom of the screen.

Touching the vehicle icon will bring up a menu that allows for reporting of a blocked road or a safety camera.

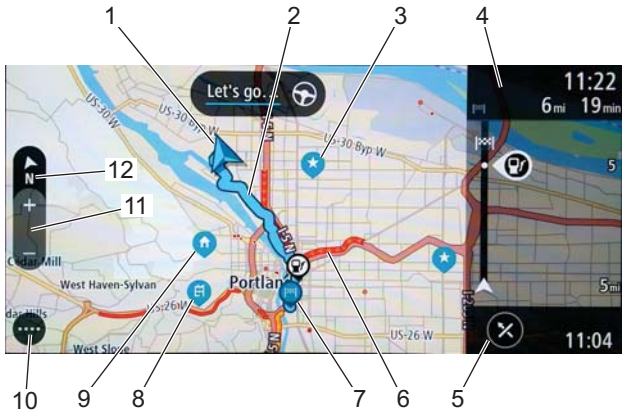
The wide progress bar shows a simplified view of the vehicle's current location on the route.

The progress bar can also show intermediate destinations and traffic messages on the route. Only the next 31 miles (50 km) will be displayed. For stretches longer than 31 miles (50 km), the progress bar can be moved by swiping up or down.

The progress bar can be zoomed in on by selecting any of the route features, e.g. gas stations, traffic delays.

Overview of Lane Recommendations

If the digital map contains the corresponding data, lane recommendations for upcoming changes of direction can be displayed before freeway exits and intersections.



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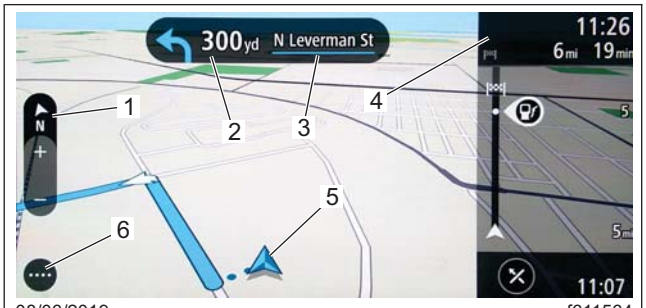
1. Vehicle
2. Planned Route
3. Saved Location
4. Route Bar
5. Cancel Route
6. Slow Traffic
7. Destination
8. Work
9. Home
10. ....Menu
11. Map Zoom
12. 2D to 3D Switch

Fig. 7.11, Route Overview - ICC5



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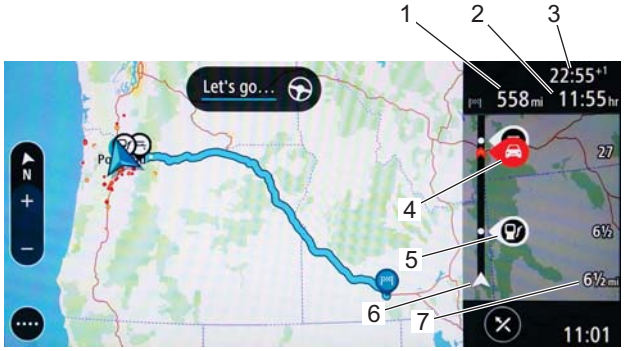
1. 2D to 3D View Switch
2. Distance to Change of Direction
3. Next Road Name
4. Route Overview
5. Current Vehicle Position
6. ....Menu

Fig. 7.12, Overview of 3D Display- ICC5

Quick-Access

With quick access, you can mark the location, avoid closed roads or display the current vehicle position



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1. Distance to Destination
2. Arrival Time
3. Journey Time
4. Traffic Disruption
5. Gas Station
6. Route Bar
7. Distance to Next Destination/POI

Fig. 7.13, Example of a Wide Route Bar - ICC5

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1. Recommended lane (marked with colored arrows)
2. Lane not recommended (grey)

Fig. 7.14, Lane Recommendation

and the longitude and latitude. To open the quick access menu, select the symbol for the current vehicle position or the speed display.

Traffic

Live Traffic Information

Live Traffic Information is a subscription service which shows real-time traffic information. This service is available free of charge for three years upon activation of Live Traffic Information. Subsequently, the service may be extended for a fee.

Live Traffic Information is not available in all countries or regions. Further information can be found at **TomTom Traffic North America**.

Activating Live Traffic Information

When first starting the navigation system, a popup window will appear asking if Live Traffic Information should be turned on. As soon as it is turned on the traffic situation will be shown on the Navigation Map and will be taken into account when the navigation system is asked to calculate a route.

Showing Traffic Information on the Map

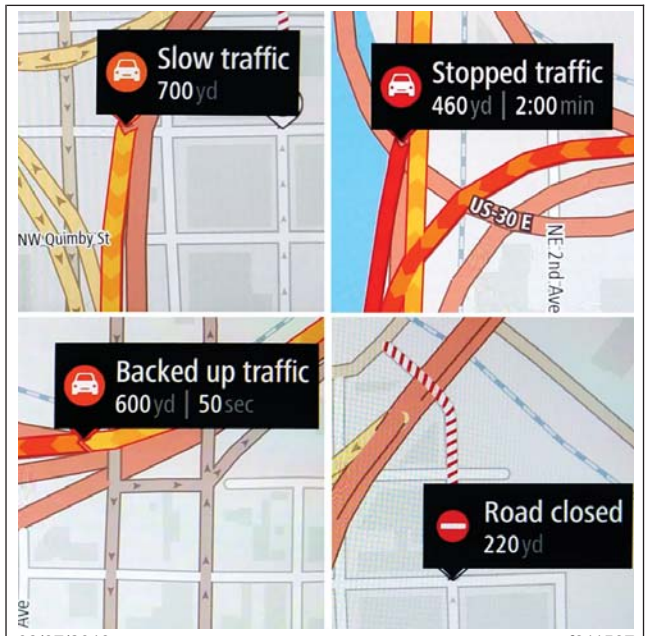

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Fig. 7.15, Traffic Information Key - ICC5

NOTE: The traffic disruption symbols display the type of traffic disruption, length, and delay in minutes. The colors display the speed of the traffic in relation to the speed limit. Red indicates stopped traffic, a mix of red and orange indicates backed-up traffic, and mix of yellow and orange indicates slow traffic. Red and white indicates a closed road.

To Display Information About the Traffic Disruption;

Select the traffic disruption on the map or route bar.

The following information about the traffic disruption is displayed:

- Type of traffic disruption, e.g. accident
- Severity of the traffic disruption: slow, heavily congested or stopped traffic
- Length of the traffic disruption
- Duration of delay

The system will also give the option of Avoid to recalculate the route to avoid the delay.

1. Select Avoid. An alternative route is calculated.
2. Select the new route on the map on by selecting the button showing the change in distance or time.
3. The route on the map and the bar update. Let's Go··· appears.

Standard Cruise Control

⚠ WARNING

Do not use the cruise control system when driving conditions do not permit maintaining a constant speed, such as in heavy traffic or on roads that are winding, icy, snow-covered, slippery, or roads with a loose driving surface. Failure to follow this precaution could cause a collision or loss of vehicle control, possibly resulting in personal injury or property damage.

NOTICE

When the cruise control is engaged, do not attempt to shift gears without using the clutch pedal. Failure to follow this precaution will result in a temporarily uncontrolled increase in engine speed. Transmission damage and gear stripping could result.

NOTE: If the vehicle is equipped with a Detroit automated transmission, setting the cruise control with the engine brake on will activate Descent Control Mode. Moving the transmission shift lever to the top position will resume the set cruise speed. Moving the lever down to engage the engine brake after the cruise control has been set will activate Deceleration Mode. See "Descent Control and Deceleration Modes, Detroit™ Automated Transmissions" in this chapter.

In the ICUC, standard cruise control is operated by three switches mounted in the right-hand switch pod of the steering wheel. See **Fig. 7.16**.

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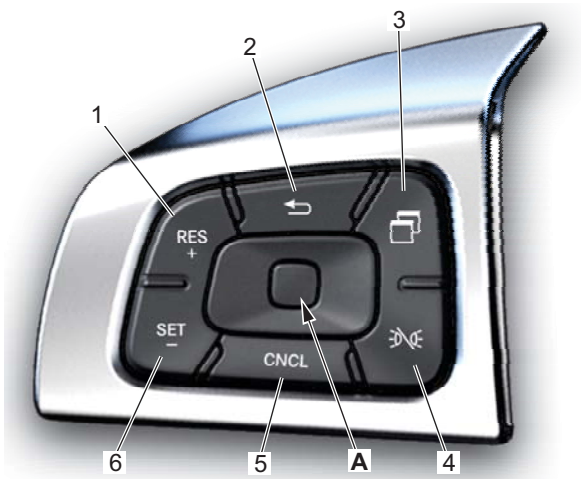
1. Cruise Accelerate/Resume
2. Quick Access System Settings
3. Cruise Decelerate/Set
4. Phone Hang-Up/Reject
5. Marker Interrupt**
6. Phone Pick-Up
7. Headlamp Interrupt**
8. Cancel Cruise Control

** Not available in all markets

Fig. 7.16, Steering-Wheel-Mounted Right-Hand Switch Pod - ICUC

In the ICC5, standard cruise control is operated by three buttons mounted in the left-hand pod of the steering wheel. See **Fig. 7.17**.

- Cruise Decelerate/SET Button—Press to set the cruise speed while the vehicle is traveling at the desired speed. Press and hold to decrease the set cruise speed by 5 mph increments (Detroit Diesel engines only). Single press decreases cruise speed by 1 mph. When cruise control has been set, the driver display static menu in the ICUC shows relevant cruise control icons and the set speed. See **Fig. 7.18**. The speed memory will be retained until the ignition is turned off.
- CNCL Button —Press to pause the cruise control, while retaining the speed setting in memory. The cruise control can also be disengaged, while retaining the speed memory, by depressing the brake or clutch pedals.
- Cruise Accelerate/RES Button—Press to resume the set speed. Press and hold to increase the set cruise speed by 5 mph increments (Detroit Diesel engines only). Single press increases cruise speed by 1 mph. If no



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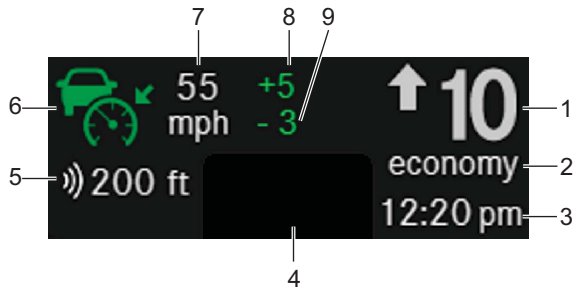
A. Menu Button—Press the button to access instrument panel menus. When the button is pressed, information appears on the driver display screen.
1. Cruise Accelerate/Resume
2. Back Button
3. Quick Access System Settings
4. Marker Interrupt
5. Cruise Cancel
6. Cruise Decelerate/Set

Fig. 7.17, Steering-Wheel-Mounted Left-Hand Switch Pod - ICC5



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1. Gear Indicator
2. Gear Mode
3. Clock
4. Soft Telltales
5. Adaptive Cruise Control and Tracked Vehicle Distance
6. Cruise Control Symbol (adaptive cruise control shown)
7. Cruise Control Set Speed
8. Cruise Control Overspeed
9. Cruise Control Underspeed

Fig. 7.18, Static Menu - ICUC

previous set speed is stored, pressing the button sets the cruise speed.

1. To cruise at a particular speed:

   1.1 Depress the accelerator pedal until the speedometer reaches the desired speed.

   NOTE: Cruise control is cancelled if the brake or clutch pedal is depressed, or vehicle speed drops below the minimum cruise control speed.

   1.2 Press the cruise decelerate/SET button to set the desired speed.

NOTE: The speed memory is lost whenever the ignition switch is turned to OFF.

2. To disengage the cruise control, do one of the following:
   - In the ICUC system, press the CNCL button in the center of the right-hand steering-wheel-mounted switch pod. A single press disengages the cruise control, but retains the set speed. Press and hold to clear the set speed (Detroit Diesel engines only).
   - In the ICC5 system, press the CNCL button at the bottom of the left-hand control pod. A single press disengages the cruise control, but retains the set speed. Press and hold to clear the set speed (Detroit Diesel engines only).
   - Depress the brake pedal.
   - Depress the clutch pedal (on a manual transmission only).
3. To resume a preselected cruise speed, press the cruise accelerate/RES button. Cruise will return to the last set speed.

NOTE: If vehicle speed drops below the minimum cruise control speed, cruise control will disengage. To resume to the preselected cruise speed, increase vehicle speed to above minimum cruise control speed and press the cruise accelerate/RES button.

4. To increase cruise speed, press the cruise accelerate/RES button until the desired set speed is displayed.
5. To decrease cruise speed, press the cruise decelerate/SET button until the desired set speed is displayed.

The cruise speed hysterisis (maximum speed above and below the set speed) can be set in the ICU settings menu.

On vehicles with adaptive cruise control, the leading vehicle following distance can be set in the Quick Access menus.

PasSmart

On vehicles equipped with PasSmart, the driver can exceed predetermined road limit speed temporarily. The PasSmart function is initiated by double-pumping the accelerator pedal. When the predetermined road limit speed is exceeded, the driver display shows the status and time remaining until the vehicle decelerates. See **Fig. 7.19**.

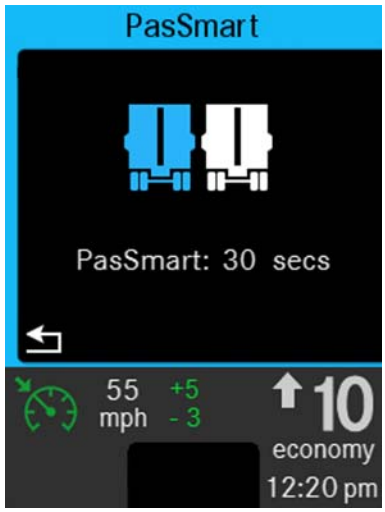

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Fig. 7.19, PasSmart Alert Screen - ICUC

Intelligent Powertrain Management (IPM)

NOTE: IPM isn't an option with a DT12 transmission.

IPM is an optional fuel savings application that functions as a predictive cruise control. Using 3D digital map technology and GPS, IPM evaluates the upcoming road grade about a mile in advance to determine the best use case for most fuel-efficient vehicle speed and gear selection.

An indicator on the driver display illuminates when one of the IPM modes is activated. See **Fig. 7.20**.

09/11/2017 f611487

1. IPM Active Indicator

Fig. 7.20, IPM Active on the Driver Display - ICUC

The 3D digital map database contains profile information for over 200,000 highway miles (322,000 km) in the 48 contiguous United States, the Trans-Canada Highway, and most major Canadian highways. IPM will vary the cruise speed, depending on the approaching road grade. For a New Cascadia equipped with the Economy Package, the default variance is +5/–4 mph (+8/–6 km/h). If the engine brake is enabled, IPM may automatically engage the engine brake at speeds higher than the cruise set speed.

Key predictive features of IPM are:

- Steep Mountain Mode — applies if the vehicle will not maintain cruise set speed while climbing. To balance travel time while saving fuel, the vehicle will first predictively accelerate before starting the climb, and may slow down as it approaches the crest of the hill. In this scenario the speed is allowed to fall below the cruise control underspeed.
- Crest Coasting — reduces speed before cresting a hill
- Dip Coasting — increases speed before a dip
- Predictive Shifting — selects a gear shifting strategy for upcoming terrain
- Load Balancing — maintains most efficient power for near zero road grades; small fluctuation in road speed may be seen from cruise set speed by ±1 or 2 mph

- Predictive Adaptive Cruise Control — if equipped with adaptive cruise control (ACC), allows IPM to increase following distance

IMPORTANT: IPM behavior is different from that of conventional cruise control. The system incorporates features to improve the overall driver experience. Some key points to remember are:

- IPM is active only when cruise control is engaged.
- IPM only controls speed within the upper and lower bounds of the cruise set speed. The upper and lower set limits may be exceeded up to 2 mph (3 km/h) for a limited time during dip coasts, as IPM predicts the terrain demands for the most fuel-efficient performance. The driver is responsible for setting a speed appropriate for the conditions and grade. If equipped, IPM upper and lower bounds can be adjusted by selecting the quick access button on the steering wheel.
- IPM can engage eCoast sooner, later, or not at all compared to conventional cruise control.
- IPM may automatically engage the engine brake at a higher speed than the cruise set speed.
- If IPM becomes unavailable, conventional cruise control can still function.

⚠ WARNING

Apply the brakes and downshift as necessary when driving on downhill grades. IPM does not adequately control vehicle speed on steep downhill grades. Failure to use normal braking techniques when IPM is active could result in personal injury and vehicle damage.

IMPORTANT: IPM adjusts the vehicle set speed to achieve maximum fuel economy, but it does not account for traffic flows or surrounding vehicles.

For best fuel-savings, use cruise control whenever possible. Driver interaction with IPM is the same as conventional cruise control, using the standard cruise control buttons. In the event of a problem with IPM, or when driving on a road with no profile information available, the system reverts to conventional cruise control.

Using the accelerator pedal will abort the current IPM use case. Disengaging the cruise control will also disengage IPM.

Descent Control and Deceleration Modes, Detroit™ Engines

On vehicles equipped with a Detroit engine, the functions of the engine brake controls change, depending on which specialty braking mode is being utilized. Two distinct modes can be activated:

- Descent Control Mode—engine braking attempts to maintain a set speed; accelerator pedal is not automatically applied.
- Deceleration Mode—engine braking activates to reduce vehicle speed (with no lower limit) at a constant rate.

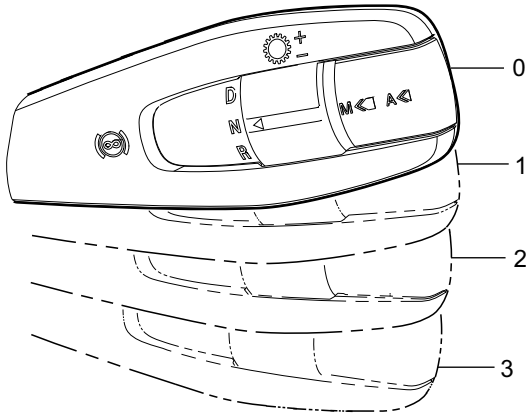
Descent Control Mode

Descent Control Mode attempts to keep the vehicle speed at the set speed on a downhill, using all available engine brake stages.

To activate Descent Control Mode, exit cruise control, remove your foot from the accelerator pedal, set the engine brake in any of the 3 "on" positions (positions 1, 2, or 3 in **Fig. 7.21**), and use the set or resume buttons to set the vehicle speed. In this mode, all three levels of engine braking will be employed to keep the speed below the set speed. This mode will not keep the speed above the lower limit of the set speed, so it is possible to eventually coast to a stop, unless the lever is moved to "engine brake off" (position 0), or the accelerator pedal is applied. After accelerator pedal application, the Descent Control Mode is resumed. In the case of very steep road grades, the engine brake may not be able to maintain the vehicle speed. The driver may apply the service brakes without dropping out of descent mode to slow the vehicle speed down slower than their set speed. After releasing the service brakes, a new cruise set speed lower than the original set speed will be set. A message in the instrument panel will inform the driver a new set speed was captured.

Decreasing the lever to the 0 position deactivates Descent Control Mode and resumes cruise control, using the Descent Control set speed as the cruise control set speed. To reactivate Descent Control Mode, reset the control speed with the lever in position 1, 2, or 3.

An indicator on the driver display illuminates when descent control mode is active. See **Fig. 7.22**.



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0. Resume cruise control set speed.
1, 2, 3. Descent Control maintains set speed.

Fig. 7.21, Descent Control Mode Positions, Automated/ Automatic Transmission Multifunction Control

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1. Descent Control Mode Indicator

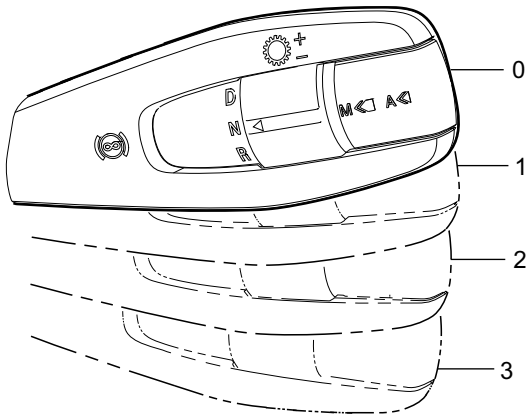
Fig. 7.22, Descent Control Mode on the Driver Display - ICUC

Deceleration Mode

Deceleration Mode reduces the vehicle speed at a constant rate.

While in cruise control, activate Deceleration Mode by turning on the engine brake (**Fig. 7.23**, lever position 1, 2, or 3). The vehicle will decelerate at a constant rate until the vehicle comes to a stop, unless the accelerator pedal is applied to override the deceleration, or the lever is moved to "engine brake off" (position 0).

Moving the lever to position 0 resumes the previously set cruise control speed.



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0. Resume cruise control set speed.
1. Low
2. Medium
3. High

Fig. 7.23, Deceleration Mode Positions, Automated/ Automatic Transmission Multifunction Control

Enhanced Stability Control (ESC)

⚠ WARNING

Enhanced Stability Control is intended only as an aid for a conscientious and alert driver. Carefully read the information in this manual to understand this system and its limitations. ESC is not a substitute for safe driving procedures. Failure to drive safely, and use the system properly, could result in personal injury and/or death and property damage.

An amber-colored dash indicator light (**Fig. 7.24**), indicate that the vehicle is equipped with roll stability system components.

The roll stability system uses a lateral-acceleration sensor that monitors rollover risk. Shortly after a curve, lane change, or other driving maneuver that results in a rollover-risk detection, a dash warning light illuminates and an audible tone sounds. The purpose is to advise the driver that the previous maneuver produced a rollover risk.

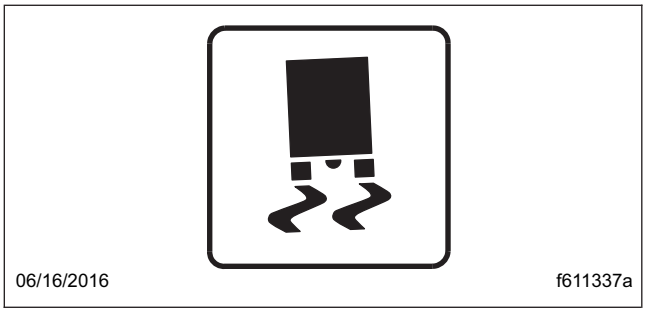


Fig. 7.24, ATC/Stability Indicator Lamp

The roll stability control system, within ESC, automatically reduces engine power, applies the engine brake, and/or applies the tractor and trailer brakes when the acceleration sensor detects that the vehicle is at risk of rolling over.

ESC also has the capability of complete directional stability (yaw control) in oversteer and understeer conditions to reduce the likelihood of drift-out or jackknife. The system determines where the driver is attempting to steer the vehicle and how much brake demand is required in order to more precisely control the vehicle in an emergency situation.

ESC works by constantly comparing the driver's intention with the vehicle's actual behavior. The system does this by monitoring systems such as wheel speed, steering angle, yaw rate, lateral acceleration, throttle position, and brake application. A central microcomputer analyzes the collected data and triggers a response to keep the vehicle on course when an unstable condition is detected.

When the system detects that the vehicle is at risk of oversteering or understeering, it applies individual tractor wheel end brakes and trailer brakes, activates the engine retarder (if equipped), and/or cuts engine power, depending on the severity. As a result, the driver has full control over the vehicle until the system detects a potential risk and intervenes accordingly. ESC operates automatically; the driver does not monitor or activate the system.

The dash indicator light illuminates whenever the roll stability control system intervenes.

AutoVue® Lane Departure Warning System

NOTE: The Bendix AutoVue LDW system option became available in June 2021.

Overview

AutoVue is a camera-based warning system that helps a driver avoid unintentional lane departure.

A camera mounted near the top center of the vehicle windshield tracks visible lane markings to monitor the vehicle's position within the lane. When the vehicle crosses lane markings without the turn signal being activated, AutoVue gives an audible warning.

⚠ WARNING

The AutoVue Lane Departure Warning (LDW) system is intended only as an aid for a conscientious and alert driver. It may not warn of unintended lane departures under certain conditions. It does not warn of all possible hazards. Do not rely solely on the system to safely operate the vehicle.

The system cannot help prevent an accident if the driver is impaired or not driving safely.

Ultimate responsibility for the safe operation of the vehicle remains with the driver at all times.

System Startup

AutoVue activates when the ignition is turned on. Lane departure warnings are active only when the vehicle is traveling at or above 37 mph (60 kph).

At start-up the system performs a self-test. It then plays a brief clip of the "rumble strip" alert sound, first through the left speaker, then the right. The amber 'enabled' lamp on the 'LDW OFF' switch and the lane searching dash indicator then illuminate. See **Fig. 7.25** and **Fig. 7.26**.

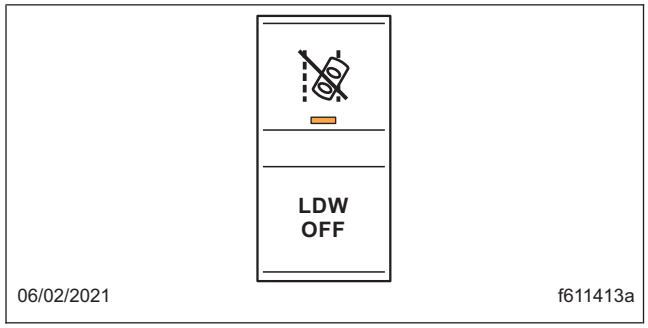


Fig. 7.25, AutoVue LDW OFF Switch

The amber 'enabled' lamp on the LDW switch will go OFF under the following conditions:

- the driver temporarily disables the system;

- an active diagnostic trouble code (DTC) is present.

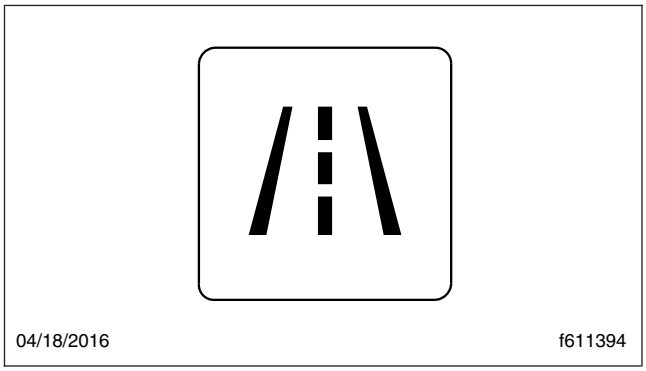


Fig. 7.26, AutoVue Lane Searching Dash Indicator

The lane searching dash indicator will remain ON under the following conditions:

- vehicle speed is below 37 mph (60 kph);
- an active diagnostic trouble code (DTC) is present.

⚠ WARNING

If the system cannot discover right or left lane markings, the AutoVue Lane Departure Warning system may not deliver expected alerts or erroneous alerts may occur.

Missed and false alerts may occur in the following situations:

- Lane markings are difficult to distinguish due to standing water, snow, ice, mud, sand, dirt, or other debris on the road.
- Lane markings are hidden or obscured by heavy rain, fog, falling snow or sleet, or blowing smoke.
- Lane markings are missing or faded.
- Sun glare or other light sources blind the camera, obscuring lane markings or making other road markings (e.g. tar strips) look like lane markings.
- The camera's view through the windshield glass is blocked or obscured by dirt, chips, cracks, or some other distortion.
- The camera is mis-installed.
- Headlights are not operating or are misaligned.

It is always the responsibility of the driver to remain vigilant and change driving practices to suit traffic and road conditions.

Intentional Lane Changes

At or above 37 mph (60 kph), the AutoVue LDW system tracks both solid and dashed shoulder lines, center lines, and the lines between lanes. For a representation of the camera's field of view, see **Fig. 7.27.**

The system identifies intentional lane changes by monitoring the turn signal. When a lane change is made with the turn signal on, no warnings are made.

Unintentional Lane Departure

When a lane change takes place without the turn signal being activated, the system alerts the driver to make a correction. The alert will come from the side of the vehicle crossing the lane markings.

Alert Warnings

The AutoVue LDW system uses speakers that emit a distinctive "rumble strip" sound on the appropriate side of the cab to alert a driver of an unintentional lane departure. Audible alert volume levels are set at the factory and cannot be adjusted.

SafetyDirect

When triggered by a truck safety event, the AutoVue LDW system records ten seconds of video and transmits it to the SafetyDirect portal. Fleet managers can use the video along with vehicle sensor information to enhance driver training and road safety.

Cleaning the Windshield in the Area of the Camera

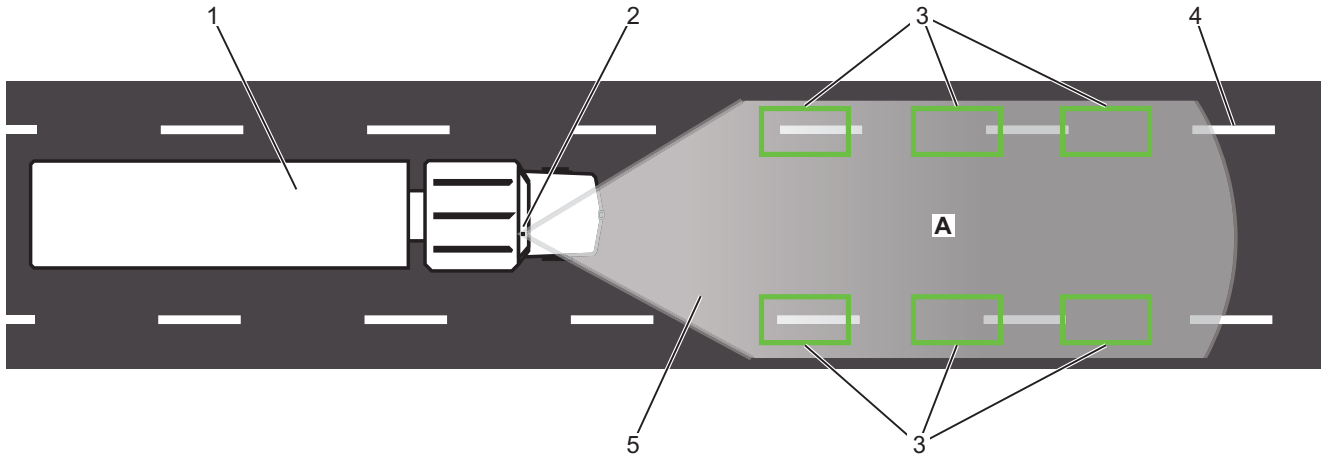
Make sure that the windshield is always kept clean and unobstructed in the area of the camera.

The driver should switch on the windshield wiper to clean the windshield and remove snow and ice to avoid incorrect lane detection.

If this area of the windshield is damaged, the AutoVue LDW system may not work as intended. If this happens, the windshield must be replaced.

Temporarily Disabling the System

The system can be temporarily disabled by pressing the LDW OFF switch; when the system is disabled,



A. Camera Field of View
1. Equipped Vehicle
2. Windshield Mounted Camera
3. Lane Measurement Zones
4. Painted Road Stripes
5. Lane Position Evaluation Zone

Fig. 7.27, Camera Field of View

the ambered 'enabled' lamp will go OFF. See **Fig. 7.25.** The system will re-enable itself after 15 minutes. Warnings can be enabled sooner by pressing the switch again.

System Offline Indicators

If the AutoVue LDW system goes offline while vehicle speed is at or above 37 mph (60 kph), the lane searching dash indicator will appear and the amber light in the LDW OFF switch will go out. Conditions that may cause this include:

- undetectable lane markings;
- an obscured camera lens;
- a system diagnostic trouble code (DTC).

If the lane searching dash indicator stays ON for a long period of time with the vehicle speed at or above 37 mph (60 kph) and the amber enabled lamp on the LDW OFF switch remains ON despite depressing the switch, the system requires calibration services at an authorised dealer.

OnGuardACTIVE™ Collision Mitigation System

WABCO OnGuardACTIVE CMS is a forward-looking radar-based safety system. The system includes forward collision warning, adaptive cruise control (ACC), and collision mitigation.

OnGuard equipped vehicles have antilock brakes (ABS) and automatic traction control (ATC), and either roll stability control (RSC) or electronic stability control (ESC). These systems work together to enhance control of the vehicle. Depending on the situation, any of these features may apply throttle control, engine brakes, and/or service brakes, as needed.

The front-looking antenna assembly transmits radar signals to, and receives them back from, objects ahead of the vehicle. To be detected, vehicles must be within the radar field of view and provide a surface area that can reflect the radar. The distance, speed, and angle of the vehicle ahead is calculated, and the driver is warned of potentially dangerous situations. The system also warns of stationary objects to alert the driver of potential obstructions ahead in their lane.

⚠ WARNING

The WABCO OnGuardACTIVE™ Collision Mitigation System is intended solely as an aid for an alert and conscientious professional driver. It is not intended to be relied upon to operate a vehicle. Use the system in conjunction with rearview mirrors and other instruments to safely operate the vehicle. Operate a vehicle equipped with OnGuardACTIVE in the same safe manner as if the CMS were not present.

The OnGuardACTIVE Collision Safety System is not a substitute for safe, normal driving procedures, nor will it compensate for any driver impairment such as drugs, alcohol, or fatigue.

Failure to drive safely and use the system properly could result in personal injury and/or death and severe property damage.

System Limitations

The OnGuardACTIVE Collision Mitigation System may provide little or no warning of hazards such as pedestrians, animals, oncoming vehicles, or cross traffic.

The OnGuardACTIVE CMS only brakes for lead vehicles located directly in front of your vehicle, and does not operate when vehicle speed is less than 15 mph (25 km/h).

Due to these limitations, the system:

- will not react and alert the operator to objects crossing in front of the vehicle or oncoming traffic;
- should not be relied on to track lead vehicles when traveling through a severe curve in the road. Because of this, ACC is not recommended for use on winding roads;
- should not be relied upon to track narrow objects like motorcycles, mopeds, bicycles, or pedestrians;
- should not be relied on to alert drivers to vehicles in an adjacent lane.

OnGuard Display Unit

The OnGuardACTIVE CMS controls are located in the display unit. The display provides visual and audible warnings and messages, as well as verification of correct system operation and faults. Menu selections are made by pressing the up and down arrows, and the MODE button. See **Fig. 7.28**.

The display unit includes:

- an internal speaker
- a graphic display
- buttons to scroll and select options
- day/night display mode (second-generation only)

1. Mode
2. Day/Night Mode
3. Up
4. Down

Fig. 7.28, OnGuard Display Unit

Collision Warning System (CWS)

The CWS generates audible, visual, and vibrational alerts when the following distance may result in a collision. The OnGuard display unit shows a graphic of the condition, enhanced by a screen color relevant to the intensity of the situation. See **Table 7.1**.

OnGuard Display Screen Background Colors	
Screen Color	**Description**
Blue	General operation; no lead vehicles detected.
Green	Lead vehicle detected.
Yellow	Following distance alert, accompanied by an audible alert.
Red	Collision warning, stationary object warning. Accompanied with audible alert.
Amber	Data Error

Table 7.1, OnGuard Display Screen Background Colors

If a potential collision is developing and the driver does not take action to slow the vehicle, OnGuardACTIVE's active braking feature issues a short brake pulse and de-throttles the engine.

If the driver does not take the appropriate action and a potential collision still exists, OnGuardACTIVE reduces the engine torque and applies the engine and service brakes to slow the vehicle.

The active braking application is intended only to provide early braking; the driver is still required to recognize and react to all driving situations.

If OnGuardACTIVE detects a stationary object (such as a disabled car), it will provide an audible alert followed by a vibrational alert and then brake to reduce the vehicle's speed.

Again, the active braking application is intended only to provide early braking; the driver is still required to recognize and react to all driving situations.

IMPORTANT: the collision mitigation system (CMS) and active braking are not operational at vehicle speeds below 15 mph (25 km/h).

The collision warning system (CWS) cannot be disengaged or turned off, and is always active at vehicle speeds above 15 mph (25 km/h).

Standby

When no lead vehicle is detected, the display shows that the CMS is on and the radar is searching. See **Fig. 7.29**.

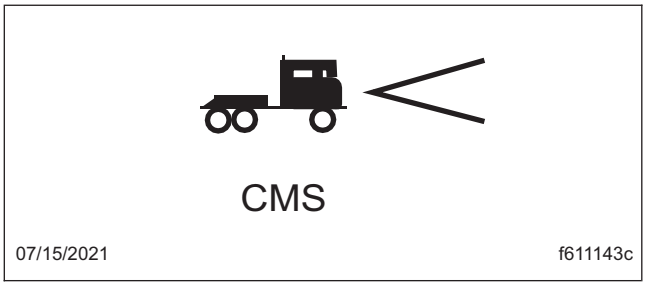


Fig. 7.29, CMS Standby (blue)

A Vehicle is Detected

When a lead vehicle is detected in the lane ahead, the display shows that the CMS is on and the radar is tracking a lead vehicle at the speed shown. See **Fig. 7.30**.

If the following distance between the vehicle and the lead vehicle is too close, the CMS will emit an audible alert and the display background will turn yellow. The alert will end when the vehicle speed drops below the lead vehicle speed and the following distance is increased.

Collision Warning

When a lead vehicle is detected traveling slower than your vehicle, or the gap between them becomes too close, the CMS warns of an impending collision by emitting an urgent audible alert and displaying the collision warning symbol with a red background. See **Fig. 7.31**.

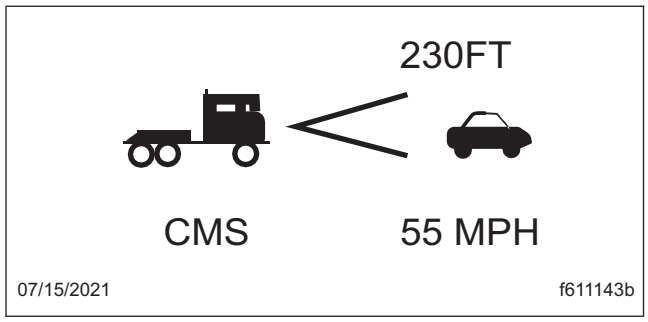


Fig. 7.30, CMS Lead Vehicle Detected (green)

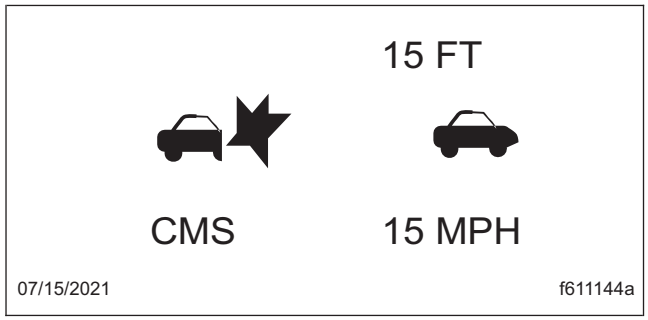


Fig. 7.31, CMS Collision Warning (red)

Adaptive Cruise Control (ACC)

Adaptive Cruise Control (ACC) works in conjunction with conventional cruise control to maintain a minimum following distance when a lead vehicle is being tracked. The minimum following distance is maintained by automatically decelerating the vehicle using accelerator pedal, engine, and service brakes without driver intervention.

When the lead vehicle is no longer being tracked, the set cruise control speed resumes automatically.

Vehicles equipped with the WABCO OnGuard CMS and Cummins engines come standard with Adaptive Cruise Control (ACC) and Adaptive Cruise Control Recovery enabled.

If ACC is not available, the cancel button must be used to engage standard cruise control.

To obtain cruise control when the adaptive cruise control function has been interrupted, press the pause button 2 times (ON-OFF-ON-OFF) and then press the set button once.

A Set or Resume command on the Set, Resume buttons will now engage the standard cruise control features.

Standby

When no lead vehicle is detected, OnGuard ACC operates similarly to conventional cruise control. The cruise control set speed is shown on the OnGuard display unit. See **Fig. 7.32**.

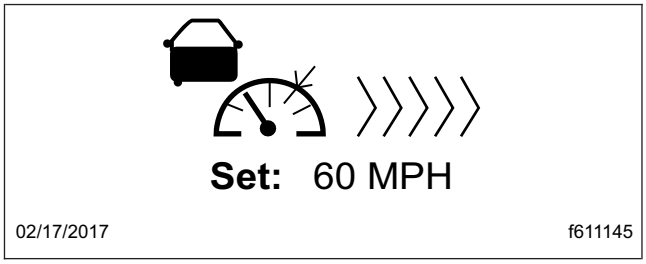


Fig. 7.32, ACC Standby (blue)

Lead Vehicle Detected

When a lead vehicle is detected in the lane ahead, the display shows that ACC is on and the radar is tracking it. See **Fig. 7.33**.

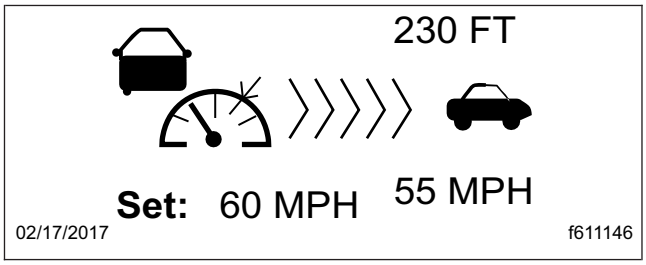


Fig. 7.33, ACC Lead Vehicle Detected (green)

If the driver uses the accelerator pedal to override the cruise control and approach a vehicle too closely, the ACC will emit an audible alert and the display background will turn yellow. The alert will end when vehicle speed drops below the lead vehicle's speed and the following distance is increased.

NOTE: The following distance alert does not operate at speeds below 15 mph (25 km/h) or above 77 mph (124 km/h).

Collision Warning

If the lead vehicle is traveling slower than the driver's vehicle, the CMS warns of an impending collision by emitting an urgent audible alert and displaying the collision warning symbol with a red background. See **Fig. 7.34**.

If the system determines a rear end collision is imminent, it will automatically apply the brakes to reduce the vehicle's speed. The driver may also feel a short

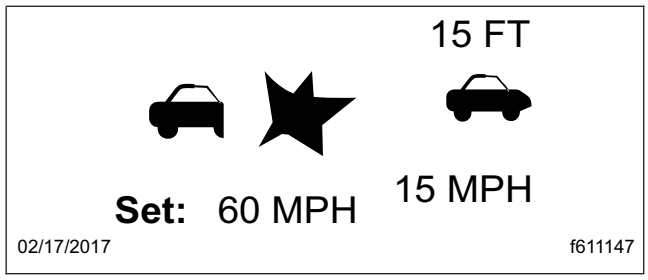


Fig. 7.34, ACC Collision Warning (red)

brake pulse to warn of an imminent collision. The driver must also initiate braking.

If OnGuardACTIVE detects a stationary object (such as a disabled car), it will sound an urgent audible alert, then a brake pulse, then apply the vehicle's brakes to reduce the vehicle's speed. The driver must also initiate braking.

Error Screens

IMPORTANT: The OnGuard collision mitigation system is not operational when an error screen is displayed. If a fault occurs or OnGuard fails to properly track a vehicle, take the vehicle in for service as soon as possible. Standard cruise control will not function with an active OnGuard system fault.

If a system fault is detected, the OnGuard display unit will immediately display an error screen as shown in **Fig. 7.35**. The first error code transmitted will be displayed first; additional faults (if any) can be viewed using the up or down buttons. The display does not show stored fault codes.

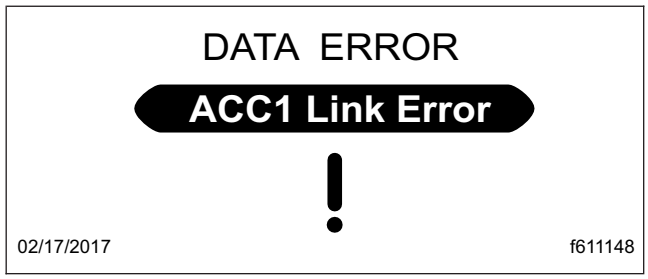


Fig. 7.35, OnGuard Error Screen (amber)

Refer to the *OnGuard™ and OnGuardActive™ Collision Mitigation Systems Maintenance Manual* for a full list of error screens and messages. (**www.meritorwabco.com**).

Additional Features

Press the MODE button to access the OnGuard display unit additional features from the CMS or ACC main operating screen. Press the up and down arrows to scroll through each menu, then press the MODE button to select the value to be changed. In edit mode, press the up or down arrows to change a value setting, then press the MODE button to save the setting. Pressing MODE in each feature screen advances the display to the next feature.

The Display Control menu allows adjustment of the alarm volume, LCD brightness, LCD contrast, and U.S./metric unit conversion. See **Fig. 7.36**.

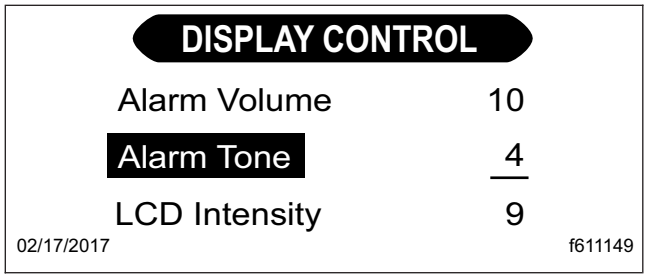


Fig. 7.36, Display Control Menu

The component test menu provides verification of system component operation and acts as a valuable OnGuard system diagnostic tool. The header will display either COMPONENT TEST or ACC FUNCTION, depending on the software release version of the OnGuard system. The component test screen shown in **Fig. 7.37** provides access to the following components (press the up or down arrows to scroll through the menu):

- brake pedal position

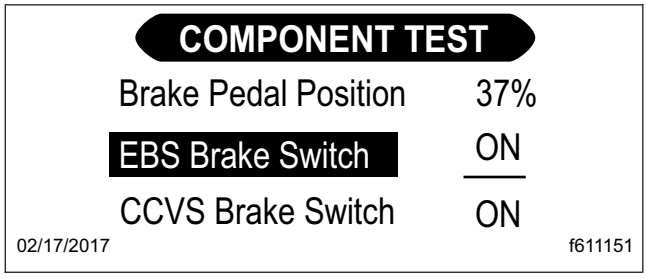


Fig. 7.37, Component Test Menu

- EBS brake switch
- CCVS brake switch
- clutch switch
- park brake switch
- accelerator pedal position
- driveline engaged
- cruise control enable
- cruise control set speed switch
- cruise control coast switch
- cruise control resume switch
- cruise control accelerate switch
- cruise control pause switch

Zonar® 2020 Tablet

The Zonar 2020 on-board tablet is an optional feature that tracks hours of service, posts driver alerts, documents pre- and post-trip vehicle inspections, and provides advanced navigation. See **Fig. 7.38**.

Fig. 7.38, Detroit Connect Tablet

The tablet operates in conjunction with the connectivity onboard platform to provide communication between drivers and fleet managers.

Refer to Zonar user documentation for more information.

8

Climate Controls

Cab Climate Controls

NOTE: On vehicles equipped with the ICC5 instrument panel, the fan speed, temperature, and mode temporarily appear on the 10-inch infotainment screen when these items are adjusted.

The standard cab climate controls include a fan knob with a recirculation button, temperature control knob with an A/C button, and a mode control knob. See **Fig. 8.1**. The mode control knob in sleeper cabs is equipped with a bunk override button.

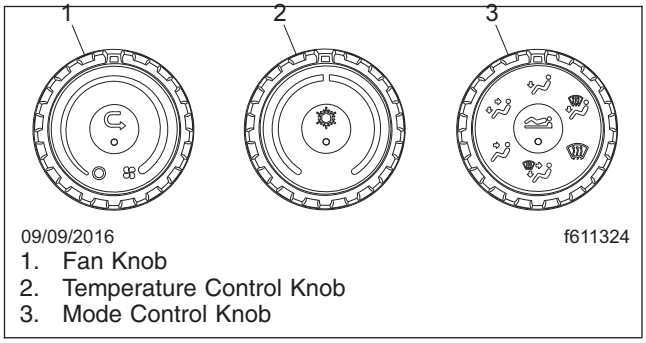


Fig. 8.1, Cab Climate Controls

Fan Knob

The fan knob activates the fan, which forces outside air or recirculated air through the air outlets. The fan knob has ten fan speed settings and an OFF position. See **Fig. 8.2**.

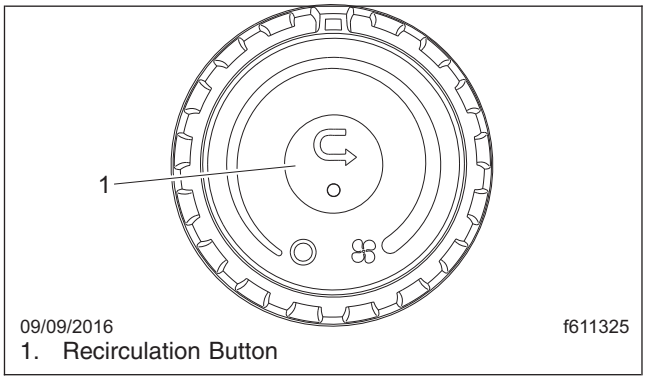


Fig. 8.2, Fan Knob

To operate the fan, turn the fan knob clockwise to increase airflow; turn the fan knob counterclockwise to decrease airflow.

There is a two-second delay between the time the engine is started and the blower is operational. It can take an additional four seconds for the blower to reach high speed. The blower motor performs a self-test immediately after the engine is started, which causes the delay. If the vehicle has Optimized Idle, the fan will not operate with the key in accessory mode. Optimized Idle may also turn the fan off to reduce stress on the batteries. Refer to **Chapter 13** for more information.

Recirculation

Recirculation mode limits the amount of outside air entering the cab. Press the recirculation button to prevent dusty or smoky air from entering the cab. See **Fig. 8.2**. Recirculation mode can also decrease the time required to cool or heat the cab interior during extreme outside temperature conditions. An amber indicator on the recirculation button will illuminate when the recirculation mode is activated.

The recirculation button will not work when the mode control switch is in either defog or defrost modes.

NOTE: To prevent the buildup of odors or oxygen depletion inside the cab, the system switches from full recirculation mode to partial recirculation mode after 20 minutes. In extremely dusty or smoky conditions, the partial recirculation mode can be overridden by pressing the recirculation button twice to obtain full recirculation mode. This resets the 20-minute timer.

Temperature Control Knob

The temperature control knob is used to select the desired temperature in the cab. Turn the knob counterclockwise for cool air, or clockwise for hot air. See **Fig. 8.3**.

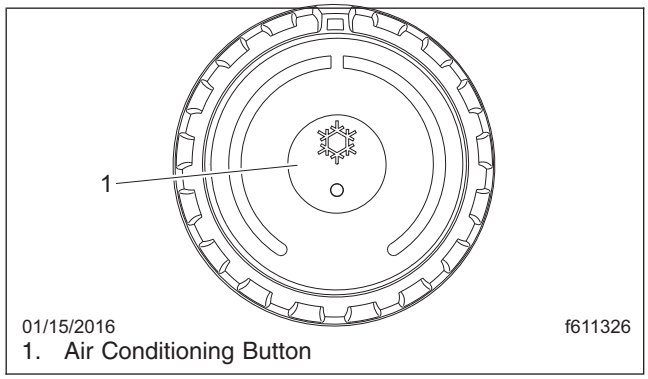


Fig. 8.3, Temperature Control Knob

Air Conditioning Button

The air conditioner (A/C) cools and dehumidifies the air inside the cab. Press the A/C button, located in the center of the temperature control knob, to turn the air conditioner on and off. See **Fig. 8.3**. The A/C has three modes:

- Off
- Economy (ECO); green LED
- Full A/C (maximum cooling); blue LED

The ECO mode does not cool the air temperature as low as the full A/C mode, and can provide fuel savings.

When using the climate control in full A/C mode (blue LED illuminated), after 45 minutes the system will automatically switch to ECO mode (green LED illuminated) to improve fuel economy. Full A/C can be reset by pushing the A/C button again.

Mode Control Knob

The mode control knob allows the driver to control the flow of air through the face outlets, the floor outlets, the defrost (windshield) outlets, or a combination of these outlets. See **Fig. 8.4**.

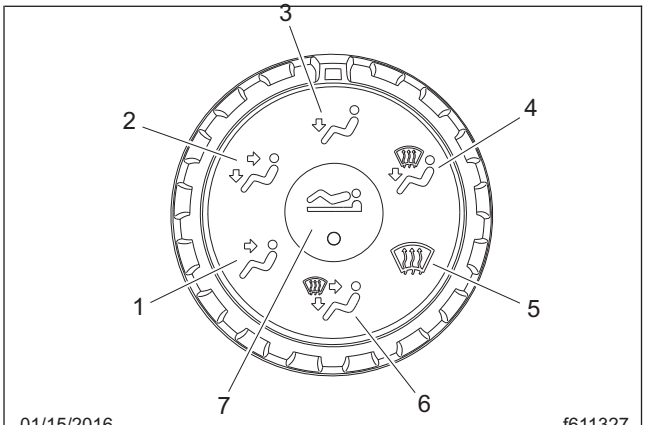
- *Face Mode:* Directs all airflow through the face or instrument panel outlets.
- *Bi-Level Mode:* Directs the airflow equally to the face outlets and the floor outlets.
- *Floor Mode:* Directs all airflow through the floor outlets.
- *Floor/Defrost Mode:* Directs the airflow equally to the floor outlets and the defrost outlets.
- *Defrost Mode:* Directs all airflow through the defrost outlets.
- *All Mode:* Directs the airflow equally to the face, floor, and defrost outlets.

NOTE: There are intermediate modes between each knob position.

Bunk Override Button

The bunk override button, equipped on sleeper cabs only, copies the temperature and fan settings from the cab to the sleeper. See **Fig. 8.4**.

Pressing the bunk override button in either the cab or the sleeper will copy the current cab HVAC temperature and fan settings to the sleeper HVAC. An amber indicator will illuminate when bunk override mode is activated. When in override mode, the sleeper climate control panel automatically conforms to the fan speed and temperature settings on the cab climate panel at the time the override mode is activated. Further changes of the cab climate control settings will not alter the settings of the sleeper climate control panel.



NOTE: There are intermediate modes between each knob position.

1. Face Mode
2. Bi-Level Mode
3. Floor Mode
4. Floor/Defrost Mode
5. Defrost Mode
6. All Mode
7. Bunk Override Button (on sleeper-cabs only)

Fig. 8.4, Mode Control Knob With Bunk Override Button

The override mode is disabled when the fan or temperature control knob on the sleeper climate control panel is manually set to a different setting. The override mode is also disabled when the bunk override button is pressed to the off position in the cab.

Sleeper Climate Control Panel

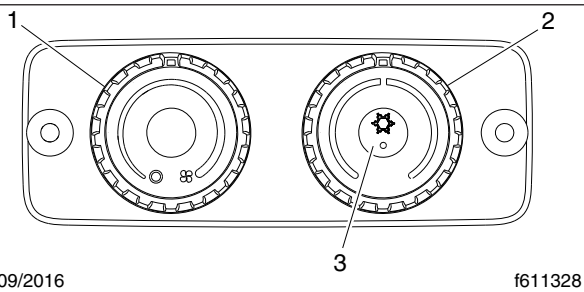
The standard sleeper climate control panel has a fan knob and a temperature control knob with an A/C button.

If the bunk override button has been activated, the override mode can be canceled by changing the sleeper fan speed or temperature setting. The climate control system will then operate from the sleeper controls.

Fan Switch

The fan knob activates the fan, which forces air through the air outlets. The fan knob has ten fan speeds and an OFF position. See **Fig. 8.5**.

To operate the fan knob, turn the knob clockwise to increase airflow; turn the fan knob counterclockwise to decrease airflow. If the vehicle has Optimized Idle, the fan will not operate with the key in accessory mode. Optimized Idle may also turn the fan off to reduce stress on the batteries. Refer to **Chapter 13** for more information.



1. Fan Knob
2. Temperature Control Knob
3. Air Conditioning Button

Fig. 8.5, Sleeper Climate Control Panel

When the cab air conditioner (A/C) is on, it is normal for the sleeper fan to operate at low speed even if the sleeper fan knob is in the off position. This is necessary to protect the evaporator in the sleeper heater and air conditioner system from freezing. At lower fan speed settings, a slight increase in airflow levels may appear at times, as the control acts to regulate the evaporator temperature.

When the park brake is set, any temperature or blower speed setting changes on the bunk HVAC unit control panel will be mimicked by the front HVAC unit. For example, if you set bunk blower speed to HI and the temperature to COLD, the front unit will also operate on HI/COLD.

When the park brake is not set, the front and rear HVAC settings function independently, unless the bunk override button is pressed, or "minimum AC support" is required.

Minimum AC support is when the front unit is off and the bunk unit is set such that AC is requested (needs the AC compressor to run). In this case, the front unit will go into minimum AC support mode by operating the front blower at minimum speed to prevent the front unit evaporator from freezing up. This is also true, if the rear unit is off and the front unit is set such that AC is requested, in order to prevent the bunk evaporator from freezing up.

Temperature Control Knob

The temperature control knob is used to select the desired temperature in the sleeper. Turn the switch counterclockwise for cool air, or clockwise for hot air.

Air Conditioning Button

The A/C cools and dehumidifies the air inside the sleeper. Press the air conditioning button, located in the center of the temperature control knob to turn the A/C on and off.

Smartway Certified Parked Heater Operation

All vehicles equipped with diesel operated coolant heaters are "Smartway Certified". The coolant heater will keep the engine coolant between approximately 150 and 180°F (65 and 82°C). Heated coolant is routed through the auxiliary HVAC heater core to allow heater-only function of the auxiliary HVAC system.

System Operation

1. Turn the block heater on.
2. Set the temperature dial to the desired heat setting.
3. Turn the HVAC blower on.

Accessory Heaters

Optional accessary heaters are available from the factory in several configurations. Familiarize yourself with the equipment on your specific vehicle, and follow the manufacturer's operating and maintenance instructions.

⚠ WARNING

Do not operate fuel-operated heaters in an area where flammable vapors, including gasoline or diesel fumes, are present, such as at filling stations and oil depots. Turn off a fuel-operated heater and allow it shut down completely before entering an area where flammable gases or liquids are present. Heaters continue to operate for up to three minutes after being turned off.

Failure to observe these precautions could cause an explosion or fire, resulting in serious property damage, and personal injury or death.

NOTICE

Always ensure that air inlet and outlet grilles are not restricted. Restriction of any air inlet or outlet ports could result in damage to the auxiliary heater.

IMPORTANT: To maintain reliable performance, run the accessory heater for at least 15 minutes every month to prevent fuel from degrading.

On vehicles without Optimized Idle, accessory heaters function when the ignition switch is in the OFF position and the cab load disconnect switch (if equipped) is in the ON position.

On vehicles with Optimized Idle, accessory heaters function when the ignition switch is in the ON or ACC position, the cab load disconnect switch (if equipped) is in the ON position, and the parking brake is engaged. The heater may run briefly after the ignition key has been turned to the OFF position.

IMPORTANT: Wait eight minutes after shutting down an accessory heater before turning the cab load disconnect switch (CLDS) to OFF.

NOTE: The low voltage disconnect (LVD) control prevents a heater from draining the batteries below starting voltage.

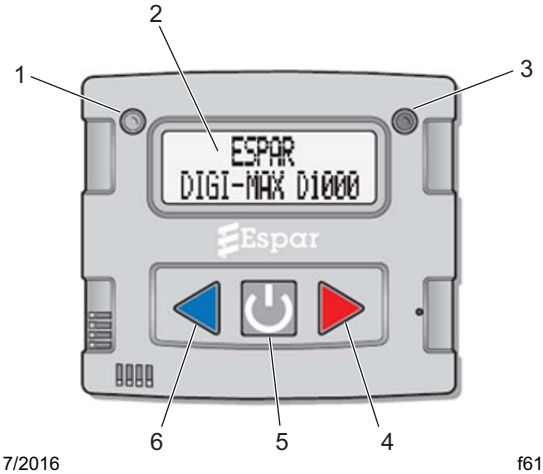
Eberspaecher (Espar) Heater

Refer to the Eberspaecher website, **www.eberspaecher-na.com**, for additional information.

Eberspaecher Digi-Max D1000 Controller

To turn the heater on, press the POWER button. See **Fig. 8.6**. The display will indicate that heater is enabled and show the remaining runtime and the set temperature. See **Fig. 8.7**. The green LED indicates that the heater is on.

To adjust the desired temperature, press the left or right arrow buttons. The left arrow button lowers the desired temperature, and the right arrow button raises it. The adjustment range is from 48 to 93°F (8 to 34°C).



1. Heater Enabled LED (green)
2. LCD Display
3. Maintenance Required LED (red)
4. Temperature UP Button (right arrow)
5. Power Button
6. Temperature DOWN Button (left arrow)

Fig. 8.6, Eberspaecher Digi-Max D1000 Controller

1. Remaining Runtime
2. Set Temperature

Fig. 8.7, Controller LCD

To turn the heater off, press the POWER button again. The heater will initiate a 5- to 8-minute cooling cycle.

The controller has a real-time diagnostic feature, and will automatically display fault codes as they happen (e.g. 48—Check Fuel Pump). The red LED will illuminate, indicating that maintenance is required.

The controller has a programmable run timer that will display a maintenance message on the LCD after the set time limit when the heater is off. See **Fig. 8.8**. The fault codes and maintenance messages will not prevent the heater from operating, but they reflect conditions that should be addressed promptly.

Fig. 8.8, Maintenance Required Message

Webasto Heater

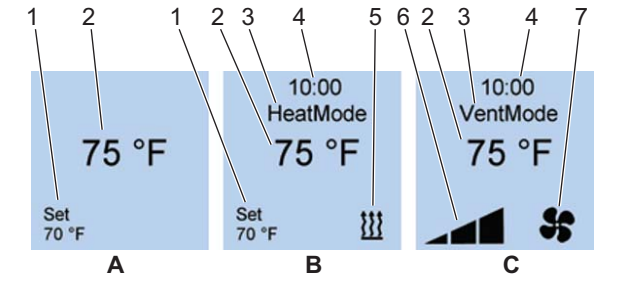
Webasto heaters have a heat mode and a vent mode. The fan speed is adjustable in the vent mode. The control also has a timer function, allowing a start time and/or duration to be set.

To turn the heater on, push the ON/OFF button. See **Fig. 8.9**. The LCD screen displays the mode, ambient temperature, set temperature, timer, and fan speed. See **Fig. 8.10**.

Refer to the Webasto website, **techwebasto.com**, for additional information.

1. Rotary Knob
2. ON/OFF Button
3. Indicator Light
4. Selection Button

Fig. 8.9, Webasto Temperature Control



A. Standby Mode
B. Heat Mode
C. Vent Mode

1. Set Temperature
2. Ambient Temperature
3. Mode
4. Timed Duration
5. Heat ON Indicator
6. Fan Speed Indicator
7. Vent ON Indicator

Fig. 8.10, Webasto Temperature Control Display Screens

Setting the Temperature and Heater Runtime

1. Press the selection button.
2. Using the rotary knob, select Options > Duration > Timed > Adjust Runtime to xx Hours. Confirm the adjustment by pressing the selection button.
3. Using the rotary knob, adjust the control to the desired temperature. Confirm the adjustment by pressing the selection button.

NOTE: The temperature can be adjusted while the heater is running.

Setting the Timer

1. Press the selection button.
2. Using the rotary knob, select Timer.
3. Press the selection button. Select Edit from the sub-menu.
4. Using the rotary knob, select the day. To confirm, press the selection button.
5. Using the rotary knob, select the start time. To confirm, press the selection button.
6. Using the rotary knob, select the run time. To confirm, press the selection button.

Dual HVAC System

The Dual HVAC system replaces the standard sleeper HVAC when optioned. Vehicles with a Dual HVAC system have a larger alternator, additional batteries, and premium insulation. The Dual HVAC system operates both when the engine is running and when the engine is off.

The Dual HVAC system controls temperature differently than the standard sleeper HVAC system. The standard sleeper HVAC (without Optimized Idle) attempts to maintain vent discharge temperature at the sleeper vents, much like the main HVAC in the dash. The Dual HVAC system is a zone control system which attempts to hold the bunk at a constant temperature.

The Dual HVAC system has two evaporators for cooling, one supported by the engine-driven A/C system, and the other on a separate battery-powered A/C loop with a back wall-mounted condenser. When the engine is running, the Dual HVAC system uses the traditional engine-supported systems for heating

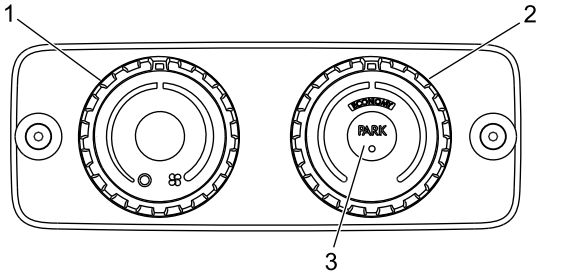
and cooling. When the engine is turned off, the vehicle batteries power the separate electric air conditioner loop or support a fuel-operated heater.

Operation of the Dual HVAC system is regulated by the cab Progressive Low Voltage Disconnect (PLVD). The PLVD must be enabled for the Dual HVAC system to be started. The PLVD will stop operation of the Dual HVAC system when the voltage gets below a pre-determined threshold. Before operating the Dual HVAC system, bring the sleeper interior temperature to the desired temperature with the engine running and the bunk curtain open. The Dual HVAC system is designed to maintain an established comfortable bunk temperature in parked mode for up to 12 hours with the bunk curtain closed.

NOTE: The condition and charge of the vehicle batteries will directly affect the run time of the Dual HVAC system. If the vehicle run time between discharges is less than eight hours, or if additional loads are added to the vehicle batteries, the Dual HVAC system run time will be less than expected.

Dual HVAC Control Panel

The Dual HVAC system control panel replaces the standard sleeper control panel in Dual HVAC-equipped sleeper cabs. See **Fig. 8.11**. The Dual HVAC system is designed to maintain a comfortable temperature inside the sleeper, and can operate in combination with the cab climate control system when the vehicle is running, or independently when the vehicle is parked.



1. Fan Knob
2. Temperature Control Knob
3. PARK Button

Fig. 8.11, Dual HVAC System Control Panel

To operate Dual HVAC system, select a fan speed (other than off) and push the PARK button. Adjust the temperature control knob to the desired temperature.

The fan switch has ten fan speeds. Zero (0) is the OFF position. Turn the switch clockwise to increase airflow, and counterclockwise to decrease airflow.

The temperature control knob controls the temperature from 65°F to 85°F (18°C to 29°C). At the minimum setting of 65°F the unit will attempt to cool the bunk to 65°F and will not allow the coolant heater to operate. At the maximum setting of 85°F the unit will attempt to heat the bunk to 85°F and will not allow the A/C cooling to operate. In between the two extremes the unit will operate in either the heating or cooling mode to achieve the set point.

On vehicles with Optimized Idle, interior comfort mode with Dual HVAC system operates with the following parameters regarding the set point and comfort zone:

- If the bunk area reaches more than 10°F (5.5 °C) above the set point the Dual HVAC system immediately requests the engine to start for bunk cooling.
- Bunk area temperature 5 to 10°F (2.8 to 5.5°C) above the set point for over twenty minutes will cause the Dual HVAC system to request the engine to start for bunk cooling.
- When the sleeper area drops to more than 10°F (5.5 °C) below the set point, the comfort zone is exceeded and the Dual HVAC system immediately requests the engine to start for bunk heating.
- Bunk area temperatures 5 to 10°F (2.8 to 5.5 °C) below the set point for over twenty minutes will cause the Dual HVAC system to request the engine to start for bunk heating.

The mid-point position on the Dual HVAC system temperature control knob is a set point of 73°F (23°C). In most conditions the mid-set point for temperature and mid-set point for fan speed will assure a stable environment. Mid-point for both controls is suggested as the initial position, with subsequent adjustment for personal preference.

IMPORTANT: Wait three minutes after shutting down the Dual HVAC system before turning the cab load disconnect switch (CLDS) to OFF.

9

Seats and Restraints

Seats, General Information

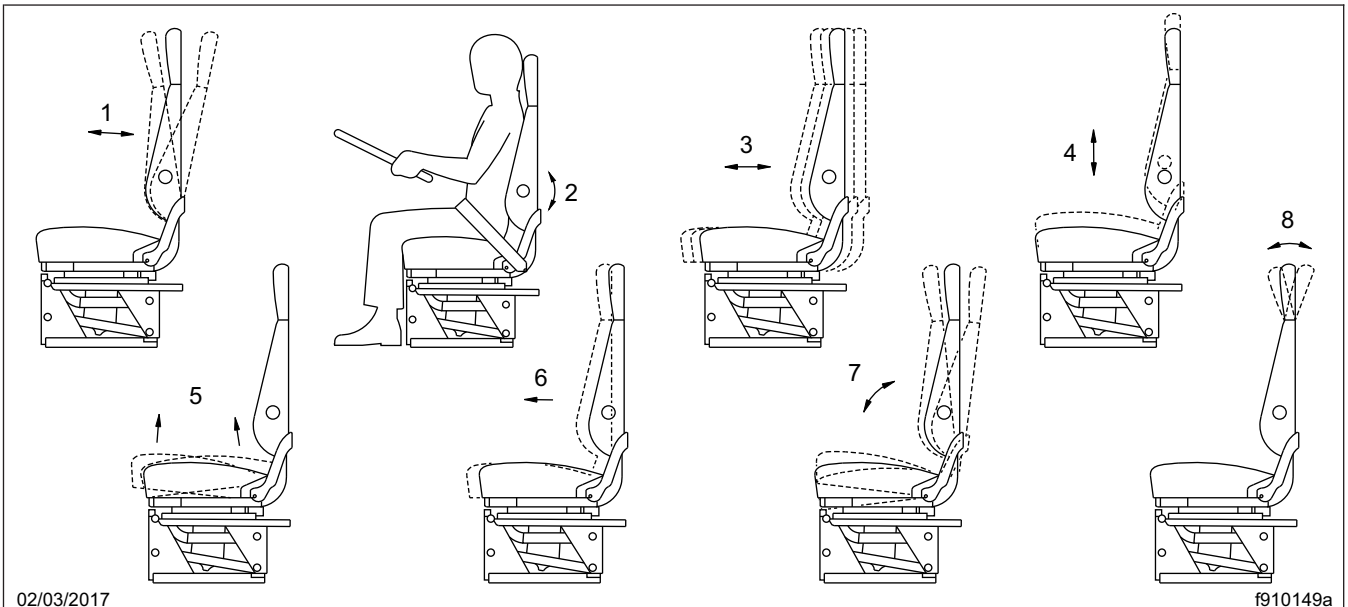
Unless otherwise noted, all seat adjustments should be made while seated and before the engine is started.

Due to the maximum adjustability of mid- and high-back air suspension seats, it is possible to combine the seat back recline adjustment and the seat slide adjustment so that the seat back contacts the backwall. It is the responsibility of the driver to adjust the seat to prevent damage to the seat and the cab interior.

⚠ WARNING

Keep hands, tools, and other objects away from the scissor points under the seats. Failure to do so could cause personal injury.

The following is a description of adjustments that can be made to various Freightliner-installed seats. Not all seats have all of the adjustments listed below. See **Fig. 9.1**.



1. Backrest Tilt
2. Lumbar Support
3. Isolator Feature
4. Height Adjustment
5. Bottom Cushion Angle (fore-and-aft cushion height)
6. Fore-and-Aft Seat Slide (seat track adjustment)
7. Seat Tilt
8. Headrest Adjustment

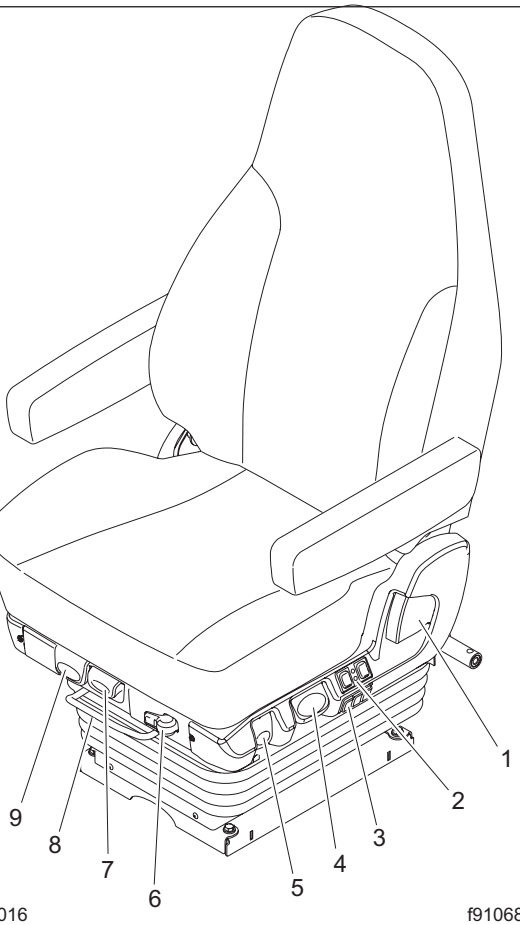
Fig. 9.1, General Seat Adjustments

1. Backrest Tilt: This adjustment enables the backrest to pivot forward or backward.
2. Lumbar Support: Lumbar support changes the shape of the seat back to give more or less support to the occupant's lumbar (lower back) area. This adjustment is either mechanical or air controlled, depending on make and model of the seat.
3. Isolator: This feature reduces the amount of road shock by isolating the occupant from the motion of the vehicle, and allowing the upper seat to move in a simple pendulum motion. A lockout feature is used whenever the isolator is not desired.
4. Height Adjustment: This adjustment moves the entire seat up or down. The adjustment is either manual or air-controlled, depending on the make of the seat.
5. Bottom Cushion Angle, or Fore-and-Aft Bottom Cushion Height: This adjustment enables the occupant to raise or lower the front or back of the bottom cushion. This adjustment is easier to perform when all weight is removed from the seat.
6. Fore-and-Aft Seat Slide, or Seat Track Adjustment: This adjustment moves the entire seat forward or backward on its track.

7. Seat Tilt: This adjustment allows the seat assembly (back and bottom cushions) to tilt forward or backward.
8. Headrest Adjustment: This adjustment changes the angle of the upper part of the backrest to provide head and upper back support.

High Back Seat

See **Fig. 9.2** for seat adjustment controls. Not all models of High Back seat have all the adjustments listed below.



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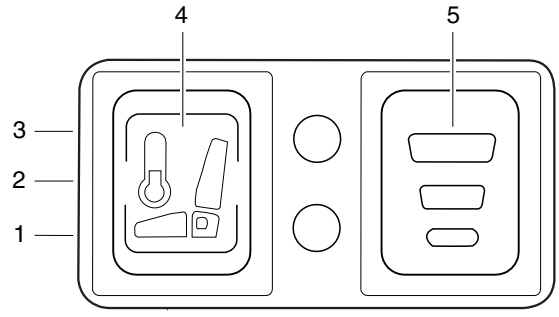
1. Backrest Tilt Handle
2. Heat/Ventilation Switches
3. Lumbar and Side Support Switches
4. Height Adjustment Lever
5. Shock Absorber Adjustment Lever
6. Fore/Aft Isolator Lever
7. Bottom Cushion Extension Lever
8. Seat Fore/Aft Slide Lever
9. Seat Tilt Lever

Fig. 9.2, High Back Seat

NOTICE

Do not install seat covers on seats with heating and ventilation. Do not cover the seat with blankets, clothing, or pillows. Blocking the air flow through the cushions can overheat and damage the seat.

1. *Backrest Tilt:* Pull the recline handle to adjust the backrest tilt.
2. *Heat/Ventilation:* Use the forward switch to turn the seat heater and ventilation ON or OFF. To turn on the heat, push the top of the switch. To turn on the ventilation, push the bottom of the switch. To turn off the heat or ventilation, move the switch to the middle position. To adjust the heat or ventilation, Use the rear button to adjust seat heating or ventilation. Three settings are available: low, medium, and high. See **Fig. 9.3**.



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1. Ventilation ON
2. Heat/Ventilation OFF
3. Heat ON
4. Heat/Ventilation ON/OFF Switch
5. Heat/Ventilation Adjustment Switch

Fig. 9.3, High Back Seat Heat/Ventilation Controls

IMPORTANT: Turn off seat heating/ventilation when the seat is unoccupied.

3. *Lumbar and Side Support:* Press the forward button to adjust lower lumbar support, the middle button to adjust upper lumbar support, and the rear button to adjust side support.
4. *Height Adjustment:* Pull or push the lever to adjust seat height.
5. *Shock Absorber Adjustment:* Move the lever down to increase damping on rough roads, or up to decrease damping on flat roads.

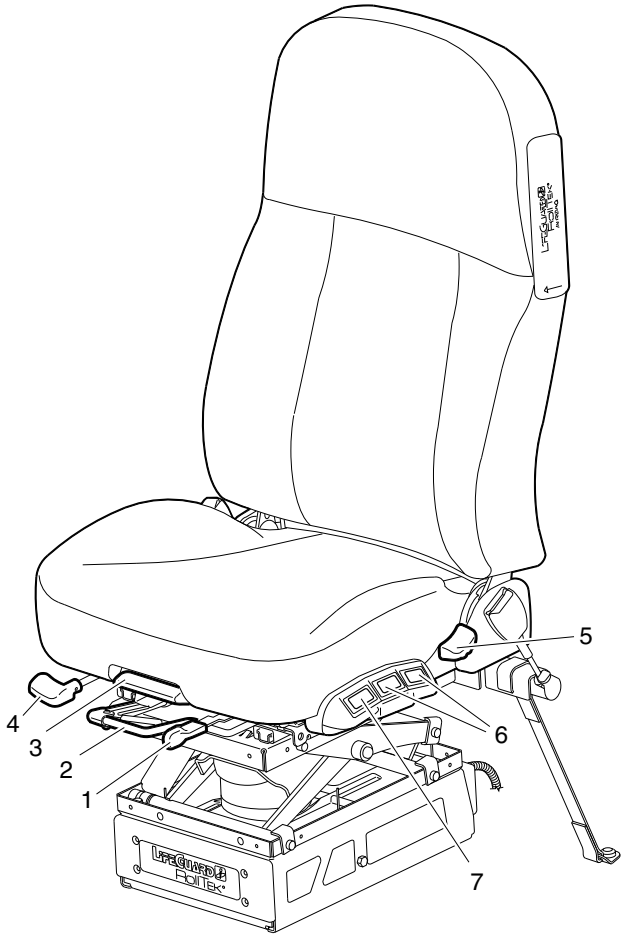
6. *Fore/Aft Isolator:* Rotate the isolator knob to the left to lock the isolator, or to the right to allow movement.
7. *Bottom Cushion Extension:* Pull the lever to move the seat cushion forwards or backwards. The cushion moves 2-3/8 inches (60 mm) in 3/8-inch (10-mm) increments.
8. *Seat Fore/Aft Slide:* Lift the lever to slide the seat forward or backward. Release the lever to lock the seat in position.
9. *Seat Tilt:* Pull the lever and lean back to tilt the seat backwards. Three positions are available.

Armrest Tilt: To adjust the armrest angle, tilt the armrest to the highest position, then down to the lowest position, then to the desired position.

Sears Atlas Seat

See **Fig. 9.4** for seat adjustment controls.

1. *Isolator:* Position the handle to the left to allow isolation movement. Position the handle to the right to lock-out isolation movement.
2. *Fore/Aft Seat Slide:* To adjust the fore-and-aft position of the entire seat, squeeze the fore/aft slide lock against the adjustment bail, and lift the bail up. See **Fig. 9.5**. Slide the seat forward or backward to the desired position. Release the bail and fore/aft slide lock, to its original position, to lock the seat in place.
3. *Bottom Cushion Tilt:* Lift the handle upward and move the seat cushion to the desired position. Three positions are available.
4. *Seat Extension:* Rotate the handle upward to disengage, then move the seat cushion to the desired position and release the lever. Three positions are available.
5. *Backrest Tilt:* Pull upward on the recliner handle, move the backrest to the desired position and release the handle.
6. *Lumbar Support:* Rear rocker switch: Push forward to inflate the lower lumbar bag; push rearward to deflate the bag. Center rocker switch: Push forward to inflate the upper lumbar bag; push rearward to deflate the bag.
7. *Suspension Inflation/Deflation:* Push forward on the gray rocker switch to inflate and raise the suspension; push rearward to deflate and lower the suspension.



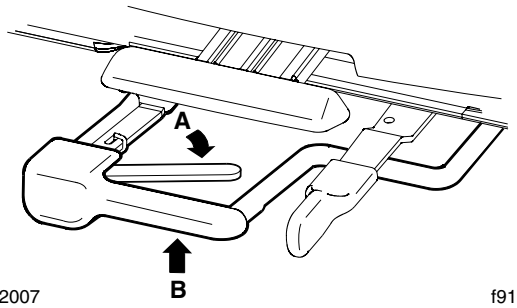
1. Isolator Lever
2. Fore/Aft Seat Slide Lever
3. Bottom Cushion Tilt Handle
4. Seat Extension Lever
5. Backrest Tilt Lever
6. Lumbar Support Switches
7. Suspension Inflation/Deflation Switch

Fig. 9.4, Sears Atlas Seat

Armrest Angle: Rotate the control knob, located on the underside of the armrest, to set the desired angle of the armrest.

Seat Belts and Tether Belts

Seat belt assemblies are designed to secure persons in the vehicle to help reduce the chance of injury, or the amount of injury, resulting from accidents or sudden stops. For this reason, Daimler Trucks North America LLC (DTNA) urges that the driver and *all*



A. Squeeze the fore-and-aft slide lock against the adjustment bail.
B. Lift up the adjustment bail.

Fig. 9.5, Fore/Aft Slide Adjustment, Sears Atlas Seat

passengers, regardless of age or physical condition, use seat belts when riding in the vehicle.

⚠ WARNING

Always use the vehicle's seat belt system when operating the vehicle. Failure to do so can result in severe personal injury or death.

Seat belt assemblies in DTNA vehicles meet Federal Motor Vehicle Safety Standard 209, "Type 1" and "Type 2" requirements.

When transporting a child, always use a child restraint system or the vehicle seat belts as appropriate. To determine whether a child restraint system is required, review and comply with applicable state and local laws. Any child restraint used must comply with Federal Motor Vehicle Safety Standard 213, "Child Restraint Systems." When providing a child restraint system, always carefully read and follow all instructions pertaining to installation and usage for the child. Make certain the child remains in the restraint system at all times when the vehicle is in motion.

In addition to seat belt assemblies, tether belts are installed on suspension-type seats. Tether belts help secure the seat to the floor and are intended to restrain the seat and seat belt in case of an accident or sudden stop.

IMPORTANT: Seat belts have a finite life which may be much shorter than the life of the vehicle. Regular inspections and replacement as needed are the only assurance of adequate seat belt security over the life of the vehicle.

Seat Belt Inspection

⚠ WARNING

Inspect and maintain seat belts. When any part of a seat belt system needs replacement, the entire seat belt must be replaced, both retractor and buckle side. Any time a vehicle is involved in an accident, and the seat belt system was in use, the entire vehicle seat belt system must be replaced before operating the vehicle. Do not attempt to modify the seat belt system; doing so could change the effectiveness of the system. Failure to replace worn or damaged seat belts, or making any modifications to the system, may result in personal injury or death.

Inspect the seat belts and tether belts (if so equipped).

1. Check the web for fraying, cuts, extreme dirt and dust, or for severe fading from exposure to sunlight, especially near the buckle latch plate and in the D-loop guide area.
2. Check operation of the buckle, latch, Komfort Latch or Sliding Komfort Latch (if equipped), web retractor, and upper seat belt mount on the door pillar. Check all visible components for wear or damage.
3. Check the seat belt and tether belt connection points and tighten any that are loose.

Seat Belt Operation

When engaged and used properly, the Komfort Latch (**Fig. 9.6**) and the Sliding Komfort Latch (**Fig. 9.7**) introduce a small amount of slack into the seat belt, resulting in a more comfortable ride.

1. Slowly pull the link end of the seat belt out of the retractor and pull it across your lap (from outboard to inboard) far enough to engage the buckle. If the retractor locks too soon, allow the belt to retract slightly, then slowly pull it out again. See **Fig. 9.8**.
2. Fasten the seat belt by pushing the latch into the buckle. Listen for an audible click.
3. Tug on the seat belt to make sure it is securely fastened. If the buckle unlatches, repeat this step. If the problem continues, replace the seat belt.
4. Snug the seat belt to your waist.

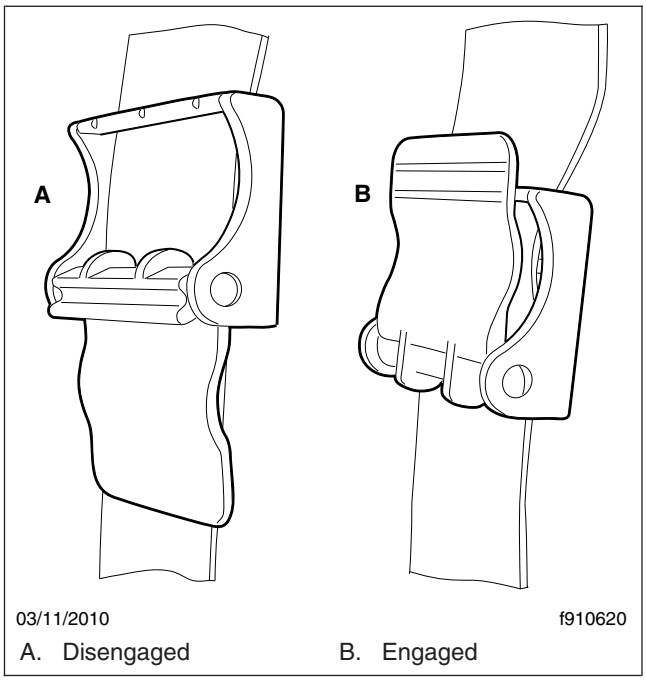


Fig. 9.6, Komfort Latch

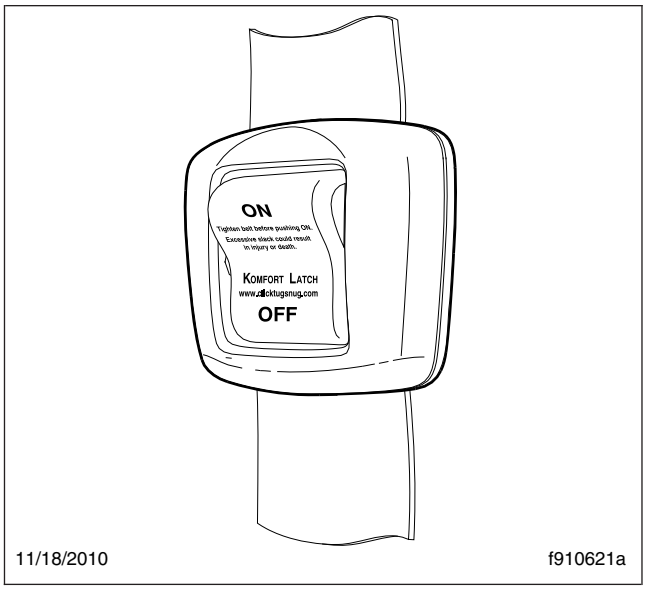


Fig. 9.7, Sliding Komfort Latch

⚠ WARNING

Before activating the Komfort Latch or the Sliding Komfort Latch, make sure the amount of slack in the shoulder strap is set as described below. Excess slack in the shoulder strap reduces the effectiveness of the seat belt, and increases the risk of injury or death in an accident.

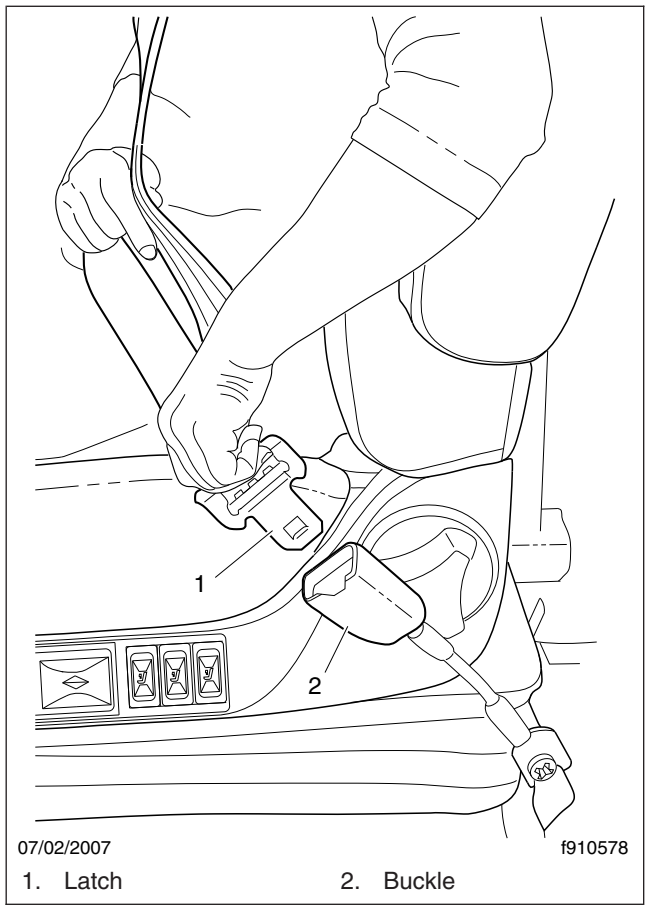


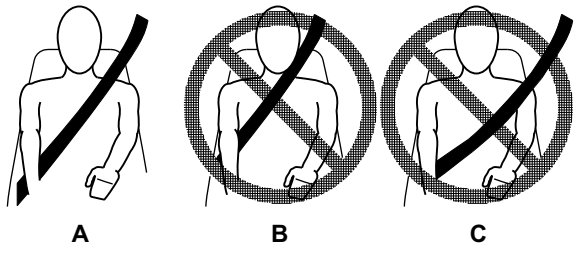
Fig. 9.8, Three-Point Seat Belt Operation

5. Position the shoulder strap diagonally across your chest with the adjustable D-loop bracket (if equipped). The shoulder strap must be centered on your shoulder and chest, away from your face and neck. See **Fig. 9.9**. If desired, engage the Komfort Latch or Sliding Komfort Latch as follows.

   If equipped with a Sliding Komfort Latch, make sure that the shoulder strap is snug against your chest. Without loosening the shoulder strap, push the Sliding Komfort Latch switch to the "ON" position. See **Fig. 9.7**. To activate the latch lean forward until you hear a click. This will allow for approximately 1 inch (2.5 cm) of slack between your chest and the shoulder harness. Once engaged, the latch will allow you to lean forward about 5 inches (13 cm) without having to reset the latch. Leaning forward more than 5

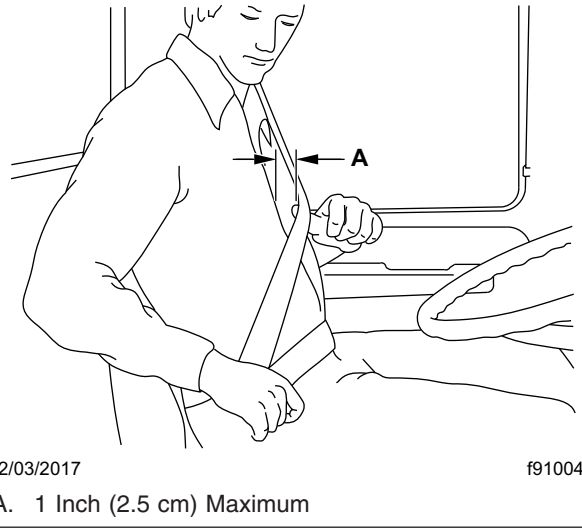
inches (13 cm) will disengage the Sliding Komfort Latch, requiring it to be reset.

If equipped with a Komfort Latch, pull on the shoulder strap to lessen the pressure of the strap on your shoulder and chest. Allow no more than 1 inch (2.5 cm) of slack between your chest and the shoulder harness. More slack can significantly reduce the seat belt effectiveness in an accident or a sudden stop. While holding the belt slack, press the Komfort Latch lever up, clamping the seat belt webbing (**Fig. 9.10** and **Fig. 9.11**).



A. Correct—Belt is centered on your shoulder and chest, away from your face and neck.
B. Wrong—Belt must not rub against face or neck.
C. Wrong—Belt must not hang off shoulder.

Fig. 9.9, Proper Shoulder Strap Fit



A. 1 Inch (2.5 cm) Maximum

Fig. 9.10, Adjusting Shoulder Harness Clearance, Komfort Latch

6. Unbuckle the seat belt and release the Komfort Latch or the Sliding Komfort Latch as follows.

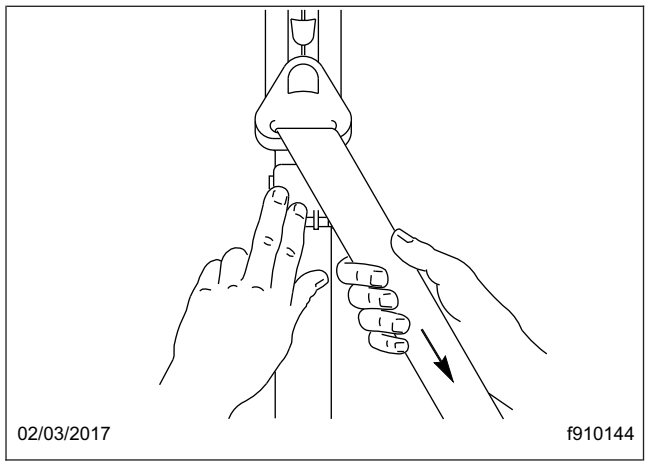


Fig. 9.11, Locking the Komfort Latch

If equipped with a Sliding Komfort Latch, unbuckle the seat belt, then tug on the shoulder belt to release the Sliding Komfort Latch, *or* press the Sliding Komfort latch to the "OFF" position, then unbuckle the seat belt.

If equipped with a Komfort Latch, unbuckle the seat belt, then release the Komfort Latch by giving the shoulder belt a quick tug. If you lean forward against the shoulder belt, the Komfort Latch will automatically release, and will need to be reset.

NOTE: Neither the Komfort Latch nor the Sliding Komfort Latch need to be manually released in an emergency situation. Each will release by itself under rough road or other abnormal conditions. Make sure the seat belt is completely retracted when it is not in use.

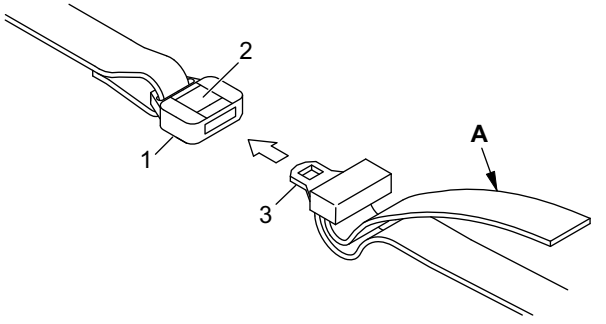
Sleeper Compartment Restraints

⚠ WARNING

Keep the upper bunk folded up and locked, and do not use the sleeper compartment while the vehicle is in motion unless a bunk restraint is installed and used. Not using the bunk restraint increases the chance of injury, or the degree of injury, to all occupants of the vehicle from accidents or sudden stops.

Bunk Restraint Adjustment

1. Make sure the belt is attached to the bunk support and sleeper wall.
2. To lengthen the belt, tip the link end downward and pull the link until it connects with the buckle.
3. After the belt is connected, shorten it by pulling on the loose end until the belt is snug, but comfortable. Be sure the belts are not twisted. See **Fig. 9.12**.



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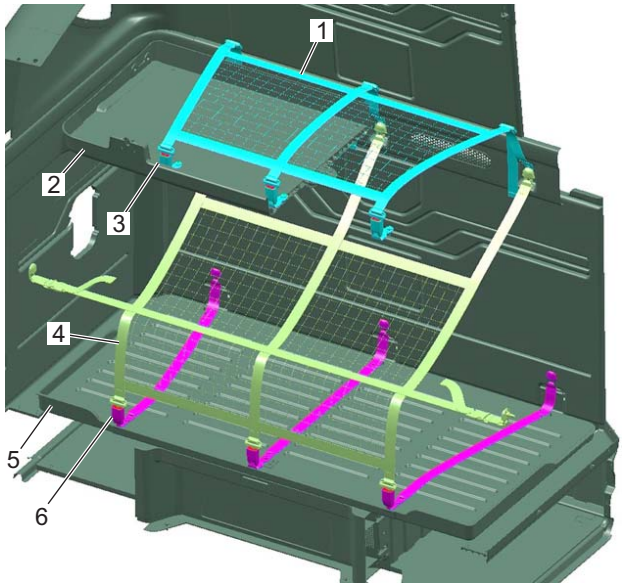
A. Pull on the loose end to shorten the belt.
1. Buckle
2. Belt Release Button
3. Link

Fig. 9.12, Bunk Restraint Adjustment

Bunk Restraint Operation

1. Starting at the foot of the bunk, pull the link end of the belt up far enough to engage the buckle. See **Fig. 9.13**.
2. Fasten the belt by pushing the link end into the buckle until it latches. Make sure that the belt is not twisted. Check the engagement by trying to pull the link out of the buckle. If they come apart, repeat this step. If the problem continues, replace the belt. Repeat steps 1 and 2 for the other two belts located in the middle and upper portion of the bunk to lock the restraint in place.
3. To release the bunk restraint, push the release button on the buckle at the head of the bunk and pull the link from the buckle.

   Repeat this step for the other two buckles to completely release the bunk restraint.



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NOTE: Mattresses not shown for clarity. Upper bunk pan cutaway shown for clarity.

1. Upper Bunk Restraint
2. Upper Bunk
3. Upper Bunk Buckle
4. Lower Bunk Restraint
5. Lower Bunk
6. Lower Bunk Buckle

Fig. 9.13, Bunk Restraints

Steering Wheel Air Bag

Operation

NOTE: Only vehicles with the letters "SRS" molded into the steering wheel center pad are equipped with a steering wheel air bag.

The air bag, when used with seat belts, provides additional protection to the driver in severe frontal collisions. Steering wheel air bags are designed to inflate only in severe frontal collisions. The driver and the passenger should always wear seat belts. The steering wheel air bag will activate during a collision even if the seat belts are not fastened, but the system is designed to provide protection to the occupant only when the seat belts are fastened.

⚠ WARNING

Keep all heavy objects in the cab secured. Do not place objects on the steering wheel or between you and the steering wheel. Any such objects may cause harm during an accident. Keep your hands on the sides and lower portion of the

steering wheel. Failure to follow these instructions may result in death or personal injury.

For maximum protection in a collision, always be in a normal seated position with your back against the seat back and your head upright. Fasten your seat belt and ensure that it is properly positioned on your body as described under the "Seat Belt Operation" heading. Since the air bag inflates with considerable speed and force, a proper seat position will help keep you a safe distance from the inflating air bag.

Inspection and Service

⚠ WARNING

Do not attempt to service or modify the air bag system. Unintentional or improper air bag deployment could cause severe bodily injury or death. Contact an authorized Freightliner service facility for all service and maintenance.

The air bag system contains components that use combustible chemicals. Do not cut, drill, braze, solder, weld, strike, or probe the air bag components. Keep all liquids and chemicals away from air bag components.

The surface of the deployed air bag may contain small amounts of sodium hydroxide (which is a by-product of the gas generant combustion) and metallic sodium. Sodium hydroxide may be irritating to the skin and eyes. Immediately wash your hands and exposed skin areas with a mild soap and water. Flush your eyes immediately if exposed to sodium hydroxide.

The operational readiness of the air bag system is indicated by the supplemental restraint system (SRS) indicator on the dash. The SRS indicator illuminates for several seconds when the ignition is turned on, and then it goes off. The indicator will remain on if there is a problem with the air bag system. The vehicle should be serviced if the SRS indicator does not illuminate when the ignition is turned on, or if the SRS indicator remains on.

The air bag module may contain perchlorate material; for information, see **www.dtsc.ca.gov/hazardouswaste/perchlorate**. Special handling may apply; follow appropriate rules and regulations when disposing of materials.

For all service and maintenance, contact an authorized Freightliner service facility.

RollTek Rollover Protection System

Identification

Only seats with the RollTek module under the seat and the molded side-roll air bag cover on the upper side of the seat back are equipped with the RollTek rollover protection system; see **Fig. 9.14**. RollTek may be installed in one of the following configurations:

- driver seat only or driver and passenger seats
- driver seat only, with an optional steering wheel frontal air bag
- driver and passenger seats, with an optional steering wheel frontal air bag

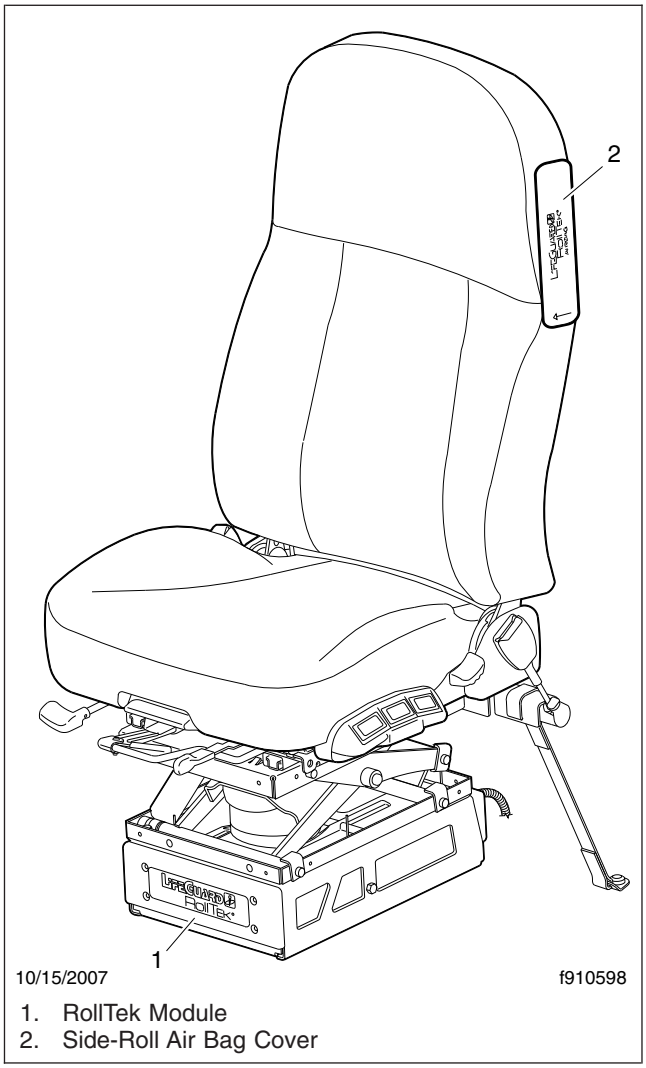
Operation

The RollTek system, when used with seat belts, provides additional protection to the driver and passenger (if equipped with a passenger-side system) in rollover accidents. The RollTek system provides a significant increase in seat stability during a rollover. Vehicles equipped with RollTek rollover protection have a sensor mounted in the seat base that activates the side-roll air bag and seat pull-down device during a rollover.

When the RollTek module senses a rollover, the module triggers gas cylinders mounted in the base of the seat. The gas cylinders activate the power cinches that then tighten the lap and shoulder belts against the occupant of the seat and lower the seat suspension, moving the occupant down and away from the steering wheel and ceiling. The side-roll air bag deploys from the outboard side of the seat as the seat is pulled down to its lowest position. See **Fig. 9.15**.

⚠ WARNING

Always use the seat belts when operating the vehicle. Failure to do so can result in severe personal injury or death. Do not place infants and children in seats equipped with the RollTek system. The RollTek system is designed for adults only. Doing so could result in severe bodily injury or death. Keep all heavy objects in the cab secured. Do not place objects on the seat back or block the side-roll air bag. Objects that block the side-roll air bag may prevent proper inflation and could result in serious injury or death.



1. RollTek Module
2. Side-Roll Air Bag Cover

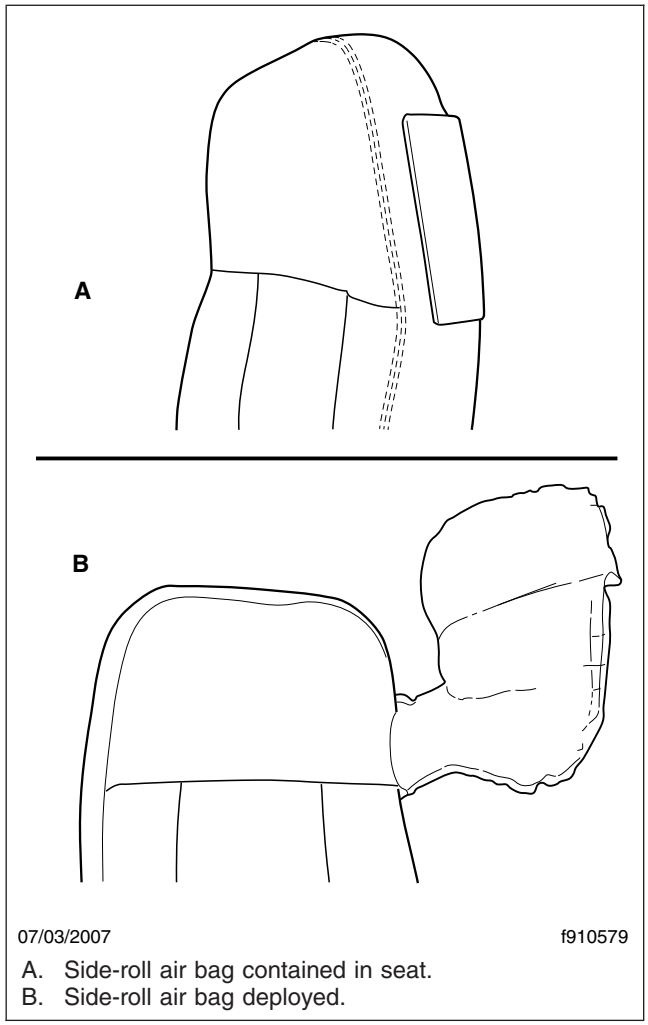
Fig. 9.14, RollTek Protection System Components

The RollTek system will activate during a rollover even if the seat belts are not fastened, but the RollTek system is only designed to provide protection to the occupant when the seat belts are fastened.

For vehicles with the RollTek system(s) only, device(s) deploy as follows:

- Rollover Crash—occupant seat belt pretensioning, seat pretensioning, and side-roll air bag at the proper time
- Frontal Crash—no devices deployed

For vehicles with the RollTek system(s) and frontal steering wheel air bag, device(s) deploy as follows:



A. Side-roll air bag contained in seat.
B. Side-roll air bag deployed.

Fig. 9.15, Side-Roll Air Bag

- Rollover Crash—occupant seat belt pretensioning, seat pretensioning, and side-roll air bag at the proper time
- Frontal Crash—steering wheel air bag, occupant seat belt pretensioning, seat pretensioning, and the side-roll air bag at the proper time

Inspection and Service

⚠ WARNING

Keep hands and tools away from the scissor points under the seats.

The RollTek system contains components that use combustible chemicals. Do not cut, drill, braze, solder, weld, strike, or probe any part of

the RollTek system. Keep all liquids and chemicals away from the RollTek components.

Do not attempt to service or modify the RollTek system. Unintentional or improper deployment of the RollTek system could cause severe bodily injury or death. Contact an authorized Freightliner service facility for all service and maintenance.

IMPORTANT: The RollTek system must be replaced after being activated. Damaged seat belts and tethers, or seat belts and tethers that were worn in an accident, must be replaced, and their anchoring points must be checked.

The operational readiness of the RollTek system is indicated by the supplemental restraint system (SRS) indicator on the dash. The SRS indicator illuminates for several seconds when the ignition is turned on, and then it goes off. The indicator will remain on if there is a problem with the air bag or RollTek system. The vehicle must be serviced if the SRS indicator does not illuminate when the ignition is turned on, or if the SRS indicator remains on.

The air bag module may contain perchlorate material; for information, see **www.dtsc.ca.gov/hazardouswaste/perchlorate**. Special handling may apply; follow appropriate rules and regulations when disposing of materials.

For all service and maintenance, contact an authorized Freightliner service facility.

10

Cab and Sleeper Features

Windows

Power windows are standard on New Cascadia™ vehicles. The driver's door has two switches mounted in the top of the door, that control the driver and passenger windows separately. See **Fig. 10.1**. The passenger door has a switch mounted in the top of the door that controls the passenger-side power window.

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1. Mirror Selector Switch
2. Mirror Directional Switch
3. Mirror Heat Switch
4. Passenger-Side Window Switch
5. Driver-Side Window Switch
6. Door Lock Switch

Fig. 10.1, Door Switches (driver-side shown)

⚠ CAUTION

There is no anti-pinch protection when the window is almost closed. Be sure to clear all objects from the window before closing.

The window switches have three positions: lower window, neutral, and raise window. Press forward on the switch to lower the window. Hold the switch down in the forward position for approximately one second to activate the express function; the window will continue to roll down after the switch is released. Press the switch in the rearward position (bump) to raise the window.

Mirrors

The standard outside mirrors are mounted on the door frame. The power mirrors are controlled with a left-hand or right-hand mirror selector switch, and a directional switch. Select the left (driver) mirror, or the right (passenger) mirror using the selector switch. The mirror can then be adjusted by pressing the directional switch arrow for the direction the mirror should be adjusted.

The outside door mirrors can be heated to keep them clear of fog, frost, and ice. To heat the mirrors, press the outboard part of the mirror heat switch on the door. See **Fig. 10.1**. When the mirror heat switch is on, an amber indicator light illuminates inside the switch. If the vehicle has Optimized Idle, mirror heating will not operate with the key in accessory mode, or if the Optimized Idle feature turns mirror heating off to reduce stress on the batteries. Refer to **Chapter 13** for more information.

Cab Amenities

New Cascadia vehicles are available with many optional features. The following are some of those options.

Cup Holders

Three cup holders and a map pocket are molded into the center dash. See **Fig. 10.2**. A removable ash cup is located in one of the cup holders.

Lighting

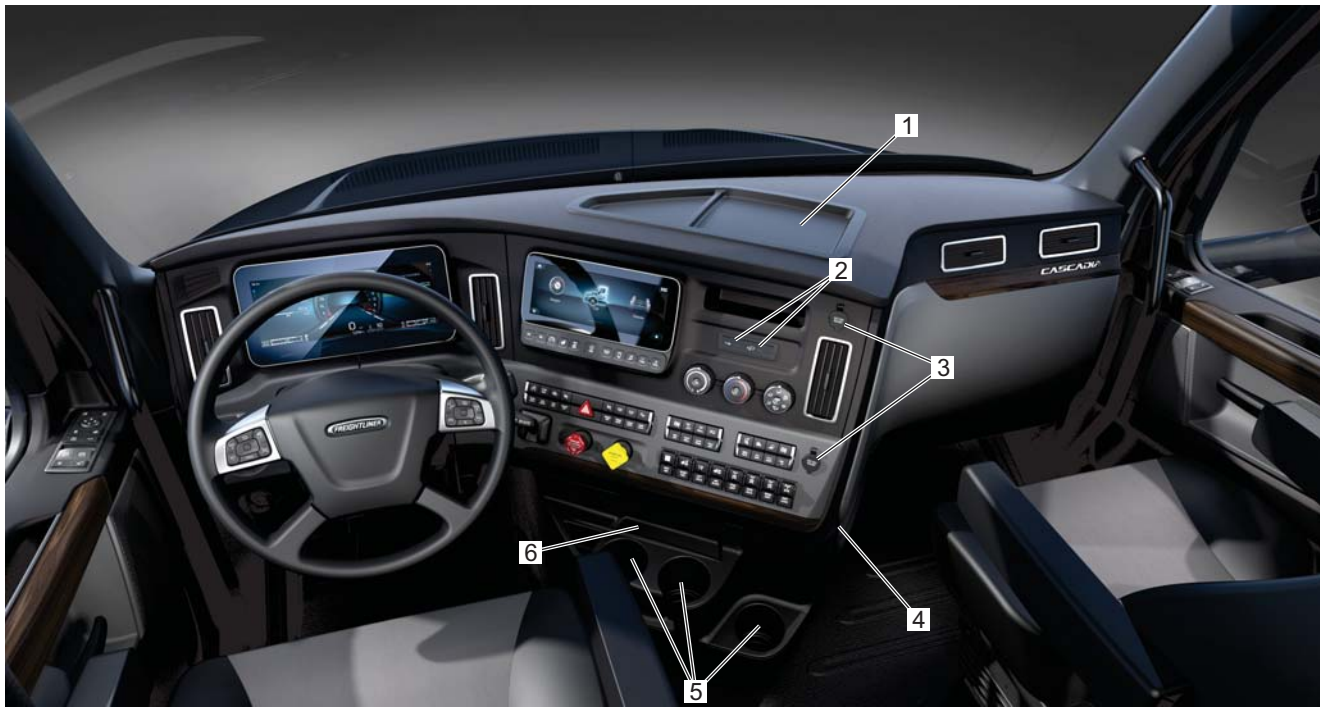
See **Chapter 4** for detailed information regarding lighting controls.

Power Outlets

Two power outlets that supply 12V power for accessories are located on the dash switch panel. Optionally, three power outlets, or two power outlets and a cigarette lighter, are offered.

Radio and CB

The radio is mounted in the center dash panel. The CB is typically installed in the overhead console. An optional hot mount may be installed on top of the dash for fleet CB radios.



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1. CB Tray
2. USB Outlets
3. Power Outlets
4. Map Pocket
5. Cup Holders
6. Storage Tray

Fig. 10.2, Dash Amenities

Storage

Storage pockets are molded into the lower portion of the driver and passenger doors. A map pocket is located on the passenger side of the center dash. See **Fig. 10.2**.

Storage compartments are located in the overhead console, above the windshield and the cab doors. See **Fig. 10.3**. For compartments with doors, open the door by pulling outward on the latch. The doors are hinged at the top, and will swing upwards.

Universal Serial Bus (USB) Outlets

Two USB outlets are located on the dash switch panel.

Sleeper Amenities

Sleepers are available with a number of optional features. The following are some of those options.

NOTE: See **Chapter 8** for detailed information regarding sleeper climate controls.

Sleeper Bunks

NOTE: Make sure bunks are locked in place before sleeping or driving the vehicle.

Sleeper cabs can come with a lower bunk, an upper bunk, or both.

Lower bunk configurations include a bed with a storage compartment or, in 72 inch sleepers, a pull-down bed with two foldable seats and a table.

The release lever to unlock the storage bed is centered under the bunk. Press the lever to the right and pull up on the bunk to access the storage compartment. Pushing the bunk back into its original horizontal position will cause the bed latches to lock.

Setting up the pull-down bed (see **Fig. 10.4)** consists of the following steps.

NOTE: To avoid damaging the upholstery, unlatch and move the seatbelts to the side before folding the chairs closed.

1. Pull forward on the seat latch while lowering the chair back toward the seat, and fold it down.

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1. Storage Compartment
2. CB Compartment

Fig. 10.3, Overhead Console

2. Pull the table t-pull handle forward, then push down on the top of the table until it is at the same level as the folded seats.
3. Pull out the bed release latch until you feel a release of tension. See item 2 in **Fig. 10.4**.
4. Grasping the edge of the bed, pull it down until the lower latch pins engage in the lower bunk locks.

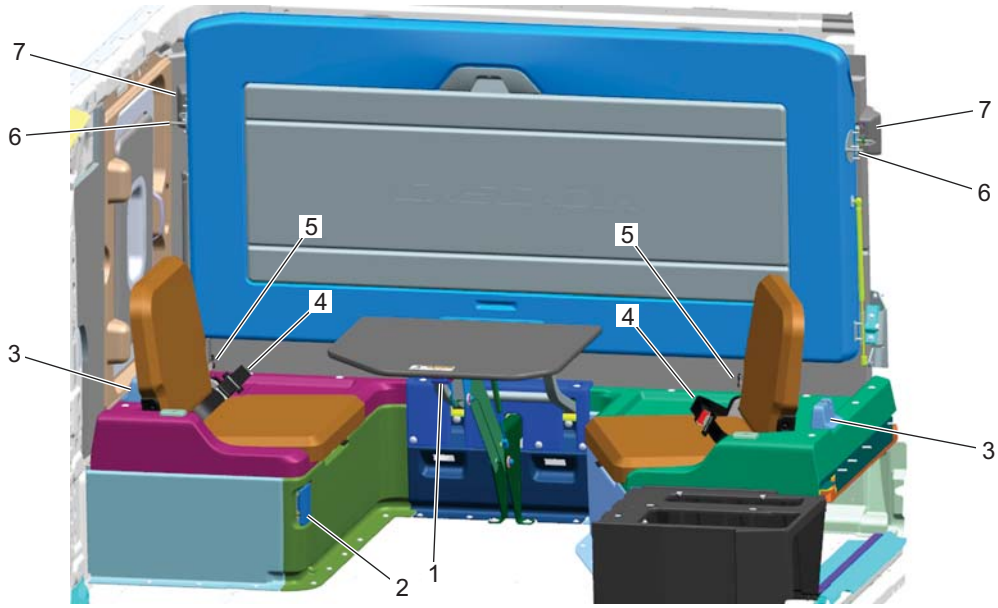
Setting up the lounge area consists of the following steps:

1. Pull out the bed release latch until you feel a release. See item 2 in **Fig. 10.4**.
2. Holding the front edge, push the bed up toward the back wall until you hear or feel the upper latch pins lock into place.
3. Pull the t-handle and lift up on the table. As the table nears the correct height, the t-pull handle will be pulled back and lock into position. If this doesn't happen, reach under the raised table and push the t-pull handle in. Then gently push down to make sure the table is locked in the upright position.
4. To unfold each chair, push down on the seat latch while lifting the chair back.

Upper bunks fold up against and lock onto the cab back wall. To unlock and fold down an upper bunk, grasp the bunk release handle (see **Fig. 10.5**) and turn it to either the left or right and pull. To fold up and lock an upper bunk, turn the bunk release handle to the left or right and push up and back.

Sleeper Curtain

Sleeper curtains are included with all sleepers and work to block out light and help regulate temperatures in the sleeper compartment.



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1. Table T-Pull Handle
2. Pull-Down Bed Release Latch
3. Lower Bunk Locks
4. Seatbelts
5. Seat Latches
6. Lower Bunk Latch Pins
7. Upper Bunk Latch Pins Engaged in Upper Locks

Fig. 10.4, Pull-Down Bed With Lounge

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Fig. 10.5, Upper Bunk Release Handle

Baggage Compartment Doors

The baggage compartment doors are intended as a convenient means to stow or remove items under the bunk. The baggage compartment doors can be opened from the inside by using the pull cable located near the rear edge of the cab door opening. Pull the cable handle labeled BAGGAGE forward to open the door.

IMPORTANT: The baggage compartment doors have two-stage latching. When closing the doors, ensure that they are completely latched to prevent wind noise and water intrusion.

Lighting

See **Chapter 4** for detailed information regarding lighting controls.

Lighting controls in the sleeper control panel will control lights in the bunk area.

Power Outlets

Power outlets are located underneath the lower bunk and/or the sleeper control panel. See **Fig. 10.6** for a typical sleeper panel with power outlets.

Sleeper Access Door

The sleeper access door is not intended for entry or exit. The door is intended only as a convenient means to stow or remove personal belongings in the sleeper area. The sleeper access door can be opened from inside the cab using two different methods. The primary method is the pull cable located near the lower-rear edge of the cab door opening.

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1. Inverter/Charger Display Panel
2. Sleeper Climate Control Panel
3. Power Outlet
4. Clock

Fig. 10.6, Sleeper Control Panel

Pull the cable handle labeled ACCESS forward to open the sleeper door. The secondary method is the black knob located at the upper rear edge of the sleeper door opening. Pull this knob down to open the sleeper door.

IMPORTANT: The sleeper access doors have two-stage latching. When closing the doors, ensure that they are completely latched to prevent wind noise and water intrusion.

Sliding Side Window

The lower section of the sliding side window moves vertically and may be locked in multiple positions to suit. Two spring-loaded tabs are located at the top of the sliding section. To adjust the window, pull both tabs toward the center of the glass and move the sliding section to the desired height. Release the tabs to lock the sliding section.

11

Electrical System

System Overview

The New Cascadia has a multiplex electrical system. By transmitting multiple electronic messages through the same wire, a multiplex system reduces the number of interconnected wires, allows for more precise control of the electrical system, and makes it easer and quicker to diagnose electrical faults and add optional equipment.

In addition, the wiring harnesses are developed for the maximum number of options, meaning that space for additional wires is available within the wiring harness regardless of the number of optional features on the vehicle. This design provides a cleaner main harness and is meant to eliminate the need for wiring overlays

Traditional power distribution devices are replaced with electronic control modules (ECUs). These coordinate power to outputs such as lighting, displays, gauges, and indicators and control power distribution by monitoring inputs such as sensors and switches. Power is supplied by the vehicle power distribution module (VPDM).

The ECUs also continuously monitor the status of all input devices and transmit messages over multiple control area networks (CANs), reducing the number of sensors required for operation.

The Instrumentation Control Unit (ICU) and Fault Codes

NOTE: Some non-critical faults may be suppressed and will not appear during an instrumentation control unit (ICU) self-check.

The majority of electrical and electronic issues on the vehicle will have an associated fault code, which will be displayed on the ICU.

If the ICU receives active fault codes during the ICU self-check, it displays them one after the other until the parking brake is released or the ignition is turned off. Once the parking brake is completely released, the ICU displays alerts until acknowledged. See **Fig. 11.1.** If there are no active faults, the ICU displays the home screen after the self-check completes.

When there is an active vehicle fault code, a popup will appear on the ICU message screen.

To access fault codes in the ICU:

1. Use the buttons on the left-hand steering wheel to navigate to the wrench icon and press OK.

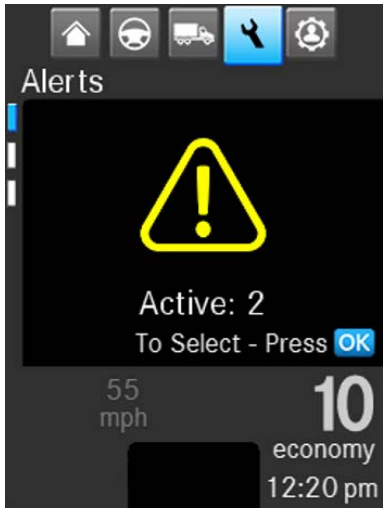


Fig. 11.1, ICUC Active Faults Alert Screen

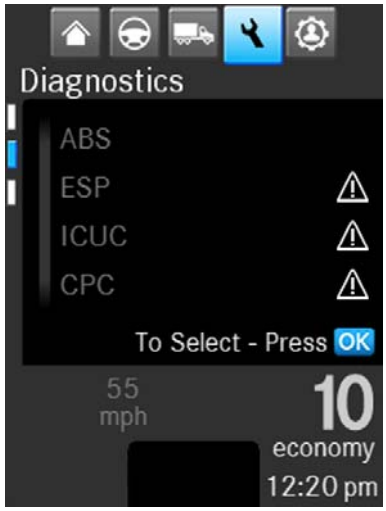


Fig. 11.2, Electronic Control Unite (ECU) List in the ICUC

2. ECUs with active faults will have an exclamation point next to them. Use the down arrow to select the affected ECU from the list, then press OK.

   Refer to the ECU acronyms list for the full names of acronyms on the ICU screen. See **Table 11.1.**

3. Locate the code to troubleshoot from the list of active fault codes, then press OK to access the information screen. See **Fig. 11.3.**

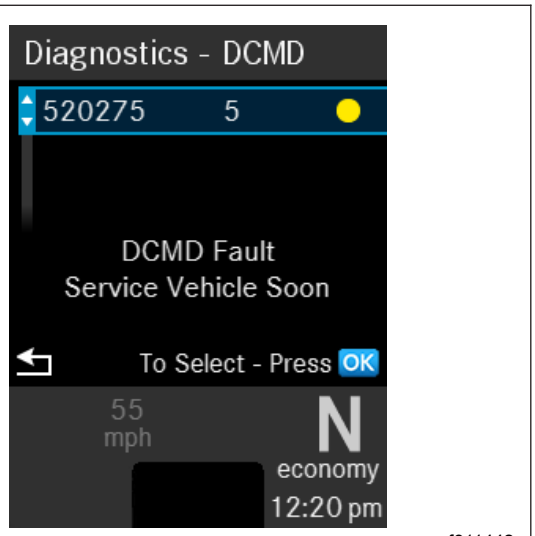


Fig. 11.3, Information Screen for an Active Fault Code

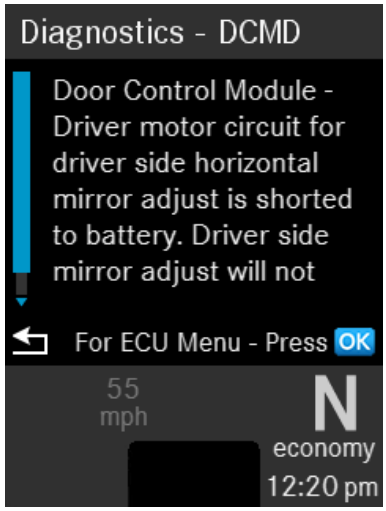


Fig. 11.4, Additional Information for the Fault

4. Press OK again to access additional information. See **Fig. 11.4.**

ICU Electronic Control Unit Acronyms			
ABS	Antilock Brake System	**ICU**	Instrumentation Control Unit
ACM	Aftertreatment Control Module	**MCM**	Motor Control Module
CGW	Central Gateway	**RDF**	Radar Front End
CPC	Common Powertrain Controller	**SAS**	Steering Angle Sensor
DCMD	Door Control Module, Driver	**SSAM**	Single Signal Detect and Actuation Module
DCMP	Door Control Module, Passenger	**TCM**	Transmission Control Module
HVCF	Heating/Ventilation/AC Front (HVAC)	**TPMS**	Tire Pressure Monitoring System
HVCP	Heating/Ventilation/AC, Auxiliary (HVAC)	**VRDU**	Video Radar Decision Unit

Table 11.1, ICU Electronic Control Unit Acronyms

Vehicle Power Distribution

The vehicle power distribution system provides battery power to the electrical and electronic systems.

The following components make up the vehicle power distribution system:

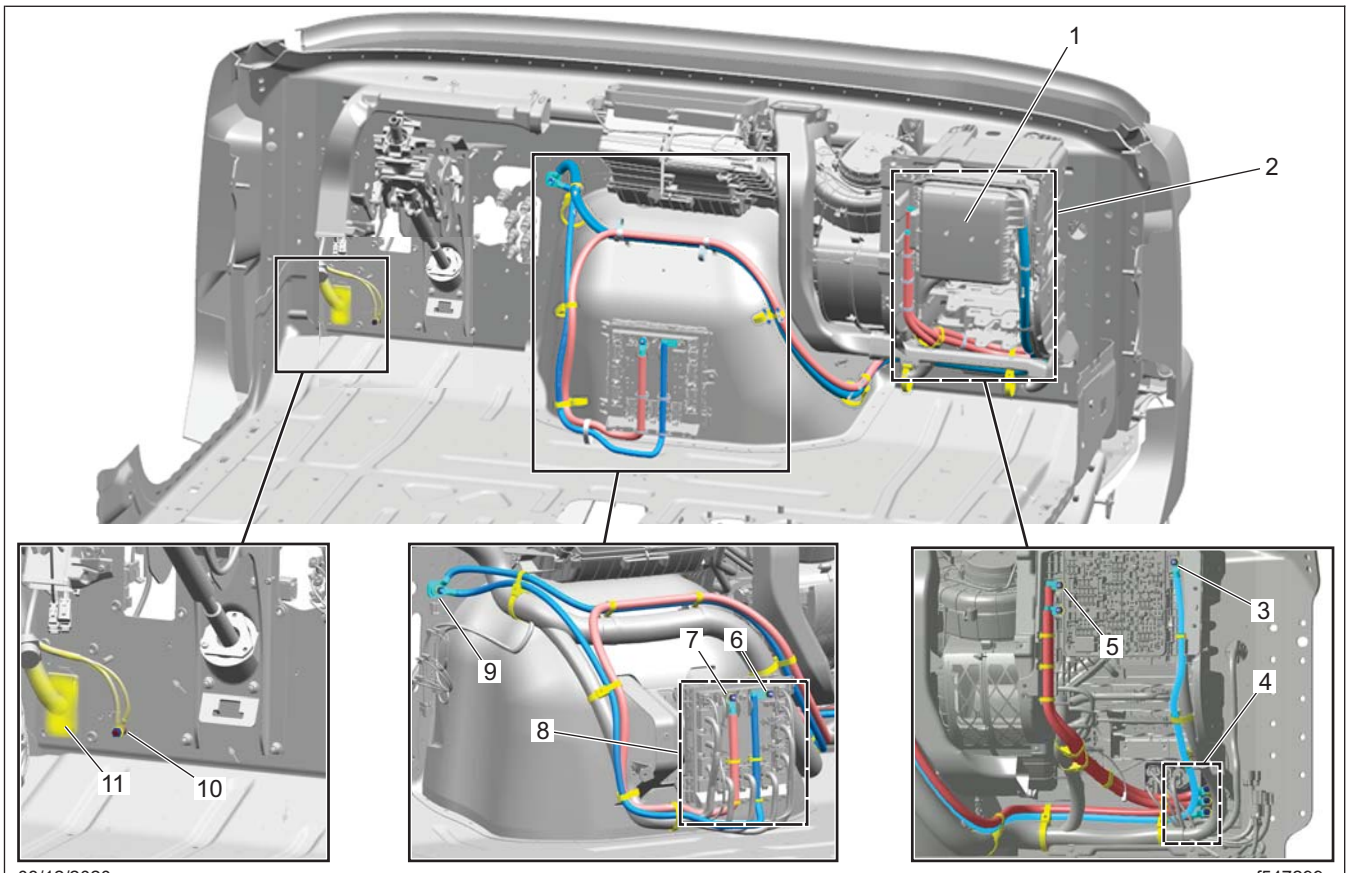
- Battery Cable Access (BCA)
- Vehicle Power Distribution Module (VPDM)
- Optional Cab Load Disconnect Switch (CLDS)

Vehicle power is supplied by the batteries to the battery cable access (BCA) box. The BCA front wall pass-through is the primary interface through which battery power gets transferred from outside the cab to the inside. It is located on the passenger side of the engine compartment front wall. See **Fig. 11.5.**

On vehicles equipped with an optional high current receptacle and/or optional inverter, the BCA will have circuit protection and power cables supplying those devices. Fuse locations will depend on the vehicle and will be outlined on a label on the BCA cover. For an example see **Fig. 11.6.**

The power supplied by the batteries goes to the vehicle power distribution module (VPDM) and the single signal detect and actuation (sSAM) module.

The VPDM is a fuse and relay power distribution box. It provides power and circuit protection for powertrain needs, cab functions, and various stand alone modules. It also supplies power to the emergency



1. Vehicle Power Distribution Module (VPDM)
2. Electronics Bay
3. VPDM Ground
4. Battery Cable Access (BCA) Front Wall Pass-Through
5. VPDM Power
6. sSAM Ground
7. sSAM Power
8. Single Signal Detect and Actuation Module (sSAM)
9. Front Wall Cab Ground Pass-Through Stud
10. Front Wall Interior Ground Stud
11. Pass-Through Bulkhead Connector

Fig. 11.5, Cab Power Distribution and Component Location Overview

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Fig. 11.6, Example Fuse Labeling on BCA Cover

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Fig. 11.7, VPDM Inside Cover Map of Fuses and Relays

power supply circuits in the event of a module failure. The VPDM is located in the vehicle electronics bay, behind the passenger-side dash panel. See **Fig. 11.5.**

Depending on a vehicle's specifications, the fuses and relays installed and their locations can vary. Each VPDM cover is illustrated with an image of the fuse and relay layout for that vehicle. See **Fig. 11.7** for an example of VPDM cover map of fuses and relays.

Both the VPDM and the sSAM are grounded at the cab-side front wall. See **Fig. 11.5.**

On vehicles equipped with a cab load disconnect switch (CLDS), the BCA houses a contacting device that can open to shut off power to high current loads.

The cab load disconnect switch (CLDS) is an optional switch that can be used to open (turn OFF) or close (turn ON) circuits between the battery and the battery cable access box (BCA). It is described more fully later in this chapter.

Cab Electrical and Electronic Components

Pass-Through Bulkhead Connector

The pass-through bulkhead connector is where the interior dash harness connects to the exterior chassis harness. This provides a disconnect point for harness service, testing, and replacement. It is located on the driver-side front wall of the truck. See **Fig. 11.5.**

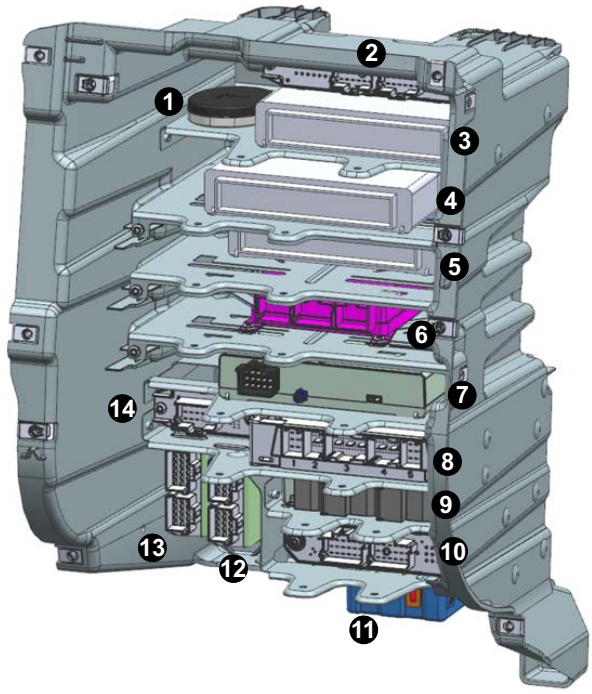
Single Signal Detect and Actuation Module (sSAM)

The single signal detect and actuation module (sSAM) is the primary module in the electrical system, combining chassis power distribution, cab power distribution, and modular switch functions into a single ECU. The sSAM does **not** contain fuses or relays.

The sSAM reads input information from sensors, switches, and databus messages, and drives output and controller area network (CAN) messages. The sSAM is located near the center of the cab behind the lower dash panel. See **Fig. 11.5**

Electronics Bay

The electronics bay contains the electronic control units that control different vehicle features. It is located on the passenger-side of the cab behind the dash panel. See **Fig. 11.5** for its location in the cab and **Fig. 11.8** for the location of ECUs in the bay.



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NOTE: This figure shows almost all slots filled. In a typical vehicle, more electronics bay slots would be free.

1. Truck Data Connect Antenna
2. Chassis CAN Starpoint Connector
3. Common Telematics Platform
4. Expansion Module
5. Expansion Module
6. Electronically Controlled Air Suspension (ECAS) ECU
7. Integrative Predicative Powertrain Control (IPPC) Module
8. Common Powertrain Controller ECU
9. Antilock Braking System (ABS) ECU
10. Cabin CAN Starpoint Connector
11. Central Gateway
12. Video Radar Decision Unit (VRDU) ECU
13. Expansion Module
14. Powertrain CAN Starpoint Connector

Fig. 11.8, Electronics Bay

Cab Load Disconnect Switch

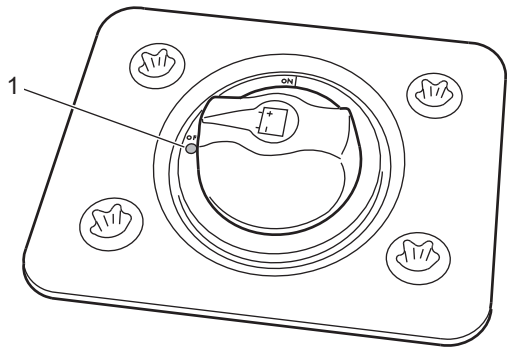
⚠ WARNING

Turning the cab load disconnect switch (CLDS) to the off position does not disconnect power to all electrical components (e.g. the starter and sSAM). To work on the vehicle safely, the negative leads must be disconnected from the battery.

IMPORTANT: The ignition should be turned off before turning the cab load disconnect switch on or off.

The cab load disconnect switch (CLDS) is an optional switch that can be used to open (turn OFF) or close (turn ON) circuits between the battery and the battery cable access box (BCA).

A vehicle in daily use would have the CLDS switch turned ON. When the CLDS switch is set to ON, a red LED indicator at the base of the switch selector illuminates. See **Fig. 11.9**.



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1. LED Indicator Light

Fig. 11.9, Cab Load Disconnect Switch

Turning the CLDS switch OFF minimizes the power draw on the battery, preserving battery life and the ability of the vehicle to start after being parked for a number of days. The CLDs switch should be set to OFF if the vehicle is going to be parked for more than three days.

The CLDS may be mounted in a variety of location, including:

- inside the cab on the outboard side of the driver's seat;
- behind the cab on the driver's side;
- at the battery box.

If the CLDS is turned to the off position while the vehicle is running, the emergency power system will activate. The powertrain power distribution module will receive power from the emergency power feed, but the batteries will not be charging. See the **Emergency Power** for details about vehicle behavior under these conditions.

Battery Contactor Control Board

The optional battery contactor control board (CCB) is designed to cut power to high-current components when the cab load disconnect switch is in the OFF position. The battery contactor control board has an LED that reports the status of the cab load disconnect switch. See **Fig. 11.10**. Refer to **Table 11.2** for LED status message explanations; this information will also posted on a label inside the cover of the battery cable access box (see **Fig. 11.6.**)

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1. Cab Load Disconnect Switch Status LED

Fig. 11.10, Battery Cable Access Box (engine side)

CLDS LED Status Messages		
Description	LED Status	Message
Solid red	ON	CLDS ON (normal operation)
Slow flashing red	ON	CLDS disconnected (error)
Flashing red	ON	CLDS ON/circuits OFF (error)
Fast flashing red	ON	CLDS OFF/circuits ON (error)
OFF	OFF	Power OFF

Table 11.2, CLDS LED Status Messages

Emergency Power

⚠ WARNING

If emergency power is activated, do not shut down the engine until the vehicle is out of traffic and in a safe place. The engine will not be able to be restarted until the cause of the loss of power is corrected.

The emergency power circuit, formerly called limp home mode, allows a vehicle to be moved out of traffic and off the road in the event of a loss of power.

The emergency power circuit is live even when the cab load disconnect switch (CLDS) is turned off.

When the emergency power circuit is active, the vehicle will display varying behaviors depending on the cause of the loss of power:

- Windshield wipers may activate in vehicles built in or after 2018.
- Windshield wipers may activate in vehicles built before 2018 if the sSAM module and/or software has been upgraded.
- Gauges may become unresponsive or freeze.
- Switches may become inoperative.
- Warning lamps may display indicating low voltage and/or ECU faults.
- Different lamps on both or one side of the vehicle will come on and stay on.

- Different lamps on both or one side of the vehicle will start flashing.

Causes and their specific symptoms are detailed in the **New Cascadia Electrical Systems and Troubleshooting Manual**.

No matter the cause, the following lamps will remain constantly on:

- headlamps, low beams (either the left, right, or both)

No matter the cause, the following lamps will flash:

- front turn signals, left and right

Turning the ignition switch to OFF when in emergency power mode shuts down the exterior lighting, windshield wipers, and the engine. The engine will not start if the ignition switch is turned back to the ON position.

Powernet Management

The powernet management feature protects the batteries from excessive discharge by disconnecting certain loads—features that draw power—from the battery power supply. This allows the batteries to maintain enough of a charge to restart the vehicle.

Features that draw power are prioritized into different categories:

1. House loads: this includes the majority of dash and sleeper power outlets, sleeper reading and spot lamps, and sleeper auxiliary fans.
2. Basic loads: this includes power for fleet management systems and third party telematics as well as critical dash and sleeper power outlets.

By making noncritical features that draw power temporarily unavailable, powernet management allows the driver to continue using critical features.

Progressive low voltage disconnect (PLVD) is used to implement the powernet management feature.

PLVD calculates disconnecting loads based on battery voltage, ignition switch status, and engine rpm. When battery voltage drops below a predetermined value, house loads are turned off. One minute before house loads are turned off, a pop-up message will display in the ICU and an audible alarm will sound.

The front reading lamp, spot lamp, and sleeper lamps—designated as house loads—can be turned back on after being shutdown by PLVD by pressing on the light or light switch.

No alarm sounds before basic loads are turned off.

A time delay is implemented for the shutdown and reactivation of loads to avoid unnecessary cycling when battery voltage is close to shutdown thresholds.

Loads disconnected by the PLVD will reconnect when all of the following conditions are met:

- ignition ON;
- engine at 450 rpm or above;
- batteries reach and maintain 12.7 volts for one minute.

Optional Power Systems

A 48" sleeper may be equipped with shore power; a 60" and 72" sleeper may be equipped with shore power and/or an optional inverter/charger.

Shore Power

Shore power provides the ability to connect to an external power source when parked by providing exterior power inlets. The 120 volts of alternating current provided can be used to power small appliances and electrical equipment without idling the engine.

A shore power system consists of one or two 120 volt power inlets on the exterior of the cab and, depending on the cab height, one to two power receptacles inside the cab. Sixty-inch and seventy-two inch raised roof sleeper cabs have two power receptacles; the forty-eight raised roof sleeper cab has one power receptacle.

An optional 120 volt indicator illuminates on the ICU when the shore power system is in use.

Inverter/Charger

An optional 1500- or 1800-watt inverter/charger is available on 60" and 72" sleepers. An inverter converts the vehicle's battery power to 120 volts to provide electricity for small appliances and electrical equipment. It is located in the driver-side luggage compartment. See **Fig. 11.11**. The unit has one three-pin GFIC OUT connector, one three-pin GFIC IN connector, and two AC power outlets.

⚠ DANGER

Do not store gasoline, flammable material, or any component with a connection to the fuel system in the storage compartment with the inverter/

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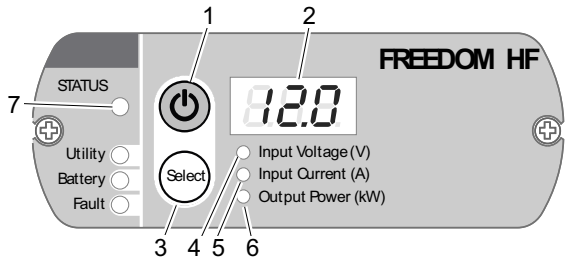
Fig. 11.11, Inverter/Charger

charger. The unit contains equipment that may produce sparks. Storing flammable or electrical equipment in proximity to the unit could result in fire or explosion hazards, which could result in serious injury or death.

The display on the sleeper control panel provides information about the operation of the unit. See **Fig. 11.12** (Xantrex Freedom) or **Fig. 11.13** (Eaton). Refer to **Table 11.3** for general control panel details.



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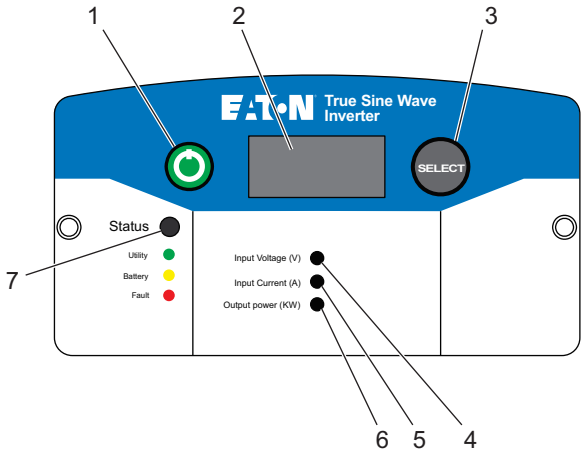
1. Power Button
2. LED Display
3. Select Status Display Button
4. Input Voltage LED
5. Input Current LED
6. Output Power LED
7. Status LED

Fig. 11.12, Inverter/Charger Display Panel (Xantrex Freedom)



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1. Power Button
2. LED Display
3. Select Status Display Button
4. Input Voltage LED
5. Input Current LED
6. Output Power LED
7. Status LED

Fig. 11.13, Inverter/Charger Display Panel (Eaton)

Display Panel Functions		
Number	**Name**	**Function**
1	Power Button	Press the power button for one second to turn the unit ON or OFF (when AC shore power is not present). Press and hold the button for five seconds to enter the Settings mode. Refer to the owner's manual for more information.
2	LED Display	The three digit LED display screen shows status information and fault codes.

Display Panel Functions		
Number	**Name**	**Function**
3	Select Status Display Button	The Select status display button changes the display or settings. Press the Select button to cycle through the setting options. Refer to the owner's manual for more information. • With the inverter mode ON, press the button to choose what appears on the LED display screen: Input Voltage, Input Current, or Output Power. An LED will illuminate next to the chosen mode. Details are provided below. NOTE: The unit is in "Inverter Mode" when shore power is not present and the unit is using the battery to power the appliances connected to it. • In an alarm condition, press and hold the button for two seconds to disable or enable the audible alarm.
4	Input Voltage LED	In inverter mode, when Input Voltage is selected, the corresponding LED will light up and the display will show the input voltage.
5	Input Current LED	In inverter mode, when Input Current is selected, the corresponding LED will light up and the display will show the input current.
6	Output Power LED	In inverter mode, when Output Power is selected, the corresponding LED will light up and the display will show the output power.
7	Status LED	The Status LED indicates the unit's mode of operation through the display of one of three colored lights that • **Green**: Utility (Shore Power Mode) A solid green light indicates that the battery is fully charged. A flashing green light indicates that the unit is charging the battery. • **Yellow**: Battery (Inverter Mode) A solid yellow light indicates that the unit is using the battery to supply AC power. A flashing yellow light indicates that the unit is in inverter mode, but AC shore power is detected and the unit is transferring to shore power mode within 20 seconds. • **Red**: Fault Condition. Refer to the owner's manual for fault code information and troubleshooting procedures.

Table 11.3, Display Panel Functions

For more information about troubleshooting, settings, and other features, refer to the owners manual included with the inverter/charger.

12

Engine Starting, Operation, and Shutdown

Engine Starting

This engine chapter is to serve as a guide for best practices only. Each engine model may have operating characteristics that are unique to that particular engine, and will be documented in the engine manufacturer's literature. Always refer to specific instructions and recommendations from the engine manufacturer.

NOTE: Before starting the engine, read **Chapter 3**, **Instruments**, and **Chapter 4**, **Driver Controls**. Read the engine manufacturer's operating instructions before starting the engine.

⚠ WARNING

Never pour fuel or other flammable liquid into the air inlet opening in the air intake in an attempt to start the vehicle. This could result in a flash fire causing serious personal injury or property damage.

IMPORTANT: The New Cascadia vehicle is equipped with starter interlocks to enhance reliability and safety. Anti-grinding, starter pinion, and thermal protection logic limit the amount of time and conditions for starter engagement. Cranking may be limited from 5 to 15 seconds, with a 30-second cool-down period, as determined by the protection logic. If the engine is turning, the starter will not engage. Depending on the transmission option, the starter will not engage if the clutch is not fully depressed, or if the transmission is not in neutral.

IMPORTANT: The starter **can not** be used for priming the fuel system. If the fuel/water separator filter is replaced, and the fuel system needs to be primed, see the engine manufacturer's operating instructions.

1. Before engine start-up, complete the pre- and post-trip inspections and maintenance procedures in **Chapter 25**.
2. Set the parking brake.
3. Place the transmission in neutral. On vehicles with manual transmissions, fully depress the clutch pedal.

NOTE: Depending on local jurisdictional emissions regulations, vehicles and/or engines that are domiciled outside of the U.S. and Canada may not be equipped with the STARTER BLOCKED function.

4. Turn the ignition switch to the ON position and allow the self-check to complete. See **Fig. 12.1**.

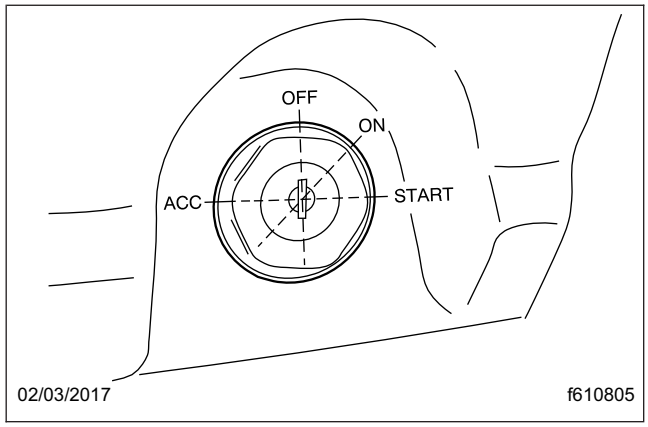


Fig. 12.1, Ignition Switch

NOTE: The driver display screen may present a STARTER BLOCKED message if the gauge sweep is not completed, the transmission is in gear, or the starter has overheated.

5. Once the gauge sweep has completed, turn the ignition key to the START position. Release the key the moment the engine starts.

   If the vehicle is equipped with an engine start switch (see **Fig. 12.2**), hold the switch down while turning the ignition key to the START position. Release the switch and the key the moment the engine starts.

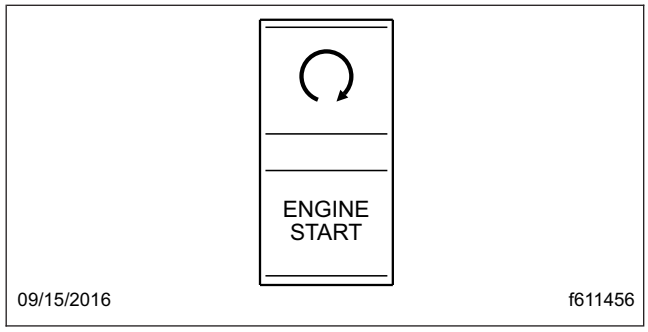


Fig. 12.2, Engine Start Switch

NOTICE

Do not rev the engine if the oil pressure gauge indicates no oil pressure. Shut down the engine

if oil pressure does not build within approximately ten seconds. Check to determine the cause of the problem. Operating the engine with no oil pressure will damage the engine.

6. It is not necessary to idle the engine before engaging or starting the operation, but load should be applied gradually during the warm-up period until the oil temperature reaches 140°F (60°C).
7. Apply load gradually during the warm-up period.

NOTICE

If the oil pressure gauge indicates no oil pressure, shut down the engine within approximately ten seconds to avoid engine damage.

8. Check the oil pressure gauge for any drop in lubricating oil pressure or mechanical malfunction in the lubricating oil system. Minimum oil pressure at idle is 7 psi (50 kPa).

Cold-Weather Starting

See the engine manufacturer's operation manual for starting aids that are approved for specific engines.

Starting After Extended Shutdown

Before engine start-up, complete the engine pretrip inspections in **Chapter 25**.

NOTICE

Failure to eliminate water-diluted lubricating oil may lead to serious engine damage at startup.

An engine in storage for an extended period of time (over winter, for example) may accumulate water in the oil pan through normal condensation of moisture on the internal surfaces of the engine. Oil diluted by water cannot provide adequate bearing protection at start-up. For this reason, change the engine oil and filters after extended storage.

Engine Operation

Safety and Environmental Considerations

WARNING

Do not operate the engine in an area where flammable vapors such as gasoline or diesel fumes are present. Shut off the engine when in an area where flammable liquids or gases are being handled. Failure to observe these precautions could result in serious injury or death.

All engines on Freightliner vehicles comply with the requirements of the Federal (U.S.) Clean Air Act. Once an engine is placed in service, the responsibility for meeting both state and local regulations is with the owner/operator.

IMPORTANT: Depending upon local jurisdictional emissions guidelines, vehicles that are domiciled outside of the U.S. and Canada may not have engines and/or emissions aftertreatment systems that are compliant with EPA10 or GHG21 regulations.

NOTICE

It is extremely important that the following guidelines be followed for engines that comply with EPA07 or newer regulations, or damage may occur to the aftertreatment device, and the warranty may be compromised.

- **Use ultralow-sulfur diesel with 15 ppm sulfur content or less.**
- **Do not use fuel blended with used engine lube oil or kerosene.**
- **Use only engine lube oil with a sulfated ash level less than 1.0 wt%; API CJ-4, CK-4, and FA-4 oils meet this requirement.**

A Top Tier™ compliant fuel is recommended. Look for the symbol that denotes a Top Tier compliant fuel; see **Fig. 12.3**.

Fig. 12.3, Top Tier Fuel Symbol

Adequate maintenance of the engine and the diesel particulate filter (DPF) are the responsibility of the owner/operator, and are essential to keep the emission levels low. Good operating practices, regular maintenance, and correct adjustments are factors that will help keep emissions within the regulations.

The driver should be familiar with the vehicle warning system in order to bring the vehicle to a safe stop if

the engine malfunctions. If the driver doesn't understand how the warning system works, an engine shutdown could occur, causing a safety hazard. See **Chapter 13** for more information.

Engine Break-In

Each engine must pass a full-load operating test on a dynamometer before shipment, thereby eliminating the need for a break-in. Before running the engine for the first time, follow the instructions in the manufacturer's engine operation manual.

Normal Operation

⚠ WARNING

Do not operate the engine in an area where flammable vapors such as gasoline or diesel fumes are present. Shut off the engine when in an area where flammable liquids or gases are being handled. Failure to observe these precautions could result in serious injury or death.

Every engine has an operating range in which it performs most efficiently. The operating range extends from maximum torque rpm at the low end, to engine rated speed at the high end. Most engines deliver best fuel economy when operated in the low- and mid-speed segments of the efficiency range and produce maximum horsepower at rated speed, which is also the recommended maximum speed of the engine. For further engine-specific information, refer to the engine manufacturer's operation manual.

Prolonged idling of engines is not recommended, and is illegal in some states. Idling produces sulfuric acid that is absorbed by the lubricating oil, and eats into bearings, rings, valve stems, and engine surfaces. If you must idle the engine for cab heating or cooling, use the high idle function of the cruise control switches. An idle speed of 900 rpm should be enough to provide cab heat in ambient temperatures that are above freezing.

If the engine is programmed with an idle shutdown timer, 90 seconds before the preset shutdown time, the CHECK engine light will begin to flash at a rapid rate. If the position of the clutch pedal or service brake changes during this final 90 seconds the idle shutdown timer will be disabled until reset.

Cold-Weather Operation

Satisfactory performance of a diesel engine operating in low ambient temperatures requires modification of the engine, surrounding equipment, operating practices, and maintenance procedures. The lower the temperature, the greater the amount of modification required. For service products approved for use in cold weather for your engine, see the engine manufacturer's engine operation manual.

If satisfactory engine temperature is not maintained, maintenance costs will increase due to greater engine wear. If the engine coolant gets too cold, raw fuel will wash the lubricating oil off the cylinder walls and dilute the crankcase oil, causing all moving parts of the engine to suffer from poor lubrication.

If the engine is in good mechanical condition and the precautions necessary for cold-weather operation are taken, ordinary cold weather will not cause difficulty in starting or loss of efficiency.

The following points are important to observe when operating in cold weather.

- Check for cracks in the battery cases, for corrosion of the terminals, and for tightness of the cable clamps at the terminals.
- Charge the batteries to full capacity. Replace damaged batteries.
- If equipped, turn off the load disconnect switch after the engine is shut down to prevent battery discharge.
- Have the alternator output checked at an authorized Freightliner service provider.
- Check the condition and tension of the drive belts.
- Refer to the engine manufacturer's operation manual for recommended heaters, low-viscosity lubricating oils, winter-grade fuels, and approved coolants.
- Periodically check the coolant mixing ratio (concentration of antifreeze in the coolant). Add more if necessary.
- At outside temperatures below -4°F (-20°C), a coolant preheater is recommended.

NOTICE

For Detroit engines (EPA07 and newer), use of a winterfront is not recommended, as it can cause false fault codes with the engine and aftertreatment system, and possible emission component failures.

If using a winterfront, leave at least 25% of the grille opening exposed in sectioned stripes that run perpendicular to the charge-air-cooler tube-flow direction. This assures even cooling across each tube, and reduces header-to-tube stress, and possible chance of component failure. For engine-specific guidelines, see below:

Cummins engines: A winterfront may be used to improve cab heating while idling, and only when the ambient temperature remains below 10°F (-12°C).

Detroit engines: Use of a winterfront is not recommended. Using a winterfront can cause excessive fan run time, increased fuel consumption, and failure of the DEF system heaters to operate correctly, resulting in fault codes, poor performance, and power reduction. A winterfront should only be used temporarily in the following situations:

- To improve cab heating while idling in an extremely cold ambient temperature;
- When the ambient temperature remains below -22°F (-30°C) and the engine is unable to maintain a running coolant temperature of 175°F (80°C) during normal over-the-road operation.

High-Altitude Operation

Engines lose horsepower when operated at high altitude because the air is too thin to burn as much fuel as at sea level. This loss equals about three percent for each 1000 ft (300 m) altitude above sea level for a naturally aspirated engine.

All engines used on Freightliner vehicles are altitude-compensated by the use of a turbocharger. This reduces smoky exhaust at high altitudes, requires less downshifting, and allows the engine to make better use of its fuel. Nevertheless, shift gears as needed to avoid excessive exhaust smoke.

Engine Shutdown

1. With the vehicle stopped, set the parking brake and place the transmission in neutral.

NOTICE

Idle the engine one to two minutes before shutting it down. After hard operation, shutting down the engine without idling may cause damage to the turbocharger.

2. Allow the engine to idle one to two minutes before shutting it down. This allows the lubricating oil and the coolant to carry heat away from the combustion chambers, bearings, shafts, and seals.
3. Turn off the ignition switch and shut down the engine.

Engine Protection—Warning and Shutdown

The driver should be familiar with the vehicle warning system in order to bring the vehicle to a safe stop if necessary. If the driver doesn't understand how the warning system works, the driver may not be able to utilize the advantage of the advance warning system to pull over appropriately.

The engine will begin a warning and derate and/or shutdown process if the engine coolant temperature, coolant level, engine oil pressure, or exhaust aftertreatment system (ATS) reach preset levels. On some engines, the warning process will begin when the engine oil temperature, engine coolant temperature, or the intake air temperature reach preset levels. Detroit™ engines may also begin the warning and shutdown process if water is detected in the fuel.

See the engine manufacturer's operation manual for specific details for your vehicle. See **Chapter 14** for the warning and shutdown modes associated with the ATS.

Electronic engine protection can be specified as either SHUTDOWN or WARNING and DERATE.

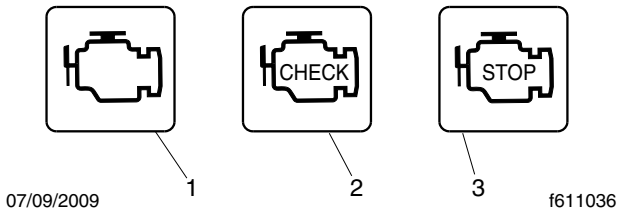
⚠ WARNING

When the STOP engine or CHECK engine lamp illuminates, most engines are programmed to shut down automatically within 30 seconds. The driver must immediately move the vehicle to a safe location at the side of the road to prevent causing a hazardous situation that could cause bodily injury, property damage, or severe damage to the engine.

In SHUTDOWN mode, the red STOP engine lamp will illuminate when the problem is serious enough to reduce power or speed. See **Fig. 12.4**. Engine power will ramp down, then the engine will shut down if the problem continues while in derate mode. The driver has 30 or 60 seconds (depending on the critical fault type) after the STOP engine lamp illuminates to move the vehicle safely off the road. If the vehicle

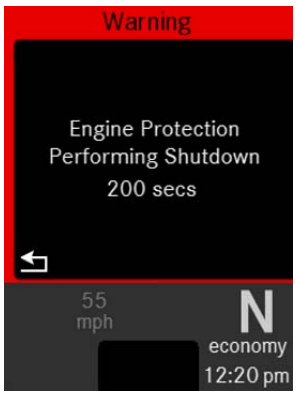
cannot be moved to a safe location within that time, turn the ignition switch to OFF for at least five seconds, then restart the engine. Repeat this action until the vehicle is safely off the road.

NOTE: In addition to the warning lamp, the driver display screen will present a warning message when the engine is in SHUTDOWN mode. See **Fig. 12.5**. For vehicles with Detroit engines only, the time remaining before shutdown is displayed.



1. Malfunction Indicator Lamp (MIL)
2. CHECK Engine Lamp
3. STOP Engine Lamp

Fig. 12.4, Engine Warning Lamps



NOTE: On vehicles with Detroit engines only, the time remaining before shutdown is displayed.

Fig. 12.5, Shutdown Alert

Do not operate the vehicle further until the problem causing the shutdown has been corrected.

Some vehicles may have a shutdown override switch, which can be used to momentarily override the shutdown sequence. This switch resets the shutdown timer, restoring power to the level before the derate. The switch must be pressed again after five seconds to obtain a subsequent override. See **Fig. 12.6**.

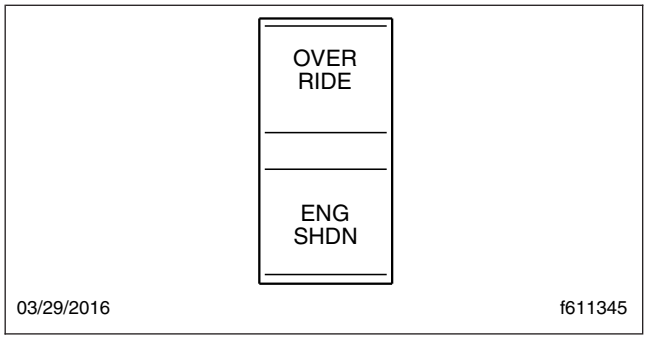


Fig. 12.6, Shutdown Override Switch

NOTICE

When the derate process begins, immediately get the vehicle serviced in order to prevent severe damage to the engine.

Detroit engines may begin a warning and derate process if water is detected in the fuel, or for high engine coolant temperature. In WARNING and DERATE mode, the CHECK engine, STOP engine, or MIL lamp will illuminate to indicate an engine problem that requires service and the engine controls will begin a derate of engine output. Continuing to run the engine while it is in derate mode could cause severe damage to the engine.

13

Optional Engine Systems

Engine Idle Limiting

Idle Shutdown Timer

This feature is an optional 1- to 100-minute idle shutdown system with a timer on the driver display screen. Its purpose is to conserve fuel by eliminating excessive idling. Idle shutdown timing and parameters are programmable. See the engine manufacturer's operation manual for specific details for your vehicle.

Optimized Idle®

Optimized Idle is an optional feature on vehicles equipped with Detroit engines. Optimized Idle reduces engine idle time by running the engine only as required when the vehicle is parked.

Optimized Idle automatically shuts down and restarts the engine as needed to:

- keep the engine oil temperature between programmed limits;
- maintain battery voltage;
- keep the cab and sleeper areas at the thermostat setting; and
- in coordination with the Dual HVAC system (if equipped), maintain the battery and assist in HVAC.

The benefits of the system include reduced engine idle time, fuel savings, reduction of exhaust emissions and noise, increased starter and engine life, and a reduced chance of dead batteries.

Optimized Idle operates in the following modes:

- Cold startability mode and battery mode: both modes keep the battery charged and engine oil temperature between programmed limits.
- Interior comfort mode (for sleeper cabs without a Dual HVAC system): keeps the cab and sleeper at a constant preset temperature, in addition to all functions available in cold startability and battery modes. Extended and continuous run modes allow the engine to keep running longer if necessary.
- Interior comfort mode with a Dual HVAC system: keeps the cab and sleeper at a constant preset temperature, in addition to all functions available in cold startability and battery modes.

In cold startability mode, Optimized Idle starts the engine when engine oil temperature drops to a programmable preset lower limit. The engine is shut down when engine oil temperature reaches a programmable upper limit, unless the requirements of other active modes require the engine to keep running.

In battery mode, the engine runs for 2 hours before shutting down. On vehicles without a Dual HVAC system, the engine will run an additional 2 hours in extended mode if necessary, and continuously in continuous mode. When in continuous mode, the driver display will indicate Optimized Idle status as "continuous battery mode." Continuous mode may indicate a problem, such as a bad battery.

Interior comfort mode controls the temperature set point, which is the desired temperature of the cab and sleeper, and the comfort zone, which is the allowed temperature deviation from the set point before the engine starts.

Interior comfort mode with a Dual HVAC system operates with the following parameters regarding the set point and comfort zone:

- If the bunk area temperature reaches more than 10°F (5.5 °C) above the set point the comfort zone is exceeded and the Dual HVAC system immediately requests the engine to start for comfort support cooling.
- Bunk area temperatures 5 to 10°F (2.8 to 5.5°C) above the set point for over twenty minutes will cause the Dual HVAC system to request the engine to start for comfort support cooling.
- If the bunk area temperature drops to more than 10°F (5.5 °C) below the set point, the comfort zone is exceeded and the Dual HVAC system immediately requests the engine to start for comfort support heating.
- Temperatures 5 to 10°F (2.8 to 5.5 °C) below the set point for over twenty minutes will cause the Dual HVAC system to request the engine to start for comfort support for heating.

In extreme ambient conditions, comfort mode may stay on continuously.

NOTE: If the mode settings are changed while in one mode, the system may continue running in another mode.

When Optimized Idle is on, it may turn off these functions to reduce stress on the batteries:

- Cab climate control fan

- Sleeper climate control fan
- Mirror heat
- Fuel/water separator heat
- Seat heat
- Advertising light
- Auxiliary circulation fan (windshield)
- Air dryer

Activating Optimized Idle

The vehicle must be in neutral gear, the hood latched, and the park brake set for Optimized Idle to work. Failure to meet these conditions will result in a checklist pop-up screen showing both the met and unmet conditions. See **Fig 13.1.**

Fig. 13.1, Optimized Idle Activation Conditions Pop-Up

Dismiss the pop-up screen, fix the issue(s), and restart Optimized Idle.

NOTE: Turning the sleeper HVAC fan off will turn off the interior comfort mode until the fan is turned back on.

1. Set the parking brake.
2. If open, close and secure the hood.
3. Allow the engine to idle if it is running. If the engine is not running, turn the key to the ON position.
4. Put the transmission in neutral.
5. Navigate to the Optimized Idle screen on the driver display. See **Fig. 13.2**.
6. Press OK on the steering wheel switch pod to view the mode option screen. See **Fig. 13.3**.

Fig. 13.2, Optimized Idle Start Screen

7. Select OK to enable Optimized Idle, and, if desired, turn on the interior comfort mode (sleeper cabs only). The current Optimized Idle state is displayed. See **Fig. 13.4**.

   When Optimized Idle is active, the Optimized Idle telltale illuminates at the bottom of the driver display. See **Fig. 13.5**.

   If Optimized Idle fails to start, see the driver display for information.

Fig. 13.3, Optimized Idle Mode Selection Screen

8. If the interior comfort mode is activated (sleeper cabs only), set the desired temperature and fan speed on the sleeper HVAC controls.

   The allowable temperature range for Optimized Idle operation is 65 to 80°F (18 to 27°C).

   Optimized Idle will operate the engine, starting and turning it off as needed to maintain battery charge, engine oil temperature, and cab/sleeper temperature.

Fig. 13.4, Optimized Idle State Screen

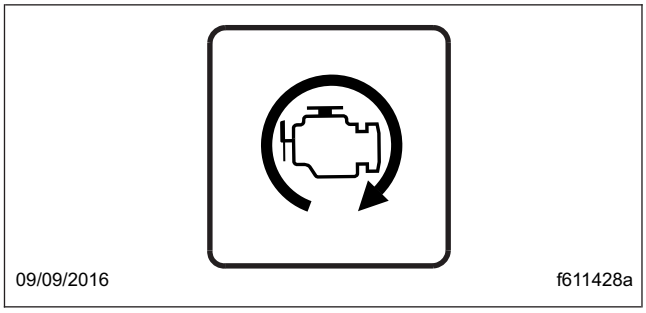


Fig. 13.5, Optimized Idle Telltale

Reactivating Optimized Idle

If the hood is opened or the vehicle is put into gear while Optimized Idle is running, the system will enter a safety loop and a pop-up will appear. See **Fig. 13.6.** Restoring operating conditions (e.g. closing the hood or setting the transmission in neutral) and performing a key cycle will allow you to reactivate Optimized Idle.

Deactivating Optimized Idle

Optimized Idle can be shut down by:

- using the Optimized Idle menu screens on the driver display;
- turning off the ignition;
- using the drive-away feature, as follows.

1. If the engine is running: Release the parking brakes, put the transmission in gear (automated/automatic transmissions), or depress the clutch (manual transmissions).

   If the engine is not running: Start the engine. Release the parking brakes, put the transmission in gear (automated/automatic transmissions), or depress the clutch (manual transmissions).

2. Let the engine return to base idle. The telltale will turn off. Optimized Idle is now disabled.

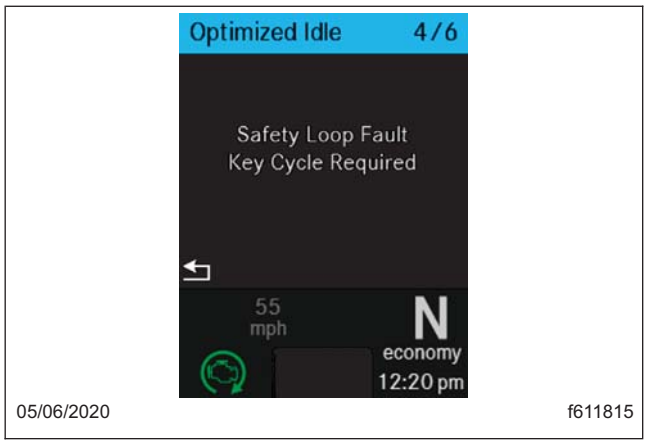


Fig. 13.6, Safety Loop Pop-Up

Power Takeoff (PTO) Governor

⚠ WARNING

To avoid injury, do not install a PTO that is not Detroit Diesel approved onto a Detroit™ Transmission. Use of a non-Detroit Diesel approved PTO with a Detroit Transmission could result in unintended operation which could lead to severe personal injury.

Engine power takeoffs (PTO) tap into engine power to run auxiliary devices, such as hydraulic pumps that power additional equipment. The following are general guidelines for operating a PTO.

1. Set the parking brake and put the transmission in neutral.
2. Press the dash PTO switch. Release the switch when the light begins to blink.

   When the light illuminates steadily, the PTO is engaged and ready to operate. In stationary mode, the vehicle must remain in neutral with the parking brake set.
3. To activate mobile mode, shift from neutral to reverse, 1st, or 2nd gear. The clutch will open and the PTO will disengage for a moment.
4. Touch the accelerator pedal to close the clutch and engage the PTO in mobile mode. The PTO

may be operated with the transmission in neutral or reverse, and 1st and 2nd gears only.

NOTE: Do not attempt to change gears while the vehicle is moving. The transmission will ignore the request.

5. To deactivate mobile mode, bring the vehicle to a stop. The clutch will open and shut down power to the PTO.
6. To resume stationary mode, shift to neutral. The PTO will engage.
7. To deactivate PTO, press the PTO switch again. When the light in the switch goes out, power to the PTO is shut off.

14

Emissions and Fuel Efficiency

Greenhouse Gas Emissions and Fuel Consumption Standards

Model year 2007 and later vehicles and/or engines domiciled in the U.S. or Canada are designed to meet Emission and Fuel Efficiency Standards of the U.S. (Federal) Environmental Protection Agency (EPA), the National Highway Traffic Safety Administration (NHTSA), Emission Regulations under the Canada Motor Vehicle Safety Act in Canada, and the California Air Resources Board (CARB) effective as per the applicable emission model year. To determine an engine's or vehicle's emission model year, refer to the respective EPA/CARB certification label.

EPA Regulations	
Regulation	**Emissions Components**
EPA07 (Reduction of nitrogen oxides (NOx) emissions to 1.1 g/bhp-hr, and particulate matter emissions to 0.01 g/bhp-hr)	Aftertreatment device (ATD) containing a diesel particulate filter that traps soot and ash.*
EPA10 (Reduction of NOx emissions to 0.2 g/bhp-hr)	EPA07-type ATD, with additional selective catalyst reduction (SCR) technology that utilizes diesel exhaust fluid (DEF) to convert NOx to nitrogen and water vapor.
GHG14 (Reduction of greenhouse gas emissions)	Fuel efficiency components including, but not limited to, engines, tires, aerodynamic components, vehicle speed limiters, and idle reduction timers specifically designed to meet regulatory fuel efficiency and greenhouse gas emissions standards.
GHG17	Fuel efficiency components including, but not limited to, engines, tires, aerodynamic components, vehicle speed limiters, and idle reduction timers specifically designed to meet regulatory fuel efficiency and greenhouse gas emissions standards.
GHG21	GHG14/17 components plus additional components including, but not limited to, transmissions, axles, predictive technologies, idle reduction technologies for vocational vehicles, tire pressure monitoring systems.

* Cummins and Detroit ATD's are also equipped with a diesel oxidation catalyst to break down pollutants.

Table 14.1, EPA Regulations

Emission Regulations by Model Year		
Model Year	**Engine Regulation**	**GHG Regulation**
2007–2009	EPA07	N/A
2010–2012	EPA10	N/A
2013–2015	EPA10, GHG14	GHG14
2016	EPA10, GHG17	GHG14
2017–2020	EPA10, GHG17	GHG17
2021–and later	EPA10, GHG21	GHG21

Table 14.2, Emission Regulations by Model Year

EPA-Regulated Emissions Aftertreatment Systems

NOTICE

Follow these guidelines for engines that comply with EPA07 or newer regulations, or damage may occur to the aftertreatment device (ATD) and the warranty may be compromised.

- **Use ultralow-sulfur diesel with 15 ppm sulfur content or less.**
- **Do not use fuel blended with used engine lube oil or kerosene.**
- **Engine lube oil must have a sulfated ash level less than 1.0 wt %; API CJ-4, CK-4, and FA-4 oils meet this requirement.**

IMPORTANT: Using non-specification fuels or oils can lead to shortened diesel particulate filter (DPF) cleaning or replacement intervals. For example, using CI-4 Plus oil with 1.3% sulfated ash (30% more ash content) may result in the

need for DPF cleaning or replacement 20 to 30% sooner than would normally be required.

IMPORTANT: See the engine manufacturer's operation manual for complete details and operation of the ATS.

Euro V Emission Compliant Engines for Export

IMPORTANT: Depending on local jurisdictional guidelines, vehicles that are domiciled outside of the U.S. and Canada may not have emissions aftertreatment systems (ATS) that are compliant with EPA regulations.

Vehicles sold with Euro V engines for export are required to use diesel with a maximum sulfur content as follows:

- Cummins Engines 50 ppm (tolerant to 500 ppm)
- Detroit Engines 50 ppm

See **Fig. 14.1** for an example of the label.

Fig. 14.1, Euro V Engine Label (Detroit engine label shown)

EPA10 and Newer Engines

The EPA mandates that all engines built after December 31, 2009 must reduce the level of emissions exhausted by the engine to the following levels:

- Nitrogen Oxides (NOx) – 0.2 g/bhp-hr
- Particulate Matter (PM) – .01 g/bhp-hr

To meet EPA guidelines, engines that are compliant with EPA10 and newer regulations use an ATS where the exhaust first passes over the diesel oxidation catalyst (DOC), then passes through the diesel particulate filter (DPF), which traps soot particles. The soot is burned to ash during a process called regeneration (regen). A Selective Catalytic Reduction (SCR) device is used to reduce NOx downstream of the engine. After exhaust gases leave the DPF, a controlled quantity of diesel exhaust fluid (DEF) is injected into the exhaust stream. In the presence of heat, DEF is converted to ammonia gas, which reacts with NOx in the selective catalyst chamber to yield nitrogen and water vapor, which exit through the tailpipe.

Regeneration

The harder an engine works, the better it disposes of soot. If the exhaust temperature is high enough, a process called **passive regeneration** (regen) occurs as the vehicle is driven normally. However, if the engine isn't running hot enough, the electronic controls may initiate an **active regen**, whereby extra fuel is injected into the exhaust stream to superheat and reduce the soot trapped in the DPF to ash. Active regen happens only when the vehicle is moving above a certain speed, determined by the engine manufacturer. See your engine operation manual for complete details. Both active and passive regen happen automatically, without driver input.

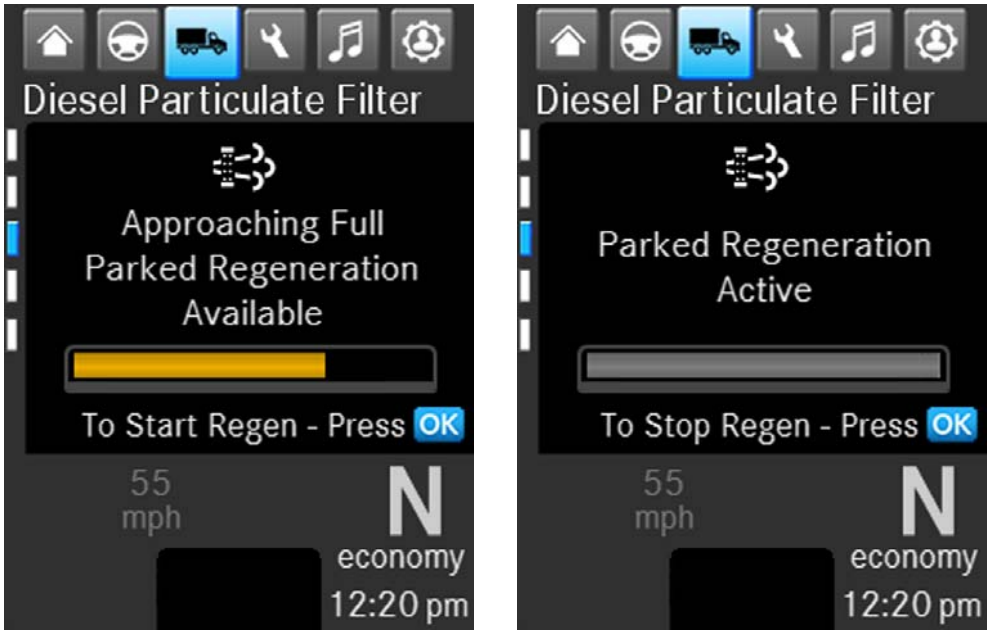
⚠ WARNING

Active regeneration can occur automatically anytime the vehicle is moving. The exhaust gas temperature could reach 1500°F (800°C), which is hot enough to cause a fire, heat damage to objects or materials, or personal injury to persons near the exhaust outlet. The exhaust temperature can remain high even after the vehicle has stopped. When stopping the vehicle shortly after an automatic regen, ensure the exhaust outlets are directed away from structures, vegetation, flammable materials, and anything else that may be harmed by exposure to high heat.

See *Regen Switches*, below, for instructions on preventing automatic regen if necessary.

When operating conditions do not allow for ATD filter cleaning by active or passive regen, the vehicle may require a driver-activated **parked regen**. When this occurs, the driver display screen presents a message indicating that a regen is required. See **Fig. 14.2**. The driver must either bring the vehicle up to highway speed to increase the load (thus starting an active regen), or park the vehicle and initiate a parked

regen. See *Regen Operations*, below, for instructions on initiating a parked regen.



A. Start Regen Message Screen

B. Stop Regen Message Screen

Fig. 14.2, Parked Regen Message Screens

Regen Operations

Parked regen is initiated by selecting OK when the driver display screen shows "Parked Regen Required." See **Fig. 14.2**. If the vehicle is equipped with the optional digital STOP REGEN switch, parked regen can be stopped by selecting OK while the regen is in progress. See **Fig. 14.2**.

Some vehicles may be equipped with a regen inhibit switch. See **Fig. 14.3**. To stop a regen in progress or prevent the start of a regen, press the lower half of the switch. Regen is then delayed until the switch is no longer active.

NOTE: Parked regen can be initiated only when the DPF lamp is illuminated.

⚠ WARNING

During parked regen, exhaust temperatures are very high and could cause a fire, heat damage to objects or materials, or personal injury to persons near the exhaust outlet.

Before initiating a parked regeneration, make certain the exhaust outlets are directed away from structures, vegetation, flammable materials, and anything else that may be harmed by prolonged exposure to high heat.

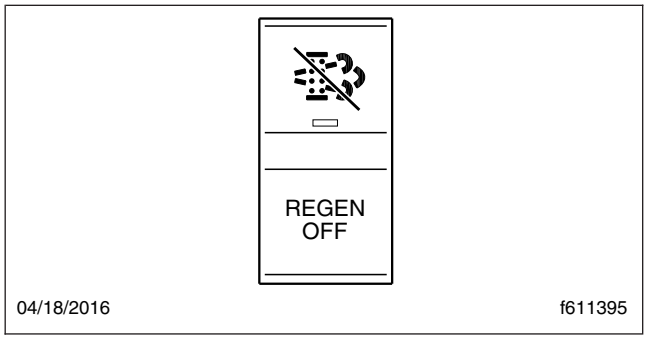


Fig. 14.3, Regen Inhibit Switch

To initiate a parked regen, perform the following steps.

1. Park the vehicle away from all flammable materials, put the transmission in neutral, and set the parking brake.

2. Start and warm the engine until the coolant temperature is at least 150°F (66°C).
3. Select OK when the DPF screen is displayed on the driver display screen. See **Fig. 14.2**. Select OK again to confirm regen. As the regen process is initiated, engine rpm increases and the HEST lamp illuminates to indicate extremely high exhaust temperatures.

IMPORTANT: The driver is responsible for ensuring, during the entire regen cycle, that anything that could be harmed by exposure to high heat does not come in contact with the exhaust gases flowing from the outlets.

4. The regen cycle will finish after 20 to 60 minutes, at which time engine idle speed drops to normal and the vehicle can be driven normally. The HEST lamp is extinguished when vehicle speed exceeds 5 mph (8 km/h) or the system has cooled to normal operating temperature.
5. To stop a parked regen at any time during the process:
    - depress the clutch pedal, brake pedal, or accelerator pedal;
    - select OK on the parked regen screen while the regen is active, then select OK again to confirm;
    - press and hold the regen inhibit switch until idle returns to normal;
    - shut down the engine.

ATS Warning Lamps and Messages

There are three warning lamps that alert the driver of high exhaust temperature, the need to perform a parked regen or service the DPF, or of an engine fault that affects emissions. A decal attached to the driver's sun visor explains the ATS warning lamps.

Malfunction Indicator Lamp (MIL)

A steadily illuminated yellow malfunction indicator lamp (MIL) indicates an engine fault that affects emissions. See **Fig. 14.4**.

DPF Status Lamp and Messages

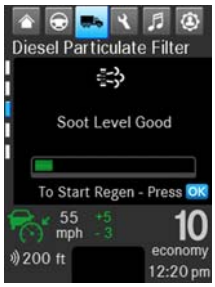
When soot accumulates in the DPF, the driver display screen presents a DPF status bar. As the soot level in the DPF reaches 60%, the DPF status lamp illuminates. See **Fig. 14.5**. Perform a parked regen or bring the vehicle up to highway speed to increase the load (thus starting an active regen). After the soot level in the DPF reaches 80%, a parked regen is necessary.

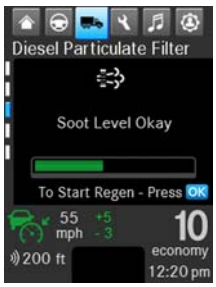
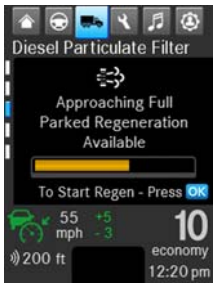
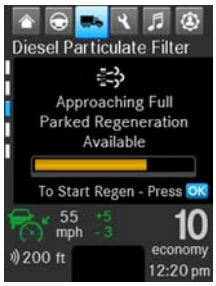
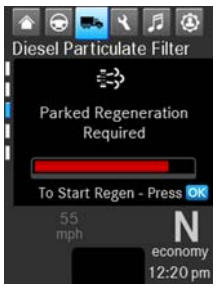
For an explanation of DPF zones, message screens, warning lamps, and available regen modes, see **Table 14.3** (Detroit engines) or **Table 14.4** (Cummins engines).

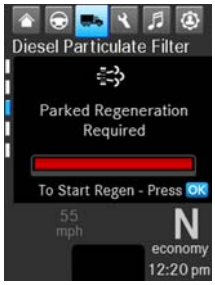
If the DPF status lamp blinks and the driver display screen shows a red status bar (90% full), initiate a parked regen immediately in order to prevent an engine derate.

If the DPF status lamp blinks, and the driver display screen shows a DPF status bar that is fully red (100% full), begin a parked regen in order to prevent an engine shutdown. Park the vehicle and perform a parked regen.

DPF Zones, Detroit Engines

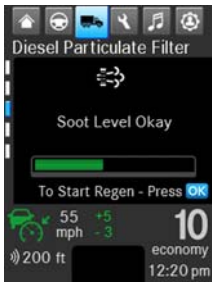
DPF Zone	DPF Status Bar	Warning Lamps	Regen Mode Available
0	 06/10/2016 f611398 0–10% Green	—	• passive

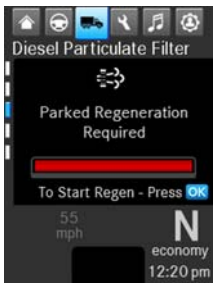
DPF Zones, Detroit Engines			
DPF Zone	**DPF Status Bar**	**Warning Lamps**	**Regen Mode Available**
1	 06/10/2016 f611399 10–60% Green	—	• over-the-road
2	 06/10/2016 f611400 60–70% Yellow	 DPF solid yellow  HEST solid yellow*	• over-the-road • parked
3	 06/10/2016 f611401 70–80% Yellow	 DPF flashing yellow  HEST solid yellow*	• over-the-road • parked
4	 06/10/2016 f611402 80–90% Red	 DPF flashing yellow  HEST solid yellow*	• parked

DPF Zones, Detroit Engines			
DPF Zone	**DPF Status Bar**	**Warning Lamps**	**Regen Mode Available**
5	 06/10/2016 f611403 90–100% Red	 DPF flashing yellow  HEST solid yellow*	• parked

* Illuminates if exhaust temperature is above a preset limit.

Table 14.3, DPF Zones, Detroit Engines

DPF Zones, Cummins Engines			
DPF Zone	**DPF Status Bar**	**Warning Lamps**	**Regen Mode Available**
1	 06/10/2016 f611399 0–60% Green	—	• over-the-road
3	 06/10/2016 f611401 60–80% Yellow	 DPF flashing yellow  HEST solid yellow*	• over-the-road • parked

DPF Zones, Cummins Engines			
DPF Zone	**DPF Status Bar**	**Warning Lamps**	**Regen Mode Available**
5	 06/10/2016 f611403 80–100% Red	 DPF flashing yellow  HEST solid yellow*	• parked

* Illuminates if exhaust temperature is above a preset limit.

Table 14.4, DPF Zones, Cummins Engines

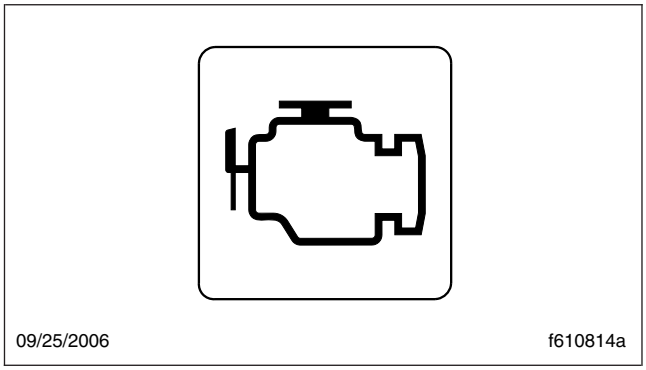


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Fig. 14.4, Malfunction Indicator Lamp (MIL)

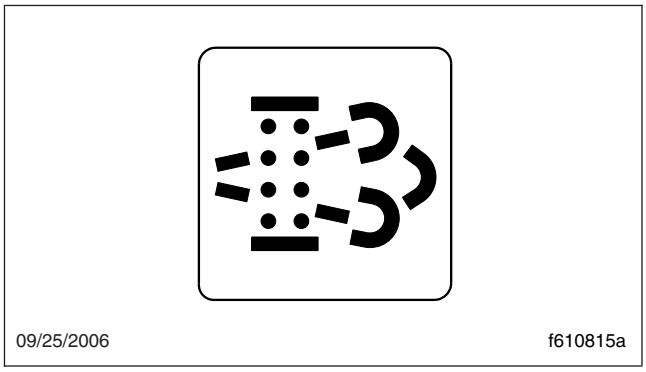

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Fig. 14.5, DPF Status Lamp

High Exhaust System Temperature (HEST) Lamp

Slow (10-second) flashing of the high exhaust system temperature (HEST) lamp indicates that a parked regen is in progress, and the engine's high idle speed is being controlled by the engine software, not the vehicle driver.

Steady illumination of the HEST lamp alerts the driver of high exhaust temperature during the regen process if the vehicle speed is below 5 mph (8 km/h), or during a parked regen. See **Fig. 14.6**.

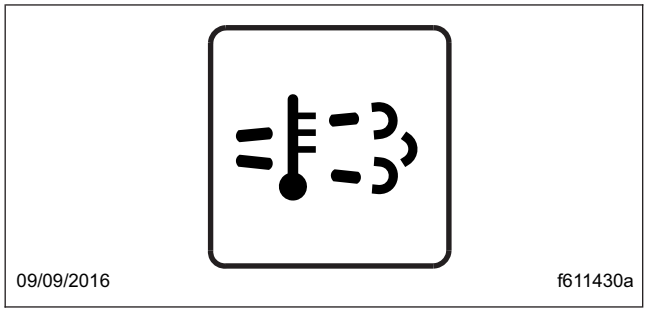

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Fig. 14.6, HEST Lamp

Maintenance

Authorized service facilities must perform any DPF service. For warranty purposes, maintain a record that includes:

- date of cleaning or replacement;
- vehicle mileage;
- particulate filter part number and serial number.

Diesel Exhaust Fluid and Tank

Diesel Exhaust Fluid

Diesel exhaust fluid (DEF) is used in the ATS to lower NOx in the exhaust stream. DEF is colorless

and close to odorless (it may have a slightly pungent odor similar to ammonia). It is nontoxic, nonflammable, and biodegradable. It is mildly corrosive to aluminum, but does not affect the strength or structure of the aluminum.

White crystals may be noticeable around components that come into contact with DEF. The crystals are easily removed with water.

DEF consumption varies depending on ambient conditions and vehicle application.

Freezing Conditions

DEF freezes to slush at around 12°F (-11°C). It is not damaged or destroyed if frozen, and is fully usable when thawed. The DEF in the tank is allowed to freeze while a vehicle is non-operational. At start-up, normal operation of the vehicle is not inhibited if the DEF is frozen; an immersion heater with engine coolant flowing through it warms the DEF once the engine is running, allowing the SCR system to operate.

DEF Tank

Engines that are compliant with EPA10 and newer regulations are equipped with a DEF tank located on the driver's side of the vehicle behind the battery box or forward of the fuel tank. The DEF tank has a 19 mm filler neck inlet that prevents the hose from a diesel outlet from being inserted, and has a blue cap for easy identification.

Fuel/DEF Gauge

The diesel fuel and DEF levels are measured in a dual-purpose gauge. Below the gauge, a low fuel warning lamp illuminates amber when the fuel level drops below 1/8th of the capacity. See **Fig. 14.7**.

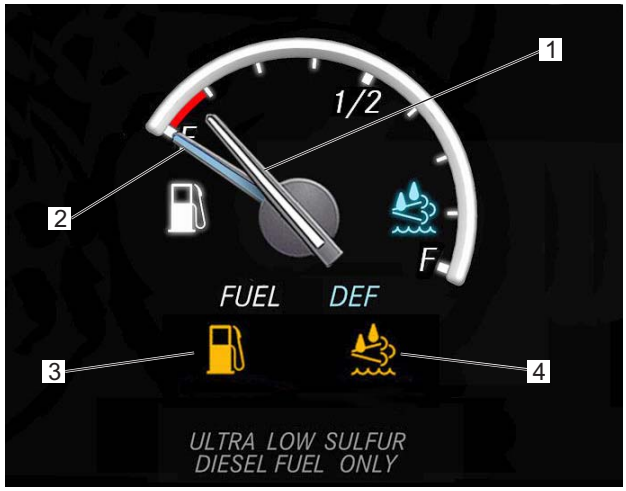
A DEF warning lamp illuminates amber when the DEF tank is near empty.

DEF Warnings and Engine Limits

IMPORTANT: Ignoring the DEF low level warnings results in limited engine power, with the application of a 5 mph (8 km/h) speed limit.

DEF Level Low—Initial Warning

When the DEF level is low, the DEF warning lamp illuminates solid amber, and the driver display screen presents an alert. See **Fig. 14.8**. Refill the DEF tank in order to cancel the warning sequence.



06/28/2016 f611409

1. Fuel Gauge Pointer
2. DEF Gauge Pointer
3. Low Fuel Level Warning Lamp
4. Low DEF Level Warning Lamp

Fig. 14.7, Fuel/DEF Gauge

DEF Empty

When the DEF level reads empty, the following lamps and messages notify the driver.

- The DEF warning lamp flashes amber.
- The MIL lamp illuminates.
- The driver display screen presents the warning, "DEF Tank Empty." See **Fig. 14.8**.

Power is limited with progressively harsher engine power limits applied.

DEF Tank Empty and Ignored

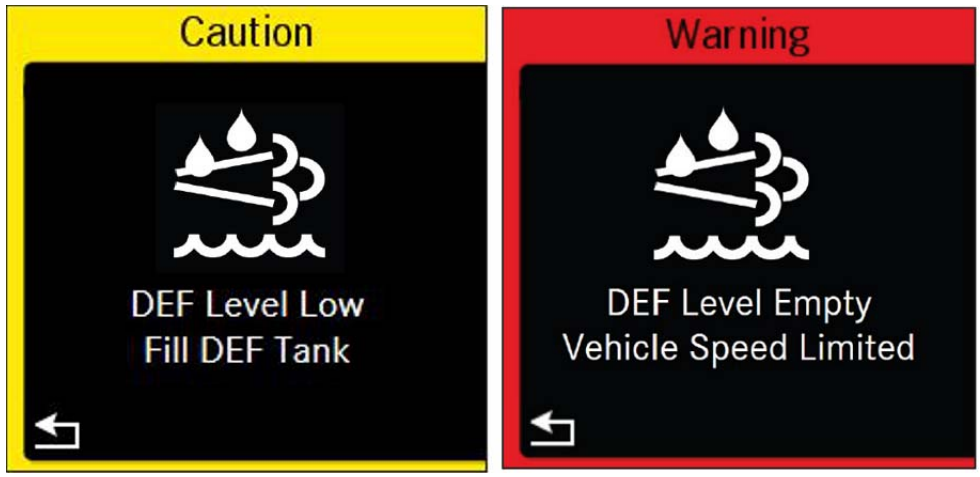
If the empty warning is ignored and the DEF tank is not refilled, the red STOP engine lamp illuminates in addition to the MIL lamp and CHECK engine lamp (on vehicles with a Cummins ISB or ISC/L engine).

If the DEF is not refilled, a 5 mph (8 km/h) speed limit is applied after the next engine shutdown, while parked and idling, or if a fuel refill is detected.

DEF Contamination or SCR Tampering

NOTICE

Once contaminated DEF or tampering has been detected, the vehicle must be taken to an authorized service facility to check the SCR system for



A. DEF Level Low

B. DEF Tank Empty

Fig. 14.8, DEF Level Messages

damage and to deactivate the warning lights and engine limits.

If contaminated DEF or tampering with the ATS is detected, the DEF warning light flashes and the MIL lamp illuminates to warn the driver. The CHECK engine lamp also illuminates on vehicles with a Cummins ISB or ISC/L engine.

- Detroit engines: Engine power is limited with progressively harsher limits applied. If the fault is not corrected, the STOP engine light illuminates and a 5 mph (8 km/h) speed limit is applied after the next engine shutdown, while parked and idling, or if a fuel refill is detected.
- Cummins engines: Engine power is limited with progressively harsher limits applied. If the fault is not corrected, the STOP engine light illuminates and a 5 mph (8 km/h) speed limit is applied after the next engine shutdown, or while parked and idling.

15

Brake Systems

Air Brake System

Brake System General Information

A dual air brake system consists of two independent air systems that use a single set of brake controls. Each system has its own reservoirs, plumbing, and brake chambers. The primary system operates the service brakes on the rear axle; the secondary system operates the service brakes on the front axle. Service brake signals from both systems are sent to the trailer.

⚠ WARNING

Do not operate the vehicle with the front brakes backed off or disconnected. Backing off or disconnecting the front brakes will not improve vehicle handling and may lead to loss of vehicle control, resulting in property damage or personal injury.

If air pressure drops below approximately 70 psi (483 kPa) in either system, a warning light illuminates and the driver display shows a warning. An audible alert also sounds if the park brake is not set. See **Table 15.1**.

If the low air pressure warning is activated, check the air pressure gauges to determine which system has low air pressure. Although the vehicle's speed can be reduced using the foot brake control pedal, either the front or rear service brakes will not be operating at full capacity, causing a longer stopping distance. Bring the vehicle to a safe stop and have the air system repaired before continuing.

NOTE: The buzzer sounds only when the park brake is released.

Brake System Warnings, Indicators, and Messages

Telltale	Color	Description		Driver Display
BRAKE AIR	Red	Low Air Pressure (EPA10 and Newer)	Indicates air pressure in the primary or secondary reservoir has dropped below approximately 70 psi (483 kPa).	 06/30/2016 f611429
(P) PARK	Red	Parking Brake (EPA10 and Newer)	Indicates the parking brake is engaged.	N/A
(ABS)	Amber	Vehicle ABS	Momentary illumination indicates the vehicle ABS is engaged. Solid illumination indicates a problem with the vehicle ABS. Repair the ABS immediately to ensure full braking capability.	N/A
(ABS)	Amber	Trailer ABS	Momentary illumination indicates the trailer ABS is engaged. Solid illumination indicates a problem with the trailer ABS. Repair the ABS immediately to ensure full braking capability.	N/A
	Amber	Stability Event	Flashing indicates a stability event has been detected, and the ESC system is active. Solid illumination indicates a problem with the stability system. Repair the ESC system immediately to ensure full stability capability. For more information on the ESC system, see **Chapter 7**.	N/A

Brake System Warnings, Indicators, and Messages				
Telltale	**Color**	**Description**		**Driver Display**
	Amber	Wheel Spin Event	Flashing indicates a wheel spin event has been detected, and the ATC system is active.	N/A
		ATC Deactivated	Indicates the ATC SPIN button has been pressed to allow wheel slip.	
	Green	Engine Brake	Indicates the engine brake is enabled.	N/A

Table 15.1, Brake System Warnings, Indicators, and Messages

IMPORTANT: In the event of a total loss of service brakes with full system air pressure, use the parking brake control valve (yellow knob) to bring the vehicle to a complete stop in the safest location possible.

Before a vehicle with insufficient system air pressure can be moved, the spring parking brakes must be released by applying an external air source at the gladhands, or by manually caging the parking brake springs.

⚠ WARNING

Do not release the spring parking brakes and then drive the vehicle. There would be no means of stopping the vehicle, which could result in serious personal injury or vehicle damage. Before releasing the spring parking brakes, make the connection to a towing vehicle or chock the tires.

After correcting the brake system problem, uncage the spring parking brakes before resuming normal vehicle operation.

Loss of air pressure in the primary air system causes the rear service brakes to become inoperative. The secondary air system will continue to operate the front brakes and the trailer brakes (if equipped).

Loss of air pressure in the secondary air system causes the front axle brakes to become inoperative. The primary air system will continue to operate the rear service brakes and the trailer brakes (if equipped).

Brake System Operation

Before driving your vehicle, allow time for the air compressor to build up a minimum of 100 psi (689 kPa) pressure in both the primary and secondary systems. Monitor the air pressure system by observing the air pressure gauges and the low-air-pressure warning light and buzzer. The warning light and buzzer shut off when air pressure in both systems reaches approximately 70 psi (483 kPa).

NOTE: The buzzer sounds only when the park brake is released.

IMPORTANT: Before driving the vehicle, secure all loose items in the cab so that they will not fly forward during a full brake application. Make sure all passengers are wearing seat belts.

During normal brake stops, depress the foot brake control pedal until braking action slows down the vehicle. Increase or decrease the pressure on the pedal so that the vehicle comes to a smooth, safe stop. Apply the spring parking brakes if the vehicle is to be parked.

IMPORTANT: An air brake proportioning system may be used in tractor air brake systems when the vehicle is not equipped with antilock braking system (ABS). When operating in bobtail mode, the rear brake chambers (on which the axle

load has been greatly reduced) receive reduced (proportional) air pressure, while the front axle brake chambers receive full (normal) air pressure. This results in a different brake pedal "feel," as the pedal seems to require more travel and/or effort to slow or stop the vehicle. However, the air brake proportioning system actually improves vehicle control when the tractor is in bobtail mode. When the tractor is towing a trailer, the rear brake chambers will receive full (normal) application air pressure.

When parking a vehicle attached to a trailer that does not have spring parking brakes, apply the tractor parking brakes. Chock the trailer tires before disconnecting the vehicle from the trailer.

⚠ WARNING

If a trailer or combination vehicle is not equipped with spring parking brakes, do not park it by pulling out only the trailer air supply valve knob. This would apply only the trailer service brakes. If air were to bleed from the trailer brake system, the trailer brakes would release, possibly causing an unattended runaway vehicle.

NOTICE

Never apply the service and spring parking brakes simultaneously. To do so transmits excessive input force to the brake components, which could damage or cause eventual failure of brake actuating components.

Brake Controls

The trailer brake lever (hand control valve) is used for applying the trailer brakes without applying the truck or tractor service brakes. It is usually mounted on the right-hand control panel. See **Fig. 15.1**. The valve can be partially or fully applied, but in any partially on position it will be overridden by a full application of the service brake pedal. Moving the lever down applies the trailer brakes, while moving it up releases the trailer brakes. The lever will automatically return to the up position when it is released.

⚠ WARNING

Do not use the trailer service brakes for parking; they are not designed for this purpose. If air bleeds out of the trailer air tank during parking, the vehicle could roll, causing serious personal injury or property damage.

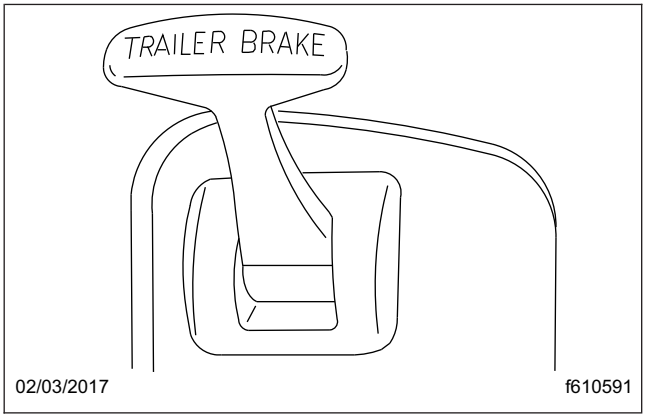
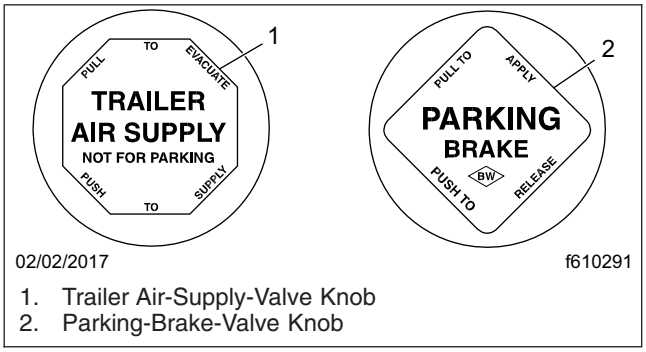


Fig. 15.1, Trailer Brake Lever

The red octagonal-shaped knob in the control panel actuates the trailer air supply valve. See **Fig. 15.2**. After the vehicle's air hoses are connected to a trailer and the pressure in both air systems is at least 65 psi (448 kPa), the trailer air supply valve must be pushed in. It should stay in to charge the trailer air supply system and to release the trailer spring parking brakes.

Pull the trailer air supply valve out before disconnecting a trailer or when operating a vehicle without a trailer.

If pressure in both air systems drops to 20 to 45 psi (138 to 310 kPa), the red trailer air supply valve and yellow parking brake valve automatically pop out, applying both the tractor and trailer spring parking brakes. If the trailer is not equipped with spring parking brakes, the trailer service brakes are applied.



1. Trailer Air-Supply-Valve Knob
2. Parking-Brake-Valve Knob

Fig. 15.2, Brake Valve Knobs

The yellow diamond-shaped knob in the control panel actuates the parking brake valve. See **Fig. 15.2**. Pulling out the parking brake valve applies

both the tractor and trailer spring parking brakes and automatically causes the trailer air supply valve to pop out. Pushing in the parking brake valve releases the tractor parking brakes.

NOTICE

Do not use the spring parking brakes if the service brakes are hot, such as after descending a steep grade. To do so could damage the brakes. Allow hot brakes to cool before using the spring parking brakes.

Do not use the spring parking brakes during freezing temperatures if the service brakes are wet. To do so could cause them to freeze. If the brakes are wet, drive the vehicle in low gear and lightly apply the brakes to heat and dry them.

If the trailer is not equipped with spring parking brakes, pulling out the parking brake valve applies the tractor spring parking brakes and the trailer service brakes. When the tractor and trailer parking brakes (or trailer service brakes) are both applied, the trailer brakes are released by pushing in the trailer air supply valve, leaving the tractor parking brakes applied. Air pressure in the primary or secondary reservoir must be at least 65 psi (447 kPa) before the tractor spring parking brakes, or the trailer service or spring parking brakes, can be released.

Automatic Slack Adjusters

Automatic slack adjusters should never be manually adjusted except during routine maintenance of the foundation brakes (e.g., replacing shoes), during slack adjuster installation, or in an emergency situation.

When the brake pushrod stroke exceeds the legal brake adjustment limit on a vehicle, there is likely a mechanical problem with the foundation brake components or the adjuster is improperly installed.

Visit a repair facility as soon as possible when brakes equipped with automatic slack adjusters are determined to be out of adjustment.

⚠ WARNING

Manually adjusting an automatic slack adjuster to bring the pushrod stroke within legal limits is likely masking a mechanical problem. Adjustment is not a repair. Before adjusting an automatic slack adjuster, troubleshoot the foundation brake system and inspect it for worn or damaged components. Improperly maintaining the vehicle braking system may lead to brake failure, resulting in property damage, personal injury, or death.

Meritor WABCO® Antilock Braking System

The Meritor WABCO Antilock Braking System (ABS) is an electronic wheel speed monitoring and control system that works with the standard air brake system. ABS passively monitors vehicle wheel speed at all times, and controls wheel speed during emergency stops.

IMPORTANT: For proper ABS system operation, do not change tire sizes. The sizes of the tires installed during production are programmed into the electronic control unit. Installing different-sized tires could result in a reduced braking force, leading to longer stopping distances.

ABS includes signal-generating tone wheels and sensors located in the wheel hubs of each sensed wheel. The sensors transmit vehicle wheel speed information to an electronic control unit, located in the vehicle electronics bay. The control unit's main circuit interprets the speed sensor signals and calculates wheel speed, wheel retardation, and a vehicle reference speed. If the calculations indicate wheel lockup, the main circuit signals the appropriate modulator valve to reduce braking pressure. During emergency braking, the modulator valve alternately reduces, increases, or maintains air pressure supply in the brake chamber to prevent front and rear wheel lockup.

The electronic control unit (ECU) also has a safety circuit that constantly monitors the wheel sensors, traction control valve (if equipped), modulator valves, and the electrical circuitry.

The Meritor WABCO ABS combines one front-axle control channel with one rear-axle control channel to form one control circuit. For example, the sensor and modulator valve on the left-front axle form a control circuit with the sensor and modulator valve on the right-rear axle. If, during vehicle operation, the safety circuit senses a failure in any part of the ABS, the driver display presents an ABS warning,the tractor warning lamp (TRACTOR ABS) illuminates, and the control circuit where the failure occurred is switched to normal braking action. See **Table 15.1**. The remaining control circuit will retain the ABS effect. Even if the ABS is completely inoperative, normal braking ability is maintained. An exception would be if a

modulator valve (or combination modulator valve) is damaged and inoperative. As these components are an integral part of the air brake system, normal braking may be impaired or inoperative.

During emergency or reduced-traction stops, fully depress the brake pedal until the vehicle comes to a safe stop. *Do not pump the brake pedal*. With the brake pedal fully depressed, the ABS will control all wheels to provide steering control and a reduced braking distance.

Although the ABS improves vehicle control during emergency braking situations, the driver still has the responsibility to change driving styles depending on existing traffic and road conditions. For example, the ABS cannot prevent an accident if the driver is speeding or following too closely.

Trailer ABS Compatibility

The Meritor WABCO ABS is designed to communicate with a trailer ABS, if they are compatible. Compatibility will result in the illumination of the TRAILER ABS lamp during vehicle start-up and fault detection. See **Table 15.1**.

The TRAILER ABS lamp will not illuminate unless a compatible trailer is connected to the tractor. The dash-mounted lamp will operate as follows when a compatible trailer is properly connected to the tractor:

- When the ignition key is turned to the ON position, the TRAILER ABS lamp will illuminate momentarily, then turn off.
- If the lamp illuminates momentarily during vehicle operation, then shuts off, a fault was detected and corrected.
- If the lamp illuminates and stays on during vehicle operation, there is a fault with the trailer ABS. Repair the trailer ABS system immediately to ensure full antilock braking capability.

IMPORTANT: If a compatible trailer is connected, and the lamp is not illuminating momentarily when the ignition key is turned to the ON position, it is possible that the lamp is burnt out.

Automatic Traction Control

Vehicles with electronic engines and ABS may have Automatic Traction Control (ATC). On these vehicles, the ATC system automatically limits wheel spin during reduced-traction situations. In normal braking applications, the standard air brake system is in effect.

An additional solenoid valve is installed. During reduced-traction situations, the ATC solenoid valve controls air pressure to the modulator valves and they in turn increase, hold, or reduce pressure to the appropriate brake chambers to provide better traction whenever wheel spin occurs.

When the ATC system is in the NORMAL mode, it will apply gentle braking to the spinning wheel, to feed power to the wheel(s) with better traction. If both wheels are spinning, the system will signal the engine to reduce power.

If the system detects wheel spin or a stability event, the wheel spin/stability telltale illuminates and an alert is shown on the driver display. See **Table 15.1**.

Pressing the ATC SPIN switch (**Fig. 15.3**) shuts ATC off and allows drive wheel spin. An alert is shown on the driver display. Pressing the switch again, or cycling the ignition key, will cycle the system back to normal operation.

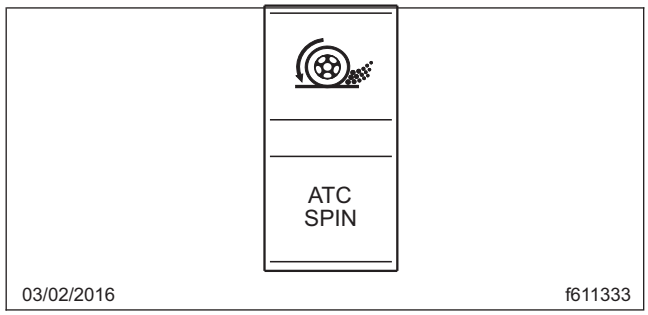


Fig. 15.3, ATC SPIN Switch

NOTICE

The ATC spin feature is intended to be used under specific slippery conditions that require momentary increased wheel spin. Using this option for an extended period of time may damage the vehicle brake system.

After the ignition switch is turned on, the TRACTOR ABS lamp comes on for about three seconds. After three seconds, the warning light goes out if all of the tractor's ABS components are working.

IMPORTANT: If the ABS warning light does not work as described above, or comes on while driving, repair the ABS immediately to ensure full antilock braking capability.

ECAS Automatic Load Transfer (ECAS only)

On vehicles equipped with Electronically Controlled Air Suspension (ECAS), ECAS works in conjunction with ABS. When wheel slippage is detected by the ABS, the ECAS system transfers weight from the tag axle to the drive axle by changing air pressures in the suspension air bellows, increasing drive wheel traction.

The ECAS load transfer feature is optimized to apply the maximum available vehicle load on the drive axle, up to the maximum allowable limit, determined by the gross axle weight rating (GAWR). In bobtail or with a loaded trailer less than the GAWR, the tag axle supports a negligible load while the drive axle supports nearly the full weight. Above the GAWR, the drive axle is loaded with approximately the maximum allowable load and the tag supports the remainder.

On vehicles equipped with the ICUC, when load transfer mode is active, "Load Transfer" will display in the message field of the driver display. See **Figure 15.4**.

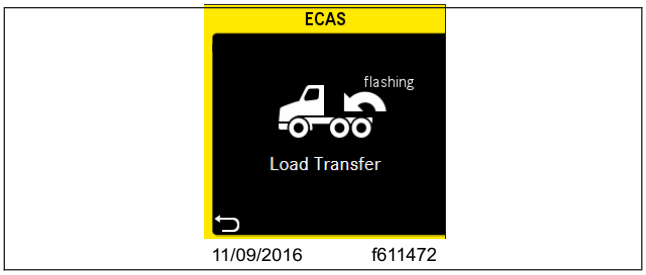


Fig. 15.4, Load Transfer Notification, ICUC

Load transfer mode will automatically deactivate when the vehicle reaches 45 mph (72 kmh).

Engine Brake

Each engine manufacturer uses a specific engine brake for their engine. Regardless of the manufacturer, the engine brake is operated with the principles outlined in here. Refer to the engine manufacturer's operation manual for details of their particular engine brake product.

⚠ WARNING

To avoid injury from loss of vehicle control, do not activate the engine brake system under the following conditions:

- **on wet or slippery pavement, unless the vehicle is equipped with antilock braking system (ABS) and you have had prior experience driving under these conditions;**
- **when driving without a trailer or pulling an empty trailer;**
- **if the tractor drive wheels begin to lock, or there is fishtail motion after the engine brake is activated.**

NOTE: When the engine brake is enabled, the engine brake lamp illuminates in the ICU. See **Table 15.1**.

Whenever vehicle braking is required on good road conditions, the engine brake may be used in conjunction with the service brakes. There is no time limit for operation of the engine brake. However, an engine brake does not provide the precise control of, and is not a substitute for, service brakes.

⚠ WARNING

Usage of the engine brake as the primary braking system can cause unpredictable stopping distances, that could result in personal injury or property damage. Service brakes are the primary vehicle braking system.

Since the engine brake is most effective at rated engine speed, gear selection is very important. Gearing down the vehicle within the limits of the rated engine speed makes the engine brake more effective. Recommended engine braking speed is above 1800 rpm and below the rated speed.

"Control speed" is the speed at which the engine brake performs 100 percent of the required downhill braking, resulting in a constant speed of descent. The control speed varies, depending on vehicle weight and the downhill grade.

For faster descent, select a higher gear than that used for control speed. Service brakes must then be used intermittently to prevent engine overspeed and to maintain desired vehicle speed.

For slower descent, select a lower gear, being careful not to overspeed the engine. Occasional deactivation of the engine brake may be necessary to maintain the designated road speed under these conditions.

If the engine is equipped with both cruise control and an engine brake, the engine brake can operate automatically while cruise control is activated. The maximum amount of braking is selected with the engine brake control. When the vehicle returns to the set cruise speed, the engine brake will turn off.

The engine brake will only operate when the accelerator and clutch pedals are fully released.

ABS has the ability to turn the engine brake off if wheel slip is detected. The engine brake will automatically turn back on once wheel slip is no longer detected.

Engine Brake Operation

NOTICE

Do not allow the engine to exceed its governed speed, or serious engine damage could result.

NOTE: Depending on the brake type, the engine brake may be disabled when engine temperature falls below a set level.

The engine brake control is located on the right-hand steering column lever. At the top position, the engine brake is off, and at the three lower positions, the engine brake is on and the intensity (low, medium, high) increases with each step down. See **Fig. 15.5**.

NOTE: The cruise control system and safety systems may activate the engine brake regardless of the lever position.

NOTE: On vehicles equipped with a Detroit automated transmission, setting the engine brake with the cruise control set activates Deceleration Mode. Setting the cruise control while the engine brake is on activates Descent Control Mode. For information on these modes, see "Cruise Control" in **Chapter 7**.

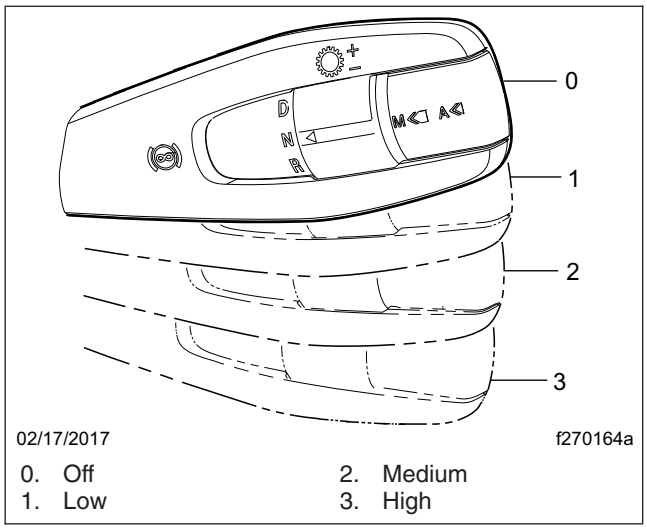


Fig. 15.5, Engine Brake Positions, Right-Hand Steering Column Lever

16

Steering System

Power Steering System

The power steering system includes the power steering gear, hydraulic hoses, power steering pump, reservoir, steering wheel and column, and other components.

The power steering pump, driven by the engine, provides the power assist for the steering system. If the engine is not running, there is no power assist.

⚠ WARNING

Driving the vehicle without the power-assist feature of the steering system requires much greater effort, especially in sharp turns or at low speeds, which could result in an accident and possible injury.

If the power-assist feature does not work due to hydraulic fluid loss, steering pump damage, or another cause, bring the vehicle to a safe stop. Do not drive the vehicle until the cause of the problem has been corrected.

NOTICE

Never steam clean or high-pressure wash the steering gear. Internal damage to gear seals, and ultimately the steering gear, can result.

Drivers should carefully use the power available with a power steering system. If the front tires become lodged in a deep hole or rut, drive the vehicle out instead of using the steering system to lift the tires out of the hole.

NOTICE

Avoid turning the tires when they are against a curb, as this places a heavy load on steering components and could damage them.

17

Automated and Automatic Transmissions

Automated/Automatic Transmission Shift Control

Vehicles with automated or automatic transmissions use the multifunction stalk switch control shown in **Fig. 17.1** and **Fig. 17.2**. This control can be used to request manual shifts, change driving mode, and set engine brake levels. See **Table 17.1** for an overview of control functionality.

Direction Switch

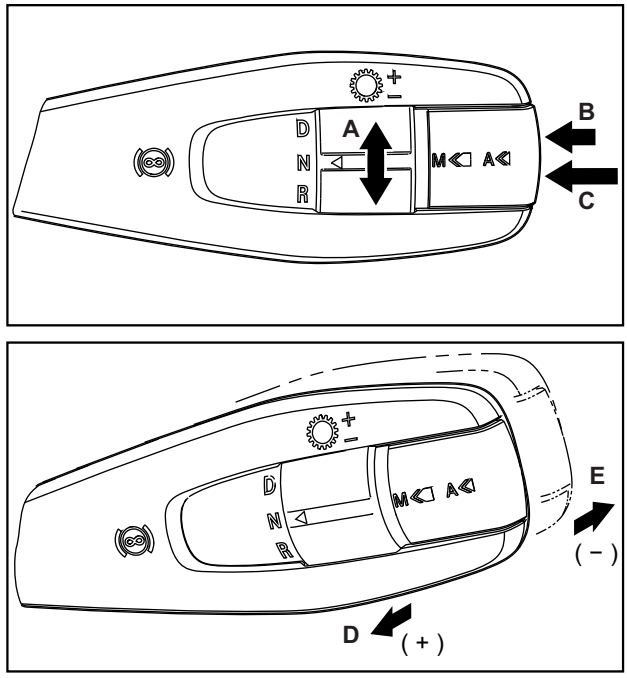
Use the direction switch to request drive (D), neutral (N), or reverse (R). See **Fig. 17.1**, Ref. A.

Mode Switch

The driving mode can be changed using the Mode switch on the shift control. See **Fig. 17.1**, Ref. B and C.

Gear Switch

For automated and automatic transmissions, gear shifts can be requested manually; push the lever away to request a downshift, or pull the lever toward you to request an upshift (**Fig. 17.1**, Ref. D and E). See **Table 17.1** for more information about upshift and downshift requests.



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See **Table 17.1** for a description of control functionality.

A. Rotate for drive (D), neutral (N), or reverse (R).
B. Short press for automatic mode or switch between available modes.
C. Long press for manual mode.
D. Pull for upshift (+) request.
E. Push for downshift (-) request.

Fig. 17.1, Automated/Automatic Transmission Shift Control

Functionality, Automated/Automatic Transmission Shift Control		
Function/Switch	**Action/Position**	**Request**
Direction	**All Transmissions**	
	D	Forward gears
	N	Neutral
	R	Reverse gears
Mode	Short press	**Detroit and Eaton:** Activate the automatic drive mode, or switch between available modes **Allison:** Switch between available shift modes.
	Long press	**Detroit and Eaton:** Activate the manual drive mode (if available) **Allison:** Switch between automatic and manual drive mode.

Functionality, Automated/Automatic Transmission Shift Control		
Function/Switch	**Action/Position**	**Request**
Gear(Detroit Automated Transmissions)	**Detroit Automated Transmissions**	
	Short pull on the lever	Upshift, single gear
	Pull on the lever in quick repetitions	Upshift, multiple gears
	Short push on the lever	Downshift, single gear
	Push on the lever in quick repetitions	Downshift, multiple gears
Gear (Eaton Automated Transmissions)	**Eaton Automated Transmissions**	
	Short pull on the lever	Upshift, single gear
	Pull on the lever in quick repetitions	Upshift, multiple gears
	Short push on the lever	Downshift, single gear
	Push on the lever in quick repetitions	Downshift, multiple gears
	While in automatic drive mode, long push on the lever	Downshift to low mode
	While in low mode, pull on the lever	Exits low mode and returns to automatic drive mode
	While in reverse mode, push on the lever	Selects deep reverse gear
	While in deep reverse gear, pull on the lever	Upshifts to standard reverse gear
Gear (Allison Automatic Transmissions)	**Allison Automatic Transmissions**	
	Short pull on the lever	Upshift, single gear
	Pull on the lever in quick repetitions	Upshift, multiple gears
	Short push on the lever	Downshift, single gear
	Push on the lever in quick repetitions	Downshift, multiple gears
	While in automatic drive mode, long push on the lever	Downshift to low mode
	While in low mode, pull on the lever	Exits low mode and returns to automatic drive mode
	While in reverse mode, push on the lever	Selects deep reverse gear (only on 7-speed 4000 Series transmissions)
	While in deep reverse gear (only on 7-speed 4000 Series transmissions), pull on the lever	Upshifts to standard reverse gear
Engine Brake *	**Engine Brake Functions**	
	Lever at position 0 (top)	Engine brake off
	Lever at position 1	Low intensity
	Lever at position 2	Medium intensity
	Lever at position 3 (bottom)	High intensity

* For functions with cruise control active, see **Chapter 7**.

Table 17.1, Functionality, Automated/Automatic Transmission Shift Control

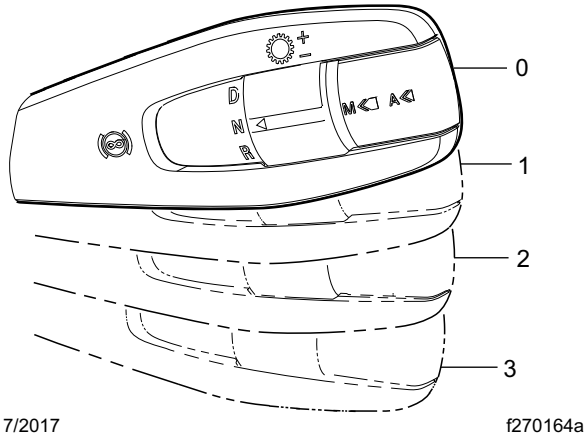
Engine Brake

The engine brake is controlled by the lever position (as shown in **Fig. 17.2**). At the top position, the engine brake is off, and at the three lower positions, the engine brake is on and the intensity (low, medium, high) increases with each step down. For more information about using the engine brake, see **Chapter 15**.

NOTE: Using the engine brake with cruise control can be used to activate Descent Control Mode or Deceleration Mode. For more information, see "Cruise Control" in **Chapter 7**.

Power Up and Shift into Gear

1. With the parking brake set and Neutral (N) selected on the shift control, turn the ignition switch to the ON position.
2. Start the engine.
3. Apply the service brake.
4. Select the desired starting gear.
5. Release the parking brake.
6. Release the service brake and apply the accelerator.

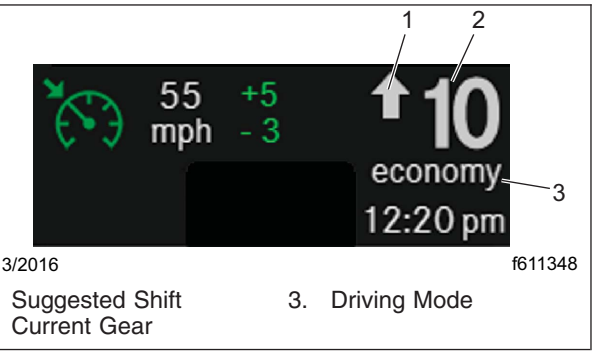


0. Off
1. Low
2. Medium
3. High

Fig. 17.2, Engine Brake Positions

Gear Display

The current transmission gear and driving mode are displayed in the static menu at the bottom of the driver display screen. See **Fig. 17.3**.



1. Suggested Shift
2. Current Gear
3. Driving Mode

Fig. 17.3, Typical Gear Display (Detroit and Eaton)

Selected Gear (Detroit and Eaton Transmissions)

If the selected gear is different than the current gear for longer than a half second, the current gear display will flash and the selected gear value will be shown. Once the current gear and selected gear match, the selected gear display disappears and the current gear display stops flashing.

Suggested Shift (Detroit and Eaton Transmissions)

In Manual mode only (if available), a suggested shift is displayed to indicate the most economical gear available. The suggested shift is the number of up or down arrows from the current gear with a maximum of three up or down arrows.

Detroit™ Automated Transmissions (DT12)

Detroit transmissions have twelve forward gears and up to four reverse gears that can be shifted automatically or manually. Shifting and clutch actuation are computer controlled, and there is no clutch pedal needed to operate the vehicle. Automatic shifts are selected for fuel economy or engine power. Manual shifts can be requested with the shift control and the transmission ECU grants them when conditions permit. In all cases, shifts depend on the following factors: engine speed, accelerator pedal position, service brake usage, engine brake operation, vehicle load status, and road conditions.

NOTE: To avoid potential engine stall risk or unexpected shifting, use the interaxle differential lock when the vehicle is operated in slippery conditions. See **Chapter 19** for information about the interaxle differential lock.

Driving Modes

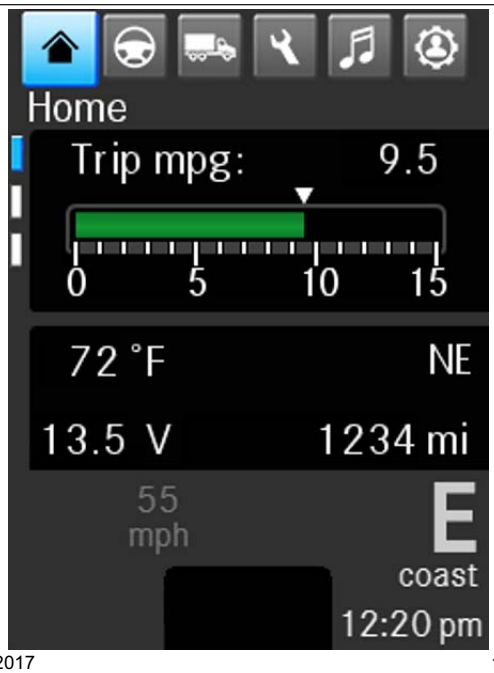
There are three driving modes: Manual, Automatic Economy, and Automatic Performance. To activate the manual drive mode, press and hold the mode switch briefly. Press the switch quickly to activate the automatic drive mode or change between modes. See **Fig. 17.1**.

In Automatic Economy mode, gear shifts are designed for saving fuel. In Automatic Performance mode, gear shifts are designed for higher performance and are made at higher engine speeds. In manual mode, gear shifts are requested manually.

NOTE: In Automatic Performance mode, the transmission will automatically change to Automatic Economy mode if it hasn't received a request for more power in several minutes, unless current road conditions require higher engine performance.

eCoast

The eCoast feature can improve driving economy. When conditions permit, the transmission control automatically shifts the transmission to neutral to coast at speeds of approximately 50 mph (80 km/h) and above. However, the vehicle can coast down to 45 mph (72 km/h). An "E" shows in the gear display when eCoast is in effect. See **Fig. 17.4**.



NOTE: Upshift and downshift arrows are not shown when "E" is shown in the gear display.

Fig. 17.4, eCoast Display

To turn eCoast on or off, navigate to the transmission settings screen. See **Fig. 17.5.**

The eCoast function is not active when any of the following occur:

- the accelerator pedal is pressed.
- vehicle acceleration rate is exceeded.
- the service brake pedal is pressed.
- the engine brake is in use.
- cruise control brakes or accelerates.
- vehicle speed exceeds the cruise control set speed by more than approximately 4 mph (6 km/h).
- the speed limiter is active and the maximum speed set is exceeded.
- diesel particulate filter (DPF) regeneration occurs.

NOTE: eCoast availability and the On/Off screen are customer-selectable parameters. To enable or disable eCoast, see an authorized Freightliner service facility.

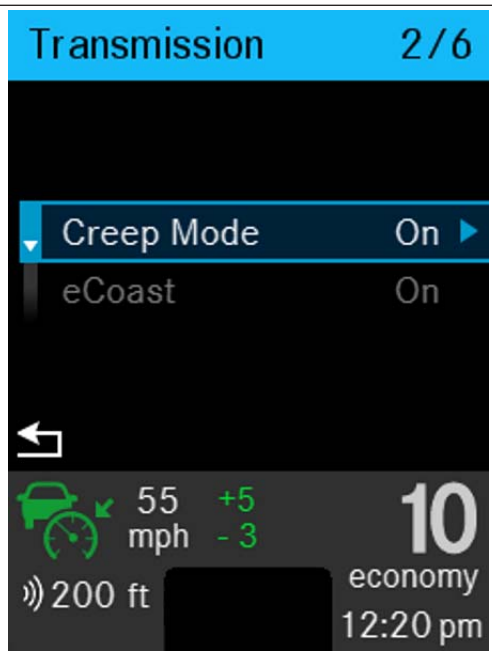


Fig. 17.5, eCoast and Creep Mode On/Off Screen

Creep Mode

Creep mode allows the vehicle to be maneuvered at very slow speeds. To activate Creep mode for the first time within the current driving cycle, press the accelerator pedal to launch the vehicle, thereby modulating the clutch and allowing it to slip. Following this and for the duration of the current driving cycle, Creep mode is active.

Once the vehicle is stopped via the service brakes, the vehicle will begin to creep again, without the accelerator pedal actuation, as soon as the service brakes are released.

To begin using Creep mode (once active) from a parked position, shift from neutral to either drive or reverse, release the service brakes, and briefly depress the accelerator pedal. The vehicle's urge to move can then be felt.

If creep is active and no acceleration is achieved, then Creep mode will abort. A display message notifies the operator when Creep mode is about to be aborted.

IMPORTANT: When slowing down from higher speeds in drive or reverse, remember that Creep mode will be in effect at lower speeds. Use the service brakes to stop the vehicle.

To turn Creep Mode on or off, navigate to the transmission settings screen (if available). See **Fig. 17.5**.

NOTE: Creep mode availability and the On/Off screen are customer-selectable parameters. To enable or disable creep mode, see an authorized Freightliner service facility.

Hill Start Aid (HSA)

Detroit transmissions are equipped with a Hill Start Aid (HSA) feature to prevent rolling backward when launching the vehicle on an uphill grade. The system delays the release of service brakes until enough torque is available to begin moving the vehicle forward. The system will hold the brakes for a maximum of 3 seconds. If driveline torque is not detected, the system will audibly alert the driver and release the brakes.

Clutch Abuse Protection

A vehicle equipped with a Detroit transmission does not have a clutch pedal, but still has a clutch that is operated automatically and can be damaged by abusive driver actions. To protect the clutch, the vehicle has a clutch abuse protection system that alerts the driver and restricts functionality when needed. Extended periods in Creep Mode, slipping the clutch (using the accelerator pedal to hold the vehicle on a hill, for example), and high clutch temperatures can activate the clutch abuse protection system. A display message notifies the operator when the protections are needed.

NOTICE

To hold the vehicle stationary on an uphill slope, use the service brakes, not the accelerator pedal. Using the accelerator pedal can overheat and damage the clutch. To start moving, use the accelerator pedal and release the brakes as the vehicle begins to move.

There are three clutch abuse protection levels. At each, the driver is alerted and functionality is modified; see **Table 17.2**.

To avoid clutch overheating, follow these tips:

- To hold the vehicle stationary on an uphill slope, use the service brakes, not the accelerator pedal.
- To start moving on an uphill slope, use the accelerator pedal and release the brakes as the vehicle begins to move.
- When hooking up to a trailer, ensure the trailer is high enough to back under, and use first gear reverse.
- Avoid starting in higher gears, and start in first gear when a trailer is attached.
- Ensure trailer brakes have had time to completely release prior to starting.
- Do not use Creep mode for an extended period. Stop or adjust the vehicle speed when warned to deactivate Creep mode.

Engine Overspeed Alerts

To help protect the engine, the system has display messages to notify the operator when the engine has exceeded certain thresholds and needs to be slowed down before significant engine damage occurs. There are two warnings, one at about 2300 rpm and another at 2500 rpm, indicated with messages and a fault code.

Descent Control Mode

Descent Control mode helps control the vehicle and engine speed when descending a grade.

NOTE: Before engaging Descent Control mode, determine an appropriate speed for the vehicle load and grade of the road.

To activate Descent Control mode, manually set the engine brakes with the shifter stalk and, while the engine brakes are actively working, set cruise to the desired descent speed. A Descent Control mode engaged icon will appear on the ICUC screen showing it is active. See **Fig. 17.6**

The Descent Control mode will attempt to manage the vehicle's speed by varying the engine brake level.

The driver should be ready to intervene by applying the service brakes if the grade is too steep and the

1. Icon Showing Descent Control Mode Engaged

Fig. 17.6, Descent Control Mode Active

vehicle is traveling too fast. Applying the service brake to slow the vehicle will not cancel cruise control. Once the service brake is released, the vehicle speed becomes the new Descent Control set speed. A pop-up will appear on the instrument cluster screen to notify the driver of the new speed. See **Fig. 17.7.**

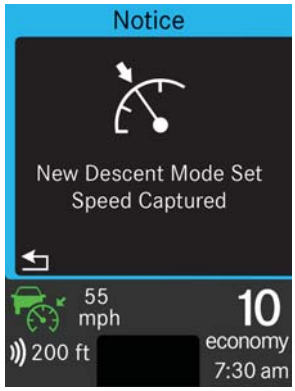


Fig. 17.7, New Descent Control Mode Set Speed Pop-Up

When the vehicle's descent is complete, return the engine brake stalk to the OFF/Auto position. At this point the Descent Control set speed will become the new cruise speed.

Hill Descent Upshift Feature

NOTE: It is critical that the driver maintains complete control over the vehicle at all times. The proper speed, and gear if in manual mode, should be selected before the crest of any hill to ensure a safe descent. The driver should apply engine and service brakes appropriately during any descent.

The Detroit™ Automated Transmission (DT12) is capable of upshifting automatically when descending grades. When the vehicle is descending without engine or service brake application, the DT12 will upshift at 2000 rpm. If the engine or service brake is applied during descent, the DT12 will upshift at 2400 rpm.

Transmission Low Air Warning

CAUTION

If the yellow "Caution: Transmission Air Supply Low" popup appears while the vehicle is in operation, slow down, safely pull the vehicle off the road, then correct the problem.

Pneumatic controls are used to shift the transmission. If there is inadequate air pressure, a yellow caution pop-up will appear and the quality of gear shifts may be degraded. See **Fig. 17.8.** Wait for air pressure to build before operating the vehicle.

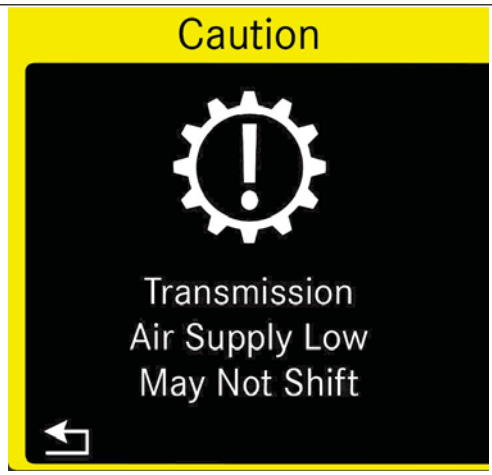


Fig. 17.8, Low Transmission Air Pressure Pop-up

CAUTION

If the red "Warning: Transmission Will Not Shift" popup appears while the vehicle is in operation, choose the safest location available to pull the

vehicle off the road. Prepare for the vehicle to be immobile if the problem cannot be resolved.

If a severe loss of air pressure occurs, a red warning pop-up will appear and the transmission will not shift. See **Fig. 17.9.**

Clutch Abuse Alerts and Protections

Fig. 17.9, No Transmission Air Pressure Pop-up

Clutch Abuse Alerts and Protections				
Alert Level	Alert	Protections		
		Highest Start Gear	Creep Mode	Clutch Function
1	Heavy clutch load message	1	No restriction	Normal function
2	Heavy clutch load message	1	Disabled	Normal function
3	Clutch overload message and buzzer	1	Disabled	If the accelerator pedal is depressed, the clutch closes at fixed rate. If the accelerator pedal is released, the clutch opens at fixed rate.

Table 17.2, Clutch Abuse Alerts and Protections

Eaton Automated Transmissions

Eaton automated transmissions use shift selection software and electric clutch actuation; a clutch pedal is not needed to operate the vehicle. These transmissions use the multi-function stalk switch shown in **Fig. 17.1** to select mode, direction, neutral, low, and to make manual shifts. To know what gear the transmission is in, see the driver display. Forward shifts can be made either manually or automatically.

Automatic Mode (A)

In automatic drive mode, upshifts and downshifts are made by the transmission without driver intervention.

Use the mode switch on the shift control to select the automatic mode (A). Rotate the D/N/R switch to Drive (D), and press down on the throttle pedal. The transmission will shift automatically.

NOTE: If attempting to select a non-Neutral mode without applying the service brakes, the transmission will not shift into gear. To shift into gear, select Neutral, apply the service brakes, and select the desired mode again.

In Drive, the start gear is automatically selected. The selected start gear can vary depending on several vehicle inputs such as load, grade, and axle/transmission ratio. The start gear can be changed using the shift control, provided the selected gear would allow the vehicle to launch without damaging the transmission. If the start gear is changed using

the shift control, it will be the default until the vehicle is powered down or the selection is changed again manually.

IMPORTANT: Prior to ascending a steep grade, either reduce the default start gear by one (using the shift control) or apply full throttle for the duration of the grade so the vehicle maintains the proper engine and vehicle speed during the entire grade.

In Drive, the transmission automatically performs upshifts and downshifts. However, when the transmission is near the shift point, the shift can be forced using the upshift or downshift function of the shift control.

NOTE: The transmission may deny a shift while ascending or descending a grade if the load of the vehicle and grade of the terrain in combination with the drivetrain ratio and engine torque fall outside of the acceptable range to perform a shift. If the shift is denied, a tone will sound.

Manual Mode (M)

In manual mode, the driver requests upshifts and downshifts instead of letting the Eaton transmission select them automatically. Manual shifting may be helpful when traversing a work site, railroad tracks, or steep grades, for example.

Use the mode switch on the shift control to select the manual mode (M). To drive forward, rotate the D/N/R switch to Drive (D), and press down on the throttle pedal. To shift up, pull the lever up (towards you); to shift down, push the lever down (away from you). The system holds the current gear unless a shift is requested or if the system initiates a manual mode override.

NOTE: The transmission may deny a shift while ascending or descending a grade if the load of the vehicle and grade of the terrain in combination with the drivetrain ratio and engine torque fall outside of the acceptable range to perform a shift. If the shift is denied, a tone will sound.

NOTE: If attempting to select a non-Neutral mode without applying the service brakes, the transmission will not shift into gear. To shift into gear, select Neutral, apply the service brakes, and select the desired mode again.

Manual Mode Override

The system is equipped with a manual mode override function. If the vehicle is being "back driven" (for example, descending a grade and the engine speed is excessively high), the system will upshift automatically. Also, if the start gear is changed and it causes the engine to lug at takeoff, the system will override the current position and select the best available gear.

Low (L)

Use Low when wanting to maximize engine braking and minimize the use of the brake pedal—for example, when driving down long grades or when coming to a stop. To select Low, push down on the multifunction stalk switch, and hold in the down-shift position for half a second or more. The lowest available start gear will be selected (the starting gear cannot be changed in Low).

If Low is selected while moving, the transmission will not upshift (unless the system initiates a Low override). The system will downshift at the earliest opportunity to provide maximum engine braking.

NOTE: If attempting to select a non-Neutral mode without applying the service brakes, the transmission will not shift into gear. To shift into gear, select Neutral, apply the service brakes, and select the desired mode again.

Low Override

The system is equipped with a Low override function. If the vehicle is being "back driven" (for example, descending a grade and the engine speed is excessively high), the system will upshift automatically. Also, if the start gear is changed and it causes the engine to lug at takeoff, the system will override the current position and downshift.

Clutch Abuse Protection

Although a vehicle equipped with an Eaton automated transmission uses an automated clutch, the clutch can still overheat and slip with improper use. The clutch abuse protection feature helps protect the clutch if the automated clutch starts to overheat. When the clutch abuse protection feature initiates and sounds a warning tone, full clutch actuation must be completed quickly. If it is not completed quickly enough, the system will either open the clutch (if the throttle pedal is not being pressed) or close the clutch (if the throttle pedal is being pressed). If the

abuse continues, the system will open the clutch and take away throttle control briefly to allow the clutch to cool down.

To protect the clutch:

- Select the lowest possible start gear for the application.
- Use Creep Mode when appropriate.
- Use the service brakes and the Hill Start Aid when launching on a grade.
- Minimize the time it takes to engage the clutch from rest.
- Do not use the throttle to hold the vehicle on a grade; use the service brakes.
- Do not use the throttle to stop roll back on an incline after Hill Start Aid disengages; use the service brakes, and then relaunch.
- Do not continually start and stop, especially when loaded; use a lower gear or Creep Mode.

Creep Mode

The Creep Mode function allows the vehicle to maintain a constant speed at engine idle without the driver holding the throttle pedal position. This mode is useful for very low-speed maneuvering and applications where steady vehicle speed is required. The vehicle speed is determined by the selected gear ratio operating at governed low engine idle speed. Any available gear may be selected, though the transmission will downshift or exit Creep Mode to prevent stalling if the engine lugs due to load conditions.

By default, Creep Mode can be activated while in Manual Mode or Low. Eaton's ServiceRanger diagnostic software can be used to enable Creep Mode in Automatic Mode and/or Reverse.

Engaging Creep Mode

To engage Creep Mode:

1. Select Low, Manual, or Automatic Mode, and the desired gear (while stopped or moving).
2. Apply the throttle pedal to accelerate the vehicle until the clutch is closed (engaged).
3. Release the throttle pedal. The vehicle will continue moving at governed low engine idle speed.

Exiting Creep Mode

To exit Creep Mode, apply the throttle pedal to accelerate temporarily, or select a higher gear in Manual Mode. (Creep Mode can be resumed in the selected gear by releasing the throttle pedal.)

NOTE: The transmission will exit Creep Mode if the engine lugs 150 rpm below the governed low engine idle speed. In this case, a lower gear should be selected if available.

Hill Start Aid

Eaton transmissions are equipped with a Hill Start Aid (HSA) feature to prevent the vehicle from rolling while on grades steeper than 3% and allow for a controlled launch. A grade sensor is used to determine when to engage the feature.

HSA is "on" by default. It can be turned off by pressing and releasing the override switch on the dash (see **Chapter 4**). HSA will turn back on after the first successful launch.

When the vehicle is stopped on a grade greater than 3% and in a forward mode or reverse, depress the service brakes then release them. The vehicle will begin to move after 3 seconds, and the clutch will perform partial engagements to slow the vehicle motion. Either step on the brake or apply the throttle to continue negotiating the grade.

Engine Overspeed Protection

The system will upshift if necessary to prevent engine overspeed in Drive, Manual, and Low.

Shuttle Shifting

Shuttle shifting from reverse to any forward mode is only allowed if the vehicle speed is approximately zero.

Auto Start Gear Selection and Override

The transmission uses various inputs to automatically select the best start gear in Drive and Manual. This selection can be changed using the shift control; however, if the selection requested could cause damage or engine lugging, the request will be denied and a tone will sound.

Skip Shifting

When appropriate, the transmission may skip shift in Drive. When prevailing conditions like load and grade allow, skip shifts can be performed in Manual mode using the SmartShift control.

Auto Neutral

An Eaton automated transmission system will automatically shift to neutral if the vehicle is left in Drive and the parking brake is set. "AN" will show on the gear display. To re-engage the transmission, select Neutral and then either Drive or Reverse on the shift control (it will re-engage regardless of whether the parking brake is released).

Automatic Traction Control

An Eaton automated transmission system requires the Automatic Traction Control (ATC) option to be enabled when driving in soft soil/sand to prevent wheel slippage and shifting issues.

With the ATC enabled, the system will engage the brakes on the wheel or side that the wheel slip is occurring to help the vehicle gain traction. The point at which the traction control will actuate the braking system increases with throttle: low throttle allows the system to brake the wheels earlier; heavy/full throttle raises the point of the acceptable wheel slip.

Adhere to the following points when driving with ATC enabled:

- If using Automatic mode in soft soil and/or sand, maintain the engine speed between 1000 and 1300 rpm to prevent unnecessary upshifting.
- If using Manual mode in soft soil and/or sand, do not attempt an upshift and try to maintain the current gear.
- If the vehicle comes to a stop in the sand it may be necessary to back up prior to attempting forward movement.

To disable the ATC, depress the ATC switch (see **Chapter 4**). This mode allows for the drive axle wheels to spin.

Load-Based Shifting

An Eaton automated transmission system is adaptive and will change the shift points based on grade, engine RPM, throttle position, and vehicle load. After changing loads or powering up, the system needs to relearn these inputs for the first few shifts to make the proper adjustments.

Coasting

When coasting to a stop on level terrain, the transmission system may not downshift into the lower gears. It will select a gear after the throttle is applied.

Transmission Low Air Warning

⚠ CAUTION

If the yellow "Caution: Transmission Air Supply Low" popup appears while the vehicle is in operation, slow down, safely pull the vehicle off the road, then correct the problem.

Pneumatic controls are used to shift the transmission. If there is inadequate air pressure, a yellow caution pop-up will appear and the quality of gear shifts may be degraded. See **Fig. 17.8.** Wait for air pressure to build before operating the vehicle.

⚠ CAUTION

If the red "Warning: Transmission Will Not Shift" popup appears while the vehicle is in operation, choose the safest location available to pull the vehicle off the road. Prepare for the vehicle to be immobile if the problem cannot be resolved.

If a severe loss of air pressure occurs, a red warning pop-up will appear and the transmission will not shift. See **Fig. 17.9.**

Transmission Prognostics

The Eaton Ultrashift clutch requires the application of grease for maintenance.

The Eaton transmission prognostics display can be found by navigating to the maintenance screens in the driver display. The screen will state if the Grease Interval is OK or if grease needs to be added. See **Fig. 17.10.**

If the system status cannot be read, the message "SNA" displays.

Allison Automatic Transmissions

Refer to the Allison website for additional information: **www.allisontransmission.com**.

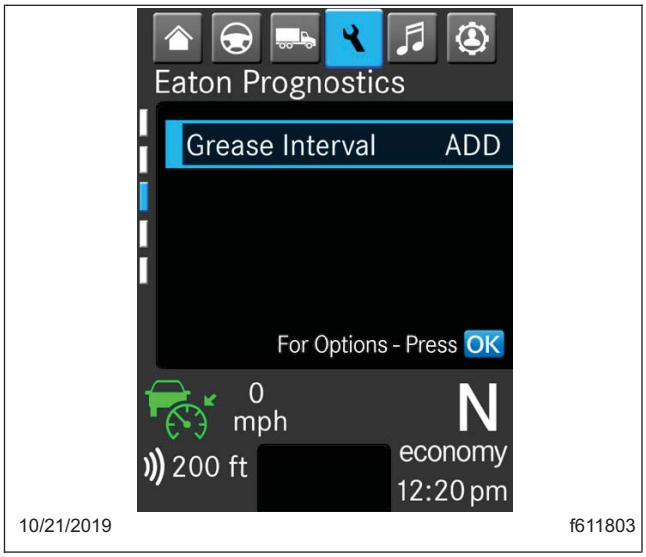


Fig. 17.10, Eaton Transmission Prognostics

General Information, Allison Transmissions

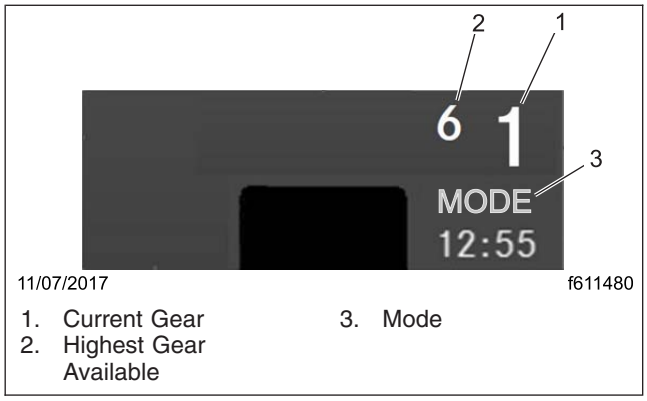
Allison transmissions have electronic shift controls that can be programmed to allow the use of different numbers of geared speeds. For instance, the transmission can be programmed to operate as a 4-speed, 5-speed, or 6-speed unit in the "primary" shift mode. If needed, a "secondary" shift mode can be programmed to provide another shift configuration to optimize vehicle use under different operating conditions. To activate a secondary shift mode, or other special functions programmed into the electronic control unit (ECU), briefly depress the mode switch on the multi-function stalk switch control; see **Fig. 17.1**, item 3.

These transmissions use the multi-function stalk switch to select mode, direction, neutral, low, and to preselect lower ranges. The current gear, highest available gear, and mode are shown in the driver display; see **Fig. 17.11**. Forward shifts can be made either automatically or by using Manual mode.

Operation Tips, Allison Transmissions

⚠ WARNING

Never shift from neutral (N) to drive (D) or reverse (R) at engine speeds above idle. The vehicle will lurch forward or backward, which could cause property damage and personal injury.



1. Current Gear
2. Highest Gear Available
3. Mode

Fig. 17.11, Allison Gear Display in Automatic Mode

NOTICE

The engine should never be operated for more than thirty seconds at full throttle with the transmission in gear and the output stalled. Prolonged operation of this type will overheat the transmission fluid and will result in severe damage to the transmission.

NOTICE

Do not allow the vehicle to coast in neutral. This can result in severe transmission damage. Also, no engine braking is available.

The following tips highlight important operation principles.

- Use reverse (R) to back the vehicle. Completely stop the vehicle before shifting from a forward gear to reverse, or from reverse to forward.
- Select drive (D) for all normal driving conditions. The vehicle will start out in 1st gear (unless the transmission is programmed with 2nd gear start), and as speed increases, the transmission will upshift through each gear automatically. As the vehicle slows down, the transmission will downshift to the correct gear automatically.
- The pressure of your foot on the accelerator pedal influences the automatic shifting. When the pedal is fully depressed, the transmission will automatically upshift at higher engine speeds. A partially-depressed position of the pedal will cause the upshifts to occur at a lower engine speed.

- Occasionally the road, load, or traffic conditions make it desirable to restrict the automatic shifting to a lower range. The lower the gear range, the greater the engine braking power. When in Manual mode, push or pull on the multifunction stalk switch to reach the desired gear. In the lower gear ranges, the transmission will not upshift above the highest gear selected unless the hold override upshift speed is exceeded.
- Use neutral and apply the parking brake when the vehicle is parked with the engine running.

Automatic Mode (A)

In automatic drive mode, upshifts and downshifts are made by the transmission without driver intervention.

Automatic mode is the default start mode. If in manual mode, a short push on the shift control mode switch activates the automatic mode (A). Rotate the D/N/R switch to Drive (D), and press down on the throttle pedal. The transmission will shift automatically.

NOTE: If attempting to select a non-Neutral mode without applying the service brakes, the transmission will not shift into gear. To shift into gear, select Neutral, apply the service brakes, and select the desired mode again.

In Drive, the start gear is automatically selected. The transmission automatically performs upshifts and downshifts.

Manual Mode (M)

In manual mode, the driver selects the maximum allowed range. This may be helpful when traversing a work site, railroad tracks, or steep grades, for example.

When in automatic mode and with the D/N/R switch set to Drive (D), a long push on the shift control mode switch activates the manual mode (M). To increase selected range, pull the lever up (towards you); to decrease the selected range, push the lever down (away from you). The transmission will not upshift above the selected range unless the hold override upshift speed is exceeded.

See **Fig. 17.12** for an example of the driver display with the transmission in manual mode.

NOTE: The transmission may deny a downshift if the engine speed would fall outside of the acceptable range.

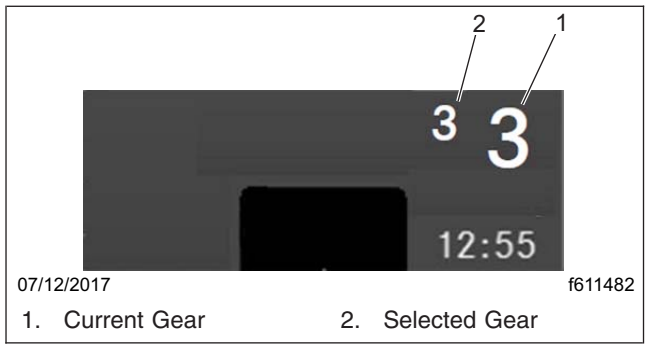


Fig. 17.12, Allison Gear Display in Manual Mode

NOTE: If attempting to select a non-Neutral mode without applying the service brakes, the transmission will not shift into gear. To shift into gear, select Neutral, apply the service brakes, and select the desired mode again.

Low (L)

Use Low when wanting to maximize engine braking and minimize the use of the brake pedal—for example, when driving down long grades or when coming to a stop. To select Low, push down on the multifunction stalk switch, and hold in the down-shift position for half a second or more. The lowest available start gear will be selected (the starting gear cannot be changed in Low).

If Low is selected while moving, the transmission will not upshift (unless the system initiates a Low override). The system will downshift at the earliest opportunity to provide maximum engine braking.

In the driver display, the low gear is shown as "1." See **Fig. 17.13**.

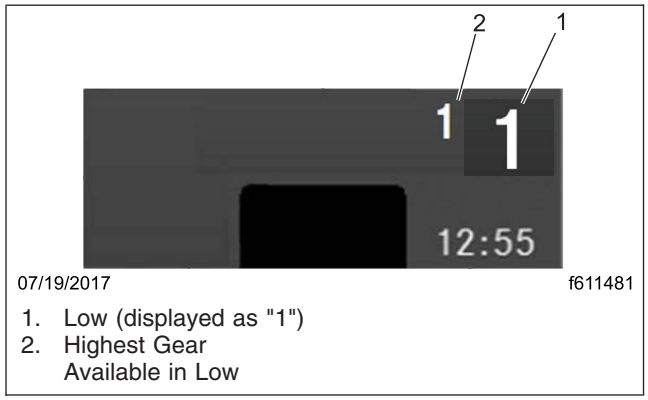


Fig. 17.13, Allison Gear Display in Low Gear

NOTE: If attempting to select a non-Neutral mode without applying the service brakes, the transmission will not shift into gear. To shift into gear, select Neutral, apply the service brakes, and select the desired mode again.

Transmission Prognostics

The Allison transmission prognostics display can be found by navigating to the maintenance screens in the driver display. The prognostics screen displays information on the transmission health status (oil filter status, oil level, and oil life). See **Fig. 17.14**. If transmission health falls below acceptable limits, a message will be shown on the driver display.

NOTE: For a valid oil level measurement, the vehicle must be stopped on a level surface with the transmission in neutral (N).

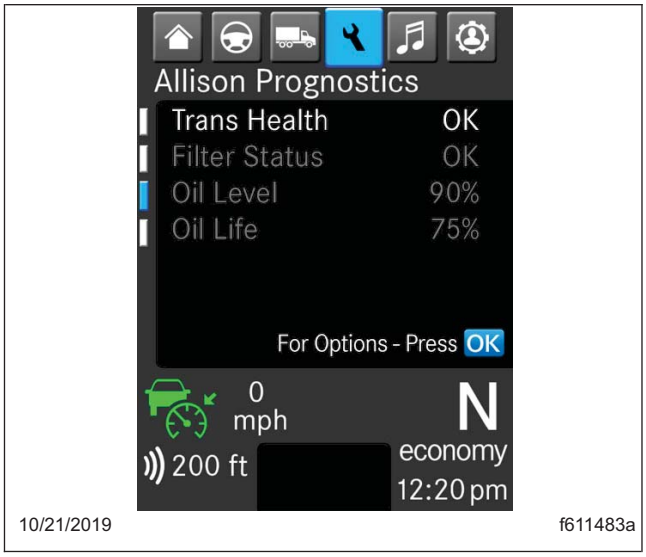


Fig. 17.14, Allison Transmission Prognostics

18

Manual Transmissions and Clutch

Eaton® Fuller® Manual Transmissions

General Information

A Freightliner New Cascadia vehicle may be equipped with an Eaton 10-, 13-, or 18-speed manual transmission. Vehicles with Eaton manual transmissions have clutch brakes and a hydraulic clutch actuation system.

The transmission shift pattern is printed on a decal attached to the driver-side sun visor or to the dash below the center dash panel. The shift pattern may also be printed on the shift knob.

NOTE: For additional information, refer to the Eaton website, **www.roadranger.com**.

Transmission Operation Tips

Follow these important operation principles:

- For all conditions, use the highest gear that is still low enough to start the vehicle moving with the engine at or near idle speed, and without slipping the clutch excessively.

  When operating on-highway with no load or under ideal conditions, use 1st gear to start the vehicle moving forward.

  When operating off-road or under adverse conditions, use LOW gear to start the vehicle moving forward.
- Use the clutch brake to stop gear rotation when shifting into LOW or reverse while the vehicle is stationary. The clutch brake is actuated by depressing the clutch pedal all the way to the floor.
- Partially disengage the clutch to break engine torque during normal gear shifts.
- Double-clutch between all upshifts and downshifts that require movement of the shift knob. Splitting of gears does not require movement of the shift knob.
- Never push the range-preselection lever down into low range while operating in high range, except when downshifting from 5th gear to 4th gear.
- Do not shift from high range to low range at high vehicle speeds.
- Never make a range shift or a splitter shift while the vehicle is in reverse.
- Never move the range-preselection lever with the transmission in neutral while the vehicle is moving.
- Skip ratios while shifting *only* when operating conditions permit, depending on the load, grade, and road speed.
- Never coast with the transmission in neutral.

Clutch

General Information

The hydraulic clutch control system consists of a pedal unit and a slave cylinder connected by a hydraulic hose. The components of the system have been specially designed to use DOT 4 brake fluid. The hydraulic system is self-adjusting.

Typical operation will not break down the clutch friction surfaces. Heat and wear are almost nonexistent when a clutch is fully engaged. However, during the moment of engagement, when the clutch is picking up the load, considerable heat is generated. If a clutch slips excessively, high temperatures develop quickly between the flywheel, driven discs, and pressure plates. An improperly adjusted or slipping clutch can generate temperatures high enough to cause the friction-facing material to char and burn, destroying the clutch.

To ensure long service life of the clutch, start in the right gear and be alert to clutch malfunctions.

Clutch Operation

Clutch Break-In

With a new or newly installed clutch, the clutch may slip for a short time while the friction surfaces break-in. However, allowing the clutch to slip for more than two seconds can severely damage the clutch disc, pressure plate, and the flywheel.

During initial operation of a new vehicle or a vehicle with a new clutch, check for clutch slippage during acceleration. If the clutch slips, decelerate until the clutch does not slip. Allow the clutch to cool 15 to 30 seconds, and then gradually accelerate again. If the clutch continues to slip, repeat the procedure. If necessary, repeat the procedure up to five times. If the clutch slips after five attempts, stop the vehicle. Allow the clutch to cool for at least one hour. Notify your Freightliner dealer of the problem.

NOTICE

Do not allow sustained slippage of the clutch; this could severely damage the clutch disc, pressure plate, or flywheel. Damage caused by clutch slippage due to improper break-in is not warrantable.

Using the Clutch Brake

The clutch brake is applied by depressing the clutch pedal past the fully released clutch position, almost to the floor plate. The last part of the clutch pedal travel will compress the clutch brake plates together, stopping the transmission input shaft. The purpose of the clutch brake is to stop the transmission gears from rotating in order to quickly engage a transmission gear after idling in neutral.

NOTICE

Never apply the clutch brake when the vehicle is moving. If the clutch brake is applied when the vehicle is moving, the clutch brake will try to stop or decelerate the vehicle, causing rapid wear of the clutch brake friction discs. Considerable heat will be generated, causing damage to the release bearings and the transmission front bearings.

Holding the Vehicle on an Incline

Always use the vehicle service brakes to prevent the vehicle from rolling backwards while stopped on a hill. Slipping the clutch on a hill to maintain the vehicle position will quickly damage the clutch assembly.

Coasting

Coasting with the clutch pedal depressed and the transmission in a low gear can cause high driven disc speed. The clutch speed can be much higher under these conditions than when the engine is driving the clutch. This condition creates a hazardous situation due to the lack of vehicle control and due to the high clutch disc speed. Engaging the clutch under these conditions can cause component damage because of the shock loads to the clutch and drivetrain.

⚠ WARNING

Always shift into the gear that is correct for the traveling speed of the vehicle and engage the clutch. Coasting with the clutch disengaged can prevent engagement of the correct transmission gear which can cause loss of vehicle control, possibly resulting in personal injury or property damage.

High clutch disc speeds while coasting can also cause the clutch facing to be thrown off the disc. Flying debris from the clutch can cause injury to persons in the cab.

Clutch Adjustment

Eaton Fuller Solo clutches are adjustment-free. As the clutch wears, its wear-adjusting technology monitors clutch components and makes any necessary adjustments. The wear adjusting technology comes from two sliding cams, which rotate to maintain the proper adjustment. Atop the upper cam, a wear indicating tab mirrors the cam's movement, letting you know when it's time to replace the clutch.

19

Drive Axles

Interaxle Lock, Tandem Axles

The interaxle lock (axle lock, interaxle differential lockout) feature causes the drive axle shafts to rotate together, and is recommended for use under adverse road conditions where greater traction is needed.

When engaged, the interaxle lock essentially makes the driveshaft a solid connection between the drive axles. Power entering the forward axle is transmitted straight through to the rearmost axle(s). Driveline torque is now delivered equally and the drive axles, and wheels, turn together at the same speed. The interaxle lock increases drivetrain and tire wear and should be used only when improved traction is required.

A status screen showing engaged locks is found in the vehicle operations menus on the driver display. See **Fig. 19.1**.

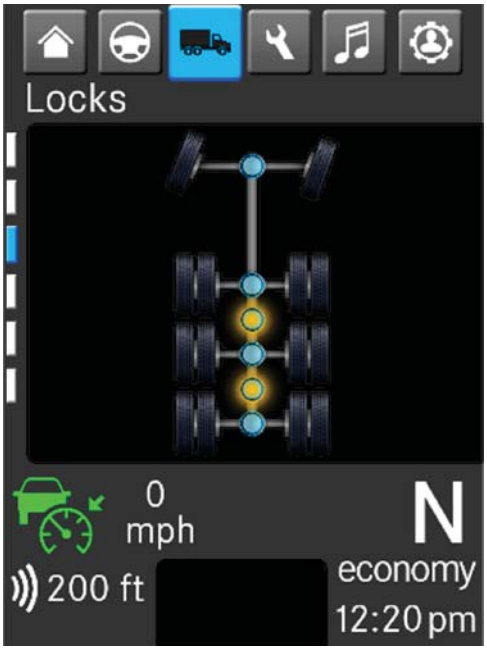
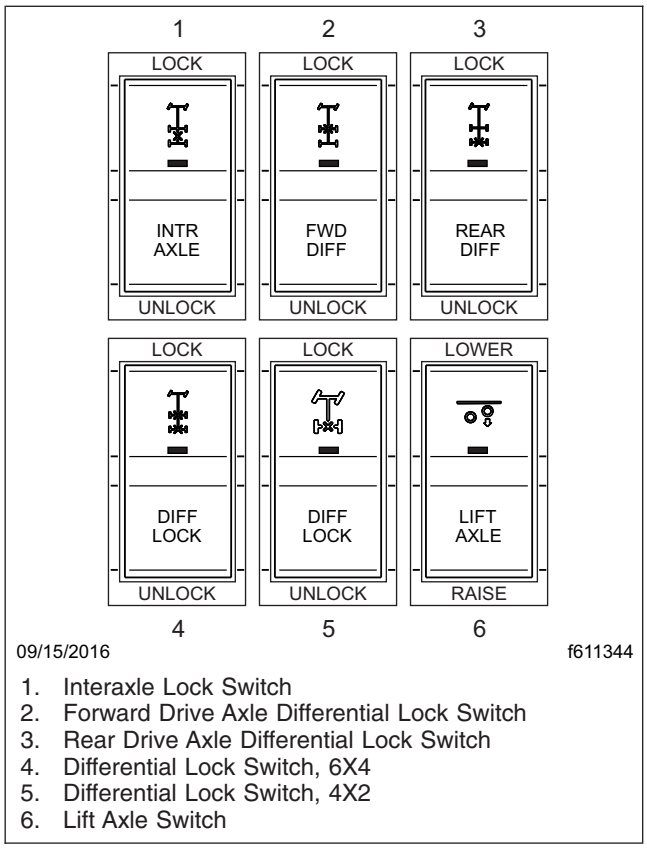


Fig. 19.1, Interaxle and Differential Locks Status Screen

Interaxle Lock Switch

The interaxle lock switch, shown in **Fig. 19.2,** allows the driver to lock the drive axles together. If the vehicle is equipped with Detroit axles, the switch illumination indicates the lock is engaged.



1. Interaxle Lock Switch
2. Forward Drive Axle Differential Lock Switch
3. Rear Drive Axle Differential Lock Switch
4. Differential Lock Switch, 6X4
5. Differential Lock Switch, 4X2
6. Lift Axle Switch

Fig. 19.2, Axle Switches

Interaxle Lock Operation

NOTICE

The interaxle lock should not be engaged on a vehicle with obviously spinning wheels. Engagement at high speed or power can damage the axle(s).

NOTE: If the interaxle lock is engaged when the engine is turned off, the interaxle lock will disengage.

Do not wait until traction is lost and the tires are spinning before engaging the interaxle lock.

1. With the engine running, press the upper half of the interaxle lock switch to engage the interaxle lock. If the vehicle is moving, briefly let up on the accelerator until the interaxle lock engages.

   If the vehicle is equipped with Detroit axles, the illumination of the switch indicates the lock is engaged. Depending on the vehicle configuration, a buzzer may also sound.

NOTICE

Do not operate the vehicle continuously with the interaxle locked during extended good road conditions. To do so could result in damage to the axle gearing and excessive driveline and tire wear.

2. Proceed over poor road conditions with caution.
3. After leaving poor road conditions, press the lower half of the interaxle lock switch to disengage the interaxle lock. If the vehicle is moving, briefly let up on the accelerator to allow the interaxle lock to disengage.

   If the vehicle is equipped with Detroit axles, the deactivation of the indicator light on the switch indicates disengagement.
4. Resume driving at normal speed.

Driver-Controlled Differential Lock (DCDL)

The driver-controlled differential lock (DCDL) feature (side-to-side wheel lock, traction control, or traction equalizer) is available on vehicles with single- or tandem-drive axles.

The DCDL provides maximum traction for slippery conditions by forcing the wheels on each drive axle governed by the switch to rotate together. When the DCDL is engaged, the clutch collar completely locks the differential case, gearing, and axle shafts together, maximizing the traction of both wheels. Use the DCDL if the interaxle lock does not provide sufficient traction.

A status screen showing engaged locks is found in the vehicle operations menus on the driver display. See **Fig. 19.1**.

Differential Lock Switch

Each differential lock is controlled by a switch on the dash. See **Fig. 19.2**.

DCDL Operation

NOTICE

Engage the DCDL only when the vehicle is stopped or moving at less than 5 mph (8 km/h). Engaging the DCDL at speeds above 5 mph (8 km/h) can cause internal axle damage.

NOTE: On some vehicles, the differential lock system is connected through the low speed range of the transmission. If this system is used, the transmission must be in the low speed range for the wheels to fully lock. In addition, shifting out of low speed range will also disengage the differential lock.

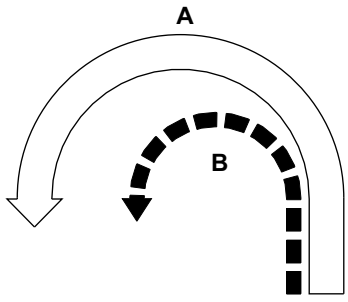
NOTE: If the DCDL is engaged when the engine is shut down, the DCDL will disengage.

1. With the engine running, press the upper half of the differential lock switch to engage the DCDL.
2. If the vehicle is moving, briefly let up on the accelerator to relieve torque on the gearing, allowing the differential to fully lock. An indicator light on the differential lock switch illuminates when the lock is engaged. Depending on the vehicle configuration, a buzzer may also sound.

⚠ WARNING

Be especially careful when driving under slippery conditions with the differential locked. Though forward traction is improved, the vehicle can still slip sideways, causing possible loss of vehicle control, personal injury, and property damage.

3. Drive cautiously and do not exceed 25 mph (40 km/h). When the differential is fully locked, the turning radius will increase because the vehicle understeers. See **Fig. 19.3**.



A. Turning Radius When the DCDL is Engaged (understeer condition)
B. Turning Radius When the DCDL is Disengaged

Fig. 19.3, Turning Radii

4. Press the lower half of the differential lock switch to disengage the DCDL after leaving poor road conditions.

5. If the vehicle is moving, briefly let up on the accelerator to allow the wheels to fully unlock, then resume driving at normal speed.

Single Drive Axles with Traction Equalizer

Some single drive axles are equipped with a traction equalizer that is a load-sensing, self-actuating feature. A traction equalizer provides normal differential action where traction is good. When one wheel begins to spin faster than the other, clutch plates in the differential housing automatically engage, delivering power to both wheels. There is no operator control with this feature.

NOTICE

Tire sizes on both rear wheels should be the same on axles equipped with a traction equalizer. If not, excessive wear may occur in the traction equalizer.

20

Fifth Wheels

Fifth Wheels, General Information

⚠ WARNING

Do not use any fifth wheel that fails to operate properly. Doing so may cause loss of vehicle control, possibly resulting in severe personal injury or death.

Fifth Wheel Lubrication

⚠ WARNING

Keep the fifth wheel plate lubricated to prevent binding between the tractor and trailer. A binding fifth wheel could cause erratic steering and loss of vehicle control, possibly resulting in personal injury or death.

The standard fifth wheel plate must be kept well lubricated with chassis grease to prevent friction and binding between the tractor fifth wheel plate and the trailer.

For a low-lube fifth wheel plate, inspect the condition of the low-lube pads. There should be no damaged or missing pieces. Slight puckering at the outside edges is normal.

For lubrication instructions, see **Group 31** of the vehicle Maintenance Manual.

Fifth Wheel Coupling

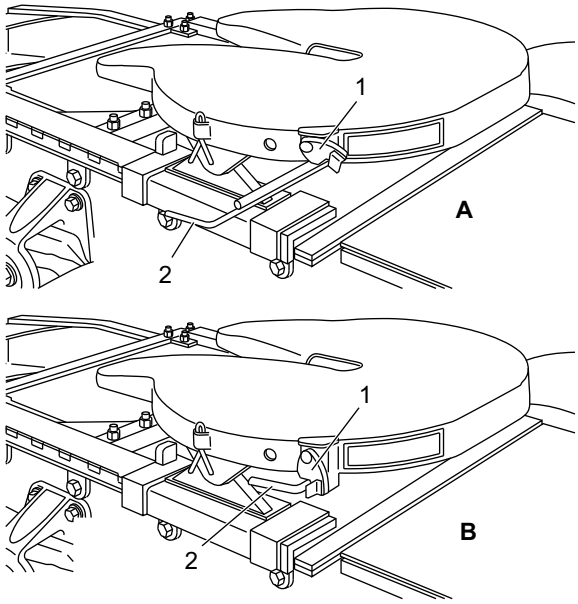
Fifth wheel coupling is activated with the lock control handle located on either the right side or left side of the fifth wheel. Coupling has successfully occurred when the kingpin has been forced into the jaws and the lock control handle has moved to the locked position.

NOTICE

Some fifth wheels may be mounted on sliding rails. Before attempting to couple a trailer to a sliding fifth wheel, the slide feature must be locked to prevent the top plate from sliding rapidly forward or rearward, causing damage to the fifth wheel or kingpin.

Fontaine and Holland Fifth Wheels Coupling

1. Chock the front and rear of the trailer tires to prevent the trailer from moving.
2. Ensure the fifth wheel jaw is fully open and the operating rod is in the unlocked position. See **Fig. 20.1** or **Fig. 20.2**.



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NOTE: Make sure the safety latch is down when the control handle is locked.

A. Unlocked	B. Locked
1. Safety Latch	2. Lock Control Handle

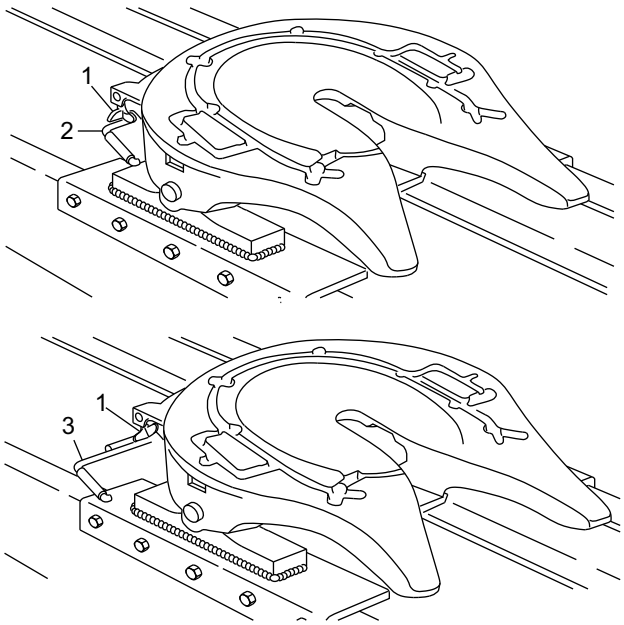
Fig. 20.1, Fontaine Locking Mechanism

3. Make sure the fifth wheel top plate is tilted so the ramps are as low as possible.
4. Position the tractor so that the center of the fifth wheel is in line with the trailer kingpin. The kingpin should be in a position to enter the throat of the locking mechanism.

NOTICE

Attempting to couple at the wrong height may cause improper coupling, which could result in damage to the fifth wheel or kingpin.

5. Adjust the trailer height if required.



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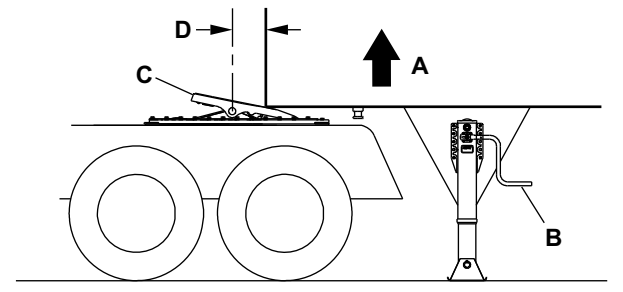
1. Safety Latch
2. Operating Rod (locked)
3. Operating Rod (unlocked)

Fig. 20.2, Holland Simplex SE Locking Mechanism

For a standard fifth wheel plate, the trailer should contact the fifth wheel approximately 4 to 8 inches (10 to 20 cm) behind the fifth wheel pivot. See **Fig. 20.3**.

For a low-lube fifth wheel plate, the fifth wheel must slide freely under the trailer, and the trailer should contact the fifth wheel at the pivot. See **Fig. 20.4**.



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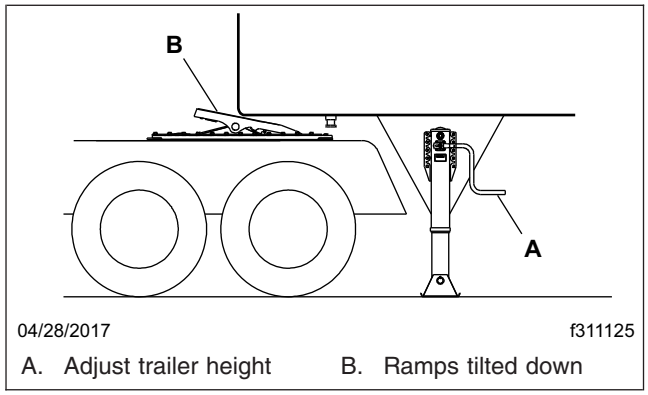
A. Fifth wheel must lift trailer
B. Adjust trailer height
C. Ramps tilted down
D. 4 to 8 inches

Fig. 20.3, Trailer Connection Point, Standard Fifth Wheel



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A. Adjust trailer height
B. Ramps tilted down

Fig. 20.4, Trailer Connection Point, Low-Lube Fifth Wheel

6. With the fifth wheel lock opening aligned with the trailer kingpin, back the tractor slowly toward the trailer. After sliding under the trailer, STOP to prevent from hitting the kingpin too hard, then resume backing slowly until the fifth wheel locks.

   On a standard fifth wheel, the fifth wheel must lift the trailer.

   On a low-lube fifth wheel, do not lift the trailer as this may damage the fifth wheel plate.

7. Apply the tractor parking brakes.

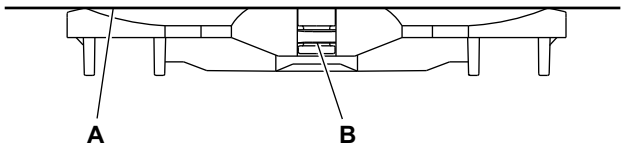
⚠ WARNING

A visual inspection is required by law. Some improper couplings can pass a pull test. Sound is not reliable. Get out of the cab and look. Incorrect coupling could cause the trailer to disconnect, possibly resulting in serious personal injury or death.

8. Perform a coupling inspection, checking that there is no gap between the bottom of the trailer and the fifth wheel, and that the kingpin is securely locked. See **Fig. 20.5**

   When lockup has occurred, the fifth wheel control handle moves to the locked position. Make sure that the safety latch is down over the lock control handle to hold the control handle in the locked position. (The safety latch will only rotate down if the operating rod is fully retracted in the locked position.) See **Fig. 20.1** for Fontaine fifth wheels. See **Fig. 20.2** for Holland fifth wheels.

9. Release the tractor parking brakes. Test for kingpin lockup slowly inching the tractor forward, pulling on the trailer against the chocks.



A. No gap between trailer and fifth wheel B. Kingpin inside lock

Fig. 20.5, Coupling Inspection

10. After lockup is completed, connect the tractor-to-trailer air system lines and the electrical cable to the trailer. Take care to prevent dirt or foreign material from entering the air system lines.

NOTICE

Always make sure the connection hanger keeps the trailer air hoses and electrical cables positioned so that they do not rub on anything. Rubbing may wear through hoses or cables, resulting in air leaks, or exposed or broken wires, potentially affecting trailer brake or electrical systems.

11. Charge the air brake system with air, checking that the air connections do not leak.

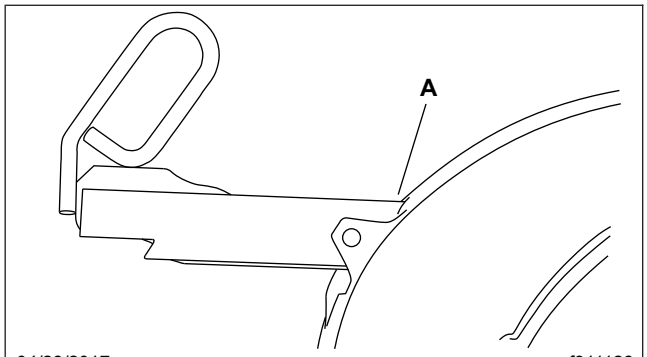
⚠ WARNING

Incorrect fifth wheel lock adjustment could cause the trailer to disconnect, possibly resulting in serious personal injury or death.

12. With the trailer wheels chocked and the brakes set, check for clearance between the kingpin and the fifth wheel jaws by moving the tractor forward and backward against the locked kingpin. If slack is present, uncouple the trailer and have the fifth wheel inspected and adjusted by a certified technician.

Jost Fifth Wheel Coupling

1. Tilt the ramp down.
2. Open the kingpin locks. See **Fig. 20.6**.
3. Back the vehicle close to the trailer, centering the kingpin on the fifth wheel.
4. Chock the trailer wheels.
5. Connect the air lines and electrical cable.
6. Ensure that the red trailer air supply valve (trailer brake) is pulled out, and that the trailer parking brakes are set. See **Chapter 4** in this manual for operation of the dash-mounted brake controls.



A. Lock held open by catch mechanism

Fig. 20.6, Jost Release Handle Unlocked

NOTICE

Attempting to couple at the wrong height may cause improper coupling, which could result in damage to the fifth wheel or kingpin.

7. Adjust the trailer height (if required).

   For a standard fifth wheel plate, the trailer should contact the fifth wheel approximately 4 to 8 inches (10 to 20 cm) behind the pivot. See **Fig. 20.3**.

   For a low-lube fifth wheel plate, the fifth wheel must slide freely under the trailer, and the trailer should contact the fifth wheel at the pivot. See **Fig. 20.4**.

8. Back the tractor under the trailer.

   On a standard fifth wheel, the fifth wheel must lift the trailer.

   On a low-lube fifth wheel, do not lift the trailer as this may damage the fifth wheel plate.

9. After sliding under the trailer, STOP to prevent from hitting the kingpin too hard, then resume backing slowly until the fifth wheel locks.

⚠ WARNING

A visual inspection is required by law. Some improper couplings can pass a pull test. Sound is not reliable. Get out of the cab and look. Incorrect coupling could cause the trailer to disconnect, possibly resulting in serious personal injury or death.

10. Apply the tractor parking brake, then perform a physical check for positive kingpin lockup, and that there is no gap between the trailer and the fifth wheel. See **Fig. 20.5**.
11. Ensure that the release handle is in the locked position adjacent to the casting. See **Fig. 20.7**.

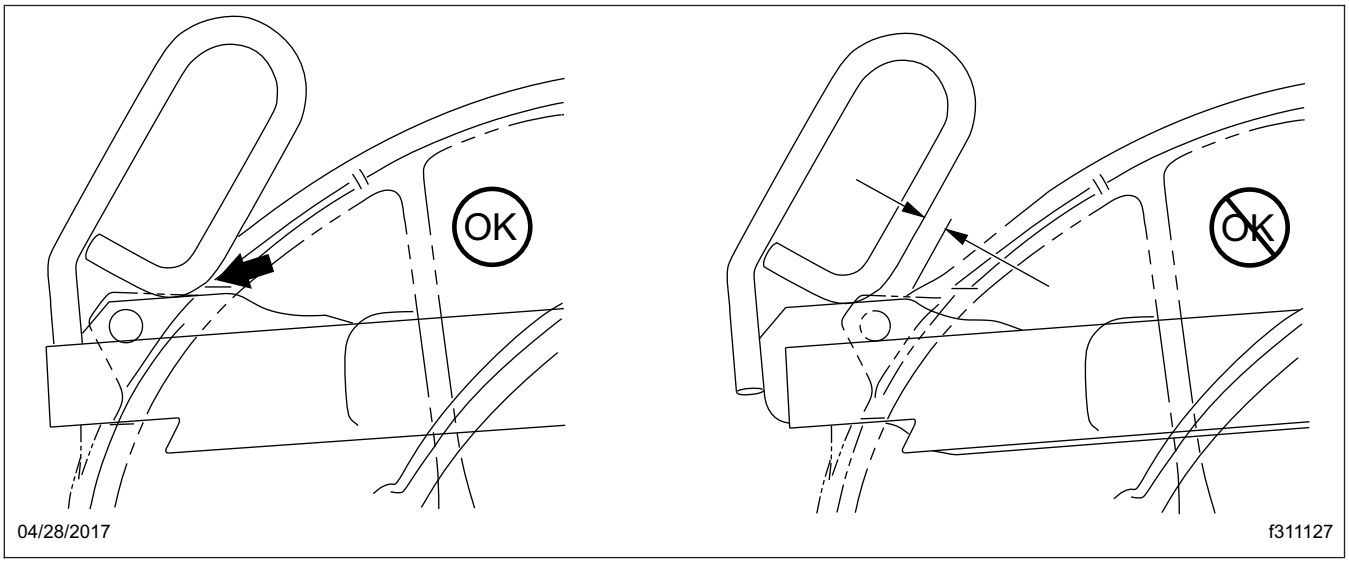


Fig. 20.7, Jost Release Handle Locked

12. Release the tractor parking brakes and test for kingpin lockup by slowly moving the tractor forward, pulling on the trailer against the chocks.

Fifth Wheel Uncoupling

Manual Uncoupling

1. Apply the tractor and trailer parking brakes.
2. Chock the trailer rear wheels.
3. Lower the trailer landing gear until the weight is removed from the fifth wheel.
4. Disconnect the tractor-to-trailer air system lines and electrical cable. Plug the air lines to prevent dirt or foreign material from entering the lines.
5. Verify that both the yellow parking-brake and red trailer-air-supply knobs are out, the tractor and trailer parking brakes are set, and that the trailer is prepared for uncoupling.
6. Release the kingpin locking mechanism following the instructions for each manufacturer below.

   6.1 **Fontaine:** Lift the safety latch and pull the lock control handle to the unlocked position. See **Fig. 20.1**.

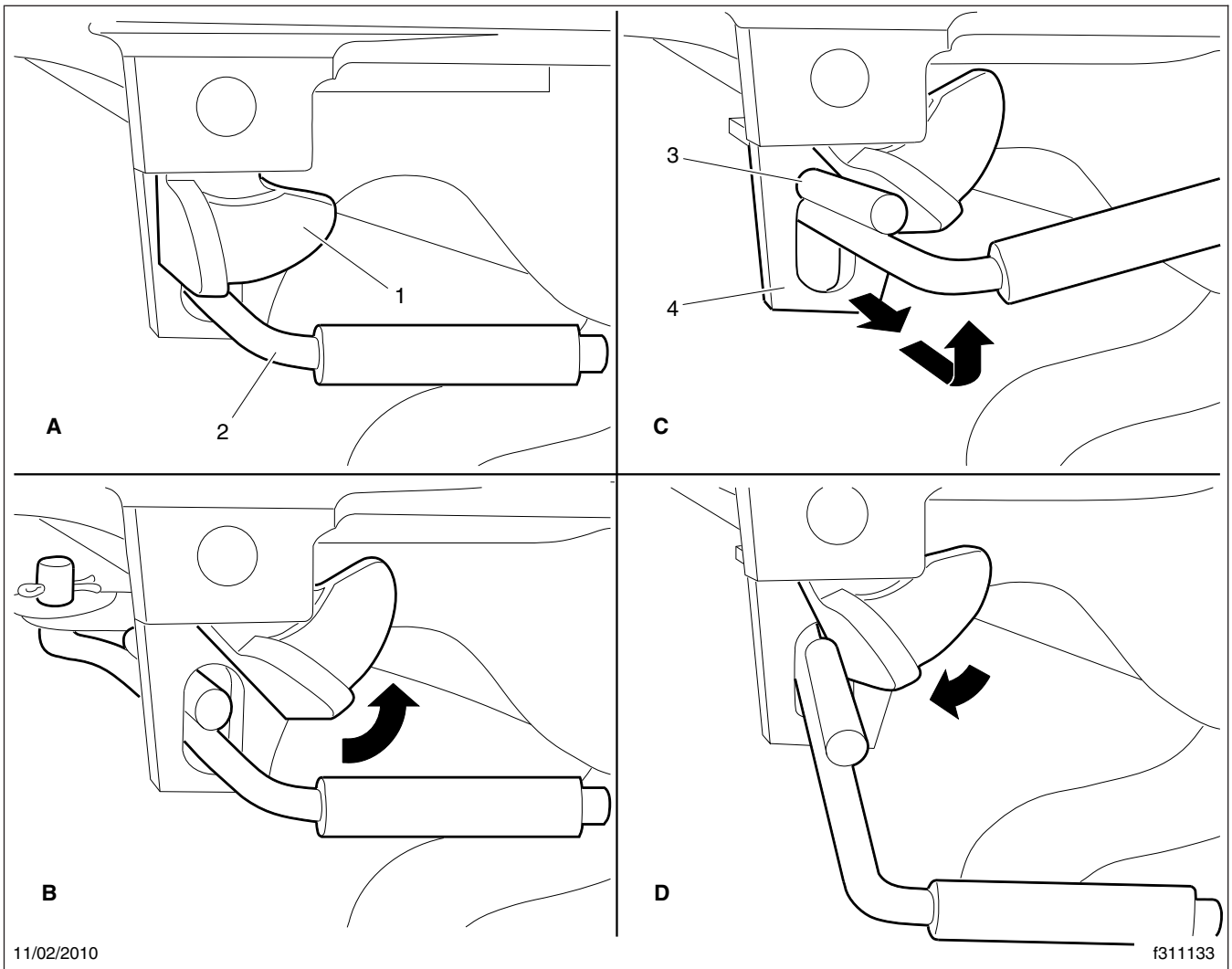
   6.2 **Holland:** In the locked position the safety indicator swings freely over the operating rod. See **Fig. 20.8**, View A.

   To unlock the mechanism, manually rotate the safety indicator toward the rear of the fifth wheel. See **Fig. 20.8**, View B.

   Pull the operating rod out. When the upper operating rod shoulder is outside the slot, raise the handle and place the shoulder of the upper rod against the plate casting, above the slot. See **Fig. 20.8**, View C.

   The fifth wheel is now in the lockset position and is ready for uncoupling. As the tractor pulls away from the trailer the kingpin forces the jaw to rotate, contacting the lock. Continued rotation of the jaw forces the lock to move outward, and drops the upper rod back into the slot. See **Fig. 20.8** View D. The wheel is now ready for coupling.

   6.3 **Jost:** Pull the retractable handle out, then secure it in the open position with the catch. See **Fig. 20.6**.
7. Release the tractor parking brake then drive out slowly, allowing the trailer to slide down the fifth wheel and pick-up ramps.



A. Locked Position
B. Unlatched Position (safety indicator rotated towards the rear of the fifth wheel)
1. Safety Indicator
2. Operating Rod
C. Lockset Position (upper rod resting against casting above slot)
D. Open Position (ready for recoupling)
3. Upper Rod
4. Plate Casting

Fig. 20.8, Holland Kingpin Locking Mechanism

Air-Actuated Uncoupling

A dash-mounted kingpin release switch (if equipped) may be used to uncouple the trailer. See **Fig. 20.9**.

NOTE: In the event of an air system failure, air-actuated kingpins can be manually released following the instructions for manual unlocking.

⚠ WARNING

Once the kingpin release switch has been pushed, the kingpin lock is released. The vehicle MUST NOT be driven with the trailer until the trailer has been uncoupled and coupled again. Failure to do so may result in separation of the trailer from the tractor, possibly causing serious personal injury or death.

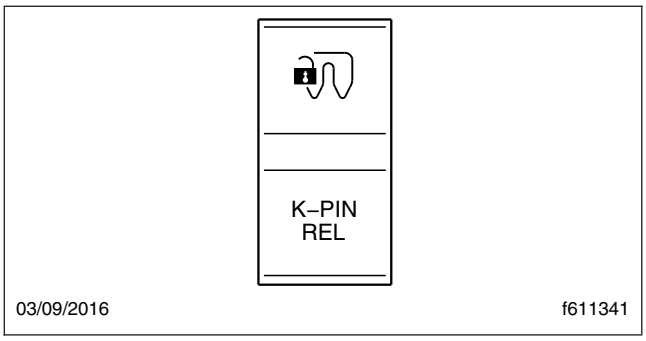


Fig. 20.9, Kingpin Release Switch

Preparing the Trailer for Uncoupling

Before using the air valve to unlock a fifth wheel kingpin, prepare the trailer as follows.

1. Apply the tractor and trailer parking brakes.
2. Chock the trailer rear wheels.
3. Lower the trailer landing gear until the weight is removed from the fifth wheel.
4. Disconnect the tractor-to-trailer air lines and electrical cable. Plug the air lines to prevent dirt or foreign material from entering the lines.

Air-Activated Kingpin Unlock

1. Verify that both the yellow parking-brake and red trailer-air supply knobs are out, the tractor and trailer parking brakes are set, and that the trailer is prepared for uncoupling.

NOTE: The kingpin release will not actuate if the switch is pushed for less than 3 seconds, the vehicle is moving, or the parking brake is not set. Unless all these conditions are met, the trailer is not uncoupled and an alert is shown on the driver display.

2. Push and hold the kingpin release switch (**Fig. 20.9**) for a minimum of 3 seconds. The system will apply air for 20 to 30 seconds to ensure the kingpin unlocks. When the kingpin is unlocked, a notification is displayed; see **Fig. 20.10**.
3. Release the tractor parking brake.
4. Drive out from under the trailer.

Fig. 20.10, Kingpin Release Alert Screen

Fifth Wheel Slide

⚠ WARNING

Adjust the fifth wheel slide correctly, and do not overload any tractor axle by incorrectly loading the trailer. Incorrect slide adjustment or improper axle loading could cause erratic steering and loss of vehicle control, possibly resulting in serious personal injury or death.

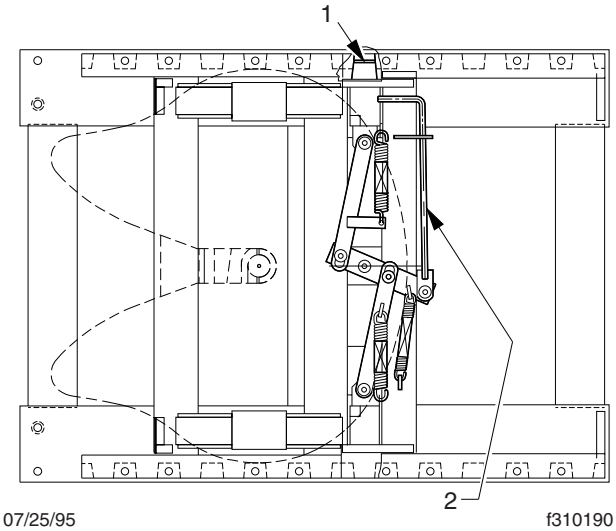
On sliding fifth wheel assemblies, the fifth-wheel plate is attached to rails that allow forward and rearward movement of the fifth wheel to optimally distribute the load across the axles. Slots are evenly spaced along the slide rails, and retractable wedges are positioned through the slots to hold the fifth wheel in the desired position.

The amount of load distribution on the front steering axle and rear drive axle(s) will have a direct effect on the steering control of the vehicle. Determine the front and rear axle weights by weighing the vehicle on scales designed for this purpose.

The maximum axle weight ratings are shown on the Federal Motor Vehicle Safety Standard (FMVSS) label or Canadian Motor Vehicle Safety Standard (CMVSS) label attached to the left rear door post of the tractor. The desired load on the axle is no less than 80 percent of the maximum axle weight rating, but in no instances should the axle load exceed the maximum axle weight rating given on the FMVSS or CMVSS label.

Manual Slide Operation

The manual slide feature is operated from the fifth wheel plate with a manual release handle using the following procedure. See **Fig. 20.11**.



1. Locking Wedge
2. Slide Release Pull Handle

Fig. 20.11, Manual Release Sliding Fifth Wheel (Fontaine shown)

1. Stop the tractor and trailer in a straight line on level ground. Pull the red trailer air supply knob to apply the trailer parking brakes.
2. Apply the tractor parking brake, then release the sliding mechanism using the appropriate method for the fifth wheel manufacturer.
   - 2.1 **Fontaine:** Lift the slide release pull handle to disengage it from the guide plate. Then, pull out the handle until it is in the unlocked position and can be positioned against the guide plate to hold it out. The handle will stay in the unlocked position until it is manually disengaged from the guide plate. See **Fig. 20.12**.
   - 2.2 **Holland:** Pull the operating rod out. Make sure both side plungers have released. See **Fig. 20.13**.
3. Lower the trailer landing gear just enough to remove the weight from the tractor.
4. Chock the front and rear of the trailer tires to prevent the trailer from moving.
5. Release the tractor parking brakes, then slowly move the tractor forward or backward until the fifth wheel is in the desired location.

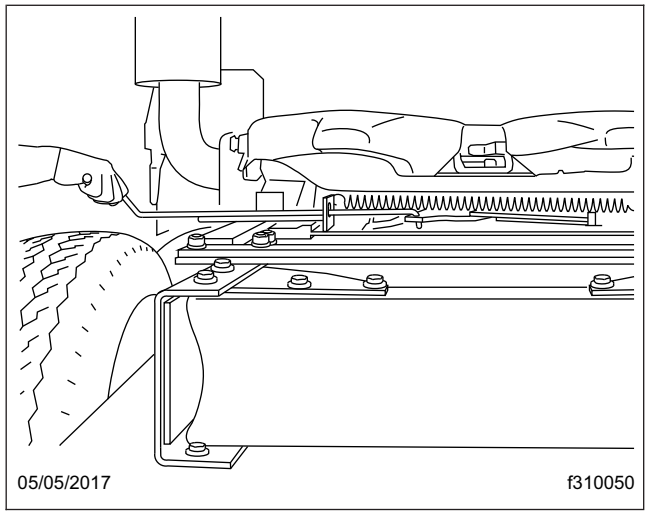
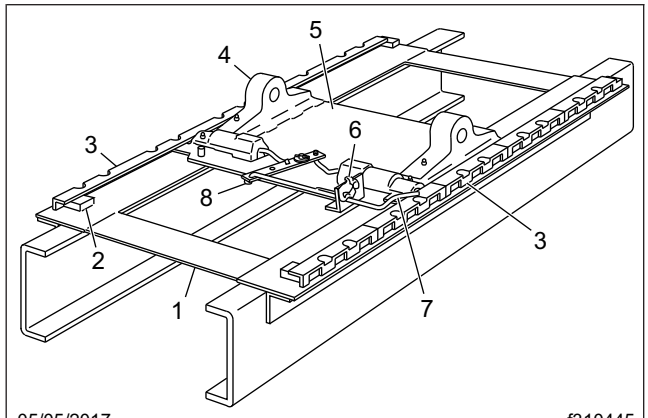


Fig. 20.12, Releasing the Sliding Fifth Wheel, (Fontaine)



1. Baseplate
2. Bolted Stop
3. Baseplate Rail
4. Fifth Wheel Mount
5. Slider Saddle Plate
6. Safety Latch
7. Operating Rod
8. Operating Lever

Fig. 20.13, Sliding Fifth Wheel Manual Release, (Holland Simplex)

NOTICE

When moving the fifth wheel to the desired position, be sure the trailer landing gear will not at any time come in contact with the tractor frame or other components. Make sure that the front of the trailer will not come in contact with the rear of the cab or with other components if they extend beyond the rear of the cab.

⚠ WARNING

Check that the locking wedges have seated in the slots. Failure to achieve complete lockup may allow disengagement of the tractor from the trailer, possibly resulting in serious personal injury or death.

6. Apply the tractor parking brakes, then lock the sliding member in position using one of the following methods:

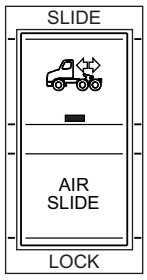
   6.1 **Fontaine:** Disengage the slide release pull handle from the guide plate. The slide release pull handle is spring-loaded in the locked position and will seek the locked position when disengaged from the guide plate. After the slide release pull handle returns to the fully locked position, visually and physically check the locking wedges to make sure they are fully inserted into the slots in the slide rails. Make sure the handle is locked in position against the guide plate.

   6.2 **Holland:** Raise the operating rod so that it is free to move inward. Make sure that the lock pins have seated in the base plate rail holes and the operating rod moves into the locked position.

NOTE: The fifth wheel may need to be moved slightly to enable the locking wedges to enter the fully locked position.

Air Slide Operation

The slide feature may be operated with an air switch mounted in the dash, that operates an air cylinder that locks and unlocks the slide. See **Fig. 20.14**.



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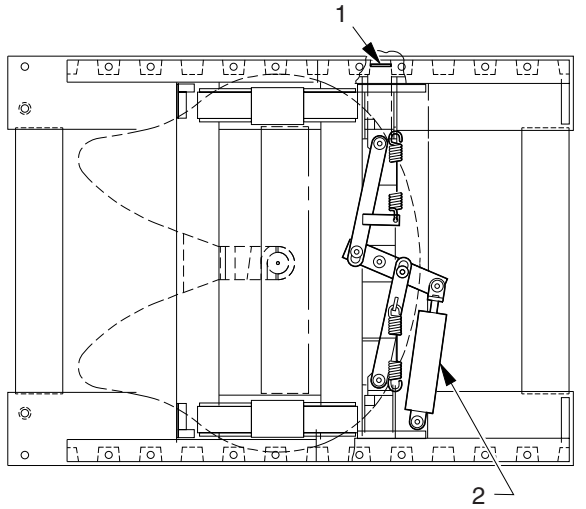
1. Fifth Wheel Air-Slide Switch

Fig. 20.14, Air-Slide Switch

1. Set the air-slide switch (**Fig. 20.14**) to SLIDE.

   Ensure the locking plungers have released. See **Fig. 20.15**.

   For Jost fifth wheels, the mechanism activates as shown in **Fig. 20.16**.



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1. Locking Wedge 2. Air Cylinder

Fig. 20.15, Air-Operated Sliding Fifth Wheel (Fontaine shown)

2. Lower the trailer landing gear just enough to remove the weight from the tractor.
3. Pull the red trailer-air-supply knob to set the trailer-parking brakes.
4. Slowly move the tractor forward or backward until the fifth wheel is in the desired location.

NOTICE

Ensure the trailer landing gear does not come in contact with the tractor frame or other components, and that the front of the trailer will not come in contact with the rear of the cab or other components if they extend beyond the rear of the cab.

5. Apply the tractor parking brakes.

⚠ WARNING

Check that the locking wedges have seated in the slots. Failure to achieve complete lockup may allow disengagement of the tractor from the trailer, possibly resulting in serious personal injury or death.

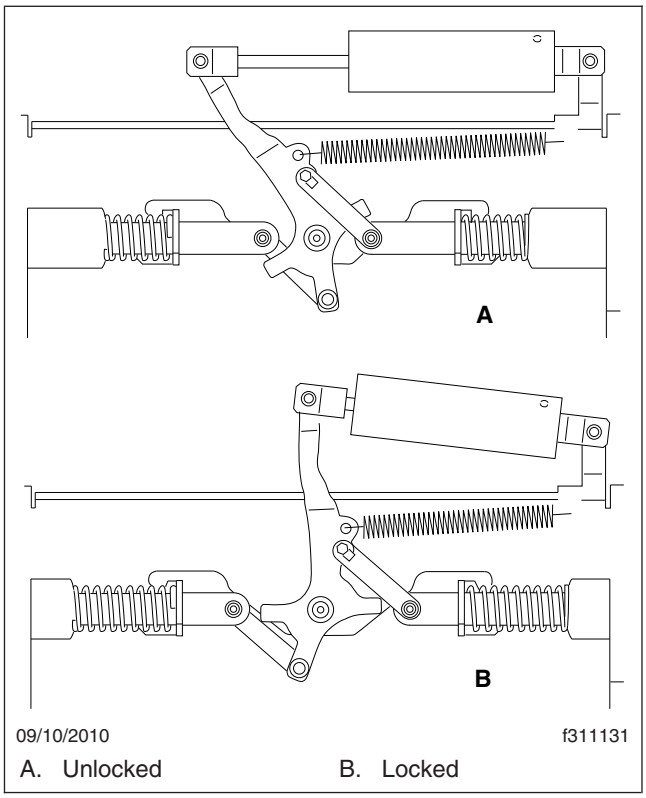


Fig. 20.16, Jost Sliding Fifth Wheel

6. Set the air-slide switch to LOCK. Visually inspect the locking wedges or plungers to make sure that they are fully inserted in the slide rail slots. Verify that the plungers have engaged by tugging the tractor forward while the trailer brakes are locked and the wheels are chocked.

NOTE: The fifth wheel may need to be moved slightly to enable the locking wedges to fully lock.

21

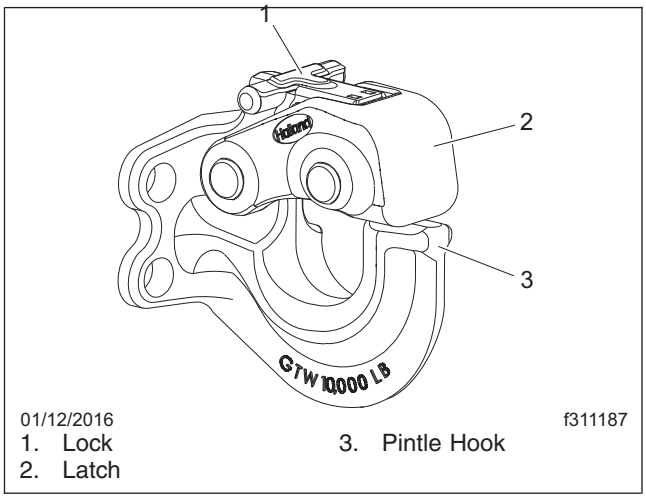
Trailer Couplings

Holland Trailer Coupling

General Information

IMPORTANT: Refer to the Holland web site (**www.hollandhitch.com**) for additional information.

The Holland trailer coupling is designed for use with trailers having a maximum gross weight of 10,000 lb. (4540 kg) for Holland PH-10RP41 and PH-10RP51, or 30,000 lb. (13,610 kg) for Holland PH-30RP41 and PH-30RP51. It is a rigid-type pintle hook, used only on tractor applications, and is fastened to the rear closing crossmember of the vehicle. It is a non-air-adjusted coupling. See **Fig. 21.1** and **Fig. 21.2**.



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1. Lock
2. Latch
3. Pintle Hook

Fig. 21.1, Holland Trailer Coupling with FastLatch

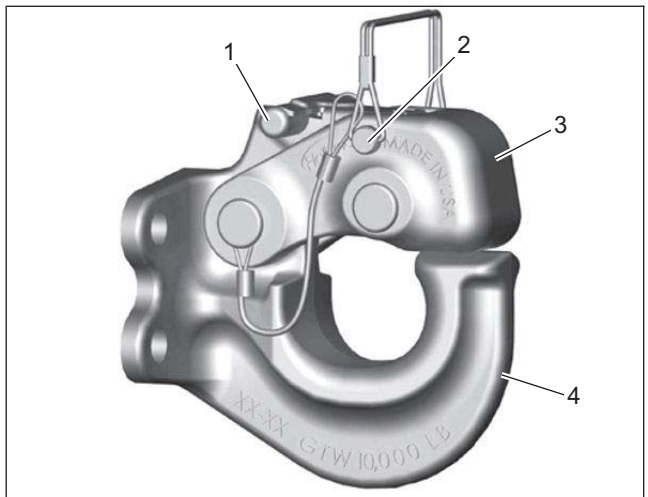
Trailer Hookup

1. Chock the front and rear tires of the trailer.
2. Remove the lock pin (if equipped), then lift the lock handle and raise the latch.
3. Back up the vehicle until the drawbar eye is over the pintle hook.
4. Lower the trailer, until the drawbar eye rests on the pintle hook.
5. Push the latch closed, then insert the lock pin (if equipped).

NOTICE

Always make sure the connection hanger keeps the trailer air hoses and electrical cables positioned so that they do not rub on anything. Rubbing may wear through hoses or cables, resulting in air leaks, or exposed or broken wires, potentially affecting trailer brake or electrical systems.

6. Connect the trailer electrical and air lines.



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1. Lock
2. Lock Pin
3. Latch
4. Pintle Hook

Fig. 21.2, Holland Trailer Coupling with Lock Pin

Trailer Release

1. Apply the tractor and trailer parking brakes.

WARNING

Do not use the trailer air supply for parking trailers not equipped with spring parking brakes. This applies the trailer service brakes only. As air bleeds from the trailer brake system, brake application is lost. This could allow the unattended vehicle to roll away, possibly resulting in serious personal injury or death.

2. Chock the front and rear tires of the trailer.
3. Disconnect the trailer air and electrical lines. Plug the air lines to keep them free of dirt.
4. Take the weight of the trailer drawbar off the pintle hook.
5. Open the latch by removing the lock pin (if equipped), then lift up the lock and raise the latch.
6. Slowly drive the vehicle away from the trailer.

22

Headlights

Headlights

Headlight Aiming, Preliminary Checks

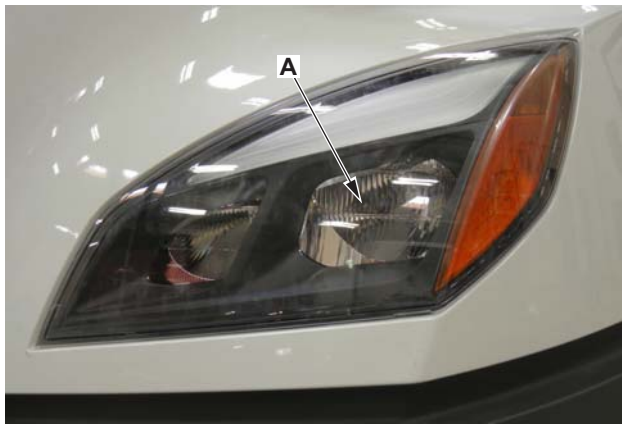
Before checking or adjusting the headlight aim, do the following.

- Check that the hood is closed and latched.
- Remove any large amounts of mud or ice from the underside of the fenders.
- Check the springs for sagging or broken leaves.
- Check the suspension for proper functioning of the leveling mechanism. On cabs with air suspensions, make sure that the height is properly adjusted.
- Check for damage to the hood and hinge assembly. Repair as necessary.
- With the vehicle unloaded, check that the tires are inflated to the recommended air pressure.
- Clean the headlight lenses. Use a soft cloth with mild, non-caustic soap or detergent, and water.

Headlight Aim Check

1. Park the vehicle on a level surface, 25 ft (7.6 m) away from, and perpendicular to, a vertical screen or wall. Shut down the engine and set the parking brake. Chock the tires.
2. Each headlight has a height adjusting dot on the lens. See **Fig. 22.1**. Measure the distance from the ground to the height adjusting dot on each headlight (**Fig. 22.2**, Item A). Note those distances.
3. On the screen or wall, mark the locations of each headlight bulb center using the distances found in step 2. See **Fig. 22.2**, Items 2 and 3.
4. Turn on the low-beam headlights.
5. Check the vertical adjustment of the low beams. The center of each beam projection should fall on or near the marks made during step 3. See **Fig. 22.3**.
6. Use **Table 22.1** to determine the maximum vertical distance allowable between the marks on the wall and the center of each low-beam projection.

   If the distance between either projection center and the mark made on the wall or screen is greater than the maximum distance given in **Table 22.1**, adjust the vertical positioning of that headlight.



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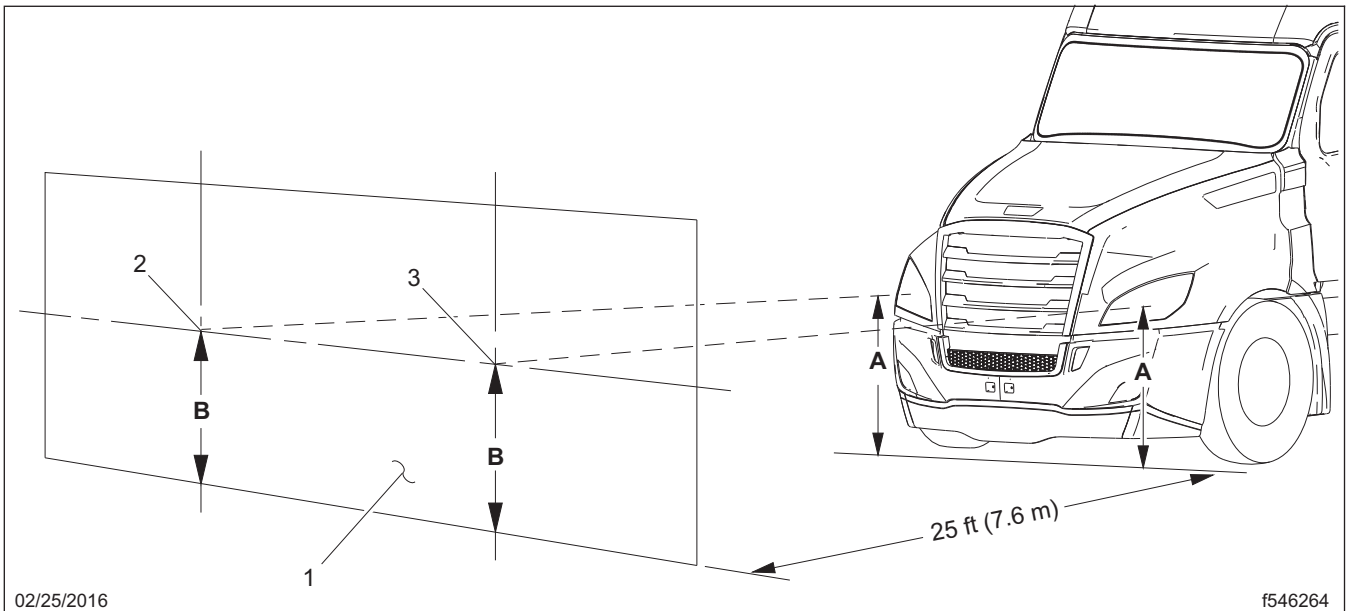
A. The height adjusting dot is located in front of the low-beam lamp on the headlight lens.

Fig. 22.1, Headlight

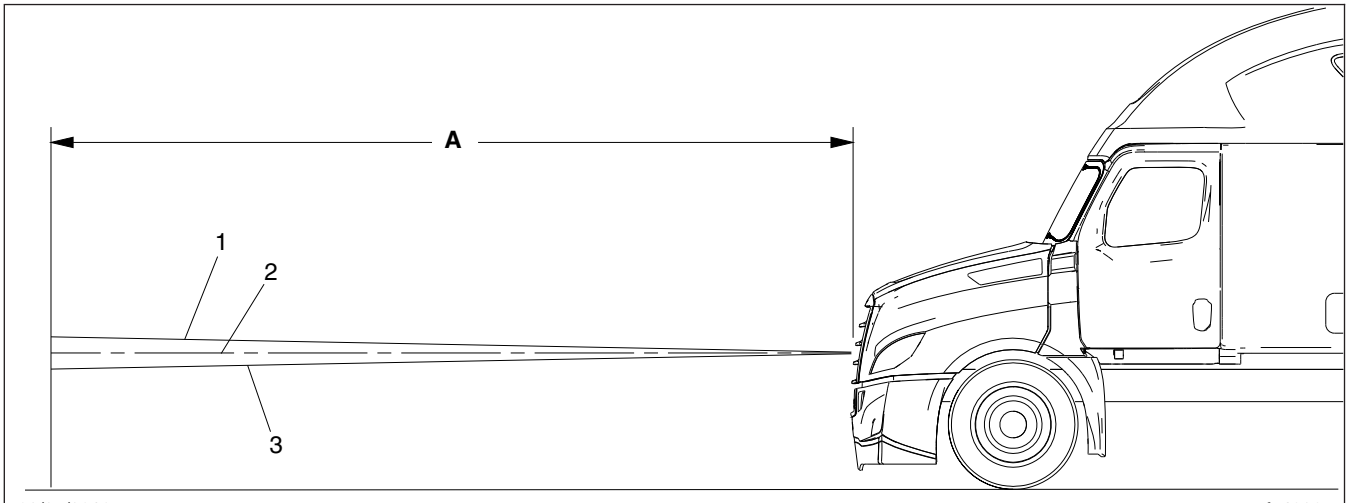
Headlight Aim Adjustment

The adjusting screw is located on the bottom of the headlight assembly, accessible from inside the wheel well when the hood is closed. See **Fig. 22.4**. Remove the plug. Turn the adjusting screw clockwise to raise the beam and counterclockwise to lower it, until the beam pattern meets the acceptable standard.



A. Measure the distance from the ground to the center of each headlight bulb.
B. Mark where the center of each headlight projection should appear.
1. Screen or Wall
2. Center of Right-Hand Headlight Projection
3. Center of Left-Hand Headlight Projection

Fig. 22.2, Headlight Aiming Screen/Wall



A. Measurement: 25 ft (7.6 m)
1. Low-Beam Angle Upper Limit
2. Ideal Low-Beam Projection
3. Low-Beam Angle Lower Limit

Fig. 22.3, Vertical Low-Beam Headlight Variation Limits

Fig. 22.4, Headlight Adjusting (shown with the hood open)

Vertical Low-Beam Headlight Variation Limits			
Distance Between Ground and Headlight: inches (mm)	**Desired Variation (Fig. 22.3, Item 2): inches (mm)**	**Upper Limit (Fig. 22.3, Item 1): inches (mm)**	**Lower Limit (Fig. 22.3, Item 3): inches (mm)**
22–36 (560–900)	0	3.9 (100)	3.9 (100)
36–48 (900–1200)	2 (50) down	2 (50)	6 (150)
48–54 (1200–1400)	4 (101.6) down	1.6 (40)	6.5 (165)

Table 22.1, Vertical Low-Beam Headlight Variation Limits

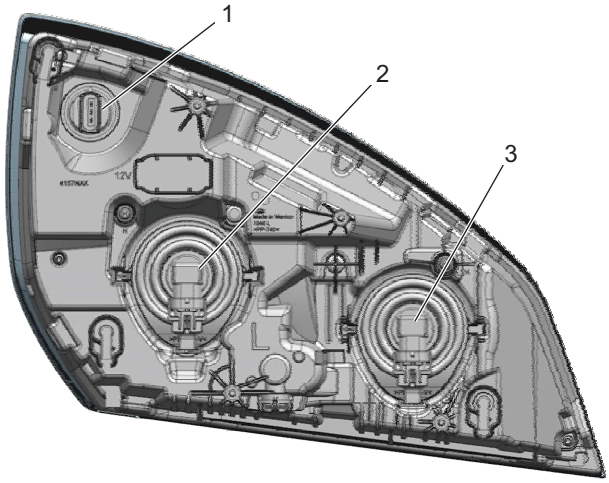
Halogen Headlamps Bulb Replacement

IMPORTANT: Use only SAE/DOT approved H11 bulbs with a 55 watt rating for the headlamps. Use only SAE/DOT approved 4157 NAK LL lamps for turn signal and marker lamps. Installing higher wattage bulbs may damage the headlamp housing or the wiring.

There are three bulbs housed in the headlight bucket assembly. See **Fig. 22.5**. Each bulb can be replaced using the same procedure.

1. Open the hood.
2. Remove the back cover from the headlamp housing.

NOTE: Remove the bulb from the headlamp assembly before disconnecting the electrical connector.



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1. Turn Signal Lamp, 4157NAL LL, 28.5/8.3 Watt (dual element)
2. Low Beam Headlamp, H11, 55 Watt
3. High Beam Headlamp, H11, 55 Watt

Fig. 22.5, Halogen Headlamp Assembly

3. Remove the bulb from the headlamp assembly by twisting the bulb counterclockwise a quarter turn then lifting the bulb out of the headlamp assembly.
4. Squeeze the connector lock and slide the red locking tab down to disconnect the electrical connector. See **Fig. 22.6**.

⚠ CAUTION

Ensure that the bulb is installed correctly, and that it is firmly seated in the headlamp housing. Improper bulb installation may result in melting or fire damage to the vehicle.

IMPORTANT: Do not touch the glass of the bulb during replacement. Any oils or debris that come in contact with the glass of the bulb may shorten the life of the lamp.

5. Connect the electrical connector to the new lamp and slide the red locking tab up.
6. Position the bulb in the headlamp housing, then twist the bulb clockwise a quarter turn.
7. Visually verify from either the front or back that the bulb is correctly oriented in the headlamp housing.

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1. Red Locking Tab

Fig. 22.6, Halogen Headlamp Electrical Connector

See **Fig. 22.7** to verify from the front that the three tabs of the headlamp housing are correctly oriented.

See **Fig. 22.8** and **Fig. 22.9** to verify the correct installation from the back. The lamp is fully seated only when the connector is pointing straight down.

8. Install the back cover on the headlamp housing.

A B C

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NOTE: The reflective area of the headlamp has been painted white to show details of the assembly.

A. Bulb Positioned in Headlamp Housing
B. Bulb Twisted an Eighth of a Turn
C. Bulb Twisted a Quarter Turn, Tabs Against Metal Stops

Fig. 22.7, Proper Bulb Installation, Front View

A B C

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A. Bulb Positioned in Headlamp Housing
B. Bulb Twisted an Eighth of a Turn
C. Connector Pointing Straight Down

Fig. 22.8, Improper and Proper Bulb Installation, Back View

Fig. 22.9, Correct Halogen Headlamp Installation With Foam Grommet

23

Vehicle Appearance and Care

Cab Washing and Polishing

IMPORTANT: Carefully read all instructions before using or applying any cleaner or product on the vehicle or components. Failure to follow manufacturers' recommendations can result in damage to the finish.

⚠ WARNING

Do not power wash or steam clean the engine bay in the area of vehicle electrical components, unless specified by vehicle manuals or service literature. Power washing and steam cleaning can cause corrosion, permanently damaging these components, which could result in fire, personal injury, or property damage.

To protect the finish of your new vehicle, follow these guidelines carefully.

- During the first 30 days, rinse your vehicle frequently with water. If the vehicle is dirty, use a mild liquid soap. Do not use detergent.
- During the first 30 days, do not use anything abrasive on your vehicle. Brushes, chemicals, and cleaners may scratch the finish.
- During the first 120 days, do not wax your vehicle.

To extend the life of your vehicle's finish, follow these guidelines.

- Avoid washing your vehicle in the hot sun.
- Always use water. After the cab is completely washed, dry it with a towel or chamois.
- Do not dust painted surfaces with a dry cloth, as this will scratch the paint.
- Do not remove ice or snow from a painted surface with a scraper of any sort.
- To prevent damage to the finish, wax it regularly. Before waxing, if the finish has become dull, remove oxidized paint using a cleaner specifically designed for this purpose. Remove all road tar and tree sap before waxing. Freightliner recommends that a quality brand of cleaner or cleaner-polish and polishing wax be used.
- Do not let diesel fuel or antifreeze stand on a painted surface. If either should occur, rinse the surface off with water.
- To prevent rust, have any nicks or other damage on the finish touched up as soon as possible.
- Park your vehicle in a sheltered area whenever possible.

To prevent delamination and deterioration of labels and stickers on the cab, follow these guidlines carefully:

- Do not pressure wash the label or sticker or surfaces near it.
- Do not use strong alkaline soaps on or near the label or sticker.

Care of Fiberglass Parts

Wash unpainted fiberglass air fairings and shields monthly with a mild detergent, such as dishwashing liquid. Avoid strong alkaline cleansers.

Apply a wax specifically designed for fiberglass.

Care of Chrome Parts

To prevent rust, keep chrome parts clean and protected at all times. This is especially important during winter driving and in coastal areas where there is exposure to salt air.

When cleaning chrome parts, use clean water and a soft cloth or sponge. A mild detergent may also be used.

Sponge gently, then rinse. If necessary, use a non-abrasive chrome cleaner to remove stubborn rust or other material. Do not use steel wool.

To help protect the chrome after cleaning, apply a coat of polishing wax to the surface. Never use wax on parts that are exposed to high heat, such as exhaust pipes.

Care of Exterior Lights

Clean the headlight lenses by hand only, using a flannel cloth with mild, non-caustic soap or detergent, and water.

NOTICE

Do not use a power buffer, paper towels, chemical solvents, or abrasive cleaners on the headlight lens, all of which can remove the UV coating from the surface, and result in yellowing of the lens.

Dashboard and Instrument Panel Care

NOTICE

When cleaning the dashboard, instrument panel, or gauge lens covers, do not use Armor-All Protectant®, STP Son-of-a-Gun®, window cleaner, or other equivalent treatments. These cleaners contain vinyl plasticizers which can cause stress crazing in the interior plastic panels and can result in cracking of the panels. Some cleaners can also have an adverse effect on the clear plastic of instrument panels and gauge lens covers, resulting in a foggy or cloudy appearance. This type of damage is not covered by vehicle warranty.

To clean the dashboard, instrument panel, and gauge lens covers, use a cloth dampened with warm soapy water. Make certain to wring the cloth out well before cleaning, as excess water will damage the electrical components.

Vinyl Upholstery Cleaning

To prevent soiling, frequent vacuuming or light brushing to remove dust and dirt is recommended. Harsh cleaning agents can cause permanent damage to vinyl upholstery. To preserve the upholstery and prevent damage, carefully review the following sections for recommended cleaning procedures. Waxing or refinishing improves soil resistance and cleanability for all vinyls. Any hard wax, such as that used on automobiles, may be used.

Ordinary Dirt

Wash the upholstery with warm water and mild soap, such as saddle or oil soap. Apply soapy water to a large area and allow to soak for a few minutes, then rub briskly with a cloth to remove the dirt. This can be repeated several times, as necessary.

If dirt is deeply imbedded, use a soft bristle brush after applying the soap.

If dirt is extremely difficult to remove, wall-washing preparations normally found around the home can be used. Powdered cleaners, such as those used for sinks and tiles, are abrasive and must be used with caution as they can scratch the vinyl or give it a permanent dull appearance.

Chewing Gum

Harden the gum with an ice cube wrapped in a plastic bag, then scrape it off with a dull knife. Any remaining traces of gum can be removed with an all-purpose light oil (peanut butter will also work) and wiped off.

Tars, Asphalts, and Creosote

Each of these items stains vinyl after prolonged contact. They should be wiped off immediately and the area carefully cleaned, using a cloth dampened with naphtha.

Paint, Shoe Heel Marks

Paint should be removed immediately. Do not use paint remover or liquid-type brush cleaner on vinyl. An unprinted cloth, dampened with naphtha or turpentine may be used. Use care to prevent contact with parts of the upholstery that are not vinyl.

Sulfide Stains

Sulfide compounds, such as those found in eggs and some canned goods, can stain after prolonged contact with vinyl. These stains can be removed by placing a clean, unprinted piece of cloth over the spotted area and pouring a liberal amount of 6 percent hydrogen peroxide onto the cloth. Allow the saturated cloth to remain on the spot for 30 to 60 minutes. For stubborn spots, allow the hydrogen-peroxide saturated cloth to remain on the area overnight. Use caution to prevent the solution from seeping into the seams, or it will weaken the cotton thread.

Nail Polish and Nail Polish Remover

Prolonged contact with these substances causes permanent damage to vinyl. Careful blotting immediately after contact minimizes damage. Do not spread the liquid during removal.

Shoe Polish

Most shoe polishes contain dyes which penetrate vinyl and stain it permanently. Shoe polish should be wiped off as quickly as possible using naphtha or lighter fluid. If staining occurs, try the procedure used for sulfide stains.

Ball Point Ink

Ball point ink can sometimes be removed if rubbed immediately with a damp cloth, using water or rubbing alcohol. If this does not work, try the procedure used for sulfide stains.

Miscellaneous

If stains do not respond to any of the treatments described above, it is sometimes helpful to expose the vinyl to direct sunlight for up to 30 hours. Mustard, ball point ink, certain shoe polishes, and dyes often bleach out in direct sunlight, leaving the vinyl undamaged.

Velour Upholstery Cleaning

To prevent soiling, frequent vacuuming or light brushing to remove dust and dirt is recommended. Spot clean with a mild solvent or an upholstery shampoo, or the foam from a mild detergent. When using a solvent or a dry-cleaning product, follow the instructions carefully, and clean only in a well-ventilated area. Avoid any product that contains carbon tetrachloride or other toxic materials. With either method, pretest a small area before proceeding. Use a professional upholstery cleaning service when extensive cleaning is needed.

Grease and Oil-Based Stains

Dampen a small absorbent cloth with dry-cleaning solvent or spot remover. Apply the cloth carefully to the spot from the outer edge to the center. Pat and blot the spot with a clean, dry cloth. Repeat several times, as necessary, turning the cloths so that the stain does not redeposit on the fabric.

Sugar and Water-Based Stains

Apply water-based detergent or cleaner, working in circular motions. Pat and blot as dry as possible. Repeat, if necessary, before drying thoroughly.

Chewing Gum or Wax

Harden the gum or wax with an ice cube wrapped in a plastic bag, then scrape it off with a dull knife. Excess wax can be absorbed by placing a thick white blotter over the wax and heating with a warm (not hot) iron. Remove the remainder by using the procedure for grease and oil-based stains.

Mildew

Brush the dry fabric with a soft brush. Sponge with detergent, and blot. If the fabric is colorfast, dilute a teaspoon of bleach in one quart (one liter) of cool water. Apply with a swab, directly on the mildew stain. Dab repeatedly with clear, cool water, and blot dry.

24

Pre- and Post-Trip Checklists

Periodic Inspections and Maintenance, General Information

It is the driver's responsibility to perform an inspection, and ensure the complete road-worthiness of a vehicle, before placing it into service. Commercial vehicles may be subject to inspection by authorized inspectors, and an unsafe vehicle can be taken "out of service" until the driver or owner repairs it.

Use the following checklists to ensure that vehicle components are in good working condition before each trip. Careful inspections eliminate stops later to fix overlooked or forgotten items.

The checklists in this chapter can be copied and kept as a record that the procedures have been completed. For details on how to inspect each item on the checklists, see the corresponding procedure (step number) in **Chapter 25**.

Checklists

NOTE: Checklists in this chapter correspond with the procedures and steps in **Chapter 25**, *Pre- and Post-Trip Inspections and Maintenance*. Your vehicle may not be equipped with all components listed below.

Daily Pretrip Inspection Checklists

See the following tables for a list of procedures that should be performed daily, before the first trip. Place a check mark in the complete (**Comp.**) column to indicate a procedure has been performed.

Inspector	Date

	Suspension and Slack Adjusters	Comp.
1	Suspension components	
2	Slack adjusters	

	Wheels and Tires	Comp.
1	Wheel covers	
2	Tire condition	
3	Tire inflation	
4	Rims and wheel components	
5	Wheel bearing oil seals and lubrication levels	
6	Mud Flaps	

	Saddle Tank Areas	Comp.
1	Drain air reservoirs (without automatic drain valves)	
2	Fuel tank(s) secure	
3	Frame rails and crossmembers	
4	Visible exhaust components	

	Engine Compartment	Comp.
1	Leakage under engine	
2	Air intake system	
3	Engine oil level	
4	Power steering reservoir level	
5	Engine coolant level	
6	Visible engine wiring	
7	Frame rails	

	Cab	Comp.
1	Reset dash-mounted air intake restriction indicator (if equipped)	
2	Air pressure warning systems	
3	Air governor cut-in and cut-out pressures	
4	Air pressure build-up time	
5	Air system leakage	
6	Air pressure reserve	
7	Mirrors, windows, windshield	
8	Horn, windshield wipers, windshield washers	
9	Heater and defroster	
10	Interior lights	
11	Exterior lights	
12	Seat belts and tether belts	
13	Fuel level	
14	Mirror adjustment	
15	Service brakes	
16	Backup alarm	

Weekly Post-trip Inspection Checklist

See the following table for procedures that should be performed weekly, post-trip. Place a check mark in the complete (**Comp.**) column to indicate a procedure has been performed.

Inspector	Date

	Engine Compartment	Comp.
1	Windshield washer reservoir level	
2	Air intake restriction indicator	
3	Water evacuation components	
4	Automatic transmission fluid level	
5	Water in fuel/water separator	

	Engine Compartment	Comp.
6	Steering components	
7	Serpentine drive belts	

Monthly Post-trip Inspection Checklists

See the following tables for procedures that should be performed monthly, post-trip. Place a check mark in the complete (**Comp.**) column to indicate a procedure has been performed.

Inspector	Date

	Brake Components	Comp.
1	Brake system components	
2	Brake chambers	
3	Air brake lines	
4	Flex air hoses	
5	Brake linings and brake drums	
6	Brake lining thickness	

	Saddle Tank Areas	Comp.
1	Drain air reservoirs (with automatic drain valves)	
2	Batteries (location may vary)	
3	Aerodynamic components	

	Engine Compartment	Comp.
1	Hood and bumper	
2	Hydraulic clutch reservoir	
3	Radiator and heater hoses	
4	Steering wheel play	

Fluids Added

Use the following table to note any fluids that were added during the inspection and maintenance procedures.

Fluids Added During Inspection	
Fluid	**Amount Added**
Wheel Bearing Lubricant	
Engine Oil	
Power Steering Fluid	
Engine Coolant	
Windshield Washer Fluid	
Automatic Transmission Fluid	

Fluids Added During Inspection	
Fluid	**Amount Added**
Hydraulic Clutch Fluid (DOT 4 brake fluid)	

25

Pre- and Post-Trip Inspections and Maintenance

Safety Precautions

⚠ DANGER

When working on the vehicle, shut down the engine, set the parking brake, and chock the tires. Before working under the vehicle, always place jack stands under the frame rails to ensure the vehicle can not drop. Failure to follow these steps could result in serious personal injury or death.

Daily Pretrip Inspections and Maintenance

Complete the following inspection and maintenance procedures to ensure that vehicle components are in good working condition before each trip. A driver who is familiar with the vehicle and drives it regularly can perform the daily inspections, then add the weekly and monthly post-trip inspections as scheduled.

If the driver does not operate the vehicle on a consistent basis, all daily, weekly, and monthly inspection and maintenance procedures should be performed before the trip.

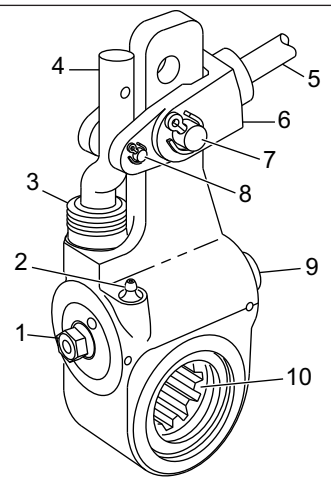
IMPORTANT: The pre- and post-trip checklists, inspections, and maintenance procedures detailed in this chapter are **not all-inclusive**. Refer to other component and body manufacturers' instructions for specific inspection and maintenance instructions, as well as local, state, and federal guidelines.

NOTE: If any system or component does not pass this inspection, it must be corrected before operating the vehicle. Whenever equipment requires adjustment, replacement, and/or repair, see the *New Cascadia Workshop Manual* for procedures and specifications.

Suspension and Slack Adjuster Inspection

Walk around the vehicle and visually inspect suspension and slack adjuster components.

1. Inspect the following suspension components for signs of structural damage, cracks, or wear.
    - springs
    - spring hangers
    - shocks
    - suspension arms
    - suspension brackets
    - axle seats
    - bushings
2. Inspect slack adjusters for signs of damage. See **Fig. 25.1**, **Fig. 25.2**, or **Fig. 25.3**.



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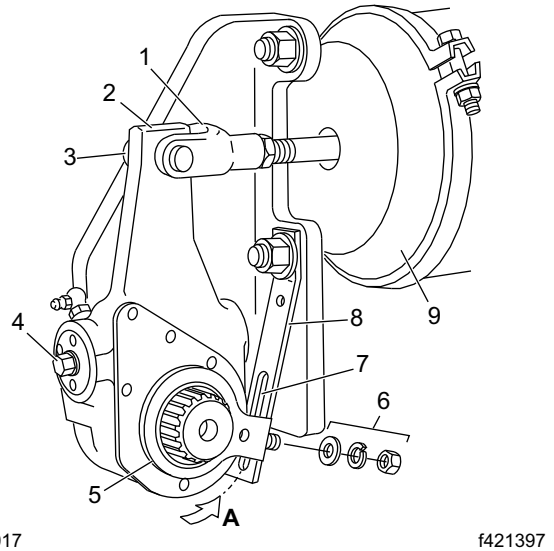
1. 7/16-inch Adjusting Nut
2. Grease Fitting
3. Boot
4. Link
5. Brake Chamber Piston Rod
6. Clevis
7. ½-inch Clevis Pin
8. 1/4-inch Clevis Pin
9. Grease Relief Opening
10. Slack Adjuster Spline

Fig. 25.1, Gunite Automatic Slack Adjuster

- Inspect slack adjuster boots, if equipped, for cuts or tears.
- Inspect anchor straps, if equipped, for damage.
- Look for worn clevis pins on brake chamber pushrods.
- Look for missing or damaged cotter pins on the clevis pins.
- Ensure chamber piston rods are in line with the slack adjusters.

Wheel and Tire Inspection

Walk around the vehicle and visually inspect each wheel and tire assembly.



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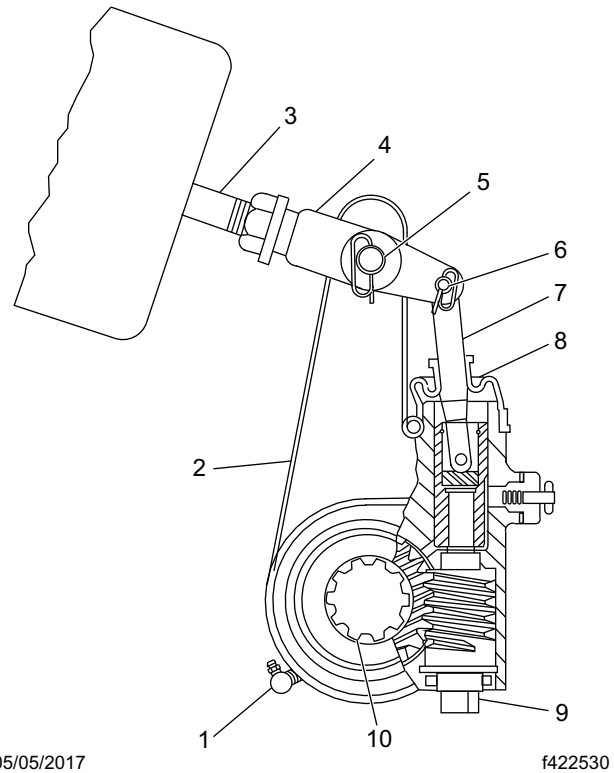
1. Clevis
2. Slack Adjuster
3. Clevis Pin
4. Manual Adjusting Nut
5. Control Arm
6. Control-Arm Washers and Nut
7. Anchor Strap Slot
8. Anchor Strap
9. Brake Chamber

Fig. 25.2, Haldex Automatic Slack Adjuster

IMPORTANT: Wheel covers decrease drag force as a vehicle moves, thereby improving fuel efficiency. If replacement of a wheel cover is necessary, the replacement cover must meet or exceed the drag reduction performance of the originally installed cover in order to maintain compliance with greenhouse gas and fuel efficiency regulations.

1. If the vehicle was originally equipped with wheel covers, ensure all wheel covers are present. Inspect wheel covers for damage or wear. Remove wheel covers from rear drive wheels, if equipped, prior to inspecting the tires and wheel components.

NOTE: During wheel cover installation, ensure the V-notch in the liner inner retaining ring is centered on the valve stem. The inner and outer retaining rings should be uniformly aligned to each other and to the wheel rim. The outer retaining ring of the liner is equipped with two canvas flaps. When installing the face cover, make sure the cover retaining ring is inserted between the two canvas flaps on the liner outer retaining ring so that the Velcro strips line up between the face cover and the liner. Make certain the detachable view cover is centered on the face cover, and the Velcro strips are pressed firmly in place.



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1. Grease Fitting (if equipped)
2. Slack Adjuster Housing
3. Brake Chamber Pushrod
4. Clevis
5. Clevis Pin (large)
6. Clevis Pin (small)
7. Actuator Rod
8. Boot
9. Manual Adjusting Nut
10. Camshaft Splines

Fig. 25.3, Meritor Automatic Slack Adjuster

2. Inspect each tire for the following:
   - valve stem caps on every tire, screwed on finger-tight
   - bulges, cracks, cuts, and penetrations
   - oil contamination (petroleum derivatives will soften the rubber and destroy the tire)
   - tread depth—if tread is less than 4/32 inch (3 mm) on any front tire, or less than 2/32 inch (1.5 mm) on any rear tire, replace the tire
   - debris lodged between dual tire sets

IMPORTANT: Low-rolling resistance (LRR) tires minimize wasted energy as a tire rolls, thereby decreasing rolling effort and improving fuel efficiency. If tire replacement is necessary, replacement tires must meet or have less rolling resistance than the originally installed tires in order to maintain compliance with greenhouse gas and fuel efficiency regulations.

Contact your tire manufacturer/supplier to determine the rolling resistance of the originally installed tires. Visit **www.epa.gov/smartway** for additional information and resources.

3. Check tire inflation.

   For inflation pressures and maximum loads, see the tire manufacturer's guidelines. Inflate the tires to the applicable pressures if needed.

   If a tire has been run flat or under-inflated, check the wheel and tire for damage before adding air.

   Keep compressed air reservoirs and lines dry during tire inflation. Use well-maintained inline moisture traps and service them regularly.

⚠ WARNING

Do not operate the vehicle with underinflated or overinflated tires. Incorrect inflation can stress the tires and make the tires and rims more susceptible to damage, possibly leading to rim or tire failure and loss of vehicle control, resulting in serious personal injury or death.

NOTICE

A weekly pressure loss of 4 psi (28 kPa) or more in a tire may indicate damage. The tire should be inspected and, if necessary, repaired or replaced by a qualified tire service facility.

IMPORTANT: The load and cold inflation pressure must not exceed the rim or wheel manufacturer's recommendations, even though the tire may be approved for a higher load inflation. Consult the rim or wheel manufacturer for the correct tire inflation pressure for the vehicle load.

4. Examine each rim and wheel component.

   4.1 Remove all dirt and debris from the assembly. Rust streaks or metal build-up around stud holes, or out-of-round or worn stud holes, may be caused by loose wheel nuts.

⚠ WARNING

Have any worn or damaged wheel components replaced by a qualified person using the wheel manufacturer's instructions and the wheel industry's standard safety precautions and equipment. Otherwise a vehicle or workshop accident could occur, possibly resulting in serious personal injury or death.

   4.2 Inspect for broken, cracked, badly worn, bent, rusty, or sprung rings and rims.

NOTICE

Use the recommended torque values and follow the proper tightening sequence. Insufficient wheel nut torque can cause wheel shimmy, resulting in wheel damage, stud breakage, and extreme tire tread wear. Excessive wheel nut torque can break studs, damage threads, and crack discs in the stud hole area.

   4.3 Make sure all wheel nuts are tightened. If tightening is necessary, use the tightening pattern in **Fig. 25.4** to initially tighten the flange nuts to 50 to 100 lbf·ft (68 to 136 N·m). Then tighten the flange nuts to 450 to 500 lbf·ft (610 to 678 N·m).

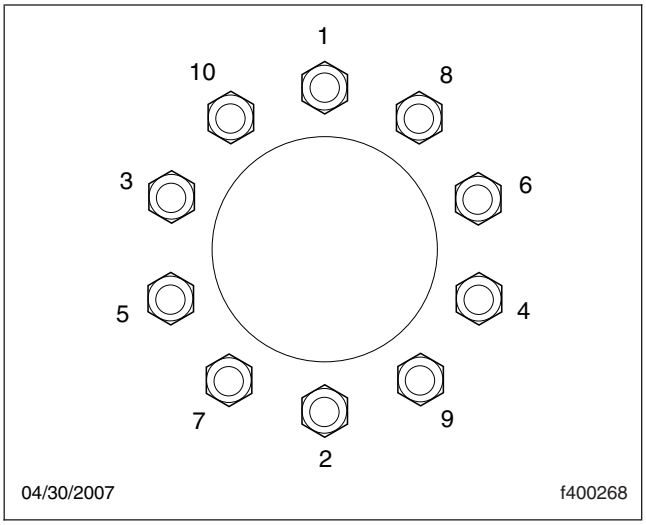


Fig. 25.4, Tightening Pattern, 10-Hole Wheels

5. Inspect the outboard side of all wheel hubs and the hub oil seal area on the inboard side of each wheel for signs of oil leakage. If any oil is found on wheel and tire or brake components, remove the vehicle from service until the leak has been fixed.

   If needed, fill the hubs to the level indicated on the hub cap. See **Group 35** of the *New Cascadia Maintenance Manual* for recommended lubricants.

6. Check that mud flaps are undamaged and hang 10 inches (25.4 cm) or less from the ground.

Saddle Tank Areas Inspection

⚠ WARNING

When draining the air reservoir, do not look into the air jets or direct them toward anyone. Dirt or sludge particles may be in the airstream and could cause injury.

NOTICE

If the water drained from the air reservoirs is cloudy or oily, it may indicate a problem with the compressor. If oil is allowed to contaminate the air dryer, it will not remove the water from the air brake system, which could adversely affect braking.

1. Drain the brake system air reservoirs (reservoirs without automatic drain valves only).

⚠ WARNING

Never operate the engine with the fuel tank shutoff valves partially closed. This could damage the fuel pump, causing sudden loss of engine power, possibly resulting in serious personal injury due to reduced vehicle control.

2. Ensure fuel tanks are secured to their mounting brackets and that the mounting brackets are secured to the frame.

   If equipped with fuel tank shutoff valves, be sure the valves are fully open.

3. Inspect visible frame rails for missing bolts, shiny areas, or rust streaks. Check all visible crossmembers for damage or signs of looseness.

4. Inspect visible components of the exhaust system to ensure connections are tight.

   Inspect upstream of the aftertreatment device (ATD), if equipped, for cracking or signs of leaks, such as soot trails. Inspect downstream of the ATD for signs of exhaust leaks, such as blistering or warping of nearby components.

Engine Compartment Inspection

1. Check the ground underneath the engine for fuel, oil, or coolant leaks.

2. Inspect the air intake system for leaks or damage.

NOTICE

Failure to maintain a sealed air intake system could allow the entry of dirt and contaminants into the engine. This could adversely affect engine performance and result in engine damage.

   2.1 Push the reset button on the air intake restriction indicator, if equipped.

   NOTE: The air intake restriction indicator may be located on the air intake or the dash.

   2.2 Check the air intake duct from the air cleaner to the engine intake. Make sure the duct components are secure and airtight.

3. Check the engine oil level.

NOTICE

Operating the engine with the oil level below the minimum fill (or "add") mark or above the maximum fill (or "full") mark could result in engine damage.

   3.1 Check the oil level with the vehicle parked on a level surface. See the engine manufacturer's guidelines for engine shutdown time requirements prior to checking the oil level.

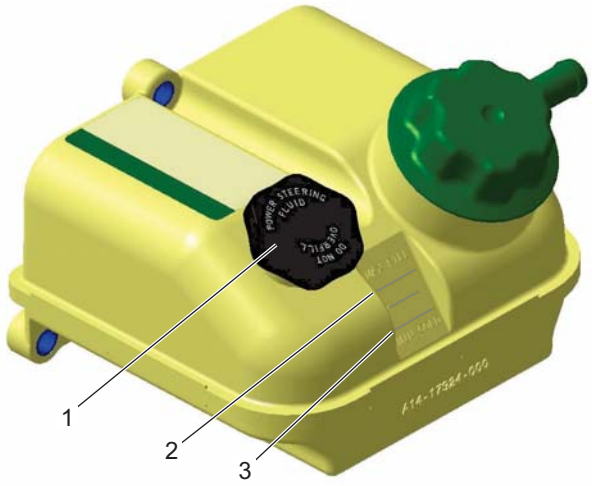
   IMPORTANT: Use CJ-4 engine oil with less than 1% sulfated ash. Failure to use CJ-4 oil may void the warranty on emission aftertreatment components.

   3.2 If the oil level is at or below the minimum fill (or "add") mark on the dipstick, add enough oil to maintain the level between

the minimum and maximum fill marks. See the engine operation manual for recommended lubricants.

4. Check the power steering reservoir fluid level.

   The power steering fluid level should be between the MIN COLD mark and the middle mark just above it. See **Fig. 25.5**. If needed, fill the reservoir with automatic transmission fluid that meets Dexron III or TES-389 specifications.



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NOTE: Typical reservoir shown; configurations may vary.

1. Filler Cap
2. MAX Fill Line
3. COLD MIN Fill Line

Fig. 25.5, Power Steering Fluid Reservoir

NOTICE

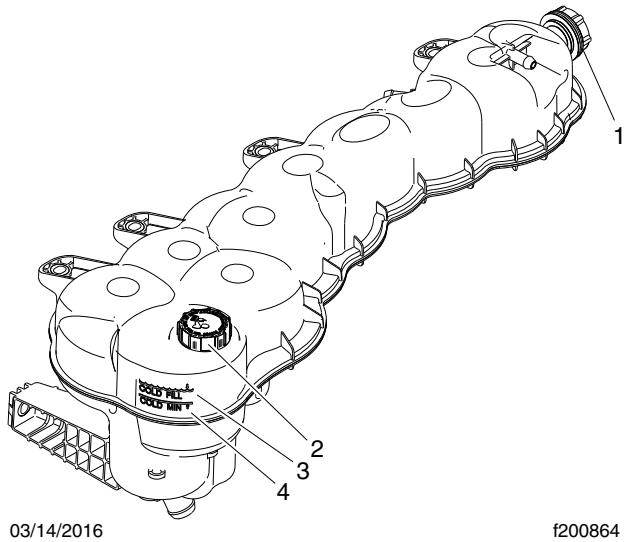
Low coolant could result in engine overheating, which could cause engine damage.

IMPORTANT: The surge tank must be cool to check the coolant level.

5. Check the engine coolant level in the radiator surge tank. See **Fig. 25.6**.

NOTICE

Coolant must be filled to the COLD MAX line of the surge tank. Low coolant could result in engine overheating, which could cause engine damage.



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1. Pressure Relief Cap
2. Filler Cap
3. COLD MAX Fill Line
4. COLD MIN Fill Line

Fig. 25.6, Coolant Surge Tank

5.1 If the coolant is low, fill the surge tank to the MAX line with a 50/50 mixture of water and the type of antifreeze currently installed in your vehicle.

5.2 If the surge tank was empty, start the engine after refilling and check the level again when the engine is at operating temperature.

6. Inspect visible engine wiring for damage or looseness. Check for loose wiring, chafed insulation, and damaged or loose hold-down clamps.

7. Inspect visible frame rails for missing bolts, shiny areas, or rust streaks.

Cab Inspection

1. Push the reset button on the dash-mounted air intake restriction indicator, if equipped.

2. With the ignition switch in the OFF position, check the air-pressure warning system.

   NOTE: The low-air warning buzzer only works when the park brake is released. The low-air warning buzzer is silenced when the park brake is set.

2.1 If not previously drained, drain the air reservoirs using moderate brake applications until pressure in both reservoirs is less than 70 psi (483 kPa).

2.2 Turn the ignition to the ON position. The ICU will complete a full gauge sweep and bulb check, and a low-air warning buzzer will sound. Ensure the low air pressure lamp (BRAKE AIR) remains illuminated and a low-air warning buzzer continues to sound after the gauge sweep is complete.

3. Check air governor cut-in and cut-out pressures.

3.1 Start the engine and ensure the BRAKE AIR lamp goes out and the buzzer silences when pressure reaches approximately 70 psi (483 kPa) in both air reservoirs.

The air governor should cut out at approximately 120 psi (827 kPa). For vehicles with an optional dryer reservoir module (DRM), the cut-out pressure is approximately 130 psi (896 kPa).

3.2 With the engine idling, apply the brake pedal several times. The air governor should cut in when pressure in the primary air reservoir (top air gauge) reaches approximately 100 psi (689 kPa).

4. Check air pressure build-up time.

4.1 With the air system fully charged, make one full brake application and note the air pressure reading on the primary air gauge.

4.2 Further reduce air pressure using moderate brake applications, then run the engine at governed rpm.

4.3 Note the time that the pressure reaches the previously noted reading on the primary air gauge, then note the time that the air pressure reaches cut-out pressure.

4.4 If it takes longer than 30 seconds to reach cut-out pressure after the primary air gauge passes the previously noted pressure (noted after one full brake application), eliminate any leaks or replace the air compressor before operating the vehicle.

5. Check air leakage in the system.

5.1 With the parking brake applied, the transmission out of gear, and the air system fully charged, release the service brakes and shut down the engine.

5.2 Wait one minute and note the air pressure drop in psi (kPa) per minute from the primary air reservoir.

If the pressure drop exceeds the limits shown in **Table 25.1**, eliminate any leaks before operating the vehicle.

6. Check the air pressure reserve.

With the engine still off, make one full brake application and observe the pressure drop on the primary air gauge. If pressure drops more than 25 psi (172 kPa), eliminate any leaks before operating the vehicle.

Maximum Allowable Air Leakage		
Description	**Pressure Drop: psi (kPa) Per Minute**	
	Released	**Applied**
Truck or Tractor Only	2 (14)	3 (21)
Truck or Tractor w/Single Trailer	3 (21)	4 (28)
Truck or Tractor w/Two Trailers	5 (35)	6 (42)

Table 25.1, Maximum Allowable Air Leakage

⚠ WARNING

When cleaning windshields and windows, always stand on the ground or on a secure ladder or platform. Use a long-handled window cleaner. Do not use the cab steps, tires, fenders, fuel tanks, engine, or under-hood components to access the windshield or windows. Doing so could cause a fall and result in an injury.

7. Inspect the mirrors, window glass, and windshield for cracks or other damage.

8. Ensure that the horn, windshield wipers, and windshield washers are operating properly. These devices must be in good working order for safe vehicle operation.

9. Ensure the heater and defroster are operating properly.

10. Check the operation of all interior lights.

10.1 Turn on the headlamps and leave them on. If equipped, ensure all gauge bulbs illuminate. If equipped, ensure ICU screens illuminate.

10.2 Ensure all equipped driver control switches illuminate and verify the interior cab lights controlled by these switches illuminate.

10.3 Ensure both turn signal indicators illuminate when the turn signal switch is activated.

11. Check the operation of all exterior lamps manually or, if equipped, by using either the LIGHT TEST switch on the dash or the Lamp Check button on the key fob.

12.3 Activate the high-beam headlamps and hazard warning lamps.

12.4 Exit the cab and check that all exterior lamps and reflectors are clean and intact.

12.5 Check that the brake lamps, tail lamps, headlamps, turn signals, marker lamps, identification lamps, and clearance lamps are working properly.

13. To check the exterior lamps using the dash LIGHT TEST switch (see **Fig. 25.8**) or key fob

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1. Clearance Lamp
2. Identification Lamps
3. Turn Signal
4. DRL/Accent Lamps
5. Headlamp, Low Beam
6. Headlamp, High Beam
7. Fog/Driving Lamp
8. Side Marker Lamp
9. Stop Lamps, Tail Lamps, Turn Signals, and Back-Up Lamp

Fig. 25.7, Exterior Lights

12. To check exterior lamps manually:

12.1 Turn the ignition switch to the ACC or ON position.

12.2 Make certain the parking brake is set.

Lamp Check button (see **Fig. 25.9**):

13.1 Make sure the parking brake is set.

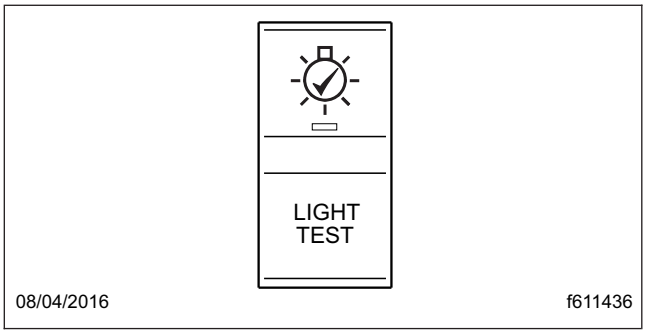


Fig. 25.8, Pretrip Light Test Switch

1. Door Lock 2. Door Unlock 3. Lamp Check

Fig. 25.9, Key Fob

NOTE: Factory settings have groups of lamps activate sequentially up to 100 times or until manually stopped.

13.2 Press either the LIGHT TEST switch or Lamp Check button to begin the pretrip light inspection. If equipped, groups of lamps will cycle on and off in the following sequence:

- Group 1: Always ON: marker lamps, clearance lamps, tail lamps, licence plate lamp
- Group 2: Low beam headlamps
- Group 3: High beam headlamps and stop lamps
- Group 4: Backup lamps and daytime running lamps
- Group 5: Front and rear fog lamps
- Group 6: Turn signals and utility lamps

NOTE: LED accent lighting turns off when the high beam headlamps turn on.

13.3 Walk around the truck and check that the lamps are working properly.

13.4 Verify that all exterior lights and reflectors are clean and intact.

13.5 The pretrip light inspection can be stopped by:

- releasing the parking brake;
- Pressing either the LIGHT TEST switch on the dash or the Lamp Check button on the key fob.

14. Inspect the seat belts and tether belts.

⚠ WARNING

Inspect and maintain seat belts. When any part of a seat belt system needs replacement, the entire seat belt must be replaced, both retractor and buckle side. Any time a vehicle is involved in an accident, and the seat belt system was in use, the entire vehicle seat belt system must be replaced before operating the vehicle. Do not attempt to modify the seat belt system; doing so could change the effectiveness of the system. Failure to replace worn or damaged seat belts, or making any modifications to the system, may result in personal injury or death.

14.1 Check the web for fraying, cuts, extreme dirt and dust, or for severe fading from exposure to sunlight, especially near the buckle latch plate and in the D-loop guide area.

14.2 Check operation of the buckle, latch, Komfort Latch or Sliding Komfort Latch (if equipped), web retractor, and upper seat belt mount on the door pillar. Check all visible components for wear or damage.

14.3 Check the seat belt and tether belt connection points and tighten any that are loose.

⚠ WARNING

Never fill fuel tanks to more than 95 percent of their liquid capacity. This could make them more likely to rupture from impact, possibly causing fire and resulting in serious personal injury or death by burning.

Do not mix gasoline or alcohol with diesel fuel. This mixture could cause an explosion, possibly resulting in serious personal injury or death. Do not fill the fuel tanks in the presence of sparks, open flames, or intense heat. These could ignite the fuel, possibly causing severe burns.

IMPORTANT: Use ultralow-sulfur diesel (ULSD) with 15 ppm sulfur content or less. Failure to use ULSD fuel may void the warranty on emission components.

15. Check the fuel level in the fuel tank(s). To keep condensation to a minimum, fuel tanks should be filled at the end of each day.
16. Adjust the rearview and down view mirrors as necessary.
17. Test the service brakes.
    - 17.1 With the engine running and air system fully charged, set the parking brake.
    - 17.2 Put the vehicle in the lowest gear and gently attempt to move it forward. The vehicle should not move.

      If the vehicle moves, the parking brakes are not operating correctly and must be repaired before the vehicle is operated.
18. Test the backup alarm.
    - 18.1 Release the parking brake and put the transmission in reverse.
    - 18.2 Move the vehicle slightly backward to ensure that the backup alarm is operating correctly.

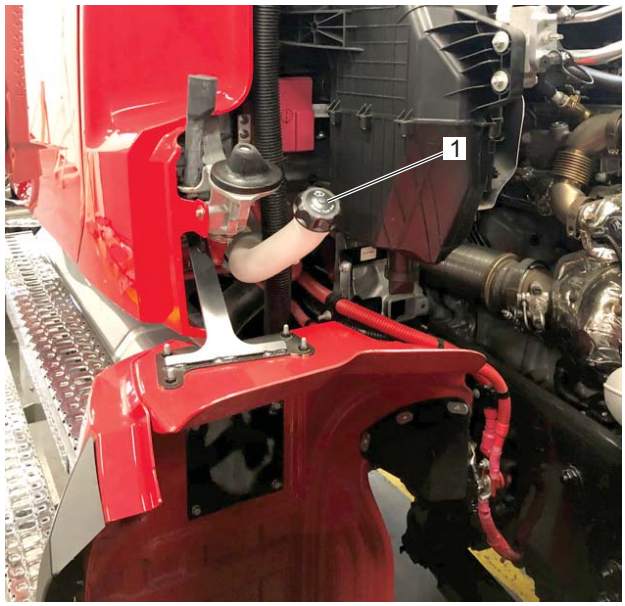
Weekly Post-Trip Inspections and Maintenance

Engine Compartment Inspection

⚠ WARNING

Washer fluids may be flammable and poisonous. Do not expose washer fluid to an open flame or any burning material, such as a cigarette. Always comply with the washer fluid manufacturer's recommended safety precautions.

1. Check the windshield washer reservoir fluid level. The reservoir is usually located near the right-hand frame rail. See **Fig. 25.10**.



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1. Washer Fluid Filler Cap

Fig. 25.10, Windshield Washer Reservoir

2. After resetting the air intake restriction indicator during the daily pretrip inspection, check the indicator again with the engine off.
   - 2.1 Check an indicator with graduations to see if air restriction exceeds the value shown in **Table 25.2**.

     Check a go/no-go indicator without graduations to see if the colored bar shows through the clear window.

Air Intake Maximum Restriction Values (inH_2O)	
Engine Make	**GHG14, GHG17, and GHG21 Engines**
Cummins	25
Detroit	18

Table 25.2, Air Intake Maximum Restriction Values (inH_2O)

2.2 If air restriction exceeds the maximum allowable value, operate the vehicle for one more day, making sure not to run the engine over rated rpm. Refer to the engine operation manual for more information on rated rpm for your engine.

2.3 If air restriction exceeds the maximum value again, replace the air cleaner. For instructions, refer to **Group 09** of the *New Cascadia Workshop Manual*.

3. Inspect water evacuation components.

3.1 Inspect the vacuator valve(s) installed on the hood interior and air cleaner. Make sure the lips of each valve are undamaged and pliable, free of debris, and remain closed during inspection. See **Fig. 25.11**.

3.2 Inspect the rain tray installed at the base of the windshield. Ensure that the seal on the forward edge of the rain tray is in good condition.

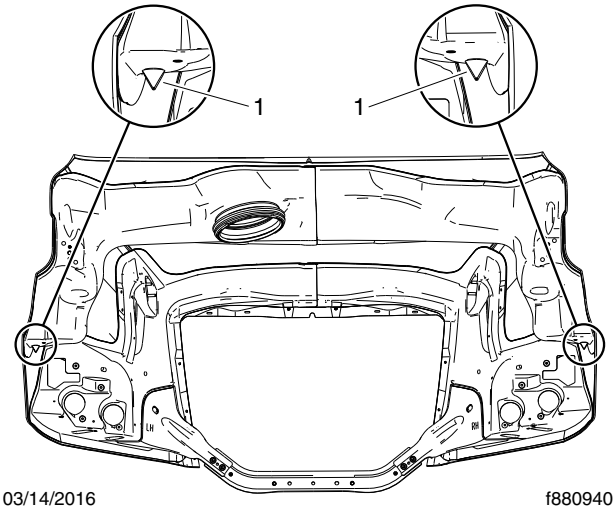
3.3 Inspect the drain hoses installed on the rain tray. Both hoses should be securely attached to the rain tray and direct water down the aft side of the front fenders.

4. If the vehicle is equipped with an Allison automatic transmission, check the automatic transmission fluid level.

5. Check for water in the fuel/water separator, if equipped.

IMPORTANT: When draining fluid from a fuel/water separator, drain the fluid into an appropriate container and dispose of it properly. Many jurisdictions now issue fines for draining fuel/water separators onto the ground.

5.1 Place a suitable container under the fuel/water separator.



1. Vacuator Valves

Fig. 25.11, Hood Vacuator Valves (hood interior shown)

NOTE: A hose may be used to direct water into the container. On older DAVCO models, the drain valve has a 1/2-inch (12.7-mm) pipe with threads. Use a hose with a 1/2-inch pipe thread to fit correctly and open the drain valve by turning it one-quarter revolution. On new DAVCO models, the drain valve has a 3/4-inch (19-mm) slip-on hose connection; pipe threads are no longer used. Open the drain valve by turning it one to one-and-a-half revolutions.

5.2 If the engine is equipped with a built-in water separator, loosen the drain valve, and allow the water to run out. Close the drain valve, taking care not to overtighten it.

5.3 *Detroit/Racor Models*: Turn the drain plug counterclockwise to open it.

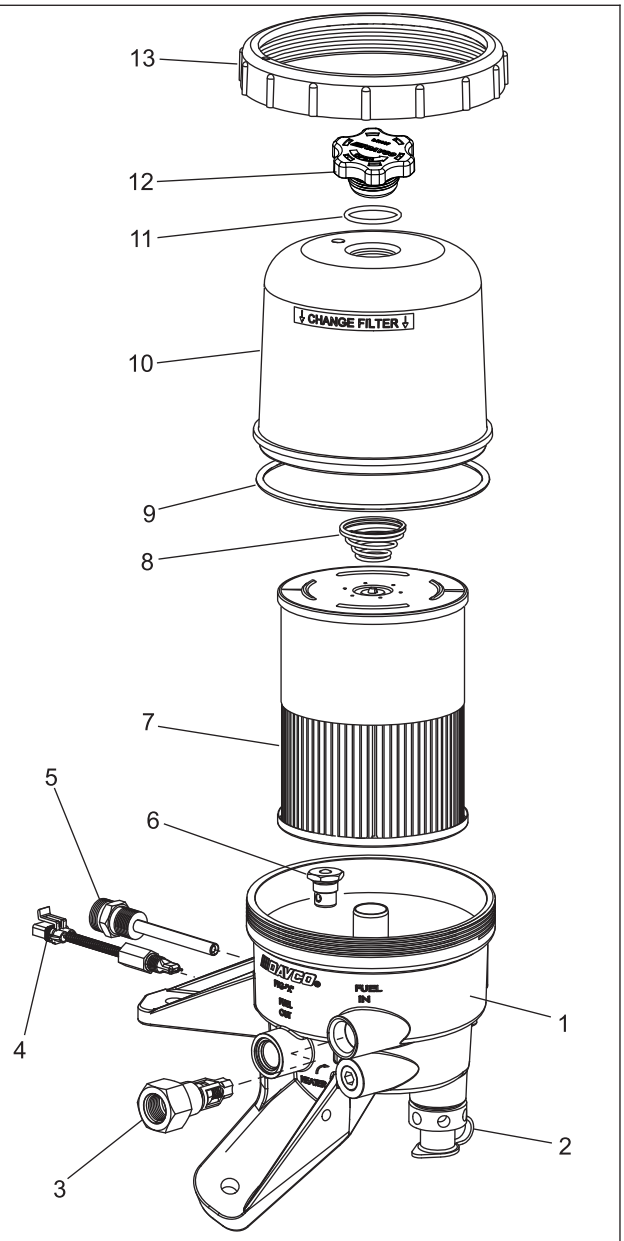
DAVCO Models: Remove the vent cap and open the drain. See **Fig. 25.12**.

5.4 Stop draining fluid when fuel begins to drain out.

Detroit/Racor Models: turn the drain plug clockwise to close it.

DAVCO Models: close the drain valve. Install and hand-tighten the vent cap.

6. Inspect the steering components.



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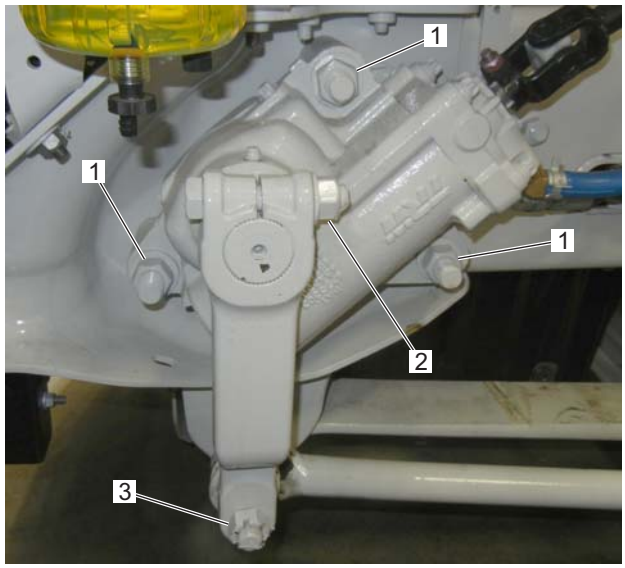
1. Lower Housing
2. Drain Valve
3. Inlet Port/Check Valve
4. 12VDC Pre-Heater
5. 120VAC Pre-Heater
6. Bypass Valve
7. Filter Element
8. Spring
9. Cover O-Ring
10. Clear Cover
11. Vent Cap O-Ring
12. Vent Cap
13. Collar

Fig. 25.12, DAVCO Fuel Pro 485

6.1 Inspect tie rods, steering arms, and the drag link for signs of looseness (i.e., shiny spots or rust tracks).

6.2 Check the steering gear mounting bolts and pitman arm nut, if equipped, for signs of looseness. See **Fig. 25.13**.

6.3 Check the drag link nuts for missing cotter pins.



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1. Steering Gear Mounting Bolts
2. Pitman Arm Pinch Bolt Nut
3. Drag Link Nut

Fig. 25.13, Steering Gear Fasteners

6.4 Inspect the steering intermediate shaft and end yokes for excessive looseness or other damage.

NOTICE

Do not drive with a drive belt that is visibly worn or damaged. If it fails, the lack of coolant flow could rapidly cause damage to engine components.

7. Inspect the serpentine drive belts for signs of glazing, frayed edges, breaks, cracks, or oil contamination.

Monthly Post-Trip Inspections and Maintenance

Brake Component Inspection

Walk around the vehicle and inspect brake system components for visible damage.

NOTE: Some vehicles may be equipped with a brake check valve on the dash, which allows the driver to set the service brakes and exit the vehicle to check the brake system for leaks. The parking brakes must be applied before the brake check valve will function.

1. Inspect all visible brake system components for missing fasteners or signs of looseness, such as rust tracks.

NOTICE

If the external breather tube or breather cap is missing or incorrectly installed, road dirt and debris can adversely affect the operation of the brake chamber. Once inside of the chamber, dirt and debris can cause the internal parts of the chamber to deteriorate faster.

2. Inspect the exterior surfaces of brake chambers for damage. Make sure that breather holes are open and free of debris.

NOTE: Do not route air brake lines on top of anything likely to be stepped on.

3. Inspect air brake lines for dents, swelling, kinks, twisting, abrasion, and damage, especially near moving parts.
4. Inspect flex air lines for deterioration or signs of abrasion.
5. Inspect for cracked, worn, or oil-contaminated brake linings and brake drums (or rotors).
6. Check the thickness of the brake linings. Replace brake linings on all brake assemblies on the axle if any brake linings are worn to less than approximately 1/4 inch (6.4 mm) at the thinnest point.

Saddle Tank Areas Inspection

⚠ WARNING

When draining the air reservoir, do not look into the air jets or direct them toward anyone. Dirt or sludge particles may be in the airstream and could cause injury.

NOTICE

If the water drained from the air reservoirs is cloudy or oily, it may indicate a problem with the compressor. If oil is allowed to contaminate the air dryer, it will not remove the water from the air brake system, which could adversely affect braking.

1. Drain the brake system air reservoirs (reservoirs with automatic drain valves only).

NOTE: Battery locations vary between vehicles.

2. Inspect the batteries.

⚠ 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. To prevent possible personal injury, always wash your hands after handling battery parts and related accessories.

2.1 Remove the battery box cover and inspect all visible battery cables for loose wiring or damage.

2.2 Check that the battery hold-down is secure.

IMPORTANT: Aerodynamic components decrease drag force as a vehicle moves, thereby improving fuel efficiency. If replacement of an aerodynamic component is necessary, replacement components must meet or exceed the drag reduction performance of the originally installed component in order to maintain compliance with greenhouse gas and fuel efficiency regulations.

3. Inspect the following aerodynamic components, if equipped, for structural damage, cracks, or wear.
    - Chassis fairings

- Roof fairing/deflector
- Side skirts
- Cab/sleeper extenders
- Battery access cover

Engine Compartment Inspection and Adjustments

IMPORTANT: If replacement of the hood or bumper is necessary, the replacement component must meet or exceed the drag reduction performance of the originally installed item in order to maintain compliance with greenhouse gas and fuel efficiency regulations.

NOTE: Anytime a hood is adjusted, removed, or reinstalled, the headlamp aim should be checked.

1. Inspect the bumper and hood for structural damage, cracks, or wear.
2. Check the hydraulic clutch reservoir, if equipped. If necessary, add DOT 4 brake fluid.
3. Inspect the radiator and heater hoses, including the clamps and support brackets.

   3.1 Inspect the radiator and charge air cooler for damage and accumulated debris. Straighten bent or damaged fins to permit airflow across all areas of the cores.

   NOTE: When traveling through areas of high insect concentration, it may be necessary to clean the exterior of the radiator or the charge air cooler core as often as every 200 miles (320 km).

   3.2 Make sure the radiator inlet and outlet hoses are pliable and are not cracking or ballooning.

   3.3 Make sure the heater hoses are pliable and are not cracking or ballooning.

   3.4 Tighten hose clamps as necessary.

   IMPORTANT: Do not overtighten hose clamps, as hose life can be adversely affected.

   3.5 Ensure hose support brackets are securely fastened. Make sure hoses are not located near sources of wear, abrasion, or high heat.

   IMPORTANT: When replacing hoses, install service-type knitted or braided yarn-reinforced neoprene hose. Extended-service-life silicone hoses may also be used. See the Alliance Parts Catalog at **www.alliancebrandparts.com** or contact your Freightliner Dealer.

4. Check the steering wheel for excessive play.

   4.1 Start the engine. With the front tires straight ahead, turn the steering wheel until motion is observed at the front wheels.

   4.2 Align a reference mark on the steering wheel to a rule, then slowly turn the steering wheel in the opposite direction until motion is again detected at the wheels.

   4.3 Measure the lash (free play) at the rim of the steering wheel. Excessive lash exists if steering wheel movement exceeds 2-1/4 inches (57 mm) with an 18-inch (450-mm) steering wheel.

   4.4 If there is excessive lash, check the steering system for wear or incorrect adjustment before operating the vehicle.

26

In An Emergency

Hazard Warning Lights

The hazard warning light switch is located on the dash in what is referred to as the master module. See **Fig. 26.1**. The hazard lights can be activated regardless of the ignition switch position.

To activate the hazard lights, push the center of the switch once. The switch will blink at the same rate that the hazard lights flash. Push the switch again to turn them off. All the turn signal lights on the vehicle and trailer, as well as the turn signal indicators in the ICU, flash simultaneously when the hazard lights are activated.

Fig. 26.1, Hazard Warning Switch

Fire Extinguisher

An optional factory-installed fire extinguisher may be located in the cab, usually by the driver's door, or in the sleeper baggage compartment.

Emergency Equipment

Emergency equipment and tools may be supplied in the cab or sleeper baggage compartment. The equipment may include: a first aid kit, triangular reflectors, flares, tire-changing equipment, and tools.

⚠ WARNING

Use extreme care when placing flares in emergency situations that involve exposure to flammable substances such as fuel. An explosion or fire could occur causing serious personal injury.

If there is an emergency while driving, cautiously pull off the road. Turn on the hazard warning lights. Place the flares and reflector along the side of the road to alert other drivers that an emergency situation exists.

Emergency Starting With Jumper Cables

When using jumper cables, follow the instructions below.

⚠ WARNING

Batteries release explosive gas. Do not smoke when working around batteries. Put out all flames and remove all sources of sparks or intense heat in the vicinity of the battery. Do not allow the vehicles to touch each other. Do not lean over the batteries when making connections, and keep all other persons away from the batteries. Failure to follow these precautions could lead to severe personal injury as a result of an explosion or acid burns.

NOTICE

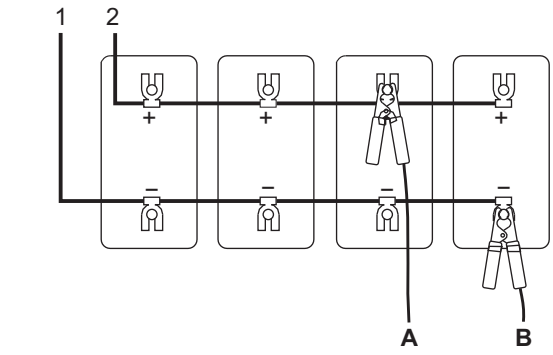
Make sure both electrical systems are the same voltage. Electronic devices on both vehicles can be damaged when connected to a vehicle with a different operating voltage.

NOTE: On vehicles equipped with optional underhood jump start posts, connect to these posts instead of the batteries.

1. Apply the parking brakes and turn off the lights and all other electrical devices.
2. Remove the battery box cover.

NOTE: The battery box on a New Cascadia may be located in a variety of locations, including under the passenger seat, behind the side fairing, or behind the cab. If the battery box is located behind the side fairing, it can be accessed by opening the side fairing kick panel.

3. Connect the positive (+) jumper cable to the positive battery post or jump start post on the vehicle needing the jump start. See callout A in **Fig. 26.2**.
4. Then connect the other end of the positive jumper cable to the positive battery or jump start post of the vehicle providing the jump start.



1. – Hardline Battery Cable of Vehicle Needing the Jump
2. + Hardline Battery Cable of Vehicle Needing the Jump

A. + Jumper Cable to Connect First and Disconnect Last
B. – Jumper Cable to Connect Last and Disconnect First

Fig. 26.2, Jumper Connections on Vehicle Needing Jump Start

⚠ WARNING

Do the next step exactly as instructed and do not allow the clamps of one cable to touch the clamps of the other cable. Otherwise, a spark could occur near a battery, possibly resulting in severe personal injury from explosion or acid burns.

5. Connect one end of the negative jumper cable to the negative battery or jump start post of the vehicle providing the jump start.
6. Then connect (ground) the other end of the cable to a negative battery or jump start post on the vehicle needing a jump start. See callout B in **Fig. 26.2**.
7. Start the engine of the vehicle providing the jump start and let the engine run a few minutes to charge the batteries of the other vehicle.
8. Attempt to start the engine of the vehicle with the batteries receiving the charge. Do not operate the starter longer than 30 seconds, and wait at least two minutes between starting attempts to allow the starter to cool.
9. When the engine starts, let it idle a few minutes.

⚠ WARNING

Do the next step exactly as instructed and do not allow the clamps of one cable to touch the clamps of the other cable. Otherwise, a spark could occur near a battery, possibly resulting in severe personal injury from explosion or acid burns.

10. Disconnect the negative (grounded) jumper cable from the vehicle that needed the jump start. See callout B in **Fig. 26.2**.
11. Then disconnect the other end of the jumper cable from the vehicle that provided the jump start.
12. Disconnect the positive jumper cable from the positive battery or jump start post of the vehicle that provided the jump start.
13. Then disconnect the other end of the positive jumper cable from the positive battery or jump start post of the vehicle that received the jump start. See callout A in **Fig. 26.2**.
14. Install the battery box cover; be sure it is positioned properly before fastening the latches.

Raising and Lowering a Vehicle

Raising a Vehicle with Air Suspension

1. Park the vehicle on a level surface, set the parking brakes, and shut down the engine. Chock the tires.

⚠ WARNING

Remove the air from the suspension. Failure to remove the air from the suspension may cause the vehicle to move or shift on the jack stands as air pressure drains from the system; this could cause the vehicle to fall, resulting in damage to the vehicle, serious injury, or death.

2. Exhaust all air from the air suspension.

⚠ WARNING

Do not use bottle jacks to raise the vehicle. Always use floor jacks. Bottle jacks can slip, allowing the vehicle to fall, which could result in damage to the vehicle, serious injury, or death.

IMPORTANT: Only lift unloaded vehicles and vehicles disconnected from trailers. Unload vehicles with bodies (drilling rigs, mixers) as much as possible.

3. Place a floor jack under the axle housing, the clamp group, or the frame rail.

NOTICE

NOTICE: Do not place jack stands under any of the suspension components; doing so could cause suspension component damage. Jack stands can be placed at any point below the axle, including the differential area.

4. Raise the vehicle. Add additional jack stands, as needed, under the axles to support the vehicle.

Lowering a Vehicle with Air Suspension

WARNING

Do not use bottle jacks to raise the vehicle. Always use floor jacks. Bottle jacks can slip, allowing the vehicle to fall, which could result in damage to the vehicle, serious injury, or death.

NOTICE

NOTICE: Do not place jack stands under any of the suspension components; doing so could cause suspension component damage. Jack stands can be placed at any point below the axle, including the differential area.

1. Using the floor jack, raise the vehicle to remove any jack stands used to support the vehicle.
2. Slowly lower the vehicle to the ground.
3. Inflate the air suspension, and check for proper operation. Refer to **Group 32** in the *New Cascadia Workshop Manual* for instructions.

Raising a Vehicle without Air Suspension

1. Park the vehicle on a level surface, set the parking brakes, and shut down the engine. Chock the tires.

WARNING

Do not use bottle jacks to raise the vehicle. Always use floor jacks. Bottle jacks can slip, allowing the vehicle to fall, which could result in damage to the vehicle, serious injury, or death.

IMPORTANT: Only lift unloaded vehicles and vehicles disconnected from trailers. Unload vehicles with bodies (drilling rigs, mixers) as much as possible.

2. Place a floor jack under the axle housing, the clamp group, or the frame rail.

NOTICE

NOTICE: Do not place jack stands under any of the suspension components; doing so could cause suspension component damage. Jack stands can be placed at any point below the axle, including the differential area.

3. Raise the vehicle. Add additional jack stands, as needed, to support the vehicle.

Lowering a Vehicle without Air Suspension

WARNING

Do not use bottle jacks to raise the vehicle. Always use floor jacks. Bottle jacks can slip, allowing the vehicle to fall, which could result in damage to the vehicle, serious injury, or death.

NOTICE

NOTICE: Do not place jack stands under any of the suspension components; doing so could cause suspension component damage. Jack stands can be placed at any point below the axle, including the differential area.

1. Using the floor jack, raise the vehicle to remove any jack stands used to support the vehicle.
2. Slowly lower the vehicle to the ground.

Towing

⚠ WARNING

Do not tow an unbraked vehicle if the combined weight of both vehicles is more than the sum of the gross axle weight ratings (GAWR) of the towing vehicle. Otherwise brake capacity will be inadequate, which could result in personal injury or death.

Use of Tow Hooks

Tow hooks are not designed for on-road towing of the vehicle, but to recover and move the vehicle to a position where it can be hooked up properly for front or rear towing.

NOTICE

When using tow hooks to move the vehicle, do not pass a sling (for example, a rope or chain) from one hook to another. Known as reeving, this practice is *not* permissible in most industrial applications of towing and hoisting. Reeving can overload the hooks and result in damage to the vehicle. See 26.3.

Front Towing Hookup

1. Disconnect the battery ground cables.

NOTICE

Failure to remove the driveline(s) or the drive axle shafts when towing the vehicle with the rear wheels on the ground could result in damage to the transmission and other parts.

2. If required, remove the driveline, the interaxle driveline (if equipped), and the axle shafts for each axle that may touch the ground during the towing process.
3. If the driveline(s) were removed, ensure the U-joint caps are secure so they will not come off.

   For any axle shaft that has been removed, cover the ends of the hubs with metal plates or plywood cut to fit the axle opening, and drilled to fit the axle shaft studs. This prevents lubricant from leaking out and will keep contaminants from getting into and damaging the wheel bearings and axle lubricant.

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IMPORTANT: Do not reeve when towing.

1. Tow Hook
2. Chain

Fig. 26.3, Reeving

NOTICE

Failure to protect the frame rails from the chains could cause damage, leading to eventual frame failure.

4. On dual drive axles, if the vehicle is to be lifted and towed, chain the forward rear-axle assembly to the vehicle frame. Use protection to keep the chains from damaging the frame.

NOTICE

Before towing, failure to remove an aerodynamic bumper equipped with an air dam could result in damage to the air dam, which will impact the vehicle's aerodynamic performance.

5. Remove the aerodynamic bumper if it is equipped with an air dam.
6. Attach the towing device.

NOTE: Due to the many variables that exist in towing, positioning the lifting and towing device is the sole responsibility of the towing-vehicle operator.

7. Lift the vehicle and secure the safety chains. If extra towing clearance is needed, remove the front wheels.
8. Connect the clearance lights, tail lights, and signal lights. Connect any special towing lights required by local regulations.

⚠ WARNING

Failure to chock the tires or connect the tow truck's air brake system before releasing the spring parking brakes could allow the disabled vehicle to suddenly roll. This could cause property damage or personal injury.

9. Chock the tires on the disabled vehicle and connect the towing vehicle's air brake system to the vehicle being towed. Then, release the spring parking brakes on the disabled vehicle and remove the chocks.

Front Towing Hookup With Removable Tow Hooks

⚠ DANGER

When working on the vehicle, shut down the engine, set the parking brake, and chock the tires. Before working under the vehicle, always place jack stands under the frame rails to ensure the vehicle can not drop. Failure to follow these steps could result in serious personal injury or death.

1. Open the hood. Remove the tow hooks, located behind the driver's-side bumper. See **Fig. 26.4**. Close and latch the hood.

NOTICE

New or ungreased tow hooks may be hard to install. Tow hooks that are not properly installed may be damaged or break.

2. Install the tow hooks onto the tow hook receivers through the tow hook holes in the bumper, rotating the hooks so the hook opening faces down. See **Fig. 26.5**. Pull the tow hooks to ensure they are securely engaged in the tow hook receivers.

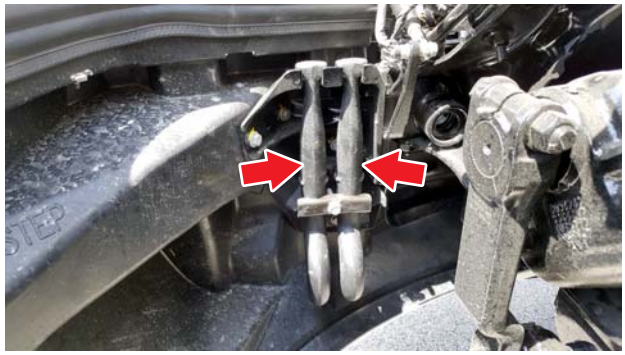

Fig. 26.4, Tow Hooks

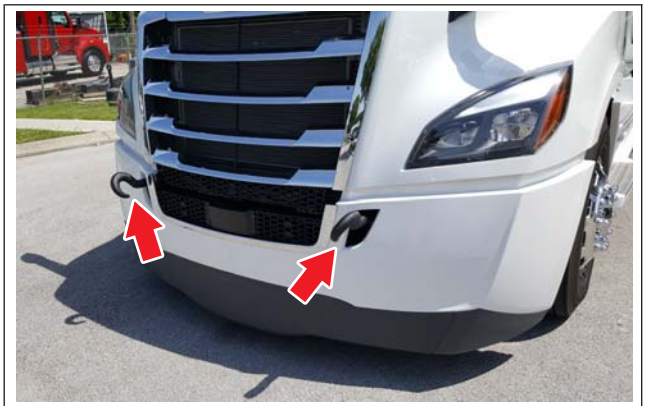

Fig. 26.5, Tow Hooks Installed, Facing Down

3. Lower the stinger assembly so that it is level and approximately 1 inch (0.3 cm) off the ground. Back the tow truck so that the crossbar with lift adaptors is within 6 inches (15 cm) of the Aero bumper. See **Fig. 26.6**.

Fig. 26.6, Positioning the Stinger Assembly

Fig. 26.7, Tow Cables Connected to the Tow Hooks

NOTICE

When using tow hooks to move the vehicle, do not pass a sling (for example, a rope or chain) from one hook to another. Known as reeving, this practice is *not* permissible in most industrial applications of towing and hoisting. Reeving can overload the hooks and result in damage to the vehicle. See Fig. 26.3.

4. Pull the tow cables out of the tow truck and connect the tow cable lifting hooks onto the tow hooks, then extend the recovery boom within 4 to 6 inches (10 to 15 cm) of being vertical of the tow hooks. See **Fig. 26.7**.
5. Lift the front of the truck until there is enough clearance for the stinger and crossbar to pass under the bumper. See **Fig. 26.8**.

   If enough clearance cannot be gained with a single lift, jack stands or other means capable of supporting the weight on the front axle must be used while the cables are shortened to allow a second lift.

⚠ WARNING

Failure to chock the tires or connect the tow truck's air brake system before releasing the spring parking brakes could allow the disabled vehicle to suddenly roll. This could cause property damage or personal injury.

6. Chock the rear tires.

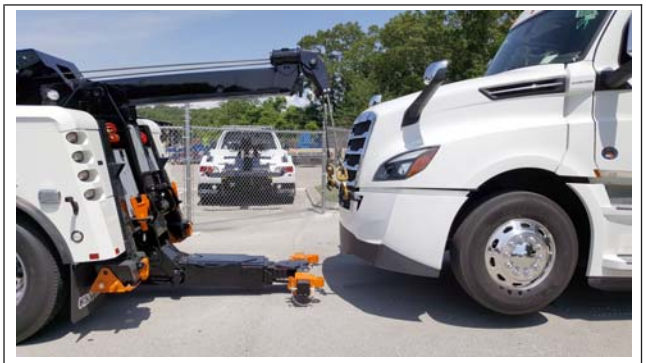

Fig. 26.8, Moving the Stinger and Crossbar Under the Bumper

NOTICE

Reference the applicable axle manufacturer's information to avoid damaging the axle when towing the truck.

7. Use mid-rise or high-rise forks, or lift adaptors (part number 0200020) on the crossbar to provide clearance for the aerodynamic bumper. See **Fig. 26.9** and **Fig. 26.10**.
8. Extend the stinger and place the lift adaptors under the axle. Make certain the lift adaptors are under the front suspension springs between the U-bolts. See **Fig. 26.11** and **Fig. 26.12**.
9. Secure the axle to the crossbar with a chain or ratchet strap.

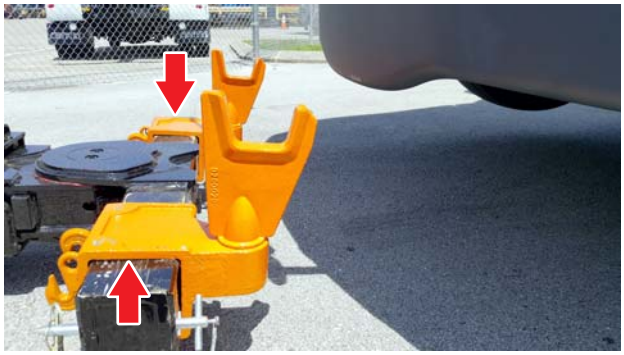

Fig. 26.9, Lift Adaptors Installed on the Crossbar

Fig. 26.10, Backing the Tow Truck with Lift Adaptors on the Crossbar

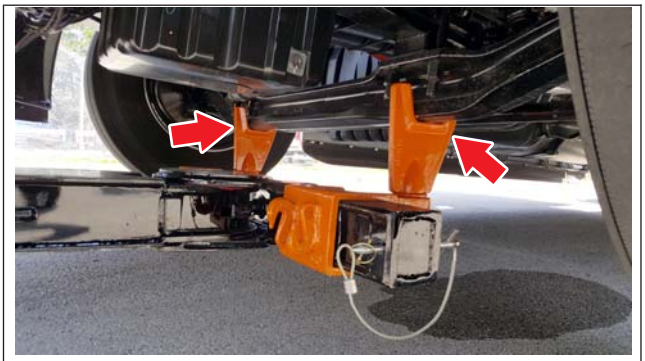

Fig. 26.11, Positioning the Stinger with Lift Adaptors Under the Axle

NOTICE

Failure to remove the driveline(s) or the drive axle shafts when towing the vehicle with the rear wheels on the ground could result in damage to the transmission and other parts.

Fig. 26.12, Stinger with Lift Adaptors Under the Axle (tow truck shown)

10. If required, remove the driveline, the interaxle driveline (if equipped), and the axle shafts for each axle that may touch the ground during the towing process.
11. Remove the tow cables from the tow hooks and retract the recovery boom. See **Fig. 26.13**.

Fig. 26.13, Retracting the Recovery Boom

12. Remove the tow hooks from the bumper.
13. Connect the air and electrical supply lines from the tow truck to the truck being towed.

IMPORTANT: On trucks equipped with a front air suspension, either air pressure must be supplied to the secondary air system or the front suspension must be blocked to operating height with wooden spacers and the axle chained to the frame to prevent damage to the truck.

14. Release the park brake and remove the chocks from the rear tires.
15. Use the stinger to pull the truck close to the back of the tow truck for final towing position. See **Fig. 26.14**.

Fig. 26.14, Final Towing Position

16. Connect the safety chains. See **Fig. 26.15**.

Fig. 26.15, Safety Chains Connected on the Towed Vehicle

Rear Towing Hookup

NOTICE

Using a rear towing hookup on a vehicle equipped with a roof fairing could cause damage to the cab structure.

If reverse towing at speeds above 45 mph (70 kph) is necessary, note the following precautions:

- **Remove the rubber flex extenders from the side extenders. Failure to do so could result in the loss of the rubber flex extenders.**
- **Hold down the cab with tension straps looped over the cab shocks and under the frame rails. Failure to do so could allow the wind load to lift the cab unexpectedly, resulting in damage to the air springs and other components.**

1. If the vehicle is equipped with side extenders, and reverse towing at speeds above 45 mph (70 kph) is necessary, remove the rubber flex extenders from the side extenders.
2. If the vehicle is equipped with cab air suspension, and reverse towing at speeds above 45 mph (70 kph) is necessary, hold down the cab as follows:

   2.1 Drain the air from the cab air springs.

   2.2 Loop a 2-inch (5-cm) ratchet-style tension strap (rated 2000 lb [900 kg] minimum work load) over the top of the cab shock and under the frame rail. See **Fig. 26.16**. Tighten the strap for a snug fit. If the cab is equipped with two or more shocks, restrain the aft-most shock on each side of the vehicle.

Fig. 26.16, Tension Strap Installed to Hold Down the Cab

3. Place the front tires straight forward and secure the steering wheel in this position.
4. Disconnect the battery ground cables.

NOTICE

Failure to protect the frame rails from the chains could cause damage, leading to eventual frame failure.

5. On dual drive axles, using protection to keep the chains from damaging the vehicle frame, chain the forward-rear drive axle to the frame.

NOTICE

Before towing, failure to remove an aerodynamic bumper equipped with an air dam could result in damage to the air dam, which will impact the vehicle's aerodynamic performance.

6. Remove the aerodynamic bumper if it is equipped with an air dam.
7. Attach the towing device.

NOTE: Due to the many variables that exist in towing, positioning the lifting and towing device is the sole responsibility of the towing-vehicle operator.

8. Lift the vehicle and secure the safety chains. If extra clearance is needed, remove the bumper extension if equipped.
9. Connect the clearance lights, taillights, and signal lights. Also connect any special towing lights required by local regulations.

Fire in the Cab

The incidence of fire in heavy- and medium-duty trucks is rare, according to data from the National Highway Traffic Safety Administration. Federal Motor Vehicle Safety Standard #302 limits the flammability of specified materials used inside the cab, but despite this, most materials can burn.

⚠ WARNING

Do not allow flames, sparks, or any other heat sources (such as cigarettes or light bulbs) to contact materials in the cab. Any materials in the cab in contact with these heat sources could cause serious personal injury or vehicle damage.

In Case of a Cab Fire

As quickly as possible, bring the vehicle to a safe stop, apply the parking brake, turn off the ignition, and get out of the vehicle.

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Telematics Data

Telematics Information: Terms of Use

Your vehicle ("Vehicle") may be equipped with one or more devices that gather information described below regarding the Vehicle and the environment in which it may be operating ("Telematics Information"). The devices may periodically send Telematics Information to Daimler Trucks North America LLC ("DTNA"). Additionally, DTNA and its dealers may manually retrieve Telematics Information from the devices for the purposes described below.

Telematics Information We Collect and Why We Collect It

The Telematics Information we collect may include, but is not limited to, the following information about the Vehicle:

- performance
- operation
- location
- speed
- trips;
- travel history
- stop and idle times
- fuel consumption
- fault codes
- diagnostic information
- steering performance
- braking performance
- air bag deployment
- seatbelt use
- decelerations
- other information relating to the performance, operation, health and safety of the Vehicle.

DTNA gathers this information to improve the performance, operation, health and safety of your Vehicle and other DTNA vehicles and products. Information is gathered:

- **To enable your subscription services.** DTNA and other third party service providers have developed a variety of applications and services that are now available to you to optimize the performance, use, reliability and safe operation of your Vehicle. These services are enabled by the Telematics Information we receive from your Vehicle and will likely be made more effective in the future by the use of that Telematics Information and similar information we receive from other DTNA vehicles.
- **To make your Vehicle safer and to improve its performance.** Depending on the type of device installed on your Vehicle, DTNA may periodically update your Vehicle's on-board software to improve the performance and safe use of the Vehicle. We may need to obtain certain Telematics Information to ensure the effectiveness of these updates.
- **To monitor and manage the health and efficiency of your Vehicle.** Telematics Information from your Vehicle may be used by DTNA and its affiliates, dealers and service providers to diagnose and resolve problems with your Vehicle more effectively and to help you maintain it.
- **To improve your customer service experience.** Telematics Information may be used by DTNA and its affiliates, dealers and service providers to provide you a more efficient and effective customer service experience in conjunction with Vehicle service, maintenance, field service campaigns and recalls.
- **For product development and product improvement.** Telematics Information may be analyzed and used to identify and resolve performance and safety issues and to develop improvements to our products that will benefit you and our future customers.
- **To develop more meaningful product marketing.** Telematics Information may be used to provide more customized and meaningful information to our customers regarding products and services that best satisfy their operational requirements and improve the performance of their businesses.
- **To help match our customers with the right products.** Telematics Information may be used to develop future products and services that best satisfy the operational requirements of our customers.

What We Do with Telematics Information and Who We Share It With

DTNA may use Telematics Information for any purpose allowed by law, including but not limited to using the information for any of the purposes described in this chapter. DTNA may share Telematics Information with its service providers, affiliates, subsidiaries, dealers and distributors, but only for lawful business purposes. This may include third parties who process information on behalf of DTNA, third parties who you authorize directly to receive information from us, and law enforcement agencies pursuant to applicable law.

DTNA may also combine Telematics Information it obtains from your Vehicle with data from others, anonymize and de-identify that aggregated data ("Aggregated Data"), and use and disclose that Aggregated Data and derivatives of it indefinitely and for any purpose whatsoever, including sharing it with third parties for any purpose without restriction. You will not have any rights in any Aggregated Data or any derivatives or proceeds of it. DTNA will be the exclusive owner of all rights, title and interests in and to all Aggregated Data. DTNA shall not have any obligation to provide any Aggregated Data to you or to compensate you for any use or disclosure of any Aggregated Data.

Collection Method

The Telematics Information may be transmitted automatically or manually from the devices on your Vehicle to DTNA or Detroit Diesel Corporation (DDC) through diagnostic tools, including but not limited to DDC DiagnosticLink.

Safeguards

DTNA will use reasonable data security systems and procedures in an effort to protect Telematics Information from unauthorized use, access, disclosure, distribution, loss or alteration. We do this through physical, electronic and procedural safeguards that are designed to protect the confidentiality, integrity and availability of Telematics Information. However, no security system is perfect. DTNA cannot guarantee that Telematics Information will not be hacked, deleted, intercepted or altered.

DTNA will also require other parties to whom Telematics Information is disclosed to take reasonable steps to protect the Telematics Information from unauthorized use, access, disclosure, distribution, loss or alteration.

Your Consent

By continuing to provide to us, or allowing us to receive or retrieve, Telematics Information through the devices on your Vehicle, you consent to its collection and use as described in this chapter.

Although some information may be transferred to and processed in countries without laws providing the same level of data protection as your country, our use and disclosure of your information is subject to these terms of use regardless of where your information is transferred.

If you have subscribed to a subscription service such as Virtual Technician or Detroit Analytics, the Telematics Terms and Conditions for that service will apply to DTNA's collection, storage, use and sharing of the data covered by those Terms and Conditions.

Your Rights

You may ask DTNA to discontinue receiving and retrieving Telematics Information from the devices on your Vehicle. If you do so, you will be unable to receive telematics subscription services relating to your Vehicle and unable to remotely receive important Vehicle software updates, among other things. If you are interested in that option, please contact DTNA at: **DetroitConnect@Daimler.com**.

Privacy Statement Changes

DTNA reserves the right to amend these terms of use from time to time. Changes will be reflected in the online version of this document, which can also be found at: **https://dtnacontent-dtna.prd.freightliner.com/content/dtna-servicelit/search/home-page.html**. **By continuing to provide to us, or allowing us to receive or retrieve, Telematics Information through the devices on your Vehicle, you consent to and accept those changes.**

NOTE: These terms of use do not apply to aftermarket telematics devices that may be provided by others or configured to send information to someone other than DTNA or its affiliates, dealers or service providers.

Frequency Bands and Maximum Transmission Output

Wireless Applications on the Vehicle

Frequency Bands and Maximum Transmission Output			
Component	**Service**	**Frequency Band**	**Transmission Output**
CTP2019DTNA	4G LTE	LTE FDD Band 2 LTE FDD Band 4 LTE FDD Band 5 LTE FDD Band 7 LTE FDD Band 17	0.25 W (Power Class 3)
	3G UMTS/HSDPA/HSUPA	UMTS Band 1 UMTS Band 2 UMTS Band 4 UMTS Band 5 UMTS Band 8	0.25 W (Power Class 3)
	2G GSM/GPRS/EDGE	GSM 850 MHz E-GSM 900 MHz	2 W (Power Class 4)
		DCS 1800 MHz PCS 1900 MHz	1 W (Power Class 1)
	WLAN (IEEE 802.11b)	2.4 GHz band	20 mW
	WLAN (IEEE 802.11g/n)	2.4 GHz band	20 mW
	Bluetooth	2.4 GHz band	10 mW
	GPS / GLONASS	1575 and 1602 MHz	Receive only

Table 27.1, Frequency Bands and Maximum Transmission Output

The Common Telematics Platform

The Detroit Connect Platform is the connectivity module of Daimler Trucks North America. It receives and transmits data in real time and is the interface for all connectivity-related services. Both the Detroit Connect Platform and a valid agreement is required for use of the Detroit Connect services.

Vehicle antennas (WLAN/BT/CellularNetworks) are located inside and behind the dashboard on the passenger side. In both locations, the shortest possible distance between the antennas and any human or animal body part inside the vehicle cabin is greater than 8 in (20 cm).

Therefore Daimler Trucks North America LLC declares that the radio equipment type CTP2019DTNA is in compliance with Directive 2014/53/EU.

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