

Introduction

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

Custom-built Western Star 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. Western Star 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 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 *Western Star 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.

Customer Assistance Center

Having trouble finding service? Call the Customer Assistance Center at 1-866-850-7827 or 1-866-850-STAR. 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

Foreword

people are knowledgeable, professional, and committed to following through to help you keep your truck moving.

Reporting Safety Defects

Vehicles domiciled in the USA that are 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 Western Star about a concern about a specific vehicle call the Customer Assistance Center at 1-866-850-STAR or complete a **Product Concern Form**.

Vehicles domiciled in Canada that are 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 Western Star about a concerns about a specific vehicle call the Customer Assistance Center at 1-866-850-STAR 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 Gatineau-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

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Vehicle Identification

Component Information Label

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

The component information label lists the vehicle model, vehicle identification number (VIN), and major component models. It also lists the major assemblies and installations shown on the chassis specification sheet.

The component information label is attached to the inside floor of the glove box, or, if the vehicle does not have a glove box, on the top side of the passenger's sun visor. An example label is shown in Fig. 1.1.



WESTERN STAR

COMPONENT INFORMATION

SEE VEHICLE ID NO.
WHEN ORDERING PARTS

MANUFACTURED BY: DAIMLER TRUCKS NORTH AMERICA LLC	
MODEL: WE126064S T	BASE MODEL: 5700XE SLP
VEHICLE ID NO: XXXXXXXXXX	CUSTOMER: XXXXXX
ENGINE MOD: DETROIT DD15 14.8L 505 HP / 1625 RPM, 19	ENGINE NO: 47291050679738
MAIN TRANS MOD: DT12-1750-OH1 HEAVY DUTY 12-SPEED OVERDR	TRANS NO: 716330E0085400
PTO MOD: PTO NO: 739912A008941	PTO NO: FOR0506065
FRONT AXLE MOD: DETROIT DA-F-13.3-3 13,300# FF1 71.5 KPI	FRONT AXLE NO: 739912A008941
1ST INT AXLE MOD: MT-40-14XP 40,000# R-SERIES TANDEM REAR	1ST INT AXLE NO: FOR0506065
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-40-14XP 40,000# R-SERIES TANDEM REAR	REAR AXLE NO: FOR0506064
	RATIO: 3.08
PAINT MFR: ELITE BC PAINT C	
PAINT CODE: CAB COLOR A: LS007EB	
FOR COMPLETE PAINT INFORMATION SEE VEHICLE SPECIFICATION SHEET.	

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Fig. 1.1, Component Information Label

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; dealer applications can scan this code to bring up information about the vehicle. See Fig. 1.2. The customer assistance label is located on the driver-side door A-pillar. See Fig. 1.3.



WESTERN STAR

FOR CUSTOMER
ASSISTANCE CENTER:

1-866-850-STAR
1-866-850-7827

24 HRS/DAY
7 DAYS/WEEK



07/20/2020

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Fig. 1.2, Customer Assistance Label

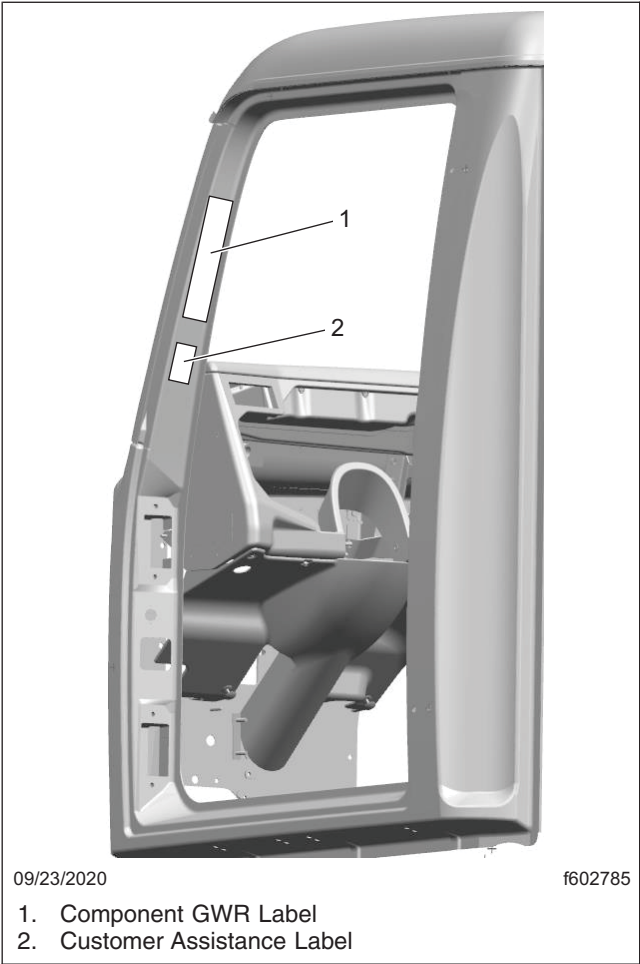


Fig. 1.3, Western Star A-Pillar Labels

Federal Motor Vehicle Safety Standard Label

Tractors with or without fifth wheels purchased in the U.S. are marked as certified by means of an FMVSS label. An example label is shown in Fig. 1.4.

The FMVSS certification label is attached to the driver-side door B-pillar, as shown in Fig. 1.5.

The tire and rim portion of the FMVSS certification label certifies suitable tire and rim combinations 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

 WESTERN STAR CAN ICES-2 / NMB-2 08/03/2020	MANUFACTURED BY: DAIMLER TRUCKS N.A. LLC	GAWR/PNBE	GAWR/PNBE	TIRES	RIMS	KPA	PSI	"S"
	DATE OF MFR: 04/19	KGS	LBS			COLD	COLD	
	GVWR/PNBV-KG: 24,140	FRONT AXLE: 5,996	13,220	11R22.5(H)	22.5X8.25	827	120	S
	GVWR/PNBV-LBS: 53,220	1ST INT AXLE: 9,072	20,000	11R22.5(G)	22.5X8.25	724	105	D
	THIS VEHICLE COMPLIES WITH ALL	2ND INT AXLE:						
	APPLICABLE FEDERAL MOTOR VEHICLE	3RD INT AXLE:						
	SAFETY STANDARDS IN EFFECT AT THE DATE	4TH INT AXLE:						
	OF MANUFACTURE SHOWN ABOVE.	5TH INT AXLE:						
	VEHICLE ID NO: XXXXXXXXXXXXXXXXX	6TH INT AXLE:						
	TYPE: TRUCK/TRACTOR TT/CT	REAR AXLE: 9,072	20,000	11R22.5(G)	22.5X8.25	724	105	D
	COUNTRY OF ORIGIN: U.S.A.							
								f080206

Fig. 1.4, FMVSS Certification Label

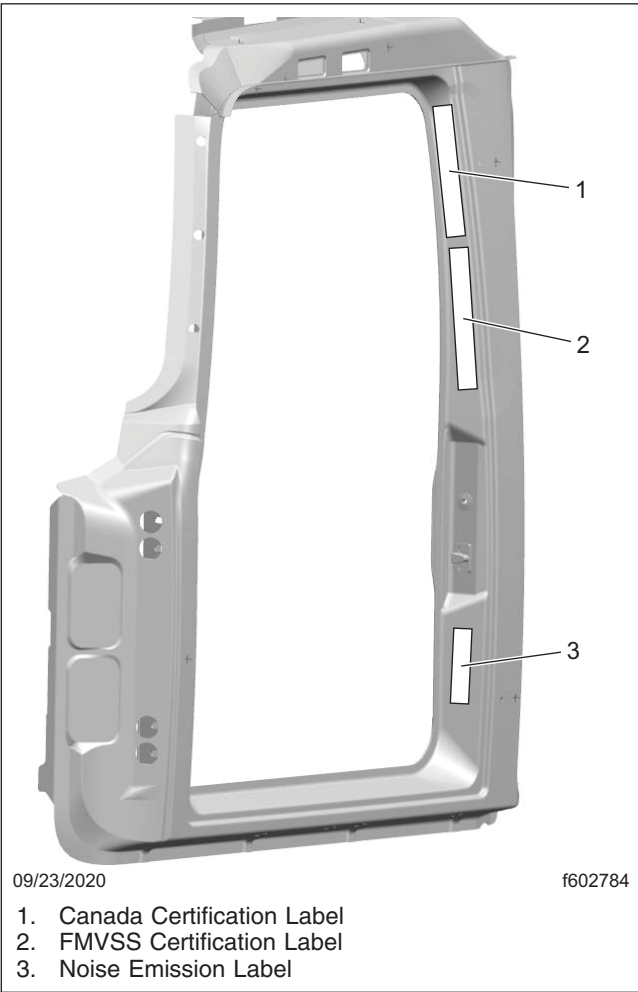


Fig. 1.5, Western Star B-Pillar Labels

tire and rim label, then the tires and rims determine the load limitations on each of the axles.

Trucks built without a cargo body that are intended for service in the U.S. have an incomplete FMVSS

certification label. See Fig. 1.6 for an example of such a label.

The incomplete FMVSS certification label will be attached to the incomplete vehicle document included with the vehicle.

After completion of the vehicle, a complete certification label must be attached by the final-stage manufacturer to certify that the vehicle conforms to all applicable FMVSS regulations in effect on the date of completion.

Canada Certification Label

NOTE: Vehicles with a Canada certification label will not have a Component GWR label.

In Canada, tractors with fifth wheels are marked as certified by means of a Canada certification label (see Fig. 1.7) attached to the passenger-side B-pillar (see Fig. 1.5).

Trucks built without a cargo body and tractors built without a fifth wheel that are intended for service in Canada have an incomplete vehicle certification label (similar to Fig. 1.6) attached to the driver-side B-pillar. After completion of the vehicle, a complete certification label must be attached by the final-stage manufacturer to certify that the vehicle conforms to all applicable Canadian motor vehicle safety regulations in effect on the date of completion.

NOTE: Older vehicles may be marked with a Canada National Safety Mark label.

Component GWR Label

NOTE: Vehicles with the Canada certification label will not have a component GWR label.

The component GWR label is located on the A-pillar of the passenger-side door frame (see Fig. 1.3). The

Vehicle Identification

	MFD BY:	DAIMLER TRUCKS NORTH AMERICA LLC									
	DATE OF MFR:	01/20	GAWR/PNBE	KGS	GAWR/PNBE	LBS	TIRES	RIMS	KPA COLD	PSI COLD	"S"
	GVWR/PNBV-KG:	14,968	FRONT AXLE:	5,443	12,000	275/80R22.5(G)	22.5X8.25	758	110	S	
	GVWR/PNBV-LBS:	33,000	1ST INT AXLE:								
			2ND INT AXLE:								
			3RD INT AXLE:								
			4TH INT AXLE:								
			5TH INT AXLE:								
			6TH INT AXLE:								
			REAR AXLE:	9,525	21,000	275/80R22.5(G)	22.5X8.25	758	110	D	
CAN ICES-2	VEHICLE ID NO:	XXXXXXXXXXXXXXXXXX									
/NMB-2	TYPE:	INCOMPLETE VEHICLE-TRU/CAM									
	COUNTRY OF ORIGIN:	U.S.A.									
08/03/2020											f080220

Fig. 1.6, FMVSS Incomplete Certification Label

	VIN/NIV: XXXXXXXXXXXXXXXXXX	CANADA CERTIFICATION	DATE OF MFR: 01/20
	THIS VEHICLE CONFORMS TO ALL APPLICABLE STANDARDS PRESCRIBED UNDER THE CANADIAN MOTOR VEHICLE SAFETY REGULATIONS IN EFFECT ON THE DATE OF MANUFACTURE / CE VEHICULE EST CONFORME A TOUTES LES NORMES QUI LUI SONT APPLICABLES EN VERTU DU REGLEMENT SUR LA SECURITE DES VEHICULES AUTOMOBILES DU CANADA EN VIGUEUR A LA DATE DE SA FABRICATION.		
	08/03/2020		

Fig. 1.7, Canada Certification Label

label provides maximum GWR ratings for each component.
See Fig. 1.8 for a typical component GWR label.

tions apply to different model years. See Fig. 1.14 for information on the driver’s visor warning label for important warning indicators in the instrument cluster

	MAXIMUM GWR BY COMPONENT (KG/LBS)	COMPONENT	FRONT AXLE	1ST INT AXLE	2ND INT AXLE	3RD INT AXLE	4TH INT AXLE	5TH INT AXLE	6TH INT AXLE	REAR AXLE	COMPONENT GVWR
		AXLES:	(5443) 12000							(9525) 21000	CHASSIS:
		SUSPENSION:	(5443) 12000							(9525) 21000	ENG/TRANS: (36288) 80000
		TIRES:	(5601) 12350							(10296) 22700	5TH WHEEL:
		RIMS:	(6713) 14800							(13426) 29600	PARK BRAKE:
		HUBS/SPOKES:	(6032) 13300							(10432) 23000	AXLE:
		BRAKES:	(5443) 12000							(9979) 22000	
		STEERING:	(6032) 13300								VIN: XXXXXXXXXXXXXXXXX
07/20/2020											f080219

Fig. 1.8, Component GWR Label

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 at the end of this chapter for additional information on what EPA and GHG regula-

that pertain to the ATS.

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 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 (see [Fig. 1.9](#)) is located on the driver-side door (see [Fig. 1.10](#)). It is the owner's responsibility to maintain the vehicle so it conforms to EPA and NHTSA regulations.

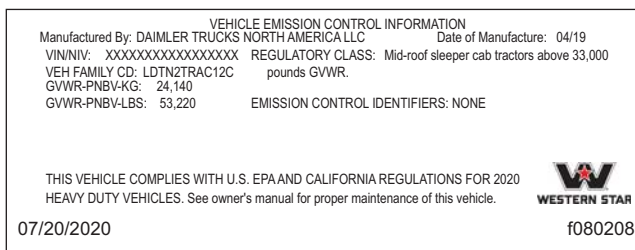


Fig. 1.9, Vehicle Emission Control Information Label

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 idling emissions of particulate matter and NOx.

Certified vehicles are equipped with a label placed near the external bottom edge of the driver-side door. See [Fig. 1.11](#) for an example of the label.

EPA Noise Emission Control Label

A vehicle noise emission control label ([Fig. 1.12](#)) is located on the driver-side B-pillar as shown in [Fig. 1.5](#). It is the owner's responsibility to maintain the vehicle so it conforms to EPA noise regulations.

IMPORTANT: Certain Western Star incomplete vehicles may be produced with incomplete noise control hardware. Such vehicles will have an incomplete vehicle noise emission control information label. See [Fig. 1.13](#). For such vehicles, it is the final-stage manufacturer's responsibility to complete the vehicle in conformity to U.S. EPA regulations (40 CFR Part 205) and label it for compliance.

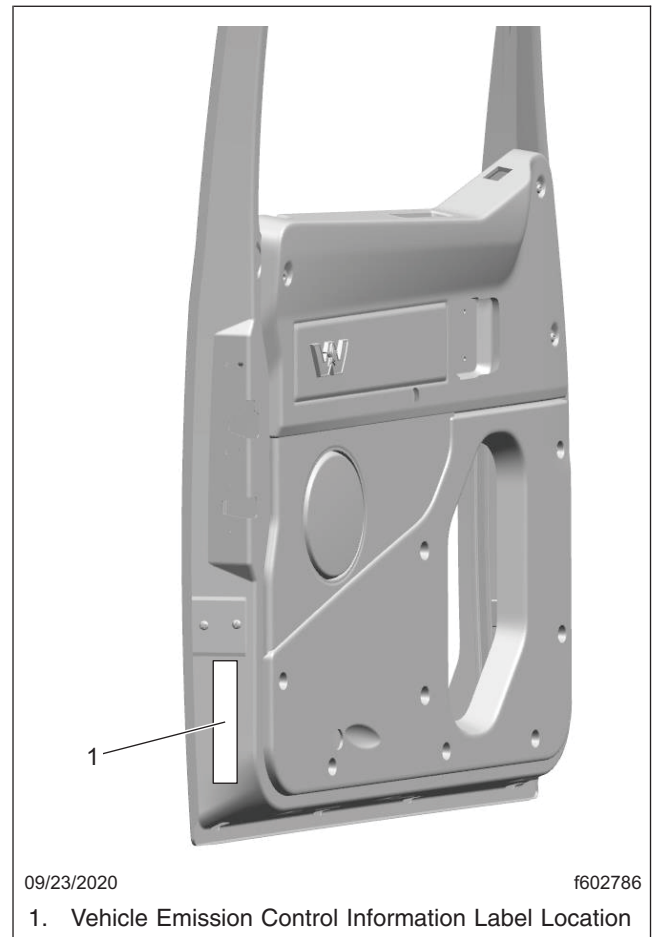


Fig. 1.10, Driver's Side Door Label



Fig. 1.11, CARB Clean Idle Label

Vehicle Identification

VEHICLE NOISE EMISSION CONTROL INFORMATION DAIMLER TRUCKS NORTH AMERICA LLC DATE OF MANUFACTURE: 01/20 THIS COMPLETE VEHICLE CONFORMS TO U.S. EPA REGULATIONS FOR NOISE EMISSIONS APPLICABLE TO MEDIUM AND HEAVY TRUCKS, THE FOLLOWING ACTS, OR THE CAUSING THEREOF BY ANY PERSON ARE PROHIBITED BY THE NOISE CONTROL ACT OF 1972: A. THE REMOVAL OR RENDERING INOPERABLE OF, OTHER THAN FOR PURPOSES OF MAINTENANCE, REPAIR OR REPLACEMENT OF ANY NOISE CONTROL DEVICE OR ELEMENT OF DESIGN (LISTED IN THE OWNER'S MANUAL) INCORPORATED INTO THIS VEHICLE IN COMPLIANCE WITH THE NOISE CONTROL ACT. B. THE USE OF THIS VEHICLE AFTER SUCH DEVICE OR ELEMENT OF DESIGN HAS BEEN REMOVED OR RENDERED INOPERABLE.	07/20/2020  WESTERN STAR f080217
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Fig. 1.12, Vehicle Noise Emission Control Label (Complete Vehicle)

VEHICLE NOISE EMISSION CONTROL INFORMATION DAIMLER TRUCKS NORTH AMERICA LLC DATE OF MANUFACTURE: 01/20 THIS INCOMPLETE VEHICLE AS DELIVERED BY DAIMLER TRUCKS NORTH AMERICA LLC CONFORMS TO U.S. EPA REGULATIONS FOR NOISE EMISSIONS APPLICABLE TO MEDIUM AND HEAVY TRUCKS. IT IS THE RESPONSIBILITY OF THE FINAL STAGE MANUFACTURER TO COMPLETE THIS VEHICLE WHILE MAINTAINING CONFORMANCE TO 40 CFR PART 205, INCLUDING LABELING FOR COMPLIANCE (SEC. 205.55-41).	07/20/2020  WESTERN STAR f080201b
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Fig. 1.13, Vehicle Noise Emission Control Label (Incomplete Vehicle)

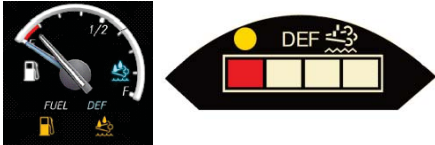
EPA Regulations	
Regulation	Emissions Components
EPA07 (Reduction of nitrogen oxides (NOx) emissions to 1.1 g/bhp-hr, and particulate matter emissions to 0.01 g/bhp-hr)	Aftertreatment device (ATD) containing a diesel particulate filter that traps soot and ash.*
EPA10 (Reduction of NOx emissions to 0.2 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 1.1, 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 1.2, Emission Regulations by Model Year

IMPORTANT	
DPF Regen Needed 	• Diesel Particulate Filter (DPF) regeneration is needed. • If flashing, regenerate as soon as possible. Engine derate possible.
Hot Exhaust 	• Hot exhaust can cause fire. • Keep flammables and people away from exhaust.
DEF Refill Needed 	• Diesel Exhaust Fluid (DEF) level is low. Engine derate likely. • Refill tank with certified DEF.
See operator's manual or glove compartment card for complete instructions. 24-01656-000	

10/23/2020

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Fig. 1.14, ATS Indicators

Vehicle Access

Door Locks and Handles	2.1
Grab Handles and Access Steps	2.1
Back-of-Cab Access	2.3
Hood Opening and Closing	2.4

Vehicle Access

Door Locks and Handles

To unlock either door from outside the cab, insert the key in the lock and turn it one-quarter turn towards the front of the vehicle. See [Fig. 2.1](#). Turn the key back to the original position to remove it. Pull out on the paddle latch to open the door.

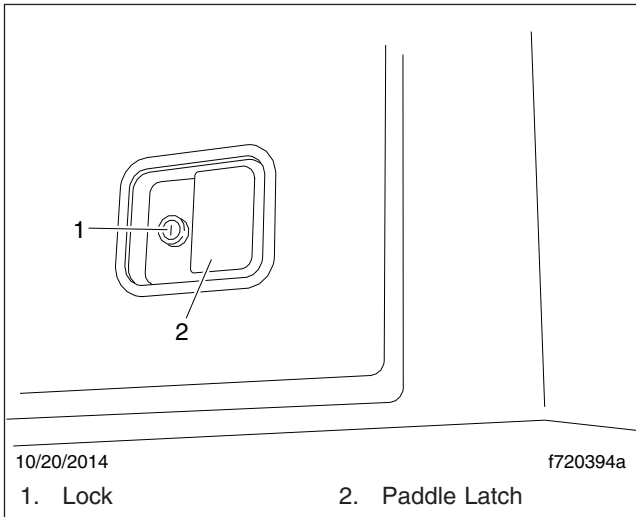


Fig. 2.1, Exterior Door Handle

To lock either door from outside the cab, insert the key in the lock and turn it one-quarter turn towards the rear of the vehicle. Turn the key back to the original position to remove it. If the door is closed, it will now be locked. If the door is open, close the door firmly.

To lock either door from inside the cab, push the lock button down. Pull the lock button up to unlock the door from the inside.

To open either door from inside the cab, pull the lock button up, then pull the interior door latch out and push the door outwards.

Remote Keyless Entry

Remote keyless entry is optional on Western Star vehicles. The remote entry key fob can be used to unlock the doors from outside the cab.

To unlock both doors, press the unlock button. To lock both doors, press the lock button. See [Fig. 2.2](#).

Key Fob Programming

A maximum of four fobs can be programmed to work on one vehicle. Whenever a new fob will be used, all existing fobs must be reprogrammed at the same

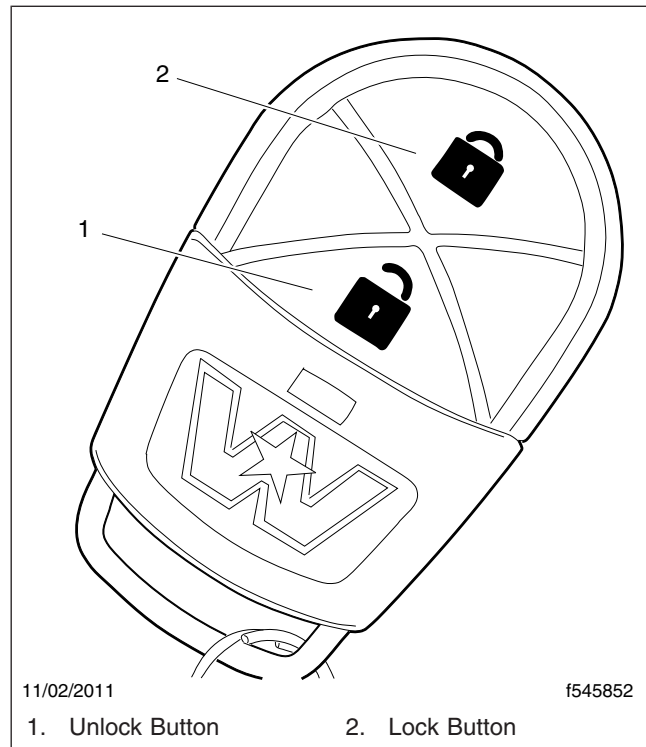


Fig. 2.2, Key Fob

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 Western Star dealer or service facility.

Grab Handles and Access Steps

The grab handles, access steps, and steering wheel are all part of the cab access system. Use these "helping hands" when getting into or out of the cab. They will increase your security and comfort.



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.

For ease of entry and exit, there are multiple grab handles: a handle on the A-pillar (optional on the driver's side), handles on the inside of the door, and handles on the B-pillar. In addition, the steering wheel may be used to provide a secure handhold. There are at least two access steps to provide secure footholds.

Entering the Driver's Side

1. Open the driver-side door and place anything that you are carrying in the cab.
2. Grasp the B-pillar grab handle with your right hand. See [Fig. 2.3](#).
3. Grasp the lower door pocket with your left hand.
4. Place your right foot on the bottom step, and pull yourself up.
5. Place your left foot on the top step.
6. Grasp the steering wheel or A-pillar grab handle, if equipped, with your left hand.
7. Step into the cab with your right foot first, and grasp the steering wheel with your right hand.

Exiting the Driver's 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

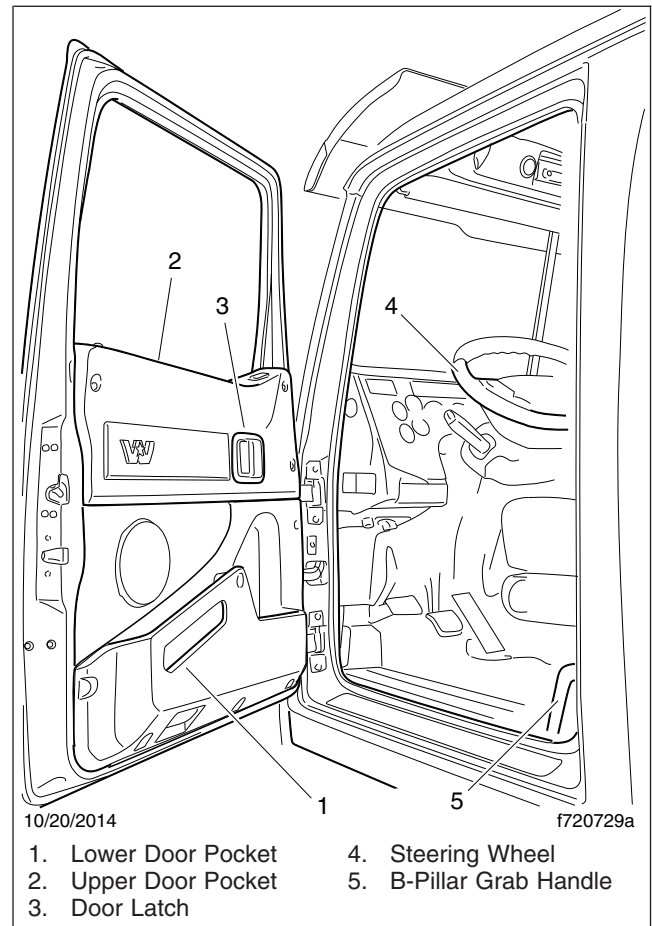


Fig. 2.3, Driver-Side Cab Access

in this way, there is a greater likelihood of personal injury.

1. Grasp the steering wheel with both hands, place your left foot on the top step, and stand on the threshold, facing into the cab.
2. Grasp the B-pillar grab handle with your right hand. See [Fig. 2.3](#), item 5.
3. Move your right foot to the bottom step.
4. Move your left hand to the lower door pocket.
5. Step to the ground with your left foot first.

Entering the Passenger's Side

1. Open the passenger-side door and place anything that you are carrying in the cab.
2. Grasp the B-pillar grab handle with your left hand. See [Fig. 2.4](#).

Vehicle Access

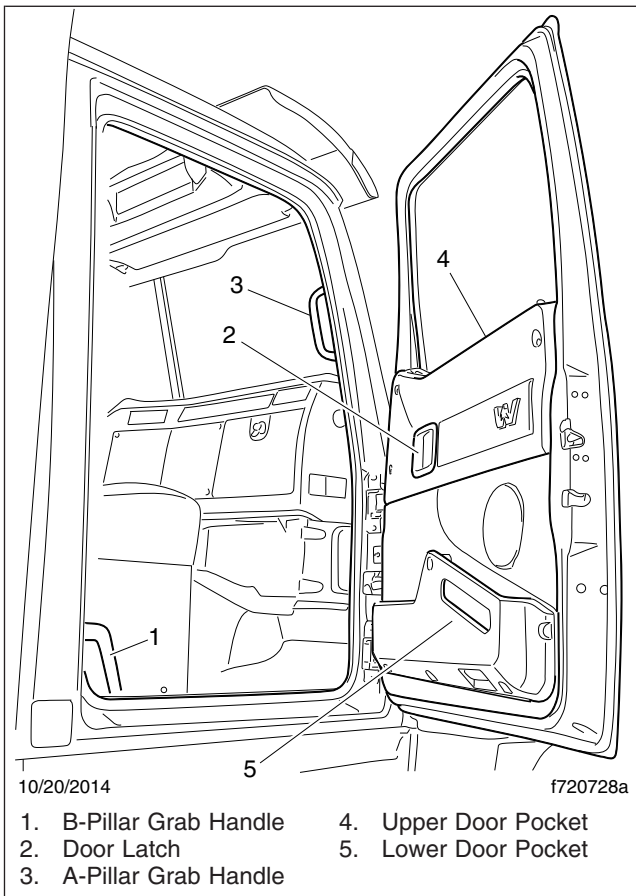


Fig. 2.4, Passenger-Side Cab Access

3. Grasp the lower door pocket with your right hand.
4. Place your left foot on the bottom step.
5. Place your right foot on the top step and move your right hand to the A-pillar grab handle.
6. Place your left foot on the top step, then move your left hand to the A-pillar grab handle.
7. Step into the cab with your left foot first.

Exiting the Passenger's 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, then place your right foot on the top step while facing inward. See [Fig. 2.4](#).
2. Place your left foot on the top step.
3. Move your left hand to the B-pillar grab handle.
4. Move your right foot to the bottom step.
5. Move your right hand to the lower door pocket.
6. Step to the ground with your left foot first.

Back-of-Cab Access

When trailer air and electrical connections cannot be reached conveniently from the ground, Federal Motor Carrier Safety Regulations require that tractors have adequate back-of-cab access. Grab handles are typically located on the backwall of the cab or sleeper, or on the inside of the cab extender, if equipped. A grab handle may also be provided on the exhaust stack. Steps may be mounted on the fuel tank(s), battery or tool box(es), or on metal brackets secured to the frame rail. A deck plate is mounted across the top of the frame rails. All other areas are not meant to support back-of-cab access.



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, behind the cab while 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 deck plate, 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.
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. Face the center of the vehicle and grasp the sidewall grab handle with both hands.
2. Place one foot at a time on 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.

Hood Opening and Closing

The hood can be raised to a full-open position. Tilt-assist struts help you to raise the hood, and to lower it to the operating position. In the operating position, the hood is secured to the cab-mounted cowl by a hold-down latch on each side.

Opening the Hood

NOTICE

For hoods with tilt-assist springs, do not let the hood free-fall to the full-open position. To do so could cause damage to the hood or hood springs.

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.

Closing the Hood

1. Grasp and lift the grab handle to tilt the hood toward the closed position.
2. As the hood goes over center, slowly lower the hood with both hands on the grab handle.

IMPORTANT: Make sure that both latches are fully engaged before operating the vehicle.

3. Make sure the hood is flush with the cowl, then secure the hood by engaging both hood hold-down latches.

Instruments

Instrumentation Control Units	3.1
Warning and Indicator Lights	3.2
Instruments	3.6
Driver Message Center	3.12
Overhead Instrument Panel	3.15

Instruments

Instrumentation Control Units

The instrumentation control unit (ICU) provides the driver with engine and vehicle information. It is comprised of standard and optional gauges, an audible warning, a driver message center, and a lightbar containing warning and indicator lamps (also known as telltales). Warning and indicator lamps illuminate in red (danger), amber (caution), green (status advisory), or blue (high-beam headlights active).

Western Star 5700 vehicles are equipped with an ICU4Me. See [Fig. 3.1](#) for a typical ICU layout.

The following headings in this chapter provide additional information and operating instructions for ICU components:

- "Warning and Indicator Lights"
- "Instruments"
- "Driver Message Center"

Ignition Sequence

When the ignition is turned on, the ICU runs a self-check. See [Fig. 3.2](#). 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.

NOTE: Primary and secondary air pressure gauges are the only air gauges that complete a sweep of their dials during the ignition sequence.

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

- electronic gauges complete a full sweep of their dials

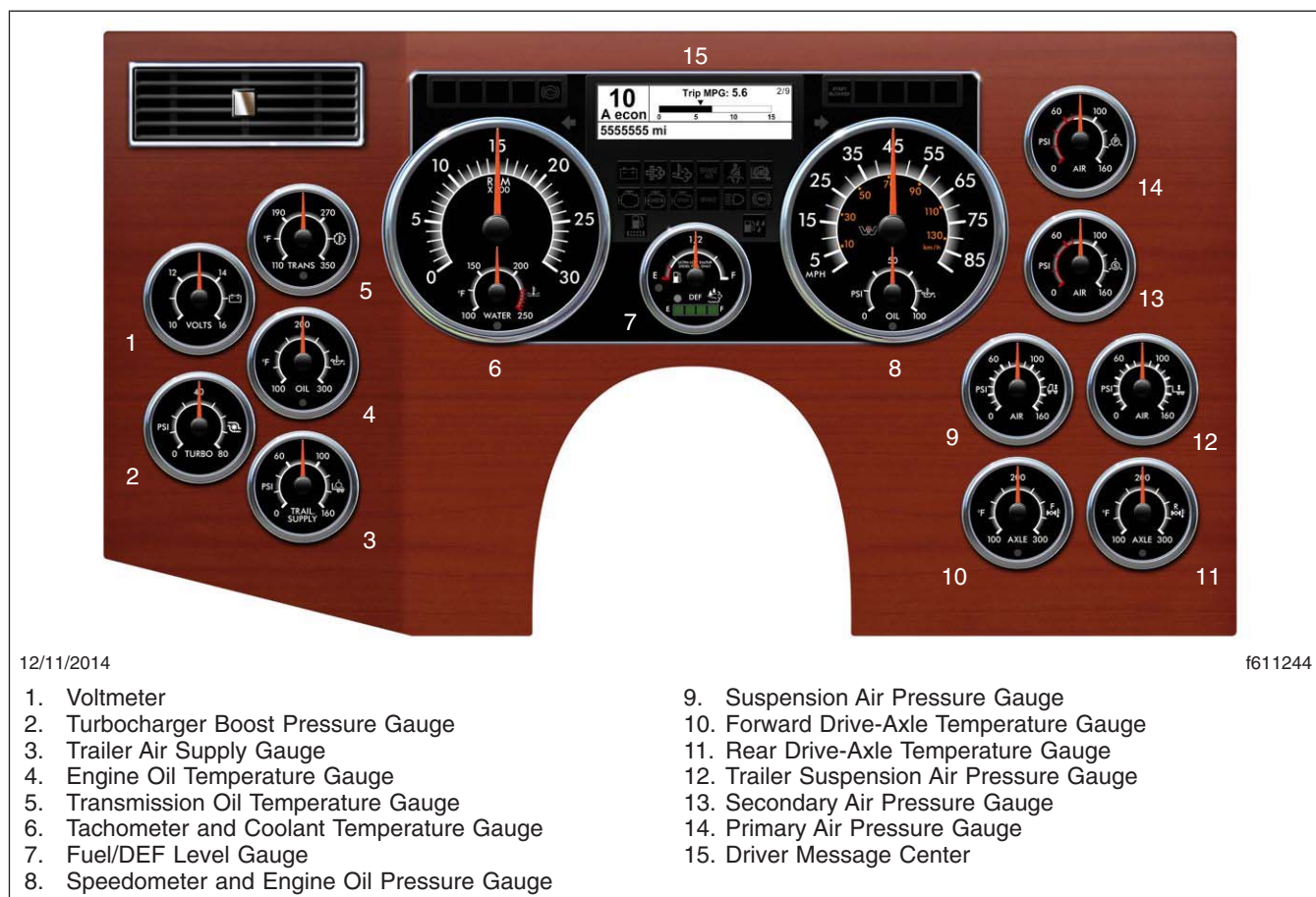


Fig. 3.1, ICU4Me Instrument Cluster

- warning and indicator lamps illuminate, then are extinguished
- audible alert sounds for approximately four seconds or until sufficient air pressure builds up in the primary and secondary air systems
- DEF level indicator illuminates all segments green, then turns them off one at a time before turning the leftmost segment amber and then red
- Western Star logo displays on the ICU4Me driver message center for two seconds.
- software revision level of the ICU is displayed on the driver message center, followed by any active faults

IMPORTANT: If any red or amber warning and indicator lamps do not illuminate during the ICU self-check or do not go out after the self-check completes, take the action outlined in [Table 3.1](#), then take the vehicle to an authorized Western Star service facility as soon as possible.

NOTE: If active faults are present, take the vehicle to an authorized Western Star service facility as soon as possible.

If the ICU receives active fault codes, 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 the home screen. If there are no active faults, the ICU displays the home screen after the self-check completes.

Audible Alerts

An audible alert sounds during the ignition sequence and 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 two miles per hour.
- System voltage falls below 11.9 volts.
- Door is open or the headlights are on, with the parking brake off.

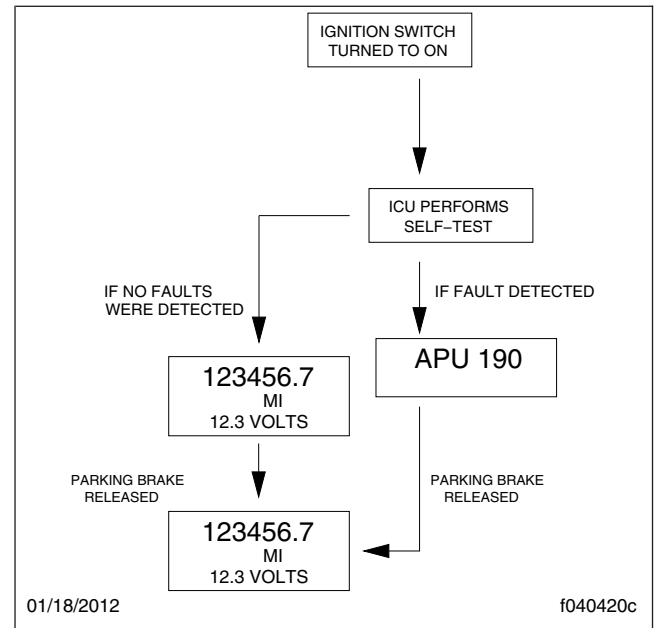


Fig. 3.2, ICU Ignition Sequence

- Driver seat belt is not fastened with the parking brake off (optional).
- Outside temperature falls below 35°F (1.7°C) (optional).

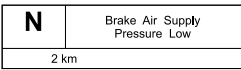
Warning and Indicator Lights

The ICU has three or four rows of warning and indicator lights with icon symbols, depending on the ICU configuration. The positions of the lights may vary, but the telltales are standard for all applications. See [Table 3.1](#) for a listing of standard and commonly used warning and indicator lamps.

Warning and indicator lamps illuminate in red (danger), amber (caution), green (status advisory), or blue (high-beam headlights active).

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 warning and indicator lamps shown in [Table 3.1](#).

Instruments

Common Warning and Indicator Lamps			
Lamp Description			Color
	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.	Red
	High Coolant Temperature	Indicates the coolant temperature is above the maximum allowable temperature.	Red
	Low Air Pressure (EPA10 and Newer)	Indicates air pressure in the primary or secondary reservoir has dropped below approximately 70 psi (483 kPa).	Red
	Low Air Pressure (ICU4Me only, mid-GHG14)	Indicates air pressure in the primary or secondary reservoir has dropped below approximately 70 psi (483 kPa).	—
	Low Engine Oil Pressure	Indicates the engine oil pressure is below the minimum allowable pressure.	Red
	Transmission Overheat	Indicates high transmission temperature.	Red
	Transmission Fluid Level	Indicates low transmission fluid level. Safely bring the vehicle to a stop as soon as possible.	Red
	Parking Brake (EPA10 and Newer)	Indicates the parking brake is engaged.	Red
	Low Battery Voltage	Indicates that battery voltage is 11.9 volts or less.	Red
	Unfastened Seat Belt	Activates with an audible alert when the system detects that the parking brake is off and the driver seat belt is not fastened on some vehicles. On other vehicles, this lamp illuminates for 15 seconds when the ignition is first turned on.	Red
	Check ECAS	Indicates Electronically Controlled Air Suspension (ECAS) active fault.	Red

Common Warning and Indicator Lamps			
Lamp Description			Color
	CHECK Engine*	Indicates an engine condition (low oil pressure, low coolant level, high coolant temperature, high DPF soot level, or uncontrolled DPF regeneration) that requires correction. Correct the condition as soon as possible. If the condition worsens, the STOP engine lamp will illuminate.	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 flammable material. Solid illumination indicates high exhaust temperatures at the outlet of the tail pipe when speed is below 5 mph (8 km/h).	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.	Amber
	Malfunction Indicator Lamp (MIL)	Indicates an emissions-related fault. See the engine operation manual for details.	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.	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.	Amber
	No Charge	Indicates the alternator is not properly powering the electrical system.	Amber
	Water in Fuel	Indicates the fuel may contain water. Drain any water collected in the fuel/water separators.	Amber
	Fuel Filter Restriction	Indicates the fuel filter is clogged and requires service.	Amber
	Check Transmission	Indicates an undesirable transmission condition.	Amber

Instruments

Common Warning and Indicator Lamps			
Lamp Description			Color
	Start Blocked (GHG14 only)	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: Illumination of the Start Blocked lamp does not indicate a problem with the starter. Turn the ignition switch back to ON, wait for the lamp to go out, then turn the ignition switch to START again.	Amber
	Wheel Spin (pre-EPA16)	Flashing indicates the ATC system is active, or the ATC button has been pressed to allow wheel slip. Solid illumination indicates ATC is shut off or unavailable due to a system fault. In the event of a system fault, repair the ATC system immediately to ensure full braking capability.	Amber
	Stability Event (EPA16 and newer)	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
	ATC Deactivated (EPA16 and newer)	Flashing indicates the ATC SPIN button has been pressed to allow wheel slip. Solid illumination indicates ATC is shut off or unavailable due to a system fault. In the event of a system fault, repair the ATC system immediately to ensure full braking capability.	Amber
	Roll Stability (pre-EPA16)	Momentary illumination indicates that a stability event has occurred. On vehicles that are also equipped with ATC, flashing indicates the ATC button has been pressed to allow wheel slip. Solid illumination indicates ATC is shut off or unavailable due to a system fault. In the event of a system fault, repair the ATC system immediately to ensure full braking capability.	Amber
	Hill Start Aid (HSA) Override	Indicates the HSA switch has been pressed to override the hill start assist feature.	Amber
	Outside Normal Ride Height	Indicates the current rear suspension height is not at the normal ride height. This light will turn off once the vehicle returns to normal ride height.	Amber
	Engine Brake	Indicates the engine brake is enabled.	Green
	Left-Turn Signal	Flashing indicates the outside left-turn signal lights are activated.	Green

Common Warning and Indicator Lamps			
Lamp Description			Color
	Right-Turn Signal	Flashing indicates the outside right-turn signal lights are activated.	Green
	Cruise Control	Indicates the cruise control is enabled. NOTE: The ICU4Me does not have a green cruise control telltale.	Green
	High-Beam Headlights	Indicates the high-beam headlights are on.	Blue

* See [Fig. 3.3](#) for an explanation of the aftertreatment system (ATS) warning indicators, and actions required to avoid further engine protection steps.

Table 3.1, Common Warning and Indicator Lamps

Engine Protection System



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 [Fig. 3.3](#) 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 10](#) 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.

Instruments

The instruments are listed here in alphabetical order, to make the information easier to find.

NOTE: Some of the listed instruments are optional, and not found in every vehicle.

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. 3.4](#). As an option, a graduated indicator ([Fig. 3.5](#)) 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 (inH₂O). For vehicles equipped with a graduated indicator or a restriction gauge on the

EXHAUST AFTERTREATMENT SYSTEM INFORMATION					
INDICATOR LAMP(S)	 (Solid) Level 1	 (Flashing) Level 2	 (Flashing) Level 3	 Level 4	 WARNING
Indicator Lamp Message(s)	Filter Regeneration Recommended.	Filter Regeneration Necessary	Parked Regeneration Required – Engine Derate	Service Regeneration Required. Engine Derate To Idle Only.	HEST (High Exhaust System Temperature)
Diesel Particulate Filter Condition	Filter is reaching capacity.	Filter is now reaching maximum capacity.	Filter has reached maximum capacity.	Filter has exceeded maximum capacity.	Flashing A regeneration is in progress.
Required Action	Bring vehicle to highway speeds to allow for an Automatic Regeneration or perform a Parked Regeneration.	To avoid engine derate, bring vehicle to highway speeds to allow for an Automatic Regeneration, or perform a Parked Regeneration as soon as possible.	Vehicle must be parked, and a Parked Regeneration must be performed. Engine will begin derate.	Vehicle must be parked, and a Service Regeneration must be performed. Check engine operator's manual for details. Engine will shut down.	Solid Exhaust components and exhaust gas are at high temperature. When stationary, keep away from people and flammable materials or vapors.
For a driver performed Parked Regeneration, vehicle must be equipped with a dash mounted Regeneration Switch.					

Fig. 3.3, ATS Warning Lamps

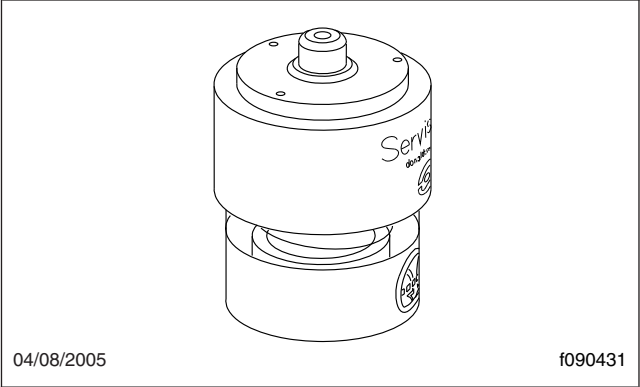


Fig. 3.4, Manual-Reset Air Restriction Indicator, Go/No-Go

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 4.2, the air cleaner element needs to be replaced.

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

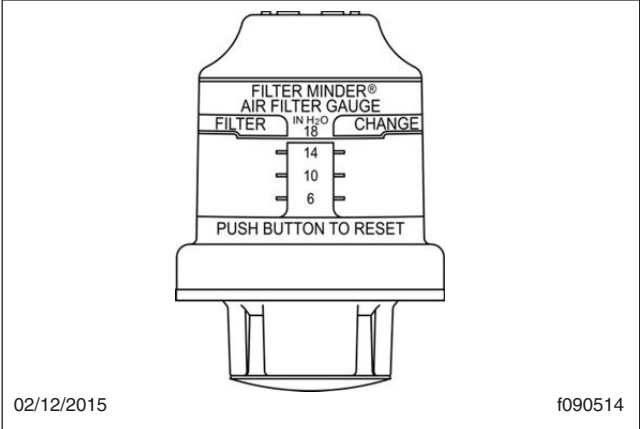


Fig. 3.5, Air Intake Restriction Indicator, Graduated

Air Intake Maximum Restriction Values (inH ₂ O)	
Engine Make	GHG14, GHG17, and GHG21 Engines
Detroit	18
Cummins	25

Table 3.2, Air Intake Maximum Restriction Values

Application Air Pressure Gauge

An application air pressure gauge (Fig. 3.6) 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.

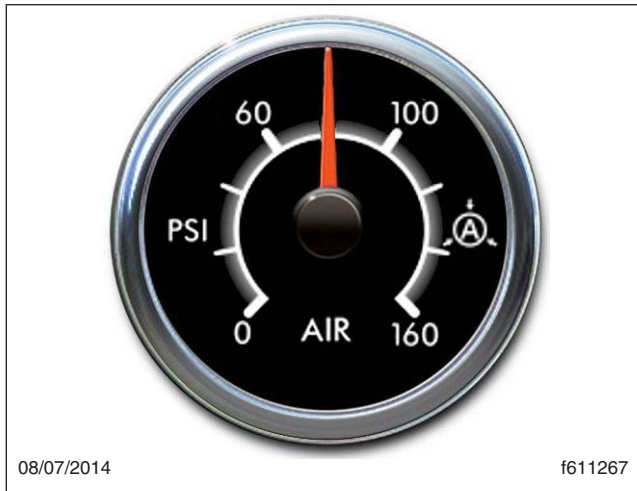


Fig. 3.6, Application Air Pressure Gauge

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 (Fig. 3.7) 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 215°F (101°C), 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.

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



Fig. 3.7, Tachometer and Coolant Temperature Gauge

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 (Fig. 3.8) 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.

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

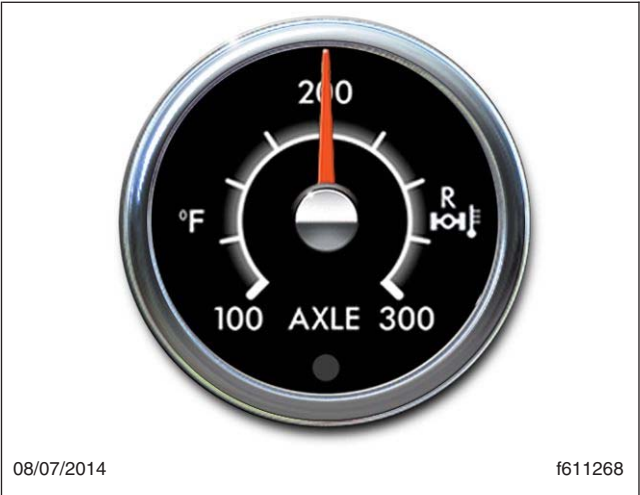


Fig. 3.8, Drive Axle Oil Temperature Gauge (rear drive axle gauge shown)

until the cause has been determined and corrected.

The engine oil pressure gauge, as shown in Fig. 3.9, 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.

NOTE: Oil pressures in Table 3.3 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.

Minimum Oil Pressure		
Engine Model	At Idle Speed: psi (kPa)	At Rated RPM: psi (kPa)
Detroit	14 (97)	55 (350)

Table 3.3, Minimum Engine Oil Pressure

Engine Oil Temperature Gauge

NOTICE

A sudden increase in oil temperature that is not caused by a load increase may indicate mechani-



Fig. 3.9, Speedometer and Engine Oil Pressure Gauge

cal 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. 3.10) should read in the following temperature range:

- 200 to 260°F (93 to 126°C) for Detroit 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.

Fuel/Diesel Exhaust Fluid (DEF) Gauge

For engines that are EPA10-compliant or newer, the fuel and DEF levels are measured in a dual purpose fuel/DEF level gauge. See Fig. 3.11.

The diesel fuel level is indicated at the top of the gauge, with a low-fuel warning lamp that illuminates amber when the diesel fuel level registers 1/8th of capacity.

The DEF level is indicated in a four-segment lightbar on the lower portion of the gauge. There is a low DEF level warning lamp that illuminates amber when

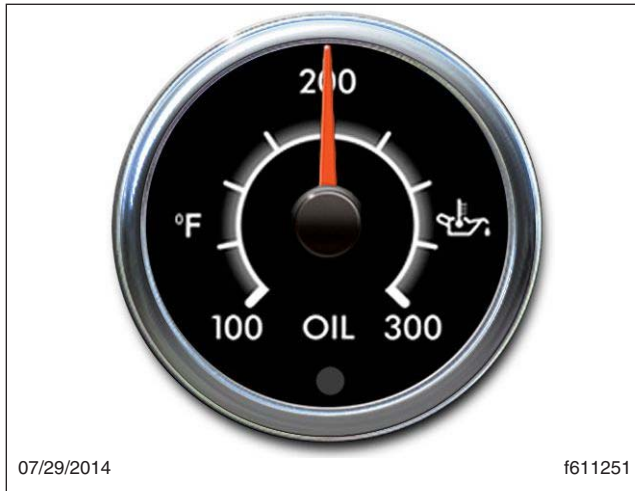


Fig. 3.10, Engine Oil Temperature Gauge

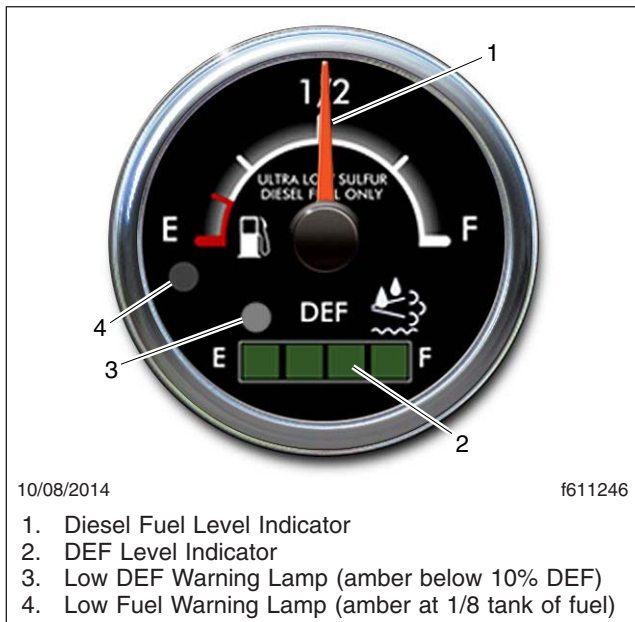


Fig. 3.11, Fuel/DEF Gauge, EPA10 and Newer

the DEF level reaches 10% of capacity. See [Chapter 12](#) for details of the DEF gauge functions.

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 ([Fig. 3.12](#)) register the pressure in the primary and secondary air systems. Normal pressure, with the engine running, is 100 to 120 psi (689 to 827 kPa) in both systems.

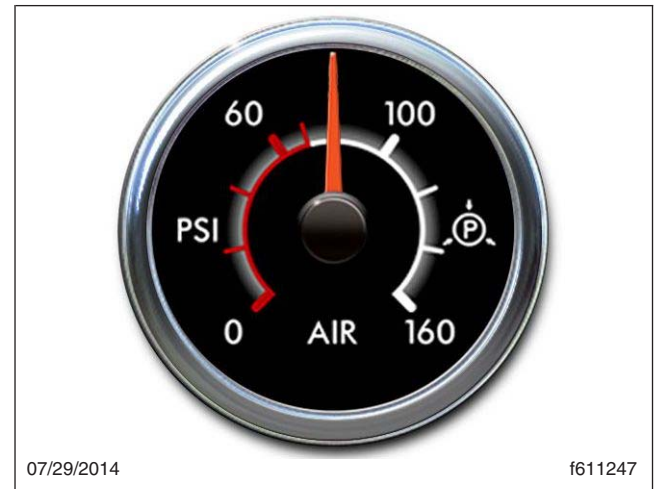


Fig. 3.12, Air Pressure Gauge (primary shown)

A low-air-pressure warning light and audible alert, connected to both the primary and secondary systems, activate when air pressure in either system drops below approximately 70 psi (483 kPa).

When the engine is started, the warning light and audible warning remain on until air pressure in both systems exceeds minimum pressure.

Speedometer

Two speedometer options are available. The U.S. version of the speedometer ([Fig. 3.9](#)) 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.

Suspension Air Pressure Gauge

A suspension air pressure gauge ([Fig. 3.13](#)) registers the air pressure applied to the vehicle air suspension.

Instruments

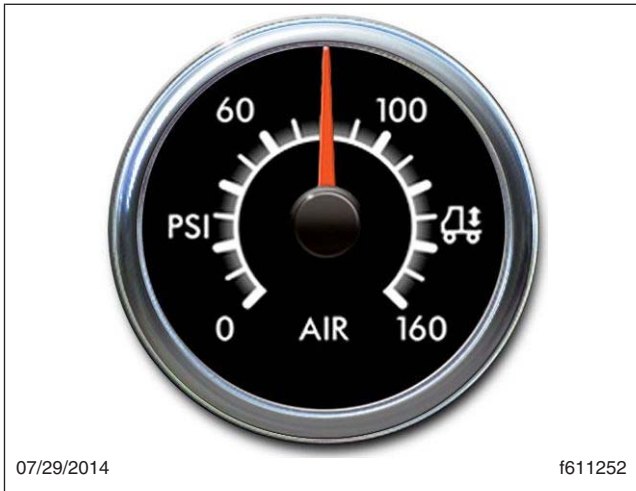


Fig. 3.13, Suspension Air Pressure Gauge

Tachometer

The tachometer (Fig. 3.7) 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. For low idle and rated rpm, see the engine identification plate.

Transmission Fluid Temperature Gauge

The transmission fluid temperature gauge, shown in Fig. 3.14, measures the transmission lubricant operating temperature. Temperatures vary by application, but the transmission fluid temperature gauge reading should not exceed 250°F (121°C).

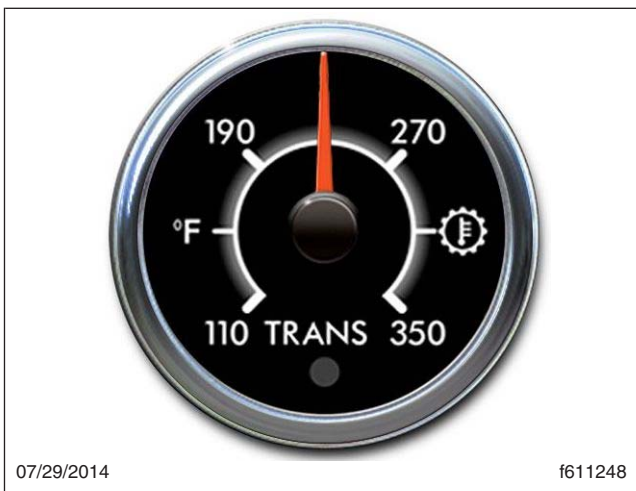


Fig. 3.14, Transmission Fluid Temperature Gauge

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. 3.15) indicates the pressure in the intake manifold, in excess of atmospheric pressure, being created by the turbocharger.

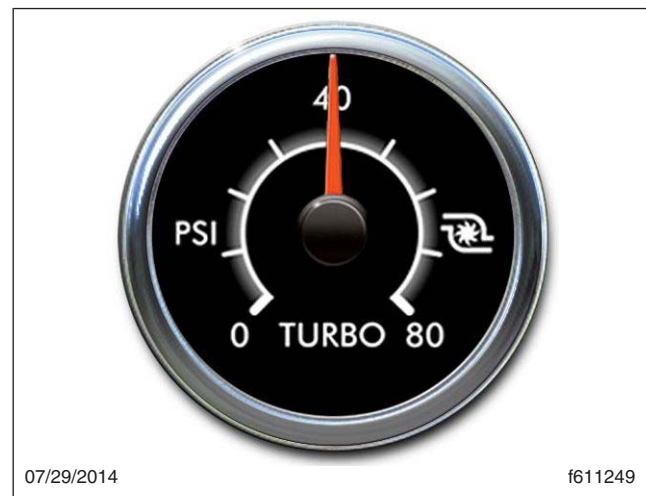


Fig. 3.15, Turbocharger Boost Pressure Gauge

Voltmeter

The voltmeter indicates the vehicle charging system voltage when the engine is running and the battery 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. A digital voltage display is integrated with driver message center. An optional voltmeter gauge (Fig. 3.16) may be installed.

The voltmeter will normally show approximately 13.7 to 14.1 volts when the engine is running. The voltage

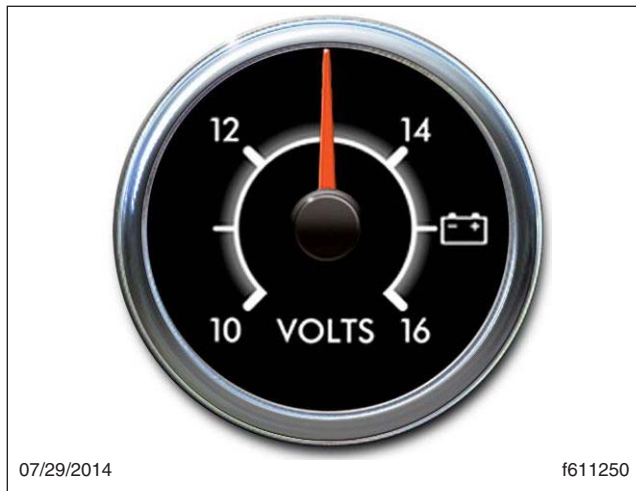


Fig. 3.16, Voltmeter

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 Western Star 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.

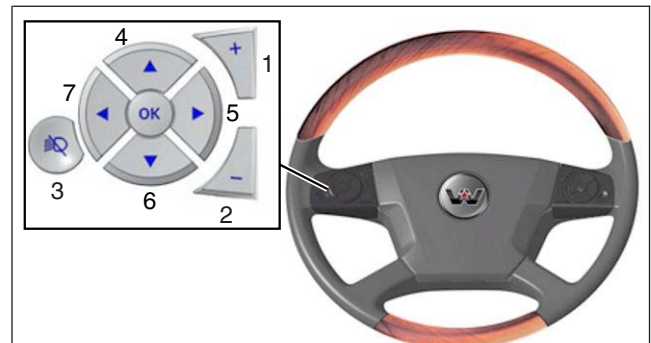
Driver Message Center

ICU4Me

Functions

ICU4Me settings and the driver message center are controlled using the switches mounted in the left-hand switch pod of the steering wheel. See [Fig. 3.17](#).

The driver message center is divided into four sections. The odometer and cruise control status field are displayed along the bottom of the message center. When cruise control is active, the cruise control status field displays relevant cruise control icons and the set speed. If the vehicle is equipped with a manual transmission, time and temperature are displayed in the top left corner of the driver message center. The message field displays the driving screens and alert messages. See [Fig. 3.18](#).



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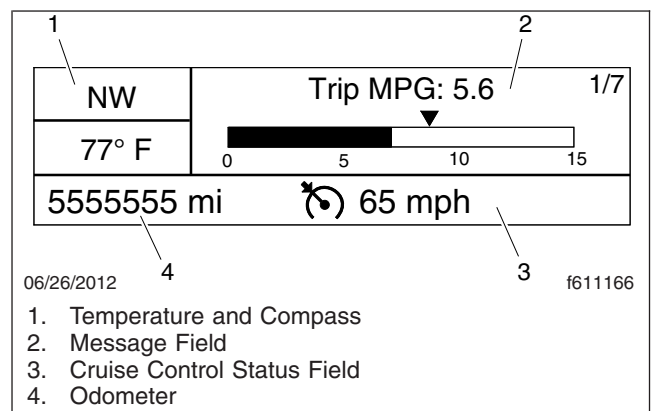
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NOTE: To reset values in the ICU4Me driver message center, press and hold the RIGHT navigation switch.

1. Volume Up Switch
2. Volume Down Switch
3. Headlight Interrupt Switch
4. UP Navigation Switch
5. RIGHT Navigation Switch
6. DOWN Navigation Switch
7. LEFT Navigation Switch

Fig. 3.17, Steering Wheel-Mounted Switches, Left-Hand Switch Pod

If the vehicle is equipped with an automated transmission, the gear display is located in the top left corner of the driver message center. Time and temperature are displayed in the message field, unless an alert message is active or a driving screen has been selected. The odometer and cruise control status field are displayed along the bottom of the message center. See [Fig. 3.19](#). For information about transmission display options, see [Chapter 15](#).



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1. Temperature and Compass
2. Message Field
3. Cruise Control Status Field
4. Odometer

Fig. 3.18, Driver Message Center Without Gear Display, ICU4Me

Instruments

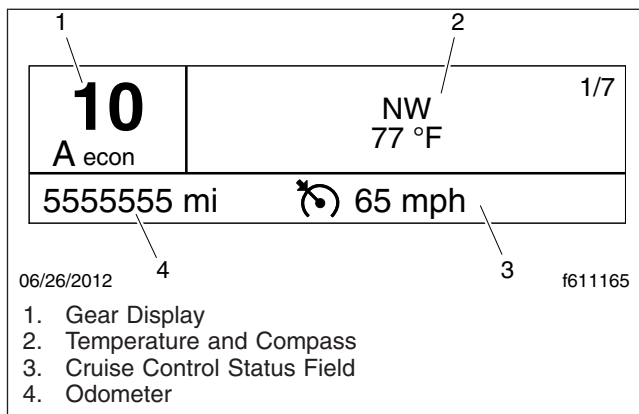


Fig. 3.19, Driver Message Center with Gear Display, ICU4Me

Alert Messages

Alert messages are displayed in the message field to notify the driver when certain conditions occur. They include warnings, cautions, and other messages 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.

NOTE: All alert messages follow the format shown in [Fig. 3.20](#).

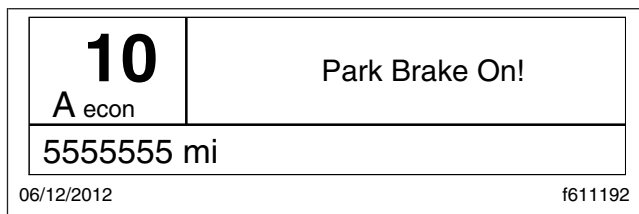


Fig. 3.20, Parking Brake Alert Message

Press the OK button on the left-hand steering wheel pod to acknowledge alert messages and revert to the previously displayed driving screen. The following alert messages will repeat intermittently until the condition is eliminated:

- turn signal on
- low voltage
- no datalink
- low transmission air pressure (Detroit transmissions only)

Driving Screens

With the parking brake off, only the driving screens are available. Use the UP and DOWN navigation switches on the steering wheel to scroll through the driving screens; see [Fig. 3.21](#). To reset any values, press and hold the RIGHT navigation switch.

- Temperature
- MPG information
- Trip information
- Leg information
- Gauge display (if selected)
- Predictive Cruise Control (optional)
- Enter parked menus

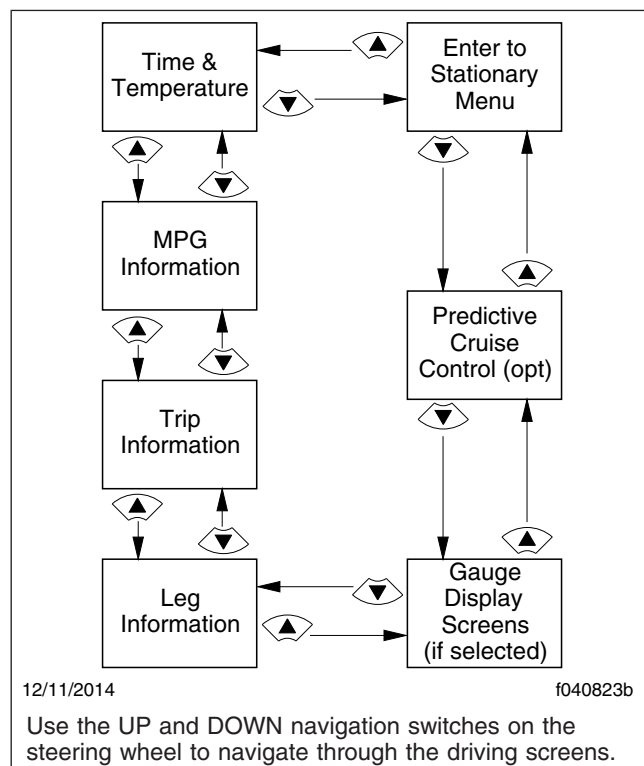


Fig. 3.21, Driving Screen Navigation, ICU4Me

Parked Screens/Menus

Park the vehicle and set the parking brake to access the parked menus and submenus. See [Fig. 3.22](#). To reset values in any of the menus, press and hold the RIGHT navigation switch.

- Trip information

- Fuel information
- Engine information
- Diagnostics
- Service information
- Settings
- ICU Information

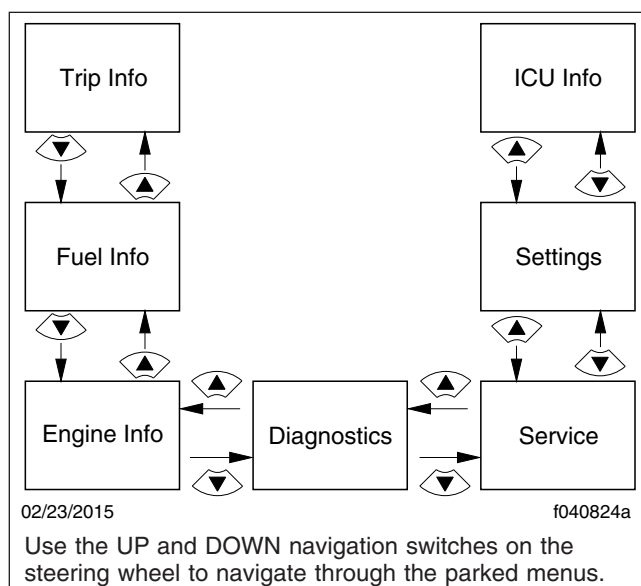


Fig. 3.22, Parked Menus, ICU4Me

A small numerical fraction is displayed in the upper right-hand corner of each screen to indicate the number of available screens or options to scroll through. See [Fig. 3.23](#). Press the OK button on the left-hand steering wheel pod to select a menu choice. Press the LEFT navigation switch to back out of a selected menu or submenu. Use the UP navigation switch to scroll up, and the DOWN navigation switch to scroll down.

When navigating the parked menus, the left side of the driver message center displays a "breadcrumb menu" to show the order of menus and submenus that have been selected during the current navigation.

Trip Information

The ICU can record data for one trip segment and one leg segment. When trip information is reset, all the leg information is reset as well.

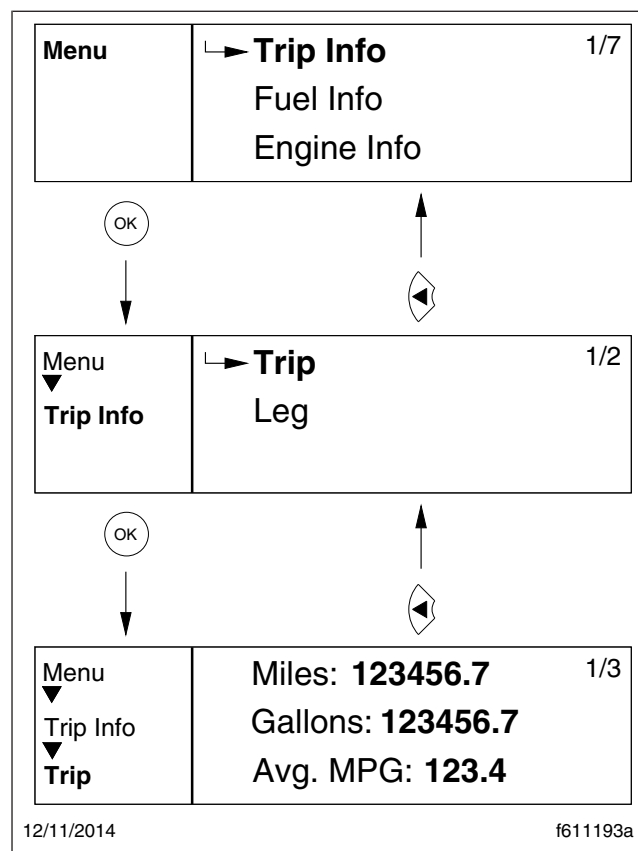


Fig. 3.23, Parked Menu Navigation, ICU4Me

Fuel Information

Using this menu, the driver can view the total fuel used since the last reset, the total idle gallons used since the last reset, and the average MPG since the last reset.

Engine Information

Using this menu, the driver can view engine miles, engine hours, gallons used, PTO hours, and PTO gallons. Engine oil level is optional for Detroit engines. The information contained in the Engine Information screens cannot be reset.

Diagnostics

Active faults are displayed in the diagnostics menu. See [Fig. 3.24](#). If there are any active faults, the total number of faults is displayed in parenthesis next to the affected controller. To view specific active faults, press the OK button on the left-hand steering wheel pod. Press the OK button to toggle between the text description and the failure code for each selected fault.

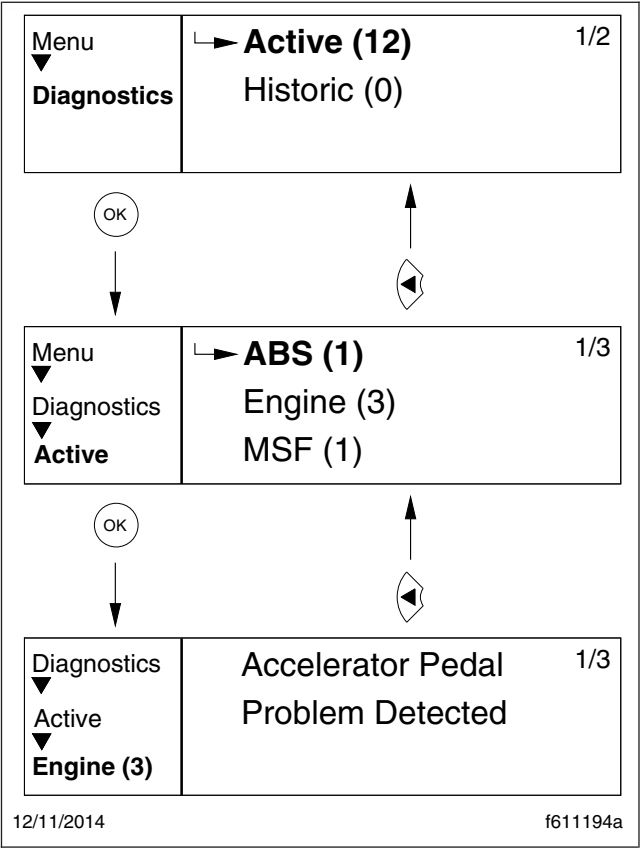


Fig. 3.24, Diagnostics Menu Navigation, ICU4Me

Service Information

Using this menu, the driver can enable, disable, and set service intervals for engine miles or engine hours. After enabling service intervals, select interval unit (miles or hours), and the interval duration.

Settings

The settings menu contains the controls for the following settings:

- Display (includes brightness, display light, and night mode settings)
- Gauge select
- Language
- Temperature warning enable/disable
- Units

The Gauge Select submenu allows the driver to select certain gauge values for display in the message field while driving. See Fig. 3.25. Use the UP and DOWN navigation switches on the steering wheel to

scroll through the list of available gauges, then press the OK button to select a desired gauge. The OK button can also be used to uncheck boxes if necessary.

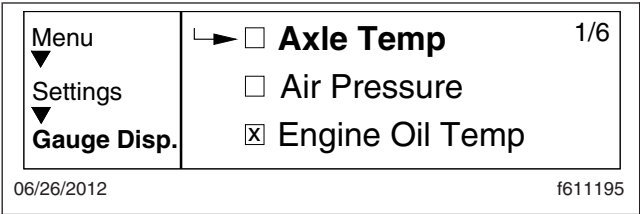


Fig. 3.25, Selecting Gauges to Display, ICU4Me

ICU Information

The ICU Information screen displays the part numbers for the instrument cluster and software.

Overhead Instrument Panel

The overhead instrument panel typically holds a citizen’s band (C/B) radio, an AM/FM radio, a digital clock, and storage areas with netting. The underside of the overhead console also holds the sun visors and the dome/reading light assembly. For more information on the dome/reading light assembly, see Chapter 8.

Driver Controls

Control Panels	4.1
Ignition Switch	4.1
Lighting Controls	4.2
Horn Controls	4.4
Powertrain Controls	4.4
Cruise Control	4.9
Dash-Mounted Brake Controls	4.11
Windshield Wiper and Washer Controls	4.12
Suspension/Trailer Connection Controls	4.13
Adjustable Steering Column Controls	4.16
Radio/Bluetooth Controls	4.16
Climate Controls	4.16
Seat Controls	4.17

Driver Controls

Control Panels

NOTE: Western Star vehicles are offered with various chassis and body components. Because of the various options, the information contained in this chapter may not apply to every vehicle.

The right-hand dash control panel contains a face vent, the majority of the driver switch controls, automated and automatic transmission controls, and the OnGuard display module, if equipped.

The ignition switch control panel (below the right-hand dash panel) contains the ignition switch, cigarette lighter, and climate controls.

The instrument cluster is located behind the steering wheel.

Fig. 4.1 shows a typical dash control panel layout.



Fig. 4.1, Dash Control Panel

Ignition Switch

The ignition switch has four positions: OFF, ACCESSORY, ON, and START. See Fig. 4.2.

In the OFF position, the key slot is vertical. The key can be inserted and removed only in the OFF position.

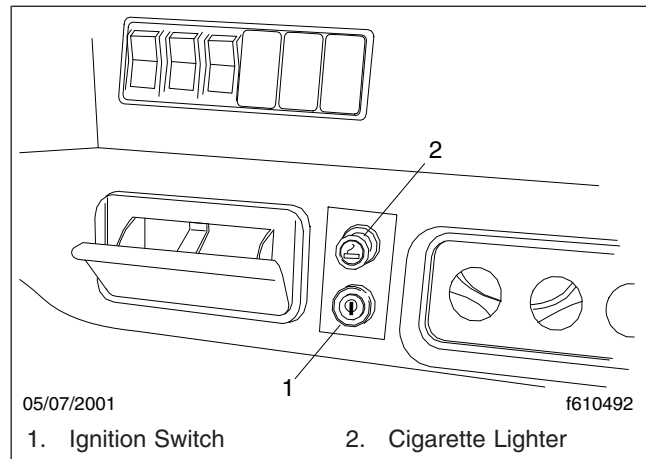


Fig. 4.2, Ignition Switch and Cigarette Lighter

The following functions are operable when the ignition switch is in the OFF position (regardless of whether the key is inserted):

- high-beam headlights
- taillights
- brake lights
- road lights
- dome lights
- clearance lights
- turn signals
- hazard warning lights
- utility and baggage lights
- spotlights
- electric horn
- clock
- refrigerator
- television

Turn the key counterclockwise to the ACCESSORY position. In addition to all the functions that are operable with the ignition switch in the OFF position, the following functions are operable when the switch is in the ACCESSORY position:

- radio/stereo system
- heater and A/C fan
- mirror defog
- windshield wipers

- beacons
- power windows
- windshield washer
- outside air temperature display

Turn the key clockwise past the OFF position to the ON position. With the switch in the ON position, the warning and indicator lamps illuminate. Wait for three seconds before starting the engine.

Turn the key clockwise past the ON position to the START position and start the engine. Do not operate the starter longer than thirty seconds, and wait at least two minutes between starting attempts to allow the starter to cool. Release the key the moment the engine starts.

Switching on the ignition and releasing the parking brake automatically activates the daytime running lights, if equipped. The daytime running lights will operate until the parking brake is applied or the headlights are turned on.

Lighting Controls

IMPORTANT: Unless otherwise noted below, press the upper half of the switch to activate the desired light(s). Press the lower half of the switch to turn the light(s) off.

Exterior Lighting Controls

Exterior light controls are listed here in alphabetical order. See [Fig. 4.3](#) or [Fig. 4.4](#) for exterior light locations. At the rear of the vehicle there are taillights, brake lights with turn signals, backup lights, and optional utility lights.

See [Fig. 4.5](#) for exterior and interior light switches.

Backup Lights

Backup lights are activated automatically when the vehicle is in reverse, and are designed to be used while backing up at night.

Clearance Lights

Press the upper half of the clearance lights switch to activate all clearance lamps including back-of-sleeper and mirrors.

Driving Lights

Driving lights are designed to extend the range of the high-beam headlights, and can only be activated

when the headlight high-beams are on. When headlights are dimmed, the driving lights automatically turn off.

Fog Lights

Fog lights are designed to reduce glare in foggy conditions. The headlights must be on and set on low beam for the fog lights to activate.

Hazard Warning Lights

Press the upper half of the hazard light switch to activate all of the turn signal lights. Both of the telltales on the instrument cluster will flash. To cancel the hazard lights, press the lower half of the switch.

Headlights

The headlight switch is operated by pushing the upper half of the switch once for the parking lights, illuminating the taillights and side marker lamps on both the tractor and trailer. Pressing the upper half of the switch a second time activates the headlights. An audible warning will sound if the lights are left on when the ignition is turned off and the driver-side door is open.

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. 4.6](#). 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.

Headlight Interrupt

The headlight interrupt switch is located on the left-hand switch pod of the steering wheel. See [Fig. 4.7](#). When the headlight interrupt switch is activated, the daytime running lights blink. The headlight interrupt switch only operates when the headlights are on.

Turn Signals

The turn-signal lever is mounted on the left-hand side of the steering column. Pulling the turn-signal lever up activates the right-turn signal; pushing it

Driver Controls

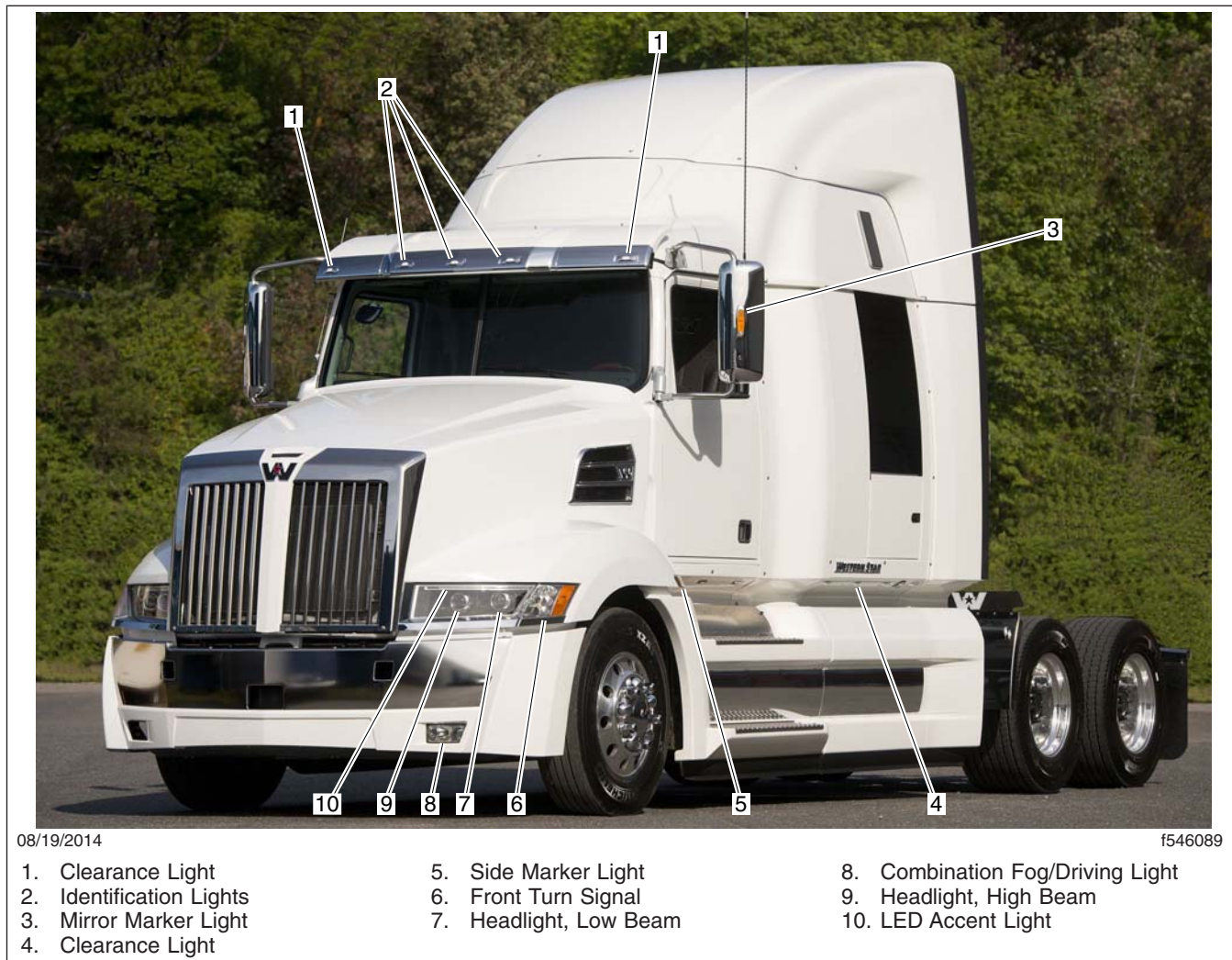


Fig. 4.3, Exterior Lights (5700 models)

down activates the left-turn signal. The lever is typically a non-canceling combination turn-signal, windshield wiper/washer switch, and headlight control unit. See [Fig. 4.6](#).

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.

Trailer Clearance Lights

The trailer clearance lights switch activates the trailer clearance lamps independent of the tractor lamps.

Utility Lights

Utility lights can be swivel-mounted on the upper half of the cab, or flush-mounted on the back of the cab or sleeper. Press the upper half of the switch to activate it. Press the lower half of the switch to turn it off.

Interior Lighting Controls

The cab is equipped with door-activated dome lamps on the ceiling and under the overhead console, and courtesy lights on the bottom edge of each door and under the dash. Depending on vehicle configuration, there may also be LH and RH reading/map lamps.

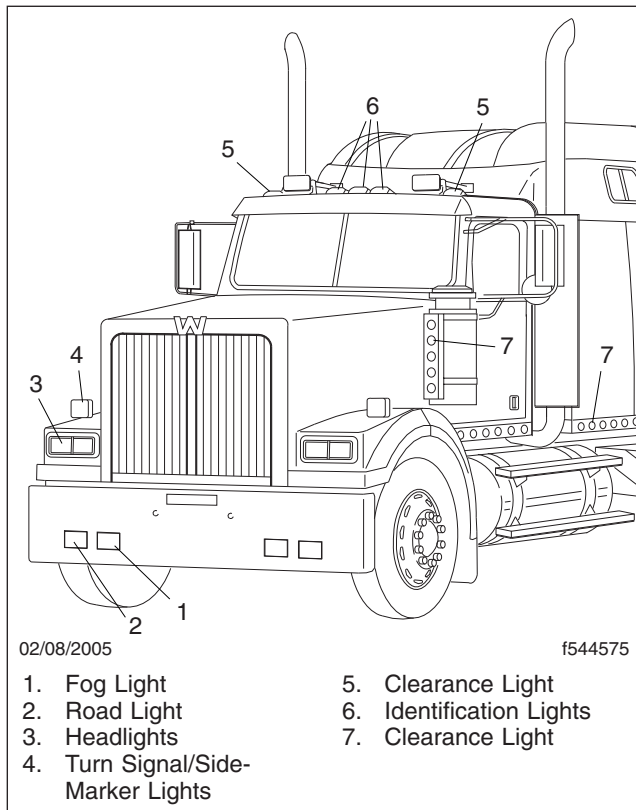


Fig. 4.4, Exterior Lights (4700 models)

When the instrument panel lights are on, most switch icons are backlit with a colored light to allow the driver to find switches more easily in the dark. When a switch is activated, an LED on the switch is illuminated.

For sleeper and baggage compartment lights, see [Chapter 8](#).

Dash Lights

The dash lights are controlled by the dash lights switch ([Fig. 4.5](#), item 9). With the headlight switch in position 1 (marker lights on) or position 2 (headlights on), tapping the upper half of the dash lights switch increases the instrument cluster and switch backlighting incrementally. Note that tapping the switch past the maximum setting also activates the dome lamps and courtesy lights. Tapping the lower half of the switch dims the dash lights.

Cab Dome Lamps and Courtesy Lights

The dome lamps on the cab ceiling and overhead console, and the courtesy lights on the cab doors and under the dash are activated when a cab door is

opened. Closing the doors will cause the lights to be turned off after 30 seconds. If a cab door is left open, a timer turns the lights off after 15 minutes.

Both the ceiling and overhead console dome lamps can be activated using the dash lights switch ([Fig. 4.5](#), item 9) when the headlight switch is in position 1 (marker lights on) or position 2 (headlights on). Tap the top half of the dash lights switch until the dome lamps are activated. Tap the bottom half of the switch to turn the dome lamps off.

Overhead Console Dome/Reading Lamps

The overhead console dome/reading lamps ([Fig. 4.8](#)) are powered by both the ECC module and the battery. When powered by the ECC module, they are controlled together with the cab dome lamps (see "Cab Dome Lamps and Courtesy Lights" above). They can also be operated individually (when not powered by the ECC module) by pushing on the lens.

Red Map Lamps

The red map lamps ([Fig. 4.8](#)) on the overhead console are operated by pushing on the lens.

Horn Controls

Air Horn

The air horn is controlled by a wire lanyard hanging from the center of the overhead console. Pull down on the lanyard to sound the air horn.

Electric Horn

The electric horn control is located in the center of the steering wheel. To sound the horn, press down on the top of the steering wheel center pad. The horn will sound for the duration that the button pressed, up to 60 seconds.

Powertrain Controls

Aftertreatment System Regen Switches

NOTE: See [Chapter 12](#) for detailed information about the operation of the regeneration (regen) switches and the aftertreatment system (ATS).

The regen request switch is used to initiate a parked regen. See [Fig. 4.9](#).

Driver Controls

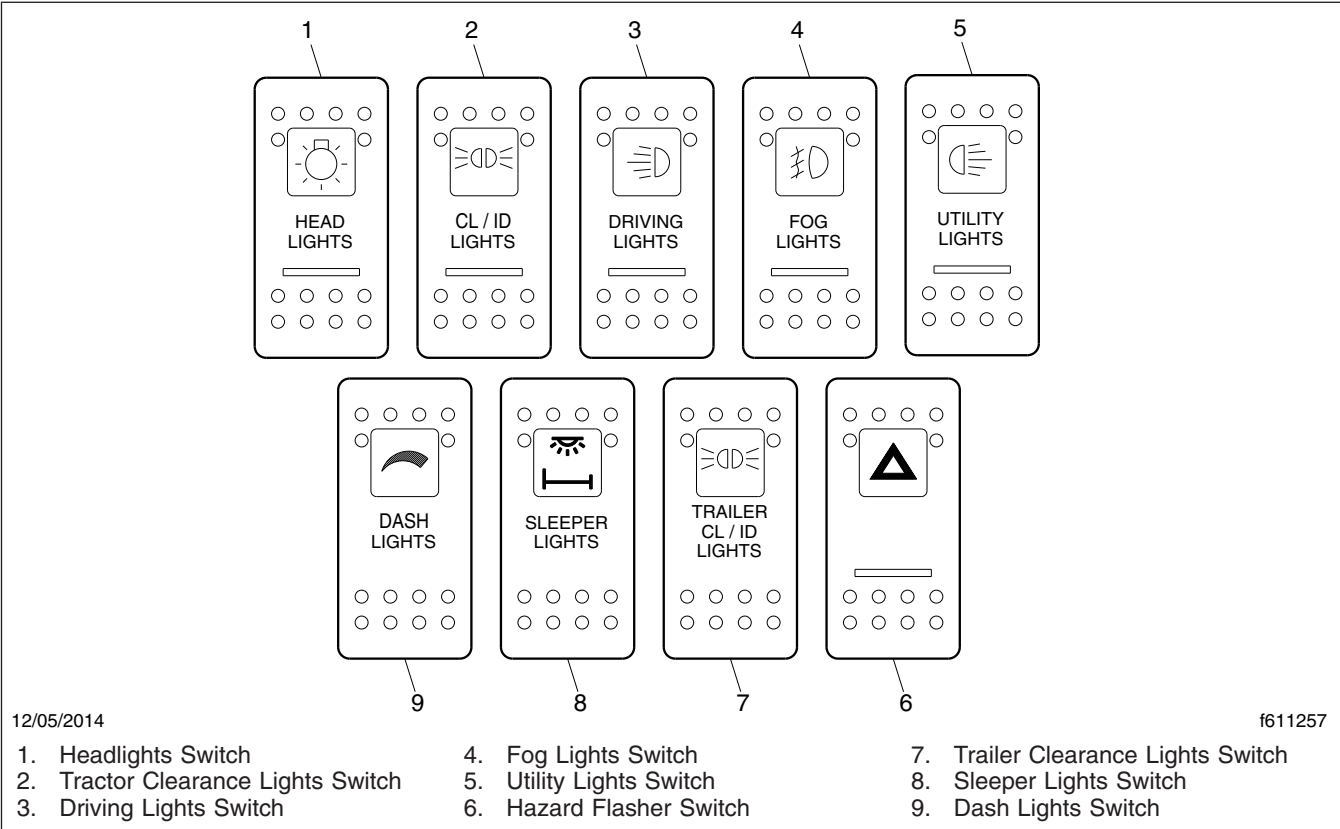


Fig. 4.5, Exterior and Interior Light Switches

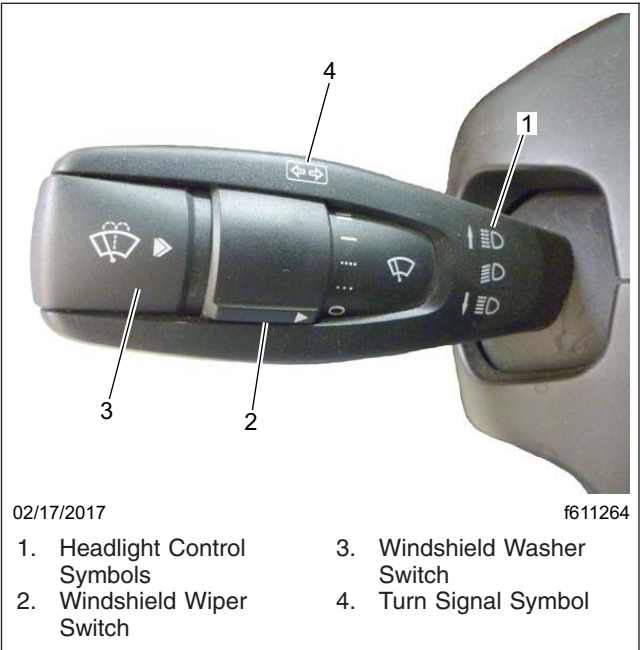


Fig. 4.6, Steering Column-Mounted Turn Signal Lever



Fig. 4.7, Left-Hand Steering Wheel Switches

Some vehicles are equipped with an optional regen request/inhibit switch. To request a parked regen, press the upper half of the switch. To stop a regen in progress or prevent the start of a regen, press the

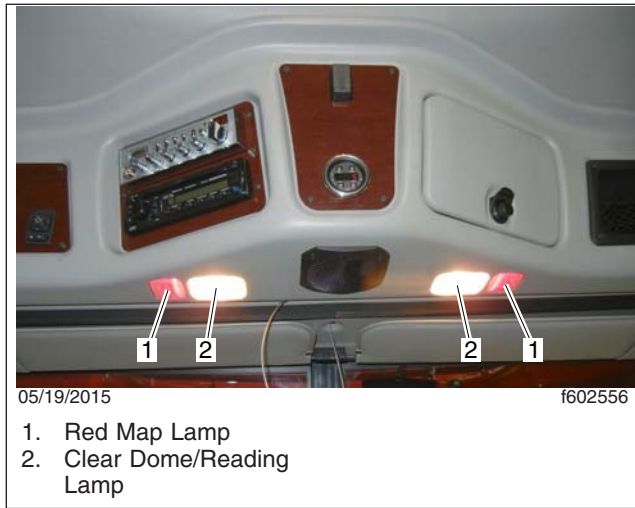


Fig. 4.8, Overhead Console Lamps

lower half of the switch. Regen will not occur until the switch is no longer active.

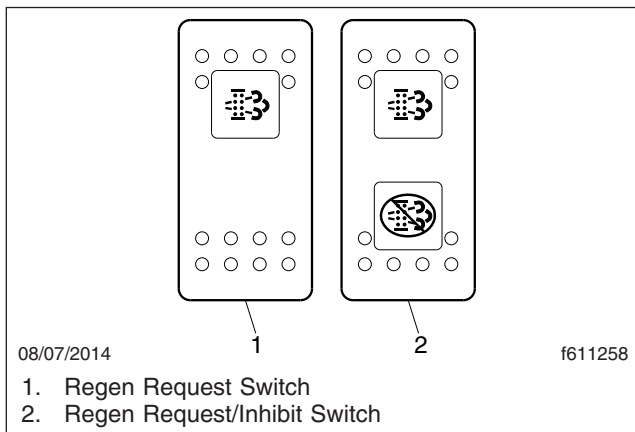


Fig. 4.9, Aftertreatment System Regen Switches

Axle Switches

Axle switch controls are listed here in alphabetical order. See [Fig. 4.10](#).

NOTE: See [Chapter 17](#) for detailed information about drive axle functions.

Differential Lock Switch

The differential lock switch provides maximum traction for slippery conditions by forcing the wheels on each drive axle governed by the switch to rotate together. Engagement can be at any speed, provided the wheels are not slipping or spinning.

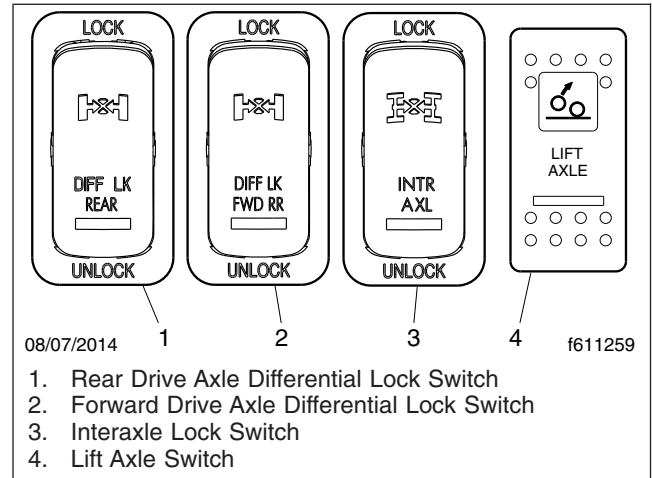


Fig. 4.10, Axle Switches

Interaxle Lock Switch

The interaxle lock switch allows the driver to lock the drive axles together, causing the drive axle shafts to rotate together. Use this feature only under adverse road conditions where greater traction is needed.

Leave the control in the UNLOCK position for normal highway operation. When a spinning or slipping action occurs at any of the drive wheels, press the upper half of the switch to LOCK the differential and prevent the wheels from spinning.

NOTICE

Do not shift into LOCK while the rear wheels are spinning. Come to a halt before engaging to prevent damage to the interaxle and main differentials.

Do not permit rear wheels to spin freely for more than ten seconds when traction is lost. Shift into LOCK to prevent damage to the interaxle and main differentials.

Lift Axle Switch

The lift axle switch controls the lift axle operation. Pushing the upper half of the switch will lower the lift axle.

Engine Brake Switches

NOTE: See [Chapter 13](#) for detailed information about engine brake operation.

Driver Controls

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. 4.11](#)

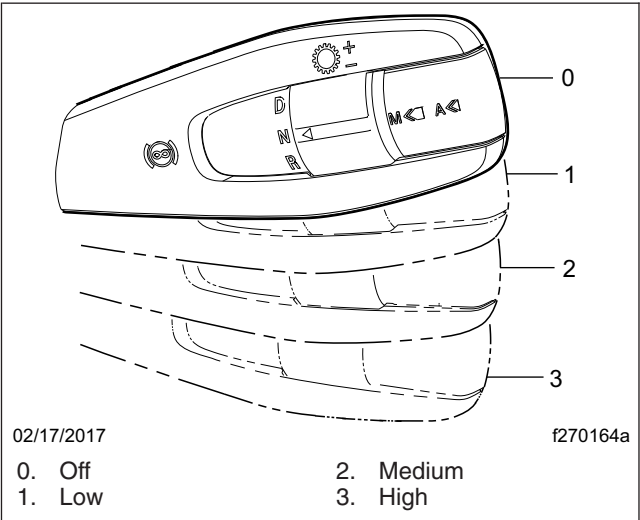


Fig. 4.11, Engine Brake Positions

Engine Fan Switch

Press the upper half of the engine fan switch to override the automatic fan control and cause the engine fan to run continuously. See [Fig. 4.12](#), item 1. This switch is intended for temporary use, or if the automatic fan control fails. Press the lower half of the switch to return to automatic fan control.

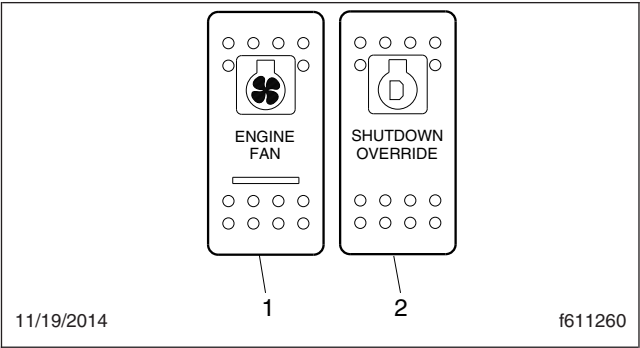


Fig. 4.12, Engine Switches

Shutdown Override Switch

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. 4.12](#), item 2.

NOTICE

When the derate process begins, immediately get the vehicle serviced in order to prevent severe damage to the engine.

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 is "on" by default. It can be turned off by pressing and releasing the HSA override switch on the dash (see [Fig. 4.13](#)).

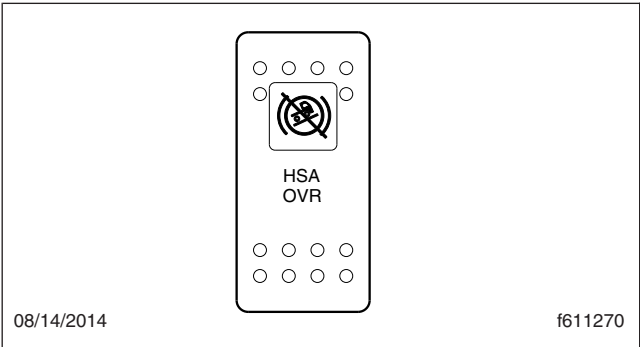


Fig. 4.13, Hill Start Aid Override Switch

Power Takeoff Controls

Engine power takeoffs (PTO) are devices used to tap into engine power to run auxiliary devices, such as hydraulic pumps that power additional equipment. The following instructions are general guidelines for operating a PTO.

1. Set the parking brake and put the transmission in neutral.
2. Press the PTO switch. See [Fig. 4.14](#). When the light is steadily illuminated, the PTO is engaged and ready to operate. In stationary mode, the vehicle must remain in neutral with the parking brake set.

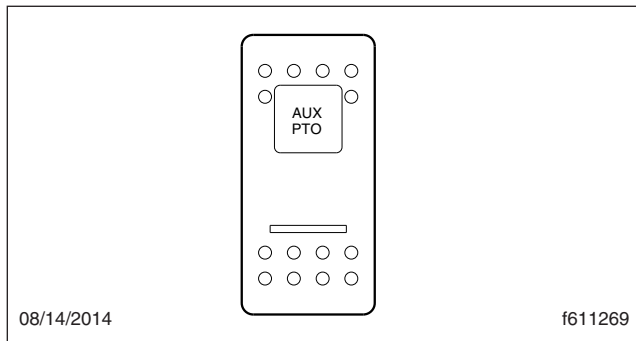


Fig. 4.14, PTO Switch

3. To activate the 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 reverse, neutral, 1st, or 2nd gear only.

NOTE: Do not attempt to change gears while the vehicle is moving. The transmission will ignore the request.

5. To end the 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 end stationary mode, press the PTO switch. When the light in the switch goes out, power to the PTO is shut off.

Transmission Controls

Detroit™ Automated Transmissions

NOTE: See [Chapter 15](#) for complete Detroit automated transmission operating instructions.

Vehicles with Detroit transmissions use the multifunction control shown in [Fig. 4.15](#). 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 during cruise control operation.

Manual Transmissions

NOTE: See [Chapter 16](#) for complete manual transmission operating instructions.

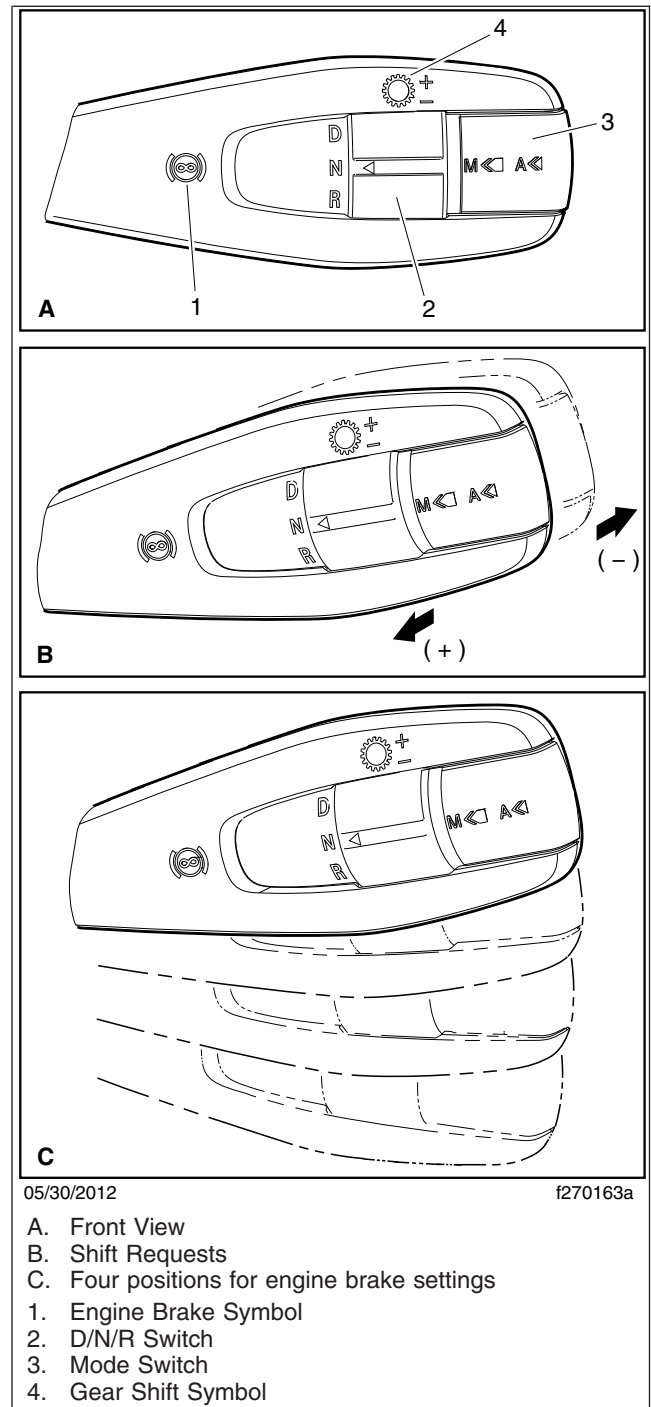


Fig. 4.15, Detroit Multifunction Control

if equipped, the transmission range control and splitter valves are attached to the gear shift knob.

Driver Controls

To operate a range-shift transmission, move the shift knob through all the low-range gear positions and then pull the range-preselection lever up to move into the high-range ratios. Use the same shift knob positions in both the low and high ranges.

Dependent on the transmission model, some ratios can be split using the splitter-control button (located on the side of the shift knob).

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 multifunction control, setting the cruise control with the engine brake on will activate Descent Control Mode. Moving the 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.

The cruise control is operated by four buttons mounted in the right-hand switch pod of the steering wheel. See [Fig. 4.16](#).

- **Cruise On/Off Button**—Press to turn cruise control on or off. When cruise control is on, the ICU message center displays relevant cruise control icons and the set speed. The speed memory will be retained until the cruise control is disabled with the ON/OFF button, or the ignition is turned off.

- **Cruise Accelerate/SET Button**—Press to set the cruise speed while the vehicle is traveling at the desired speed. Press and hold to increase the set cruise speed.
- **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 Decelerate/RES Button**—Press to resume the set speed. Press and hold to decrease the set cruise speed.

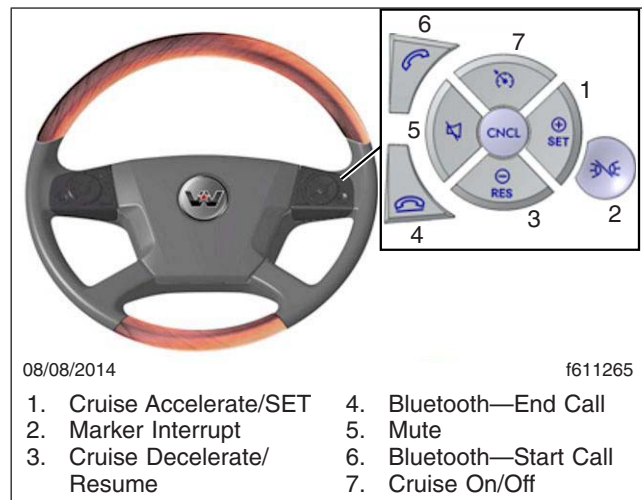


Fig. 4.16, Right-Hand Steering Wheel Switches

1. To cruise at a particular speed:
 - 1.1 Press the on/off button to turn cruise control on.
 - 1.2 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.

- 1.3 Press the cruise accelerate/SET button to set the desired speed.

NOTE: The speed memory is lost whenever the ignition switch is turned to OFF, or cruise control is turned off.

2. To disengage the cruise control, do one of the following:

- Press the CNCL button in the center of the right-hand control pod.
 - Depress the brake pedal.
 - Depress the clutch pedal (on a manual transmission only).
3. To resume a preselected cruise speed:
 - 3.1 Ensure cruise control is on.
 - 3.2 Press the cruise decelerate/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 decelerate/RES button.
4. To increase cruise speed, press the cruise accelerate/SET button until the vehicle accelerates to the desired speed.
 5. To decrease cruise speed, press the cruise decelerate/RES button until the vehicle decelerates to the desired speed.

Cruise Control ("CC") Limiter

On vehicles equipped with a CC limiter switch (see [Fig. 4.17](#)), the cruise control limiter allows the vehicle to exceed the set cruise control speed before engine braking is applied. The CC limiter switch provides more flexibility to the existing cruise control limit function, allowing the driver to tune the cruise function to better suit driving preferences and conditions. To select a limit, use the three-position CC Limiter switch on the dash. See [Table 4.1](#) for switch settings.

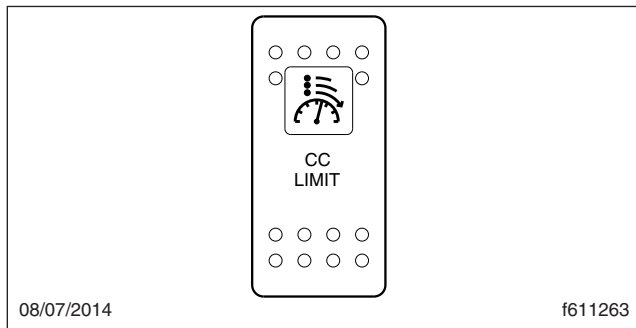


Fig. 4.17, CC Limiter Switch

CC Limiter Switch Settings	
Position	Approximate Overrun Setting
Top in	3 mph (5 km/h)
Middle	6 mph (9 km/h)
Bottom in	Unlimited

Table 4.1, CC Limiter Switch Settings

Descent Control and Deceleration Modes, Detroit™ Automated Transmissions

On vehicles equipped with a Detroit multifunction control ([Fig. 4.18](#)), the functions of the lever positions for engine brake control change when cruise control is set. Two distinct modes can be activated:

- **Descent Control Mode**—engine braking keeps the speed below cruise set speed; throttle 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 keeps the vehicle speed below the set cruise speed on a downhill.

To activate Descent Control Mode, set the cruise control speed with the engine brake on ([Fig. 4.18](#), positions 1, 2, or 3). In this mode, all three levels of engine braking will be employed to keep the speed below the set cruise 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 throttle is applied. After throttle application, the Descent Control Mode is resumed.

Moving the lever to "engine brake off" (position 0) cancels Descent Control Mode and resumes cruise speed. To reactivate Descent Control Mode, reset the cruise control speed with the lever in position 1, 2, or 3.

Deceleration Mode

Deceleration Mode reduces the vehicle speed at a constant rate.

With the cruise control speed set, activate Deceleration Mode by moving the lever to engine brake on ([Fig. 4.19](#), position 1, 2, or 3). This mode engages one of the engine brake levels, depending on the

Driver Controls

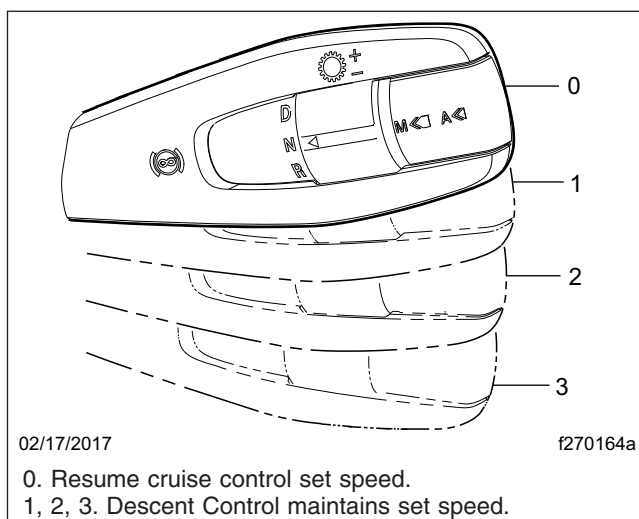


Fig. 4.18, Descent Control Mode Positions, Detroit Multifunction Control

lever position. The vehicle will decelerate at a constant rate until the vehicle comes to a stop, unless throttle 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.

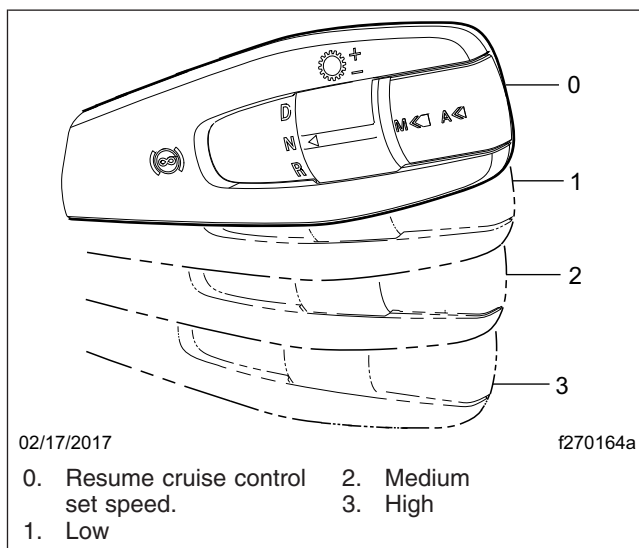


Fig. 4.19, Deceleration Mode Positions, Detroit Multifunction Control

Dash-Mounted Brake Controls

NOTE: See [Chapter 13](#) for detailed information about brake systems.

Parking Brake Control Valve

NOTICE

Do not step on the service brake pedal while the parking brakes are applied. To do so can cause damage to the brake mechanisms.

The yellow diamond-shaped knob operates the parking brake valve. See [Fig. 4.20](#). Pull the knob out to apply both the tractor and the trailer spring parking brakes. Push the knob 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.

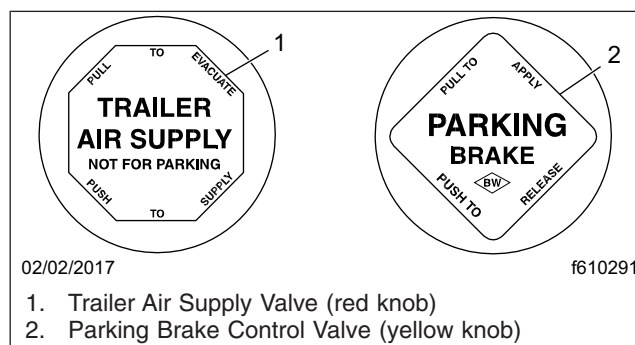


Fig. 4.20, Brake Valve Control Knobs

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. 4.20](#).

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. See [Fig. 4.21](#). 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. 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.

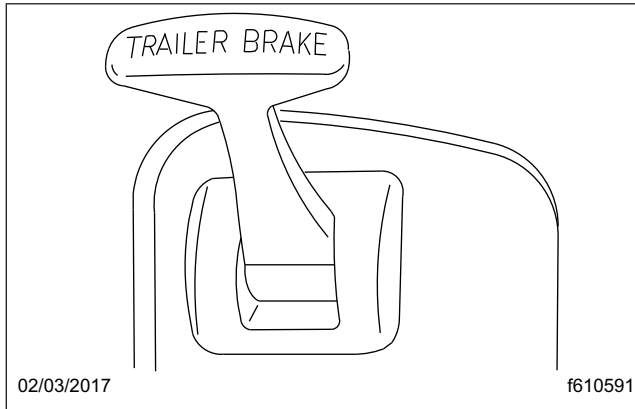


Fig. 4.21, Trailer Brake Lever

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.

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.

ATC includes a deep snow and mud option to increase available traction on extra-soft surfaces like snow, mud, or gravel. A switch labeled ATC will be located on the dash. See [Fig. 4.22](#). Press the switch to temporarily allow more drive wheel spin. The activation of the deep snow and mud option is indicated

by a flashing WHEEL SPIN lamp. Press the switch again to cycle the system back to normal operation.

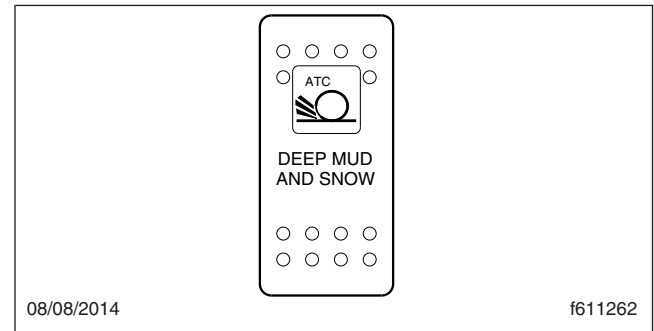


Fig. 4.22, ATC Switch

NOTICE

The deep snow and mud option 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 brake system.

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. 4.23](#).

The wipers are operated by a rotary switch on the turn signal lever. There are five settings, marked on the dial by symbols for off, two intermittent settings, and two continuous speeds.

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 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.

For wiper intermittent operation, there are two settings. The first intermittent setting has a default interval of 6 seconds, but the interval is programmable from 1 to 25 seconds. To program the interval, rotate the switch from the first intermittent position to the

Driver Controls

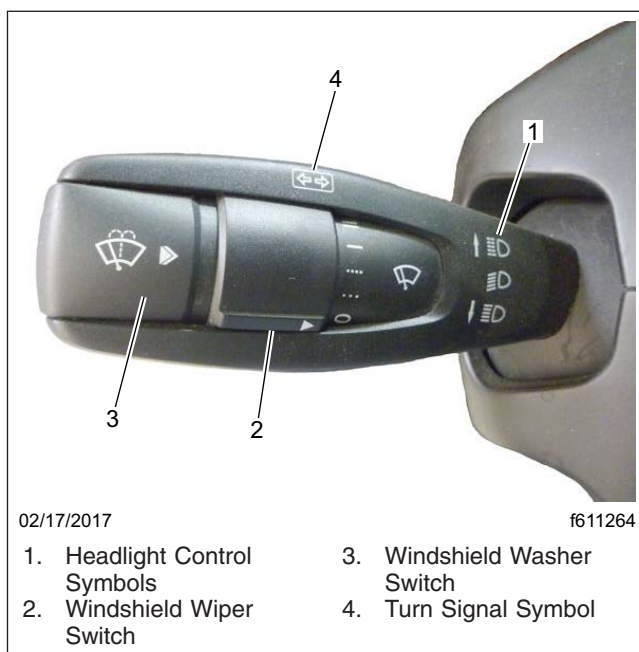


Fig. 4.23, Windshield Wiper/Washer Controls

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.

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/Trailer Connection 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 DOWN deflates the air springs to lower the rear of the vehicle. In the UP position, the air springs inflate to raise the rear of the vehicle to normal ride height.

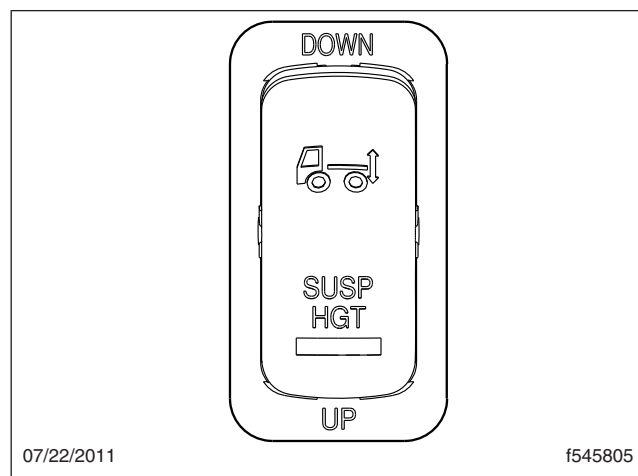


Fig. 4.24, Air Suspension Height Control Switch

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.

ECAS Dash Switches

Vehicles with Electronically Controlled Air Suspension (ECAS) may be equipped with either dash switches ([Fig. 4.25](#)) or a remote control unit, not both.

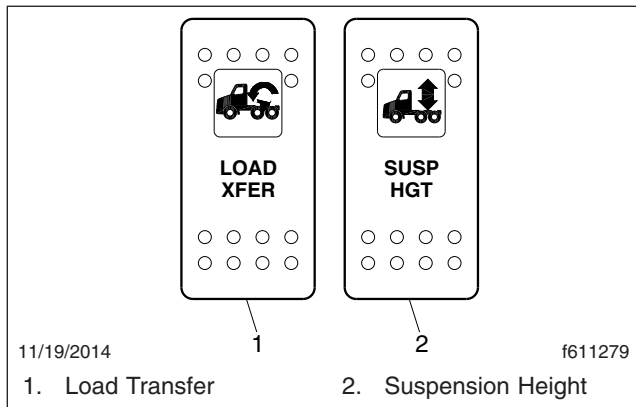


Fig. 4.25, ECAS Dash Switches

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.

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 kmh).

When Load Transfer mode is active, "Load Transfer" will display in the message field of the driver message center. See [Figure 4.26](#).

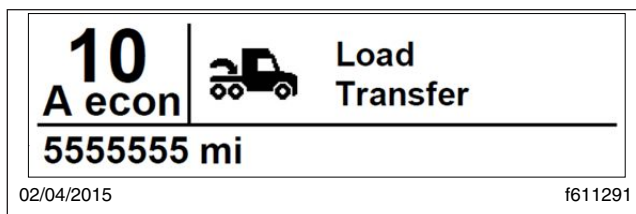


Fig. 4.26, Load Transfer Notification

SUSP HGT (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

Messages about the ride height status will display in the message field of the driver message center. See [Figure 4.27](#).

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).

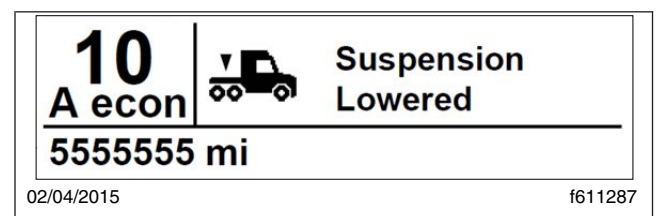


Fig. 4.27, Example of Ride Height Message

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 SUSP HGT switch, which should not adjust the suspension.

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 4.2](#) for keys and functions.

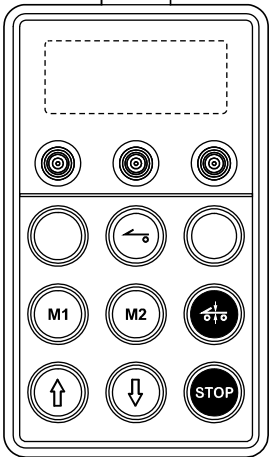
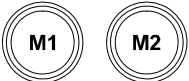
ECAS Remote Control Keys and Functions	
 02/03/2017f611211	
Key	Function
	Remote Control On/Off. The middle light will remain lit while the remote is active.
	Memory keys. Pressing the Stop key and a memory key simultaneously will store the current height. Once stored, pressing the key will adjust the 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 4.2, ECAS Remote Control 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 message field of the driver message center.

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.

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. 4.28](#). 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 unlock 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 18](#).

Trailer Auxiliary Switch

Trailers that are equipped with pneumatic brakes and used in North America or South America are generally equipped with power for the trailer lights. The connection is passed from the vehicle to the trailer via the primary receptacle, controlled by a dash switch.

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. 4.29](#).

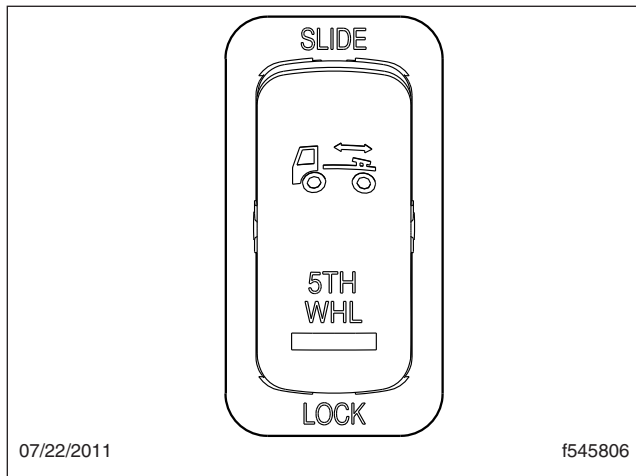


Fig. 4.28, Fifth Wheel Slide Control Switch

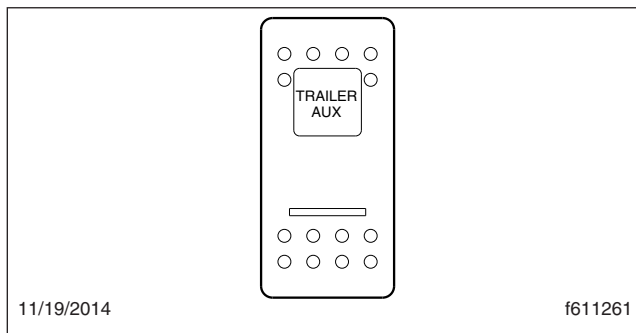


Fig. 4.29, Trailer Auxiliary Switch

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. 4.30](#). 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.

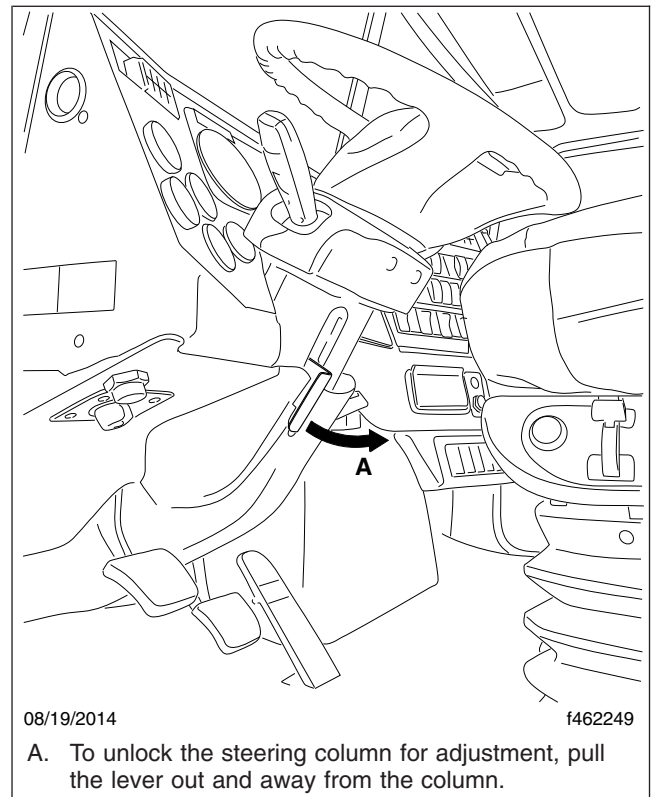


Fig. 4.30, Steering Column Locking Lever

Radio/Bluetooth Controls

Bluetooth controls are located on the steering wheel. Volume up and down buttons are on the left-hand switch pod. Start call, end call, and mute buttons are on the right-hand switch pod. See [Fig. 4.31](#). For additional radio operating instructions, see the radio manufacturer's manual.

Climate Controls

NOTE: See [Chapter 6](#) for detailed climate control panel operating instructions.

The climate control panel allows you to control the heating, ventilating, defrosting, and air conditioning functions. See [Fig. 4.32](#). Western Star vehicles have several heater and air conditioner options.

Options for the cab include:

- heater only
- heater and air conditioner
- heater and air conditioner with automatic temperature control (ATC)

Driver Controls



Fig. 4.31, Radio/Bluetooth Controls on the Steering Wheel

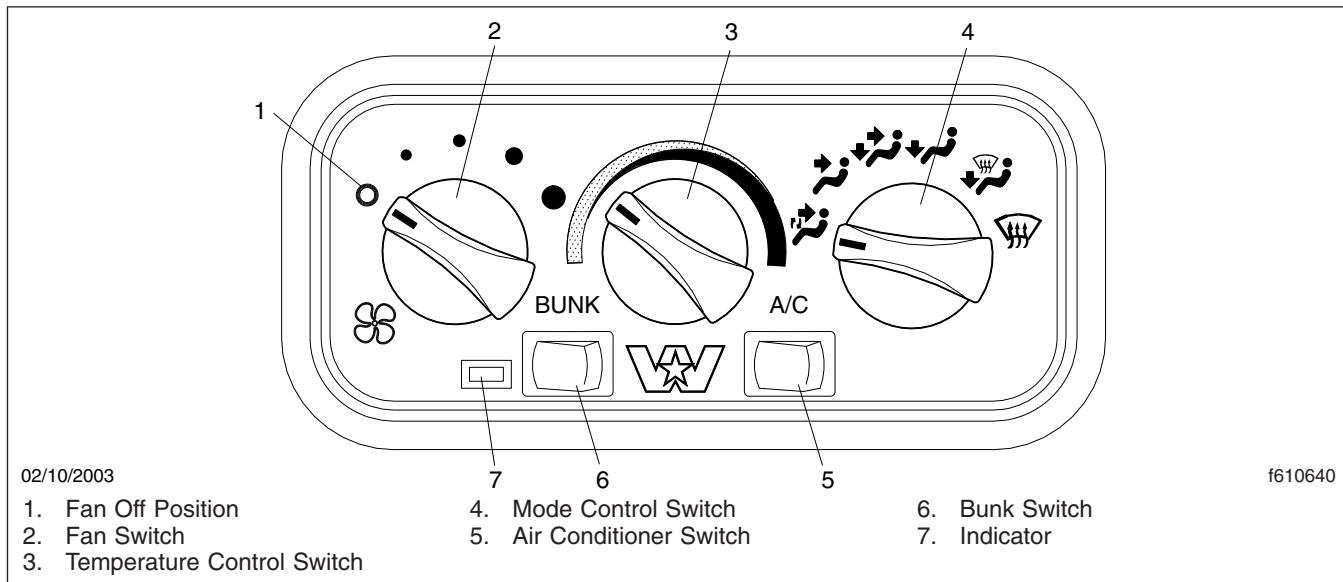


Fig. 4.32, Cab Climate Control Panel, No ATC

Options for a sleeper unit include:

- no heater or air conditioner
- heater only
- heater and air conditioner
- heater and air conditioner with ATC

The ATC feature automatically controls the heating and cooling system to maintain the cab and sleeper

air temperature close to the temperature set by the user. The ATC adjusts the air temperature blown through the air outlets to maintain the selected temperature.

Seat Controls

NOTE: See [Chapter 7](#) 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 Western Star seats. Not all seats have all of the adjustments listed below. See [Fig. 4.33](#).

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.

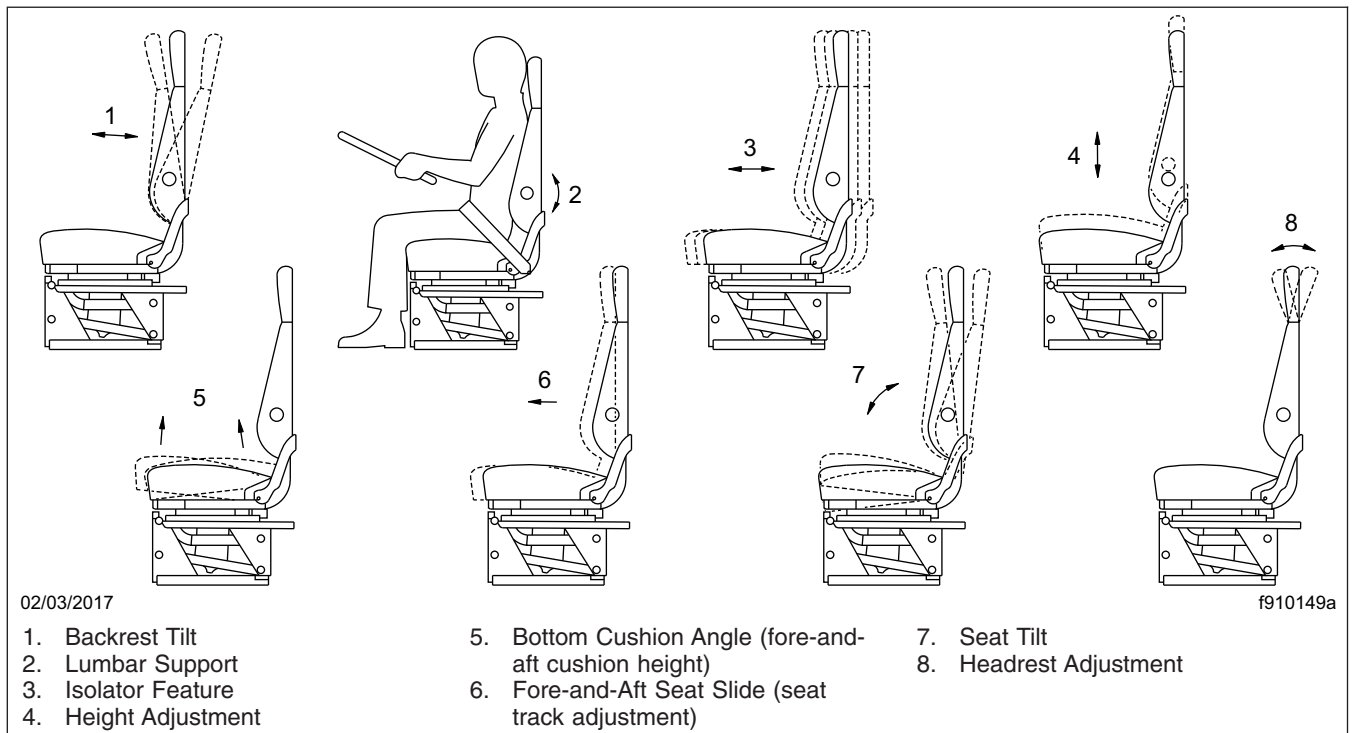


Fig. 4.33, General Seat Adjustments

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 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.

Driver Assistance Features

OnGuard™ Collision Safety System	5.1
AutoVue® Lane Departure Warning System	5.4
Roll Stability System	5.6
Enhanced Stability Control	5.8
OnLane™ Lane Departure Warning	5.9

Driver Assistance Features

OnGuard™ Collision Safety System

Meritor WABCO OnGuard 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 Meritor WABCO OnGuard™ Collision Safety 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 the OnGuard in the same safe manner as if the CMS were not present.

The OnGuard 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 OnGuard Collision Safety System may provide little or no warning of hazards such as pedestrians, animals, oncoming vehicles, or cross traffic.

OnGuard 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;
- will alert, but not actively brake, on stationary objects;
- should not be relied upon to track smaller 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 OnGuard system 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. 5.1](#).

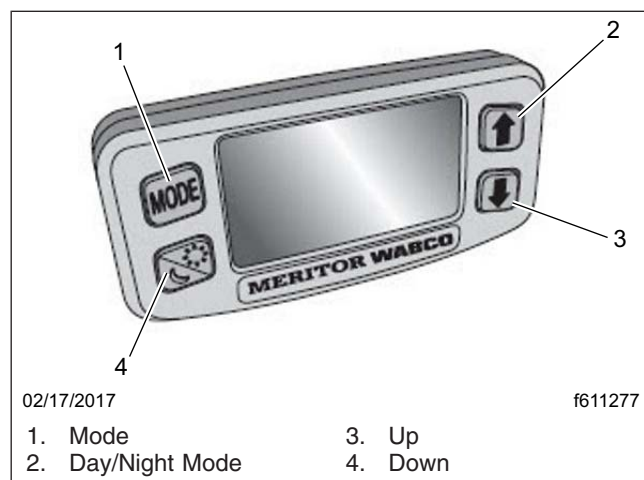


Fig. 5.1, OnGuard Display Unit

The display includes:

- an internal speaker
- a graphic display
- buttons to scroll and select options

- day/night display mode

Collision Mitigation System (CMS)

The CMS provides the driver with audible and visual alerts when the vehicle's following distance could result in a rear-end 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 5.1](#). If a potential rear-end collision is imminent, OnGuard's active braking automatically 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.

IMPORTANT: CMS and active braking are not operational at vehicle speeds below 15 mph (25 km/h).

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 5.1, OnGuard Display Screen Background Colors

Standby

When no lead vehicle is detected, the display shows that the CMS is on and the radar is searching. See [Fig. 5.2](#).

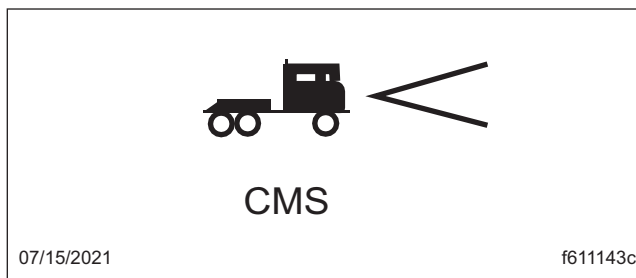


Fig. 5.2, CMS Standby (blue)

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. 5.3](#).

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.

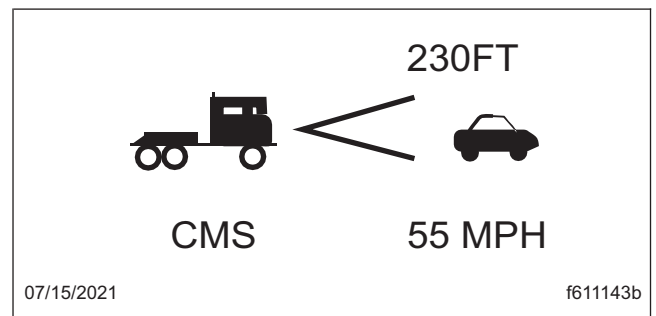


Fig. 5.3, CMS Lead Vehicle Detected (green)

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. 5.4](#).

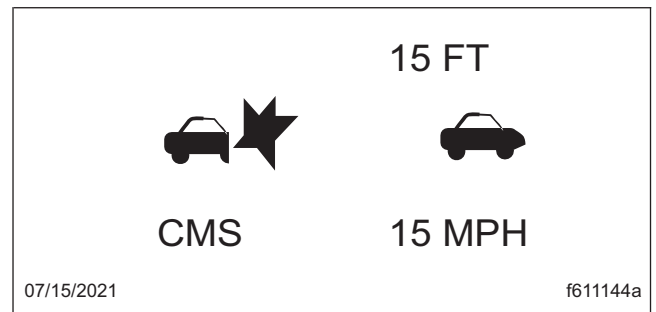


Fig. 5.4, CMS Collision Warning (red)

Adaptive Cruise Control (ACC)

ACC works in conjunction with conventional cruise control to maintain a minimum following distance when a lead vehicle is being tracked. The minimum

Driver Assistance Features

following distance is maintained by automatically decelerating the vehicle using throttle, engine, and service brakes without driver intervention. When the lead vehicle is no longer being tracked, the set cruise control speed resumes automatically.

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. 5.5](#).

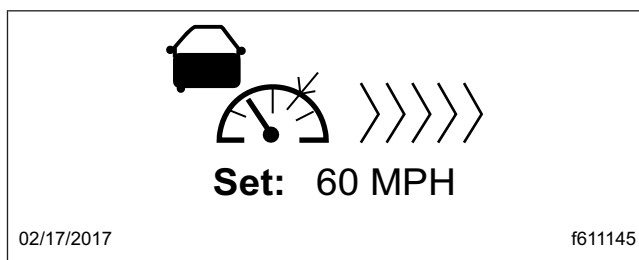


Fig. 5.5, ACC Standby (blue)

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. 5.6](#).

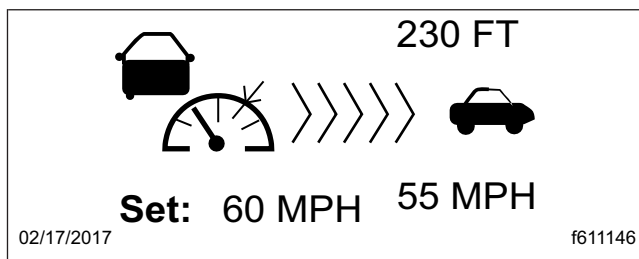


Fig. 5.6, ACC Lead Vehicle Detected (green)

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).

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. 5.7](#).

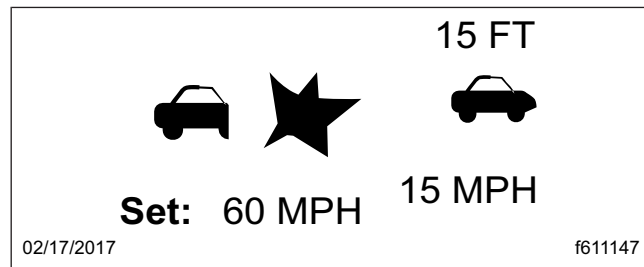


Fig. 5.7, ACC Collision Warning (red)

The braking control will activate and slow the vehicle. The driver must also initiate braking.

Error Screens

IMPORTANT: The OnGuard collision safety 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. 5.8](#). 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.

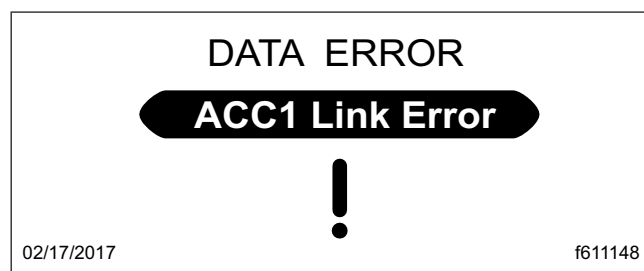


Fig. 5.8, OnGuard Error Screen (amber)

Refer to the OnGuard Collision Safety System Maintenance Manual MM-0951 for a full list of faults (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. 5.9](#).

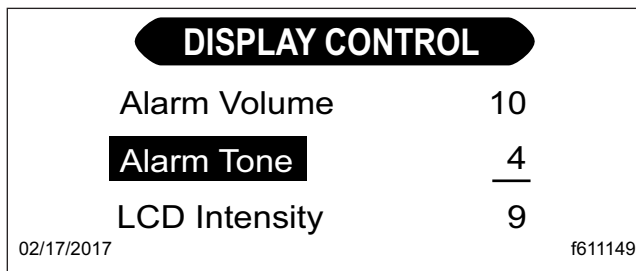


Fig. 5.9, Display Control Menu

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. 5.10](#) provides access to the following components (press the up or down arrows to scroll through the menu):

- brake pedal position

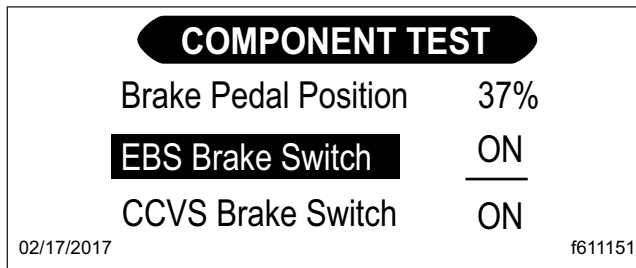


Fig. 5.10, Component Test Menu

- 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

AutoVue® Lane Departure Warning System

NOTE: The Bendix AutoVue LDW system option became available in 2019.

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 red 'enabled' lamp on the LANE ALERT switch (see [Fig. 5.11](#)) and the 'lane searching' dash indicator (see [Fig. 5.12](#)) then illuminate.

The red 'enabled' switch lamp will go OFF under the following conditions:

Driver Assistance Features

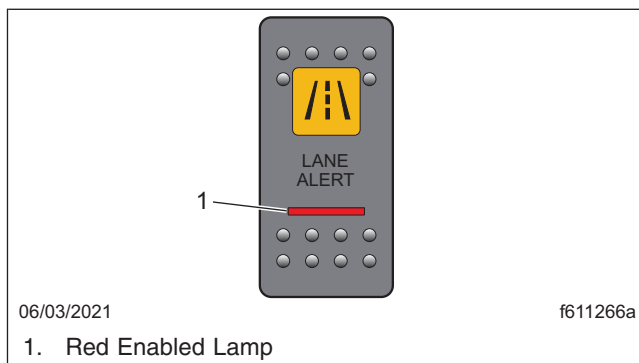


Fig. 5.11, Western Star LANE ALERT Switch

- the driver temporarily disables the system,
- an active diagnostic trouble code (DTC) is present.

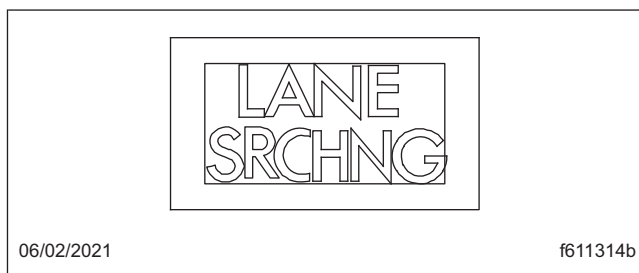


Fig. 5.12, Lane Searching Dash Indicator

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.



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 mis-aligned.

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 an representation of the camera's field of view, see [Fig. 5.13](#).

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.

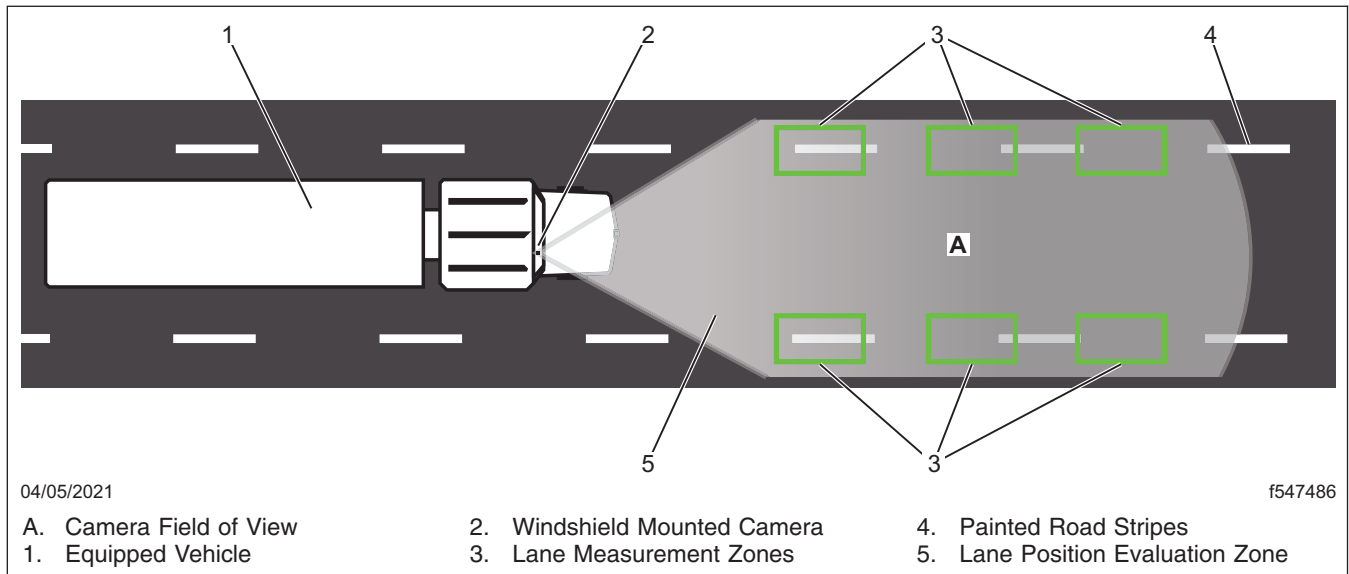


Fig. 5.13, Camera Field of View

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 LANE ALERT switch; when the system is disabled, the red 'enabled' lamp will go OFF. See [Fig. 5.11](#). 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 illuminate and the red 'enabled' lamp on the LANE ALERT switch will go OFF. 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 red enabled lamp on the LANE ALERT remains OFF despite depress-

ing the switch, the system requires calibration services at an authorised dealer.

Roll Stability System

The roll stability system may include the roll stability advisor (RSA) only, or it may also include the roll stability control (RSC).

A decal ([Fig. 5.14](#)) on the auxiliary dash panel, and an amber-colored dash indicator light ([Fig. 5.15](#)), indicate that the vehicle is equipped with roll stability system components.

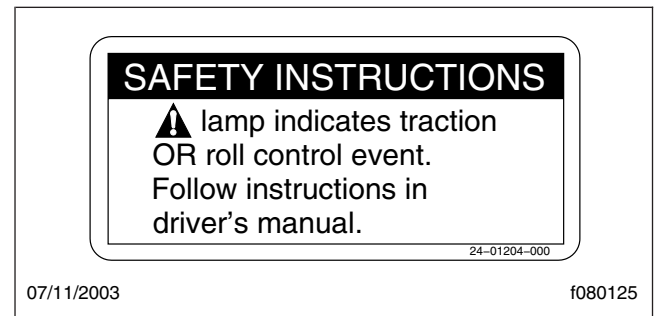


Fig. 5.14, Roll Stability Decal

Roll Stability Advisor

IMPORTANT: This is not an advance warning system. The roll stability advisor displays a message only after the driving maneuver is completed.

Driver Assistance Features



Fig. 5.15, Roll Stability Indicator Lamp

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, an audible tone sounds, and a driver advisory message is displayed in the driver message center. The purpose is to advise the driver that the previous maneuver produced a rollover risk.

The roll stability advisor displays different text messages depending on the severity of the risk of each occurrence of risky driving. From the highest risk level to the lowest risk level, the system will sound an audible alert, and display a message, as shown in [Fig. 5.16](#).

NOTE: The system will calculate and recommend a speed reduction value. It may be different than the values shown here.

Bring the vehicle to an authorized service facility if a system failure message is displayed.

Roll Stability Control



The Roll Stability Control system 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. The Roll Stability Control 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 property damage.

The roll stability control system 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. The control can intervene even before an advisory message is displayed.

MSG No.	Message	Message to Display	Display Time: Seconds	Buzzer Time: Seconds
1	System Fault	WARNING RAC SYSTEM FAIL	4	1
2	RSC	ACTIVE SLOWING ROLLOVER RISK	4	None
3	RSA Level 3	VERY HIGH RISK OF + ROLLOVER DETECTED REDUCE SPEED + AT LEAST 7 MPH or in metric REDUCE SPEED + AT LEAST 11 KPH	19.6	10
4	RSA Level 2	HIGH RISK OF + ROLLOVER DETECTED REDUCE SPEED + AT LEAST 7 MPH or in metric REDUCE SPEED + AT LEAST 11 KPH	14	5
5	RSA Level 1	ROLLOVER RISK + DETECTED REDUCE SPEED + AT LEAST 7 MPH or in metric REDUCE SPEED + AT LEAST 11 KPH	8.4	2
6	HBED Level 3	HARD BRAKING WITH + ABS ACTIVATED LOOK AHEAD + BRAKE SOONER	14	0.5
7	HBED Level 2	HARD BRAKING + DETECTED LOOK AHEAD + BRAKE SOONER	14	0.5
8	HBED Level 1	LOSS OF TRACTION + ABS ACTIVATED ROAD SURFACE + MAY BE POOR	14	0.5

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Fig. 5.16, Roll Stability and Hard-Braking Warnings

The dash indicator light illuminates whenever the roll stability control system intervenes.

Hard-Braking Advisor

The hard-braking advisor uses the information from the ABS wheel speed sensors to determine when braking is severe enough to produce lockup at one or more wheels on the tractor, and/or very rapid vehicle deceleration. Shortly after a hard-braking event occurs, an advisory message is displayed in the driver message center, indicating that the braking behavior was too aggressive for the current road surface conditions. This system is not a replacement for a driver's good judgment. Sometimes it is necessary to brake hard.

From the highest risk level to the lowest risk level, the system will sound an audible alert, and display a message, as shown in [Fig. 5.16](#).

Trip/Leg Totals

The driver message center records the number of messages received, and displays the number of messages as counts. Roll stability advisor (RSA) and hard-braking event data (HBED) counts can be viewed in the trip advisory screen, and the leg advisory screen.

Counts can be reset using the + key on the steering wheel. Clearing RSA and HBED leg counts will also reset the leg miles and leg hours. Clearing RSA and HBED trip counts will also reset trip miles, trip hours, leg miles, leg hours, and leg advisory counts. In addition, resetting leg miles will clear leg counts. Clearing trip miles will reset miles, hours, and counts in both the leg and trip screens.

The TRIP and LEG advisor screens count both the roll stability advisories (ROLL) and hard-braking events (BRK). For example, if during a TRIP, the driver message center recorded the events in [Table 5.2](#), the message center would display as shown in [Fig. 5.17](#).

RSA/HBED Count	
Message Received	Message Counts
RSA Level 3	2
RSA Level 2	3
RSA Level 1	7
HBED Level 3	5
HBED Level 2	1
HBED Level 1	8

Table 5.2, RSA/HBED Count

If the count reaches more than 9 occurrences an up-arrow symbol will appear, to indicate to the driver

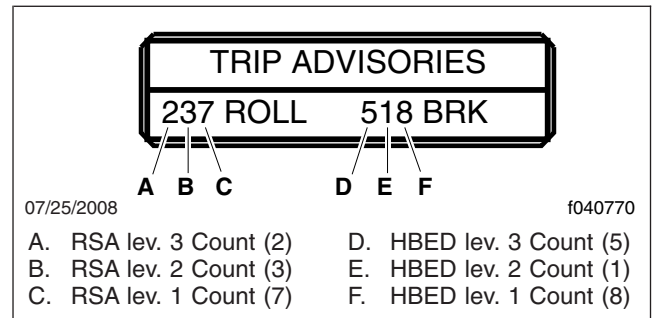


Fig. 5.17, Trip Advisor Message Screen

that the count has exceeded 9 counts. See [Fig. 5.18](#).

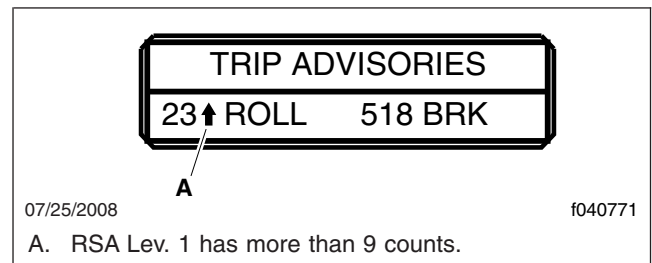


Fig. 5.18, Trip Advisor Message Screen (more than 9 counts)

Enhanced Stability Control

⚠ WARNING

Enhance Stability Control (ESC) 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.

ESC offers the full capability of RSC (shown above) with the added 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 input with the vehicle's actual behavior. The system does this by monitoring systems such as wheel speed, steering angle, yaw rate, lateral acceleration, throttle

Driver Assistance Features

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.

OnLane™ Lane Departure Warning

NOTE: The Wabco OnLane Lane Guidance system was an option prior to 2020.



OnLane lane departure warning is intended only as an aid for a conscientious and alert driver. 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. Do not rely solely on the system to safely operate the vehicle. 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.

OnLane is a camera-based warning system that helps the driver avoid unintentional lane drifting.

The system utilizes a camera mounted near the top center of the vehicle windshield, which calculates vehicle position within the lane. When the vehicle crosses lane markings without the turn signal being activated, OnLane sounds an audible warning.

The Driver Alertness Warning (DAW) system provides a warning when weaving or erratic driving is detected within the driving lane.

System Startup

OnLane is activated when the vehicle ignition is turned on. Lane departure warnings are active only when the vehicle is traveling at 42 mph (68 kph) or above.

Intentional Lane Changes

The system identifies intentional lane changes by monitoring the turn signal, the brake switch, and vehicle speed. When a lane change is intentional, the assistance warnings are disabled. The following conditions will disable/enable the warnings:

- If brake lights are ON, all warnings are disabled.
- If the Left Turn Signal is ON, left departure warnings are disabled.
- If the Right Turn Signal is ON, right departure warnings are disabled.
- If the vehicle's speed is under 42 mph (68 kph), all warnings are disabled.
- If the hazard lights are ON, all warnings are enabled.

Unintentional Lane Departure

The system constantly monitors and calculates the vehicle's position within the lane. In the event of an unintentional lane change, the system provides an audible warning (rumble strip noise). The audible warning will terminate once the vehicle is guided back into the lane.

Driver Alertness Warning

The system detects erratic driving based on weaving behavior within the driving lane. OnLane computes a "Driver Alertness Index" based on driving performance, and alerts the driver when it falls below a certain threshold. DAW warns the driver by providing an intermittent warning tone when it detects erratic driving or weaving within the driving lane. The alert terminates when driving performance improves, or when the key is cycled.

Temporarily Disabling the System

The system can be temporarily disabled by pressing the OnLane switch. This disables warnings for 15 minutes. Warnings can be enabled by pressing the OnLane switch again.

Climate Controls

Climate Control Options	6.1
Cab Climate Control Panels	6.1
Sleeper Climate Control Panels	6.3
Parked HVAC	6.7
Accessory Heaters	6.8

Climate Controls

Climate Control Options

The climate control panel allows you to control the heating, ventilating, defrosting, and air conditioning functions. Western Star vehicles have several heater and air conditioner options.

Options for the cab include:

- heater and air conditioner
- heater and air conditioner with automatic temperature control (ATC)

Options for a sleeper unit include:

- no heater or air conditioner
- heater only
- heater and air conditioner
- heater and air conditioner with ATC

The ATC feature automatically controls the heating and cooling system to maintain the cab and sleeper air temperature close to the temperature set by the user. The ATC adjusts the air temperature blown through the air outlets to maintain the selected temperature.

Cab Climate Control Panels

The standard cab climate control panel has a fan switch, a temperature control switch, and a mode control switch that allows the driver to control heating, cooling, defrosting, and ventilating. The control panel may also be equipped with an optional A/C switch and/or an optional BUNK switch. See [Fig. 6.1](#).

Vehicles equipped with ATC have an LED display. See [Fig. 6.2](#).

Controls

Fan Switch

The fan switch activates the fan, which forces fresh air or recirculated air through the air outlets. The fan switch has four fan speed settings and an off position. See [Fig. 6.1](#).

To operate the fan switch, turn the fan switch clockwise to increase airflow; turn the fan switch counterclockwise to decrease airflow.

On vehicles equipped with ATC, the AUTO setting on the fan switch places the heater and air conditioner system in the automatic fan speed control mode. When the fan switch is set to AUTO, the fan speed

will vary as necessary to maintain the temperature set by the user.

Temperature Control Switch

To select the desired temperature:

- *Vehicles Without ATC*: Turn the switch to the left (counterclockwise) for cool air, or to the right (clockwise) for hot air.
- *Vehicles With ATC*: Press and release the right side of the temperature up/down switch to increase the temperature to the desired setting. Press and release the left side of the temperature up/down switch to decrease the temperature to the desired setting. Press and hold the temperature up/down switch to change the desired temperature in large increments.

Mode Control Switch

The mode control switch 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 to provide six air selection modes. See [Fig. 6.3](#).

- *Face Mode (using recirculating air)*: Directs all airflow through the face or instrument panel outlets, using recirculated air.
- *Face Mode (using fresh air)*: Directs all airflow through the face or instrument panel outlets, using fresh air.
- *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.

NOTE: The face mode using recirculating air is the only mode that recirculates the air in the cab. All other modes draw in fresh air from outside the vehicle.

Bunk Switch

The optional BUNK switch allows the driver to control the sleeper heater and air conditioner from the cab. Press the BUNK switch to turn the sleeper heater and air conditioner on. When the bunk switch is on, the indicator light is on. The sleeper heater and air

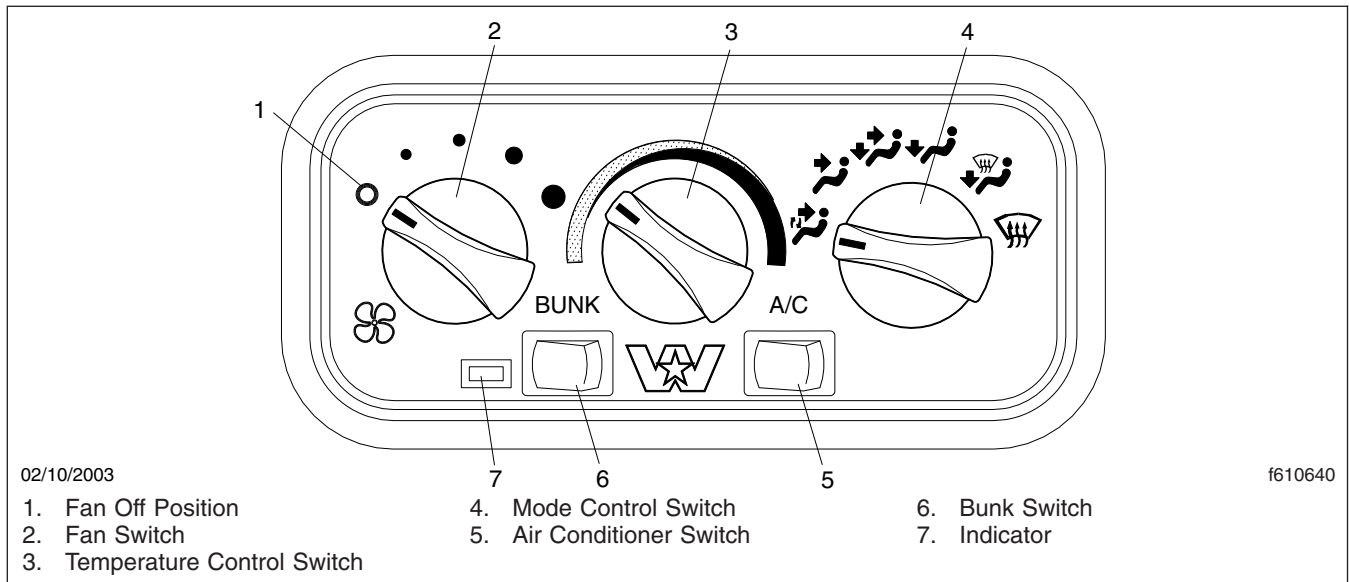


Fig. 6.1, Cab Climate Control Panel, No ATC

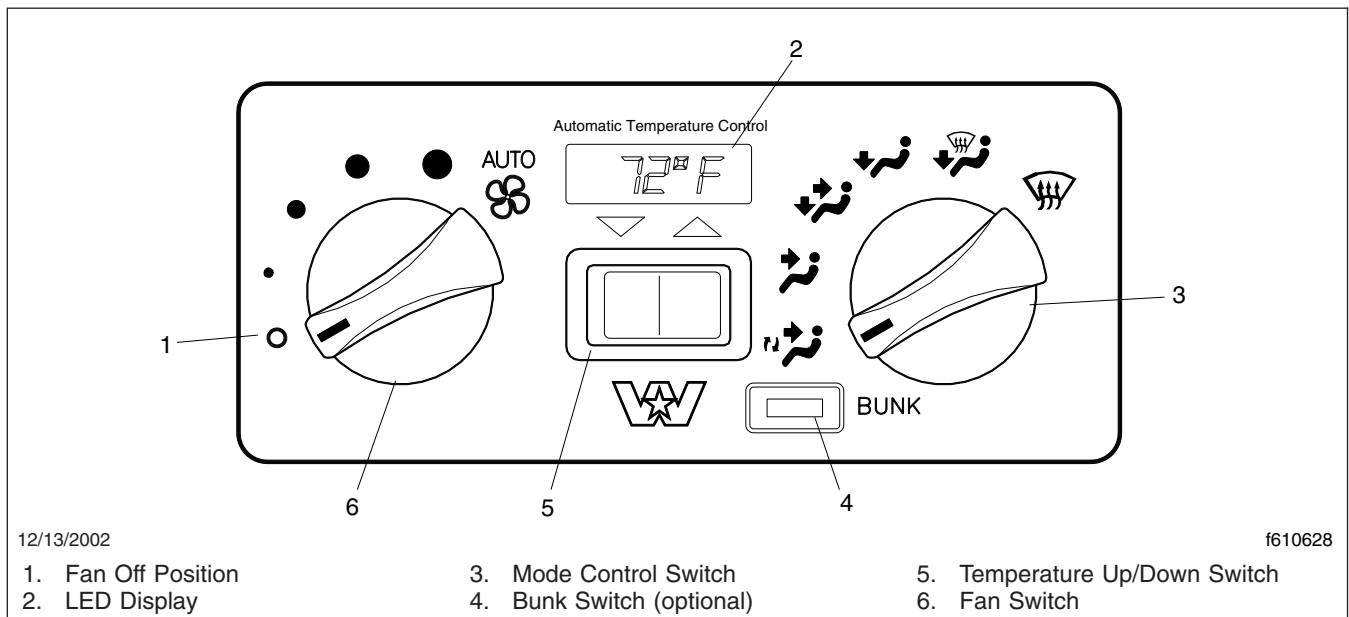


Fig. 6.2, Cab Climate Control Panel With ATC

conditioner can still be controlled from the sleeper when the BUNK switch is on.

Air Conditioner (A/C) Switch

The air conditioner cools and dehumidifies the air inside the cab. Press the optional A/C switch to turn the air conditioner on or off. When the air conditioner is on, the A/C switch illuminates.

IMPORTANT: Operate the air conditioner at least five minutes each month, even during cool weather. This helps prevent drying and cracking of the refrigerant compressor seals and reduces the chance of refrigerant leaks in the system.

Climate Controls

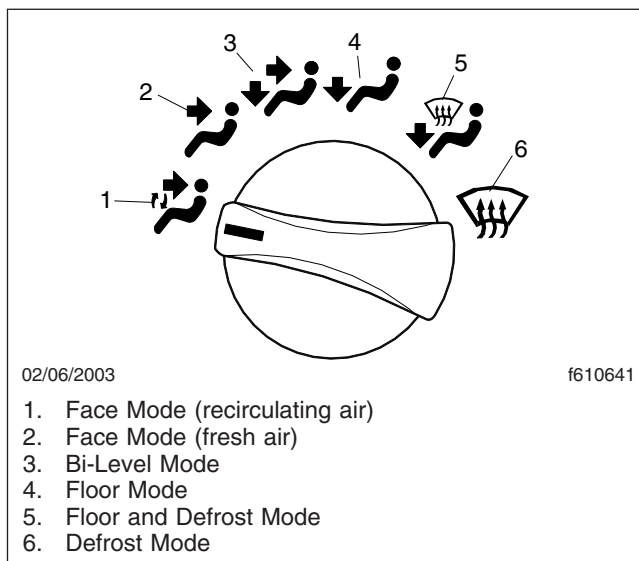


Fig. 6.3, Mode Control Switch Settings

LED Display, Vehicles With ATC Only

The LED display shows the temperature to which the heater or air conditioner has been set in degrees Fahrenheit or degrees Celsius.

Changing Temperature Units

The temperature units can be changed from Fahrenheit (°F) to Celsius (°C) or from Celsius to Fahrenheit by turning the ignition on, turning the fan switch off, and pressing and holding the left side of the temperature up/down switch for five seconds. The current temperature unit will then be shown on the LED display. Press the left side of the temperature up/down switch again to toggle between °F and °C. Changing the temperature units on the cab climate control panel will also effect the sleeper climate control panel.

Error Codes

Error codes can be displayed by turning the ignition on, turning the fan switch off, and pressing and holding the right side of the temperature up/down switch for five seconds. The current error status will be shown on the LED display. Press the right side of the temperature up/down switch again repeatedly to scroll the display through any existing error codes. If an error code is displayed, contact your Western Star dealer for service.

Modes

Recirculation Mode



WARNING

Do not use the recirculation mode when the heater is on and the vehicle is in motion. Driving with the recirculation mode on while the heater is on may cause the windows to be obscured by moisture or ice, which could result in an accident possibly causing personal injury or property damage.

Do not use the recirculation mode for more than 20 minutes at a time because the air inside the cab may become stuffy and the windows may become obscured by moisture, which could result in an accident possibly causing personal injury or property damage.

When the mode control switch (see Fig. 6.3) is turned to the face mode using recirculating air, the air in the cab is recirculated through the heater and air conditioner system. This is the only mode that uses recirculated air. Fresh air, or outside air, is circulated through the heating and air conditioning system when any other mode is selected.

The recirculation mode can be used to prevent dusty or smoky air from entering the cab, or to decrease the time required to cool or heat the cab interior during extreme outside temperature conditions. When the outside air is clear or the desired cab temperature is reached, change the mode control switch to a fresh-air mode. The recirculation mode can be used when the air conditioner is on whether the vehicle is moving or not.

Defrost Mode

The defrost mode is used to deice, defrost, or defog the windows.

NOTE: When the defrost mode is on, the air conditioner is on. The air conditioner is used to dehumidify the air entering the cab and to remove the moisture from the windshield.

Sleeper Climate Control Panels

The standard sleeper climate control panel has a fan switch, a temperature control switch, and a power switch that allow you to control the heating and air conditioning functions in the sleeper. A vehicle with

an air conditioner has an air conditioner switch on the control panel. See [Fig. 6.4](#).

Vehicles with ATC have button controls instead of switch controls. See [Fig. 6.5](#).

Controls, Vehicles Without ATC

Power Switch and Indicator

The power switch is used to turn the sleeper heater and air conditioner on and off. When the heater or air conditioner is on, the indicator illuminates.

Fan Switch

The fan switch controls the fan speed and forces air through the air outlets. The fan switch has three speed settings and an off position. See [Fig. 6.4](#).

To operate the fan switch, turn the switch clockwise to increase airflow; turn the fan switch counterclockwise to decrease airflow.

Controls, Vehicles With ATC

The controls for the sleeper heater and air conditioner are located on the right side of the ATC sleeper control panel. See [Fig. 6.5](#).

Power Switch and Indicator

Turn the sleeper heater and air conditioner on by pressing the ON button. The current set temperature is displayed for five seconds, after which it returns to the time display. When the heater or air conditioner is on, the indicator illuminates. To turn the sleeper heater and air conditioner off, press the OFF button.

Fan Switch

To operate the fan switch, press the fan up or fan down button repeatedly to incrementally increase or decrease the fan speed. Press either button for at least two seconds to continuously increase or de-

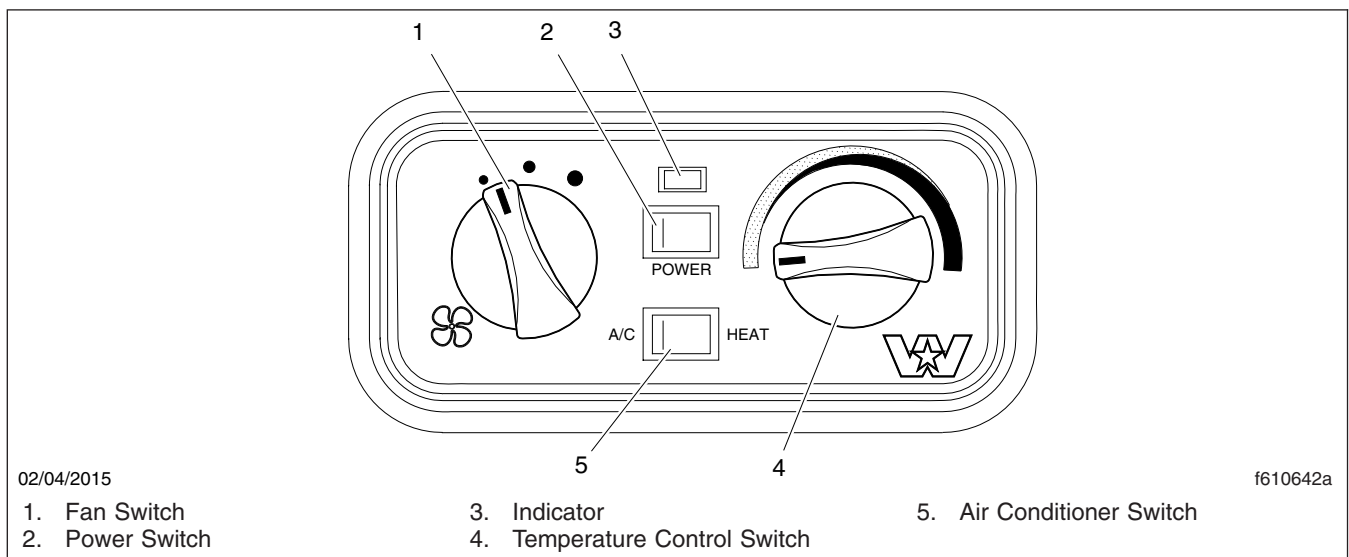


Fig. 6.4, Sleeper Climate Control Panel, No ATC

Temperature Control Switch

To select the desired temperature, turn the switch to the left (counterclockwise) for cool air, or to the right (clockwise) for hot air.

Air Conditioner (A/C) Switch

The air conditioner cools and dehumidifies the air inside the sleeper. Press the optional A/C switch to turn the air conditioner on or off.

crease the fan speed. The fan speed setting is displayed on the sleeper control panel in 10 percent increments. When the highest or lowest fan speed is selected, HI or LO is displayed. The display returns to the time display five seconds after a fan up/down button is pressed and released.

In the ATC mode, fan speed is determined by the system as required. The fan speed is based on the difference between the set point temperature and the actual sleeper cab temperature. The greater the difference, the greater the fan speed. The AUTO fan

Climate Controls

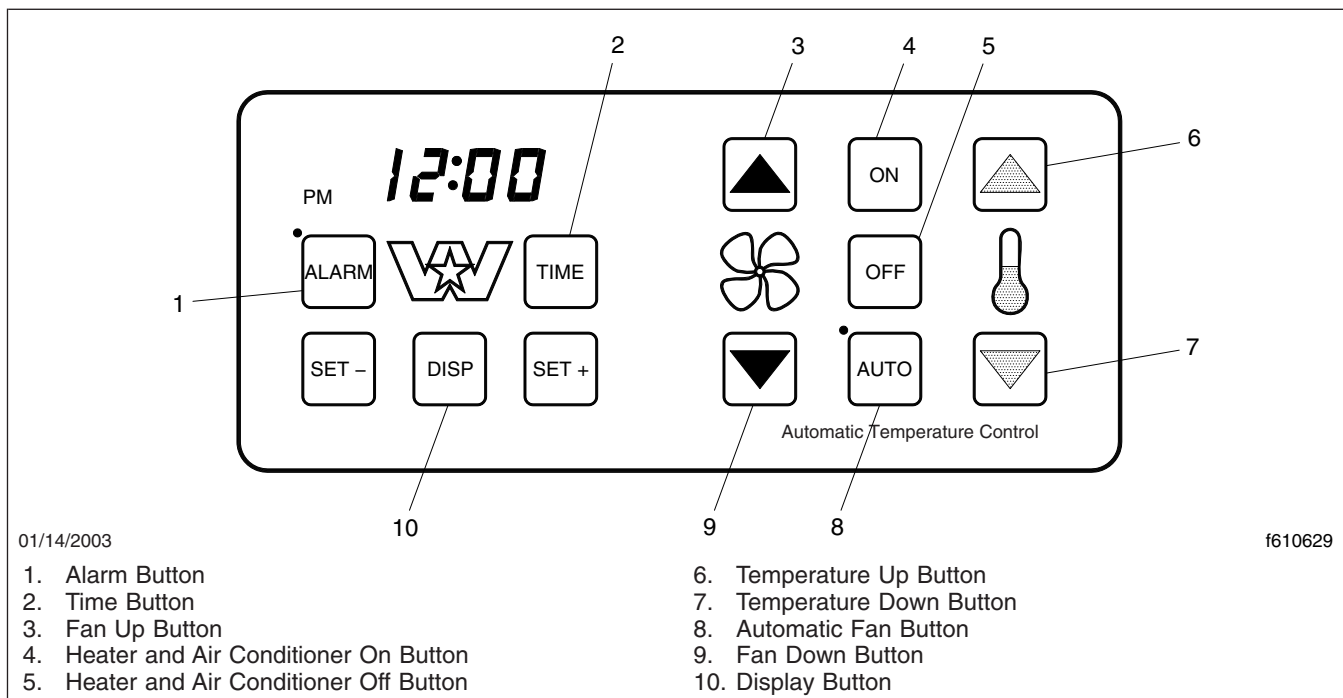


Fig. 6.5, Sleeper Climate Control Panel With ATC

function is disabled when either the fan up or fan down button is pressed.

Temperature Control Switch

Temperature is displayed with a three-digit annotation and can be displayed either in degrees Celsius or degrees Fahrenheit. A capital "C" or "F" is displayed for the appropriate temperature scale.

To select the desired temperature, press the temperature up or temperature down button repeatedly to incrementally increase or decrease the set temperature. Press either button for at least two seconds to continuously increase or decrease the set temperature. The temperature setting is displayed on the sleeper control panel. The display returns to the time display five seconds after a temperature up/down button is pressed and released.

The temperature units can be changed from °F to °C or from °C to °F by pressing the temperature up and temperature down buttons simultaneously. Changing the temperature units on the ATC sleeper control panel will also change the temperature units on the ATC cab control panel.

Auto Button

Press the AUTO button to enable automatic control of the fan speed. The display will show the current set temperature for five seconds, then return to the time display. When in the automatic mode, the fan speed can vary to maintain the temperature set by the user. When automatic control is turned on, the indicator above the AUTO button illuminates.

Alarm Button

Momentarily press the ALARM button to turn the alarm on and to illuminate the alarm indicator above the ALARM button. Momentarily press the button again to deactivate the alarm.

When pressing the ALARM button, the display shows the alarm time setting for five seconds before returning to the current time display. If the ALARM button is pressed and held down continuously for more than one second, the alarm time setting can be viewed without changing the state of the alarm indicator. If either the SET+ or SET- buttons are pressed simultaneously with the ALARM button held down, the alarm time setting will increase or decrease. When the ALARM button is released after changing the

alarm time, the alarm will be turned on and the indicator will be illuminated. When the ALARM is sounding, press the ALARM button to turn the alarm off and to reset the alarm for the next 24-hour cycle.

To set the snooze function, press any button on the control panel, except the ALARM button, when the alarm is sounding. The alarm will sound again after seven minutes. The alarm indicator flashes when the snooze function is set.

To cancel the snooze function, press the ALARM button. This will also reset the alarm for the next 24-hour cycle.

Time Button

The clock controls are located on the left side of the ATC sleeper control panel under the display. The display will show the clock time as the default mode.

Press the TIME button to display the current time. If the TIME button is held down and either the SET+ or SET- buttons are pressed simultaneously with the TIME button, the clock setting will increase or decrease.

Display Button

Press the DISP button to allow the display and illumination of the control panel to scroll through three illumination levels: bright, dim, and off. If you want the alarm, time, or temperature setting to be displayed when the display is in the off mode, press the ALARM, TIME, or temperature up/down buttons to display the corresponding display for five seconds. After five seconds, the display will turn off. If the alarm sounds while in the display off mode, the current time will be displayed simultaneously. The display will remain on for five minutes, then turn off.

When the vehicle ignition is not powered, the sleeper climate control panel is in a power-saving mode and the display and illumination of the control panel will be off. All clock functions, including the alarm, will continue to work internally.

Temperature Slave Mode Feature

The temperature slave mode allows the set temperature of the cab heater and air conditioner to be automatically tied to the sleeper heater and air conditioner. In this mode, the set temperature in the vehicle will be the same whether the set temperature is changed on the cab climate control panel or the sleeper climate control panel. To enable the temperature slave mode, press the SET+ and SET- buttons

simultaneously. The display will read S-ON when the temperature slave mode is enabled.

To disable the temperature slave mode, press the SET+ and SET- buttons simultaneously. The display will read S-OFF indicating that the temperature slave mode is disabled. When disabled, the temperatures for the cab and sleeper can be changed independently for separate temperature control. If you wish to maintain a temperature in the sleeper that is different than the temperature in the front of the cab, it is recommended that a curtain be used between the sleeper and the front of the cab.

Turning on the Sleeper Air Conditioner When the Cab Air Conditioner is Off

The sleeper ATC control panel can turn on the air conditioner even if the cab HVAC unit is turned off but the engine is running. By pressing the ON button, the ATC sleeper control panel will turn on the cab unit and the bunk indicator light on the cab control panel will be illuminated. If cooling is needed in the sleeper, the cab HVAC unit will switch on to a low blower fan setting and the A/C compressor clutch will engage. If cooling is no longer required in the sleeper or if heat is needed, the cab unit fan and the compressor clutch will be turned off after a five-minute delay.

Accessory Heaters

Optional accessory 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 tank farms. 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.

Climate Controls

Parked HVAC

The Bergstrom NITE parked HVAC system consists of a compact electrical 3000-BTU air-conditioning system, and a diesel-fired heater unit. It is completely self-contained, and runs on 12-volt deep-cycle batteries located between the frame rails. The parked HVAC batteries are isolated from the vehicle-starting batteries, to prevent the starting batteries from being drawn down during HVAC operation.

The A/C system is designed to maintain cool air in the sleeper interior without having the engine running. However, the parked A/C unit will not cool down a hot sleeper that has been sitting in the sun without the vehicle A/C running. If the interior temperature is higher than desired, start the engine and run the vehicle A/C system until the desired sleeper temperature is achieved. This will help cool the sleeper to a temperature that the parked A/C system can maintain. For optimal operation, the curtain between the cab and the sleeper should be closed when using the Parked HVAC A/C system.

The A/C unit is located under the lower bunk in the sleeper compartment, and intakes air through a grille located on the front panel of the lower bunk. The outlet ducting runs from the left side of the unit to an outlet on the back wall of the sleeper.

The heater unit is located next to the A/C unit. It intakes air through a grille located on the right side of the front panel of the lower bunk. The outlet ducting runs from the back of the unit to a grille on the left side of the front panel of the lower bunk.

 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 tank farms. 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.

IMPORTANT: Blocked vents will hamper the operation of the unit. Keep the area around the air intake grilles clear of objects that may block air flow, or emit objectionable odors into the HVAC system.

Parked-HVAC Controls

The control panel for the parked HVAC is located on the left side of the rear wall, in the sleeper. It has a temperature-control dial, and a 4-position mode switch. Turn the temperature-control dial to the left for cooling, and to the right for heat. See Fig. 6.6. See Table 6.1 for a description of the mode functions.

After using the system, turn the mode switch to the OFF position, even if the unit is not running, or the batteries may not charge properly.

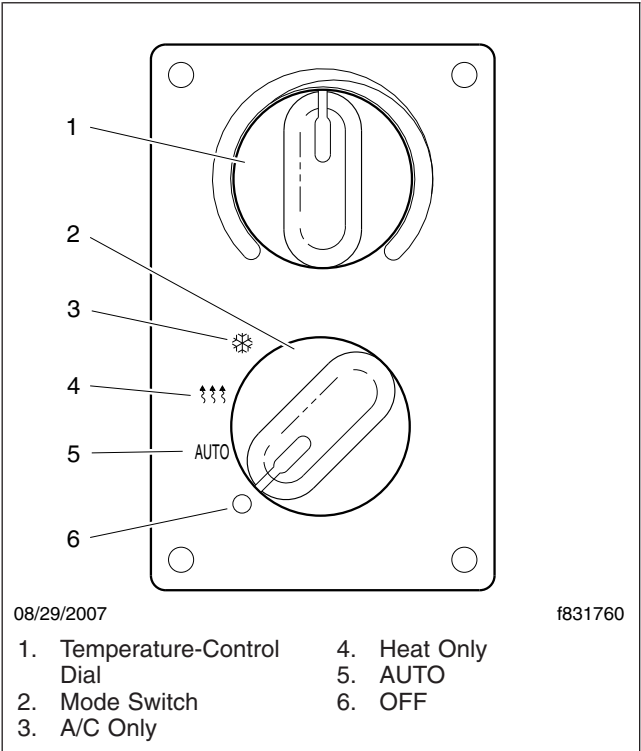


Fig. 6.6, Parked-HVAC Control Panel

Parked-HVAC Mode Operation	
Mode	Function
OFF	Turns the unit OFF.
AUTO	Allows the unit to automatically heat or cool the sleeper, depending on the temperature setting and the sleeper temperature. Adjusts the compressor, heater, and fans to keep temperature constant.
Heat Only	Allows only the heat portion of the system to run. Adjusts the heater only to keep the temperature constant.

Parked-HVAC Mode Operation	
Mode	Function
A/C Only	Allows only the A/C portion of the system to run. Adjusts compressor and fans only to keep the temperature constant.

Table 6.1, Parked-HVAC Mode Operation

Accessory Heaters

Optional accessory 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 tank farms. 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.

Accessory heaters function when the ignition switch is in the off position and the cab load disconnect switch is on, if equipped.

IMPORTANT: Wait three 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.

Espar Heater

Refer to the Espar website, www.espar.com, for additional information.

Espar Mini-Controller

To turn the heat on, press the heat button. See [Fig. 6.7](#). The red indicator will illuminate when heat mode is activated. Adjust the desired temperature with the control knob; rotate the temperature control knob clockwise for warmer air, or counterclockwise for cooler air. To turn the heat off, press the off button.

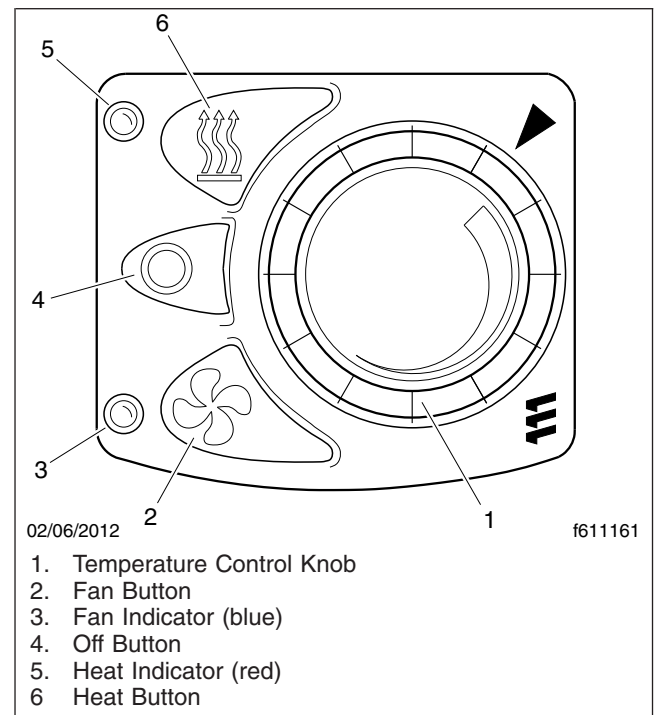


Fig. 6.7, Espar Mini-Controller

To turn the fan on, press the fan button. The blue indicator will illuminate when ventilation mode is activated. To turn the fan off, press the off button.

Espar Digi-Controller

Vehicles built after December 8, 2011 with the Digi-Controller and D2 air heaters are equipped with an internal LVD in the Digi-Controller that prevents the heater from draining battery voltage below 12.0 volts.

To turn heat mode on, press the heat button and the heater will begin its start-up cycle. See [Fig. 6.8](#). ON

Climate Controls

will display briefly followed by the ambient temperature, and the green indicator will illuminate. Ambient display temperature range is 41°F to 90°F.

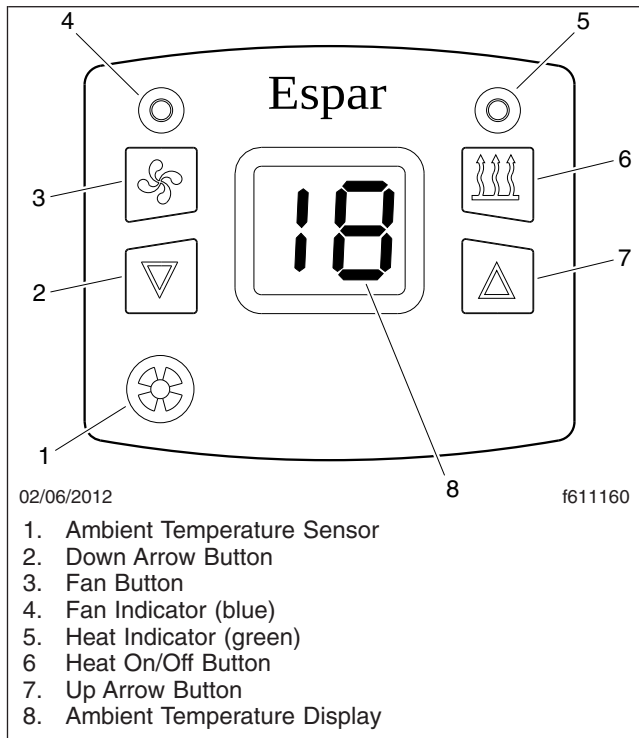


Fig. 6.8, Espar Digi-Controller

To adjust the desired temperature, press the up or down arrow buttons. The desired temperature will display briefly, followed by the ambient temperature. The desired temperature will remain in the modulator memory when the heater is not in operation. Temperature adjustment range is from 41°F to 90°F.

To turn heat mode off, press the heat button again. The heater will initiate a 3-minute cooling cycle.

To turn the fan on, press and hold the fan button until the blue indicator illuminates and the display shows active rotating digits. To turn the fan off, press the fan button again.

NOTE: The Digi-Controller also has a programmable run timer that will automatically shut the heater off after the set time limit. The default time limit setting is 10 hours.

Webasto Heater

To turn the heater on, rotate the heater control knob clockwise until the indicator light illuminates. See

Fig. 6.9. The Webasto heater requires one to two minutes to warm up before warm air is delivered.

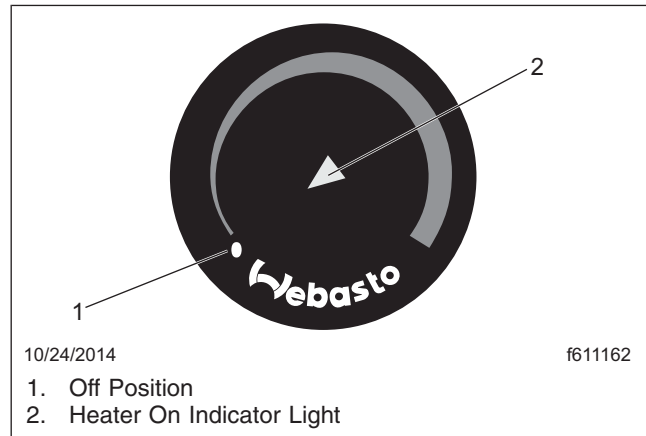


Fig. 6.9, Webasto Heater Control Knob

To set the desired temperature, rotate the heater control knob clockwise for warmer air, or counterclockwise for cooler air.

To turn the heater off, rotate the heater control counterclockwise until it clicks and the indicator light is extinguished. The heater will initiate a two-minute cooling cycle.

Refer to the Webasto website, techwebasto.com, for additional information.

Seats and Restraints

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National High-Back Seat	7.3
Seat Belts and Tether Belts	7.5
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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 back-wall. 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 Western Star seats. Not all seats have all of the adjustments listed below. See [Fig. 7.1](#).

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.

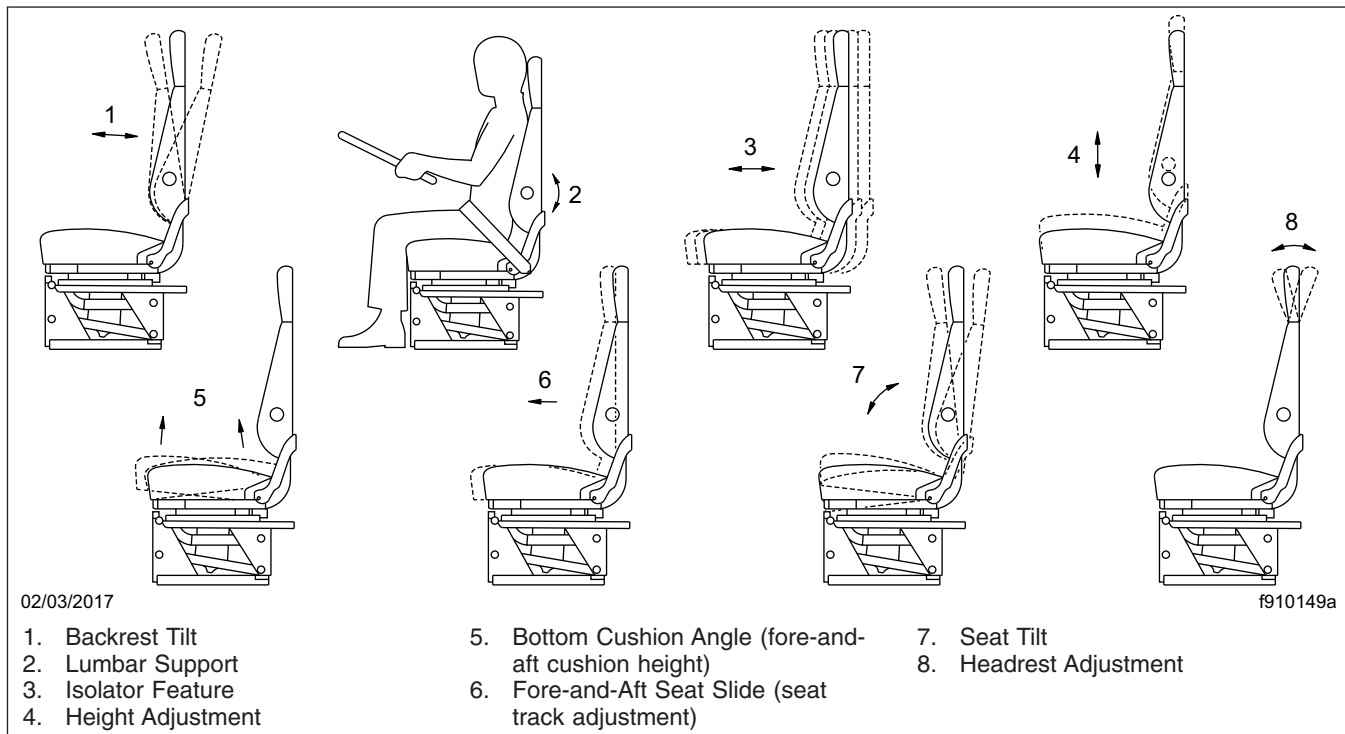


Fig. 7.1, General Seat Adjustments

1. Backrest Tilt: This adjustment enables the backrest to pivot forward or backward.
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.

Western Star High-Back Seat

See [Fig. 7.2](#) for seat adjustment controls. Not all models of the seat have all the adjustments listed below.

2. **Fore/Aft Isolator:** To engage the isolator, turn the isolator knob rearward to the unlocked position. Turn the isolator knob forward to the locked position when the isolator feature is not desired.
3. **Front Cushion Height:** To adjust the height of the front of the cushion, remove your weight from the seat, then turn the adjustment knob toward the front of the seat (clockwise) to increase cushion height. To lower the cushion height, turn the adjustment knob toward the rear of the seat (counterclockwise).

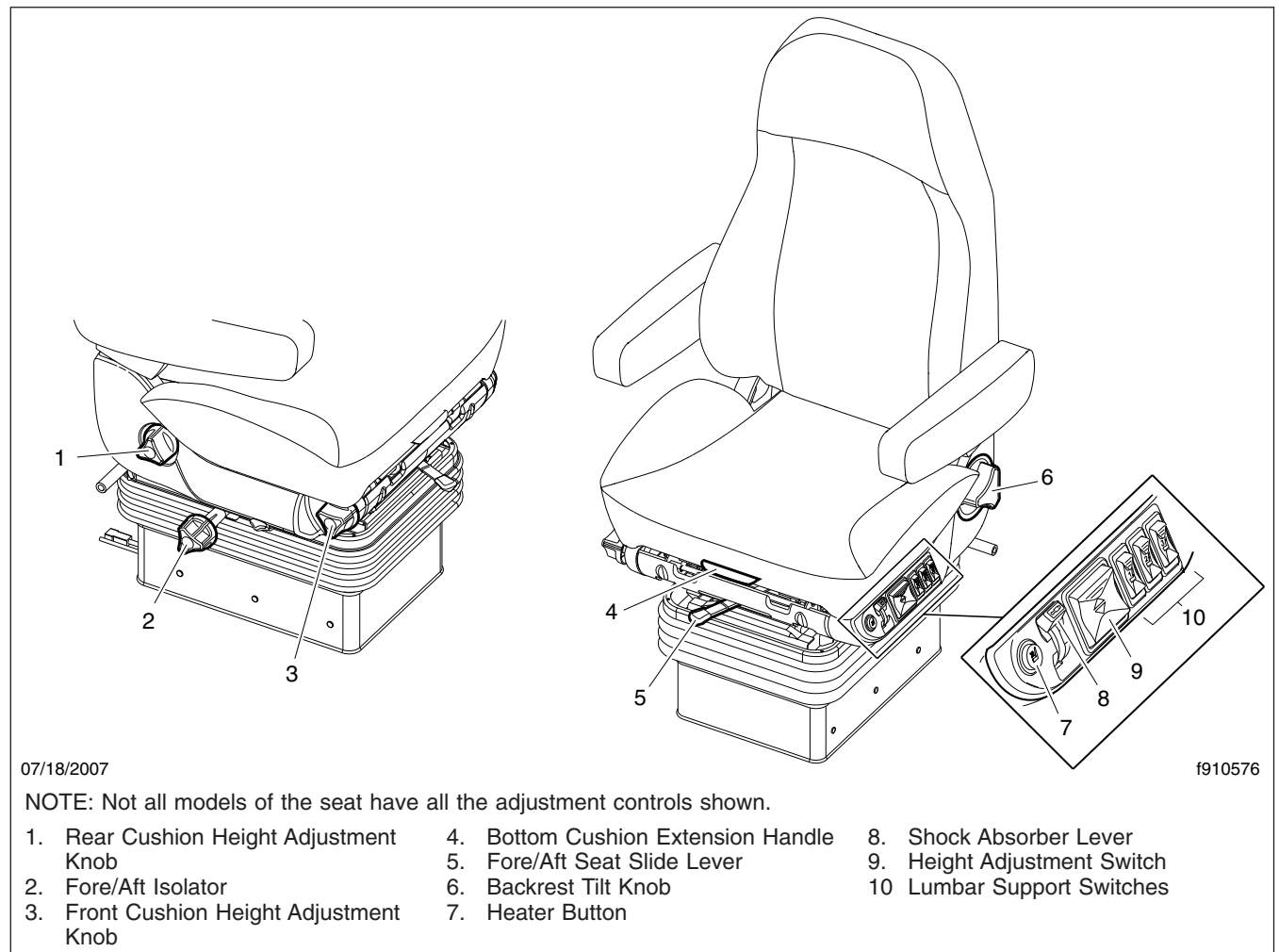


Fig. 7.2, Western Star High-Back Seat

1. **Rear Cushion Height:** To adjust the height of the rear of the seat cushion, remove your weight from the seat and turn the rear cushion adjustment knob to one of three positions.
4. **Bottom Cushion Extension:** To adjust the fore-and-aft position of the seat cushion, remove your weight from the seat, then lift up and pull forward on the cushion adjustment handle. To return the

Seats and Restraints

cushion to the aft position, lift up and push rearward.

5. **Fore/Aft Seat Slide:** To adjust the fore-and-aft position of the entire seat, move the fore-and-aft seat adjustment lever to the left and slide the seat forward or backward to the desired position. Move the lever back to its original position to lock the seat in place.
6. **Backrest Tilt:** To tilt the backrest, lean forward slightly to remove pressure from the cushion, then turn the knob forward or rearward to achieve the desired position.
7. **Heater:** To turn on the heat option, press the button. To turn off the heat option, press the button again.
8. **Shock Absorber:** To adjust the amount of damping the shock absorber provides, move the lever up to increase damping; move the lever down to decrease damping.
9. **Height Adjustment:** To raise or lower the height of the seat, use the height adjustment switch on the side of the seat.
10. **Lumbar Support:** To adjust the lumbar support, use the lumbar support switches on the side of the seat.

National High-Back Seat

See [Fig. 7.3](#) and [Fig. 7.5](#) for seat controls.

If equipped, the BackCycler feature cyclically inflates and deflates air bladders in the low-back area of the seat. When used regularly during long periods of sitting, the BackCycler potentially relieves back strain.

National Seat Controls (Left-Side)

Seat Heat

If equipped, the heater switch turns on heating pads in the seat and low-back areas. See [Fig. 7.4](#).

A thermostat in the seat cushion monitors the temperature. When it detects the area has reached 114° F, both the low-back and seat heating pads will cycle off. When the thermostat detects the seat area has dropped to 81° F, both the low-back and seat heating pads will cycle on. Cycling is highly variable as heat is captured and the seat is insulated in various ways by different bodies.

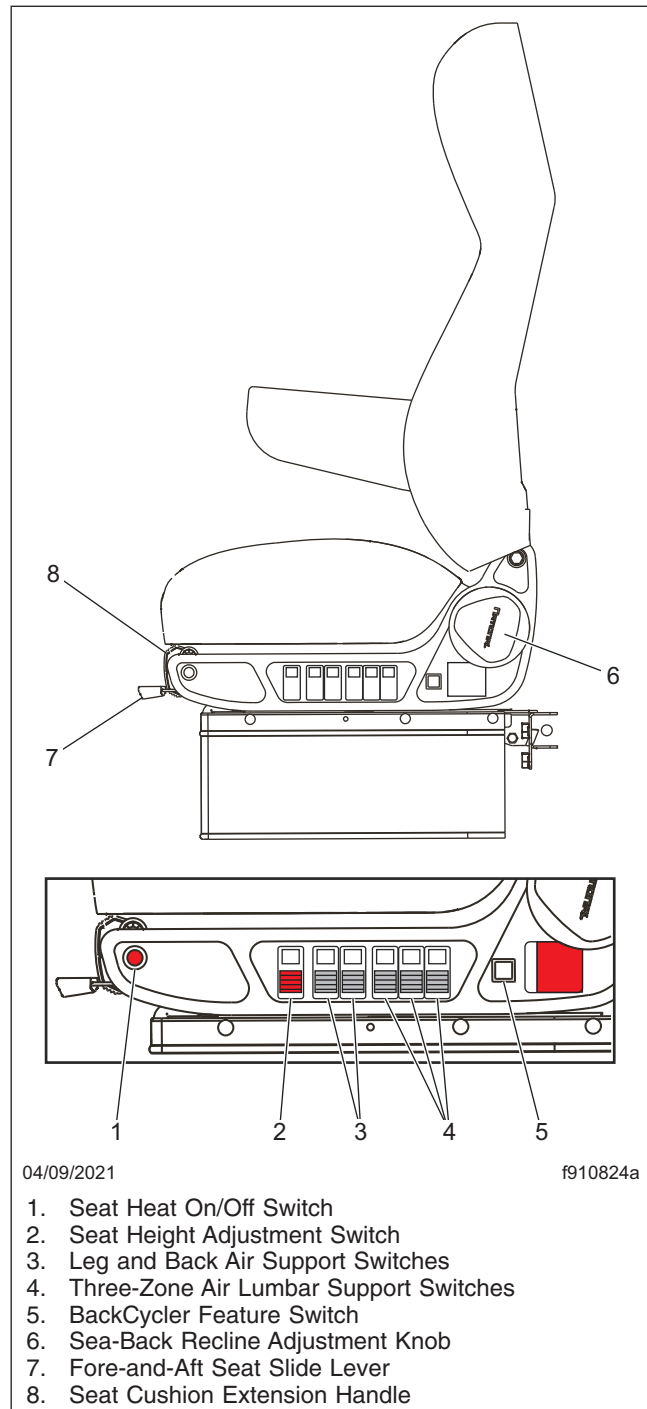


Fig. 7.3, Left Side Controls of the National Seat

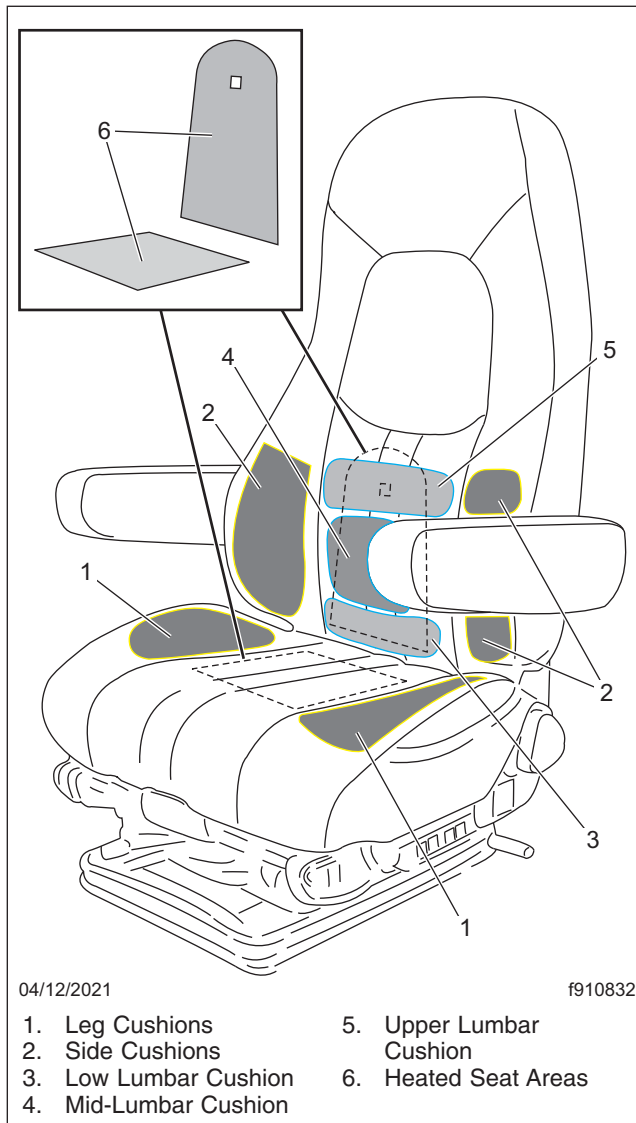


Fig. 7.4, Left View of Air Cushion Supports and Heated Seat Areas

Seat Height Adjustment

Pull up on the red valve switch to increase air pressure and raise the seat. Push down on the switch to lower the seat.

Leg and Back Air Support

Air cushions on either side of the seat and back can be inflated to provide support. See [Fig. 7.4](#) for cushion locations. Pull up on a valve switch to inflate an area; push down on a valve switch to deflate.

Three-Zone Air Lumbar Support

To adjust any of the three lumbar zones, pull up on a valve switch to inflate and push down to deflate. The further back the valve switch, the higher the lumbar zone it controls. See [Fig. 7.4](#) for the locations of the three low-back air cushions.

BackCycler Feature

If equipped, the Backcycler will inflate and deflate the lumbar area sections of the seat in 40 second cycles. To operate, deflate all three lumbar support areas then press the BackCycler switch to the ON position. Let the BackCycler go through two or three cycles before turning it off and reinflating the lumbar support air cushions to the desired comfort level.

Seat-Back Recline Adjustment

Rotate the triangular knob at the back of the seat rearward to increase the seat-back recline and forward to bring it back to vertical. The seat back can recline up to 23°.

Fore-and-Aft Seat Slide

The lever beneath the front of the seat cushion controls the fore-and aft position of seat. While sitting in the seat, move the lever to the left, then move the seat forward or back. When the seat is in the desired position, release the track slide lever to lock it into position. The seat can move seven inches (17.8 cm).

Seat Cushion Extension

With your weight off the seat, lift the bottom cushion adjustment handle and pull it forward or push it back to move the seat into the desired location.

National Seat Controls (Right-Side)

Rear Cushion Tilt

With your weight off the seat, rotate the knob clockwise to raise the rear of the seat cushion to the desired height. There are three rear cushion height positions.

Suspension Base Isolator

Rotate the knob counterclockwise to enable the isolation feature. Rotate the knob clockwise to decrease the level of isolation. To turn the isolator off, turn the knob clockwise until completely tightened.

Seats and Restraints

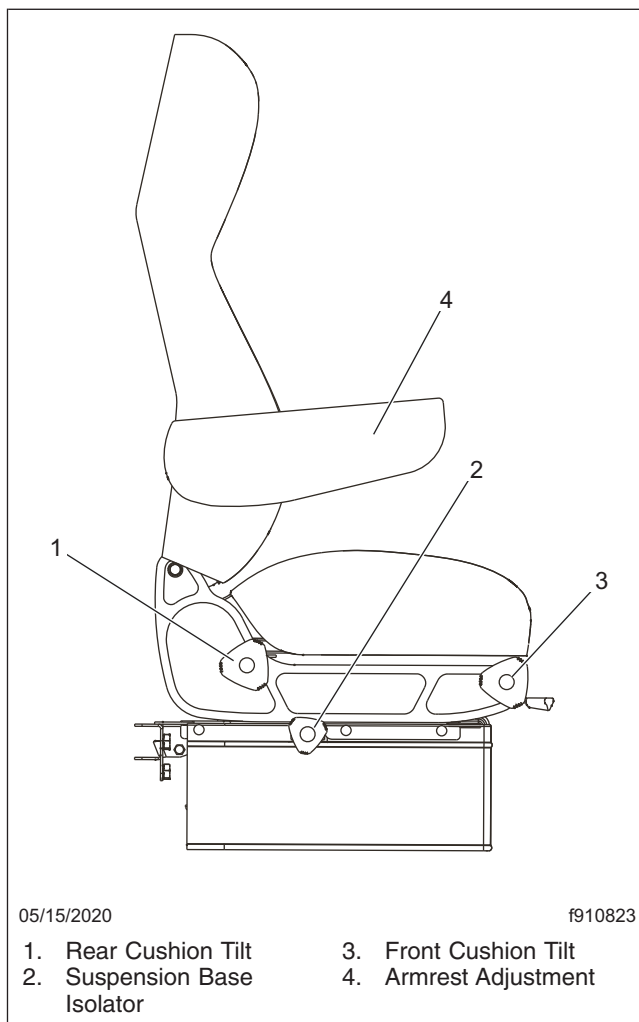


Fig. 7.5, Right Side Controls of the National Seat

Front Cushion Tilt

With your weight off the seat, rotate the knob clockwise to raise the front of the seat cushion to the desired height. There are three front cushion height positions.

Armrest Adjustment

Rotate an arm to the full up position then rotate it fully down. Then slowly raise the arm as you listen for clicks. Each click represents one of seven armrest positions. Stop when the armrest is high enough to support your forearm in a horizontal position. Each armrest can be adjusted independently.

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* 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

Three-Point Seat Belt

NOTE: For vehicles equipped with the Komfort Latch or the Sliding Komfort Latch, see the seat belt operation under the heading **Seat Belt With Komfort Latch or Sliding Komfort Latch**.

WARNING

Wear three-point seat belts only as described below. Three-point seat belts are designed to be worn by one person at a time. In case of an accident or sudden stop, personal injury or death could result from misuse.

Fasten the seat belts before driving. Fastening a three-point seat belt while driving creates a hazard.

1. Slowly pull the link end of the three-point 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.
2. Fasten the seat belt by pushing the latch into the buckle. Listen for an audible click. See [Fig. 7.6](#).
3. Tug on the seat belt to make sure it is securely fastened. If the buckle unlatches, repeat this

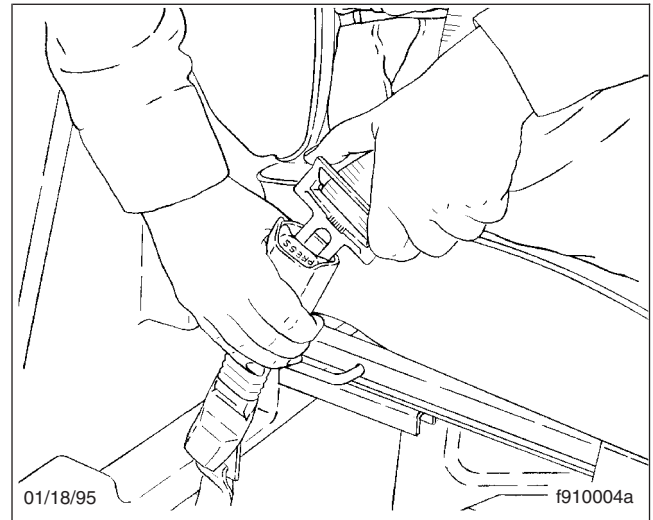


Fig. 7.6, Fastening the Three-Point Belt

step. If the problem continues, replace the seat belt.

4. Snug the seat belt to your waist.
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. 7.7](#).

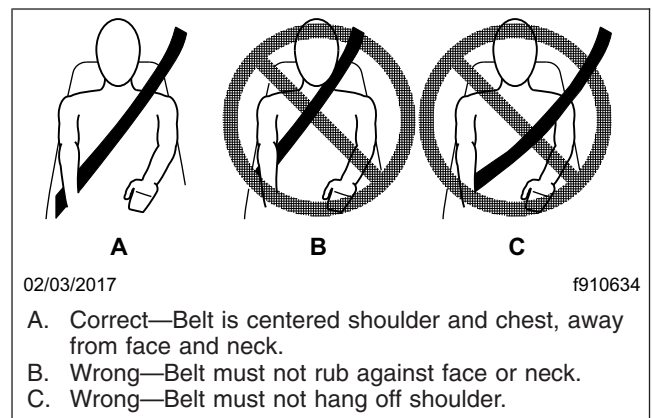


Fig. 7.7, Proper Shoulder Strap Fit

6. To unbuckle the seat belt, press the release button on the buckle. See [Fig. 7.8](#).

NOTE: Make sure the seat belt is completely retracted when it is not in use.

Seats and Restraints

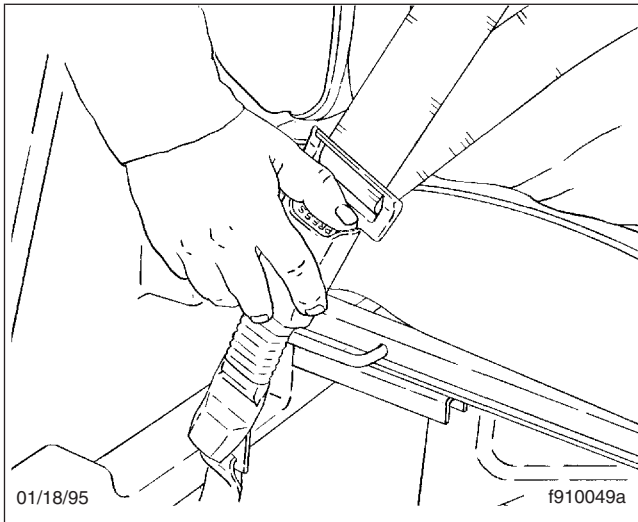


Fig. 7.8, Releasing the Three-Point Seat Belt

Seat Belt With Komfort Latch or Sliding Komfort Latch

NOTE: For vehicles not equipped with the Komfort Latch or the Sliding Komfort Latch, see the seat belt operation under the heading **Three-Point Seat Belt**.

WARNING

Wear three-point seat belts only as described below. Three-point seat belts are designed to be worn by one person at a time. In case of an accident or sudden stop, personal injury or death could result from misuse.

Fasten the seat belts before driving. Fastening a three-point seat belt while driving creates a hazard.

When engaged and used properly, the Komfort Latch (Fig. 7.9) and the Sliding Komfort Latch (Fig. 7.10) 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.
2. Fasten the seat belt by pushing the latch into the buckle. Listen for an audible click. See Fig. 7.6.

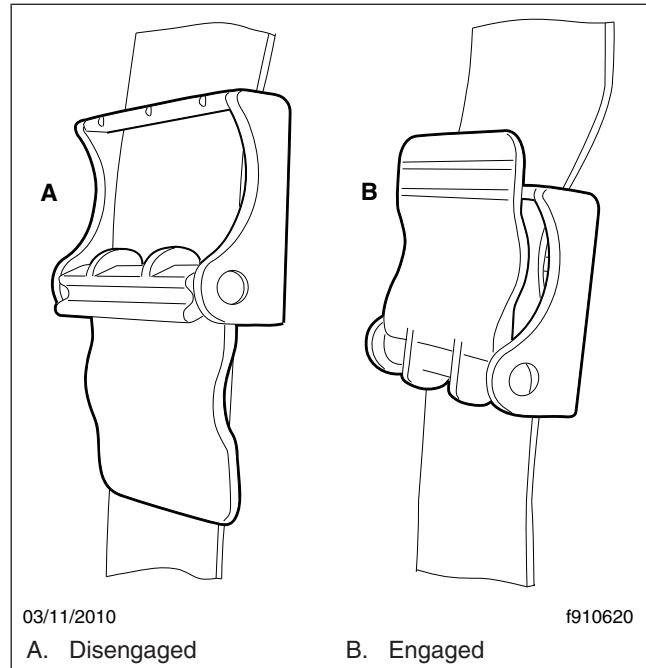


Fig. 7.9, Komfort Latch

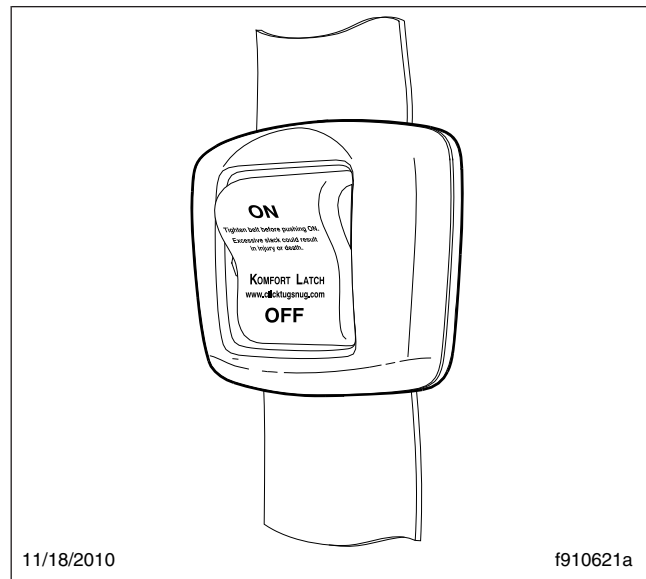


Fig. 7.10, Sliding Komfort Latch

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.

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.

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. 7.7](#). 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. 7.10](#). 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. 7.11](#) and [Fig. 7.12](#)).

6. Unbuckle the seat belt and release the Komfort Latch or the Sliding Komfort Latch as follows.

If equipped with a Sliding Komfort Latch, unbuckle the seat belt ([Fig. 7.8](#)), 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 ([Fig. 7.8](#)), 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.

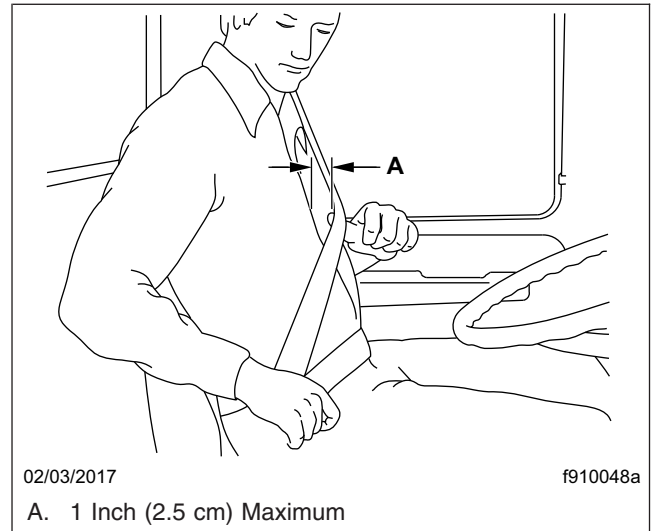


Fig. 7.11, Adjusting Shoulder Harness Clearance, Komfort Latch

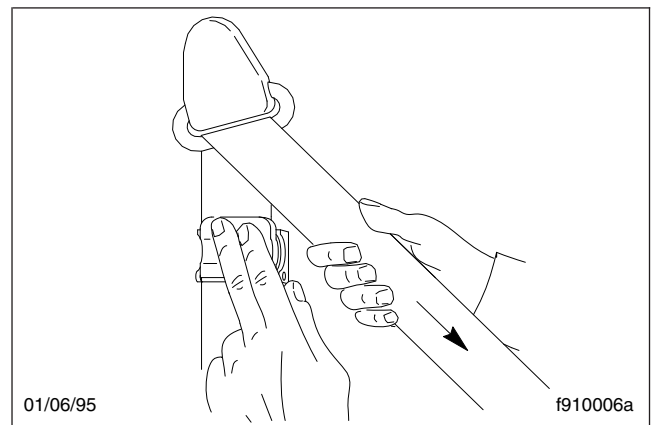


Fig. 7.12, Locking the Komfort Latch

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

On vehicles equipped with a sleeper compartment, bunk restraints should be used whenever the sleeper compartment is occupied and the vehicle is moving.

Seats and Restraints

Restraints are designed to lessen the chance of injury or the amount of injury resulting 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. 7.13](#).

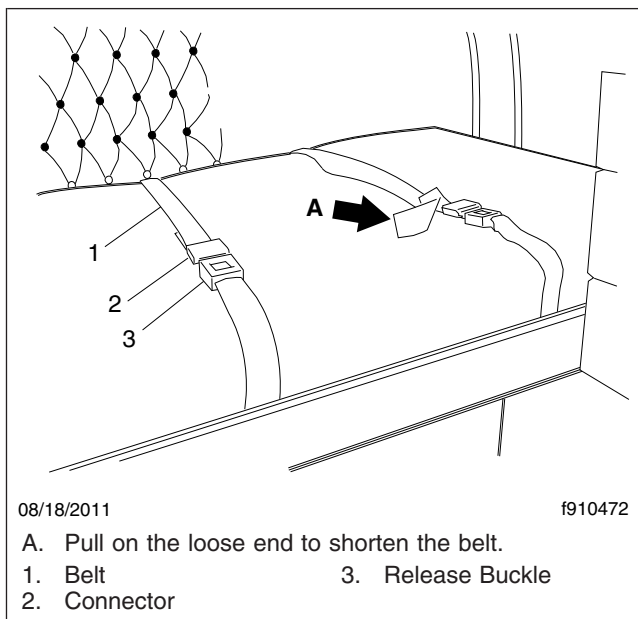


Fig. 7.13, Bunk Restraint Adjustment

Cab and Sleeper Features

Windows and Mirrors	8.1
Cab Amenities	8.1
Sleeper Amenities	8.3

Cab and Sleeper Features

Windows and Mirrors

Power Mirrors

The outside mirrors are mounted on the cab. There is a primary rear view mirror and a convex mirror on both the driver and passenger sides. The mirrors are controlled by a switch pad located on the overhead console. See [Fig. 8.1](#).

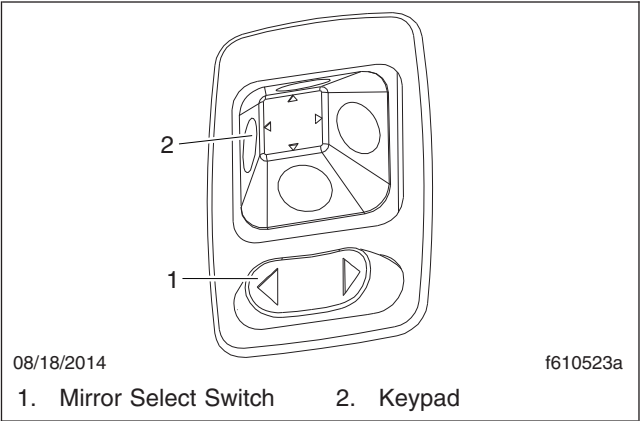


Fig. 8.1, Power Mirror Switch Pad

One or both outside mirrors may be heated to clear fog, frost, or ice. To defog the mirrors, press the upper half of the mirror defog switch (MIRROR DEFOG). See [Fig. 8.2](#). When the mirror defog switch is on, the status bar illuminates. To turn off heat to the mirror(s), press the lower half of the switch.

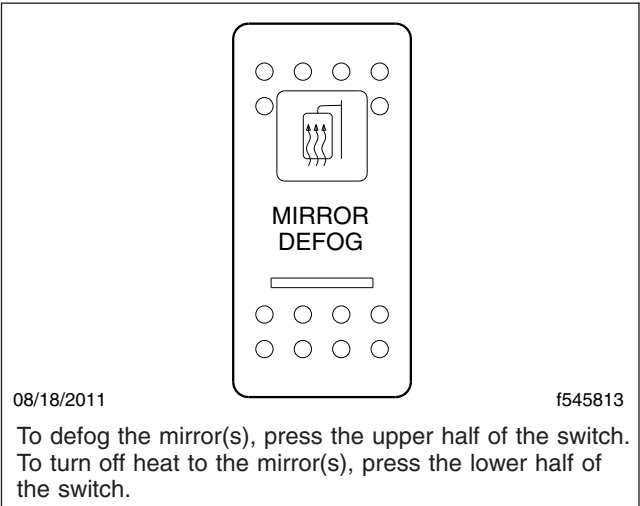


Fig. 8.2, Mirror Defog Switch

Down-View Mirror

A down-view mirror is installed on the door frame to provide the driver a view of the area adjacent to the side of the cab. See [Fig. 8.3](#).

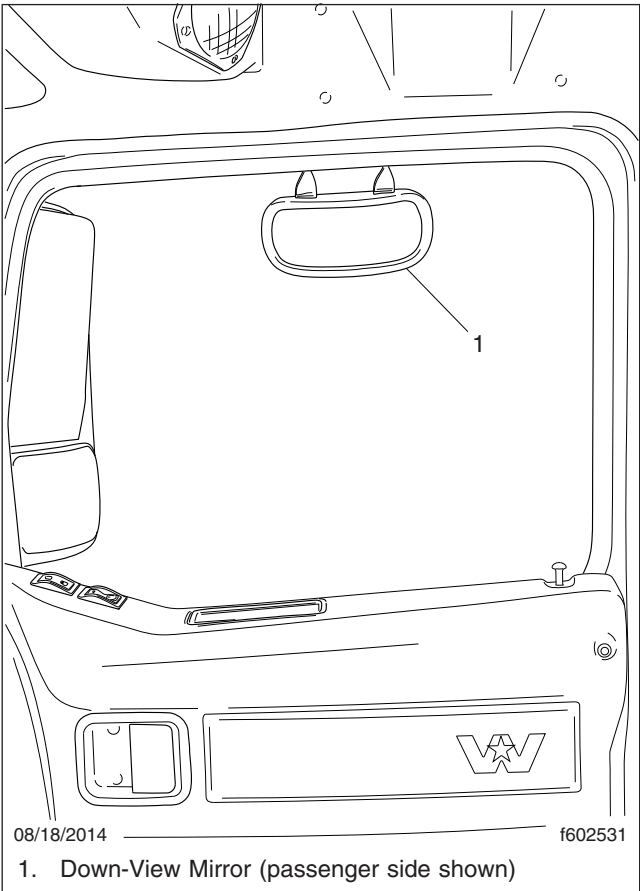


Fig. 8.3, Down-View Mirror

Windows

Power windows are operated by switches (POWER WINDOW) located on the door. See [Fig. 8.4](#).

To raise the window, press the upper half of the switch. To lower the window, press the lower half of the switch.

Cab Amenities

Western Star vehicles are available with many optional features. The following are some of those options.

Cab and Sleeper Features



Fig. 8.4, Door Lock and Power Window Switches

Cigar Lighter/Accessory Plugs

The cigar lighter/accessory plug (Fig. 8.5) is located on the lower right-hand dash panel, above the ignition switch. The ash tray is located to the left of the cigar lighter. Optional 12V receptacles may be located on the dash.

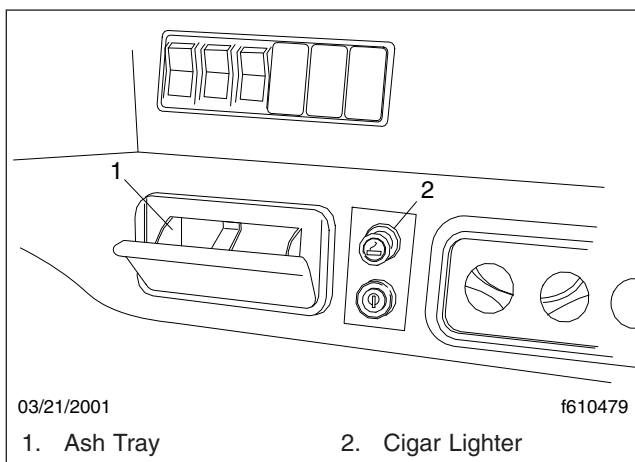


Fig. 8.5, Ash Tray and Lighter

To activate the cigar lighter, push in the element knob. It will pop out when heated. Grasp the element knob and pull it out of the socket.

To remove the ash tray, push down on the center bar, and swing outwards. To install the ash tray, insert in the opening then swing upwards until the bar snaps into place.

Cup Holders

A dual cup holder with a cell phone holder, standard in the sleeper cab and optional in the day cab, is located below the right-hand dash control panel.

Glove Box

The glove box (Fig. 8.6) is located on the right side of the dash face, and is equipped with a lock. To lock the latch, insert the key in the lock, and turn it 1/2-turn clockwise. Remove the key. To unlock the latch, insert the key in the lock, and turn it 1/2-turn counter-clockwise.

The glove box door is hinged at the bottom. To open the unlocked door, push the button in with your thumb and pull gently on the tang-style latch. The door will swing downwards, then stop in the open position. To close the door, swing it upwards, and put gentle pressure on the latch. The door will be secured, but not locked.

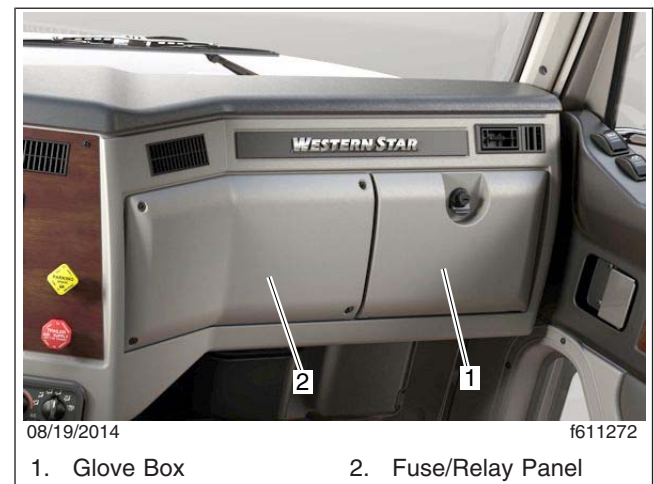


Fig. 8.6, Passenger-Side Dash Panels

Electronic Device Mount

Some vehicles may be equipped with an optional electronic device mounting station and 12-volt outlet on the dash. The standard bolt pattern allows the mounting of a variety of devices including navigation systems, cell phone holders, portable music players, and other electronic devices. Mounting systems can be found at www.ram-mount.com.

Cab and Sleeper Features

Cab Lighting

See [Chapter 4](#) for detailed information regarding cab lighting controls.

Storage Areas

Some vehicles may have a storage bin and a glove box located on the right-hand side of the overhead console (Fig. 8.7). The storage bin has an elastic mesh cover to keep objects in place. Map pockets are molded into the lower portion of the driver and passenger doors.

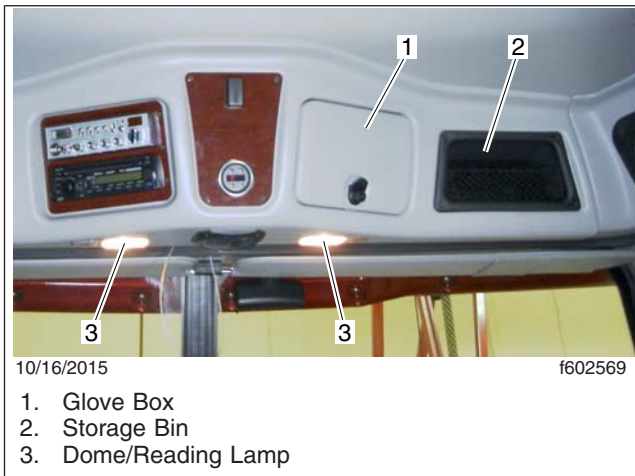


Fig. 8.7, Overhead Console Area

Sleeper Amenities

Western Star sleepers are available with many optional features. The following are some of those options.

NOTE: See [Chapter 6](#) for detailed information regarding sleeper climate controls and the digital clock.

Baggage Compartment Doors

To unlock, insert the baggage door key in the lock and turn counterclockwise 1/4-turn. Push the button, and the latch will spring open. To lock, press the latch in, turn the key clockwise 1/4-turn, then remove the key. If the baggage compartment door is unlocked, it can be opened simply by pushing the button.

Sleeper Lighting

The sleeper is equipped with two dome lamps, a floor courtesy light, and swivel reading lamps. The baggage compartment is equipped with LH and RH compartment lights. Depending on vehicle configuration, the sleeper may also be equipped with dome lamps under the rear shelf, a swivel task lamp mounted on the cabinet, and a pull-out desk lamp. See [Fig. 8.8](#).

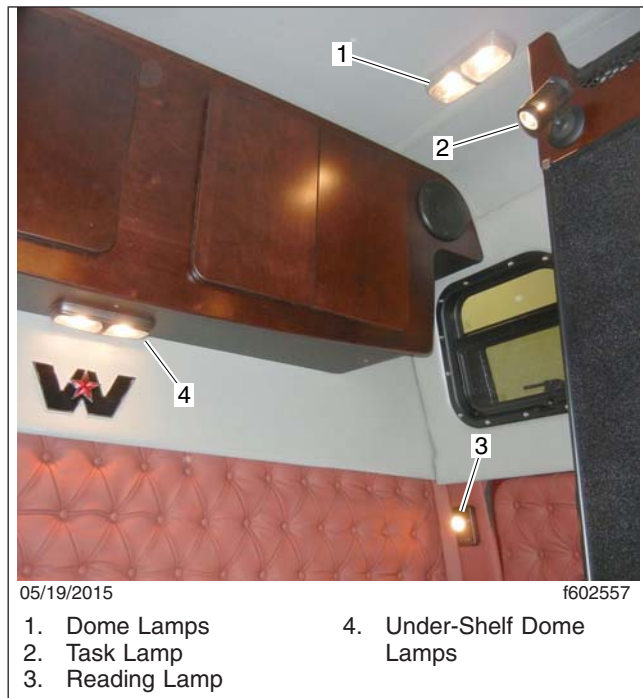


Fig. 8.8, Sleeper Lighting

Dome Lamps and Sleeper Courtesy Light

The ceiling dome lamps and the floor courtesy light are operated by the sleeper lights switches on the sleeper control panel and the dash. The under-shelf dome lamps are operated by pushing on the lens.

Reading Lamps

The swivel reading lamps are operated with a rocker switch on the lamp.

Baggage Compartment Lights

The baggage compartment lights are activated by opening or closing the baggage compartment door, raising and lowering the bunk, or toggling the switch on the sleeper control panel (if equipped).

Task Lamp

The task lamp is operated by rotating the end of the lamp canister.

Sleeper Door

NOTE: The sleeper 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.

To open the sleeper door, reach behind the latch cover at the rear upper corner, locate the flat handle, and push down.

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.

Sliding Side Window

The sliding side window is locked with an over-center toggle lever. When unlocked, the window may be adjusted to suit.

Vent

The air vent is operated using a simple, over-center latch. The vent will open in two directions. Push the knob firmly forward or back to open. The center position is closed.

Electrical System

Vehicle Power Distribution	9.1
Battery Disconnect Switch	9.1
Battery Access	9.2
Low Voltage Disconnect	9.2
Inverter/Charger	9.3

Electrical System

Vehicle Power Distribution

There are three standard power distribution modules (PDMs) on vehicles that are compliant with EPA10 and newer regulations: the dash electrical panel, the powertrain PDM, and the powernet distribution box (PNDB). See [Fig. 9.1](#) for the typical location of the powertrain PDM located in the engine compartment.

IMPORTANT: The cover on the powertrain PDM unit must be in place to protect against water splash and dust intrusion.

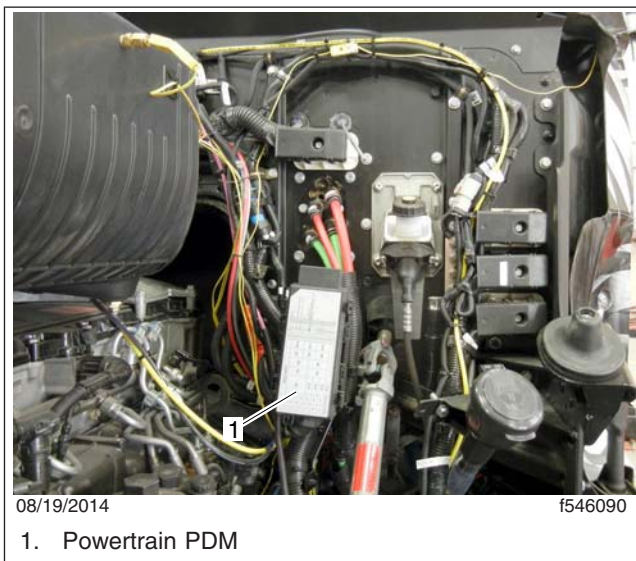


Fig. 9.1, Powertrain PDM Location

The powertrain PDM houses many of the fuses and relays for the engine, transmission, and aftertreatment system (ATS). There is a label on the cover of the powertrain PDM identifying the fuses and relays.

The PNDB houses up to three MIDI fuses and four ATO fuses. A label on the cover of the PNDB identifies the fuses.

Vehicles may also be equipped with a secondary PNDB. The secondary PNDB sources power to any of the following:

- fleet management communications
- trailer end-of-frame connection
- shore power inverter
- bodybuilder PDM (housing any fuses and relays necessary for customer-installed truck body equipment)

The main PDMs are located inboard of the passenger-side glove box. Access to the PDMs is achieved by removing the four screws that secure the panel cover. See [Fig. 9.2](#) and [Fig. 9.3](#).



Fig. 9.2, Passenger-Side Dash Panels

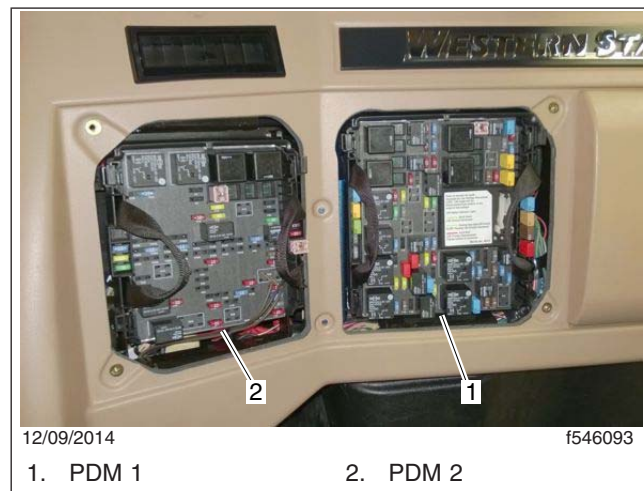


Fig. 9.3, Main PDMs

Battery Disconnect Switch

Your Western Star vehicle may be equipped with a cab load disconnect switch (CLDS).

The optional CLDS ([Fig. 9.4](#)) is used to minimize draw on the battery, and should be set to OFF when the vehicle is parked for an extended period of time.

When the CLDS is set to OFF, it signals the PNDB to disconnect battery power to the circuits powered by the MIDI fuses.

The CLDS is mounted on the underdash cover, out-board of the steering column.



Fig. 9.4, Cab Load Disconnect Switch

IMPORTANT: The ignition should be turned OFF before using the CLDS.

Battery Access

The batteries on a Western Star vehicle may be located in a variety of locations, including under the passenger seat, under the cab, behind the cab, or under the sleeper bunk, if equipped. Some vehicles may have two batteries in the step compartments on both sides of the vehicle.

Low Voltage Disconnect

The Low Voltage Disconnect (LVD) system protects the batteries from excessive discharge by disconnecting certain isolated circuits from battery power supply if necessary. See [Table 9.1](#). This allows the batteries to maintain acceptable charge to restart the vehicle. The LVD is integrated into PDM 1. See [Fig. 9.3](#).

Isolated Circuits	
Function	Key Position
PDM 1	
12V Power Receptacle 1, Dash	OFF/ACC/IGN*
12V Power Receptacle 2, Dash	OFF/ACC/IGN
12V Power Receptacle 1, Sleeper	OFF/ACC/IGN
CB Radio	OFF/ACC/IGN*
Dome Lamp, Cab, Dome/Reading	OFF/ACC/IGN
Dome Lamp, Sleeper	OFF/ACC/IGN
Dome Lamp, Floor Lamp, Sleeper	OFF/ACC/IGN

Isolated Circuits	
Function	Key Position
Fuel Water Separator Heater Element	IGN
Mirror Heat, Driver	IGN
Mirror Heat, Hood-Mounted	IGN
Spare Power Feed 1	IGN
Spare Power Feed 2	IGN
Utility Lamp	OFF/ACC/IGN
PDM 2	
12V Power Receptacle 2, Sleeper	OFF/ACC/IGN
12V Power Receptacle 3, Sleeper	OFF/ACC/IGN
Air Dryer	ACC
Amplifier Power	ACC
Sleeper/Cab Auxiliary Heater/Parked HVAC	OFF/ACC/IGN*
Auxiliary Circulation Fan, Windshield	ACC
Auxiliary/Thermo Coolant Heater	OFF/ACC/IGN*
Heated Seat	ACC
Navigation System	ACC
Optional Switch 1	OFF/BAT/IGN†
Optional Switch 2	OFF/ACC/IGN†
Optional Switch 3	OFF/ACC/IGN†
Optional Switch 4	OFF/ACC/IGN†
Optional Switch 5	OFF/ACC/IGN†
Optional Switch 6	OFF/ACC/IGN†
Optional Switch 7	OFF/ACC/IGN†
Optional Switch 8	OFF/ACC/IGN†
Optional Switch 9	OFF/ACC/IGN†
Optional Switch 10	OFF/ACC/IGN†
Radio	ACC
Refrigerator	OFF/ACC/IGN*
Sleeper HVAC Controller, Wake-Up	ACC
Sleeper HVAC Fan Motor	ACC
Spare Power Feed 3	ACC
Spare Power Feed 4	OFF/ACC/IGN

* Option to move fuse to remove the function from the LVD bus.

† Option to move fuse to BAT to remove the function from the LVD bus.

Table 9.1, Isolated Circuits

If battery voltage drops to the trip point (12.3 or 12.1 volts, determined by the vehicle configuration), the LVD system implements a shut-down. At 70 seconds before the disconnect, an alarm beeps and the low battery indicator light on PDM 1 flashes green. The alarm beeps again at 9 and 3 seconds before the disconnect. If no action is taken, the LVD system will shut off power to the circuits, and a red low battery indicator remains lighted.

These circuits will remain off until the LVD system measures 13.0 volts applied to the system, which

Electrical System

can be achieved by starting the engine. After the engine is started, the system will reset.

Vehicles are equipped with an LVD label on the drivers-side sun visor, indicating the presence of the system.

Inverter/Charger

The optional Freedom HF Inverter/Charger powers small appliances and other electric equipment. It is located in the driver-side luggage compartment. See [Fig. 9.5](#). The unit has one three-pin GFIC OUT connector, one three-pin GFIC IN connector, and two AC power outlets.

There are two models available for the Western Star:

- **1000W:** 1000 watt, 20-amp
- **1500W:** 1500 watt, 40-amp



Fig. 9.5, Inverter/Charger



Do not store gasoline, flammable material, or any component with a connection to the fuel system in the storage compartment with the inverter/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. 9.6](#). Refer to [Table 9.2](#) for details on the display panel.

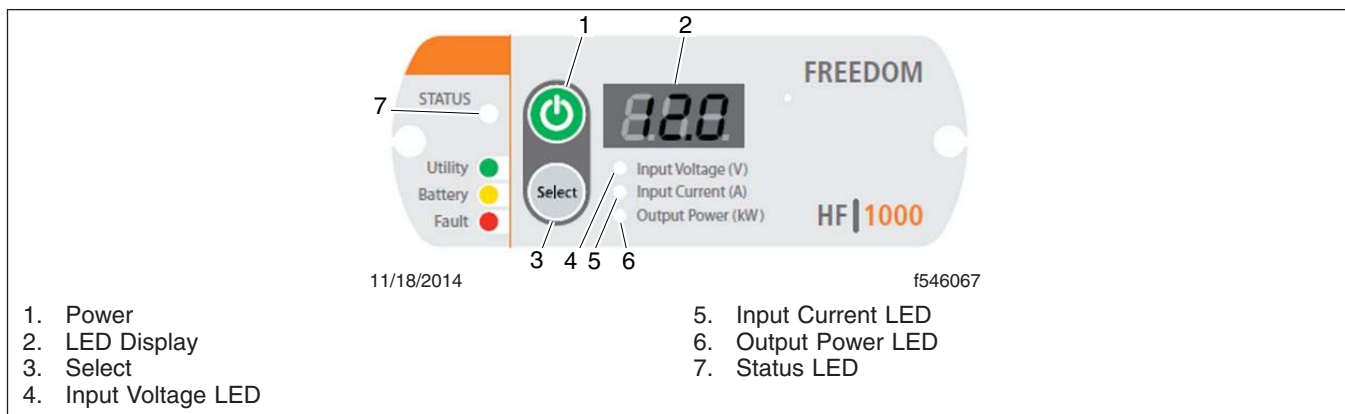


Fig. 9.6, Inverter/Charger Display Panel (1000W shown)

Display Panel Functions		
Number	Name	Function
1	Power	Press the power button for one second to turn on the unit. Press and hold the button for five seconds to enter the feature settings mode, then press the button to toggle between the following modes: • Charging Current Setting • Inverter Mode Setting • Alarm Setting • Shutdown Setting • Factory Setting Refer to the owner's manual for more information.
2	LED Display	The LED display screen shows status information and fault codes.
3	Select	The Select button changes the display or settings. Press the Select button to cycle through the setting options. Press and hold the Select button for five seconds to save the setting. Refer to the owner's manual for more information. • In "Inverter Mode Setting" press the button to turn the inverter mode ON or OFF. • With the inverter mode ON, press the button to choose what appears on the LED display screen: Input Voltage, Input Current, or Output Power. 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. • In "Charging Current Setting" mode, press the button to select the charger current.
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.

Electrical System

Display Panel Functions		
Number	Name	Function
7	Status	The color of the Status light indicates the unit's mode of operation: • 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 that AC shore power is detected and is transferring to shore power mode within 20 seconds. • Red: Fault Condition The fault status light indicates a fault condition with the unit. Refer to the owner's manual for fault code information and troubleshooting procedures.

Table 9.2, Display Panel Functions

For more information about troubleshooting, settings, and other features, refer to the owner's manual included with the inverter/charger.

10

Engine Starting, Operation, and Shutdown

Engine Starting	10.1
Engine Operation	10.1
Engine Shutdown	10.3
Engine Cooling	10.3

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** for detailed information on how to read the instruments and see **Chapter 4** for detailed information on how to operate the controls. Read the engine manufacturer's operating instructions before starting the engine.



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.

1. Before engine start-up, complete the engine pre-trip inspection and maintenance procedures in **Chapter 23**.
2. Set the parking brake.
3. For manual transmissions, place the transmission in neutral and fully depress the clutch pedal. Do not depress the accelerator pedal.
For automatic transmissions, put the transmission in neutral. Do not depress the accelerator pedal.

NOTICE

If the warning lights stay on, or do not come on momentarily after turning on the ignition, do not operate the engine. To do so may result in engine damage.

4. Turn the ignition switch to the ON position. The buzzer will sound for three seconds.
During cold conditions, the START BLOCKED lamp may illuminate. Wait until the lamp goes out before turning the ignition key to START.

NOTE: The length of time the START BLOCKED lamp remains illuminated depends on the ambient temperature. The lower the ambient temperature, the longer the lamp will be illuminated.

NOTE: The engine electronics supply the correct amount of fuel for starting the engine. Accelerator pedal pressure is unnecessary and could interfere with engine starting.

5. Turn the ignition key to the START position. Do not depress the accelerator pedal.
Release the key the moment the engine starts.
6. Apply load gradually during the warm-up period.

NOTICE

Do not rev the engine if the oil pressure gauge indicates no oil pressure. Shut down the engine within approximately ten seconds to avoid engine damage.

7. Check the oil pressure gauge for any drop in lubricating oil pressure or mechanical malfunction in the lubricating oil system.

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 inspection and maintenance procedures in **Chapter 23**.

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

All engines on Western Star vehicles comply with the requirements of the Federal (U.S.) Clean Air Act.

Engine Starting, Operation, and Shutdown

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%; currently referred to as CJ-4 oil.

A Top Tier™ compliant fuel is recommended. Look for the symbol that denotes a Top Tier compliant fuel; see [Fig. 10.1](#).



Fig. 10.1, 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 11](#) 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 engine manufacturer's operation manual specific to your engine.

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 heat 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 the idle shutdown timer, ninety 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 ninety 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

Engine Starting, Operation, and Shutdown

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 batteries, 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 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.

NOTICE

For Detroit engines, 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 engine: A winterfront may be used to improve cab heating while idling, and only when the ambient temperature remains below 10°F (-12°C).

Detroit engine: 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.

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.

NOTICE

Except in an emergency, do not shut down the engine when the coolant temperature is above 194°F (90°C). To do so could damage the engine.

3. Turn off the ignition switch and shut down the engine.

Engine Cooling

The cooling system used on all Western Star vehicles is a pressure type system. This raises the coolant boiling point, permitting higher operating temperatures. The coolant supplied in your vehicle will be a 50/50 mix of antifreeze and water, giving protection down to -35°F (-37°C). It is recommended that an antifreeze mixture be used at all times, as, in addition to providing frost protection, it is a more effective coolant, and has a higher boiling point than tap water.

Over-concentration of antifreeze or coolant conditioner can cause silicate to precipitate out of the coolant, forming silica gel on cooling system heat

Engine Starting, Operation, and Shutdown

transfer surfaces (fuel coolers, oil coolers, radiators, and heater cores), resulting in reduced coolant flow and overheating.

Hard water (with high levels of calcium and magnesium ions) encourages formation of silica gel. Do not use softened water as the salt used to artificially soften it is corrosive. Most engine manufacturers prefer the use of distilled or de-ionized water to reduce the potential and severity of silicate dropouts.

Never exceed a 60/40 antifreeze-to-water ratio. If the level is low, add a 50/50 antifreeze solution to maintain solution concentrations. Note that checking the engine coolant level is part of the pretrip inspection. See [Chapter 23](#) for more information.

Optional Engine Systems

Engine Protection—Warning and Shutdown	11.1
Engine Idle Limiting	11.2
Power Takeoff (PTO) Governor	11.2

Optional Engine Systems

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 after-treatment 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 12](#) 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. 11.1](#). 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.

Do not operate the vehicle further until the problem causing the shutdown has been corrected.

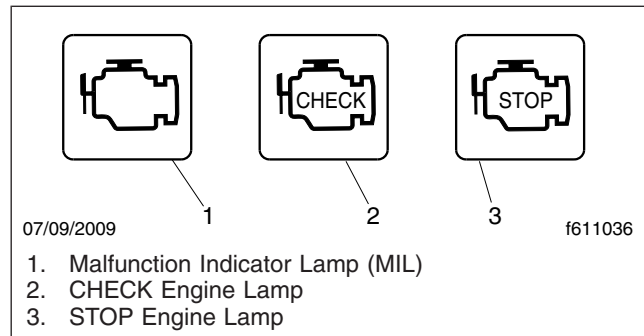


Fig. 11.1, Engine Warning Lamps

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. 11.2](#).

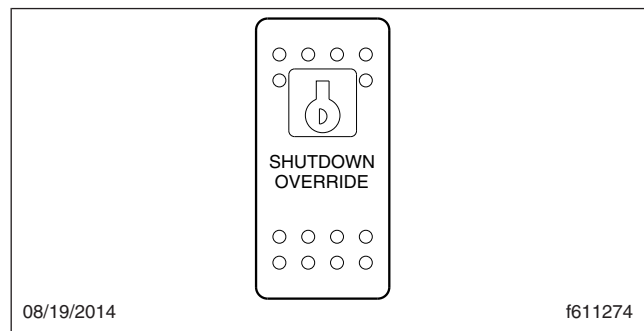


Fig. 11.2, Shutdown Override Switch

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 if engine coolant temperature is high. 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.

Engine Idle Limiting

Idle Shutdown Timer

This feature is an optional 1- to 100-minute idle shutdown system. Its purpose is to conserve fuel by eliminating excessive idling, and allowing a turbo-charger cool-down period. Idle shutdown timing and parameters are programmable. See the engine manufacturer's operation manual for specific details for your vehicle.

The idle shutdown system requires that the transmission be in neutral with the parking brake set.

Power Takeoff (PTO) Governor



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.

Emissions and Fuel Efficiency

Greenhouse Gas Emissions and Fuel Consumption Standards	12.1
EPA-Regulated Emissions Aftertreatment Systems	12.1
Diesel Exhaust Fluid and Tank, EPA10 and Newer Engines	12.4

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 12.1, 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 12.2, Emission Regulations by Model Year

EPA-Regulated Emissions Aftertreatment Systems

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.

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 %; currently referred to as CJ-4 oil.**

IMPORTANT: Using non-specification fuels or oils can lead to shortened diesel particulate filter (DPF) cleaning or replacement intervals. For example, using CJ-4+ 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.

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 that has, in addition to a DOC/DPF device like that used in an EPA07 ATD, a Selective Catalytic Reduction (SCR) device 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 DPF lamp illuminates, indicating that a regen is required. 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 Switches*, below, for instructions on initiating a parked regen.

Regen Switches

The regen request switch, located on the dash, is used to initiate a parked regen. See [Fig. 12.1](#), item 1. The function of the switch varies by the engine make and model in the vehicle. See the engine operation manual for switch operation details.

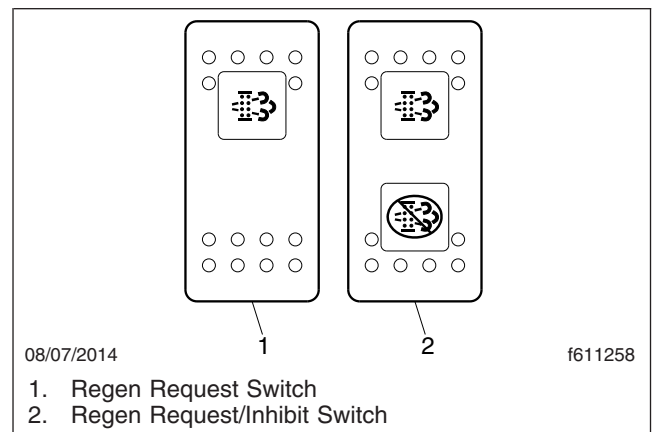


Fig. 12.1, Aftertreatment System Regen Switches

Some vehicles may be equipped with a regen request/inhibit switch. See [Fig. 12.1](#), item 2. To stop

Emissions and Fuel Efficiency

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: The regen switch can initiate a parked regen 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 regen, 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.

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. Press and hold the regen switch for five seconds. The engine will increase rpm and initiate the regen process. 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;
 - press and hold the regen inhibit switch until idle returns to normal;

- shut down the engine.

ATS Warning Lamps

There are three warning lamps that alert the driver of the need to perform a regen, of high exhaust temperature, and of a need to refill the diesel exhaust (DEF) fluid tank. A decal attached to the driver's sun visor explains these ATS warning lamps. See [Fig. 12.2](#).

See [Fig. 12.3](#) for an explanation of the ATS warnings, and actions required to avoid engine protection sequences.

Malfunction Indicator Lamp (MIL)

A steadily illuminated yellow malfunction indicator lamp (MIL) indicates an engine fault that affects the emissions. See [Fig. 12.4](#).

DPF Lamp

When soot accumulates in the DPF and the DPF status lamp illuminates, see [Fig. 12.5](#), perform a parked regen or bring the vehicle up to highway speed to increase the load (thus starting an active regen).

If the DPF status lamp blinks while the CHECK engine lamp is illuminated, initiate a parked regen immediately in order to prevent an engine derate.

If the red STOP engine lamp illuminates with the blinking DPF lamp and the CHECK engine lamp, begin a parked regen in order to prevent an engine shutdown. Park the vehicle and perform a parked regen.

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. 12.6](#).

Maintenance

Authorized service facilities must perform any DPF service. For warranty purposes, maintain a record that includes:

- date of cleaning or replacement;

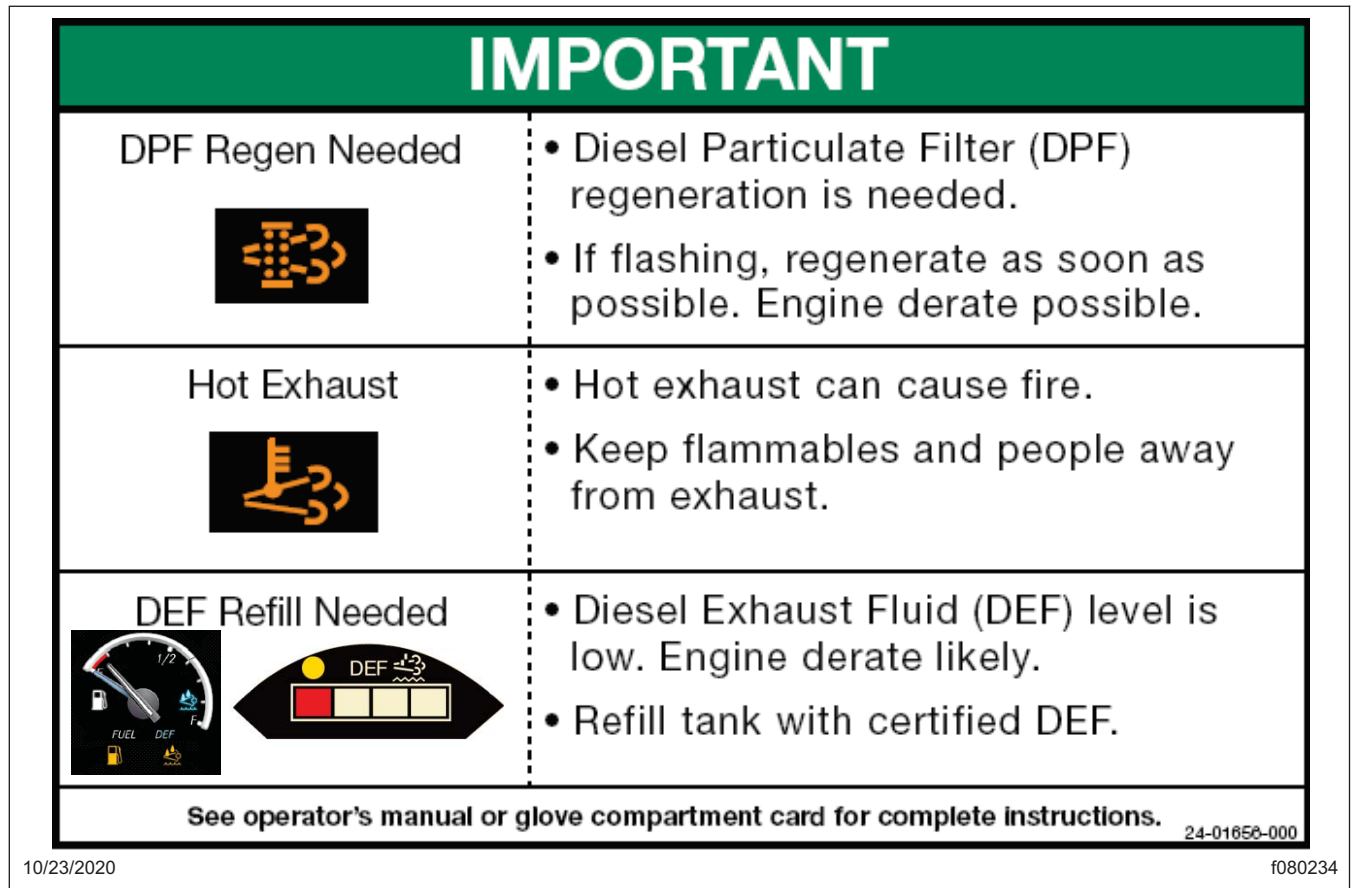


Fig. 12.2, Warning Lamp Decal, Sun Visor

- vehicle mileage;
- particulate filter part number and serial number.

Diesel Exhaust Fluid and Tank, EPA10 and Newer Engines

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.

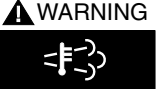
DEF consumption varies depending on ambient conditions and vehicle application.

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. See Fig. 12.7. 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.

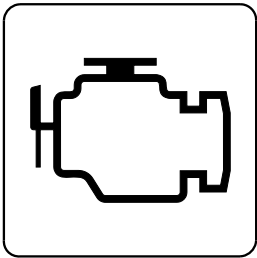
EXHAUST AFTERTREATMENT SYSTEM INFORMATION					
INDICATOR LAMP(S)	 (Solid) Level 1	 (Flashing) Level 2	 (Flashing) CHECK Level 3	 (Flashing) CHECK STOP Level 4	 WARNING
Indicator Lamp Message(s)	Filter Regeneration Recommended	Filter Regeneration Necessary	Parked Regeneration Required – Engine Derate	Parked Regeneration Required – Engine Shut Down	HEST (High Exhaust System Temperature)
Diesel Particulate Filter Condition	Filter is reaching capacity.	Filter is now reaching maximum capacity.	Filter has reached maximum capacity.	Filter has exceeded maximum capacity.	Flashing A regeneration is in progress.
Required Action	Bring vehicle to highway speeds to allow for an Automatic Regeneration or perform a Parked Regeneration.	To avoid engine derate bring vehicle to highway speeds to allow for an Automatic Regeneration or perform a Parked Regeneration as soon as possible.	Vehicle must be parked and a Parked Regeneration must be performed – engine will begin derate.	Vehicle must be parked and a Parked Regeneration or Service Regeneration must be performed. Check engine operator's manual for details –engine will shut down.	Solid Exhaust Components and exhaust gas are at high temperature. When stationary, keep away from people and flammable materials or vapors.
For a driver performed Parked Regeneration, vehicle must be equipped with a dash mounted Regeneration Switch.					
See Engine Operator's Manual for complete Regeneration Instructions.					

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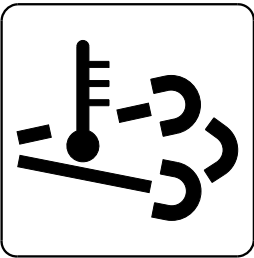
Fig. 12.3, ATS Warning Lamps



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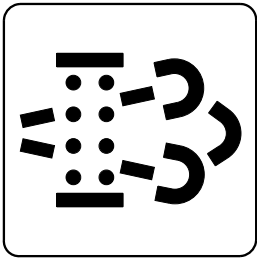
Fig. 12.4, Malfunction Indicator Lamp (MIL)



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Fig. 12.6, High Exhaust System Temperature (HEST) Lamp



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Fig. 12.5, Diesel Particulate Filter (DPF) Status Lamp

Fuel/DEF Gauge

The diesel fuel and DEF levels are measured in a dual-purpose gauge. See Fig. 12.8.

Fuel level is indicated at the top of the gauge. Below the fuel level, a low fuel warning lamp illuminates amber when the fuel level drops below 1/8th of the capacity.

The lower portion of the gauge has a DEF warning lamp that illuminates amber when the DEF tank is near empty, and a lightbar that indicates the level of DEF in the tank. The DEF light bar illuminates as follows.



Fig. 12.7, DEF Tank Location (Western Star 5700 shown)

- One bar flashing red—DEF empty, refill DEF

DEF Warnings and Engine Limits

IMPORTANT: Ignoring the DEF warning lights 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 following lamps notify the driver. See **Fig. 12.9**. Refill the DEF tank in order to cancel the warning sequence.

- One bar of the DEF level indicator illuminates amber—DEF very low, refill DEF.
- The DEF warning lamp illuminates solid amber.

DEF Empty

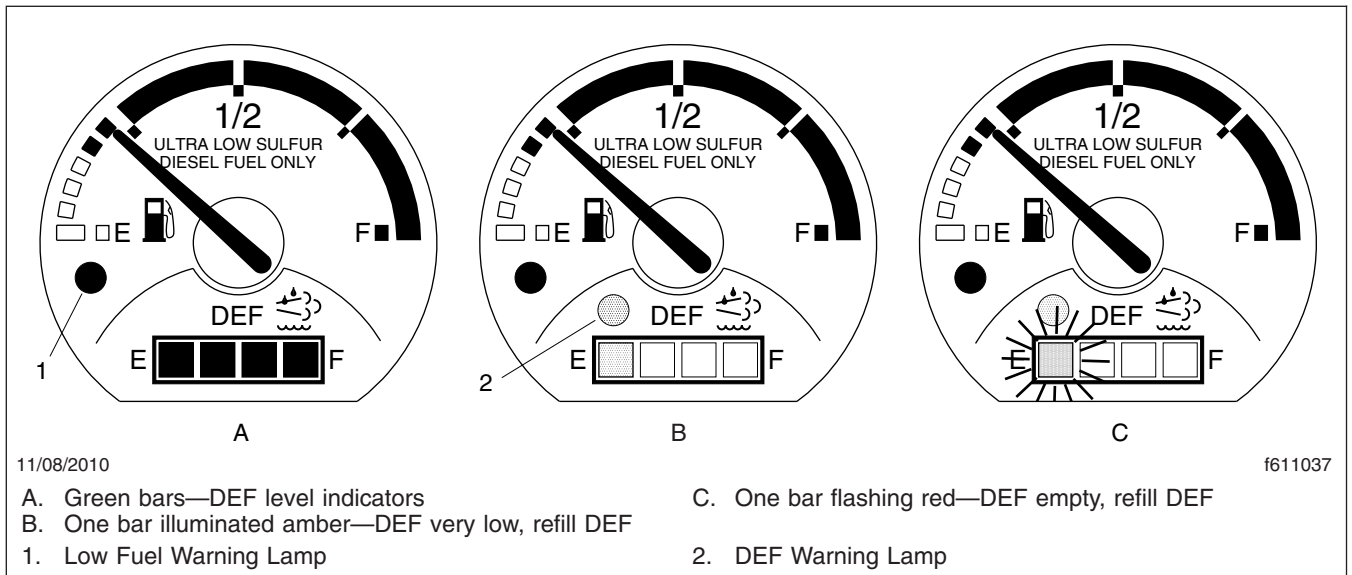


Fig. 12.8, Fuel/DEF Gauge

- Four bars illuminated green—Between 75% and 100% full
- Three bars illuminated green—Between 50% and 75% full
- Two bars illuminated green—Between 25% and 50% full
- One bar illuminated green—Between approximately 10% and 25% full
- One bar illuminated amber—DEF very low, refill DEF

When the DEF level reads empty, the following lamps notify the driver. See **Fig. 12.10**.

- One bar of the DEF level indicator flashes red—DEF empty, refill DEF.
- The DEF warning lamp flashes amber.
- The MIL lamp illuminates.

Power is limited with progressively harsher engine power limits applied.

Emissions and Fuel Efficiency

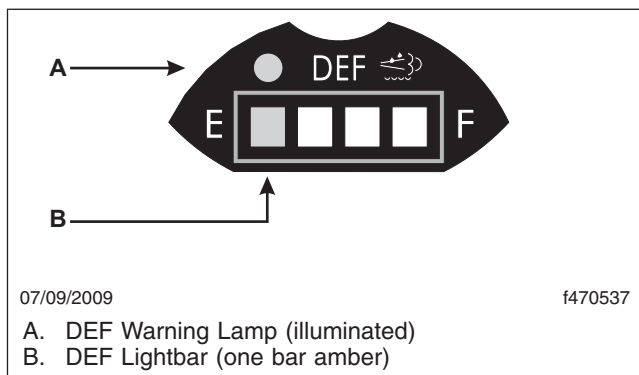


Fig. 12.9, DEF Level Low Initial Warning

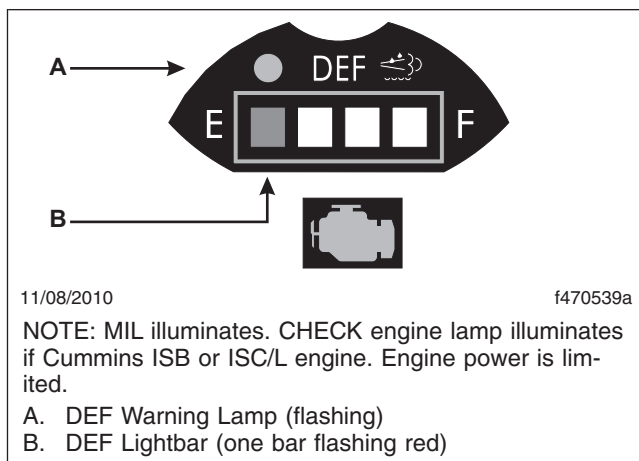


Fig. 12.10, DEF Empty Warning

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.) See [Fig. 12.11](#).

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 damage and to deactivate the warning lights and engine limits.

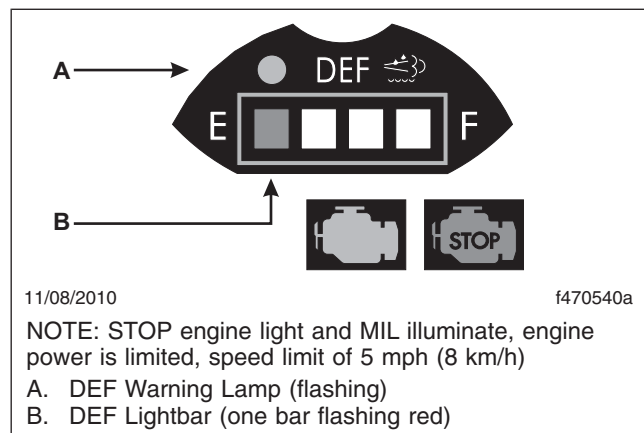


Fig. 12.11, DEF Empty and Ignored Warning

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. See [Fig. 12.11](#).

- 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.

Brake Systems

Air Brake System	13.1
Meritor WABCO® Antilock Braking System	13.4
Engine Brake	13.6

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.



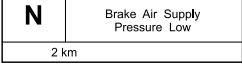
WARNING

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.

Brake System Components

A warning light or ICU text message (ICU4Me only) and buzzer come on if air pressure drops below approximately 70 psi (483 kPa) in either system. See [Table 13.1](#). If this happens, 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.

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.

Brake System Warning and Indicator Lamps				
Lamp Description				Color
	Low Air Pressure (EPA10 and Newer)	Indicates air pressure in the primary or secondary reservoir has dropped below approximately 70 psi (483 kPa).		Red
	Low Air Pressure (ICU4Me only, mid-GHG14)	Indicates air pressure in the primary or secondary reservoir has dropped below approximately 70 psi (483 kPa).		—
	Parking Brake	Indicates the parking brake is engaged.		Red
	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.		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.		Amber
	Wheel Spin	Flashing indicates the ATC system is active, or the ATC button has been pressed to allow wheel slip. Solid illumination indicates a problem with the ATC system. Repair the ATC system immediately to ensure full braking capability.		Amber

Brake System Warning and Indicator Lamps		
Lamp Description		Color
	Engine Brake Indicates the engine brake is enabled.	Green

Table 13.1, Brake System Warning and Indicator Lamps

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.

Primary Air Brake System

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).

Secondary Air System

Loss of air pressure in the secondary air system causes the front service 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).

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 an 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.

Brake Systems

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. 13.1](#). 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.

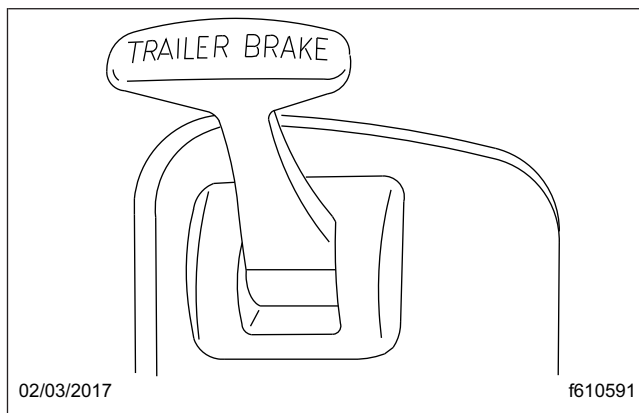


Fig. 13.1, Trailer Brake Lever

The red octagonal-shaped knob in the control panel actuates the trailer air supply valve. See [Fig. 13.2](#). 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 35 to 45 psi (241 to 310 kPa), the trailer air supply valve automatically pops out, exhausting the trailer air supply, and applying the trailer service or spring parking brakes.

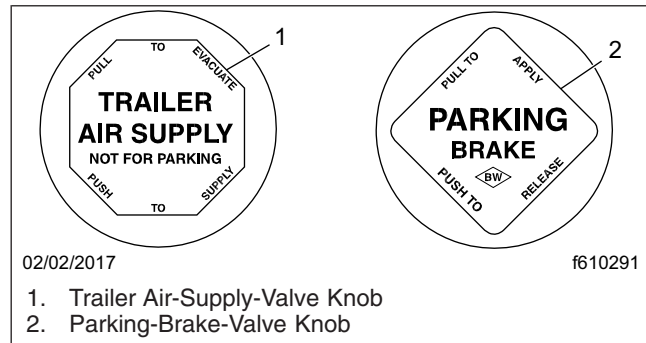


Fig. 13.2, Brake Valve Knobs

The yellow diamond-shaped knob in the control panel actuates the parking brake valve. See [Fig. 13.2](#). 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.

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 (448 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 behind the center dash). 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 vehicle ABS warning lamp (see [Table 13.1](#)) illuminates and the control circuit where the failure occurred is switched to normal braking action. 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 (see [Table 13.1](#)) during vehicle start-up and fault detection.

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:

Brake Systems

- 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.

ATC includes a deep snow and mud option to increase available traction on extra soft surfaces like snow, mud, or gravel. A rocker switch labeled ATC will be located on the dash. See [Fig. 13.3](#). Pressing the switch will temporarily allow more drive wheel spin. The activation of the deep snow and mud option is indicated by a flashing WHEEL SPIN lamp. See [Table 13.1](#). Pressing the switch again will cycle the system back to normal operation.

NOTICE

The deep snow and mud option 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.

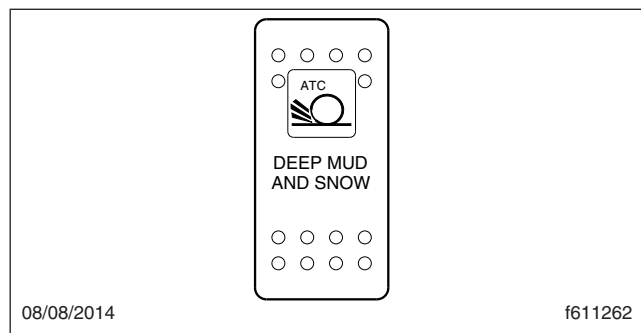


Fig. 13.3, ATC Switch

After the ignition switch is turned on, the vehicle ABS lamp and the WHEEL SPIN indicator lamp come on for about three seconds. After three seconds, the warning lights go out if all of the tractor's ABS components are working.

IMPORTANT: If any of the ABS warning lights do not work as described above, or come 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.

When Load Transfer mode is active, "Load Transfer" will display in the message field of the driver message center. See [Figure 13.4](#).

Load transfer mode will automatically deactivate when the vehicle reaches 45 mph (72 kmh).

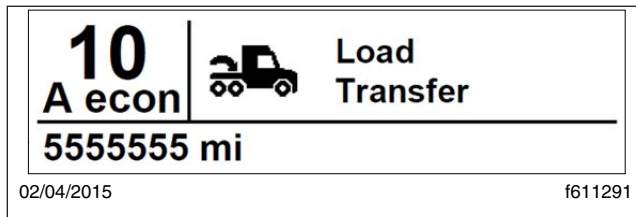


Fig. 13.4, Load Transfer Notification

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 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 instrument panel. See [Table 13.1](#).

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.

WARNING

The engine brake must be disengaged when shifting gears using the clutch pedal. If the engine brake is engaged when the transmission is in neutral, the braking power of the engine brake can stall the engine, which could result in loss of vehicle control, possibly causing personal injury and property damage.

"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.

Vehicles equipped with ABS have 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.

Brake Systems

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. 13.5](#).

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 4](#).

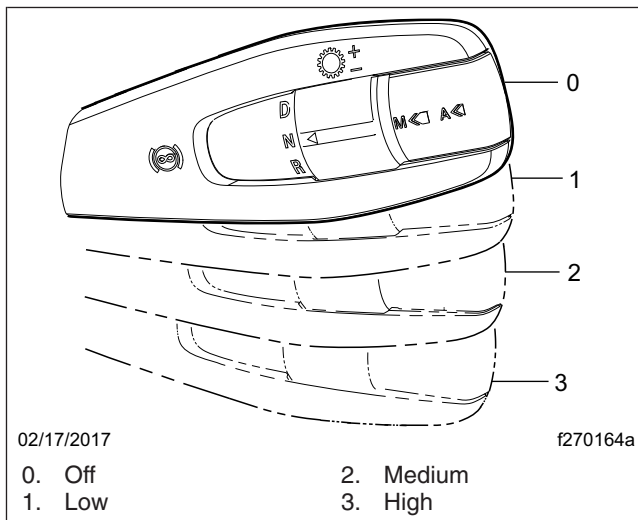


Fig. 13.5, Engine Brake Positions, Detroit Multifunction Control

Steering System

Power Steering System	14.1
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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.

Steering Wheel Adjustment

When there is no load on the vehicle and the front tires are pointed straight ahead, the standard steering wheel spokes should be at the 3 o'clock and 9 o'clock positions or within 10 degrees of these positions. See [Fig. 14.1](#).

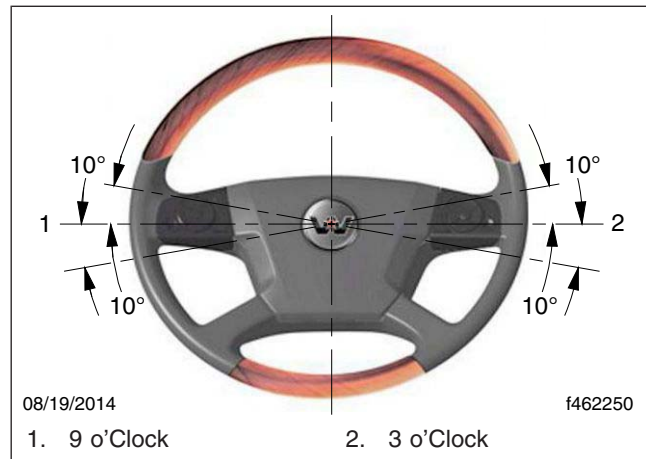


Fig. 14.1, Steering Wheel Centered

Automated Transmissions

Detroit™ Automated Transmissions	15.1
Eaton® Fuller® Automated Transmissions	15.5
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Automated Transmissions

Detroit™ Automated Transmissions

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 17](#) for information about the interaxle differential lock.

Detroit™ Multifunction Control

Vehicles with Detroit transmissions use the control shown in [Fig. 15.1](#). This control can be used to request manual shifts, change driving mode, and set engine brake levels. See [Table 15.1](#) for an overview of control functionality.

D/N/R Switch

Use the "D/N/R Switch" to request drive (D), neutral (N), or reverse (R).

Mode Switch

The driving mode can be changed using the Mode switch on the shift control (see [Fig. 15.1](#)). To activate the manual drive mode, press and hold the switch briefly. Press the switch quickly to activate the automatic drive mode or change between Automatic Economy and Automatic Performance modes.

Upshifting and Downshifting

Gear shifts can be requested manually; push the lever away to request a downshift, or pull the lever toward you to request an upshift. See [Table 15.1](#) for more information about upshift and downshift requests.

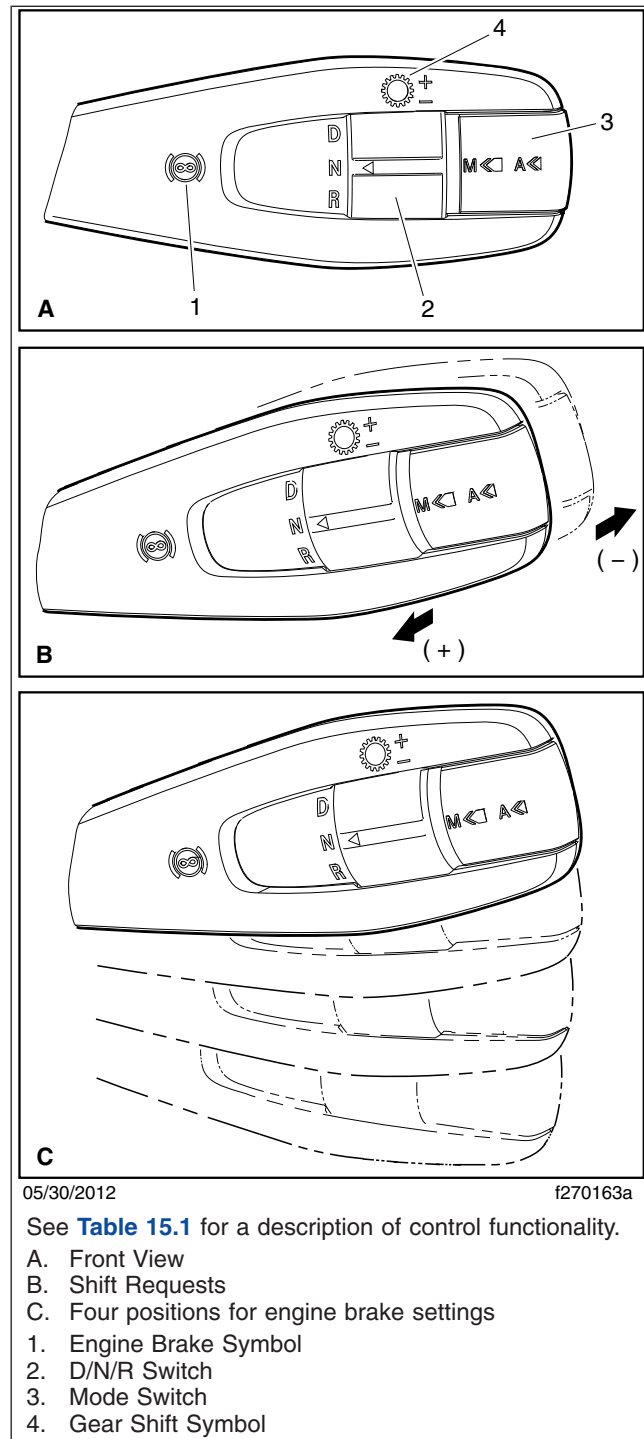


Fig. 15.1, Detroit Multifunction Control

Functionality, Detroit Multifunction Control		
Function/Switch	Action/Position	Request
D/N/R	D	Forward gears
	N	Neutral
	R	Reverse gears
Mode	Depress switch and release it quickly	Activate the automatic drive mode, or switch between Automatic Economy and Automatic Performance.
	Depress switch and hold it briefly	Activate the manual drive mode.
Upshifting and Downshifting	Pull the lever toward you momentarily	Upshift, single gear
	Pull the lever toward you in quick repetitions	Upshift, multiple gears
	Push the lever away momentarily	Downshift, single gear
	Push the lever away in quick repetitions	Downshift, multiple gears
Engine Brake*	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 4](#).

Table 15.1, Functionality, Detroit Multifunction Control

Engine Brake

The engine brake is controlled by the lever position (as shown in [Fig. 15.1](#), Ref. C). 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 13](#).

NOTE: Setting the cruise control with the engine brake on will activate Descent Control Mode. Moving the lever down to engage the engine brake after the cruise control has been set will activate Deceleration Mode. For information on these modes, see "Cruise Control" in [Chapter 4](#).

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.

Gear Display Window

The gear display window shows the current transmission gear and driving mode. See [Fig. 15.2](#).

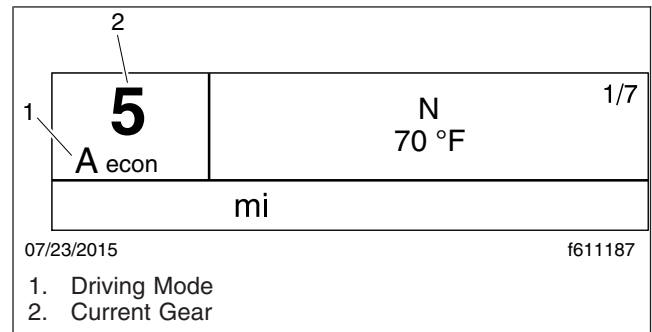


Fig. 15.2, Gear Display Window

Driving Modes

There are three driving modes: Manual, Automatic Economy, and Automatic Performance.

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. See [Chapter 4](#) for more information about upshifting and downshifting using the control.

Automated Transmissions

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.

Selected Gear

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. See Fig. 15.3.

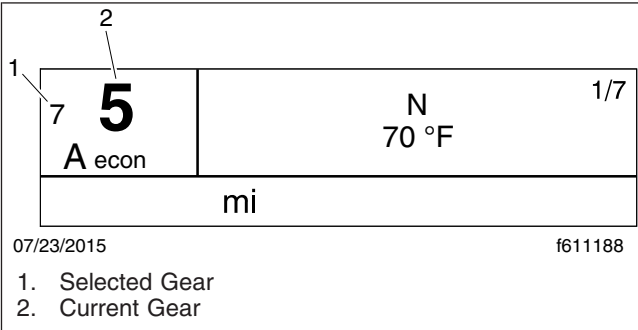


Fig. 15.3, Selected Gear Display

Suggested Shift

In Manual mode only, 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. See Fig. 15.4.

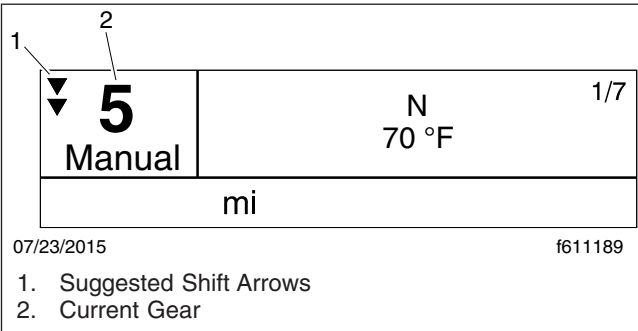


Fig. 15.4, Suggested Shift

eCoast

The eCoast feature can improve driving economy. When conditions permit, the transmission control au-

tomatically shifts the transmission to neutral to coast at speeds between approximately 22 - 55 mph (35 - 88.5 km/h), and above depending on specific programming. An "E" shows in the gear display window when eCoast is in effect. See Fig. 15.5.

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.

The eCoast function cannot be deactivated when the Automatic Economy mode is active.

NOTE: To disable eCoast, see an authorized Western Star service facility.

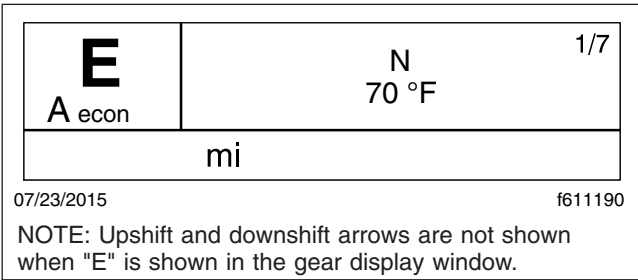


Fig. 15.5, eCoast Display

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 fully engaging the clutch. 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 within five seconds, 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.

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 15.2](#).

To avoid overheating the clutch, 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.

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 15.2, Clutch Abuse Alerts and Protections

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 2400 rpm and

Automated Transmissions

another at 2500 rpm, indicated with messages and a fault code.

Low Transmission Air Warning

Pneumatic controls are used to shift the transmission. If there is inadequate air pressure, a warning is displayed and the quality of gear shifts may be degraded. Wait for air pressure to build before operating the vehicle.

IMPORTANT: If the low transmission air warning indicator appears while the vehicle is in operation, safely pull the vehicle off the road, and correct the problem.

Eaton® Fuller® Automated Transmissions

Refer to the Eaton website (www.roadranger.com) for additional information.

General Information, Automated Transmissions

The Eaton Fuller UltraShift is a heavy-duty fully automated transmission. The UltraShift uses a dry clutch system, so no clutch pedal is required to shift gears.

The Eaton Fuller AutoShift transmission requires the driver to use the clutch to start and stop the vehicle. However, the driver does not need to use the clutch to shift gears.

The Eaton Fuller automated transmissions use a shift selection module located on the dash control panel. See [Fig. 15.6](#). Shifts can be made automatically, or manually using the shift selection module.

The current gear is displayed on the indicator shown in [Fig. 15.7](#). At the start of a shift, the current gear continues to display until the transmission has been pulled into neutral. As the transmission is synchronizing for the new (target) gear, the gear indicator flashes the number of the target gear. When the shift is complete, the gear indicator displays the new gear, without flashing.

Automated Transmission Operation

Modes

The shift selection module controls the driving mode, which includes drive, manual, reverse, or low.

IMPORTANT: In all modes but low, it is possible to shift manually by pressing the upshift or

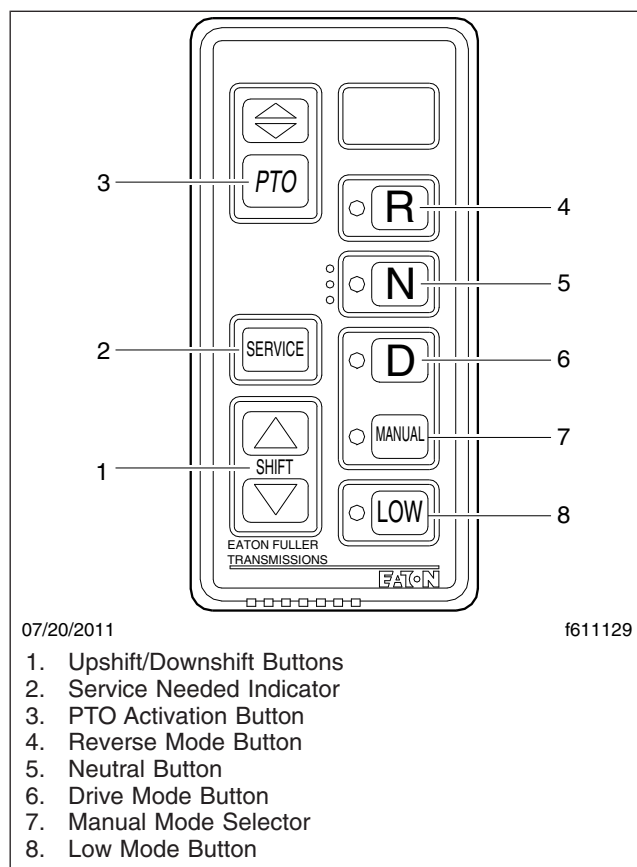


Fig. 15.6, Shift Selection Module, UltraShift and AutoShift Transmissions

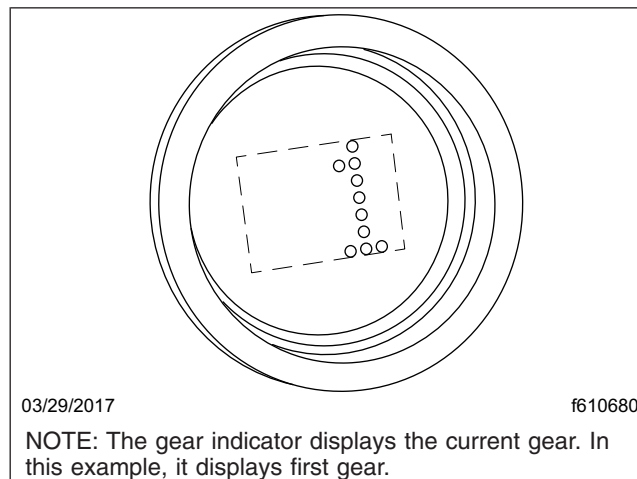


Fig. 15.7, Gear Indicator

downshift selectors as needed. When the engine speed is within 75 rpm of the load-based

shift point for an automatic shift, the transmission will advance the shift.

Drive Mode

Press the drive mode button (D) on the shift selection module to put the transmission in drive mode.

In drive mode, upshifts and downshifts are made by the transmission without driver intervention. The transmission will shift automatically when the driver presses the drive mode button (D) and depresses the accelerator pedal.

If driving conditions require, it is still possible to request a manual shift. The transmission will make the shift if the engine speed is within 75 rpm of the load-based shift point for that gear.

If the vehicle is stopped while in drive mode, the upshift/downshift buttons can be used to change the starting gear. This selection becomes the default starting gear until it is changed by the driver again, or the vehicle is shut down.

The transmission controller adapts to the working conditions of each vehicle and its driver. After power-up or a load change, it needs to learn the new conditions. While learning, it may hold a gear too long before upshifting. If this occurs, start the upshift manually. It may take three or four shifts before the transmission succeeds in learning the new load-based shift points, but after that it will handle the shifting automatically.

Automatic skip shifts may occur in drive mode if conditions are appropriate.

Manual Mode

In manual mode, upshifts and downshifts are made by the driver. This allows the driver to respond to a wide range of driving conditions, such as blind corners, tight curves, and steep hills.

To change to manual mode, press the manual mode button (MANUAL) on the shift selection module. If manual mode is selected while the vehicle is moving, the current gear will be maintained until the driver requests a shift using the proper upshift/downshift arrow button. If the manual mode is selected while the vehicle is not moving, the starting gear will be maintained until the driver requests a shift. In downhill situations in particular, the driver must be alert to vehicle speed by downshifting and/or using the service brakes as needed. A shift request will be refused if the selected gear would cause engine overspeed or excessive lugging.

To upshift, press the upshift arrow button on the shift selection module; to downshift, press the downshift arrow button. See [Fig. 15.6](#). A shift request will be refused if the selected gear would cause engine overspeed or excessive lugging.

Reverse Mode

To put the transmission in reverse, press the reverse mode button on the shift selection module.

The UltraShift transmission has two reverse gears: reverse low and reverse high. The AutoShift transmission may have multiple reverse gears. To shift manually between the reverse gears, press the upshift or downshift arrow button until the desired reverse gear is displayed.

Reverse low is the default reverse gear. When reverse low is selected, the letter R displays on the gear indicator. See [Fig. 15.8](#). When reverse high is selected, the letter H is displayed.

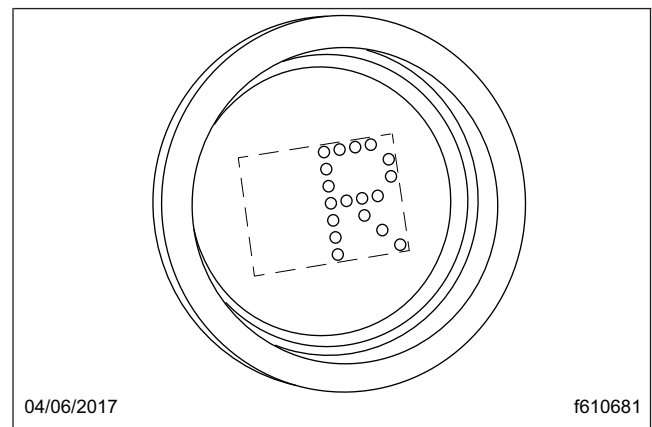


Fig. 15.8, Gear Indicator: Reverse Low Gear

IMPORTANT: Under normal conditions, do not select reverse with the vehicle moving forward.

The vehicle must be moving at less than two miles per hour (3 km/h) before selecting reverse. If reverse is selected when the vehicle is moving faster, an audible alert will sound and continue sounding at three-second intervals until the vehicle slows to the proper speed or the driver selects the drive mode.

Low Mode

Low mode should be used to maximize engine braking and minimize the use of the brake pedal. It is most useful when descending steep hills or when coming to a stop. Engine speed will be increased by 200 rpm and shift points will be offset by 200 rpm.

Automated Transmissions

To select low mode, press the low mode button (LOW) on the shift selection module. When in low, the current gear is maintained. Requests to upshift are not enabled.

IMPORTANT: If the engine is approaching overspeed, the transmission controller will override the current gear setting and upshift to prevent engine damage.

If low mode is selected from neutral while the vehicle is stopped, the vehicle will start up in first gear and stay there until the engine approaches overspeed.

Neutral

IMPORTANT: Always start the engine with the transmission in neutral (N) and the parking brake set.

WARNING

Do not coast in neutral. Coasting in neutral can cause an accident, possibly resulting in severe personal injury or death.

Neutral is always available during operation, whatever the vehicle speed. When in neutral, requests to upshift or downshift are ignored. If the driver selects drive mode while the vehicle is moving in neutral, the transmission will shift into the appropriate gear given the engine speed.

When shifting from neutral, always depress the brake pedal. If the brake pedal is not depressed, the transmission will not shift and an audible alert will sound. To reset the transmission, select neutral again and attempt the shift again, this time with the brake pedal depressed.

Before shutting down the engine, return the transmission to neutral.

Powering Up

1. With the parking brake set, turn the ignition switch on and allow the shift selection module to power up. The gear indicator will show the dot display, arranged in a square pattern. All dots in the pattern should light up, without gaps or spaces. See [Fig. 15.9](#).
2. Wait for the gear indicator to show a solid N. See [Fig. 15.10](#). When the N is solid (not flashing), the transmission controller is powered up.
3. On vehicles with an AutoShift transmission, depress the clutch pedal all the way to the floor.

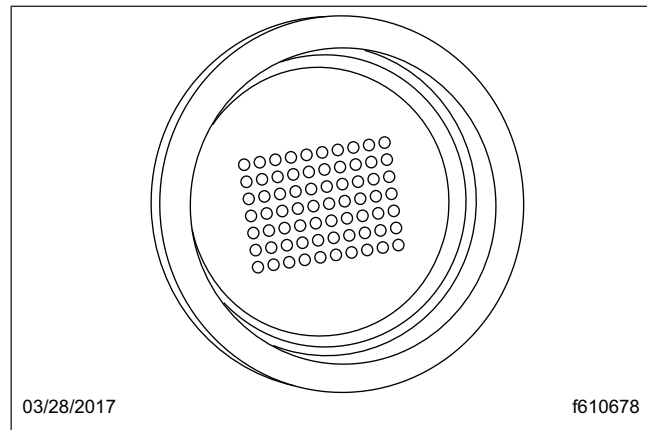


Fig. 15.9, Gear Indicator: Power Up Dot Display

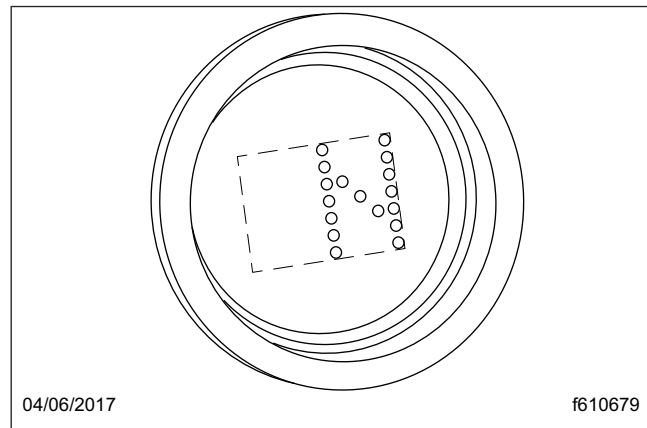


Fig. 15.10, Gear Indicator: Neutral

4. Apply the service brake and start the engine.
5. On vehicles with an AutoShift transmission, release the clutch to allow the speed sensor on the input shaft to get a reading, then depress the clutch pedal again.

NOTE: When in drive mode, the transmission defaults to second gear when starting off. If desired, the driver can select to start off in first gear. No other start gear is available.

6. Select the desired mode (drive, manual, low, or reverse), then select the desired starting gear.

WARNING

When starting or stopping on hills and grades, use extra care to prevent the vehicle from rolling back. A rollback accident could cause death, serious personal injury, or property damage.

7. On a level grade, release the parking and service brakes.
8. Move the vehicle forward by doing one of the following:
 - *Vehicles with an UltraShift transmission:* depress the accelerator pedal.
 - *Vehicles with an AutoShift transmission:* release the clutch and depress the accelerator pedal.

Powering Down

1. On vehicles equipped with an AutoShift transmission, depress the clutch pedal to the floor.
2. Bring the vehicle to a halt
3. Apply the service brakes.
4. Select neutral (N) on the shift selection module. When the N on the gear indicator is solid (not flashing), the transmission controller is ready to power down.
5. Set the parking brake and shut down the engine.

Upshifting

To request an upshift, push the upshift arrow button on the shift selection module. If the gear is available, the transmission will upshift and the new gear will display on the gear indicator. If the gear requested is unavailable, a tone will sound.

Upshifts are not available in low mode, except to prevent engine overspeed.

NOTE: The AutoShift transmission is able to perform triple upshifts when the next three higher gears are available and conditions are appropriate.

Skip shifts can be performed only in manual mode. To skip shift, press the upshift button twice or three times. The number of the gear engaged will appear on the gear indicator.

Downshifting

To request a downshift, push the downshift arrow button on the shift selection module. If the gear is available, the transmission will downshift and the new gear will display on the gear indicator. If the gear requested is unavailable, a tone will sound.

Before starting down a hill, downshift to a speed that you can control without hard pressure on the service

brakes. Before entering a curve, downshift if necessary. This lets you use some power through the curve to help the vehicle be more stable in the turn. It also allows you to regain speed faster as you come out of the curve.

NOTE: The AutoShift transmission is able to perform triple downshifts when the next three lower gears are available and conditions are appropriate.

Skip shifts can be performed only in manual mode. To skip shift, press the downshift button twice or three times. The number of the gear engaged will appear on the gear indicator.

For best engine braking, select low mode while moving. In low, downshifts are performed at higher rpm than in drive.

IMPORTANT: If the engine is approaching overspeed, the transmission controller will override the current gear setting and upshift to prevent engine damage.

Transmission Diagnostics

Clutch Protection Fault, UltraShift Transmissions

Even though a vehicle with an UltraShift transmission does not have a clutch pedal, it does have a mechanical clutch. As you slowly increase and decrease engine rpm from a stop, the mechanical clutch is engaging and disengaging, just like slipping the clutch with a manual transmission. Excessive clutch slip-page creates heat and reduces the life of the clutch. Conditions that can cause clutch damage include:

- Using the accelerator pedal to hold the vehicle on a hill
- Starting the vehicle from a stop in a gear that's too high
- Overloading the vehicle
- Using high idle with the vehicle in gear

The transmission controller is programmed to prevent clutch damage. When the clutch overheats, the following alerts take place:

- The TRANS TEMP light comes on
- The gear indicator displays "C," then "A"
- A warning tone sounds at one-second intervals

Automated Transmissions

The alerts continue until the clutch cools, the accelerator pedal is released, or the clutch is fully engaged.

System Problem

In the event of a problem, complete the following steps.

1. Note the driving conditions at the time the problem occurred.
2. Record the status of the transmission at the time of the problem (current mode, current gear, engine speed, etc.).
3. Complete the transmission reset procedure.

Transmission Reset Procedure

In some cases, proper transmission operation can be restored by resetting the transmission controller.

1. When it is safe to do so, stop the vehicle.
2. Select neutral by pressing the neutral button (N) on the shift selection module.
3. Set the parking brake.
4. Shut down the engine.
5. Wait at least two minutes.
6. Restart the engine.
7. If the problem continues or the transmission doesn't achieve neutral after power-up, contact an authorized Western Star or Eaton service facility.

Locked In Gear

If the vehicle is shut down while in gear, the transmission may become locked in gear. The transmission will attempt to get to neutral during the next power-up if neutral is selected on the shift selection module. If neutral can't be achieved, a dash (–) will appear on the gear indicator when the vehicle is restarted.

Complete the following steps.

1. Set the parking brake.
2. Turn off the ignition and wait at least two minutes.
3. Depress the brake pedal and release the parking brake.
4. On vehicles with an AutoShift transmission, depress the clutch partway to the floor.

5. Select neutral by pressing the neutral button (N) on the shift selection module, then turn on the ignition key. Do not attempt to start the engine yet.
6. Release the pressure on the brake pedal slightly.
7. Once the transmission is in neutral, a solid N will appear on the gear indicator and the vehicle will start. Apply the service brakes and start the engine.
8. If the gear indicator continues to display a dash, contact an authorized Western Star or Eaton service facility.

Allison Automatic Transmissions

Refer to the Allison website for additional information (www.allisontransmission.com).

General Information, Allison Transmissions

HD-series automatic transmissions have six forward speeds and one reverse speed. These 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), press the Mode button. See [Fig. 15.11](#).

"MODE ON" is displayed in the indicator panel just above the push buttons. A label just above the Mode button identifies the special function.

NOTE: Each time a button is pressed on the shift selector, a short beep will be heard. This indicates that the ECU has received input to change operation.

The HD-series transmission is designed to warn the driver of transmission malfunctions. The driver should know the extent of the warning system in order to safely operate the vehicle.

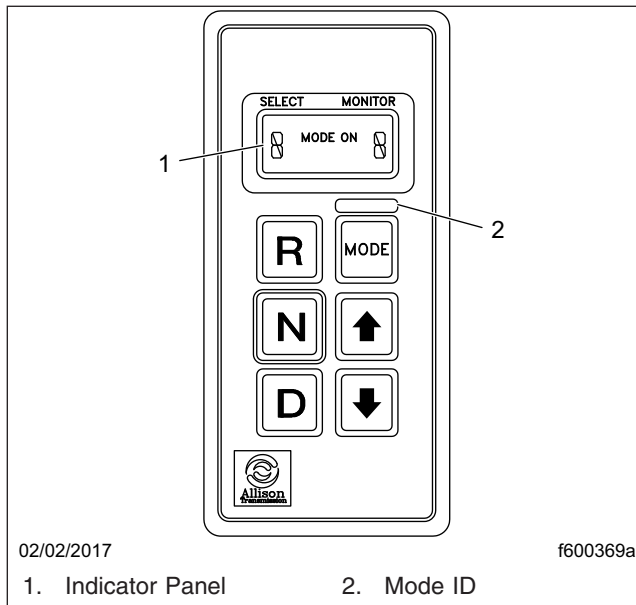


Fig. 15.11, Allison Push Button Shift Selector

Allison Transmission Operation

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.

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.

The following tips highlight important operation principles.

- Start the engine, then check the digital display on the shift selector. Under "Select" at the top of the unit, the display should always show the "primary" shift mode. Under "Monitor," the current gear should be displayed.

- Use reverse to back the vehicle. Completely stop the vehicle before shifting from a forward gear to reverse, or from reverse to forward. There is only one reverse gear.
- Select drive (D) for all normal driving conditions. The vehicle will start out in 1st gear, and as speed increases, the transmission will upshift through each gear automatically. As the vehicle slows down, the transmission will downshift 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 near the governed speed of the engine. A partially depressed 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.

Use the up or down buttons on the shift selector to reach the desired gear. The "SELECT" indicator will display your choice, and the "MONITOR" indicator will show the selected gear once it is reached. In the lower gear ranges, the transmission will not upshift above the highest gear selected unless the engine governed speed is exceeded.
- Use neutral and apply the parking brake when the vehicle is parked with the engine running.

Manual Transmissions and Clutch

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Eaton Fuller 13-Speed and 18-Speed Splitter and Range-Shift Transmissions	16.1
Eaton Fuller 10-Speed Range-Shift Transmissions	16.4
Clutch	16.5

Manual Transmissions and Clutch

Eaton® Fuller® Transmission Operation Tips

NOTE: Refer to the Eaton website (www.roadranger.com) for additional information.

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.

Eaton Fuller 13-Speed and 18-Speed Splitter and Range-Shift Transmissions

NOTE: Refer to the Eaton website for additional information, www.roadranger.com.

General Information, Eaton Fuller Splitter and Range-Shift Transmissions

Combination splitter and range-shift transmissions allow the choice of two splitter ratios in each lever position as well as the additional ratio provided in each lever position after shifting to the other range.

IMPORTANT: Not all lever positions are used in each range and the shift patterns vary between transmissions. Be sure to read the shift pattern decal for the specific transmission installed in your vehicle. The shift pattern decal may be found on the shift knob, the dash, or the visor.

13-Speed RTLO Models

Eaton Fuller 13-speed transmissions have thirteen forward speeds and two reverse speeds. Each transmission consists of a 5-speed front section, and a 3-speed auxiliary section. The auxiliary section contains low- and high-range ratios, plus an overdrive splitter gear. See [Fig. 16.1](#) for the shift pattern.

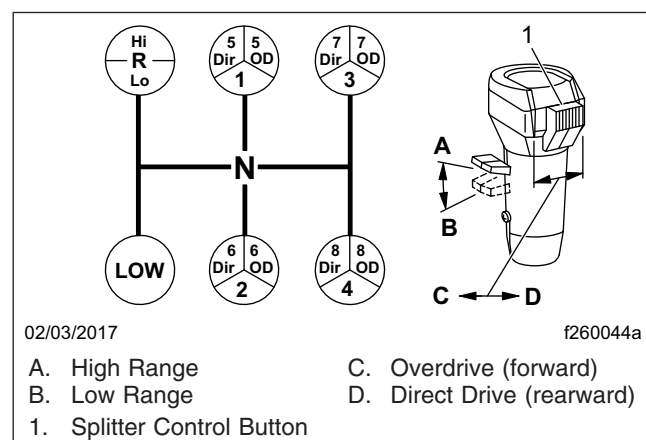


Fig. 16.1, Eaton Fuller 13-Speed Transmission Shift Pattern

All of the 13 speeds are controlled with one shift lever. A range preselection lever and a splitter control

button are built into the shift knob. The range preselection lever controls range selection and the splitter control button (located on the side of the shift knob) controls gear splits.

Low gear in the front section is used only as a starting ratio. The remaining four forward positions are used once in the low range and once in the high range. However, each of the four high range gear positions can be split with the underdrive ratio (RT models), or overdrive ratio (RTO models) of the splitter gear. Ratios cannot be split while the transmission is in low range.

18-Speed RTLO Splitter and Range-Shift Models

Eaton Fuller 18-speed transmissions have 18 forward speeds and four reverse speeds. These transmissions consisting of a 5-speed front section and a 3-speed auxiliary section. The auxiliary section contains low and high range ratios, plus an overdrive splitter gear.

One ratio in the front section (low) is used as a starting ratio; it is never used when the transmission is in high range. Low gear can be split to provide both a direct and an overdrive ratio.

The other four ratios in the front section are used once in low range and once again in high range; however, each of the five ratios (low–1–2–3–4) in low range and each of the four ratios (5–6–7–8) in high range can be split with the overdrive splitter gear.

All of the 18 speeds are controlled with one shift lever. A range preselection lever and a splitter control button are built into the shift knob. The range preselection lever controls range selection and the splitter control button (located on the side of the shift knob) controls gear splits.

Operation, Eaton Fuller Splitter and Range-Shift Transmissions

IMPORTANT: The shifter knob has an interlock feature that prevents the splitter control button from being moved forward when the range preselection lever is down (in low range); when in high range and the splitter control button is in the forward position, the range preselection lever cannot be moved down.

Upshifting

1. Position the gear shift lever in neutral. Start the engine, and bring the air system pressure up to 100 to 120 psi (689 to 827 kPa).
2. Position the range preselection lever down, into low range. See [Fig. 16.2](#).

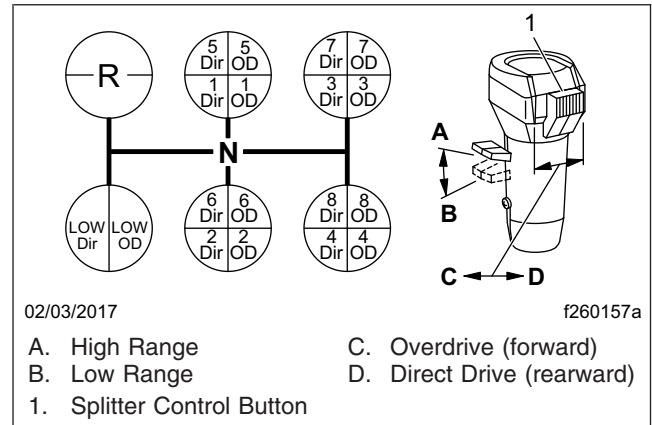


Fig. 16.2, Eaton Fuller 18-Speed Transmission Shift Pattern

3. Make sure the splitter control button is in the direct (rearward) position. See [Fig. 16.2](#).
4. For 13-speed transmissions:
Press the clutch to the floor, shift into low or 1st gear; then engage the clutch, with the engine at or near idle speed, to start the vehicle moving. Accelerate to 80 percent of engine governed speed.
For 18-speed transmissions:
Press the clutch to the floor, shift into low; then engage the clutch, with the engine at or near idle speed, to start the vehicle moving.
To shift from low direct to low overdrive, move the splitter control button into the overdrive (forward) position, then immediately release the accelerator. Press and release the clutch pedal. After releasing the clutch, accelerate again.
5. For 13-speed transmissions:
Shift upward from low to 1st gear, 2nd, etc. until 4th gear, double-clutching between shifts, and accelerating to 80 percent of engine governed speed. See [Fig. 16.1](#).
For 18-speed transmissions:

Manual Transmissions and Clutch

Shift upward from low overdrive to 1st direct by first moving the splitter control button into the direct (rearward) position (**Fig. 16.2**). Move the shift lever, double-clutching, to the 1st gear position.

Continue upshifting through the shift pattern. Double-clutch during lever shifts (1st to 2nd to 3rd to 4th); single-clutch during split shifts (1st direct to 1st overdrive, etc.).

6. When in 4th gear (13-speed transmissions) or 4th overdrive (18-speed transmissions) and ready to shift up to 5th gear, use the range shift lever as follows:

For 13-speed transmissions:

While in 4th gear, pull the range shift preselection lever up, into high range. The transmission will automatically shift from low to high range as the shift lever passes through neutral. Then, disengage the clutch; double-clutch through neutral; move the shift lever to 5th gear; engage the clutch, and accelerate the engine.

For 18-speed transmissions:

While in 4th overdrive, pull the range shift preselection lever up, into high range. The transmission will automatically shift from low to high range as the shift lever passes through neutral.

Move the shift lever, double-clutching, to the 5th gear position. Just before making final clutch engagement, move the splitter control button to the direct (rearward) position; then engage the clutch and accelerate. Do not move the control button while the shift lever is in neutral.

7. Shift up through the high range gears as follows:

For 13-speed transmissions:

To shift from 5th direct to 5th overdrive, move the splitter control button (**Fig. 16.1**) into the overdrive (forward) position, then immediately release the accelerator. Press and release the clutch pedal. After releasing the clutch, accelerate again.

Continue upshifting through the shift pattern. Double-clutch during lever shifts (6th to 7th to 8th); single-clutch during split shifts (6th direct to 6th overdrive, etc.).

For 18-speed transmissions:

To shift from 5th direct to 5th overdrive, move the splitter control button (**Fig. 16.2**) into the overdrive (forward) position, then immediately release

the accelerator. Press and release the clutch pedal. After releasing the clutch, accelerate again.

Continue upshifting through the shift pattern. Double-clutch during lever shifts (6th to 7th to 8th); single-clutch during split shifts (6th direct to 6th overdrive, etc.).

Downshifting

1. Downshift from 8th overdrive to 8th direct without moving the shift lever. Flip the splitter control button to the direct (rearward) position, then immediately release the accelerator, and disengage the clutch. Engage the clutch, and accelerate the engine only after the transmission has shifted.
2. Start the downshift from 8th direct to 7th overdrive by flipping the splitter control button to the overdrive (forward) position; then, immediately double-clutch through neutral, moving the shift lever from 8th to 7th gear.
3. Shift downward through each of the high range gears, alternating the procedures in steps 1 and 2, above, until reaching 5th direct.
4. While in 5th direct and ready for the downshift to 4th (13-speed transmissions) or 4th overdrive (18-speed transmissions), push the range preselection lever down. Then, double-clutch through neutral and move the shift lever to the 4th gear position. On 18-speed transmissions, move the splitter control button to the overdrive (forward) position *before* engaging the clutch. Do not move the control button while the shift lever is in neutral.

5. Continue downshifting from 4th to 1st as follows:

For 13-speed transmissions:

Downshift through the low range gears as conditions require.

For 18-speed transmissions:

Continue downshifting from 4th overdrive to 4th direct, then 4th direct to 3rd overdrive, 3rd overdrive to 3rd direct, etc. Single-clutch when split shifting (direct to overdrive, overdrive to direct). Double-clutch when making lever shifts (4th to 3rd, 3rd to 2nd, etc.).

IMPORTANT: Never use the clutch brake when downshifting, or as a brake to slow the vehicle.

Eaton Fuller 10-Speed Range-Shift Transmissions

NOTE: Refer to the Eaton website for additional information, www.roadranger.com.

General Information, Eaton Fuller Range-Shift

To operate a range-shift transmission, move the shift lever through all the low gear positions and then activate a range switch to provide an additional set of ratios in the high range. Using the same shift lever positions as in low range, move the shift lever through each position as before. On some models, the initial low gear is often used only in low range.

IMPORTANT: Not all lever positions are used in each range and the shift patterns vary between transmissions. Be sure to read the shift pattern decal for the specific transmission installed in your vehicle. The shift pattern decal may be found on the shift knob, the dash, or the visor.

10-Speed FR/FRO and RT/RTO/RTX Models

Eaton Fuller 10-speed transmissions have 10 selective, evenly spaced forward ratios. Each transmission has a 5-speed front section and a 2-speed rear range section. The 10 forward speeds are obtained by twice using a 5-speed shift pattern: the first time in low range, the second time in high range. See [Fig. 16.3](#) for the shift patterns.

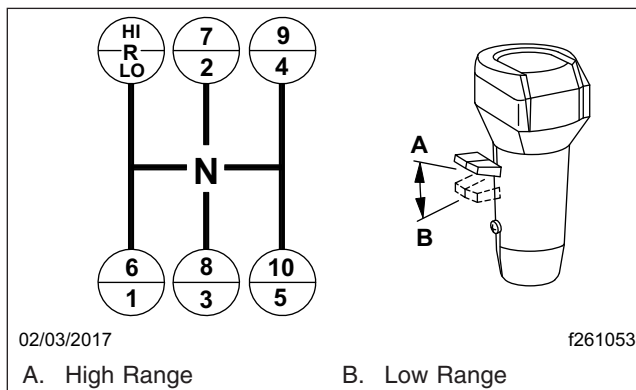


Fig. 16.3, Eaton Fuller 10-Speed Transmission Shift Patterns

NOTE: The 4th/9th and the 5th/10th shift positions in the RT (direct ratio) and RTX (overdrive

ratio) transmissions are directly opposite in the RTO (overdrive ratio) transmissions

Operation, Eaton Fuller Range-Shift Upshifting

1. Position the gear shift lever in neutral. Start the engine, and bring the air system pressure up to 100 to 120 psi (689 to 827 kPa).
2. Position the range preselection lever down, into low range.
3. Press the clutch pedal to the floor; shift into low or 1st gear ([Table 16.1](#)), then engage the clutch, with the engine at or near idle speed, to start the vehicle moving. Accelerate to 80 percent of engine governed speed.

Eaton Fuller Shift Progressions			
TRANS. MODEL	LOW RANGE		HIGH RANGE
	Off-Highway	On-Highway	
10-Speed Direct or Overdrive (RT or RTX)			

Table 16.1, Eaton Fuller Range-Shift Shift Progressions

4. Shift progressively upward from low or 1st gear, to the top gear in low range ([Table 16.1](#)), double-clutching between shifts, and accelerating to 80 percent of engine governed speed.
5. While in the top gear of the low range shift pattern, and ready for the next upshift, flip the range preselection lever up into high range. Double-clutch through neutral, and shift into the bottom gear in high range ([Table 16.1](#)). As the shift lever passes through neutral, the transmission will automatically shift from low range to high range.
6. With the transmission in high range, shift progressively upward through each of the high range gears ([Table 16.1](#)), double-clutching between shifts.

Downshifting

1. With the transmission in high range, shift progressively downward to the bottom gear in high range, double-clutching between shifts.
2. When in the bottom gear of the high range shift pattern, and ready for the next downshift, push

Manual Transmissions and Clutch

the range preselection lever down into low range. Double-clutch through neutral, and shift into the top gear of the low range shift pattern. As the shift lever passes through neutral, the transmission will automatically shift from high range to low range.

3. With the transmission in low range, downshift through the low range gears as conditions require.

IMPORTANT: Never use the clutch brake when downshifting, or as a brake to slow the vehicle.

Clutch

General Information

The hydraulic clutch control system consists of a pedal unit and a slave cylinder, connected by a hydraulic hose and fastened with quick-disconnect clamps. The components of the system have been specially designed to use DOT 4 brake fluid. The pedal unit includes a hydraulic subassembly, composed of the master cylinder and reservoir, which can be removed from the pedal unit for service purposes. When the clutch pedal is depressed, the fluid in the master cylinder is forced through a hydraulic line to the slave cylinder. The fluid pressure moves the slave cylinder piston, pushing the plunger rod and clutch release lever, which disengages the clutch. The hydraulic system is self-adjusting.

Clutches are designed to absorb and dissipate more heat than encountered in typical operation. The temperatures developed in typical operation will not break down the clutch friction surfaces. However, if a clutch is slipped excessively, or asked to do the job of a fluid coupling, high temperatures develop quickly and destroy the clutch. Temperatures generated between the flywheel, driven discs, and pressure plates can be high enough to cause the metal to flow and the friction facing material to char and burn.

Heat and wear are practically nonexistent when a clutch is fully engaged. But during the moment of engagement, when the clutch is picking up the load, it generates considerable heat. An improperly adjusted or slipping clutch will rapidly generate sufficient heat to destroy itself.

To ensure long service life of the clutch, start in the right gear, be alert to clutch malfunctions, and know when to adjust the clutch.

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 Western Star 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.

Moving the Vehicle in the Proper Gear

An empty truck can be started in a higher transmission gear than can a partially or fully loaded truck. A good rule of thumb for the driver to follow is to select the gear combination that allows the vehicle to start moving with an idling engine, or, if necessary, just enough throttle to prevent stalling the engine. After the clutch is fully engaged, the engine can be accelerated to the correct rpm for the upshift into the next higher gear.

Gear Shifting Techniques

Shift into the next higher gear when the vehicle speed allows the transmission input shaft speed to match the flywheel speed when engaging the clutch. This technique results in the smallest speed difference between the clutch disc and the flywheel and causes the least heat and wear on the clutch assembly. When downshifting, the input shaft speed must be increased by slightly revving the engine to match the flywheel speed for smooth clutch engagement. For transmission operating instructions, refer to the transmission headings in this manual.

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Vehicle Loading

Clutches are designed for specific vehicle applications and loads. These weight limitations should not be exceeded.

NOTICE

Exceeding vehicle load limits can not only result in damage to the clutch, but can also damage the entire powertrain.

Using the Clutch

The clutch pedal must be used only to start the vehicle moving or while shifting. To start the vehicle moving, depress the clutch pedal all the way to the floor plate (see "Using the Clutch Brake") and shift from neutral to a low gear. Slowly raise your foot until the clutch starts to engage. In this position the clutch is starting to connect the transmission input shaft to the flywheel and is causing the most heat and wear. Slightly increase the engine speed and smoothly allow the clutch pedal to return to its at rest position. Do not allow the clutch to remain in the partially engaged position any longer than necessary to obtain a smooth start.

To shift gears while the vehicle is moving, push the clutch pedal most of the way (but not all of the way) to the floor plate. Shift the transmission into neutral and fully release the clutch pedal. If upshifting, wait long enough for the engine speed to decrease to the road speed. If downshifting, increase the engine speed to match the road speed. Again, push down the clutch pedal part way and then move the shift lever to the next gear position. Fully release the clutch pedal after completing the shift.

Slightly depressing the clutch pedal while driving is damaging to the clutch, because partial clutch engagement causes slippage and heat. Resting your foot on the clutch pedal will also put a constant thrust load on the release bearing, thinning the bearing lubricant and increasing the wear on the bearing.

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 Maintenance

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

Manual Transmissions and Clutch

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.

NOTICE

Operating the vehicle with incorrect free pedal could result in clutch damage.

Hydraulic Clutch Fluid Reservoir Checking

Make sure that the clutch fluid reservoir is full. See [Fig. 16.4](#). The reservoir is full when the fluid level is up to the "max" mark. The fluid level must always be above the "min" mark. Use only heavy-duty brake fluid, DOT 4, in the clutch hydraulic system.

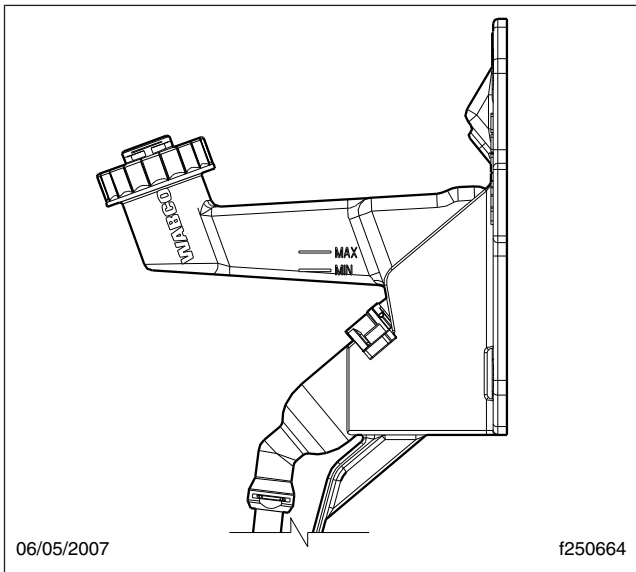


Fig. 16.4, Clutch Fluid Reservoir

Drive Axles

Differential Lock, Drive Axles	17.1
Interaxle Lock, Tandem Axles	17.2
Transfer Cases	17.3

Drive Axles

Differential Lock, Drive Axles

The driver-controlled differential lock feature (side-to-side wheel lock, traction control, or traction equalizer) is available on vehicles with single- or tandem-drive axles.

The differential lock provides maximum traction for slippery conditions by forcing the wheels on each drive axle governed by the switch to rotate together. When the differential lock is engaged, the clutch collar completely locks the differential case, gearing, and axle shafts together, maximizing the traction of both wheels.

Differential Lock Switch

Each differential lock is controlled by a switch on the dash. See [Fig. 17.1](#).

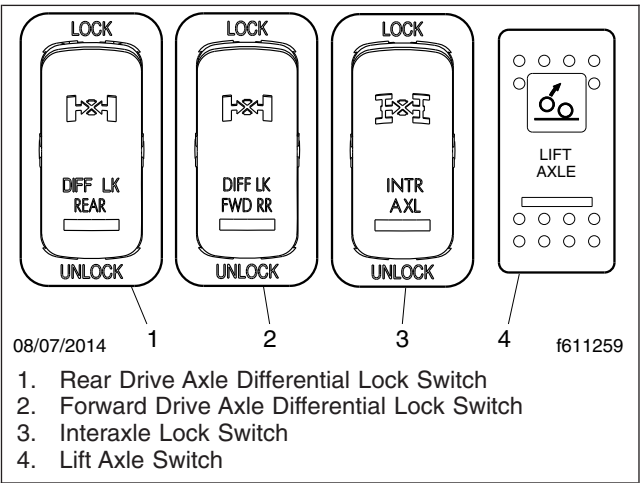


Fig. 17.1, Axle Switches

Differential Lock Operation

**WARNING**

Locking the wheels when the vehicle is traveling down steep grades or when the wheels are slipping could damage the differential and/or lead to loss of vehicle control, causing personal injury and property damage.

NOTICE

Engage the differential lock only when the vehicle is stopped or moving slowly at low speed, less than 5 mph (8 km/h). Engaging the differen-

tial lock at high speeds 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 differential lock is engaged when the engine is shut down, the differential lock will disengage.

1. With the engine running, press the upper half of the differential lock switch to engage the differential lock.
2. If the vehicle is moving, briefly let up on the accelerator to relieve torque on the gearing, allowing the differential to fully lock.

**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. 17.2](#).

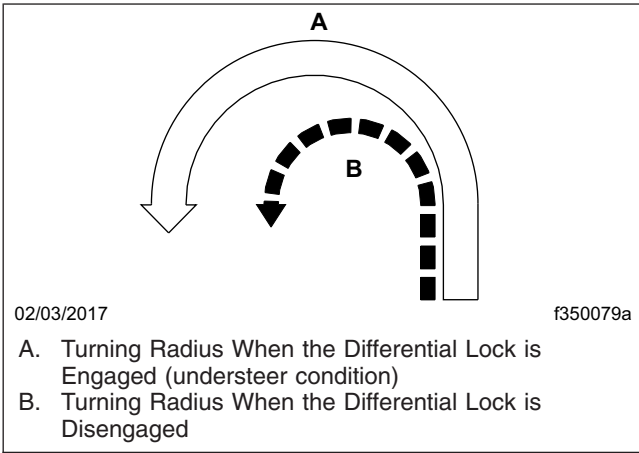


Fig. 17.2, Turning Radii

4. Press the lower half of the differential lock switch to disengage the differential lock 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.

Interaxle Lock, Tandem Axles

NOTICE

When the interaxle differential (IAD) lock is engaged on a tandem axle that has tires with varying diameters, the wheels of one axle try to rotate at a different speed than the other axle. In this event, torque builds up between the drive axles, which prevents the IAD lock from disengaging and leads to a severe increase in axle operating temperature that can cause premature oil failure and result in gear, bearing, or seal damage. Using the interaxle differential lock on a tandem axle with different size tires can cause catastrophic damage to the axle and axle components.

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.

See the axle manufacturer's website for more information.

Interaxle Lock Switch

The interaxle lock switch (see [Fig. 17.1](#), item 3) allows the driver to lock the drive axles together.

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.

1. With the engine running, press the upper half of the interaxle lock switch to engage the interaxle lock. Do not wait until traction is lost and the tires are spinning before engaging the interaxle lock.
2. If the vehicle is moving, briefly let up on the accelerator until the interaxle lock engages. The red interaxle indicator light illuminates on the dash message center when interaxle lock is engaged.

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.

3. Proceed over poor road conditions with caution.
4. Press the lower half of the interaxle lock switch to disengage the interaxle lock after leaving poor road conditions.
5. If the vehicle is moving, briefly let up on the accelerator to allow the interaxle lock to disengage, then resume driving at normal speed. Once the interaxle lock disengages, the indicator light will go off.

Drive Axles

Transfer Cases

Meritor MTC Series

Some vehicles are equipped with a Meritor MTC Series transfer case for part-time 4x4, 6x6, or 8x8 operation. Meritor MTC Series transfer cases have two gear sets: HIGH RANGE and LO RANGE.



WARNING

Do not engage a Meritor MTC Series transfer case when driving on normal highway conditions. Severe personal injury and/or damage to components can result when the transfer case is mis-used.

IMPORTANT: Steer axle engagement is limited to 20% or less of annual vehicle mileage.

Follow the operating guidelines in [Table 17.1](#) when driving a vehicle equipped with a Meritor MTC transfer case.

Engaging and Disengaging the Steer Axle

Dash-mounted switches control the transfer case functions; see [Chapter 4](#) for more information.

IMPORTANT: The wheels must not slip during engagement of the steer axle driveline.

To engage the steer axle driveline, drive the vehicle at a constant speed below 10 mph (16 km/h) and press the AWD switch. An audible engagement may be heard.

To disengage the steer axle, drive the vehicle at a constant speed below 10 mph (16 km/h) and press the AWD switch. An audible disengagement may be heard. If the steer axle driveline does not disengage,

the steer axle driveline coupling may be in a bind. Turn the steering wheel back and forth while driving, or briefly drive the vehicle in reverse.

Shifting Between HIGH RANGE and LO RANGE

MTC Series transfer cases use an air cylinder to shift between HIGH RANGE and LO RANGE. A dash-mounted switch operates the shift mechanism (see [Chapter 4](#) for more information).

Shift between HIGH RANGE and LO RANGE, as follows:

1. Stop the vehicle.
2. Shift the transmission to NEUTRAL.
3. Apply the parking brake.
4. Move the dash-mounted switch to the HIGH or LO RANGE position to pressurize the shift mechanism in the transfer case. An audible engagement may be heard (which is normal).
5. Shift the transmission to FIRST gear and apply light torque to test the engagement.

If the shifter does not engage when shifting from HIGH RANGE to LO RANGE, shift the transmission into REVERSE, then NEUTRAL, and apply light torque to engage the LO RANGE.

Engaging PTO

Some vehicles are equipped with a PTO mounted to a Meritor MTC transfer case. For these vehicles, engage the PTO only when the transfer case is in neutral, the transmission is in neutral/park, and the parking brake is applied. To begin using the PTO, select the drive gear based on the PTO system operators manual.

Range	Disengaged Steer Axle		Engaged Steer Axle	
	Traction Conditions	Applicable Vehicle Speeds	Traction Conditions	Applicable Vehicle Speeds
HIGH RANGE	Most normal driving conditions (such as dry or wet pavement or mixed road surfaces) when moderate to high vehicle speeds are appropriate.	0 mph (0 km/h) to maximum vehicle speed	When more traction is needed at moderate to low vehicle speeds on dirt or gravel surface with shallow to moderate grades (8% maximum), icy or snow-covered roads, or hard-packed sand.	20 mph (32 km/h) or less

Range	Disengaged Steer Axle		Engaged Steer Axle	
	Traction Conditions	Applicable Vehicle Speeds	Traction Conditions	Applicable Vehicle Speeds
LO RANGE	Not applicable. Do not use LO RANGE unless the steer axle is engaged.		When maximum power and maximum traction is needed on steeper grades (15% maximum), deeply rutted tracks, deep mud or snow, extremely rocky surfaces, or soft, loamy sand.	15 mph (24 km/h) or less
IMPORTANT: Engaging the steer axle will increase the turning radius of the vehicle.				

Table 17.1, Operating Guidelines, Meritor MTC Transfer Cases

Fifth Wheels

Fifth Wheels, General Information	18.1
Fifth Wheel Coupling	18.1
Fifth Wheel Uncoupling	18.4
Fifth Wheel Slide	18.7

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.

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 may be used to adjust the vehicle height to aid in coupling or uncoupling from a trailer. See [Fig. 18.1](#). Setting the switch to DOWN deflates the air springs to lower the rear of the vehicle. In the UP position, the air springs inflate to raise the rear of the vehicle to normal ride height.

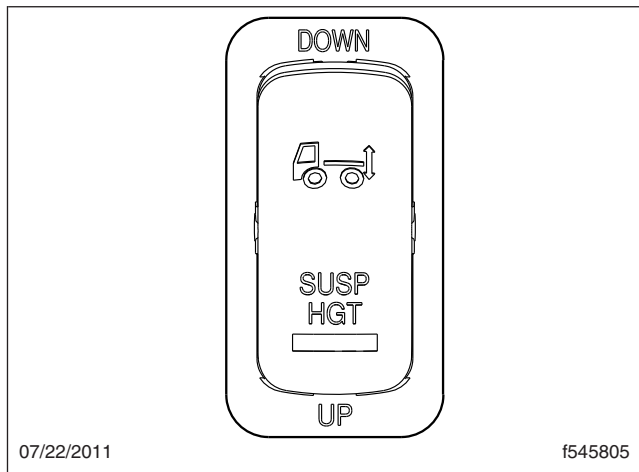


Fig. 18.1, Air Suspension Height Control Switch

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.

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 vehicle 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 *Western Star Maintenance Manual*.

Fifth Wheel Coupling

Fifth wheel coupling is activated with the lock control handle located on either the right or left side of the fifth wheel. Coupling is complete 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.

Coupling, Fontaine and Holland Fifth Wheels

NOTE: For a tractor equipped with a Jost fifth wheel, see the heading **Coupling, Jost Fifth Wheel** below.

1. Chock the front and rear trailer tires.
2. Ensure the fifth wheel jaw is fully open and the operating rod is in the unlocked position. See [Fig. 18.2](#) or [Fig. 18.3](#).

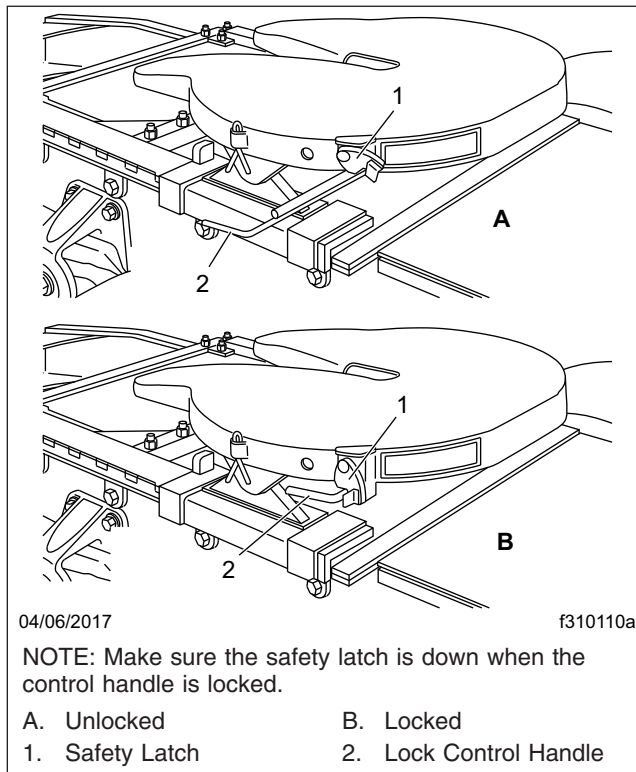


Fig. 18.2, Fontaine Locking Mechanism

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.

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. 18.4](#).

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. 18.5](#).

6. With the fifth wheel lock opening aligned with the trailer kingpin, back the tractor slowly toward the

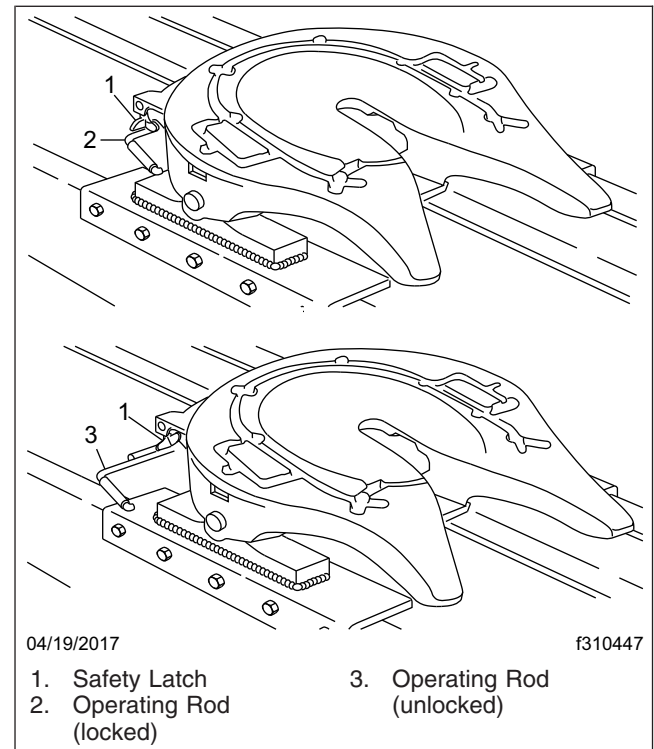


Fig. 18.3, Holland Simplex SE Locking Mechanism

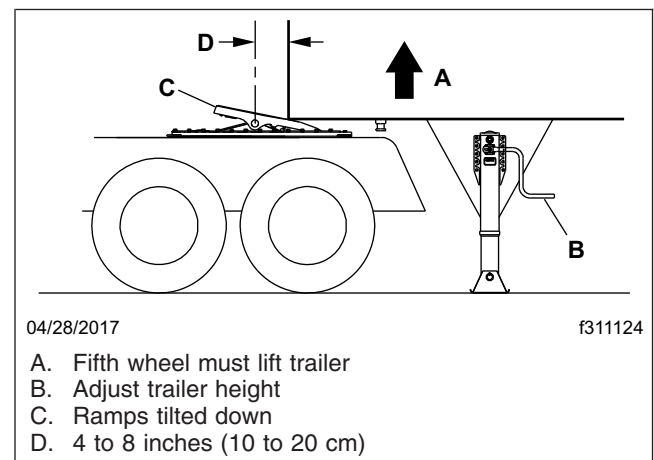


Fig. 18.4, Trailer Connection Point, Standard Fifth Wheel Plate

trailer. After sliding under the trailer, stop to avoid hitting the kingpin too hard, then resume backing slowly until the fifth wheel locks.

For a standard fifth wheel plate, the fifth wheel must lift the trailer.

For a low-lube fifth wheel plate, do not lift the trailer as this may damage the fifth wheel plate.

Fifth Wheels

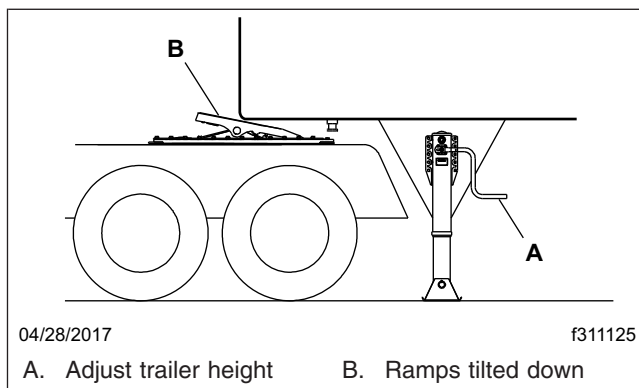


Fig. 18.5, Trailer Connection Point, Low-Lube Fifth Wheel Plate

7. Set the tractor parking brake.

! 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. 18.6](#).

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. 18.2](#) or [Fig. 18.3](#).

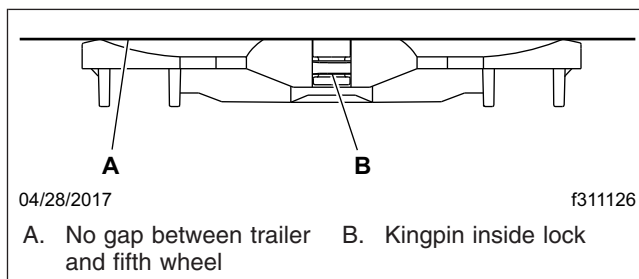


Fig. 18.6, Coupling Inspection

9. Release the tractor parking brake. Test for kingpin lockup by slowly inching the tractor forward, pulling on the trailer against the chocks.

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 and check 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 tires 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.

Coupling, Jost Fifth Wheel

NOTE: For a tractor equipped with a Fontaine or Holland fifth wheel, see the heading **Coupling, Fontaine and Holland Fifth Wheels** above.

1. Tilt the ramp down.
2. Open the kingpin locks. See [Fig. 18.7](#).
3. Back the tractor close to the trailer, centering the kingpin on the fifth wheel.
4. Chock the trailer tires.
5. Connect the air lines and electrical cable.
6. Ensure that the trailer air supply valve (trailer brake) is pulled out, and that the trailer parking brakes are set. See [Fig. 18.8](#).

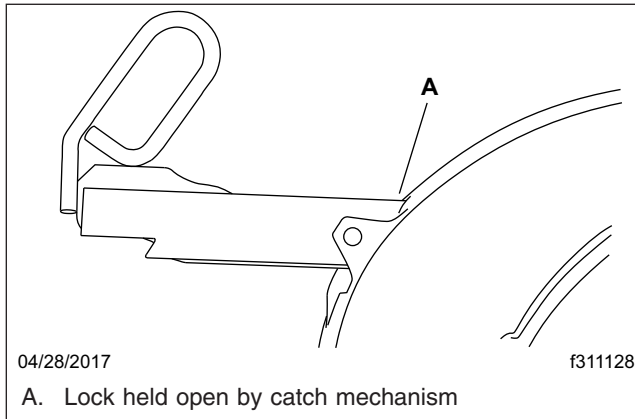


Fig. 18.7, Jost Release Handle Unlocked

NOTICE

Attempting to couple at the wrong height may cause improper coupling, which could result in damage to the fifth wheel or kingpin.

- 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. 18.4](#).

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. 18.5](#).

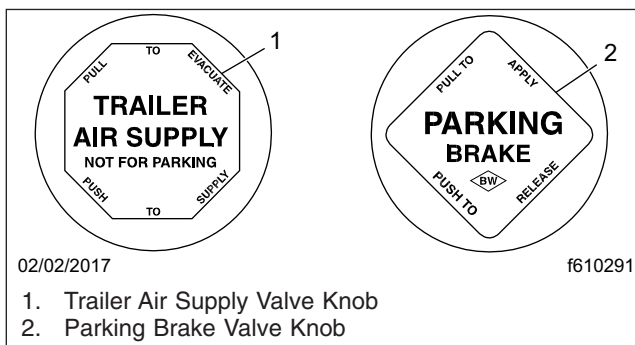


Fig. 18.8, Brake Valve Knobs

- Back the tractor under the trailer.

For a standard fifth wheel plate, the fifth wheel must lift the trailer.

For a low-lube fifth wheel plate, do not lift the trailer as this may damage the fifth wheel plate.

- After sliding under the trailer, stop to avoid hitting the kingpin too hard, then resume backing slowly until the fifth wheel locks.
- Set the tractor parking brake.

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.

- Perform a physical check for positive kingpin lockup, ensuring that there is no gap between the trailer and the fifth wheel. See [Fig. 18.6](#).
- Ensure that the release handle is in the locked position adjacent to the casting. See [Fig. 18.9](#).
- Release the tractor parking brake and test for kingpin lockup by slowly moving the tractor forward, pulling on the trailer against the chocks.

Fifth Wheel Uncoupling

Manual Uncoupling

- Set the tractor and trailer parking brakes.
- Chock the trailer rear wheels.
- Lower the trailer landing gear until the weight is removed from the fifth wheel.
- 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.
- Verify that both the parking brake and trailer air supply knobs are out (see [Fig. 18.8](#)), the tractor and trailer parking brakes are set, and that the trailer is prepared for uncoupling.
- Release the kingpin locking mechanism following the instructions for each manufacturer listed below.
 - Fontaine:** Lift the safety latch and pull the lock control handle to the unlocked position. See [Fig. 18.2](#).
 - Holland:** In the locked position the safety indicator swings freely over the operating rod. See [Fig. 18.10](#), View A.

Fifth Wheels

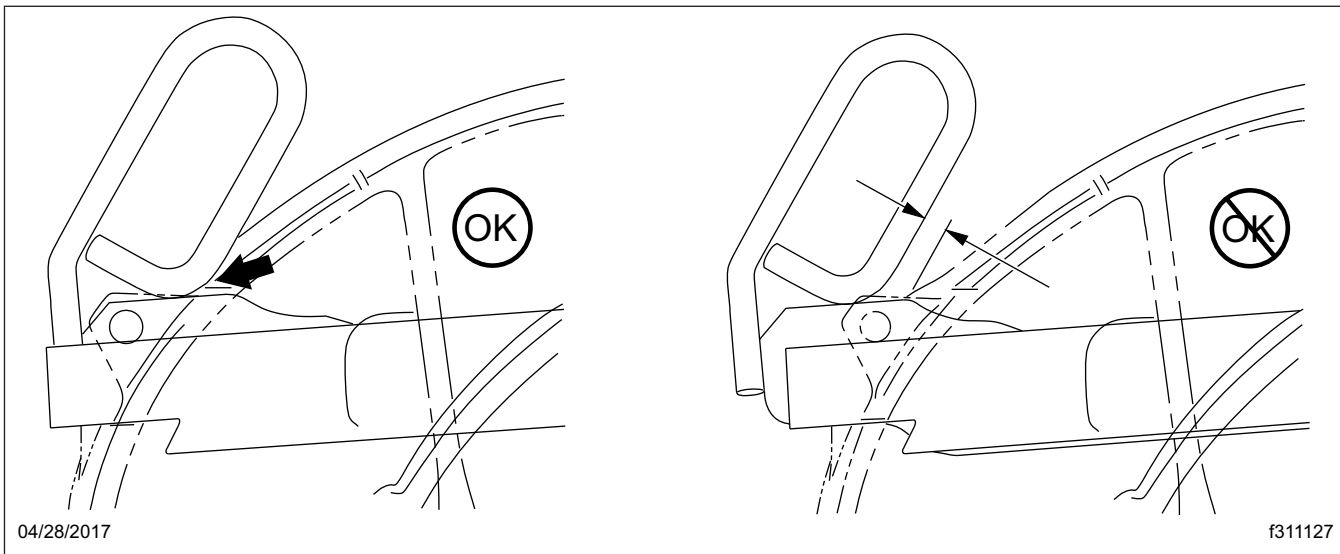


Fig. 18.9, Jost Release Handle Locked

To unlock the mechanism, manually rotate the safety indicator toward the rear of the fifth wheel. See Fig. 18.10, 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. 18.10, View C.

The fifth wheel is now in the lock 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. 18.10, 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. 18.7.
7. Release the tractor parking brake, then drive forward slowly, allowing the trailer to slide down the fifth wheel and pick-up ramps.

Air-Actuated Uncoupling

An air-actuated kingpin release valve is optional with all fifth wheels. See Fig. 18.11.

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 valve has been pulled 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.

Preparing the Trailer for Uncoupling

Before using the air valve to unlock a fifth wheel kingpin, prepare the trailer as follows.

1. Set the tractor and trailer parking brakes.
2. Chock the rear trailer tires.
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, Fontaine and Holland Fifth Wheels

1. Verify that both the parking brake and trailer-air supply knobs are out (see Fig. 18.8), the tractor

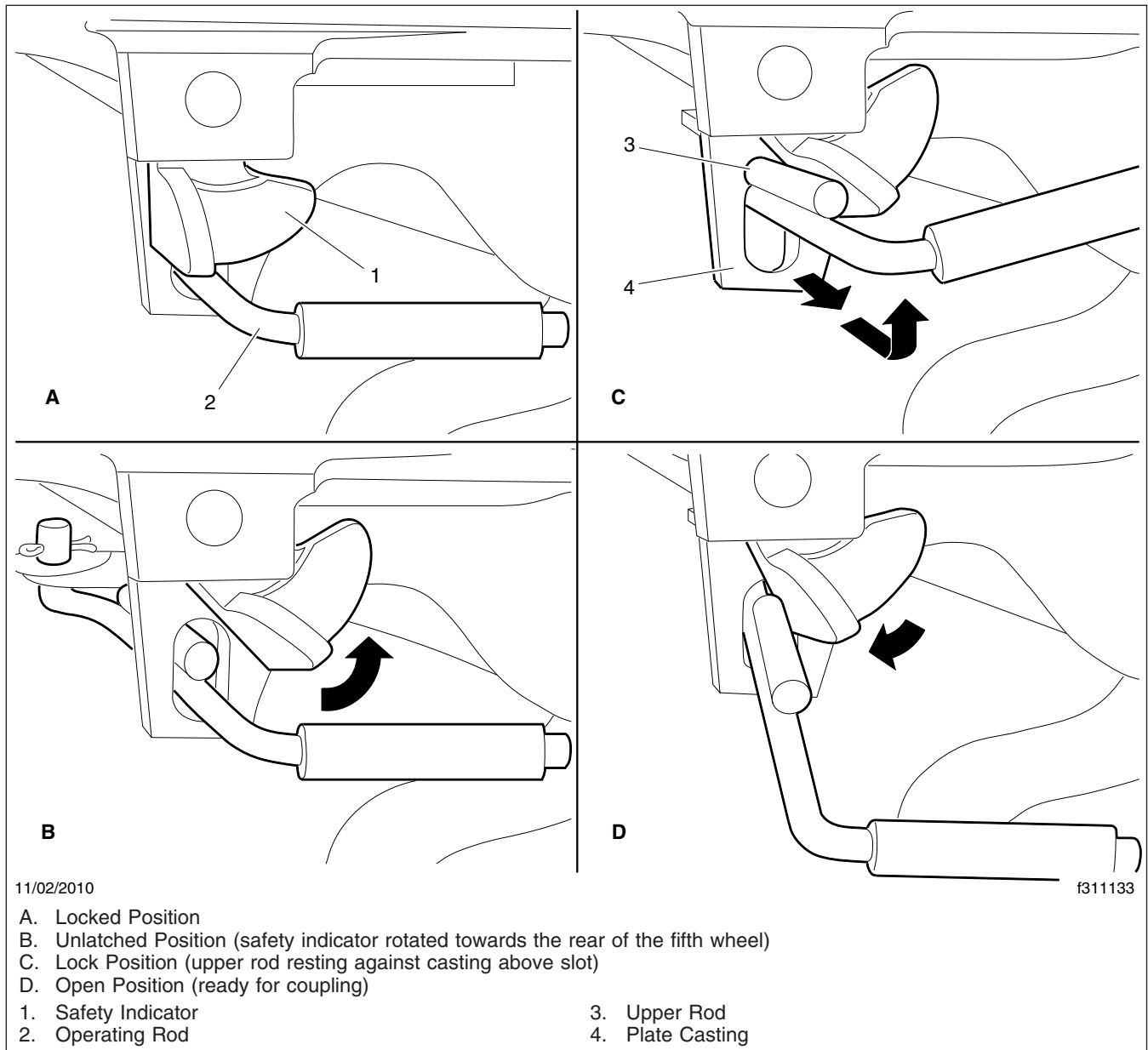


Fig. 18.10, Holland Kingpin Locking Mechanism

and trailer parking brakes are set, and that the trailer is prepared for uncoupling.

NOTE: If the tractor parking brake is not set, the air-actuated kingpin-release valve will not activate.

2. Pull and hold the kingpin release valve (Fig. 18.11) until the kingpin lock mechanism opens and locks in place.

3. Let go of the kingpin release valve.
4. Release the tractor parking brake.
5. Drive out from under the trailer.

Air-Activated Kingpin Unlock, Jost Fifth Wheels

1. Verify that both the parking brake and trailer air supply knobs are out (see Fig. 18.8), the tractor

Fifth Wheels

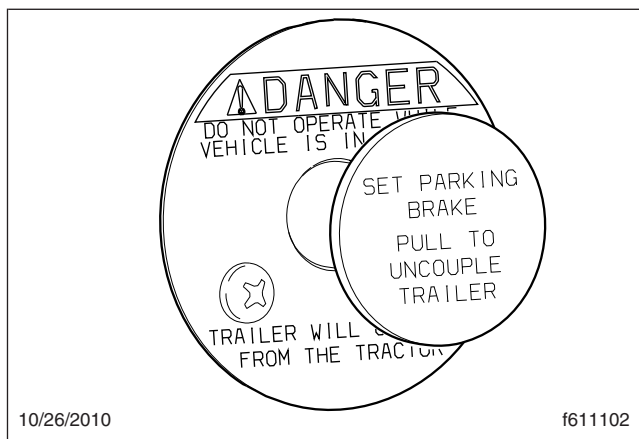


Fig. 18.11, Air-Actuated Kingpin Release Valve

and trailer parking brakes are set, and that the trailer is prepared for uncoupling.

NOTE: If the trailer parking brake is not set, the air-actuated valve will not activate.

2. Release the tractor parking brake.
3. Pull and hold the kingpin release valve, then drive forward slowly.
4. After the trailer has slid down the fifth wheel and pick-up ramps, let go of the kingpin release valve.

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 in order 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 desirous 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 tractor. Determine the front and rear axle weights by weighing the tractor 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 driver-side door frame. 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

Use the following procedure to manually slide the fifth wheel. See [Fig. 18.12](#).

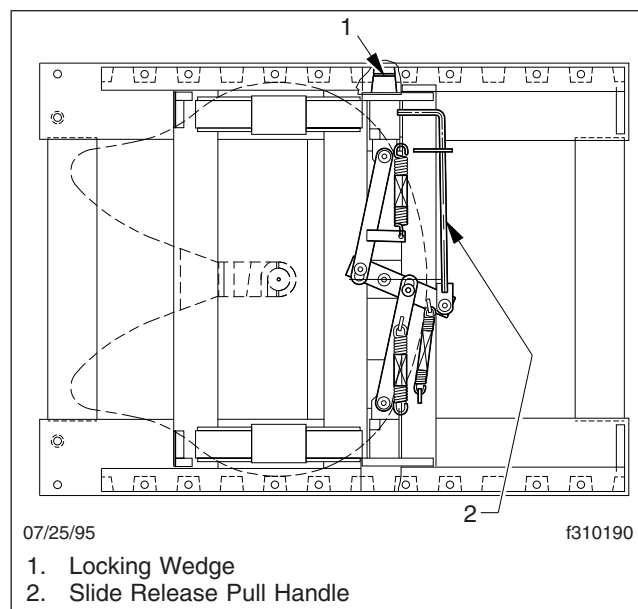


Fig. 18.12, Manual Release Sliding Fifth Wheel, Fontaine

1. Stop the tractor and trailer in a straight line on level ground. Pull the trailer air supply knob to set the trailer parking brakes.
2. Set 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. 18.13](#).

- 2.2 **Holland:** Pull the operating rod out. Make sure both side plungers have released. See [Fig. 18.14](#).

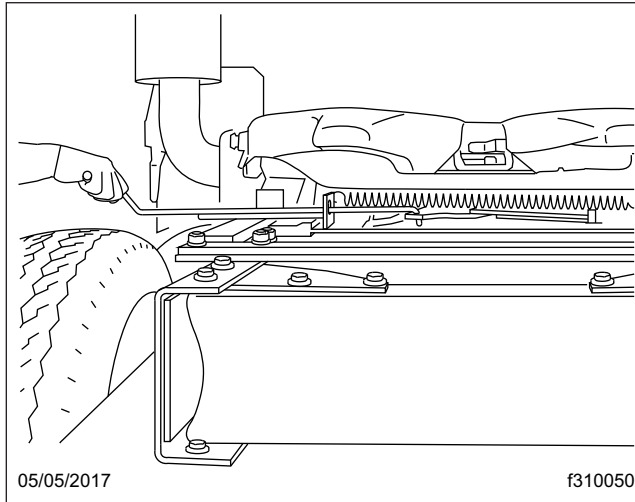


Fig. 18.13, Sliding Fifth Wheel Manual Release, Fontaine

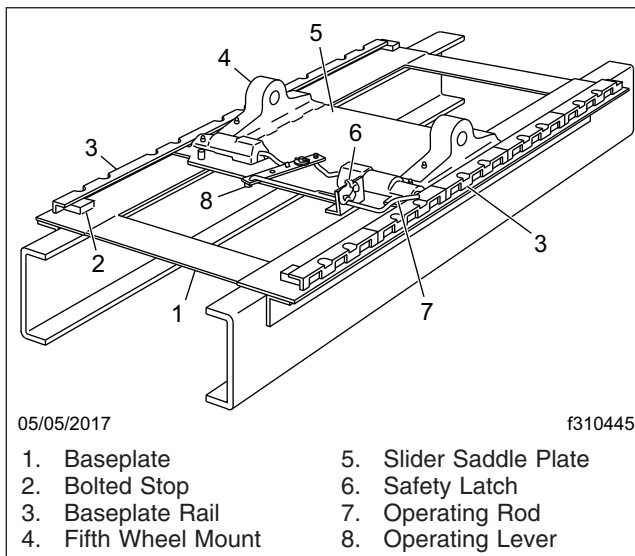


Fig. 18.14, Sliding Fifth Wheel Manual Release, Holland Simplex

- Lower the trailer landing gear just enough to remove the weight from the tractor.
- Chock the front and rear trailer tires to prevent the trailer from moving.

NOTICE

When moving the fifth wheel to the desilocation, 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.

- Release the tractor parking brake, then slowly move the tractor forward or backward until the fifth wheel is in the desilocation.

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.

- Set the tractor parking brake, then lock the sliding member in position using one of the following methods:
 - 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.
 - 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 a dash-mounted switch that operates an air cylinder that locks and unlocks the slide.

Fifth Wheels

1. Press the top half of the air-slide switch to enable the air-slide feature. See [Fig. 18.15](#).
Ensure the locking plungers have released. See [Fig. 18.16](#).
For Jost fifth wheels, the mechanism activates as shown in [Fig. 18.17](#).
2. Lower the trailer landing gear just enough to remove the weight from the tractor.
3. Pull the 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 desilocation.

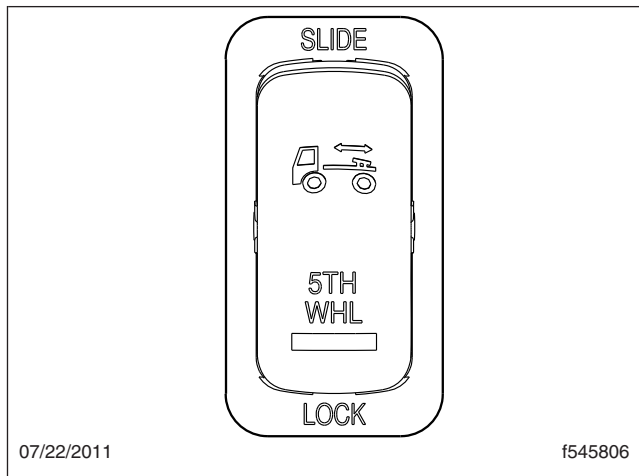


Fig. 18.15, Air Slide Switch

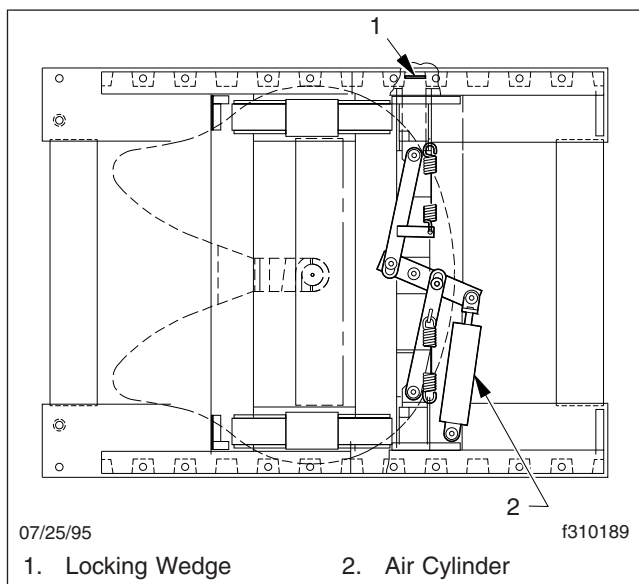


Fig. 18.16, Air-Operated Sliding Fifth Wheel, Fontaine

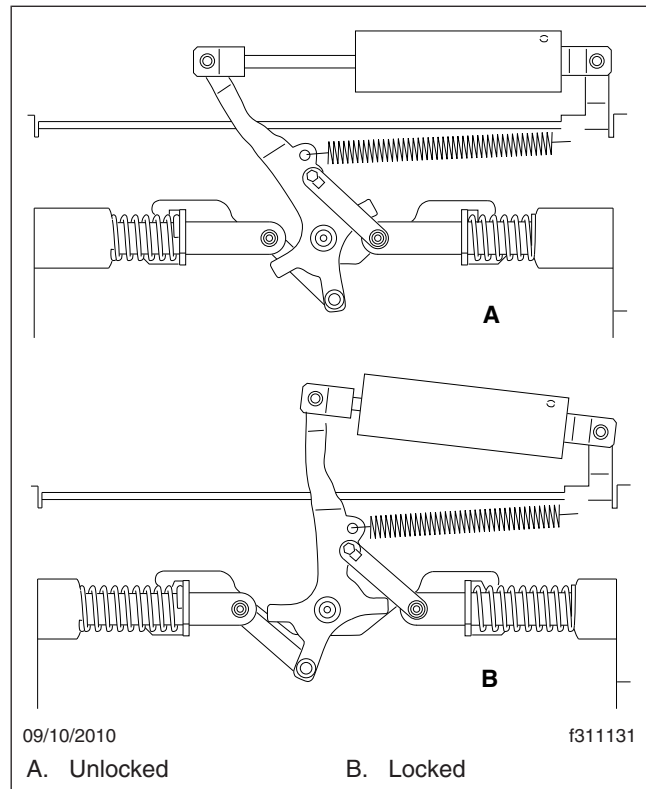


Fig. 18.17, Jost Sliding Fifth Wheel

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. Set the tractor parking brake.

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. Press the lower half of the air-slide switch to disable the air-slide feature. 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 tires are chocked.

NOTE: The fifth wheel may need to be moved slightly to enable the locking wedges to fully lock.

19

Trailer Couplings

Holland Trailer Coupling	19.1
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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. 19.1**.

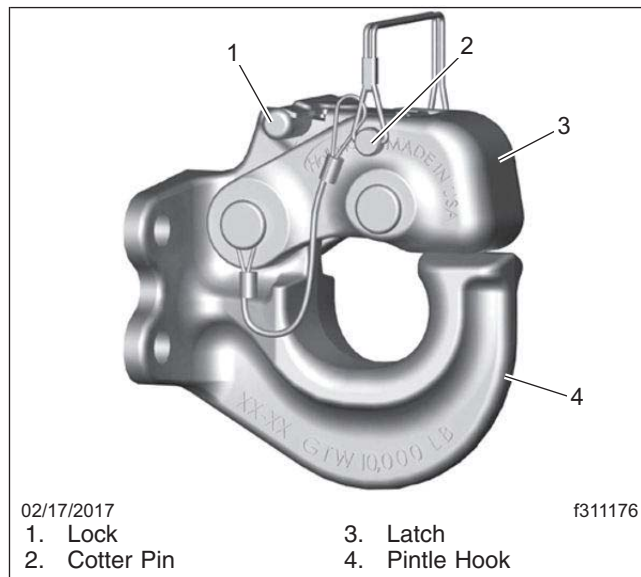


Fig. 19.1, Holland Trailer Coupling (typical)

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.

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.

Headlight Aiming

Preliminary Checks	20.1
Checking Headlight Aim	20.1
Adjusting Headlight Aim	20.1

Headlight Aiming

Preliminary Checks

Before checking or adjusting the headlight aim, complete the following inspection:

- 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.

Checking Headlight Aim

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. On each headlight, find the low-beam bulb center, marked by a small transparent ring on the inside of the headlight lens.
3. Measure the distance from the ground to the center of each headlight bulb ([Fig. 20.1](#), Item A). Note those distances.
4. On the screen or wall, mark the locations of each low-beam headlight bulb center using the distances found in step 3. See [Fig. 20.1](#), Items 2 and 3.
5. Turn on the low-beam headlights.
6. Check the vertical adjustment of the low beams. The center of each beam projection should fall on or near the marks made during step 4. See [Fig. 20.2](#).
7. Use [Table 20.1](#) to determine the maximum vertical distance allowable between the marks on the wall and the center of each 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 20.1](#), adjust the vertical positioning of that headlight.

IMPORTANT: The zone of high-intensity light from a low-beam lamp should not project above the low-beam angle upper limit. See [Fig. 20.3](#) for an example of correctly aimed headlights.

Adjusting Headlight Aim

For 5700 models, headlight adjustment is made on the bottom of the headlight assembly, accessible through the wheel well when the hood is closed. Using a Phillips #2 screwdriver inserted through the slot in the hood-mounted splash shield ([Fig. 20.4](#)), turn the adjusting screw clockwise to raise the beam and counterclockwise to lower it, until the beam pattern meets the acceptable standard.

For adjustment screw locations on a 4700 model, see [Fig. 20.5](#). Turn the adjustment screw in either direction until the beam pattern meets the acceptable standard.

Headlight Aiming

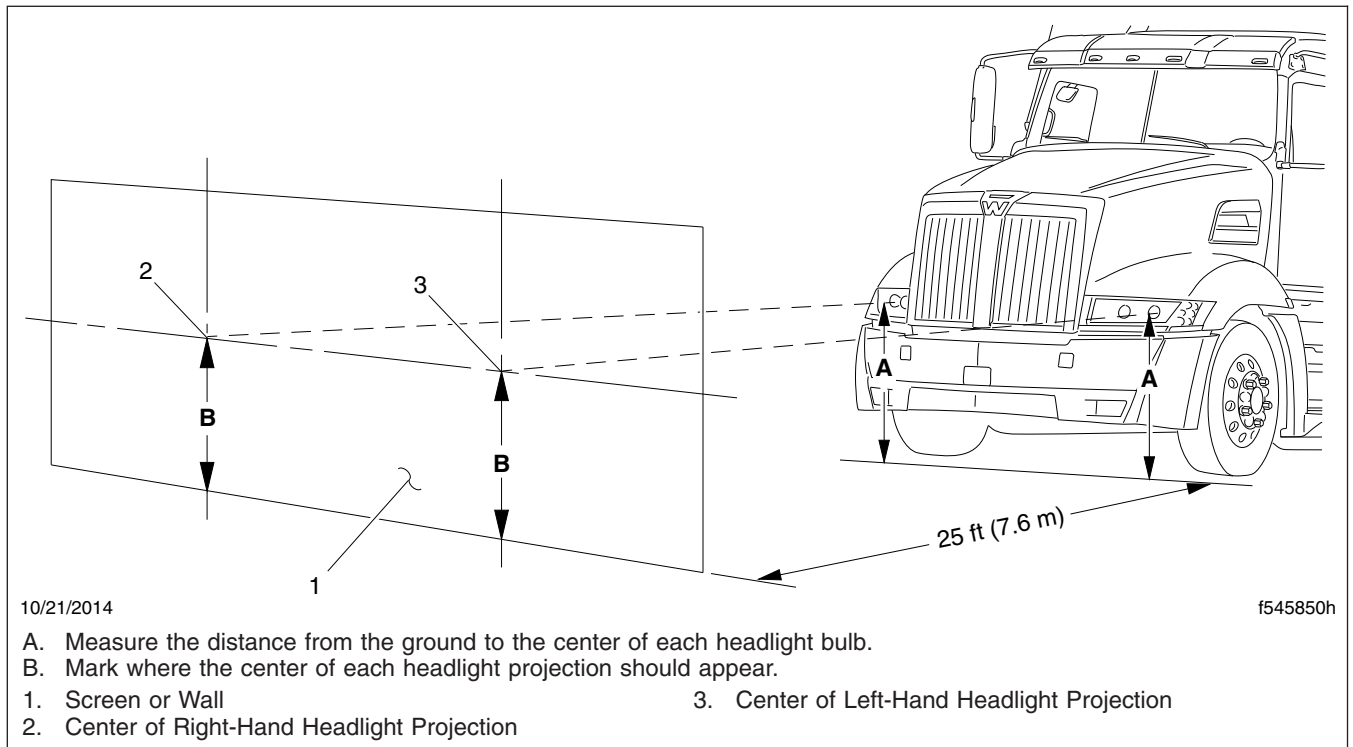


Fig. 20.1, Headlight Aiming Screen/Wall

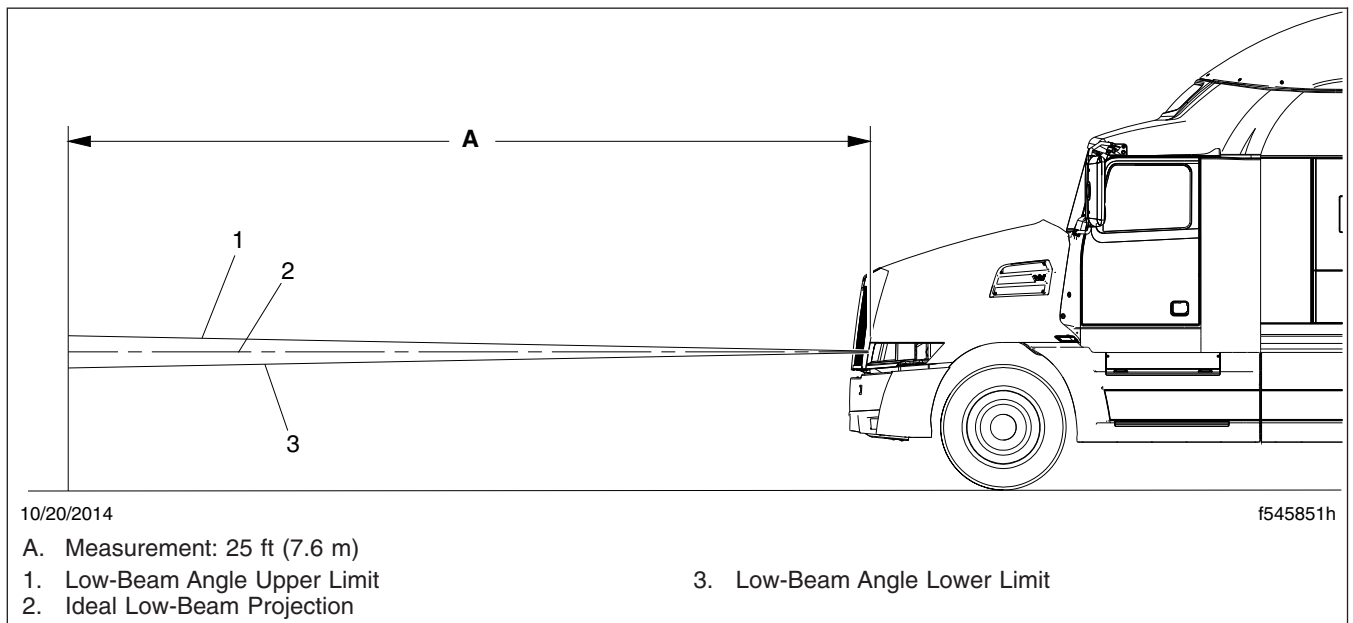


Fig. 20.2, Vertical Low-Beam Headlight Variation Limits

Headlight Aiming

Vertical Low-Beam Headlight Variation Limits			
Distance Between Ground and Headlight: in (mm)	Desired Variation (Fig. 20.2, Item 2) : in (mm)	Upper Limit (Fig. 20.2, Item 1): in (mm) up	Lower Limit (Fig. 20.2, Item 3): in (mm) down
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 20.1, Vertical Low-Beam Headlight Variation Limits

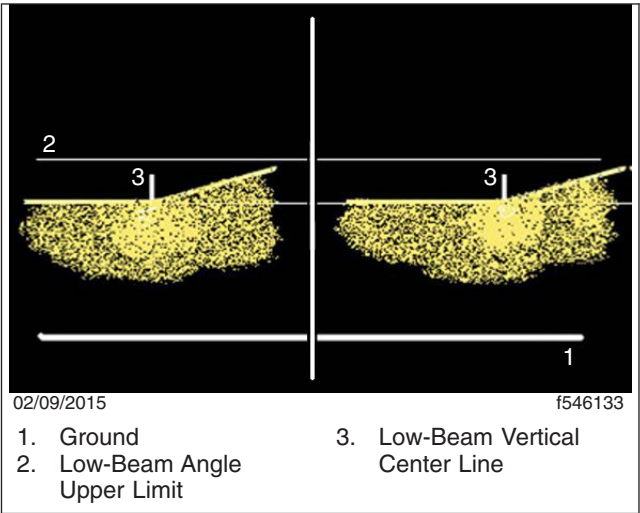


Fig. 20.3, Beam Projection of Correctly Aimed Headlights (5700 model)

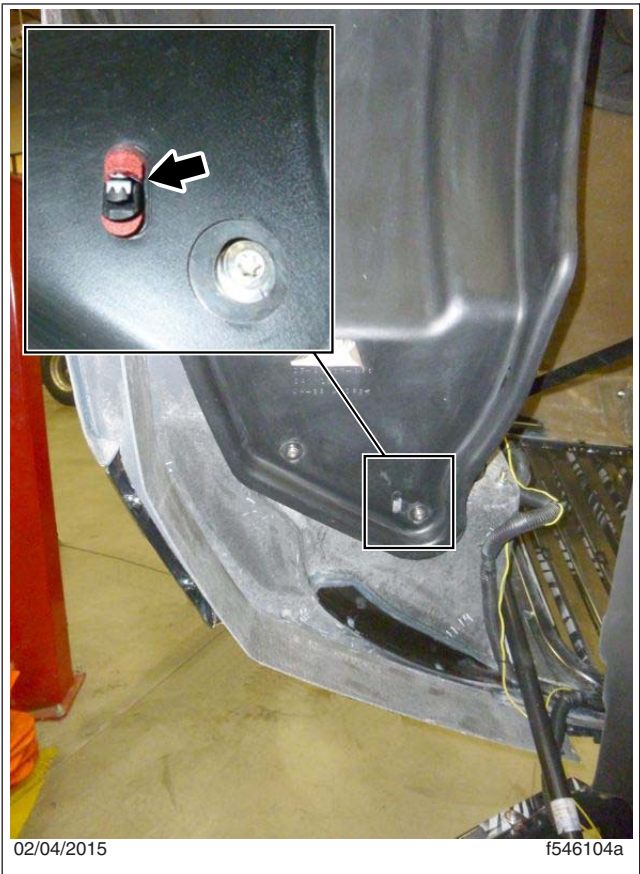


Fig. 20.4, Headlight Adjustment Slot (5700 model, shown with the hood open)

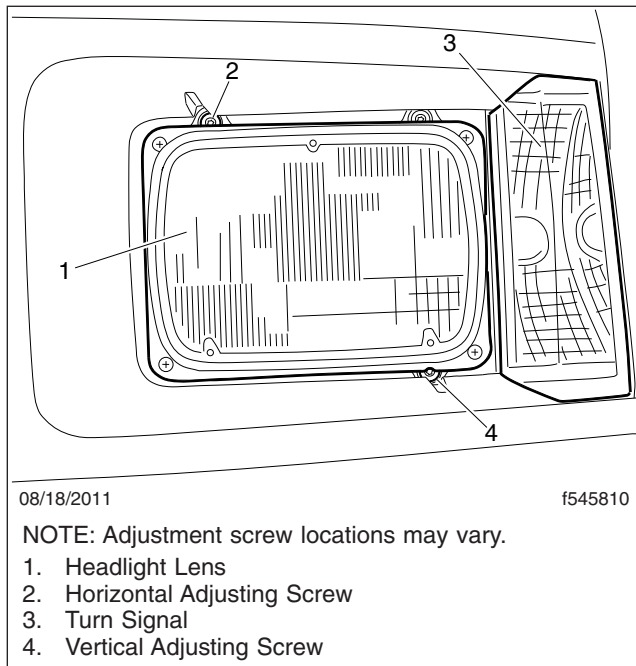


Fig. 20.5, Single Headlight Assembly (4700 model)

Vehicle Appearance and Care

Cab Washing and Polishing	21.1
Care of Fiberglass Parts	21.1
Care of Chrome Parts	21.1
Care of Exterior Lights	21.1
Dashboard and Instrument Panel Care	21.2
Vinyl Upholstery Cleaning	21.2
Velour Upholstery Cleaning	21.3

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.

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. Western Star Trucks recommends using a high quality brand of cleaner or cleaner-polish and polishing wax.
- 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 guidelines 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. Use 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. Use any hard wax, such as that used on automobiles.

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. Repeat 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, use a wall-washing preparation such as those normally found around the home. 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. Remove any remaining traces of gum with an all-purpose light oil (peanut butter will also work). Wipe off the gum and oil substance.

Tars, Asphalts, and Creosote

Each of these items stains vinyl after prolonged contact. Wipe any of these items off immediately and carefully clean the area using a cloth dampened with naphtha.

Paint, Shoe Heel Marks

Remove paint 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. Remove these stains 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, where it can 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. Wipe shoe polish off as quickly as possible using naphtha or lighter fluid. If staining occurs, try the procedure used for sulfide stains.

Vehicle Appearance and Care

Ball Point Ink

Rub ball point ink 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. Absorb excess wax 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.

Pre- and Post-Trip Checklists

Periodic Inspections and Maintenance, General Information	22.1
Checklists	22.1
Fluids Added	22.2

Pre- and Post-Trip Checklists

Periodic Inspections and Maintenance, General Information

Regulations in Canada and the U.S. clearly indicate that 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 23](#).

Checklists

NOTE: Checklists in this chapter correspond with the procedures and steps in [Chapter 23](#), *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	
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	

Pre- and Post-Trip Checklists

Engine Compartment		Comp.
4	Automatic transmission fluid level	
5	Water in fuel/water separator	
6	Steering components	
7	Serpentine drive belts	

Fluids Added During Inspection	
Fluid	Amount Added
Automatic Transmission Fluid	
Hydraulic Clutch Fluid (DOT 4 brake fluid)	

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	

Pre- and Post-Trip Inspections and Maintenance

Safety Precautions	23.1
Daily Pretrip Inspections and Maintenance	23.1
Weekly Post-Trip Inspections and Maintenance	23.9
Monthly Post-Trip Inspections and Maintenance	23.11

Pre- and Post-Trip Inspections and Maintenance

Safety Precautions



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 *Western Star 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. 23.1](#), [Fig. 23.2](#), or [Fig. 23.3](#).

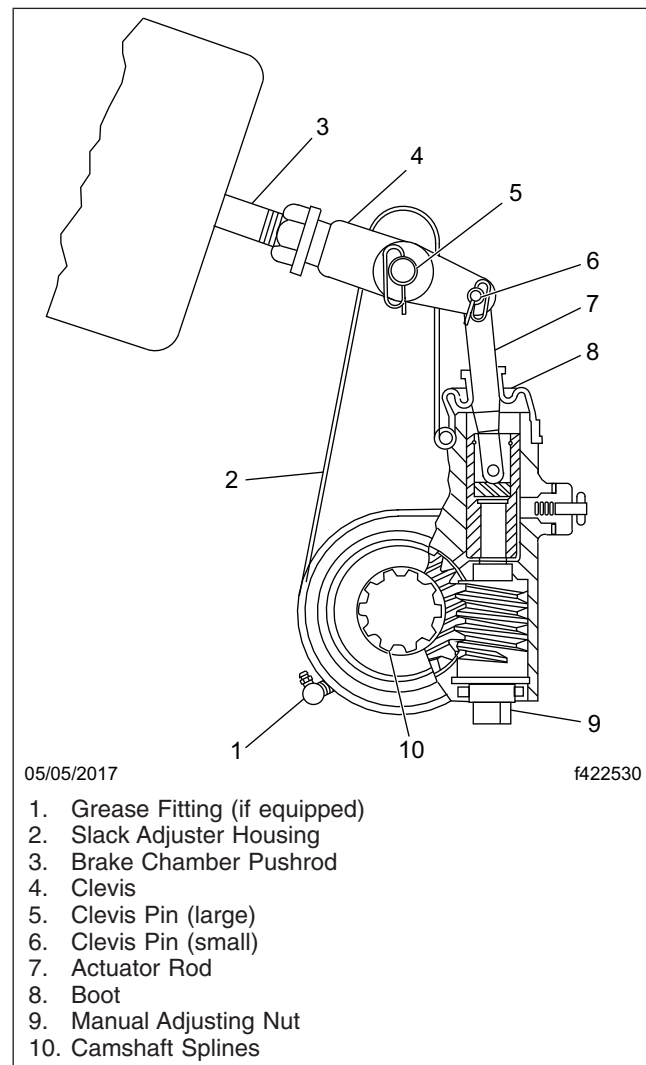


Fig. 23.1, Meritor Automatic Slack Adjuster

- 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.

Pre- and Post-Trip Inspections and Maintenance

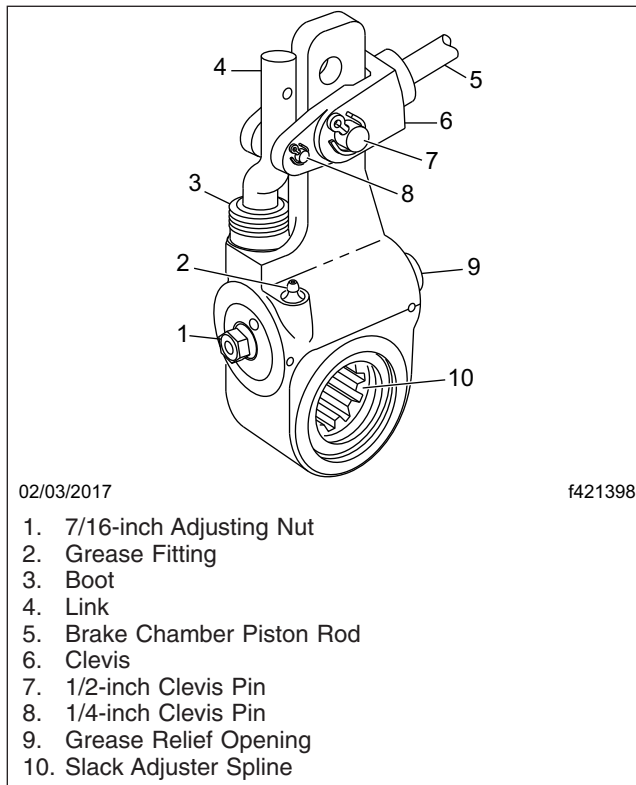


Fig. 23.2, Gunite Automatic Slack Adjuster

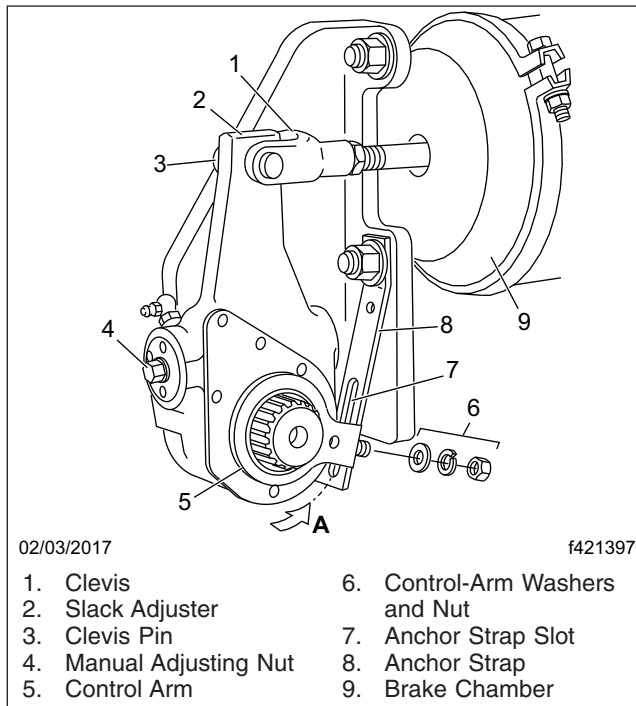


Fig. 23.3, Haldex Automatic Slack Adjuster

- 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.

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.

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

Pre- and Post-Trip Inspections and Maintenance

- 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. 23.4](#) 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).

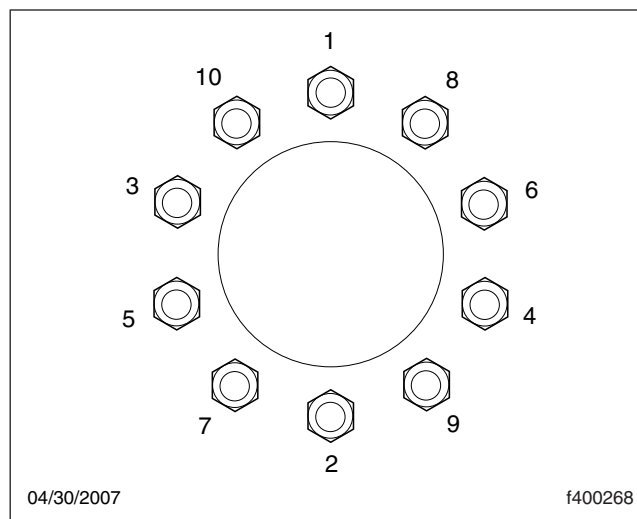


Fig. 23.4, Tightening Pattern, 10-Hole Wheels

Pre- and Post-Trip Inspections and Maintenance

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 *Western Star 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 cross-members 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 located on the air cleaner, if equipped.
- 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: On engines that comply with EPA07 or newer regulations, 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.

Pre- and Post-Trip Inspections and Maintenance

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. 23.5](#). If needed, fill the reservoir with automatic transmission fluid that meets Dexron III or TES-389 specifications.

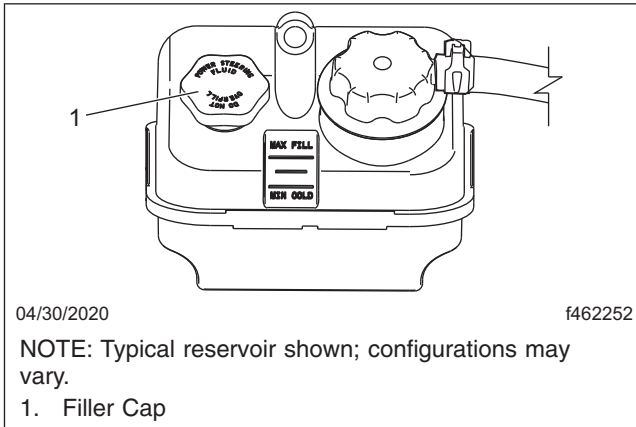


Fig. 23.5, Power Steering Fluid Reservoir

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. 23.6](#) or [Fig. 23.7](#).

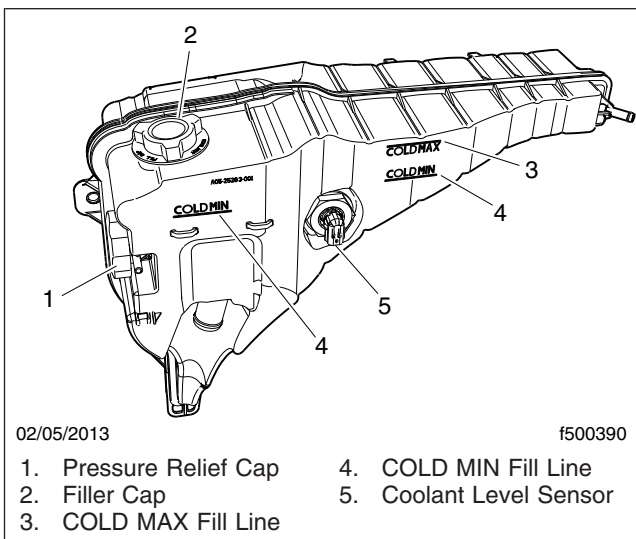


Fig. 23.6, Coolant Surge Tank (5700 models)

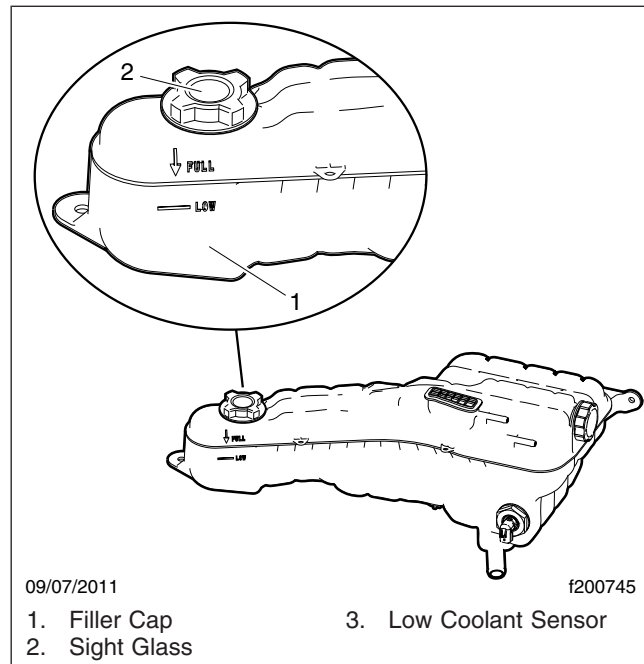


Fig. 23.7, Coolant Surge Tank (4700 models)

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.

- 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.

Pre- and Post-Trip Inspections and Maintenance

- 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 an audible warning will sound. Ensure the low air pressure lamp (BRAKE AIR) remains illuminated and an audible warning 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 23.1](#), 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 23.1, 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 headlights and leave them on. Ensure all equipped gauge bulbs illuminate in the dash message center.

Pre- and Post-Trip Inspections and Maintenance

- 10.2 Ensure all equipped driver control switches illuminate.
- 10.3 Ensure both turn signal indicator bulbs illuminate in the dash message center when the turn signal switch is activated.
- 11. Check the operation of all exterior lights. See [Fig. 23.8](#) or [Fig. 23.9](#).
 - 11.1 Activate the high-beam headlights and hazard warning lights.
 - 11.2 Exit the cab and check that all exterior lights and reflectors are clean and intact.

- 11.3 Check that the brake lights, taillights, headlights, turn signals, marker lights, identification lights, and clearance lights are working properly.

- 12. 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,



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|--------------------------|------------------------|----------------------------------|
| 1. Clearance Light | 5. Side Marker Light | 8. Combination Fog/Driving Light |
| 2. Identification Lights | 6. Front Turn Signal | 9. Headlight, High Beam |
| 3. Mirror Marker Light | 7. Headlight, Low Beam | 10. LED Accent Light |
| 4. Clearance Light | | |

Fig. 23.8, Exterior Lights (5700 models)

Pre- and Post-Trip Inspections and Maintenance

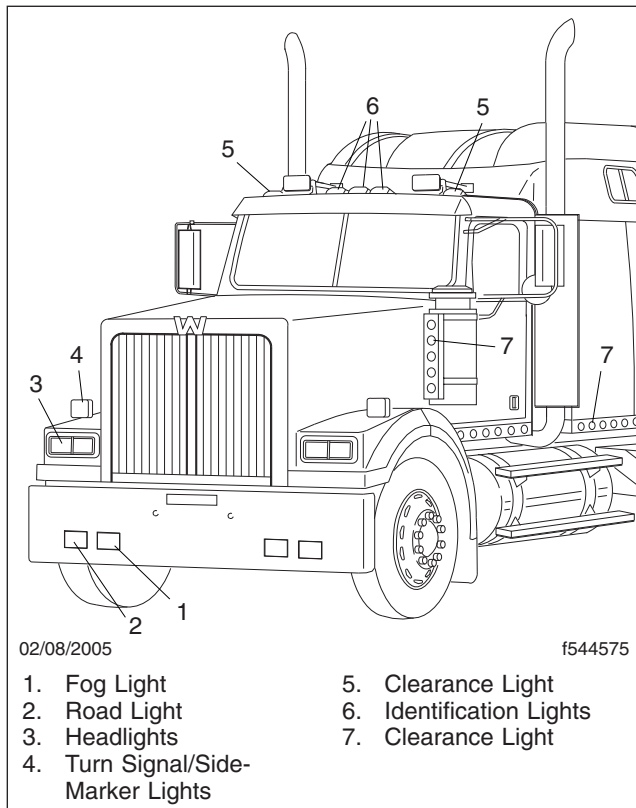


Fig. 23.9, Exterior Lights (4700 models)

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.

- 12.1 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.
- 12.2 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.
- 12.3 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: On engines that comply with EPA07 or newer regulations, use ultralow-sulfur diesel (ULSD) with 15 ppm sulfur content or less. Failure to use ULSD fuel may void the warranty on emission components.

13. 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.
14. Adjust the rearview and down view mirrors as necessary.
15. Test the service brakes.
 - 15.1 With the engine running and air system fully charged, set the parking brake.
 - 15.2 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.
16. Test the backup alarm.
 - 16.1 Release the parking brake and put the transmission in reverse.
 - 16.2 Move the vehicle slightly backward to ensure that the backup alarm is operating correctly.

Pre- and Post-Trip Inspections and Maintenance

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 left-hand hood support. See [Fig. 23.10](#).



Fig. 23.10, Windshield Washer Reservoir (Western Star 5700 shown)

2. After resetting the air intake restriction indicator during the daily pretrip inspection, check the indicator again with the engine off.
 - 2.1 For an indicator with graduations, check to see if air restriction exceeds 18 inH₂O.
For a go/no-go indicator without graduations, check to see if the colored bar shows through the clear window.

Air Intake Maximum Restriction Values (inH ₂ O)	
Engine Make	GHG14, GHG17, and GHG21 Engines
Detroit	18

Air Intake Maximum Restriction Values (inH ₂ O)	
Engine Make	GHG14, GHG17, and GHG21 Engines
Cummins	25

Table 23.2, Air Intake Maximum Restriction Values

- 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 *Western Star Workshop Manual*.
3. Inspect water evacuation components.
 - 3.1 Inspect the vacuator valve(s). Make sure the lips of each valve are undamaged and pliable, free of debris, and remain closed during inspection.
 - 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.
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.

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.

Pre- and Post-Trip Inspections and Maintenance

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 *Alliance/Racor Models:* Turn the drain plug counterclockwise to open it. See [Fig. 23.11](#).

DAVCO Models: Remove the vent cap and open the drain. See [Fig. 23.12](#) and [Fig. 23.13](#).

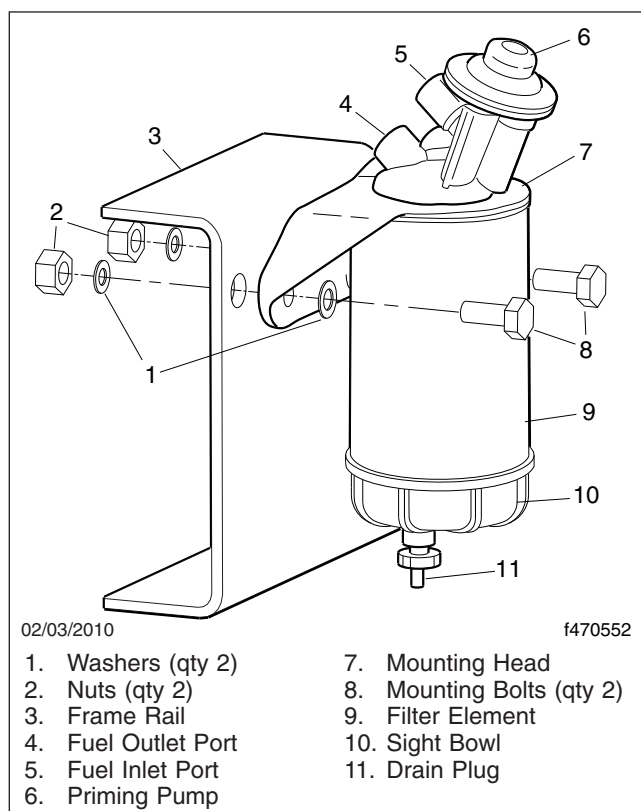


Fig. 23.11, Alliance Fuel/Water Separator Assembly and Installation

5.4 Stop draining fluid when fuel begins to drain out.

Alliance/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.

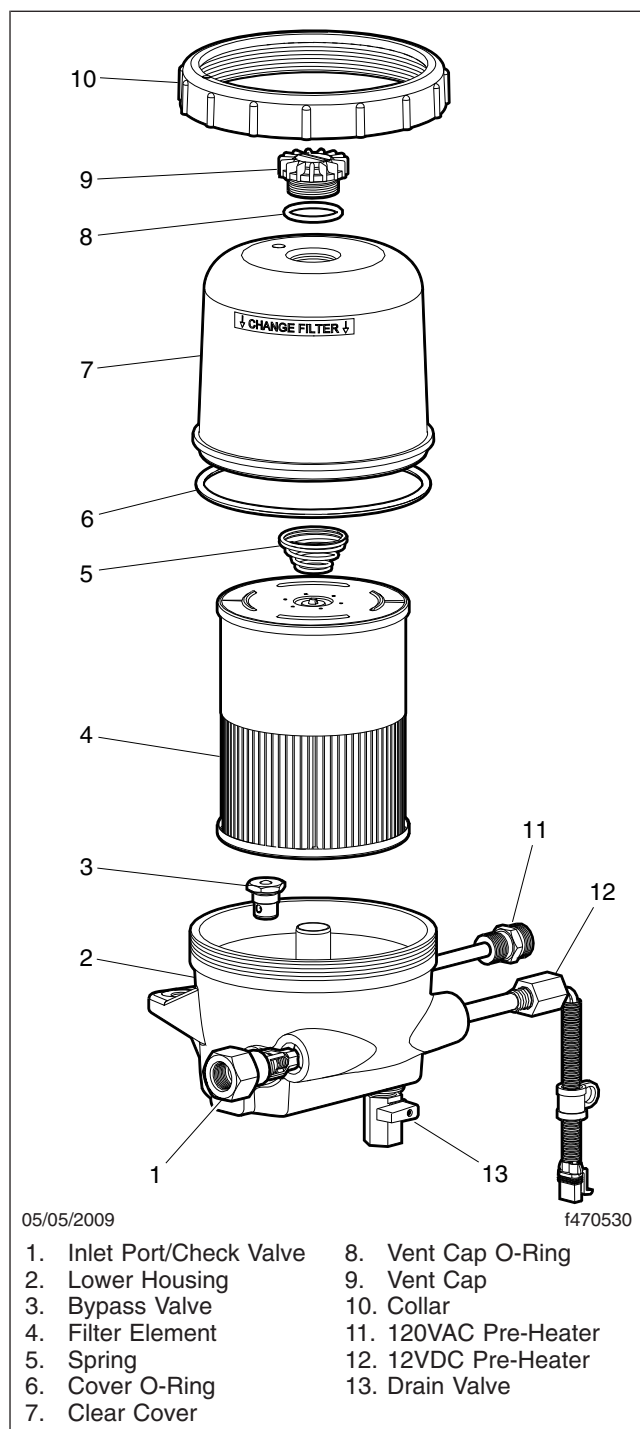


Fig. 23.12, DAVCO Fuel Pro 482

6.1 Inspect tie rods, steering arms, and the drag link for signs of looseness (i.e., shiny spots or rust tracks). See [Fig. 23.14](#).

Pre- and Post-Trip Inspections and Maintenance

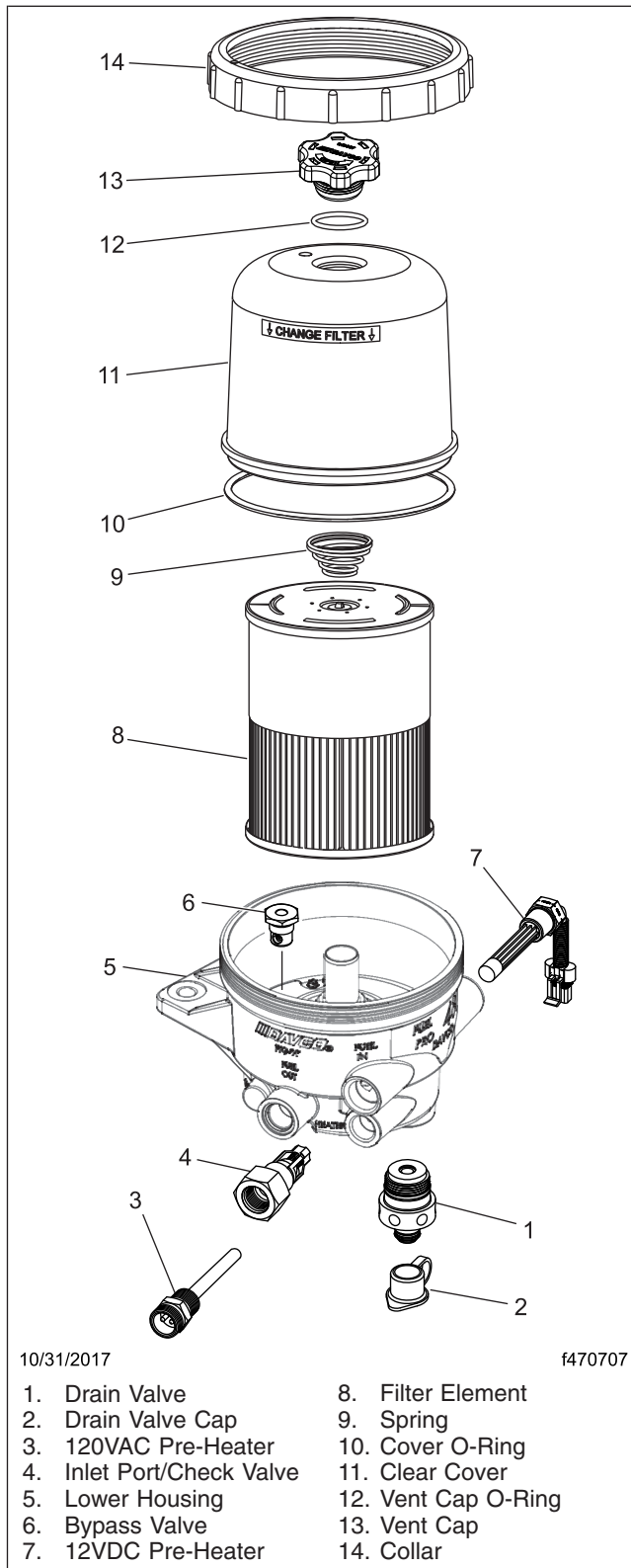


Fig. 23.13, DAVCO Fuel Pro 487

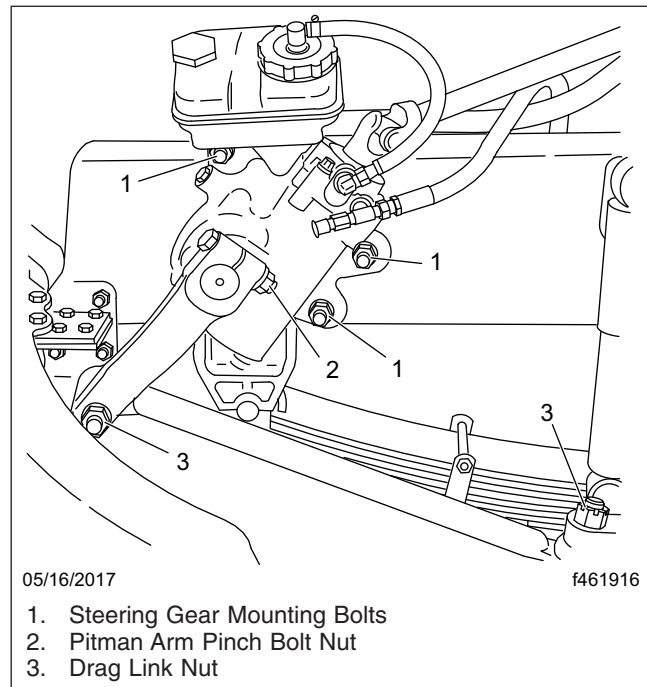


Fig. 23.14, Integral Steering Gear Fasteners

- 6.2 Check the steering gear mounting bolts and pitman arm pinch bolt and nut for signs of looseness.
- 6.3 Check the drag link nuts for missing cotter pins.
- 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.

Pre- and Post-Trip Inspections and Maintenance

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.

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.

Pre- and Post-Trip Inspections and Maintenance

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 Western Star 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 2-1/2 inches (64 mm) with a 20-inch (508-mm) steering wheel, or 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.

In An Emergency

Hazard Warning Lights	24.1
Fire Extinguisher	24.1
Emergency Kit	24.1
Emergency Filter Replacement, DAVCO	24.1
Emergency Starting With Jumper Cables	24.2
Raising and Lowering a Vehicle	24.5
Towing	24.6
Fire in the Cab	24.9

In An Emergency

Hazard Warning Lights

The hazard warning light switch (**Fig. 24.1**) is located on the right-hand dash panel. To operate the hazard lights, press the upper half of the switch. To cancel the hazard warning lights, press the lower half of the switch.

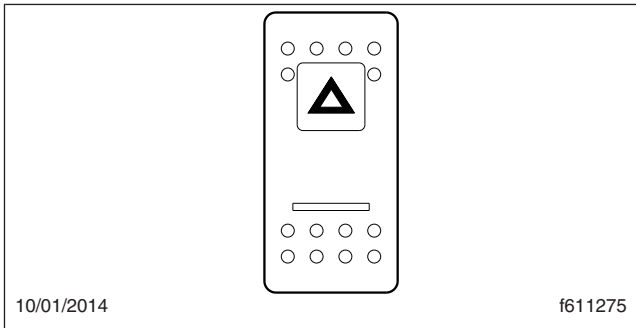


Fig. 24.1, Hazard Warning Light Switch

Fire Extinguisher

An optional factory-installed fire extinguisher may be located in the cab by the driver's door, between the seats, or in the sleeper baggage compartment, if equipped.

Emergency Kit

An optional emergency reflector kit containing three triangular reflectors may be supplied in the cab.

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 reflectors and flares along the side of the road to alert other drivers that an emergency situation exists.

Emergency Filter Replacement, DAVCO

If the filter cover on the DAVCO fuel/water separator is broken, it will not be possible to operate the vehicle. A standard spin-on filter will correct this problem.

Refer to the DAVCO web site for additional information, www.davcotec.com.

WARNING

Fluid circulated through the fuel/water separator to heat the fuel may be diesel fuel returned from the engine, or engine coolant. Drain the fuel/water separator only when the engine and fluids have cooled. Draining it when the engine is hot could cause severe personal injury due to scalding.

If returning fuel is released into the atmosphere, its vapors can ignite in the presence of any ignition source. Do not expose the fuel to, or work with the fuel system near, open flame or intense heat. To do so could cause fire, possibly resulting in serious personal injury or property damage.

1. Shut down the engine, apply the parking brake, and chock the tires.
2. Put a clean receptacle under the fuel/water separator and attach a piece of hose to the drain valve, to direct fuel into the receptacle.

NOTE: The drain valve on the Fuel Pro 382 has a 1/2-inch (12.7-mm) opening; use a hose with a 1/2-inch pipe thread to fit correctly. Open the drain valve by turning it one-quarter revolution.

3. Remove the vent cap, shown in **Fig. 24.2**, Item 9, and open the drain valve, shown in **Fig. 24.2**, Item 13, to drain the fuel to just below the collar level, then close the drain valve.
4. Using a DAVCO collar wrench, shown in **Fig. 24.3**, remove the clear cover and collar.

NOTE: Broken vent cap and collar warranty claims will not be accepted if any tool other than a DAVCO collar wrench, p/n 482017 (8-in collar), 380134 (6-in collar), or 232007 (5-in collar), is used for removal. During installation, the vent cap is to be **hand-tightened only**, not tightened with a wrench.

5. Remove the filter and dispose of it in an environmentally acceptable manner.
6. Clean all threads and sealing surfaces very thoroughly. Even a small amount of dirt will prevent the fuel/water separator from sealing, and an air leak will result.
7. Ensure that the drain valve is closed.

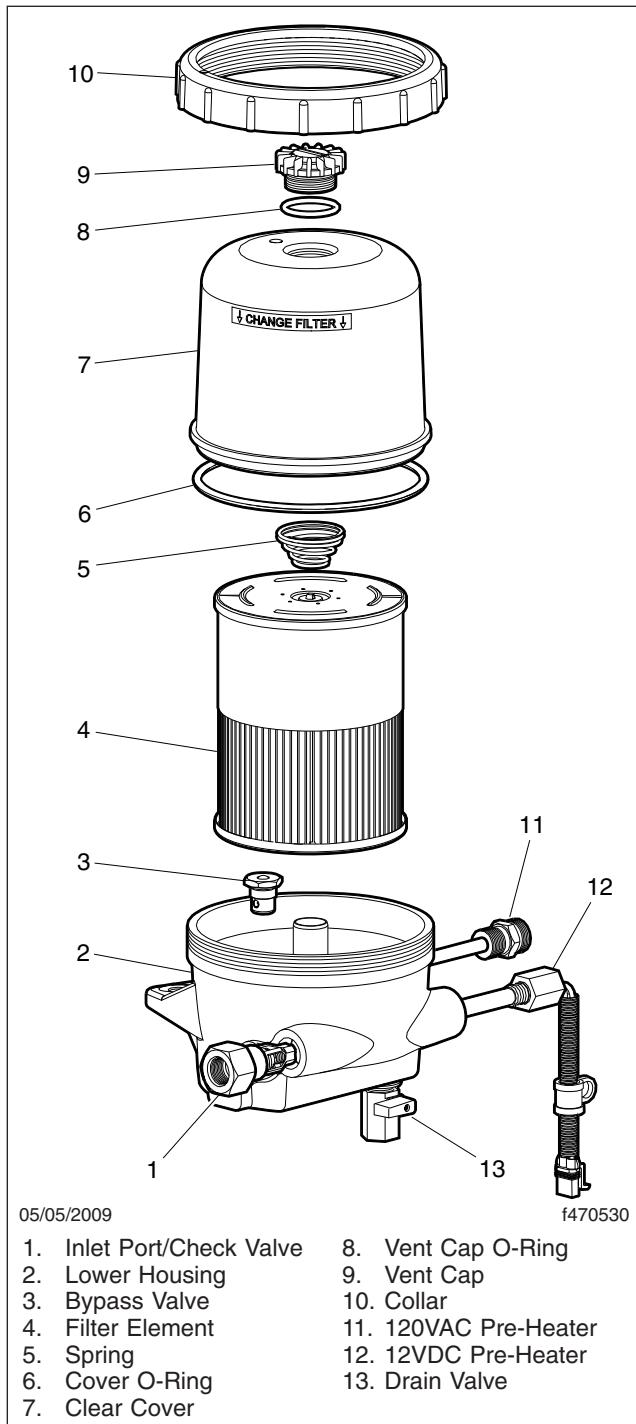


Fig. 24.2, DAVCO Fuel Pro 482

8. Remove the filter grommet from the filter stud, if equipped.

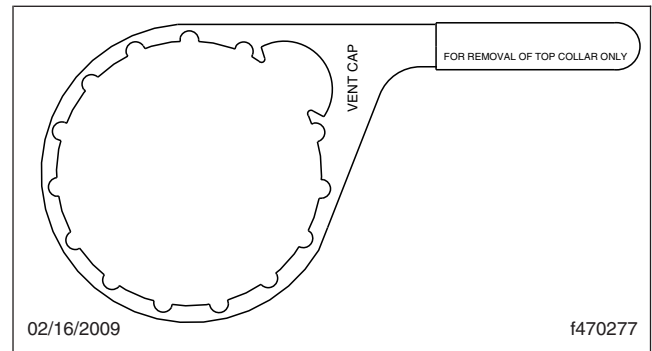


Fig. 24.3, DAVCO Collar Wrench

9. Fill the housing to the top of the filter element with clean diesel fuel.
10. Install a standard fuel filter element on the filter stud. If a standard filter element is not available, install a spin-on fuel filter element (part number FF105 or equivalent).
11. Install the cover O-ring, clear cover, and the collar. Simultaneously apply downward pressure to the top of the clear cover until it is seated on the body of the lower housing and hand tighten the collar until it no longer spins freely. Using the collar wrench, tighten the cover 18 lbf·ft (24 N·m). This is equivalent to rotating the collar clockwise two or three additional ribs, depending on the specific filter model.
12. Install and hand-tighten the vent cap O-ring and vent cap.
13. Start the engine. When the lubricating oil reaches its normal operating pressure, increase engine speed to high idle for one to two minutes to purge air from the system.

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

In An Emergency

following 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.

1. Apply the parking brakes and turn off all lights and other electrical devices. Ensure that the vehicles are not touching and both ignition switches are turned to the OFF position.

IMPORTANT: Do not attempt to jump start a damaged battery.

2. Remove the battery box cover.

NOTE: The batteries on a Western Star vehicle may be located in a variety of locations, including under the passenger seat, under the cab, behind the cab, or under the sleeper bunk, if equipped. Some vehicles may have two batteries in the step compartments on both sides of the vehicle.

NOTICE

Always connect the batteries and jumper cables correctly (positive-to-positive and negative-to-negative). Connecting a charging device backwards (positive-to-negative) can severely damage the vehicle electrical content and cause non-warrantable failures.

IMPORTANT: On vehicles equipped with optional jump start posts, connect to these posts instead of the battery terminals. Jump start posts may be installed in various locations on the vehicle. See [Fig. 24.4](#).

3. Connect the positive (+) jumper cable to the positive terminal or jump start post on the discharged battery. See [Fig. 24.5](#).
4. Connect the other end of the positive jumper cable to the positive terminal or jump start post on the booster battery providing the charge.

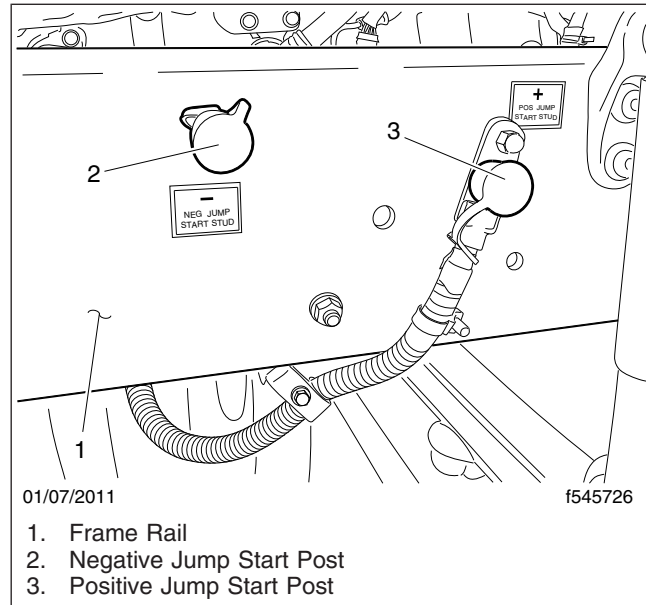


Fig. 24.4, Possible Jump Start Post Location (passenger-side engine compartment)

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 the negative (-) jumper cable to the negative terminal or jump start post on the booster battery.
6. Connect the other end of the negative jumper cable to the negative ground stud on the vehicle requiring the jump start.
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 receiving the jump. 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.

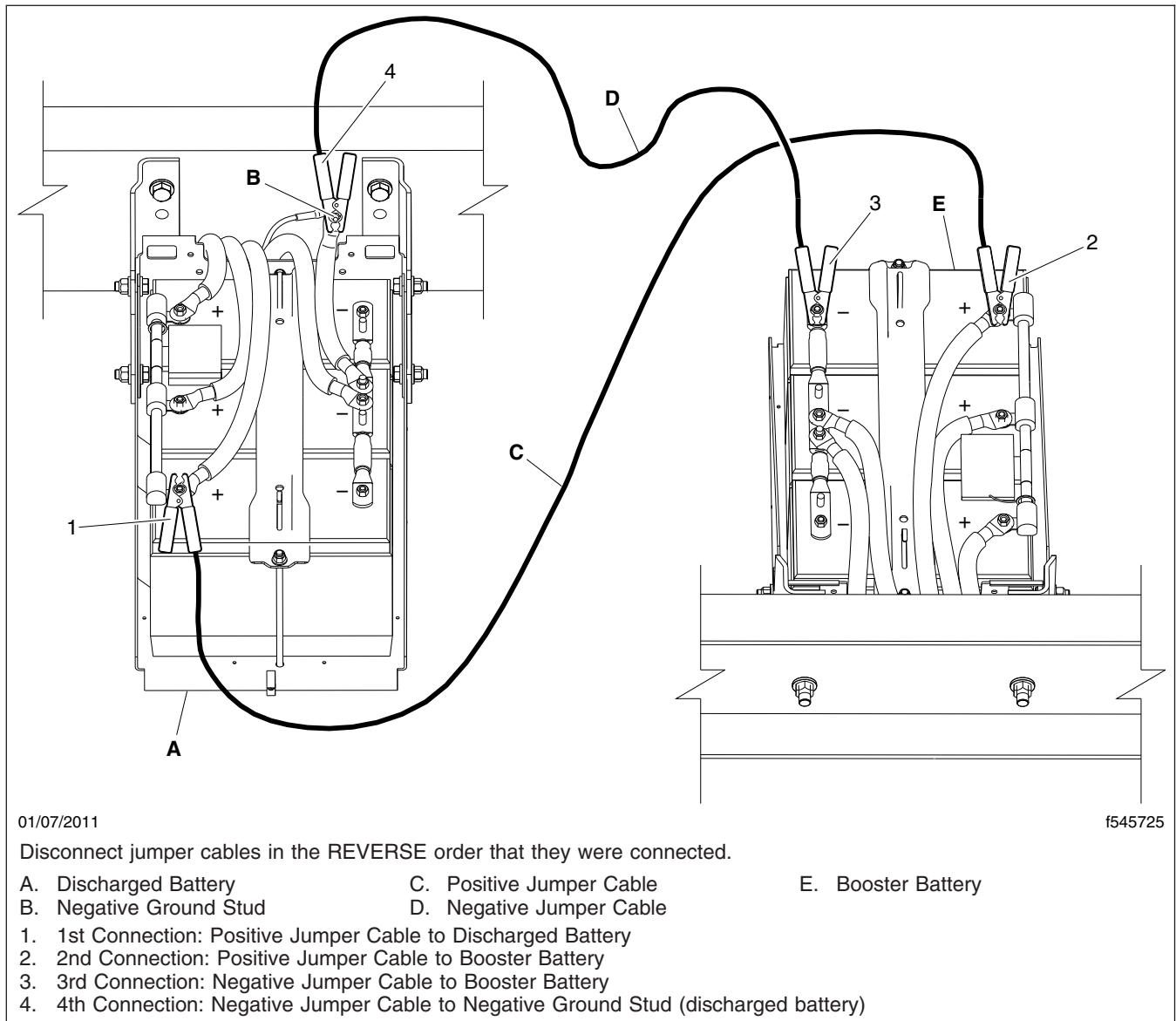


Fig. 24.5, Jumper Connections

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 jumper cable from the negative cable stud on the jump started vehicle.

11. Disconnect the negative jumper cable from the booster battery.
12. Disconnect the positive cable from the booster battery.
13. Disconnect the other end of the positive jumper cable from the jump started vehicle.
14. Install the battery box cover; be sure it is positioned properly before fastening the latch.

In An Emergency

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, allow-

ing 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 4700 / 5700 / 4900 / 6900 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

NOTE: The vehicle shown in the figures is for reference only and may not match the model of your vehicle.

1. Shutdown the engine and set the parking brake.
2. Open the hood. Remove the tow hooks, located behind the driver's-side bumper. See [Fig. 24.6](#). 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.

3. 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. 24.7](#). Pull the tow hooks to ensure they are securely engaged in the tow hook receivers.
4. 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. 24.8](#).



Fig. 24.6, Tow Hooks



Fig. 24.7, Tow Hooks Installed, Facing Down

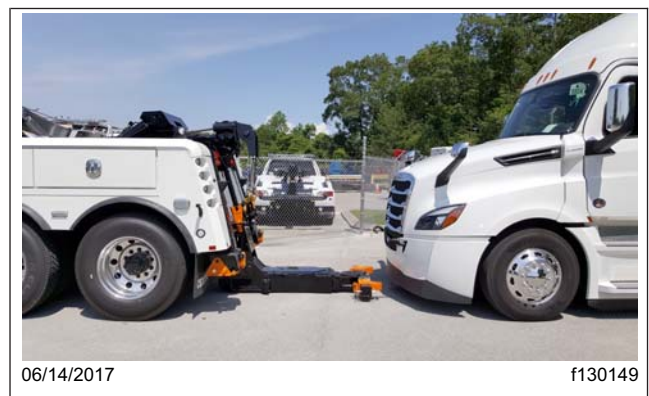


Fig. 24.8, Positioning the Stinger Assembly

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

In An Emergency

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. 24.9.

5. 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. 24.10.

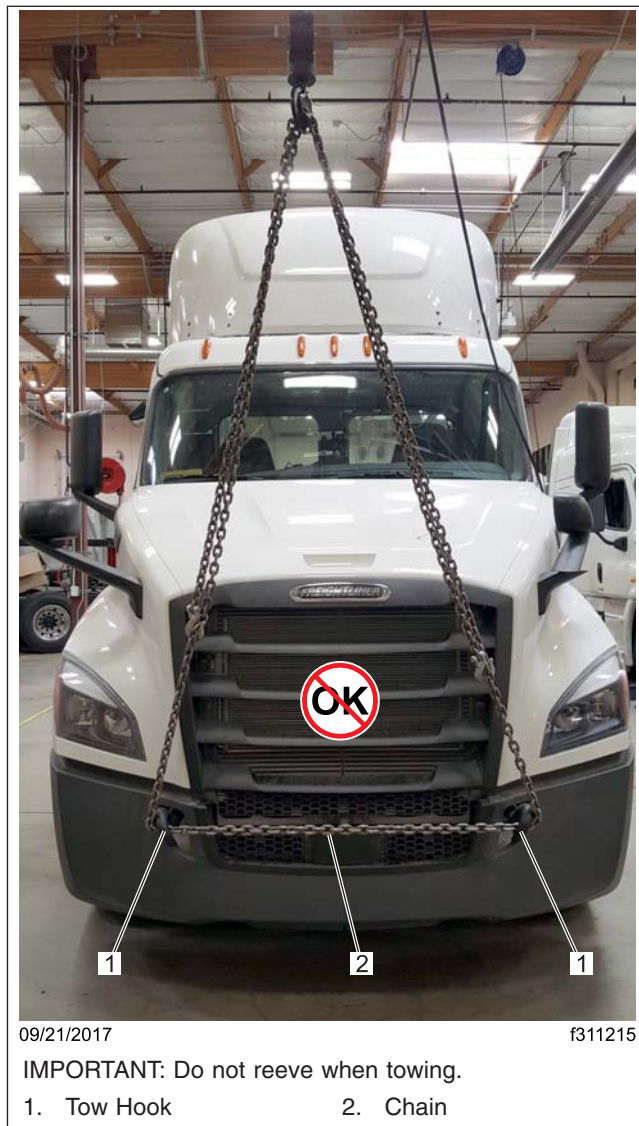


Fig. 24.9, Reeving

6. Lift the front of the vehicle until there is enough clearance for the stinger and crossbar to pass under the bumper. See Fig. 24.11.

If enough clearance can not 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.



Fig. 24.10, Tow Cables Connected to the Tow Hooks

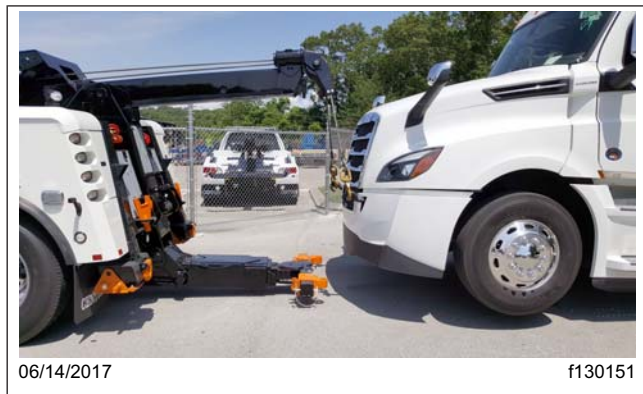


Fig. 24.11, Moving the Stinger and Crossbar Under the Bumper

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.

7. Chock the rear tires.

NOTICE

Reference the applicable axle manufacturer's information to avoid damaging the axle when towing the truck.

8. 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. 24.12](#) and [Fig. 24.13](#).

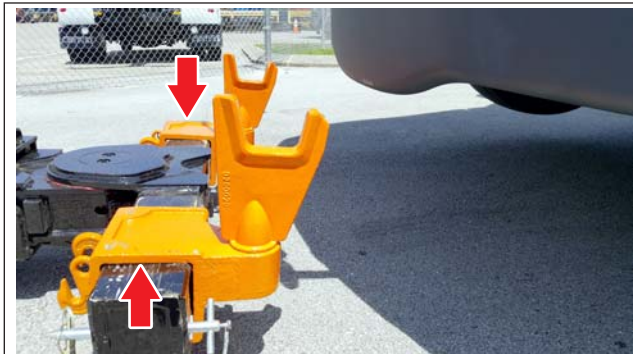


Fig. 24.12, Lift Adaptors Installed on the Crossbar

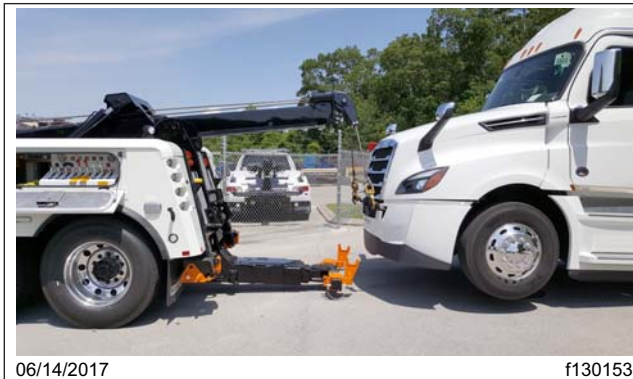


Fig. 24.13, Backing the Tow Truck with Lift Adaptors on the Crossbar

9. 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. 24.14](#) and [Fig. 24.15](#).
10. Secure the axle to the crossbar with a chain or ratchet strap.

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.

11. Remove all drivelines or all axle shafts for towing.

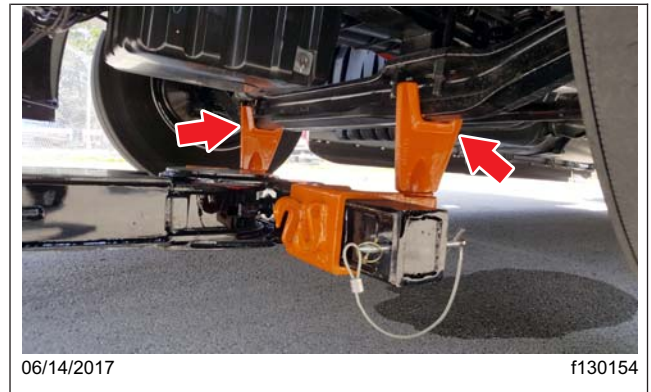


Fig. 24.14, Positioning the Stinger with Lift Adaptors Under the Axle



Fig. 24.15, Stinger with Lift Adaptors Under the Axle (tow truck shown)

12. Remove the tow cables from the tow hooks and retract the recovery boom. See [Fig. 24.16](#).
 13. Remove the tow hooks from the bumper.
 14. Connect the air and electrical supply lines from the tow truck to the vehicle being towed.
- IMPORTANT:** On vehicles 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 vehicle.
15. Release the park brake and remove the chocks from the rear tires.
 16. Use the stinger to pull the vehicle close to the back of the tow truck for final towing position. See [Fig. 24.17](#).
 17. Connect the safety chains. See [Fig. 24.18](#).

In An Emergency



Fig. 24.16, Retracting the Recovery Boom

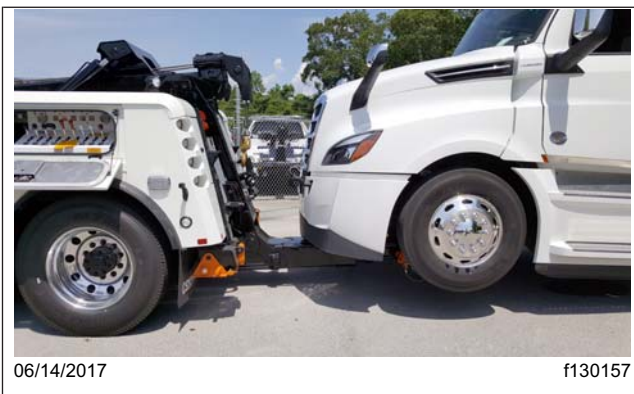


Fig. 24.17, Final Towing Position

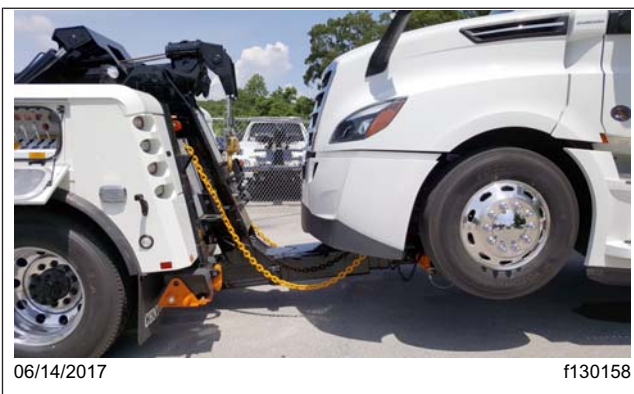


Fig. 24.18, Safety Chains Connected on the Towed Vehicle

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.

Fire in the Cab

The incidence of fire in 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

25

Telematics Data

Terms of Use	25.1
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Telematics Data

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, information regarding the performance, operation, location, speed, trips, travel history, stop and idle times, fuel consumption, fault codes and diagnostic information, steering and braking performance, air bag deployment and seatbelt use, decelerations, and other information relating to the performance, operation, health and safety of your Vehicle.

DTNA gathers this information in order to improve the performance, operation, health and safety of your Vehicle and other DTNA vehicles and products, in the following ways, among others:

- **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 re-

ceive 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 found at: <https://cmspublish-dtna.prd.freightliner.com/content/public/dtnaconnect---daimler-trucks-north-america.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 after-market 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.

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