Peterbilt Heavy Duty Body Builder Manual 2.1M 2019

VECU ARCHITECTURE

Peterbilt

A PACCAR COMPANY

Release Date 1/21/19

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BODY BUILDER MANUAL CONTENTS

SECTION 1: INTRODUCTION

SECTION 2: SAFETY AND COMPLIANCE

SAFETY SIGNALS	2-1
FEDERAL MOTOR VEHICLE SAFETY STANDARDS AND COMPLIANCE	2-2
NOISE AND EMISSIONS REQUIREMENTS	2-3
FUEL SYSTEM	2-4
COMPRESSED AIR SYSTEM	2-5
EXHAUST AND EXHAUST AFTER-TREATMENT SYSTEM	2-5
COOLING SYSTEM	2-6
ELECTRICAL SYSTEMS	2-7
AIR INTAKE SYSTEM	2-9
CHARGE AIR COOLER SYSTEM	2-9

SECTION 3: DIMENSIONS

INTRODUCTION	3-1
ABBREVIATIONS	3-1
OVERALL DIMENSIONS	3-1
SLEEPERS	3-8
FRAME RAILS	3-9
FRAME HEIGHT CHARTS	3-10
REAR FRAME HEIGHTS "C"	3-13
REAR SUSPENSION LAYOUTS	3-16
LIFT AXLES (PUSHERS AND TAGS)	3-28
AXLE TRACK AND TIRE WIDTH	3-31
FRONT DRIVE AXLE, PTO'S AND AUXILIARY TRANSMISSIONS	3-33
EXHAUST HEIGHT CALCULATIONS	3-40
GROUND CLEARANCE CALCULATIONS	3-41
OVERALL CAB HEIGHT CALCULATIONS	3-42
FRAME COMPONENTS	3-43
FRAME SPACE REQUIREMENTS	3-45
567/579 FAMILY 2017 EMISSIONS	3-51

SECTION 4: BODY MOUNTING

INTRODUCTION	4-1
FRAME RAILS	4-1
CRITICAL CLEARANCES	4-2
BODY MOUNTING USING BRACKETS	4-3
BODY MOUNTING USING U–BOLTS	4-7

SECTION 5: FRAME MODIFICATIONS

INTRODUCTION	5-1
DRILLING RAILS	5-1
MODIFYING FRAME LENGTH	5-1
CHANGING WHEELBASE	5-1
CROSSMEMBERS	5-2
TORQUE REQUIREMENTS	5-3
WELDING	5-3

SECTION 6: CONTROLLER AREA NETWORK (CAN) COMMUNICATIONS

INTRODUCTION	6-1
SAE J1939	6-2
PARAMETER GROUP NUMBER	6-2
SUSPECT PARAMETER NUMBER	6-2
CAN MESSAGES AVAILABLE ON BODY CONNECTIONS	6-3

TABLE OF CONTENTS

SECTION 7: ELECTRICAL

INTRODUCTION	7-1
ELECTRICAL ACRONYM LIBRARY	7-1
ELECTRICAL WIRING CIRCUIT CODES	7-2
MULTIPLEX SYSTEM	7-3
OVERVIEW DIAGRAM OF ELECTRICAL COMPONENT LOCATIONS	7-4
ELECTRICAL HARNESS OVERVIEW	7-5
IN CAB CAN BASED MESSAGING CONNECTOR	7-6
BODY CONNECTION POINTS	7-7
ELECTRIC ENGAGED EQUIPMENT	7-10
OPTIONAL 8 PIN PTO INPUT CONNECTOR	7-10
REMOTE THROTTLE AND REMOTE PTO CONTROLS	7-11
DUAL STATION CONTROLS	7-15
POWER DISTRIBUTION CENTER	7-19
CHASSIS MODULE	7-22
ELECTRIC OVER AIR SOLENOIDS	7-24
SWITCHES	7-26
SWITCH RELEARN PROCESS	7-27
GROUNDING	7-29
SPARE POWER	7-30
JUNCTION BOX	7-33
TRANSMISSION BACK UP SIGNALS	7-34
SNOW PLOW LIGHTING	7-34
TELLTALE ICONS	7-35
LIFT AXLES	7-36
GAUGES	7-37

SECTION 8: POWER TAKE OFF (PTO)

INTRODUCTION	8-1
PTO ACRONYM LIBRARY	8-1
TRANSMISSION MOUNTED PTO	8-2
REAR ENGINE PTO	8-9
PTO MOUNTING CLEARNANCE	8-10
MX PTO MODE CONTROL (PMC)	8-14
MX PTO MODE FEATURE	8-15
MX PTO MODE PROTECTIONS AND LIMITS	8-15
MX PTO SPEED CONTROL (PSC) FEATURES	8-16
MX PTO SPEED CONTROL INTERLOCKS	8-17
REMOTE PMC CONNECTIONS	8-18
PTO MODE CONTROL FLOW CHARTS	8-19
PTO TROUBLE SHOOTING GUIDE	8-20

SECTION 9: AFTERTREATMENT SYSTEM

INTRODUCTION	9-1
DEF SYSTEM SCHEMATIC	9-1
GENERAL GUIDELINES FOR DEF SYSTEM	9-3
INSTALLATION REQUIREMENTS AND DIMENSIONS FOR DEF SYSTEM	9-3
ROUTING TO THE DOSING MODULE (INJECTOR)	9-3
DEF SUPPLY MODULE MOUNTING REQUIREMENTS	9-4

SECTION 10: ROUTING

INTRODUCTION	10-1
DEFINITIONS	10-1
ROUTING REQUIREMENTS	10-2
ROUTING OF WIRES AND HOSES NEAR EXHAUST SYSTEM	10-4

SECTION 1 **INTRODUCTION**

The Peterbilt Heavy Duty Body Builder Manual was designed to provide body builders with a comprehensive information set to guide the body planning and installation process. Use this information when installing bodies or other associated equipment.

This manual contains appropriate dimensional information, guidelines for mounting bodies, modifying frames, electrical wiring information, and other information useful in the body installation process.

The Peterbilt Heavy Duty Body Builder Manual can be very useful when specifying a vehicle, particularly when the body builder is involved in the vehicle selection and component ordering process. Information in this manual will help reduce overall costs through optimized integration of the body installation with vehicle selection. Early in the process, professional body builders can often contribute valuable information that reduces the ultimate cost of the body installation.

In the interest of continuing product development, Peterbilt reserves the right to change specifications or products at any time without prior notice. It is the responsibility of the user to ensure that he is working with the latest released information. Check Peterbilt.com for the latest released version.

If you require additional information or reference materials, please contact your local Peterbilt dealer.

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SECTION 2 **SAFETY AND COMPLIANCE**

SAFETY SIGNALS

We've put a number of alerting messages in this book. Please read and follow them. They are there for your protection and information. These alerting messages can help you avoid injury to yourself or others and help prevent costly dam- age to the vehicle.

Key symbols and "signal words" are used to indicate what kind of message is going to follow. Pay special attention to comments prefaced by "WARNING", "CAUTION", and "NOTE." Please don't ignore any of these alerts.

WARNINGS, CAUTIONS, AND NOTES

WARNING

When you see this word and symbol, the message that follows is especially vital. It signals a **potentially hazardous situation** which, if not avoided, could result in death or serious injury. This message will tell you what the hazard is, what can happen if you don't heed the warning, and how to avoid it.

Example:

WARNING! Be sure to use a circuit breaker designed to meet lift-gate amperage requirements. An incorrectly specified circuit breaker could result in an electrical overload or fire situation. Follow the lift-gate installation instructions and use a circuit breaker with the recommended capacity.

CAUTION

Signals a **potentially hazardous situation** which, if not avoided, could result in minor or moderate injury or damage to the vehicle.

Example:

CAUTION: Never use a torch to make a hole in the rail. Use the appropriate drill bit.

NOTE

Provides general information: for example, the note could warn you on how to avoid damaging your vehicle or how to drive the vehicle more efficiently.

Example:

Note: Be sure to provide maintenance access to the battery box and fuel tank fill neck.

Please take the time to read these messages when you see them, and remember:

WARNING
Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION
Signals a potentially hazardous situation which, if not avoided, could result in minor or moderate injury or damage to the vehicle.

NOTE
Useful information that is related to the topic being discussed.

FEDERAL MOTOR VEHICLE SAFETY STANDARDS COMPLIANCE

As an Original Equipment Manufacturer, Peterbilt Motors Company, ensures that our products comply with all applicable U.S. or Canadian Federal Motor Vehicle Safety Standards. However, the fact that this vehicle has no fifth wheel and that a Body Builder (Intermediate or Final Stage Manufacturer) will be doing additional modifications means that the vehicle

was incomplete when it left the build plant. See next section and Appendix A for additional information.

INCOMPLETE VEHICLE CERTIFICATION

An Incomplete Vehicle Document is shipped with the vehicle, certifying that the vehicle is not complete. See Figure 2–1. In addition, affixed to the driver's side door frame or edge is an Incomplete Vehicle Certification label. See Figure 2–2.

NOTE

These documents list the U.S. or Canadian Federal Motor Vehicle Safety Standard regulations that the vehicle complied with when it left the build plant. You should be aware that if you add, modify or alter any of the components or systems covered by these regulations, it is your responsibility as the Intermediate or Final Stage Manufacturer to ensure that the complete vehicle is in compliance with the particular regulations upon completion of the modifications.

FIGURE 2-1. Incomplete Vehicle Certification Document

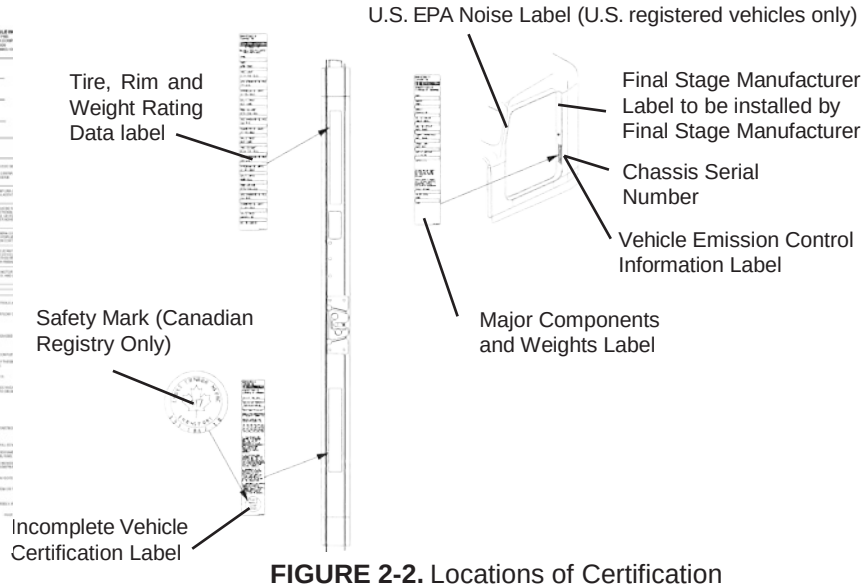


FIGURE 2-2. Locations of Certification Labels - Driver's Door and Frame

As the Intermediate or Final Stage Manufacturer, you should retain the Incomplete Vehicle Document for your records. In addition, you should record and retain the manufacturer and serial number of the tires on the vehicle. Upon completion of the vehicle (installation of the body and any other modifications), you should affix your certification label to the vehicle as required by Federal law. This tag identifies you as the "Intermediate or Final Stage Manufacturer" and certifies that the vehicle complies with Federal Motor Vehicle Safety Standards. (See Figure 2–2.) Be advised that regulations affecting the intermediate and final stage manufacturer may change without notice. Ensure you are referencing the most updated copy of the regulation during the certification and documentation processes.

In part, if the final stage manufacturer can complete and certify the vehicle within the instruction in the incomplete vehicle document (IVD) the certification label would need a statement that reads, "This vehicle has been completed in accordance with the prior manufacturers, IVD where applicable. This vehicle conforms to all applicable Federal Motor Vehicle Safety Standards [and Bumper and Theft Prevention Standards if applicable] in effect in (month, year)."

However, if the vehicle cannot be completed and certified with in the guidance provided in the IVD, the final stage manufacturer must ensure the vehicle conforms to all applicable Federal Motor Vehicle Safety Standards (FMVSS). The final stage manufactures certification label would need a statement that reads, “This vehicle conforms to all applicable Federal Motor Vehicle Safety Standards [and Bumper and Theft Prevention Standards if applicable] in effect in (month, year).”

These statements are just part of the changes to the new certification regulation. Please refer to the Feb 15, 2005 final rule for all of the details related to this regulation. You can contact NTEA Technical Services Department at 1-800-441-NTEA for a copy of the final rule (DocID 101760).

For Canadian final stage manufacturers see:
http://www.gazette.gc.ca/index-eng.html; and
http://www.tc.gc.ca/eng/acts-regulations/menu.htm for the regulations.

Or contact: Transport Canada
Tower C, Place de Ville, 330 Sparks Street
Ottawa, Ontario K1A 0N5 (613) 990-2309
TTY: 1-888-675-6863

NOISE AND EMISSIONS REQUIREMENTS

NOTE

This truck may be equipped with specific emissions control components/systems* in order to meet applicable Federal and California noise and exhaust emissions requirements. Tampering with these emissions control components/systems* is against the rules that are established by the U.S Code of Federal Regulations, Environment Canada Regulations and California Air Resources Board (CARB). These emissions control components/systems* may only be replaced with original equipment parts.

Additionally, most vehicles in North America will be equipped with a Greenhouse Gas (GHG) “Vehicle Emission Control Information” door label indicating its certified configuration. The vehicle components listed on this label are considered emission control devices.

Modifying (i.e. altering, substituting, relocating) any of the emissions control components/systems defined above will affect the noise and emissions performance/certification. Modifications that alter the overall shape and aerodynamic performance of a tractor will also affect the emission certification. If modifications are required, they must first be approved by the manufacturer. Unapproved modifications could negatively affect emissions performance/certification. There is no guarantee that proposed modifications will be approved.

Tires may be substituted provided the new tires possess a Coefficient of rolling resistance (Crr) equal to or lower than Crr of the original tires. Consult with your tire supplier(s) for appropriate replacement tires.

Contact the engine manufacturer for any requirements and restrictions **prior** to any modifications.

- For Cummins Contact 1-800-DIESELS or your local Cummins distributor. Reference AEB 21.102.

It is possible to relocate the DEF tank, however the relocation requirements need to be followed. Any variance from the relocation requirements may cause the emissions control components/systems to operate improperly potentially resulting in engine de-rate.

NOTE

All 2017 engine emissions certified vehicles will be equipped with an On-Board Diagnostics (OBD) system. The OBD system is designed to detect malfunctions of any engine or vehicle component that may increase exhaust emissions or interfere with the proper performance of the OBD system itself.

All diesel engines will be equipped with an On-Board Diagnostics (OBD) system. The OBD system consists of computer program on one or more of the vehicle's Electronic Control Units (ECUs). This program uses information from the control system and from additional sensors to detect malfunctions. When a malfunction is detected, information is stored in the ECU(s) for diagnostic purposes. A Malfunction Indicator Light (MIL) is illuminated in the dash to alert the driver of the need for service of an emission-related component or system.

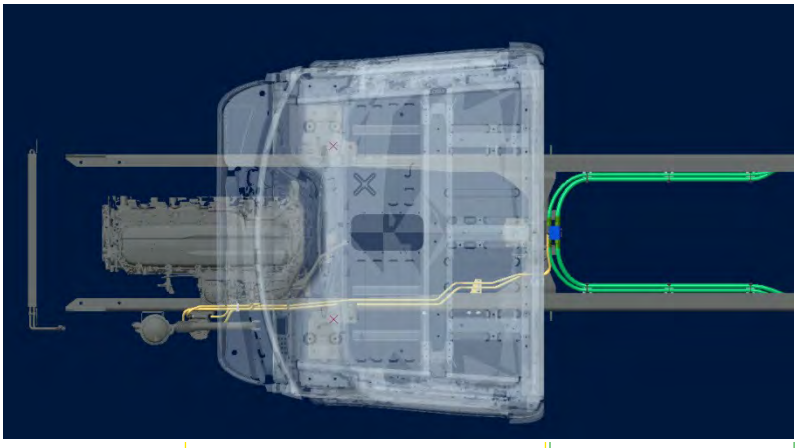
To ensure compliance to emissions regulations, the final configuration of certain features of the completed vehicle must meet specific requirements. This section describes requirements relevant for only the most common or critical modifications done by body builders. For a complete description of acceptable modifications, see the application guidance available from the manufacturer of the engine installed in the chassis.

FUEL SYSTEM

The following are highlights of some of the more common or critical aspects of this system.

The overall system restriction may not exceed the restriction limitations set forth by the engine manufacturer for both supply and return.

- Ensure that fuel lines are not pinched or can potentially be damaged when installed between body and frame
- Fuel lines must be routed and secured without dips or sags
- There must be easy access to filter(s) and fill cap
- The tank vent may not obstructed
- Added accessories (heaters, generators) cannot introduce air into system
- Fuel tank must be located so that the full level is not above cylinder head
- "Ultra-Low Sulfur Fuel Only" labels must be present on the dash and fuel fill
- Modification of the pressure side secondary filter and plumbing is not allowed without engine manufacturer approval
- Body installation of fuel tank or routing of lines must not cause significant increase in fuel temperature
- Fuel hoses shall meet or exceed OEM supplied hose material construction specifications
- Formed nylon fuel lines with quick-connects are installed underneath the cab and hood along the frame rail. Behind the cab from the fuel tee to tanks are wirebraid-reinforced rubber lines. Supply and return fittings are poka-yoked to prevent incorrect assembly.



COMPRESSED AIR SYSTEM

The following are highlights of some of the more common or critical aspects of this system.

- Air system modification must meet applicable FMVSS regulations
- Compressed Air tank may not be modified (exception – addition or removal of fittings or relocation of the tank)
- Added devices or bodywork may not interfere with or rub air lines
- Air supply to the engine doser may not be restricted or disconnected
- Air lines should be routed, protected from heat, and properly secured to prevent damage from other components
- Care should be taken so that air lines do not rub against other components
- Care should be taken to protect the air system from heat sources.

EXHAUST AND EXHAUST AFTER-TREATMENT SYSTEM

The following are highlights of some of the more common or critical aspects of this system.

- The following after-treatment and exhaust system components may not be modified:
  - DPF assembly
  - SCR Catalyst assembly
- Exhaust pipes between the engine and after-treatment devices (DPF, SCR Catalyst) and between after-treatment devices
  - NO_x Sensors
  - PM Sensor
- The following modifications may only be done within the guidelines of the “DEF System Relocation Guide.”
  - Modifications to Diesel Exhaust Fluid (DEF) throttle, suction, or pressure lines
  - Modification or relocation of the DEF tank
  - Modification of coolant lines to and from the DEF tank
- All DEF and coolant lines should be routed, protected, and properly secured to prevent damage during vehicle operation or other components

- If relocation of the DCU or ACM is necessary, use existing frame brackets and mount inside of frame flanges where necessary. Do not extend the harnesses
- The DPF, the SCR catalyst, or their mounting may not be modified
- The NOx sensor may not be relocated or altered in any way; this includes re-clocking the after-treatment canister or reorienting the sensor(s)
- Exhaust pipes used for tailpipes/stacks must be properly sized, and must prevent water from entering
- Ensure adequate clearance between the exhaust and body panels, hoses, and wire harnesses
- The body in the vicinity of the DPF must be able to withstand temperatures up to 400°C (750°F)
- Do not add thermal insulation to the external surface of the DPF
- The SCR water drain hole may not be blocked
- Allow adequate clearance (25mm (1 inch)) for servicing the DPF sensors, wiring, and clamped joints
- Drainage may not come in contact with the DPF, SCR catalyst, sensors or wiring
- Allow sufficient clearance for removing sensors from DPF. Thermistors require four inches. Other sensors require one inch
- Wiring should be routed, protected from heat, and properly secured to prevent damage from other components
- The exhaust system from an auxiliary power unit (APU) must not be connected to any part of the vehicle after-treatment system or vehicle tail pipe.

COOLING SYSTEM

The following are highlights of some of the more common or critical aspects of this system.

- Modifications to the design or locations of fill or vent lines, heater or defroster core, and surge tank are not recommended
- Additional accessories plumbed into the engine cooling system are not permitted, at the risk of voiding vehicle warranty
- Coolant level sensor tampering will void warranty
- When installing auxiliary equipment in front of the vehicle, or additional heat exchangers, ensure that adequate air flow is available to the vehicle cooling system. Refer to engine manufacturer application guide- lines for further detail
- When installing FEPTO drivelines, the lower radiator anti-recirculation seal must be retained with FEPTO driveline clearance modification only
- Changes made to cooling fan circuit and controls are not allowed, with the exception of AC minimum fan on time parameter
- See owner's manual for appropriate winter front usage

ELECTRICAL SYSTEM

The following are highlights of some of the more common or critical aspects of this system.

- Electrical harnesses providing battery power and electronic control signals to engine and emissions control/ vehicle OBD components including datalinks may not be spliced. These emissions control/vehicle OBD components include the following:
    - throttle pedal
    - vehicle speed sensor
    - after-treatment wiring
    - 9-pin OBD Connector
    - CAN Communication / OBD Diagnostic wiring
- If the alternator or battery is substituted, it must meet the requirements of the engine manufacture's guide- lines. This includes alternator ground voltage drop and alternator ground cable effectiveness. See the engine manufacture's guidelines for recommended test procedure. Additionally the maximum voltage differential and the peak-peak voltage differential between the engine ECM block ground stud and battery negative terminal may not exceed 500 mV under any combination of loads or operating conditions.
- Only an OBD compliant battery disconnect switch may be installed on vehicles equipped EPA 2013 and beyond compliant diesel engines. An OBD compliant switch and harness, even in the off position, supply a small amount of power to the engine controller and enable certain emissions critical functions (e.g. DEF line purge). Any modifications to the electrical system which interrupt this power supply will cause OBD fault codes and illumination of the MIL. In addition, such a modification will render the engine non-compliant with certain emission regulations. As a general rule of thumb, you can remove and replace a battery disconnect switch on a truck equipped with a battery disconnect switch at the factory. However, if a battery disconnect switch was not installed in the factory a significant harness modification is required before a battery disconnect switch can be added.
- Installation of aftermarket transfer-cases must address the vehicle speed sensor position. The standard position of the speed sensor is at the transmission tail shaft. When a transfer-case is added it is best to relocate the sensor to the axle side output shaft of the transfer-case. This is typically accomplished by adding a tone wheel into the driveline yoke assembly.
- Wiring extensions for the after-treatment wiring are available for relocating the DEF tank from your dealer via Paccar Parts. For relocation of DEF tank, refer to the after-treatment section of this manual.
- The emission system requires an accurate Outside Air Temperature (OAT) reading in order to properly run its control algorithms. The OAT sensor is located in the driver's side mirror assembly on Peterbilt trucks and is shown in the figures below. If the body builder needs to modify the mirror assembly in any way, it is important the OAT sensor stay positioned on the mirror assembly. Running the vehicle without the OAT sensor connected will cause the MIL lamp to illuminate. If needed, a replacement sensor can be ordered from your Peterbilt dealer.

FIGURE 2-3: Aerodynamic Mirror OAT Sensor Location

- Coolant Sensor considerations are given in the Cooling section above
- The OBD/Diagnostic connector port is located below the dash to the left of the steering wheel. This connector and its location may not be changed.
- All vehicles equipped with EPA 2013 compliant diesel and bi-fueled engines must be equipped with a Malfunction Indicator Lamp (MIL) lamp. This lamp is required to be an engine outline symbol as defined by ISO (International Standards Organization). The figure below shows the instrument cluster and MIL lamp position. Note this lamp location is fixed with respect to the controls and its location may not be changed if you are updating the warning lamp cards.

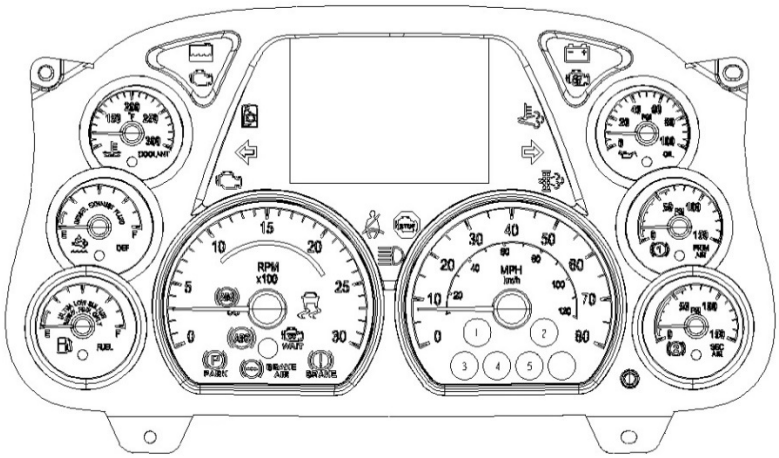


FIGURE 2-4: Instrument Cluster for 579/567 used with EPA 2013 Emission compliant engines. The Check Engine lamp and/or the MIL will appear in the Driver Information Display. See 579/567 Operator's Manual for more information.

- In addition to the sensors and lamps above, the emission system also depends on signals from the exhaust DPF (Diesel Particulate Filter), SCR (Selective Catalytic Reduction), and NOx sensor. Wiring between these devices, the Dosing Control Unit (DCU) and engine ECM should not be tampered with or altered in any way.

AIR INTAKE SYSTEM

The following are highlights of some of the more common or critical aspects of this system.

- The air intake screen may not be blocked, either fully or partially
- Modification to the air intake system may not restrict airflow. For example, pipe diameter may not be reduced
- All sensors must be retained in existing locations
- To retain system seal, proper clamp torque must be used. Refer to service manual for proper clamp torque

CHARGE AIR COOLER SYSTEM

The following are highlights of some of the more common or critical aspects of this system.

- The Charge Air Cooler may not be modified
- The installation of engine over-speed shutdown devices must not introduce restriction in the intake system
- All plumbing associated with the charge air cooler may not be modified

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SECTION 3 **DIMENSIONS**

INTRODUCTION

This section has been designed to provide enough information to successfully layout a chassis in the body planning process. All dimensions are in inches unless otherwise noted. Optional equipment may not be depicted. Please contact your local Peterbilt dealer if more dimensional information is desired.

ABBREVIATIONS

Throughout this section and in other sections as well, abbreviations are used to describe certain characteristics on your vehicle. The chart below lists the abbreviated terms used.

TABLE 3-1. Abbreviations Used

CA	Cab to axle. Measured from the back of the cab to the centerline of the rear axle(s).
EOF	Frame rail overhang behind rear axle--measured from the centerline of tandems
FOF	Front of frame
FAX	Front Axle
BOC	Back of cab
SOC	Side of cab
WB	Wheelbase
BFA	Bumper to front axle. Measured from front of bumper centerline of front axle.
BBC	Bumper to back of cab Measured from front of bumper to back of cab.

OVERALL DIMENSIONS

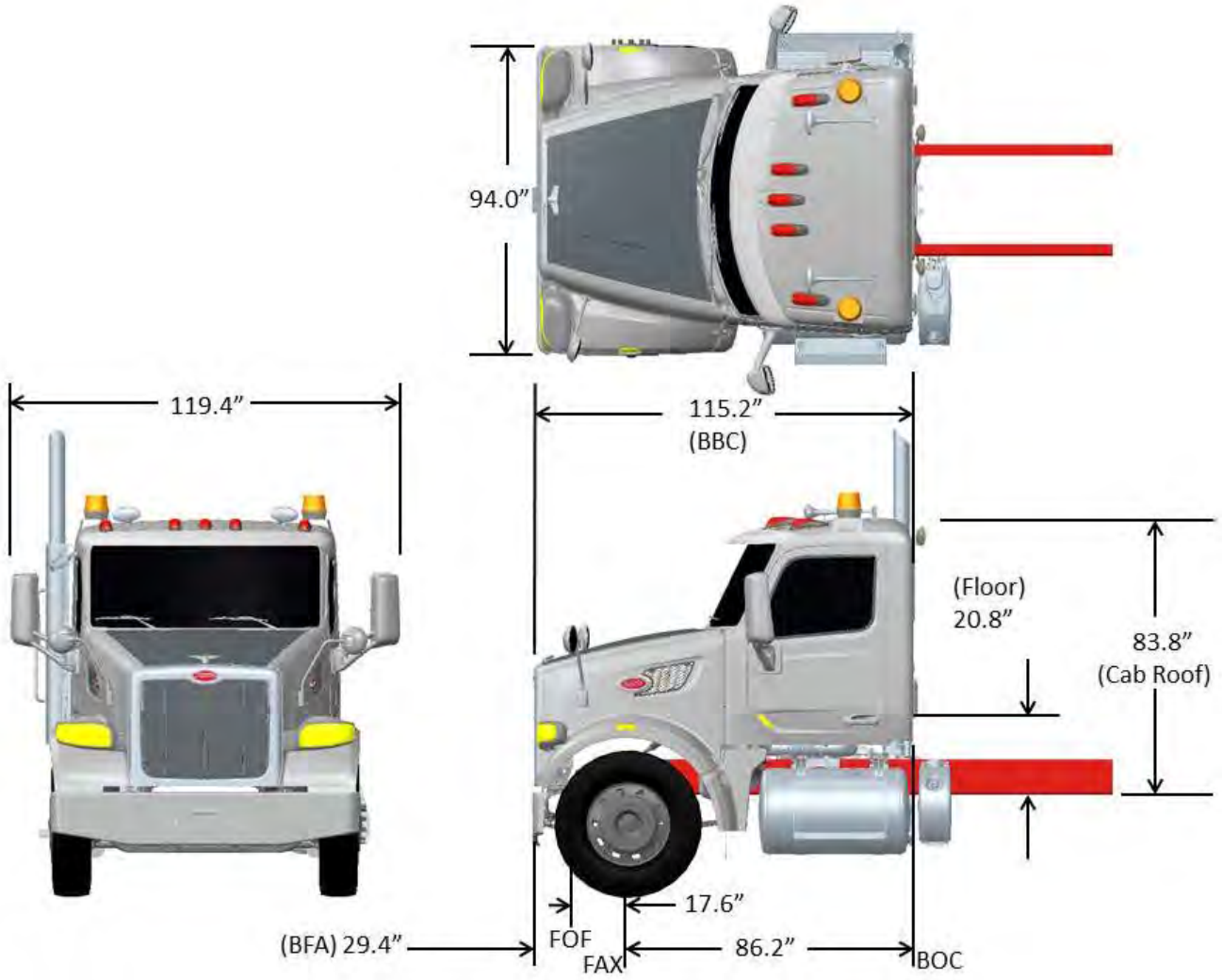
This section includes drawings and charts of the following Peterbilt Models: 389, 367, 365, 567 and 579. The Extended Rear Window, Extended Cab and Unibilt sleepers are also included.

On the pages that follow, detail drawings show particular views of each vehicle; all dimensions are in inches (in). They illustrate important measurements critical to designing bodies of all types. See the “Contents” at the beginning of the manual to locate the drawing that you need.

All heights are given from the bottom of the frame rail.

Peterbilt also offers .dxf files and frame layouts of ordered chassis prior to build. Please speak with your local dealership to request this feature when specifying your chassis.

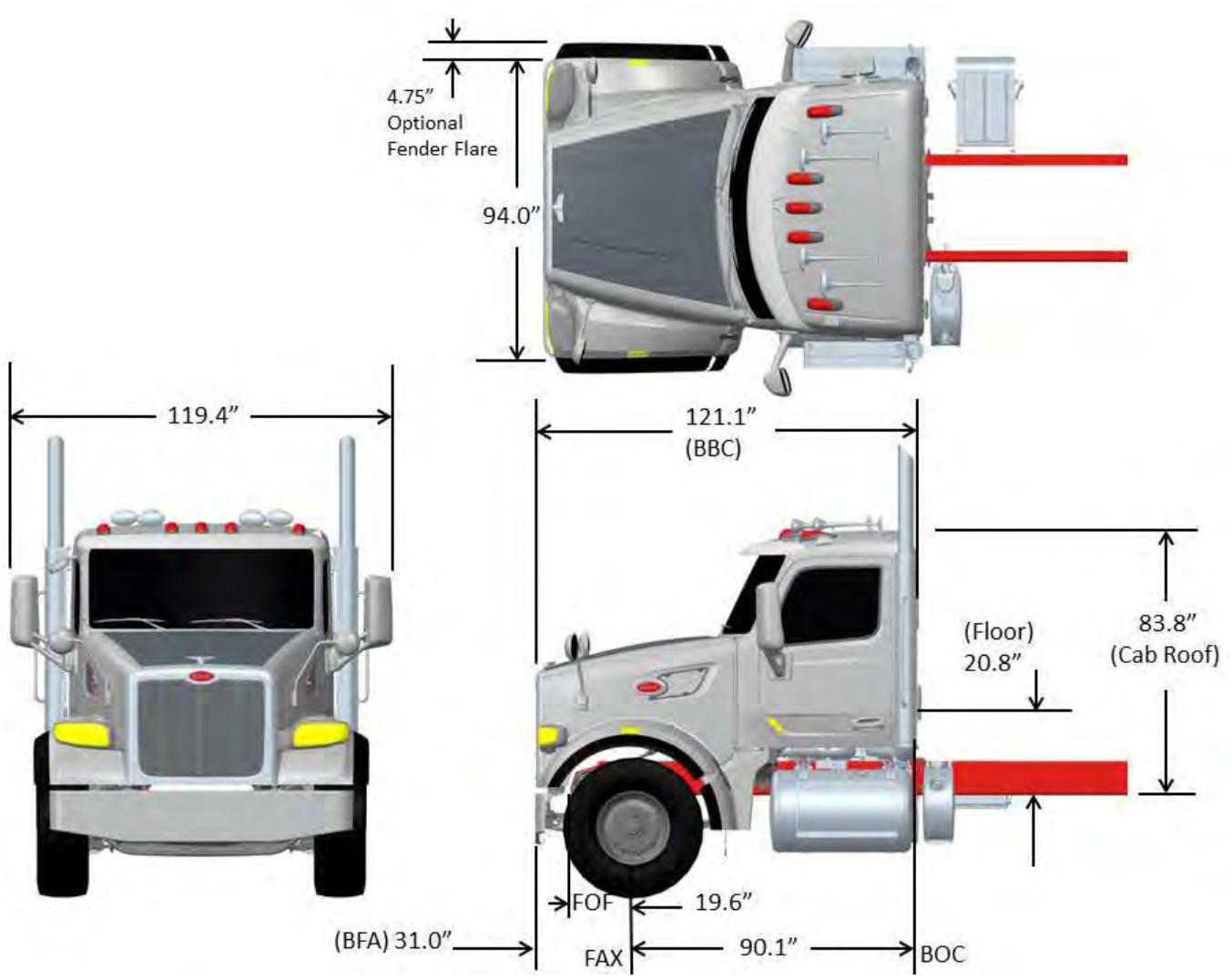
567-115 SFFA



NOTES:
1) DIMENSIONS ARE FOR REFERENCE ONLY
2) DIMENSIONS ARE TO FRONT OF BUMPER

FIGURE 3-1. Model 567-115 SFFA – Overall Dimensions

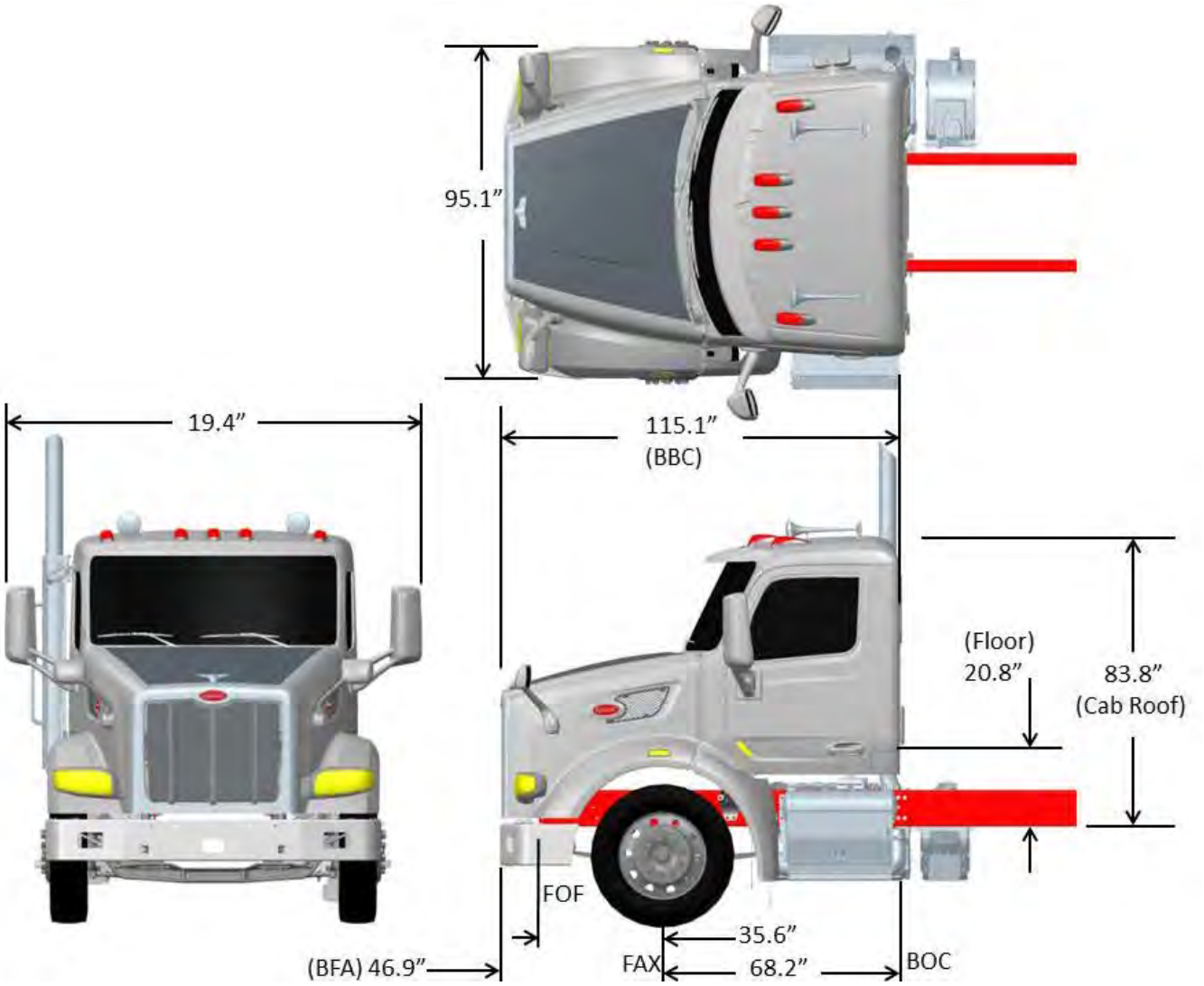
567-121 SFFA



NOTES:
1) DIMENSIONS ARE FOR REFERENCE ONLY
2) DIMENSIONS ARE TO FRONT OF BUMPER

FIGURE 3-2. Model 567-121 SFFA – Overall Dimensions

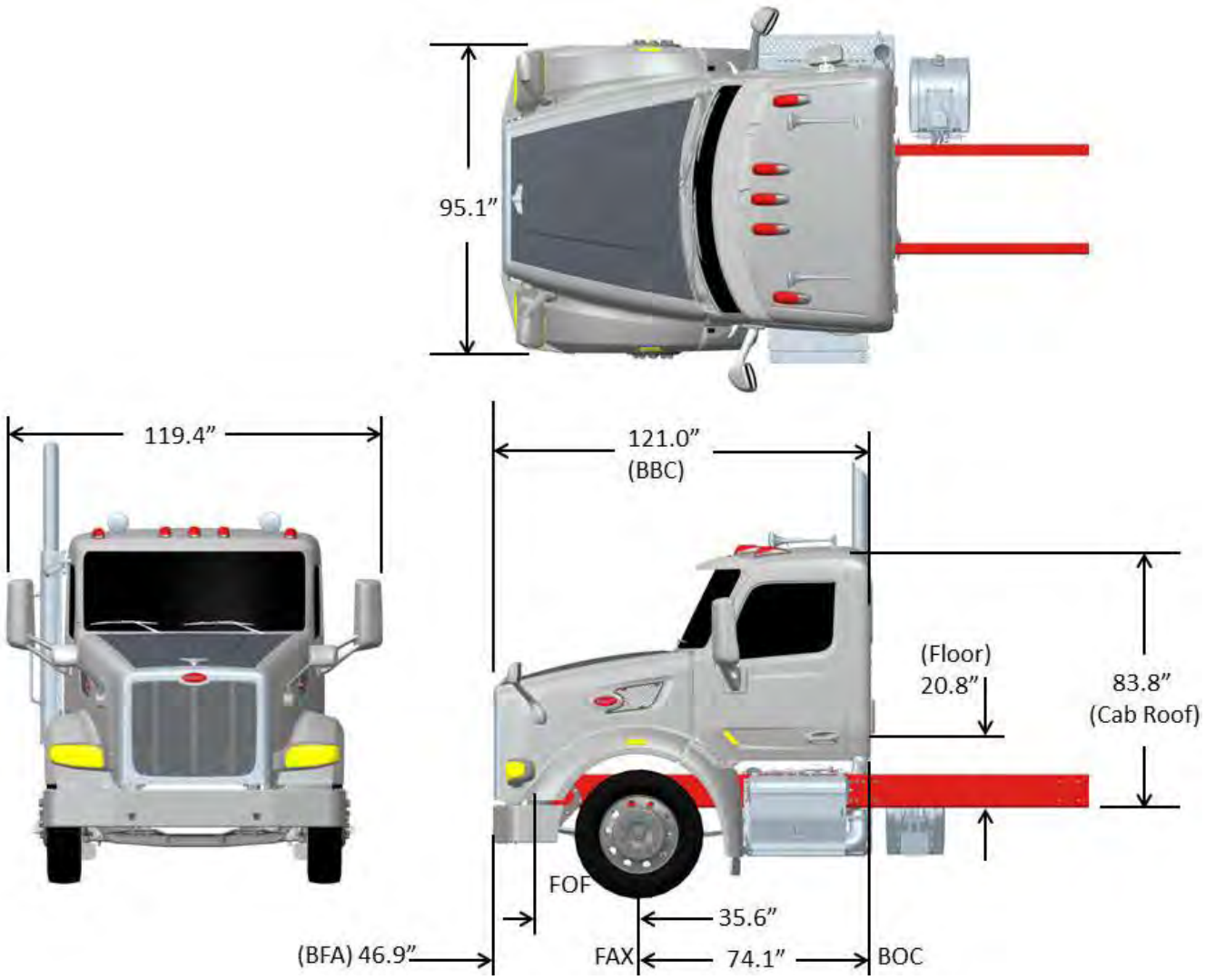
567-115 SBFA



NOTES:
1) DIMENSIONS ARE FOR REFERENCE ONLY
2) DIMENSIONS ARE TO FRONT OF BUMPER

FIGURE 3-3. Model 567-115 SBFA – Overall Dimensions

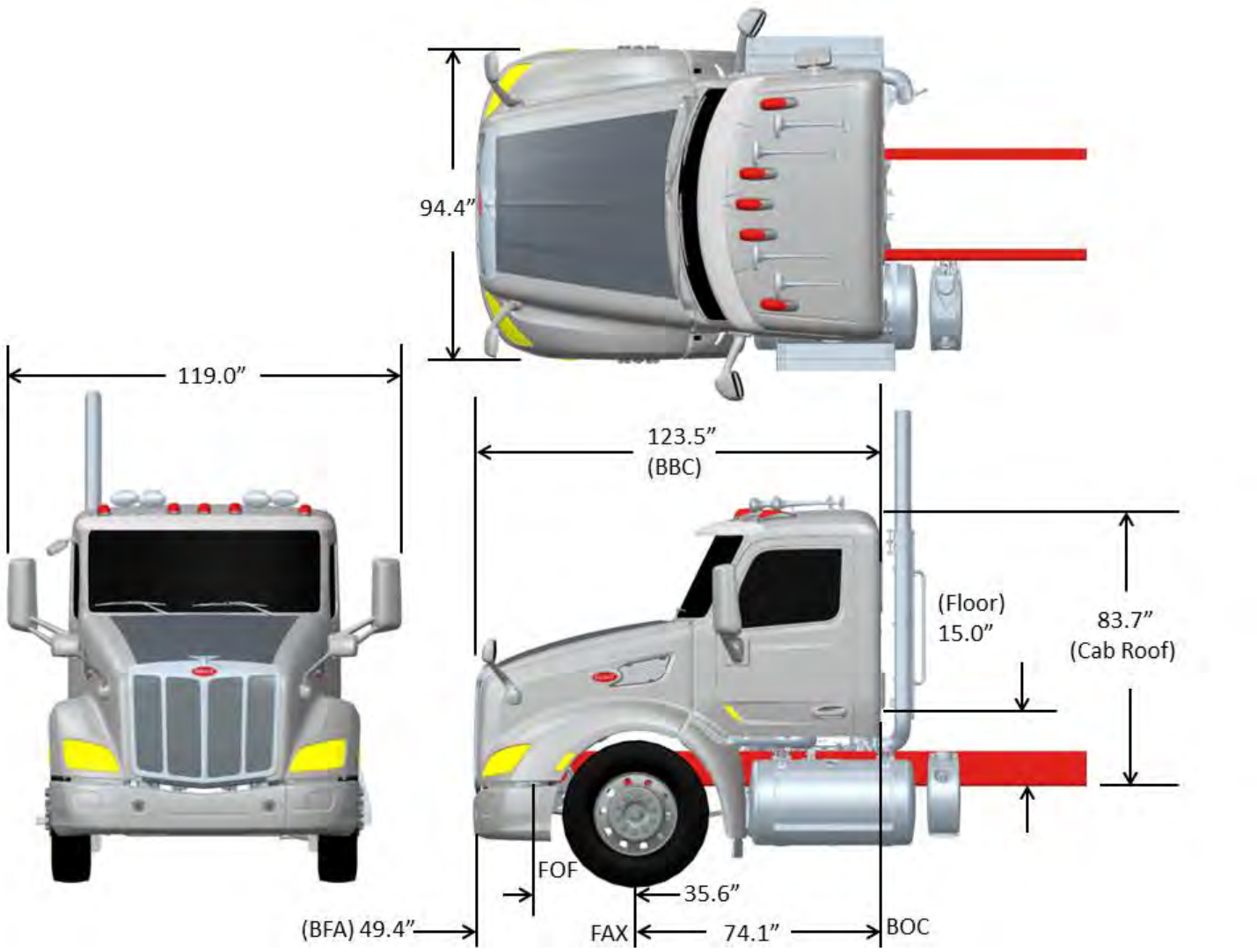
567-121 SBFA



NOTES:
1) DIMENSIONS ARE FOR REFERENCE ONLY
2) DIMENSIONS ARE TO FRONT OF BUMPER

FIGURE 3-4. Model 567-121 SBFA – Overall Dimensions

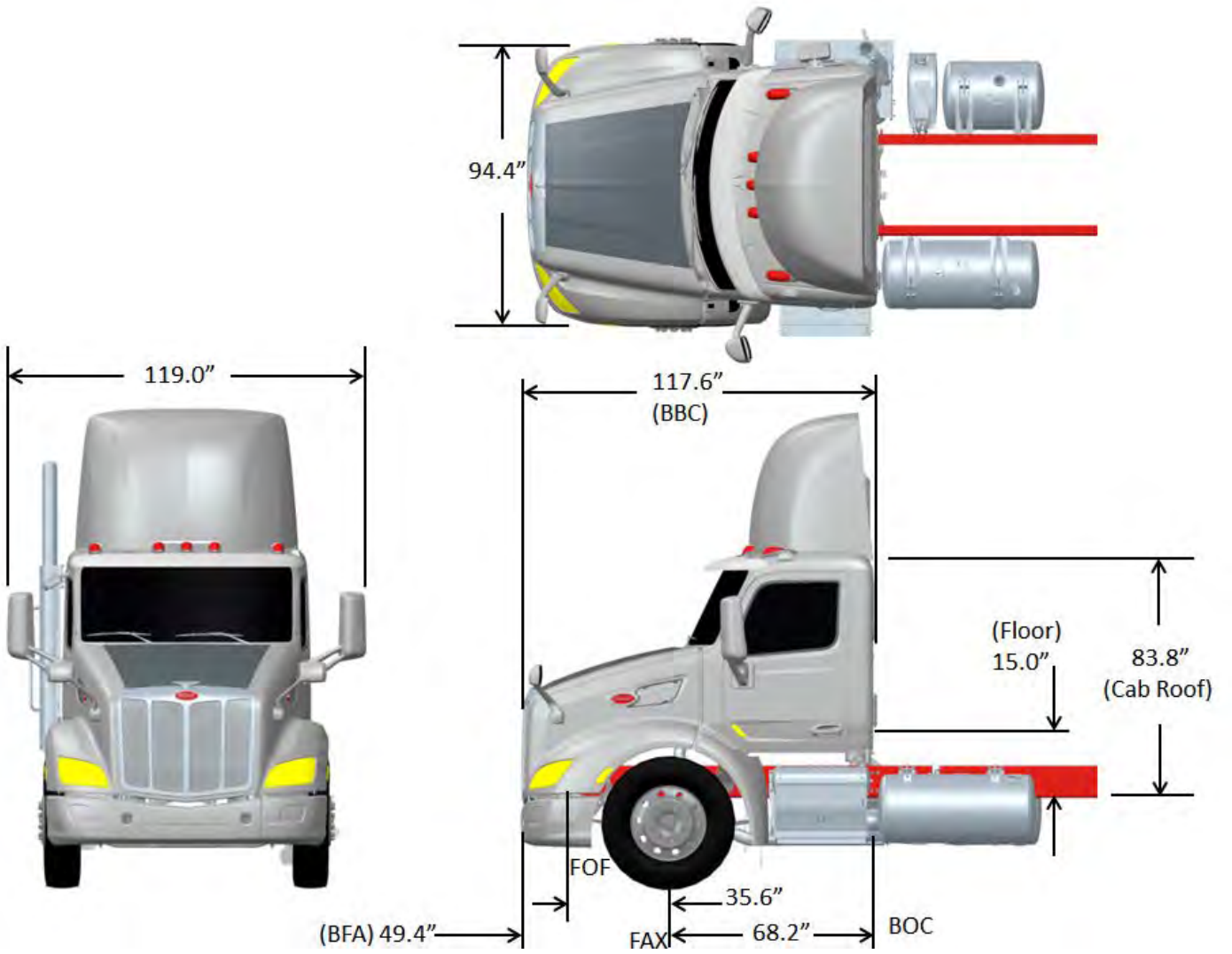
Model 579-123 SBFA



NOTES:
3) DIMENSIONS ARE FOR REFERENCE ONLY
4) DIMENSIONS ARE TO FRONT OF BUMPER

FIGURE 3-17. Model 579-123 SBFA – Overall Dimensions

Model 579-117 SBFA



NOTES:
1) DIMENSIONS ARE FOR REFERENCE ONLY
2) DIMENSIONS ARE TO FRONT OF BUMPER
3) OPTIONAL ROOF FAIRING SHOWN

FIGURE 3-18. Model 579-117 SBFA Top & LH View – Overall Dimensions

SLEEPERS

TABLE 3-2. Sleeper Dimensions

	CAB TO SLEEPER OPENING				SLEEPER DIMENSIONS							CAB TO SLEEPER GAP
	STD CAB		ULTRACAB		D = DISTANCE FROM BTM OF FRAME RAIL TO TOP OF ROOF							
MODEL	"A"	"B"	"A"	"B"	44"	58" LOW	58" HIGH	72" LOW	72" HIGH	78"	80"	"E"
579, 567	49.0	68.1	66.5	68.1	83.7	85.5	N/A	N/A	101.8	N/A	106.3	1.8
	SLEEPER LENGTH "C" =				36.0	48.0	48.0	63.0	63.0	70.0	70.0	

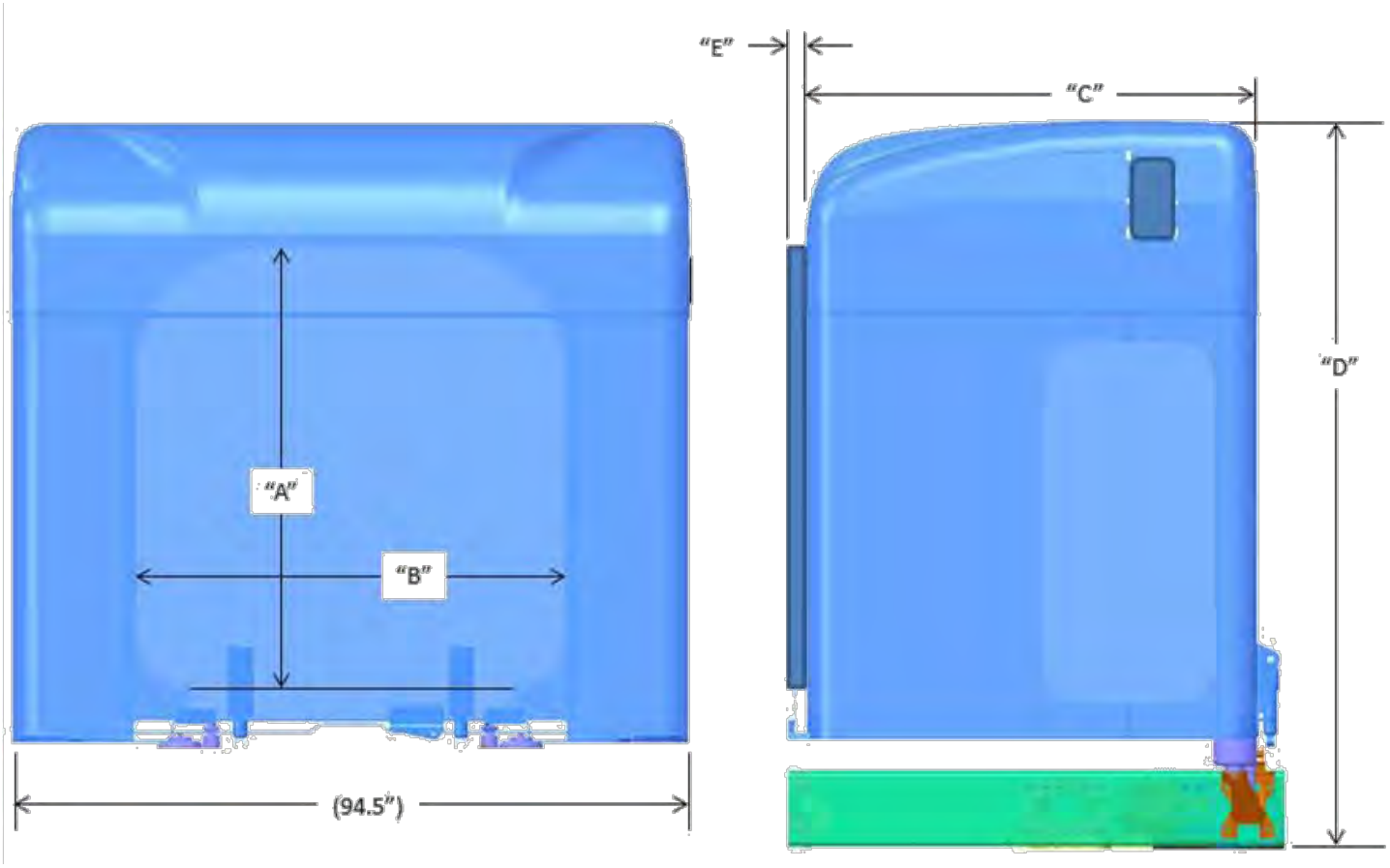


FIGURE 3-19. Sleeper Dimensions – Front & LH View

FRAME RAILS

Frame rail configurations are shown in FIGURE 3-22. Rail height, flange and structural values can be found in the Body Mounting Section.

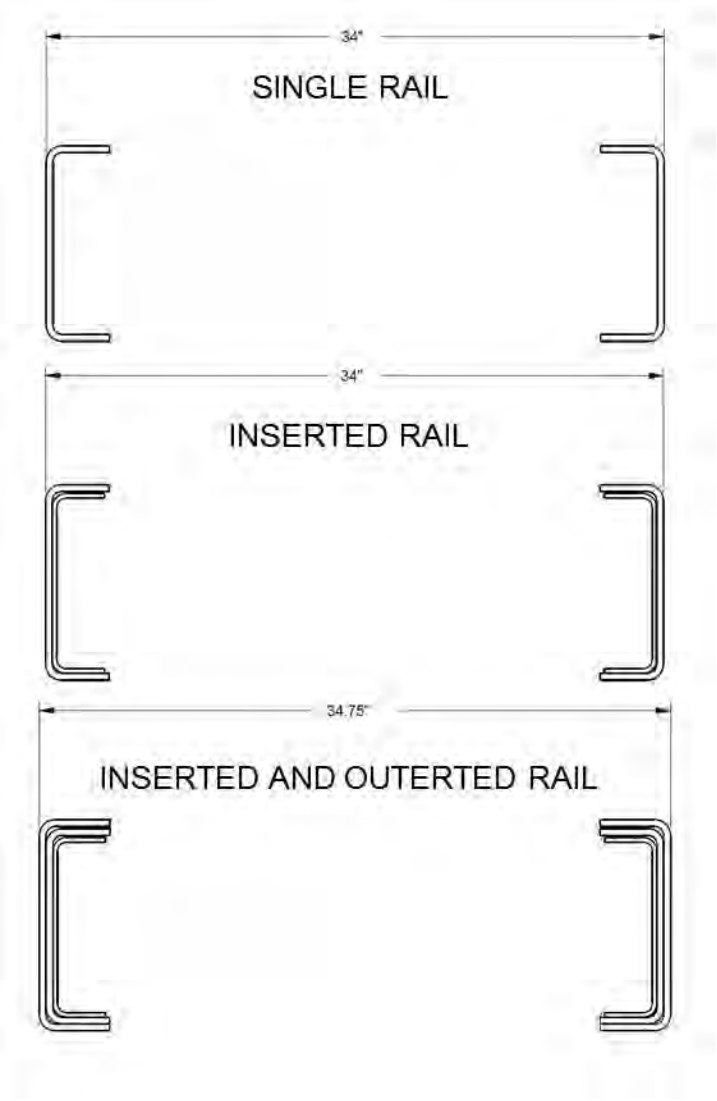


FIGURE 3-22. Frame Rail Configurations

NOTE: The outserted frame section does not extend through the rear suspension area.

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FRAME HEIGHT CHARTS

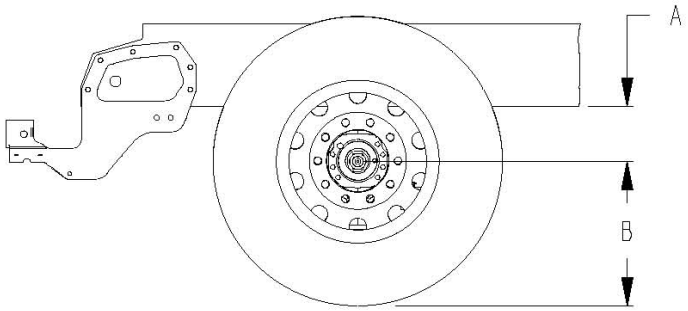
THE FOLLOWING FRAME HEIGHT CHARTS MAY BE USED FOR FINDING APPROXIMATE FRONT AND REAR FRAME HEIGHTS.

THE RESULTS ARE APPROXIMATIONS BECAUSE OF THE MANY VARIABLES SUCH AS TIRE TREAD THICKNESS, MANUFACTURING TOLERANCES, SPRING SET, AND THE LOADING IMPOSED IN THE LOADED SITUATION.

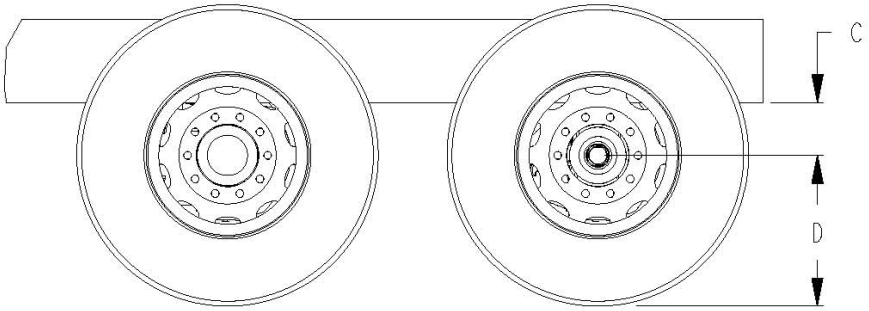
LOADED VALUES ARE QUOTES FOR REPRESENTATIVE LOADS AT THE GROUND FOR THE PARTICULAR SPRING AND AXLE COMBINATION, AND, AS SUCH, CAN VARY WITH LOADING VARIATIONS.

SPECIAL INSTALLATIONS ARE SOMETIMES POSSIBLE WITH CERTAIN SUSPENSIONS ALLOWING VARIATIONS FROM STANDARD. PLEASE CONTACT APPLICATIONS ENGINEERING FOR INFORMATION.

FRONT FRAME HEIGHT



REAR FRAME HEIGHT



NOTES:

1) "B" AND "D" DIMENSIONS CAN BE FOUND IN THE TIRES/WHEELS SECTION OR IN THE TIRE VENDOR'S LITERATURE.

FIGURE 3-23. Frame Height

TABLE 3-3. Front Frame Height "A" - SFFA

SFFA SUSPENSION			SPACER (mm)	LIGHT	LOADED
12,000 lbs.[3]	TAPERLEAF	SFFA	10	9.3	8.9
			20	9.7	9.3
			30	10.1	9.7
			40	10.5	10.1
			50	10.9	10.5
			60	11.3	10.9
			70	11.7	11.2
			80	12.1	11.6
13,200 lbs.[3]	TAPERLEAF	SFFA	10	9.3	8.9
			20	9.7	9.3
			30	10.1	9.7
			40	10.5	10.1
			50	10.9	10.5
			60	11.3	10.9
			70	11.7	11.3
			80	12.1	11.5
14,600 lbs.	TAPERLEAF	SFFA	10	9.3	8.9
			20	9.7	9.3
			30	10.1	9.7
			40	10.5	10.1
			50	10.9	10.5
			60	11.3	10.9
			70	11.7	11.3
			80	12.1	11.7
16,000 lbs.	TAPERLEAF	SFFA	10	10.5	10.0
			20	10.9	10.3
			30	11.3	10.7
			40	11.7	11.1
			50	12.1	11.5
			60	12.5	11.9
			70	12.9	12.3
			80	13.3	12.7
18,000 - 20,000 lbs. [1]	TAPERLEAF	SFFA	10	10.6	9.5
			20	11.0	10.0
			30	11.4	10.4
			40	11.8	10.8
			50	12.2	11.2
			60	12.6	11.6
			70	13.0	12.0
			80	13.4	12.4
22,000 - 24,000 lbs. [2]	TAPERLEAF	SFFA	10	12.4	10.9
			20	12.8	11.3
			30	13.2	11.7
			40	13.6	12.1
			50	14.0	12.5
			60	14.3	12.9
			70	14.7	13.3
			80	15.1	13.6

NOTES:

1) Shown with 20K load for laden dim. Add 0.3" to laden dim. if 18K load.
2) Shown with 23K load for laden dim. Add 0.1" to laden dim. if 22K load. Subtract .01" from unladen dim if 24K load.
   Note: Standard 3-1/2" drop axle heights shown, for 5" drop axles, subtract an additional 1-1/2".
   Spacer blocks are used by Engineering to obtain level frame and are not options.
   "A" dimension shown is to bottom of frame rail. Add frame rail height dimension for frame height.

TABLE 3-4. Front Frame Height "A" - SBFA

SBFA Suspension			Spacer (Mm)	Unladen (In.)	Laden (In.)
12,000 lbs.	TAPERLEAF	SBFA	30	9.7	8.5
			40	10.1	8.9
			50	10.5	9.3
			60	10.9	9.7
			70	11.3	10.1
			80	11.7	10.5
13,200 lbs.	TAPERLEAF	SBFA	30	9.8	8.5
			40	10.2	8.9
			50	10.6	9.3
			60	11	9.7
			70	11.4	10.1
			80	11.8	10.5
14,600 lbs.	TAPERLEAF	SBFA	30	10.1	8.5
			40	10.5	8.9
			50	10.9	9.3
			60	11.3	9.7
			70	11.7	10.1
			80	12.1	10.5
16,000 lbs.	TAPERLEAF	SBFA	30 3	11.4	9.5
			40 3	11.8	9.9
			50	12.2	10.3
			60	12.6	10.7
			70	13	11.1
			80	13.4	11.5
18,000-20,000 [1]	TAPERLEAF	SBFA	50	11.9	10
			60	12.3	10.4
			70	12.7	10.8
			80	13.1	11.2
22,000 - 24,000 lbs. [2]	TAPERLEAF	SBFA	OMIT	12.3	9.4
			30	13.4	10.5
			40	13.8	10.9
			50	14.2	11.3
			60	14.6	11.7
			70	15	12.1
			80	15.4	12.5

NOTES:

1) Shown with 20K load for laden dim. Add 0.3" to laden dim. if 18K load. S
2) Shown with 23K load for laden dim. Add 0.1" to laden dim. if 22K load. Subtract 0.1" from laden dim. if 24K load.
3) 16K springs with 12K to 14.6K axle minimum spacer block is 30 mm. With 16K springs and 20K axle minimum spacer block is 50 mm.
   Note: Standard 3-1/2" drop axle heights shown, for 5" drop axles, subtract an additional 1-1/2".
   Spacer Blocks are used by Engineering to obtain level frame and are not options.
   "A" dimension shown is to bottom of frame rail. Add frame rail height for frame height.

REAR FRAME HEIGHTS "C"

TABLE 3-5. Single Drive Suspension Heights

Suspension	Rating	Version	Unladen Height	Laden Height
AIR TRAC	20,000 lbs.	Standard	11.4	11.0
	23,000 lbs.	Standard	11.4	11.0
REYCO 79KB	20,000 lbs.	Taperleaf (3.38" saddle)	9.4	11.8
	21,000 lbs.	Taperleaf (1.38" saddle)	7.4	9.8
	23,000 lbs.	Multileaf (1.38" saddle)	8.8	11.6
	26,000 lbs.	Multileaf (1.38" saddle)	9.2	11.8
	28,000 lbs.	Multileaf (1.38" saddle)	9.7	12.3
	31,000 lbs.	Multileaf (1.38" saddle)	10.8	13.3
REYCO 102	23K-29K lbs.	4.38 saddle	12.1	10.2
	23K-29K lbs.	4.63 saddle	12.2	10.4
	29,000 lbs	3.50 saddle	11.7	10.0
	31,000 lbs	3.50 saddle	12.2	10.5
	31,000 lbs	4.38 saddle	12.5	10.7
	31,000 lbs	4.63 saddle	12.7	10.9
REYCO 102AR (AIR)	17K -23K	Standard	9.3	9.3
		Low	8.3	8.3

TABLE 3-6. Tandem Peterbilt Suspension Heights

Suspension	Rating	Version	Unladen Height	Laden Height
AIR LEAF	38,000 lbs.		12.0	11.7
LOW AIR LEAF	40,000 lbs.		8.8	8.5
FLEX AIR	38,000 lbs.		8.7	8.5
LOW LOW AIR LEAF	40,000 lbs.		6.8	6.5
AIR TRAC	40K-46K lbs		11.4	11.0
QUADRAFLEX	38,000 lbs.	Taperleaf	10.6	8.7

TABLE 3-7. Tandem Neway Suspension Heights

Suspension	Rating	Version	Unladen Height	Laden Height
NEWAY AD	52,000 lbs.		10.0	10.0
NEWAY ADZ	46K-52K lbs.		10.0	10.0

TABLE 3-8. Tandem Reyco Suspension Heights

Suspension	Rating	Version	Unladen Height	Laden Height
REYCO 102 MULTILEAF	40,000 lbs	1.75 saddle (STD)	11.7	9.9
		1.38 saddle	10.2	8.3
		3.38 saddle	13.4	11.5
	44,000 lbs	1.75 saddle (STD)	11.7	9.8
		1.38 saddle	11.5	9.7
REYCO 102AR (Air)	34K-40K	STD LOW	8.3	8.3

TABLE 3-9. Tandem Chalmers Suspension Heights

Suspension	Rating	Version	Unladen Height	Laden Height[1]
CHALMERS 854/860	40,000 lbs	LOW	11.2	8.9
		HIGH	12.4	10.2
		X-HIGH	14.5	12.2
		XX-HIGH	17.2	14.9
CHALMERS 854/860	46,000 lbs	LOW	11.3	8.9
		HIGH	12.5	10.1
		X-HIGH	14.7	12.2
		XX-HIGH	17.3	14.9
CHALMERS 854/860	50K-52K	LOW	11.3	8.9
		HIGH	12.5	10.1
		X-HIGH	14.7	12.1
		XX-HIGH	17.3	14.8
CHALMERS 872	46,000 lbs	LOW	11.2	8.8
		HIGH	12.5	10.3
		X-HIGH	14.7	12.2
		XX-HIGH	17.3	14.9
CHALMERS 872	50,000 lbs	LOW	11.2	8.8
		HIGH	12.5	10.3
		X-HIGH	14.7	12.1
		XX-HIGH	17.3	14.8

NOTES:
1) Laden dimension shown with standard restrictor cans. Add 0.7” for #29 High Stability Restrictor Cans.
2) * With Meritor 70K axles frame height is 22.5" for R650.

TABLE 3-10. Tandem Hendrickson Suspension Heights

Suspension	Rating	Version	Unladen Height	Laden Height
RT-403	40,000 lbs	6.00 saddle	9.9	8.9
		7.188 saddle (std)	11.2	10.1
RTE-403	40,000 lbs	6.00 saddle	9.9	8.4
		7.188 saddle (std)	11.2	9.6
R-403	40,000 lbs	12.80 saddle	5.9	5.9
		15.81 saddle (std)	8.9	8.9
		17.60 saddle	10.6	10.6
RS-403	40,000 lbs	12.25 saddle	9.7	8.9
		14.00 saddle (std)	11.5	10.6
		15.25 saddle	12.7	11.9
HMX	40,000 lbs	16.5 saddle (low)	10.6	9.5
		18.5 saddle (std)	12.6	11.5
HMX	46,000 lbs	16.5 saddle (low)	10.6	9.5
		18.5 saddle (std)	12.6	11.5
HN462	46,000 lbs	20.25 saddle (high)	15	13.3
R-463	46,000 lbs	15.75 saddle (std)	8.8	8.8
		20.50 saddle	13.5	13.5
RS-463	46,000 lbs	12.25 saddle	9.7	8.9
		14.00 saddle (std)	11.5	10.6
		15.25 saddle	12.7	11.9
RT-463	46,000 lbs	6.00 saddle	11.3	10.5
		7.188 saddle (std)	13	11.4
		11.00 saddle	16.3	15.2
RTE-463	46,000 lbs	7.188 saddle (std)	11.6	10.2
		11.00 saddle	15.4	14
RS-503	50,000 lbs	14.00 saddle (std)	11.5	10.6
		15.25 saddle	12.7	11.9
RT-503	50,000 lbs	7.188 saddle (std)	12.2	11.2
		11.0[1] saddle	6.4	15.4
RTE-503	50,000 lbs	7.188 saddle (std)	11.6	10.2
		11.00 saddle	15.4	14
RS-523	52,000 lbs	14.0 saddle (std)	11.5	10.6
RT-523 , RT-650	52K-65K	7.188 saddle (std)	12.2	11.2
		11.00 saddle	16.4	15.4
HN522	52,000 lbs	18.50 saddle (std)	12.6	11.5
RS650	65,000 lbs	15.00 saddle (std)	12.0 [1]	11.0 [2]
		19.00 saddle	16.0 [2]	15.1 [2]
R650 [3]	65,000 lbs	20.25 saddle (std)	12.5	12.5
R850 w/70K Meritor	85,000 lbs	20.25 saddle	12	12
R850 w/SISU 70K		20.25 saddle	12.1	12.1
RS850 w/SISU 70K	85,000 lbs	16.75 saddle	14.5	13.8

NOTES:

1) With SISU 70K axle subtract .39" from light/laden.
2) With SISU 70K axle subtract .28 from light and.39 from laden.
3) With Meritor 70K axles frame height is 22.5" for R650.

REAR SUSPENSION LAYOUTS

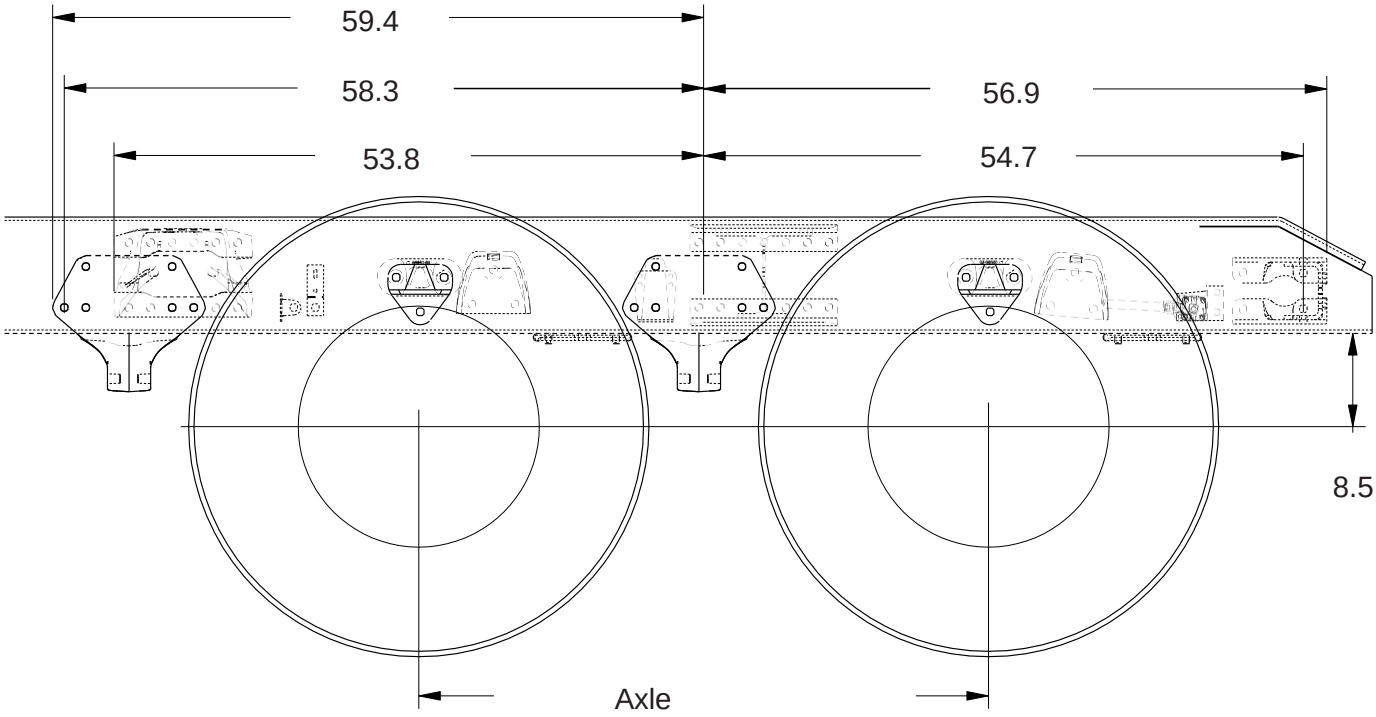
The rear suspension layouts are provided as a tool to help layout bodies prior to arrival. The applicable dimensions are shown. Be sure to check the axle spacing that is shown, as alternate spacing may exist and could change some of the dimensions. The dimensions shown are the most typical installations, in special cases some hole locations will move. If you are planning on using the holes shown for your body installation, please confirm with your local Peterbilt dealer that the drawing below will be the installation used on your specific truck. Ensure that proper torque is used to reinstall any suspension components. It would be a good idea in this case to order the frame layout of your chassis along with your truck order. This can be done on any Peterbilt truck, and will be provided ahead of the build schedule.

If there are hole locations that are not detailed please work with your local Peterbilt Dealer to request that information.

Additionally optional axle spacing are shown in the charts, if you would like details on the frame drilling with optional spacing, please contact your local Peterbilt dealer.

NOTE: Actual axle spacing can depart from nominal due to axle slant requirements. Final axle spacing can vary by more than an inch from nominal in some cases. If precise axle spacing is critical due to body installation or state/local regulatory requirements please contact Peterbilt Applications/Technical Support for assistance.

PB LOW AIR LEAF TANDEM AXLE



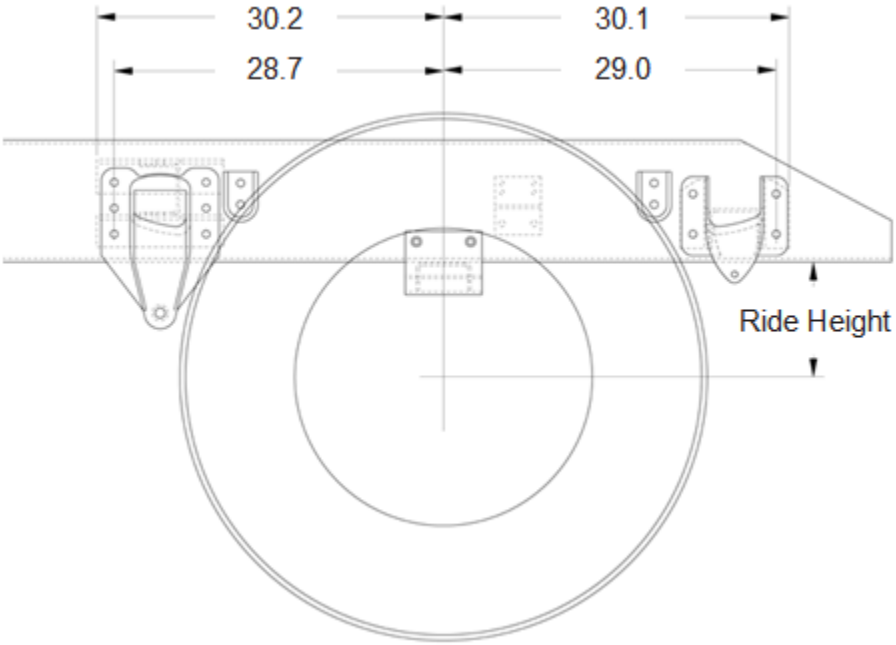
PB Low Air Leaf Suspensions

Note: “54” Axle Spacing dimensions shown

TABLE 3-11. Rear Suspension Options

Suspension Type	Rating	Axle Spacing	Laden Ride Height	Unladen Ride Height
PB Low Air Leaf Tandem	40K	52"	8.5"	8.5"
PB Low Air Leaf Tandem	40K	54"	8.5"	8.5"

REYCO 79KB SINGLE REAR AXLE



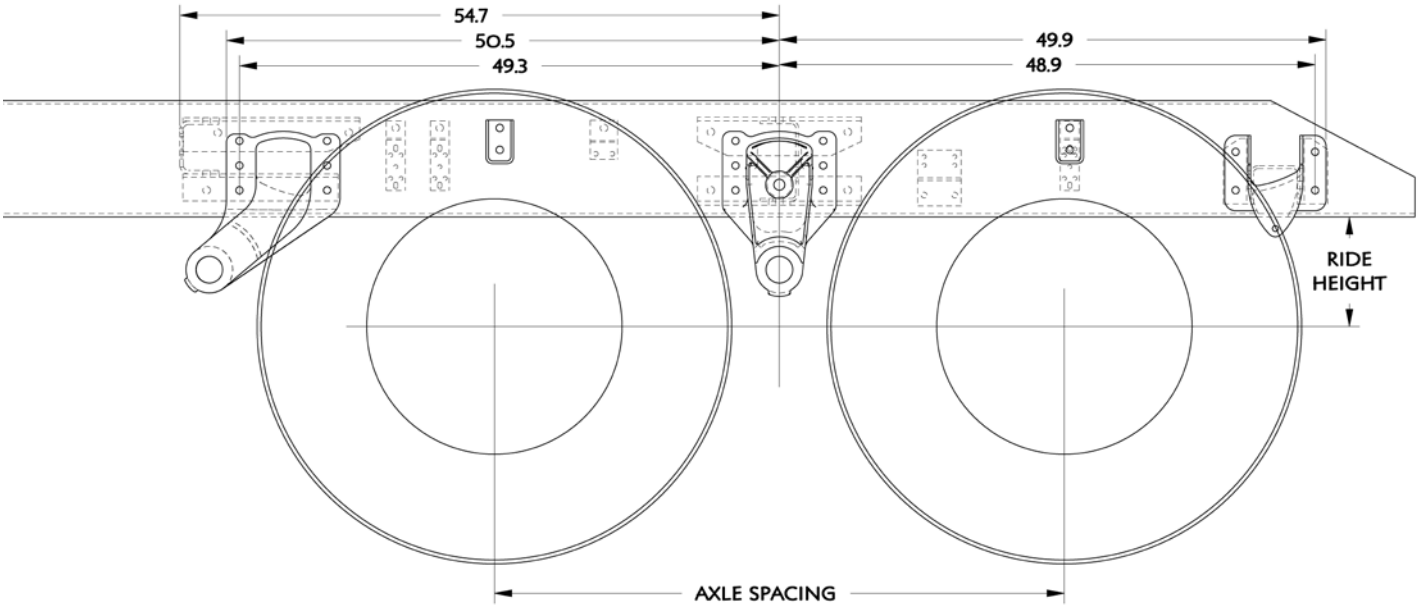
Optional Reyco 79KB Suspensions

TABLE 3-12. Rear Suspension Options

Suspension Type	Rating	Axle Spacing	Laden Ride Height	Unladen Ride Height
Reyco 79KB single	20K	-	8.3”	10.8”
Reyco 79KB single	23K	-	8.3”	10.8”
Reyco 79KB single	26K	-	8.2”	11.3”
Reyco 79KB single	31K	-	9.6”	12.2”

REYCO 102 TANDEM REAR AXLE

Shown with a 52” Axle Spacing

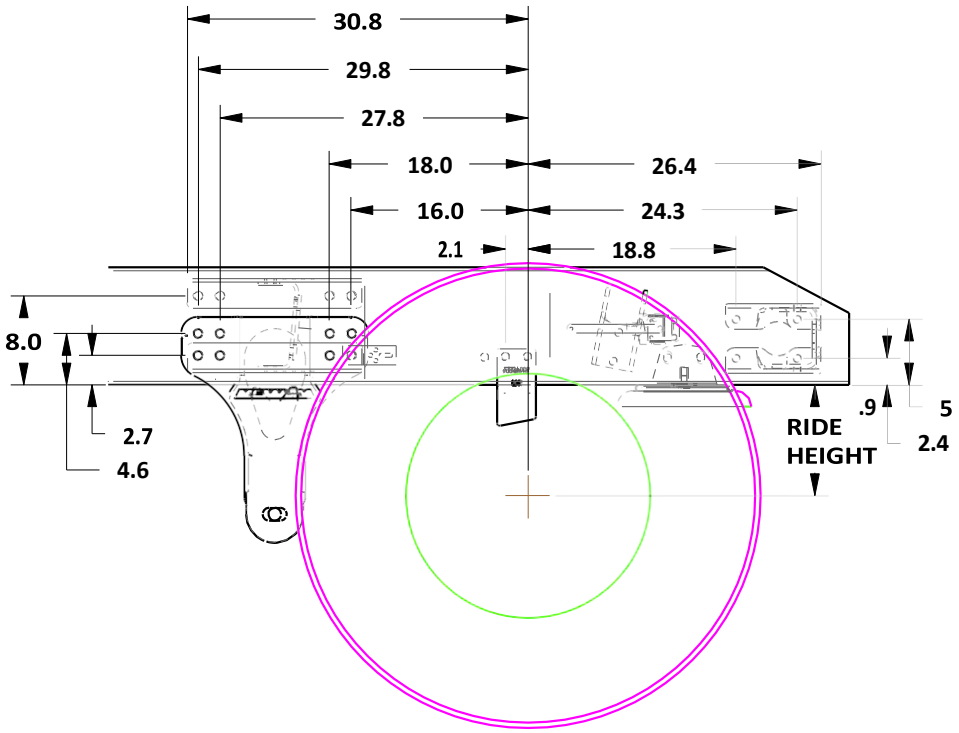


Reyco 102 Suspension

TABLE 3-13. Rear Suspension Options

Suspension Type	Rating	Axle Spacing	Laden Ride Height	Unladen Ride Height
Reyco 102 Tandem	40K	52”	9.2”	10.8”

NEWAY ADZ 123 SINGLE REAR AXLE



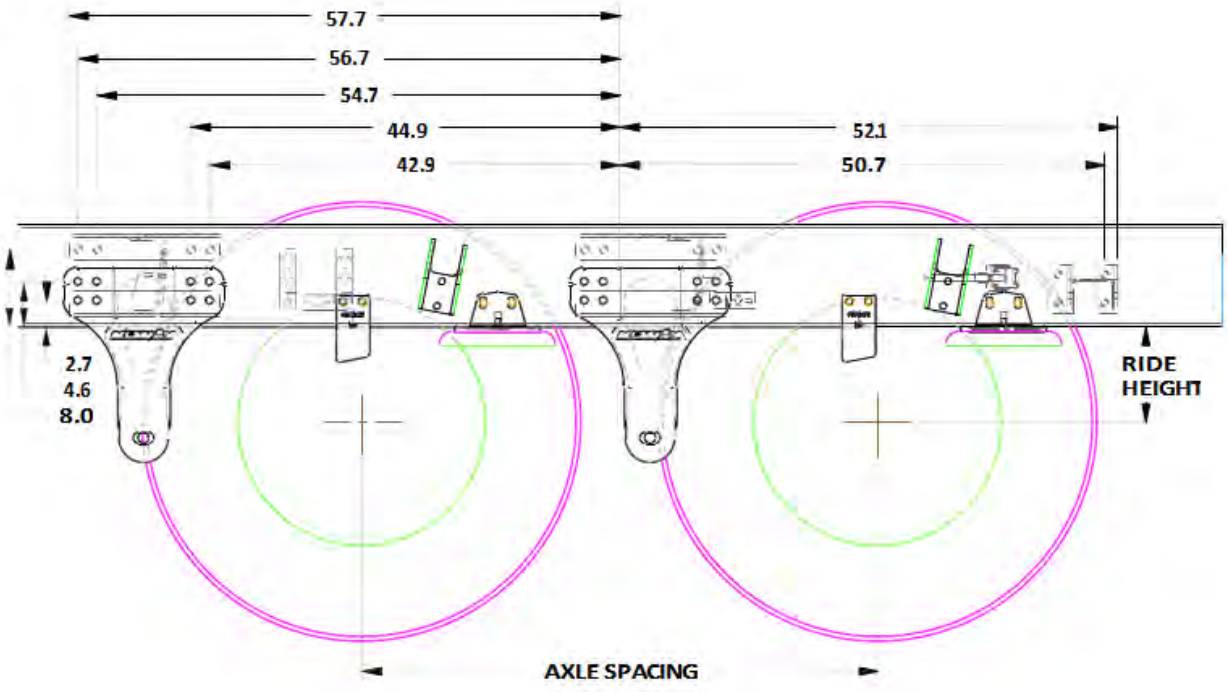
Optional Neway ADZ Single Suspensions

TABLE 3-14. Rear Suspension Options

Suspension Type	Rating	Axle Spacing	Laden Ride Height	Unladen Ride Height
Neway ADZ123 single	23K	-	10”	10”
Neway ADZ126 single	26K	-	10”	10”

NEWAY ADZ 246 TANDEM SUSPENSION

Shown with a 54” Axle Spacing



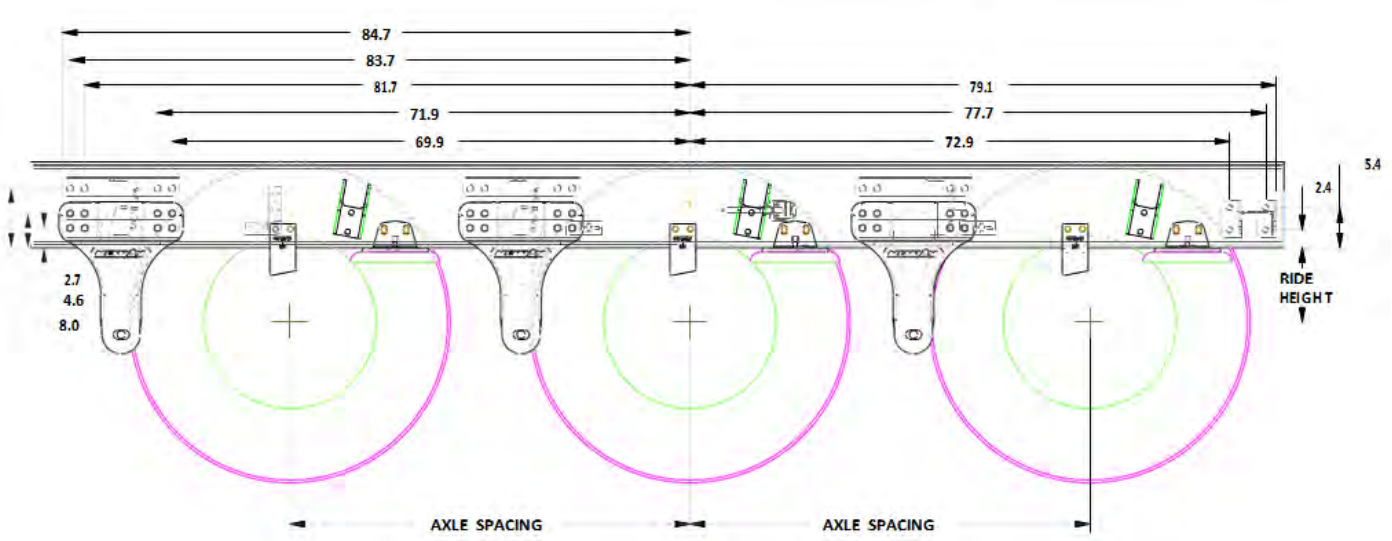
Optional Neway ADZ Tandem Suspensions

TABLE 3-15. Rear Suspension Options

Suspension Type	Rating	Axle Spacing	Laden Ride Height	Unladen Ride Height
Neway ADZ246 tandem	46K	54”	10”	10”
Neway ADZ246 tandem	46K	60”	10”	10”
Neway ADZ252 tandem	52K	54”	10”	10”
Neway ADZ252 tandem	52K	54”	12”	12”
Neway ADZ252 tandem	52K	60”	10”	10”
Neway ADZ252 tandem	52K	60”	12”	12”

NEWAY ADZ 369 SUSPENSION

Shown with 54” Axle Spacing



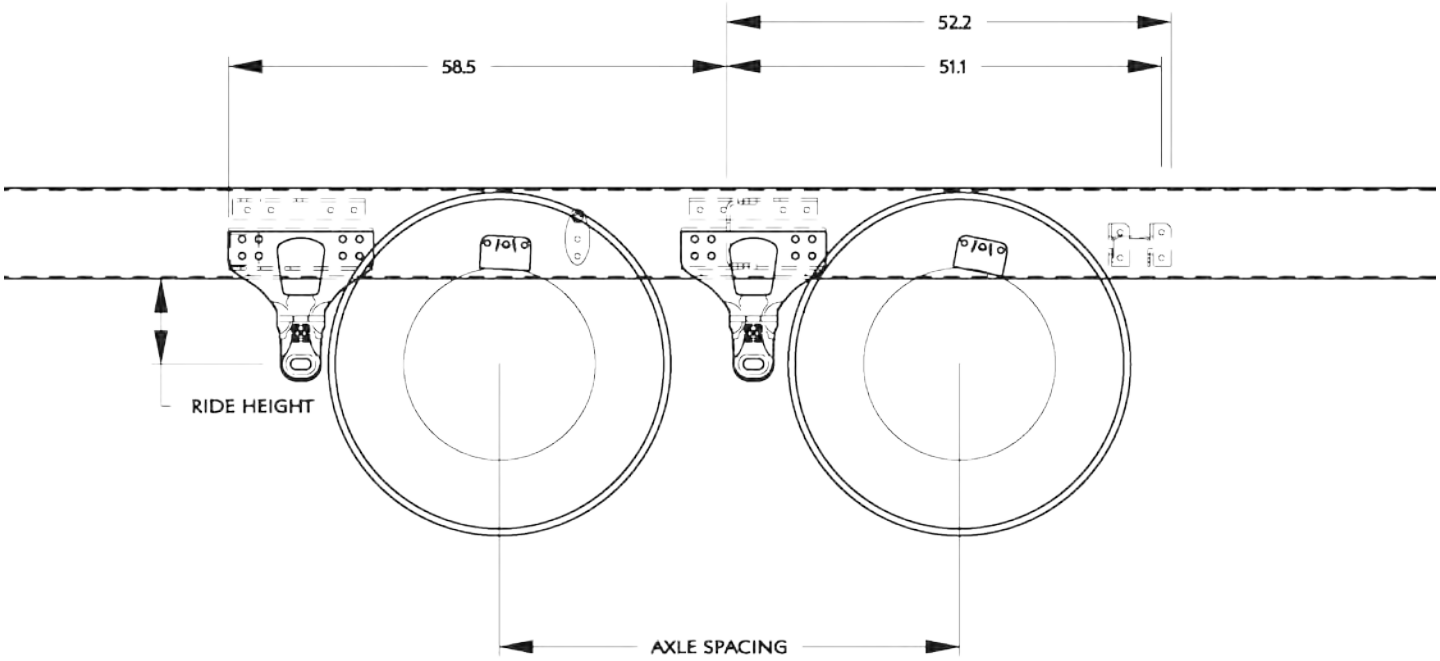
Optional Neway ADZ Suspensions

TABLE 3-16. Rear Suspension Options

Suspension Type	Rating	Axle Spacing	Laden Ride Height	Unladen Ride Height
Neway ADZ369	69K	54”	10”	10”
Neway ADZ369	69K	54”	12”	12”
Neway ADZ369	69K	60”	12”	12”
Neway ADZ378	78K	54”	10”	10”
Neway ADZ378	78K	60”	10”	10”

HENDRICKSON PRIMAAX TANDEM SUSPENSION

Shown with 54” Axle Spacing



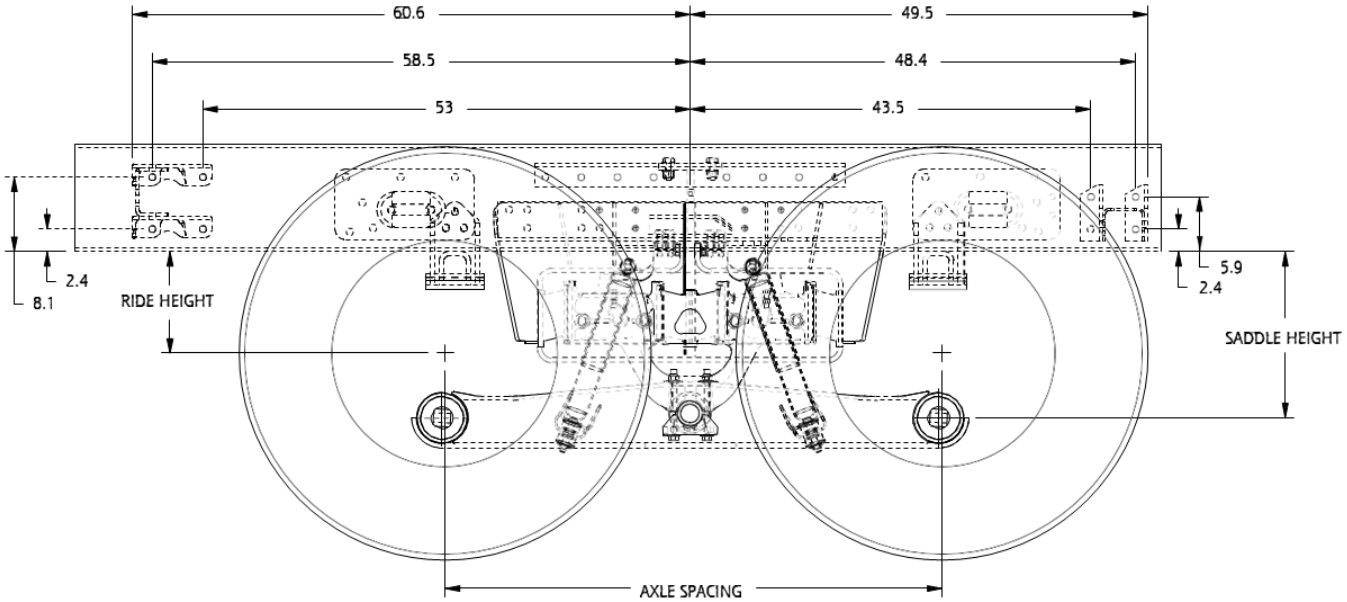
Optional Hendrickson Primaax Tandem Suspensions

TABLE 3-17. Rear Suspension Options

Suspension Type	Rating	Axle Spacing	Laden Ride Height	Unladen Ride Height
Hendrickson Primaax Tandem	46K	54”	10”	10”
Hendrickson Primaax Tandem	46K	60”	10”	10”
Hendrickson Primaax Tandem	46K	72”	10”	10”

HENDRICKSON HMX TANDEM SUSPENSION

Shown with 54” Axle Spacing



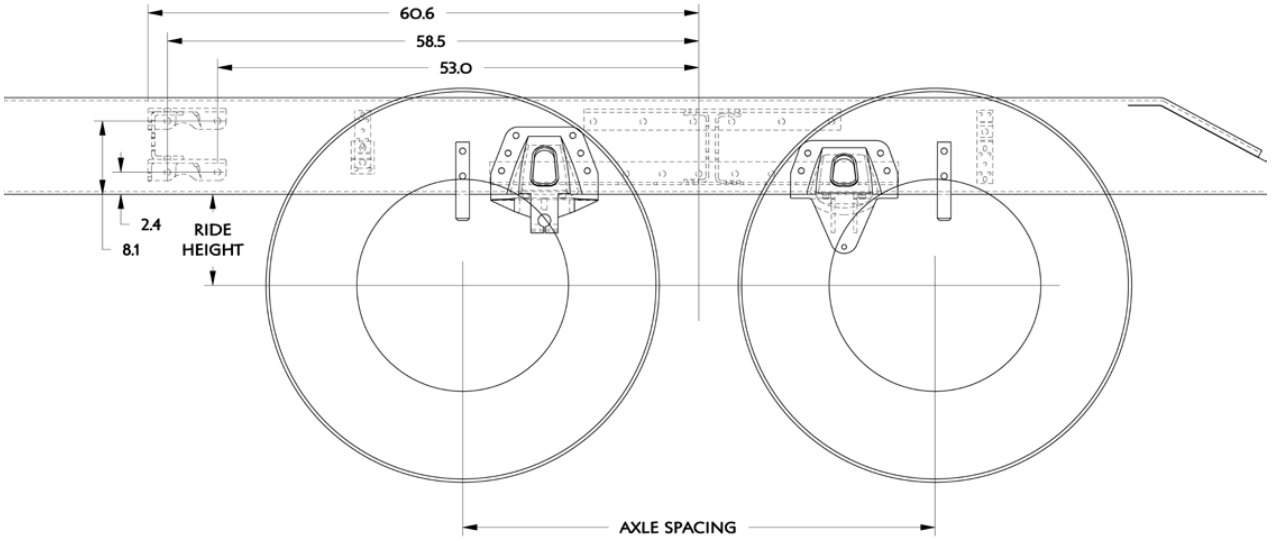
Optional Hendrickson HMX Tandem Suspensions

TABLE 3-18. Rear Suspension Options

Suspension Type	Rating	Axle Spacing	Laden Ride Height	Unladen Ride Height
Hendrickson ULTIMAAX 460 17.5” Saddle Height	46K	54”	11”	12.5”
Hendrickson ULTIMAAX 460 18.25” Saddle Height	46K	54”	11”	12.5”
Hendrickson ULTIMAAX 460 17.5” Saddle Height	46K	60”	11”	12.5”
Hendrickson ULTIMAAX 460 18.25” Saddle Height	46K	60”	11”	12.5”
Hendrickson ULTIMAAX 520 17.5” Saddle Height	52K	54”	11”	12.5”
Hendrickson ULTIMAAX 520 18.25” Saddle Height	52K	54”	11”	12.5”
Hendrickson ULTIMAAX 520 17.5” Saddle Height	52K	60”	11”	12.5”
Hendrickson ULTIMAAX 520 18.25” Saddle Height	52K	60”	11”	12.5”

HENDRICKSON RT TANDEM SUSPENSION

Shown with a 54” Axle Spacing without Track Rods



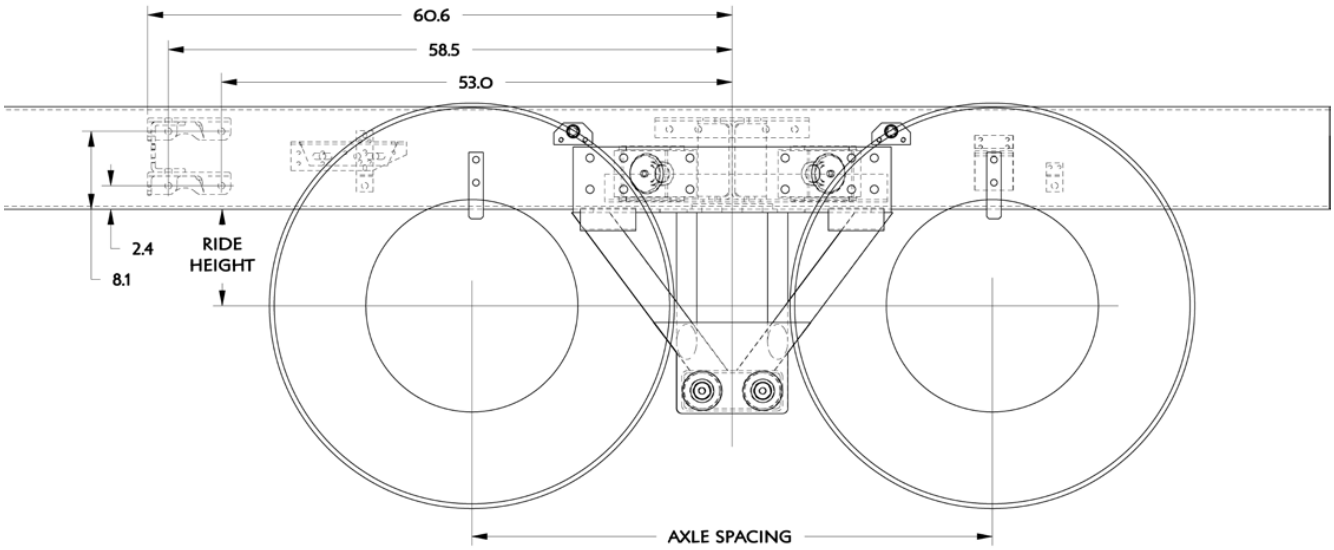
Optional Hendrickson RT Tandem Suspensions

TABLE 3-19. Rear Suspension Options

Suspension Type	Rating	Axle Spacing	Laden Ride Height	Unladen Ride Height
Hendrickson RT463 6” saddle	46K	52”	10.0”	11.1”
Hendrickson RT463 6” saddle	46K	54”	10.0”	11.1”
Hendrickson RT463 7.19” saddle	46K	54”	11.2”	12.5”
Hendrickson RT463 7.94” saddle	46K	54”	11.9”	13.3”
Hendrickson RT463 6” saddle	46K	60”	10.0”	11.1”
Hendrickson RT463 7.94” saddle	46K	60”	11.9”	13.0”
Hendrickson RTE463 7.19” saddle	46K	52”	10.5”	11.6”
Hendrickson RT523 6” saddle	52K	52”	9.9”	11.0”
Hendrickson RT523 6” saddle	52K	54”	9.9”	11.0”
Hendrickson RT523 7.19” saddle	52K	54”	11.1”	12.2”
Hendrickson RT523 11” saddle	52K	54”	14.9”	16.0”
Hendrickson RT523 6” saddle	52K	60”	9.9”	11.0”
Hendrickson RT523 7.19” saddle	52K	60”	11.1”	12.2”

CHALMERS 854 TANDEM SUSPENSION

Shown with a 54” Axle Spacing



Optional Chalmers Tandem Suspensions

TABLE 3-20. Rear Suspension Options

Suspension Type	Rating	Axle Spacing	Laden Ride Height	Unladen Ride Height
Chalmers 854-40-L	40K	54”	8.9”	11.1”
Chalmers 854-40-L-HS	40K	54”	9.6”	11.1”
Chalmers 854-40-H	40K	54”	10.2”	12.4”
Chalmers 854-40-H-HS	40K	54”	10.9”	12.4”
Chalmers 854-46-L	46K	54”	8.9”	11.3”
Chalmers 854-46-L-HS	46K	54”	9.6”	11.3”
Chalmers 854-46-H	46K	54”	10.1”	12.5”
Chalmers 854-46-H-HS	46K	54”	10.9”	12.5”
Chalmers 854-50-L	50K	54”	8.9”	11.3”
Chalmers 854-50-L-HS	50K	54”	9.6”	11.3”
Chalmers 854-50-H	50K	54”	10.1”	12.5”

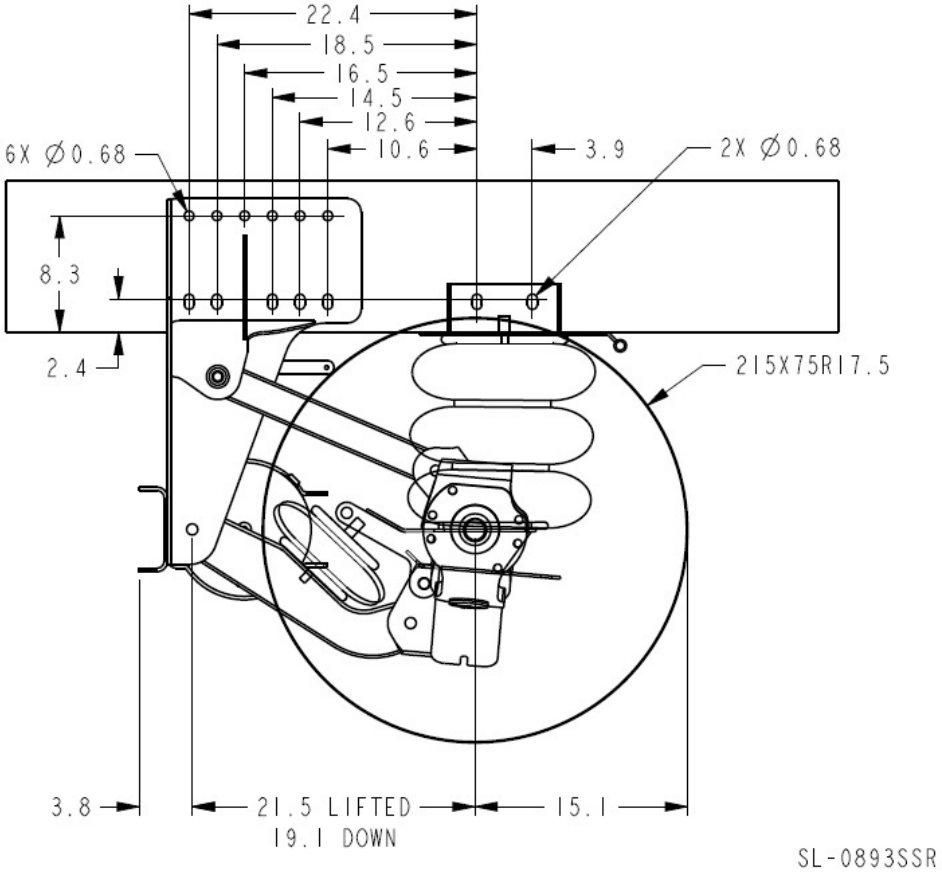
Suspension Type	Rating	Axle Spacing	Laden Ride Height	Unladen Ride Height
Chalmers 854-50-H-HS	50K	54”	10.9”	12.5”
Chalmers 854-52-L-HS	52K	54”	9.6”	11.3”
Chalmers 854-52-H-HS	52K	54”	10.9”	12.5”
Chalmers 860-40-L	40K	60”	8.9”	11.1”
Chalmers 860-46-L	46K	60”	8.9”	11.3”
Chalmers 860-46-L-HS	46K	60”	9.6”	11.3”
Chalmers 860-46-H	46K	60”	10.1”	12.5”
Chalmers 860-46-H-HS	46K	60”	10.9”	12.5”
Chalmers 860-52-H	52K	60”	10.9”	12.5”
Chalmers 872-46-H-HS	46K	72”	11.0”	12.5”

LIFT AXLES (PUSHERS AND TAGS)

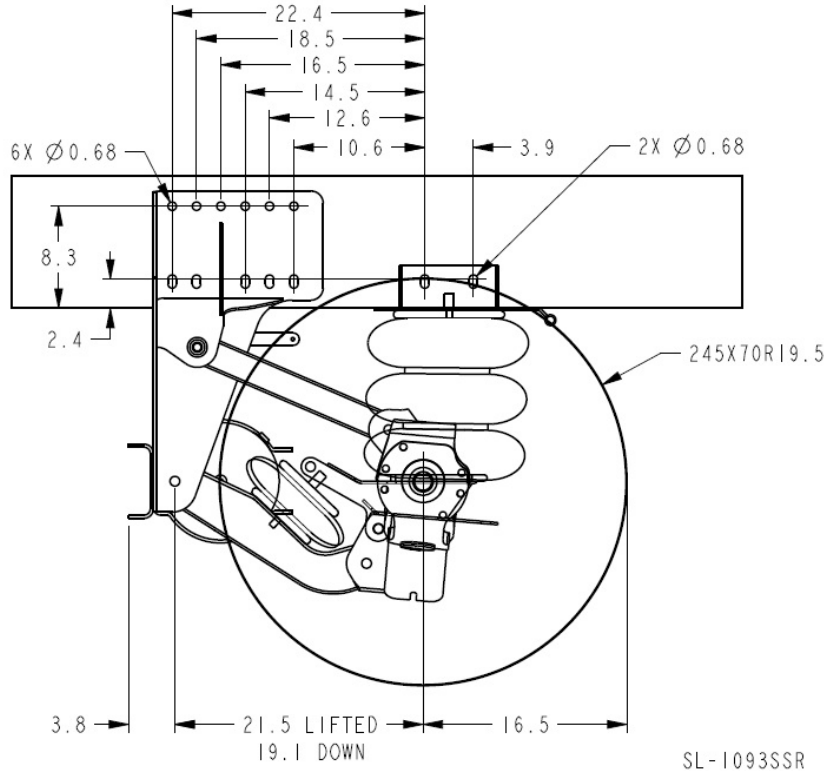
The rear pusher axle layouts are provided as a tool to help layout bodies prior to arrival. The applicable dimensions are shown. When using the pusher layouts to determine available frame space please be aware that clearances required are not shown. For information that may not be detailed in these drawings work with your local Peterbilt Dealer to request that information.

Peterbilt will automatically install highest lift axle kit as applicable based on chassis frame height and loading conditions. Lift axle available run range it utilized, along with frame height and lift axle tire size to identify applicable kits that can be installed. Installing highest lift axle kit will maximize ground clearance when axle is in lifted state. If needed, kit may be lowered in order to clear driveline when in lifted state.

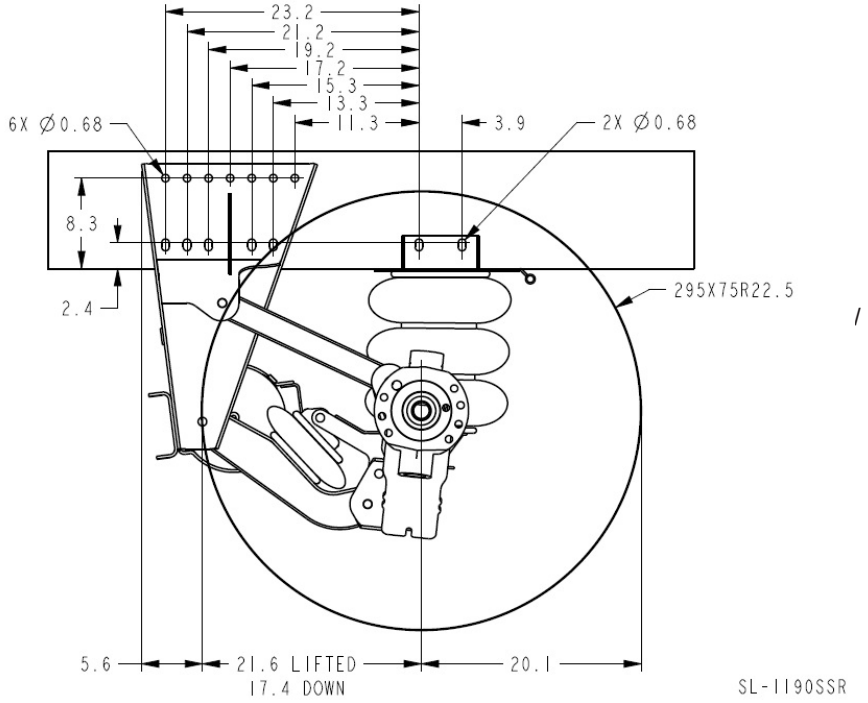
Watson & Chalin 8K Steerable (SL0893SSR)



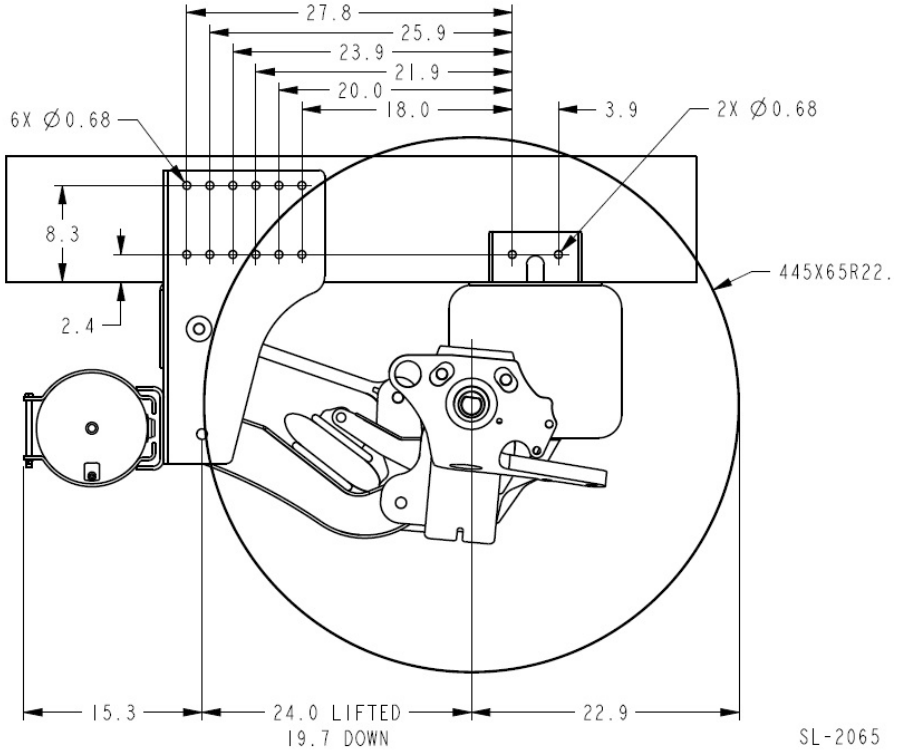
Watson & Chalin 10K Steerable (SL1093SSR)



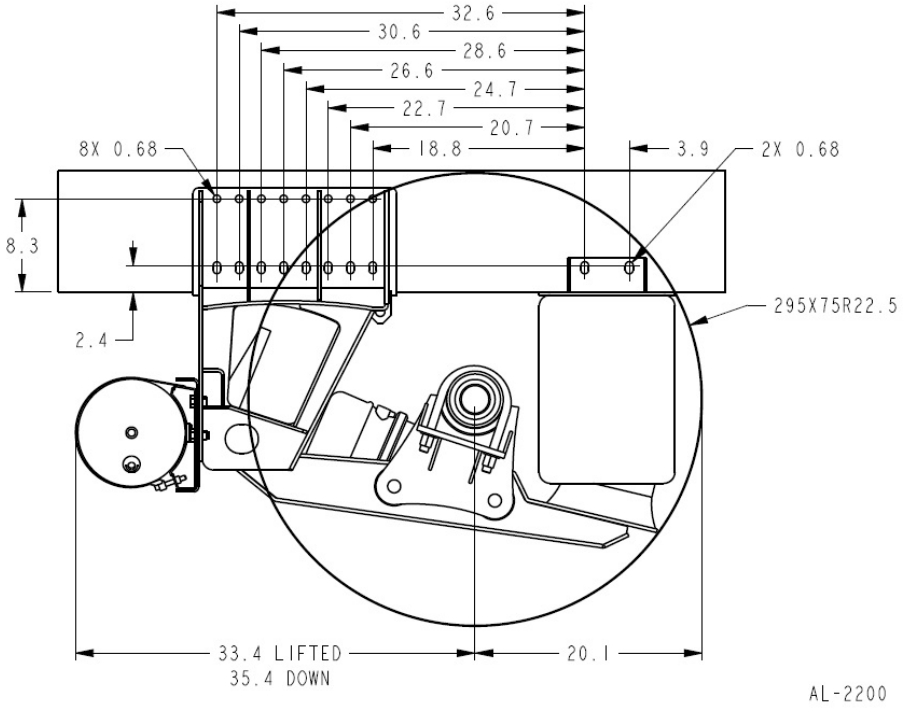
Watson & Chalin 13.5K Steerable (SL1190SSR)



Watson & Chalin 20K Steerable (SL2065)



Watson & Chalin 23K Non-Steerable (AL2200)



AXLE TRACK AND TIRE WIDTH

The dimensions provided in this section are representative of some typical product combinations. The purpose of this section is to demonstrate some of the typical dimensions.

- Axle Track: The distance between the dual tire centerlines on a dual tire arrangement or the distance between the tire centerlines on a single tire arrangement.
- Width: The distance over the outermost tire sidewall to sidewall.

These dimensions may be significant to the following:

- Appearance relative to other tires and chassis mounted equipment.
- Load carrying capacity. Different wheel disc offset can have a positive or negative impact on the axle carrying capacity of the axle.

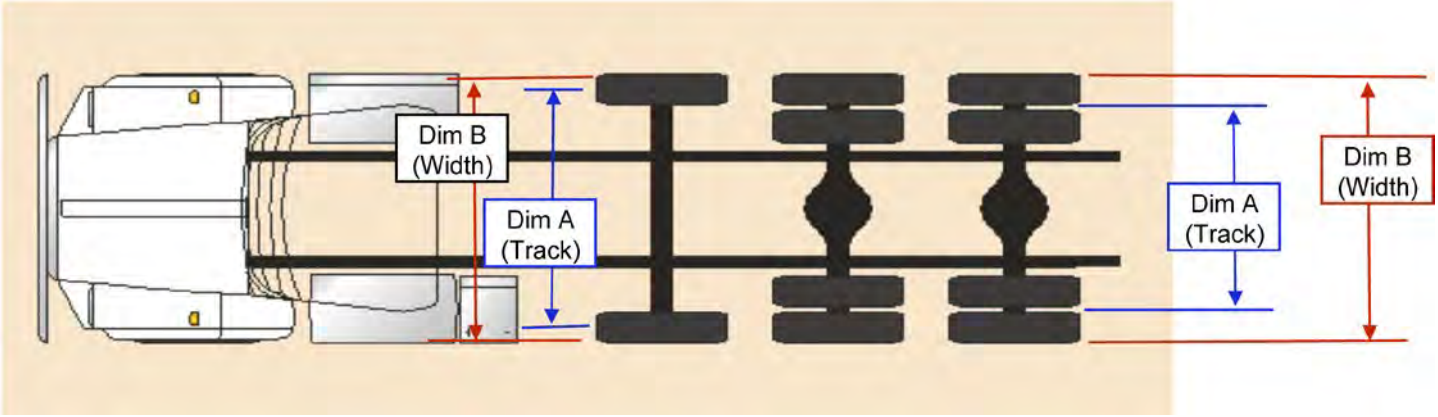


TABLE 3-21. Axle Width Calculation.

Axle - Drive	Wheel	Tire	Configuration	Track Dim "A"	Overall Width Dim "B:
Meritor RT46-160(P)(EH) 46K Dual Dana Spicer D46-170(H)(P) 46K Dual	Alcoa 88367 22.5X8.25	11R22.5	4-4	73.3"	97.8"
Meritor RT46-160(P)(EH) 46K Dual Dana Spicer D46-170(H)(P) 46K Dual	Alcoa 98363 24.5X8.25	11R24.5	4-4	73.6"	98.0"
Meritor RT46-160WT(P)(EH) 46K Dual Wide Track Dana Spicer D46-170W(H)(P) 46K Dual Wide Track	Alcoa 88367 22.5X8.25	11R22.5	4-4	79.2"	103.7"
Meritor RT46-160WT(P)(EH) 46K Dual Wide Track Dana Spicer D46-170W(H)(P) 46K Dual Wide Track	Alcoa 98363 24.5X8.25	11R24.5	4-4	79.5"	103.9"
Dana Spicer D46-170(H)(P) 46K Dual Meritor RT46-160(P)(EH) 46K Dual	Alcoa 82262 22.5X12.25	425/65R22.5	2-4	72.7	88.9"
Meritor RT46-160WT(P)(EH) 46K Dual Wide Track Dana Spicer D46-170W(H)(P) 46K Dual Wide Track	Alcoa 82262 22.5X12.25	425/65R22.5	2-4	78.7"	94.9"

Axle - Steer	Wheel	Tire	Brake Drum Type	Track Dim "A"	Overall Width Dim "B:
Meritor MFS13 Std Track Dana Spicer E-1322I 13.2K	Alcoa 98363 24.5X8.25	11R24.5	CAST	80.2"	91.0"
Meritor MFS13 Wide Track Dana Spicer E-1322W 13.2K	Alcoa 98363 24.5X8.25	11R24.5	CAST	82.2"	93.0"
Meritor MFS20 Std Track Dana Spicer D2000 20K	Alcoa 82362 22.5X12.25	425/65R22.5	CAST	86.5"	102.7"
Meritor MFS20 Std Track Dana Spicer D2000 20K	Alcoa 82462 22.5X12.25	425/65R22.5	CAST	82.6"	98.8"

Lift Axle Model	Wheel	Tire	Wheel Orientation	Track Dim "A"	Overall Width Dim "B"
W&C SL0893SSR 8K Steerable	Alcoa 66480 17.5x6	215/75R17.5	Same as FR	77.3"	85.8"
W&C SL1093SSR Steerable 10K	Alcoa 77349 19.5x7.5	265/70R19.5	Same as FR	78.5"	88.5"
W&C SL1190SSR Steerable 13.5K	Alcoa 88367 22.5x8.25	255/70R22.5	Same as FR	80.4"	90.7"
W&C SL2065 Steerable 20K	Alcoa 82362 22.5x12.25	425/65R22.5	Same as FR	83.6"	99.8"
W&C SL2200 Steerable 23K	Alcoa 88367 22.5x8.25	295/75R22.5	Same as RR, dual	78.2"	102.8"
W&C AL2200-STD Track Non-Steerable 23K	Alcoa 88367 22.5x8.25	11R22.5	Same as RR, dual	72.2"	96.6"
W&C AL2200-STD Track Non-Steerable 23K	Alcoa 82362 22.5x12.25	425/65R22.5	Same as RR, single	78.4"	94.7"
W&C AL2200-Wide Track Non-Steerable 23K	Alcoa 89465 22.5x9	315/80R22.5	Same as FR, single	64.7"	77.3"
W&C AL2200-Wide Track Non-Steerable 23K	Alcoa 84362 22.5x14	445/50R22.5	Same as RR, single	80.6"	97.7"

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FRONT DRIVE AXLE, PTO'S AND AUXILIARY TRANSMISSIONS

The front drive axle, PTO and auxiliary transmission layouts are provided as a tool to help layout bodies prior to arrival. For information not detailed in these drawings, work with the local Peterbilt dealer to request that information.

EXAMPLES

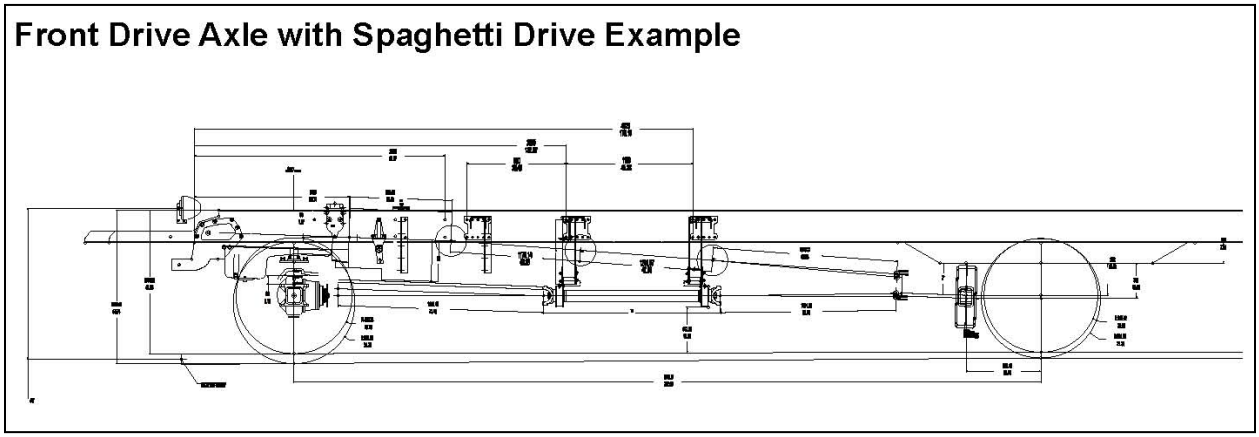

FIGURE 3-24. Front Drive Axle with Spaghetti Drive Example

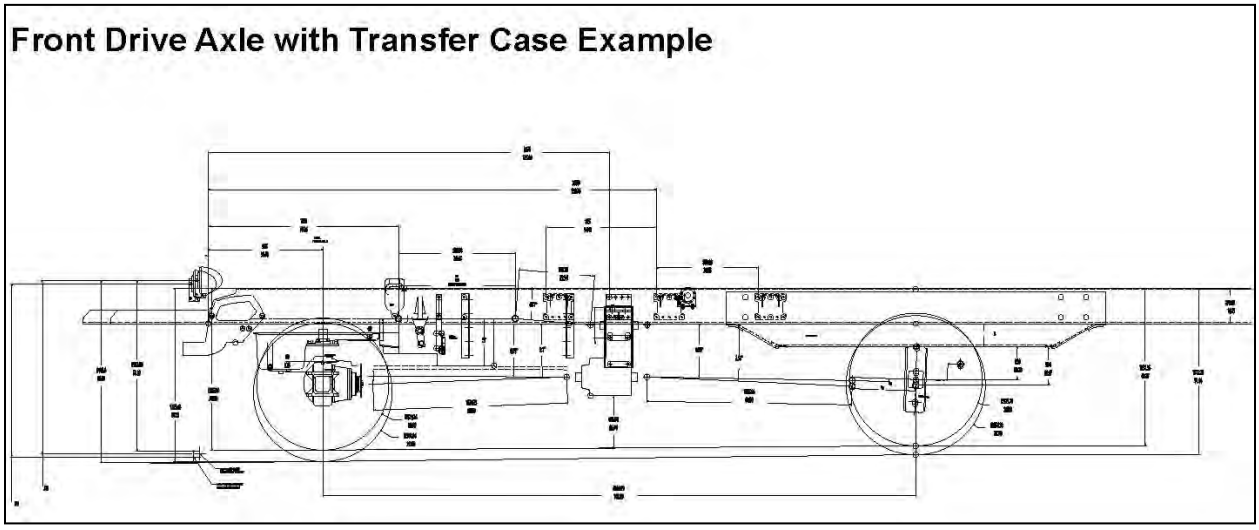

FIGURE 3-25. Front Drive Axle with Transfer Case Example

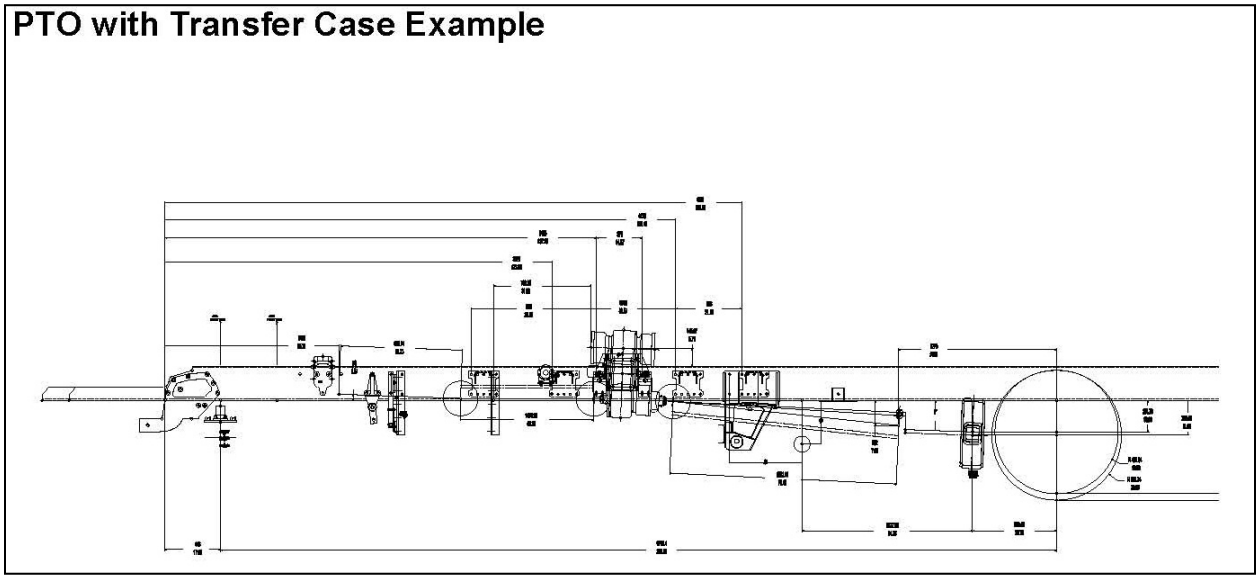

FIGURE 3-26. PTO with Transfer Case Example

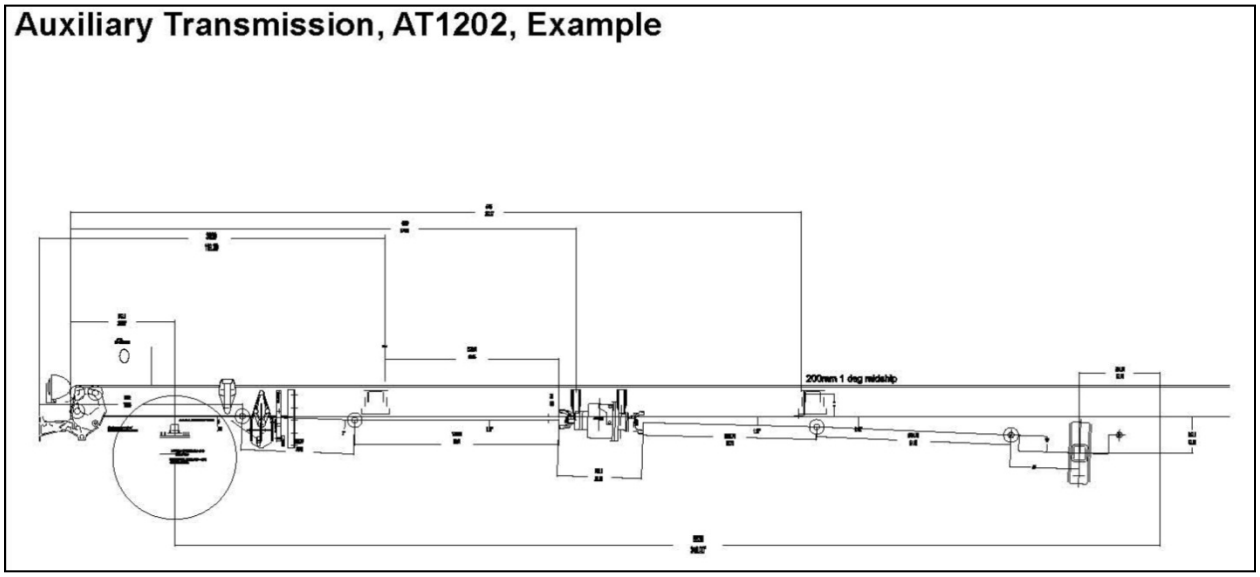

FIGURE 3-27. PTO with Transfer Case Example

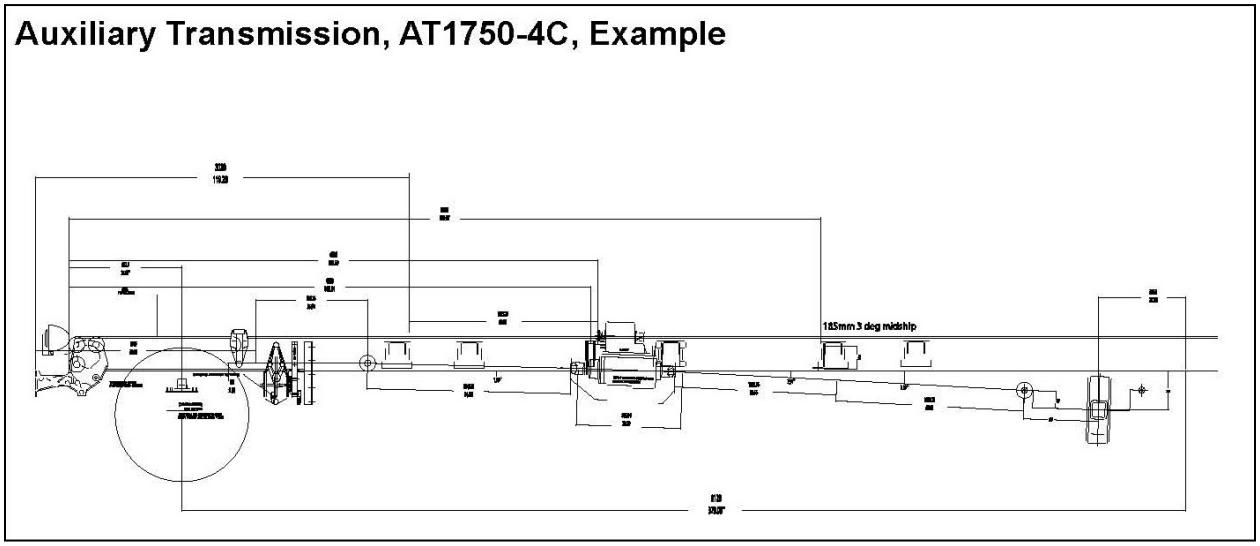

FIGURE 3-28. PTO with Transfer Case Example

GUPPY OUTSERTS

The rear suspension guppy outsert layouts are provided as a tool to help layout bodies prior to arrival. For information not detailed in these drawings, work with the local Peterbilt dealer to request that information.

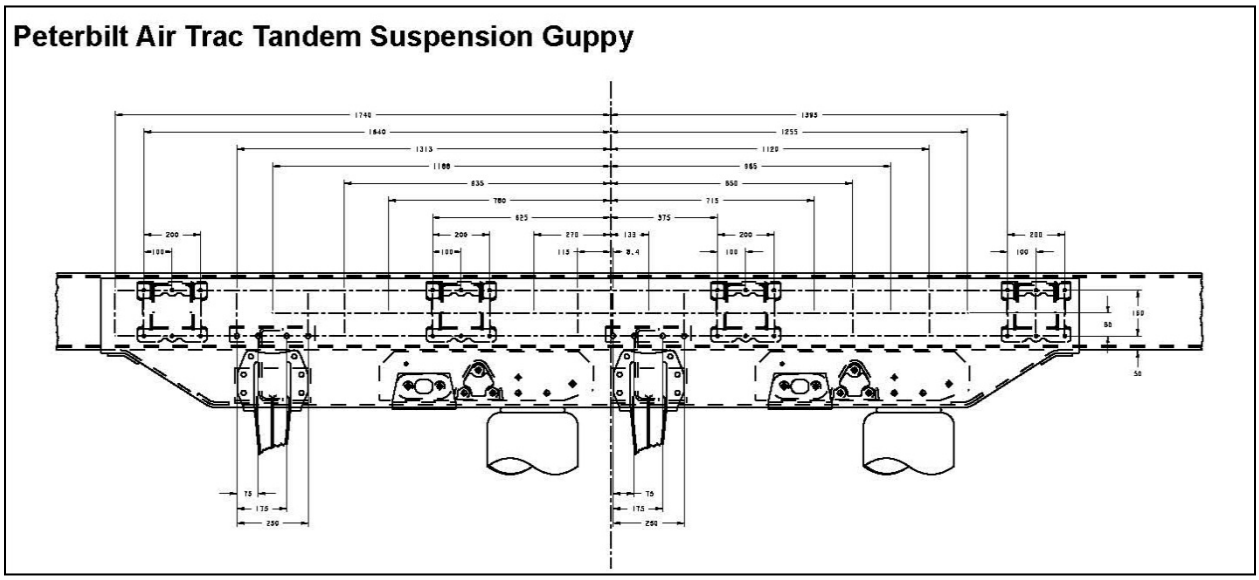

FIGURE 3-29. Peterbilt Air Trac Tandem Suspension Guppy

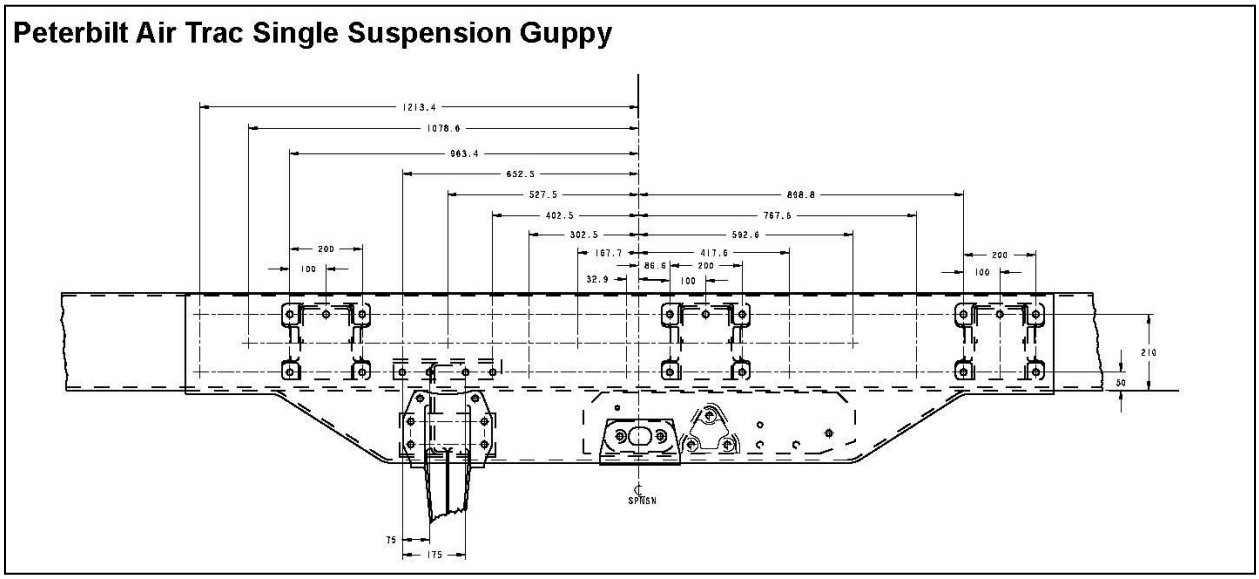

FIGURE 3-30. Peterbilt Air Trac Single Suspension Guppy

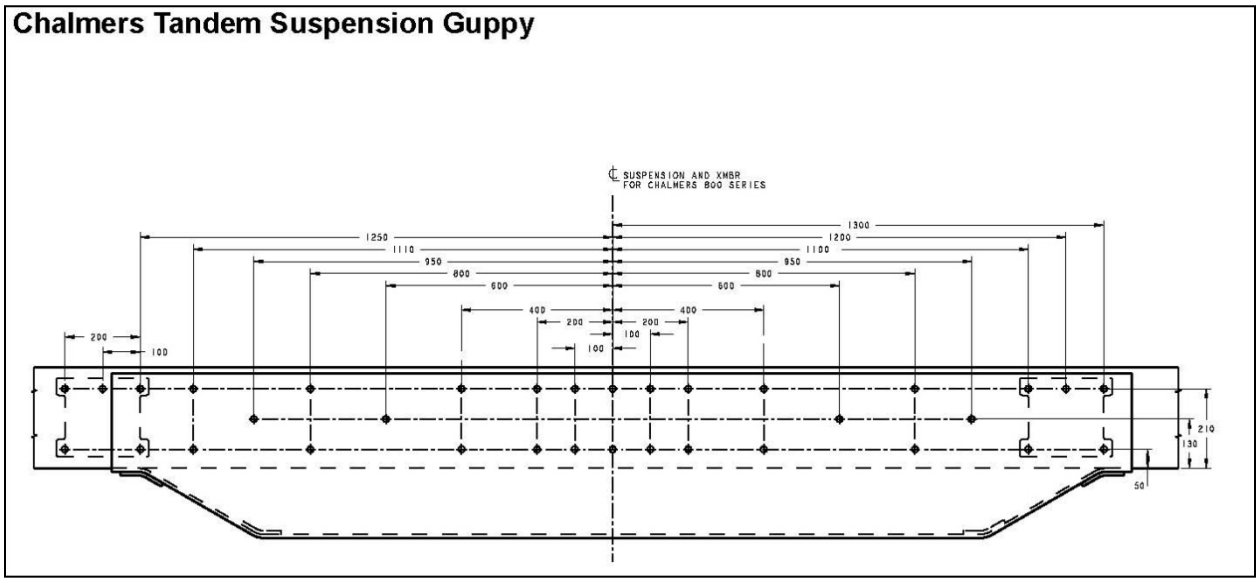

FIGURE 3-31. Chalmers Tandem Suspension Guppy

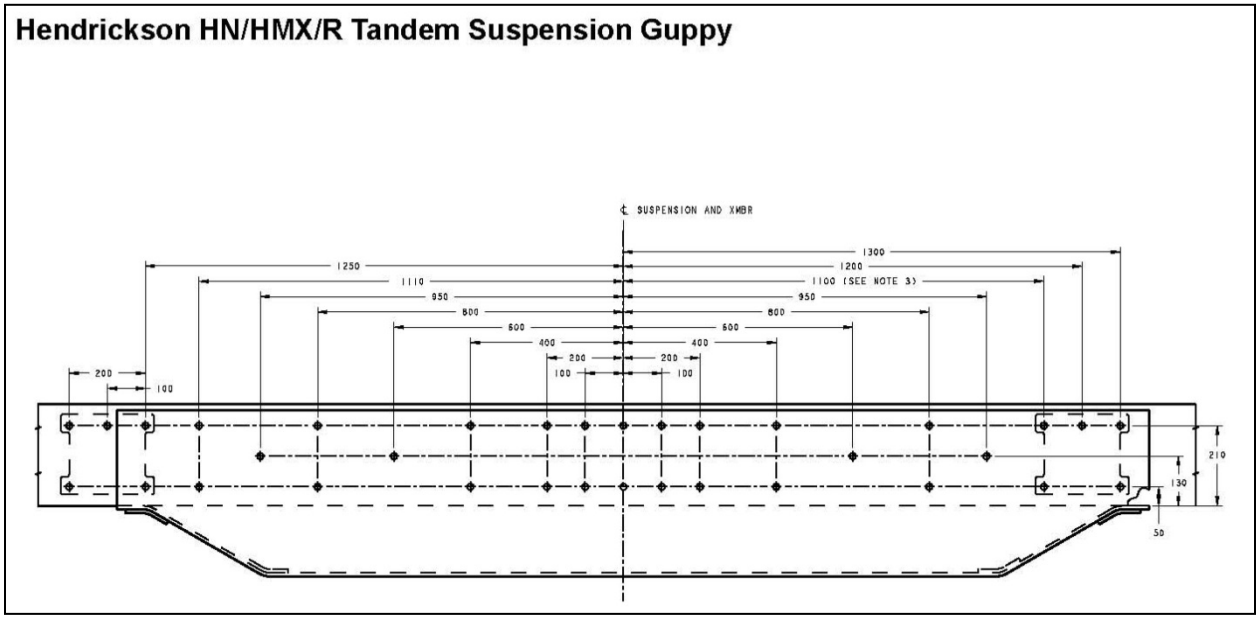

FIGURE 3-32. Hendrickson HN/HMX/R Tandem Suspension Guppy

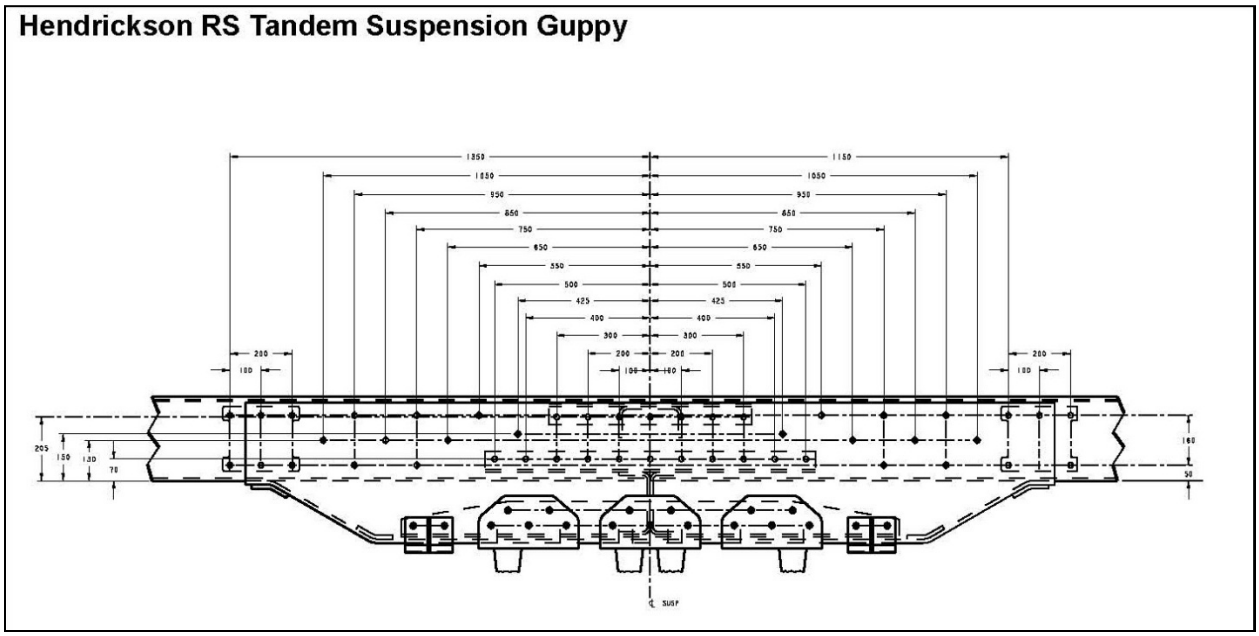

FIGURE 3-33. Hendrickson RS Tandem Suspension Guppy

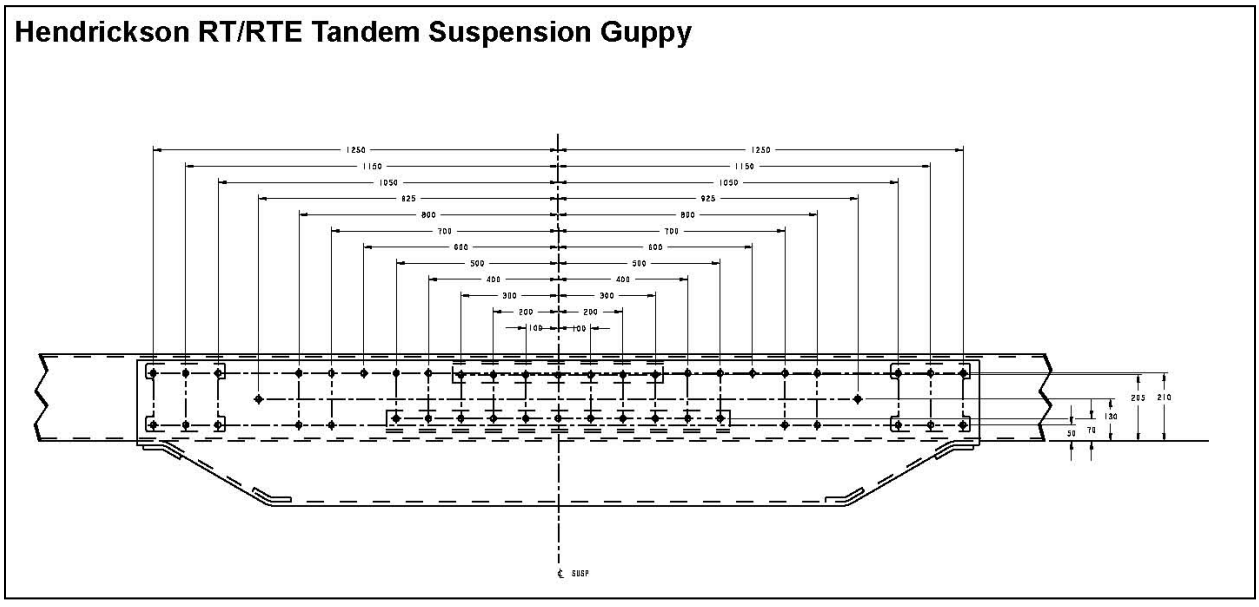

FIGURE 3-34. Hendrickson RT/RTE Tandem Suspension Guppy

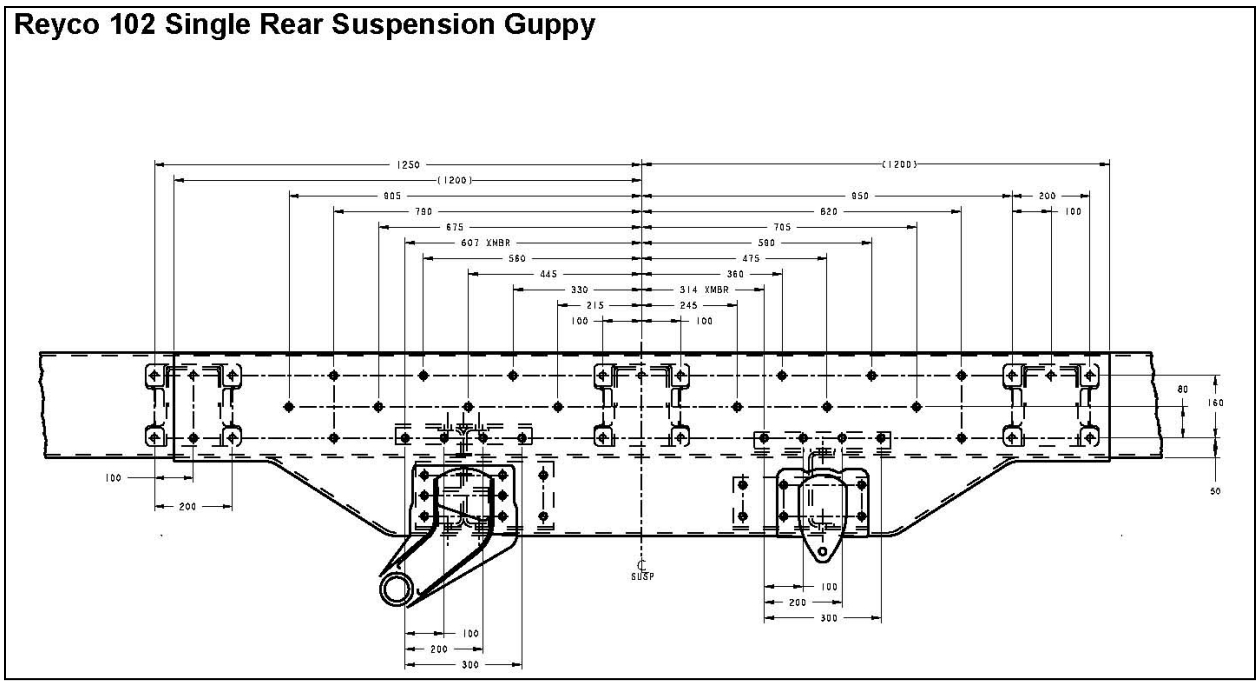

FIGURE 3-35. Reyco 102 Single Drive Suspension Guppy

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EXHAUST HEIGHT CALCULATIONS

The exhaust height calculations are provided as a tool to help layout bodies prior to arrival as well as aid in exhaust configuration selection.

Please work with the local Peterbilt Dealer to request additional information if required.

The overall exhaust height (EH) can be estimated based on the following formula: EH = Y + SPL + (A + B + C + D) / 2

TABLE 3-22. Exhaust Heights

Y = DISTANCE FROM BTM OF FRAME RAIL TO BTM OF STANDPIPE	
Exhaust Location	579, 567
SOC Mounted (Day Cab)	70.2
SOC Mounted (Sleeper)	67.6
BOC Mounted	69.2
Frame Mounted	86.0
Vertical-Vertical EPA 2013	ISX/MX=78.3, ISL=75.7

NOTES:
1) For “A” and “C” values, reference the FRAME HEIGHTS section for front or rear suspension height.
2) For “B” and “D” values, reference the tire manufacturer’s website or catalog for static loaded radius (SLR).
3) For Stand Pipe Length (SPL) values, reference the truck sales order.

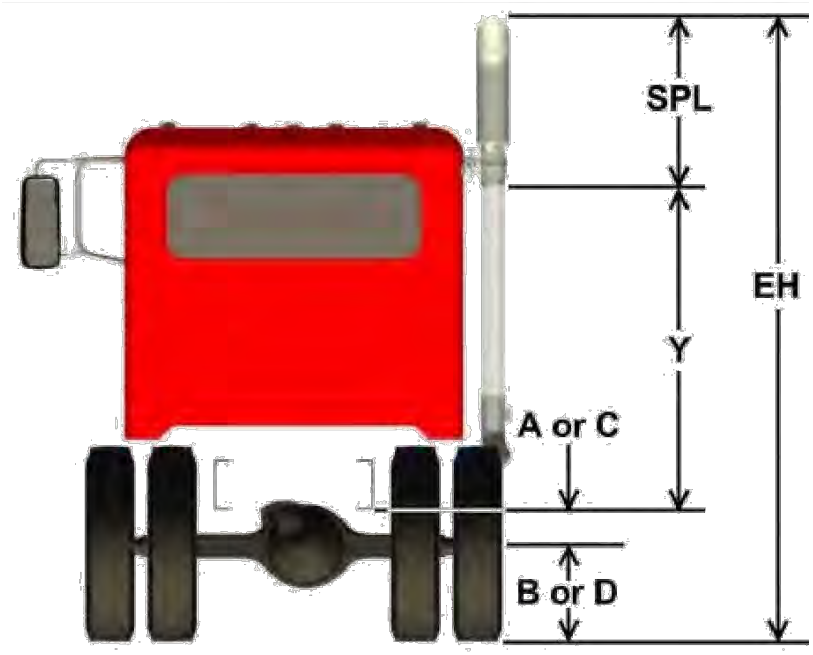


FIGURE 3-36. Exhaust Height Calculations

GROUND CLEARANCE CALCULATIONS

The ground clearance tables are provided as a tool as a tool to help layout bodies prior to arrival, not all optional equipment is included.

The ground clearance (GC) can be estimated based on the following formula: GC = (A + B + C + D) / 2 - Y

TABLE 3-23. Ground Clearance

Y = DISTANCE FROM BOTTOM OF FRAME TO BOTTOM OF COMPONENT	
Component	**Y**
RHUC DPF/SCR	16.7
Horizontal (Series or X-Over) DPF/SCR	16.5
Battery/Tool Box	15.4
Space Saver Battery Box (w/o Air Tanks or Step)	3.9
Space Saver Battery Box (w/ Air Tanks or Step)	12.7
Frame Mounted Ladder Step	13.9
20" Diameter Fuel Tank	12.4
23" Diameter Fuel Tank	15.2
26" Diameter Fuel Tank	18.0
DEF Tank	15.4

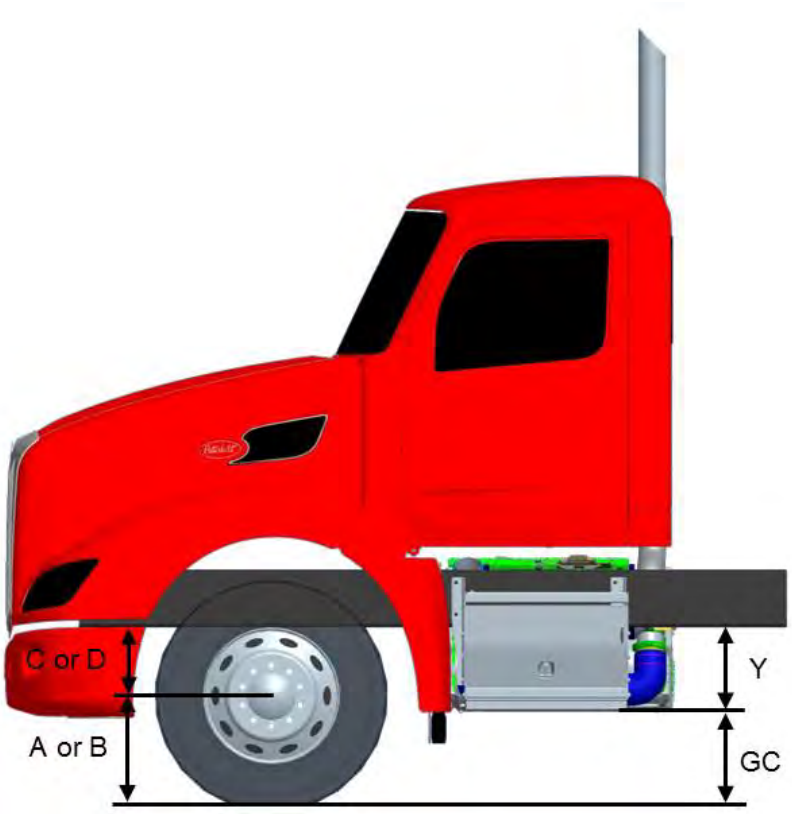


FIGURE 3-37. Ground Clearance Calculations

NOTES:

1) For “A” and “C” values, reference the FRAME HEIGHTS section for front suspension height or rear suspension height.
2) For “B” and “D” values, reference the tire manufacturer’s website or catalog for overall diameter or static loaded radius (SLR).

OVERALL CAB HEIGHT CALCULATIONS

The overall cab height tables are provided as a tool as a tool to help layout bodies prior to arrival, no roof mounted equipment is included.

The overall cab height (CH) can be estimated based on the following formula: CH = (A + B + C + D) / 2 + Y

TABLE 3-24. Overall Cab Height

Y = DISTANCE FROM BTM OF FRAME TO TOP OF STANDARD CAB ROOF	
Model	**Y**
579/567	83.7

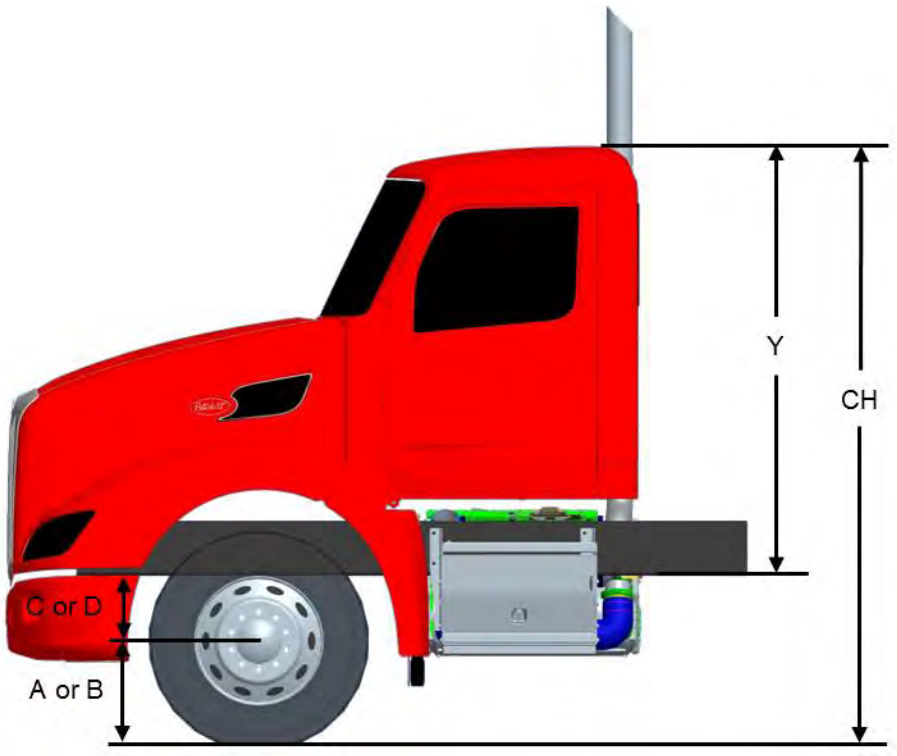


FIGURE 3-38. Overall Cab Height Calculations

NOTES:

1) For “A” and “C” values, reference the FRAME HEIGHTS section for front suspension height or rear suspension height.
2) For “B” and “D” values, reference the tire manufacturer’s website or catalog for overall diameter or static loaded radius (SLR).
3) Roof mounted content such as horns and antennas are not included.
4) For extended day cab configurations, add 5.8” to overall cab height.

FRAME COMPONENTS

This section includes drawings and charts related to common frame mounted components. Optional equipment may not be depicted.

Please work with the local Peterbilt Dealer to request additional information if required. At the dealer's request, Peterbilt can provide frame layouts for individual vehicles prior to delivery.

FUEL TANKS

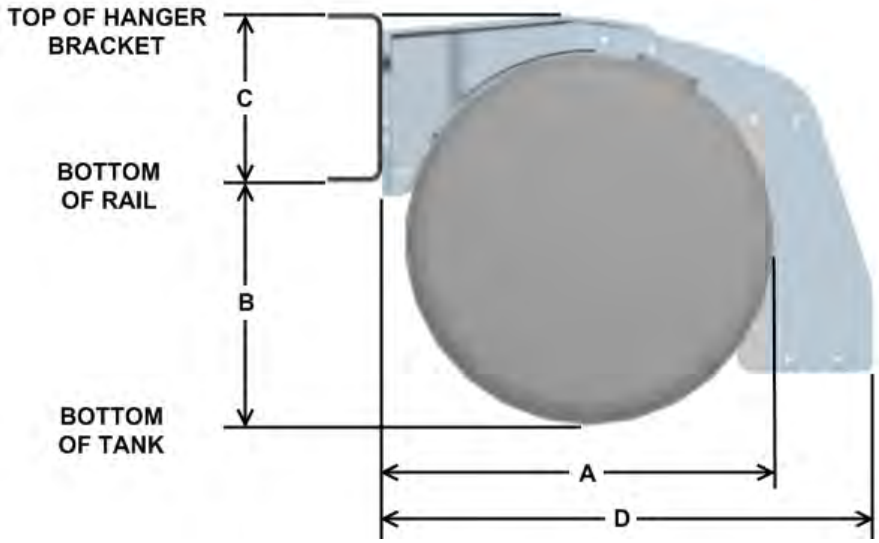


FIGURE 3-39. Fuel Tanks

TABLE 3-25. Fuel Tank Dimensions

	DIMENSIONS			
	A	B	C	D
20" TANK	22.7	12.4	10.3	27.5
23" TANK	24.5	15.2	10.5	31.0
26" TANK	27.2	18.0	10.6	33.7

TABLE 3-26. Fuel Tank Data

GALLONS		TANK LENGTH		
USEABLE	TOTAL	20"	23"	26"
40	46	33.3	N/A	N/A
50	57	43.2	34.5	26.7
60	67	51.3	40.7	31.5
70	78	57.3	46.8	36.2
80	89	65.3	52.9	41.0
90	99	N/A	59.0	45.7
100	110	N/A	*65.1	50.5
110	121	N/A	N/A	55.2
120	131	N/A	77.3	60.0
135	147	N/A	N/A	66.8
150	163	N/A	N/A	*74.0

NOTES:

1) * Largest capacity without a weld seam.

DEF TANKS

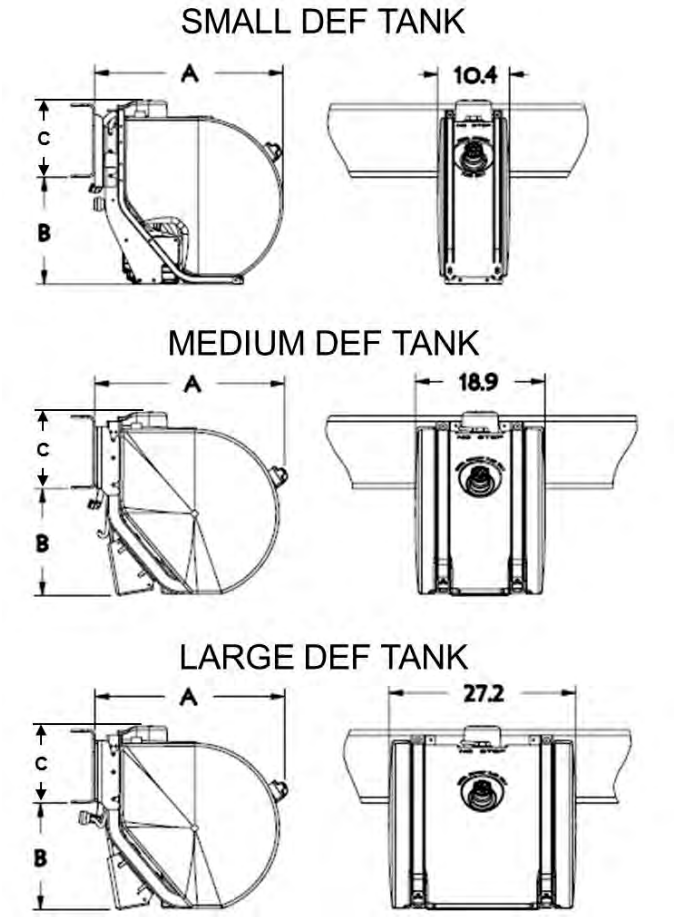


FIGURE 3-40. DEF Tanks

FIGURE 3-41. DEF Tank Isometric View

TABLE 3-27. DEF Tank Dimensions and Data

DESCRIPTION	GALLONS	A	B	C
SMALL DEF TANK	11.0	27.7	15.4	10.5
MEDIUM DEF TANK	20.7	27.7	15.4	10.5
LARGE DEF TANK	31.1	27.7	15.4	10.5

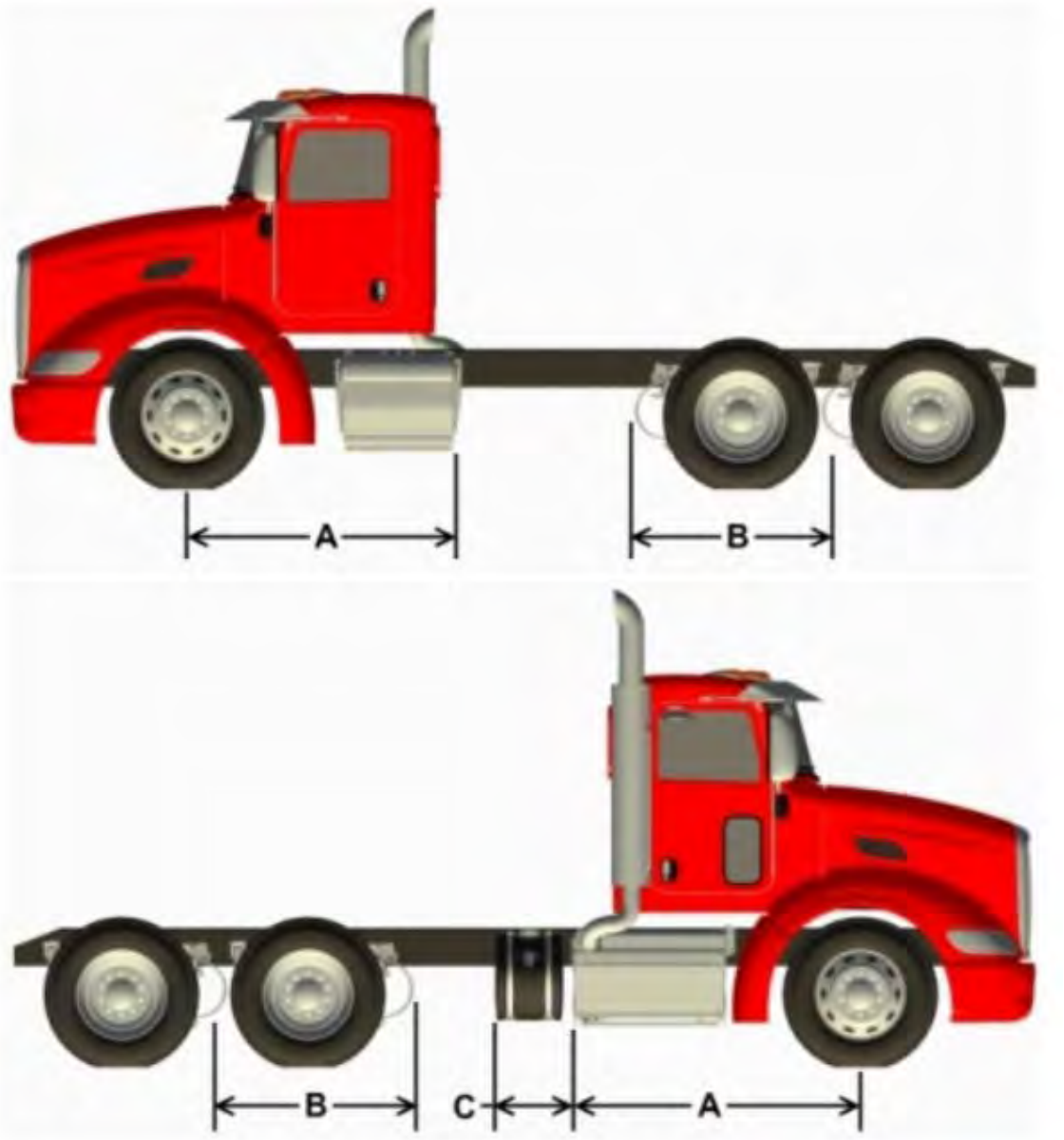
OTHER FRAME COMPONENTS

TABLE 3-28. Other Frame Component Dimensions

DESCRIPTION	LENGTH
STANDARD BOC BATTERY BOX	40.9
STANDARD BOC TOOL BOX	31.6
SPACE SAVER BATTERY BOX W/ STEP	28.2
SPACE SAVER BATTERY BOX W/O STEP	25.1
FRAME MOUNTED LADDER STEP	12.8

FRAME SPACE REQUIREMENTS

This section includes drawings and charts related to frame space components to ensure adequate space for fuel tanks, ladder steps, additional tool/battery boxes, pusher axles and other frame mounted components, the amount of available space must be calculated by using the formula below.



BASIC FORMULA: BOC Frame Space = Wheelbase - Dimension A - Dimension C - Dimension B

Dimension "A" (shown in charts on following pages) is the minimum clearance measured from the centerline of the front axle to the back of the under cab component (DPF/SCR exhaust, fuel tank, battery box, tool box, etc). Dimension "C" is the amount of space from the rear of the under cab component to the back of the DEF tank (can be on LH or RH rail). Dimension "B" is the amount of required suspension and quarter fender clearance from the rear axle centerline to clear rail for a given suspension.

REAR SUSPESION

TABLE 3-29. Rear Suspension Frame Space Requirements

FRAME SPACE REQUIREMENTS			
DIMENSION "B" IN INCHES (52" Axle Spacing on Tandems)			
REAR SUSPENSION	**"B"**	**OVERHANG (1)**	**NOTES**
AIR LEAF	53.0	53.0	2
LOW/LOW LOW AIR LEAF	62.4	53.0	
LOW AIR LEAF SINGLE	36.5	27.0	
AIR TRAC SINGLE	27.0	27.0	3
AIR TRAC TANDEM	53.0	53.0	3
FLEX AIR	59.0	53.7	8
CHALMERS 800 (54" SPACING)	49.0	52.0	4
HENDRICKSON HLM / AL	26.6	N/A	6, 7
HENDRICKSON HLR2	30.5	N/A	6, 7
HENDRICKSON HMX, HN	53.0	54.0	
HENDRICKSON R/RS/RT/RTE	53.0	53.0	3
HENDRICKSON SC20	25.6	15.0	6, 7
HENDRICKSON SC8/10/13, FX, FXO, SCO	23.6	13.8	5, 6, 7
NEWAY ADZ (54" SPACING)	61.0	58.3	
REYCO 102 SINGLE	30.0	25.8	
REYCO 102AR SINGLE	30.0	31.0	
REYCO 102 TANDEM	56.0	52.7	
REYCO 79KB	30.1	32.2	
WATSON-CHALIN AL2200	26.6	22.2	6, 7
WATSON-CHALIN SL0893SSR	27.6	11.8	5, 6, 7
WATSON-CHALIN SL1093SSR	27.6	11.8	6, 7
WATSON-CHALIN SL1190SSR	26.0	12.8	6, 7
WATSON-CHALIN SL2065	28.8	14.4	6, 7

Notes:

1. Overhang for tractor taper EOF and standard mudflap hangers on suspensions; Square EOF w/o Crossmember for Lift Axles.
2. Add 2.0" to "B" dimension with quarter fenders.
3. Add 1.5" to "B" dimension with quarter fenders.
4. Add 0.6" to "B" dimension with quarter fenders.
5. Add 2.8" to "B" dimension with quarter fenders.
6. Add 3.0" to "B" dimension if pusher is mounted behind sleeper. The suspension bracket protrudes 3" BOS.
7. "B" dimension is from axle centerline (or bogie for tandem) to clear frame forward.
8. Extended Tractor Taper requires 58.0" overhang.

Model: 579-123" BBC SBFA and 567-121" BBC SBFA w/o Chassis Fairings

FAX to BOC= 74.1"

Under Cab Component "A" Dim					DEF Tank Dimension "C" LH DEF Tank W/RHUC DPF/SCR		
Fuel Tank Diameter	Capacity in Gallons	DC and xx" Slpr	Exhaust	"A" LH, RH Rail	Small	Medium	Large
23"	50	DC, 58", 72", 80"		71.1	16.1	23.5	32.1
	60	DC, 58", 72", 80"		74.9 (RH 75.4)	12.3	21.7	32.3
	70	DC, 58", 72", 80"	W/O DSOC	81.1	14.0	21.4	32.0
		DC, 58", 72", 80"	W/DSOC	84 (RH 81.1)	13.0	22.4	31.0
	80	DC, 58", 72", 80"		87.3	13.7	21.1	31.7
	90	58"	W/O DSOC	93.5 (RH N/A)	13.4	22.8	
		DC, 72", 80"	W/O DSOC	93.5 (RH N/A)	13.4	22.8	30.3
	100	58"		99.4	13.4		
		DC, 72", 80"		99.4	13.4	22.8	31.4
	120	72"		111.7	12.9	22.3	
		DC, 80"		111.7	12.9	22.3	30.9
26"	70	DC, 58", 72", 80"	W/O DSOC	70.5 (RH 71.9)	12.8	24.1	32.7
		DC, 58", 72", 80"	W/DSOC	70.5 (RH 71.9)	16.7	24.1	32.7
	80	DC, 58", 72", 80"		75.2	13.9	21.4	31.9
	90	DC, 58", 72", 80"	W/O DSOC	80.0	13.2	22.5	31.1
		DC, 58", 72", 80"	W/DSOC	83.9 (RH 80)	13.2	22.5	31.1
	100	DC, 58", 72", 80"		84.8	12.3	21.7	30.2
	110	DC, 58", 72", 80"		89.4	13.5	20.9	30.5
	120	58"		94.2	12.6	22.0	
		DC, 72", 80"		94.2	12.6	22.0	30.6
	135	58"		101.1	13.7		
		DC, 72", 80"		101.1	13.7	21.1	31.7
	150	72"		108.1	12.6	22.0	
		DC, 80"		108.1	12.6	22.0	30.6

Under Cab Boxes				DEF Tank Dimension "C" w/ Under Cab Boxes W/RHUC DPF/SCR		
RHUC Box	Engine	Fairings	"A"	RH Small	RH Medium	RH Large
RHUC DPF/SCR HD Low HP	MX-11, MX-13, ISX15-1	NO	76.8	16.3	27.7	36.3
RHUC DPF/SCR HD High HP	ISX15-3	NO	77.3	15.8	27.2	35.7
RHUC DPF/SCR Aero w/o BOC	All	YES	78.8	18.2	27.6	38.1
RHUC DPF/SCR Aero W/BOC	All	YES	78.8	24.1	33.5	42.1
RH Batt/Tool Box			66.1			
Under Cab Component				**LH Small**	**LH Medium**	**LH Large**
LH Batt/Tool Box W/O DSOC		NO	66.1	21.1	28.5	37.1
LH Batt/Tool W/DSOC		NO	66.1	21.1	30.5	39.1
LH UnderCab Fairings To BOC		Yes	A+C	A+C=97	A+C=106.4	A+C=117.0

Open Frame Space = Wheelbase - (A + B + C)

1) Find the Under Cab Component "A" applicable to your spec for either RH or LH rail.
2) Find the total fuel capacity of the vehicle to determine the DEF tank size used.
3) Find the DEF tank dimension "C" dependent on U/C tanks, DPF/SCR position or bat/tool boxes
4) Note that the "B" dimension is the rear suspension clearance.
5) If you want to find BOC Protrusion Subtract the A (or A+C) dimension from 74.1" (front axle to BOC dimension)

Notes:

1) DEF tank locations are sometimes dependent on sleeper box length, noted in column "capacity/DC, slpr", otherwise DEF tank location is good for 58/72/80" sleepers as shown.
2) DEF tanks not available on RH rail with Under Frame exhaust.

Model: 579-117" BBC SBFA and 567-115" BBC SBFA w/o Chassis Fairings

FAX to BOC= 68.2"

Under Cab Component "A" Dim					DEF Tank Dimension "C" LH DEF Tank W/RHUC DPF/SCR		
Fuel Tank Diameter	Capacity in Gallons	DC and xx" Slpr	Exhaust	"A" LH, RH Rail	Small	Medium	Large
23"	50	DC, 58", 72", 80"		68.7	12.6	22.0	30.6
	60	DC, 58", 72", 80"	W/DSOC	76.8 (RH 74.9)	12.4	23.7	34.2
		DC, 58", 72", 80"	W/O DSOC	74.9	12.3	21.7	32.2
	70	DC, 58", 72", 80"		81.1	14.0	21.4	31.9
	80	58"		87.3 (RH 88.3)	13.7	20.1	
		DC, 72", 80"		87.3 (RH 88.3)	13.7	20.1	30.6
	100	58"		99.4	13.4		
		72"		99.4	13.4	22.8	
		DC, 80"		99.4	13.4	22.8	31.3
	120	72"		111.7	12.9	22.3	
		DC, 80"		111.7	12.9	22.3	30.9
26"	50	DC, 58", 72", 80"		63.9	17.4	24.8	33.4
	60	DC, 58", 72", 80"		65.7	15.6	23.0	31.6
	70	DC, 58", 72", 80"		70.5	12.8	22.1	32.7
	80	DC, 58", 72", 80"	W/DSOC	76.2 (RH 75.2)	13.0	23.4	31.9
		DC, 58", 72", 80"	W/O DSOC	75.2	14.0	21.4	31.9
	90	DC, 58", 72", 80"		80.0	13.1	22.5	31.1
	100	58"		84.8 (RH 86.3)	12.2	20.1	
		DC, 72", 80"		84.8 (RH 86.3)	12.2	20.1	28.7
	110	58"		89.4	13.6	20.9	
		DC, 58", 72", 80"		89.4	13.6	20.9	31.5
	120	58"		94.2	12.7		
		DC, 72", 80"		94.2	12.7	22.1	30.6
	135	58"		101.1	13.7		
		72"		101.1	13.7	21.1	
		DC, 80"		101.1	13.7	21.1	31.6
	150	72"		108.1	12.6		
		DC, 80"		108.1	12.6	22.0	30.5

Under Cab Boxes				DEF Tank Dimension "C" w/ Under Cab Boxes W/RHUC DPF/SCR		
Box	Engine	Fairings	"A"	RH Small	RH Medium	RH Large
RHUC DPF/SCR MD MHP	PX-9	NO	70.9	16.3	25.7	36.3
RHUC DPF/SCR MD HHP	PX-9	NO	73.3	17.8	27.2	35.8
RHUC DPF/SCR HD Low HP	MX-13, MX-11	NO	70.9	16.3	25.7	36.3
RHUC DPF/SCR HD AERO W/O BOC EXH		Yes	78.8	12.3	21.7	32.2
RHUC DPF/SCR HD AERO W/BOC EXH		Yes	78.8	24.1	33.5	42.1
RH Batt/Tool Box		NO	66.1			
Under Cab Component				**LH Small**	**LH Medium**	**LH Large**
LH Batt/Tool Box		NO	66.1	17.2	24.6	35.1
LH UnderCab Fairings To BOC		Yes	A+C	A+C = 91.1	A+C = 100.5	A+C = 111.1

Open Frame Space = Wheelbase - (A + B + C)

1) Find the Under Cab Component "A" applicable to your spec for either RH or LH rail.
2) Find the total fuel capacity of the vehicle to determine the DEF tank size used.
3) Find the DEF tank dimension "C" dependent on U/C tanks, DPF/SCR position or bat/tool boxes
4) Note that the "B" dimension is the rear suspension clearance.
5) If you want to find BOC Protrusion Subtract the A (or A+C) dimension from 68.2" (front axle to BOC dimension)

Notes:

1) DEF tank locations are sometimes dependent on sleeper box length, noted in column "capacity/DC, slpr", otherwise DEF tank location is good for 58/72/80" sleepers as shown.
2) DEF tanks not available on RH rail with Under Frame exhaust.

Model: 567-121" BBC SFFA w/o Chassis Fairings

FAX to BOC=90.1"

Under Cab Component "A" Dim				DEF Tank Dimension "C" w/ Under Cab Fuel Tanks					
				DEF Tank Behind UC FT W/RH U/C DPF/SCR.			LH & RH DEF Tank W/Vertical DPF/SCR		
Fuel Tank Diameter	Capacity DC and xx" Slpr	Dual SOC W/ or W/O	"A" LH, RH Rail	Small	Medium	Large	Small	Medium	Large
23"	50 gal, 44"	W/ or W/O	86.8	14.4	23.8	32.4	16.4	23.8	32.4
	50 gal, DC, 58", 72", 80"	W/ or W/O	86.8	14.4	23.8	32.4	24.3	41.5	52.1
	70 gal, 44"	W/ or W/O	88.2	13.0	22.4	31.0	15.0	22.4	31.0
	70 gal, DC, 58", 72", 80"	W/ or W/O	88.2	13.0	22.4	31.0	22.9	40.1	50.7
	80 gal, 44"	W/ or W/O	92	13.2	22.5	68.5	13.2	22.5	31.1
	80 gal, DC, 58", 72", 80"	W/ or W/O	92	13.2	22.5	31.1	19.1	36.3	46.9
	100 gal, 44"	W/ or W/O	104.1	38.5	45.9	56.4	12.9	59.6	68.2
	100 gal, DC, 58, 72", 80"	W/ or W/O	104.1	12.9	24.2	32.8	18.8	24.2	34.8
	120 gal, 44"	W/ or W/O	116.4	26.2	33.6	44.1	30.1	47.3	55.9
	120 gal, 58"	W/ or W/O	116.4	14.3	47.3	55.9	14.3	23.7	34.3
	120 gal, DC, 72, 80"	W/ or W/O	116.4	14.3	21.8	32.3	14.3	23.7	34.3
26"	50 gal, 44"	W/ or W/O	81.1	14.2	21.6	32.2	14.2	21.6	32.2
	50 gal, DC, 58", 72", 80"	W/ or W/O	81.1	14.2	21.6	32.2	16.2	47.2	57.8
	60 gal, 44"	W/ or W/O	85.9	13.4	24.7	33.3	13.4	24.7	33.3
	60 gal, DC, 58", 72", 80"	W/ or W/O	85.9	13.4	24.7	33.3	25.2	42.4	53.0
	70 gal, 44"	W/ or W/O	88.4	14.8	22.2	30.8	14.8	22.2	30.8
	70 gal, DC, 58", 72", 80"	W/ or W/O	88.4	14.8	22.2	30.8	22.7	39.9	50.5
	80 gal, 44"	W/ or W/O	86.3	13.0	24.3	32.9	16.9	24.3	32.9
	80 gal, DC, 58", 72", 80"	W/ or W/O	86.3	13.0	24.3	32.9	24.8	42.0	52.6
	90 gal, 44"	W/ or W/O	89	14.2	21.6	32.1	14.2	21.6	32.1
	90 gal, DC, 58", 72", 80"	W/ or W/O	89	14.2	21.6	32.1	22.1	39.3	49.9
	100 gal, 44"	W/ or W/O	89.5	13.7	23.1	31.6	13.7	23.1	31.6
	100 gal, DC, 58", 72", 80"	W/ or W/O	89.5	13.7	23.1	31.6	21.6	38.8	49.4
	110 gal, 44"	W/ or W/O	94.2	12.9	22.3	66.3	12.9	22.3	30.9
	110 gal, DC, 58", 72", 80"	W/ or W/O	94.2	12.9	22.3	30.9	16.9	34.1	44.7
	120 gal, 44"	W/ or W/O	99	14.0	23.4	61.5	14.0	23.4	73.3
	120 gal, DC, 58", 72", 80"	W/ or W/O	99	14.0	23.4	32.0	23.9	29.3	39.9
	135 gal, 44"	W/ or W/O	105.8	13.1	22.5	31.1	17.1	24.5	33.1
	135 gal, 58"	W/ or W/O	105.8	13.1	22.5	66.5	17.1	24.5	33.1
	135 gal, DC, 72", 80"	W/ or W/O	105.8	13.1	22.5	31.1	17.1	24.5	33.1
	150 gal, 44"	W/ or W/O	112.8	29.8	37.2	47.7	33.7	50.9	59.5
	150 gal, 58"	W/ or W/O	112.8	14.0	23.4	59.5	16.0	25.4	33.9
	150 gal, DC, 72", 80"	W/ or W/O	112.8	14.0	23.4	32.0	16.0	25.4	33.9

Under Cab Boxes				DEF Tank Dimension "C" w/ Under Cab Boxes					
				LH DEF			RH DEF		
Box	Exhaust	Fairing	"A"	Small	Medium	Large	Small	Medium	Large
LH UC B/T Box W / RH UC Exhaust	W/O Dual SOC	No	82.1	21.1	28.5	37.1			
LH UC B/T Box W / RH UC Exhaust	W/ Dual SOC	No	82.1	21.1	30.5	39.0			
LH UC B/T Box W / 44"	Vertical DPF/SCR	No	82.1	15.2	24.6	33.1			
LH UC B/T Box W /DC, 58", 72" 80"	Vertical DPF/SCR	No	82.1	15.2	44.2	54.8			
RH U/C DPF/SCR w/ HD LHP engines	W/ or W/O DSOC	No	90.3				18.8	20.8	22.7
RH U/C DPF/SCR w/ HD HHP engines	W/ or W/O DSOC	No	90.8				18.3	20.3	22.2

Open Frame Space = Wheelbase - (A + B + C)

1) Find the Under Cab Component "A" applicable to your spec for either RH or LH rail.
2) Find the total fuel capacity of the vehicle to determine the DEF tank size used.
3) Find the DEF tank dimension "C" dependent on U/C tanks, DPF/SCR position or bat/tool boxes
4) Note that the "B" dimension is the rear suspension clearance.
5) If you want to find BOC Protrusion Subtract the A (or A+C) dimension from 90.1" (front axle to BOC dimension

Notes:

1) DEF tank locations are sometimes dependent on sleeper box length, noted in column "capacity/DC, slpr", otherwise DEF tank location is good for 44/58/72/80" sleepers as shown.
2) DEF tanks not available on RH rail with Under Frame exhaust.

Model: 567-115" BBC SFFA w/o Chassis Fairings

FAX to BOC=86.2"

Under Cab Component "A" Dim				DEF Tank Dimension "C" w/ Under Cab Fuel Tanks					
				LH DEF Tank W/RH U/C DPF/SCR.			LH & RH DEF Tank W/Vertical DPF/SCR		
Fuel Tank Diameter	Capacity DC and xx" Slpr	Dual SOC W/ or W/O	"A" LH / RH Rail	Small	Medium	Large	Small	Medium	Large
23"	50 gal w/ 44"	W/ or W/O	81.3	16.0	23.4	32.0	16.0	23.4	32.0
	50 gal w/DC, 58", 72", 80"	W/ or W/O	81.3	16.0	23.4	32.0	23.9	43.1	51.6
	70 gal w/44"	W/ or W/O	82.3	15.0	22.4	31.0	15.0	22.4	31.0
	70 gal w/DC, 58", 72", 80"	W/ or W/O	82.3	15.0	22.4	31.0	22.9	42.1	50.6
	80 gal, 44"	W/ or W/O	88.5	12.7	22.1	66.1	12.7	22.1	79.9
	80 gal, DC, 58", 72", 80"	W/ or W/O	88.5	12.7	22.1	30.7	16.7	35.9	79.9
	100 gal, 44"	W/ or W/O	100.6	14.4	43.5	54.0	14.4	59.2	67.8
	100 gal, 58"	W/ or W/O	100.6	14.4	21.8	32.3	16.4	23.8	34.3
	100 gal, DC, 72", 80"	W/ or W/O	100.6	14.4	21.8	32.3	16.4	23.8	34.3
	100 gal, DC, 58", 72", 80"	W/ or W/O	100.6	14.4	21.8	32.3	16.4	23.8	34.3
	120 gal, 44"	W/ or W/O	112.9	23.8	31.2	41.7	27.7	46.9	55.5
	120 gal, 58"	W/ or W/O	112.9	13.9	21.3	53.5	15.9	23.3	33.8
	120 gal, DC, 72, 80"	W/ or W/O	112.9	13.9	21.3	31.9	15.9	23.3	33.8
26"	50 gal w/44"	W/ or W/O	75.1	12.3	21.7	32.3	12.3	21.7	32.3
	50 gal w/DC, 58", 72", 80"	W/ or W/O	75.1	12.3	21.7	32.3	14.3	49.3	57.8
	60 gal, w/44"	W/ or W/O	80.0	13.3	24.7	33.3	17.3	24.7	33.3
	60 gal w/DC, 58", 72", 80"	W/ or W/O	80.0	13.3	24.7	33.3	25.2	44.4	52.9
	70 gal w/44"	W/ or W/O	82.5	14.8	22.2	30.8	14.8	22.2	30.8
	70 gal w/DC, 58", 72", 80"	W/ or W/O	82.5	14.8	22.2	30.8	22.7	41.9	50.4
	80 gal w/44"	W/ or W/O	80.4	12.9	24.3	32.9	16.9	24.3	32.9
	80 gal w/DC, 58", 72", 80"	W/ or W/O	80.4	12.9	24.3	32.9	24.8	44.0	52.5
	90 gal w/44"	W/ or W/O	83.1	14.2	23.6	32.1	14.2	21.6	32.1
	90 gal w/DC, 58", 72", 80"	W/ or W/O	83.1	14.2	23.6	32.1	22.1	41.3	49.8
	100 gal w/44"	W/ or W/O	86.0	13.3	22.6	31.2	13.3	22.6	31.2
	100 gal w/DC, 58", 72", 80"	W/ or W/O	86.0	13.3	22.6	31.2	31.0	38.4	46.9
	110 gal, 44"	W/ or W/O	90.7	12.5	21.9	63.9	14.5	21.9	77.7
	110 gal, DC, 58, 72, 80"	W/ or W/O	90.7	12.5	21.9	30.4	26.3	33.7	42.2
	120 gal, 44"	W/O DSOC	95.5	13.6	21.0	59.1	13.6	64.3	72.9
	120 gal, DC, 58, 72, 80"	W/O DSOC	95.5	13.6	21.0	31.5	21.5	28.9	37.4
	120 gal, 44"	W/DSOC	98.0 / 95.5	13.1 / 15.6	46.1 / 48.6	56.6 / 59.1	11.1 / 13.6	61.8 / 64.3	70.4 / 72.9
	120 gal, DC, 58", 72", 80"	W/DSOC	98.0 / 95.6	13.1 / 15.6	22.4 / 24.8	31.0 / 33.4	19.0 / 21.4	26.4 / 28.8	34.9 / 37.3
	135 gal, 44"	W/ or W/O	102.3	12.7	41.8	52.3	12.7	24.0	66.1
	135 gal, 58"	W/ or W/O	102.3	12.7	22.1	64.1	14.7	24.0	34.6
	135 gal, DC, 72, 80"	W/ or W/O	102.3	12.7	22.1	30.6	14.7	24.0	34.6
	150 gal, 44"	W/ or W/O	109.3	27.4	34.8	45.3	31.3	24.9	59.1
	150 gal, 58"	W/ or W/O	109.3	13.6	23.0	57.1	15.5	24.9	33.5
	150 gal, DC, 72", 80"	W/ or W/O	109.3	13.6	23.0	31.5	15.5	24.9	33.5

Under Cab Boxes				DEF Tank Dimension "C" w/ Under Cab Boxes					
				LH DEF			RH DEF		
Box	Exhaust	Fairing	"A"	Small	Medium	Large	Small	Medium	Large
LH U/C B/T Box, DC, 44", 58", 72", 80"	W/O Vertical DPF/SCR	No	76.2	17.1	24.6	35.1			
LH U/C B/T Box, 44"	W / Vertical DPF/SCR	No	76.2	27	46.2	54.8			
LH U/C B/T Box, DC, 58", 72", 80"	W / Vertical DPF/SCR	No	76.2	16.8	36	44.6			
RH U/C with LHP Engines	W/ or W/O	No	86.4				20.7	30.1	38.7
RH U/C with MHP rated PX-9	W/ or W/O	No	84.9				22.2	31.6	40.2
RH U/C with HHP rated PX-9	W/ or W/O	No	87.4				19.7	29.1	37.7

Open Frame Space = Wheelbase - (A + B + C)

1) Find the Under Cab Component "A" applicable to your spec for either RH or LH rail.
2) Find the total fuel capacity of the vehicle to determine the DEF tank size used.
3) Find the DEF tank dimension "C" dependent on U/C tanks, DPF/SCR position or bat/tool boxes
4) Note that the "B" dimension is the rear suspension clearance.
5) If you want to find BOC Protrusion Subtract the A (or A+C) dimension from 86.2" (front axle to BOC dimension

Notes:

1) DEF tank locations are sometimes dependent on sleeper box length, noted in column "capacity/DC, slpr", otherwise DEF tank location is good for 44/58/72/80" sleepers as shown.
2) DEF tanks not available on RH rail with Under Frame exhaust.

567/579 FAMILY 2017 EMISSIONS

MODEL 567-115 SBFA EXHAUST SINGLE RH BACK OF CAB DPF/SCR RH UNDER CAB 2017 EMISSIONS

(Reference option code 3365250)

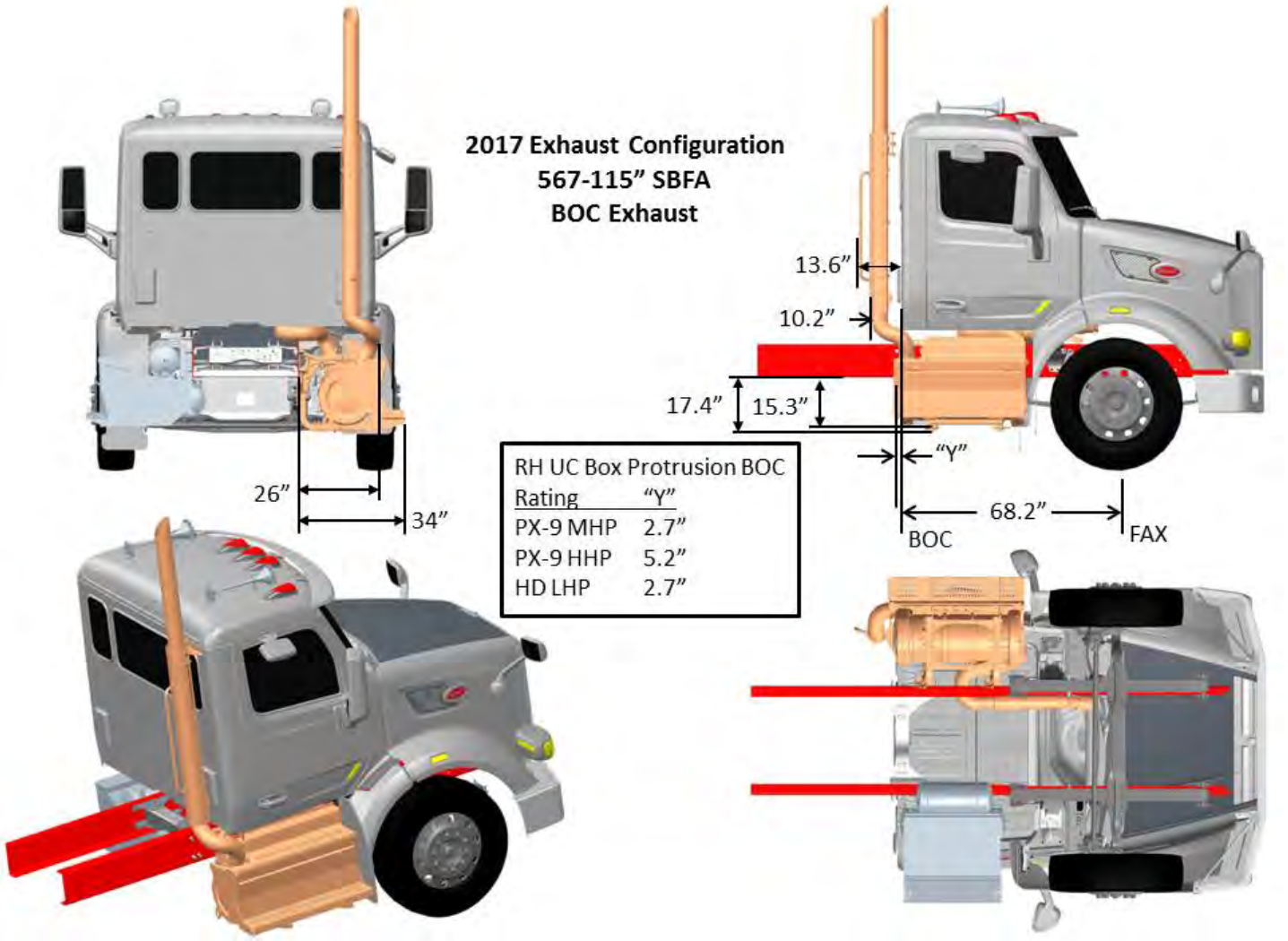


FIGURE 3-76. Exhaust Single RH Back of Cab DPF/SCR RH Under Cab

MODEL 567-115 SBFA EXHAUST SINGLE RH SIDE OF CAB DPF/SCR RH UNDER CAB
2017 EMISSIONS
(Reference option code 3365270)

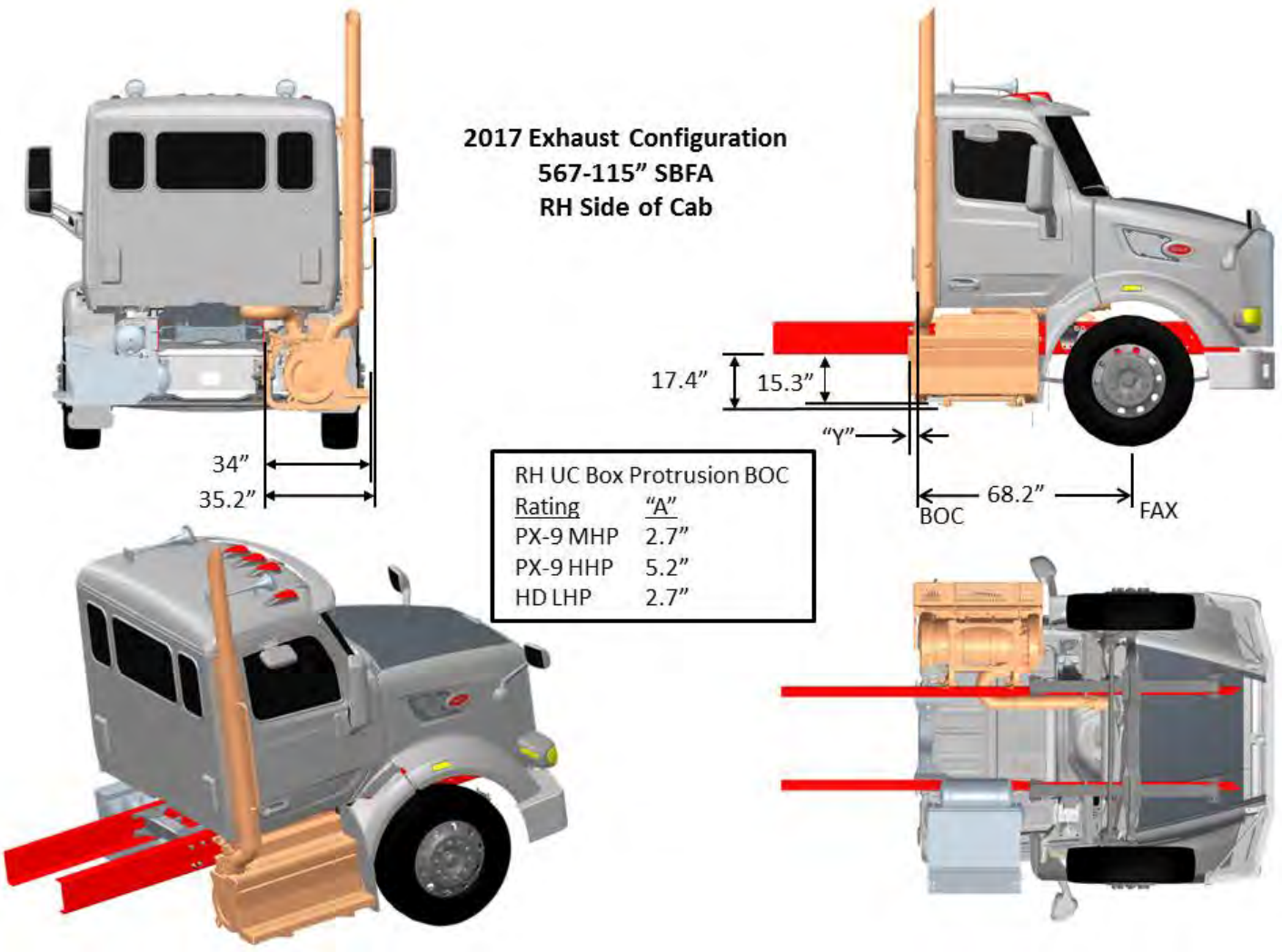


FIGURE 3-77. Exhaust Single RH Side of Cab DPF/SCR RH Under Cab

MODEL 567-115 SBFA EXHAUST SINGLE RH HORIZONTAL DPF/SCR RH UNDER CAB
2017 EMISSIONS
(Reference option code 3365280)

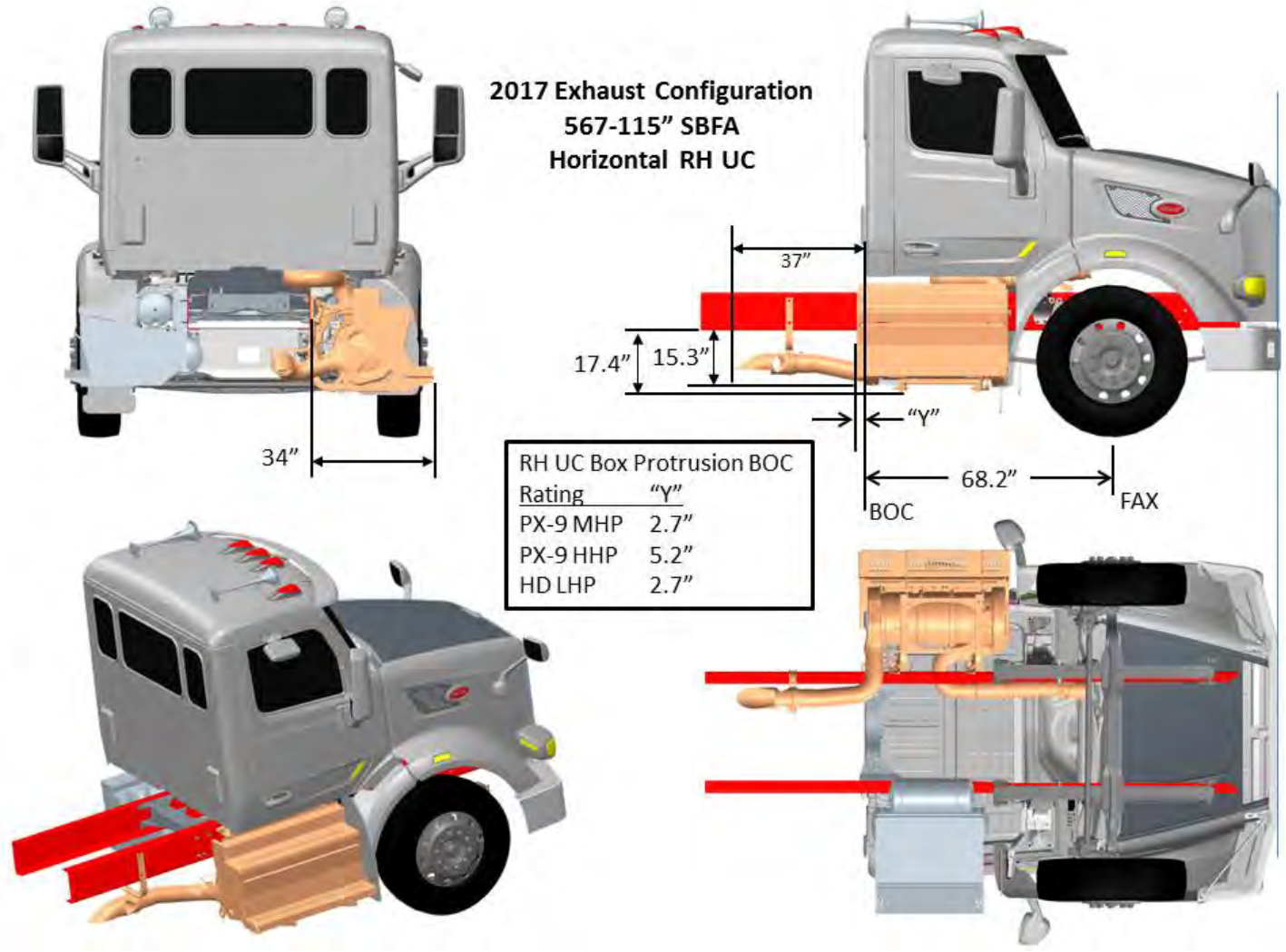


FIGURE 3-78. Exhaust Single RH Horizontal DPF/SCR RH Under Cab

MODEL 567-115 SBFA EXHAUST SINGLE RH HORIZONTAL DPF/SCR RH UNDER FRAME
2017 EMISSIONS
(Reference option code 3365290)

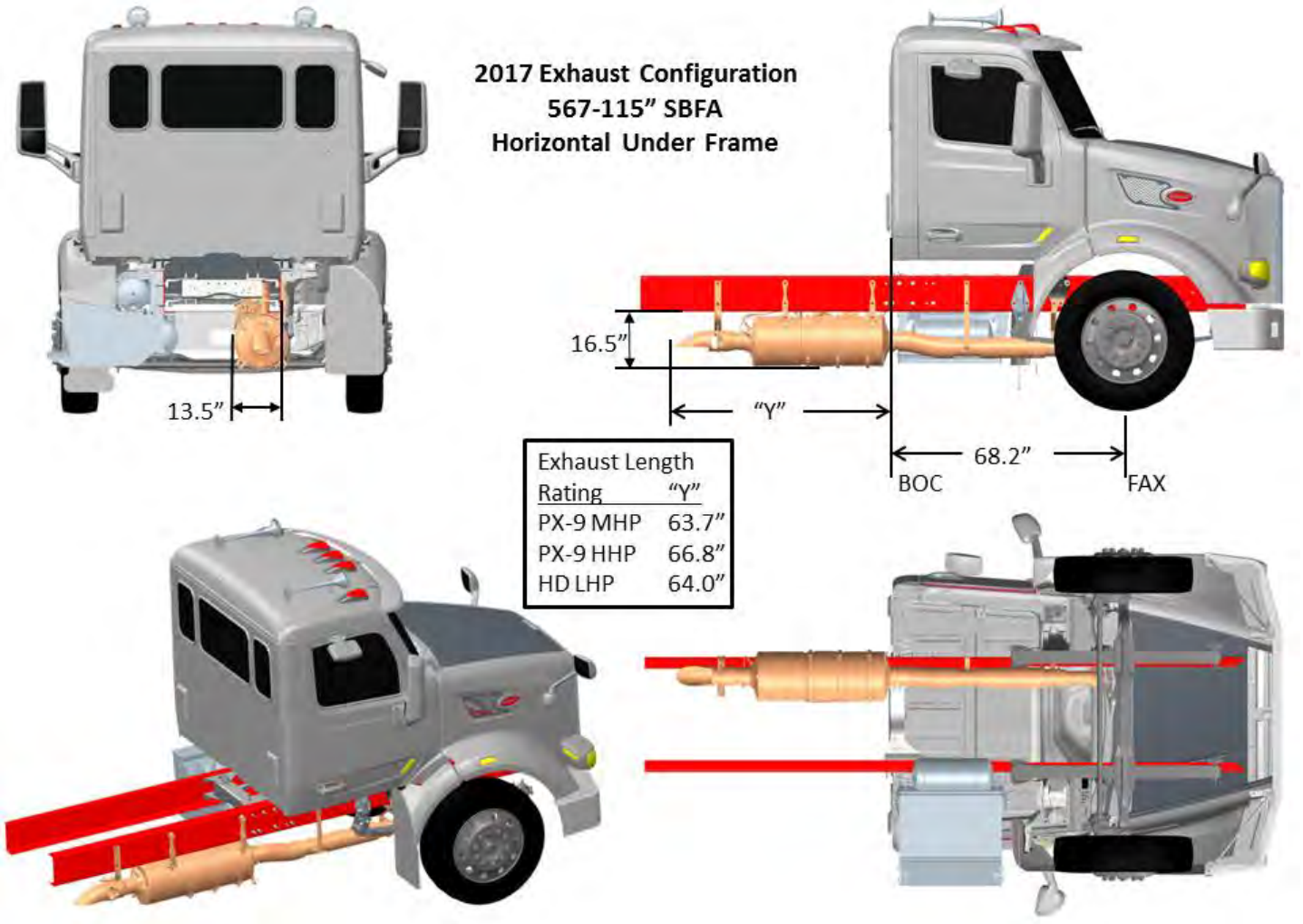


FIGURE 3-79. Exhaust Single RH Horizontal DPF/SCR RH Under Frame

MODEL 567-115 SBFA EXHAUST DUAL SOC DPF/SCR RH UNDER CAB
2017 EMISSIONS
(Reference option code 3365340)

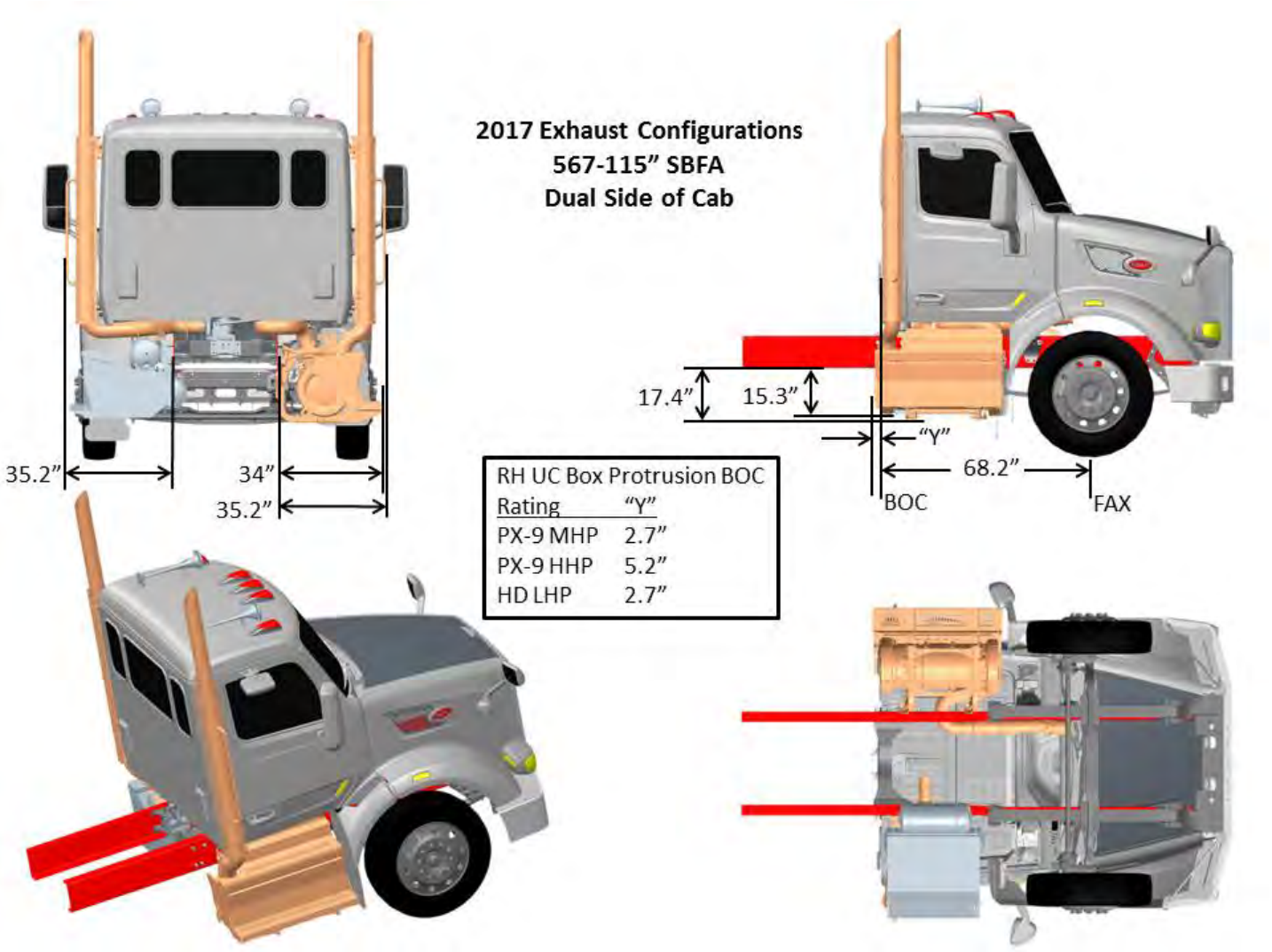


FIGURE 3-80. Exhaust Dual SOC DPF/SCR RH Under Cab

MODEL 567-115 SFFA EXHAUST SINGLE RH BACK OF CAB DPF/SCR RH UNDER CAB
2017 EMISSIONS
(Reference option code 3365250)

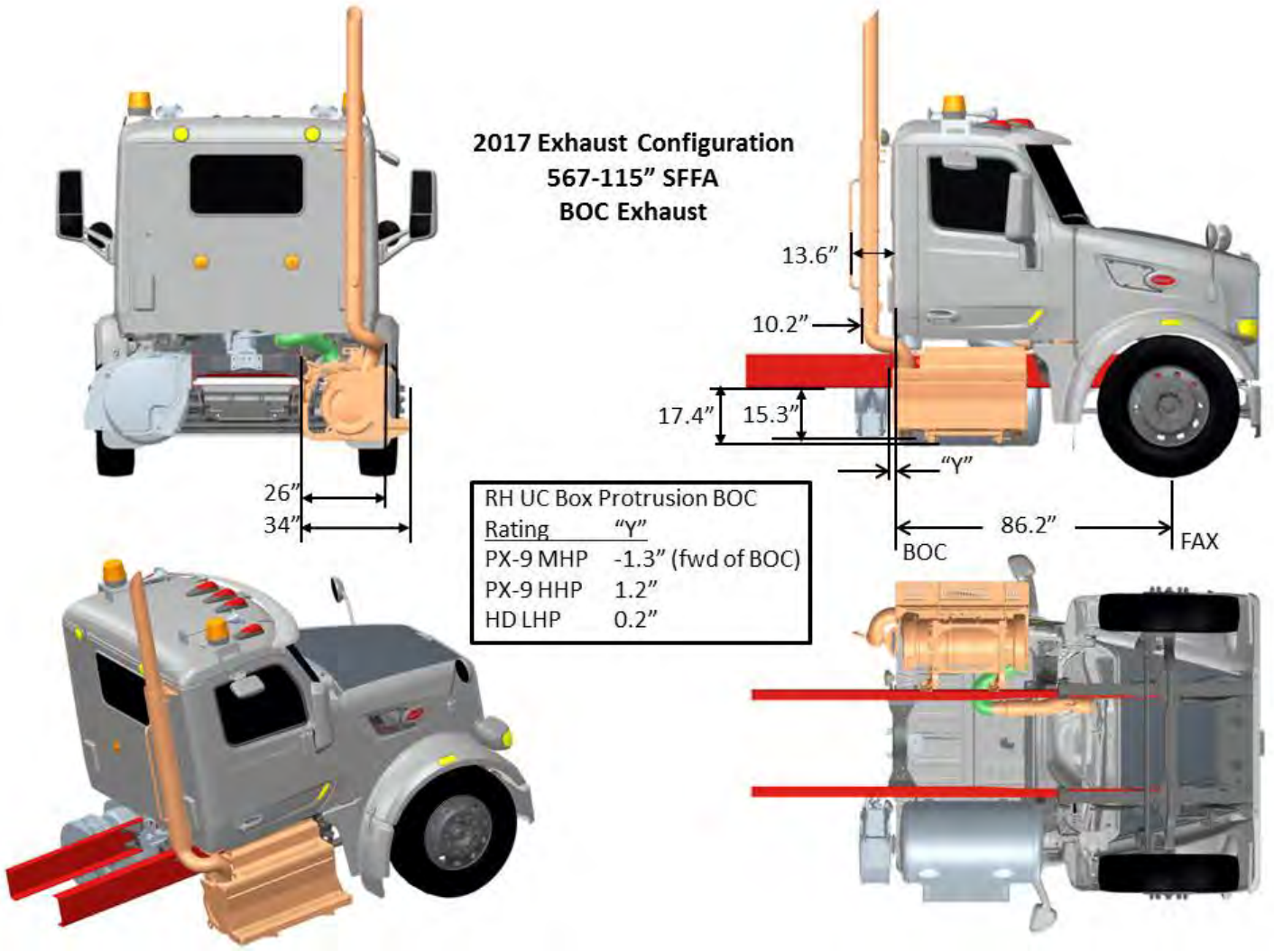


FIGURE 3-81. Exhaust Single RH Back of Cab DPF/SCR RH Under Cab

MODEL 567-115 SFFA EXHAUST SINGLE RH SIDE OF CAB DPF/SCR RH UNDER CAB
2017 EMISSIONS
(Reference option code 3365270)

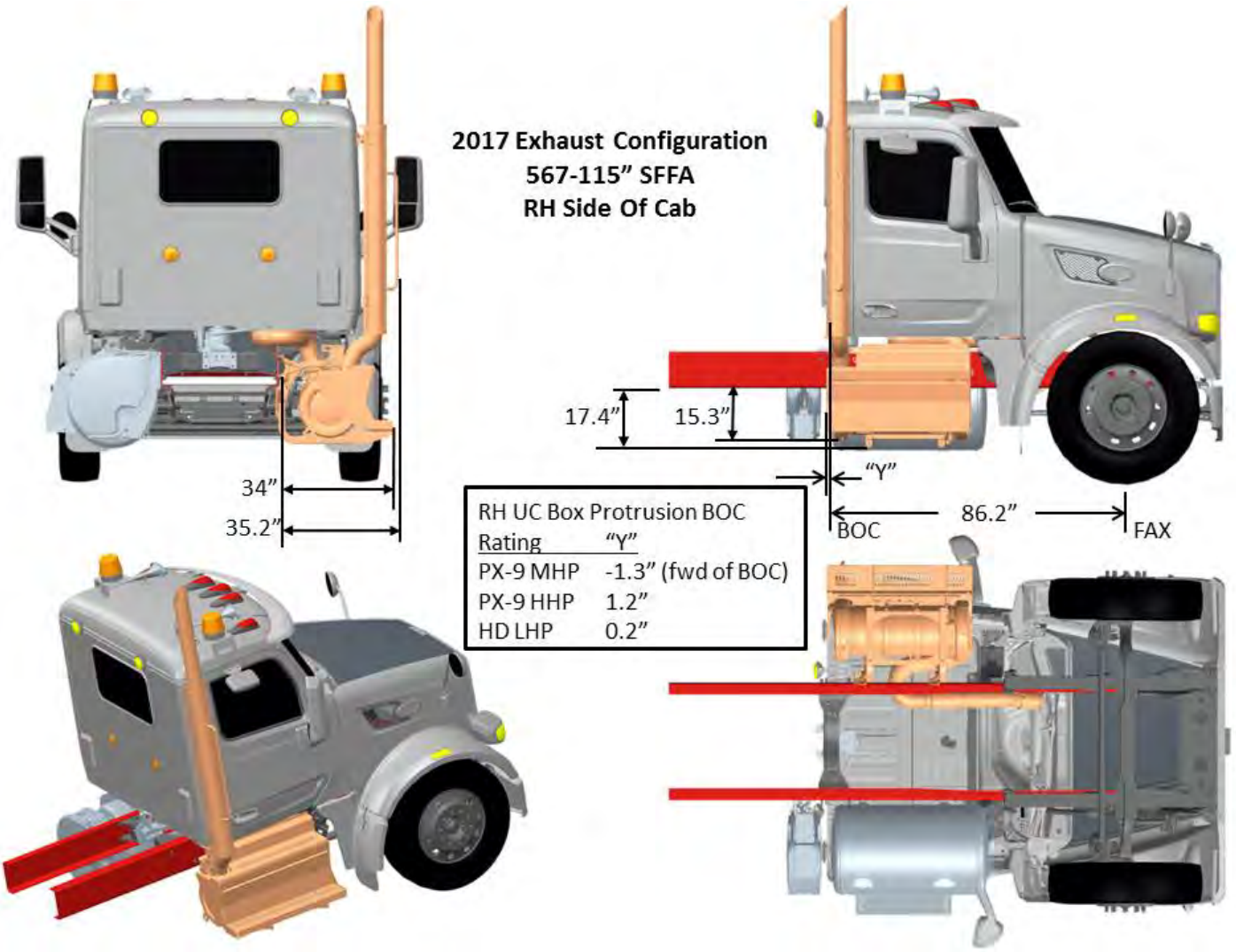


FIGURE 3-82. Exhaust Single RH Side of Cab DPF/SCR RH Under Cab

MODEL 567-115 SFFA EXHAUST SINGLE RH HORIZONTAL DPF/SCR RH UNDER CAB
2017 EMISSIONS
(Reference option code 3365280)

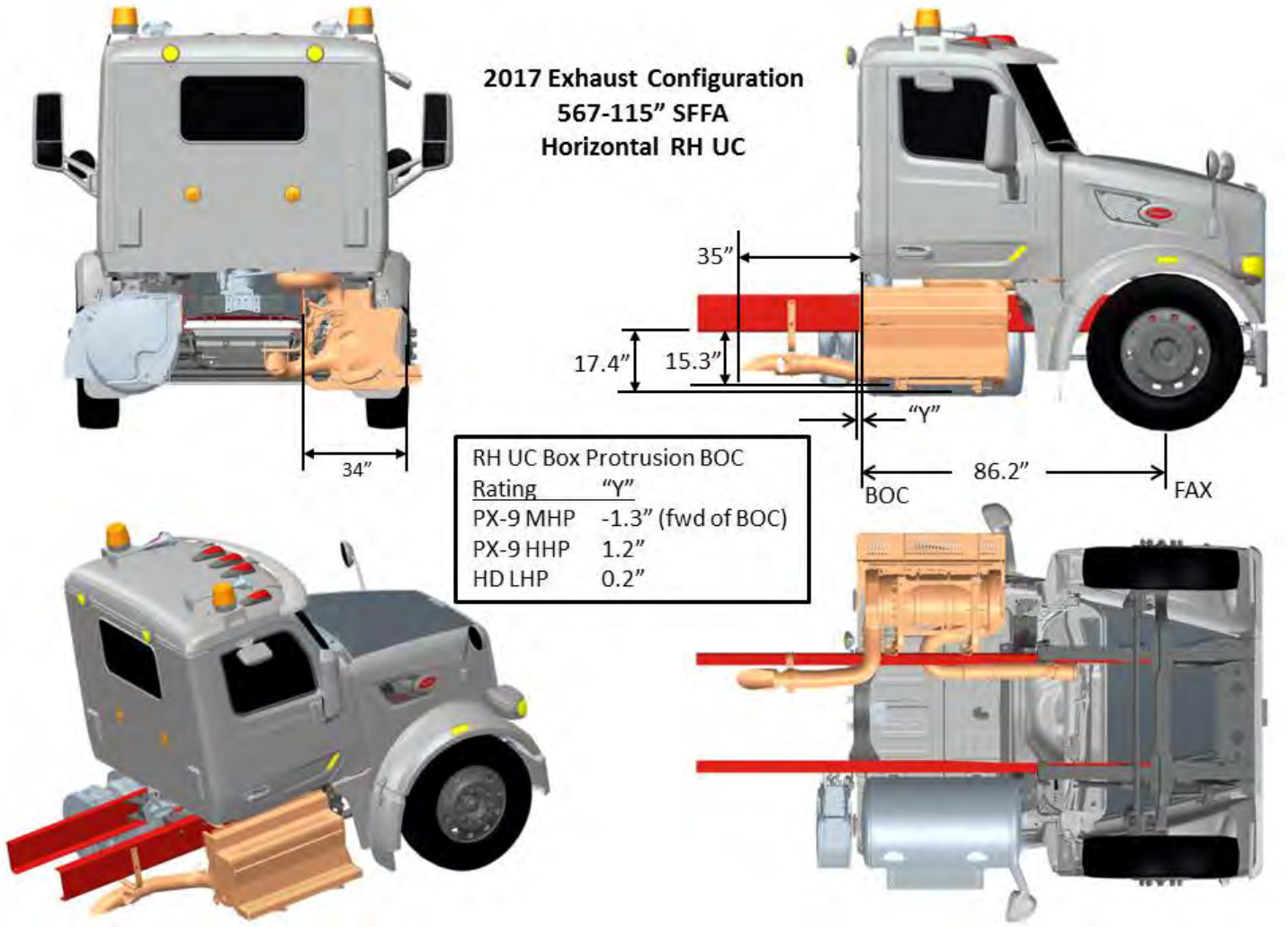


FIGURE 3-83. Exhaust Single RH Horizontal DPF/SCR RH Under Cab

MODEL 567-115 SFFA EXHAUST SINGLE RH HORIZONTAL DPF/SCR RH UNDER FRAME
2017 EMISSIONS
(Reference option code 3365290)

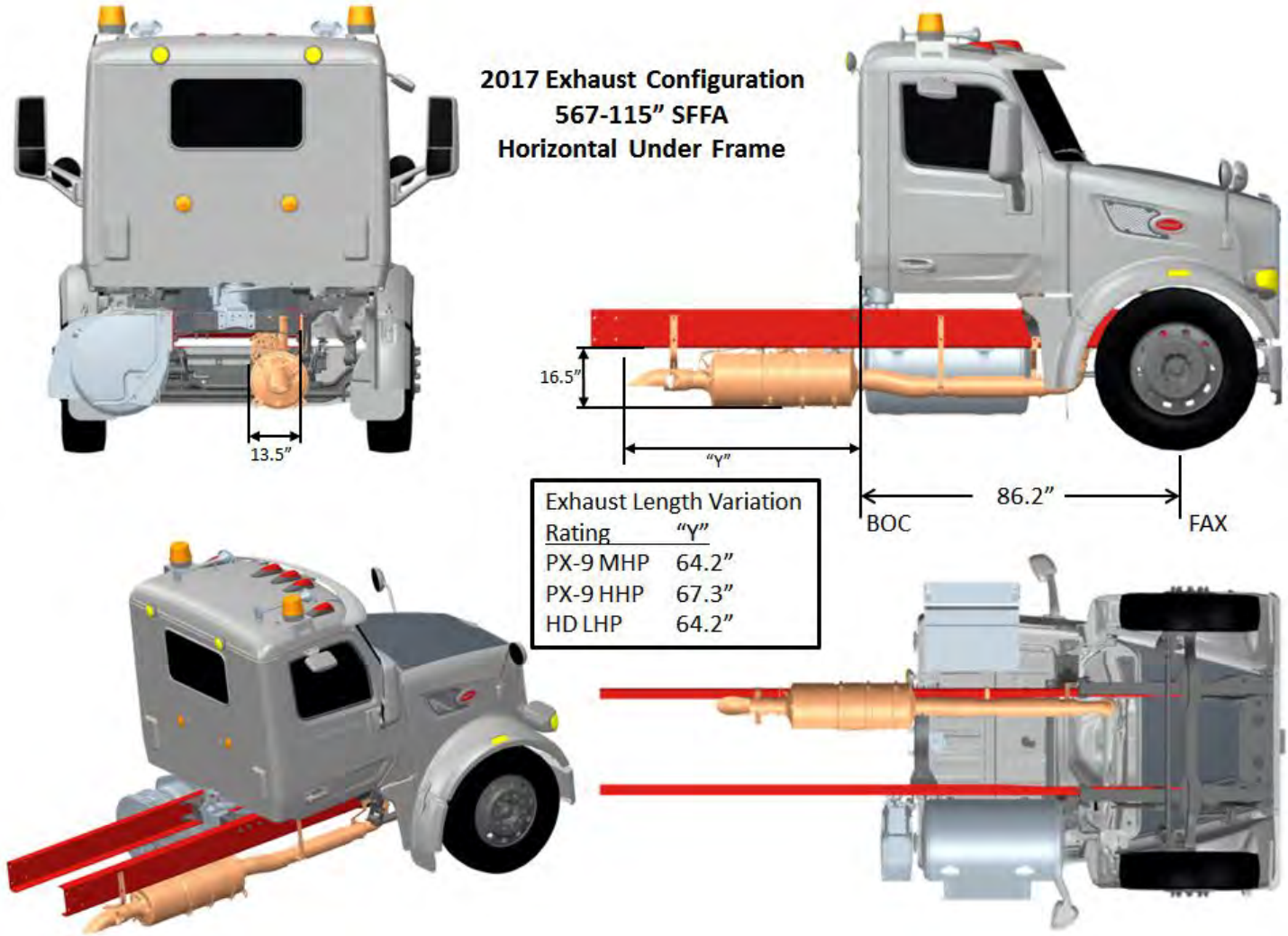


FIGURE 3-84. Exhaust Single RH Horizontal DPF/SCR RH Under Frame

MODEL 567-115 SFFA EXHAUST DUAL SOC DPF/SCR RH UNDER CAB
2017 EMISSIONS
(Reference option code 3365340)

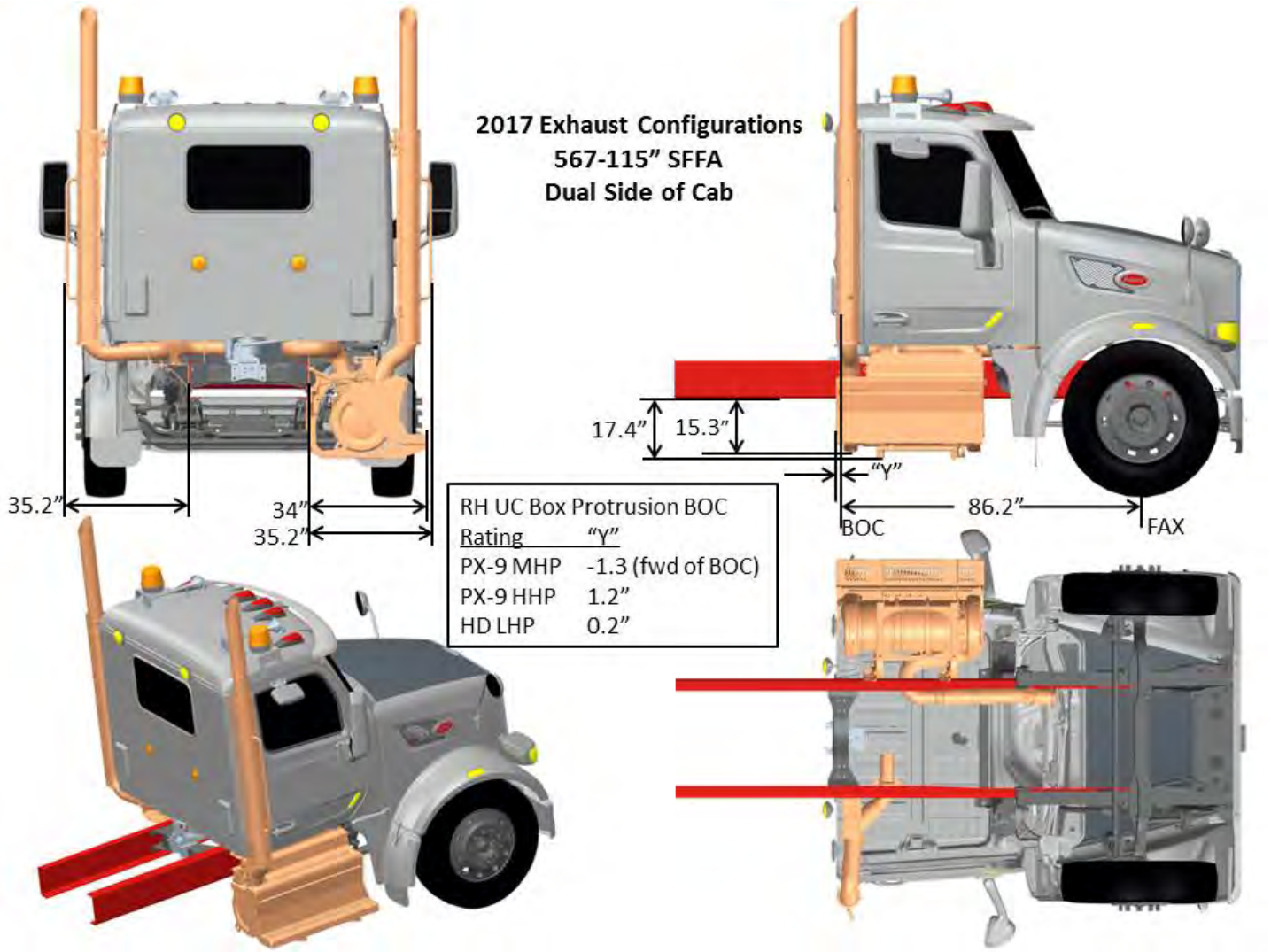


FIGURE 3-85. Exhaust Dual SOC DPF/SCR RH Under Cab

MODEL 567-121 SBFA EXHAUST SINGLE RH BACK OF CAB DPF/SCR RH UNDER CAB
2017 EMISSIONS
(Reference option code 3365250)

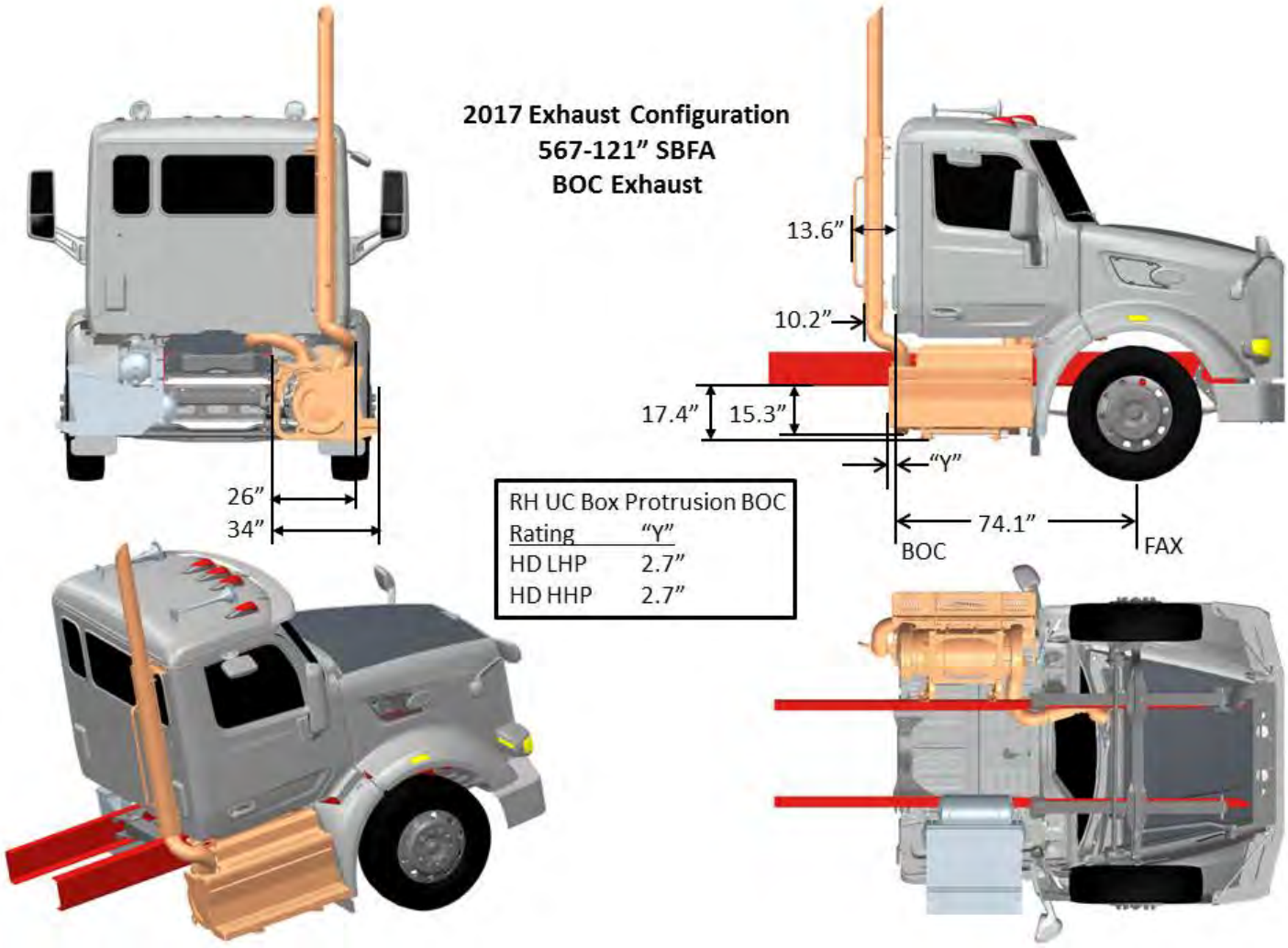


FIGURE 3-86. Exhaust Single RH Back of Cab DPF/SCR RH Under Cab

MODEL 567-121 SBFA EXHAUST SINGLE RH SIDE OF CAB DPF/SCR RH UNDER CAB
2017 EMISSIONS
(Reference option code 3365270)

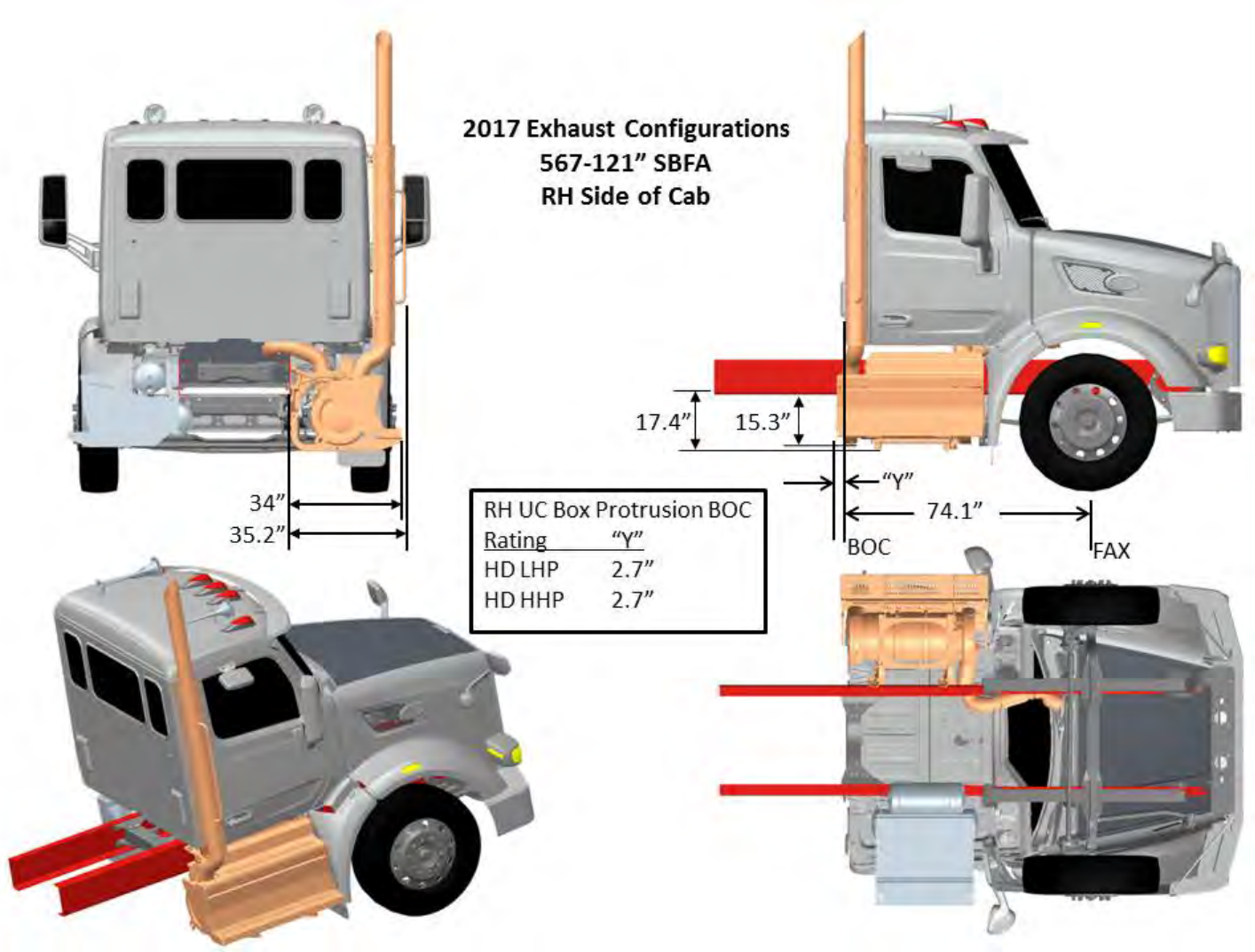


FIGURE 3-87. Exhaust Single RH Side of Cab DPF/SCR RH Under Cab

MODEL 567-121 SBFA EXHAUST SINGLE RH HORIZONTAL DPF/SCR RH UNDER CAB
2017 EMISSIONS
(Reference option code 3365280)

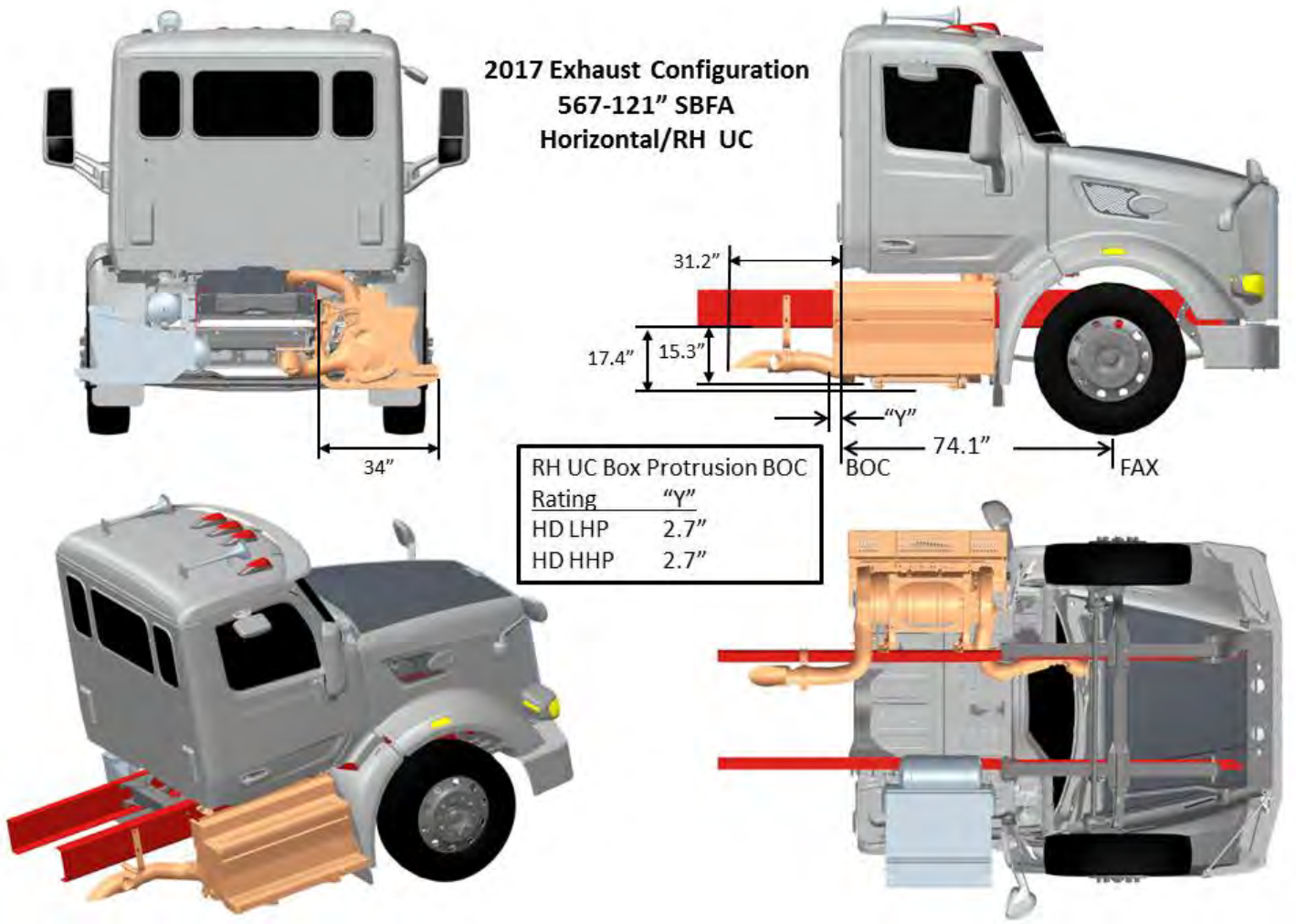


FIGURE 3-88. Exhaust Single RH Horizontal DPF/SCR RH Under Cab

MODEL 567-121 SBFA EXHAUST SINGLE RH HORIZONTAL DPF/SCR RH UNDER FRAME
2017 EMISSIONS
(Reference option code 3365290)

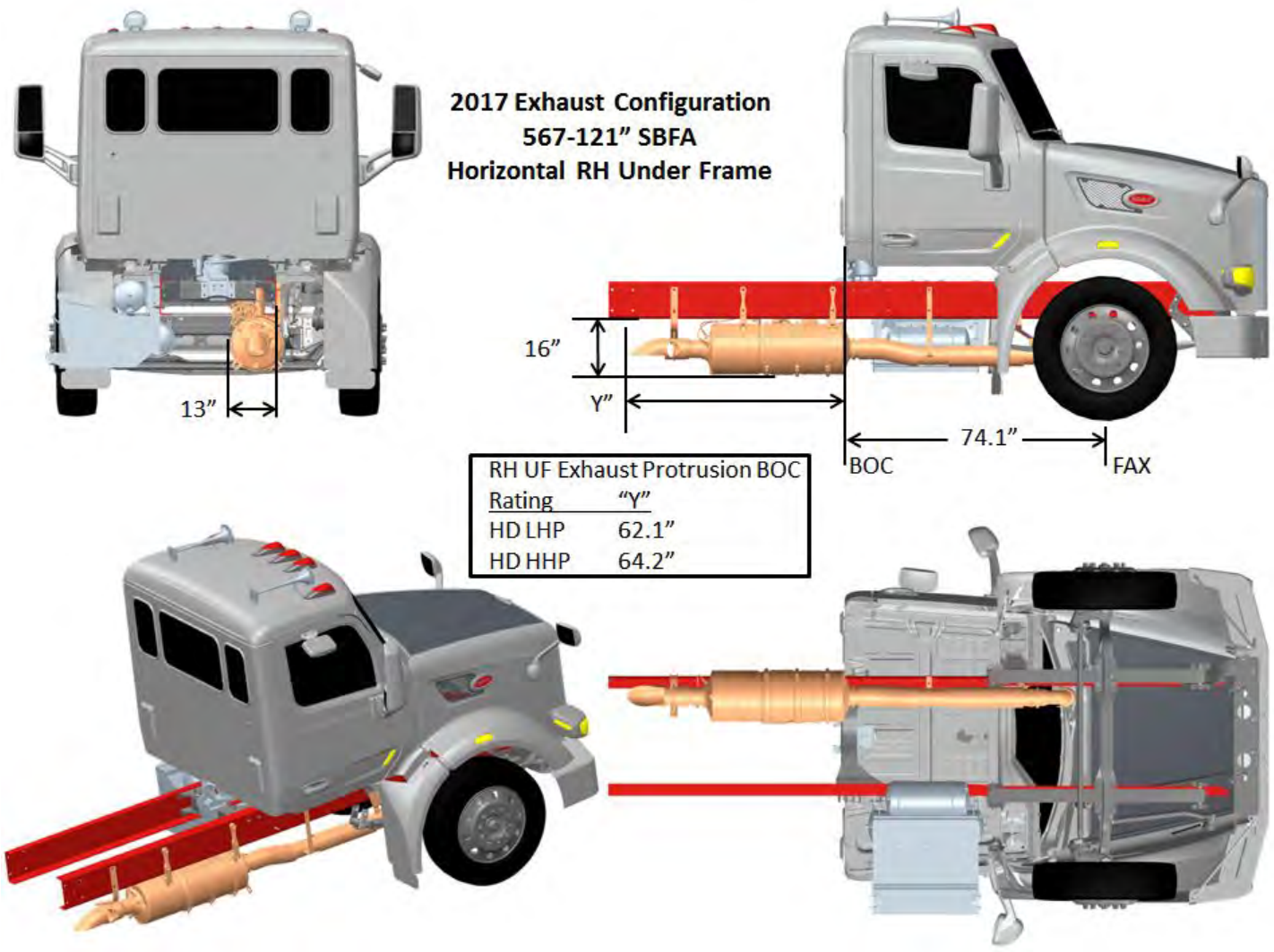


FIGURE 3-89. Exhaust Single RH Horizontal DPF/SCR RH Under Frame

MODEL 567-121 SBFA EXHAUST DUAL SOC DPF/SCR RH UNDER CAB
2017 EMISSIONS
(Reference option code 3365340)

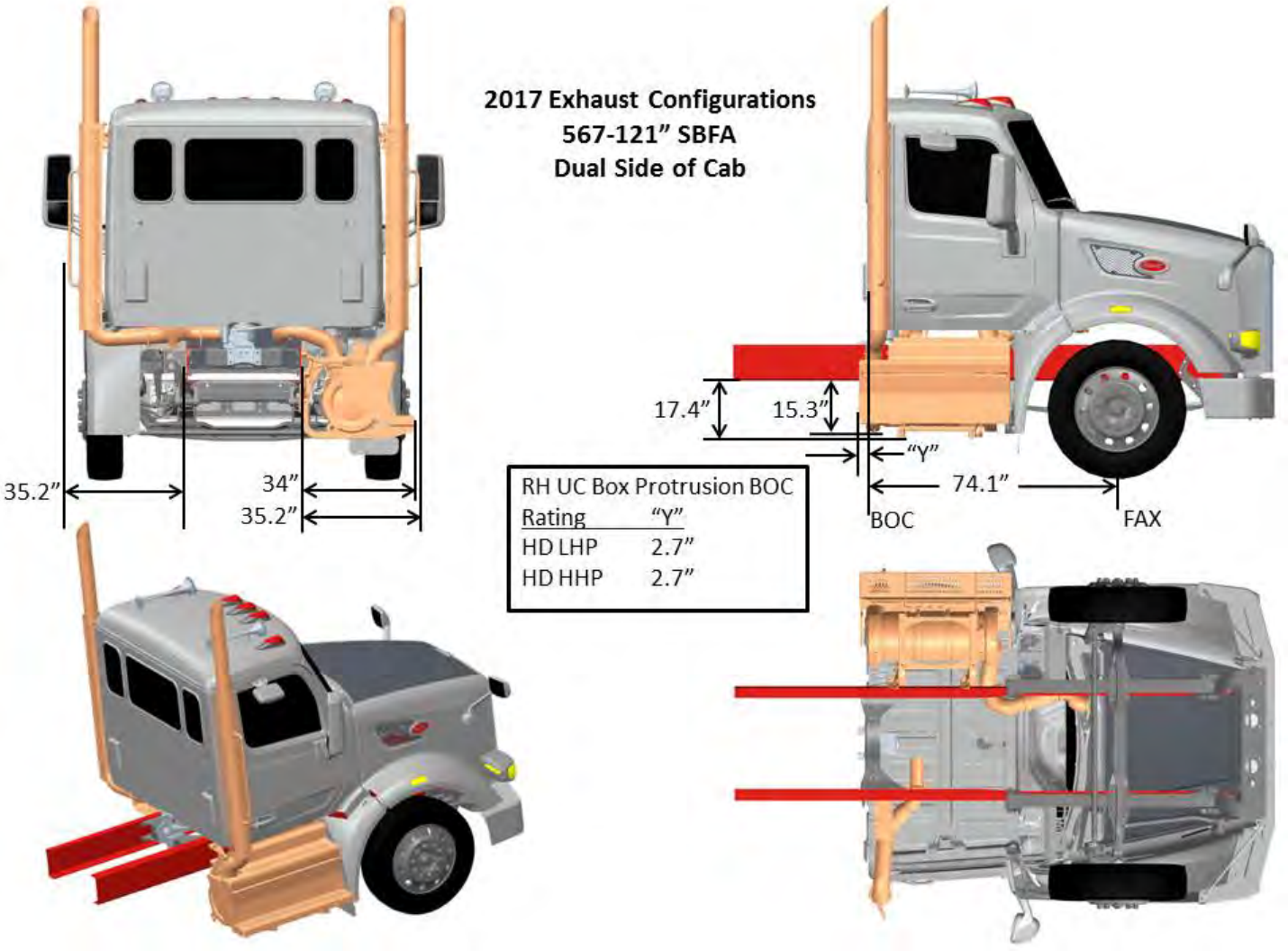


FIGURE 3-90. Exhaust Dual SOC DPF/SCR RH Under Cab

MODEL 567-121 SFFA EXHAUST SINGLE RH BACK OF CAB DPF/SCR RH UNDER CAB
2017 EMISSIONS
(Reference option code 3365250)

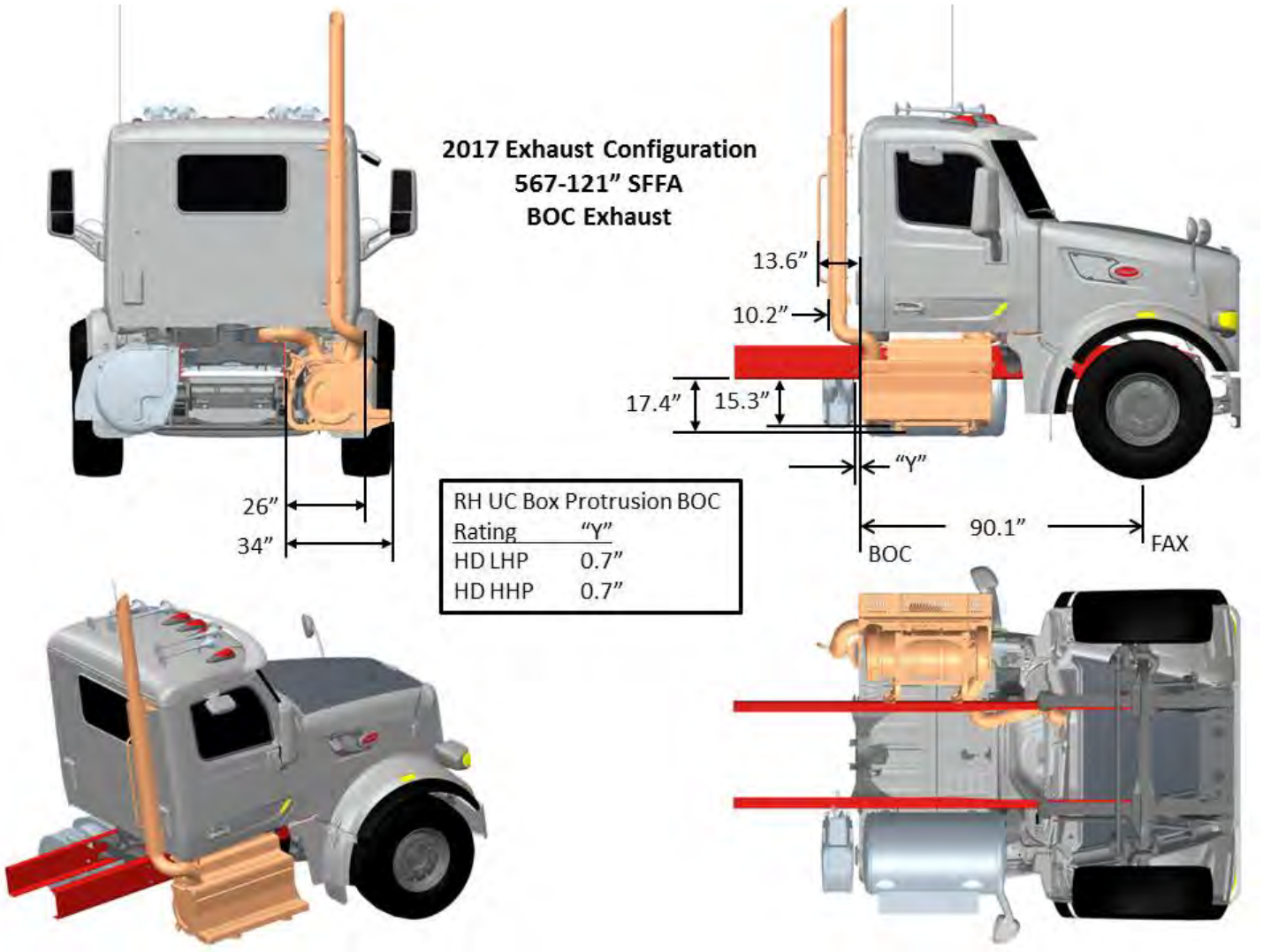


FIGURE 3-91. Exhaust Single RH Back of Cab DPF/SCR RH Under Cab

MODEL 567-121 SFFA EXHAUST SINGLE RH SIDE OF CAB DPF/SCR RH UNDER CAB
2017 EMISSIONS
(Reference option code 3365270)

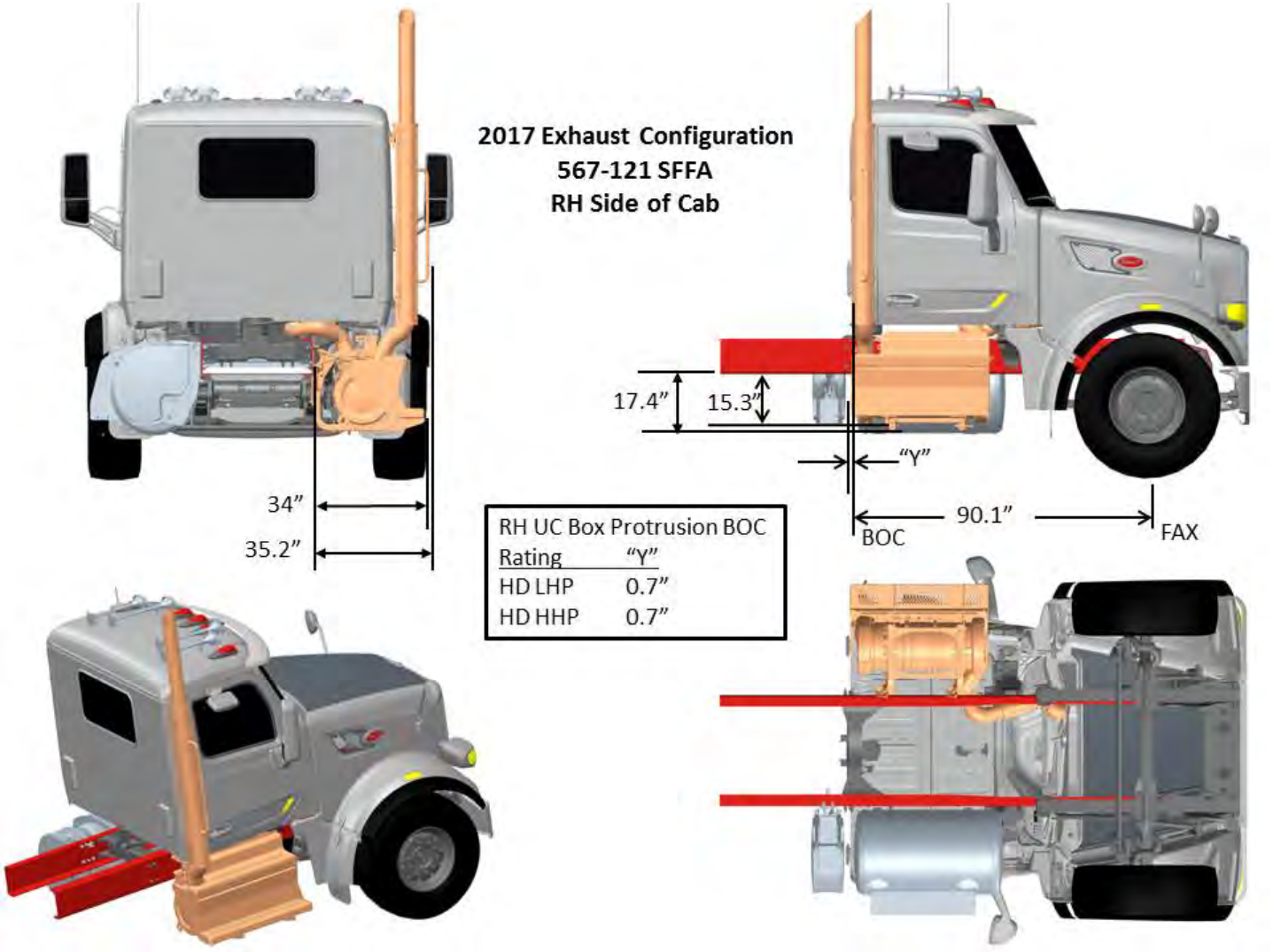


FIGURE 3-92. Exhaust Single RH Side of Cab DPF/SCR RH Under Cab

MODEL 567-121 SFFA EXHAUST SINGLE RH HORIZONTAL DPF/SCR RH UNDER CAB
2017 EMISSIONS
(Reference option code 3365280)

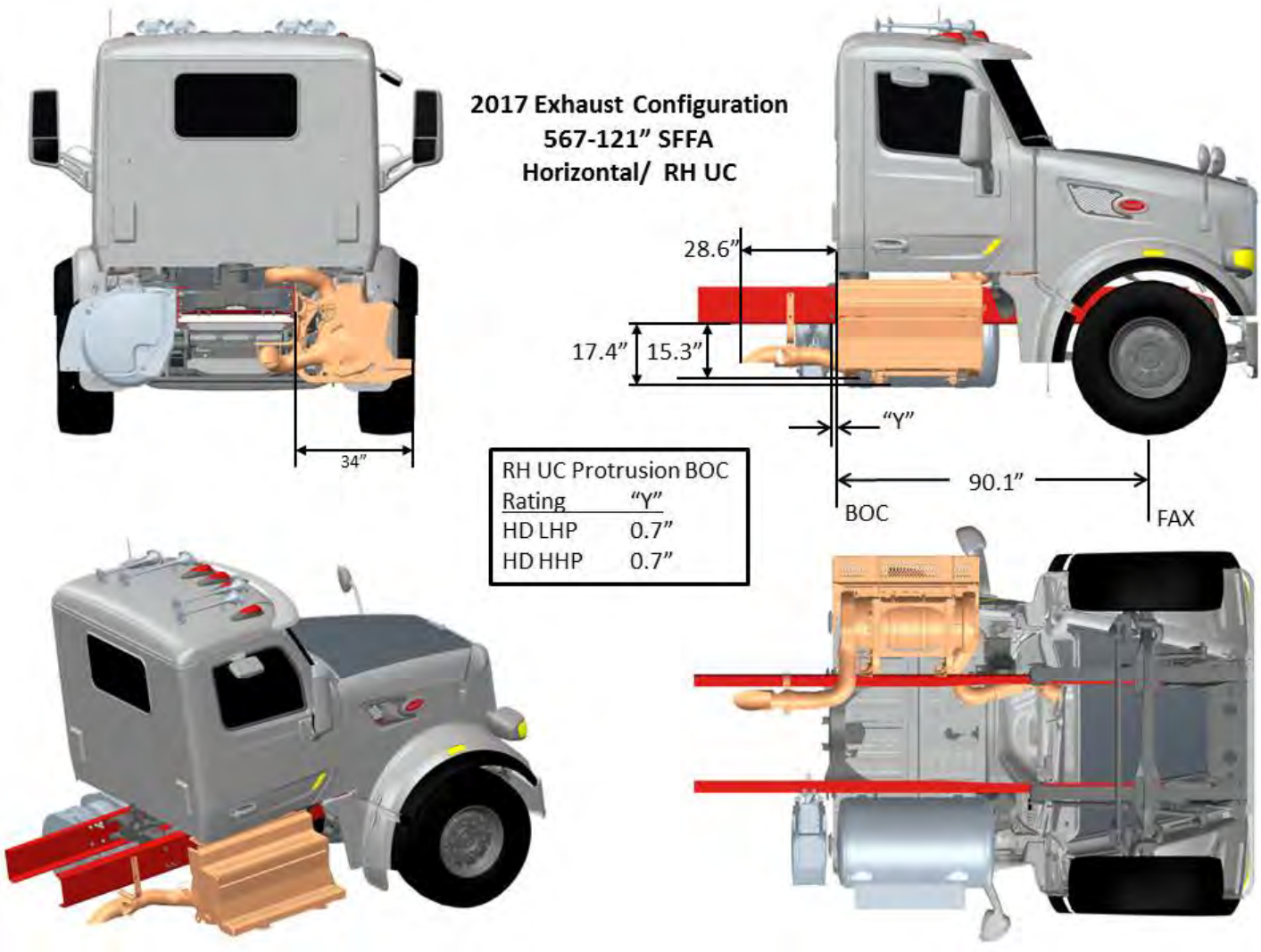


FIGURE 3-93. Exhaust Single RH Horizontal DPF/SCR RH Under Cab

MODEL 567-121 SFFA EXHAUST SINGLE RH HORIZONTAL DPF/SCR RH UNDER FRAME
2017 EMISSIONS
(Reference option code 3365290)

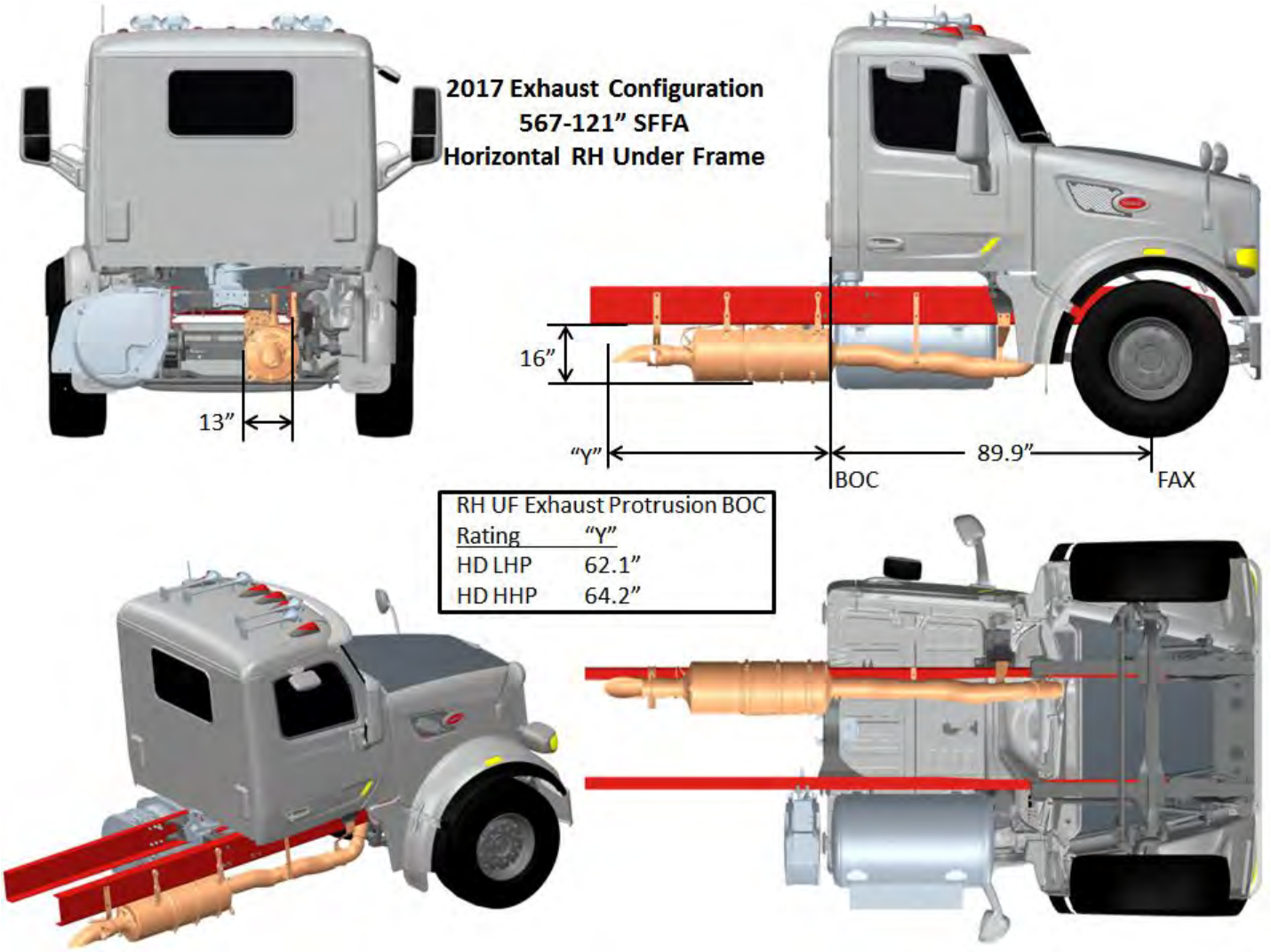


FIGURE 3-94. Exhaust Single RH Horizontal DPF/SCR RH Under Frame

MODEL 567-121 SFFA EXHAUST DUAL SOC DPF/SCR RH UNDER CAB
2017 EMISSIONS
(Reference option code 3365340)

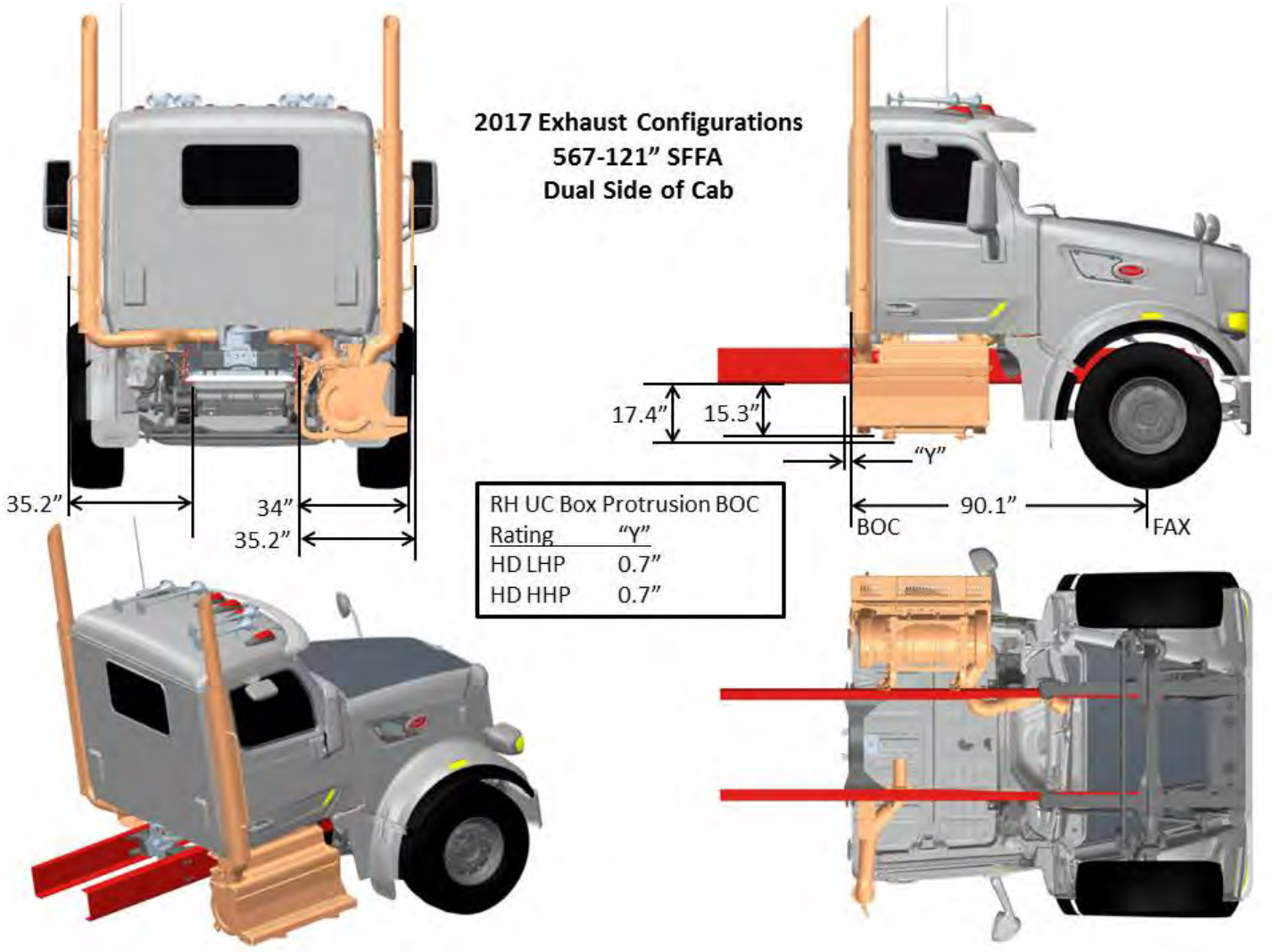


FIGURE 3-95. Exhaust Dual SOC DPF/SCR RH Under Cab

MODEL 579-117 SBFA EXHAUST SINGLE RH BACK OF CAB DPF/SCR RH UNDER CAB
2017 EMISSIONS
(Reference option code 3365250)

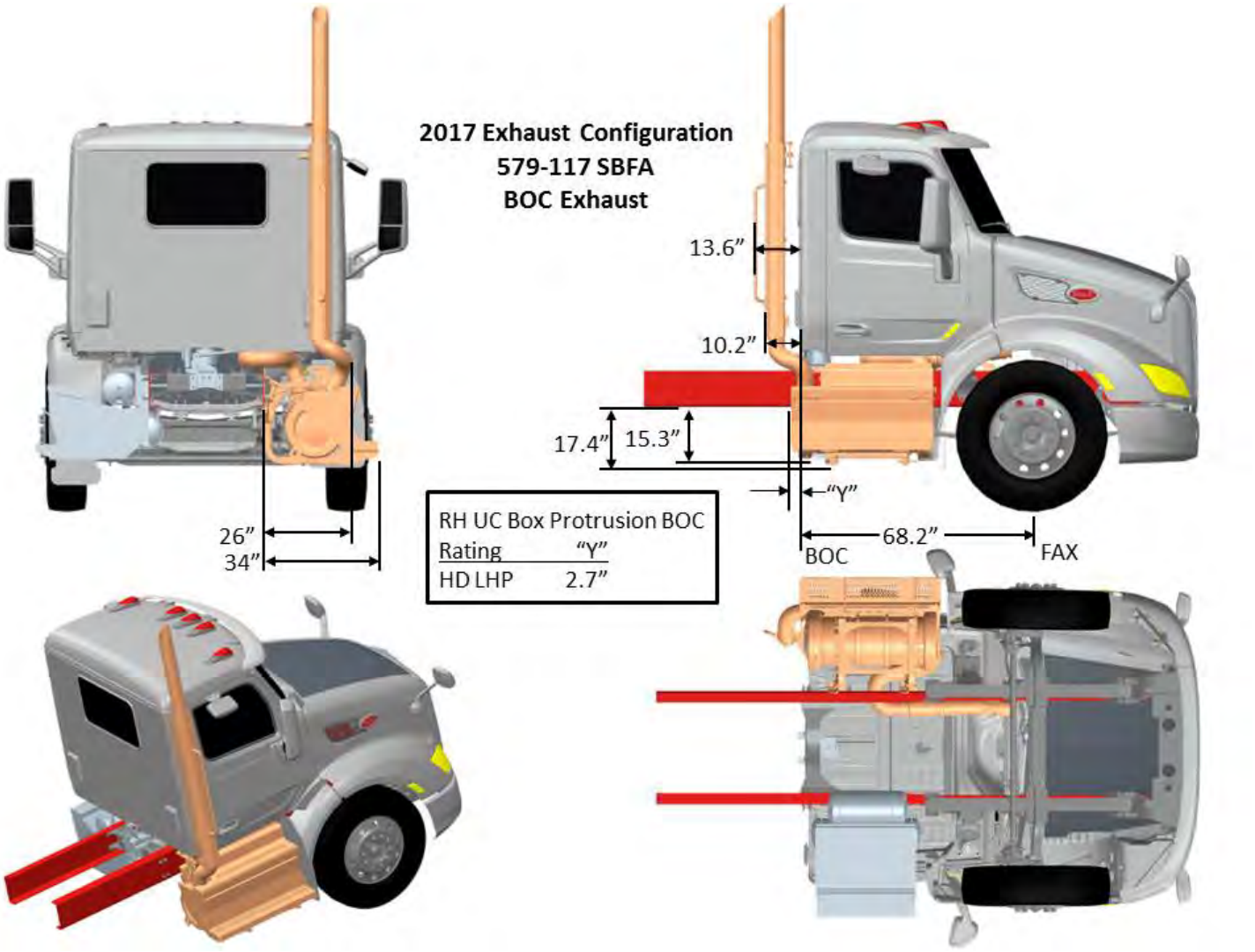


FIGURE 3-96. Exhaust Single RH Back of Cab DPF/SCR RH Under Cab

MODEL 579-117 SBFA EXHAUST SINGLE RH SIDE OF CAB DPF/SCR RH UNDER CAB
2017 EMISSIONS
(Reference option code 3365270)

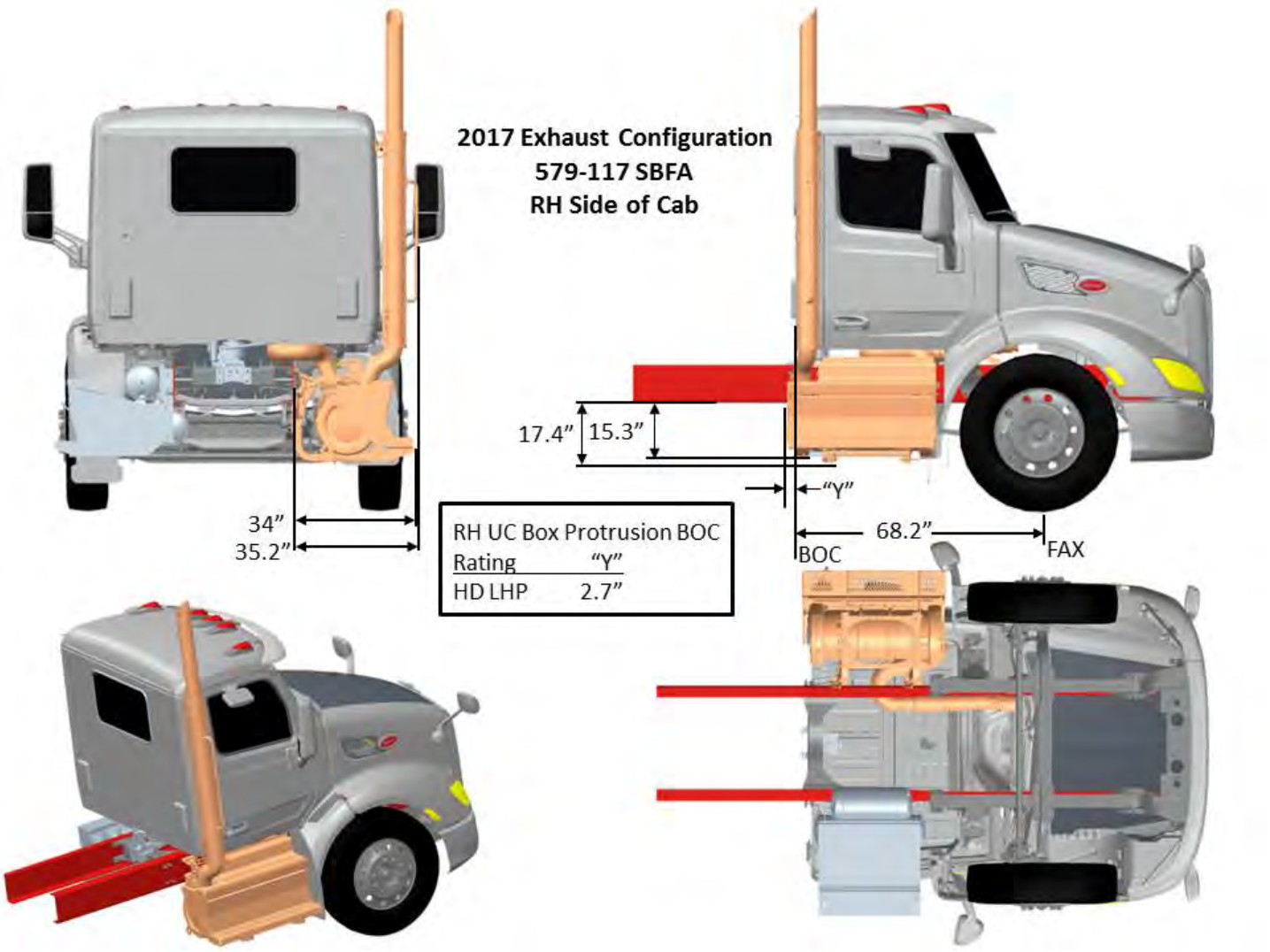


FIGURE 3-97. Exhaust Single RH Side of Cab DPF/SCR RH Under Cab

MODEL 579-117 SBFA EXHAUST SINGLE RH HORIZONTAL DPF/SCR RH UNDER CAB
2017 EMISSIONS
(Reference option code 3365280)

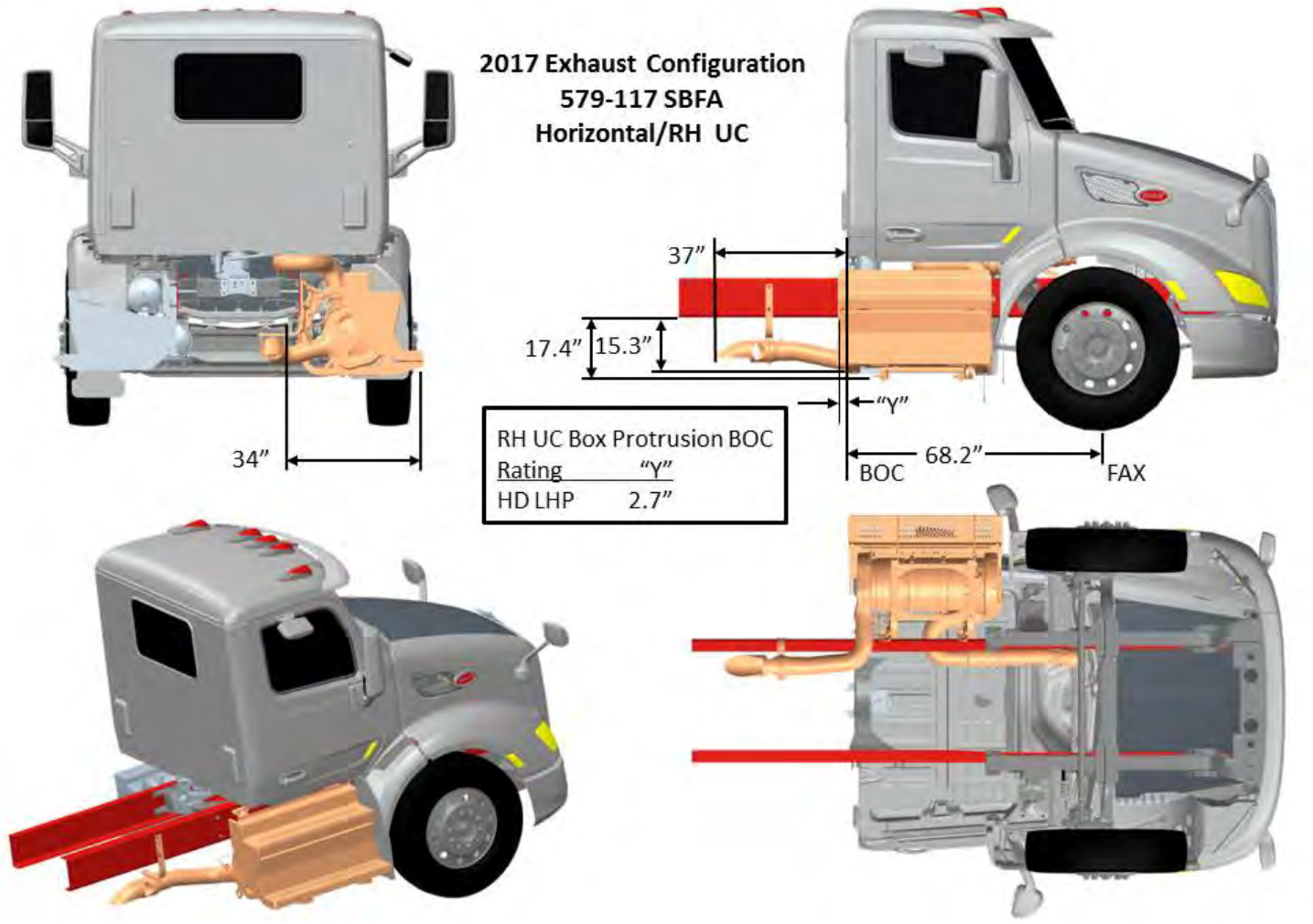


FIGURE 3-98. Exhaust Single RH Horizontal DPF/SCR RH Under Cab

MODEL 579-117 SBFA EXHAUST SINGLE RH HORIZONTAL DPF/SCR RH UNDER FRAME
2017 EMISSIONS
(Reference option code 3365290)

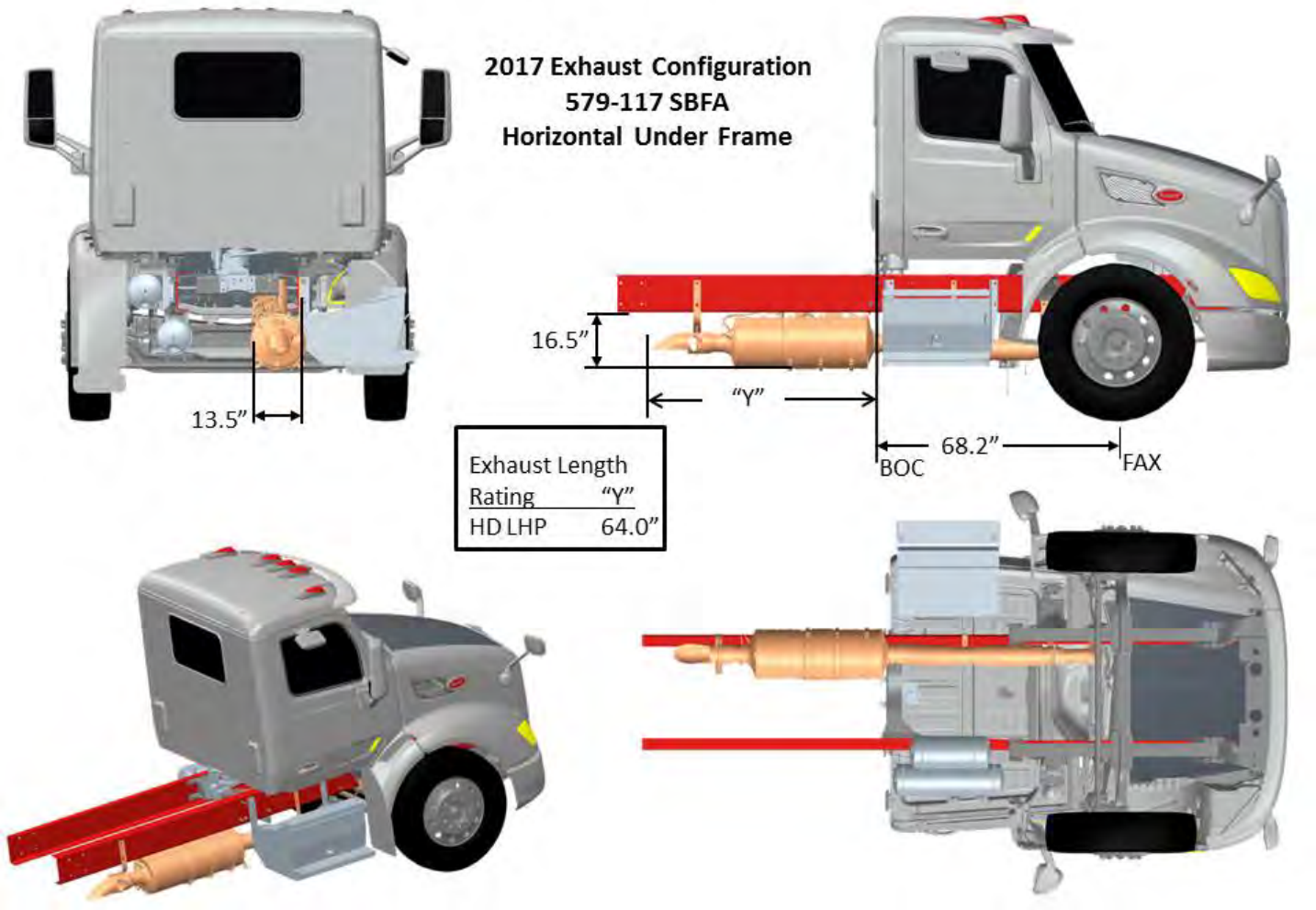


FIGURE 3-99. Exhaust Single RH Horizontal DPF/SCR RH Under Frame

MODEL 579-117 SBFA EXHAUST DUAL SOC DPF/SCR RH UNDER CAB
2017 EMISSIONS
(Reference option code 3365340)

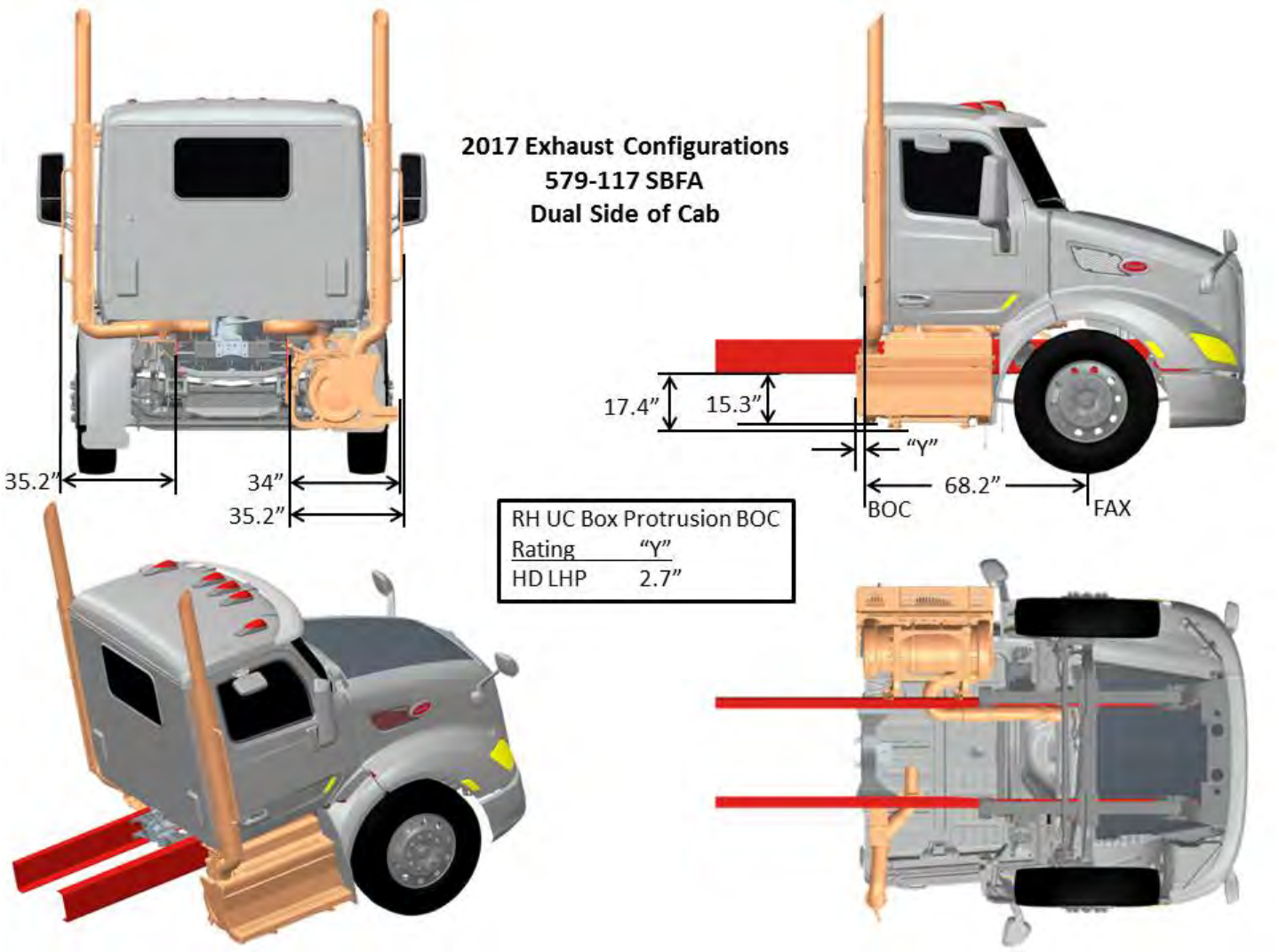


FIGURE 3-100. Exhaust Dual SOC DPF/SCR RH Under Cab

MODEL 579-123 SBFA EXHAUST SINGLE RH BACK OF CAB DPF/SCR RH UNDER CAB
2017 EMISSIONS
(Reference option code 3365250)

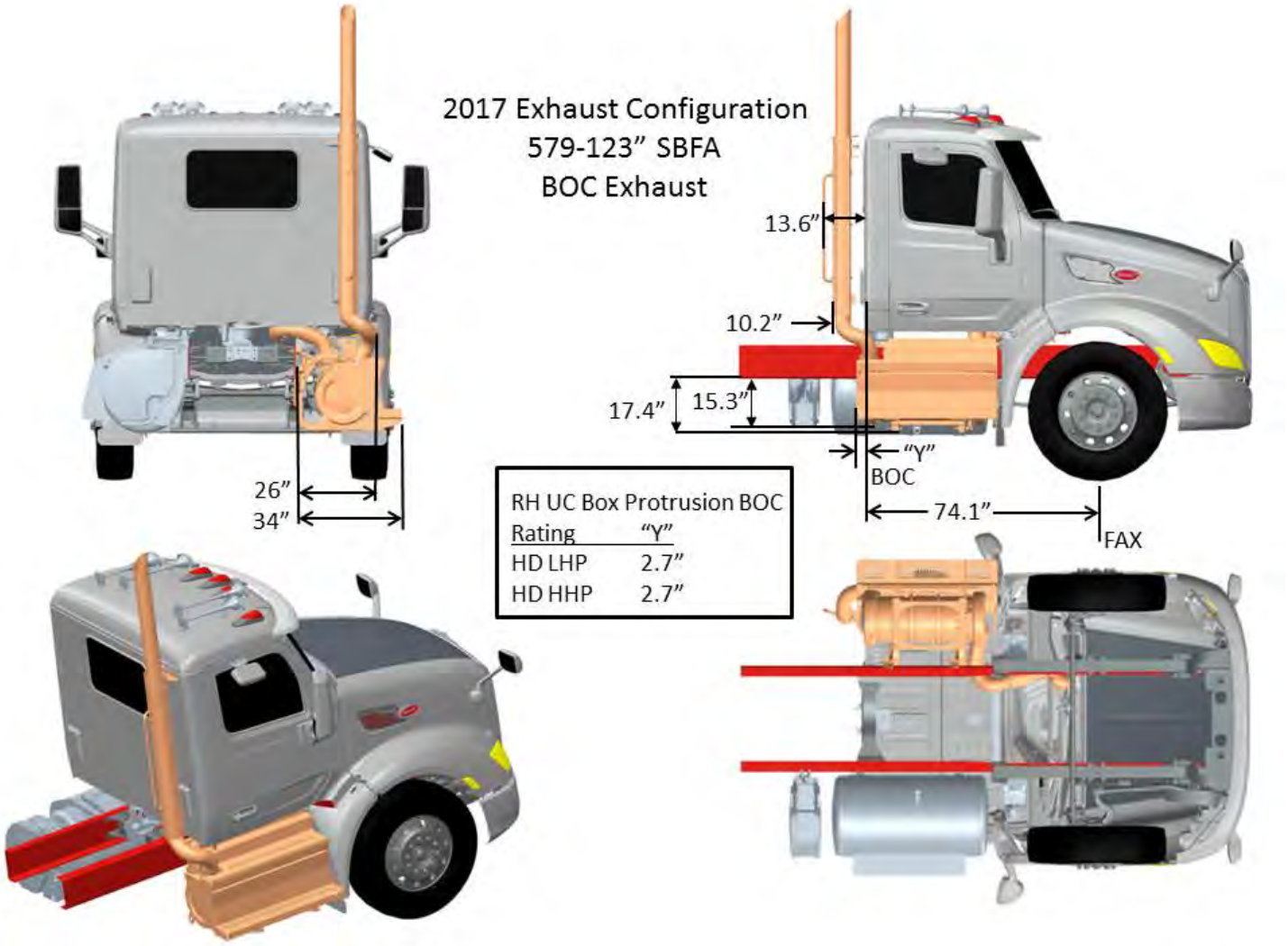


FIGURE 3-101. Exhaust Single RH Back of Cab DPF/SCR RH Under Cab

MODEL 579-123 EXHAUST SINGLE RH SIDE OF CAB DPF/SCR RH UNDER CAB
2017 EMISSIONS
(Reference option code 3365270)

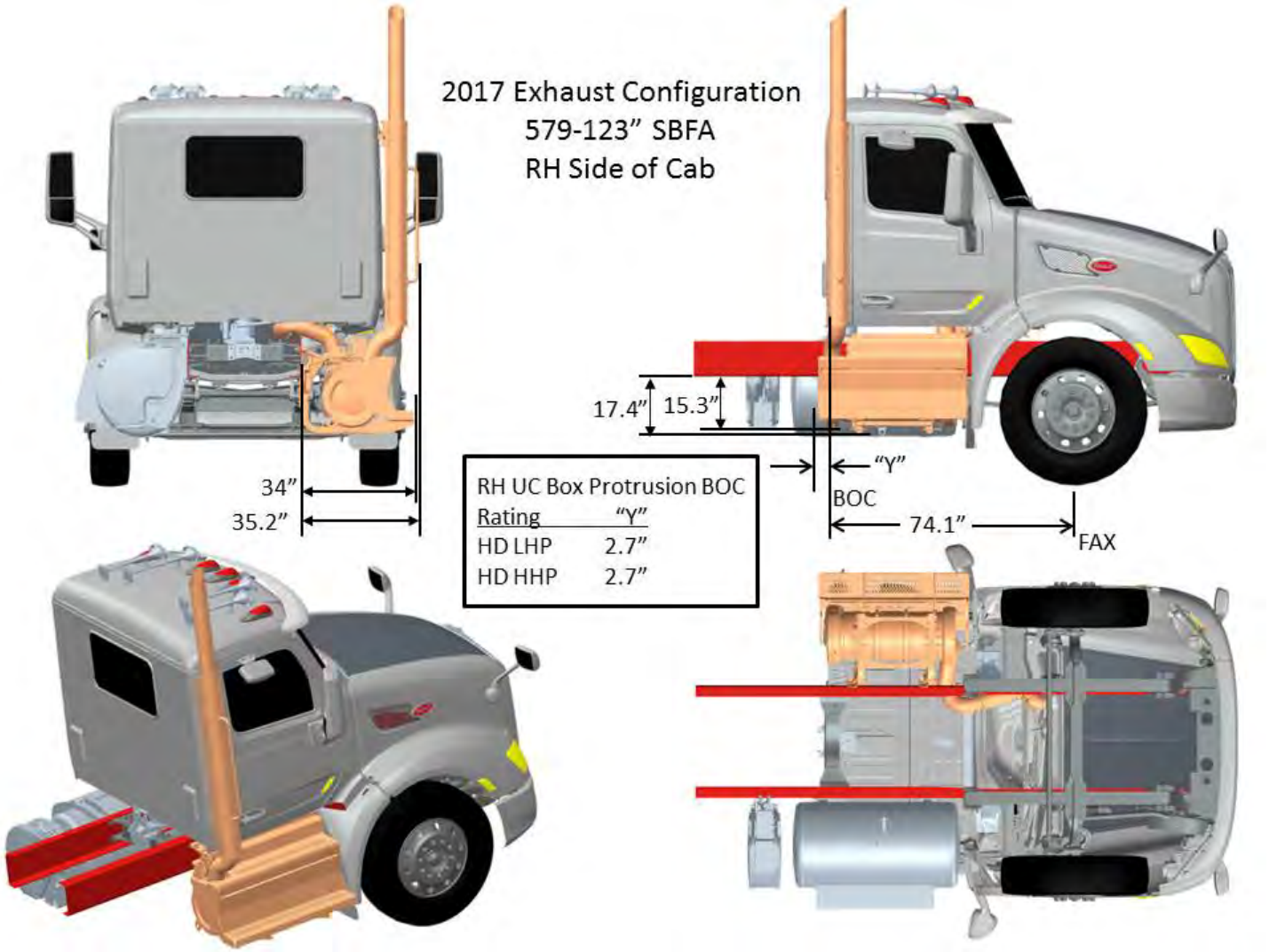


FIGURE 3-102. Exhaust Single RH Side of Cab DPF/SCR RH Under Cab

MODEL 579-123 EXHAUST SINGLE RH HORIZONTAL DPF/SCR RH UNDER CAB
2017 EMISSIONS
(Reference option code 3365280)

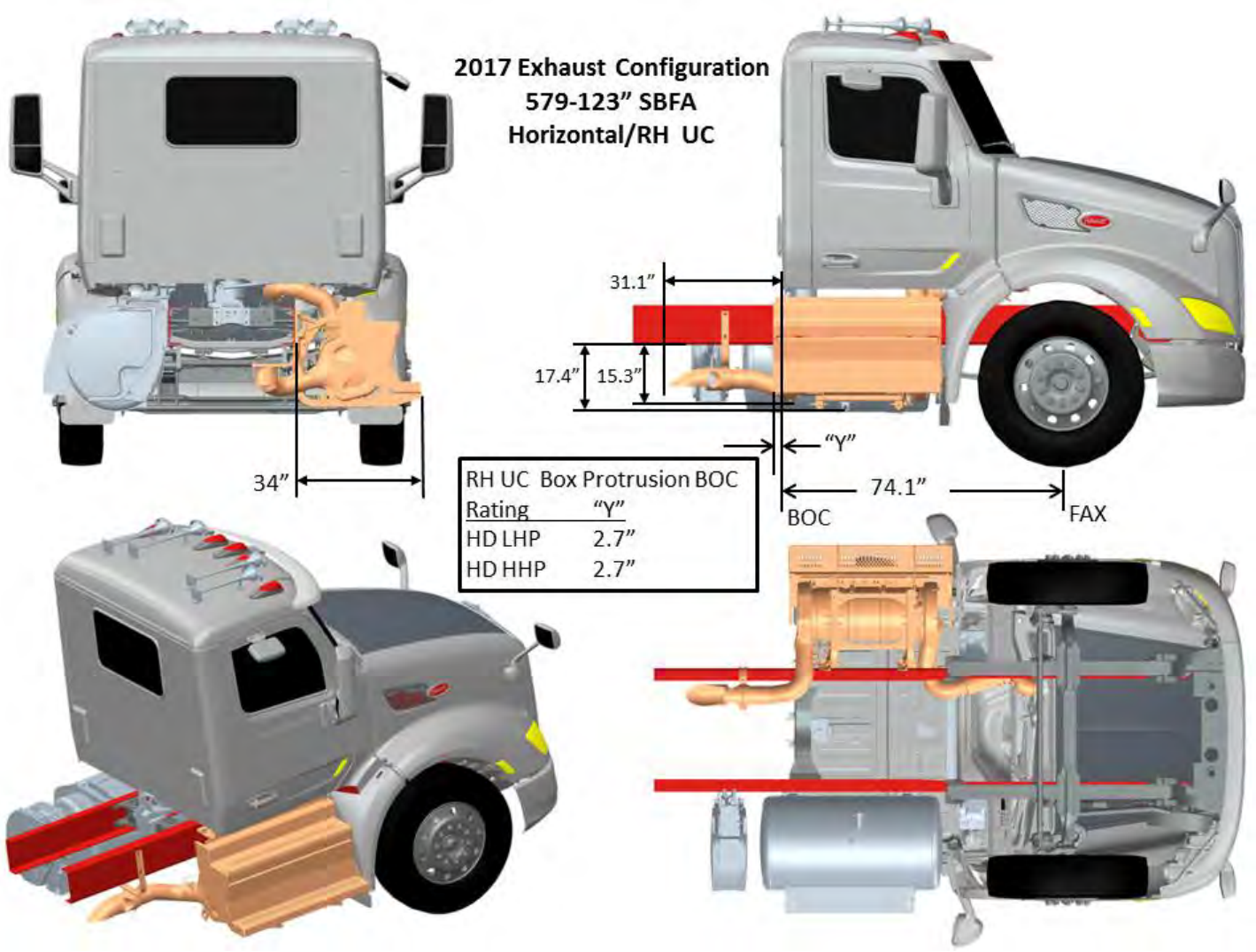


FIGURE 3-103. Exhaust Single RH Horizontal DPF/SCR RH Under Cab

MODEL 579-123 EXHAUST SINGLE RH HORIZONTAL DPF/SCR RH UNDER FRAME
2017 EMISSIONS
(Reference option code 3365290)

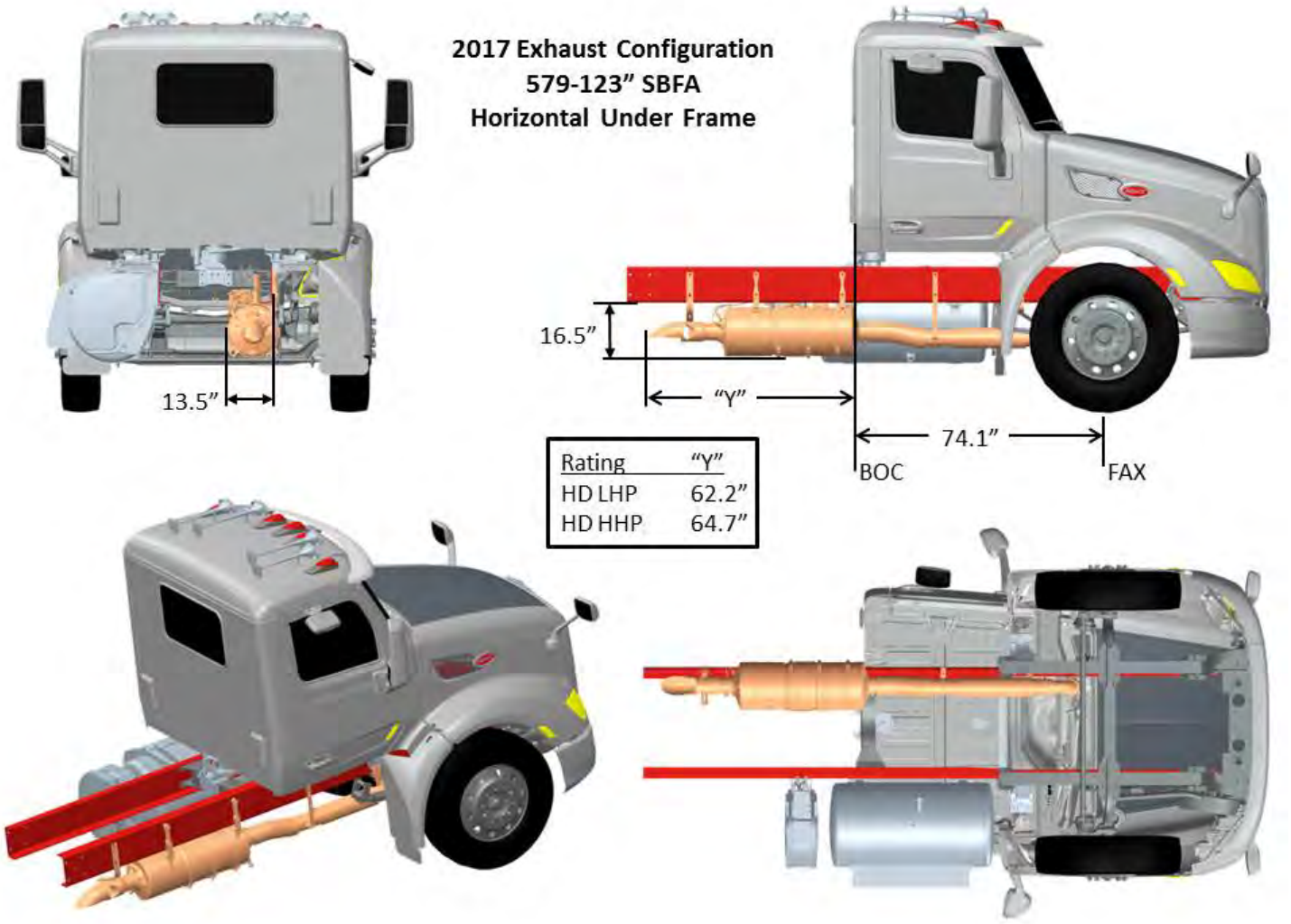


FIGURE 3-104. Exhaust Single RH Horizontal DPF/SCR RH Under Frame

MODEL 579-123 EXHAUST DUAL SOC DPF/SCR RH UNDER CAB
2017 EMISSIONS
(Reference option code 3365340)

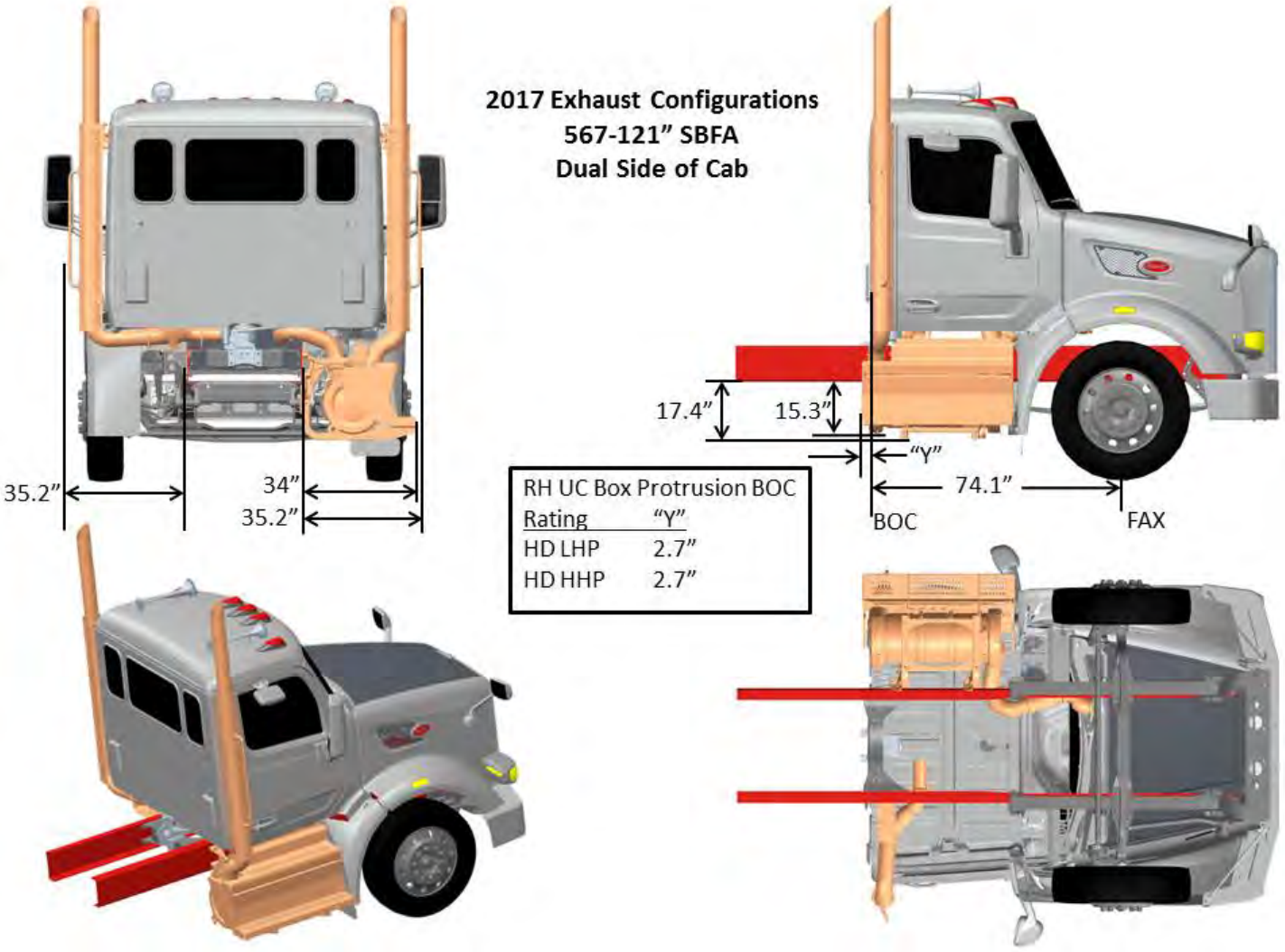


FIGURE 3-105. Exhaust Dual SOC DPF/SCR RH Under Cab

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SECTION 4 **BODY MOUNTING**

INTRODUCTION

This section has been designed to provide guidelines to aid in body mounting. This is not intended as a complete guide, rather as general information. Body mounting strategies are unique to each body type and body builder must determine the appropriate method.

Please contact your local Peterbilt dealer if more information is desired.

FRAME RAILS

Frame rail information is provided per rail.

TABLE 4-1. Single Frame Rails

Rail Height (in.)	Flange Width (in.)	Web Thickness (in)	Section Modulus (cu. In.)	RBM (per rail) (in.-lbs)	Weight (per rail) (lbs/in.)
10 5/8	3.45	0.313	14.8	1,776,000	1.44
10 3/4	3.50	0.375	17.8	2,136,000	1.74
10 11/16	3.50	0.500	22.35	2,683,000	2.35
11 5/8	3.875	0.375	21.4	2,568,000	1.91
13 3/8[(1)]	3.625	0.375	18.2 25.1	2,184,000 3,012,000	1.78 2.05

[(1)]The 13 3/8 rail has a front rail height of 10 3/4. The front rail height values are listed on top of the 13 3/8 values.

TABLE 4-2. Built-up Frame Rails

Main Rail Height (in.)	Insert	Outsert	Section Modulus (cu. In.)	RBM (per rail) (in.-lbs)	Weight (per rail) (lbs/in.)
10 5/8	9.875 x 2.87 x .250	None	23.6	2,832,000	2.48
10 3/4	9.875 x 2.87 x .250	None	28.9	3,468,000	2.78
10 3/4	9.875 x 2.87 x .250	11.625 x 3.87 x .375	45.7	5,484,000	4.67
11 5/8	10.75 x 3.50 x .375	None	37.7	4,524,000	3.65

CRITICAL CLEARANCES

REAR TIRES AND CAB

CAUTION: *Insufficient clearance between rear tires and body structure could cause damage to the body during suspension movement.*

Normal suspension movement could cause contact between the tires and the body. To prevent this, mount the body so that the minimum clearance between the top of the tire and the bottom of the body is 8 inches (203 mm). This should be measured with the body empty. See **FIGURE 4-1**.

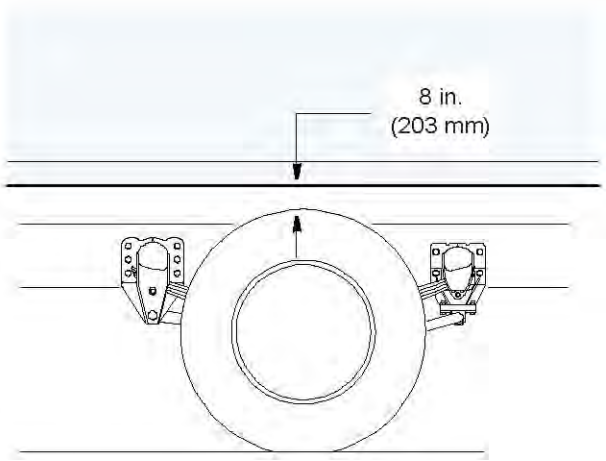


FIGURE 4-1. Minimum Clearance Between Top of Rear Tires and Body Structure Overhang

CAUTION: *Maintain adequate clearance between back of cab and the front (leading edge) of mounted body. It is recommended the body leading edge be mounted 4 in. behind the cab. See **FIGURE 4-2**.*

NOTE: *Be sure to provide maintenance access to the battery box and fuel tank fill neck.*

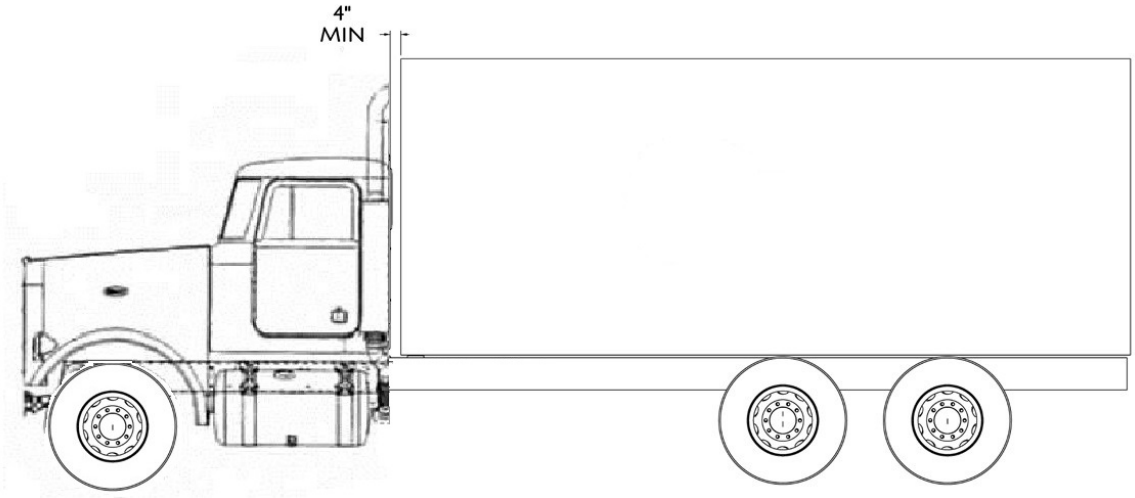


FIGURE 4-2. Minimum Back of Cab Clearance

BODY MOUNTING USING BRACKETS

CAUTION: *Always install a spacer between the body subframe and the top flange of the frame rail. Installation of a spacer between the body subframe and the top flange of the frame rail will help prevent premature wear of the components due to chafing or corrosion.*

WARNING! *When mounting a body to the chassis, DO NOT drill holes in the upper or lower flange of the frame rail. If the frame rail flanges are modified or damaged, the rail could fail prematurely and cause an accident. Mount the body using body mounting brackets or U–bolts.*

FRAME SILL

If the body is mounted to the frame with brackets, we recommend a frame sill spacer made from a strip of rubber or plastic (delrin or nylon). These materials will not undergo large dimensional changes during periods of high or low humidity. The strip will be less likely to fall out during extreme relative motion between body and chassis. See **FIGURE 4-3**.

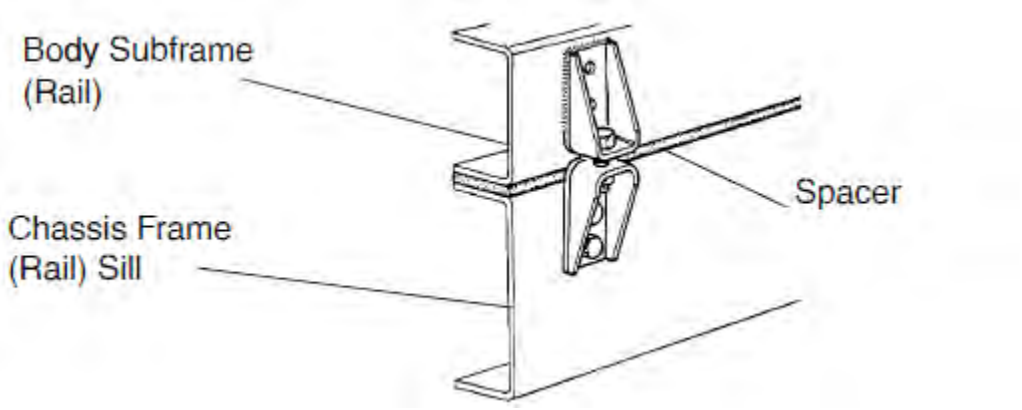


FIGURE 4-3. Spacer Between Frame Sill and Body Rail – Rubber or Plastic

BRACKETS

When mounting a body to the chassis with brackets, we recommend designs that offer limited relative movement, bolted securely but not too rigid. Brackets should allow for slight movement between the body and the chassis. For instance, **FIGURE 4-4** shows a high compression spring between the bolt and the bracket and **FIGURE 4-5** shows a rubber spacer between the brackets. These designs will allow relative movement between the body and the chassis during extreme frame racking situations. Mountings that are too rigid could cause damage to the body. This is particularly true with tanker installations.

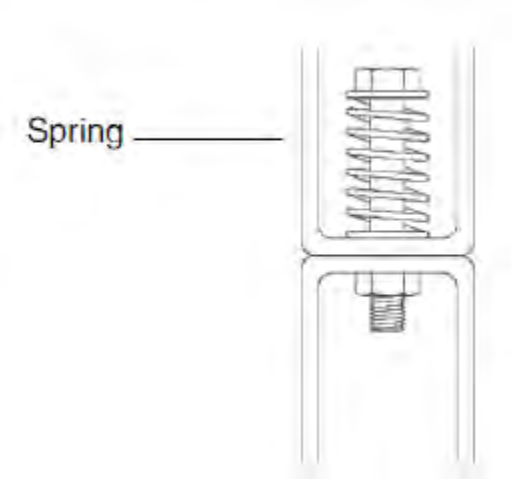


FIGURE 4-4. Mounting Brackets

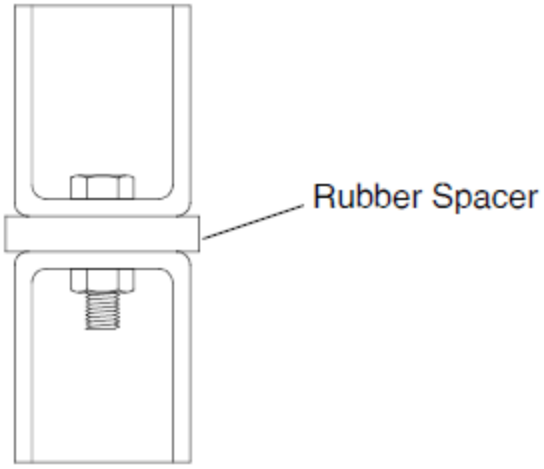


FIGURE 4-5. Mounting Brackets

MOUNTING HOLES

When installing brackets on the frame rails, the mounting holes in the chassis frame bracket and frame rail must comply with the general spacing and location guidelines illustrated in **FIGURE 4-6**.

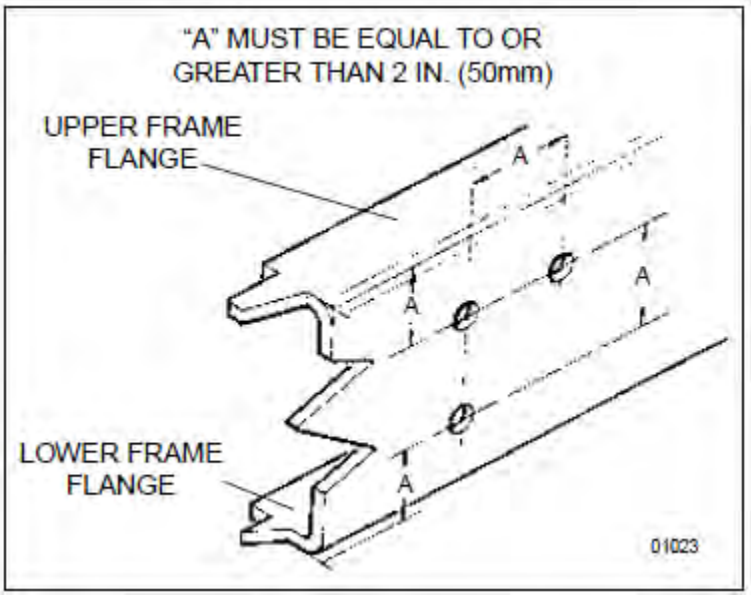


FIGURE 4-6. Hole Location Guidelines for Frame Rail and Bracket

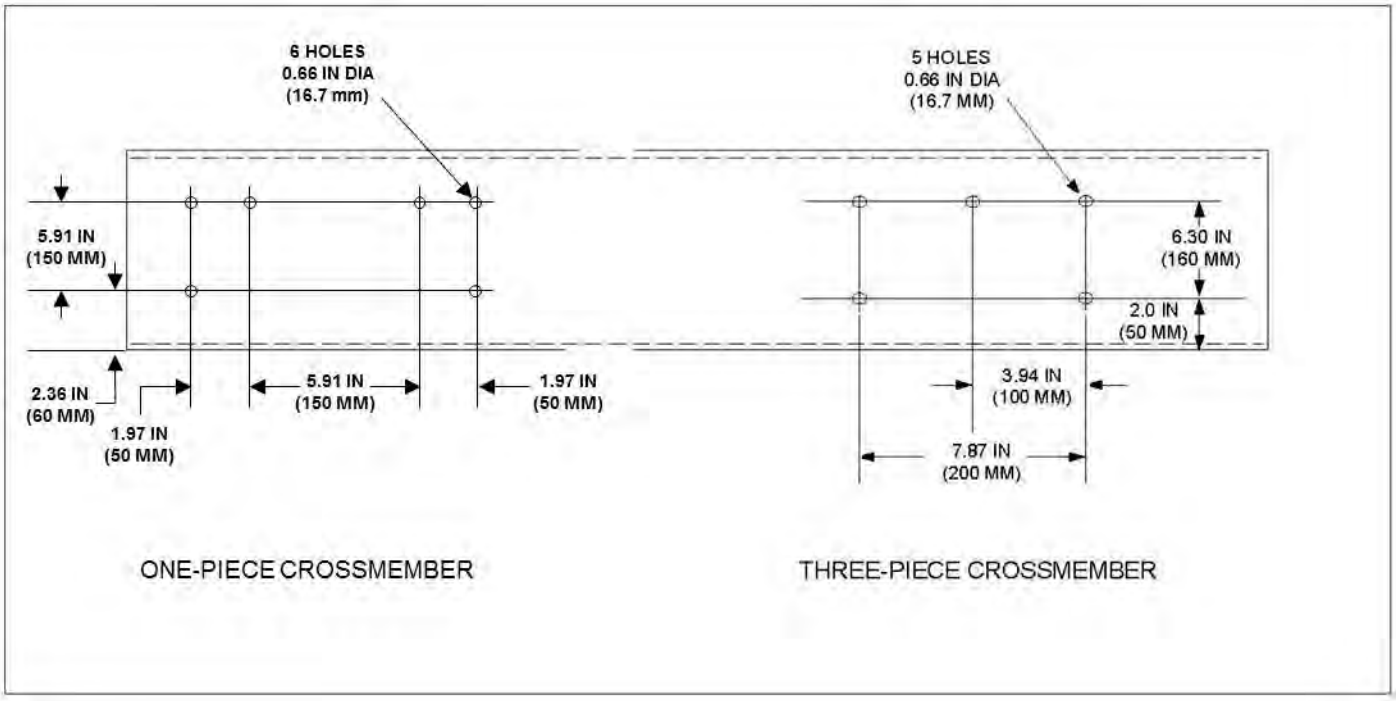


FIGURE 4-7. Crossmember Gusset Hole Patterns (Additional Holes Available in 50 mm Horizontal Increments)

FRAME DRILLING

WARNING! *When mounting a body to the chassis, DO NOT drill holes in the upper or lower flange of the frame rail. If the frame rail flanges are modified or damaged, the rail could fail prematurely and cause an accident. Mount the body using body mounting brackets or U–bolts.*

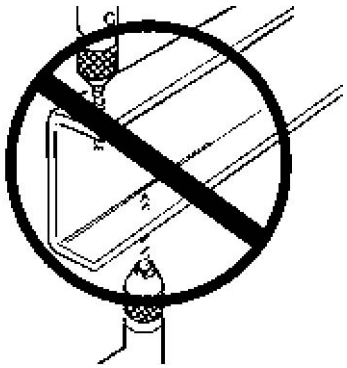


FIGURE 4-8. Frame Rail Flange Drilling Prohibited

WARNING! *DO NOT drill closely spaced holes in the frame rail. Hole centers of two adjacent holes should be spaced no less than twice the diameter of the largest hole. Closer spacing could induce a failure between the two holes.*

CAUTION: *An appropriately sized bolt and nut must be installed and torqued properly in all unused frame holes. Failure to do so could result in a frame crack initiation around the hole.*

CAUTION: *Use care when drilling the frame web so the wires and air lines routed inside the rail are not damaged. Failure to do so could cause an inoperable electrical or air system circuit.*

CAUTION: *Never use a torch to make holes in the rail. Use the appropriate diameter drill bit. Heat from a torch will affect the material properties of the frame rail and could result in frame rail cracks.*

CAUTION: *The hole diameter should not exceed the bolt diameter by more than .060 inches (1.5mm).*

BODY MOUNTING USING U–BOLTS

If the body is mounted to the frame with U–bolts, use a hardwood sill (minimum 1/2 inch (12.7 mm) thick) between the frame rail and body frame to protect the top surface of the rail flange.

WARNING! *Do not allow the frame rails or flanges to deform when tightening the U–bolts. It will weaken the frame and could cause an accident. Use suitable spacers made of steel or hardwood on the inside of the frame rail to prevent collapse of the frame flanges.*

Use a hardwood spacer between the bottom flange and the U–bolt to prevent the U–bolt from notching the frame flange. See **FIGURE 4-9**.

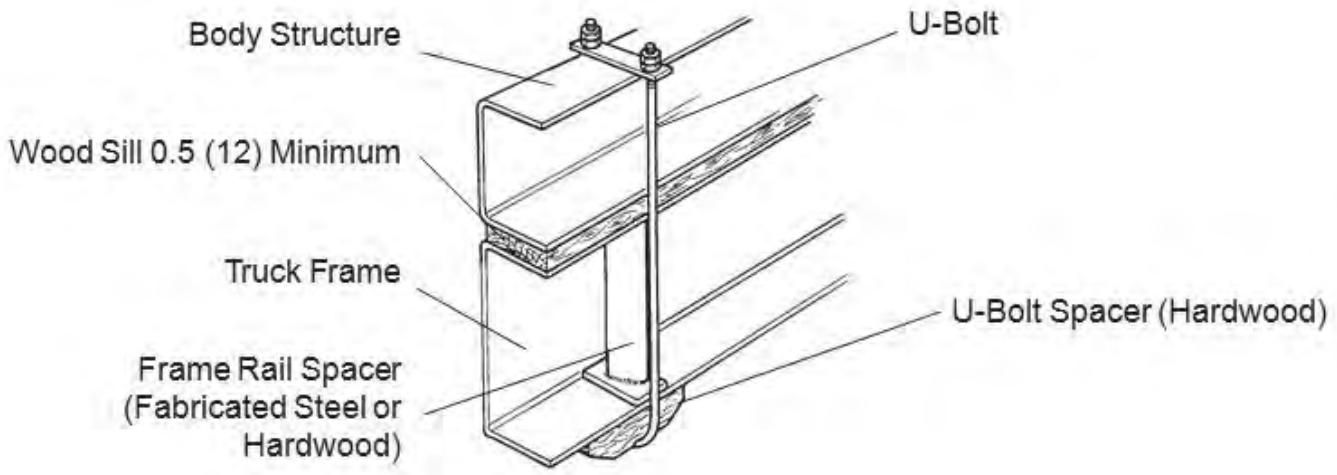


FIGURE 4-9. Acceptable U-Bolt Mounting with Wood and Fabricated Spacers

WARNING! *Do not allow spacers and other body mounting parts to interfere with brake lines, fuel lines, or wiring harnesses routed inside the frame rail. Crimped or damaged brake lines, fuel lines, or wiring could result in loss of braking, fuel leaks, electrical overload or a fire. Carefully inspect the installation to ensure adequate clearances for air brake lines, fuel lines, and wiring. See **FIGURE 4-10**.*

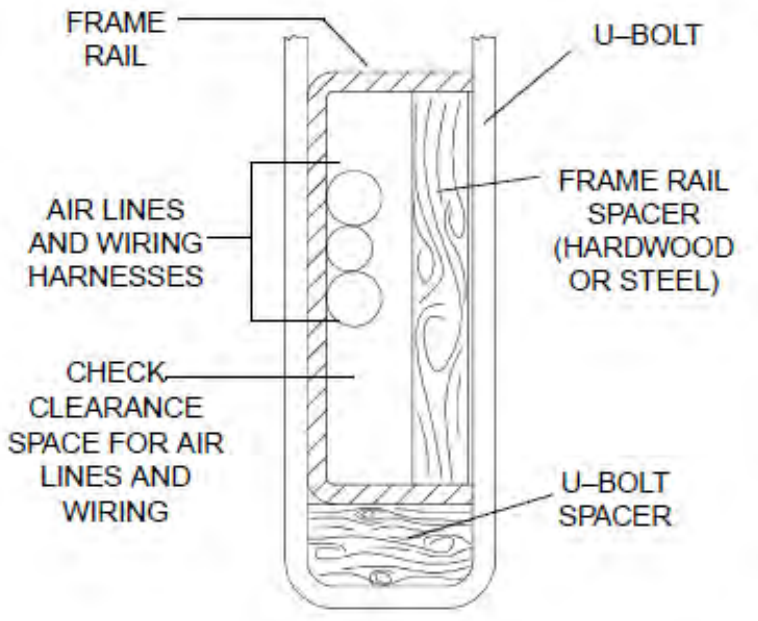
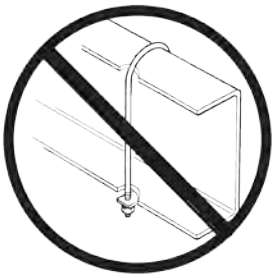


FIGURE 4-10. Clearance Space for Air Lines and Cables

WARNING! *Do not notch frame rail flanges to force a U–bolt fit. Notched or damaged frame flanges could result in premature frame failure. Use a larger size U-bolt.*



CAUTION: *Mount U–bolts so they do not chafe on frame rail, air or electric lines.*

REAR BODY MOUNT

When U–bolts are used to mount a body we recommend that the last body attachment be made with a “fishplate” bracket. See **FIGURE 4-11**. This provides a firm attaching point and helps prevent any relative fore or aft movement between the body and frame. For hole location guidelines, See **FIGURE 4-7**.

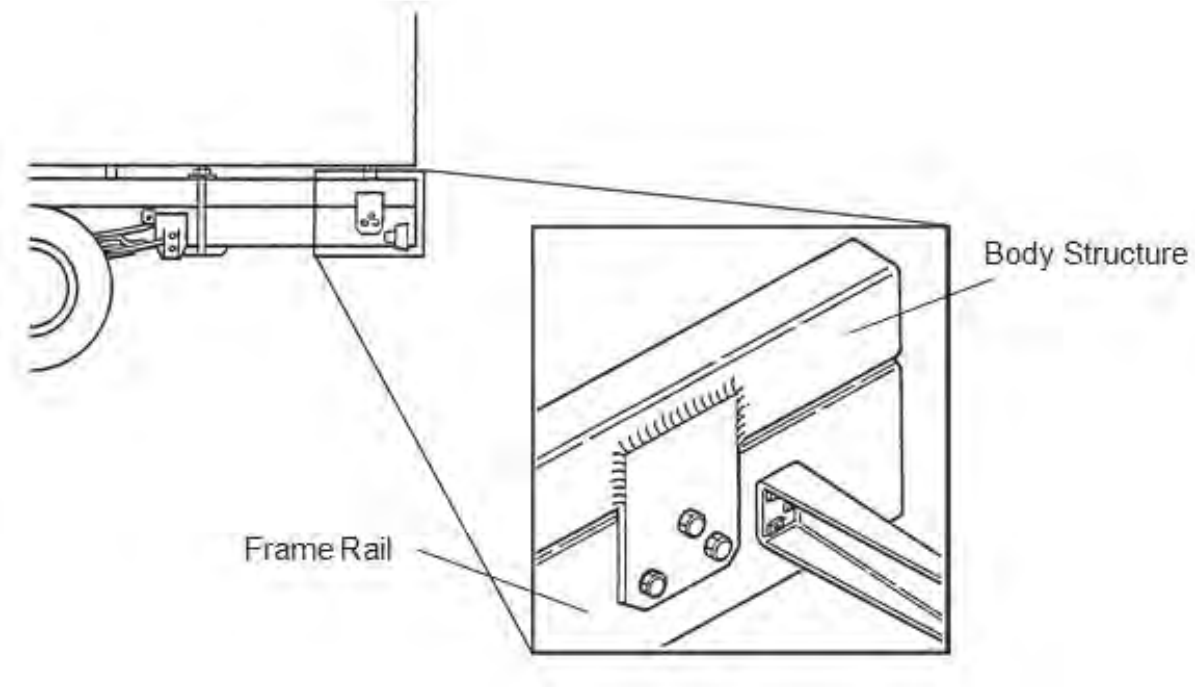


FIGURE 4-11. Fishplate Bracket at Rear End of Body

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SECTION 5 **FRAME MODIFICATIONS**

INTRODUCTION

Peterbilt offers customer specified wheelbases and frame overhangs. So, in most cases frame modifications should not be necessary.

However, some body installations may require slight modifications, while other installations will require extensive modifications. Sometimes an existing dealer stock chassis may need to have the wheelbase changed to better fit a customer's application. The modifications may be as simple as modifying the frame cutoff, or as complex as modifying the wheelbase.

DRILLING RAILS

If frame holes need to be drilled in the rail, see SECTION 4 BODY MOUNTING for more information.

MODIFYING FRAME LENGTH

The frame overhang after the rear axle can be shortened to match a particular body length. Using a torch is acceptable; however, heat from a torch will affect the material characteristics of the frame rail. The affected material will normally be confined to within 1 to 2 inches (25 to 50mm) of the flame cut and may not adversely affect the strength of the chassis or body installation.

CHANGING WHEELBASE

Changing a chassis' wheelbase is not recommended. Occasionally, however, a chassis wheelbase will need to be shortened or lengthened. Before this is done there are a few guidelines that should to be considered.

WARNING! *When changing the wheelbase, be sure to follow the driveline manufacturer's recommendations for driveline length or angle changes. Incorrectly modified drivelines can fail prematurely due to excessive vibration. This can cause an accident and severe personal injury.*

Before changing the wheelbase, the driveline angles of the proposed wheelbase need to be examined to ensure no harmful vibrations are created. Consult with the driveline manufacturer for appropriate recommendations.

Before the rear suspension is relocated, check the new location of the spring hanger brackets. The new holes for the spring hanger brackets must not overlap existing holes and should adhere to the guidelines in the "FRAME DRILLING" section of this manual.

When shortening the wheelbase, the suspension should be moved forward and relocated on the original rail. The rail behind the suspension can then be cut to achieve the desired frame overhang. See **FIGURE 5-1**.

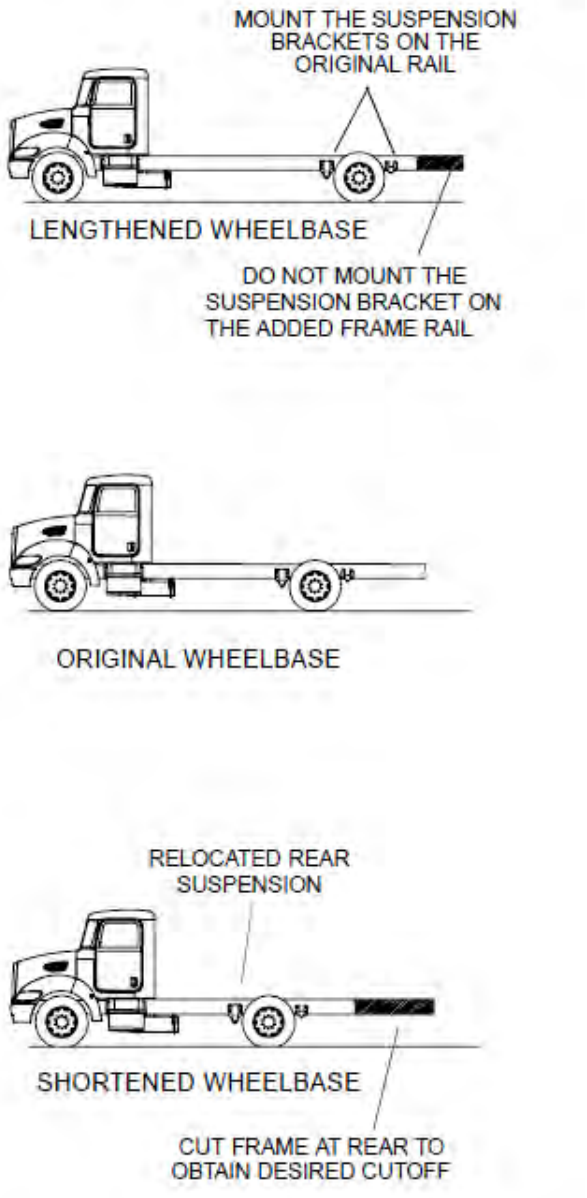

FIGURE 5-1. Wheelbase Customization

CROSSMEMBERS

After lengthening a wheelbase, an additional crossmember may be required to maintain the original frame strength. The maximum allowable distance between the forward suspension crossmember and the next crossmember forward is 47.2 inches (1200 mm). If the distance exceeds 47.2 inches (1200 mm) after the wheelbase is lengthened, add a crossmember between them.

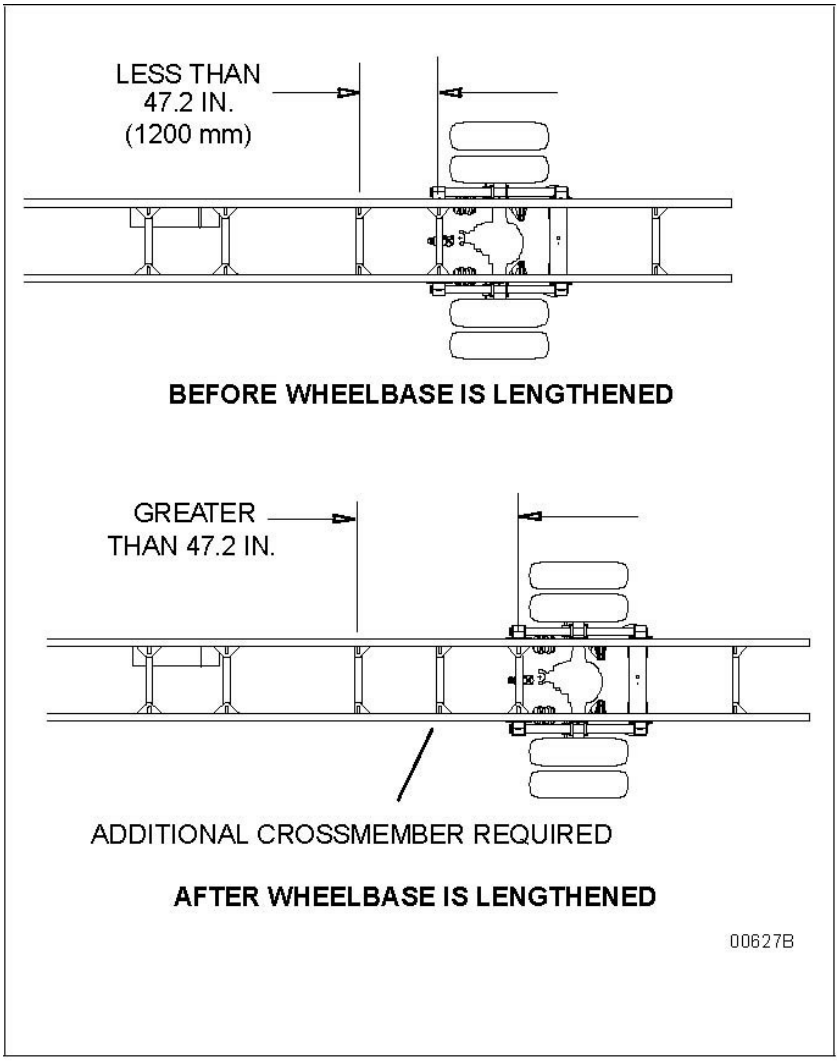

FIGURE 5-2. Crossmember Spacing Requirements

TORQUE REQUIREMENTS

Torque values apply to fasteners with clean threads, lightly lubricated, with hardened steel washers, and nylon-insert nuts.

TABLE 5-1. Customary Grade 8 UNF or UNC.

Fastener	Torque	
Size	**Nm**	**lb-ft**
5/16	22–30	16–22
3/8	41–54	30–40
7/16	75–88	55–65
1/2	109–122	80–90
9/16	156–190	115-140
5/8	224–265	165–195
3/4	394–462	290–340
7/8	517–626	380–460
1	952–1129	800–830
1-1/8	1346–1591	990–1170
1-1/4	1877–2217	1380–1630

TABLE 5-2. U.S. Customary - Grade 8 Metric Class 10.9

Fastener	Torque	
Size	**Nm**	**lb-ft**
M6	9–15	7–11
M8	23–31	17–23
M10	33–43	24–32
M12	75–101	55–75
M14	134–164	99–121
M16	163–217	120–160
M20	352–460	260–340

WELDING

The frame rails are heat treated and should not be welded. The high heat of welding nullifies the special heat treatment of the rails, greatly reducing the tensile strength of the frame rail. If a frame member becomes cracked from overloading, fatigue, surface damage or a collision, the only permanent repair is to replace the damaged frame member with a new part.

The following information is provided (for temporary emergency repair). Prior to welding a cracked frame rail, the area should be beveled (V'd out) to allow for a better weld. To prevent spreading of the crack, a 7 to 9 mm (1/4 in. to 3/8 in.) dia. hole should be drilled at the end of the crack. Widen the crack along its full length by using two hack saw blades together. When welding steel frames use the shielded arc method. When welding aluminum frames use either the tungsten inert gas (TIG) or consumable electrode method. Be sure to obtain full weld penetration along the entire length of the crack.

PRECAUTIONS

CAUTION:

Before welding, disconnect the negative terminal battery cable.

CAUTION:

Before welding, disconnect the alternator terminals. Failure to do so could result in damage to the voltage regulator and/or alternator.

CAUTION:

To prevent damage to electrical equipment, disconnect battery cables before arc-welding on a truck, and be sure that the welding ground lead is connected to the frame. Bearings and other parts will be damaged if current must pass through them in order to complete the circuit.

WELDING PRECAUTIONS: ALL ELECTRONIC ENGINES

Before welding on vehicles with electronic engines, the following precautions should be observed.

1. Disconnect all electrical connections to the vehicle batteries.
2. Disconnect all ECM connectors.
3. Do no use the ECM or engine ground stud for the ground of the welding probe.
4. Ensure that the ground connection for the welder is as close to the weld point as possible. This ensures maxi- mum weld current and minimum risk to damage electrical components on the vehicle.
5. Turn off key.

NOTE:

Bosch ABS and Wabco ABS: Disconnect ECU.

SECTION 6 **CAN COMMUNICATIONS**

INTRODUCTION

Controller Area Network (CAN) is a serial network technology that was originally designed for the automotive industry but has also become popular in the commercial trucking industry. The CAN bus is primarily used in the embedded systems and network technology that provides fast communication among controllers up to real-time requirements, eliminating the need for the much more expensive and complex technology.

CAN is a two-wire high-speed network system, that is far superior to conventional hardwired technologies functionality and reliability. CAN implementations are more cost effective. CAN is designed for real-time requirements which can easily beat hardwire connections when it comes to short reaction times, timely error detection, quick error recovery and error repair.

Characteristics of the Controller Area Network

- A serial networking technology for embedded solutions
- Needs only two wires to communicate messages
- Operates at data rates of 250K and 500K
- Supports a maximum of 8 bytes per message frame
- One application can support multiple message IDs
- Supports message priority, i.e. the lower the message ID the higher its priority

CAN COMMUNICATIONS ACRONYM LIBRARY

Acronym	Definition
CAN	Controller Area Network
J-1939	SAE CAN Communication Standard
PGN	Parameter Group Number
PTO	Power Take Off
SPN	Suspect Parameter Number
SCR	Selective Catalytic Reduction
DPF	Diesel Particulate Filter
TSC1	Torque Speed Commands

SAE J1939

The Society of Automotive Engineers (SAE) Communications Subcommittee for Truck and Bus Controls has developed a family of standards concerning the design and use of devices that transmit electronic signals and control information among vehicle components. SAE J1939 and its companion documents are the accepted industry standard for the vehicle network of choice for commercial truck applications s. SAE J1939 is used in the commercial vehicle area for communication in the embedded systems of the commercial vehicle.

SAE J1939 uses CAN as physical layer. It is a recommended practice that defines which and how the data is communicated between the Electronic Control Units within a vehicle network. Typical controllers are the Engine, Brake, Transmission, etc. The messages exchanged between these units can be data such as vehicle road speed, torque control message from the transmission to the engine, oil temperature, and many more.

Characteristics of J1939

- Extended CAN identifier (29 bit)
- Peer-to-peer and broadcast communication
- Network management
- Definition of parameter groups for commercial vehicles and others
- Manufacturer specific parameter groups are supported
- Diagnostics features
- A standard developed by the Society of Automotive Engineers
- Defines communication for vehicle networks
- A Higher-Layer Protocol using CAN as the physical layer
- Uses shielded twisted pair wire
- Applies a maximum network length of 120 ft.
- Applies a standard baud rate of 250 Kbit/sec
- Supports peer-to-peer and broadcast communication
- Supports message lengths up to 1785 bytes
- Defines a set of Parameter Group Numbers
- Supports network management

PARAMETER GROUP NUMBER

Parameter Groups contain information on parameter assignments within the 8-byte CAN data field of each message as well as repetition rate and priority. Parameters groups are, for instance, engine temperature, which includes coolant temperature, fuel temperature, oil temperature, etc. Parameter Groups and their numbers are listed in SAE J1939 and defined in SAE J1939/71, a document containing parameter group definitions plus suspect parameter numbers.

SUSPECT PARAMETER NUMBER

A Suspect Parameter Number is a number assigned by the SAE to a specific parameter within a parameter group. It describes the parameter in detail by providing the following information:

Data Length in bytes
Data Type
Resolution
Offset
Range
Reference Tag (Label)

SPNs that share common characteristics are grouped into Parameter Groups and they will be transmitted throughout the network using the Parameter Group Number.

CAN MESSAGES AVAILABLE ON BODY CONNECTIONS

SPN	CAN Signal Description	PGN	CAN BUS
5400	SCR Thermal Management Active	61443, EEC2	SCAN, KCAN, BCAN
91	Accelerator Pedal Position 1	61443, EEC2	SCAN, KCAN, BCAN
92	Engine Percent Load At Current Speed	61443, EEC2	SCAN, KCAN, BCAN
5399	DPF Thermal Management Active	61443, EEC2	SCAN, KCAN, BCAN
559	Accelerator Pedal Kickdown Switch	61443, EEC2	SCAN, KCAN, BCAN
2979	Vehicle Acceleration Rate Limit Status	61443, EEC2	SCAN, KCAN, BCAN
1437	Road Speed Limit Status	61443, EEC2	SCAN, KCAN, BCAN
558	Accelerator Pedal1 Low Idle Switch	61443, EEC2	SCAN, KCAN, BCAN
3357	Actual Max Available Engine Torque	61443, EEC2	SCAN, KCAN, BCAN
5398	Estimated Pumping-Percent Torque	61443, EEC2	SCAN, KCAN, BCAN
513	Actual Engine-Percent Torque	61444, EEC1	SCAN, KCAN, BCAN
512	Driver's Demand Engine-Percent Torque	61444, EEC1	SCAN, KCAN, BCAN
2432	Engine Demand–Percent Torque	61444, EEC1	SCAN, KCAN, BCAN
190	Engine Speed	61444, EEC1	SCAN, KCAN, BCAN
899	Engine Torque Mode	61444, EEC1	SCAN, KCAN, BCAN
1483	Source Address of Controlling Device for Engine Control	61444, EEC1	SCAN, KCAN, BCAN
1675	Engine Starter Mode	61444, EEC1	SCAN, KCAN, BCAN
4154	Actual Engine - Percent Torque (Fractional)	61444, EEC1	SCAN, KCAN, BCAN
3697	Diesel Particulate Filter Lamp Command	64892, DPFC1	SCAN, KCAN, BCAN
3700	Aftertreatment Particulate Filter Active Regen Status	64892, DPFC1	SCAN, KCAN, BCAN
3703	Particulate Filter Active Regen Inhibited Due to Inhibit Switch	64892, DPFC1	SCAN, KCAN, BCAN
3701	Aftertreatment Diesel Particulate Filter Status	64892, DPFC1	SCAN, KCAN, BCAN
3702	Filter Active Regen Inhibited Status	64892, DPFC1	SCAN, KCAN, BCAN
3704	Filter Active Regen Inhibited Due to Clutch Disengaged	64892, DPFC1	SCAN, KCAN, BCAN
3705	Filter Active Regen Inhibited Due to Service Brake Active	64892, DPFC1	SCAN, KCAN, BCAN
3706	Filter Active Regen Inhibited Due to PTO Active	64892, DPFC1	SCAN, KCAN, BCAN
3707	Filter Active Regen Inhibited Due to Accelerator Pedal Off Idle	64892, DPFC1	SCAN, KCAN, BCAN
3708	Filter Active Regen Inhibited Due to Out of Neutral	64892, DPFC1	SCAN, KCAN, BCAN
3709	Filter Active Regen Inhib Due to Vehicle spd Above Allowed Spd	64892, DPFC1	SCAN, KCAN, BCAN
3710	Filter Active Regen Inhibited Due to Parking Brake Not Set	64892, DPFC1	SCAN, KCAN, BCAN
3711	Filter Active Regen Inhibited Due to Low Exhaust Temperature	64892, DPFC1	SCAN, KCAN, BCAN
3712	Filter Active Regen Inhibited Due to System Fault Active	64892, DPFC1	SCAN, KCAN, BCAN
3713	Filter Active Regen Inhibited Due to System Timeout	64892, DPFC1	SCAN, KCAN, BCAN
3716	Filter Active Regen Inhibited Due to Engine Not Warmed Up	64892, DPFC1	SCAN, KCAN, BCAN
3717	Filter Active Regen Inhib Due to Vehicle spd Below Allowed Spd	64892, DPFC1	SCAN, KCAN, BCAN
3718	Filter Automatic Active Regen Initiation Configuration	64892, DPFC1	SCAN, KCAN, BCAN
3698	Exhaust System High Temperature Lamp Command	64892, DPFC1	SCAN, KCAN, BCAN
4175	Particulate Filter Active Regen Forced Status	64892, DPFC1	SCAN, KCAN, BCAN
1761	Aftertreatment 1 Exhaust Fluid Tank Volume	65110, AT1T1I1	SCAN, KCAN, BCAN
3031	Aftertreatment 1 Exhaust Fluid Tank Temperature	65110, AT1T1I	SCAN, KCAN, BCAN

3363	Aftertreatment 1 Exhaust Fluid Tank Heater	65110, AT1T1I	SCAN, KCAN, BCAN
5246	Aftertreatment SCR Operator Inducement Severity	65110, AT1T1I	SCAN, KCAN, BCAN
5245	Aftertreatment Exhaust Fluid Tank Low Level Indicator	65110, AT1T1I	SCAN, KCAN, BCAN
1639	Fan speed	65213, FD1	SCAN, KCAN, BCAN
975	Engine Fan1 Estimated Percent Speed	65213, FD1	SCAN, KCAN, BCAN
977	Fan Drive State	65213, FD1	SCAN, KCAN, BCAN
247	Engine Total Hours of Operation	65253, HOURS	SCAN, KCAN, BCAN
249	Engine Total Revolutions	65253, HOURS	SCAN, KCAN, BCAN
250	Engine Total Fuel Used	65257, LFC1	SCAN, KCAN, BCAN
182	Engine Trip Fuel	65257, LFC1	SCAN, KCAN, BCAN
110	Engine Coolant Temperature	65262, ET1	SCAN, KCAN, BCAN
174	Engine Fuel Temperature 1	65262, ET1	SCAN, KCAN, BCAN
52	Engine Intercooler Temperature	65262, ET1	SCAN, KCAN, BCAN
175	Engine Oil Temperature 1	65262, ET1	SCAN, KCAN, BCAN
111	Engine Coolant Level 1	65263, EFLP1	SCAN, KCAN, BCAN
94	Engine fuel Delivery Pressure	65263, EFLP1	SCAN, KCAN, BCAN
100	Engine Oil Pressure	65263, EFLP1	SCAN, KCAN, BCAN
101	Engine Crankcase Pressure	65263, EFLP1	SCAN, KCAN, BCAN
98	Engine Oil Level	65263, EFLP1	SCAN, KCAN, BCAN
185	Engine Average Fuel Economy	65266, LFE1	SCAN, KCAN, BCAN
184	Engine Instantaneous Fuel Economy	65266, LFE1	SCAN, KCAN, BCAN
183	Engine Fuel Rate	65266, LFE1	SCAN, KCAN, BCAN
51	Engine Throttle Valve1 Postion1	65266, LFE1	SCAN, KCAN, BCAN
171	Ambient Air Temperature	65269, AMB	SCAN, KCAN, BCAN
108	Barometric Pressure	65269, AMB	SCAN, KCAN, BCAN
173	Engine Exhaust Temperature	65270, IC1	SCAN, KCAN, BCAN
105	Engine Intake Manifold 1 Temperature	65270, IC1	SCAN, KCAN, BCAN
81	Aftertreatment 1 Particulate Filter Intake Pressure	65270, IC1	SCAN, KCAN, BCAN
106	Engine Intake Air Pressure	65270, IC1	SCAN, KCAN, BCAN
102	Engine Intake Manifold #1 Pressure	65270, IC1	SCAN, KCAN, BCAN
191	Transmission Output Shaft Speed	61442, ETC1	SCAN, KCAN, BCAN
574	Transmission Shift in Process	61442, ETC1	SCAN, KCAN, BCAN
4816	Transmission Torque Converter Lockup Transition in Process	61442, ETC1	SCAN, KCAN, BCAN
573	Transmission Torque Converter Lockup Engaged	61442, ETC1	SCAN, KCAN, BCAN
560	Transmission Driveline Engaged	61442, ETC1	SCAN, KCAN, BCAN
606	Engine Momentary Overspeed Enable	61442, ETC1	SCAN, KCAN, BCAN
607	Progressive Shift Disable	61442, ETC1	SCAN, KCAN, BCAN
161	Transmission Input Shaft Speed	61442, ETC1	SCAN, KCAN, BCAN
1482	Source Address of Controlling Device for Transmission Control	61442, ETC1	SCAN, KCAN, BCAN
526	Transmission Actual Gear Ratio	61445, ETC2	SCAN, KCAN, BCAN
523	Transmission Current Gear	61445, ETC2	SCAN, KCAN, BCAN
524	Transmission Selected Gear	61445, ETC2	SCAN, KCAN, BCAN

163	Transmission Current Gear	61445, ETC2	SCAN, KCAN, BCAN
162	Transmission Requested Range	61445, ETC2	SCAN, KCAN, BCAN
177	Transmission Oil Temperature1	65272, TRF1	SCAN, KCAN, BCAN
3027	Transmission Oil Level1 High/Low	65272, TRF1	SCAN, KCAN, BCAN
3026	Transmission Oil Level 1 Measurement Status	65272, TRF1	SCAN, KCAN, BCAN
3028	Transmission Oil Level 1 Countdown Timer	65272, TRF1	SCAN, KCAN, BCAN
597	Brake Switch	65265, CCVS1	SCAN, KCAN, BCAN
598	Clutch Switch	65265, CCVS1	SCAN, KCAN, BCAN
595	Cruise Control Active	65265, CCVS1	SCAN, KCAN, BCAN
976	PTO Governor State	65265, CCVS1	SCAN, KCAN, BCAN
527	Cruise Control States	65265, CCVS1	SCAN, KCAN, BCAN
70	Parking Brake Switch	65265, CCVS1	SCAN, KCAN, BCAN
596	Cruise Control Enable Switch	65265, CCVS1	SCAN, KCAN, BCAN
599	Cruise Control Set Switch	65265, CCVS1	SCAN, KCAN, BCAN
600	Cruise Control Coast (Decelerate) Switch	65265, CCVS1	SCAN, KCAN, BCAN
601	Cruise Control Resume Switch	65265, CCVS1	SCAN, KCAN, BCAN
602	Cruise Control Accelerate Switch	65265, CCVS1	SCAN, KCAN, BCAN
86	Cruise Control Set Speed	65265, CCVS1	SCAN, KCAN, BCAN
69	Two Speed Axle Switch	65265, CCVS1	SCAN, KCAN, BCAN
84	Wheel-Based Vehicle Speed	65265, CCVS1	SCAN, KCAN, BCAN
244	Trip Distance	65248, VD	SCAN, KCAN, BCAN
245	Total Vehicle Distance	65248, VD	SCAN, KCAN, BCAN
979	Engine Remote PTO Governor Preprogrammed spd Control Switch	65264, PTO	SCAN, KCAN, BCAN
3447	Remote PTO Governor Preprogrammed spd Control Switch 2	65264, PTO	SCAN, KCAN, BCAN
974	Remote Accelerator Pedal Position	61443, EEC2	SCAN, KCAN, BCAN
980	Engine PTO Governor Enable Switch	65264, PTO	SCAN, KCAN, BCAN
982	Engine PTO Governor Resume Switch	65264, PTO	SCAN, KCAN, BCAN
984	Engine PTO Governor Set Switch	65264, PTO	SCAN, KCAN, BCAN
90	PTO Oil Temperature	65264, PTO	SCAN, KCAN, BCAN
695	Engine Override Control Mode	0,TSC1	SCAN, KCAN, BCAN
696	Engine Requested Speed Control Conditions	0,TSC1	SCAN, KCAN, BCAN
897	Override Control Mode Priority	0,TSC1	SCAN, KCAN, BCAN
898	Engine Requested Speed/Speed Limit	0,TSC1	SCAN, KCAN, BCAN
518	Engine Requested Torque/Torque Limit	0,TSC1	SCAN, KCAN, BCAN
3349	TSC1 Transmission Rate	0,TSC1	SCAN, KCAN, BCAN
3350	TSC1 Control Putpose	0,TSC1	SCAN, KCAN, BCAN
4191	Engine Requested Torque - High Resolution	0,TSC1	SCAN, KCAN, BCAN
4206	Message Counter	0,TSC1	SCAN, KCAN, BCAN
4207	Message Checksum	0,TSC1	SCAN, KCAN, BCAN
187	Power Take Off Set Speed	65264,PTO	SCAN, KCAN, BCAN
3696	Force Regen	57344,CM1	SCAN, KCAN, BCAN
3695	Inhibit Regen	57344,CM1	SCAN, KCAN, BCAN

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SECTION 7 **ELECTRICAL**

INTRODUCTION

This section is written to provide information to the body builder when installing equipment into vehicles built with multiplexed instrumentation. The technology presented by VECU level instrumentation integrates J-1939 CAN data communications between controllers and equipment on the vehicle. This section is intended to address how to work in aftermarket equipment while still maintaining full functionality of the OEM vehicle.

These topics apply to 2.1M chassis built with VECU architecture. The electrical architecture for these trucks will be named VECU01 which replaces NAMUX4.This system integrates a parallel control unit to manage outbound messages via a faster baud rate 500kbps and FCAN signals for the chassis module(s). All other CAN busses (except the K-CAN) are managed in parallel with the existing CECU3 unit. Since the F-CAN has moved to the VECU, the VCAN on CECU3 is now divided into a 1 (250 kbps) and 2 (500 kbps). The second CAN is dedicated to OBD communication.

The most important advancement of electrical instrumentation is the implementation of the VECU controller. While it is still possible to wire completely outside of the VECU system, utilizing the VECU functions will make a cleaner installation and will maintain OEM functionality. VECU expands controls to air operated devices by receiving input from dash switches, remote (aftermarket) switches, sensors mounted to the aftermarket equipment and other vehicle parameters (engine speed, transmission status etc.) With the proper programming, the VECU will then process the inputs and will create a J-1939 Data instruction which is communicated to another controller outside the cab called the Chassis Module. This chassis module receives the instruction and communicates the information to the air solenoid bank. Then 12V power will open the solenoid and supply air pressure the specified air circuit. The chassis module can also supply voltage to other systems on the chassis.

ELECTRICAL ACRONYM LIBRARY

Acronym	Definition
CAN	Controller Area Network
CECU	Cab Electrical Control Unit
DTC	Diagnostics Trouble Code
ECM	Engine Control Module
ECU	Electrical Control Unit
EOA	Electric Over Air
EOH	Electric Over Hydraulic
J-1939	SAE CAN Communication Standard
LIN	Local Interconnect Network
MSB	Master Solenoid Bank
MSM	Master Switch Module
MUX	Multiplex Switch
OBD	On Board Diagnostics
OEM	Original Equipment Manufacture
PCC	Predictive Cruise Control
PDC	Power Distribution Center
PGN	Parameter Group Number
PTO	Power Take Off
RP1226	TMS Messaging Standard
SPN	Suspect Parameter Number
TCM	Transmission Control Module
VECU	Vehicle Electrical Control Unit

ELECTRICAL WIRING CIRCUIT CODES

The wire system uses 10 different colors and only on striped wire color. Each wire has a minimum of seven characters, with the first three characters as the wire color. The remaining four characters are related to the wire services. The colors determine the circuits function as follows:

ELECTRICAL WIRE CIRCUIT CODE TABLES

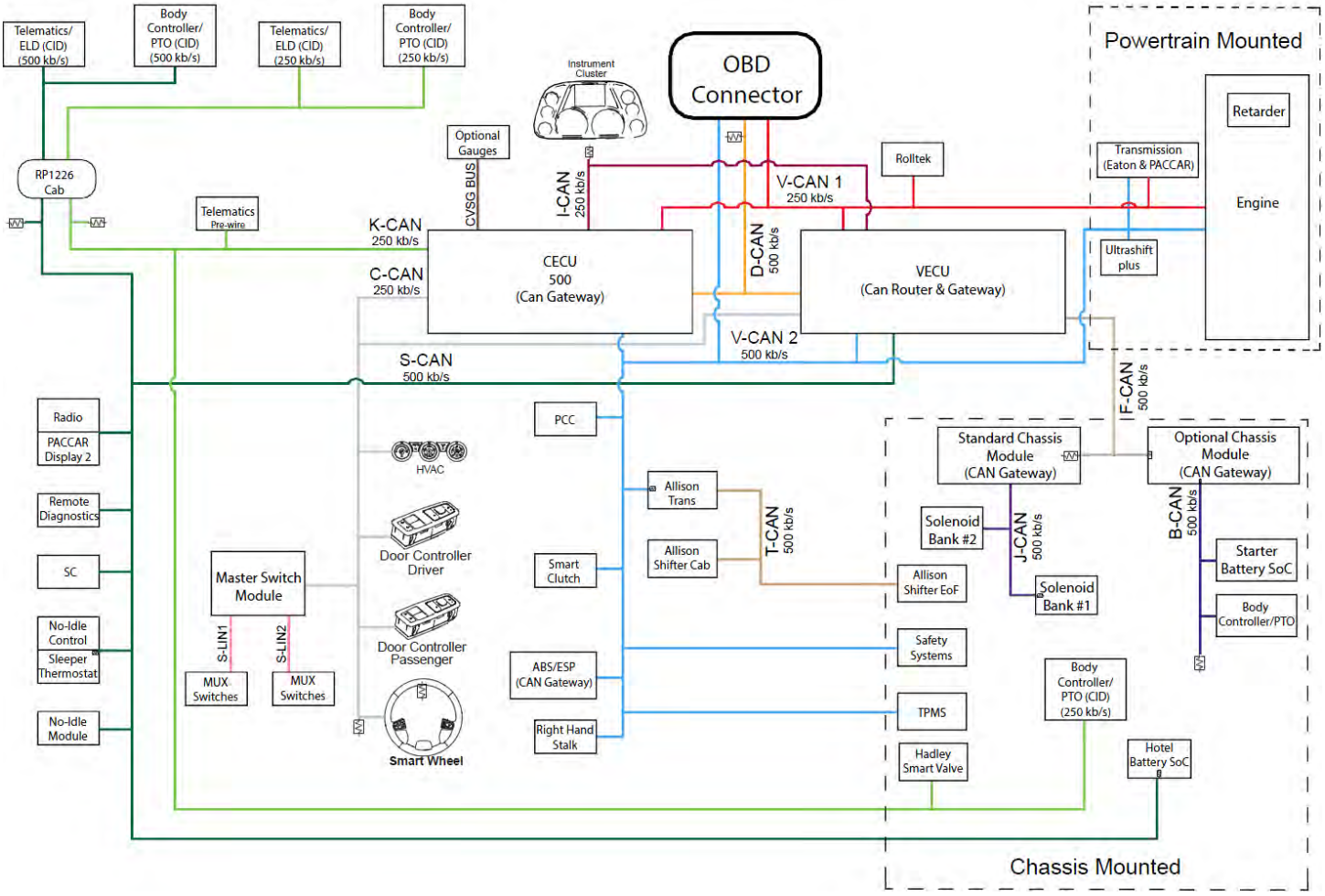
PACCAR Electrical Circuit Code		
Insulation Color	Color Code	Electrical Function
Red w/ white stripe	R/WXXXX	Direct battery power
Red	REDXXXX	Protected battery power
Orange	ORNXXXX	Ignition, Accessory, Low Voltage Disconnect, StartPower
Yellow	YELXXXX	Activated Power
White	WHTXXXX	Ground
Black	BLKXXXX	Load Retun
Gray	GRAXXXX	Control
Brown	BRNXXXX	Indicator Illumination Backlit Illumination
Violet	VIOXXXX	Reference Voltage or +5VDC or Sensor Power
Light Blue	BLUXXXX	Sensor Signal
Light Green	GRNXXXX	Sensor common or Sensor Ground

Number			Category
XXX0000	through	XXX0999	General
XXX1000	through	XXX1999	Power Supply
XXX2000	through	XXX2999	Lighting
XXX3000	through	XXX3999	Powertrain
XXX4000	through	XXX4999	Instrumentation
XXX5000	through	XXX5999	Safety systems
XXX6000	through	XXX6999	Convenience, Security
XXX7000	through	XXX7999	HVAC
XXX8000	through	XXX8999	Undefined
XXX9000	through	XXX9999	Trailer/Body Connections

MULTIPLEX SYSTEM

The VECU electrical architecture uses a multiplexing system. Multiplexing can be defined as the process of sending multiple digital signals on the same shared medium at the same time. These signals are introduced into the multiplexing system through data connection points which are defined by J1939 backbone.

CAN BUS SYSTEM OVERVIEW



CAN BUS SPEEDS AND CIRCUIT DESIGNATION

J1939-14 (500KBPS):

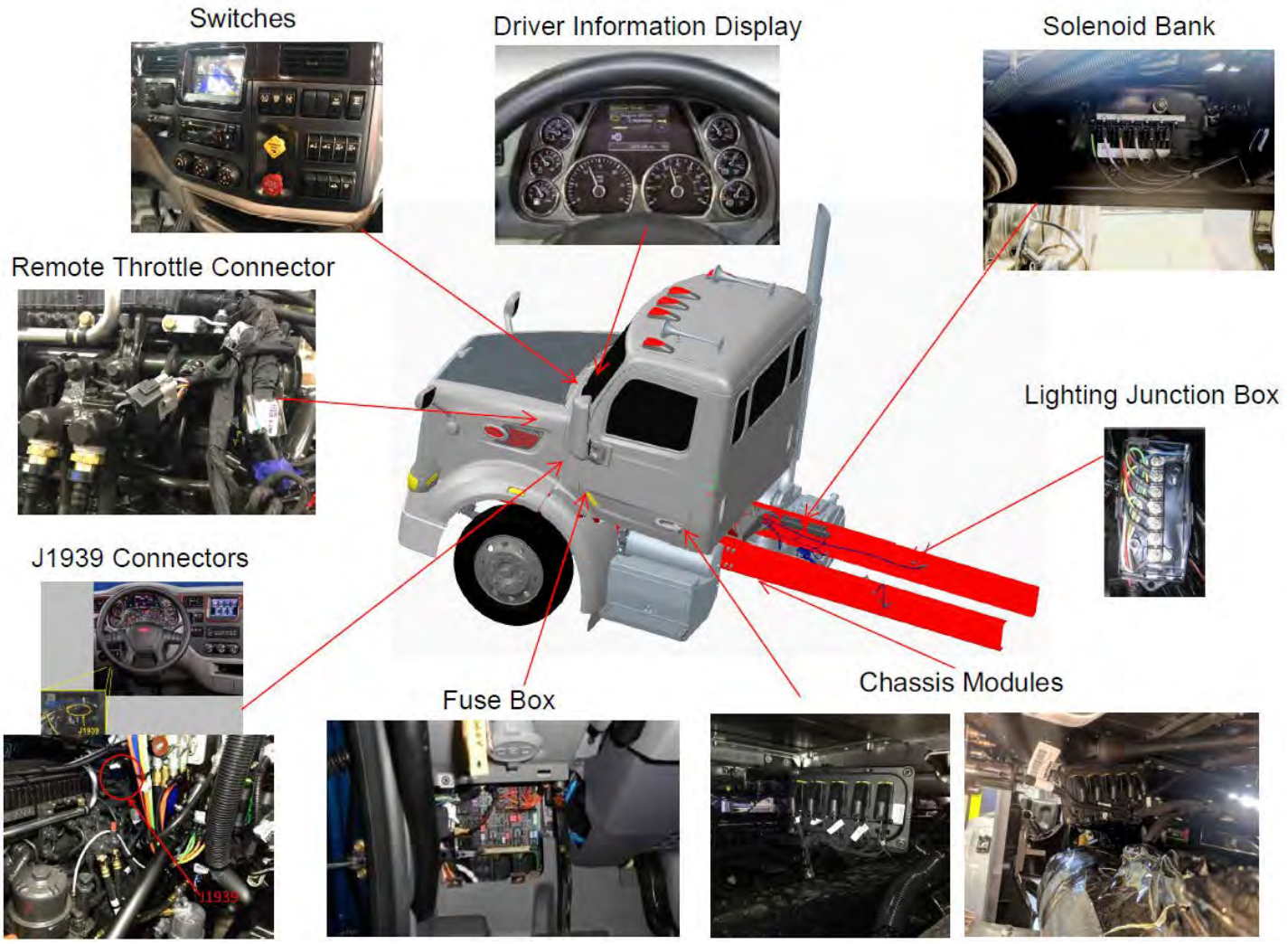
B-CAN – 0813 Body Builder
D-CAN – 0822 Diagnostics
F-CAN – 0819 Frame
G-CAN – 0825 Bendix ACB Antenna
J-CAN – 0826 Solenoid Bank
T-CAN – 0828 Transmission
V-CAN2 – 0823 Vehicle
S-CAN – 0827 Sleeper

J1939-15 (250KBPS):

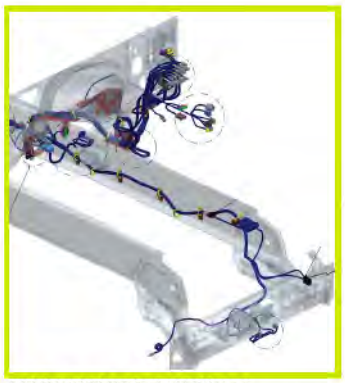
I-CAN – 0825 Instrumentation
C-CAN – 0821 Cab
K-CAN – 0829 Telematics and Remote PTO

ELECTRICAL COMPONENT OVERVIEW

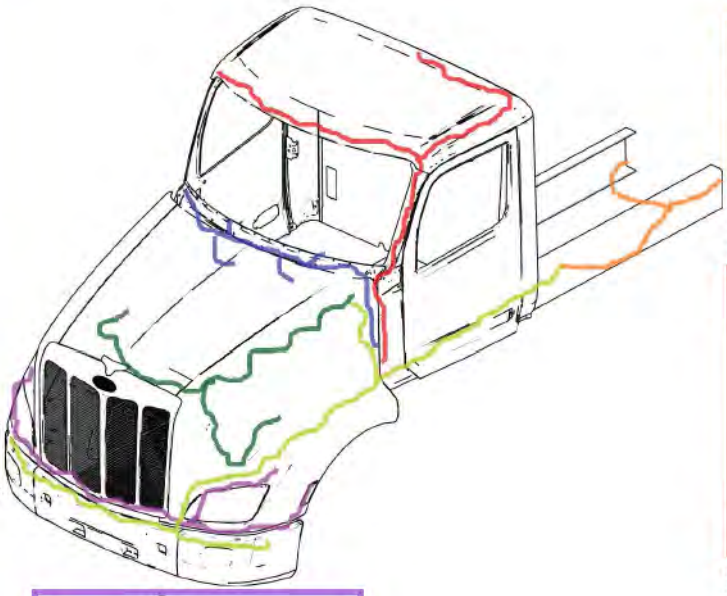
OVERVIEW DIAGRAM OF ELECTRICAL COMPONENT LOCATIONS

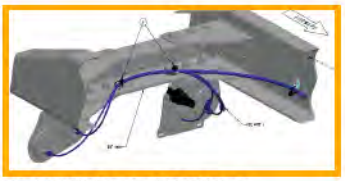


ELECTRICAL HARNESS OVERVIEW



MAIN CHASSIS HARNESS
1) Connections to Firewall Bulkhead
2) Connections to Rear Chassis Harness
3) Connections to Chassis Module
4) Connection to Solenoid Bank
5) Connections to Rear Chassis Harness
6) Connections to Hood Harness



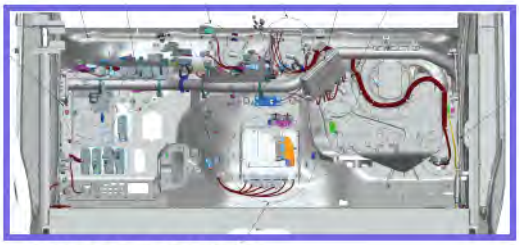


REAR CHASSIS HARNESS
1) Connections to Chassis Harness
2) Connections to Tail Light

CAB ROOF HARNESS
1) Connections to Main Cab IP Harness
2) Connections to Antennas
3) Connections to Roof Lighting

ENGINE HARNESS
1) Connections to Main Chassis Harness
2) Connections to Firewall Bulkead
3) Connections to Starter
4) Connections to Aftertreatment Harness
5) Connection to Engine ECU

HOOD CHASSIS HARNESS
1) Connections to Main Chassis Harness
2) Connections to Head Lights
3) Connections to Turn Signal Lamps

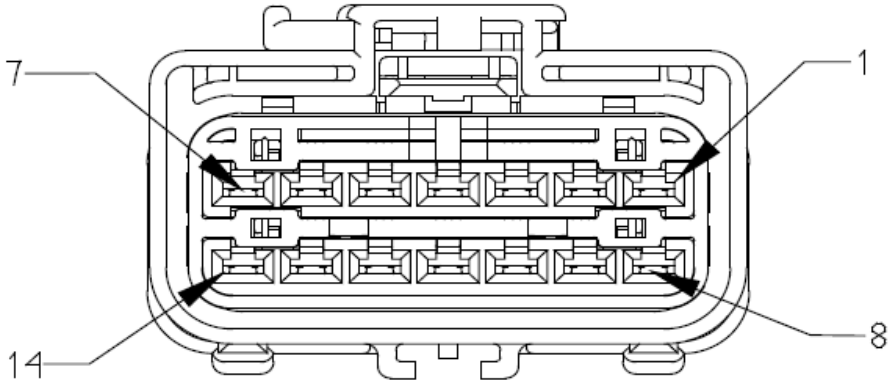


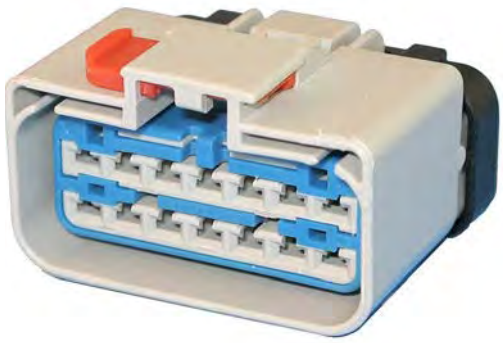
MAIN CAB IP HARNESS
1) Connections to Firewall Bulkhead
2) Connections to VECU and CECU
3) Connections to Power Distribution Center
4) Connections to Instrument Panels
5) Connection to Allison TCM
6) Connections to Cab Roof Harness

IN CAB CAN BASED MESSAGING CONNECTOR

RP1226 CONNECTOR

The RP1226 connector is located on the left hand side of the steering wheel behind the dash near the OBD connector. The RP1226 connector can be used for after-market telematics, ELD, body controls, and PTO controls. There will be multiple bus speeds available K-CAN for 250kbps and S-CAN for 500 kbps. The RP1226 provides defined messages and major telematics supplier data for customer use.



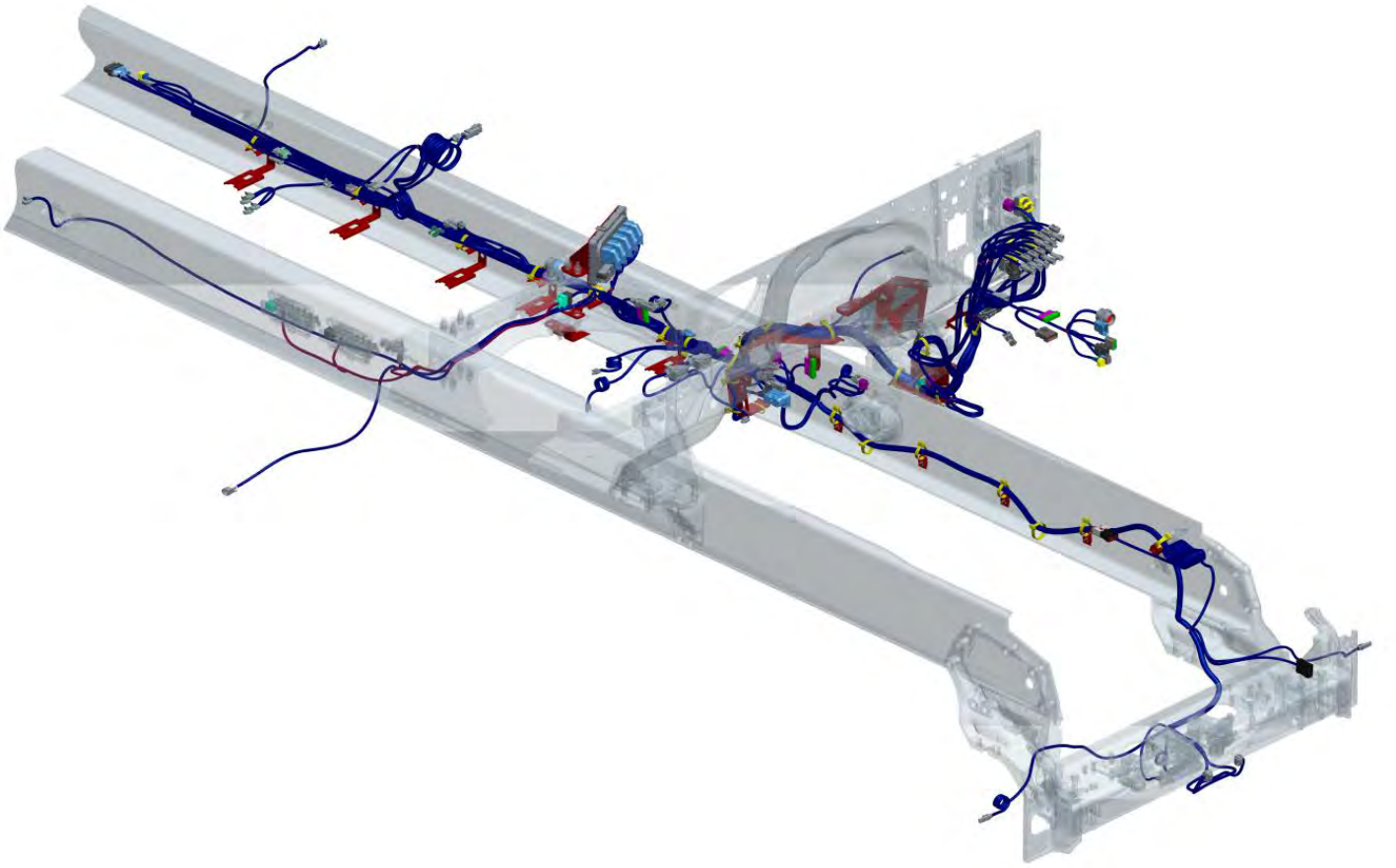


Pin	Description
1	PROTECTED POWER
2	J1939 S-CAN (+)
4	J1939 K-CAN (+)
7	IGNITION POWER
8	GROUND
9	J1939 S-CAN (-)
11	J1939 K-CAN (-)

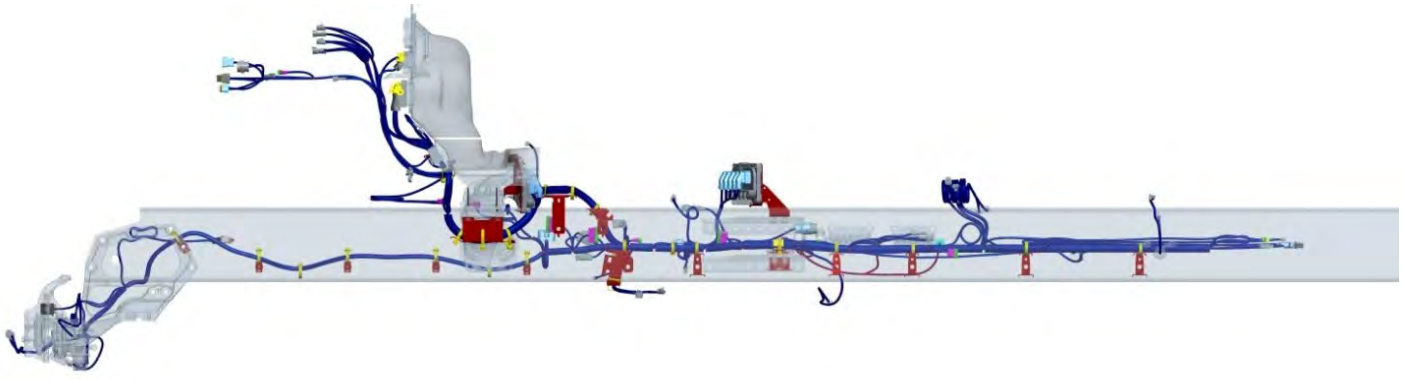
BODY CONNECTION POINTS

LOCATION DIAGRAMS FOR VARIOUS BODY CONNECTORS ON THE MAIN CHASSIS HARNESS

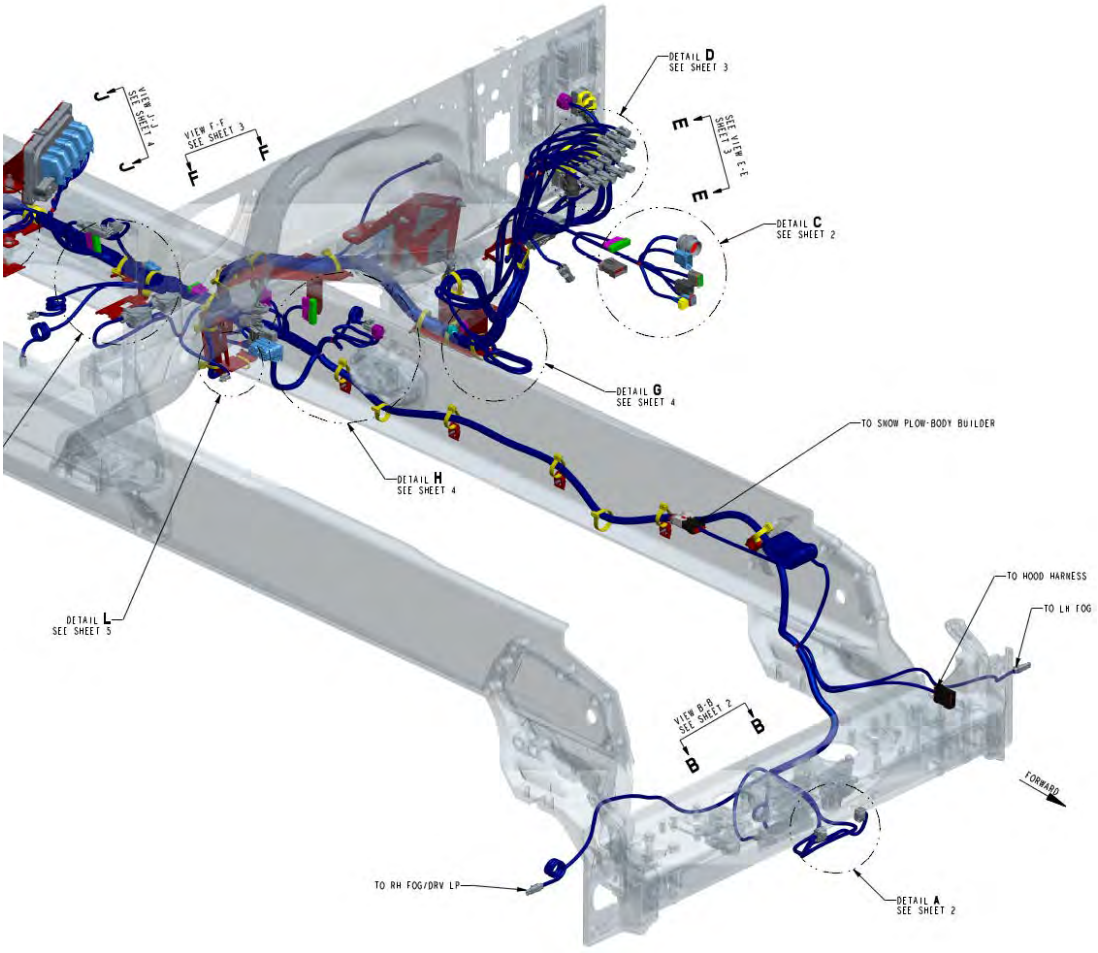
Isometric View



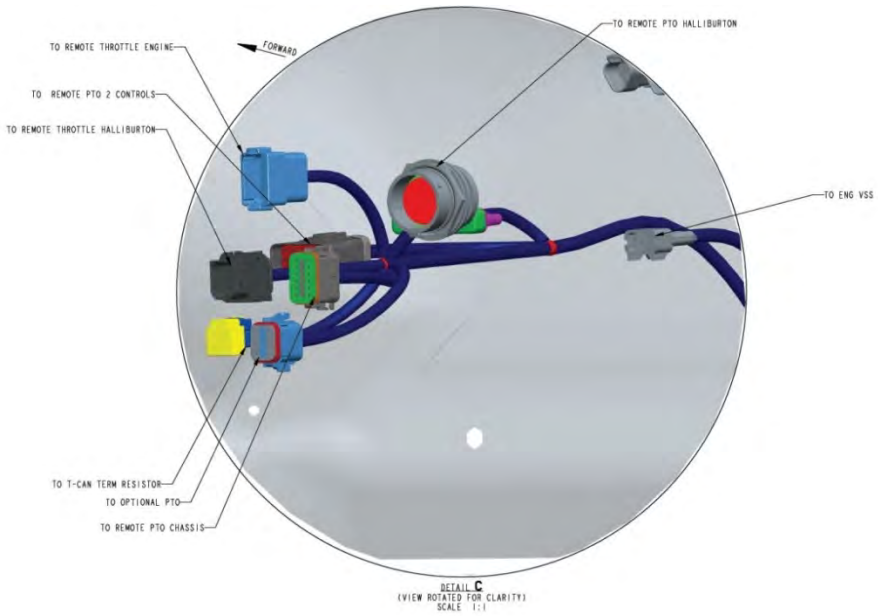
Side View



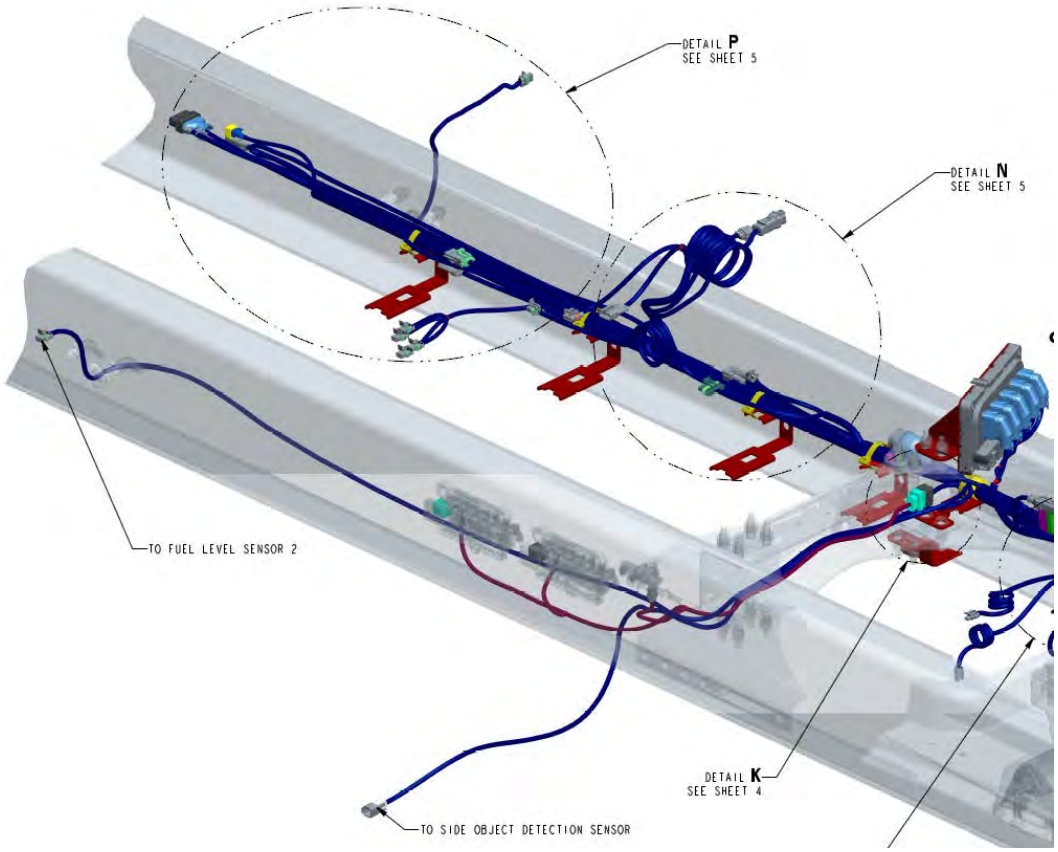
FRONT PORTION VIEW



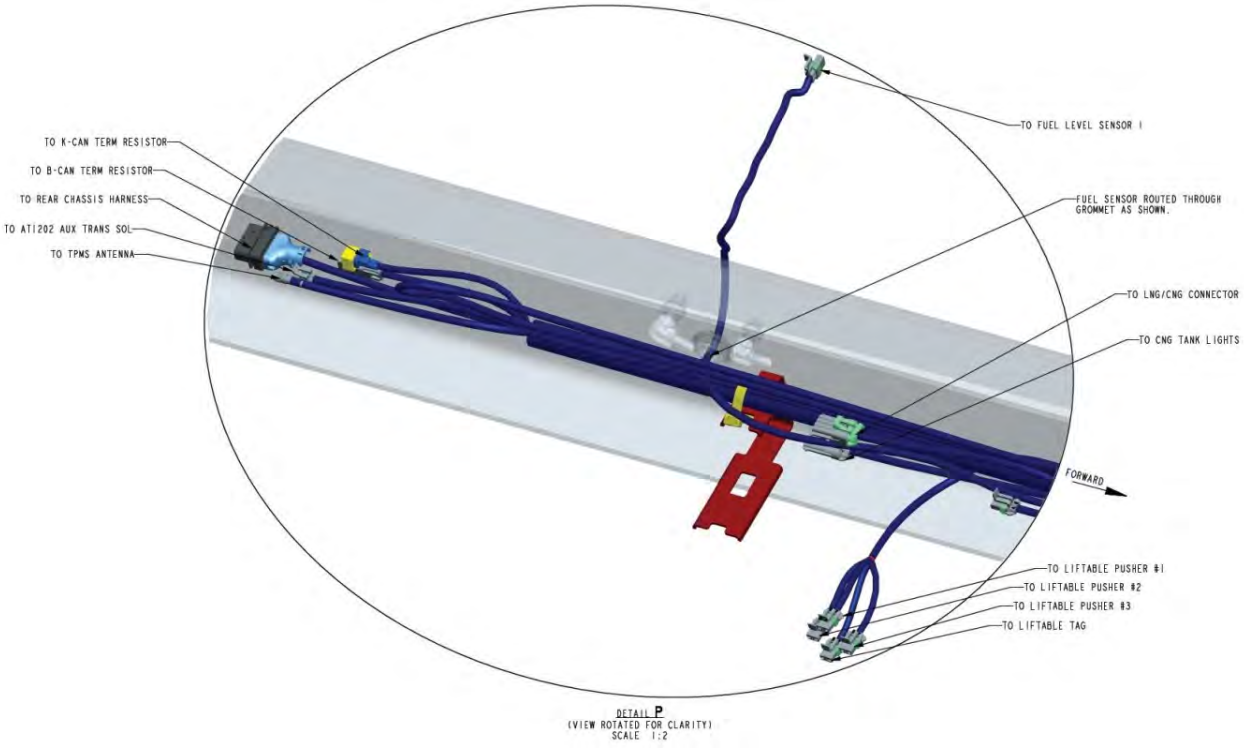
DETAIL VIEW OF ENGINE COMPARTMENT BODY CONNECTORS



REAR PORTION VIEW

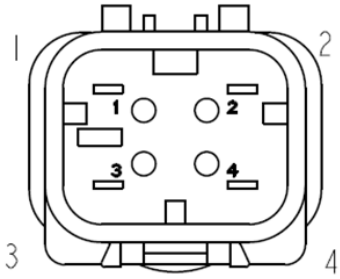


DETAIL VIEW OF BOC/BOS AND EOF BODY CONNECTORS



ELECTRIC ENGAGED EQUIPMENT

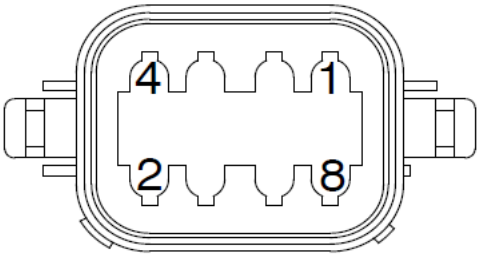
At the left hand forward cab mount, P198 is available for PTO controls that are electrically engaged via ground.



Pin	Description
1	VEHICLE GROUND
2	#1 PTO ON/OFF
3	PTO PUMP MODE SIGNAL
4	#2 PTO ON/OFF

OPTIONAL 8 PIN PTO INPUT CONNECTOR

Chassis Harness (P197N)

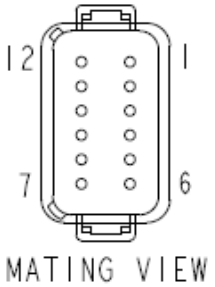


Pin	Description
1	12V IGNITION SIGNAL
2	PTO INTERLOCK INPUT (Active Low)
3	REMOTE PTO PRESET 3 (Active High)
4	REMOTE PTO PRESET 2 (Active High)
5	REMOTE PTO PRESET 1 (Active High)
6	REMOTE PTO PRESET INCREMENT + (Active High)
7	REMOTE PTO PRESET DECREMENT - (Active High)
8	VEHICLE GROUND

REMOTE THROTTLE AND REMOTE PTO CONTROLS

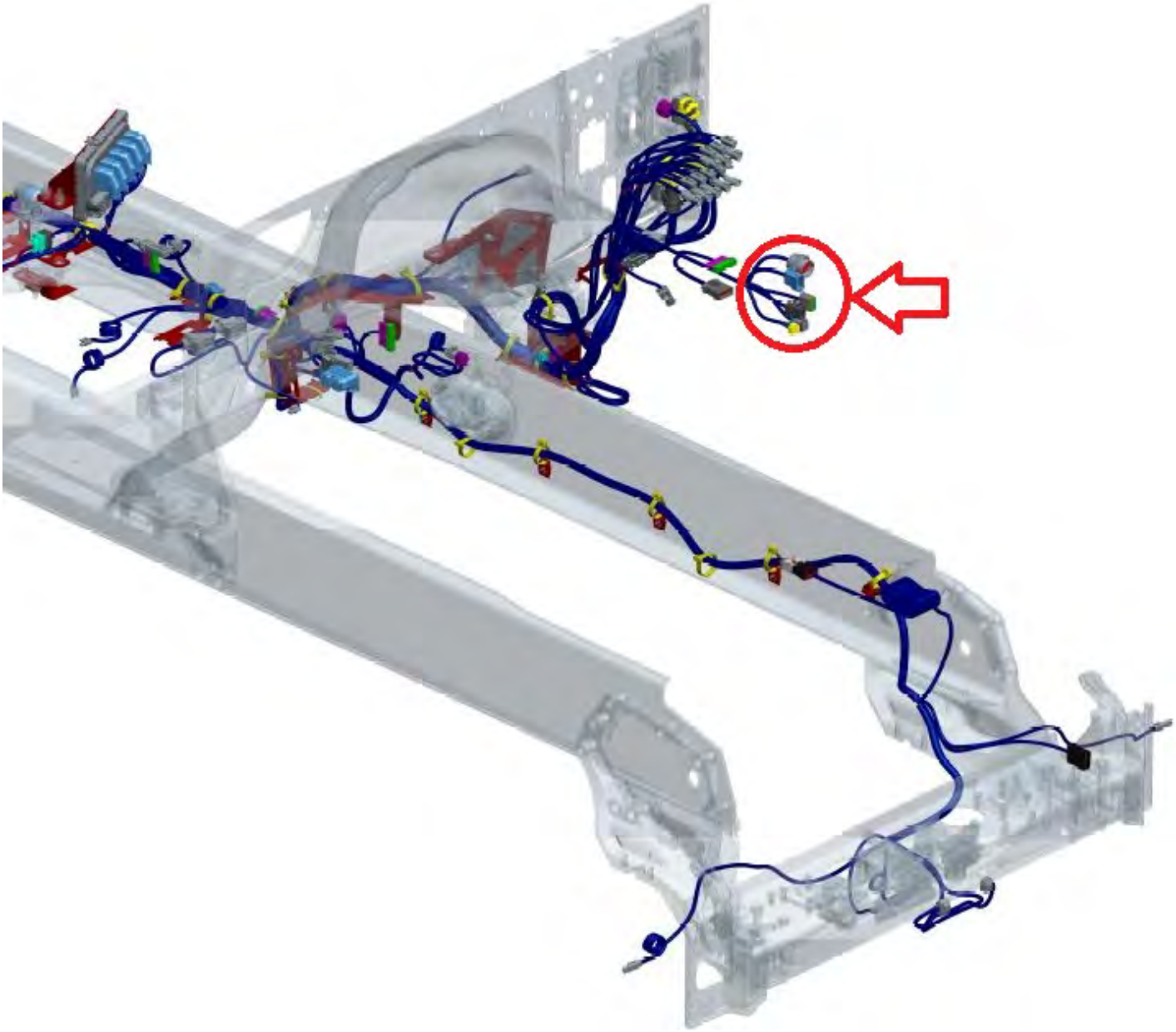
PACCAR MX Engines

Chassis must be ordered with the appropriate option to have a 12 pin connector on the chassis harness. All signals will feed into the Chassis Modules, which will have Active Low inputs. Connect pins 3 and 5 for simple PTO ON/OFF signal. For Remote throttle bump, you must connect pins 3 & 6. Then momentarily connect pins 2 and 3 for SET, and pins 1 and 3 for Resume. Engine speed will depend on how engine ECM is programmed. Unless otherwise specified, engine is set by default for incremental speed increase. Full remote throttle control can be achieved with a twisted triple to pin 3, 4, and 10.



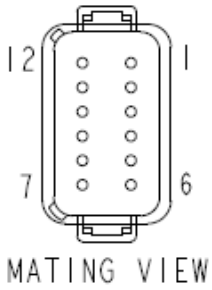
Pin	Description
1	INPUT FOR REMOTE PTO RESUME (Active Low)
2	INPUT FOR REMOTE PTO SET (Active Low)
3	INPUT FOR NAMUX ANALOG RETURN (TWISTED TRIPLE)
4	INPUT FOR REMOTE THROTTLE SENSOR CIRCUIT (TWISTED TRIPLE)
5	PTO ENGAGED SIGNAL (LOW = ENGAGED)
6	CRUISE ON/OFF (Active Low)
7	+12V 10A BODY IGN FUSE C_A6
8	VEHICLE GROUND
9	NOT USED
10	INPUT FOR NAMUX PWR SUPPLY +5V (TWISTED TRIPLE)
11	+12V 20A ENG PWR (MX) FUSE C_A6
12	NOT USED

MX-11 and MX-13 Connector Location.

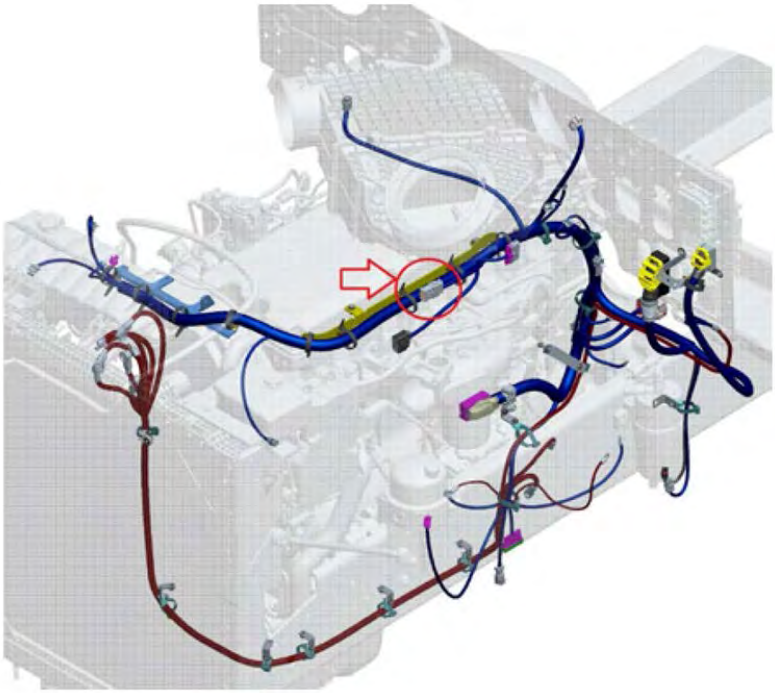


Cummins Engines 12 Pin Connector

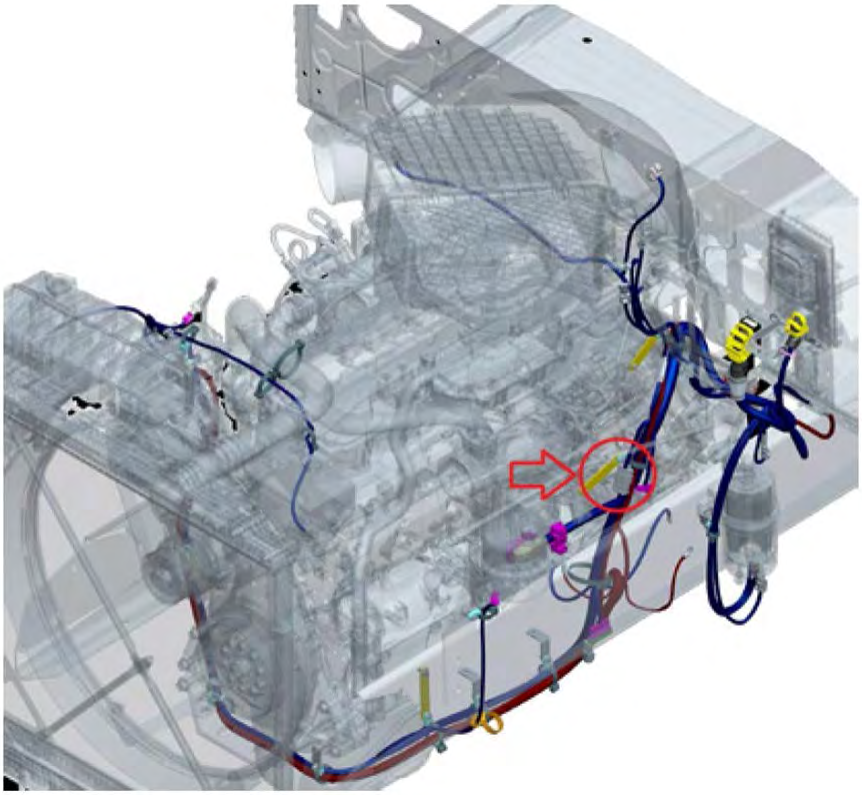
Chassis must be ordered with the appropriate option to have a 12 pin connector on the engine harness. The Body IGN signal was moved off the engine harness connector, so for Cummins the Chassis Harness will include the PTO layer to insert the Body IGN signal back into the 12-way connector. Signals that feed directly to the engine ECM typically will be active low signals. Connect pins 3 and 5 for simple PTO ON/OFF signal. For Remote throttle bump, you must connect pins 3 & 6. Having a momentary switch to signal ground on pins 2 and 1 will then increase/decrease engine speed. Engine speed will depend on how engine is programmed. Unless otherwise specified, engine is set by default for incremental speed increase. Full remote throttle control can be achieved with a twisted triple to pin 4, 10, and 11.



Pin	Description
1	INPUT FOR REMOTE PTO RESUME (Active Low)
2	INPUT FOR REMOTE PTO SET (Active Low)
3	SWITCH RETURN
4	INPUT FOR REMOTE THROTTLE SENSOR CIRCUIT (TWISTED TRIPLE)
5	PTO ENGAGED SIGNAL (LOW = ENGAGED)
6	CRUISE ON/OFF (Active Low)
7	+12V 10A BODY IGN FUSE C_A6
8	VEHICLE GROUND
9	TORQUE LIMIT INPUT (Active Low)
10	INPUT FOR NAMUX PWR SUPPLY +5V(TWISTED TRIPLE)
11	INPUT FOR NAMUX ANALOG RETURN (TWISTED TRIPLE)
12	REMOTE PTO ON/OFF (Active Low)



X15 Connection location



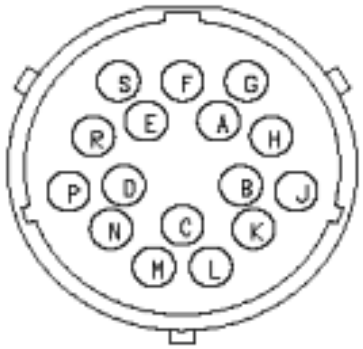
ISX12 Connection location

DUAL STATION CONTROLS

When equipped, dual station controls allow extra controls from a remote station outside of the cab. The option will either include a 16 way connector, or a 23 way connector. When the in-cab PTO control switch is switched to the “on” position with the park brake applied, the engine will turn off unless the dual station remote run input is properly powered via the 16 or 23 way connector. To power the remote run input, terminal X of the 23 way connector or terminal L of the 16 way connector will be powered with a 12V+ input which will power terminal 87 of the remote run relay. To operate the remote start input, terminal F of the 23 way connector will be powered with a 12V+ input which will power terminal 85 of the remote run relay and terminal 85 of the remote start relay.

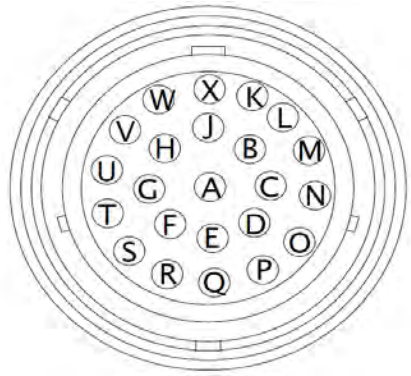
Following is a list of pin descriptions, and the required input or supplied output signal type for both the 23 way and the 16 way connectors for both PACCAR MX and Cummins engines. Also following are examples of wiring connections for common items used.

PACCAR MX ENGINE 16 PIN



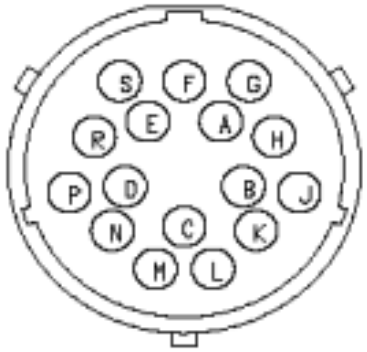
Pin	Description	Input/Output	Destination/Source
A	External Regeneration Notification	Output, Active High	Pin C18 from Chassis Node
B	Remote Run	Input 12V (+)	Pin 87A Remote Run Relay
C	Remote Start	Input 12V (+)	Pin 87 of Remote Start Relay.
D	Remote Throttle Sensor Supply	Output, 5V (+) Supply	Pin C1 of CECU
E	Remote Throttle Position	Input Variable 0-5V	Pin C27 Of CECU
F	Remote Throttle Return	Analog Sensor Ground	Pin C25 of CECU
G	DEF Lamp Return	Not Used, Cummins ONLY	
H	Regeneration Lamp Return	Not Used, Cummins ONLY	
J	tachometer (+)	Tachometer Output (+)	Body Builder Supplied sensor, Input on P669 Pin 1
K	tachometer (-)	Tachometer Output (-)	Body Builder Supplied sensor, Input on P669 Pin 2
L	Remote ECM Power Engine Run	Input 12V (+)	Pin 87 Remote Run relay, supplies Pin 1 Engine ECM When Relay Active.
M	Engine oil Pressure	Output	Body Builder Supplied sensor, Input on J668
N	NOT USED	NOT USED	
P	Water Temp	Output	Body Builder Supplied sensor, Input on J667
R	J1939 B-CAN (+)	B-CAN (+)	Pin 43 of CECU
S	J1939 B-CAN (-)	B-CAN (-)	Pin 44 of CECU

PACCAR MX ENGINE 23 PIN CONNECTOR



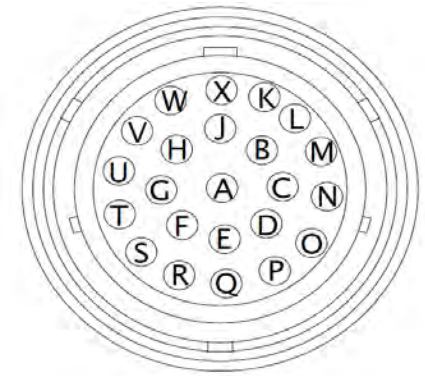
Pin	Description	Input/Output	Destination/Source
A	12 VDC IGN Power	Output 12V (+)	Tied To Pin L of 23 Way Conn. Engine PDC Fuse E9. 10A Fused
B	City Horn	Input 12V (+)	Pin 85 of Horn Relay
C	Check Engine Lamp	Output Active Low	Pin 4 of Engine ECM
D	Remote Start	Input 12V (+)	Pin 87 of Remote Start Relay
E	Remote Throttle Return	Analog Sensor Ground	CECU Pin C25
F	Remote Enable	Input 12V (+)	Pin 85 of Remote Start Relay. Pin 85 of Remote Run Relay
G	Remote Resume	Input Active Ground	Pin B16 of CECU
H	Remote Set	Input Active Ground	Pin B15 of CECU
J	Remote Throttle Position	Input, Variable 0-5V	Pin C27 of CECU
K	Remote Run	Input 12V (+)	Pin 87A Remote Run relay
L	12 VDC IGN Power	Output 12V (+)	Tied To Pin A of 23 Way Connector. Engine PDC Fuse E9. 10A Fused
M	J1939 B-CAN (-)	B-CAN (-)	Pin 44 of CECU
N	J1939 B-CAN (+)	B-CAN (+)	Pin 43 of CECU
O	Common Return (General)	Common Ground	Firewall Ground
P	Engine Oil Pressure	Output	Body Builder Supplied sensor, Input on J668
Q	Remote PTO ON/OFF	Input, Active low - 567 only Input 12V(+) - Legacy	Pin 85 MX PTO relay. Pin 85 Eaton PTO Relay. Pin 85 of PTO hour Meter Relay - 567 only. Pin 21 on engine ECM on Legacy
R	DEF Lamp Return	Not Used, Cummins ONLY	
S	Regeneration Lamp Return	Not Used, Cummins ONLY	
T	External Regeneration Notif	Output, Active High	Pin C18 of Chassis Node
U	Common Return (Switch)	Common Switch Ground	Firewall Ground
V	Torque Limit Switch	Not Used, Cummins ONLY	
W	Remote Throttle Sensor	Output, 5V (+)	Pin C1 of CECU
X	Remote ECM Power Engine	Input 12V (+)	Pin 87 Remote Run relay

Cummins Engine 16 Pin Connector



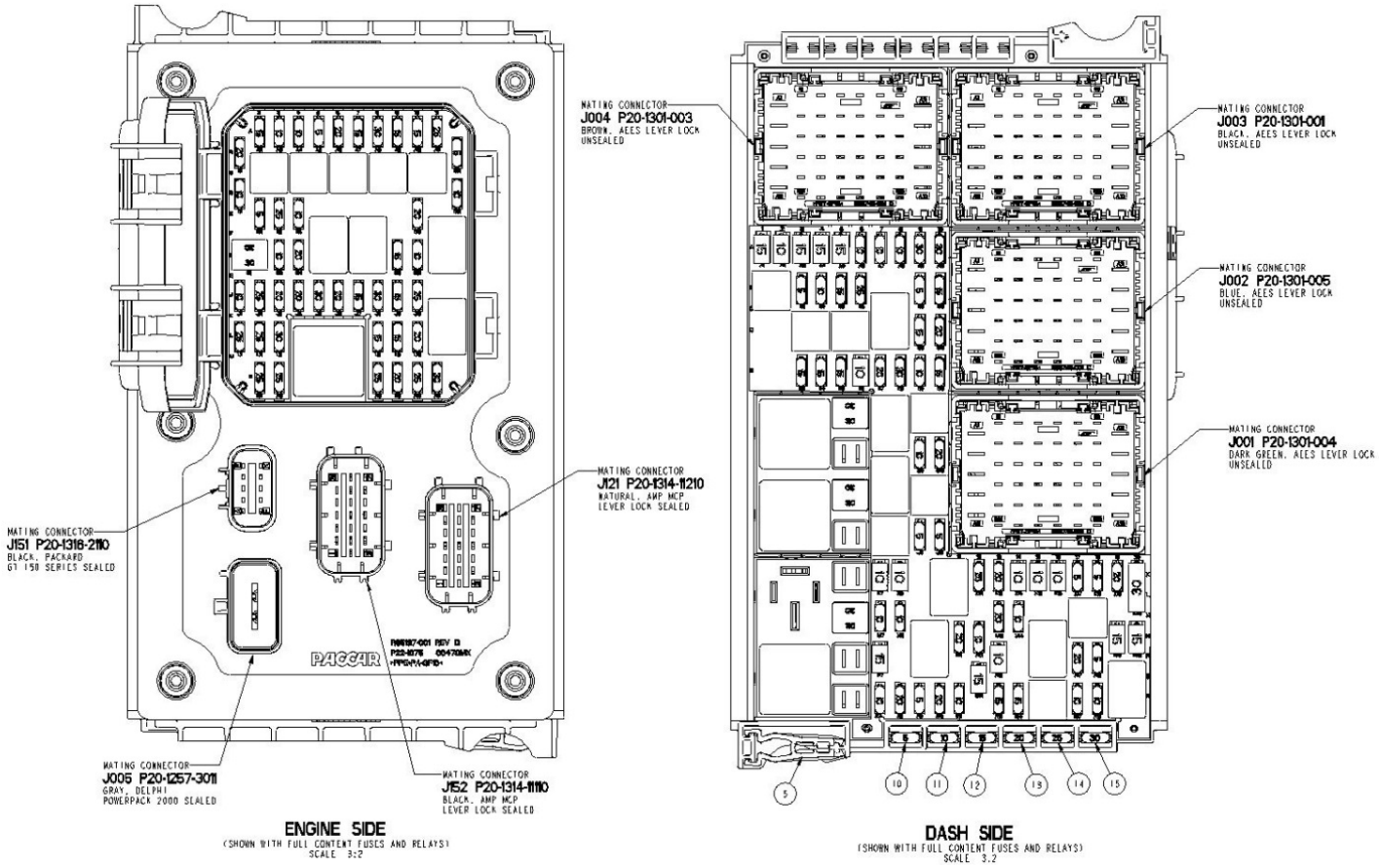
Pin	Description	Input/Output	Destination/Source
A	External Regeneration Notification	Output, Active High	Pin C18 From Chassis Node
B	Remote Run	Input 12V (+)	Pin 87A of Remote Run Relay
C	Remote Start	Input 12V (+)	Pin 87 of Remote Start Relay.
D	Remote Throttle Sensor Supply	Output, 5V (+) Supply	Pin 8 Engine ECM
E	Remote Throttle Position	Input Variable 0-5V	Pin 63 of Engine ECM
F	Remote Throttle Return	Analog Sensor Ground	Pin 32 of Engine ECM
G	DEF Lamp Return	Output Active Low	Pin 2 of Engine ECM
H	Regeneration Lamp Return	Output Active Low	Pin 23 of Engine ECM.
J	tachometer (+)	Tachometer Output (+)	Body Builder Supplied Sensor, Input on P669 Pin 1
K	tachometer (-)	Tachometer Output (-)	Body Builder Supplied Sensor, Input on P669 Pin 2
L	Remote ECM Power Engine Run	Input 12V (+)	Pin 87 of Remote Run Relay
M	Engine oil Pressure	Output	Body Builder Supplied Sensor, Input on J668
N	NOT USED	NOT USED	
P	Water Temp	Output	Body Builder Supplied Sensor, Input on J667
R	J1939 B-CAN (+)	B-CAN (+)	Pin 43 of CECU
S	J1939 B-CAN (-)	B-CAN (-)	Pin 44 of CECU

Cummins Engine 23 Pin Connector

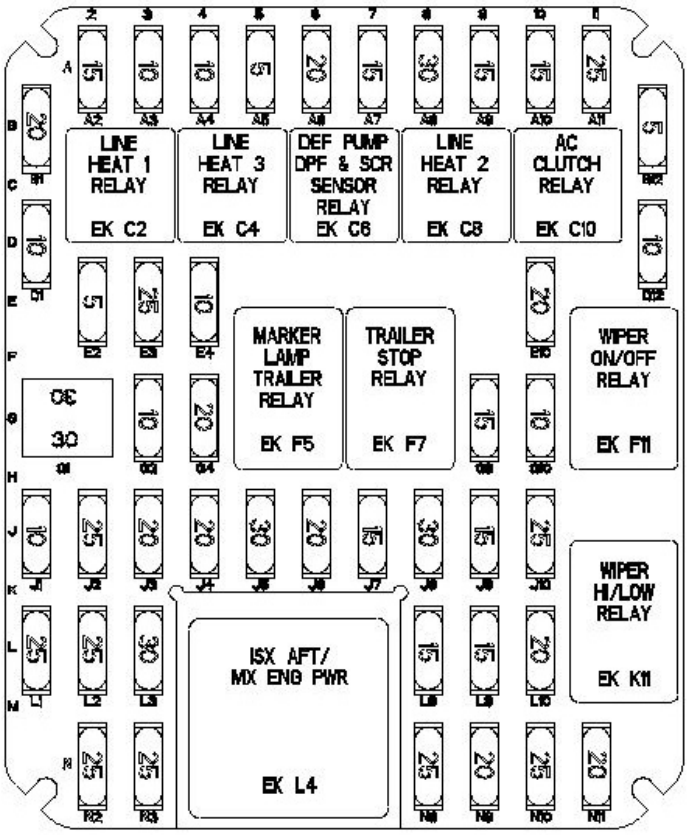


Pin	Description	Input/Output	Destination/Source
A	12 VDC IGN Power	Output 12V (+)	Tied To Pin L of 23 Way Connector. Engine PDC Fuse E9. 10A Fused
B	City Horn	Input 12V (+)	Pin 85 of Horn Relay
C	Check Engine Lamp	Output Active Low	Pin 72 of Engine ECM
D	Remote Start	Input 12V (+)	Pin 87 of Remote Start Relay.
E	Remote Throttle Return	Analog Sensor Ground	Pin 32 of Engine ECM
F	Remote Enable	Input 12V (+)	Pin 85 of Remote Start Relay. Pin 85 of Remote Run Relay
G	Remote Resume	Input Active Ground	Pin 19 of Engine ECM
H	Remote Set	Input Active Ground	Pin 12 of Engine ECM
J	Remote Throttle Position	Input, Variable 0-5V	Pin 63 of Engine ECM
K	Remote Run	Input 12V (+)	Pin 87A of Remote Run Relay
L	12 VDC IGN Power	Output 12V (+)	Tied To Pin A of 23 Way Connector. Engine PDC Fuse E9. 10A Fused
M	J1939 B-CAN (-)	B-CAN (-)	Pin 44 of CECU
N	J1939 B-CAN (+)	B-CAN (+)	Pin 43 of CECU
O	Common Return (General)	Common Ground	Pin 57 of Engine ECM
P	Engine Oil Pressure	Output	Body Builder Supplied sensor, Input on J668
Q	Remote PTO ON/OFF	Input, Active Low	Pin 94 Engine ECM. Pin 85 of Eaton PTO Relay. Pin 85 of PTO Hour Meter Relay
R	DEF Lamp Return	Output, Active Low	Pin 2 of Engine ECM
S	Regeneration Lamp Return	Output, Active Low	Pin 23 of Engine ECM.
T	External Regeneration Notification	Output, Active High	Pin C18 of Chassis Node
U	Common Return (Switch)	Common Switch Ground	Pin 62 of Engine ECM
V	Torque Limit Switch	Input Ground	Pin 93 Engine ECM
W	Remote Throttle Sensor Supply (+5V)	Output 5V (+)	Pin 8 Engine ECM
X	Remote ECM Power Engine Run	Input 12V (+)	Pin 87 Remote Run relay

POWER DISTRIBUTION CENTER

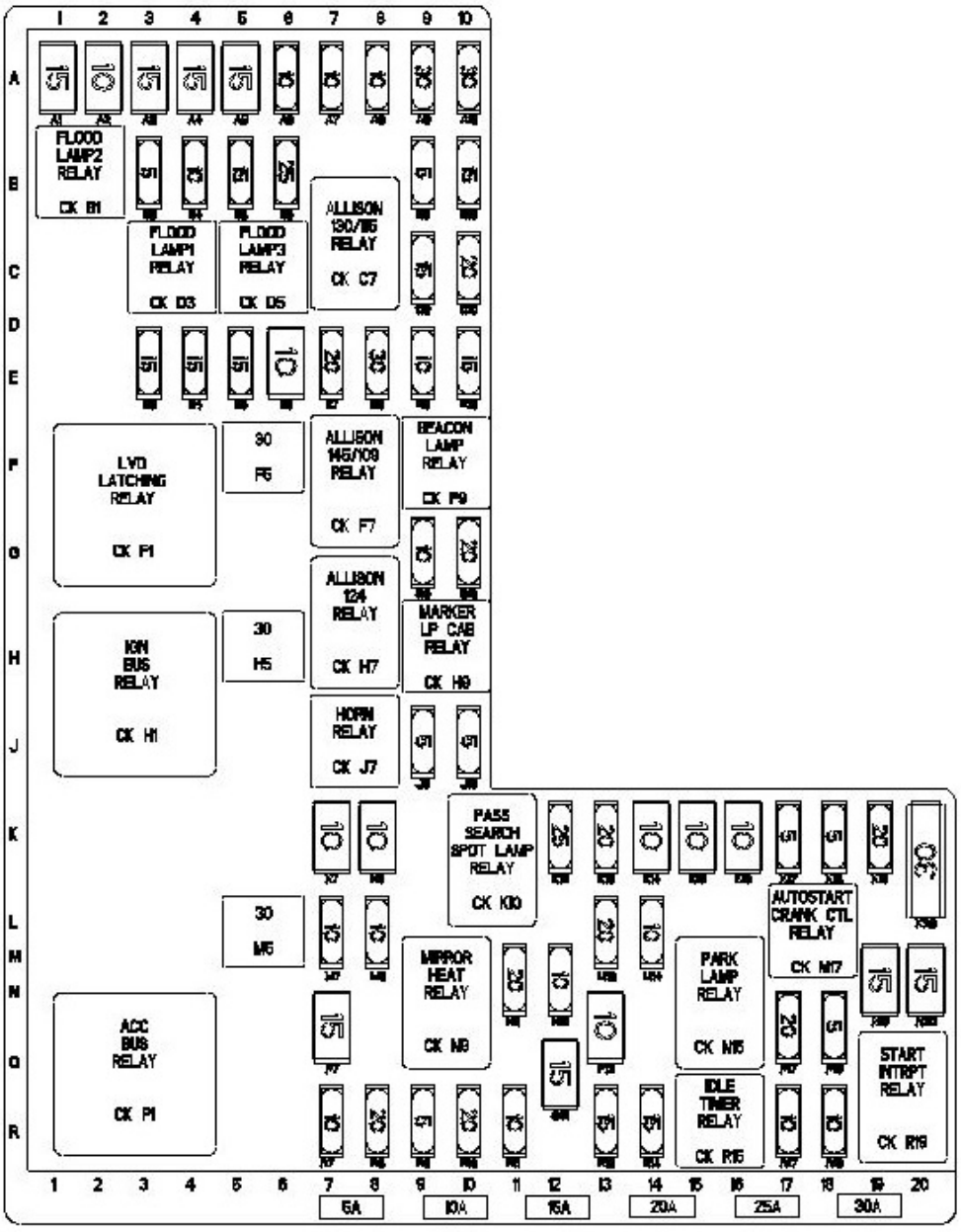


Engine Side Fuse Box Full Content Population



FUSE ID	AMP	DESCRIPTION
A2	15A	LINE HEAT 1 (PRESSURE) -PWR
A3	10A	ALLISON/AUTO/ULTRASHIFT
A4	10A	CHASSIS MODULE
A5	5A	LINE HEAT 3
A6	20A	SCM F1-HDLP LH HI/RH RR TURN/BRK
A7	15A	DEF PUMP / DPF### SENSORS PWR
A8	30A	CAB ABS
A9	15A	LINE HEAT 2 (BACKFLOW) -PWR
A10	15A	AUX TRANS AIR TO OIL COOLER
A11	25A	WIPER MOTOR
B1	20A	EXT REGEN / SPARE IGN
B12	5A	HVAC HEAD PWR
D1	10A	ACC RADAR/TPMS
D12	10A	AC CLUTCH RELAY - PWR
E2	5A	ECU WAKEUP (ENG SIDE)
E3	25A	OCM F6
E4	10A	MUX SOL BANK 2
E10	20A	SPARE BATT 2
G1	30A JCASE	HVAC BLDC MOTOR
G3	10A	MUX SOL BNK 1
G4	20A	OCM F4
G9	15A	ISX AFT / MX ENGINE PWR
G10	10A	VECU BATT PWR 1
J1	10A	CAB ABS PWR -10A IGN
J2	25A	SCM F3-HDLP RH LO/FRNT PARK/RH DRL/TURN
J3	20A	SCM F2-HDLP LH LO/FRNT PARK/LH DRL/TURN
J4	20A	SCM F7
J5	30A	TRLR MARKER RELAY-PWR
J6	20A	OCM F5
J7	15A	BACKUP LAMP
J8	30A	TRAILER STOP RELAY-PWR
J9	15A	VTG
J10	25A	WIPER ON CTL
L1	25A	QUALCOMM TRLR TRACKS
L2	25A	SCM F4-HDLP RH HI/FRNT FOG/PB DRL
L3	30A	AUTO TRANS
L8	15A	MX AFT/ CUM AFT PWR (CNG/LNG)
L9	15A	MX ENG ACC PWR
L10	20A	DCU PWR/LPC(MX)/ISX SM/DEF HT CTL
N2	25A	SCM F5
N3	25A	SCM F6
N8	25A	FRAME FUEL HEATER
N9	20A	MX ENGINE PWR 1
N10	25A	MX ECM
N11	20A	CUM ECM/ MX ACM PWR 1&2

Dash Side Fuse Box Full Content Population



FUSE ID	AMP	DESCRIPTION
A1	15A	FLOOD LAMP 2 +
A2	10A	SPOT LAMP +
A3	15A	FLOOD LAMP 1 +
A4	15A	FLOOD LAMP 3 +
A5	15A	FLOOD BEACON PWR +
A6	10A	BODY IGN
A7	10A	RP1226 IGN
A8	10A	RP1226 BATT
A9	30A	SLEEPER PDC 1
A10	30A	SLEEPER PDC 2
B3	5A	DOOR AJAR SENSOR
B4	10A	VECU BATT PWR 2
B5	15A	CECU BATT PWR 2
B6	25A	PACCAR ANT/SPARE BATT
B9	5A	MASTER SWITCH MODULE
B10	15A	CECU BATT PWR 1
C9	15A	CB/RADIO POWER
C10	20A	OCN F1
E3	15A	SPARE LVD 2
E4	15A	POWER PORT 1
E5	15A	POWER PORT 2
E6	10A	CAB DOME LP +
E7	20A	SPARE LVD 1
E8	30A	RADIO AMPLIFIER
E9	10A	QUALCOMM-BATT
E10	15A	OCN F2
F5	30A KASE	RH DOOR MOD
G9	10A	EOAS
G10	20A	TELEMATICS
H5	30A KASE	LH DOOR MOD
J9	5A	DIAGNOSTIC POWER
J10	5A	CECU LVD V SENSE
K7	10A	HORN RELAY - PWR +
K8	10A	CAB MARKER PWR 1 +
K12	25A	MX ON ENG FUEL HT
K13	20A	SPARE IGN 1
K14	10A	ETRAC VALVE +
K15	10A	VECU STOP LAMP SW +
K16	10A	PARK LAMP CAB PWR 1+
K17	5A	CECU/VECU IGN PWR
K18	5A	RH STALK SHITTER
K19	20A	OCN F3
K20	30A	TRAILER HOT LINE +
M5	30A KASE	SLEEPER PDC 3
M7	10A	SPLICE FEED IGN
M8	10A	RH HEATED SEAT
M13	20A	SPARE IGN 2
M14	10A	SIGN LAMP SW
M11	20A	SPARE ACC 2
M12	10A	LH HEATED SEAT
M19	15A	LH MIRROR HEAT +
M20	15A	PARK LAMP TRLR PWR+
P7	15A	AIR DRYER +
P13	10A	GAUGE CLUSTER +
P17	20A	SPARE ACC 3
P18	5A	HVAC HEAD ACC
Q12	15A	RH MIRROR HEAT +
R7	10A	SPARE ACC 6
R8	20A	SPARE ACC 1
R9	5A	VECU/CECU ACC PWR
R10	20A	SPARE ACC 1
R11	10A	REMOTE DIAG
R13	15A	SPARE ACC SW 3.4&5
R14	15A	SPARE ACC SW 1&2
R17	10A	SPARE ACC 4
R18	10A	RADIO WAKE UP

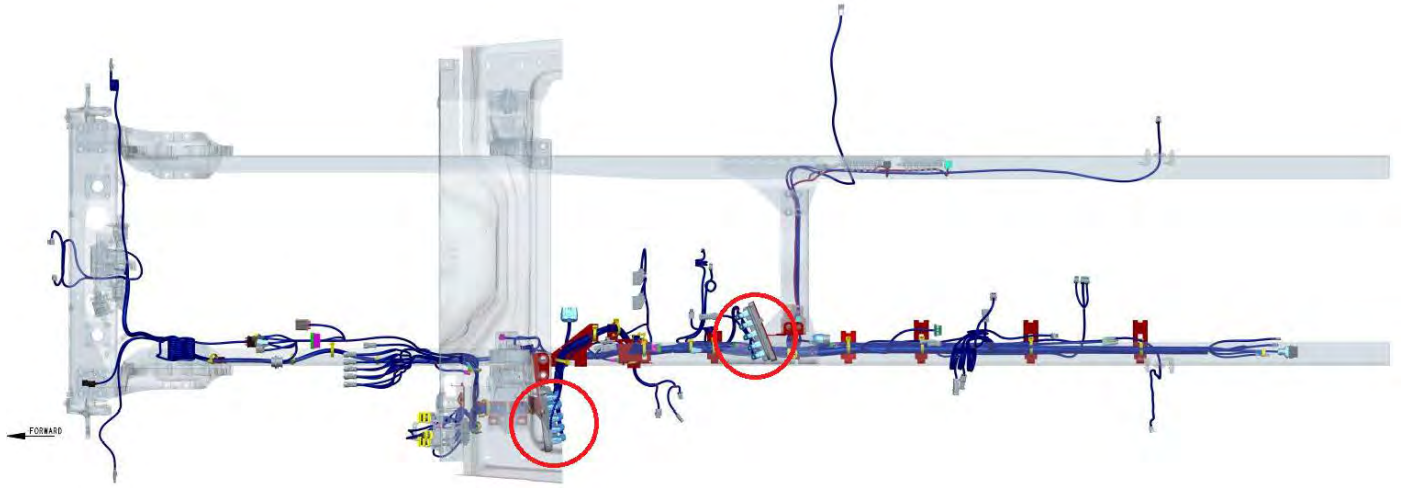
CHASSIS MODULE

The standard chassis modules are replacing the legacy NAMUX4 chassis node. The standard chassis modules are a slave I/O driver controlled by the VECU. The standard chassis modules have an expanded functionality and option platform growth in comparison to the chassis node. There is hardware and software based protections to prevent damage. The standard chassis modules will generate and store faults to free up space for the VECU. The standard chassis module can be diagnosed through DAVIE service tool.

There will be two standard chassis modules with one a primary chassis module on all trucks and a secondary for optional content. The primary chassis module will be mounted under the cab on the left hand side of the over-bell mounting bracket. The secondary optional chassis module will be located above the rail on the left hand side on the back of cab cross-member.

Chassis Module Locations

Plan View of Chassis Module Locations



CHASSIS MODULE FUNCTION DESIGNATION

Primary Chassis Module

- Exterior Lighting: Headlamps, Park/Tail, Turn, Brake, DRL, Reverse etc.
- Axle Temperature Sensor Inputs Front Rear and Rear
- Ammeter Sensor Input
- Secondary Kingpin Release Solenoid Control
- Primary/Secondary Fuel Level Sensors
- Lift Axle Air Solenoid Controls 1st, 2nd
- Primary Transmission Neutral Position Switch
- Remote PTO/Throttle Control Inputs
- J-CAN Multiplexed EOA Solenoid Bank Control
- Fuel Filter Gauges
- Main Transmission Oil Temp

Secondary Chassis Module

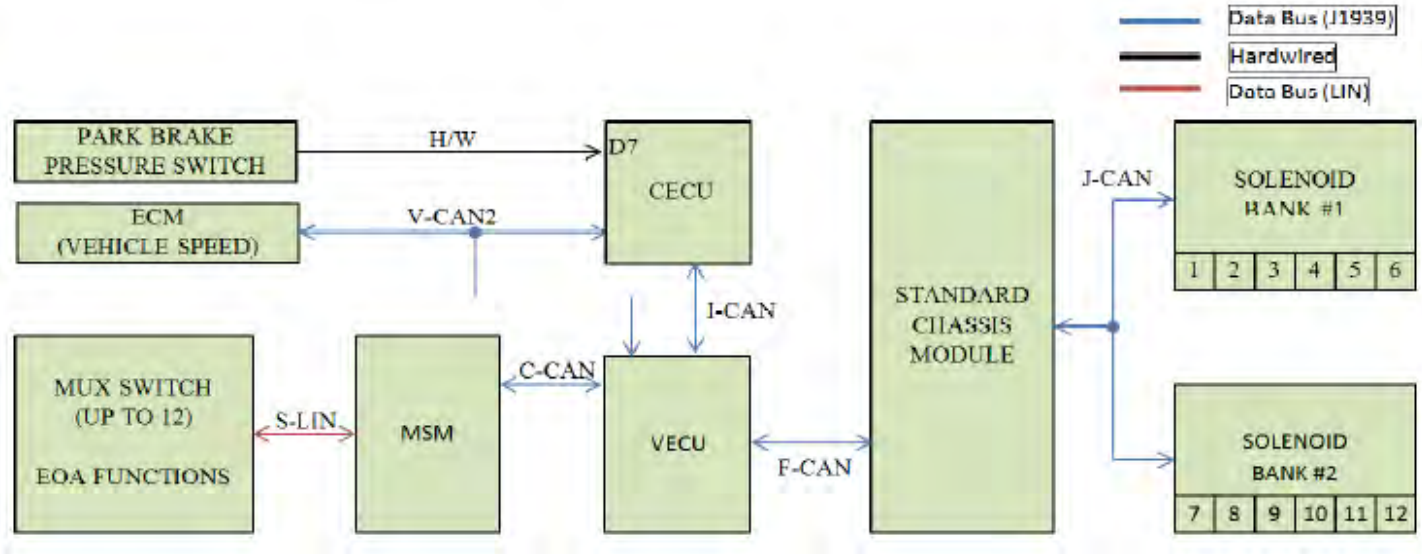
- External Notification of DPF Regeneration
- AT1202 Aux Trans Neutral Switch
- Axle Temperature Gauges Center Rear
- Lift Axle Air Solenoid Controls 3rd , Tag (Rocker Panel Controls)
- NAMCO/FABCO Splitshaft PTO/Transfer Case Sensors
- Aux Transmission Temperature Sensor
- Split Shaft PTO Temperature Sensor
- Fuel Temp Sensor (Auto Start)
- Chicken/Panel Lamps, Snow Plow Lamp
- ISO 3731 Spare Outputs
- B-CAN
- Auto Start/Stop Hood Tilt Switch
- City Horn

ELECTRIC OVER AIR SOLENOIDS

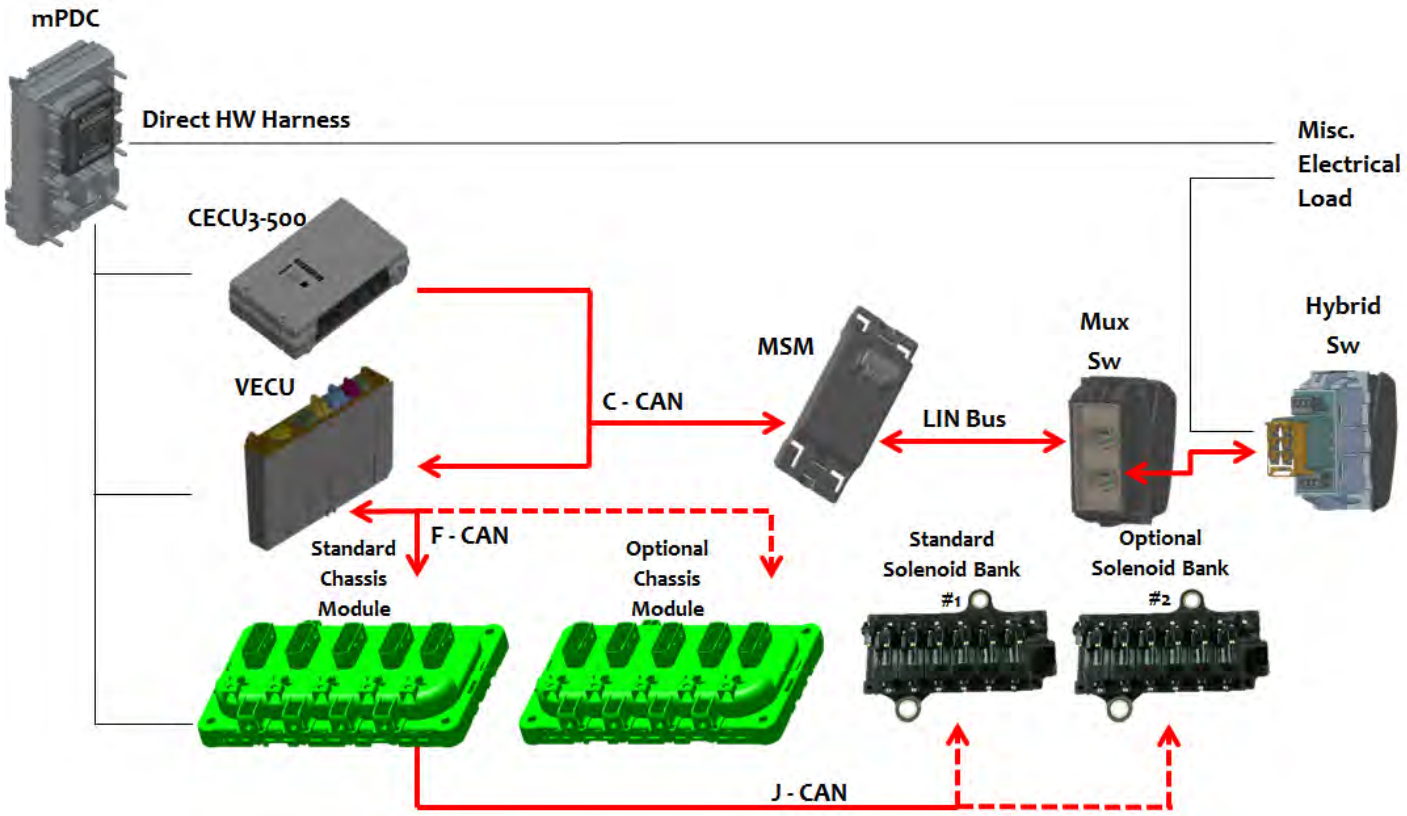
Air solenoids are devices that translate the electrical signal into physical functions that controls the air pressure in various circuits. The air solenoids are mounted to a bracket outside the cab. The solenoids are designed to stack on each other so that they share a common air supply which reduces the amount of air lines on the vehicle.

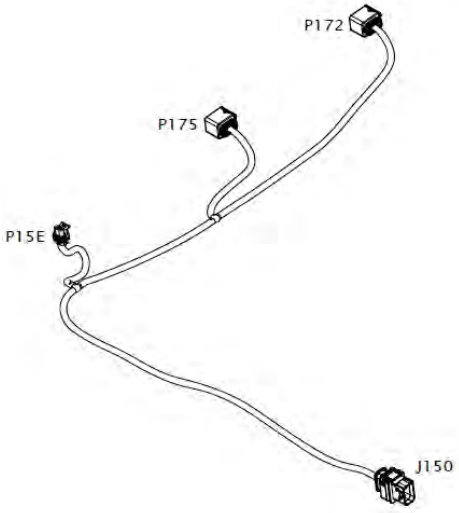
The aftermarket installer/final vehicle manufacturer needs to decide what type of valve to install and ensure that the documentation to the operator provides them with enough understanding of how the customized switches work.

SOLENOID BANK DIAGRAM

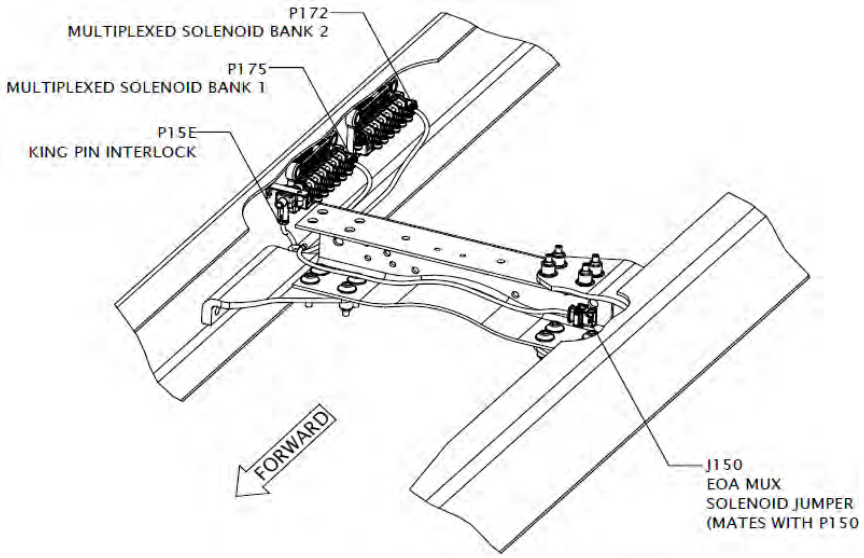


Overview Layout





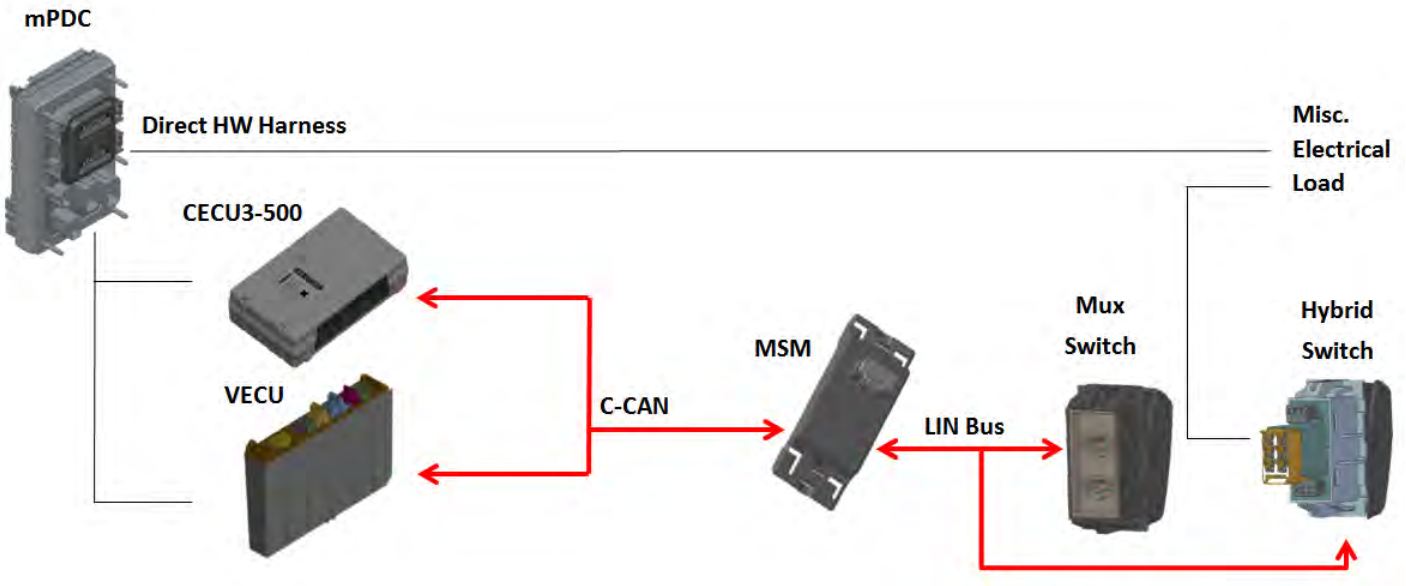
HARNESS VIEW



ROUTING VIEW
(COPONENTS HIDDEN AND CUT FOR CLARITY)
(VIEW ROTATED)

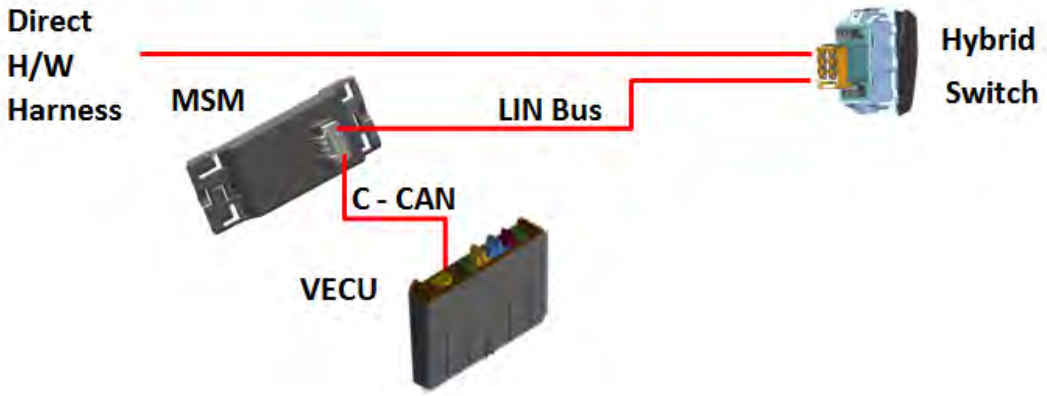
SWITCHES

Overview Layout



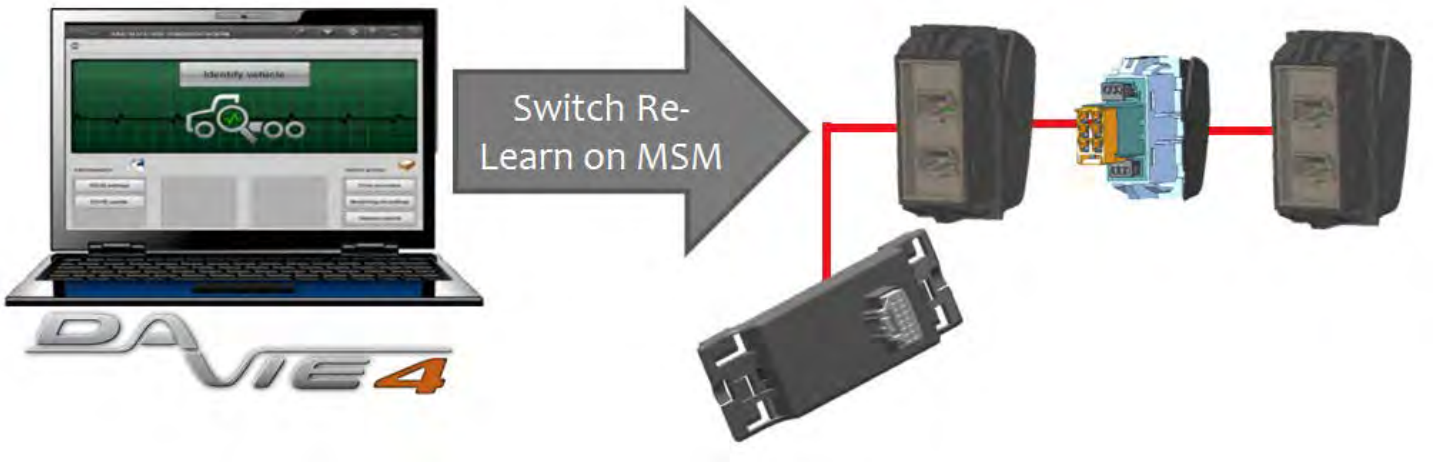
Multiplexing = shorter wire bundles, improved diagnostics, and greater driver feedback. Safety critical switches use hybrid switch with hardwire for redundancy. The switches are less expensive with fewer wires behind the dash and on chassis. The switches are self-diagnosable to improve troubleshooting with DAVIE.
Master Switch Module (MSM)
LIN Communication to/from Switches
CAN Communication to/from VECU

Spare Switches



Spare switches offer customers and body builders a convenient way to control power and air to various sources, like a body or trailer. They should be flexible and easily configurable to meet the vast and unique needs of body builders.

SWITCH RELEARN PROCESS



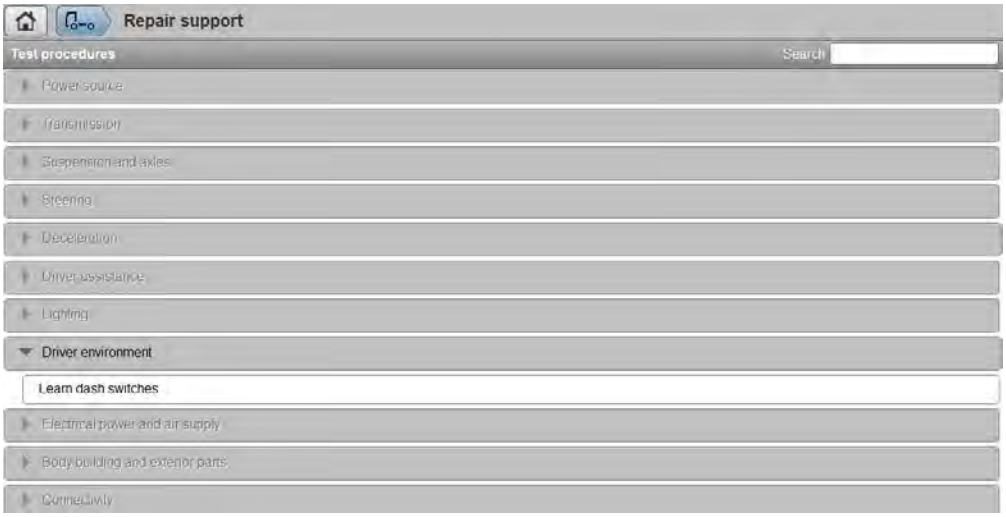
Switch replacement installation instructions:

1. Turn off the engine and all switches
2. Remove dash panel
3. Unplug LIN jumpers from the original existing switch
4. Remove original switch
5. Replace the old switch with the new switch
6. Reconnect LIN jumpers into the replacement switch
7. Reinstall the dash panel
8. Open DAVIE application
9. Select the “Repair Support” tab.
10. Select the “Driver Environment” tab
11. Select the “Learn Dash Switches”
12. When prompted by DAVIE Cycle the key on and then off
13. Run “Quick Check”
14. Clear Inactive DTCs (Diagnostics trouble code) from MSM
15. Finished

New switch installation instructions:

1. Turn off the engine and put all switches into the off position
2. Remove the dash panels
3. Remove the switch blank
4. Add the new switch into the dash panel
5. Connect the LIN jumper between the last open switch to the newly installed switch
    a. Part Number S92-1127-0125
6. Reinstall the dash panel
7. Open DAVIE application
8. Select the “Repair Support” tab.
9. Select the “Driver Environment” tab
10. Select the “Learn Dash Switches”
11. Cycle the key on and then off
12. Run “Quick Check”
13. Clear Inactive DTCs (Diagnostics trouble code) on the MSM
14. Finished

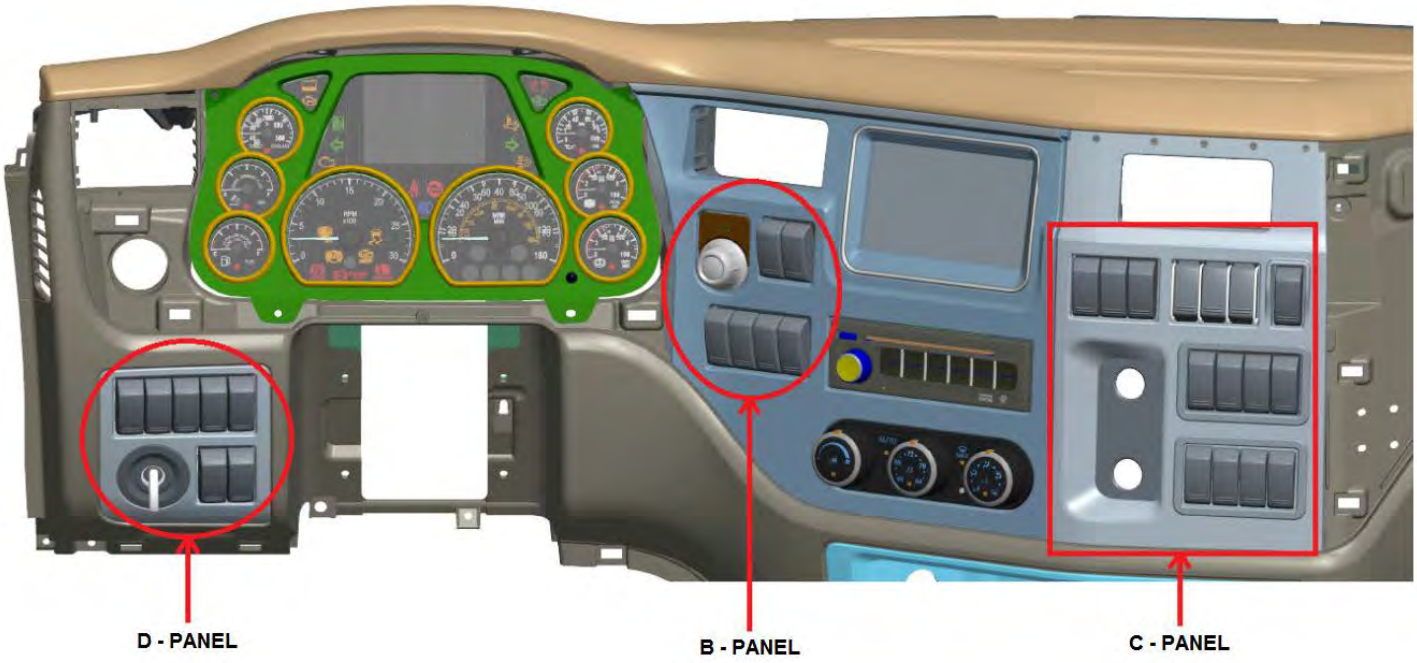
DAVIE Switch Relearn Screen View



Switch Location

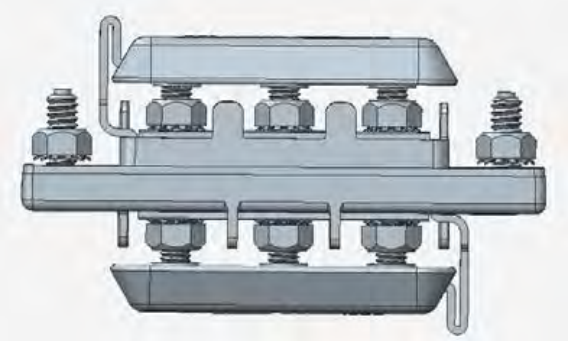
Switches on the same LIN bus can be reordered in any configuration without the need to run a relearn process with DAVIE tool. Switches that are swapped across LIN busses will need to be relearned with DAVIE. LIN bus 1 consisted of all the switches on the D panel and B panel. LIN bus 2 consists of all the switches the C panels.

Dash layout

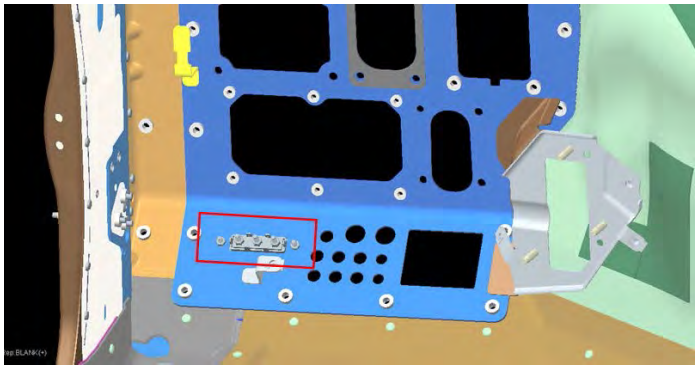


GROUNDING

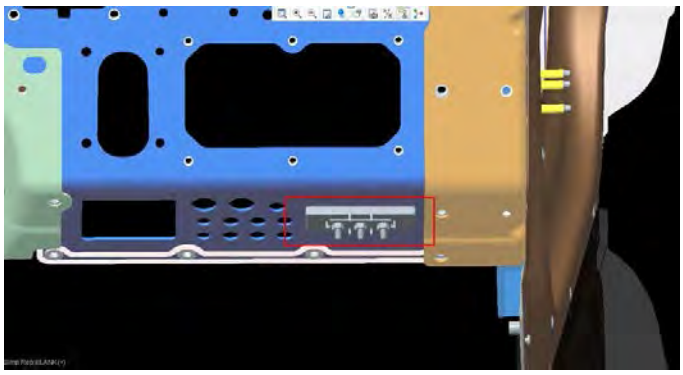
Grounding any post-OEM component/device/apparatus/etc. to the metal cab structure or frame is not acceptable. Failure to properly ground add-on components can result in vehicle damage and possibly bodily injury.
Ground all post-OEM component/device/apparatus/etc. with combined current draw of less than 30A to the firewall ground buss bar with appropriately sized wire/cable for the load required.



Grounding Buss Bar Design



Grounding Point - Cab Interior Behind Driver's Side Kick Panel

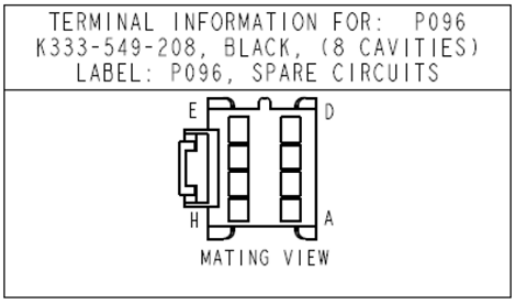


Grounding Point - Cab Exterior LH Side of Firewall

Post OEM components/devices/apparatus/etc. with combined current draw in excess of 30A, ground must be attained from vehicle batteries directly with appropriately sized wire/cable for the load required.

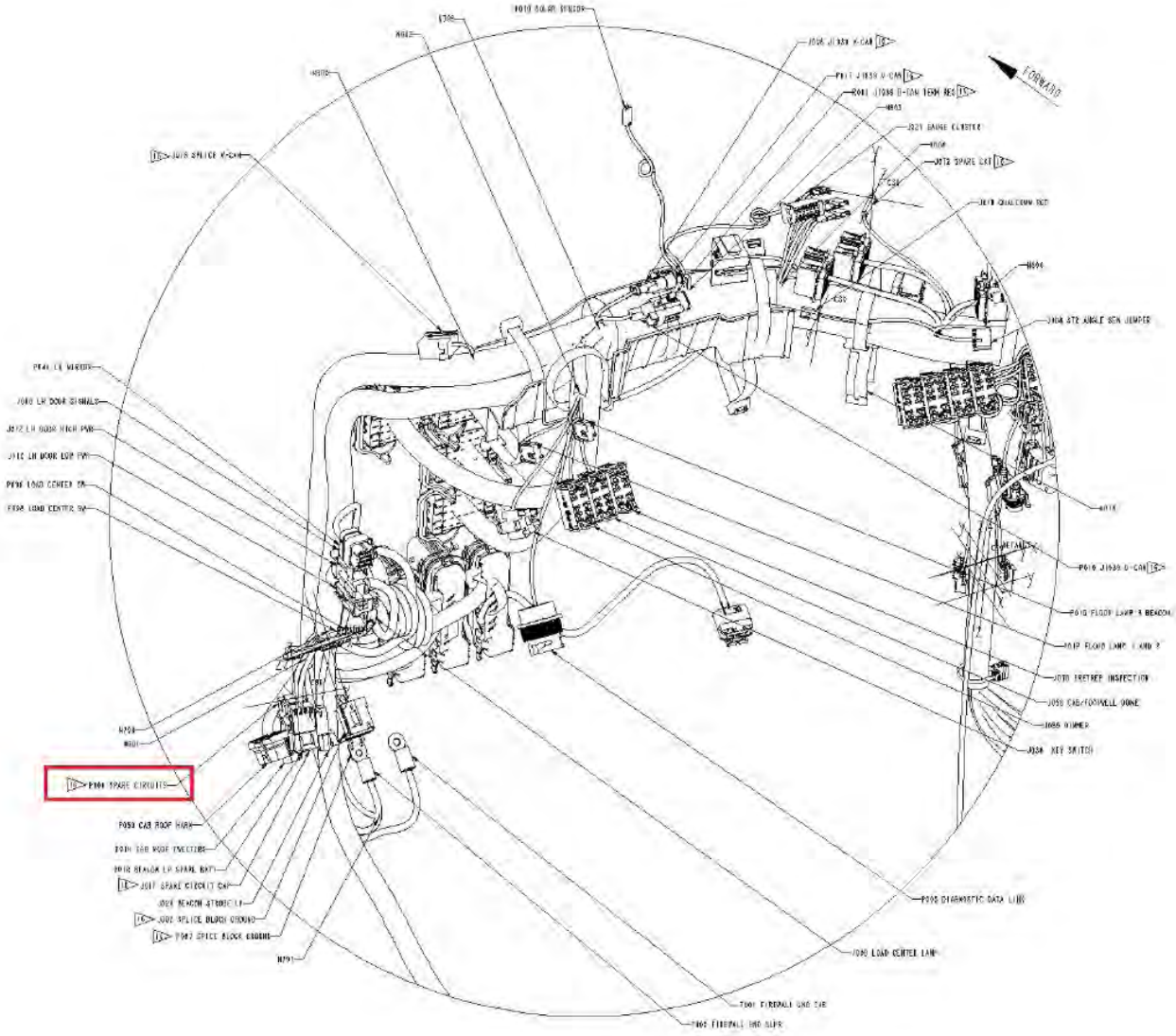
SPARE POWER

Spare power connector P096 is located on lower left side of dash behind key switch or kick panel. The mating harness is available from PACCAR parts with pre-labeled pigtails, P92-8916-000000001. Any spare power requiring more than 20 amps must go directly to the battery box, not this spare circuit.

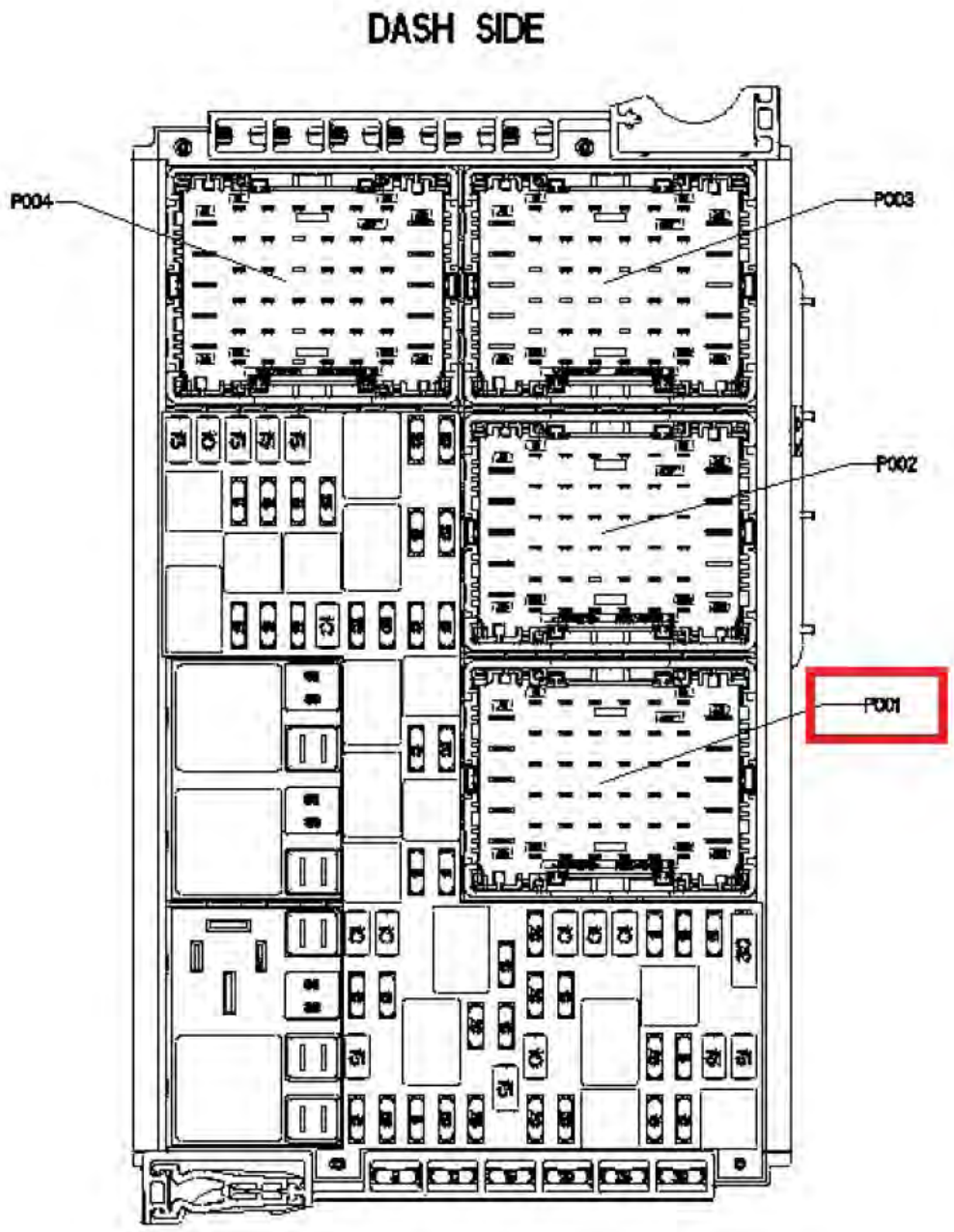


Pin	Spare Circuit No.	Designation	Fuse Location and Max Rating
F	ORN0731-001	Spare Ignition #2	Cab Side M13 - 20A
C	ORN0752-001	Spare Accessory #1	Cab Side R10 - 20A
E	ORN0731-002	Spare Ignition #1	Cab Side K13 - 20A
B	RED0712-002	Spare Battery #1	Cab Side G10 - 20A (Not Available on Chassis Built Between
G	ORN0791-001	Spare LVD #1	Cab Side E7 - 20A
A	RED0711-001	Spare Battery #2	Engine Side E10 - 20A (Not Available on Chassis Built After

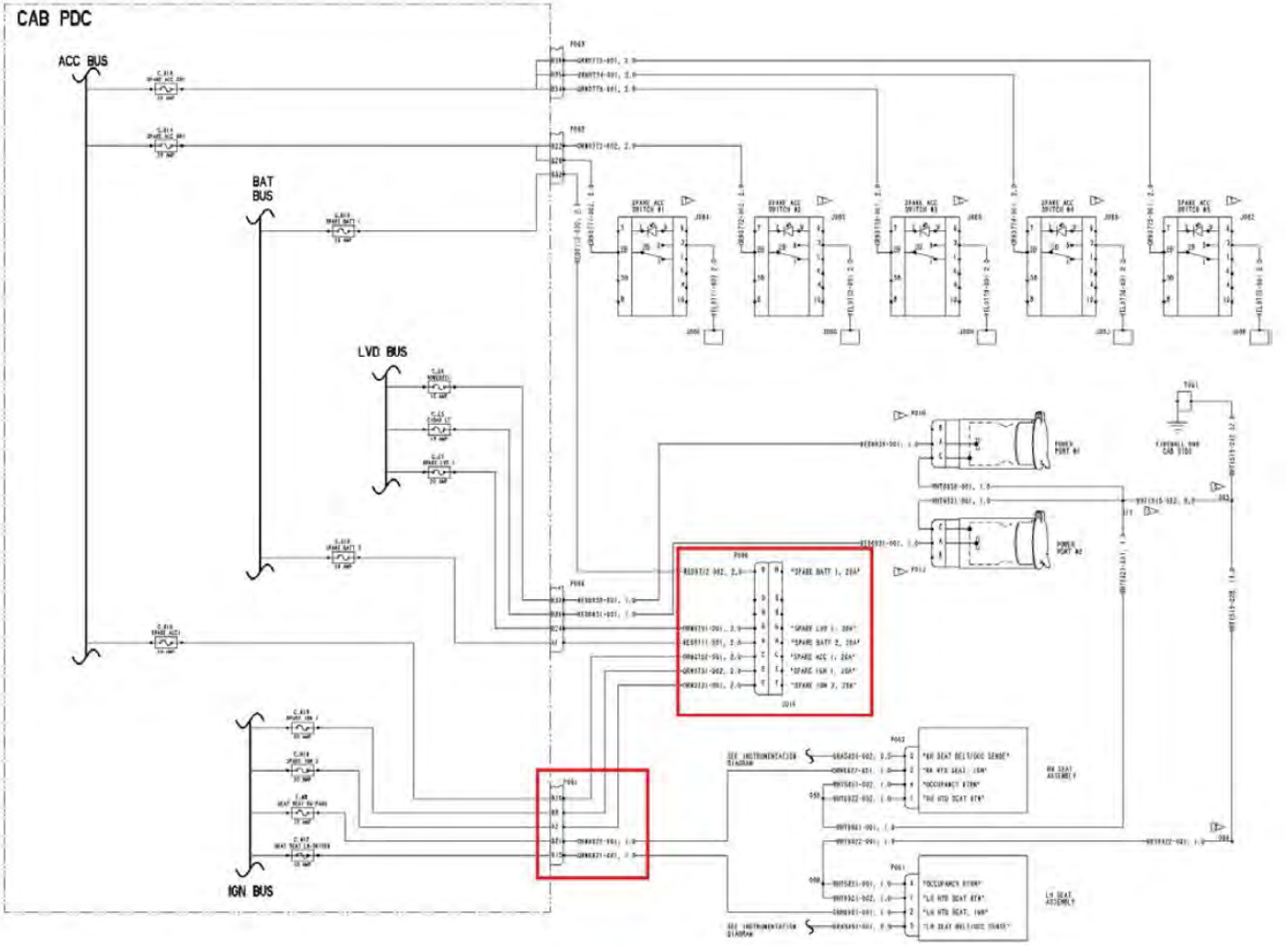
Spare Circuit Connector and Pinout Details



Spare circuit location under-dash P096



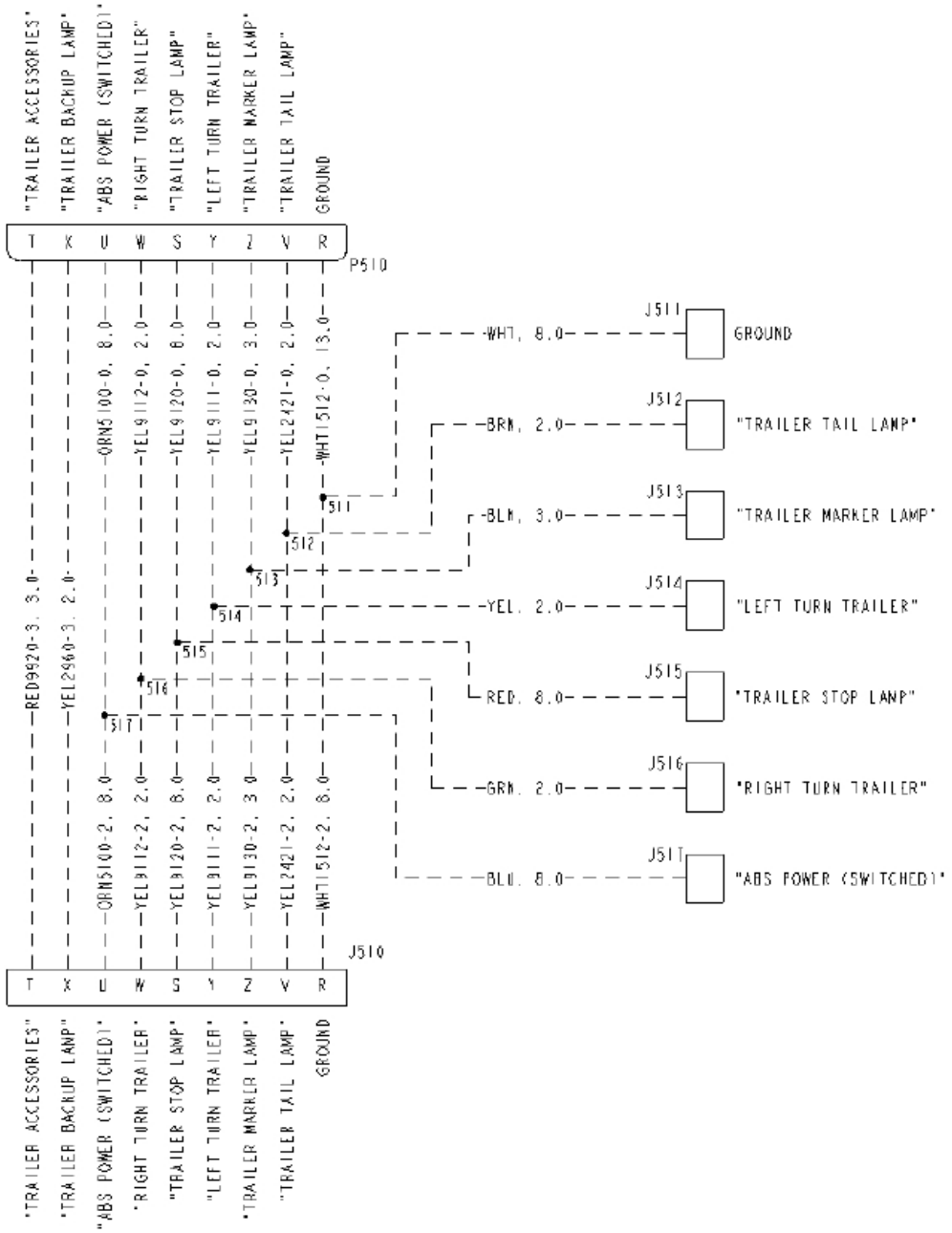
Spare circuit location on Power Distribution Center (Dash-Side, P001)



Spare circuit diagram (P001 and P096)

JUNCTION BOX

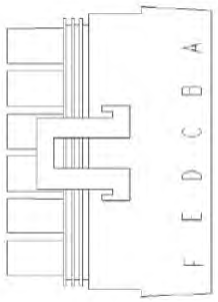
The junction box provides access to lighting signals.



Junction Box BOC or EOF

TRANSMISSION BACK UP SIGNALS

The back-up signal can be accessed from pin D of the 6-way tail light connector located at the end of frame. The tail light connector is a 6-way connector located in the chassis harness at the end of frame. It will either be connected to a tail light, a jumper harness, or tied up in the rail if no tail lights are provided.



PIN	CIRCUIT DESCRIPTION
A	Park Lamp
B	Left Turn/Stop Lamp
C	Right Turn/Stop Lamp
D	Backup Lamp
E	Aux Chassis
F	Ground

Mating Connector: Packard PN 12020786

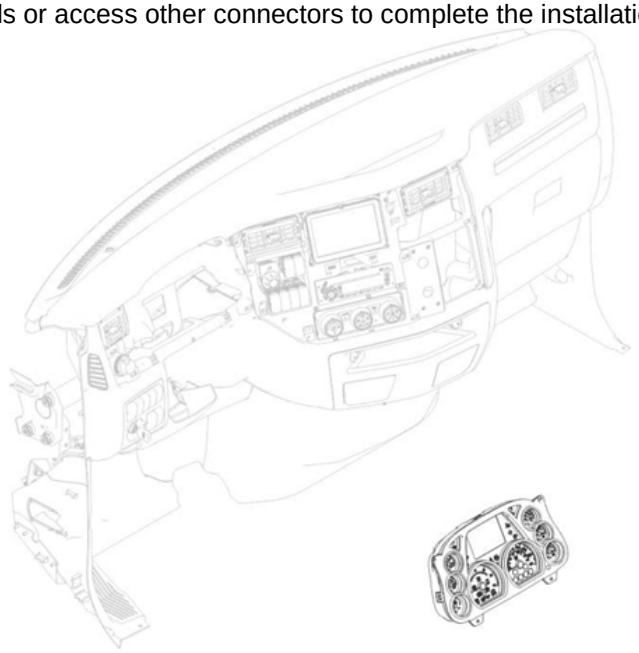
SNOW PLOW LIGHTING

When the optional switch and wiring for snow plow lights are ordered, the truck will include a switch on the dash to control the snow plow lights and a body builder connection at the front of the chassis.

The body builder connection will provide electrical support for:
-LH TURN/FRONT DAYTIME RUNNING LIGHT
-RH TURN/FRONT DAYTIME RUNNING LIGHT
-LH SIDE TURN LIGHT
-RH SIDE TURN LIGHT
-CAB PARK LAMP
-LH LOW BEAM
-RH LOW BEAM
-LH HIGH BEAM
-RH HIGH BEAM
-GROUND

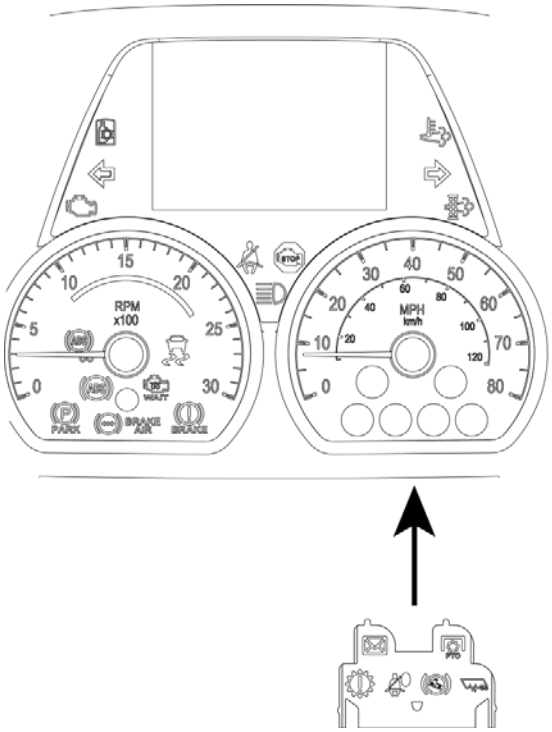
TELLTALE ICONS

Removing the first panel will allow the panel covering the instrument cluster to be removed. Removing the cluster is necessary to install telltale symbols or access other connectors to complete the installation.



Cluster Removal

To install new telltales into the instrument cluster, the cluster will need to be removed from the dash. The instrument panel trim is removed after removing the panel immediately to the right of the instrument cluster. Then 4 fasteners hold the instrument cluster to the dash structure.

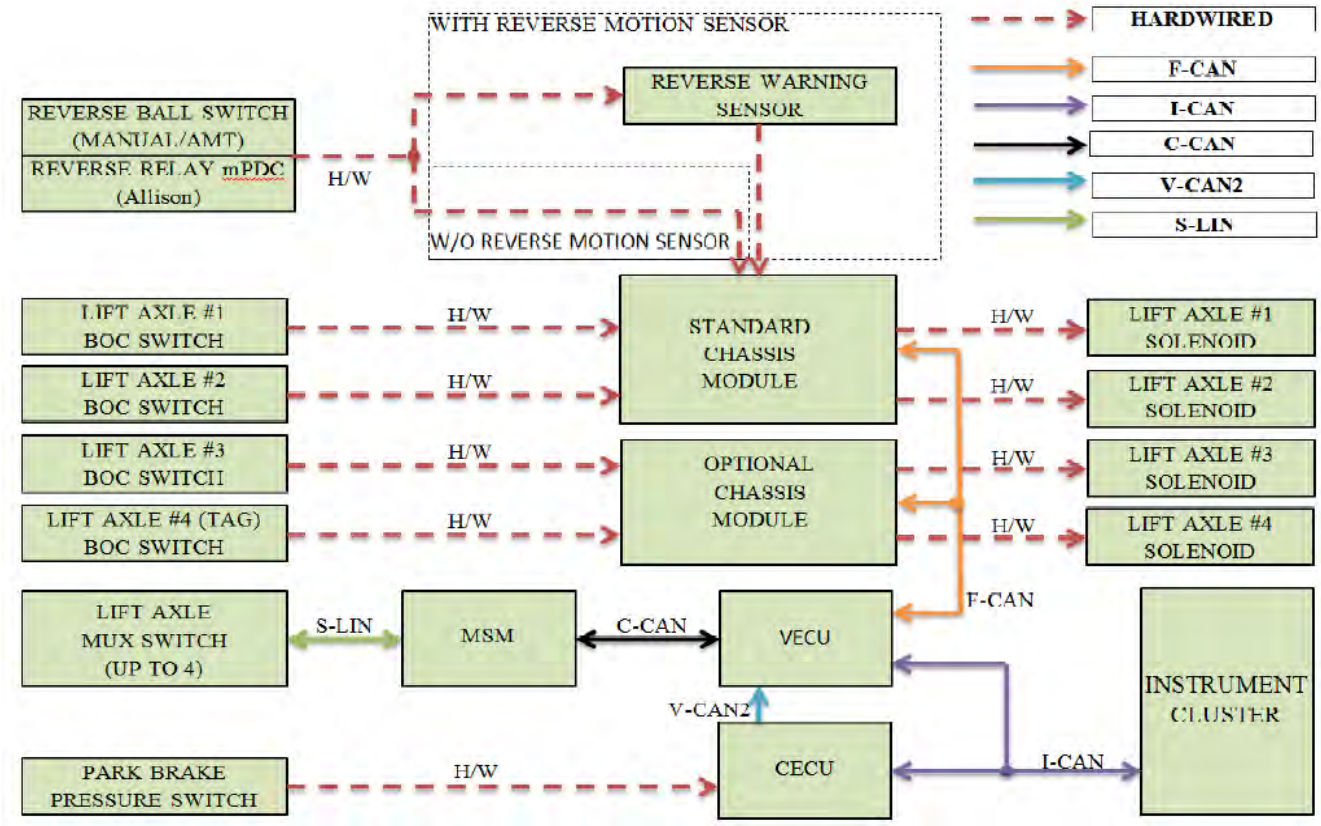


Telltale Installation

LIFT AXLES (PUSHERS & TAG)

All truck lift axles (pushers and tag), are direct wire Electric-Only from the switch to the axle mounted solenoid. This is not from the EoA Solenoid Bank. There are a total of four lift axle controls available; 3 pushers and 1 tag axle. These are controlled with separate switches by default. The customer can order the following configurations; steerable, non-steerable, with auto-reverse, and with park brake interlock. A lift axle comes with a control switch (single or separate), a gauge, and a regulator valve.

Lift Axle Diagram



Truck Lift Axle Logic

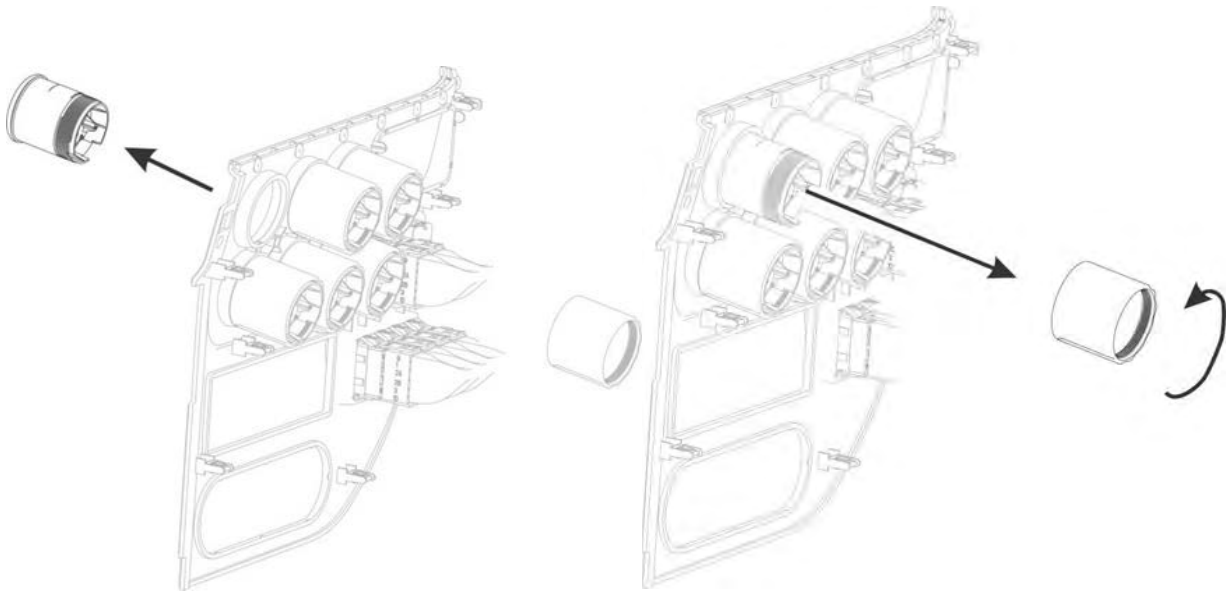
Lift Axle Type	Raise Condition Logic	Lower Condition Logic
Steerable Lift Axle w/o Auto-Reverse	- Lift Switch is Inactive OR - Park Brake Active OR - Trans in Reverse	- Lift Switch is Active AND - Park Brake Inactive AND - Trans Not is Reverse
Steerable Lift Axle with Auto-Reverse OR Non-Steerable Lift Axle w/o Park Brake	- Lift Switch is Inactive OR - Park Brake Active	- Lift Switch is Active AND - Park Brake Inactive AND
Non-Steerable Lift Axle with Park Brake	- Lift Switch is Inactive AND - Park Brake Inactive	- Lift Switch is Active OR - Park Brake Active

TRAILER LIFT AXLE

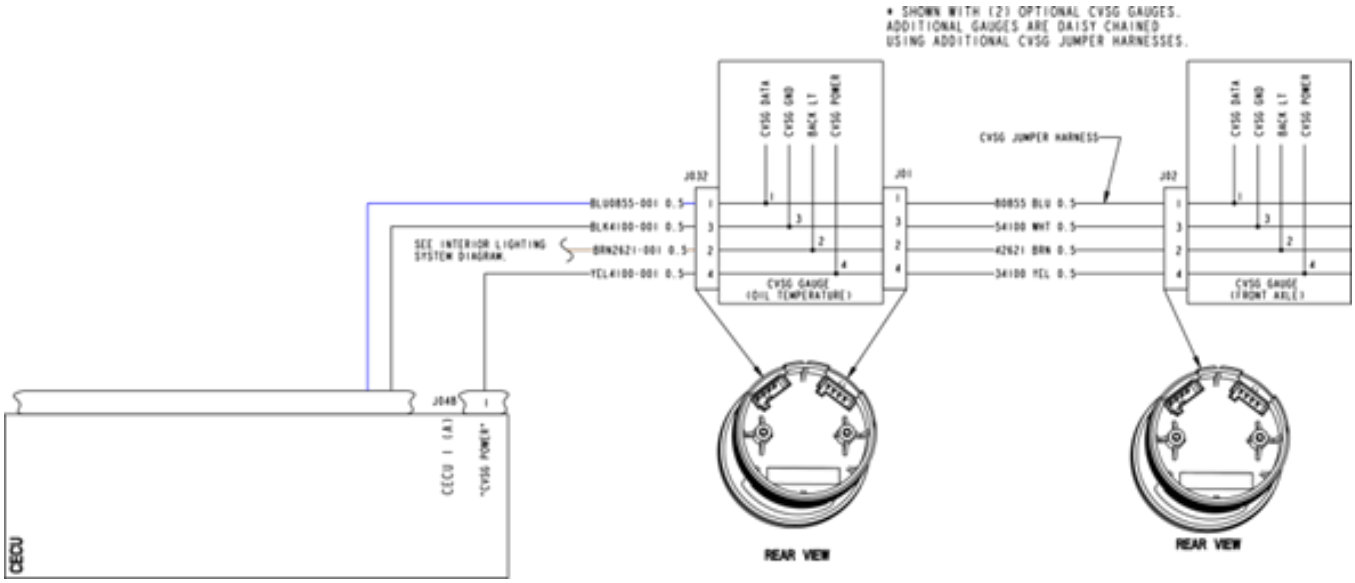
Trailer lift axles can be either EoA or Electric-Only type. There are a total of two available EoA trailer lift axle controls using latching solenoids. If one axle is ordered, the customer will receive a switch labeled “Trailer Lift Axle”. If two axles are ordered the customer can have a single switch that controls both axles or two switches. If two switches are present they are labeled “Forward Trailer Lift Axle” and “Rear Trailer Lift Axle”.

GAUGES

Gauges and switches are fastened directly to the panel. Once the panel is free, the gauge or switch can be installed. Gauges are held by a screwed on collar while switches have a plastic tab.



Optional gauges may be installed and connected to the CECU via a jumper harness. See the Dash section below for additional information.



Installing Additional Gauges on the Dash

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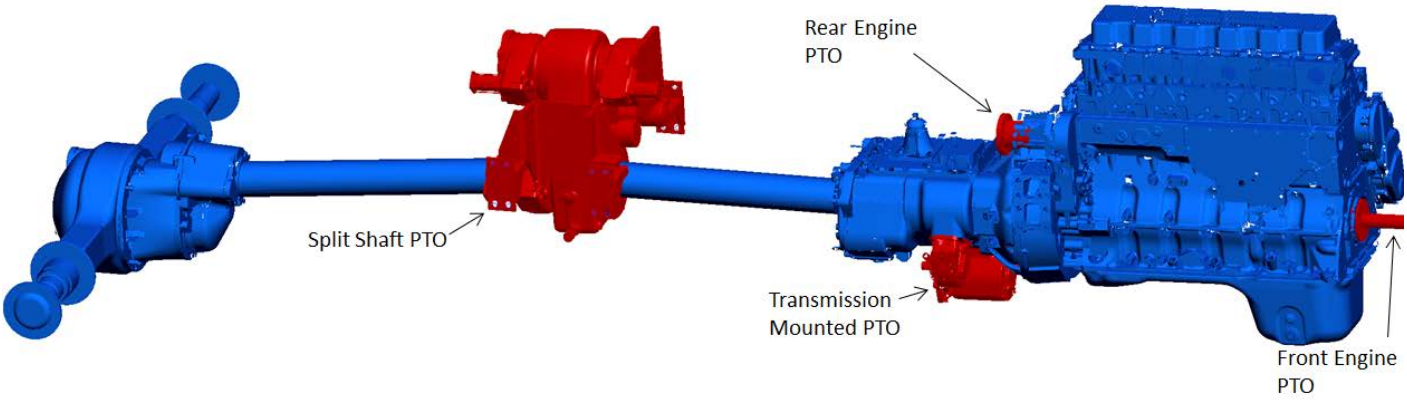
SECTION 8 POWER TAKE-OFF (PTO)

INTRODUCTION

A Power Take Off (PTO) provides a way to divert some or all of the trucks engine power to another component. There are a wide variety of PTO options available.



PTO Acronym Library

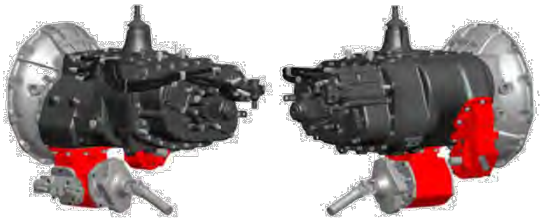
Acronym	Definition	Acronym	Definition
ABS	Anti-Lock Braking System	PMC	PTO Mode Control
CAN	Controller Area Network	PSC	PTO Speed Control
CC	Cruise Control	PTO	Power Take Off
CECU	Cab Electrical Control Unit	PVP	PACCAR Vehicle Pro
DEF	Diesel Exhaust Fluid	RP1226	TMS Messaging Standard
DTC	Diagnostics Trouble Code	SCM	Standard Control Module
ECM	Engine Control Module	SCR	Selective Catalyst Reduction
ECU	Electrical Control Unit	SPN	Suspect Parameter Number
EIST	Engine Idle Shutdown Timer	TCM	Transmission Control Module
EOA	Electric Over Air	TSC1	Torque Speed Control (request)
EOH	Electric Over Hydraulic	VECU	Vehicle Electrical Control Unit
FIC	Fast Idle Control		
J-1939	SAE CAN Communication Standard		
LIN	Local Interconnect Network		
MSB	Master Solenoid Bank		
MSM	Master Switch Module		
MUX	Multiplex		
OBD	On Board Diagnostics		
OCM	Optional Control Module		
OEM	Original Equipment Manufacture		
PCC	Predictive Cruise Control		
PDC	Power Distribution Center		
PGN	Parameter Group Number		

TRANSMISSION MOUNTED PTO

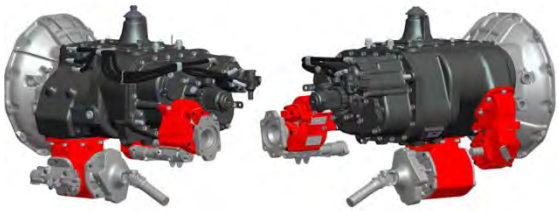
MANUAL TRANSMISSIONS

This is the most common type of PTO that is used. On a manual transmission there are two locations for PTO's. On medium duty transmissions there are 6 bolt PTO locations on the right and left. On heavy duty manual transmissions there is a 6 bolt PTO on the right and an 8 bolt PTO on the bottom left. There are also some options for a thru shaft or extended countershaft PTO. On a thru shaft PTO, the counter shaft extends out through the back of the transmission which can be used to power a PTO. When using a thru shaft PTO the vehicle must be spec'd with the correct option as not all transmissions will be set up for use with thru shaft PTO's. For more information go to www.roadranger.com and enter "PTO Installation Guide" in the search bar in the upper right corner.

MD Manual Transmission

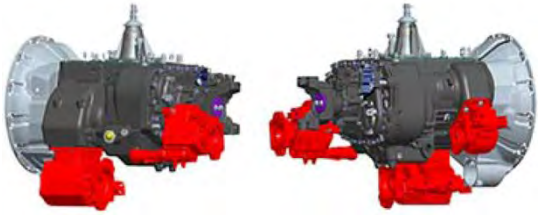


HD Manual Transmission - RT

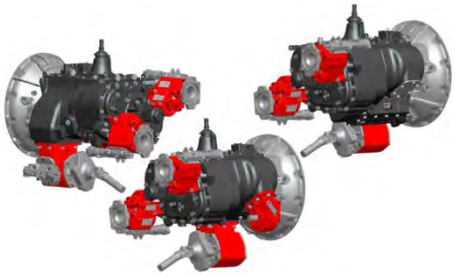


HD Manual Transmission – RT Vocational

HD Manual Transmission – RT Performance



HD Manual Transmission – Fuller Advantage



HD Manual Transmission – FR Series

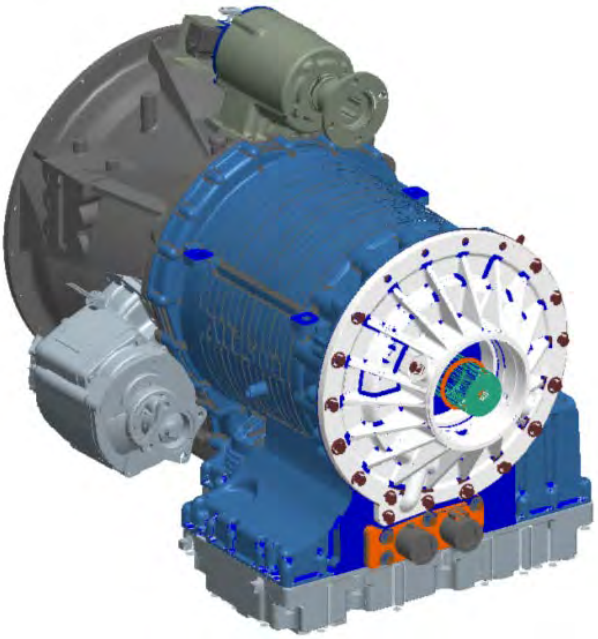
MD Automated

HD Automated – Ultrashift Plus – VCS and VMS

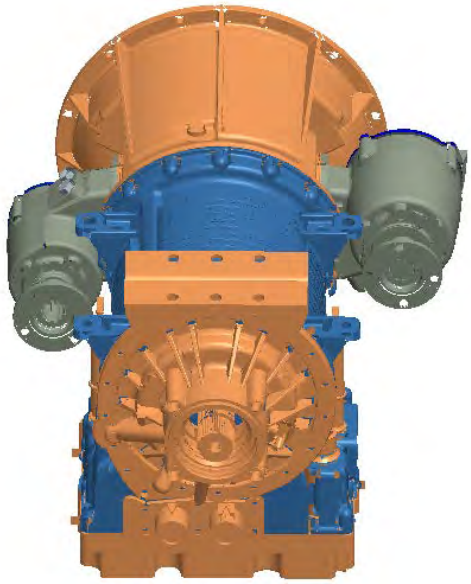
AUTOMATIC TRANSMISSIONS

On Allison transmissions there are two locations for PTO's. The Allison 4000 series has PTO locations at 1 and 8 o'clock viewed from the back of the transmission. The 4000HS transmissions do not have any PTO locations. The 3000 series Allison transmissions have PTO locations at 4 and 8 o'clock. For more information on using PTO's with an Allison transmission go to www.allisontransmission.com and refer to the "Rugged Duty Series Brochure" and "PTO Request Flyer" which is available in a 1000/2000 version and a 3000/4000 version.

Some PTO configurations will have clearance issues with other components on the truck. With manual transmissions, a 6-bolt PTO on the right will typically clear most components when the DPF and SCR are under the cab. This is also true when 30 and 45 degree adapters are used. The 8-bolt bottom mount PTO will not have any issues unless you are running a driveshaft back to another component and the truck has a crossover style exhaust. In this case, the DPF and SCR would block any routing for the driveshaft. If a wet kit is used in this scenario there is enough room to mount the PTO and the hydraulic pump without interfering with the exhaust. On Allison 4000 series transmissions, most PTO's will fit in the 1 o'clock position without interfering with the cab. If a wet kit is used here, the dipstick housing will most likely need to be modified as it runs over the top of the transmission to the driver side of the vehicle. The PTO in the 8 o'clock position is typically ok. The same issue with crossover exhaust would apply here as well. There are some scenarios where the PTO will be very close to or could interfere with the rear spring shackle on the front suspension. This problem can occur on vehicles with a set-back front axle and the problem is amplified on the short hood models.



Allison 4000 Series

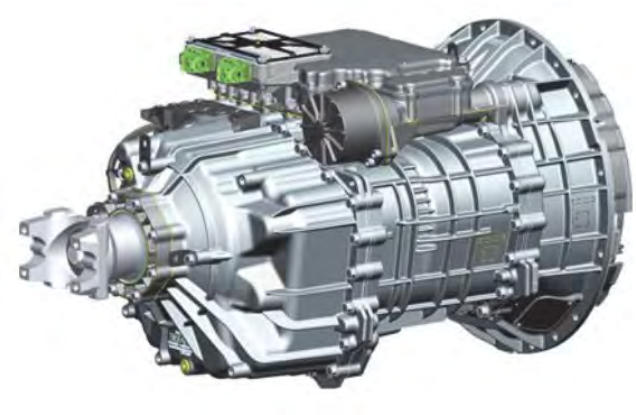


Allison 3000 Series

AUTOMATED TRANSMISSIONS

PACCAR 12 Speed And Endurnat Transmission

The automated transmission is ideal for highway fleets interested in a light-weight fuel efficient transmission. The transmission also offers broad torque coverage of 1450 to 1850 lb-ft without the use of an oil cooler. The Transmission requires a different type of PTO, previous PTO models are not compatible. Contact PTO manufacturer to verify the correct PTO for the automated transmission. Failure to use the correct PTO results in transmission damage. PTO Capabilities are 8-bolt, bottom-mount, 95 HP available while stationary and at low speeds in gears 2, 4, and R2.



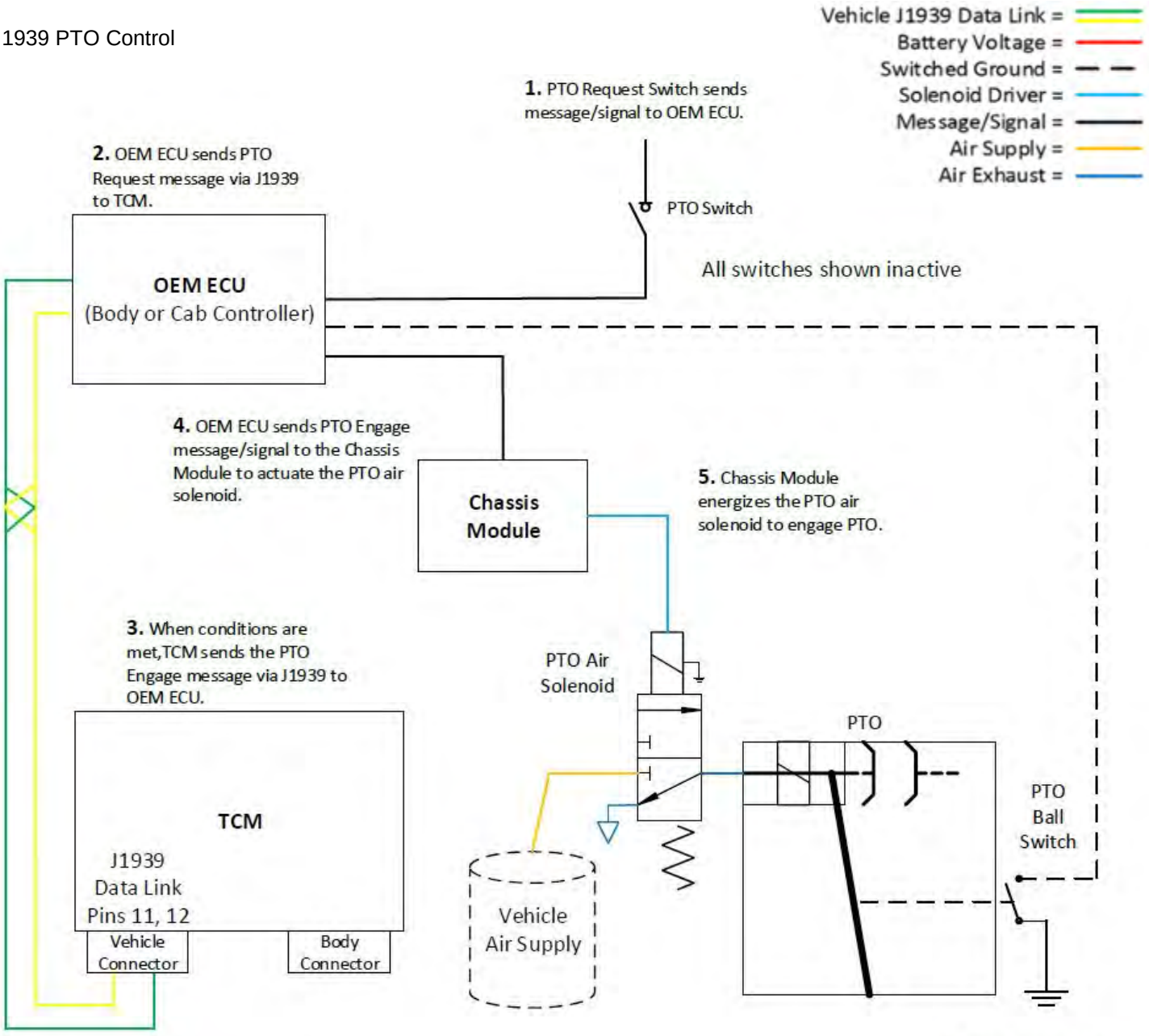
Endurant Transmission

PACCAR 12 Speed

PTO INTERFACE

The following information shows the different types of PTO wiring setup diagrams for the automated transmission.

J1939 PTO Control



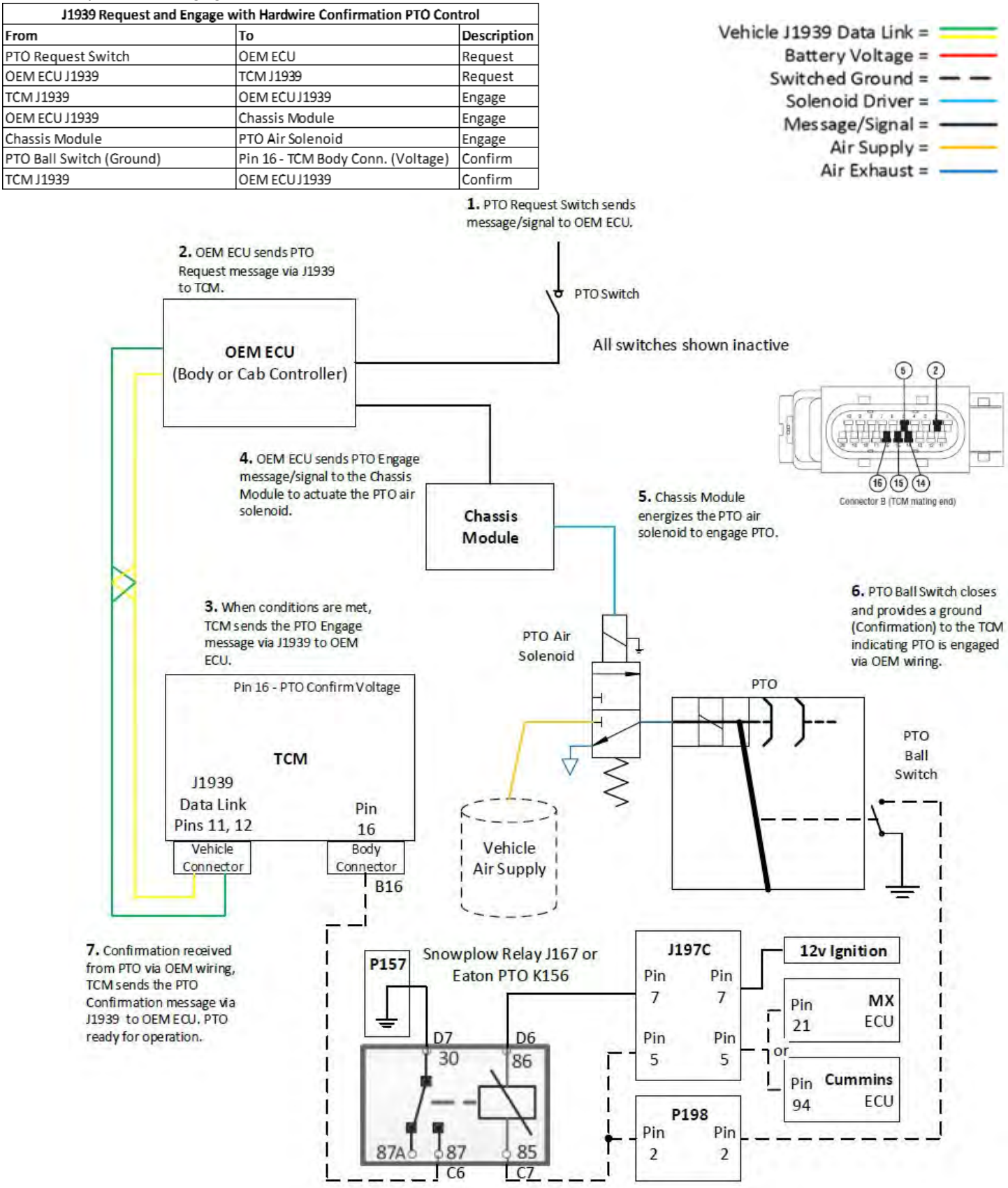
7. OEM ECU sends Confirmation message via J1939 to TCM. PTO ready for operation.

J1939 PTO Control		
From	**To**	**Description**
PTO Request Switch	OEM ECU	Request
OEM ECU J1939	TCM J1939	Request
TCM J1939	OEM ECU J1939	Engage
OEM ECU J1939	Chassis Module	Engage
Chassis Module	PTO Air Solenoid	Engage
PTO Ball Switch (Ground)	OEM ECU	Confirm
OEM ECU J1939	TCM J1939	Confirm

6. PTO Ball Switch closes and provides a ground (Confirmation) to the OEM ECU indicating PTO is engaged.

J1939 Request and Engage with Hardwire Confirmation PTO Control

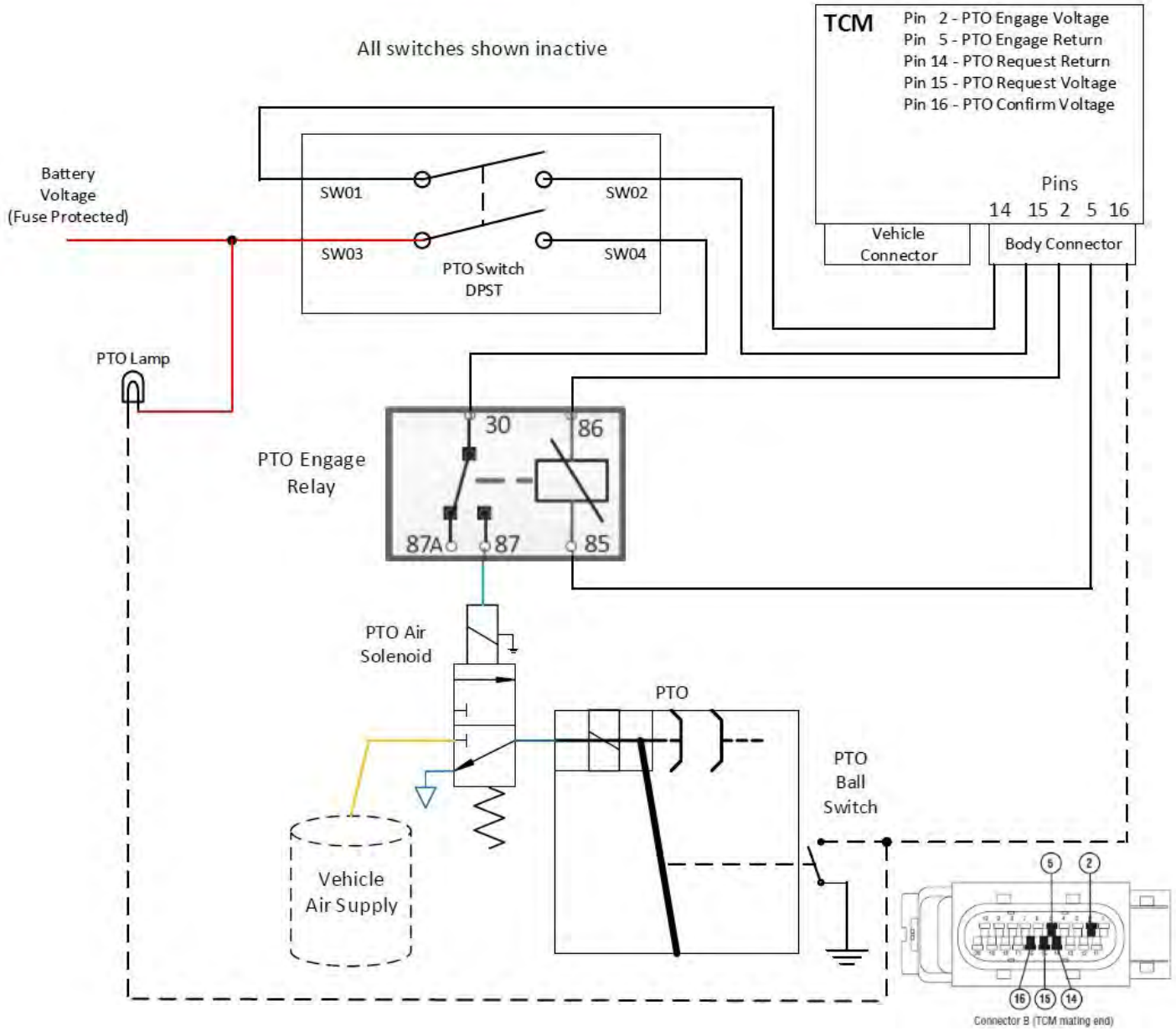
J1939 Request and Engage with Hardwire Confirmation PTO Control		
From	**To**	**Description**
PTO Request Switch	OEM ECU	Request
OEM ECU J1939	TCM J1939	Request
TCM J1939	OEM ECU J1939	Engage
OEM ECU J1939	Chassis Module	Engage
Chassis Module	PTO Air Solenoid	Engage
PTO Ball Switch (Ground)	Pin 16 - TCM Body Conn. (Voltage)	Confirm
TCM J1939	OEM ECU J1939	Confirm



Hardwire PTO Control with Ground Switched Confirmation

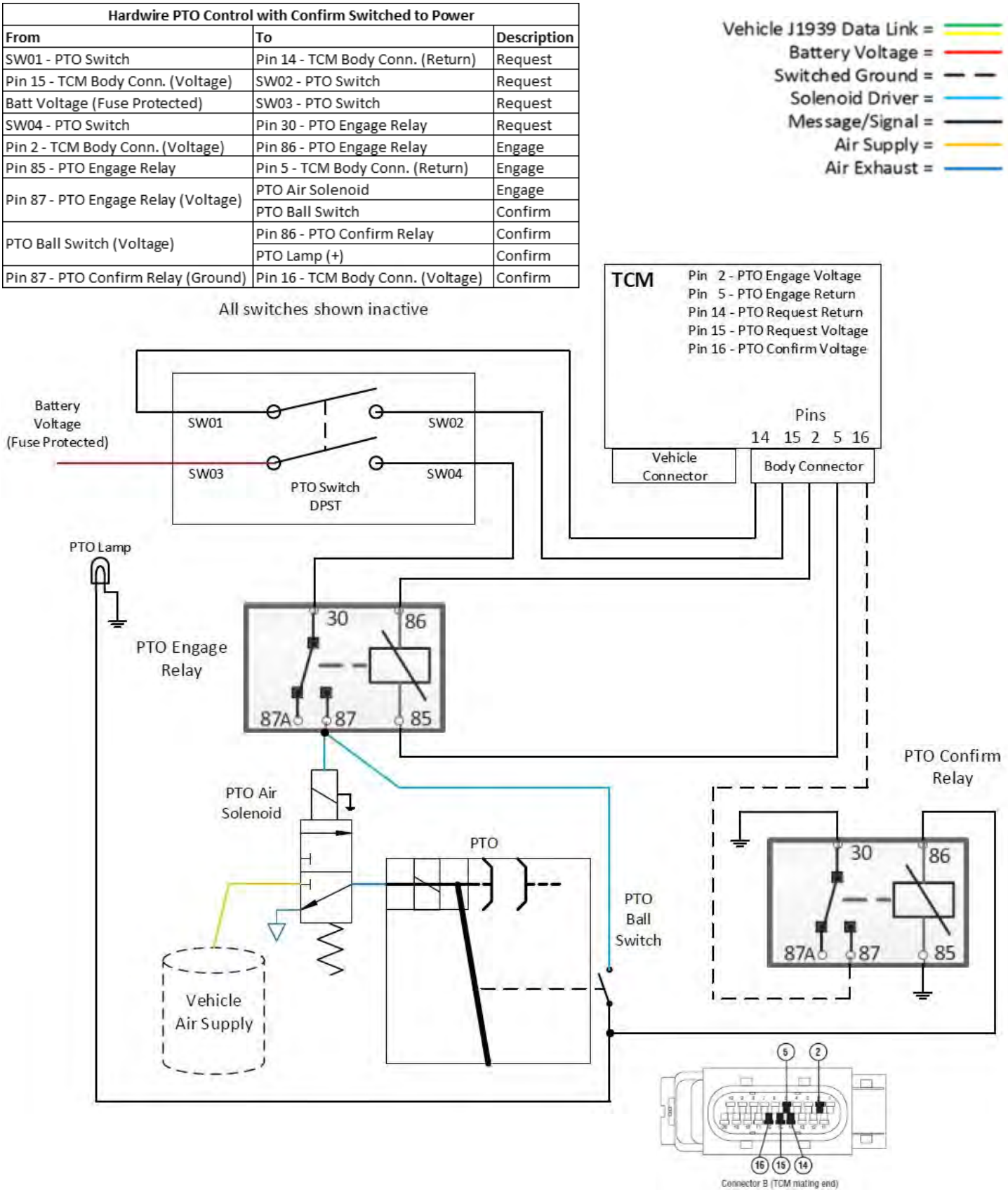
Hardwire PTO Control with Confirm Switched to Ground		
From	**To**	**Description**
SW01 - PTO Switch	Pin 14 - TCM Body Conn. (Return)	Request
Pin 15 - TCM Body Conn. (Voltage)	SW02 - PTO Switch	Request
Batt Voltage (Fuse Protected)	SW03 - PTO Switch	Request
SW04 - PTO Switch	Pin 30 - PTO Engage Relay	Request
Pin 2 - TCM Body Conn. (Voltage)	Pin 86 - PTO Engage Relay	Engage
Pin 85 - PTO Engage Relay	Pin 5 - TCM Body Conn. (Return)	Engage
Pin 87 - PTO Engage Relay	PTO Air Solenoid	Engage
PTO Ball Switch (Ground)	Pin 16 - TCM Body Conn. (Voltage)	Confirm
	PTO Lamp (-)	Confirm
Batt Voltage (Fuse Protected)	PTO Lamp (+)	Confirm

Vehicle J1939 Data Link =
Battery Voltage =
Switched Ground =
Solenoid Driver =
Message/Signal =
Air Supply =
Air Exhaust =



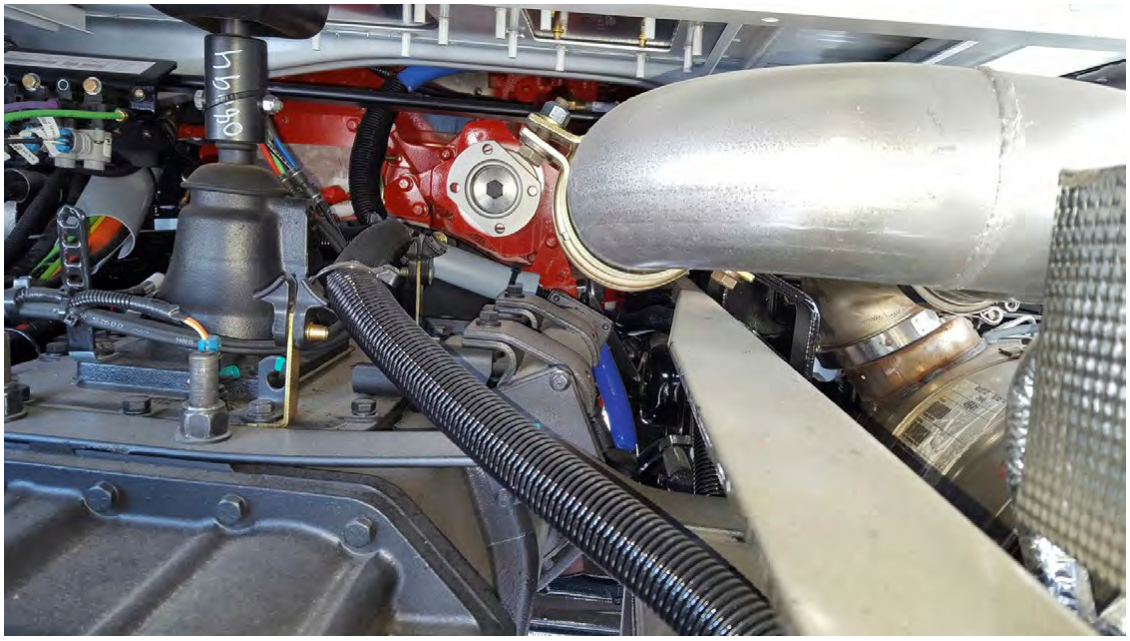
Hardwire PTO Control with Power Switched Confirmation

Hardwire PTO Control with Confirm Switched to Power		
From	**To**	**Description**
SW01 - PTO Switch	Pin 14 - TCM Body Conn. (Return)	Request
Pin 15 - TCM Body Conn. (Voltage)	SW02 - PTO Switch	Request
Batt Voltage (Fuse Protected)	SW03 - PTO Switch	Request
SW04 - PTO Switch	Pin 30 - PTO Engage Relay	Request
Pin 2 - TCM Body Conn. (Voltage)	Pin 86 - PTO Engage Relay	Engage
Pin 85 - PTO Engage Relay	Pin 5 - TCM Body Conn. (Return)	Engage
Pin 87 - PTO Engage Relay (Voltage)	PTO Air Solenoid	Engage
	PTO Ball Switch	Confirm
PTO Ball Switch (Voltage)	Pin 86 - PTO Confirm Relay	Confirm
	PTO Lamp (+)	Confirm
Pin 87 - PTO Confirm Relay (Ground)	Pin 16 - TCM Body Conn. (Voltage)	Confirm



REAR ENGINE PTO

Rear Engine PTO (REPTO) is commonly used in cement mixer and feed lot applications. The REPTO is driven off the rear gear train on the engine. There is a 1350/1410 flange on the bell housing in the 1 o'clock position that can be used to attach a hydraulic pump or driveshaft. The REPTO flange will always be turning when the engine is running and the output rotation is the same as the engine. The Cummins ISL9 and PX-9 REPTO turns at a rate of 1.15:1. The Cummins ISX-12 REPTO turns at a rate of 1.32:1. The Paccar MX-13 REPTO turns at a rate of 1.2:1. The Paccar MX-11 REPTO turns at a rate of 1.3:1.



REPTO Flywheel Housing

PTO MOUNTING CLEARNANCE

This application guide indicates if a PTO has sufficient clearance to truck components in various mounting configurations. A green "ok" indicates that there is sufficient clearance to other truck components. A red "x" indicates that there minimal or no clearance and the application is not recommended. The truck components investigated in this guide include frame rails, Set Back Front Axle (SBFA) rear shackle, SBFA Front Air Suspension (FAS) rear shackle, over-bell frame brace, coolant return manifold, transmission clutch actuator, and exhaust system components.

Usage Notes:

1. This application guide is only applicable to 2.1M trucks.
2. Only the specified PTO configurations have been analyzed.
3. Horizontal crossover exhaust limits access behind PTO's for shaft drives and other PTO attachments.
4. Eaton FR transmissions require the use of a 30° adapter when installing Chelsea or Muncie transmission PTO's in the right hand position.
5. Eaton RT & Ultrashift Plus transmissions require the use of a 49° adapter when installing Chelsea transmission PTO’s in the right hand position.
6. Eaton RT & Ultrashift Plus transmissions require the use of a 55° adapter when installing Muncie transmission PTO’s in the right hand position.
7. Eaton transmissions require the use of a 6 to 8 Bolt adapter when installing a 6 bolt PTO in the bottom position.

2.1M PTO MOUNTING CLEARNANCE CHARTS

10-Bolt PTO's for Allison Transmissions			4000 Series		3000 Series - 1 & 8 Housing		3000 Series - 4 & 8 Housing	
Brand	PTO	Truck Model	1 o'clock	8 o'clock	1 o'clock	8 o'clock	4 o'clock	8 o'clock
Chelsea	267-M3XK	All	x	x	ok	x	x	x
	267-M5XK	All	ok	ok	ok	X	ok	ok
	277-B5XS	579-123/567-121	ok	ok	ok	x	ok	ok
		579-117/567-115	ok	x	ok	x	ok	ok
	859-B5XS	All	ok	x	x	x	x	x
	870X-B3RS	All	ok	x	ok	x	x	x
	870X-B5RS	All	ok	x	ok	x	x	x
	890-B5XS	All	ok	x	ok	x	x	ok
Muncie	CD05-M3CX	All	ok	ok	ok	ok	ok	ok
	CD10-M1CX, DX	579-123/567-121	ok	x	ok	x	ok	ok
		579-117/567-115	ok	x	ok	x	x	ok
	CD10-M3CX, DX	579-123/567-121	ok	x	ok	x	ok	ok
		579-117/567-115	ok	x	ok	x	x	ok
	CS10-H1CX, EX	All	x	x	x	x	x	x
	CS10-H3CX, EX	All	x	x	x	x	x	x
	CS24-H1KX	All	ok	x	ok	x	x	x
	CS24-H3BX, KX	579-123/567-121	ok	ok	ok	x	ok	ok
		579-117/567-115	ok	ok	ok	x	x	ok
	CS24-X1BX	All	ok	x	ok	x	x	ok
	CS41-H1EX, CX	All	ok	x	x	x	x	x
	CS41-H3CX, EX	All	ok	x	x	x	x	x
	HS24-H1BX, KX	579-123/567-121	ok	x	x	x	ok	x
		579-117/567-115	ok	x	x	x	ok	ok
	HS24-H3BX, KX	All	ok	ok	ok	x	x	ok

10-Bolt PTO's for Allison Transmissions

6 & 8 Bolt PTO's for Eaton Transmissions

			FR		RT		Ultrashift Plus	
Brand	**Style**	**PTO**	**Bottom**	**Right**	**Bottom**	**Right**	**Bottom**	**Right**
Chelsea	6-Bolt	230-V3XD/XK	ok	ok[1,2,3]	ok	ok[1,2,3]	ok	ok[1,2,3]
		236-V3XD/XK	Recomend 238	ok[1,2,3]	Recomend 238	ok[1,2,3]	Recomend 238	ok[1,2,3]
		270-B3XD/XK	ok	ok[1,2,3]	ok	ok[1,2,3]	ok	ok[1,2,3]
		340-V5XD	ok	ok[1,2,3]	ok	ok[1,2,3]	ok	ok[1,2,3]
		442-V3XK	Recomend 489	ok[1,2,3]	Recomend 489	ok[1,2,3]	Recomend 489	ok[1,2,3]
		660-V3XK	Recomend 680	ok[1,2,3]	Recomend 680	ok[1,2,3]	Recomend 680	ok[1,2,3]
	8-Bolt	238-V3XD/XK	ok	n/a	ok	n/a	ok	n/a
		489-V3XK	ok	n/a	ok	n/a	ok	n/a
		680-V3XK	ok	n/a	ok	n/a	ok	n/a
		823-V3XS	ok	n/a	ok	n/a	ok	n/a
		880-V3XS/XV[4]	ok	n/a	ok	n/a	ok	n/a
		885-V3XS[4]	ok	n/a	ok	n/a	ok	n/a
Muncie	6-Bolt	CS6-P1BX/KX	Recomend CS8	ok[1,2,3]	Recomend CS8	ok[1,2,3]	x	ok[1,2,3]
		SH6-P1BX/KX	Recomend SH8	ok[1,2,3]	Recomend SH8	ok[1,2,3]	x	ok[1,2,3]
		TG6-P1BX/KX	Recomend TG8	ok[1,2,3]	Recomend TG8	ok[1,2,3]	Recomend TG8	ok[1,2,3]
	8-Bolt	828S-U1CX/EG	ok	n/a	ok	n/a	x	n/a
		CS8-P1BX/KX	ok	n/a	ok	n/a	ok	n/a
		SH8-P1BX/KX	ok	n/a	ok	n/a	ok	n/a
		TG8S-P1BX/KX	ok	n/a	ok	n/a	ok	n/a

6 and 8-Bolt PTO's for Eaton Transmissions

Notes:
Not available with Front Air Leaf Suspension.
Not available with Horizontal Crossover or Right Hand behind Fairing Exhaust Systems.
Restricted PTO access with RH Cab Step Assembly DPF-SCR exhaust systems with Vertical BOS tailpipes or RH Horizontal Tailpipe below rail.
The Optional Hydraulic Clutch Orientation must be used with this PTO.

Dual PTO Compatibility for Eaton Transmissions

		Chelsea								Muncie						
		RH (6-Bolt) PTO's														
		RT			FR			Ultrashift+			RT		FR		Ultrashift+	
	Model	230/236-V3	340X-A5	442/660-V3	230/236-V3	340X-A5	442/660-V3	340X-A5	442/660-V3	Model	CS/SH6-A1	TG6-A1	CS/SH6-A1	TG6-A1	CS/SH6-A1	TG6-A1
LH (6 & 8-Bolt) PTO's	230/236-V3	S	S	S	S	S	S	ok	ok	828S-Q1	S	S	S	S	ok	ok
	238-V3	S	S	S	S	S	S	ok	ok	CS/SH8-A1	S	S	S	S	ok	ok
	340X-A5	S	S	S	S	S	S	ok	ok	TG8S-A1	S	S	S	S	ok	ok
	442/660-V3	S	S	S	S	S	S	ok	ok							
	489/680-V3	S	S	S	S	S	S	ok	ok							
	823-V3	S	S	S	S	S	S	ok	ok							
	880-V3	x	x	O	x	O	x	ok	ok							
	885-V3	x	x	O	x	O	x	ok	ok							

S = Standard Hydraulic Clutch Actuator Configuration
O = Optional Hydraulic Clutch Actuator Configuration

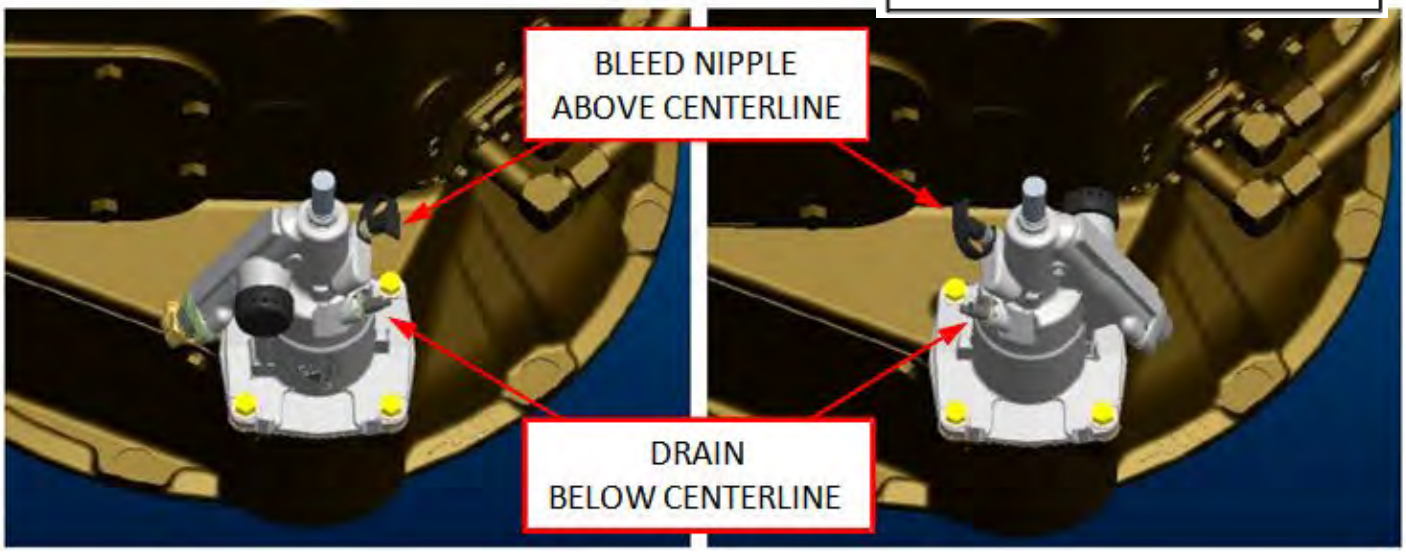
Dual PTO Compatibility for Eaton Transmissions

Note:
The actuator should not be flipped upside down to achieve PTO clearance.

1. Bleed nipple should always be above centerline.
2. Drain should always be below centerline.

HYDRAULIC CLUTCH ACTUATOR CONFIGURATIONS

(Only used with 2.1M models with Eaton FR or RT transmissions)



Standard Configuration
Air assist connection faces driver's side
Used with all but Chelsea 880 and 885 PTOs

Bottom Mount PTO Provisions
Air assist connection faces passenger's side
Used with Chelsea 880 and 885 PTOs

MX PTO MODE CONTROL (PMC)

MX PTO Mode Control (PMC) includes features, limits, and protections that are active in PTO Mode. It also includes PTO Speed Control (PSC) functionality that includes a variety of useful ways to control engine speed during PTO operation.

Reference the VECU Programming Guide for detailed information on PTO Mode Control configuration, functionality and usage.

MX PTO MODE ACTIVATION

There are three ways to activate PTO Mode. PMC parameter(s) must be enabled on the vehicle in order for PTO Mode to activate.

- Active feedback of physical PTO engagement
  - Trucks with factory installed PTOs or that are coded for Customer Installed PTOs will come prewired to receive the PTO engaged signal.
- Active PTO Mode Switch
  - The PTO Mode Switch can be configured at the time of order or in the aftermarket. The PTO Mode switch can be used to activate PTO Mode independent of PTO engagement and may be useful for trucks with FEPTOs or REPTOs that need the ability to use PMC features.
- PTO Mode Request over the CAN bus

PTO Mode Switch

MX PTO MODE CONTROL LOCATION

Vehicles can be configured to control PTO functionality from a cab location and/or a remote location (outside the cab). Most PTO Mode Features and Interlocks have a cab station option and a remote station option. This allows a vehicle to be configured for two unique jobs. For example a vehicle could be configured for mobile cab station operation with one set of limits and stationary remote station operation with a different set of limits.

If a vehicle is configured for both cab and remote PTO control, a PMC Location Switch must be installed on the dash. This switch will determine which set of PTO Mode Features to apply and which control location to use.

PMC Location Switch

MX PTO MODE FEATURES

The following features and configurations are available when PTO Mode is active.

- Cab Accelerator Configurations
  - Disable in PTO Mode
  - Torque Control (Automotive Style)
  - Speed Control
  - Enable in Remote PTO Mode
- Log Time and Fuel in PTO Mode
- Disable Engine Idle Shutdown Timer (EIST) in PTO Mode
- PTO Mode Specific Engine Idle Shutdown Timer (EIST)
- Fan On in PTO Mode
- Adjustable PTO Engine Speed Governor Responsiveness (for light or heavy varying loads)

MX PTO MODE PROTECTIONS AND LIMITS

The following protections and limits are available when PTO Mode is active. Protections and limits are active when PTO Mode is active and will continue to be active until PTO Mode is no longer active.

- Max Vehicle Speed
- Max Engine Torque
- Max Engine Speed – Accelerator Controlled
- Max Engine Speed – Switch Controlled
- Min Engine Speed
- Max Rate of Engine Speed Change

MX PTO SPEED CONTROL (PSC) FEATURES

PTO Mode must be active prior to using PTO Speed Control (PSC) to control engine speed. PSC is available from both the cab station and remote station (see PTO Mode Control Location Section above). In the cab location, cruise control switches and PSC specific switches are used to control engine speed. Equivalent remote station inputs are available (Reference Remote PMC Connections section below).

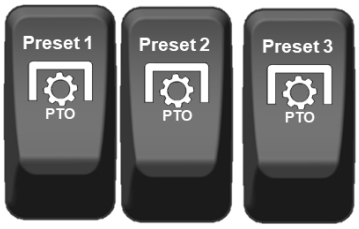
Steering Wheel Buttons

- Set / Res
  - Bump RPM Up / Down (Short Press)
  - Ramp RPM Up / Down (Long Press)

- \+ / -
  - Configurable to either command one unique preset when "+" is pressed and a second unique preset when "-" is pressed OR toggle through up to 6 presets.

Dash Switches

- Preset 1, 2 & 3
  - 3 Dedicated Presets with the following configuration options.
    - Latch: Hold Preset Speed When Switch is Released
    - Cancel: Cancel PSC When Switch is Released
  - The Remote PTO Inputs for Presets 1, 2 & 3 can be configured to function when Cab PTO Mode is active
  - In some applications, it may be useful to connect the Remote PTO Inputs for Presets 1, 2 & 3 to something other than a hand-operated switch. For example, the inputs can be configured to activate based off PTO engagement, hydraulic pressure or equipment movement.



Dedicated Preset Switches

MX PTO SPEED CONTROL INTERLOCKS

PTO Speed Control Interlocks cancel PSC when active. There is an option to disable the accelerator when a PSC interlock is active. When a PSC interlock is active the engine speed will return to the Minimum Engine Speed in PTO Mode or the engine speed commanded by the accelerator if applicable. An active PSC interlock does not disable PMC protections and limits.

The configurable PSC interlocks are listed below.

- Clutch Pressed
- Park Brake NOT Set
- Transmission NOT in Neutral
- Service Brake (Configurable for Pressed or NOT Pressed)
- Custom Hardwired Interlock (Configurable Polarity)

A custom hardwired interlock input is available that will allow a body builder to create a customized interlock for their specific application. This interlock functions for both Cab and Remote Station PSC. Many types of switches such as hand-operated switches, hydraulic pressure switches, equipment position switches, or pressure plate switches can activate the interlock. The switch polarity is configurable which allows the body builder to choose the interlock state if the circuit fails.

PTO SPEED CONTROL ICONS

During PSC operation there will be icons on the driver information display that indicate:

- PSC Enabled (white icon) or Active (green icon)
- PSC Control Location (designed by “Cab” or “Remote”)
- PSC target engine speed when active

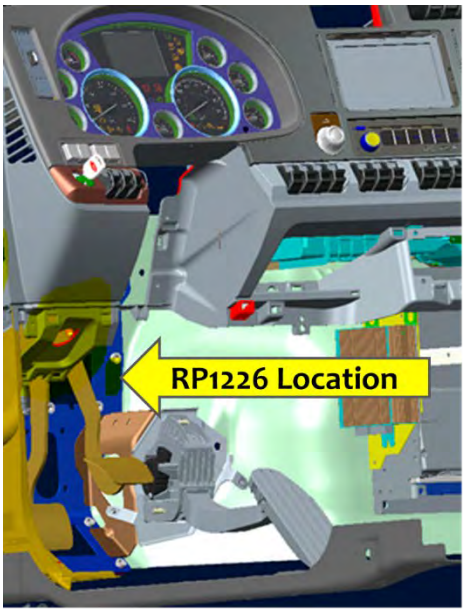
PSC Icons

REMOTE PMC CONNECTIONS

There are options to control PTO functionality from the following locations.

- Engine Bay – Hardwired option only
- RP1226 Connection in the Cab – CAN bus connection only
- BOC/BOS – Hardwired and CAN bus connections
- EOF – Hardwired and CAN bus connections

There are options available for the body builder to specify controller speeds of 250 kbps or 500 kbps.

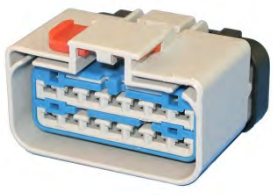


MX PTO CAN functionality may be accessed in the cab through the RP1226 connector and remotely through the body connectors K-CAN (E-3375-021) and B-CAN (DTM06-2S-EP10) Connectors.

MX PTO hardwired functionality may be accessed in the engine bay or on the frame through optional 12-Way and 8-Way connectors

12-Way Deutsch Connector

8-Way Deutsch Connector

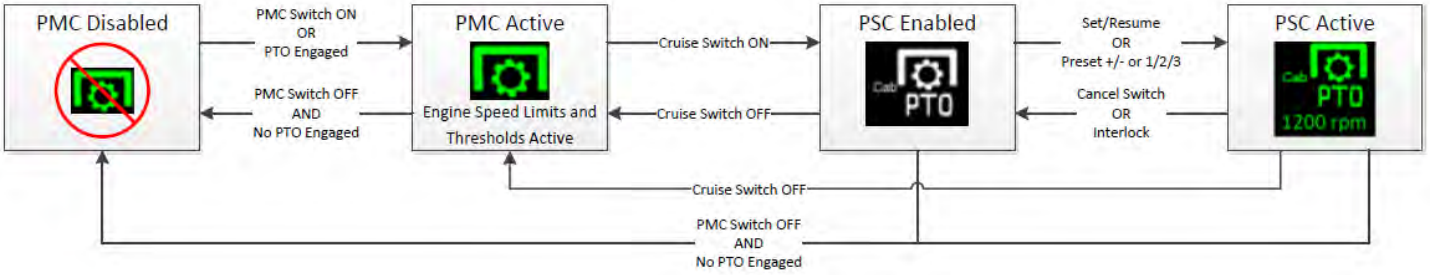


RP1226 Delphi Connector

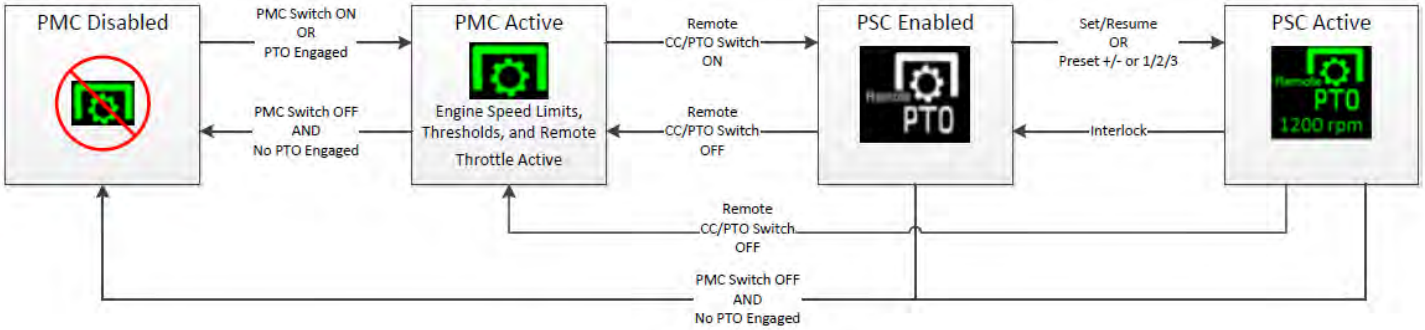
Pin-out information for the PTO connectors can be found in the Electrical Section

PTO MODE CONTROL FLOW CHARTS

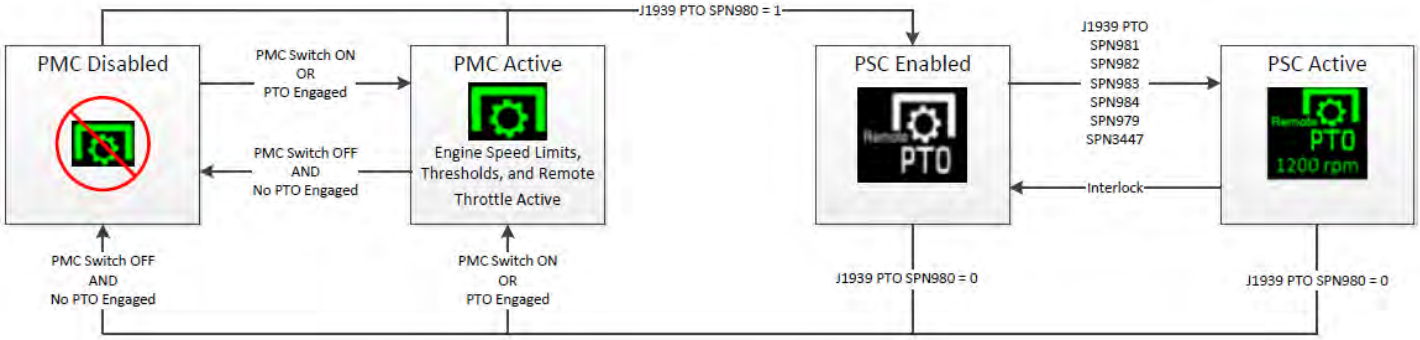
Cab Controls



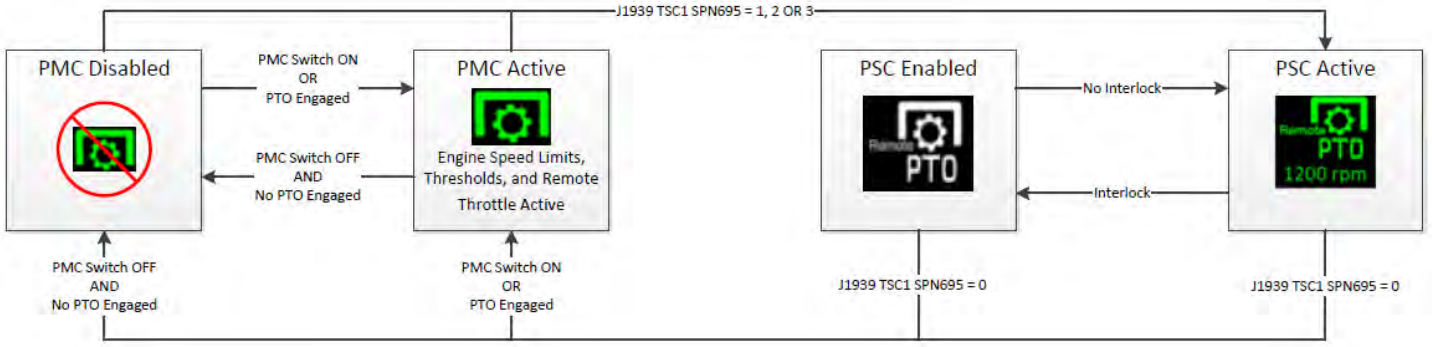
Remote Hardwire Controls



Remote CAN Controls

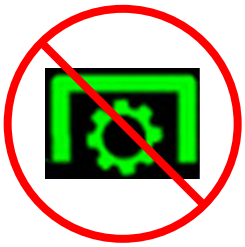
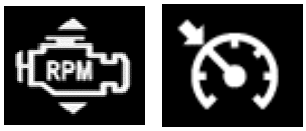


Remote TSC1 CAN Controls



MX PTO TROUBLE SHOOTING GUIDE

The following table is s trouble shooting guide for MX PTO functionality.

SYMPTOM	POSSIBLE CAUSE	SOLUTION
No green PTO cluster telltale (PMC is not active) 	PTO Mode Switch is not installed	Install and apply PTO Mode Switch
	PTO engagement feedback is not provided to standard/optional chassis module	Provide PTO engagement feedback to SCM (PTO#1) and/or OCM (PTO#2)
	PTO ball switch is faulty	Check that PTO ball switch is providing power or ground
	PTO device is not engaging due to air supply solenoid or electric signal not active	*Check EOA parameter settings in PVP *EOH PTOs are configured with parameter P816 *Check popups on driver display for interlock conditions (PTO engagements may be configured with park brake or PTO interlocks dependent on EOA parameter settings, these will result in popups on driver display)
PTO cluster telltale blinks intermittently 	PTO engagement feedback connection is faulty	Check PTO engagement feedback to SCM/OCM
	PMC switch connection is intermittent	Verify PMC switch connection (LIN jumper)
FIC or Cruise Control appears instead of PTO Speed Control on driver display  (when green PTO cluster telltale is present) 	Both Cab and Remote control locations are configured in PVP, but PMC location switch is not installed	Install PMC location switch, or select Cab or Remote control location in PVP
	PTO/CC On/Off switch is not applied	Press/apply the PTO/CC On/Off switch on steering wheel or dashboard (cab controls) or remote station (pin 6 on P197) or via J1939 PTO SPN980 (remote controls)
	CAB and/or Remote PMC is not configured	Enable CAB and/or Remote PMC in PVP and re-flash the VECU (PMC location switch is required if both control locations are configured)

White PTO icon appears, but no green PTO Speed Control icon on driver display 	PTO Speed Control is not active	Activate PTO Speed Control using cab or remote Set/Resume, +/-, Dedicated Preset, or J1939 PTO inputs. See PTO Mode Control Flowcharts in this section.
	PTO Speed Control switches are not enabled	Enabled PTO Speed Control switches P543 (Cab +/-), P610 (Cab Set/Resume), PXXX (Cab Dedicated Preset), P576 (Remote +/-), P611 (Remote Set/Resume, or P568/P569 (Remote Dedicated Preset)
	PTO Speed Control interlock is violated	Check that enabled PTO Speed Control interlocks are satisfied for cab and/or remote controls: *Park brake *Service brake active or inactive *Neutral position *Custom interlock *SCR/DEF Level Inducement *Adaptive Cruise Control fault *ABS Braking Event *Stop Engine Lamp
	Current PTO Speed Control location is not selected (when configured for Cab AND Remote control)	Select CAB or REMOTE control location using PMC location switch
Green PTO Speed Control icon on driver display appears, but engine speed will not change 	PMC engine speed slew rates are zero	Change engine speed slew rates to non-zero values
	PMC engine torque limit is too low	Increase engine torque limit
	PSC Increment and/or decrement intervals are zero	Configure increment and/or decrement to non-zero values
	PSC Presets are not enabled or are programmed to the Min Engine Speed in PTO Mode	Enable PSC Presets and program preset values greater than the Min Engine Speed in PTO Mode
Cab accelerator pedal does not control engine speed	Cab accelerator control is not enabled	Enable the accelerator in Cab Control (P545), and/or Remote Control (P577) in PVP and re-flash the VECU

Remote accelerator pedal does not control engine speed	PTO Mode Control is not active	Activate PTO Mode Control using PMC switch, provide PTO engagement feedback, or over the CAN bus
	Remote accelerator control is not enabled	Enable the remote accelerator control (P578) in PVP and re-flash the VECU
	PTO Speed Control interlock is violated	Check that enabled PTO Speed Control interlocks are satisfied: *Park brake *Service brake *Neutral position *Clutch position *Custom interlock *SCR/DEF Level Inducement *Adaptive Cruise Control *ABS Braking Event *Stop Engine Lamp
	Remote accelerator pedal has not returned to the fully released/zero position after entering PTO Mode Control	Calibrate/release remote accelerator to zero position
J1939 PTO CAN message does not affect PTO Speed Control	Remote controls are not configured and/or selected	Configure Remote PTO Mode Control and ensure it is selected using PMC Location switch (if Cab and Remote are both enabled)
	Body controller source address is not equal to 7d or 33d (0x21)	Configure body controller source address equal to 7d or 33d (0x21)
	J1939 PTO SPN980 (PTO Governor Enable Switch) is not equal to 1 (enabled)	Send J1939 PTO SPN 980 equal to 1
J1939 TSC1 CAN message does not affect PTO Speed Control	Remote controls are not configured and/or selected	Configure Remote PTO Mode Control and ensure it is selected using PMC Location switch (if Cab and Remote are both enabled)
	Body controller source address is not equal to 7d or 33d (0x21)	Configure body controller source address equal to 7d or 33d (0x21)
	J1939 TSC1 SPN695 (Override Control Mode) is equal to zero	Send J1939 TSC1 SPN695 equal to 1, 2 or 3
	J1939 TSC1 SPN3350 (TSC1 Control Purpose) is not 2 (PTO Governor)	Send J1939 TSC1 SPN3350 equal to 2

SECTION 9 **AFTERTREAMENT**

INTRODUCTION

The following section is designed to give you information regarding the after-treatment systems on Peterbilt chassis.

All Peterbilt's equipped with 2017 emission level engines will utilize Selective Catalyst Reduction (SCR). SCR is a process in which Diesel Exhaust Fluid (DEF) is injected into the exhaust downstream of the engine. DEF is converted to ammonia by the heat of the exhaust system. Inside of the SCR canister a catalyst causes a chemical reaction to occur between the ammonia and NOx, turning it into water and nitrogen. For more information on the specific details of how SCR works, please contact your local Peterbilt dealer.

DEF SYSTEM SCHEMATIC

On most Peterbilt chassis the DEF Supply Module (or pump) is integrated into the DEF tank. Peterbilt does not allow relocation of this pump. The following schematic details how the DEF lines route to the after-treatment system.

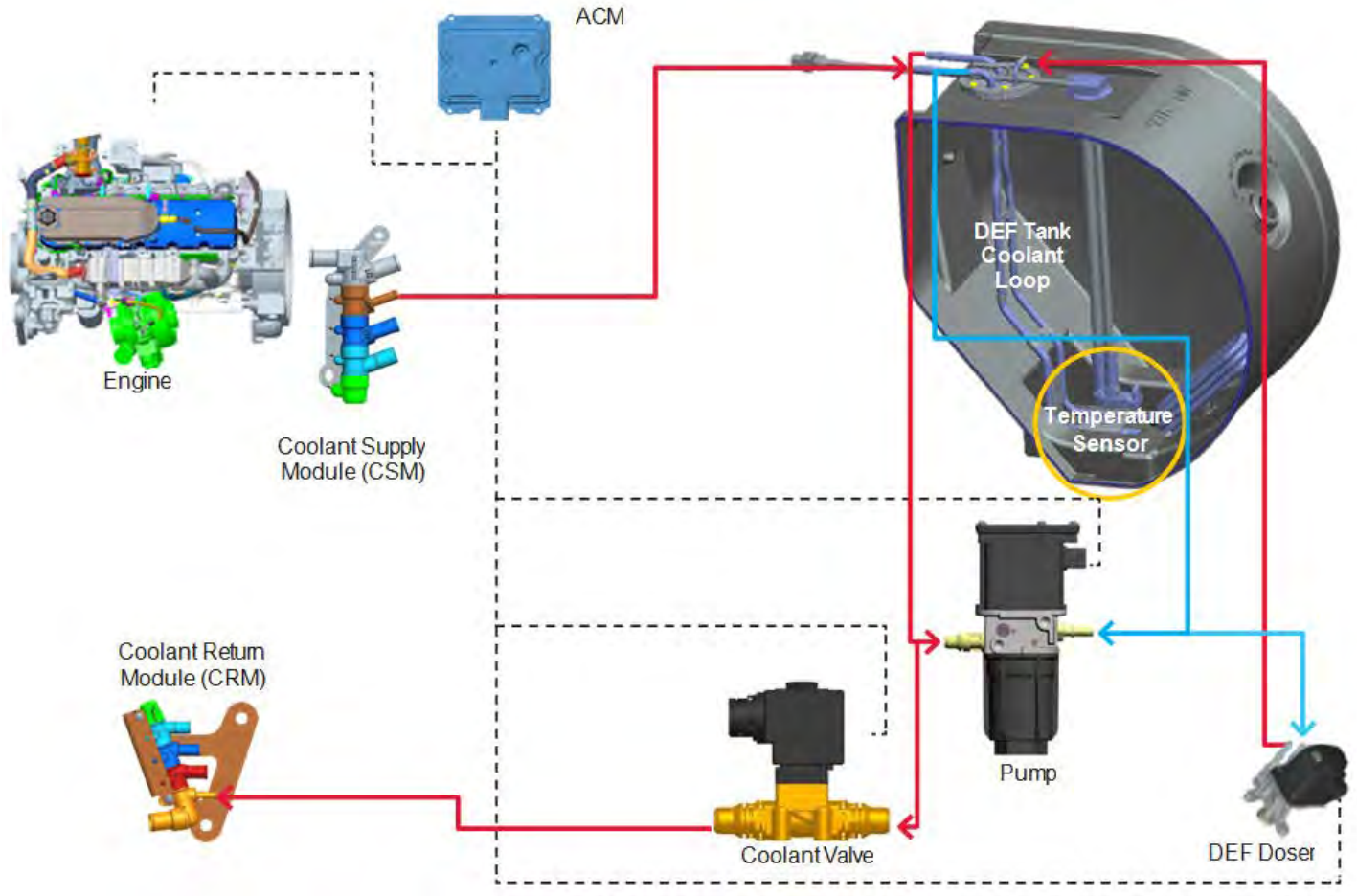


FIGURE 9-1. DEF System Schematic

DEF will freeze at approximately 11° F. In order to keep DEF from freezing all tanks will be heated with engine coolant. The following schematic shows the routing of these lines. It is critical that the system is not compromised in any manner. Below, numbers denote the order of the component in the flow.

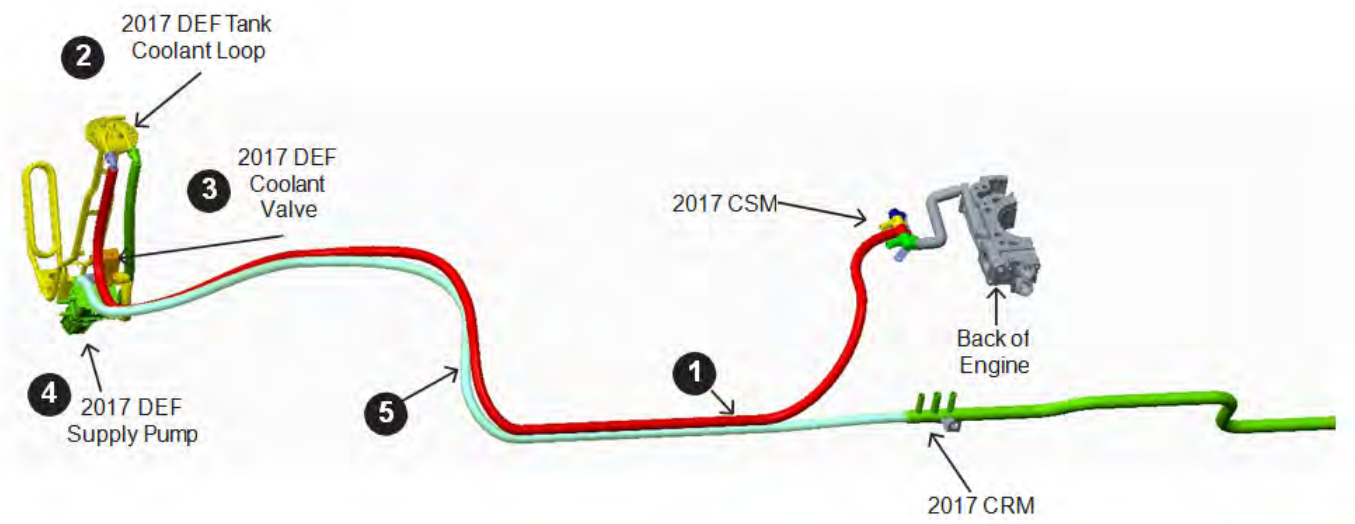


FIGURE 9-2. DEF Coolant Routing Schematic

GENERAL GUIDELINES FOR DEF SYSTEM

The installation of the DEF tank is a critical component of the aftertreatment system. While Peterbilt does not recommend relocating the DEF tank, there are applications and body installations that will require it. The guidelines below must be strictly followed by any entity relocating the tank. Failure to follow the guidelines completely and accurately may result in engine shut-down situations.

PACCAR-approved DEF hoses are required when retrofitting for system to function properly. The use of unapproved hoses for DEF lines will void warranty and may cause engine shut-down situations. The DEF pump (or Supply Module) cannot be relocated from the DEF tank.

Peterbilt offers a variety of DEF tank sizes to meet every application. The DEF tank volume is regulated by the E.P.A. Peterbilt advises against modifying the tank volume after the truck has been delivered from the factory. These are estimated nominal (published) maximum fuel capacities for various DEF tanks, engines, and fill ratios. Dosing rates for these calculations are also shown.

TABLE 9-1. DEF Fuel Ratios

	FUEL VOLUME ALLOWED (USABLE GALLONS)							
	Standard DEF-Fuel Ratio (2:1)				Minimum Recommended DEF-Fuel Ratio (1:1), No Derates			
DEF Tank	PX-7/ ISX15	ISX12	MX-11/ MX-13	PX-9	PX-7/ ISX15	ISX12	MX-11/ MX-13	PX-9
SMALL	153	162	113	189	193	204	152	238
MEDIUM	286	303	212	353	387	409	286	477
LARGE	431	455	318	531	581	614	430	717
MEDIUM AERO	291	307	215	358	393	416	308	485
LARGE AERO	368	389	272	454	538	569	419	664
Rectangular	103	109	76	128	148	157	110	183

INSTALLATION REQUIREMENTS AND DIMENSIONS FOR DEF SYSTEM

When relocating any DEF system components, the locations must meet the guidelines below. Failure to comply may result in non-conformance to EPA standards and engine shutdown.

With all relocating procedures, general clearances and routing guidelines must be followed. See section 10 of this manual for general routing guidelines.

When relocating the components the maximum pressure DEF hose length, from Supply module to Dosing Module, is 5.5 meters (216.5").

Maintain a minimum of 3" clearance to shielded exhaust components when routing DEF lines to prevent possible melting.

If the DEF tank is relocated the coolant lines will need to be modified. During this process if the tank is moved forward on the chassis (closer to the engine) it is necessary to remove excess coolant lines and maintain the original routing path. If the tank is moved rearward on the chassis the additional length of cooling line required to complete the installation must be installed in a straight section of the existing coolant routing lines. This process minimizes the change in coolant flow by mitigating changes in restrictions. Changes in restriction are added with excessive line length and bends. Work with your local Peterbilt dealer if you are unsure about the coolant line modifications.

ROUTING TO THE DOSING MODULE (INJECTOR)

A DEF pressure line “trap” is no longer required after EPA 2013 emissions level engine. The dosing module (injector) no longer needs to be purged and relative heights of components are no longer critical. See Figure 9.3 below for typical routing with RHUC exhaust and LH DEF tank shown. Also shown in this figure is the coolant line routing for 579 and 567 models.

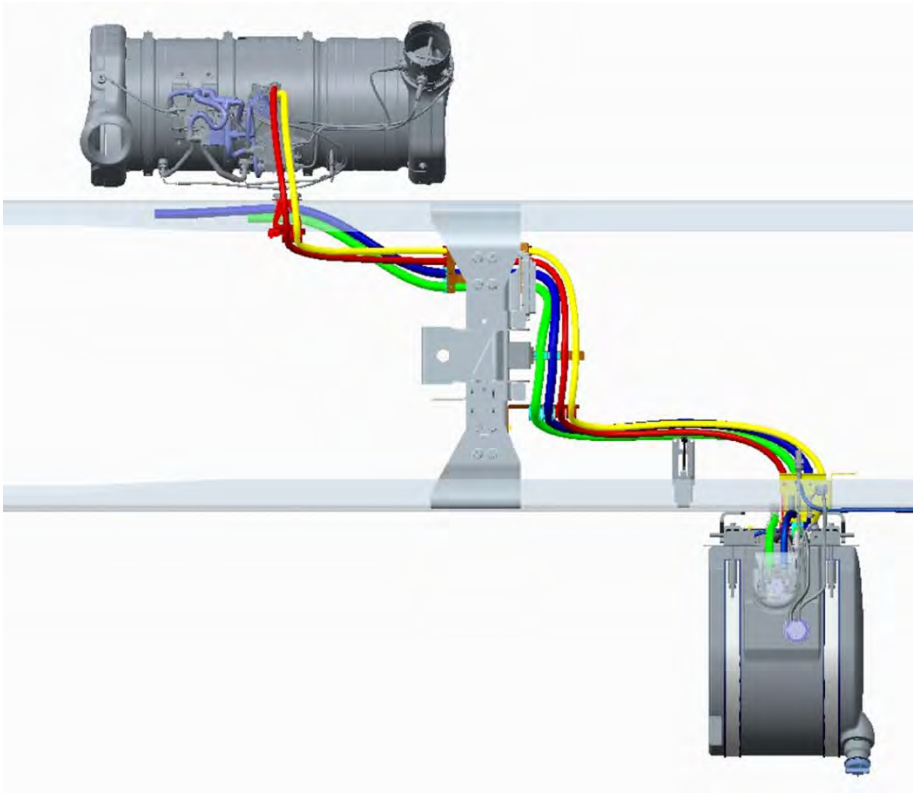


FIGURE 9-3. Routing for DEF and Coolant Lines

DEF SUPPLY MODULE MOUNTING REQUIREMENTS

The Supply Module (or Pump) standard mounting location is on the DEF tank assembly. Body builders may need to relocate this component, and should follow the location and length restrictions above. Additionally the mounting and the orientation of the Supply Module must not exceed 45° from vertical in any direction.

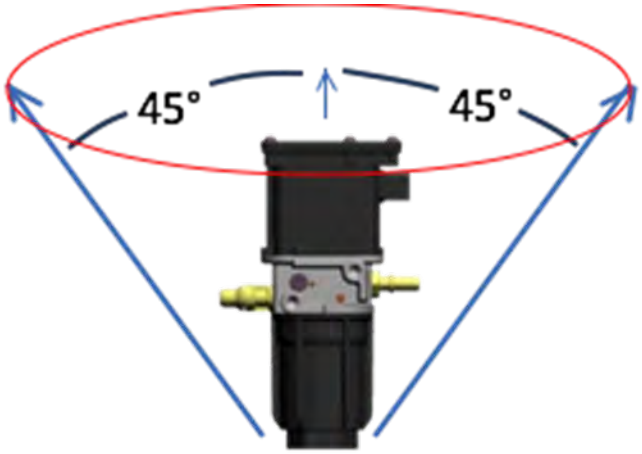


FIGURE 9-4. Supply Module Allowed Clocking Angle Limit Scribes a 90° Inverted Cone.

SECTION 10 **ROUTING**

INTRODUCTION

This section specifies the general requirements for securing hoses and electrical wires to present an orderly appearance, facilitate inspection and maintenance, and prevent potential damage to these lines.

DEFINITIONS

Bundle: Two or more air, electrical, fuel, or other lines tied together to form a unitized assembly.

Clamp: A cushioned rigid or semi-rigid, anti-chafing device for containing the bundle and securing it to the frame or other structural support. Standard clamps have a black elastomer lining. High temperature clamps (e.g., those used with compressor discharge hose) have a white or red elastomer lining (most applications for these are called out in the bills of material). An assembly of two clamps fastened together to separate components is referred to as a “butterfly” clamp. Note: the metal portion of clamps shall be stainless steel or otherwise made capable, through plating or other means, of passing a 200 hour salt spray test per ASTM B117 without rusting.

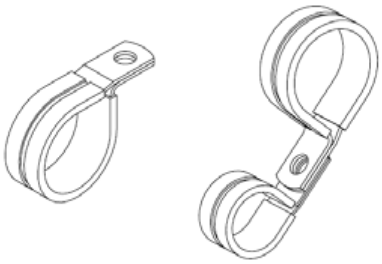


FIGURE 10-1. Clamp and Butterfly Clamp

Butterfly Tie: A tough plastic (nylon or equivalent) locking dual clamp tie strap used to separate bundles or single lines, hoses, etc. These straps must be UV stable. (Tyton DCT11)

FIGURE 10-2. Butterfly Tie

Tie Strap: A tough plastic (nylon, or equivalent) locking strap used to tie the lines in a bundle together between clamps or to otherwise secure hoses and wires as noted below. These straps must be UV stable.

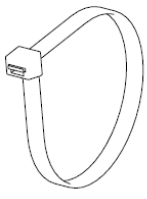


FIGURE 10-3. Tie Strap

Heavy Duty (HD) Mount: A black rigid device used for securing a tie strap to the frame or other structural support. Mounts are made of impact modified, heat stabilized UV resistant nylon capable of continuous operation between temperatures 220°F (150°) and -40°F (-40°).

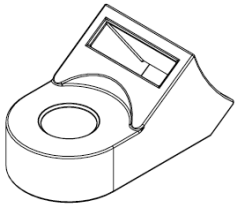


FIGURE 10-4. Heavy Duty (HD) Mount.

NOTE: Heavy duty tie straps 0.50in (12.7mm) wide (Tyton T255ROHIR or similar) shall be used whenever HD mounts are specified, although 0.25in (6.4mm) tie straps may be used in some specified applications.

Excess of material: More than 3 inches of slack for every 14 inch section of hose routing, except for air conditioner hoses.

Shortness of material: Less than 1 inch of slack on a 14 inch section of hose routing.

ROUTING REQUIREMENTS

Electrical Wiring

- Electrical ground wire terminals must be securely attached and the complete terminal surface must contact a clean bare metal surface. See R414-558 for grounding wire connection practice. Apply electrical contact corrosion inhibitor Nyogel 759G grease (made by William F. Nye, Inc., New Bedford, MA) per R414-558.
- Don't bend wires or use tie straps within 3 inches (75 mm) of (connected) wire connectors or plugs.
- Electrical wiring must be routed so that other components do not interfere with it
- Electrical wiring must be routed away from moving components so that at least 13.0 mm (0.5 in.) of clearance exists when the component is in operation and at maximum limits of the component's travel
- Electrical wiring must be protected in the locations they are routed
- Electrical wiring must be routed to avoid heat sources
- Electrical wiring must be secured to a crossmember when going from one frame rail to the other
- When crossing other components, electrical wiring must have a covering of convoluted tubing, PSA tape, or must be separated from the component with a standoff or butterfly clamp
- Electrical wiring must not be routed directly over a sharp edge unless separated from the edge by a clip, standoff bracket, or similar spacing feature that prevents any risk of chafing or cutting
    - Alternatively, the installation of windlace applied to the edge along with PSA tape or convoluted tubing on the harness is acceptable
- Electrical wiring must be routed in a way that will not place strain on connectors.

Wires in Bundles

Electrical wires (other than the exceptions covered below) running parallel with air or coolant hose bundles, may be included in the bundle if they are isolated from the hoses with a covering of convoluted plastic tubing.

Exceptions:

Battery cables (including jump start cables) may be bundled with or tied to the charging wire harness. They shall not be bundled with or tied directly to any other components, including hoses, wires, or bundles. They shall be separated from other routed components using butterfly ties at intervals not exceeding 14 inches (356 mm). Battery strap (W84-1000) tie down shall be used without exception to secure battery cables to frame mounted or other major component (e.g. engine, transmission, etc.) mounted standoffs at intervals not exceeding 14 inches (356 mm). The (positive) battery cable shall be covered with convoluted plastic tubing from terminal to terminal.

110/220 volt wires for engine heaters, oil pan heaters, transmission oil heaters and battery pad warmers, shall not be included in any hose/wire bundle with a fuel hose. Individual heater wires not in a bundle shall be separated from other components by using butterfly clamps or butterfly ties at intervals not exceeding 14 inches (356 mm). Heater wires with a secondary covering shall be covered with convoluted tubing whether they are in bundles or not.

Wires Crossing Other Components

Electrical wires crossing over other components, such as lines, bolt heads, fittings, engine components lifting eyes, engine block, cylinder head, etc., close enough to rub shall be isolated with a covering of convoluted tubing and separated from the component by using butterfly clamps, butterfly ties, or plastic sheathing. 110/220 volt engine heater wiring shall be installed with butterfly ties or butterfly clamps

Piping

Use no street elbows in air brake, water, fuel, or hydraulic systems unless specified on the piping diagram and the build instructions.
Use no elbows in the air brake system unless specified on the air piping diagram and the build instructions.

Hoses Crossing Components

Hoses crossing over other components close enough to rub shall be protected with a secured covering of convoluted plastic tubing (part number K344-813), another section of hose, or plastic sheathing (part number K213-1312). The usage of butterfly ties, or butterfly clamps are also recommended.

Air Compressor Discharge Hoses

Wires or hoses shall not be tied to the high temperature air compressor discharge hose. Hoses and wires may be routed across the air compressor discharge hose at a distance of 18 inches (457 mm) or greater from the compressor discharge port. In this case the crossing hoses and wires shall be “butterfly” clamped to the air compressor discharge hose and covered with convoluted tubing at the clamp point (use high temperature clamps on the compressor hose).

Bundles

HD mount and tie strap, or clamp shall be located at intervals not to exceed 14 inches (356 mm) along the bundle.

Regular tie straps shall be located at intervals not to exceed 7 inches (178 mm) between HD mount or clamps. Extra tie straps may be used as needed to contain the hoses and wires in the bundle.

Routing of Wires and Hoses near Moving Components

Wires and Hoses shall be routed away from moving components, such as fans, shackle links, drivelines, steering linkages, etc. so that there is at least 0.5 inches (12.7 mm) clearance when the component is operating at its maximum travel limits.

A minimum clearance of 1.0 inches (25.4) shall be maintained between steering axle tires (and associated rotating parts) in all positions and routed components, such as hoses, oil lines, wires, pipes, etc.

ROUTING OF WIRES AND HOSES NEAR EXHAUST SYSTEM

TABLE 10-1. Exhaust – System Clearance

Description	Shielded	Unshielded
Coolant hoses, HVAC hoses and tubing, and electrical wires within 15” of the turbo and/or over 15” from the turbo	2” minimum	3” minimum
Fuel hoses		
within 15” of the turbo	n/a	4” minimum
over 15” from the turbo	2” minimum	3” minimum
Fuel tanks and hydraulic tanks		
crossing tank	n/a	2” minimum
parallel to tank	n/a	2” minimum
end of tank	n/a	1” minimum
aluminum/ceramic-coated exhaust pipe crossing tank	n/a	1.5” minimum
Air hose		
nylon	3” minimum	8” minimum
wire braid	2” minimum	3” minimum

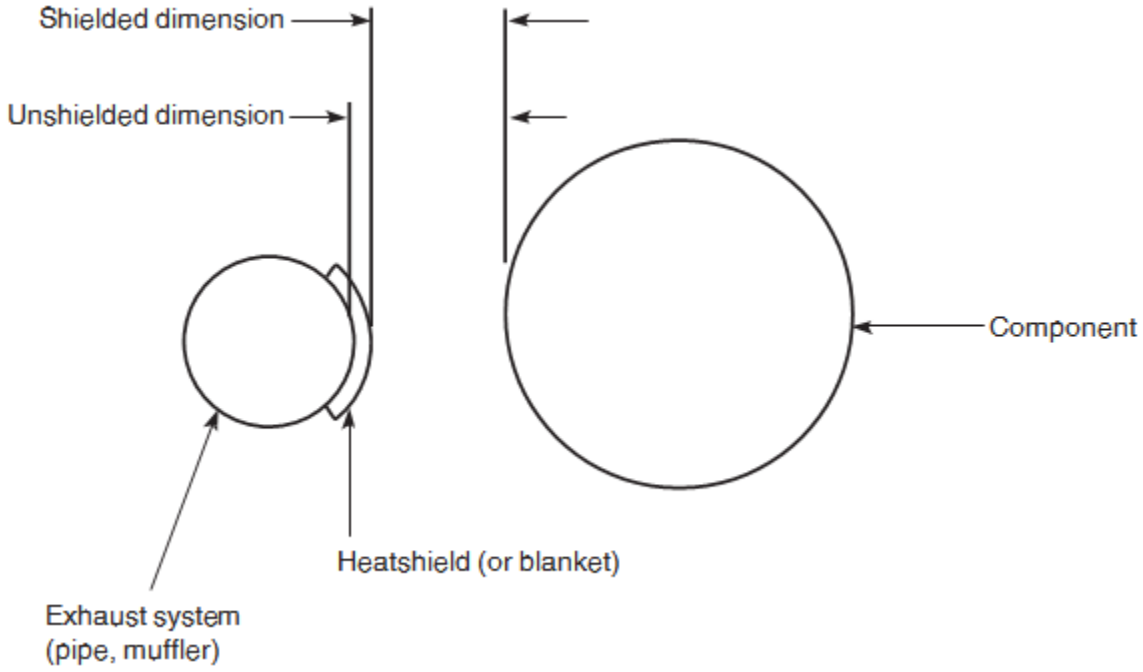


FIGURE 10-5. Definition of measurements.