HEAVY DUTY

BODY BUILDER MANUAL

March 2015
Rev A

Peterbilt

CLASS PAYS

BODY BUILDER MANUAL CONTENTS

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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.

In this manual you will find appropriate dimensional information, guidelines for mounting bodies, modifying frames, electrical wiring configurations, as well as 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.

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

SECTION 2 **SAFETY AND COMPLIANCE**

SAFETY SIGNALS

A number of alerting messages are shown 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 damage 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.

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 liftgate amperage requirements. An incorrectly specified circuit breaker could result in an electrical overload or fire situation. Follow the liftgate 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 (FMVSS) AND CANADIAN MOTOR VEHICLE SAFETY STANDARDS (CMVSS) COMPLIANCE

As an Original Equipment Manufacturer (OEM), Peterbilt Motors Company ensures that our products comply with all applicable Federal Motor Vehicle Safety Standards (FMVSS) and Canadian Motor Vehicle Safety Standards (CMVSS) where applicable. However, the fact that this vehicle has no fifth–wheel and that a Body Builder (Final Stage Manufacturer) will be doing additional modifications means that the vehicle was incomplete when it left the build plant.

Incomplete Vehicle Certification

An Incomplete Vehicle Document is shipped with the vehicle, certifying that the vehicle is not complete (see figure below). In addition, affixed to the driver's side door frame or edge is an Incomplete Vehicle Certification label.

NOTE: These documents list the FMVSS (or CMVSS) regulations that the vehicle complied with when it left the build plant. You should be aware that if you modify or alter any of the components or systems covered by these FMVSS (or CMVSS) regulations, it is your responsibility as the Final Stage Manufacturer to ensure that the complete vehicle maintains compliance with the particular FMVSS (or CMVSS) regulations when you complete your modifications.

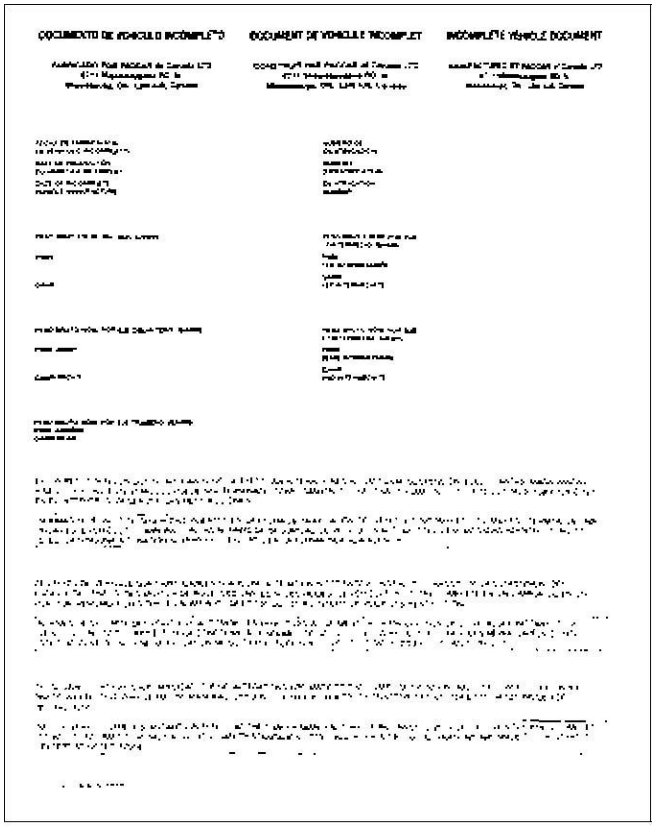


Figure 2-1. Incomplete Vehicle Certification Document

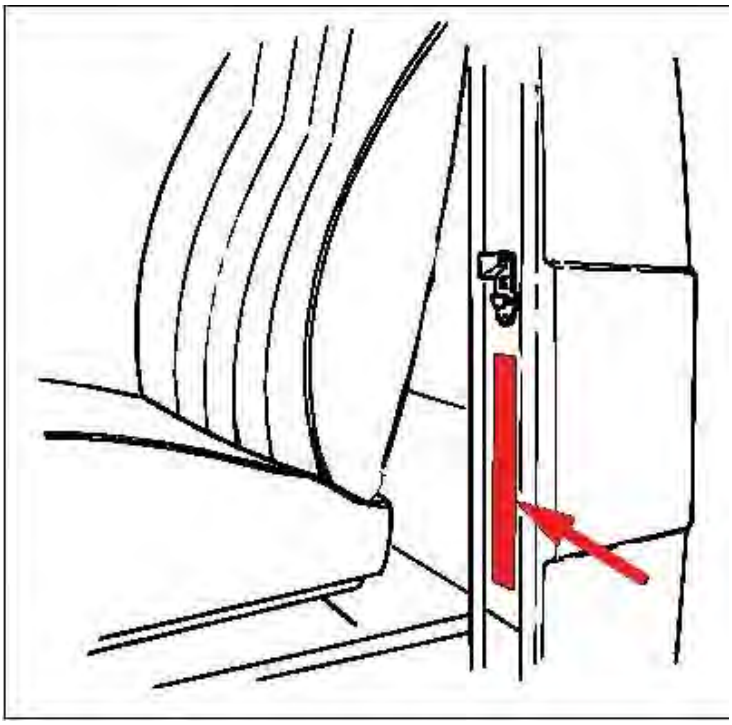


Figure 2-2. Location of Certification Labels -Driver's Door Frame

As the 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 "Final Stage Manufacturer" and certifies that the vehicle complies with Federal Motor Vehicle Safety Standards.

Trucks equipped with a “Vehicle Emission Control Information” door label are certified to comply with United States Greenhouse Gas (GHG) regulations. Original tires may be substituted provided the new tires possess an equal to or lower Coefficient of rolling resistance (Crr).

The Emission Controls shown in **Figure 2-3** may be indicated on the label.

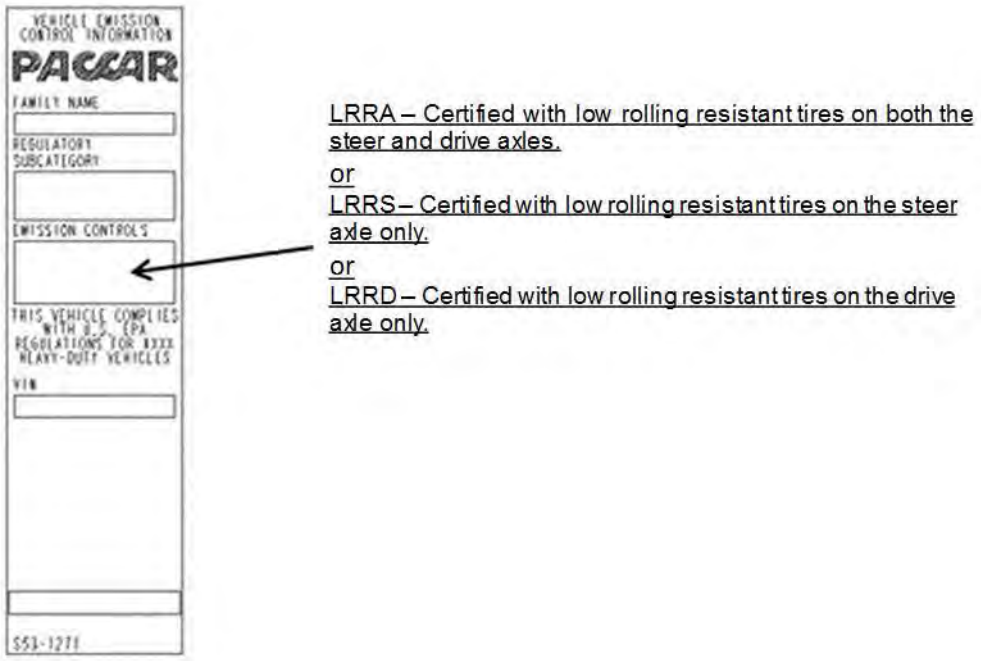


Figure 2-3. Incomplete Vehicle Certification Document

Noise and Emissions Requirements

NOTE: This truck may be equipped with a Diesel Particulate Filter (DPF) muffler unit in order to meet both noise and exhaust emissions requirements. Removal or tampering with the DPF muffler will not improve engine performance. Also tampering with the exhaust system is against the rules that are established by the U.S. Code of Federal Regulations and Environment Canada Regulations. The DPF muffler may only be replaced with an approved part.

NOTE: 2007/10/13 emissions engines are integrated with particulate filters for 2007/10/13 EPA certification. The particulate filter assembly may consist of one or more of the following components: a diesel oxidation catalyst, a diesel particulate filter, temperature sensors, differential pressure sensor, and exhaust silencing components integrated into a modular housing. Body Builders must not modify or relocate this assembly or any components associated with it. It is also the case that there should not be any modifications made to the exhaust piping from turbo outlet to aftertreatment inlet.

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 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
FS	Front suspension height
RS	Rear suspension height
WB	Wheelbase
SOC	Side of cab
BOC	Back of cab

OVERALL DIMENSIONS

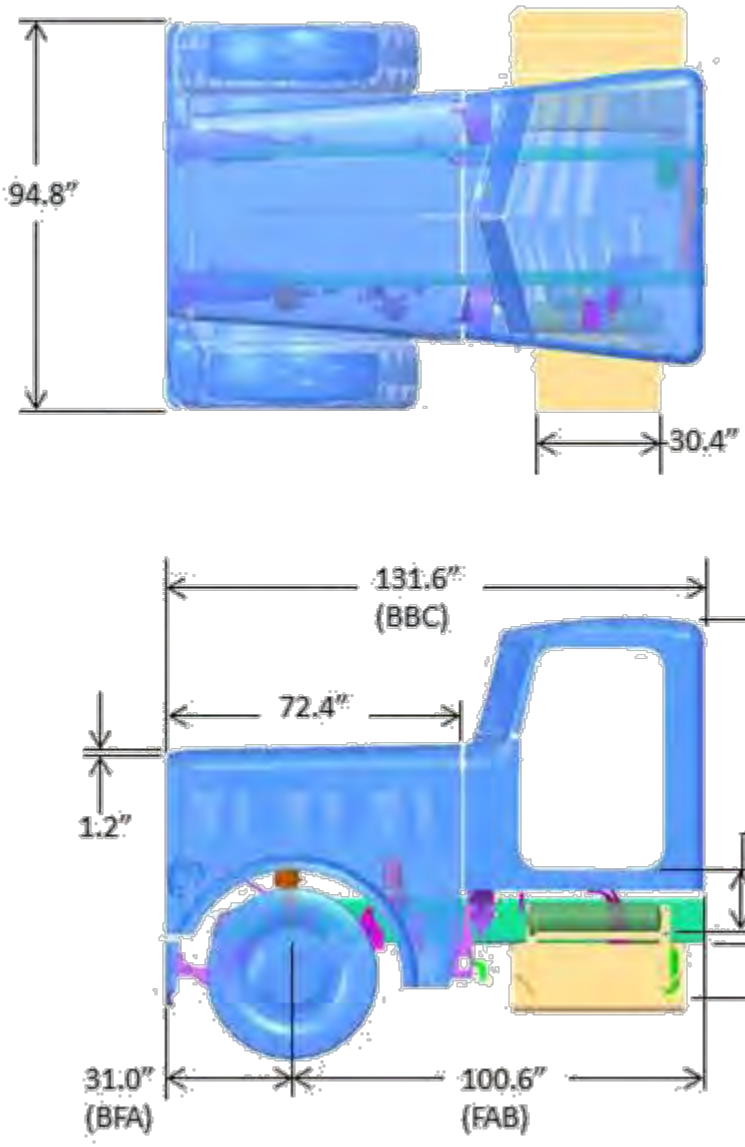
This section includes drawings and charts of the following Peterbilt Models: 389, 386, 384, 367 SFFA, 367 SBFA, 367 HH, 367 FEPTO, 365 SFFA, 365 SBFA, 365 FEPTO, 567 and 579. The Extended Rear Window, Extended Cab and Unibilt sleepers are also included.

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.

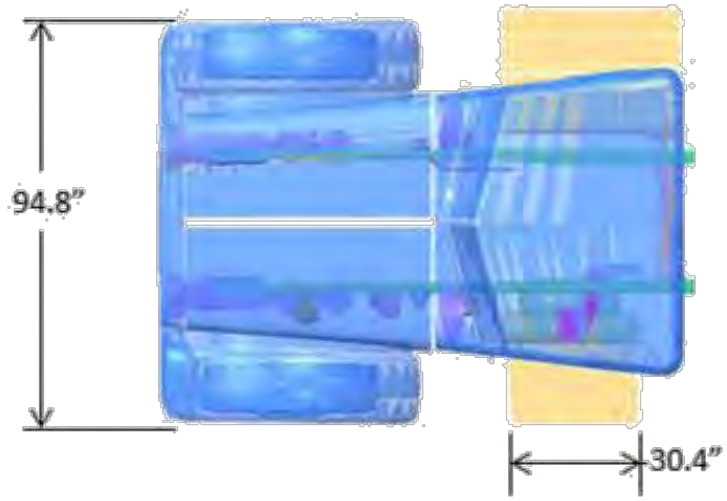
MODEL 389-131

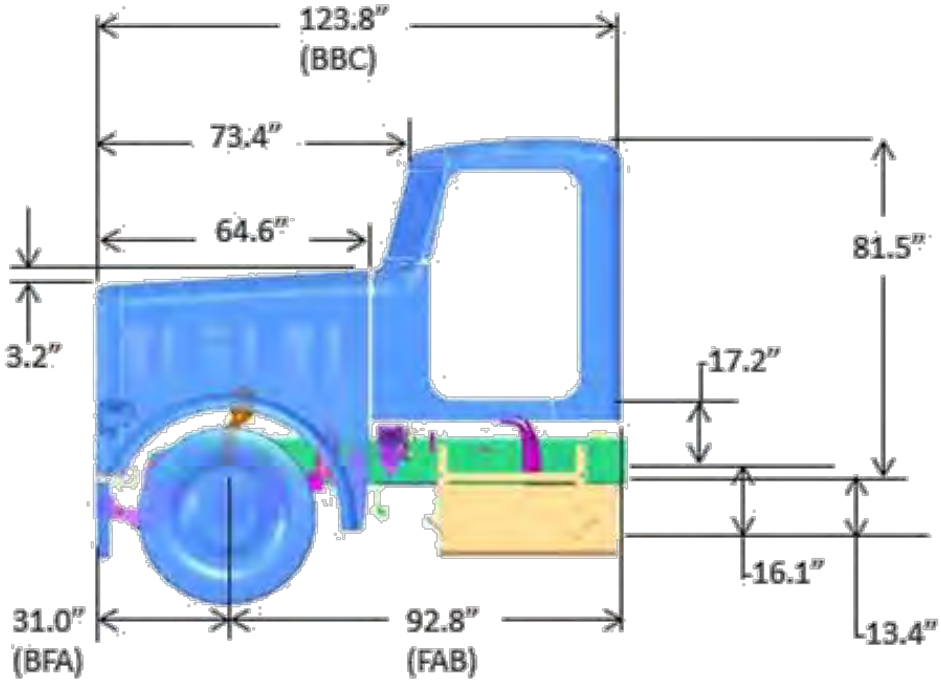


NOTES:
1) DIMENSIONS ARE FOR REFERENCE ONLY
2) DIMENSIONS ARE TO FRONT OF 0.25" THICK BUMPER
3) DIMENSION IS 16.1" WITH 11-5/8" RAIL
4) DIMENSION FRONT AXLE TO FRONT OF FRAME (FFA) IS 19.6"
5) DIMENSION FRONT OF BUMPER TO FRONT OF FRAME (BFF) IS 11.4"

FIGURE 3-1. Model 389-131 Top & LH View – Overall Dimensions

MODEL 388-123

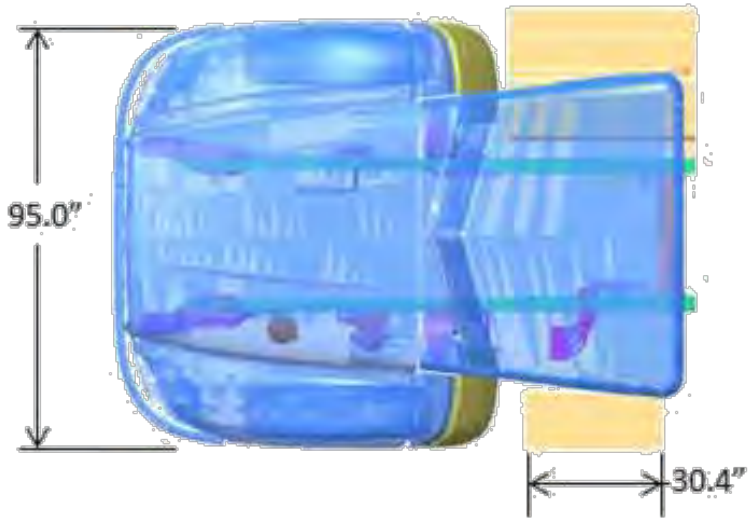


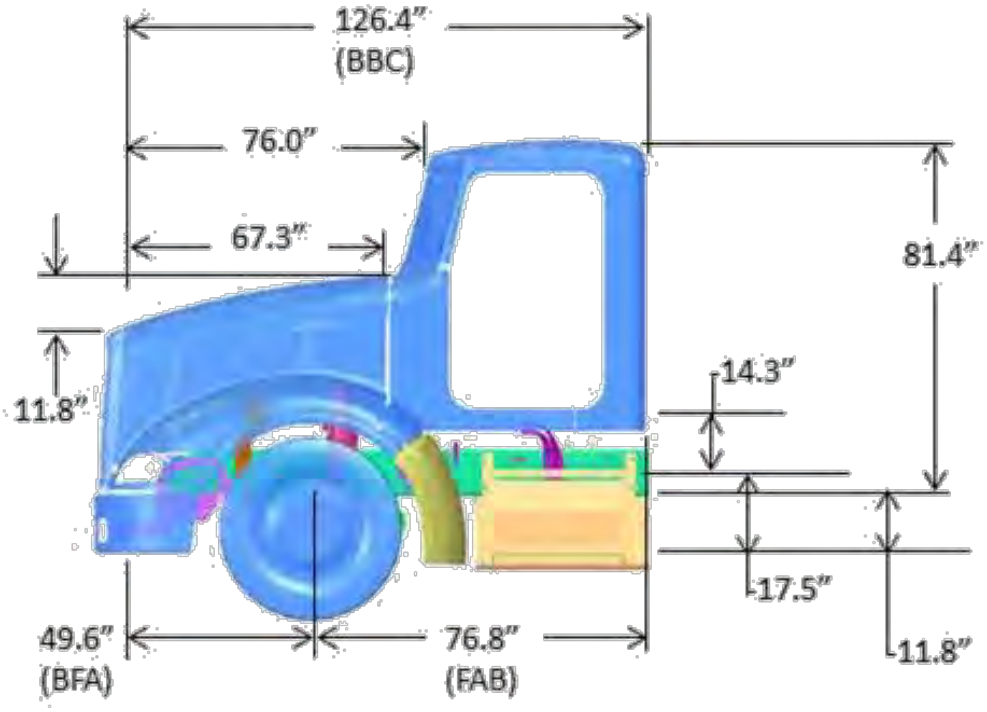


NOTES:
1) DIMENSIONS ARE FOR REFERENCE ONLY
2) DIMENSIONS ARE TO FRONT OF 0.25" THICK BUMPER
3) DIMENSION FRONT AXLE TO FRONT OF FRAME (FFA) IS 19.6"
4) DIMENSION FRONT OF BUMPER TO FRONT OF FRAME (BFF) IS 11.4"

FIGURE 3-2. Model 389-123 Top & LH View – Overall Dimensions

MODEL 386

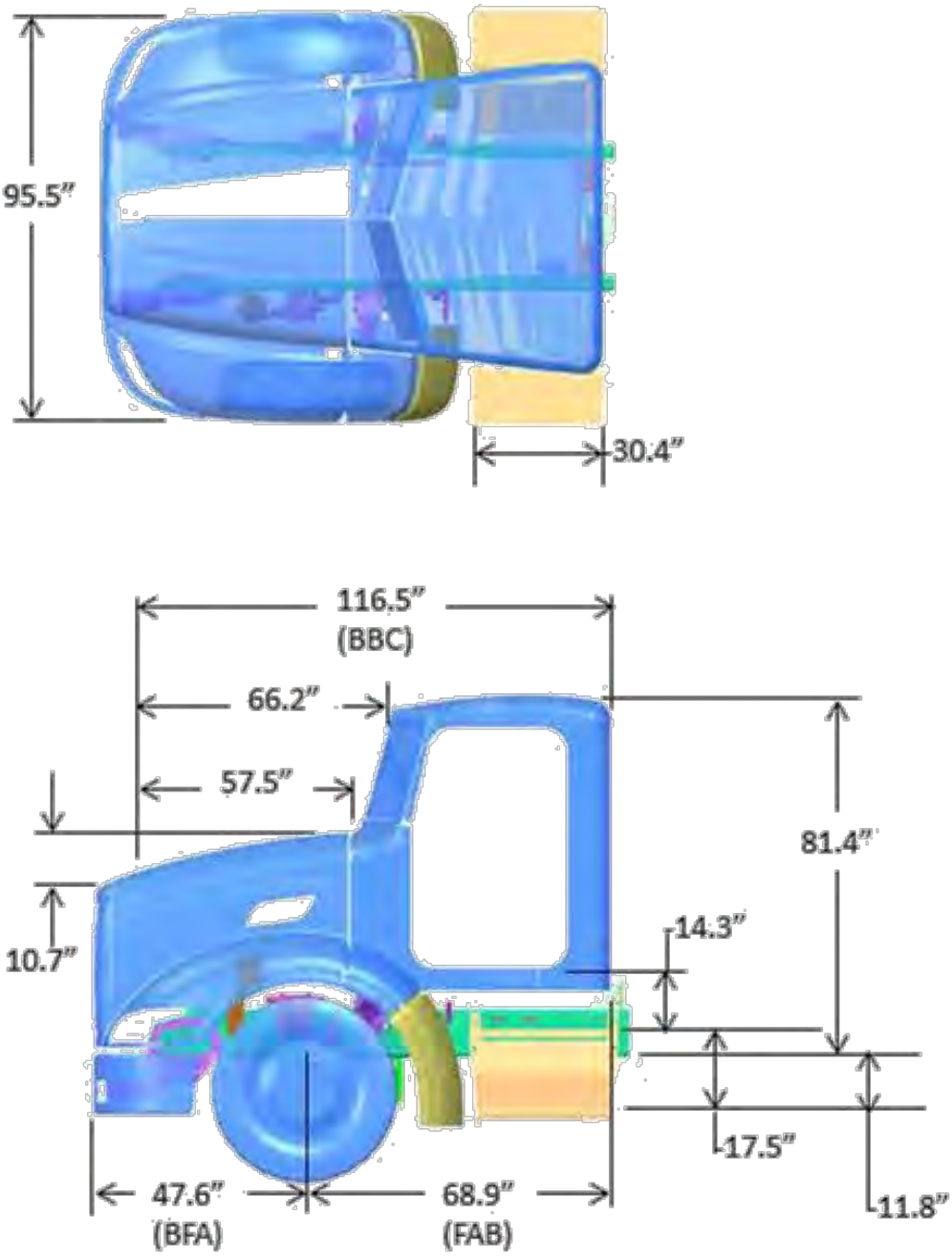




NOTES:
1) DIMENSIONS ARE FOR REFERENCE ONLY
2) DIMENSIONS ARE TO FRONT OF BUMPER
3) DIMENSION FRONT AXLE TO FRONT OF FRAME (FFA) IS 35.6"
4) DIMENSION FRONT OF BUMPER TO FRONT OF FRAME (BFF) IS 14.0"

FIGURE 3-3. Model 386 Top & LH View – Overall Dimensions

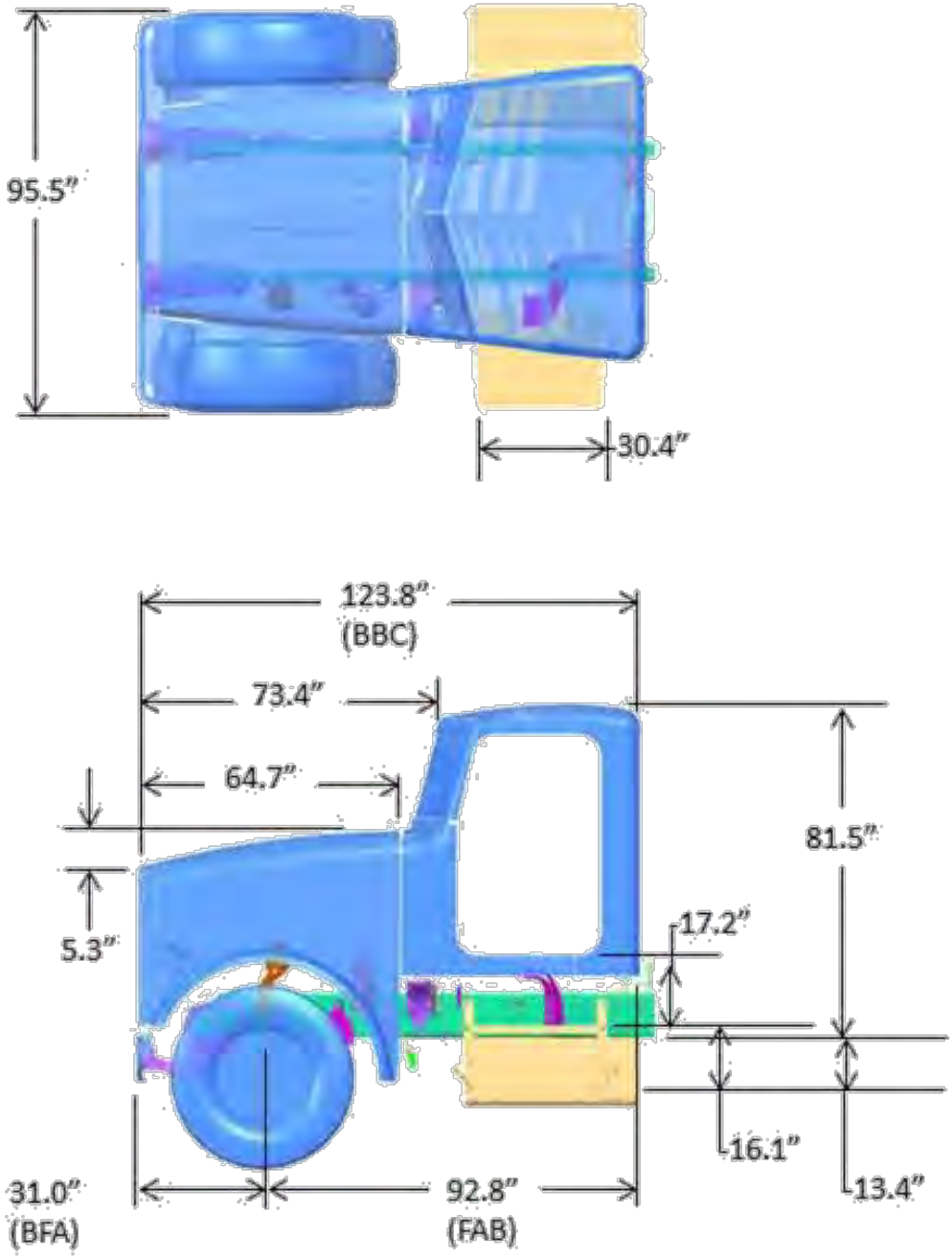
MODEL 384



NOTES:
1) DIMENSIONS ARE FOR REFERENCE ONLY
2) DIMENSIONS ARE TO FRONT OF BUMPER
3) DIMENSION FRONT AXLE TO FRONT OF FRAME (FFA) IS 35.6"
4) DIMENSION FRONT OF BUMPER TO FRONT OF FRAME (BFF) IS 12.0"

FIGURE 3-4. Model 384 Top & LH View – Overall Dimensions

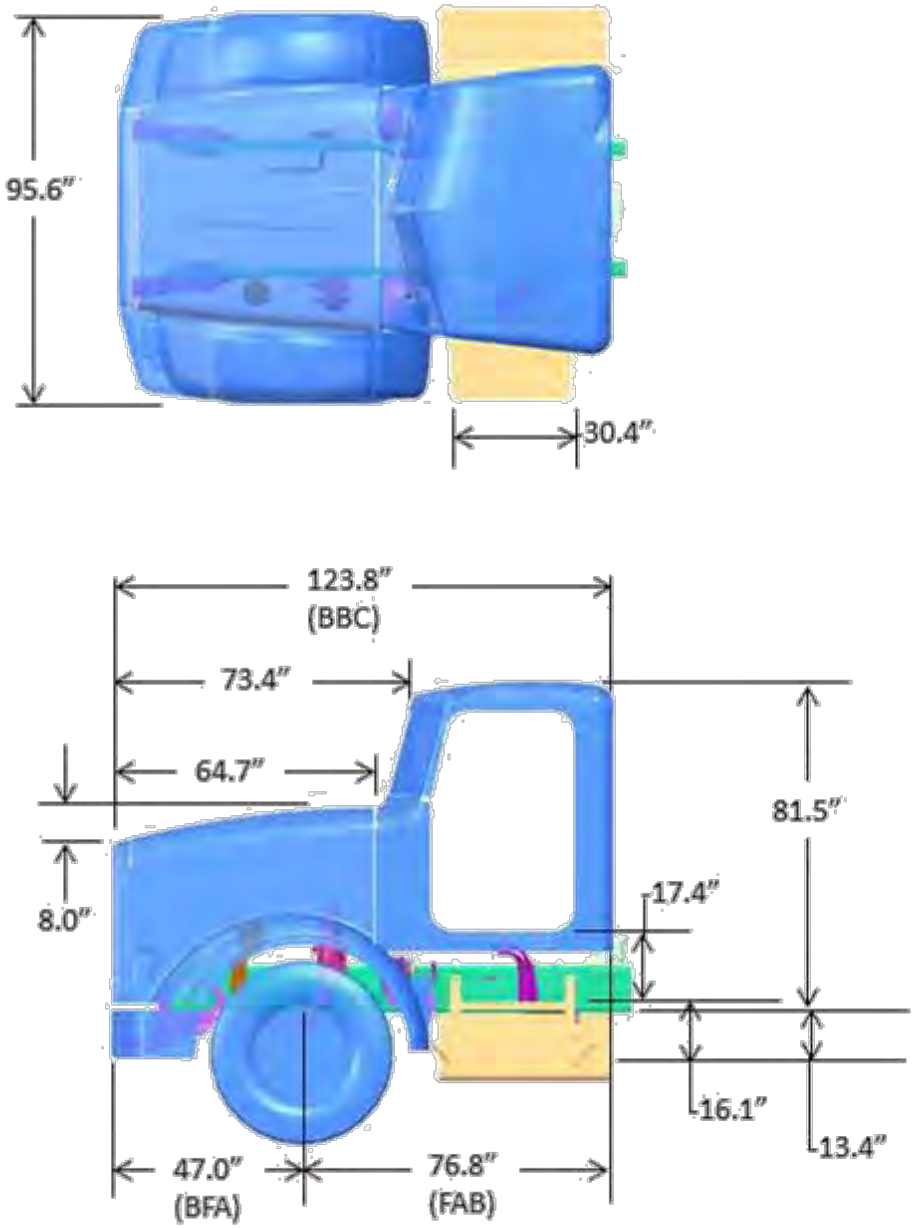
Model 367SFFA



NOTES:
1) DIMENSIONS ARE FOR REFERENCE ONLY
2) DIMENSIONS ARE TO FRONT OF 0.25" THICK BUMPER
3) DIMENSION FRONT AXLE TO FRONT OF FRAME (FFA) IS 19.6"
4) DIMENSION FRONT OF BUMPER TO FRONT OF FRAME (BFF) IS 11.4"

FIGURE 3-5. Model 367 SFFA Top & LH View – Overall Dimensions

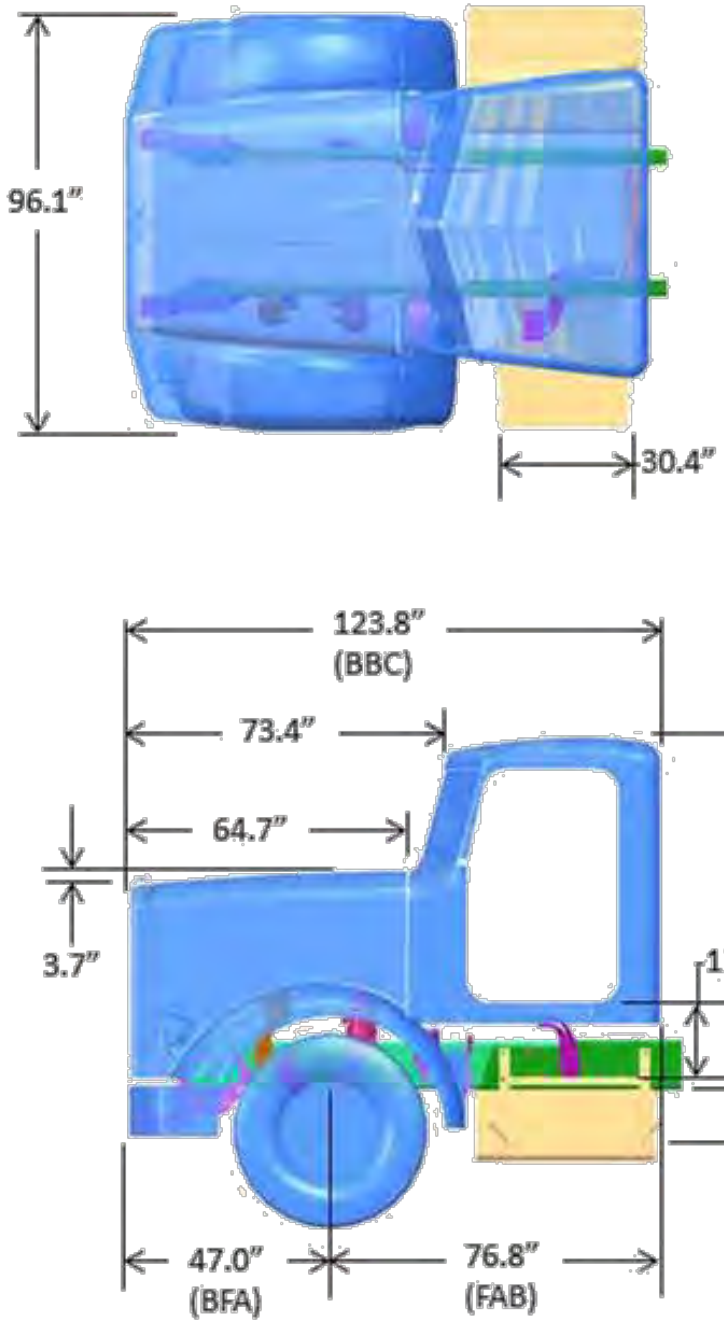
Model 367SBFA Sloped Hood



NOTES:
1) DIMENSIONS ARE FOR REFERENCE ONLY
2) DIMENSIONS ARE TO FRONT OF 0.25" THICK BUMPER
3) DIMENSION FRONT AXLE TO FRONT OF FRAME (FFA) IS 35.6"
4) DIMENSION FRONT OF BUMPER TO FRONT OF FRAME (BFF) IS 11.4"

FIGURE 3-6. Model 367 SBFA Sloped Hood Top & LH View – Overall Dimensions

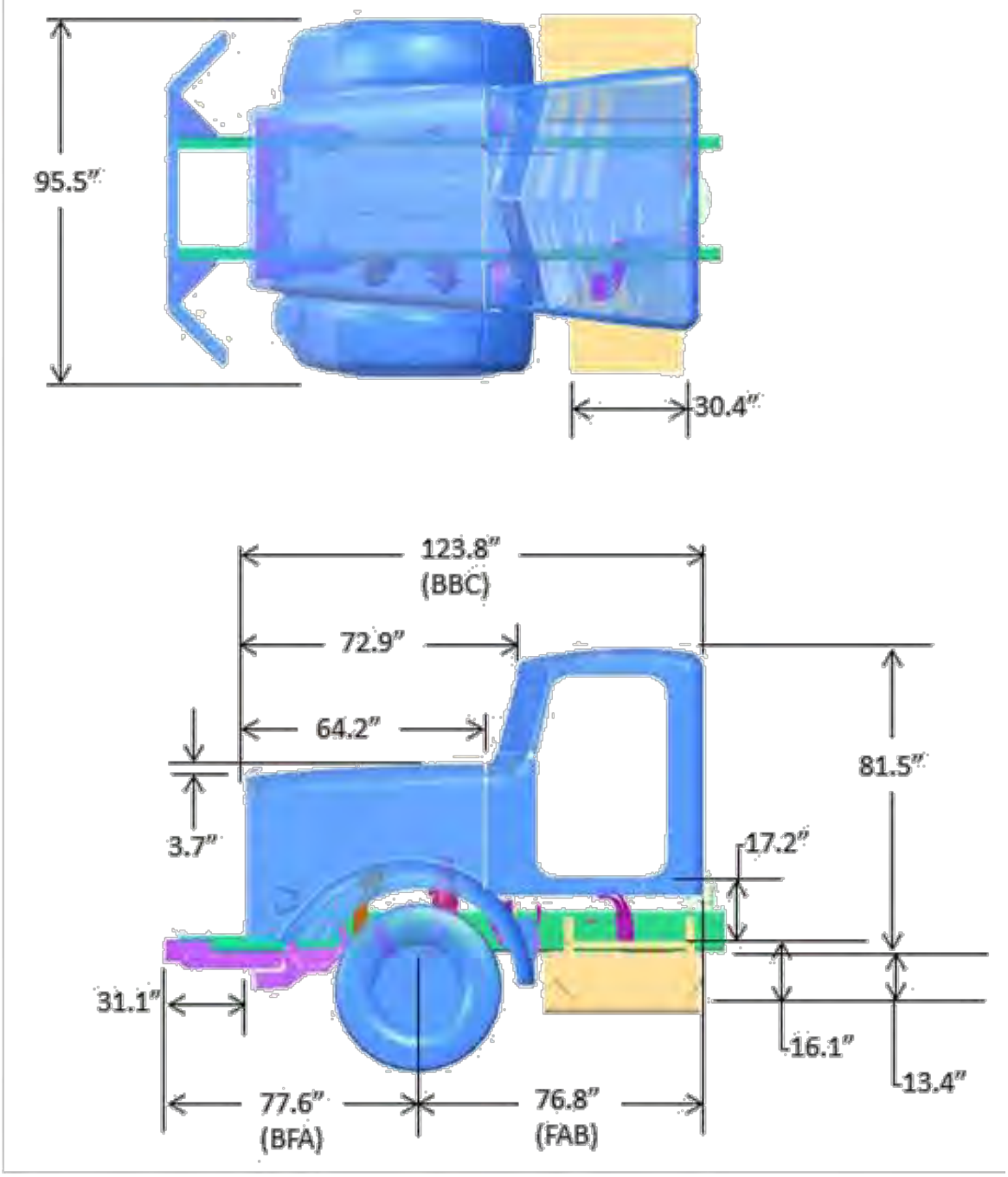
Model 367SBFA HH



NOTES:
1) DIMENSIONS ARE FOR REFERENCE ONLY
2) DIMENSIONS ARE TO FRONT OF 0.25" THICK BUMPER
3) DIMENSION FRONT AXLE TO FRONT OF FRAME (FFA) IS 35.6"
4) DIMENSION FRONT OF BUMPER TO FRONT OF FRAME (BFF) IS 11.4"

FIGURE 3-7. Model 367 SBFA Heavy Haul Hood Top & LH View – Overall Dimensions

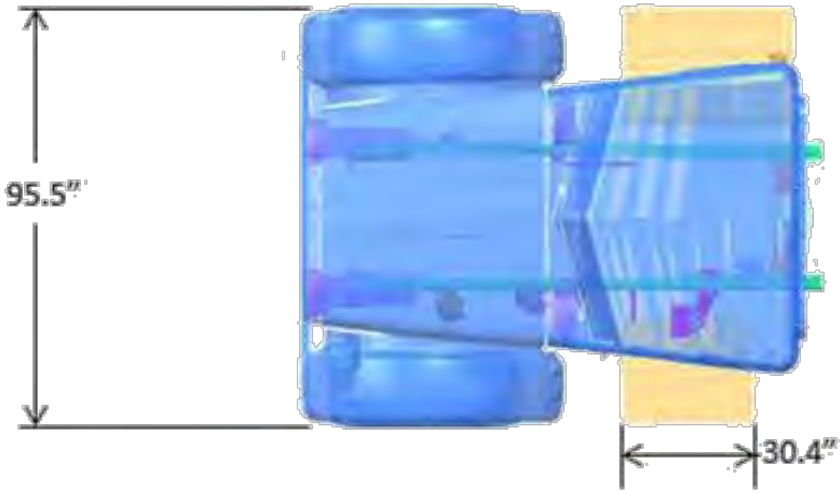
Model 367SBFA HH FEPTO

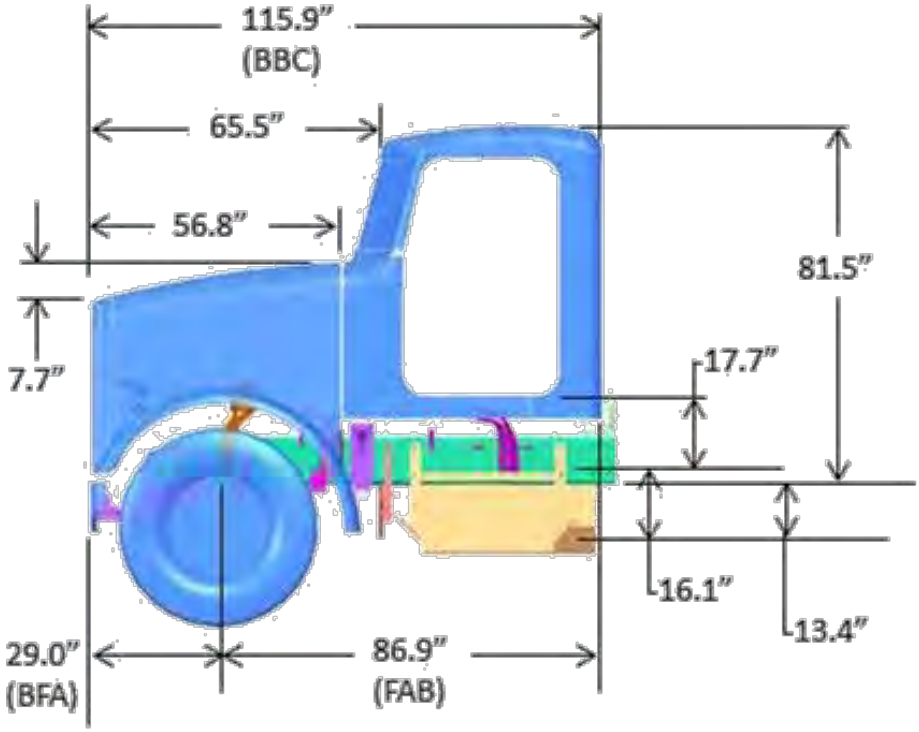


NOTES:
1) DIMENSIONS ARE FOR REFERENCE ONLY
2) DIMENSIONS ARE TO FRONT OF 0.25" THICK BUMPER
3) AVAILABLE IN 22.4" OR 31" FEPTO AND WITHOUT FEPTO (31" FEPTO SHOWN)

FIGURE 3-8. Model 367 SBFA FEPTO Heavy Haul Hood Top & LH View – Overall Dimensions

Model 365SFFA

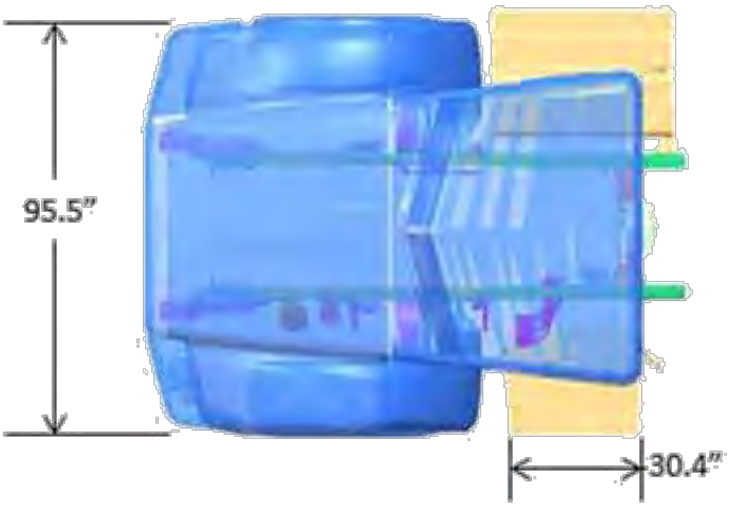


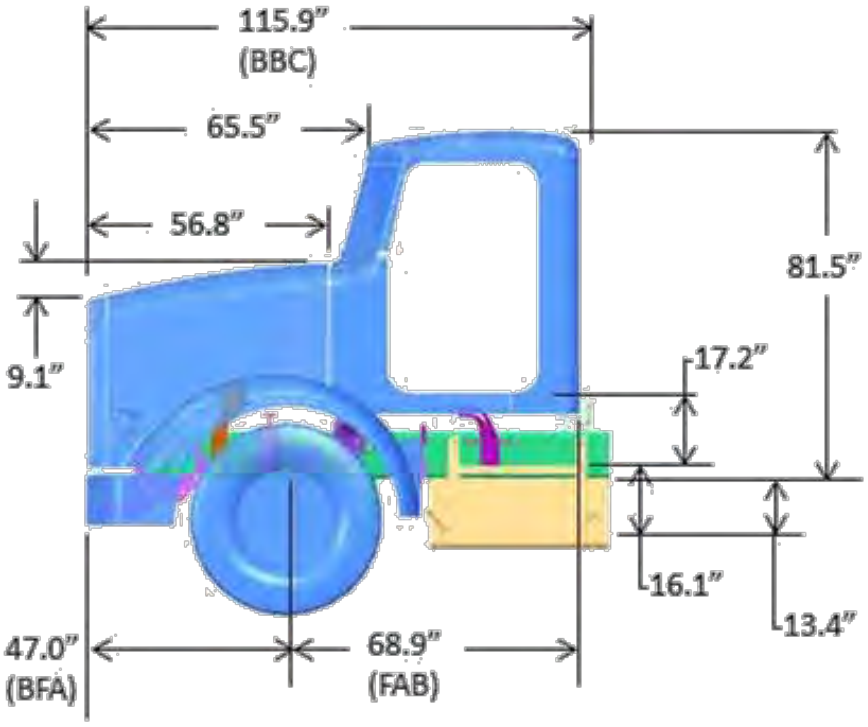


NOTES:
1) DIMENSIONS ARE FOR REFERENCE ONLY
2) DIMENSIONS ARE TO FRONT OF 0.25" THICK BUMPER
3) DIMENSION FRONT AXLE TO FRONT OF FRAME (FFA) IS 17.6"
4) DIMENSION FRONT OF BUMPER TO FRONT OF FRAME (BFF) IS 11.4"

FIGURE 3-9. Model 365 SFFA Top & LH View – Overall Dimensions

Model 365SBFA

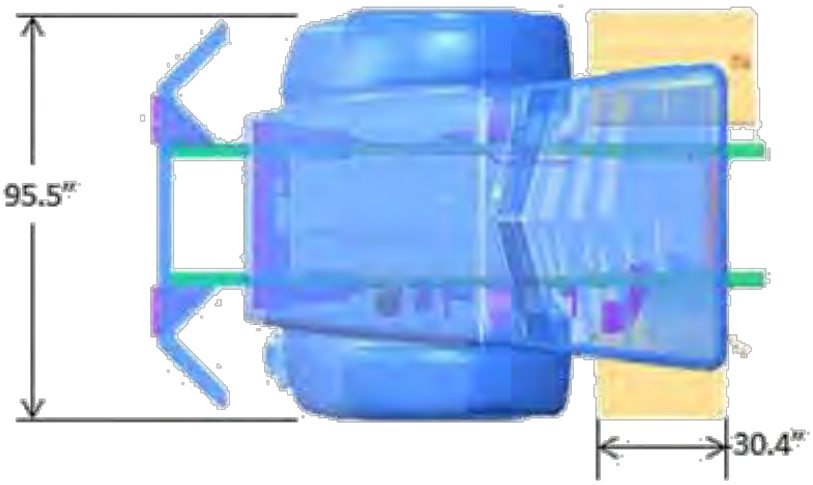


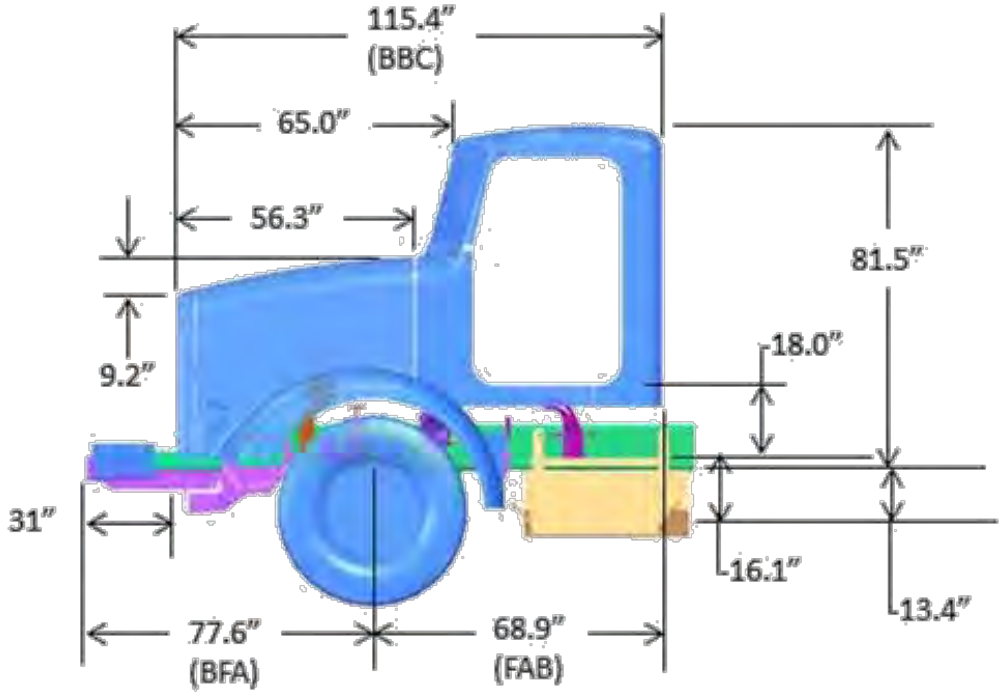


NOTES:
1) DIMENSIONS ARE FOR REFERENCE ONLY
2) DIMENSIONS ARE TO FRONT OF 0.25" THICK BUMPER
3) DIMENSION FRONT AXLE TO FRONT OF FRAME (FFA) IS 35.6"
4) DIMENSION FRONT OF BUMPER TO FRONT OF FRAME (BFF) IS 11.4"

FIGURE 3-10. Model 365 SBFA Top & LH View – Overall Dimensions

Model 365SBFA FEPTO

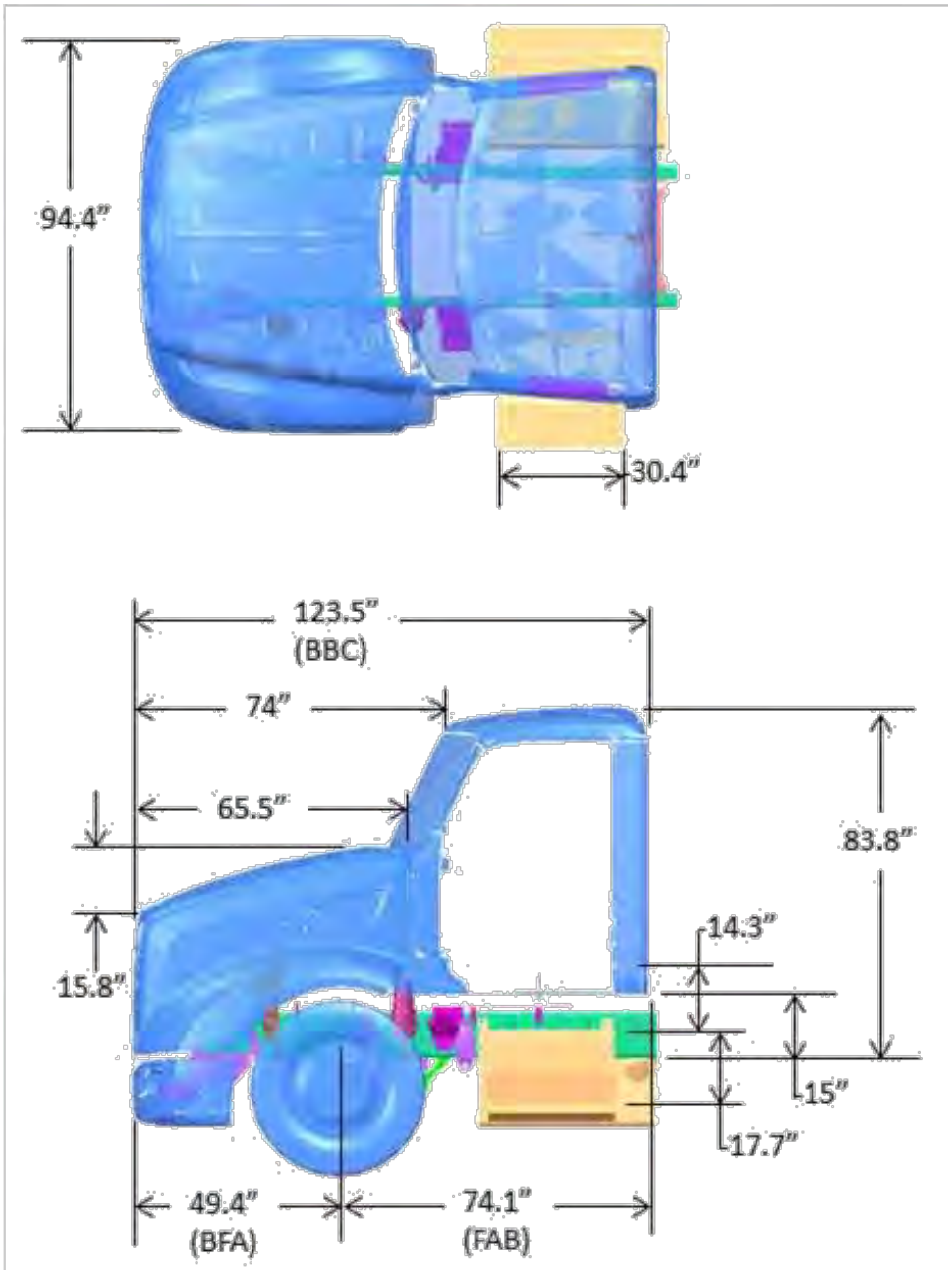




NOTES:
1) DIMENSIONS ARE FOR REFERENCE ONLY
2) DIMENSIONS ARE TO FRONT OF 0.25" THICK BUMPER
3) AVAILABLE IN 22.4" OR 31" FEPTO AND WITHOUT FEPTO (31" FEPTO SHOWN)
4) ADD 4" OVERALL CAB HEIGHT FOR FULL PROFILE HEIGHT FRAME RAILS (85.5")

FIGURE 3-11. Model 365 SBFA FEPTO Hood Top & LH View – Overall Dimensions

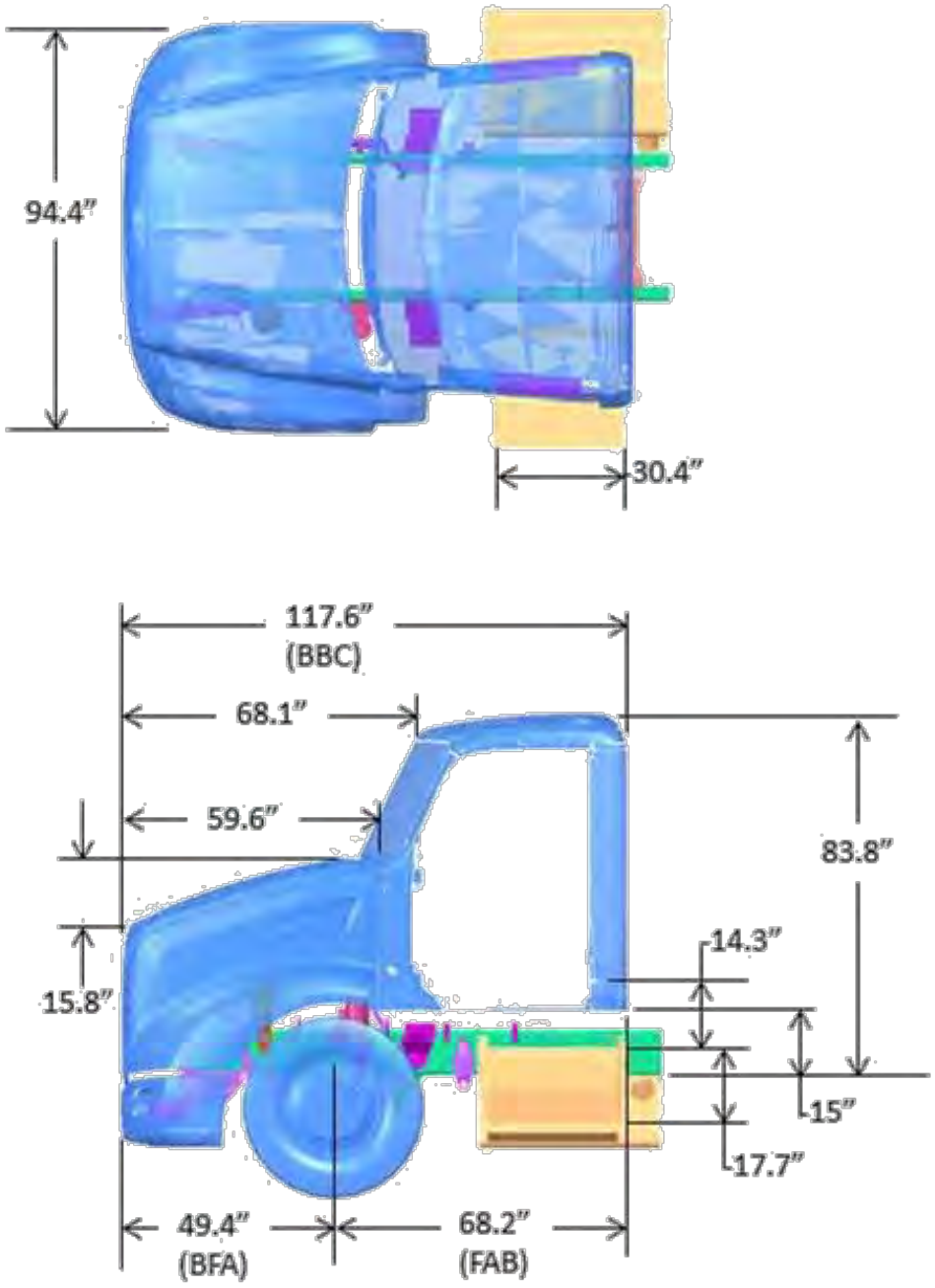
Model 579-123



NOTES:
1) DIMENSIONS ARE FOR REFERENCE ONLY
2) DIMENSIONS ARE TO FRONT OF BUMPER
3) DIMENSION FRONT AXLE TO FRONT OF FRAME (FFA) IS 35.6”
4) DIMENSION FRONT OF BUMPER TO FRONT OF FRAME (BFF) IS 13.8”

FIGURE 3-12. Model 579-123 SBFA Top & LH View – Overall Dimensions

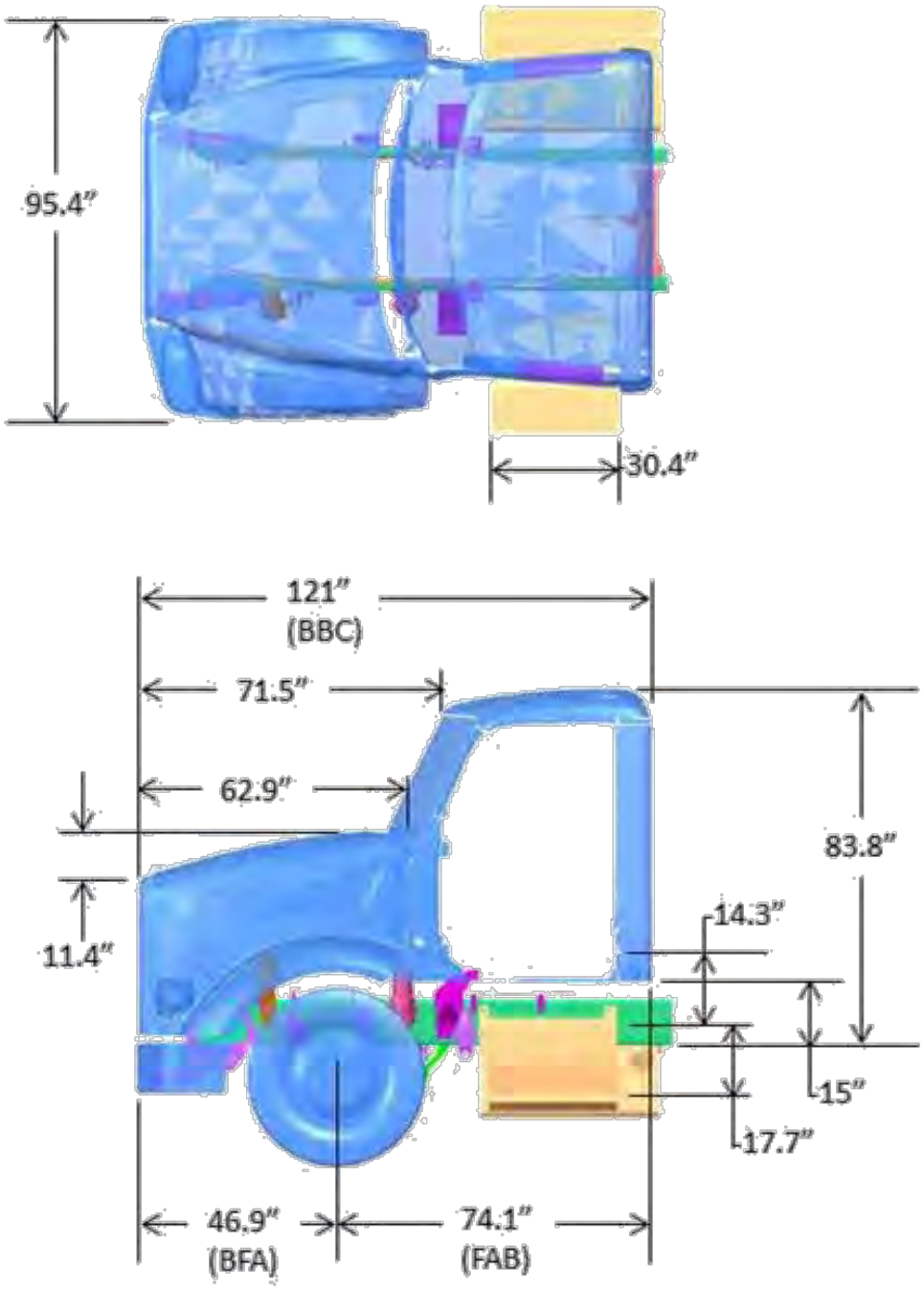
Model 579-117



NOTES:
1) DIMENSIONS ARE FOR REFERENCE ONLY
2) DIMENSIONS ARE TO FRONT OF BUMPER
3) DIMENSION FRONT AXLE TO FRONT OF FRAME (FFA) IS 35.6”
4) DIMENSION FRONT OF BUMPER TO FRONT OF FRAME (BFF) IS 13.8”

FIGURE 3-13. Model 579-117 SBFA Top & LH View – Overall Dimensions

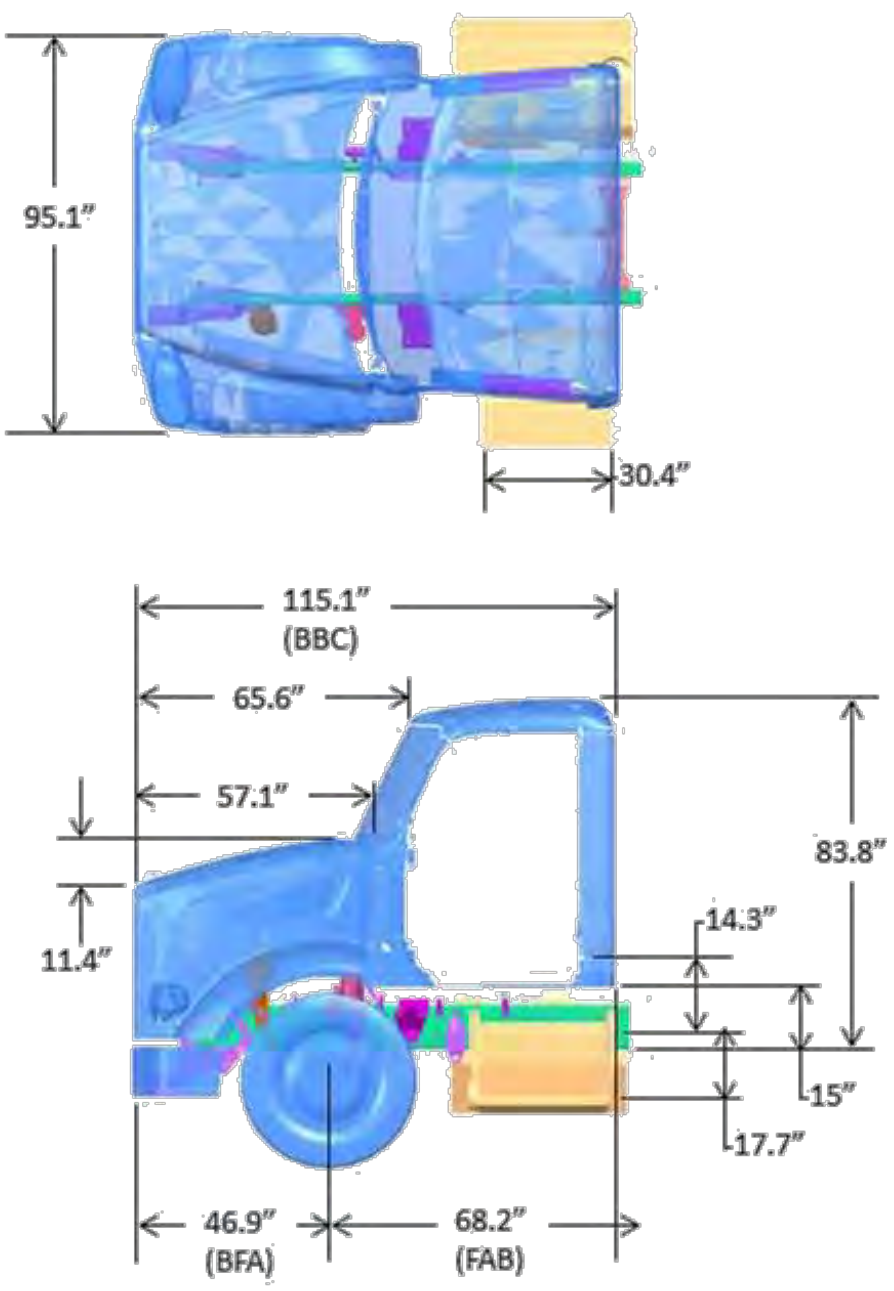
Model 567-121



NOTES:
1) DIMENSIONS ARE FOR REFERENCE ONLY
2) DIMENSIONS ARE TO FRONT OF BUMPER
3) DIMENSION FRONT AXLE TO FRONT OF FRAME (FFA) IS 35.6”
4) DIMENSION FRONT OF BUMPER TO FRONT OF FRAME (BFF) IS 11.3”

FIGURE 3-14. Model 567-121 SBFA Top & LH View – Overall Dimensions

Model 567-115



NOTES:
1) DIMENSIONS ARE FOR REFERENCE ONLY
2) DIMENSIONS ARE TO FRONT OF BUMPER
3) DIMENSION FRONT AXLE TO FRONT OF FRAME (FFA) IS 35.6"
4) DIMENSION FRONT OF BUMPER TO FRONT OF FRAME (BFF) IS 11.3"

FIGURE 3-15. Model 567-115 SBFA Top & LH View – Overall Dimensions

SLEEPERS

TABLE 3-2. Sleeper Dimensions

MODEL	CAB TO SLEEPER OPENING				SLEEPER DIMENSIONS							CAB TO SLEEPER GAP
	STD CAB		ULTRACAB		D = DISTANCE FROM BTM OF FRAME RAIL TO TOP OF ROOF							
	"A"	"B"	"A"	"B"	44"	58" LOW	58" HIGH	72" LOW	72" HIGH	78"	80"	"E"
389-131	49.0	59.0	59.0	59.0	81.7	83.5	99.3	83.3	99.4	101.6	N/A	2.3
389-123, 386, 384, 367, 365	49.0	59.0	59.0	59.0	83.7	85.5	101.4	85.3	101.5	103.7	N/A	2.3
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	

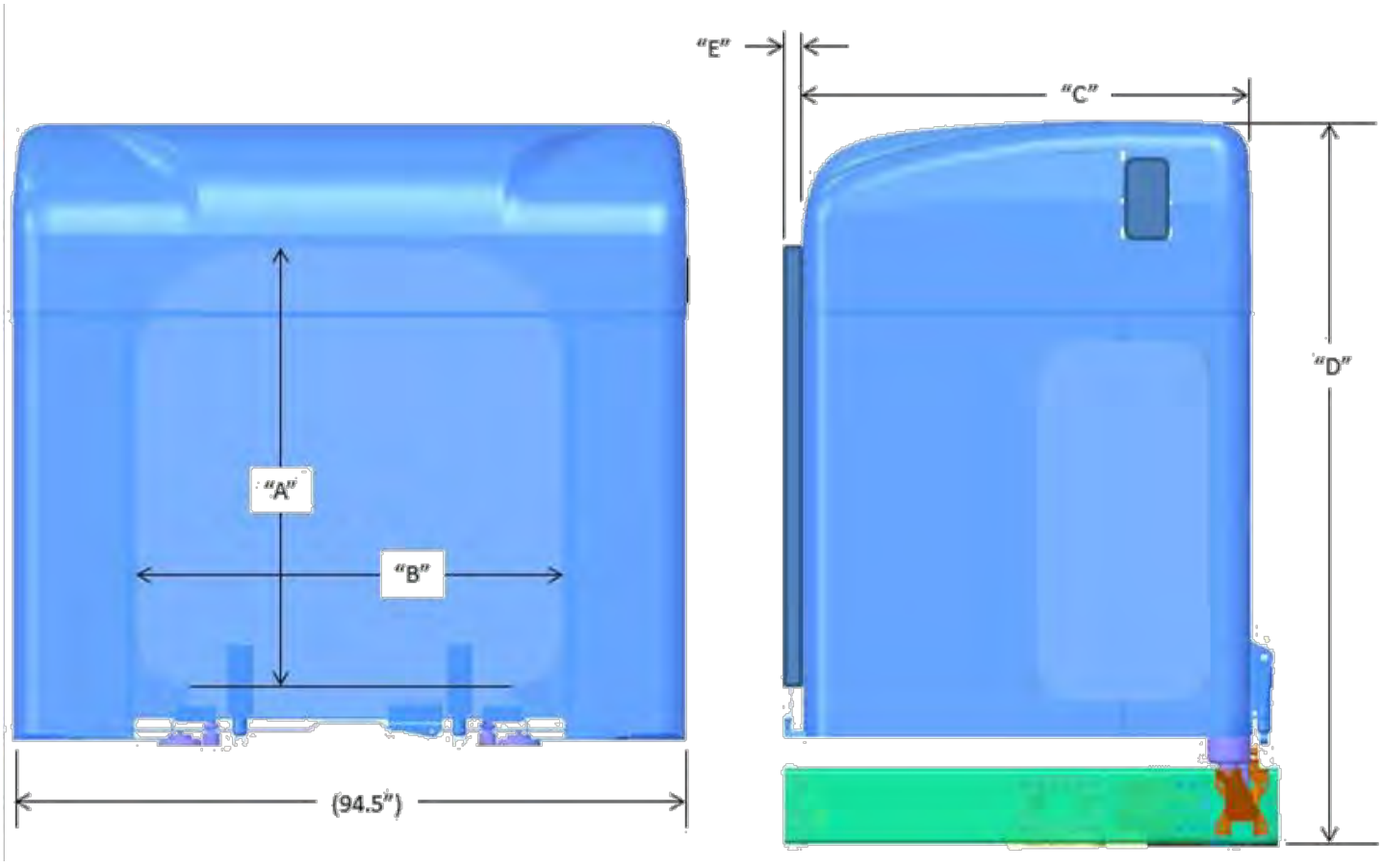


FIGURE 3-16. Sleeper Dimensions – Front & LH View

CAB – 1.9 m CAB FAMILY

Models 389, 388, 386, 384, 367, 365

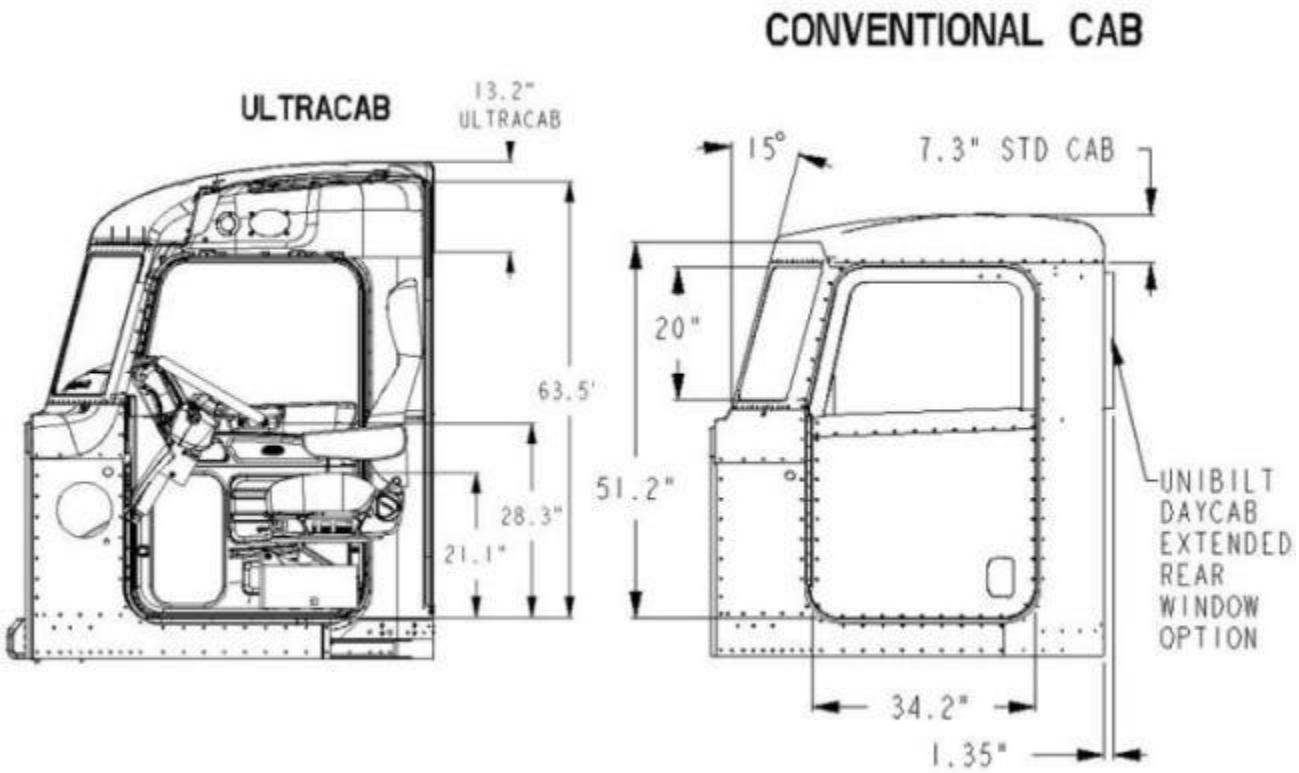


FIGURE 3-17. Cab Dimensions 1.9 m Cab Family

EXTENDED CAB – 1.9 m CAB FAMILY

Models 389, 388, 386, 384, 367, 365

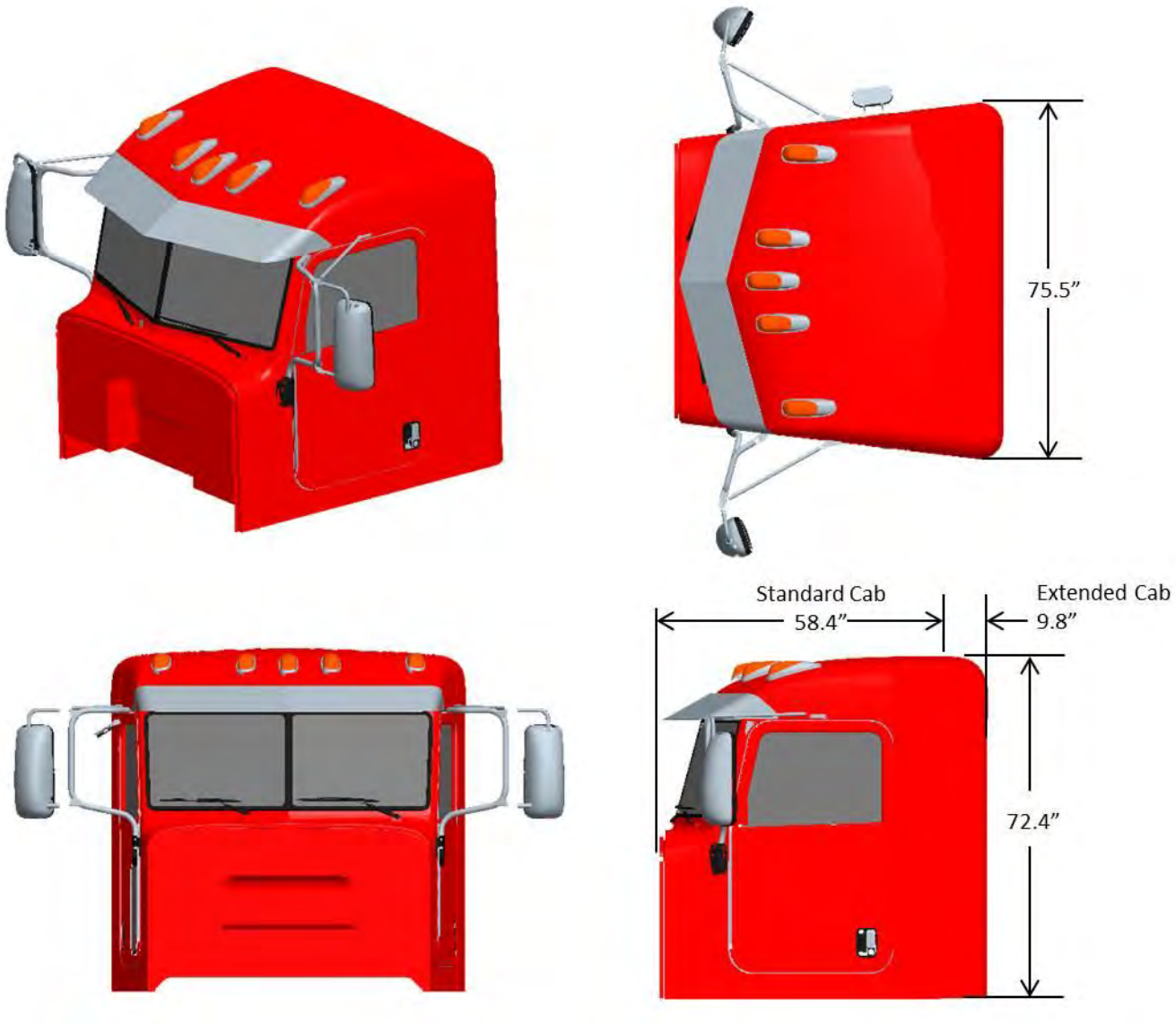


FIGURE 3-18. Extended Cab

FRAME RAILS

Frame rail configurations are shown in FIGURE 3-19. Frame height, flange and structural values can be found in the Body Mounting Section.

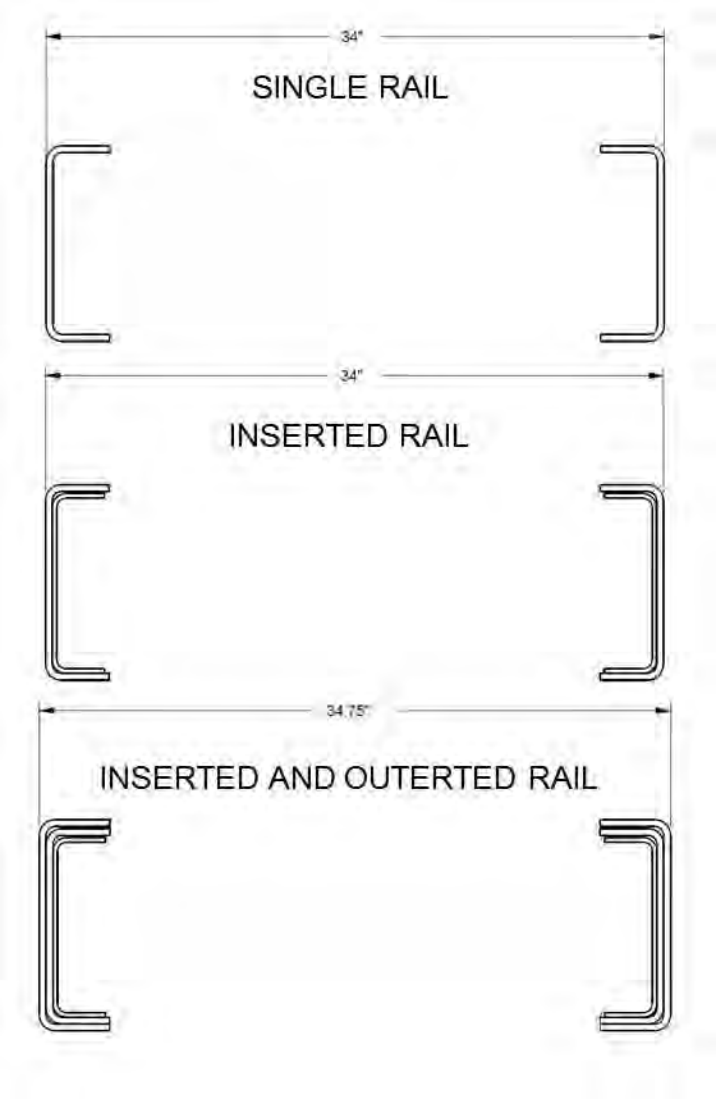


FIGURE 3-19. Frame Rail Configurations

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

FRAME HEIGHT CHARTS

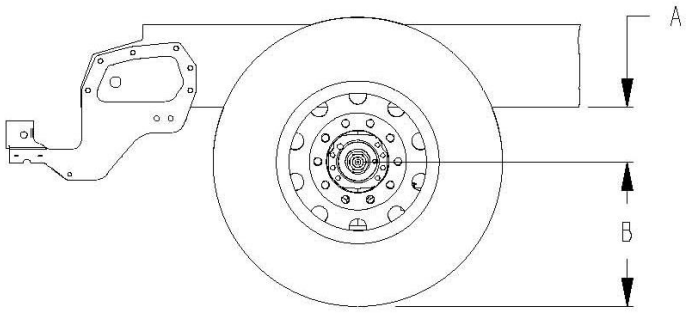
THE FOLLOWING FRAME HEIGHT CHARTS MAY BE USED FOR FINDING APPROXIMATE FRONT AND REAR FRAME HEIGHTS.

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.

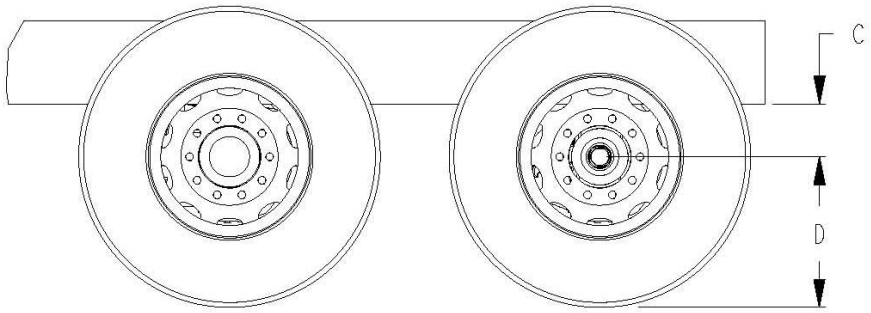
LOADED VALUES ARE QUOTES FOR REPRESENTATIVE LOADS AT THE GROUND FOR THE PARTICULAR SPRING AND AXLE COMBINATION, AND, AS SUCH, CAN VARY WITH LOADING VARIATIONS.

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 3-20. 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)	LIGHT (in.)	LOADED (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	Light 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	Light 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	Light 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	Light 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	Light 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	Light 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.

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

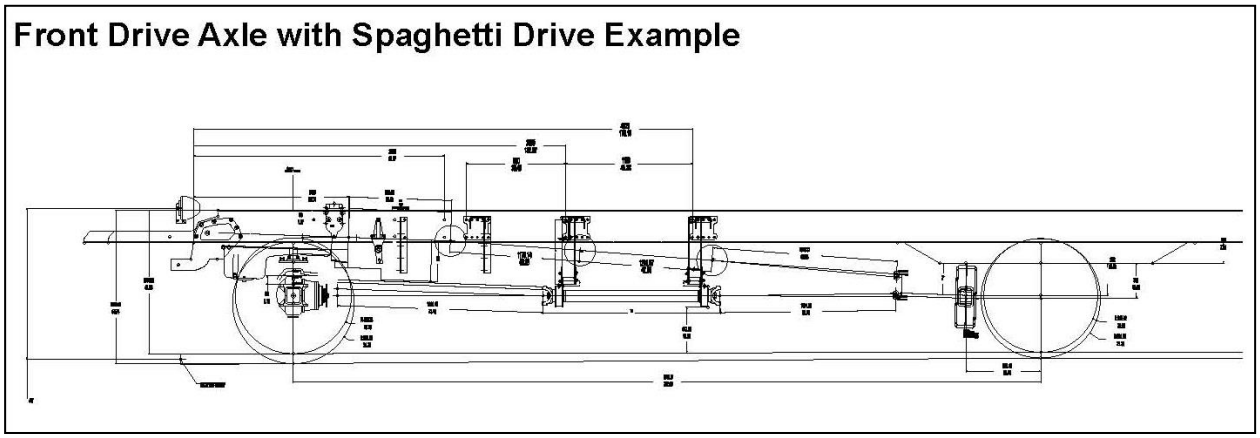


FIGURE 3-20. Front Drive Axle with Spaghetti Drive Example

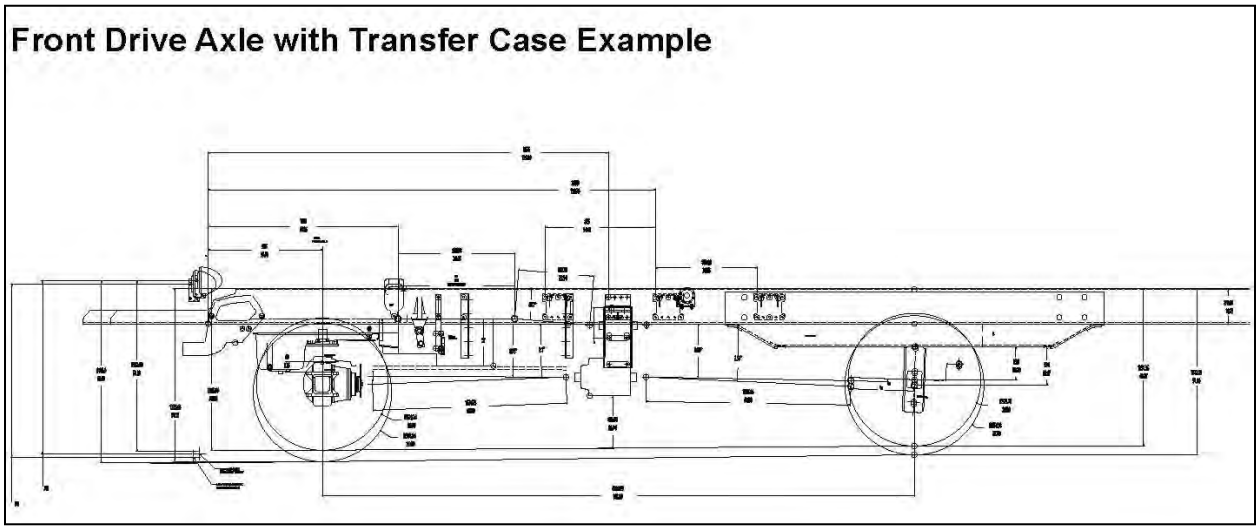


FIGURE 3-21. Front Drive Axle with Transfer Case Example

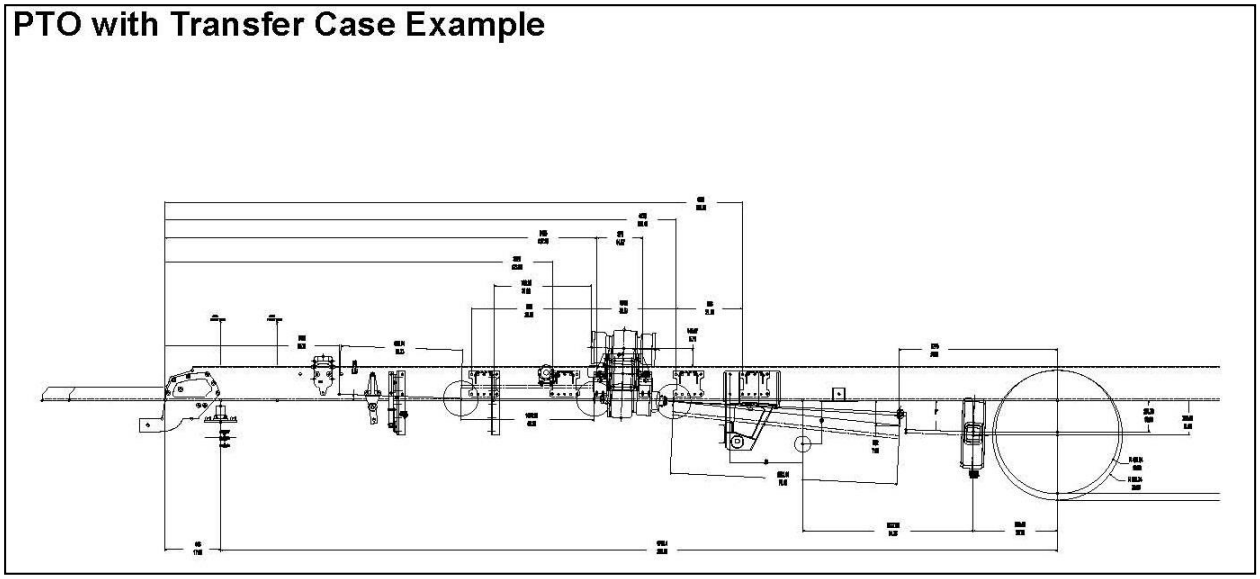


FIGURE 3-22. PTO with Transfer Case Example

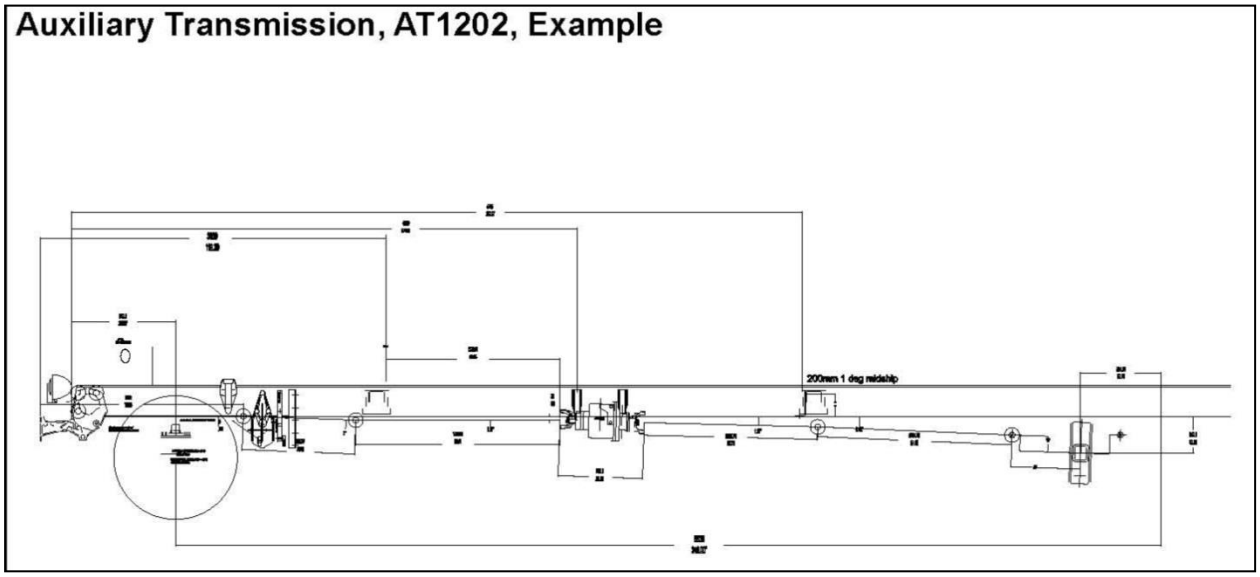


FIGURE 3-23. PTO with Transfer Case Example

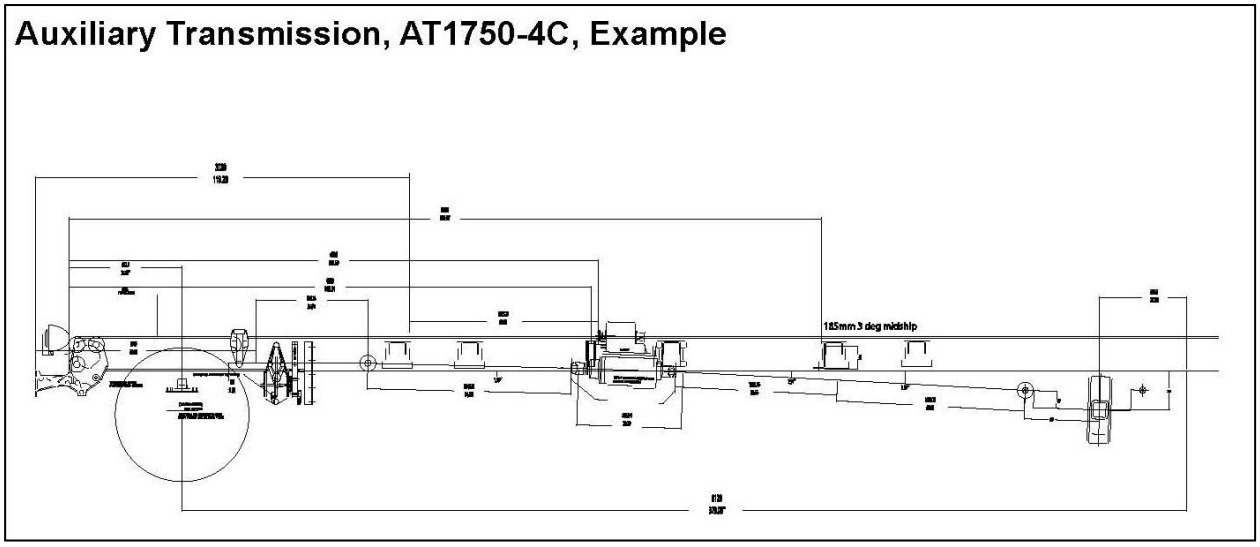


FIGURE 3-24. PTO with Transfer Case Example

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.

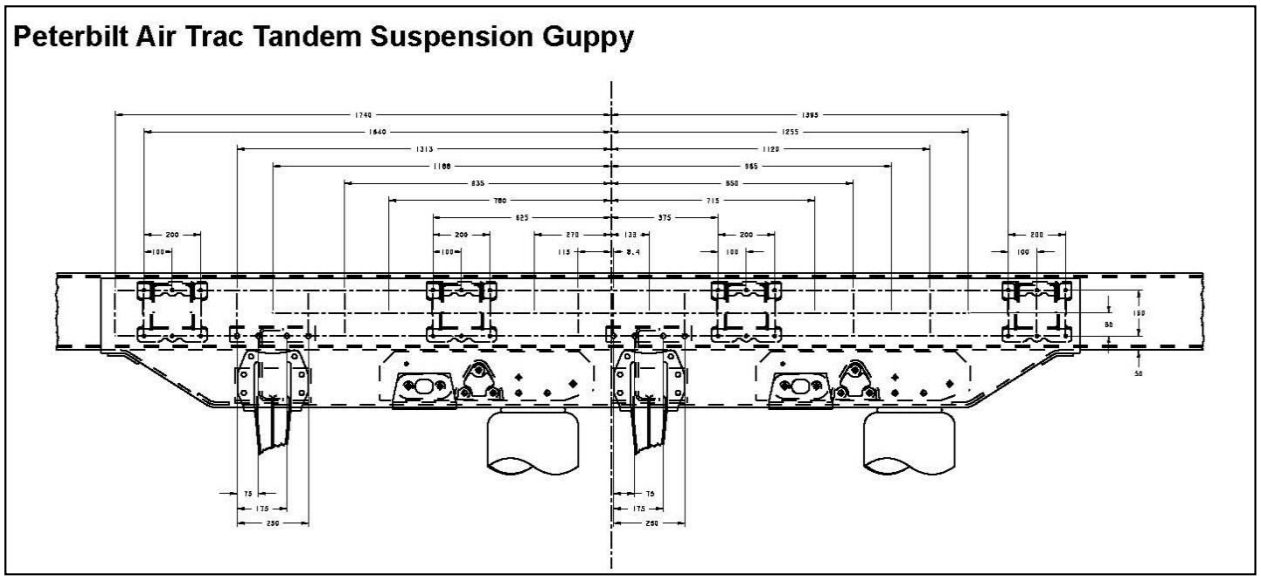


FIGURE 3-25. Peterbilt Air Trac Tandem Suspension Guppy

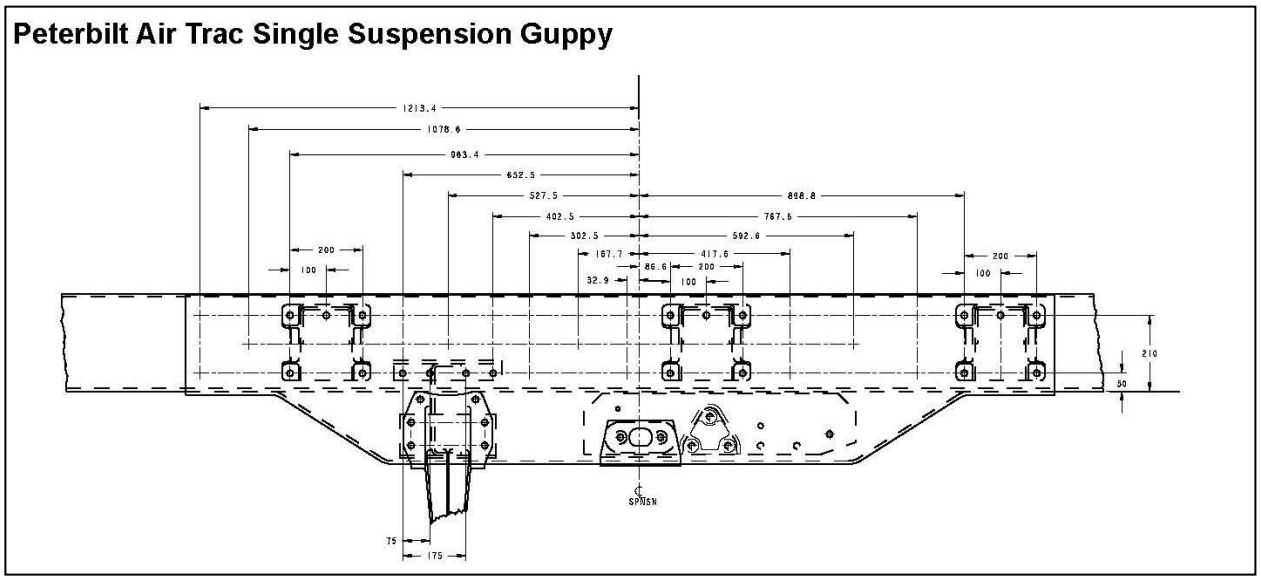


FIGURE 3-26. Peterbilt Air Trac Single Suspension Guppy

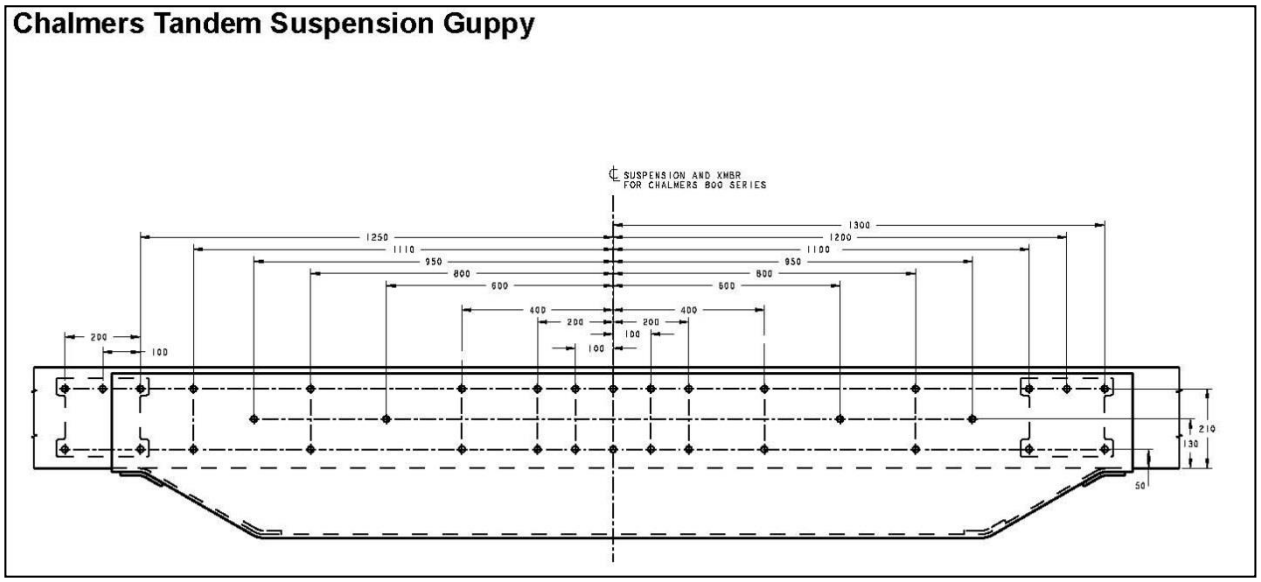


FIGURE 3-27. Chalmers Tandem Suspension Guppy

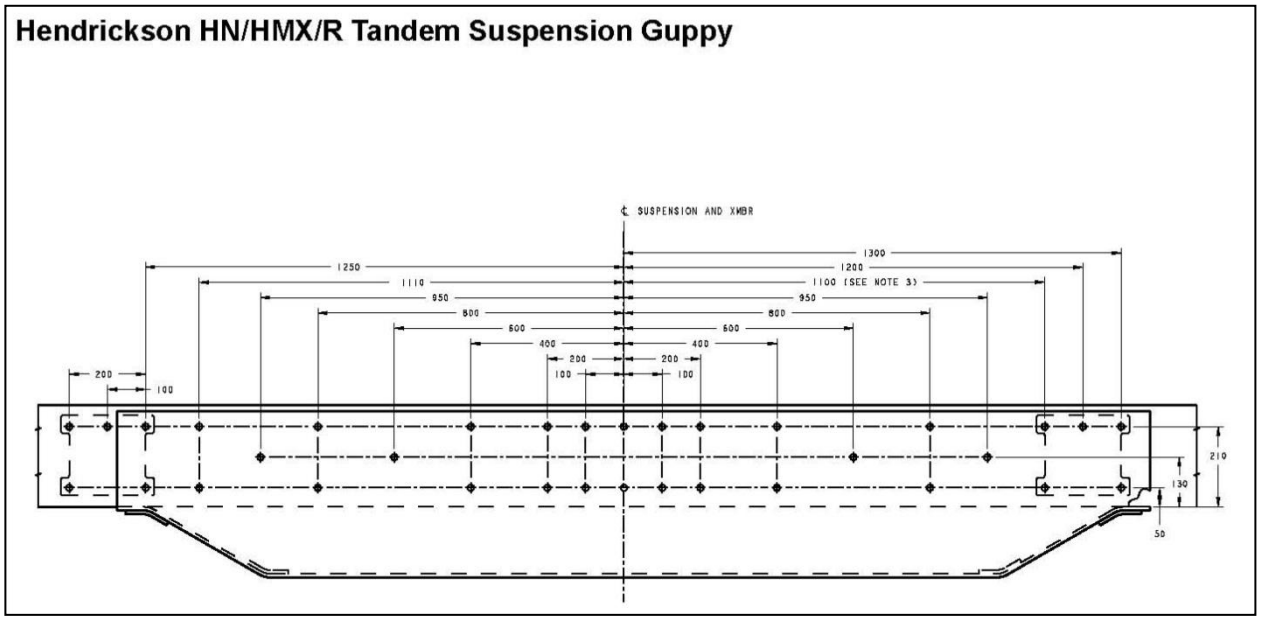


FIGURE 3-28. Hendrickson HN/HMX/R Tandem Suspension Guppy

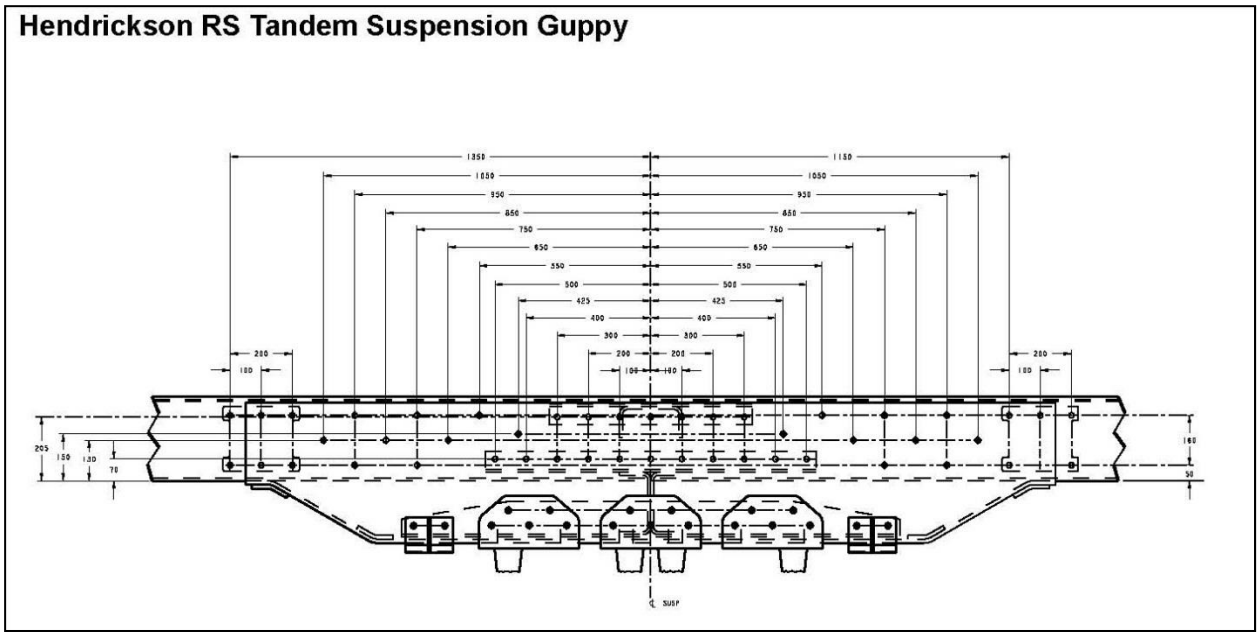


FIGURE 3-29. Hendrickson RS Tandem Suspension Guppy

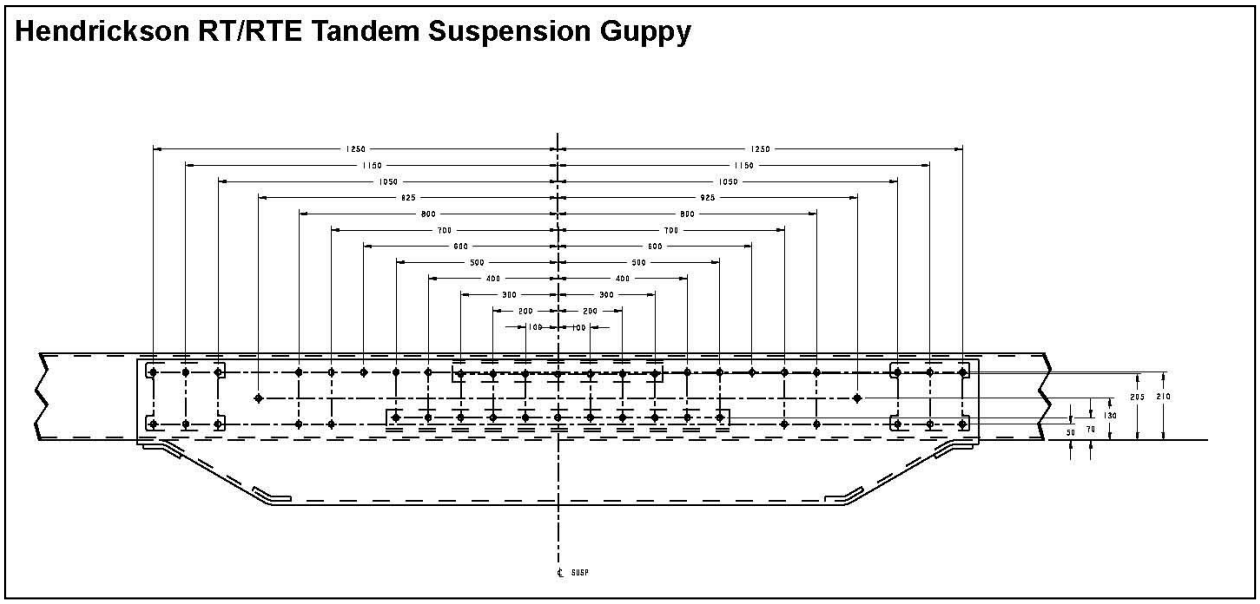


FIGURE 3-30. Hendrickson RT/RTE Tandem Suspension Guppy

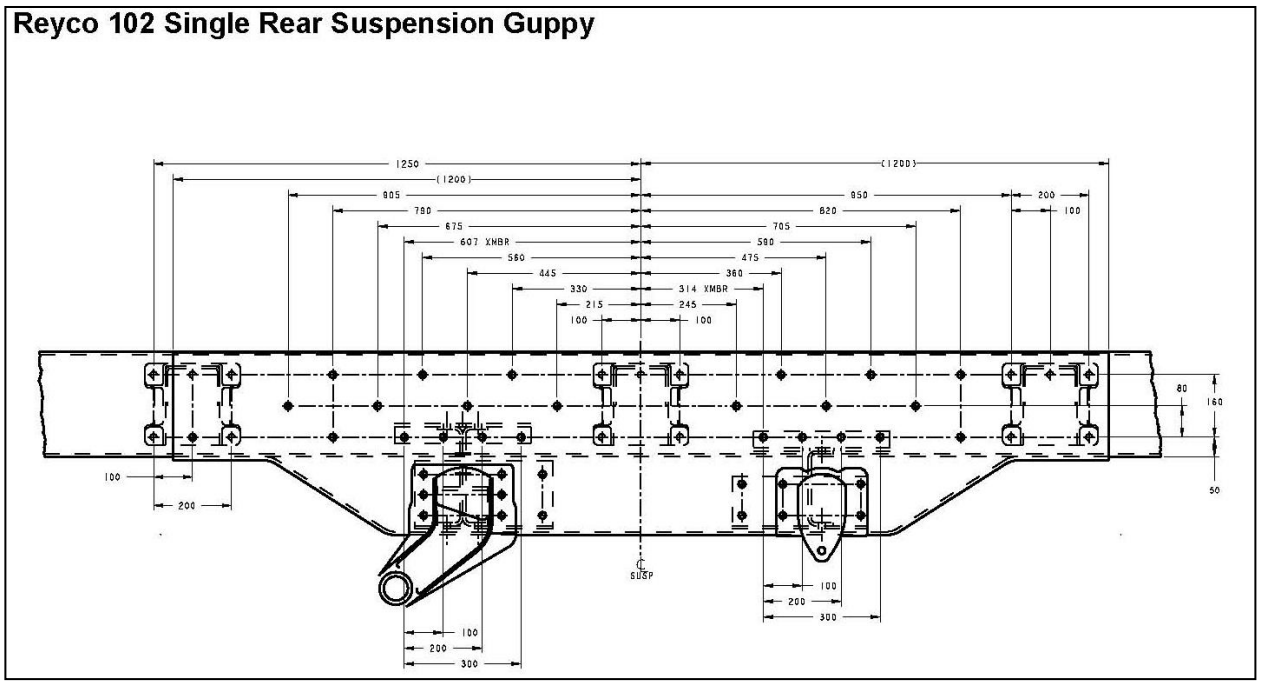


FIGURE 3-31. Reyco 102 Single Drive Suspension Guppy

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 3-11. Exhaust Heights

Y = DISTANCE FROM BTM OF FRAME RAIL TO BTM OF STANDPIPE					
Exhaust Location	389-131	389-123, 386, 384, 367, 365	579, 567	587	388 w/ Low Profile Alum Hood
SOC Mounted (Day Cab)	67.2	69.2	70.2	N/A	67.2
SOC Mounted (Sleeper)	67.2	69.2	67.6	N/A	67.2
BOC Mounted	N/A	70.7	69.2	N/A	68.7
Frame Mounted	N/A	84.9	86.0	84.9	N/A
Vertical-Vertical	N/A	ISX/MX=77.3, ISL=75	ISX/MX=78.3, ISL=75.7	N/A	N/A

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.

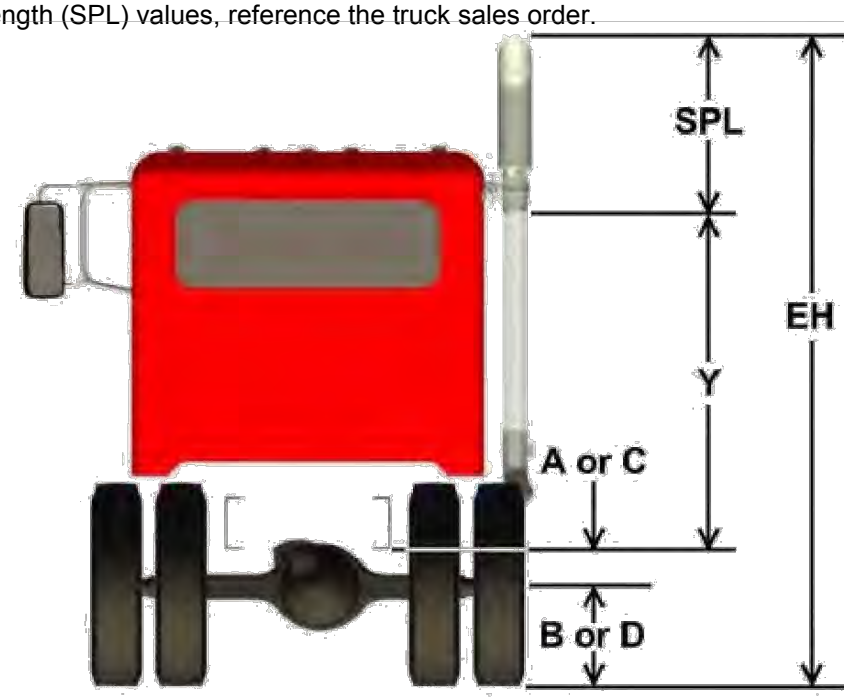


FIGURE 3-32. Exhaust Height Calculations

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 3-12. 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

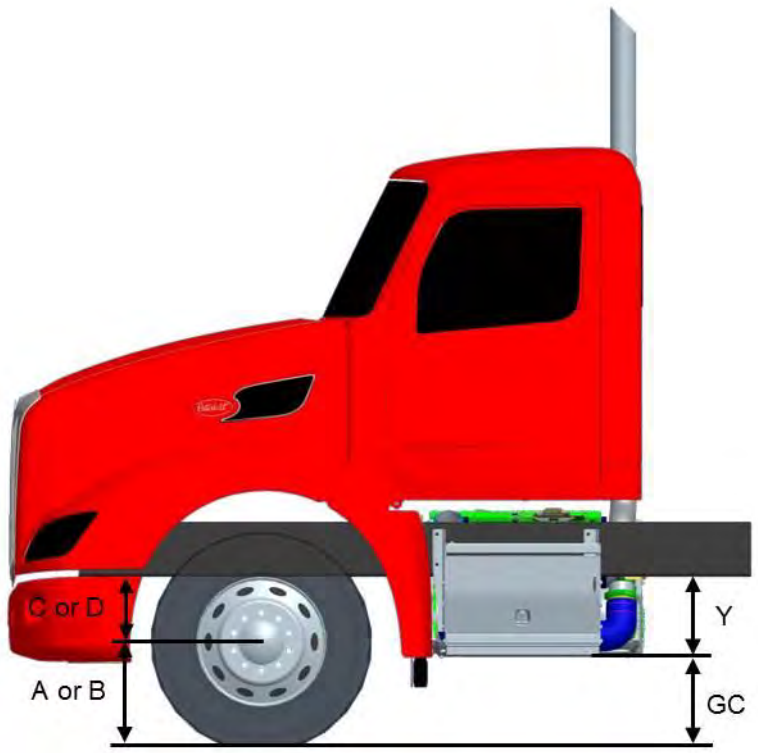


FIGURE 3-33. Ground Clearance Calculations

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 3-13. Overall Cab Height

Y = DISTANCE FROM BTM OF FRAME TO TOP OF STANDARD CAB ROOF	
Model	**Y**
389-131, 389-123 Low Profile Hood	79.4
389-123, 386, 384, 367, 365	81.5
365 Full Profile Frame Extensions	85.5
587 Day Cab	85.2
579/567	83.7

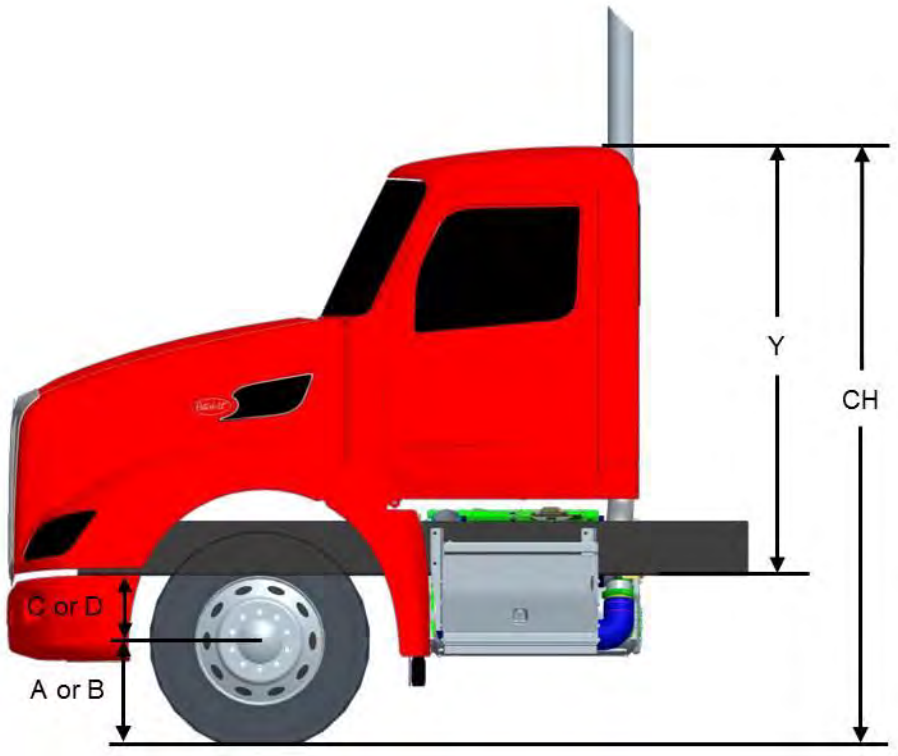


FIGURE 3-34. Overall Cab Height Calculations

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

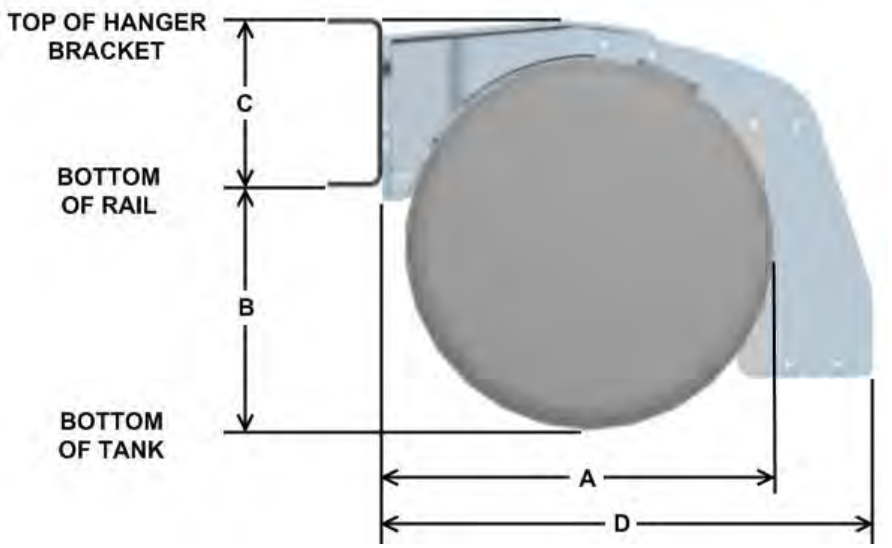


FIGURE 3-35. Fuel Tanks

TABLE 3-14. 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 3-15. 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

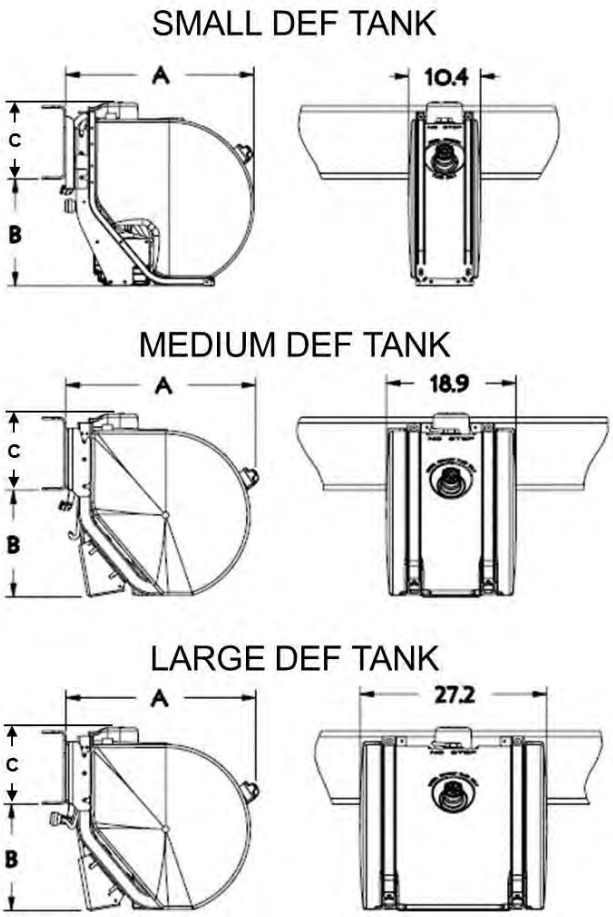


FIGURE 3-36. DEF Tanks

FIGURE 3-37. DEF Tank Isometric View

TABLE 3-16. 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 3-17. 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

EXHAUST SYSTEMS – 389 Family

EXHAUST SINGLE RH SIDE OF CAB DPF/SCR RH UNDER CAB
(Reference option code 3365040)

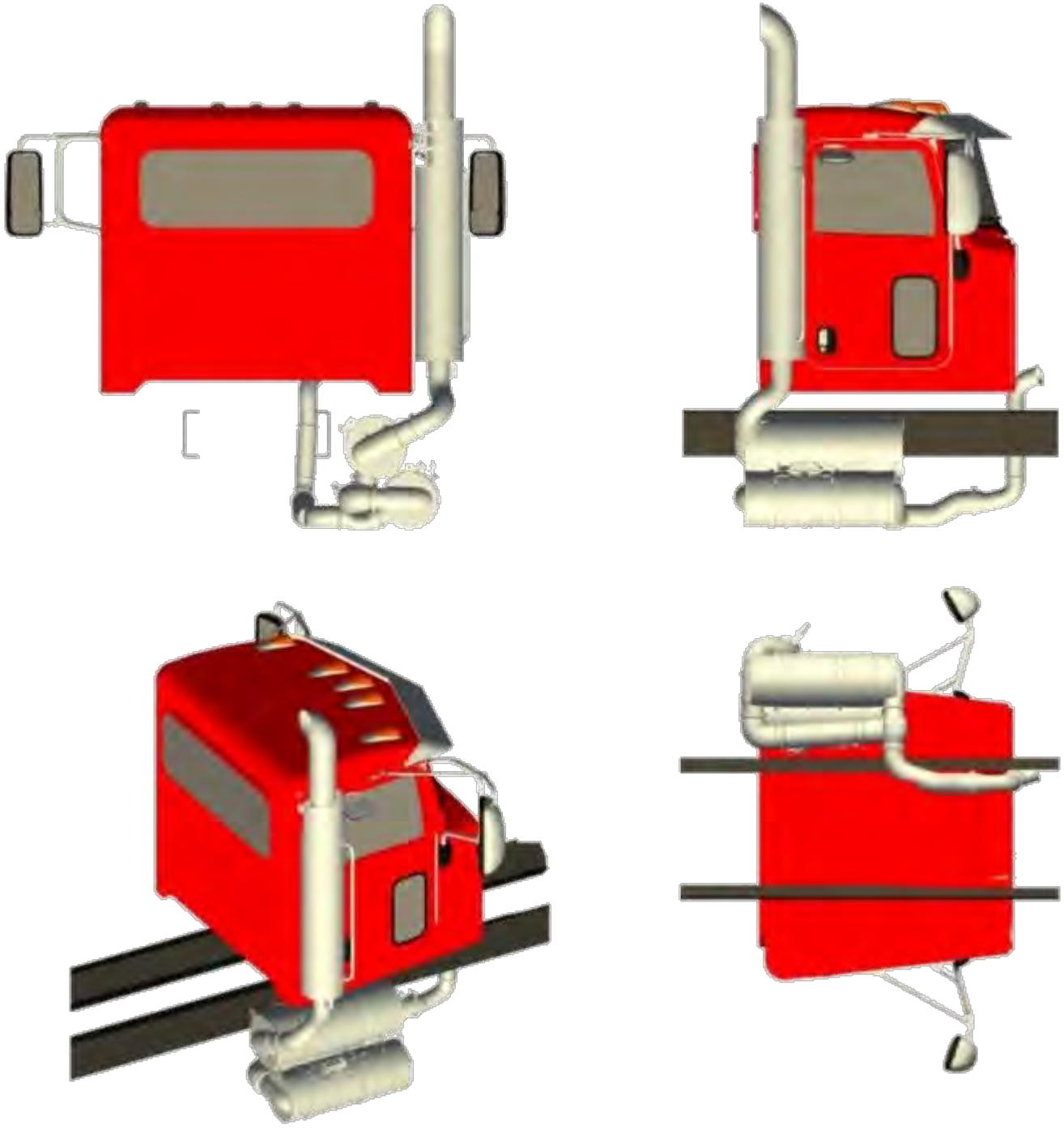


FIGURE 3-38. Exhaust Single RH Side of Cab DPF/SCR RH Under Cab

EXHAUST DUAL SIDE OF CAB DPF/SCR RH UNDER CAB
(Reference option code 3365090)

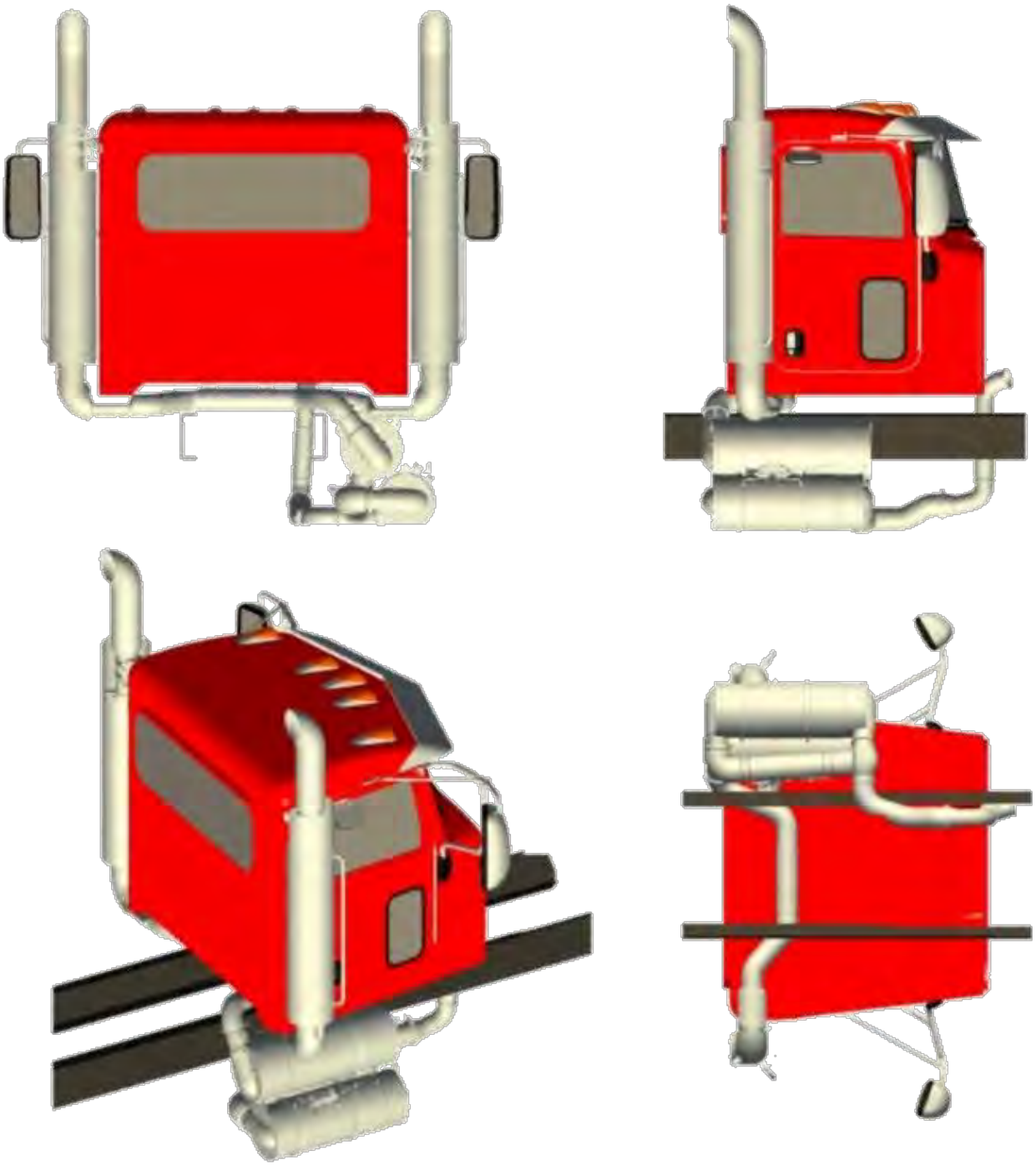


FIGURE 3-39. Exhaust Dual Side of Cab DPF/SCR RH Under Cab

Notes:
1) 11 5/8" frame rails or outserts are not available with dual side of cab exhaust configuration.
2) Dual side of cab exhaust is not available with Models 384 or 365 SBFA.
3) Dual side of cab exhaust is not available with an PX-9.
4) Dual side of cab exhaust on Model 389-131 will be low route configuration, not the high route shown above.

EXHAUST SINGLE RH BACK OF CAB DPF/SCR RH UNDER CAB
(Reference option code 3365020)

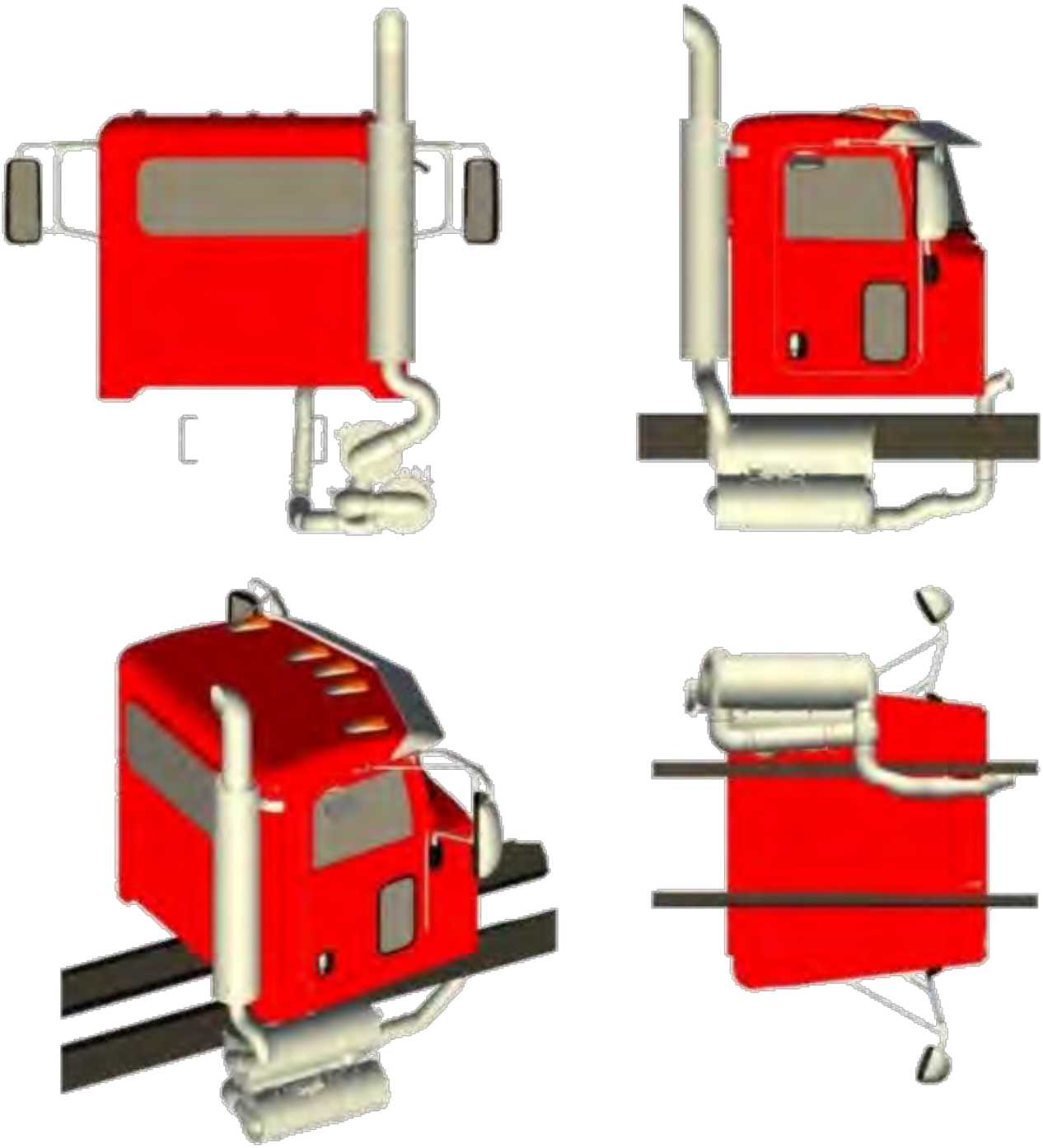


FIGURE 3-40. Exhaust Single RH Back of Cab DPF/SCR RH Under Cab

EXHAUST SINGLE HORIZONTAL DPF/SCR RH UNDER CAB
(Reference option code 3365050)

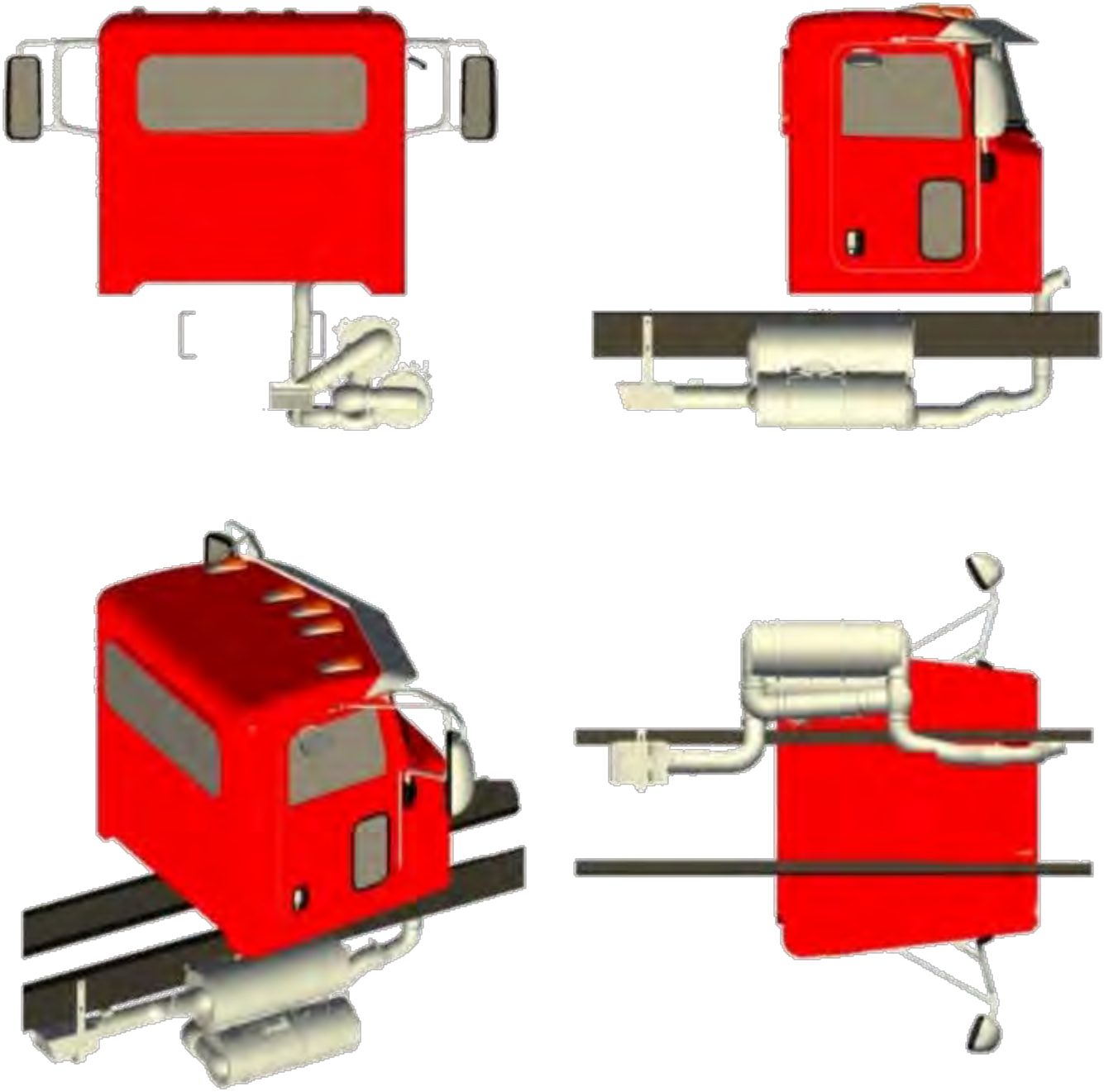


FIGURE 3-41. Exhaust Single Horizontal DPF/SCR RH Under Cab

EXHAUST SINGLE RH BACK OF SLEEPER DPF/SCR RH UNDER CAB
(Reference option code 3365030)

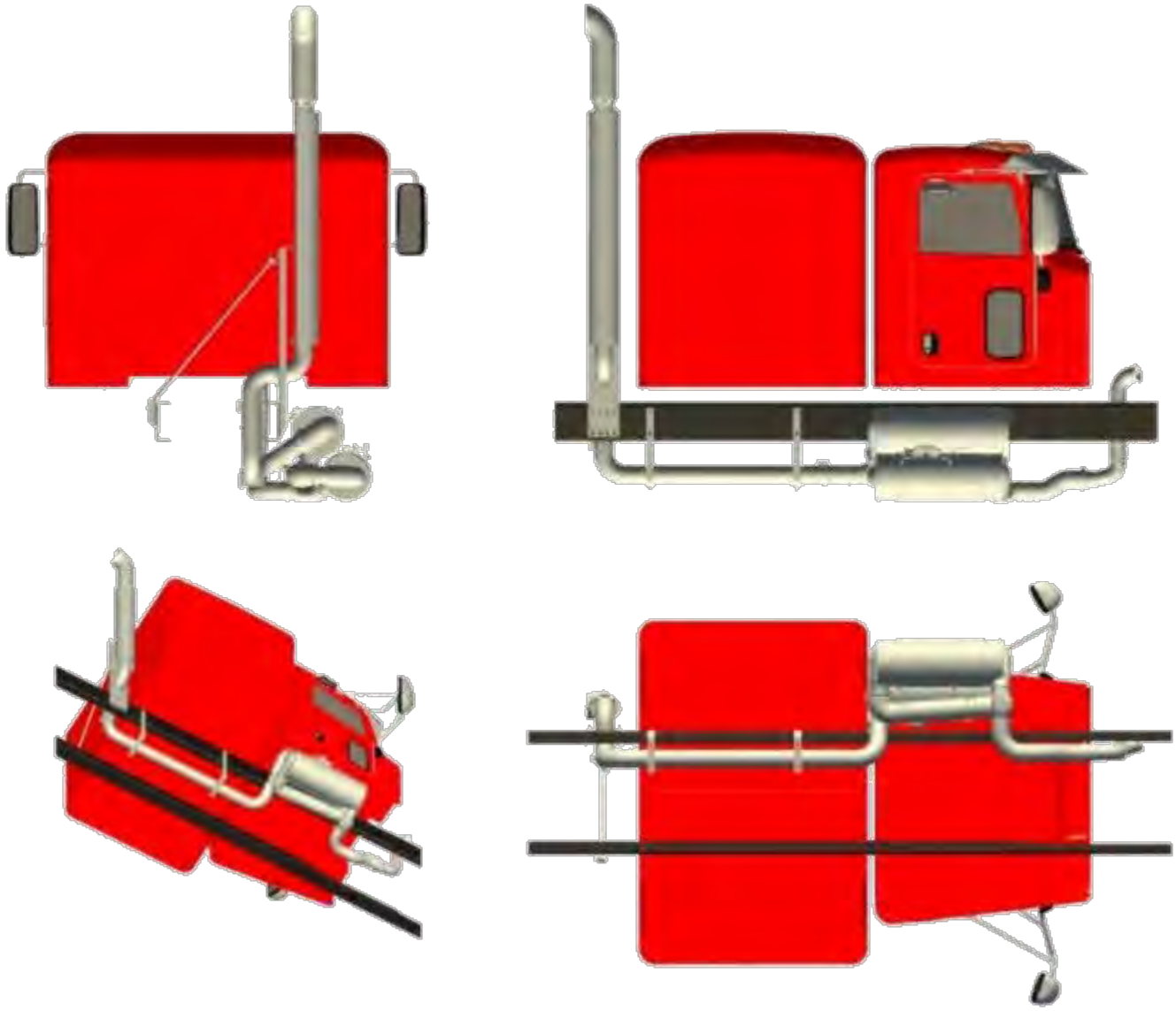


FIGURE 3-42. Exhaust Single RH Back of Sleeper DPF/SCR RH Under Cab

EXHAUST DUAL BACK OF SLEEPER DPF/SCR RH UNDER CAB
(Reference option code 3365100)

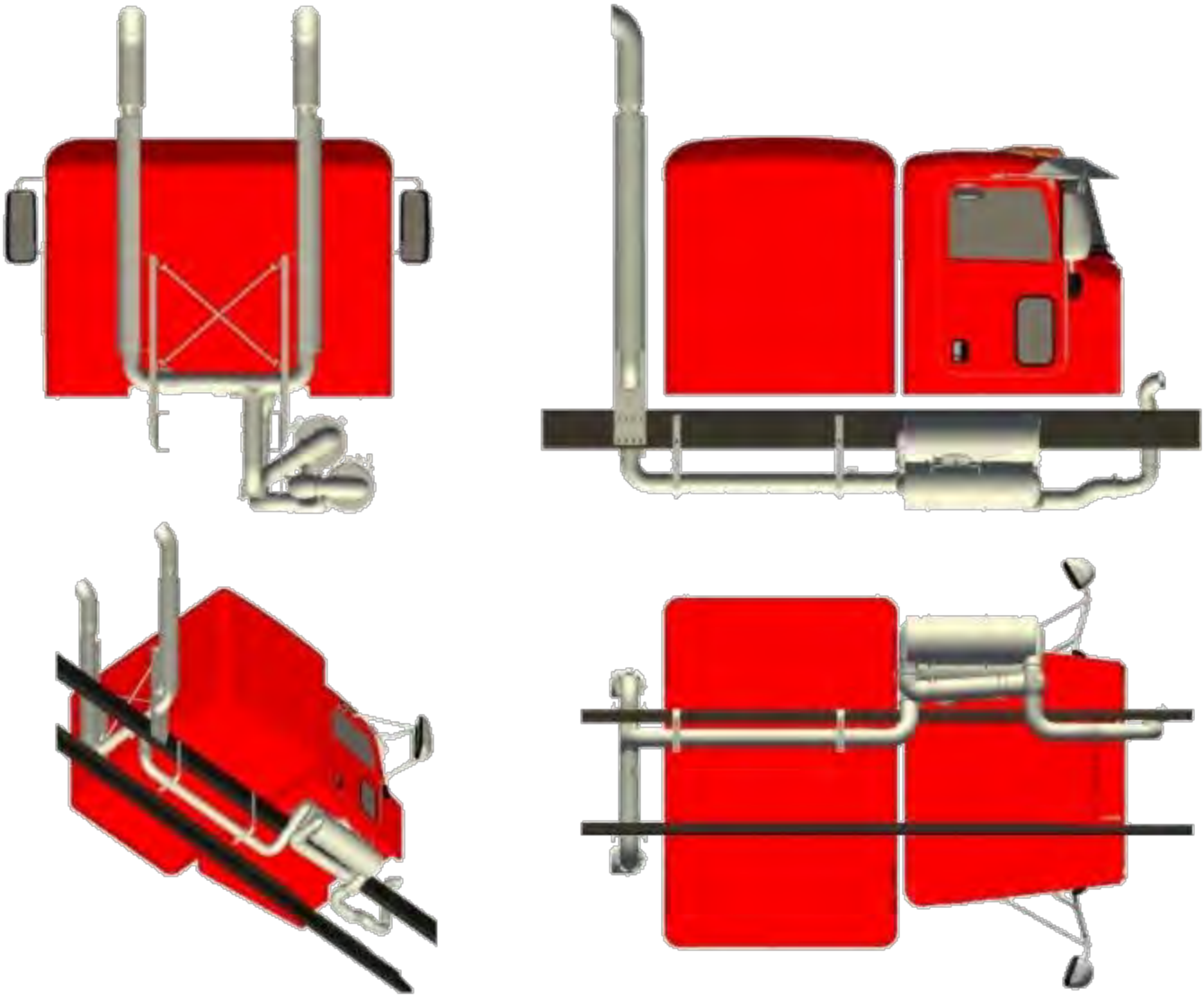


FIGURE 3-43. Exhaust Dual Back of Sleeper DPF/SCR RH Under Cab

EXHAUST SINGLE RH BACK OF SLEEPER DPF/SCR CROSS OVER UNDER FRAME
(Reference option code 3365000)

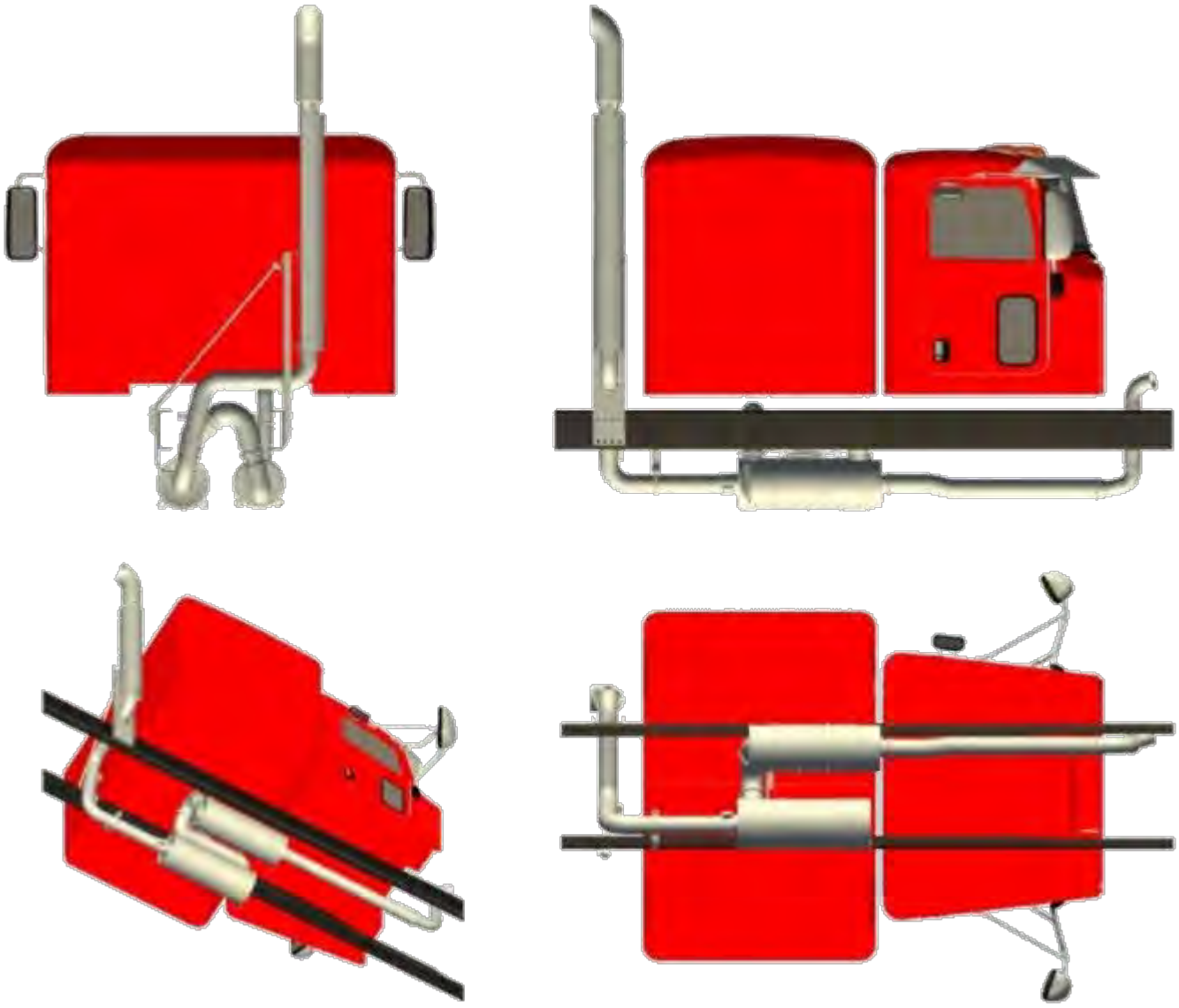


FIGURE 3-44. Exhaust Single RH Back of Sleeper DPF/SCR Cross Over Under Cab

EXHAUST DUAL BACK OF SLEEPER DPF/SCR CROSS OVER UNDER FRAME
(Reference option code 3365110)

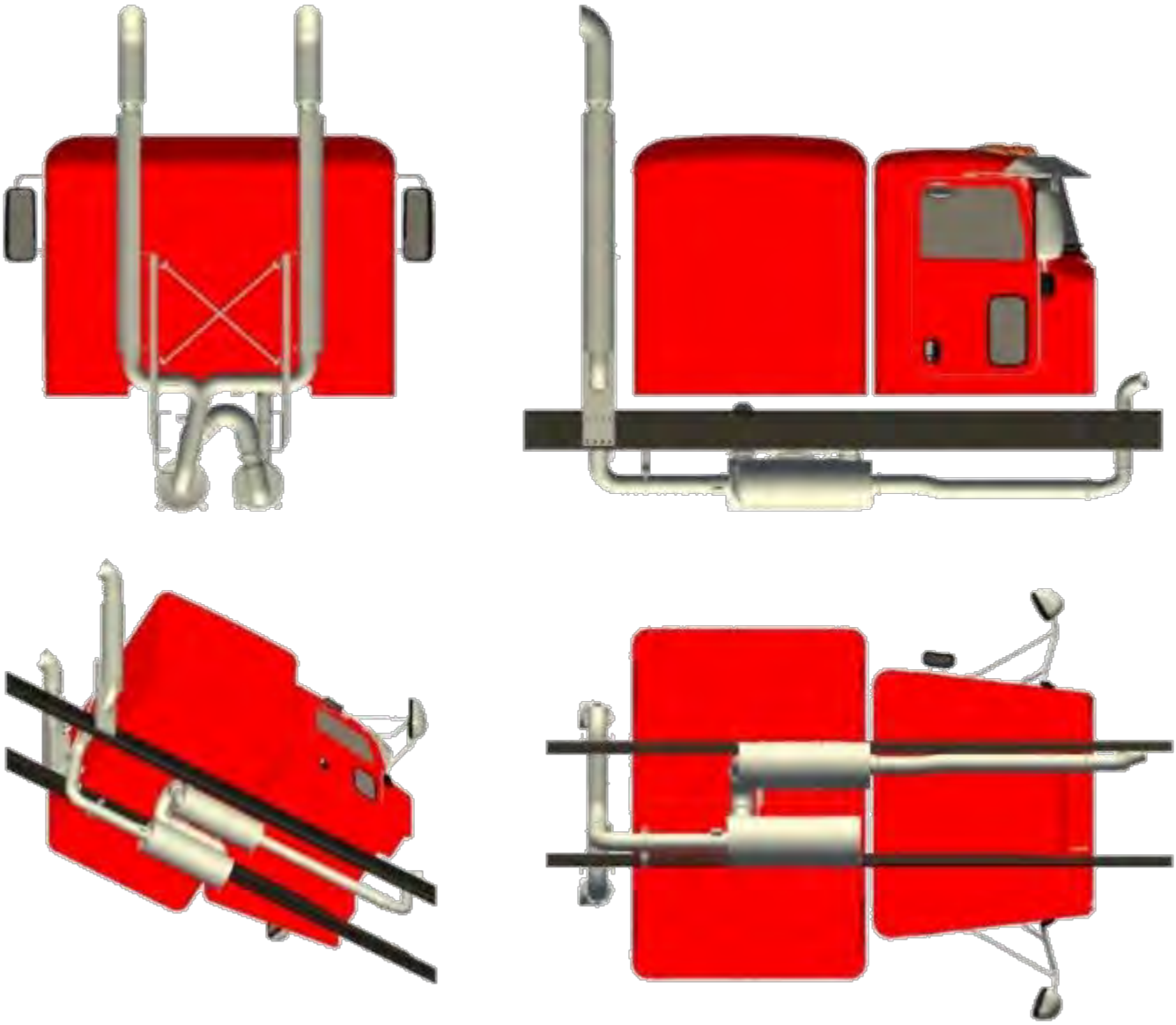


FIGURE 3-45. Exhaust Dual Back of Sleeper DPF/SCR Cross Over Under Cab

EXHAUST SINGLE HORIZONTAL LH DPF/SCR CROSS OVER UNDER FRAME
(Reference option code 3365070)

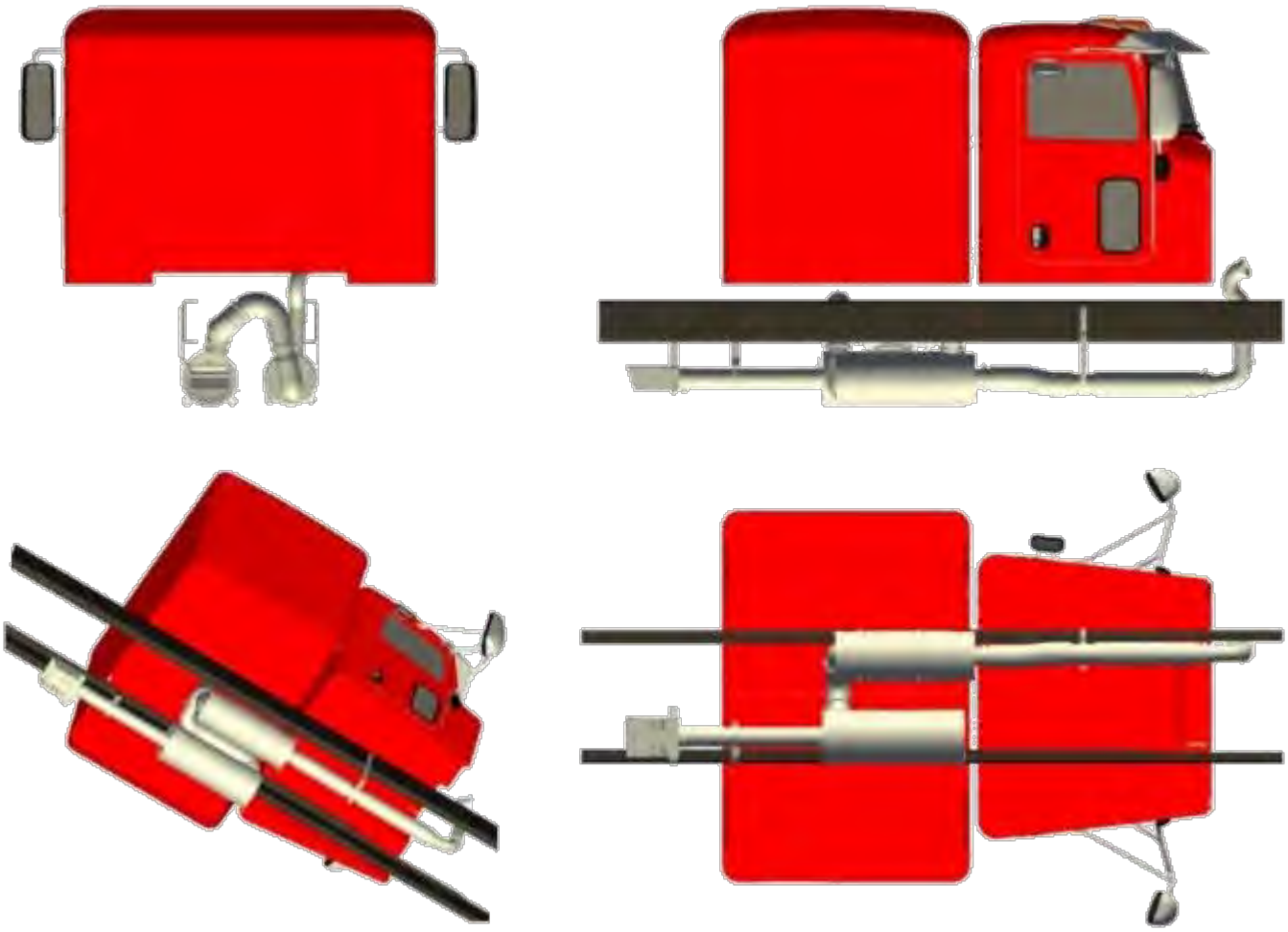


FIGURE 3-46. Exhaust Single Horizontal DPF/SCR Cross Over Under Cab

Notes:
1) Day cabs require LH under cab battery box or in-cab battery box and omit hose tenna option. DEF injector and coolant lines will be routed above the rails.
2) The piping between the DPF and SCR protrudes 1.2” above the 10-5/8” frame rail.

EXHAUST SINGLE LH BACK OF CAB/SLEEPER DPF/SCR VERTICAL – DAY CAB
(Reference option code 3365010)

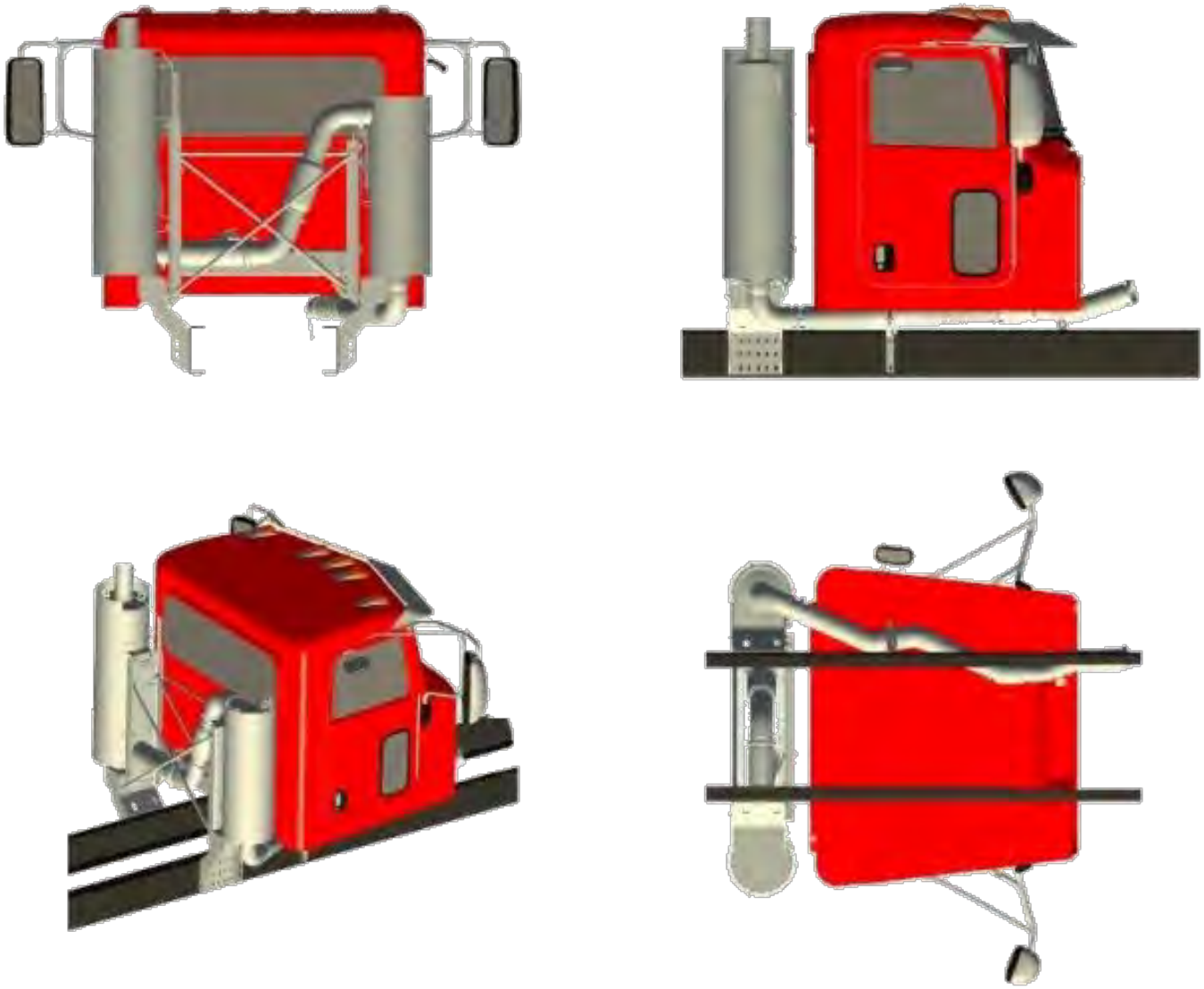


FIGURE 3-47. Exhaust Single LH Back of Sleeper DPF/SCR Vertical – Day Cab

Notes:
1) With Model 365 or 384 and an MX engine, the piping will route below the frame rails similar to EXHAUST SINGLE LH BACK OF SLEEPER DPF/SCR VERTICAL – 44” SLEEPER.

EXHAUST SINGLE LH BACK OF SLEEPER DPF/SCR VERTICAL – 44” SLEEPER
(Reference option code 3365010)

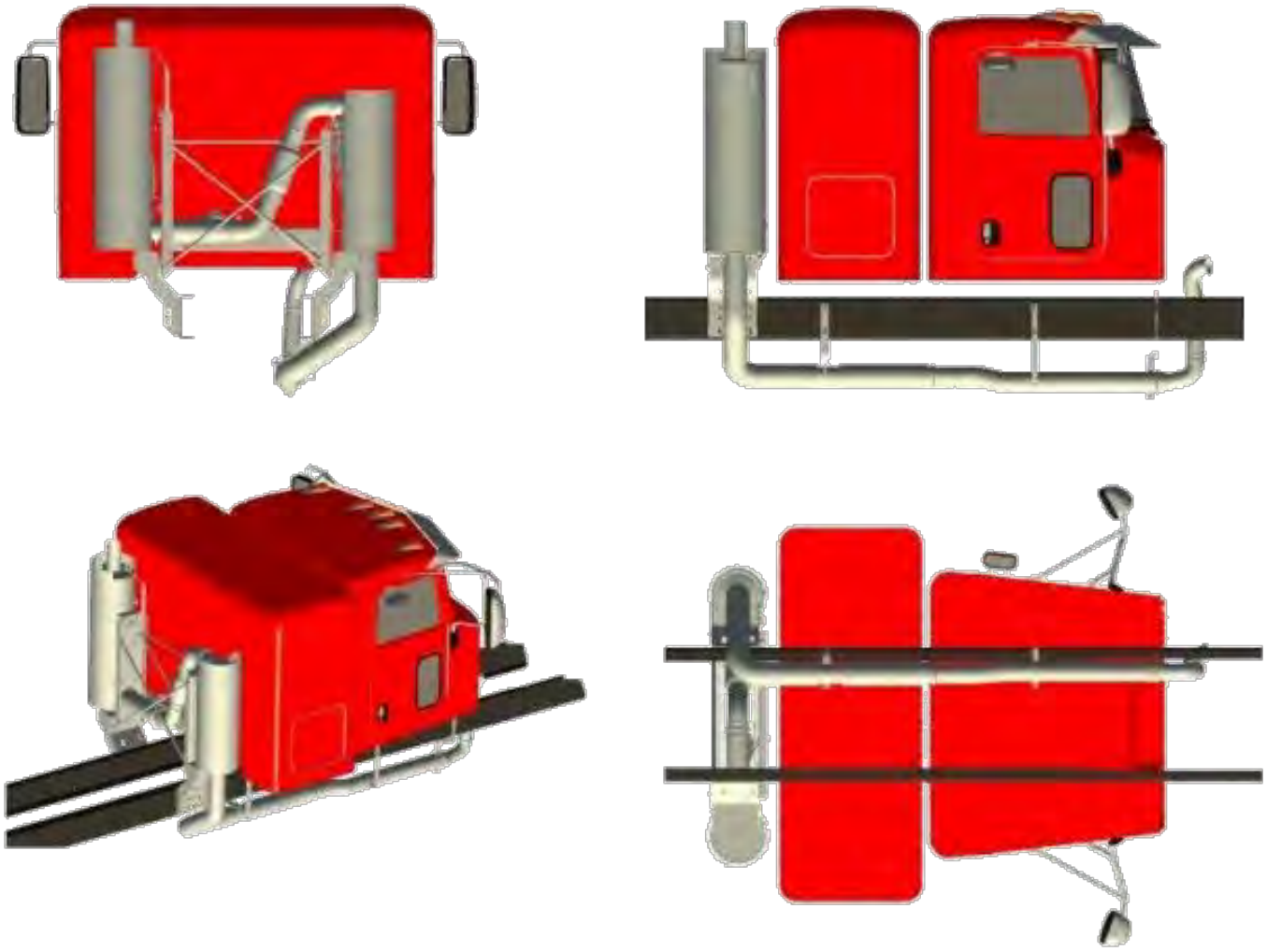


FIGURE 3-48. Exhaust Single LH Back of Sleeper DPF/SCR Vertical – 44” Sleeper

EXHAUST SGL RH SIDE OF CAB ISL-G ONLY
(Reference option code 3365130)

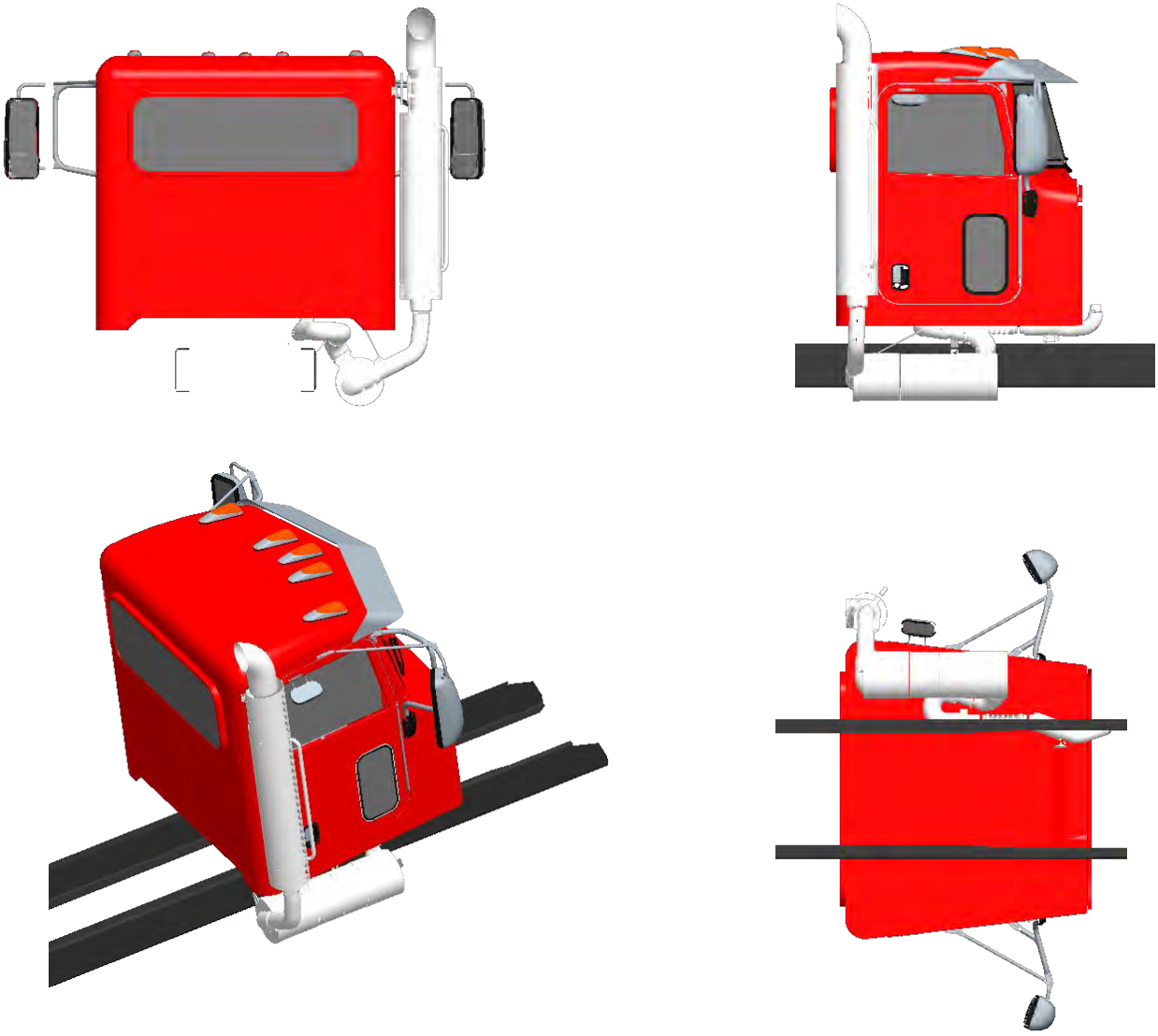


FIGURE 3-49. Exhaust Single RH Side of Cab ISL-G Only

EXHAUST SINGLE RH BACK OF CAB ISL-G ONLY
(Reference option code 3365200)

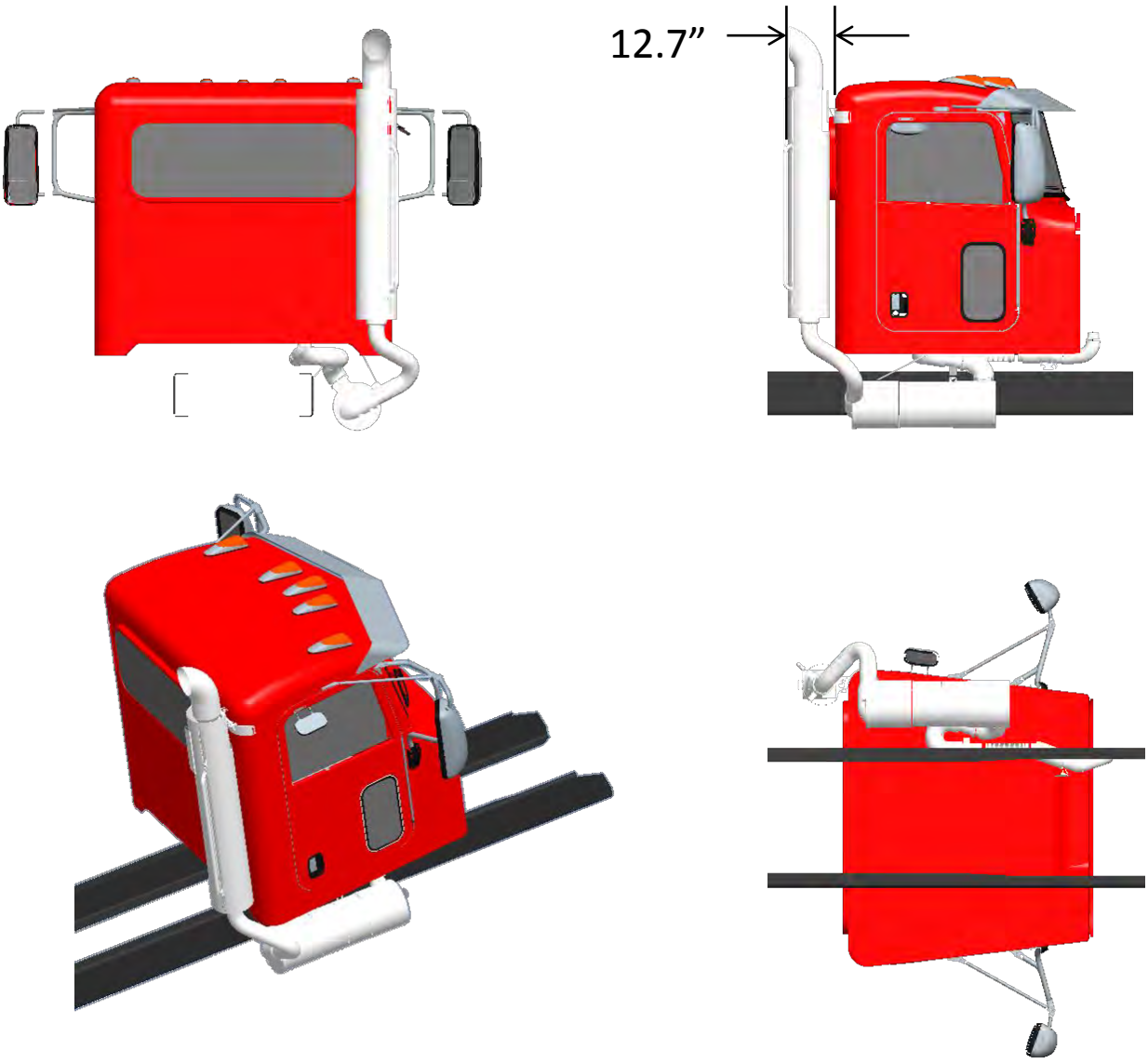


FIGURE 3-50. Exhaust Single RH Back of Cab ISL-G Only

EXHAUST SINGLE HORIZONTAL ISL-G OR ISX12-G ONLY
(Reference option code 3366650)

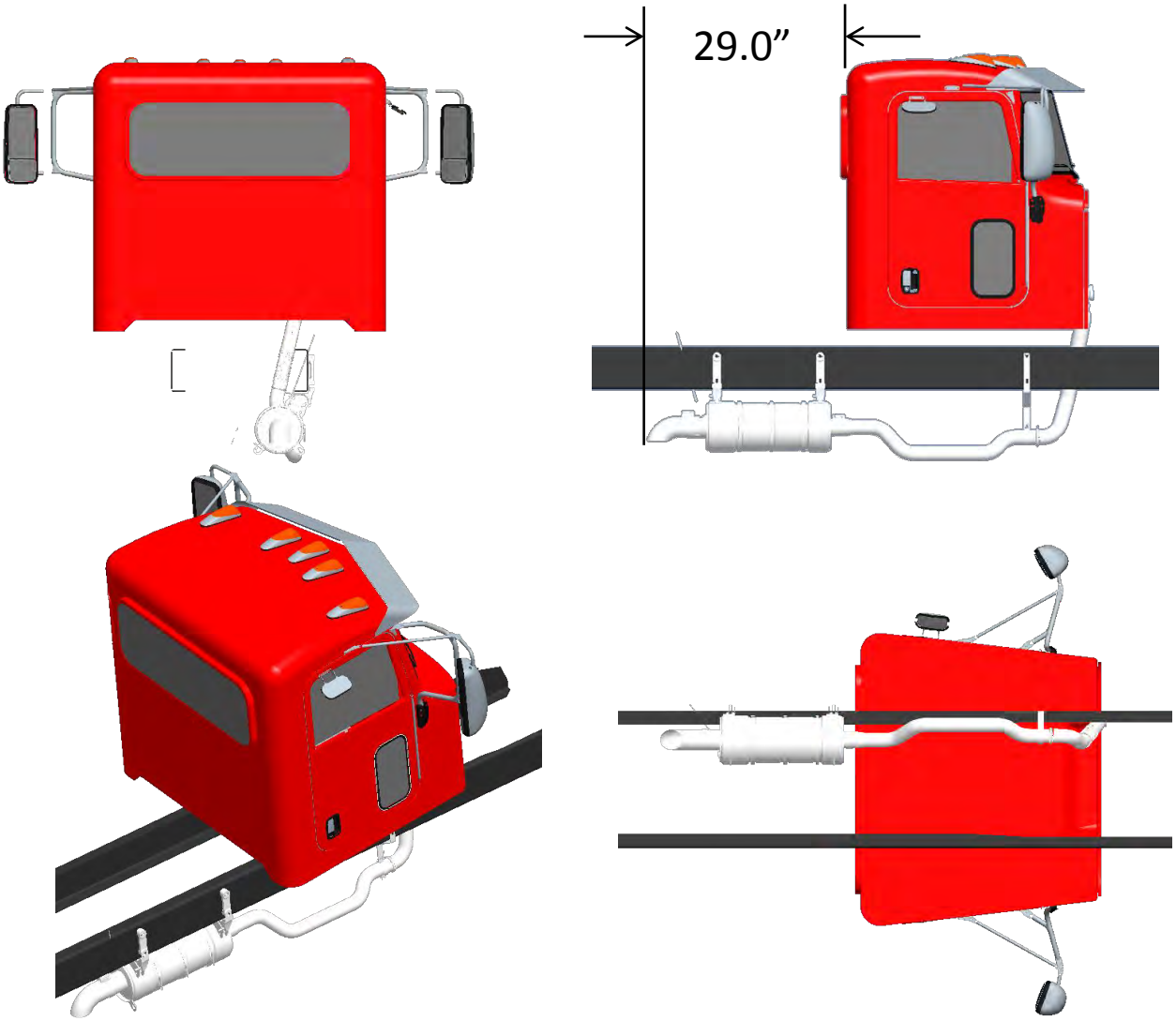


FIGURE 3-51. Exhaust Single Horizontal ISL-G or ISL12-G Only

EXHAUST SINGLE RH FRAME MTD ISL-G OR X12-G ONLY
(Reference option code 3365140)

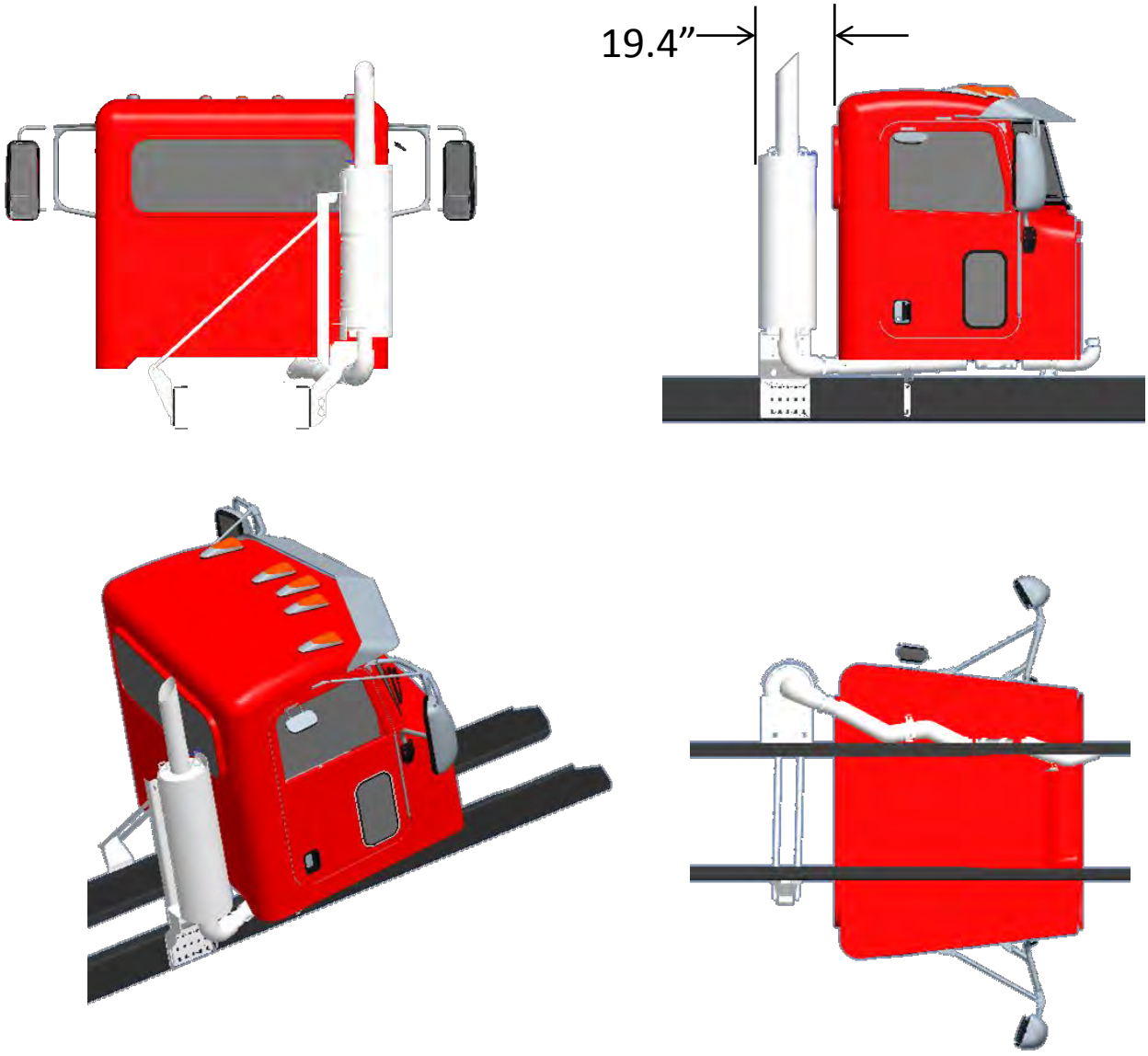


FIGURE 3-52. Exhaust Single Vertical ISL-G or ISL12-G Only

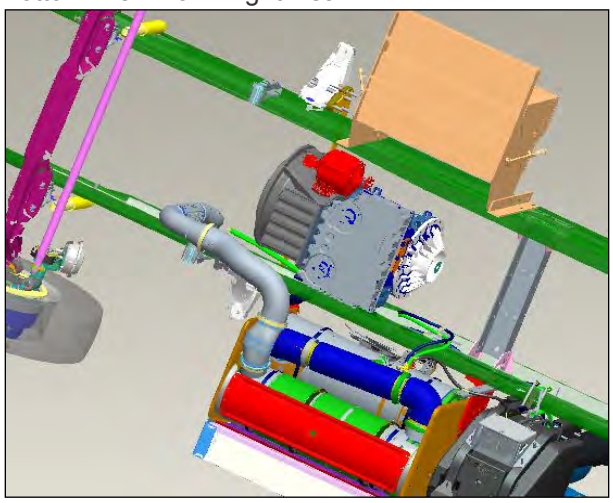
PTO CLEARANCES

This section includes visuals to aid in determining PTO locations and clearances.

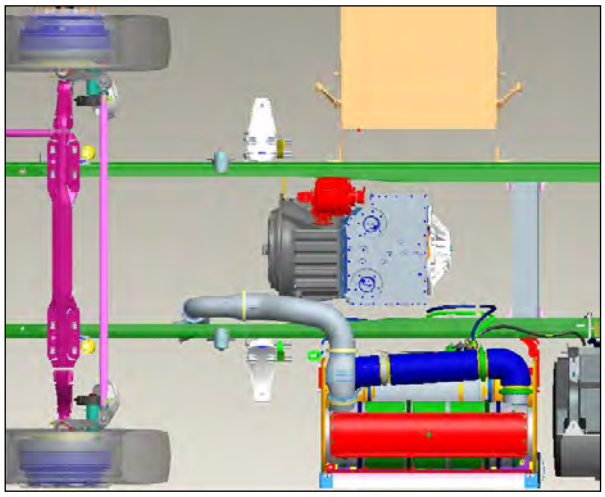
Please work with the local Peterbilt Dealer to request additional information such as specific dimensions if required.

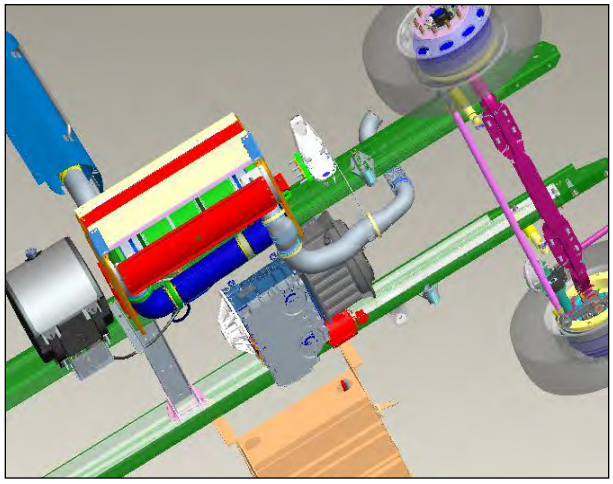
Reference transmission manufacturer literature for PTO locations for each transmission.

Bottom View from Right Rear

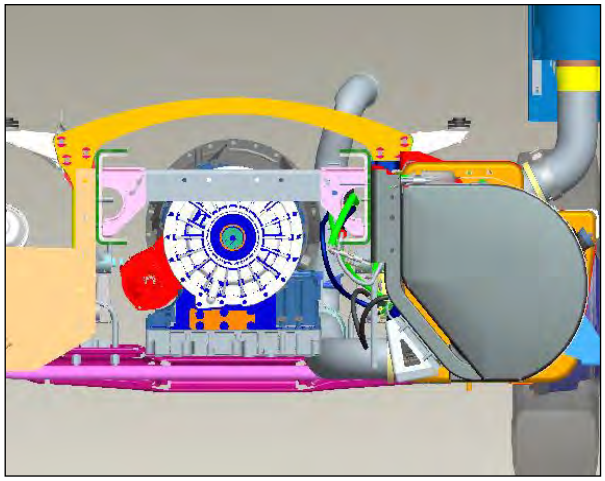


Bottom View





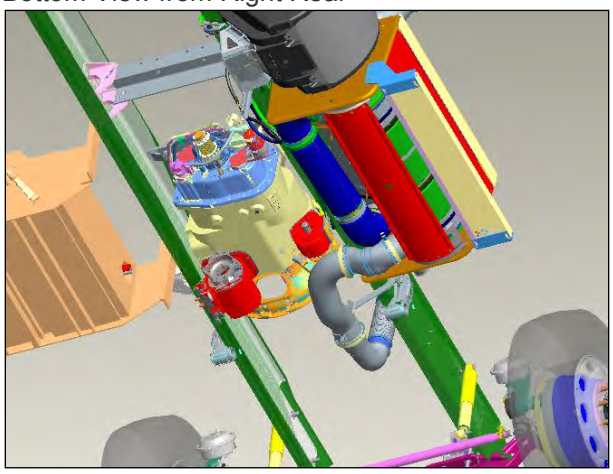
Bottom View from Right Side



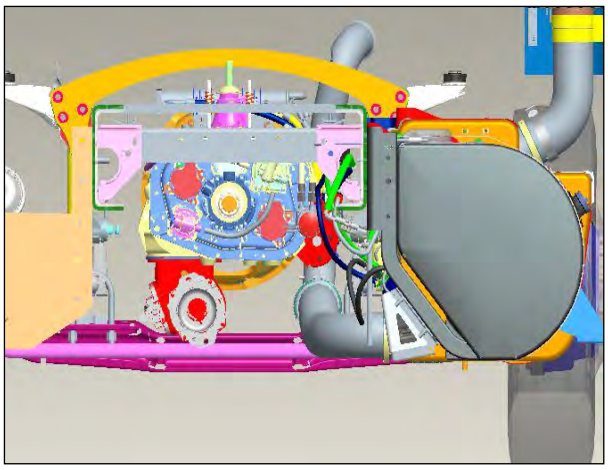
Rear View

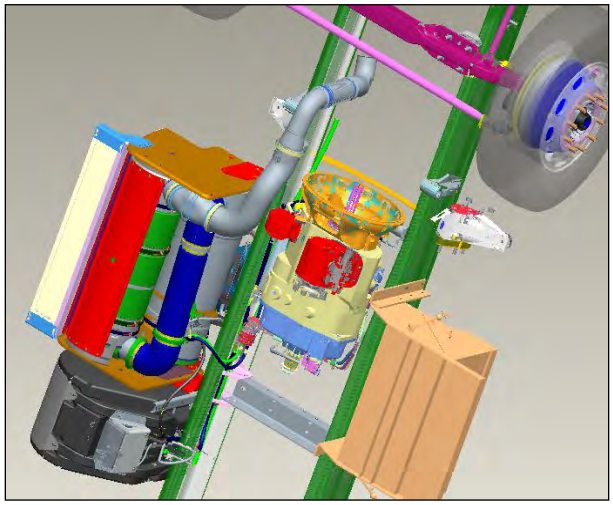
FIGURE 3-53. Automatic Transmission PTO Clearances

Bottom View from Right Rear

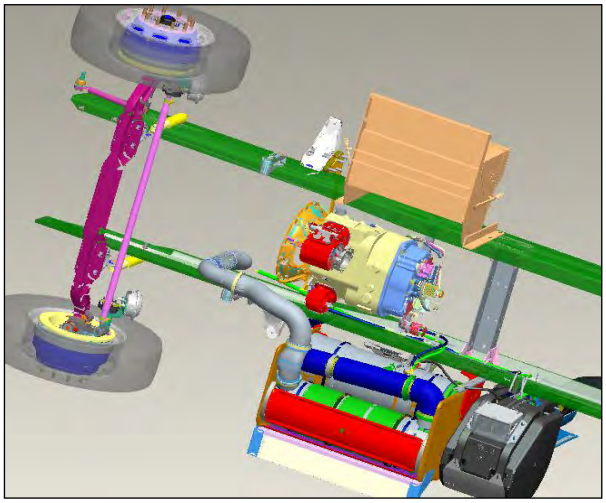


Bottom View





Bottom View from Right Side



Rear View

FIGURE 3-54. Manual Transmission PTO Clearances

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
11 5/8	3.87	0.375	21.4	2,568,000	1.91

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	11.63 x 3.87 x .375	45.7	5,484,000	4.67(1)
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**.

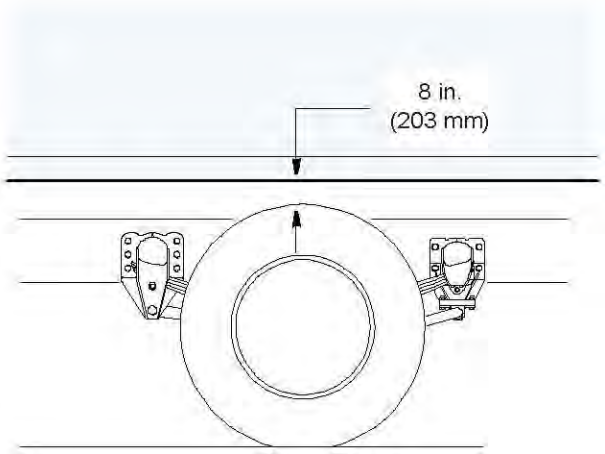


FIGURE 4-1. Minimum Clearance Between Top of Rear Tires and Body Structure Overhang

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.*

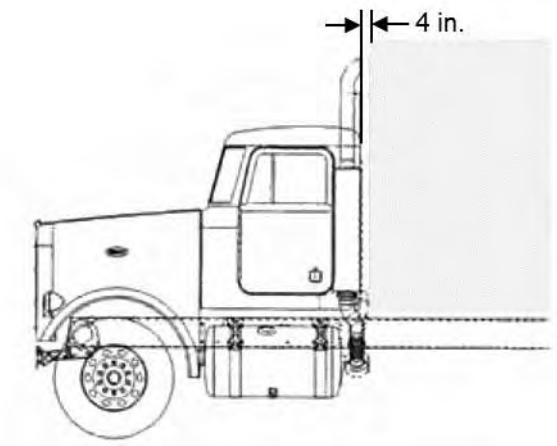


FIGURE 4-2. Minimum Back of Cab Clearance

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**.

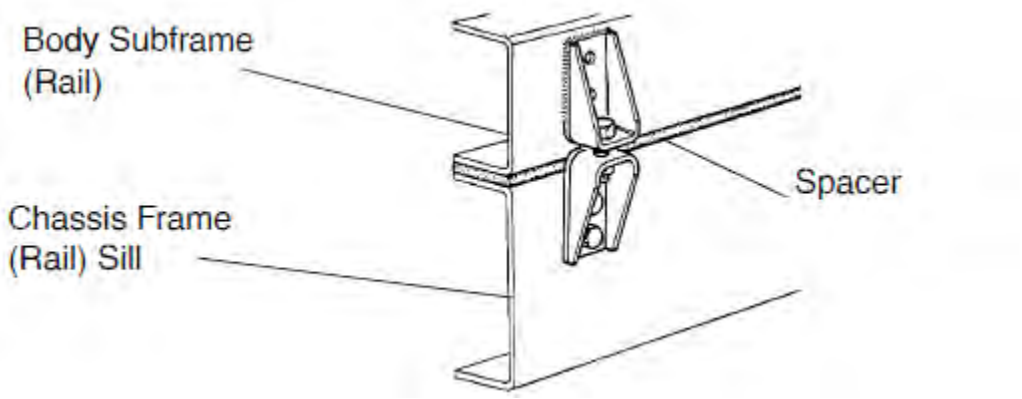


FIGURE 4-3. Spacer Between Frame Sill and Body Rail – Rubber or Plastic

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.

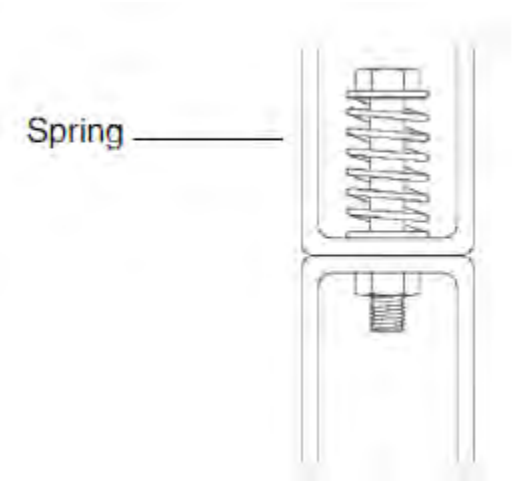


FIGURE 4-4. Mounting Brackets

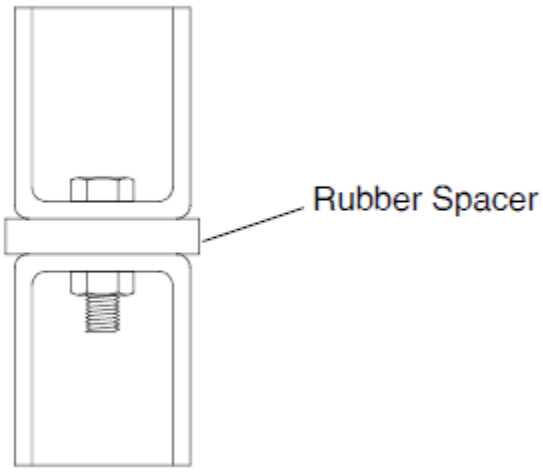


FIGURE 4-5. Mounting Brackets

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**.

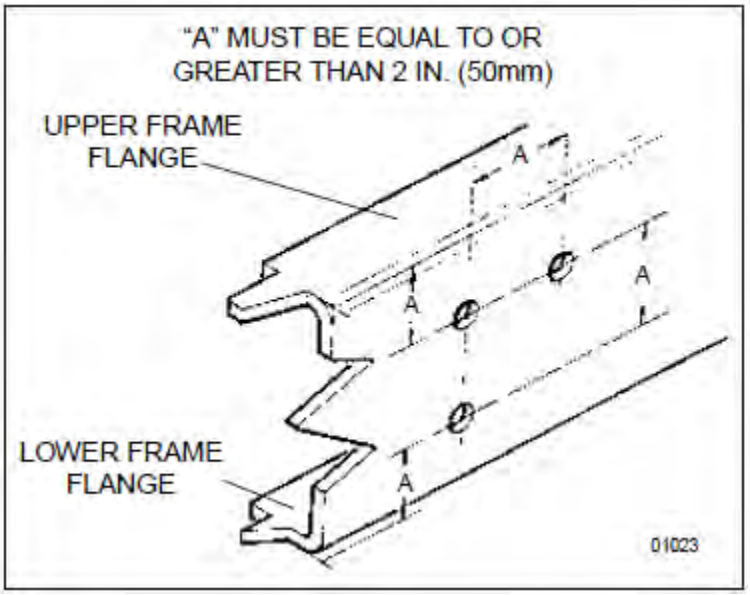


FIGURE 4-6. Hole Location Guidelines for Frame Rail and Bracket

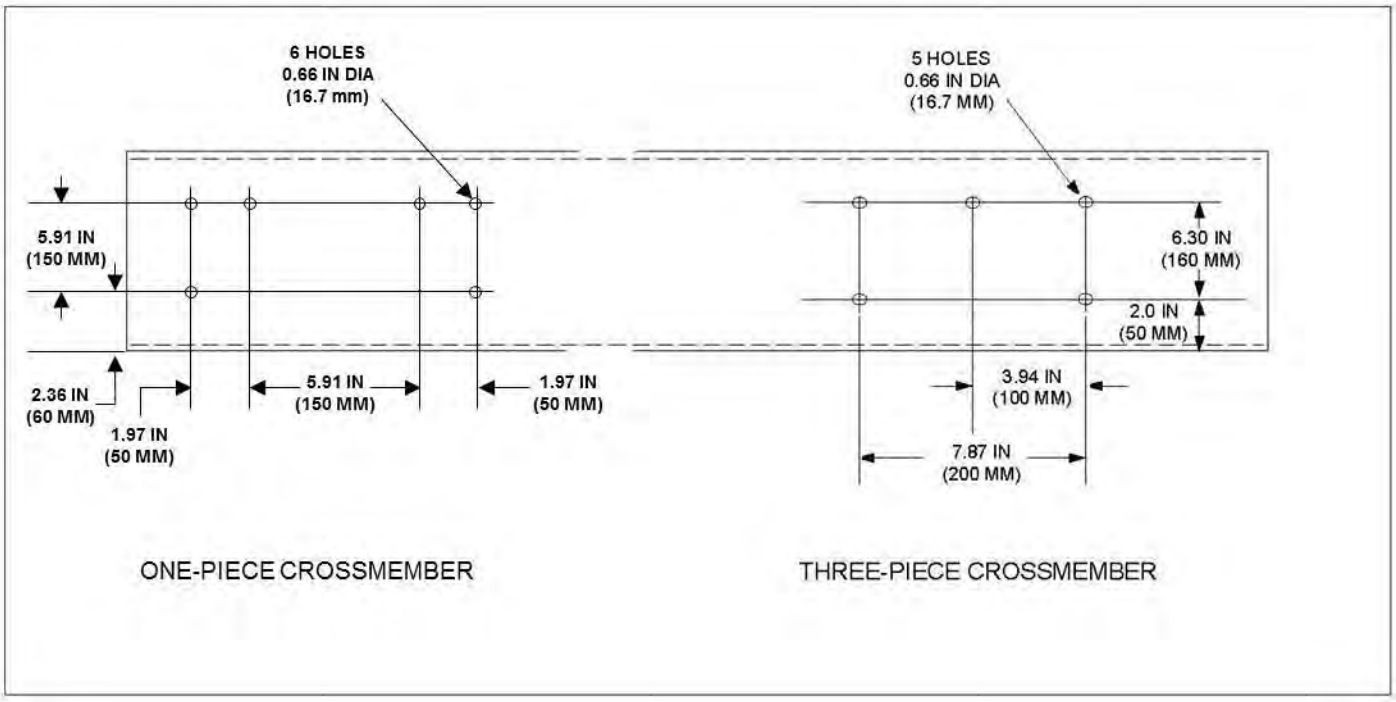


FIGURE 4-7. Crossmember Gusset Hole Patterns (Additional Holes Available in 50 mm Horizontal Increments)

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.*

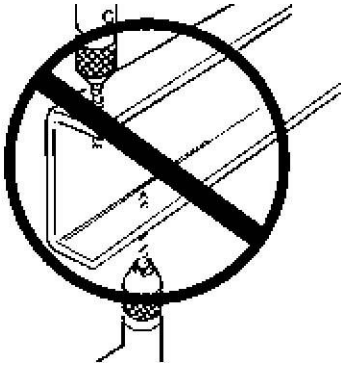


FIGURE 4-8. Frame Rail Flange Drilling Prohibited

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**.

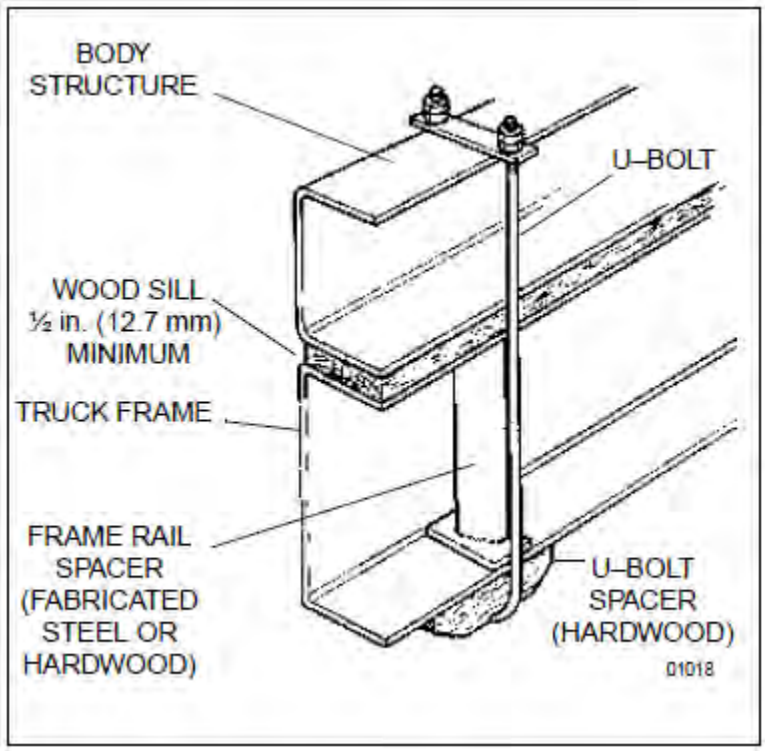


FIGURE 4-9. Acceptable U-Bolt Mounting with Wood and Fabricated Spacers

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****.*

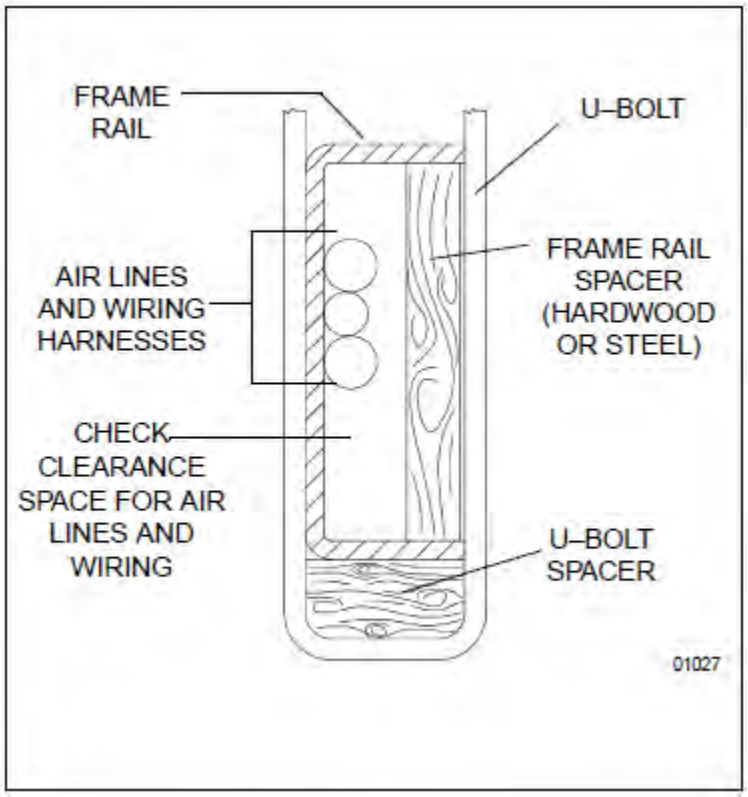


FIGURE 4-10. Clearance Space for Air Lines and Cables

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**.

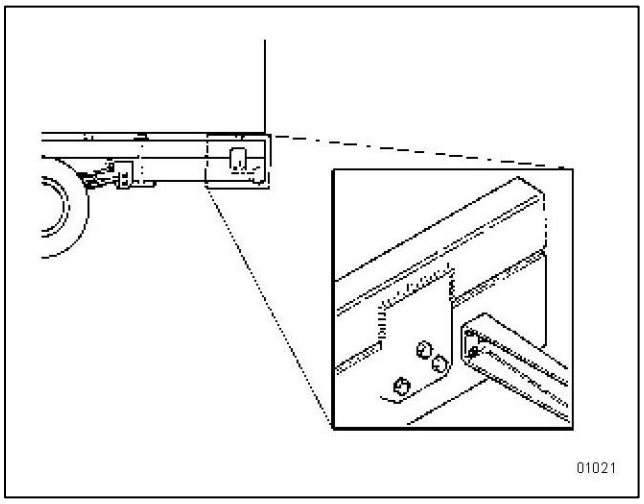


FIGURE 4-11. Fishplate Bracket at Rear End of Body

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**.

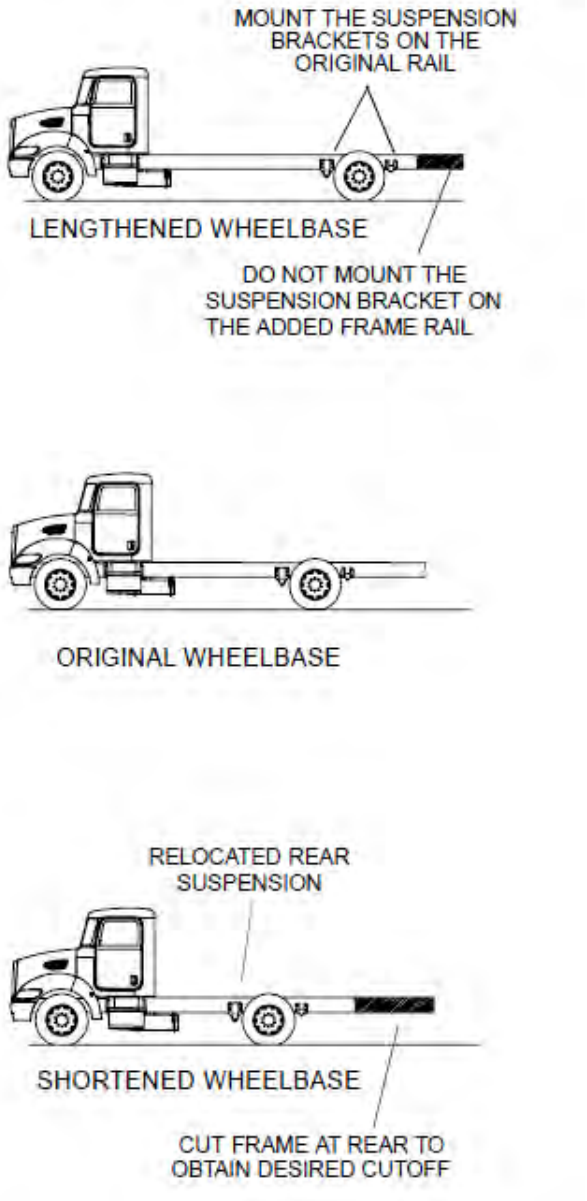


FIGURE 5-1. Wheelbase Customization

CROSSMEMBERS

After lengthening a wheelbase, an additional crossmember may be required to maintain the original frame strength. Contact Dealer for crossmember locations.

- 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. See Figure 5-4. See Figure 4-7 on page 4-3 for crossmember hole patterns.

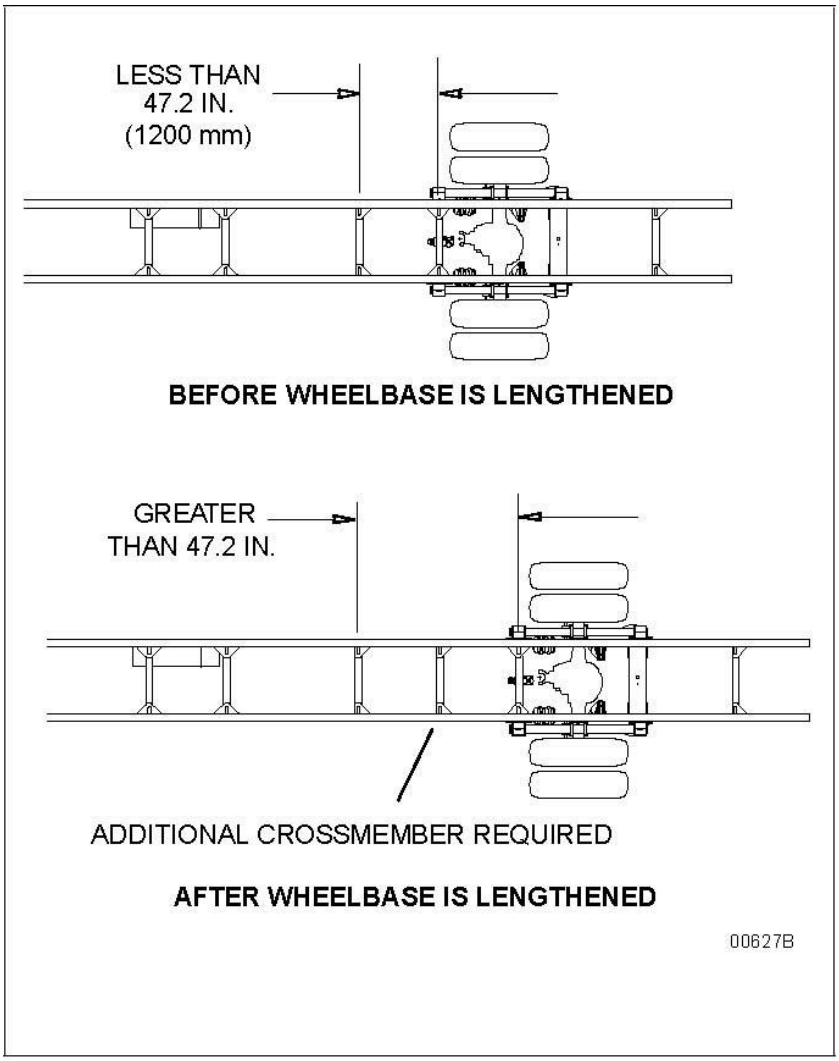


FIGURE 5-2. Crossmember Spacing Requirements

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; therefore, they are not weldable.

SECTION 6 **ELECTRICAL 389 FAMILY**

CONTROL UNIT IDENTIFICATION

This manual provides service information covering models equipped with the multiplexed instrumentation system. Before attempting to make service repairs, the technician should be knowledgeable about the system design, components, operation and troubleshooting procedures for diagnosing instrumentation problems.

Vehicle component inputs are sent to the ICU/CECU through the J1939 data bus or conventional wiring. The ICU/CECU interprets the various inputs and monitors/controls the functions for each input through the ICU/CECU software. Output signals from the ICU/CECU provide data for the gauges, warning lamps, audible alarms, and displays inside the cluster.

When used in conjunction with the Electronic Service Analyst (ESA) diagnostic software tool, the technician can review fault codes stored in the ICU/CECU, verify whether the instrumentation is working properly and diagnose the root cause of the problem more easily.

FUNCTIONAL DESCRIPTION-INSTURMENTATION CONTROL UNIT/CAB ELECTRONIC CONTROL UNIT (ICU/CECU)

The heart of the multiplexed instrumentation system is the ICU/CECU. The ICU/CECU is located behind the radio at the center of the dash. See **FIGURE 6-1**.

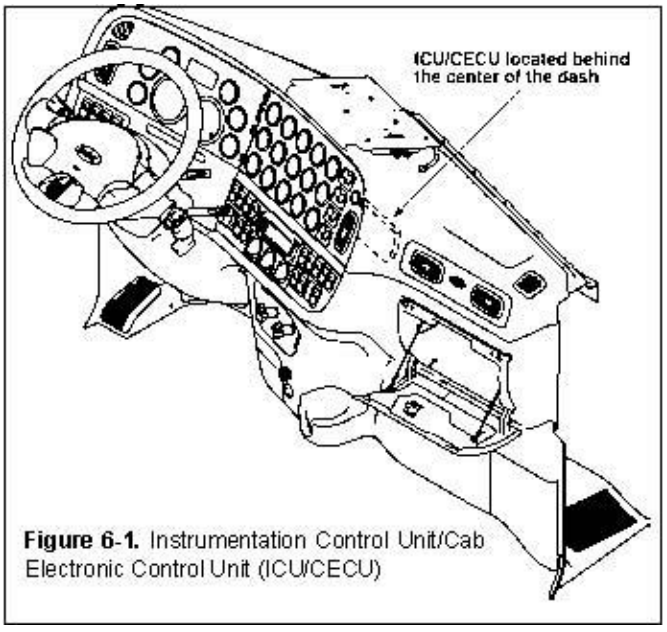


Figure 6-1. Instrumentation Control Unit/Cab Electronic Control Unit (ICU/CECU)

This manual provides service information covering trucks equipped with the multiplexed instrumentation system. Before attempting to make service repairs, the technician should be knowledgeable about the system design, components, operation and troubleshooting procedures for diagnosing multiplexed instrumentation problems.

Electronic Service Agent (ESA)

Introduced in 2005, the Electronic Service Analyst (ESA) is the diagnostic software tool that is used to simplify the troubleshooting of the new multiplexed instrumentation.
CU or CECU?

Early multiplexing in Peterbilt trucks was for the instrumentation system only. The module was known as the Instrumentation Control Unit (ICU).

Now, as multiplexing from this control module is being used for systems other than just the instrumentation, the module has been renamed the Cab Electronic Control Unit (CECU).

The CECU is an updated ICU. It is still located behind the center console, but now includes a few more circuits to incorporate the new features. ESA 2.0 is the tool for both.

Identifying which control module is in the vehicle helps determine what features are present and also aids in troubleshooting.

Models–Build Dates Identification

TABLE 6-1. Control Module

Control Module	Models	Production Build Dates
ICU	357, 378, 379, 385, 386	Vehicles built with new conventional interiors from April 2005 to January 2007
CECU	365, 367, 384, 386, 387, 388, 389, 567, 579, 587	Vehicles built with EPA compliant engines beginning January 2007

IDENTIFICATION

Control module identification can be made using a few methods:

- Searching using the Electronic Catalog (ECAT)
- Connecting using the Electronic Service Analyst (ESA) 2.0
- Dome light function

ECAT IDENTIFICATION

Using ECAT or ESA 2.0 are the easiest and most exact ways of determining the type of control module in the truck.

ECAT provides a parts list “as built” and Bill of Materials in formation for each specific truck. The catalog is searchable, and contains the part number and identification of the truck’s instrument panel control module.

- ICU Part Number Q21-1029-X-XXX
- CECU Part Number Q21-1055-X-XXX

ESA IDENTIFICATION
Connecting using ESA 2.0 brings up a control module information window. In this window, the fourth line item is the Control Unit Type and identifies whether the truck has an ICU or CECU.

FIGURE 6-2. ESA Identification, Programming Date and Module Software Version

DOME LIGHT IDENTIFICATION

The CECU system has an updated feature that delays turning the dome light off when you close the door. The previous ICU system did not have this function so the light turns off as soon as the door is shut. Therefore, if the dome light does not turn off immediately after all doors are shut, then the vehicle has a CECU system. If the dome light does turn off immediately, then the vehicle may be ICU OR CECU with this function disabled. In these cases, you will need to refer to ECAT for verification.

Comparison Chart

The following charts show the differences between the ICU and CECU.

The first chart provides an alphabetical listing of the features available for either an ICU or CECU. Since the CECU is an updated ICU, almost all of the features of an ICU are found in a CECU, except a few out dated options such as the pyrometer.

The similarity of the modules is easily seen in the second chart as well. This chart is an abbreviated connector pinout of each module. Since the same wiring connections are used for both modules, it's easy to see that the CECU has more circuits to handle the increase in multiplexed features.

TABLE 6-2. Dome Light Identification

Supported Features	ICU	CECU
Air filter restriction	x	x
Air pressure transducer	x	x
Ammeter	x	x
Axle temperature 1	x	x
Axle temperature 2	x	x
Axle temperature 3	x	x
Backlighting -auxiliary	x	x
Brakesaver oil temperature	x	
Cab dome lamp		x
Check engine telltale	x	x
Clutch switch		x
Courtesy lights - left door	x	x
Courtesy lights -right door		x
Cruise control		x
CVSG data/power	x	x
Dash buzzer	x	x
Dash/panel illumination	x	x
Dimmer input	x	x
Dome lamp		x
Editable telltale 1, position 4	x	x
Editable telltale 2, position 7	x	x
Editable telltale 3, position 8	x	x
Editable telltale 4, position 9	x	x
Editable telltale 5, position 10	x	
Editable telltale 6, position 12	x	x
Editable telltale 7, position 13	x	
Editable telltale 8, position 14	x	x
Editable telltale 9, position 16	x	x
Engine fan override		x
Fifth wheel lock telltale	x	x
Fuel filter restriction	x	x
Fuel level sensor 1	x	x
Fuel level sensor 2	x	x
General oil temperature	x	x
Hazard	x	x
Headlamps active		x
High beam active	x	x
I-CAN high	x	x
I-CAN low	x	x
Idle timer relay		x
Interaxle lock telltale	x	x
K-line	x	x
Left turn	x	x
Message display		x
Outside air temperature	x	x
Park brake active	x	x
Power -accessory	x	x
Power -battery	x	x
Power -ignition	x	x
Power supply +5V sensors	x	x
Pyrometer	x	
Regeneration switch enable		x
Retarder select		x
Right turn	x	x
Seat belt telltale		x
Spare analog input 2R		x
Spare analog input 3V		x
Spare digital input 1H		x
Spare digital input 1L		x
Stop engine telltale	x	x
Tail & park lamps active	x	x
Tractor ABS telltale	x	x
Trailer ABS telltale	x	x
Transfer case oil temp	x	x
Transmission oil temp -aux	x	x
Transmission oil temp - main	x	x
V-CAN high	x	x
V-CAN low	x	x

Con nector	Pin Number	Circuit Function	ICU	CECU
A	1	CVSG power	x	x
	2	Power - battery	x	x
	3	Cab dome lamp		x
	4	Menu control switch power		x
	5	Ground	x	x
	6	Menu control switch ground		x
	7	Dash/panel illumination	x	x
	8	Auxiliary backlighting	x	x
	9	Power -battery		x
B	1	Menu control switch encode A		x
	2	Menu control switch encode B		x
	3	Menu control switch enter		x
	4	Courtesy lights - right door jamb switch		x
	5	Spare digital input 1H		x
	6	Dome lamp input		x
	7	Seat belt telltale		x
	8	Cruise set		x
	9	Cruise resume		x
	10	Spare digital input 1L		x
	11	Retarder select 1		x
	12	Retarder select 2		x
	13	Clutch switch		x
	14	Headlamps active		x
	15	PTO set (future provision)		x
	16	PTO resume (future provision)		x
	17	Engine fan override		x
	18	Regen enable		x
	19	Spare digital input 3L (future prov)		x
	20	Spare digital input 4L (future prov)		x
	21	Spare digital input 5L (future prov)		x
	22	Spare digital input 2H (future prov)		x

Connector	Pin Number	Circuit Function	ICU	CECU
C	1	Power supply +5V sensors	x	x
	2	Analog return	x	x
	3	PTO oil temp (future provision)		x
	4	K-line	x	x
	5	Dimmer input	x	x
	6	Air pressure transducer - primary	x	x
	7	Air pressure transducer - secondary	x	x
	8	Air pressure transducer - application	x	x
	9	Ammeter	x	x
	10	Air filter restriction	x	x
	11	Fuel filter restriction	x	x
	12	Fuel level sensor 1	x	x
	13	Fuel level sensor 2	x	x
	14	CVSG data	x	x
	15	CVSG return	x	x
	16	Outside air temperature	x	x
	17	Axle temperature 1	x	x
	18	Axle temperature 2	x	x
	19	Axle temperature 3	x	x
	20	General oil temperature	x	x
	21	Transmission oil temperature - main	x	x
	22	Transmission oil temperature - aux	x	x
	23	Pyrometer	x	
	24	Brakesaver oil temperature	x	
	25	Analog return	x	x
	26	Transfer case oil temperature	x	x
	27	Remote throttle signal (future provision)		x
	28	Spare analog input 1V (future provision)		x
	29	Spare analog input 2V (future provision)		x
	30	Spare analog input 3V		x
	31	Spare analog input 2R		x
	32	Spare analog input 1R (future provision)		x
	39	Spare relay output 8 (future provision)		x
D	1	Power - ignition	x	x
	2	Courtesy lights -left door jamb switch	x	x
	3	Power - accessory	x	x
	4	Hazard	x	x
	5	Tail & park lamps active	x	x
	6	High beam active	x	x
	7	Park brake active	x	x
	8	Left turn	x	x

Connector	Pin Number	Circuit Function	ICU	CECU
D (cont.)	9	Right turn	x	x
	10	Cruise on/off		x
	11	Interaxle lock telltale	x	x
	12	Fifth wheel lock telltale	x	x
	13	Tractor ABS telltale	x	x
	14	Trailer ABS telltale	x	x
	15	Check engine telltale	x	x
	16	Stop engine telltale	x	x
	17	Spare digital input 6L (future provision)		x
	19	Editable telltale 1 - position 4	x	x
	20	Editable telltale 2 - position 7	x	x
	21	Editable telltale 3 - position 8	x	x
	22	Editable telltale 4 - position 9	x	x
	23	Editable telltale 5 - position 10	x	
	24	Editable telltale 6 - position 12	x	x
	25	Editable telltale 7 - position 13	x	
	26	Editable telltale 8 - position 14	x	x
	27	Editable telltale 9 - position 16	x	x
	28	Dash buzzer 1A	x	x
	29	Dash buzzer 1B	x	x
	30	Dash buzzer 1C	x	x
	31	Dash buzzer 2	x	x
	32	M-CAN high (future provision)		x
	33	M-CAN low (future provision)		x
	34	I-CAN high	x	x
	35	I-CAN low	x	x
	37	V-CAN high	x	x
	38	V-CAN low	x	x
E	1	Idle timer relay		x
	2	Spare relay output 1 (future provision)		x
	3	Spare relay output 2 (future provision)		x
	4	Spare relay output 3 (future provision)		x
	5	Ground		x
	6	Spare relay output 4 (future provision)		x
	7	Spare relay output 5 (future provision)		x
	8	Spare relay output 6 (future provision)		x
	9	Spare relay output 7 (future provision)		x

HOW MULTIPLEXED INSTRUMENTS WORK

Multiplexed gauges receive signals through the Instrumentation Control Unit/Cab Electronic Control Unit (ICU/ CECU) located behind the center console. The ICU/CECU receives sensor signals either through the J1939 data bus or via conventional wiring sending signals from sensors that read actual pressures or temperatures. The ICU/CECU interprets this data and monitors or controls vehicle operation through the ICU/CECU software. The ICU/CECU then sends data to the gauges, warning lamps, audible alarms, and displays located inside the gauge clusters. The central instrument cluster (Figure 6-3) includes the speedometer (including odometer and trip meter) and tachometer (including engine hour meter and outside temperature display), plus pre-installed standard and/or editable warning light symbols called “telltale decals” mounted on the “Icon Tray.”

The Icon Tray slides into the bottom of the cluster. The standard Icon Tray covers most warning light requirements; editable icon lenses can be added for less common components that also require warning lights.

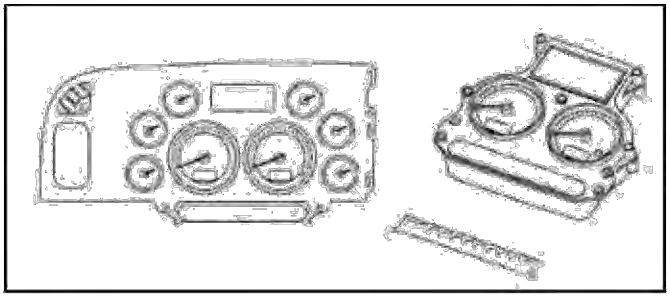


FIGURE 6-3. Central Instrument Cluster

Introduction

This section provides service information covering Peterbilt Conventional Models equipped with the multiplexed instrumentation system. Before attempting to make service repairs, the technician should be knowledgeable about the system design, components, operation and troubleshooting procedures for diagnosing instrumentation problems.

Vehicle component inputs are sent to the ICU/CECU through the J1939 data bus or conventional wiring. The ICU/CECU interprets the various inputs and monitors/controls the functions for each input through the ICU/CECU software. Output signals from the ICU/CECU provide data for the gauges, warning lamps, audible alarms, and displays inside the cluster. See Figure 6-5.

When used in conjunction with the Electronic Service Analyst (ESA) diagnostic software tool, the technician can review fault codes stored in the ICU/CECU, verify whether the instrumentation is working properly and diagnose the root cause of the problem more easily.

Central Instrument Cluster

The central instrument cluster includes:

- driver information display
- speedometer (including odometer and trip meter)
- tachometer (including engine hour meter and outside temperature display)
- pre-installed standard and/or editable warning light symbols called “telltale decals” mounted on the “Icon Tray.”

The Icon Tray slides into the bottom of the cluster. The standard Icon Tray covers most warning light requirements; editable icon lenses can be added for less common components that also require warning lights.

The Driver Information Display, located at the top of the instrument cluster, displays vehicle information and warnings through a constant monitoring of the vehicle systems. The various functions may be accessed by navigating through menu screens using the menu control switch (rotational knob).

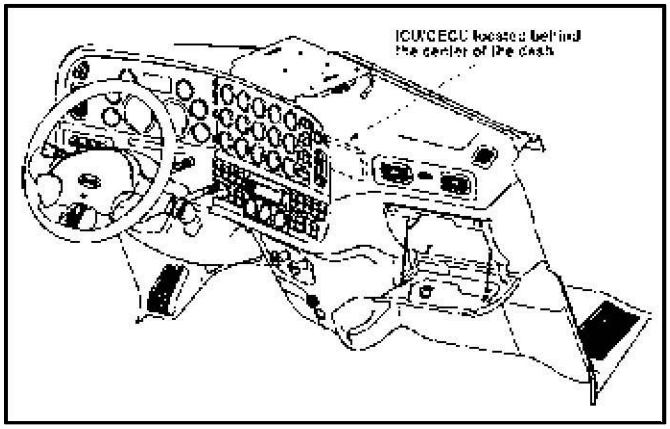
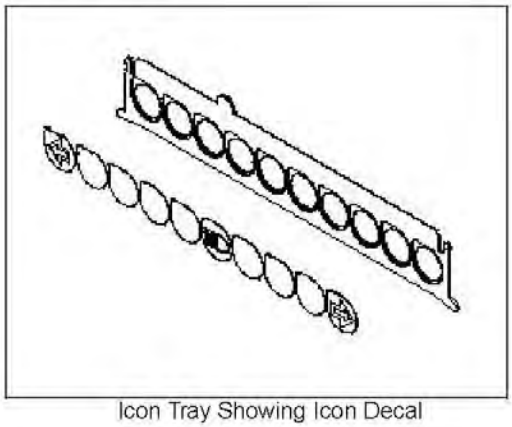


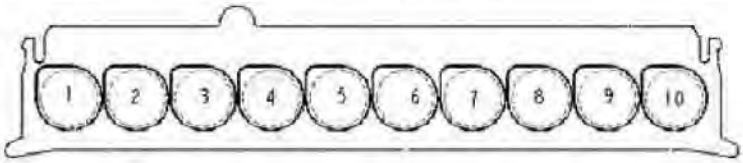
FIGURE 6-4. ICU/CECU Access

"A" Panel with Cluster Installed Removed

Cluster Installed with Icon Tray



Icon Tray Showing Icon Decal



POSITION	ICON DESCRIPTION	COLOR (CLUSTER L.E.D.)	ILLUMINATION SIGNAL
1	LEFT TURN	GREEN	MFTS MODULE TO ICU
2	BLANK	GREEN	EDITABLE #1 BREAKOUT ON MAIN CAB HARNESS
3	BLANK	RED	EDITABLE #2 BREAKOUT ON MAIN CAB HARNESS
4	BLANK	YELLOW	EDITABLE #3 BREAKOUT ON MAIN CAB HARNESS
5	BLANK	YELLOW	EDITABLE #4 BREAKOUT ON MAIN CAB HARNESS
6	HIGH BEAM	BLUE	MFTS MODULE TO ICU
7	BLANK	YELLOW	EDITABLE #5 BREAKOUT ON MAIN CAB HARNESS
8	BLANK	YELLOW	EDITABLE #6 BREAKOUT ON MAIN CAB HARNESS
9	BLANK	RED	DIRECT CONTROLLED-TWO WIRE BREAKOUT AT CLUSTER
10	RIGHT TURN	GREEN	MFTS MODULE TO ICU

Figure 6-5. Telltales

ICU/CECU Architecture
The software programming of the control module can be grouped into three main types:

- Run Time (RT) - which acts as the operating system where all communication takes place.
- Programmable Logic Controller (PLC) Code - manufacturer specific programmed code and software that is developed, accessible and editable.
- Vendor Module - blocks of code that are developed for specific manufacturers to allow other features to be implemented more efficiently.

See Multiplexed Instrumentation Block Diagram (Figure 6-6).

To better understand how Electronic Service Analyst (ESA) functions and why there are current limitations on some of the multiplexed features, by explaining what ESA can see. Currently ESA can look at all information that is communicated between the RT and PLC Code portions of the programming. Any signals, be they inputs, outputs, or dataline signals, sent between the RT and PLC Code are visible to ESA. These are the signals that may be monitored and simulated using ESA.

Limitations with the ESA program are found in the communications that go to the pre-developed Vendor Modules. Currently this information is not available for ESA to look at. That is why some features that have Vendor Module programming, such as the odometer and the message display, are not available to monitor and/or simulate through ESA.

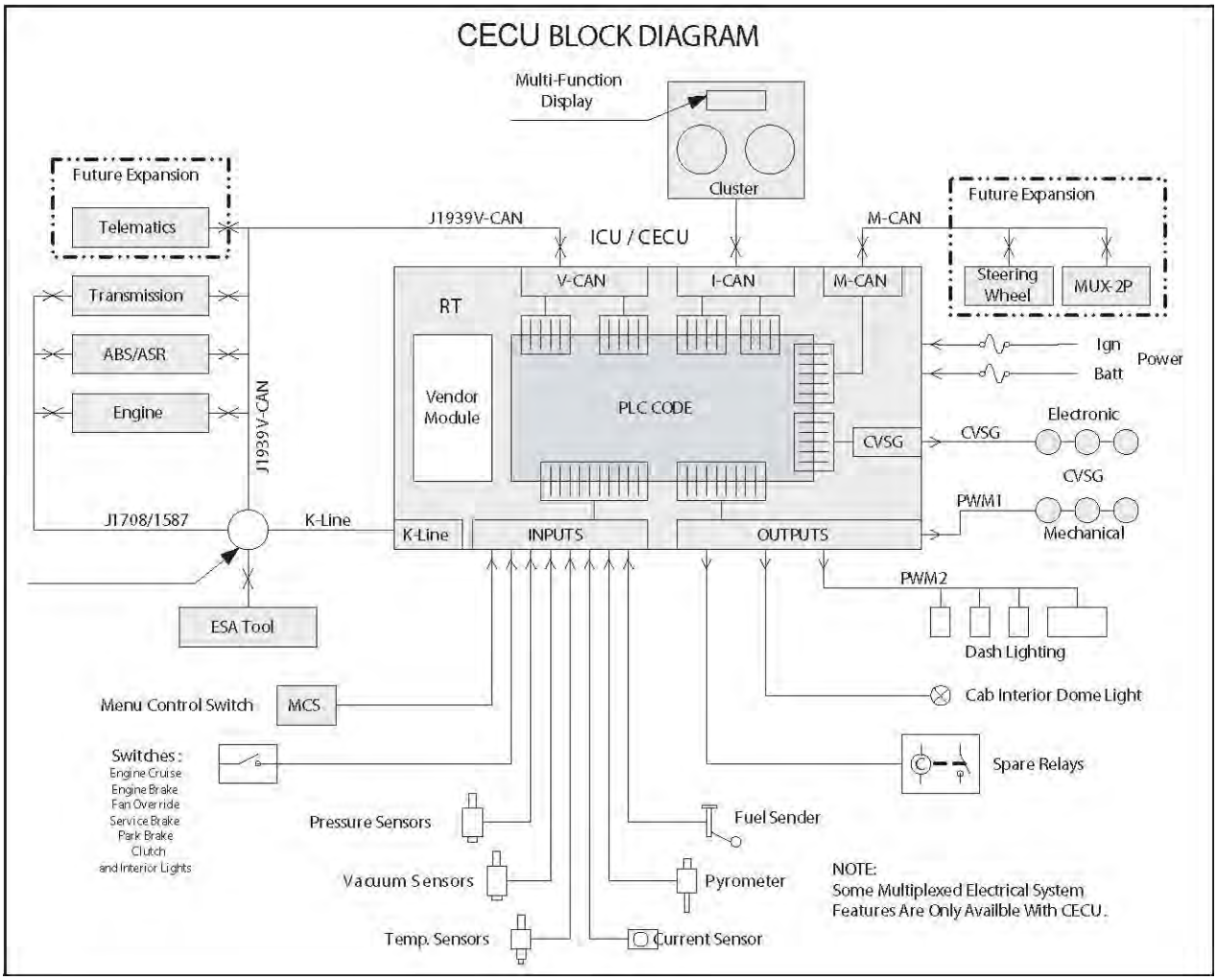


FIGURE 6-6. CECU Block Diagram

The central instrument cluster receives input data from the ICU/CECU via the I-CAN data bus. When the ignition key is first turned ON, the cluster performs a calibration power
on self-test.

Power On Self-Test

- Ignition key turned ON.
- The speedometer and tachometer gauge pointers move from pointing at zero, counter-clockwise to their mechanical limit (approx. -8°), remain there for 1 second and return to pointing at zero.
- At the same time, all LED indicators and telltales are switched on together, and then switched off together.
- A warning sound sequence is also activated five times without a break.
- The warning lamps in the cluster are all activated by the ICU/CECU, Three screens will sequentially display warning icons on the Driver Information Dis¬play. The ICU/CECU receives direct wire inputs for all warning lamps with the exception of the Low Cool¬ant Level warning and the Traction Control/Stability Control lamp. These lamp inputs are received via the J1939 (vehicle CAN) data link. The ICU/CECU typi¬cally receives the Trailer ABS warnings via the J1939 (Vehicle CAN) data link, however it can also be di¬rect wired to the ICU/CECU from the ABS unit on the trailer, if required.

NOTE: Before replacing the ICU/CECU or any gauges, check the wiring and fuses, and perform the diagnostic tests using ESA to verify that you are not replacing a good component.

Commercial Vehicle Smart Gauges (CVSG)

The right and left instrument panel gauges used with the multiplexed instrumentation are commonly referred to as Commercial Vehicle Smart Gauges (CVSG). Like the central instrument cluster, the 2-inch gauges also receive input data directly from the ICU/CECU. CVSG's are electronic and mechanical. The electronic CVSG's receive digi¬tal data from the ICU/CECU via the CVSG data bus. The mechanical gauges (i.e. suspension air pressure, etc.) are driven directly from the air pressure. Both types of gauges receive input signals from the ICU/CECU via a 4-wire "daisy chained" jumper harness that links one gauge to another. When the ignition key is first turned ON, all the electronic 2-inch gauges will perform a calibration "power on self-test."

Power On Self-Test

- Ignition key turned ON.
- The gauge pointers move from pointing at zero, counterclockwise to their mechanical limit (approx. ¬5°), remain there for 1 second and return to pointing at zero.
- At the same time, all LED indicators are switched on together, and then switched off together.

Additional CVSG gauge information service technicians should be aware of:

- 2-inch electronic gauges receive their power from the ICU/CECU.
- Yellow = Power wire (9-16 volts)
- Green = Ground (Return) wire
- The ICU/CECU sends 2-inch electronic gauges information over a data link (blue wire) between the ICU/ CECU and the gauge.
- 4-way jumper harnesses link each 2-inch gauge together.
- Yellow = Power wire
- Green = Ground (Return)
- Blue = Data link
- Brown = Backlighting (used for mechanical gauges only)
- Backlighting for 2-inch electronic gauges is sent from the ICU/CECU to the gauges via the data link (Blue wire).
- If the headlamps are on and the dimmer is turned to bright, you can scan the panel and tell which elec¬tronic gauges are wired and functioning correctly.

- If part of the panel has gauges backlit and some of the gauges are not backlit, the jumper harness wire between the gauges is probably not connected properly.
- If a 2-inch electronic gauge has power (yellow wire) and ground (green wire) but is not receiving data (blue wire), then the red indicator lamp at the 6 o'clock position of the gauge blinks after 30 seconds of waiting for data. This indicates there is an open or short in the blue wire between the gauge and the ICU/CECU.
- If the red indicator lamp is on but the gauge is operational, it indicates the value is out of normal range.
- If a 2-inch electronic gauge has a short or open in the sensor wiring, the gauge needle moves 5° below the first tick mark (approximately one needle thickness).
- Optional mechanical gauge (such as air suspension) needles are driven mechanically with air pressure. There is no red warning lamp and the backlighting is through the brown wire from the ICU/CECU (a PWM input). The 4-way jumper harness is still used to pass all 4 circuits through the gauge to the next gauge in the chain.
- Specialty CVSG gauges (such as the clock, PTO hour meter, and transmission display) are stand-alone gauges and are independent of the ICU/CECU.

Instruments and Controls Operation

Before attempting to repair any instrumentation problems, the technician should have a complete understanding of how the instruments and controls operate.

Speedometer The Speedometer indicates the vehicle speed in miles per hour (mph) and in kilometers per hour (km/h).

Tachometer The Tachometer measures the engine speed in revolutions per minute (rpm).

Air Filter Restriction Pressure The Air Filter Restriction Pressure gauge indicates the condition of the engine air cleaner and is measured by inches of water (H_2O). A clean filter should register 7 in. H_2O (may vary with system design) and a filter whose life is over registers approximately 25 in. H_2O.

Air Starter Pressure The Air Starter Pressure Gauge indicates the amount of air pressure in the air start reservoir.

Ammeter The Ammeter monitors the vehicle's electrical system and makes sure the system is in balance and operating normally. If not, it may be drawing power from the alternator (positive reading) or from the batteries (negative reading). Under normal conditions the ammeter will read nearly "zero."

Axle, Drive Oil Temperature The Drive Axle Oil Temperature gauges (front, rear, and center) indicate the temperature of the lubricant in the vehicle's axles.

Axle, Pusher Air Pressure, #1, #2, #3 The Pusher Axle Air Pressure gauges indicate the air pressure in each of the pusher axles suspension air bags.

Axle, Tag Air Pressure The Tag Axle Air Pressure gauge indicates the amount of air pressure in the tag axle suspension air bags.

Brake, Application Air Pressure The Brake Application Air Pressure gauge indicates how much air pressure is being applied from the foot brake valve or trailer brake hand valve to the air brakes.

BrakeSaver Application Air Pressure (Export vehicles only) The BrakeSaver Application Air Pressure gauge indicates the amount of air pressure applied to the BrakeSaver hand control valve.
BrakeSaver Oil Temperature (Export vehicles only) The BrakeSaver Oil Temperature gauge indicates the temperature in the BrakeSaver. If the oil temperature exceeds the maximum limits, a red warning lamp in the gauge turns on.

Engine Coolant Temperature The Engine Coolant Temperature gauge indicates the temperature of the engine coolant. If the coolant temperature exceeds the maximum limits, a red warning lamp in the gauge illuminates and an audible warning sounds. If the coolant temperature continues to rise, the Check Engine and/or Stop Engine lights illuminate. Under normal operating conditions the water temperature gauge should register between 165 and 205°F (74 and 90°C). Under certain conditions, somewhat higher temperatures may be acceptable. The maximum allowable temperature is 220°F (104°C) with the cooling system pressurized, except for certain engines.

Engine, Oil Pressure If the oil pressure drops below the minimum pressure a red warning light in the gauge illuminates, the Stop Engine light illuminates and an audible alarm tone sounds.

Engine Oil Temperature The Engine Oil Temperature gauge indicates the engine oil temperature. If the oil temperature exceeds the maximum limits, a red warning light in the gauge illuminates.

Fuel Filter Restriction Pressure This gauge tells you the condition of the fuel filter by indicating the restriction from the fuel filter to the fuel pump. The restriction is measured by inches of mercury (in-Hg).

Fuel Level, Primary/Secondary (if equipped) The Pri¬mary Fuel gauge and Secondary Fuel gauge (if equipped) indicate the approximate amount of fuel in each fuel tank. In addition to indicating empty and full, the gauge(s) also indicate the fuel level in graduated increments. When the fuel level for each tank is below 1/4 full, a red warning light in the gauge illuminates.

General Air Pressure #1, #2 The General Air Pressure gauge(s) are used for customer installed component applications.

General Oil Temperature The General Oil Temperature gauge(s) are used for customer installed component applications.

Manifold Pressure (Boost) The Manifold Pressure (Boost) gauge indicates the power the engine is putting out by showing the amount of turbo boost. If the pressure indicated by the manifold pressure gauge goes down, there may be something wrong with the engine

Primary and Secondary Air Pressure Gauge The Primary Air Pressure gauge indicates pressure in the rear braking system. The Secondary gauge indicates pressure in the front braking system. Each gauge indicates the amount of air pressure in each system in pounds per square inch (psi). On vehicles equipped with metric air pressure gauges, the gauge faceplate includes a kPa (major) scale and psi (minor) scale. If the pressure in either or both circuits falls below 65 psi, a red warning light in the gauge illuminates and an audible alarm tone sounds when the engine is running.

Suspension Load Air Pressure, #1, #2 The Suspension Load Air Pressure gauge indicates the amount of air pressure in the air suspension air bags. When the vehicle is equipped with a second Suspension Load Air pressure gauge, the #1 gauge indicates the air pressure in the driver's side air bags. The #2 gauge indicates the air pressure in the passenger's side air bags.

Tractor Brake Application Air Pressure The Tractor Brake Application Air Pressure gauge indicates the amount of air pressure applied to the tractor brakes.

Trailer Brake Application Air Pressure The Trailer Brake Application Air Pressure gauge indicates the amount of air pressure applied to the trailer brakes during brake foot valve and/or hand brake control valve applications.
Trailer Reservoir Air Pressure The Trailer Reservoir Air Pressure gauge indicates the amount of air pressure in the trailer brake reservoir.

Transfer Case Oil Temperature The Transfer Case Oil Temperature gauge indicates the temperature of the oil in the transfer case. If the oil temperature exceeds maximum limits, a red warning light in the gauge illuminates.
Transmission Oil Temperature, Main The Main Transmission Oil Temperature Gauge indicates the temperature of the oil in the transmission.

Transmission Oil Temperature, Auxiliary The Auxiliary Transmission Oil Temperature gauge indicates the temperature of the oil in the auxiliary transmission.

Transmission Retarder Oil Temperature The Transmission Retarder Oil Temperature gauge indicates the temperature of the oil in the transmission retarder.

Voltmeter The Voltmeter displays the battery voltage. Normally, it shows 12 to 14V (volts). A red warning light in the gauge illuminates when an out of range condition exists.

TABLE 6-3. Gauge Input Sources

Standard / Optional Input Source	Input Source	Sensor Type *
Air Filter Restriction Pressure	Sensor	Active
Air Starter Pressure	Mechanical	
Ammeter	Sensor	Active
Auxiliary Transmission Oil Temperature	Sensor	Passive
Brake Application Pressure	Sensor	Active
Brake Saver Application Air Pressure	Mechanical	
Brake Saver Oil Temperature *(Not available with CECU instrumentation)*	Sensor	Passive
Drive Axle Oil Temperature	Sensor	Passive
Engine Coolant Temperature	V-CAN (J1939)	
Engine Oil Pressure	V-CAN (J1939)	
Engine Oil Temperature	V-CAN (J1939)	
Fuel Filter Restriction Pressure	Sensor	Active
Fuel Level	Sensor	Passive
General Air Pressure	Mechanical	
General Oil Temperature	Sensor	Passive
Main Transmission Oil Temperature	Sensor	Passive
Manifold Pressure (Boost)	V-CAN (J1939)	
Primary & Secondary Air Pressure	Sensor	Active
Pusher Axle Air Pressure	Mechanical	
Pyrometer (Exhaust Temperature) *(Not available with CECU instrumentation)*	Sensor	Passive
Speedometer	V-CAN (J1939)	
Suspension Load Air Pressure	Mechanical	
Tachometer	V-CAN (J1939)	
Tag Axle Air Pressure	Mechanical	
Trailer Brake Application Air Pressure	Mechanical	
Trailer Reservoir Air Pressure	Mechanical	
Transfer Case Oil Temperature	Mechanical	
Voltmeter	Battery Voltage	

* Sensor Types:
Active - Has 3 wires and requires power to operate. Output is a linear voltage.
Passive - Has 2 wires and does not require power to operate. Output is a change in resistance.

TRANSMISSION BACK UP SIGNALS

The back-up signal can be accessed from pin A of the 5-way tail light connector located at the end of frame.

The tail light connector is a 5-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.

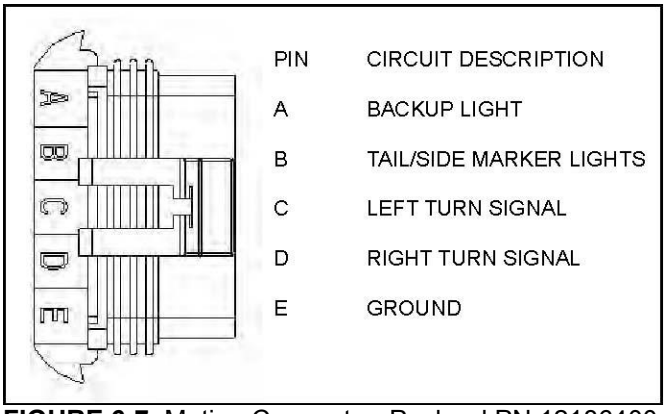


FIGURE 6-7. Mating Connector: Packard PN 12186400

JUNCTION BOX

The junction box easy access to various signals as outlined in Figure 6-6.

Wire Color	Description
Red	Stop Lights
Yellow	LH Turn Lamp
Green	RH Turn Lamp
Brown	Marker Lamp
Black	Clearance Lamp
White	Ground

FIGURE 6-8. Junction Box BOC or EOF

J1939

Warning! The J1939 databus is the communication link between the engine and the Anti-Lock Braking System (ABS). Only J1939 compatible devices should be added to the databus. Some J1939 compatible aftermarket devices may disrupt the ability of the databus to communicate. If the databus is disrupted by an aftermarket device, it must be removed from the databus.

Guidelines - J1939 Circuit Requirements

- Circuits added must be a twisted pair consisting of a minimum of 1 twist per inch.
- Individual breakout length of circuits added cannot exceed 118 inches.
- Do not splice into existing J1939 circuits. Use the connection points provided.
- J1939 circuits are for data transmission only and are not to be used for power or ground circuits.
- Any modifications must conform to SAE J1939-15.

J1939 Access

All Peterbilt vehicles equipped with 2007 Emissions compliant engines include J1939-15 circuitry. The J1939 circuit can be accessed in two locations. The first access is located inside the dash near the diagnostic connector. The second access is at the driver side toward the rear of the engine.

1. Dash Access - Connector located in dash behind key switch panel approx 1 foot down the harness

FIGURE 6-9. Dash Access

2. Engine Access - Connector located on OEM engine harness on driver's side of engine toward the rear of engine

FIGURE 6-10. Engine Access

J1939 Access Procedures

1. Identify J1939 Access Connector (note long blue shell)
2. Disconnect connection (note terminating resistor from inside blue connector)

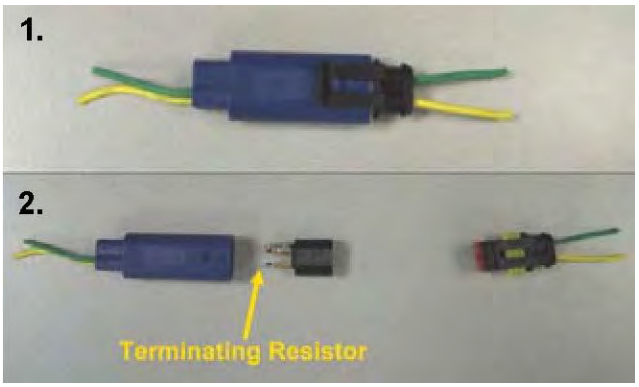


FIGURE 6-11. J1939 Access

3. Make connection in between original connection (tin).
4. Ensure terminating resistor is inserted in blue connector shell (arrow).

FIGURE 6-12. J1939 Access

SECTION 7 **ELECTRICAL 579 FAMILY**

INTRODUCTION

This section is written to provide information to the body builder when installing equipment into vehicles built with Multiplexed instrumentation. The new technology presented by NAMUX 4 level instrumentation integrates J-1939 CAN data communications to various equipment on the vehicle. This book is intended to address how to work in aftermarket equipment while still maintaining full functionality of the OEM vehicle.

The most important advancement of NAMUX 4 instrumentation is the implementation of the Cab ECU controlling air operated aftermarket devices. While it is still possible to wire completely outside of the Cab ECU system, utilizing the CECU functions will make a cleaner installation and will maintain OEM functionality. NAMUX 4 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 CECU 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 Node. This chassis node receives the instruction and connects 12V power to an air solenoid. 12V power will open the solenoid and supply air pressure to that air circuit.

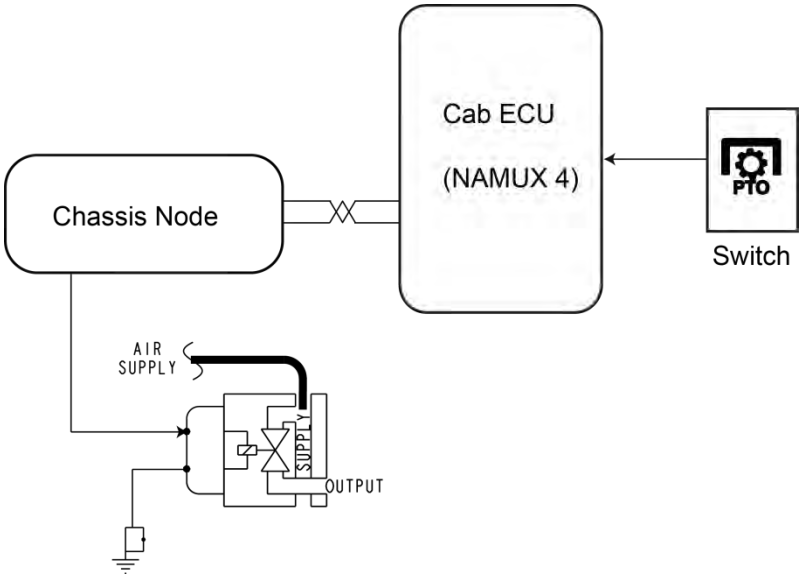


FIGURE 7-1. NAMUX 4 System Diagram

In addition to NAMUX 4 technology, the vehicle electrical harness has been redesigned to minimize weight and reduce various connectors (which have been proven to increase the opportunity for electrical malfunctions which also increase the amount of time to troubleshoot). What this means for the aftermarket installer is that there is a limitation to modifying a vehicle with aftermarket equipment if the vehicle was not originally specified for those options from the factory. To the aftermarket installer, more time will be spent installing pins and routing wires instead of simply installing jumper harnesses if the vehicle was not specified with 'customer installed' equipment from the factory. For example, vehicles ordered with a 'customer installed' PTO will have connectors on the vehicle for aftermarket connectors. A vehicle specified with standard radio will not have a pigtail for premium sound speakers.

BODY BUILDER CONNECTION POINTS

Becoming familiar with the various connectors available to the aftermarket installer is important. This section contains reference information for the connectors that are used to add equipment.

Harness Design

The 579 and the vocational 567 are designed and manufactured with a cab harness that is chassis specific. The new design minimizes the number of connectors which improves routing, reduces electrical problems and reduces diagnostic time when servicing. The new design, however, changes the way electrical components are added to the vehicle for final use customers. The after-market installer will have several options available:

1. Ensure that the vehicle is ordered and specified with the equipment installed or at least have 'furnish by owner' provision.
2. Install electronic accessories outside of the CECU network, direct power from the power distribution center and no splicing into the cab harness.
3. Route new wires and install pins to the designated pin location on all connectors.

It is imperative that the installer never splice into a cab harness for signal or power purposes.

Remote Throttle and Remote PTO Control

The body builder will need to find the 12-pin remote throttle connector, located in the engine compartment on the engine harness. See the PTO Section for additional information

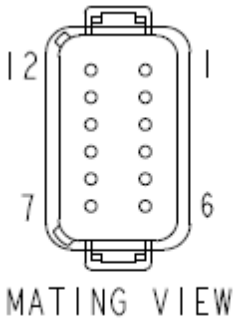


FIGURE 7-2. 12 Pin Connector

Spare Power

Spare power is located at the fuse panel or connector P001.

Air Solenoid Ground

Air solenoids are grounded to connectors P157 and P185 which are located behind the overbell between the air manifold and the chassis node.

Cab Switch Backlighting

Splice blocks P011 and P013 provide power for switch lighting. These are located behind the panel to the right of the steering column. In some instances, you may need to remove the instrument cluster.

Electric Engaged Equipment (Opposed to Air Operated)

At the left hand forward cab mount, P198 is available for PTO controls that are electrically engaged via 12V DC power.

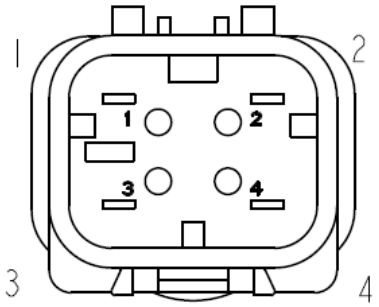


FIGURE 7-3. Electric Engaged Equipment Connector

Air Solenoid Bank and Chassis Node

The installer needs to identify where these two components are located.

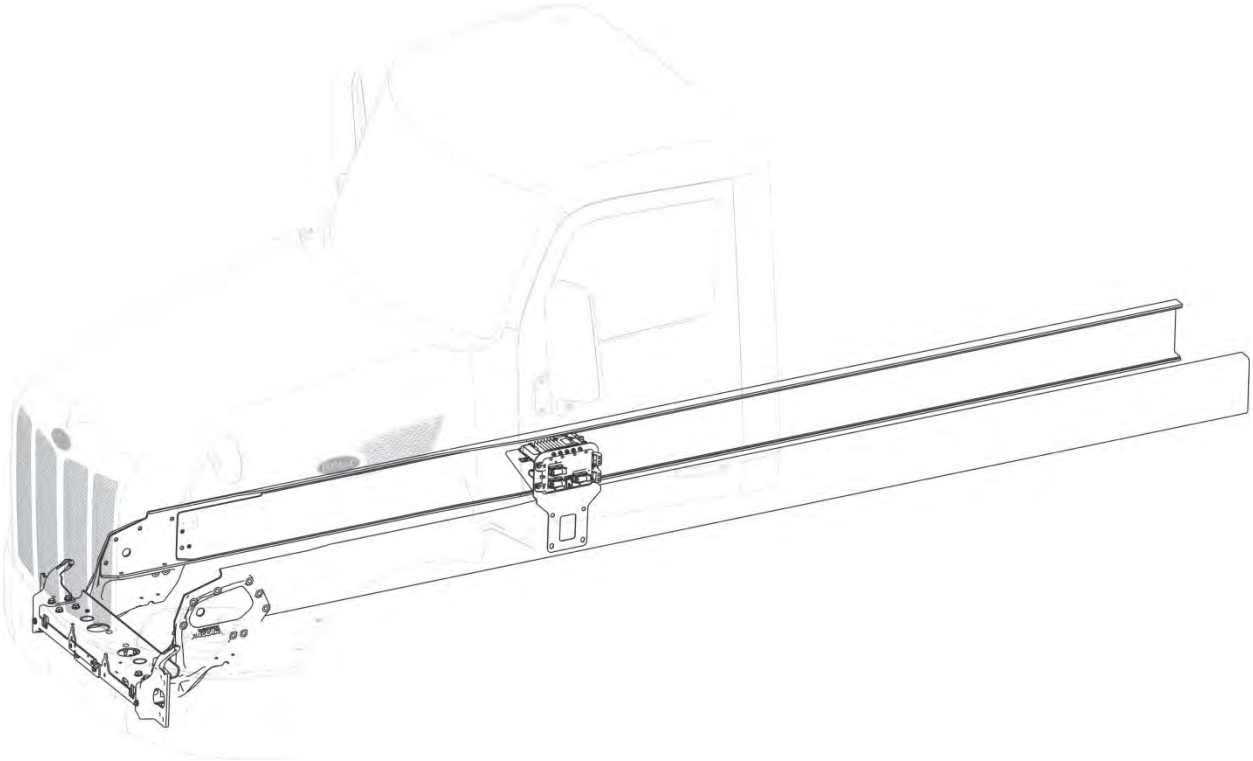


FIGURE 7-4. Air Solenoid Bank and Chassis Node

Rear Axle Controls and Sensors

Two connectors are located on the left hand frame rail forward of the forward rear drive axle. P046 is to install axle temperature sensors and P047 is to connect differential lock mechanisms.

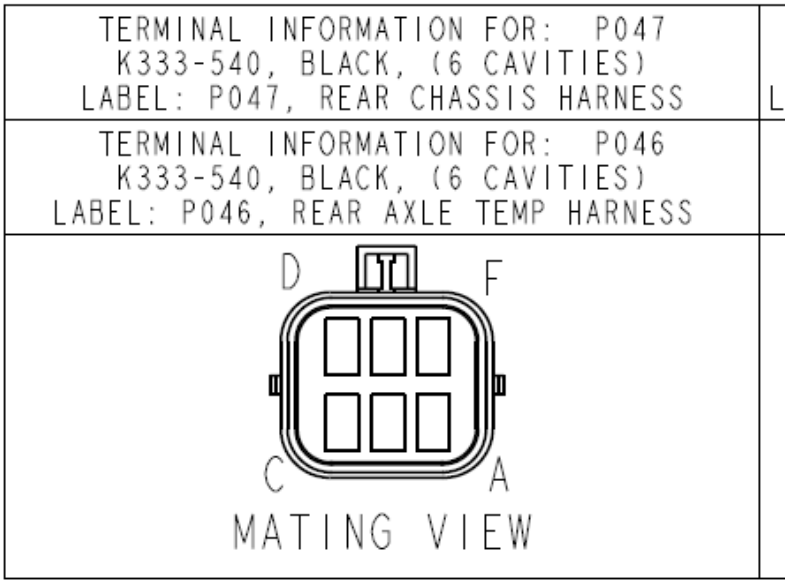


FIGURE 7-5. Rear Axle Controls and Sensors Connector

B-CAN Interface

One connector is located at the EOF for the BCAN interface.

FIGURE 7-6. B-CAN Connector

Location Diagrams for Various Connectors on the Frame

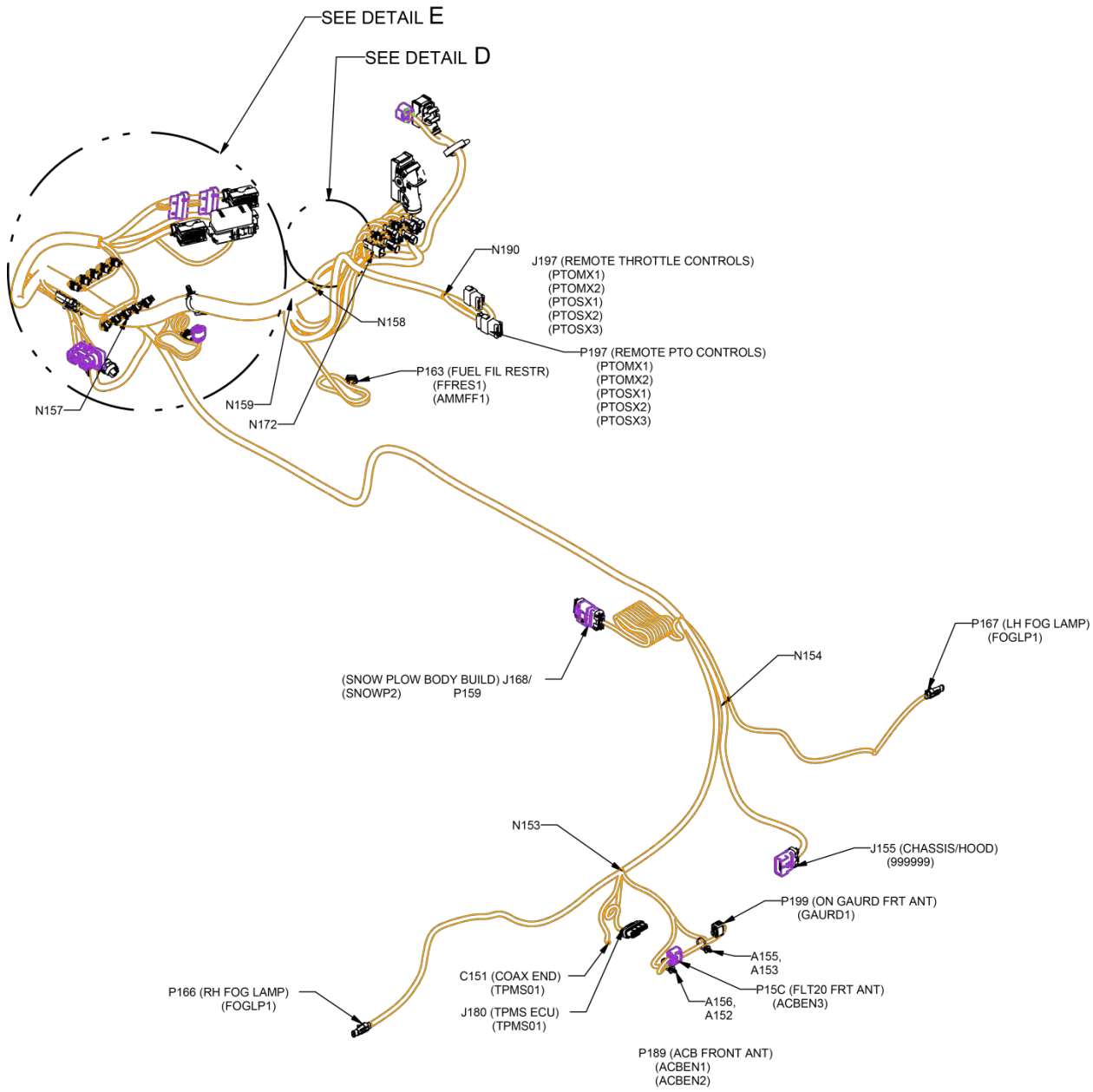


FIGURE 7-7. Chassis Harness From Cab Mount to Front of Frame

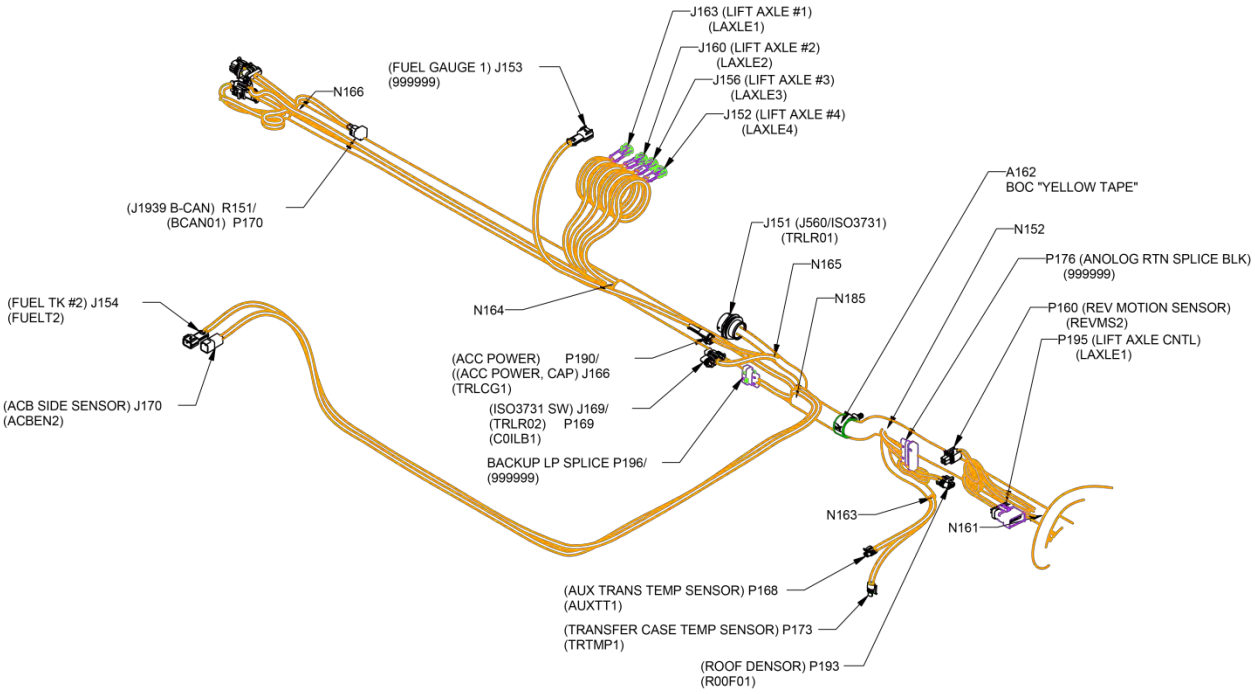


FIGURE 7-8. Chassis Harness From Cab Mount to BOC

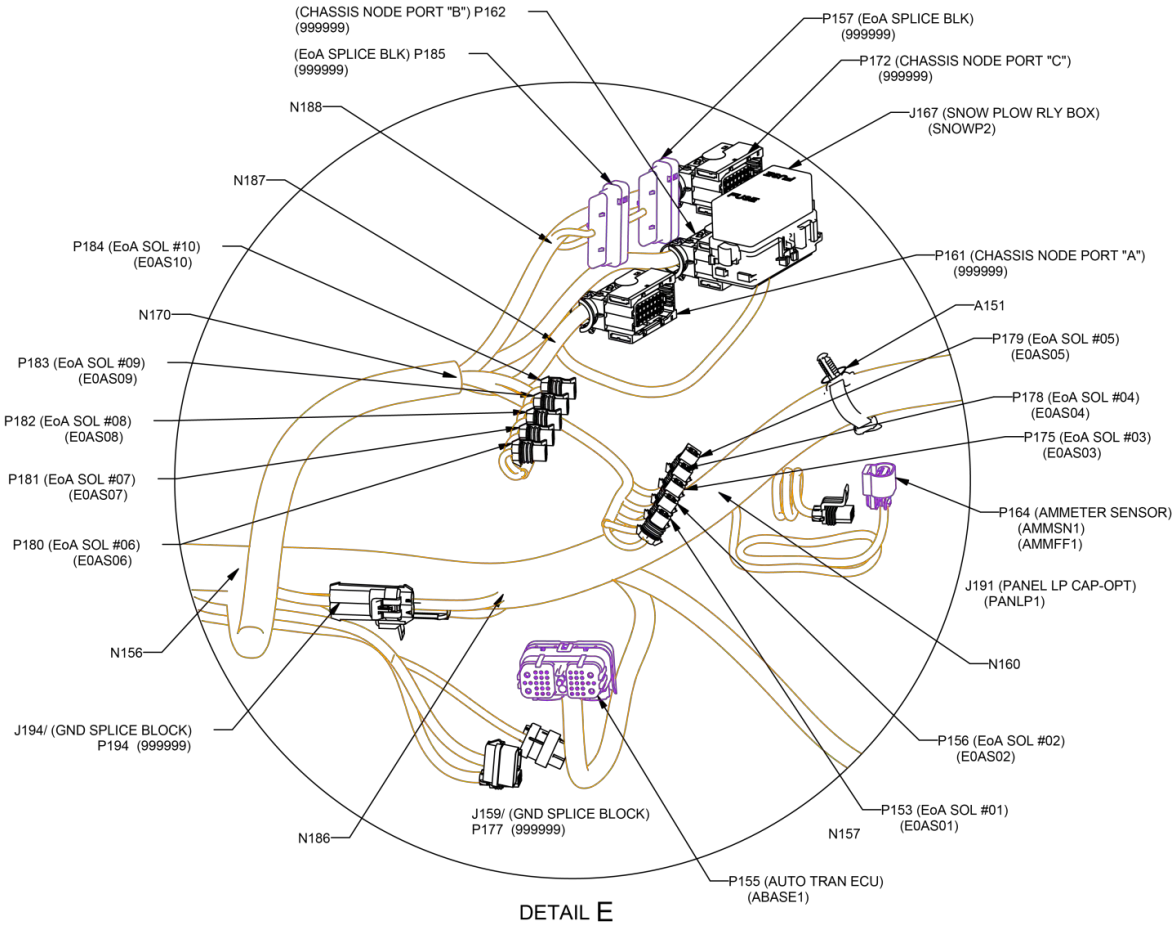


FIGURE 7-9. Connectors Near Front Cab Mount

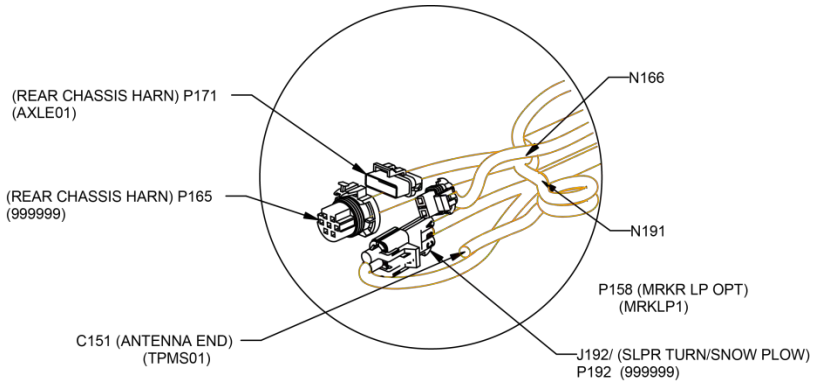


FIGURE 7-10. Connector Near BOC

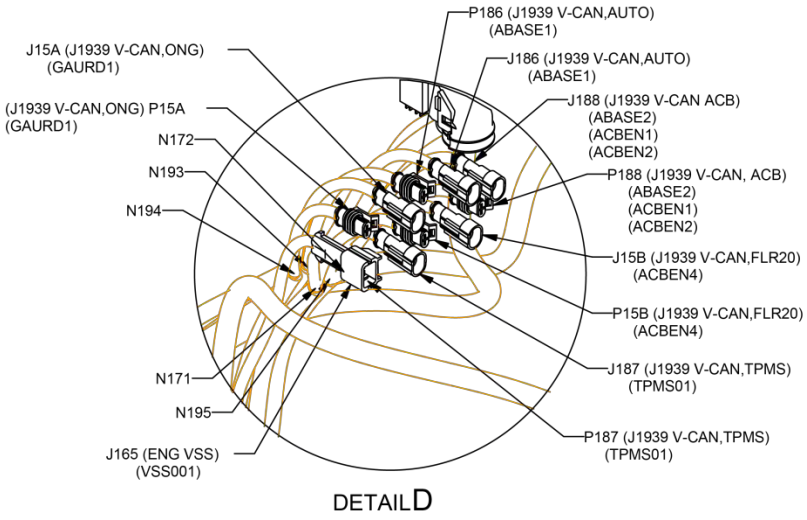


FIGURE 7-11. VCAN Connectors

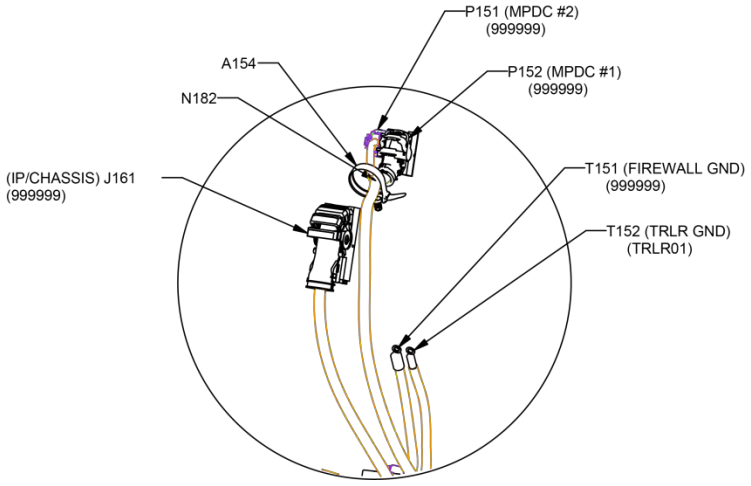


FIGURE 7-12. Firewall Connectors

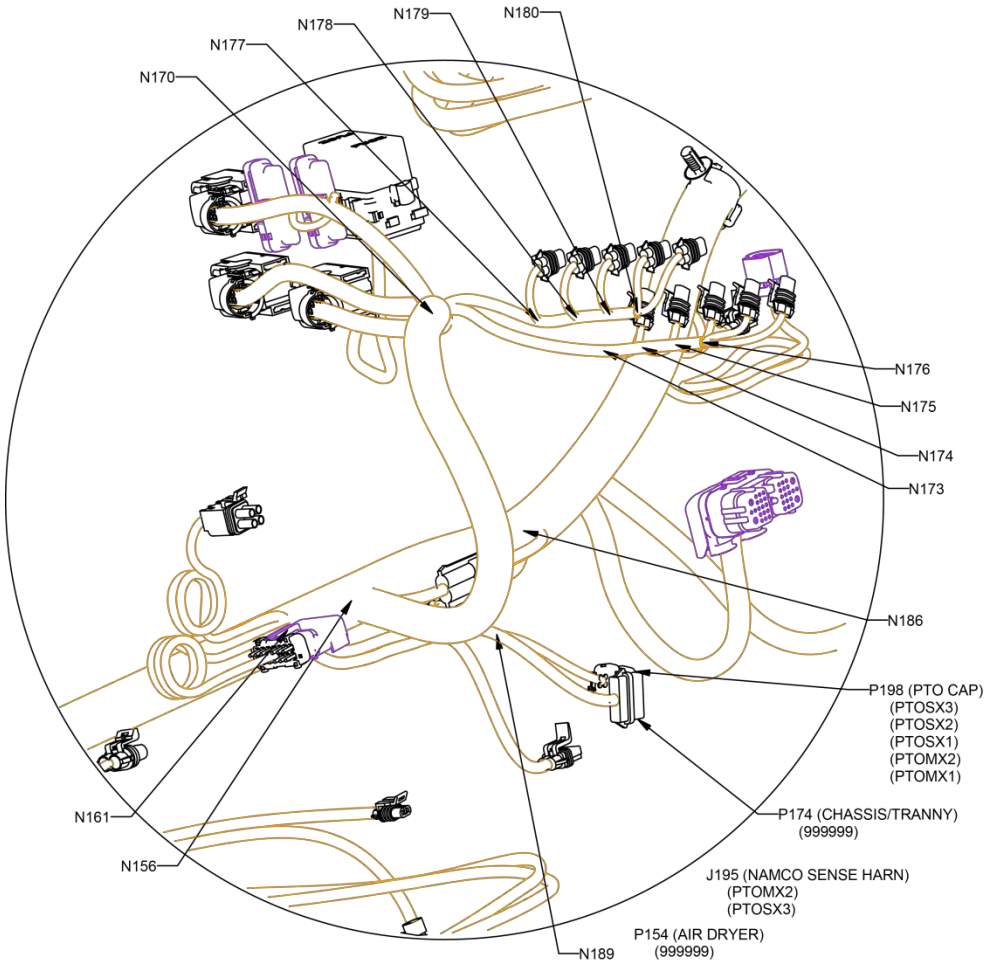


FIGURE 7-13. Chassis Node and Electric Over Air Solenoid Bank

Installing Additional Switches onto the Chassis

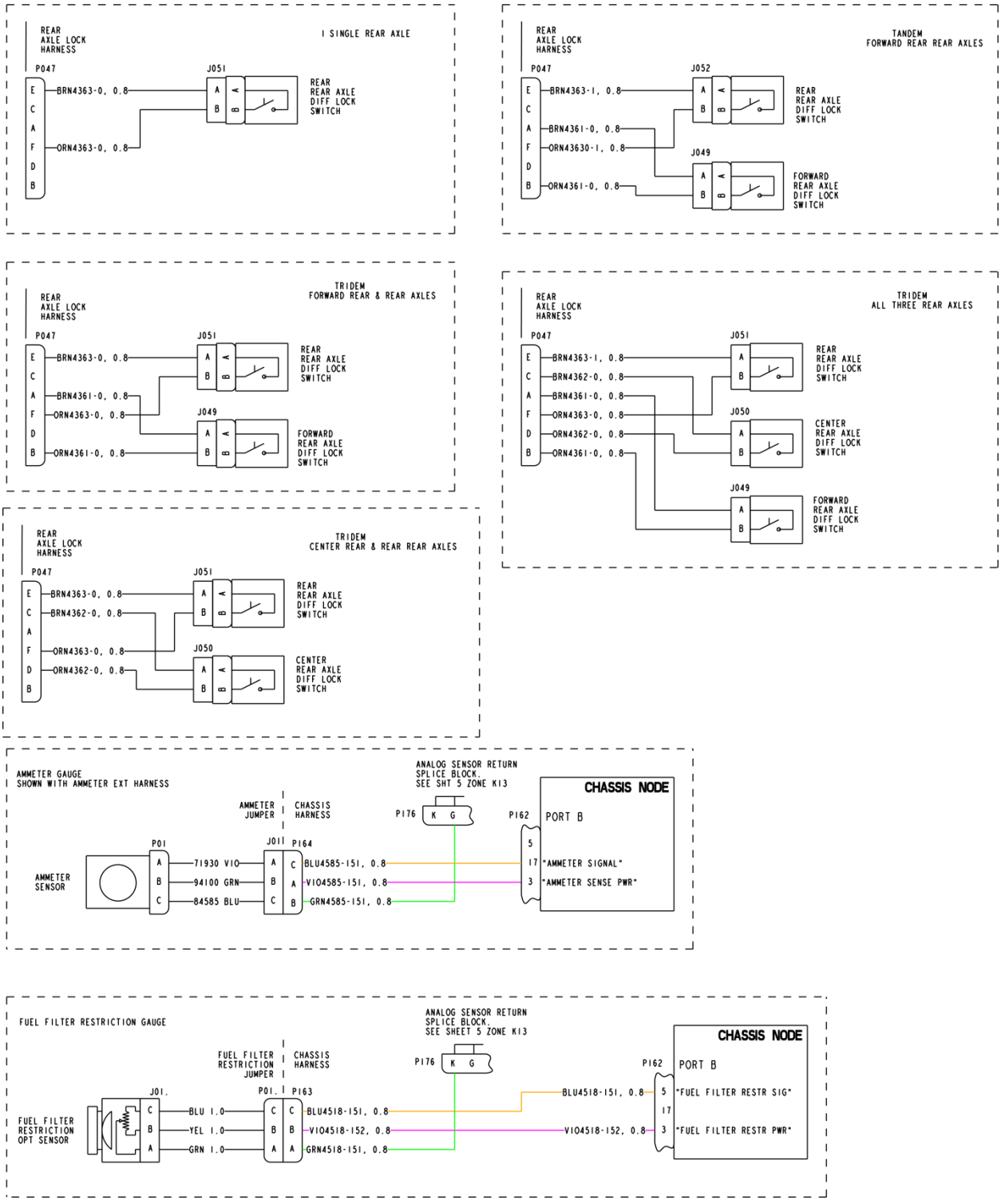


FIGURE 7-14. Installing Additional Switches onto the Chassis Side

Installing Additional Gauges on the Dash

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

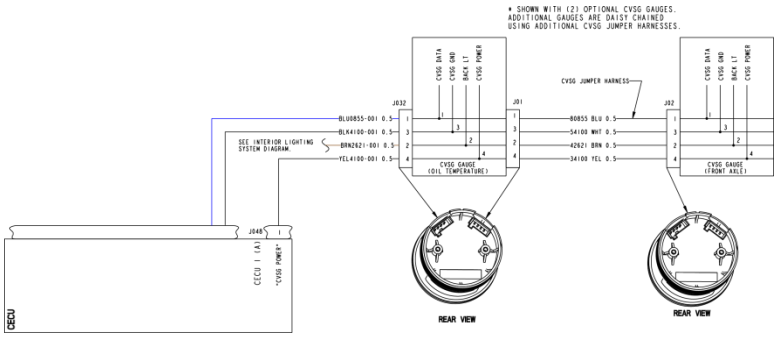


FIGURE 7-15. Installing Additional Gauges on the Dash

Installing Sensors on the Chassis for Gauges

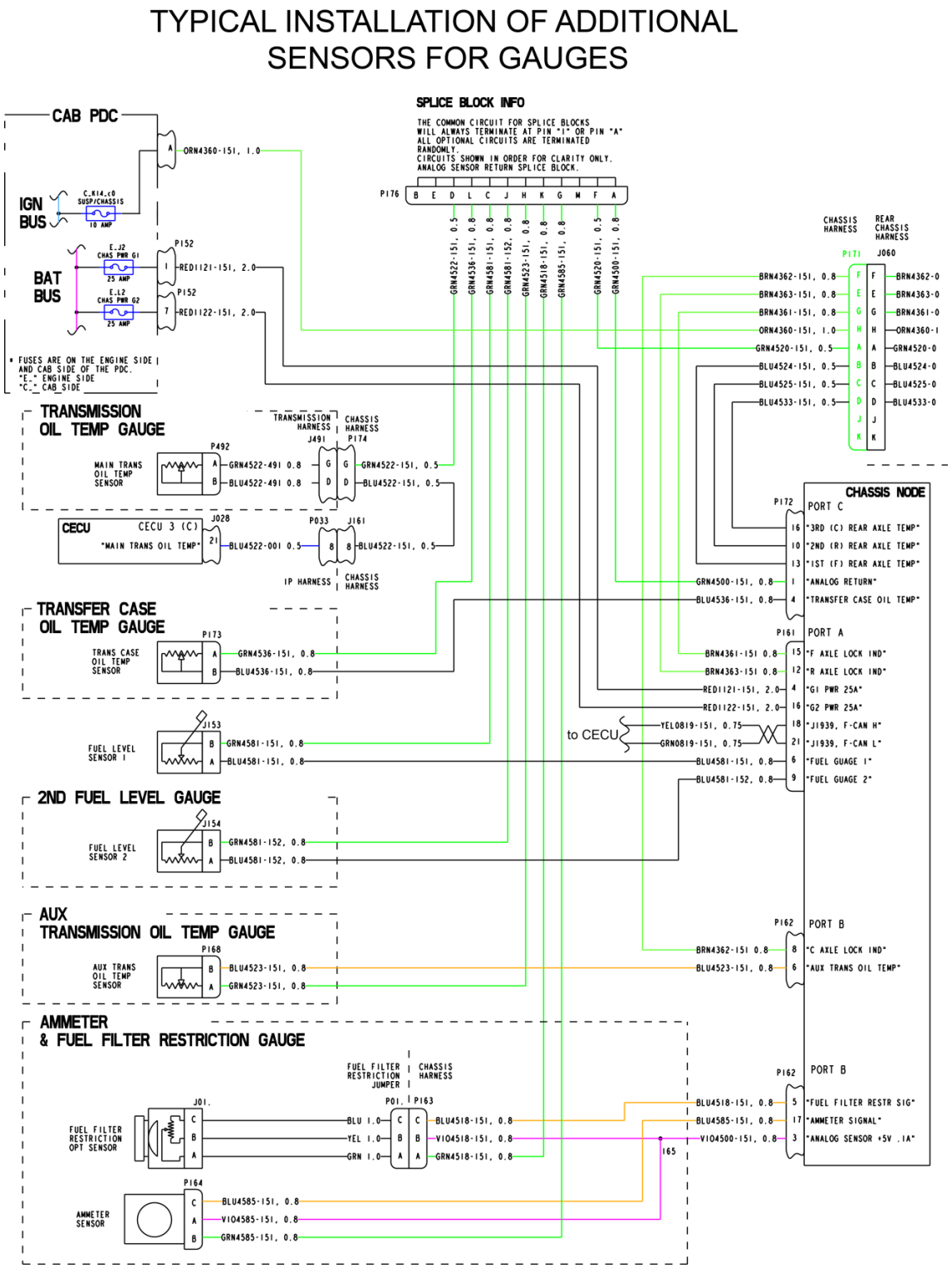


FIGURE 7-16. Installing Sensors on the Chassis Side for Gauges

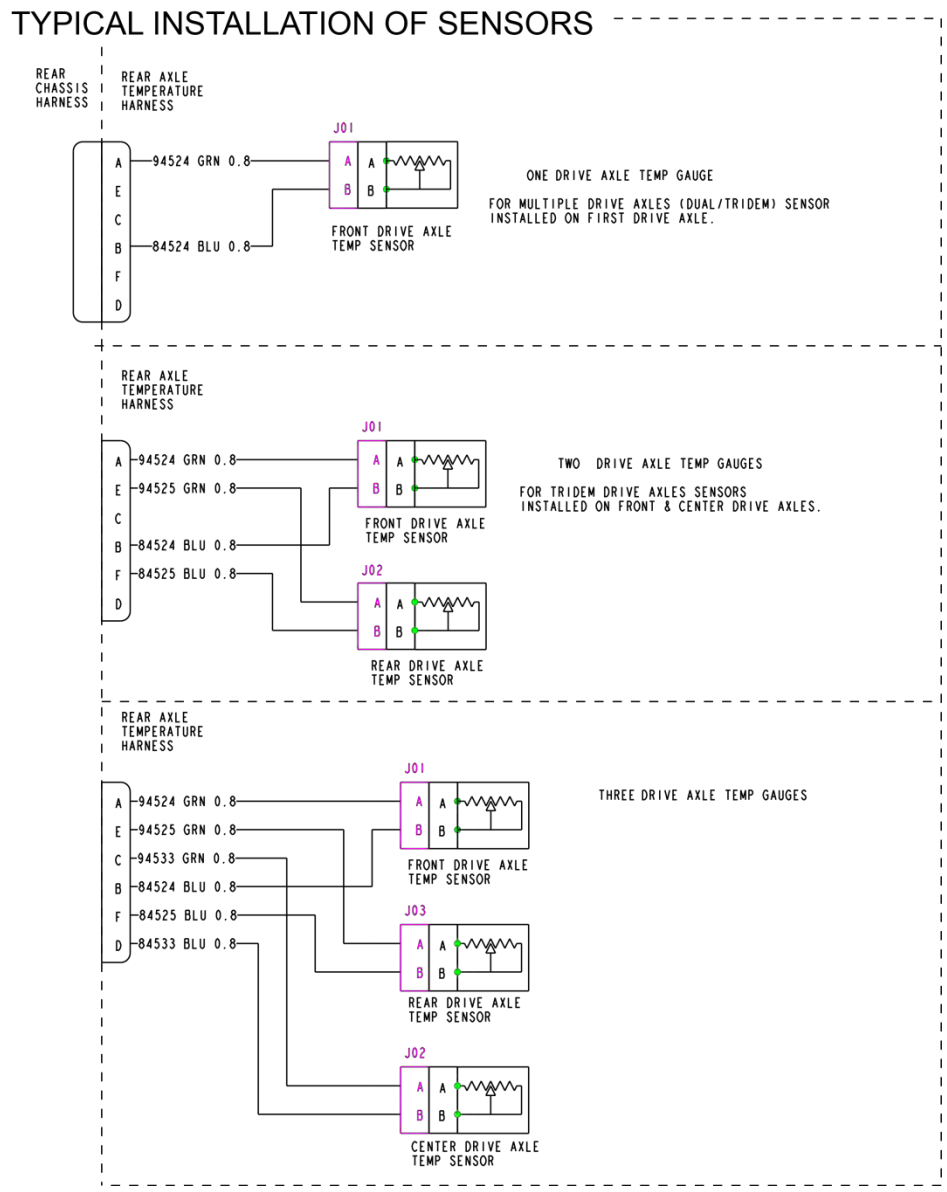


FIGURE 7-17. Typical Installation of Sensors Diagram

Spare power is found via a connector behind the fuse panel cover (left hand side of the dash, below the ignition switch). This connector is labeled P096.

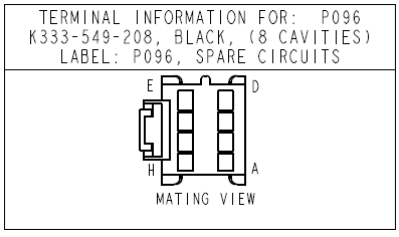


FIGURE 7-18. Spare Power Connector

Lift Axles (Pushers & Tag)

Truck Lift Axles

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.

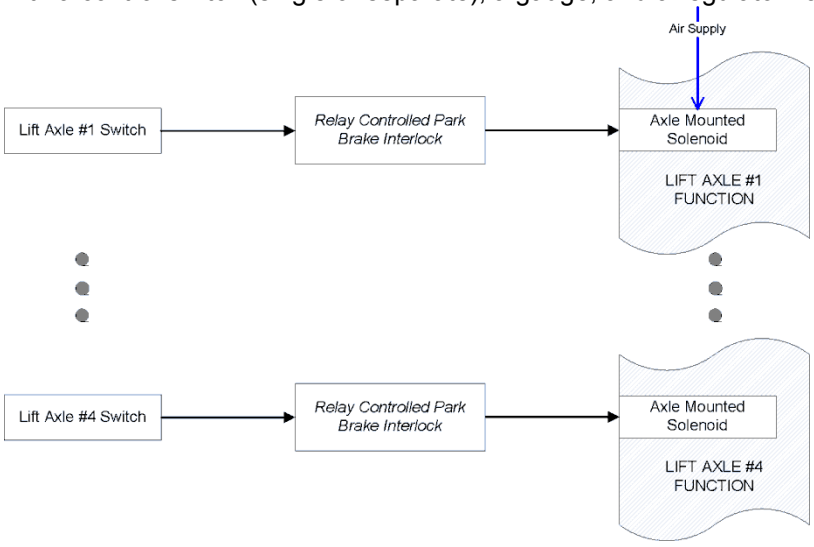


FIGURE 7-19. Truck Lift Axles (Separate Switches)

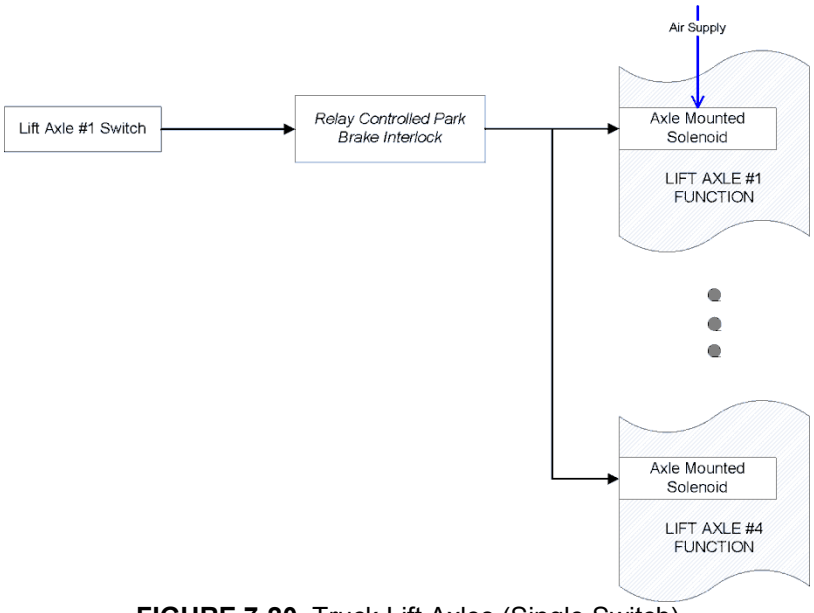


FIGURE 7-20. Truck Lift Axles (Single Switch)

TABLE 7-1. 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 Axles

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”.

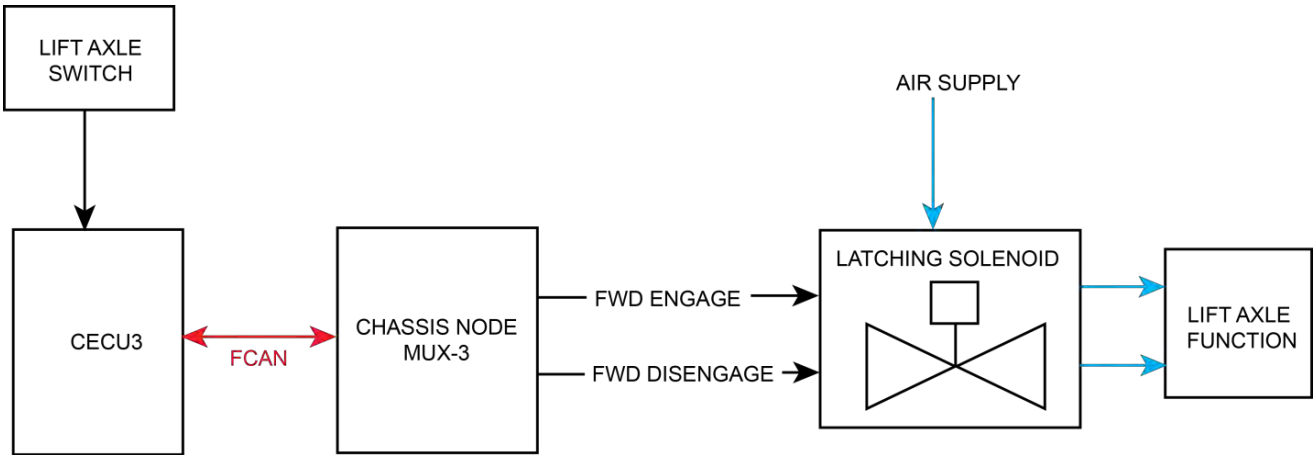


FIGURE 7-21. EoA Trailer Lift Axles

Air Solenoids

Air solenoids are the devices that translate the electrical signal into physical change 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 rail which reduces the amount of air lines on the vehicle.

Air solenoids used on the vehicle are both of Latching and Non Latching types.

TABLE 7-2. Air Solenoid Types

Latching	Requires a signal voltage to close or open a solenoid. Will remain in position if power is disconnected. Physically, these require 2 spots on the bank compared to a non-latching valve.
Non-latching	Requires 12v to change a valve from its normal position. Will revert back to its normal position if power is disconnected.

For safety reasons, certain circuits are designed with latching type solenoid valves. These circuits include but are not limited to:

1. Air suspension dump (tractor and trailer)
2. 2 speed rear axle control
3. Liftable axle controls (both on the vehicle and on the trailer)
4. Workbrakes for winches

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.

NOTE: General air accessory, when ordered from the factory, is wired to a non-latching solenoid. Therefore, general air accessory options will reset when the ignition is turned off. If a latching solenoid is installed on a “furnish by owner” air accessory, the installer will need to document how the system operates.

Remote Throttle

Remote control of the PTO is performed through the 12-pin remote throttle connector on the engine harness. These are pins 1, 2, and possibly 6 (depending on engine) on J111_.

The 2010 and 2013 MX engine controller port (J2 pin 21) will report a PTO active when driven high (+12V DC). Since PTO and pump mode signals are low when active a relay is needed to convert the low signal to a high signal. When a PTO is specified on a chassis the MX engine harness will contain the optional remote throttle/PTO 12-way connector and cap (P111C/J111C).

TABLE 7-3. MX engine (P111C/J111C)

Pin	Function
1	CECU INPUT FOR REMOTE PTO RESUME
2	CECU INPUT FOR REMOTE PTO SET
3	CECU INPUT FOR NAMUX ANALOG RETURN (TWISTED TRIPLE)
4	CECU INPUT FOR NAMUX PWR SUPPLY +5V (TWISTED TRIPLE)
10	CECU INPUT FOR REMOTE THROTTLE SENSOR CIRCUIT (TWISTED TRIPLE)
5	PTO ENGAGED SIGNAL (LOW = ENGAGED)
6	PUMP MODE ENGAGED SIGNAL (LOW = ENGAGED)
7	+12V 10A BODY IGN FUSE E_E9
8	VEHICLE GROUND
9	NOT USED
11	+12V 20A ENG PWR (MX) FUSE E_N9
12	NOT USED

The 2010 ISX engine controller port (J3 pin 39) and the 2013 ISX engine controller port (J2 pin 94) will report a PTO active when driven low (Ground). When a PTO is specified on a chassis the ISX engine harness will contain the optional remote throttle/PTO 12-way connector and cap (P111A/J111A).

TABLE 7-4. ISX Remote Throttle/PTO Connector P111A/J111A:

Pin	Function
1	CC/REMOTE PTO RESUME SWITCH
2	CC/REMOTE PTO SET SWITCH
3	COMMON RTN #1 (SW)
4	REMOTE THROTTLE SENSOR CIRCUIT (TWISTED TRIPLE)
10	SENSOR SUPPLY +5V (TWISTED TRIPLE)
11	COMMON RTN #3 (SENSOR) (TWISTED TRIPLE)
5	PTO ENGAGED SIGNAL (LOW = ENGAGED)
6	CC/PTO ON/OFF SWITCH
7	+12V 10A BODY IGN FUSE E_E9
8	VEHICLE GROUND
9	TORQUE LIMIT SWITCH
12	REMOTE THROTTLE ON/OFF

Focusing on the PACCAR MX-13, the electrical design requires an additional relay to turn the normally LOW PTO engage signal into a 12V HIGH signal to the engine ECU.

Chassis node connector pin reference (Port C).

The label ‘C’ will be in raised lettering on the chassis node.

TABLE 7-5. EoA Chassis Node Guide

EOA switch number	Port C Pin location
1	2
2	3
3	5
4	6
5	8
6	9
7	11
8	12

CECU input locations for EOA Switches from the dash.

This connector is the center most connector and has 52 pins.

TABLE 7-6. EoA CECU Guide

EOA switch number	CECU (connector C) Pin location
1	3
2	26
3	17
4	18
5	19
6	20
7	22
8	24

Cab ECU Parameter Reference Table

Cab ECU parameters are used to define whether a function is turned on in the system. Control hardware may be installed, however it will not function until the software is programmed to use it.

TABLE 7-7. CECU Parameters

Q30-1024-005	Cruise Control Set Switch Accel or Decel	0	1	Parameter is used to define the cruise control set/resume switch functionality. Value 0/Disabled means set switch is used for accelerate, and resume switch is used for decelerate. Value 1/Enabled means set switch is used for decelerate, and resume switch is used for accelerate.
Q30-1024-006	Cruise Control Present	0	1	Parameter is used to determine if cruise control is installed and controls the cruise control messages to the engine. Value 0/Disabled means cruise control switches are not installed. Value 1/Enabled means cruise control switches are installed.
Q30-1024-039	PTO Oil Temperature Gauge Installed	0	1	Valve 0/Disabled means gauge is not installed. Valve 1/Enable means gauge is installed.
Q30-1024-042	Transfer Case Oil Temperature Gauge Installed	0	1	Parameter controls the functionality (output on CVSG bus and DTC's) of the transfer case oil temperature gauge. Value 0/Disabled means Transfer Case Oil Temperature Gauge is not installed. Value 1/Enabled means Transfer Case Oil Temperature Gauge is installed.
Q30-1024-047	Engine Fan Override Present	0	1	Parameter is used to determine if the fan override switch is installed. Value 0/Disabled means engine fan override switch is not installed. Value 1/Enabled means engine fan override switch is installed.
Q30-1024-058	Transfer Case Temperature Sensor Type	0	1	Parameter is used to determine which type of transfer case temperature sensor is installed for the transfer case temperature gauge. This determines the input range. Value 0 means Transfer Case Temperature Sensor Type = Delphi. Value 1 means Transfer Case Temperature Sensor Type = Siemens (or Continental).
Q30-1024-060	PTO Control Present	0	1	Parameter is used to determine the presence of PTO controls. (For CUMMINS engine, default value is 1 -Cruise Control PTO idle bump). Value 0/Disabled means PTO Control functionality is disabled. Value 1/Enabled means PTO Control functionality is enabled.
Q30-1024-063	Remote PTO Present	0	1	Parameter is used to determine if the remote PTO switches are installed (PACCAR engines only). Value 0/Disabled means Remote PTO switches are not installed. Value 1/Enabled means Remote PTO switches are wired to CECU and functionality is enabled.
Q30-1024-075	Engine Fan With Park Brake Installed	0	1	Parameter is used to determine if an engine fan override is available to the operator. This override will allow the operator to turn the engine fan on when the park brakes are set and the engine ECU permits the fan to turn on. Value 0/ Disable means that this function is not enabled and the operator cannot control when the engine fan turns on. Value 1/Enabled means that the operator may turn the engine fan on when the park brakes are on and the engine ECU permits the fan to be on.
Q30-1024-132	Engine Fan on with AC and Park Brake	0	1	Parameter is used to determine if an engine fan override is available to the operator. This override will allow the operator to turn the engine fan on when the park brakes are set, A/C is ON and the engine ECU permits the fan to turn on. Value 0/ Disable means that this function is not enabled and the operator cannot control when the engine fan turns on. Value 1/Enabled means that the operator may turn the engine fan on when the park brakes are on, A/C is ON and the engine ECU permits the fan to be on.
Q30-1024-156	PTO Total Fuel Fault Enabled	0	1	Parameter is used to determine if the PTO total fuel fault message is enabled. Value 0/Disabled means the PTO total fuel fault message is disabled. Value 1/Enabled means the PTO total fuel fault message is enabled.
Q30-1024-160	Electric Over Air Function 1			Parameter is used to set the function that is installed to this EOA switch-output pair
Q30-1024-161	Electric Over Air Function 2			Parameter is used to set the function that is installed to this EOA switch-output pair
Q30-1024-162	Electric Over Air Function 3			Parameter is used to set the function that is installed to this EOA switch-output pair
Q30-1024-163	Electric Over Air Function 4			Parameter is used to set the function that is installed to this EOA switch-output pair
Q30-1024-164	Electric Over Air Function 5			Parameter is used to set the function that is installed to this EOA switch-output pair

Q30-1024-165	Electric Over Air Function 6			Parameter is used to set the function that is installed to this EOA switch-output pair
Q30-1024-166	Electric Over Air Function 7			Parameter is used to set the function that is installed to this EOA switch-output pair
Q30-1024-167	Electric Over Air Function 8			Parameter is used to set the function that is installed to this EOA switch-output pair
Q30-1024-168	Electric Over Air Function 1 Speed Cutoff			Parameter is used to set the interlock speed cutoff for the corresponding EOA switch-output pair
Q30-1024-169	Electric Over Air Function 2 Speed Cutoff			Parameter is used to set the interlock speed cutoff for the corresponding EOA switch-output pair
Q30-1024-170	Electric Over Air Function 3 Speed Cutoff			Parameter is used to set the interlock speed cutoff for the corresponding EOA switch-output pair
Q30-1024-171	Electric Over Air Function 4 Speed Cutoff			Parameter is used to set the interlock speed cutoff for the corresponding EOA switch-output pair
Q30-1024-172	Electric Over Air Function 5 Speed Cutoff			Parameter is used to set the interlock speed cutoff for the corresponding EOA switch-output pair
Q30-1024-173	Electric Over Air Function 6 Speed Cutoff			Parameter is used to set the interlock speed cutoff for the corresponding EOA switch-output pair
Q30-1024-174	Electric Over Air Function 7 Speed Cutoff			Parameter is used to set the interlock speed cutoff for the corresponding EOA switch-output pair
Q30-1024-175	Electric Over Air Function 8 Speed Cutoff			Parameter is used to set the interlock speed cutoff for the corresponding EOA switch-output pair

Interlock Programming Details

* = Latching Type Solenoid, requires two MUX3P outputs to control on/off.
[1] = Dual Single Type Solenoid, function is called twice to achieve two inputs and two outputs.
[2] = Dual Single Type Solenoid, function must called as a pair with the Main and Opposite direction to achieve two input and two outputs.
[3] = Momentary switch input.

TABLE 7-8. Interlocks

#	Function	Interlock	Default	Range	Options for Interlock
1 *	Air Suspension Dump w/ Park Brake Interlock	Under Speed Threshold & Park Brakes Set	7	0-10	Optional Add
2 *	Air Suspension Dump	Under Speed Threshold & Park Brakes Set	7	0-10	Standard
3 *	Trailer Suspension Dump	Under Speed Threshold & Park Brakes Set	7	0-10	Standard
4 *	Trailer Suspension Dump w/ Park Brake Interlock	Under Speed Threshold & Park Brakes Set	7	0-10	Optional Add
5	Trailer Lift Axle (single)	None			Standard
6	Trailer Lift Axle (Forward	None			Standard
7	Trailer Lift Axle (Rear)	None			Standard
8	Air Suspension Over-Inflation	Under Speed Threshold	25	0-40	Standard Non-Configurable
9	Two-Speed Rear Axle w/ Park Brake Interlock	Inter-Axle Diff. Lock Switch Off & Park Brakes Set			Optional Add
10	Two-Speed Rear Axle	Inter-Axle Diff. Lock Switch Off			Standard

#	Function	Interlock	Default	Range	Options for Interlock
11	Fifth Wheel Slide	Under Speed Threshold	7	0-10	Standard
12	Front-Axle Declutch	Under Speed Threshold	25	0-70	Standard
13	Inter-Axle Differential Lock	Under Speed Threshold	25	0-70	Standard Non-Configurable
14 [3]	Kingpin Release (Momentary)	Park Brakes Set			Standard
15	Rear Axle Declutch (aka. Transfer Case Engage)	Under Speed Threshold & Transmission In Neutral	7	0-10	Standard Non-Configurable
16	Transfer Case Hi/Low	Under Speed Threshold & Transmission In Neutral	7	0-10	Standard Non-Configurable
17 [1]	Aux Trans 3-Position Control (AT1202) w/ Park Brake Interlock	Park Brakes Set			Optional Add
18	~~Front Axle Declutch~~ *(not currently used)*	Under Speed Threshold	25	0-70	Standard
19 [1]	PTO 2-Position (Fwd/Rev) w/ Park Brake Interlock	Park Brakes Set			Optional Add
20	PTO #1 w/ Park Brake Interlock	Park Brakes Set			Optional Add
21	PTO #2 w/ Park Brake Interlock	Park Brakes Set			Optional Add
22	Trailer Dump Gate (single) w/ Speed Interlock (EoA version - KW ONLY)	Under Speed Threshold	25	0-40	Optional Add
23	Trailer Belly Dump (Center) w/ Speed Interlock *(not currently used)*	Under Speed Threshold	25	0-40	Optional Add
24	Trailer Belly Dump (Forward) w/ Speed Interlock (EoA version - KW ONLY)	Under Speed Threshold	25	0-40	Optional Add
25	Trailer Belly Dump (Rear) w/ Speed Interlock (EoA version - KW ONLY)	Under Speed Threshold	25	0-40	Optional Add
26	Truck Dump Gate w/ Speed Interlock (EoA version - KW only)	Under Speed Threshold	25	0-40	Optional Add
27	Wheel Diff. Lock Axle (Single Rear) w/ Speed Interlock	Under Speed Threshold	25	0-40	Optional Non-Configurable
28	Wheel Diff. Lock Axle (Forward Rear) w/ Speed Interlock	Under Speed Threshold	25	0-40	Optional Non-Configurable
29	Wheel Diff. Lock Axle (Center Rear) w/ Speed Interlock	Under Speed Threshold	25	0-40	Optional Non-Configurable

#	Function	Interlock	Default	Range	Options for Interlock
30	Wheel Diff. Lock Axle (Rear Rear) w/ Speed Interlock	Under Speed Threshold	25	0-40	Optional Non-Configurable
31	Wheel Diff. Lock Axle (Dual Rear) w/ Speed Interlock	Under Speed Threshold	25	0-40	Optional Non-Configurable
32	Wheel Diff. Lock Axle (Front Drive) w/ Speed Interlock	Under Speed Threshold	25	0-40	Optional Non-Configurable
33	Air Accessory (Non-Latching) w/ Park Brake Interlock	Park Brakes Set			Optional Add
34	Air Accessory (Non-Latching)	None			Standard
35 [1]	Aux Trans 3-Position Control (AT1202)	None			Standard
36 [1]	PTO 2-Position (Fwd/Rev)	None			Standard
37	PTO #1	None			Standard
38	PTO #2	None			Standard
39	Trailer Dump Gate (single)	None			Standard
40	Trailer Belly Dump (Center) *(not currently used)*	None			Standard
41	Trailer Belly Dump (Forward)	None			Standard
42	Trailer Belly Dump (Rear)	None			Standard
43	Trailer Tow / Pintle Hook	None			Standard
44	Truck Dump Gate	None			Standard
45	Wheel Diff. Lock Axle (Single Rear)	None			Standard
46	Wheel Diff. Lock Axle (Forward Rear)	None			Standard
47	Wheel Diff. Lock Axle (Center Rear)	None			Standard
48	Wheel Diff. Lock Axle (Rear Rear)	None			Standard
49	Wheel Diff. Lock Axle (Dual Rear)	None			Standard
50	Wheel Diff. Lock Axle (Front Drive)	None			Standard
51	Winch Clutch	None			Standard
52 *	All Brakes/ Work Brakes w/ Speed Interlock (a.k.a Winching Brake)	Under Speed Threshold	7	0-10	Standard
53 *	All Brakes/ Work Brakes (a.k.a Winching Brake)	None			Standard
54 *	Double Acting PTO *(not currently used)*	None			Standard
55 *	Double Acting PTO	Park Brake			Optional Add

#	Function	Interlock	Default	Range	Options for Interlock
	(not currently used)				
56 [2]	Reversible PTO – Main Direction Switch Input *(not currently used)*	None			Standard
57 [2]	Reversible PTO – Opposite Direction Switch Input *(not currently used)*	None			Standard
58 [2]	Reversible PTO – Main Direction Switch Input *(not currently used)*	Park Brake			Optional Add
59 [2]	Reversible PTO – Opposite Direction Switch Input *(not currently used)*	Park Brake			Optional Add
60	Interlock Only – Park Brake	Park Brake			Standard
61	Interlock Only - Speed	Under Speed Threshold	25	0-70	Standard

Transmission Back Up Signals

The back-up signal can be accessed from pin A of the 5-way tail light connector located at the end of frame.

The tail light connector is a 5-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.

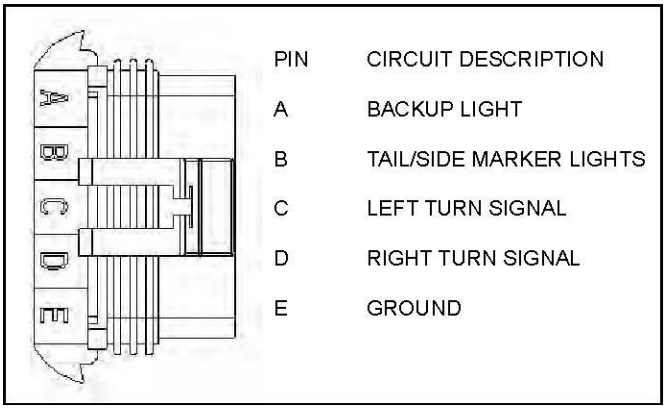
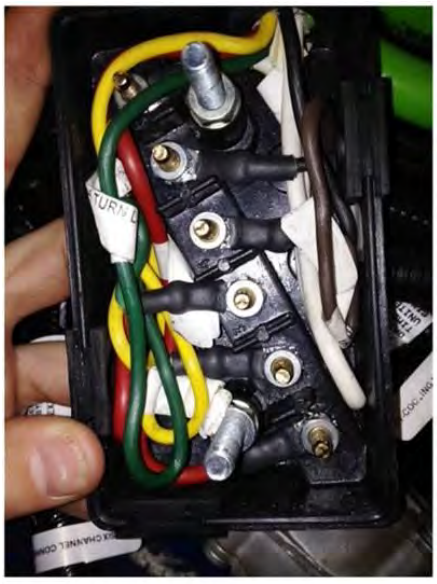


FIGURE 7-22. Mating Connector: Packard PN 12186400

Junction Box

The junction box easy access to various signals as outlined in Figure 6-6.



Wire Color	Description
Red	Stop Lights
Yellow	LH Turn Lamp
Green	RH Turn Lamp
Brown	Tail Lamp
Black	Marker Lamp
White	Ground
Blue	Switched Power

NOTE: Separate Junction Box Will Contain 4 Fused Spare Power Splices.

FIGURE 7-23. Junction Box BOC or EOF

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

J1939

Warning! The J1939 databus is the communication link between the engine and the Anti-Lock Braking System (ABS). Only J1939 compatible devices should be added to the databus. Some J1939 compatible aftermarket devices may disrupt the ability of the databus to communicate. If the databus is disrupted by an aftermarket device, it must be removed from the databus.

Guidelines - J1939 Circuit Requirements

- Circuits added must be a twisted pair consisting of a minimum of 1 twist per inch.
- Individual breakout length of circuits added cannot exceed 118 inches.
- Do not splice into existing J1939 circuits. Use the connection points provided.
- J1939 circuits are for data transmission only and are not to be used for power or ground circuits.
- Any modifications must conform to SAE J1939.

J1939 Access

All Peterbilt vehicles include J1939 circuitry. The J1939 circuit can be accessed in two locations. The first access is located inside the dash near the diagnostic connector. The second access is at the driver side toward the rear of the engine.

1. Dash Access - Connector located in dash behind key switch panel approximately 1 foot down the harness

FIGURE 7-24. Dash Access

2. Engine Access - Connector located on OEM engine harness on driver's side of engine toward the rear of engine

FIGURE 7-25. Engine Access

J1939 Access Procedures

1. Identify J1939 Access Connector (note long blue shell)
2. Disconnect connection (note terminating resistor from inside blue connector)

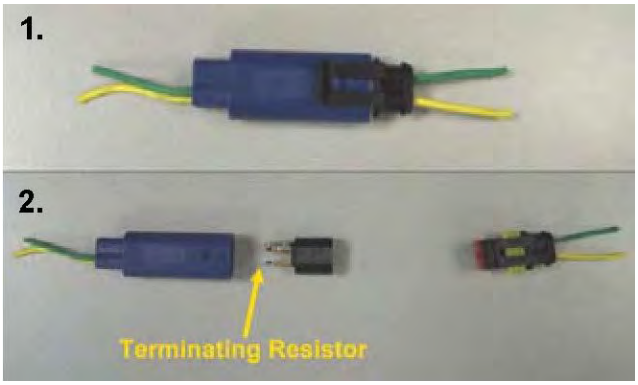


FIGURE 7-26. J1939 Access

3. Make connection in between original connection (tin).
4. Ensure terminating resistor is inserted in blue connector shell (arrow).

FIGURE 7-27. J1939 Access

How Do I...

This section is created to provide specific instructions to completing the installation. Please refer to the section for dash board to access dash panels for switches and gauges.

Install a Multiplexed Instrument

Generally, installing gauges and switches into the dash board will require installing pins in a connector of the CECU if a connector is not present. The CECU will then need to be re-programmed to accept the new instruments.

Install and Air Operated External Device

After installing the instruments in the cab, and before re-programming the CECU, the electric over air solenoid will need to be installed onto the solenoid bank. These instructions do not apply to vehicles that have all spaces on the solenoid bank already in use by some device.

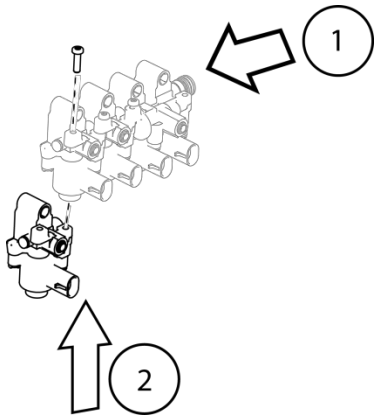


FIGURE 7-28. J1939 Access

Once the solenoid is installed, wiring must be installed between the chassis node and the solenoid. Then the ground wire should be installed between the solenoid and the ground splice. Air supply to the solenoid bank is already in place, but air lines from the output of the solenoid to the air operated device will need to be installed.

Re-program the CECU

The CECU may be programmed by using the software Electronic Service Application (ESA). The engine will need to be programmed using the engine specific software.

Install New Telltale Icons into the Instrument Cluster

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. Refer to the Dash removal chapter to identify the location of the telltale icon tray.

Access the Solenoid Bank and Chassis Node

Accessing these two items will require opening the hood and removing the fairings. After the fairings are removed, the battery box/batteries will need to be removed from the frame rail. This process will provide open access to the chassis node, solenoid bank and all electrical connectors.

The solenoid bank and chassis node may be removed without removing the battery box, however this will not provide access to the splice block needed for ground connection.

Get the Suspension Air Bags to Deflate When the PTO is on

Dump body applications will be able to utilize a function such that when the PTO is active (and the dump body is being lifted), the body is sitting on the suspension bump stops. This provides a more stable platform than the airbag.

EE_PAR_EOA_bool_SuspensionDumpWithPTOActivation enables this functionality. If any switch is configured to be a PTO switch and any switch is configured to be Suspension Dump, the Suspension Dump switch shall be considered as active. All existing Suspension Dump interlocks must still pass for the suspension to be dumped.

Dash

The following section identifies ways to access the dash to install or modify the vehicle for aftermarket devices.

Gauge and Switch Installation

The first step to accessing the dash instruments is to remove the trim. The panel immediately to the right is the first panel to come off. These panels are held in by snap fasteners. Be sure that the metal retaining clips are not lost otherwise the panel will not install snug.

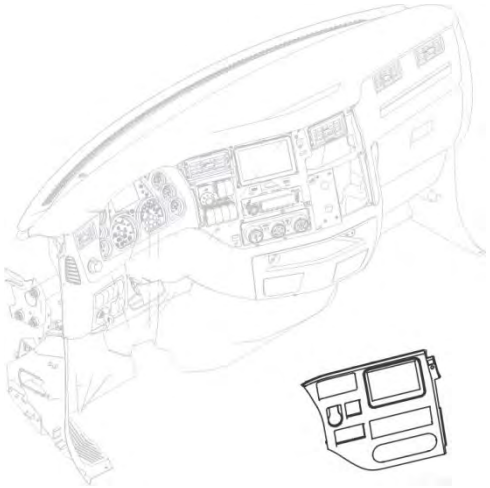


FIGURE 7-29. Trim Panel Removal

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.

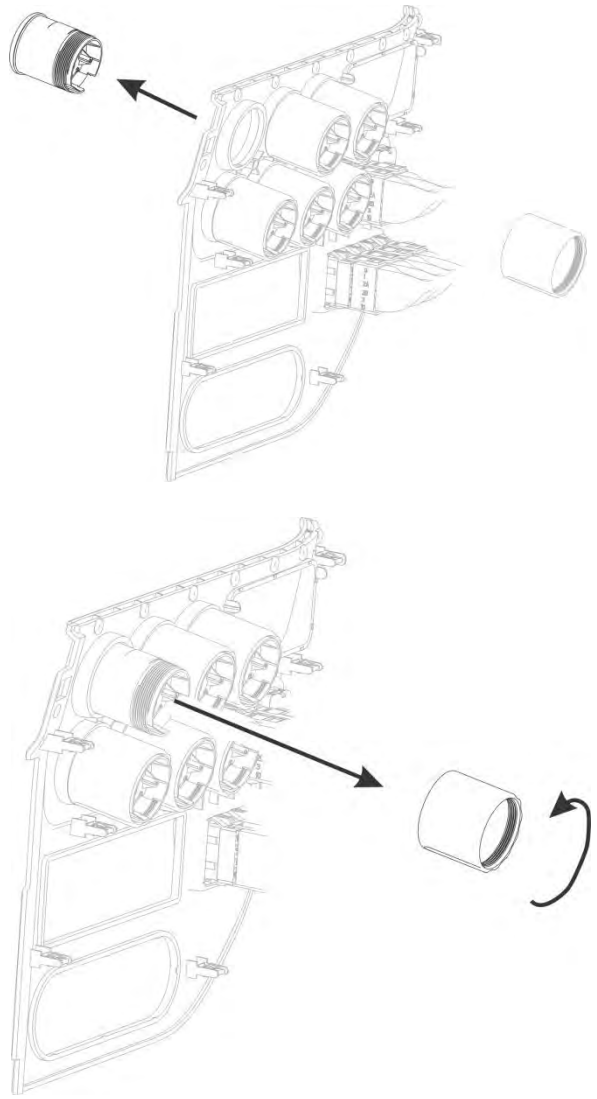


FIGURE 7-30. Gauge Installation

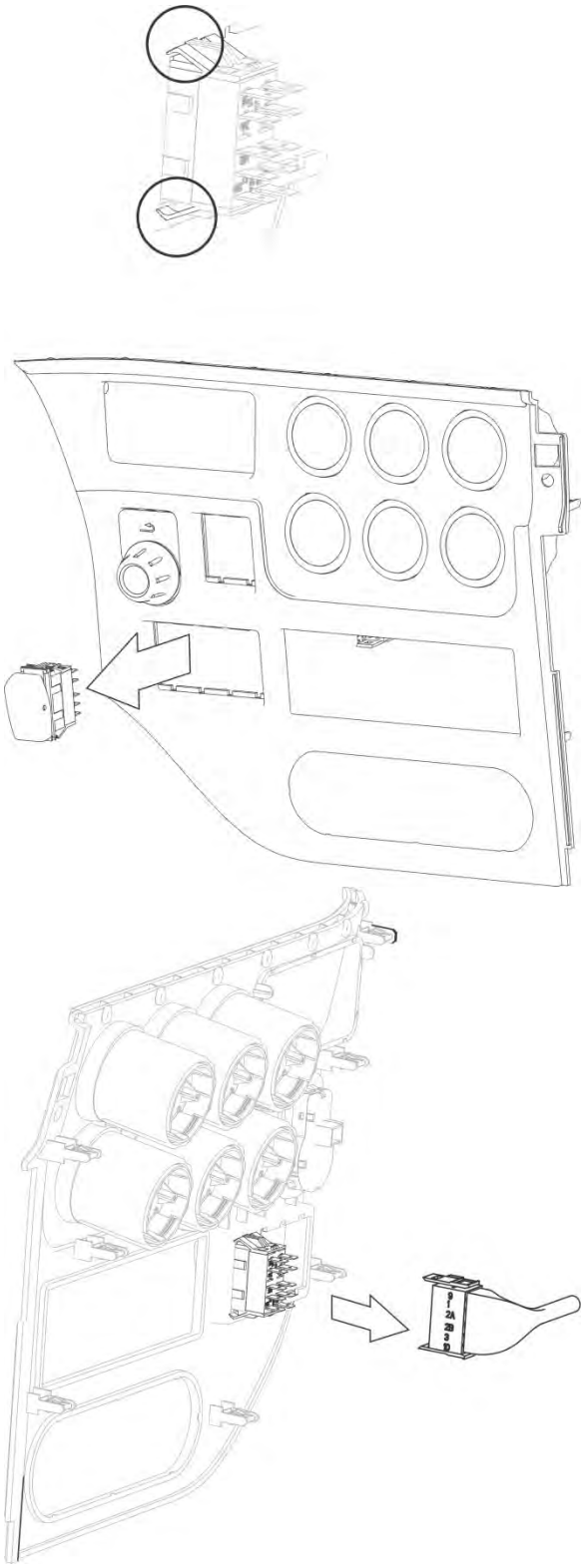


FIGURE 7-31. Switch Installation

Telltale Icons Installation

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.

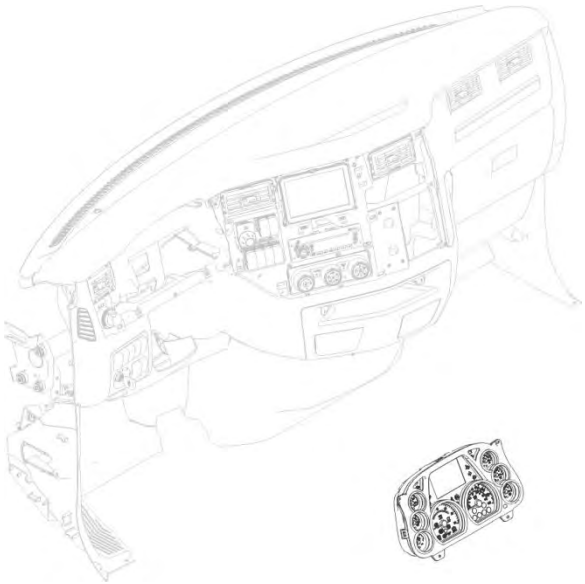


FIGURE 7-32. Cluster Removal

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.

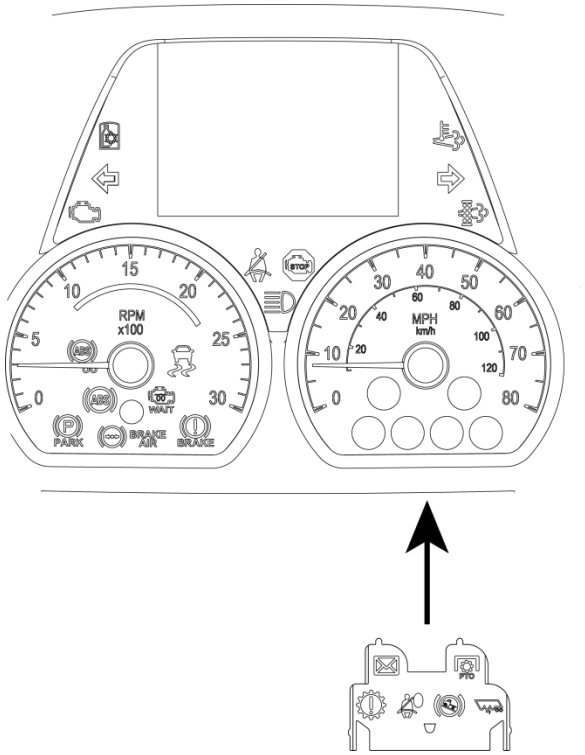


FIGURE 7-33. Telltale Installation

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 on a Peterbilt that are described below.

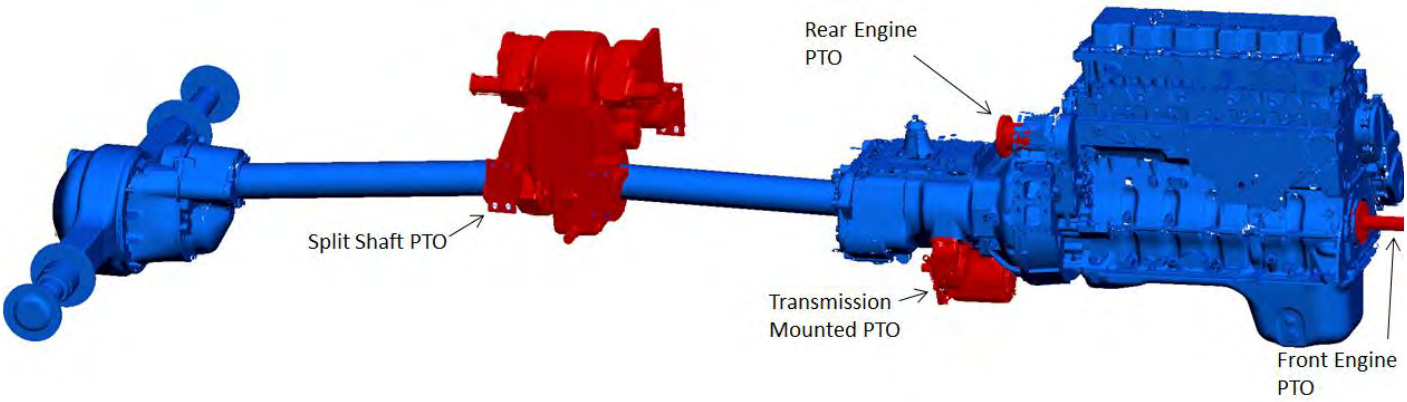


FIGURE 8-1. Power Take-Off Locations

TRANSMISSION MOUNTED PTO – GENERAL

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 (Figure 8.2). On heavy duty manual transmissions there is a 6 bolt PTO on the right and an 8 bolt PTO on the bottom left (Figure 8.3). 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 (Figure 8.4). 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.

FIGURE 8-2. MD Manual Transmission

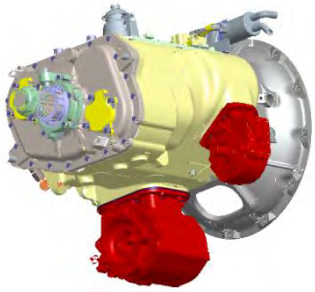


FIGURE 8-3. HD Manual Transmission

FIGURE 8-4. Thru Shaft PTO

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. See Figure 8.5. The 4000HS transmissions do not have any PTO locations. The 3000 series Allison transmissions have PTO locations at 4 and 8 o'clock (Figure 8.6). 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.

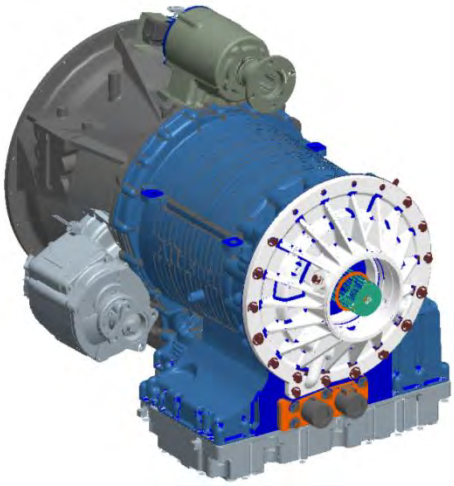


FIGURE 8-5. Allison 4000 Series

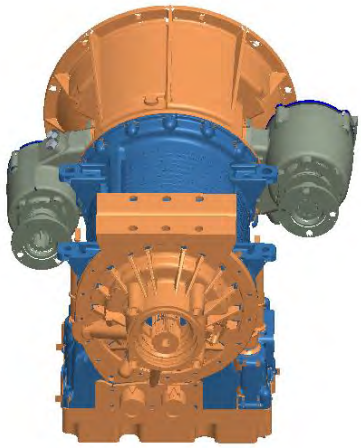


FIGURE 8-6. Allison 3000 Series

TRANSMISSION MOUNTED PTO – 579 FAMILY

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 579/567 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.

PTO CONTROLS

The 579/567 models have been designed to use electric in-dash switches to control air solenoids which engage/disengage transmission PTOs. This system allows for increased control and interlock opportunities. This also keeps air lines for transmission PTO controls from routing inside the cab. In cab air valve actuators for transmission PTO control are still available and are located on the cab floor on the LH side of the driver's seat. Air valve style transmission PTO actuators should not be installed on the dash due to the difficulty of air-line routing. Customer installed transmission PTO controls for use with customer installed transmission PTO's include a chassis and dash harness pre-wire to ease the installation of in-dash transmission PTO controls at the body builder. It is strongly recommended that the truck be coded for this if transmission PTO(s) could be installed after initial in-service date.

TRANSMISSION CLEARANCE CHARTS – 579 FAMILY

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

FIGURE 8-7. 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	x	n/a
		SH8-P1BX/KX	ok	n/a	ok	n/a	x	n/a
		TG8S-P1BX/KX	ok	n/a	ok	n/a	ok	n/a

FIGURE 8-8. 6 and 8-Bolt PTO's for Eaton Transmissions

Notes:

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

Dual PTO Compatibility for Eaton Transmissions

		Chelsea								Muncie							
		RH (6-Bolt) PTO's															
	Model	RT			FR			Ultrashift+		Model	RT		FR		Ultrashift+		
		230/236-V3	340X-A5	442/660-V3	230/236-V3	340X-A5	442/660-V3	340X-A5	442/660-V3		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	x	x
	238-V3	S	S	S	S	S	S	ok	ok	CS/SH8-A1	S	S	S	S	x	x
	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

FIGURE 8-9. Dual PTO Compatibility for Eaton Transmissions

HYDRAULIC CLUTCH ACTUATOR CONFIGURATIONS

(Only used with 579/567 with Eaton FR or RT transmissions)

FIGURE 8-10. Standard Configuration
Air assist connection faces driver's side
Used with all but Chelsea 880 and 885 PTOs

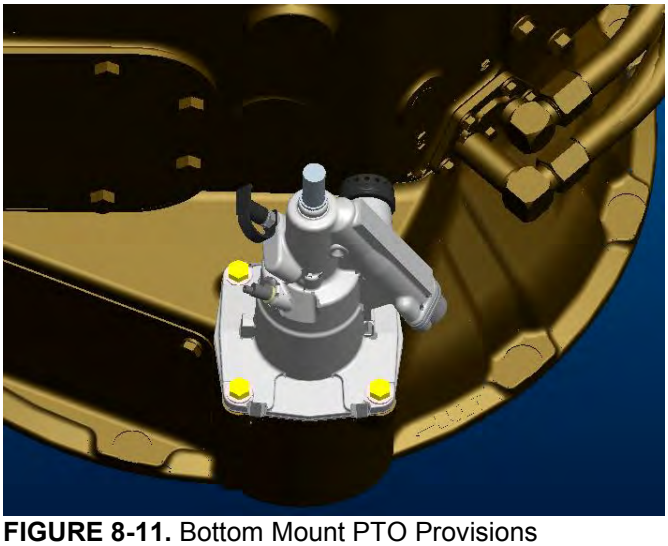


FIGURE 8-11. Bottom Mount PTO Provisions
Air assist connection faces passenger's side
Used with Chelsea 880 and 885 PTOs

FRONT ENGINE PTO

Front engine PTO (FEPTO) is commonly used in mixer, snow plow, and crane applications. When a FEPTO is spec'd on a truck, the cooling module moves up to allow for a shaft to be bolted to the front of the crankshaft and extend out to the front of the truck. The vehicle can be spec'd with a 1350 flange adapter to simplify installing the FEPTO shaft. The frame rails will be extended out to mount a hydraulic pump, snow plow or outriggers. There are options for either a 27.8" or a 22.4" frame extension. See Figures 8.12-8.14 for frame extension dimensions.

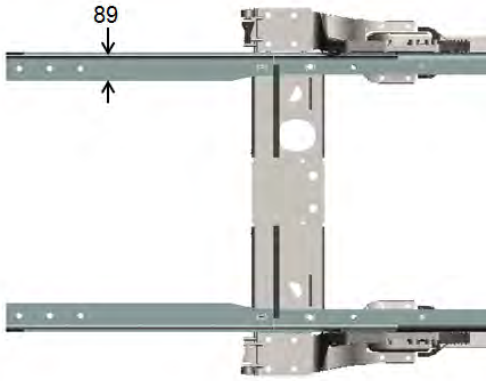


FIGURE 8-12. Frame Extension Top View

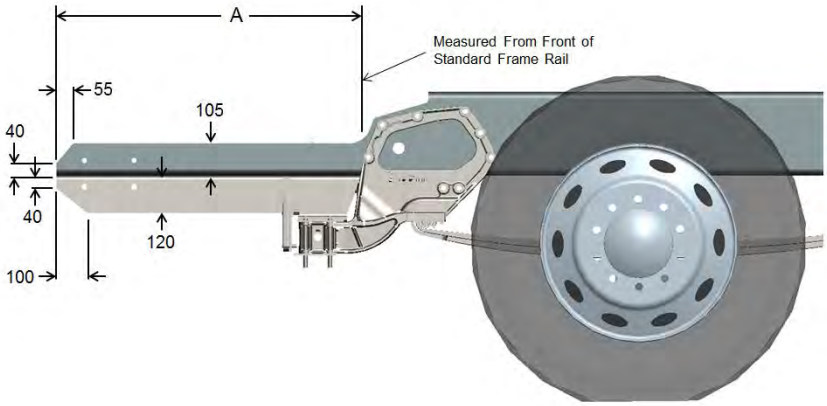


FIGURE 8-13. Frame Extension Left Hand View

FIGURE 8-14. Frame Extension

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. See Figure 8.15 for an example. 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 REPTO turns at a rate of 1.2:1.

FIGURE 8-15. REPTO Flywheel Housing

PTO INSTALLATIONS – 389 FAMILY

Standard PTO operation is also called cab PTO. With this feature, the operator can set the engine to pre-programmed set speed(s) and ramp the engine speed up and down with the set/resume switch. To control the PTO there are various dash switches that we offer. Standard with every vehicle is the Cruise Control/PTO on off switch and the Set/Resume switch. There are also several additional PTO control switches that can be used. The PTO control switch will be plumbed with air lines that will be plugged at the firewall bulkhead. See Section 7 for PTO dash switch plumbing and firewall bulkhead locations. With the MX engine when the PTO dash switch is engaged a pressure switch on the air lines under the dash will send a signal to the engine to go into PTO mode. On Cummins engines, when the cruise control switch is activated and all parameters set in the ECM for PTO mode are met, the engine will go into PTO mode. In this mode, the engine will respond to all PTO mode parameters that have been programmed into the software. These parameters can be changed with INSITE on all Cummins engines and DAVIE on all MX engines. There is a PTO light on the dash that should be wired to the PTO to inform the operator when the PTO has engaged or disengaged. This should be wired to the PTO output, not just a dash switch or PTO enable circuit. The wire can be found in the right hand rail in the area of the transmission. The wire is labeled WHT1513 PTO Circuit.

On Allison transmissions, the PTO's will require an electric signal. We do not currently offer an electric PTO switch for the 389 family, but there are several options available. The most common method of getting an electric signal for the PTO is to get a factory air switch and install a pressure switch on the air line. It is recommended to provide a 12 volt signal to the transmission control module (TCM) and have the TCM programmed to check for specific requirements such as engine speed, gear selection, output speed etc. before engaging the PTO. If the TCM logic is bypassed and the PTO is engaged directly it could cause damage to the PTO and the transmission. Contact your local Allison rep for more information.

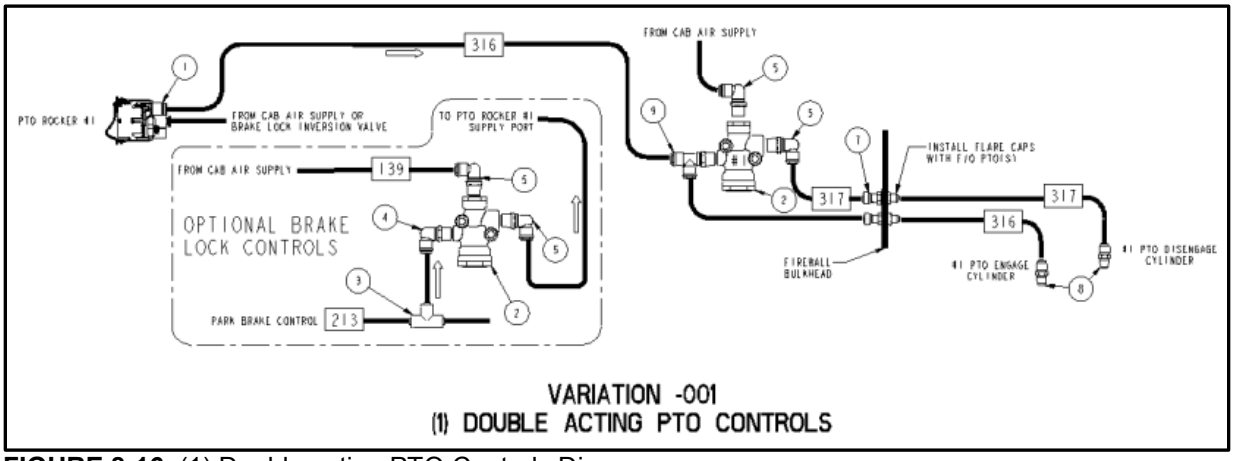


FIGURE 8-16. (1) Double acting PTO Controls Diagram

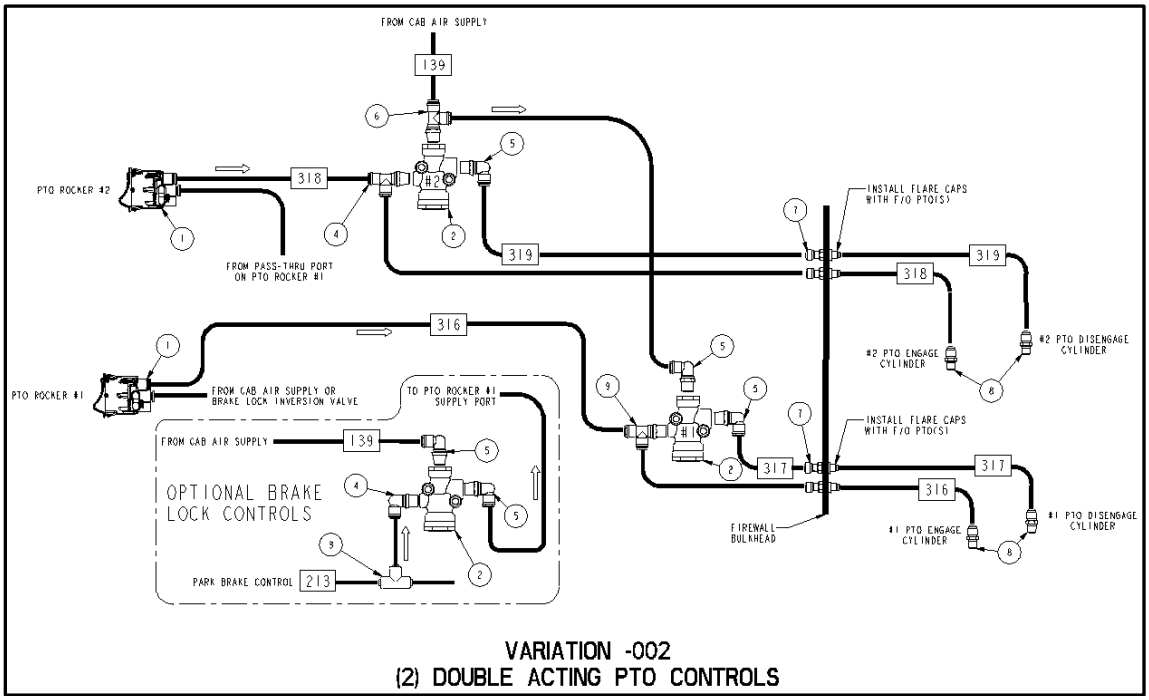


FIGURE 8-17. (2) Double acting PTO Controls Diagram

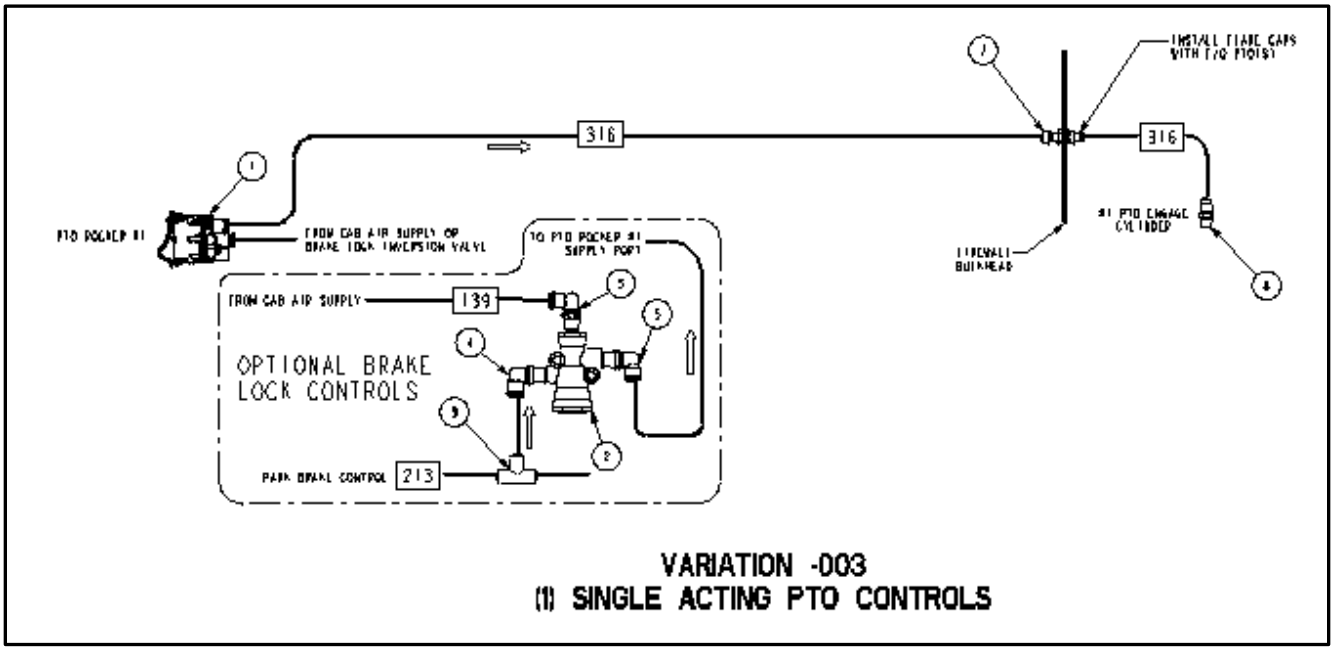


FIGURE 8-18. (1) Single acting PTO Controls Diagram

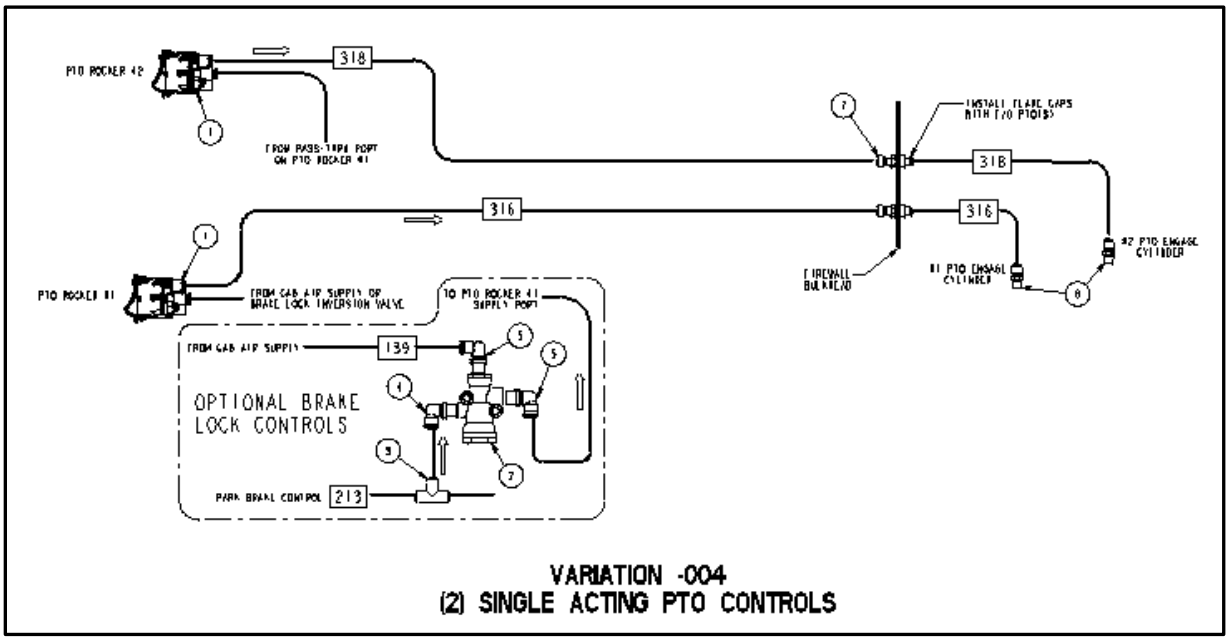


FIGURE 8-19. (2) Single acting PTO Controls Diagram

PTO INTEGRATION – 579 FAMILY

PTO CONTROLS

The 579/567 models use Electric Over Air (EOA) or Electric Over Hydraulic (EOH) controls to supply the signal to activate the PTO. The EOA controls are recommended for manual or automated transmissions. The EOH controls are recommended for automatic transmissions.

The EOA controls feature a valve that is located under the left hand side of the cab as shown in Detail "B" of Figure 8-20. The valve converts an electrical signal from the PTO dash switch into an air supply. This air supply is then plumbed to the PTO activation port for manual transmissions, or a pressure switch for automatic transmissions (automatic transmissions require an electrical signal for PTO engagement).

The EOH controls will send an electrical signal from the PTO dash switch to the transmission harness that will activate the PTO function of the transmission.

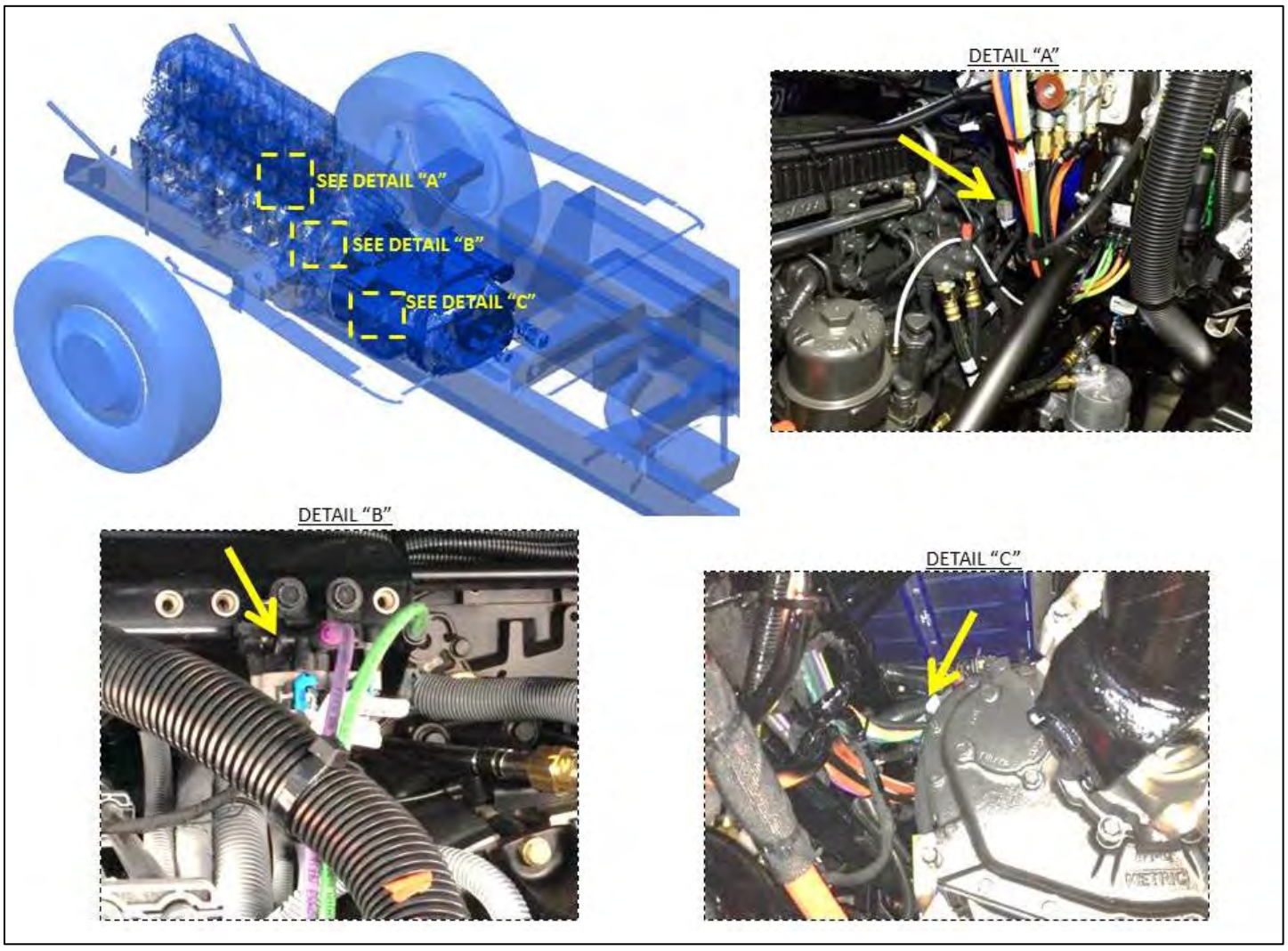


FIGURE 8-20.

The EOA controls are used to engage the PTO, but to get the engine to go in to PTO mode a signal must be sent from the PTO to the engine. When pin 2 (PTO engaged signal) of the chassis PTO connector is grounded, the engine will go to

PTO mode. This can be done by using the PTO activation switch on the PTO to close a circuit between pin 2 and pin 1 (chassis ground) of the chassis PTO connector. This will also activate the dash icon to notify the operator PTO mode is engaged. The chassis PTO connector is located inside the rail adjacent to the transmission as shown in Detail "C" of Figure 8-20.

PTO OPTIONS

Single acting PTOs have a single air control. A single chassis node output controls the air solenoid, and the air pressure engages the PTO, and the lack of air pressure at the control port disengages the PTO from the driveline.

Double acting PTOs have a dual air control. One air controls the engagement, and one air control controls the disengagement. This can be achieved one of two ways:

1) A Single Acting PTO is configured. The engage air control port is connected to the chassis node output and a pilot inversion valve in the chassis air plumbing is connected to the second disengage air control port
2) Two chassis node outputs control the PTO. One chassis node output and solenoid is connected to the engage air control port of the PTO, and one chassis node output and solenoid is connect to the disengage air control port.

Reversible PTOs have three different operational states:

1) Inactive, not engaged to driveline, no air control ports active
2) Main Direction, engaged to driveline, Main air control port pressurized
3) Opposite Direction, engaged to driveline, Opposite air control port pressurized

The CECU software is written as part of 3-position switch design strategy. This 3 position switch prevents the possibility that both inputs are active at the same time.

CECU INTERFACE WITH PTO CONTROLS

If the vehicle is specified with a PTO installation from the factory a protected PTO on/off switch will be present in the dash. If the truck has the option for EOA PTO controls, it will connect to the instrument panel harness with a switch connector labeled "EOA x" x being a number between 1 and 10. If numbered between 1 and 8, the switch will be connected to the Cab ECU.

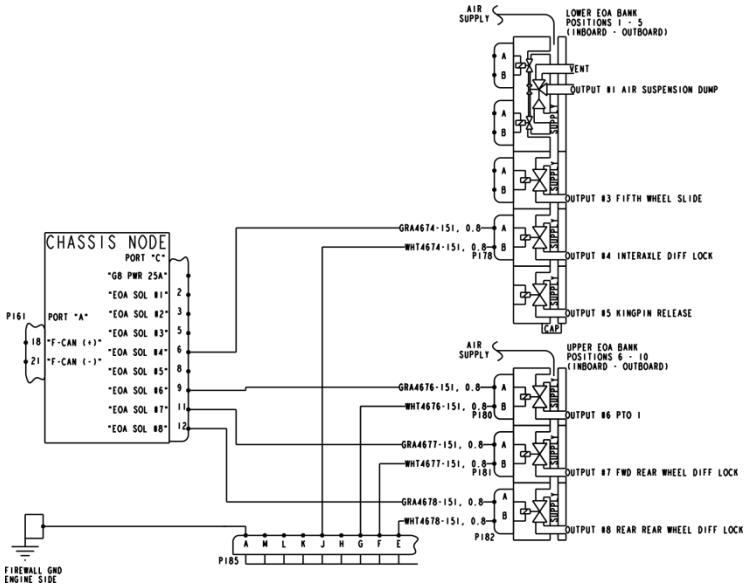


FIGURE 8-21. Chassis Node / EoA Diagram

If numbered 9 or 10 the switch will be wired directly to EOA valve 9 or 10.

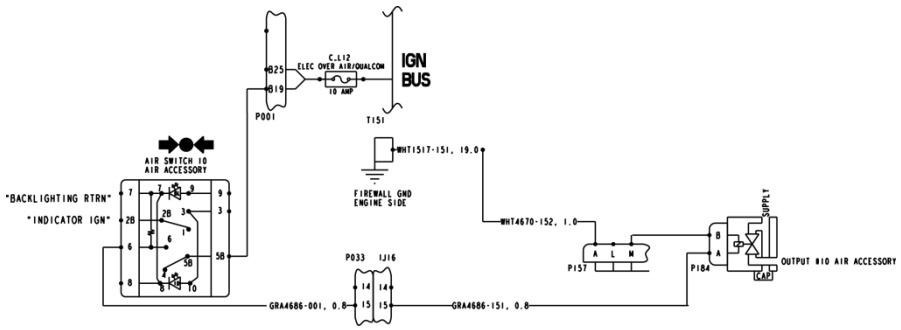


FIGURE 8-22. Interlock Example Diagram

If the Cab ECU detects the switch in the on position and if applicable, the park brake interlock is validated by the Cab ECU, the Cab ECU will send a mux signal to the chassis node via F-CAN. The EOA valve will be the same number as on the dash switch. Electronic Service Application (ESA) can be used to add or remove the PTO engage park brake interlock. Depending on the application and the PTO type, the switches and wiring may differ.

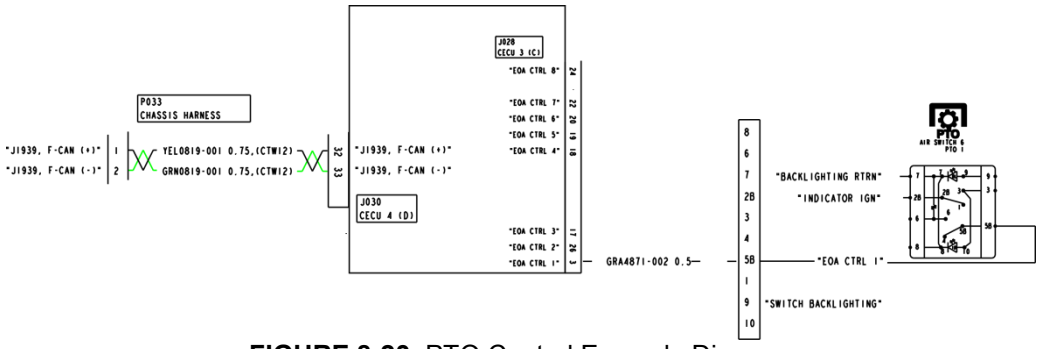


FIGURE 8-23. PTO Control Example Diagram

For single acting PTO, the chassis node will energize the coil on the EOA valve allowing air to engage the PTO.

For dual acting PTO, the PTO's pilot valve will provide the air function to switch the air between engage and dis-engage.

If the PTO is a forward/reverse PTO:

A protected PTO forward and a protected PTO reverse switch will be present in the dash. Each switch controls a separate EOA solenoid, each solenoid is dedicated to either forward or reverse.

If the Cab ECU detects both the forward and reverse switches in the on position the Cab ECU will ignore the switch input for the second switch thrown and provide a message in the cluster display informing the operator of the non-valid switch configuration.

PTO AND PUMP MODE WARNING

Instrument panel wiring:

Pump mode warning lamp is an editable telltale and requires a diode.

PTO engaged warning lamp Peterbilt is an editable telltale and requires a diode.

The diodes prevent relay coil back feed from driving the CECU input high which could activate the warning lamp (bi-stable input) giving false indications.

CK_K10 spare relay #3 is used to power the PTO hour meter whenever the PTO engaged warning lamp is on.

ENGINE WIRING

The ISX engine controller port (J2 pin 94) will report a PTO active when driven low (grounded). When a PTO is specified on a chassis the ISX engine harness will contain the optional remote throttle/PTO 12-way connector and cap (P111A/J111A).

The MX engine controller port (J2 pin 21) will report a PTO active when driven high (+12V DC). Since PTO and pump mode signals are low (grounded) when active, a relay is needed to convert the low (ground) signal to a high (+12V DC) signal. This relay is installed below the left hand side of the cab near the chassis node. When a PTO is specified on a chassis the MX engine harness will contain the optional remote throttle/PTO 12-way connector and cap (P111C/J111C).

The remote throttle/PTO 12-way connector is located on the back, left hand side of the engine as shown in Detail “A” of Figure 8-20. See Figure 8-24 for pin out information of the 12-way connector. There are also 16-way and 23-way connectors available for setting up dual station controls or other high content applications. See Figure 8-25 for the 16-way pin out information and Figure 8-26 for the 23-way pin out information. The CECU parameters for REMOTE PTO CONTROL and REMOTE THROTTLE CONTROL may need to be enabled.

There are two common methods of utilizing remote engine speed controls:

1) A 5V variable signal can be used to control the engine speed via a potentiometer. For this configuration the CECU parameter for REMOTE THROTTLE may need to be activated.
   -For the MX engine, pins 3, 4 and 10 can be connected to the potentiometer to convert the 5V signal to a remote throttle signal.
   -For Cummins engines, pins 4, 10 and 11 can be used the same way as described above for the MX engine.
2) The engine speed can be bumped up or down using momentary switches or preset speeds. For this configuration the CECU parameter for REMOTE PTO may need to be activated.
   -For the MX engine, momentarily connecting pin 8 to pin 2 will increase the engine speed. Momentarily connecting pin 8 to pin 1 will decrease the engine speed.
   -For Cummins engines, the engine will go to the first set speed when PTO mode is initially activated by applying ground from pin 3 to PTO ON/OFF pin 5. If this connection is broken and reapplied within 0.5 seconds, the engine will go to set speed 2. If this is done again, the engine will go to set speed 3 and so on. There are up to 5 preset speeds that can be modified using INSITE. If the connection is broken longer than 0.5 seconds and then reapplied, the engine will go back to set speed 1.

PIN	CUMMINS	MX
1	REMOTE PTO RESUME	REMOTE PTO RESUME
2	REMOTE PTO SET	REMOTE PTO SET
3	COMMON RETURN #1 (SWITCH)	NAMUX ANALOG RETURN
4	REMOTE THROTTLE SIGNAL	REMOTE THROTTLE SIGNAL
5	PTO ON/OFF	PTO ON/OFF
6	REMOTE PTO ENABLE	NOT USED
7	10A IGNITION POWER	10A IGNITION POWER
8	GROUND	GROUND
9	TORQUE LIMIT SWITCH	NOT USED
10	5V SUPPLY	NAMUX POWER (+5V)
11	COMMON RETURN #3 (SENSOR)	20A ENGINE POWER
12	REMOTE THROTTLE ON/OFF	NOT USED

FIGURE 8-24. 12 Pin Connector

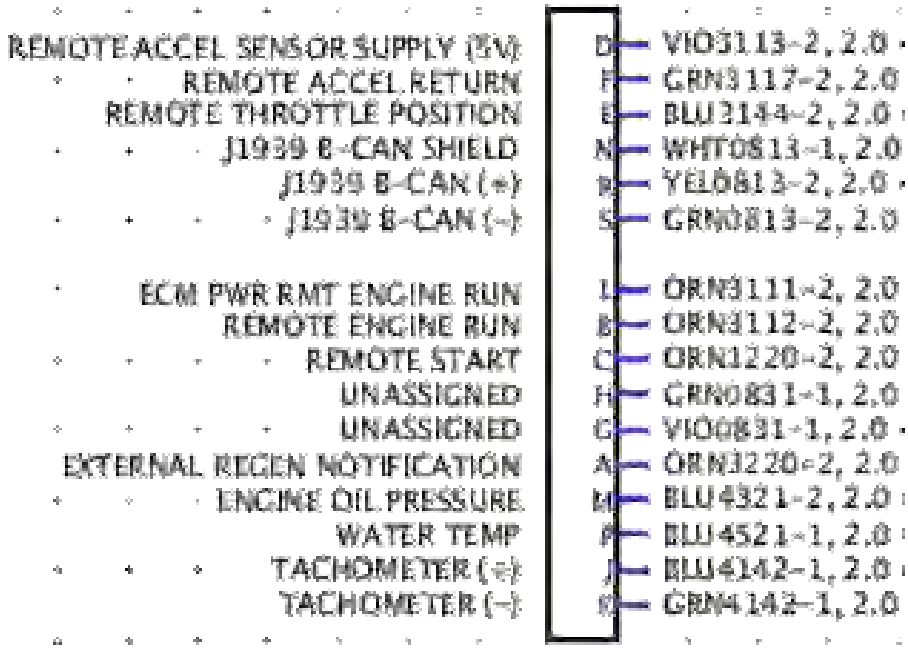


FIGURE 8-25. 16 Pin Connector (MX and Cummins)

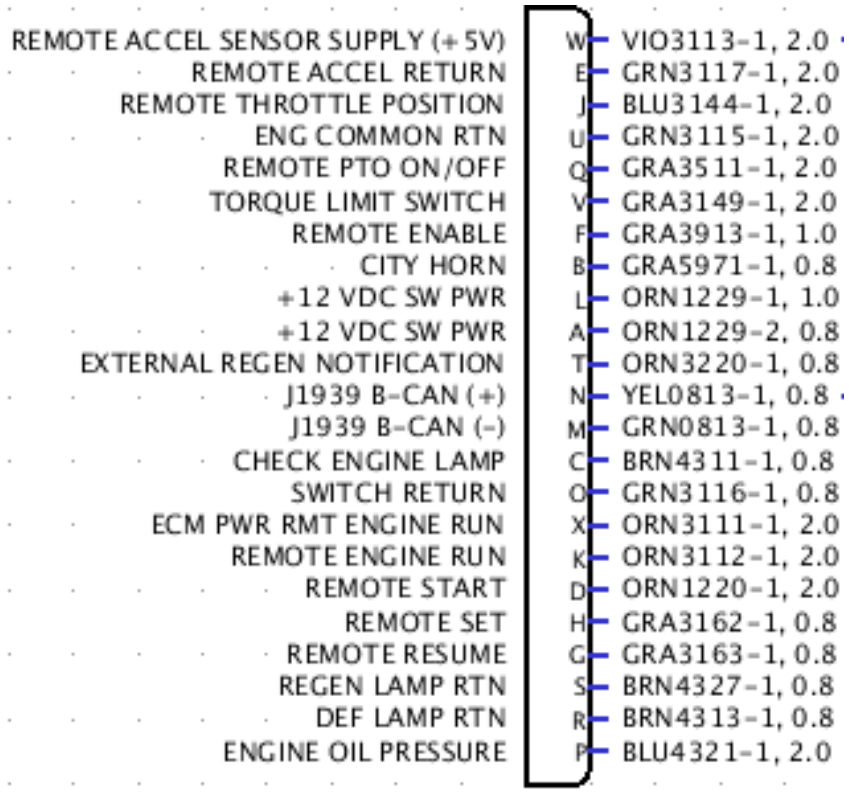


FIGURE 8-26. 23 Pin Connector (MX and Cummins)

CHASSIS HARNESS WIRING

W/ Eaton automated transmissions:

For Eaton Ultrashift Plus and Advantage automated transmissions, the transmission ECU requires an isolated PTO engaged signal. The Eaton PTO relay (P27-1151) is used to isolate the PTO engaged signal to the transmission ECU. The Eaton PTO relay coil receives 12V IGN power from fuse E_E9 body IGN from pin 7 of the engine harness PTO/remote throttle connector (P111). PTO engage circuit has a path to ground. This ground path allows current to flow through the Eaton PTO relay coil. When the relay is active pins 34 and 18 on the transmission controller are shorted providing the PTO engaged signal to the transmission ECU.

W/ MX engines:

The MX PTO relay is required to convert the low PTO engaged signal to a high signal for the MX ECU. The MX PTO relay (P27-1151) is used to convert this signal. The MX PTO relay coil receives 12V IGN power from fuse E_E9 body IGN from pin 7 of the MX engine harness PTO/remote throttle connector (P111). When a PTO engages the PTO engage circuit has a path to ground. This ground path allows current to flow through the MX PTO relay coil. When the MX PTO relay is active the MX ECU receives a high input signaling that the PTO is engaged.

W/ Namco split shaft PTO/transfer case units:

Note: since the Namco option uses relays in the same position as the snow plow option these options cannot be called out together. For chassis with a Namco split shaft PTO/transfer case several configurations are available which require up to three relays to convert the engaged signal to drive the PTO, pump mode and front axle declutch warning lamps. The three possible clutch configurations: rear axle & front axle, rear axle & PTO, rear axle, PTO and front axle.

PTO:

When the PTO is not engaged the Namco sensor sends a high signal on pin 2 (J195) energizing the Namco PTO relay coil (P27-1150). When the Namco PTO relay is energized no signal leaves the relay. When the PTO is engaged the sensor output goes low. The Namco PTO relay coil de-energizes and the PTO warning lamp is grounded.

Pump mode: (rear axle declutch)

When the Namco axle clutch is in road mode the Namco sensor sends a high signal on pin 4 (J195) energizing the Namco pump relay coil (P27-1150). While the Namco pump relay is energized no signal leaves the relay. When the rear axle is declutched for pump mode the sensor output goes low. The Namco pump relay coil de-energizes and the pump mode circuit is grounded.

Front axle clutch:

When the Namco front axle clutch is not engaged the Namco sensor sends a high signal on pin 5 (J195) energizing the Namco front axle clutch relay coil (P27-1150). While the Namco pump relay is energized no signal leaves the relay. When the front axle is clutched for front axle power the sensor output goes low. The Namco pump relay coil de-energizes and the front axle clutch circuit is grounded.
Chassis with a Namco split shaft PTO will also be provided with a 6-way connector to connect to the Namco sensor jumper harness (J195).

Three circuits are passed to the IP harness, PTO, pump mode sense, front axle clutch via the chassis to IP connection (J161/P033).

Two 12-way connectors are provided to connect to the MX or ISX engine harness remote throttle/PTO connector (P197/J197).

The Eaton PTO relay, MX PTO relay, Namco PTO relay, Namco pump relay and Namco front axle clutch relay are located in a 40-way sealed relay box mounted behind the chassis node.

Fabco split shaft PTO/transfer case jumper harness:

There are 4 different split shaft PTO/transfer case jumper harnesses. They account for, rear & front axle, rear & one PTO, rear & two PTO's, rear & front & one PTO configurations.

PTO sensor to chassis harness connector (P198/J198):
The chassis harness provides for a 4-way connector to connect to a PTO sensor harness. It will always be capped for shipment to the plant (P198/J198).
Pin 1 - wht4395, provides vehicle ground for 2-pin PTO engagement switches
Pin 2 - gra4395, PTO engaged signal. When low activates the PTO engaged warning lamp.
Pin 3 - gra4355, pump mode engaged signal - When low activates the pump mode warning lamp.
Pin 4 - gra3521, rear axle clutch engaged signal - When low activates the front axle clutch warning lamp.

For electric engaged PTO's:

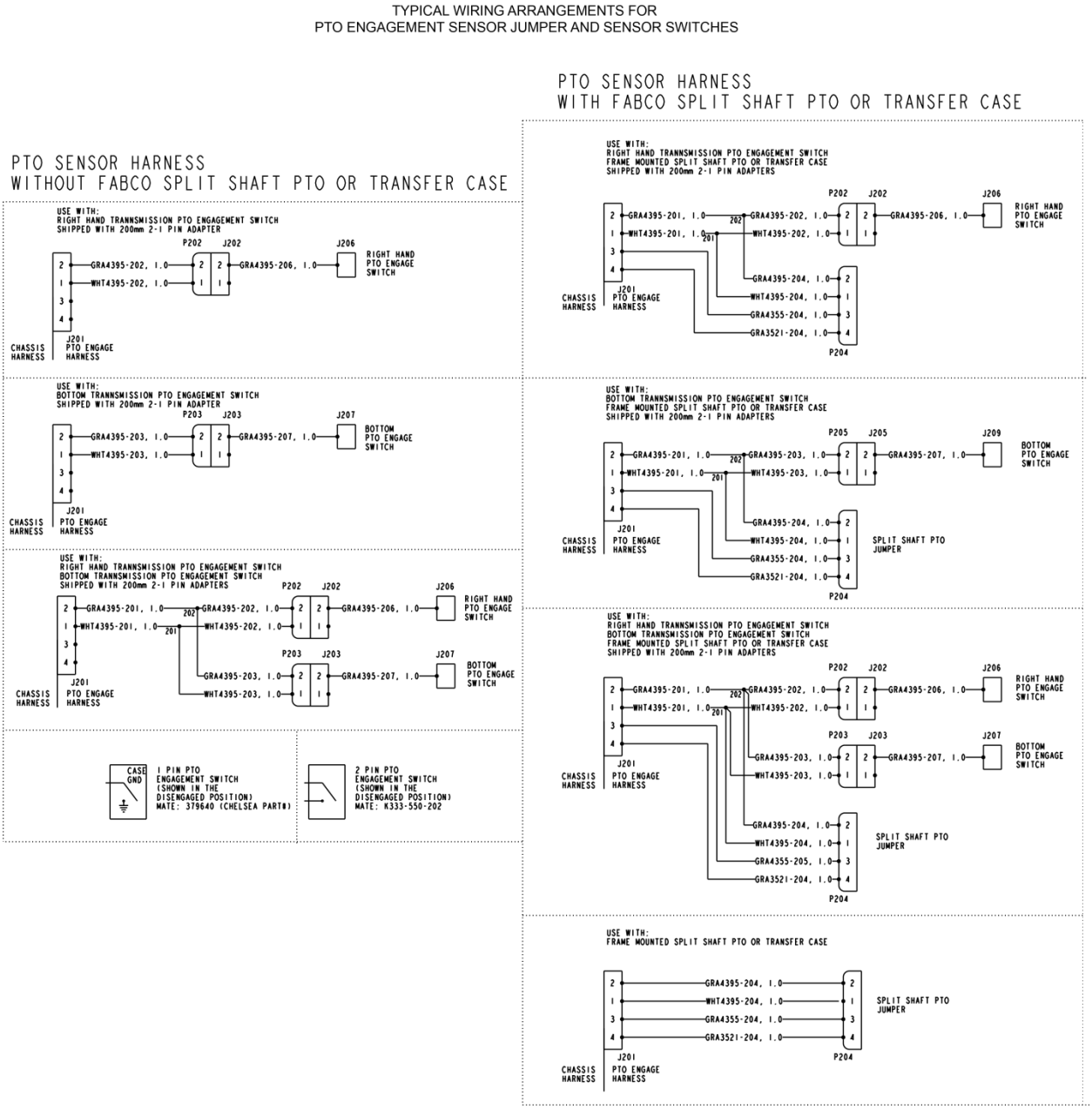


FIGURE 8-27. Electric Engaged PTO Diagrams

TYPICAL WIRING ARRANGEMENTS FOR
PTO ENGAGEMENT SENSOR JUMPER
AND SENSOR SWITCHES (con't.)

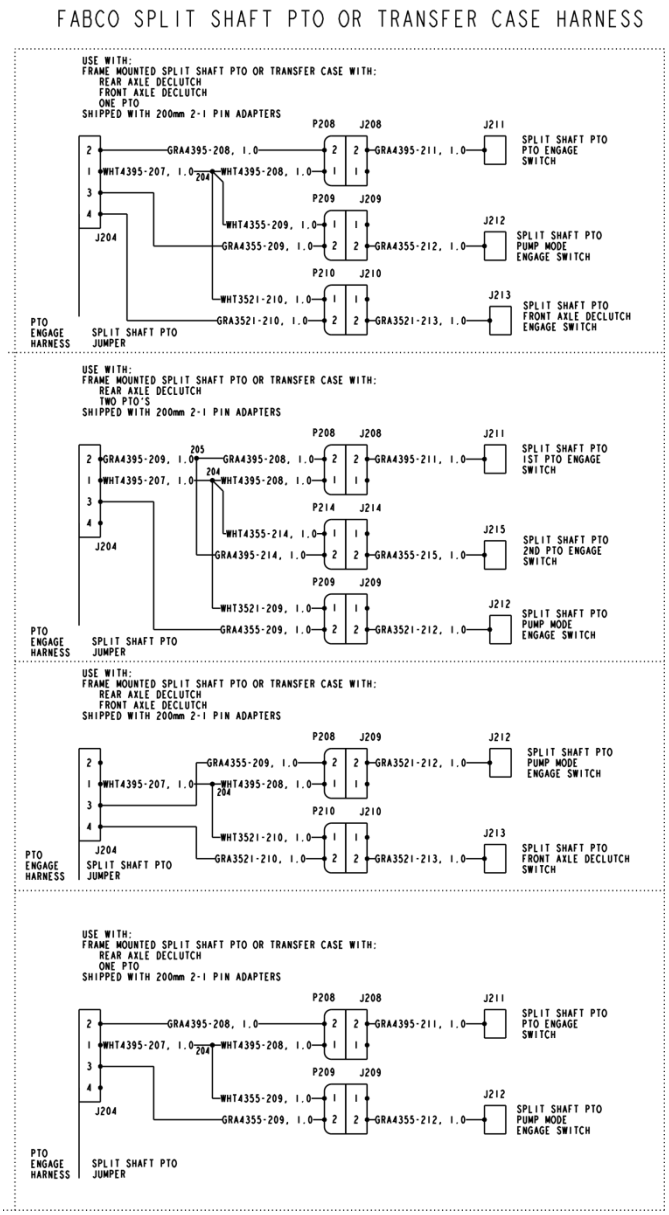


FIGURE 8-28. Additional Electric Engaged PTO Diagrams