

Model 520 Body Builder Manual 2019



A **PACCAR** COMPANY

Release Date 7/30/19

This page intentionally left blank

BODY BUILDER MANUAL CONTENTS

SECTION 1: INTRODUCTION	1-1
SECTION 2: SAFETY AND COMPLIANCE	
SAFETY SIGNALS	2-1
FEDERAL MOTOR VEHICLE SAFETY STANDARDS AND COMPLIANCE	2-2
NOISE AND EMISSIONS REQUIREMENTS	2-3
FUEL SYSTEM	2-4
COMPRESSED AIR SYSTEM	2-4
EXHAUST AND EXHAUST AFTER-TREATMENT SYSTEM	2-5
COOLING SYSTEM	2-6
AIR INTAKE SYSTEM	2-6
CHARGE AIR COOLER SYSTEM	2-6
SECTION 3: DIMENSIONS	
INTRODUCTION	3-1
ABBREVIATIONS	3-1
OVERALL DIMENSIONS	3-2
FRAME RAILS	3-9
FRAME HEIGHT CHARTS	3-11
REAR SUSPENSION LAYOUTS	3-18
Reyco 79KB Single	3-19
Reyco 102AR Single	3-20
Neway ADZ252	3-21
Neway ADZ369/378	3-22
Peterbilt Air Leaf	3-23
Peterbilt Air Trac Single	3-24
Peterbilt Air Trac Tandem	3-25
Peterbilt Air Trac Tri-Drive	3-26
Peterbilt Low Air Leaf	3-27
Chalmers 854	3-28
Hendrickson HMX	3-29
Hendrickson RT/RTE	3-30
Hendrickson HN	3-31
Hendrickson R	3-32
Hendrickson RS	3-33
PUSHER AND TAG LAYOUTS	3-34
Hendrickson	3-34
Watson-Chalin	3-38
EXHAUST HEIGHT CALCULATIONS	3-42
GROUND CLEARANCE CALCULATIONS	3-43
OVERALL CAB HEIGHT CALCULATIONS	3-44
FRAME COMPONENTS	3-45
Fuel Tanks	3-45
EXHAUST SYSTEM	3-46
SECTION 4: BODY MOUNTING	
INTRODUCTION	4-1
FRAME RAILS	4-1
CRITICAL CLEARANCES	4-2
BODY MOUNTING USING BRACKETS	4-3
Brackets	4-4
Mounting Holes	4-5
Frame Drilling	4-6

BODY MOUNTING USING U-BOLTS	4-7
Rear Body Mount	4-9
SECTION 5: FRAME MODIFICATIONS	
INTRODUCTION	5-1
DRILLING RAILS	5-1
MODIFYING FRAME LENGTH	5-2
CHANGING WHEELBASE	5-2
CROSSMEMBERS	5-3
TORQUE REQUIREMENTS	5-4
SECTION 6: ELECTRICAL 520 FAMILY	
CONTROL UNIT IDENTIFICATION	6-1
Functional Description-Cab Electronic Control Unit (CECU)	6-1
HOW MULTIPLEXED INSTRUMENTS WORK	6-2
CECU Architecture	6-2
Power On Self-Test	6-3
ELECTRICAL INTERFACE	6-4
Cab Harness	6-4
Chassis Harness	6-9
Body Builder Harness Extensions	6-10
Optional Body Builder PTO Module	6-10
J1939	6-13
Guidelines - J1939 Circuit Requirements	6-13
J1939 Access	6-13
J1939 Access Procedures	6-13
SECTION 7: PTO SECTION	
INTRODUCTION	7-1
TRANSMISSION MOUNTED PTO – GENERAL	7-1
Manual Transmission	7-1
Automatic Transmission	7-2
Installation Clearances	7-2
FRONT ENGINE PTO	7-3
REAR ENGINE PTO	7-4
PTO INSTALLATIONS	7-5
REMOTE PTO CONTROL (12 PIN CONNECTOR)	7-6
Cummins Remote PTO Operation	7-6
INSTALLATION OF PTO MODEL	7-7
Chelsea 890	7-7
OPTIONAL PTO FUNCTION MODULE	7-8
APPENDICES:	
REVISION LOG	A1

SECTION 1 INTRODUCTION



The Peterbilt 520 Body Builder Manual was designed to provide body builders with a comprehensive information set to guide the body planning and installation process. Use this information when installing bodies or other associated equipment.

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

The Peterbilt 520 Body Builder Manual can be very useful when specifying a vehicle, particularly when the body builder is involved in the vehicle definition and ordering process. Information in this manual will help reduce overall costs through optimized integration of the body installation with vehicle selection. Early in the process, professional body builders can often contribute valuable information that reduces the ultimate cost of the body installation.

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

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

This page intentionally left blank

SECTION 2 SAFETY AND COMPLIANCE

SAFETY SIGNALS

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

Warnings, cautions, and notes

WARNING



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

Example:

WARNING! Be sure to use a circuit breaker designed to meet 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 AND COMPLIANCE

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

Incomplete Vehicle Certification

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

NOTE



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



FIGURE 2-1. Incomplete Vehicle Certification Document

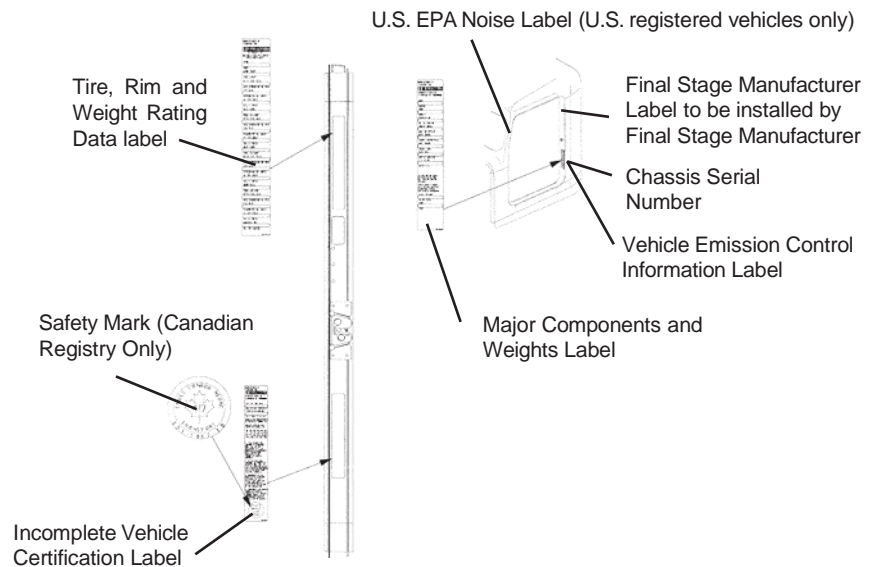


FIGURE 2-2. Locations of Certification Labels - Driver's Door and Frame

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

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

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

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

For Canadian final stage manufacturers see:

<http://www.gazette.gc.ca/index-eng.html>;
and <http://www.tc.gc.ca/eng/acts-regulations/menu.htm> for
the regulations.

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

Noise and Emissions Requirements

NOTE



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

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

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

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

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

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

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

NOTE

All 2017 engine emissions certified vehicles will be equipped with an On-Board Diagnostics (OBD) system. The OBD system is designed to detect malfunctions of any engine or vehicle component that may increase exhaust emissions or interfere with the proper performance of the OBD system itself. All diesel engines will be equipped with an On-Board Diagnostics (OBD) system. The OBD system consists of computer program on one or more of the vehicle's Electronic Control Units (ECUs). This program uses information from the control system and from additional sensors to detect malfunctions. When a malfunction is detected, information is stored in the ECU(s) for diagnostic purposes. A Malfunction Indicator Light (MIL) is illuminated in the dash to alert the driver of the need for service of an emission-related component or system.

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

Fuel System

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

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

- Ensure that fuel lines are not pinched or can potentially be damaged when installed between body and frame
- Fuel lines must be routed and secured without dips or sags
- There must be easy access to filter(s) and fill cap
- The tank vent may not obstructed
- Added accessories (heaters, generators) cannot introduce air into system
- Fuel tank must be located so that the full level is not above cylinder head
- "Ultra-Low Sulfur Fuel Only" labels must be present on the dash and fuel fill
- Modification of the pressure side secondary filter and plumbing is not allowed without engine manufacturer approval
- Body installation of fuel tank or routing of lines must not cause significant increase in fuel temperature
- Fuel hoses shall meet or exceed OEM supplied hose material construction specifications

Compressed Air System

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

- Air system modification must meet applicable FMVSS regulations
- Compressed Air tank may not be modified (exception – addition or removal of fittings or relocation of the tank)
- Added devices or bodywork may not interfere with or rub air lines

- Air supply to the engine doser may not be restricted or disconnected
- Air lines should be routed, protected from heat, and properly secured to prevent damage from other components
- Care should be taken so that air lines do not rub against other components
- Care should be taken to protect the air system from heat sources

Exhaust and Exhaust After-treatment System

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

- The following after-treatment and exhaust system components may not be modified:
 - DPF assembly
 - SCR Catalyst assembly
 - Exhaust pipes between the engine and after-treatment devices (DPF, SCR Catalyst) and between after-treatment devices
 - NO_x Sensors
 - PM Sensor
- The following modifications may only be done within the guidelines of the “DEF System Relocation Guide.”
 - Modifications to Diesel Exhaust Fluid (DEF) throttle, suction, or pressure lines
 - Modification or relocation of the DEF tank
 - Modification of coolant lines to and from the DEF tank
 - All DEF and coolant lines should be routed, protected, and properly secured to prevent damage during vehicle operation or other components
 - If relocation of the DCU or ACM is necessary, use existing frame brackets and mount inside of frame flanges where necessary. Do not extend the harnesses
- The DPF, the SCR catalyst, or their mounting may not be modified
- The NO_x sensor may not be relocated or altered in any way; this includes re-clocking the aftertreatment canister or reorienting the sensor(s)
- Exhaust pipes used for tailpipes/stacks must be properly sized, and must prevent water from entering
- Ensure adequate clearance between the exhaust and body panels, hoses, and wire harnesses
- The body in the vicinity of the DPF must be able to withstand temperatures up to 400°C (750°F)
- Do not add thermal insulation to the external surface of the DPF
- The SCR water drain hole may not be blocked
- Allow adequate clearance (25mm (1 inch)) for servicing the DPF sensors, wiring, and clamped joints
- Drainage may not come in contact with the DPF, SCR catalyst, sensors or wiring

- Allow sufficient clearance for removing sensors from DPF. Thermistors require four inches. Other sensors require one inch
- Wiring should be routed, protected from heat, and properly secured to prevent damage from other components
- The exhaust system from an auxiliary power unit (APU) must not be connected to any part of the vehicle after-treatment system or vehicle tail pipe.

Cooling System

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

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

Air Intake System

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

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

Charge Air Cooler System

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

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

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. Table 3-1 below lists the abbreviated terms used.

TABLE 3-1. Abbreviations Used

BFA	Bumper to front axle
BOC	Back of cab
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
FAX	Front axle
FOF	Front of frame
WB	Wheelbase



OVERALL DIMENSIONS

This section includes drawings and charts of the Peterbilt Model 520.

On the pages that follow, detail drawings show particular views of the 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.

Note that the Aftertreatment mounting is almost identical other than the use of a DEF tank (for diesels) and different canister/catalyst but both use the same stanchions for mounting BOC.

Model 520 EPA 2017



FIGURE 3-1. Various Views of the Model 520

EXTERIOR DIMENSIONS

Model 520 Dimensions

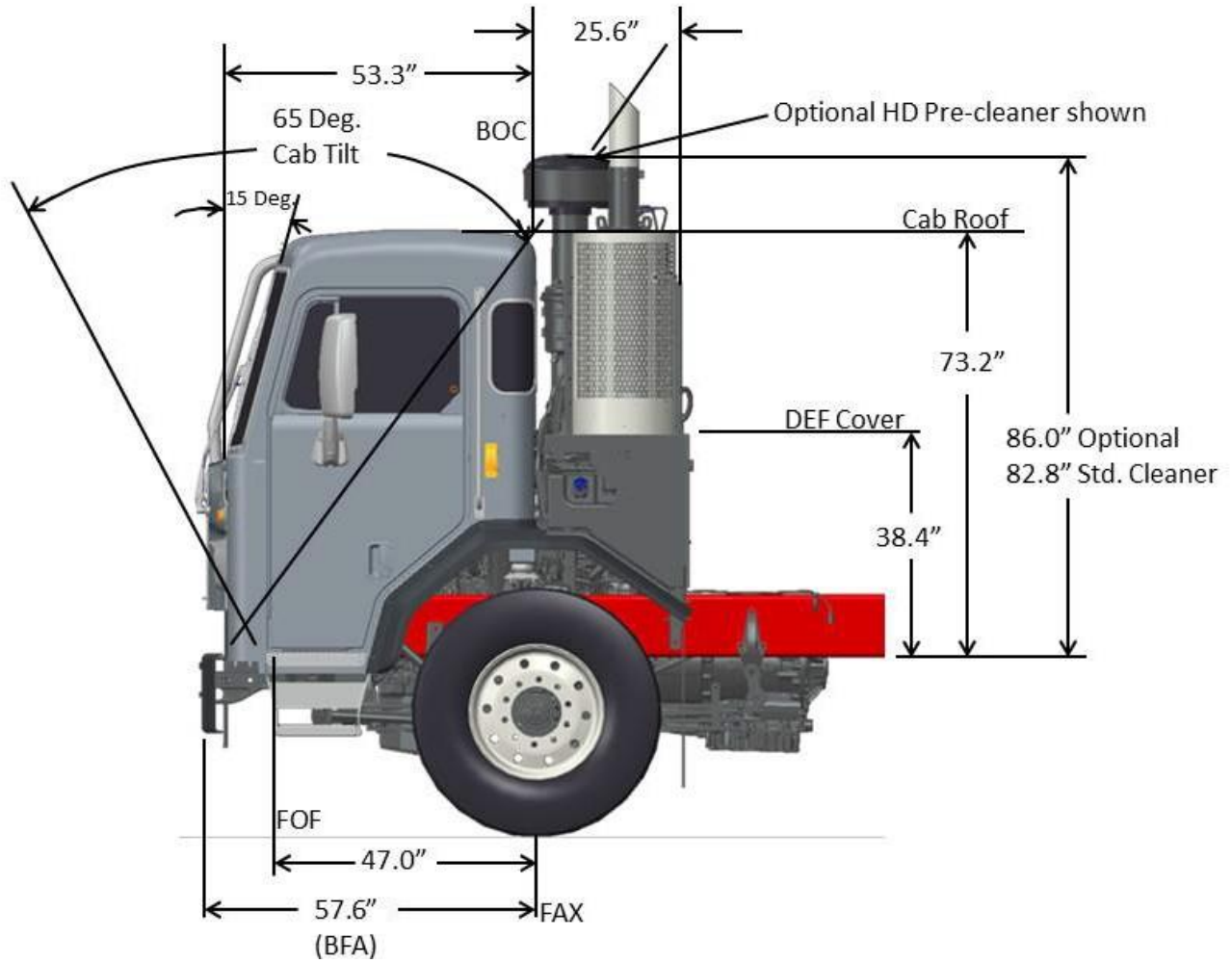


FIGURE 3-2. 520 Cab Dimensions

Notes:

1. Shown with optional HD Air intake Pre-Cleaner
2. Shown with optional front cab guard
3. Door dimension is 33.4"W x 61"H
4. Diesel truck shown, but Natural Gas has same BOC dimension for Aftertreatment.

INTERIOR DIMENSIONS

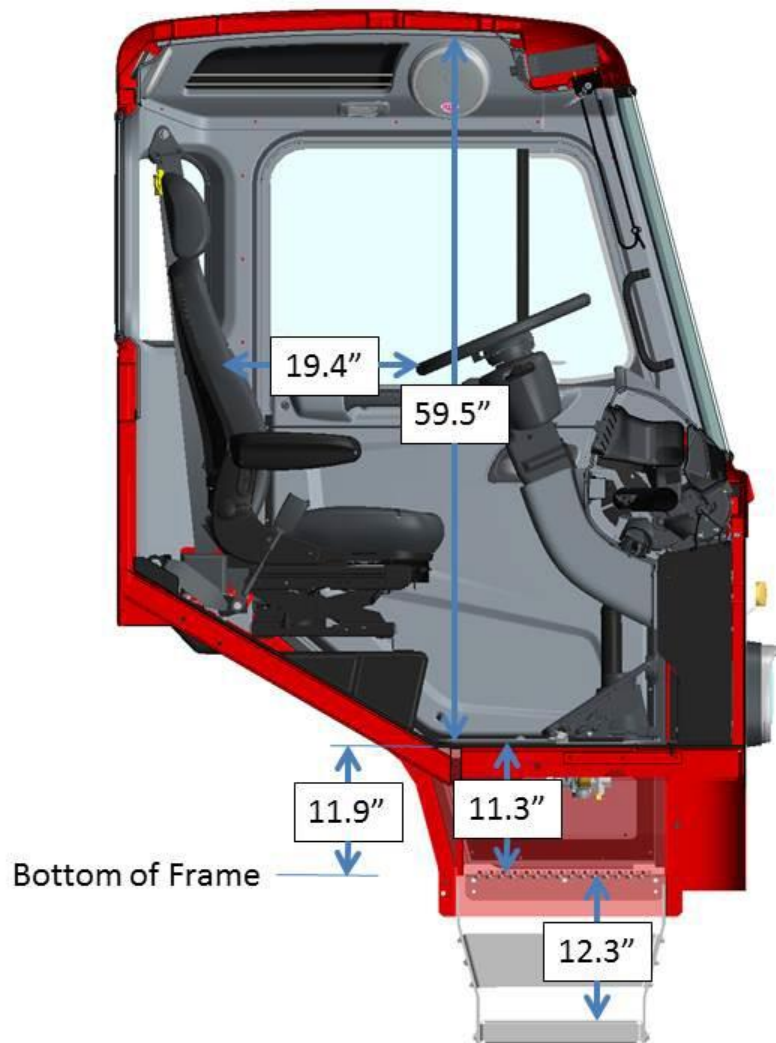


FIGURE 3-3. View Looking Through Cab to the Driver's Side (LH Steer)

INTERIOR DIMENSIONS

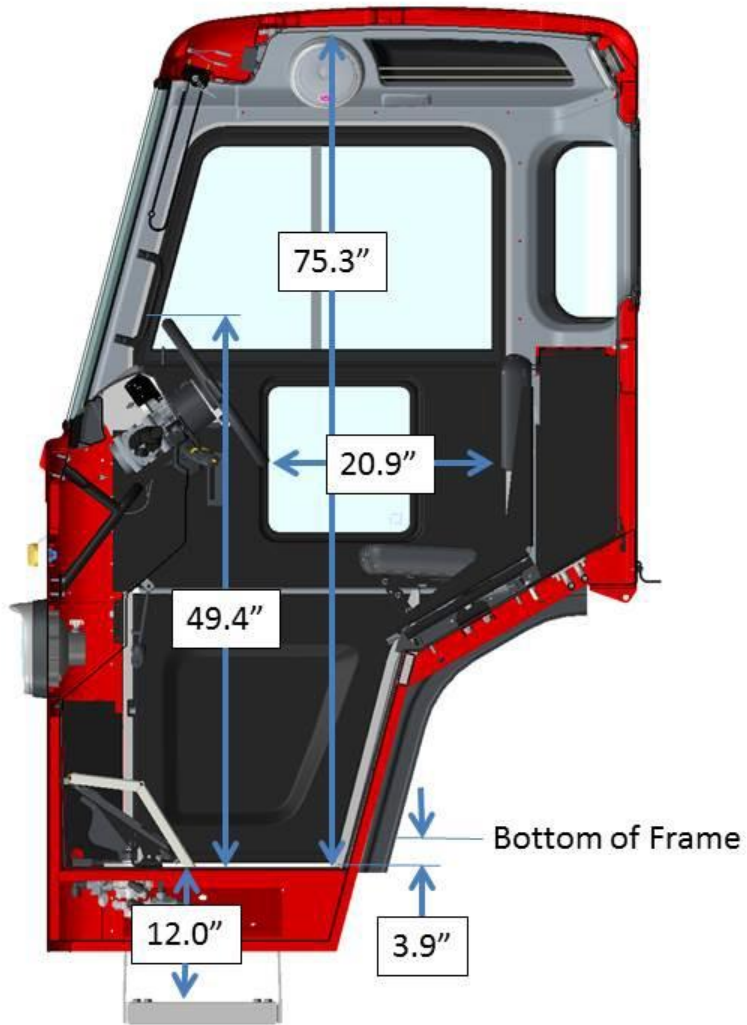


FIGURE 3-4. View Looking Through the Cab At The RH Drive Standup Version

INTERIOR DIMENSIONS

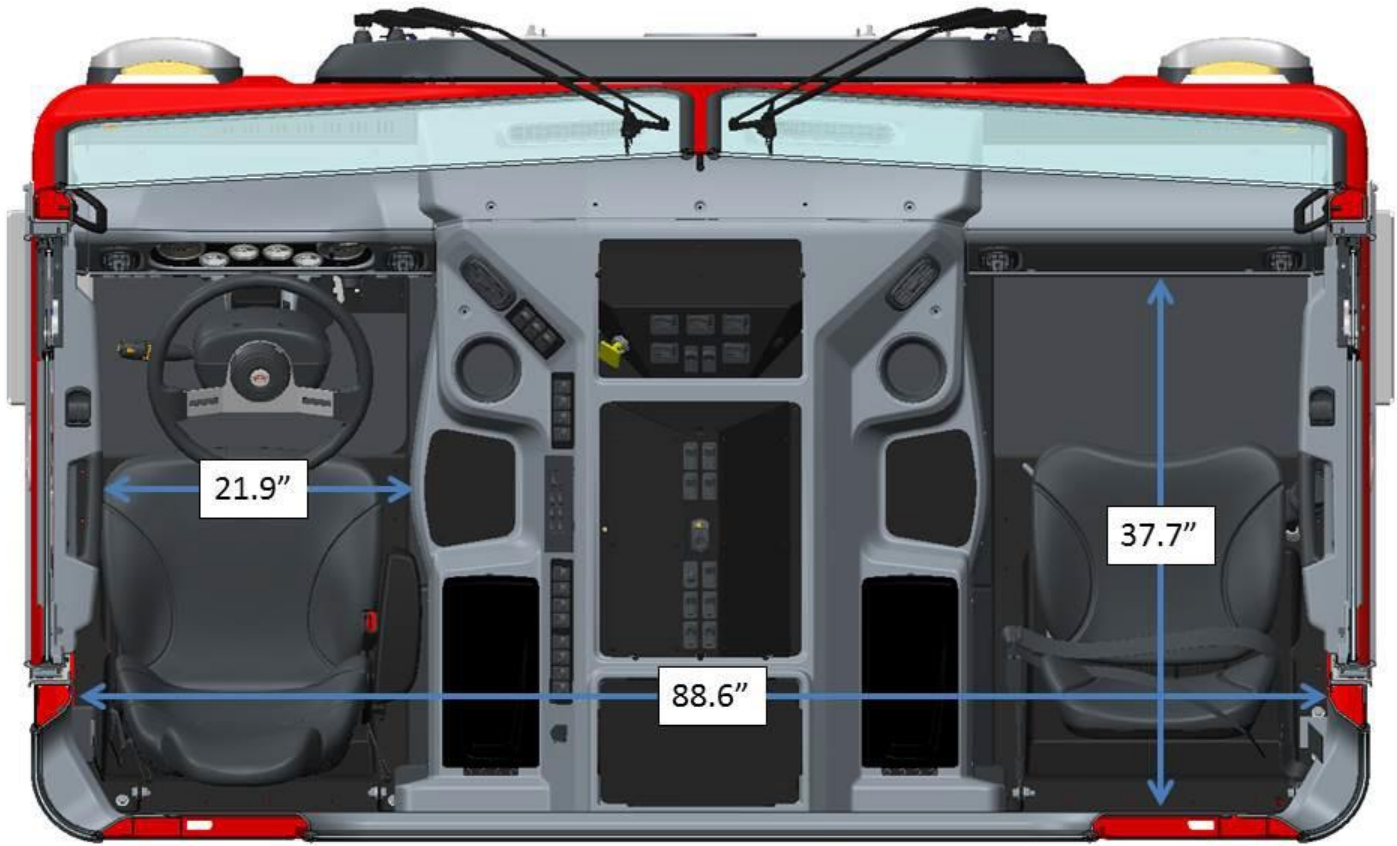


FIGURE 3-5. Top View of LH Steer Model

INTERIOR DIMENSIONS

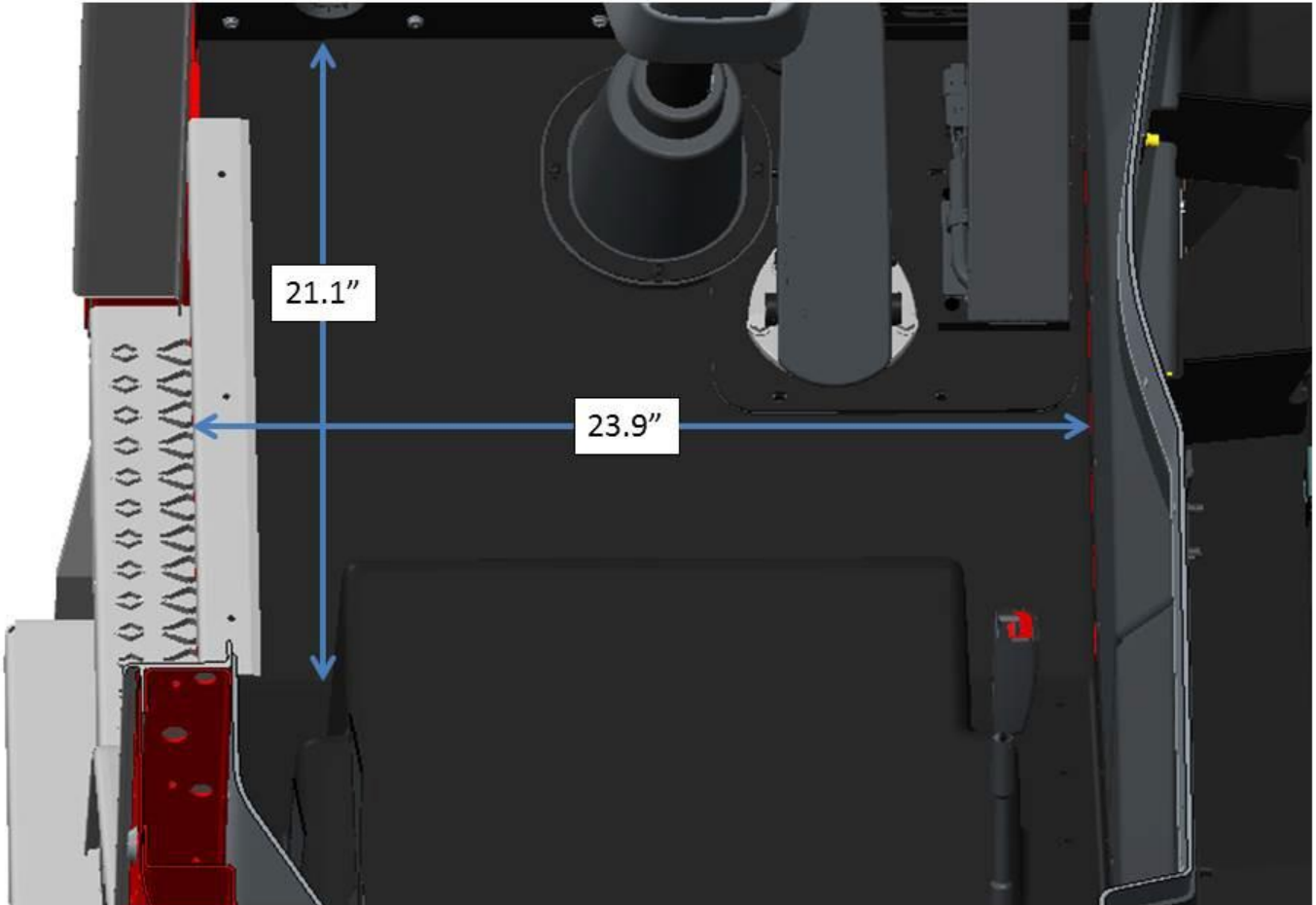


FIGURE 3-6. Floor Dimensions for LH Floor

INTERIOR DIMENSIONS

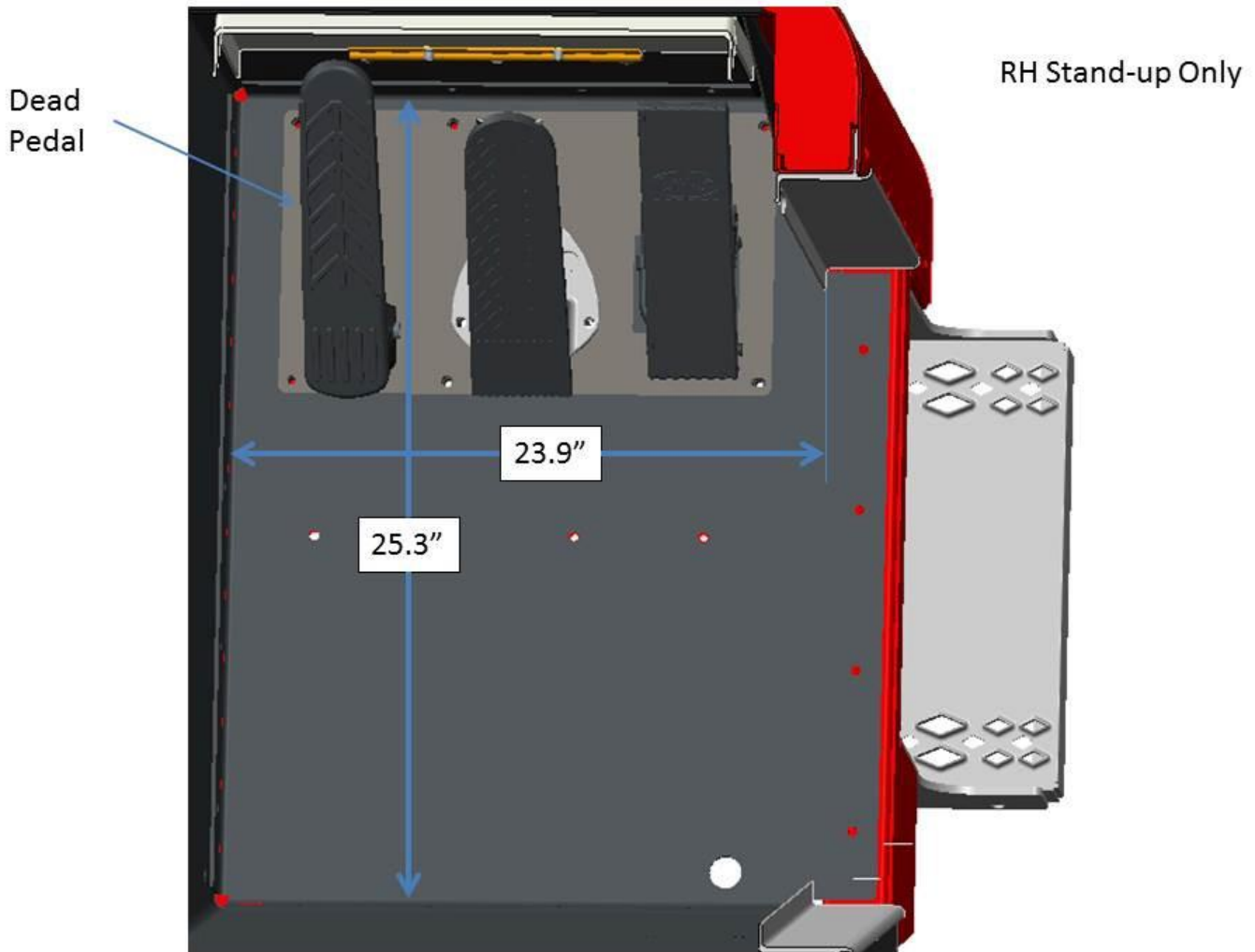


FIGURE 3-7. Passenger Floor RH Stand Up

FRAME RAILS

Frame rail configurations are shown in Figure 3-8. The under cab area of the 520 frame rails are splayed as shown in Figure 3-9. Frame height, flange and structural values can be found in the Body Mounting Section.

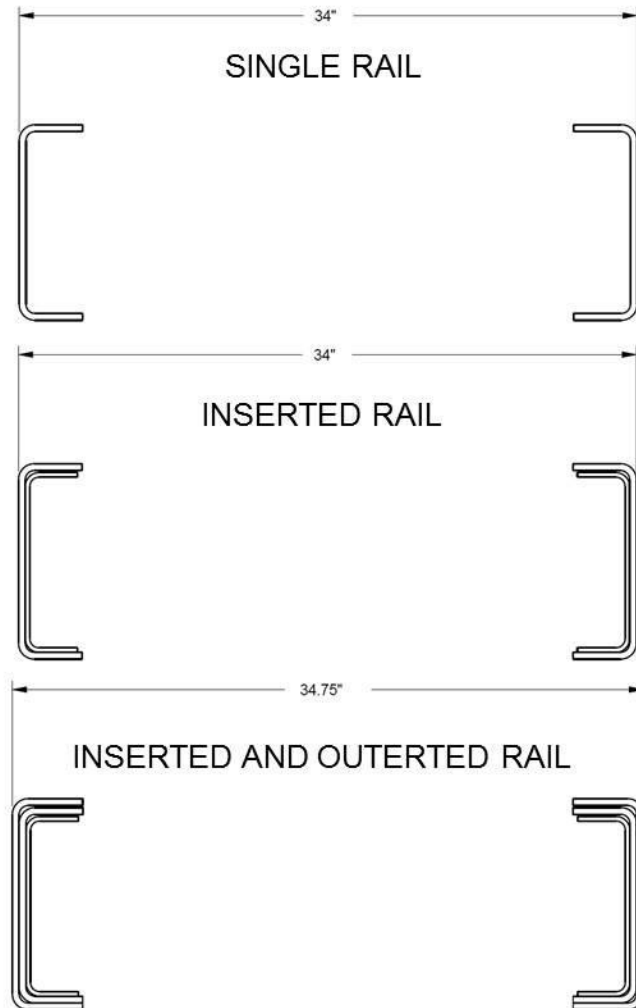


FIGURE 3-8. Frame Rail Configurations



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

FRAME RAILS

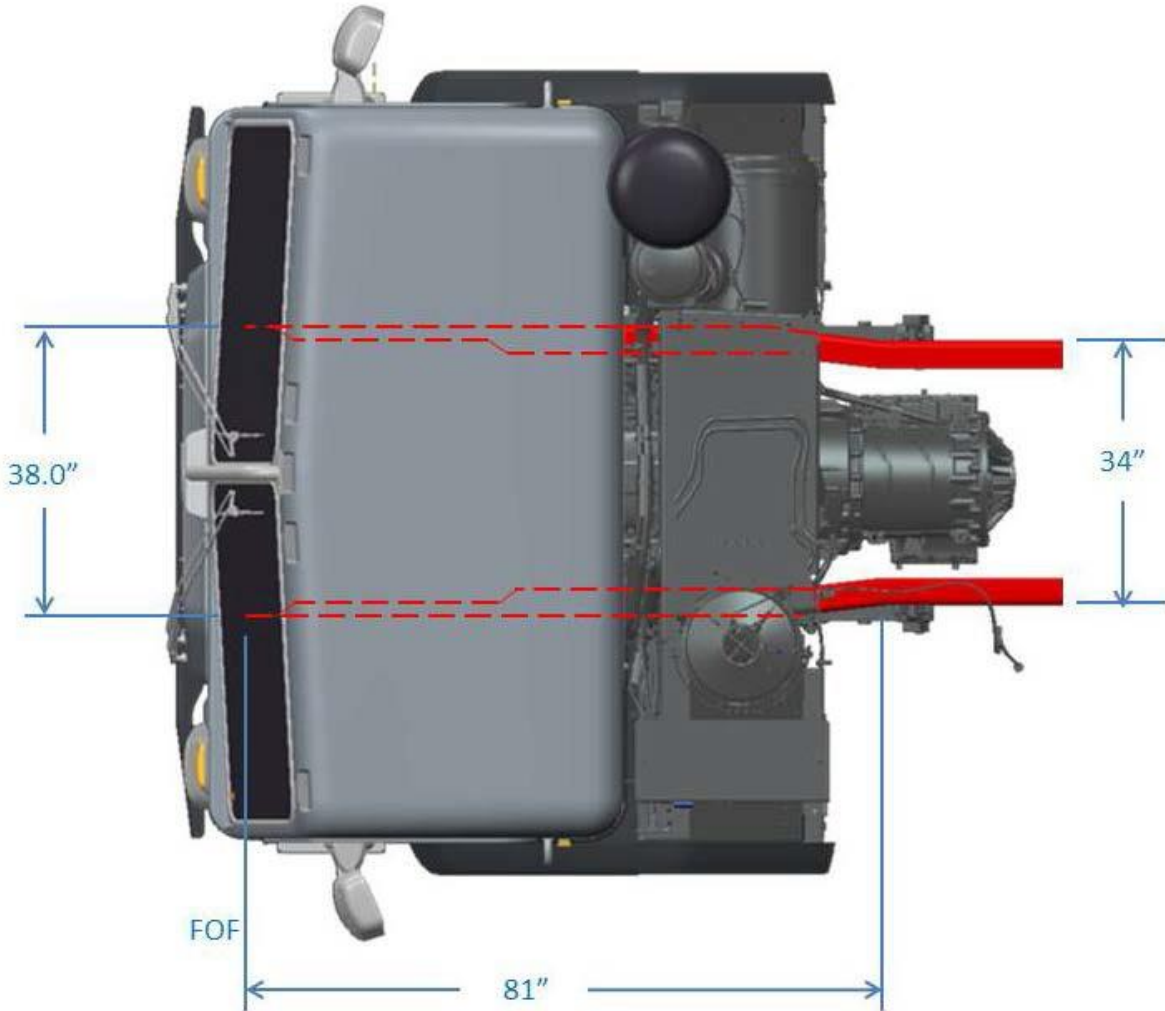


FIGURE 3-9. Model 520 Frame Rail

FRAME HEIGHT CHARTS

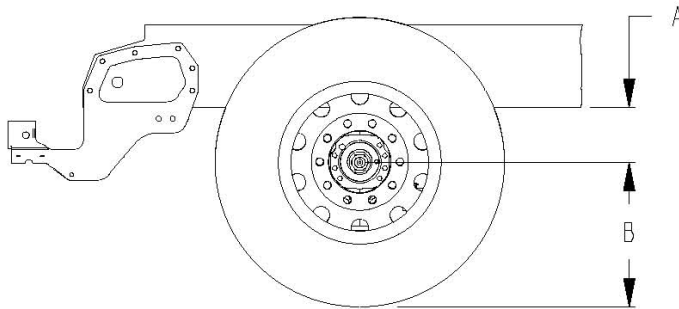
THE FOLLOWING FRAME HEIGHT CHARTS MAY BE USED FOR FINDING APPROXIMATE FRONT AND REAR FRAME HEIGHTS.

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.

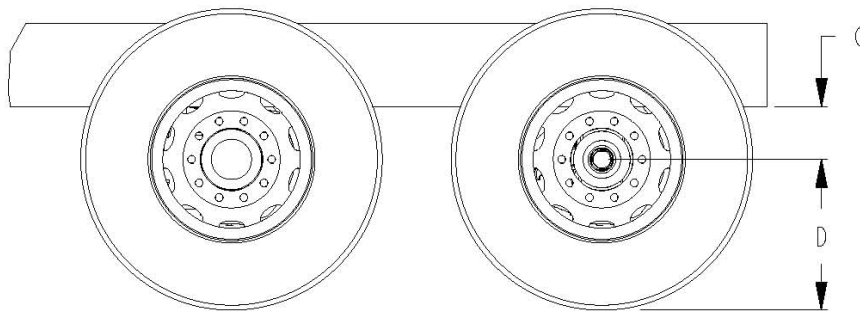
LOADED VALUES ARE QUOTES FOR REPRESENTATIVE LOADS AT THE GROUND FOR THE PARTICULAR SPRING AND AXLE COMBINATION, AND, AS SUCH, CAN VARY WITH LOADING VARIATIONS.

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 3-4. Frame Height

TABLE 3-2. Front Frame Height "A" – 520

FRONT FRAME HEIGHT "A"				
SUSPENSION		SPACER (mm)	LIGHT (in.)	LOADED (in.)
20,000 lbs.	TAPERLEAF	OMIT	14.0	10.9
		25 mm (2)	15.0	11.9
17,000-23,000 lbs.	TAPERLEAF @ 18,000 lbs.	OMIT (1)	12.2	10.7
		25 mm	13.15	10.65
	TAPERLEAF @ 20,000 lbs.	OMIT (1)	12.5	9.5
		25 MM	13.5	10.5
17,000-23,000 lbs.	TAPERLEAF @ 23,000 lbs.	OMIT (1)	12.9	9.1
		25 mm	13.9	10.1
36,000 lbs.	TANDEM 4	25 mm (2)	13.2	11.2

NOTES:

- 1) Omit spacer block standard.
- 2) 25mm spacer block standard and required.
- 3) Standard 3-1/2" drop axle heights shown, for 5" drop axles, subtract an additional 1-1/2".
- 4) Spacer blocks are used by Engineering to obtain level frame and are not options.
- 5) "A" dimension shown is to bottom of frame rail. Add frame rail height dimension for frame height.

REAR FRAME HEIGHTS "C"

TABLE 3-3. Single Drive Suspension Heights

Suspension	Rating	Version	Light Height	Laden Height
LOW AIR LEAF	21,000 lbs.	Standard	6.8	6.5
AIR TRAC	20,000 lbs.	Standard	11.4	11.0
	23,000 lbs.	Standard	11.4	11.0
REYCO 79KB	20,000 lbs.	Taper-leaf (3.38" saddle)	9.4	11.8
	21,000 lbs.	Taper-leaf (1.38" saddle)	7.4	9.8
	23,000 lbs.	Multi-leaf (1.38" saddle)	8.8	11.6
	26,000 lbs.	Multi-leaf (1.38" saddle)	9.2	11.8
	28,000 lbs.	Multi-leaf (1.38" saddle)	9.6	12.3
	31,000 lbs.	Multi-leaf (1.38" saddle)	10.7	13.3
REYCO 102	23K-29K lbs.	4.38 saddle	12.0	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 3-4. Tandem Drive 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.		8.8	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.	Taper-leaf	10.6	8.7

TABLE 3-5. Tandem Drive 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 3-6. Tandem Drive Reyco Suspension Heights

Suspension	Rating	Version	Light Height	Laden Height
REYCO 102 MULTILEAF	40,000 lbs.	1.75 saddle (STD)	11.7	9.8
		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 3-7. Tandem Drive Chalmers Suspension Heights

Suspension	Rating	Version	Light Height	Laden Height
CHALMERS 854 & 860	40,000 lbs.	LOW	11.1	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	14.6	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	14.6	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	14.6	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.

TABLE 3-8. Tandem Drive Hendrickson Suspension Heights

Suspension	Rating	Version	Light Height	Laden Height
RT-403	40,000 lbs.	6.00	9.9	8.9
		7.188 (std.)	11.2	10.1
RTE-403	40,000 lbs.	6.00	9.9	8.4
		7.188 (std.)	11.2	9.5
R-403	40,000 lbs.	12.80	5.8	5.8
		15.81 (std.)	8.8	8.8
		17.60	10.6	10.6
RS-403	40,000 lbs.	12.25	9.9	9.1
		14.00 (std.)	11.7	10.8
		15.25	12.9	12.1
HMX	40,000 lbs.	16.5 (low)	10.6	9.5
		18.5 (std.)	12.6	11.5
HMX	46,000 lbs.	16.5 (low)	10.6	9.5
		18.5 (std.)	12.6	11.5
HN462	46,000 lbs.	20.25 (high)	15.0	13.3
R-463	46,000 lbs.	15.75 (std.)	8.8	8.8
		20.50	13.5	13.5
RS-463	46,000 lbs.	12.25	9.7	8.9
		14.0 (std.)	11.5	10.6
		15.25	12.7	11.9
RT-463	46,000 lbs.	6.00	11.3	10.5
		7.188 (std.)	13.0	11.4
		11.00	16.3	15.2
RTE-463	46,000 lbs.	7.188 (std.)	11.6	10.2
		11.00	15.4	14.0
RS-503	50,000 lbs.	14.0 (std.)	11.7	10.8
		15.25	12.9	12.1
RT-503	50,000 lbs.	7.188 (std.)	12.1	11.1
		11.0 1	16.4	15.4
RTE-503	50,000 lbs.	7.188 (std.)	11.6	10.2
		11.00	15.4	14.0
RS-523	52,000 lbs.	14.0 (std.)	11.7	10.8
RT-523 , RT-650	52K-65K	7.188 (std.)	12.1	11.1
		11.00	16.4	15.4
HN522	52,000 lbs.	18.50 (std.)	12.6	11.5
RS650	65,000 lbs.	15.00 (std.)	12.0 ¹	11.0 ²
		19.00	16.0 ²	15.1 ²
R650 *	65,000 lbs.	20.25 (std.)	12.5	12.5
R850 w/70K Meritor	85,000 lbs.	20.25	12.0	12.0
R850 w/SISU 70K		20.25	12.1	12.1
RS850 w/SISU 70K	85,000 lbs.	16.75	11.5	10.6

NOTES:

- 1) With SISU 70k axle subtract 0.39" from light/laden
- 2) With SISU 70k axle subtract 0.28" from light and 0.39" from laden

TABLE 3-9. Tri-Drive Suspension Heights

SUSPENSION	RATING (lbs.)		LIGHT (in.)	LOADED (in.)
TRI-DRIVE SUSPENSION				
AIR TRAC	40K-46K		11.4	11.0
NEWAY ADZ369	69,000		10.0	10.0
NEWAY ADZ378	78,000		10.0	10.0

REAR SUSPENSION LAYOUTS

The rear suspension layouts are provided as a tool to help layout bodies prior to arrival. The applicable dimensions are shown. Verify the axle spacing that is shown, as alternate spacing may exist and could change some of the dimensions. The dimensions shown below are the most typical installations, in special cases some hole locations will move.

If the holes shown will be used for body installation, please confirm with the local Peterbilt dealer the drawing below will be the installation used on the specific truck. In this case, ordering the frame layout of the chassis is advised. This can be done on any Peterbilt truck, and will be provided ahead of the build schedule. Ensure proper torque to reinstall any suspension components. See Tables 5-1 and 5-2 on page 5-4.

For hole locations not detailed, please work with the local Peterbilt Dealer to request that information.

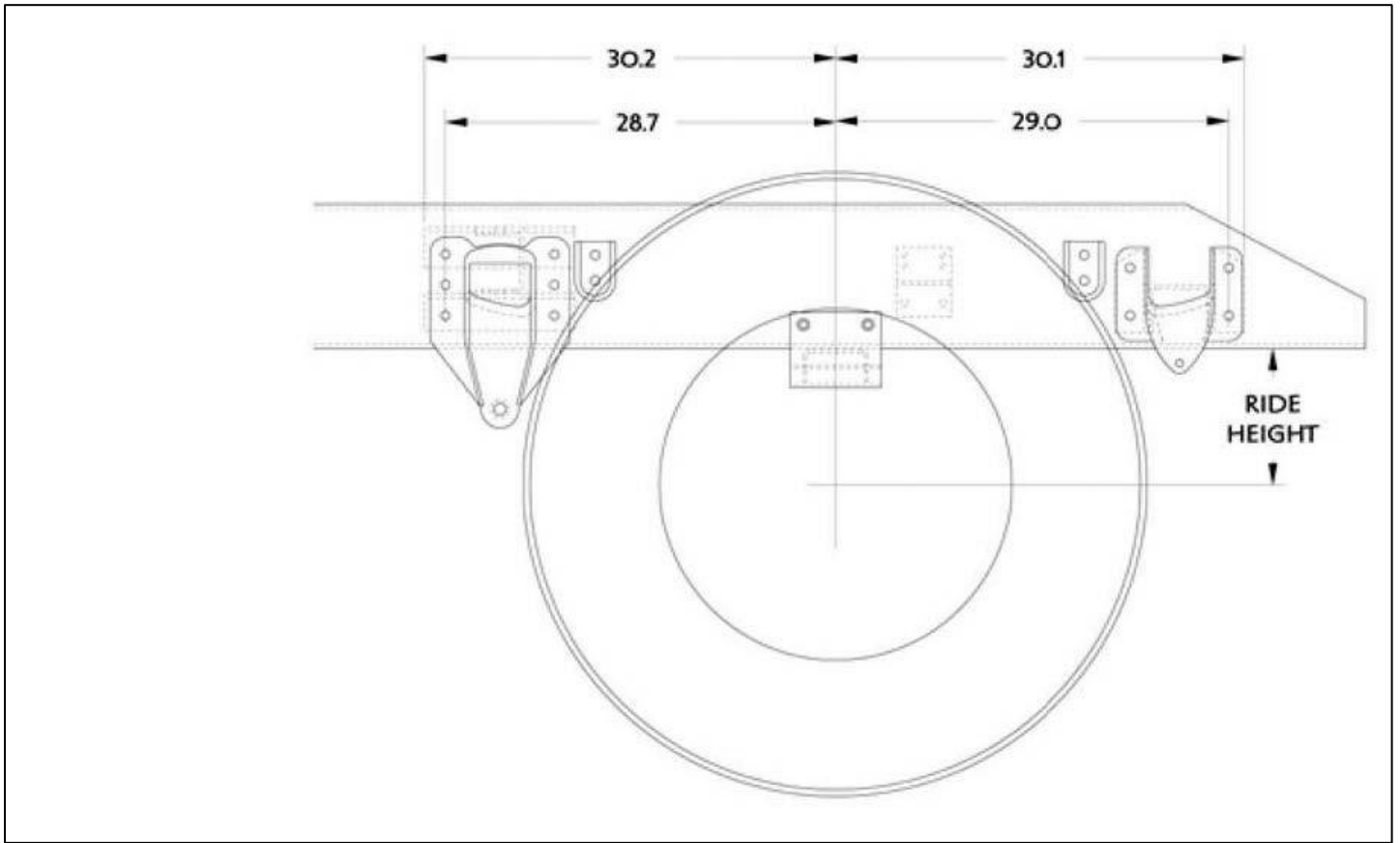


FIGURE 3-5. Reycor 79KB Frame Drilling (Dimensions In Millimeters)

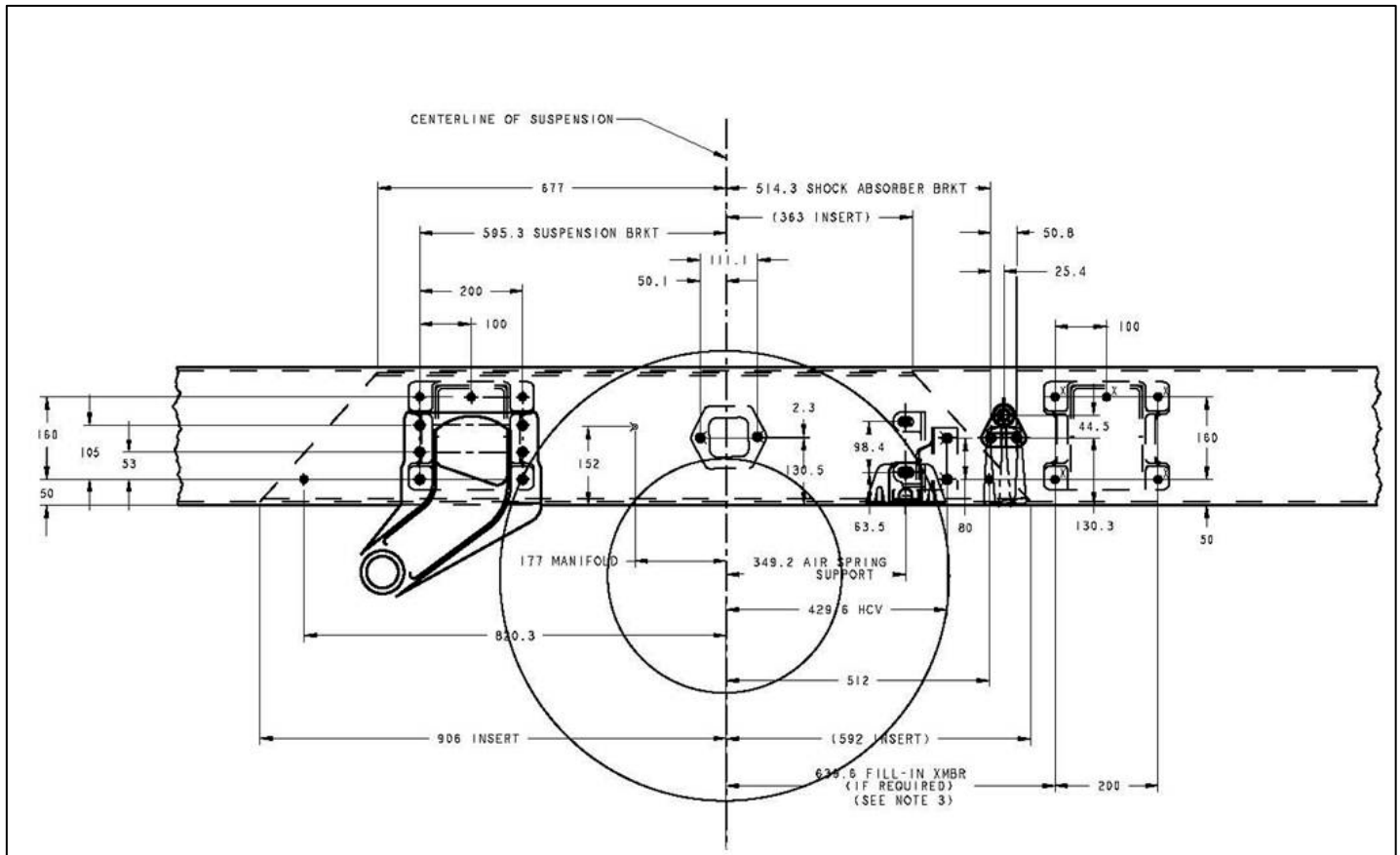


FIGURE 3-6. Reycos 102AR Frame Drilling (Dimensions In Millimeters)

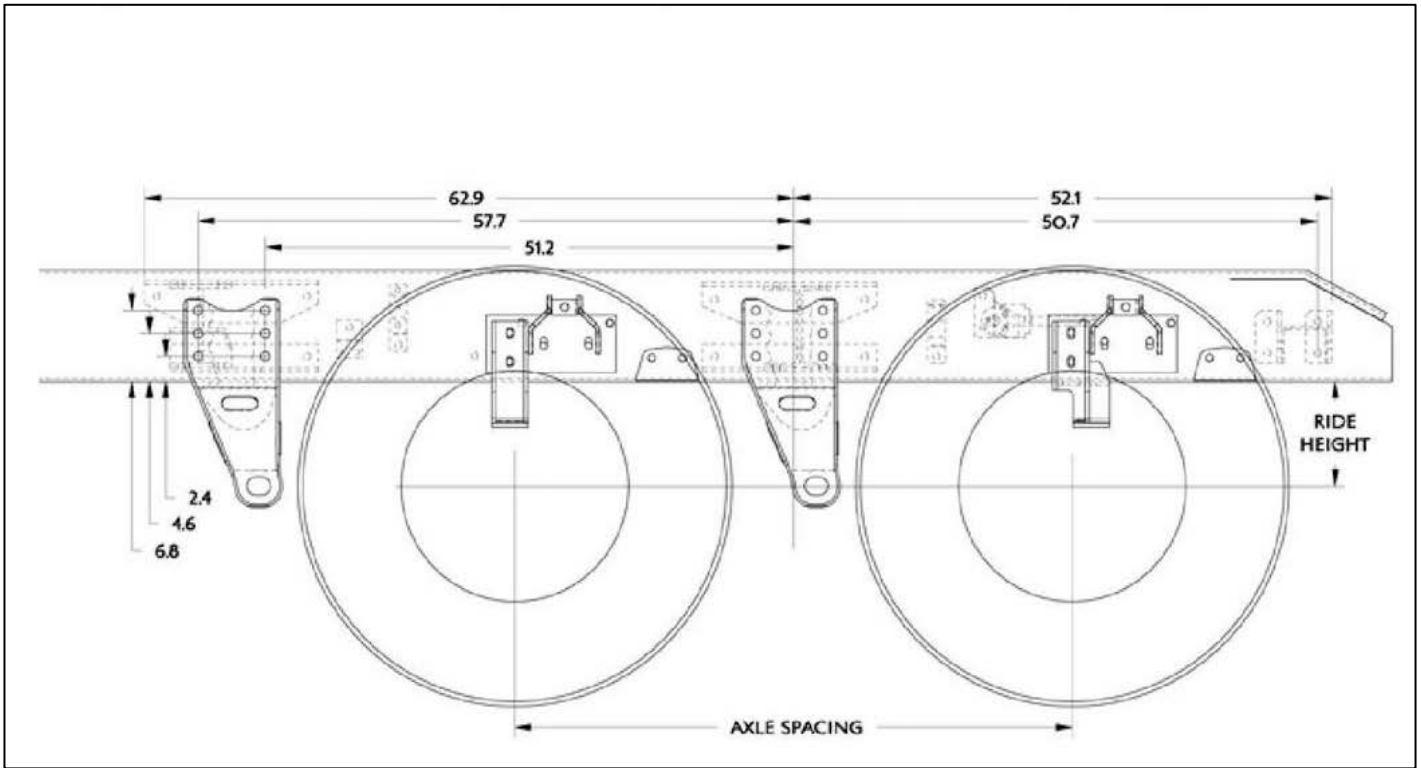


FIGURE 3-7. Neway ADZ 252 Frame Drilling (Dimensions In Millimeters)

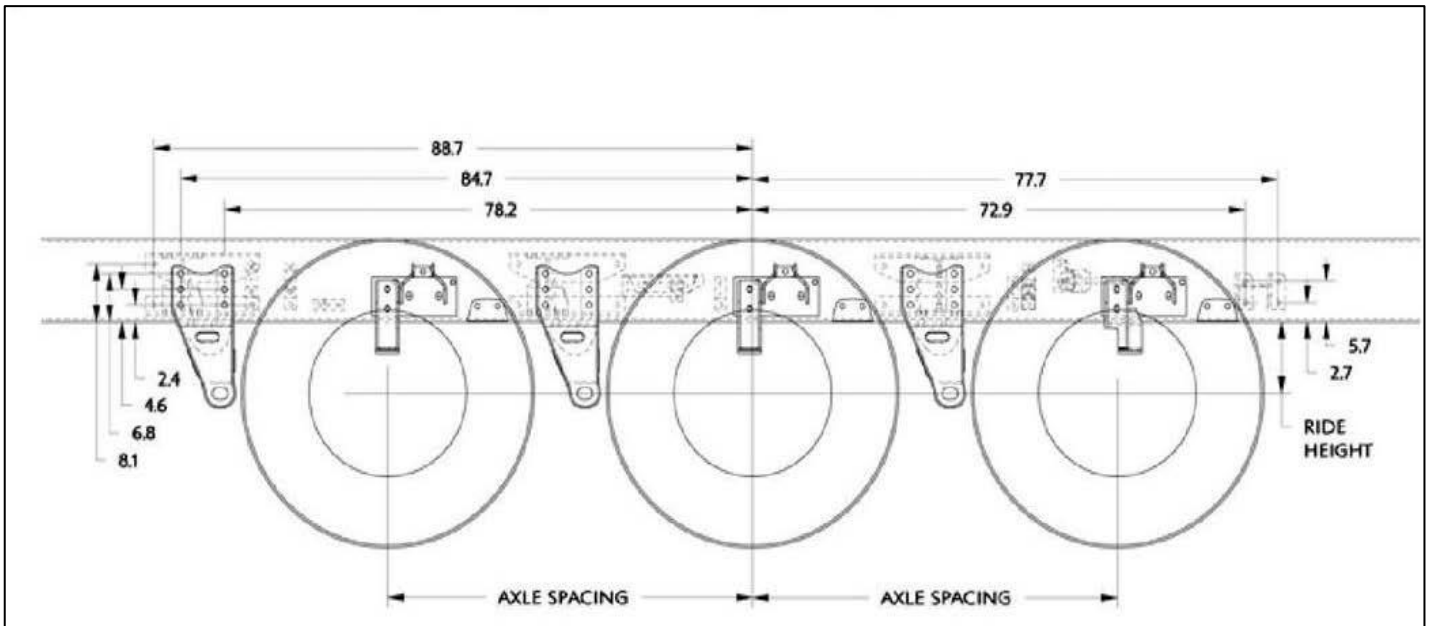


FIGURE 3-8. Neway ADZ 369/378 Frame Drilling (Dimensions In Millimeters)

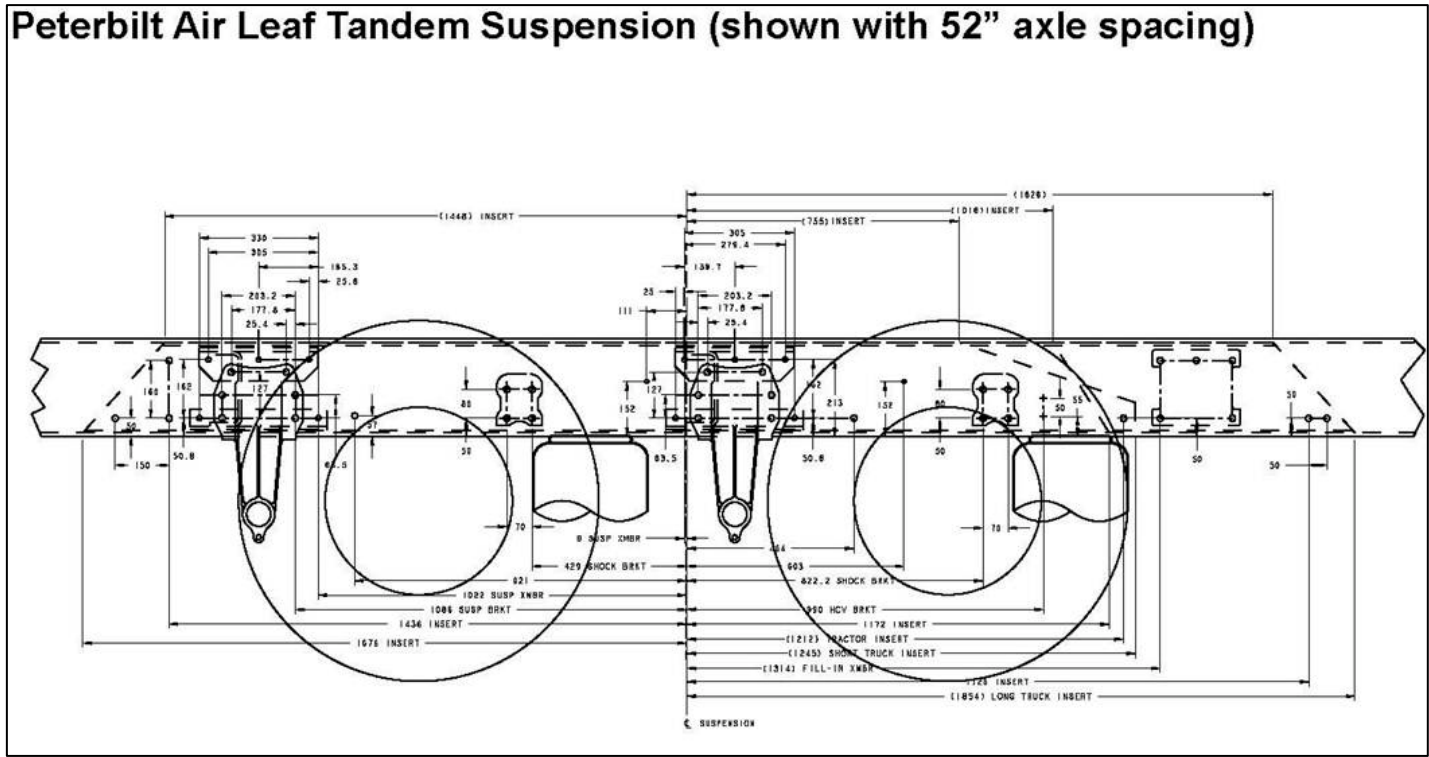


FIGURE 3-9. Peterbilt Air Leaf Tandem Frame Drilling (Dimensions In Millimeters)

Peterbilt Air Trac Single Suspension

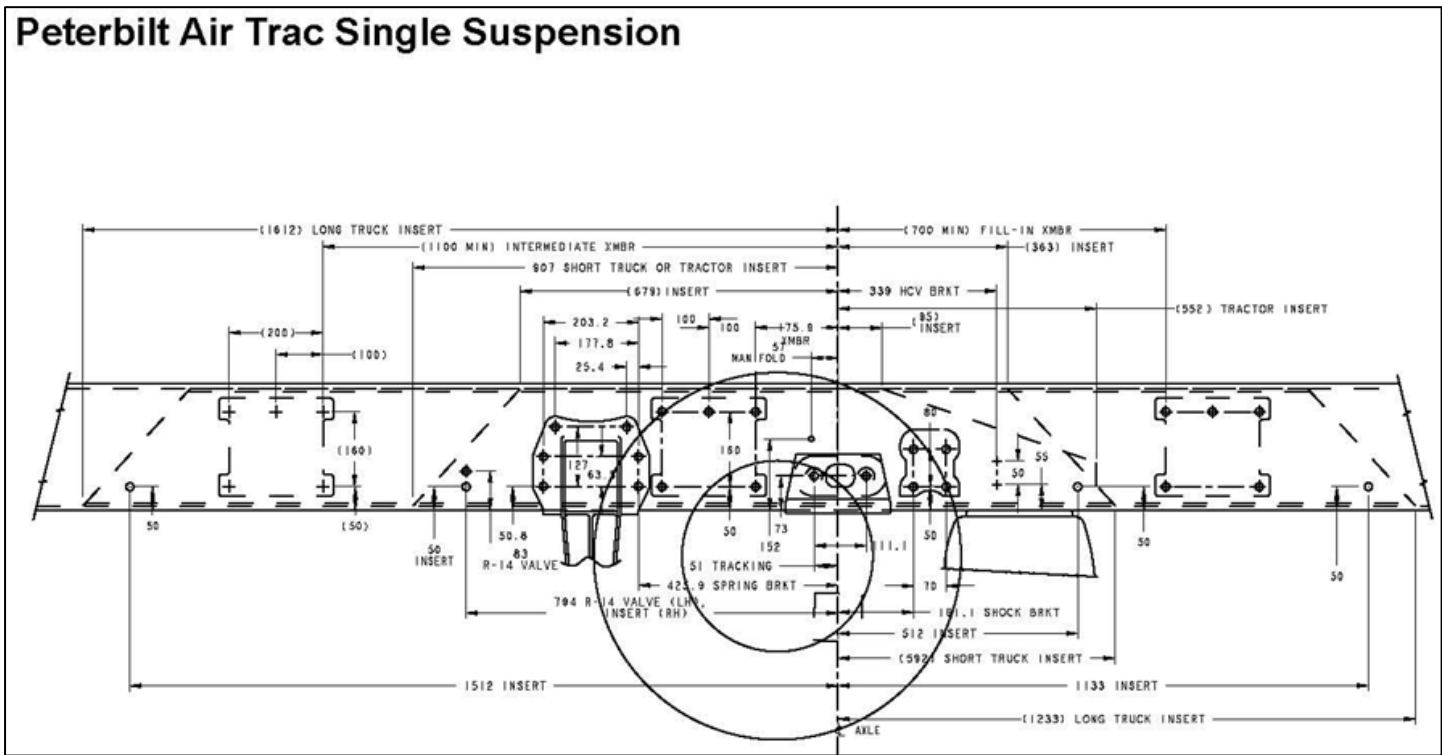


FIGURE 3-10. Peterbilt Air Trac Single Frame Drilling (Dimensions In Millimeters)

Peterbilt Air Trac Tandem Suspension (shown with 52" axle spacing)

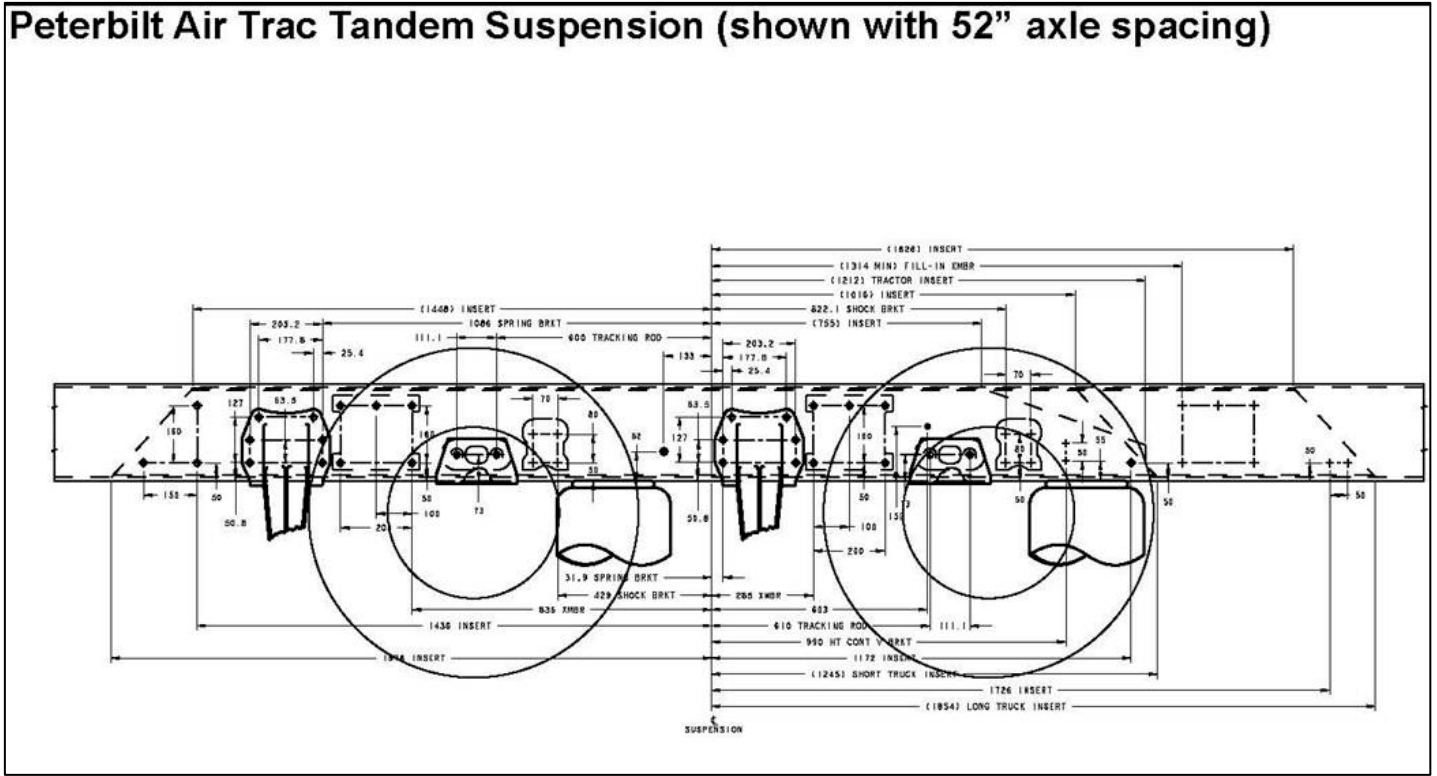


FIGURE 3-11. Peterbilt Air Trac Tandem Frame Drilling (Dimensions In Millimeters)

Peterbilt Air Trac Tri-Drive Suspension (shown with 54" axle spacing)

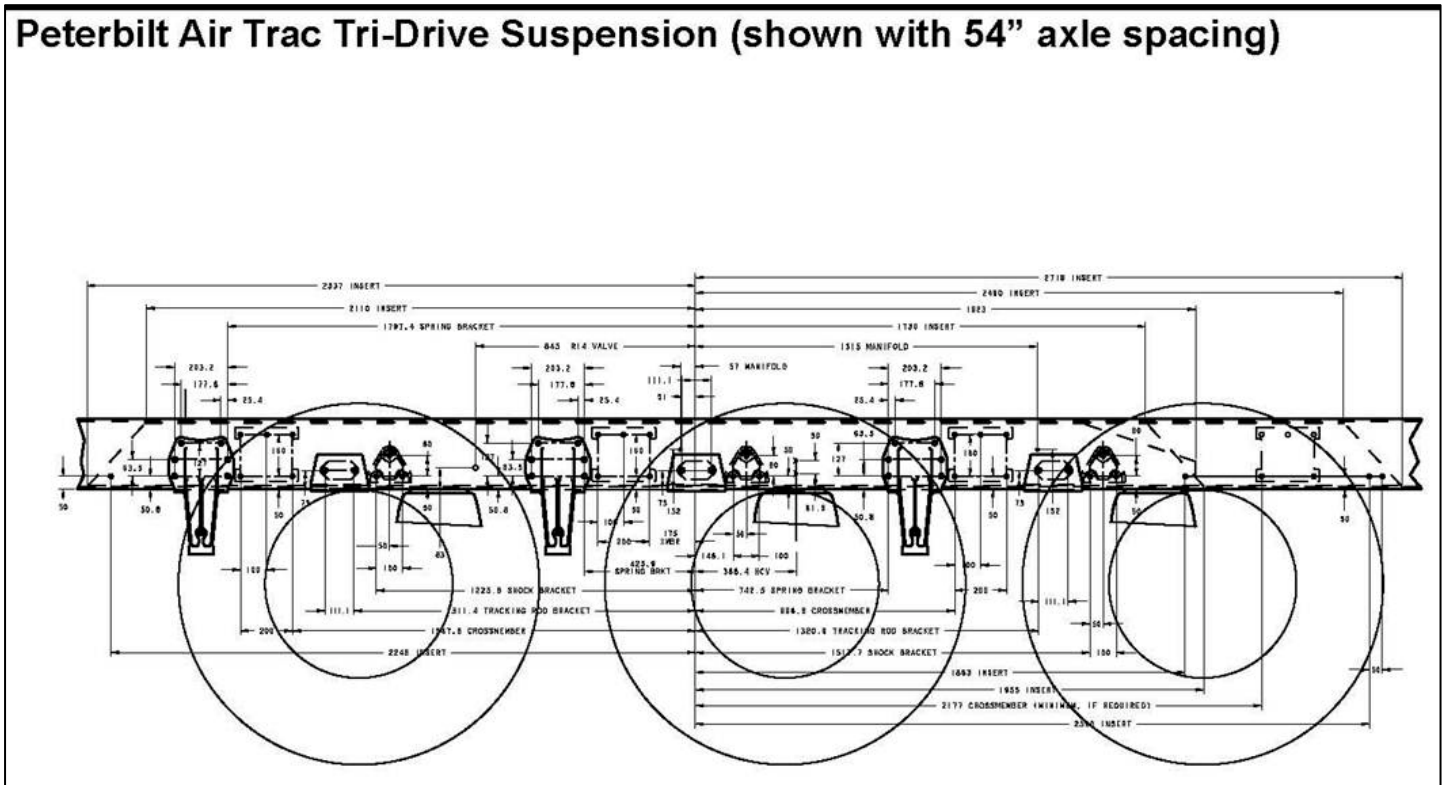


FIGURE 3-12. Peterbilt Air Trac Tri-Drive Frame Drilling (Dimensions In Millimeters)

**Peterbilt Low and Low Low Air Leaf Tandem Suspension
(shown with 52" axle spacing)**

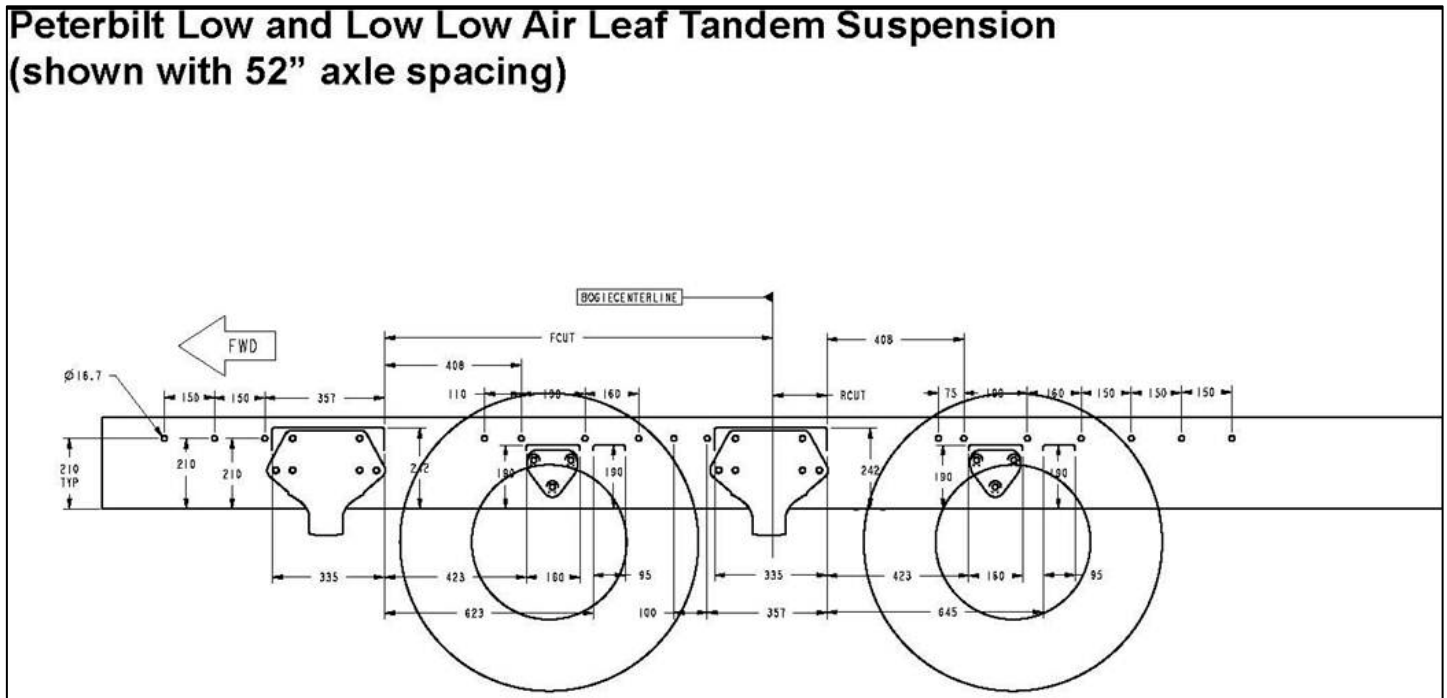


FIGURE 3-13. Peterbilt Low and Low-Low Air Leaf Tandem Frame Drilling (Dimensions In Millimeters)

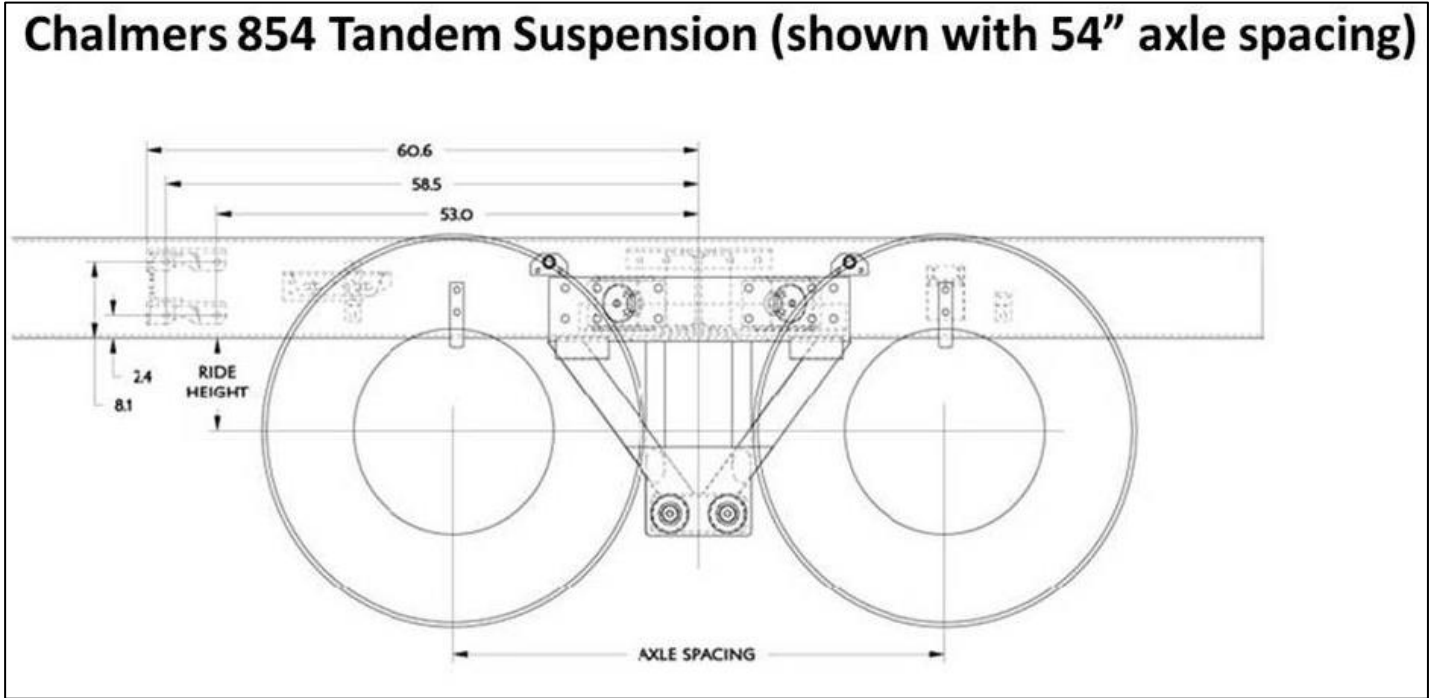


FIGURE 3-14. Chalmers 854 Tandem Frame Drilling

**Hendrickson HMX Tandem Suspension
(shown with 54" axle spacing w/o tracking rods)**

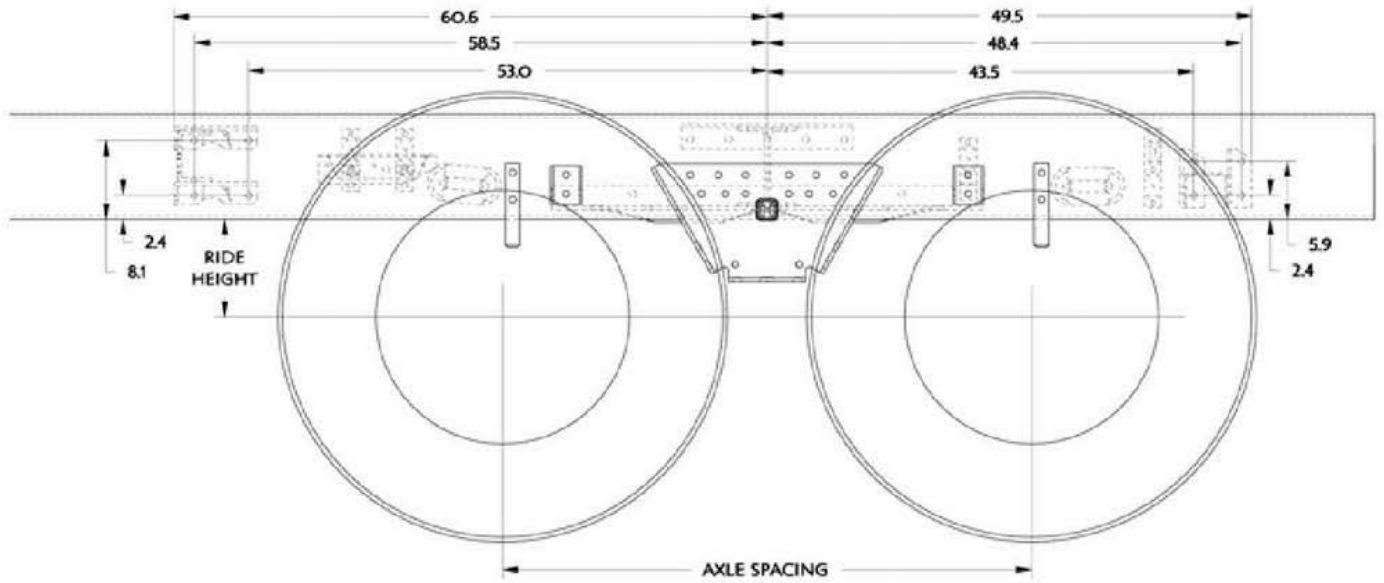


FIGURE 3-15. Hendrickson HMX Tandem Frame Drilling

Hendrickson RT/RTE Tandem Suspension (shown with 54" axle spacing w/o tracking rods)

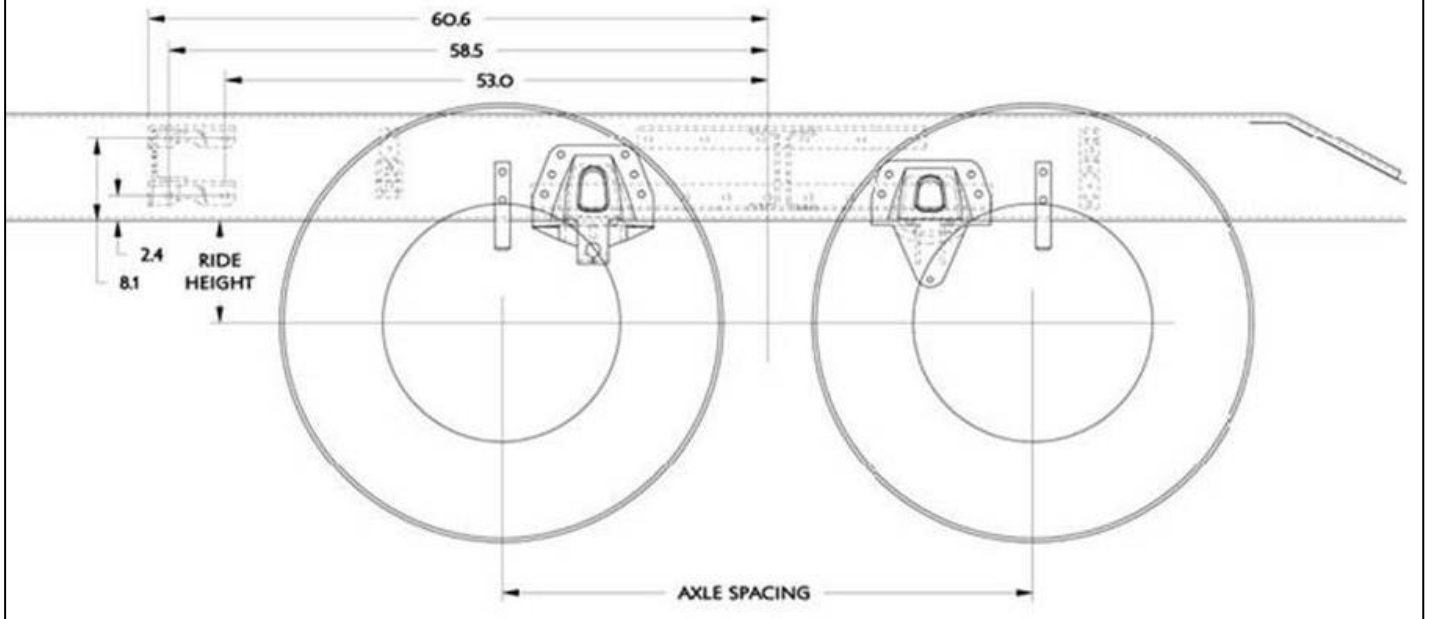


FIGURE 3-16. Hendrickson RT/RTE Tandem Frame Drilling

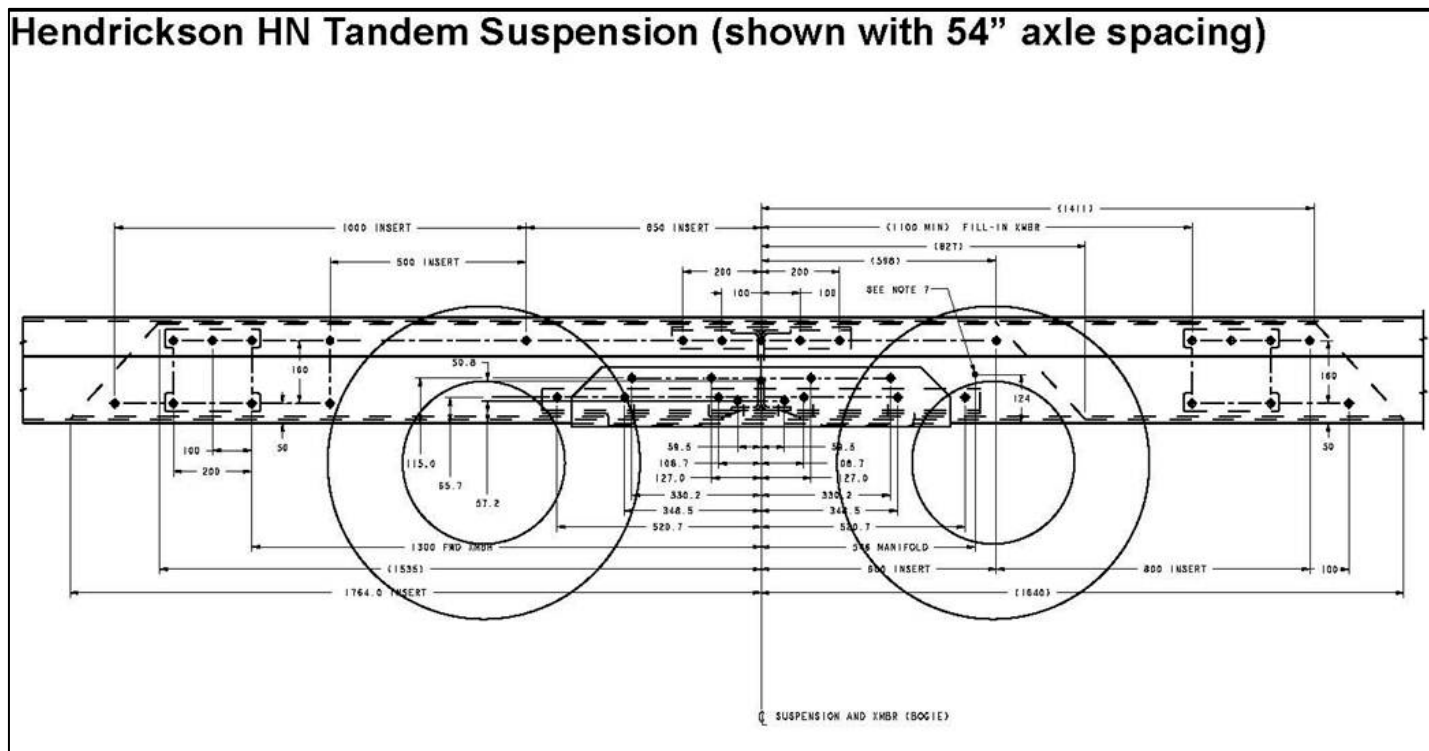


FIGURE 3-17. Hendrickson HN Tandem Frame Drilling (Dimensions In Millimeters)

Hendrickson R Tandem Suspension

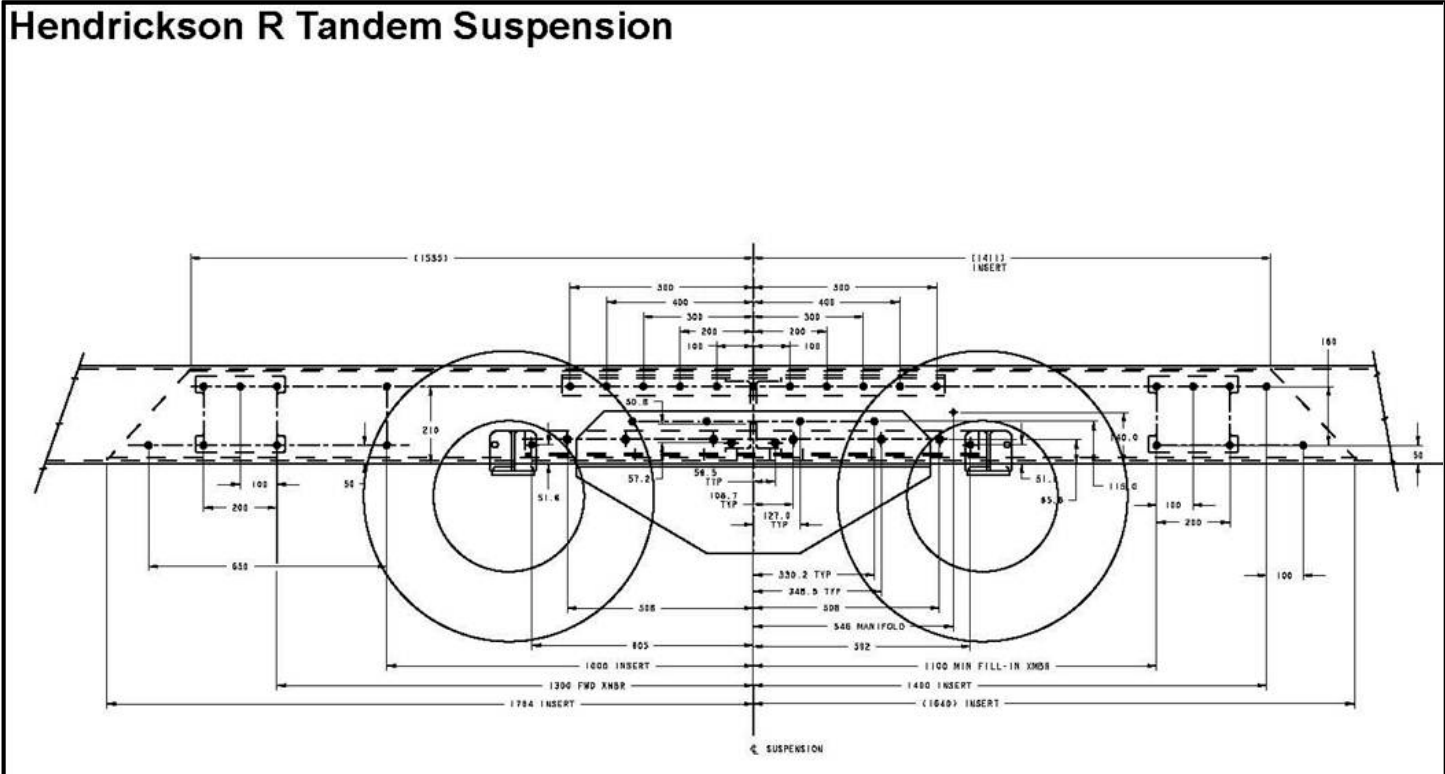


FIGURE 3-18. Hendrickson R Tandem Frame Drilling (Dimensions In Millimeters)

Hendrickson RS Tandem Suspension

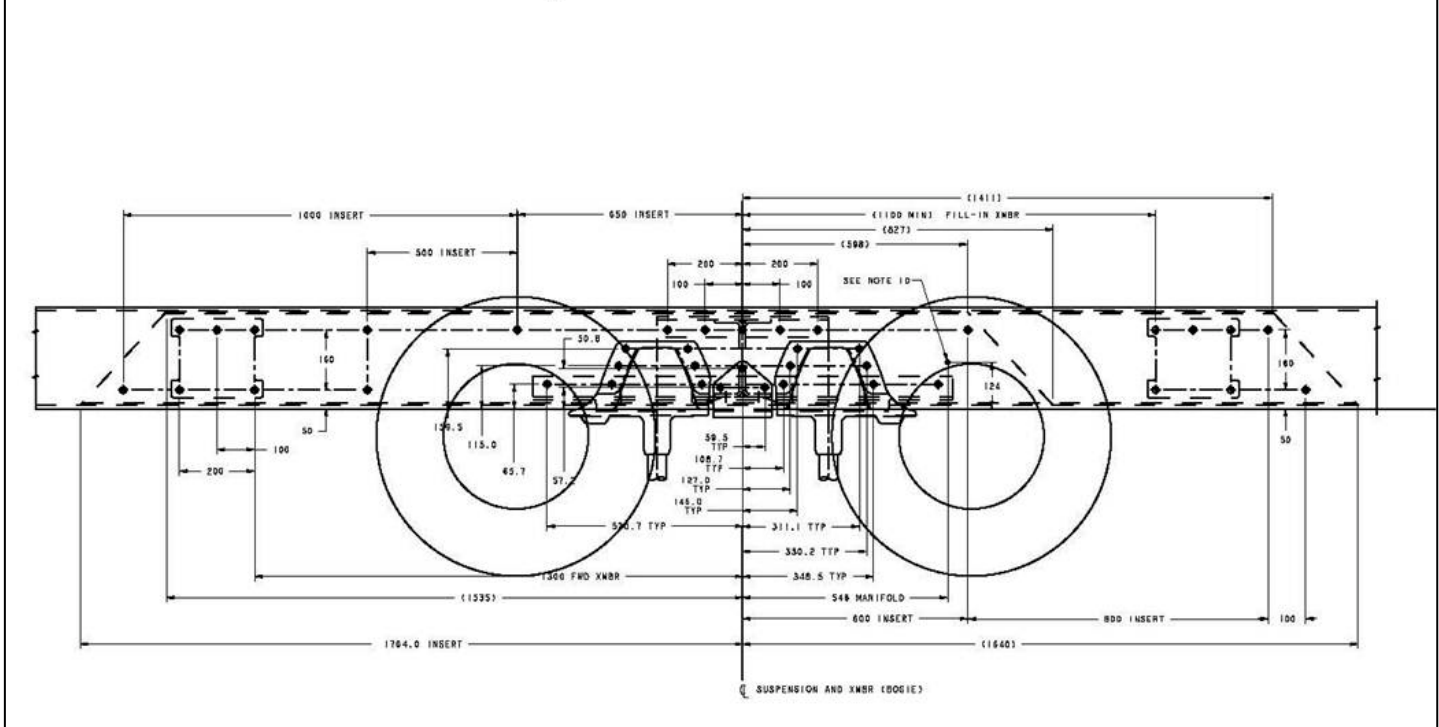


FIGURE 3-19. Hendrickson RS Tandem Frame Drilling (Dimensions In Millimeters)

PUSHER AND TAG AXLE LAYOUTS

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

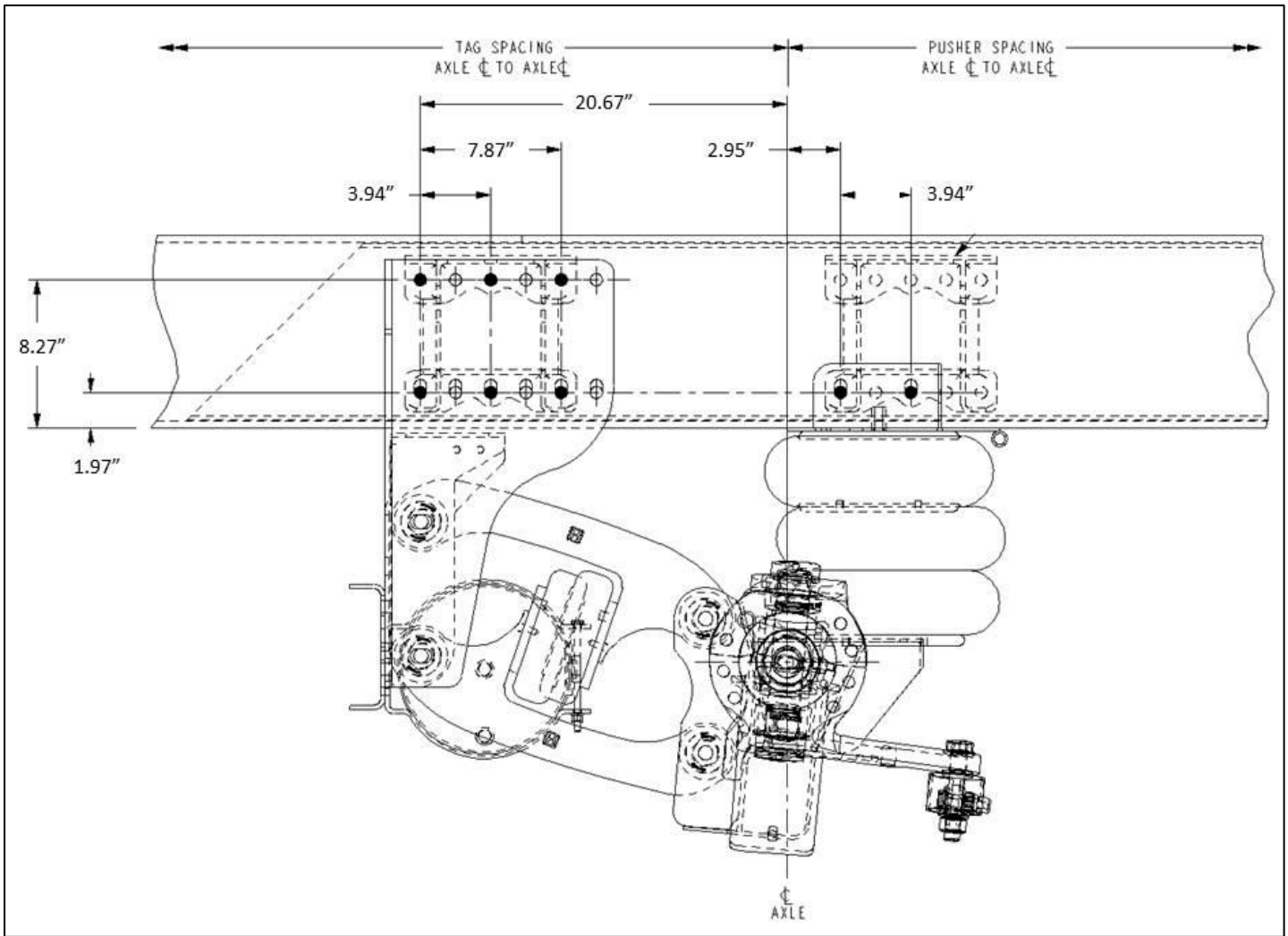


FIGURE 3-20. Hendrickson SC8, SC10, SC13, SCO13, FX or FXO Pusher or Tag

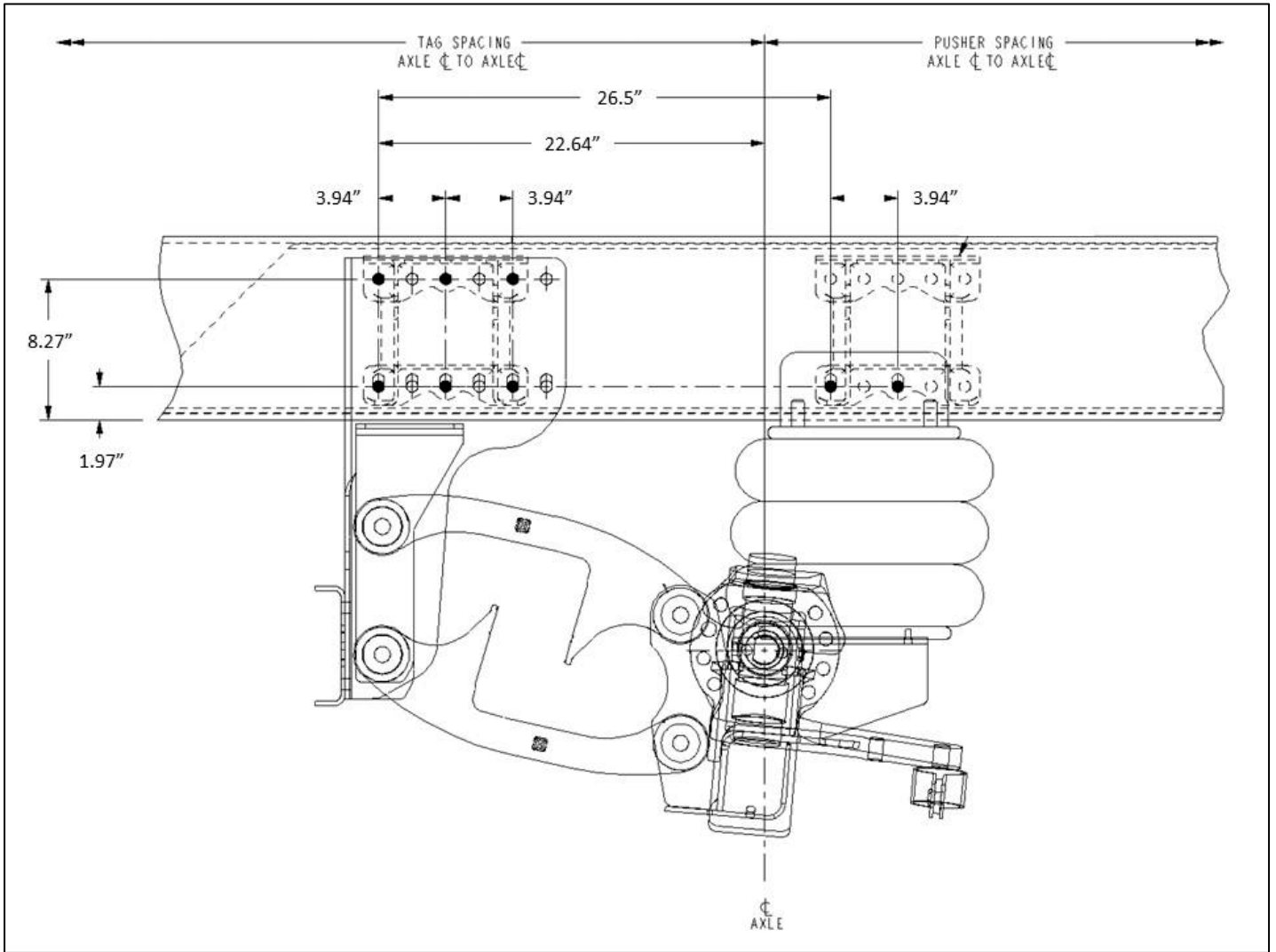


FIGURE 3-21. Hendrickson SC20 Pusher or Tag

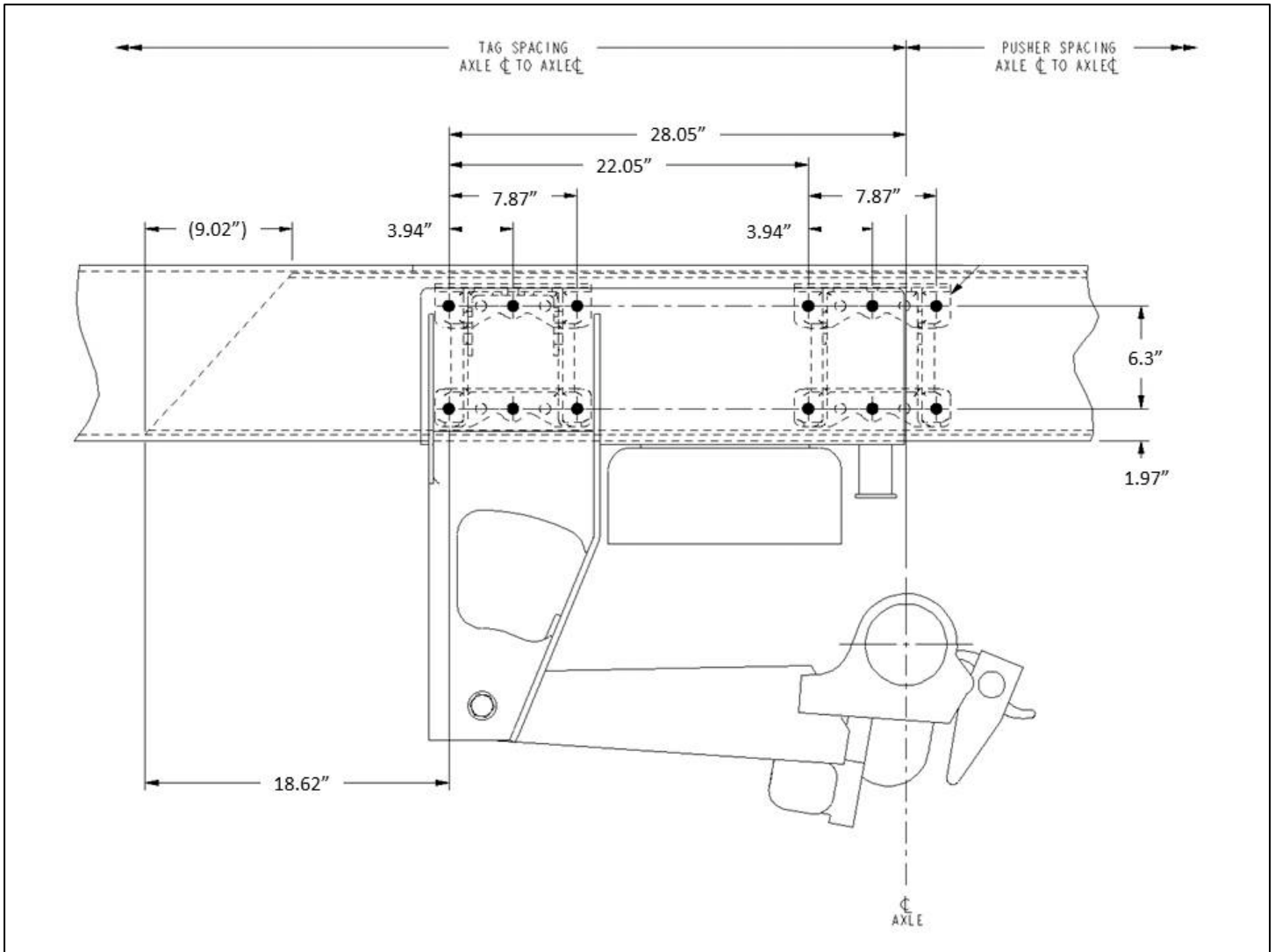


FIGURE 3-22. Hendrickson HLR2 Pusher

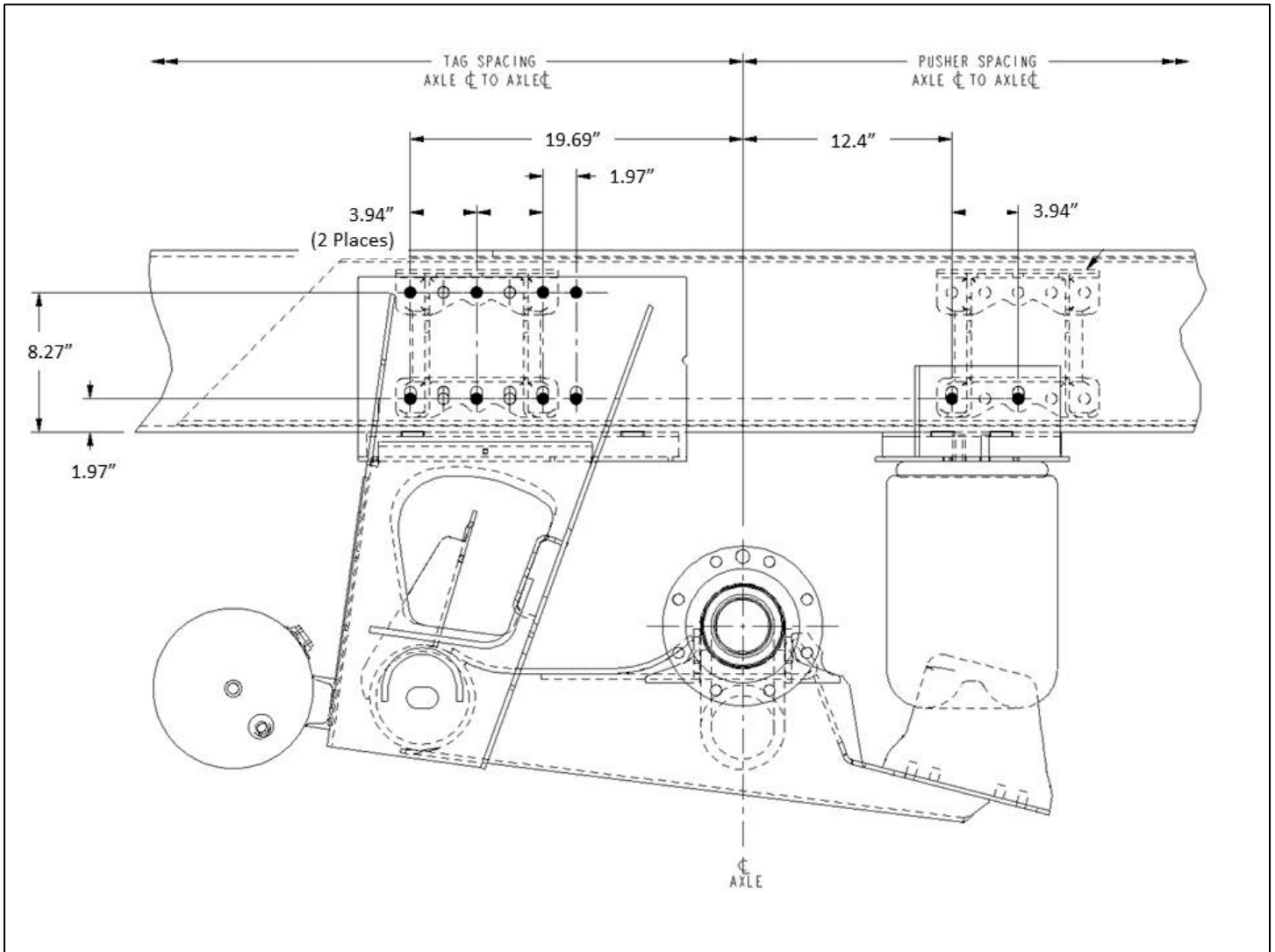


FIGURE 3-23. Hendrickson HLM Pusher or Tag

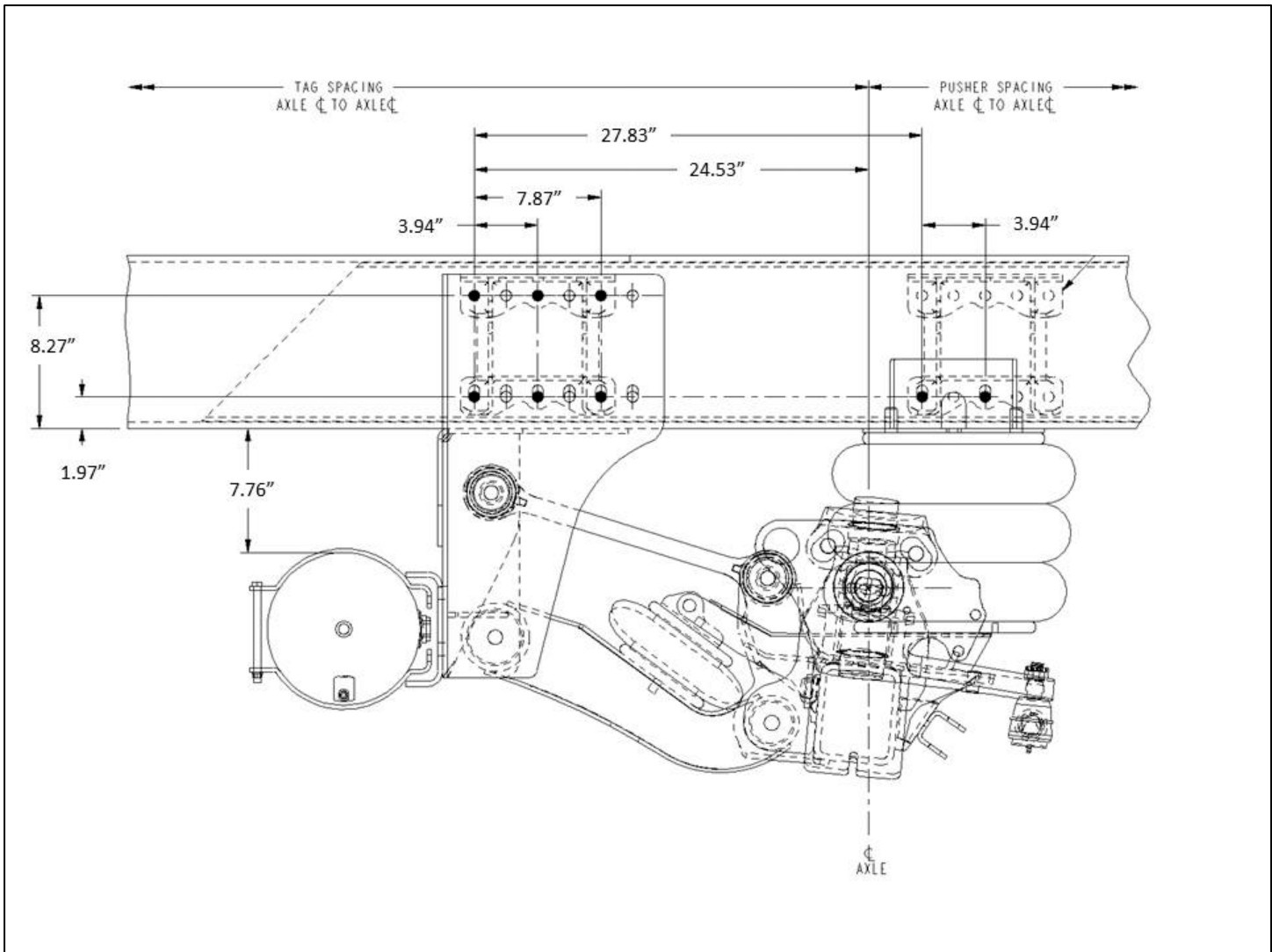


FIGURE 3-24. Watson-Chalin SL2065 Pusher or Tag

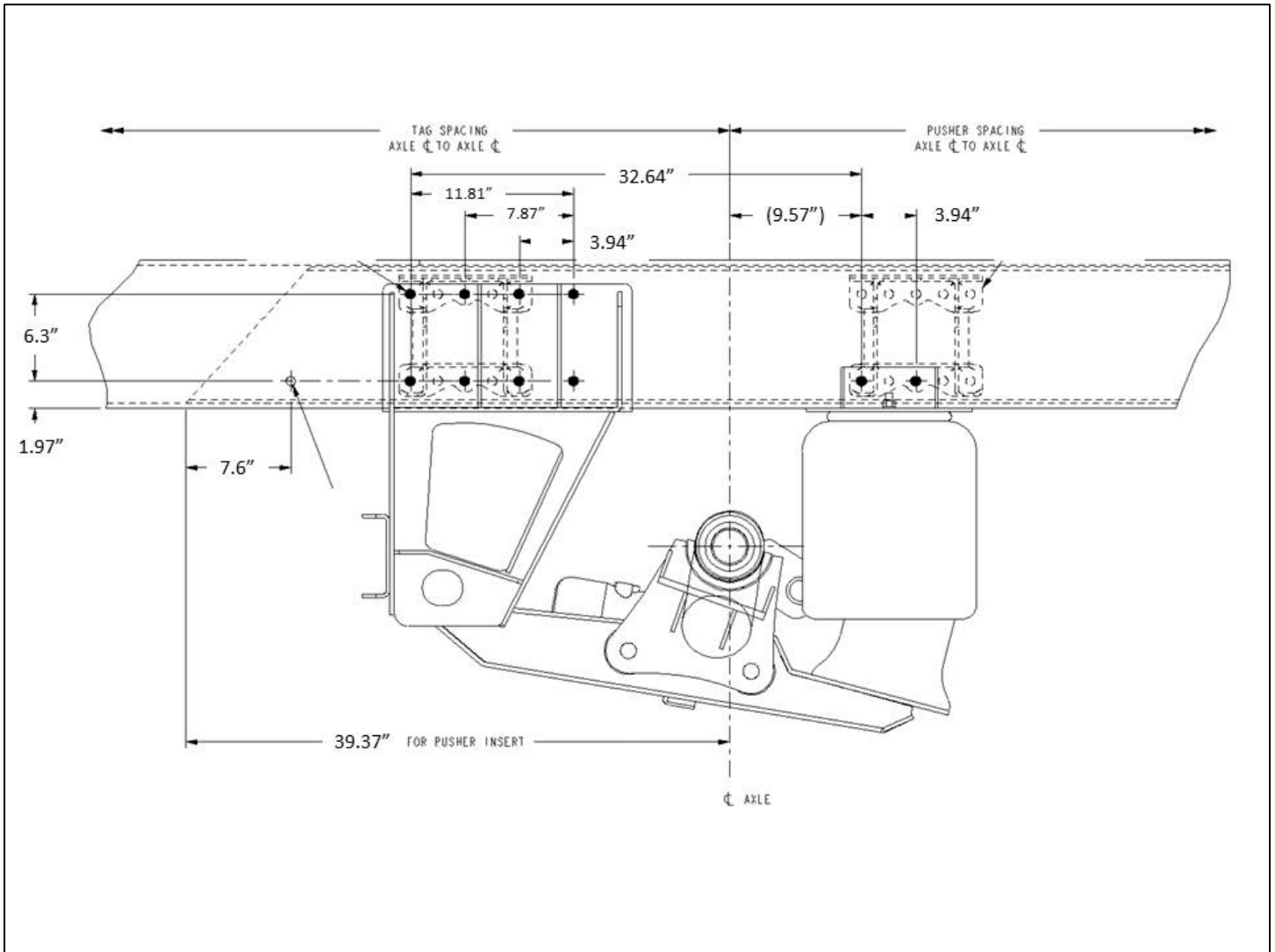


FIGURE 3-25. Watson-Chalin AL2200 Pusher or Tag

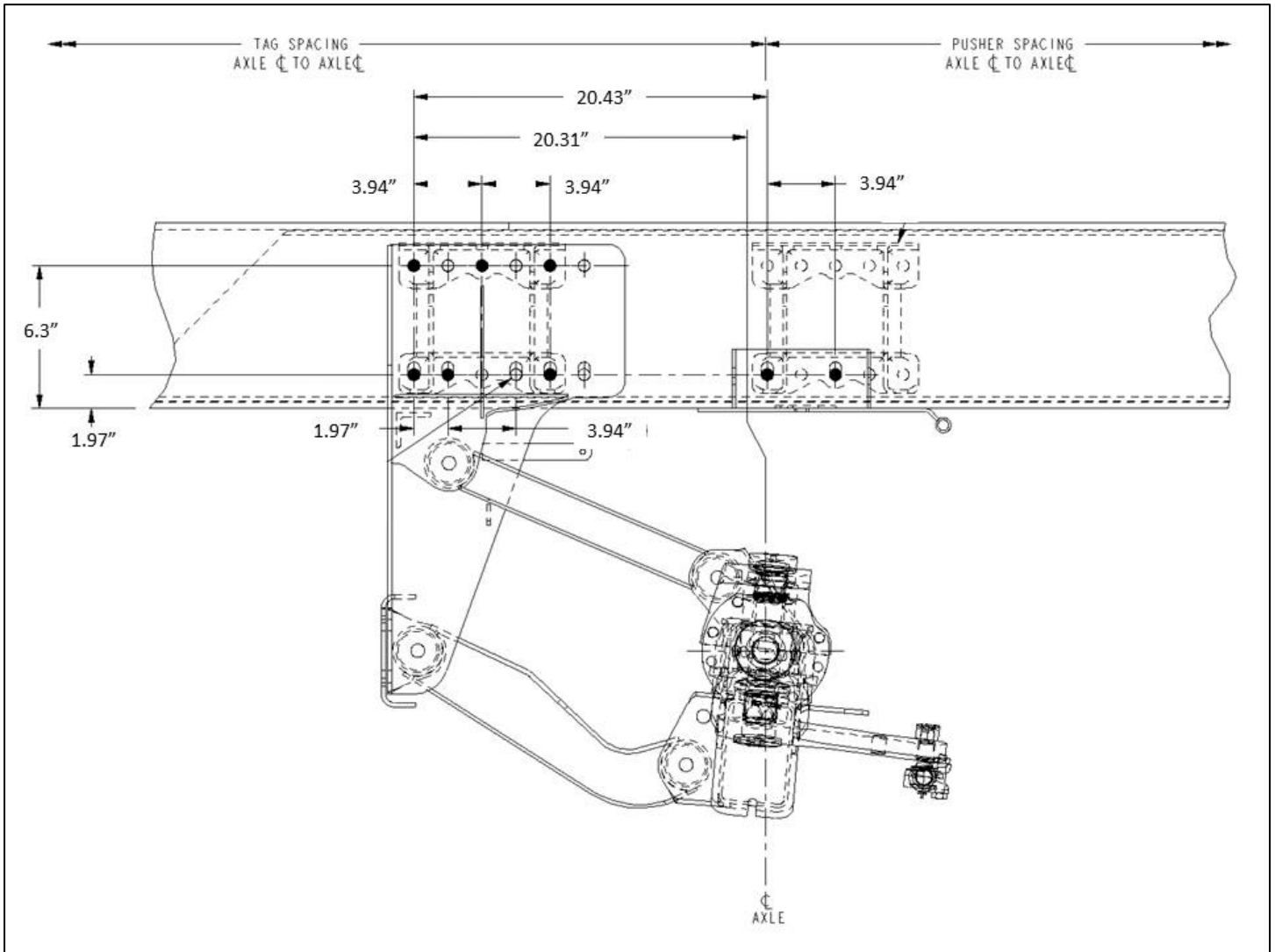


FIGURE 3-26. Watson-Chalin SL0893SSR or SL1093SSR Pusher or Tag

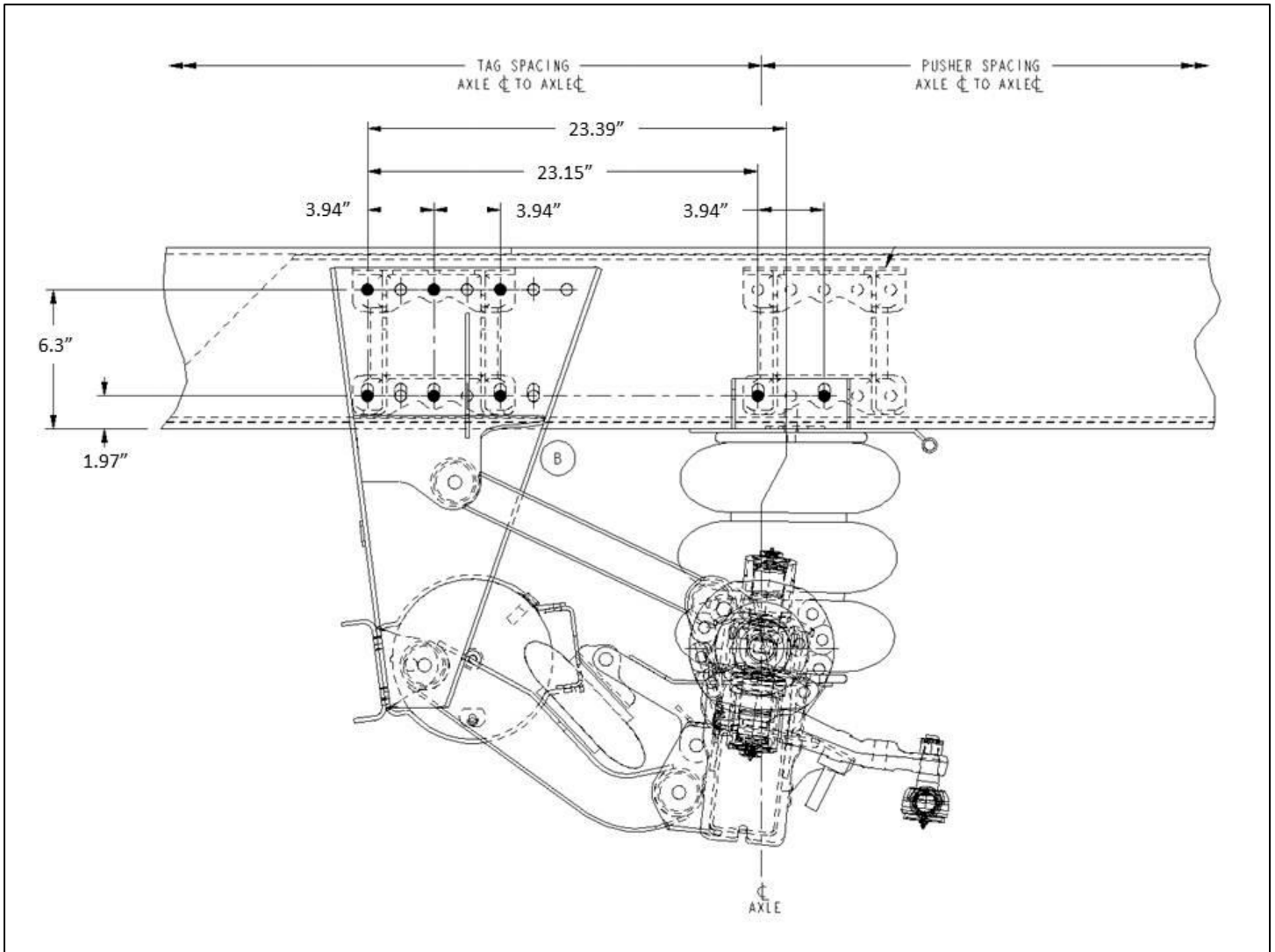


FIGURE 3-27. Watson-Chalin SL1190SSR Pusher or Tag

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 3-10. Exhaust Heights

"Y" Dimension					
Exhaust Location	ISX12 EPA 2013	ISLG	ISLG Near Zero	MX-11	PX-9 HHP PX-9 MHP
BOC Vertical	67.2"	74.2"	80.5"	84.4"	81.2" 79.7"

NOTES:

- 1) For "A" and "C" values, reference the FRAME HEIGHTS section for front or rear suspension height.
- 2) For "B" and "D" values, reference the tire manufacturer's website or catalog for static loaded radius (SLR).
- 3) For Stand Pipe Length (SPL) values, reference the truck sales order.
- 4) Not applicable to horizontal exhaust.

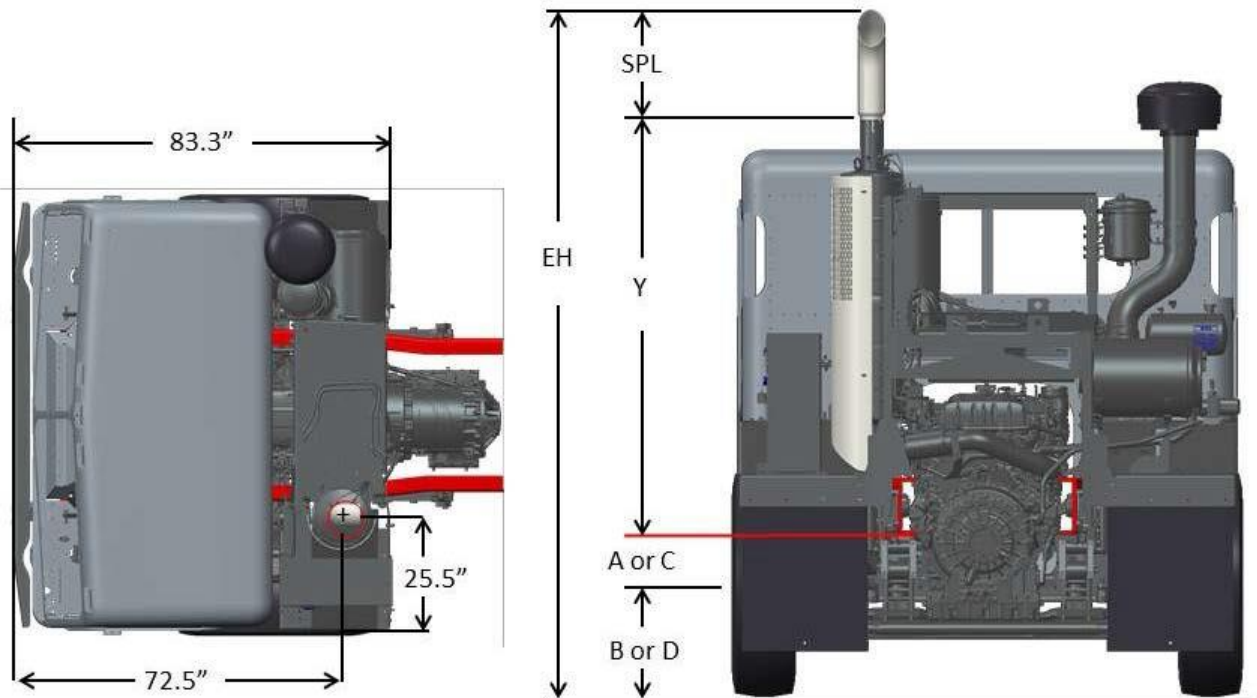


FIGURE 3-27. Exhaust Height Calculations

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 3-11. Ground Clearance

Y = DISTANCE FROM BOTTOM OF FRAME TO BOTTOM OF COMPONENT	
Component	Y
Cab Access Step	13.7"
Alum Space Saver (Shown Below)	10.0"
Steel Space Saver Battery Box	11.8"
Narrow Space Saver Battery Box	11.9"
Fender Mounted Battery Box (ISX12 EPA13 and Natural Gas)	4.4"
20" Diameter Fuel Tank	12.4"
23" Diameter Fuel Tank	15.2"
26" Diameter Fuel Tank	18.0"



FIGURE 3-28. Ground Clearance Calculations

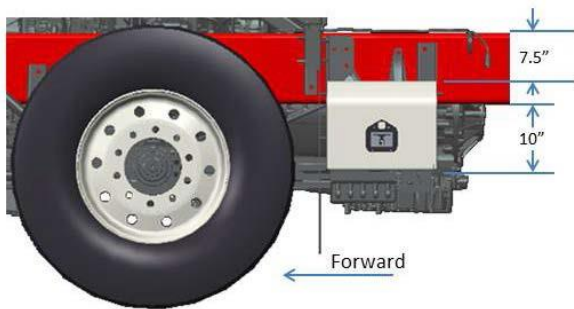


FIGURE 3-29. Space Saver Battery Box

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: $CH = (A + B + C + D) / 2 + 73.2$ "

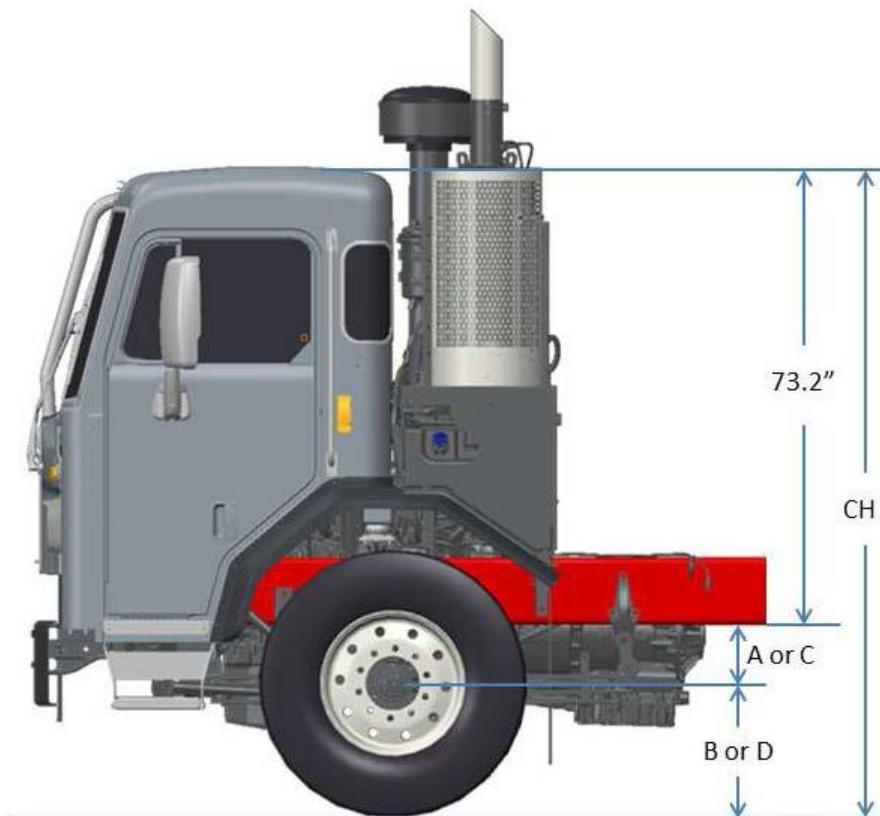


FIGURE 3-30. Overall Cab Height Calculations

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.

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

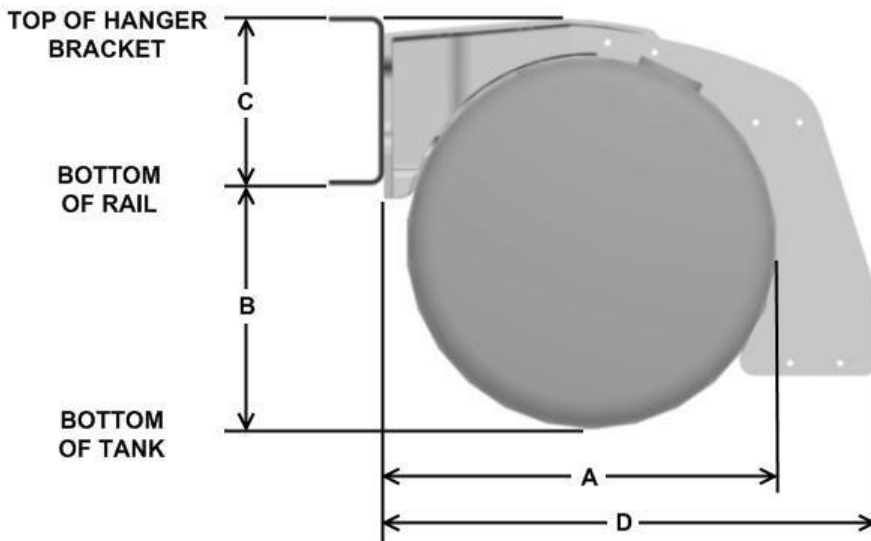


FIGURE 3-31. Fuel Tanks

TABLE 3-12. 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 3-13. Fuel Tank Data

GALLONS		H		
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	47.0
100	110	N/A	*65.1	50.5
110	121	N/A	N/A	54.2
120	131	N/A	77.3	60.0
135	147	N/A	N/A	68.8
150	163	N/A	N/A	*74.0

NOTES:

- 1) * Largest capacity without a weld seam.

EXHAUST SYSTEMS

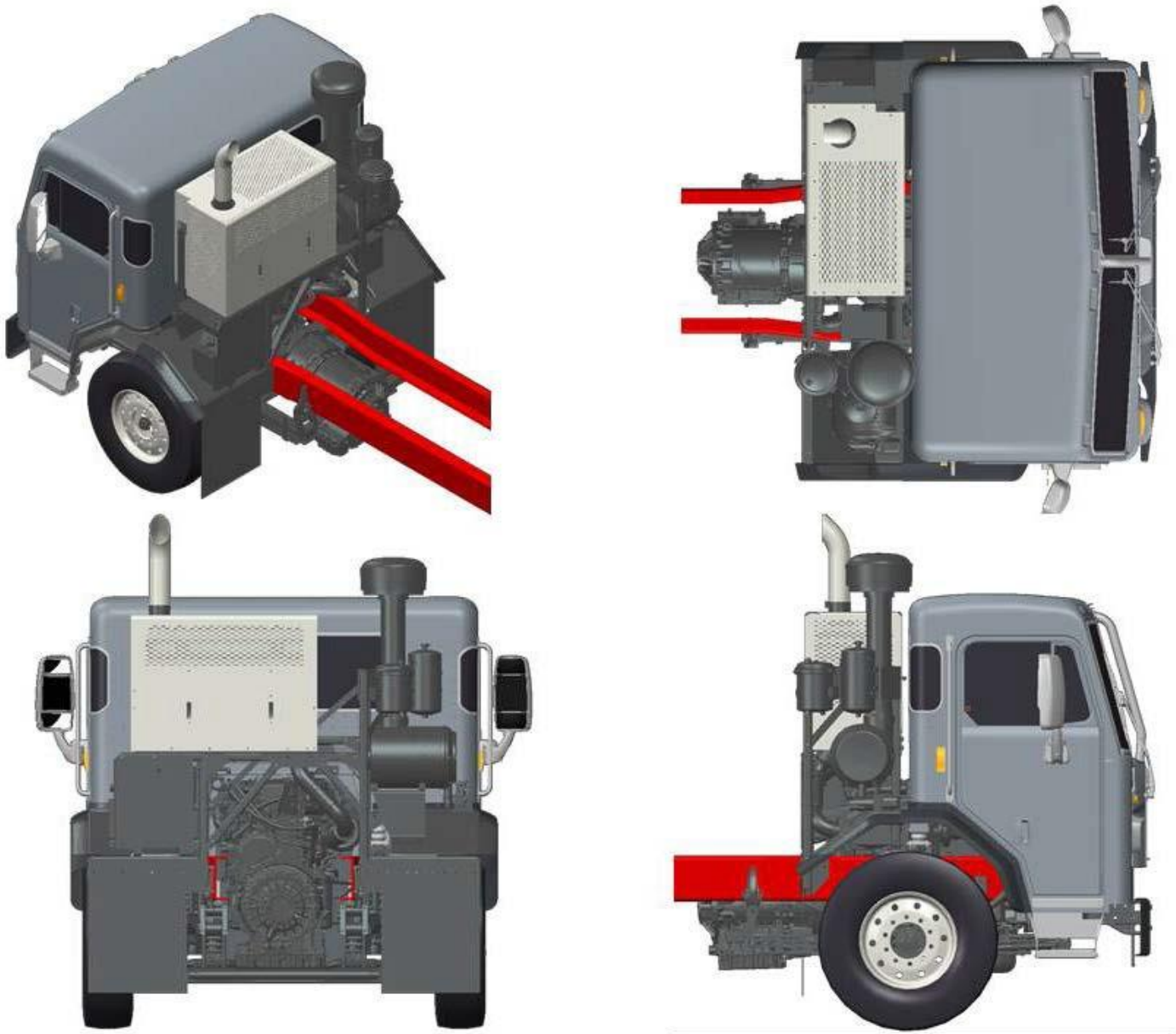


FIGURE 3-32. Exhaust Transverse DPF/SCR for ISX12 EPA 2013 Only (ISX12 didn't convert to 2017 Exhaust)

See figure 3-1 for 2017 exhaust views showing all other engine configurations.

SECTION 4 BODY MOUNTING

INTRODUCTION

This section has been designed to provide guidelines to aid in body mounting. This is not intended 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 note, an alignment adjustment is required after body installation. Front alignment and rear alignment must be performed prior to putting the vehicle into service.

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

FRAME RAILS

Frame rail information is provided in Table 4-1 and Table 4-2.

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 3/4	3.50	0.375	17.8	2,136,000	1.74

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 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⁾

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.

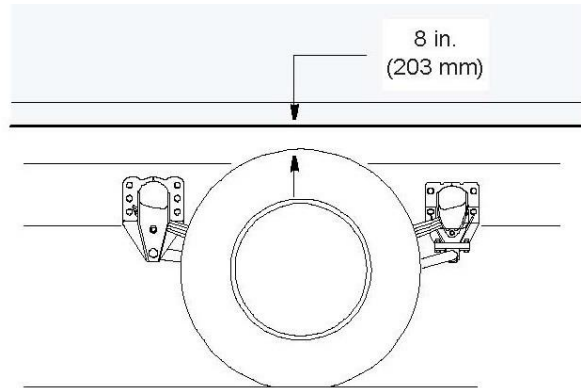


FIGURE 4-1. Minimum Clearance Between Top of Rear Tires and Body Structure Overhang



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 access to all maintenance and service components.*

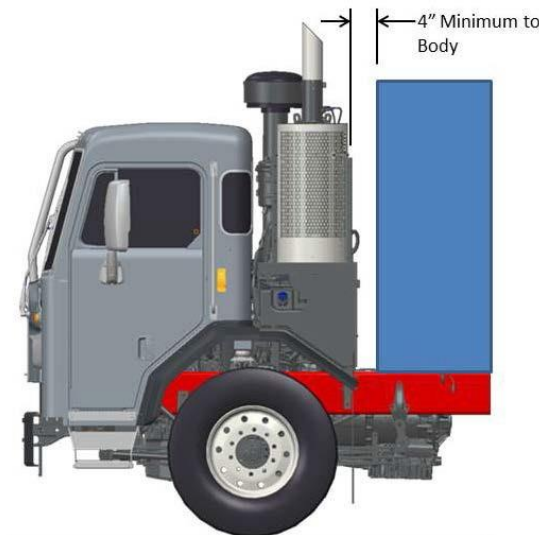


FIGURE 4-2. Minimum Back of Cab Clearance

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.

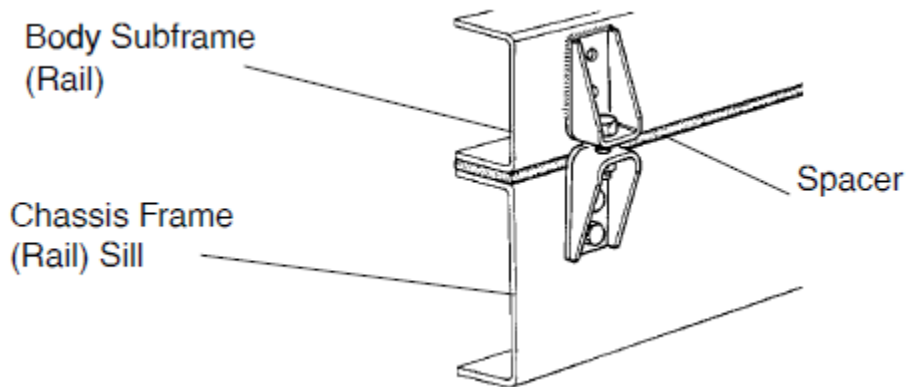
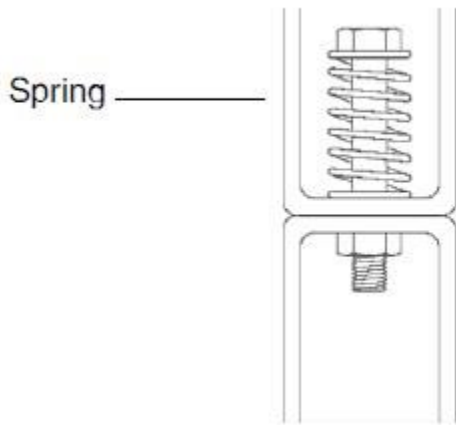
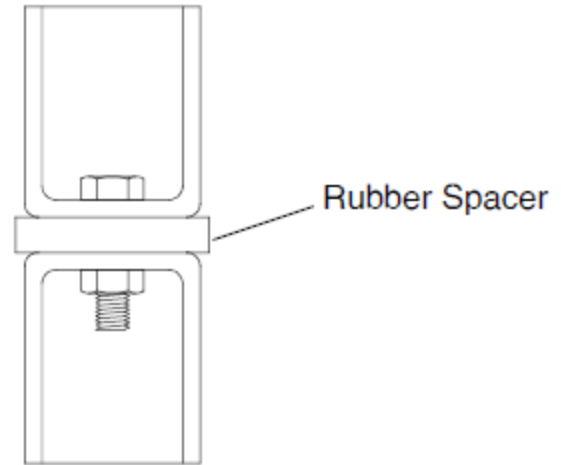


FIGURE 4-3. Spacer Between Frame Sill and Body Rail – Rubber or Plastic

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.

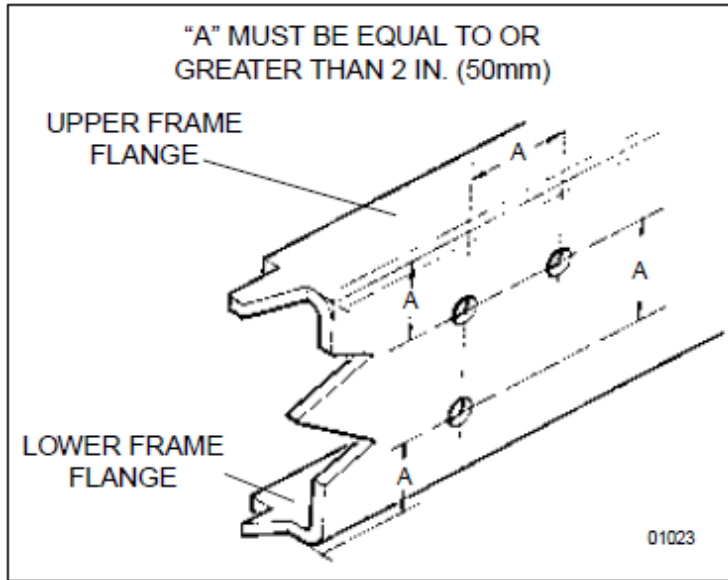


FIGURE 4-6. Hole Location Guidelines for Frame Rail and Bracket

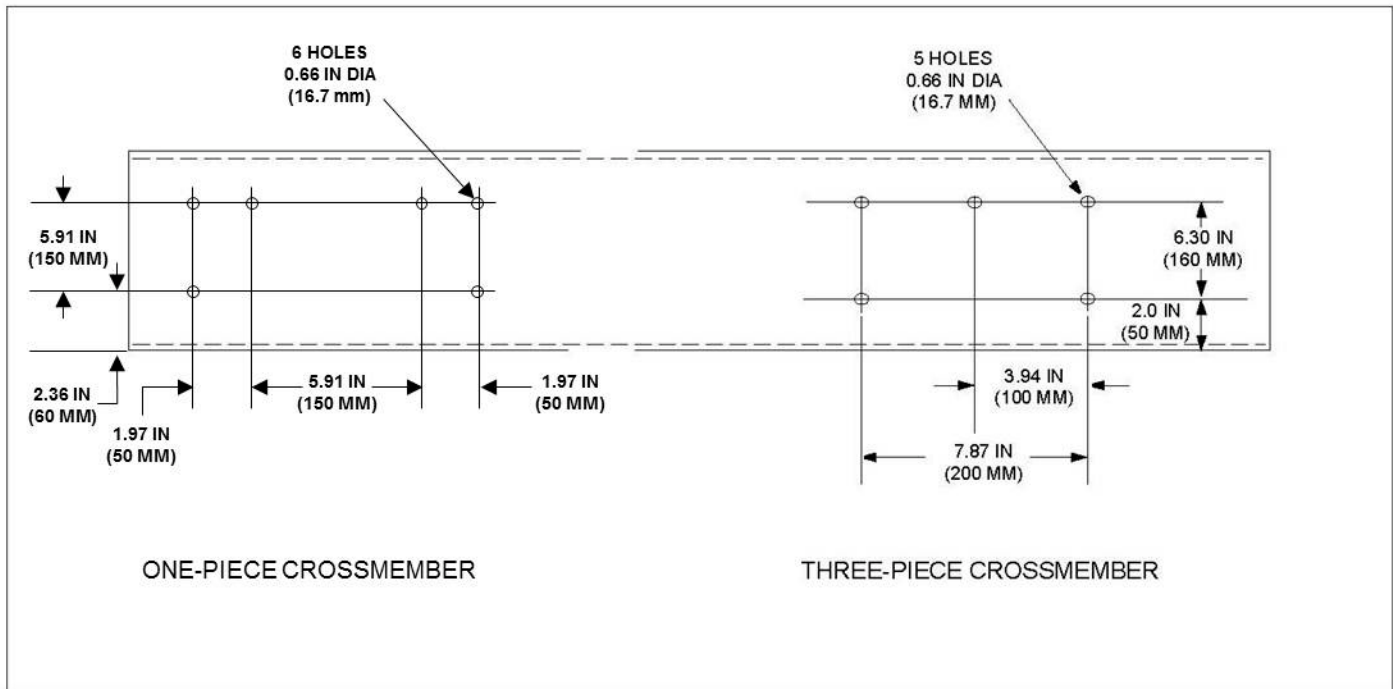


FIGURE 4-7. Crossmember Gusset Hole Patterns (Additional Holes Available in 50 mm Horizontal Increments)

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.

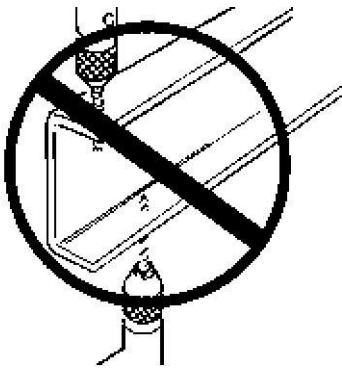


FIGURE 4-8. Frame Rail Flange Drilling Prohibited



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.

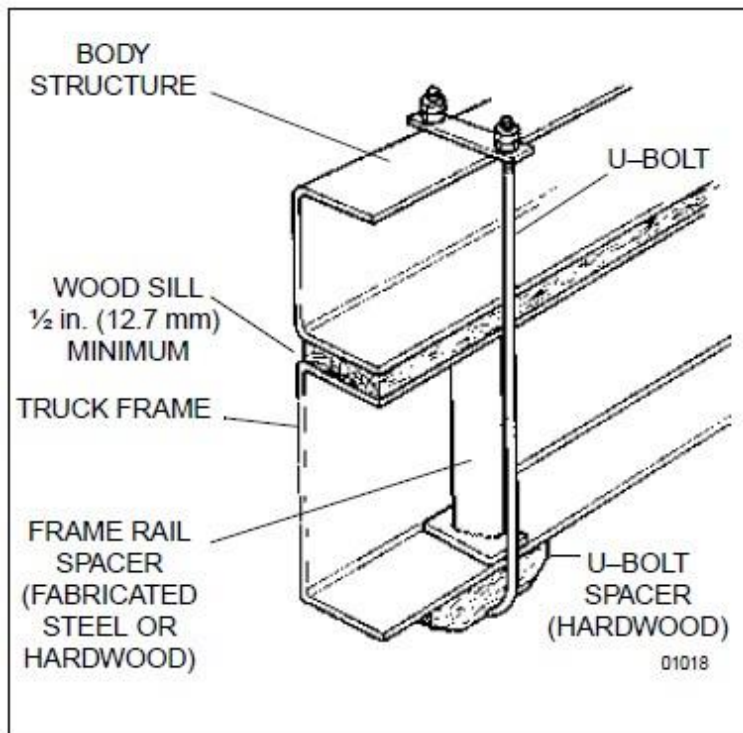


FIGURE 4-9. Acceptable U-Bolt Mounting with Wood and Fabricated Spacers



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.

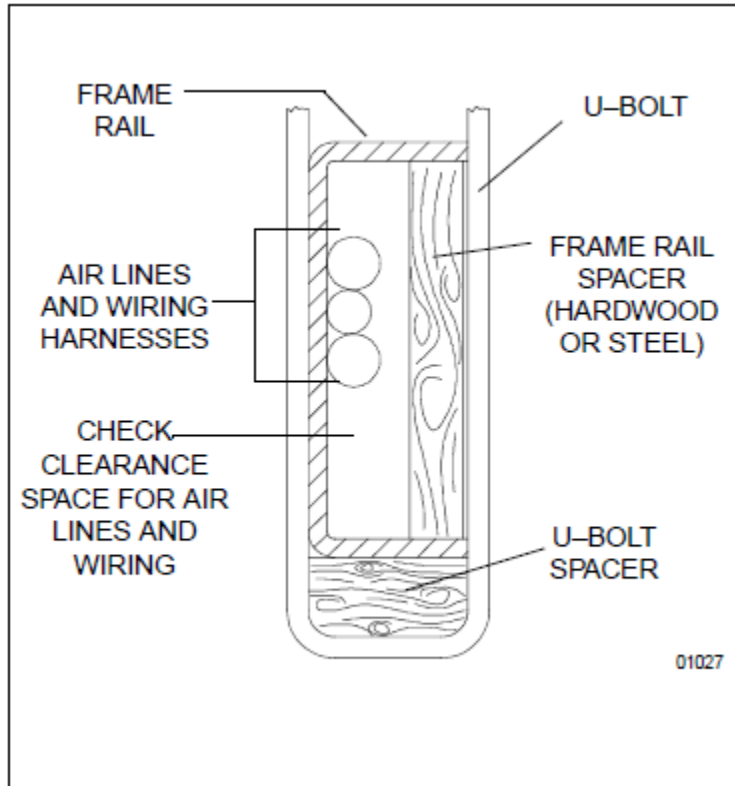


FIGURE 4-10. Clearance Space for Air Lines and Cables



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.

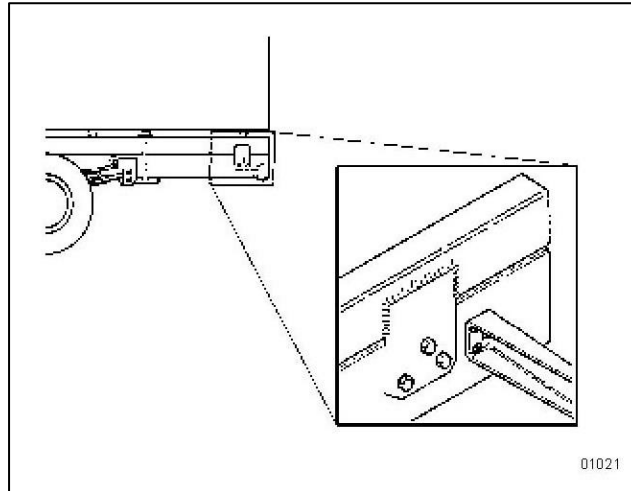


FIGURE 4-11. Fishplate Bracket at Rear End of Body

This page intentionally left blank

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.

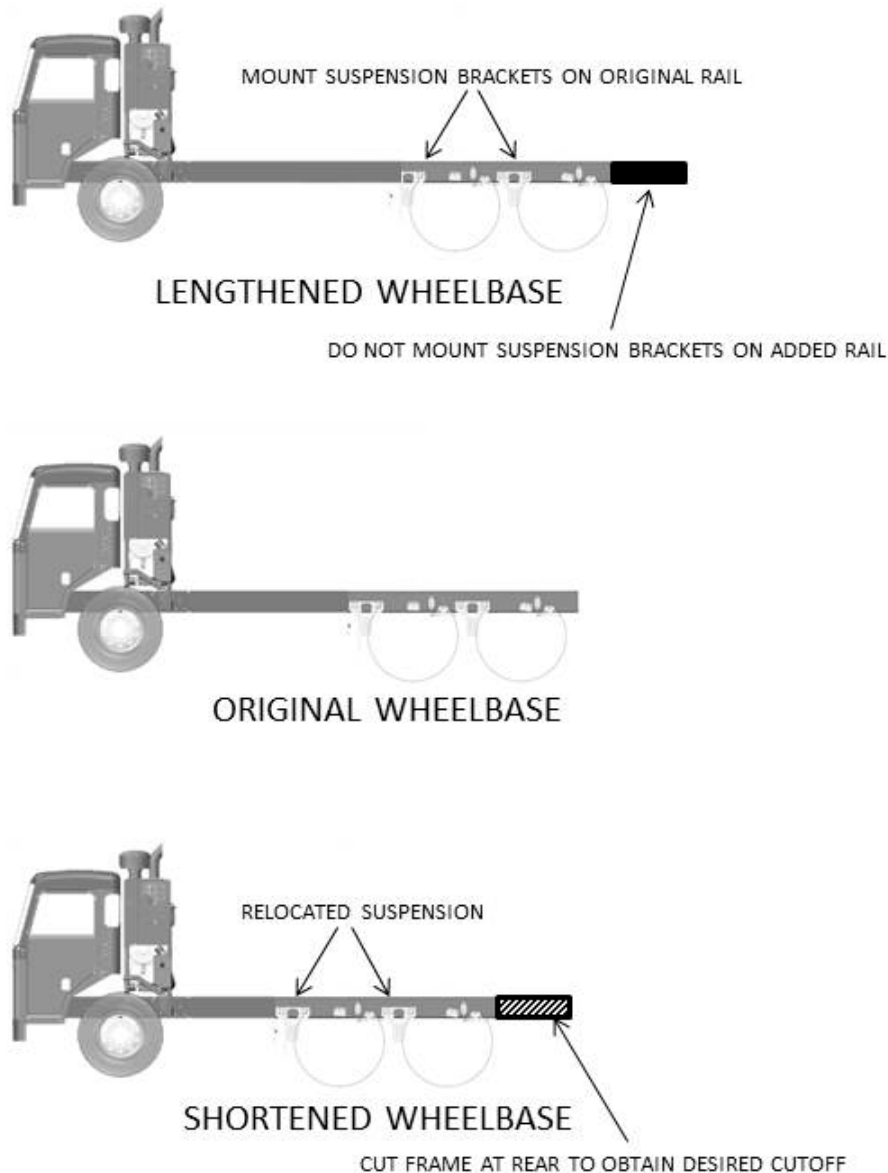


FIGURE 5-1. Wheelbase Customization

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.

Welding:

Frame rails are heat treated. Do Not Weld the frame rails.

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 5-2. See Figure 4-7 on page 4-5 for crossmember hole patterns.

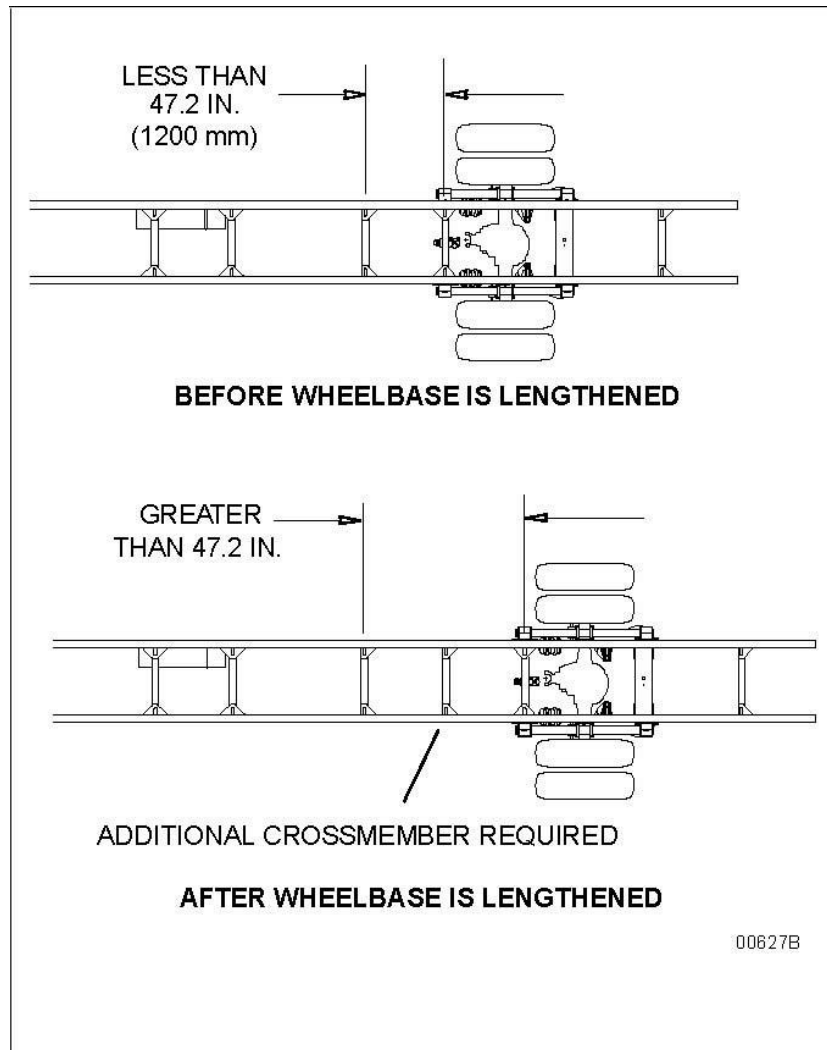


FIGURE 5-2. Crossmember Spacing Requirements

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

SECTION 6 ELECTRICAL 520 FAMILY

CONTROL UNIT IDENTIFICATION

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 2-level instrumentation integrates J-1939 CAN data communications to various components on the vehicle. This book is intended to address how to integrate aftermarket equipment while still maintaining full functionality of the OEM vehicle.

The most important advancement of NAMUX 2 instrumentation is the implementation of the CECU controlling aftermarket devices. While it is still possible to wire completely outside of the CECU system, utilizing the CECU functions will make a cleaner installation and will maintain OEM functionality. NAMUX 2 expands controls to 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.

FUNCTIONAL DESCRIPTION - CAB ELECTRONIC CONTROL UNIT (CECU)

The heart of the multiplexed instrumentation system is the CECU. The CECU is inside the center console below the cover panel. See Figure 6-1.

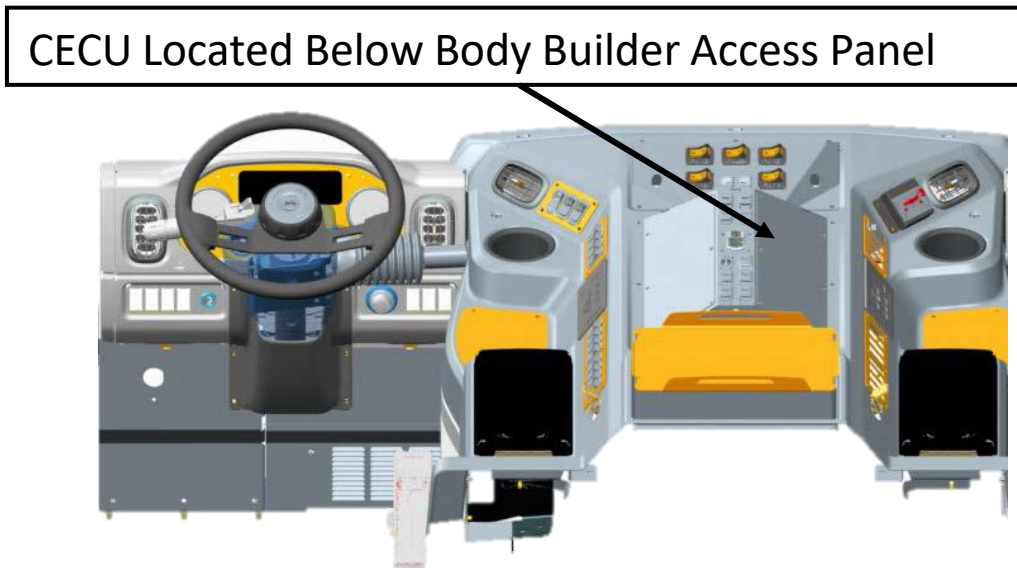


FIGURE 6-1. CECU Location

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.

HOW MULTIPLEXED INSTRUMENTS WORK

Multiplexed gauges and devices send and receive signals through the CECU located in the center console. The 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 CECU interprets this data and monitors or controls vehicle operation through the CECU software. The CECU then sends data to the gauges, warning lamps, audible alarms, and displays located inside the gauge clusters.

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 6-2).

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. Most signals, be they inputs, outputs, or databus 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.

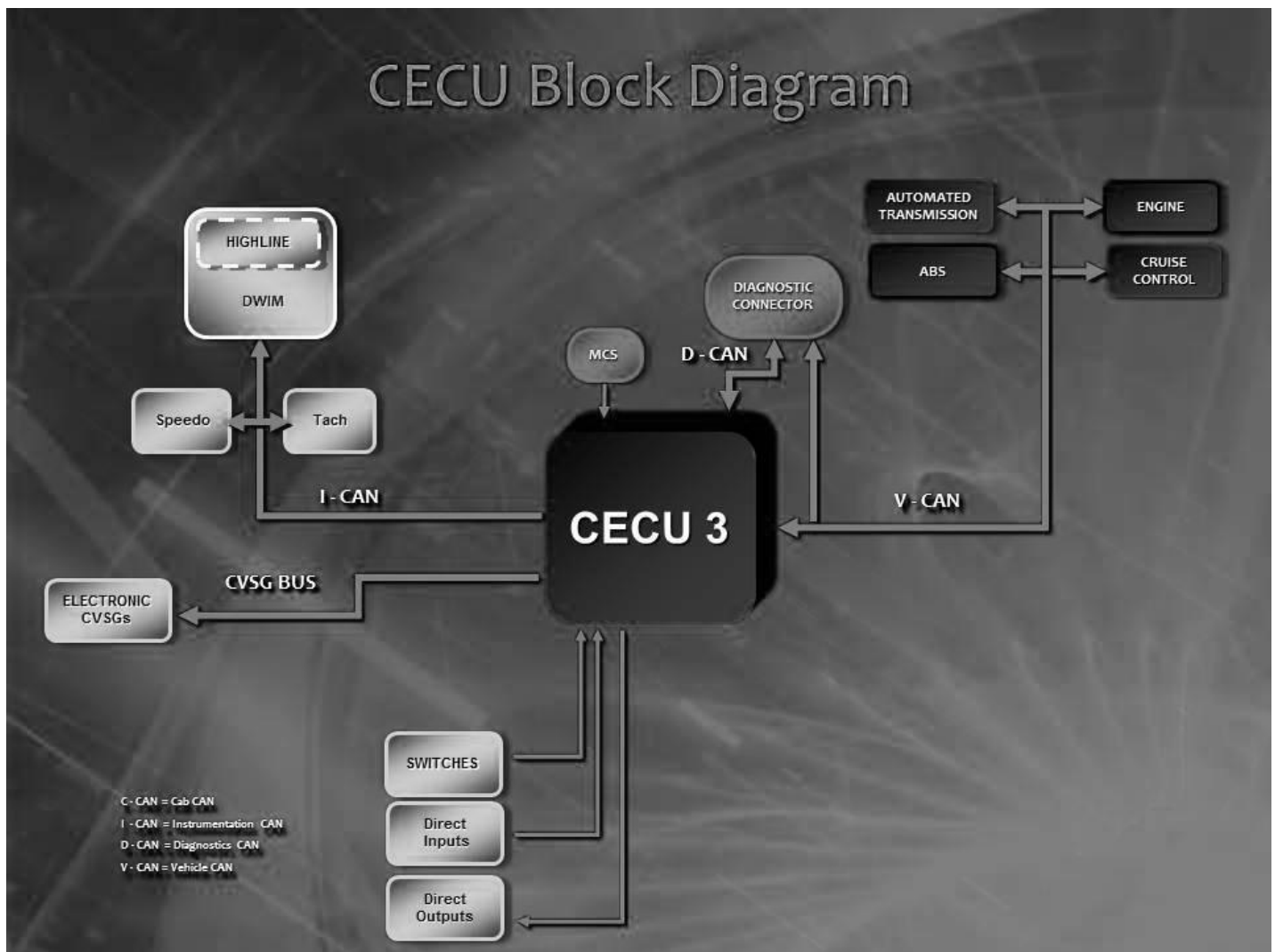


FIGURE 6-2. CECU Block Diagram

The Driver Warning Information Module (DWIM) receives input data from the CECU via the I-CAN databus. When the ignition key is first turned ON, the DWIM 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 to their mechanical limits, 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.
- The warning lamps are all activated by the CECU.

NOTE: Before replacing the 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.

ELECTRICAL INTERFACE

The multiplexed 520 electrical systems features factory installed connections for the body builder to interface the system. These connections comply with RP-170A. This design limits the need for splicing harnesses.

CAB HARNESS

The two body builder interface connections inside the cab of the 520 are located near the CECU under the cover panel of the center console (see Figure 6-3). The first body builder connection is pinned per Figure 6-6. Note that cavity 5 is only for dual steer applications. The second body builder connection is pinned per Figure 6-8. The Cab body builder harness part number is S92-6160.



FIGURE 6-3. Center Console

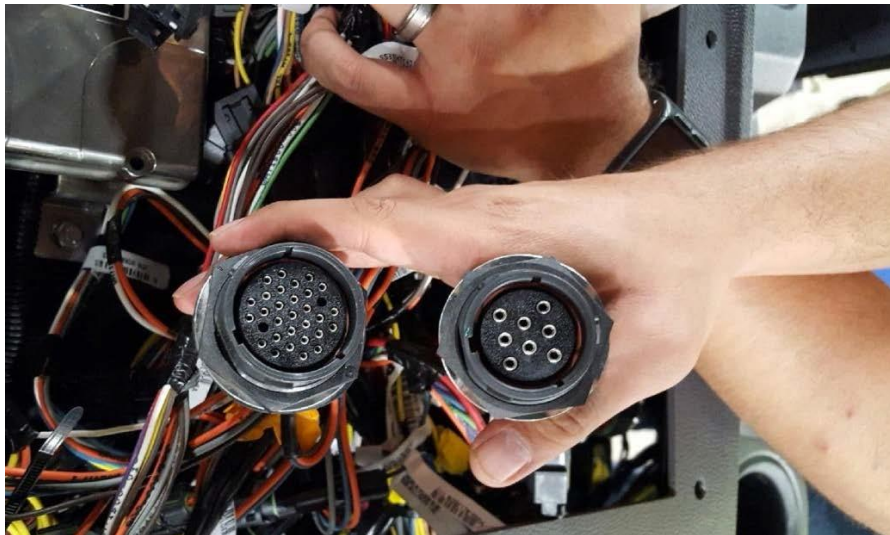


FIGURE 6-4. Body Builder Connections in Cab



FIGURE 6-5. Body Builder Connections in Cab

Cavity	Source	Type	Amp Rating	Wire Gauge	Details
1	Chassis	Power	20	12	Battery (+) thru Disconnect switch (If disconnect switch specified)
2	Chassis	Power	20	12	Hot with crank, Ignition controlled battery (+) thru Disconnect switch (If disconnect switch specified)
3	Chassis	Power	20	12	Hot with crank, Ignition controlled battery (+) thru Disconnect switch (If disconnect switch specified)
4	Chassis	Power	15	14	Battery (+) Constant Hot
5	Chassis	Power	25	12	Ignition controlled Battery (+) Controlled through Reverse circuit
6	Chassis	Ground	25	12	Ground (-) Battery Direct
7	Chassis	Ground	25	12	Ground (-) Battery Direct
8	Chassis	Ground	25	12	Ground (-) Battery Direct

Figure 6-6. Cab Body Builder Connection 1

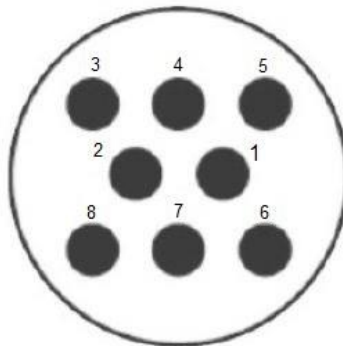


Figure 6-7. Cab Body Builder Connection 1 Pin Assignment

Cavity	Name	Source	Type	Function	Capacity (amps)	Wire (AWG)
1	tachometer	engine	signal	tachometer	0.1	18
2	ECM common	engine	ground	electronic ground reference	1	18
3	throttle limit	engine	signal	Throttle	0.1	18
4	throttle advance	engine	signal	Throttle	0.1	18
5	J1939-15	engine	signal	communication	0.1	18
6	J1939-15	engine	signal	communication	0.1	18
7	input 1	engine	signal	input	0.1	18
8	input 2	engine	signal	input	0.1	18
9	input common	engine	ground	electronic reference	1	18
10	input 3	engine	signal	input	0.1	18
11	input 4	engine	signal	input	0.1	18
12	input 5	engine	signal	input	0.1	18
13	input 6	engine	signal	input	0.1	18
14	input 7	engine	signal	input	0.1	18
15	input 8	engine	signal	input	0.1	18
16	speedometer	transmission	signal	speedometer	0.1	18
17	TCU common	transmission	ground	electronic ground reference	10	18
18	prog. Input 1	transmission	signal	input	0.1	18
19	prog. Input 3	transmission	signal	EOS enable typ.	0.1	18
20	prog. Input 4	transmission	signal	input	0.1	18
21	prog. Input 5	transmission	signal	autoneutral typ.	0.1	18
22	prog. Input 6	transmission	signal	input	0.1	18
23	prog. Input 9	transmission	signal	service brake status typ.	0.1	18
24	prog. Input 10	transmission	signal	autoneutral typ.	0.1	18
25	prog. Output 1	transmission	signal	FOS signal typ.	0.5	18
26	prog. Output 3	transmission	signal	neutral indicator typ.	2	18
27	prog. Output 4	transmission	signal	output speed indicator typ.	0.5	18
28	prog. Output 6	transmission	signal	trans temp typ.	0.5	18
29	prog. Output 7	transmission	signal	output	0.5	18
30	prog. Output 8	transmission	signal	reverse typ.	2	18
31	spare	transmission	signal	spare	0.5	18

FIGURE 6-8. Cab Body Builder Connection 2

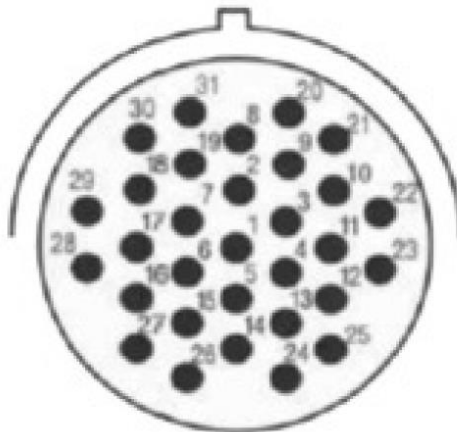


Figure 6-9. Cab Body Builder Connection 1 Pin Assignment

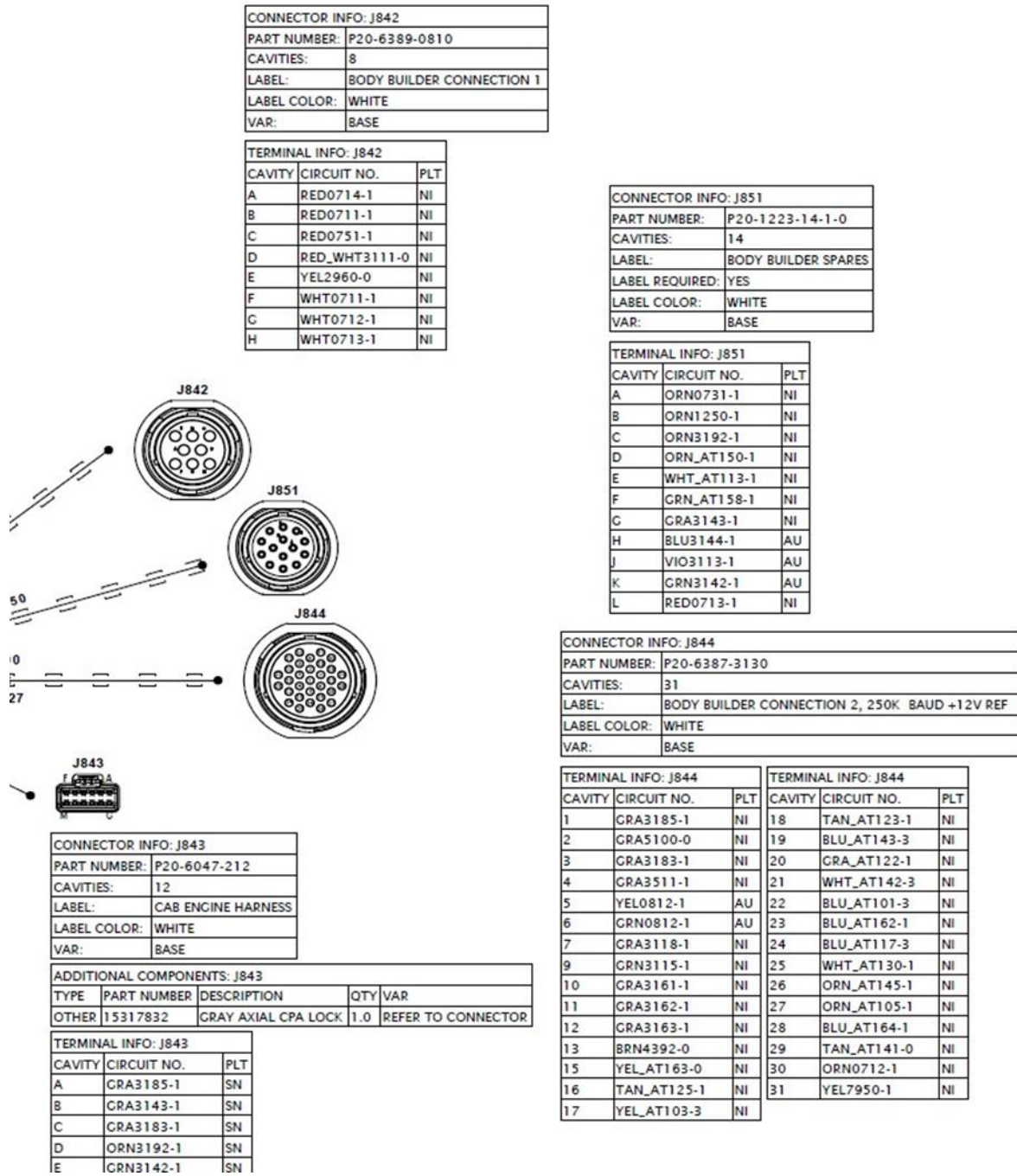


FIGURE 6-10. Harness S92-6160 Body Builder Connectors

The gas engines have a separate harness S92-6160 for the J1939 signal as shown in Figure 6-11 and 6-12. The gas engine harness S92-6160 is located in the same location as the other body builder cab harnesses in Figure 6-5 under the center console panel.

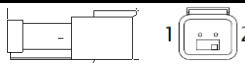
Engine	CAN Bus	Connector
Gas Engine	V-CAN (250Kbd)	2-way Connector 

FIGURE 6-11. Harness S92-6160 Body Builder Connectors

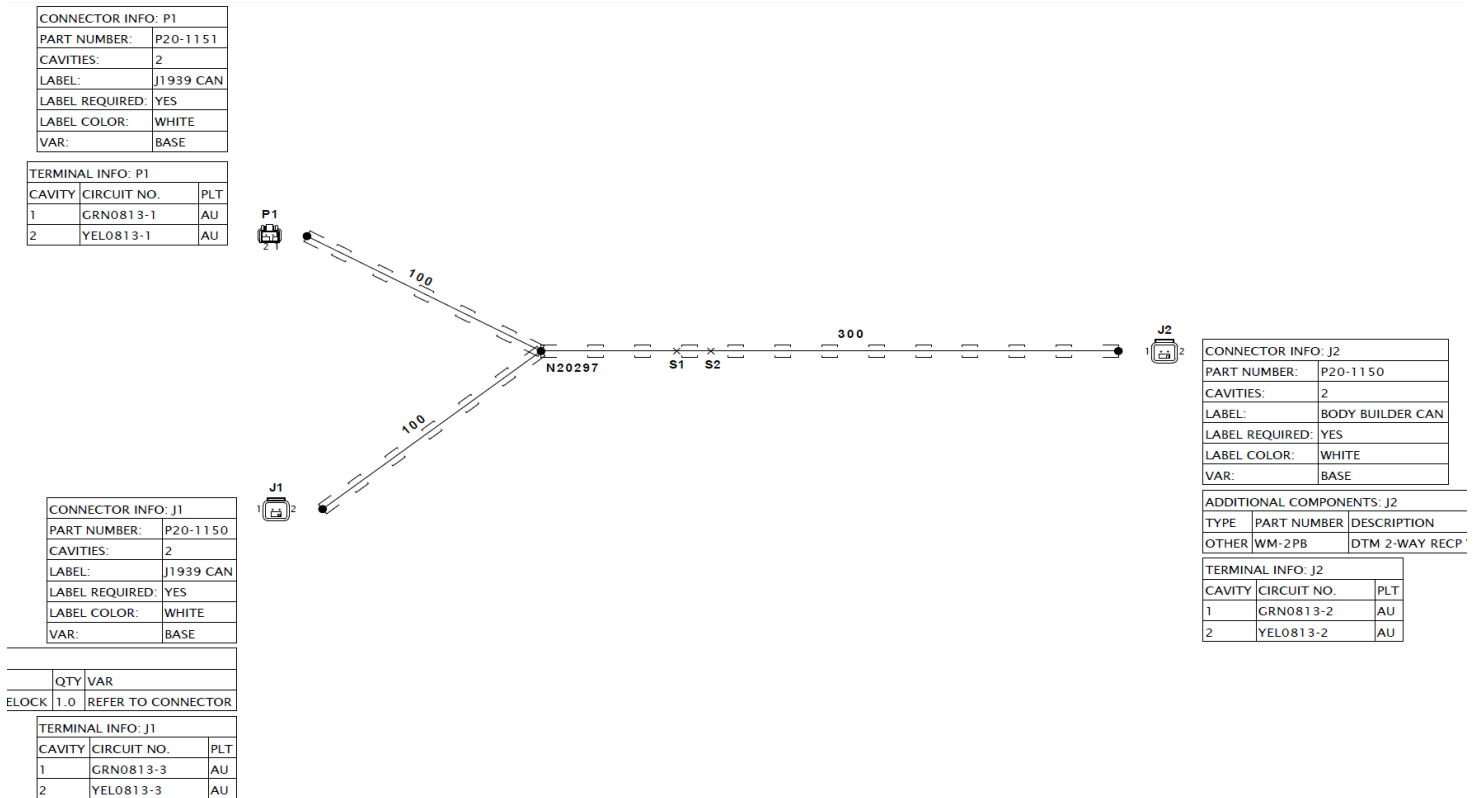


FIGURE 6-12. Harness S92-6160 Body Builder Connectors

CHASSIS HARNESS

The body builder connection that interfaces the chassis harness is located inside the right hand frame rail adjacent to the transmission per Figure 6-13. The chassis body builder connection is pinned per Figure 6-14.

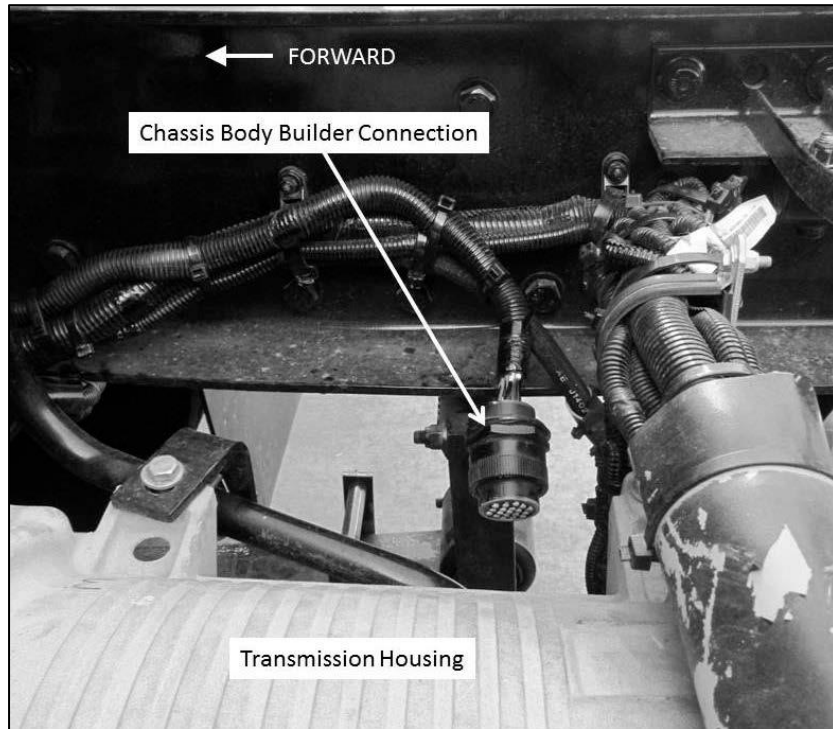


FIGURE 6-13. Chassis Body Builder Interface Location

Cavity	Name	Source	Type	Function	Capacity (amps)	Wire (AWG)	Details
1	Ground	Chassis	Ground	Battery, Direct	75	4	Battery Constant Ground
2	Backup	Chassis	Signal	Lamp	15	12	via ECU, if equipped
3	Left Stop/Turn	Chassis	Signal	Lamp	5	16	via ECU, if equipped
4	Right Stop/Turn	Chassis	Signal	Lamp	5	16	via ECU, if equipped
5	Tail/Marker	Chassis	Signal	Lamp	10	14	via ECU, if equipped
6	Clearance	Chassis	Signal	Lamp	10	14	via ECU, if equipped
7	Stop	Chassis	Signal	Lamp	10	14	via ECU, if equipped
8	Plugged - reserved work lamp	Chassis	Signal	Lamp	-	-	via ECU, if equipped
9	Plugged - reserved strobe lamp	Chassis	Signal	Lamp	-	-	via ECU, if equipped
10	Plugged	-	-	-	-	-	-
11	Plugged	-	-	-	-	-	-
12	Plugged	-	-	-	-	-	-
13	Left Turn	Chassis	Signal	Lamp	5	16	via ECU, if equipped
14	Right Turn	Chassis	Signal	Lamp	5	16	via ECU, if equipped

FIGURE 6-14. Chassis Body Builder Connection

BODY BUILDER HARNESS EXTENSIONS

Extension harnesses have been designed to ease in the installation of aftermarket electrical components. The extensions can be utilized to prevent the need to cut and splice the production harnesses. These extensions have a mating connector for the corresponding factory harness on one end and open wires on the other end. The extensions can be purchased from PACCAR Parts. The harness available to extend from the second body builder connector (J844) of the cab harness is P92-9276.

OPTIONAL BODY BUILDER PTO MODULE

The optional PTO module adds PTO mode, vehicle speed control, engine torque limits, and engine RPM control functions similar to VECU on 2.1M product. This is accomplished via a simple hardwired interface for customers who do not use CAN-based controls. The module has four customer interface connections: P197C, P197N, J197Q, and J195A. The module comes pre-programmed with both CAB and Remote stations enabled, and requires feedback from the PTO on J195A or a customer installed switch on J197Q Pin 2 to activate PMC. J197Q Pin 3 is used to switch between the two locations, open circuit will enable CAB and therefore CAB is the default, while grounding the pin will enable Remote. Only the CAB dash switches ON/OFF and SET/RES are factory installed. The PMC switch, PMC Location switch, Preset switches, and remote station controls are left for the customer to install and customize to their needs. Please reference the Body Builder PTO Module Programming Guide for additional integration information, available on Peterbilt.com under the "Resources & Support" tab.

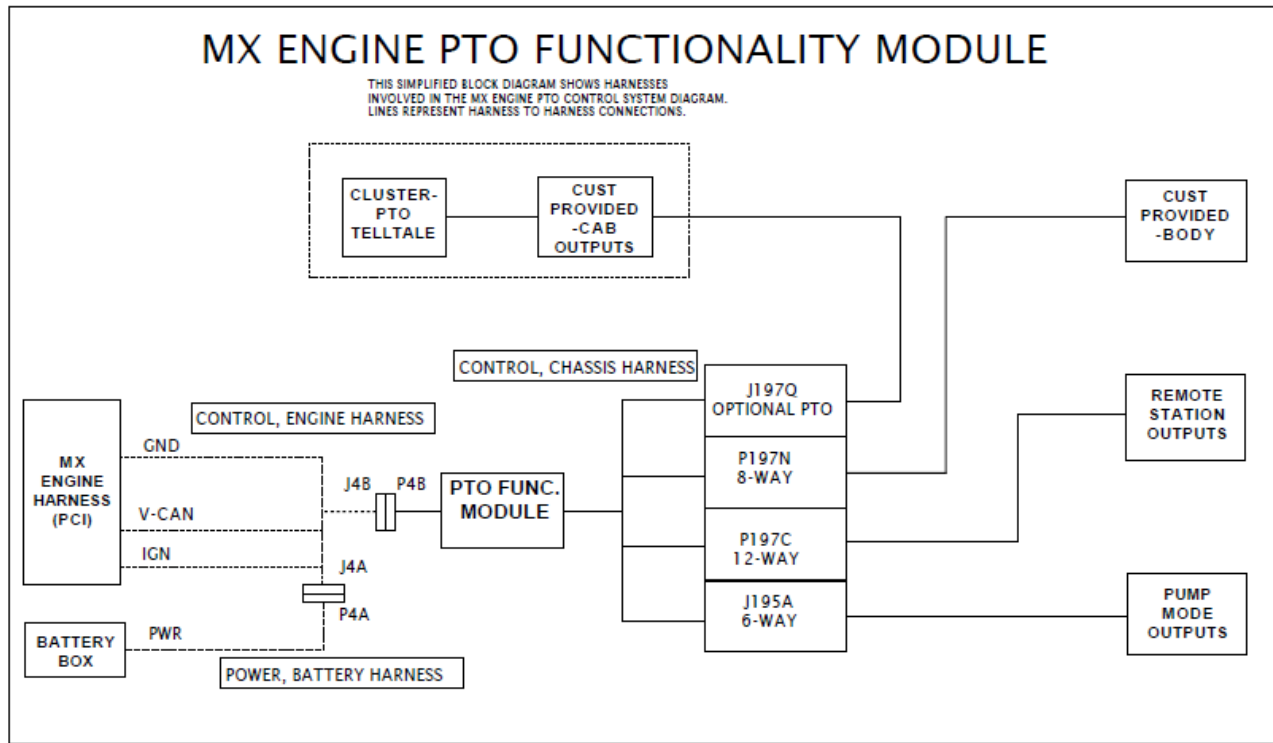


FIGURE 6-15. Optional PTO Module Block Diagram

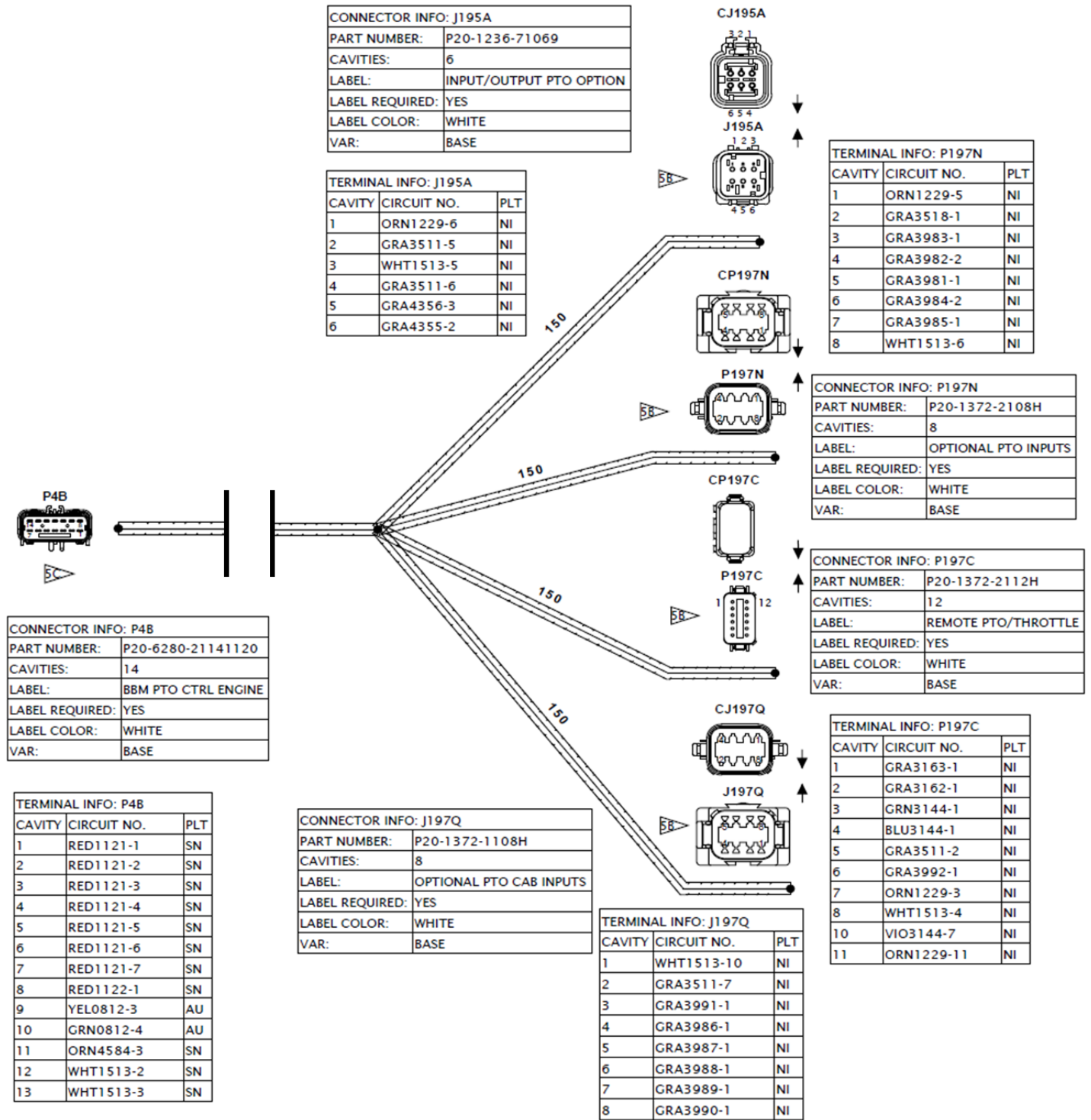


FIGURE 6-16. Body Builder Module Control Harness A92-6061

Pin	P197C 12-Way, REMOTE PTO/THROTTLE
1	Remote Resume/Decel
2	Remote Set/Accel
3	Remote Throttle Return
4	Remote Throttle Signal
5	PTO #1 Engaged
6	Remote PTO On/Off
7	10A Ignition Power
8	Vehicle Ground
10	Rem Throttle +5V Supply
11	20A Engine Power

CONNECTOR P197C

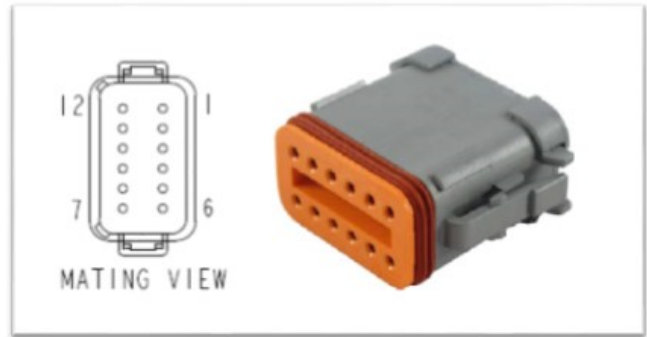


FIGURE 6-17. Customer Interface P197C Connector – Pinouts

Pin	P197N 8-Way, OPTIONAL PTO INPUTS
1	Ignition Power
2	Custom Interlock
3	Rem PTO Preset 3
4	Rem PTO Preset 2
5	Rem PTO Preset 1
6	Rem PTO Preset (+) (1 - 8)
7	Rem PTO Preset (-) (1 - 8)
8	Vehicle Ground

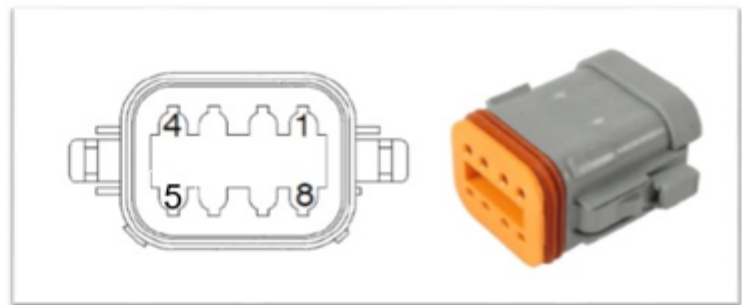


FIGURE 6-18. Customer Interface P197N Connector – Pinouts

Pin	J197Q 8 Way, OPTIONAL PTO CAB INPUTS
1	Vehicle Ground
2	PMC Switch
3	Cab/Remote Selector
4	Cab Preset Increment (+)
5	Cab Preset Decrement (-)
6	Cab Preset #1
7	Cab Preset #2
8	Cab Preset #3

CONNECTOR J197Q

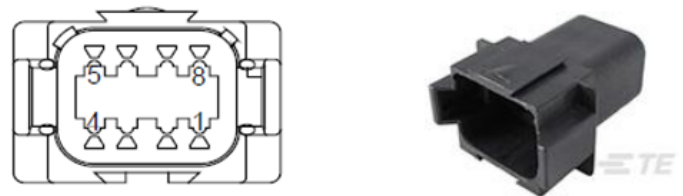


FIGURE 6-19. Customer Interface P197Q Connector – Pinouts

Pin	J195A 6- Way, INPUT/OUTPUT PTO OPTION
1	Ignition Power
2	PTO #1 Engaged
3	Vehicle Ground
4	Pump Mode/RAX De-clutch
5	PMC Active
6	Interlock Active

CONNECTOR J195A

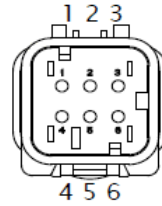



FIGURE 6-20. Customer Interface P195A Connector – Pinouts

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 2017 Emissions and later compliant engines include J1939-15 circuitry. The J1939 circuit can be accessed under the cover panel of the center console with the body builder cab harness connections (reference Figure 6-3 for access location).

J1939 ACCESS PROCEDURES

1. Identify J1939 Access Connector
2. Disconnect connection

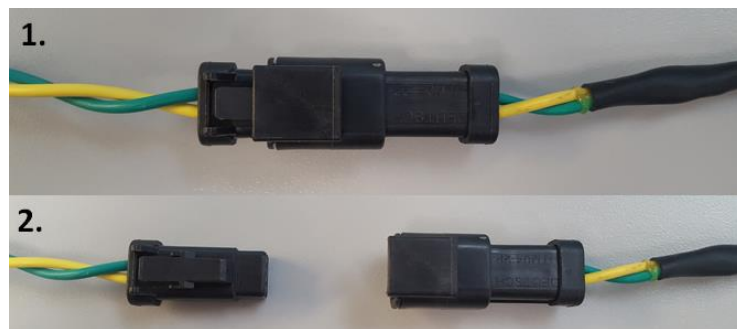


FIGURE 6-21. J1939 Access

3. Make connection in between original connection.



FIGURE 6-22. J1939 Access

SECTION 7 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.

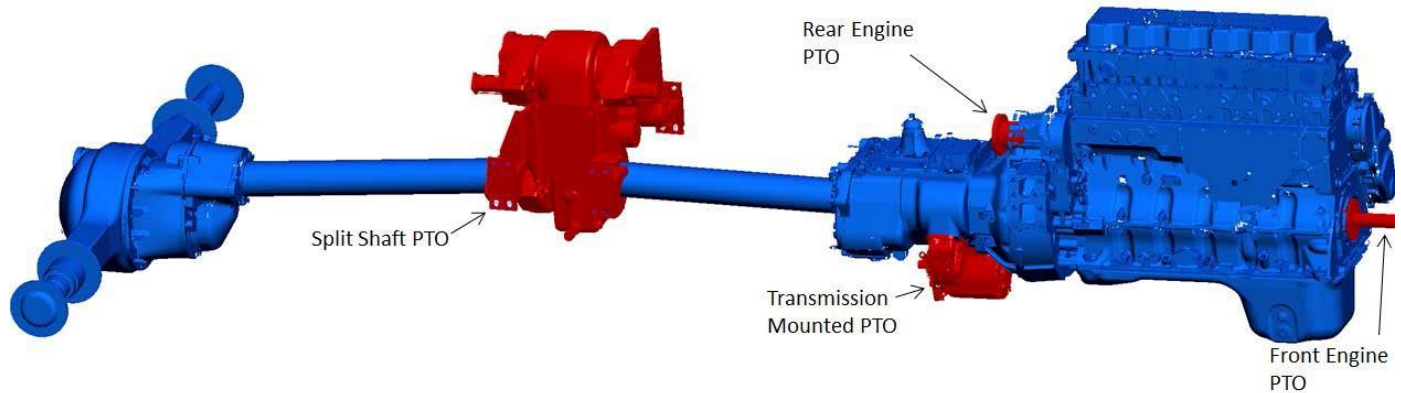


FIGURE 7-1. Power Take-Off Locations

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. There is a 6 bolt PTO on the right and an 8 bolt PTO on the bottom left (Figure 7.2). For more information go to www.roadranger.com and enter "PTO Installation Guide" in the search bar in the upper right corner.

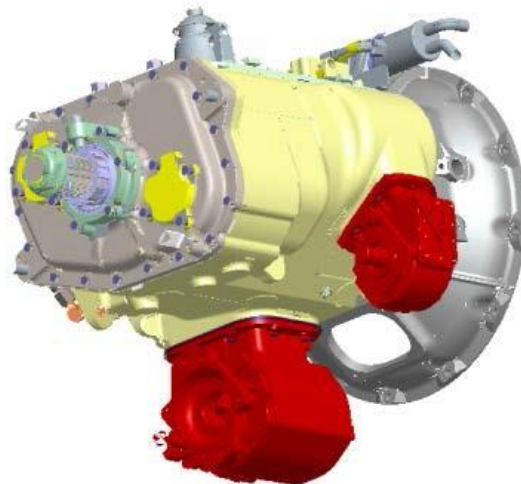


FIGURE 7-2. HD Manual Transmission

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 7-3. The 4000HS transmissions do not have any PTO locations. The 3000 series Allison transmissions have PTO locations at 4 and 8 o'clock (Figure 7-4). 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.

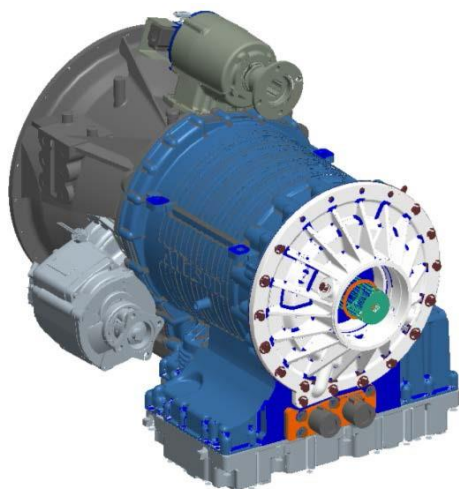


FIGURE 7-3. Allison 4000 Series

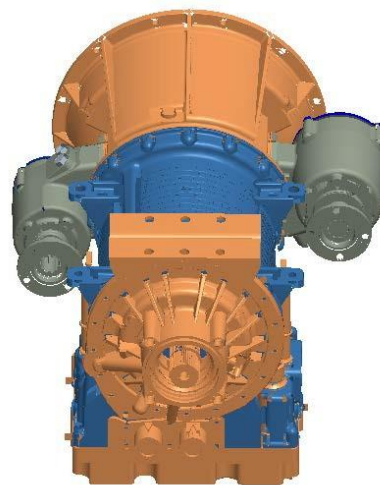


FIGURE 7-4. Allison 3000 Series

INSTALLATION CLEARANCES

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. This is also true when 30 and 45 degree adapters are used. The 8-bolt bottom mount PTO will not have any issues. 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. There are some scenarios where the PTO will be very close to or could interfere with the rear spring shackle on the front suspension.

FRONT ENGINE PTO

Front engine PTO (FEPTO) is sometimes used in vocational applications. When a FEPTO is spec'd on a truck, the cooling module has a pass-thru to allow for a shaft to be bolted to the front of the crankshaft and extend out to the front of the truck. The bumper will be extended out to mount the customer installed aftermarket device. See Figure 7-5 and Figure 7-6 for radiator installations with and without FEPTO provisions.

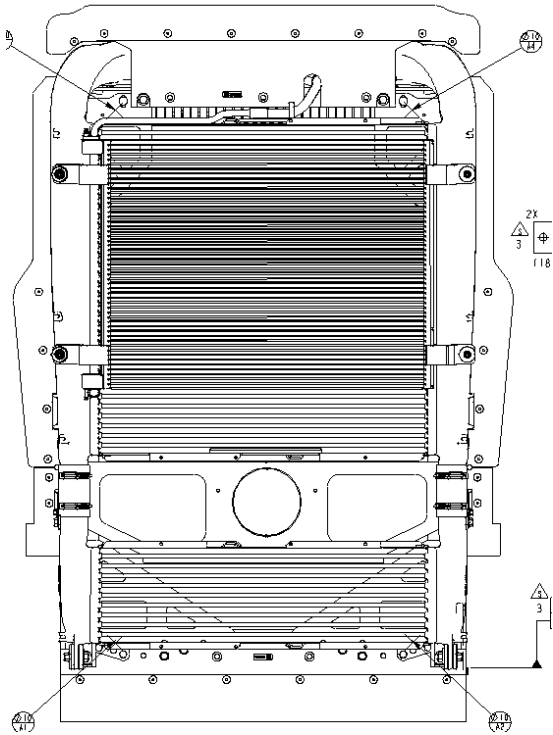


FIGURE 7-5. Cooling Module With FEPTO Provision

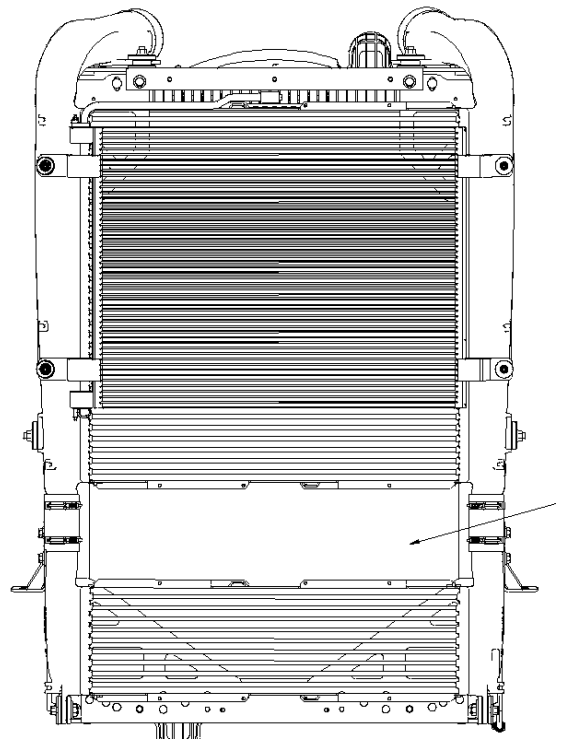


FIGURE 7-6. Cooling Module Without FEPTO Provision

REAR ENGINE PTO

Rear Engine PTO (REPTO) is also sometimes used in vocational 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 7-7 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.



FIGURE 7-7. REPTO Flywheel Housing

PTO INSTALLATIONS

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 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 additional PTO control switches that can be used. The PTO control switch will be plumbed with air lines that will be plugged at the bulkhead. See Figure 7-8 for PTO dash switch plumbing. The cab air manifold is located where the floor meets the firewall on the LH side of the cab. 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. 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.

On Allison transmissions, the PTO's will require an electric signal. We do not currently offer an electric PTO switch 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.

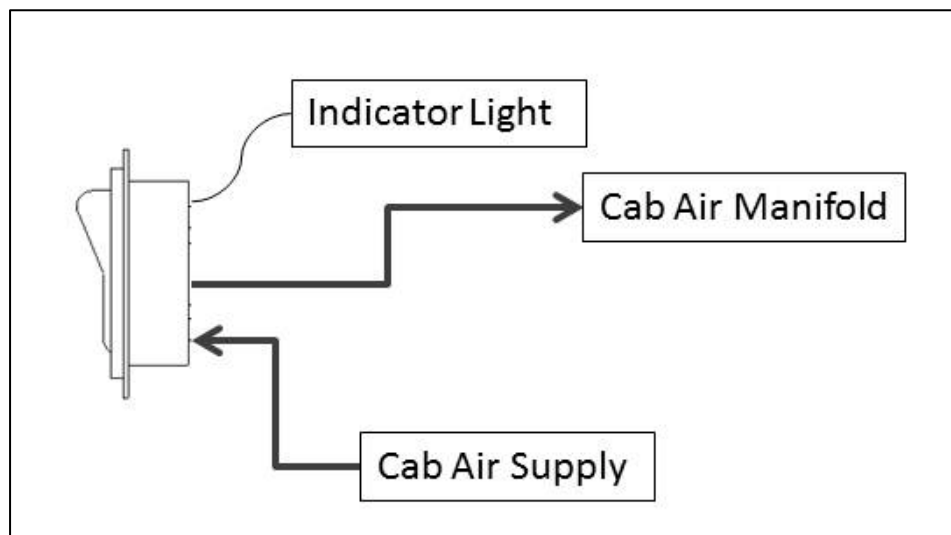


FIGURE 7-8. (1) Single acting PTO Controls Diagram

REMOTE PTO CONTROL

When a truck is ordered the option code for with remote PTO and throttle controls, a 12 pin connector will be provided. For all heavy duty models this will be a breakout of the main engine harness located on the left side of the back of the engine. See Figure 7-9. See Table 1 for the pin out descriptions on the 12 pin connector.

CUMMINS REMOTE PTO OPERATION

For Cummins engines and the Paccar PX-9, there are 2 different modes of operation through the 12 pin connector. If you put the engine in PTO mode by applying common switch return (ground) pin 3 to PTO on/off pin 5 the engine RPM will go to the first set speed. If the connection between pin 3 and 5 is broken and reapplied within ½ second, the engine will go to the second set speed. If this is done again, it will go to the 3rd set speed and so on. There are up to 5 preset speeds that can be modified with INSITE. If the connection is broken longer than ½ second and then reapplied, the RPM will go back to the first set speed. In this mode, the engine will not respond to any throttle inputs unless the throttle pedal override is engaged using INSITE. The second mode of operation is remote throttle which is engaged by applying common switch return (ground) pin 3 to remote throttle on/off pin 12. In this mode the engine will respond to the remote throttle signal. The throttle works off a variable 5V source. To control the throttle, you would use a potentiometer with pin 10 for the 5V source, pin 11 for the common sensor return (ground) and output the variable 5V signal to the remote throttle signal pin 4. In this mode the engine will not respond to the cab pedal unless the accelerator pedal override is engaged using INSITE.

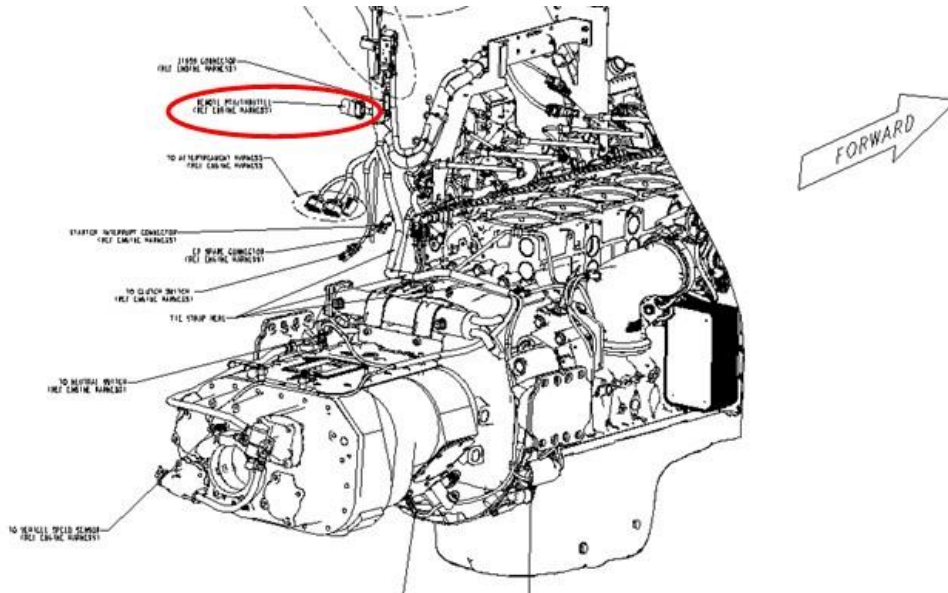


FIGURE 7-9. Connector Location

TABLE 7-1. 12 Pin Connector

Pin	Cummins
1	Not Used
2	Not Used
3	Common Return #1 (Switch)
4	Remote Throttle Signal
5	PTO On/Off
6	Remote Throttle Enable
7	Keyed Switch Power
8	Ground
9	Torque Limit Switch
10	5V Supply
11	Common Return #3 (Sensor)
12	Remote Throttle On/Off

INSTALLATION OF PTO BY MODEL

CHELSEA 890

The installation shown below in figures 7-10 through 7-12 are of the model 520 with a Chelsea 890 PTO.

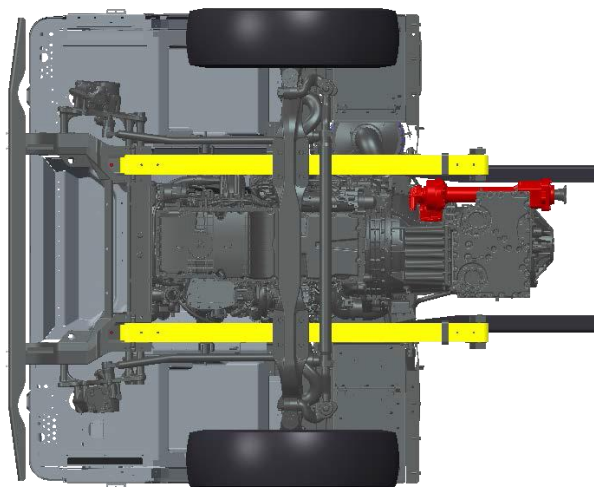


FIGURE 7-10. Bottom View

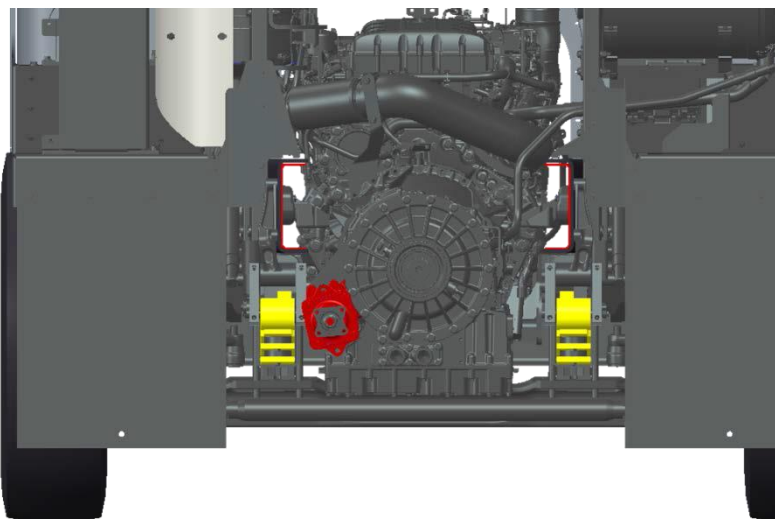


FIGURE 7-11. Rear View

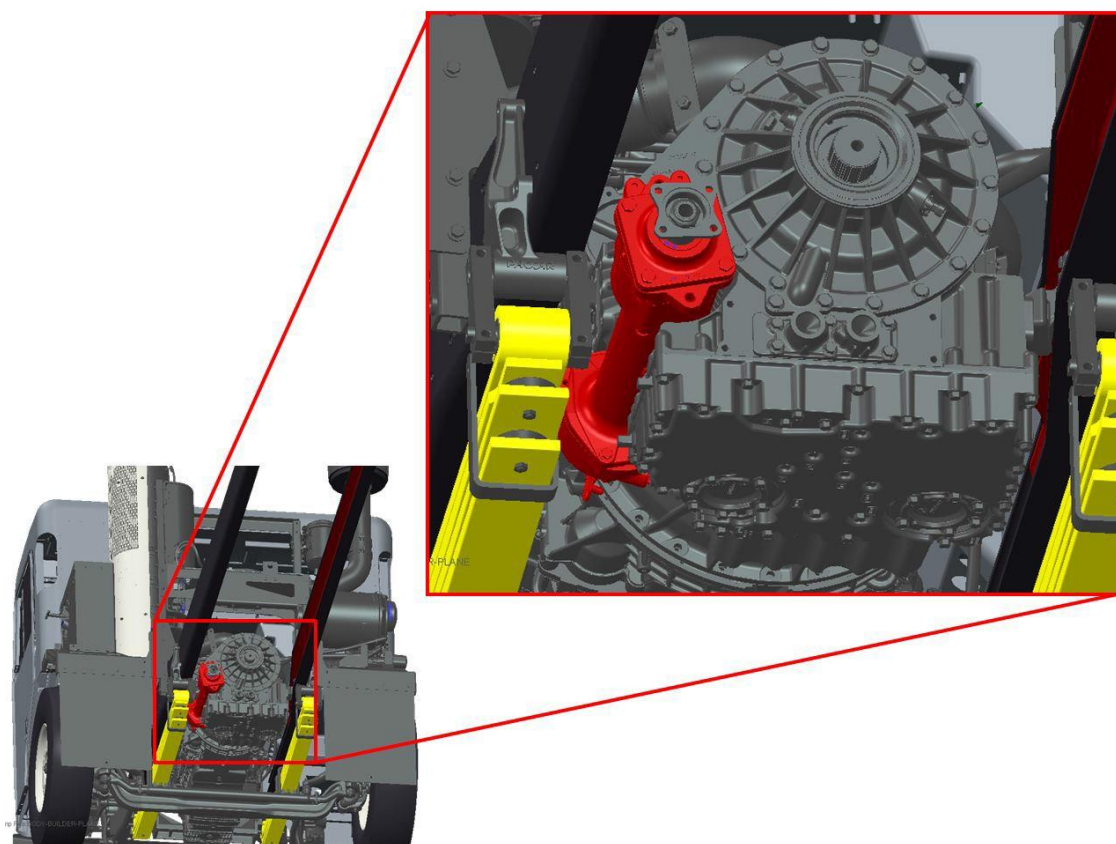


FIGURE 7-12. Isometric View with Enhanced View

OPTIONAL PTO FUNCTION MODULE

The Body Builder PTO module is optional equipment available with MX engines, ordered at the point of sale. If necessary, the module can be integrated onto a vehicle after initial build on a case-by-case basis. Please contact your local dealership and field service representative for assistance with parts and required vehicle programming. The PTO Module is mounted perpendicular to the inside LH frame rail between the first and second crossmember. The designed frame rail drilling locations are shown in figure 7-13.

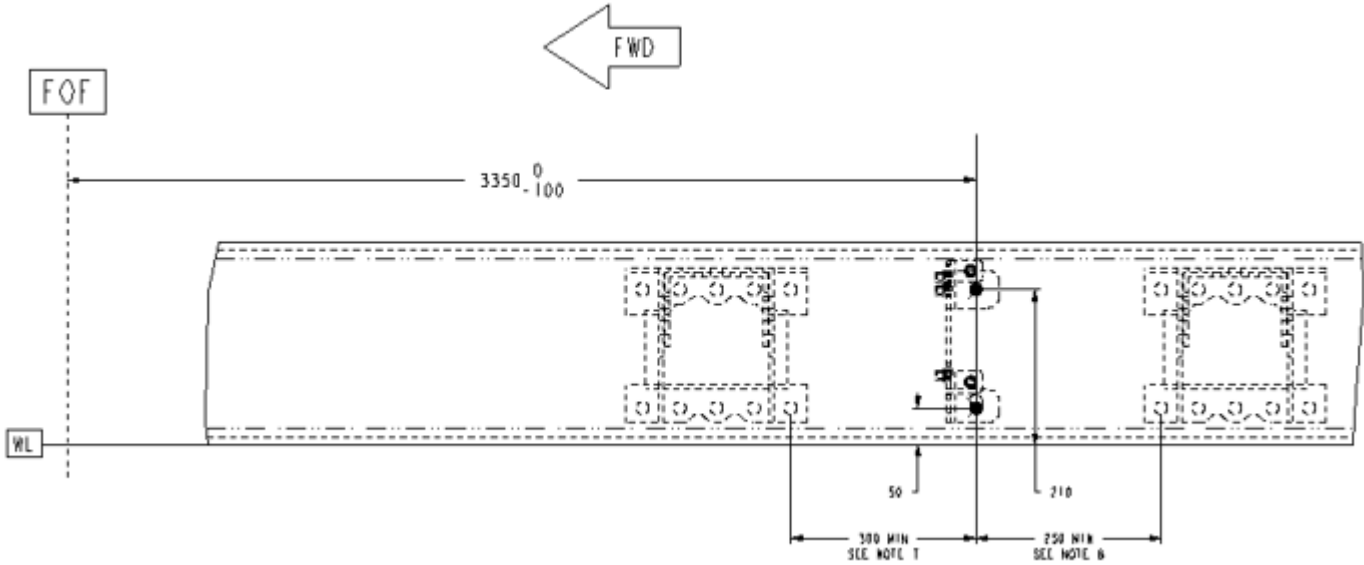


FIGURE 7-13. Optional Module Drilling Location for Bracket Installation

The Module mounts flat against the bracket facing the rear of the vehicle. A shield mounts over the module and secures to the frame bracket. For new installations, the frame space should be available if there is not an air component mounted in this position. As shown in figure 7-14, the module and guard will be connected to the frame bracket prior to installation on the rail.

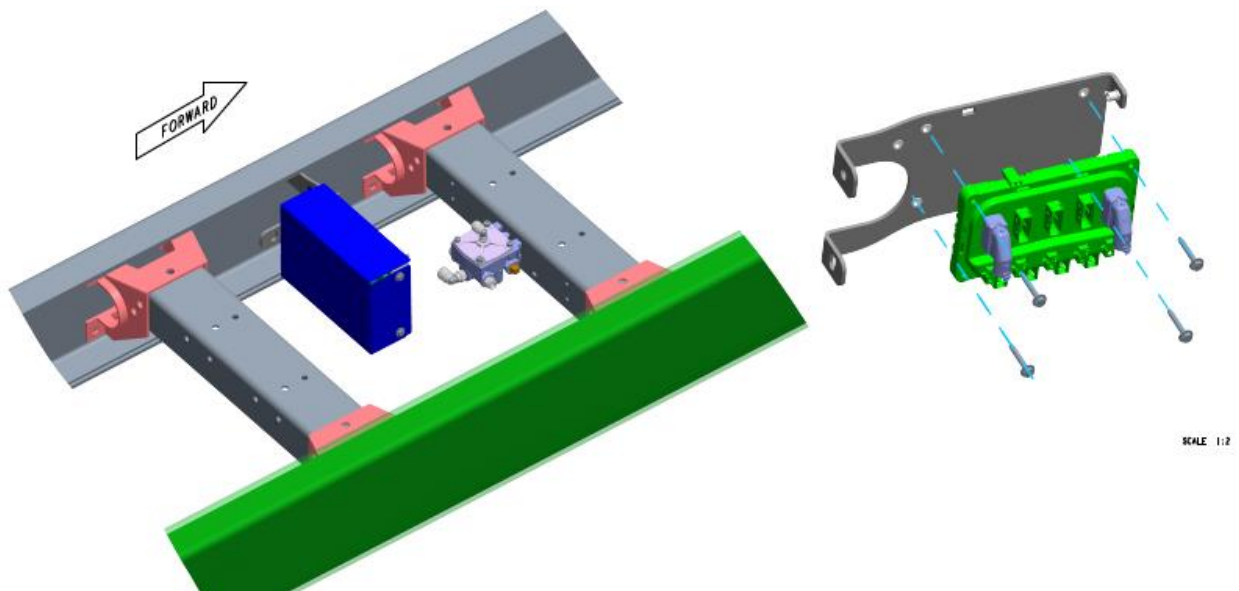


FIGURE 7-14. PTO Control Module Installation

Figure 7-15 shows the battery power, engine, and chassis body builder control harness routing. There is a routing aid on the module shield which the harness will be secured to. Please refer to section 6 for additional electrical content.

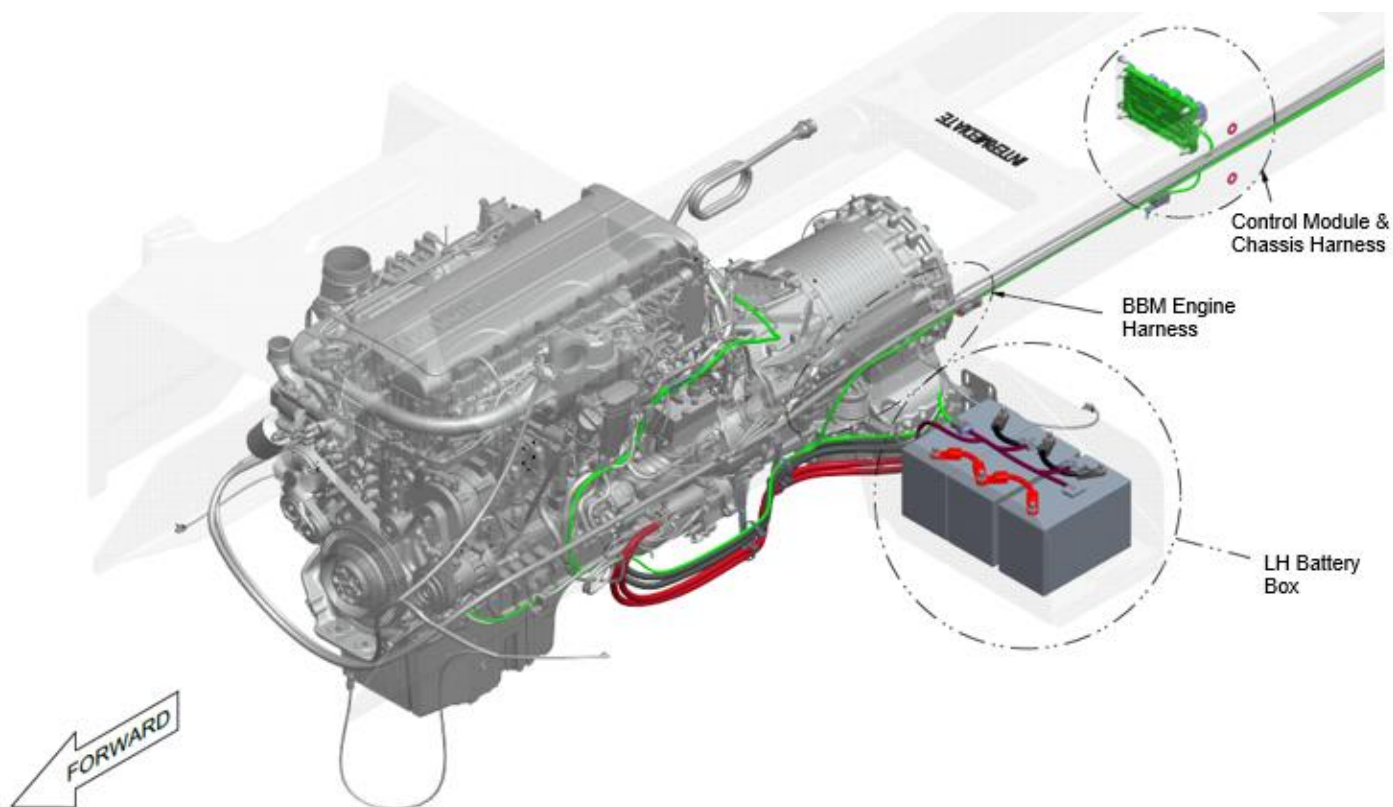


FIGURE 7-15. PTO Control Harness Routing

APPENDICES

Revision Log

Revision Log - 520 Body Builder Manual				
Revision	Author	Date of Publication	Pages #	Description of Changes
	B. Rose	3/23/2017	n/a	Initial Release
001	Z. Clevinger	7/30/2019	Title Page	* Changed from "2017" to "2019" * Changed release date to 7/30/19
	Z. Clevinger		iii	* Corrected Table of contents (TOC) section 6 subheader "cab harness" to "6-4" in place of "6-5". * Added "Cummins Remote PTO Operation 7-6" subheader * Added Optional PTO sections 6 and 7 to TOC. * Added Appendices section to TOC, "Revisions Log A.1"
	Z. Clevinger		4-1	Added statement "Please note, an alignment adjustment is required after body installation. Front alignment and rear alignment must be performed prior to putting the vehicle into service."
	Z. Clevinger		6-4	Changed text "see figure 6-4" to "see figure 6-3"
	Z. Clevinger		6-10 through 6-13	New Optional PTO Module Content
	Z. Clevinger		7-8 & 7-9	New Optional PTO Module Content
	Z. Clevinger		A1	Revision Log