2021 MODEL 520 VMUX BODY BUILDER

Release Date 5/18/2021

MODEL 520

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BODY BUILDER MANUAL CONTENTS

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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.

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SECTION 2 **SAFETY AND COMPLIANCE**

SAFETY SIGNALS

There are 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.

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

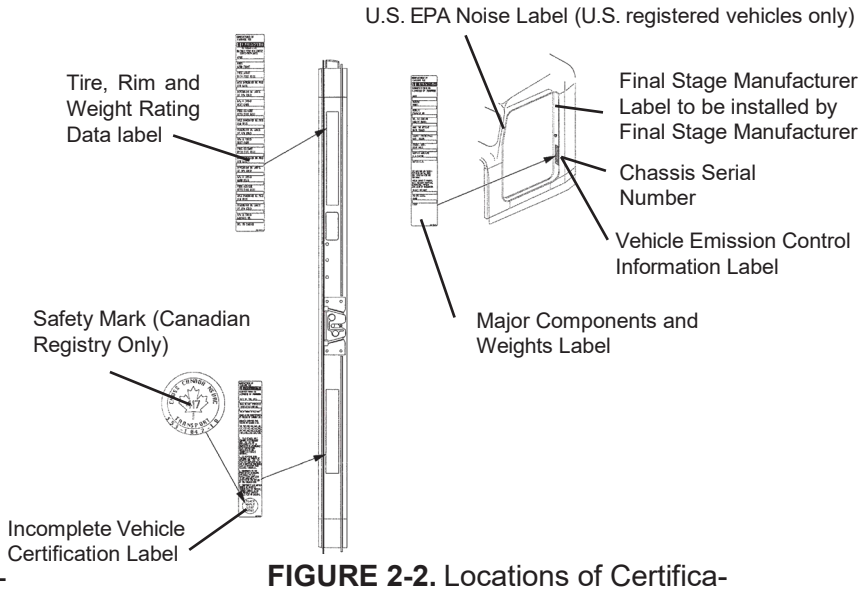


FIGURE 2-2. Locations of Certification Labels - Driver's Door and Frame

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
- The DPF/SCR catalyst or its mounting may not be modified
- The NOx sensor may not be relocated or altered in any way; this includes re-clocking the aftertreatement 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, 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 guidelines 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	End of frame
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 “Table of 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.

FIGURE 3-1. Various Views of the Model 520

EXTERIOR DIMENSIONS

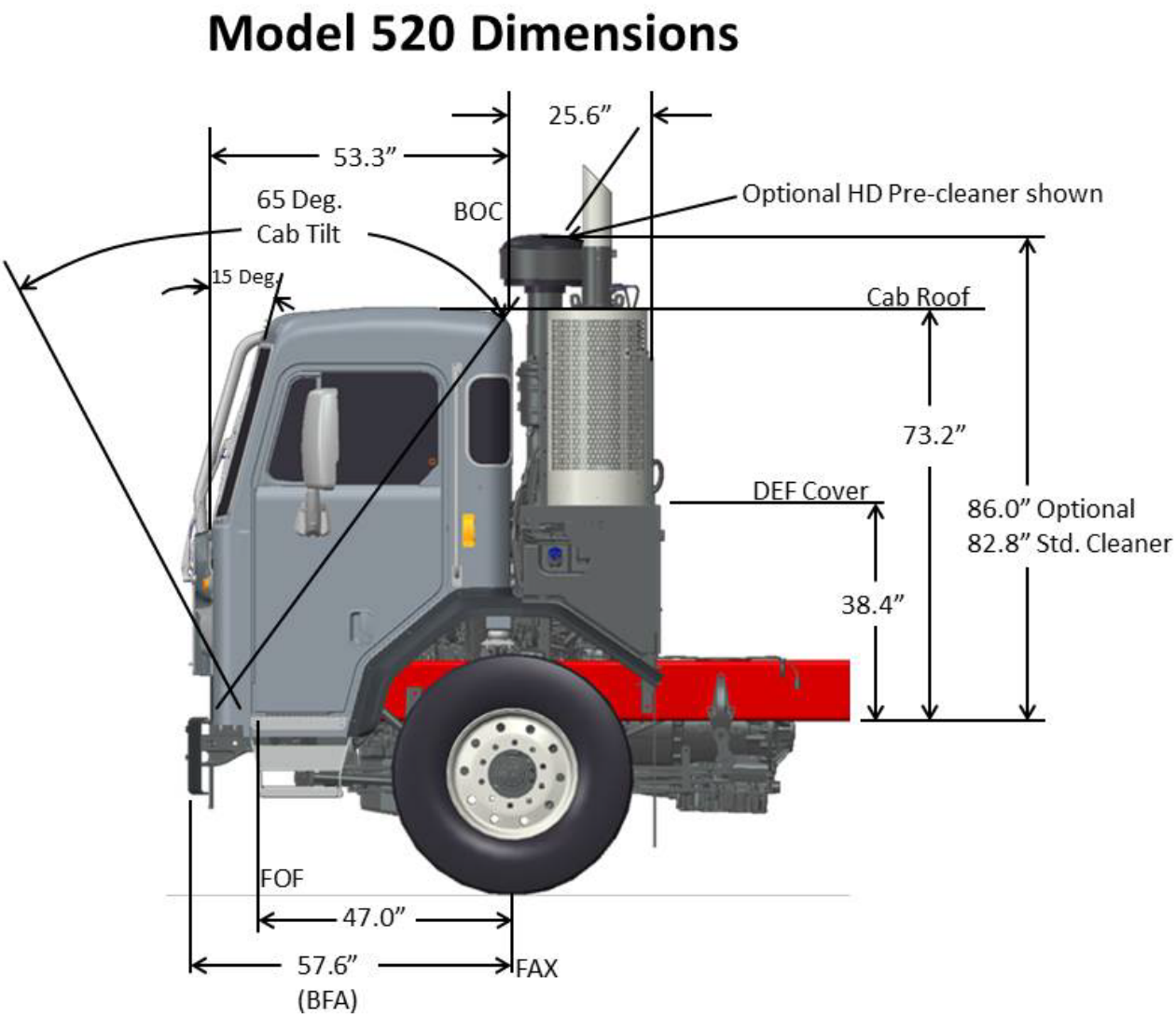


FIGURE 3-2. 520 Cab Dimensions

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 After-treatment.

EXTERIOR DIMENSIONS

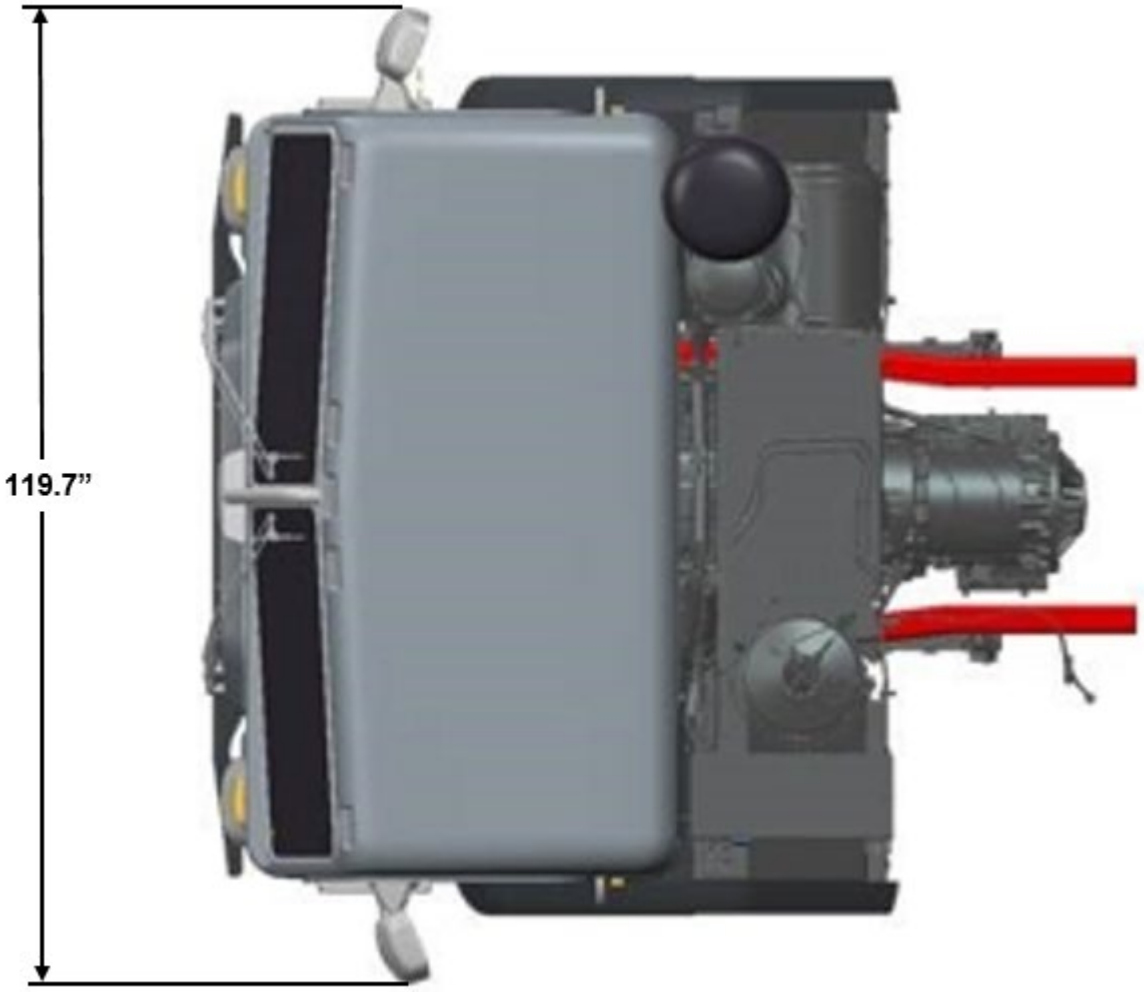


FIGURE 3-3. 520 Overall Width Dimensions

Notes:

1. Shown with Velvac mirrors
2. West coast mirrors 111.8”

INTERIOR DIMENSIONS

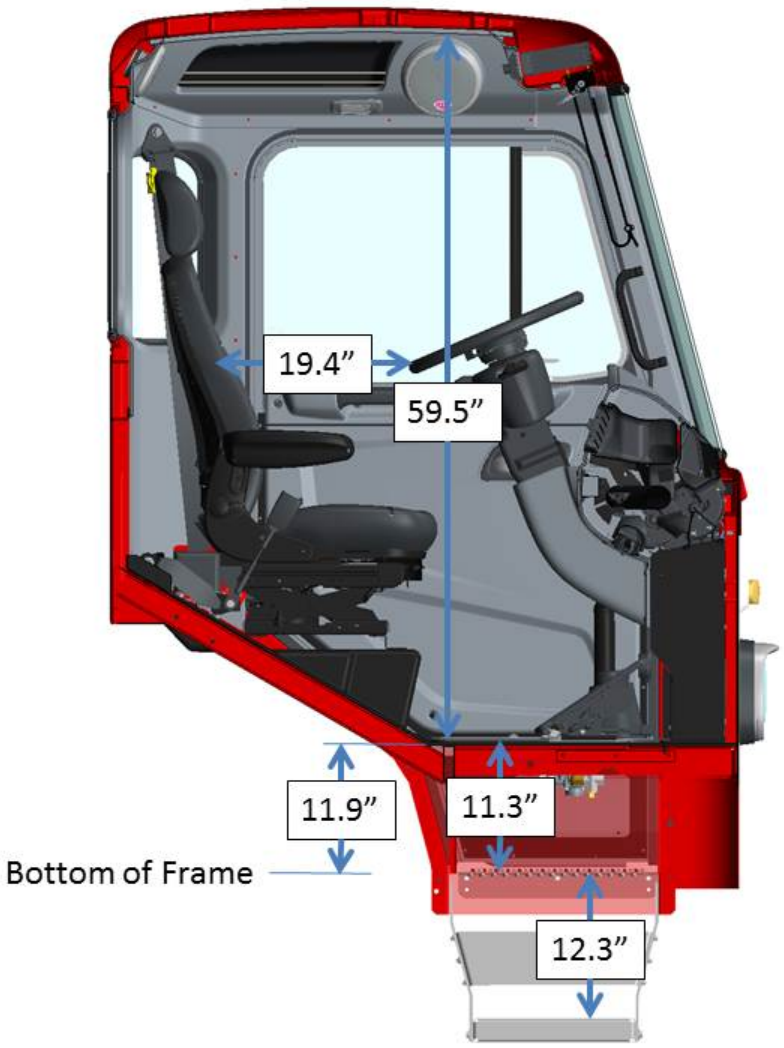


FIGURE 3-4. View Looking Through Cab to the Driver’s Side (LH Steer)

INTERIOR DIMENSIONS

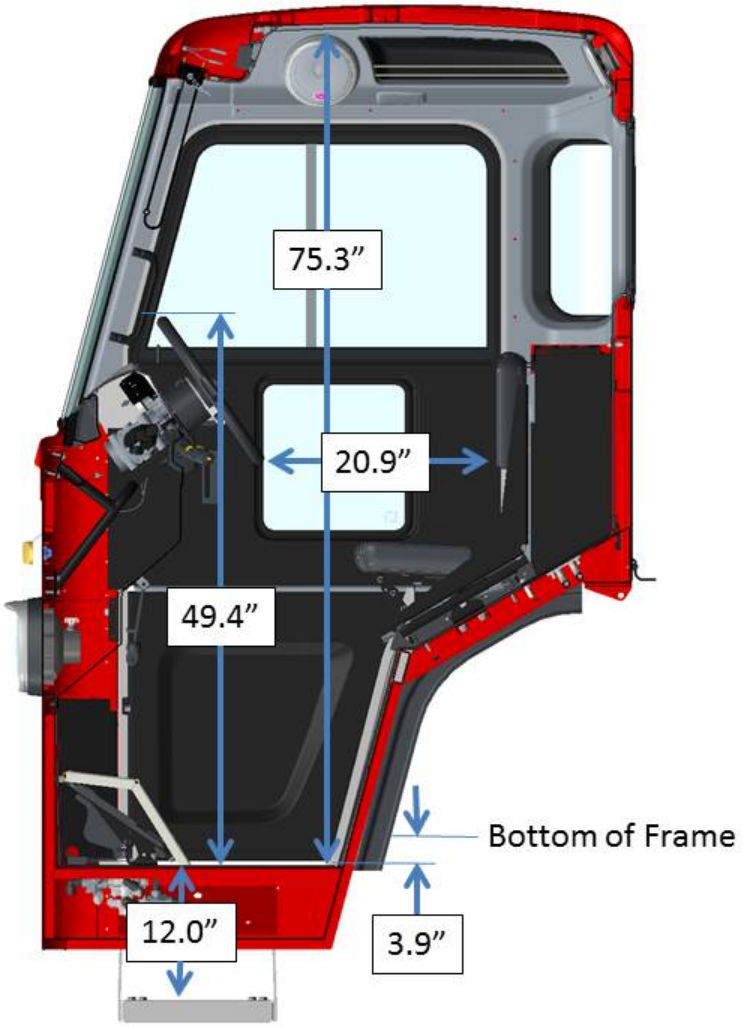


FIGURE 3-5. View Looking Through the Cab At The RH Drive Standup Version

INTERIOR DIMENSIONS

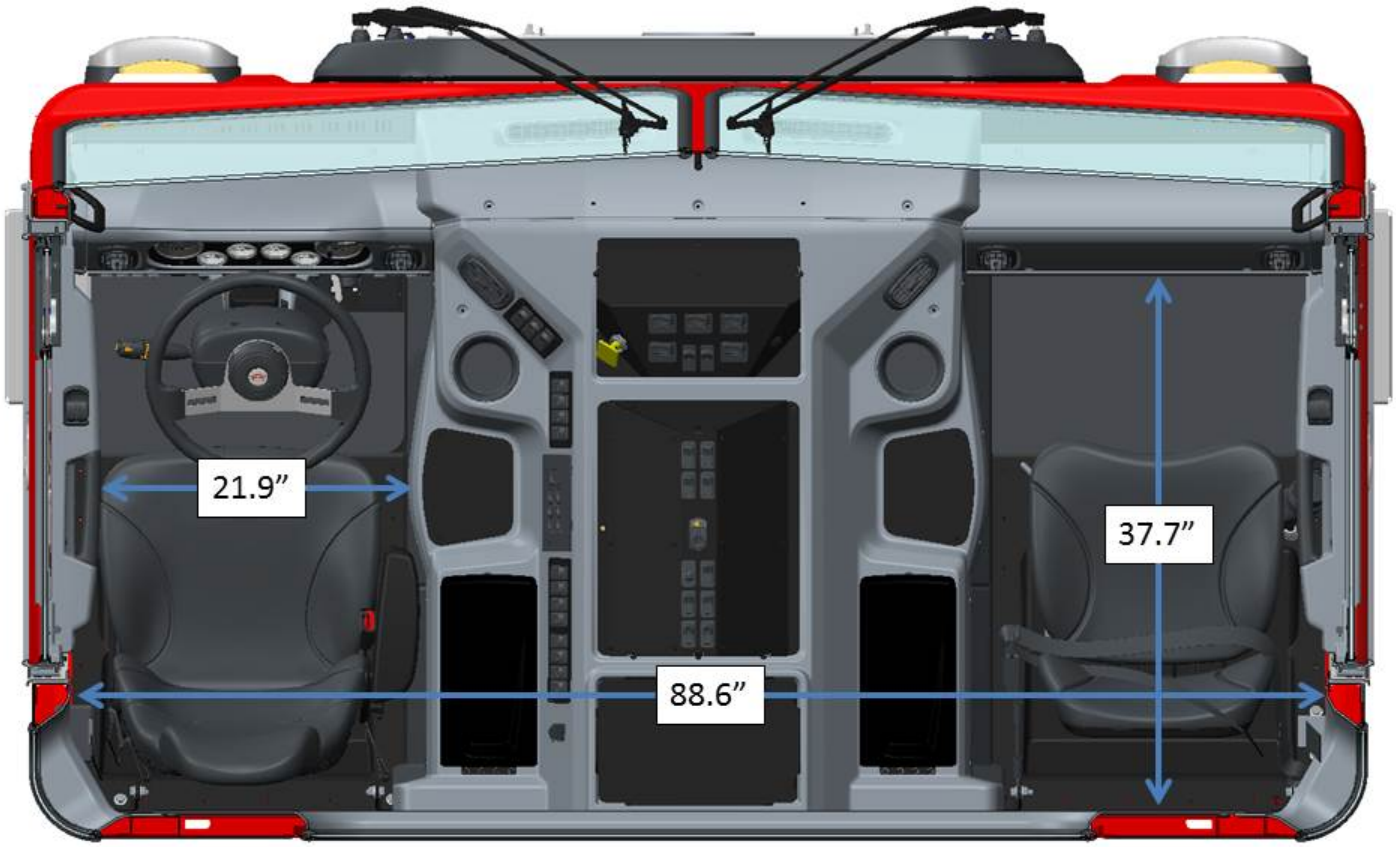


FIGURE 3-6. Top View of LH Steer Model

INTERIOR DIMENSIONS

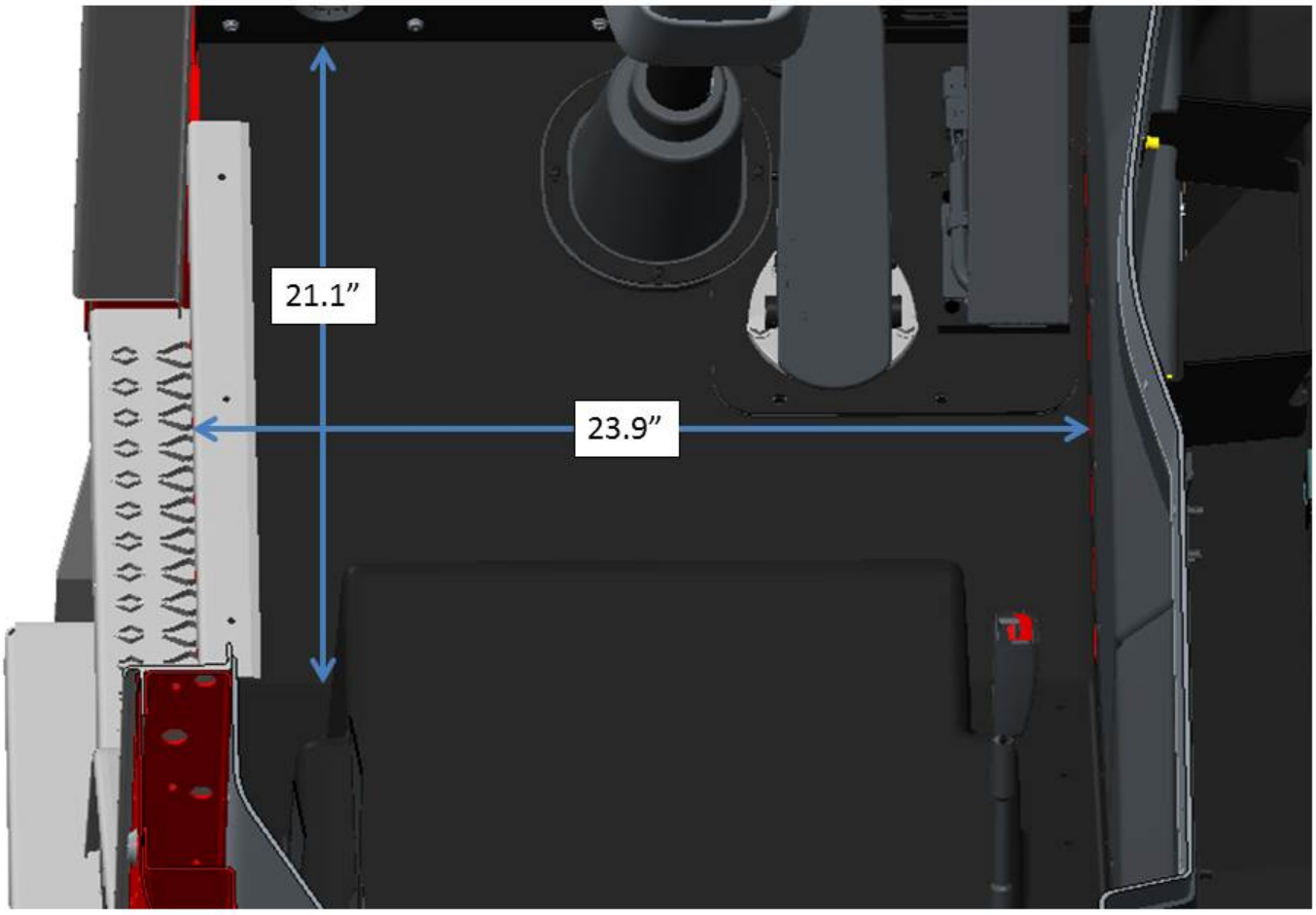


FIGURE 3-7. Floor Dimensions for LH Floor

INTERIOR DIMENSIONS

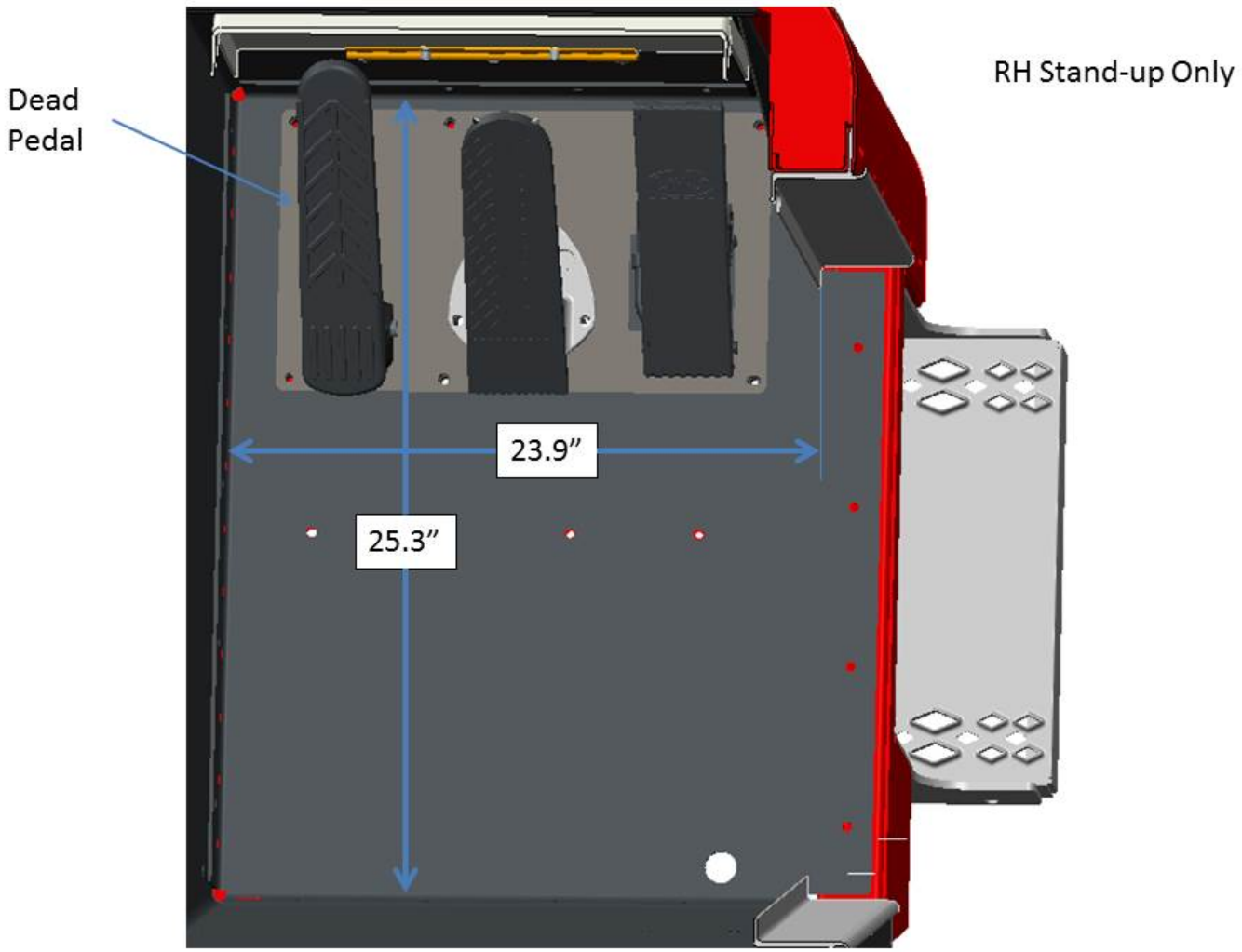


FIGURE 3-8. Passenger Floor RH Stand Up

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.

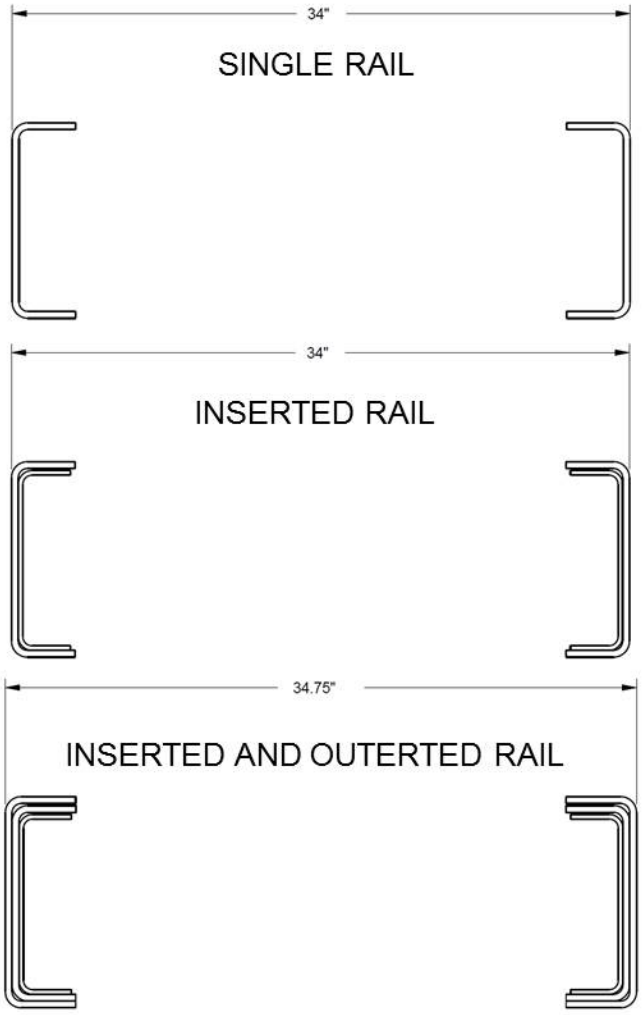


FIGURE 3-9. Frame Rail Configurations

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

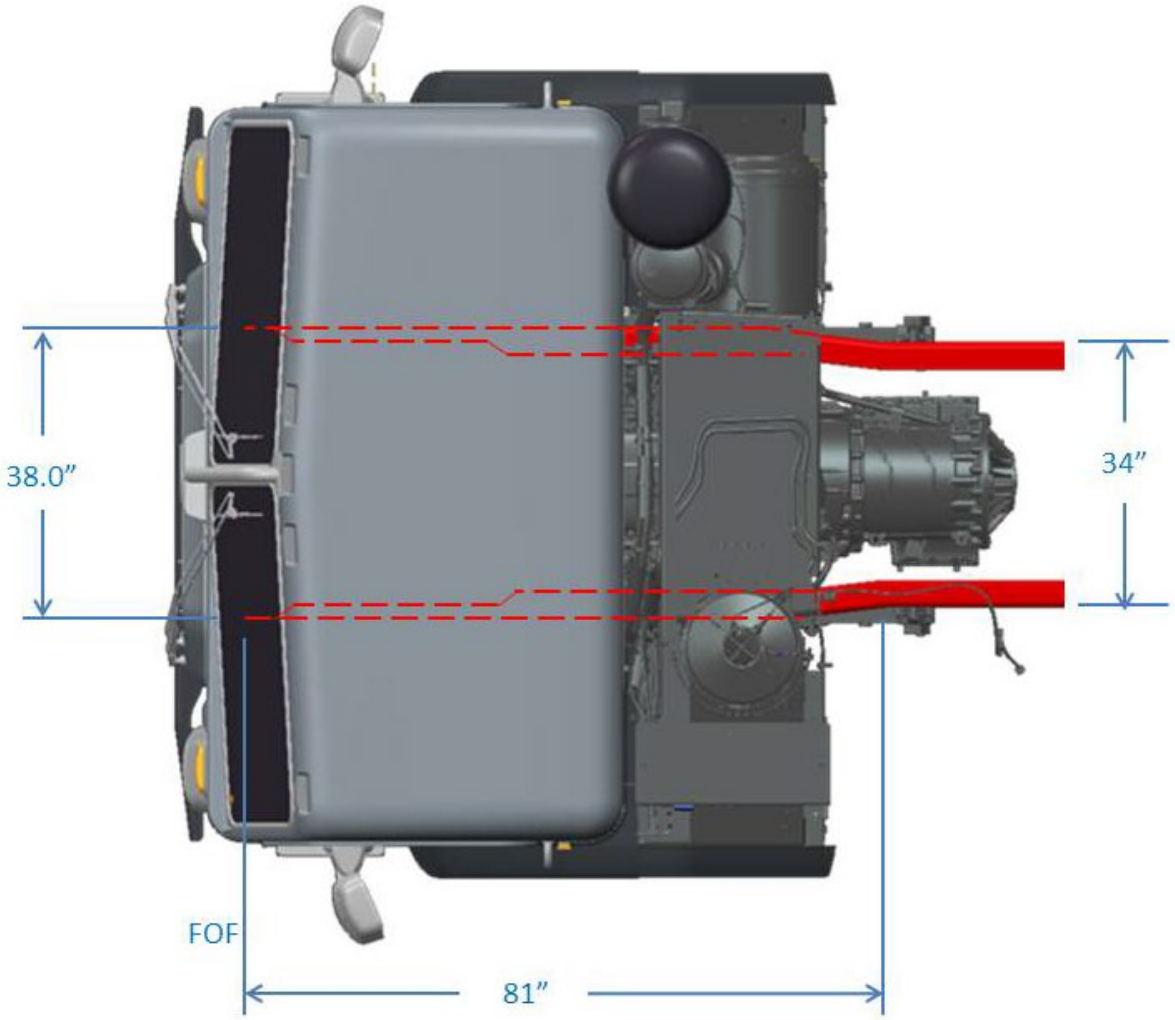


FIGURE 3-10. Model 520 Frame Rail

FRAME HEIGHT CHARTS

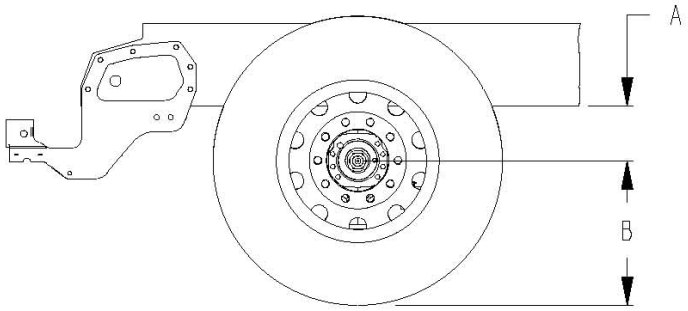
THE FOLLOWING FRAME HEIGHT CHARTS MAY BE USED FOR FINDING APPROXIMATE FRONT AND REAR FRAME HEIGHTS.

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.

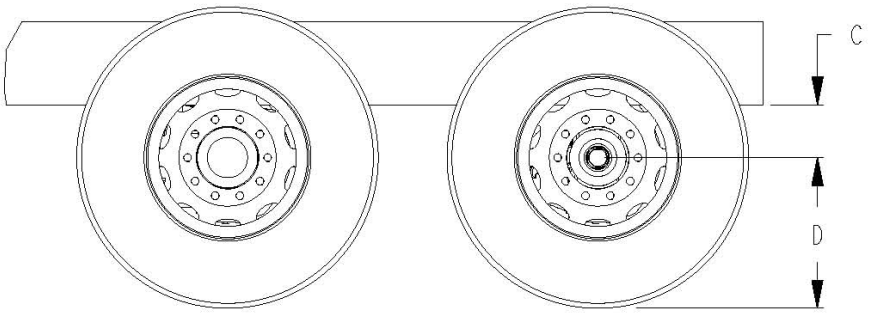
LOADED VALUES ARE QUOTES FOR REPRESENTATIVE LOADS AT THE GROUND FOR THE PARTICULAR SPRING AND AXLE COMBINATION, AND, AS SUCH, CAN VARY WITH LOADING VARIATIONS.

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
HMX EX	40,000 lbs	16.5	11.6	9.5
		17.5	12.6	10.5
		18.5 (std.)	13.6	11.5
	46,000 lbs	16.5	11.6	9.5
		17.5	12.6	10.5
		18.5 (std.)	13.6	11.5
	52,000 lbs	18.5	13.6	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

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 3-8 (cont). Tandem Drive Hendrickson Suspension Heights

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

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.

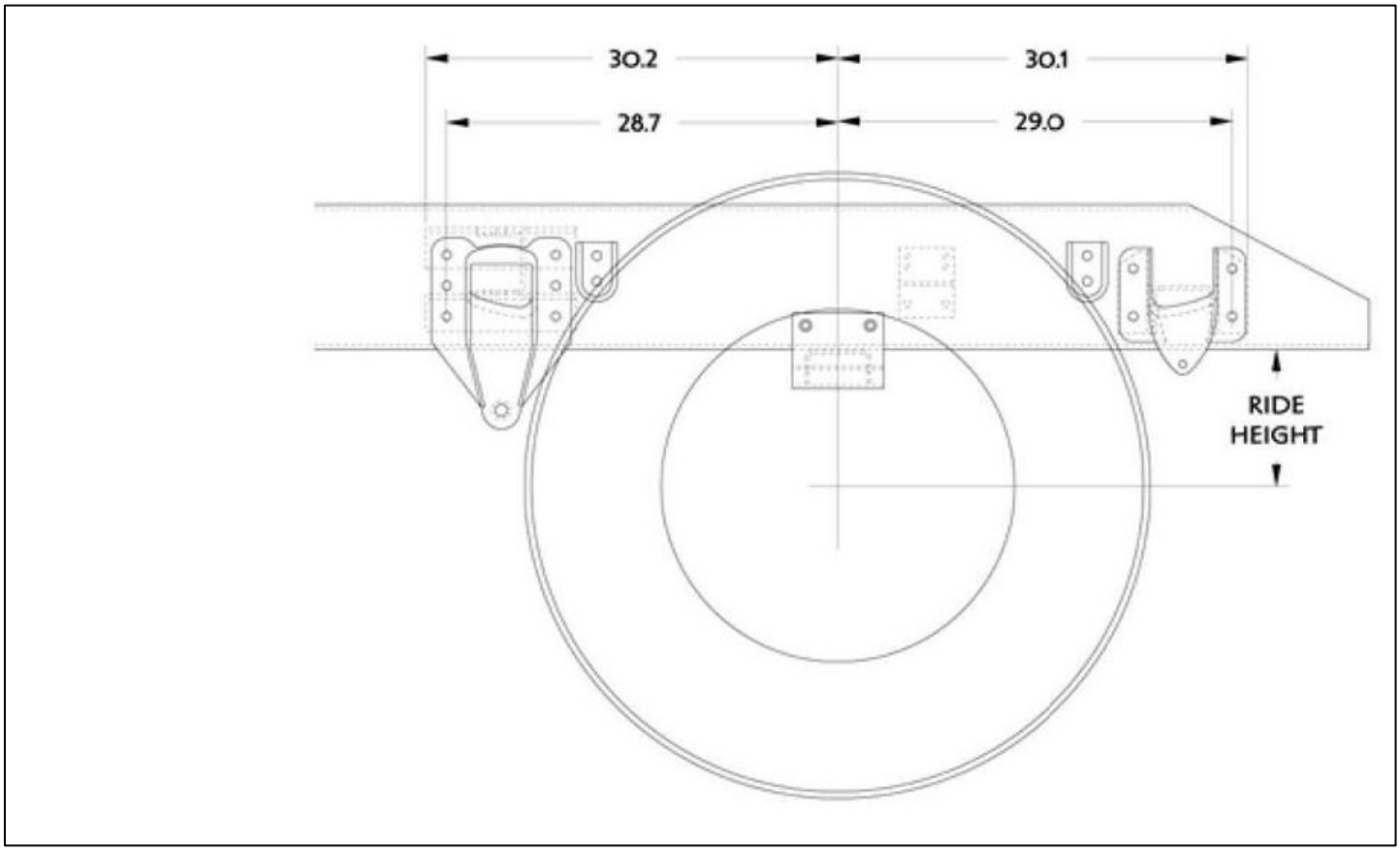


FIGURE 3-5. Reyco 79KB Frame Drilling (Dimensions In Inches)

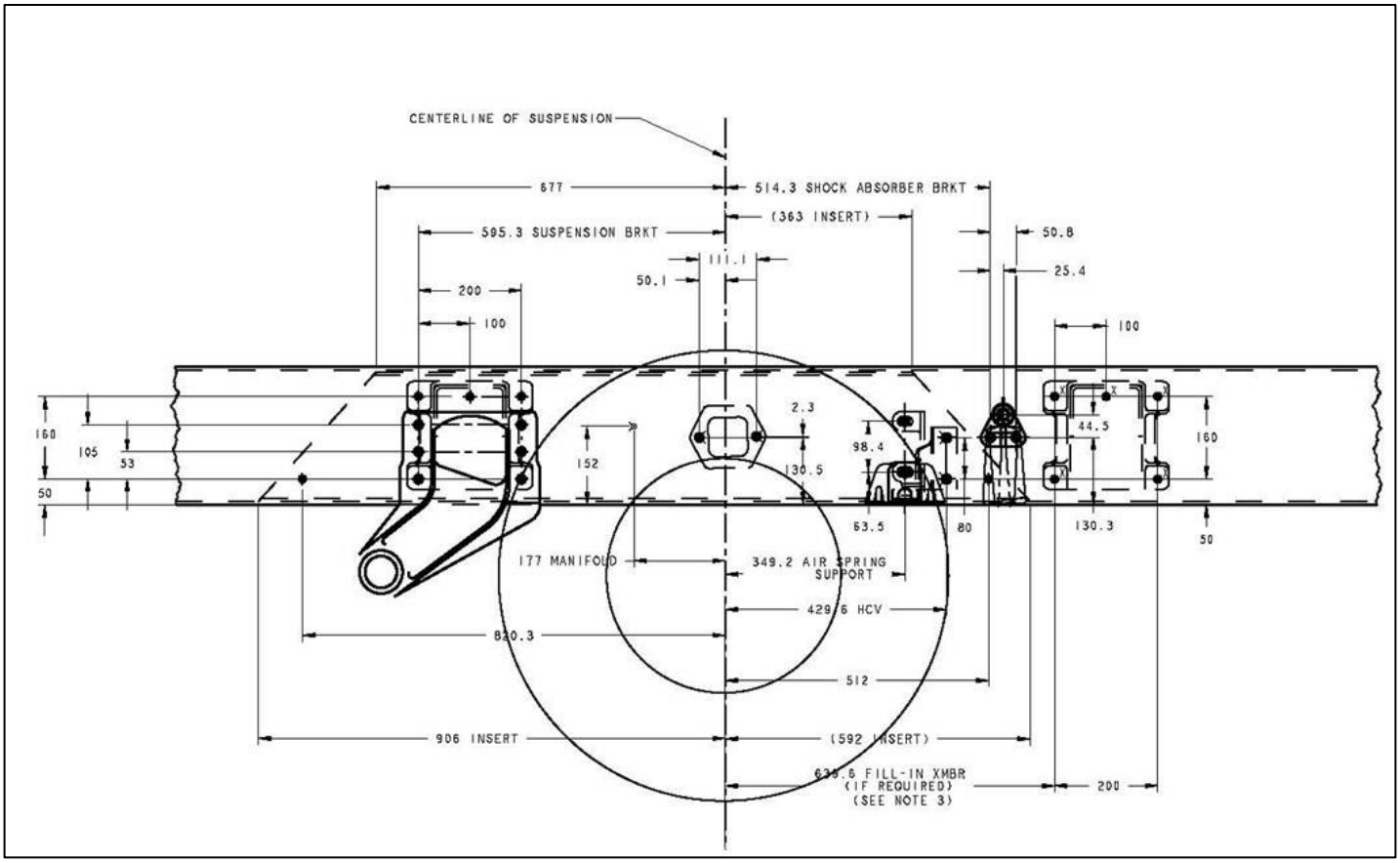


FIGURE 3-6. Reyco 102AR Frame Drilling (Dimensions In Millimeters)

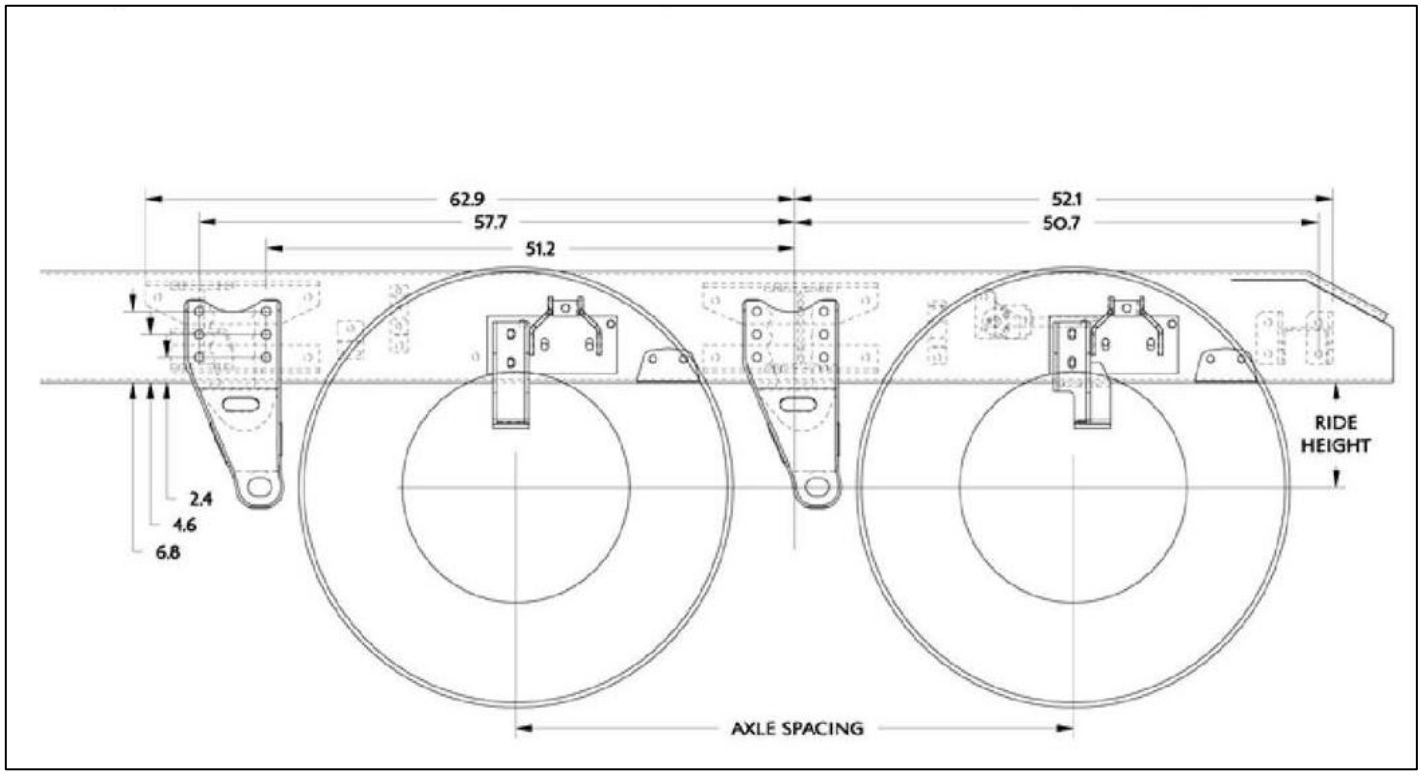


FIGURE 3-7. Neway ADZ 252 Frame Drilling (Dimensions In Inches)

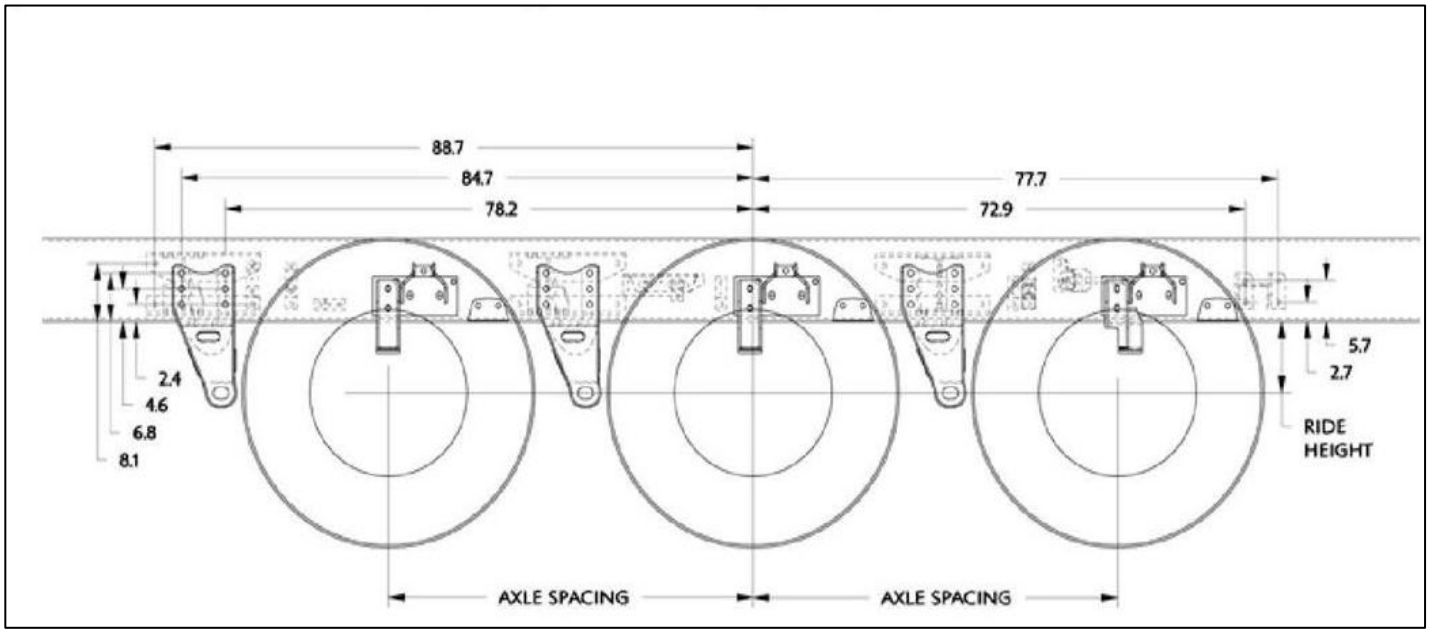


FIGURE 3-8. Neway ADZ 369/378 Frame Drilling (Dimensions In Inches)

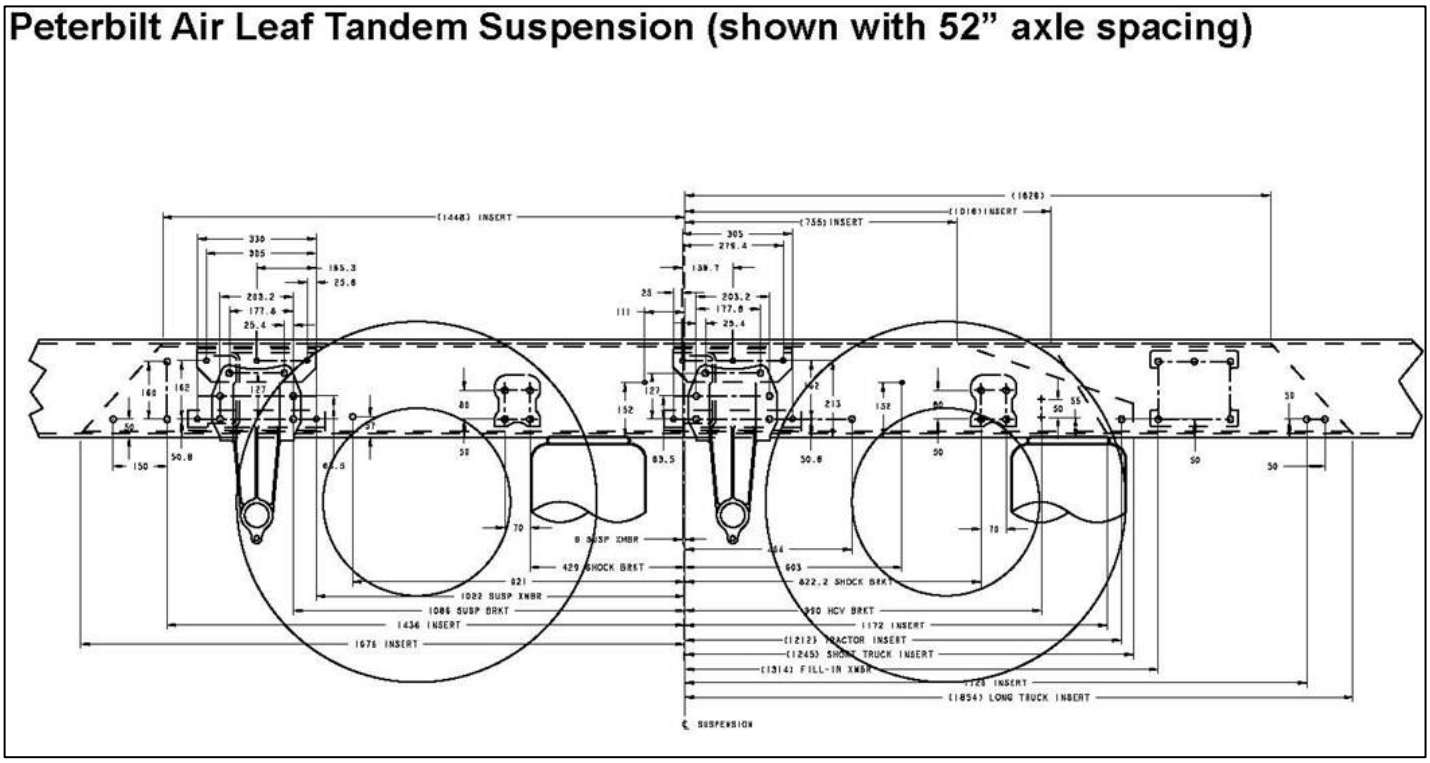


FIGURE 3-9. Peterbilt Air Leaf Tandem Frame Drilling (Dimensions In Millimeters)

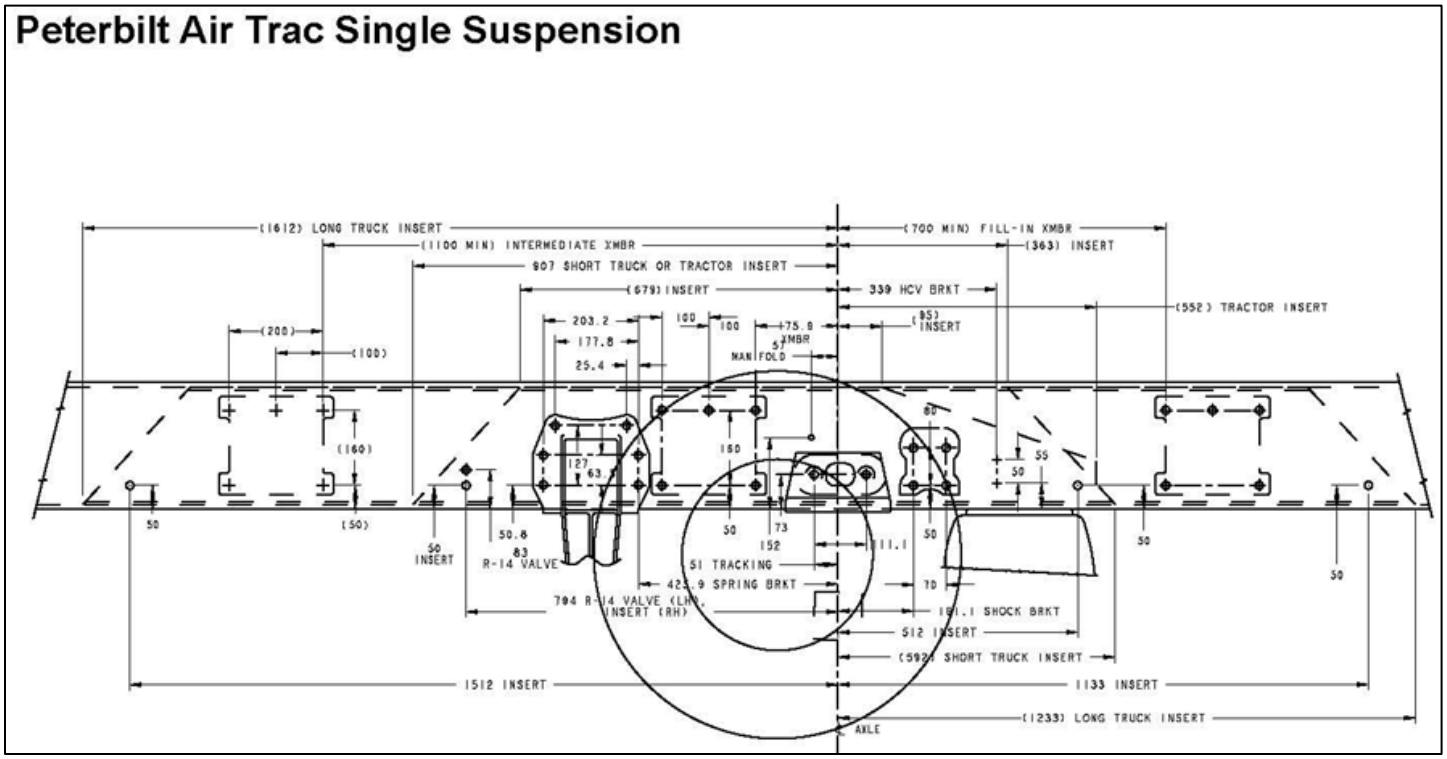


FIGURE 3-10. Peterbilt Air Trac Single Frame Drilling (Dimensions In Millimeters)

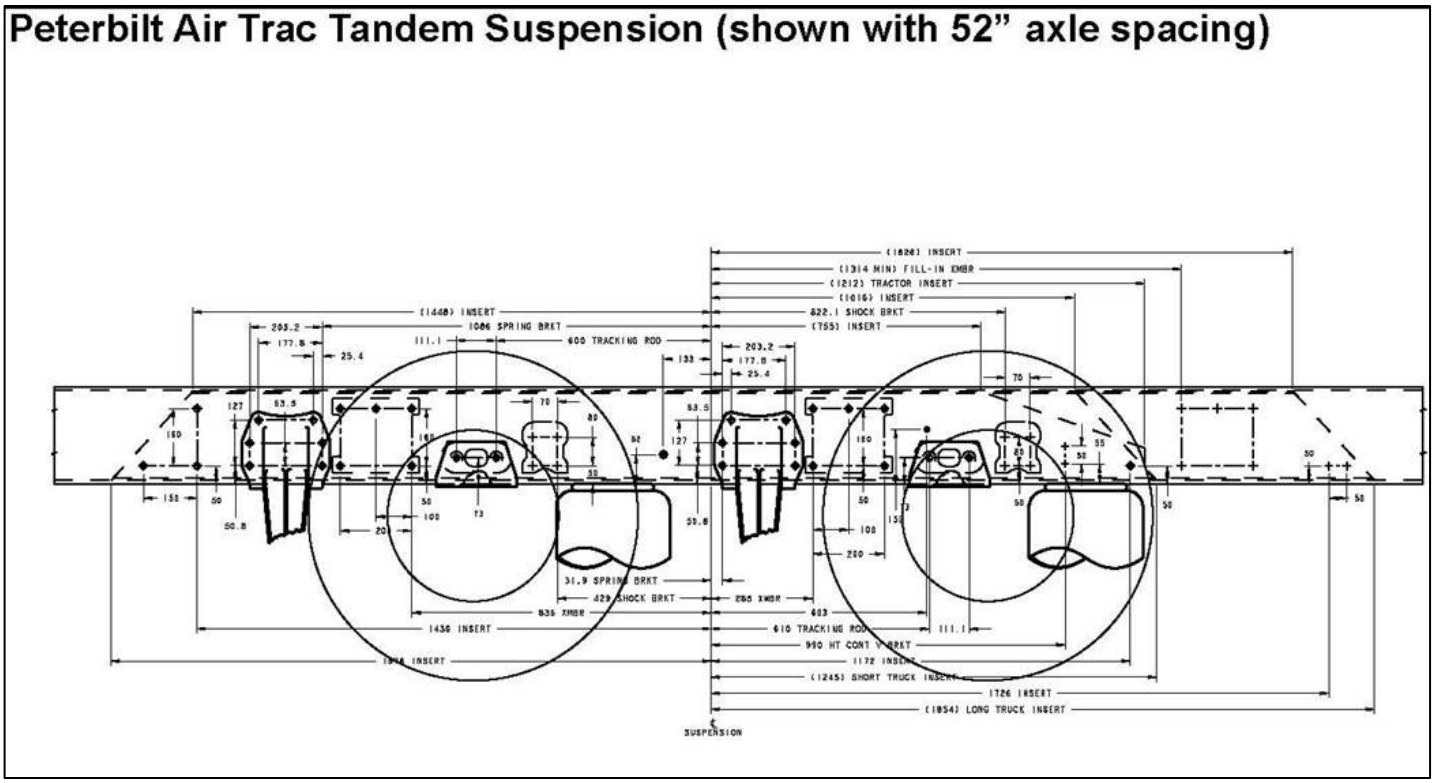


FIGURE 3-11. Peterbilt Air Trac Tandem Frame Drilling (Dimensions In Millimeters)

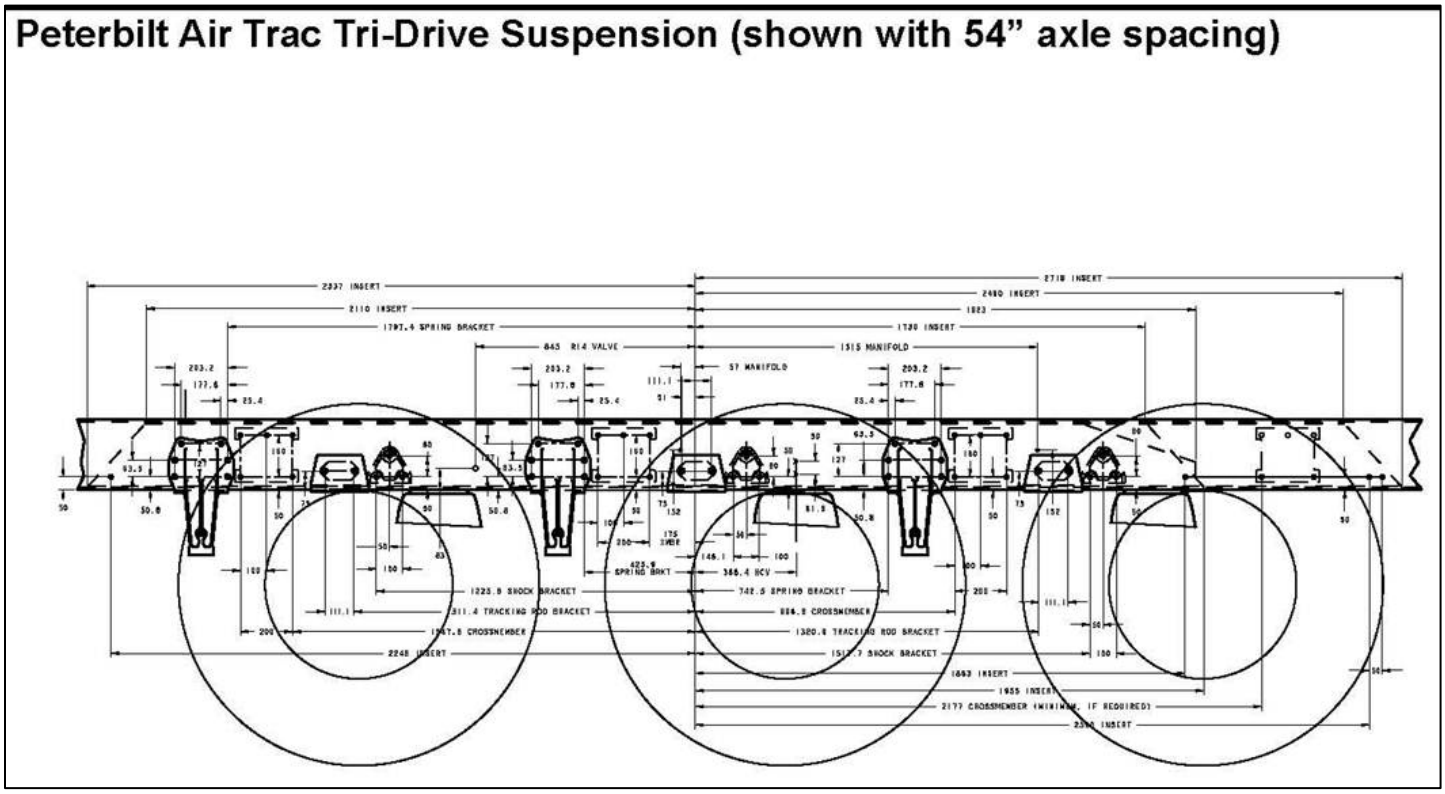


FIGURE 3-12. Peterbilt Air Trac Tri-Drive Frame Drilling (Dimensions In Millimeters)

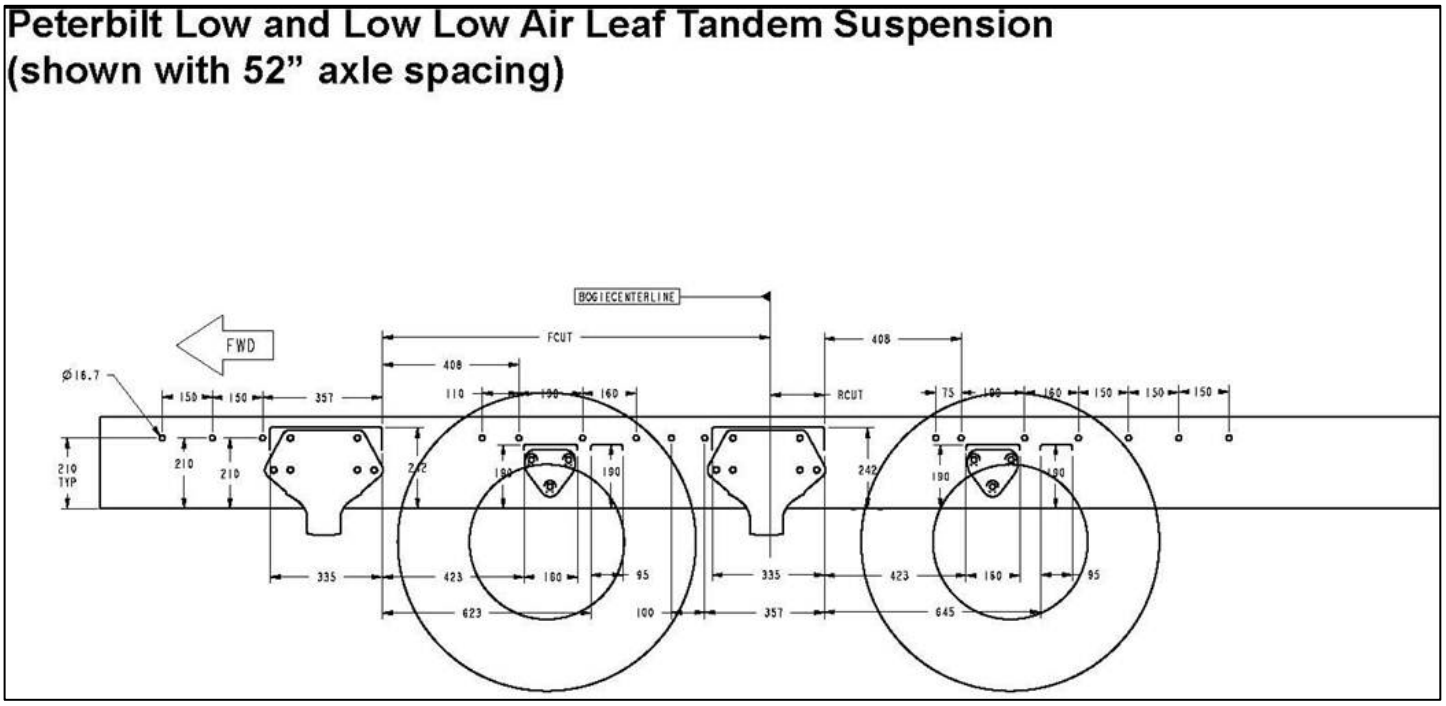


FIGURE 3-13. Peterbilt Low and Low-Low Air Leaf Tandem Frame Drilling (Dimensions In Millimeters)

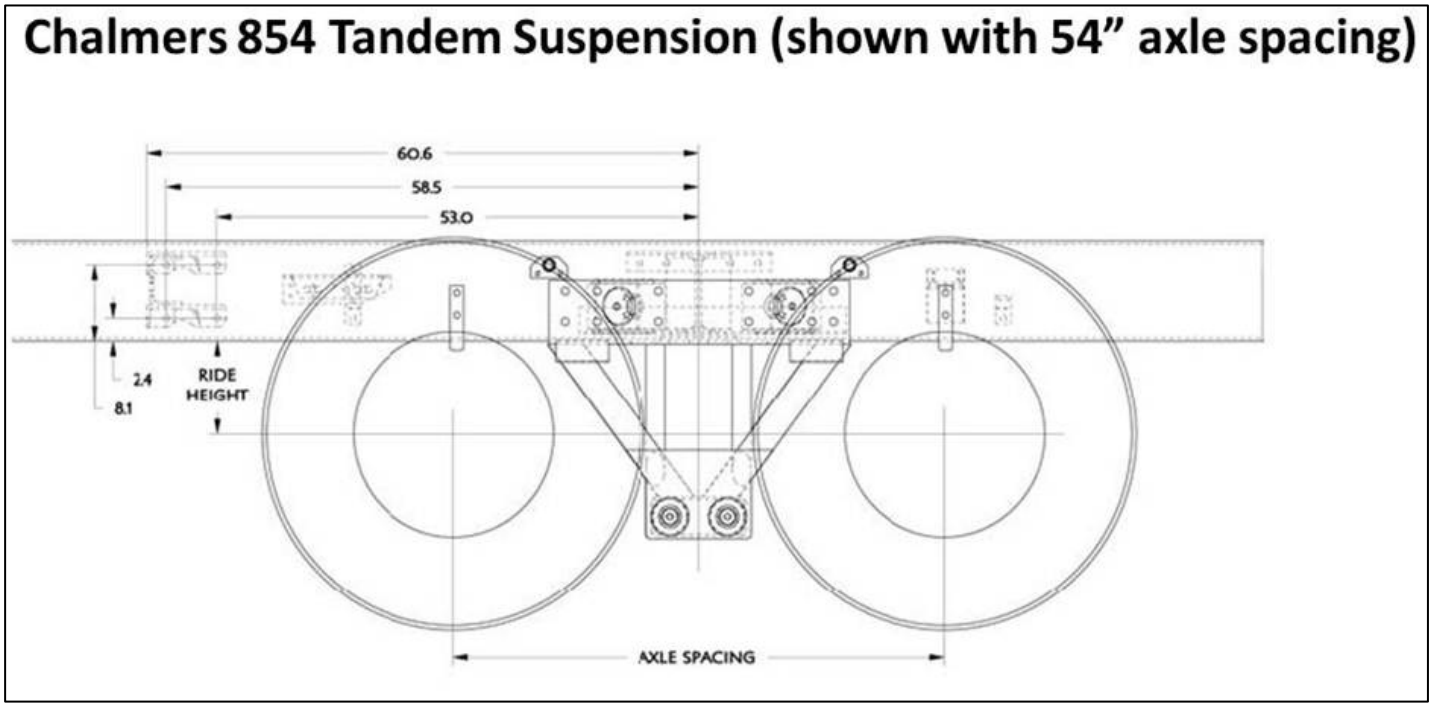


FIGURE 3-14. Chalmers 854 Tandem Frame Drilling

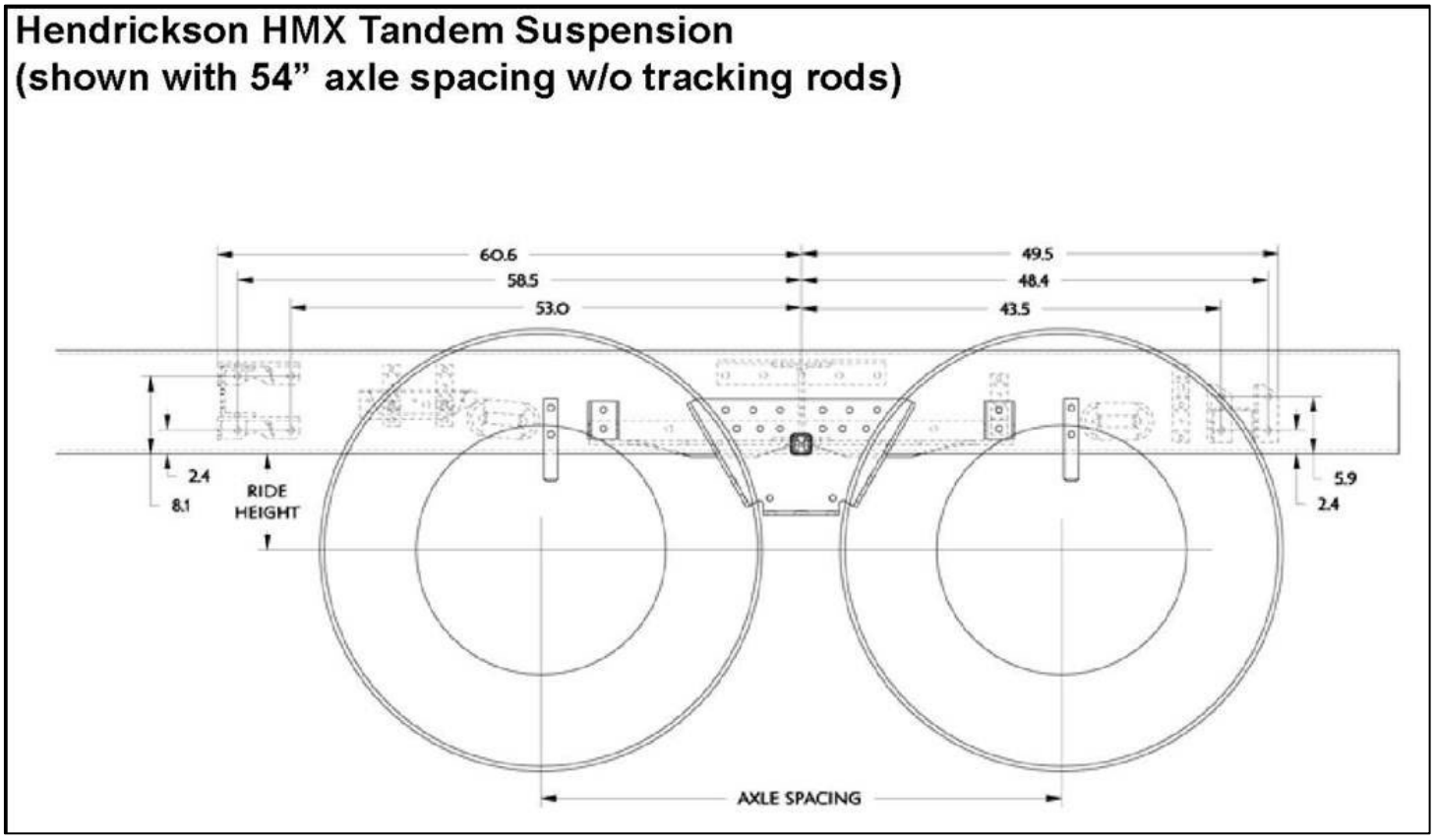


FIGURE 3-15. Hendrickson HMX Tandem Frame Drilling

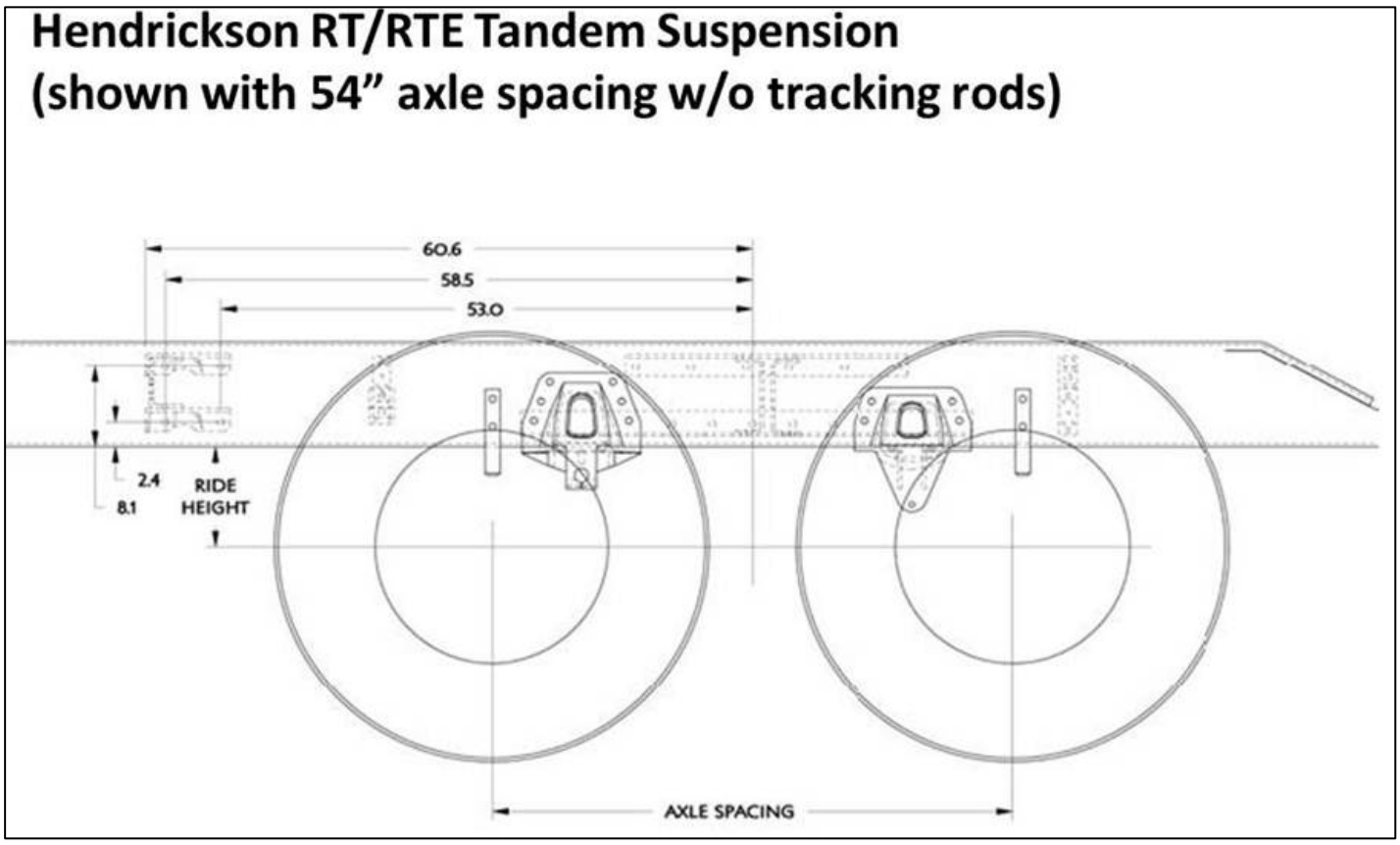


FIGURE 3-16. Hendrickson RT/RTE Tandem Frame Drilling

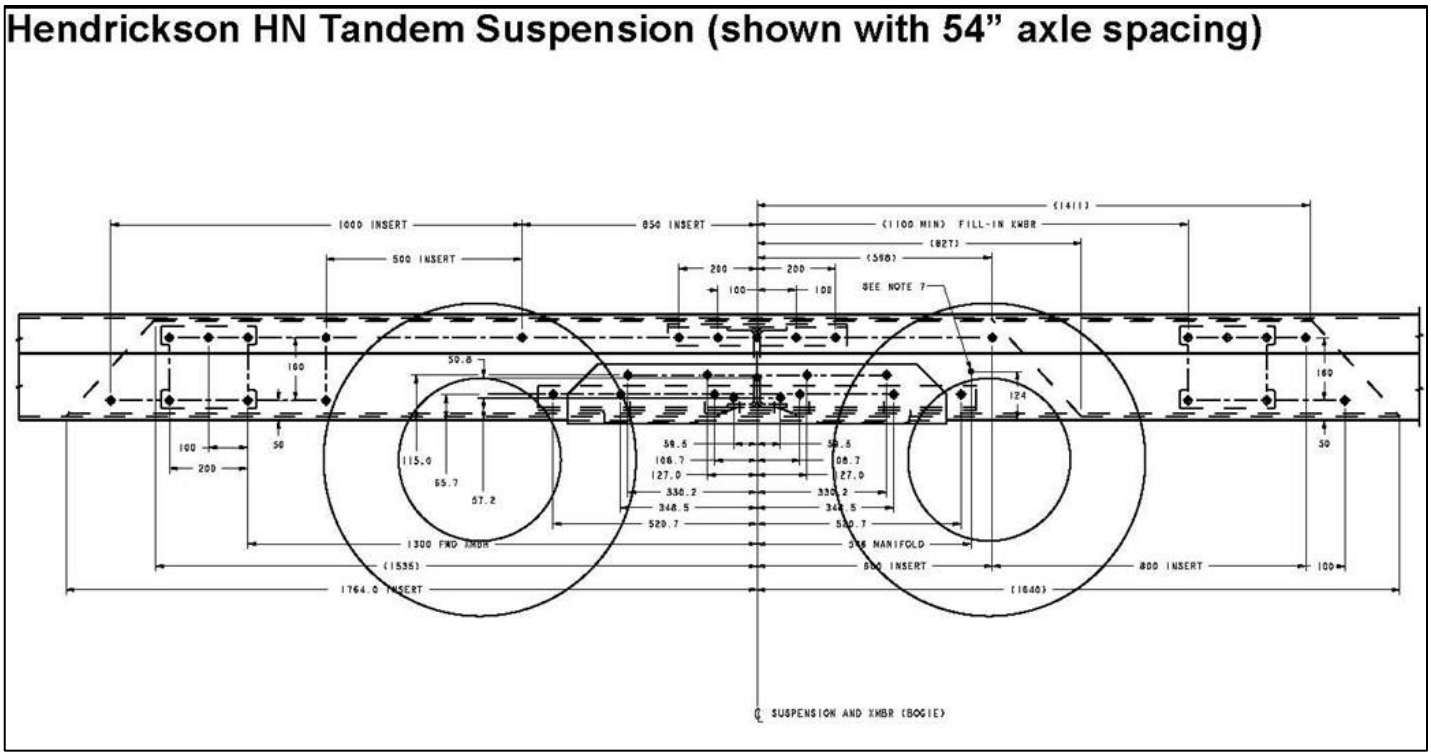


FIGURE 3-17. Hendrickson HN Tandem Frame Drilling (Dimensions In Millimeters)

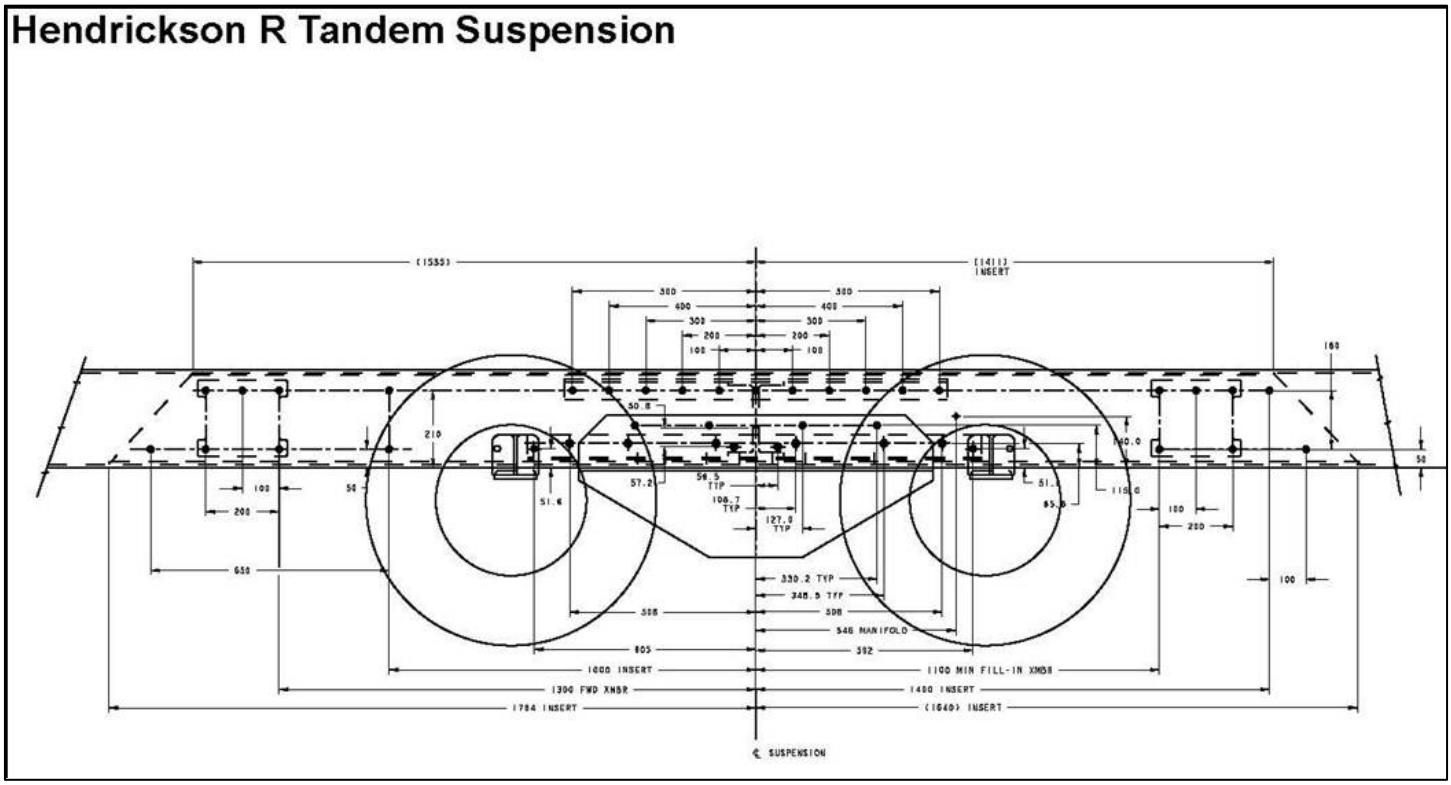


FIGURE 3-18. Hendrickson R Tandem Frame Drilling (Dimensions In Millimeters)

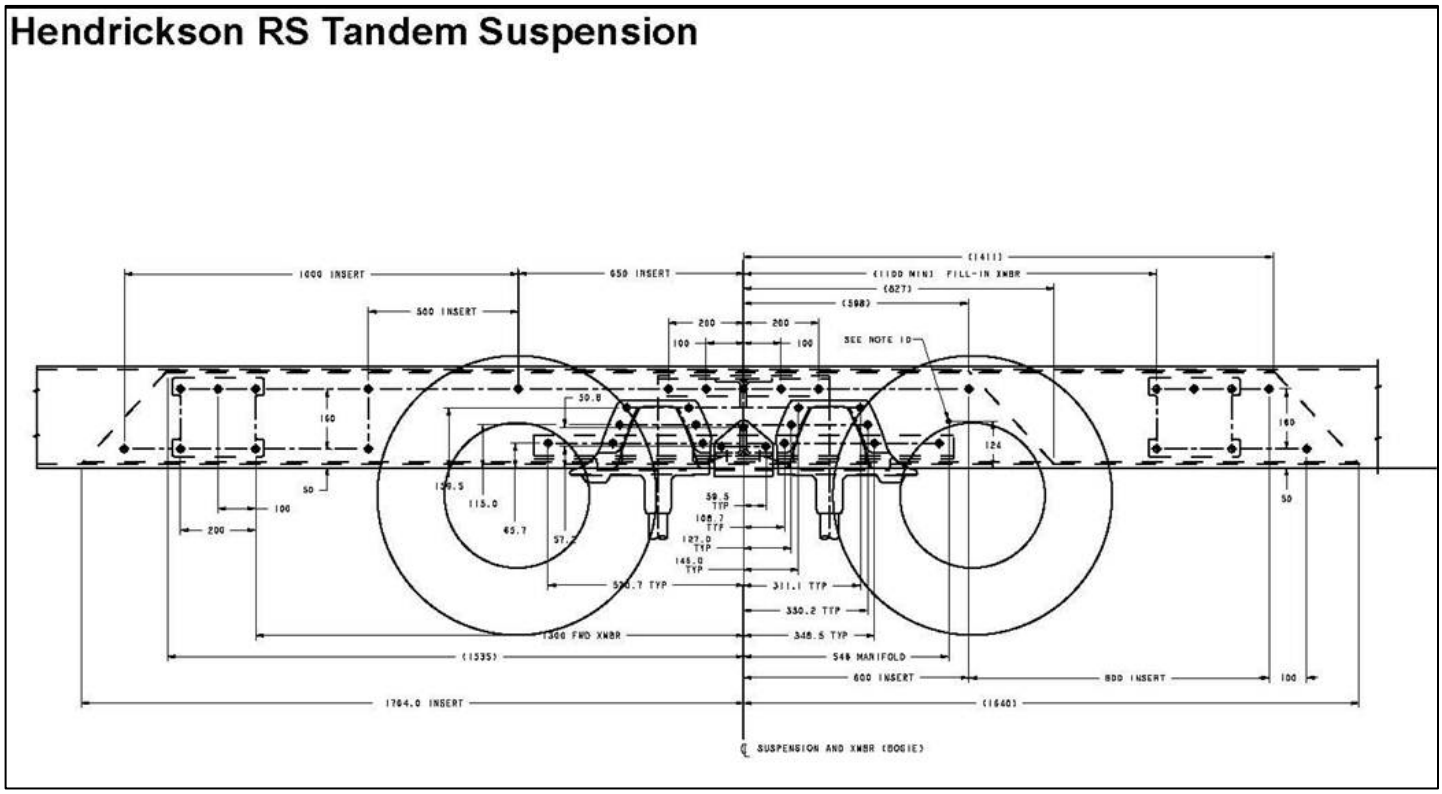


FIGURE 3-19. Hendrickson RS Tandem Frame Drilling (Dimensions In Millimeters)

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.

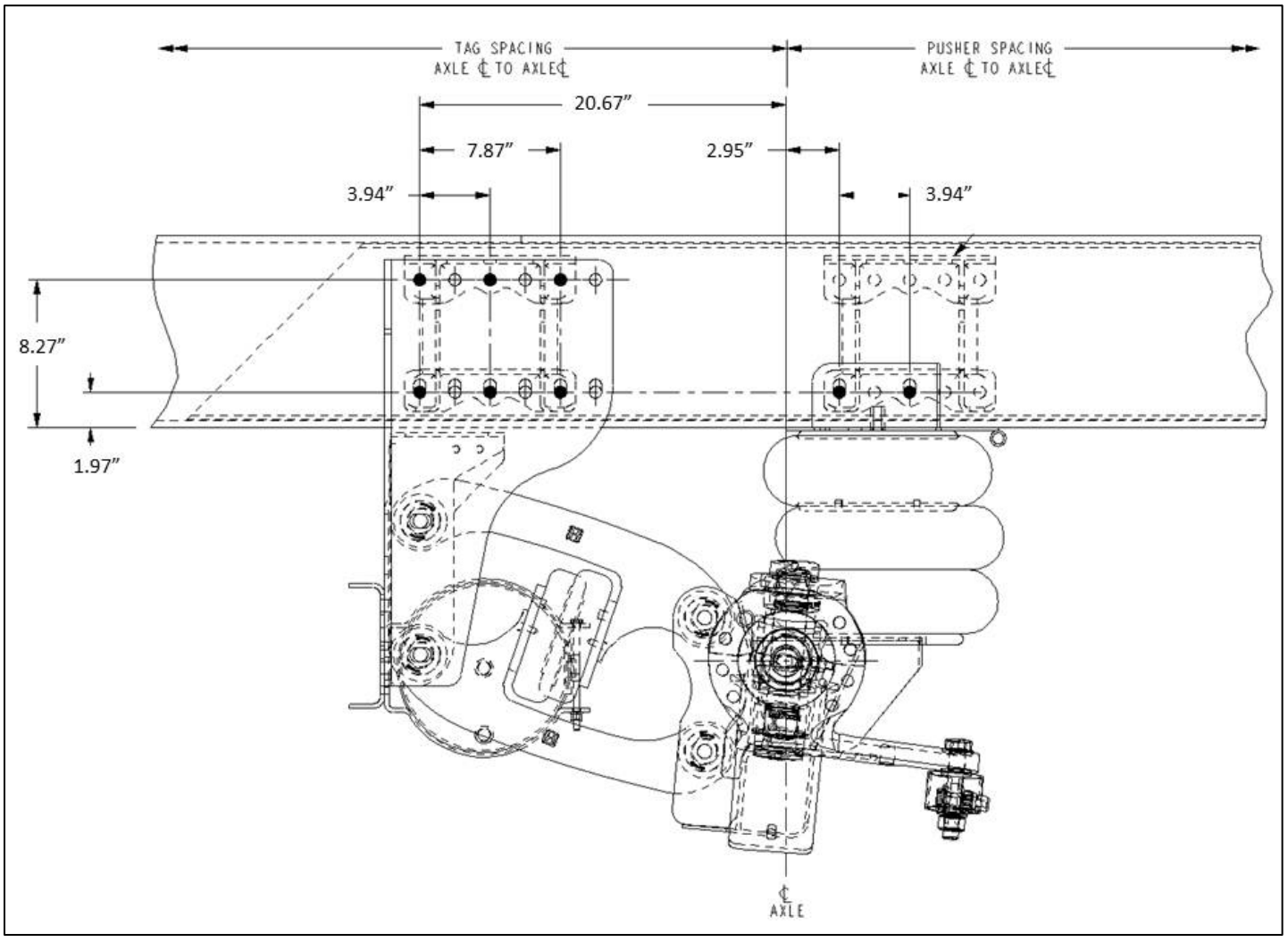


FIGURE 3-20. Hendrickson SC8, SC10, SC13, SCO13, FX or FXO Pusher or Tag

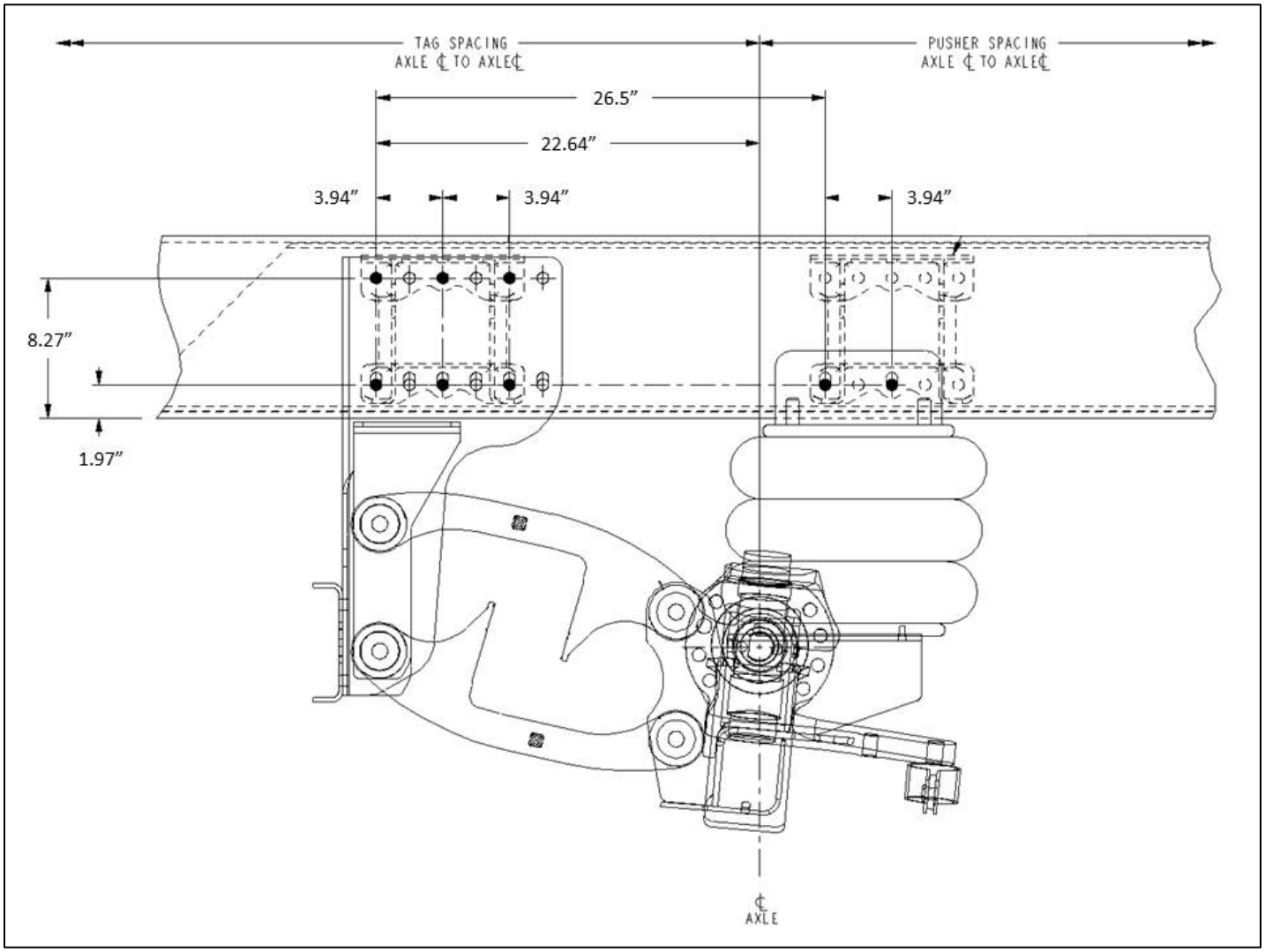


FIGURE 3-21. Hendrickson SC20 Pusher or Tag

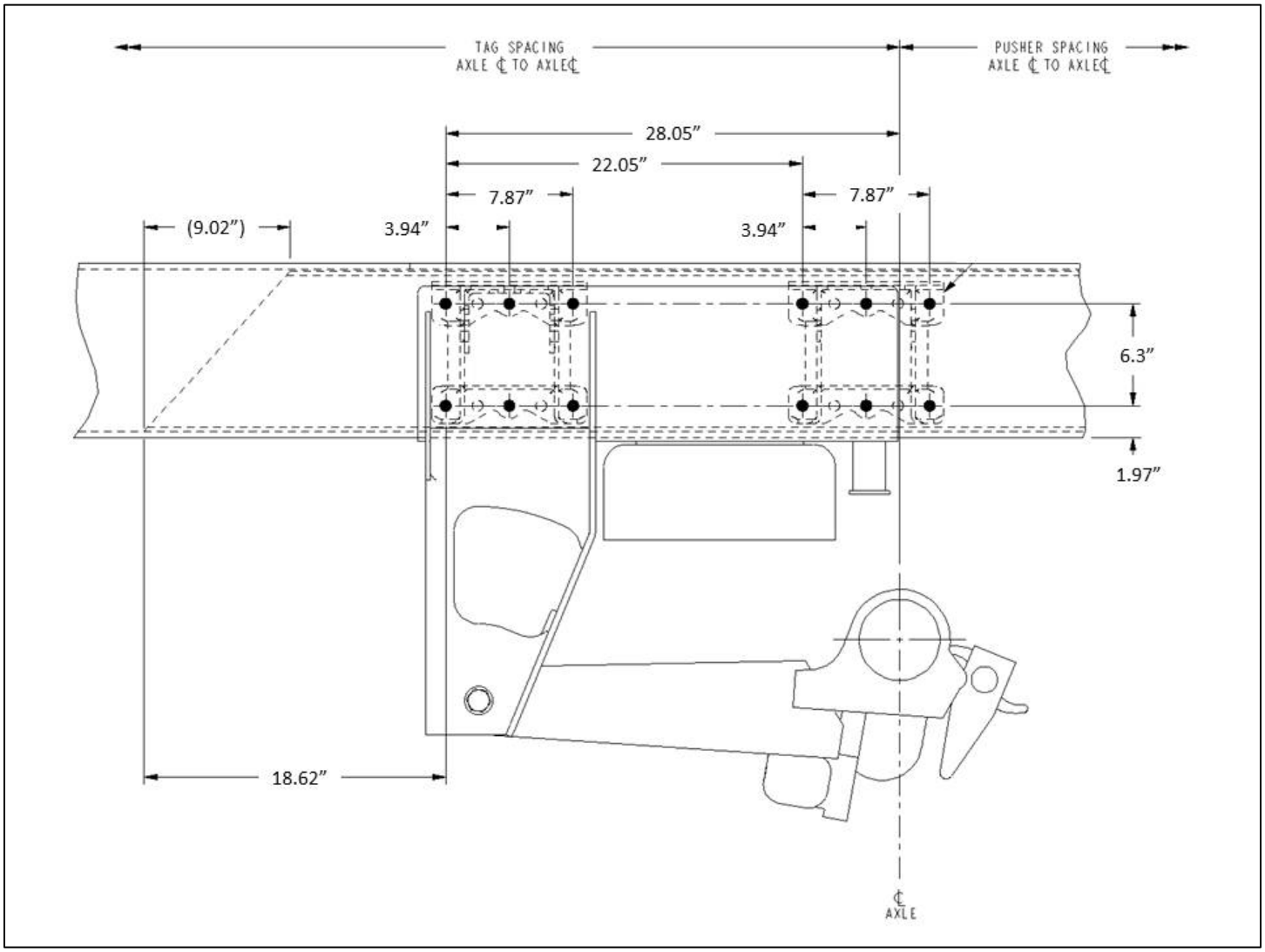


FIGURE 3-22. Hendrickson HLR2 Pusher

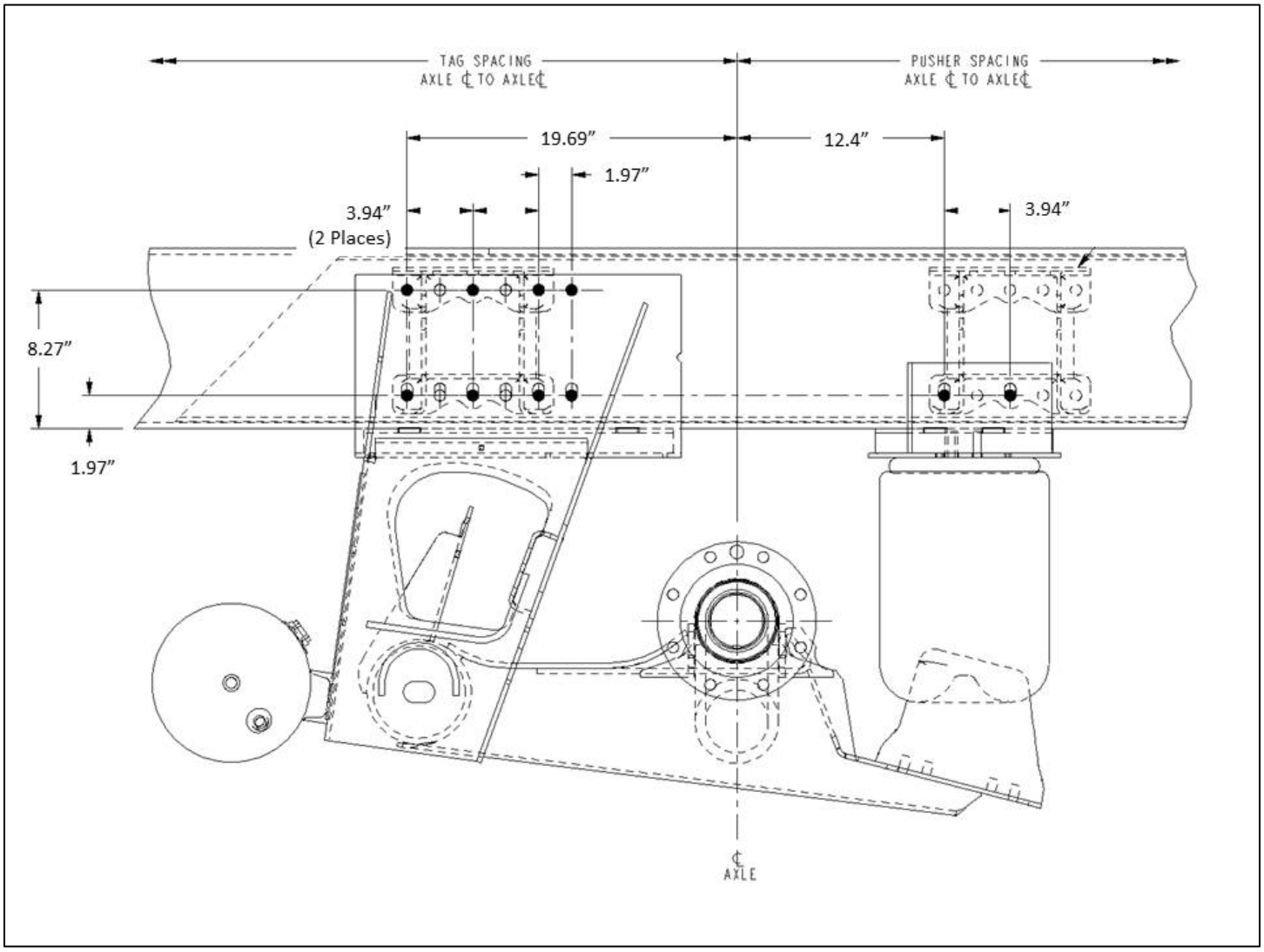


FIGURE 3-23. Hendrickson HLM Pusher or Tag

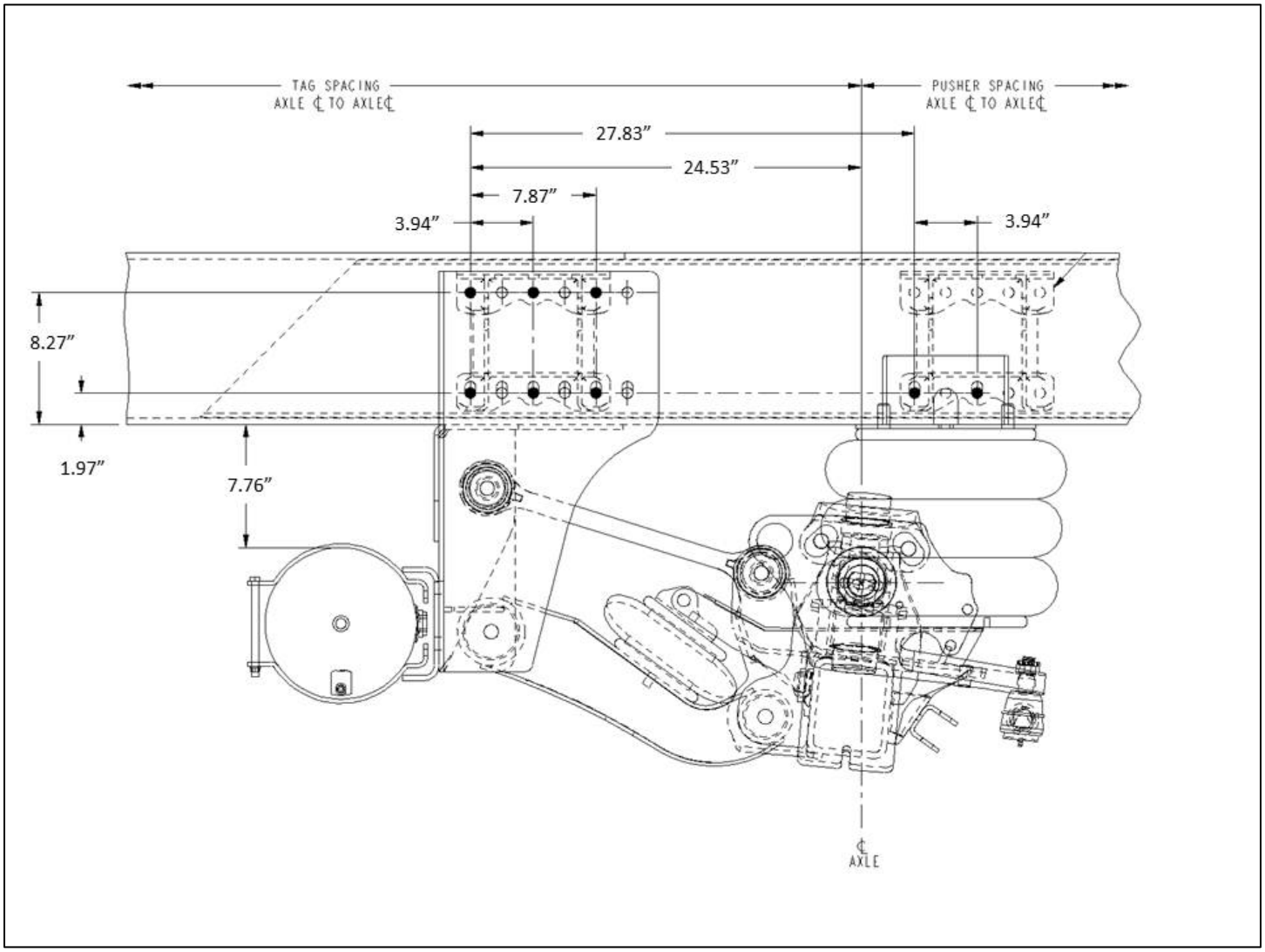


FIGURE 3-24. Watson-Chalin SL2065 Pusher or Tag

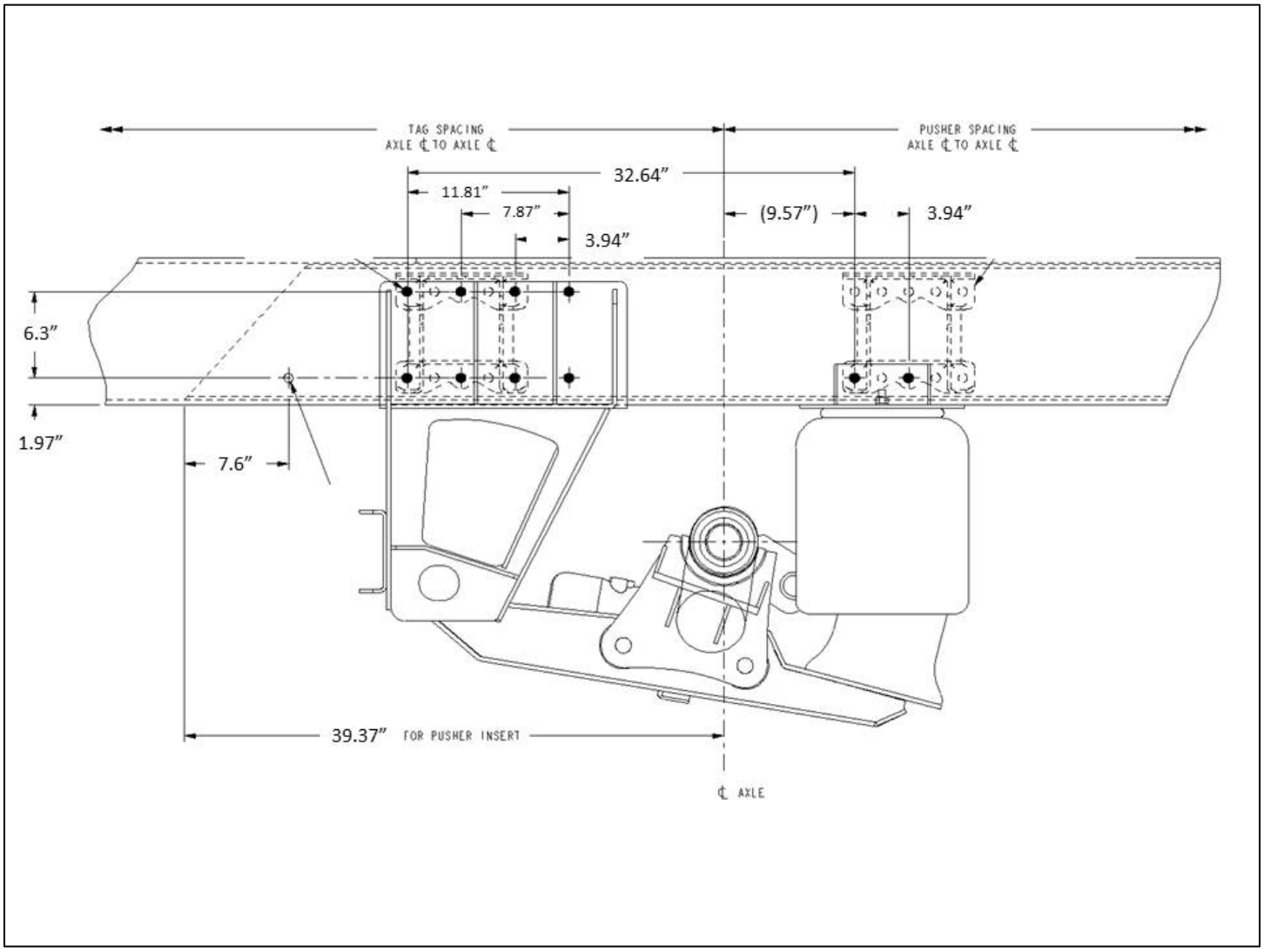


FIGURE 3-25. Watson-Chalin AL2200 Pusher or Tag

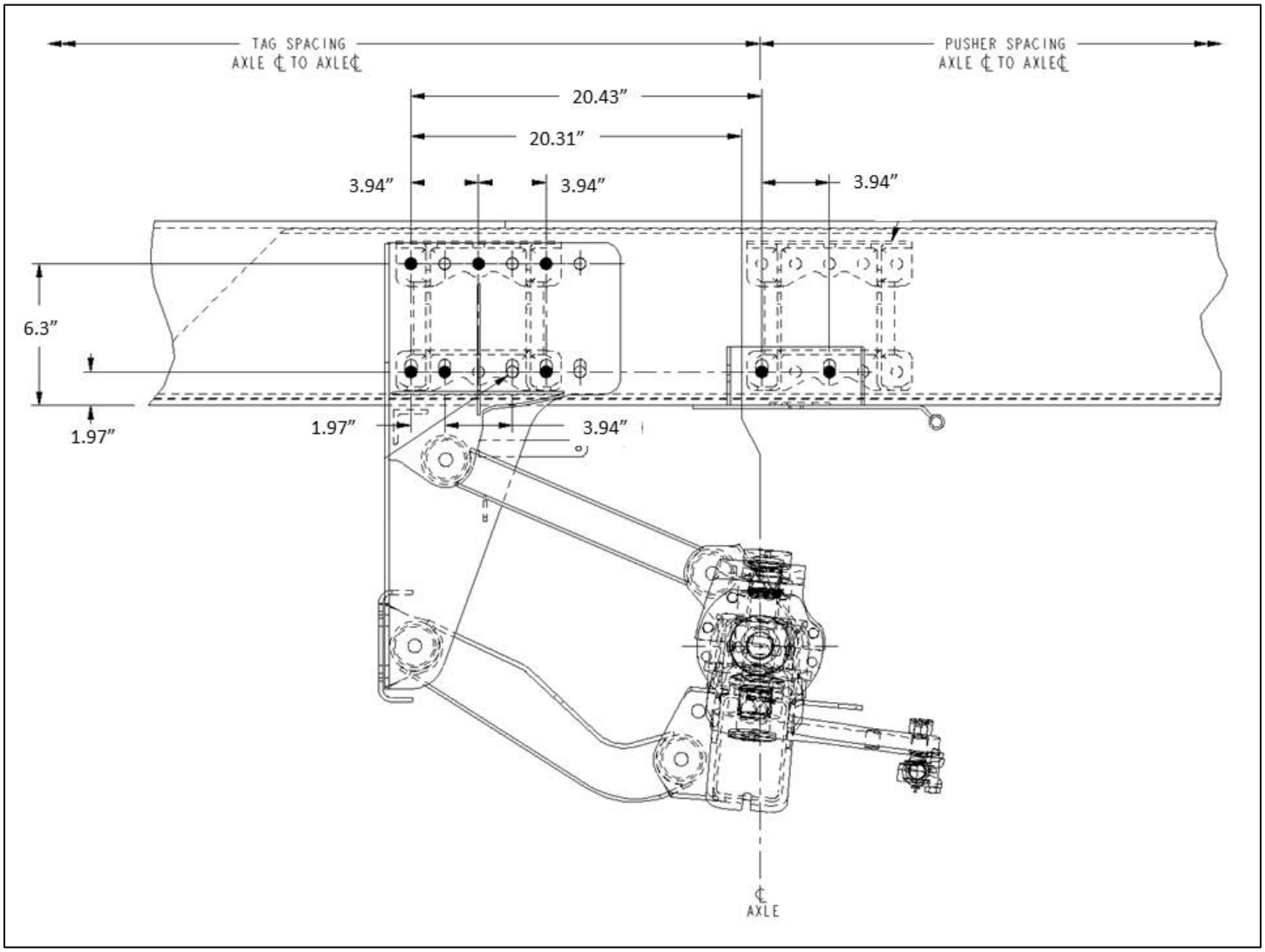


FIGURE 3-26. Watson-Chalin SL0893SSR or SL1093SSR Pusher or Tag

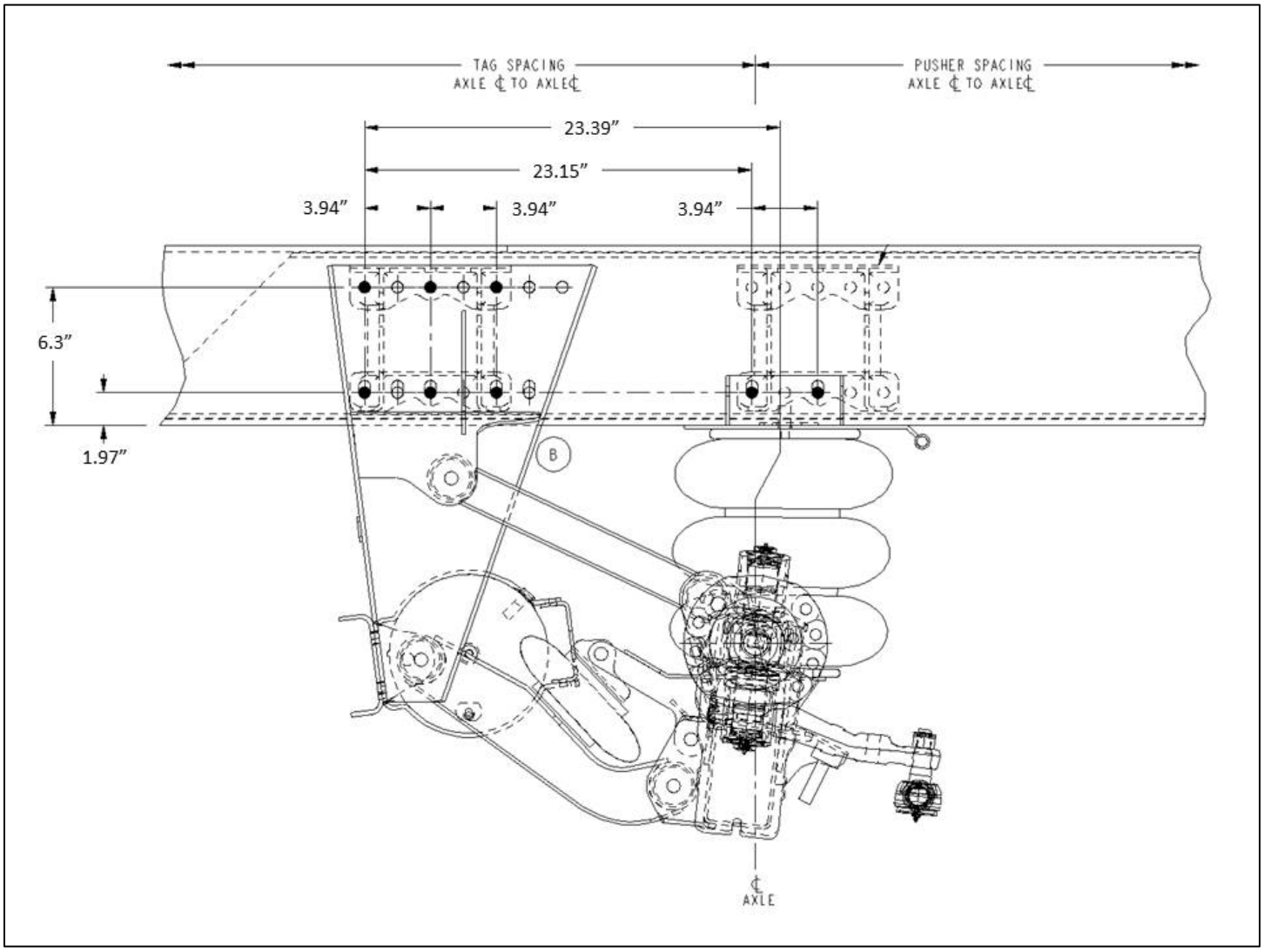


FIGURE 3-27. Watson-Chalin SL1190SSR Pusher or Tag

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	ISLG	ISLG Near Zero	MX-11	PX-9 HHP PX-9 MHP
BOC Vertical	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.

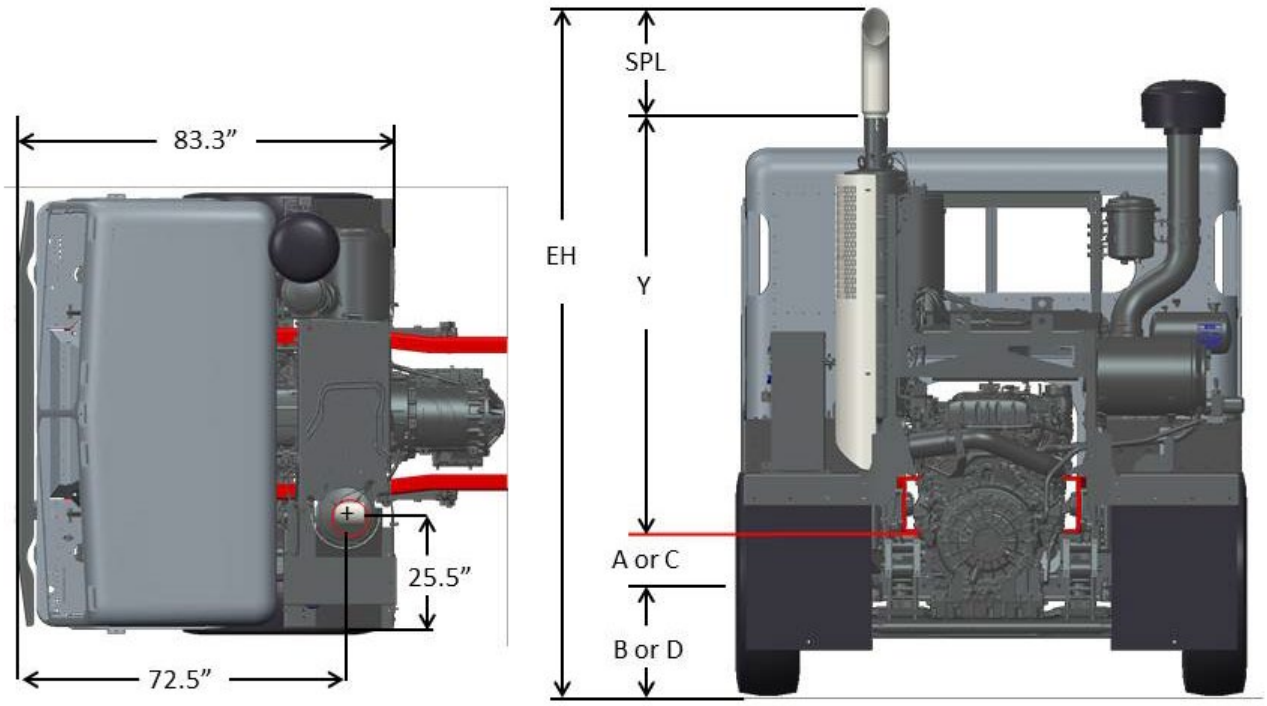


FIGURE 3-27. Exhaust Height Calculations

GROUND CLEARANCE CALCULATIONS

The ground clearance tables are provided as a tool 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	14.7”
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	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

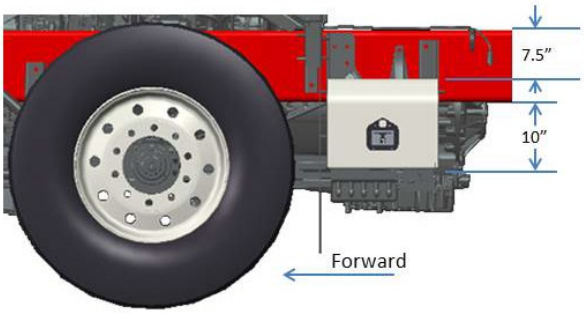


FIGURE 3-29. Space Saver Battery Box

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 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”

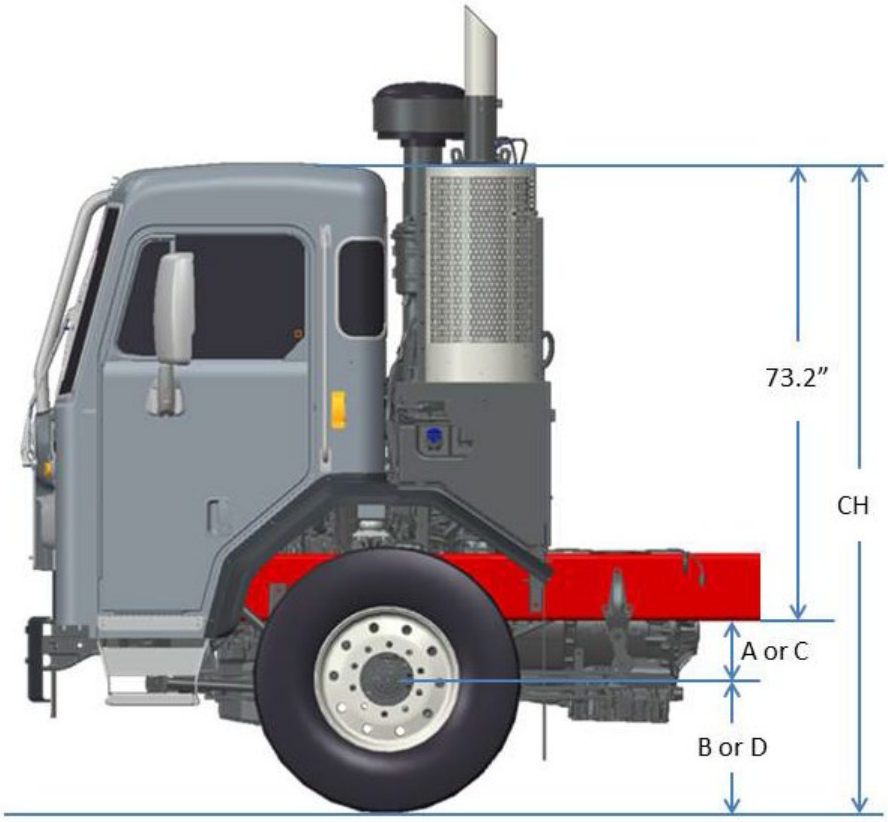


FIGURE 3-30. Overall Cab Height Calculations

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

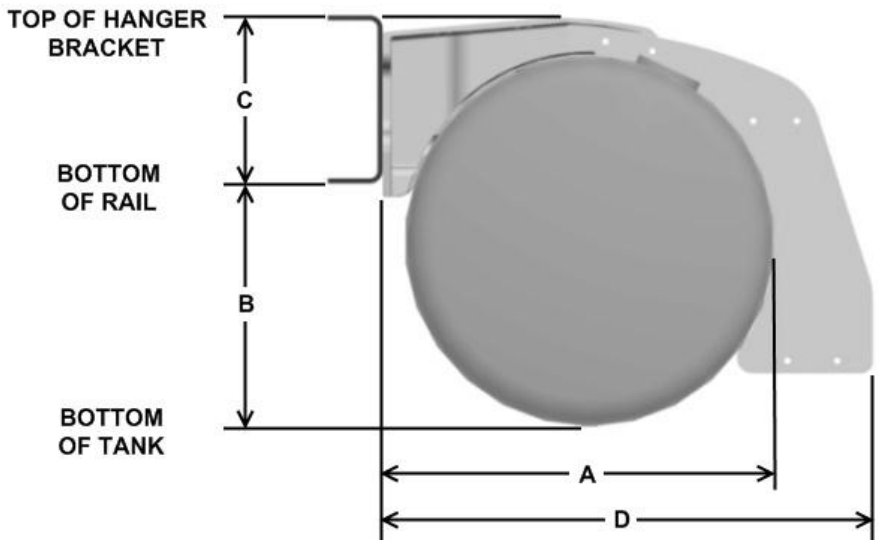


FIGURE 3-31. Fuel Tanks

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		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

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 builders must determine the appropriate method.

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)

(1)Weight per inch in the outserted area only. (Outsert starts behind the rear front spring hanger)

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**.

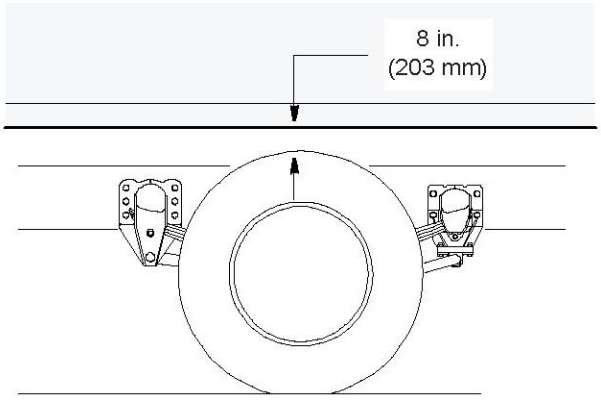


FIGURE 4-1. Minimum Clearance Between Top of Rear Tires and Body Structure Overhang

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.*

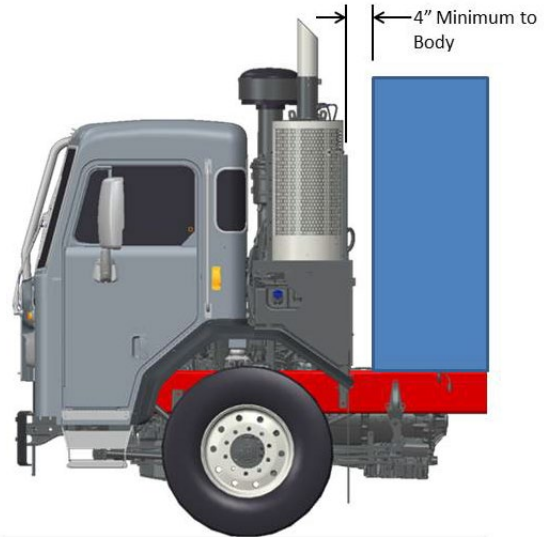


FIGURE 4-2. Minimum Back of Cab Clearance

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**.

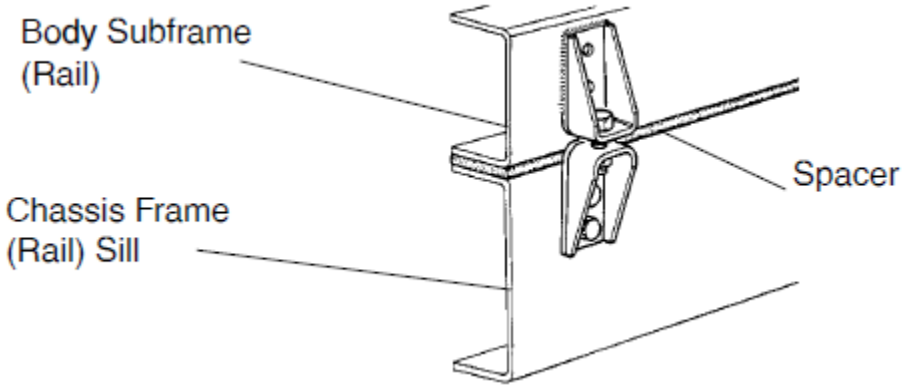


FIGURE 4-3. Spacer Between Frame Sill and Body Rail – Rubber or Plastic

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.

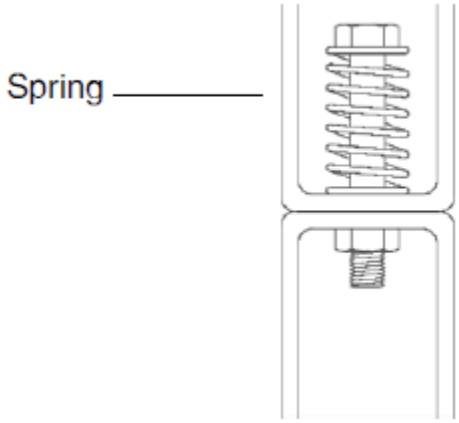


FIGURE 4-4. Mounting Brackets

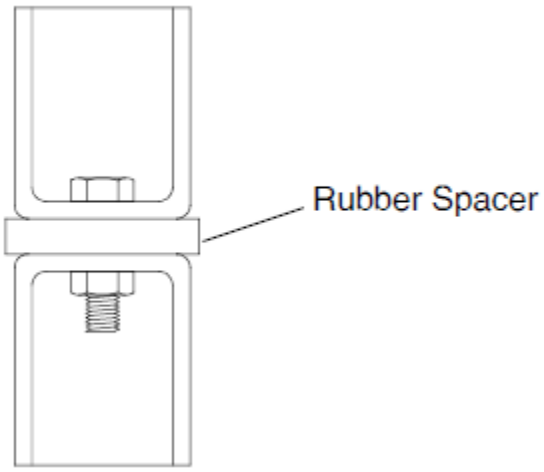


FIGURE 4-5. Mounting Brackets

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.**

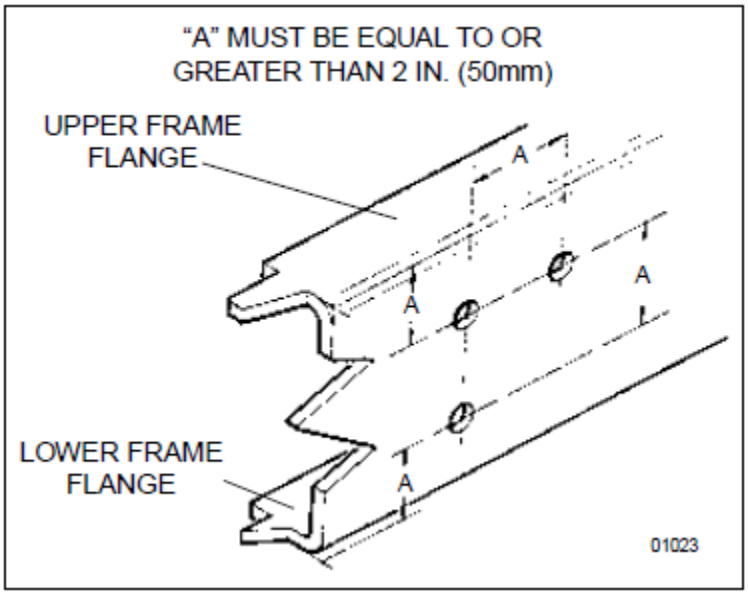


FIGURE 4-6. Hole Location Guidelines for Frame Rail and Bracket

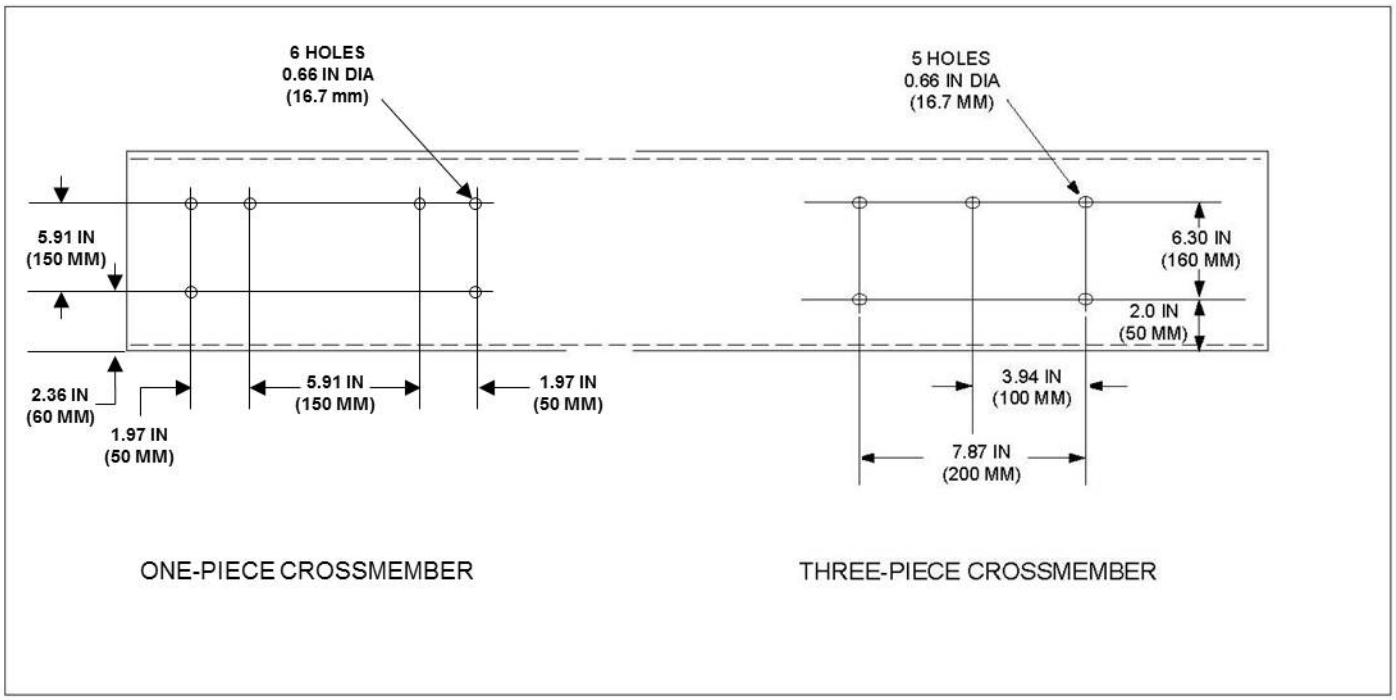


FIGURE 4-7. Crossmember Gusset Hole Patterns (Additional Holes Available in 50 mm Horizontal Increments)

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.*

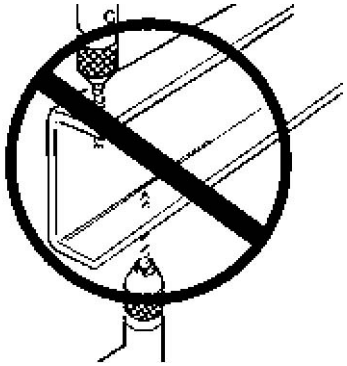


FIGURE 4-8. Frame Rail Flange Drilling Prohibited

WARNING! *DO NOT drill closely spaced holes in the frame rail. Frame 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 frame hole diameter should not exceed the bolt diameter by more than 0.060 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 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.**

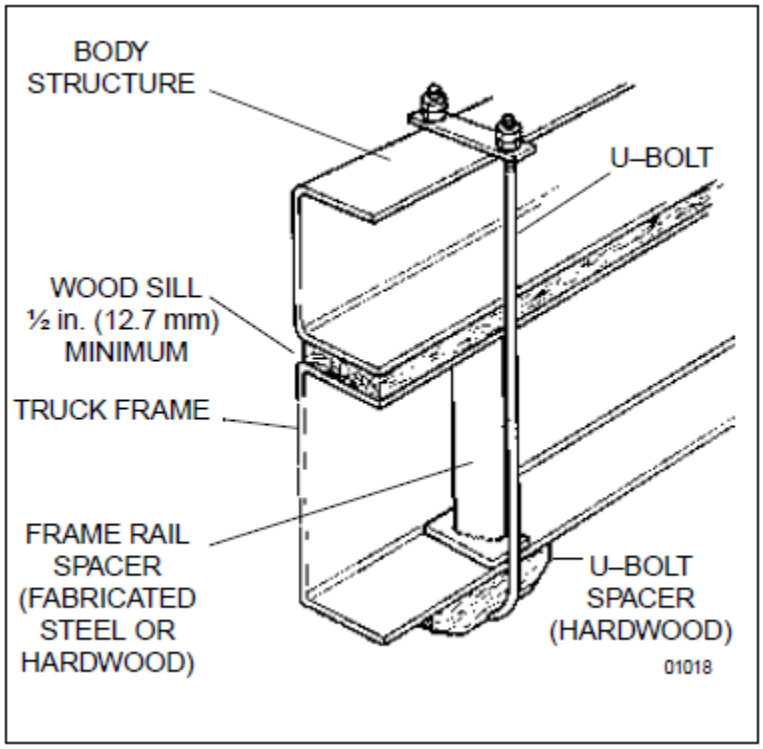


FIGURE 4-9. Acceptable U-Bolt Mounting with Wood and Fabricated Spacers

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.***

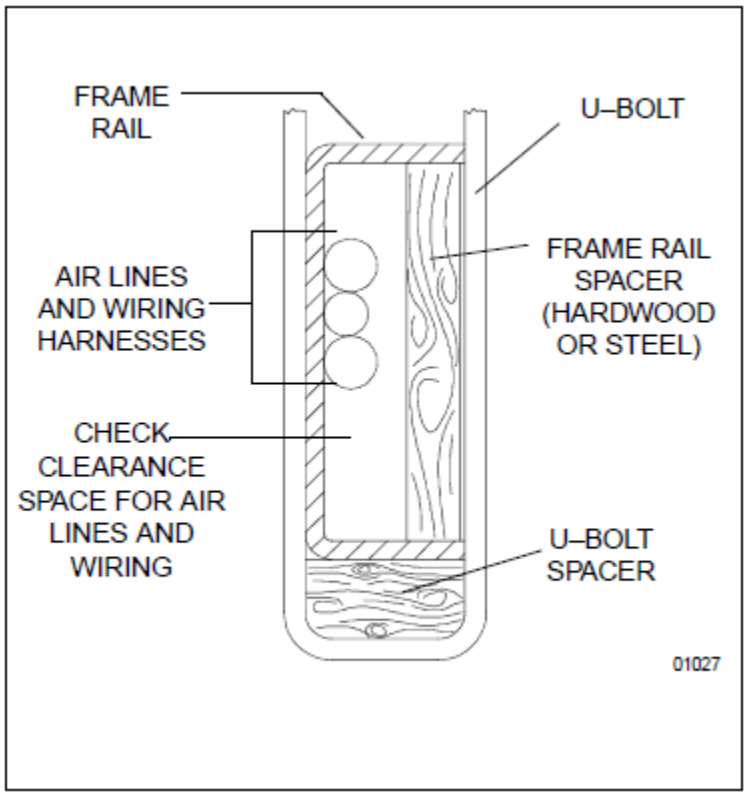
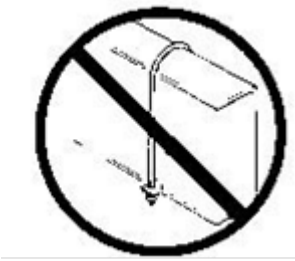


FIGURE 4-10. Clearance Space for Air Lines and Cables

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 4-6**.

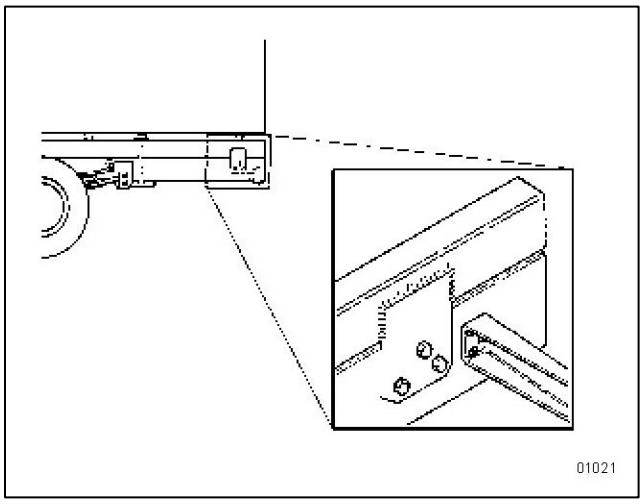


FIGURE 4-11. Fishplate Bracket at Rear End of Body

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SECTION 5 **FRAME MODIFICATIONS**

INTRODUCTION

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

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

DRILLING RAILS

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

MODIFYING FRAME LENGTH

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

CHANGING WHEELBASE

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

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

WARNING! *When changing the wheelbase, contact your local Peterbilt dealership for support. It is important to verify that these changes do not compromise vehicle frame strength.*

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.**

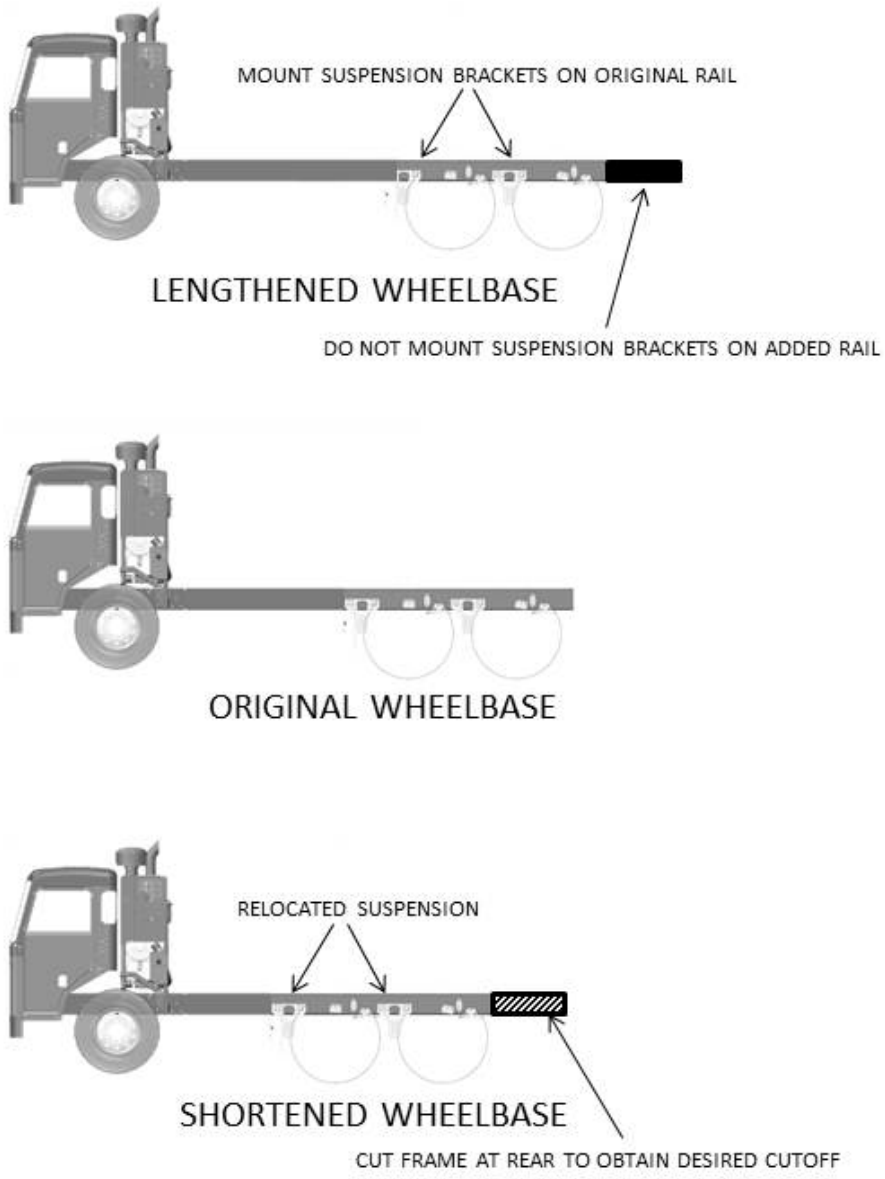

FIGURE 5-1. Wheelbase Customization

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

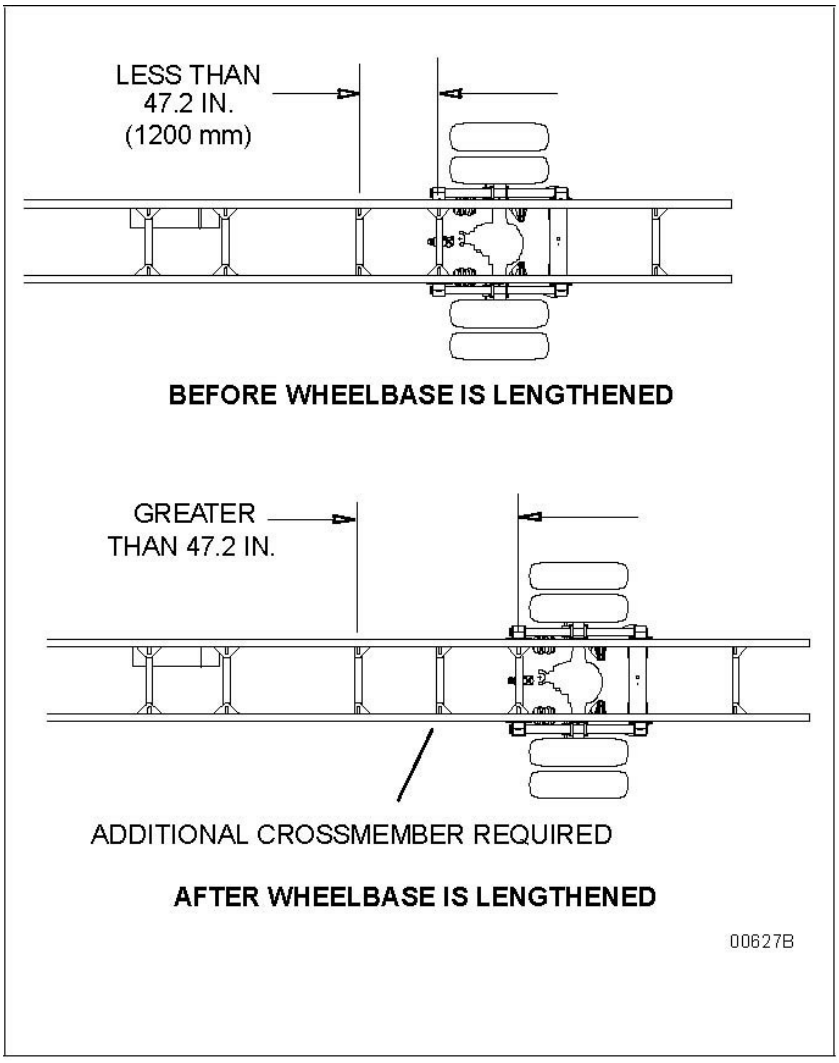

FIGURE 5-2. Crossmember Spacing Requirements

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	27–34	20–25
3/8	47–60	35–44
7/16	76–96	56–71
1/2	117–148	86–109
9/16	167–214	123-158
5/8	235–296	173–218
3/4	411–523	303–386
7/8	654–846	482–624
1	973–1268	718–935

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

Fastener	Torque	
Size	Nm	lb-ft
M6	9–11	7–8
M8	24–27	18–20
M10	47–54	35–40
M12	83–95	61–70
M14	132–150	97–111
M16	206–235	152–173
M20	403–458	297–338

WELDING

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

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

PRECAUTIONS

CAUTION:

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

CAUTION:

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

WELDING PRECAUTIONS: ALL ELECTRONIC ENGINES

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

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

NOTE:

Bendix ABS and Wabco ABS: Disconnect ECU, TCM & VECU.

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SECTION 6 **CAN COMMUNICATIONS**

INTRODUCTION

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

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

Characteristics of the Controller Area Network

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

CAN COMMUNICATIONS ACRONYM LIBRARY

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

SAE J1939

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

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

Characteristics of J1939

- Extended CAN identifier (29 bit)
- Peer-to-peer and broadcast communication
- Network management
- Definition of parameter groups for commercial vehicles and others
- Manufacturer specific parameter groups are supported
- Diagnostics features
- A standard developed by the Society of Automotive Engineers
- Defines communication for vehicle networks
- A Higher-Layer Protocol using CAN as the physical layer
- Uses unshielded twisted pair wire
- Applies a maximum network length of 120 ft.
- Applies a standard baud rate of 500 Kbit/sec
- Supports peer-to-peer and broadcast communication
- Supports message lengths up to 1785 bytes
- Defines a set of Parameter Group Numbers
- Supports network management

PARAMETER GROUP NUMBER

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

SUSPECT PARAMETER NUMBER

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

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

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

CAN MESSAGES AVAILABLE ON BODY CONNECTIONS

SPN	CAN Signal Name	PGN, Message	Tx SA	Rx SA	CAN Bus
38	Fuel Level 2	65276, DD1	39	Broadcast	KCAN, SCAN, BCAN
46	Pneumatic Supply Pressure	65198, AIR1	48	Broadcast	KCAN, SCAN, BCAN
51	Engine Throttle Valve 1 Position 1	65266, LFE1	00	Broadcast	KCAN, SCAN, BCAN
52	Engine Intercooler Temperature	65262, ET1	00	Broadcast	KCAN, SCAN, BCAN
69	Two Speed Axle Switch	65265, CCVS1	00	Broadcast	KCAN, SCAN, BCAN
70	Parking Brake Switch	65265, CCVS1	39	Broadcast	KCAN, SCAN, BCAN
74	Maximum Vehicle Speed Limit	65261, CCSS	39	Broadcast	KCAN, SCAN
81	Aftertreatment 1 Diesel Particulate Filter Intake Pressure	65270, IC1	00	Broadcast	KCAN,SCAN,BCAN
84	Wheel-Based Vehicle Speed	65265, CCVS1	00	Broadcast	KCAN, SCAN, BCAN
86	Cruise Control Set Speed	65265, CCVS1	00	Broadcast	KCAN, SCAN, BCAN
86	Cruise Control Set Speed	65265, CCVS1	39	Broadcast	KCAN, SCAN
90	Power Takeoff Oil Temperature	65264, PTO	7, 33	Broadcast	KCAN, SCAN, BCAN
91	Accelerator Pedal Position 1	61443, EEC2	00	Broadcast	KCAN, SCAN, BCAN
92	Engine Percent Load At Current Speed	61443, EEC2	00	Broadcast	KCAN, SCAN, BCAN
94	Engine Fuel Delivery Pressure	65263, EFL/P1	00	Broadcast	KCAN, SCAN, BCAN
96	Fuel Level 1	65276, DD1	39	Broadcast	KCAN, SCAN, BCAN
97	Water In Fuel Indicator 1	65279, OI	00	Broadcast	KCAN, SCAN, BCAN
98	Engine Oil Level	65263, EFLP1	00	Broadcast	KCAN, SCAN,BCAN
100	Engine Oil Pressure 1	65263, EFL/P1	00	Broadcast	KCAN, SCAN, BCAN
101	Engine Crankcase Pressure 1	65263, EFL/P1	00	Broadcast	KCAN, SCAN, BCAN
102	Engine Intake Manifold #1 Pressure	65270, IC1	00	Broadcast	KCAN, SCAN, BCAN
105	Engine Intake Manifold 1 Temperature	65270, IC1	00	Broadcast	KCAN, SCAN, BCAN
106	Engine Intake Air Pressure	65270, IC1	00	Broadcast	KCAN, SCAN, BCAN
108	Barometric Pressure	65269, AMB	00	Broadcast	KCAN, SCAN, BCAN
110	Engine Coolant Temperature	65262, ET1	00	Broadcast	KCAN, SCAN, BCAN
111	Engine Coolant Level 1	65263, EFL/P1	00	Broadcast	KCAN, SCAN, BCAN
117	Brake Primary Pressure	65274, B1	39	Broadcast	KCAN, SCAN, BCAN
118	Brake Secondary Pressure	65274, B1	39	Broadcast	KCAN, SCAN, BCAN
158	Key Switch Battery Potential	65271, VEP1	39	Broadcast	KCAN, SCAN
161	Transmission 1 Input Shaft Speed	61442, ETC1	03	Broadcast	KCAN, SCAN, BCAN
162	Transmission Requested Range	61445, ETC2	03	Broadcast	KCAN, SCAN, BCAN
163	Transmission Current Range	61445, ETC2	03	Broadcast	KCAN, SCAN, BCAN
168	Battery Potential / Power Input 1	65271, VEP1	39	Broadcast	KCAN, SCAN, BCAN
168	Battery Potential / Power Input 1	65271, VEP1	00	Broadcast	KCAN, SCAN, BCAN
171	Ambient Air Temperature	65269, AMB	00	Broadcast	KCAN, SCAN, BCAN
173	Engine Exhaust Temperature	65270, IC1	00	Broadcast	KCAN, SCAN, BCAN
174	Engine Fuel Temperature 1	65262, ET1	00	Broadcast	KCAN, SCAN, BCAN
175	Engine Oil Temperature 1	65262, ET1	00	Broadcast	KCAN, SCAN, BCAN

177	Transmission Oil Temperature 1	65272, TRF1	03	Broadcast	KCAN, SCAN, BCAN
182	Engine Trip Fuel	65257, LFC1	00	Broadcast	KCAN, SCAN, BCAN
183	Engine Fuel Rate	65266, LFE1	00	Broadcast	KCAN, SCAN, BCAN
184	Engine Instantaneous Fuel Economy	65266, LFE1	00	Broadcast	KCAN, SCAN, BCAN
185	Engine Average Fuel Economy	65266, LFE1	23	Broadcast	KCAN, SCAN, BCAN
187	Power Takeoff Set Speed	65264, PTO	39	Broadcast	KCAN, SCAN, BCAN
187	Power Take Off Set Speed	65264, PTO	00	Broadcast	KCAN, SCAN, BCAN
190	Engine Speed	61444, EEC1	00	Broadcast	KCAN, SCAN, BCAN
191	Transmission 1 Output Shaft Speed	61442, ETC1	03	Broadcast	KCAN, SCAN, BCAN
235	Engine Total Idle Hours	65244, IO	00	Broadcast	KCAN, SCAN, BCAN
236	Engine Total Idle Fuel Used	65244, IO	00	Broadcast	KCAN, SCAN, BCAN
237	Vehicle Identification Number	65260, VI	00	Broadcast	KCAN, SCAN, BCAN
244	Trip Distance	65248, VD	00	Broadcast	KCAN, SCAN, BCAN
245	Total Vehicle Distance	65248, VD	00	Broadcast	KCAN, SCAN, BCAN
247	Engine Total Hours of Operation	65253, HOURS	00	Broadcast	KCAN, SCAN, BCAN
248	Total Power Takeoff Hours	65255, VH	00	Broadcast	KCAN, SCAN, BCAN
249	Engine Total Revolutions	65253, HOURS	00	Broadcast	KCAN, SCAN, BCAN
250	Engine Total Fuel Used	65257, LFC1	00	Broadcast	KCAN, SCAN, BCAN
512	Driver's Demand Engine - Percent Torque	61444, EEC1	00	Broadcast	KCAN, SCAN, BCAN
513	Actual Engine - Percent Torque	61444, EEC1	00	Broadcast	KCAN, SCAN, BCAN
518	Engine Requested Torque/Torque Limit	0, TSC1	39	249 (DA specific)	KCAN, SCAN, BCAN
518	Engine Requested Torque/Torque Limit	0, TSC1	7, 33	00 (DA specific)	KCAN, SCAN, BCAN
523	Transmission Current Gear	61445, ETC2	03	Broadcast	KCAN, SCAN, BCAN
524	Transmission Selected Gear	61445, ETC2	03	Broadcast	KCAN, SCAN, BCAN
525	Transmission Requested Gear	256, TC1	03	255 (DA specific)	KCAN, SCAN, BCAN
525	Trans Requested Gear	256, TC1	7, 33	03 (DA specific)	KCAN, SCAN, BCAN
526	Transmission Actual Gear Ratio	61445, ETC2	03	Broadcast	KCAN, SCAN, BCAN
527	Cruise Control States	65265, CCVS1	39	Broadcast	KCAN, SCAN, BCAN
527	Cruise Control States	65265, CCVS1	00	Broadcast	KCAN, SCAN
558	Accelerator Pedal1 Low Idle Switch	EEC2, 61443	00	Broadcast	KCAN, SCAN, BCAN
559	Accelerator Pedal Kick down Switch	61443, EEC2	00	Broadcast	KCAN, SCAN, BCAN
560	Transmission Driveline Engaged	61442, ETC1	03	Broadcast	KCAN, SCAN, BCAN
561	ASR Engine Control Active	61441, EBC1	39	Broadcast	KCAN, SCAN, BCAN
562	ASR Brake Control Active	61441, EBC1	39	Broadcast	KCAN, SCAN, BCAN
563	Anti-Lock Braking (ABS) Active	61441, EBC1	39	Broadcast	KCAN, SCAN, BCAN
573	Transmission Torque Converter Lockup Engaged	61442, ETC1	03	Broadcast	KCAN, SCAN, BCAN
574	Transmission Shift In Process	61442, ETC1	03	Broadcast	KCAN, SCAN, BCAN
590	Engine Idle Shutdown Timer State	65252, SHUTDN	00	Broadcast	KCAN, SCAN, BCAN

590	Engine Idle Shutdown Timer State	65252, SHUTDN	39	Broadcast	KCAN, SCAN, BCAN
591	Engine Idle Shutdown Timer Function	65252, SHUTDN	00	Broadcast	KCAN, SCAN, BCAN
591	Engine Idle Shutdown Timer Function	65252, SHUTDN	39	Broadcast	KCAN, SCAN, BCAN
592	Engine Idle Shutdown Timer Override	65252, SHUTDN	00	Broadcast	KCAN, SCAN, BCAN
593	Engine Idle Shutdown has Shutdown Engine	65252, SHUTDN	00	Broadcast	KCAN, SCAN, BCAN
594	Engine Idle Shutdown Driver Alert Mode	65252, SHUTDN	00	Broadcast	KCAN, SCAN, BCAN
595	Cruise Control Active	65265, CCVS1	39	Broadcast	KCAN, SCAN, BCAN
595	Cruise Control Active	65265, CCVS1	00	Broadcast	KCAN, SCAN, BCAN
596	Cruise Control Enable Switch	65265, CCVS1	39	Broadcast	KCAN, SCAN, BCAN
597	Brake Switch	65265, CCVS1	39	Broadcast	KCAN, SCAN, BCAN
598	Clutch Switch	65265, CCVS1	39	Broadcast	KCAN, SCAN, BCAN
599	Cruise Control Set Switch	65265, CCVS1	39	Broadcast	KCAN, SCAN, BCAN
600	Cruise Control Coast (Decelerate) Switch	65265, CCVS1	39	Broadcast	KCAN, SCAN, BCAN
601	Cruise Control Resume Switch	65265, CCVS1	39	Broadcast	KCAN, SCAN, BCAN
602	Cruise Control Accelerate Switch	65265, CCVS1	39	Broadcast	KCAN, SCAN, BCAN
606	Engine Momentary Overspeed Enable	61442, ETC1	03	Broadcast	KCAN, SCAN, BCAN
607	Progressive Shift Disable	61442, ETC1	03	Broadcast	KCAN, SCAN, BCAN
684	Requested % Clutch Slip	256, TC1	7, 33	03 (DA specific)	KCAN, SCAN, BCAN
695	Engine Override Control Mode	0, TSC1	7, 33	00 (DA specific)	KCAN, SCAN, BCAN
696	Engine Requested Speed Control Conditions	0, TSC1	7, 33	00 (DA specific)	KCAN, SCAN, BCAN
897	Override Control Mode Priority	0, TSC1	7, 33	00 (DA specific)	KCAN, SCAN, BCAN
898	Engine Requested Speed/Speed Limit	0, TSC1	7, 33	00 (DA specific)	KCAN, SCAN, BCAN
899	Engine Torque Mode	61444, EEC1	00	Broadcast	KCAN, SCAN, BCAN
917	Total Vehicle Distance (High Resolution)	65217, VDHR	39	Broadcast	KCAN, SCAN, BCAN
969	Remote Accelerator Enable Switch	61441, EBC1	00	Broadcast	KCAN, SCAN, BCAN
970	Engine Auxiliary Shutdown Switch	61441, EBC1	7, 33, 160	Broadcast	KCAN, SCAN, BCAN
974	Remote Accelerator Pedal Position	61443, EEC2	7, 33	Broadcast	KCAN, SCAN, BCAN
974	Remote Accelerator Pedal Position	61443, EEC2	00	Broadcast	KCAN, SCAN, BCAN
975	Engine Fan 1 Estimated Percent Speed	65213, FD1	00	Broadcast	KCAN, SCAN, BCAN
976	PTO Governor State	65265, CCVS1	39	Broadcast	KCAN, SCAN, BCAN
976	PTO Governor State	65265, CCVS1	00	Broadcast	KCAN, SCAN, BCAN
976	PTO Governor State	65265, CCVS1	7, 33	Broadcast	KCAN, SCAN, BCAN
977	Fan Drive State	65213, FD1	00	Broadcast	KCAN, SCAN, BCAN
979	Engine Remote PTO Governor Preprogrammed Speed Control Switch	65264, PTO	7, 33	Broadcast	KCAN, SCAN, BCAN
979	Engine Remote PTO Governor Preprogrammed Speed Control Switch	65264, PTO	00	Broadcast	KCAN, SCAN, BCAN
980	Engine PTO Governor Enable Switch	65264, PTO	7, 33	Broadcast	KCAN, SCAN, BCAN

980	Engine PTO Governor Enable Switch	65264, PTO	00	Broadcast	KCAN, SCAN, BCAN
982	Engine PTO Governor Resume Switch	65264, PTO	7, 33	Broadcast	KCAN, SCAN, BCAN
984	Engine PTO Governor Set Switch	65264, PTO	7, 33	Broadcast	KCAN, SCAN, BCAN
985	A/C High Pressure Fan Switch	65252, SHUTDN	00	Broadcast	KCAN, SCAN, BCAN
1028	Total Engine PTO Governor Fuel Used	65203, LFI1	00	Broadcast	KCAN, SCAN, BCAN
1040	Total Fuel Used (Gaseous)	65199, GFC	00	Broadcast	KCAN, SCAN, BCAN
1081	Engine Wait to Start Lamp	65252, SHUTDN	00	Broadcast	KCAN, SCAN, BCAN
1087	Service Brake Circuit 1 Air Pressure	65198, AIR1	39	Broadcast	KCAN, SCAN, BCAN
1087	Service Brake Circuit1 Air Pressure	65198, AIR1	11	Broadcast	KCAN, SCAN, BCAN
1087	Service Brake Circuit1 Air Pressure	65198, AIR1	48	Broadcast	KCAN, SCAN, BCAN
1088	Service Brake Circuit 2 Air Pressure	65198, AIR1	39	Broadcast	KCAN, SCAN, BCAN
1090	Air Suspension Supply Pressure 1	65198, AIR1	23	Broadcast	KCAN, SCAN, BCAN
1107	Engine Protection System Timer State	65252, SHUTDN	00	Broadcast	KCAN, SCAN, BCAN
1108	Engine Protection System Timer Override	65252, SHUTDN	00	Broadcast	KCAN, SCAN, BCAN
1109	Engine Protection System Approaching Shutdown	65252, SHUTDN	00	Broadcast	KCAN, SCAN, BCAN
1110	Engine Protection System Approaching Shutdown	65252, SHUTDN	00	Broadcast	KCAN, SCAN, BCAN
1111	Engine Protection System Configuration	65252, SHUTDN	00	Broadcast	KCAN, SCAN, BCAN
1172	Engine Turbocharger1 Compressor Intake Temperature	65178, TCI2	00	Broadcast	KCAN, SCAN, BCAN
1184	Engine Turbocharger1 Turbine Outlet Temperature	TCI5, 65175	00	Broadcast	KCAN, SCAN, BCAN
1214	Suspect Parameter Number	65226, DM1	39	Broadcast	KCAN, SCAN
1215	Failure Mode Identifier	65226, DM1	39	Broadcast	KCAN, SCAN
1216	Occurrence Count	65226, DM1	39	Broadcast	KCAN, SCAN
1437	Road Speed Limit Status	61443, EEC2	00	Broadcast	KCAN, SCAN, BCAN
1482	Source Address of Controlling Device for Transmission Control	61442, ETC1	03	Broadcast	KCAN, SCAN, BCAN
1483	Source Address of Controlling Device for Engine Control	61444, EEC1	00	Broadcast	KCAN, SCAN, BCAN
1487	Illumination Brightness Percent	53248, CL	39	74 (DA specific)	KCAN, SCAN
1639	Fan Speed	65213, FD1	00	Broadcast	KCAN, SCAN, BCAN
1675	Engine Starter Mode	61444, EEC1	00	Broadcast	KCAN, SCAN, BCAN
1706	SPN Conversion Method	65226, DM1	39	Broadcast	KCAN, SCAN
1761	Aftertreatment 1 Diesel Exhaust Fluid Tank Volume	65110, AT1T1I1	00	Broadcast	KCAN, SCAN, BCAN
1807	Steering Wheel Angle	61449, VDC2	11, 62	Broadcast	KCAN, SCAN, BCAN
1854	TransMode3	256, TC1	7, 33	03 (DA specific)	KCAN, SCAN, BCAN
1856	Seat Belt Switch	57344, CM1	39	255 (DA specific)	KCAN, SCAN
2347	High Beam Head Light Command	65089, LCMD	39	Broadcast	KCAN, SCAN, BCAN

2347	High Beam Head Light Command	65089, LCMD	7, 33, 160	Broadcast	KCAN, SCAN, BCAN
2349	Low Beam Head Light Command	65089, LCMD	39	Broadcast	KCAN, SCAN, BCAN
2349	Low Beam Head Light Command	65089, LCMD	7, 33, 160	Broadcast	KCAN, SCAN, BCAN
2367	Left Turn Signal Lights Command	65089, LCMD	39	Broadcast	KCAN, SCAN, BCAN
2367	Left Turn Signal Lights Command	65089, LCMD	7, 33, 160	Broadcast	KCAN, SCAN, BCAN
2369	Right Turn Signal Lights Command	65089, LCMD	39	Broadcast	KCAN, SCAN, BCAN
2369	Right Turn Signal Lights Command	65089, LCMD	7, 33, 160	Broadcast	KCAN, SCAN, BCAN
2371	Left Stop Light Command	65089, LCMD	39	Broadcast	KCAN, SCAN, BCAN
2371	Left Stop Light Command	65089, LCMD	7, 33, 160	Broadcast	KCAN, SCAN, BCAN
2373	Right Stop Light Command	65089, LCMD	39	Broadcast	KCAN, SCAN, BCAN
2373	Right Stop Light Command	65089, LCMD	7, 33, 160	Broadcast	KCAN, SCAN, BCAN
2385	Rotating Beacon Light Command	65089, LCMD	39	Broadcast	KCAN, SCAN, BCAN
2385	Rotating Beacon Light Command	65089, LCMD	7, 33, 160	Broadcast	KCAN, SCAN, BCAN
2387	Tractor Front Fog Lights Command	65089, LCMD	39	Broadcast	KCAN, SCAN, BCAN
2387	Tractor Front Fog Lights Command	65089, LCMD	7, 33, 160	Broadcast	KCAN, SCAN, BCAN
2391	Back Up Light and Alarm Horn Command	65089, LCMD	39	Broadcast	KCAN, SCAN, BCAN
2391	Back Up Light and Alarm Horn Command	65089, LCMD	7, 33, 160	Broadcast	KCAN, SCAN, BCAN
2403	Running Light Command	65089, LCMD	39	Broadcast	KCAN, SCAN, BCAN
2403	Running Light Command	65089, LCMD	7, 33, 160	Broadcast	KCAN, SCAN, BCAN
2432	Engine Demand – Percent Torque	61444, EEC1	00	Broadcast	KCAN, SCAN, BCAN
2538	TransMode3Indicator	65098, ETC7	03	Broadcast	KCAN, SCAN, BCAN
2540	Parameter Group Number (RQST)	59904, RQST	251	255 (DA specific)	KCAN, SCAN
2540	Parameter Group Number (RQST)	59904, RQST	7, 33, 160	00 (DA specific)	KCAN, SCAN, BCAN
2609	Cab A/C Refrigerant Compressor Outlet Pressure	64993, CACI	25	Broadcast	KCAN, SCAN, BCAN
2641	Horn Switch	64980, CM3	7, 33, 160	Broadcast	KCAN, SCAN, BCAN
2863	Front Operator Wiper Switch	64973, OWW	39	Broadcast	KCAN, SCAN, BCAN
2873	Work Light Switch	64972, OEL	39	Broadcast	KCAN, SCAN, BCAN
2873	Work Light Switch	64972, OEL	7, 33, 160	Broadcast	KCAN, SCAN, BCAN
2875	Hazard Light Switch	64972, OEL	7, 33, 160	Broadcast	KCAN, SCAN, BCAN
2876	Turn Signal Switch	64972, OEL	39	Broadcast	KCAN, SCAN
2979	Vehicle Acceleration Rate Limit Status	61443, EEC2	39	Broadcast	KCAN, SCAN, BCAN

2979	Vehicle Acceleration Rate Limit Status	61443, EEC2	00	Broadcast	KCAN, SCAN, BCAN
3026	Transmission Oil Level 1 Measurement Status	65272, TRF1	03	Broadcast	KCAN, SCAN, BCAN
3027	Transmission Oil Level 1 High / Low	65272, TRF1	03	Broadcast	KCAN, SCAN, BCAN
3028	Transmission Oil Level 1 Countdown Timer	65272, TRF1	03	Broadcast	KCAN, SCAN, BCAN
3031	Aftertreatment 1 Diesel Exhaust Fluid Tank Temperature 1	65110, AT1T1I1	00	Broadcast	KCAN, SCAN, BCAN
3246	Aftertreatment 1 Diesel Particulate Filter Outlet Temperature	64947, AT1OG2	00	Broadcast	KCAN, SCAN, BCAN
3349	TSC1 Transmission Rate	0, TSC1	7, 33	00 (DA specific)	KCAN, SCAN, BCAN
3350	TSC1 Control Purpose	0, TSC1	7, 33	00 (DA specific)	KCAN, SCAN, BCAN
3357	Actual Maximum Available Engine - Percent Torque	61443, EEC2	00	Broadcast	KCAN, SCAN, BCAN
3363	Aftertreatment 1 Diesel Exhaust Fluid Tank Heater	65110, AT1T1I1	00	Broadcast	KCAN, SCAN, BCAN
3447	Remote PTO Governor Preprogrammed Speed Control Switch #2	65264, PTO	7, 33	Broadcast	KCAN, SCAN, BCAN
3462	Engagement Status	64932, PTODE	7, 33	Broadcast	KCAN
3462	Engagement Status	64932, PTODE	7, 33	03 (DA specific)	SCAN, BCAN
3543	Engine Operating State	64914, EOI	00	Broadcast	KCAN, SCAN, BCAN
3606	Engine Controlled Shutdown Request	64914, EOI	00	Broadcast	KCAN, SCAN, BCAN
3607	Engine Emergency (Immediate) Shutdown Indication	64914, EOI	00	Broadcast	KCAN, SCAN, BCAN
3609	Aftertreatment 1 Diesel Particulate Filter Intake Pressure	64908, AT1GP	00	Broadcast (255)	KCAN, SCAN, BCAN
3610	Aftertreatment 1 Diesel Particulate Filter Outlet Pressure	64908, AT1GP	00	Broadcast	KCAN, SCAN, BCAN
3673	Engine Throttle Valve2 Position	65266, LFE1	00	Broadcast	KCAN, SCAN, BCAN
3695	Aftertreatment Regeneration Inhibit Switch	57344, CM1	7, 33, 160	255 (DA specific)	KCAN, SCAN, BCAN
3695	Aftertreatment Regeneration Inhibit Switch	57344, CM1	39	255 (DA specific)	KCAN, SCAN, BCAN
3696	Aftertreatment Regeneration Force Switch	57344, CM1	7, 33, 160	255 (DA specific)	KCAN, SCAN, BCAN
3696	Aftertreatment Regeneration Force Switch	57344, CM1	00	255 (DA specific)	KCAN, SCAN, BCAN
3696	Force Regen	57344, CM1	39	255 (DA specific)	KCAN, SCAN, BCAN
3697	Diesel Particulate Filter Lamp Command	64892, DPFC1	00	Broadcast	KCAN, SCAN, BCAN
3698	Exhaust System High Temperature Lamp Command	64892, DPFC1	00	Broadcast	KCAN, SCAN, BCAN
3700	Aftertreatment Diesel Particulate Filter Active Regeneration Status	64892, DPFC1	00	Broadcast	KCAN, SCAN, BCAN
3701	Aftertreatment Diesel Particulate Filter Status	64892, DPFC1	00	Broadcast	KCAN, SCAN, BCAN

3702	Diesel Particulate Filter Active Regeneration Inhibited Status	64892, DPFC1	00	Broadcast	KCAN, SCAN, BCAN
3703	Diesel Particulate Filter Active Regeneration Inhibited Due to Inhibit Switch	64892, DPFC1	00	Broadcast	KCAN, SCAN, BCAN
3704	Diesel Particulate Filter Active Regeneration Inhibited Due to Clutch Disengaged	64892, DPFC1	00	Broadcast	KCAN, SCAN, BCAN
3705	Diesel Particulate Filter Active Regeneration Inhibited Due to Service Brake Active	64892, DPFC1	00	Broadcast	KCAN, SCAN, BCAN
3706	Diesel Particulate Filter Active Regeneration Inhibited Due to PTO Active	64892, DPFC1	00	Broadcast	KCAN, SCAN, BCAN
3707	Diesel Particulate Filter Active Regeneration Inhibited Due to Accelerator Pedal Off Idle	64892, DPFC1	00	Broadcast	KCAN, SCAN, BCAN
3708	Diesel Particulate Filter Active Regeneration Inhibited Due to Out of Neutral	64892, DPFC1	00	Broadcast	KCAN, SCAN, BCAN
3709	Diesel Particulate Filter Active Regeneration Inhibited Due to Vehicle Speed Above Allowed Speed	64892, DPFC1	00	Broadcast	KCAN, SCAN, BCAN
3710	Diesel Particulate Filter Active Regeneration Inhibited Due to Parking Brake Not Set	64892, DPFC1	00	Broadcast	KCAN, SCAN, BCAN
3711	Diesel Particulate Filter Active Regeneration Inhibited Due to Low Exhaust Temperature	64892, DPFC1	00	Broadcast	KCAN, SCAN, BCAN
3712	Diesel Particulate Filter Active Regeneration Inhibited Due to System Fault Active	64892, DPFC1	00	Broadcast	KCAN, SCAN, BCAN
3713	Diesel Particulate Filter Active Regeneration Inhibited Due to System Timeout	64892, DPFC1	00	Broadcast	KCAN, SCAN, BCAN
3716	Diesel Particulate Filter Active Regeneration Inhibited Due to Engine Not Warmed Up	64892, DPFC1	00	Broadcast	KCAN, SCAN, BCAN
3717	Diesel Particulate Filter Active Regeneration Inhibited Due to Vehicle Speed Below Allowed Speed	64892, DPFC1	00	Broadcast	KCAN, SCAN, BCAN
3718	Diesel Particulate Filter Automatic Active Regeneration Initiation Configuration	64892, DPFC1	00	Broadcast	KCAN, SCAN, BCAN
3719	Aftertreatment 1 Diesel Particulate Filter Soot Load Percent	64891, AT1S1	00	Broadcast	KCAN, SCAN, BCAN
3721	Aftertreatment 1 Diesel Particulate Filter Time Since Last Active Regeneration	64891, AT1S1	00	Broadcast	KCAN, SCAN, BCAN
3948	At least one PTO engaged	64932, PTODE	39	Broadcast	KCAN, SCAN, BCAN
4154	Actual Engine - Percent Torque (Fractional)	61444, EEC1	00	Broadcast	KCAN, SCAN, BCAN
4175	Diesel Particulate Filter Active Regeneration Forced Status	64892, DPFC1	00	Broadcast	KCAN, SCAN, BCAN
4191	Engine Requested Torque (Fractional)	0, TSC1	7, 33	00 (DA specific)	KCAN, SCAN, BCAN
4206	Message Counter	0, TSC1	7, 33	00 (DA specific)	KCAN, SCAN, BCAN
4207	Message Checksum	0, TSC1	7, 33	00 (DA specific)	KCAN, SCAN, BCAN
4765	Aftertreatment 1 Diesel Oxidation Catalyst Intake Temperature	64800, A1DOC1	00	Broadcast	KCAN, SCAN, BCAN

4816	Transmission Torque Converter Lockup Transition in Process	61442, ETC1	03	Broadcast	KCAN, SCAN, BCAN
5078	Engine Amber Warning Lamp Command	64775, DLCC1	00	Broadcast	KCAN, SCAN, BCAN
5079	Engine Red Stop Lamp Command	64775, DLCC1	00	Broadcast	KCAN, SCAN, BCAN
5082	Engine Oil Pressure Low Lamp Command	64775, DLCC1	00	Broadcast	KCAN, SCAN, BCAN
5083	Engine Coolant Temperature High Lamp Command	64775, DLCC1	00	Broadcast	KCAN, SCAN, BCAN
5084	Engine Coolant Level Low Lamp Command	64775, DLCC1	00	Broadcast	KCAN, SCAN, BCAN
5086	Engine Air Filter Restriction Lamp Command	64775, DLCC1	23	Broadcast	KCAN, SCAN, BCAN
5087	Vehicle Battery Voltage Low Lamp Command	64774, DLCC2	23	Broadcast	KCAN, SCAN, BCAN
5088	Vehicle Fuel Level Low Lamp Command	64774, DLCC2	23	Broadcast	KCAN, SCAN, BCAN
5245	Aftertreatment Diesel Exhaust Fluid Tank Low Level Indicator	65110, AT1T1I1	00	Broadcast	KCAN, SCAN, BCAN
5246	Aftertreatment SCR Operator Inducement Severity	65110, AT1T1I1	00	Broadcast	KCAN, SCAN, BCAN
5398	Estimated Pumping - Percent Torque	61443, EEC2	00	Broadcast	KCAN, SCAN, BCAN
5399	DPF Thermal Management Active	61443, EEC2	00	Broadcast	KCAN, SCAN, BCAN
5400	SCR Thermal Management Active	61443, EEC2	00	Broadcast	KCAN, SCAN, BCAN
5466	Aftertreatment 1 Diesel Particulate Filter Soot Load Regeneration Threshold	64891, AT1S1	00	Broadcast	KCAN, SCAN, BCAN
5676	Forward Collision Advanced Emergency Braking System State	61487, AEBS1	42	Broadcast	KCAN, SCAN
5825	Driver Warning System Indicator Status	65279, OI	00	Broadcast	KCAN, SCAN, BCAN
8484	Demanded Brake Application Pressure	61712, B2	39	Broadcast	KCAN, SCAN, BCAN
12308	Headlamp Emergency Flash Switch	64972, OEL	7, 33	Broadcast	SCAN
12308	Headlamp Emergency Flash Switch	64972, OEL	7, 33	Broadcast	KCAN
12308	Headlamp Emergency Flash Switch	64972, OEL	7, 33	Broadcast	BCAN
12964	Auxiliary Lamp Group Switch	64972, OEL	39	Broadcast	KCAN, SCAN, BCAN
12964	Auxiliary Lamp Group Switch	64872, OEL	7, 33, 160	Broadcast	KCAN, SCAN, BCAN
13105	Engine Oil Temperature High Lamp Command	64775, DLCC1	23	Broadcast	KCAN, SCAN, BCAN
13108	Primary Air Pressure Low Lamp Command	64774, DLCC2	23	Broadcast	KCAN, SCAN, BCAN
13109	Secondary Air Pressure Low Lamp Command	64774, DLCC2	23	Broadcast	KCAN, SCAN, BCAN
13116	Transmission Oil Temperature High Lamp Command	64775, DLCC1	23	Broadcast	KCAN, SCAN, BCAN
13132	Air Suspension Supply Pressure 2	64195, AIR3	23	Broadcast	KCAN, SCAN, BCAN

SECTION 7 **ELECTRICAL**

INTRODUCTION

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

These topics apply to 520 chassis built with a Vehicle Electronic Control Unit (VECU). The electrical architecture for these trucks will be named VMUX which replaces NAMUX2. This system integrates a parallel control unit to manage outbound messages via a faster baud rate 500kbps and FCAN signals for the chassis module(s). Since the F-CAN has moved to the VECU, the VCAN is divided into VCAN1 and VCAN2. The second CAN is dedicated to OBD communication.

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

ELECTRICAL ACRONYM LIBRARY

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

ELECTRICAL WIRING CIRCUIT CODES

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

ELECTRICAL WIRE CIRCUIT CODE TABLES

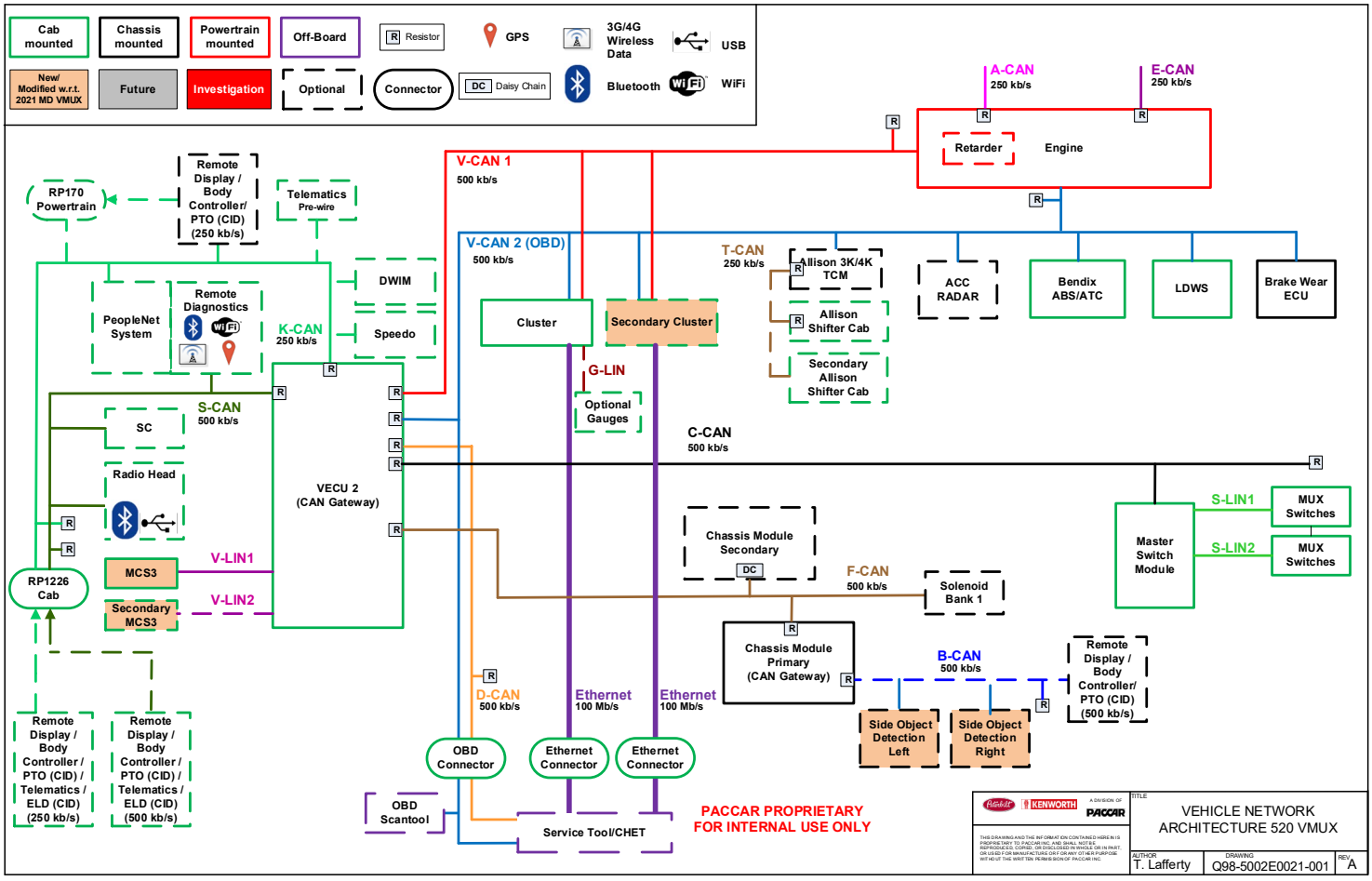
PACCAR Electrical Circuit Code		
Insulation Color	Color Code	Electrical Function
Red w/ white stripe	R/WXXXX	Direct battery power
Red	REDXXXX	Protected battery power
Orange	ORNXXXX	Ignition, Accessory, Low Voltage Disconnect, StartPower
Yellow	YELXXXX	Activated Power
White	WHTXXXX	Ground
Black	BLKXXXX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

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

MULTIPLEX SYSTEM

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

CAN BUS SYSTEM OVERVIEW



CAN BUS SPEEDS AND CIRCUIT DESIGNATION

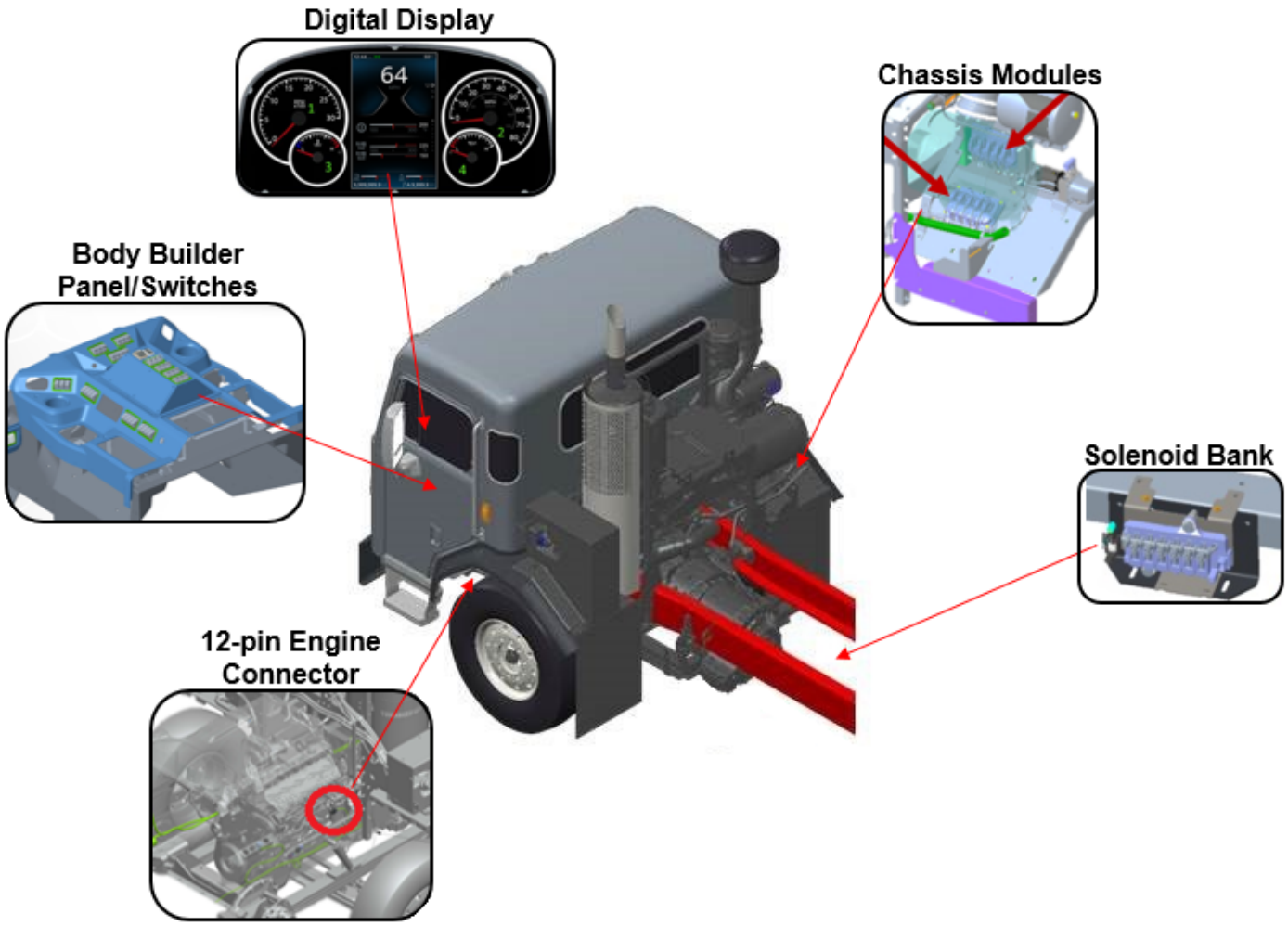
J1939-14 (500KBPS):

B-CAN – 0813 Body Builder
C-CAN – 0821 Cab
D-CAN – 0822 Diagnostics
F-CAN – 0819 Frame
G-CAN – 0825 Safety Systems
S-CAN – 0827 Infotainment and Mobile Gateway
V-CAN1 – 0812 Vehicle1
V-CAN2 – 0823 Vehicle2

J1939-15 (250KBPS):

T-CAN – 0828 Transmission
K-CAN – 0829 Customer Installed Devices

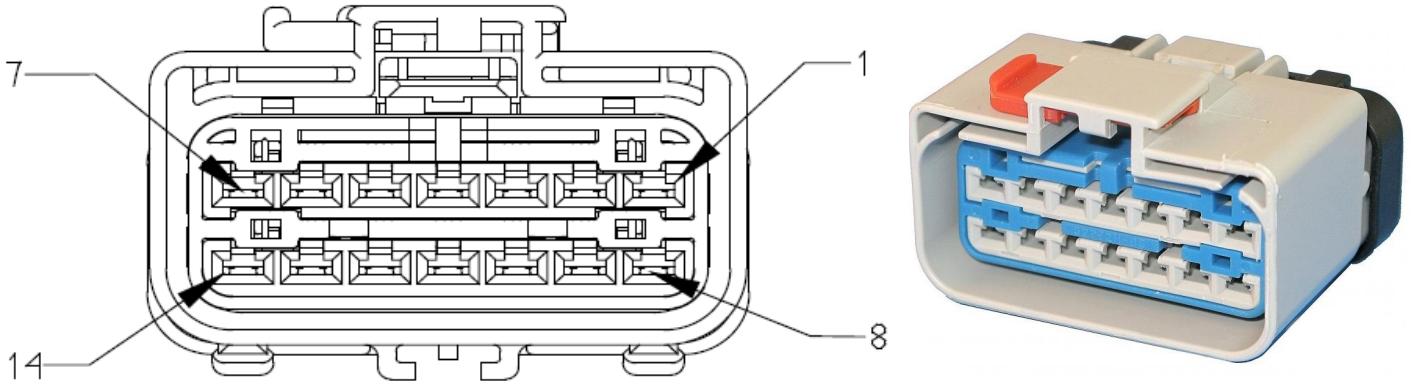
ELECTRICAL COMPONENT OVERVIEW



IN CAB CAN BASED MESSAGING CONNECTOR

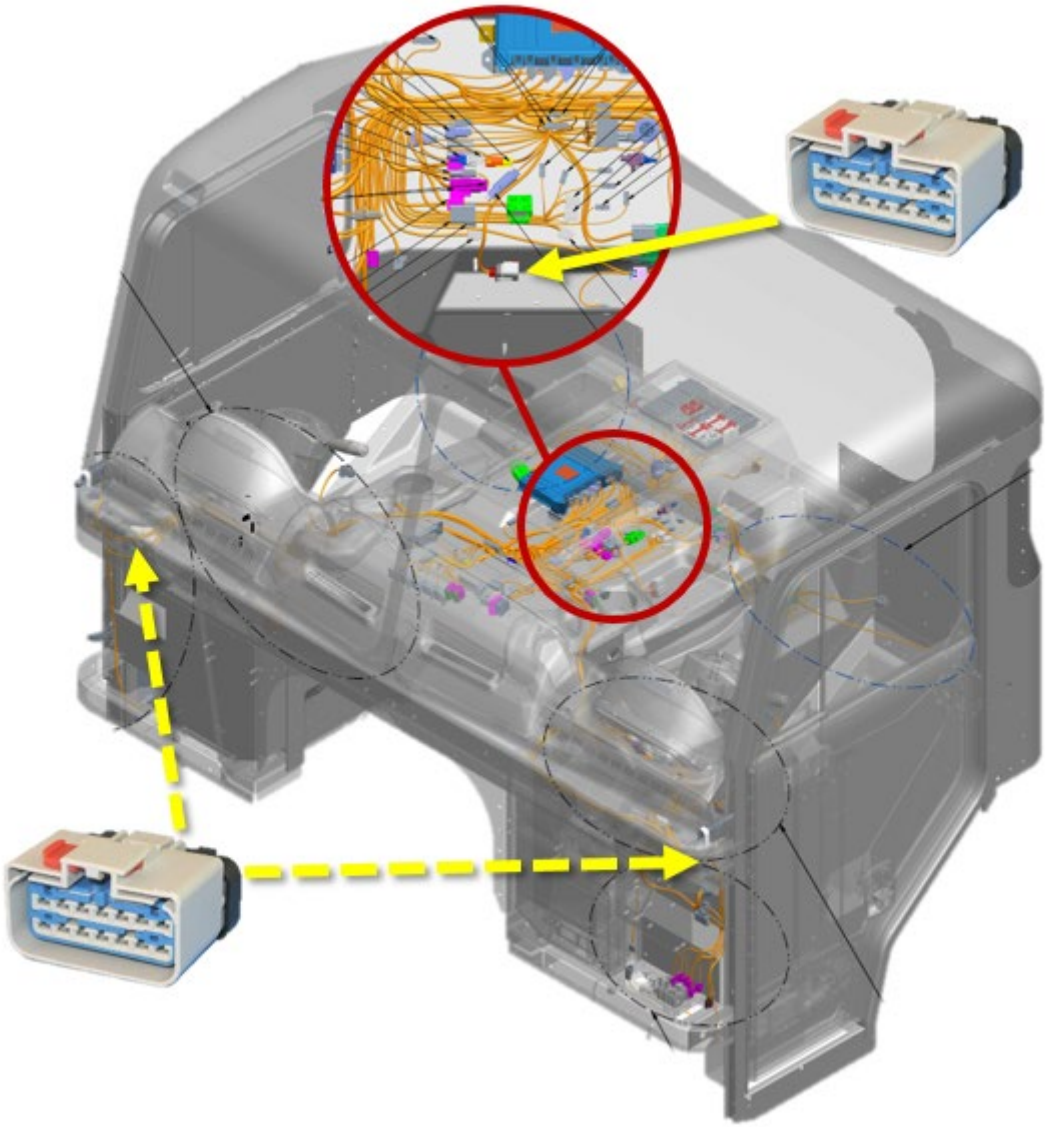
RP1226 CONNECTOR

The RP1226 connectors are located under the body builder panel (near the PDC) and behind the driver kick panel (LH for LH and dual drive, RH for RH drive). The RP1226 connector can be used for after-market telematics, ELD, body controls, and PTO controls. There will be multiple bus speeds available, K-CAN for 250kbps and S-CAN for 500 kbps. The RP1226 provides defined messages and major telematics supplier data for customer use.



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

RP1226 CONNECTOR LOCATIONS



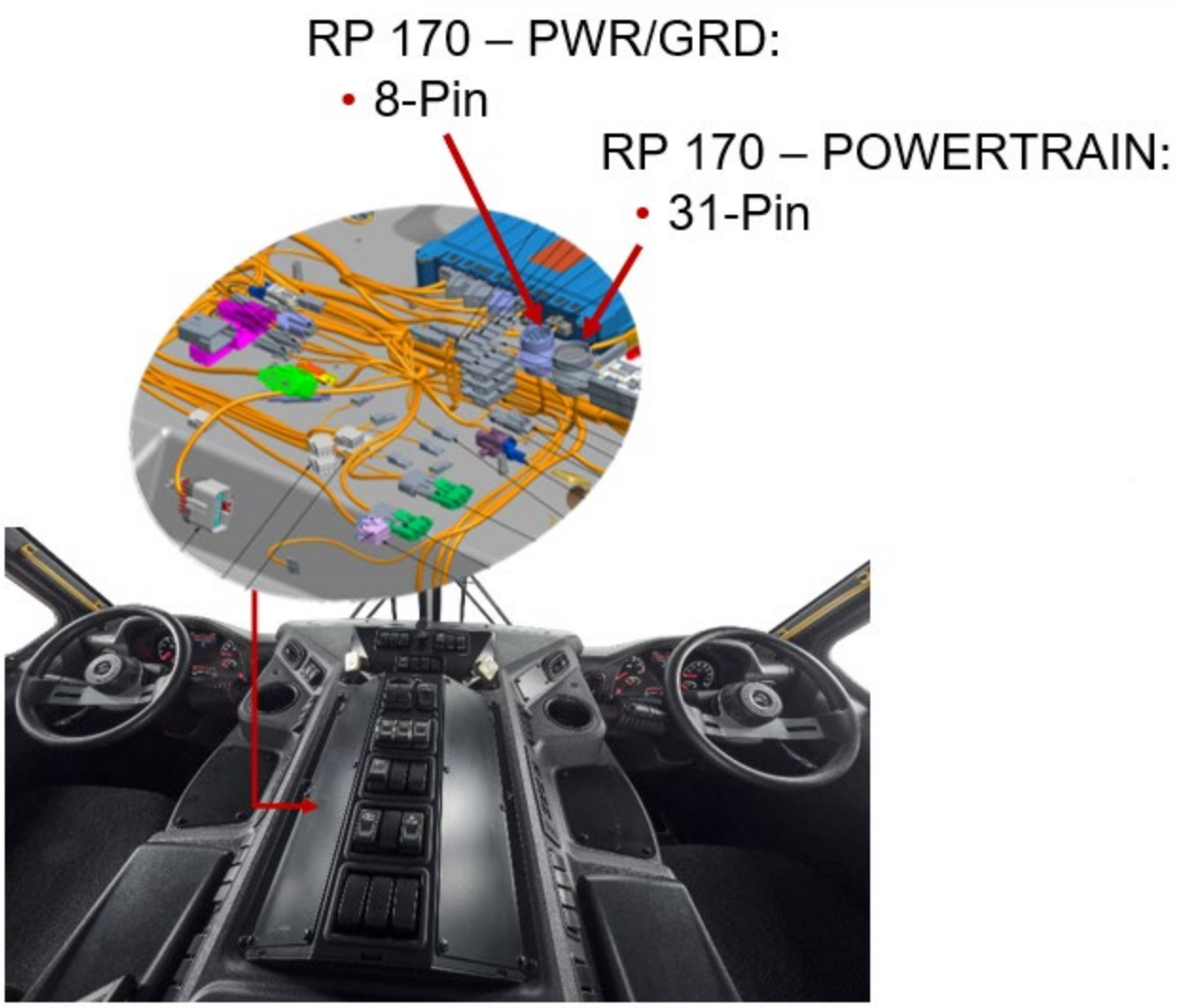
RP1226 Connector Locations – LH location for LH and dual drive cabs, RH location for RH drive cab

ELECTRIC ENGAGED EQUIPMENT

RP170 CONNECTOR

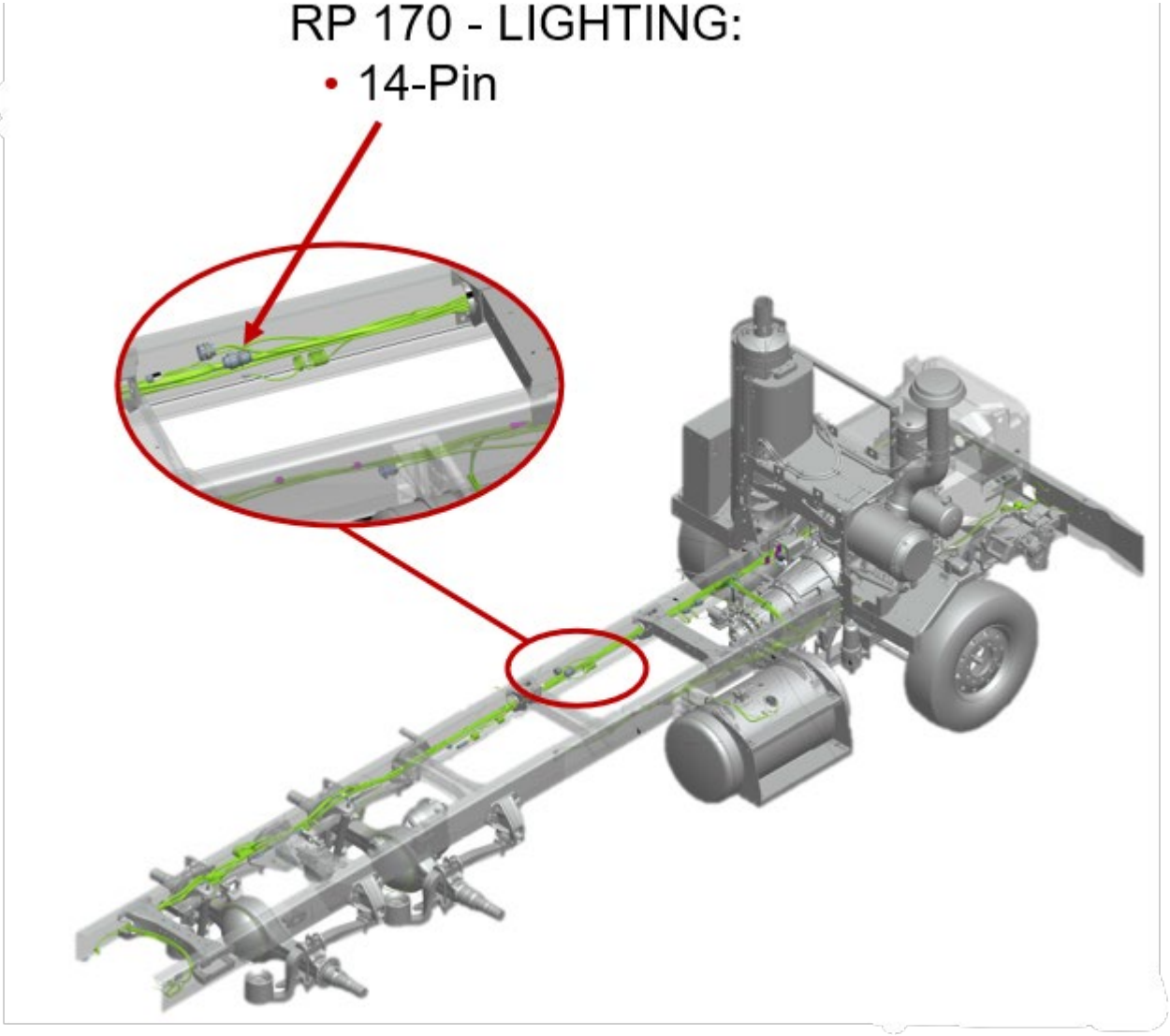
There are three RP170 connectors total. The 8-pin and 31-pin are located inside the cab under the body builder panel. The 14-pin connector is located inside the left hand frame rail.

RP170 CONNECTOR LOCATIONS – 8 PIN & 31 PIN



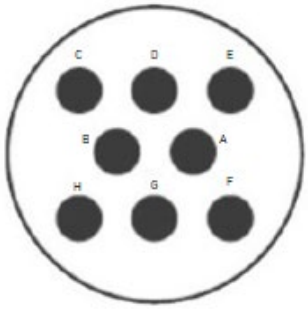
RP170 8-Pin & 31-Pin Connectors

RP170 CONNECTOR LOCATIONS – 14 PIN



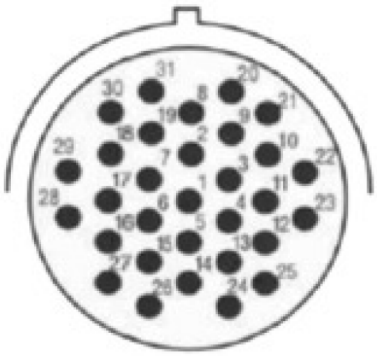
RP170 14-Pin Connector

8-PIN CONNECTOR



PIN	DESCRIPTION
A	BATTERY (20A)
B	IGNITION (20A)
C	IGNITION (20A)
D	CONSTANT BATTERY (15A)
E	IGN THRU REV CIRCUIT (25A)
F	GROUND
G	GROUND
H	GROUND

31-PIN CONNECTOR



PIN	DESCRIPTION	PIN	DESCRIPTION
FROM ENGINE		FROM TRANSMISSION	
1	TACH (DIESEL) DIAG TEST SWITCH (NG)	15	TCM IGNITION POWER (12V)
2	ABS RETARDER	16	ROAD SPEED SIGNAL
3	THROTTLE LIMIT	17	TCM SIGNAL RETURN
4	THROTTLE ADVANCE	18	AT123 INPUT
5	K-CAN HIGH (250K)	19	PTO CONTROLS INPUT
6	K-CAN LOW (250K)	20	PUMP MODE ENABLED INPUT
7	THROTTLE INTERLOCK (MX) TORQUE LIMIT (CUMMINS)	21	AUTO NEUTRAL INPUT
8	APPLICATION SPEED LIMITER (MX) BLANK (CUMMINS)	22	SHIFT SELECTOR TRANSMISSION INPUT
9	GROUND (MX) ECM COMMON (CUMMINS)	23	SERVICE BRAKE STATUS INPUT
10	REMOTE PTO ENABLE	24	AUTO NEUTRAL INPUT
11	REMOTE PTO SET	25	PTO DRIVE INTERFACE OUTPUT
12	REMOTE PTO RESUME	26	NEUTRAL INDICATOR OUTPUT
13	PARK BRAKE APPLIED	27	OUTPUT SPEED INDICATOR OUTPUT
14	BLANK	28	SUMP/RETARDER TEMP INDICATOR OUTPUT
		29	NEUTRAL START SIGNAL
		30	IGNITION (10A)
		31	DUAL STEER RH ACTIVE SIGNAL

14-PIN CONNECTOR

PIN	DESCRIPTION
1	GROUND
2	BACKUP LIGHTS
3	LH TURN/STOP
4	RH TURN/STOP
5	TAIL LAMPS
6	CLEARANCE LAMPS
7	STOP LAMPS
8	BLANK
9	BLANK
10	BLANK
11	BLANK
12	BLANK
13	LH MARKER TURN LAMPS
14	RH MARKER TURN LAMPS

ENGINE HARNESS 12 PIN CONNECTOR

PACCAR MX Engines

Chassis must be ordered with the appropriate option to have a 12 pin connector on the chassis harness. All signals will feed into the Chassis Modules.

Wiring Function Description:
Connect pin 5 and pin 6 to pin 8 to activate PTO Mode Control (PMC) and Enable PTO Speed Control (PSC).

- "Bump up" Engine Speed: Connect pins 2 to pin 8 momentarily
- "Accelerate" Engine Speed: Connect pins 2 to pin 8 until desired RPM is reached then disconnect
- "Bump down" Engine Speed: Connect pin 1 to pin 8 momentarily
- "Decelerate" Engine Speed: Connect pins 1 to pin 8 until desired RPM is reached then disconnect
- “0-5v Variable Voltage Remote Throttle”: See PTO section

P197 - Remote PTO Chassis

Equipped: Optional
Available Locations: Firewall, BOC/BOS, EOF
Supplier: Deutsch-DT Series

TRUCK CONNECTOR

Mating Connector:
PACCAR P/N: P20-1372-1112H
TE P/N: DT04-12PA-CE02)
Terminals:
16-20 awg: 0460-202-16141
14 awg : 0460-215-16141
Plugs: 0413-217-1605

Note: Cap installed from Factory

MATING CONNECTOR

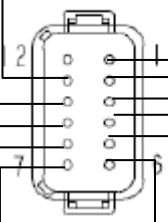
Pin 11-12V 10A Body Ignition
Wire #: ORN1220-86
Fuse: CHASSIS PDC F25
Amperage: 10A

Pin 10-5V supply for variable voltage throttle
Wire #: VIO3144-2
Source: Chassis Module Primary

Pin 9-MX Application Speed Limiter
Wire #: GRA3100-3
Signal: DUAL ACTIVATION
Destination: Standard Chassis Module

Pin: 8-Vehicle Ground
Wire #: WHT3511-2
Notes: Recommended source for all ground signals on this connector

Pin 7-12V 10A Body Ignition
Wire #: ORN1220-30
Fuse: CHASSIS PDC F25
Amperage: 10A



Pin 1-Resume/decel
Wire #: GRA3513-5
Signal: LOW/GROUND

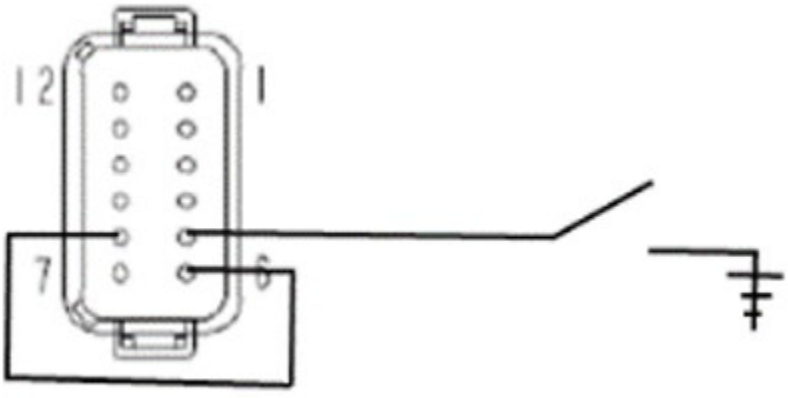
Pin 2-Set/accel
Wire #: GRA3512-5
Signal: LOW/GROUND

Pin 3-Return for variable voltage throttle
Wire #: GRN3144-2

Pin 4-Signal for variable voltage throttle
Wire #: BLU3144-2
Signal: 0-5V
Note: See PTO Section for detail on VVRT

Pin 5-PTO Engaged
Wire #: GRA3511-19
Signal: DUAL ACTIVATION
Note: Same circuit as P201 connector, pin 2

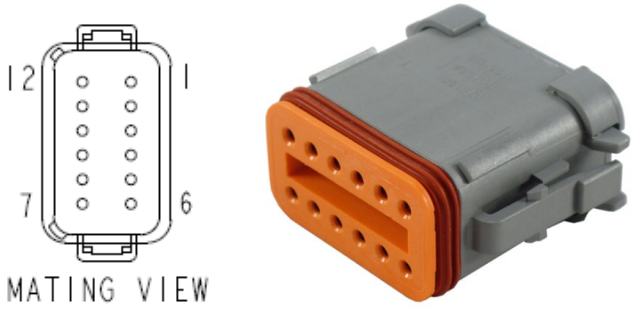
Pin 6-REMOTE PTO ENABLE
Wire #: GRA3511-63
Signal: LOW/GROUND



PACCAR Recommended PTO Wiring

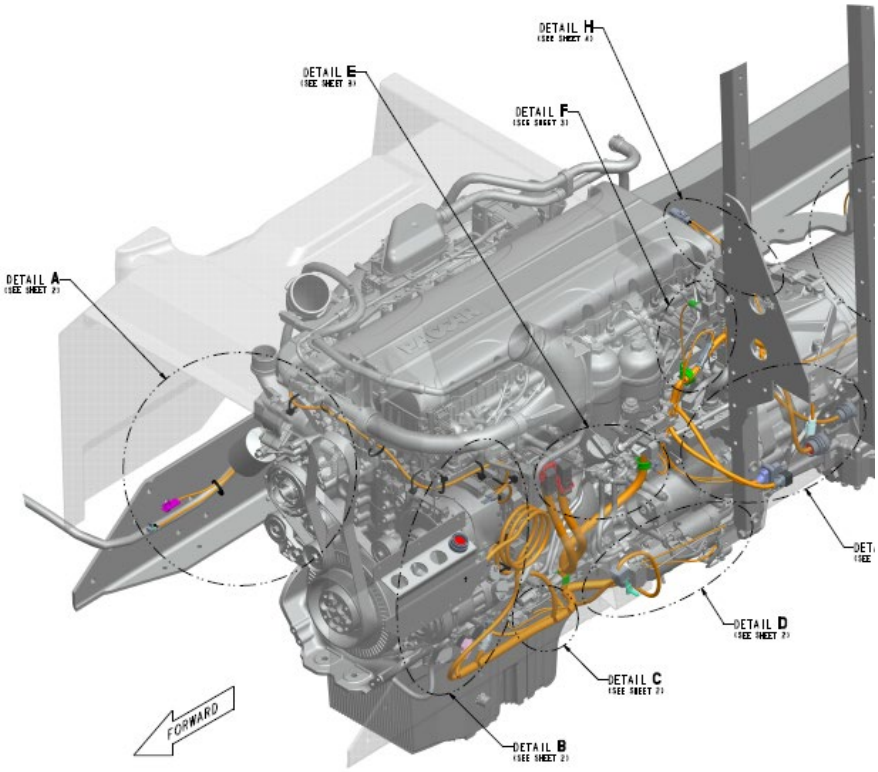
Cummins Engines 12 Pin Connector

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

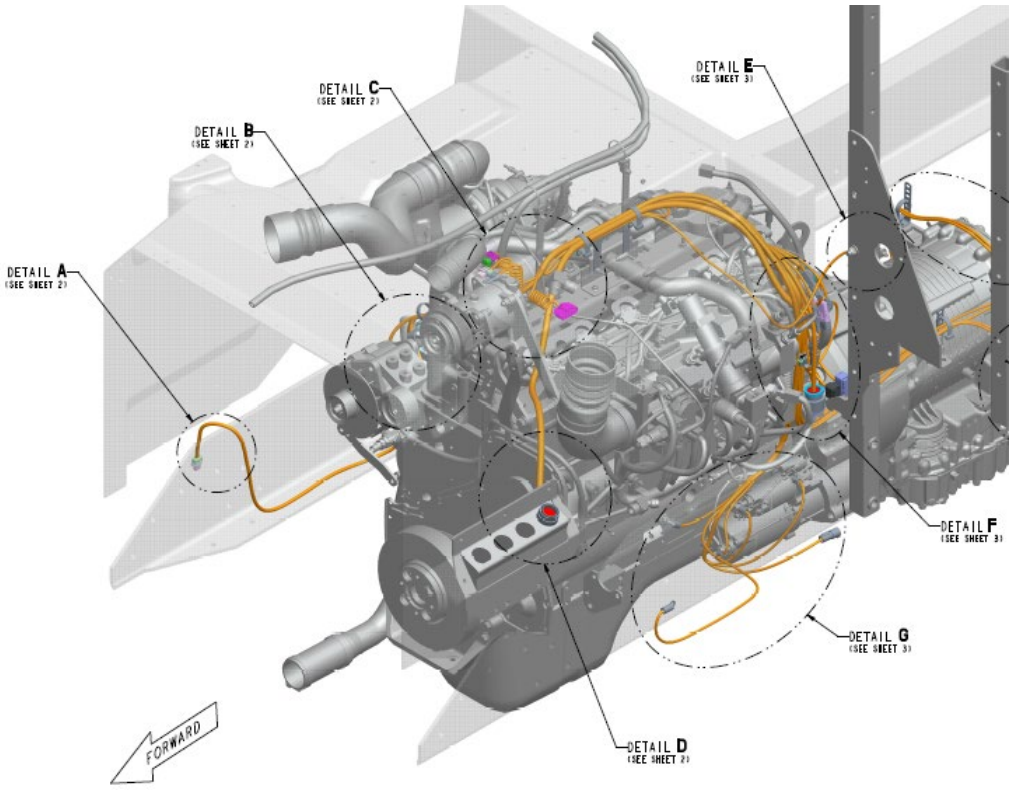


Pin	Description
1	INPUT FOR REMOTE PTO RESUME (Active Low)
2	INPUT FOR REMOTE PTO SET (Active Low)
3	SWITCH RETURN FOR CUMMINS ENGINE
4	INPUT FOR REMOTE THROTTLE SENSOR CIRCUIT (TWISTED TRIPLE)
5	PTO ENGAGED SIGNAL (LOW = ENGAGED)
6	CRUISE ON/OFF (Active Low)
7	+12V 10A BODY IGN CHASSIS PDC F25
8	VEHICLE GROUND
9	TORQUE LIMIT INPUT (Active Low)
10	PWR SUPPLY +5V (TWISTED TRIPLE)
11	ANALOG RETURN (TWISTED TRIPLE)
12	REMOTE ACCELERATOR ENABLE (Active Low)

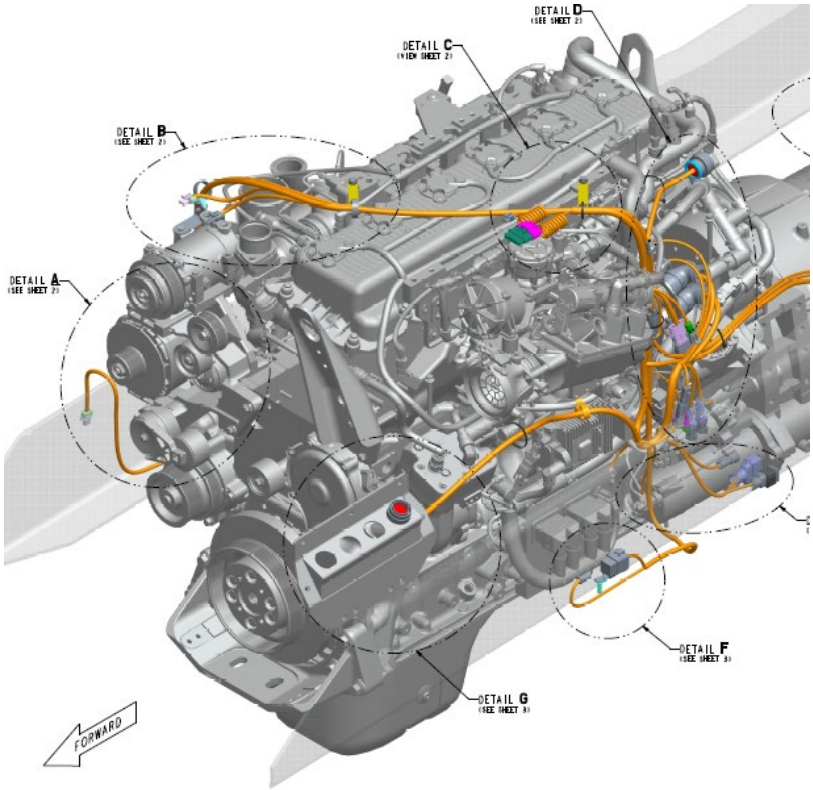
ENGINE HARNESS CONNECTION LOCATION



MX11 Connection location



L9N Connection location

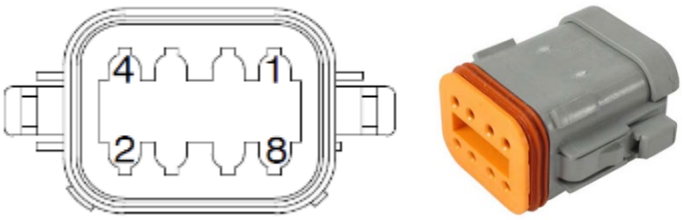


ISX12N Connection location

ENGINE HARNESS 8 PIN CONNECTOR

PACCAR MX Engines

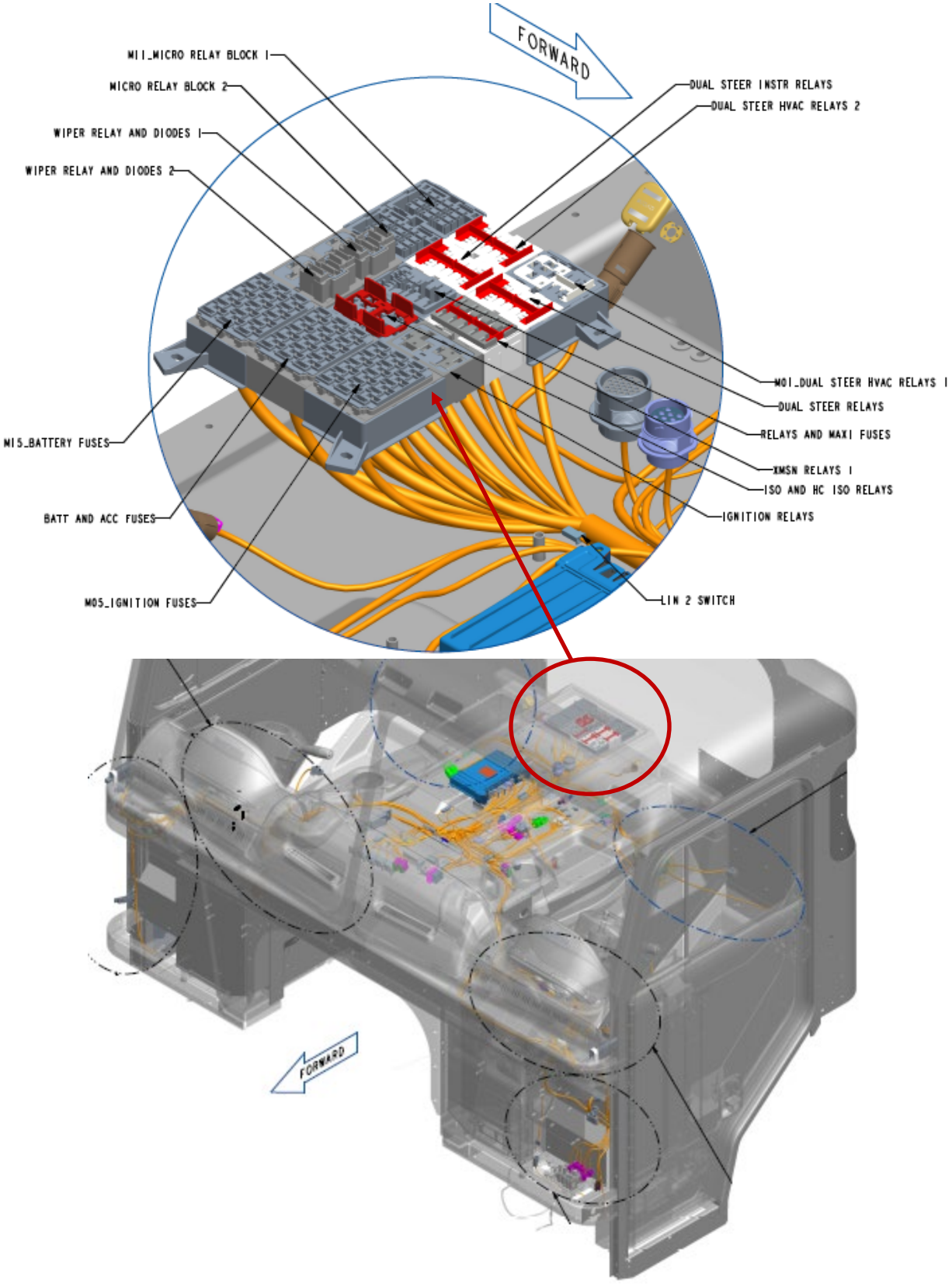
Optional 8-pin PTO connector offers advanced PTO features, available only with MX engines. Option must be spec'd when the chassis is ordered. 8-pin connector is located BOC in RH frame rail.



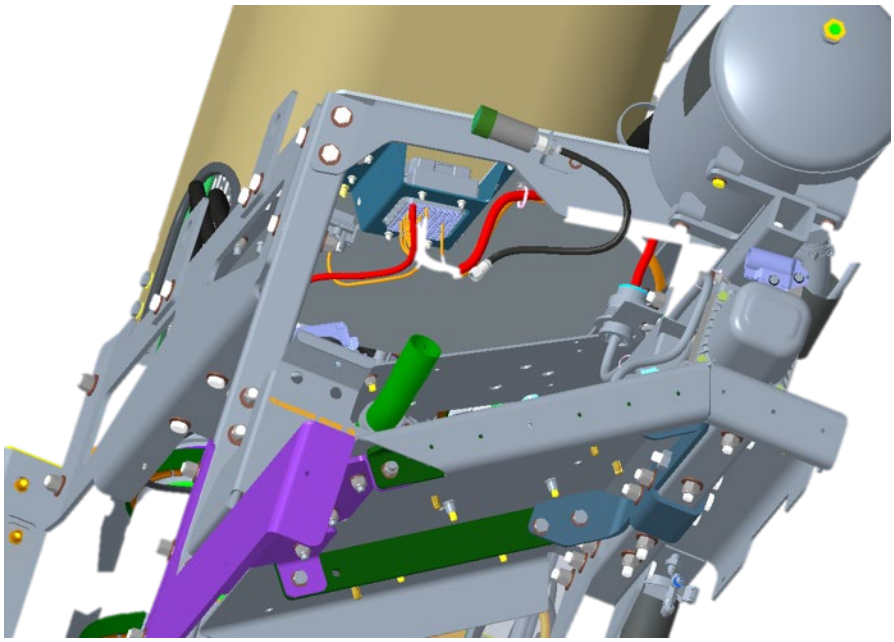
Pin	Description
1	12V IGNITION SIGNAL
2	PTO INTERLOCK INPUT (Active Low)
3	REMOTE PTO PRESET 3 (Active High)
4	REMOTE PTO PRESET 2 (Active High)
5	REMOTE PTO PRESET 1 (Active High)
6	REMOTE PTO PRESET INCREMENT + (Active High)
7	REMOTE PTO PRESET DECREMENT - (Active High)
8	VEHICLE GROUND

POWER DISTRIBUTION CENTER

CAB LOAD CENTER



CHASSIS PDC

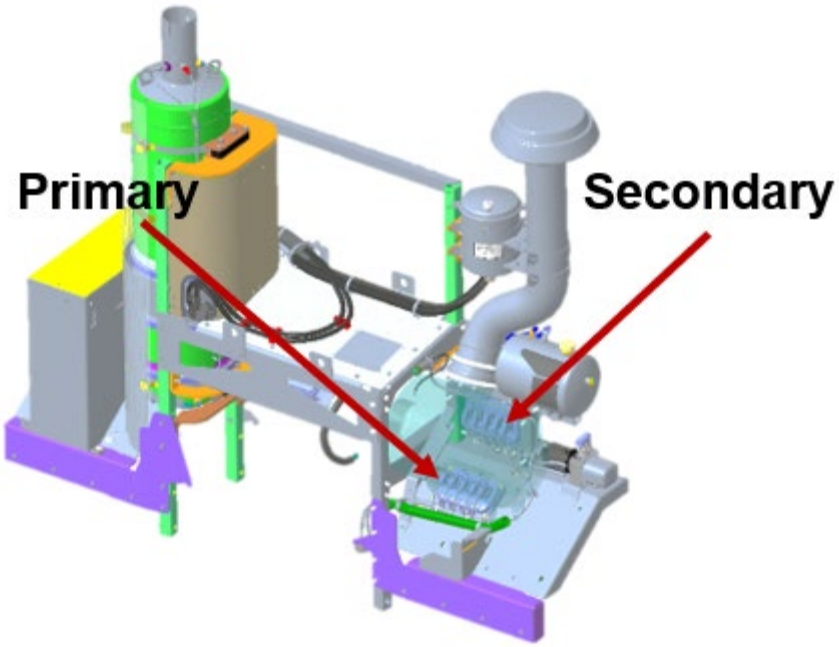


Chassis PDC Location on Stanchion BOC

CHASSIS MODULE

Chassis modules are replacing the legacy NAMUX2. Chassis modules are slave I/O drivers controlled by the VECU. Chassis modules have expanded functionality and option platform growth in comparison to the previous chassis node. There will be two chassis modules with one standard primary chassis module on all trucks and a secondary for optional content. The primary and secondary chassis modules will be mounted behind the cab on the stanchion. Chassis modules have built-in protections to prevent internal damage, are capable of detecting faults and storing DTC's. Chassis modules can also be diagnosed through the DAVIE service tool.

CHASSIS MODULE LOCATIONS



Chassis Modules Located on Stanchion BOC

CHASSIS MODULE FUNCTION DESIGNATIONS

PRIMARY CHASSIS MODULE

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

SECONDARY CHASSIS MODULE

- Axle Temperature Gauges Center Rear
- Lift Axle Air Solenoid Controls 3rd , Tag
- Tag Axle Lockout

FUSE GROUPS

PRIMARY CHASSIS MODULE

Fuse Group	Function
F1	Electric Over Air Solenoid Kingpin Release
	Main Beam (aka High Beam) - LH
	Tractor Direction Indication and Hazard Lights - RH Rear (Brake Lamps Also)
F2	Front Tractor Position lights (Park Lamps)
	Tractor Direction Indication Hazard Side Turn Indicator LH Front
	Dipped Beam (aka Low Beam) - LH
F3	Lift Axle #2 Solenoid
	Tractor Direction Indication Hazard Side Turn Indicator RH Front
	Dipped Beam (aka Low Beam) - RH
F4	Main Beam (aka High Beam) - RH
	Fog/Driving Lights (Front) 1st Set
F5	Reverse Warning (aka Backup Alarm)
	(Rear) Direction Indication and Hazard Lights - LH Trailer
F6	Rear Tractor Position lights (Park Lamps)
	Reverse Lamps
	Tractor Direction Indication and Hazard Lights LH Rear (Brake Lamps Also)
F7	Lift Axle #1 Solenoid
	(Rear) Direction Indication and Hazard Lights - RH Trailer

SECONDARY CHASSIS MODULE

Fuse Group	Function
F2	Tag Axle Lockout
F4	Lift Axle #3 Solenoid
F5	Lift Axle #4 (Tag) Solenoid

VECU

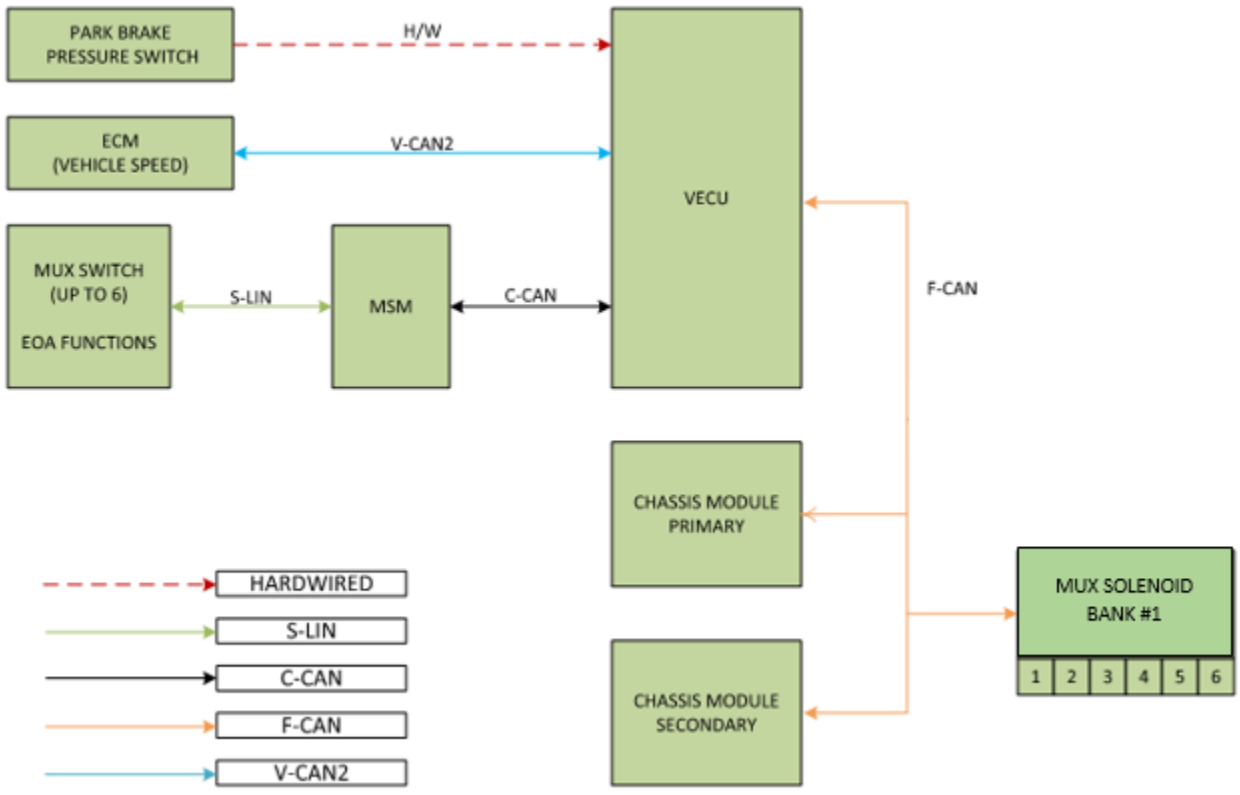
Fuse Group	Function
G1	Starter Interrupt / Start Enable Relay Control
	Cab Dome Lamp
	Trailer Marker/Clearance Lamps
G2	Recirculating Header Fan - Low Speed
	Trailer Hotline Relay
	Allison MTD PTO Controls - PTO 1
	Spot Lamp
	Work Lights (Flood Lamps) 1
	Beacon/Strobe
	Trailer Brake Lamps
	Trailer/Cab Park Lamps
	Recirculating Header Fan - High Speed
	Right Hand Steer
G3	Cab Marker/Clearance Lamps Relay Output
	Washer Pump Control
	Windshield Wiper Control
G4	Dash PWM Backlighting
	Dash Illumination 2

ELECTRIC OVER AIR SOLENOIDS

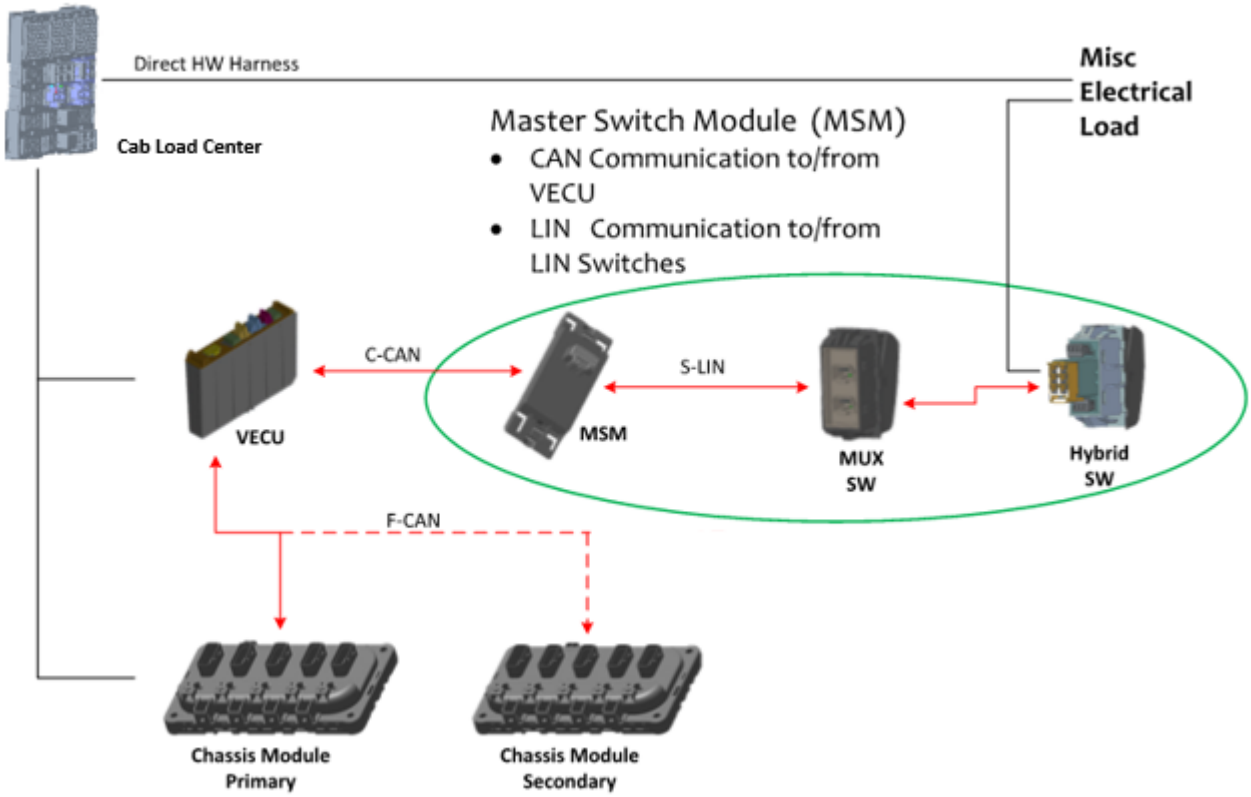
Air solenoids are devices that translate the electrical signal into physical functions that controls the air pressure in various circuits. The air solenoids are mounted to a bracket outside the cab. The solenoids are designed to stack on each other so that they share a common air supply which reduces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

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

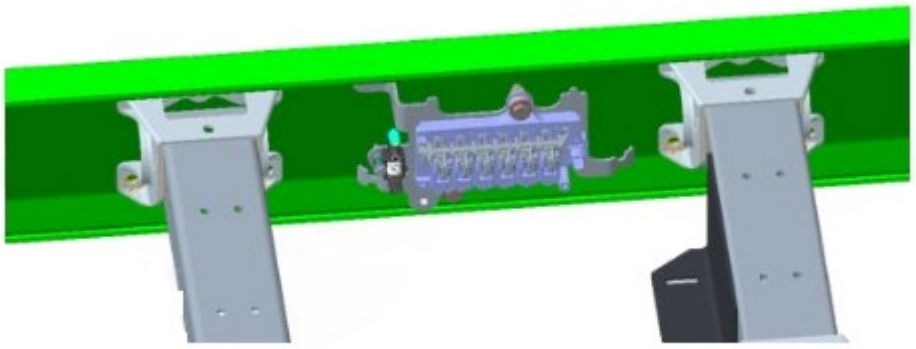
SOLENOID BANK DIAGRAM



SOLENOID OVERVIEW LAYOUT

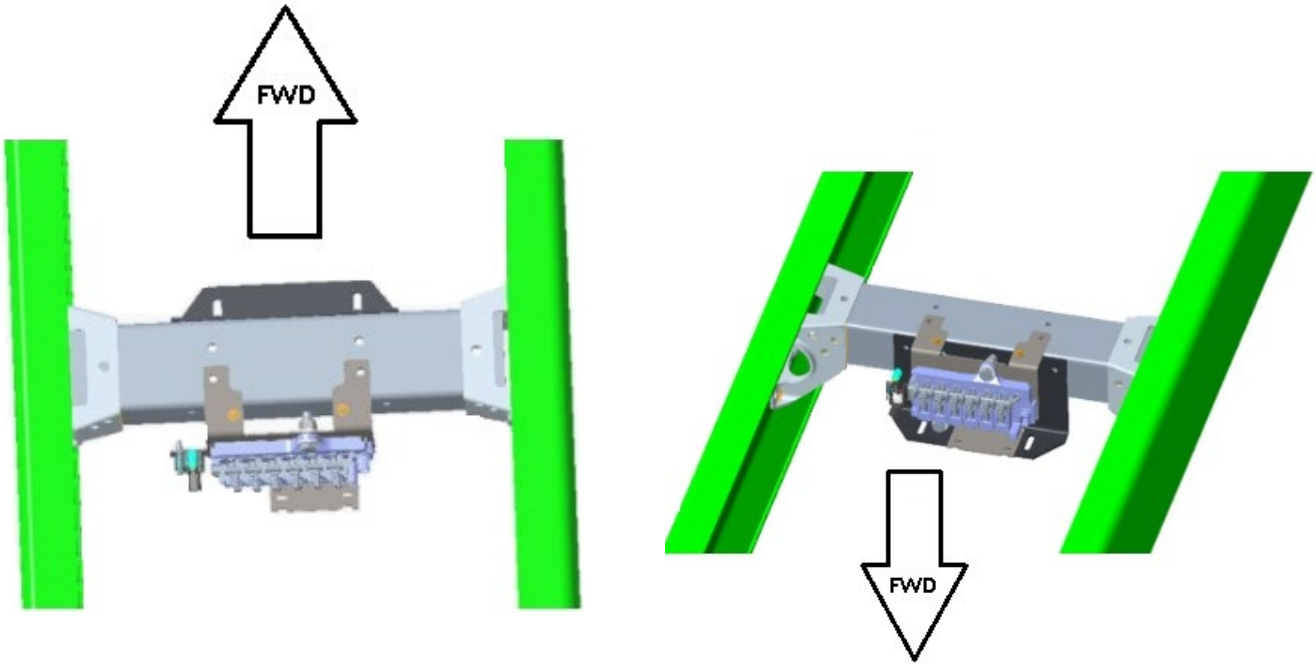


MUX SOLENOID BANK FRAME MOUNTING LOCATION



Inside right hand rail between 1st and 2nd crossmember

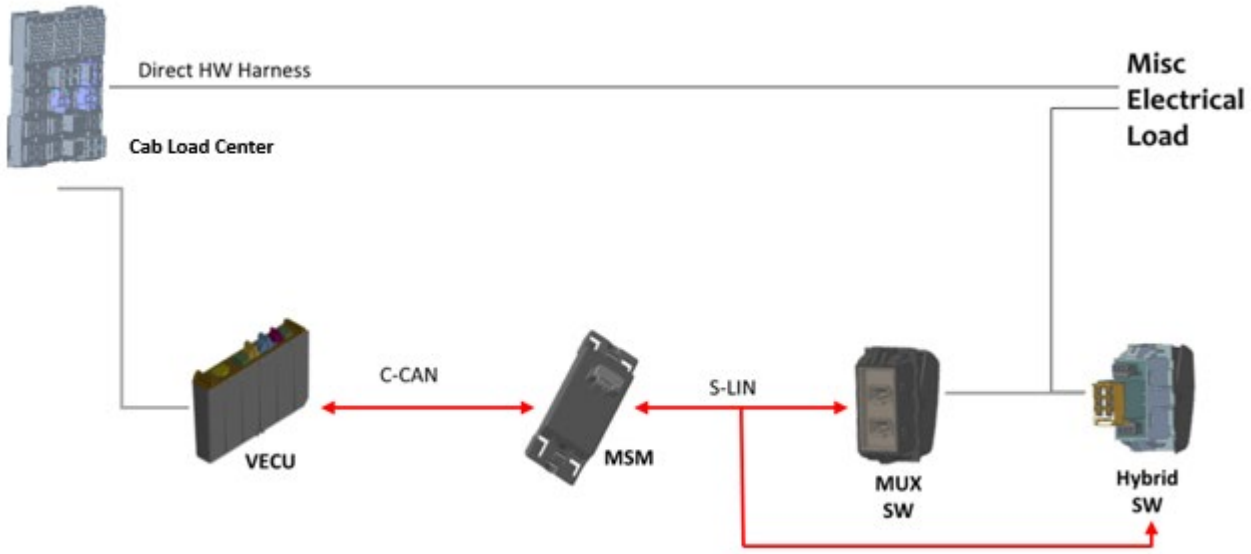
MUX SOLENOID BANK CROSSMEMBER MOUNTING LOCATION



*Mounting location is determined by engineering and the configuration of the vehicle

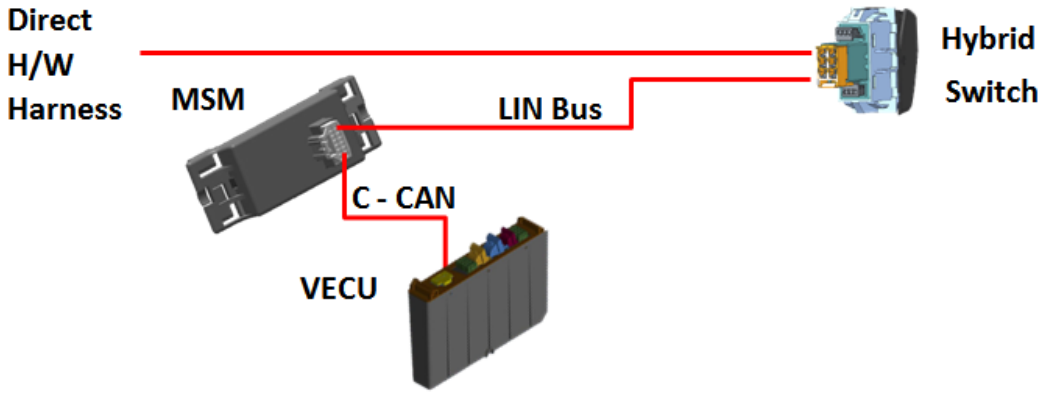
SWITCHES

SWITCH OVERVIEW LAYOUT



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

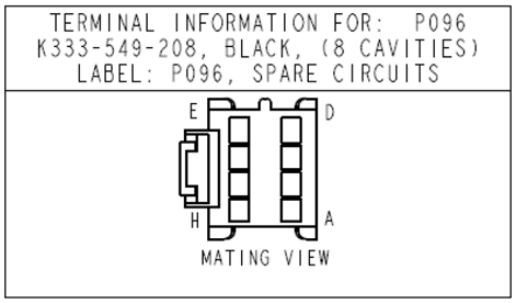
SPARE SWITCHES



Spare switches offer customers and body builders a convenient way to control power and air to various sources, like a body or trailer. They should be flexible and easily configurable to meet the vast and unique needs of body builders. The Spare switches, along with all hybrid switch variants, are rated to 15 A of current.

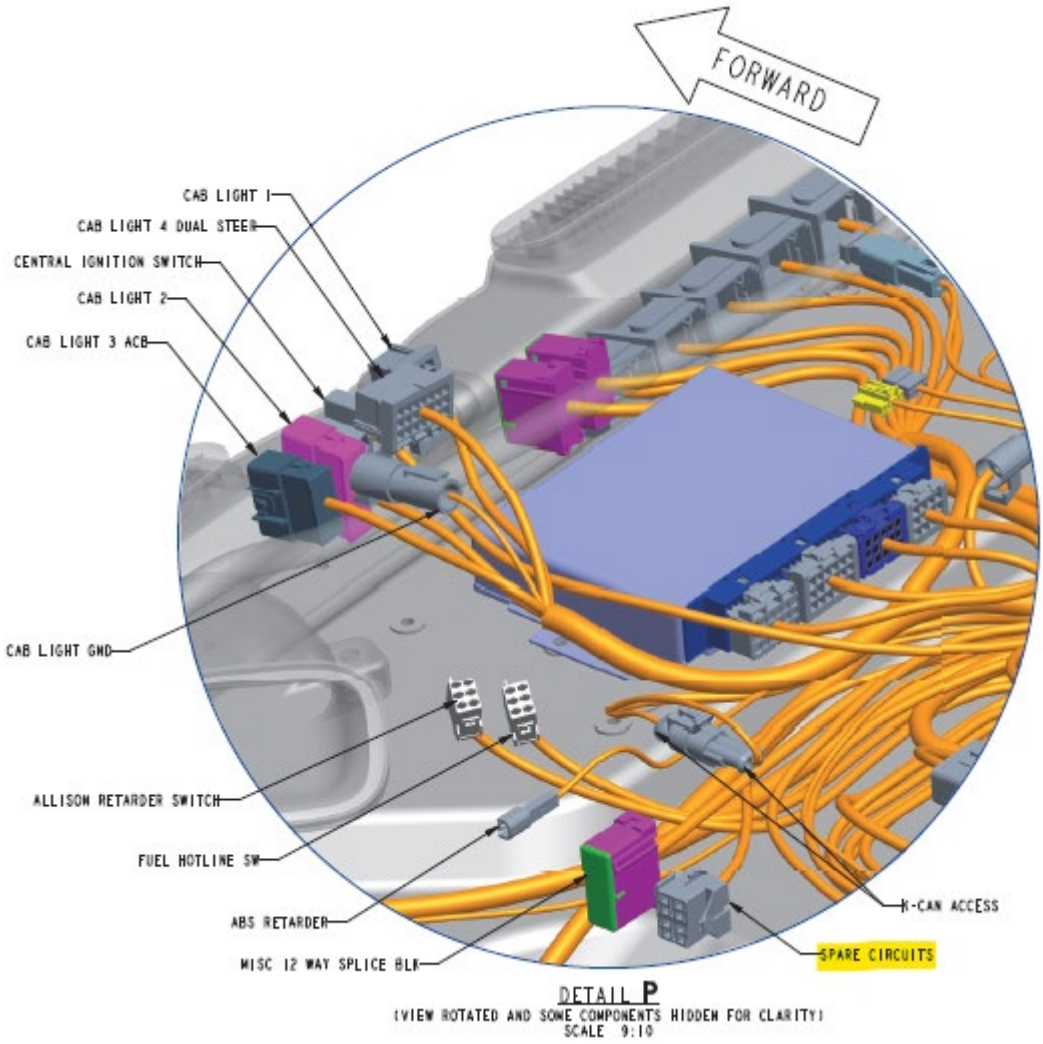
SPARE POWER

Spare power connector P096 is located under the body builder panel towards the front on the right side. The mating harness is available from PACCAR parts with pre-labeled pigtails, S92-1250-1000. Any spare power requiring more than 20 amps must go directly to the battery box, not this spare circuit.



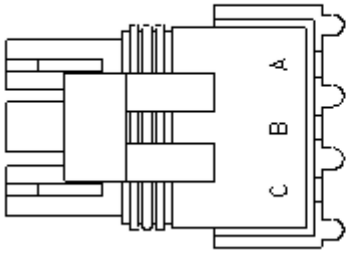
Pin	Spare Circuit No.	Designation	Fuse Max Rating
A	RED0710-2	Spare Battery #2	20A
B	RED0710-5	Spare Battery #1	20A
C	ORN0752-4	Spare Accessory #1	20A
D	WHT1500-102	Spare Ground	20A
E	ORN0730-1	Spare Ignition #1	20A
F	ORN0730-6	Spare Ignition #2	20A
H	BRN2620-8	Backlight	20A

SPARE CIRCUIT CONNECTOR



TRANSMISSION BACKUP SIGNALS

The back-up lamp signal can be accessed from P791 or P792 pin C tail lamp connector located on the chassis harness. It is recommended to use the RP170 connector, found on page 7-11 of this manual, as the preferred access point.



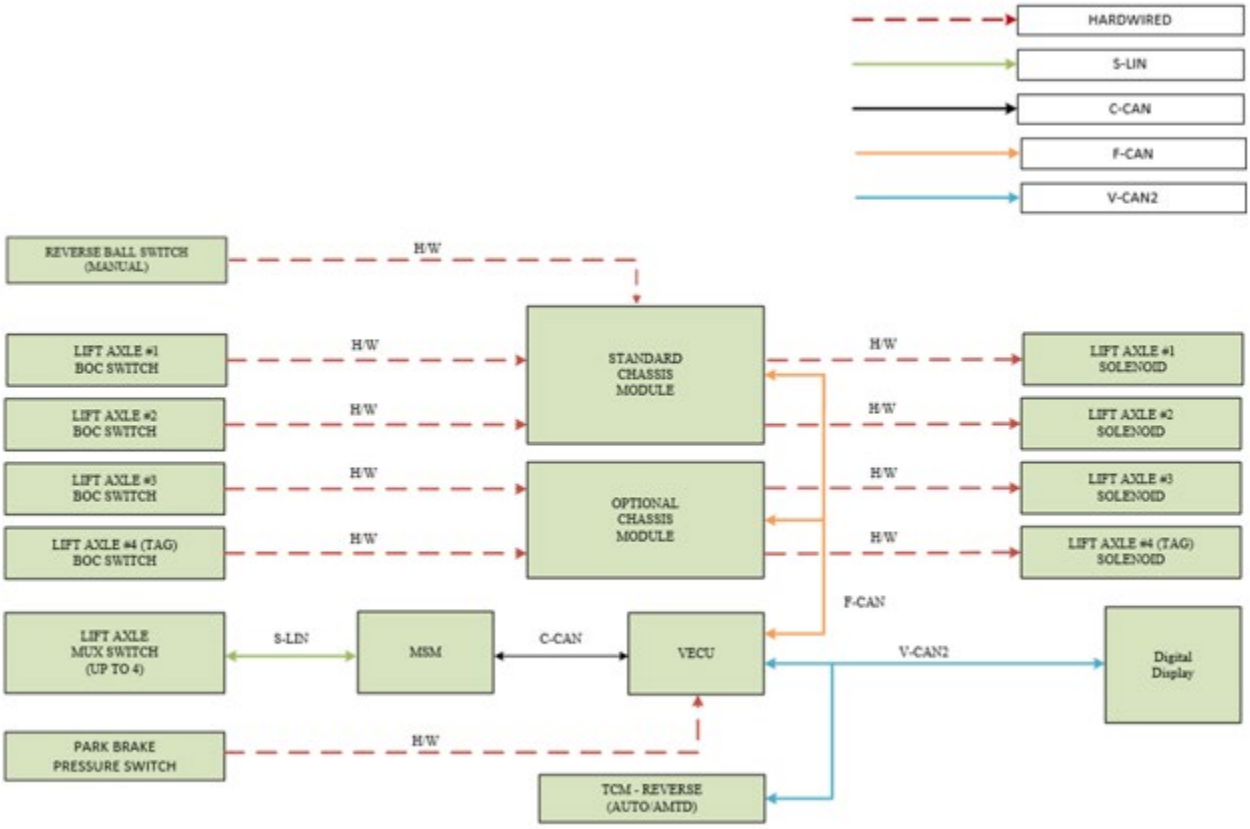
PIN	CIRCUIT DESCRIPTION
A	Stop/Turn Lamp (LH for P791, RH for P792)
B	Tail Lamp
C	Backup Lamp

Mating Connector: Packard PN 12015713

LIFT AXLES (PUSHERS & TAG)

All truck lift axles (pushers and tag), are direct wire Electric-Only. The wiring comes from the Primary Chassis Module or Secondary Chassis Module, and goes direct to the axle mounted solenoid. This is not from the EoA Solenoid Bank. The activation signal comes from either a dash mounted MUX switch, or a hardwired switch that is mounted outside of the cab. There are a total of four lift axle controls available; 3 pushers and 1 tag axle, or 4 pushers and no tag. These are controlled with separate switches by default. The customer can order the following configurations; steerable, non-steerable, with auto-reverse, and with park brake interlock. A lift axle comes with a control switch (single or separate), a gauge, and a regulator valve.

LIFT AXLE DIAGRAM



TRUCK LIFT AXLE LOGIC

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

DIGITAL DISPLAY

The standard display comes with a set of gauges. A limited number of additional gauges can be configured on the 7” digital display after the initial truck build using Paccar Vehicle Pro (PVP). Please contact your local Peterbilt dealership for assistance.

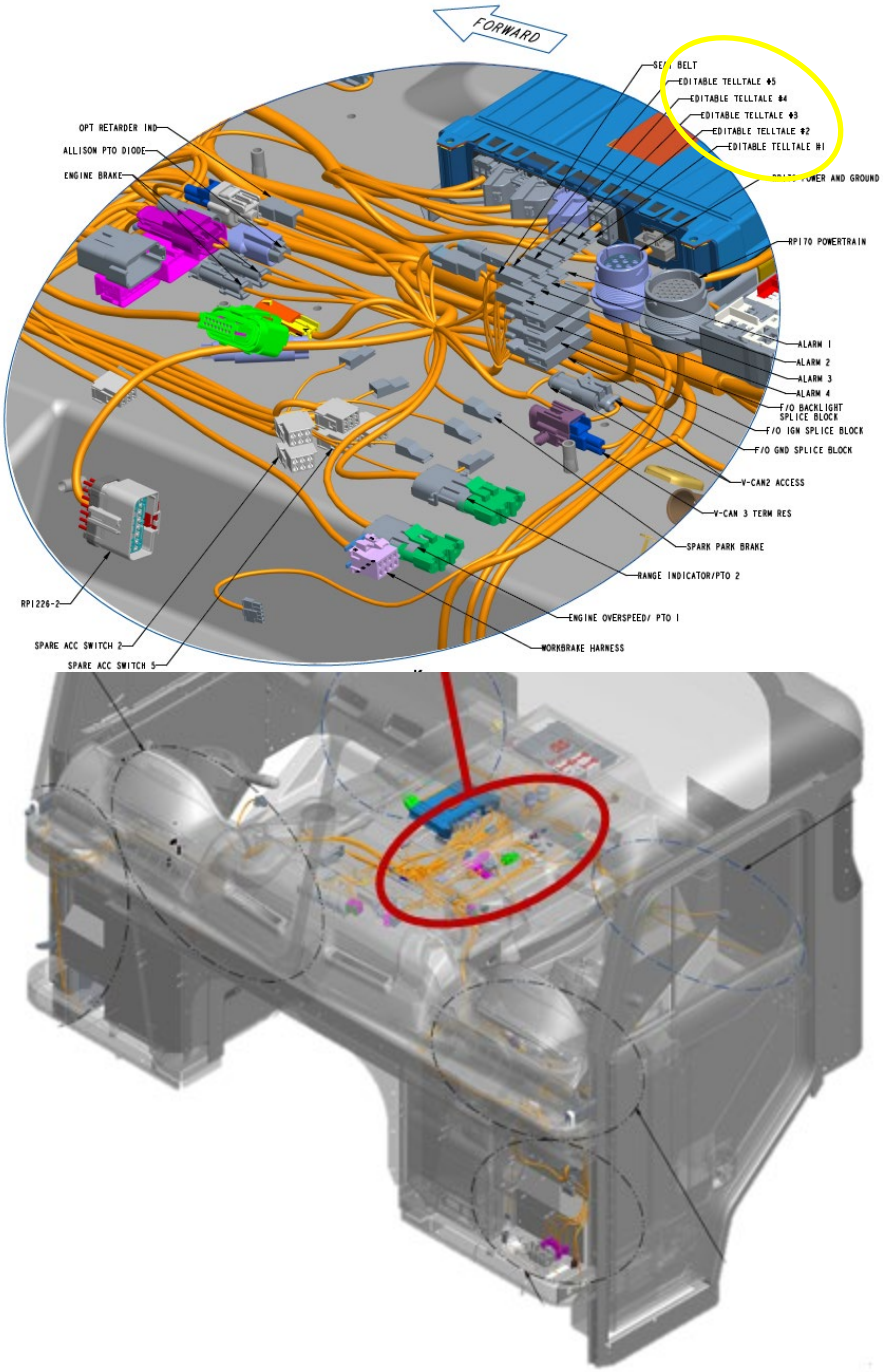
Gauges on the 7” Digital Display

TELLTALE ICONS

Custom Telltales will no longer be available with a physical card inserted into the dash cluster. Instead, the body builder telltales will populate on the digital portion of the display from a limited list and can be reconfigured using PVP at your local Peterbilt dealership. The location of the telltale will be dependent on the configuration of the vehicle and what other telltales are present on the digital display. The Digital Display is capable of receiving up to 5 hardwire inputs to trigger the body builder (editable) telltales.

Body Builder Telltale Positions

BODY BUILDER TELLTALE LOCATIONS



Body Builder Telltale Locations

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.

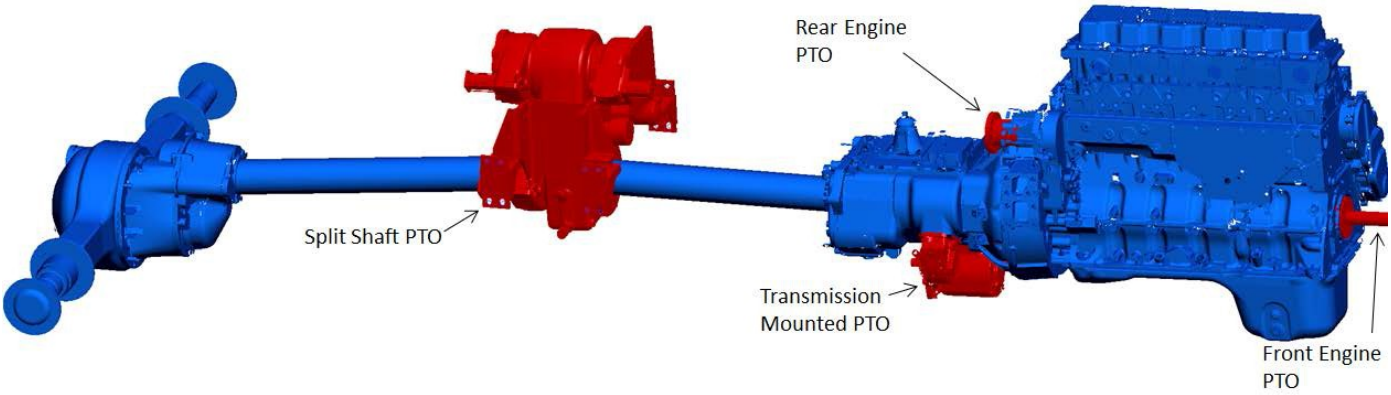


FIGURE 7-1. Power Take-Off Locations

TRANSMISSION MOUTED 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.

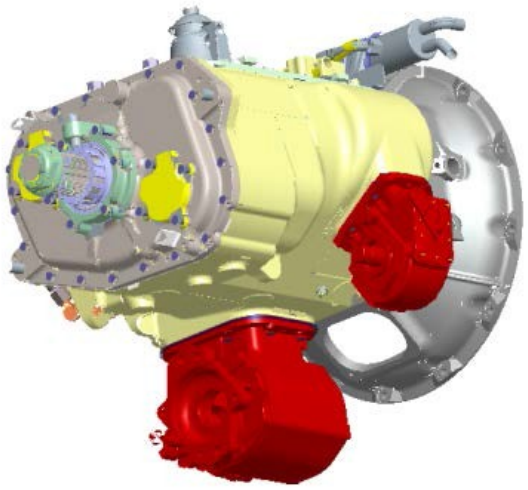


FIGURE 7-2. HD Manual Transmission

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.

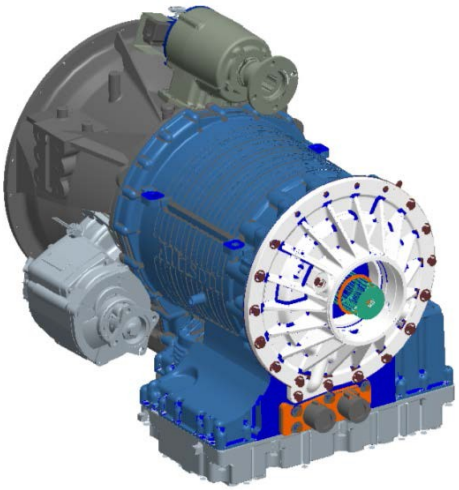


FIGURE 7-3. Allison 4000 Series

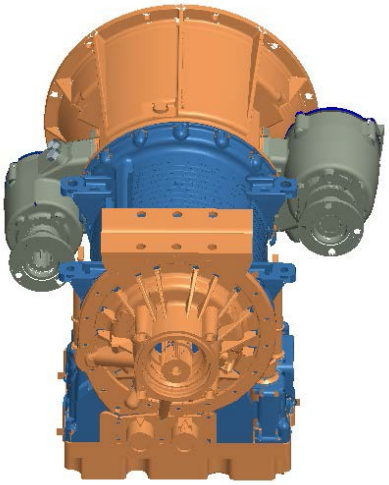


FIGURE 7-4. Allison 3000 Series

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. Bumper extensions available are 9", 4-7/8", or no extension. See Figure 7-5 and Figure 7-6 for radiator installations with and without FEPTO provisions.

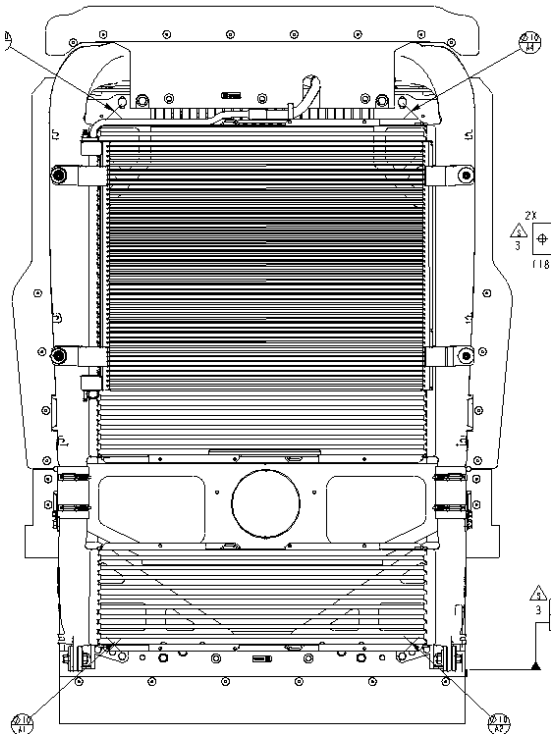


FIGURE 7-5. Cooling Module With FEPTO Provision

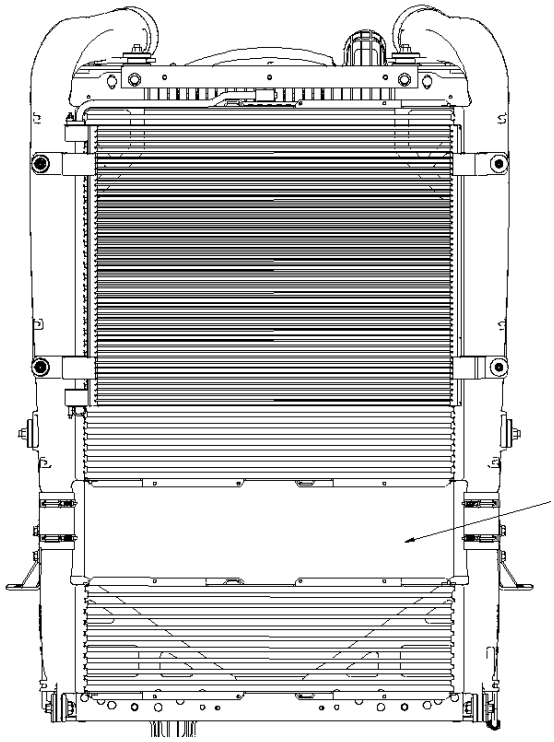


FIGURE 7-6. Cooling Module Without FEPTO Provision

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 Paccar MX-11 turns at a rate of 1.3:1.

FIGURE 7-7. REPTO Flywheel Housing

INSTALLATION OF PTO

CHELSEA 890

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

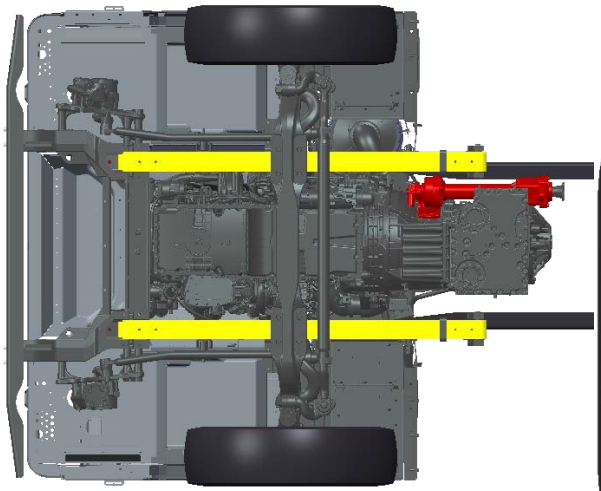


FIGURE 7-10. Bottom View

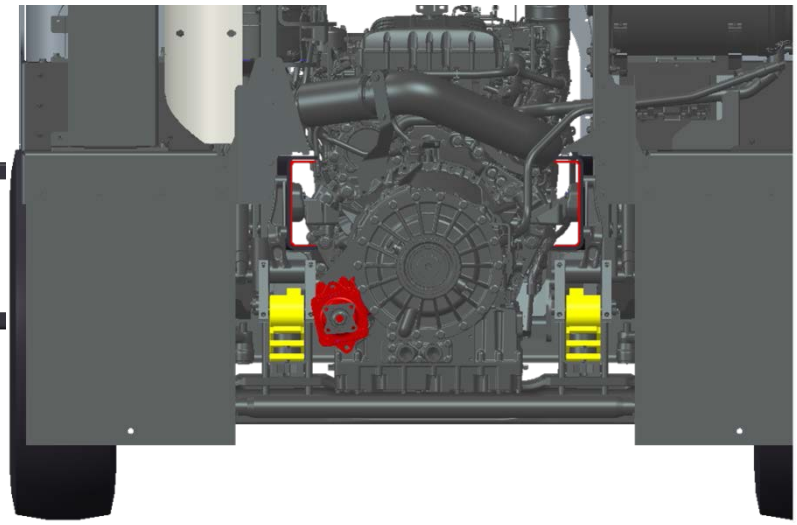


FIGURE 7-11. Rear View

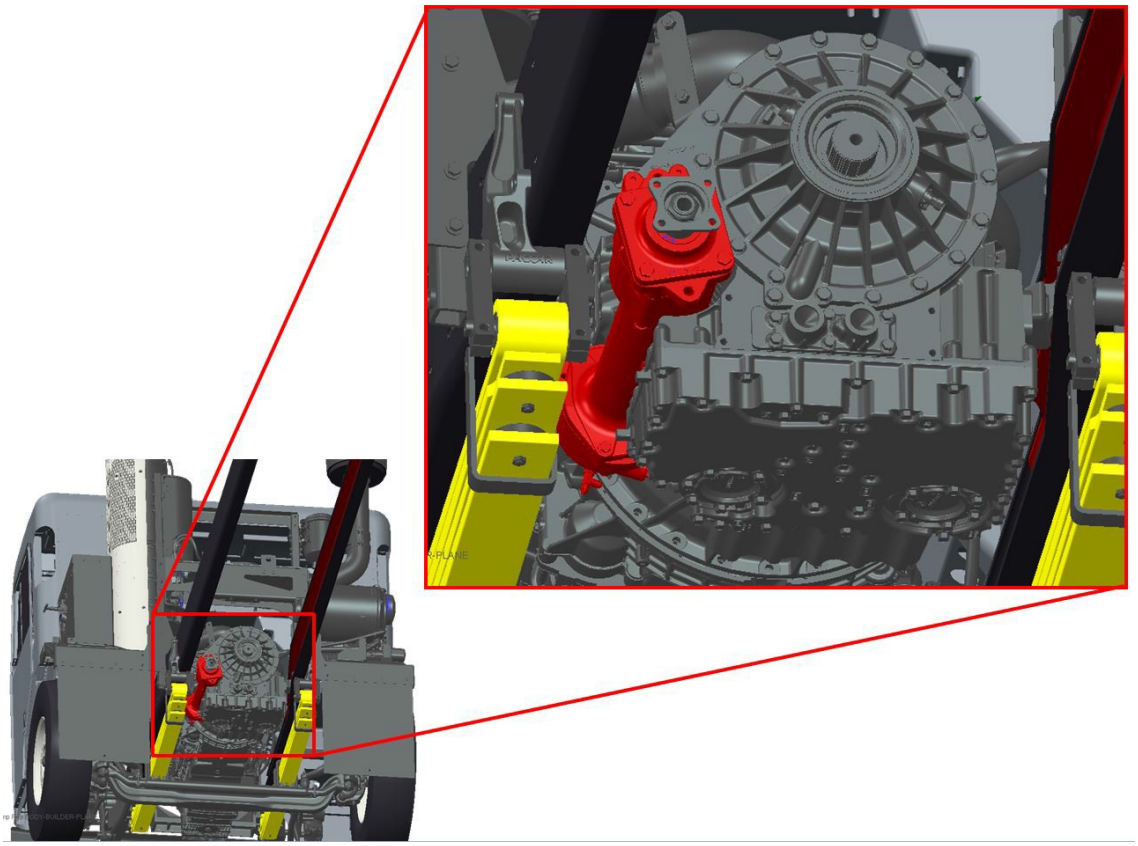


FIGURE 7-12. Isometric View with Enhanced View

MX PTO MODE CONTROL (PMC)

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

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

MX PTO MODE ACTIVATION

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

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

PTO Mode Switch

MX PTO MODE CONTROL LOCATION

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

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

PMC Location Switch

MX PTO MODE FEATURES

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

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

MX PTO MODE PROTECTIONS AND LIMITS

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

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

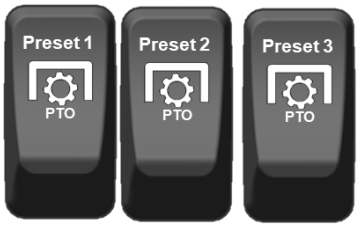
MX PTO SPEED CONTROL (PSC) FEATURES

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

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

Dash Switches

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



Dedicated Preset Switches

MX PTO SPEED CONTROL INTERLOCKS

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

The configurable PSC interlocks are listed below.

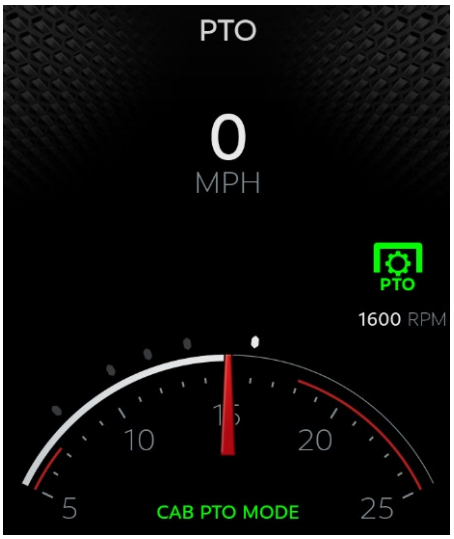
- Clutch Pressed
- Park Brake NOT Set
- Transmission NOT in Neutral
- Service Brake (Configurable for Pressed or NOT Pressed)
- Custom Hardwired Interlock (Configurable Polarity)

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

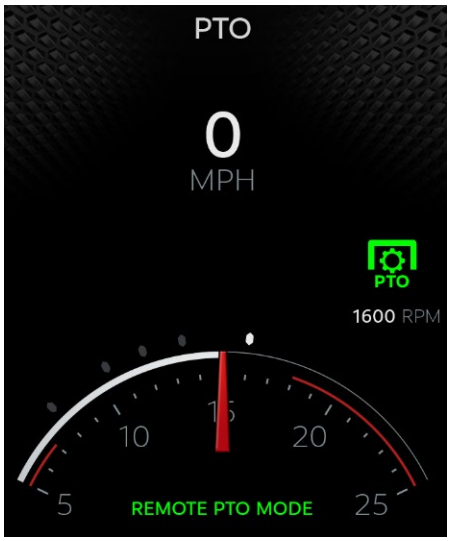
PTO SPEED CONTROL ICONS

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

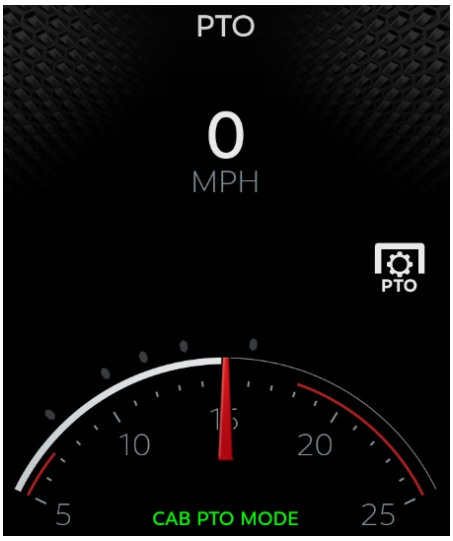
- PSC Enabled (white icon) or Active (green icon)
- PSC Control Location (designed by “Cab” or “Remote”)
- PSC target engine speed when active



Cab PTO Active



Remote PTO Active



Cab PTO Enabled

REMOTE PMC CONNECTIONS

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

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

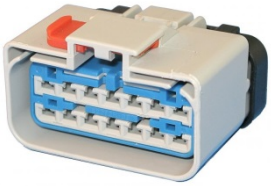
There are options available for the body builder to specify controller speeds of 250 kbps or 500 kbps.

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

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

12-Way Deutsch Connector

8-Way Deutsch Connector

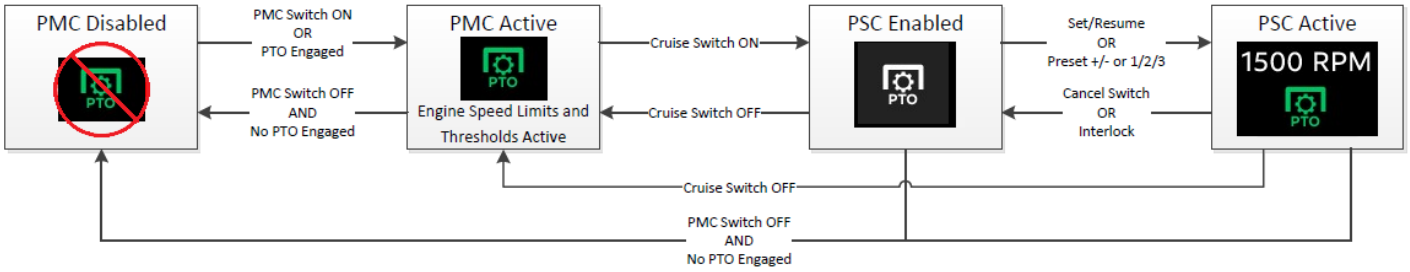


RP1226 Delphi Connector

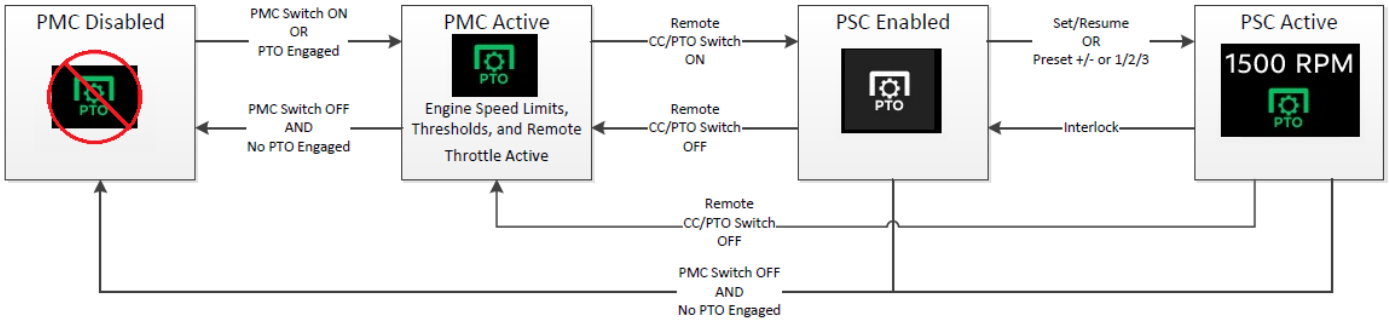
Pin-out information for the PTO connectors can be found in the Electrical Section

PTO MODE CONTROL FLOW CHARTS

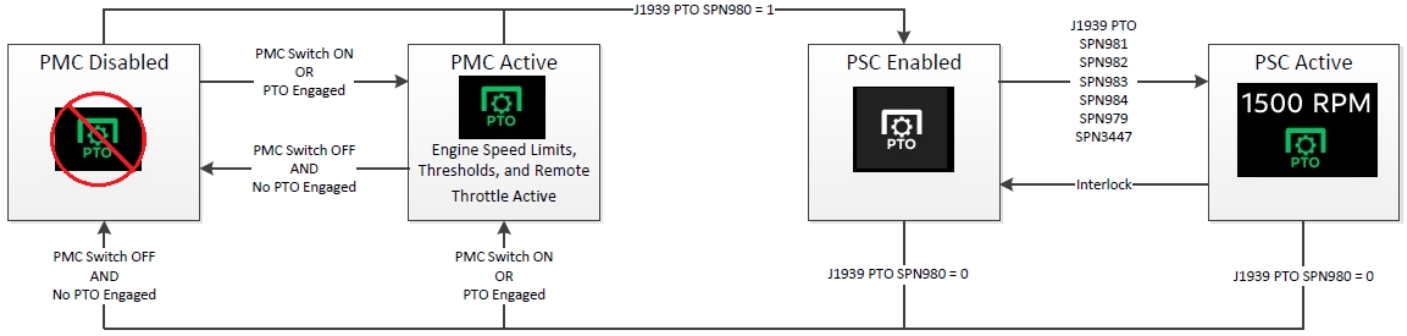
Cab Controls



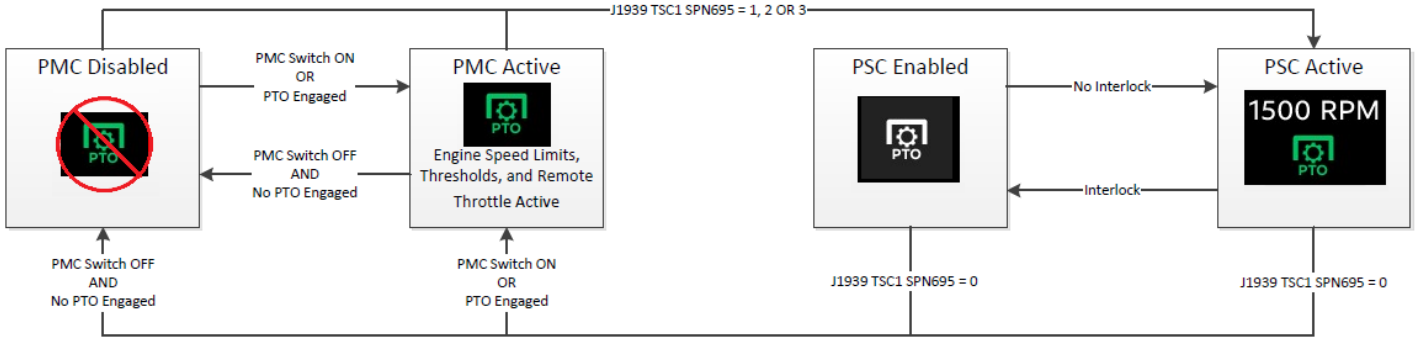
Remote Hardwire Controls



Remote CAN Controls

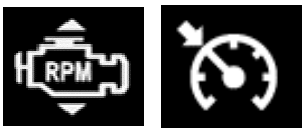


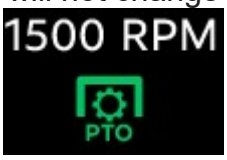
Remote TSC1 CAN Controls



MX PTO TROUBLESHOOTING GUIDE

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

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

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

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

	J1939 TSC1 SPN695 (Override Control Mode) is equal to zero	Send J1939 TSC1 SPN695 equal to 1, 2 or 3
	J1939 TSC1 SPN3350 (TSC1 Control Purpose) is not 2 (PTO Governor)	Send J1939 TSC1 SPN3350 equal to 2

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APPENDICES

Revision Log

Revision Log – 2021 520 VMUX Body Builder Manual				
Revision	**Author**	**Date of Publication**	**Pages #**	**Description of Changes**
000	M. Evans	5/18/2021	n/a	Initial Release