Kenworth

T170 / T270 / T370 and Hybrid Body Builders Manual

KENWORTH®

A PACCAR COMPANY

Kenworth Medium Duty Body Builders Manual

Models: T170/T270/T370 and Hybrid

For 2008 Model Year and Later with 2007 EPA Compliant Engines

Body Builder's Manual Contents

Body Builder's Manual Contents

FIGURES

Section 1
Introduction

SCOPE

This manual was created to provide body builders with appropriate information and guidelines useful in the body planning and installation process. This information will be helpful when installing bodies or other associated equipment.

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

The intended primary users of this manual are body builders who install bodies and associated equipment on Kenworth T170/T270/T370 Medium Duty vehicles. Dealers who sell and service the vehicle will also find this information useful.

This Body Builders' Manual can be very useful when specifying a vehicle, particularly when the body builder is involved in the vehicle definition and ordering process. 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, Kenworth 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 update. The most current update is available through your local Kenworth dealer.

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

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Section 2
Safety & 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 do not 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 do not 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 about 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.

Signals the location of a high voltage electrical components

Example:
HAZARDOUS VOLTAGE: To reduce the risk of possible serious injury (Shock, Burn or Death): Components marked with High Voltage should be avoided. Service must be performed by qualified personnel only.

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

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

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

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

FEDERAL MOTOR VEHICLE SAFETY STANDARDS COMPLIANCE

As an Original Equipment Manufacturer (OEM), Kenworth Truck Co. 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 making additional modifications means that the vehicle was incomplete when it left the Kenworth build plant. See next section and Appendix A for additional information.

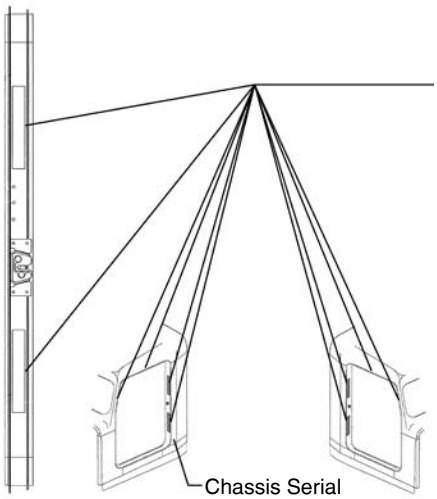
Incomplete Vehicle Certification

An Incomplete Vehicle Document is shipped with the vehicle, certifying that the vehicle is not complete. See Figure 2–1. In addition, affixed to the driver's side door frame or door edge is an Incomplete Vehicle Certification label. See Figure 2–2. For further information on Vehicle Certification and Identification, see APPENDIX A "VEHICLE IDENTIFICATION."

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 applicable regulations upon completion of the modifications.

FIGURE 2-1. Incomplete Vehicle Certification Document



Labels:
Tire, Rim & Weight Rating, Certification,
Major Components & Weights,
Paint,
Canadian Safety Mark - (Canadian registry only),
U.S. EPA Noise,
Patent, and others.

Note: Final Stage Manufacturer Label to be installed by Final Stage Manufacturer on driver's door edge or driver's door frame.

FIGURE 2-2. Locations of Certification Labels—Driver's Door & Door Frames

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 effective September 1, 2006, a new regulation affects the intermediate and final stage manufacturer certification process and documentation.

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 can not be completed and certified within 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 September 1, 2006 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 intermediate or final stage manufacturers see:

http://canadagazette.gc.ca/partII/2002/20020213/html/sor55-e.html and
http://www.tc.gc.ca/acts-regulations/GENERAL/M/mvsa/regulations/mvsrg/toc_mvsrg.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

CAUTION

Kenworth designed the 2007 exhaust system to meet the requirements of the specific engine manufacturer. These designs meet or exceed the EPA emissions requirements for the 2007 engine.

As a first priority Kenworth recommends that the dealer / customer / body builder maintain the system as designed and installed by Kenworth.

If in certain situations the exhaust systems needs to be revised, it will be the responsibility of the modifying party to follow the guidelines established by the engine manufacturer (PACCAR Engines – Application Engineering Bulletin Guide) and to obtain their approval for the revised installation. These guidelines are available from the respective local engine distributor. Be advised that the exhaust systems and requirements are complex and some of the factors that will have to be considered in the modification are: exhaust back pressure, location & structural mounting requirements of the DPF (the engine manufacturer provides warranty for the DPF) material used for the pipes, leakage requirements, temperature drop, etc. and these modifications will have to be verified and tested by the local engine distributor.

If the modified system is approved by the engine manufacturer Kenworth will warranty the Kenworth components used.

Installation and workmanship is the responsibility of the modifying party.

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Section 3
Dimensions

DIMENSIONS

This section is designed to provide enough information to successfully layout chassis in the body planning process. Only typical truck layouts and configurations are shown. Optional equipment may not be depicted. Please contact your local Kenworth dealer if more information is desired.

ABBREVIATIONS AND DEFINITIONS

Throughout this section, and in other sections as well, abbreviations and specific terminology are used to describe certain characteristics on your vehicle. The charts below list the abbreviated terms used and provide definitions for terminology used.

TABLE 3-1. Abbreviations Used

AF	Frame rail overhang behind rear axle or measured from the centerline of tandem
BOC	Back of Cab
BOF	Bottom of Rail
CA	Back of cab to centerline of rear axle or centerline of tandems on tandem suspension
FS	Front suspension height from centerline of axle up to the bottom of the frame rail
OAL	Overall Vehicle Length
SOC	Side of Cab
RS	Rear suspension height from centerline of axle up to the bottom of the frame rail
WB	Centerline of front axle to centerline of rear axle or centerline of tandems on tandem suspension

TABLE 3-2. Definitions

GAWR	The maximum allowable weight each axle assembly is designed to carry, as measured at the tires, therefore including the weight of the axle assembly itself. GAWR is established by considering the rating of each of its components (tires, wheels, springs, axle and steering system), and rating the axle on its weakest link. The GAWR assumes that the load is equal on each side.
LADEN	This is the weight condition of the truck with the front and rear axles loaded to their Gross Axle Weight Rating, GAWR.
UNLADEN	This is the weight condition of the truck delivered from the PACCAR factory. This is without the following: body, driver, and tools. It does include fluids, but no fuel.

TURNING RADIUS

Approximate turning radius specifications for the T170/270/370 are listed (by wheelbase) in the following tables. Table 3-3 lists turn radius information for chassis with standard components. Optional components may give different results.

TABLE 3-3. Turning Radius

Steering Gear	Rear Axles	Tire, Bridgestone	Wheelbase Range, Inch	Curb to Curb Est. Radius, ft	Wall to Wall Radius Est., ft
TAS 40	Single	R250F 245/70R19.5	140 152 176 188 206 218 236 245 254 260 272	24 26 30 32 34 36 39 40 41.5 42 44	27 29 33 35 37 39 42 43 44.5 45 47
TAS 65 (T270/370 only)	Single	R250F 295/75R22.5	145 150 160 200 215 230 245 260 280	20 21 22 27 29 31 32 34 36	23 24 25 30 32 34 35 37 39
	Tandem		175 190 205 220 235 250 260	26 27 29 31 33 35 36	29 30 32 34 36 38 39
M110P (T370 only)	Single	R294 275/70R22.5	140 150 160 170 180 190	22 23 24 25 27 28	25 26 27 28 30 31
	Tandem		165 175 190	26 28 30	29 31 33
	Single	R250 295/80R22.5	140 150 160 170 180 190	31 33 34 36 38 40	34 36 37 39 41 43
	Tandem		165 175 190	38 40 43	41 43 46
	Single	M843 12R22.5	140 150 160 170 180 190	34 36 38 40 42 44	37 39 41 43 45 47
	Tandem		165 175 190	42 44 47	45 47 50

Section 3
Dimensions

OVERALL DIMENSIONS

This section includes drawings and charts of the following medium duty models: T170, T270 and T370.

On the pages that follow, detail drawings show particular views of each vehicle with dimensions being in inches and (mm). 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.

Kenworth also offers .dxf files and frame layouts of ordered chassis four weeks prior to build. Please speak to your sales person to request this feature when specifying your chassis.

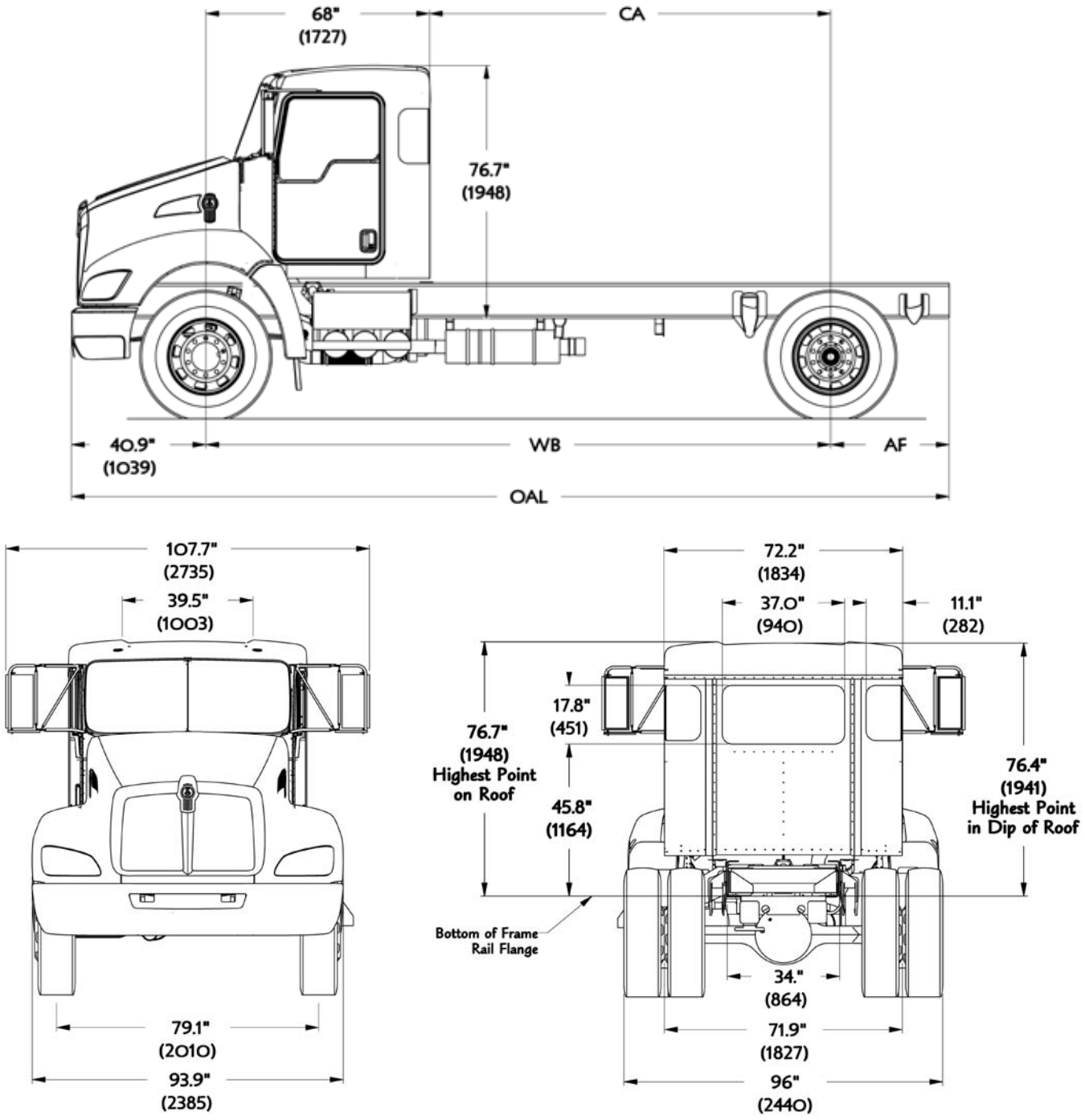


FIGURE 3-1. T170/T270/T370 Overall Height, and Length Dimensions [inches (mm)]

Section 3
Dimensions

TABLE 3-4.1. T170 Single Rear Axle: Overall Fore-Aft Dimensions [inches (mm)]

WB	OAL	AF	CA
152 (3861)	247.9 (6297)	55 (1397)	84 (2134)
176 (4470)	280.9 (7135)	64 (1626)	108 (2743)
188 (4775)	304.9 (7745)	76 (1930)	120 (3048)
206 (5232)	328.9 (8354)	82 (2083)	138 (3505)
218 (5537)	352.9 (8964)	94 (2388)	150 (3810)
236 (5994)	376.9 (9573)	100(2540)	168 (4267)
245 (6223)	384.9 (9777)	99 (2515)	177 (4496)

TABLE 3-4.2. T270/370 with Single Rear Axle: Overall Fore-Aft Dimensions [inches (mm)]

WB**	OAL	AF	CA
140 (3556)*	235.9 (5992)	55 (1397)	72 (1829)
145 (3810)	240.9 (6119)	55 (1397)	77 (1956)
150 (3810)	240.9 (6119)	50 (1270)	82 (2083)
152 (3861)*	247.9 (6297)	55 (1397)	84 (2134)
160 (4064)	264.9 (6728)	64 (1626)	92 (2337)
176 (4470)*	280.9 (7135)	64 (1626)	108 (2743)
188 (4775)*	304.9 (7745)	76 (1930)	120 (3048)
194 (4928)	304.9 (7745)	70 (1778)	126 (3200)
200 (5080)	312.9 (7948)	72 (1829)	132 (3353)
206 (5232)*	328.9 (8354)	82 (2083)	138 (3505)
215 (5461)	336.9 (8557)	81 (2057)	147 (3734)
218 (5537)*	352.9 (8964)	94 (2388)	150 (3810)
230 (5842)	360.9 (9167)	90 (2286)	162 (4115)
236 (5994)*	376.9 (9573)	100 (2540)	168 (4267)
245 (6223)*	384.9 (9777)	99 (2515)	177 (4496)
254 (6452)*	424.9 (10793)	130 (3302)	186 (4724)
260 (6604)*	448.9 (11402)	148 (3759)	192 (4877)
272 (6909)*	462.9 (11758)	150 (3810)	204 (5182)
280 (7112)	460.9 (11707)	140 (3556)	212 (5385)

* Hydraulic brake chassis only available in these wheelbases.
** Air brake chassis are available in inch increments starting from 140 inches.

TABLE 3-4.3. T370 with Tandem Rear Axles: Overall Fore-Aft Dimensions [inches (mm)]

WB***	OAL	AF	CA
175 (4445)	286.9 (7287)	71 (1803)	107 (2718)
190 (4826)	310.9 (7897)	80 (2032)	122 (3099)
205 (5207)	334.9 (8507)	89 (2261)	137 (3480)
220 (5588)	358.9 (9116)	98 (2489)	152 (3861)
235 (5969)	382.9 (9726)	107 (2718)	167 (4242)
250 (6350)	406.9 (10335)	116 (2946)	182 (4623)
260 (6604)	430.9 (10945)	130 (3302)	192 (4877)
280 (7112)	454.9 (11554)	134 (3403)	212 (5385)

*** Available in inch increments starting from 175 inches.

DETAIL VIEWS

Top of Cab: Roof Mounted Options – T270/370

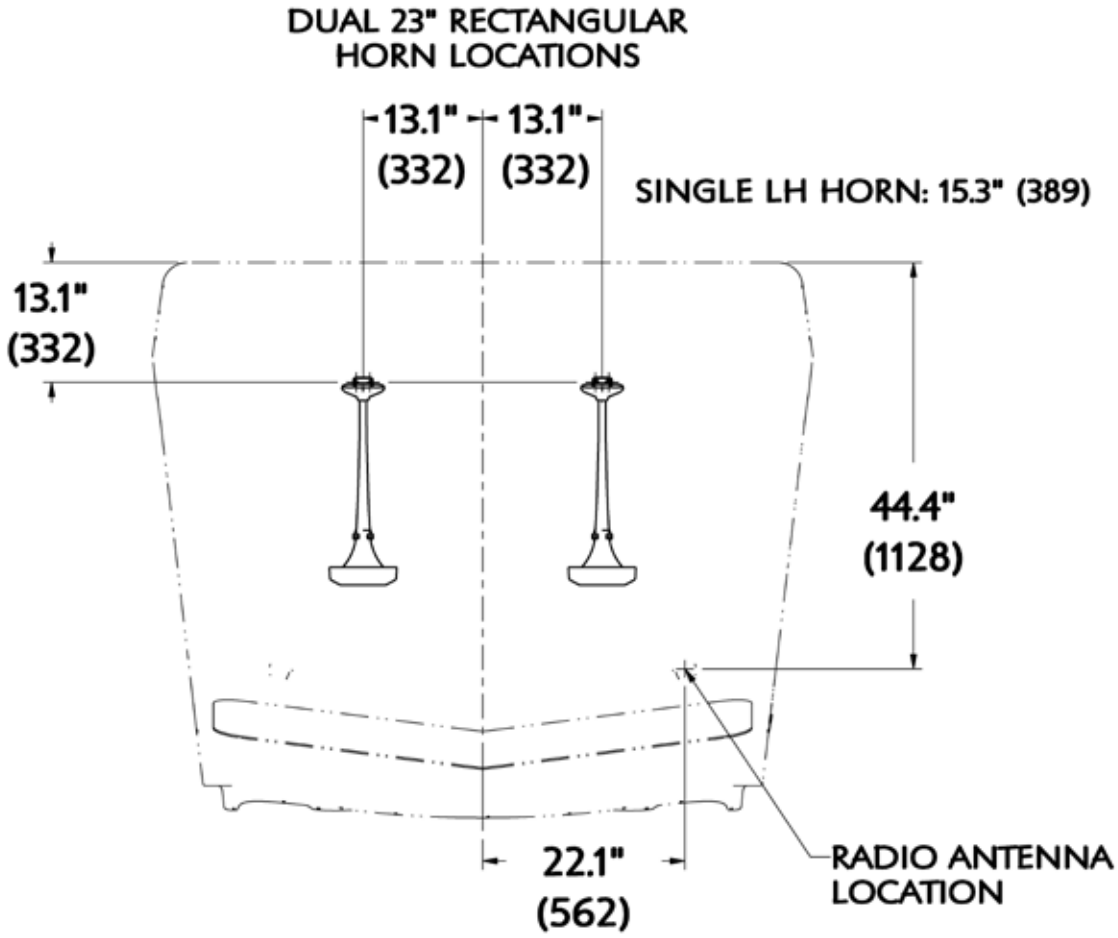


FIGURE 3-2.1. Top of Cab View, T270/T370, Roof Mounted Options

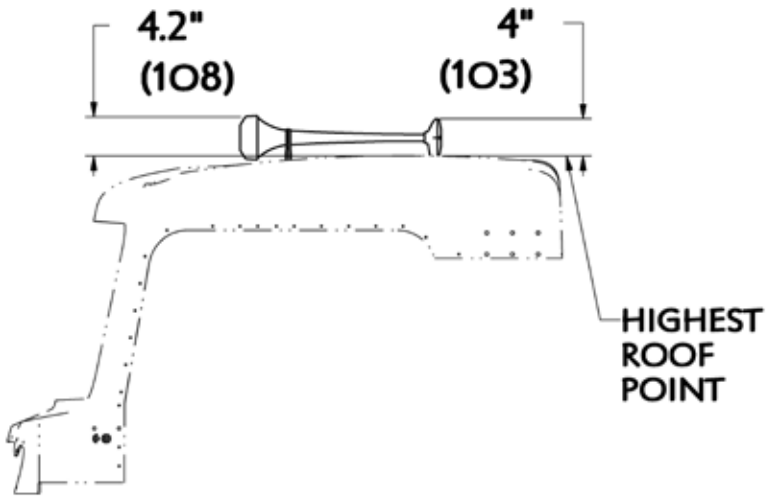


FIGURE 3-2.2. Side of Cab View, T270/370, Roof Mounted Options

DETAIL VIEWS
Back of Cab: Flush Mounted Flood Lamps – T270/370

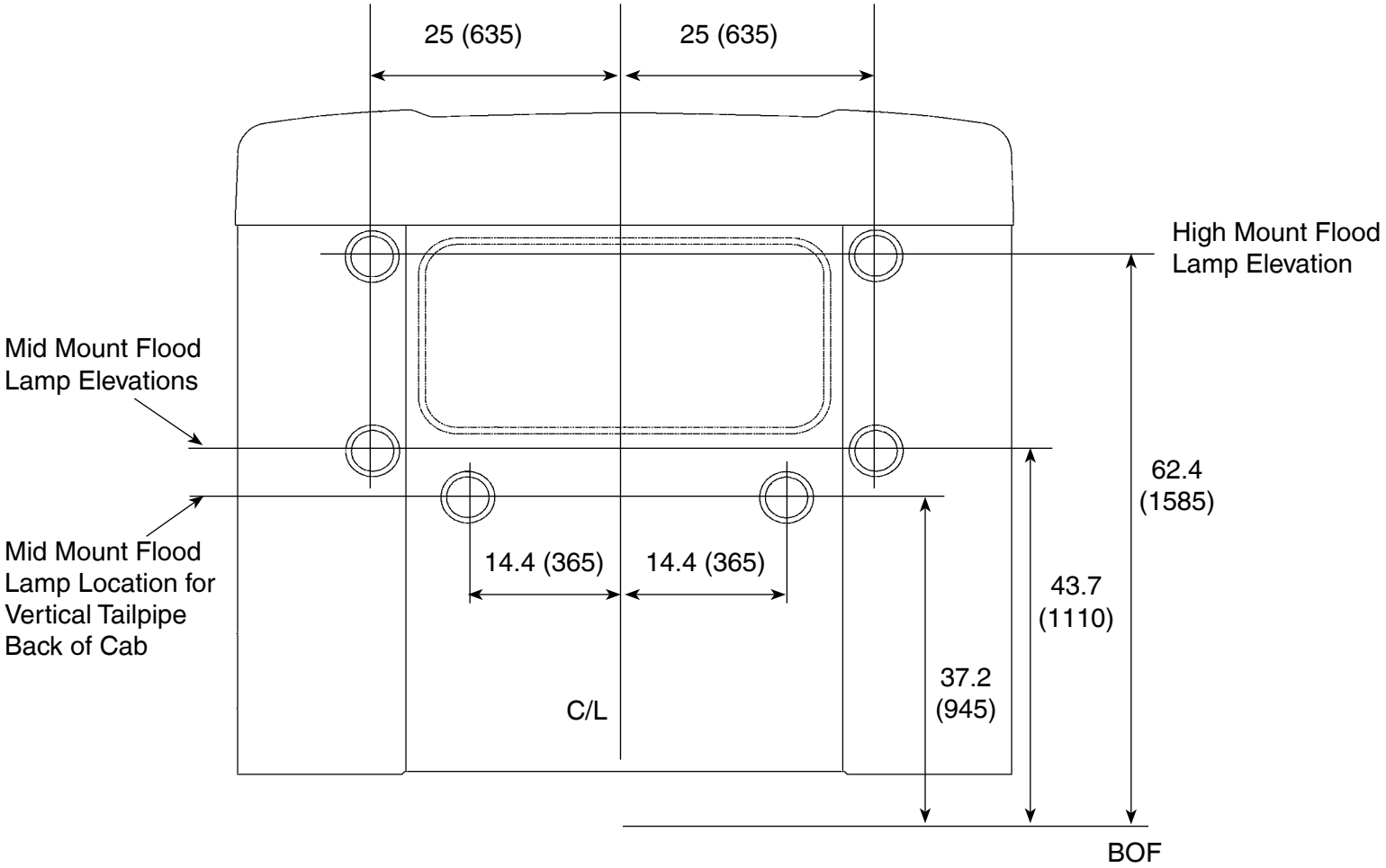


FIGURE 3-2.3. Flush Mounted Flood Lamp Locations [inches (mm)]

DETAIL VIEWS
Extended Cab Dimensions – T170/270/370

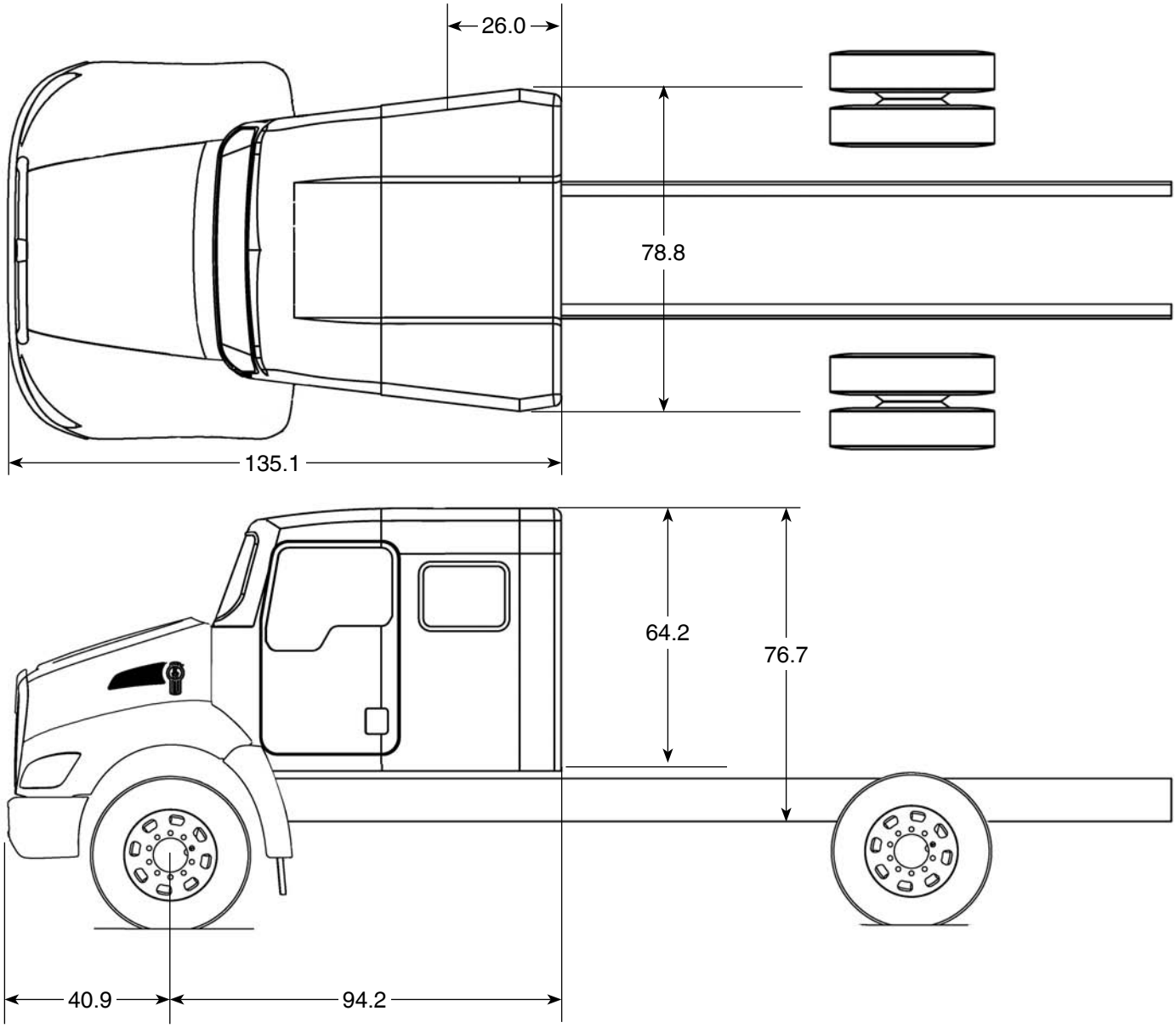


FIGURE 3-2.4. T170/T270/T370 Extended Cab, Overall Dimensions [inches (mm)]

NOTE **This configuration is not available from the factory.**

DETAIL VIEWS
Crew Cab Conversion Dimensions – T170/270/370

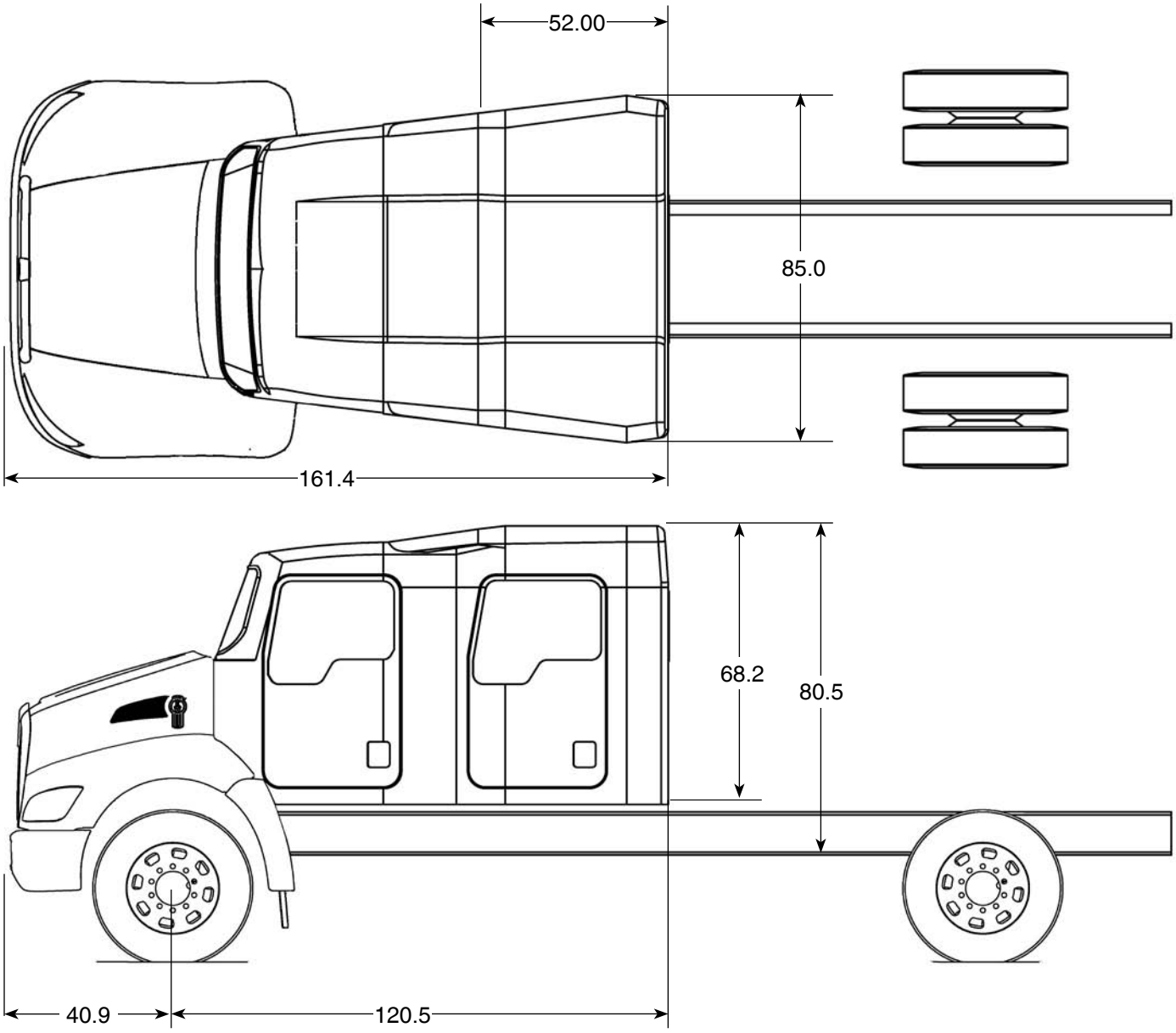


FIGURE 3-2.5. T170/T270/T370 Crewcab Conversion, Overall Dimensions [inches (mm)]

NOTE

This configuration is not available from the factory.

DETAIL VIEWS
Crossmember Locations – T170

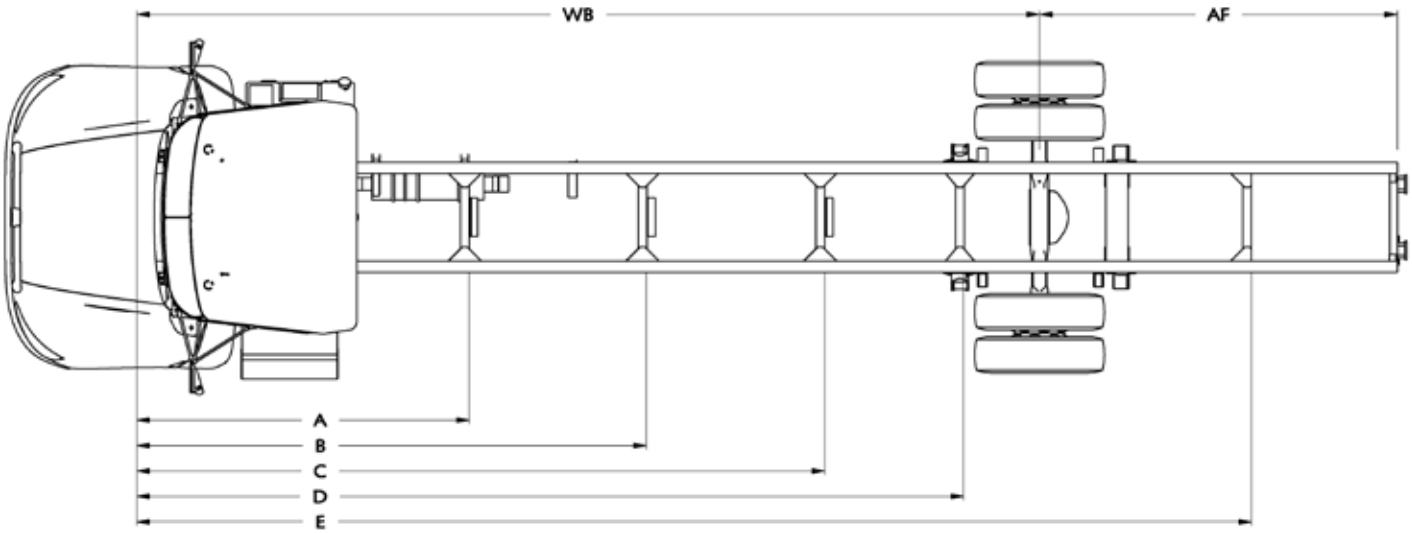


FIGURE 3-3. T170 Crossmember Location

TABLE 3-5 T170. Crossmember Locations: measured from front axle centerline [inches (mm)]*

WB	A	CB	B	CB	C	D	E
152 (3861)	90.7 (2305)	Y					1.) For without a square end of frame crossmember with an AF range of 80 (2032) to 125 (3175) a crossmember is installed at: E = WB + 64.4” (1636 mm) 2.) For AF range of 126 (3200) to 173 (4394) a 2nd crossmember is installed at: E = WB + 112.4” (2855 mm)
176 (4470)	101.8 (2585)	Y					
188 (4775)	101.8 (2585)	Y					
206 (5232)	90.7 (2305)	Y	134.8 (3425)	Y			
218 (5537)	101.8 (2585)	Y	145.9 (3705)	Y			
236 (5994)	101.8 (2585)	Y	156.9 (3985)	Y			
245 (6223)	101.8 (2585)	Y	156.9 (3985)	Y			

Y SPL100 Driveline centerbearing (CB) is mounted on this crossmember.
* Allison 1000HS/RDS, FS5406A, FS6406, FS06406

COMPONENTS

This section includes detail drawings and charts showing particular vehicle components with dimensions in inches and (millimeters). 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.

Frame Rail Configurations - T170/270/370

Note: Bottom of frame rail is a reference point that you can use to determine estimated heights of components and ground clearances.

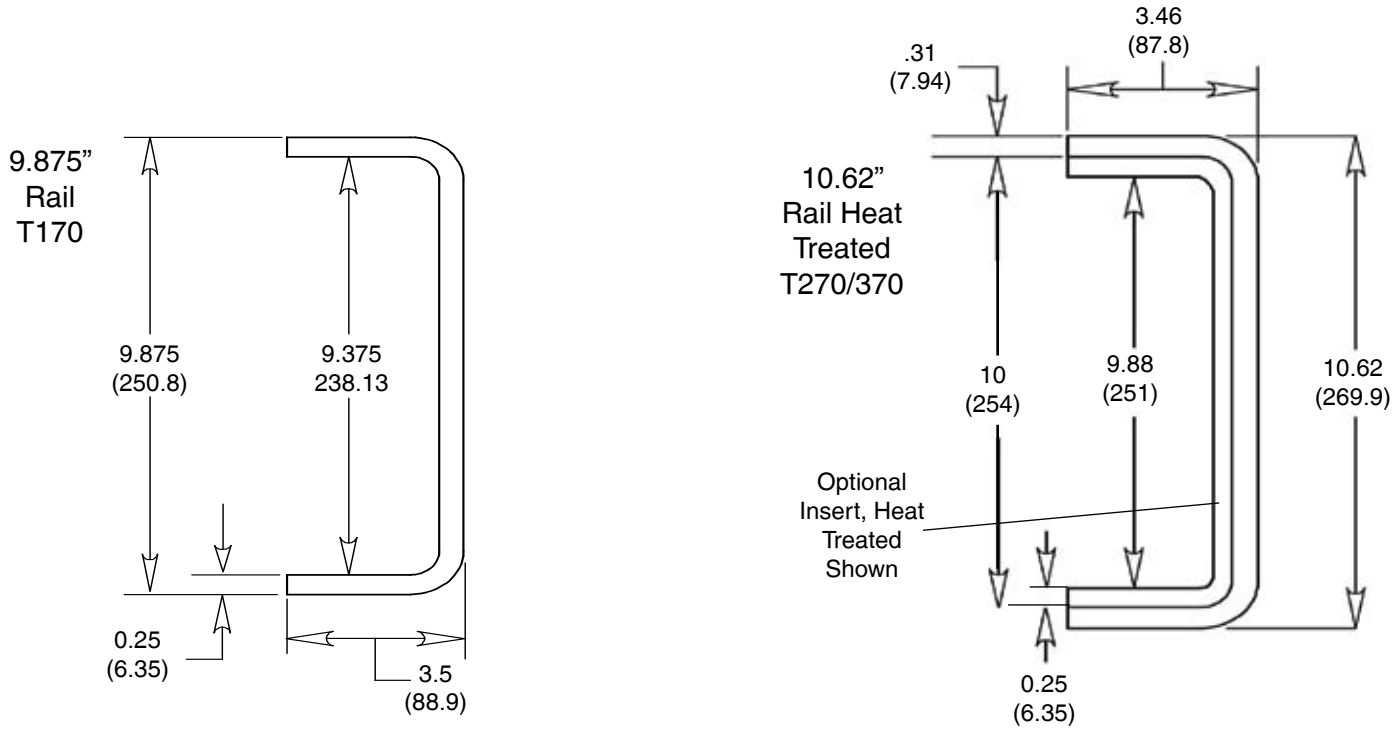


FIGURE 3-4.1. Frame Rail Dimensions and Properties [inches (mm)]

TABLE 3-6.1. Frame Rail Properties

Frame Rail	9.875” Heat Treated	10.62” Heat Treated	10.62” Rail with Insert, Both Heat Treated
Model	T170	T270/370	T270/370
Yield Strength, PSI	120,000	120,000	120,000
Section Modulus, Cubic Inches	9.88	14.8	24.37
RBM, lbs-Inch	1,254,767	1,776,000	2,925,000
Weight per inch per pair, lbs	2.1	2.9	4.9

Battery Box – T270/370

Parallel Battery Box LH Under Cab for air braked truck or hydraulic braked truck with an accessory air system.

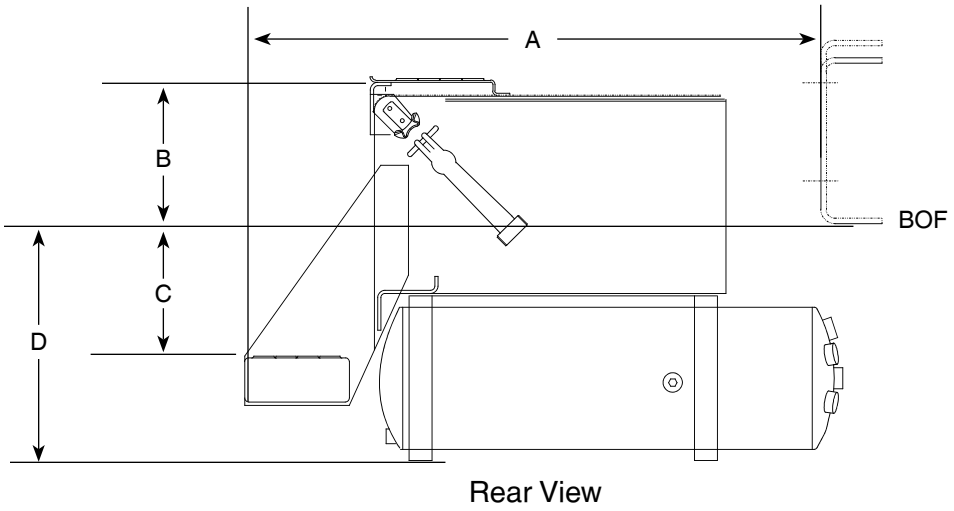


FIGURE 3-4.2. T270/370 Battery Box Measurements [inches (mm)]

Type	A, inch (mm)	B, inch (mm)	C, inch (mm)	D, inch (mm)
Hybrid	33.4 (848)	6.7 (170)	9.5 (241)	15.8 (401)
Non-Hybrid	33.4 (848)	8.5 (215)	9.3 (236)	13.4 (354)

Battery/Tool Box – T270/370

Parallel Battery Box LH Under Cab for Hydraulic braked Truck w hout an Accessory Air System or Tool Box Under Cab.

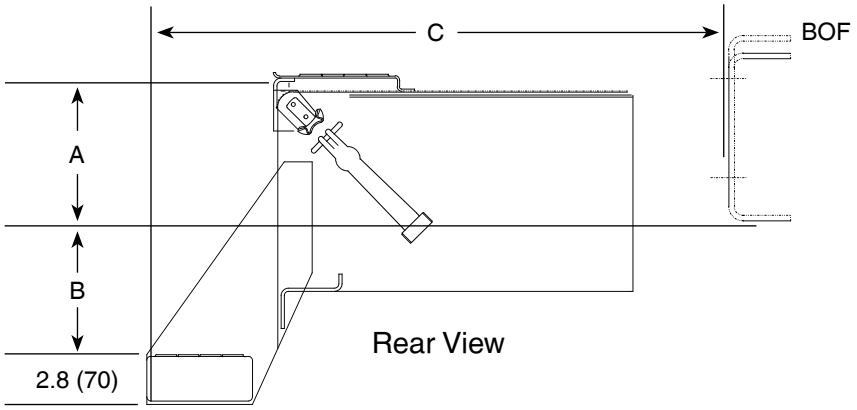


FIGURE 3-4.3. T270/370 Battery/Tool Box Measurements [inches (mm)]

TABLE 3-6.2. T270/370 Battery Box/Toolbox Dimensions

Type	A, inch (mm)	B, inch (mm)	C, inch (mm)
Non-Hybrid Battery Box	8.5 (215)	9.4 (239)	33.4 (848)
Hybrid Battery Box	8.5 (215)	9.5 (241.6)	33.4 (848)
Toolbox	9.3 (236)	9.2 (233)	33 (848)

Section 3
Dimensions

22-inch Fuel Tanks — T270/370

Round Fuel Tank Mounting

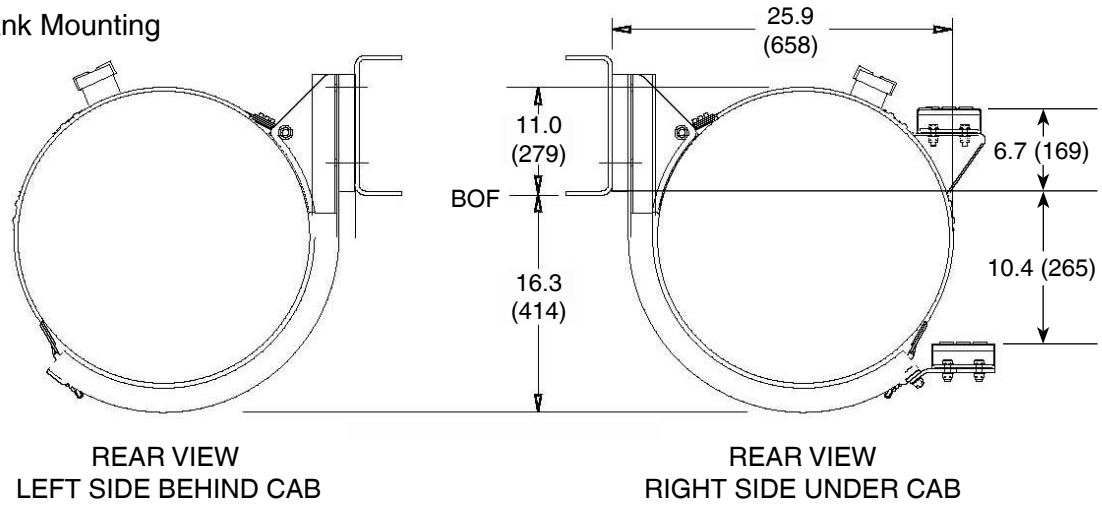


FIGURE 3-4.4. T270/370 22" Fuel Tank Mounting Measurements [inches (mm)]

Rectangular Fuel Tanks

Rectangular Fuel Tank Mounting

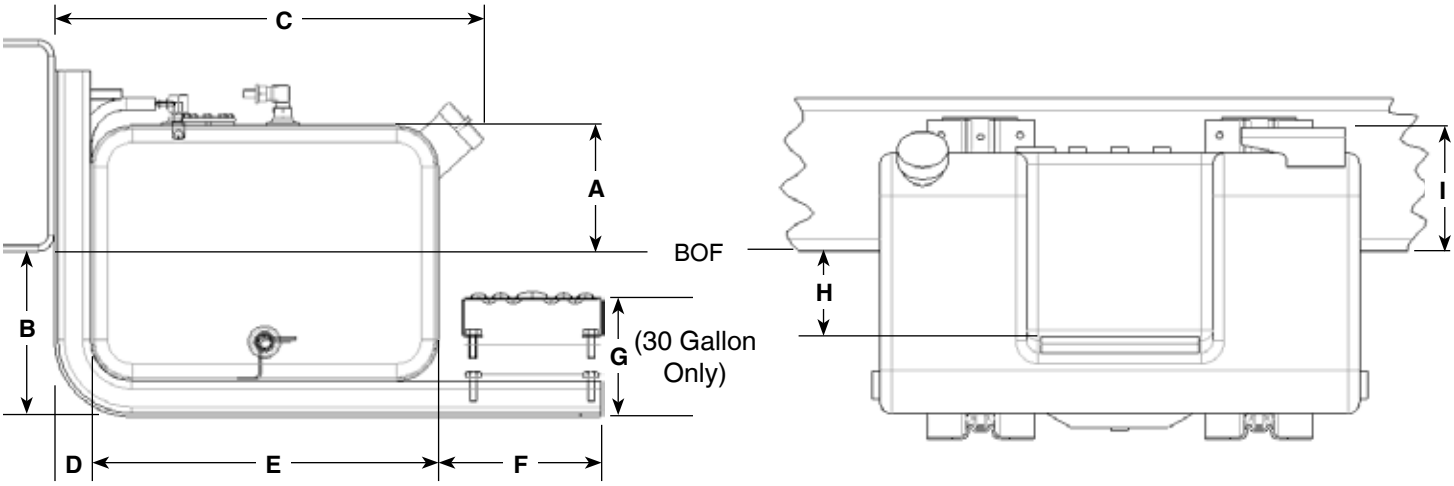


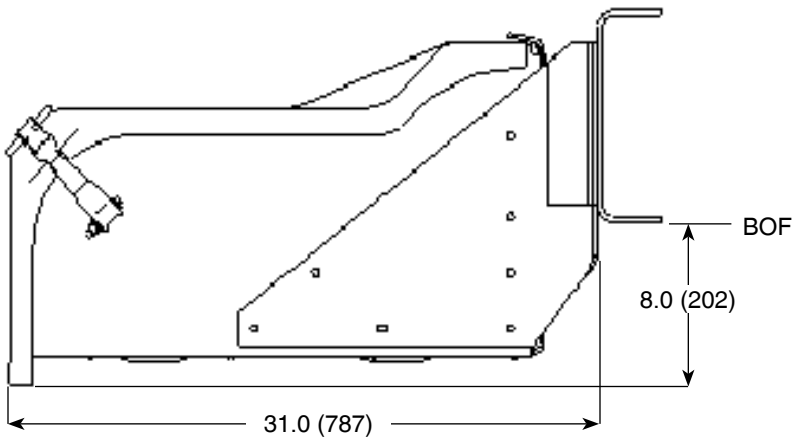
FIGURE 3-13. Rectangular Fuel Tank Measurements [inches (mm)]

TABLE 3-6.3 Rectangular Fuel Tank Dimensions

Model	Size (Gal.)	A, inch (mm)	B, inch (mm)	C, inch (mm)	D, inch (mm)	E, inch (mm)	F, inch (mm)	G, inch (mm)	H, inch (mm)	I, inch (mm)
T270/370	50	6.8 (172)	13.2 (334)	26.2 (685)	1.8 (44)	23 (583)	N/A	N/A	6.0 (152)	8.6 (219)
T170	30 (1)	6.3 (161)	8.3 (211)	21.5 (547)	1.8 (46)	18.0 (457)	8.2 (209)	1.9 (49)	N/A	N/A
T170	35 (1)	6.3 (161)	8.3 (211)	21.5 (547)	1.8 (46)	18.0 (457)	N/A	N/A	N/A	N/A
Notes: (1) Right hand side tank shown, left hand tank is opposite.										

Battery Box – T270/370

Cantilever Battery Box Back of Cab.

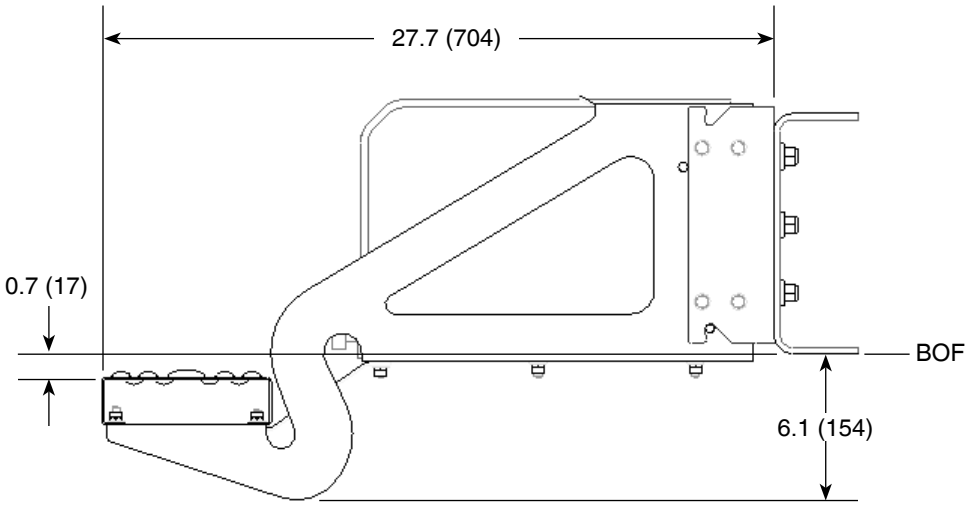


Rear View

FIGURE 3-4.6. T270/370 Battery Box Measurements [inches (mm)]

Battery/Access Step – T170

Parallel Battery Box LH Under Cab or Cab Access RH under Cab.

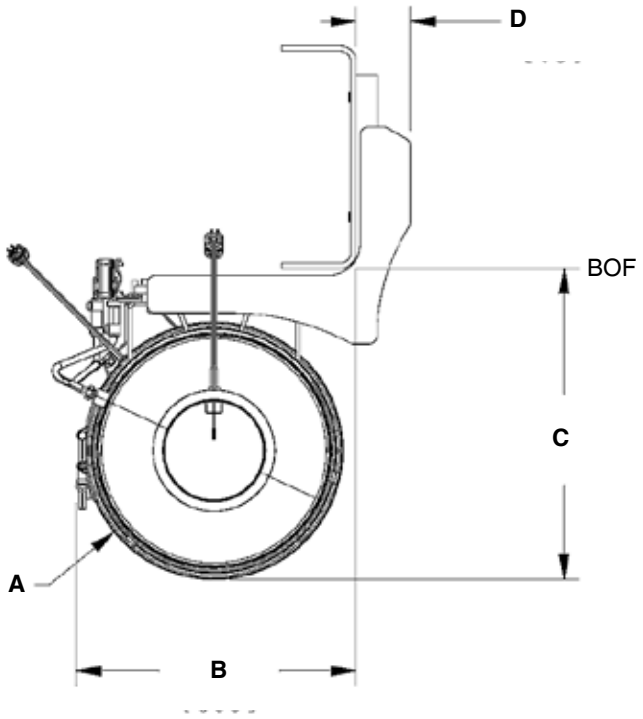


Rear View – Battery Box LH under shown, Cab Access Step RH under is opposite.

FIGURE 3-4.7. T170 Battery Box/Cab Access Step Measurements [inches (mm)]

Horizontal Exhaust/Muffler

Horizontal Exhaust Muffler/DPF Mounting



Rear View

FIGURE 3-4.8. Horizontal Exhaust Muffler/DPF Measurements [inches (mm)]

TABLE 3-6.4. RH Under Frame Horizontal Exhaust Mounting

Model	A, Inch (mm)	B, inch (mm)	C, inch (mm)	D(1), inch (mm)
T170	10.7 (271)	13.2 (335)	11.0 (280)	0.75 (19)
T270/370	12.1 (308)	13.2 (335)	14.7 (372)	2.5 (65)
Notes: (1) T270/370 Installations shown. T170 dimension is for exhaust diffuser support rear of DPF.				

Horizontal Exhaust Mounting with Tailpipe Exiting LH side.

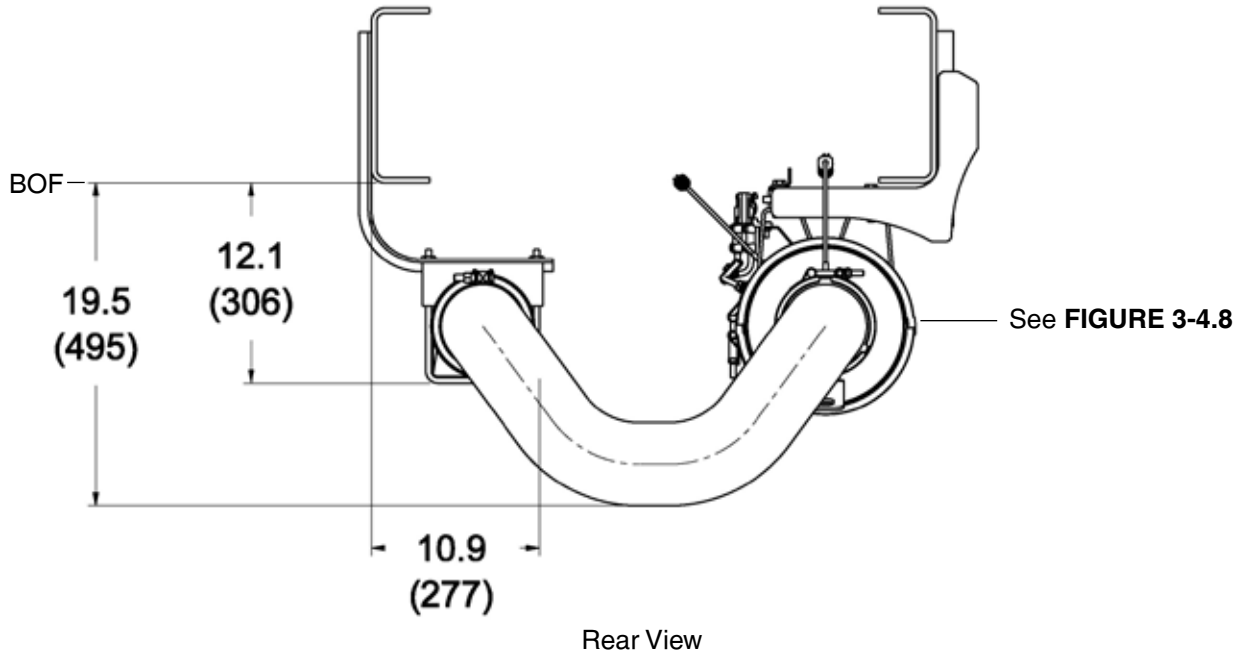


FIGURE 3-4.9. Horizontal Exhaust with LH Side Existing Tailpipe Measurements [inches (mm)]

Horizontal Exhaust Mounting with Tailpipe Exiting LH Side.

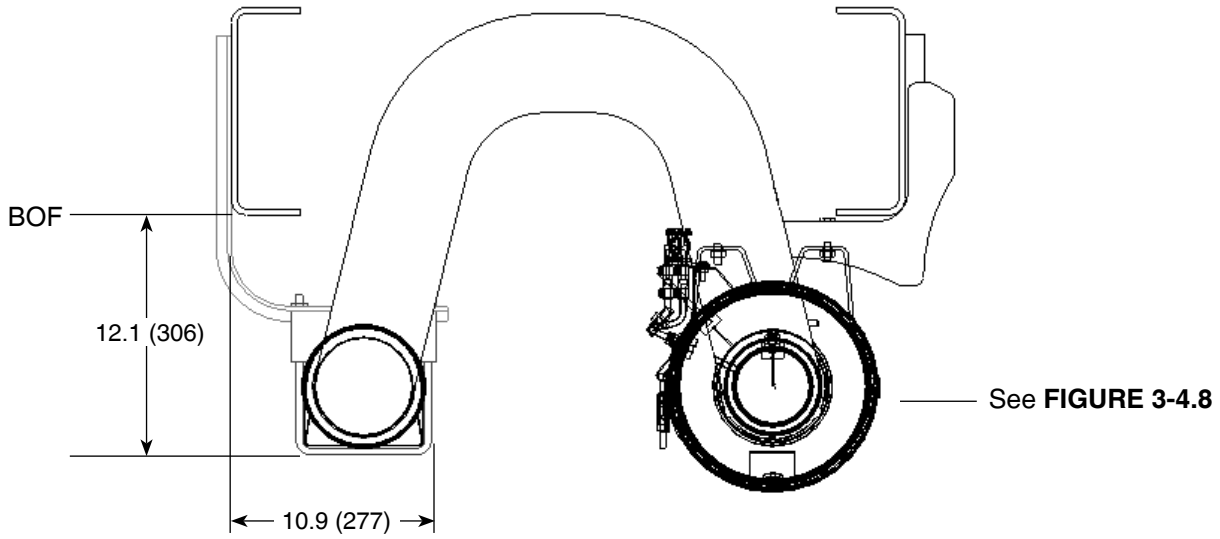


FIGURE 3-4.10. Horizontal Exhaust with LH Side Existing Tailpipe Measurements [inches (mm)]

Step/DPF Box Assembly RH Under Cab – T270/370

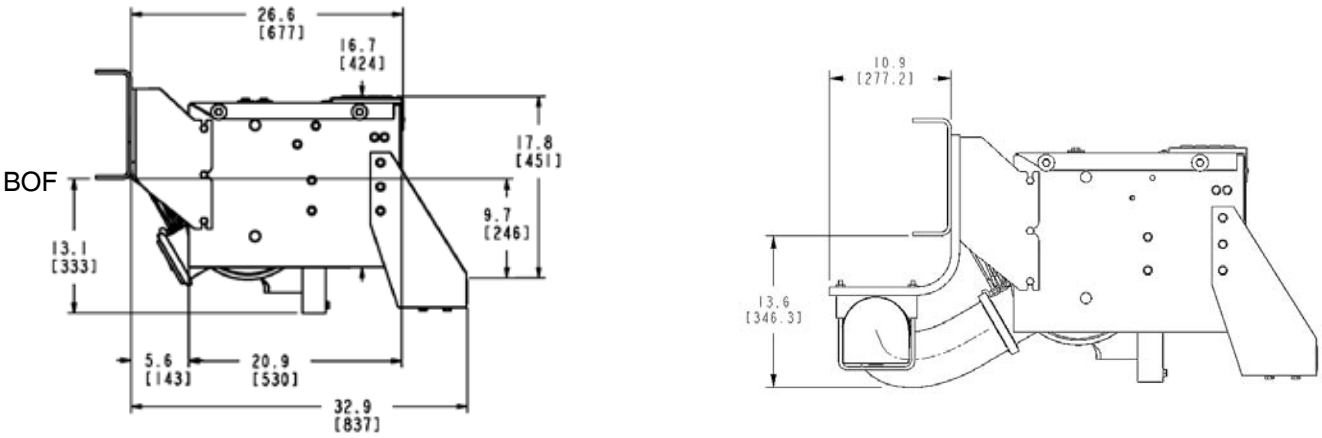


FIGURE 3-4.11. T270/T370 RH Step/DPF Box Assembly for Use with Vertical Tailpipe (left) or Horizontal Tailpipe (right) [inches (mm)]

Horizontal Muffler-Vertical Tailpipe on Cab – T270/370

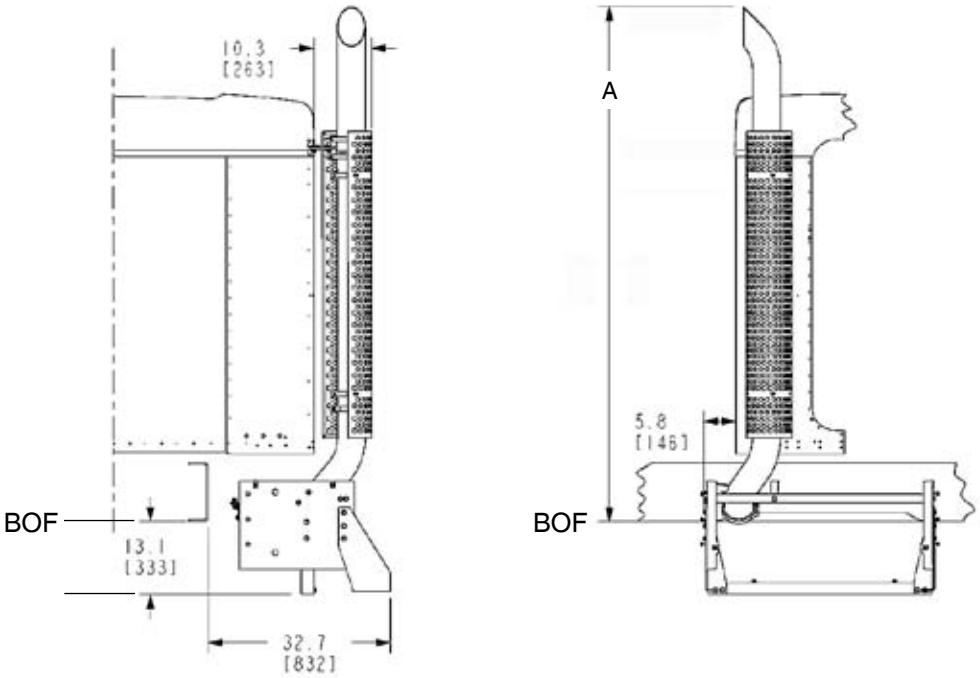


FIGURE 3-4.12. T270/370 Vertical Tailpipe on Right Side of Cab [inches (mm)]

RH Back of Cab Independent Muffler — T270/T370

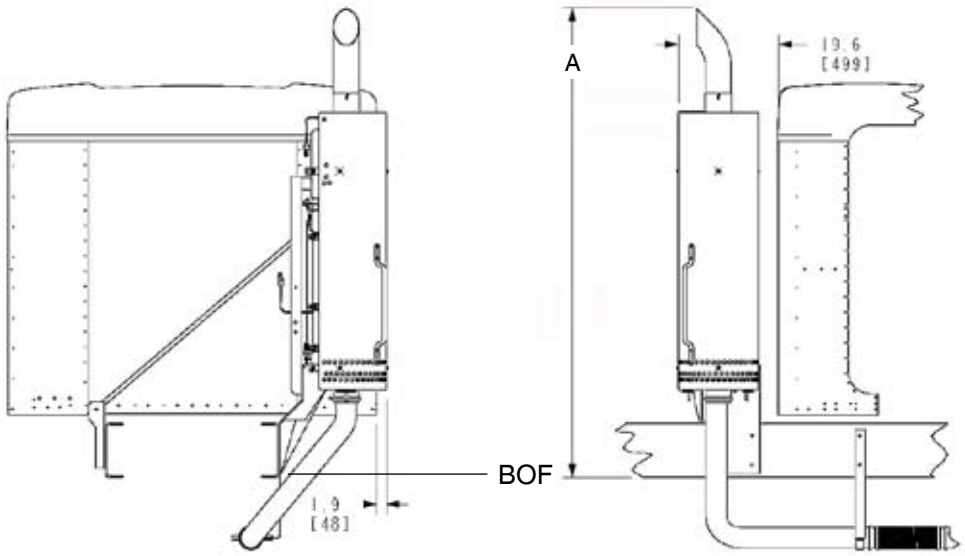


FIGURE 3-4.13. T270/T370 with Vertical Muffler/DPF Behind RH Side of Cab [inches [mm]]

TABLE 3-6.5. Vertical Tail Pipe Height Dimensions.

	Vertical Tail Pipe RH Side of Cab		Vertical Muffler/DPF RH Back of Cab	
Vertical Tail Pipe	**A** Bottom of Rail (BOF) to Top of Tail Pipe (mm)	**A** Bottom of Rail (BOF) to Top of Tail Pipe (inch)	**A** Bottom of Rail (BOF) to Top of Tail Pipe (mm)	**A** Bottom of Rail (BOF) to Top of Tail Pipe (inch)
30” Curved	2373	93.4	2707	106.6
36” Curved	2525	99.4	2859	112.6
42” Curved	2678	105.4	3012	118.6
48” Curved	2830	111.4	3164	124.6
54” Curved	2983	117.4	3317	130.6
60” Curved	3135	123.4	3469	136.6
28” Curved	2322	91.4	2666	105.0
34” Curved	2475	97.4	2819	111.0
40” Curved	2627	103.4	2971	117.0
46” Curved	2779	109.4	3123	123.0
52” Curved	2932	115.4	3276	129.0
58” Curved	3084	121.4	3428	135.0

RIDE HEIGHTS

The front (FS) and rear (RS) suspension ride heights are provided as a basic tool to determine overall height of the cab, height of exhaust components, and frame heights. The heights are calculated from the centerlines of the axles. Please be sure to include the tire radius dimension to determine overall height. Note: frame rail height itself will not affect the overall height as all components are located from the bottom of the rail.

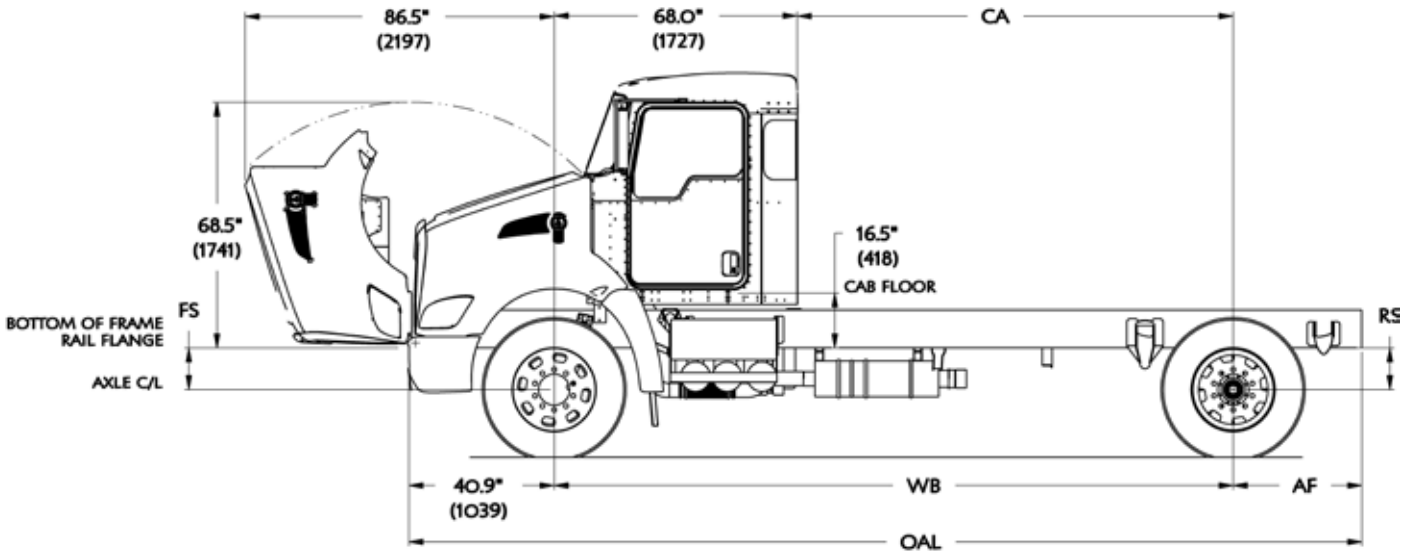


TABLE 3-7.1. Estimated Front Suspension Ride Heights

		FS: Estimated Front Ride Height	
Model	**Front Suspension**	**Laden inch (mm)**	**Unladen inch (mm)**
T170	8K Taper Leaf	6.0 (152)	7.1 (180)
T270/370	10K Taper Leaf with 19.5" Tires	7.4 (187)	8.5 (216)
	10K Taper Leaf with 22.5" or Greater Tires	8.4 (212)	9.5 (241)
	12K Taper Leaf	7.8 (197)	9.5 (241)
	13.2K Taper Leaf	8.4 (213)	10.0 (253)
	14.6K Taper Leaf	8.0 (203)	10.0 (253)

TABLE 3-7.2. Estimated Rear Suspension Ride Heights

		RS: Estimated Rear Ride Height	
Model	**Rear Suspension (# Rear Axles)**	**Laden inch (mm)**	**Unladen, inch (mm)**
T170	Reyco 79KB 13.5K (Single)	5.9 (150)	8.1 (206)
T270/370	Reyco 79KB 20K Capacity (Single)	6.6 (168)	9.0 (229)
	Reyco 79KB 21K Capacity (Single)	6.6 (168)	9.0 (229)
	Reyco 79KB with Helper 23K Capacity (Single)	6.6 (168)	9.0 (229)
	Reyco 79KB with Helper 26K Capacity (Single)	8.2 (208)	11.3 (287)
	Hendrickson HAS 210L/230L Air (Single)	7.8 (198)	
	Reyco 102 Multileaf 40K Capacity (Tandem)	8.0 (203)	9.6 (244)
	Hendrickson HAS 402 Air (Tandem)	7.8 (198)	
	Hendrickson RT-403 40K Capacity (Tandem)	7.6 (193)	8.6 (218)
	Chalmers 854-40-XL 40K Capacity (Tandem)	6.9 (175)	9.3 (236)
	Chalmers 854-40-XL-HS 40K Capacity (Tandem)	7.6 (193)	9.3 (236)

REAR SUSPENSION LAYOUTS

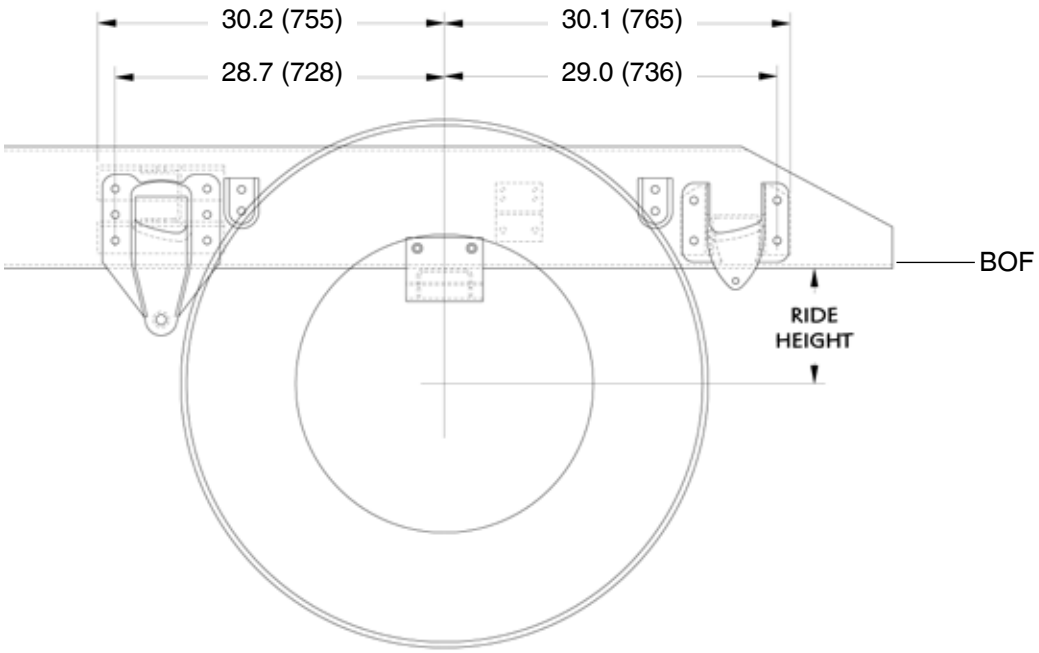
The rear suspension layouts are provided as a tool to help layout bodies prior to arrival. The applicable dimensions are shown. Be sure to check the axle spacing that is shown, as alternate spacings may exist and could change some of the dimensions. The dimensions shown below are the most typical installations, in special cases some hole locations will move. If you are planning on using the holes shown for your body installation, please confirm with your local KW dealer that the drawing below will be the installation used on your specific truck. Ensure that proper torque is used to reinstall any suspension components. See Table 5-1 and 5-2 on page 5-6.

It would be recommended to order the frame layout of your chassis along with your truck order. This can be done on any Kenworth truck, and will be provided 4 weeks ahead of the build schedule.

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

If you would like details on the frame drilling with optional spacings, please contact your local Kenworth dealer.

REYCO 79KB SINGLE REAR AXLE

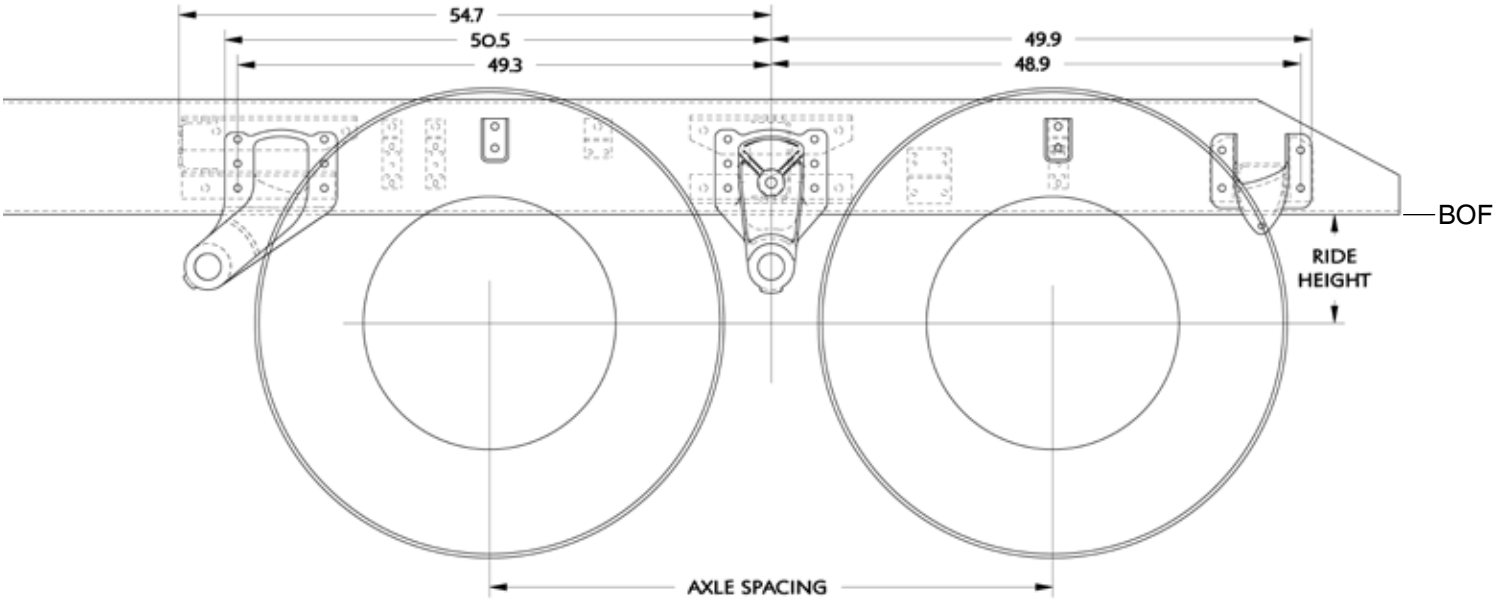


Optional Reyco 79KB Suspensions

TABLE 3-8.1. Rear Suspension Options

Suspension Type	Rating	Axle Spacing	Laden Ride Height	Unladen Ride Height
Reyco 79KB single	20K	-	6.6”	9.0”
Reyco 79KB single	23K	-	6.6”	9.0”
Reyco 79KB single	26K	-	8.2”	11.3”
Reyco 79KB single	21K	-	6.6”	9.0”
Reyco 79KB single	13.5K	-	5.9”	8.1”

REYCO 102 TANDEM REAR AXLE

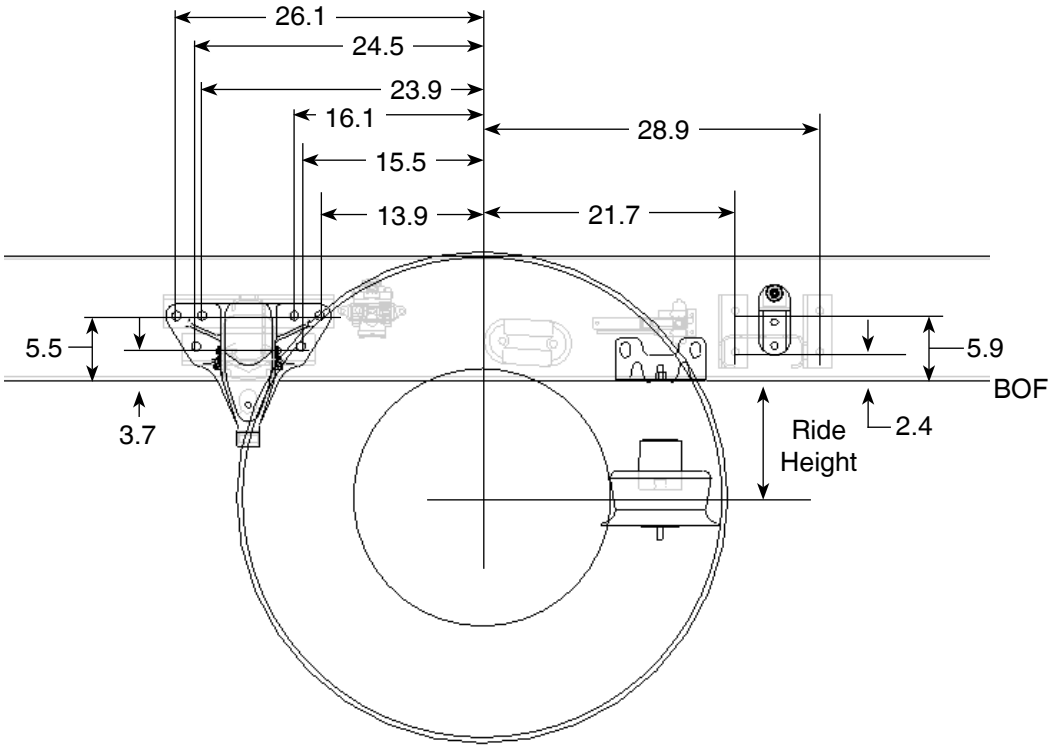


Optional Reyco 102 Suspension

TABLE 3-8.2. Rear Suspension Options

Suspension Type	Rating	Axle Spacing	Laden Ride Height	Unladen Ride Height
Reyco 102 Tandem	40K	52”	8.0”	9.6”

HENDRICKSON HAS SINGLE REAR AXLE

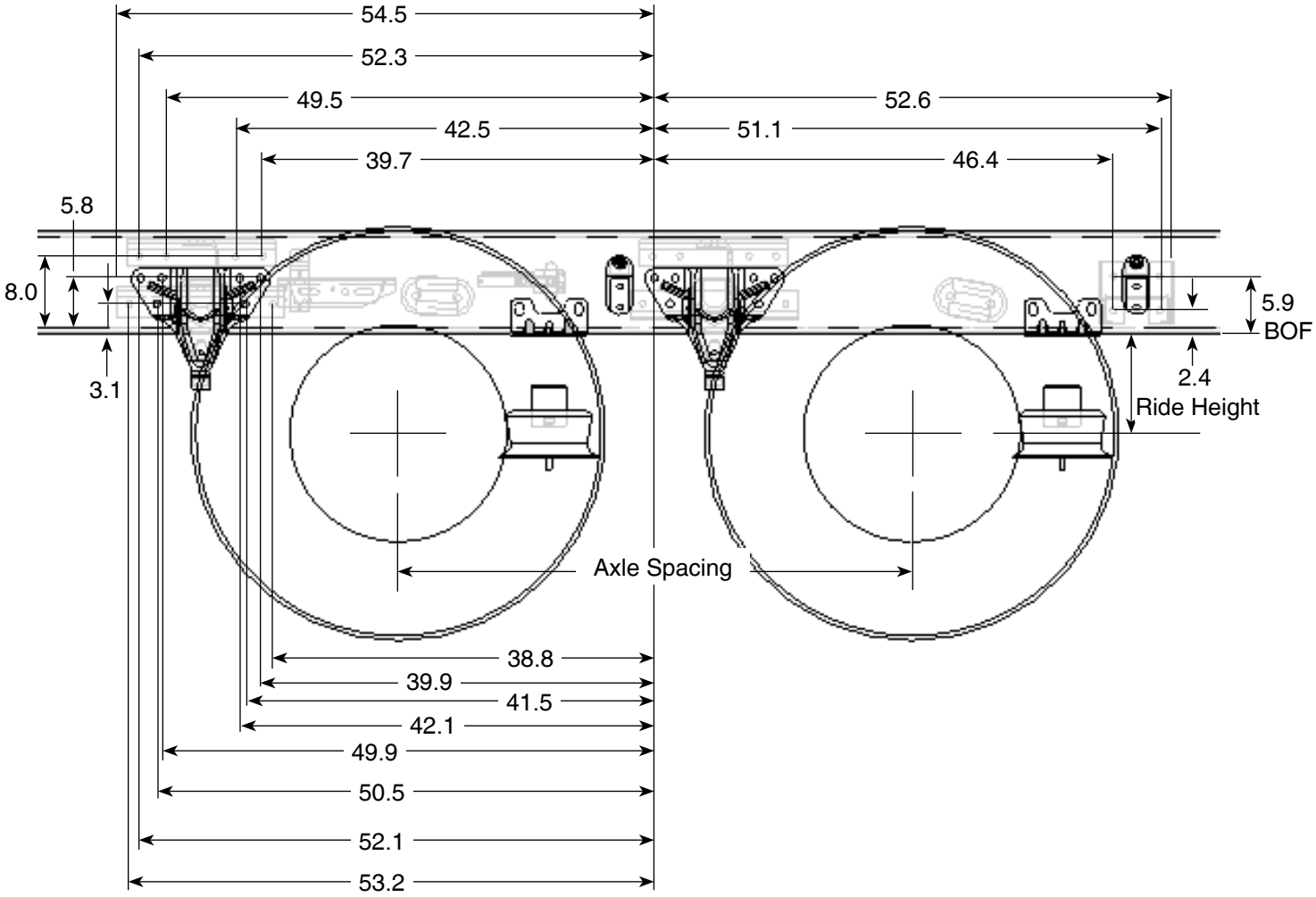


Optional Hendrickson HAS Single Suspensions

TABLE 3-8.3. Rear Suspension Options

Suspension Type	Rating	Axle Spacing	Laden Ride Height	Unladen Ride Height
Hendrickson HAS 210L	21K	-	7.8”	7.8”
Hendrickson HAL 230L	26K	-	7.8”	7.8”

HENDRICKSON HAS TANDEM SUSPENSION



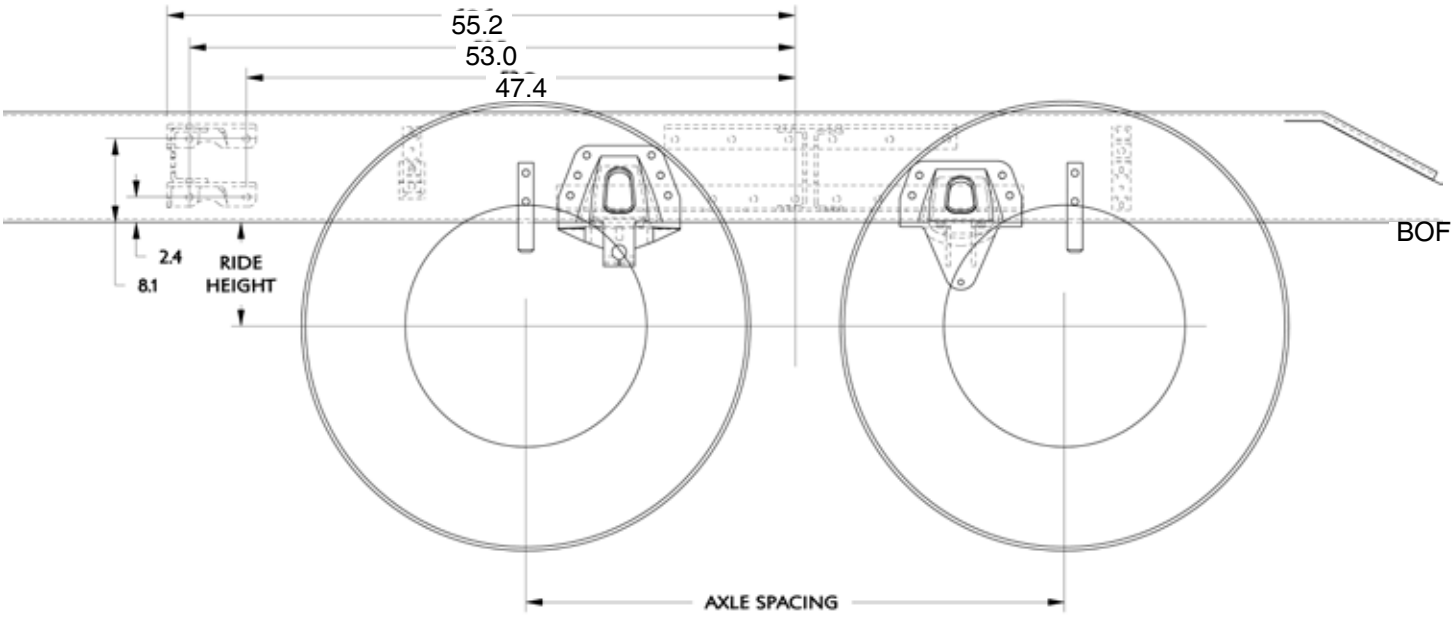
Optional Hendrickson HAS Tandem Suspensions

TABLE 3-8.4. Rear Suspension Options

Suspension Type	Rating	Axle Spacing	Laden Ride Height	Unladen Ride Height
Hendrickson HAS 402 tandem	40K	52”	7.8”	7.8”

HENDRICKSON RT TANDEM SUSPENSION

Shown with a 54” Axle Spacing Without Track Rods

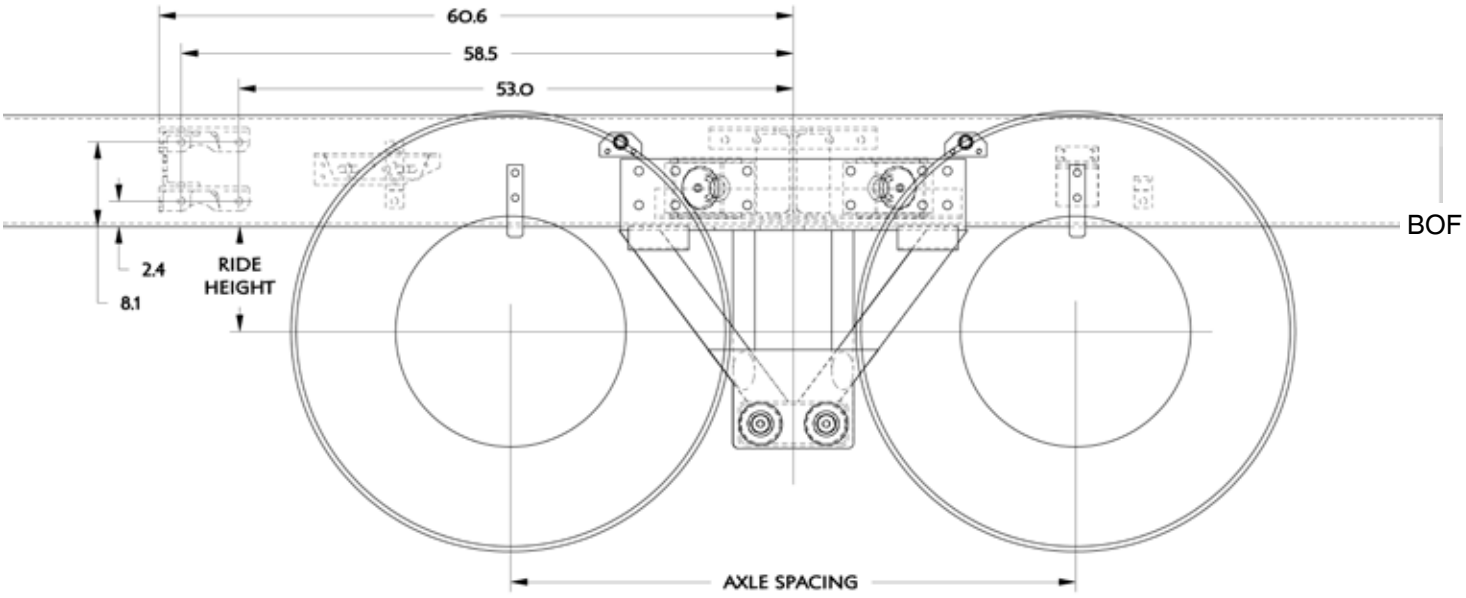


Optional Hendrickson RT Tandem Suspensions

TABLE 3-8.5. Rear Suspension Options

Suspension Type	Rating	Axle Spacing	Laden Ride Height	Unladen Ride Height
Hendrickson RT403 6” saddle	40K	52”	7.6”	8.6”

CHALMERS 854-40 TANDEM SUSPENSION



Optional Chalmers Tandem Suspensions

TABLE 3-8.6. Rear Suspension Options

Suspension Type	Rating	Axle Spacing	Laden Ride Height	Unladen Ride Height
Chalmers 854-40-XL	40K	54”	6.9”	9.3”
Chalmers 854-40-XL-HS	40K	54”	7.6”	9.3”

TIRE DATA

For dimensions for your particular Bridgestone tire, visit the Bridgestone website, www.bridgestonetrucktires.com.

FRAME AND CAB RELATED HEIGHTS

The bottom of the frame rail (BOF) at the front and rear axle can be used as a reference point to estimate vertical heights. Use the following to calculate estimates for frame and cab related heights, such as top of frame rail, step height, top of exhaust pipe, etc.:

1.) Tire radius data from the manufacturer
2.) Front and rear suspension ride heights in this section
3.) Frame rail heights defined in this section if needed
4.) Component dimensions from bottom of rail defined in this section if needed

Note that there are many factors that will affect heights including, but not limited to, front and rear axle loading and tire pressure. Placement of frame components such as fuel tanks, will affect loads on the front axle and rear axle, as well as distribution to the left and right side of the vehicle. Heights calculated from this information are estimates only.

GROUND CLEARANCES

To calculate estimates for ground clearance for mounted components using the underside of the bottom of the frame rail as a reference use the following:

1.) Tire radius data from the manufacturer
2.) Front and rear suspension ride heights in this section
3.) Component dimensions from bottom of rail defined in this section

Ground clearances, like height calculations, are affected by factors including, but not limited to, front and rear axle loading and tire pressure. Placement of frame components, such as fuel tanks, will affect loads on the front axle and rear axle, as well as distribution to the left and right side of the vehicle. Ground clearances calculated from this information are estimates only.

FRAME LAYOUTS

The dimensions in the frame layout section are intended to aid in layout of the chassis and to help determine the best possible combination of fuel tanks, battery boxes, and diesel particulate filter (DPF). The layouts focus on the under cab area, with appropriate dimensional information included for pertinent back of cab components. Not all optional equipment is included in this section. Additional components may be placed on the rail behind components shown. The back of cab components are shown primarily for reference. For more specific requirements, please work with your local Kenworth Dealer. Please read the instructions carefully.

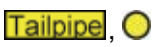
The following dimensions are consistent across the entire section to aid in the comparison of one layout option versus another.

TABLE 3-10. Frame Layout Dimensions

Dimension	Location
A	RH Side, Under Cab, Below Rail
B	RH Side, Above Rail
C	LH Side, Under Cab, Below Rail
D	LH Side, Above Rail
E	RH Side, Under Rail Back of Cab
F	LH Side, Under Rail Back of Cab
G	RH Side, Under Rail Back of Cab
BOC	Back of Cab

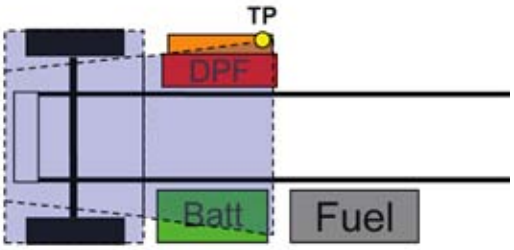
The layouts are organized by type, specifically the arrangement of under cab components. The visual index that follows will give you a quick overview of the layouts that are included. Using the index locate the layout that you are interested in, then turn to the specified pages. The charts that follow are then model specific. It is important that the correct chart is used for accurate dimensional information.

Visual Index

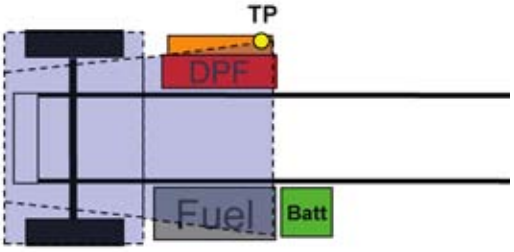
Symbol	Description
	Diesel Particulate Filter, see Cautions on pages 2-3
	Vertical Diesel Particulate Filter, see Cautions on pages 2-3
	Battery Box
	Cantilever Battery Box
	Fuel Tank
	Tailpipes (Horizontal, Vertical)
	Access Step
	Hybrid Power Electronic Carrier (PEC)

FRAME LAYOUT INDEX

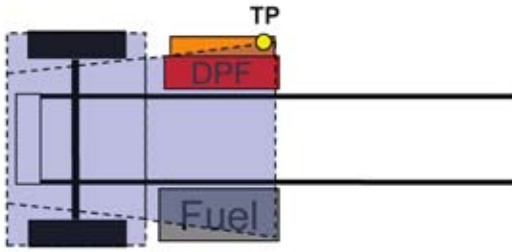
Chassis Layout Options



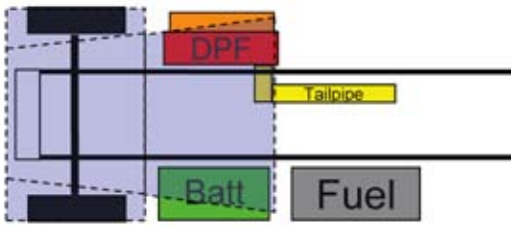
D1A is used for single exhaust located RH side of cab with battery box LH under, DPF RH under and fuel tank back of cab. Charts located on page 3-33 (D1A).



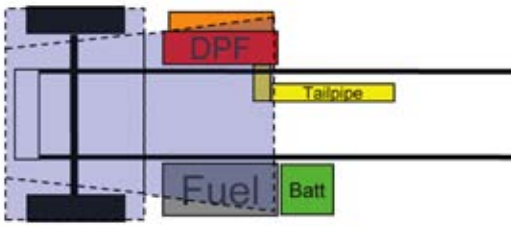
D2A is used for single exhaust located RH side of cab with the cantilever style battery box LH back of cab, fuel tank LH under, and DPF RH under. Charts located on page 3-34 (D2A).



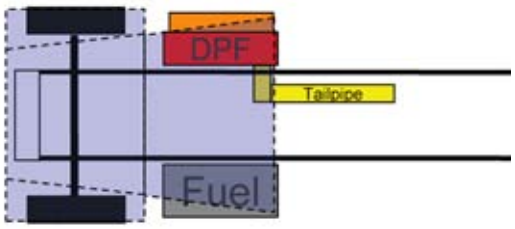
D3A is used for single exhaust located RH side of cab with fuel tank LH under, DPF RH under and in cab or temporary battery box. Charts located on page 3-35 (D3A).



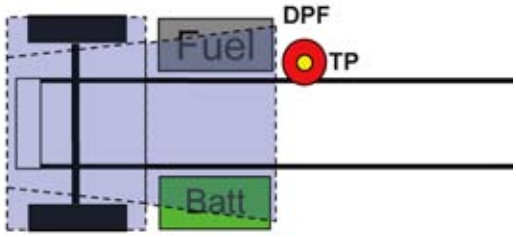
DA7 is used for horizontal exhaust back of cab with battery box LH under, DPF RH under and fuel tank back of cab. Charts located on page 3-36.



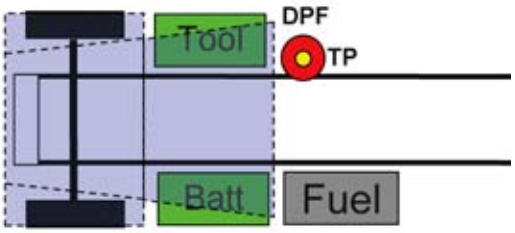
D8 is used for horizontal exhaust back of cab with cantilever battery box LH back of cab, fuel tank LH under and DPF RH under. Charts located on page 3-37.



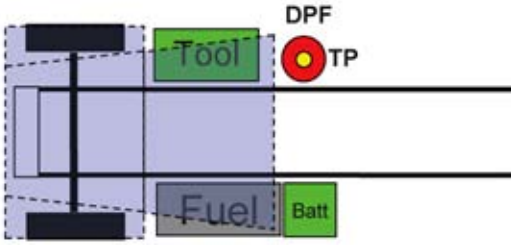
D9 is used for horizontal exhaust back of cab with fuel tank LH under, DPF RH under and in cab or temporary battery box. Charts located on page 3-38.



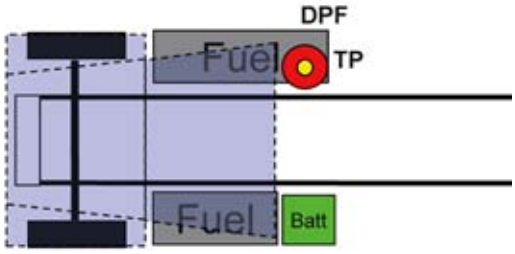
D10 is used for vertical independent exhaust RH back of cab, including DPF, battery box LH under, and fuel tank RH under. Charts located on page 3-39.



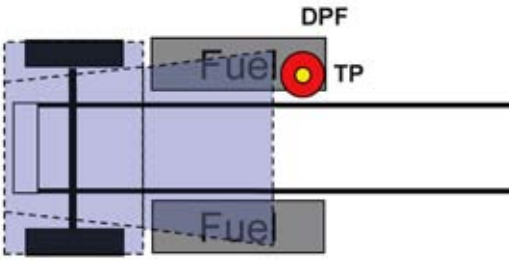
D11 is used for vertical independent exhaust RH back of cab, including DPF, battery box LH under, tool box RH under and fuel tanks located back of cab. Charts located on page 3-40.



D12 is used for vertical independent exhaust RH back of cab, including DPF, cantilever battery box LH back of cab, fuel tank LH under and tool box RH under. Charts located on page 3-41.

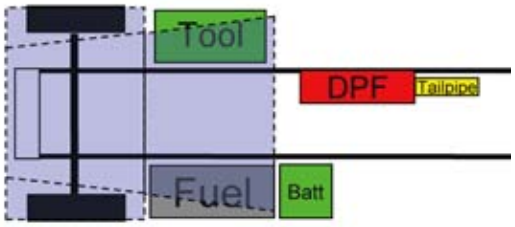


D13 is used for vertical independent exhaust RH back of cab, including DPF, cantilever battery box LH back of cab, fuel tank LH under and fuel tank RH under. Charts located on page 3-42.



D14 is used for vertical independent exhaust RH back of cab, including DPF, fuel tanks LH and RH under, and in cab or temporary battery box. Charts located on page 3-43.

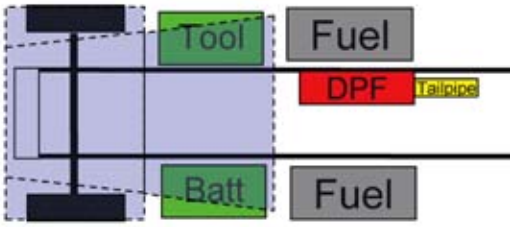
D15 is used for horizontal exhaust back of cab, including DPF, battery box LH under, and fuel tank RH. Charts located on page 3-44.



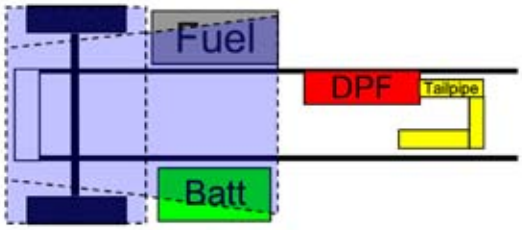
D16 is used for horizontal exhaust back of cab, including DPF, cantilever battery box LH back of cab, fuel tank LH under and tool box RH under. Charts located on page 3-45.

D17 is used for horizontal exhaust back of cab, including DPF, cantilever battery box LH back of cab, fuel tank LH under and fuel tank RH under. Charts located on page 3-46.

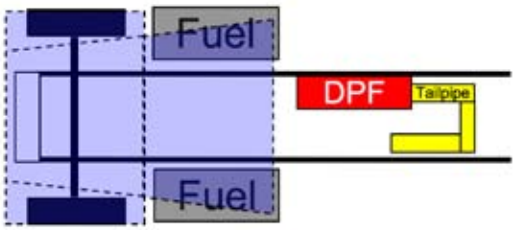
D18 is used for horizontal exhaust back of cab, including DPF, fuel tanks LH and RH under, and in cab or temporary battery box. Charts located on page 3-47.



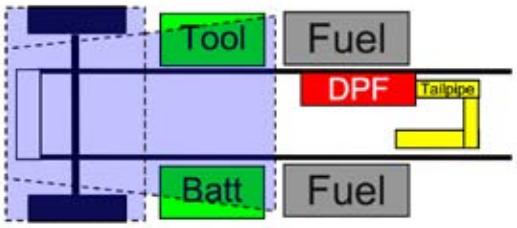
D19 is used for horizontal exhaust back of cab, including DPF, battery box LH under, tool box RH under, fuel tanks LH and RH back of cab. Charts located on page 3-48.



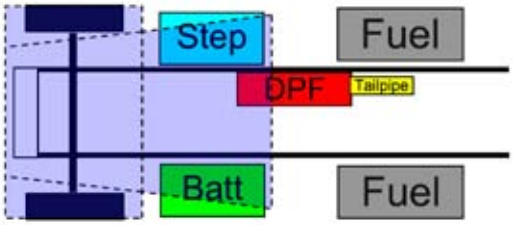
D20 is used for RH horizontal mounted DPF back of cab with horizontal tailpipe existing LH side, battery box LH under cab, and fuel tank RH under cab. Charts located on page 3-49.



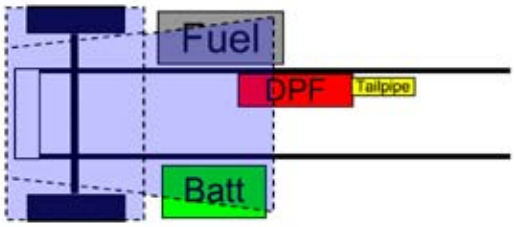
D23 is used for RH horizontal mounted DPF back of cab with horizontal tailpipe existing LH side, including fuel tank LH and RH under, in cab or temporary battery box. Charts located on page 3-50.



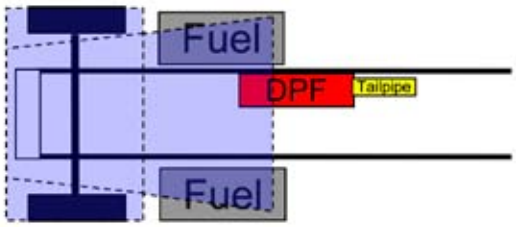
D24 is used for RH horizontal mounted dpf back of cab with horizontal tailpipe existing LH side, including fuel tanks LH and RH back of cab, battery box LH under cab and toolbox step RH under cab. Charts located on page 3-51.



D25 is used for RH horizontal mounted DPF back of cab with horizontal tailpipe, including fuel tanks LH and RH back of cab, battery box LH under cab and access step RH under cab. Charts located on page 3-52.

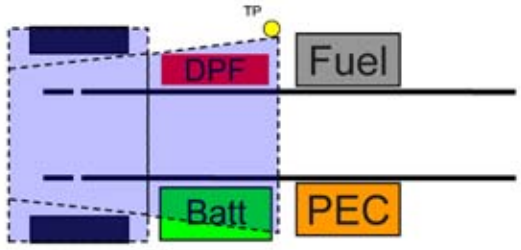


D26 is used for RH horizontal mounted DPF under frame with horizontal tailpipe, battery box LH under cab and fuel tank RH under cab. Charts located on page 3-53.

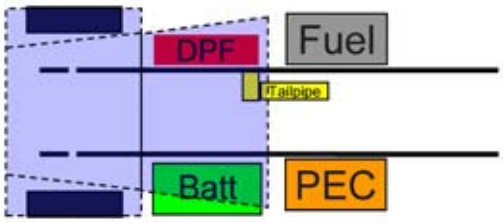


D27 is used for RH horizontal mounted DPF under frame with horizontal tailpipe, in cab battery box and fuel tanks LH and RH under cab. Charts located on page 3-53.

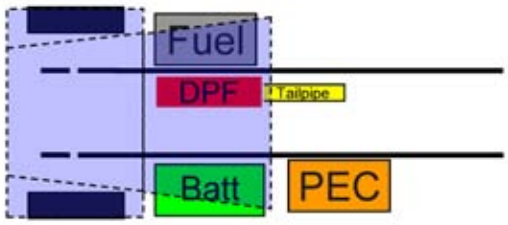
Chassis Layout Options - Hybrid (PEC required LH BOC)



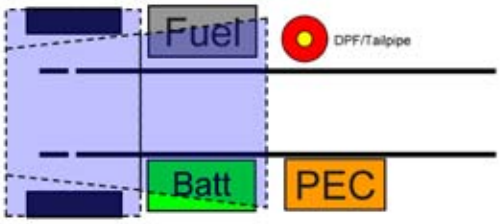
H1 is used for single exhaust located RH side of cab with battery box LH under, DPF RH under and fuel tank back of cab. Charts located on page 3-54.



H2 is used for single exhaust located under cab, battery box LH under, fuel tank RH behind, and DPF RH under. Charts located on page 3-55.



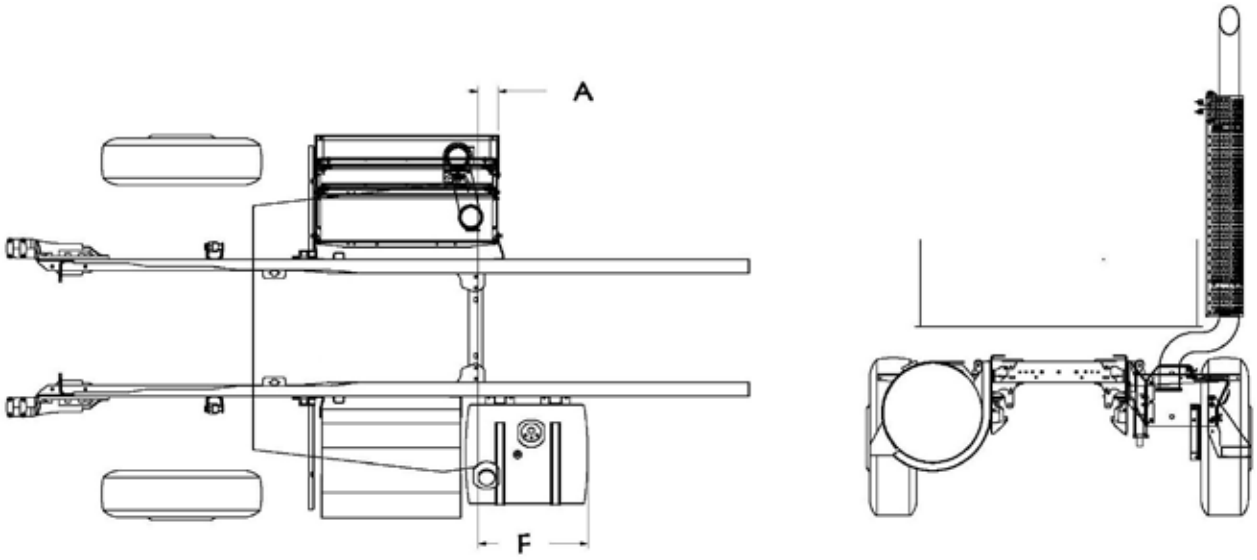
H3 is used for single exhaust located under cab, battery box LH under, fuel tank RH under, and DPF under. Charts located on page 3-56.



H4 is used for single vertical exhaust located RH behind cab, battery box LH under, fuel tank RH under, and vertcle DPF RH behind. Charts located on page 3.57.

CHARTS

D1A—Use with the following models: T270/370



DPF Location: RH Under Cab
Battery Box: LH Under Cab
Fuel Tank: BOC, LH

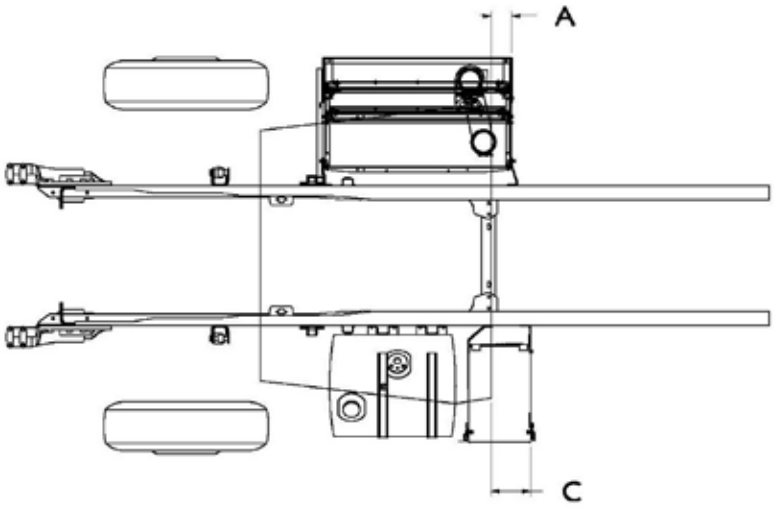
TABLE 3-11. D1A

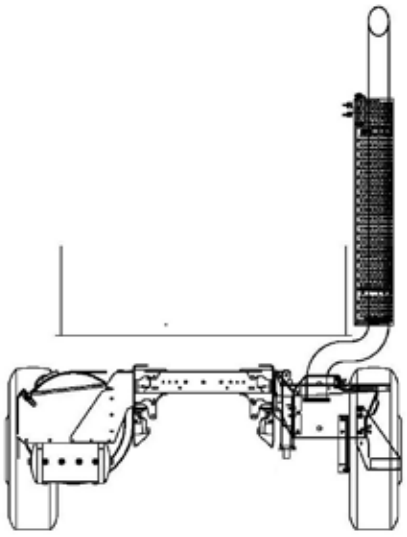
Model	Cab Configuration	Tailpipe Configuration	Dimension A DPF to BOC (in.)
T270/T370	Day Cab	Single RH SOC	5.8[1]

22" Fuel Tank			Rectangular Fuel Tank		
Gallons	Tank Length (in.)	Dim. F Day Cab BOC to End of Fuel Tank (in.)	Gallons	Tank Length (in.)	Dim. F Day Cab BOC to End of Fuel Tank (in.)
56	35.5	44.8	50	30.5	40.8
75	47.3	56.6			

[1] Refer to Figure 3-4.12 for tailpipe BOC dimensions.

D2A—Use with the following models: T270/T370





DPF Location: RH Under Cab
Battery Box: Cantilever LH BOC
Fuel Tank: LH Under Cab

TABLE 3-13. D2A

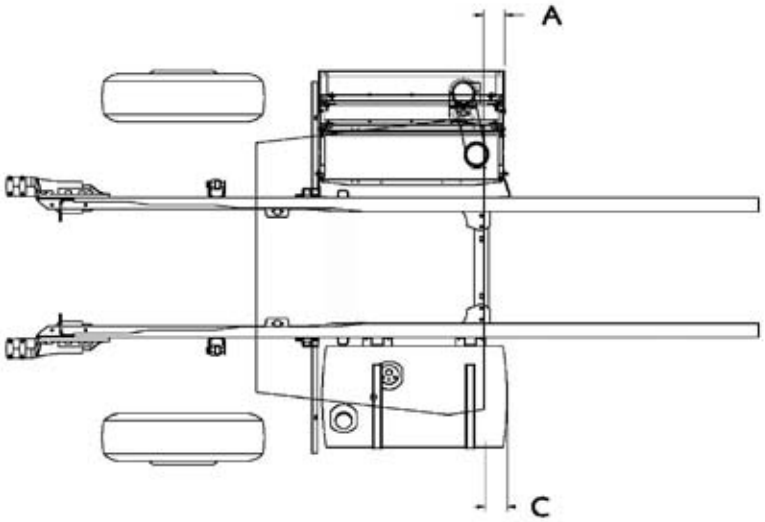
Model	Cab Configuration	Tailpipe Configuration	Dimension A DPF to BOC (in.)
T270/T370	Day Cab	Single RH SOC	5.8[1]

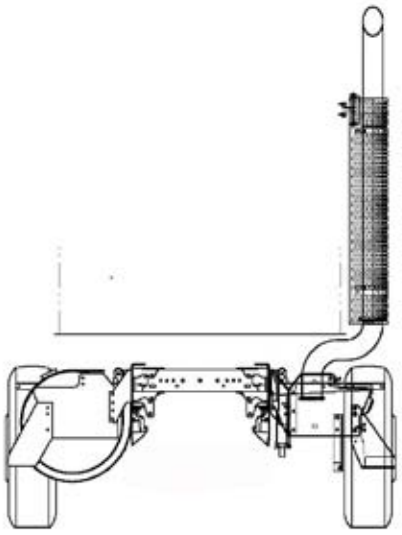
22" Fuel Tank		
Gallons	**Tank Length (in.)**	**Dim. C Day Cab BOC to Batt. Box (in.)**
56	35.5	32.0
75	47.3	37.0

[1] Refer to Figure 3-4.12 for tailpipe BOC dimensions.

Section 3
Dimensions

D3A—Use with the following models: T270/T370





DPF Location: RH Under Cab
Battery Box: In Cab or Temporary
Fuel Tank: LH Under Cab

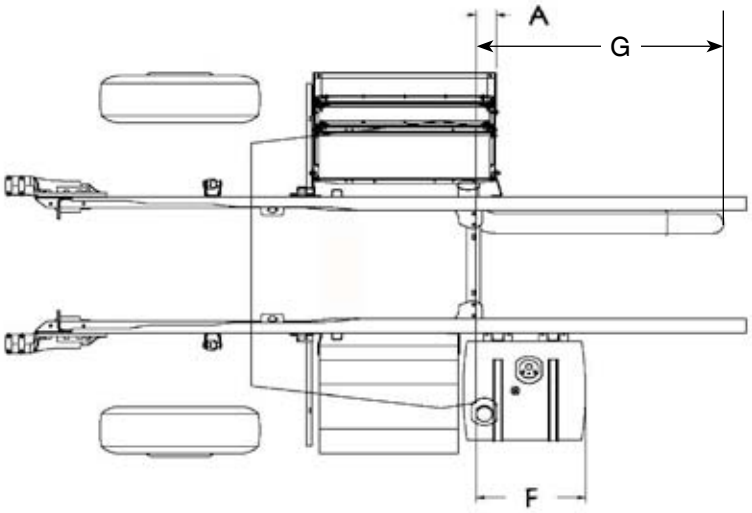
TABLE 3-15. D3A

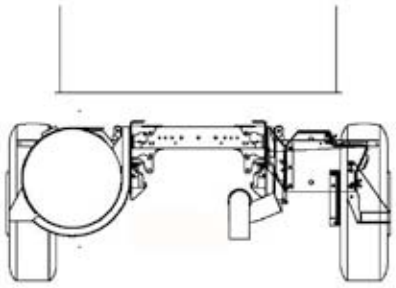
Model	Cab Configuration	Tailpipe Configuration	Dimension A DPF to BOC (in.)
T270/T370	Day Cab	Single RH SOC	5.8[2]

22" Fuel Tank		
Gallons	**Tank Length (in.)**	**Dim. C Day Cab BOC to End of Fuel Tank (in.)**
56 [1]	35.5	0.3
75	47.3	12.1

[1] Maximum fuel tank to match dimension "A".
[2] Refer to Figure 3-4.12 for tailpipe BOC dimensions.

D7—Use with the following models: T270/T370





DPF Location: RH Under Cab
Battery Box: LH Under Cab
Fuel Tank: LH BOC

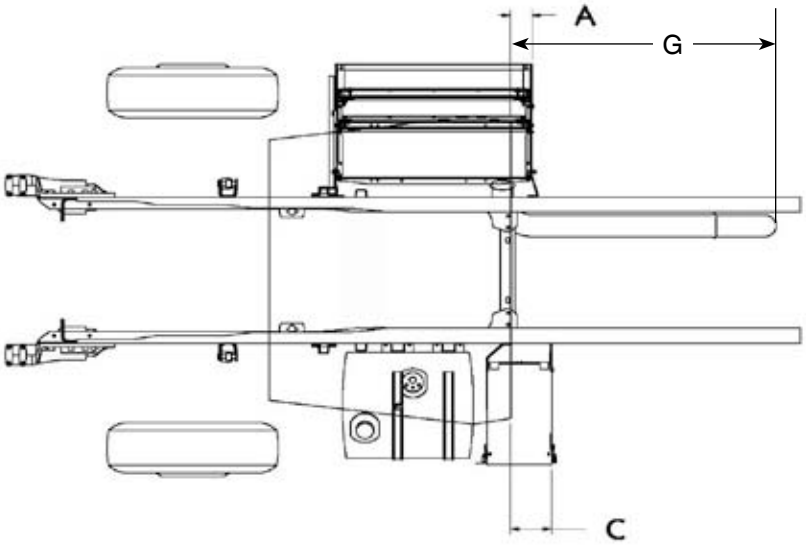
TABLE 3-17. D7

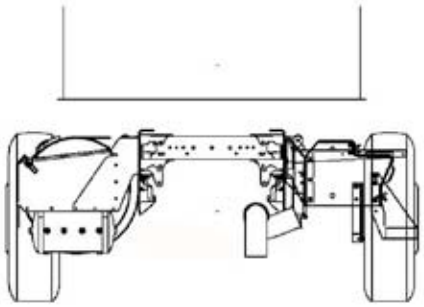
Model	Cab Configuration	Tailpipe Configuration	Dimension A DPF to BOC (in.)	Dimension G Rear of Tailpipe to BOC (in.)
T270/T370	Day Cab	Horizontal	5.8	44.3

22" Fuel Tank			Rectangular Fuel Tank		
Gallons	Tank Length (in.)	Dim. F Day Cab BOC to End of Fuel Tank (in.)	Gallons	Tank Length (in.)	Dim. F Day Cab BOC to End of Fuel Tank (in.)
56	35.5	46.6	50	30.5	41.5
75	47.3	58.4			

Wheelbase Restrictions		
Axle Spacing (in.)	Brakes	Minimum Wheelbase (in.)
52	Air	171
54	Air	172
Single	Air	145
Single	Hydraulic	140

D8—Use with the following models: T270/T370





DPF Location: RH Under Cab
Battery Box: Cantilever LH BOC
Fuel Tank: LH Under Cab

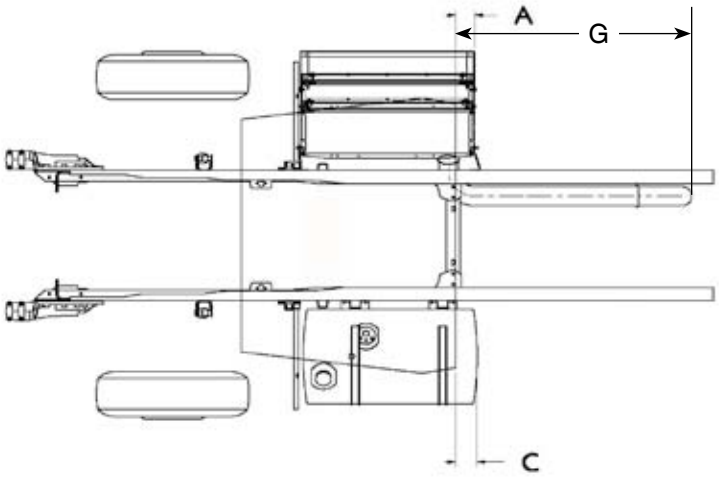
TABLE 3-18. D8

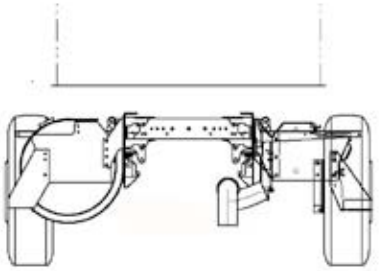
Model	Cab Configuration	Tailpipe Configuration	Dimension A DPF to BOC (in.)	Dimension G Rear of Tailpipe to BOC (in.)
T270/T370	Day Cab	Horizontal	5.8	44.3

22” Fuel Tank		
Gallons	**Tank Length (in.)**	**Dim. C Day Cab BOC to Batt. Box (in.)**
56	35.5	32
75	47.3	37.0

Wheelbase Restrictions		
Axle Spacing (in.)	Brakes	Minimum Wheelbase (in.)
52	Air	171
54	Air	172
Single	Air	145
Single	Hydraulic	140

D9—Use with the following models: T270/T370





DPF Location: RH Under Cab
Battery Box: In Cab or Temporary
Fuel Tank: LH Under Cab

TABLE 3-19. D9

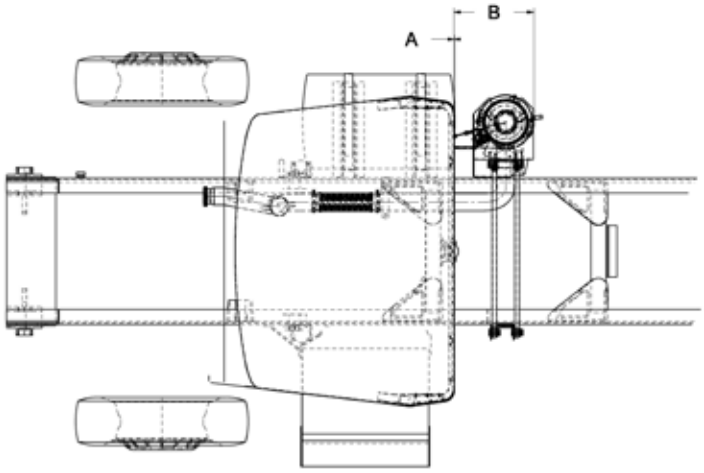
Model	Cab Configuration	Tailpipe Configuration	Dimension A DPF to BOC (in.)	Dimension G Rear of Tailpipe to BOC (in.)
T270/T370	Day Cab	Horizontal	5.8	44.3

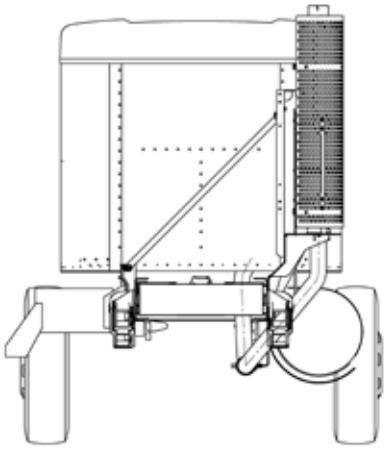
22" Fuel Tank		
Gallons	**Tank Length (in.)**	**Dim. C Day Cab BOC to End of Fuel Tank (in.)**
56 [2]	35.5	0.3
75	47.3	12.1

Wheelbase Restrictions		
Axle Spacing (in.)	Brakes	Minimum Wheelbase (in.)
52	Air	171
54	Air	172
Single	Air	145
Single	Hydraulic	140

[2] Maximum fuel tank to match dimension "A".

D10—Use with the following models: T270/T370





DPF Location: RH Vertical BOC
Battery Box: LH Under Cab
Fuel Tank: RH Under Cab

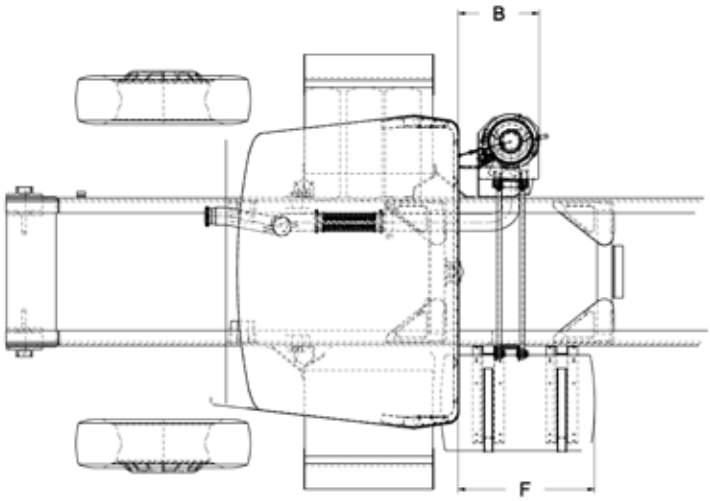
TABLE 3-20. D10

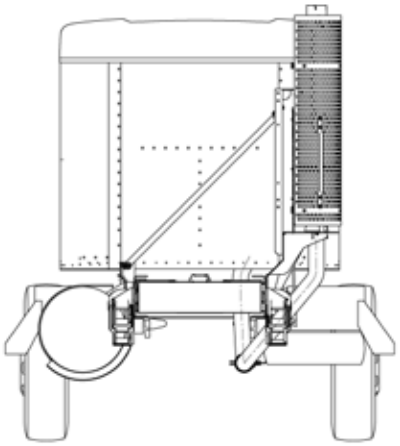
Model	Cab Configuration	Tailpipe Configuration	Dimension B Max from BOC (in.)
T270/T370	Day Cab	Vertical	19.6[2]

22" Fuel Tank			Rectangular Fuel Tank		
Gallons	Tank Length (in.)	Dim. A Day Cab BOC (in.)	Gallons	Tank Length (in.)	Dim. A Day Cab BOC (in.)
40	25.6	-9.6	50	33.5	-1.64
56 [1]	35.5	0.3			

[1] Maximum day cab fuel tank to match dimension "B".
[2] Refer to Figure 3-4.14 for DPF to BOC dimensions.

D11—Use with the following models: T270/T370





DPF Location: RH Vertical BOC
Battery Box: LH Under Cab
Toolbox: RH Under Cab
Fuel Tank: BOC

TABLE 3-21. D11

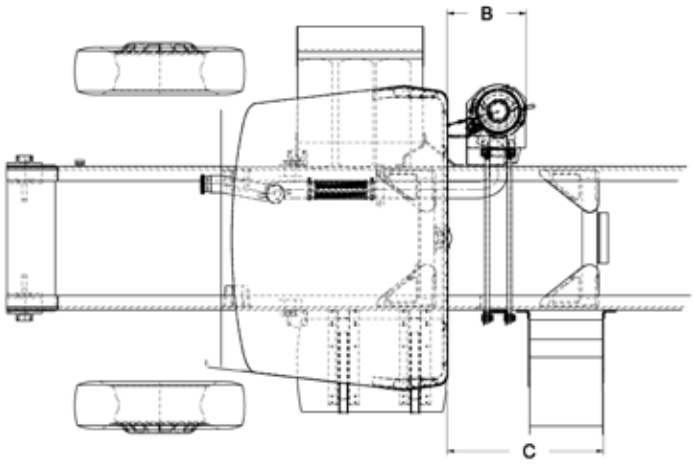
Model	Cab Configuration	Tailpipe Configuration	Dimension B Max from BOC (in.)
T270/T370	Day Cab	Vertical	19.6[1]

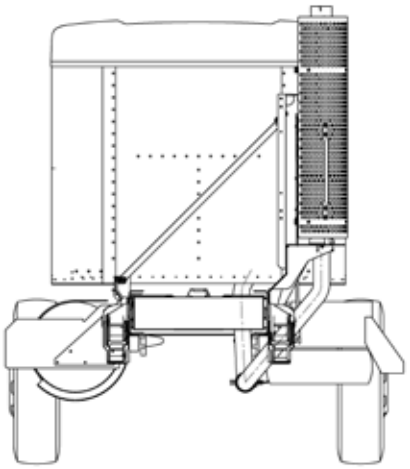
22" Fuel Tank			Rectangular Fuel Tank		
Gallons	Tank Length (in.)	Dim. F Day Cab BOC to End of Fuel Tank	Gallons	Tank Length (in.)	Dim. F Day Cab BOC to End of Fuel Tank
56	35.5	44.8	50	30.5	40.8
75	47.3	56.6			

[1] Refer to Figure 3-4.14 for DPF to BOC dimensions.

Section 3
Dimensions

D12—Use with the following models: T270/T370





DPF Location: RH Vertical BOC
Battery Box: Cantilever LH BOC
Toolbox: RH Under Cab
Fuel Tank: LH Under Cab

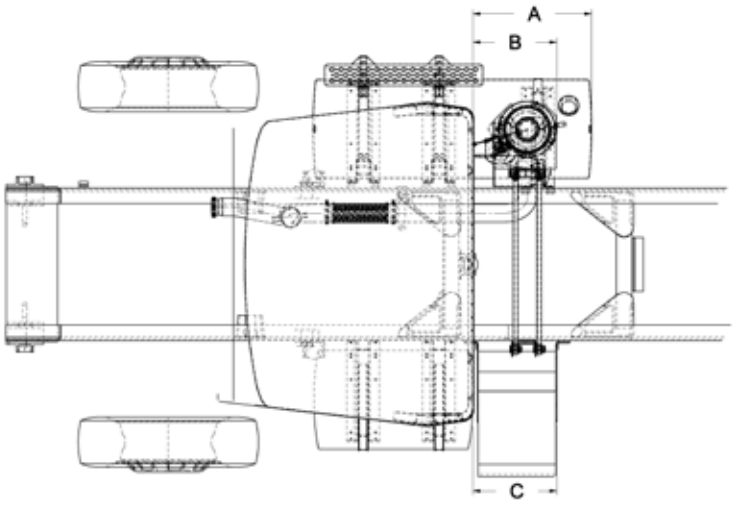
TABLE 3-22. D12

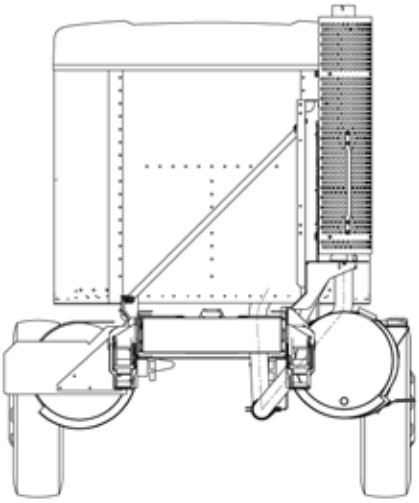
Model	Cab Configuration	Tailpipe Configuration	Dimension B Max from BOC (in.)
T270/T370	Day Cab	Vertical	19.6[2]

22" Fuel Tank		
Gallons	**Tank Length (in.)**	**Dim. C Day Cab BOC to Batt. Box (in.)**
56[1]	35.5	37.0
75	47.3	37.0

[1] Maximum day cab fuel tank to match dimension "B".
[2] Refer to Figure 3-4.14 for DPF to BOC dimensions.

D13—Use with the following models: T270/T370





DPF Location: RH Vertical BOC
Battery Box: Cantilever LH BOC
Fuel Tank: LH Under Cab
RH Under Cab

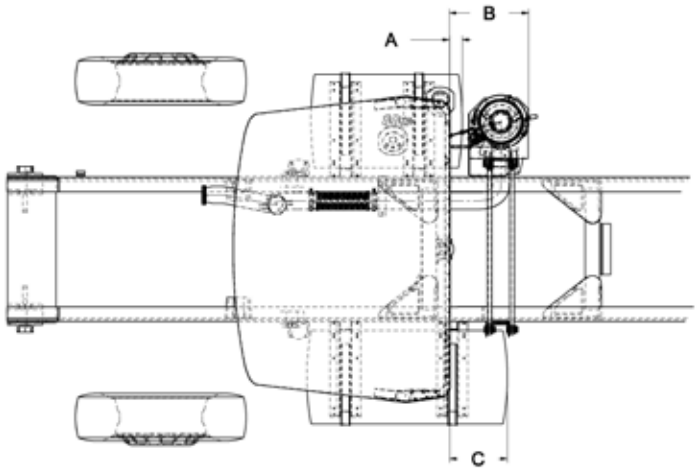
TABLE 3-23. D13

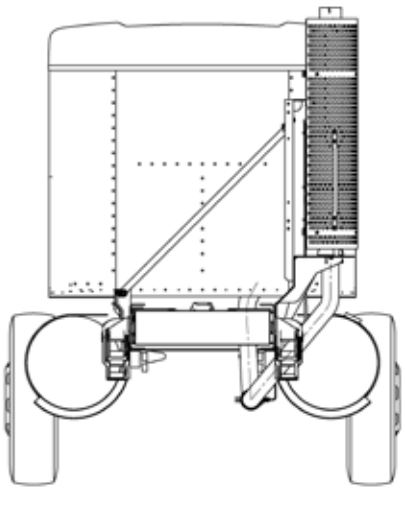
Model	Cab Configuration	Tailpipe Configuration	Dimension B DPF to BOC (in.)
T270/T370	Day Cab	Vertical	19.6[3]

22" Fuel Tank				Rectangular Fuel Tank		
Gallons	Tank Length (in.)	Dim. A Day Cab BOC (in.)	Dim. C Day Cab BOC to Batt. Box (in.)	Gallons	Tank Length (in.)	Dim. A Day Cab BOC (in.)
40 (RH Under only)	25.6	-9.6	N/A	50 (RH Under only)	33.5	-1.6
56[1]	35.5	0.3	37.0			
75[2]	47.3	12.1	37.0			
100 (RH Under only)	62.2	27.0	N/A			
120 (RH Under only)	74.2	39.0	N/A			

[1] Maximum LH fuel tank to match dimension "B".
[2] Maximum RH fuel tank to match dimension "B".
[3] Refer to Figure 3-4.14 for DPF to BOC dimensions.

D14—Use with the following models: T270/T370





DPF Location: RH Vertical BOC
Battery Box: In Cab or Temporary
Fuel Tank: LH Under Cab
RH Under Cab

TABLE 3-24. D14

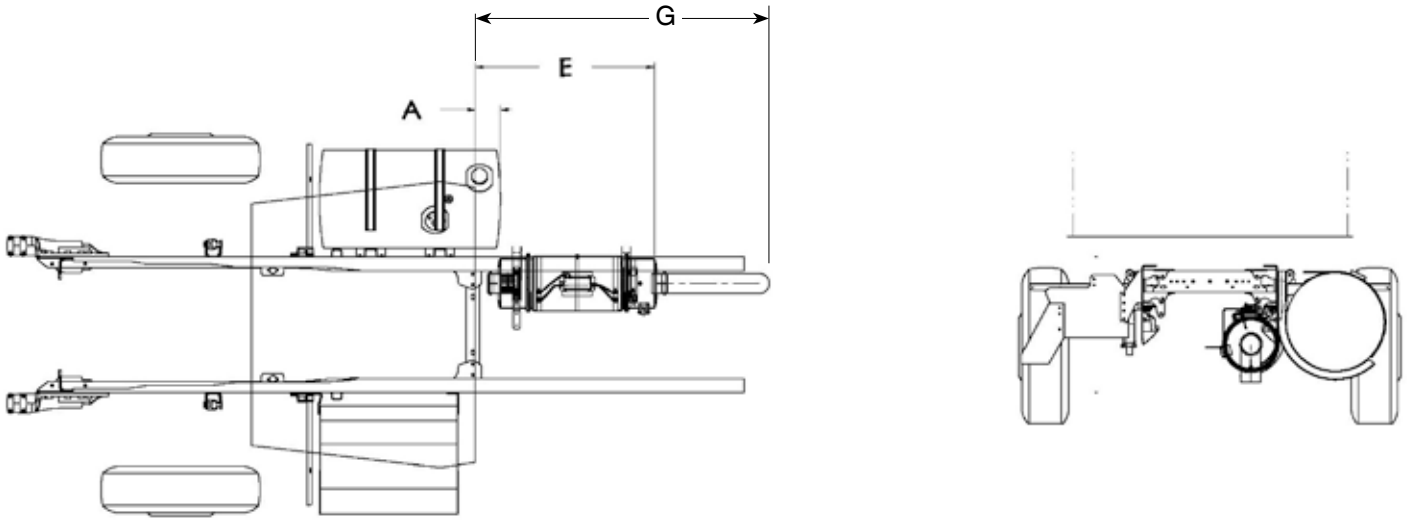
Model	Cab Configuration	Tailpipe Configuration	Dimension B DPF to BOC (in.)
T270/T370	Day Cab	Vertical	19.6[3]

22" Fuel Tank			Rectangular Fuel Tank, RH Under only		
Gallons	Tank Length (in.)	Dim. A & C Day Cab BOC to Fuel tank (in.)	Gallons	Tank Length (in.)	Dim. A Day Cab BOC to Fuel tank (in.)
40 (RH Under only)	25.6	-9.6	50 (RH Under only)	33.5	-1.6
56[1]	35.5	0.3			
75[2]	47.3	12.1			
100 (RH Under only)	62.2	27.0			
120 (RH Under only)	74.2	39.0			

[1] Maximum RH fuel tank to match dimension "B".
[2] Maximum LH fuel tank to match dimension "B".
[3] Refer to Figure 3-4.14 for DPF to BOC dimensions.

Section 3
Dimensions

D15—Use with the following models: T270/T370



DPF Location: Right Hand Horizontal BOC
Battery Box: LH Under Cab
Fuel Tank: RH Under Cab

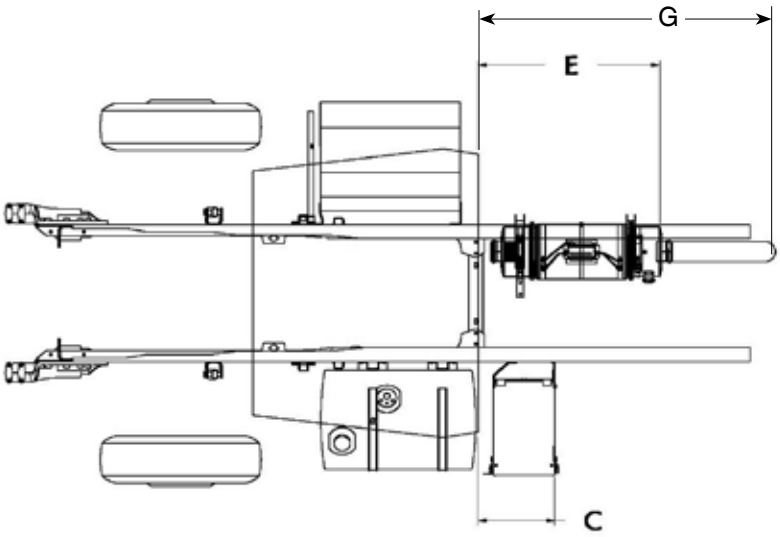
TABLE 3-25. D15

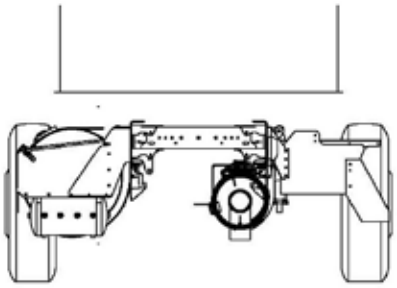
Model	Cab Configuration	Tailpipe Configuration	Dimension E Rear of DPF to BOC (in.)	Dimension G Rear of Tailpipe to BOC (in.)
T270/T370	Day Cab	Horizontal	40.2	79.0

22" Fuel Tank			Rectangular Fuel Tank		
Gallons	Tank Length (in.)	Dim. A Day Cab BOC (in.)	Gallons	Tank Length (in.)	Dim. A Day Cab BOC (in.)
40	25.6	-9.6	50	33.5	-1.7
56	35.5	0.3			
75	47.3	12.1			
100	62.2	27.0			
120	74.2	39.0			

Wheelbase Restrictions		
Axle Spacing (in.)	Brakes	Minimum Wheelbase (in.)
52	Air	202
54	Air	203
Single	Air	176
Single	Hydraulic	176

D16—Use with the following models: T270/T370





DPF Location: Right Hand Horizontal BOC
Battery Box: Cantilever LH BOC
Toolbox: RH Under Cab
Fuel Tank: LH Under Cab

TABLE 3-26. D16

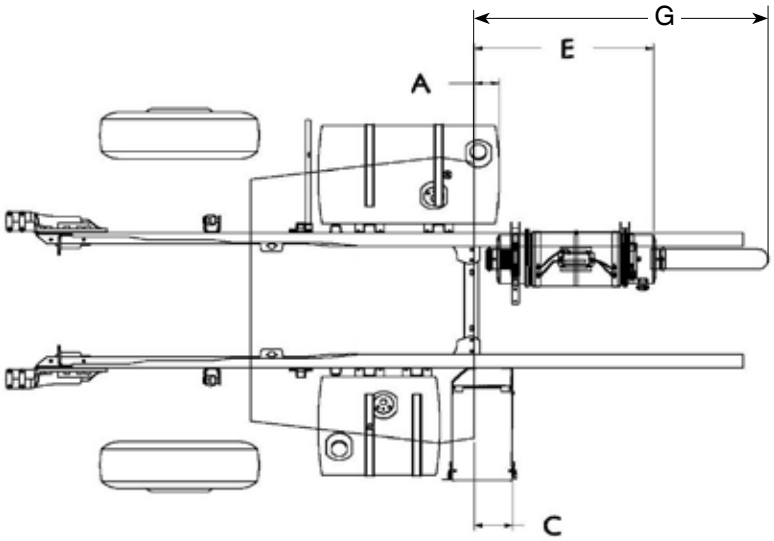
Model	Cab Configuration	Tailpipe Configuration	Dimension E Rear of DPF to BOC (in.)	Dimension G Rear of Tailpipe to BOC (in.)
T270/T370	Day Cab	Horizontal	40.2	79.0

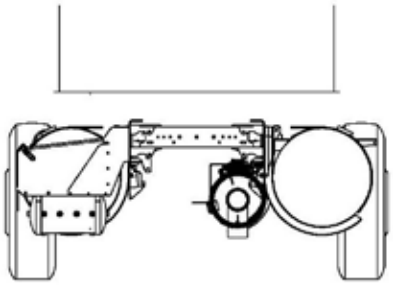
22” Fuel Tank		
Gallons	**Tank Length (in.)**	**Dim. C Day Cab BOC to Batt. Box (in.)**
56	35.5	32.0
75	47.3	37.0

Wheelbase Restrictions		
Axle Spacing (in.)	Brakes	Minimum Wheelbase (in.)
52	Air	202
54	Air	203
Single	Air	176
Single	Hydraulic	176

Section 3
Dimensions

D17—Use with the following models: T270/T370





DPF Location: Right Hand Horizontal BOC
Battery Box: Cantilever LH BOC
Fuel Tank: LH Under Cab
RH Under Cab

TABLE 3-27. D17

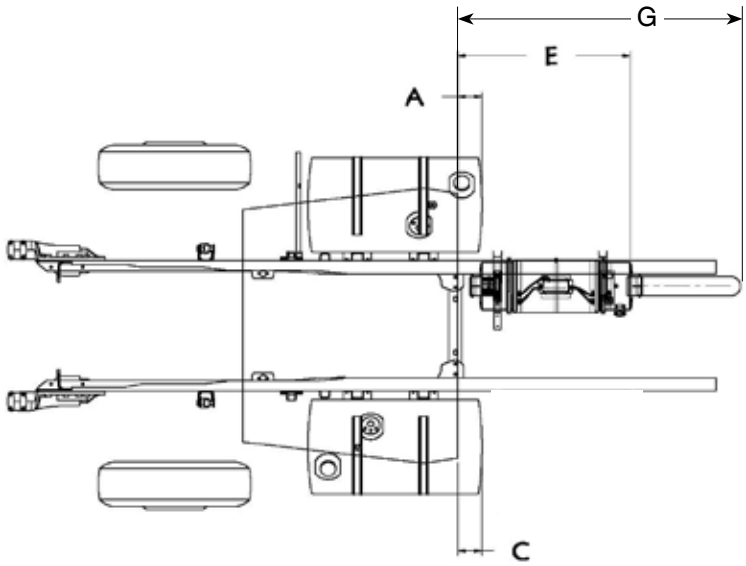
Model	Cab Configuration	Tailpipe Configuration	Dimension E Rear of DPF to BOC (in.)	Dimension G Rear of Tailpipe to BOC (in.)
T270/T370	Day Cab	Horizontal	40.2	79.0

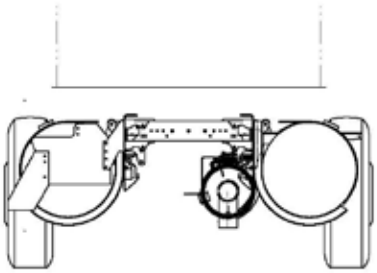
22" Fuel Tank				Rectangular Fuel Tank (RH only)		
Gallons	Tank Length (in.)	Dim. A Day Cab BOC to Fuel tank (in.)	Dim. C Day Cab BOC to Batt. Box (in.)	Gallons	Tank Length (in.)	Dim. A Day Cab BOC to Fuel tank (in.)
40 (RH Under only)	25.6	-9.6	N/A	50 (RH Under only)	33.5	-1.7
56	35.5	0.3	32.0			
75	47.3	12.1	37.0			
100 (RH Under only)	62.2	27.0	N/A			
120 (RH Under only)	74.2	39.0	N/A			

Wheelbase Restrictions		
Axle Spacing (in.)	Brakes	Minimum Wheelbase (in.)
52	Air	202
54	Air	203
Single	Air	176
Single	Hydraulic	176

Section 3
Dimensions

D18—Use with the following models: T270/T370





DPF Location: Right Hand Horizontal BOC
Battery Box: In Cab or Temporary
Fuel Tank: LH Under Cab
RH Under Cab

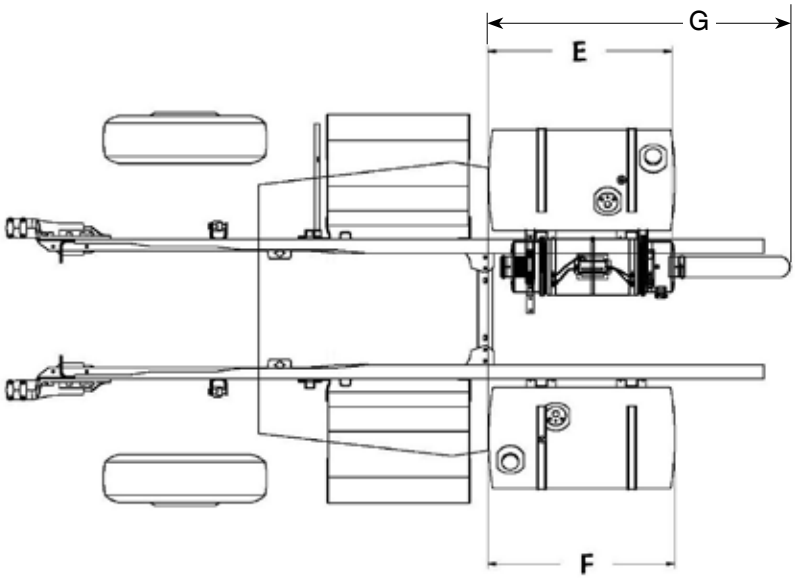
TABLE 3-28. D18

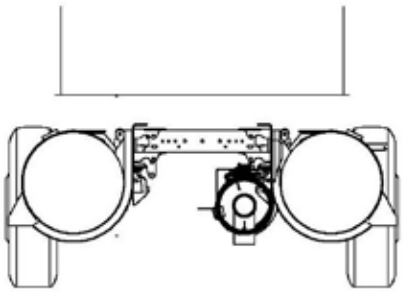
Model	Cab Configuration	Tailpipe Configuration	Dimension E Rear of DPF to BOC (in.)	Dimension G Rear of Tailpipe to BOC (in.)
T270/T370	Day Cab	Horizontal	40.2	79.0

22" Fuel Tank			Rectangular Fuel Tank (RH only)		
Gallons	Tank Length (in.)	Dim. A & C Day Cab BOC to Fuel tank (in.)	Gallons	Tank Length (in.)	Dim. A Day Cab BOC to Fuel tank (in.)
40 (RH Under only)	25.6	-9.6	50 (RH Under only)	33.5	-1.7
56	35.5	0.3			
75	47.3	12.1			
100 (RH Under only)	62.2	27.0			
120 (RH Under only)	74.2	39.0			

Wheelbase Restrictions		
Axle Spacing (in.)	Brakes	Minimum Wheelbase (in.)
52	Air	202
54	Air	203
Single	Air	176
Single	Hydraulic	176

D19—Use with the following models: T270/T370





DPF Location: Right Hand Horizontal/BOC
Battery Box: LH Under Cab
Toolbox: RH Under Cab
Fuel Tank: LH and RH BOC

TABLE 3-29. D19

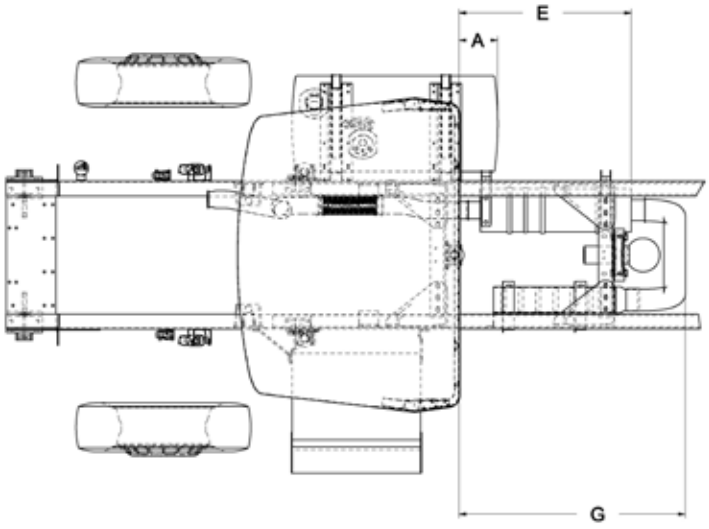
Model	Cab Configuration	Tailpipe Configuration	Dimension E Rear of DPF to BOC (in.)	Dimension G Rear of Tailpipe to BOC (in.)
T270/T370	Day Cab	Horizontal	40.2	79.0

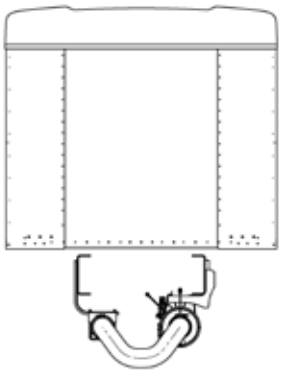
22" Fuel Tank			Rectangular Fuel Tank		
Gallons	Tank Length (in.)	Dim. F Day Cab BOC to End of Fuel tank (in.)	Gallons	Tank Length (in.)	Dim. F Day Cab BOC to End of Fuel tank (in.)
56	35.5	44.8	50 (LH BOC only)	30.5	39.8
75	47.3	56.6			
100 (RH BOC only)	62.2	71.5			

Wheelbase Restrictions		
Axle Spacing (in.)	Brakes	Minimum Wheelbase (in.)
52	Air	202
54	Air	203
Single	Air	176
Single	Hydraulic	176

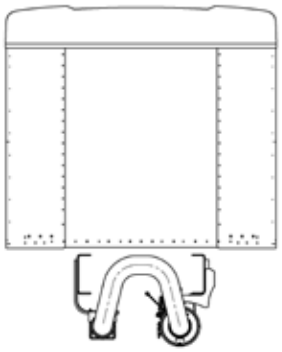
Section 3
Dimensions

D20—Use with the following models: T270/T370





Rear View
Under Driveline



Rear View
Over Driveline

DPF Location: Right Hand Horizontal Back of Cab (BOC)
Battery Box: LH Under Cab
Fuel Tank(s): RH Under Cab

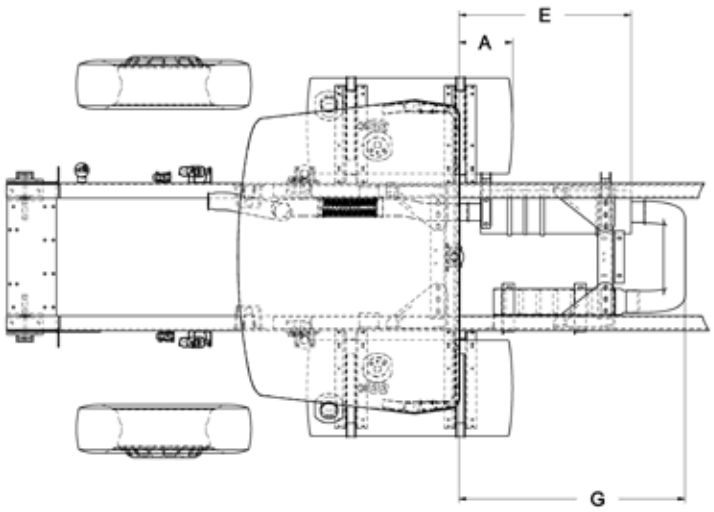
TABLE 3-30. D20

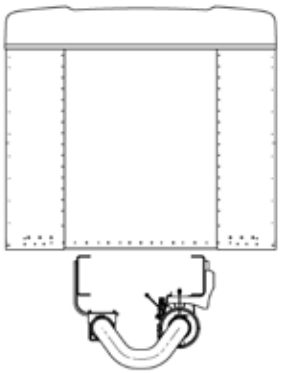
Model	Cab Configuration	Tail Pipe Configuration	Dimension E Rear of DPF to BOC (in.)	Dimension G Rear of Tail Pipe to BOC (in.)	Exhaust Cross over pipe
T270/370	Day Cab	Horizontal	40.2	52.1	Under Driveline
T270/370	Day Cab	Horizontal	40.2	51.8	Over Driveline

22" Round Fuel Tank			Rectangular Fuel Tank		
Gallons	Tank Length (in.)	Dim. A Day Cab BOC (in.)	Gallons	Tank length (in.)	Dim. A Day Cab BOC (in.)
40	25.6	-9.6	50.0	33.5	-1.7
56	35.5	0.3			
75	47.3	12.1			
100	62.2	27.0			
120	74.2	39.0			

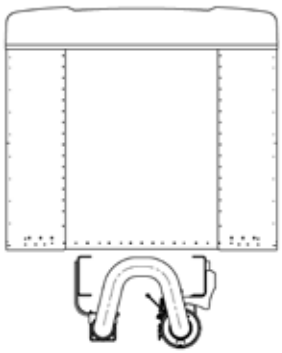
Wheelbase Restrictions			
Axle Spacing (in.)	**Brakes**	**Wheelbase (in.)**	**Exhaust Cross over pipe**
Single	Hydraulic	140	Under Driveline
Single	Hydraulic	152, 176, 188, 206, 218, 236, 245, 254, 260, 272	Over Driveline
Single	Air	150 or greater	

D23—Use with the following models: T270/T370





Rear View
Under Driveline



Rear View
Over Driveline

DPF Location: Right Hand Horizontal Back of Cab (BOC)
Battery Box: In Cab or Temporary
Fuel Tank(s): LH and RH Under Cab

TABLE 3-33. D23

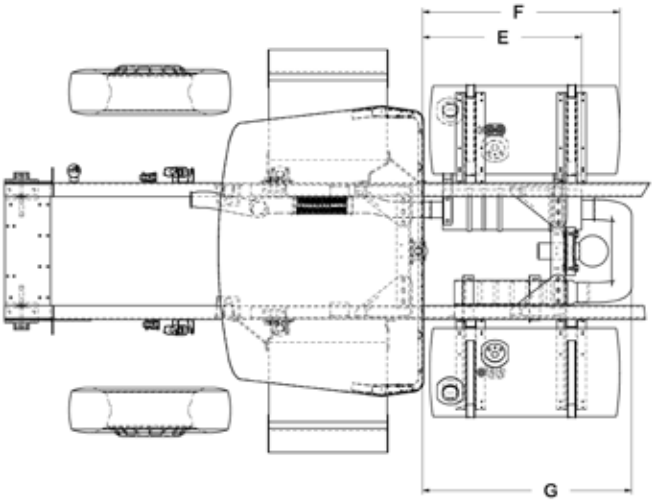
Model	Cab Configuration	Tail Pipe Configuration	Dimension E Rear of DPF to BOC (in.)	Dimension G Rear of Tail Pipe to BOC (in.)	Exhaust Cross over pipe
T270/370	Day Cab	Horizontal	40.2	52.1	Under Driveline
T270/370	Day Cab	Horizontal	40.2	51.8	Over Driveline

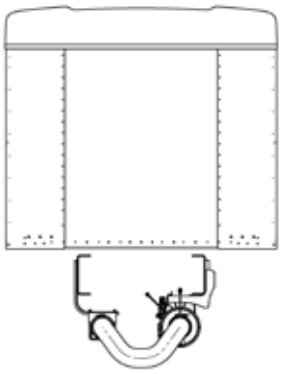
22" Round Fuel Tank			Rectangular Fuel Tank		
Gallons	Tank Length (in.)	Dim. A Day Cab BOC to Fuel Tank (in.)	Gallons	Tank length (in.)	Dim. A Day Cab BOC (in.)
40 (RH Under Only)	25.6	-9.6	50.0	33.5	-1.7
56	35.5	0.3			
75	47.3	12.1			
100 (RH Under Only)	62.2	27.0			
120 (RH Under Only)	74.2	39.0			

Wheelbase Restrictions			
Axle Spacing (in.)	Brakes	Wheelbase (in.)	Exhaust Cross over pipe
Single	Hydraulic	140	Under Driveline
Single	Hydraulic	152, 176, 188, 206, 218, 236, 245, 254, 260, 272	Over Driveline
Single	Air	150 or greater	

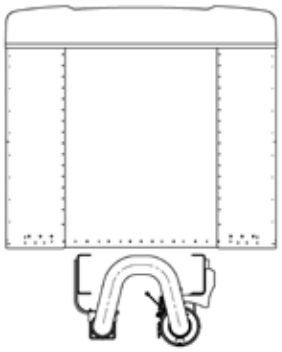
Section 3
Dimensions

D24—Use with the following models: T270/T370





Rear View
Under Driveline



Rear View
Over Driveline

DPF Location: Right Hand Horizontal Back of Cab (BOC)
Battery Box: LH Under Cab
Fuel Tank(s): LH and RH Back of Cab
Toolbox: RH Under Cab

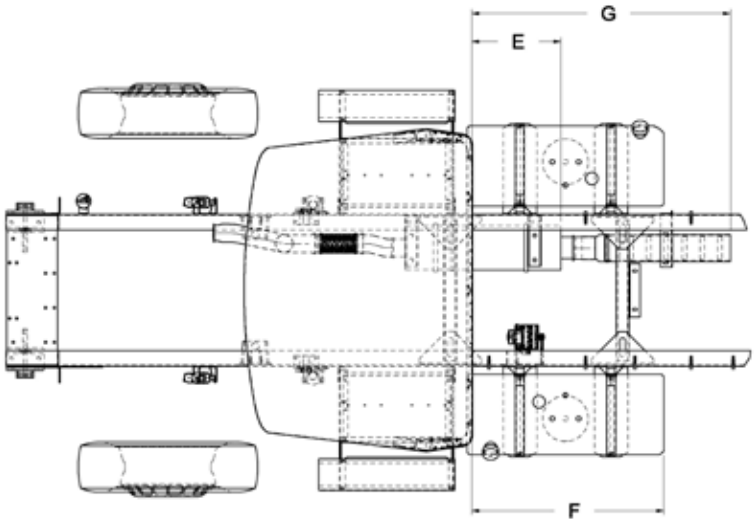
TABLE 3-34. D24

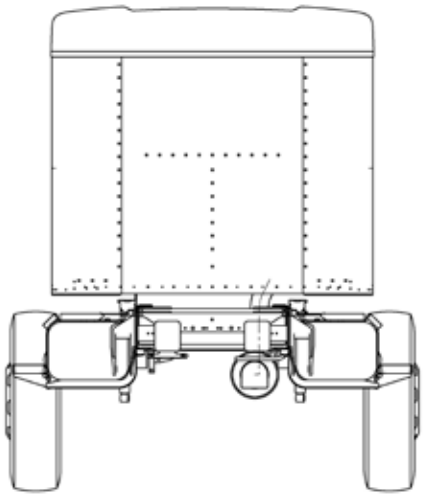
Model	Cab Configuration	Tail Pipe Configuration	Dimension E Rear of DPF to BOC (in.)	Dimension G Rear of Tail Pipe to BOC (in.)	Exhaust Cross over pipe
T270/370	Day Cab	Horizontal	40.2	52.1	Under Driveline
T270/370	Day Cab	Horizontal	40.2	51.8	Over Driveline

22" Round Fuel Tank			Rectangular Fuel Tank		
Gallons	Tank Length (in.)	Dim. F Day Cab BOC to End of Fuel Tank (in.)	Gallons	Tank length (in.)	Dim. F Day Cab BOC to End of Fuel Tank (in.)
56	35.5	44.8	50 (LH BOC only)	30.5	39.8
75	47.3	56.6			
100 (RH BOC Only)	62.2	71.5			

Wheelbase Restrictions			
Axle Spacing (in.)	Brakes	Wheelbase (in.)	Exhaust Cross over pipe
Single	Hydraulic	140	Under Driveline
Single	Hydraulic	152, 176, 188, 206, 218, 236, 245, 254, 260, 272	Over Driveline
Single	Air	150 or greater	

D25—Use with the following models: T170





DPF Location: Right Hand Horizontal Back of Cab (BOC)
Battery Box: LH Under Cab
Fuel Tank(s); LH or RH or both BOC
Cab Access Step: RH Under Cab

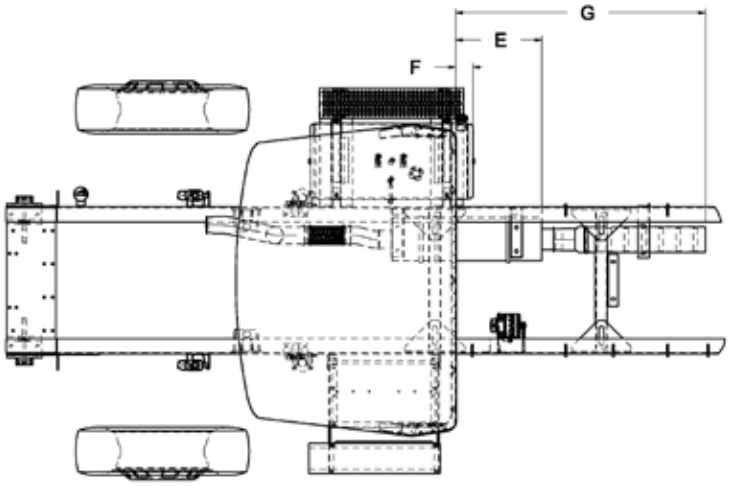
TABLE 3-35. D25

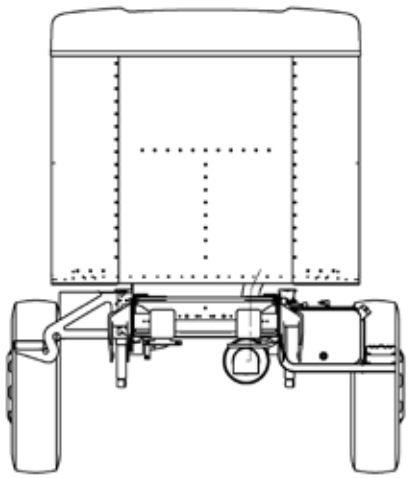
Model	Cab Configuration	Tail Pipe Configuration	Dimension E Rear of DPF to BOC (in.)	Dimension G Rear of Tail Pipe to BOC (in.)
T170	Day Cab	Horizontal	20.0	57.9

Rectangular Fuel Tank			
Gallons	Tank Length (in.)	Wheelbase (in_)	Dimension F Day Cab BOC to End of Fuel Tank (in.) [1]
35.0	43.7	152	52.2
		176	68.8
		188	81.4
		206	101.8
		218	112.9
		236	123.9
		245	123.9

[1] Applies to LH and/or RH BOC

D26/D27—Use with the following models: T170





DPF Location: Right Hand Horizontal Back of Cab
Battery Box: LH Under Cab, or In Cab
Fuel Tank(s); RH Under only or LH and RH Under cab

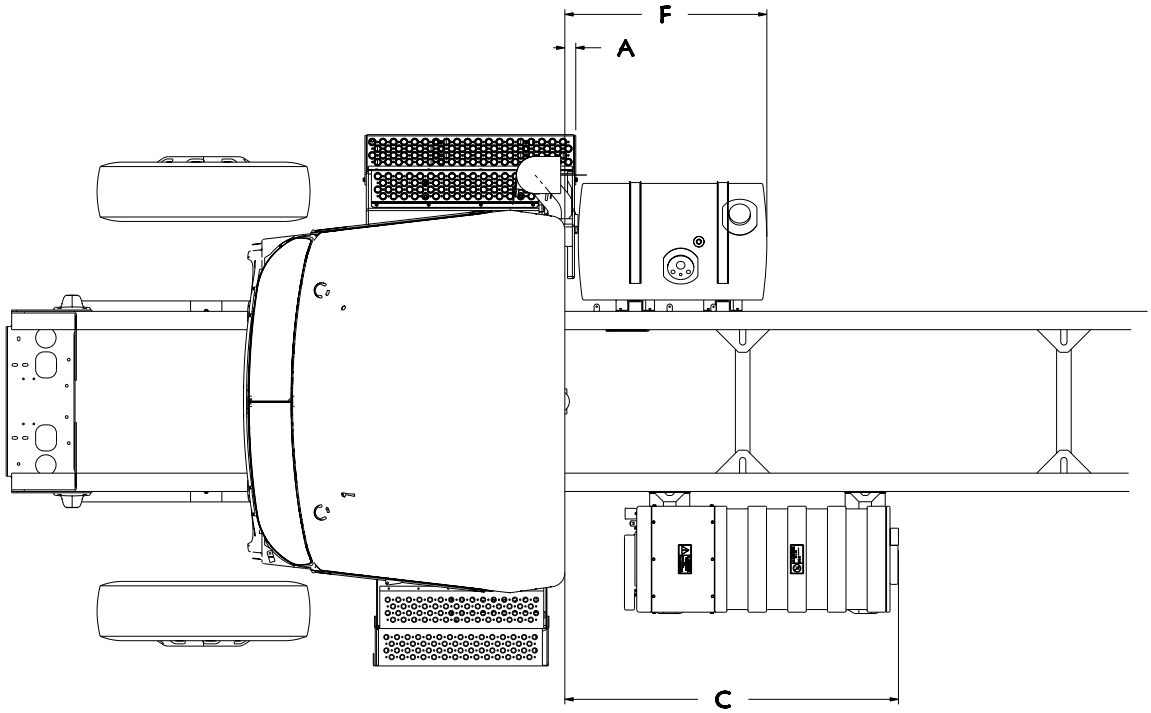
TABLE 3-36. D26 (shown), D27

Model	Cab Configuration	Tail Pipe Configuration	Dimension E Rear of DPF to BOC (in.)	Dimension G Rear of Tail Pipe to BOC (in.)
T170	Day Cab	Horizontal	20.0	57.9

Rectangular Fuel Tank	
Gallons	Dimension F Day Cab BOC to End of Fuel Tank (in.) [1]
30.0	4.0

[1] Applies to RH under only and LH and RH under cab

H1 - Use with the following models: T270/370 Hybrid



DPF Location: RH Under Cab
Hybrid Battery Box: LH Under Cab
Fuel Tank: BOC, RH
PEC: LH BOC

TABLE H1

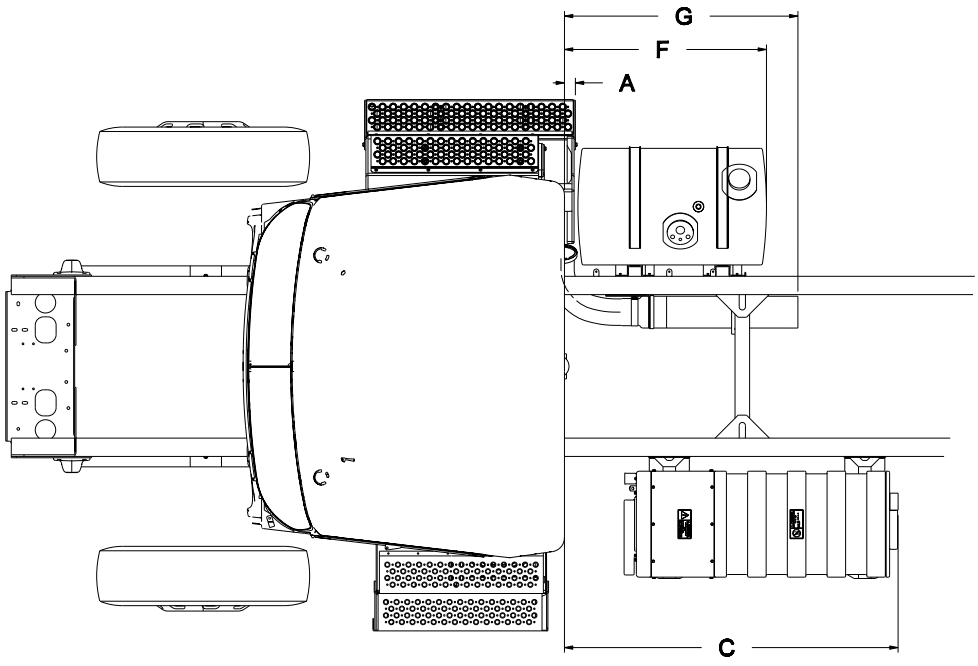
Model	Cab Configuration	Tailpipe Configuration	Dimension A DPF to BOC (in.)
T270/T370	Day Cab	Single RH SOC	5.8[1]

22" Fuel Tank			Rectangular Fuel Tank		
Gallons	Tank Length (in.)	Dim. F Day Cab BOC to End of Fuel Tank (in.)	Gallons	Tank Length (in.)	Dim. F Day Cab BOC to End of Fuel Tank (in.)
56	35.5	44.8	50	30.5	40.8
75	47.3	56.6			

[1] Refer to Figure 3-4.12 for tailpipe BOC dimensions.

PEC		
Wheelbase (in.)	PEC Length (in.)	Dim. C BOC to End of PEC (in.)
153-185	51.6	63.1
186-260		68.6
261-280		63.1
281-315		68.6

H2 - Use with the following models: T270/370 Hybrid



DPF Location: RH Under Cab
Hybrid Battery Box: LH Under Cab
Fuel Tank: BOC, RH
PEC: LH BOC

TABLE H2

Model	Cab Configuration	Tailpipe Configuration	Dimension A DPF to BOC (in.)	Dimension G Rear of Tailpipe to BOC (in.)
T270/T370	Day Cab	Horizontal	5.8	44.3

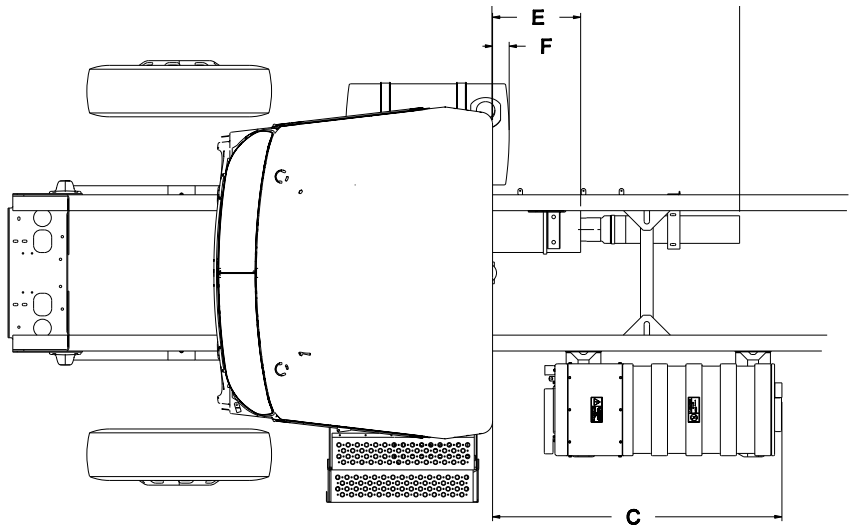
22" Fuel Tank			Rectangular Fuel Tank		
Gallons	Tank Length (in.)	Dim. F Day Cab BOC to End of Fuel Tank (in.)	Gallons	Tank Length (in.)	Dim. F Day Cab BOC to End of Fuel Tank (in.)
56	35.5	46.6	50	30.5	41.5
75	47.3	58.4			

[1] Refer to Figure 3-4.12 for tailpipe BOC dimensions.

PEC		
Wheelbase (in.)	PEC Length (in.)	Dim. C BOC to End of PEC (in.)
153-185	51.6	63.1
186-260		68.6
261-280		63.1
281-315		68.6

Section 3
Dimensions

H3—Use with the following models: T270/T370 Hybrid



DPF Location: Right Hand Horizontal BOC
Hybrid Battery Box: LH Under Cab
Fuel Tank: RH Under Cab
PEC Locaton: LH Behind Cab

TABLE H3

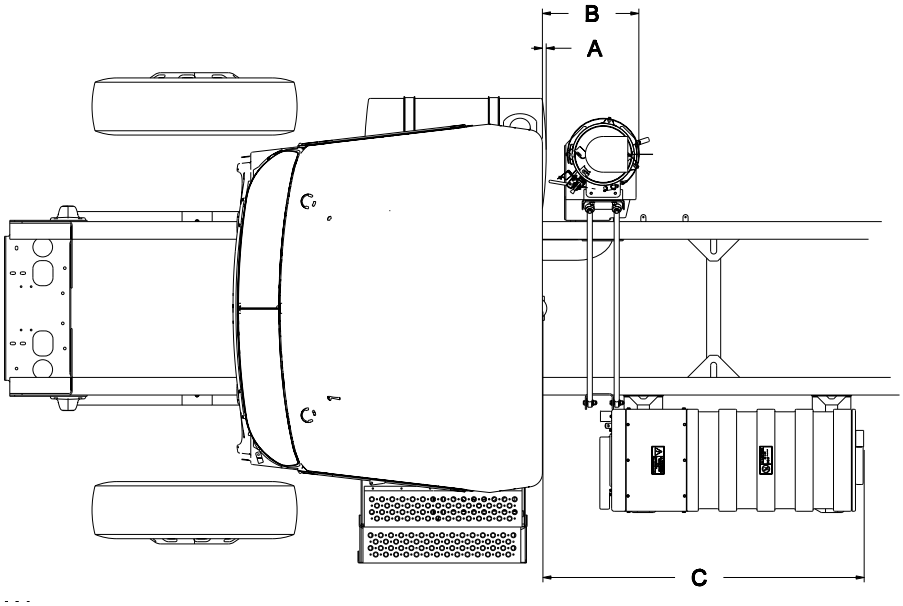
Model	Cab Configuration	Tailpipe Configuration	Dimension E Rear of DPF to BOC (in.)	Dimension G Rear of Tailpipe to BOC (in.)
T270/T370	Day Cab	Horizontal	40.2	79.0

22" Fuel Tank			Rectangular Fuel Tank		
Gallons	Tank Length (in.)	Dim. A Day Cab BOC (in.)	Gallons	Tank Length (in.)	Dim. A Day Cab BOC (in.)
40	25.6	-9.6	50	33.5	-1.7
56	35.5	0.3			
75	47.3	12.1			
100	62.2	27.0			
120	74.2	39.0			

Wheelbase Restrictions		
Axle Spacing (in.)	Brakes	Minimum Wheelbase (in.)
Single	Air	176
Single	Hydraulic	176

PEC		
Wheelbase (in.)	PEC Length (in.)	Dim. C BOC to End of PEC (in.)
153-185	51.6	63.1
186-260		68.6
261-280		63.1
281-315		68.6

H4—Use with the following models: T270/T370 Hybrid



DPF Location: Right Hand Vertical BOC
Hybrid Battery Box: LH Under Cab
Fuel Tank: RH Under Cab
PEC Locaton: LH Behind Cab

TABLE H4

Model	Cab Configuration	Tailpipe Configuration	Dimension B DPF to BOC (in.)
T270/T370	Day Cab	Vertical	19.6

22" Fuel Tank			Rectangular Fuel Tank		
Gallons	Tank Length (in.)	Dim. A Day Cab BOC (in.)	Gallons	Tank Length (in.)	Dim. A Day Cab BOC (in.)
40	25.6	-9.6	50 (RH Under Only)	33.5	-1.6
56	35.5	0.3			
75	47.3	12.1			
100	62.2	27.0			
120	74.2	39.0			

[1] Maximum LH fuel tank to match dimension "B".
[2] Maximum RH fuel tank to match dimension "B".
[3] Refer to Figure 3-4.14 for DPF to BOC dimensions.

PEC		
Wheelbase (in.)	PEC Length (in.)	Dim. C BOC to End of PEC (in.)
176-185	51.6	63.1
186-260		68.6
261-280		63.1
281-315		68.6

Section 4
Body Mounting

CRITICAL CLEARANCES
Rear Wheels and Cab

CAUTION: **Insufficient clearance between rear tires and body structure could cause damage to the body during suspension movement. Allow at least 8 inches clearance (See Figure 4–1.)**

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.

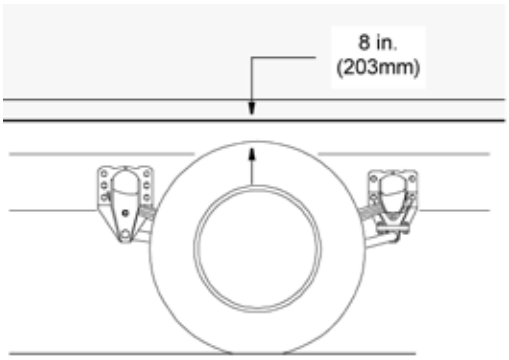


FIGURE 4-1. Minimum Clearance Between Top of Rear Tires and Body Structure Overhang

CAUTION: **Maintain adequate clearance between back of cab and the front (leading edge) of mounted body. Failure to do so could cause damage to the cab, body or both during cab & body movement. See Figure 4–2.**

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

The true distance from the centerline of the front axle to the back of the cab is 68 inches (1727 mm). It is recommended that the leading edge of the body be mounted a minimum of 4 inches (102 mm) behind the cab. The result is a minimum back–of–cab clearance of 72 inches (1829 mm) from the front axle to the leading edge of the body.

See SECTION 3 “DIMENSIONS” for further details on dimensions and clearances.
Also, see APPENDIX B “WEIGHT DISTRIBUTION” for explanation of back–of–cab (BOC) / CA calculations.

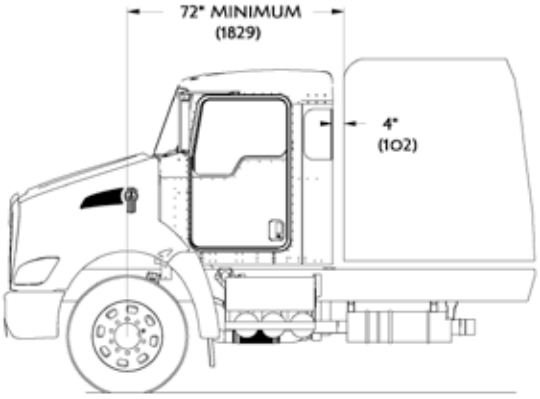


FIGURE 4-2. Minimum Back of Cab Clearance

Section 4
Body Mounting

Body Mounting Using Brackets

CAUTION: **Always install a spacer between the body subframe and the top flange of the frame rail. Failure to do so could result in corrosion due to dissimilar materials.**

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.

Frame Sill

If the body is mounted to the frame with brackets, we recommend that the frame sill spacer be 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.

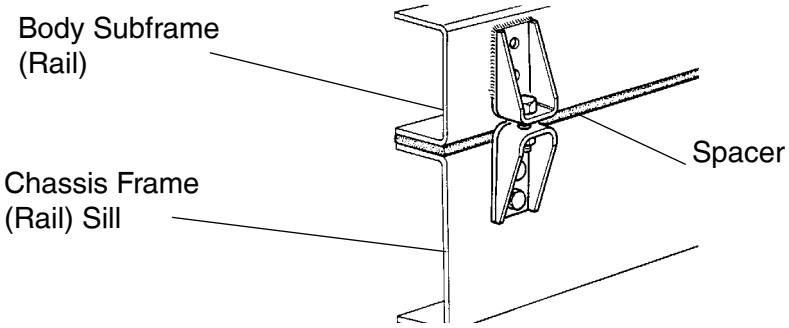


FIGURE 4-3. Spacer Between Frame Sill and Body Rail - Rubber or Plastic

Brackets

When mounting a body to the chassis with brackets, we recommend designs that offer limited amount of 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.

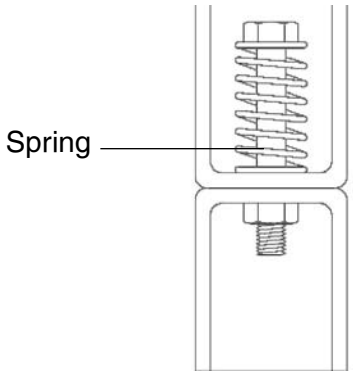


FIGURE 4-4. High Compression Spring Between the Mounting Bolt and Upper Bracket

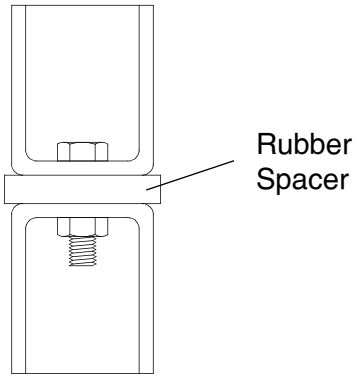


FIGURE 4-5. Rubber Spacer Between Brackets

Another possibility is mounting a rubber spacer between the brackets. See Figure 4–5.

These designs will allow relative movement between the body and the chassis during extreme frame racking situations. Extreme frame racking, with rigid mountings, could cause damage to the body. This is particularly true with tanker installations.

Mounting Holes

When installing the lower bracket on 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. The hole diameter should not exceed the bolt diameter by more than .060 inches (1.5 mm).

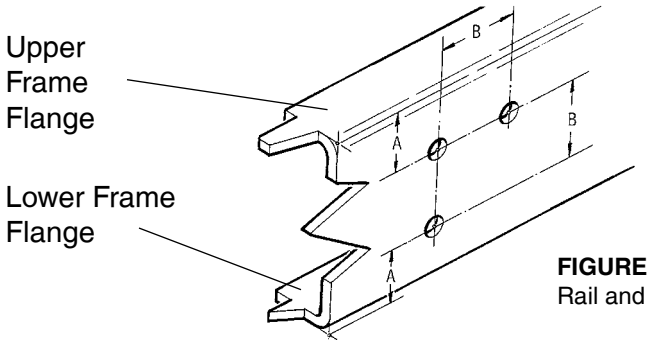


FIGURE 4-6. Hole Locations Guidelines for Frame Rail and Bracket

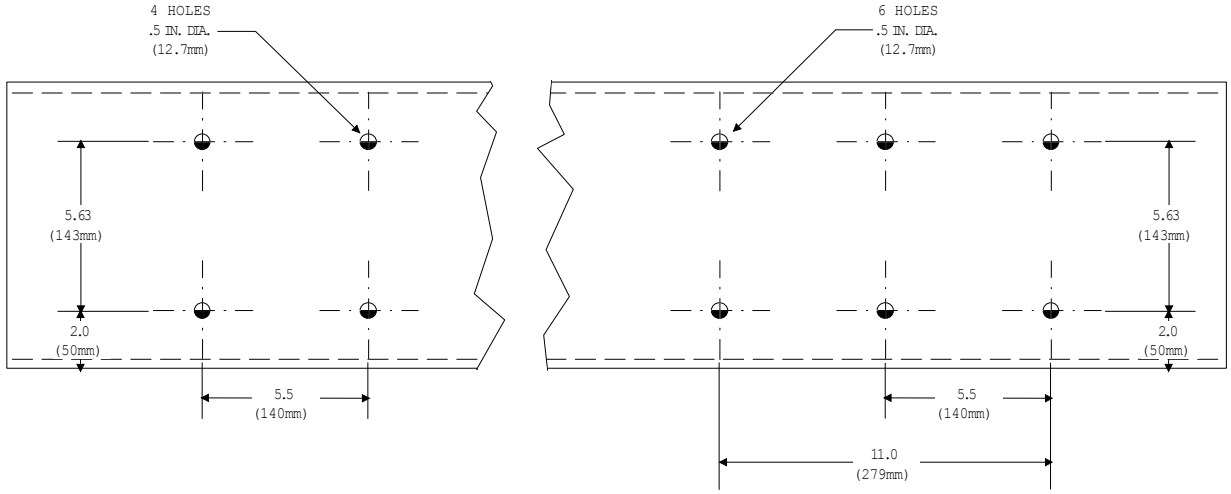


FIGURE 4-7. Crossmember-Gusset Hole Pattern Requirements [inch (mm)]

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.**

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 lead to equipment damage and cause an inoperable electrical or air system circuit.**

WARNING: **Do not drill new holes any closer than 2 inches (50 mm) to existing holes. Frame drilling affects the strength of the rails and if not done properly, can cause the frame rails to fail and cause an accident.**

Hole Location Guidelines

Holes must be located from the flange as indicated in Figure 4–7. They must be no closer than 2 inches (50 mm) to each other.

CAUTION: **Any unused holes must have the correct size bolts installed and torqued properly. Failure to do so can cause the frame rails to crack around the holes.**

Note: **If your design permits placement of body mounting brackets at crossmember locations, you can use the crossmember gusset bolt holes for body mounting. See Figure 4-8**

BODY MOUNTING USING U–BOLTS

Spacers

If the body is mounted to the frame with U–bolts, use a hardwood sill (minimum 0.5 inch (12 mm) thick) between the frame rail and body frame to protect the top surface of the rail flange.

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

Use a hardwood spacer between the bottom flange and the U–bolt to prevent the U–bolt from notching the frame flange. See Figure 4–8.

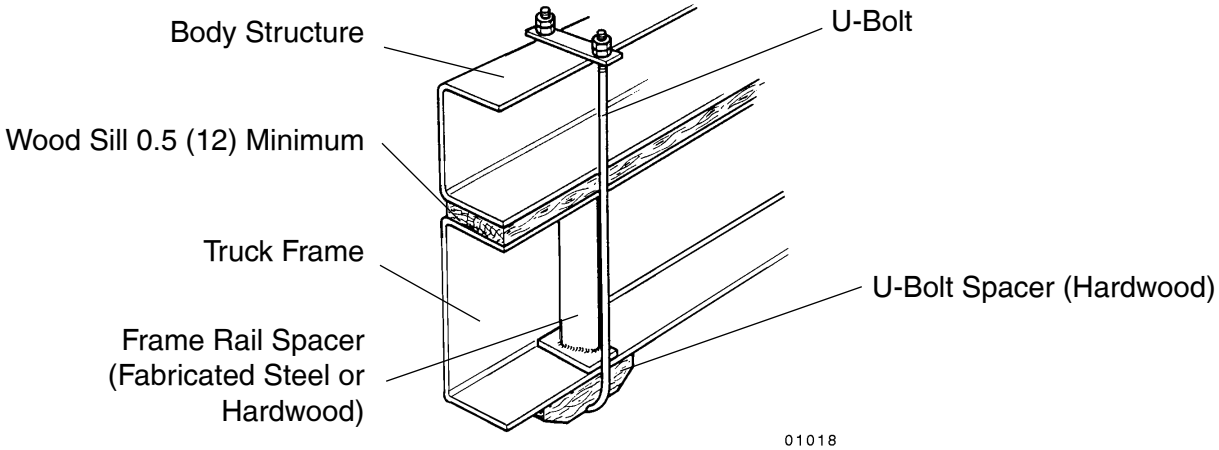


FIGURE 4-8. Acceptable U-Bolt Mounting with Wood and Fabricated Spacers [inch mm)]

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 4–9.**

CAUTION: **Mount U–bolts so they do not chafe on frame rail. Failure to do so could result in premature wear of the U-bolt or frame rail and cause an accident.**

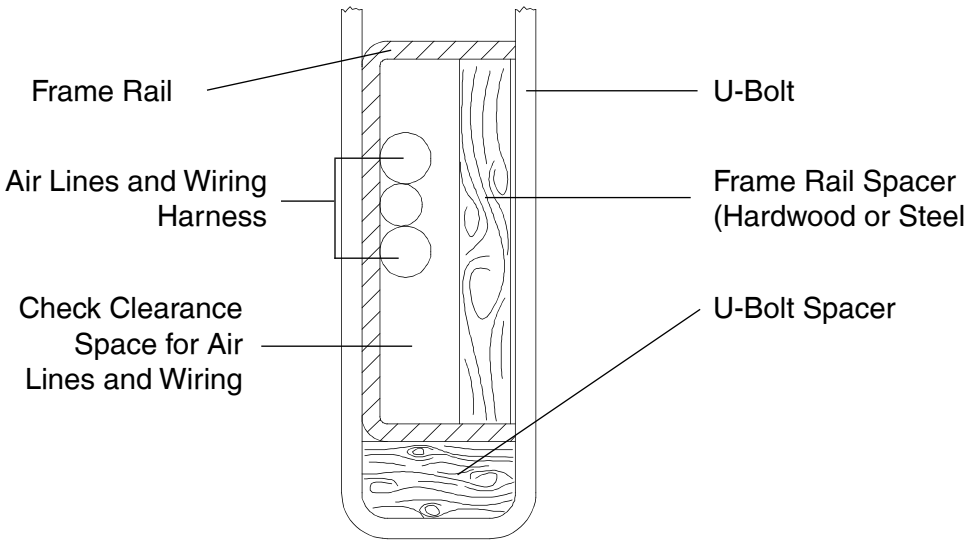
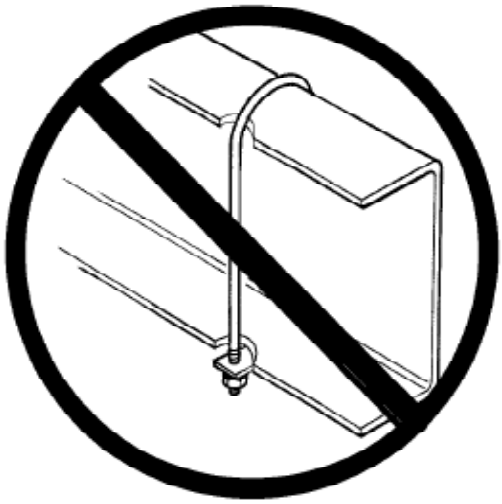


FIGURE 4-9. Clearance Space for Air Lines and Cables

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. Use a hardwood spacer as shown in Figure 4-9.**



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 4–10. This provides a firm attaching point and helps prevent any relative fore or aft movement between the body and frame. Refer to Figure 4-6 for mounting hole location guidelines.

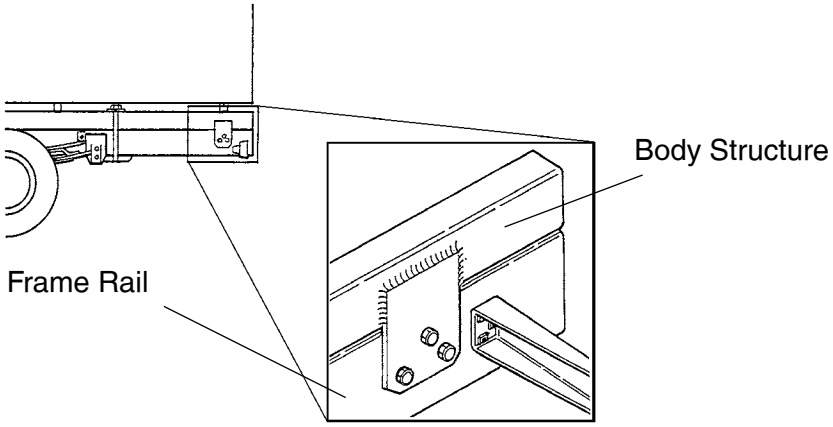


FIGURE 4-10. Example of Fishplate Bracket at Rear End of Body, used with U-Bolts

Hybrid Clearances

Hybrid PEC

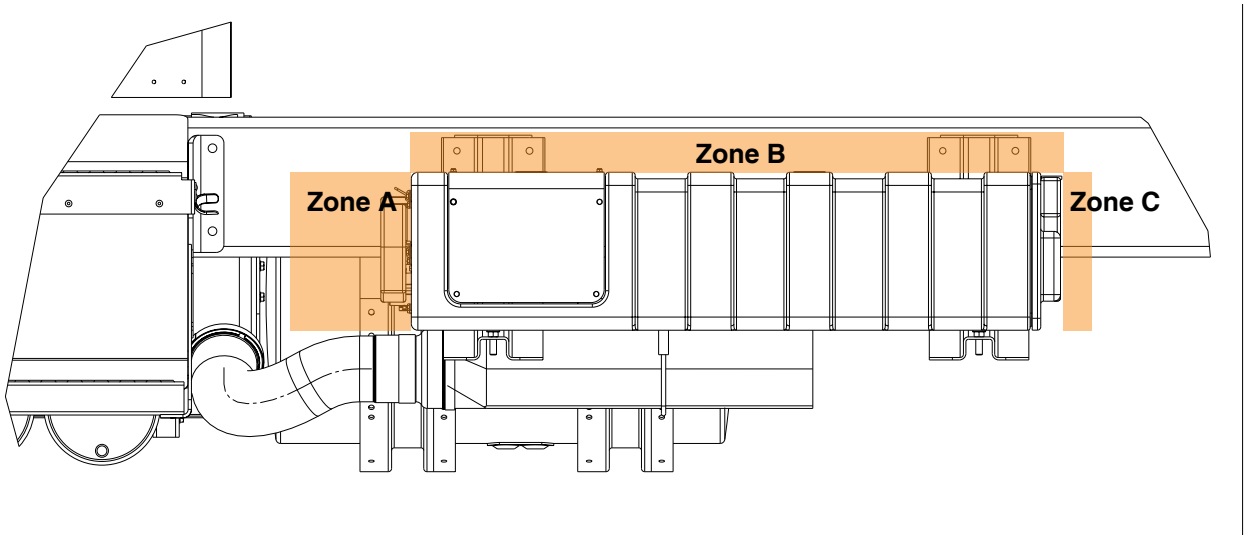


Figure 4-11: Clearance zones around Hybrid Power Electronics Carrier (PEC)

HAZARDOUS VOLTAGE: To reduce the risk of possible serious injury (Shock, Burn or Death): Components marked with High Voltage should be avoided. Service must be performed by qualified personnel only.

Clearances
For vehicles equipped with a Hybrid PEC, frame mounted components or body installations must allow a minimum clearance of 10.9” in front of the PEC (Zone A), 3” above the PEC (Zone B), and 2” behind the PEC (Zone C).

Refer to Section 7 of this manual for information on the routing requirements of the High Voltage and Low Voltage Hybrid cables and wires.

Service Access
Adequate access must be maintained to allow for service of the air cleaner and easy access to the service switch on the front side of the PEC, as well as removal of the PEC unit for service

Hybrid Battery Box

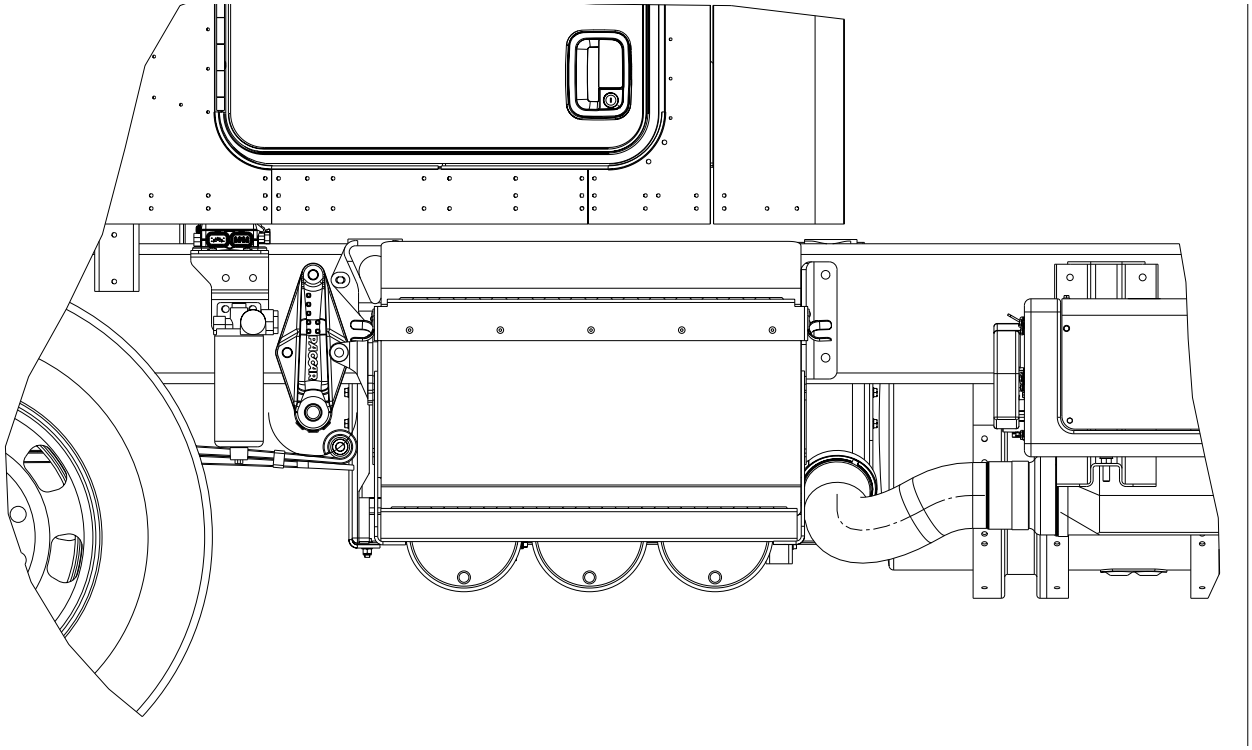


Figure 4-12: Clearance zones around the Hybrid Battery Box located LH Under Cab

Clearances
For vehicles equipped with a Hybrid Battery Box, frame mounted components or body installations must allow a minimum clearance of 4” behind the rear surface of the box and must not extend below the battery box in any way.

Remote Installation – Hybrid PEC

Hybrid vehicles have an option for additional cables to allow for a remote installation of the hybrid system PEC. The intention of this option is to allow a body builder to control the location of the PEC within the body if desired. Requirements that must be met when relocating the PEC are outlined below.

Eaton Installation Guide
Eaton provides guidelines for OEMs and body builders to follow for the integration of their hybrid components. All requirements under the Power Electronic Carrier (PEC) section of the Eaton installation guide must be met. The current version of the Installation Guide can be found on the Eaton website at www.Roadranger.com.

Clearances
Minimum clearances as outlined in the PEC Clearances section of this document must be followed.

Mounting
The PEC must be mounted to a rigid platform or structure with all four (4) of the PEC mounting studs secured and properly torqued (see Eaton Installation Guide for torque specifications). The 4 nuts that are installed between the factory provided frame bracket and the PEC housing must be retained on the PEC studs when relocating the PEC as they are integral to the PEC assembly.

Airflow Requirements
The PEC unit is air cooled and requires unrestricted air flow to the air inlet duct on the front of the PEC and the air exhaust duct on the rear of the PEC. The temperature of the air entering the PEC must be the same temperature as the ambient air temperature, thus ducting or otherwise providing intake air that has been heated above ambient temperature is not permitted.

Service Access
Adequate access must be maintained to allow for service of the air cleaner and easy access to the service switch on the front side of the PEC, as well as removal of the PEC unit for service

Warning: The PEC is not to be used or installed in a manner susceptible to being used as a step or seat.

HAZARDOUS VOLTAGE: To reduce the risk of possible serious injury (Shock, Burn or Death): Components marked with High Voltage should be avoided. Service must be performed by qualified personnel only.

Section 5
Frame Modifications

FRAME MODIFICATIONS

Introduction

The T170/T270/T370 offers multiple wheelbase configurations from the factory. So, in most cases frame modifications to produce a particular wheelbase should not be necessary.

However, some installations may require slight modifications, while other installations will require extensive modifications. For example 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 shortening or lengthening the frame cutoff, or they may be as complex as changing the wheelbase.

DRILLING RAILS

Location and Hole Pattern

If holes need to be drilled to attach anything to the rail, see SECTION 4 "BODY MOUNTING" for more information. Follow the general spacing and hole location guidelines on Page 4–3, Figure 4–7.

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.**

WARNING: **Do not drill new holes any closer than 2 inches (50 mm) to existing holes. Frame drilling affects the strength of the rails and if not done properly can cause the frame rails to fail and cause an accident.**

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 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 lead to equipment damage and 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: **Hole diameter should not exceed the bolt diameter by more than .060 inches (1.5 mm). Oversized holes could result in excessive frame wear around the hole.**

Hole pattern dimensions for crossmember designs are illustrated in Page 4–4, Figure 4–8.

Hole diameter should not exceed the bolt diameter by more than .060 inches (1.5 mm).

Section 5
Frame Modifications

MODIFYING FRAME LENGTH

The frame cutoff 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 50 mm) of the flame cut and may not adversely affect the strength of the chassis or body installation.

The frame cutoff can be lengthened by adding frame extenders.

When extending 10.5” frame rails, the additional sections can be welded to the existing rails. The joint should be welded and reinforced as illustrated in Figure 5–1.

Note: **See page 5-4 for more information on welding frames.**

WARNING: **Do not drill new holes any closer than 2 inches (50 mm) to existing holes. Frame drilling affects the strength of the rails and if not done properly can cause the frame rails to fail and cause an accident.**

Frame Insert

A frame insert must be added after welding a frame rail extension to compensate for lost strength. The insert should be of the same material as the frame member, or of steel, and at least equal to the frame rail in thickness. Attachment of the insert to the frame should be made with Ream-Fit heat-treated bolts, 5/8 in. (16 mm) diameter or the next larger size. Both the reinforcement and frame holes should be reamed to provide a fit of from .001 in. to .003 in. (.025 to .076 mm) clearance. Do not weld reinforcing members. The insert should span a distance of at least 24.21 in. (615 mm) on either side of the crack to ensure an even distribution of stresses. Cut the ends of the insert at 45° as shown in Figure 5–2 unless the insert extends to the end of the frame.

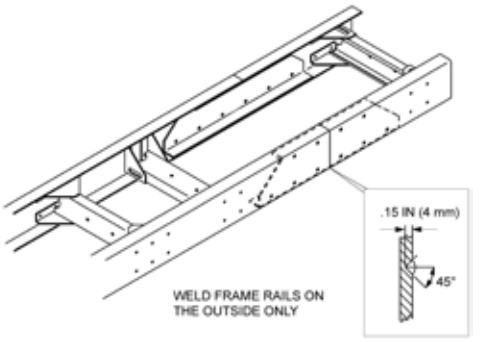


FIGURE 5-1. Detail of Frame Extension and Joint Welding

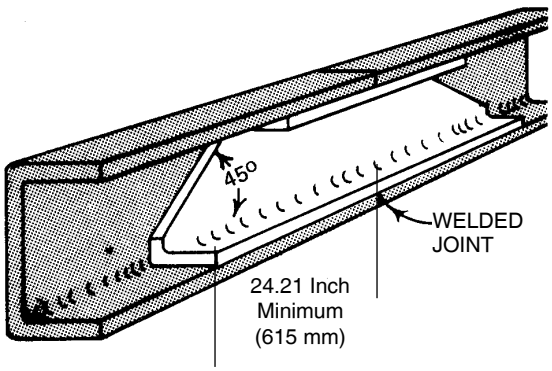
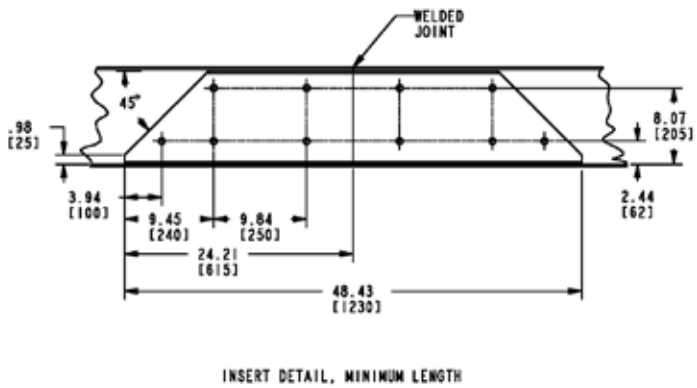
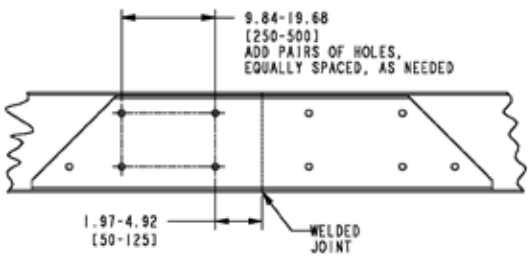


FIGURE 5-2. Frame Insert



INSERT DETAIL, MINIMUM LENGTH



INSERT DETAIL, VARIABLE LENGTH

Section 5
Frame Modifications

Where possible, use existing bolt holes to attach the insert to the frame. Bolt holes must not be located closer to the frame flanges than the present bolt pattern.

If the insert is placed in a section of the main frame where few bolts are located, additional bolts are required. Use the following guideline for locating additional bolt holes.

Changing Wheelbase

We do not recommend modifying the wheelbase. Occasionally, however, a chassis wheelbase will need to be reduced or lengthened. When this needs to be 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 and could cause personal injury and/or an accident.**

WARNING: **When changing the wheelbase, a continuous blank frame insert/outsert must be added in the area of the new rear suspension mounting bolts. All new mounting holes must pass through the original rail, rear suspension crossmembers and the insert/outsert. Failure to do so could cause excessive stress in the original rail due to additional holes.**

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

WARNING: **Do not drill new holes any closer than 2 inches (50 mm) to existing holes. Frame drilling affects the strength of the rails, and if not done properly can cause the frame rails to fail and cause an accident.**

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 not come any closer than 2 inches (50 mm) to existing holes in the frame.

WARNING: **When relocating a suspension bracket, do not mount it on the extended (added) section of a frame rail. The suspension loading could result in premature failure of the added section splice. This could cause an accident. Use care when planning the wheelbase so that the rear suspension bracket is always mounted on the original rail section. See Figure 5–3.**

If you are extending the wheelbase, you may also have to extend the frame length to accommodate a body. When you reposition the rear suspension spring hangers, do not mount them on the added extended portion of the rail. The relocated rear suspension bracket should be located on the original frame rails. See Figure 5–3.

When reducing the wheelbase, we recommend that the suspension be moved forward and relocated on the original rail. The rail behind the suspension can then be cut to achieve the desired frame cutoff. See Figure 5–3.

WARNING: **When changing the wheelbase & frame inserts are used, crossmembers require replacement and/or adjustment or in order to maintain the original frame rail spacing. Failure to do so could cause damage to rear suspension components & lead to an accident**

WARNING: **When changing the wheelbase & frame outserts are used, the rear suspension requires replacement to compensate for the original frame width caused by the outserts. Failure to do so could cause damage to rear suspension components & lead to an accident.**

When inserts longer than the minimum length are required, extra pairs of bolt holes shall be added, evenly spaced, resulting in bolt spacings of not less than 9.8 inches (250mm) or more than 19.7 inches (500mm) along the length of the insert, as shown in Figure 5-2: Insert Detail, Variable Length.

Section 5
Frame Modifications

WARNING: Do not drill new holes any closer than 2 inches (50 mm) to existing holes. Frame drilling affects the strength of the rails and if not done properly can cause the frame rails to fail and cause an accident.

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 not come any closer than 2 inches (50 mm) to existing holes.

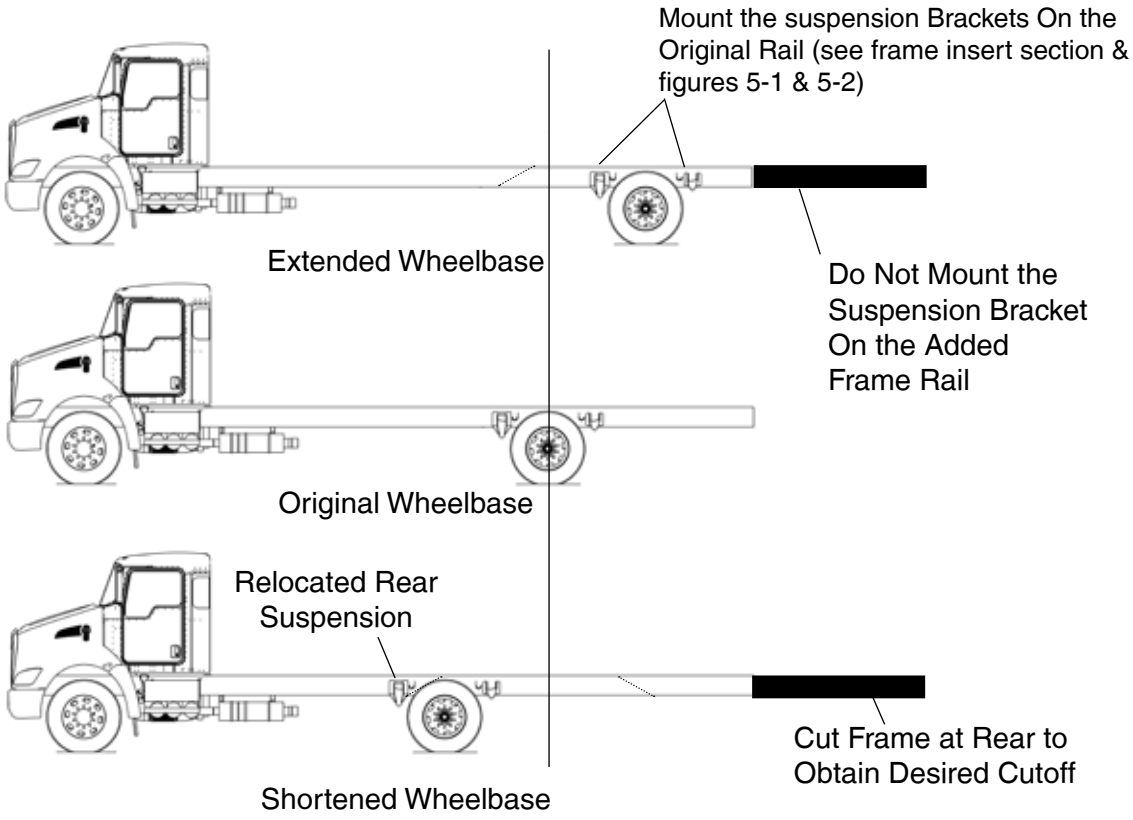


FIGURE 5-3. Comparison of Original, Shortened, and Extended Wheelbases

Crossmembers

After changing a wheelbase, an additional crossmember may be required to maintain the original frame strength. The maximum allowable distance between adjacent crossmembers is 60 inches (1524 mm). If the distance between adjacent crossmembers exceeds this dimension, add a crossmember between them. See Figure 5–4.

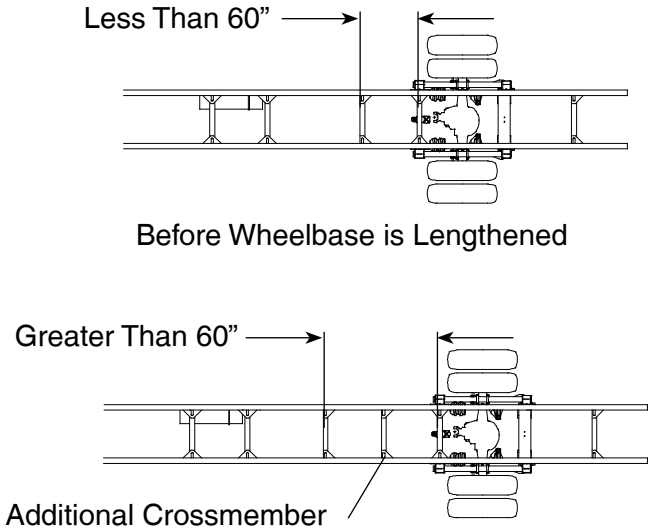


FIGURE 5 - 4. Crossmember Added when Distance Exceeds 60 inches (1524 mm)

WELDING

The 9.875” and 10.62” rails along with the 9.875” insert are heat treated; therefore, it is not weldable.

CAUTION: **The 9.875 (9-7/8) inch rail, 10.62 (10-5/8) inch rail and the 9.88 (9-7/8) insert for the 10.62 inch rail are heat treated; therefore are not weldable. Welding can affect frame rail strength leading to a failure resulting in serious injury and /or an accident. Rail failures resulting from such modifications are not warrantable.**

To determine if the frame rails are heat treated:

1. Check for heat treat caution labels on the frame rails. See figure 5-5.

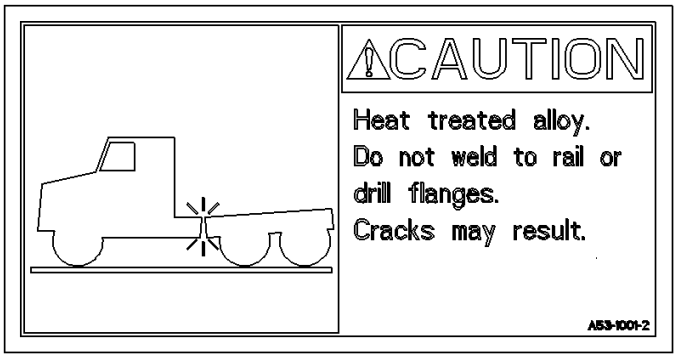


FIGURE 5-5. Heat Treated Frame Rail Warning Label

TORQUE REQUIREMENTS

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

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

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

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

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

ELECTRICAL

Introduction

Electrical wiring can sometimes be very frustrating. This is especially true when adding circuits to an existing setup. Through the use of an optional body harness and additional spare circuits, we have tried to reduce the complexity associated with adding common circuits to a body installation.

Note: **The most common circuits that body builders may need are pre-connected to this optional wiring harness.**

The new body related circuits can be added by connecting the added circuit wires to the appropriate wires in this harness.

ELECTRICAL CIRCUITS

Capacity

WARNING: **Do not install an electrical circuit that requires more amperage (electrical capacity) than what is available in the specific chassis circuit. An overloaded circuit could cause a fire. Compare the amperage requirements of the new circuit to the electrical current capacity of the existing chassis circuit before adding the body or other equipment.**

When adding an electrical circuit, you must know the current capacity (amperes) of each circuit.

The capacity of the existing system in the chassis must be enough to power the additional circuit. The new circuit will require a certain amount of power to operate; so, the existing (battery or alternator) power source must have the capacity to provide additional power or the new circuit will not function properly.

Check the current (ampere) demand of the circuit to be added. Compare it to the current capacity of the circuit you are connecting into. The current carrying capacity of the wires, controls, switches, and circuit breakers that provide current to the circuit must be equal to or greater than the demand of the added circuit otherwise these components may not work properly. See Table 6-1.1 and Figure 6-2 for relevant circuit information.

Additional Spare Circuits for Wiring

Depending on options ordered for the truck, there may be up to four spare circuits with labeled connectors available in the fuse panel (dash) harness. These are wired to labeled connectors on the engine or chassis harness. See Table 6-1.1 for circuit information, circuit CAPACITY, connector breakout locations and location to install fuses in fuse panel. For unused spare circuits, since these are separate circuits; you will not affect existing circuits in the chassis by connecting to them.

An example of how these can be used: You can wire a device to be powered in the chassis to the chassis harness SPARE 3 connector. You can wire a switch to the SPARE 3 connector in the dash to control it. You should install an appropriate rated fuse in the fuse panel behind the dash. This circuit would only have power when the key is in the accessory position.

Two wire connectors with 12” long pigtails and butt splices are available through PACCAR Parts. For connecting to the dash harness use K246-746. For connecting to the engine or chassis harness use K246-744.

Fuses for the fuse panel are available through PACCAR Parts in different ratings: K371-39-5 for 5 ampere rating, K371-39-10 for 10 ampere rating, and K371-39-15 for 15 ampere rating.

Spare Circuit Powered Through:	Label on Connector	Minimum Wire Gauge	Dash Harness Connector Behind Dash						Engine or Chassis Harness Connector				
			Pin A	Pin B	Circuit	Wire Color	Capacity (Amperes). Install a fuse of appropriate rating	Numbered Location on fuse panel behind dash	Breakout and Connector Location	Pin A	Pin B	Circuit	Wire Color
Accessory	Spare 1	14	P301 AX	C301 AX	301	Black/White	15	D3	Chassis harness: Front left wheel well area ahead of steering gear	GND AB	CSP1	CSP1	Black/Green (GND is white)
Accessory	Spare 2	14	P302 AX	C302 AX	302	Black/Yellow	15	G2	Engine harness: Left hand rear corner of engine	GND L	CSP2	CSP2	Black/Yellow (GND is white)
Ignition	Spare 3	14	P303 AX	C303 AX	303	Black/Red	10	F6	Chassis harness: Inside Left Frame Rail Back of Cab	GND AC	CSP3	CSP3	Black/Green (GND is white)
Battery	Spare 4	14	P304 AX	C304 AX	304	Black/Green	15	B6	Engine harness: Left hand rear corner of engine	GND W	CSP4	CSP4	Black/Green (GND is white)

K246-746: Connector with 12” long pigtails with butt spices for use connecting to dash harness spare connectors.

K246-744: Connector with 12” long pigtails with butt spices for use connecting to engine or chassis harness spare connectors.

TABLE 6-1.1. Additional Spare Circuits for Wiring

Optional Body Harness

The optional body harness can be connected to the chassis harness through a standard connector mounted on the left hand frame rail directly behind the battery box.
See Figure 6–1.

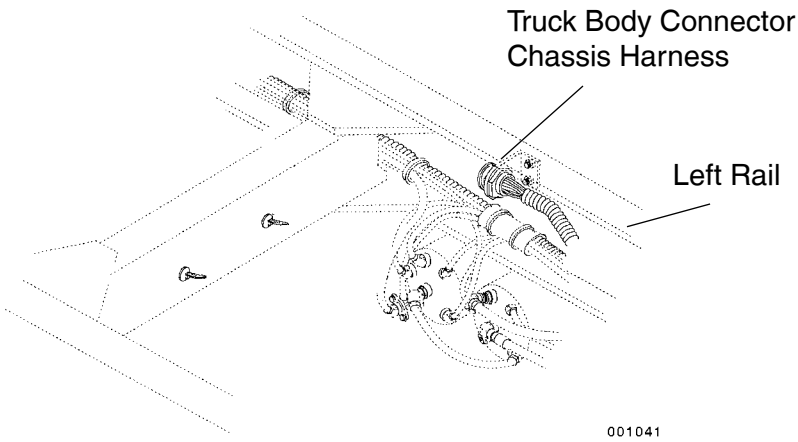


FIGURE 6-1. Location of Standard Body Harness Connection

For shipping purposes the body harness is coiled and shipped loose in the cab. The body harness wire ends are tagged with circuit markers, identifying the connecting circuit. See Figure 6–2 on the next page.

CAUTION:

Body Builder Power and Return (Ground)

All body builder Power and Return lines must be connected directly to battery terminals and be properly fused. Using the frame as a Return (Ground) is not allowed. Using the frame as a Return could result in the creation of ground loops and damage the Hybrid System.

Hybrid Utility Connector

Hybrid utility trucks come equipped with a utility connector to interface with the body builder's body controller. The breakout for the utility connector is 3000mm long and can be located, bundled up, by the transmission (see Figure 6-1.1). The length of the body builder's mating harness must not exceed 2500mm. Pins 7 and 8 are J1939 communication lines and must be a twisted, shielded, jacketed pair of wires. Pin 6 is the drain wire for the shield.

Pins 1&2

Pins 1&2 are part of a Park Brake and Hood Switch interlock circuit. A ground signal is applied to pin 1 and with both the hood closed and the park brake applied the circuit will be completed and a signal will appear on pin 2.

Pin 3

Pin 3 is Battery Power and is rated for 10 Amps. The fuse is located inside the Vehicle Electronics Carrier (VEC) in position F6. Pin 3 is live at key on.

Pin 4

Not Used.

Pin 5

Pin 5 is Ground.

Pin 6

Pin 6 is the drain wire for the J1939 CAN line. The drain wire must only be connected to Pin 6. Do not connect the other end of the drain wire.

Pin 7&8

Pins 7&8 are J1939-11 Vehicle CAN (VCAN) lines. Pin 7 is LOW and Pin 8 is HIGH.

Note: **All VCAN lines must conform to J1939-11 guidelines; this includes using a jacketed, shielded, twisted pair of wires. Keep the VCAN lines away from high current, rapidly switching loads and the wires connected to these devices. For more details about 1939-11 VCAN specifications please refer to SAE J1939-11.**

PTO

Hybrid trucks have the option of two different PTO operation modes; they can be outfitted with either an Electronic PTO or a Mechanical PTO.

ePTO

EPTO uses the Hybrid Systems electric motor to turn the PTO gear in the transmission. A 3 way connector is provided on the Transmission Harness to interface with the PTO. The connector provides the positive and negative signals to engage the PTO and an interlock to insure the PTO is engaged. The interlock circuit is a ground signal. This is typically done with a ball switch on the PTO. One side of the ball switch would be connected to ground and the other to Pin A.

ePTO 3 way connector

Pin A is for PTO interlock negative signal
Pin B is for PTO solenoid Neg
Pin C is for PTO solenoid Pos

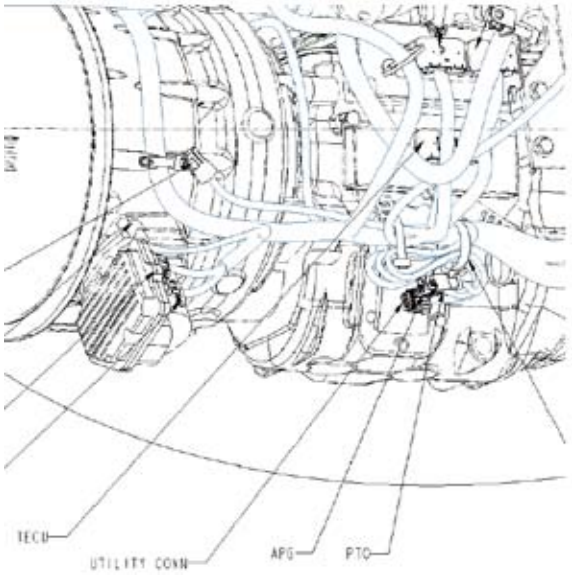


FIGURE 6-1.1 ePTO Harness Location

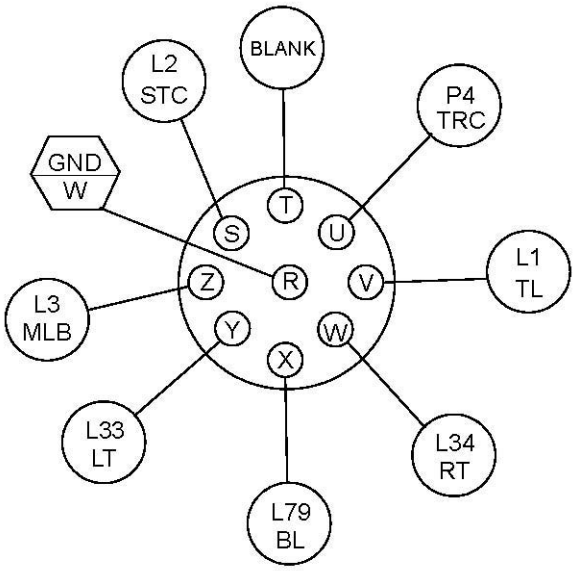
mPTO

MPTO operates like a normal PTO with the exception of the use of a PTO interlock circuit. The interlock circuit is a ground signal. This is typically done with a ball switch on the PTO. One side of the ball switch would be connected to ground and the other to terminal P206 located LH side of the transmission on the hybrid transmission harness.

Fuse and Circuit Identification

Fuses protect each wire (See CAPACITY in Figure 6-2 for capacity of each circuit). These are separate circuits; so by connecting to them, you will not affect the existing circuit in the chassis.

(For chassis built after April 30, 2006)



WIRE DESCRIPTION	FUNCTION	PIN	CIRCUIT	WIRE COLOR	CAPACITY (AMPERES)	FUSE LOCATION	WIRE GAUGE
BACKUP LP	BACKUP LAMP/ ALARM	X	L79BL	PINK / WHITE	10	F4	12
RH TURN	RIGHT TURN SIGNAL LAMP	W	L34RT	GREEN / BLACK	20	B1	14
LH TURN	LEFT TURN SIGNAL LAMP	Y	L33LT	YELLOW / BLACK	20	B1	14
AUX PWR	AUXILIARY POWER, BODY OR TRAILER	U	P4TRC	BLUE	15 STD Config - IGN power 10 Optional config - BAT power	E2 D6	10
CLEARANCE LP	MARKER/ CLEARANCE LAMPS	Z	L3MLB	BLACK	15	C5	12
STOP LP	BRAKE LAMP	S	L2STC	RED	20	B1	10
TAIL LP	TAIL LAMP	V	L1TL	BROWN	20	B4	12
GND	GROUND	R	GND	WHITE			6

FIGURE 6-2. Optional Truck and Body Harness (after 4/06)

Circuits Wired Through the Ignition

The following circuits are powered on when the ignition key is turned to the ON position.

Right and Left Turn Signal
Backup Lamp

After the connections are made by splicing into the optional body harness, the body components will have power when the similar chassis components receive power.

For instance, when the right hand turn signal is activated and the right hand turn signal light flashes on the cab, the right hand turn signal light on the installed body will also flash.

Connecting Ignition Circuits

Ignition circuits are tagged as follows:

Right Turn Signal - The right turn signal wire is tagged RH TURN and is green/black.
Left Turn Signal - The left turn signal wire is tagged LH TURN and is yellow/black.
Backup Lamp - The backup lamp wire is tagged BACKUP LP and is pink/white.
Ground - The ground wire is tagged GND and is white.
Auxiliary Power - (Standard config for chassis built after first quarter, 1998)

The auxiliary power circuit wire is tagged AUX PWR and is blue. Used for TRLR ABS if there is a trailer.

This aux power circuit is a 15 ampere capacity circuit in the ignition circuit. Install a 15 ampere fuse in the fuse panel (locations E2) behind the dash panel. This aux power circuit can be used only when the ignition switch is ON.

Circuits Wired to Battery

The following circuits are wired directly to the battery through a fuse and switch.

Auxiliary Power - optional if there are no trailer connections.
Brake Lamp
Tail Lamp
Clearance Lamps

When the optional body harness is properly connected, the similar circuit in the body will also have power. If the chassis clearance lamps are activated, the body clearance lamps will also be activated.

Auxiliary Power in Battery Circuit

The auxiliary power circuit is a 10 ampere capacity circuit connected directly to the battery. Install a 10 ampere fuse in the fuse panel location D6 behind the dash. Use this circuit whenever you need power for auxiliary equipment. There is continuous power to this circuit (when the batteries are charged) even when the engine is off.

For example, if the van body has interior lights or floodlights, these can be wired to the auxiliary power circuit and switched ON from inside the van.

Connecting Battery Circuits
Battery circuits are tagged as follows:

Auxiliary Power (optional w/o TRLR connections) - The auxiliary power circuit wire is tagged AUX PWR and is blue.
Brake Lamp - The brake lamp wire is tagged STOP LP and is red.
Tail Lamp - The tail lamp wire is tagged TAIL LP and is brown.
Clearance Lamps - The clearance lamp wire is tagged CLEARANCE LP and is black.

INSTALLING A THIRD BATTERY (NOT AVAILABLE ON HYBRID)

A third battery is a published option and can be ordered with your vehicle. If this was not done, use Figure 6–3.1 and 6-3.2 as guides for installing a third battery.

You will need the following additional parts to install the third battery:

Item	T170 Qty	T270/370 Qty	Part Number	Description
1	1	1	P27-6100-111	Battery - GRP 31 w/Threaded Posts
2	1	1	K396-1010-008	Jumper Cable, Positive
3	1	1	K395-1020-008	Jumper Cable, Negative
4	0	1	N63-1002	Battery Pad
5	0	2	N20-1025	Battery Retainer, lower
6(1)	0	4	W34-1070-060	Bolt - Hex M8 X 60
7(1)	0	4	K169-162-8CA	Nut - Hex Metric
8(1)	0	8	K363-338-2-312	Washer - Flat
9	0	1	N20-1001	Battery Retainer, Upper
10	1	0	15-05609	Battery Hold - Down
11	1	0	15-05719	Battery Hold - Down Hook
12	1	0	27-00791-005	Locknut
13	1	0	27-00428-005	Washer - Flat 5/16
14	0	1	K041-804-275CA	Bolt - Hex M10 X 275
15	0	1	K363-3	Washer - Cupped
16	0	1	4023	Button
17(2)	1	1	K396-1710-008	Jumper Cable, Positive
18	1	1	K333-46-18	Ring Terminal, 1/4”

TABLE 6-2. Third Battery Installation Parts for Parallel Battery Box LH Under Cab

Note: (1) For T270/370 with hydraulic brakes use these to install both item 5, otherwise use the existing fasteners.
(2) Use this in place of item 2 when liftgate wiring is required.

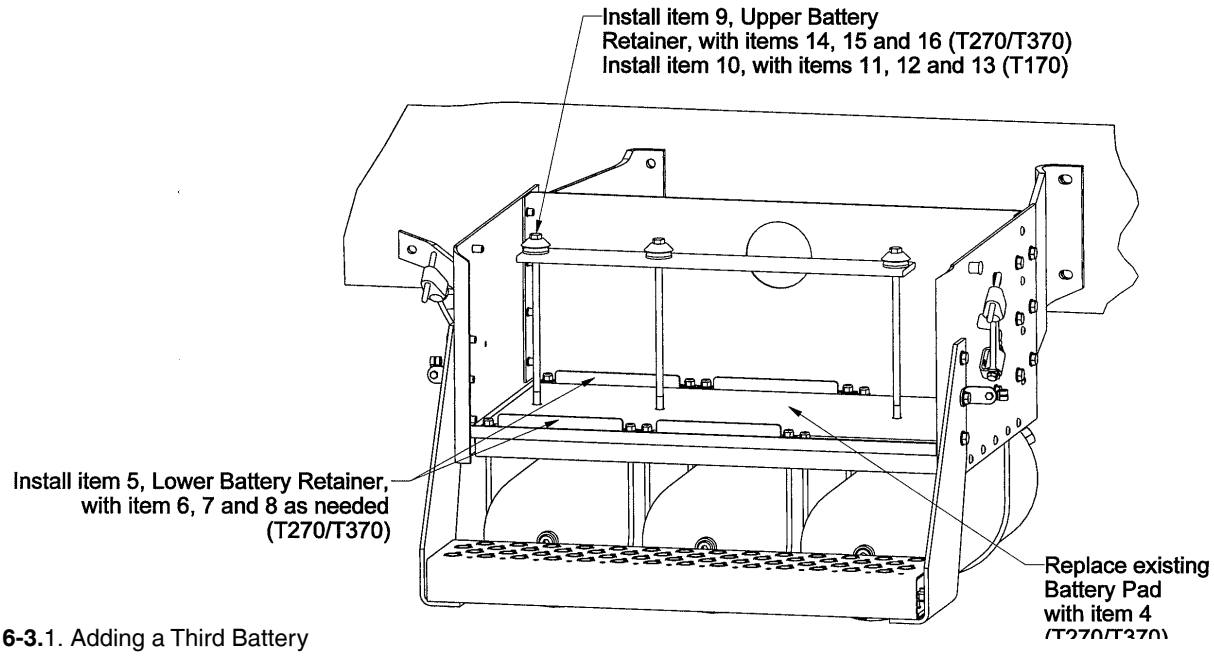


FIGURE 6-3.1. Adding a Third Battery

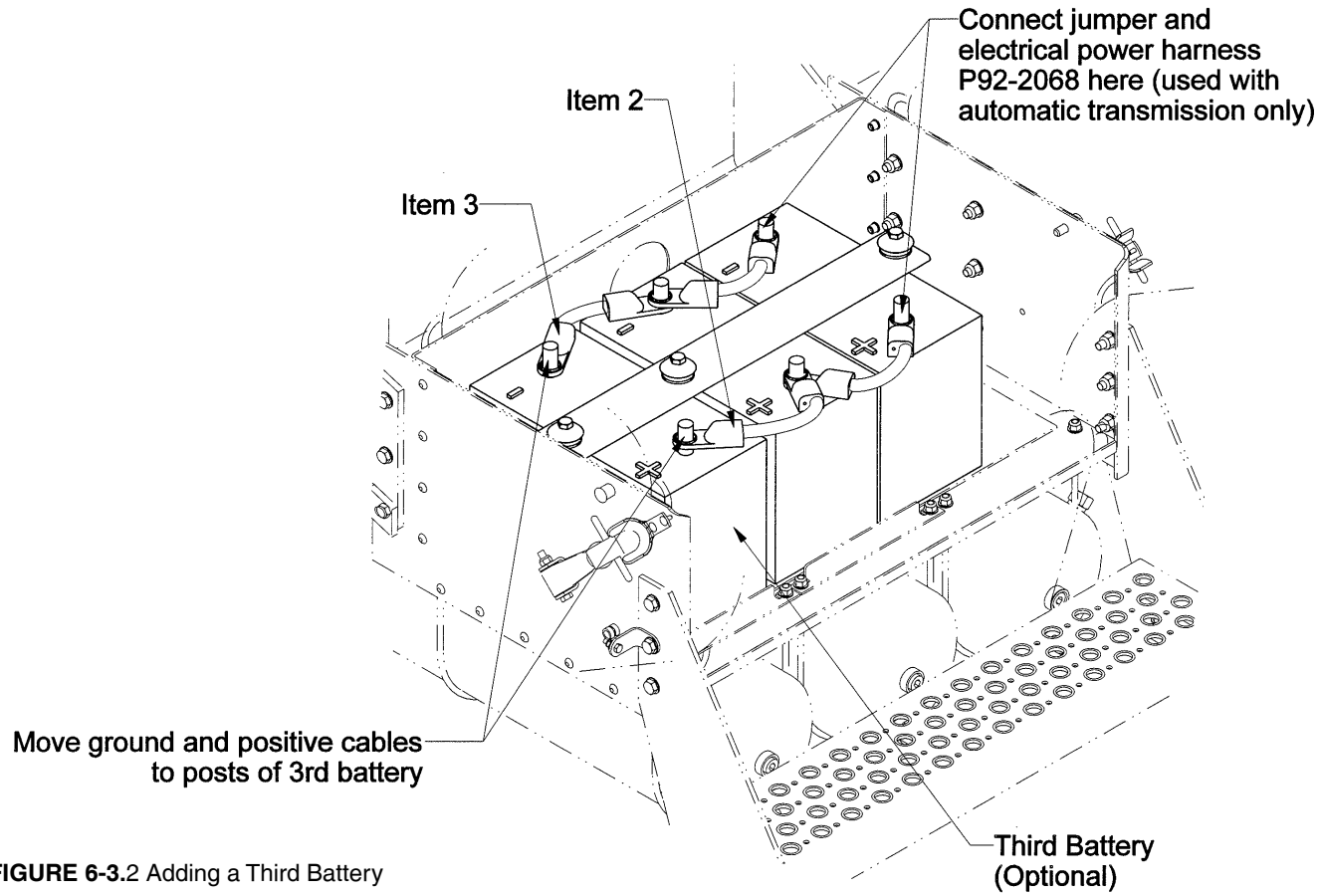


FIGURE 6-3.2 Adding a Third Battery

WIRING FOR A LIFTGATE

CAUTION: **Consult the liftgate manufacturer's installation instructions for details concerning wiring for their product and specific model.**

A liftgate will usually require current much greater than 10 amperes. Typically, 100 to 150 amperes is required and some models require more than 150 amperes. For a liftgate installation a third battery is required for adequate power.

Note: **A liftgate installation must have a dedicated circuit to distribute power to the liftgate.**

Liftgate Power Source

Liftgate motors will typically use DC power. A convenient power source is the battery. Use Figure 6-4 as a guide. Install the circuit breaker inside the battery box on the rear panel.

WARNING: **DO NOT use a circuit breaker of lower capacity than the liftgate amperage requirements. If you do, it could result in an electrical overload or fire. Follow the liftgate installation instructions and use a circuit breaker with capacity recommended by the liftgate manufacturer.**

Connecting the Liftgate Power

Follow these instructions to connect the liftgate to the third battery. See Figure 6-4.

1. Install the third battery.
2. Positive battery jumper cable with ring terminal breakout wire, item 17 in Table 6-2, page 6-6, should be installed instead of item 2.
3. Install circuit breaker
4. Shorten the ring terminal breakout wire on positive battery jumper cable, item 17, to length as needed for routing to the circuit breaker. Install ring terminal, item 18 as needed. Route the wire per routing requirements in Section 7.
5. Connect the ring terminal breakout wire to the circuit breaker.

The positive battery jumper cable with ring terminal breakout, item 17, and the ring terminal, item 18, are in Table 6-2, page 6-6. These are available form PACCAR Parts.

The remainder of the wiring installation should be in accordance with the liftgate manufacturer's installation instructions.

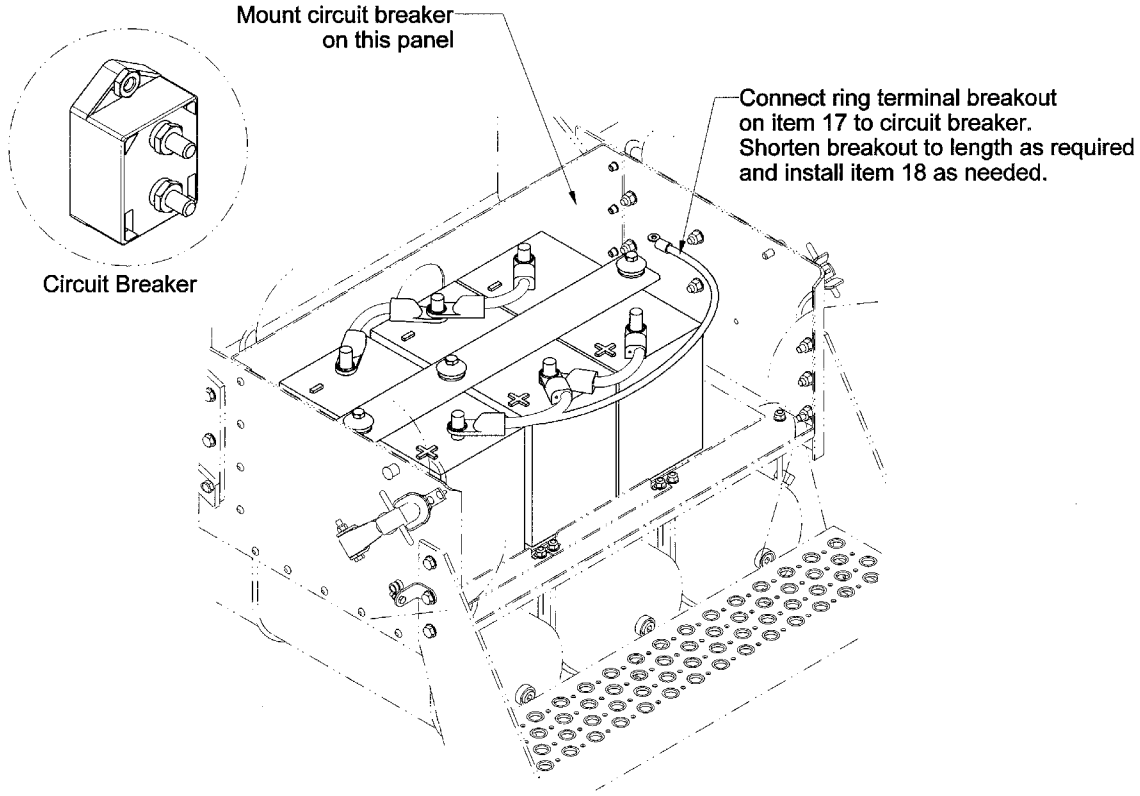


FIGURE 6-4. Liftgate Circuit Breaker Inside Battery Box

Engine Connections

Electronic engines have the ability to send and receive control and warning signals from the components on the chassis and body. Consult the appropriate body builder manual before making connections to the engine electronic control unit (ECU) or to other electronic engine components.

Remote PTO/Throttle Harness

This option provides wiring from the engine to end of frame for remote control of engine throttle and a customer installed PTO. Controls are not provided with this option. Included is a 354.3 inch (9000 mm) wiring harness with a 7-pin connector that is routed to the end of frame. Any excess is coiled and secured there. See Table 6-3 for wiring harness connector pin outs and Figure 6-5 for end of frame connector configuration.

WARNING: Follow the engine manufacturer's guidelines for use of these circuits. See your engine manufacturer to verify that the engine is programmed correctly for the intended applications. Failure to properly program the engine or wire these circuits could cause an accident.

Engine Harness, PACCAR PX-6 and PX-8			KW Harness Connector Pin Outs		
Engine Mfgr Circuit Function Name	**Engine ECU Pin #**	**KW Circuit #**	**Wire Color**	**Wire Gauge**	**Pin Outs**
NOT USED	NONE	NONE	None	None	1
NOT USED	NONE	NONE	None	None	2
COMMON RTN #1 (SWITCH)	41	GRN3115-0	GREEN	16	3
REMOTE THROTTLE SIGNAL	37	BLU3144-0	BLUE	16	4
PTO ON/OFF	18	GRA3511-0	GRAY	16	5
NOT USED	NONE	NONE	NONE	None	6
NOT USED	NONE	NONE	NONE	None	7
GROUND	NONE	WHT1513-4	WHITE	14	8
TORQUE LIMIT SWITCH	17	GRA3149-2	GRAY	16	9
5V SUPPLY	26	VIO3113-0	VIOLET	16	10
COMMON RTN #3 (SENSOR)	22	GRN3117-0	GREEN	16	11
REMOTE THROTTLE ON/OFF	8	GRA3143-0	GRAY	16	12

TABLE 6-3. Remote PTO/Throttle Wiring Harness

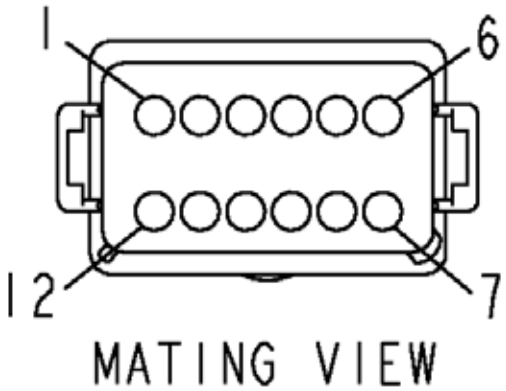


FIGURE 6-5. Remote PTO/Throttle Control Wiring Harness Connector Pinouts

ROUTING

Introduction

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

Definitions

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

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

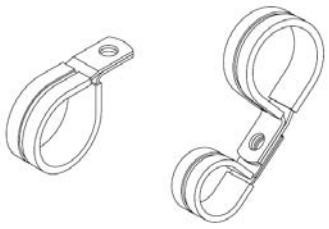


FIGURE 7-1. Clamp and Butterfly Clamp

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

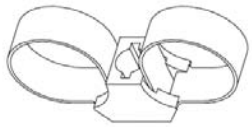


FIGURE 7-2. Butterfly Tie

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

FIGURE 7-3. Tie Strap

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

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

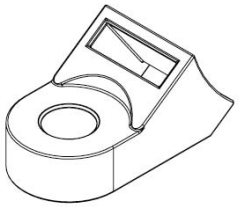


FIGURE 7-4. Heavy Duty (HD) Mount.

Excess of material: More than 3 inches of slack for every 14 inch section of hose routing, except for air conditioner hoses. See section 4.1.3 for air conditioner hose requirements.

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

ROUTING REQUIREMENTS

Wiring

Electrical ground wire terminals must be securely attached and the complete terminal surface must contact a clean bare metal surface. See R414-558 for grounding wire connection practice. Apply electrical contact corrosion inhibitor Nyogel 759G grease (made by William F. Nye, Inc., New Bedford, MA) per R414-558.

Don't bend wires or use tie straps within 3 inches (75 mm) of (connected) wire connectors or plugs.

Wires in Bundles

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

EXCEPTIONS:

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

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

Wires Crossing other Components

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

Piping

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

Use no elbows in the air brake system unless specified on the air piping diagram and the build instructions.

Hoses Crossing Components

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

Air Compressor Discharge Hoses

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

Bundles

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

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

Routing of Wires and Hoses near Moving Components

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

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

Routing of Wires and Hoses near Exhaust System

TABLE 7-1. Exhaust – System Clearance

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

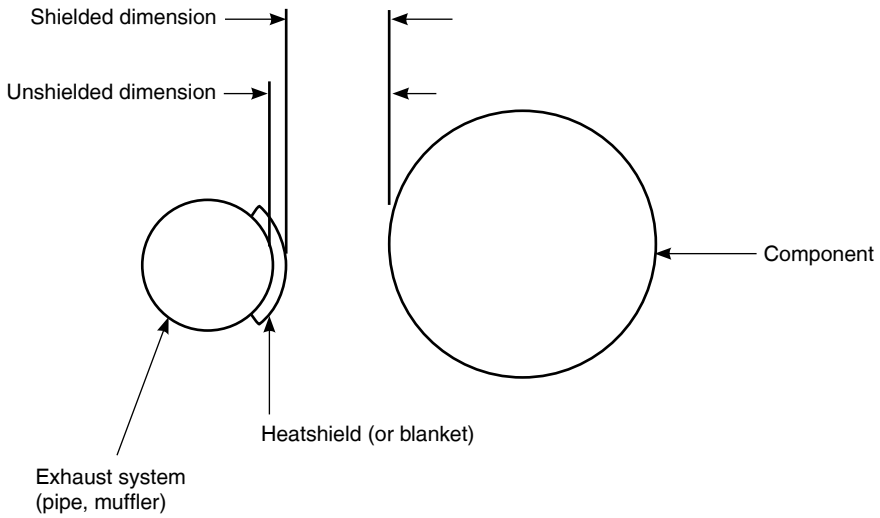


FIGURE 7-5. Definition of measurements.

Hybrid High Voltage Cable Routing

High Voltage cables must be routed in such a way as to prevent them from coming in contact with any object that could pinch, cut, chafe, or in any other way damage the cable. The High Voltage cables must be secured every 14". High voltage cables should not be routed alongside any wires or bundles that contain signals. Do not route High Voltage cables with fuel, air, hydraulic or any other type of line containing a flammable, corrosive, or conductive substance. Do not route High Voltage cables with any lines under pressure.

WARNING: When disconnecting the High Voltage cables be sure that the service switch on the Power Electronics Carrier (PEC) has been pushed in. After the service switch has been pushed in you MUST what 5 minutes before disconnecting the High Voltage cables.

WARNING: The wire lengths for the Low Voltage PEC wiring that are provided from the factory (with Extended Cables for Remote Mount PEC option) are the maximum allowed. Do not splice, alter or otherwise extend the existing Low Voltage harness.

WARNING: The cable lengths for the High Voltage cables that are provided from the factory (with Extended Cables for Remote Mount PEC option) are the maximum allowed. Do not splice, alter or modify the High Voltage Cables.

WARNING: The High Voltage cables that are part of the hybrid system are painted orange as an indication that the cable carries High Voltage electricity. Do not cover the orange cables with convoluted tubing of another color, shielding that obscures the orange color, or paint that obscures the orange color.

APPENDIX A - VEHICLE IDENTIFICATION

APPENDIX B - WEIGHT DISTRIBUTION

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Appendix A
Vehicle Identification

VEHICLE IDENTIFICATION NUMBER

A 17–character number (numeral and letter combination) forms the Vehicle Identification Number (VIN) which includes the Chassis Number. It contains among other information, the model year (4), assembly plant (5), and vehicle serial number (6). See Figure A–1

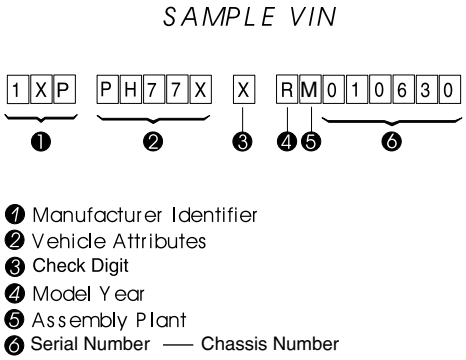


FIGURE A-1. Vehicle Identification Number (VIN).

The model year (4) is designated by an alphanumeric code in the tenth character position in the VIN. See Table A-1 and Figure A–1.

Code	Year
5	2005
6	2006
7	2007
8	2008
9	2009

Code	Year
A	2010
B	2011
C	2012
D	2013

TABLE A-1. Model Year (Code) Designations.

VIN Location

The VIN is marked on the Incomplete Vehicle Certification Label (on trucks). It is located either on the driver's door edge or door frame. See Figure A–2.

Chassis Number Locations

The Chassis Number comprises the last six characters of the VIN.

- The vehicle chassis number is shown in multiple locations.
- Right frame rail, bottom flange (underside), about 4 to 4.5 ft. from the front end: stamped.
- Left frame rail, top of flange, about 4 to 4.5 feet from front end: stamped
- Left side of cab, lower right corner of door frame: stamped plate.
- Tire, Rim, and Weight Rating Data label.
- Major Components and Weights label.
- Noise Emission label.
- Paint Identification label.

Appendix A
Vehicle Identification

VEHICLE IDENTIFICATION LABELS

Vehicle Identification Labels are located on the driver's side door edge or on either the driver's or passenger's side door frames. See Figure A-2. Labels include Vehicle Certification, Components and Weights, Tire/Rim and Weight Rating Data, Noise Emissions, and Paint Identification. Quantity and location of labels may differ based on Complete/Incomplete vehicle, and Single/Dual certification.

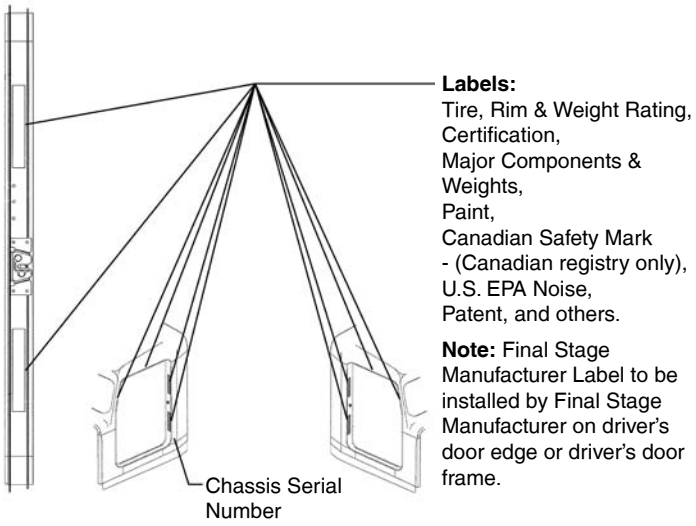


FIGURE A-2. Drivers Door and Door Frame Labels

Tire/Rim and Weight Rating Data Label

The Tire/Rim and Weight Rating Data Label is used in conjunction with the Incomplete Vehicle Certification Label on Incomplete Vehicles. It contains chassis serial number and the following information:

- GVWR — Gross Vehicle Weight Rating
- GAWR FRONT and REAR — Gross Axle Weight Ratings for Front and Rear Axle
- TIRE/RIM SIZES AND INFLATION PRESSURES — Tire/Rim Sizes and Cold Pressure Minimums

Note: **GVWR is the TOTAL WEIGHT the vehicle is designed to carry. This includes the weight of the empty vehicle, loading platform, occupants, fuel, and any load.**

Incomplete Vehicle Certification Label

The Incomplete Vehicle Certification Label contains the chassis VIN, date of manufacture, and listing of applicable motor vehicle safety standards.

Components and Weights Label

The Major Components and Weights Label includes chassis weight and gross weight information, as well as model and serial numbers for the vehicle, engine, transmission, and axles.

Appendix A
Vehicle Identification

Noise Emission Label

The Noise Emission Label contains the chassis serial number, date of manufacture, and information regarding US noise emission regulations. This label is not provided on Canadian registered vehicles.

Paint Identification Label

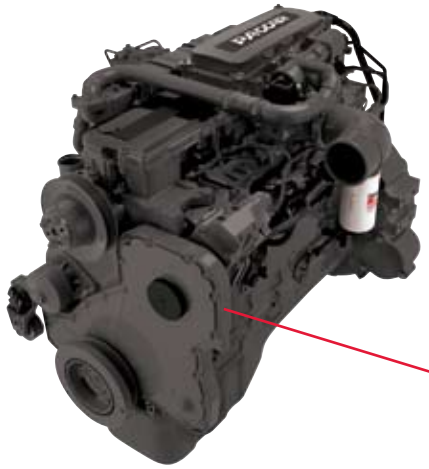
The Paint Identification Label contains the paint colors used by the factory to paint the truck. It lists frame, wheels, cab interior and exterior colors. This label is located either underneath the dash to the left of the steering column support, inside the glovebox, or on the passenger's door frame.

COMPONENT IDENTIFICATION

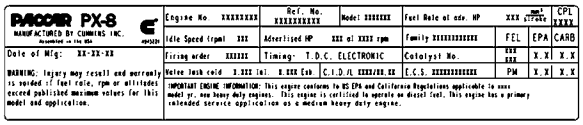
Each of the following components has their own identification label.

Engine Identification

The engine serial number is stamped on a plate located on the left front of the engine. For further information, please refer to the Engine Operation and Maintenance Manual (included in the glove compartment of each vehicle).



Engine Identification Location (PX-8 Shown)



PX-8 LABEL

FIGURE A-3. Engine Identification Location

Appendix A
Vehicle Identification

Transmission Identification

The transmission identification number is stamped on a tag affixed to the right forward side of the transmission case. It includes among other specifications the transmission model, serial number, and part number.

Front Axle Identification

The front axle has an identification tag located on the front axle beam. It includes the axle model, part number and serial number.

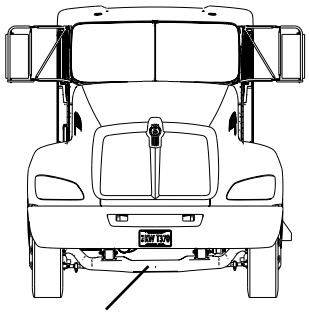


FIGURE A-4. Front Axle Identification

Rear Axle Identification

The rear axle identification numbering system includes two labels or stamps.

1. Axle Housing Number Tag, located on the left forward side of the housing arm. This tag identifies the axle housing.

2. Axle Differential Carrier Identification, located on the top side of the differential carrier. The following information is either stamped, or marked with a metal tag: Model No., Carrier Production Assembly No., Carrier Assembly Serial No., Gear Ratio, Axle Specifications Number and OEM part number and country of origin.

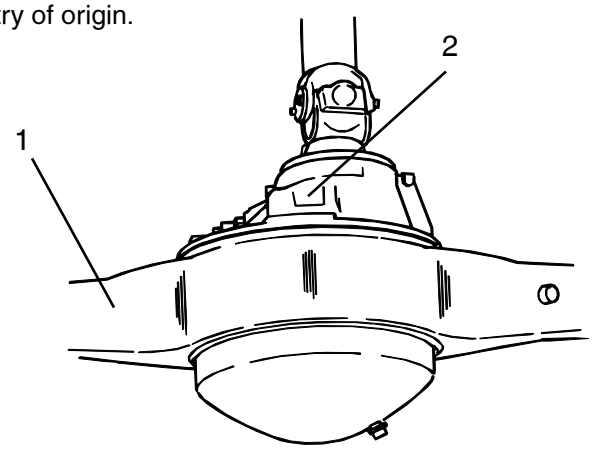


FIGURE A-5. Rear Axle Identification

Note: **Illustrated identification tag locations are typical. Actual locations may vary by axle manufacturer and with single versus tandem axles.**

Appendix B
Weight Distribution

INTRODUCTION

In the Medium Duty truck market, matching the wheelbase to the body specification is extremely important. Selection of the wrong wheelbase may lead to premature component failure, poor performance, and ultimately a dissatisfied customer. Before selecting the proper wheelbase, it is important to have a basic understanding of weight distribution.

Abbreviations

Throughout this section, abbreviations are used to describe certain features and requirements of the vehicle (see the list below). Review this list frequently so you know what the abbreviations mean.

AF	=	Frame rail overhang length (behind the rear axle)
BL	=	Body Length
CA	=	Back of cab to centerline of rear axle

Note: **The T170/T270/T370 CA figures are measured from the true back of cab to the centerline of the rear axle. To obtain a usable CA the body builder must subtract any required space behind the cab, which may be needed for other equipment.**

CG	=	Center of gravity: the balance point or center of a load. It is usually identified by a circle with alternating black and white quarters.
CGf	=	Distance from the centerline of the front axle to the center of gravity of the load (L). The load can be any load such as a fuel tank, a body, or the payload.
FA	=	Front Axle
GVWR	=	Gross Vehicle Weight Rating
L	=	Load: the weight that is carried. This could be the body, the payload or any item that has its weight distributed between the two axles.
Lf	=	Portion of load (L) carried by front axle
Lr	=	Portion of load (L) carried by rear axle
RA	=	Rear Axle
WB	=	Wheelbase Length

Appendix B
Weight Distribution

CALCULATIONS
Weight Distribution without Body

There are two primary equations used in weight distribution calculations:

- The first equation determines the portion of the load carried by the rear axle (Lr).

$$Lr = \frac{CGf}{WB} \times L$$ Portion of Load Carried by the Rear Axle **Equation 1**

- The second determines the portion of the load carried by the front axle (Lf).

$$Lf = L - Lr$$ Portion of Load Carried by the Front Axle **Equation 2**

Note: **For the purposes of calculation, the load (L) in these equations can be either actual revenue producing load or it can be other weight that is carried such as a van body or an optional fuel tank.**

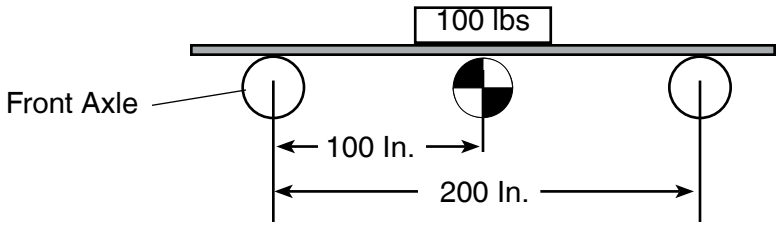


FIGURE B-1. Balanced Load: CGf 100 in. from front axle

Step 1. Figures B–1 and B–2 show a representation of a 200–inch (5080 mm) wheelbase (WB) truck designed to carry a 100–lb. (45.3–kg) load. Figure B–1 represents a truck with the load placed an equal distance between the two axles.

a. For our balanced load example we need to establish the center of gravity location (CGf, as shown in Figure B–1) by dividing the wheelbase by 2:

$$CGf = \frac{200}{2} = 100 \text{ in (2540mm)}$$

b. Use equations 1 and 2 to determine the portions of the load carried by each axle.

- The weight distribution is calculated as illustrated below:

$Lr = \frac{CGf}{WB} \times L$	$\frac{100}{200} \times 100 = 50$ lbs (23 kg)
$Lf = L - Lr$	100 - 50 = 50 lbs (23 kg)

- Since the load is centered between both axles, 50 percent of the load is carried by each axle: i.e., 50 lb. (22.6 kg) is distributed to each axle.

C. In Figure B–2, the load (L) is located 133 in. (3378 mm) from the front axle. Moving the load towards the rear axle changes the weight distribution. Use equations 1 and 2 to determine the portion of the load carried by each axle.

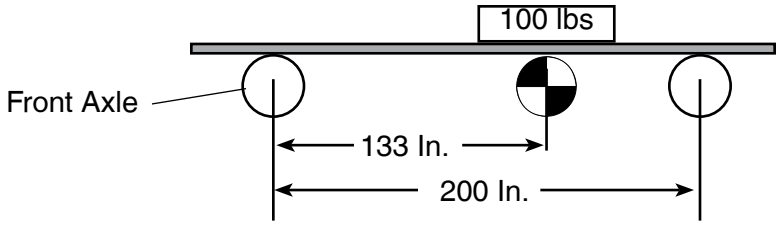


FIGURE B-2. Unbalanced Load: CGf 133 In. from Front Axle

CGf = 133 in. (3378 mm)

$Lr = \frac{CGf}{WB} \times L$ | $\frac{133}{200} \times 100 = 66$ lbs (30 kg)

$Lf = L - Lr$ | $100 - 66 = 34$ lbs (15 kg)

- The rear axle now carries a greater proportion of the load than the front axle.

Although it is usually not important to know the CG of the chassis; it is important to know the CG location of truck bodies, accessories, or loads that may be placed on the chassis. This example shows that the location of the CG of an object relative to the front and rear axles (FA and RA) affects the load carried by each axle.

For most relatively uniform objects such as van bodies and fuel tanks, the CG is located close to the midpoint of the object. For non–uniform objects such as liftgates and refrigeration units, obtain the CG from the equipment manufacturer.

Weight Distribution with Body

Chassis Weights

Step 2. In the following example, a truck is modified to include a van body mounted to the chassis. This example is a T370 chassis, 201 inches (5105 mm) WB, with a standard drivetrain and fuel tank. It is a 33,000 lb. GVWR with a 12,000 lb. front axle and a 21,000 lb. rear axle. In addition, the chassis is equipped with an optional RH under DPF with vertical pipe and a 46" tailpipe.

When calculating weight distributions, start by determining chassis ground weights for each axle. The actual chassis weight will vary with the wheelbase and the options installed. Listed in Tables B-1 and B-2 are the chassis tare weights for the standard single rear axle and tandem rear axle T370 vehicles and each wheelbase configuration.

From Table B-1 we see that the 201-inch wheelbase, 2-axle T370/T270 have the following chassis weights:

FA = 6522
RA = 3214

Table B-3 lists several available options on the T370 with nominal weights and CGs. See your Kenworth Dealer for more exact weights and CGs. It also lists their added weight when installed on the chassis and the location (from the front axle) of the CG of this added weight.

TABLE B-1. T270/T370 Single Rear Axle "Bare" Chassis Weights (no driver, no fuel).

Wheelbase	Front		Rear		Total	
	Lbs	kg	lbs	kg	lbs	kg
142	6146	2787	3295	1494	9441	4282
146	6174	2800	3278	1487	9452	4287
154	6256	2837	3282	1488	9538	4326
161	6317	2865	3282	1488	9599	4353
177	6401	2903	3242	1470	9643	4373
189	6469	2934	3232	1466	9701	4400
201	6522	2958	3214	1458	9736	4415
205	6555	2973	3227	1463	9782	4436
213	6585	2986	3215	1458	9800	4444
217	6600	2993	3212	1457	9812	4450
232	6713	3044	3261	1479	9974	4523
236	6728	3051	3258	1478	9986	4529
244	6767	3069	3266	1481	10033	4550
256	6805	3086	3262	1479	10067	4566
260	6832	3098	3276	1486	10108	4584
272	6868	3115	3275	1485	10143	4600
280	6896	3127	3279	1487	10175	4615

Appendix B
Weight Distribution

TABLE B-2. T170 Single Rear Axle "Bare" Chassis Weights (no driver, no fuel).

Wheelbase	Front		Rear		Total	
	Lbs	kg	lbs	kg	lbs	kg
140	5806	2633	2732	1239	8538	3872
152	5867	2661	2673	1212	8540	3873
176	5989	2716	2602	1180	8591	3896
188	6053	2745	2589	1174	8642	3919
206	6129	2780	2564	1163	8693	3942
218	6237	2829	2617	1187	8854	4015
236	6301	2858	2604	1181	8905	4039
245	6346	2878	2616	1186	8962	4064
254	6359	2884	2597	1178	8956	4062
260	6387	2897	2607	1182	8994	4079
272	6438	2920	2620	1188	9058	4108

TABLE B-3. T370 Tandem Rear Axle "Bare" Chassis Weights (no driver, no fuel).

Wheelbase	Front		Rear		Total	
	Lbs	kg	lbs	kg	lbs	kg
173	6353	2881	5885	2669	12238	5550
189	6482	2940	5906	2678	12388	5618
205	6564	2977	5897	2674	12461	5651
220	6637	3010	5894	2673	12531	5683
236	6706	3041	5897	2674	12461	5651
252	6818	3092	5951	2699	12769	5791
260	6864	3113	5969	2707	12833	5820
280	6924	3140	5967	2706	12891	5846

Note: **The weights in Table B-1, B2 and B3 represent a standard chassis (built to standard specifications). Weights do not include any options.**

Option Weights

Step 3. Some chassis are ordered with an optional transmission, suspension, cab items, etc. Each optional component will have a portion of its total weight distributed to both the front and rear axles. In all cases, you must calculate the load each option places on each axle.

TABLE B-4. T270/T370 Typical Options

Description	Wgt	Loc
Engines		
PX-8	507	-10
Engine Equipment		
Muffler/DPF RH horizontal mounted with horizontal LH exiting tailpipe PACCAR PX-6.	14	45
Muffler/DPF RH horizontal mounted with horizontal tailpipe PACCAR PX-8.	13	45
Muffler/DPF RH horizontal mounted with horizontal LH exiting tailpipe PACCAR PX-8.	26	45
Single vertical tailpipe up RH side of cab. PACCAR PX-6.	-2	32
Single vertical tailpipe up RH side of cab. PACCAR PX-8.	6	32
Single horizontal tailpipe. PACCAR PX-6.	23	35
Single horizontal tailpipe. PACCAR PX-8.	34	35
Muffler/DPF RH independent BOC mounted with vertical tailpipe PACCAR PX-6.	77	75
Muffler/DPF RH independent BOC mounted with vertical tailpipe PACCAR PX-8.	83	75
28” vertical curved tailpipe available with vertical exhaust only	6	68
34” vertical curved tailpipe available with vertical exhaust only	8	68
40” vertical curved tailpipe available with vertical exhaust only	11	68
46” vertical curved tailpipe available with vertical exhaust only.	12	68
52” vertical curved tailpipe available with vertical exhaust only.	16	68
58” vertical curved tailpipe available with vertical exhaust only.	18	68
Fuel filter heated PACCAR PX-6 engines only.	2	-8
Fleetguard heated fuel filter/water separator with WIF sensor for PACCAR PX-8	2	-8
Block heater, PACCAR PX-6 & PX-8.	2	-8
Compression brake for PACCAR PX-8. Replaces standard turbo brake	60	-8
270 amp Leece-Neville alternator with cab cut off switch & warning light, not PACCAR PX-6.	10	-8
Three PACCAR group 31, Dual purpose,12 volt, threaded post. Total 2100 CCA.	62	57
Two PACCAR group 31, Starting,12 volt, threaded post. Total 2000 CCA.	-6	57
Two Optima group 31 Deep cycle 12 volt, threaded post Total 1800 CCA	-16	57
Three Optima group 31 Deep cycle 12 volt, threaded post Total 2700 CCA	38	57
Jump start terminals frame mounted BOC below top flange.	8	74

Appendix B
Weight Distribution

Description	Wgt	Loc
Transmissions		
FS6406A/ FSO6406A/ FSO8406A	0	44
RT8709B	182	44
RT8908LL	292	46
FR9210B/ FRO11210B/ FRO11210C	191	44
RTO11908LL	292	46
2100HS 5-speed without PTO drive gear	8	39
2100RDS 5-speed with PTO drive gear	48	39
2200HS 5-speed without PTO drive gear	16	39
2200RDS 5-speed with PTO drive gear	56	39
2500HS 5-speed without PTO drive gear	16	39
2500RDS 5-speed with PTO drive gear	48	39
3000 without PTO drive gear	244	42
3000/3500 with PTO drive gear	291	42
P&D Hybrid transmission	179	25
Utility Hybrid transmission	179	25
Transmission Equipment		
14” Ceramic (low inertia)	30	8
14” MD Solo ceramic	30	8
Hybrid transmission clutch	37	8
Single Dana Spicer SPL100 Without centerbearing.	-37	3/4WB
Dual Dana Spicer SPL100 With centerbearing	13	3/4WB
Three Dana Spicer SPL100 With two centerbearings	85	3/4WB
Single Dana Spicer SPL140 Without centerbearing.	-12	3/4WB
Dual Dana Spicer SPL140 With centerbearing.	45	3/4WB
Three Dana Spicer SPL140 With two centerbearings.	127	3/4WB
Dual Standard duty With centerbearing (Dana Spicer 1710 series).	77	3/4WB
Three Standard duty With two centerbearings (Dana Spicer 1710 series).	169	3/4WB
Four Standard duty With three centerbearings (Dana Spicer 1710 series).	273	3/4WB
Single Dana Spicer SPL170 XL Without centerbearing.	0	3/4WB
Dual Dana Spicer SPL170 XL With centerbearing.	71	3/4WB
Three Dana Spicer SPL170 XL With two centerbearings.	176	3/4WB
Four Dana Spicer SPL170 XL With three centerbearings.	266	3/4WB
One heavy-duty centerbearing crossmember.	10	3/4WB
Two heavy-duty centerbearing crossmembers.	20	3/4WB
Three heavy-duty centerbearing crossmembers	30	3/4WB
Front Axle and Equipment		
Dana Spicer D-800F	-46	0
Dana Spicer I-80	-31	0
Dana Spicer E-1002I/E-1202I	0	0
Dana Spicer E-1322I	33	0
Dana Spicer E-1462I	36	0
Front Hydraulic Brakes	0	0
10K Air Brake: 15x4 Brakes	-48	0
10K/12K Taperleaf	0	0
13.2K/14.6K Taperleaf	11	0
TRW TAS40	-13	-16
TRW TAS65	0	-16
Sheppard M110P.	55	-16

Appendix B
Weight Distribution

Description	Wgt	Loc
Single Rear Axle and Equipment		
Dana Spicer 17060S.	-43	WB
Dana Spicer 19060S.	-43	WB
Dana Spicer 21060S.	0	WB
Dana Spicer S21-170	182	WB
Dana Spicer S23-170.	182	WB
Dana Spicer S23-190.	255	WB
Dana Spicer S26-190.	325	WB
Wheel differential lock for 17060S, 19060S or 21060S axles	15	WB
Wheel differential lock for S21-170, S23-170, S23-190 or S26-190 axles	28	WB
18K/21K Hydraulic Brake	0	WB
19K Air Brake	40	WB
23K/26K Air Brake:	0	WB
Tandem Rear Axle and Equipment		
Dana Spicer DSP41	2178	WB
Dana Spicer DSP41P	2196	WB
Wheel differential lock for Dana Spicer DSP40/DSP41(P), rear rear axle.	15	WB
Wheel differential lock for Dana Spicer DSP40/DSP41(P), forward rear & rear rear	38	WB
46K Air Brake:	0	WB
Single Axle suspensions		
21K Reyco 79KB. Taper leaf.	0	WB
Hendrickson HAS210L. Air.	-121	WB
23K Reyco 79KB. Taper leaf.	58	WB
Hendrickson HAS230L. Air.	-60	WB
26K Reyco 79KB. Multileaf with helper spring.	120	WB
Rear axle stabilizer bar for Reyco 79KB	68	WB
Rear shock absorbers for Reyco 79KB.	36	WB
Heavy-duty suspension crossmembers for Reyco 79KB replacing standard.	41	WB
Heavy duty suspension crossmembers for HAS210L & 230L replacing standard	4	WB
Tandem Axle suspensions		
Chalmers 854-40-XL./854-40-XL-HS	477	WB
Hendrickson HAS402.	450	WB
Hendrickson RT403.	463	WB
Reyco 102, multi-leaf.	482	WB
Bronze center bushings for Hendrickson 403 suspension	7	WB
Rear shock absorbers for Chalmers	35	WB
Front Tires		
Bridgestone 11R22.5 R250F 14PR	12	0
Bridgestone 12R22.5 R250F 16PR	40	0
Bridgestone 12R22.5 M843 16PR	74	0
Bridgestone 245/70R19.5 R250F 14PR	-74	0
Bridgestone 295/75R22.5 R250F 14PR	0	0
Bridgestone 295/80R22.5 R250F 16PR	36	0

Appendix B
Weight Distribution

Description	Wgt	Loc
Rear Tires		
Bridgestone 11R22.5 R250F 14PR	12	WB
Bridgestone 11R22.5 M711 14PR	22	WB
Bridgestone 11R22.5 M726EL 14PR	40	WB
Bridgestone 245/70R19.5 R250F 14PR	-74	WB
Bridgestone 245/70R19.5 M729F 14PR	-82	WB
Bridgestone 255/70R22.5 M726 16PR	-32	WB
Bridgestone 295/75R22.5 R250F 14PR	0	WB
Bridgestone 295/75R22.5 M720FE 14PR	8	WB
Bridgestone 295/75R22.5 M725 14PR	22	WB
Front Wheels		
Accuride 28680PW	-14	0
Alcoa 76449	-62	0
Accuride 50487PW	0	0
Accuride 50408PKWHT21	4	0
Alcoa 88364	-40	0
Kenworth 88761	-36	0
Rear Wheels		
Accuride 28680PW	-14	WB
Alcoa 76449	-62	WB
Accuride 50487PW	0	WB
Accuride 50408PKWHT21	4	WB
Accuride 29001PW	14	WB
Alcoa 88364	-40	WB
Kenworth 88761	-36	WB
Alcoa 88364 outside/ Accuride 50487PW inside	-20	WB
Accuride 29300RPW	80	WB
Frame & Equipment		
Steel inserts over 10' to 25'.	570	½ WB
Steel inserts over 25' to 35'.	798	½ WB
Front tow hook: 2 removable	16	-37
Delete bumper	-25	-37
Battery box: cantilever aluminum back-of-cab with fiberglass cover.	-21	80
Battery box: in-cab, steel under rider seat	-41	57
Battery box: temporary across the rails	-100	80
Battery box for Hybrid transmission	68	49
Toolbox: Steel under cab with aluminum diamond plate cover, without lock.	139	57
One aluminum crossmember for center frame replacing standard.	-11	½ WB
Two aluminum crossmember for center frame replacing standard.	-22	½ WB
One aluminum crossmember for rear frame replacing standard.	-11	½ WB
Rear cab crossmember replacing standard. (Required with Hybrid transmission)	18	65
Square end of frame with crossmember	41	WB+AF
Square end of frame with bolted crossmember.	41	WB+AF
Stainless steel quarter fenders with painted steel brackets.	55	WB-25
Black polypropylene quarter fenders with painted steel brackets.	43	WB-25
White plastic mudflaps antisail with KW logo.	9	WB+40
Betts B-25 standard duty, straight mudflap arms	12	WB+40
Power Electric Carrier (PEC) Hybrid	271	111

Appendix B
Weight Distribution

Description	Wgt	Loc
Fuel Tanks and Equipment		
FUEL per gallon	7	
50 gallon rectangular steel behind	126	85
56 gallon Al under replacement	-19	51
75 gallon Al under replacement	-11	56
100 gallon Al under replacement	0	64
120 gallon Al under replacement	8	70
56 gallon Al under additional	81	51
75 gallon Al under additional	90	56
56 gallon Al behind replacement	-86	95
75 gallon Al behind replacement	-79	101
100 gallon Al behind replacement	-68	108
56 gallon Al behind additional	72	95
75 gallon Al behind additional	81	101
NFPA step RH under	5	51
Cab and Equipment		
Grabhandle: LH/RH with short extension over door	5	58
NFPA compliant grabhandles, LH/RH.	4	58
Grabhandle: LH/RH inside door frame above dash.	2	25
Single air horn 23” LH top of roof.	6	39
Dual air horns 23” LH/RH top of roof.	12	39
Kenworth Aerodynamic Mirrors.	26	25
Single Convex Mirror Fender Mount	4	-30
Dual Convex Mirror Fender Mount	8	-30
Rear cab window Sliding	13	68
Corner windows Stationary	24	66
Delete standard rear cab window	-15	68
Outside sunvisor. Aerodynamic, with integral marker lights.	7	25
Outside sunvisor. Stainless steel.	11	25
Heater with integral defrosters in cab	-69	50
Adjustable telescoping tilt steering column.	9	25
Driver Kenworth Air Cushion Plus.	2	42
Driver Seats, Inc. 911 Non-SCBA.	10	42
Driver Kenworth Air Cushion with suspension air compressor	7	42
Rider Toolbox Plus High back	2	42
Rider Kenworth in-cab battery box low back	-40	42
Rider Kenworth in-cab battery box intermediate back	-38	42
Rider Kenworth in-cab battery box high back	-36	42
Rider Kenworth Air Cushion Plus intermediate back	33	42
Rider Kenworth Air Cushion Plus high back	33	42
Rider Seats, Inc. 911 SCBA. Fixed high back	26	42
Rider Two-passenger bench style.	62	42
Delete standard rider seat.	-71	42
Delete driver dual armrests.	-6	42
Delete rider dual armrests.	-6	42
Workstation between seats.	20	42
AM/FM radio and CB equipment	6	16

Description	Wgt	Loc
Lights and Signals		
Trucklite LED taillights	2	WB+AF
Delete taillights	-6	WB+AF
Backup alarm	4	WB+AF
Body builder harness.	2	½ WB
Strobe amber lamp 12V roof mounted	6	57
Dual strobe amber lamps 12V centered over cab door	12	57
Air Equipment		
Two Bendix DV-2 drain valves	2	57
Full truck kit	15	WB
Special Equipment		
Triangle Reflector Kit	4	60
Fire extinguisher	11	60

TABLE B-5. T170 Typical Options

Description	Wgt	Loc
Engine Equipment		
Fuel filter heated PACCAR PX-6 engines only.	2	-8
Block heater, PACCAR PX-6 & PX-8.	2	-8
Three PACCAR group 31, Dual purpose,12 volt, threaded post. Total 2100 CCA.	62	57
Two PACCAR group 31, Starting,12 volt, threaded post. Total 2000 CCA.	-6	57
Transmissions		
FS6406A/ FSO6406A/ FSO8406A	0	44
1000HS 5-speed without PTO drive gear	8	39
1000RDS 5-speed with PTO drive gear	48	39
Auto neutral for parking brakes.	1	30
14” Ceramic (low inertia) Engines, 606 to 860 lb.-ft.	30	98
Single Dana Spicer SPL100 Without centerbearing	-24	¾ WB
Dual Dana Spicer SPL100 With centerbearing.	13	¾ WB
Three Dana Spicer SPL100 With two centerbearings.	72	¾ WB
Front Axle		
Dana Spicer D-800F	-46	0
Taperleaf With shock absorbers	-30	0
Single Rear Axle and Equipment		
Dana Spicer S14-110.	-223	WB
Dana Spicer S14-130.	-223	WB
Limited slip for S14-110.	1	WB
Limited slip for S14-130.	1	WB
18K Hydraulic Brake: Includes 2x66MM Disc Brakes, Rotors, Iron 8-Bolt Hubs.	-42	WB

Appendix B
Weight Distribution

Description	Wgt	Loc
Front Tires		
Bridgestone 245/70R19.5 R250F 14PR	-74	0
Rear Tires		
Bridgestone 225/70R19.5 M729F 12PR	8	WB
Bridgestone 245/70R19.5 R250F 14PR	-74	WB
Front Wheels		
Accuride 28680PW	-14	0
Alcoa 76449	-62	0
Rear Wheels		
Accuride 28680PW	-14	WB
Alcoa 76449	-62	WB
Frame & Equipment		
White plastic antisail with KW logo.	9	WB+40
Betts B-25 standard duty, straight.	12	WB+40
Fuel Tanks and Equipment		
FUEL per gallon	7	
35 gallon Steel rectangular Behind Additional	126	80
Cab and Equipment		
Grabhandle: LH inside door frame above dash.	2	25
Grabhandle: RH inside door frame above dash.	2	25
Dual Prutsman 7” x 16”	2	25
Kenworth Aerodynamic Mirrors.	26	25
Mirror brackets 8’ load width	-2	25
Convex mirror Single 8” Stainless Steel RH fender mounted.	4	-30
Convex mirrors Dual 8” Stainless Steel Fender mounted.	8	-30
Convex mirrors Dual Heated 8” Stainless Steel Offset mounted.	11	25
Corner windows Stationary 17½” x 16” (two) &	24	66
Delete standard rear cab window.	-15	68
Window lifts Electric powered LH Electric powered RH.	4	40
Outside sunvisor. Stainless steel.	11	25
Heater with integral defrosters in cab with 5 mode rotary controls.	-69	50
T170 Tilt Steering Column.	9	25
Adjustable telescoping tilt steering column.	9	25
Drivers Seat Kenworth Air Cushion with suspension air compressor.	7	42
Rider Seat Kenworth Toolbox Plus. . High back.	2	42
Rider Seat Two-passenger bench style.	62	42
Delete standard rider seat.	-71	42
Delete driver dual armrests.	-6	42
Delete rider dual armrests.	-6	42
Delete glovebox door, with locking latch.	-2	25
Workstation between seats.	20	42

Description	Wgt	Loc
Cab and Equipment (continued)		
Kenworth AM/FM radio	4	25
Antenna, wiring, radio cutout & bracket for din-mounted radio. Includes speakers.	4	25
Dual CB antenna. ¾ wave.	1	25
Dash-mounted CB assembly includes bracket & binding posts.	4	25
Lights and Signals		
Delete taillights	-6	WB+AF
Backup alarm	4	WB+AF
Body builder harness.	2	1/2WB
Special Equipment		
Triangle Reflector Kit	4	60
Fire extinguisher	11	60

Note:

The options listed in Table B-3, B-4 and B-5 do not include all that are available. This list is included only to give a representation of option weights. For a complete current list or to obtain the weight of a particular option, consult a T170/T270/T370 Data Book at your nearest Kenworth Dealer.

We need to determine how the weight of the fuel in the standard 50 gallon tank is distributed to each of the axles. The fuel weighs 7 lbs/gallon. Therefore 50 gallons weighs 7 x 50 = 350 lbs (159 kg). From table B-4 we find the tank CG location relative to the front axle. The fuel tank is located 85 inches (2159 mm from the front axle. Add your results to the “bare” chassis axle weights from Table B-1 or Table B-2.

$$Lr = \frac{CGf}{WB} \times L \qquad \frac{85}{201} \times 350 = 148 \text{ lbs (67 kg)}$$

$$Lf = L - Lr \qquad 350 - 148 = 202 \text{ lbs (92 kg)}$$

Next we determine how the weight of the optional exhaust is distributed to each axle. From Table B-4 we determine the option weight to be 14 lbs (6 kg) and its CG location to be 45 inches (1143 mm).

Use equations 1 and 2 to calculate the distributed weight.

$$Lr = \frac{CGf \times L}{WB} \qquad \frac{45}{201} \times 14 = 3 \text{ lbs (1 kg)}$$

$$Lf = L - Lr \qquad 14 - 3 = 11 \text{ lbs (4 kg)}$$

In like manner the 46” tailpipe data is obtained from Table B-4 and its weight is distributed as follows:

$$Lr = \frac{CGf \times L}{WB} \qquad \frac{68}{201} \times 12 = 4 \text{ lbs (2 kg)}$$

$$Lf = L - Lr \qquad 12 - 4 = 8 \text{ lbs (4 kg)}$$

Appendix B
Weight Distribution

Now we will calculate the distributed weight of a 14 foot van body that weights 2400 pounds (1089 kg). Since an empty van is very close to a uniform object, you can assume that the CG of the van body is at a point equal to half of the BL.

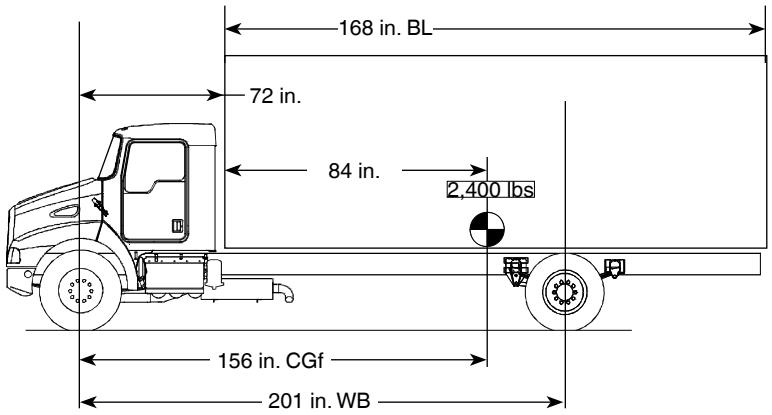


FIGURE B-3. Balanced Body Unloaded: CGf 156 in. (3962 mm) From Front Axle

When the body is mounted on the chassis, assume that the forward edge is positioned 4 inches (102 mm) behind the back of the cab. This is equivalent to 72 inches (1829 mm) behind the front axle. Therefore, the CG of the body is located 72 inches plus half the body length from the front axle.

$$CGf = \frac{1}{2} BL + 72 \qquad \frac{1}{2}(168) + 72 = 156 \text{ in.}$$

Use Equations 1 and 2 to calculate the distributed additional weight of the body:

$$Lr = \frac{CGf}{WB} \times L \qquad \frac{156}{201} \times 2400 = 1863 \text{ lbs (845 kg)}$$

$$Lf = L - Lr \qquad 2400 - 1863 = 537 \text{ lbs (244 kg)}$$

Adding a liftgate to the van body will present some interesting weight distribution results. We will add a 1000 pound (454 kg) liftgate to the end of the van body. The CG location of non-uniform objects, such as a liftgate, must be provided by the equipment manufacturer. For our example, the liftgate manufacturer has provided installation information that indicates the liftgate CGf is located 246 in (6248 mm) behind the front axle.

Rear Liftgate Example

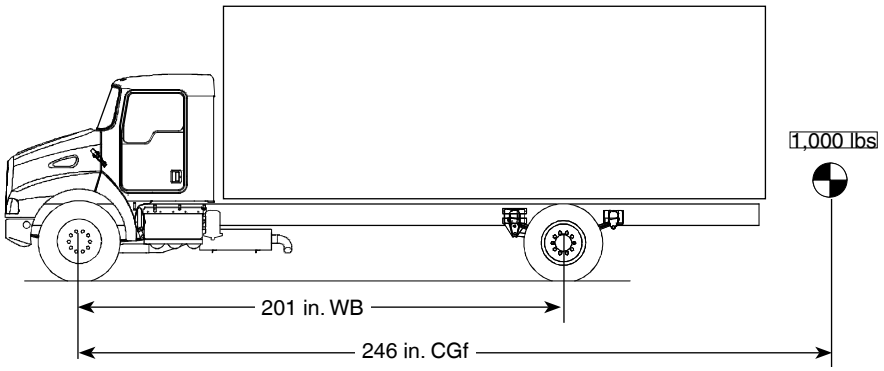


FIGURE B-4. Liftgate Example: CGf 246 in. (6248 mm) From Front Axle

Use CGf = 246 in equations 1 and 2 to determine how the liftgate weight is distributed to the axles.

$$Lr = \frac{CGf}{WB} \times L \qquad \frac{246}{201} \times 1000 = 1224 \text{ lbs (555 kg)}$$

$$Lf = L - Lr \qquad 1000 - 1224 = -224 \text{ lbs (-102 kg)}$$

This negative weight on the front axle illustrates the difference between the distribution of weight (L) mounted behind the rear axle versus in front of the rear axle.

- The load carried by the rear axle is greater than the weight of the liftgate itself. Since the weight of the liftgate (added to the vehicle) cannot be greater than 1,000 lb, the front axle loading is reduced by a compensating amount (224 lb). The combined weight on the front and rear axles is equal to that of the liftgate.
- Weight added behind the rear axle has the effect of unloading the front axle. The amount of this front axle load reduction is equal to the “extra” weight added to the rear axle.
- By positioning equipment behind the rear axle, the effective load on the rear axle is more than the weight of the equipment.
- The farther behind the rear axle the load is mounted, the greater the load on the rear axle. However, the combined weight, distributed to the front and rear axles (Lf plus Lr), does not exceed the weight of the liftgate.

In order to get a realistic curb weight, we add weight for a driver. For purposes of calculation, we use a standard of 200 lbs. (91 kg) for the driver. Of course, your driver weight will vary. Using CGf = 51 in equations 1 and 2:

$$Lr = \frac{CGf}{WB} \times L \qquad \frac{51}{201} \times 200 = 51 \text{ lbs (23 kg)}$$

$$Lf = L - Lr \qquad 200 - 51 = 149 \text{ lbs (68 kg)}$$

COMPLETE (LOADED) VEHICLE

Water Level Load

Step 4. The final step is to put a payload in the van. Assume that the payload is evenly distributed. Freight that is distributed evenly is referred to as a “water level” load. Our payload total is 16,000 lb. Since it is an evenly distributed “water level” load, its CG location will be the same as the CG location of the van body. See Figure B–5.

$$CGf = \frac{1}{2} BL + 72 \qquad \frac{1}{2}(168) + 72 = 156 \text{ in.}$$

Using CGf = 156 in equations 1 and 2:

$$Lr = \frac{CGf}{WB} X L \qquad \frac{156}{201} X\ 16{,}000 = 12{,}418 \text{ lbs } (5{,}632 \text{ kg})$$

$$Lf = L - Lr \qquad 16{,}000 - 12{,}418 = 3{,}582 \text{ lbs } (1{,}624 \text{ kg})$$

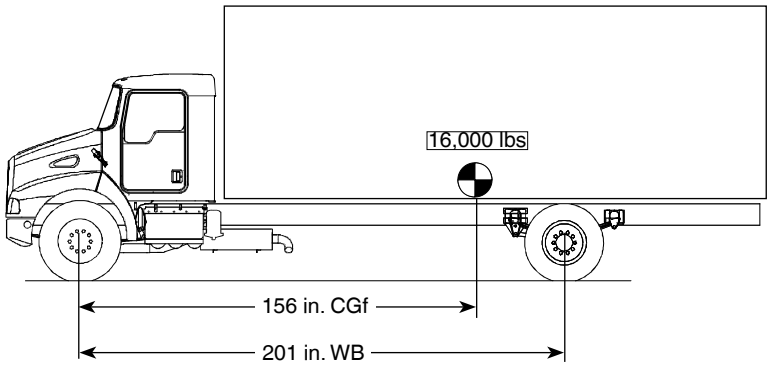


FIGURE B-5. Loaded Vehicle Example: CGf 156 inches (3962 mm) From Front Axle

TABLE B-6. T300 Weight Distribution and Chassis Rating Calculation

Item	Front Axle (FA) lb (kg)		Rear Axle (RA) lb (kg)		Total lb (kg)	
Chassis	6522	2958	3214	1458	9736	4416
Driver	149	68	51	23	200	91
Fuel	202	92	48	67	350	149
Exhaust	11	5	3	1	14	6
Tailpipe	8	4	4	2	12	6
Van Body	537	244	1863	845	2400	1089
Lift gate	-224	-102	1224	555	1000	453
Curb Weight	7205	3268	6507	2951	13712	6219
Payload	3582	1624	12418	5632	16000	7256
Total Ground	10787	4892	18925	8583	29712	13475

Weight Distribution Analysis

Step 5. The final step is to total all the front and rear axle weights to ensure that the axles are not overloaded. Table B-4 shows the assembled information in an easy to read format.

- Compare the calculated axle ground totals against the axle weight ratings to be sure that the truck is properly specified to haul this load.
- From this, it is evident that the chassis is properly equipped for this job.

These calculations illustrate the importance of doing the weight distribution analysis. In some cases the addition of one component (for example, a liftgate) can produce a dramatic difference.

Body Length

Step 6. Your analysis may produce results that indicate an overloaded axle with a total loaded chassis weight less than the GVW. This indicates that you need to use a different body length for the truck. Or if the body length is fixed you may need to change the wheelbase. Each wheelbase can accommodate several different body lengths. However, for each wheelbase and GVW one particular body length will provide best weight distribution.

Tables B-7, B-8 and B-9 list recommended body lengths for a particular wheelbase and GVW. These are not meant to be absolute fixed configurations and are presented to provide a good starting point. In fact it is very likely your chassis with options may have a weight distribution that is best suited for a different body length.

TABLE B-7. T270/T370 (Single Rear Axle) Recommended Body Lengths

Wheelbase in. (mm)	26K	30K	33K
142 (3607)	10	8	8
146 (3708)	10	8	8
154 (3912)	12	10	8
161 (4089)	12	10	8
177 (4496)	14	12	10
189 (4801)	16	14	12
201 (5105)	18	16	14
205 (5207)	20	16	14
213 (5410)	20	18	16
217 (5512)	22	18	16
232 (5893)	24	20	18
236 (5994)	24	22	18
244 (6198)	26	22	20
256 (6502)	28	24	22
260 (6604)	28	26	22
272 (6909)	30	26	24
280 (7112)	30	28	24

TABLE B-8. T370 (Tandem Rear Axle) Recommended Body Lengths

Wheelbase in. (mm)	52K
173 (4394)	14
189 (4801)	16
205 (5207)	18
220 (5588)	20
236 (5994)	22
252 (6401)	24
260 (6604)	26
280 (7112)	30

TABLE B-9. T170 (Class 5) Recommended Body Lengths

Wheelbase in. (mm)	19.5K
140 (3556)	8
152 (3861)	8
176 (4470)	12
188 (4775)	14
206 (5232)	16
218 (5537)	18
236 (5994)	22
245 (6223)	22
254 (6452)	24
260 (6604)	26
272 (6909)	28

Note: **Charts were created for a standard, no options, vehicle. With options that affect the weight distribution, your actual results may be different.**

Index

A PACCAR COMPANY

Kenworth Truck Company
P.O. Box 1000
Kirkland, WA 98083
(425) 828-5000

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