

# 2009 GM/Isuzu TRUCK

<b>INTRODUCTION .....</b>	<b>1</b>
<b>FMVSS Chart .....</b>	<b>2</b>
<b>EPA Requirements .....</b>	<b>4</b>
<b>INSTALLATION OF BODY AND SPECIAL EQUIPMENT .....</b>	<b>8</b>
<b>Clearances .....</b>	<b>8</b>
Engine.....	8
Transmission .....	8
Front and Center Propeller Shafts.....	9
Rear Propeller Shaft.....	10
Exhaust System.....	10
Rear Wheel and Axle.....	14
Other Clearances .....	14
<b>Body Installations .....</b>	<b>15</b>
Chassis.....	15
Mirrors .....	15
Special Equipment on the Chassis .....	15
Subframe Design and Mounting .....	15
Subframe Contour.....	16
<b>Prohibited Attachment Areas.....</b>	<b>17</b>
<b>Subframe Mounting.....</b>	<b>17</b>
Bracket Installation .....	18
Modular Frame Hole Pattern.....	19
U-bolt Installation.....	20
<b>Crew Cab Body/Frame Requirements.....</b>	<b>20</b>
<b>Modification of the Frame .....</b>	<b>21</b>
Working on Chassis Frame.....	21

# 2009 GM/Isuzu TRUCK

## INSTALLATION OF BODY AND SPECIAL EQUIPMENT – Modification of the Frame – (Continued)

Drilling and Welding .....	21
Reinforcement of Chassis Frame .....	22
Welding .....	22
<b>Fluid Lines .....</b>	<b>23</b>
Preparation of Additional Lines .....	23
Installation of Additional Lines .....	24
<b>Electrical Wiring and Harnessing .....</b>	<b>24</b>
Wiring .....	25
Wire Color Code .....	27
<b>Maximum Allowable Current .....</b>	<b>27</b>
Electrical System Modifications .....	28
<b>Exhaust System .....</b>	<b>28</b>
<b>Fuel System .....</b>	<b>29</b>
<b>Rear Lighting .....</b>	<b>29</b>
<b>Serviceability .....</b>	<b>29</b>
<b>Wheelbase Alteration .....</b>	<b>30</b>
<b>BODY APPLICATION SUMMARY CHART .....</b>	<b>36</b>
2009 Gas and 2009 Diesel Model Body Application Summary Chart .....	36
<b>NPR/W3500, NPR HD/W4500 Gas .....</b>	<b>38</b>
2009 Model Year – Body & Payload Weight Distribution (% Front/% Rear) .....	38
<b>NPR/W3500, NPR HD/W4500 Diesel .....</b>	<b>39</b>
2009 Model Year – Body & Payload Weight Distribution (% Front/% Rear) .....	39
<b>NQR/W5500 Diesel .....</b>	<b>40</b>
2009 Model Year – Body & Payload Weight Distribution (% Front/% Rear) .....	40
<b>NRR/W5500 HD Diesel .....</b>	<b>40</b>
2009 Model Year – Body & Payload Weight Distribution (% Front/% Rear) .....	40

# 2009 GM/Isuzu TRUCK

## **BODY APPLICATION SUMMARY CHART– NPR/W5500 HD Diesel – (Continued)**

<b>NPR/W3500, NPR HD/W4500 Gas Crew Cab, NQR/W5500 Diesel Crew Cab.....</b>	<b>41</b>
2009 Model Year – Diesel Crew Cab Body & Payload Weight Distribution (% Front/% Rear) .....	41
<b>MECHANICAL AND CAB SPECIFICATIONS.....</b>	<b>42</b>
<b>Engine Horsepower &amp; Torque Chart.....</b>	<b>42</b>
<b>GVW/GCW Ratings.....</b>	<b>42</b>
<b>Rear Frame Height Chart.....</b>	<b>43</b>
<b>Paint Code Chart.....</b>	<b>44</b>
<b>N/W Series Towing Procedure.....</b>	<b>46</b>
Front End Towing (Front Wheels Off the Ground) .....	46
Front End Towing (All Wheels On the Ground) .....	47
Rear End Towing (Rear Wheels Off the Ground) .....	48
Special Towing Instructions .....	49
<b>WEIGHT DISTRIBUTION CONCEPTS .....</b>	<b>50</b>
<b>Weight Restrictions.....</b>	<b>50</b>
<b>Gross Axle Weight Rating.....</b>	<b>51</b>
<b>Weighing the Vehicle.....</b>	<b>51</b>
<b>Tire Inflation.....</b>	<b>51</b>
<b>Center of Gravity .....</b>	<b>51</b>
<b>Weight Distribution.....</b>	<b>52</b>
<b>Glossary of Dimensions.....</b>	<b>54</b>
<b>Weight Distribution Formulas.....</b>	<b>55</b>
<b>Basic Formulas.....</b>	<b>56</b>
<b>Weight Distribution Formulas in Words.....</b>	<b>56</b>
<b>Recommended Weight Distribution % of Gross Vehicle Weight by Axle.....</b>	<b>61</b>
Conventional (2 Axle) .....	61

# 2009 GM/Isuzu TRUCK

## WEIGHT DISTRIBUTION CONCEPTS – (Continued)

COE (2 Axle) .....	61
Conventional (3 Axle) .....	62
COE (3 Axle) .....	62
<b>Trailer Weight .....</b>	<b>63</b>
Payload at Kingpin .....	64
Payload at Rear Tandem .....	64
<b>Performance Calculations .....</b>	<b>65</b>
1. Speed Formula .....	65
2. Grade Horsepower Formula .....	66
3. Air Resistance Horsepower Formula .....	67
4. Engine Horsepower Formula .....	68
5. Gradeability Formula .....	69
6. Startability Formula .....	70
7. Vertical Center of Gravity Formula .....	71
8. Horizontal Center of Gravity Formula .....	73
<b>Highway System Limits .....</b>	<b>75</b>
Bridge Formula Definitions .....	75
Exception to the Bridge Formula .....	76
Other Federal Provisions .....	76
<b>Federal Bridge Formula Table .....</b>	<b>77</b>
<b>COMMODITY AND MATERIAL WEIGHTS .....</b>	<b>80</b>
Approximate Weights of Commodities and Materials .....	80
<b>VEHICLE SPECIFICATIONS INDEX .....</b>	<b>87</b>
NPR/W3500, NPR HD/W4500 Gas .....	87
Specifications .....	87
Vehicle Weights, Dimensions and Ratings .....	88



# 2009 GM/Isuzu TRUCK

## VEHICLE SPECIFICATIONS INDEX – (Continued)

Variable Chassis Dimensions .....	89
Dimension Constants: 12,000 GVW .....	89
12,000-lb. GVWR with 4L80-E Hydra-Matic Transmission Model California/Federal .....	89
Dimension Constants: 14,500 GVW .....	90
14,500-lb. GVWR with 4L30-E Hydra-Matic Transmission Model California/Federal .....	90
Vehicle Weight Limits .....	91
<b>Frame and Crossmember Specifications.....</b>	<b>92</b>
<b>Frame Chart.....</b>	<b>93</b>
<b>Auxiliary Views.....</b>	<b>94</b>
<b>Body Builder Weight Information Chart .....</b>	<b>95</b>
Cab Tilt .....	95
Center of Gravity .....	95
<b>Front Axle Chart.....</b>	<b>97</b>
<b>Rear Axle Chart .....</b>	<b>98</b>
Definitions .....	99
Formulas for Calculating Rear Width and Height Dimensions .....	99
<b>Suspension Deflection Charts – NPR/W3500 Gas, NPR HD/W4500 Gas .....</b>	<b>100</b>
<b>Tire and Disc Wheel Chart – NPR/W3500.....</b>	<b>101</b>
Tire .....	101
Disc Wheel .....	101
<b>Tire and Disc Wheel Chart – NPR HD/W4500.....</b>	<b>102</b>
Tire .....	102
Disc Wheel .....	102
<b>Propeller Shaft .....</b>	<b>103</b>
<b>Brake System Diagram, 12,000 GVW .....</b>	<b>105</b>
Vacuum Over Hydraulic .....	105

# 2009 GM/Isuzu TRUCK

## VEHICLE SPECIFICATIONS INDEX – NPR/W3500, NPR HD/W4500 Gas – (Continued)

<b>Brake System Diagram, 14,500 GVW .....</b>	<b>106</b>
Vacuum Over Hydraulic .....	106
<b>Through the Rail Fuel Fill.....</b>	<b>107</b>
Installation Instructions .....	107
<b>Rear View Fuel Fill .....</b>	<b>108</b>
<b>Top View Fuel Fill .....</b>	<b>109</b>
<b>Through the Rail Fuel Fill Frame Hole .....</b>	<b>110</b>
<b>Fuel Fill Parts Illustration .....</b>	<b>111</b>
<b>Fuel Fill Parts List .....</b>	<b>112</b>
<b>NPR/W3500, NPR HD/W4500 Crew Cab Gas.....</b>	<b>115</b>
<b>Specifications .....</b>	<b>115</b>
<b>Vehicle Weights, Dimensions and Ratings .....</b>	<b>116</b>
Variable Chassis Dimensions .....	117
Dimension Constants: 12,000 GVW .....	117
12,000-lb. GVWR with 4L80-E Hydra-Matic Transmission Model California/Federal .....	118
Dimension Constants: 14,500 GVW .....	118
14,500-lb. GVWR with 4L30-E Hydra-Matic Transmission Model California/Federal .....	118
Vehicle Weight Limits .....	119
<b>Frame and Crossmember Specifications.....</b>	<b>120</b>
<b>Frame Chart.....</b>	<b>121</b>
<b>Auxiliary Views.....</b>	<b>122</b>
<b>Body Builder Weight Information Chart .....</b>	<b>124</b>
Center of Gravity .....	124
<b>Front Axle Chart.....</b>	<b>126</b>

## VEHICLE SPECIFICATIONS INDEX – NPR/W3500, NPR HD/W4500 Crew Cab Gas – (Continued)

<b>Rear Axle Chart .....</b>	<b>128</b>
Definitions .....	129
Formulas for Calculating Rear Width and Height Dimensions .....	129
<b>Suspension Deflection Charts – NPR/W3500 Gas, NPR HD/W4500 Crew Cab Gas .....</b>	<b>132</b>
<b>Tire and Disc Wheel Chart – NPR/W3500 Crew Cab Gas .....</b>	<b>133</b>
Tire .....	133
Disc Wheel .....	133
<b>Tire and Disc Wheel Chart – NPR HD/W4500 Crew Cab Gas .....</b>	<b>134</b>
Tire .....	134
Disc Wheel .....	134
<b>Propeller Shaft .....</b>	<b>135</b>
<b>Brake System Diagram, 12,000 GVW .....</b>	<b>140</b>
Vacuum Over Hydraulic .....	140
<b>Brake System Diagram, 14,500 GVW .....</b>	<b>141</b>
Vacuum Over Hydraulic .....	141
<b>Through the Rail Fuel Fill.....</b>	<b>142</b>
Installation Instructions .....	142
Rear View Fuel Fill .....	143
Top View Fuel Fill .....	144
Through the Rail Fuel Fill Frame Hole .....	145
Fuel Fill Parts Illustration .....	146
Fuel Fill Parts List .....	147
<b>NPR/W3500, NPR HD/W4500 Diesel.....</b>	<b>148</b>
Specifications .....	148
Vehicle Weights, Dimensions and Ratings .....	149

# 2009 GM/Isuzu TRUCK

## VEHICLE SPECIFICATIONS INDEX – NPR/W3500, NPR HD/W4500 Diesel – (Continued)

Variable Chassis Dimensions .....	150
Dimension Constants.....	150
In-Frame Tank 12,000-lb. GVWR Automatic Transmission Model.....	151
In-Frame Tank 14,500-lb. GVWR Automatic Transmission Model .....	151
Side-Mounted Tank 12,000-lb. GVWR Automatic Transmission Model .....	152
Side-Mounted Tank 14,500-lb. GVWR Automatic Transmission Model .....	152
Vehicle Weight Limits .....	153
<b>Frame and Crossmember Specifications .....</b>	<b>154</b>
<b>Frame Chart.....</b>	<b>155</b>
<b>Auxiliary Views 109" wheelbase.....</b>	<b>156</b>
<b>Auxiliary Views 132.5" wheelbase.....</b>	<b>157</b>
<b>Auxiliary Views 150" wheelbase.....</b>	<b>158</b>
<b>Auxiliary Views 176" wheelbase.....</b>	<b>159</b>
<b>Body Builder Weight Information Chart .....</b>	<b>160</b>
Cab Tilt .....	160
Center of Gravity .....	161
<b>Front Axle Chart.....</b>	<b>162</b>
<b>Rear Axle Chart .....</b>	<b>163</b>
Definitions .....	164
Formulas for Calculating Rear Width and Height Dimensions .....	164
<b>Suspension Deflection Charts .....</b>	<b>165</b>
<b>Tire and Disc Wheel Chart.....</b>	<b>166</b>
Tire .....	166
Disc Wheel .....	166
<b>Propeller Shaft .....</b>	<b>167</b>
<b>PTO Location, Drive Gear and Opening Information.....</b>	<b>169</b>

# 2009 GM/Isuzu TRUCK

## VEHICLE SPECIFICATIONS INDEX – NPR/W3500, NPR HD/W4500 Diesel – (Continued)

Opening Diagram.....	170
<b>Brake System Diagram, 12,000 GVW .....</b>	<b>171</b>
Vacuum Over Hydraulic .....	171
<b>Brake System Diagram, 14,500 GVW .....</b>	<b>172</b>
Vacuum Over Hydraulic .....	172
<b>In-Frame Diesel Fuel Fill.....</b>	<b>173</b>
Installation Instructions.....	173
<b>Rear View Fuel Fill .....</b>	<b>174</b>
<b>Top View Fuel Fill .....</b>	<b>175</b>
<b>Hose Modification for Various Width Bodies.....</b>	<b>176</b>
<b>Ultra Low Sulfur Diesel Label.....</b>	<b>177</b>
<b>Through the Rail Fuel Fill Frame Hole .....</b>	<b>178</b>
<b>Fuel Fill Parts Illustration .....</b>	<b>179</b>
<b>Fuel Fill Parts List .....</b>	<b>180</b>
<b>NQR/W5500 Diesel .....</b>	<b>181</b>
<b>Specifications.....</b>	<b>181</b>
<b>Vehicle Weights, Dimensions and Ratings.....</b>	<b>182</b>
Variable Chassis Dimensions.....	183
Dimension Constraints.....	183
In-Frame Tank 17,950-lb. GVWR Automatic Transmission Model.....	184
Side-Mounted Tank 17,950-lb. GVWR Automatic Transmission Model .....	184
Vehicle Weight Limits .....	185
<b>Frame and Crossmember Specifications.....</b>	<b>186</b>
<b>Frame Chart.....</b>	<b>187</b>
<b>Auxiliary Views 109" wheelbase.....</b>	<b>188</b>
<b>Auxiliary Views 132.5" wheelbase.....</b>	<b>189</b>

# 2009 GM/Isuzu TRUCK

## VEHICLE SPECIFICATIONS INDEX – AUXILIARY VIEWS – NQR/W5500 Diesel – (Continued)

<b>Auxiliary Views 150" wheelbase</b> .....	<b>190</b>
<b>Auxiliary Views 176" wheelbase</b> .....	<b>191</b>
<b>Auxiliary Views 200" wheelbase</b> .....	<b>192</b>
<b>Body Builder Weight Information Chart</b> .....	<b>193</b>
Cab Tilt .....	193
Center of Gravity .....	194
<b>Front Axle Chart</b> .....	<b>195</b>
Formulas for Calculating Height Dimensions .....	195
<b>Rear Axle Chart</b> .....	<b>196</b>
Definitions.....	197
Formulas for Calculating Rear Width and Height Dimensions.....	197
<b>Suspension Deflection Charts</b> .....	<b>198</b>
<b>Tire and Disc Wheel Chart</b> .....	<b>199</b>
Tire .....	199
Disc Wheel .....	199
<b>Propeller Shaft</b> .....	<b>200</b>
<b>PTO Location, Drive Gear and Opening Information</b> .....	<b>202</b>
Opening Diagram.....	203
<b>Brake System Diagram, Hydraulic Brake Booster</b> .....	<b>204</b>
<b>Diesel Fuel Fill</b> .....	<b>205</b>
Installation Instructions .....	205
<b>Rear View Fuel Fill</b> .....	<b>206</b>
<b>Top View Fuel Fill</b> .....	<b>207</b>
<b>Hose Modification for Various Width Bodies and Fuel Fill Vent Orientation and Protection</b> .....	<b>208</b>
<b>Ultra Low Sulfur Diesel Label</b> .....	<b>209</b>
<b>Through the Rail Fuel Fill Frame Hole</b> .....	<b>210</b>

# 2009 GM/Isuzu TRUCK

## VEHICLE SPECIFICATIONS INDEX – NQR/W5500 Diesel – (Continued)

<b>NQR/W5500 Diesel Fuel Fill Parts Illustration .....</b>	<b>211</b>
<b>NQR/W5500 Diesel Fuel Fill Parts List .....</b>	<b>212</b>
<b>NPR HD/W4500, NQR/W5500 Crew Cab Diesel.....</b>	<b>213</b>
<b>Specifications .....</b>	<b>213</b>
<b>Vehicle Weights, Dimensions and Ratings.....</b>	<b>214</b>
NPR HD/W4500 Variable Chassis Dimensions .....	215
NPR HD/W4500 Dimension Constants.....	215
NPR HD/W4500 In-Frame Tank 14,500-lb. GVWR Automatic Transmission Model.....	215
NPR HD/W4500 Side-Mounted Tank 14,500-lb. GVWR Automatic Transmission Model .....	215
NQR/W5500 Variable Chassis Dimensions.....	216
NQR/W5500 Dimension Constants .....	216
NQR/W5500 In-Frame Tank 17,950-lb. GVWR Automatic Transmission Model .....	216
NQR/W5500 Side-Mounted Tank 17,950-lb. GVWR Automatic Transmission Model .....	216
Vehicle Weight Limits .....	217
<b>Frame and Crossmember Specifications.....</b>	<b>218</b>
<b>Frame Chart.....</b>	<b>219</b>
<b>Auxiliary Views 150" wheelbase.....</b>	<b>220</b>
<b>Auxiliary Views 176" wheelbase.....</b>	<b>221</b>
<b>Body Builder Weight Information Chart .....</b>	<b>222</b>
NPR HD/W4500.....	222
Center of Gravity .....	222
NQR/W5500.....	223
Center of Gravity .....	223
<b>Front Axle Chart NPR HD/W4500.....</b>	<b>224</b>
Formulas for Calculating Height Dimensions .....	224

# 2009 GM/Isuzu TRUCK

## VEHICLE SPECIFICATIONS INDEX – NPR HD/W4500, NQR/W5500 Crew Cab Diesel – (Continued)

<b>Front Axle Chart NQR/W5500 .....</b>	<b>225</b>
Formulas for Calculating Height Dimensions .....	225
<b>Rear Axle Chart NPR HD/W4500.....</b>	<b>226</b>
Definitions.....	227
Formulas for Calculating Rear Width and Height Dimensions.....	227
<b>Rear Axle Chart NQR/W5500.....</b>	<b>228</b>
Definitions.....	229
Formulas for Calculating Rear Width and Height Dimensions.....	229
<b>Suspension Deflection Charts NPR HD/W4500 .....</b>	<b>230</b>
<b>Suspension Deflection Charts NQR/W5500.....</b>	<b>231</b>
<b>Tire and Disc Wheel Chart NQR/W4500 .....</b>	<b>232</b>
Tire .....	232
Disc Wheel .....	232
<b>Tire and Disc Wheel Chart NQR/W5500 .....</b>	<b>233</b>
Tire .....	233
Disc Wheel .....	233
<b>Propeller Shaft NPR HD/W4500 .....</b>	<b>234</b>
<b>Propeller Shaft NQR/W5500 .....</b>	<b>235</b>
<b>PTO Location, Drive Gear and Opening Information .....</b>	<b>237</b>
Opening Diagram.....	238
<b>Brake System Diagram 14,500 GVW.....</b>	<b>239</b>
Vacuum Over Hydraulic .....	239
<b>Brake System Diagram 17,950 GVW.....</b>	<b>240</b>
Vacuum Over Hydraulic .....	240



# 2009 GM/Isuzu TRUCK

## VEHICLE SPECIFICATIONS INDEX – NPR HD/W4500, NQR/W5500 Crew Cab Diesel – (Continued)

Diesel Fuel Fill .....	241
Installation Instructions .....	241
Rear View Fuel Fill .....	242
Top View Fuel Fill .....	243
Hose Modification for Various Width Bodies and Fuel Fill Vent Orientation and Protection .....	244
Ultra Low Sulfur Diesel Label.....	245
Through the Rail Fuel Fill Frame Hole .....	246
Fuel Fill Parts Illustration .....	247
Fuel Fill Parts List .....	248
NRR/W5500-HD.....	249
Specifications .....	249
Vehicle Weights, Dimensions and Ratings.....	250
Variable Chassis Dimensions.....	251
Dimension Constants.....	251
In-Frame Tank 19,500-lb. GVWR Automatic Transmission Model.....	251
Side-Mounted Tank 19,500-lb. GVWR Automatic Transmission Model .....	252
Vehicle Weight Limits .....	252
Frame and Crossmember Specifications.....	253
Frame Chart.....	254
Auxiliary Views 109" wheelbase.....	255
Auxiliary Views 132.5" wheelbase.....	256
Auxiliary Views 150" wheelbase.....	257
Auxiliary Views 176" wheelbase.....	258
Auxiliary Views 200" wheelbase.....	259
Auxiliary Views 212" wheelbase.....	260

## VEHICLE SPECIFICATIONS INDEX – NRR/W5500-HD – (Continued)

<b>Body Builder Weight Information Chart .....</b>	<b>261</b>
Cab Tilt .....	261
Center of Gravity .....	262
<b>Front Axle Chart.....</b>	<b>263</b>
<b>Rear Axle Chart .....</b>	<b>264</b>
Definitions .....	265
Formulas for Calculating Rear Width and Height Dimensions .....	265
<b>Suspension Deflection Charts .....</b>	<b>266</b>
<b>Tire and Disc Wheel Chart.....</b>	<b>267</b>
Tire .....	267
Disc Wheel .....	267
<b>Propeller Shaft .....</b>	<b>268</b>
<b>PTO Location, Drive Gear and Opening Information .....</b>	<b>270</b>
Opening Diagram .....	271
<b>Brake System Diagram, Hydraulic Brake Booster.....</b>	<b>272</b>
<b>Diesel Fuel Fill .....</b>	<b>273</b>
Installation Instructions .....	273
<b>Rear View Fuel Fill.....</b>	<b>274</b>
<b>Top View Fuel Fill.....</b>	<b>275</b>
<b>Hose Modification for Various Width Bodies and Fuel Fill Vent Orientation and Protection .....</b>	<b>276</b>
Ultra Low Sulfur Diesel Label .....	277
<b>Through the Rail Fuel Fill Frame Hole .....</b>	<b>278</b>
<b>NRR/W5500-HD Diesel Fuel Fill Parts Illustration.....</b>	<b>279</b>
<b>NRR/W5500-HD Diesel Fuel Fill Parts List.....</b>	<b>280</b>
<b>NPR/W3500, NPR HD/W4500 Gas Electrical .....</b>	<b>281</b>

# 2009 GM/Isuzu TRUCK

## VEHICLE SPECIFICATIONS INDEX – NRR/W5500-HD – (Continued)

<b>Symbols.....</b>	<b>281</b>
<b>Abbreviations.....</b>	<b>282</b>
<b>Wiring .....</b>	<b>283</b>
Wire Color .....	283
Distinction of Circuit by Wire Base Color .....	284
Wire Size .....	284
<b>Grounding Point Location (B-52, B-244, J-7, J-8, J-11, B-53, B-54) .....</b>	<b>286</b>
<b>Grounding Point Location (B-56, B-57, B-60, B-51, B-58, B-59) .....</b>	<b>287</b>
<b>Grounding Point Location (J-9, J-10, J-12).....</b>	<b>288</b>
<b>Grounding Point Location (Camshaft Position Sensor) (E-97, E-98, E-105, P-5) .....</b>	<b>289</b>
<b>Reference Table of Grounding Points .....</b>	<b>290</b>
<b>NPR/W3500, NPR HD/W4500 Gas – Electrical – Body Room Light, ID and Marker Light Connector Location and Circuit Diagram .....</b>	<b>291</b>
NPR/W3500 Body Connectors LH Frame.....	291
NPR/W3500 Body Connectors EOF .....	292
<b>Fuse Location.....</b>	<b>293</b>
<b>Fuse Chart.....</b>	<b>294</b>
<b>Relay Chart .....</b>	<b>296</b>
<b>Relay Location.....</b>	<b>297</b>
<b>Slow Blow Fuses .....</b>	<b>298</b>
<b>Headlights (Low Beam).....</b>	<b>299</b>
<b>Headlights (High Beam) .....</b>	<b>300</b>
<b>Tail Lights .....</b>	<b>301</b>
<b>Roof Marker Lights .....</b>	<b>302</b>
<b>Roof Clearance Lights .....</b>	<b>303</b>

# 2009 GM/Isuzu TRUCK

## VEHICLE SPECIFICATIONS INDEX – NPR/W3500, NPR HD/W4500 Gas – (Continued)

Rear Turn Signal Lights .....	304
Back Up Light, Back Up Alarm Circuit .....	305
Cigar Lighter Circuits.....	306
Radio Circuits .....	307
Auxiliary Power Source Circuit Diagram.....	308
Fuel Tank Sending Unit Resistance Values.....	309
Model Year Fuel Tank Sending Unit Resistance Values.....	310
NPR/W3500, NPR HD/W4500, NQR/W5500, NRR/W5500-HD Diesel Electrical.....	311
Symbols.....	311
Abbreviations.....	312
Wiring .....	313
Wire Color .....	313
Distinction of Circuit by Wire Base Color .....	314
Wire Size .....	314
Grounding Point Location (E-9, E-17, E-18, E-21) .....	316
Grounding Point Location (B-52, B-53, B-54, B-244, J-7, J-8, J-9, J-10, J-12, J-13, J-109, J-110) .....	317
Grounding Point Location (E-74, P-5).....	318
Reference Table of Grounding Points .....	319
NPR/W3500, NPR HD/W4500, NQR/W5500, NRR/W5500 HD Diesel – Electrical – Body Room Light, ID and Marker Light Connector Location and Circuit Diagram .....	320
Fuse Location .....	322
Fuse Box .....	323
Relay Location.....	324
Slow Blow Fuse and Diode Chart .....	326
Headlights (Low Beam).....	327
Headlights (High Beam).....	328

## VEHICLE SPECIFICATIONS INDEX – NPR/W3500, NPR HD/W4500, NQR/W5500, NRR/W5500-HD Diesel – (Continued)

Tail Lights .....	329
Roof Marker Lights .....	330
Roof Clearance Lights .....	331
Rear Turn Signal Lights .....	332
Back Up Light Circuit.....	333
Back Up Alarm Circuit .....	334
Cigar Lighter Circuits.....	335
Radio Circuits .....	336
Auxiliary Power Source Circuit Diagram.....	337
Fuel Tank Sending Unit Resistance (In-Frame Tank) .....	338
Fuel Tank Sending Unit Resistance (Side-Mounted Tank).....	339
PTO Section for the 4HK1-TC Engine (IR6) .....	340
Section Outline .....	340
Overview .....	341
Vocation/Modes .....	341
Factory Installed Equipment .....	342
Upfitter Installed Equipment .....	342
ECM Programmable Functions.....	342
PTO Switch Operation .....	343
PTO Switch Description.....	344
Stationary Preset Mode .....	344
Stationary Variable Mode .....	346
Mobile Variable Mode .....	348
Power Take Off – 4HK1-TC Engine – PTO Engine Shutdown.....	350

# 2009 GM/Isuzu TRUCK

## VEHICLE SPECIFICATIONS INDEX – NPR/W3500, NPR HD/W4500, NQR/W5500, NRR/W5500-HD – (Continued)

Location of PTO Switch and Indicator .....	351
Location of Cruise Control Switches .....	352
PTO Switch Connector and Harness.....	353
PTO Harness 1 & 2 .....	356
PTO Harness Connector (H 104).....	355
PTO Harness Connector (H 105).....	356
PTO Switch & Vehicle Speed Sensor2.....	357
PTO Resume, Disable and Set Switch.....	358
Brake Clutch Override, I/P Disable, Set A and B Switches .....	359
PTO Enable Relay .....	360
PTO Throttle Sensor.....	361
Low Speed Application for N and W-Series Chassis.....	362
Auxiliary Transmission Cooler Warning .....	362
Transmission Temperature Warning Lamp .....	362
Understanding DPF (Diesel Particulate Filter) Regeneration.....	362
N-Series and W-Series Regeneration Modes .....	364
F/T/C-Series Regeneration Modes .....	366
Diesel Air Cleaner Canister .....	368
<b>MANUAL TRANSMISSION SUPPLEMENT</b>	
NPR-HD/W5500, NQR/W5500, NRR/W5500 HD – Diesel .....	369
Mechanical Specifications .....	370
Engine Horsepower and Torque Chart.....	370
GVW/GCWR Chart.....	370
Specifications.....	371
Chassis Weight .....	372

# 2009 GM/Isuzu TRUCK

## MANUAL TRANSMISSION SUPPLEMENT – NPR-HD/W5500, NQR/W5500, NRR/W5500 HD – Diesel – (Continued)

Frame & Crossmember Specifications .....	373
PTO Location, Drive Gear and Opening .....	374
<b>Body Builder Weight Information.....</b>	<b>376</b>
Center of Gravity .....	377
Propeller Shaft .....	378
<b>Document For Incomplete Vehicle .....</b>	<b>380</b>
<b>Availability .....</b>	<b>406</b>
Vertical Exhaust Top View .....	407
Vertical Exhaust Drivers Side View.....	408
Vertical Exhaust Passenger Side View .....	409
Vertical Exhaust Rear View .....	410

## Introduction

This guide has been provided as an aid to final stage manufacturers in determining conformity to the applicable Emission Control and Federal Motor Vehicle Safety Standards. Final stage manufacturers should maintain current knowledge of all Emission Regulations and Federal Motor Vehicle Safety Standards and be aware of their specific responsibility in regards to each standard.

Any manufacturer making material alterations to this incomplete vehicle during the process of manufacturing the complete vehicle should be constantly alert to all effects, direct or indirect, on other components, assemblies or systems caused by such alterations. No alterations should be made to the incomplete vehicle that directly or indirectly results in any either component, assembly or system being in nonconformance with applicable Emission Regulations or Federal Motor Vehicle Safety Standards.

Isuzu Commercial Trucks of America, Inc. (ICTA) will honor its warranty commitment **(for the cab-chassis only)**, to the ultimate consumer, provided: (1) the final stage manufacturer has not made any alterations or modifications which do not conform to any applicable laws, regulations or standards, or adversely affect the operation of the cab-chassis; and (2) the final stage manufacturer complied with the instructions contained in this guide with respect to the completion of the vehicle. Otherwise, the warranty becomes the responsibility of the final stage manufacturer.

The final stage manufacturer is solely responsible for the final certification of the vehicle and for compliance with Emission Control and Federal Motor Vehicle Safety Standards. The information contained in this guide has been provided for the final stage manufacturer's information and guidance.

This guide contains information pertaining to the: NPR/W3500; NPR-HD/W4500 Gas, NPR/W3500; NPR-HD/W4500 Gas Crew Cab; NPR/W3500; NPR-HD/W4500 Diesel; NQR/W5500, NPR-HD/W4500; NQR/W5500 Diesel Crew Cab; and NRR/W5500-HD Series Chassis Cab.

Following is a list of Federal Motor Vehicle Safety Standards applicable to those vehicles with a GVWR greater than 10,000 lbs. Please refer to the chart on the next page.



# 2009 GM/Isuzu TRUCK

## FMVSS Chart

List of Federal or Canadian Motor Vehicle Safety Standards applicable to Isuzu/GMC Truck product lines. Gasoline or diesel fueled vehicles with GVWR greater than 10,000 lbs. (4536 Kg)

MVSS No.	Title Upper line FMVSS. Lower Line CMVSS	NPR/NPR HD W3500/W4500	NQR/NRR W5500/W5500-HD
1106	N/A Exterior Noise	1	1
101	Controls and Displays Location and Identification of controls and displays	1	1
102	Transmission shift lever sequence, starter interlock and transmission braking effect Transmission control functions	1	1
103	Windshield defrosting and defogging systems Windshield defrosting and defogging	1	1
104	Windshield wiping and washing systems Windshield wiping and washing systems	1	1
105	Hydraulic and electric brake systems Hydraulic and electric brake systems	2	2
106	Brake hoses Brake hoses	1	1
108	Lamps and reflective devices and associated equipment Lighting systems and reflective devices	2	2
111	Rear view mirrors Mirrors	1	1
113	Hood latch system Hood latch system	1	1
115	N/A Vehicle identification system	1	1
116	Motor vehicle brake fluids Hydraulic brake fluids	1	1
120	Tire selection and rims for vehicles other than passenger cars Tire selection and rims for vehicles other than passenger cars	2	2
121	Air brake systems Air brake systems	3	3

*(continued on next page)*

## FMVSS Chart (cont'd)

List of Federal or Canadian Motor Vehicle Safety Standards applicable to Isuzu/GMC Truck product lines. Gasoline or diesel fueled vehicles with GVWR greater than 10,000 lbs. (4536 Kg)

FMVSS No.	Title Upper line FMVSS. Lower Line CMVSS	NPR/NPR HD W3500/W4500	NQR/NRR W5500/W5500-HD
124	Accelerator control system Accelerator control system	1	1
205	Glazing materials Glazing materials	1	1
206	Door locks and door retention components Door locks and door retention components	1	1
207	Seating systems Anchorage of seats	1	1
208	Occupant crash protection Occupant restraint systems in frontal impacts	1	1
209	Seatbelt assemblies Seatbelt assemblies	1	1
210	Seatbelt assembly anchorages Seatbelt assembly anchorages	1	1
213 213.4	Child restraint systems Built-in child restraint systems and built-in booster cushions	3	3
302	Flammability of interior materials Flammability	1	1
	N/A On road vehicle and engine emission regulations	1, 3	1
	N/A ICES-002 Canadian interference-causing equipment standard	1	1

Type 1, 2 or 3 numbers to the right hand side of the table designate the appropriate paragraph in the Canadian Motor Vehicle Safety Standards (CMVSS), and Federal Motor Vehicle Safety Standards (FMVSS).

Please see IVD (incomplete vehicle document) for full statements.

Type 1 A statement that the vehicle when completed will conform to the standard if no alterations are made in identified components of the incomplete vehicle.

Type 2 A statement of specific conditions of final manufacture under which the manufacturer specifies that the completed vehicle will conform to the standard.

Type 3 A statement that conformity with the standard cannot be determined based upon the components supplied on the incomplete vehicle, and that the incomplete vehicle manufacturer makes no representation to conformity with the standard.

**NOTE:** This chart is only a guide. For complete information, please refer to “Document for Incomplete Vehicle” provided with each chassis.

## EPA Requirements

**NPR/W3500 Gas, NPR/W3500 Gas Crew Cab, NPR/W3500 Diesel, NQR/W5500 Diesel, NPR HD, NQR/W4500, W5500 Diesel Crew Cab and NRR/W5500-HD Series Chassis Cab**

**The following statement is applicable to all models of incomplete vehicles equipped with diesel engines. (Type 1)**

This incomplete vehicle, when completed, will conform to the above standard providing no alterations are made which affect the function, physical, chemical, or mechanical properties, environment, location or vital spatial clearances of the components, assemblies or systems including but not limited to those listed below:

- |  |   |
|--|---|
| - Injection Pump                                 | - Engine Coolant Temperature Sensor                 |
| - Injector and High Pressure Lines               | - Intake Manifold                                   |
| - Turbocharger                                   | - Catalytic converter and its location              |
| - Charger Air Cooler and Charge Air Cooler Hoses | - Exhaust Gas Recirculation System                  |
| - Engine Control Module (ECM)                    | - MAF Sensor  |
| - Engine Speed Sensor                            | - DPD (Diesel Particulate Defuser) and its location |

**The following statement is applicable to all models of incomplete vehicles equipped with diesel engines. (Type 2)**

This incomplete vehicle, when completed with the vertical exhaust system, will conform to the above standard providing it is completed by the final stage manufacturer in accordance with the following specific conditions:

- a. the incomplete vehicle manufacturer's vertical exhaust system kit is used, and
- b. the vertical exhaust system kit is installed to the vehicle in accordance with the incomplete vehicle manufacturer's instructions

For more information on the kit and instructions, please call 678-240-9818 or 562-229-5374

**The following statement is applicable to all models of incomplete vehicles equipped with gasoline engines . (Type 3)**

Conformity with On-Road Vehicle and Engine Emission Regulations cannot be determined based upon the components supplied on the incomplete vehicle, and ISUZU Motors makes no representation to conformity with the standard.

*(continued on next page)*

## EPA Requirements (cont'd)

### **INTERFERENCE CAUSING EQUIPMENT STANDARD – ICES-002**

*Applies to all models of incomplete vehicles except vehicles equipped with diesel engines contained in this book*

**TYPE 1** The following statement is applicable to all models of incomplete vehicles except vehicles equipped with diesel engines (unless otherwise noted on the cover of this document)

This incomplete vehicle, when completed, will conform to the above regulations providing no alterations are made which affect the function, physical, chemical, or mechanical properties, environment, location or vital spatial clearances of the components, assemblies or systems including but not limited to those listed below:

-Ignition Wires & plugs      -Ignition coil(s)      -Spark plug wires

### **U.S. ENVIRONMENTAL PROTECTION AGENCY AND STATE OF CALIFORNIA EMISSION REQUIREMENTS AND ON-BOARD DIAGNOSTIC SYSTEM (OBDII) REQUIREMENTS**

To assure that EPA and California emission certificate requirements and OBDII requirements are met, this incomplete vehicle (except where noted) must be completed

in strict accordance with all instructions contained in this document, especially the following instructions which relate to:

- A. Exhaust emission related components
- B. Specification for fill pipes and openings of motor vehicle fuel tanks (applicable only to California gasoline powered vehicles)
- C. Labels

*(continued on next page)*

## EPA Requirements (cont'd)

### (A) EXHAUST EMISSION RELATED COMPONENTS

1. Compliance of this vehicle with EPA/California emission certification requirements and OBDII requirements will be maintained providing no alterations (except where noted) are made to the components identified below:

-Air inlet system	-Exhaust emission control system	-MAF Sensor
-Catalytic converter (if equipped)	-Exhaust oxygen sensors (gasoline engine)	-DPD (Diesel Particulate Defuser) and its location
-Coolant temperature sensor	-Exhaust system	
-Crankcase emission control system	-*Evaporative emission control system (gasoline engine)	
-Diesel fuel injection components/controls	-Fuel injection system	
-Engine assembly	-Fuel system	
-Engine electronics (ECM/PCM/VCM)	-Ignition system (gasoline engine)	
-Engine Speed Sensor	-Intake manifold	
-EGR System	-Turbocharger and associated equipment/controls	

- \* All Federal/California gasoline powered heavy duty vehicles will have an evaporative emission control system that is certified for a fuel tank capacity not to exceed the amount shown on Vehicle Evaporative Emission Control Information Label. Persons wishing to add fuel tank capacity above the amount shown must contact California Air Resources Board and/or submit a written statement to the EPA Administrator that the Hydrocarbon Storage System has been upgraded according to the requirements of 40 CFR 86-095-35 (g) (2).

2. Compliance with applicable fuel evaporative emission regulations will be maintained if no alterations are made to the fuel filler neck(s).

Compliance with applicable fuel evaporative emission regulations will be maintained if no alterations are made to change material or increase the size or length of the following nonmetallic fuel and evaporative emission hoses.

-Fuel feed hoses front and rear	-Fuel vapor lines at canister
-Fuel return hoses front and rear	-Fuel vapor lines from engine to chassis pipes
-Fuel tank filler hoses to filler neck	-Fuel vapor lines from fuel tank sender to chassis pipes
-Fuel tank vent hoses to filler neck	

*(continued on next page)*

## EPA Requirements (cont'd)

### **(B) SPECIFICATION FOR FILL PIPES AND OPENINGS OF MOTOR VEHICLE FUEL TANKS (APPLICABLE ONLY TO CALIFORNIA GASOLINE POWERED VEHICLES)**

This incomplete vehicle, when completed, will conform to Title 13, California Administrative Code Chapter 3 Air Resources Board Subchapter 7, "Specifications for Fill Pipes and Openings of Motor Vehicle Fuel Tanks", if no alterations are made to the fuel filler neck(s).

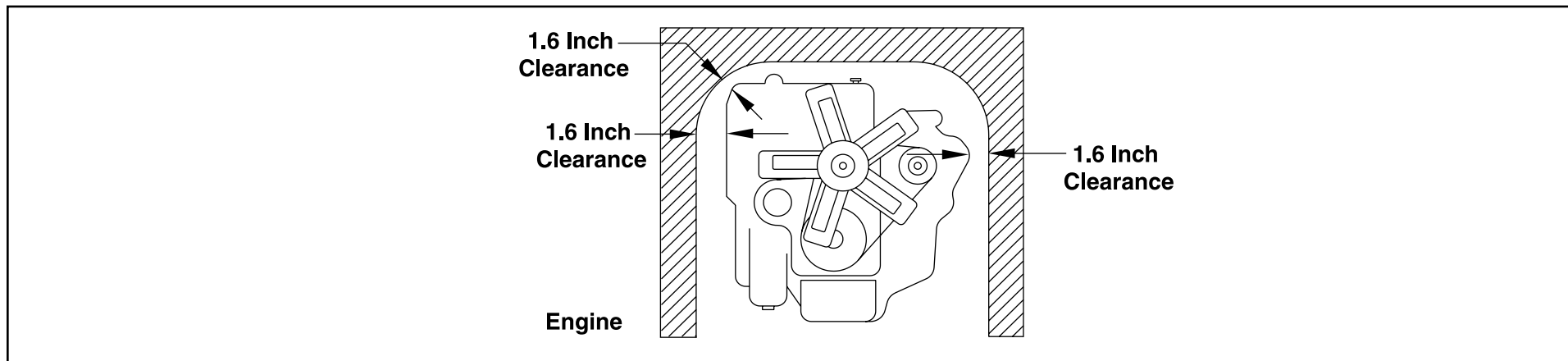
### **(C) LABELS**

The emission control related information labels and ultra low sulfur diesel fuel label that are permanently affixed are required by government regulation and must not be obstructed from view or defaced so as to impair its visibility or legibility.

## Installation of Body and Special Equipment – Clearances

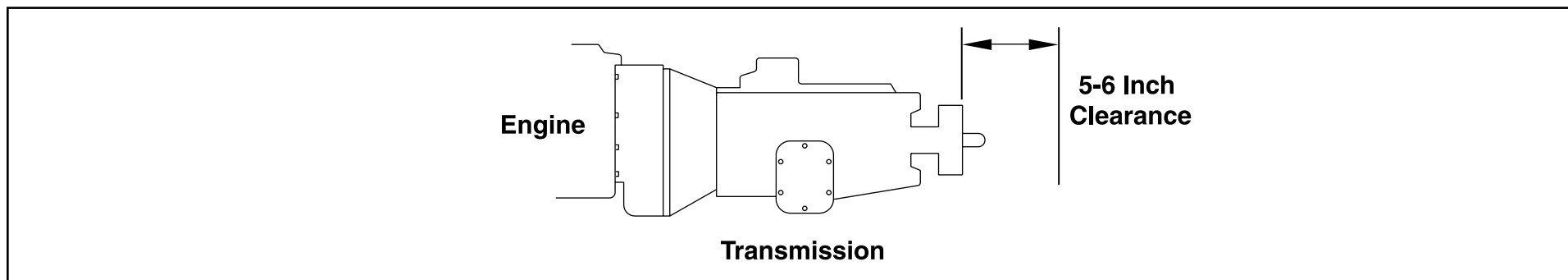
### **Engine**

At least 1.6 inches of clearance should be maintained around the engine. No obstacles should be added in front of the radiator or intercooler.



### **Transmission**

The transmission is removed from the rear. Enough clearance must be provided to allow rearward movement of the transmission assembly. Clearance should be sufficient to allow 5 to 6 inches of unrestricted movement of the transmission assembly. In addition, provide at least 2 inches of clearance around the control lever on the side of the transmission to allow free movement without any

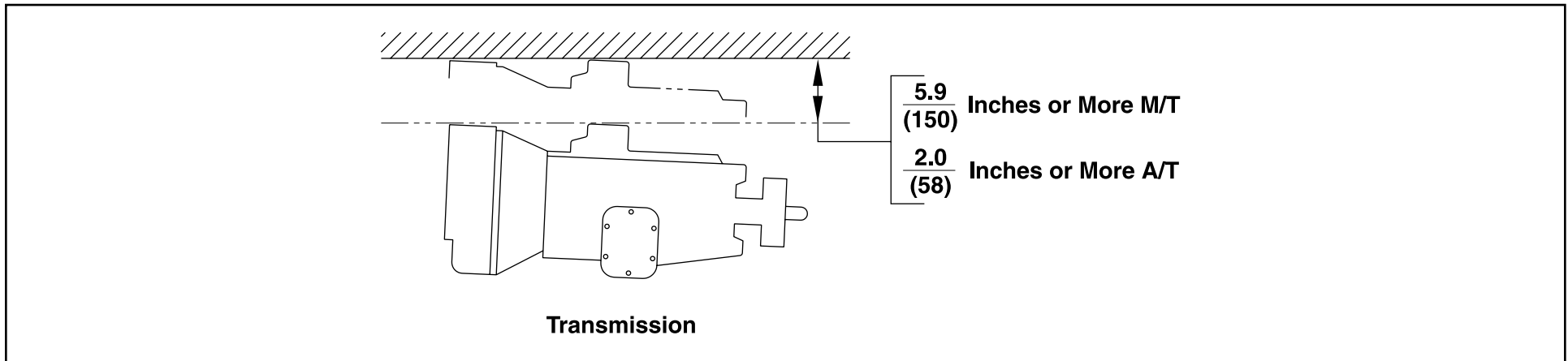


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## **Installation of Body and Special Equipment – Clearances (cont'd)**

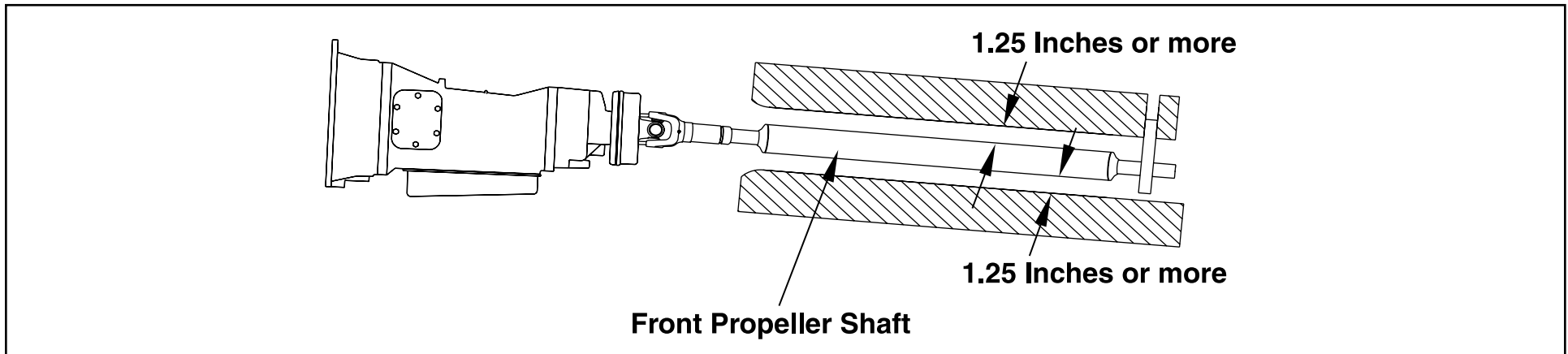
At least 6 inches of clearance should be maintained above the transmission to allow easy removal of the upper cover for manual transmissions.

At least 2 inches of clearance should be maintained above the automatic transmission to allow for transmission removal.



### ***Front and Center Propeller Shafts***

At least 1.25 inches of clearance should be maintained around front and center propeller shafts.

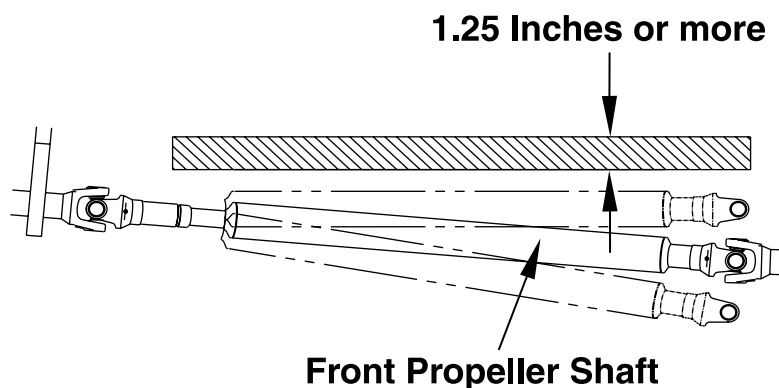




## Installation of Body and Special Equipment – Clearances (cont'd)

### **Rear Propeller Shaft**

With the rear springs at maximum deflection, at least 1.25 inches of clearance should be provided over the rear propeller shaft.



### **Exhaust System**

The exhaust system has a crucial role in meeting 07EPA regulations. In order to maintain compliance with the 07EPA emissions levels the Diesel Particulate Filter (DPF) must not be moved. The distance between the engine exhaust manifold down pipe and DPF must be maintained and the pressure in the system must be sustained at a constant level. Due to increased temperatures in the exhaust system during the regeneration cycle and the heat stress caused by these temperatures, body builders should closely evaluate the placement of equipment and provide protection to these added components as needed.

## Installation of Body and Special Equipment – Clearances (cont'd)

### **Diesel Particulate Filter (DPF) Restrictions**

The DPF has exhaust pressure pipes and temperature sensors.

Care must be taken when a body is installed so as to not damage pipe sensors.

The DPF should be free from impact or vibration during body installation.

The DPF must have enough room for disassembly of the unit for service and cleaning.

The DPF switch in the cab should not be removed or disabled.

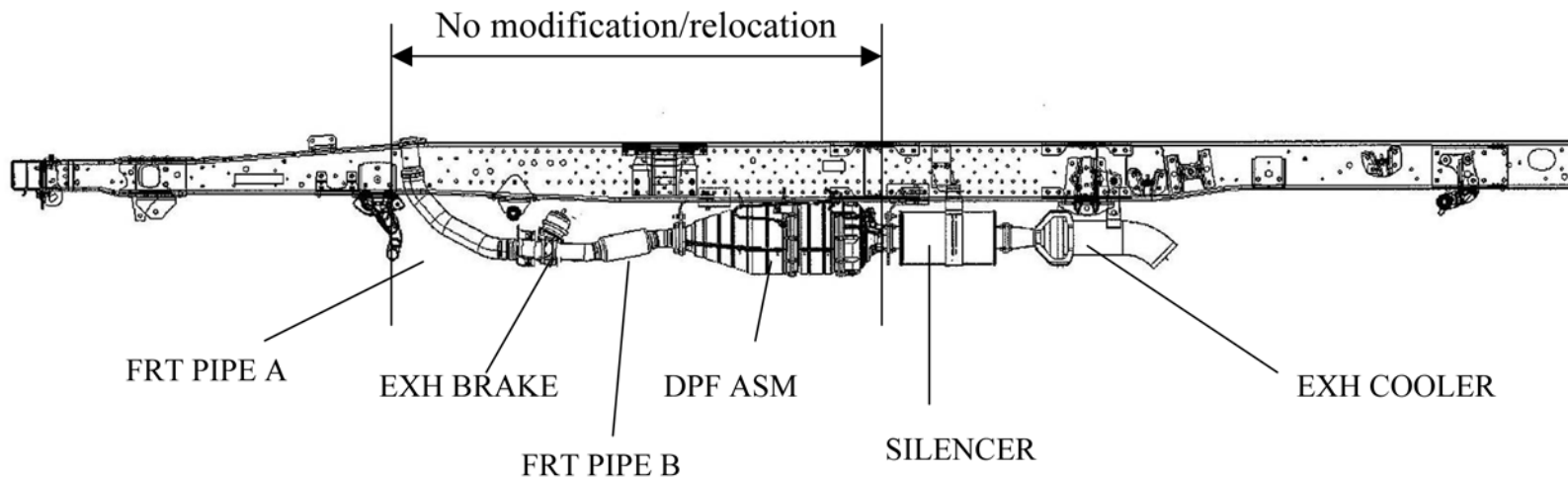
No modification or relocation of the DPF unit, pressure pipes, and sensor is permitted.

### **(No Modification Area)**

**The front section before the DPF unit cannot be modified/relocated.**

**The silencer and exhaust cooler can not be modified or removed.**

**No modification area** The front section before the DPF unit cannot be modified/relocated. The silencer and exhaust cooler can not be modified or removed.



## Installation of Body and Special Equipment – Clearances (cont'd)

### **Temporary Removal of DPF unit.**

#### **Temporary Removal of DPF Unit**

The following conditions must be met:

Harness and hose must be returned to original locations and connections

Hoses must be free from tension

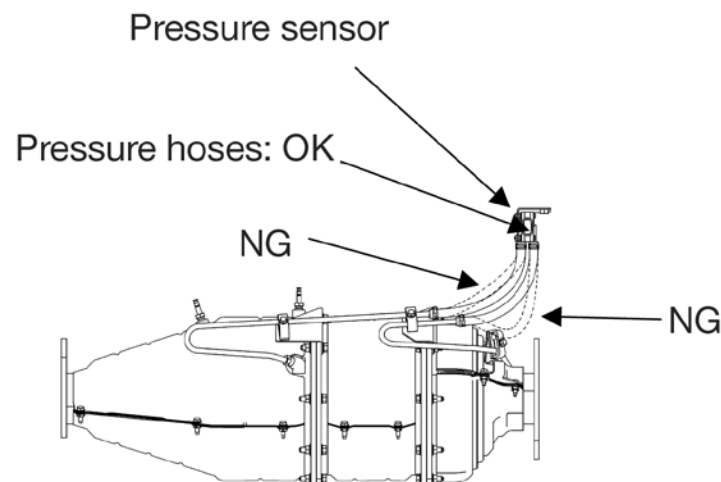
There must be no exhaust leaks (confirm this with engine running)

4 nuts on pressure sensor must not be touched

Pressure sensor must not be dropped. (If dropped, the sensor must be replaced)

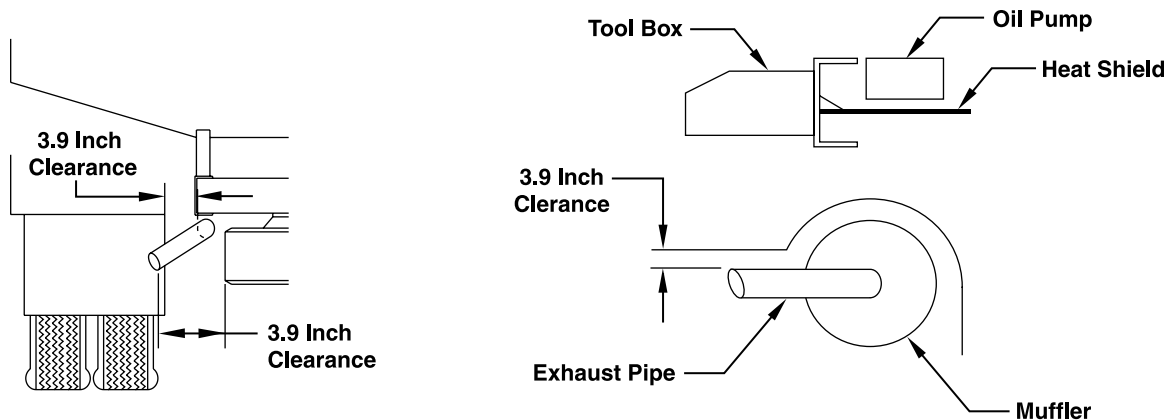
The use of an impact wrench on DPF components is prohibited

If pressure hose is damaged use only OEM replacement parts



### **Exhaust Clearances**

If flammable materials such as wood are used in the body, provide at least 3.9 inches of clearance between the body and any parts of the exhaust pipe, muffler and Diesel Particulate Filter. If it is impossible to maintain the minimum clearance, use a heat shield. Also use a heat shield if an oil pump or line is located above the exhaust pipe, muffler or catalytic converter.



## Installation of Body and Special Equipment – Clearances (cont'd)

### **(Exhaust Pipe Heat)**

#### **N-SERIES Modification Guideline (exhaust back pressure)**

Any modification causing an increase in back pressure, such as pipe extension or additional pipe bending is essentially not allowed. However, if it is absolutely necessary, the modification company must meet the following conditions:

Pipe diameter: more than 3.in (77mm)

Pipe material: Stainless steel 409 or equivalent

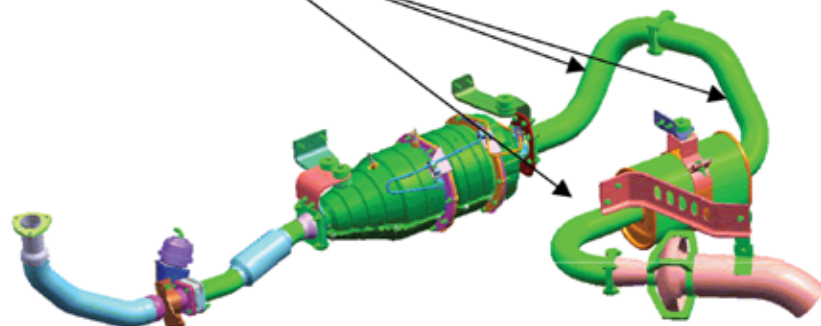
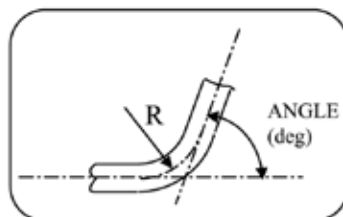
Pipe thickness: More than 0.06in (1.5mm)

Extended pipe length: Less than 70 in (1,800mm)  
(except silencer, cooler length)

Bend angle: total less than 420deg

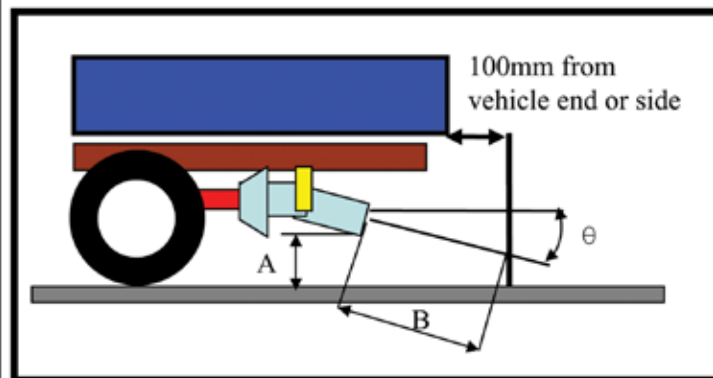
Less than 90deg / location

Pipe bend radius: Less than R5.9 in (150mm)



#### **N-SERIES Modification Guideline (heat issue)**

During the DPF regeneration cycle, exhaust gas temperatures are hot. Therefore, care should be exercised in placement of the pipe's end location and angle. Do not locate any body parts around the exhaust pipe's end area.

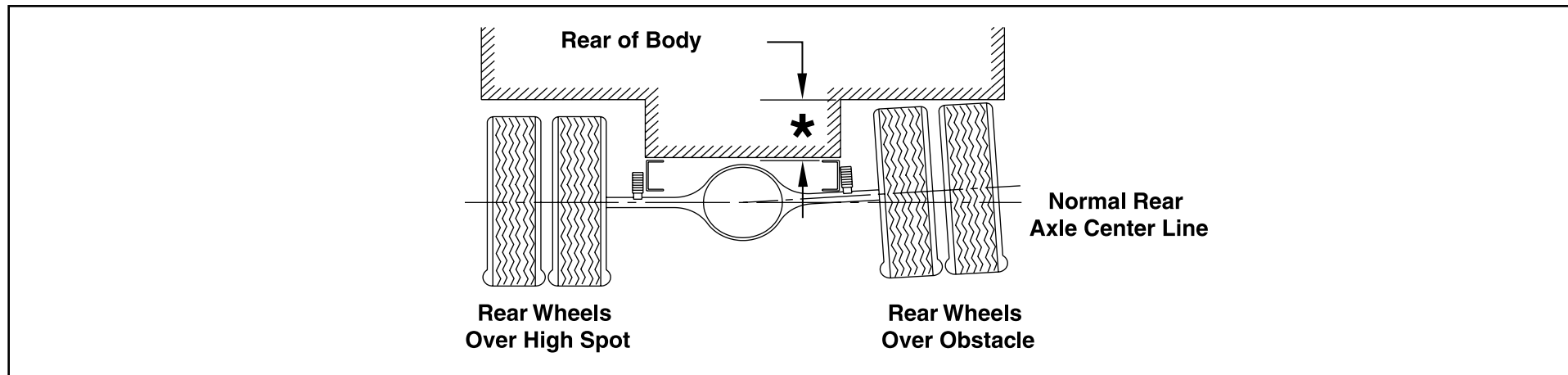


A	B	θ
More than 200mm	More than 450mm	Less than 45deg

## Installation of Body and Special Equipment – Clearances (cont'd)

### **Rear Wheel Axle**

The design and installation of the body should allow sufficient clearance for full vertical movement of the rear wheels and axle when the vehicle travels over rough or unlevel surfaces.



**Note:** For recommended clearances, please refer to the Rear Axle Chart in each model's respective section.

### **Other Clearances**

The transmission control cable may be broken if it is bent by or interferes with the body and its fixtures. To prevent this, 1 inch of minimum clearance should be provided. When cable is detached from body mounting, be sure not to bend the cable.

Accessibility to the grease nipple on the rear spring bracket/shackle should be provided so that serviceability with a grease gun is not hampered.

Parts	Minimum Clearance	Location
Brake Hose	6.7 in. 1.6 in.	Axle Side Frame Side
Parking Brake Cable	1.2 in.	—
Fuel Hose	1.6 in.	—
Shock Absorber	2.4 in. 1.2 in.	Axle Side Frame Side

*(continued on next page)*

## Installation of Body and Special Equipment

### **Chassis**

To maintain the performance of the truck chassis, either a side member or subframe should always be used for body mounting. Body mounting with low rigidity will often adversely affect riding comfort.

### **Mirrors**

The Isuzu N/W series chassis will accommodate up to 96 inch wide bodies without modification to the mirror brackets. Bodies from 97 to 102 inches wide will

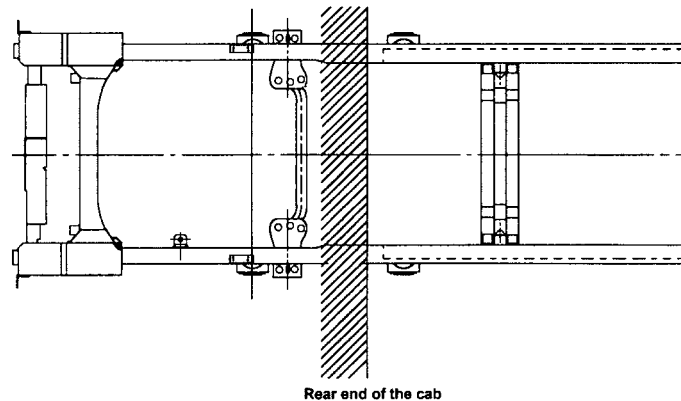
require that the mirror brackets be modified. This Modification can be made at the port and the vehicle order/label will indicate a Regular Product Option of IU3 indicating "Mirror Bracket for 102 wide body". The brackets can also be modified by the N/W Dealer or the Body Company by installing mirror brackets ordered from Isuzu Parts.

### **Special Equipment on the Chassis**

When installing special equipment on the chassis, extra consideration must be given to the weight and construction of the equipment to assure proper distribution of the load. Localization of the load should be prevented. All special equipment should be properly secured into position. We recommend the use of subframe members when installing special equipment.

### **Subframe Design and Mounting**

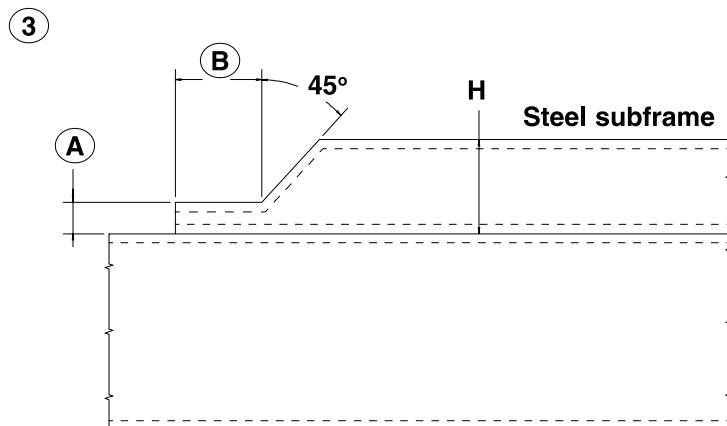
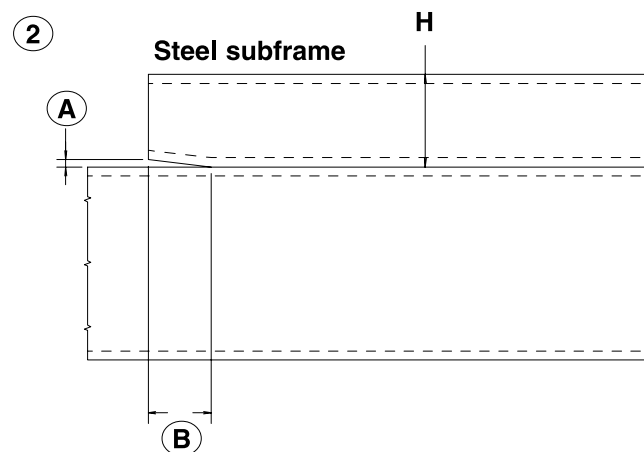
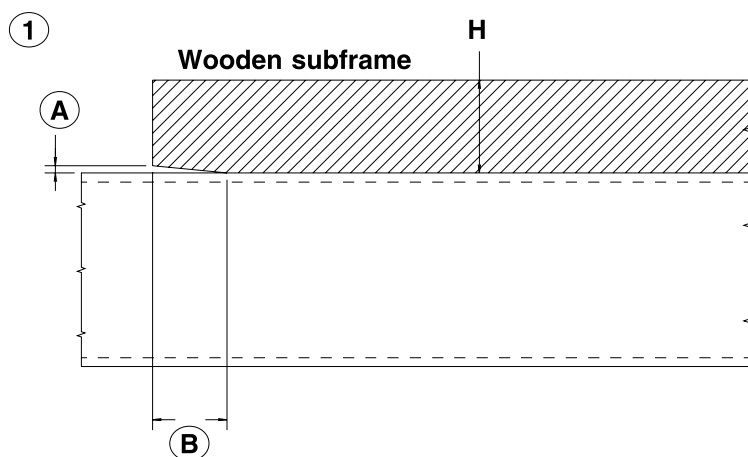
The subframe assembly should be mounted as close to the cab as possible. It should be contoured to match the shape and dimensions of the chassis frame as closely as possible.



## Installation of Body and Special Equipment (cont'd)

### **Subframe Contour**

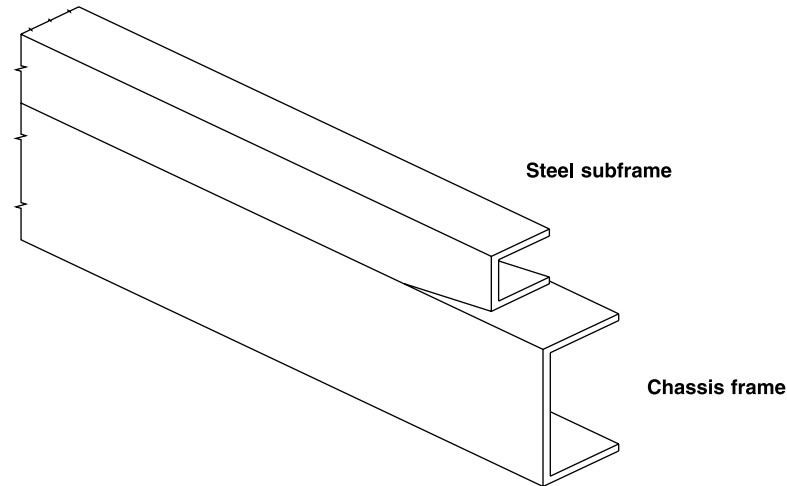
Contouring of the front end of the subframe members as shown in the three illustrations below will prevent stresses from being concentrated on certain areas of the chassis frame.



Drawing	A	B
①	0.2 in.	$\frac{H}{2} \sim H$
②	0.2 in.	H or more
③	$\frac{H}{3}$	H or more

## Installation of Body and Special Equipment (cont'd)

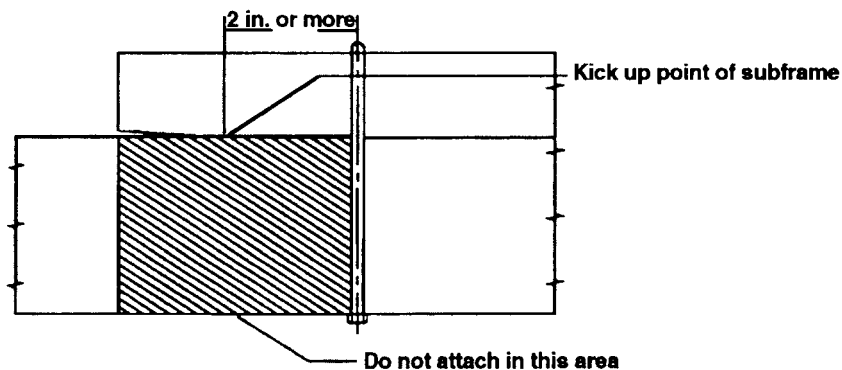
When using a steel subframe, do not close the end of the subframe.



## Prohibited Attachment Areas

Do not attach the subframe with a bolt on bracket to the chassis frame at the points indicated by shading in the following illustrations.

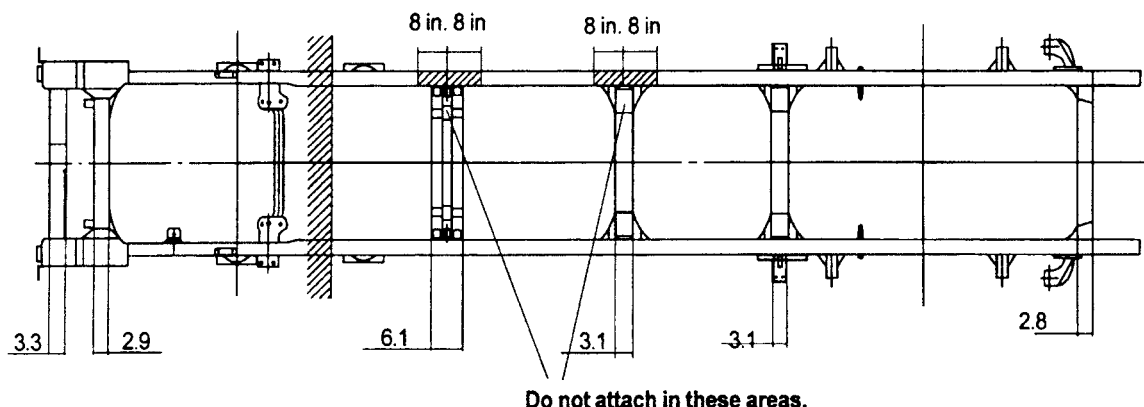
1. At the front end of the subframe. The attaching bolt or bracket must be at least 2 inches behind the kick up point of the subframe.





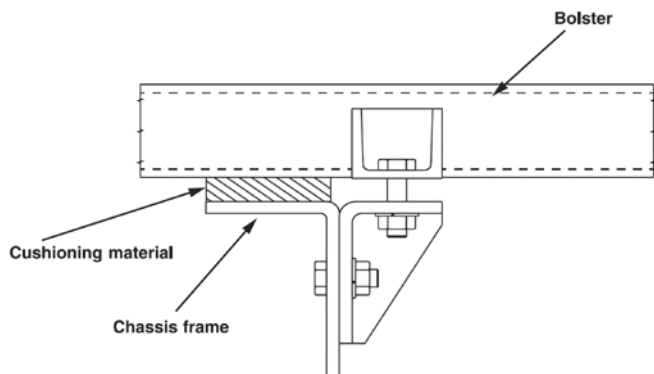
## Installation of Body and Special Equipment – Subframe Mounting

2. Within 8 inches of bends in the chassis frame or the attachment points of any crossmembers.



### **Bracket Installation**

Mounting brackets should be clamped to the chassis frame using bolts. For proper positions in which to install the bolts, refer to the preceding section and the section “Modifications to the Chassis Frame.” In addition to the illustrated bracket and U -bolts a shear plate may be required for adequately body mounting. The body company will be responsible for engineering their own mounting system.

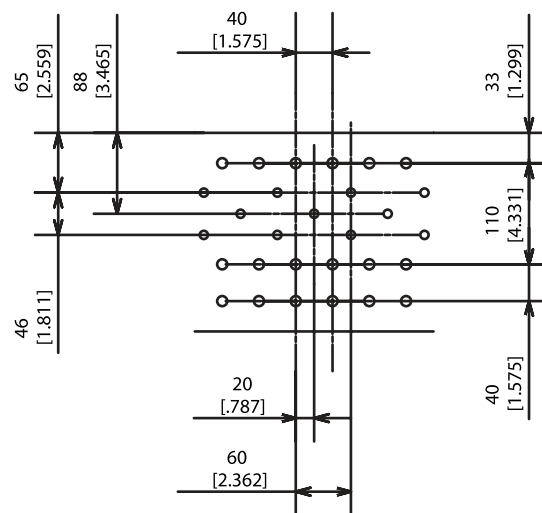


The frame material is a heat treated, carbon manganese, low alloy steel with good weldability. The frame has a 80/40 mm modular hole spacing standard. This standard pattern will assist in body mounting.

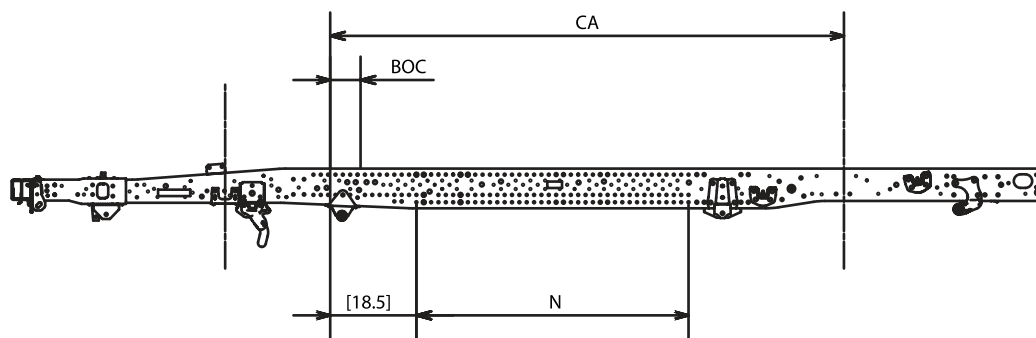
## Installation of Body and Special Equipment (cont'd)

### **Modular Frame Hole Pattern**

The frame material is a heat treated carbon manganese, and low alloy steel with good welding characteristics. The frame has an 80/40mm modular hole spacing standard. This standard pattern will assist with body mounting.



Basic hole pattern



Modular Hole Area

WB	N
[109]	880 [34.6]
[132.5]	1480 [58.3]
[150]	1920 [75.6]
[176]	2360 [92.9]

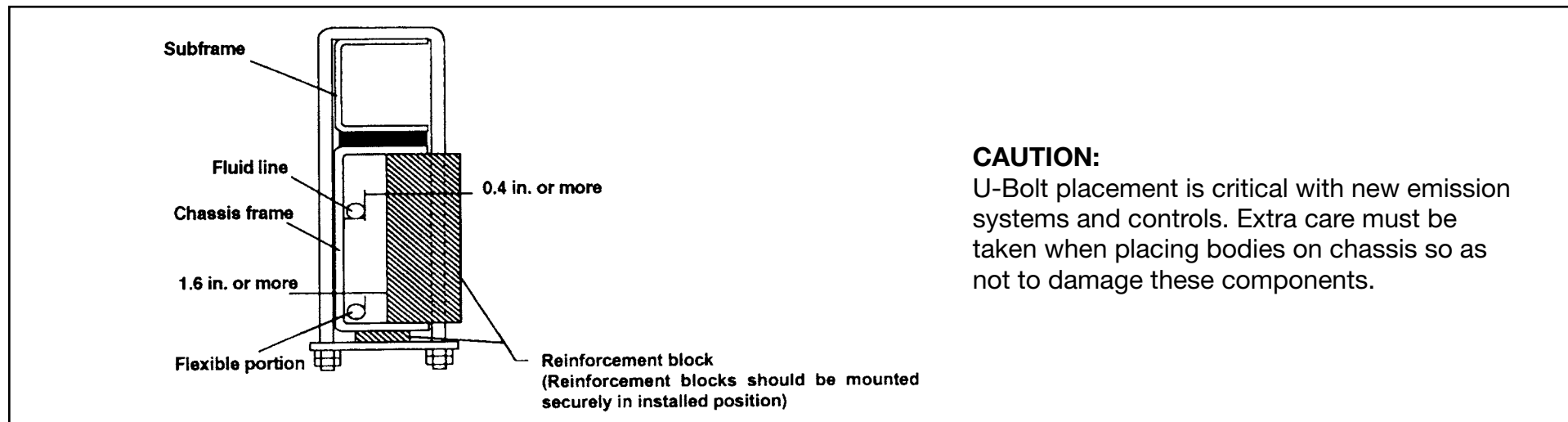
Unit ; mm [Inch]

## Installation of Body and Special Equipment – Crew Cab Body/Frame Requirement

### **U-bolt Installation**

When U-bolts are used to retain the subframe, reinforcement blocks must be installed in the frame members. This will prevent distortion of the frame flange as they are tightened. The drawing indicates the correct placement of reinforcement blocks. If you use wood blocks, be sure that there is sufficient clearance between them and any parts of the exhaust system. The use of J-bolts to retain the subframe is strictly prohibited.

If any fluid lines or electric cables are located near the reinforcement blocks, you must provide at least 0.4 inches of clearance between rigid or stationary portions, and at least 1.6 inches between moveable or flexible portions of the lines.



For the installation positions of the U-bolts, refer to “Prohibited Attachment Areas.”

The Crew Cab NPR HD/W4500 and NQR/W5500 will be available in two wheelbases, 150 and 176 inches. CA will be 88.5 and 114.5 inches. On this model chassis, Isuzu Commercial Trucks of America, Inc. (ICTA) will require that the body installed on the chassis have an understructure manufactured with any of the following structural steel “C” channels:

4” x 1-5/8”, 7.25 lbs./ft. = ok

5” x 1-3/4”, 6.7 or 9.0 lbs./ft. = ok

6” x 2”, 8.2, 10.5 or 13.0 lbs./ft. = ok

## **Installation of Body and Special Equipment – Modification of the Frame**

Modifications of the chassis frame should be held to an absolute minimum. Modification work should be performed according to the instructions in the following paragraphs.

When modification is complete, chassis frame members should be carefully inspected to eliminate the possibility of any safety-related defects.

**NOTE: Please Refer to Notes On Chassis Frame Modification with Antilock Brakes.**

### ***Working on Chassis frame***

The chassis frame is designed and built with consideration for proper load distribution. Sufficient physical strength is provided when the load is evenly distributed. Installation of special equipment on the chassis frame can cause variations in load distribution. If even distribution of load is not kept in mind when the equipment is installed, localization of stresses on specific areas of the frame could cause cracking of the chassis frame members or other problems, even if the total weight of the equipment is within the design limit.

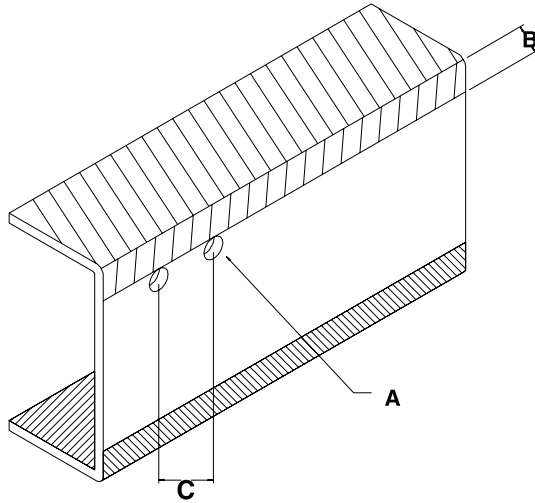
The chassis frame is designed as an integral unit. Therefore, we do not recommend cutting the chassis frame under any circumstances.

### ***Drilling and Welding***

**IMPORTANT NOTE: For vehicles equipped with electronic engines and or electronic or HydraMatic transmissions, electric arc welding must be done with the negative battery cable disconnected.**

1. Do not drill or weld in the shaded portions of the chassis frame members. Do not weld within 0.8 inches from the edges of any existing holes.
2. Hold the length of any welding beads within 1.2 - 2.0 inches. Allow at least 1.6 inches between adjacent welding beads.
3. All holes must be drilled. Do not use a torch to make any holes.
4. All riveting must be done with cold rivets. Do not use hot rivets.
5. The flange of the chassis frame must not be cut under any circumstances.
6. The subframe must be attached to the chassis frame with bolts. Do not weld.

## Installation of Body and Special Equipment – Modification of the Frame



Dimensions:

- A - not more than 0.51 in. in diameter
- B - must be more than 0.8 in.
- C - must be more than 1.0 in.

### **Reinforcement of Chassis Frame**

Reinforcements must be installed to prevent the considerable variation in the section modulus. They must be welded so as to avoid localized stresses.

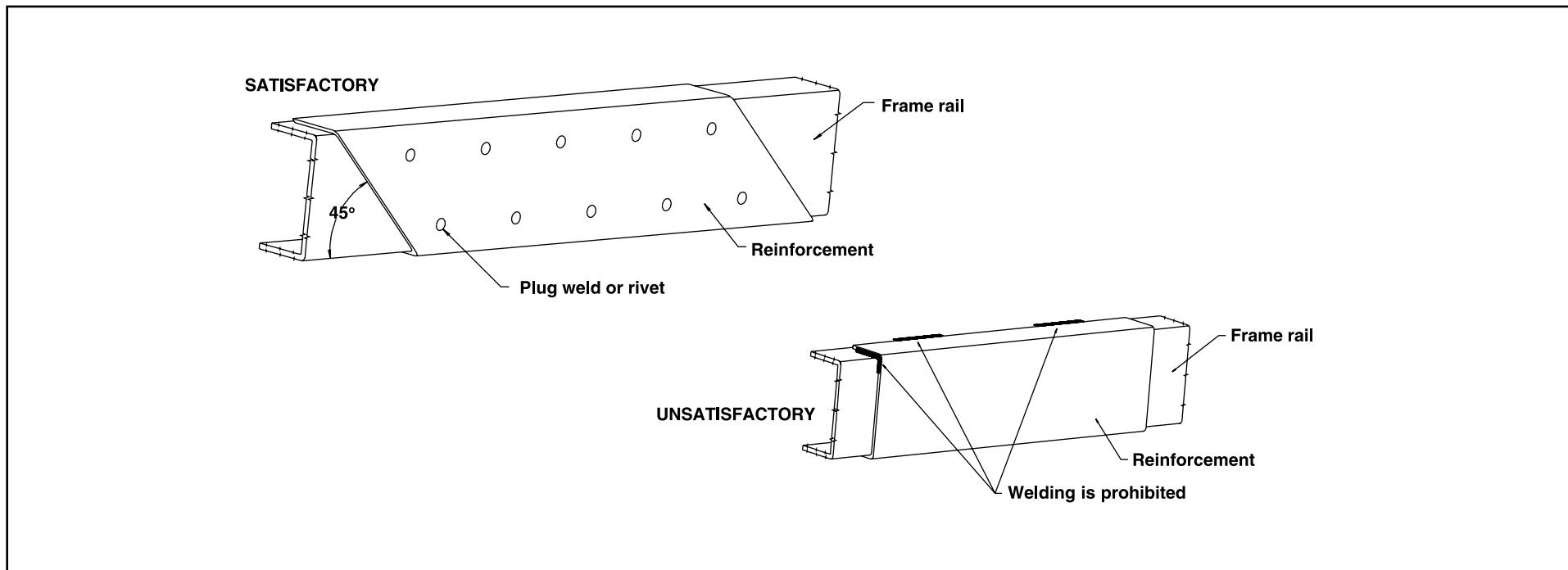
The frame of the N and W Series gas and diesel is made of SAPH440 mild steel.

The drawing on the following page illustrates correct and incorrect methods of frame reinforcement.

### **Welding**

1. Keep reinforcement plates and chassis frame free from moisture and water.
2. Avoid cooling with water after welding.
3. Use a suitable means to protect pipes, wires, rubber parts, leaf springs, etc. against heat and effect of sputtering.
4. Remove fuel tank assembly when welding portions near the fuel tank.
5. Remove coat of paint completely when welding painted areas.

## Installation of Body and Special Equipment – Fluid Lines



### **Fluid Lines**

Do not disturb the layout of any brake lines or fuel lines unless absolutely necessary. When modification is needed, follow the instructions below carefully to ensure safety. Brake fluid lines must not be cut and spliced under any circumstances. We do not recommend the cutting or splicing of any fuel lines, but if it is absolutely necessary, be sure that the correct fitting and tools are used to form the joint, and then pressure test the joint. Steel lines are metric sizes.

### **Preparation of Additional Lines**

1. Where possible, use only genuine GM/Isuzu lines as supplied by authorized GM/Isuzu dealers.
2. Use the correct metric flaring and bending tools to form the lines.
3. Avoid repeated bending. Do not use heat for flaring and bending the lines. Before and after forming the new lines, examine them carefully for scratches, distortion, dents and the presence of any foreign matter.

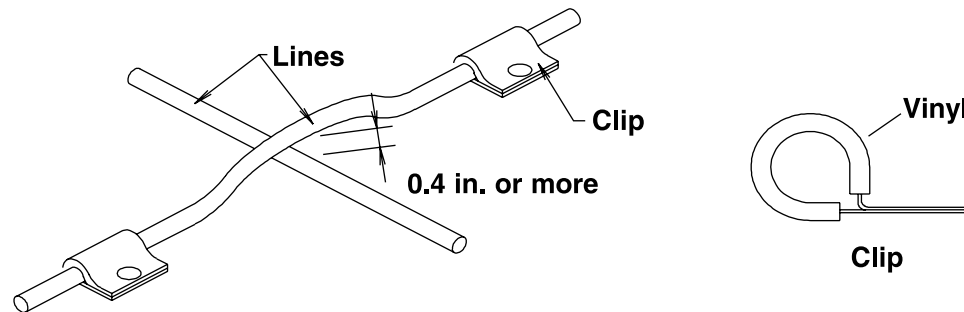
*(continued on next page)*

## Installation of Body and Special Equipment – Electrical Wiring and Harnessing

### **Installation of Additional Lines**

Install new lines away from adjacent parts and away from any sources of heat.

1. A minimum clearance of 0.4 inches must be maintained between lines. Where necessary, clip the lines into position in order to maintain this minimum clearance.
2. Minimize any crossing between lines. If a crossing is unavoidable, use the following procedure:
  - a. At least 0.4 inches of clearance should be maintained between lines at the crossing point.
  - b. If the 0.4 inches of clearance cannot be maintained, or if the lines are subject to vibration, clip them securely.
3. Plan the bends and clipping points of the lines to minimize vibration and the resulting fatigue.
4. Use rust-proofed clips and apply vinyl coating to the portions of the lines to be clipped.
5. Install new lines in positions where they are protected against water, dirt, grit, sand, rocks and other foreign matter that can come from above or below, or can be flung up by the wheels.



### **Electrical Wiring and Harnessing**

To increase the reliability of the wiring, all frame harnesses are covered with corrugated vinyl tubing. The following instructions apply to extending or modifying these harnesses. See the Electrical Section for information on commonly used circuits in the NPR, NPR HD, NQR, NRR and W-series.

## **Installation of Body and Special Equipment – Electrical Wiring and Harnessing (cont'd)**

### **Wiring**

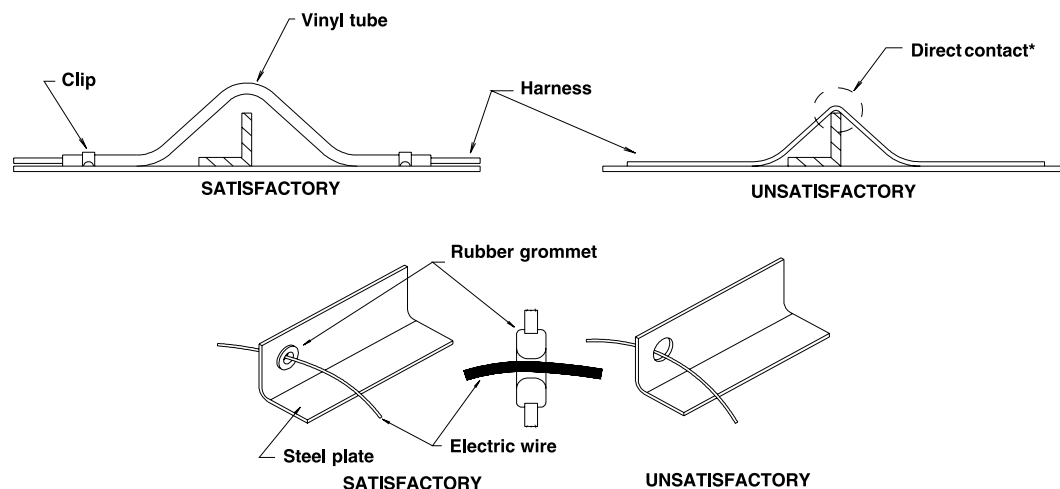
1. Most wiring connections on GM/Isuzu vehicles are made with terminals. We recommend the use of terminals when splicing cables and wires.
2. When splicing, use new wire of the same gauge, and do not make splices inside the corrugated tubing.
3. When making connections to the end of the harness, make sure the connections are electrically perfect. Use insulating tape as needed to prevent the entry of water, which results in short circuits and/or corrosion.
4. When making new circuits, or modifying circuits already installed, make the cables only just taut enough to remove any slack. Use clips or grommets where required to protect cables from heat or sharp edges. When cables must run near the exhaust system, see the instructions in the “Exhaust System” section.
5. Always use rustproof clips, and apply vinyl coating to that portion of the clips in direct contact with the harnesses. No scotch clips or connectors.
6. To minimize the vibration of the harness, clipping points should be set up according to the table.

Harness Diameter	Clip Distance
less than 0.2 in.	less than 11.8 in.
0.2 in. ~ 0.4 in.	approx. 15.7 in.
0.4 in. ~ 0.8 in.	approx. 19.7 in.

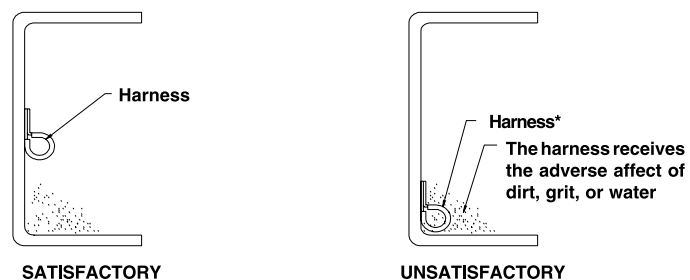
7. When changing the length of the battery cable, do not cut or splice the existing cable. Make up a new cable of the correct length and wire gauge for the load and distance, without splices.
8. When using connectors, use a socket (female) connector on the electrical source side and a plug (male) connector on the electrical load side to lower the possibility of a short circuit when disconnected.
9. When connecting cables to moving or vibrating parts such as the engine or transmission, be sure to maintain sufficient slack in the wiring to absorb the vibration. Follow the example of existing cables connected by GM/Isuzu. Keep flexible cables clear of other parts.
10. Do not use vinyl tape in the engine compartment. The heat will tend to make it peel off. Use plated steel clips coated with rubber or vinyl.



## Installation of Body and Special Equipment – Electrical Wiring and Harnessing (cont'd)

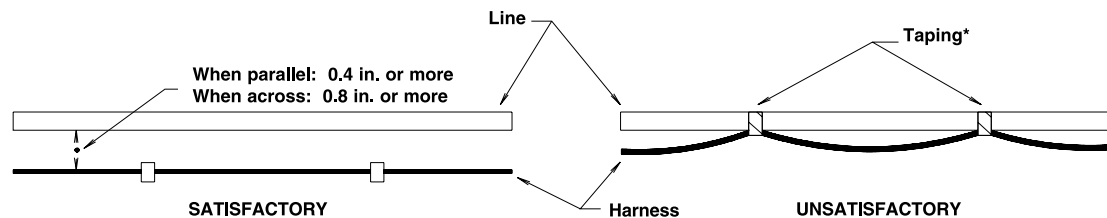


\* Cables should not be in contact with sharp edges or pierced holes.



\* Harnesses should not be installed on inside lower face of the chassis frame.

\* Harnesses should not be taped to fuel lines or other lines. A sufficient clearance should be maintained between harness and pipe lines.



## Installation of Body and Special Equipment – Electrical Wiring and Harnessing (cont'd)

### Wire Color Code

The electrical circuits of the N/W and W Series Chassis Cab are connected with low-voltage stranded wire for automotive applications. The color coding standards are as follows for the N/W Series Chassis Cab:

(1) Black	B	Starter circuits and grounds	(5) Yellow	Y	Instrument circuit
(2) White	W	Generator (alternator) circuit	(6) Brown	Br	Accessory circuit
(3) Red	R	Lighting circuit	(7) Light Green	Lg	Other circuit
(4) Green	G	Signal circuit	(8) Blue	L	Windshield wiper motor circuit

### Maximum Allowable Current

Harness Design Diameter	AWG Equivalent	No. of Wires/ Wire Diameter (mm)	Cross Sectional Area (mm <sup>2</sup> )	Maximum Allowable Current (Amps)
100	00	217/0.80	109.1	363
85	0	169/0.80	84.96	305
60	1	127/0.80	63.84	248
50	1	108/0.80	54.29	223
40	1	85/0.80	42.73	191
30	2	70/0.80	35.19	171
20	4	41/0.80	20.61	123
15	6	84/0.45	13.36	93
8	8	50/0.45	7.952	68
5	8	65/0.32	5.228	51
3	12	41/0.32	3.297	39
2	12	26/0.32	2.091	29
1.25	16	16/0.32	1.287	21
0.85	18	11/0.32	0.8846	17
0.5	20	7/0.32	0.5629	13

**Reference:** The values given in the “maximum allowable current” column are based on the ambient temperature condition of 104°F with temperature increase of 104°F.

*(continued on next page)*

## Installation of Body and Special Equipment – Exhaust System

### **Electrical System Modifications**

Modifications/add-on wiring must be carefully reviewed to ensure compatibility with the base vehicle wiring by reviewing system schematics, wire routing paths, harness connections, etc. Due to the wide range of modifications that may be required for vocational needs, it is not feasible for the O.E.M. to take into account all potential revisions. For this reason, any person modifying existing vehicle wiring must assume responsibility that the revisions have not degraded the electrical system performance. Any add-on wiring needs to be properly fused and routed to prevent cut, pinch, and chafe problems, as well as avoid exposure to excessive heat. Care must be exercised that existing vehicle interfaces do not have their current load capabilities exceeded, and that the respective control devices are not overloaded. Added wire size should be at least as large as the wire to which it is attaching in order for fuse protection to be maintained.

A Packard electric wiring repair kit is available through Kent-Moore (P/N J38125-B) (Phone # 1-800-345-2233). This kit contains instructions, tools and components for making repairs to wiring harness components. This kit would also greatly assist in accomplishing necessary add-on wiring such as body marker lamps, so that system reliability/durability is maintained.

Electrical wiring components can be obtained through your authorized GM/Isuzu dealers. Packard Electric components are also available through Power and Signal ([www.powerandsignal.com](http://www.powerandsignal.com)). Power and Signal may also be able to assist in making necessary wiring additions by providing custom wiring stubs or jumpers to your specifications.

### **Exhaust System**

Modification of the exhaust system should be avoided. If modifications are absolutely necessary, the following points should be maintained.

1. Maintain the clearance specified in the “Exhaust System” table between all parts of the exhaust system and any fuel lines, brake lines, brake hoses, electrical cables, etc. The exhaust outlet should not point toward any of these parts.

	Clearance
<b>Brake Lines</b>	2.4 in. or more. (If the combined section of a group of parallel brake lines is more than 7.8 in., a clearance of 7 in. or more should be provided.)
<b>Flexible brake hoses</b>	3.9 in. or more. (The temperature of flexible brake hoses should not exceed 158°F. If the highest temperature is not measureable, a clearance of more than 15.7 in. should be maintained between the hoses and the exhaust system.)
<b>Wiring harnesses and cables</b>	3.9 in. or more
<b>Steel fuel lines</b>	3.1 in. or more
<b>Rubber or vinyl fuel hoses</b>	5.9 in. or more

## **Installation of Body and Special Equipment – Exhaust System (cont'd)**

2. If a tool box is installed, it should preferably be made from steel. If a wooden tool box is installed, at least 7.8 inches of clearance should be maintained between the tool box and any parts of the exhaust system.
3. If the exhaust system is modified, it is the responsibility of those making the modification to ensure that the noise level meets appropriate standards.
4. If the exhaust system is modified it is the responsibility of those making the modification to ensure that the emission levels meet appropriate standards.

### ***Fuel System***

Relocation of the fuel tank, or installation of additional fuel tanks, is not recommended. If modifications to the fuel system are unavoidable, follow these recommendations:

1. Maintain adequate clearance between the fuel tank and any other device or structure.
2. Do not connect any additional fuel hose.

### ***Rear Lighting***

Brackets installed are temporary. Please do not use these brackets for body installation.

### ***Serviceability***

No matter what other modifications or changes are made, access to components requiring daily preventive maintenance or other routine service must not be obstructed. This includes:

1. Inspection, filling and draining of engine oil and cooling water.
2. Inspection, filling and draining of transmission fluid.
3. Adjustment, removal and installation of the fan belts.
4. Inspection, filling and removal of the battery and battery cover.
5. Inspection and filling of brake fluid.
6. Inspection and bleeding of the brake system and servo unit.
7. Maintenance of clearance for tightening of check bolt on brake safety cylinder.
8. Operation of the spare tire carrier, including mounting and dismounting of the spare tire.
9. Adjustment, removal and installation of distributor and/or cover.

***(continued on next page)***

## **Installation of Body and Special Equipment – Wheelbase Alteration**

With certain applications, it may become necessary to alter the wheelbase of the chassis. The next two sections provide the suggested guidelines for accomplishing either shortening or lengthening of the wheelbase.

### ***Shortening/Lengthening the Wheelbase Without Altering the Frame***

Since the frame is an integral part of the chassis, it is recommended that the frame not be cut if it is possible to avoid it. When shortening/lengthening the wheelbase on some models, it is possible to do so without cutting the frame. This is possible on models which have a straight frame rail. If the chassis does not have a straight frame rail, it may still be necessary to cut the frame. For instructions on shortening/lengthening these chassis, refer to the “Altering the Wheelbase by Altering the Frame” section of this book. Otherwise, the wheelbase may be shortened/lengthened by removing the rear suspension, drilling new suspension mounting holes at the appropriate spot in the frame, and sliding the rear suspension, suspension liner, and suspension crossmembers forward or aft.

The suspension and suspension crossmembers’ rivet holes left in the frame rail flange must be filled with GRADE 8 bolts and hardened steel washers at both the bolt head and nut, HUC bolts or Grade 8 flanged bolts and hardened steel washers at the nut. When shortening/lengthening the wheelbase in this manner, the following guidelines must be adhered to:

1. All frame drilling must comply with the DRILLING AND WELDING section of this book.
2. All rivet holes left in the frame rail flange from the suspension and suspension crossmembers must be either filled with Grade 8 bolts and hardened steel washers at both the bolt head and nut, HUC bolts or Grade 8 flanged bolts and hardened steel washers at the nut.
3. The components required to be slid forward or aft are the suspension and suspension hangers, suspension crossmembers and suspension frame liner.

### ***Altering the Wheelbase by Altering the Frame***

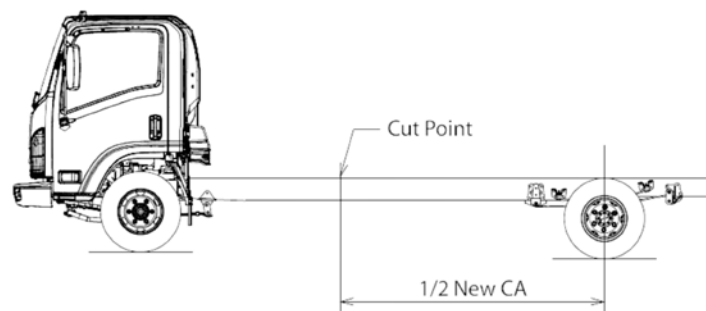
Even on a straight frame rail, it may be desirable to cut the frame and lengthen or shorten the wheelbase rather than simply sliding the rear suspension back or forward. The following section offers some guidelines and suggestions for cutting and lengthening or shortening the frame.

### ***Glossary of Terms – Chassis Wheelbase Alteration***

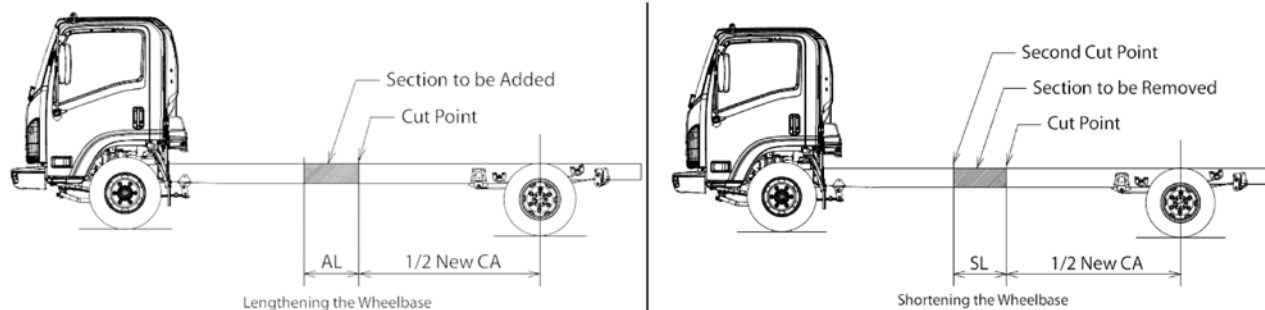
- CA – Length from back-of-cab to rear axle centerline in inches.
- AL – Added length (in case of a lengthened wheelbase). Difference between WB (new) and WB (old).
- SL – Shortened length (in case of shortened wheelbase). Difference between WB (old) and WB (new).

## Installation of Body and Special Equipment – Wheelbase Alteration (cont'd)

1. Determine the added length (AL) or shortened length (SL) required to lengthen or shorten chassis. (For added wheelbase: New CA = CA + AL; For shortened wheelbase: New CA = CA – SL.)
2. Obtain the material to be used as the insert for the lengthened wheelbase in the correct length (AL). The insert must have the same cross sectional dimensions and yield strength as the original frame rail.
3. Divide the new CA by two (2). Measure (new CA)/2 from the center of the rear axle forward and mark this point on the chassis frame (see figure below).

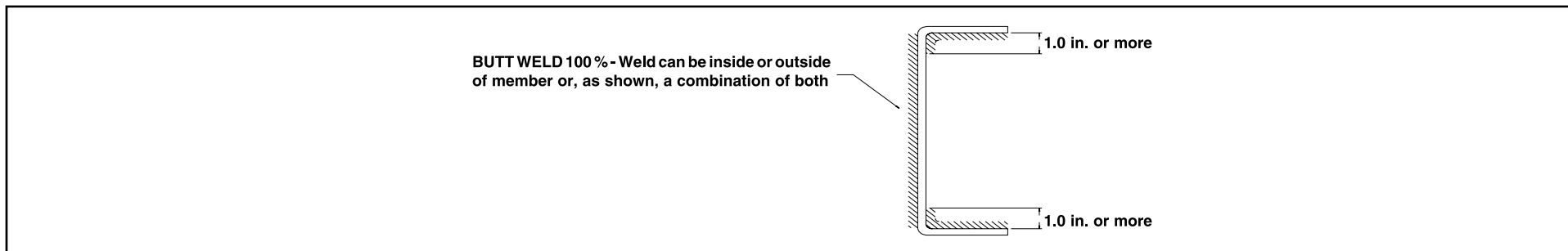


4. Cut the chassis frame at this point. If the wheelbase is to be lengthened, addition of the previously obtained insert (of length AL determined in step 1) will be made at this time. If the wheelbase is to be shortened, measure the distance (SL) forward of this cut and remove a length (SL) section from the chassis frame (see figure below). Insure that an adequate area on the frame remains for the required addition of the necessary reinforcements. These are the only suggested places for cutting the frame and reinforcements but may be changed upon the advice of Isuzu Commercial Trucks of America, Inc. Application Engineering.



## Installation of Body and Special Equipment – Wheelbase Alteration (cont'd)

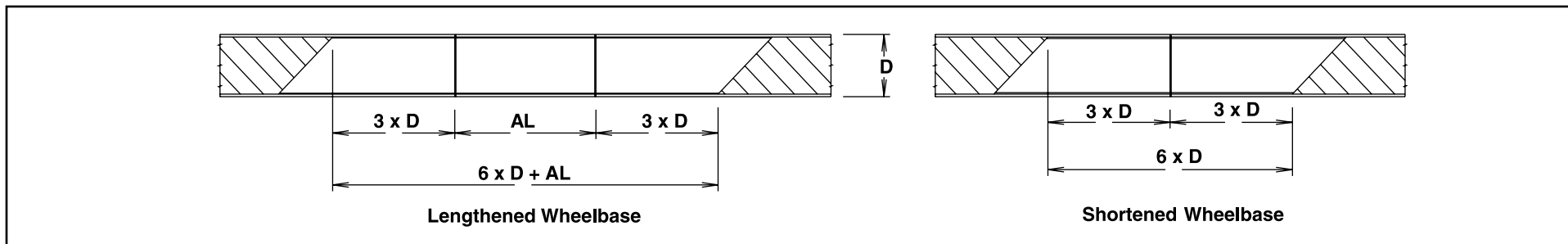
5. When welding the insert (length AL for wheelbase lengthening) to the original frame rail, a continuous butt weld must be used at the splices. When shortening the wheelbase, weld the ends of the chassis frame together with a continuous butt weld over the junction of the frame ends. Weld both the inside and outside of the frame rails using welding techniques prescribed by established welding standards (ref. SAE J1147) and in accordance with this guide. An example of this weld is shown below.



6. Determine the appropriate additional internal reinforcements which are required using this equation:

Reinforcement Length =  $AL + 6 \times (\text{original frame rail web depth})$ .

The figure below shows how this reinforcement is to be placed over the extended or shortened section of the frame rail.

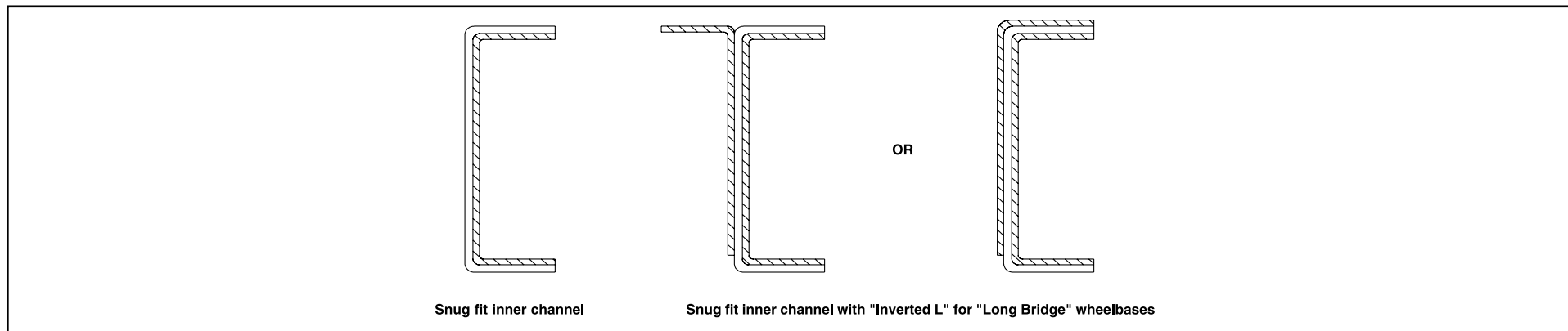


D = Original frame rail web depth

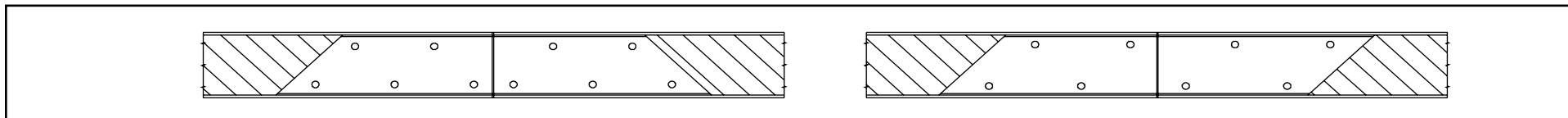
The suggested cross section of this reinforcement is a snug fit inner channel. If the new wheelbase exceeds the upper limit of the optional wheelbases of this model, i.e.; a "long bridge", it may be necessary to use an "inverted L" reinforcement in addition to the snug fit channel reinforcement (see figures on next page). Application Engineering should be consulted for approval of such cases. It should be noted that these methods of reinforcements, and any other methods which may be used, require a 45° angled cut at both ends to avoid stress concentrations in the frame (note the figures under item 7).

*(continued on next page)*

## Installation of Body and Special Equipment – Wheelbase Alteration (cont'd)



7. The reinforcements must be fastened securely to only the web of the original chassis frame rail. The reinforcement must be held rigidly in place using either HUC bolts, Grade 8 bolts and hardened steel washers at both the bolt head and nut, or Grade 8 flanged bolts and hardened steel washers at the nut. Below are some suggested bolt patterns. It should be noted that these bolt patterns must not align the bolts vertically, i.e.: the bolt pattern must be staggered.



8. Lengthening the frame will also require extending the brake lines, basic chassis electrical harness. It is recommended that the original brake lines be removed and replaced with brake lines of the same diameter as the original lines and of the appropriate length. The extended ABS brake lines must be supported back to the frame to prevent vibration. The electrical harness must be extended in accordance with the ELECTRICAL WIRING AND HARNESSING section of this book. ICTA offers an electrical extension harnesses for the N and W series chassis when a wheelbase is lengthened. One wheelbase longer is the recommended maximum wheelbase extension (please refer to the drive line section and particular models for number of drivelines and their maximum lengths). The extension of a wheelbase will require an extension harnesses (PN 8980626380) and 12 clips (5097003230).
9. The propeller shafts' overall length will also need to be lengthened or shortened. If the extension is within the limits of the optional wheelbases of the respective model, the exact propeller shaft lengths and angles are given on or about Page 12 of the respective sections of this book. If the modified wheelbase exceeds the optional wheelbases of the respective model, the following guidelines must be adhered to:

*(continued on next page)*



## **Installation of Body and Special Equipment – Wheelbase Alteration (cont'd)**

### a. Propeller Shaft Length

The maximum propeller shaft lengths (pin to pin) for the respective models are shown in the table below.

	NPR/W3500, W4500 Diesel	NPR/W3500, W4500 Gas	NQR/W5500	NPR/W5500-HD
Propeller Shaft Diameter (in.)	3.54	3.54	3.54	3.54
Maximum Propeller Shaft Length (in.)	52.9	52.9	52.9	52.9

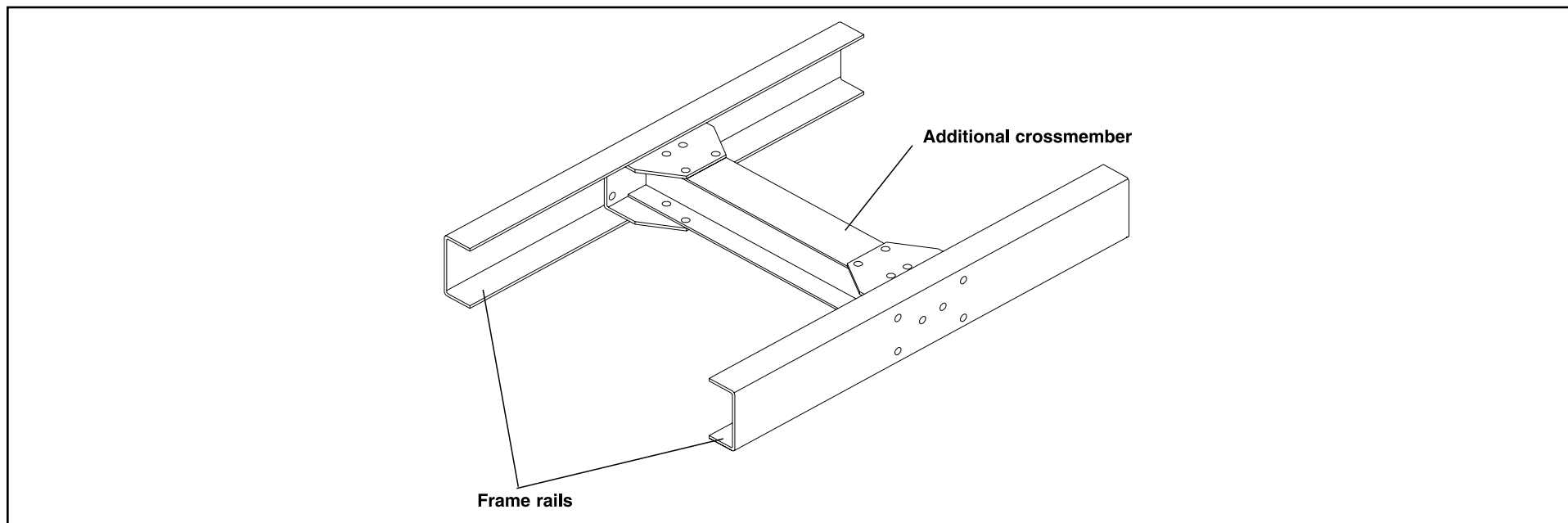
### b. Propeller Shaft Angles

The maximum propeller shaft angles, with respect to the previous shaft, are shown in the table below.

	NPR/W3500, W4500 Diesel	NPR/W3500, W4500 Gas	NQR/W5500	NPR/W5500-HD
Maximum Propeller Shaft Angle	6.1°	6.1°	6.1°	6.1°

- c. The propeller shaft angles must be designed such that the angles will cancel to avoid propeller shaft whip.
- d. The propeller shaft yokes must be assembled such that the propeller shaft yokes are “in phase.” “In phase” means that the yokes at either end of a given propeller shaft assembly are in the same plane.
- 10. Extending the frame will also require relocation and/or addition of crossmembers. If the extension is within the limits of the optional wheelbases of the respective model, the exact crossmember locations and dimensions are given in the respective model sections of this book. If the modified wheelbase exceeds the optional wheelbases of the respective model, the following guidelines must be adhered to:
  - a. The crossmember location will largely be determined by the propeller shaft lengths and where the center carrier bearing locations are for the propeller shaft assembly.
  - b. A crossmember must be located at the front and rear spring hangers of the rear suspension (refer to the appropriate section of this book to see where these suspension crossmembers are to be located).
  - c. The crossmember must be constructed such that it supports both the upper and lower flange on each frame rail (see drawing on next page). A crossmember such as the one on the next page may be constructed, or GM/Isuzu crossmembers may be obtained from your GM/Isuzu parts dealer.

## Installation of Body and Special Equipment – Wheelbase Alteration (cont'd)



d. The maximum distance between crossmembers for the respective models is given in the table below.

	NPR/W3500, W4500 Diesel	NPR/W3500, W4500 Gas	NQR/W5500	NPR/W5500-HD
Maximum Distance Between Crossmembers (in.)	<b>XXX</b>	<b>XXX</b>	<b>XXX</b>	<b>XXX</b>

- e. The drilling for any additional holes in the frame rails must comply with the DRILLING AND WELDING section of this book.
11. All other aspects of lengthening or shortening the wheelbase must comply with the applicable section of this Body Builder's Guide. For special applications and longer than recommended body lengths, ICTA Application Engineering must be consulted for approval. In the West Coast call 1-562-229-5314 and in the East Coast call 1-770-740-1670 x262.
  12. Please contact applications engineering for guidelines on N/W SERIES CHASSIS frame modifications when the vehicle is equipped with an Antilock Brake System.

# 2009 GM/Isuzu TRUCK

## Installation of Body and Special Equipment – Wheelbase Alteration (cont'd)

### Body Application Summary Chart

#### 2009 Gas and 2009 Diesel Model Body Application Summary Chart

Model/GVWR	WB	BOC	10 ft.	12 ft.	14 ft.	16 ft.	18 ft.	20 ft.	22 ft.	24 ft.
NPR/W3500 Gas 12,000 lbs.	109	6.5	X	X						
	132.5	6.5			X					
	150	6.5				X	X			
	176	6.5						X		
NPR HD/W4500 Gas 14,500 lbs.	109	6.5	X	X						
	132.5	6.5			X					
	150	6.5				X	X			
	176	6.5						X		
NPR/NPR HD/W3500/W4500 Crew Cab Gas 12,000 & 14,500 lbs.	150	5.0		X <sup>1</sup>						
	176	5.0				X <sup>2</sup>				
NPR/W3500 Diesel 12,000 lbs.	109	6.5	X	X						
	132.5	6.5			X					
	150	6.5				X	X			
	176	6.5						X		
NPR HD/W4500 Diesel 14,500 lbs.	109	6.5	X	X						
	132.5	6.5			X					
	150	6.5				X	X			
	176	6.5						X		
NPR HD/W4500 Crew Cab Diesel 14,500	150	5.0		X <sup>1</sup>						
	176	5.0				X <sup>2</sup>				

1 = 16' Dovetail landscape (12' deck plus 4' dovetail).

2 = 18' Dovetail landscape (14' deck plus 4' dovetail).

**IMPORTANT:** Body selection recommendations are based on water-level weight distribution and no accessories, liftgate or refrigeration units. This table is intended for reference and does not preclude the necessity for an accurate weight distribution calculation.

*(continued on next page)*

## Installation of Body and Special Equipment – Wheelbase Alteration (cont'd)

### **Body Application Summary Chart (continued from Pg. 36)**

#### **2009 Gas and 2009 Diesel Model Body Application Summary Chart**

Model/GVWR	WB	BOC	10 ft.	12 ft.	14 ft.	16 ft.	18 ft.	20 ft.	22 ft.	24 ft.
NQR/W5500 Gas 17,500 lbs.	109	6.5	X							
	132.5	6.5		X	X					
	150	6.5				X	X			
	176	6.5						X		
	200	6.5							X	
NQR/W5500 Crew Cab Diesel 17,950 lbs.	150	5.0		X <sup>1</sup>						
	176	5.0				X <sup>2</sup>				
NRR/W5500-HD Diesel 19,500 lbs.	109	6.5	X							
	132.5	6.5		X	X					
	150	6.5				X				
	176	6.5					X	X		
	200	6.5							X	
	212	6.5								X

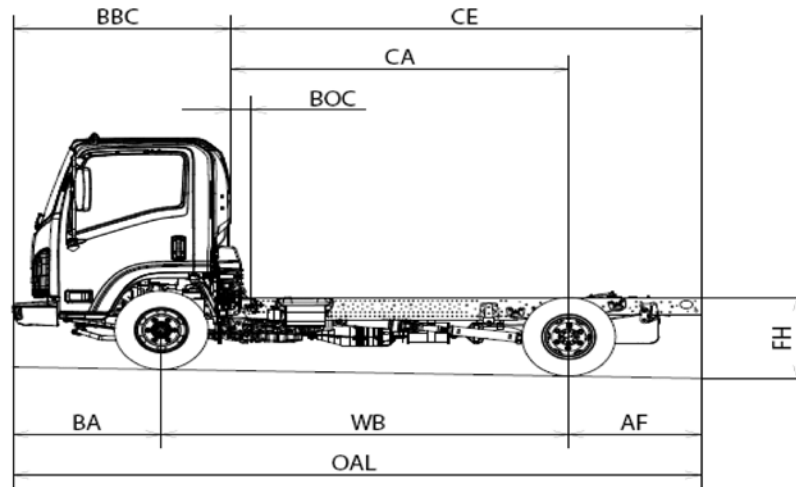
1 = 16' Dovetail landscape (12' deck plus 4' dovetail).

2 = 18' Dovetail landscape (14' deck plus 4' dovetail).

**IMPORTANT:** Body selection recommendations are based on water-level weight distribution and no accessories, liftgate or refrigeration units. This table is intended for reference and does not preclude the necessity for an accurate weight distribution calculation.

# 2009 GM/Isuzu TRUCK

## NPR/W3500, NPR HD/W4500 Gas

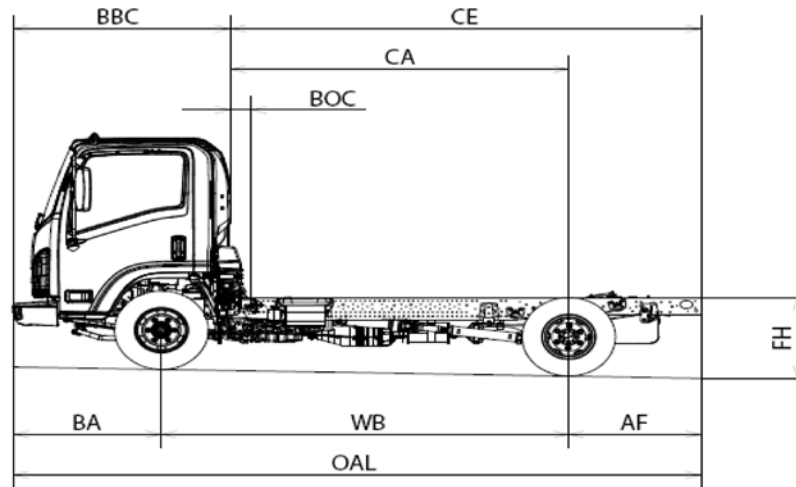


### 2009 Model Year - Body & Payload Weight Distribution (% Front / % Rear)

Model	GVWR	WB	CA	CE	OAL	BOC	10 ft.	12 ft.	14 ft.	16 ft.	18 ft.	20 ft.	22 ft.	24 ft.
<b>AUTOMATIC TRANSMISSION</b>														
NPR/W3500 Gas	12,000	109	86.5	129.6	200.5	6.5	18/82	7/93						
NPR HD/W4500 Gas	14,500	109	86.5	129.6	200.5	6.5	18/82	7/93						
NPR/W3500 Gas	12,000	132.5	110	153.1	224	6.5			14/86					
NPR HD/W4500 Gas	14,500	132.5	110	153.1	224	6.5			14/86					
NPR/W3500 Gas	12,000	150	127.5	170.6	241.5	6.5				16/84	8/92			
NPR HD/W4500 Gas	14,500	150	127.5	170.6	241.5	6.5				16/84	8/92			
NPR/W3500 Gas	12,000	176	153.5	196.6	267.5	6.5						15/85		
NPR HD/W4500 Gas	14,500	176	153.5	196.6	267.5	6.5						15/85		

# 2009 GM/Isuzu TRUCK

## NPR/W3500, NPR HD/W4500 Diesel



### 2009 Model Year - Body & Payload Weight Distribution (% Front / % Rear)

Model	GVWR	WB	CA	CE	OAL	BOC	10 ft.	12 ft.	14 ft.	16 ft.	18 ft.	20 ft.	22 ft.	24 ft.
<b>AUTOMATIC TRANSMISSION &amp; MANUAL TRANSMISSION</b>														
NPR/W3500 Diesel	12,000	109	86.5	129.6	200.5	6.50	18/82	7/93						
NPR HD/W4500 Diesel	14,500	109	86.5	129.6	200.5	6.50	18/82	7/93						
NPR/W3500 Diesel	12,000	132.5	110	153.1	224	6.50			15/85					
NPR HD/W4500 Diesel	14,500	132.5	110	153.1	224	6.50			15/85					
NPR/W3500 Diesel	12,000	150	127.5	170.6	241.5	6.50				17/83	9/91			
NPR HD/W4500 Diesel	14,500	150	127.5	170.6	241.5	6.50				17/83	9/91			
NPR/W3500 Diesel	12,000	176	153.5	196.6	267.5	6.50						15/85		
NPR HD/W4500 Diesel	14,500	176	153.5	196.6	267.5	6.50						15/85		

## NQR/W5500 Diesel

### 2009 Model Year - Body & Payload Weight Distribution (% Front / % Rear)

Model	GVWR	WB	CA	CE	OAL	BOC	10 ft.	12 ft.	14 ft.	16 ft.	18 ft.	20 ft.	22 ft.	24 ft.
<b>AUTOMATIC TRANSMISSION &amp; MANUAL TRANSMISSION</b>														
NQR/W5500 Diesel	17,950	109	86.5	129.6	200.5	6.5	18/82	7.93						
NQR/W5500 Diesel	17,950	132.5	110	153.1	224	6.5			15/85					
NQR/W5500 Diesel	17,950	150	127.5	170.6	241.5	6.5				17/83	9/91			
NQR/W5500 Diesel	17,950	176	153.5	196.6	267.5	6.5						15/85		
NQR/W5500 Diesel	17,950	200	177.5	220.6	291.5	6.5							19/81	

**IMPORTANT:** Weight distribution percentages listed do not include added accessories, liftgate or refrigeration units. Percentages based on water-level distribution of body and payload weight which is determined by subtracting chassis wet weight (including 200 lb. driver) from GVWR. These tables are intended for reference and do not preclude the necessity for an accurate weight distribution calculation.

## NRR/W5500 HD Diesel

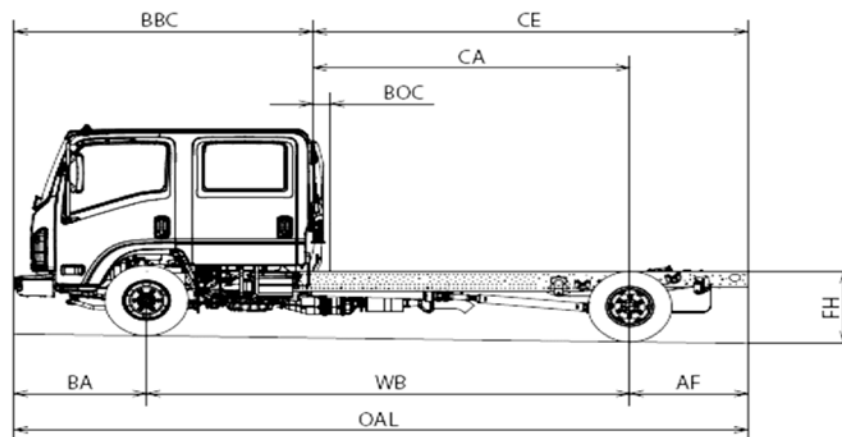
### 2009 Model Year - Body & Payload Weight Distribution (% Front / % Rear)

Model	GVWR	WB	CA	CE	OAL	BOC	10 ft.	12 ft.	14 ft.	16 ft.	18 ft.	20 ft.	22 ft.	24 ft.
<b>AUTOMATIC TRANSMISSION &amp; MANUAL TRANSMISSION</b>														
NRR/W5500-HD Diesel	19,500	109	86.5	129.6	200.5	6.5	18/82	7.93						
NRR/W5500-HD Diesel	19,500	132.5	110	153.1	224	6.5			15/85					
NRR/W5500-HD Diesel	19,500	150	127.5	170.6	241.5	6.5				17/83	9/91			
NRR/W5500-HD Diesel	19,500	176	153.5	196.6	267.5	6.5						15/85		
NRR/W5500-HD Diesel	19,500	200	177.5	200.6	291.5	6.5							19/81	
NRR/W5500-HD Diesel	19,500	212	189.5	232.6	303.5	6.5								18/82

**IMPORTANT:** Weight distribution percentages listed do not include added accessories, liftgate or refrigeration units. Percentages based on water-level distribution of body and payload weight which is determined by subtracting chassis wet weight (including 200 lb. driver) from GVWR. These tables are intended for reference and do not preclude the necessity for an accurate weight distribution calculation.

# 2009 GM/Isuzu TRUCK

## NPR/W3500, NPR-HD/W4500 Gas Crew Cab & NPR-HD/W4500, NQR/W5500 Diesel Crew Cab



### **2009 Model Year - Gas and Diesel Crew Cab Body & Payload Weight Distribution (% Front / % Rear)**

Model	GVWR	WB	CA	CE	OAL	BOC	10 ft.	12 ft.	14 ft.	16 ft.
NPR/W3500 Crew Cab Gas	12,000	150	88.5	131.6	241.5	5		8/92		
NPR/W3500 Crew Cab Gas	12,000	176	114.5	157.6	267.5	5				15/85
NPR/W4500 Crew Cab Gas	14,500	150	88.5	131.6	241.5	5		8/92		
NPR/W4500 Crew Cab Gas	14,500	176	114.5	157.6	267.5	5				15/85
NPR HD/W4500 Crew Cab Diesel	14,500	150	88.5	131.6	241.5	5		8/92		
NPR HD/W4500 Crew Cab Diesel	14,500	176	114.5	157.6	267.5	5				15/85
NQR/W5500 Crew Cab Diesel	17,950	150	88.5	131.6	241.5	5		8/92		
NQR/W5500 Crew Cab Diesel	17,950	176	114.5	157.6	267.5	5				15/85

**IMPORTANT:** Weight distribution percentages listed do not include added accessories, liftgate or refrigeration units. Percentages based on water-level distribution of body and payload weight which is determined by subtracting chassis wet weight (including 200 lb. driver and a crew of 6 @ 200 lbs. each) from GVWR. These tables are intended for reference and do not preclude the necessity for an accurate weight distribution calculation.



## Mechanical & Cab Specifications – Engine Horsepower & Torque Chart

The following table presents Net versus Gross Horsepower and Torque ratings for Isuzu/W-Series Truck Product Engines:

Engine Model	Application	Net Hp <sup>1</sup> hp/rpm	Net Torque <sup>1</sup> lbs.-ft./rpm	Gross Hp <sup>1</sup> hp/rpm	Gross Torque <sup>1</sup> lbs.-ft./rpm
GMPT 6.0L-V8	NPR/W3500, NPR-HD/W4500 Gas	N/A	N/A	300/4400	360/4000
Isuzu 4HK1-TC Automatic Transmission	NPR/W3500, NPR-HD/W4500, NQR/W5500,	193/2400	414/1850	205/2400	441/1850
	NRR/W5500-HD Diesel				
	<b>MANUAL TRANSMISSION</b>				
Isuzu 4HK1-TC	NPR-HD/W4500, NQR/W5500, NRR/W5500-HD Diesel	169/2400	379/1850	175/2400	387/1850

**NOTE:** <sup>1</sup> Horsepower and Torque Ratings measured under SAE J1349 standards.

## GVW/GCW Ratings

The following table presents GVW ratings and corresponding GCW ratings for each model truck:

Truck Model	Transmission	GVWR (lbs.)	GCWR (lbs.) <sup>1</sup>	Truck Model	Transmission	GVWR (lbs.)	GCWR (lbs.) <sup>1</sup>
NPR/W3500 Gas	Automatic	12,000	18,000	NPR-HD/W4500 Diesel	Manual	14,500	20,500
NPR-HD/W4500 Gas	Automatic	14,500	20,500				
NPR/W3500 Diesel	Automatic	12,000	18,000	NQR/W5500 Diesel	Manual	17,950	23,950
NPR-HD/W4500 Diesel	Automatic	14,500	20,500				
NQR/W5500 Diesel	Automatic	17,950	23,950	NRR/W5500-HD Diesel	Manual	19,500	25,550
NRRW5500-HD Diesel	Automatic	19,500	25,500				

<sup>1</sup> The NPR, NPR HD, NQR, NRR/W3500, W4500, W5500, W5500-HD are not approved for Hot Shot applications.

## **Mechanical & Cab Specifications – Rear Frame Height Chart**

The following table provides the rear frame height for each model/GVWR with standard tires:

Model	GVWR (lbs.)	Standard Tire	Frame HT (in.) FH Std. Tires
NPR/W3500 Gas	12,000	215/85R-16E	31.8
NPR-HD/W4500 Gas	14,500	225/70R-19.5F	33
NPR/W3500 Diesel	12,000	215/85R-16E	31.8*
NPR-HD/W4500 Diesel	14,500	215/85R-16E	31.8*
NQR/W5500 Diesel	17,950	225/70R-19.5F	33
NRR/W5500-HD Diesel	19,500	225/70R-19.5F	33

\* with side tank = 32.0 in.

## Mechanical & Cab Specifications – Paint Code Chart

MODEL	MODEL YEARS	ISUZU OPTION CODE	ISUZU PAINT CODE	ISUZU COLOR NAME	NOTES
KS22	1985	N/A	CALM WHITE	0133-P1	
NPR DIESEL	1986-95	844	GLACIER WHITE	0172-P1	
NPR , NQR NRR DIESEL	1995.5-2008	729	ARC WHITE	W301-P801-0	1999 MODEL ONLY NPR SILVER
		730	ADRIATIC BLUE	B302-P801-0	
		845	POLAR SILVER	N507-P901-0	
		989	SUNBELT GREEN	G021-P801-0	
NPR GAS	1993-94	844	GLACIER WHITE	0172-P1	
NPR GAS	1995.5-2007	729	ARC WHITE	W301-P801-0	WHEELS ONLY
			ACCURIDE WHITE	301-W-30102	
		845	POLAR SILVER	N507-P901-0	
		989	SUNBELT GREEN	G021-P801-0	
		736	CARDINAL RED	R410-P801-0	
NRR	1989-94	844	GLACIER WHITE	0172-P1	
FRR	1995-03	844	GLACIER WHITE	0172-P1	
		989	SUNBELT GREEN	G021-P801-0	

MODEL	MODEL YEARS	ISUZU OPTION CODE	ISUZU PAINT CODE	ISUZU COLOR NAME	NOTES
FSR	1987-02	729	ARC WHITE	W301-P801-0	BUMPER FRAME
		844	GLACIER WHITE	0172-P1	
		989	SUNBELT GREEN	G021-P801-0	
	2003-2008		GRAY/LIGHT ARGENT BLACK	WE6272 W20A848	
FTR	1988-02	729	ARC WHITE	W301-P801-0	BUMPER FRAME
		844	GLACIER WHITE	0172-P1	
		989	SUNBELT GREEN	G021-P801-0	
	2003-2008		GRAY/LIGHT ARGENT BLACK	WE6272 W20A848	
FVR	1988-02	729	ARC WHITE	W301-P801-0	BUMPER FRAME
		844	GLACIER WHITE	0172-P1	
		989	SUNBELT GREEN	G021-P801-0	
	2003-2008		GRAY/LIGHT ARGENT BLACK	WE6272 W20A848	
EVR	1988-92	844	GLACIER WHITE	0172-P1	

## Mechanical & Cab Specifications – Paint Code Chart (cont'd)

ISUZU PAINT CODE	ISUZU OPTION CODE	ISUZU COLOR NAME	AKZO NOBEL CODE	DUPONT CODE	NEXA COLOR CODE	PPG CODE	SHERWIN WILLIAMS/ MARTIN SENOUR	SPIES HECKER CODE	STANDOX CODE
W301-P801-0	729	Arc White	IST4002	729	2NV8B	91508	729	729	729
Y719-P801-0	812	Wheatland Yellow	IST1001	812	KPL7B	83931	812	812	812
G705-P801-0	807	Woodland Green	IST6002	807	KPL3B	48339	807	807	807
R410-P801-0	736	Cardinal Red	IST3001	736	5XA2B	75097	736	736	736
B414-P801-0	695	Dark Blue	IST5001	695	5CHCB	909649	695	695	695
K705-P801-0	508	Ebony Black II	IST4001	508	7DVVB	918055	508	508	508

## Mechanical & Cab Specifications – N/W Towing Procedure

**NOTE:** When towing, disconnect the driveshaft at the rear axle to ensure the automatic transmission is not damaged. Proper equipment must be used to prevent damage to vehicles during any towing. State and local laws which apply to vehicles in tow must be followed. Vehicles should not be towed at speeds in excess of 55 mph (90 km/h). Connect to the main structural parts of the vehicle. DO NOT attach to bumpers, tow hooks or brackets. Use only equipment designed for this purpose. Follow the instructions of the wrecker manufacturer. A safety chain system must be used. The procedures below must be followed when towing to prevent possible damage.

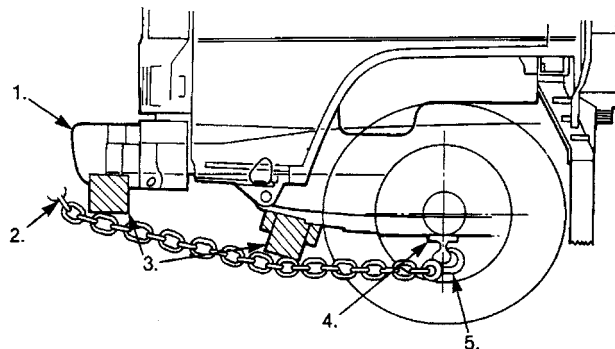
### **Front End Towing (Front Wheels Off the Ground)**

To prepare a disabled vehicle for front end towing with front wheels raised off the ground, the following steps are necessary:

- Block the rear wheels of the disabled vehicle.
- Disconnect the driveshafts at the rear axle. Secure the driveshafts to the frame or crossmember.
- If there is damage or suspected damage to the rear axle, remove the axle shafts.
- Cover the hub openings to prevent the loss of lubricant or entry of dirt or foreign objects.
- Place 4" x 4" wood beam against the towing guide behind the bumper. (If no 4" x 4" is available, then remove the bumper.) Ensure the towing chains do not contact the horns or the bumper.

#### **Legend:**

1. Bumper
2. Towing Chain
3. Towing Guide
4. Front Axle
5. Tow Hook



### **After Towing**

After towing the vehicle, block the rear wheels and install axle shafts or propeller shaft. Apply the parking brake before disconnecting from the towing vehicle.

## **Mechanical & Cab Specifications – N/W Towing Procedure (cont'd)**

### ***Front End Towing (All Wheels On the Ground)***

Your vehicle may be towed on all wheels provided the steering is operable. Remember that power steering and brakes will not have power assist. There must be a tow bar installed between the towing vehicle and the disabled vehicle.

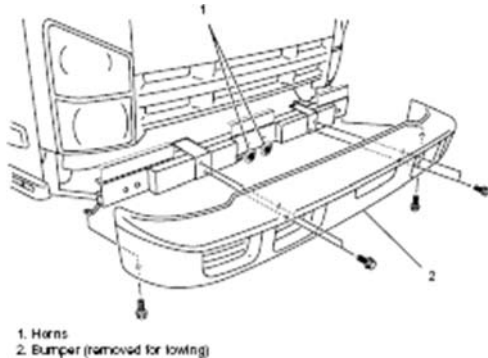
To prepare a disabled vehicle for front end towing with all wheels on the ground, the following steps are necessary:

- Block the wheels of the disabled vehicle.
- Disconnect the propeller shafts at the rear axle. Secure the propeller shafts to the frame or crossmember.
- Provide wood blocking to prevent towing chains and bar from contacting the bumper.
- If there is damage or suspected damage to the rear axle, remove the axle shafts.
- Cover the hub openings to prevent the loss of lubricant or entry of dirt or foreign objects.

### **After Towing**

After towing the vehicle, block the rear wheels and install axle shafts or propeller shaft. Apply the parking brake before disconnecting from the towing vehicle. Check and fill rear axle with oil if required.

## Mechanical & Cab Specifications – N/W Towing Procedure (cont'd)



### **Legend:**

- 1. Horns
- 2. Bumper  
(removed for towing)

### ***Rear End Towing (Rear Wheels Off the Ground)***

When towing a vehicle with rear wheels raised, secure the steering wheel to maintain straight-ahead position. Make certain that the front axle is not loaded above the front axle Gross Axle Weight Rating (GAWR) as indicated on the vehicle's VIN and Weight Rating plate.

## **Mechanical & Cab Specifications – N/W Towing Procedure (cont'd)**

### ***Special Towing Instructions:***

1. All state and local laws regarding such items as warning signals, night illumination, speed, etc., must be followed.
2. Safety chains must be used.
3. No vehicle should ever be towed over 55 mph (90 km/h).
4. Loose or protruding parts of damaged vehicles should be secured prior to moving.
5. A safety chain system completely independent of the primary lifting and towing attachment must be used.
6. Operators should refrain from going under a vehicle which is being lifted by the towing equipment unless the vehicle is adequately supported by safety stands.
7. No towing operation which for any reason jeopardizes the safety of the wrecker operator or any bystanders or other motorists should be attempted.



## Weight Distribution Concepts – Weight Restrictions

The Gross Vehicle Weight Rating (GVWR) and the Gross Axle Weight Rating (GAWR) of each Incomplete Vehicle are specified on the cover of its Incomplete Vehicle Document in conformance to the requirements of Part 568.4 of the Federal Motor Vehicle Safety Regulations. The final stage manufacturer is responsible under Part 567.5 to place the GVWR and the GAWR of each axle on the Final Vehicle Certification Label. The regulation states that the appropriate rating “shall not be less than the sum of the unloaded vehicle weight, rated cargo load, and 150 pounds times the vehicle’s designated seating capacity.”

Unloaded vehicle weight means the weight of a vehicle with maximum capacity of all fluids necessary for operation of the vehicle, but without cargo or occupants.

During completion of this vehicle, GVWR and GAWR may be affected in various ways, including but not limited to the following:

1. The installation of a body or equipment that exceeds the rated capacities of this Incomplete Vehicle.
2. The addition of designated seating positions which exceeds the rated capacities of this Incomplete Vehicle.
3. Alterations or substitution of any components such as axles, springs, tires, wheels, frame, steering and brake systems that may affect the rated capacities of this Incomplete Vehicle.

Use the following chart to assure compliance with the regulations. Chassis curb weight and GVW rating is located on Page 2 in each vehicle section. Always verify the results by weighing the completed vehicle on a certified scale.

Curb Weight of Chassis (lbs.)		_____
		(From required vehicle section)
<b>PLUS</b> weight of added body components, accessories or other permanently attached components.	+	_____
		(Body, liftgate, reefer, etc.)
<b>PLUS</b> total weight of passengers, air conditioning and all load or cargo.	+	_____
		(Driver, passengers, accessories and load)
<hr/>		
<b>EQUALS</b> Gross Vehicle Weight (lbs.) (GVW) of completed vehicle.	=	_____
		(Should equal GVWR from required vehicle section)

## **Weight Distribution Concepts – Gross Axle Weight Rating, Weighing the Vehicle, Tire Inflation, Center of Gravity**

### ***Gross Axle Weight Rating***

The Gross Vehicle Weight is further restricted by the Gross Axle Weight Rating (GAWR). The maximum GAWR for both front and rear axles is listed in each Vehicle Section. Weight distribution calculations must be performed to ensure GAWR is not exceeded. Always verify the results by weighing the completed vehicle on a certified scale.

**NOTE:** Although the Front Gross Axle Weight Rating (FGAWR) plus the Rear Gross Axle Weight Rating (RGAWR) may exceed the Gross Vehicle Weight Rating (GVWR), the total GVW may not exceed the respective maximum GVWR.

The variation in the GAWRs allow the second stage manufacturer some flexibility in the design of the weight distribution of the attached unit.

### ***Weighing the Vehicle***

Front and rear GAWRs and total GVWR should be verified by weighing a completed loaded vehicle. Weigh the front and rear of the vehicle separately and combine the weights for the total GVWR. All three weights must be less than the respective maximum shown in the vehicle sections.

### ***Tire Inflation***

Tire inflation must be compatible with GAWR and GVWR as specified on the cover of the Incomplete Vehicle Document for each vehicle.

### ***Center of Gravity***

The design of the truck body should be such that the center of gravity of the added load does not exceed the guidelines as listed in each Vehicle Section. If the body is mounted in such a way that the center of gravity height exceeds the maximum height of the center of gravity designated for each model, the directional stability at braking and roll stability at cornering will be adversely affected. A vertical and/or horizontal center of gravity calculation must be performed if a question in stability arises to ensure the designed maximum height of the center of gravity is not violated.

## **Weight Distribution Concepts – Weight Distribution**

A truck as a commercial vehicle has but one purpose. That purpose is to haul some commodity from one place to another. A short distance or a long distance, the weight to be hauled, more than any other factor, determines the size of the truck. A small weight requires only a small truck; a large weight requires a large truck. A simple principle, but it can easily be misapplied. In any case, selecting the right size truck for the load to be hauled will ensure that the job will be done and that it will be able to be done with some degree of reliability and within the legal limitations of total gross weight and axle gross weights.

Not only must a truck be selected that will handle the total load, but the weight must also be properly distributed between the axles. This is of extreme importance from both a functional and economic aspect. If a truck consistently hauls less than its capacity, the owner is not realizing full return on his investment and his operating costs will be higher than they should be. If the truck is improperly loaded or overloaded, profits will be reduced due to increased maintenance costs and potential fines resulting from overloading beyond legal limitations. Careful consideration must be given to distribution of the load weight in order to determine how much of the total, including chassis, cab, body and payload, will be carried on the front axle and how much will be carried on the rear axle, on the trailer axles and the total. Moving a load a few inches forward or backward on the chassis can mean the difference between acceptable weight distribution for the truck or an application that will not do the job satisfactorily.

Every truck has a specific capacity and should be loaded so that the load distribution is kept within Gross Axle Weight Ratings (GAWR) and the truck's Gross Vehicle Weight Rating (GVWR) or Gross Combination Weight Rating (GCWR) for a tractor/trailer and the weight laws and regulations under which the truck will operate. Improper weight distribution will cause problems in many areas:

### **1. Excessive front end wear and failure**

- a. Tie-rod and kingpin wear
- b. Front axle failure
- c. Overloading of front suspension
- d. Wheel bearing failure

### **2. Rapid tire wear**

- a. When the weight on a tire exceeds its rating capacity, accelerated wear will result and could result in tire failure.

## **Weight Distribution Concepts – Weight Distribution (cont'd)**

### **3. Rough, erratic ride**

- a. If the center of the payload is directly over or slightly behind the rear axle, the lack of sufficient weight on the front axle will create a bobbing effect, very rough ride, and erratic steering. This condition will be magnified when the truck is going uphill.

### **4. Hard steering**

- a. When loads beyond the capacity of the front axle are imposed upon it, the steering mechanism is also overloaded and hard steering will result.
- b. Excessive overloading could result in steering component damage or failure.

### **5. Unsafe operating and conditions**

- a. Poor traction on the steering axle effects the safety of the driver and equipment, particularly on wet, icy and slippery surfaces. Experience indicates that approximately 30% of the total weight at the ground on a truck or tractor should be on the front axle with a low cab forward vehicle.
- b. When a truck is overloaded, a dangerous situation may exist because minimum speeds cannot always be maintained, directional control may not be precise and insufficient braking capacity can cause longer than normal braking distances.

### **6. High maintenance costs**

- a. Improper weight distribution and overloading cause excessive wear and premature failure of parts. Additional stresses imposed on the frame by the misapplication of wheelbases may be instrumental in causing the frame to crack or break.

### **7. Noncompliance with weight laws and regulations**

- a. When there is the possibility that axle loads will exceed existing weight laws and regulations, careful weight distribution is necessary to provide a correct balance between front and rear axle loads and total load within legal limitations.

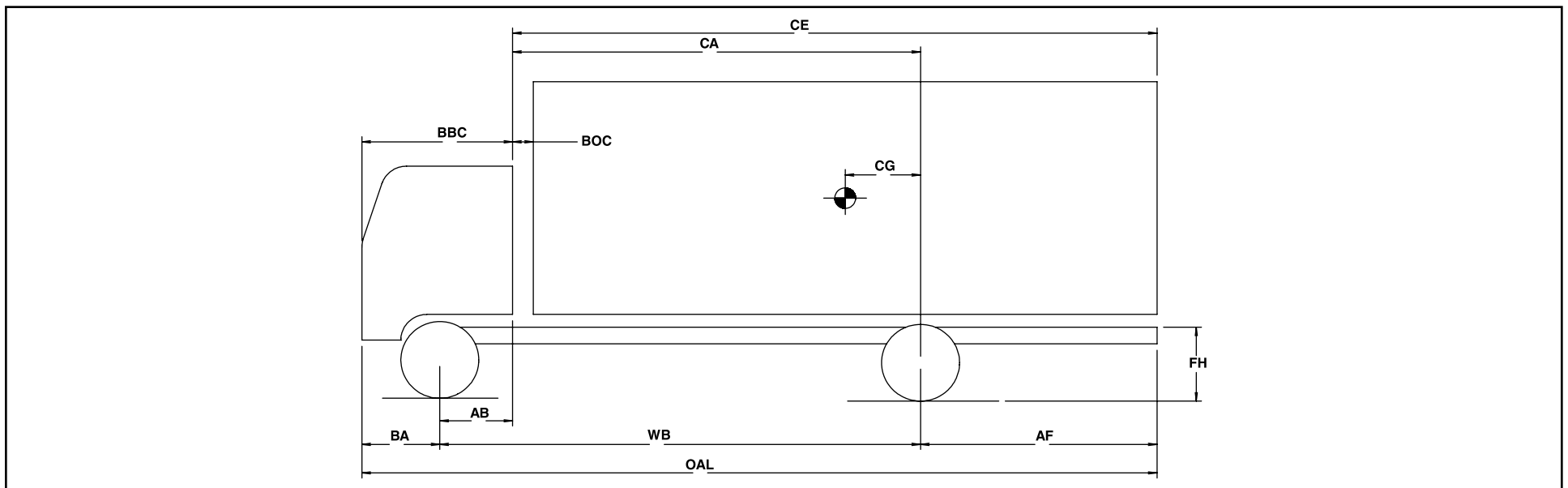
In this way, maximum payloads may be carried without exceeding legal limits. If the body is too long for a wheelbase, the center of the body and payload is placed directly over the rear axle. This places all the payload on the rear axles, resulting in overloading the rear tires, rear axle springs and wheel bearings and potentially exceeding the rear axle legal weight limit. The front axle is then carrying no part of the payload and is easily lifted off the ground when going over rough terrain, creating a very rough ride and temporary loss of steering control. If the body is too short for the wheelbase used, frame stress may be increased and may result in excessive loads on the front axle. Excessive front axle loads increase wear on the kingpins and bushings, wheel bearings and steering gear. Excessive front axle loads also overstress the front axle, springs, tires and wheels. All of these contribute directly to higher maintenance costs and hard steering, both of which are undesirable.

## Weight Distribution Concepts – Weight Distribution (cont'd)

Weight distribution analysis involves the application of basic mathematical principles to determine the proper positioning of the payload and body weight in relation to the wheelbase of the truck chassis.

It is much less expensive to work all of this out on paper, make mistakes on paper and correct them there than to set up the truck incorrectly and either have it fail to do the job or, much worse, fail completely.

It is important to become familiar with the dimensions of the truck, as these will be needed to perform the necessary calculations.

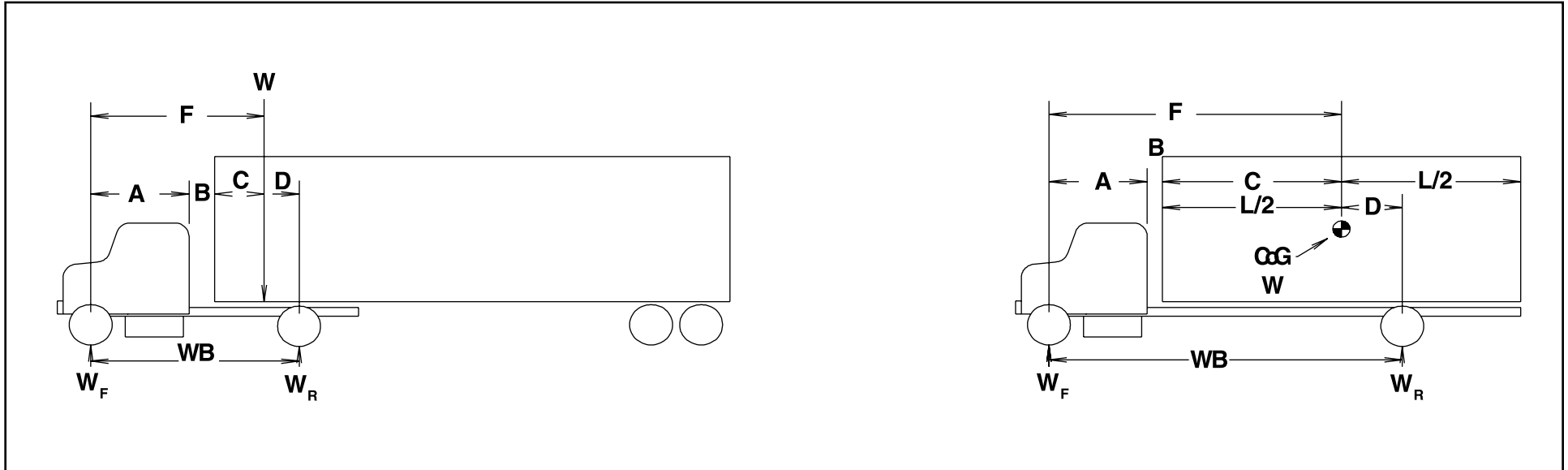


## Glossary of Dimensions

**BBC** – Bumper to back of cab  
**BA** – Bumper to axle  
**CA** – Cab to axle  
**AB** – Axle to back of cab  
**BOC** – Back of cab clearance

**CG** – Center of gravity of body and payload from axle  
**WB** – Wheelbase  
**OAL** – Overall length  
**AF** – Axle to end of frame  
**FH** – Frame height

## Weight Distribution Concepts – Weight Distribution Formulas



- A** – Front axle to back of cab
- B** – Distance between cab and body or trailer
- C** – Front of body to C.G. or front of trailer to kingpin
- D** – Distance C.G. of body or fifth wheel is ahead of rear axle
- F** – (A + B + C) or distance C.G. of weight of fifth wheel is behind front axle
- WB** – Wheelbase
- W** – Weight of body plus payload, or kingpin load
- W<sub>f</sub>** – Portion of W transferred to front axle
- W<sub>r</sub>** – Portion of W transferred to rear axle

## Weight Distribution Concepts – Weight Distribution Formulas (cont'd)

### Basic Formulas

(a)  $W \times D = W_f \times WB$

or

(c)  $WB = (A + B + C + D) = (F + D)$

(b)  $W \times F = W_r \times WB$

(d)  $W = W_f \times W_r$

1.  $W_f = \frac{W \times D}{WB}$

5.  $W_r = \frac{W \times F}{WB}$

2.  $D = \frac{W_f \times WB}{W}$

6.  $F = \frac{W_r \times WB}{W}$

3.  $WB = \frac{W \times D}{W_f}$

7.  $WB = \frac{W \times F}{W_r}$

4.  $W = \frac{W_f \times WB}{D}$

8.  $W = \frac{W_r \times WB}{F}$

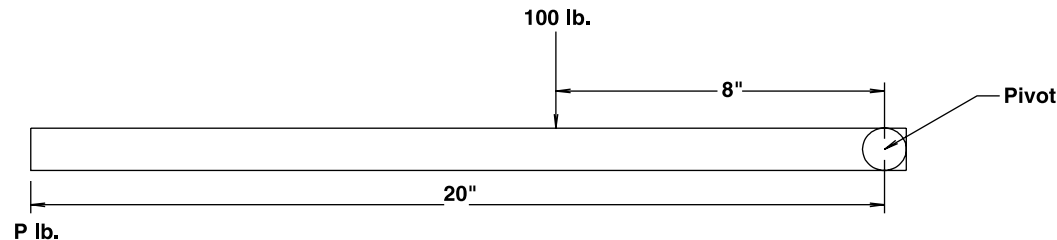
### Weight Distribution Formulas in Words

To find:

- |    |   |   |   |
|----|---|---|---|
| 1. | Weight transferred to front axle                | = | $\frac{(\text{Total weight}) \times (\text{Distance C.G. is ahead of the rear axle})}{(\text{Wheelbase})}$                                  |
| 2. | Distance C.G. must be placed ahead of rear axle | = | $\frac{(\text{Weight transferred to the front axle}) \times (\text{Wheelbase})}{(\text{Total weight})}$                                     |
| 3. | Wheelbase                                       | = | $\frac{(\text{Total weight}) \times (\text{Distance C.G. is ahead of the rear axle})}{(\text{Weight to be transferred to the front axle})}$ |
| 4. | Total Weight                                    | = | $\frac{(\text{Weight to be transferred to the front axle}) \times (\text{Wheelbase})}{(\text{Distance C.G. is ahead of the rear axle})}$    |

## Weight Distribution Concepts – Weight Distribution Formulas (cont'd)

5. Weight transferred to rear axle =  $\frac{(\text{Total weight}) \times (\text{Distance C.G. is behind the front axle})}{(\text{Wheelbase})}$
6. Distance C.G. must be placed behind the front axle =  $\frac{(\text{Weight transferred to the rear axle}) \times (\text{Wheelbase})}{(\text{Total weight})}$
7. Wheelbase =  $\frac{(\text{Total weight}) \times (\text{Distance C.G. is behind the front axle})}{(\text{Weight to be transferred to the rear axle})}$
8. Total Weight =  $\frac{(\text{Weight to be transferred to the rear axle}) \times (\text{Wheelbase})}{(\text{Distance C.G. is behind the front axle})}$
9. Remember = Total weight must always equal weight transferred to the rear axle plus the weight transferred to the front axle



To find the value of "P", the leverages must be equal for balance.

**Example:** 100 lbs. x 8 in. = "P" x 20 in.

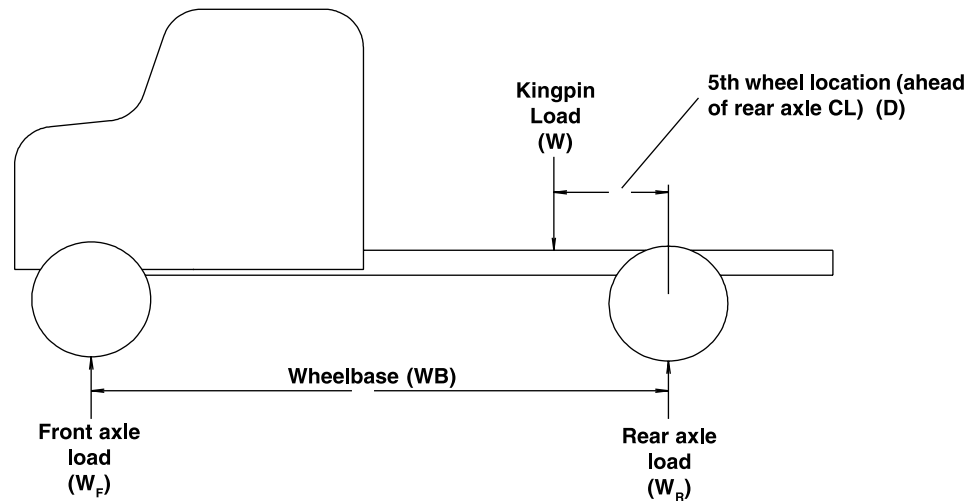
or "P" =  $\frac{100 \text{ lbs.} \times 8 \text{ in.}}{20 \text{ in.}}$

Therefore: "P" = 40 lbs.

This same approach is used to determine axle loadings on a tractor or truck chassis. Assuming the rear axle serves as a pivot point, the front axle load can be determined by applying the lever principle.



## Weight Distribution Concepts – Weight Distribution Formulas (cont'd)



**Front Axle Load:** =  $\frac{\text{Kingpin Load} \times \text{5th Wheel Location}}{\text{Wheelbase}}$

**Rear Axle Load:** = Kingpin Load – Front Axle Load

**Example:** (4) A tractor has a wheelbase of 150 inches. If the kingpin load is 20,000 lbs. and the fifth wheel location is 15 inches, find the total weight on the front and rear axles. The tare weight of the tractor is 7,000 lbs. on the front axle and 4,400 lbs. on the rear axle.

Front Axle Load =  $\frac{20,000 \times 15}{150}$  = 2,000 lbs.

Rear Axle Load = 20,000 – 2,000 lbs. = 18,000 lbs.

Therefore:

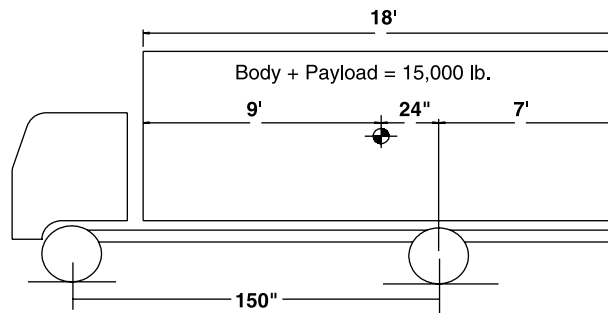
Total Front Axle Weight = 2,000 + 9,000 lbs. = 11,000 lbs.  
Total Rear Axle Weight = 4,400 + 18,000 lbs. = 22,400 lbs.

## Weight Distribution Concepts – Weight Distribution Formulas (cont'd)

In calculating the weight distribution for a truck, the same lever principle is applied; however, there is one change in the initial consideration of the method of loading the truck body. Instead of the trailer kingpin location ahead of the rear axle centerline, we must determine the position of the center of gravity of the payload and body weight in relation to the rear axle centerline.

For our calculations, we assume that the payload is distributed in the truck body so that the load is supported evenly over the truck body floor (water-level distribution). The weight of the body itself is also considered to be evenly distributed along the truck frame. In this manner, we can add the payload and body weights together and calculate the distribution on the vehicle chassis as an evenly distributed load on the truck frame rails.

So that we can make the necessary calculation in a simple manner, the total body and payload weight is considered to act at the center of gravity which will be at the center of the body length.



**Example:**

$$\text{Front Axle Load} = \frac{(\text{Body Weight} + \text{Payload}) \times \text{C of G location}}{\text{Wheelbase}}$$

$$\text{Rear Axle Load} = (\text{Body Weight} + \text{Payload}) - \text{Front Axle Load}$$

$$\begin{aligned} \text{Therefore, Front Axle Load} &= \\ \frac{15,000 \times 24}{150} &= 2,400 \text{ lbs.} \end{aligned}$$

$$\text{Rear Axle Load} = 15,000 - 2,400 = 12,600 \text{ lbs.}$$

## Weight Distribution Concepts – Weight Distribution Formulas (cont'd)

If the truck tare weight without the body is 5,000 lbs. on the front axle and 2,400 lbs. on the rear axle, then

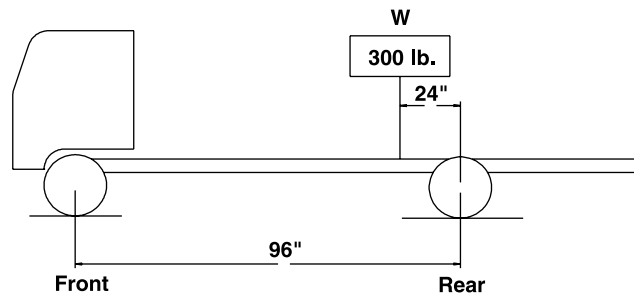
Total Front Axle Weight = 5,000 + 2,400 = 7,400 lbs. and

Total Rear Axle Weight = 2,400 + 12,600 = 15,000 lbs.

This same lever principle is applied in all calculations of weight distribution, whether we are dealing with concentrated loads as with a kingpin load acting on a fifth wheel or if it be with an evenly distributed load as with a truck body. The same approach is made in calculating an evenly distributed load on a trailer.

In the case of a tractor/trailer or a tractor with a set of double or triple trailers, each unit is handled as a separated unit and then combined to determine the total.

This simple example illustrates how the principles are applied. Using the formulas, find the weight distributed to each axle.



### Front Weight

A.  $W_f = \frac{W \times D}{WB}$

B.  $\frac{300 \times 24}{96}$

C. = 75 lbs.

### Rear Weight

A. Total Weight –

B. 300 – 75

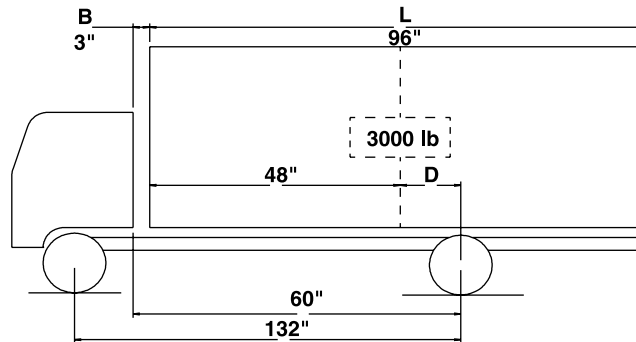
C. = 225 lbs.

The body manufacturer can provide the body length and weight, or actual measurements of the body may be taken with a tape. Generally, (D) is unknown. This you must find logically, or with a tape measure.

*(continued on next page)*

## Weight Distribution Concepts – Weight Distribution Formulas (cont'd)

Find (D) and then solve for  $W_f$  and  $W_r$ .



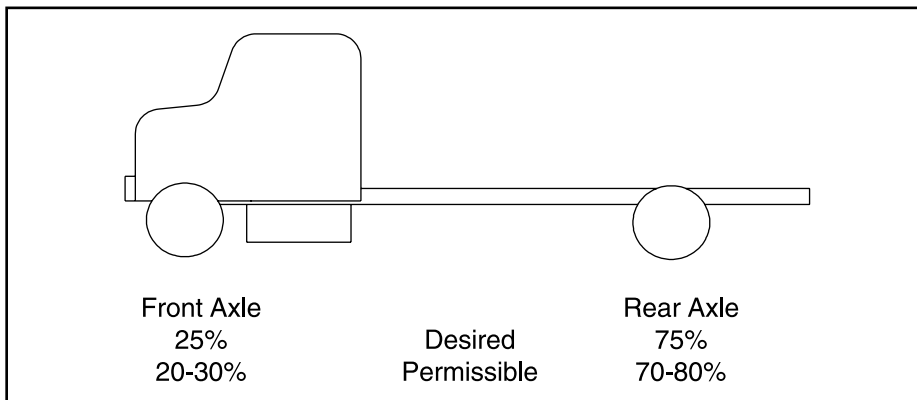
$$D = 60 - 3 - 48 = 9 \text{ in.}$$

$$W_f = 205$$

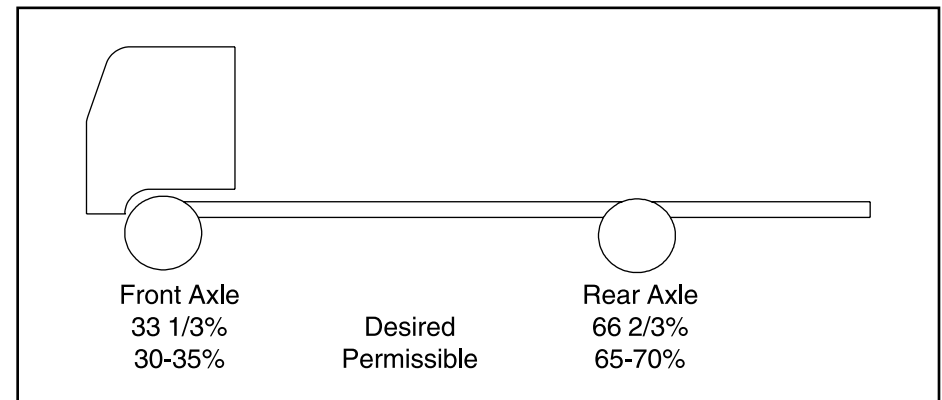
$$W_r = 2,795$$

## Recommended Weight Distribution % of Gross Vehicle Weight by Axle

**Conventional (2 Axle)**

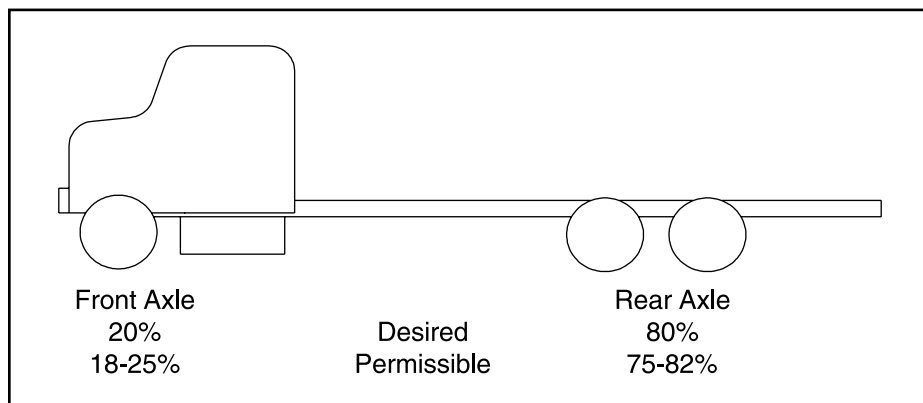


**COE (2 Axle)**

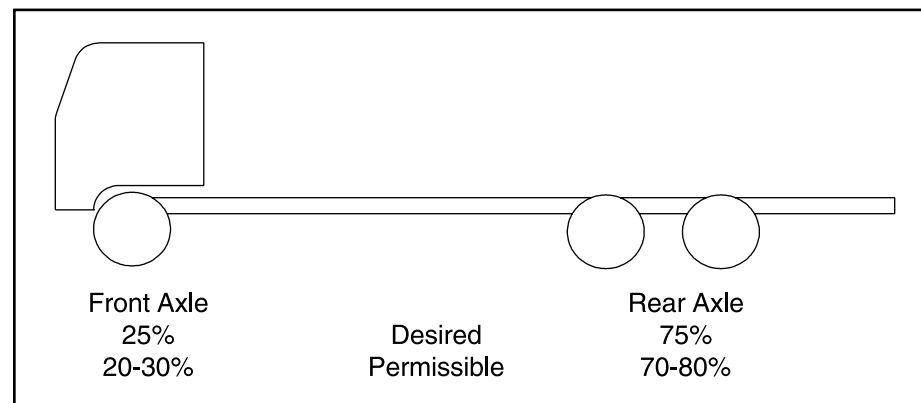


## Weight Distribution Concepts – Weight Distribution Formulas (cont'd)

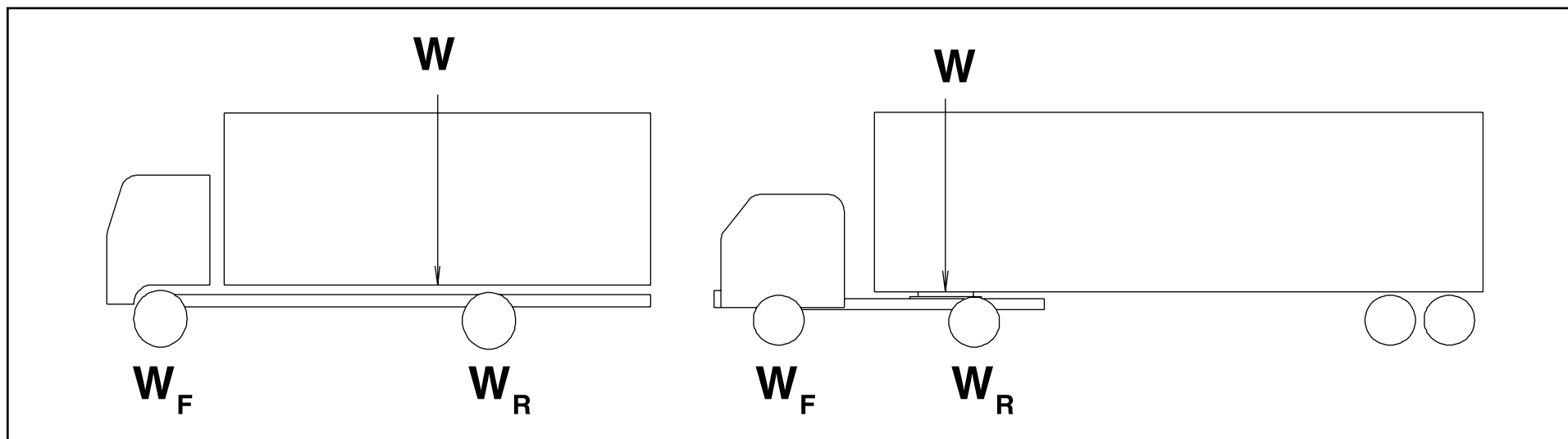
**Conventional (3 Axle)**



**COE (3 Axle)**

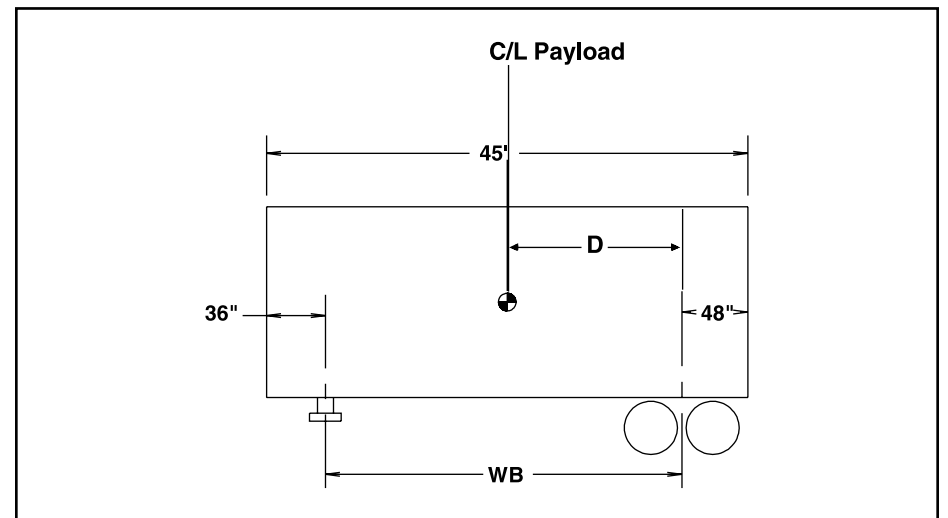
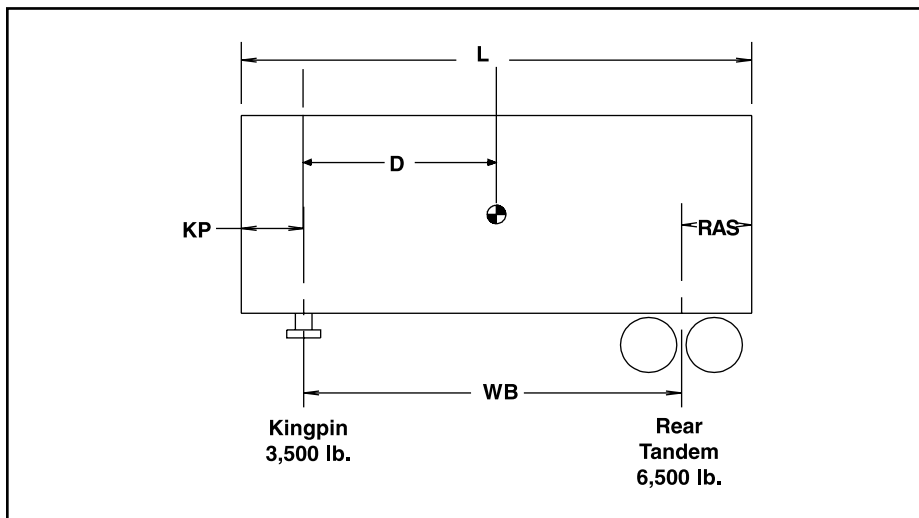
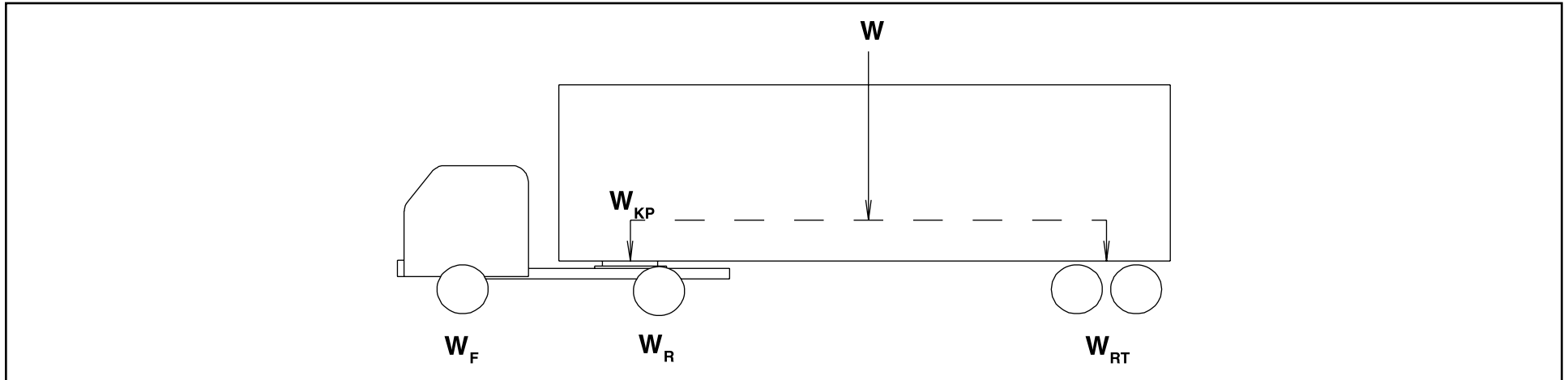


Calculating tractor/trailer weight distribution can be thought of in the same terms as calculating full trucks.



The weight at the center of the body and the load when applied is the same as the single point load of the kingpin on the fifth wheel.

## Weight Distribution Concepts – Weight Distribution Formulas – Trailer Weight



In the following example, a 50,000-pound payload at water-level loading. Calculate the payload (PL) weight transfer to kingpin and the rear axle.

**NOTE:** Apply the same principles used with truck chassis.

*(continued on next page)*

## Weight Distribution Concepts – Weight Distribution Formulas – Trailer Weight

### ***Payload at Kingpin***

$$PL_{kp} = \frac{W \times D}{WB}$$

Calculate the “D” dimension.

$$OAL/2 - AF = D$$

$$45 \text{ feet}/2 - 48 \text{ inches} - 36 \text{ inches} = 186 \text{ inches}$$

$$PL_{kp} = \frac{50,000 \text{ lbs.} \times 186 \text{ in.}}{456 \text{ in.}} = 20,394 \text{ lbs.}$$

$$PL_{kp} = 20,394 \text{ lbs.}$$

### ***Payload at Rear Tandem***

$$PL_{rt} = W - PL_{kp}$$

$$PL_{rt} = 50,000 \text{ lbs.} - 20,394 \text{ lbs.} = 29,606 \text{ lbs.}$$

$$PL_{rt} = \underline{29,606 \text{ lbs.}}$$

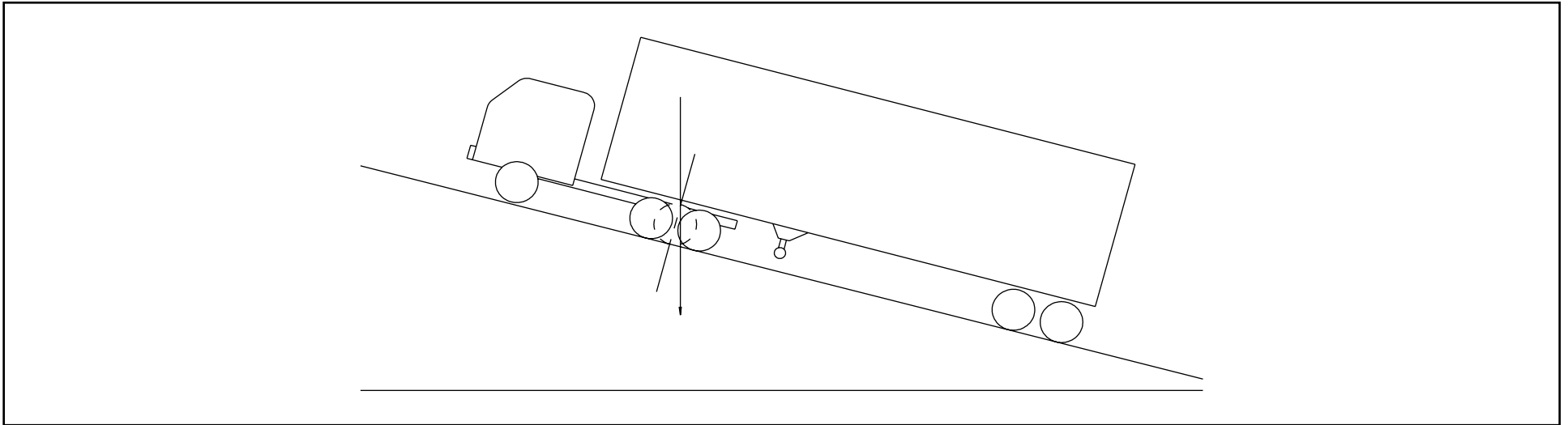
Once the weight on the kingpin is determined, it can then be treated on the tractor the same as a weight on a straight truck.

Due to the variations in hauling and wheelbase requirements from one truck application to another, there is no one specific fifth wheel setting that will apply in all cases.

A “rule of thumb” which has proven satisfactory in many cases sets the fifth wheel one inch ahead of the rear axle for every 10 inches of wheelbase. In the case of tandem axles, the wheelbase is measured from the center line of the front axle to the midpoint between the tandem rear axles. The location of the fifth wheel fixes the load distribution between the front and rear axles. Too far forward and the front axle is overloaded. If too far back, the front axle may be too lightly loaded and cause an unsafe steering and braking control situation at the front axle.

## Weight Distribution Concepts – Weight Distribution Formulas – Trailer Weight

A tractor on a hill with the fifth wheel set at the axle center line or too close to it will result in an unsafe handling situation by transferring too much weight to the rear axle and actually unloading the front axle.



## Performance Calculations

The following calculations have been included to help you determine the performance characteristics required by your customers and to select the appropriate model vehicle:

### **1. Speed Formula**

This formula can be used to determine:

1. Top speed of the vehicle.
2. Speed in a given gear.
3. Final ratio required for a given speed.

$$\text{MPH @ Governed Speed} = \frac{(60) \times (\text{RPM})}{(\text{Rev/Mile}) \times (\text{Gear Ratio})}$$



## Weight Distribution Concepts – Performance Calculations

Definitions in formula:

RPM	=	Revolutions per minute of the engine at Governed Speed
Rev/Mile	=	Tire revolutions per mile
Gear Ratio	=	The product of the axle ratio times the transmission ratio
60	=	Time Constant

**Example:** NPR/W3500 12,000 GVWR automatic transmission.

RPM	=	3,000
Rev/Mile	=	674
Gear Ratio	=	.703 x 5.375

$$\text{MPH @ Governed Speed} = \frac{(60) \times (3,000)}{(674) \times (.703 \times 5.375)}$$

$$\text{MPH @ Governed Speed} = 70 \text{ MPH}$$

### **2. Grade Horsepower Formula**

This formula can be used to determine horsepower required for a given grade and speed.

$$\text{Horsepower Req'd. for a given grade} = \frac{\text{GVWR} \times \text{Grade} \times \text{Speed}}{37,500 \times \text{Efficiency Factor}} + \text{AHP}$$

Definitions in formula:

GVWR	=	Gross Vehicle Weight Rating
Grade	=	Grade anticipated in percent
Speed	=	Speed in miles per hour
37,500	=	Constant
Efficiency Factor	=	Factor for losses in drivetrain due to friction (use 0.9 for a 90% efficient driveline)
AHP Resistance	=	Horsepower required to overcome wind force

## Weight Distribution Concepts – Performance Calculations

**Example:** NPR/W3500 11,050 GVWR automatic transmission with a van body.

GVWR	=	12,000 lbs.
Grade	=	1 percent
Speed	=	55 MPH
37,500	=	Constant
Efficiency Factor	=	0.9
AHP Resistance	=	53.6 HP (see the following formula for calculation)

$$\begin{aligned} \text{HP Required for Grade} &= \frac{12,000 \times 1 \times 55}{37,500 \times 0.9} + 53.67 \end{aligned}$$

HP Required for Grade = 73.22

### 3. Air Resistance Horsepower Formula

This formula is used to determine the horsepower required to overcome air resistance at a given speed.

$$\text{Air Resistance Horsepower} = \frac{\text{FA} \times \text{Cd} \times (\text{MPH})^3}{156,000}$$

Definitions in formula:

FA	=	Frontal area of vehicle in square feet
Cd	=	Aerodynamic Drag Coefficient
MPH	=	Speed of vehicle in miles per hour
156,000	=	Constant

Frontal area is calculated by multiplying the height of the vehicle by the width of the vehicle and subtracting the open area under the vehicle from the total.

Aerodynamic Drag Coefficients (Source Material: Motor Truck Engineering Handbook):

- 0.70 for most trucks, semitrailer combinations with tanks or van bodies
- 0.77 for double and triple trailers and flatbeds with loads

## **Weight Distribution Concepts – Performance Calculations**

**Example:** NPR/W3500 12,000 GVWR van body with 96" wide, 115" high (84" body height + 31" frame height).

$$\text{FA} = \frac{(96) \times (115)}{(12) \times (12)} - 3.2$$

$$\begin{aligned}\text{FA} &= 73.47 \text{ ft.}^2 \\ \text{Cd} &= 0.70 \\ \text{Speed} &= 55 \text{ mph}\end{aligned}$$

$$\text{Air Resistance HP} = \frac{73.47 \times 0.70 \times (55)^3}{156,000}$$

$$\text{Air Resistance HP} = 54.85$$

### **4. Engine Horsepower Formula**

This formula can be used to derive the output at a given RPM and torque.

$$\text{Horsepower} = \frac{\text{Torque} \times \text{RPM}}{5,252}$$

Definitions in formula:

$$\begin{aligned}\text{Torque} &= \text{Twisting output of engine given in lbs.-ft.} \\ \text{RPM} &= \text{Revolutions per minute of engine} \\ 5,252 &= \text{Constant}\end{aligned}$$

**Example:** NPR/W3500 12,000 GVWR automatic transmission.

$$\begin{aligned}\text{Torque} &= 347 \text{ lbs.-ft.} \\ \text{RPM} &= 2,000 \\ 132 \text{ HP} &= \frac{(347) \times (2,000)}{5,252}\end{aligned}$$

## Weight Distribution Concepts – Performance Calculations

### 5. Gradeability Formula

This formula can be used to determine how large of a grade a vehicle can climb.

$$\text{Percent Grade} = \frac{1,200 \times (T) \times (E) \times (C) \times (R)}{\text{GVWR} \times r} - \text{RR}$$

Definitions in formula:

1,200	=	Constant
T	=	Maximum Torque of Engine
E	=	Engine Efficiency (0.9)
C	=	Driveline Efficiency (0.9)
R	=	Transmission Ration x Axle Ratio
RR	=	Rolling Resistance (see following chart)
GVWR	=	Gross Vehicle Weight Rating
r	=	Loaded radius of tire

**Example:** NPR/W3500 12,000 GVWR automatic transmission on concrete highway.

T	=	347 lbs.-ft.
E	=	0.9
C	=	0.9
R	=	.703 x 5.375 (in overdrive)
RR	=	1.0
GVWR	=	12,000
r	=	14.1 in.

$$\text{Percent Grade} = \frac{1,200 \times (347) \times (0.9) \times (0.9) \times (.703) \times (5.375)}{12,000 \times 14.1} - 1.0$$

$$\text{Percent Grade} = 6.53 - 1$$

$$\text{Gradeability} = 5.53\%$$

## Weight Distribution Concepts – Performance Calculations

Road Rolling Resistance			
Road Rolling Resistance – Expressed in Percent Grade			
Road Surface	Grade Road	Surface	Grade
Concrete, excellent	1.0	Cobbles, ordinary	5.5
Concrete, good	1.5	Cobbles, poor	8.5
Concrete, poor	2.0	Snow, 2 inches	2.5
Asphalt, good	1.25	Snow, 4 inches	3.75
Asphalt, fair	1.75	Dirt, smooth	2.5
Asphalt, poor	2.25	Dirt, sandy	3.75
Macadam, good	1.5	Mud	3.75 to 15.0
Macadam, fair	2.25	Sand, level soft	6.0 to 15.0
Macadam, poor	3.75	Sand, dune	16.0 to 30.0

### 6. Startability Formula

This formula is used to determine what type of a grade a vehicle can be started on.

$$\text{Startability} = \frac{(1,200) \times (\text{CET}) \times (\text{E}) \times (\text{C}) \times (\text{R})}{(\text{GVWR} \times r)} - 10\%$$

Definitions in formula:

- 1,200 = Constant
- CET = Clutch Engagement Torque
- E = 0.9
- C = 0.9
- R = Transmission x Axle Ratio
- 10% = Average break away resistance and static inertia constant
- GVWR = Gross Vehicle Weight Rating
- r = Loaded radius of tire

## Weight Distribution Concepts – Performance Calculations

**Example:** NPR/W3500 12,000 GVWR manual transmission.

$$\begin{aligned} \text{CET} &= 260 \text{ lbs.-ft.} \\ R &= 6.02 \times 4.10 \\ \text{GVWR} &= 12,000 \text{ lbs.} \\ r &= 14.1 \text{ in.} \end{aligned}$$

$$\text{Startability} = \frac{(1,200) \times (260) \times (0.9) \times (0.9) \times (6.02 \times 4.10)}{(12,000 \times 14.1)} - 10\%$$

$$\text{Startability} = 26.86\%$$

### 7. Vertical Center of Gravity Formula

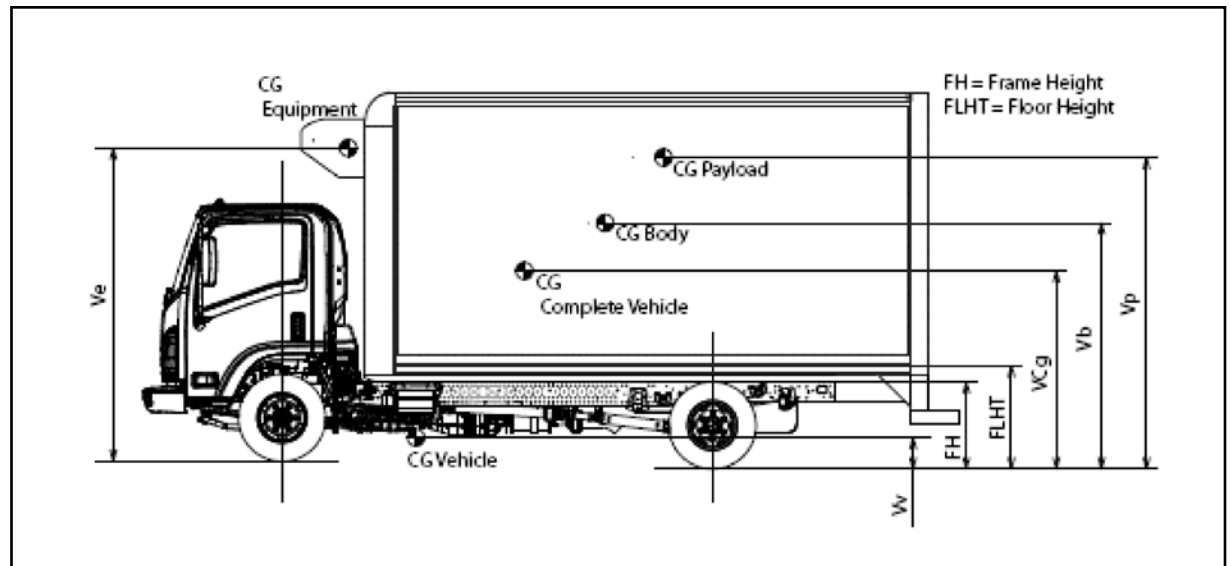
These formulas are used to estimate the vertical center of gravity of a completed vehicle in order to determine whether maximum allowable limits have been exceeded. This formula should be used when encountering high center of gravity loads.

$$\begin{aligned} 7.1 \text{ } W_v \times (V_v) &= M_v \\ 7.2 \text{ } W_b \times (V_b) &= M_b \\ 7.3 \text{ } W_p \times (V_p) &= M_p \\ 7.4 \text{ } W_e \times (V_e) &= M_e \end{aligned}$$

$$7.5 \text{ } VC_g = \frac{(M_v + M_b + M_p + M_e)}{(W_v + W_b + W_p + W_e)}$$

Definitions in formula:

$$\begin{aligned} VC_g &= \text{The total average vertical center of gravity of the completed vehicle (vehicle, body, payload and equipment)} \\ W_v &= \text{Weight of vehicle} \\ W_b &= \text{Weight of body} \\ W_p &= \text{Weight of payload} \\ W_e &= \text{Weight of equipment} \end{aligned}$$



(continued on next page)

## Weight Distribution Concepts – Performance Calculations

Definitions in formula (continued):

Vv	=	Distance from ground to center of gravity of the vehicle
Vb	=	Distance from ground to center of gravity of the body
Vp	=	Distance from ground to center of gravity of the payload
Ve	=	Distance from ground to center of gravity of the equipment
Mv	=	Moment of vehicle
Mb	=	Moment of body
Mp	=	Moment of payload
Me	=	Moment of equipment

**Example:** NPR/W3500 12,000 GVWR automatic transmission, 132" WB, 14' body length, 84" high body, full payload of boxes stacked to a maximum height of 48" above the flooring.

Wv	=	5,291 lbs.	(from vehicle specifications)
Wb	=	2,100 lbs.	(from body manufacturer)
Wp	=	4,609 lbs.	(GVWR – (Wv + Wb + We))
Vv	=	24.9 in.	(from Body Builder's Guide, NPR Section)
Vb	=	80 in.	(from body manufacturer)
Vp	=	62 in.	(1/2 of payload height + frame height + height from frame to flooring)
Mv	=	5,291 x 24.9 = 131,746 lbs.-in.	(from 7.1)
Mb	=	2,100 x 80 = 168,000 lbs.-in.	(from 7.2)
Mp	=	4,609 x 62 = 285,758 lbs.-in.	(from 7.3)

We, Ve, Me = None in this example

$$VCg = \frac{(131,746 + 168,000 + 285,758)}{(5,291 + 2,100 + 4,609)}$$

$$VCg = \frac{(528,504)}{(12,000)} = 48.8 \text{ inches}$$

48.8 < 54.0 inches (54 inches is maximum allowable VCg per mfg. specifications from Body Builder's Guide, NPR/W3500 section)  
Since maximum VCg for this truck is not exceeded, 48" stack height above flooring is acceptable.

## Weight Distribution Concepts – Performance Calculations

### 8. Horizontal Center of Gravity Formula

These formulas are used to estimate the horizontal center of gravity of a completed vehicle in order to determine whether it exists between the centerlines of the front and rear axles. This formula should be used when a load and/or permanent equipment (liftgate, reefer unit, snowplow, etc.) is installed on either extreme along the completed vehicle's overall length.

$$8.1 \text{ } W_v \times (H_v) = M_v$$

$$8.2 \text{ } W_b \times (H_b) = M_b$$

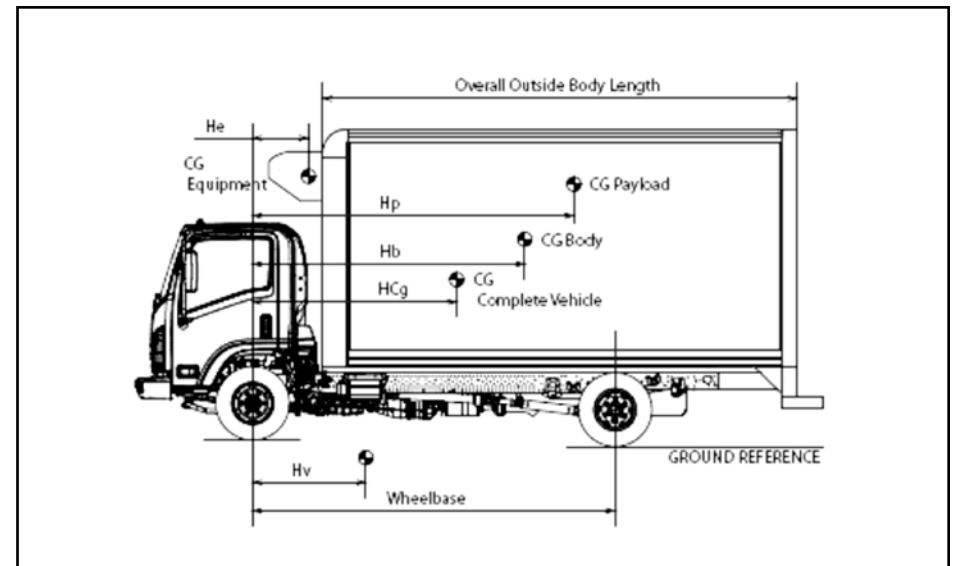
$$8.3 \text{ } W_p \times (H_p) = M_p$$

$$8.4 \text{ } W_e \times (H_e) = M_e$$

$$8.5 \text{ } HC_g = \frac{(M_v + M_b + M_p + M_e)}{(W_v + W_b + W_p + W_e)}$$

Definitions in formula:

- HCg = The total average horizontal center of gravity of the completed vehicle (vehicle, body, payload and equipment)
- Wv = Weight of vehicle
- Wb = Weight of body
- Wp = Weight of payload
- We = Weight of equipment
- Hv = Distance from front axle to center of gravity of the vehicle
- Hb = Distance from front axle to center of gravity of the body
- Hp = Distance from front axle to center of gravity of the payload
- He = Distance from front axle to center of gravity of the equipment
- Mv = Moment of vehicle
- Mb = Moment of body
- Mp = Moment of payload
- Me = Moment of equipment



(continued on next page)



## Weight Distribution Concepts – Performance Calculations

Example: NPR/W3500 Diesel 12,000 GVWR automatic transmission, 132" WB, 14' body length, full payload of boxes stacked and distributed evenly throughout the flooring, 1,000 lb. reefer unit attached in front of body.

Wv	=	5,291 lbs.	(from vehicle specifications)
Wb	=	2,100 lbs.	(from body manufacturer)
Wp	=	3,609 lbs.	(GVWR – (Wv + Wb + We))
We	=	1,000 lbs.	(from equipment manufacturer)
Hv	=	42.4 in.	(from Body Builder's Guide, NPR Section)
Hb	=	107.5 in.	(from body manufacturer)
Hp*	=	107.5 in.	(1/2 of payload length + distance from front axle to front of body)
He	=	17.5 in.	(from equipment manufacturer)
Mv	=	5,291 x 42.4 = 224,338 lbs.-in.	(from 8.1)
Mb	=	2,100 x 107.5 = 225,750 lbs.-in.	(from 8.2)
Mp	=	3,609 x 107.5 = 387,967 lbs.-in.	(from 8.3)
Me	=	1,000 x 17.5 = 17,500 lbs.-in.	(from 8.4)

$$\text{HCg} = \frac{(224,338 + 225,750 + 387,967 + 17,500)}{(5,291 + 2,100 + 3,609 + 1,000)}$$

$$\text{HCg} = \frac{(855,555)}{(12,000)} = 71.3 \text{ inches}$$

71.3 < 132 inches (132 inches is the wheelbase dimension)

Since HCg for this truck is not greater than the WB or negative (–) (denotes HCg forward of front axle centerline), it exists between the centerlines of the front and rear axles.

NOTE: Hp and Hb dimensions are the same in this example because CG of body and payload happen to be at the same point.

## **Weight Distribution Concepts – Highway System Limits**

The Federal Government established the Federal Bridge Gross Weight Formula to provide a standard to control the spacing of truck axles on trucks that use highway bridges. This is intended to space loads out over a distance to avoid too high a concentration in one area that could cause damage. The truck's gross weights, axle weight and axle spacings are set in order to keep axle loads and gross weight loads within the limits set by the Federal Government. The Bridge Formula Table is used to check trucks to make sure that Federal weight limit requirements are met and that the allowable gross and axle weights are in the correct relationship with the spacing of axles to prevent high load concentrations on highway bridges.

The Federal Government has established the following formula to be used to determine the allowable weight limits and axle spacings for trucks.

$$W = 500 (LN + 12N = 36) N-1$$

Where:

W = The total gross weight that may be carried on any group of two or more consecutive axles to the nearest 500 lbs.

L = The distance (spacing) in feet between the outer axles of any group of two or more consecutive axles.

N = The number of axles in the group under consideration; except that two consecutive sets of tandem axles may carry a gross load of 34,000 lbs. each provided the overall distance between the first and last axles of such consecutive sets of axles is 36 feet or more.

### ***Bridge Formula Definitions***

The following definitions are used for bridge formula calculations.

#### **Gross Weight**

The total weight of a truck (and/or trailer) combined with the weight of the load being hauled. The Federal gross weight limits on interstate highways and federal-aid highways and reasonable access is 80,000 lbs.

## **Weight Distribution Concepts – Highway System Limits**

### **Single Axle Weight**

The total weight at the ground by all wheels of an axle whose centers may be included between parallel transverse planes 40 inches apart, extending across the width of the truck. The Federal single axle weight limit on the interstate system and reasonable access is 20,000 lbs.

### **Tandem Axle Weight**

The total weight at the ground of two or more consecutive axles whose centers may be included between parallel vertical planes spaced more than 40 inches but not more than 96 inches apart, extending across the full width of the truck. The Federal tandem axle weight limit on the interstate system and reasonable access is 34,000 lbs.

### **Consecutive Axle Weight**

The Federal law states that any two or more consecutive axles may not exceed the weight as computed by the formula even though the single axles, tandem axles, and gross weights are within the legal requirements.

### ***Exception to the Bridge Formula***

There is one exception to the use of the Federal Bridge Formula: two consecutive sets of tandem axles may carry a gross load of 34,000 lbs. each, providing the overall distance between the first and last axles of such consecutive sets of tandem axles is 36 feet or more.

### ***Other Federal Provisions***

Maximum Width: 102 inches overall

Length: States cannot set overall length limits on tractor, semitrailer or tractor-semitrailer, trailer combinations. States must allow tractors with double trailers. States must allow semitrailers of up to 48 feet in length for doubles combinations. There is also not a limitation on overall length for semitrailer or doubles combinations.

These width and length dimensions apply to trucks operating on interstate highways and federal-aid highways designed by the Federal Highway Administration. This also provides for reasonable access to the interstate highways.

## Weight Distribution Concepts – Highway System Limits – Federal Bridge Formula Table

Distance in feet between the extremes of any group of 2 or more consecutive axles	Maximum Load in Pounds on Any Group of 2 or More Consecutive Axles							
	2 Axles	3 Axles	4 Axles	5 Axles	6 Axles	7 Axles	8 Axles	9 Axles
4	34,000*							
5	34,000*							
6	34,000*							
7	34,000*							
8 and less	34,000*	34,000						
8 and more	38,000	42,000						
9	39,000	42,500						
10	40,000	43,500						
11		44,000						
12		45,000	50,000					
13		45,500	50,500					
14		46,500	51,500					
15		47,000	52,000					
16		48,000	52,500	58,000				
17		48,500	53,500	58,500				
18		49,500	54,000	59,000				
19		50,000	54,500	60,000				
20		51,000	55,500	60,500	66,000			
21		51,500	56,000	61,000	66,500			
22		52,500	56,500	61,500	67,000			

\* Tandem Axle by Definition.

+ Exception to Federal Bridge Formula Table and Law. See Text for Explanation.

NOTE:

All permissible load calculations are to the nearest 500 lbs.

Maximum load on any single axle, 20,000 lbs.

Weights over 80,000 lbs. are in excess of the Federal GVW on the National Highway Network.

## Weight Distribution Concepts – Highway System Limits – Federal Bridge Formula Table (cont'd)

Distance in feet between the extremes of any group of 2 or more consecutive axles	Maximum Load in Pounds on Any Group of 2 or More Consecutive Axles							
	2 Axles	3 Axles	4 Axles	5 Axles	6 Axles	7 Axles	8 Axles	9 Axles
23		53,000	57,500	62,500	68,000			
24		54,000	58,000	63,000	68,500	74,000		
25		54,500	58,500	63,500	69,000	74,500		
26		55,500	59,500	64,000	69,500	75,000		
27		56,000	60,000	65,000	70,000	75,500		
28		57,000	60,500	65,500	71,000	76,500	82,000	
29		57,500	61,500	66,000	71,500	77,000	82,500	
30		58,500	62,000	66,500	72,000	77,500	83,000	
31		59,000	62,500	67,500	72,500	78,000	83,500	90,000
32		60,000	63,500	68,000	73,000	78,500	84,500	90,500
33			64,000	68,500	74,000	79,000	85,000	91,000
34			64,500	69,000	74,500	80,000	85,500	91,500
35			65,500	70,000	75,000	80,500	86,000	92,000
36			66,000+	70,500	75,500	81,000	86,500	93,000
37			66,500+	71,000	76,000	81,500	87,000	93,500
38			67,500+	72,000	77,000	82,000	87,500	94,000
39			68,000	72,500	77,500	82,500	88,500	94,500
40			68,500	73,000	78,000	83,500	89,000	94,500
41			69,500	73,500	78,500	84,000	89,500	95,000
42			70,000	74,000	79,000	84,500	90,000	95,500

\* Tandem Axle by Definition.

+ Exception to Federal Bridge Formula Table and Law. See Text for Explanation.

NOTE:

All permissible load calculations are to the nearest 500 lbs.

Maximum load on any single axle, 20,000 lbs. Weights over 80,000 lbs. are in excess of the Federal GVW on the National Highway Network.

## Weight Distribution Concepts – Highway System Limits – Federal Bridge Formula Table (cont'd)

Distance in feet between the extremes of any group of 2 or more consecutive axles	Maximum Load in Pounds on Any Group of 2 or More Consecutive Axles							
	2 Axles	3 Axles	4 Axles	5 Axles	6 Axles	7 Axles	8 Axles	9 Axles
43			70,500	75,000	80,000	85,000	90,500	96,000
44			71,500	75,500	80,500	85,500	91,000	96,500
45			72,000	76,000	81,000	86,000	91,500	97,500
46			72,500	76,500	81,500	87,000	92,500	98,000
47			73,500	77,500	82,000	87,500	93,000	98,500
48			74,000	78,000	83,000	88,000	93,500	99,000
49			74,500	78,500	83,500	88,500	94,000	99,500
50			75,500	79,000	84,000	89,000	94,500	100,000
51			76,000	80,000	84,500	89,500	95,000	100,500
52			76,500	80,500	85,000	90,500	95,500	101,000
53			77,500	81,000	86,000	91,000	96,500	102,000
54			78,000	81,500	86,500	91,500	97,000	102,500
55			78,500	82,500	87,000	92,000	97,500	103,000
56			79,500	83,000	87,500	92,500	98,000	103,500
57			80,000	83,500	88,000	93,000	98,500	104,000
58				84,000	89,000	94,000	99,000	104,500
59				85,000	89,500	94,500	99,500	105,000
60				85,500	90,000	95,000	100,500	105,500

\* Tandem Axle by Definition.

+ Exception to Federal Bridge Formula Table and Law. See Text for Explanation.

NOTE: All permissible load calculations are to the nearest 500 lbs.  
Maximum load on any single axle, 20,000 lbs. Weights over 80,000 lbs. are in excess of the Federal GVW on the National Highway Network.

## Weight Distribution Concepts – Commodity & Material Weights

### *Approximate Weights of Commodities and Materials*

Product	Size of Container	Lbs. Per Cu. Ft.	No. of Lbs. / Per
Acetone	— — —	50	6.6 / gallon
Alcohol, Commercial	— — —	51	6.8 / gallon
Proof spirits	— — —	57	7.6 / gallon
Alfalfa seed	bushel	— —	60 / bushel
Aluminum, Pure (cast)	— — —	165	4,450 / cu. yard
Apples, Fresh	basket-bushel	— —	48 / bushel
Western, box	11.5" x 12" x 20"	— —	50 / box
New England, box	11.25" x 14.5" x 17.5"	— —	56 / box
Standard barrel	17" head, 28.5" stave	— —	160 / barrel
Dried	bushel	— —	24 / bushel
Apricots, Fresh	bushel	— —	48 / bushel
Western, box	5.5" x 12" x 20"	— —	23 / box
Artichokes, Box	10" x 11.5" x 22"	— —	44 / box
Asbestos	— — —	153	4,130 / cu. yard
Asparagus, crate, Loose	11.5" high x 9.75" top	— —	38 / crate
Bunches	11" bottom x 19.38" long	— —	31 / crate
Avocados, Box	5.75" x 11.25" x 17.5"	— —	16 / box
Bananas, Single stem	bunch	— —	45-65 / bunch
Barley	bushel	— —	48 / bushel
Barytes, Mineral	— — —	280	7,560 / cu. yard
Basalt, Rock	— — —	185	5,000 / cu. yard
Beans, dry, Lima	bushel	— —	56 / bushel
White	bushel	— —	60 / bushel
Castor	bushel	— —	46 / bushel
Beans, fresh, Lima	bushel	— —	39 / bushel
String	bushel	— —	36 / bushel
	hamper, 5 peck	— —	45 / hamper

Product	Size of Container	Lbs. Per Cu. Ft.	No. of Lbs. / Per
Beef, Slack barrel	21" x 30" stave (200 lbs. net)	— —	254 / barrel
Beer, Wood barrel	.5 barrel (16 gal.)	— —	205 / barrel
Wood barrel	.25 barrel (8 gal.)	— —	105 / barrel
Steel barrel	.5 barrel (16 gal.)	— —	190 / barrel
Steel barrel	.25 barrel (8 gal.)	— —	95 / barrel
Dutchman	.13 barrel (4 gal.)	— —	51 / barrel
Case carton,* Regular bottles	17.25" x 11.5" x 9.88"	— —	45 / case
24, 12 oz. Steinie bottles	18.38" x 12.13" x 7.38"	— —	40 / case
Tin cans	16.13" x 11" x 5.13"	— —	28 / case
Wooden case,* Regular bottles	21" x 13.5" x 10"	— —	35 / case
24, 12 oz. Steinie bottles	22" x 13.75" x 7.5"	— —	46 / case
Beets	bushel	— —	50-60 / bushel
Small crate	9.75" x 13.75" x 24"	— —	50 / crate
Western crate	14" x 19" x 24.5"	— —	95 / crate
Berries, crate, 24 pint	9.75" x 9.97" x 20"	— —	25 / crate
24 quart	11.75" x 11.75" x 24"	— —	48 / crate
32 quart	15.5" x 11.75" x 24"	— —	63 / crate
Bluegrass seed	bushel	— —	44 / bushel
Bluestone	— — —	120	3,240 / cu. yard
Bone	— — —	115	3,110 / cu. yard
Borax	— — —	110	2,970 / cu. yard
Bran	bushel	— —	20 / bushel
Brick, Soft	2.25" x 4" x 8.25"	— —	4,320 / thousand
Common	2.25" x 4" x 8.25"	— —	5,400 / thousand
Hard	2.25" x 4.25" x 8.5"	— —	6,480 / thousand
Pressed	2.38" x 4" x 8.38"	— —	7,500 / thousand
Paving	2.25" x 4" x 8.5"	— —	6,750 / thousand
Paving block	3.5" x 4" x 8.5"	— —	8,750 / thousand
Fire	2.5" x 4.5" x 9"	— —	7,000 / thousand

\* Note: Beer cases vary as to size and shape. Suggest checking with local source.

## Weight Distribution Concepts – Commodity & Material Weights (cont'd)

Product	Size of Container	Lbs. Per Cu. Ft.	No. of Lbs. / Per
Broccoli, Bushel crate	12.75" x 12.75" x 17"	— —	30 / bushel
Brussels sprouts, Crate	7.75" x 10.5" x 21.38"	— —	26 / crate
Buckwheat	bushel	— —	49 / bushel
Butter, tub, Small	15" dia. x 5.75"	— —	25 / tub
Standard	15" dia. x 15"	— —	70 / tub
Butter, case, 30 – 1-lb. bricks	10.75" x 8.75" x 10.5"	— —	32 / case
9-lb. pail	pail	— —	10 / pail
Cabbage	bushel	— —	38 / bushel
Hamper	1.5 bushel	— —	58 / hamper
Crate	12.75" x 18.5" x 19"	— —	60 / crate
Western crate	14" x 19" x 24.5"	— —	85 / crate
Barrel crate	12.75" x 18.75" x 37.38"	— —	110 / crate
Calf, Live (average)	per head	— —	140-160 / head
Cantaloupe, crate, Pony	11.75" x 11.75" x 23.5"	— —	58 / crate
Standard	12.75" x 12.75" x 23.5"	— —	68 / crate
Jumbo	13.75" x 13.75" x 23.5"	— —	78 / crate
Pony flat	4.75" x 12.75" x 23.5"	— —	26 / crate
Standard flat	5.25" x 14.25" x 23.5"	— —	28 / crate
Jumbo flat	5.75" x 15.25" x 23.5"	— —	32 / crate
Honeydew (Casaba)	6.38" x 15.13" x 23.5"	— —	35 / crate
Carbolic acid	— — —	60	8.0 / gallon
Carrots, Topped	bushel	— —	55 / bushel
With tops	bushel	— —	40 / bushel
Crate	11.75" x 14.13" x 24"	— —	60 / crate
Castor oil	— — —	61	8.1 / gallon
Cauliflower	bushel	— —	30 / bushel
Crate	9.38" x 19" x 24"	— —	50 / crate
Cedar* (lumber)	— — —	30	2,500 / M. Bd. ft.
Celery, Standard crate	11.63" x 22" x 22.63"	— —	70 / crate
Half crate	10.75" x 13" x 20.38"	— —	35 / crate
Northern crate	16.5" x 21.25" x 22"	— —	85 / crate

Product	Size of Container	Lbs. Per Cu. Ft.	No. of Lbs. / Per
Cement, Block	8" x 8" x 16"	— —	42 / each
Block	8" x 12" x 16"	— —	58 / each
Portland	sack	— —	94 / sack
Portland	barrel (4 sacks per)	— —	376 / barrel
Chalk	— — —	137	3,700 / cu. yard
Charcoal, Oak	— — —	33	890 / cu. yard
Pine	— — —	23	620 / cu. yard
Cheese, Small box	15" dia. x 5.25"	— —	25 / box
Medium box	15" dia. x 7.5"	— —	35 / box
Large box	15" dia. x 15"	— —	70 / box
Cherries, Unstemmed	bushel	— —	56 / bushel
Stemmed	bushel	— —	64 / bushel
Lug box	5.63" x 11.88" x 19.75"	— —	17 / box
Chestnut* (lumber)	— — —	37	3,080 / M. Bd. ft.
Chestnuts	bushel	— —	50 / bushel
Chickens, Live, broilers (20 avg.)	standard crate	— —	58 / crate
Fowl (12 avg.)	standard crate	— —	78 / crate
Standard crate,	empty 24" x 35" x 13"	— —	18 / crate
Cinder blocks	8" x 8" x 16"	— —	35 / each
	8" x 12" x 16"	— —	45 / each
Cinders	— — —	50	1,350 / cu. yard
Clay, Dry lumps	— — —	85	2,300 / cu. yard
Wet lumps	— — —	110	2,970 / cu. yard
Wet packed	— — —	135	3,650 / cu. yard
Fire	— — —	125	3,375 / cu. yard
Cork	— — —	15	405 / cu. yard
Corn, Ear	bushel	— —	35 / bushel
Shelled	bushel	— —	56 / bushel
Sweet corn (green)	bushel	— —	43 / bushel
Crate	12.88" x 12.88" x 24"	— —	60 / crate
Corn meal	bushel	— —	44 / bushel

\*Kiln dried lumber averages 10% to 15% lighter, and green lumber 40% to 50% heavier, than air dried.



## Weight Distribution Concepts – Commodity & Material Weights (cont'd)

Product	Size of Container	Lbs. Per Cu. Ft.	No. of Lbs. / Per
Corn oil	— — —	58	7.8 / gallon
Corn syrup	— — —	86	11.5 / gallon
Cotton, Gin bale	30" x 48" x 54"	— —	515 / bale
Standard bale	24" x 28" x 56"	— —	515 / bale
Comp. bale	20" x 24" x 56"	— —	515 / bale
Cotton seed	bushel	— —	32 / bushel
Cottonseed oil	— — —	58	7.8 / gallon
Cottonwood* (lumber)	— — —	37	3,080 / M. Bd. ft.
Cow, Live-Feeder (average)	per head	— —	600 / head
Butcher (average)	per head	— —	800 / head
Butcher steer (average)	per head	— —	1100 / head
Cranberries, 1/4 barrel box	9.5" x 11" x 14"	— —	28 / box
1/2 barrel box	12.25" x 14.75" x 22"	— —	60 / box
Cream	— — —	64	8.5 / gallon
Creosote	— — —	68	9.2 / gallon
Crude oil	— — —	56	7.5 / gallon
Cucumbers	bushel	— —	55 / bushel
Crate	9.75" x 13.75" x 24"	— —	75 / crate
Case	5" x 13.25" x 19"	— —	26 / case
Earth, Loose, dry loam	— — —	76	2,050 / cu. yard
Packed	— — —	95	2,565 / cu. yard
Wet	— — —	125	3,375 / cu. yard
Eggplant, Hamper	bushel	— —	40 / bushel
Crate	14" x 11.75" x 24"	— —	54 / crate
Eggs, 30 dozen crate	12" x 12" x 26"	— —	55 / crate
Elm,* Soft	— — —	38	3,170 / M. Bd. ft.
Rock	— — —	45	3,750 / M. Bd. ft.
Fertilizer, Commercial	burlap bag	— —	100-200 / bag
Fir,* Douglas	— — —	32	2,670 / M. Bd. ft.
Eastern	— — —	25	2,080 / M. Bd. ft.

\*Kiln dried lumber averages 10% to 15% lighter, and green lumber 40% to 50% heavier, than air dried.

Product	Size of Container	Lbs. Per Cu. Ft.	No. of Lbs. / Per
Fish, fresh, Barrel	19" head, 29" stave	— —	300 / barrel
1/2 Barrel	18.5" head, 23.5" stave	— —	160 / 1/2 barrel
Flour, Barrel	19.13" head, 30" stave	— —	215 / barrel
Fuel oil, Furnace grade	— — —	56	7.5 / gallon
Diesel engine	— — —	52	7.0 / gallon
Furniture, Household	— — —	7	1,915 / cu. yard
Garbage, Dry, paper wrapped	— — —	15-30	405-810 / cu. yard
Wet	— — —	50	1,240 / cu. yard
Gasoline	— — —	45	6.0 / gallon
Glass, Common window	— — —	— —	162 / cu. foot
Plate or crown	— — —	— —	161 / cu. foot
1/4" plate	— — —	— —	3.3 / sq. foot
Glue	— — —	80	2,160 / cu. yard
Glycerine	— — —	79	10.5 / gallon
Grapefruit, Western box	11.5" x 11.5" x 24"	— —	68 / box
Southern box	12.75" x 12.75" x 27"	— —	90 / box
Grapes, Basket	bushel	— —	48 / box
Lug box	5.63" x 16.38" x 17.5"	— —	30 / box
Western keg	15.5" dia. x 14"	— —	45 / keg
Basket	12 quart	— —	18 / basket
Gravel, Dry	— — —	95	2,565 / cu. yard
Wet	— — —	125	3,375 / cu. yard
Greens	bushel	— —	25 / bushel
Groceries, Misc. assorted	— — —	30	810 / cu. yard
Hay, Bale	26" x 30" x 46"	— —	210 / bale
Bale	17" x 22" x 43"	— —	115 / bale
Bale	14" x 16" x 43"	— —	85 / bale
Hog, Live (average)	per head	— —	225-250 / head
Honey	— — —	90	12.0 / gallon
Horse, Live (average)	per head	— —	1,200-1,500 / head

(continued on next page)

## Weight Distribution Concepts – Commodity & Material Weights (cont'd)

Product	Size of Container	Lbs. Per Cu. Ft.	No. of Lbs. / Per
Horseradish roots	bushel	— —	35 / bushel
Ice	— — —	57	1,540 / cu. yard
Ice (mfg.), Block	11" x 22" x 32"	— —	250 / block
Block	14" x 14" x 40"	— —	255 / block
Block	11" x 22" x 56"	— —	440 / block
Ice Cream, 2.5 gallon can, Full	9" dia. x 11"	— —	18 / can
Empty	— — —	— —	6 / can
5 gallon can, Full	9" dia. x 21"	— —	35 / can
Empty	— — —	— —	11 / can
Kale	bushel	— —	25 / bushel
Kerosene	— — —	50	6.6 / gallon
Lamb, Live (average)	per head	— —	75-85 / head
Lard, Barrel	18" head, 30" stave	— —	425 / barrel
Lath, Standard length 29"	Packed in bundles of 50 Average bundle, dia. 9"	— —	25 / bundle
Leather, Dry	— — —	55	1,485 / cu. yard
Wet	— — —	65	1,755 / cu. yard
Lemons, Western box	10" x 13" x 25"	— —	80 / box
Southern box	12.75" x 12.75" x 27"	— —	90 / box
Lentils	bushel	— —	60 / bushel
Lettuce, Hamper	bushel	— —	25 / bushel
Hamper	1.5 bushel	— —	38 / hamper
Basket	8.5" x 11.75" x 21.38"	— —	17 / basket
Crate	18.75" x 17.5" x 24.5"	— —	75 / crate
1/2 crate	9.5" x 13.5" x 24.5"	— —	40 / 1/2 crate
Lime, Hydrated	bushel	— —	30 / bushel
Barrel (small)	16.5" head, 27.5" stave	62	210 / barrel
Barrel (large)		62	320 / barrel
Limes, Western box	10" x 13" x 25"	— —	80 / box
Southern box	12.75" x 12.75" x 27"	— —	90 / box

Product	Size of Container	Lbs. Per Cu. Ft.	No. of Lbs. / Per
Linseed oil	— — —	59	7.9 / gallon
Lubricating oil	— — —	52	7.0 / gallon
Malt, Barley	bushel	— —	28 / bushel
Rye	bushel	— —	32 / bushel
Brewer's grain	bushel	— —	40 / bushel
Maple syrup	gallon	82	11.0 / gallon
Maple,* Hard (lumber)	— — —	44	3,670 / M. Bd. ft.
Soft	— — —	34	2,830 / M. Bd. ft.
Meal-corn	bushel	— —	44 / bushel
Milk, Bulk	— — —	64	8.6 / gallon
5 gallon can	10.25" dia. x 19"	— —	62 / can
10 gallon can	13" dia. x 23"	— —	115 / can
Crate, 20.5 pt. bottles	8.5" x 12.75" x 16.75"	— —	33 / crate
20 pt. bottles	8.5" x 12.75" x 16.75"	— —	54 / crate
Millet	bushel	— —	50 / bushel
Molasses	— — —	90	12.0 / gallon
Barrel	20.25" head, 34" stave	— —	675 / barrel
Mortar, Lime	— — —	110	2,970 / cu. yard
Mud, Flowing	— — —	106	2,860 / cu. yard
Packed	— — —	125	3,375 / cu. yard
Muriatic acid, 40%	— — —	40	10.0 / gallon
Naptha, Petroleum	— — —	42	5.6 / gallon
Nitric acid, 91%	— — —	94	12.5 / gallon
Oak-red,* Black	— — —	42	3,500 / M. Bd. ft.
White	— — —	48	4,080 / M. Bd. ft.
Oats	bushel	— —	32 / bushel
Okra, Hamper	1/2 bushel	— —	18 / hamper
Hamper	bushel	— —	34 / bushel
Oleomargarine, (mfg.-tub)	21" head, 34" stave	— —	70 / tub
Cases	— — —	— —	15-65 / case

\*Kiln dried lumber averages 10% to 15% lighter, and green lumber 40% to 50% heavier, than air dried.

## Weight Distribution Concepts – Commodity & Material Weights (cont'd)

Product	Size of Container	Lbs. Per Cu. Ft.	No. of Lbs. / Per
Olive oil	— — —	58	7.7 / gallon
Onions, dry, Basket	bushel	— —	55 / bushel
Bag	17" x 32"	— —	50 / bag
Crate	20.5" x 11.5" x 10.5"	— —	58 / crate
Green (with tops)	bushel	— —	32 / bushel
Oranges, Western box	11.5" x 11.5" x 24"	— —	80 / box
Southern box	12.75" x 12.75" x 27"	— —	90 / box
Bushel box	10.75" x 10.75" x 23.5"	— —	65 / box
Oysters (shucked or meats)			
Crate with 5.1 gal. cans	18" x 12" x 24"	(11.5 lbs. per gal.)	67 / crate
With shells (bags)	bushel	— —	75 / bushel
Paint, Lead and oil	— — —	127	17 / gallon
Paper, Average solid	— — —	58	1,565 / cu. yard
Newspaper rolls	34.25" x 35" dia.	— —	500 / roll
	51.5" x 35" dia.	— —	1,000 / roll
	64.25" x 35" dia.	— —	1,300 / roll
Paraffin	— — —	56	1,510 / cu. yard
Parsley, Bushel crate	12.75" x 12.75" x 17"	— —	30 / crate
Parsnips	bushel	— —	50 / bushel
Peaches, Basket	bushel	— —	48 / bushel
1/2 bushel	— — —	— —	25 / basket
Crate	10.5" x 11.25" x 24"	— —	50 / crate
Western box	5.5" x 12.25" x 19.75"	— —	22 / box
Peanuts, Unshelled	bushel	— —	22 / bushel
Bag	— — —	— —	100 / bag
Peanut oil	— — —	57	7.6 / gallon
Pears, Basket	bushel	— —	50 / bushel
Western box	9.63" x 12.13" x 19.75"	— —	51 / box
Peas, Dry	bushel	— —	60 / bushel
Fresh hamper	bushel	— —	35 / hamper
Hamper	40 quarts	— —	45 / hamper

Product	Size of Container	Lbs. Per Cu. Ft.	No. of Lbs. / Per
Pecans, Large bag	— — —	— —	100 / bag
Small bag	— — —	— —	50 / bag
Peppers, Basket	bushel	— —	25 / basket
Crate	14.13" x 11.75" x 24"	— —	45 / crate
Petroleum	— — —	56	7.5 / gallon
Phosphate rock	— — —	200	5,400 / cu. yard
Pine,* Long leaf	— — —	44	3,670 / M. Bd. ft.
North Carolina	— — —	36	3,000 / M. Bd. ft.
Oregon	— — —	32	2,670 / M. Bd. ft.
Red	— — —	30	2,500 / M. Bd. ft.
White	— — —	26	2,170 / M. Bd. ft.
Yellow, long leaf	— — —	44	3,670 / M. Bd. ft.
Short leaf	— — —	38	3,170 / M. Bd. ft.
Pineapples, Crate	11" x 12.5" x 36"	— —	85 / crate
Pitch	— — —	70	1,900 / cu. yard
Plums, Basket	bushel	— —	56 / bushel
Western box	5.63" x 16.38" x 17.5"	— —	25 / box
Pomegranates, Box	6.5" x 12" x 24.63"	— —	30 / box
Popcorn, Ear	bushel	— —	70 / bushel
Shelled	bushel	— —	56 / bushel
Poplar*	— — —	27	2,250 / M. Bd. ft.
Porcelain	— — —	150	4,050 / cu. yard
Pork (dressed), Barrel (200 lbs. net)	18" head, 29" stave	— —	240 / barrel
Potatoes, Sweet	bushel	— —	55 / bushel
White or Irish	bushel	— —	60 / bushel
Bag	1.67 bushel	— —	102 / bag
Barrel	17.13" head, 28.5" stave	— —	185 / barrel
Prunes, Box	5.63" x 16.38" x 19.75"	— —	25 / box
Box	5.63" x 11.88" x 19.75"	— —	22 / box
Quinces	bushel	— —	50 / bushel

\*Kiln dried lumber averages 10% to 15% lighter, and green lumber 40% to 50% heavier, than air dried.

## Weight Distribution Concepts – Commodity & Material Weights (cont'd)

Product	Size of Container	Lbs. Per Cu. Ft.	No. of Lbs. / Per
Radishes, Basket	bushel	— —	34 / bushel
Crate	9.75" x 13.75" x 24"	— —	40 / crate
Redwood*	— — —	30	2,500 / M. Bd. ft.
Resin	— — —	68	1,835 / cu. yard
Rhubarb (pie plant)	bushel	— —	50 / bushel
Box	5.25" x 11.5" x 22"	— —	24 / box
Rice,	Unhulled bushel	— —	43 / bushel
Rock, Crushed (average)	— — —	100	2,700 / cu. yard
Romaine, Crate	13.88" x 18.88" x 24.5"	— —	64 / crate
Crate	12.25" x 13" x 15.25"	— —	27 / crate
Rubber goods	— — —	94	2,540 / cu. yard
Rutabagas	bushel	— —	56 / bushel
Rye	bushel	— —	56 / bushel
Salt, rock, Solid	— — —	136	3,670 / cu. yard
Coarse	— — —	45	1,215 / cu. yard
Fine	— — —	50	1,350 / cu. yard
Barrel (average)	— — —	— —	280 / barrel
Sand, fine, Dry	— — —	110	2,970 / cu. yard
Wet	— — —	125	3,375 / cu. yard
Sand, coarse, Dry	— — —	95	2,565 / cu. yard
Wet	— — —	120	3,240 / cu. yard
Sand, Mixed	— — —	115	3,100 / cu. yard
Sandstone, Solid	— — —	147	3,970 / cu. yard
Crushed	— — —	86	2,325 / cu. yard
Shale, Solid	— — —	172	4,645 / cu. yard
Crushed	— — —	92	2,485 / cu. yard
Sheep, Live (average)	per head	— —	125-150 / head
Shingles, Bundle	Pkg. in bndls. of 200-250 Size (avg.) 24" x 20" x 10"	— —	50 / bundle
Snow, Moist-packed	— — —	50	1,350 / cu. yard

Product	Size of Container	Lbs. Per Cu. Ft.	No. of Lbs. / Per
Soft drinks, Half depth bottle box	12.25" x 18.75" x 8.5"	— —	39 / box
24-6 to 8 oz. bottles			
Full depth bottle box	13.38" x 18.5" x 12.25"	— —	60 / box
12-24 to 32 oz. bottles			
Sorghum syrup	— — —	86	11.5 / gallon
Soybeans	bushel	— —	60 / bushel
Soybean oil	— — —	58	7.7 / gallon
Spinach, Hamper	bushel	— —	20 / bushel
Basket	bushel	— —	27 / bushel
Spruce*	— — —	28	2,330 / M. Bd. ft.
Squash	bushel	— —	46 / bushel
Starch	— — —	96	2,590 / cu. yard
Stone, Crushed, (average)	— — —	100	2,700 / cu. yard
Rip-rap	— — —	65	1,755 / cu. yard
Straw, Bale	17" x 22" x 42"	— —	110 / bale
Bale	26" x 30" x 46"	— —	180 / bale
Street sweepings	— — —	32	865 / cu. yard
Sugar	— — —	100	2,700 / cu. yard
Sugar, Bag	(100 lbs. net)	— —	101 / bag
Barrel (22 lbs. empty)	19.13" head, 30" stave	— —	345 / barrel
Case	24 – 5-lb. cartons	— —	135 / case
Case	60 – 2-lb. cartons	— —	135 / case
Sugar cane syrup	— — —	85	11.3 / gallon
Sulphur	— — —	125	3,375 / cu. yard
Sulfuric acid, 87%	— — —	112	15 / gallon
Sweet corn, Basket	bushel	— —	45 / bushel
Crate	13" x 13" x 24"	— —	60 / crate
Sycamore*	— — —	37	3,080 / M. Bd. ft.
Tallow	— — —	60	1,620 / cu. yard

\*Kiln dried lumber averages 10% to 15% lighter, and green lumber 40% to 50% heavier, than air dried.

## Weight Distribution Concepts – Commodity & Material Weights (cont'd)

Product	Size of Container	Lbs. Per Cu. Ft.	No. of Lbs. / Per
Tanks, Acetylene, 102 cu. foot	empty	— —	70 / tank
	filled	— —	75 / tank
	310 cu. foot	empty	200 / tank
	filled	— —	220 / tank
Tanks, Oxygen, 150 cu. foot	empty	— —	80 / tank
	filled	— —	92 / tank
	300 cu. foot	empty	133 / tank
	filled	— —	153 / tank
Tar	— — —	65	1755 / cu. yard
Tile, Solid	— — —	115	3,100 / cu. yard
	Partition (construction)	40	1,080 / cu. yard
Tomatoes, Basket	bushel	— —	55 / bushel
Lug box	7.25" x 14" x 17.5"	— —	35 / box
Crate	10.5" x 11.25" x 24"	— —	48 / crate
Basket	8.5" x 8.75" x 20"	— —	18 / basket
Basket (paper)	4.25" x 8.5" x 16.25"	— —	9 / basket
Basket (wood)	5.5" x 7.25" x 16.5"	— —	10 / basket
Turpentine	— — —	54	7.2 / gallon
Turnips, Basket	bushel	— —	54 / bushel
Vetch seed	bushel	— —	60 / bushel
Vinegar	— — —	64	8.5 / gallon
Walnuts, Bulk	bushel	— —	50 / bushel
	Bag	2 bushel	100 / bag
Water, Fresh	— — —	63	8.4 / gallon
Wheat, Bulk	bushel	— —	60 / bushel
	Bag	1.5 bushel	90 / bag
Wool, Pressed	— — —	82	2,215 / cu. yard

\*Kiln dried lumber averages 10% to 15% lighter, and green lumber 40% to 50% heavier, than air dried.

## Vehicle Specifications Index – NPR-HD/W4500 Gas

Model	NPR/W3500 Gas	NPR HD/W4500 Gas
GVWR	12,000 lbs.	14,500 lbs.
WB	109 in., 132.5 in., 150 in., 176 in.	
Engine	GMPT 8-cylinder, V Block 4-cycle, OHV, water-cooled, Sequential Port Fuel Injection	
Model/Displacement	GMPT-V8/365 CID (6.0 liters)	
HP (Gross)	325 HP @ 5,000 RPM	
Torque (Gross)	360 lbs.-ft. torque @ 4,400 RPM	
Equipment	Sequential Port Fuel Injection (SFI), mass air flow meter, powertrain control module (PCM), onboard diagnostics, oxygen sensors, catalytic convertor, map sensor, with external oil cooler, engine cruise control, rear engine cover.	
Transmission	4L80-E Hydra-Matic 4-speed automatic w/lock-up converter and overdrive	
Steering	Integral power steering 18.8-20.9:1 ratio. Tilt and telescoping steering column.	
Front Axle	Reverse Elliot "I"-Beam rated at 6,830 lbs.	
Suspension	Semi-elliptical steel alloy tapered leaf springs with stabilizer bar and shock absorbers.	
GAWR	4,700 lbs.	5,360 lbs.
Rear Axle	Full-floating single speed with hypoid gearing rated at 11,020 lbs.	
Suspension	Semi-elliptical steel alloy multi-leaf springs and shock absorbers.	
GAWR	7,950 lbs.	9,880 lbs.
Wheels	16 x 6.0 6-hole disc wheels, painted white.	19.5 x 6.0 6-hole disc wheels, painted white.
Tires	215/85R 16-E (10 pr) tubeless steel-belted radials, all-season tread front and rear.	225/70R-19.5F (12 ply) tubeless steel-belted radials, all-season tread front and rear.
Brakes	Dual-circuit, vacuum-assisted hydraulic service brakes with EBD (Electronic Brake Distribution) system for load proportioning of the brake system. Disc front and self-adjusting outboard mounted drum rear. The parking brake is a mechanical, cable-actuated, internal expanding drum type, transmission mounted. Four-channel antilock brake system.	
Fuel Tank	30-gallon rectangular steel fuel tank. Mounted between the frame rails with electric type fuel pump (mounted in tank). Through the rail fuel fill.	

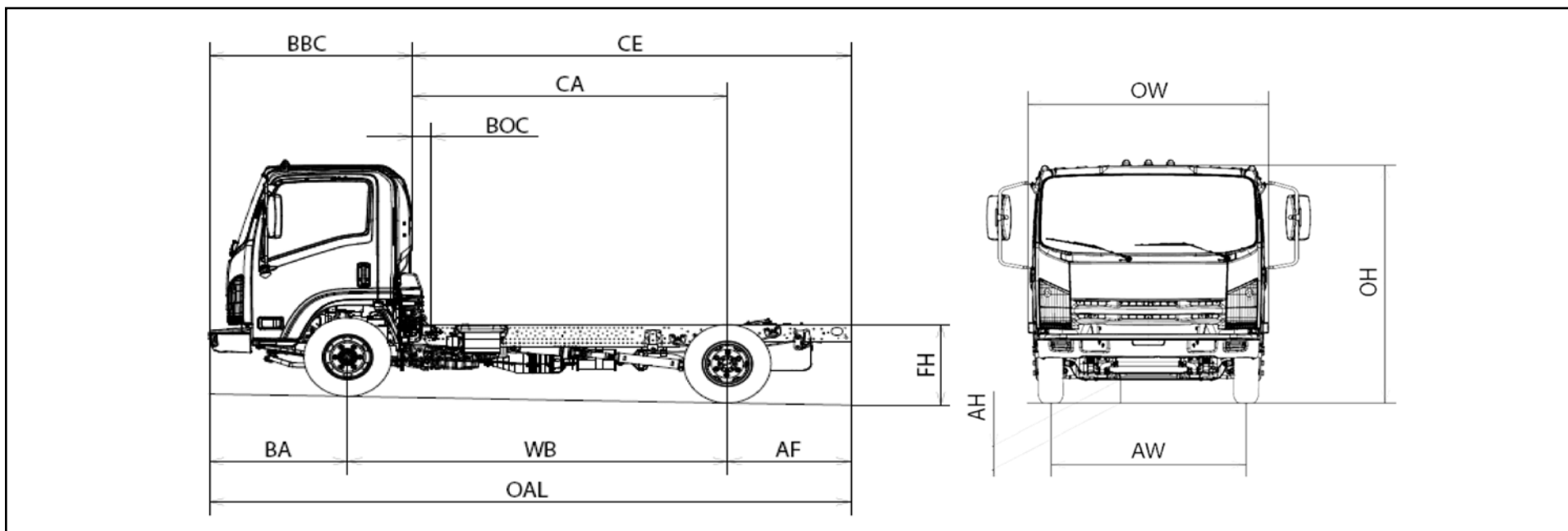
**NOTE:** These selected specifications are subject to change without notice.

## Vehicle Specifications Index – NPR-HD/W4500 Gas

Model	NPR/W3500 Gas	NPR HD/W4500 Gas
GVWR	12,000 lbs.	14,500 lbs.
Frame	Ladder type channel section straight frame rail 33.5 in. wide through the total length of the frame. Yield strength 44,000 psi section modulus 7.20 in. <sup>3</sup> , RBM 316,800 lbs.-ft./in. per rail.	
Cab	All-steel, low cab forward, BBC 70.9 in., 45° mechanical tilt with torsion assist.	
Equipment	TRICOT and JERSEY KNIT combination cloth covered high back driver's seat with two occupant passenger seat. Dual cab-mounted exterior mirrors. With integral convex mirrors. Tilt and telescoping steering column. Tinted glass, air conditioning.	
Electrical	12-volt, negative ground, maintenance-free battery located on frame, 750 CCA each, 145-amp alternator with integral regulator.	
Options	AM/FM CD stereo radio, wheel simulators, air deflector, back up alarm, mirror brackets for 102" wide body, fire extinguisher and triangle kit mounted in rear organizer, , heated mirrors, Limited Slip Differential, and Chrome Grille	

NOTE: These selected specifications are subject to change without notice.

## Vehicle Weights, Dimensions & Ratings



## Vehicle Specifications Index – NPR-HD/W4500 Gas

Variable Chassis Dimensions					
Unit	WB	CA*	CE*	OAL	AF
Inch	109.0	86.5	129.6	200.5	43.1
Inch	132.5	110.0	153.1	224.0	43.1
Inch	150.0	127.5	170.6	241.5	43.1
Inch	176.0	153.5	196.6	267.5	43.1

Effective CA & CE are CA or CE less BOC.

Dimension Constants: 12,000 GVW					
Code	Inches	Code	Inches	Code	Inches
AH	7.5	BW	83.3	FH	31.8
AW	65.6	CW	65.0		
BA	48.4	FW	33.5		
BBC	70.9	OH	90.0		
BOC	6.5	OW	81.4		

In Frame Tank 12,000-lb. GVWR Automatic Transmission Model Chassis Cab and Maximum Payload Weights						
Model	WB	Unit	Front	Rear	Total	Payload
DB1	109	LB.	3212	1790	5003	6997
DB2	132.5	LB.	3310	1769	5079	6921
DB3	150	LB.	3366	1750	5116	6884
DB4	176	LB.	3432	1739	5171	6829



# 2009 GM/Isuzu TRUCK

## Vehicle Specifications Index – NPR-HD/W4500 Gas

Dimension Constants: 14,500 GVW					
Code	Inches	Code	Inches	Code	Inches
AH	8.3	BW	83.3	FH	33.0
AW	65.6	CW	65.0		
BA	48.4	FW	33.5		
BBC	70.9	OH	91.1		
BOC	6.5	OW	81.4		

In Frame Tank 14,500-lb. GVWR Automatic Transmission Model Chassis Cab and Maximum Payload Weights						
Model	WB	Unit	Front	Rear	Total	Payload
FE1	109	LB.	3261	1828	5089	9411
FE2	132.5	LB.	3332	1815	5147	9353
FE3	150	LB.	3384	1791	5175	9325
FE4	176	LB.	3445	1776	5221	9279

## Vehicle Specifications Index – NPR-HD/W4500 Gas

### Vehicle Weight Limits:

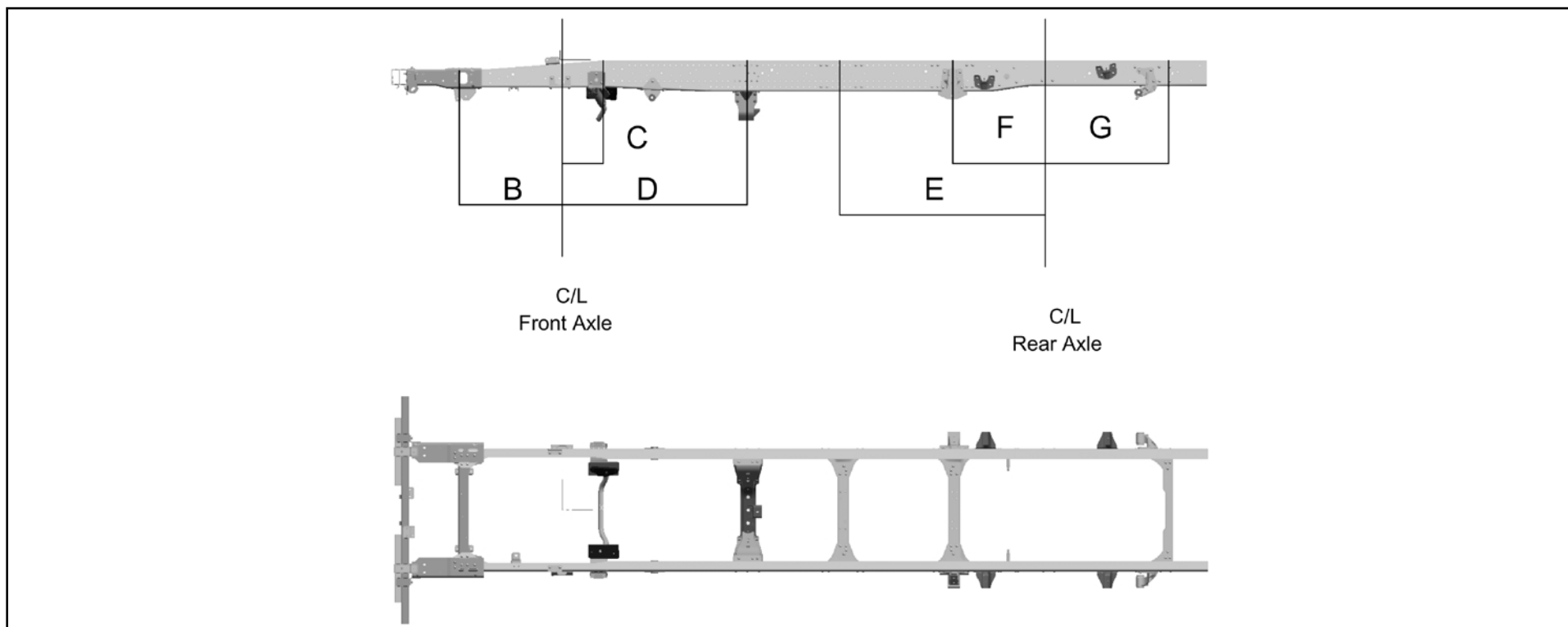
GVWR	NPR / W3500	NPR-HD / W4500
Designed Maximum	12,000 lbs.	14,500 lbs.
GAWR, Front	4,700 lbs.	5,360 lbs.
GAWR, Rear	7,950 lbs.	9,880 lbs.

### Technical Notes:

**Chassis Curb Weight** reflects standard equipment and fuel but no driver or payload.

**Maximum Payload Weight** is the allowed maximum for equipment, body, payload and driver and is calculated by subtracting chassis curb weight from the GVWR.

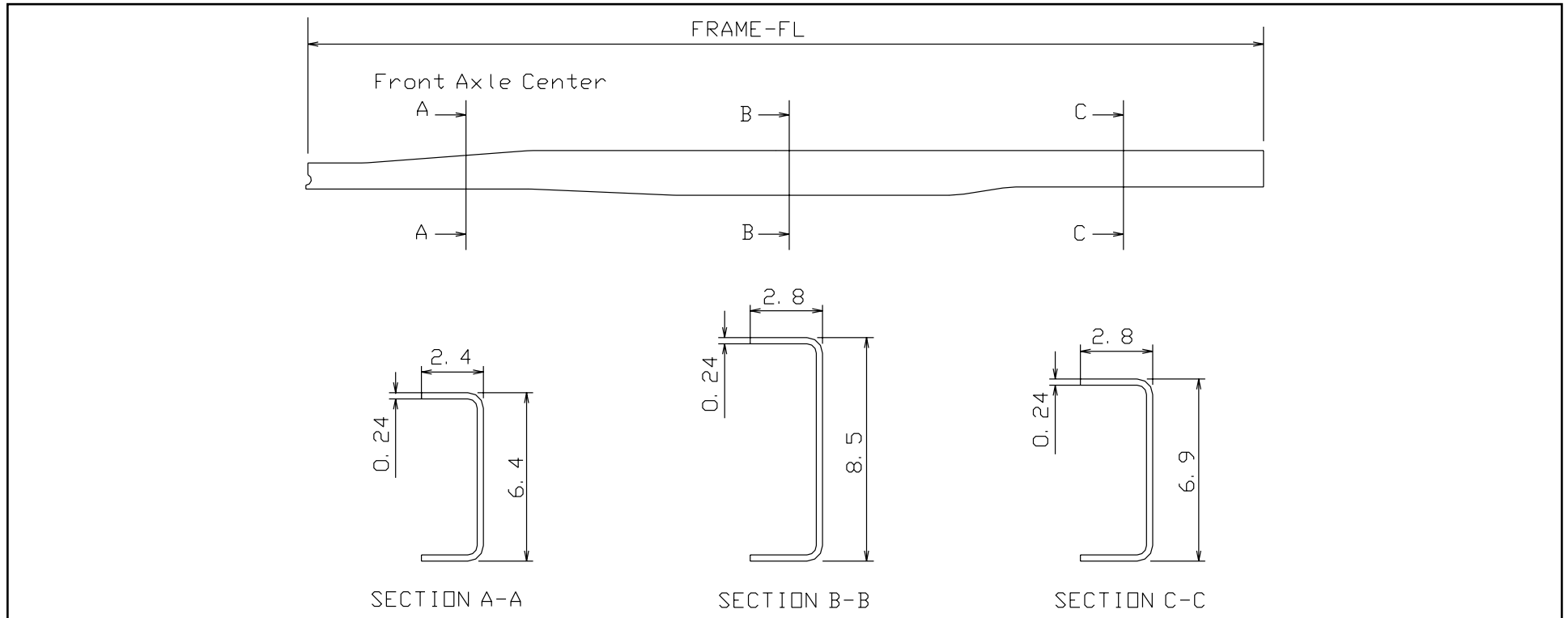
## Vehicle Specifications Index – NPR-HD/W4500 Gas – Frame & Crossmember Specifications



Wheelbase	Frame Thick	Crossmember Type/Location						
			B	C	D	E	F	G
109.0	0.24		28.3	7.9	AA 46.5	—	CC 24.2	DD 33.8
132.5	0.24		28.3	7.9	AA 46.5	BB 57.5	CC 24.2	DD 33.8
150.0	0.24		28.3	7.9	AA 46.5	BB 57.9	CC 24.2	DD 33.8
176.0	0.24		28.3	7.9	AA 46.5	BB 74.4	CC 24.2	DD 33.8

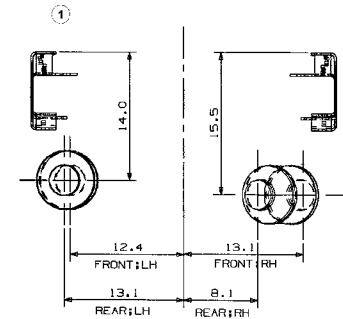
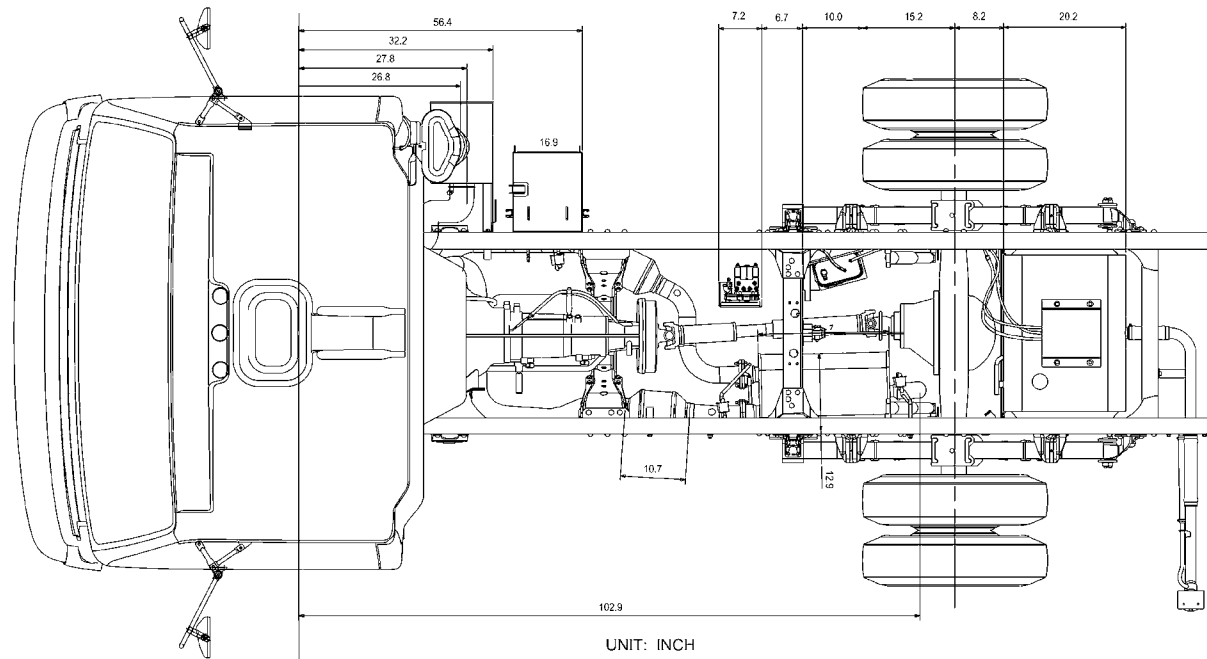
A/T = Automatic Transmission

## Vehicle Specifications Index – NPR-HD/W4500 Gas – Frame Chart

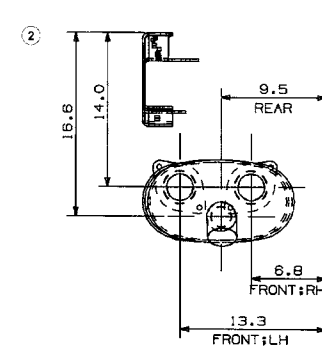


Wheelbase	Frame FL	Frame Thickness
109.0	182.5	0.24
132.5	206.1	0.24
150.0	223.8	0.24
176.0	249.8	0.24

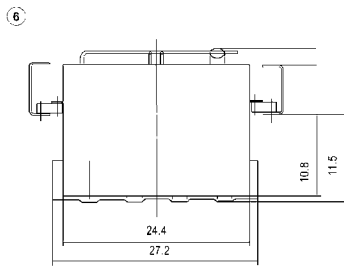
## Vehicle Specifications Index – NPR-HD/W4500 Gas – Frame Chart (cont'd)



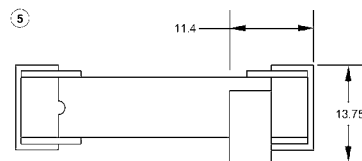
Rear View  
Catalytic Converters



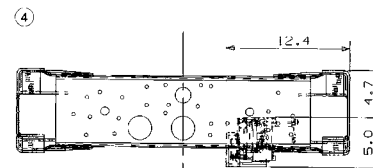
Rear View  
Muffler



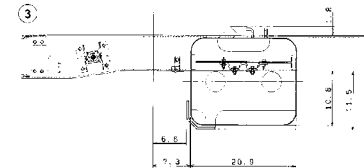
Side View  
In Frame Tank



Rear View  
Emission Canister



Rear View  
ABS Controller



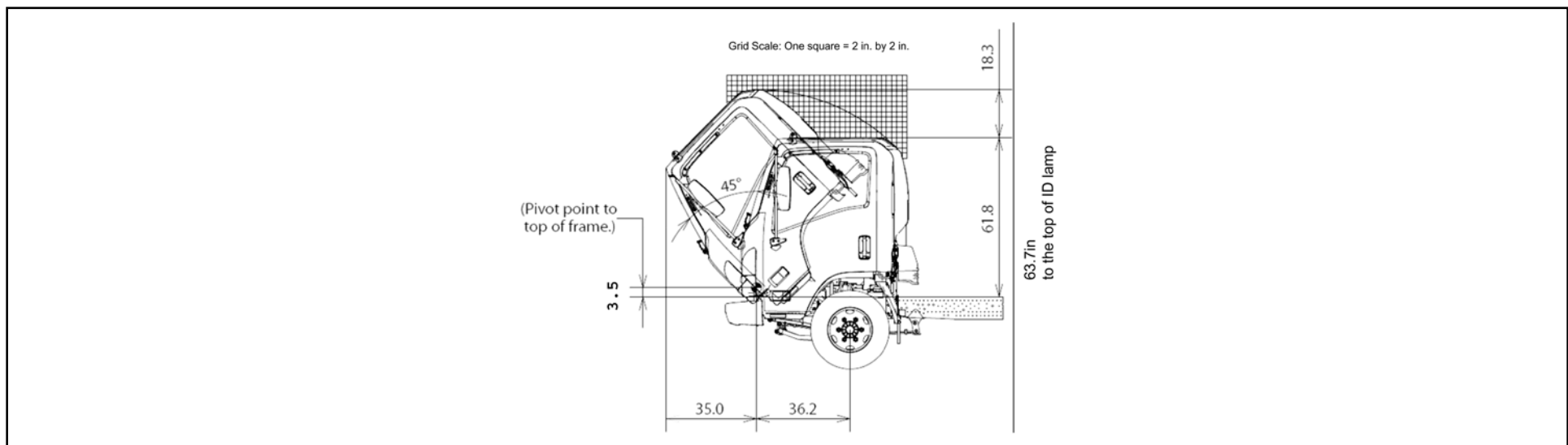
Side View  
In Frame Tank

## Vehicle Specifications Index – NPR-HD/W4500 Gas – Body Builder Weight Information Chart

### NPR NPR-HD GAS AUTOMATIC TRANSMISSION

GVWR	AXLE	Body Builder Weight Information Chart				UNSPRUNG WEIGHT
		Wheelbase				
		109	132.5	150	176	
		in frame tank	in frame tank	in frame tank	in frame tank	
12000	FRONT	3752	3827	3876	3939	573
	REAR	1967	1932	1920	1912	871
	TOTAL	5719	5759	5796	5851	1444
14500	FRONT	3704	3805	3858	3927	705
	REAR	2004	1978	1962	1948	1135
	TOTAL	5708	5783	5820	5875	1840

### Cab Tilt

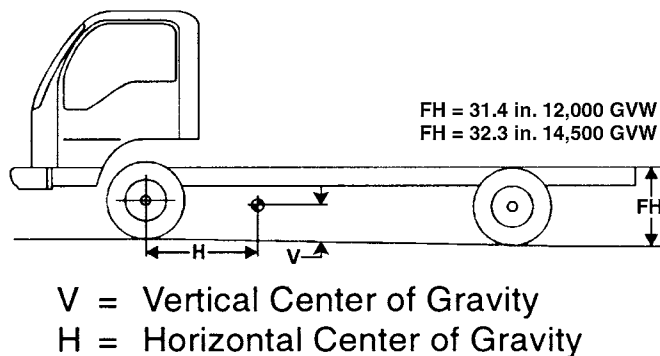


## Vehicle Specifications Index – NPR-HD/W4500 Gas – Body Builder Weight Information Chart

### Center of Gravity

The center of gravity of the chassis cab.

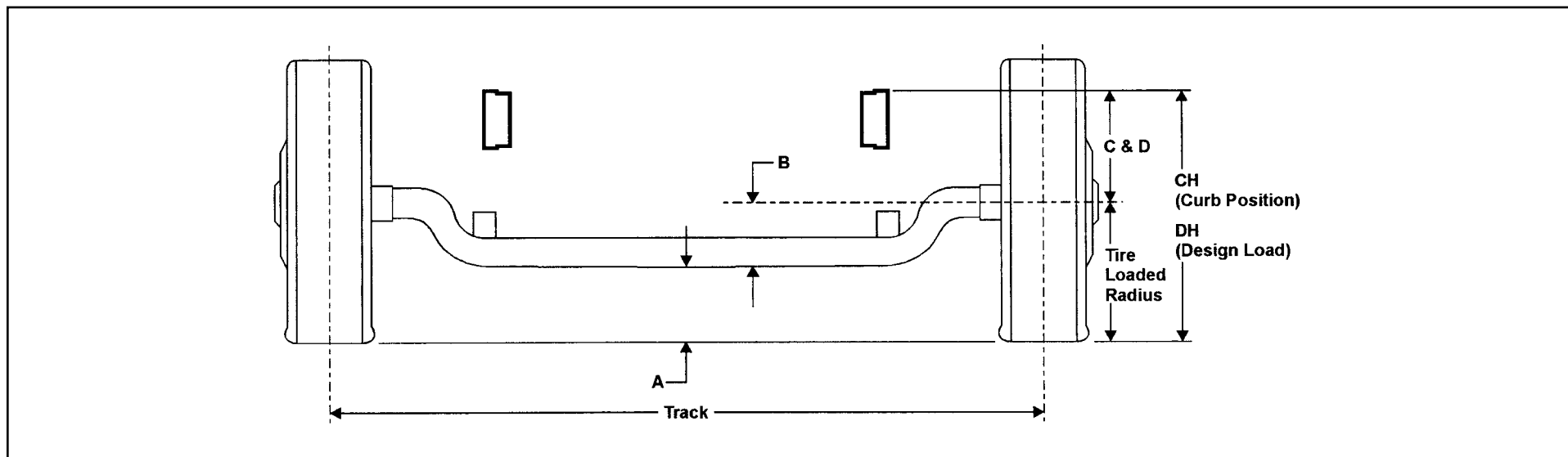
GVWR	WB	V	H Auto. Trans.
12,000	109	23.8	37.5
	132.5	23.7	44.5
	150	23.6	49.7
	176	23.6	57.5
14,500	109	23.8	38.3
	132.5	23.7	45.3
	150	23.7	50.6
	176	23.6	58.4



The center of gravity of the completed vehicle with a full load should not exceed 63 inches above ground level for the 12,000 lb. GVWR, 63 inches above ground level for the 14,500 lb. GVWR, and must be located horizontally between the centerlines of the front and rear axles.

**NOTE:** The maximum dimensions for a body installed on the N/W Series are 102 inches wide (outside) with 102" wide mirror brackets installed 90 inches high (inside). Any larger body applications must be approved by ICTA Application Engineering. On the West Coast call 1-562-229-5314 and on the East Coast call 1-770-740-1620 x 262.

## Vehicle Specifications Index – NPR-HD/W4500 Gas – Front Axle Chart



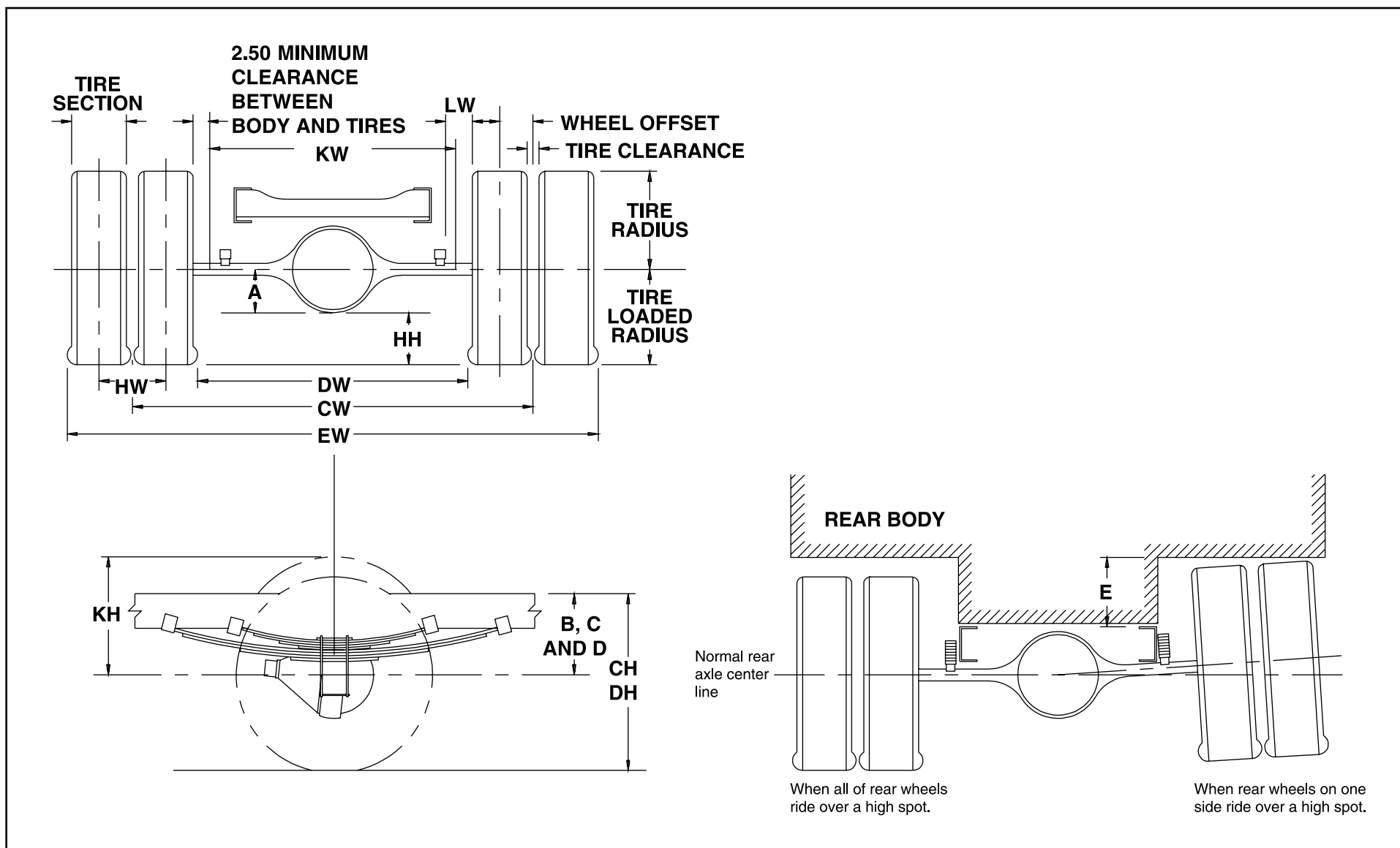
Formulas for calculating height dimensions:

- A = Tire Loaded Radius – B
- C = Centerline of Axle to Top of Frame Rail at Curb Position
- D = Centerline of Axle to Top of Frame Rail at Design Load
- CH = C + Tire Unloaded Radius
- DH = D + Tire Loaded Radius

Tire	GVWR	GAWR	A	B	C	D	CH	DH	Track	Tire Radius	
										Unload	Load
215/85R 16-E	12,000 lbs.	4,700 lbs.	7.5	6.6	12.9	12.2	27.5	26.3	65.5	14.6	14.1
225/70R 19.5	14,500 lbs.	6,830 lbs.	8.3	6.6	13	11.5	29	26.4	65.5	16	14.93



## Vehicle Specifications Index – NPR-HD/W4500 Gas – Rear Axle Chart



## Vehicle Specifications Index – NPR-HD/W4500 Gas – Rear Axle Chart

Definitions			
A	Centerline of axle to bottom of axle bowl.	DW	Minimum distance between the inner surfaces of the rear tires.
B	Centerline of axle to top of frame rail at metal-to-metal position.		
C	Centerline of axle to top of frame rail at curb position.	EW	Maximum Rear Width: Overall width of the vehicle measured at the outermost surface of the rear tires.
D	Centerline of axle to top of frame rail at design load.	HH	Rear Tire Clearance: Minimum clearance between the rear axle and the ground-line.
E	Rear Tire Clearance: Minimum clearance required for tires and chain measured from the top of the frame at the vertical centerline of the rear axle, when rear wheels on one side ride over a high spot.	HW	Dual Tire Spacing: Distance between the centerlines of the tires in a set of dual tires.
CH	Rear Frame Height: Vertical distance between the normal top of frame rail and the ground-line through the centerline of the rear axle at curb position.	KH	Tire Bounce Clearance: Minimum distance required for tire bounce as measured from the centerline of the rear axle and the top of the rear tire when one wheel rides over a high spot.
DH	Rear Frame Height: Vertical distance between the normal top of frame rail and the ground-line through the centerline of the rear axle at design load.	CW	Track Dual Rear Wheel Vehicles: Distance between the centerlines of the dual wheels measured at the ground-line.
Tire Section, Tire Radius, Tire Loaded Radius, Tire Clearance		See Tire Chart for Values	

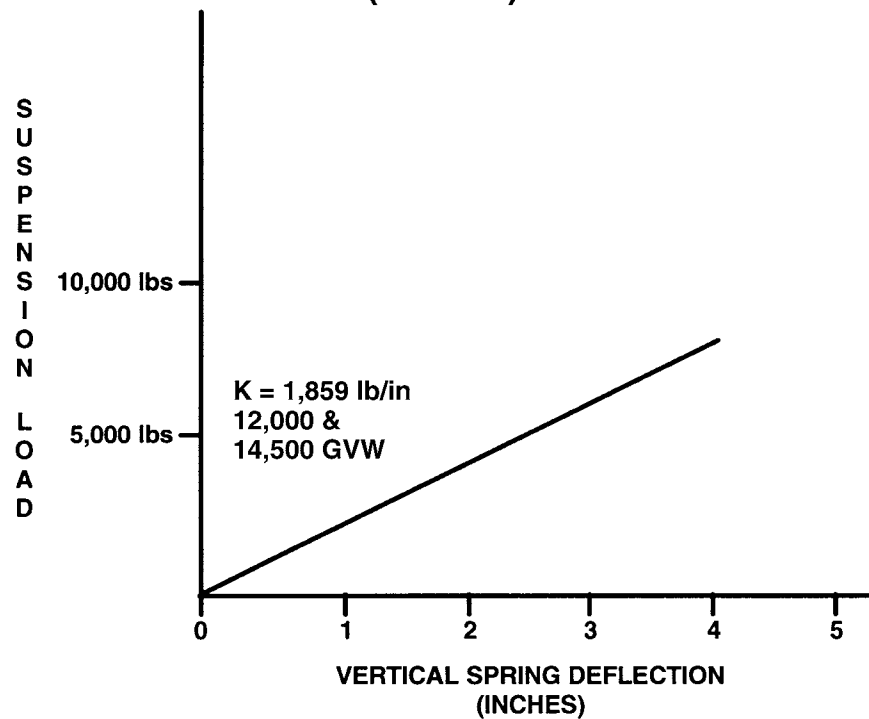
Formulas for Calculating Rear Width and Height Dimensions			
CW = Track		HH = Tire loaded radius – A	
CH = Tire loaded radius + C		JH = KH – B	
DH = Tire loaded radius + D		KH = Tire radius + 3.00 inches	
DW = Track + 2 tire sections – tire clearance		KW = DW – 5.00 inches	
EW = Track + 2 tire sections + tire clearance		LW = 1.00-inch minimum clearance between tires and springs	

**NOTE:** Track and overall width may vary with optional equipment.

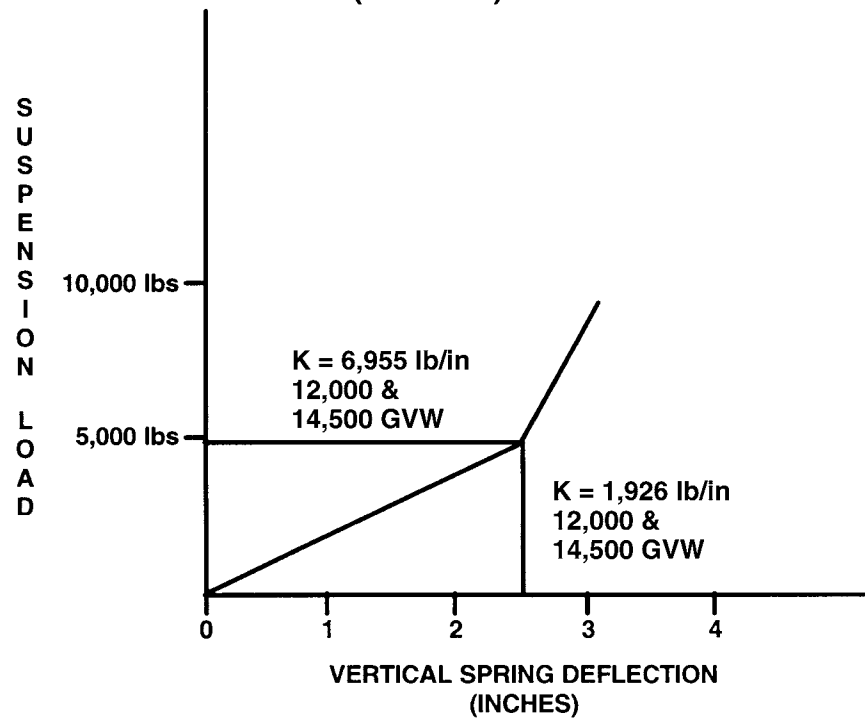
Tire	GAWR	Track CW	A	B	C	D	E
215/85R 16-E	7,950 lbs.	65.0	6.5(A/T)	9.3(A/T)	15.4	13.3/13.0	7.8
225/70R 19.5-F	9,880 lbs.	65.0	7.7 (A/T)	9.3 (A/T)	15.6	13.4	8.4

## Vehicle Specifications Index – NPR/W3500 Gas, NPR-HD/W4500 – Gas – Suspension Deflection Charts

Front Leaf Spring Load vs. Deflection  
(Per Axle)



Rear Leaf Spring Load vs. Deflection  
(Per Axle)



## Vehicle Specifications Index – NPR/W3500 Tire & Disc Wheel Chart

### Tire

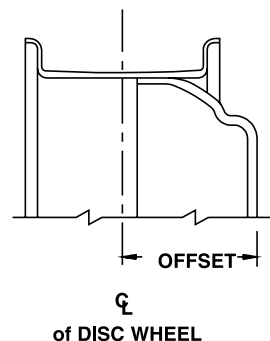
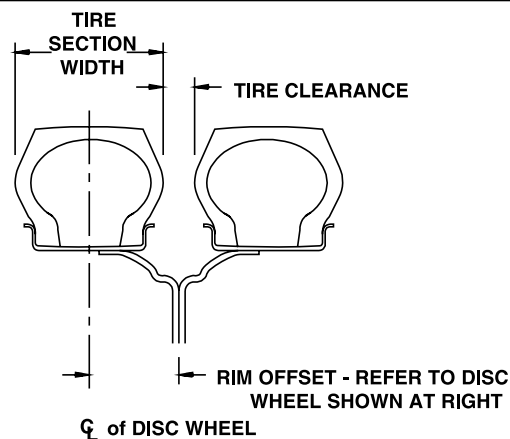
Tire Size	Tire Load Limit and Cold Inflation Pressures				Maximum Tire Load Limits		GVWR (Lb.)
	Single		Dual		Front	Rear	
	Lb.	PSI	Lb.	PSI	2 Single	4 Dual	
215/85R 16-E	2,430	70	2,210	70	4,860	8,840	12,000

Tire Size	GVWR (Lb.)	Tire Radius				Tire Section Width	Tire Clearance	Design Rim Width
		Loaded		Unloaded				
		Front	Rear	Front	Rear			
215/85R 16-E	12,000	14.05	14.05	14.6	14.6	8.54	1.46	6.0

### Disc Wheel

Wheel Size	Bolt Holes	Bolt Circle Dia.	Ft./Rr. Nut Size*	Rear Stud Size*	Nut/Stud Torque Specs.	Inner Circle	Outside Offset	Disc Thickness	Rim Type	Material Mfg.
16 X 6 K	6 JIS	8.75	1.6142 (41 mm) BUD HEX	0.8268 (21 mm) SQUARE	325 ft-lb. (440 N•m)	6.46	5.0	0.35	5° DC	Steel TOPY

\*O.D. Wrench Sizes



## Vehicle Specifications Index – NPR-HD/W4500 Tire & Disc Wheel Chart

### Tire

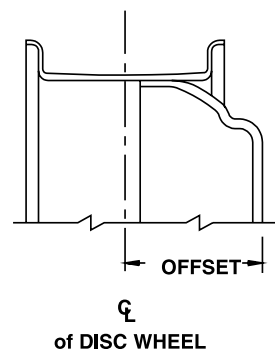
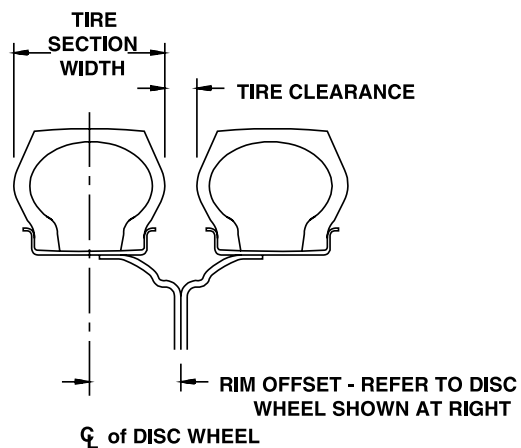
Tire Size	Tire Load Limit and Cold Inflation Pressures				Maximum Tire Load Limits		GVWR (Lb.)
	Single		Dual		Front	Rear	
	Lb.	PSI	Lb.	PSI	2 Single	4 Dual	
225/70R 19.5-F	3,315	85	3,115	85	6,630	12,460	14,500

Tire Size	GVWR (Lb.)	Tire Radius				Tire Section Width	Tire Clearance	Design Rim Width
		Loaded		Unloaded				
		Front	Rear	Front	Rear			
225/70R 19.5-F	14,500	15.24	15.28	16.10	16.10	8.9	1.1	6.0

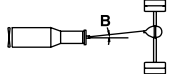
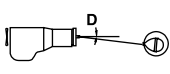
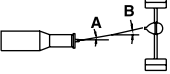
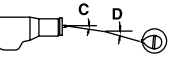
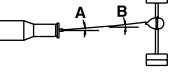
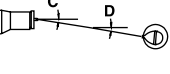
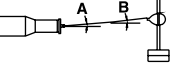
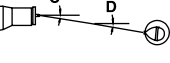
### Disc Wheel

Wheel Size	Bolt Holes	Bolt Circle Dia.	Ft./Rr. Nut Size*	Rear Stud Size*	Nut/Stud Torque Specs.	Inner Circle	Outside Offset	Disc Thickness	Rim Type	Material Mfg.
19.5 x 6.00 RW	6 JIS	8.75	1.6142 (41 mm) BUD HEX	0.8268 (21 mm) SQUARE	325 ft-lb. (440 N•m)	6.46	5.0	0.37	15° DC	Steel ACCURIED

\*O.D. Wrench Sizes

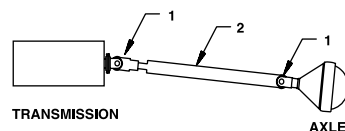


## Vehicle Specifications Index – NPR/W3500, NPR-HD/W4500 – Gas – Propeller Shaft

WB	PLANE VIEW	SIDE VIEW
109 in		
132.5 in		
150 in		
176 in		

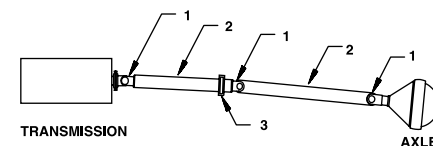
TYPICAL INSTALLATIONS SHOWING YOKES "IN PHASE." "IN PHASE" MEANS THAT THE YOKES AT EITHER END OF A GIVEN PROPELLER SHAFT ASSEMBLY ARE IN THE SAME PLANE.

**NPR EFI**  
(109 in WB)



- 1. UNIVERSAL JOINT
- 2. PROPELLER SHAFT
- 3. CENTER CARRIER BEARING

(132.5 in, 150 in and 176 in WB)

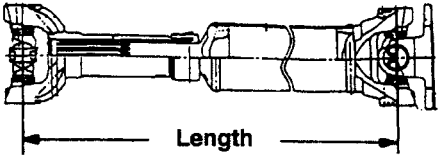
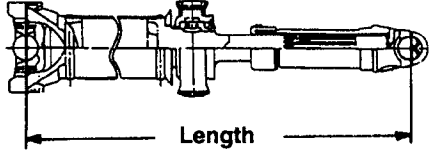
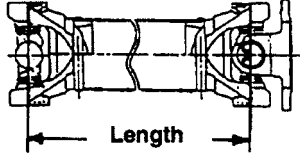


Wheelbase	Plane View		Side View	
	A Auto. Trans.	B Auto. Trans.	C Auto. Trans.	D Auto. Trans.
109 in.	—	3.2°	—	8.3°
132.5 in.	0°	3.3°	2.6°	2.6°
150 in.	0°	3.3°	1.8°	1.7°
176 in.	0°	2.2°	0.4°	3.4°

**NOTE:** All driveline angles are at unloaded condition (curb position with typical cargo body).

## Vehicle Specifications Index – NPR/W3500, NPR-HD/W4500 – Gas – Propeller Shaft (cont'd)

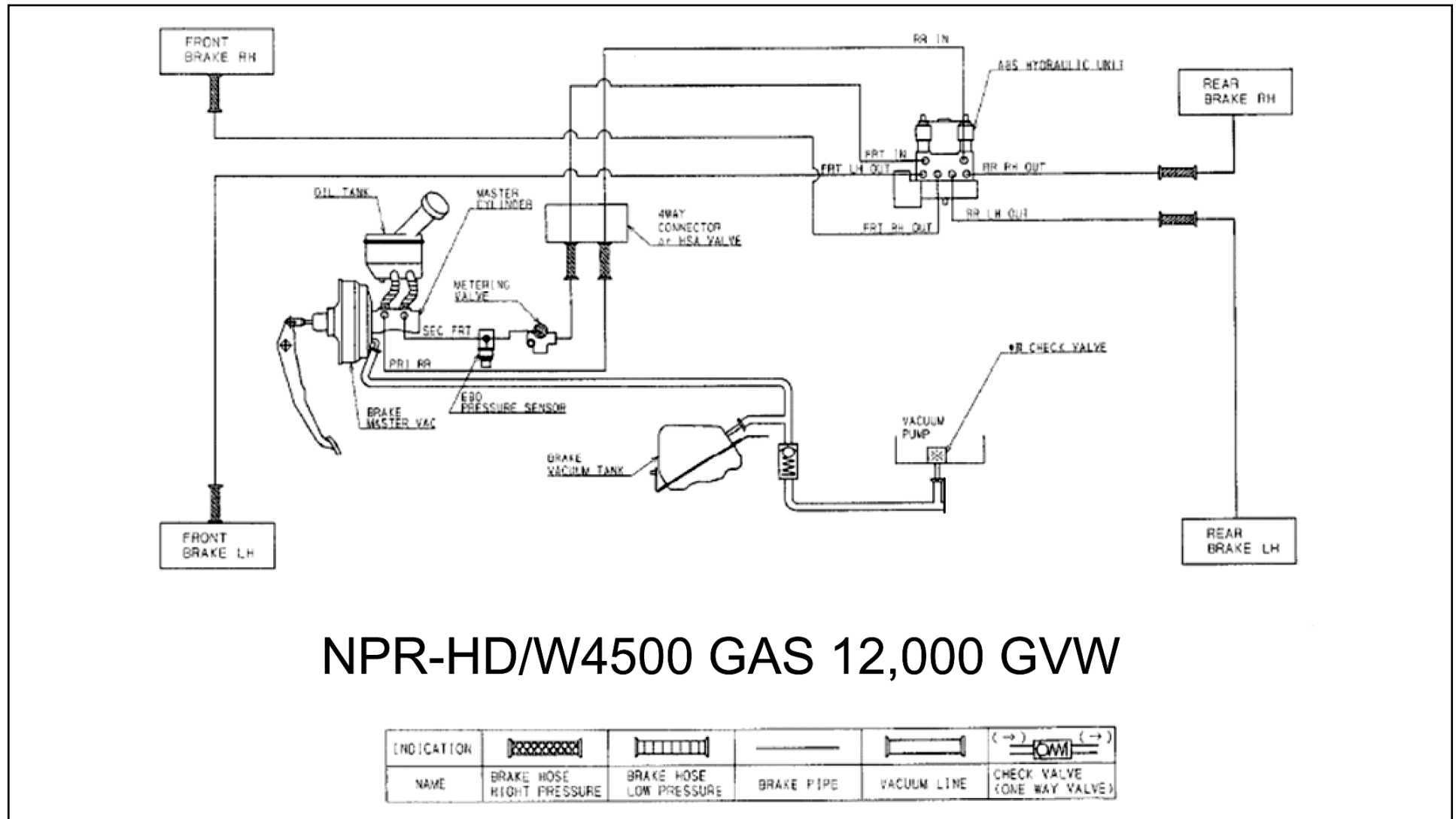
Wheelbase	109	132.5	150	176
No. of Shafts	1	2	2	2
Trans. Type	Automatic Transmission	Automatic Transmission	Automatic Transmission	Automatic Transmission
Shaft #1 O.D.	3.0			
Thickness	0.083			
Length	34.83	24.1	41.85	52.1
Type	A	B	B	B
Shaft #2 O.D.	3.0			3.5
Thickness	N/A	0.083		
Length	N/A	33.46	33.46	49.2
Type	N/A	C	C	C

Type	Description	Illustration
Type A	1st shaft in 1-piece driveline	
Type B	1st shaft in 2-piece driveline	
Type C	2nd shaft in 2-piece driveline	

## Vehicle Specifications Index – NPR/W3500, NPR-HD/W4500 – Gas – 12,000 GVW, Brake System Diagram

### Vacuum Over Hydraulic

Please refer to Introduction Section of book for antilock system cautions and wheelbase modification requirements.

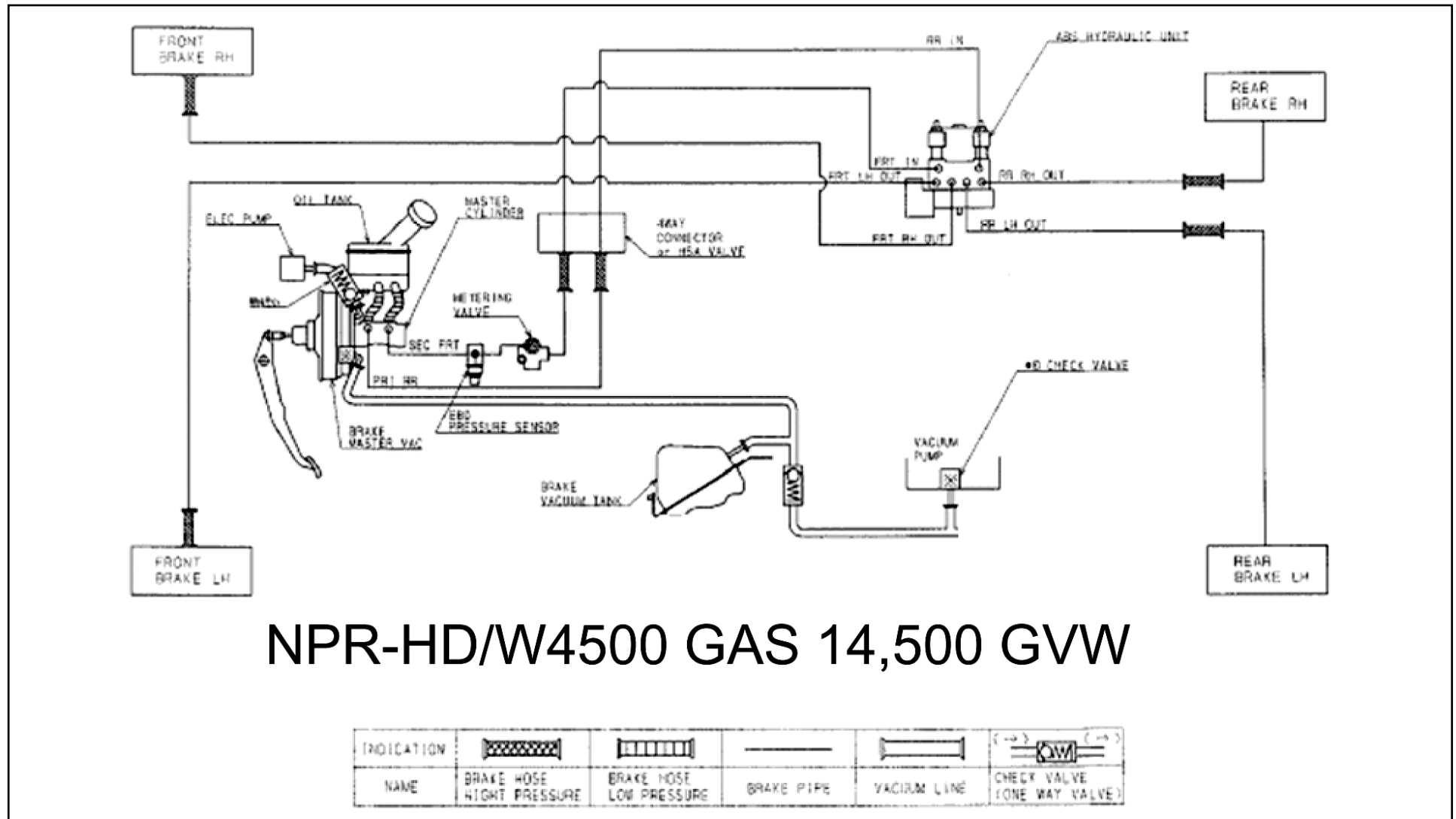




## Vehicle Specifications Index – NPR/W3500, NPR-HD/W4500 – Gas – 14,500 GVW, Brake System Diagram

### Vacuum Over Hydraulic

Please refer to Introduction Section of book for antilock system cautions and wheelbase modification requirements.

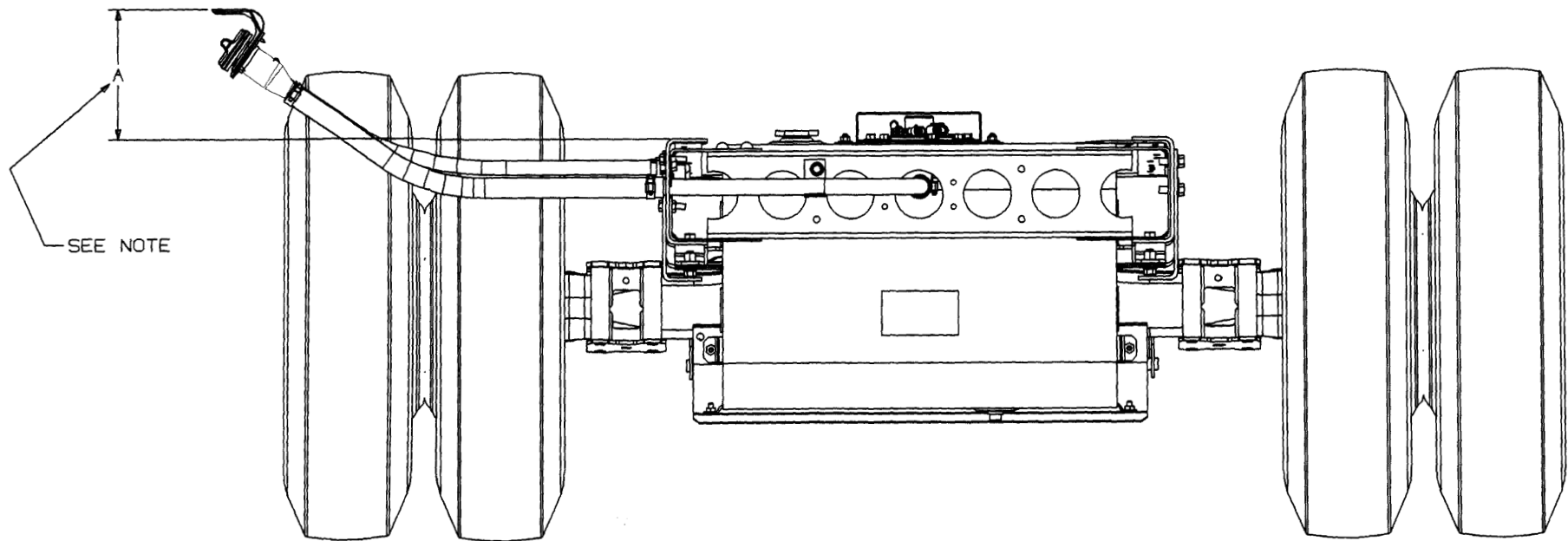


## **Vehicle Specifications Index – NPR/W3500, NPR-HD/W4500 – Gas – Through the Rail Fuel Fill**

### ***Installation Instructions***

1. Disconnect battery.
2. Remove the short filler hose and the short breather hose from the breather and fuel filler pipes and the filler neck bracket assembly.
3. Filler kit hoses are designed for the 96 inch wide body width. Modify the hoses as required to fit dimension “E” of the desired body width (see page 104)
4. Install flexible filler hose (item 2) to fuel filler pipe and filler neck bracket assembly using existing screw clamps.
5. Install flexible breather hose (item 3) to fuel breather pipe and filler neck bracket assembly using new clamps (item 4)
6. The filler neck must be mounted to allow the filler neck bracket to be parallel to the frame horizontal.
7. Filler neck (Dimension A) must be between 6.85 inches and 8.85 inches above frame.
8. Secure the filler plate to the bottom of the body and check for leaks.
9. Ensure that fill hose does not sag, creating an area where the fuel could pool in the fill hose.
10. Reconnect battery.

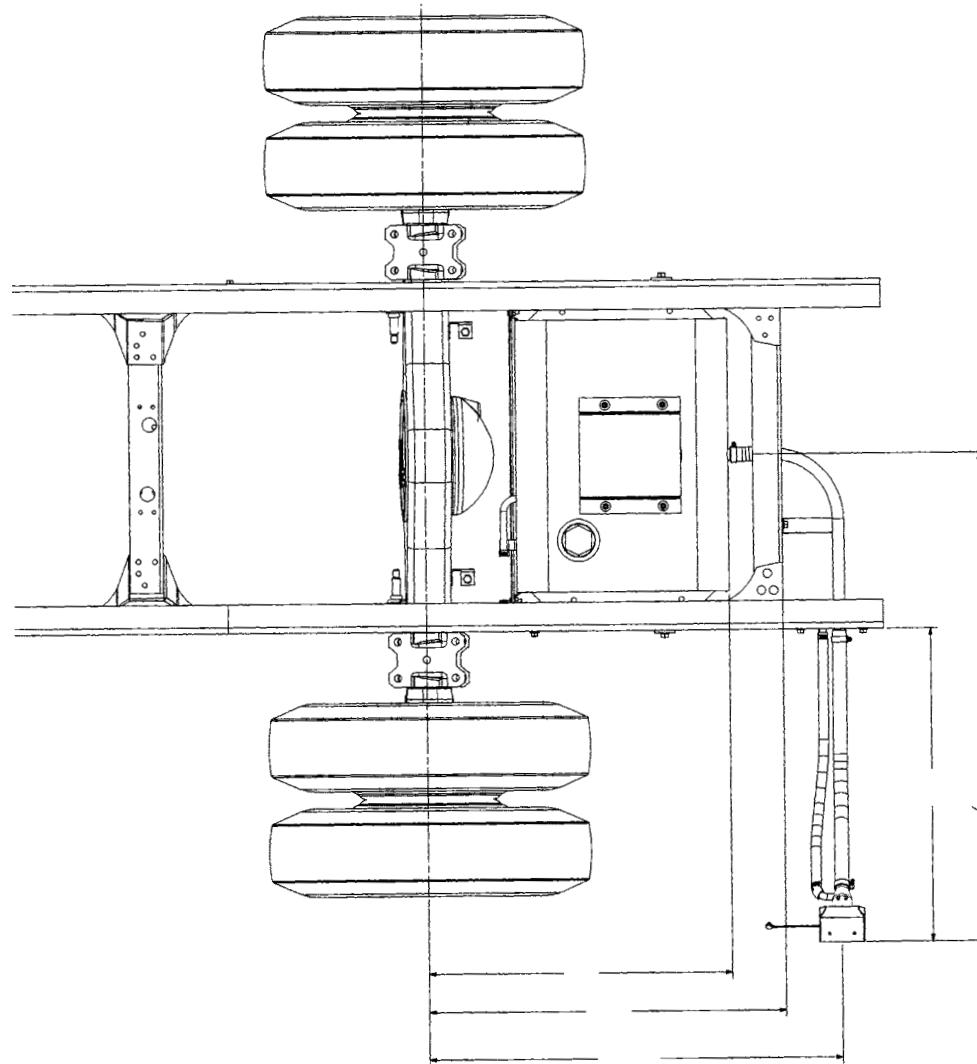
## Vehicle Specifications Index – NPR/W3500, NPR-HD/W4500 – Gas – Rear View Fuel Fill



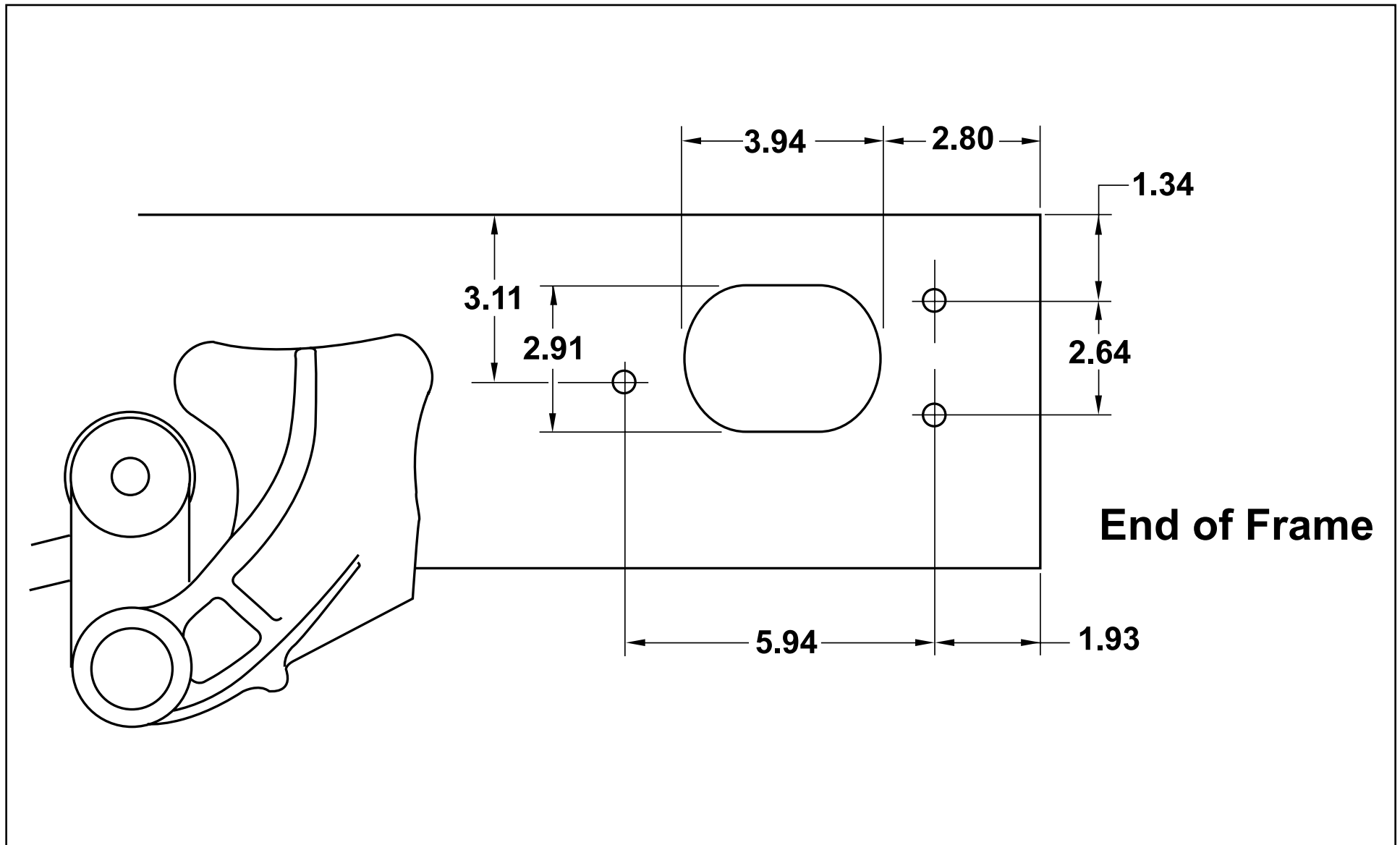
REAR VIEW FUEL FILL

Dimension A = 6.85-8.85 inches (174-216 mm)

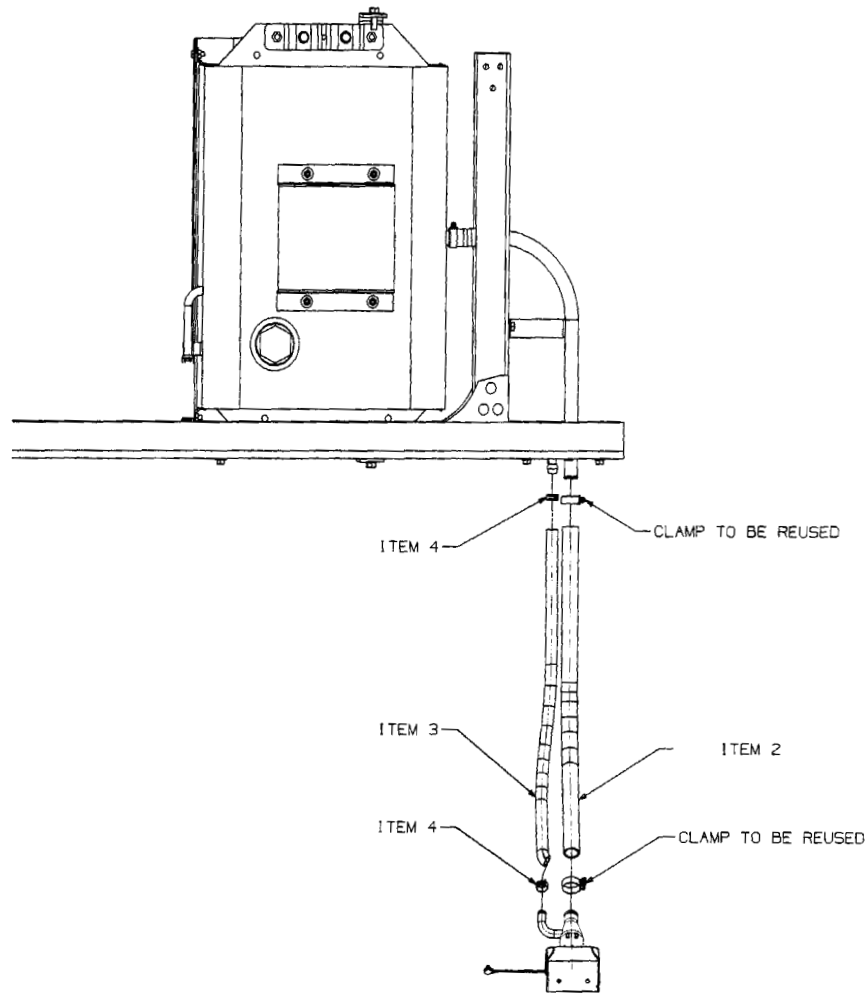
## Vehicle Specifications Index – NPR/W3500, NPR-HD/W4500 – Gas – Top View Fuel Fill



## Vehicle Specifications Index – NPR/W3500, NPR-HD/W4500 – Gas – Through the Rail Fuel Fill Frame Hole



## Vehicle Specifications Index – NPR/W3500, NPR-HD/W4500 – Gas – Fuel Fill Parts Illustration



# 2009 GM/Isuzu TRUCK

## Vehicle Specifications Index – NPR/W3500, NPR-HD/W4500 – Gas – Fuel Fill Parts List

Number	Description	Part Number – Isuzu	Part Number – GM	Quantity
		<b>PARTS</b>		
2	Hose, Fuel Filler	897378-5370	97378537	1
3	Hose, Breather	897378-5360	97378536	1
4	Clamp, Rubber Hose	815699-8250	15699825	2

## **AUXILIARY DRAWING**



## **AUXILIARY DRAWING**

# 2009 GM/Isuzu TRUCK

## Vehicle Specifications Index – NPR/W3500, NPR-HD/W4500 – Crew Cab – Gas – Specifications

Model	NPR GAS/W3500 GAS	NPR HD GAS/W4500 GAS
GVWR	12,000 lb	14,500 lbs.
WB	150 in, 176 in.	
Engine	GMPT 8-cylinder, V Block 4-cycle, OHV, water cooled, Sequential Port Fuel Injection	
Model/Displacement	GMPT-V8/365 CID (6.0 liters)	
HP (Gross)	325 HP @ 5000 rpm	
Torque (Gross)	360 lb-ft torque @ 4400 rpm	
Equipment	Sequential Port Fuel Injection (SFI), mass air flow meter, powertrain control module (PCM), onboard diagnostics, oxygen sensors, catalytic convertor, map sensor, with external oil cooler, engine cruise control.	
Transmission	4L80-E Hydra-Matic 4-speed automatic with lock-up converter and overdrive. No PTO opening	
Steering	Integral power steering 18.8-20.9:1 ratio. Tilt and telescoping steering column.	
Front Axle	Reverse Elliot "I"-Beam rated at 6,380 lbs.	
Suspension	Semi-elliptical steel alloy tapered leaf springs with stabilizer bar and shock absorbers.	
GAWR	4,700 lbs.	5,360 lbs.
Rear Axle	Full-floating single speed with hypoid gearing rated at 11,020 lb.	
Suspension	Semi-elliptical steel alloy multi-leaf springs and shock absorbers.	
GAWR	7,950 lbs.	9,880 lbs.
Wheels	16 x 6.0	19.5 x 6.0
Tires	215/85R 16-E (10 pr)	225/70R-19.5F (12 ply)
BRAKES	Dual circuit vacuum assisted hydraulic service brakes with EBD (Electronic Brake Distribution) system for load proportioning of the brake system front disc and self-adjust outboard mounted drum rear. The parking brake is a mechanical, cable actuated, internal expanding drum type, transmission mounted. 4 channel anti-lock brake system.	

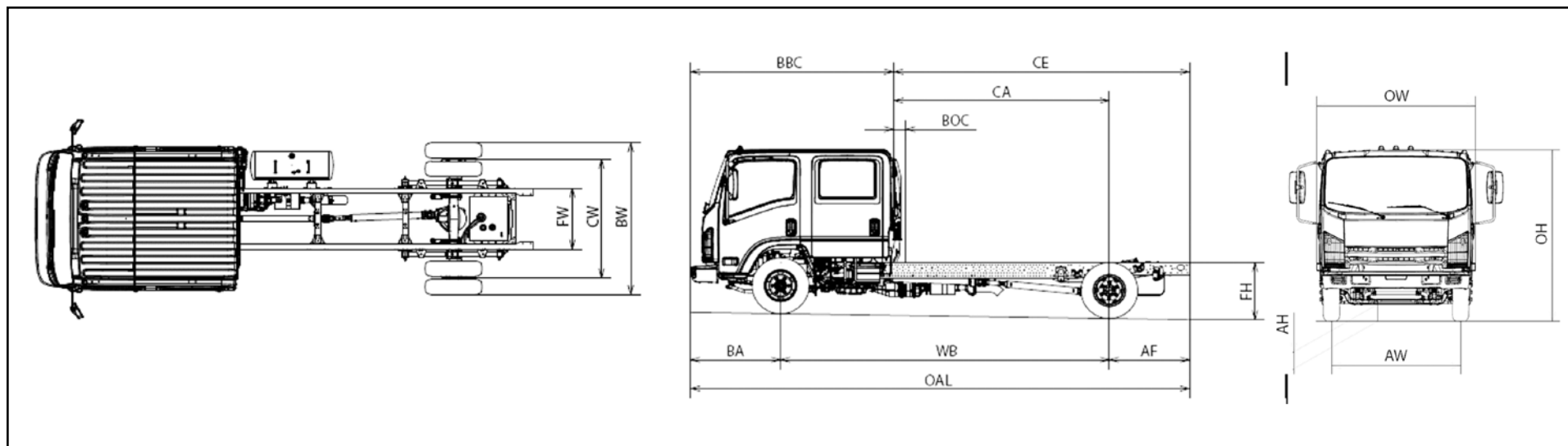
**NOTE:** These selected specifications are subject to change without notice.

## Vehicle Specifications Index – NPR/W3500, NPR-HD/W4500 – Crew Cab – Gas – Specifications

Model	NPR GAS/W3500 GAS	NPR HD GAS/W4500 GAS
Fuel Tank	30 gal. rectangular steel fuel tank. Mounted between the frame rails with electric type fuel pump (mounted in tank). Through the rail fuel fill.	
Frame	Ladder type channel section straight frame rail 33.5 inches wide through the total length of the frame. Yield strength 44,000 psi, section modulus 7.20 in <sup>3</sup> , RBM 316,800.	
Cab	All-steel, low cab forward BBC 109.9 in. All-steel, low cab forward 7 passenger, BBC 109.9 in.	
Equipment	TRICOT and JERSEY KNIT combination cloth covered high back driver's seat with two-occupant passenger seat. Four passenger rear bench seat. Dual cab mounted exterior mirrors with integral convex mirror.	
Electrical	Tilt and telescoping steering column. Power windows and door locks, front floor mats, tinted glass. 12-volt, negative ground, dual Delco maintenance free batteries, 750 CCA each, 145-Amp alternator with integral regulator.	
Options	AM/FM CD stereo radio, spare wheel, wheel simulators, back up alarm, mirror brackets for 102" wide body, fire extinguisher and triangle kit mounted under rear seat, heated mirrors, and chrome grille.	

**NOTE:** These selected specifications are subject to change without notice.

## Vehicle Weights, Dimensions & Ratings



# 2009 GM/Isuzu TRUCK

## Vehicle Specifications Index – NPR/W3500, NPR-HD/W4500 – Crew Cab – Gas – Specifications

NPR/W3500 Variable Chassis Dimensions					
Unit	WB	CA*	CE*	OAL	AF
Inch	150.0	88.5	131.6	241.5	43.1
Inch	176.0	114.5	157.6	267.5	43.1

\*Effective CA & CE are CA or CE less BOC.

NPR/W3500 Dimension Constants					
Code	Inches	Code	Inches	Code	Inches
AH	7.5	BW	83.3	FH	31.8
AW	65.6	CW	65.0		
BA	48.4	FW	33.5		
BBC	109.9	OH	90.0		
BOC	5.0	OW	81.4		

NPR /W3500 In-Frame Tank 12,000-lb. Automatic Transmission Model Chassis Cab and Maximum Payload Weights						
Model	WB	Unit	Front	Rear	Total	Payload
HB3	150	LB.	3776	1980	5756	6244
HB4	176	LB.	3852	1959	5811	6189

# 2009 GM/Isuzu TRUCK

## Vehicle Specifications Index – NPR/W3500, NPR-HD/W4500 – Crew Cab – Gas – Specifications

NPR-HD / W4500 Variable Chassis Dimensions					
Unit	WB	CA*	CE*	OAL	AF
Inch	150.0	88.5	131.6	241.5	43.1
Inch	176.0	114.5	157.6	267.5	43.1

\*Effective CA & CE are CA or CE less BOC.

NPR-HD / W4500 Dimension Constants					
Code	Inches	Code	Inches	Code	Inches
AH	8.3	BW	83.3	FH	33.0
AW	65.6	CW	65.0		
BA	48.4	FW	33.5		
BBC	109.9	OH	91.1		
BOC	5.0	OW	81.4		

In Frame Tank 14,500-lb. GVWR Automatic Transmission Model Chassis Cab and Maximum Payload Weights						
Model	WB	Unit	Front	Rear	Total	Payload
HE3	150	LB.	3794	2021	5815	8185
HE4	176	LB.	3865	1996	5861	8139

## Vehicle Specifications Index – NPR/W3500, NPR-HD/W4500 – Crew Cab – Gas – Specifications

### Vehicle Weight Limits:

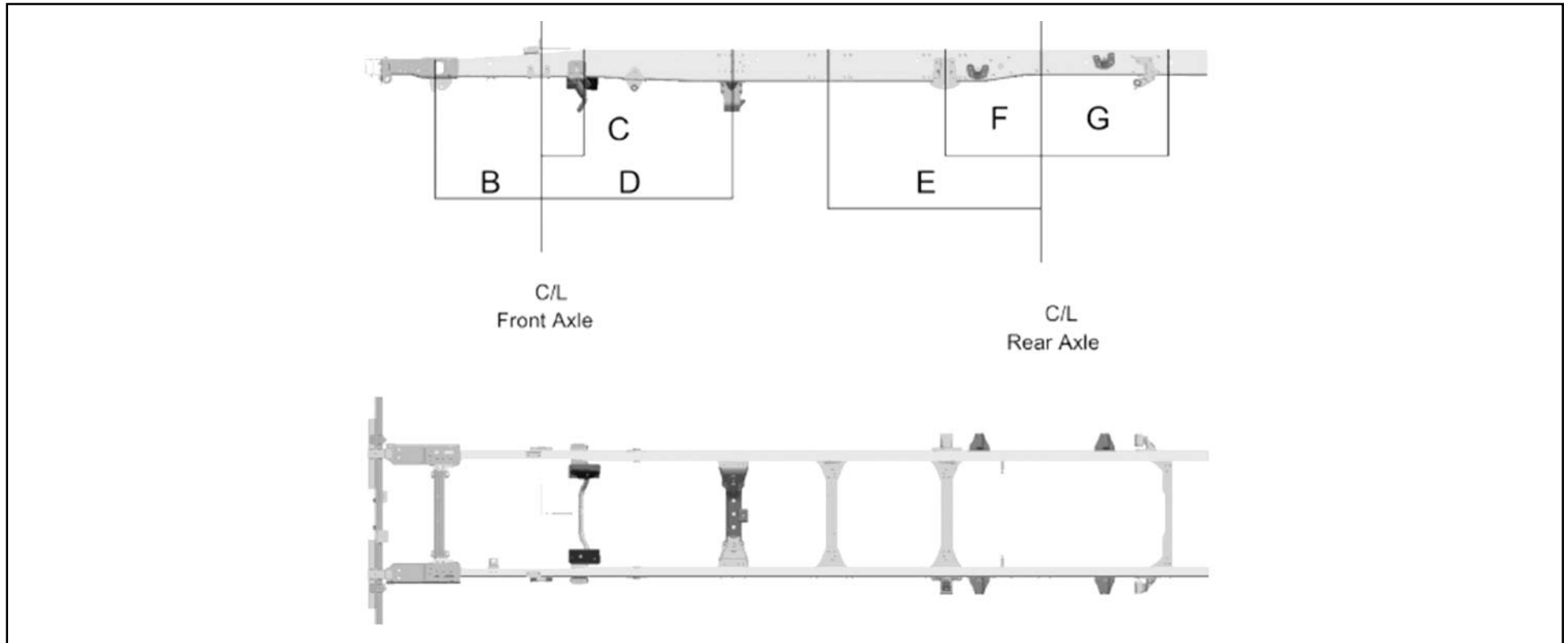
	NPR / W3500	NPR-HD / W4500
GVWR Designed Maximum	12,000 lbs.	14,500 lbs.
GAWR, Front	4,700 lbs.	5,360 lbs.
GAWR, Rear	7,950 lbs.	9,880 lbs.

### Technical Notes:

**Chassis Curb Weight** includes standard equipment and fuel. Does not include driver, passenger, payload, body or special equipment.

**Maximum Payload Weight** is the allowed maximum for equipment, body, payload, driver and passengers and is calculated by subtracting chassis curb weight from the GVWR.

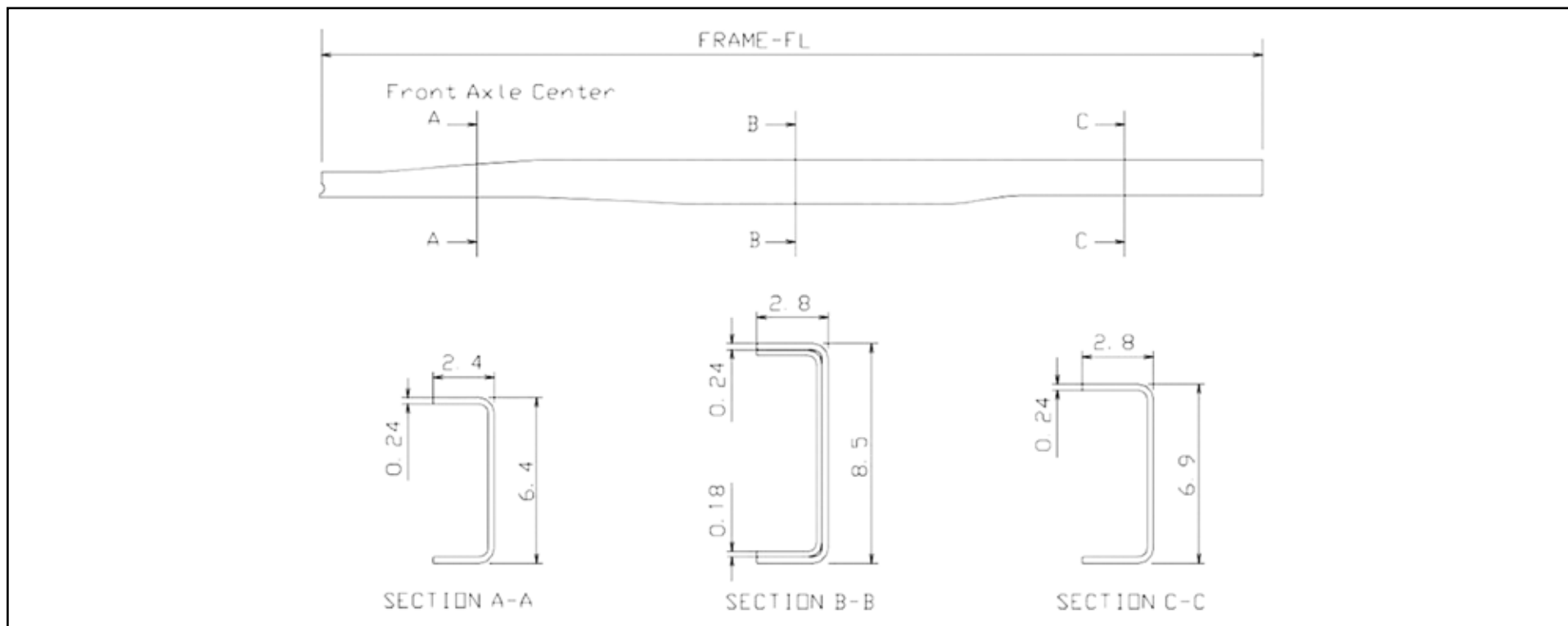
## Vehicle Specifications Index – NPR/W3500, NPR-HD/W4500 – Crew Cab – Gas – Frame & Crossmember Specifications



Wheelbase	Frame Thick	Crossmember Type/Location					
		B	C-A/T	D-A/T	E	F	G
150.0	0.24	28.3	7.9	AA 46.5	BB 57.9	CC 24.2	DD 33.8
176.0	0.24	28.3	7.9	AA 46.5	BB 74.4	CC 24.2	DD 33.8

A/T = Automatic Transmission

## Vehicle Specifications Index – NPR/W3500, NPR-HD/W4500 – Crew Cab – Gas – Frame Chart



Wheelbase	Frame FL	Frame Thickness
150.0	223.8	0.24 + 0.18
176.0	249.8	0.24 + 0.18

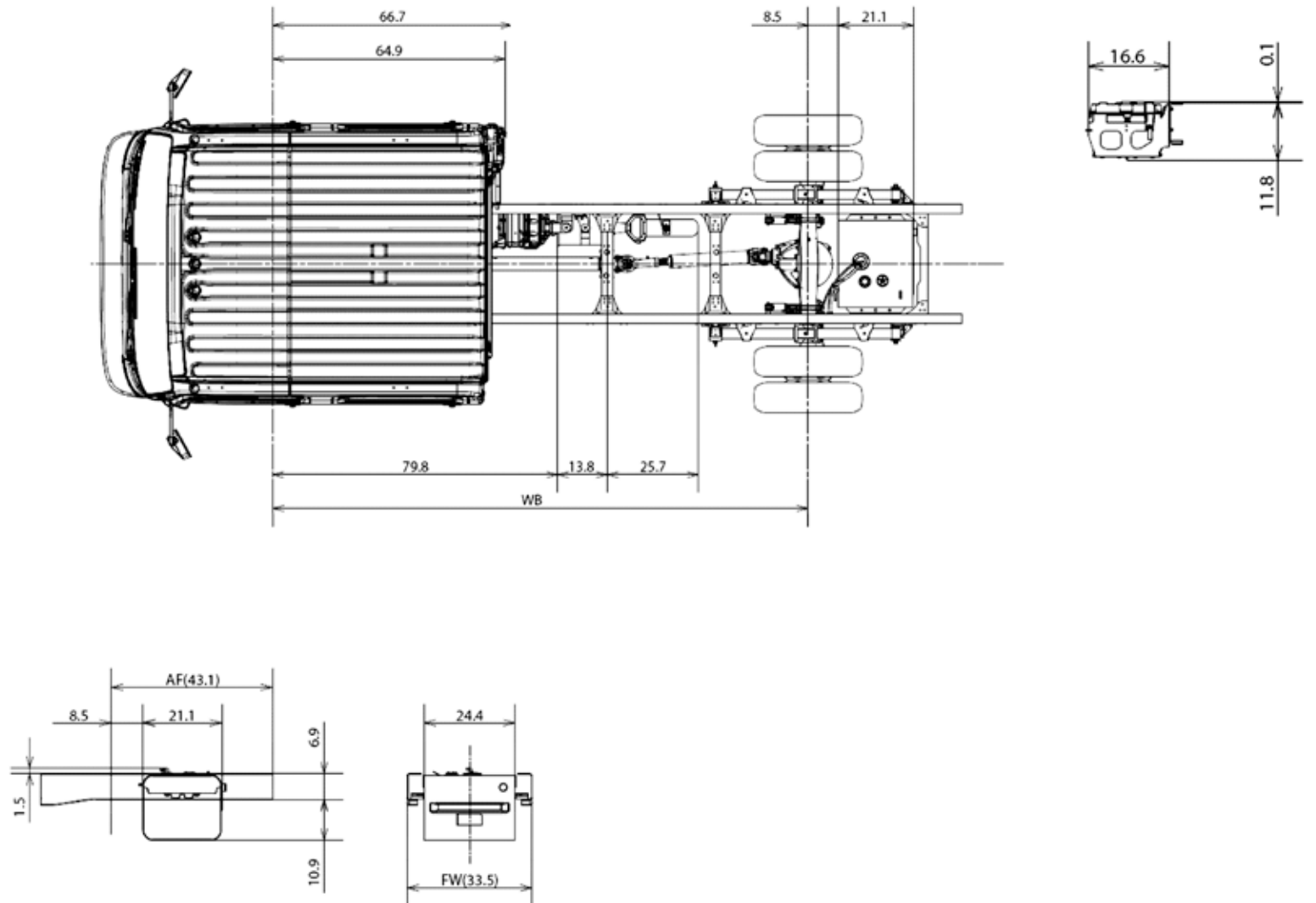
**Note:** On this model chassis, ICTA will require that the body installed on the chassis have an understructure manufactured with any of the following structural steel “C” channels: 4” x 1-5/8”, 7.5 lb./ft.; 5” x 1-3/4”, 6, 7 or 9.0 lb./ft.; 6” x 2”, 8.2, 10.5 or 13 lb./ft.



# 2009 GM/Isuzu TRUCK

PAGE 122

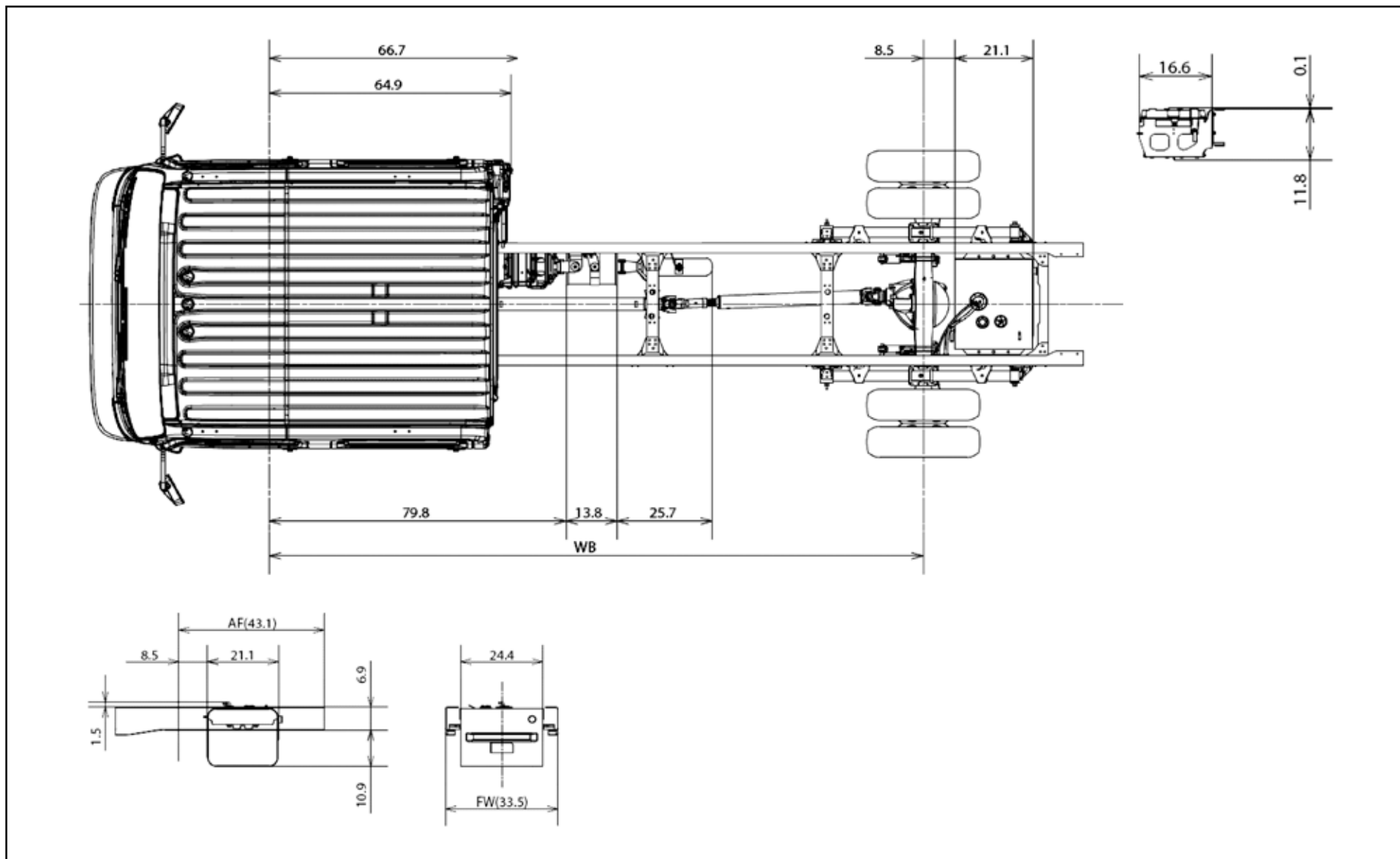
## Vehicle Specifications Index – NPR/W3500, NPR-HD/W4500 – Crew Cab – Gas – Auxiliary Views 150" Wheelbase



# 2009 GM/Isuzu TRUCK

PAGE 123

## Vehicle Specifications Index – NPR/W3500, NPR-HD/W4500 – Crew Cab – Gas – Auxiliary Views 176" Wheelbase



## Vehicle Specifications Index – NPR/W3500, NPR-HD/W4500 – Crew Cab – Gas – Body Builder Weight Information Chart

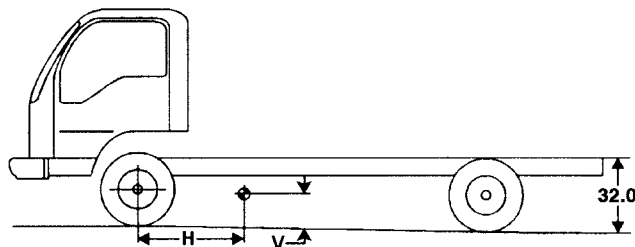
### NPR/W3500 GAS CREW CAB AUTOMATIC TRANSMISSION

GVWR	AXLE	Body Builder Weight Information Chart		UNSPRUNG WEIGHT
		Wheelbase		
		150	176	
		in frame tank	in frame tank	
12,000	FRONT	3876	3939	573
	REAR	1920	1912	871
	TOTAL	5796	5851	1444

### Center of Gravity

### NPR/W3500 GAS CREW CAB

GVWR	WB	V	H Auto. Trans. IN FRAME TANK
12,000	150	25.9	50.9
	176	28.8	58.7



V = Vertical Center of Gravity  
H = Horizontal Center of Gravity

The center of gravity of the completed vehicle with a full load should not exceed **63** inches above ground level for the **12,000** lb. GVWR, and must be located horizontally between the centerlines of the front and rear axles.

**NOTE:** The maximum dimensions for a body installed on the NPR / W3500 are 102 inches wide (outside)wide with 102" wide mirror brackets by 90 inches high (inside). Any larger body applications must be approved by Isuzu Commercial Trucks of America Application Engineering. In the West Coast call 1-562-229-5314 and in the East Coast call 1-770-740-1620 X262.

## Vehicle Specifications Index – NPR/W3500, NPR-HD/W4500 – Crew Cab – Gas – Body Builder Weight Information Chart

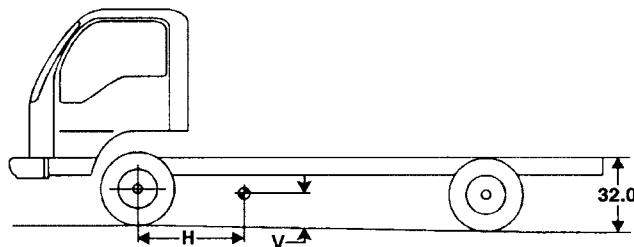
### NPR-HD/W4500 GAS CREW CAB AUTOMATIC TRANSMISSION

GVWR	AXLE	Body Builder Weight Information Chart		UNSPRUNG WEIGHT
		Wheelbase		
		150	176	
		in frame tank	in frame tank	
12,000	FRONT	3858	3927	705
	REAR	1962	1948	1135
	TOTAL	5820	5875	1840

### Center of Gravity

#### NPR-HD/W4500 GAS CREW CAB

GVWR	WB	V	H Auto. Trans. IN FRAME TANK
12,000	150	26.9	53.4
	176	26.9	61.8

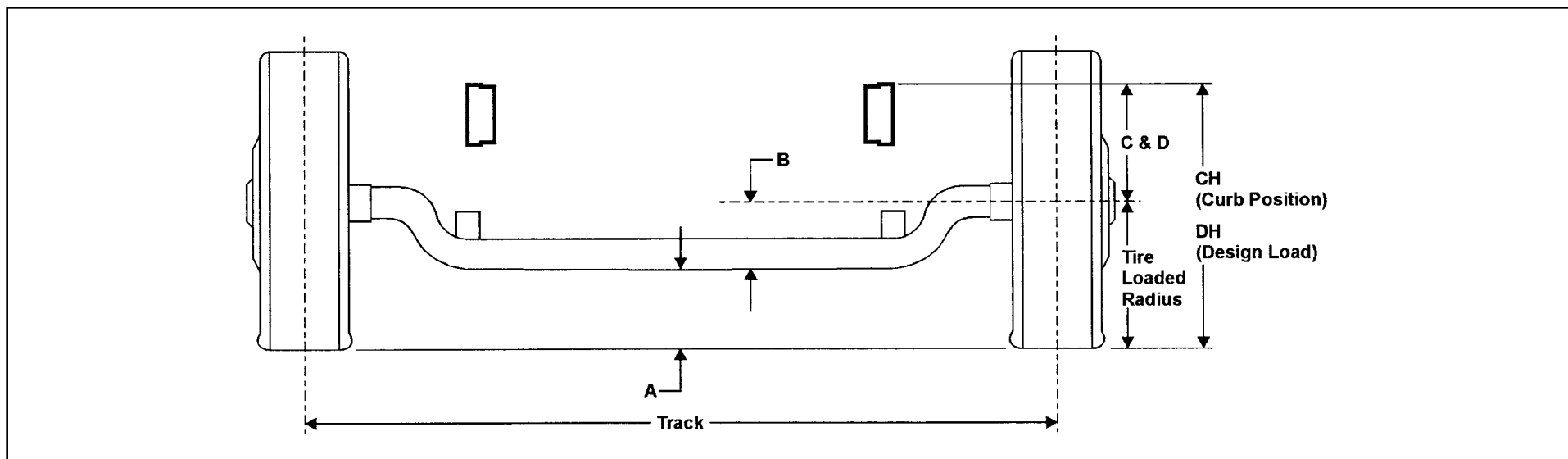


V = Vertical Center of Gravity  
H = Horizontal Center of Gravity

The center of gravity of the completed vehicle with a full load should not exceed 63 inches above ground level for the 14,500 lb. GVWR, and must be located horizontally between the centerlines of the front and rear axles.

**NOTE:** The maximum dimensions for a body installed on the NPR-HD / W4500 are 102 inches wide (outside) with 102" wide mirror brackets by 90 inches high (inside). Any larger body applications must be approved by Isuzu Commercial Trucks of America Application Engineering. In the West Coast call 1-562-229-5314 and in the East Coast call 1-770-740-1620 X262.

## Vehicle Specifications Index – NPR/W3500 – Crew Cab – Gas Front Axle Chart

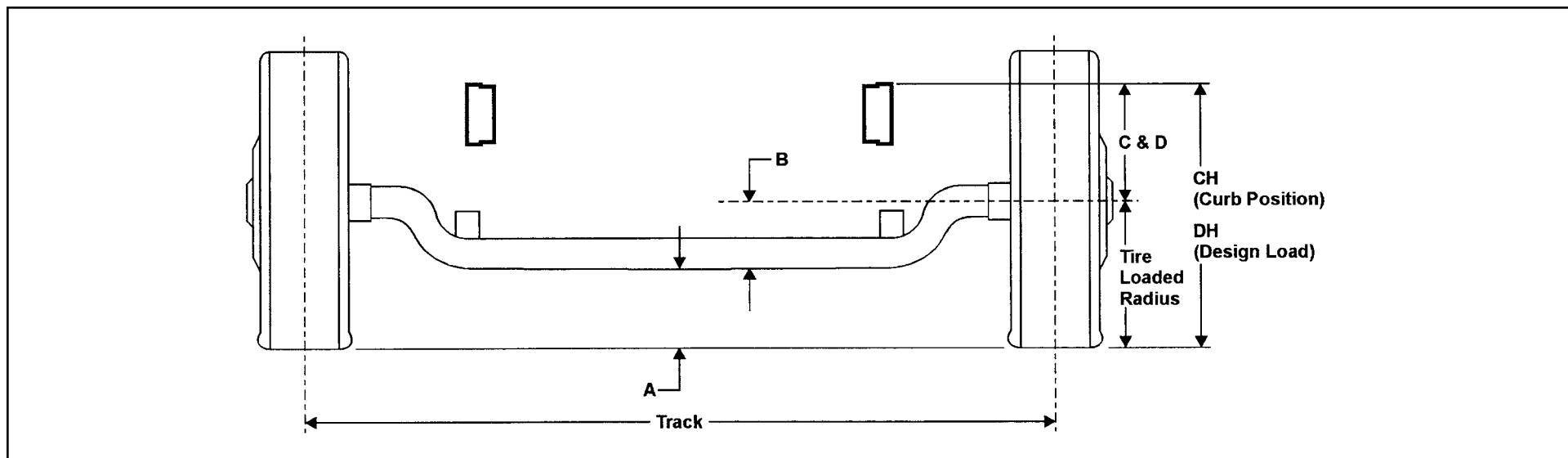


Formulas for calculating height dimensions:

- A = Tire Loaded Radius – B
- C = Centerline of Axle to Top of Frame Rail at Curb Position
- D = Centerline of Axle to Top of Frame Rail at Design Load
- CH = C + Tire Unloaded Radius
- DH = D + Tire Loaded Radius

Tire	GVWR	GAWR	A	B	C	D	CH	DH	Track	Tire Radius	
										Unload	Load
215/85R 16-E	12,000 lbs.	4,700 lbs.	7.5	6.6	12.9	12.2	27.5	26.3	65.5	14.6	14.1

## Vehicle Specifications Index – NPR-HD/W3500 – Crew Cab – Gas Front Axle Chart

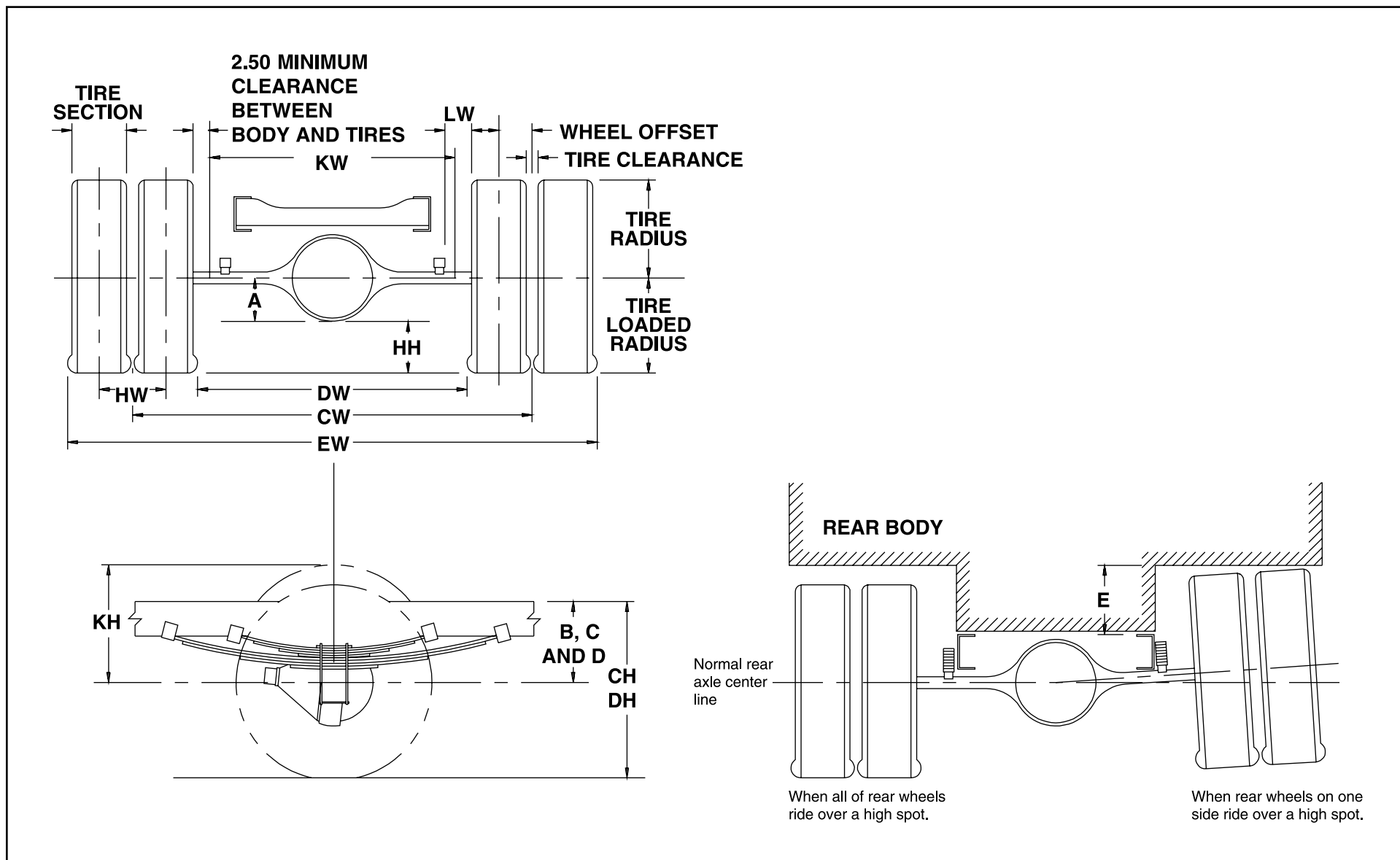


Formulas for calculating height dimensions:

- A = Tire Loaded Radius – B
- C = Centerline of Axle to Top of Frame Rail at Curb Position
- D = Centerline of Axle to Top of Frame Rail at Design Load
- CH = C + Tire Unloaded Radius
- DH = D + Tire Loaded Radius

Tire	GVWR	GAWR	A	B	C	D	CH	DH	Track	Tire Radius	
										Unload	Load
215/85R 16-E	14,500 lbs.	5,360 lbs.	8.3	6.6	13.0	11.5	29.0	26.4	65.5	16.0	14.93

## Vehicle Specifications Index – NPR/W3500 – Crew Cab – Gas Rear Axle Chart



## Vehicle Specifications Index – NPR/W3500 Crew Cab – Gas – Rear Axle Chart

Definitions			
A	Centerline of axle to bottom of axle bowl.	DH	Rear Frame Height: Vertical distance between the normal top of frame rail and the ground-line through the centerline of the rear axle at design load.
B	Centerline of axle to top of frame rail at metal-to-metal position.	DW	Minimum distance between the inner surfaces of the rear tires.
C	Centerline of axle to top of frame rail at curb position.	EW	Maximum Rear Width: Overall width of the vehicle measured at the outermost surface of the rear tires.
D	Centerline of axle to top of frame rail at design load.	HH	Rear Tire Clearance: Minimum clearance between the rear axle and the ground-line.
E	Rear Tire Clearance: Minimum clearance required for tires and chain measured from the top of the frame at the vehicle centerline of the rear axle, when rear wheels on one side ride over a high spot.	HW	Dual Tire Spacing: Distance between the centerlines of the minimum distance required for tire bounce as measured from the centerline of the rear axle and the top of the rear tire when one wheel rides over a high spot.
CH	Rear Frame Height: Vertical distance between the normal top of frame rail and the ground-line through the centerline of the rear axle at curb position.	CW	Track Dual Rear Wheel Vehicle: Distance between the centerlines of the dual wheels measured at the ground-line.
Tire Section, Tire Radius, Tire Loaded Radius, Tire Clearance		See Chart for values.	

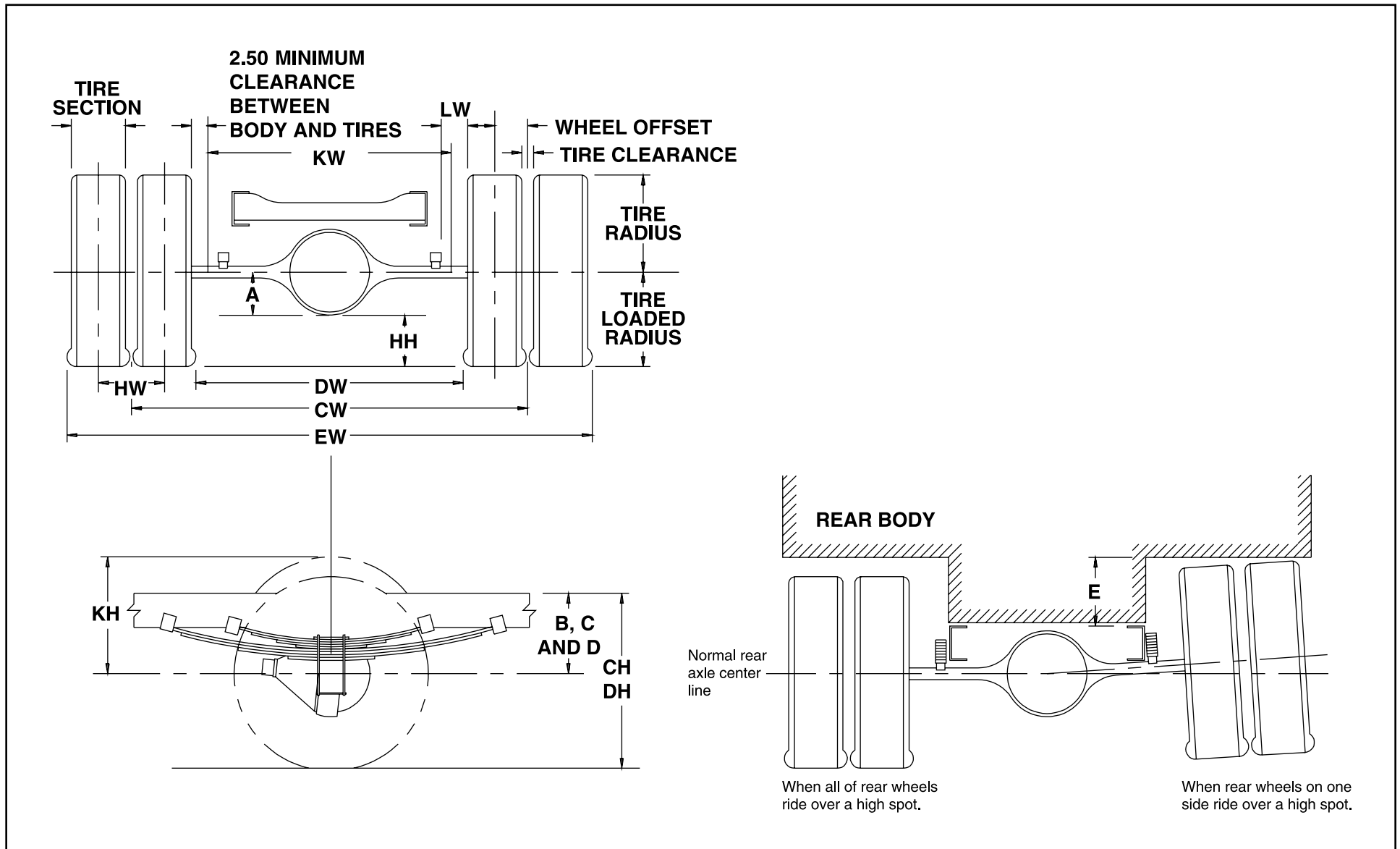
Formulas for Calculating Rear Width and Height Dimensions			
CW	= Track	HH	= Tire loaded radius – A
CH	= Tire loaded radius + C	JH	= KH – B
DH	= Tire loaded radius + D	KH	= Tire radius + 3.00 inches
DW	= Track + 2 tire sections – tire clearance	KW	= DW – 5.00 inches
EW	= Track + 2 tire sections + tire clearance	LW	= 1.00-inch minimum clearance between tires and springs

**NOTE:** Track and overall width may vary with optional equipment.

Tire	GAWR	Track CW	A	B	C	D	E
215/85R 16-E	7,950 lbs.	65.0	6.5	9.3	15.4	13.0	7.8



### Rear Axle Chart



## Vehicle Specifications Index – NPR-HD/W4500 Crew Cab – Gas – Rear Axle Chart

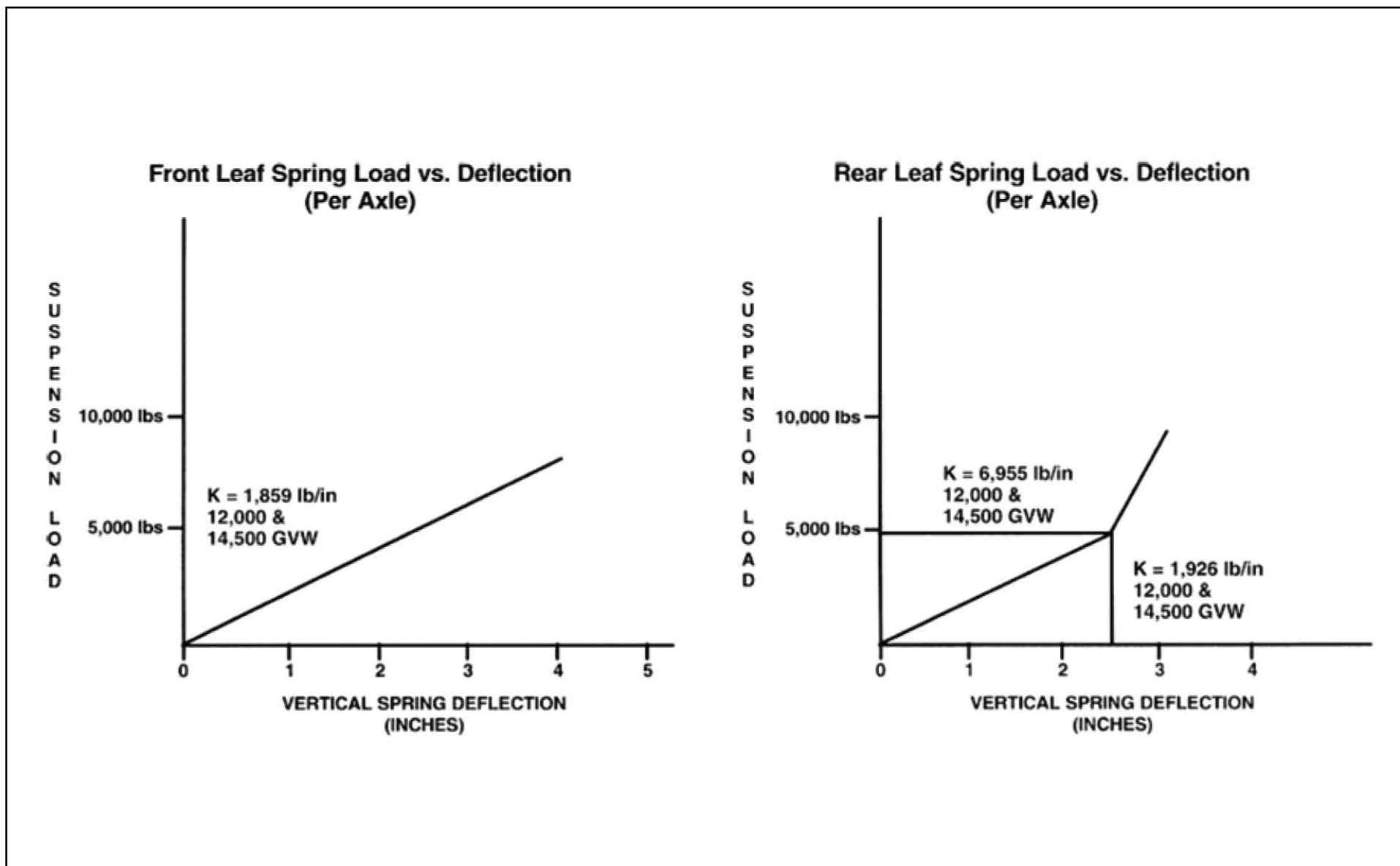
Definitions			
A	Centerline of axle to bottom of axle bowl.	DH	Rear Frame Height: Vertical distance between the normal top of frame rail and the ground-line through the centerline of the rear axle at design load.
B	Centerline of axle to top of frame rail at metal-to-metal position.	DW	Minimum distance between the inner surfaces of the rear tires.
C	Centerline of axle to top of frame rail at curb position.	EW	Maximum Rear Width: Overall width of the vehicle measured at the outermost surface of the rear tires.
D	Centerline of axle to top of frame rail at design load.	HH	Rear Tire Clearance: Minimum clearance between the rear axle and the ground-line.
E	Rear Tire Clearance: Minimum clearance required for tires and chain measured from the top of the frame at the vehicle centerline of the rear axle, when rear wheels on one side ride over a high spot.	HW	Dual Tire Spacing: Distance between the centerlines of the minimum distance required for tire bounce as measured from the centerline of the rear axle and the top of the rear tire when one wheel rides over a high spot.
CH	Rear Frame Height: Vertical distance between the normal top of frame rail and the ground-line through the centerline of the rear axle at curb position.	CW	Track Dual Rear Wheel Vehicle: Distance between the centerlines of the dual wheels measured at the ground-line.
Tire Section, Tire Radius, Tire Loaded Radius, Tire Clearance		See Chart for values.	

Formulas for Calculating Rear Width and Height Dimensions			
CW	= Track	HH	= Tire loaded radius – A
CH	= Tire loaded radius + C	JH	= KH – B
DH	= Tire loaded radius + D	KH	= Tire radius + 3.00 inches
DW	= Track + 2 tire sections – tire clearance	KW	= DW – 5.00 inches
EW	= Track + 2 tire sections + tire clearance	LW	= 1.00-inch minimum clearance between tires and springs

**NOTE:** Track and overall width may vary with optional equipment.

Tire	GAWR	Track CW	A	B	C	D	E
225/70R 19.5-F	9,880 lbs.	65.0	7.7	9.3	15.6	13.4	8.4

## Vehicle Specifications Index – NPR/W3500 Gas, NPR-HD/W4500 – Crew Cab – Gas – Suspension Deflection Charts



## Vehicle Specifications Index – NPR/W3500 – Crew Cab – Gas – Tire & Disc Wheel Chart

### **Tire**

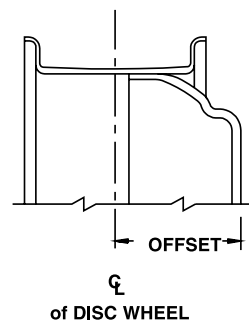
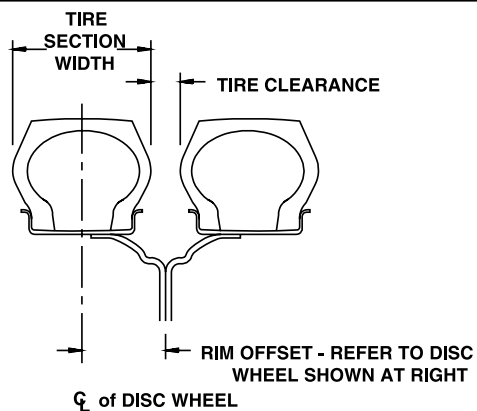
Tire Size	Tire Load Limit and Cold Inflation Pressures				Maximum Tire Load Limits		GVWR (Lb.)
	Single		Dual		Front	Rear	
	Lb.	PSI	Lb.	PSI	2 Single	4 Dual	
215/85R 16E	2,430	70	2,210	70	4,860	8,840	12,000

Tire Size	GVWR (Lb.)	Tire Radius				Tire Section Width	Tire Clearance	Design Rim Width
		Loaded		Unloaded				
		Front	Rear	Front	Rear			
215/85R 16E	12,000	14.05	14.05	14.6	14.6	8.54	1.46	6.0

### **Disc Wheel**

Wheel Size	Bolt Holes	Bolt Circle Dia.	Ft./Rr. Nut Size*	Rear Stud Size*	Nut/Stud Torque Specs.	Inner Circle	Outside Offset	Disc Thickness	Rim Type	Material Mfg.
16.6 x 6 K	6 JIS	8.75	1.6142 (41 mm) BUD HEX	0.8268 (21 mm) SQUARE	325 ft-lb. (440 N•m)	6.46	5.0	0.35	5° DC	Steel TOPY

\*O.D. Wrench Sizes



## Vehicle Specifications Index – NPR-HD/W4500 – Crew Cab – Gas – Tire & Disc Wheel Chart

### Tire

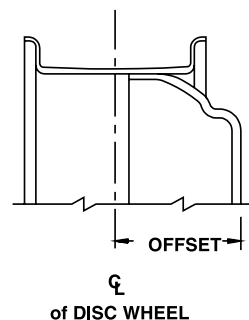
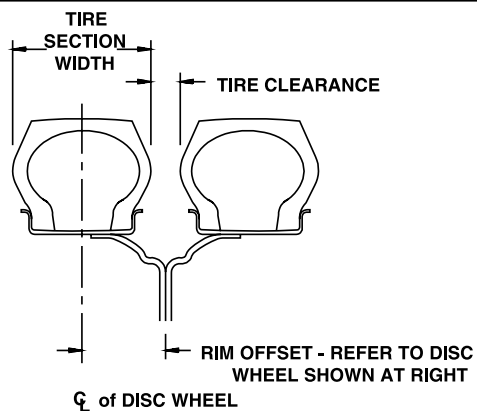
Tire Size	Tire Load Limit and Cold Inflation Pressures				Maximum Tire Load Limits		GVWR (Lb.)
	Single		Dual		Front	Rear	
	Lb.	PSI	Lb.	PSI	2 Single	4 Dual	
225/70R 19.5F	3,315	85	3,115	85	6,630	12,460	14,500

Tire Size	GVWR (Lb.)	Tire Radius				Tire Section Width	Tire Clearance	Design Rim Width
		Loaded		Unloaded				
		Front	Rear	Front	Rear			
225/70R 19.5F	14,500	15.24	15.28	16.10	15.10	8.9	1.1	6.0

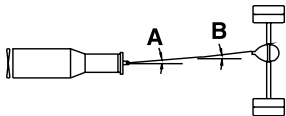
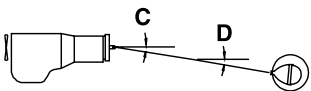
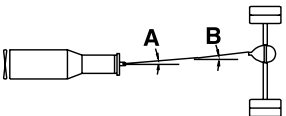
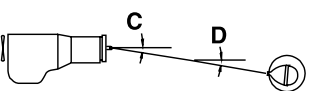
### Disc Wheel

Wheel Size	Bolt Holes	Bolt Circle Dia.	Ft./Rr. Nut Size*	Rear Stud Size*	Nut/Stud Torque Specs.	Inner Circle	Outside Offset	Disc Thickness	Rim Type	Material Mfg.
19.5 x 6.00	6 JIS	8.75	1.6142 (41 mm) BUD HEX	0.8268 (21 mm) SQUARE	325 ft-lb. (440 N•m)	6.46	5.0	0.37	15° DC	Steel TOPY

\*O.D. Wrench Sizes

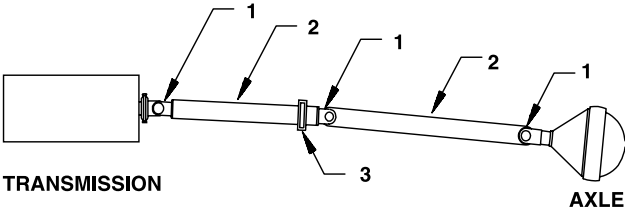


## Vehicle Specifications Index – NPR/W3500 – Crew Cab – Gas – Propeller Shaft

WB	PLANE VIEW	SIDE VIEW
150 in		
176 in		

TYPICAL INSTALLATIONS SHOWING YOKES "IN PHASE". "IN PHASE" MEANS THAT THE YOKES AT EITHER END OF A GIVEN PROPELLER SHAFT ASSEMBLY ARE IN THE SAME PLANE.

(150 and 176 in WB)

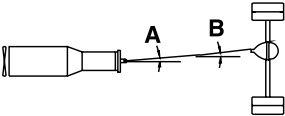
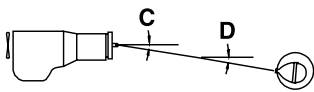
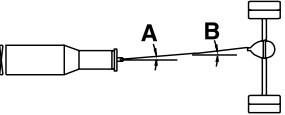
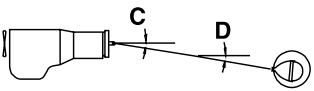


- 1. UNIVERSAL JOINT
- 2. PROPELLER SHAFT
- 3. CENTER CARRIER BEARING

Wheelbase	Plane View		Side View	
	A Auto. Trans.	B Auto. Trans.	C Auto. Trans.	D Auto. Trans.
150 in.	0°	3.3°	1.8°	1.7°
176 in.	0°	2.2°	0.4°	3.4°

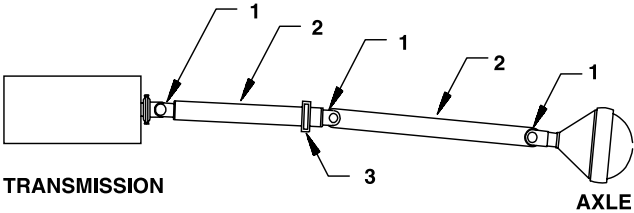
**NOTE:** All driveline angles are at unloaded condition (curb position with typical cargo body).

## Vehicle Specifications Index – NPR-HD/W4500 – Crew Cab – Gas – Propeller Shaft

WB	PLANE VIEW	SIDE VIEW
150 in		
176 in		

TYPICAL INSTALLATIONS SHOWING YOKES "IN PHASE". "IN PHASE" MEANS THAT THE YOKES AT EITHER END OF A GIVEN PROPELLER SHAFT ASSEMBLY ARE IN THE SAME PLANE.

(150 and 176 in WB)



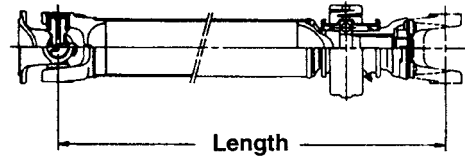
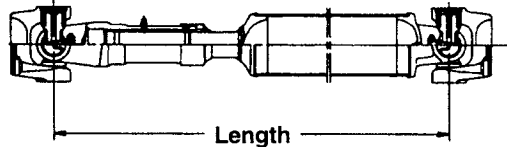
- 1. UNIVERSAL JOINT
- 2. PROPELLER SHAFT
- 3. CENTER CARRIER BEARING

Wheelbase	Plane View		Side View	
	A Auto. Trans.	B Auto. Trans.	C Auto. Trans.	D Auto. Trans.
150 in.	0°	3.3°	1.8°	1.7°
176 in.	0°	2.2°	0.4°	3.4°

**NOTE:** All driveline angles are at unloaded condition (curb position with typical cargo body).

## Vehicle Specifications Index – NPR-HD/W4500 – Crew Cab – Gas – Propeller Shaft

<b>Wheelbase</b>	<b>150</b>	<b>176</b>
<b>No. of Shafts</b>	2	2
<b>Trans. Type</b>	4 A/T	4 A/T
<b>Shaft #1 O.D.</b>	3.0	3.0
<b>Thickness</b>	0.083	0.083
<b>Length</b>	41.85	52.1
<b>Type</b>	A	A
<b>Shaft #2 O.D.</b>	3.0	3.0
<b>Thickness</b>	0.083	0.083
<b>Length</b>	33.46	49.2
<b>Type</b>	C	C

Type	Description	Illustration
Type A	1st shaft in 2-piece driveline	 <p>Length</p>
Type C	2nd shaft in 2-piece driveline	 <p>Length</p>



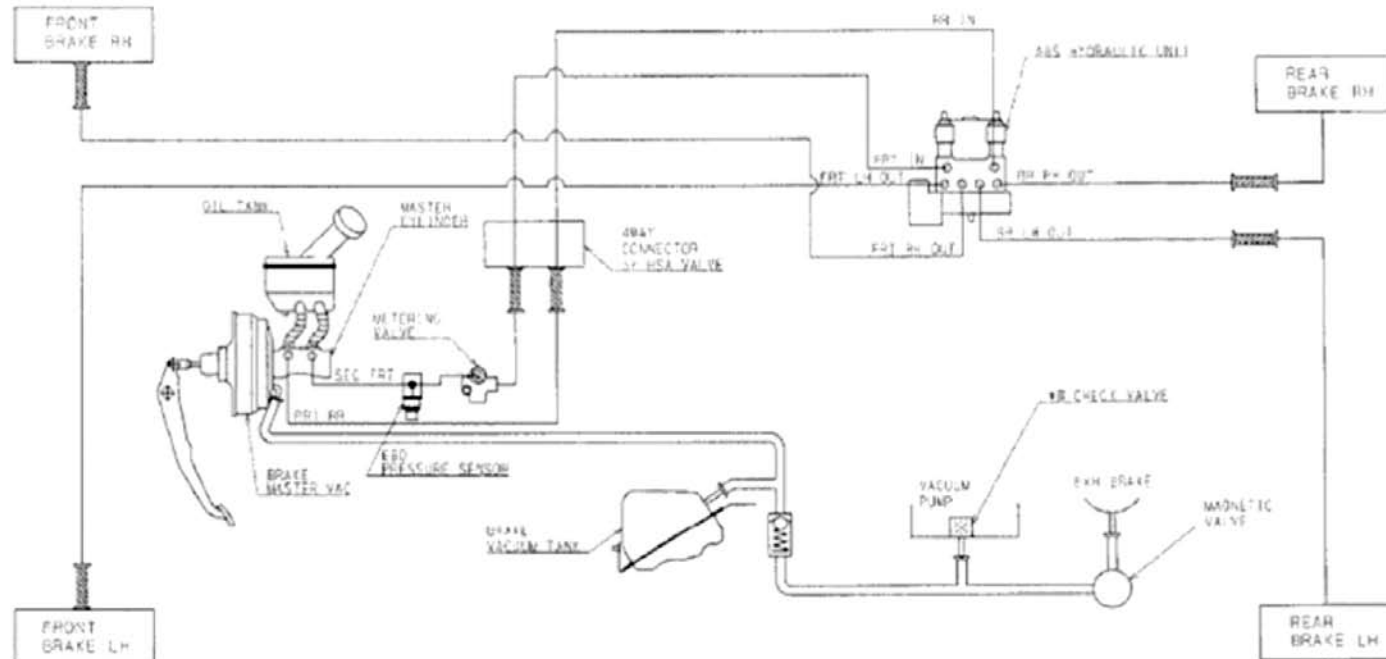
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## Vehicle Specifications Index – NPR/W3500, NPR-HD/W4500 – Crew Cab – Gas – 12,000 GVW, Brake System Diagram

### ***Vacuum Over Hydraulic***

Please refer to introduction section of book for antilock system cautions and wheelbase modification requirements.



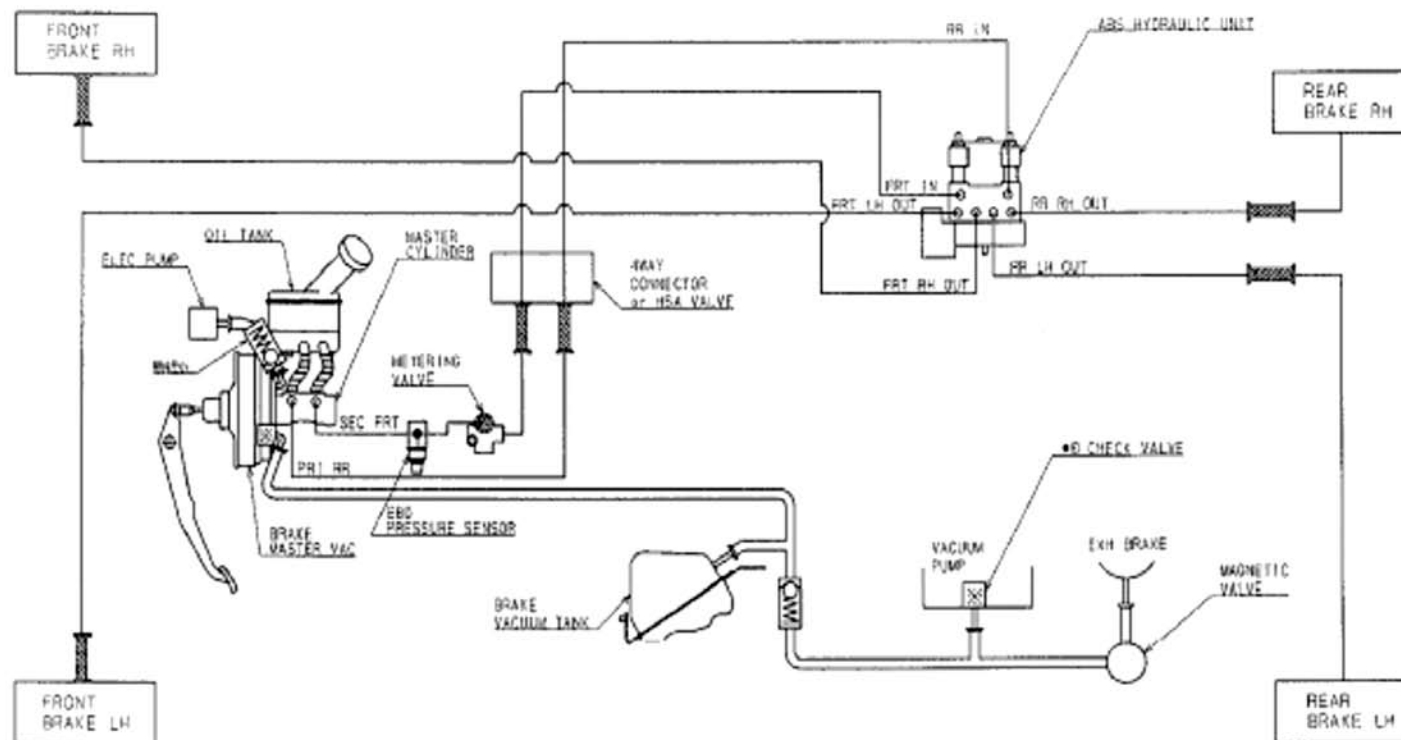
**NPR/W3500 GAS 12,000 GVW**

INDICATION					
NAME	BRAKE HOSE HIGH PRESSURE	BRAKE HOSE LOW PRESSURE	BRAKE PIPE	VACUUM LINE	CHECK VALVE (ONE WAY VALVE)

## Vehicle Specifications Index – NPR-HD/W4500 – Crew Cab – Diesel – 14,500 GVW, Brake System Diagram

### ***Vacuum Over Hydraulic***

Please refer to introduction section of book for antilock system cautions and wheelbase modification requirements.



**NPR-HD/W4500 DIESEL 14,500 GVW**

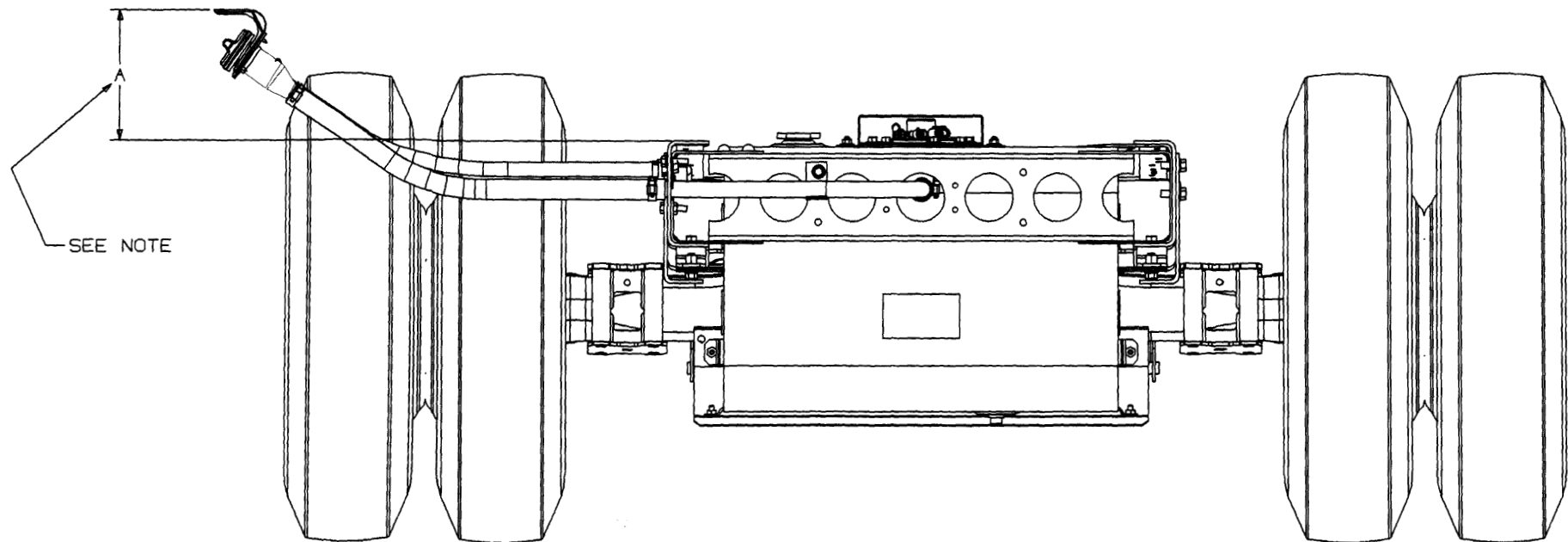
INDICATION					
NAME	BRAKE HOSE HIGH PRESSURE	BRAKE HOSE LOW PRESSURE	BRAKE PIPE	VACUUM LINE	CHECK VALVE (ONE WAY VALVE)

## Vehicle Specifications Index – NPR/W3500, NPR-HD/W4500 – Crew Cab – Gas – Through the Rail Fuel Fill

### ***Installation Instructions***

1. Disconnect battery.
2. Remove the short filler hose and the short breather hose from the breather and fuel filler pipes and the filler neck bracket assembly.
3. Filler kit hoses are designed for the 96 inch wide body width. Modify the hoses as required to fit dimension “E” of the desired body width (see page 104)
4. Install flexible filler hose (item 2) to fuel filler pipe and filler neck bracket assembly using existing screw clamps.
5. Install flexible breather hose (item 3) to fuel breather pipe and filler neck bracket assembly using new clamps (item 4)
6. The filler neck must be mounted to allow the filler neck bracket to be parallel to the frame horizontal.
7. Filler neck (Dimension A) must be between 6.85 inches and 8.85 inches above frame.
8. Secure the filler plate to the bottom of the body and check for leaks.
9. Ensure that fill hose does not sag, creating an area where the fuel could pool in the fill hose.
10. Reconnect battery.

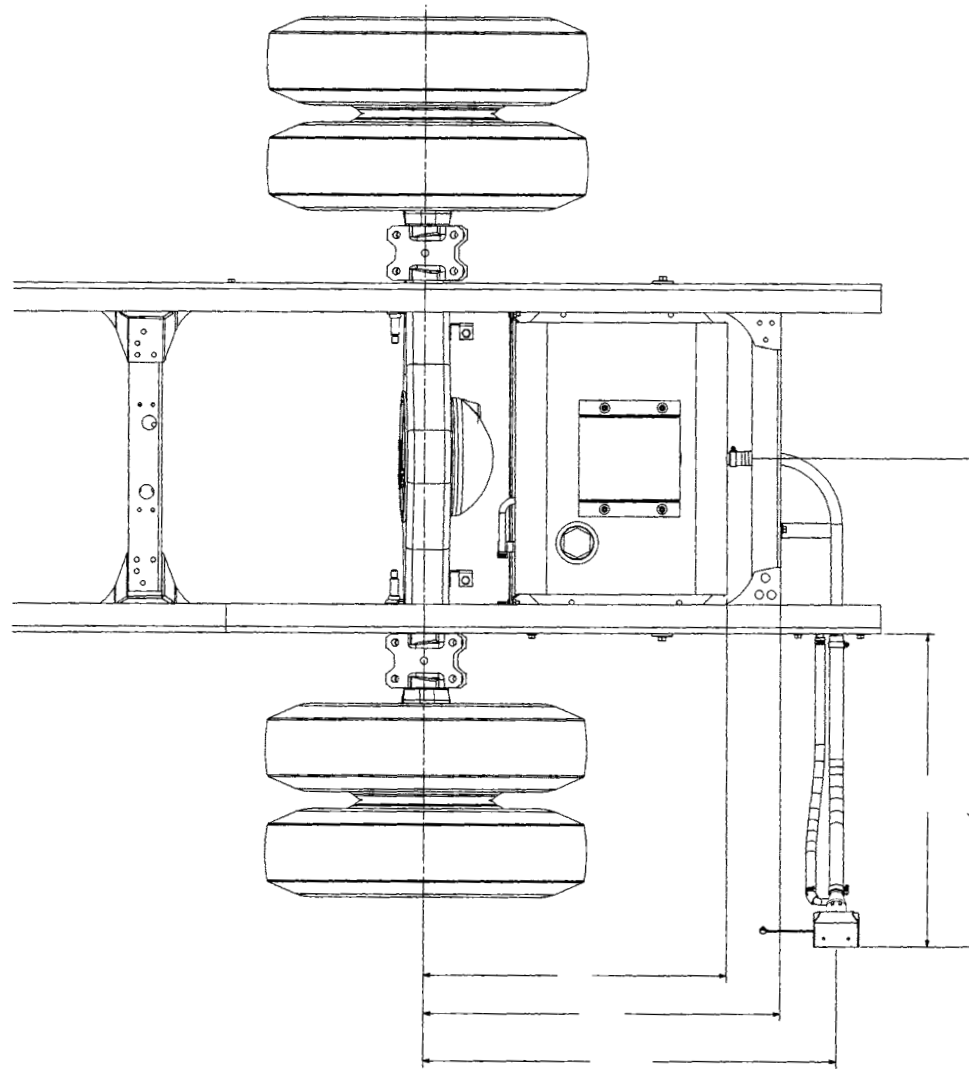
## Vehicle Specifications Index – NPR/W3500, NPR-HD/W4500 – Crew Cab – Gas – Rear View Fuel Fill



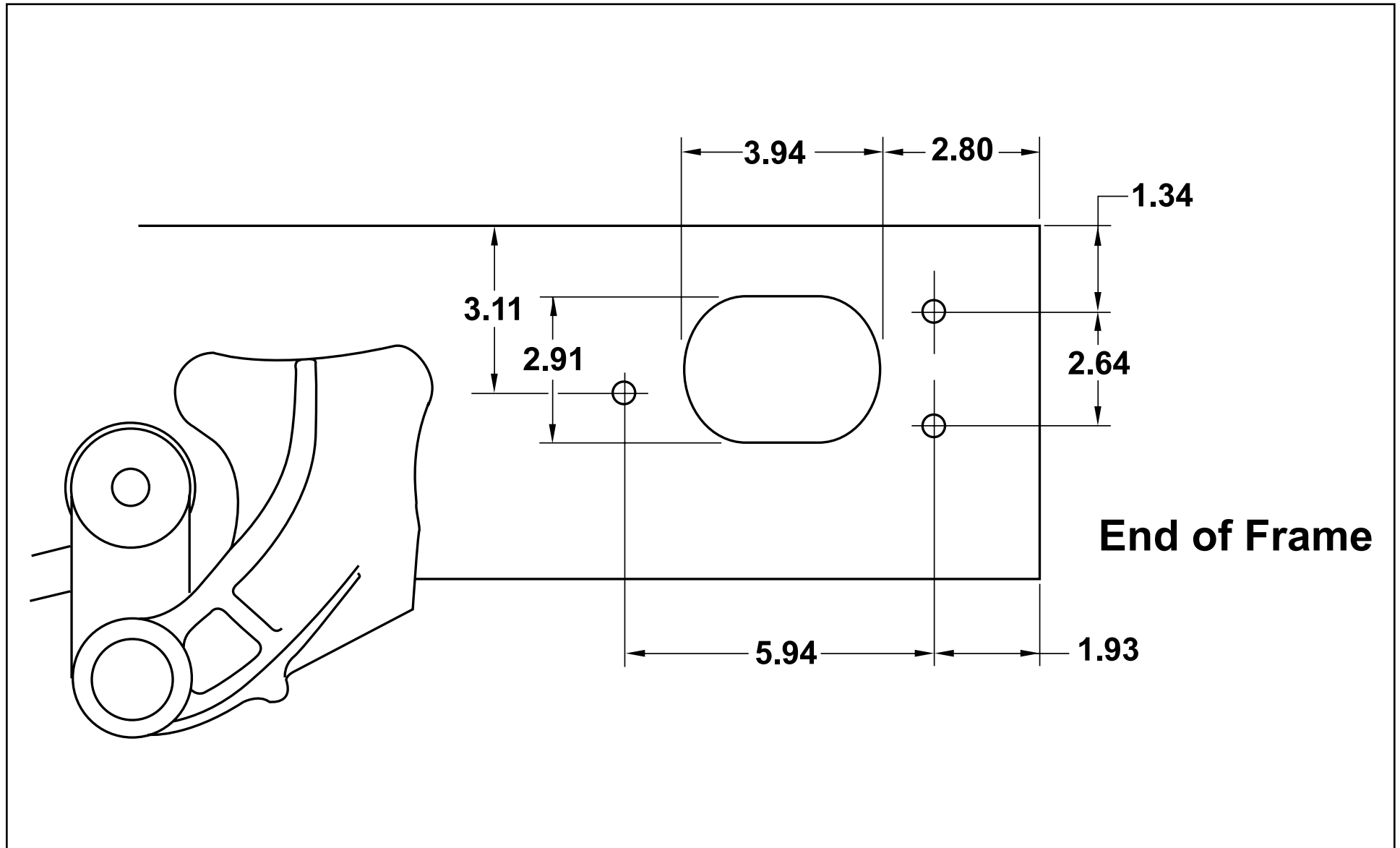
REAR VIEW FUEL FILL

Dimension A = 6.85-8.85 inches (174-216 mm)

## Vehicle Specifications Index – NPR/W3500, NPR-HD/W4500 – Crew Cab – Gas – Top View Fuel Fill

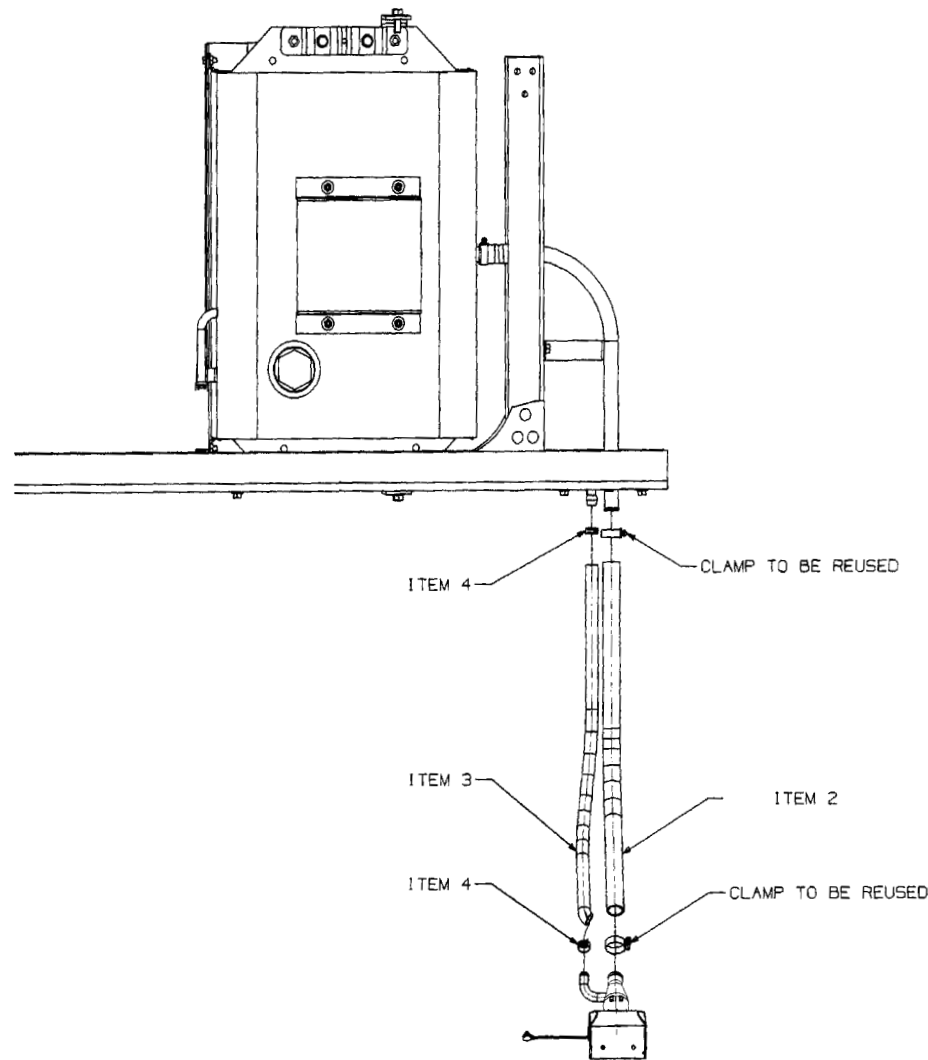


## Vehicle Specifications Index – NPR/W3500, NPR-HD/W4500 – Crew Cab – Gas – Through the Rail Fuel Fill Frame Hole





## Vehicle Specifications Index – NPR/W3500, NPR-HD/W4500 – Crew Cab – Gas – Fuel Fill Parts Illustration



# 2009 GM/Isuzu TRUCK

## Vehicle Specifications Index – NPR/W3500, NPR-HD/W4500 – Crew Cab – Gas – Fuel Fill Parts List

Number	Description	Part Number – Isuzu	Part Number – GM	Quantity
		<b>PARTS</b>		
2	Hose, Fuel Filler	897378-5370	97378537	1
3	Hose, Breather	897378-5360	97378536	1
4	Clamp, Rubber Hose	815699-8250	15699825	2

## Vehicle Specifications Index – NPR/W3500 Diesel, NPR-HD/W4500 Diesel – Specifications

Model	NPR/W3500 Diesel	NPR HD/W4500 Diesel
GVWR	14,500 lbs.	14,500 lbs.
WB	109 in., 132.5 in., 150 in., 176 in.	
Engine	Isuzu 4-cylinder, in-line 4-cycle, turbocharged, intercooled, direct injection diesel	
Model/Displacement	4HK1-TC/317 CID (5.19 liters)	
HP (Gross)	12,000/14,500 GVWR 205HP @ 2400 RPM w/ Automatic Trans	14,500 GVWR 175HP @ 2400 RPM w/ Manual Trans
Torque (Gross)	12,000/14,500 GVWR 441 lb/ft torque @ 1850 RPM w/ Automatic Trans	14,500 GVWR 387 lb/ft torque @ 1850 RPM w/ Manual Trans
Equipment	Dry element air cleaner with vertical intake; 2 rows 569 in.2 radiator; 7-blade 20.1 in. diameter fan with viscous drive. Cold weather starting device and an oil cooler. Engine oil level check switch and light. Engine warning system with audible warning for low oil pressure, high coolant temperature and low coolant level. Engine cruise control and idle up function Rear engine cover.	
Transmission	Aisin A465 6 speed automatic transmission with fifth and sixth gear overdrive with lock up in 2nd, 3rd, 4th, 5th, and 6th. PTO capability. Optional MZZ 6 speed manual transmission. (information available in manual transmission section for 14500 GVWR chassis)	
Steering	Integral power steering 18.8-20.9:1 ratio. Tilt and telescoping steering column.	
Front Axle	Reverse Elliot "I"-Beam rated at 6,380 lbs.	
Suspension	Semi-elliptical steel alloy tapered leaf springs with stabilizer bar and shock absorbers.	
GAWR	5,360 lbs.	5,360 lbs.
Rear Axle	Full-floating single speed with hypoid gearing rated at 14,550 lb.	
Suspension	Semi-elliptical steel alloy multi-leaf springs and shock absorbers.	
GAWR	8,840 lbs.	9,880 lbs.
Wheels	16 x 6.0-K 6-hole disc wheels, painted white.	
Tires	215/85R 16-E (10 pr) tubeless steel-belted radials, all-season front and rear.	
Brakes	Dual-circuit, vacuum-assisted hydraulic service brakes with EBD (Electronic Brake Distribution) system for load proportioning of the brake system front disc and self-adjust outboard mounted drum The parking brake is a mechanical, cable-actuated, internal expanding drum type, transmission mounted. The exhaust brake is standard and is vacuum-operated. 4 channel antilock brake system	

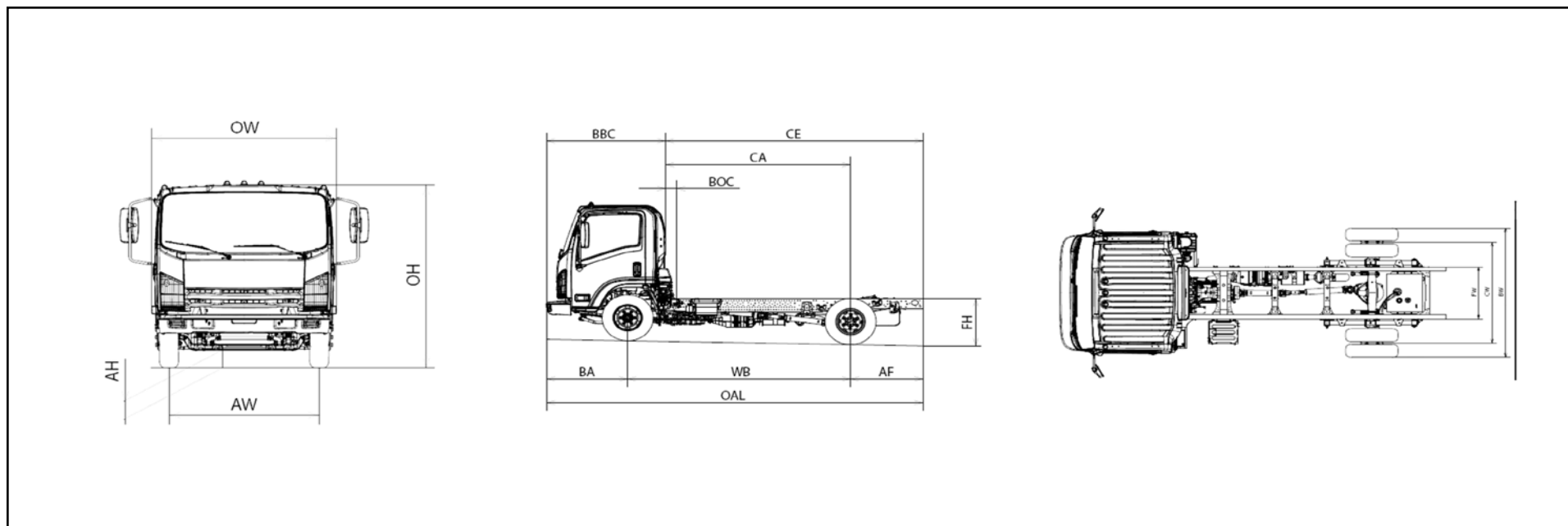
**NOTE:** These selected specifications are subject to change without notice. \*All Transmissions have a PTO gear in all wheelbases.

## Vehicle Specifications Index – NPR/W3500 Diesel, NPR-HD/W4500 Diesel – Specifications (cont'd)

Model	NPR/W3500 Diesel	NPR HD/W4500 Diesel
Fuel Tank	30-gallon rectangular steel fuel tank mounted in frame rail behind rear axle.	
Frame	Fuel water separator with dash mounted indicator light. Ladder type channel section straight frame rail 33.5 in. wide through the total length of the frame. Yield strength 44,000 psi section modulus 7.20 in. <sup>3</sup> , RBM 316,800.	
Cab	All-steel, low cab forward, BBC 70.9 in., 45° mechanical tilt with torsion assist.	
Equipment	TRICOT and JERSEY KNIT combination cloth covered high back driver's seat with two occupant passenger seat. Dual cab mounted exterior mirrors with integral convex mirror. Tilt and telescoping steering column. Power windows and door locks, floor mats, tinted glass.	
Electrical	12-volt, negative ground, dual Delco maintenance free batteries, 750 CCA each, 110-Amp alternator with integral regulator.	
Options	AM/FM CD stereo radio, engine block heater; engine oil pan heater; fuel tank mounted on right hand rail (33 gallon); spare wheel, wheel simulators air deflector, air conditioning, PTO enable switches, back up alarm, engine shutdown and hour meter, mirror brakets for 102" wide body, fire extinguisher and triangle kit mounted in rear organizer, cross rail horizontal DPF with vertical exhaust, heated mirrors, (2nd fuel tank 33 gal), Limited Slip Differential, and Chrome Grille.	

**NOTE:** These selected specifications are subject to change without notice.

## Vehicle Weights, Dimensions and Ratings



## Vehicle Specifications Index – NPR/W3500 Diesel, NPR-HD/W4500 Diesel – Specifications (cont'd)

Variable Chassis Dimensions					
Unit	WB	CA*	CE*	OAL	AF
Inch	109.0	86.5	129.6	200.5	43.1
Inch	132.5	110.0	153.1	224.0	43.1
Inch	150.0	127.5	170.6	241.5	43.1
Inch	176.0	153.5	196.6	267.5	43.1

\* Effective CA & CE are CA or CE less BOC.

Dimension Constants					
Code	Inches	Code	Inches	Code	Inches
AH	7.5	BW	83.3	FH (in frame tank)	31.8
AW	65.6	CW	65.0	FH (side tank)	32.0
BA	48.4	FW	33.5		
BBC	70.9	OH	90.0		
BOC	6.5	OW	81.4		

# 2009 GM/Isuzu TRUCK

## Vehicle Specifications Index – NPR/W3500 Diesel, NPR-HD/W4500 Diesel – Specifications (cont'd)

In-Frame Tank 12,000-lb. GVWR Automatic Transmission Model Chassis Cab and Maximum Payload Weights						
Model	WB	Unit	Front	Rear	Total	Payload
NB1	109.0 in.	lb.	3,752	1,967	5,719	6,281
NB2	132.5 in.	lb.	3,827	1,932	5,759	6,241
NB3	150.0 in.	lb.	3,876	1,920	5,796	6,204
NB4	176.0 in.	lb.	3,939	1,912	5,851	6,149

In-Frame Tank 14,500-lb. GVWR Automatic Transmission Model Chassis Cab and Maximum Payload Weights						
Model	WB	Unit	Front	Rear	Total	Payload
NF1	109.0 in.	lb.	3,704	2,004	5,708	8,792
NF2	132.5 in.	lb.	3,805	1,978	5,783	8,717
NF3	150.0 in.	lb.	3,858	1,962	5,820	8,680
NF4	176.0 in.	lb.	3,927	1,948	5,875	8,625

## Vehicle Specifications Index – NPR/W3500 Diesel, NPR-HD/W4500 Diesel – Specifications (cont'd)

Side-Mounted Tank 12,000-lb. GVWR Automatic Transmission Model Chassis Cab and Maximum Payload Weights						
Model	WB	Unit	Front	Rear	Total	Payload
NB1	109.0 in.	lb.	3,960	1,712	5,672	6,328
NB2	132.5 in.	lb.	4,015	1,733	5,748	6,252
NB3	150.0 in.	lb.	4,052	1,747	5,799	6,201
NB4	176.0 in.	lb.	4,095	1,765	5,860	6,140

Side-Mounted Tank 14,500-lb. GVWR Automatic Transmission Model Chassis Cab and Maximum Payload Weights						
Model	WB	Unit	Front	Rear	Total	Payload
NF1	109.0 in.	lb.	3,982	1,773	5,755	8,745
NF2	132.5 in.	lb.	4,043	1,788	5,831	8,669
NF3	150.0 in.	lb.	4,083	1,799	5,882	8,618
NF4	176.0 in.	lb.	4,130	1,813	5,943	8,557

# 2009 GM/Isuzu TRUCK

## Vehicle Specifications Index – NPR/W3500 Diesel, NPR-HD/W4500 Diesel – Specifications (cont'd)

### Vehicle Weight Limits:

#### GVWR

Designed Maximum	12,000 lbs.	14,500 lbs.
GAWR, Front	5,360 lbs.	5,360 lbs.
GAWR, Rear	8,440 lbs.	9,880 lbs.

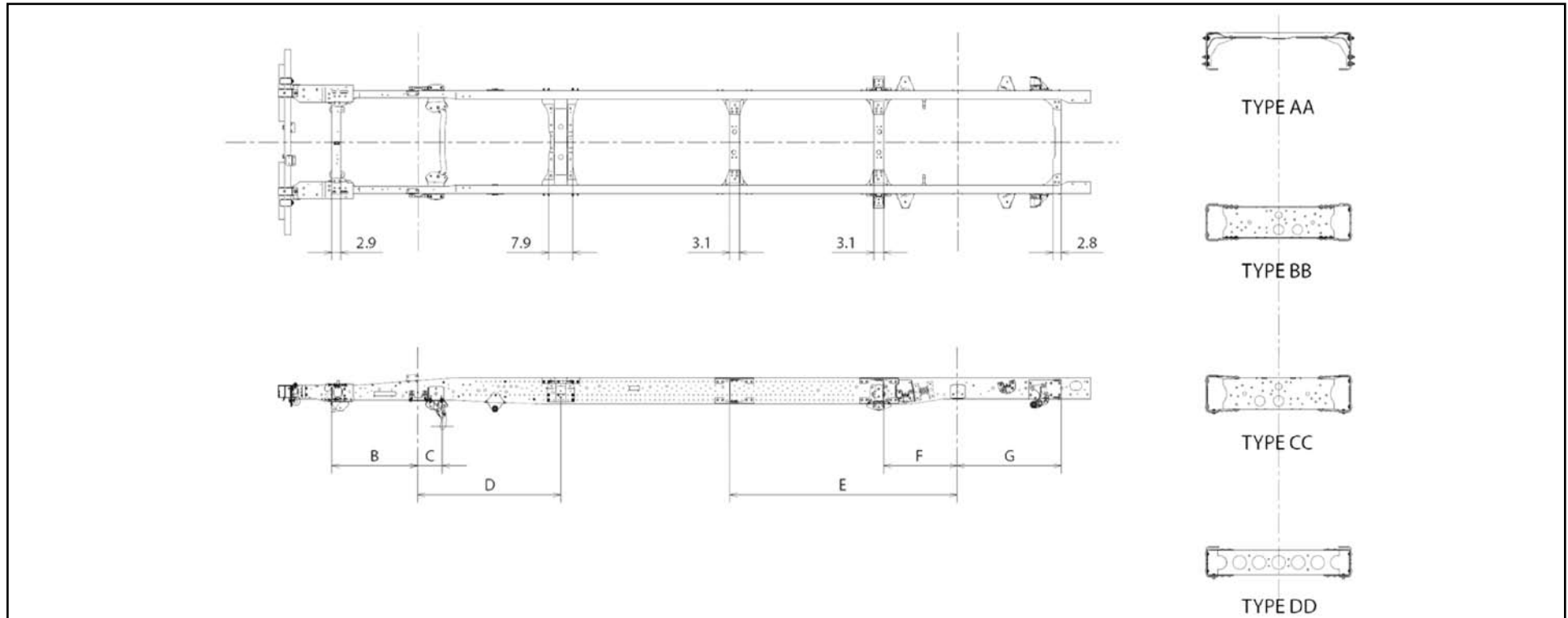
### Technical Notes:

**Chassis Curb Weight** reflects standard equipment and fuel but no driver or payload.

**Maximum Payload Weight** is the allowed maximum for equipment, body, payload and driver and is calculated by subtracting chassis curb weight from the GVWR.

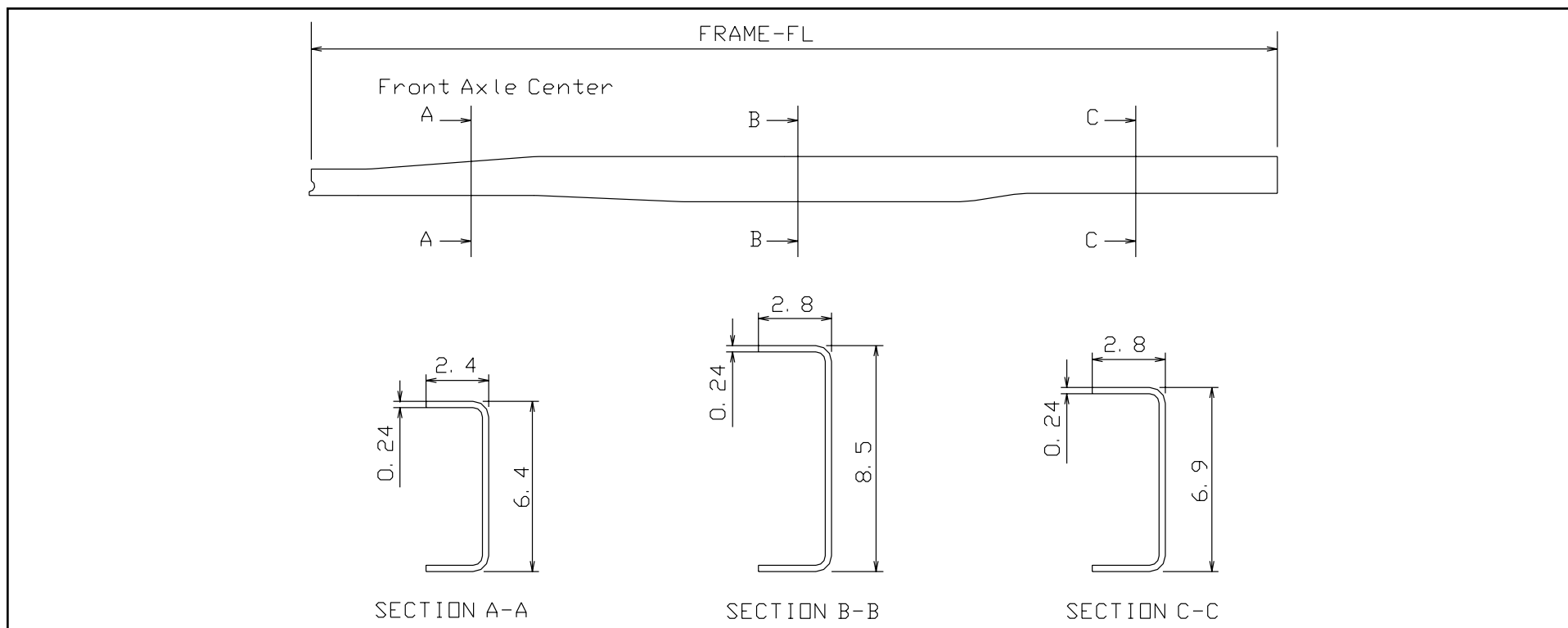


## Vehicle Specifications Index – NPR/W3500 Diesel, NPR-HD/W4500 Diesel – Frame & Crossmember Specifications



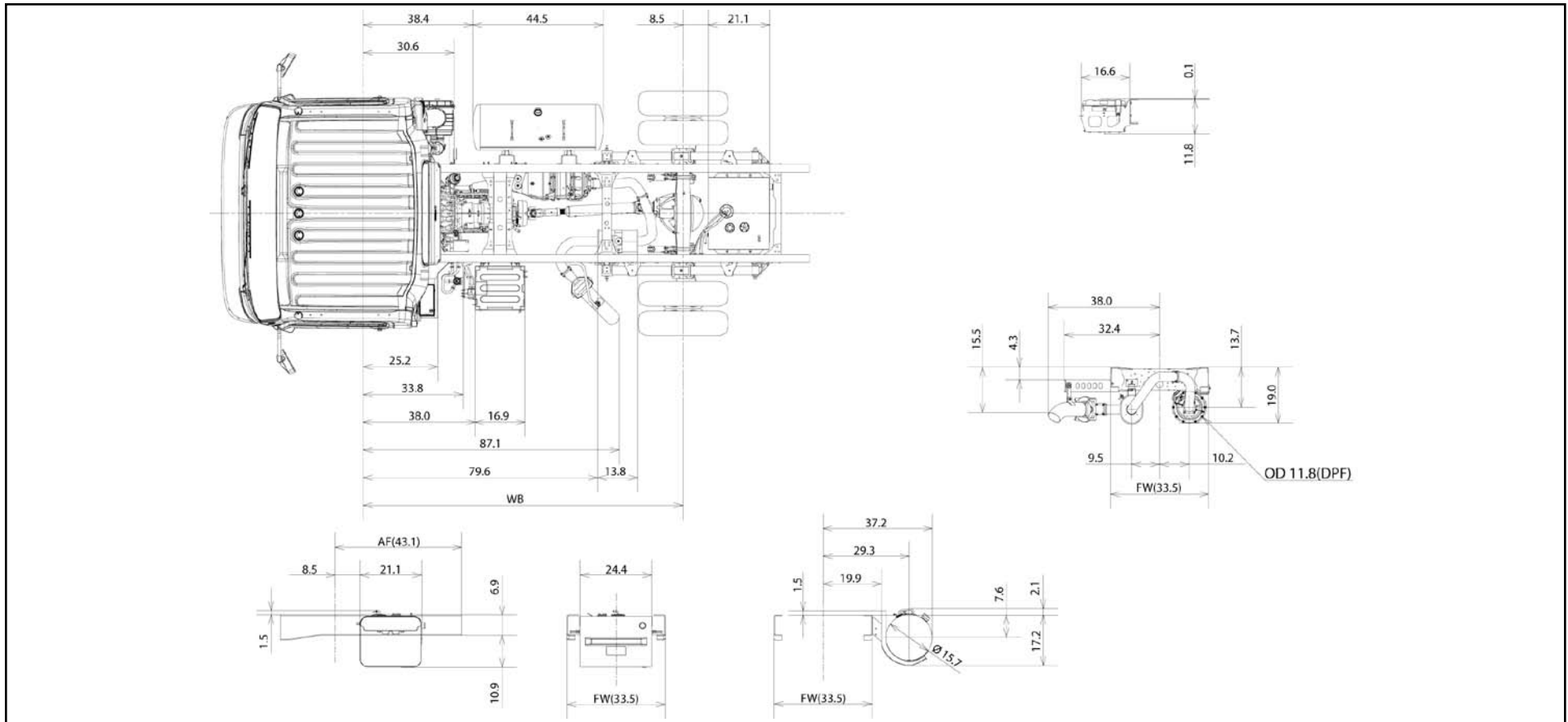
Wheelbase	Frame Thickness	Crossmember Type/Location									
		B	C	D		E		F		G	
109	0.24	28.3	7.9	AA	46.5	-		CC	24.2	DD	33.8
132.5	0.24	28.3	7.9	AA	46.5	BB	57.5	CC	24.2	DD	33.8
150	0.24	28.3	7.9	AA	46.5	BB	57.9	CC	24.2	DD	33.8
176	0.24	28.3	7.9	AA	46.5	BB	74.4	CC	24.2	DD	33.8

## Vehicle Specifications Index – NPR/W3500 Diesel, NPR-HD/W4500 Diesel – Frame Chart



Wheelbase	Frame FL	Frame Thickness
109.0	182.5	0.24
132.5	206.1	0.24
150.0	223.8	0.24
176.0	249.8	0.24

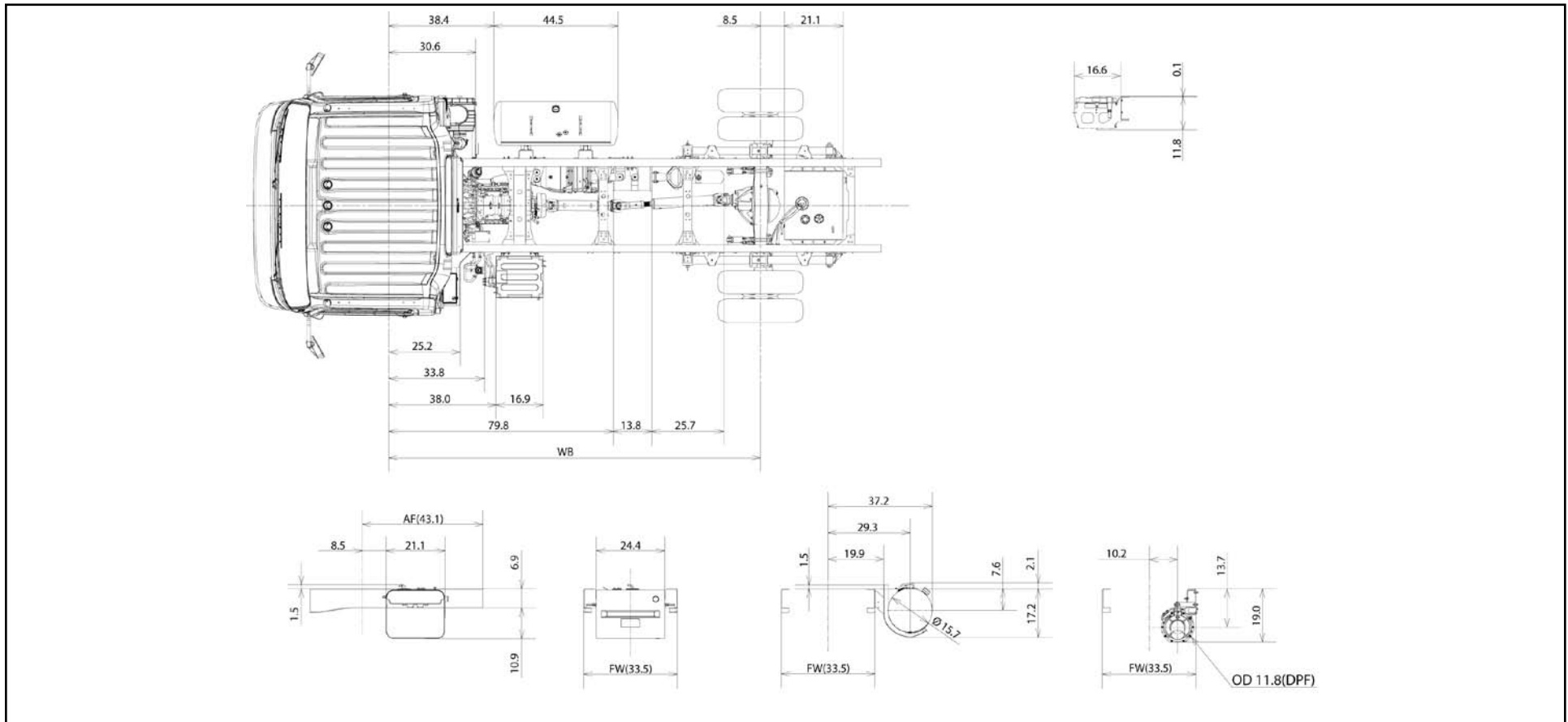
## Vehicle Specifications Index – NPR/W3500 Diesel, NPR-HD/W4500 Diesel – Auxiliary Views 109" Wheelbase



**NOTE:** Frame-mounted fuel tank available on 109", 132.5", 150" and 176" WB as an option replacing the In-Frame Tank.

\* Allow 3" additional for battery box opening clearance.

## Vehicle Specifications Index – NPR/W3500 Diesel, NPR-HD/W4500 Diesel – Auxiliary Views 132.5" Wheelbase



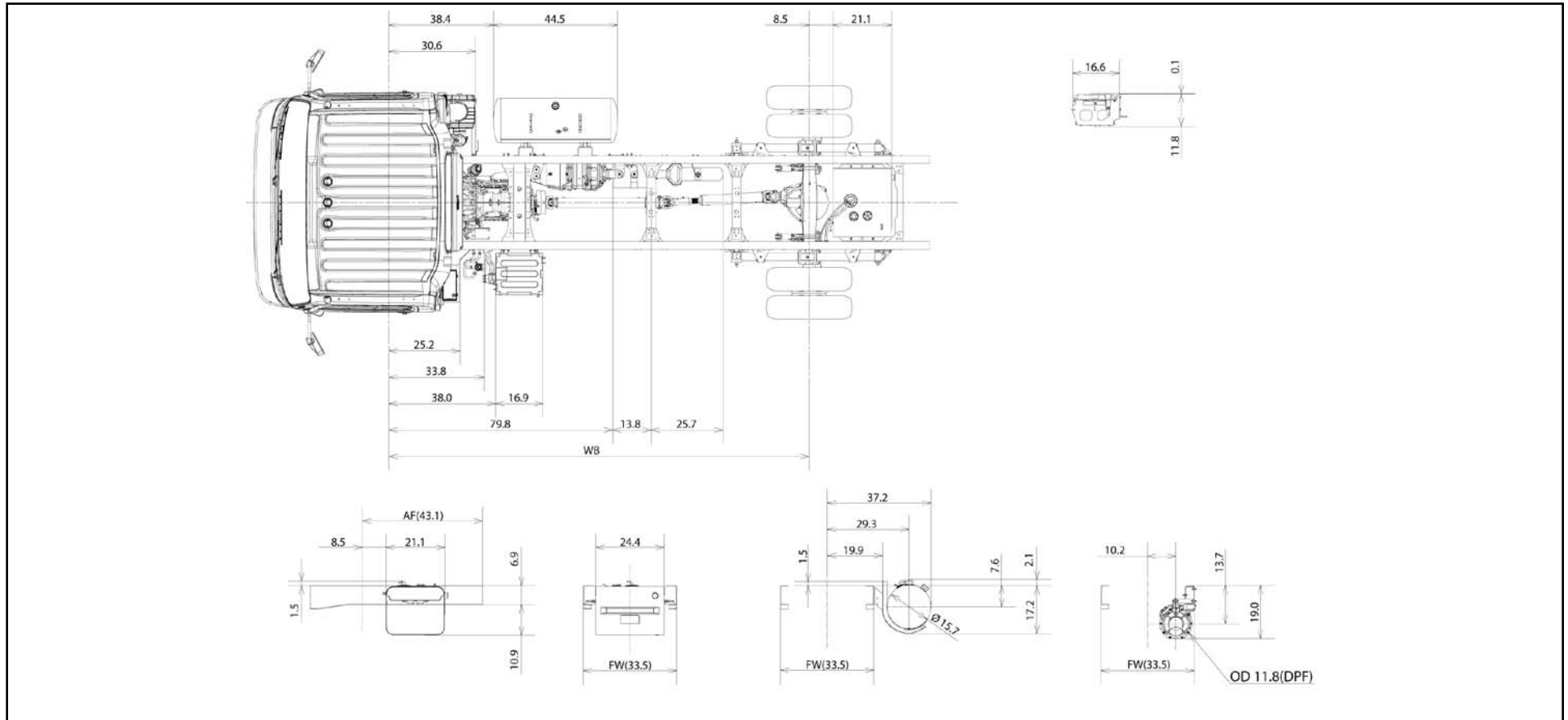
**NOTE:** Frame-mounted fuel tank available on 109", 132.5", 150" and 176" WB as an option replacing the In-Frame Tank.

\* Allow 3" additional for battery box opening clearance.

# 2009 GM/Isuzu TRUCK

PAGE 158

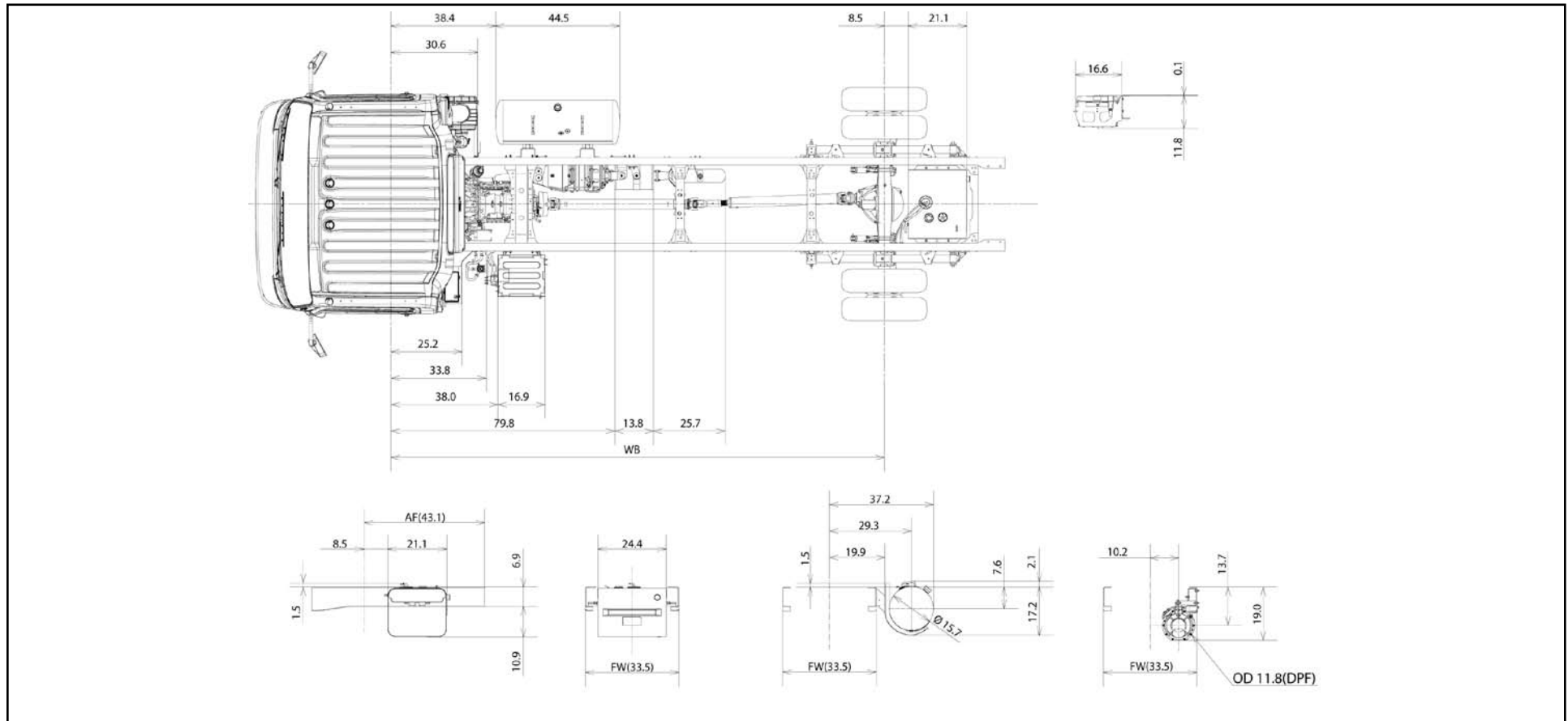
## Vehicle Specifications Index – NPR/W3500 Diesel, NPR-HD/W4500 Diesel – Auxiliary Views 150" Wheelbase



**NOTE:** Frame-mounted fuel tank available on 109", 132.5", 150" and 176" WB as an option replacing the In-Frame Tank.

\* Allow 3" additional for battery box opening clearance.

## Vehicle Specifications Index – NPR/W3500 Diesel, NPR-HD/W4500 Diesel – Auxiliary Views 176" Wheelbase



**NOTE:** Frame-mounted fuel tank available on 109", 132.5", 150" and 176" WB as an option replacing the In-Frame Tank.

\* Allow 3" additional for battery box opening clearance.

# 2009 GM/Isuzu TRUCK

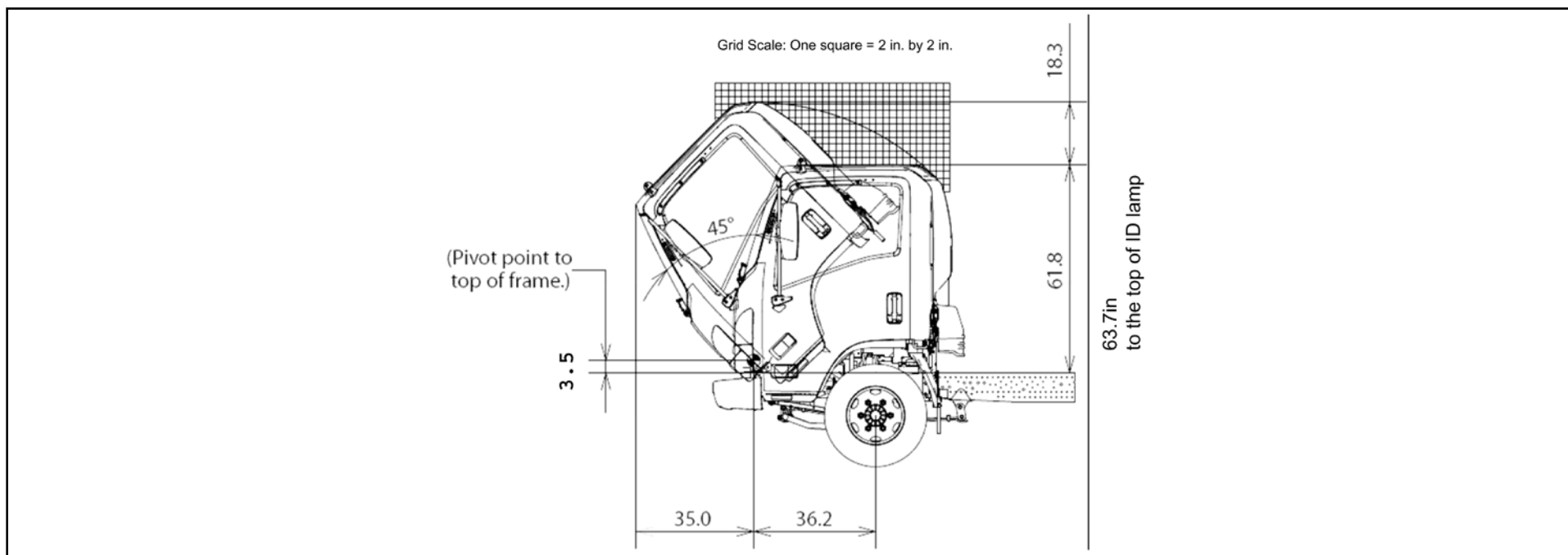
PAGE 160

## Vehicle Specifications Index – NPR/W3500 Diesel, NPR-HD/W4500 Diesel – Body Builder Weight Information Chart

### NPR NPR-HD DIESEL AUTOMATIC TRANSMISSION

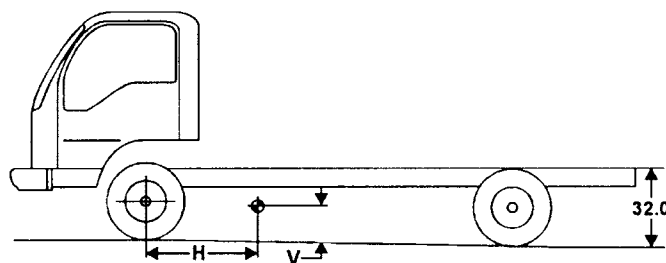
GVWR	AXLE	Body Builder Weight Information Chart								UNSPRUNG WEIGHT
		Wheelbase								
		109		132.5		150		176		
		in frame tank	side tank	in frame tank	side tank	in frame tank	side tank	in frame tank	side tank	
12000	FRONT	3752	3960	3827	4015	3876	4052	3939	4095	617
	REAR	1967	1712	1932	1733	1920	1747	1912	1765	1058
	TOTAL	5719	5672	5759	5748	5796	5799	5851	5860	1675
14500	FRONT	3704	3982	3805	4043	3858	4083	3927	4130	617
	REAR	2004	1773	1978	1788	1962	1799	1948	1813	1058
	TOTAL	5708	5755	5783	5831	5820	5882	5875	5943	1675

### Cab Tilt



## Vehicle Specifications Index – NPR/W3500 Diesel, NPR-HD/W4500 Diesel – Body Builder Weight Information Chart (cont'd)

GVWR	WB	V	H	
			IN FRAME TANK	SIDE TANK
12,000	109	23.8	37.5	32.9
	132.5	23.7	44.5	39.9
	150	23.6	49.7	45.2
	176	23.6	57.5	53.0
14,500	109	23.8	38.3	33.6
	132.5	23.7	45.3	40.6
	150	23.7	50.6	45.9
	176	23.6	58.4	53.7



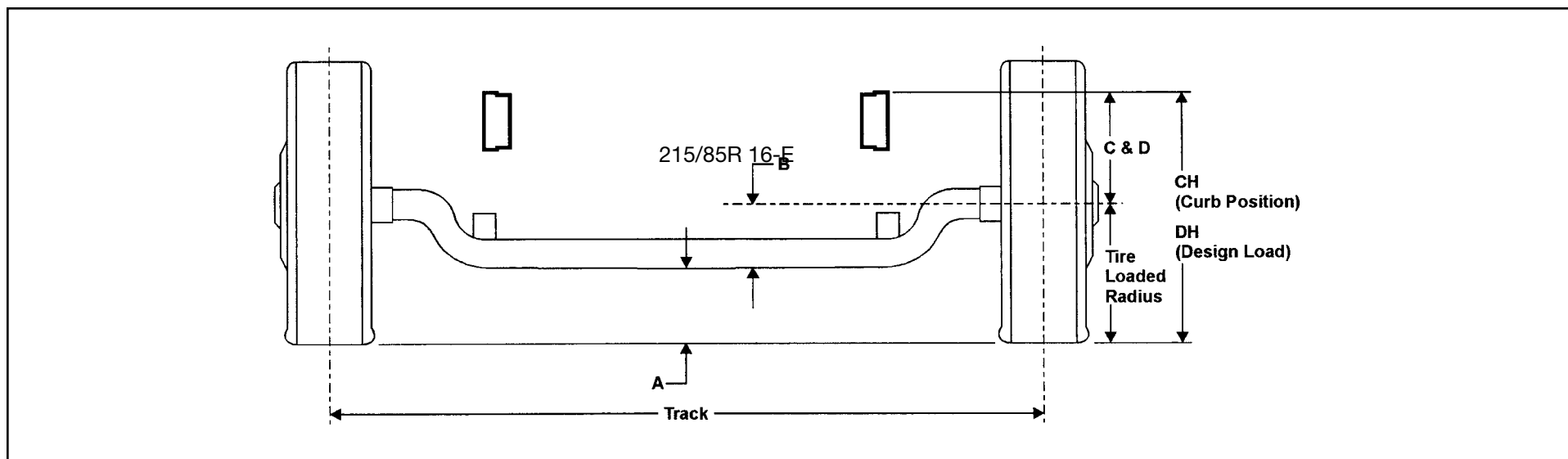
V = Vertical Center of Gravity  
H = Horizontal Center of Gravity

The center of gravity of the completed vehicle with a full load should not exceed 63 inches above ground level for the 12,000 lb. GVWR, 63 inches above ground level for the 14,500 GVWR, and must be located horizontally between the centerlines of the front and rear axles.

NOTE: The maximum dimensions for a body installed on the N/W Series are 102 inches wide (outside\*) by 90 inches high (inside). Any larger body applications must be approved by Isuzu Commercial Trucks of America (ICTA) Application Engineering. In the West Coast call 1-562-229-5314 and in the East Coast call 1-770-740-1620 x262. (\* with 102 inches wide mirror brackets installed)



## Vehicle Specifications Index – NPR/W3500 Diesel, NPR-HD/W4500 Diesel – Front Axle Chart

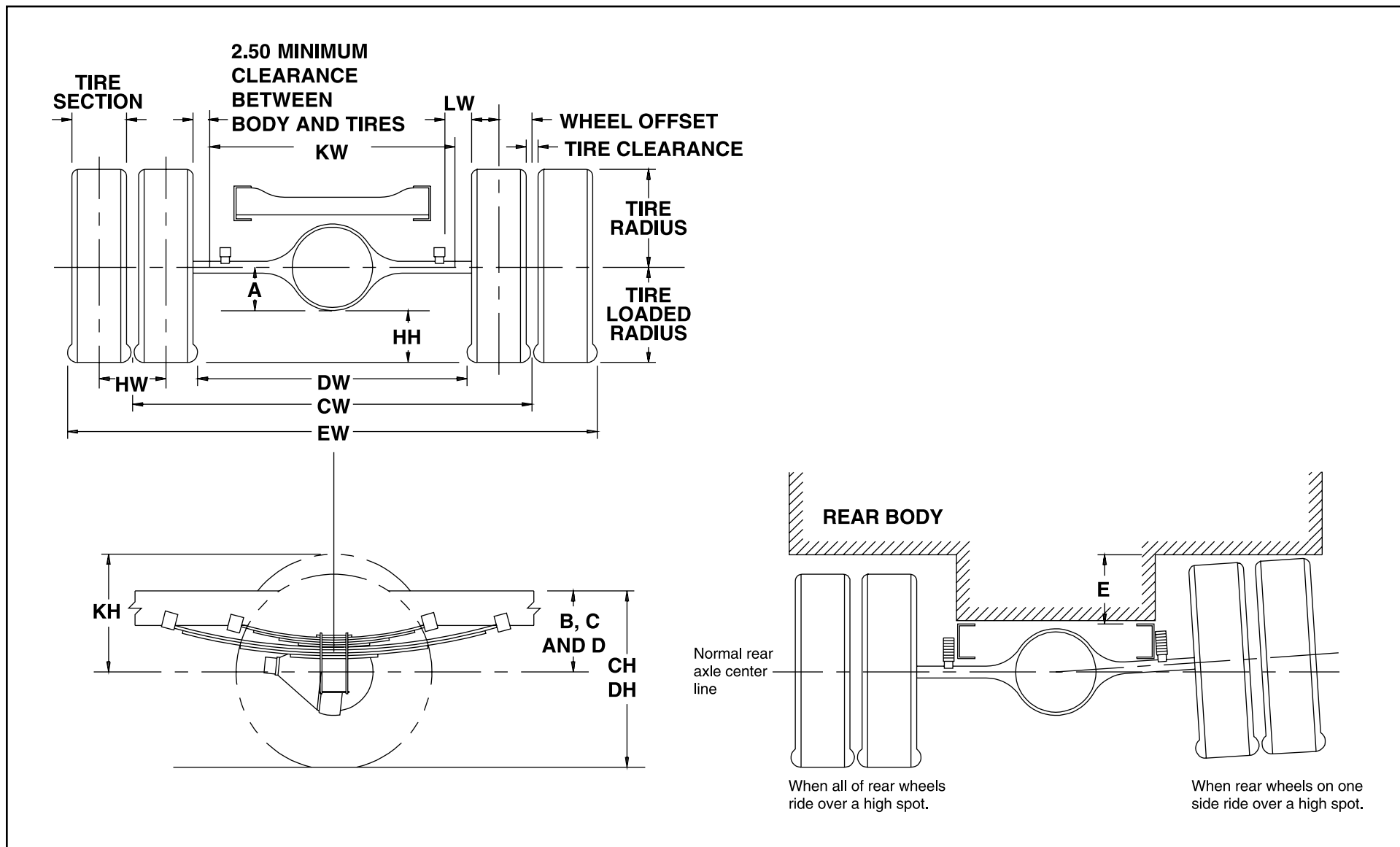


Formulas for calculating height dimensions:

- A = Tire Loaded Radius – B
- C = Centerline of Axle to Top of Frame Rail at Curb Position
- D = Centerline of Axle to Top of Frame Rail at Design Load
- CH = C + Tire Unloaded Radius
- DH = D + Tire Loaded Radius

Tire	GVWR	GAWR	A	B	C	D	CH	DH	Track	Tire Radius	
										Unload	Load
215/85R 16-E	12,000 lbs.	5,360 lbs.	7.5	6.6	12.9	12.2	27.5	26.3	65.5	14.6	14.1
	14,500 lbs.	5,360 lbs.	7.5	6.6	12.8	11.7	27.4	25.8	65.5	14.6	14.1

## Vehicle Specifications Index – NPR/W3500 Diesel, NPR-HD/W4500 Diesel – Rear Axle Chart



## Vehicle Specifications Index – NPR/W3500 Diesel, NPR-HD/W4500 Diesel – Specifications

Definitions			
A	Centerline of axle to bottom of axle bowl.	DW	Minimum distance between the inner surfaces of the rear tires.
B	Centerline of axle to top of frame rail at metal-to-metal position.	EW	Maximum Rear Width: Overall width of the vehicle measured at the outermost surface of the rear tires.
C	Centerline of axle to top of frame rail at curb position.		
D	Centerline of axle to top of frame rail at design load.	HH	Rear Tire Clearance: Minimum clearance between the rear axle and the ground-line.
E	Rear Tire Clearance: Minimum clearance required for tires and chain measured from the top of the frame at the vertical centerline of the rear axle, when rear wheels on one side ride over a high spot.	HW	Dual Tire Spacing: Distance between the centerlines of the minimum distance required for tire bounce as measured from the centerline of the rear axle and the top of the rear tire when one wheel rides over a high spot.
CH	Rear Frame Height: Vertical distance between the normal top of frame rail and the ground-line through the centerline of the rear axle at curb position.	CW	Track Dual Rear Wheel Vehicles: Distance between the centerlines of the dual wheels measured at the ground-line.
DH	Rear Frame Height: Vertical distance between the normal top of frame rail and the ground-line through the centerline of the rear axle at design load.		
Tire Section, Tire Radius, Tire Loaded Radius, Tire Clearance			See Tire Chart for Values

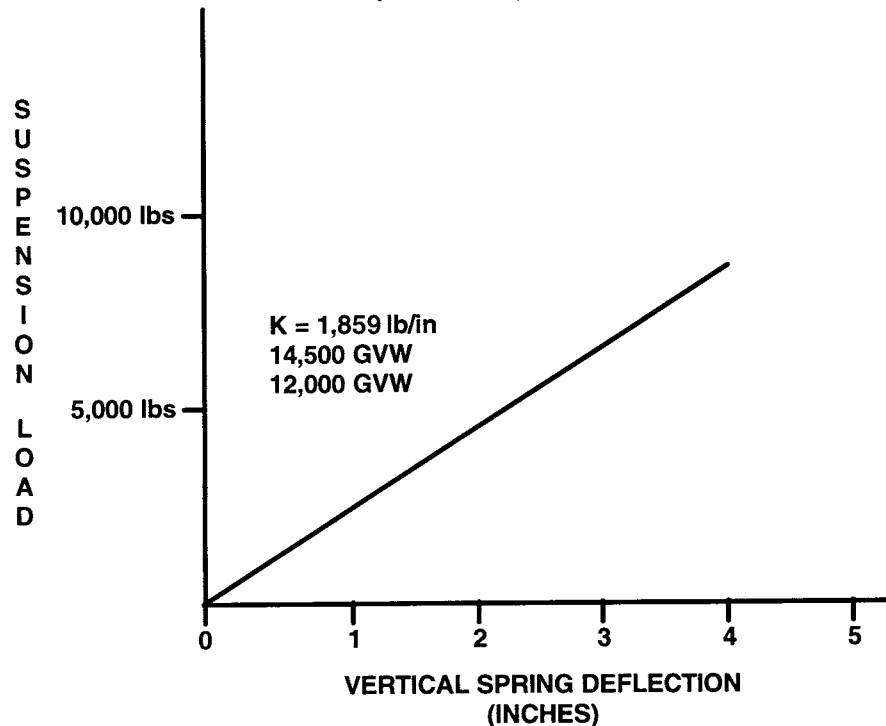
Formulas for Calculating Rear Width and Height Dimensions			
CW	= Track	HH	= Tire loaded radius – A
CH	= Tire loaded radius + C	JH	= KH – B
DH	= Tire loaded radius + D	KH	= Tire radius + 3.00 inches
DW	= Track + 2 tire sections – tire clearance	KW	= DW – 5.00 inches
EW	= Track + 2 tire sections + tire clearance	LW	= 1.00-inch minimum clearance between tires and springs

**NOTE:** Track and overall width may vary with optional equipment.

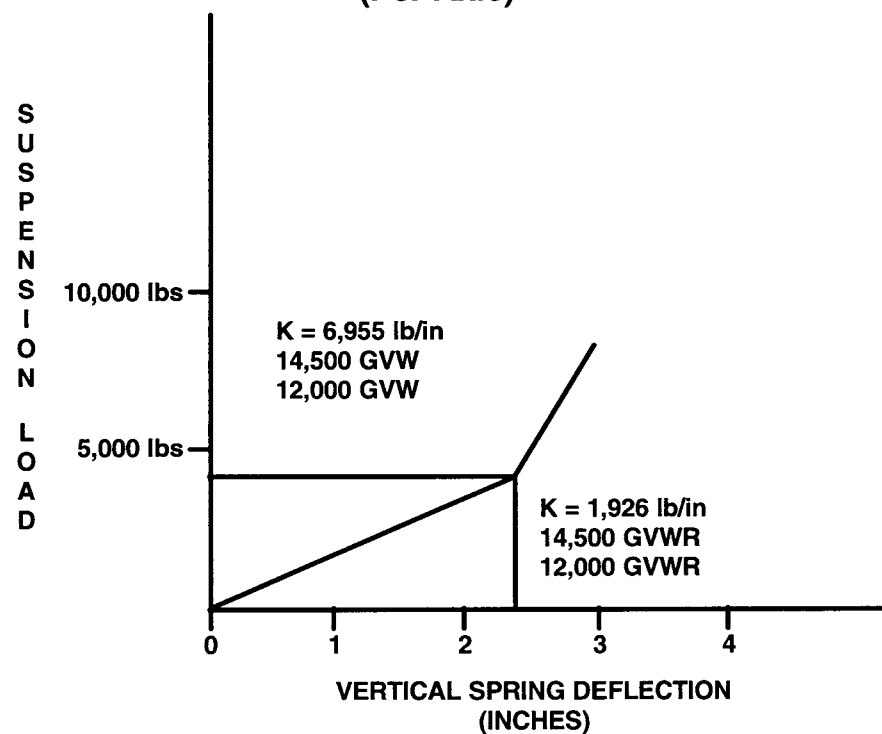
Tire	GAWR	Track CW	A	B	C	D	E
215/85R 16-E	8,840/9,880 lbs.	65.0	6.5(A/T)	9.3(A/T)	15.4	13.3/13.0	7.8

## Vehicle Specifications Index – NPR/W3500 Diesel, NPR-HD/W4500 Diesel – Suspension Deflection Charts

**Front Leaf Spring Load vs. Deflection  
(Per Axle)**



**Rear Leaf Spring Load vs. Deflection  
(Per Axle)**



# 2009 GM/Isuzu TRUCK

## Vehicle Specifications Index – NPR/W3500 Diesel, NPR-HD/W4500 Diesel – Tire & Disc Wheel Chart

### Tire

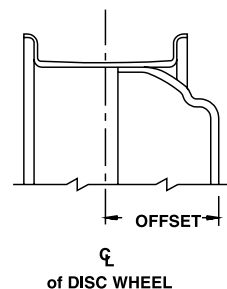
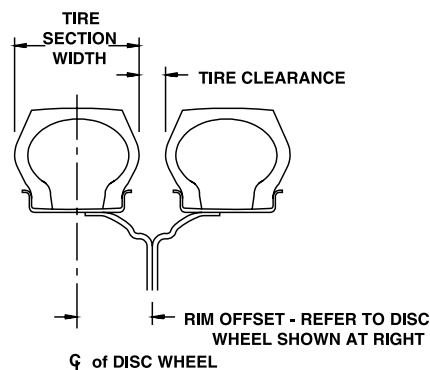
Tire Size	Tire Load Limit and Cold Inflation Pressures				Maximum Tire Load Limits		GVWR (Lb.)
	Single		Dual		Front	Rear	
	Lb.	PSI	Lb.	PSI	2 Single	4 Dual	
225/70R 19.5-F	3,315	85	3,115	85	6,630	12,460	14,500

Tire Size	GVWR (Lb.)	Tire Radius				Tire Section Width	Tire Clearance	Design Rim Width
		Loaded		Unloaded				
		Front	Rear	Front	Rear			
215/85R 16-E	12,000	14.1	14.1	14.6	14.6	8.2	1.8	6.0
215/85R 16-E	14,500	14.1	14.1	14.6	14.6	8.2	1.8	6.0

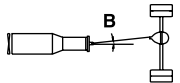
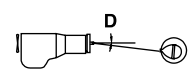
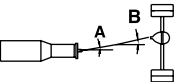
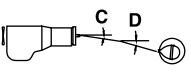
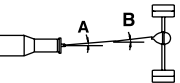
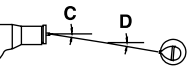
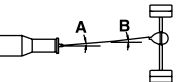
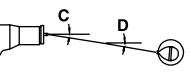
### Disc Wheel

Wheel Size	Bolt Holes	Bolt Circle Dia.	Ft./Rr. Nut Size*	Rear Stud Size*	Nut/Stud Torque Specs.	Inner Circle	Outside Offset	Disc Thickness	Rim Type	Material Mfg.
16 x 6 K	6 JIS	8.75	1.6142 (41 mm) BUD HEX	0.8268 (21 mm) SQUARE	325 ft-lb. (440 N•m)	6.46	5.0	0.37	5° DC	Steel TOPY

\*O.D. Wrench Sizes

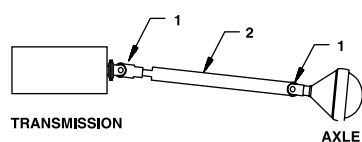


## Vehicle Specifications Index – NPR/W3500 Diesel, NPR-HD/W4500 Diesel – Propeller Shaft

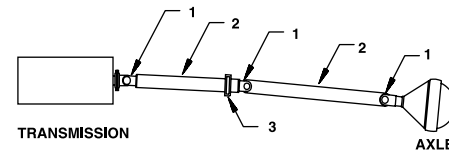
WB	PLANE VIEW	SIDE VIEW
109 in		
132.5 in		
150 in		
176 in		

TYPICAL INSTALLATIONS SHOWING YOKES "IN PHASE". "IN PHASE" MEANS THAT THE YOKES AT EITHER END OF A GIVEN PROPELLER SHAFT ASSEMBLY ARE IN THE SAME PLANE.

(109 in WB)



(132.5 in, 150 and 176 in WB)



- 1. UNIVERSAL JOINT
- 2. PROPELLER SHAFT
- 3. CENTER CARRIER BEARING

Wheelbase	Plane View		Side View	
	A Auto. Trans.	B Auto. Trans.	C Auto. Trans.	D Auto. Trans.
109 in.	—	3.2°	—	8.3°
132.5 in.	0°	3.3°	2.6°	2.6°
150 in.	0°	3.3°	1.8°	1.7°
176 in.	0°	2.2°	0.4°	3.4°

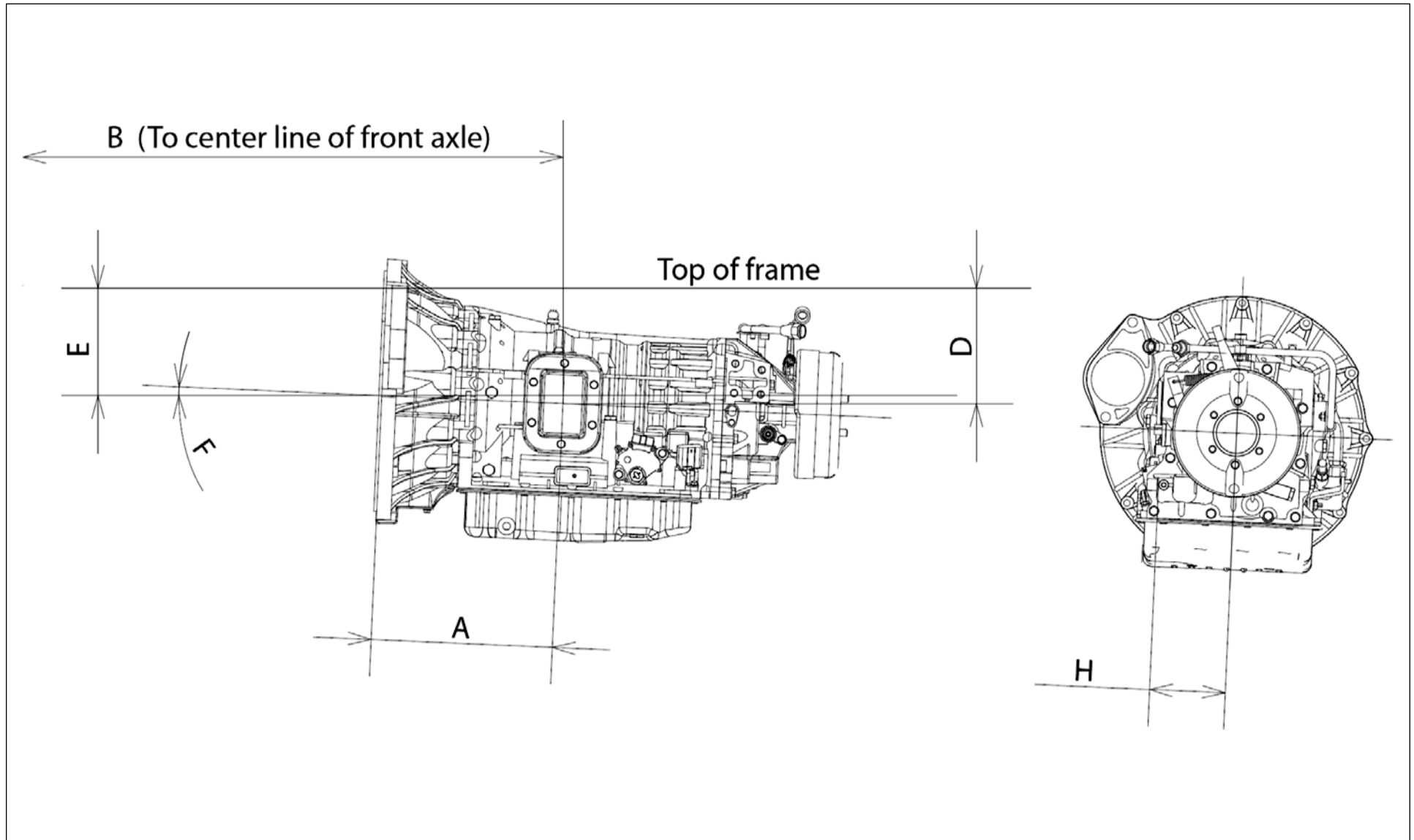
**NOTE:** All driveline angles are at unloaded condition (curb position with typical cargo body).

## Vehicle Specifications Index – NPR/W3500 Diesel, NPR-HD/W4500 Diesel – Propeller Shaft (cont'd)

Trans. Type	6 Automatic Transmission			
Wheelbase	109	132.5	150	176
No. of Shafts	1	2	2	2
Shaft #1 O.D.	3.54	3.54	3.54	3.54
Thickness	0.126	0.126	0.126	0.126
Length	37.2	24.5	41.8	51.3
Type	B	A	A	A
Shaft #2 O.D.	N/A	3.54	3.54	3.54
Thickness	N/A	0.126	0.126	0.126
Length	N/A	36.1	36.4	52.9
Type	N/A	B	B	C

Type	Description	Illustration
Type A	1st shaft in 2-piece driveline	
Type B	1st shaft in 1-piece driveline 2nd shaft in 2-piece driveline	

## Vehicle Specifications Index – NPR/W3500 Diesel, NPR-HD/W4500 Diesel – PTO Location, Drive Gear and Opening Information

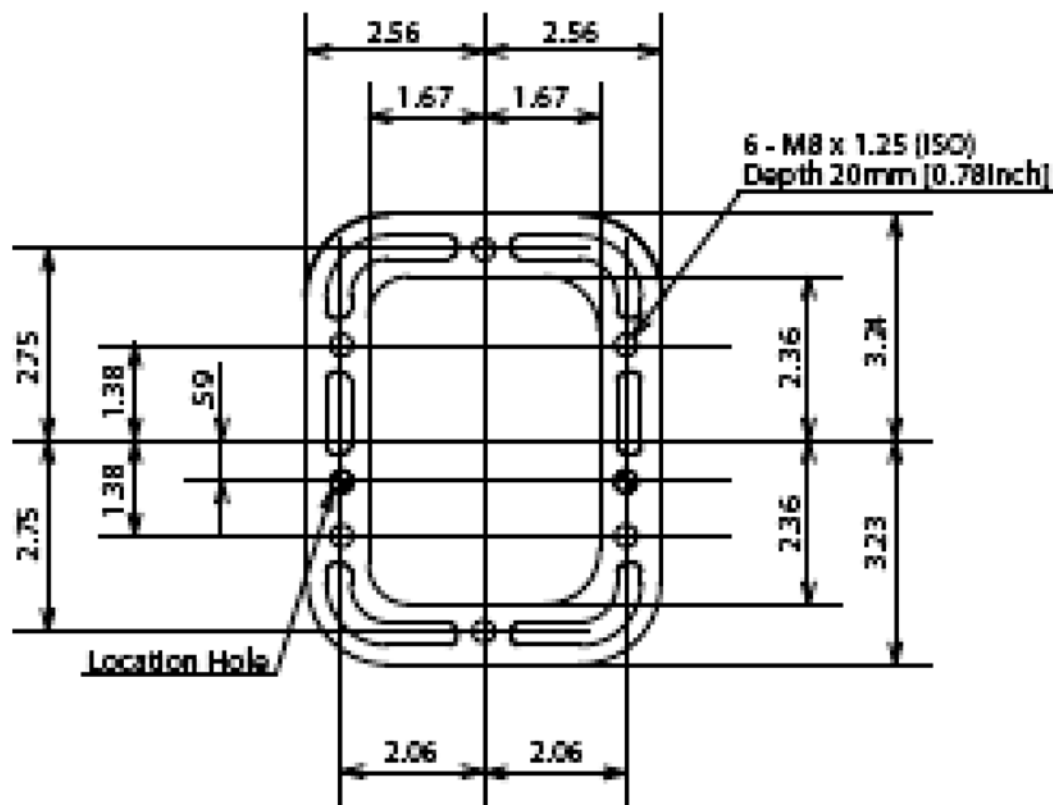




## Vehicle Specifications Index – NPR/W3500 Diesel, NPR-HD/W4500 Diesel – PTO Location, Drive Gear and Opening Information (cont'd)

Trans.	Opening Location	Bolt Pattern	A	B	C	D	E	F	H	PTO Drive Gear Location	Ratio of PTO Drv. Gear Spd. to Eng. Spd.	No. of Teeth	Pitch	Helix Angle	Max. Output Torque
Aisin 465	Left	(Dr 2)	12.35	36.89	0	7.85	7.31	2.5°	5.16	PTO Gear	1:1 with turbine	69	N/A	0	134 lbs.-ft. @ 1,700 RPM

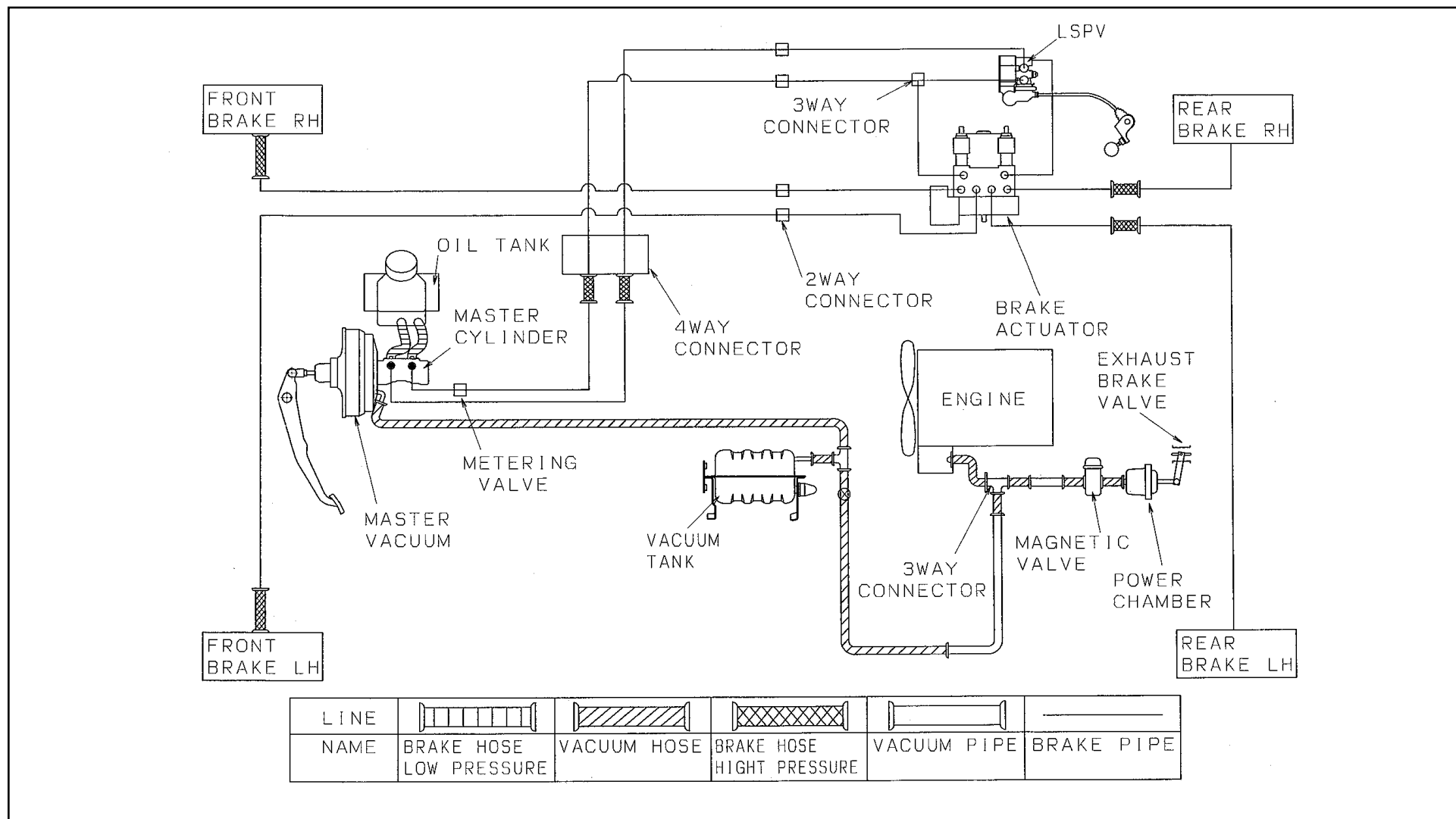
### Opening Diagram



## Vehicle Specifications Index – NPR/W3500 Diesel, NPR-HD/W4500 Diesel – 12,000 GVW, Brake System Diagram

### Vacuum Over Hydraulic

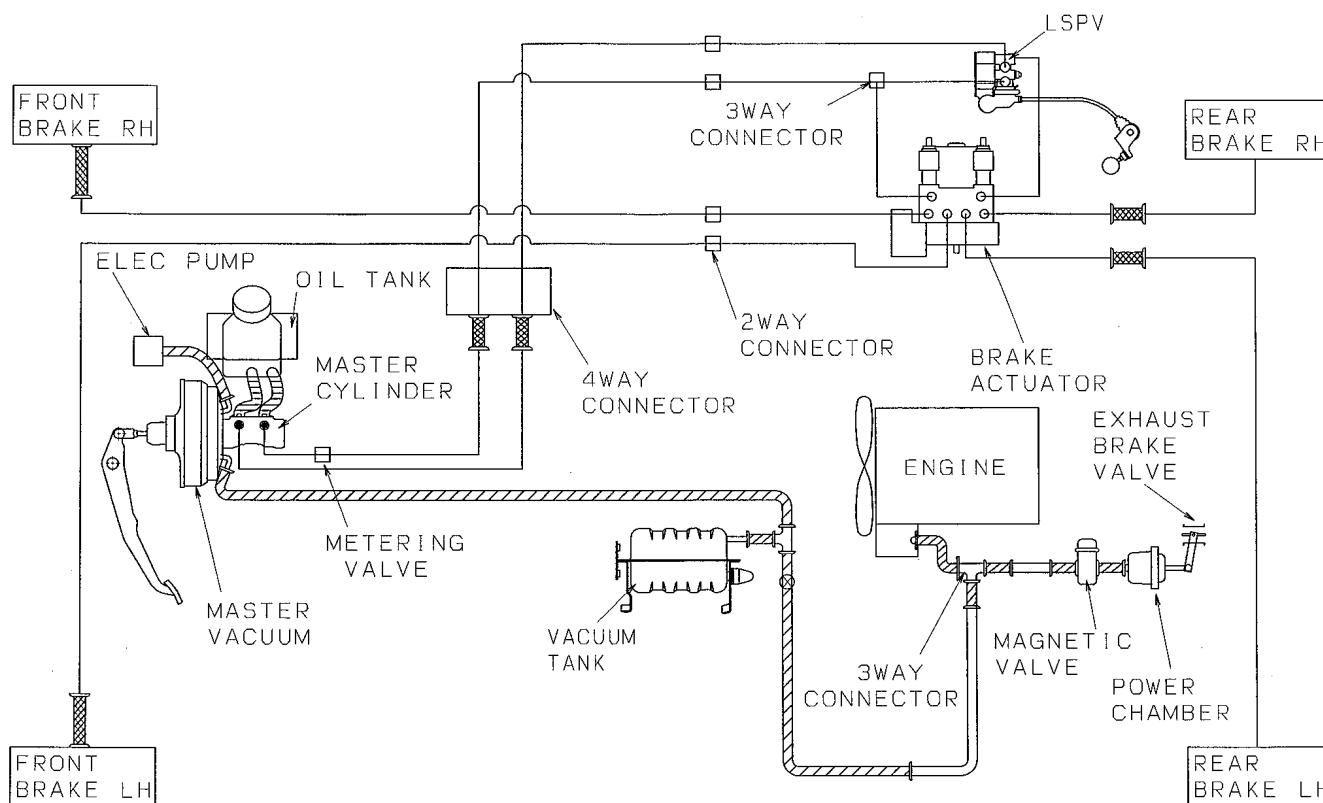
Please refer to Introduction Section of book for antilock system cautions and wheelbase modification requirements.



## Vehicle Specifications Index – NPR/W3500 Diesel, NPR-HD/W4500 Diesel – 14,500 GVW, Brake System Diagram

### Vacuum Over Hydraulic

Please refer to Introduction Section of book for antilock system cautions and wheelbase modification requirements.



LINE					
NAME	BRAKE HOSE LOW PRESSURE	VACUUM HOSE	BRAKE HOSE HIGHT PRESSURE	VACUUM PIPE	BRAKE PIPE

## **Vehicle Specifications Index – NPR/W3500 Diesel, NPR-HD/W4500 Diesel – In-Frame Diesel Fuel Fill**

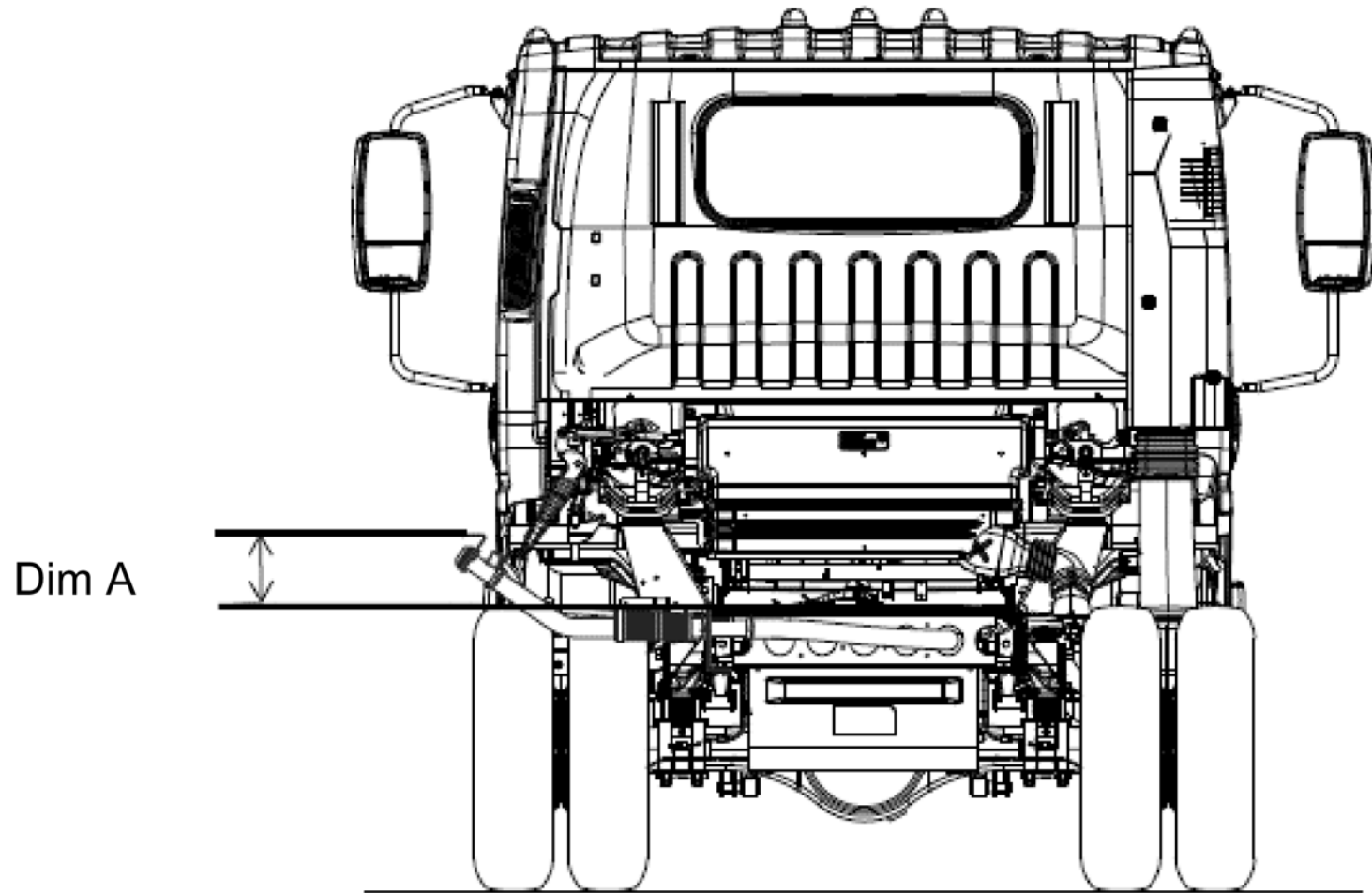
### ***Installation Instructions***

1. Disconnect battery.
2. Loosen hose from the tie downs. Remove caps from plate on rail.
3. Install hoses onto the plate.
4. Extend hose out from the driver side of the rail to body rail.
5. The filler neck must be mounted to allow the fill plate bracket to be parallel to the frame horizontal (see figure 4).
6. Cover with protector wrap and secure with tie wraps.
7. Filler hose is set for 102 inches outside width body.
8. Filler neck (dimension A) must be between 6.85 inches and 8.5 inches above frame.
9. Secure the filler plate to the bottom of the body and check for leaks.
10. Ensure that fill hose does not sag, creating an area where the fuel could pool in the fill hose.
11. Reconnect battery.

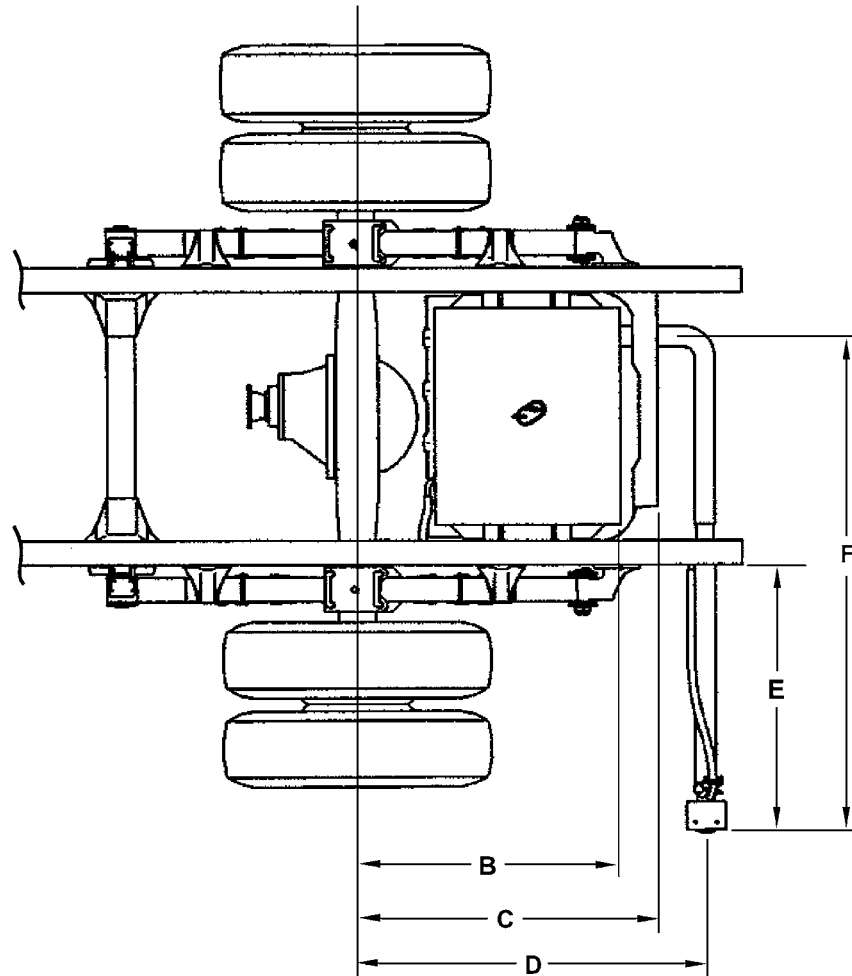
# 2009 GM/Isuzu TRUCK

PAGE 174

## Vehicle Specifications Index – NPR/W3500 Diesel, NPR-HD/W4500 Diesel – Rear View Fuel Fill



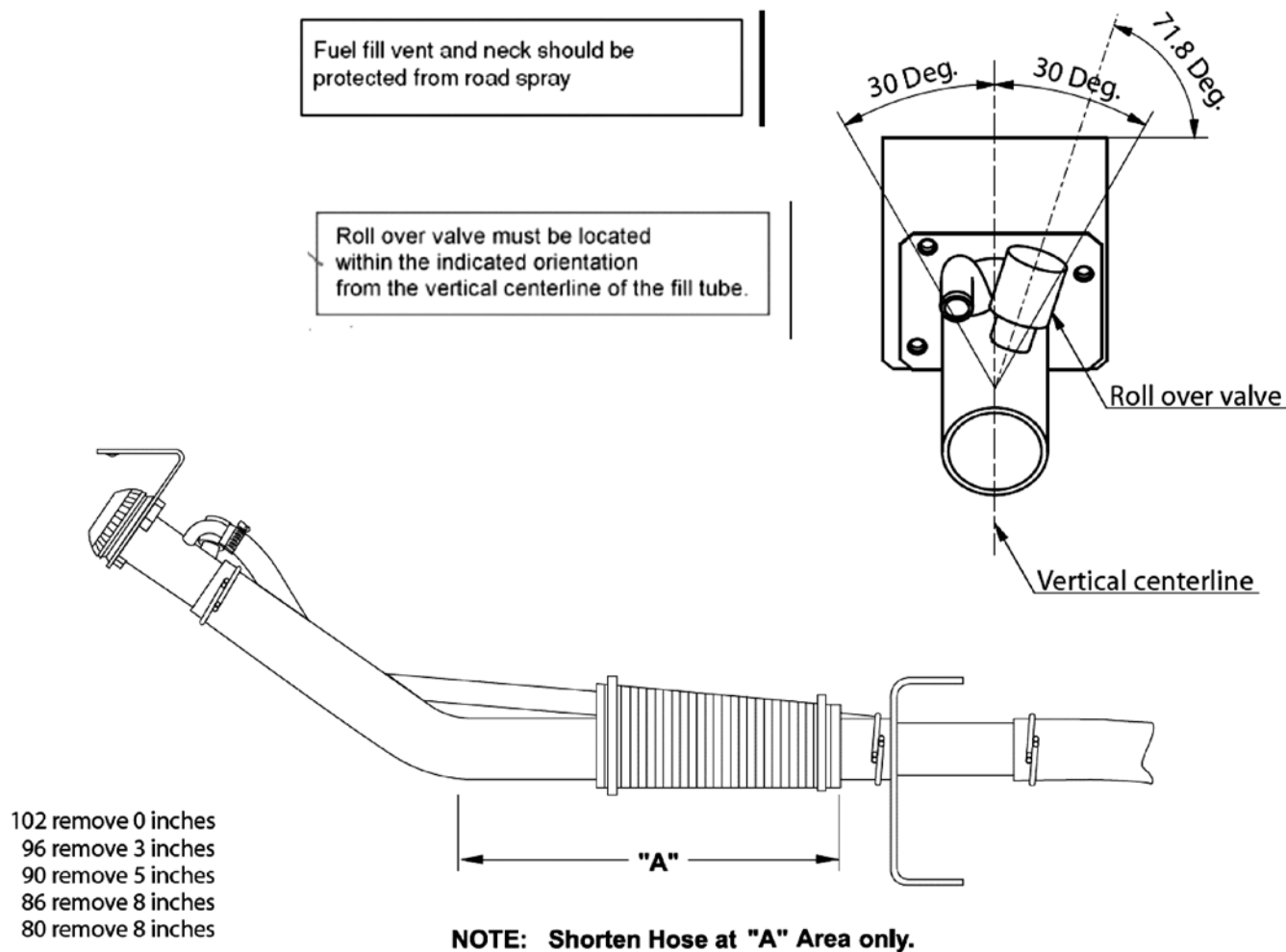
## Vehicle Specifications Index – NPR/W3500 Diesel, NPR-HD/W4500 Diesel – Top View Fuel Fill



Dimensions:

B = 29.75 inches (756 mm)  
C = 34.00 inches (863 mm)  
D = 39.29 inches (998 mm)  
E = 33.86 inches (860 mm)  
F = 59.60 inches (1,514 mm)

## Vehicle Specifications Index – NPR/W3500 Diesel, NPR-HD/W4500 Diesel – Hose Modification for Various Width Bodies



## Vehicle Specifications Index – NPR/W3500 Diesel, NPR-HD/W4500 Diesel – Ultra Low Sulphur Diesel Label

Per EPA Title 40, Part 86, 86:007—35(c),  
The decal illustrated below must be installed on the vehicle.  
The decal is included in the fuel fill parts box.

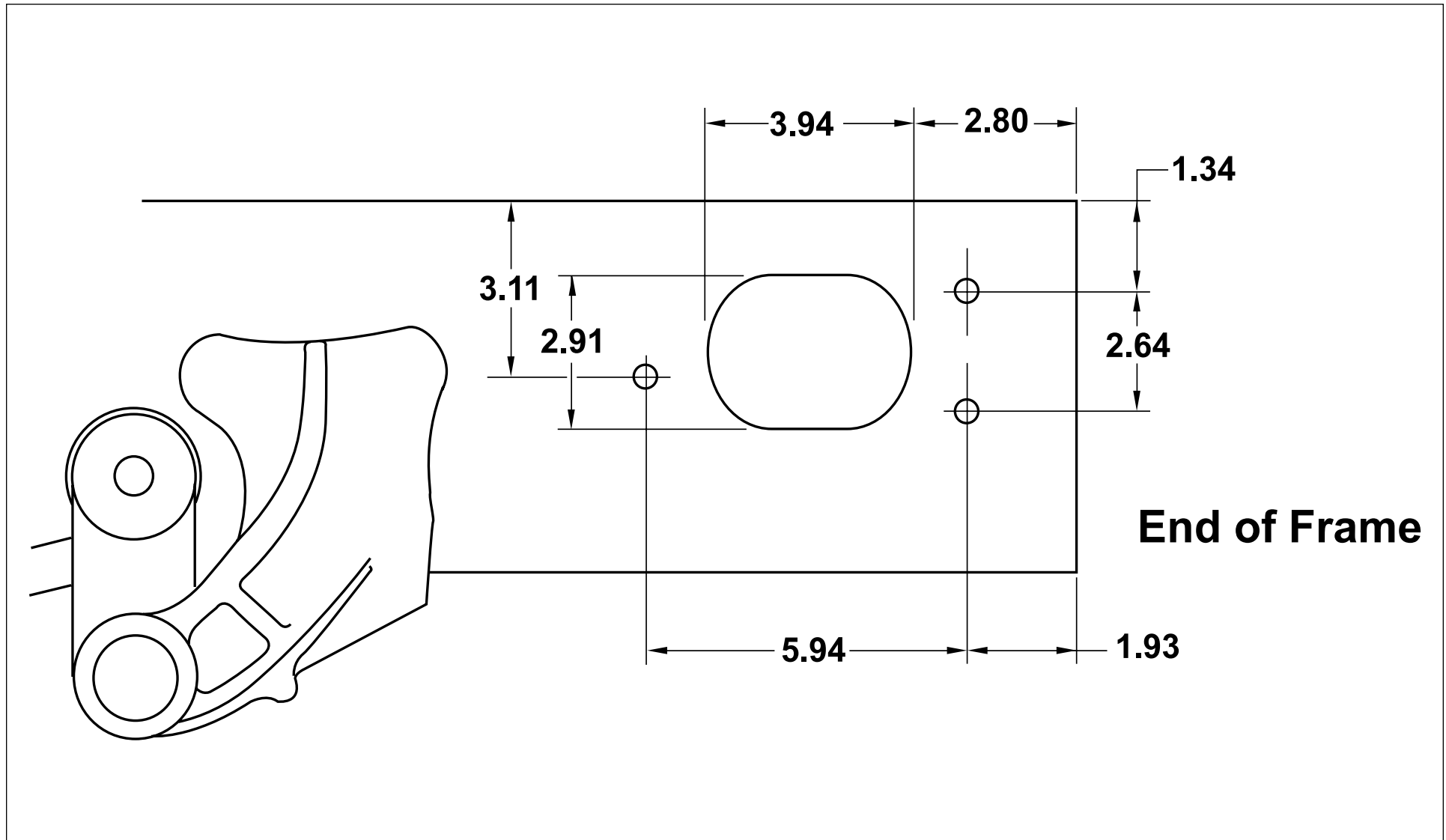


### INSTRUCTIONS FOR DECAL PLACEMENT:

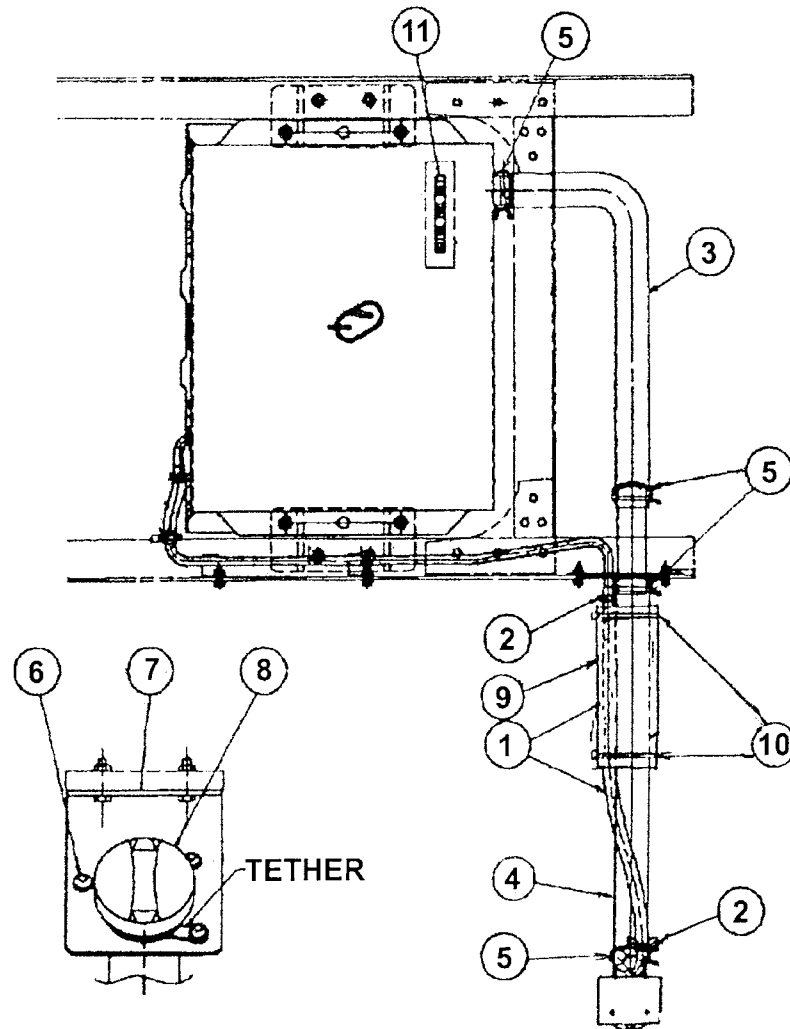
1. The decal must be placed as close as possible to the fuel inlet and be clearly visible.
  2. The decal should be placed above or to the side of the fuel cap to avoid corrosion by possible contact with fuel.
  3. The decal may be placed on aerodynamic fairings, bodies, etc. as long as the decal is clearly visible and in close proximity to the fuel inlet.
  4. For installed bodies that have a fuel door, the decal should be placed above or to the side of the fuel door.
- Thoroughly clean the area of all grease, dirt, etc. before application of the decal. Apply the decal at room temperature, 65° to 75° F.



## Vehicle Specifications Index – NPR/W3500 Diesel, NPR-HD/W4500 Diesel – Through the Rail Fuel Fill Frame Hole



## Vehicle Specifications Index – NPR/W3500 Diesel, NPR-HD/W4500 Diesel – Fuel Fill Parts Illustration



# 2009 GM/Isuzu TRUCK

## Vehicle Specifications Index – NPR/W3500 Diesel, NPR-HD/W4500 Diesel – Fuel Fill Parts List

Number	Description	Part Number – Isuzu	Part Number – GM	Quantity
1	Breather Hose	898006-4510	N/A	1
2	Clip, Rubber Hose	894242-0340	94242034	2
3	Hose, Fuel Filler	897187-8750	97187875	1
4	Hose, Fuel Filler	897253-1400	97253140	1
5	Clip, Filler Hose	894435-8760	97724373	4
6	Screw, Filler Hose	894384-6460	N/A	3
7	Bracket, Filler Neck	897116-621Y	97116621	1
8	Cap, Filler	897218-7020	N/A	1
9	Protector	897114-0630	97114063	1
10	Clip	109707-1070	94062296	2
11	Caution Plate	N/A	15798339	1

## Vehicle Specifications Index – NQR/W5500 Diesel Specifications

Model	NQR/W5500
GVWR	17,950 lbs.
WB	109 in., 132.5 in., 150 in., 176 in.
Engine	Isuzu 4-cylinder, in-line 4-cycle, turbocharged, intercooled, direct injection diesel.
Model/Displacement	4HK1-TC/317 CID (5.19 liters)
HP (Gross)	205HP/2400 RPM w/Automatic Trans
	175HP/2400 RPM w/Manual Trans
Torque (Gross)	441 lb ft torque/1850 RPM w/ Automatic Trans
	387 lb ft torque/1850 RPM w/ Manual Trans
Equipment	Dry element air cleaner with vertical intake; 2 rows 569 square in. radiator; 7 blade 20.1 in diameter fan with viscous drive. Cold weather starting device and an oil cooler. Engine oil level check switch and light. Engine warning system with audible warning for low oil pressure, high coolant temperature, and low coolant level. Engine cruise control and engine idle up function. Rear engine cover.
Transmission	Aisin A465 6 speed automatic transmission with fifth and sixth gear overdrive with lock up in 2nd, 3rd, 4th, 5th and 6th, PTO capability. Optional MZZ 6 speed manual transmission.
Steering	Integral power steering 18.8-20.9:1 ratio. Tilt and telescoping steering column.
Front Axle	Reverse Elliot 1" -Beam rated at 6,830 lb.
Suspension	Semi-elliptical steel alloy tapered leaf springs with stabilizer bar and shock absorbers.
GAWR	6,830 lb.
Rear Axle	Full floating single speed with hypoid gearing rated at 14,550 lb.
Suspension	Semi-elliptical steel alloy multi-leaf springs and shock absorbers.
GAWR	12,980 lb
Wheels	19.5x6.0-K 6 hole disc wheels, painted white.
Tires	225/70R-19.5E (12 pr) tubeless steel belted radials, all season tread front and rear.
Brakes	Dual circuit vacuum assisted hydraulic service brakes with EBD (Electronic Brake Distribution) system for load proportioning of the brake system front disc and self-adjust outboard mounted drum rear. The parking brake is a mechanical, cable actuated, internal expanding drum type, transmission mounted. The exhaust brake is standard and is vacuum operated. 4 channel anti-lock brake system.
Fuel Tank	30 gal. rec fuel tank mounted in frame rail behind rear axle. Fuel water separator with dash mounted indicator light.

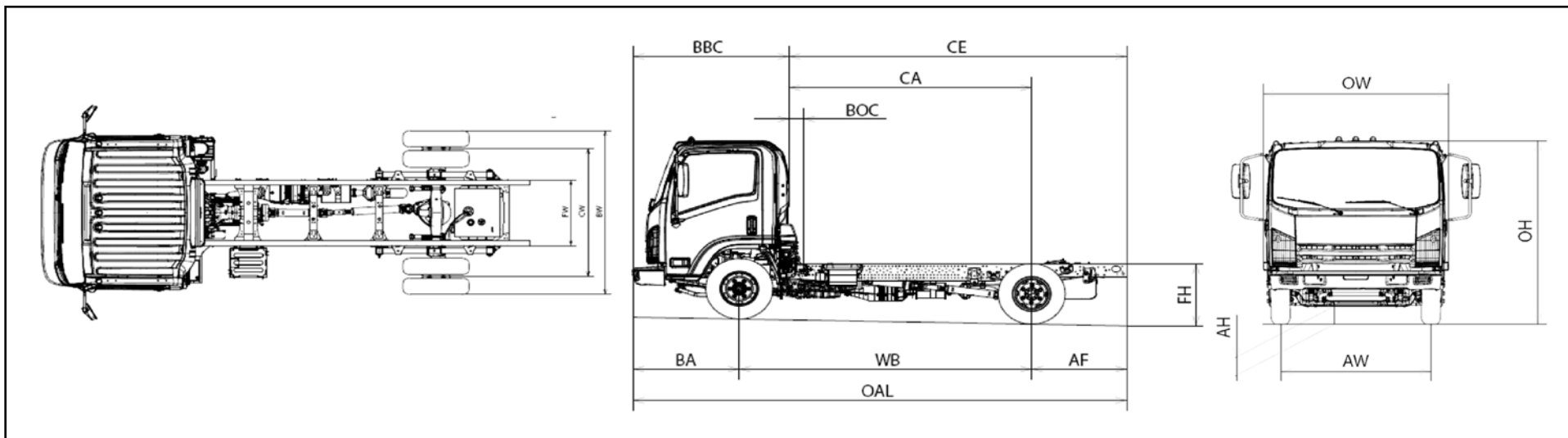
**NOTE:** These selected specifications are subject to change without notice.

## Vehicle Specifications Index – NQR/W5500 Diesel Specifications (cont'd)

Model	NQR/W5500
GVWR	17,950 lbs.
Frame	Ladder type channel section straight frame rail 33.5 in wide through the total length of the frame. Yield strength 44,000 psi, section modulus 7.20 in <sup>3</sup> . RBM 316,800.
Cab	All steel low cab forward, BBC 70.9 in, 45° mechanical tilt with torsion assist.
Equipment	TRICOT and JERSEY KNIT combination cloth covered high back driver's seat with two occupant passenger seat. Dual cab mounted exterior mirrors with integral convex mirror. Tilt and telescoping steering column. Power windows and door locks, floor mats, tinted glass.
Electrical	12 Volt, negative ground, dual Delco maintenance free batteries, 750 CCA each, 110 Amp alternator with integral regulator.
Options	AM/FM CD stereo radio, engine block heater; engine oil pan heater fuel tank mounted on right hand rail (33 gal), spare wheel, wheel simulators, air deflector, air conditioning, PTO enable switches, back up alarm, heated mirrors, engine shutdown, mirror bracket for 102" wide body, fire extinguisher and triangle kit mounted in rear organizer, cross rail horizontal DPF with vertical exhaust, and hour meter, (2nd fuel tank 33 gal), Limited Slip Differential, and Chrome Grille. *200 wheelbase chassis (NR5) will require you to add the following options to your order: White cab/ <b>Side mounted</b> fuel tank with power windows and door locks, air conditioning ( <b>OCC 74</b> ) AM/FM CD Stereo radio (IL7), Air Deflector (IF4), Back up Alarm (UZF) N/A w M/T.

NOTE: These selected specifications are subject to change without notice.

## Vehicle Weights, Dimensions and Ratings



# 2009 GM/Isuzu TRUCK

## Vehicle Specifications Index – NQR/W5500 Diesel Specifications (cont'd)

Variable Chassis Dimensions					
Unit	WB	CA*	CE*	OAL	AF
Inch	109.0	86.5	129.6	200.5	43.1
Inch	132.5	110.0	153.1	224.0	43.1
Inch	150.0	127.5	170.6	241.5	43.1
Inch	176.0	153.5	196.6	267.5	43.1
Inch	200.0	177.5	220.6	291.5	43.1

\*Effective CA & CE are CA or CE less BOC.

Dimension Constants					
Code	Inches	Code	Inches	Code	Inches
AH	8.3	BW	83.3	FH	33.0
AW	65.6	CW	65.0		
BA	48.4	FW	33.5		
BBC	70.9	OH	90.0		
BOC	6.50	OW	81.4		

# 2009 GM/Isuzu TRUCK

## Vehicle Specifications Index – NQR/W5500 Diesel Specifications (cont'd)

In-Frame Tank 17,950-lb. GVWR Automatic Transmission Model Chassis Cab and Maximum Payload Weights						
Model	WB	Unit	Front	Rear	Total	Payload
NR1	109.0 in.	lb.	3,936	2,317	6,253	11,697
NR2	132.5 in.	lb.	4,063	2,266	6,329	11,621
NR3	150.0 in.	lb.	4,129	2,236	6,365	11,585
NR4	176.0 in.	lb.	4,214	2,206	6,420	11,530

Side -Mounted 17,950-lb. GVWR Automatic Transmission Model Chassis Cab and Maximum Payload Weights						
Model	WB	Unit	Front	Rear	Total	Payload
NR1	109	lb.	4,167	2,034	6,201	11,749
NR2	132.5	lb.	4,249	2,028	6,277	11,673
NR3	150	lb.	4,301	2,027	6,328	11,622
NR4	176	lb.	4,362	2,027	6,389	11,561
NR5	200	lb.	4,423	2,021	6,444	11,506

## Vehicle Specifications Index – NQR/W5500 Diesel Specifications (cont'd)

### **Vehicle Weight Limits:**

GVWR Designed Maximum	17,950 lbs.
GAWR, Front	6,830 lbs.
GAWR, Rear	12,980 lbs.

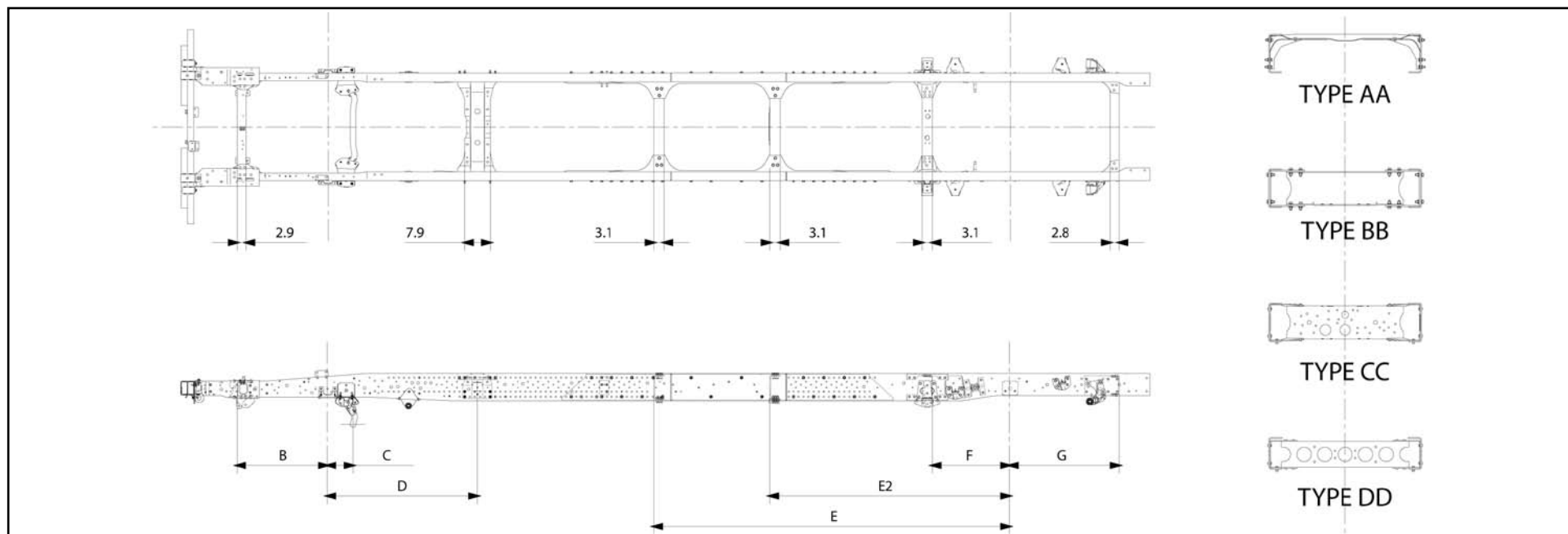
### **Technical Notes:**

**Chassis Curb Weight** reflects standard equipment and fuel but no driver or payload.

**Maximum Payload Weight** is the allowed maximum for equipment, body, payload and driver and is calculated by subtracting chassis curb weight from the GVWR.

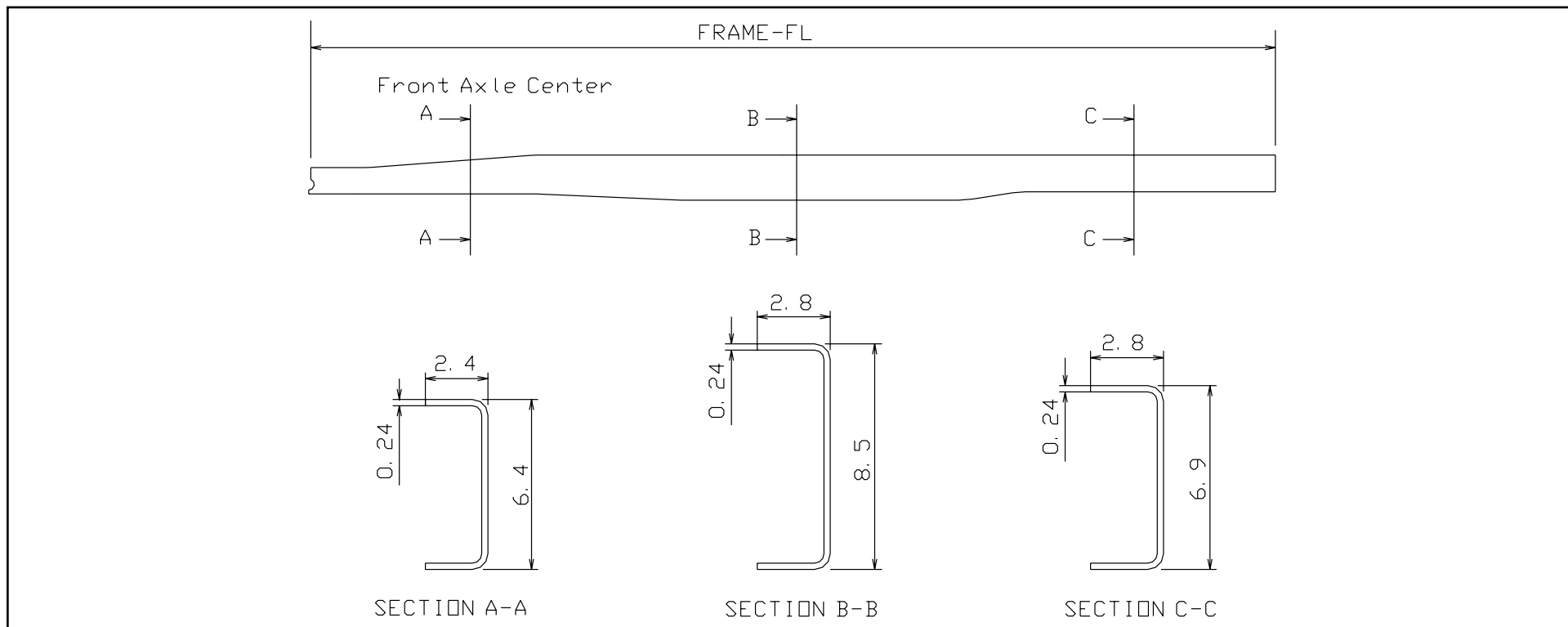


## Vehicle Specifications Index – NQR/W5500 Diesel Frame and Crossmember Specifications



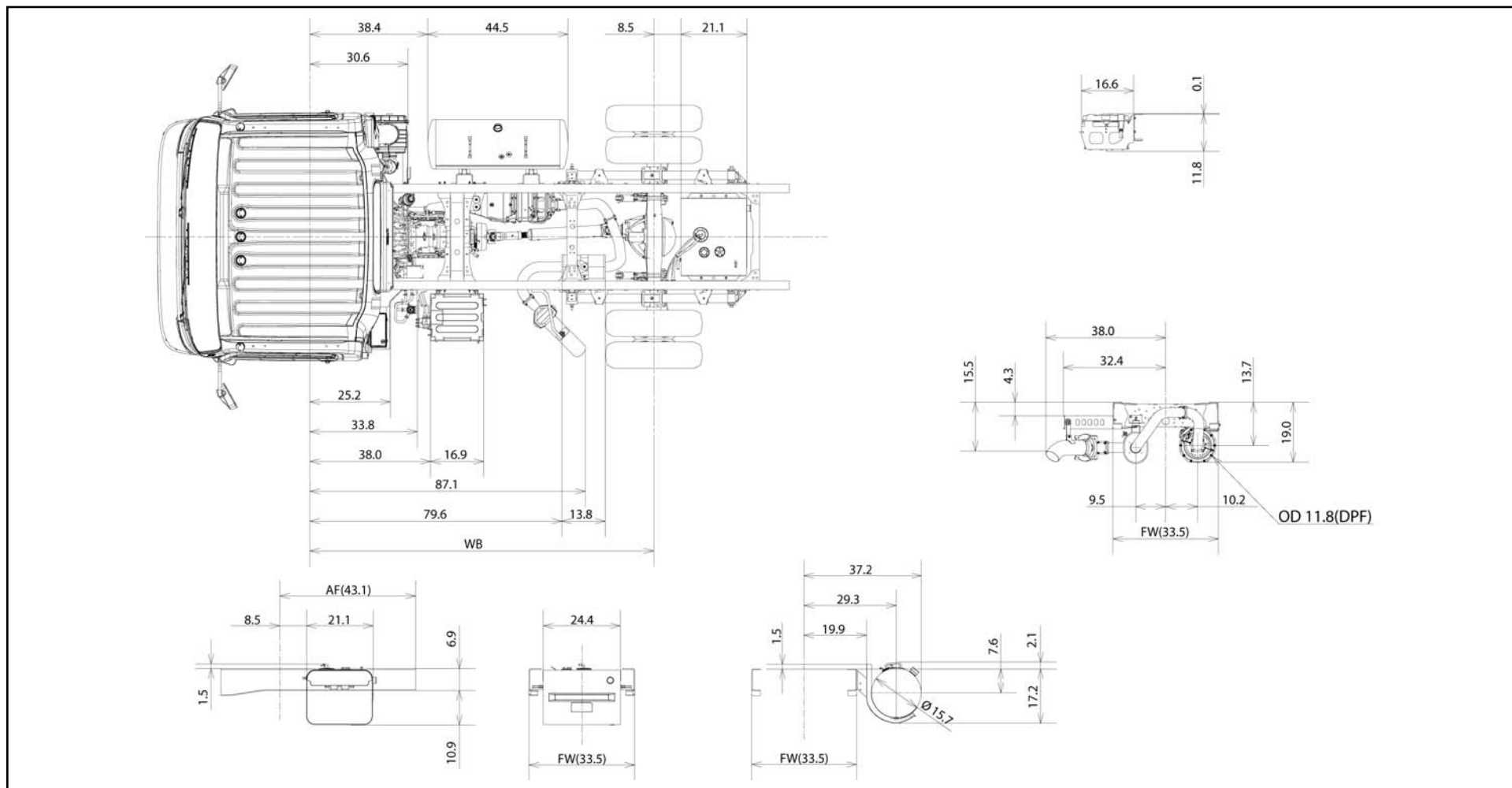
Wheelbase	Frame Thickness	Crossmember Type/Location											
		B	C	D		E		E2		F		G	
109	0.24	28.3	7.9	AA	46.5	-		-		CC	24.2	DD	33.8
132.5	0.24	28.3	7.9	AA	46.5	BB	57.5	-		CC	24.2	DD	33.8
150	0.24	28.3	7.9	AA	46.5	BB	57.9	-		CC	24.2	DD	33.8
176	0.24	28.3	7.9	AA	46.5	BB	74.4	-		CC	24.2	DD	33.8
200	0.24	28.3	7.9	AA	46.5	BB	98.4	BB	74.4	CC	24.2	DD	33.8

## Vehicle Specifications Index – NQR/W5500 Diesel Frame Chart



Wheelbase	Frame FL	Frame Thickness
109.0	182.5	0.24
132.5	206.1	0.24
150.0	223.8	0.24
176.0	249.8	0.24
200.0	273.8	0.24

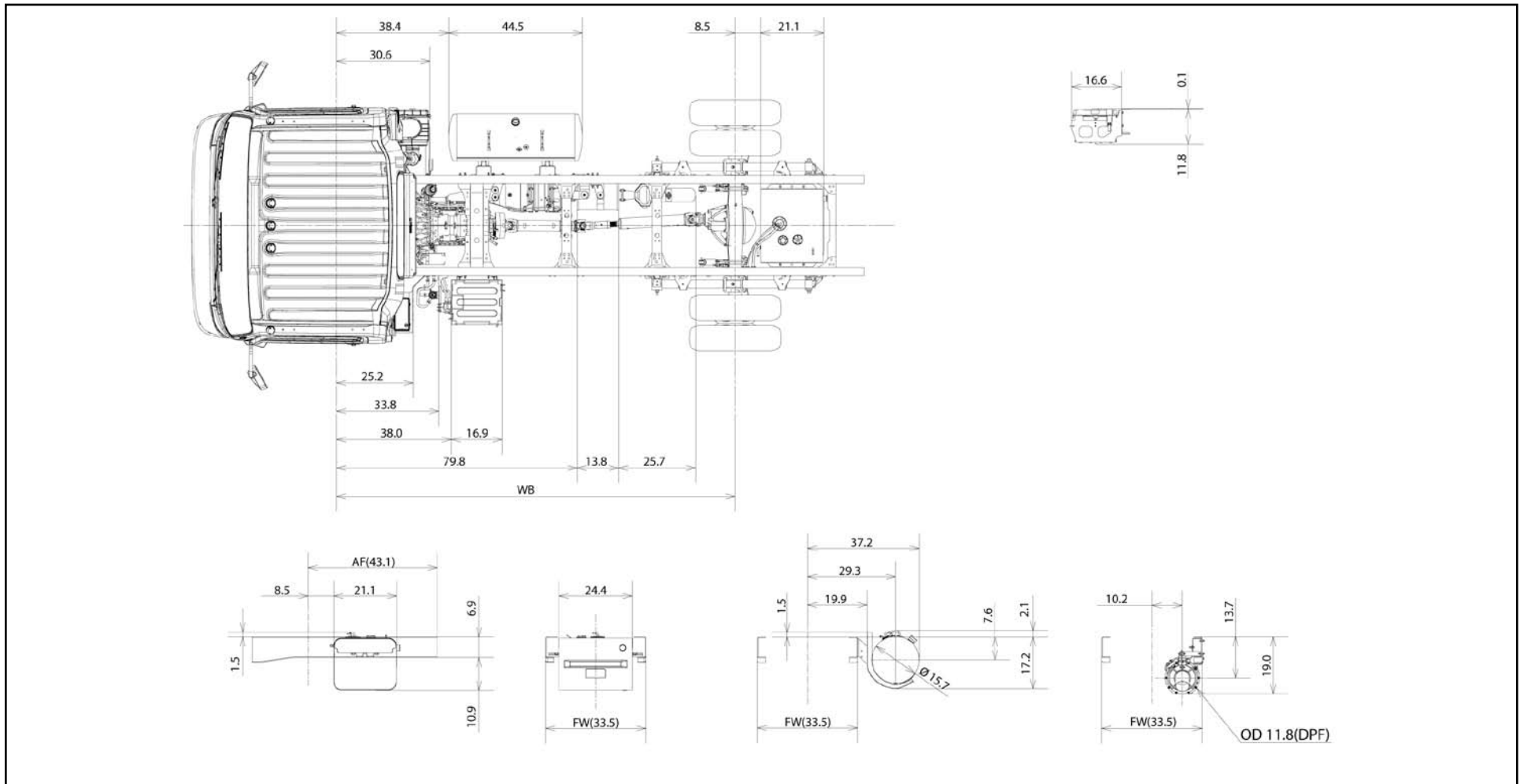
## Vehicle Specifications Index – NQR/W5500 Diesel Auxiliary Views 109" Wheelbase



**NOTE:** Frame-mounted fuel tank available on 109", 132.5", 150" and 176" WB as an option replacing the In-Frame Tank.

\* Allow 3" additional for battery box opening clearance.

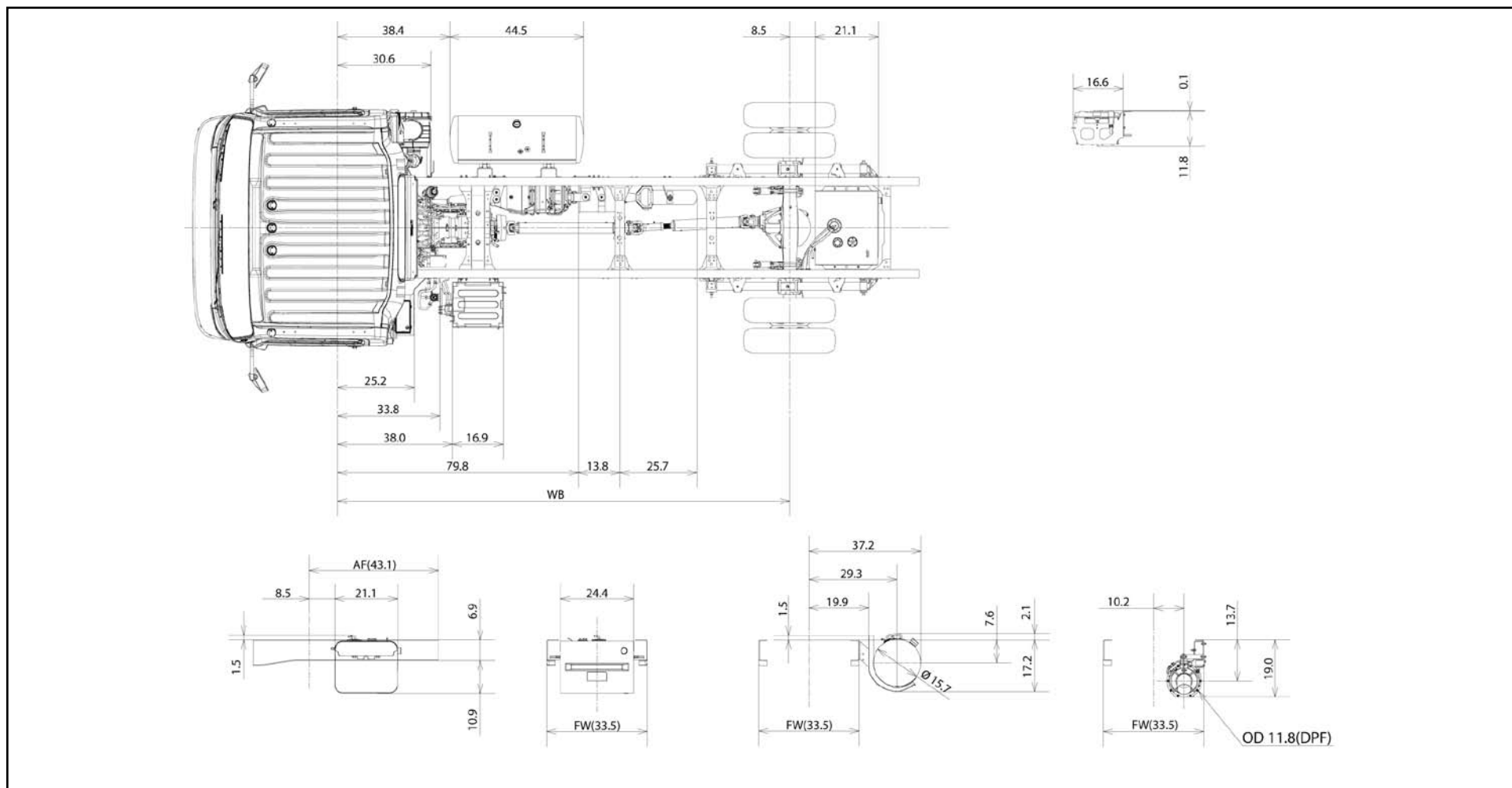
## Vehicle Specifications Index – NQR/W5500 Diesel Auxiliary Views 132.5" Wheelbase



**NOTE:** Frame-mounted fuel tank available on 109", 132.5", 150" and 176" WB as an option replacing the In-Frame Tank.

\* Allow 3" additional for battery box opening clearance.

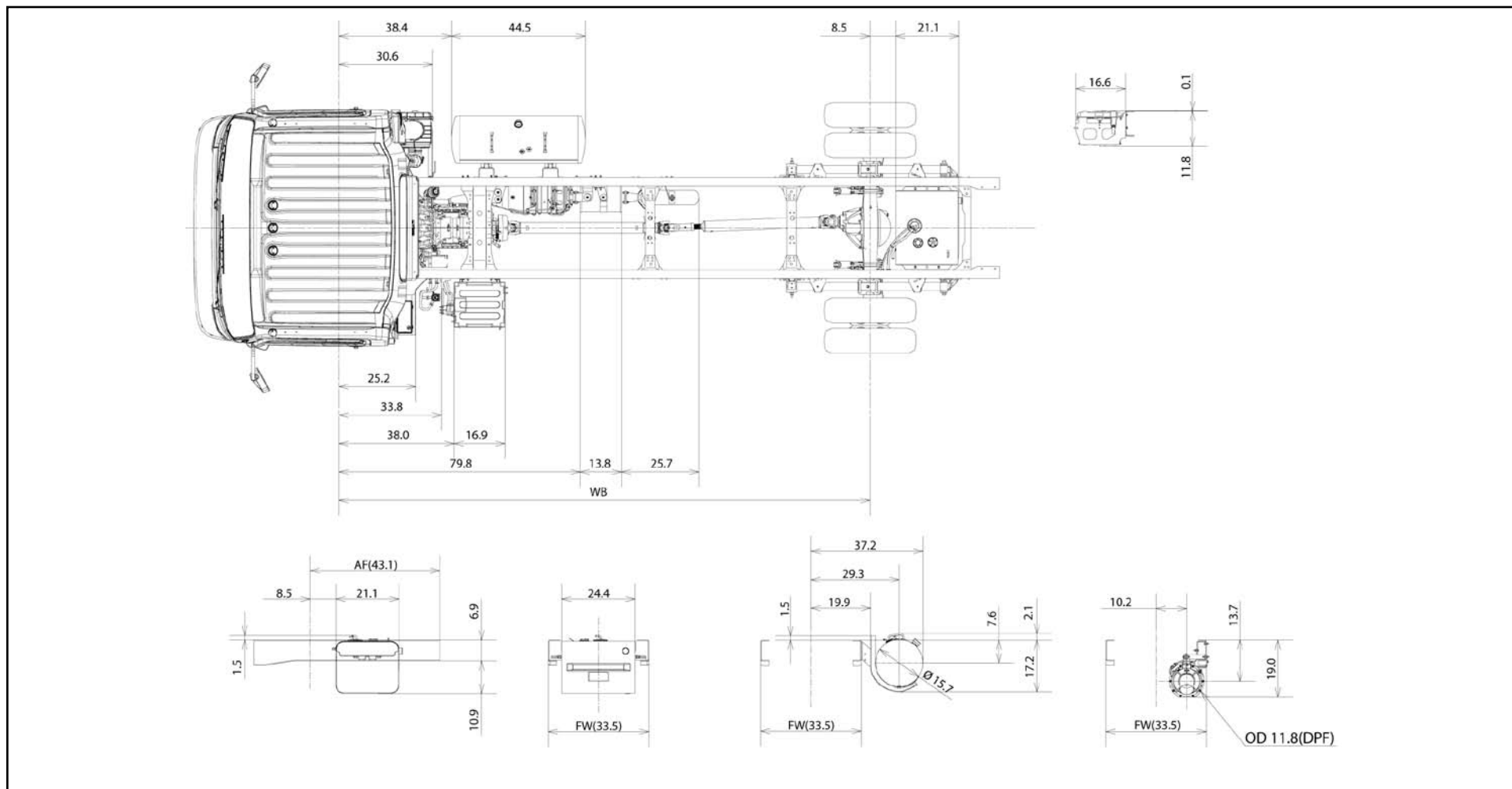
## Vehicle Specifications Index – NQR/W5500 Diesel Auxiliary Views 150" Wheelbase



**NOTE:** Frame-mounted fuel tank available on 109", 132.5", 150" and 176" WB as an option replacing the In-Frame Tank.

\* Allow 3" additional for battery box opening clearance.

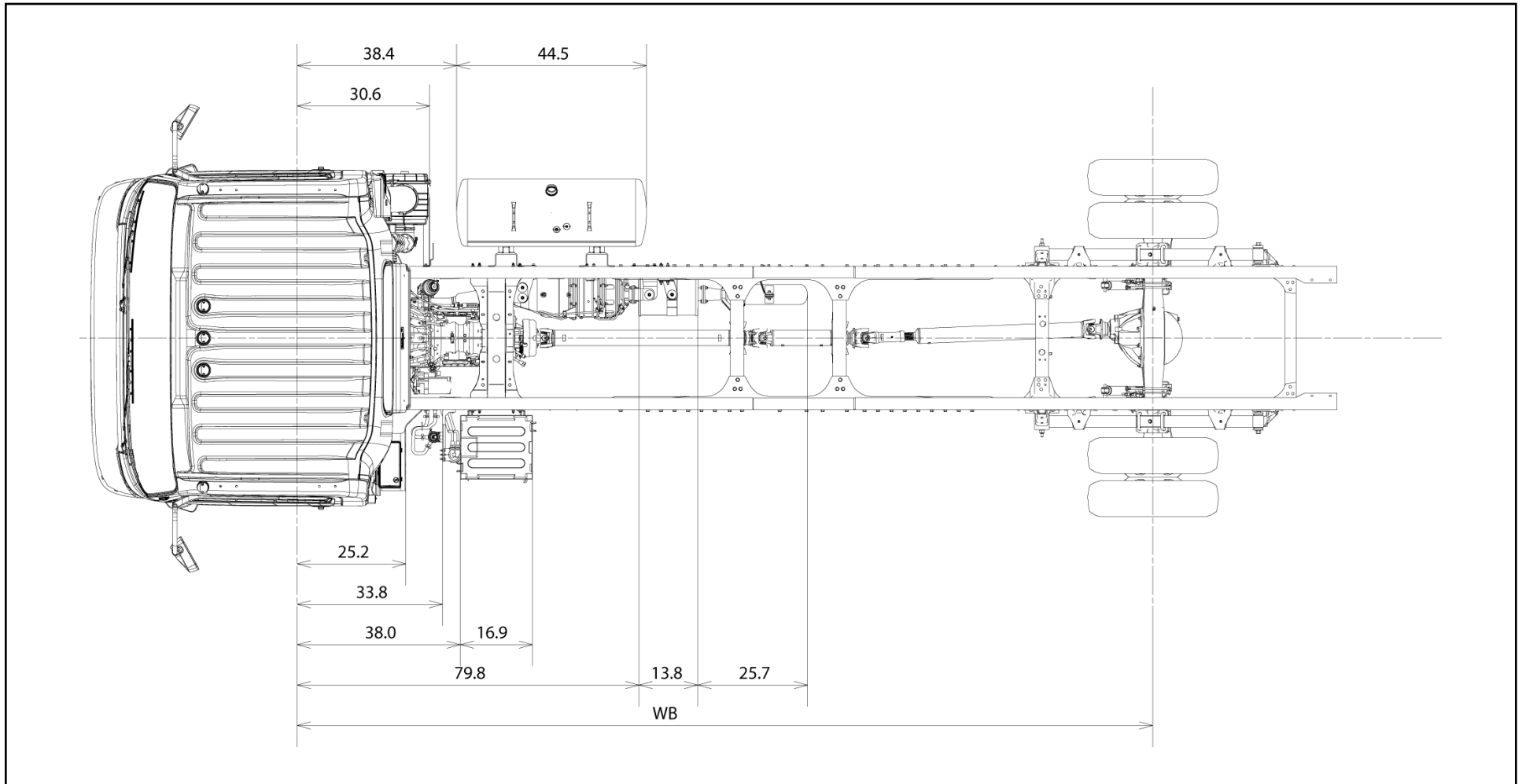
## Vehicle Specifications Index – NQR/W5500 Diesel Auxiliary Views 176" Wheelbase



**NOTE:** Frame-mounted fuel tank available on 109", 132.5", 150" and 176" WB as an option replacing the In-Frame Tank.

\* Allow 3" additional for battery box opening clearance.

## Vehicle Specifications Index – NQR/W5500 Diesel Auxiliary Views 200" Wheelbase



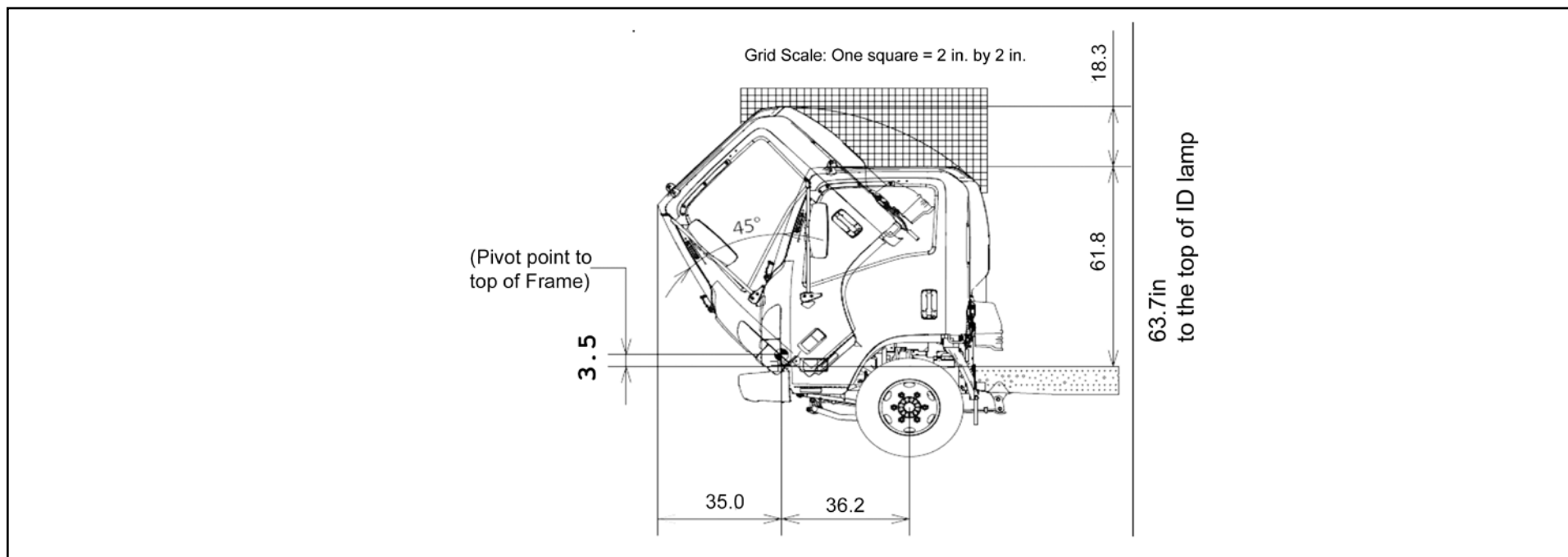
**NOTE:** Frame-mounted fuel tank available on 109", 132.5", 150" and 176" WB as an option replacing the In-Frame Tank.

\* Allow 3" additional for battery box opening clearance.

## Vehicle Specifications Index – NQR/W5500 Diesel Body Builder Weight Information Chart

GVWR	AXLE	Body Builder Weight Information Chart										UNSPRUNG
		Wheelbase										
		109		132.5		150		176		200		
		in frame tank	side tank	in frame tank	side tank	in frame tank	side tank	in frame tank	side tank	in frame tank	side tank	
	FRONT	3,936	4,167	4,063	4,249	4,129	4,301	4,214	4,362	N/A	4,423	661
17,950	REAR	2,317	2,034	2,266	2,028	2,236	2,027	2,206	2,027	N/A	2,021	1,190
	TOTAL	6,253	6,201	6,329	6,277	6,365	6,328	6,420	6,389	N/A	6,444	1,851

### Cab Tilt



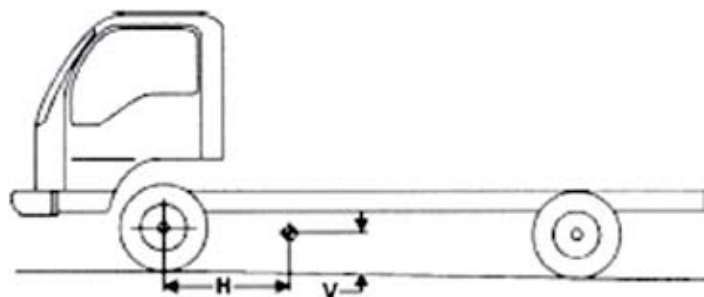


## Vehicle Specifications Index – NQR/W5500 Diesel Body Builder Weight Information Chart (cont'd)

### Center of Gravity

The center of gravity of the chassis cab.

GVWR	WB	V	H	
			IN FRAME TANK	SIDE TANK
17,950	109	25.0	40.4	35.8
	132.5	24.9	47.4	42.8
	150	24.9	52.7	48.1
	176	24.8	60.5	55.9
	200	24.8	n/a	55.9

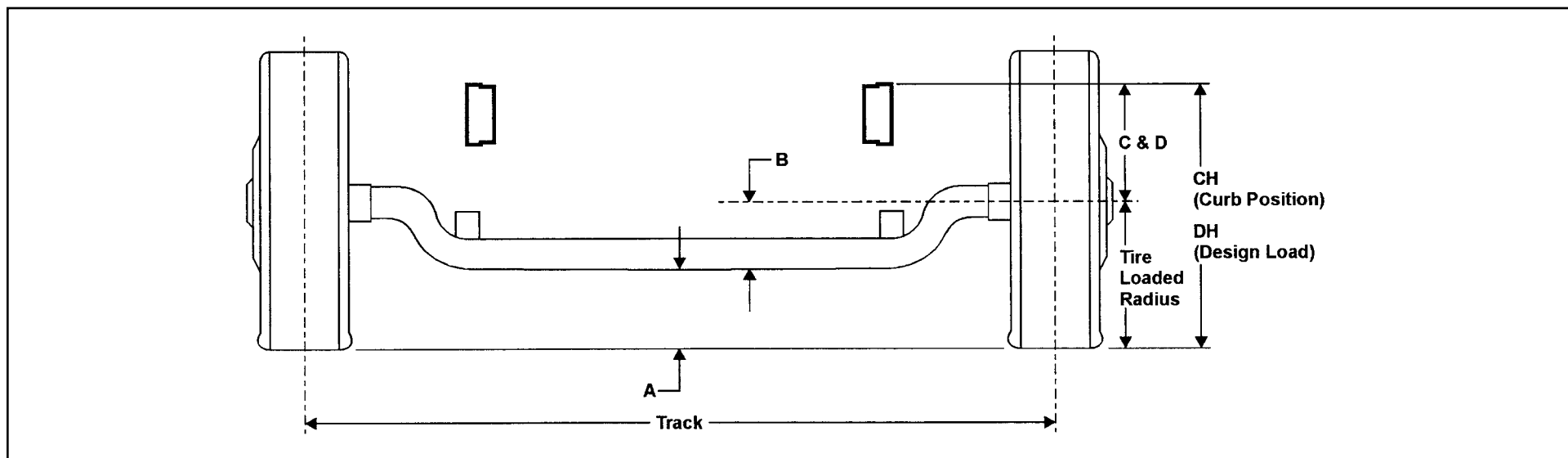


V = Vertical Center of Gravity  
H = Horizontal Center of Gravity

The center of gravity of the completed vehicle with a full load should not exceed 63 inches above ground level for the 17,950 lb. GVWR, and must be located horizontally between the centerlines of the front and rear axles.

**NOTE:** The maximum dimensions for a body installed on the NQR/W5500 are 102 inches wide (outside) by 90 inches high (inside). Any larger body applications must be approved by Isuzu Application Engineering. In the West Coast call 1-562-229-5314 and in the East Coast call 1-770-740-1620 X 262.

## Vehicle Specifications Index – NQR/W5500 Diesel Front Axle Chart

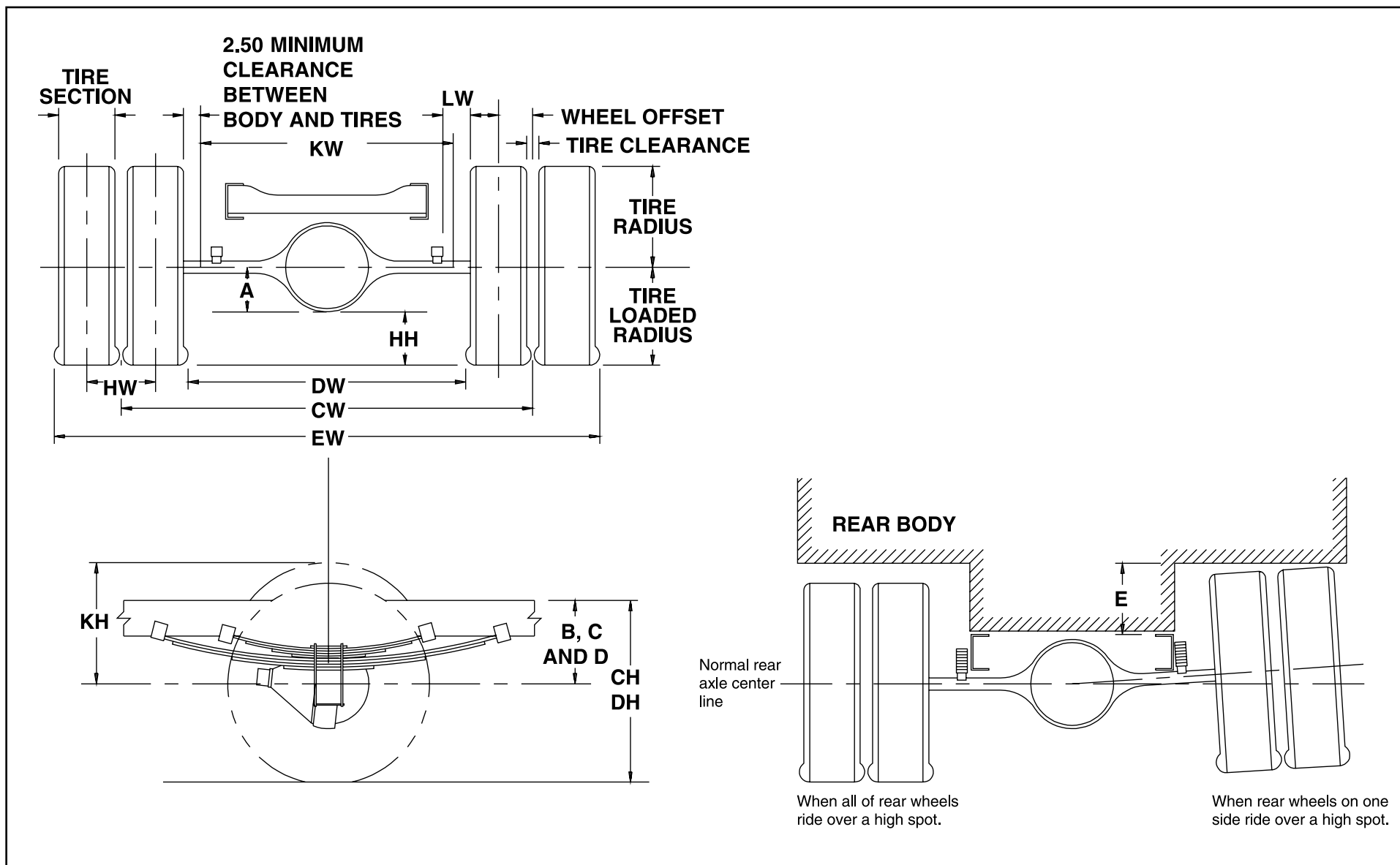


Formulas for calculating height dimensions:

- A = Tire Loaded Radius – B
- C = Centerline of Axle to Top of Frame Rail at Curb Position
- D = Centerline of Axle to Top of Frame Rail at Design Load
- CH = C + Tire Unloaded Radius
- DH = D + Tire Loaded Radius

Tire	GVWR	GAWR	A	B	C	D	CH	DH	Track	Tire Radius	
										Unload	Load
225/70R 19.5F	17,950 lbs.	6,830 lbs.	8.3	6.6	13	11.5	29	26.4	65.5	16	14.93

## Vehicle Specifications Index – NQR/W5500 Diesel Rear Axle Chart



## Vehicle Specifications Index – NQR/W5500 Diesel

### Rear Axle Specifications

Definitions			
A	Centerline of axle to bottom of axle bowl.	DH	Rear Frame Height: Vertical distance between the normal top of frame rail and the ground-line through the centerline of the rear axle at design load.
B	Centerline of axle to top of frame rail at metal-to-metal position.	DW	Minimum distance between the inner surfaces of the rear tires.
C	Centerline of axle to top of frame rail at curb position.	EW	Maximum Rear Width: Overall width of the vehicle measured at the outermost surface of the rear tires.
D	Centerline of axle to top of frame rail at design load.	HH	Rear Tire Clearance: Minimum clearance between the rear axle and the ground-line.
E	Rear Tire Clearance: Minimum clearance required for tires and chain measured from the top of the frame at the vehicle centerline of the rear axle, when rear wheels on one side ride over a high spot.	HW	Dual Tire Spacing: Distance between the centerlines of the minimum distance required for tire bounce as measured from the centerline of the rear axle and the top of the rear tire when one wheel rides over a high spot.
CH	Rear Frame Height: Vertical distance between the normal top of frame rail and the ground-line through the centerline of the rear axle at curb position.	CW	Track Dual Rear Wheel Vehicle: Distance between the centerlines of the dual wheels measured at the ground-line.
Tire Section, Tire Radius, Tire Loaded Radius, Tire Clearance		See Chart for values.	

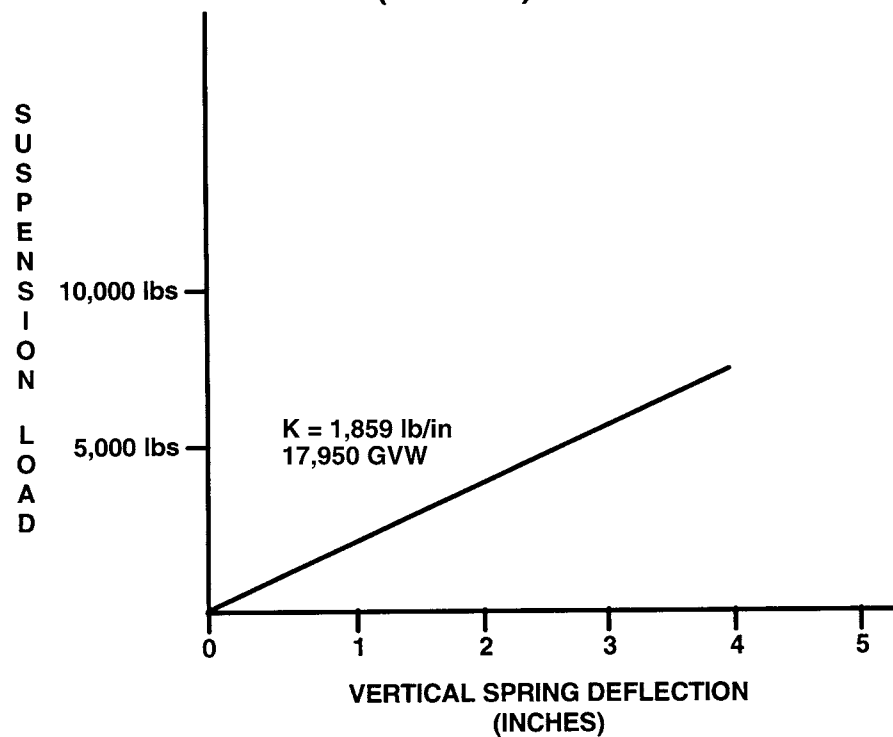
Formulas for Calculating Rear Width and Height Dimensions			
CW	= Track	HH	= Tire loaded radius – A
CH	= Tire loaded radius + C	JH	= KH – B
DH	= Tire loaded radius + D	KH	= Tire radius + 3.00 inches
DW	= Track + 2 tire sections – tire clearance	KW	= DW – 5.00 inches
EW	= Track + 2 tire sections + tire clearance	LW	= 1.00-inch minimum clearance between tires and springs

**NOTE:** Track and overall width may vary with optional equipment.

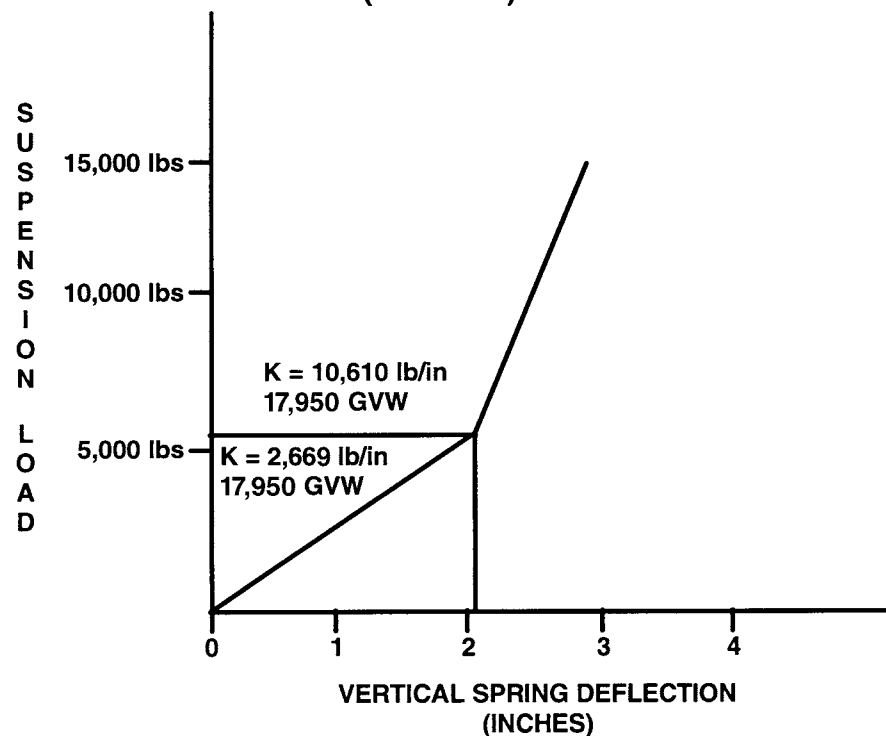
Tire	GAWR	Track CW	A	B	C	D	E
225/70R 19.5F	12,980 lbs.	65.0	7.7 (A/T)	9.3 (A/T)	15.3	13.4	8.4

## Vehicle Specifications Index – NQR/W5500 Diesel Suspension Deflection Charts

Front Leaf Spring Load vs. Deflection  
(Per Axle)



Rear Leaf Spring Load vs. Deflection  
(Per Axle)



## Vehicle Specifications Index – NQR/W5500 Diesel

### Tire & Disc Wheel Chart

#### **Tire**

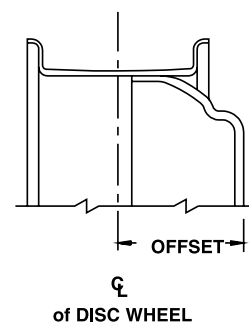
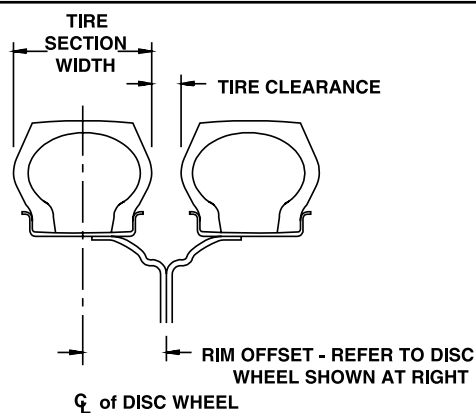
Tire Size	Tire Load Limit and Cold Inflation Pressures				Maximum Tire Load Limits		GVWR (Lb.)
	Single		Dual		Front	Rear	
	Lb.	PSI	Lb.	PSI	2 Single	4 Dual	
225/70R 19.5F	3,450	90	3,245	90	6,900	12,980	17,950

Tire Size	GVWR (Lb.)	Tire Radius				Tire Section Width	Tire Clearance	Design Rim Width
		Loaded		Unloaded				
		Front	Rear	Front	Rear			
225/70R 19.5F	17,950	14.93	14.98	16.00	16.00	8.7	1.3	6.0

#### **Disc Wheel**

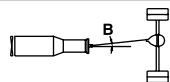
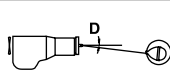
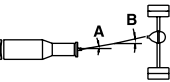
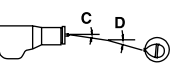
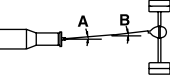
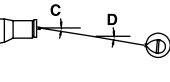
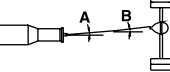
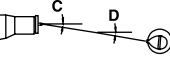
Wheel Size	Bolt Holes	Bolt Circle Dia.	Ft./Rr. Nut Size*	Rear Stud Size*	Nut/Stud Torque Specs.	Inner Circle	Outside Offset	Disc Thickness	Rim Type	Material Mfg.
19.5 x 6.00 RW	6 JIS	8.75	1.6142 (41 mm) BUD HEX	0.8268 (21 mm) SQUARE	325 ft-lb. (440 N•m)	6.46	5.0	0.35	15° DC	Steel TOPY

\*O.D. Wrench Sizes



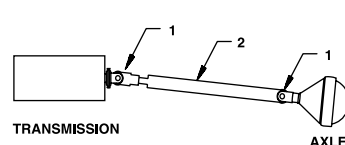
## NQR/W5500 Diesel – Vehicle Specifications Index

### Propeller Shaft

WB	PLANE VIEW	SIDE VIEW
109 in		
132.5 in		
150 in		
176 in		

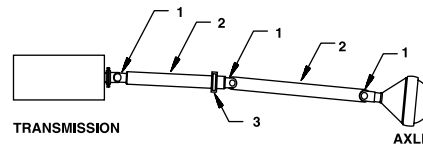
TYPICAL INSTALLATIONS SHOWING YOKES "IN PHASE." "IN PHASE" MEANS THAT THE YOKES AT EITHER END OF A GIVEN PROPELLER SHAFT ASSEMBLY ARE IN THE SAME PLANE.

**NPR EFI**  
(109 in WB)



- 1. UNIVERSAL JOINT
- 2. PROPELLER SHAFT
- 3. CENTER CARRIER BEARING

(132.5 in, 150 in and 176 in WB)



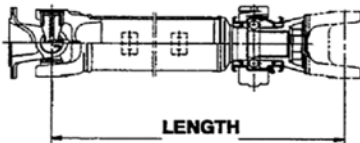
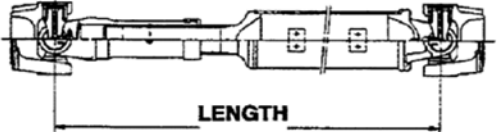
Wheelbase	Plane View		Side View	
	A	B	C	D
	Auto. Trans.	Auto. Trans.	Auto. Trans.	Auto. Trans.
109 in.	—	3.2°	—	8.4°
132.5 in.	0°	3.3°	2.6°	2.7°
150 in.	0°	3.3°	1.8°	1.8°
176 in.	0°	2.2°	0.4°	3.5°
200 in.	0°	2.2°	0.4°	3.5°

**NOTE:** All driveline angles are at unloaded condition (curb position with typical cargo body).

## NQR/W5500 Diesel – Vehicle Specifications Index

### Propeller Shaft (cont'd)

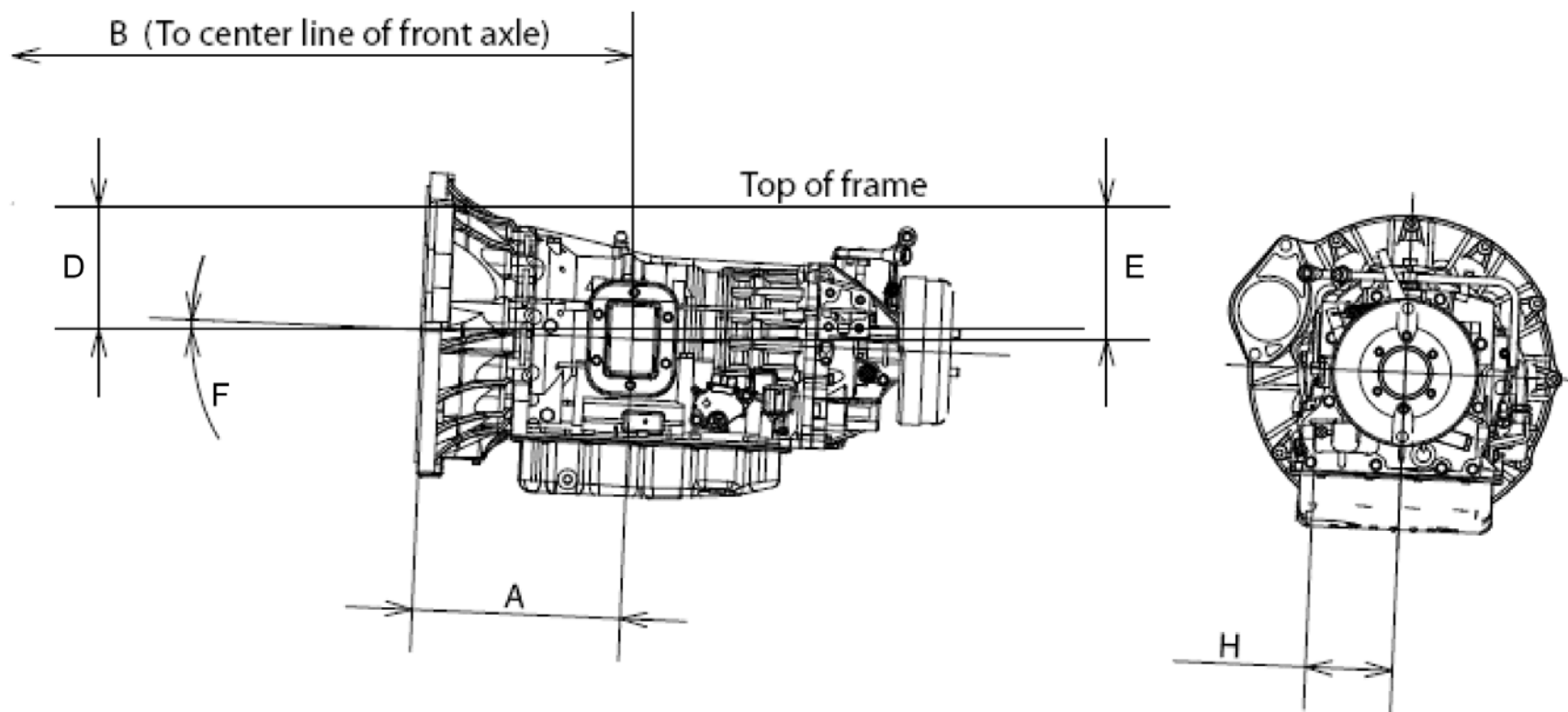
Trans. Type	6 Automatic Transmission				
Wheelbase	109	132.5	150	176	200
No. of Shafts	1	2	2	2	3
Shaft #1 O.D.	3.54	3.54	3.54	3.54	3.54
Thickness	0.126	0.126	0.126	0.126	0.126
Length	36.81	24.13	35.93	45.37	45.37
Type	B	A	A	A	A
Shaft #2 O.D.	N/A	3.54	3.54	3.54	3.54
Thickness	N/A	0.126	0.126	0.126	0.126
Length	N/A	36.81	36.81	53.23	24
Type	N/A	B	B	B	A
Shaft #3 O.D.	N/A	N/A	N/A	N/A	3.54
Thickness	N/A	N/A	N/A	N/A	0.126
Length	N/A	N/A	N/A	N/A	53.2
Type	N/A	N/A	N/A	N/A	B

Type	Description	Illustration
Type A	1 <sup>st</sup> shaft in 1-piece driveline 1 <sup>st</sup> & 2 <sup>nd</sup> shaft in 3-piece driveline	
Type B	1 <sup>st</sup> shaft in 1-piece driveline 2 <sup>nd</sup> shaft in 2-piece driveline 3 <sup>rd</sup> shaft in 3-piece driveline	



## NQR/W5500 Diesel – Vehicle Specifications Index PTO Location, Drive Gear and Opening Information

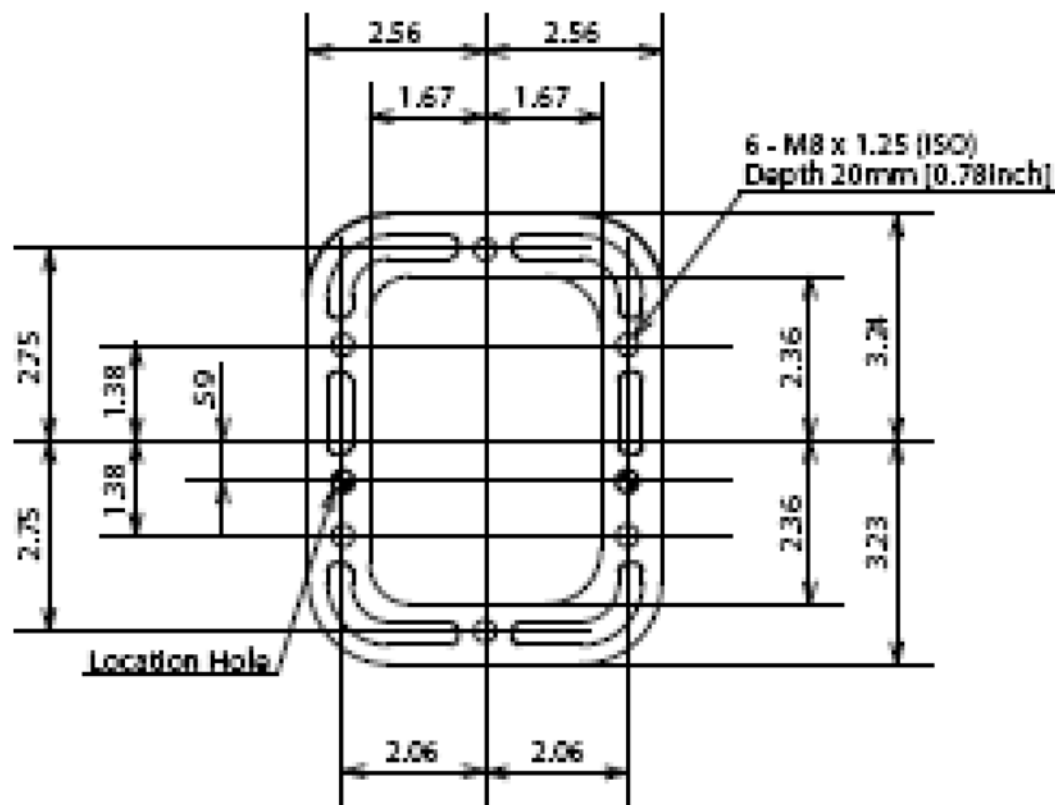
### AUTOMATIC TRANSMISSION



## NQR/W5500 Diesel – Vehicle Specifications Index PTO Location, Drive Gear and Opening Information

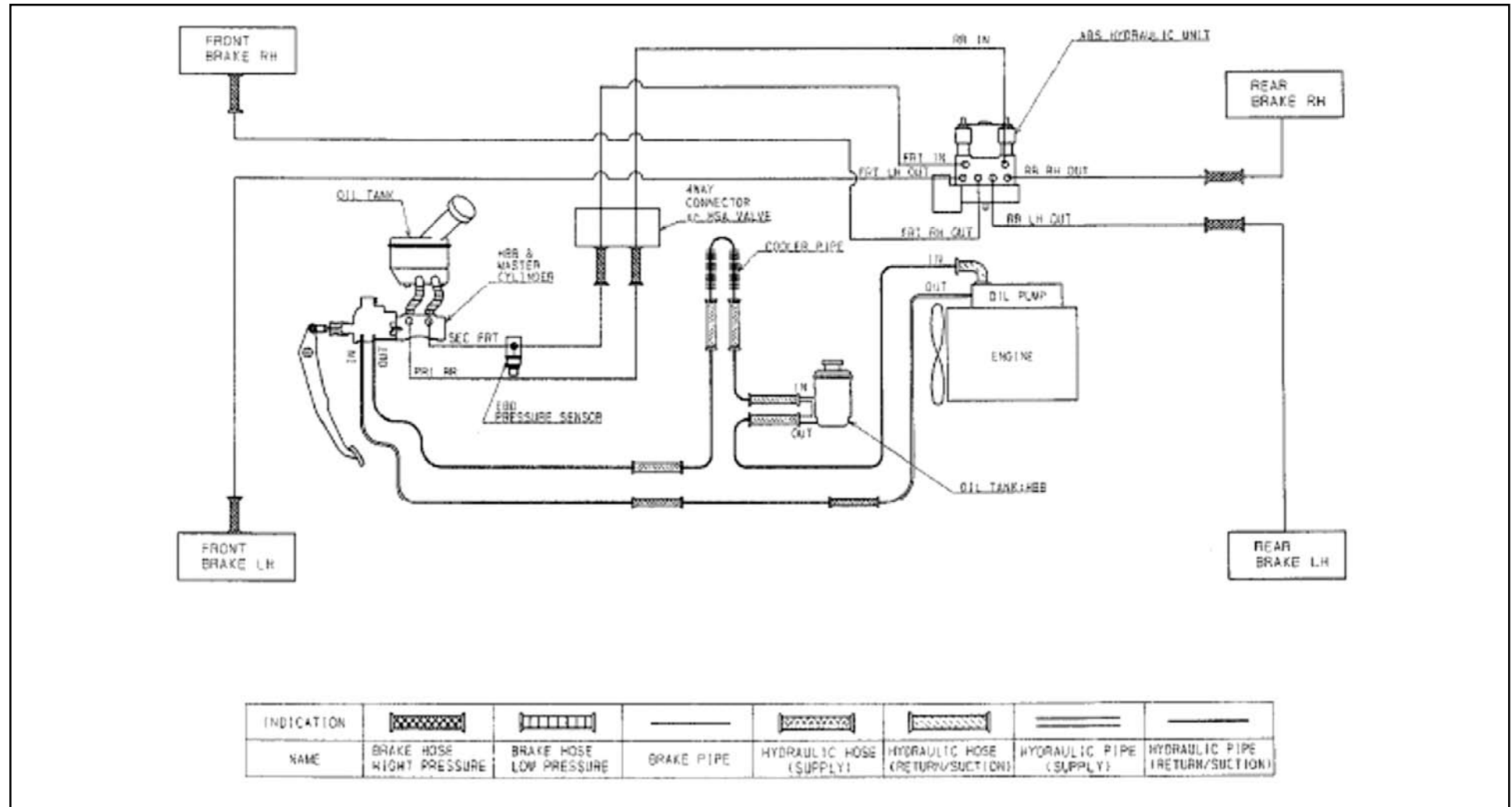
Trans.	Opening Location	Bolt Pattern	A	B	C	D	E	F	H	PTO Drive Gear Location	Ratio of PTO Drv. Gear Spd. to Eng. Spd.	No. of Teeth	Pitch	Helix Angle	Max. Output Torque
Aisin	Left	(Dr 2)	12.35	36.89	0	7.85	7.31	2.5 <sup>0</sup>	5.16	PTO Gear	1:1 with turbine	69	N/A	0 <sup>0</sup>	134 lbs.-ft. @ 1,700 RPM

### Opening Diagram



## NQR/W5500 Diesel – Vehicle Specifications Index Brake System Diagram, Hydraulic Brake Booster

Please refer to introduction section of book for antilock system cautions and wheelbase modification requirements.



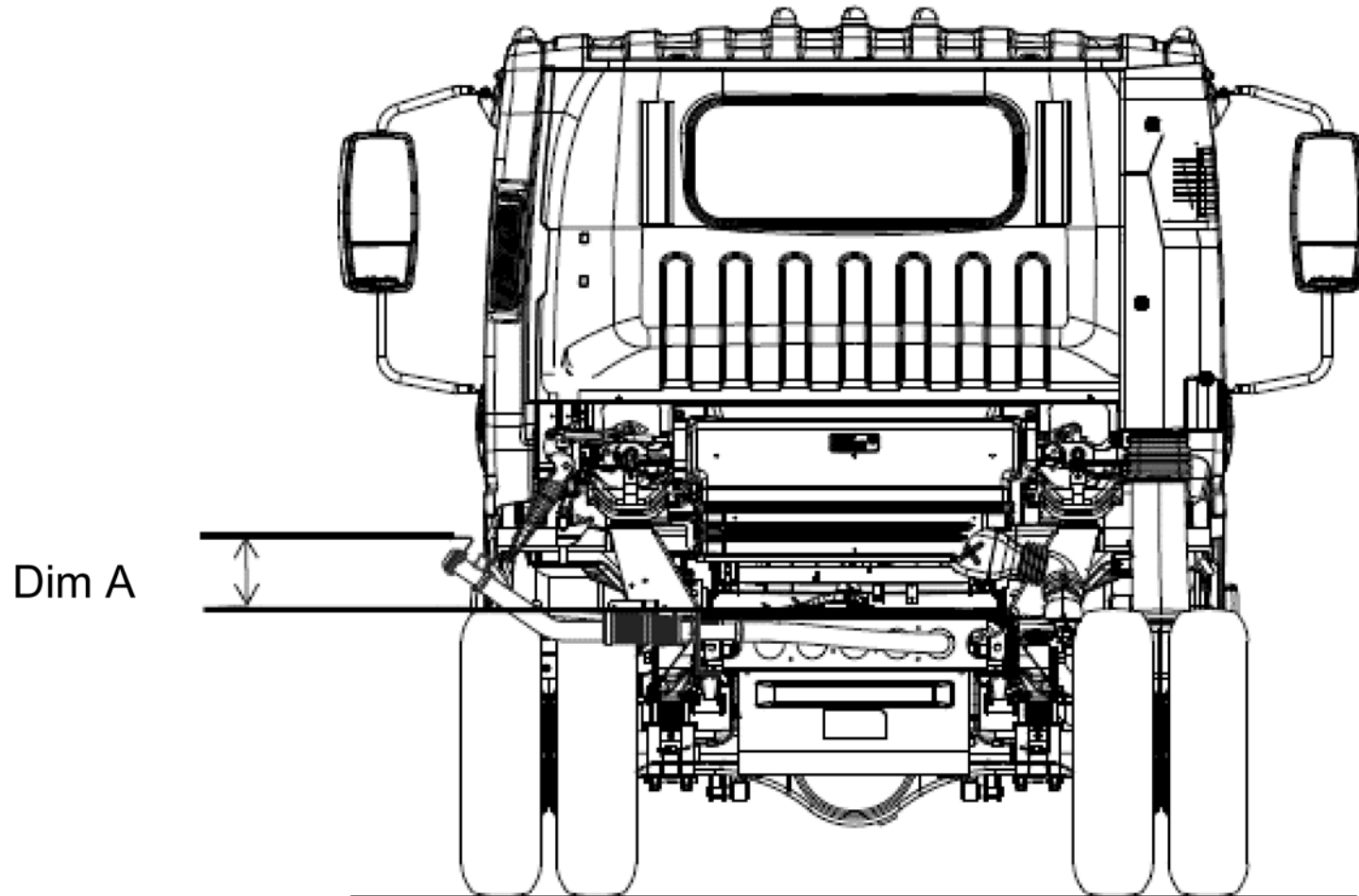
## NQR/W5500 Diesel – Vehicle Specifications Index

### Diesel Fuel Fill

#### ***Installation Instructions***

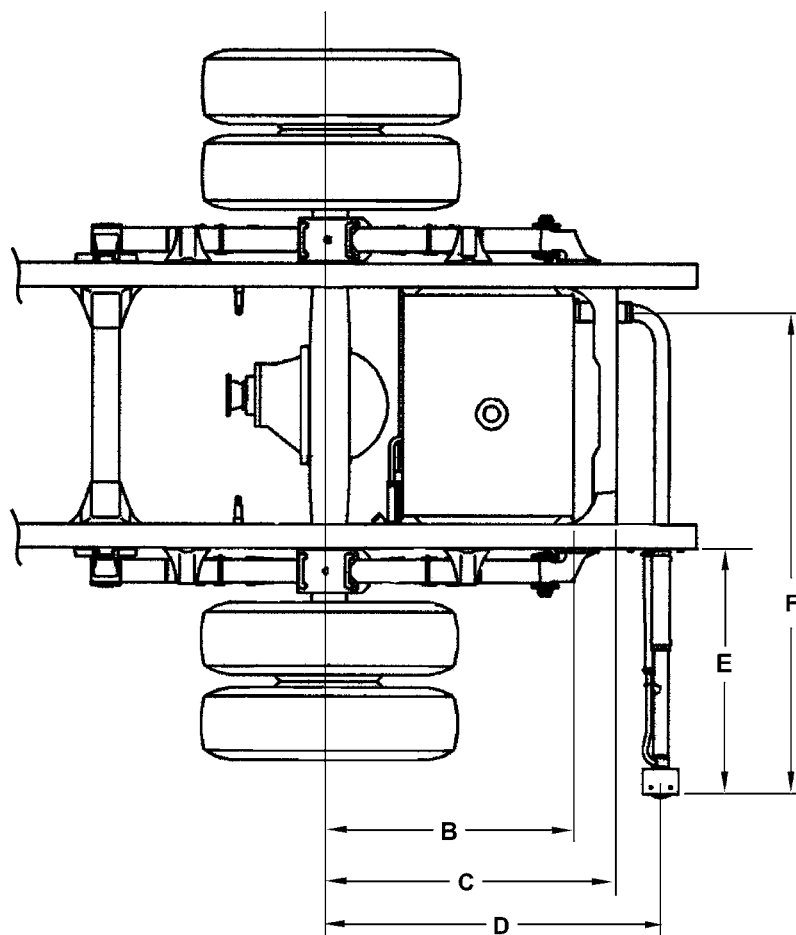
1. Disconnect battery.
2. Loosen hose from the tie downs. Remove caps from plate on rail.
3. Install hoses onto the plate.
4. Extend hose out from the driver side of the rail to body rail.
5. The filler neck must be mounted to allow the fill plate bracket to be parallel to the frame horizontal (see figure 4).
6. Cover with protector wrap and secure with tie wraps.
7. Filler hose is set for 102 inches outside width body.
8. Filler neck (dimension A) must be between 6.85 inches and 8.5 inches above frame.
9. Secure the filler plate to the bottom of the body and check for leaks.
10. Ensure that fill hose does not sag, creating an area where the fuel could pool in the fill hose.
11. Reconnect battery.

## NQR/W5500 Diesel – Vehicle Specifications Index Rear View Fuel Fill



## NQR/W5500 Diesel – Vehicle Specifications Index

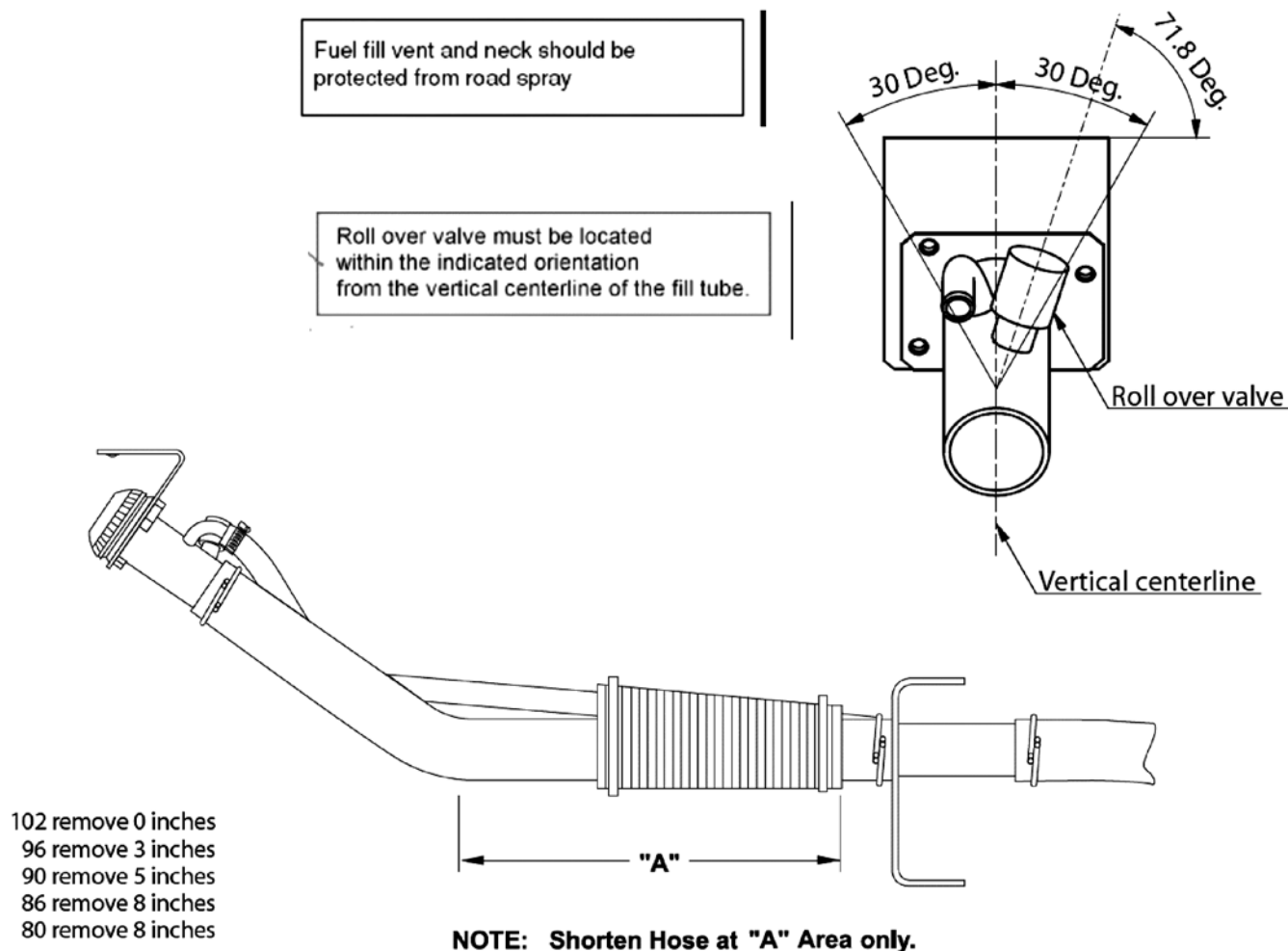
### Top View Fuel Fill



Dimensions:

B = 29.75 inches (756 mm)  
C = 34.00 inches (863 mm)  
D = 39.29 inches (998 mm)  
E = 33.86 inches (860 mm)  
F = 59.60 inches (1,514 mm)

## NQR/W5500 Diesel – Vehicle Specifications Index – Hose Modification for Various Width Bodies and Fuel Fill Vent Orientation and Protection



## NQR/W5500 Diesel – Vehicle Specifications Index Ultra Low Suphur Diesel Label

Per EPA Title 40, Part 86, 86:007—35(c),  
The decal illustrated below must be installed on the vehicle.  
The decal is included in the fuel fill parts box.

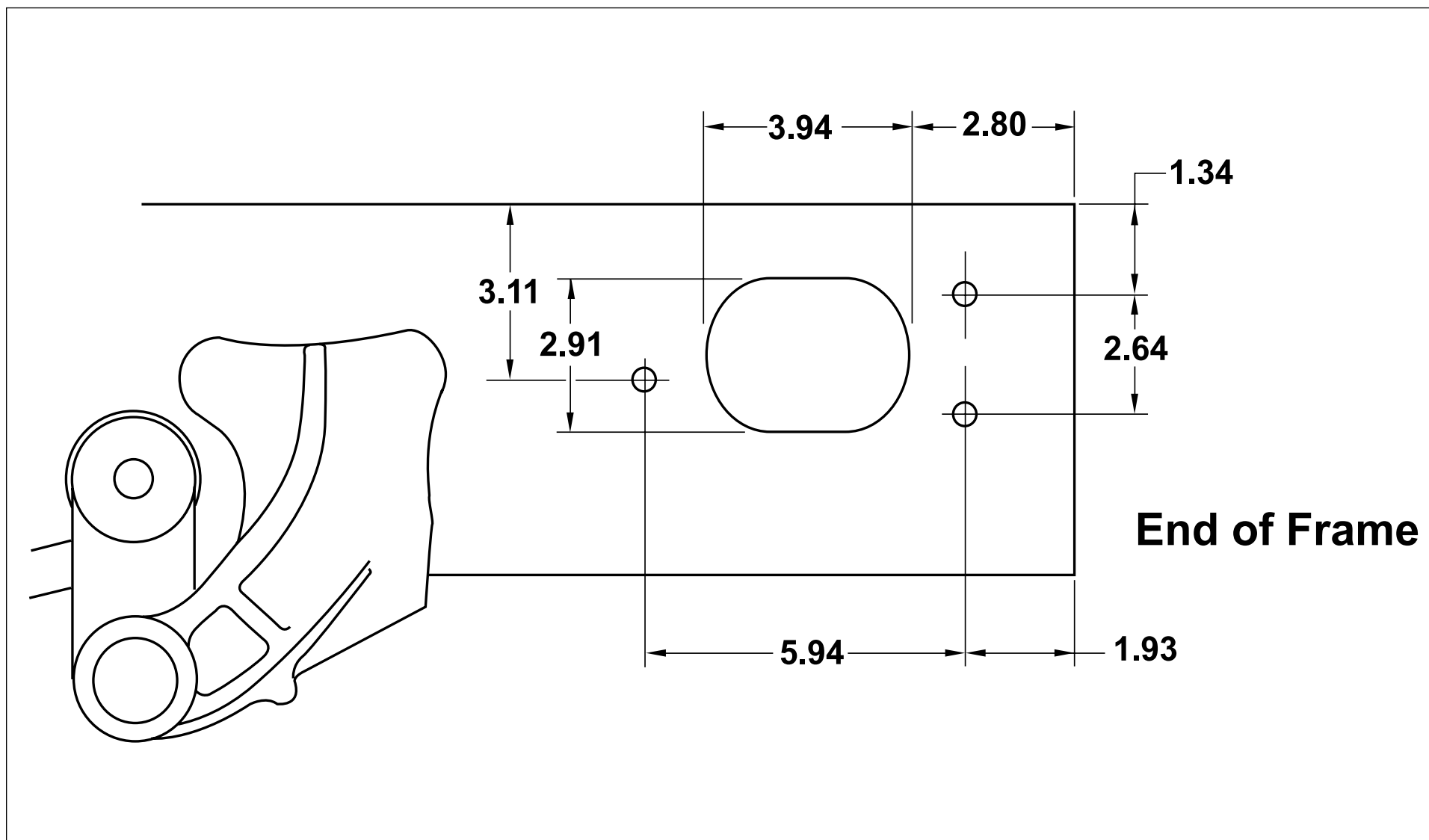


### **INSTRUCTIONS FOR DECAL PLACEMENT:**

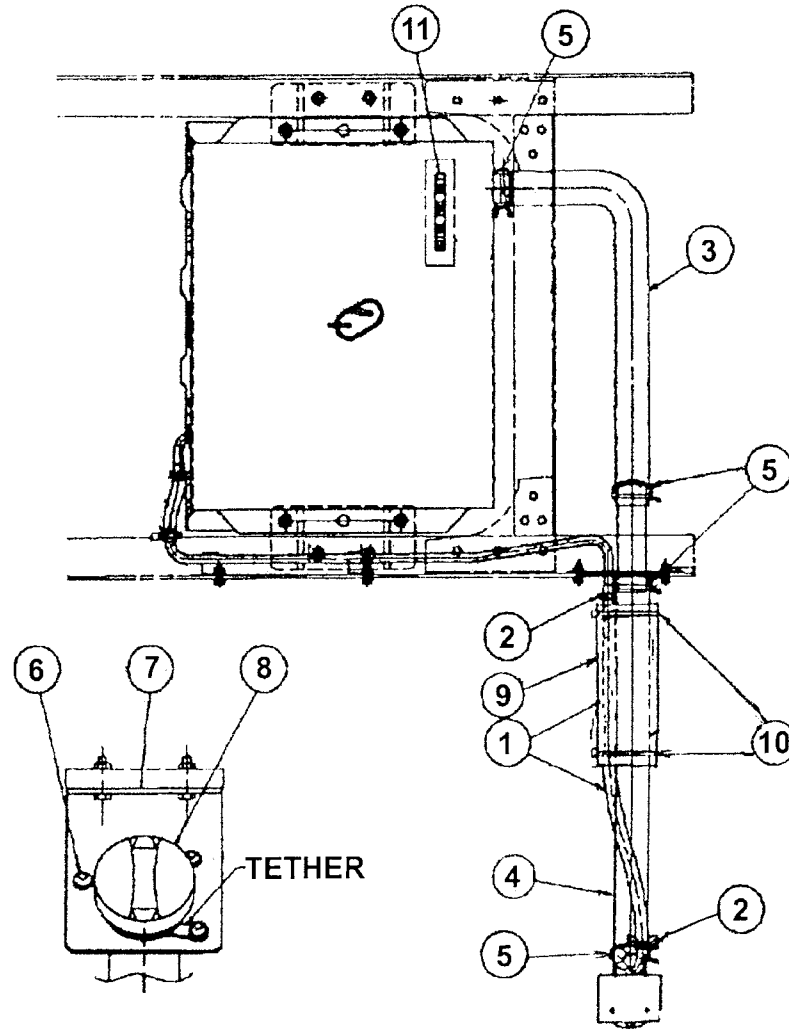
1. The decal must be placed as close as possible to the fuel inlet and be clearly visible.
  2. The decal should be placed above or to the side of the fuel cap to avoid corrosion by possible contact with fuel.
  3. The decal may be placed on aerodynamic fairings, bodies, etc. as long as the decal is clearly visible and in close proximity to the fuel inlet.
  4. For installed bodies that have a fuel door, the decal should be placed above or to the side of the fuel door.
- Thoroughly clean the area of all grease, dirt, etc. before application of the decal. Apply the decal at room temperature, 65° to 75° F.



## NQR/W5500 Diesel – Vehicle Specifications Index Through the Rail Fuel Fill Frame Hole



## NQR/W5500 Diesel – Vehicle Specifications Index Fuel Fill Parts Illustration



## NQR/W5500 Diesel – Vehicle Specifications Index

### Fuel Fill Parts List

Number	Description	Part Number – Isuzu	Part Number – GM	Quantity
1	Breather Hose	898006-4510	N/A	1
2	Clip, Rubber Hose	894242-0340	94242034	2
3	Hose, Fuel Filler	897187-8750	97187875	1
4	Hose, Fuel Filler	897253-1400	97253140	1
5	Clip, Filler Hose	894435-8760	97724373	4
6	Screw, Filler Hose	894384-6460	N/A	3
7	Bracket, Filler Neck	897116-621Y	97116621	1
8	Cap, Filler	897218-7020	N/A	1
9	Protector	897114-0630	97114063	1
10	Clip	109707-1071	94062296	2
11	Caution Plate	N/A	15798339	1

# 2009 GM/Isuzu TRUCK

PAGE 213

## NPR-HD/W4500, NQR/5500, Crew Cab Diesel – Vehicle Specifications Index Specifications

Model	NPR HD Diesel/W4500 Crew Cab	NQR Diesel/W5500 Crew Cab
GVWR	14,500 lb	17,950 lbs.
WB	150 in, 176 in.	
Engine	Isuzu 4-cylinder, in-line 4-cycle, turbocharged, intercooled, direct injection diesel.	
Model/Displacement	4HK1-TC/317 CID (5.19 liters)	
HP (Gross)	205 HP @ 2,400 rpm	
Torque (Gross)	441 lb-ft torque @ 1,850 rpm	
Equipment	Dry element air cleaner with vertical intake; 2 rows 569 square in. radiator; 7 blade 20.1 in diameter fan with viscous drive. Cold weather starting device and an oil cooler. Engine oil level check switch and light. Engine warning system with audible warning for low oil pressure, high coolant temperature, and low coolant level. Engine cruise control and engine idle up function.	
Transmission	Aisin A465 6 speed automatic transmission with fifth and sixth gear overdrive with lock up in 2nd, 3rd, 4th, 5th and 6th, PTO capability.	
Steering	Integral power steering 18.8-20.9:1 ratio. Tilt and telescoping steering column.	
Front Axle	Reverse Elliot "I"-Beam rated at 6,830 lbs.	
Suspension	Semi-elliptical steel alloy tapered leaf springs with stabilizer bar and shock absorbers.	
GAWR	5,360 lbs.	6,830 lbs.
Rear Axle	Full-floating single speed with hypoid gearing rated at 14,550 lb.	
Suspension	Semi-elliptical steel alloy multi-leaf springs and shock absorbers.	
GAWR	9,880 lbs.	12,980 lbs.
Wheels	16 x 6.0	6-hole disc wheels, painted white. 19.5 x 6.0
Tires	215/85R 16-E (10 pr)	tubeless steel-belted radials, all-season front and rear. 225/70R-19.5E (12 ply)
Brakes	Dual circuit vacuum assisted hydraulic service brakes with EBD (Electronic Brake Distribution) system for load proportioning of the brake system front disc and self-adjust outboard mounted drum rear. The parking brake is a mechanical, cable actuated, internal expanding drum type, transmission mounted. The exhaust brake is standard and is vacuum operated. 4 channel anti-lock brake system.	

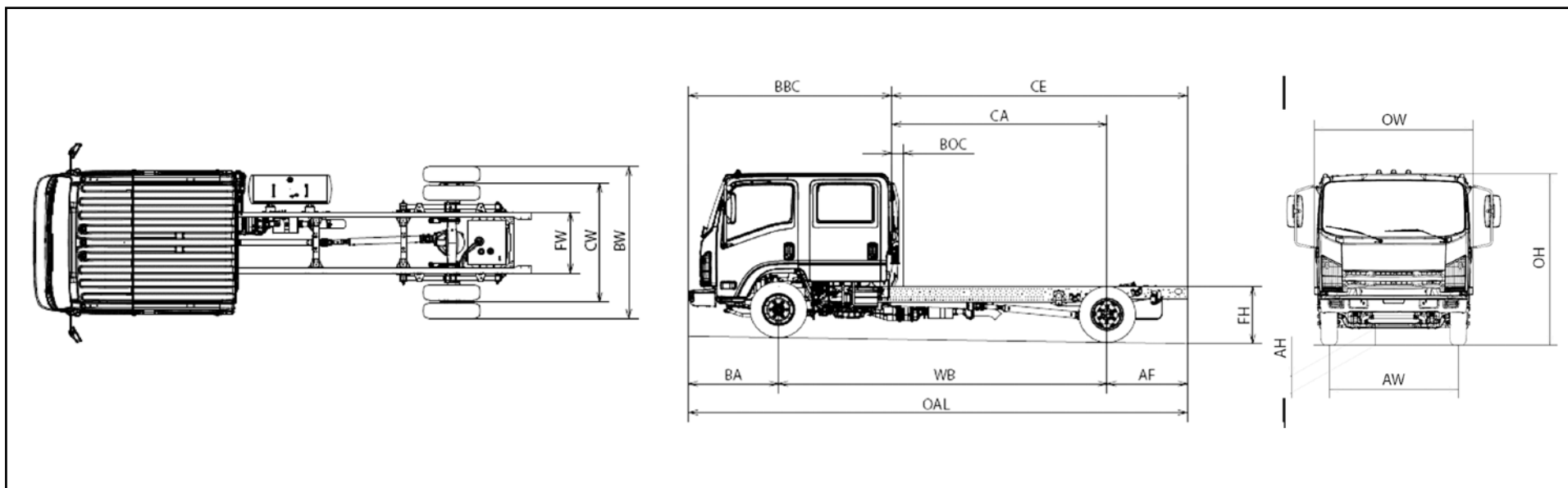
**NOTE:** These selected specifications are subject to change without notice.

## NPR-HD/W4500, NQR/5500, Crew Cab Diesel – Vehicle Specifications Index Specifications (cont'd)

Model	NPR HD Diesel/W4500 Diesel	NQR Diesel/W5500 Diesel
Fuel Tank	30 gal. rectangular steel fuel tank mounted in frame rail behind rear axle. Fuel water separator with dash mounted indicator light.	
Frame	Ladder type channel section straight frame rail 33.5 inches wide through the total length of the frame. Yield strength 44,000 psi, section modulus 11.89 in., RBM 523,160.	
Cab	All-steel 7 passenger low cab forward BBC 109.9 in.	
Equipment	TRICOT and Jersey Knit combination cloth covered high back driver's seat with two occupant passenger seat. Four passenger rear bench seat. Dual cab mounted exterior mirrors with integral convex mirror. Tilt and telescoping steering column. Power windows and door locks, front floor mat, tinted glass.	
Electrical	12-volt, negative ground, dual Delco maintenance free batteries, 750 CCA each, 110-Amp alternator with integral regulator. AM/FM CD stereo radio, engine block heater; engine oil pan heater, fuel tank mounted on right hand rail (33 gal), Options spare wheel, wheel simulators, air conditioning, PTO enable switches, back up alarm, heated mirrors, hour meter and engine shutdown, mirror brackets for 102" wide body, fire extinguisher and triangle kit mounted under rear seat, rear cab heater, Chrome Grille, and Limited Slip Differential.	

**NOTE:** These selected specifications are subject to change without notice.

## Vehicle Weights, Dimensions and Ratings



## NPR-HD/W4500, NQR/5500, Crew Cab Diesel – Vehicle Specifications Index Specifications (cont'd)

NPR HD/W4500 Variable Chassis Dimensions					
Unit	WB	CA*	CE*	OAL	AF
Inch	150.0	88.5	131.6	241.5	43.1
Inch	176.0	114.5	157.6	267.5	43.1

\*Effective CA & CE are CA or CE less BOC.

NPR HD/W4500 Dimension Constants					
Code	Inches	Code	Inches	Code	Inches
AH	7.5	BW	83.3	FH	31.8
AW	65.6	CW	65.0		
BA	48.4	FW	33.5		
BBC	109.9	OH	90.0		
BOC	5.0	OW	81.4		

NPR HD/W4500 In-Frame Tank 14,500-lb. GVWR Automatic Transmission Model Chassis Cab and Maximum Payload Weights						
Model	WB	Unit	Front	Rear	Total	Payload
NG3	150.0 in.	lb.	4,264	2,189	6,453	8,047
NG4	176.0 in.	lb.	4,347	2,174	6,521	7,979

NPR HD/W4500 Side-Mounted Tank 14,500-lb. GVWR Automatic Transmission Model Chassis Cab and Maximum Payload Weights						
Model	WB	Unit	Front	Rear	Total	Payload
NG3	150.0 in.	lb.	4,426	1,969	6,395	8,105
NG4	176.0 in.	lb.	4,481	1,982	6,463	8,037

## NPR-HD/W4500, NQR/5500, Crew Cab Diesel – Vehicle Specifications Index Specifications (cont'd)

NQR/W5500 Variable Chassis Dimensions					
Unit	WB	CA*	CE*	OAL	AF
Inch	150.0	88.5	131.6	241.5	43.1
Inch	176.0	114.5	157.6	267.5	43.1

\*Effective CA & CE are CA or CE less BOC.

NQR/W5500 Dimension Constants					
Code	Inches	Code	Inches	Code	Inches
AH	8.6	BW	83.3	FH	33.0
AW	65.6	CW	65.0		
BA	48.4	FW	33.5		
BBC	109.9	OH	91.1		
BOC	5.0	OW	81.4		

NQR/W5500 In-Frame Tank 17,950-lb. GVWR Automatic Transmission Model Chassis Cab and Maximum Payload Weights						
Model	WB	Unit	Front	Rear	Total	Payload
NS3	150.0 in.	lb.	4,422	2,447	6,869	11,081
NS4	176.0 in.	lb.	4,499	2,434	6,933	11,017

NQR/W5500 Side-Mounted Tank 17,950-lb. GVWR Automatic Transmission Model Chassis Cab and Maximum Payload Weights						
Model	WB	Unit	Front	Rear	Total	Payload
NS3	150.0 in.	lb.	4,599	2,220	6,819	11,131
NS4	176.0 in.	lb.	4,646	2,237	6,883	11,067

## NPR-HD/W4500, NQR/5500, Crew Cab Diesel – Vehicle Specifications Index Specifications (cont'd)

### **Vehicle Weight Limits:**

	NPR HD/W4500	NQR/W5500
GVWR Designed Maximum	14,500 lbs.	17,950 lbs.
GAWR, Front	5,360 lbs.	6,380 lbs.
GAWR, Rear	9,880 lbs.	12,980 lbs.

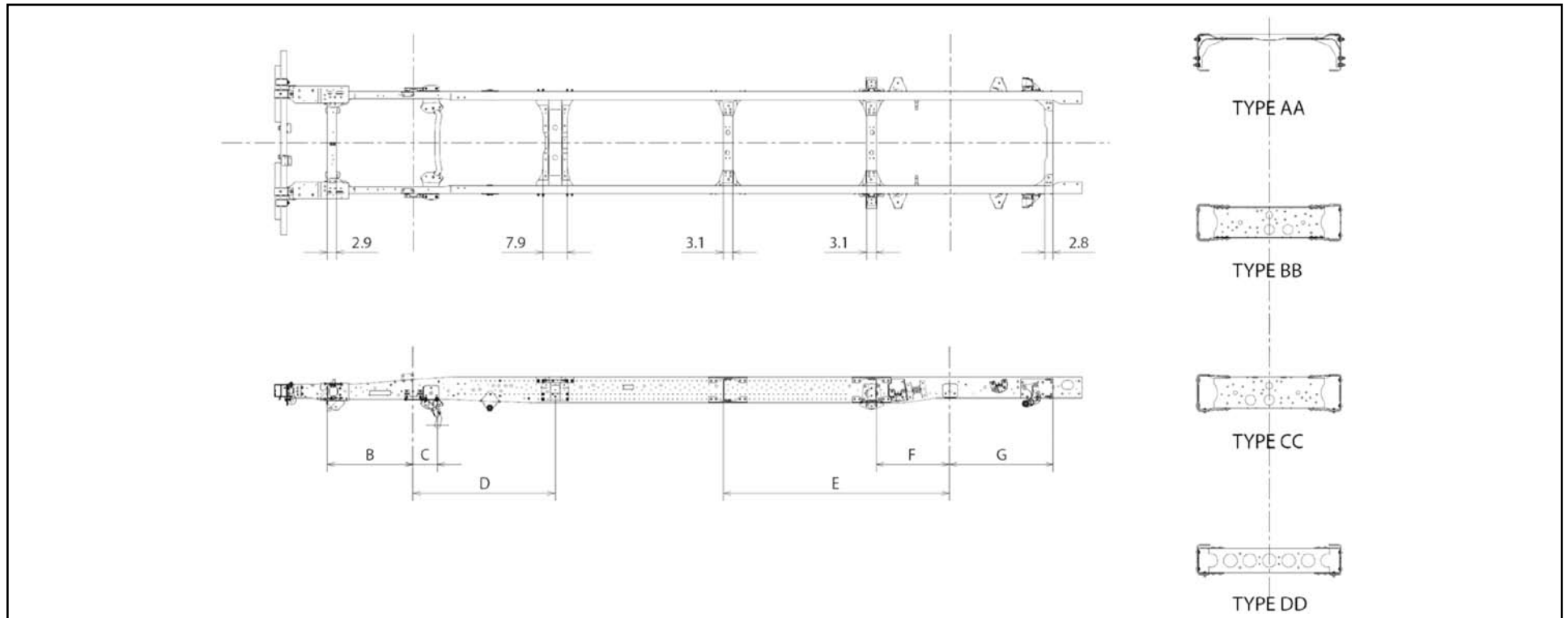
### **Technical Notes:**

**Chassis Curb Weight** includes standard equipment and fuel. Does not include driver, passenger, payload, body or special equipment.

**Maximum Payload Weight** is the allowed maximum for equipment, body, payload, driver and passengers and is calculated by subtracting chassis curb weight from the GVWR.



## NPR-HD/W4500, NQR/5500, Crew Cab Diesel – Vehicle Specifications Index Frame and Crossmember Specifications

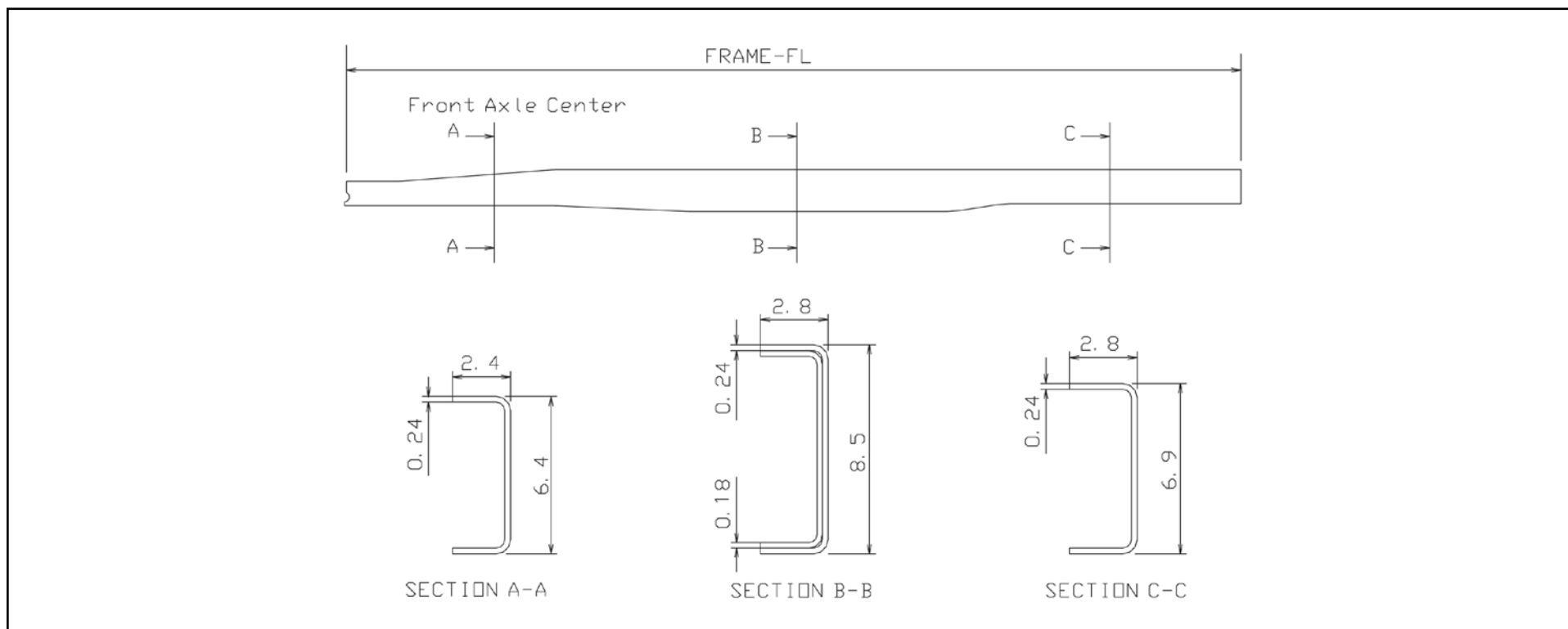


Wheelbase	Frame Thick	Crossmember Type/Location					
		B	C-A/T	D-A/T	E	F	G
150.0	0.24	28.3	7.9	AA 46..5	BB 57.9	CC 24.2	DD 33.8
176.0	0.24	28.3	7.9	AA 46.5	BB 74.4	CC 24.2	DD 33.8

A/T = Automatic Transmission

## NPR-HD/W4500, NQR/5500, Crew Cab Diesel – Vehicle Specifications Index

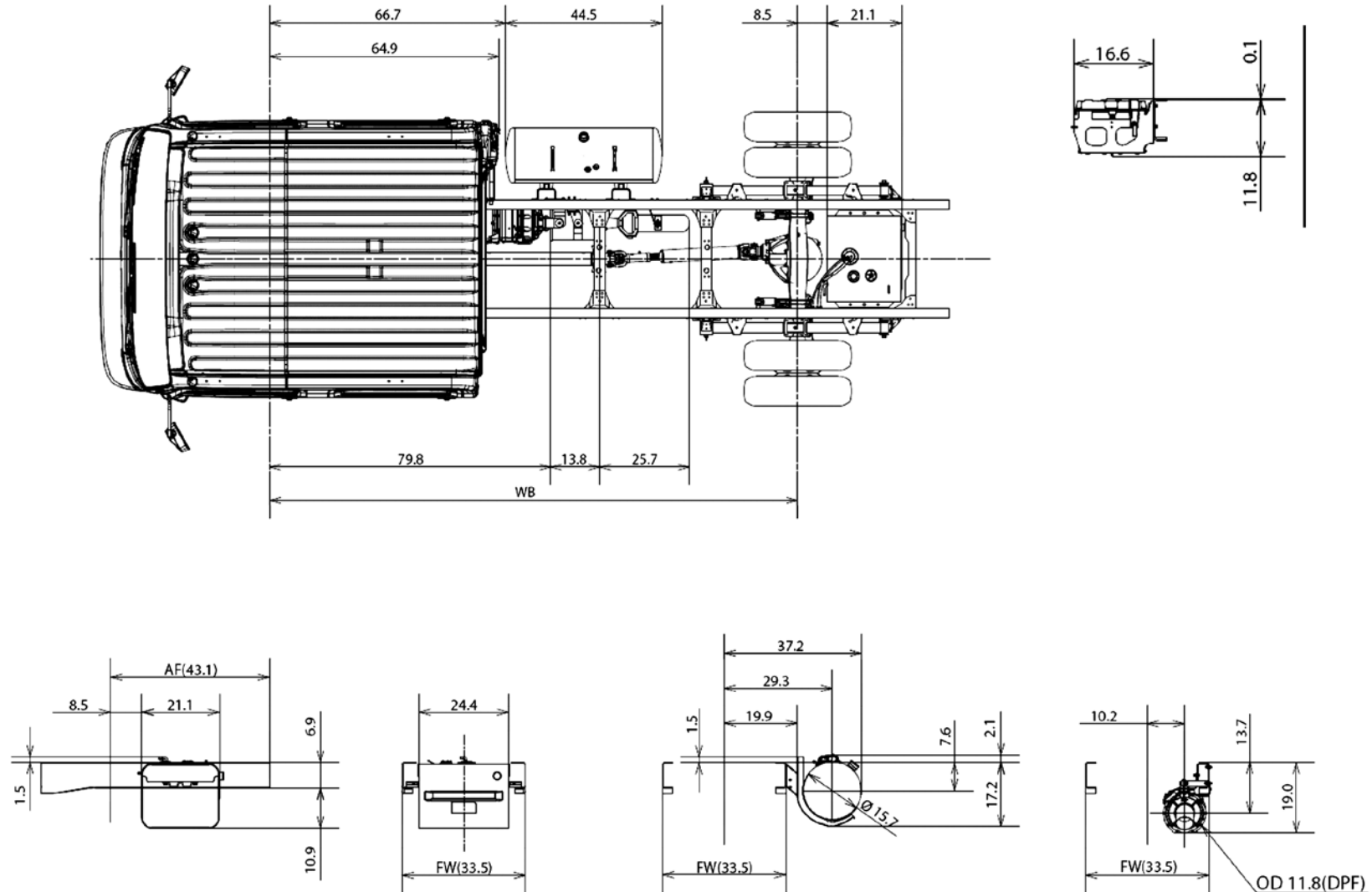
### Frame Chart



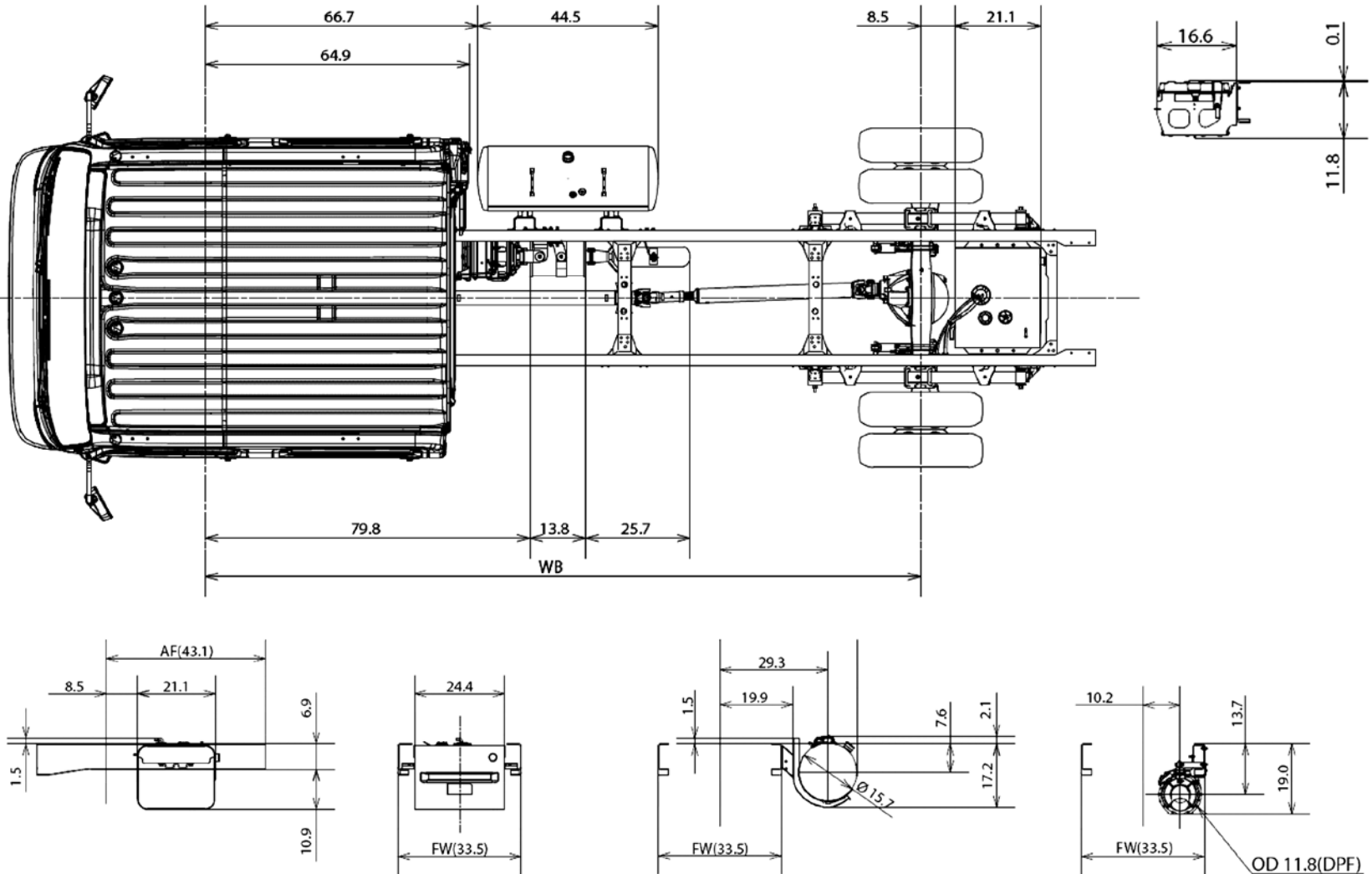
Wheelbase	Frame FL	Frame Thickness
150.0	223.8	0.24 + 0.18
176.0	249.8	0.24 + 0.18

**Note:** On this model chassis, ICTA will require that the body installed on the chassis have an understructure manufactured with any of the following structural steel “C” channels: 4” x 1-5/8”, 7.5 lb./ft.; 5” x 1-3/4”, 6, 7 or 9.0 lb./ft.; 6” x 2”, 8.2, 10.5 or 13 lb./ft.

## NPR-HD/W4500, NQR/5500, Crew Cab Diesel – Vehicle Specifications Index Auxiliary Views 150" Wheelbase



### **Auxiliary Views 176" Wheelbase**



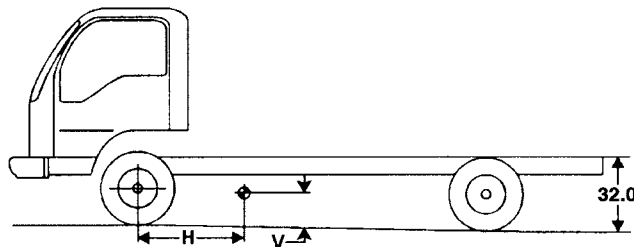
## NPR-HD/W4500, NQR/5500, Crew Cab Diesel – Vehicle Specifications Index Body Builder Weight Information Chart

### NPR HD/W4500 DIESEL CREW CAB AUTOMATIC TRANSMISSION

GVWR	AXLE	Body Builder Weight Information Chart				UNSPRUNG WEIGHT
		Wheelbase				
		150		176		
		in frame side	side tank	in frame side	side tank	
14,500	FRONT	4,264	4,426	4,347	4,481	617
	REAR	2,189	1,969	2,174	1,982	1,058
	TOTAL	6,453	6,395	6,521	6,463	1,675

### Center of Gravity

GVWR	WB	V	H	
			in frame tank	side tank
14,500	150	25.9	50.9	46.2
	176	25.8	58.7	54.0



V = Vertical Center of Gravity  
H = Horizontal Center of Gravity

The center of gravity of the completed vehicle with a full load should not exceed 63 inches above ground level for the 14,500 lb. GVWR, and must be located horizontally between the centerlines of the front and rear axles.

**NOTE:** The maximum dimensions for a body installed on the NPR-HD/W4500 are 102 inches wide (outside) by 90 inches high (inside). Any larger body applications must be approved by Isuzu Commercial Trucks of America Application Engineering. In the West Coast call 1-562-229-5314 and in the East Coast call 1-770-740-1620 X262.

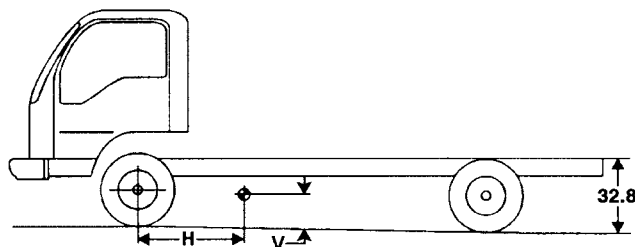
## NPR-HD/W4500, NQR/5500, Crew Cab Diesel – Vehicle Specifications Index Body Builder Weight Information Chart (cont'd)

### NQR/W5500 DIESEL CREW CAB AUTOMATIC TRANSMISSION

GVWR	AXLE	Body Builder Weight Information Chart				UNSPRUNG WEIGHT
		Wheelbase				
		150		176		
		in frame side	side tank	in frame side	side tank	
17,950	FRONT	4,222	4,599	4,499	4,646	661
	REAR	2,447	2,220	2,434	2,237	1,058
	TOTAL	6,869	6,819	6,933	6,883	1,675

### Center of Gravity

GVWR	WB	V	H	
			in frame tank	side tank
17,950	150	26.9	53.4	48.8
	176	26.9	61.8	57.2



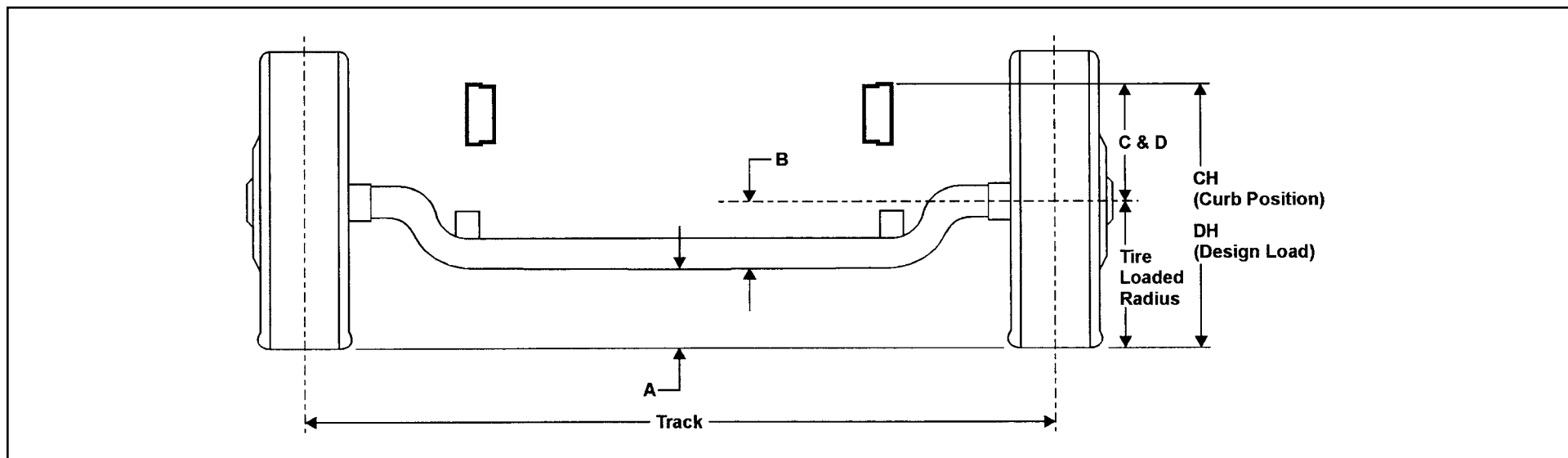
V = Vertical Center of Gravity  
H = Horizontal Center of Gravity

The center of gravity of the completed vehicle with a full load should not exceed 63 inches above ground level for the 17,950 lb. GVWR, and must be located horizontally between the centerlines of the front and rear axles.

**NOTE:** The maximum dimensions for a body installed on the NQR/W5500 are 102 inches wide (outside) by 90 inches high (inside). Any larger body applications must be approved by Isuzu Commercial Trucks of America Application Engineering. In the West Coast call 1-562-229-5314 and in the East Coast call 1-770-740-1620 X262.

## NPR-HD/W4500, NQR/5500, Crew Cab Diesel – Vehicle Specifications Index

### Front Axle Chart NPR-HD/W4500



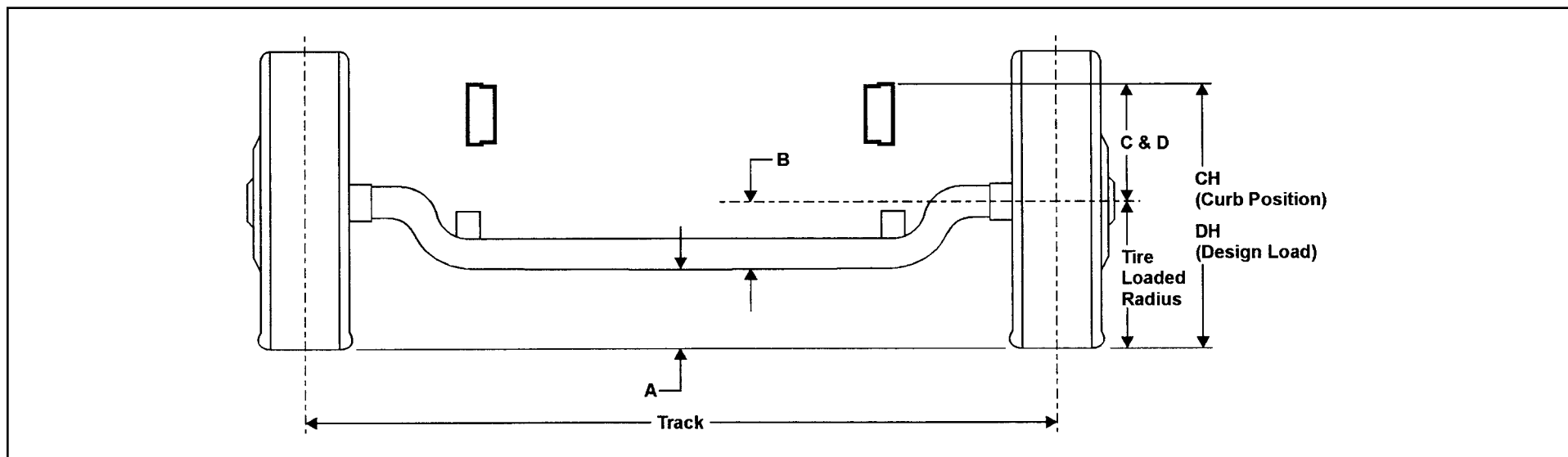
Formulas for calculating height dimensions:

- A = Tire Loaded Radius – B
- C = Centerline of Axle to Top of Frame Rail at Curb Position
- D = Centerline of Axle to Top of Frame Rail at Design Load
- CH = C + Tire Unloaded Radius
- DH = D + Tire Loaded Radius

Tire	GVWR	GAWR	A	B	C	D	CH	DH	Track	Tire Radius	
										Unload	Load
215/85R 16E	14,500 lbs.	5,360 lbs.	7.5	6.6	11.9	11.7	26.5	25.8	65.5	14.6	14.1

## NPR-HD/W4500, NQR/5500, Crew Cab Diesel – Vehicle Specifications Index

### Front Axle Chart NQR/W5500



Formulas for calculating height dimensions:

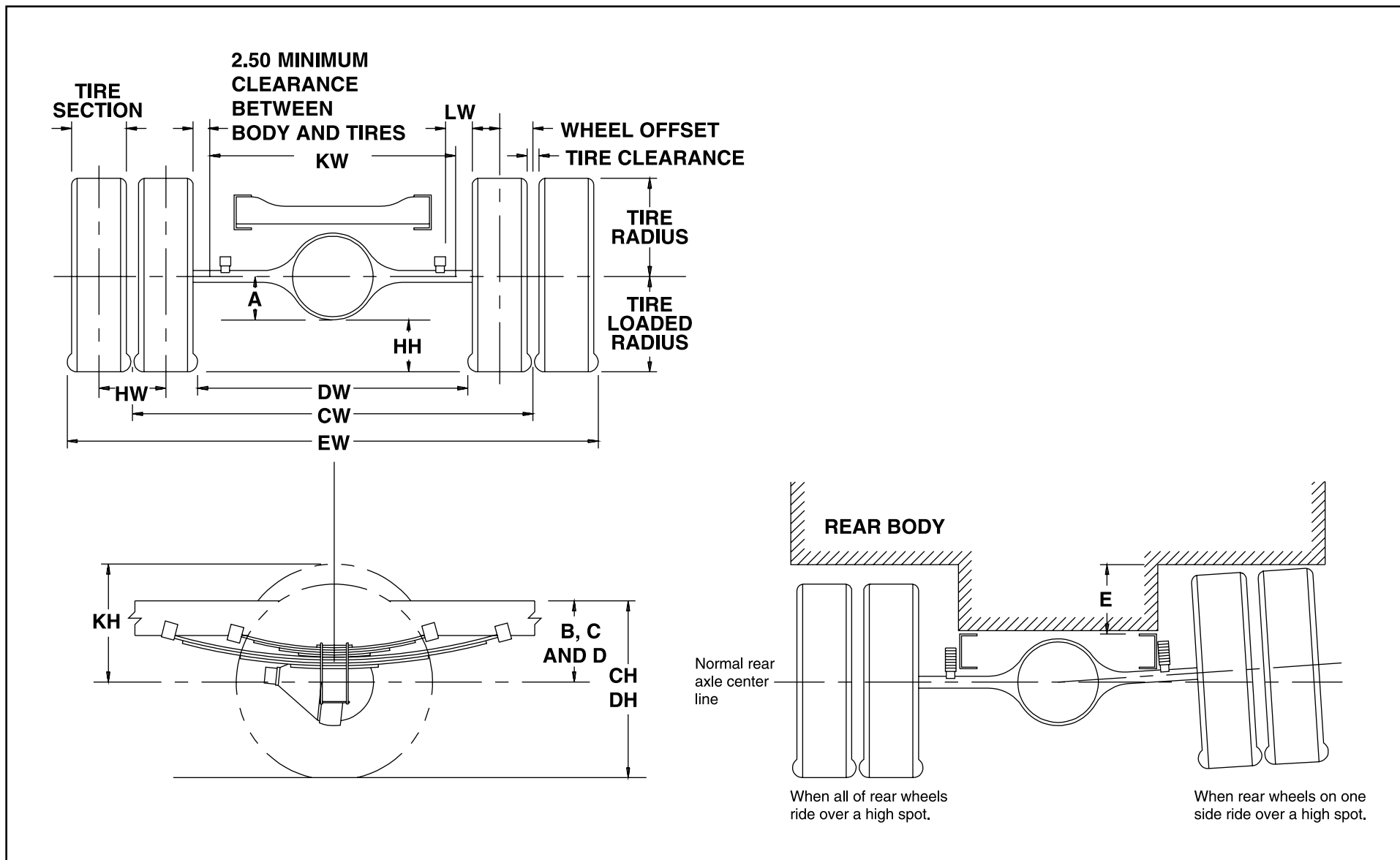
- A = Tire Loaded Radius – B
- C = Centerline of Axle to Top of Frame Rail at Curb Position
- D = Centerline of Axle to Top of Frame Rail at Design Load
- CH = C + Tire Unloaded Radius
- DH = D + Tire Loaded Radius

Tire	GVWR	GAWR	A	B	C	D	CH	DH	Track	Tire Radius	
										Unload	Load
225/70R 19.5F	17,950 lbs.	6,830 lbs.	8.6	6.6	12.3	11.5	28.4	26.7	65.5	16.1	15.24



## NPR-HD/W4500, NQR/5500, Crew Cab Diesel – Vehicle Specifications Index

### Rear Axle Chart NPR-HD/W4500



## NPR-HD/W4500, NQR/5500, Crew Cab Diesel – Vehicle Specifications Index Specifications

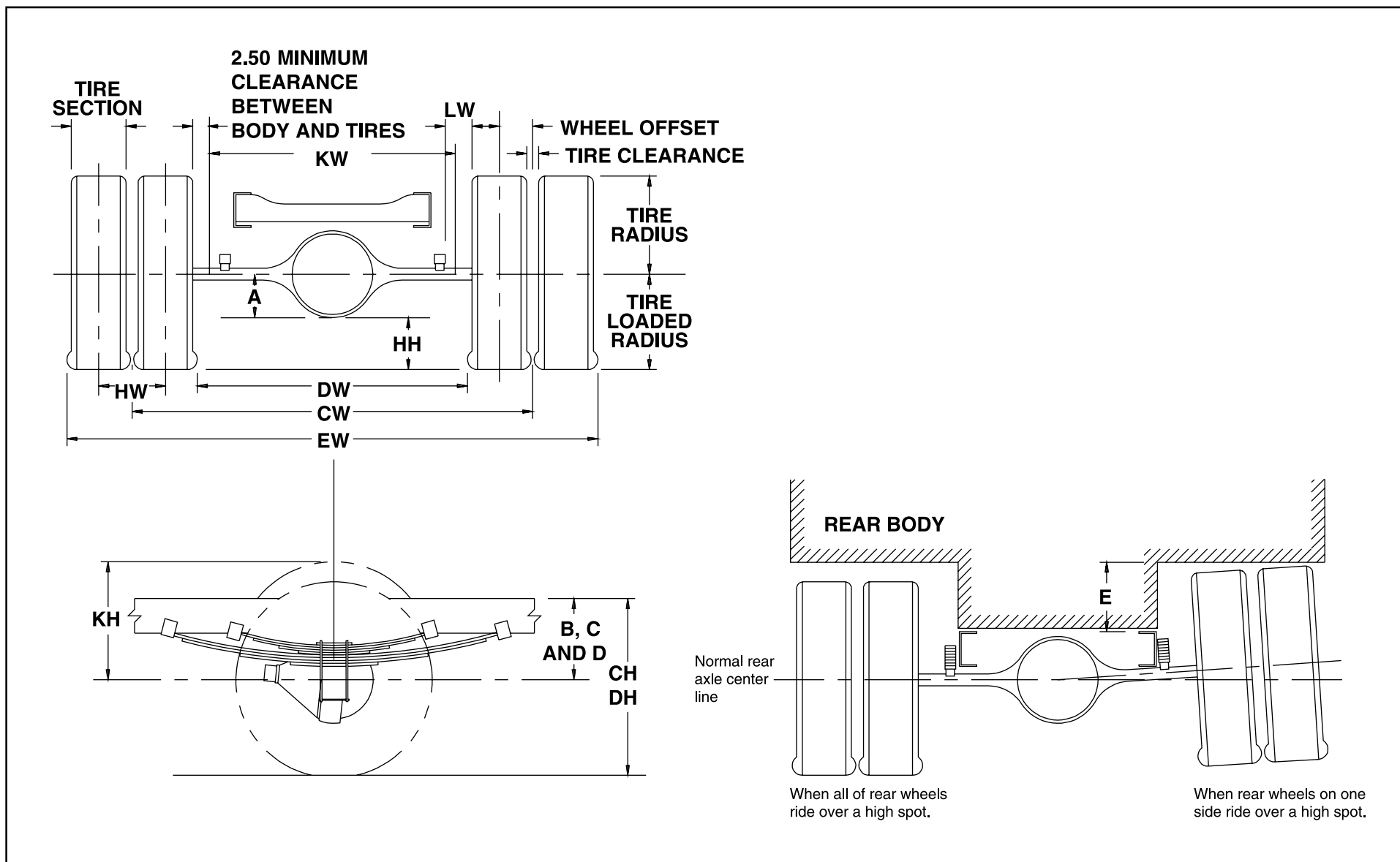
Definitions			
A	Centerline of axle to bottom of axle bowl.	DH	Rear Frame Height: Vertical distance between the normal top of frame rail and the ground-line through the centerline of the rear axle at design load.
B	Centerline of axle to top of frame rail at metal-to-metal position.	DW	Minimum distance between the inner surfaces of the rear tires.
C	Centerline of axle to top of frame rail at curb position.	EW	Maximum Rear Width: Overall width of the vehicle measured at the outermost surface of the rear tires.
D	Centerline of axle to top of frame rail at design load.	HH	Rear Tire Clearance: Minimum clearance between the rear axle and the ground-line.
E	Rear Tire Clearance: Minimum clearance required for tires and chain measured from the top of the frame at the vehicle centerline of the rear axle, when rear wheels on one side ride over a high spot.	HW	Dual Tire Spacing: Distance between the centerlines of the minimum distance required for tire bounce as measured from the centerline of the rear axle and the top of the rear tire when one wheel rides over a high spot.
CH	Rear Frame Height: Vertical distance between the normal top of frame rail and the ground-line through the centerline of the rear axle at curb position.	CW	Track Dual Rear Wheel Vehicle: Distance between the centerlines of the dual wheels measured at the ground-line.
Tire Section, Tire Radius, Tire Loaded Radius, Tire Clearance		See Tire Chart for values.	

Formulas for Calculating Rear Width and Height Dimensions			
CW = Track	HH	= Tire loaded radius – A	
CH = Tire loaded radius + C	JH	= KH – B	
DH = Tire loaded radius + D	KH	= Tire radius + 3.00 inches	
DW = Track + 2 tire sections – tire clearance	KW	= DW – 5.00 inches	
EW = Track + 2 tire sections + tire clearance	LW	= 1.00-inch minimum clearance between tires and springs	

**NOTE:** Track and overall width may vary with optional equipment.

Tire	GAWR	Track CW	A	B	C	D	E
215/85R-16E	9,880 lbs.	65.0	6.5	9.3	15.3	13.0	7.8

## NPR-HD/W4500, NQR/5500, Crew Cab Diesel – Vehicle Specifications Index NQR/W5500 – Rear Axle Chart



## NPR-HD/W4500, NQR/5500, Crew Cab Diesel – Vehicle Specifications Index Specifications

Definitions			
A	Centerline of axle to bottom of axle bowl.	DH	Rear Frame Height: Vertical distance between the normal top of frame rail and the ground-line through the centerline of the rear axle at design load.
B	Centerline of axle to top of frame rail at metal-to-metal position.	DW	Minimum distance between the inner surfaces of the rear tires.
C	Centerline of axle to top of frame rail at curb position.	EW	Maximum Rear Width: Overall width of the vehicle measured at the outermost surface of the rear tires.
D	Centerline of axle to top of frame rail at design load.	HH	Rear Tire Clearance: Minimum clearance between the rear axle and the ground-line.
E	Rear Tire Clearance: Minimum clearance required for tires and chain measured from the top of the frame at the vehicle centerline of the rear axle, when rear wheels on one side ride over a high spot.	HW	Dual Tire Spacing: Distance between the centerlines of the minimum distance required for tire bounce as measured from the centerline of the rear axle and the top of the rear tire when one wheel rides over a high spot.
CH	Rear Frame Height: Vertical distance between the normal top of frame rail and the ground-line through the centerline of the rear axle at curb position.	CW	Track Dual Rear Wheel Vehicle: Distance between the centerlines of the dual wheels measured at the ground-line.
Tire Section, Tire Radius, Tire Loaded Radius, Tire Clearance		See Chart for values.	

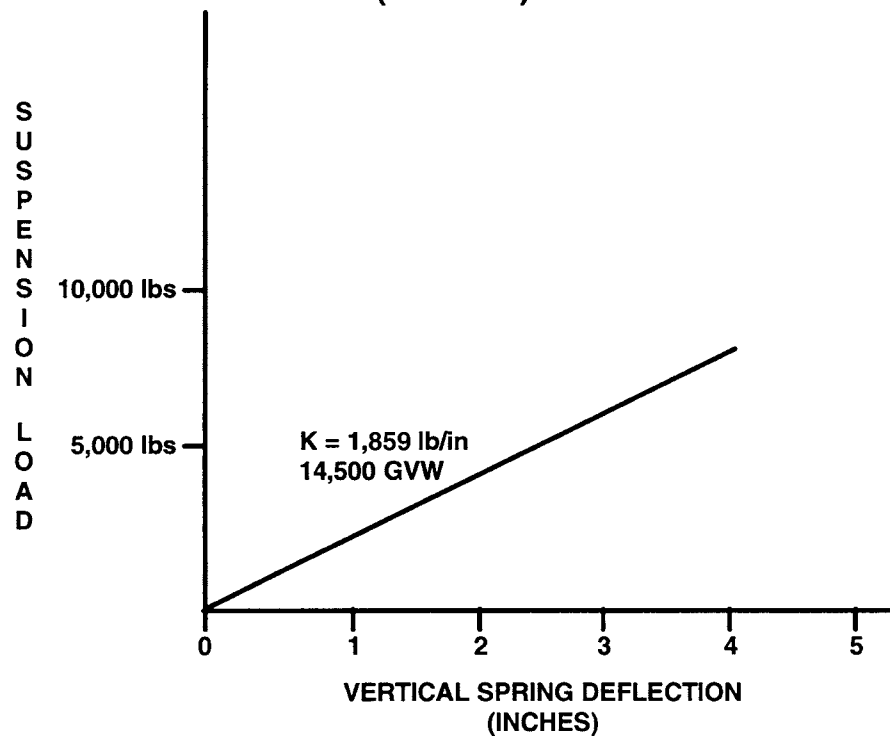
Formulas for Calculating Rear Width and Height Dimensions			
CW = Track	HH	= Tire loaded radius – A	
CH = Tire loaded radius + C	JH	= KH – B	
DH = Tire loaded radius + D	KH	= Tire radius + 3.00 inches	
DW = Track + 2 tire sections – tire clearance	KW	= DW – 5.00 inches	
EW = Track + 2 tire sections + tire clearance	LW	= 1.00-inch minimum clearance between tires and springs	

**NOTE:** Track and overall width may vary with optional equipment.

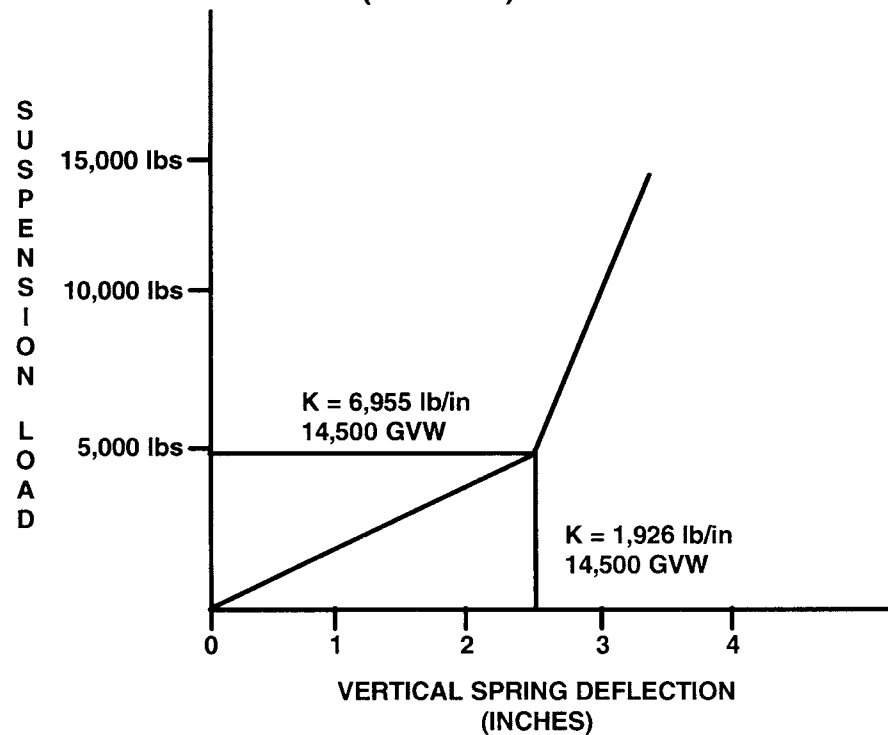
Tire	GAWR	Track CW	A	B	C	D	E
225/70R-19.5F	12,980 lbs.	65.0	7.7	9.3	15.5	13.4	8.4

## Suspension Deflection Charts NPR HD/W4500

**Front Leaf Spring Load vs. Deflection  
(Per Axle)**



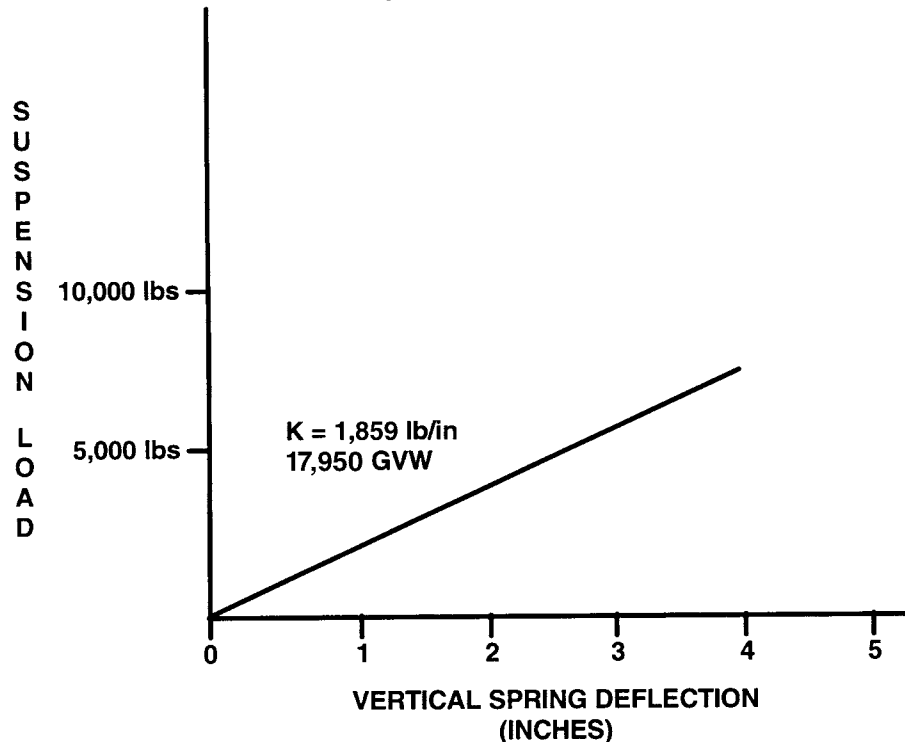
**Rear Leaf Spring Load vs. Deflection  
(Per Axle)**



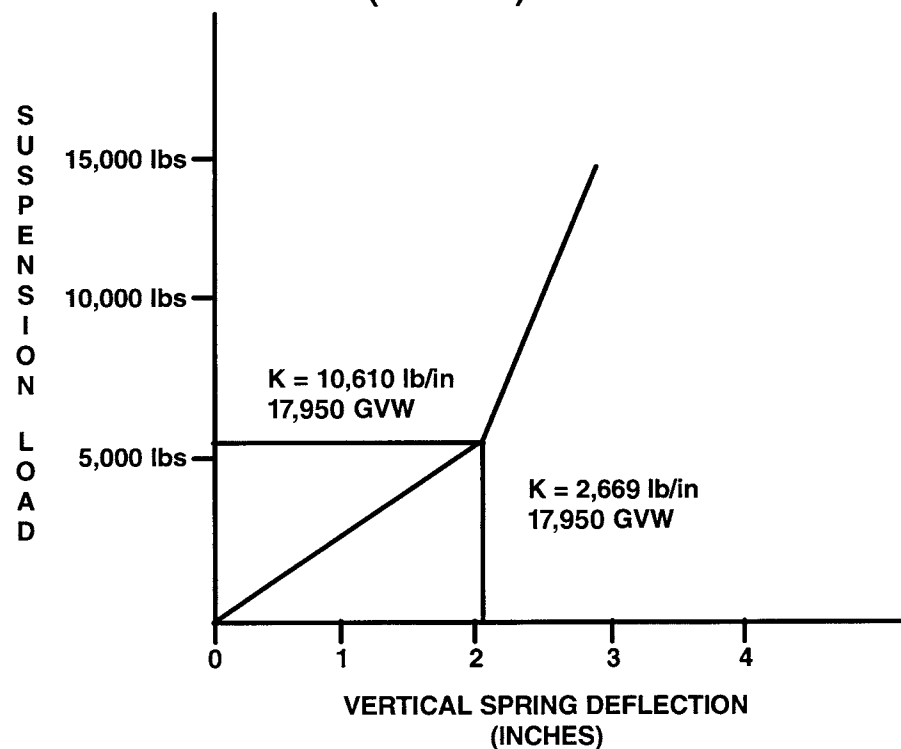
## NQR/W5500 Crew Cab Diesel – Vehicle Specifications Index

### Suspension Deflection Charts NQR/W5500

**Front Leaf Spring Load vs. Deflection  
(Per Axle)**



**Rear Leaf Spring Load vs. Deflection  
(Per Axle)**



## Tire and Disc Wheel Chart NQR/W4500

### Tire

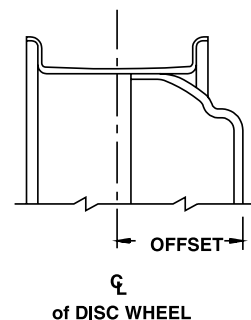
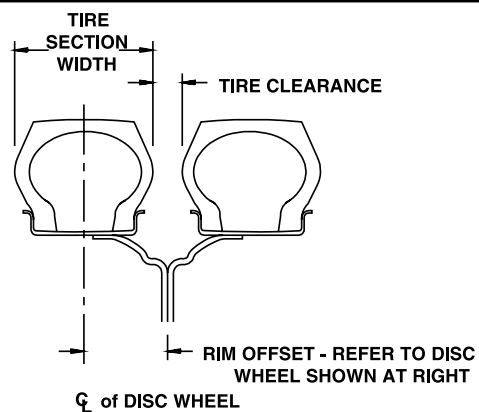
Tire Size	Tire Load Limit and Cold Inflation Pressures				Maximum Tire Load Limits		GVWR (Lb.)
	Single		Dual		Front	Rear	
	Lb.	PSI	Lb.	PSI	2 Single	4 Dual	
215/85R 16E	2,680	80	2,470	80	5,360	9,880	14,500

Tire Size	GVWR (Lb.)	Tire Radius				Tire Section Width	Tire Clearance	Design Rim Width
		Loaded		Unloaded				
		Front	Rear	Front	Rear			
215/85R 16E	14,500	14.1	14.1	14.6	14.6	8.2	18	6.0

### Disc Wheel

Wheel Size	Bolt Holes	Bolt Circle Dia.	Ft./Rr. Nut Size*	Rear Stud Size*	Nut/Stud Torque Specs.	Inner Circle	Outside Offset	Disc Thickness	Rim Type	Material Mfg.
16.6 x 6 K	6 JIS	8.75	1.6142 (41 mm) BUD HEX	0.8268 (21 mm) SQUARE	289 ft.-lb. (392 N•m)	6.46	5.0	0.39	5° DC	Steel TOPY

\*O.D. Wrench Sizes



## NQR/W5500 Crew Cab Diesel – Vehicle Specifications Index

### Tire and Disc Wheel Chart

#### ***Tire***

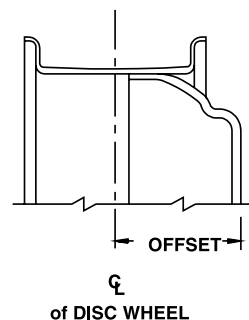
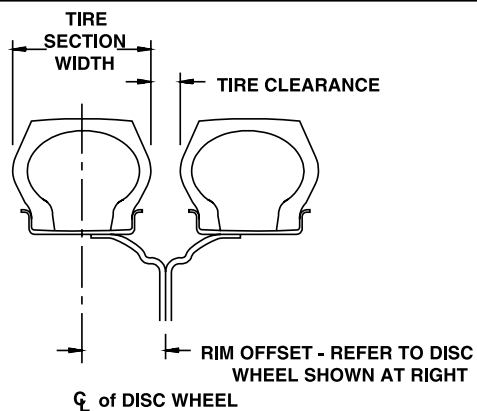
Tire Size	Tire Load Limit and Cold Inflation Pressures				Maximum Tire Load Limits		GVWR (Lb.)
	Single		Dual		Front	Rear	
	Lb.	PSI	Lb.	PSI	2 Single	4 Dual	
225/70R 19.5F	3,450	90	3,245	90	6,900	12,980	17,950

Tire Size	GVWR (Lb.)	Tire Radius				Tire Section Width	Tire Clearance	Design Rim Width
		Loaded		Unloaded				
		Front	Rear	Front	Rear			
225/70R 19.5F	17,950	14.93	14.98	16	16	8.7	1.3	6.0

#### ***Disc Wheel***

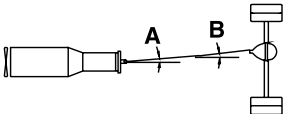
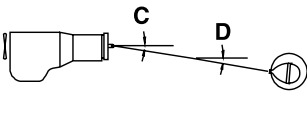
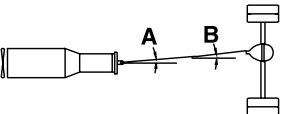
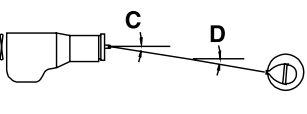
Wheel Size	Bolt Holes	Bolt Circle Dia.	Ft./Rr. Nut Size*	Rear Stud Size*	Nut/Stud Torque Specs.	Inner Circle	Outside Offset	Disc Thickness	Rim Type	Material Mfg.
19.5 x 6.00	6 JIS	8.75	1.6142 (41 mm) BUD HEX	0.8268 (21 mm) SQUARE	325 ft.-lb. (440 N•m)	6.46	5.0	0.35	15° DC	Steel TOPY

\*O.D. Wrench Sizes



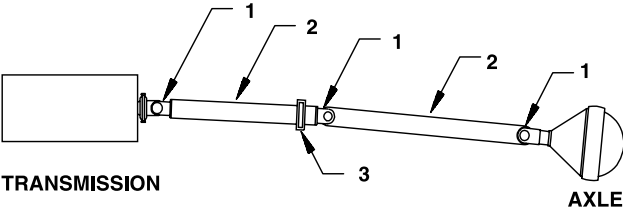


Propeller Shaft Information NPR HD/W4500

WB	PLANE VIEW	SIDE VIEW
150 in		
176 in		

TYPICAL INSTALLATIONS SHOWING YOKES "IN PHASE". "IN PHASE" MEANS THAT THE YOKES AT EITHER END OF A GIVEN PROPELLER SHAFT ASSEMBLY ARE IN THE SAME PLANE.

(150 and 176 in WB)



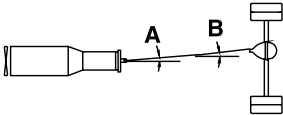
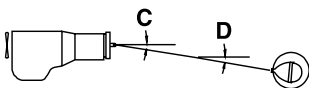
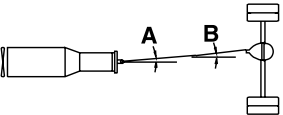
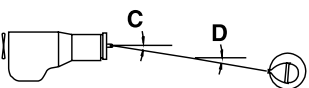
- 1. UNIVERSAL JOINT
- 2. PROPELLER SHAFT
- 3. CENTER CARRIER BEARING

Wheelbase	Plane View		Side View	
	A Auto. Trans.	B Auto. Trans.	C Auto. Trans.	D Auto. Trans.
150 in.	0°	3.3°	1.8°	1.7°
176 in.	0°	2.2°	0.4°	3.4°

NOTE: All driveline angles are at unloaded condition (curb position with typical cargo body).

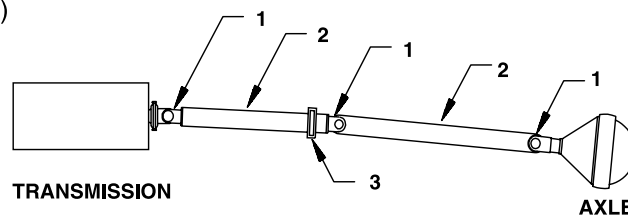
## NQR/W5500 Crew Cab Diesel – Vehicle Specifications Index

### Propeller Shaft

WB	PLANE VIEW	SIDE VIEW
150 in		
176 in		

TYPICAL INSTALLATIONS SHOWING YOKES "IN PHASE". "IN PHASE" MEANS THAT THE YOKES AT EITHER END OF A GIVEN PROPELLER SHAFT ASSEMBLY ARE IN THE SAME PLANE.

(150 and 176 in WB)



1. UNIVERSAL JOINT
2. PROPELLER SHAFT
3. CENTER CARRIER BEARING

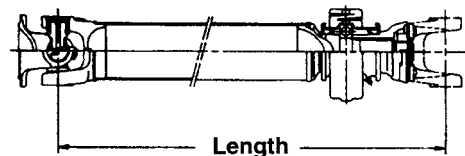
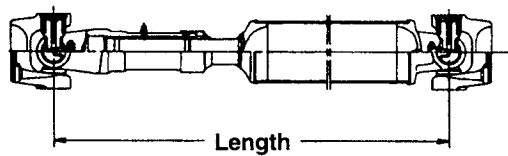
Wheelbase	Plane View		Side View	
	A Auto. Trans.	B Auto. Trans.	C Auto. Trans.	D Auto. Trans.
150 in.	0°	3.3°	1.8°	1.8°
176 in.	0°	2.2°	0.4°	3.5°

**NOTE:** All driveline angles are at unloaded condition (curb position with typical cargo body).

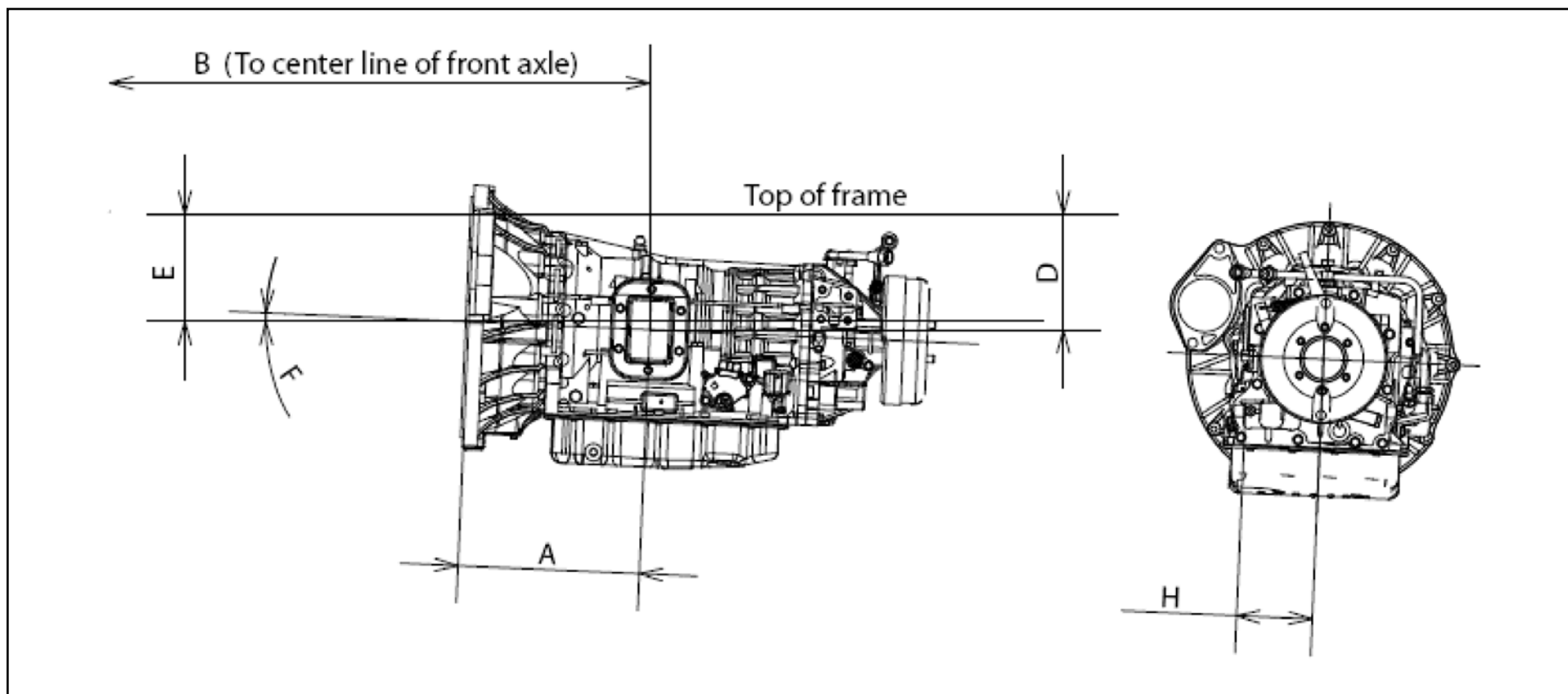
## NPR-HD/W4500, NQR/5500, Crew Cab Diesel – Vehicle Specifications Index

### Propeller Shaft (cont'd)

<b>Wheelbase</b>	<b>150</b>	<b>176</b>
<b>No. of Shafts</b>	<b>2</b>	<b>2</b>
<b>Trans. Type</b>	<b>6 A/T</b>	<b>6 A/T</b>
<b>Shaft #1 O.D.</b>	<b>3.54</b>	<b>3.54</b>
<b>Thickness</b>	<b>0.126</b>	<b>0.126</b>
<b>Length</b>	<b>41.8</b>	<b>51.3</b>
<b>Type</b>	<b>A</b>	<b>A</b>
<b>Shaft #2 O.D.</b>	<b>3.54</b>	<b>3.54</b>
<b>Thickness</b>	<b>0.126</b>	<b>0.126</b>
<b>Length</b>	<b>36.4</b>	<b>52.9</b>
<b>Type</b>	<b>C</b>	<b>C</b>

<b>Type</b>	<b>Description</b>	<b>Illustration</b>
Type A	1st shaft in 2-piece driveline	 <p>Length</p>
Type C	1st shaft in 1-piece driveline 2nd shaft in 2-piece driveline	 <p>Length</p>

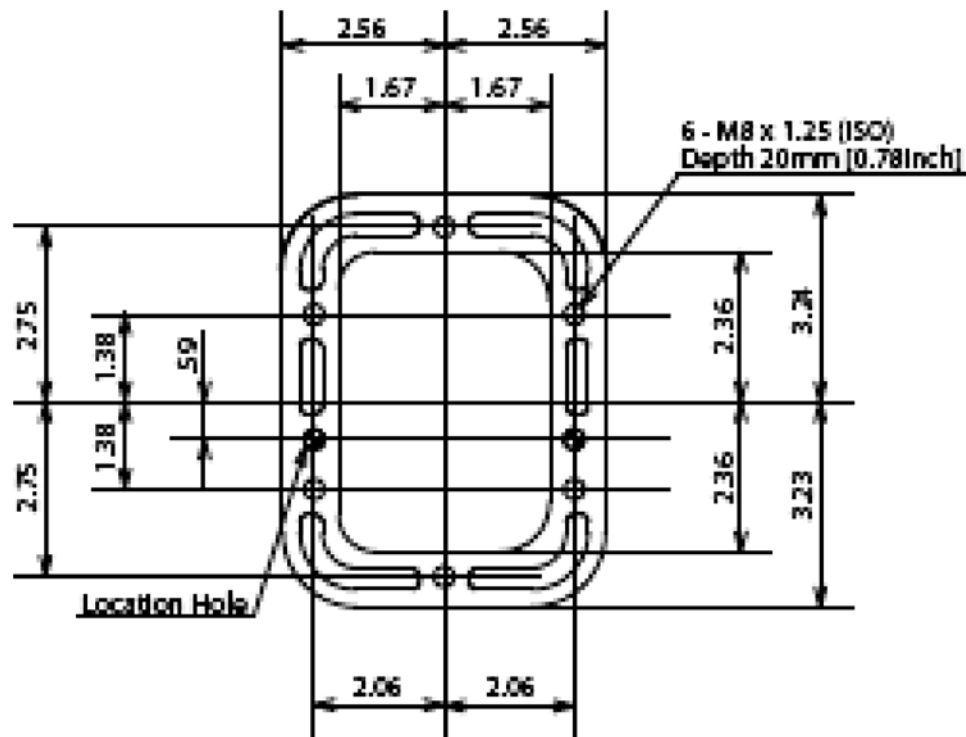
## NPR-HD/W4500, NQR/5500, Crew Cab Diesel – Vehicle Specifications Index PTO Location, Drive Gear and Opening Information



Trans.	Opening Location	Bolt Pattern	A	B	C	D	E	F	H	PTO Drive Gear Location	Ratio of PTO Drv. Gear Spd. to Eng. Spd.	No. of Teeth	Pitch	Helix Angle	Max. Output Torque
Aisin 465	Left	(Dr 2)	12.35	36.89	0	7.85	7.31	2.5°	5.16	PTO Gear	1:1 with turbine	69	N/A	0°	134 lbs.-ft. @ 1,700 RPM

## NPR-HD/W4500, NQR/5500, Crew Cab Diesel – Vehicle Specifications Index PTO Location, Drive Gear and Opening Information (cont'd)

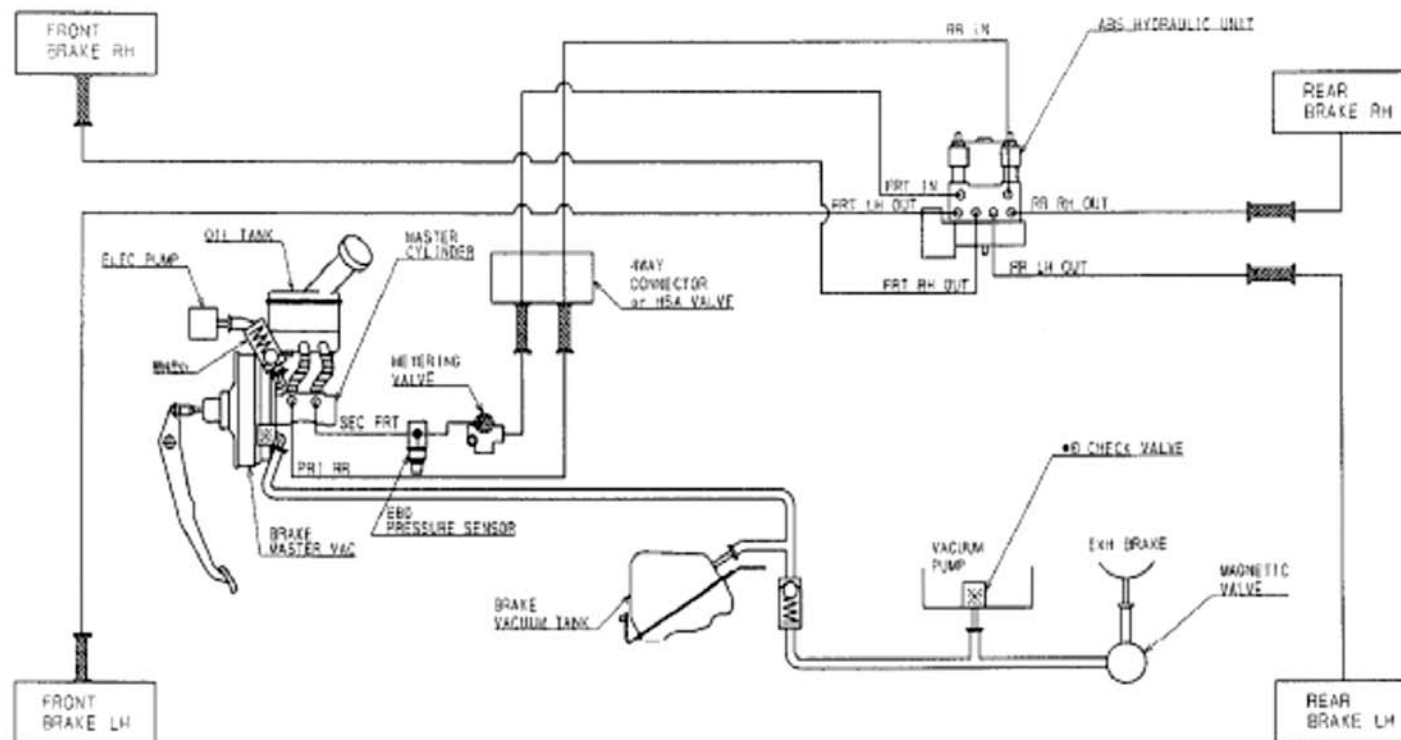
### Opening Diagram



## NPR-HD/W4500, NQR/5500, Crew Cab Diesel – Vehicle Specifications Index 14,500 GVW – Brake System Diagram

### **Vacuum Over Hydraulic**

Please refer to introduction section of book for antilock system cautions and wheelbase modification requirements.



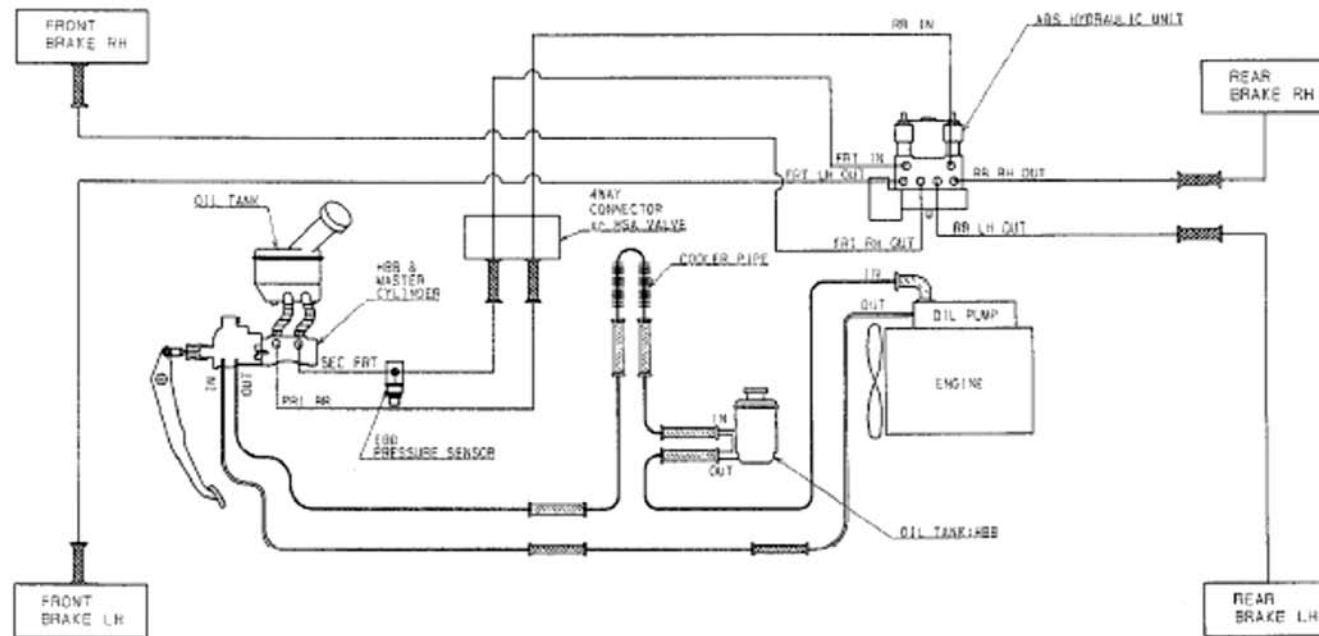
**NPR-HD/W4500 DIESEL 14,500 GVW**

INDICATION					
NAME	BRAKE HOSE HIGH PRESSURE	BRAKE HOSE LOW PRESSURE	BRAKE PIPE	VACUUM LINE	CHECK VALVE (ONE WAY VALVE)

## NPR-HD/W4500, NQR/5500, Crew Cab Diesel – Vehicle Specifications Index 17,950 GVW – Brake System Diagram

### **Vacuum Over Hydraulic**

Please refer to introduction section of book for antilock system cautions and wheelbase modification requirements.



INDICATION							
NAME	BRAKE HOSE HIGHT PRESSURE	BRAKE HOSE LOW PRESSURE	BRAKE PIPE	HYDRAULIC HOSE (SUPPLY)	HYDRAULIC HOSE (RETURN/SUCTION)	HYDRAULIC PIPE (SUPPLY)	HYDRAULIC PIPE (RETURN/SUCTION)

## **NPR-HD/W4500, NQR/5500, Crew Cab Diesel – Vehicle Specifications Index** **Diesel Fuel Fill**

### ***Installation Instructions***

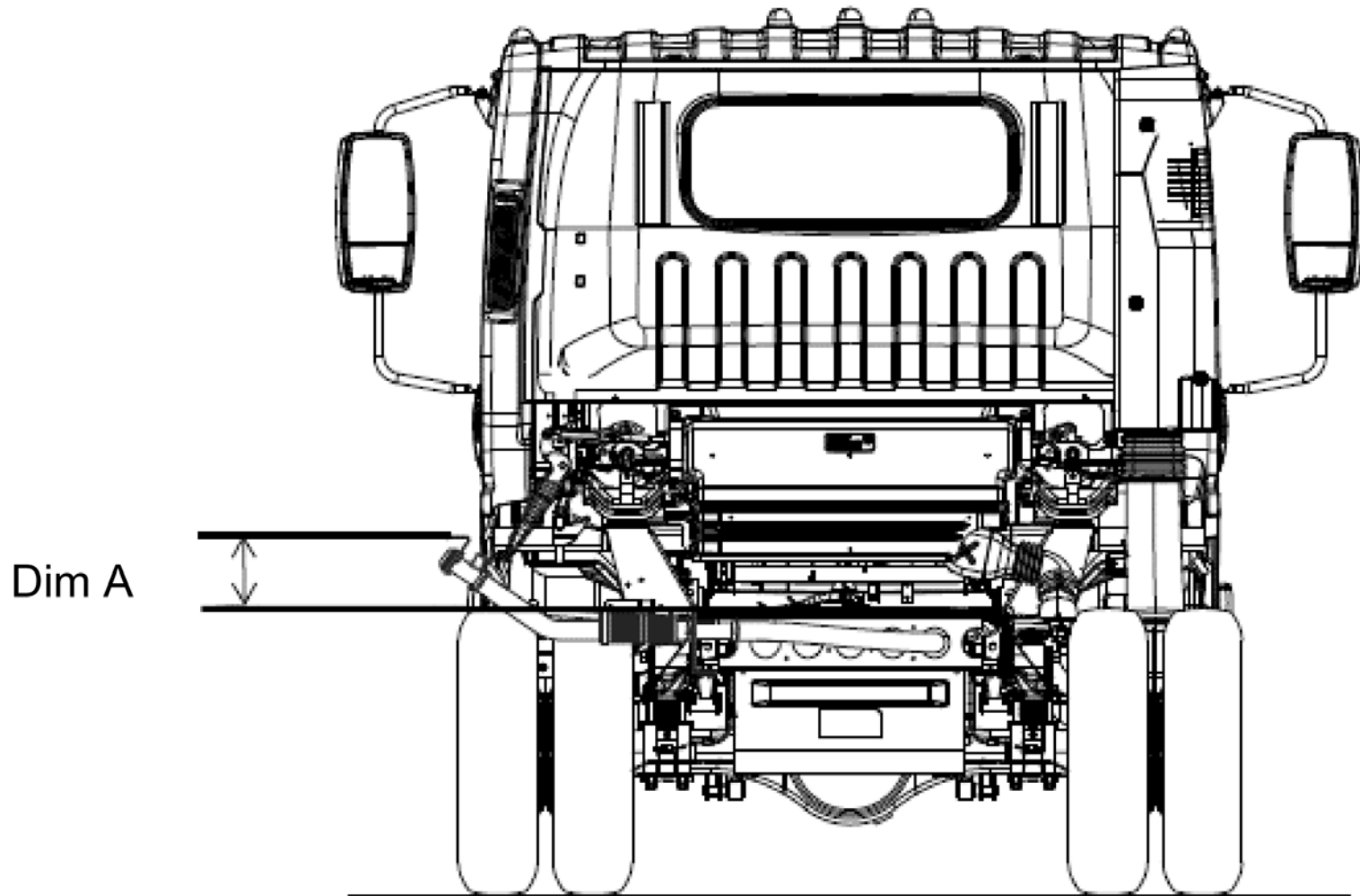
1. Disconnect battery.
2. Loosen hose from the tie downs. Remove caps from plate on rail.
3. Install hoses onto the plate.
4. Extend hose out from the driver side of the rail to body rail.
5. The filler neck must be mounted to allow the fill plate bracket to be parallel to the frame horizontal (see figure 4).
6. Cover with protector wrap and secure with tie wraps.
7. Filler hose is set for 102 inches outside width body.
8. Filler neck (dimension A) must be between 6.85 inches and 8.5 inches above frame.
9. Secure the filler plate to the bottom of the body and check for leaks.
10. Ensure that fill hose does not sag, creating an area where the fuel could pool in the fill hose.
11. Reconnect battery.



# 2009 GM/Isuzu TRUCK

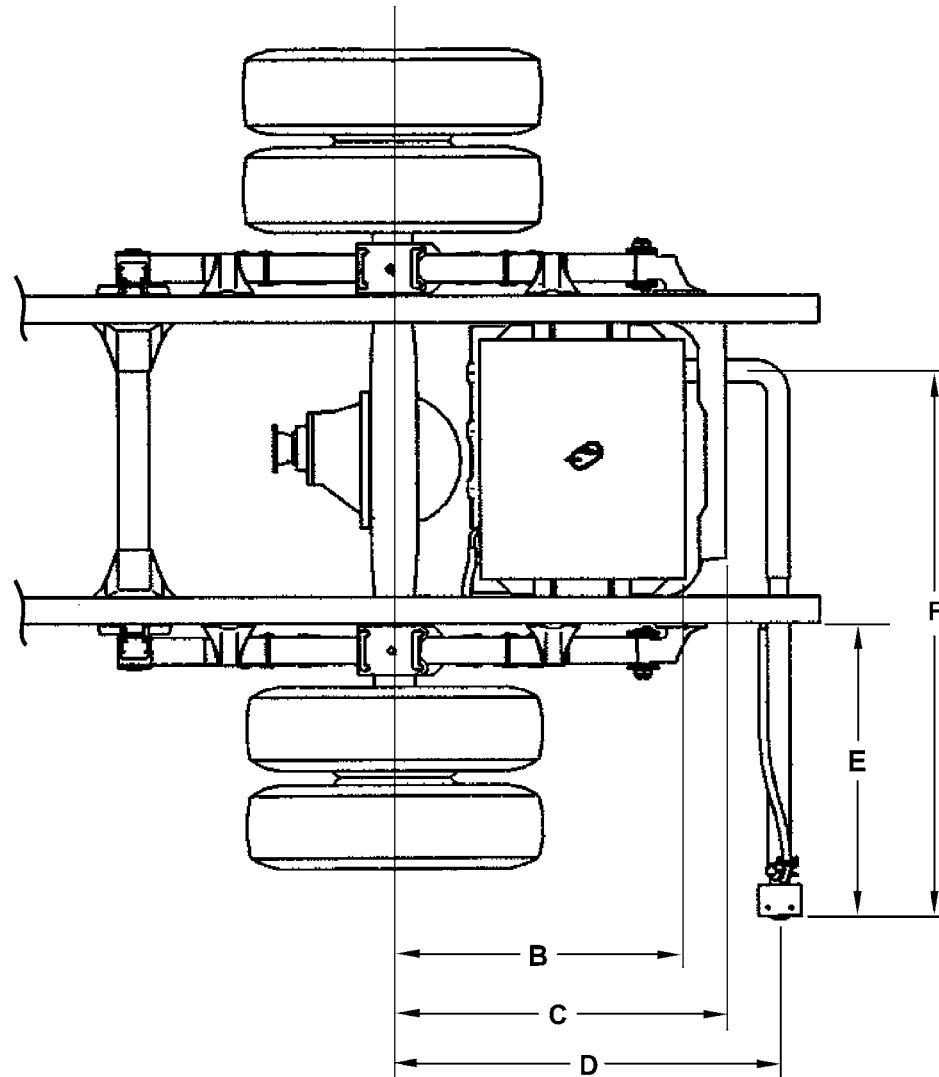
PAGE 242

## NPR-HD/W4500, NQR/5500, Crew Cab Diesel – Vehicle Specifications Index Rear View Fuel Fill



## NPR-HD/W4500, NQR/5500, Crew Cab Diesel – Vehicle Specifications Index

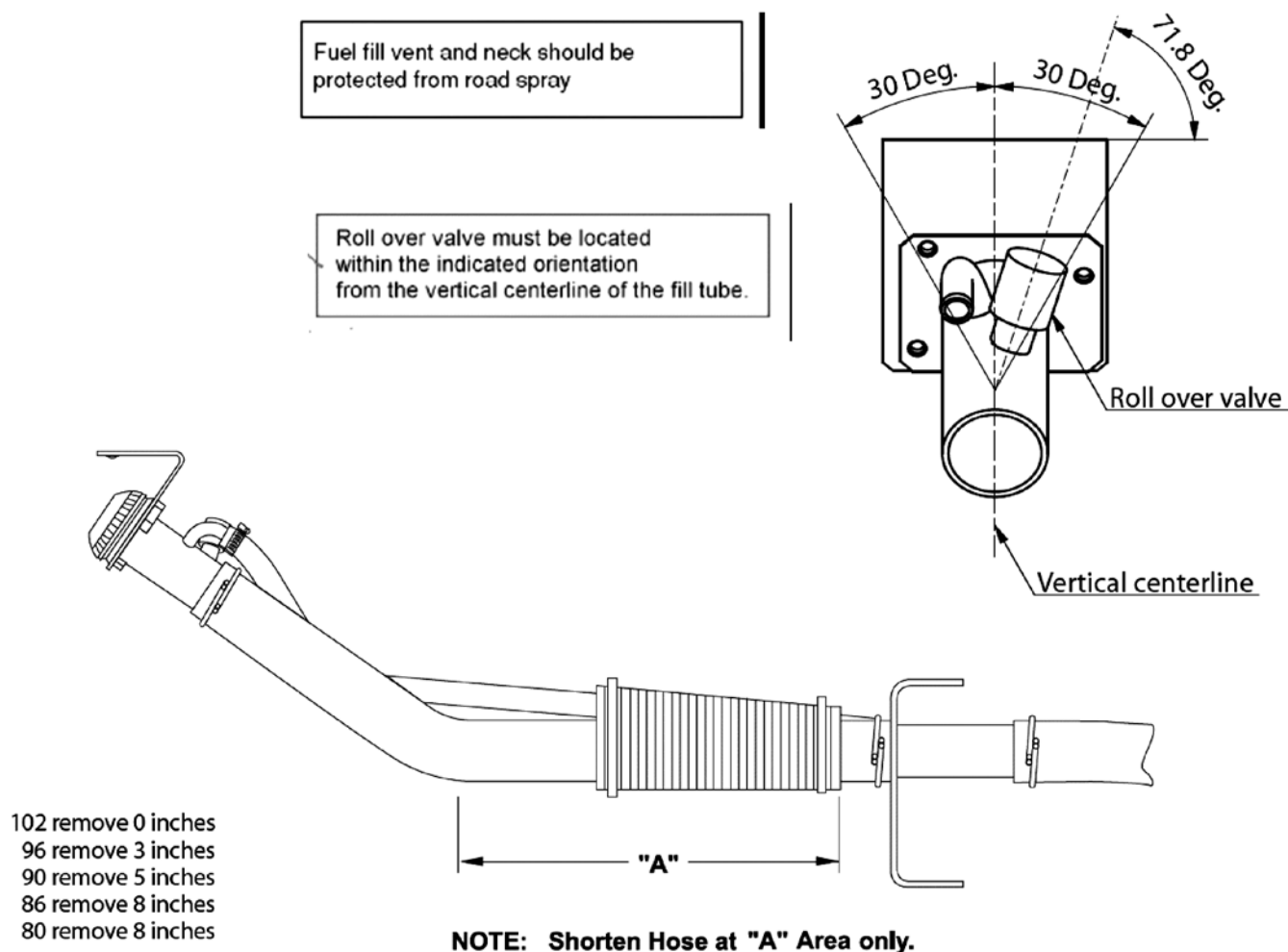
### Top View Fuel Fill



Dimensions:

B = 29.75 inches (756 mm)  
C = 34.00 inches (863 mm)  
D = 39.29 inches (998 mm)  
E = 33.86 inches (784 mm)  
F = 59.60 inches (1,438 mm)

## NPR-HD/W4500, NQR/5500, Crew Cab Diesel – Vehicle Specifications Index Hose Modification for Various Width Bodies and Fuel Fill Vent Orientation and Protection



## NPR-HD/W4500, NQR/5500, Crew Cab Diesel – Vehicle Specifications Index Ultra Low Sulfur Diesel Label

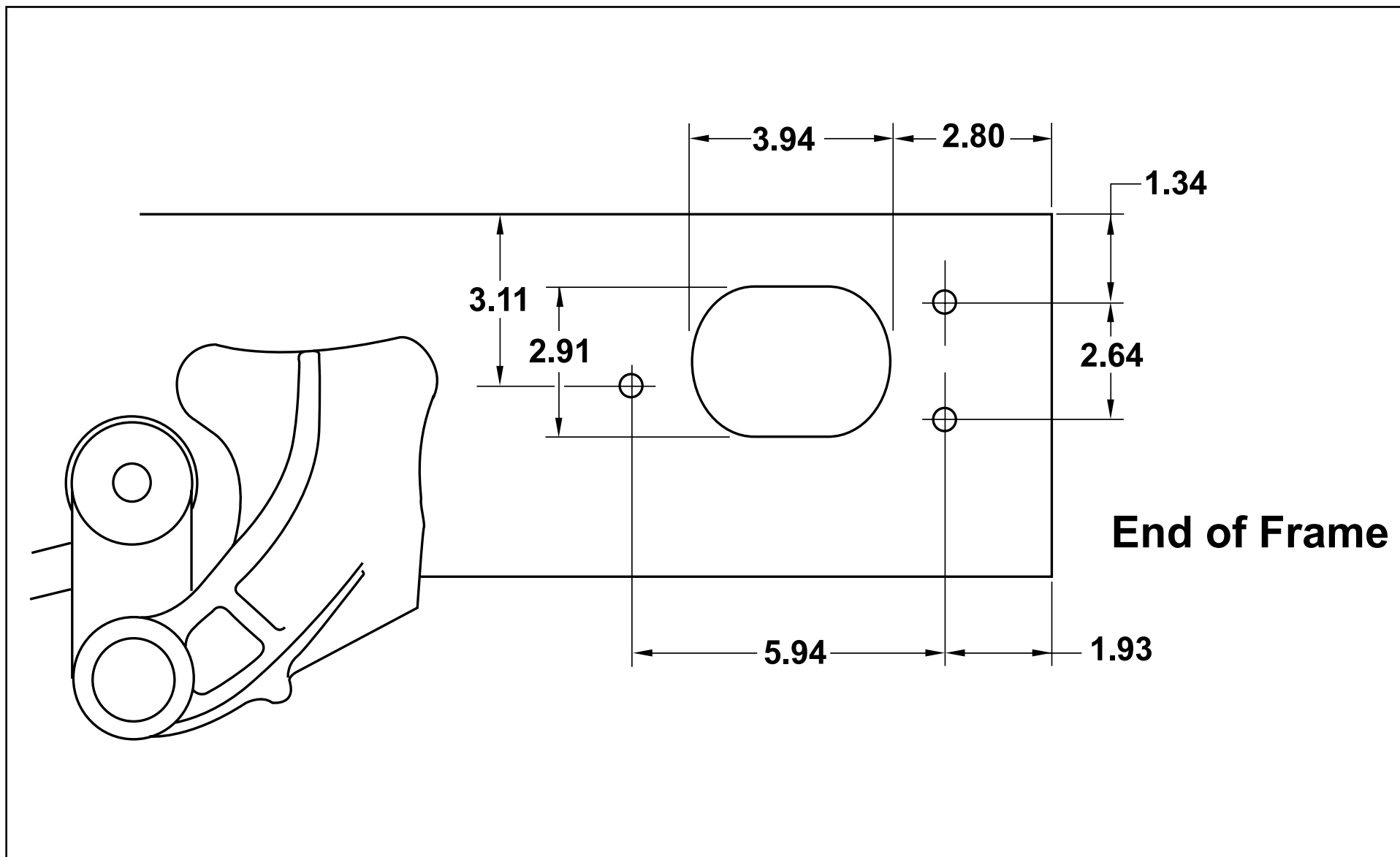
**Per EPA Title 40, Part 86, 86:007—35(c),  
The decal illustrated below must be installed on the vehicle.  
The decal is included in the fuel fill parts box.**



### **INSTRUCTIONS FOR DECAL PLACEMENT:**

1. The decal must be placed as close as possible to the fuel inlet and be clearly visible.
  2. The decal should be placed above or to the side of the fuel cap to avoid corrosion by possible contact with fuel.
  3. The decal may be placed on aerodynamic fairings, bodies, etc. as long as the decal is clearly visible and in close proximity to the fuel inlet.
  4. For installed bodies that have a fuel door, the decal should be placed above or to the side of the fuel door.
- Thoroughly clean the area of all grease, dirt, etc. before application of the decal. Apply the decal at room temperature, 65° to 75° F.

## NPR-HD/W4500, NQR/5500, Crew Cab Diesel – Vehicle Specifications Index Through the Rail Fuel Fill Frame Hole



### **Fuel Fill Parts Illustration**



# 2009 GM/Isuzu TRUCK

## NPR-HD/W4500, NQR/5500, Crew Cab Diesel – Vehicle Specifications Index Fuel Fill Parts List

Number	Description	Part Number – Isuzu	Part Number – GM	Quantity
1	Breather Hose	898006-4510	N/A	1
2	Clip, Rubber Hose	894242-0340	94242034	2
3	Hose, Fuel Filler	897187-8750	97187875	1
4	Hose, Fuel Filler	897253-1400	97253140	1
5	Clip, Filler Hose	894435-8760	97724373	4
6	Screw, Filler Hose	894384-6460	N/A	3
7	Bracket, Filler Neck	897116-621Y	97116621	1
8	Cap, Filler	897218-7020	N/A	1
9	Protector	897114-0630	97114063	1
10	Clip	109707-1070	94062296	2
11	Caution Plate	N/A	15798339	1

## NRR/W5500 HD – Vehicle Specifications Index

Model	NRR/W5500 HD
GVWR	19,500 lbs.
WB	109 in., 132.5 in., 150 in., 176 in., 200 in., 212 in
Engine	Isuzu 4-cylinder, in-line 4-cycle, turbocharged, intercooled, direct injection diesel.
Model/Displacement	4HK1-TC/317 CID (5.19 liters)
HP (Gross)	205HP/2400 RPM w/Automatic Trans
	175HP/2400 RPM w/Manual Trans
Torque (Gross)	441 lb ft torque/1850 RPM w/ Automatic Trans
	387 lb ft torque/1850 RPM w/ Manual Trans
Equipment	Dry element air cleaner with vertical intake; 2 rows 569 square in. radiator; 7 blade 20.1in diameter fan with viscous drive. Cold weather starting device and an oil cooler. Engine oil level check switch and light. Engine warning system with audible warning for low oil pressure, high coolant temperature, and low coolant level. Engine cruise control and engine idle up function. Rear engine cover.
Transmission	Aisin A465 6 speed automatic transmission with fifth and sixth gear overdrive with lock up in 2nd, 3rd, 4th, 5th and 6th, PTO capability. Optional MZZ 6 speed manual transmission.
Steering	Integral power steering 18.8-20.9:1 ratio. Tilt and telescoping steering column.
Front Axle	Reverse Elliot "I" -Beam rated at 6,830 lb.
Suspension	Semi-elliptical steel alloy tapered leaf springs with stabilizer bar and shock absorbers.
GAWR	6,830 lb.
Rear Axle	Full floating single speed with hypoid gearing rated at 14,550 lb.
Suspension	Semi-elliptical steel alloy multi-leaf springs and shock absorbers.
GAWR	13,660 lb
Wheels	19.5x6.0-K 6 hole disc wheels, painted white.
Tires	225/70R-19.5E (12 pr) tubeless steel belted radials, all season tread front and rear.
	Dual circuit power assisted hydraulic service brakes with EBD (Electronic Brake Distribution) system for load proportioning of the brake system front disc and self-adjust outboard mounted drum rear. The parking brake is a mechanical, cable actuated, internal expanding drum type, transmission mounted. The exhaust brake is standard and is vacuum operated. 4 channel anti-lock brake system.
Fuel Tank	30 gal. rectangular steel fuel tank mounted in frame rail behind rear axle. Fuel water separator with dash mounted indicator light.

**NOTE:** These selected specifications are subject to change without notice.

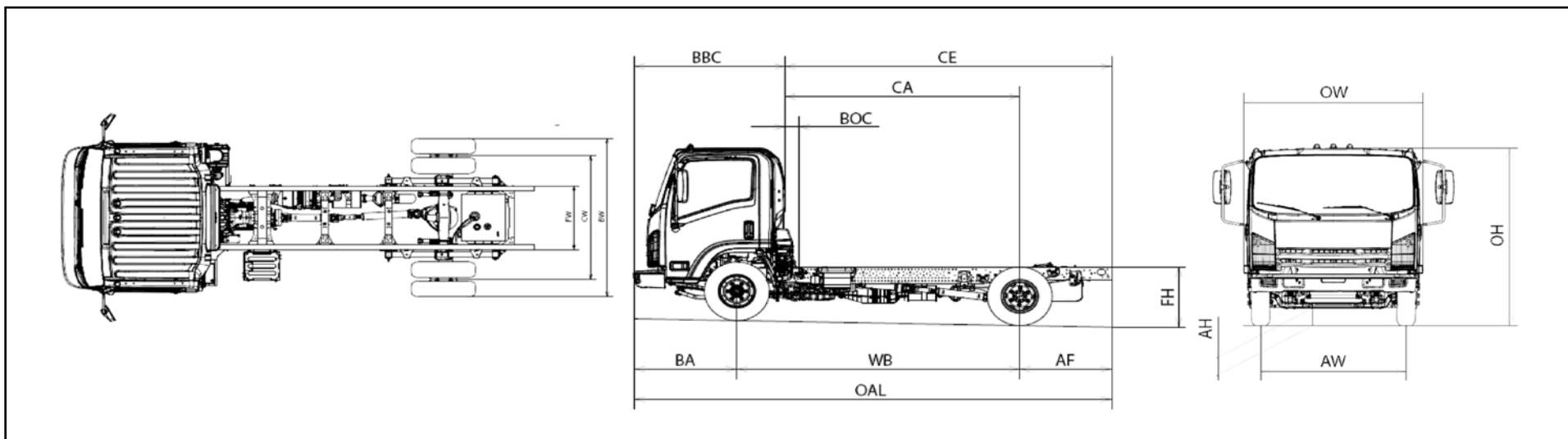


## NRR/W5500 HD – Vehicle Specifications Index (cont'd)

Model	NRR/W5500 HD
GVWR	19,500 lbs.
Frame	Ladder type channel section straight frame rail 33.5 in wide through the total length of the frame. Yield strength 44,000 psi, section modulus 7.20 in <sup>3</sup> . RBM 316,800.
Cab	All steel low cab forward, BBC 70.9 in, 45° mechanical tilt with torsion assist.
Equipment	TRICOT and JERSEY KNIT combination cloth covered high back driver's seat with two occupant passenger seat. Dual cab mounted exterior mirrors with integral convex mirror. Tilt and telescoping steering column. Power windows and door locks, floor mats, tinted glass.
Electrical	12 Volt, negative ground, dual Delco maintenance free batteries, 750 CCA each, 110 Amp alternator with integral regulator.
Options	AM/FM CD stereo radio, engine block heater; engine oil pan heater fuel tank mounted on right hand rail (33 gal), spare wheel, wheel simulators, air deflector, air conditioning, PTO enable switches, back up alarm, heated mirrors, hour meter, engine shutdown, mirror brackets for 102" widebody, fire extinguisher and triangle kit mounted in rear organizer, cross rail horizontal DPF with vertical exhaust, 2nd fuel tank (33 gal), Limited Slip Differential and chrome grille. *200 and 212 wheelbase chassis (NU5 NU6) will require you to add the following options to your order: White cab/Side mounted fuel tank with power windows and door locks, air conditioning ( <b>OCC 74</b> ) AM/FM CD Stereo radio (IL7), Air Deflector (IF4), Back up Alarm (UZF)

NOTE: These selected specifications are subject to change without notice.

## Vehicle Weights, Dimensions and Ratings



(continued on next page)

## NRR/W5500 HD – Vehicle Specifications Index (cont'd)

Variable Chassis Dimensions					
Unit	WB	CA*	CE*	OAL	AF
Inch	109.0	86.5	129.6	200.5	43.1
Inch	132.5	110.0	153.1	224.0	43.1
Inch	150.0	127.5	170.6	241.5	43.1
Inch	176.0	153.5	196.6	267.5	43.1
Inch	200.0	177.5	220.6	291.5	43.1
Inch	212.0	189.5	232.6	303.5	43.1

\*Effective CA & CE are CA or CE less BOC.

Dimension Constants					
Code	Inches	Code	Inches	Code	Inches
AH	8.3	BW	83.3	FH	33.0
AW	65.6	CW	65.0		
BA	48.4	FW	33.5		
BBC	70.9	OH	91.1		
BOC	6.5	OW	81.3		

In-Frame Tank 19,500-lb. GVWR Automatic Transmission Model Chassis Cab and Maximum Payload Weights						
Model	WB	Unit	Front	Rear	Total	Payload
NU1	109 in.	lb.	3,997	2,319	6,316	13,184
NU2	132.5 in.	lb.	4,121	2,270	6,391	13,109
NU3	150 in.	lb.	4,186	2,242	6,428	13,072
NU4	176 in.	lb.	4,125	2,412	6,537	12,963

## **NRR/W5500 HD – Vehicle Specifications Index (cont'd)**

Side-Mounted Tank 19,500-lb. GVWR Automatic Transmission Model Chassis Cab and Maximum Payload Weights						
Model	WB	Unit	Front	Rear	Total	Payload
NU1	109	lb.	4,231	2,035	6,266	13,234
NU2	132.5	lb.	4,310	2,032	6,342	13,158
NU3	150	lb.	4,359	2,033	6,392	13,108
NU4	176	lb.	4,419	2,035	6,454	13,046
NU5	200	lb.	4,479	2,037	6,516	12,984
NU6	212	lb.	4,527	2,039	6,566	12,934

### **Truck Weight Limits:**

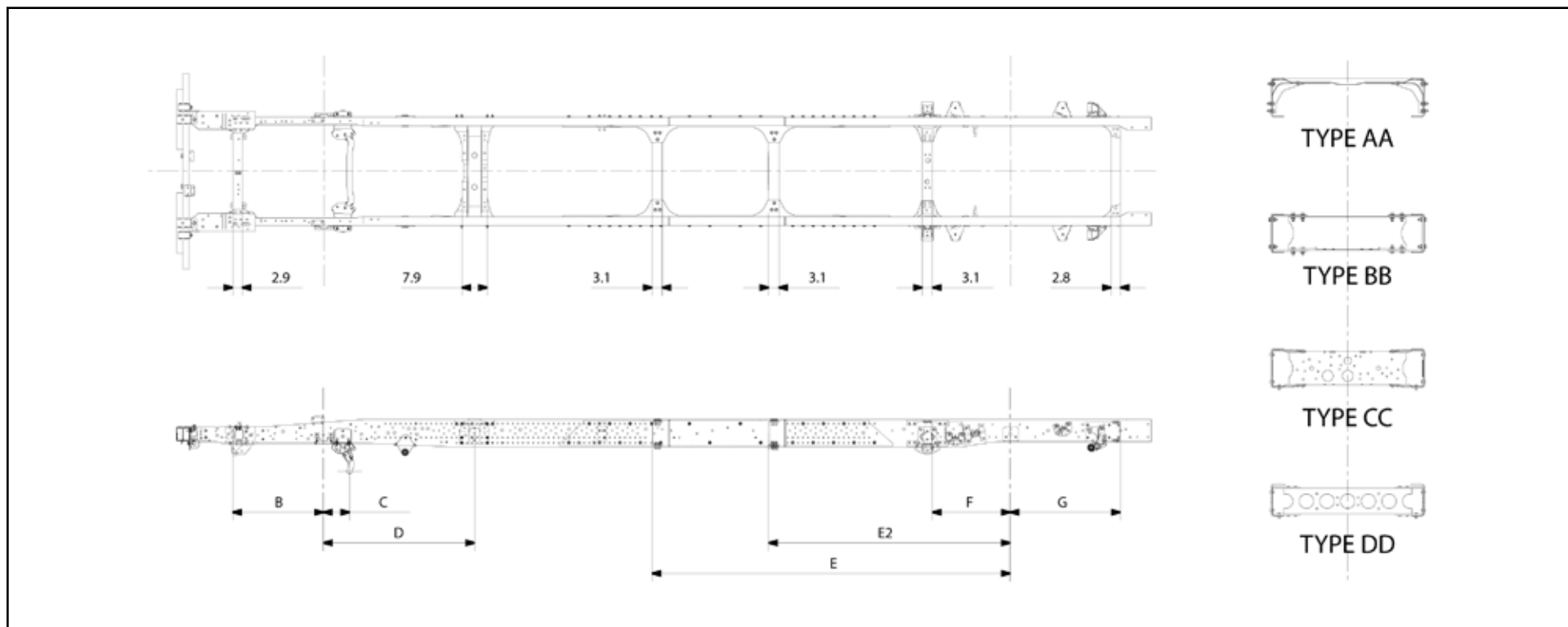
GVWR Designed Maximum	19,500 lbs.
GAWR, Front	6,830 lbs.
GAWR, Rear	13,660 lbs.

### **Technical Notes:**

**Chassis Curb Weight** reflects standard equipment and fuel, but no driver or payload.

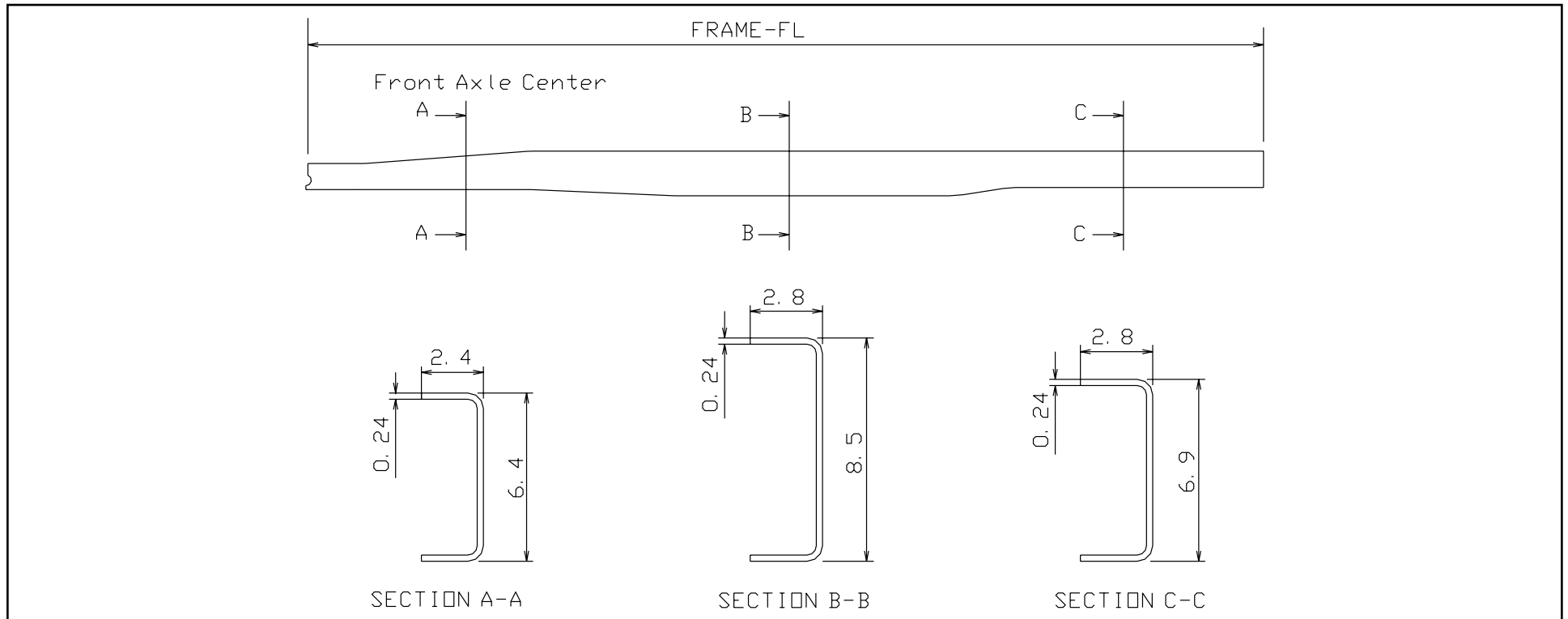
**Maximum Payload Weight** is the allowed maximum for equipment, body, payload and driver and is calculated by subtracting chassis curb weight from the GVWR.

## NRR/W5500 HD – Frame and Crossmember Specifications



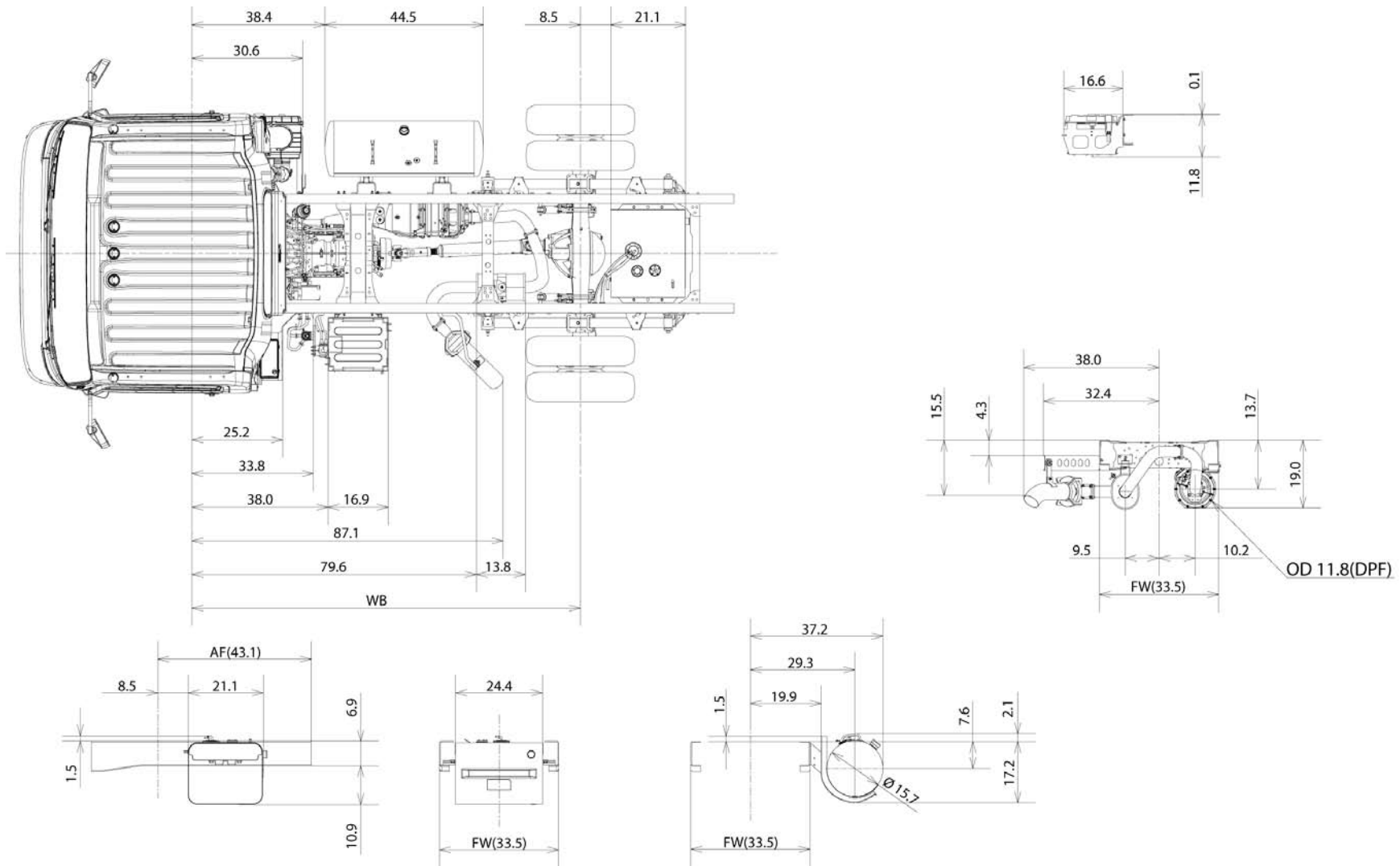
Wheelbase	Frame Thickness	Crossmember Type/Location											
		B	C	D		E		E2		F		G	
109	0.24	28.3	7.9	AA	46.5	-		-		CC	24.2	DD	33.8
132.5	0.24	28.3	7.9	AA	46.5	BB	57.5	-		CC	24.2	DD	33.8
150	0.24	28.3	7.9	AA	46.5	BB	57.9	-		CC	24.2	DD	33.8
176	0.24	28.3	7.9	AA	46.5	BB	74.4	-		CC	24.2	DD	33.8
200	0.24	28.3	7.9	AA	46.5	BB	98.4	BB	74.4	CC	24.2	DD	33.8
212	0.24	28.3	7.9	AA	46.5	BB	110.4	BB	74.4	CC	24.2	DD	33.8

## NRR/W5500 HD – Frame Chart



Wheelbase	Frame FL	Frame Thickness
109.0	182.5	0.24
132.5	206.1	0.24
150.0	223.8	0.24
176.0	249.8	0.24
200.0	273.8	0.24
212.0	285.8	0.24

## NRR/W5500 HD – Auxiliary Views 109" Wheelbase



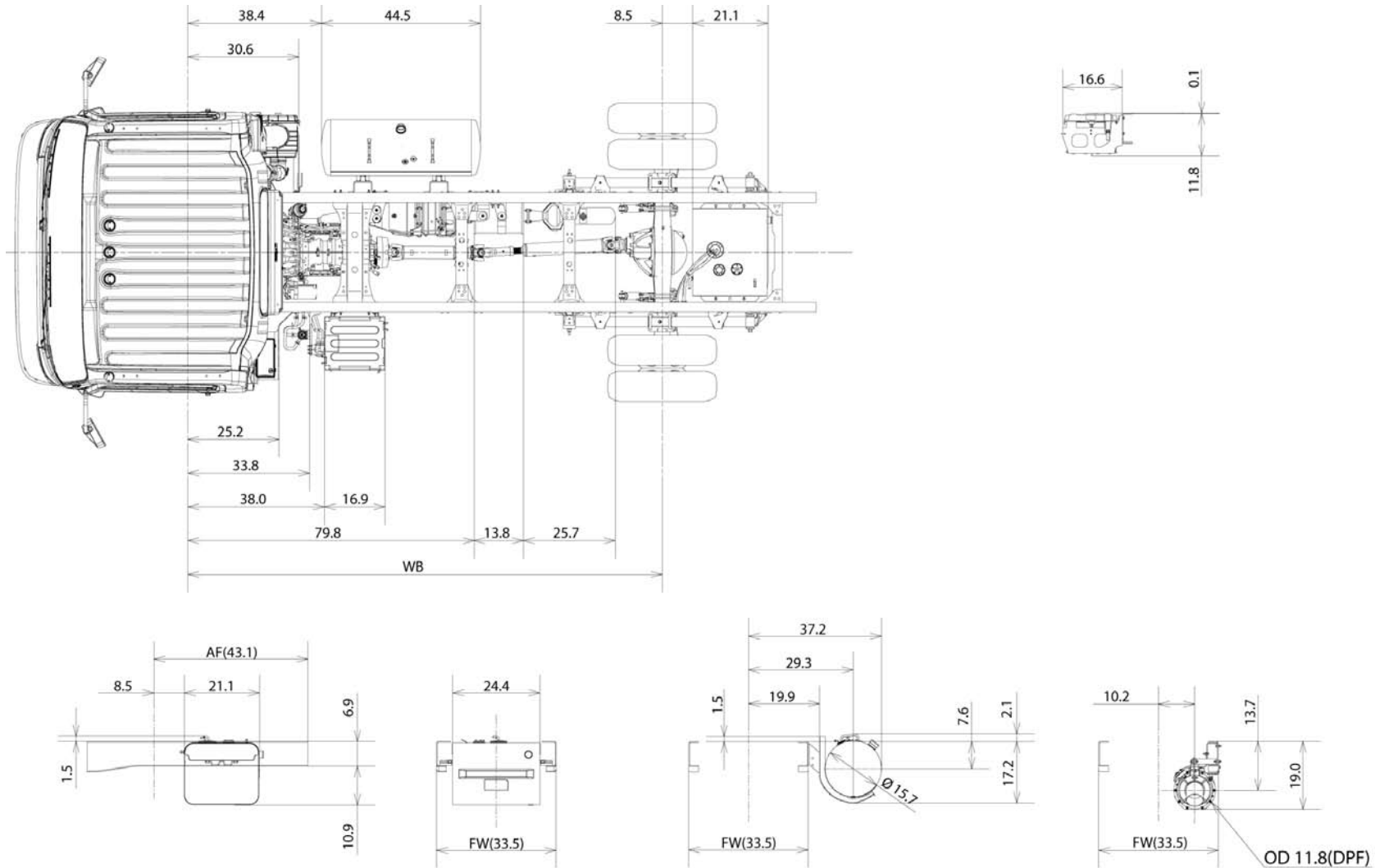
**NOTE:** Frame-mounted fuel tank available on 109", 132.5", 150" and 176" WB as an option replacing the In-Frame Tank.

\* Allow 3" additional for battery box opening clearance.

# 2009 GM/Isuzu Truck

PAGE 256

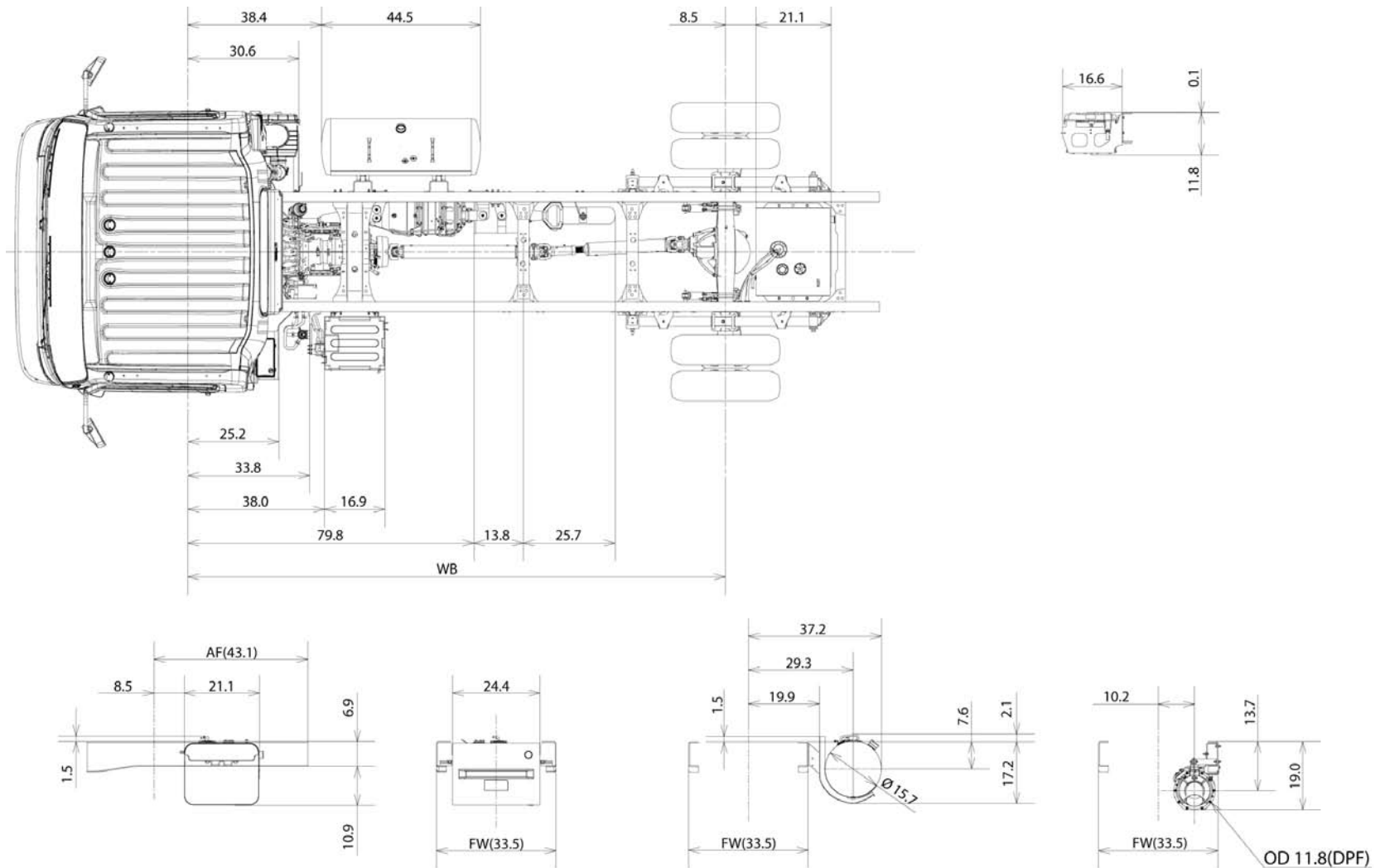
## NRR/W5500 HD – Auxiliary Views 132.5" Wheelbase



**NOTE:** Frame-mounted fuel tank available on 109", 132.5", 150" and 176" WB as an option replacing the In-Frame Tank.

\* Allow 3" additional for battery box opening clearance.

## NRR/W5500 HD – Auxiliary Views 150" Wheelbase



**NOTE:** Frame-mounted fuel tank available on 109", 132.5", 150" and 176" WB as an option replacing the In-Frame Tank.

\* Allow 3" additional for battery box opening clearance.



Technical drawing of the chassis of a Mercedes-Benz Sprinter 519 CDI, showing top, side, and detail views with dimensions in inches.

**Top View Dimensions:**

- Overall width: 38.4
- Wheelbase (WB): 79.8
- Front overhang: 30.6
- Engine compartment length: 44.5
- Front suspension track width: 25.2
- Front suspension mounting points: 33.8, 38.0
- Front suspension mounting offset: 16.9
- Front suspension mounting distance: 13.8
- Front suspension mounting offset: 25.7
- Front suspension mounting distance: 8.5
- Front suspension mounting offset: 21.1

**Side View Dimensions:**

- Overall height: 11.8
- Front suspension mounting offset: 0.1

**Detail Views:**

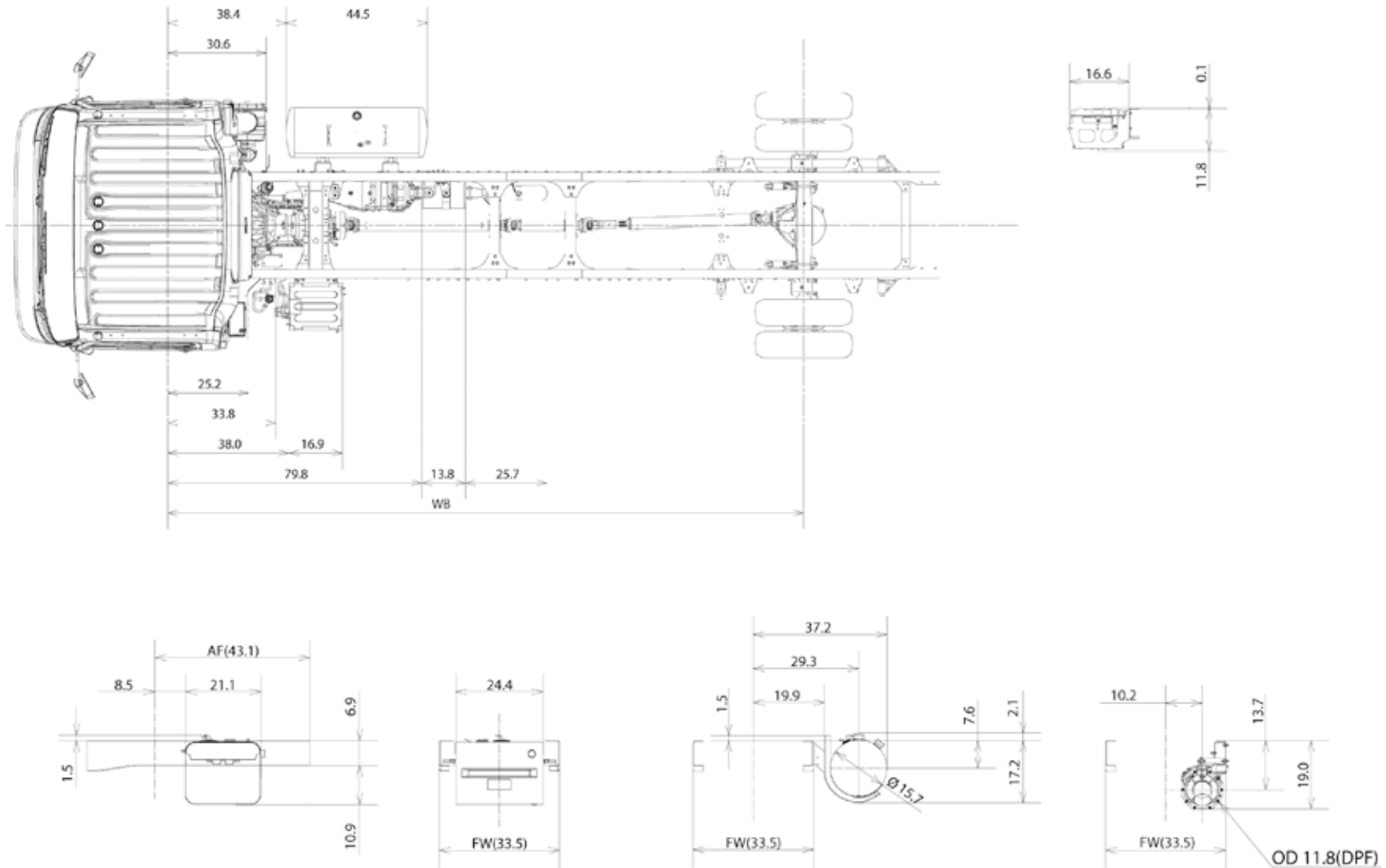
- Front Suspension Mounting:** Dimensions include 1.5, 8.5, 21.1, 6.9, 10.9, 24.4, FW(33.5), 37.2, 29.3, 19.9, 1.5, 7.6, 2.1, 17.2, and  $\varnothing 15.7$ .
- Front Suspension Mounting (DPF):** Dimensions include 10.2, 13.7, 19.0, FW(33.5), and OD 11.8(DPF).

\* Allow 3" additional for battery box opening clearance.

# 2009 GM/Isuzu TRUCK

PAGE 259

## NRR/W5500 HD – Auxiliary Views 200" Wheelbase

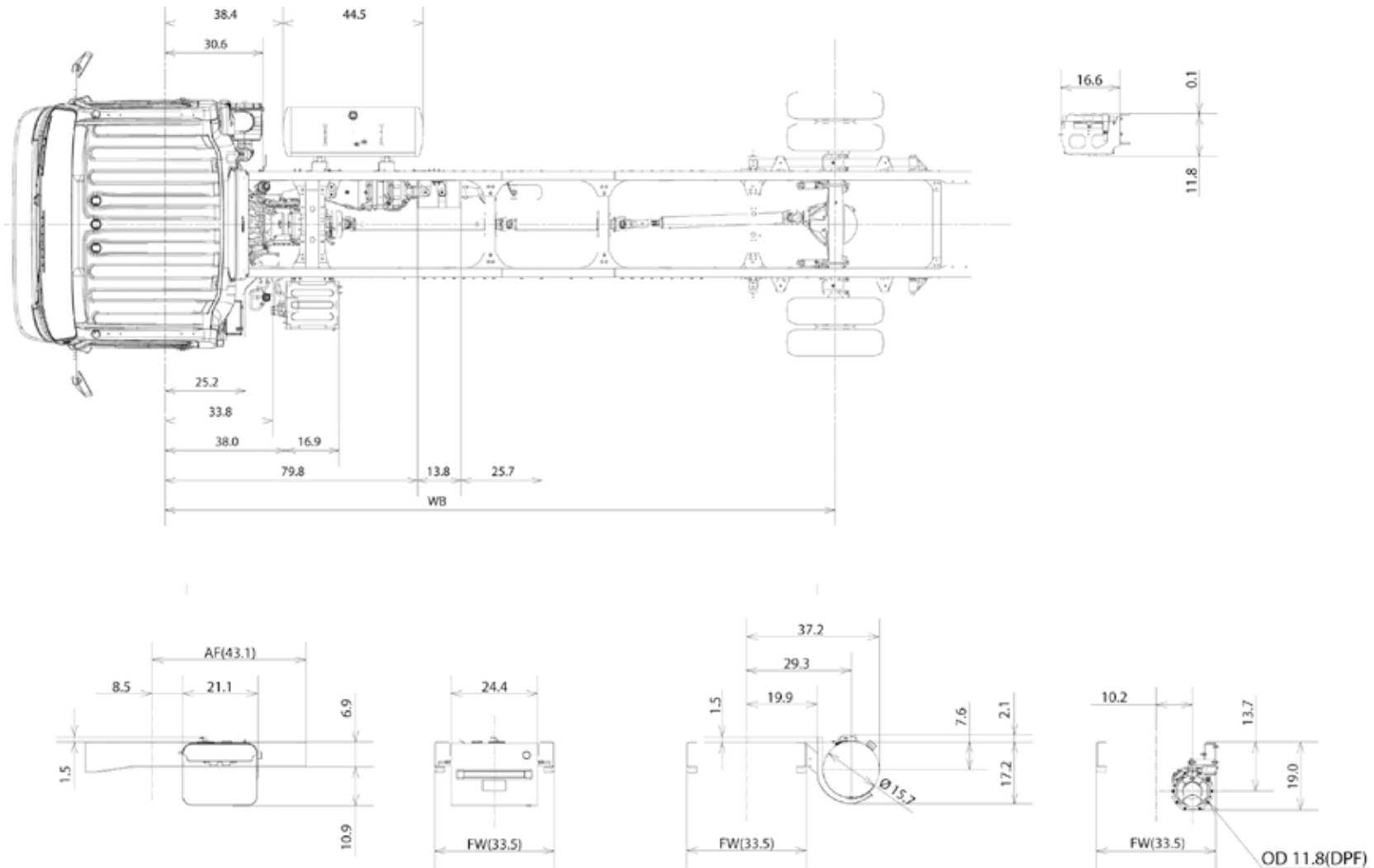


**NOTE:** \* Allow 3" additional for battery box opening clearance.

# 2009 GM/Isuzu TRUCK

PAGE 260

## NRR/W5500 HD – Auxiliary Views 212" Wheelbase



**NOTE:** \* Allow 3" additional for battery box opening clearance.

# 2009 GM/Isuzu TRUCK

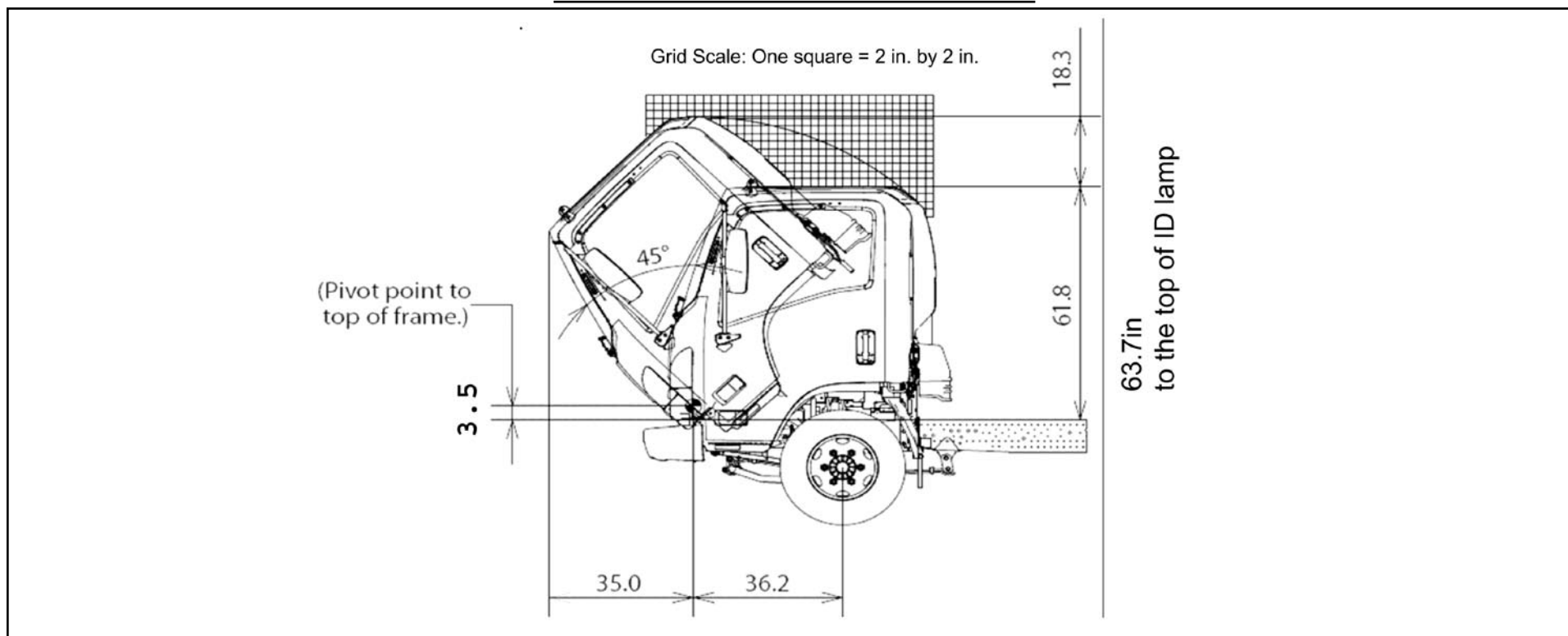
PAGE 261

## NRR/W5500 HD – Body Builder Weight Information Chart

### NRR AUTOMATIC TRANSMISSION

GVWR	AXLE	Body Builder Weight Information Chart												UNSPRUNG WEIGHT
		Wheelbase												
		109		132.5		150		176		200		212		
		in frame tank	side tank	in frame tank	side tank	in frame tank	side tank	in frame tank	side tank	in frame tank	side tank	in frame tank	side tank	
19,500	FRONT	3,997	4,231	4,121	4,310	4,186	4,359	4,125	4,419	N/A	4,479	N/A	4,527	661
	REAR	2,319	2,035	2,270	2,032	2,242	2,033	2,412	2,035	N/A	2,037	N/A	2,039	1,190
	TOTAL	6,316	6,266	6,391	6,342	6,428	6,392	6,537	6,454	N/A	6,516	N/A	6,566	1,851

## NRR/W5500 HD – Cab Tilt

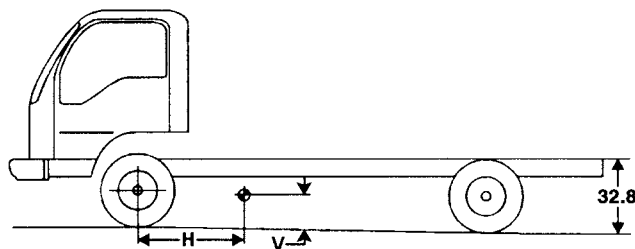


## NRR/W5500 HD – Body Builder Weight Information Chart (cont'd)

### Center of Gravity

The center of gravity of the chassis cab.

GVWR	WB	V	H	
			IN FRAME TANK	SIDE TANK
19,500	109	24.9	40.0	35.4
	132.5	24.9	47.1	42.5
	150	24.9	52.3	47.7
	176	24.9	64.9	55.5
	200	24.9	N/A	55.5
	212	24.9	N/A	55.5

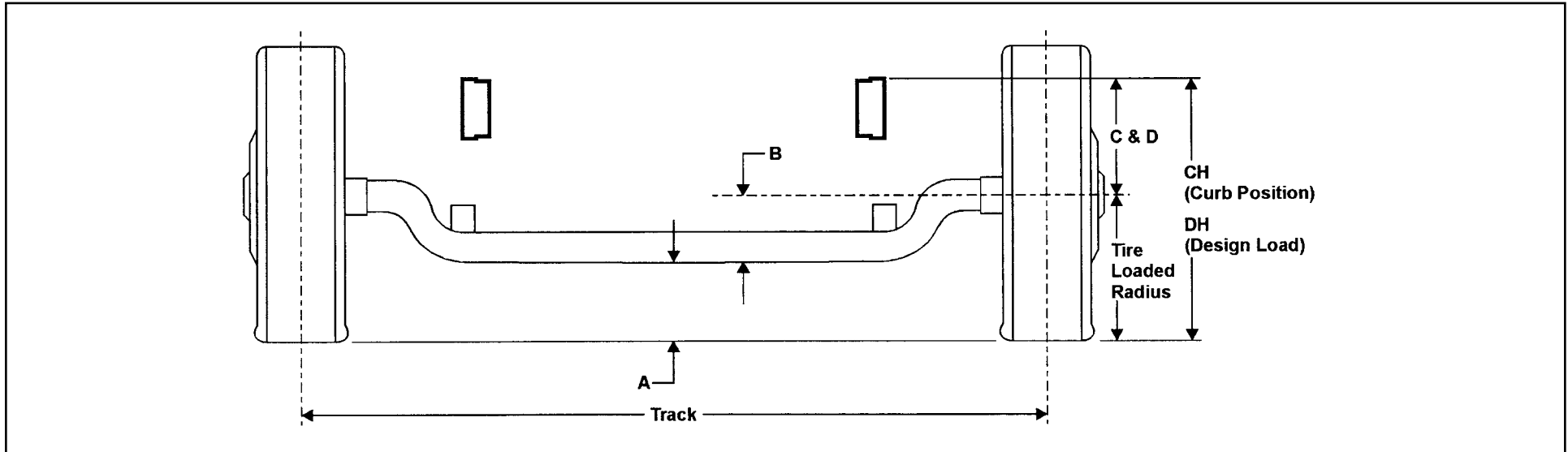


V = Vertical Center of Gravity  
H = Horizontal Center of Gravity

The center of gravity of the completed vehicle with a full load should not exceed 63 inches above ground level for the **19,500 LB.** GVWR, and must be located horizontally between the centerlines of the front and rear axles.

**NOTE:** The maximum dimensions for a body installed on the NRR/W5500-HD are 102 inches wide (outside) by 90 inches high (inside). Any larger body applications must be approved by Isuzu Commercial Trucks of America Application Engineering. In the West Coast call 1-562-229-5314 and in the East Coast call 1-770-740-1620 x 262.

## NRR/W5500 HD – Front Axle Chart

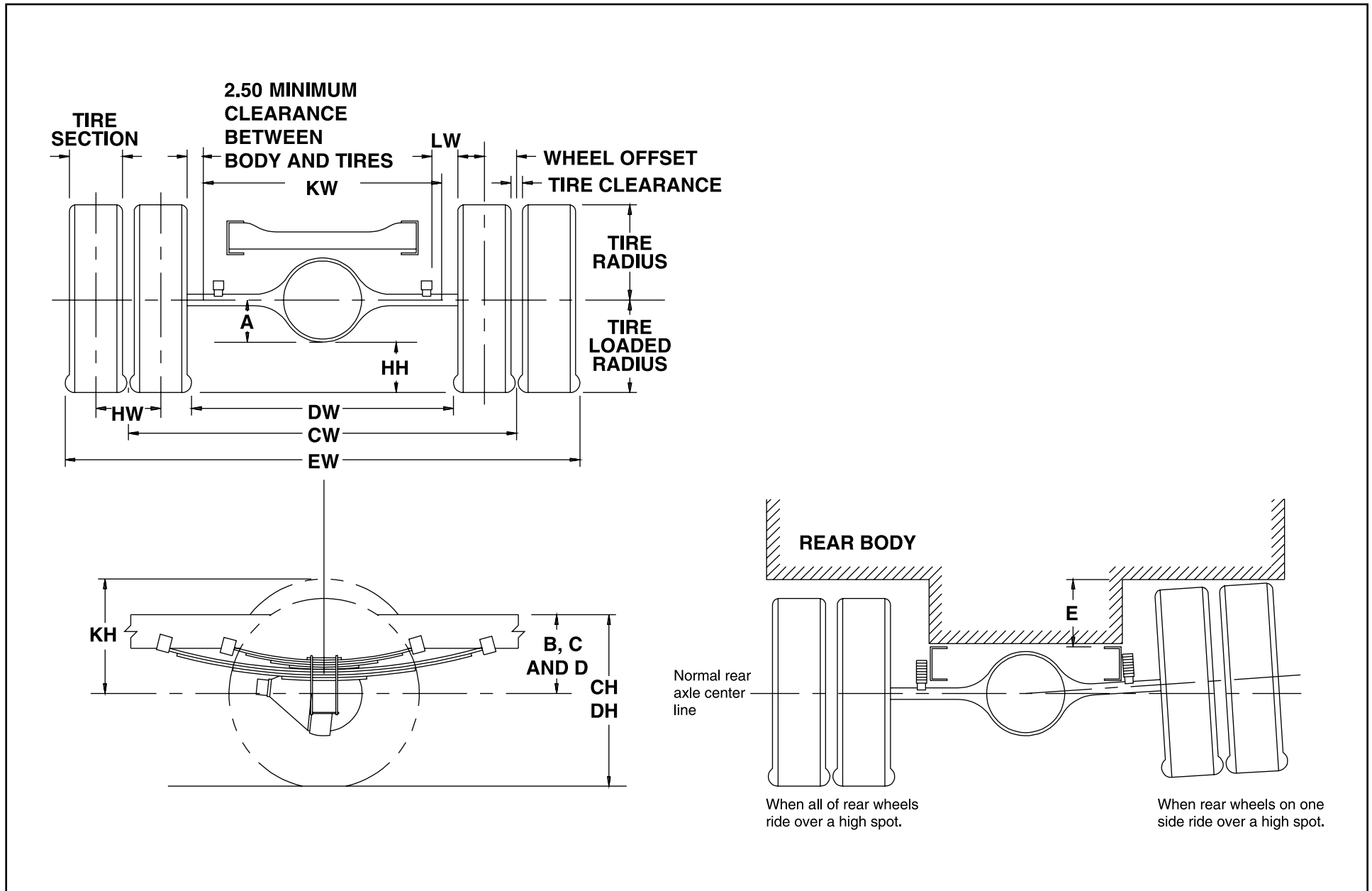


Formulas for calculating height dimensions:

- A = Tire Loaded Radius – B
- C = Centerline of Axle to Top of Frame Rail at Curb Position
- D = Centerline of Axle to Top of Frame Rail at Design Load
- CH = C + Tire Unloaded Radius
- DH = D + Tire Loaded Radius

Tire	GVWR	GAWR	A	B	C	D	CH	DH	Track	Tire Radius	
										Unload	Load
225/70R 19.5F	19,500 lbs.	6,830 lbs.	8.3	6.6	12.3	11.5	28.3	26.4	65.5	16	14.91

## NRR/W5500 HD – Rear Axle Chart



## NRR/W5500 HD – Rear Axle Chart (cont'd)

Definitions			
A	Centerline of axle to bottom of axle bowl.	DH	Rear Frame Height: Vertical distance between the normal top of frame rail and the ground-line through the centerline of the rear axle at design load.
B	Centerline of axle to top of frame rail at metal-to-metal position.	DW	Minimum distance between the inner surfaces of the rear tires.
C	Centerline of axle to top of frame rail at curb position.	EW	Maximum Rear Width: Overall width of the vehicle measured at the outermost surface of the rear tires.
D	Centerline of axle to top of frame rail at design load.	HH	Rear Tire Clearance: Minimum clearance between the rear axle and the ground-line.
E	Rear Tire Clearance: Minimum clearance required for tires and chain measured from the top of the frame at the vehicle centerline of the rear axle, when rear wheels on one side ride over a high spot.	HW	Dual Tire Spacing: Distance between the centerlines of the tires in a set of dual tires.
		KW	Tire Bounce Clearance: Minimum distance required for tire bounce as measured from the centerline of the rear axle and the top of the rear tire when one wheel rides over a high spot.
CH	Rear Frame Height: Vertical distance between the normal top of frame rail and the ground-line through the centerline of the rear axle at curb position.	CW	Track Dual Rear Wheel Vehicle: Distance between the centerlines of the dual wheels measured at the ground-line.
Tire Section, Tire Radius, Tire Loaded Radius, Tire Clearance		See Tire Chart for values.	

Formulas for Calculating Rear Width and Height Dimensions			
CW	= Track	HH	= Tire loaded radius – A
CH	= Tire loaded radius + C	JH	= KH – B
DH	= Tire loaded radius + D	KH	= Tire radius + 3.00 inches
DW	= Track + 2 tire sections – tire clearance	KW	= DW – 5.00 inches
EW	= Track + 2 tire sections + tire clearance	LW	= 1.00-inch minimum clearance between tires and springs

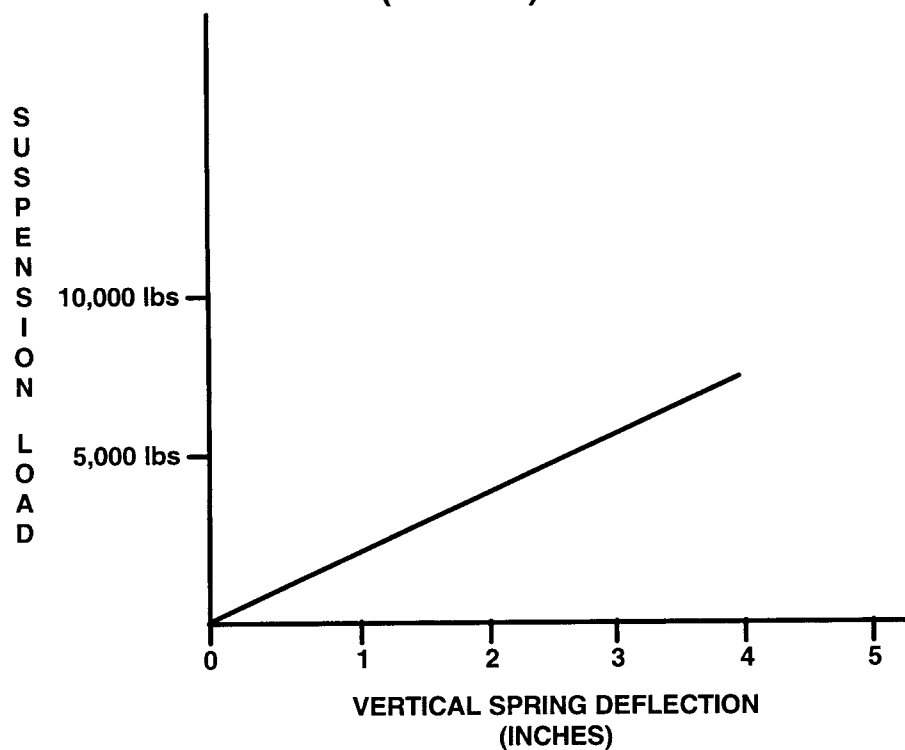
**NOTE:** Track and overall width may vary with optional equipment.

Tire	GAWR	Track CW	A	B	C	D	E
225/70R 19.5F	12,980 lbs.	65.0	7.7 (A/T)	9.3 (A/T)	15.6	13.4	8.4

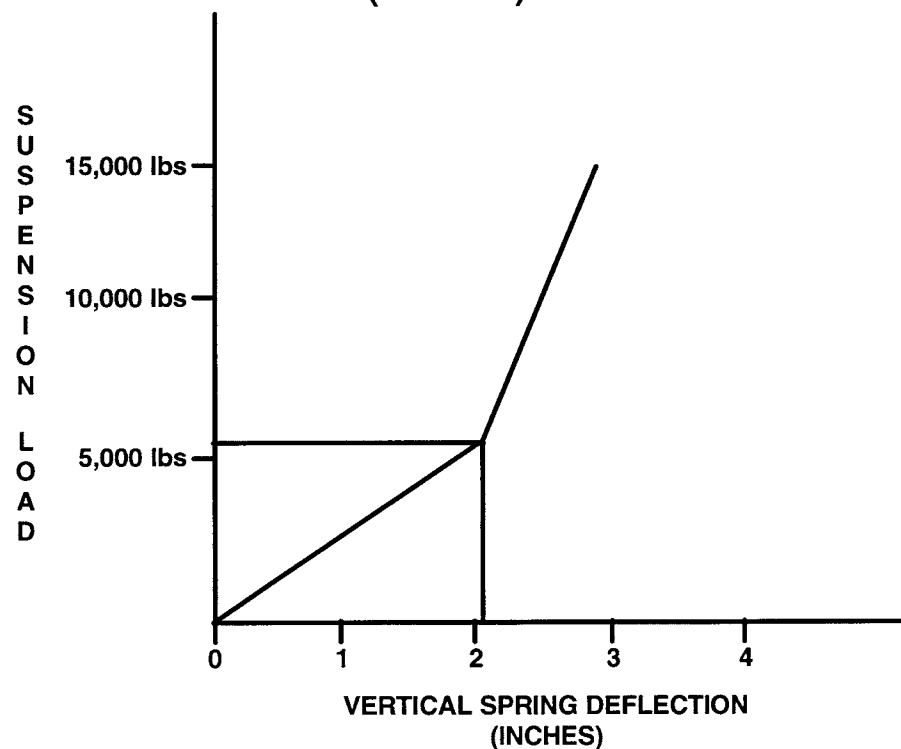


## NRR/W5500 HD – Suspension Deflection Charts

**Front Leaf Spring Load vs. Deflection  
(Per Axle)**



**Rear Leaf Spring Load vs. Deflection  
(Per Axle)**



## NRR/W5500 HD – Tire and Disc Wheel Chart

### Tire

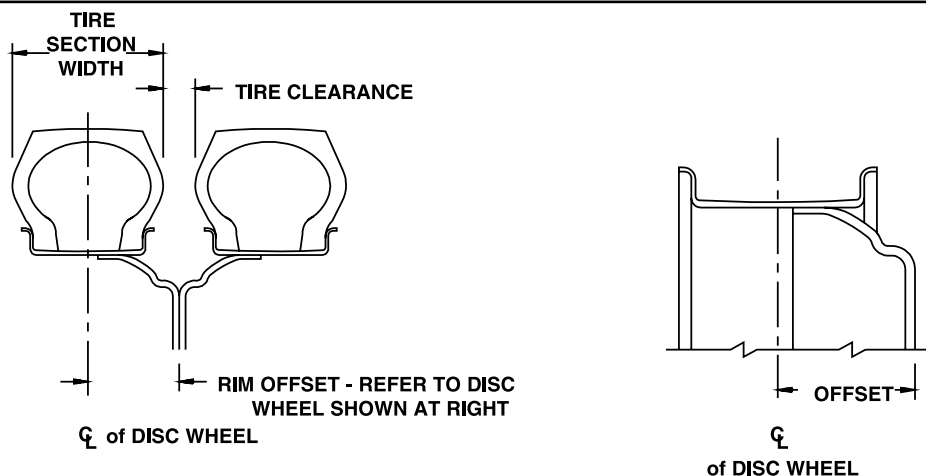
Tire Size	Tire Load Limit and Cold Inflation Pressures				Maximum Tire Load Limits		GVWR (Lb.)
	Single		Dual		Front	Rear	
	Lb.	PSI	Lb.	PSI	2 Single	4 Dual	
225/70R 19.5F	3,640	95	3,415	95	7,280	13,660	19,500

Tire Size	GVWR (Lb.)	Tire Radius				Tire Section Width	Tire Clearance	Design Rim Width
		Loaded		Unloaded				
		Front	Rear	Front	Rear			
225/70R 19.5F	19,500	14.91	14.96	16.00	16.00	8.7	1.3	6.0

### Disc Wheel

Wheel Size	Bolt Holes	Bolt Circle Dia.	Ft./Rr. Nut Size*	Rear Stud Size*	Nut/Stud Torque Specs.	Inner Circle	Outside Offset	Disc Thickness	Rim Type	Material Mfg.
19.5 x 6.00 K	6 JIS	8.75	1.6142 (41 mm) BUD HEX	0.8268 (21 mm) SQUARE	325 ft.-lb. (440 N•m)	6.46	5.0	0.35	15° DC	Steel TOPY

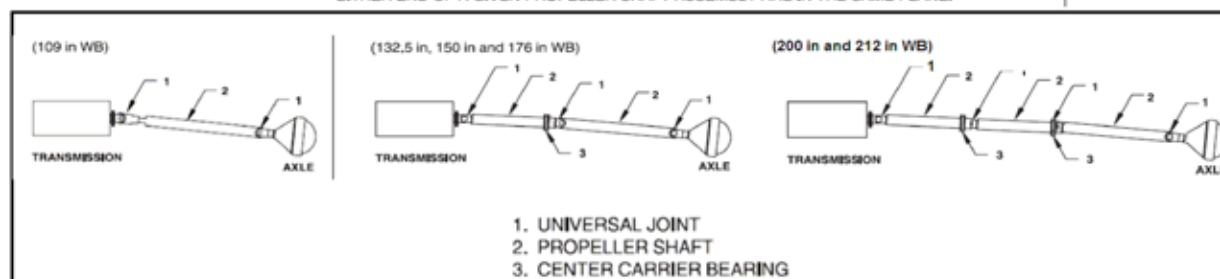
\*O.D. Wrench Sizes



## NRR/W5500 HD – Propeller Shaft NQR/W5500

WB	PLANE VIEW	SIDE VIEW
109		
132.5		
150		
176		
200		
212		

TYPICAL INSTALLATIONS SHOWING YOKES "IN PHASE." "IN PHASE" MEANS THAT THE YOKES AT EITHER END OF A GIVEN PROPELLER SHAFT ASSEMBLY ARE IN THE SAME PLANE.

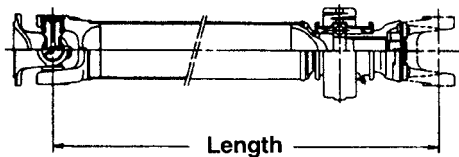
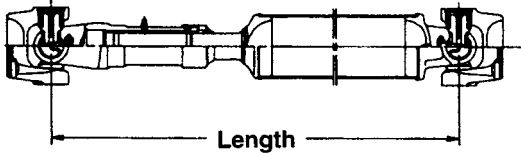


Wheelbase	Plane View			Side View		
	A	B	C	D	E	F
109 in.	—	3.2°	—	8.5°	—	—
132.5 in.	0°	3.3°	—	2.6°	2.8°	—
150 in.	0°	3.3°	—	1.8°	1.9°	—
176 in.	0°	2.2°	—	0.4°	3.5°	—
200 in.	0°	0°	2.2°	0.4°	0°	3.5°
212 in.	0°	0°	2.2°	0.4°	0°	3.5°

**NOTE:** All driveline angles are at unloaded condition (curb position with typical cargo body).

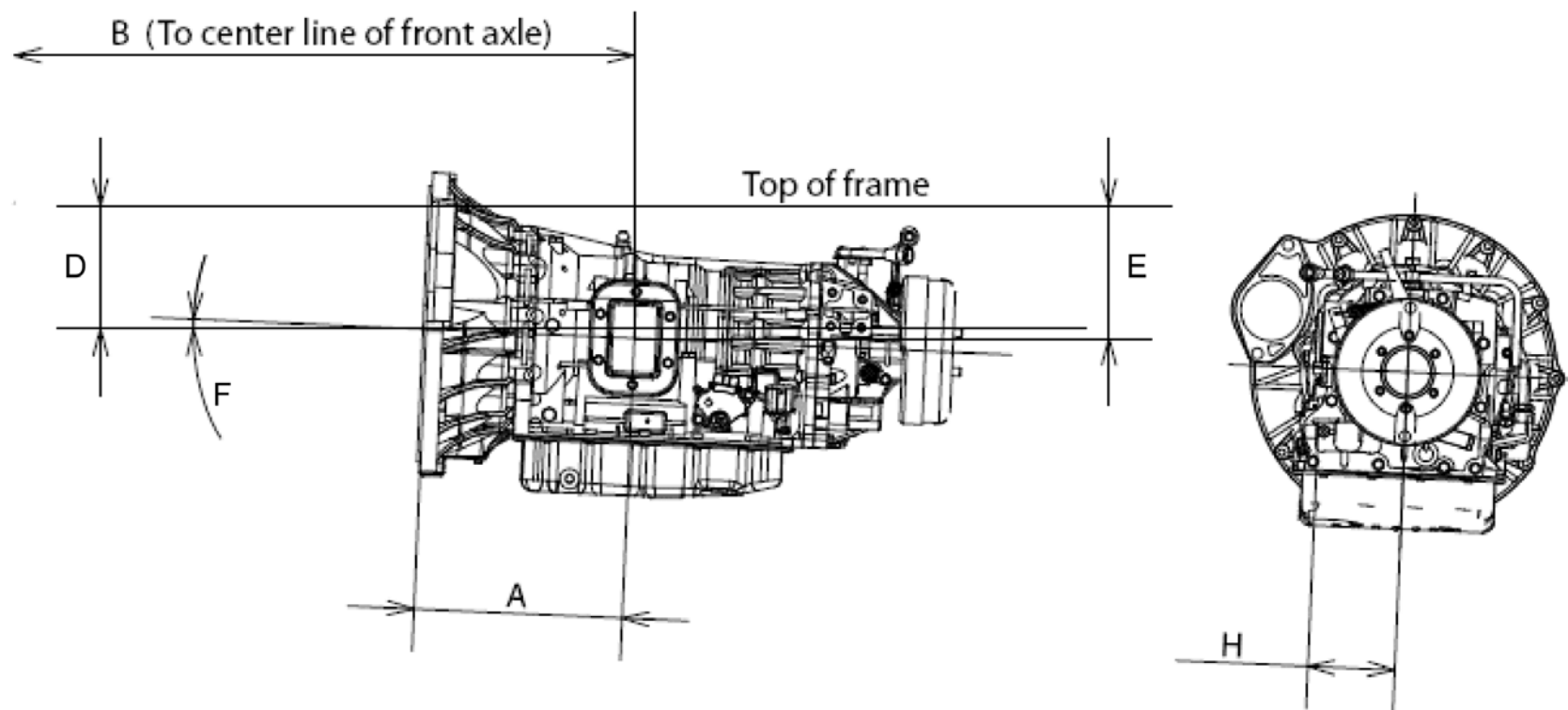
## NRR/W5500 HD – Propeller Shaft NQR/W5500 (cont'd)

Trans. Type	6 Automatic. Transmission					
Wheelbase	109	132.5	150	176	200	212
No. of Shafts	1	2	2	2	3	3
Shaft #1 O.D.	3.54	3.54	3.54	3.54	3.54	3.54
Thickness	0.126	0.126	0.126	0.126	0.126	0.126
Length	36.81	24.13	35.93	45.37	45.37	45.37
Type	B	A	A	A	A	A
Shaft #2 O.D.	N/A	3.54	3.54	3.54	3.54	3.54
Thickness	N/A	0.126	0.126	0.126	0.126	0.126
Length	N/A	36.81	36.81	53.23	24	36
Type	N/A	B	B	B	A	A
Shaft #3 O.D.	N/A	N/A	N/A	N/A	3.54	3.54
Thickness	N/A	N/A	N/A	N/A	0.126	0.126
Length	N/A	N/A	N/A	N/A	53.2	53.2
Type	N/A	N/A	N/A	N/A	B	B

Type	Description	Model	Illustration
Type A	1 <sup>st</sup> shaft in 1-piece driveline 1 <sup>st</sup> & 2 <sup>nd</sup> shaft in 3-piece driveline	P30	
Type B	2 <sup>nd</sup> shaft in 2-piece driveline 3 <sup>rd</sup> shaft in 3-piece driveline	P30	

## NRR/W5500 HD – PTO Location, Drive Gear and Opening Information

### AUTOMATIC TRANSMISSION



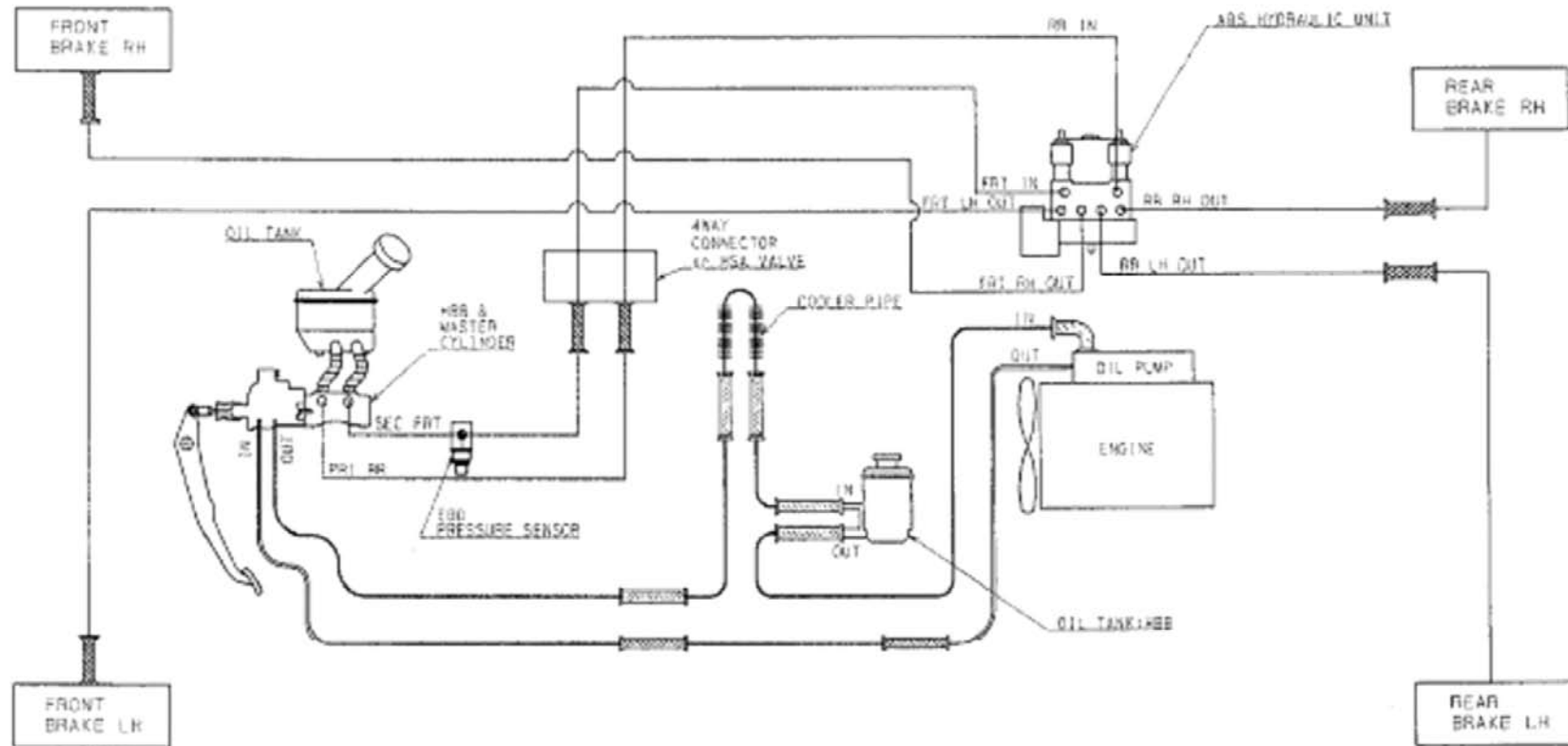
## Opening Diagram

Technical drawing of a rectangular plate with the following dimensions and specifications:

- Overall width: 5.12 (2.56 + 2.56)
- Overall height: 5.51 (2.75 + 2.75)
- Inner width: 3.34 (1.67 + 1.67)
- Inner height: 4.74 (2.36 + 2.36)
- Distance from top edge to top hole center: 2.75
- Distance from bottom edge to bottom hole center: 2.75
- Distance from left edge to left hole center: 2.06
- Distance from right edge to right hole center: 2.06
- Distance between top holes: 1.67
- Distance between bottom holes: 1.67
- Distance between left holes: 1.38
- Distance between right holes: 1.38
- Distance between top and bottom holes on each side: 5.0
- Hole specifications: 6 - M8 x 1.25 (ISO) Depth 20mm [0.78Inch]
- Location Hole: Indicated by a leader line pointing to one of the holes.

## NRR/W5500 HD – Brake System Diagram, Hydraulic Brake Booster

Please refer to Introduction Section of book for antilock system cautions and wheelbase modification requirements.



INDICATION							
NAME	BRAKE HOSE HIGH PRESSURE	BRAKE HOSE LOW PRESSURE	BRAKE PIPE	HYDRAULIC HOSE (SUPPLY)	HYDRAULIC HOSE (RETURN/SUCTION)	HYDRAULIC PIPE (SUPPLY)	HYDRAULIC PIPE (RETURN/SUCTION)

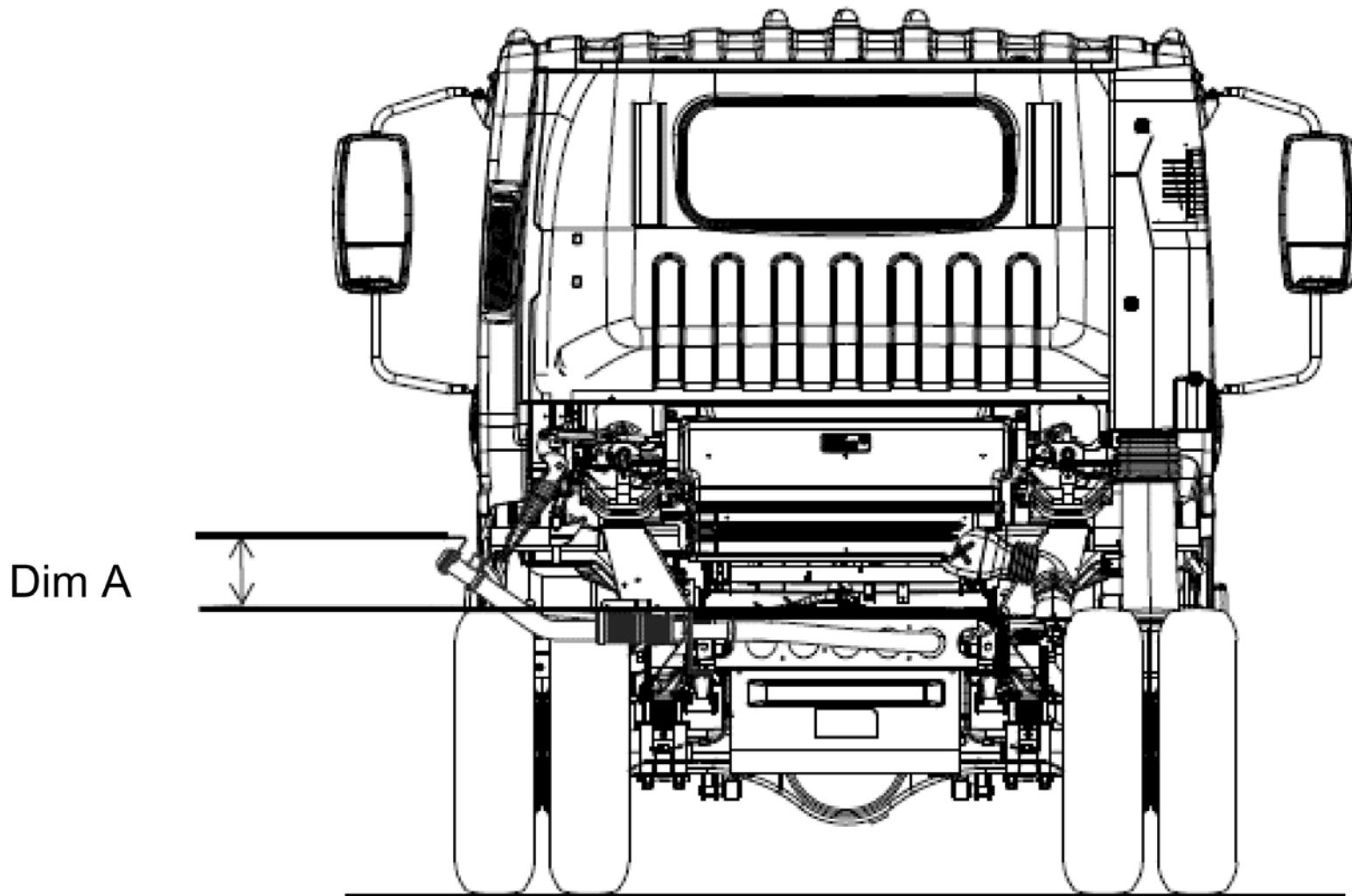
## NRR/W5500 HD – Diesel Fuel Fill

### ***Installation Instructions***

1. Disconnect battery.
2. Loosen hose from the tie downs. Remove caps from plate on rail.
3. Install hoses onto the plate.
4. Extend hose out from the driver side of the rail to body rail.
5. The filler neck must be mounted to allow the fill plate bracket to be parallel to the frame horizontal (see figure 4).
6. Cover with protector wrap and secure with tie wraps.
7. Filler hose is set for 102 inches outside width body.
8. Filler neck (dimension A) must be between 6.85 inches and 8.5 inches above frame.
9. Secure the filler plate to the bottom of the body and check for leaks.
10. Ensure that fill hose does not sag, creating an area where the fuel could pool in the fill hose.
11. Reconnect battery.

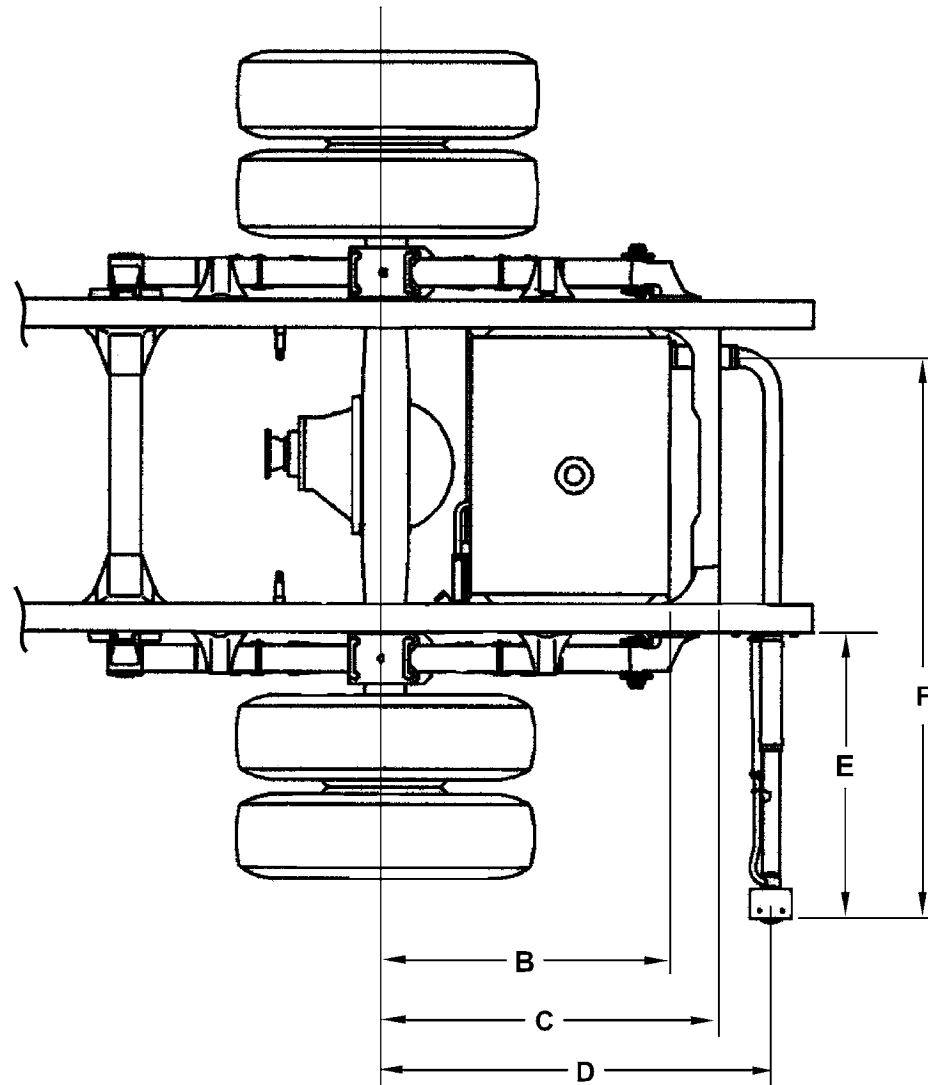


## NRR/W5500 HD – Rear View Fuel Fill



Dimension A = 6.85 - 8.5 inches (174-216 mm)

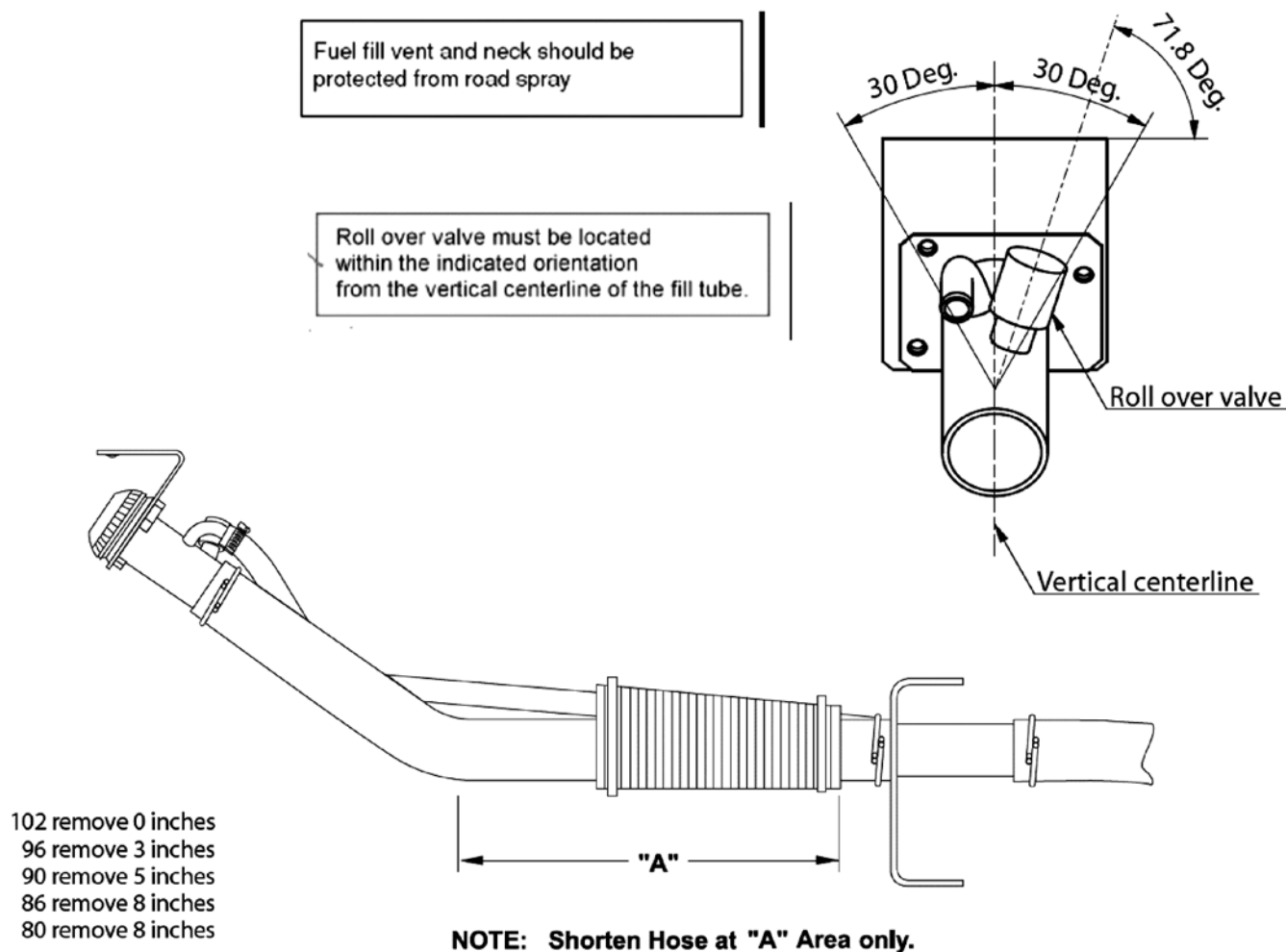
## NRR/W5500 HD – Top View Fuel Fill



Dimensions:

B = 29.75 inches (756 mm)  
C = 34.00 inches (863 mm)  
D = 39.29 inches (998 mm)  
E = 33.86 inches (860 mm)  
F = 59.60 inches (1,514mm)

## NRR/W5500 HD – Hose Modification for Various Width Bodies and Fuel Fill Vent Orientation and Protection



## NRR/W5500 HD – Ultra Low Sulphur Diesel Label

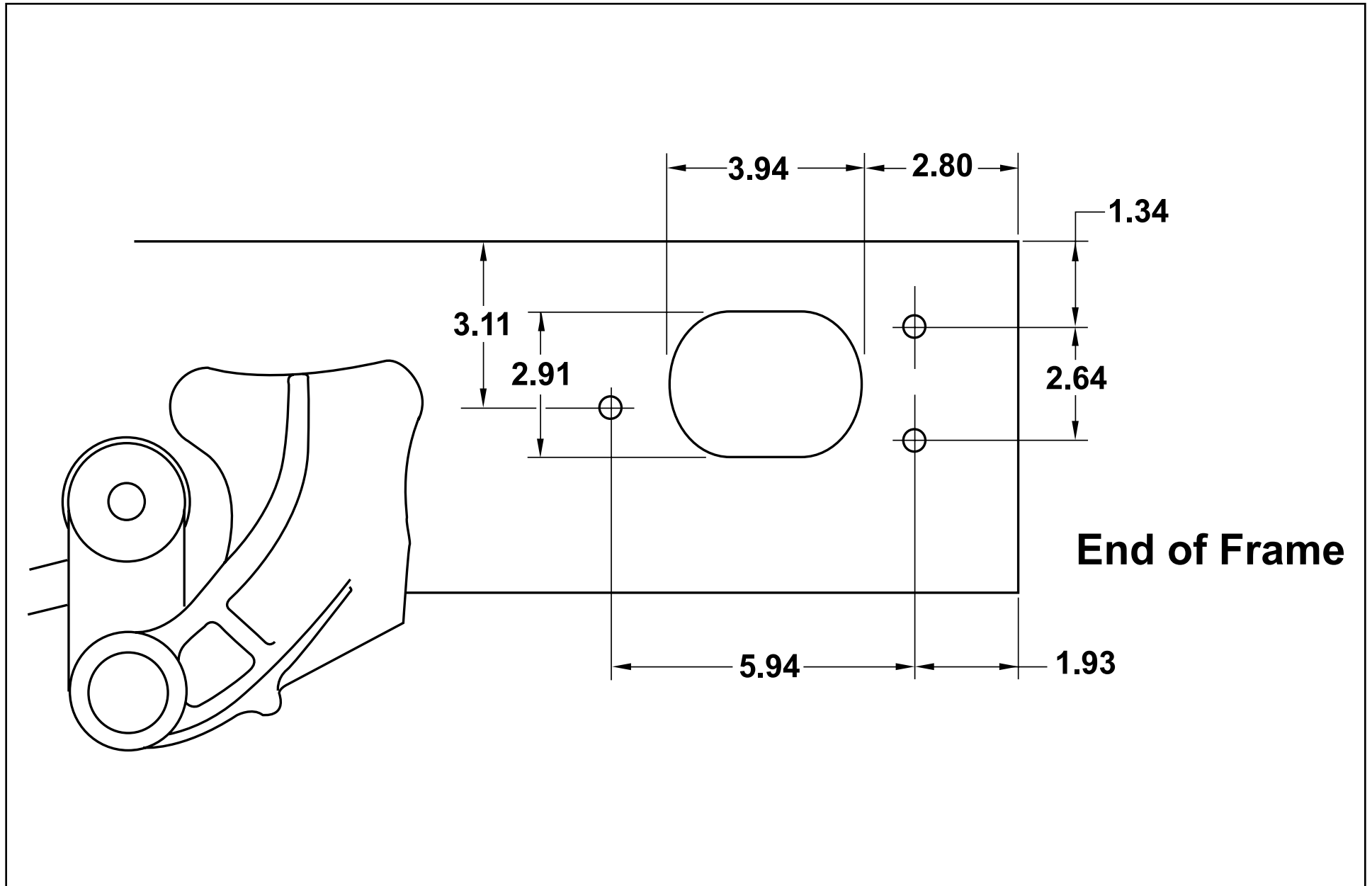
Per EPA Title 40, Part 86, 86:007—35(c),  
The decal illustrated below must be installed on the vehicle.  
The decal is included in the fuel fill parts box.



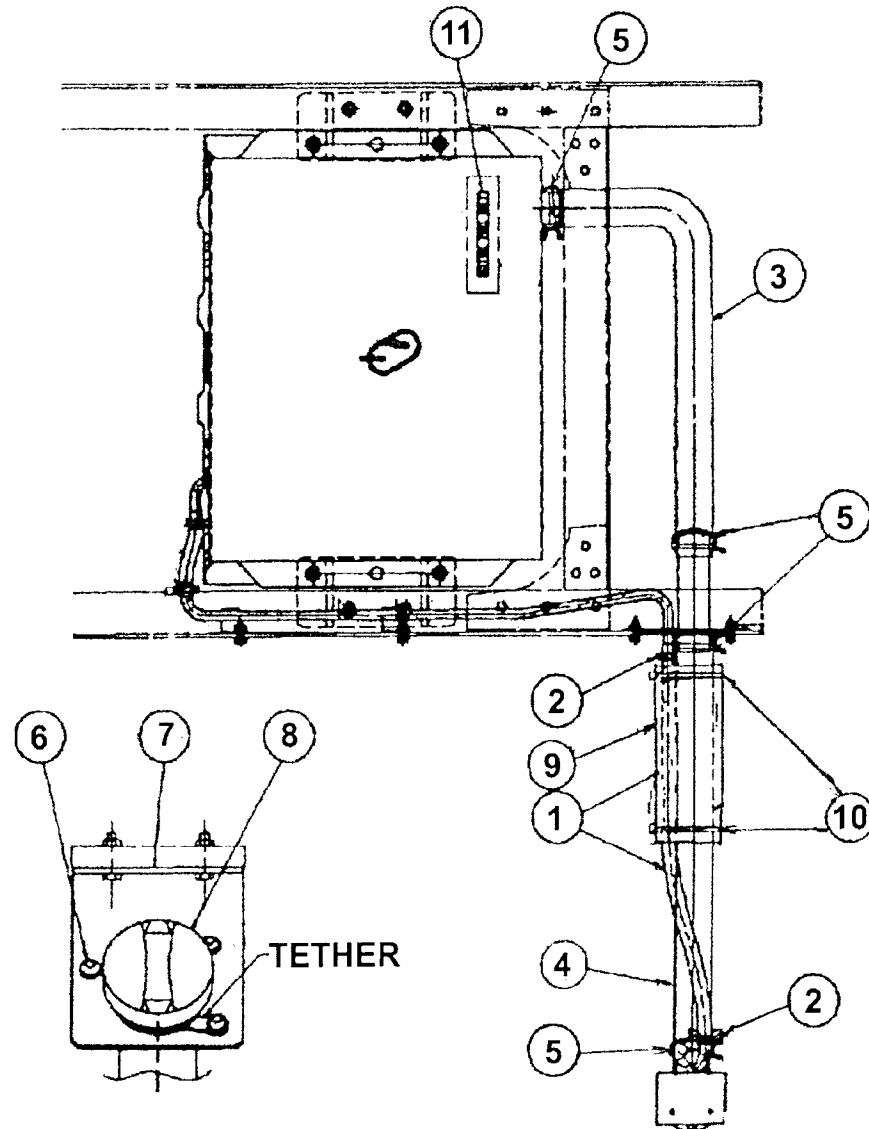
### INSTRUCTIONS FOR DECAL PLACEMENT:

1. The decal must be placed as close as possible to the fuel inlet and be clearly visible.
  2. The decal should be placed above or to the side of the fuel cap to avoid corrosion by possible contact with fuel.
  3. The decal may be placed on aerodynamic fairings, bodies, etc. as long as the decal is clearly visible and in close proximity to the fuel inlet.
  4. For installed bodies that have a fuel door, the decal should be placed above or to the side of the fuel door.
- Thoroughly clean the area of all grease, dirt, etc. before application of the decal. Apply the decal at room temperature, 65° to 75° F.

## NRR/W5500 HD – Through the Rail Fuel Fill Frame Hole



## NRR/W5500 HD – Diesel Fuel Fill Parts Illustration






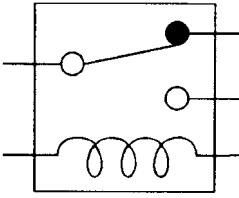


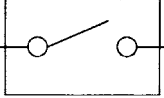
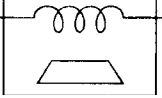
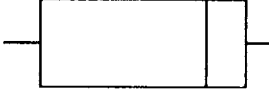
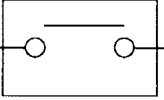
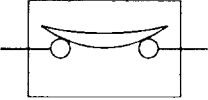
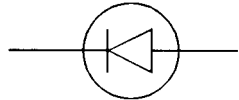
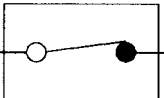

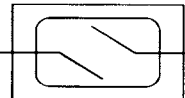


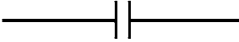
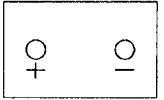

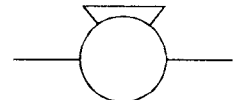
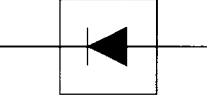
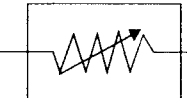
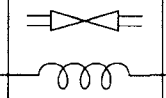


# 2009 GM/Isuzu TRUCK

## NRR/W5500 HD – Fuel Fill Parts List

Number	Description	Part Number – Isuzu	Part Number – GM	Quantity
1	Breather Hose	898006-4510	N/A	1
2	Clip, Rubber Hose	894242-0340	94242034	2
3	Hose, Fuel Filler	897187-8750	97187875	1
4	Hose, Fuel Filler	897253-1400	97253140	1
5	Clip, Filler Hose	894435-8760	97724373	4
6	Screw, Filler Hose	894384-6460	N/A	3
7	Bracket, Filler Neck	897116-621Y	97116621	1
8	Cap, Filler	897218-7020	N/A	1
9	Protector	897114-0630	97114063	1
10	Clip	109707-1071	94062296	2
11	Caution Plate	N/A	15798339	1

## NPR/W3500, NPR HD/W4500 Gas – Electrical Symbols

Symbol	Meaning	Symbol	Meaning	Symbol	Meaning
	Fuse		Electronic Parts		Coil (Inductor), Solenoid Magnetic Valve
	Fusible Link		Resistor		Relay
	Fusible Link Wire		Speaker		
	Switch		Buzzer		Connector
	Switch		Circuit Breaker		Light-Emitting Diode
	Switch (Normal Close Type)		Bulb		Reed Switch
	Contact Wiring		Double-Filament Bulb		Condenser
	Battery		Motor		Horn
	Diode		Variable Resistor Rheostat		Vacuum Switching Valve



## NPR/W3500, NPR HD/W4500 Gas – Abbreviations

Abbreviation	Definition	Abbreviation	Definition
3A/T	6-Speed Automatic Transmission	IG	Ignition
4A/T	4-Speed Automatic Transmission	kW	kilowatt
A/T	Automatic Transmission	LH	Left hand
ABS	Anti-lock brake system	LO	Low
APP	Accelerator pedal position	LWB	Long wheelbase
ATF	Automatic Transmission Fluid	M/T	Manual Transmission
AUTO	Automatic	M/V	Magnetic valve
BRKT	Bracket	MAF	Mass airflow
C/B	Circuit breaker	MIL	Check engine light
CKP	Crankshaft position	OD	Over drive
CMP	Camshaft position	OPT	Option
COMB	Combination	PTO	Power Take Off
CONT	Control	RH	Right hand
D.R.L.	Day time running light	RR	Rear
DC	Direct current	SCV	Suction control valve
ECM	Electronic control module	ST	Start
ECT	Engine coolant temperature	STD	Standard
ECU	Electronic control unit	SW	Switch
EGR	Exhaust gas reticulation	SWB	Short wheelbase
EHCU	Electronic and hydraulic control unit	TCM	Transmission control module
FL	Fusible link	V	Volt
FRT	Front	VSV	Vacuum switching valve
FT	Fuel Temperature	W	Watt (S)
H/L	Headlight	W/	With
HI	High	W/O	Without
IAT	Intake air temperature	W/S	Weld splice
IC	Integrated circuit	WOT	Wide-open throttle

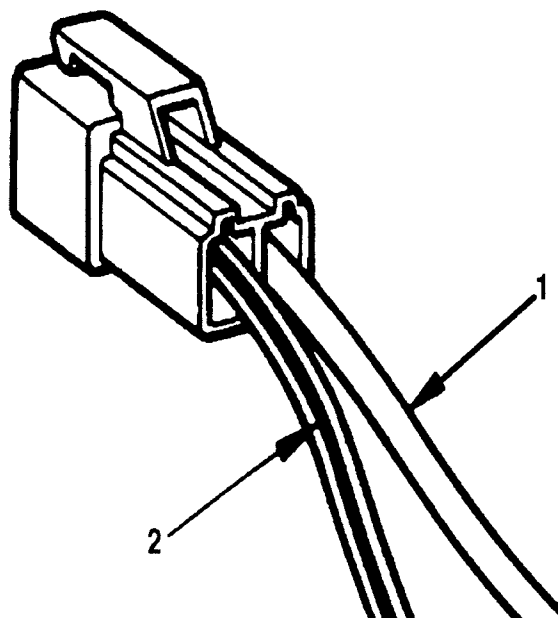
## NPR/W3500, NPR HD/W4500 Gas – Electrical – Wiring

### Wire Color

All wires have color-coded insulation. Wires belonging to a system's main harness will have a single color. Wires belonging to a system's sub-circuits will have a colored stripe. Striped wires use the following code to show wire size and colors.

Example: 0.5 G / R

Red (Stripe Color)  
Green (Base Color)  
Wire Size (0.5 mm<sup>2</sup>)



- 1. Single Color Wire
- 2. Colored Stripe Wire

## NPR/W3500, NPR HD/W4500 Gas – Electrical – Wiring (cont'd)

Abbreviations are used to indicate wire color within a circuit diagram. Refer to the following table.

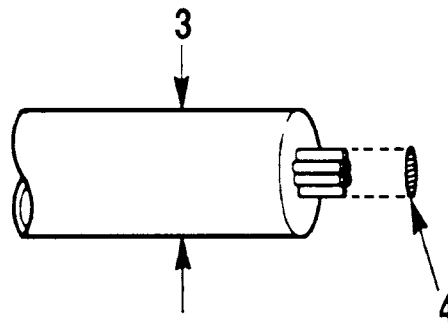
Color-Coding	Meaning	Color-Coding	Meaning
B	Black	BR	Brown
W	White	LG	Light Green
R	Red	GR	Grey
G	Green	P	Pink
Y	Yellow	LB	Light Blue
L	Blue	V	Violet
O	Orange		

### Wire Size

The size of wire used in a circuit is determined by the amount of current (amperage), the length of the circuit, and the voltage drop allowed. The following wire size and load capacity are specified by AWG (American Wire Gauge). (Nominal size means approximate cross sectional area.)

3. Outside Diameter

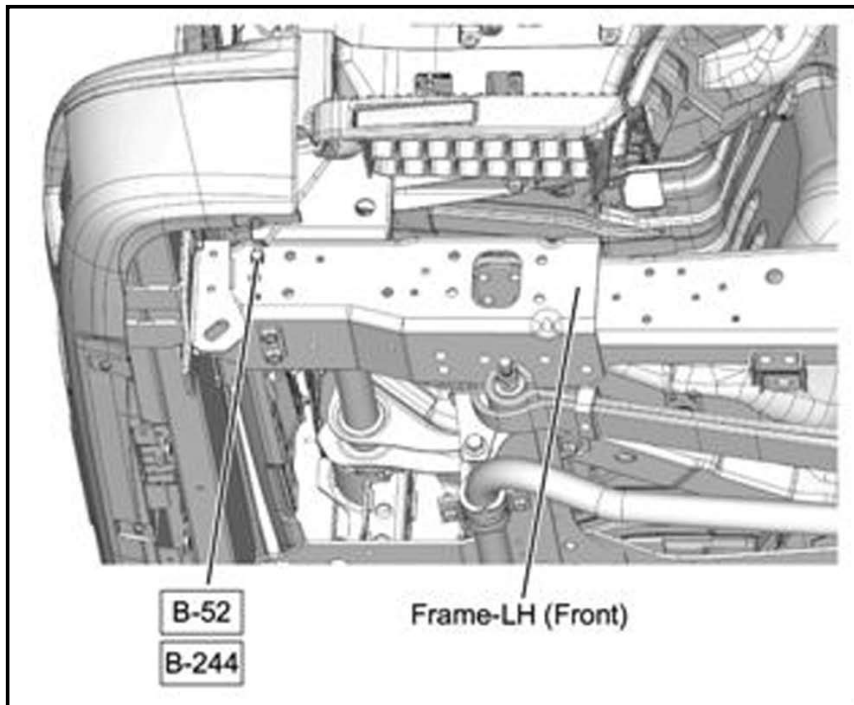
4. Cross Sectional Area



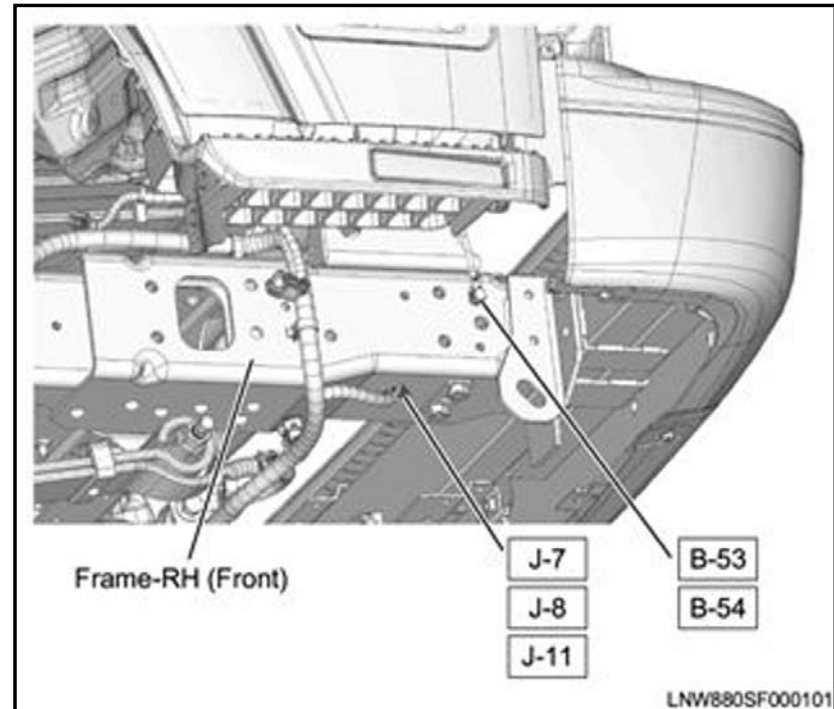
## NPR/W3500, NPR HD/W4500 Gas – Electrical – Wiring (cont'd)

Nominal Size	Cross Sectional Area (mm <sup>2</sup> )	Outside Diameter (mm)	Allowable Current (A)	AWG Size (Cross reference)
0.3	0.372	1.8	9	22
0.5	0.563	2.0	12	20
0.85	0.885	2.2	16	18
1.25	1.287	2.5	21	16
2	2.091	2.9	28	14
3	3.296	3.6	37.5	12
5	5.227	4.4	53	10
8	7.952	5.5	67	8
15	13.36	7.0	75	6
20	20.61	8.2	97	4

## NPR/W3500, NPR HD/W4500 Gas – Electrical – Grounding Point Locations



B-52  
B-244

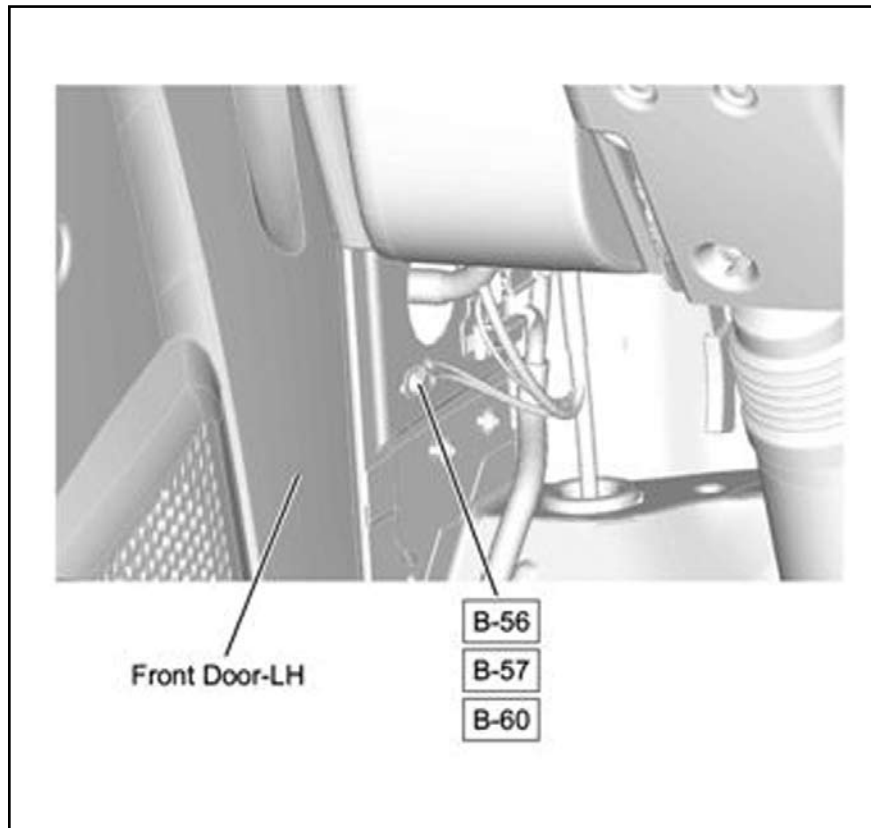


J-7  
J-6  
J-11

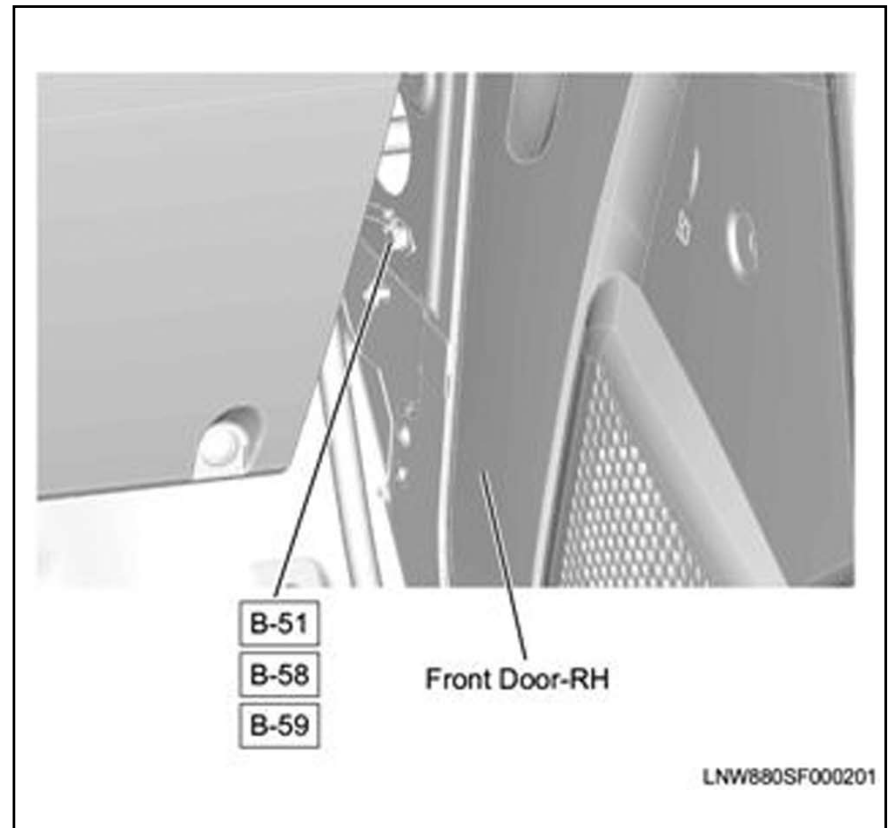
B-53  
B-54

## NPR/W3500, NPR HD/W4500 Gas – Electrical – Grounding Point Locations (cont'd)

B-56, B-57, B-60

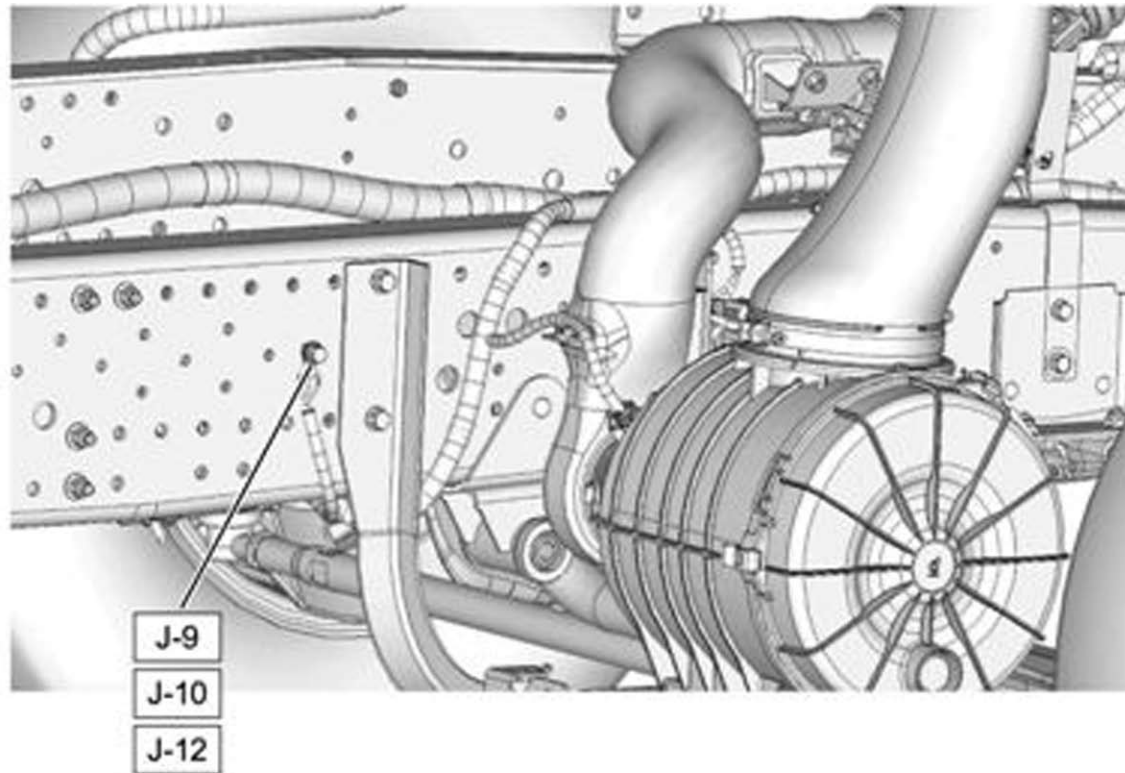


B-51, B-58, B-59



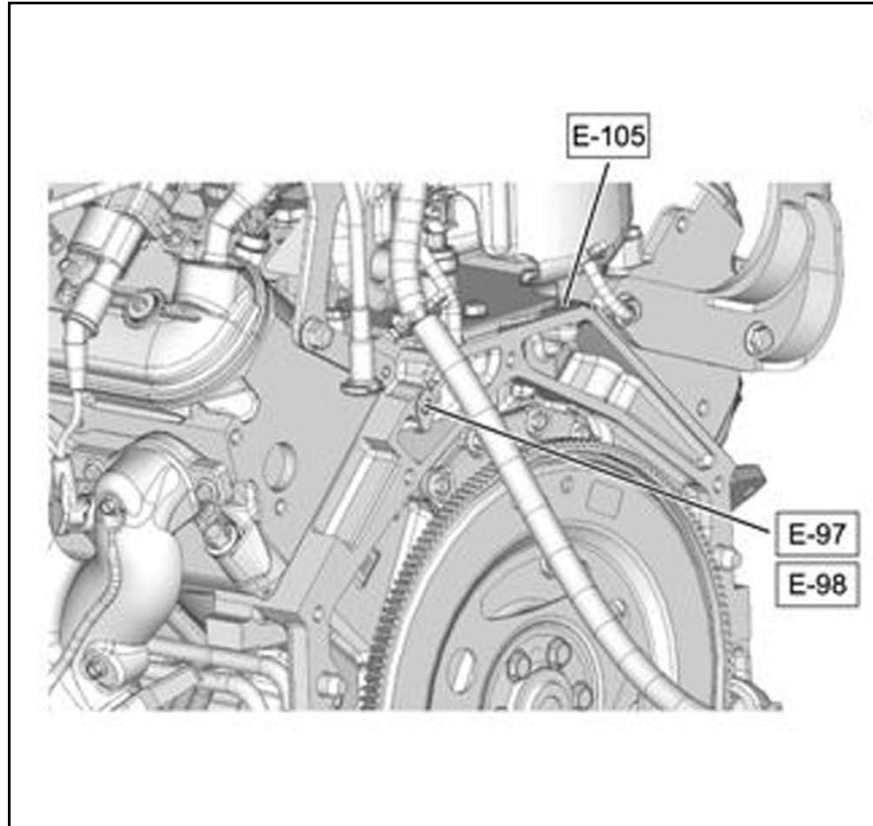
## NPR/W3500, NPR HD/W4500 Gas – Electrical – Grounding Point Locations (cont'd)

J-9, J-10, J-12

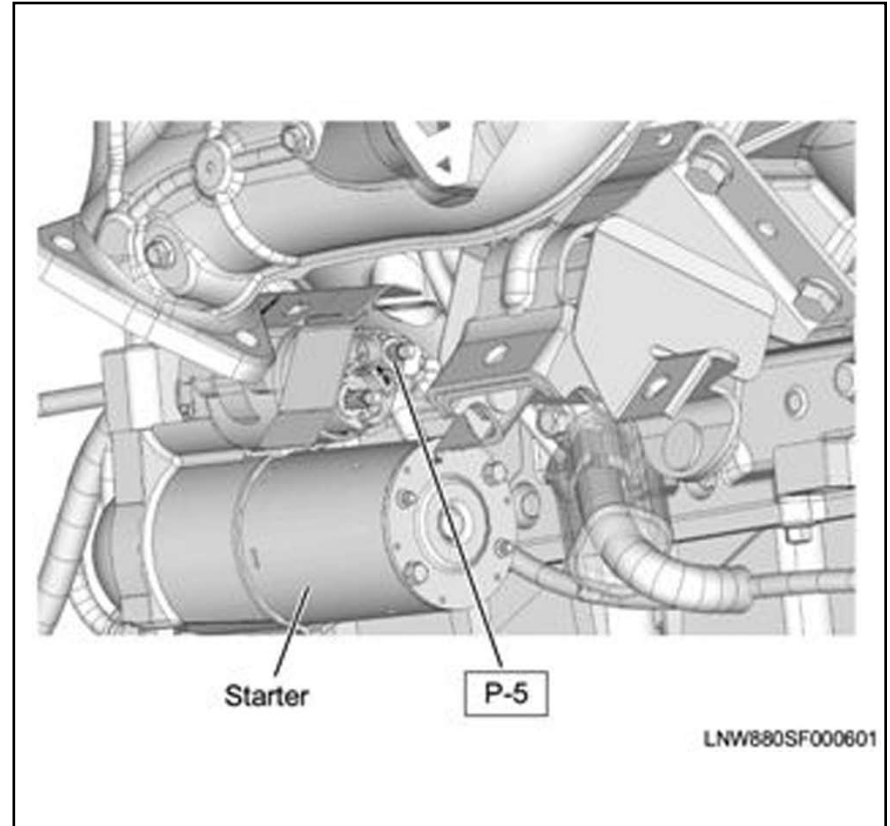


## NPR/W3500, NPR HD/W4500 Gas – Electrical – Grounding Point Locations (cont'd)

E-97, E-98, E-105



P-5

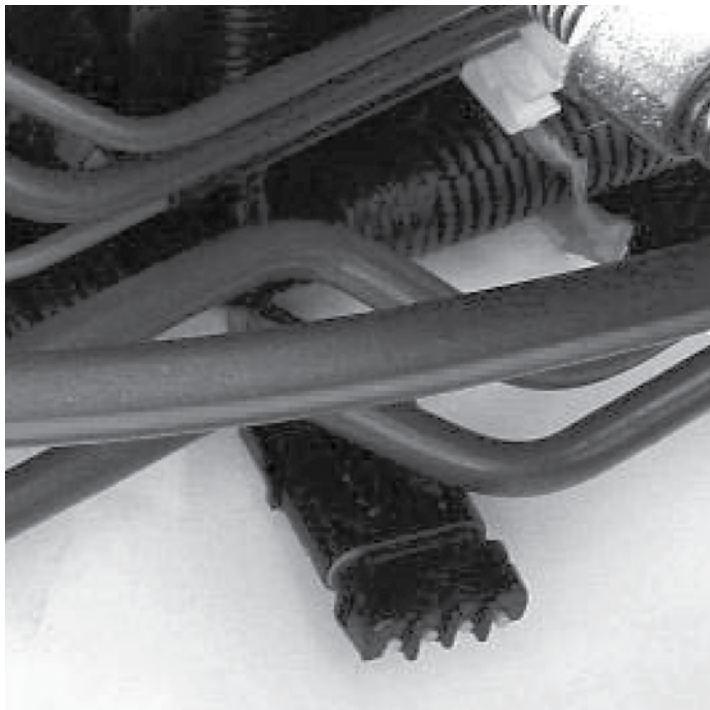




## NPR/W3500, NPR HD/W4500 Gas – Electrical – Reference Table of Grounding Points

Connector Number	Main Parts (Load)
B-48 B-53	Sub Junction Block, Illumination Control Switch, DRL Control Unit , Audio, Side Marker Light RH, Mirror Heater RH, Rear Power Window Switch Rh,Headlight RH
B49	Front Power Window Switch LH, Combination Switch, Rear Power Window Switch Blower Resistor Headlight LH, Vacuum Pump Motor Mirror Heated LH
B-57, B-58	Sub Junction Block, Cigar Lighter, ACC Socket
B-60, B-51	Fan Control Switch, Front Wiper Motor
B-105	IP Cluster
B264	Main Switch., A/C Switch, Door Lock Relay, Door Lock Switch Electronic Thermostat, Front Turn Light LH Front Turn Light, RH Front Position Light, LH, Front Positoin Light RH
E-97	Ignition Coil, A/C Compressor
E-98	Powertrain Control Module (PCM), MAF & IAT Sensor
E105	Transmission control module (TCM), NSBU Switch
J-7	Rear Manufacturers Connector
J-8	Fuel Pump
J-9	Diode 2, License Plate Light, Rear Combination Light LH, Rear Combination Light RH, Condenser Fan Motor, Triple Pressure Switch, Fuel Pump Relay, Marker Light Relay, Back Up Buzzer
J-10	Front Manufacturers Connection
J-11	Electronic Hydraulic Control Unit (EHCU)
J-12	Rear Manufacturers Connector

## NPR/W3500, NPR HD/W4500 Gas – Electrical – Body Room Light, I.D. and Marker Lamp Connector Location and Circuit Diagram



- Packard Body Plug
- 4-Pin Weather Seal Connector with Mating Plug
- Location:

Inside left-hand frame rail 28 to 31 inches BOC

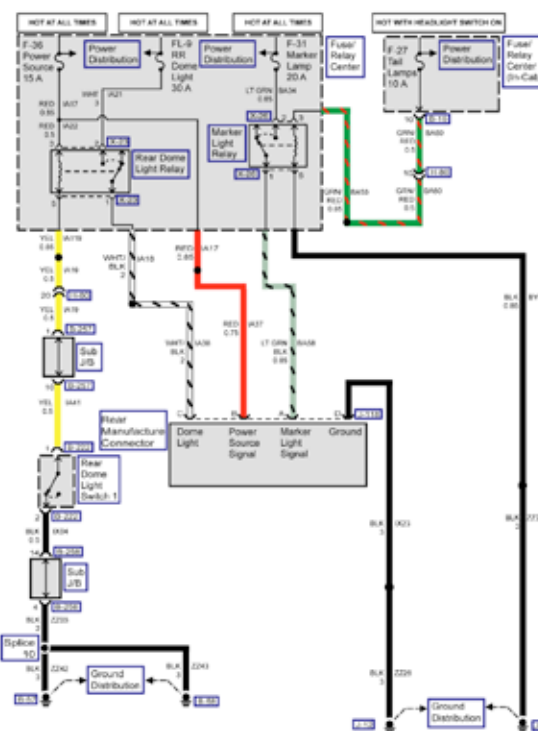
- Circuits:

Marker Black/Green = A  
 Hot Wire (Red) = B  
 Dome Light (White /Black) = C  
 Ground (Black) = D



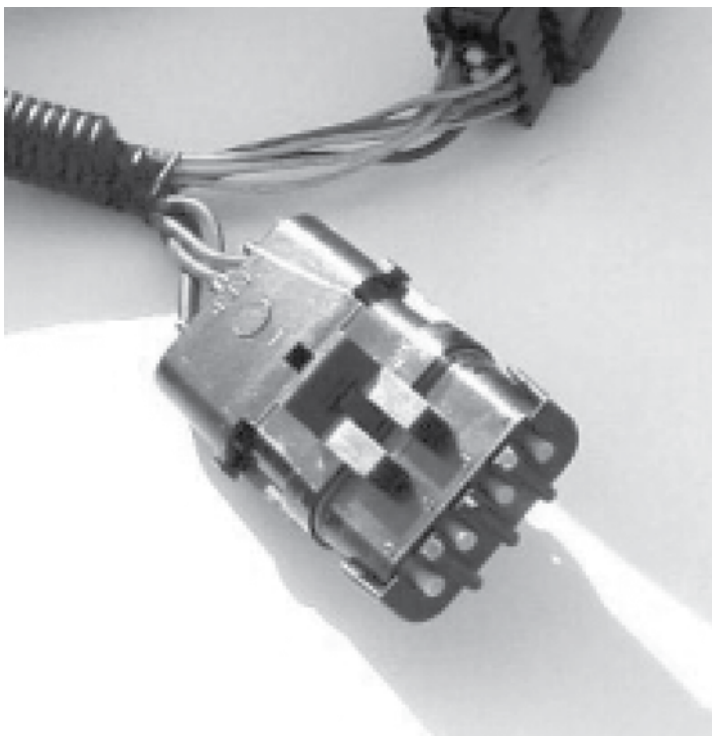
### Packard Body Plug Connector Parts

Chassis Housing ASM .....	1201-0974
Terminal .....	1208-9040
Terminal .....	1212-4587
Seal .....	1208-9679
Seal .....	1201-5193
Body Housing ASM .....	1201-5797
Housing .....	1201-5787
Connector Seal .....	1201-0492
Dummy Seal .....	1201-0300



(continued on next page)

## NPR/W3500, NPR HD/W4500 Gas – Electrical – Body Room Light, I.D. and Marker Lamp Connector Location and Circuit Diagram (cont'd)



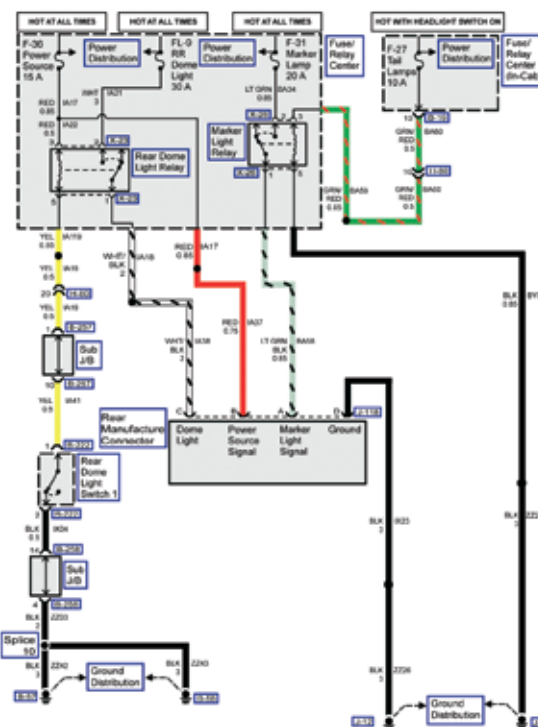
- **Packard Body Plug**
- **4-Pin Weather Seal Connector with Mating Plug**
- **Location:**  
Center of Crossmember
- **Circuits:**

Marker Black/Green)	=	A
Hot Wire (Red)	=	B
Rear Dome (White/Black)	=	C
Ground (Black)	=	D



### Packard Body Plug Connector Parts

Chassis Housing ASM .....	1201-0974
Terminal .....	1208-9040
Terminal .....	1212-4587
Seal .....	1208-9679
Seal .....	1201-5193
Body Housing ASM .....	1201-5797
Housing .....	1201-5787
Connector Seal .....	1201-0492
Dummy Seal .....	1201-0300



## NPR/W3500, NPR HD/W4500 Gas – Electrical – Fuse Location

FUSE LABEL

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
SSR PIWINDOW	—	ROOM LAMP/AUDIO	DOOR LOCK	—	PIWINDOW	BACK UP LAMP	WIPER	HLAMP LO (LH)	LAMPS (BATT)	HLAMP LO (RH)	BRAKE LAMPS	STARTER	HLAMP HI (LH)	HLAMP HI (RH)
25A		10A	15A		25A	10A	25A	10A	10A	10A	10A	10A	10A	10A

P. NO. 898078 1981

SPARE

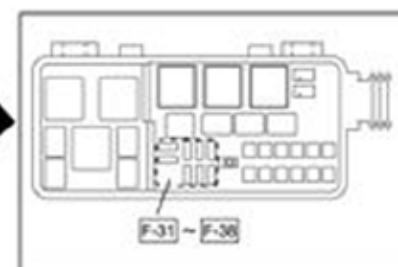
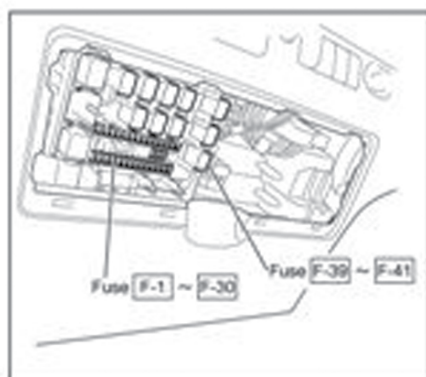
SPARE

SPARE

SPARE

16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
MIRROR HEATER	IGNITION2	IGNITION1	—	ECM	METER	ECU (BATT)	MIRROR	AUDIO ACCESSORIES	HORN	TURN HAZARD	TAIL LAMPS	ILLUMINATIONS	CORNERING LAMPS	AIR CONDITIONER
15A	10A	10A		10A	10A	10A	10A	15A	15A	15A	10A	10A	10A	10A

D-1	20A	CIGAR
D-2	10A	ACCESSORIES SOCKET
D-3	20A	POWER SOURCE
D-4		



20A F-31	MARKER LAMP
20A F-32	TAIL MAIN
20A F-33	PCM1
20A F-34	PCM2
20A F-35	PCM3
15A F-36	POWER SOURCE
20A F-37	CONDENSER FAN
10A F-38	AIR CONDITIONER

## NPR/W3500, NPR HD/W4500 Gas – Electrical – Fuse Chart

Fuse No.	Capacity	Indication on Label	Main Parts (Load)
F-1	25A	RR P/WINDOW	Rear Power Window Switch RH, Rear Power Window Switch LH Rear Power Window Relay
F-2	—	—	—
F-3	10A	ROOM LAMP, AUDIO	Radio, Data Link Connector, Room Light
F-4	15A	DOOR LOCK	Door Lock Relay
F-5	—	—	—
F-6	25A	P/WINDOW	Front Power Window RH Switch, Front Power Window LH Switch Power Window Relay
F-7	10A	BACK UP LAMP	Shift Lever Switch
F-8	25A	WIPER	Wiper Main Relay, Wiper High Low Relay, Key On Relay, Front Wiper Motor, Front Washer Motor
F-9	10A	H/LAMP LO (LH)	Headlight LH, Headlight Low Relay, DRL Control Unit
F-10	10A	LAMPS (BATT)	DRL Relay, Headlight High Relay, Headlight Low Relay, Tail Relay
F-11	10A	H/LAMP LO (RH)	Headlight RH, Headlight Low Relay, DRL Control Unit
F-12	10A	BRAKE LAMPS	Stoplight Relay
F-13	10A	STARTER	PIM.B, P/N Start Relay
F-14	10A	H/LAMP HI (LH)	Headlight LH, Meter, Headlight High Relay
F-15	10A	H/LAMP HI (RH)	Headlight RH, Headlight High Relay
F-16	15A	MIRROR HEATER	Mirror Heater Switch, Blower Relay, Power Window Relay
F-17	10A	IGNITION2	Rear Window Lock Switch
F-18	10A	IGNITION1	Intermittent Relay, Vacuum Pump Relay
F-19	—	—	—
F-20	10A	ECM	Stoplight Switch, PIM. B, Cruise Main Switch ,TCM Relay
F-21	10A	METER	Key On Relay, P/N Start Relay, Vacuum Pump Relay, Meter, Shift Lever Switch, Charge Relay, EHCUC, Flasher Unit, DRL Relay
F-22	10A	ECU (BATT)	Check Miles Switch, TCM Relay, Meter, Power train Control Module, PIM.B
F-23	10A	MIRROR	—
F-24	15A	AUDIO, ACCESSORIES	Radio, Cigarette Lighter Relay, Power ACC Relay, PIM.A, PIM.B
F-25	15A	HORN	Horn Relay

## NPR/W3500, NPR HD/W4500 Gas – Electrical – Fuse Chart (cont'd)

Fuse No.	Capacity	Indication on Label	Main Parts (Load)
F-25	15A	HORN	Horn Relay
F-26	15A	TURN, HAZARD	Flasher Unit
F-27	10A	TAIL LAMPS	Tail Relay, Front Position Light RH, Front Position Light LH, ID1, ID2, ID3, Marker1, Marker2, Side Marker RH, Side Marker LH
F-28	10A	ILLUMINATIONS	Tail Relay, Meter, Mirror Heater Switch, Blower Switch, Door Lock Switch, Cruise Main Switch, Rear Dome Light Switch, Hazard Switch, Check Miles Switch, Shift Lever Switch, Radio, Illumination Control Switch
F-29	10A	CORNERING LAMPS	Tail Relay, DRL Relay
F-30	10A	AIR CONDITIONER	DEF Switch, A/C Switch, AC Enable Relay, Magnetic Clutch Relay
F-31	20A	MARKER LAMP	Marker Light Relay
F-32	20A	TAIL MAIN	Tail Relay
F-33	20A	PCM1	PCM Main Relay, Power train Control Module Ignition Coil 1, Ignition Coil 3, Ignition Coil 5, Ignition Coil 7, Injector 1, Injector 3, Injector 5, Injector 7
F-34	20A	PCM2	PCM Main Relay, Ignition Coil 2, Ignition Coil 4, Ignition Coil 6, Ignition Coil 8, Injector 2, Injector 4, Injector 6, Injector 8
F-35	20A	PCM3	PCM Main Relay, Front Heater O2 Sensor LH, Front Heater O2 Sensor RH, Rear Heater O2 Sensor LH, Rear Heater O2 Sensor RH, Canister Purge Solenoid
F-36	15A	POWER SOURCE	Rear Dome Light Relay, Front Manufacture Connector, Rear Manufacture Connector
F-37	20A	CONDENSER FAN	Condenser Fan Relay
F-38	10A	AIR CONDITIONER	Magnetic Clutch Relay
F-39 (D-1)	20A	CIGAR	Cigarette Lighter Relay, Cigarette Lighter

## NPR/W3500, NPR HD/W4500 Gas – Electrical – Fuse Chart (cont'd)

Fuse No.	Capacity	Indication on Label	Main Parts (Load)
F-40 (D-2)	10A	ACCESSORIES SOCKET	Power ACC Relay, ACC Socket
F-41 (D-3)	20A	POWER SOURCE	Power Source

## Relay Chart

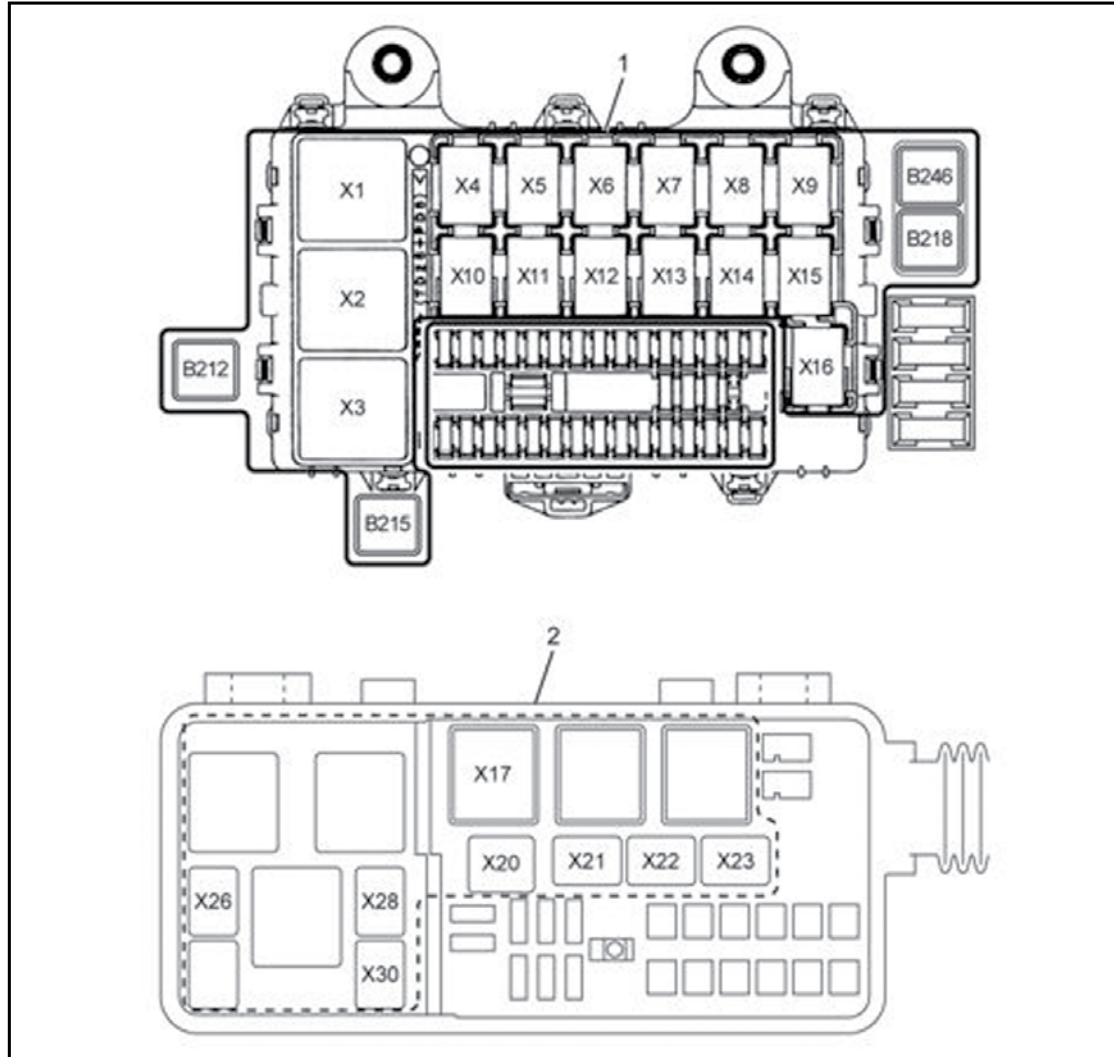
Connector No.	Relay Name
X1	Stoplight
X2	Daytime Running Light
X3	Key On
X4	TCM
X5	P/N Start
X6	Wiper Main
X7	Horn
X8	Wiper High/ Low
X9	-
X10	Rear Power Window
X11	Charge
X12	Front Power Window
X13	Headlights (Low)
X14	Vacuum Pump
X15	Headlight (High)

Connector No.	Relay Name
X16	Taillight
B212	Accessory Power
B215	Blower
B218	Cigarette Lighter
B246	Daytime Running Light
X17	Starter
X20	Magnetic Clutch
X21	Condenser Fan
X22	Fuel Pump
X23	Rear Dome Light
X26	Marker Lamp
X28	PCM Main
X30	A/C Enable

## NPR/W3500, NPR HD/W4500 Gas – Electrical – Relay Locations

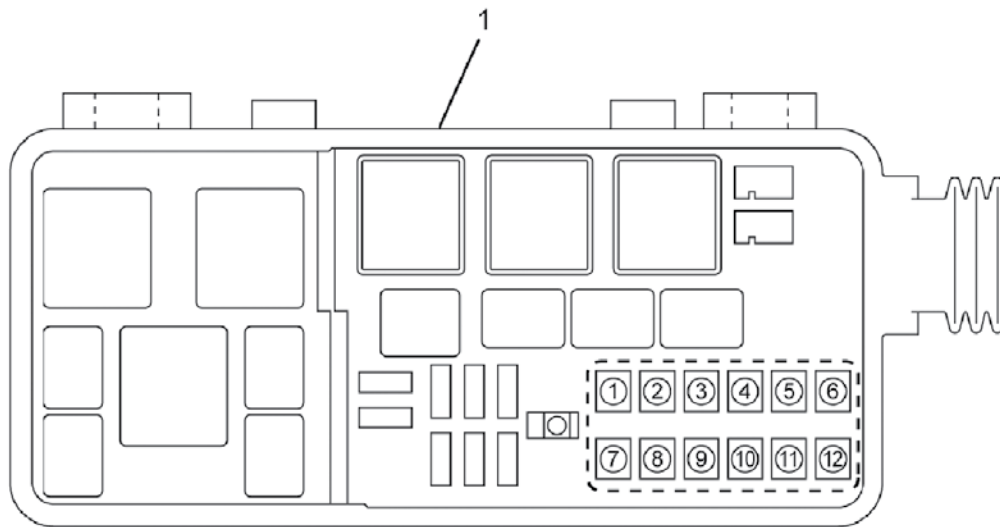
1, 2

- 1. Fuse Panel in Cab
- 2. Relay Box on Frame





## NPR/W3500, NPR HD/W4500 Gas – Electrical – Slow Blow Fuses

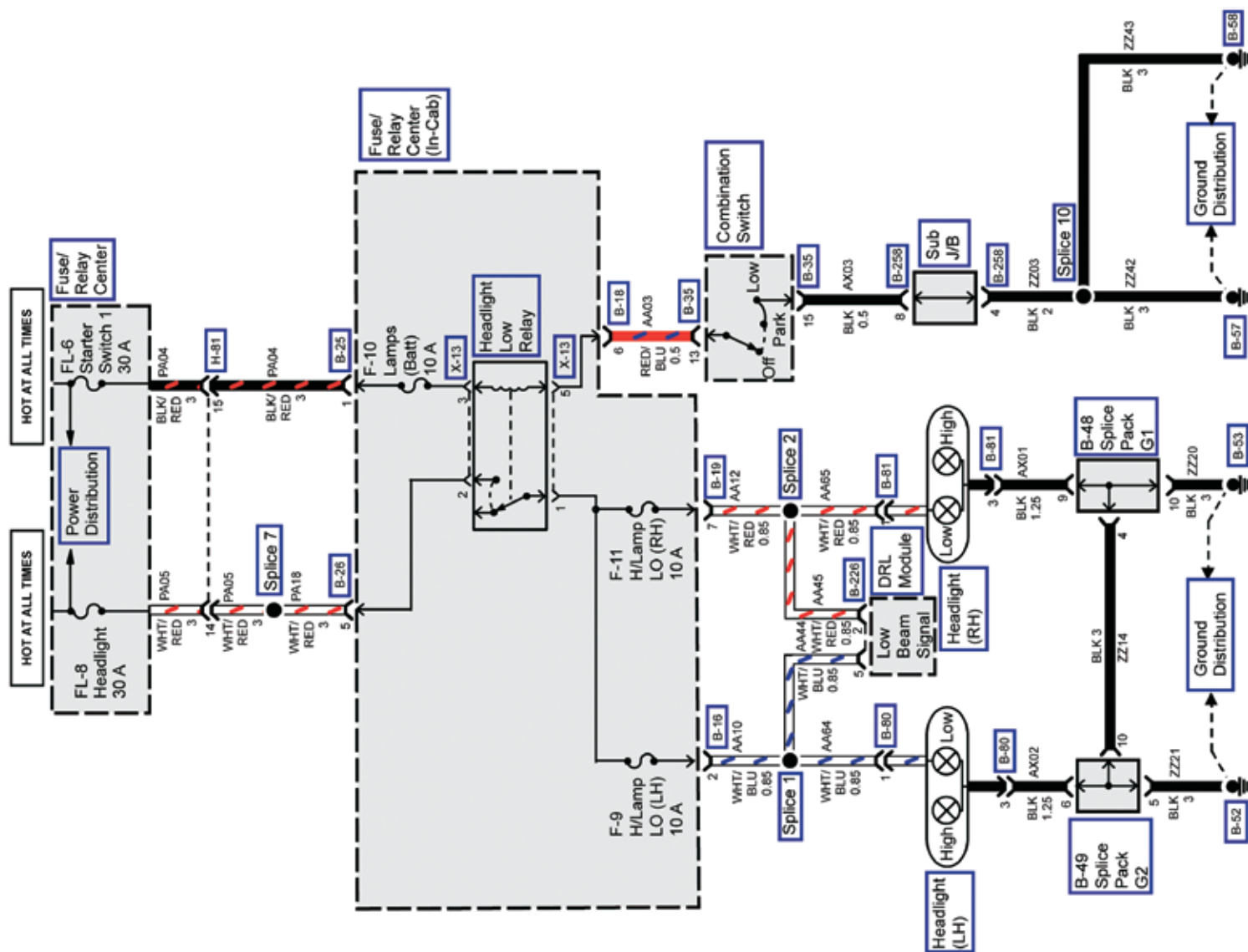


1. Relay Box (on frame)

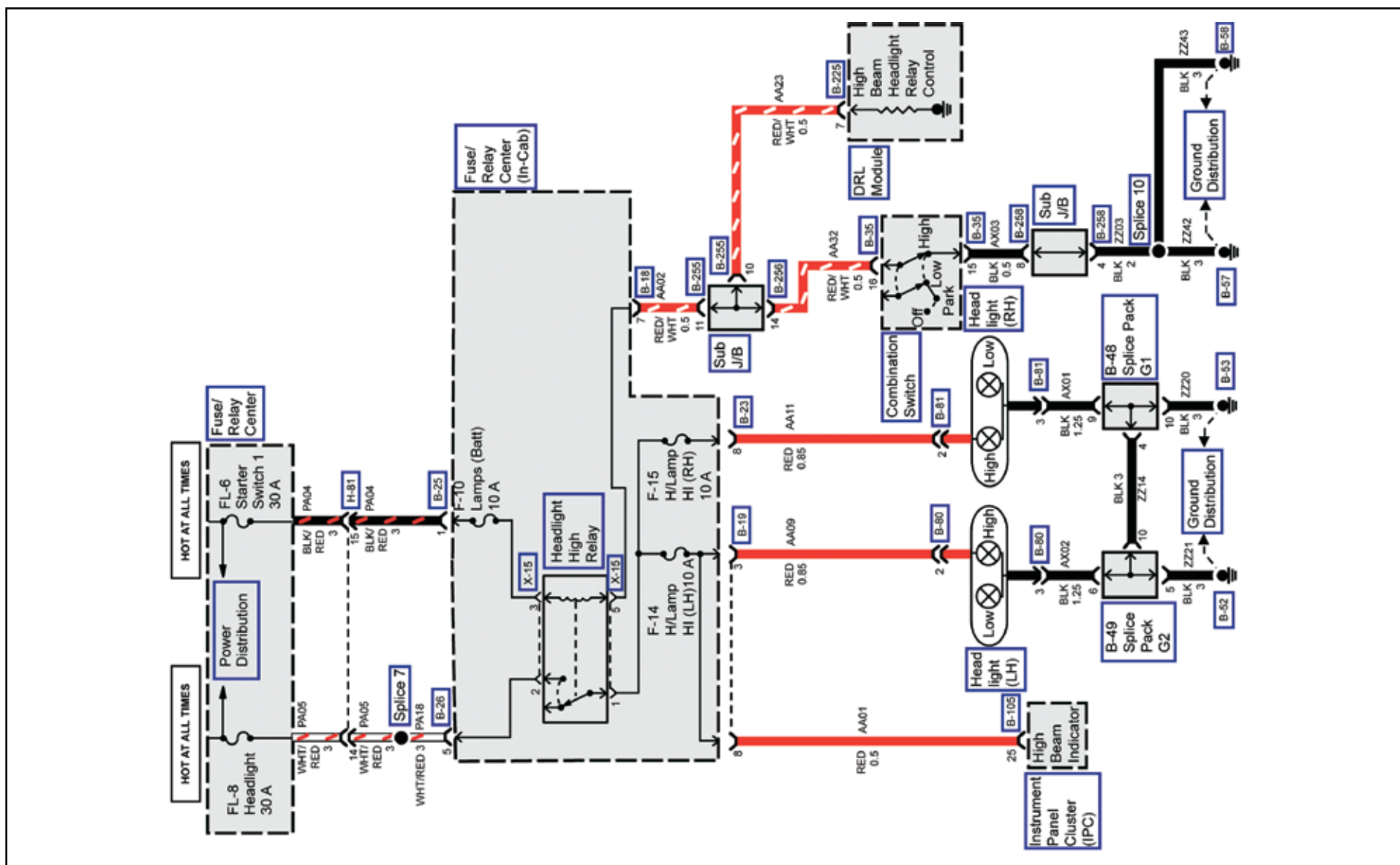
No.	SBF No.	Name	Capacity
①	FL-1	PCM	40A
②	FL-2	STARTER	60A
③	FL-3	POWER ACC	50A
④	FL-4	FUEL PUMP	30A
⑤	FL-5	STARTER SWITCH 2	40A
⑥	FL-6	STARTER SWITCH 1	30A
⑦	FL-7	HVAC	40A
⑧	FL-8	HEADLIGHT	30A
⑨	FL-9	RR DOME LIGHT	30A
⑩	FL-10	WIPER	50A
⑪	FL-11	ABS	60A
⑫	FL-12	JUNCTION BLOCK	50A

LNW880SF000301

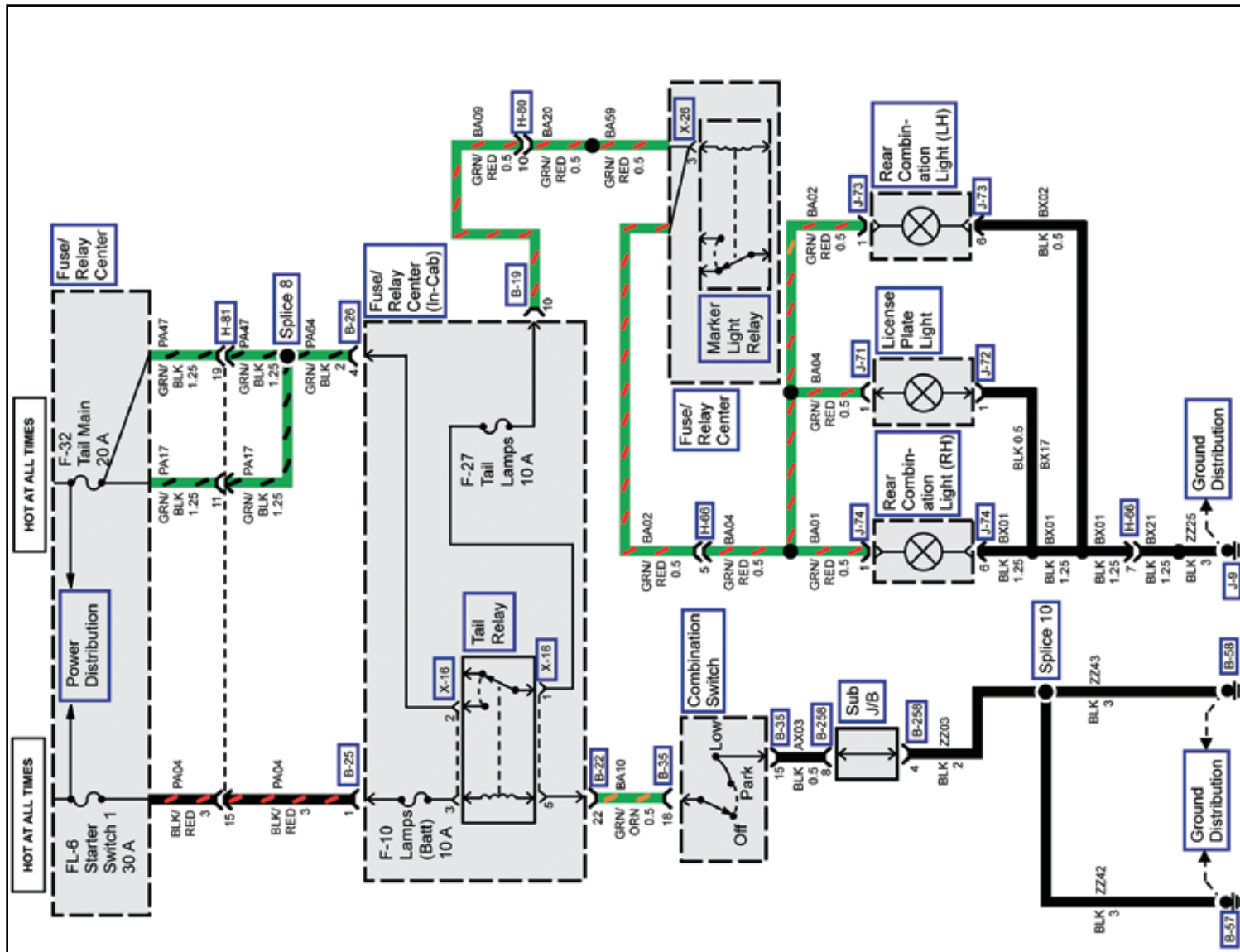
## NPR/W3500, NPR HD/W4500 Gas – Electrical – Headlights (Low Beam)



## NPR/W3500, NPR HD/W4500 Gas – Electrical – Headlights (High Beam)



## NPR/W3500, NPR HD/W4500 Gas – Electrical – Tail Lights



The connectors that match the end of frame tail and stop lamp harness can now be ordered through Isuzu & W-Series dealers.

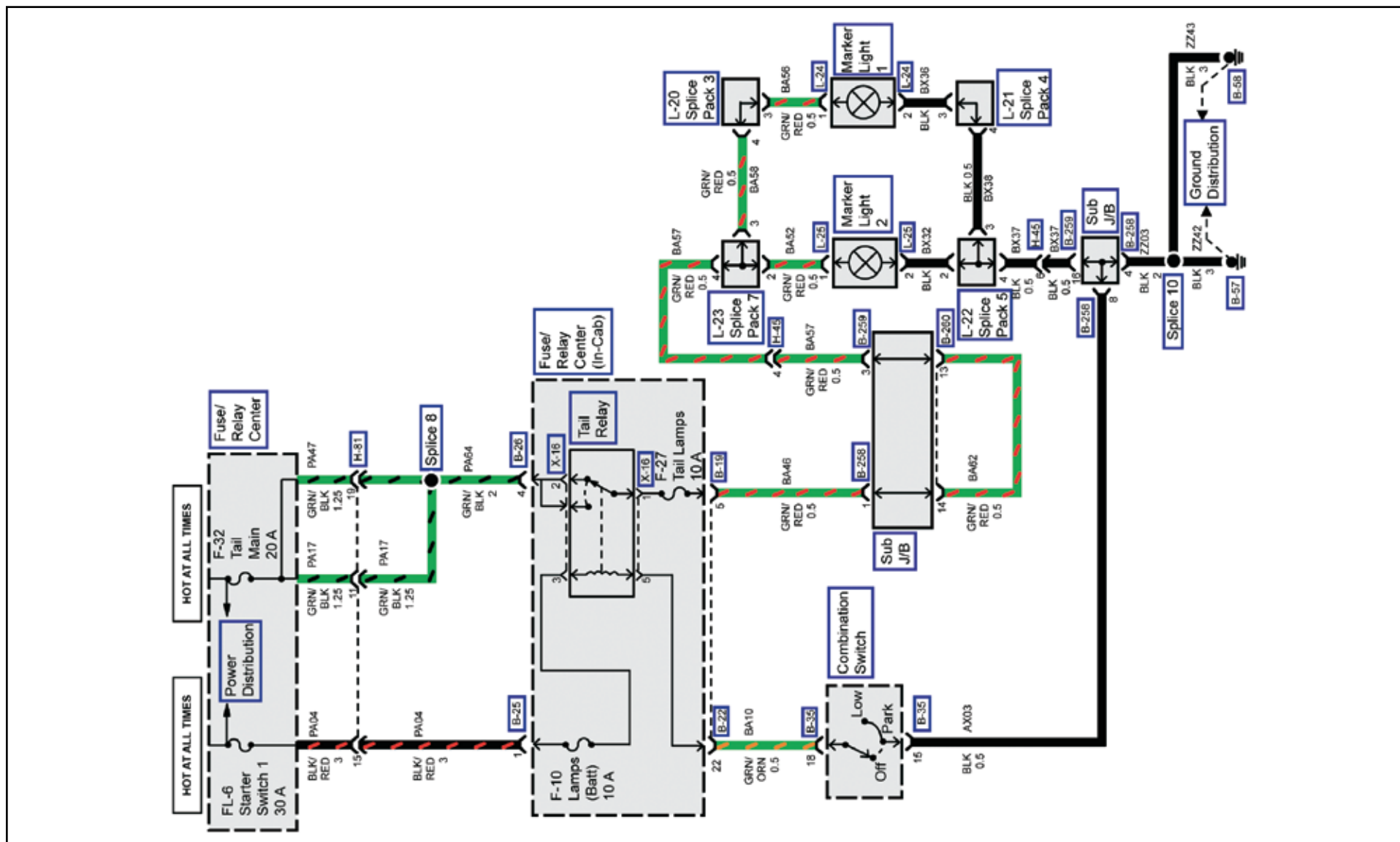


Chassis harness side  
part number **897364-5300**



Stop and tail lamp side  
part number **897364-5310**

## NPR/W3500, NPR HD/W4500 Gas – Electrical – Roof Marker Lights





The diagram illustrates the electrical system for a vehicle, organized into two main sections: "HOT AT ALL TIMES" and "HOT ONLY WHEN ENGINE RUNNING".

- HOT AT ALL TIMES Section:** Includes the FL-6 Starter Switch (30 A), Power Distribution, Fuse/Relay Center, and F-10 Lamps (Batt) (10 A). It shows connections to the Tail Relay and Tail Lamps.
- HOT ONLY WHEN ENGINE RUNNING Section:** Includes the Combination Switch (Off, Low, Park), Clearance Lights (1, 2, 3), and Ground Distribution. It also shows connections to the Sub J/B and Splice 10.
- Wiring Details:** The diagram specifies wire colors (e.g., BLK, RED, GRN, WH, YEL) and gauges (e.g., 30 A, 10 A, 20 A, 1.25, 0.5, 18, 19, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 48, 50, 52, 54, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100). It also indicates terminal numbers and splice points (e.g., Splice 1, Splice 2, Splice 3, Splice 4, Splice 5, Splice 6, Splice 7, Splice 8, Splice 9, Splice 10).
- Components:** Key components include the FL-6 Starter Switch, Power Distribution, Fuse/Relay Center, F-10 Lamps (Batt), Tail Relay, Tail Lamps, Combination Switch, Clearance Lights, Sub J/B, and Ground Distribution.

## ***Rear Turn Signal Lights***

A close-up photograph showing a 12-pin D-sub connector being inserted into a cable. The connector is a black plastic housing with a red ring around the pins. The cable is green and black, and the background is a grey metal surface.

A close-up photograph of a yellow and black electrical connector, likely a multi-pin connector, attached to a black cable. The connector has a yellow plastic housing with a black base and several pins visible inside. It is connected to a black cable with a braided shield. The background is a light-colored, textured surface.

The diagram illustrates the electrical system for a vehicle, showing the battery, ignition, turn signal, and combination switch components. The battery is connected to the ignition and the turn signal switch. The turn signal switch is connected to the combination switch, which controls the turn signals and the rear combination light. The diagram includes various wire colors, gauges, and connector types, along with labels for components like the Fuse/Relay Center, Power Distribution, and Turn Signal Switch.

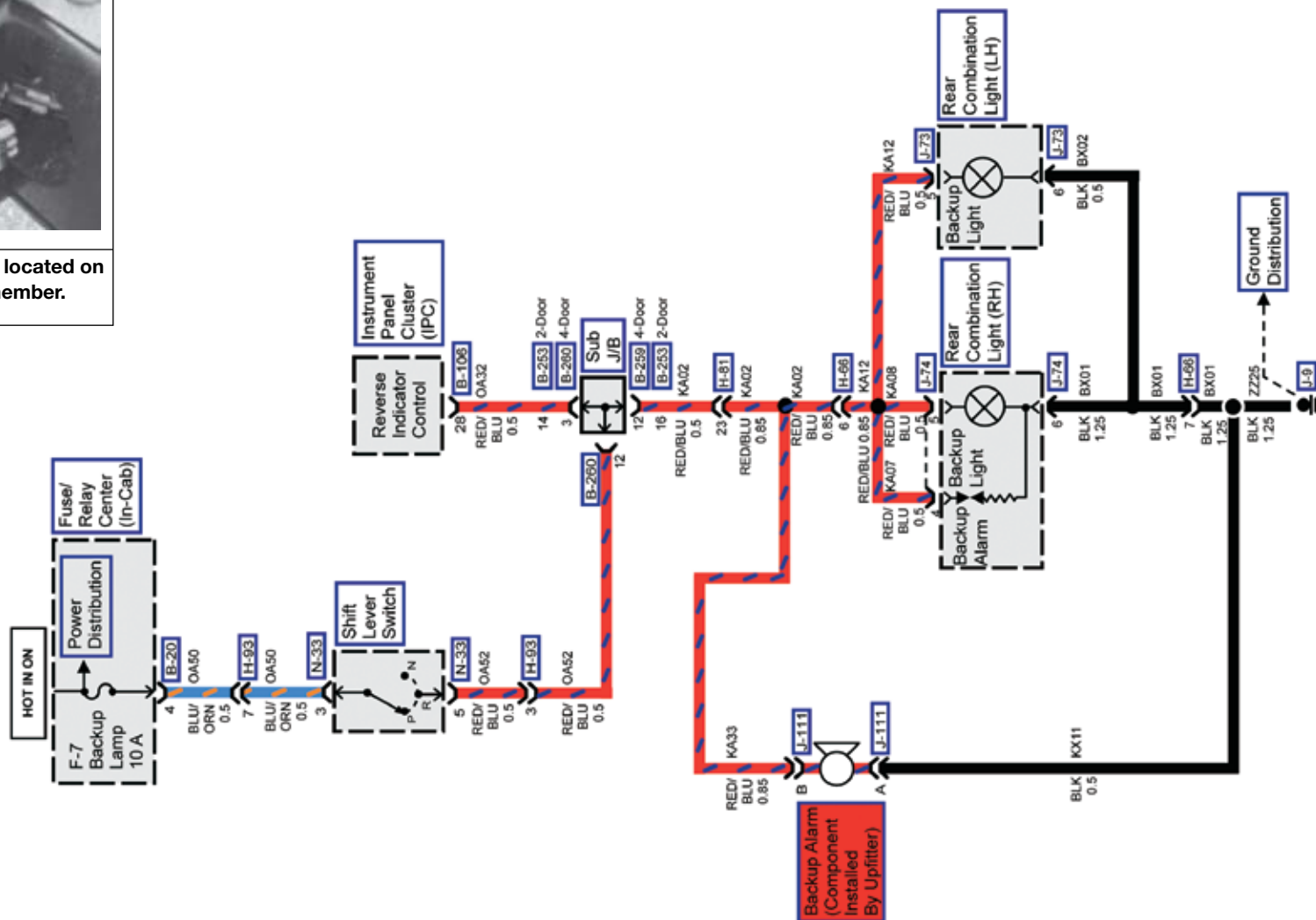
**Legend:**

- Wires:** Color and gauge (e.g., RED 0.85, GRN/ WHT 0.5).
- Connectors:** B-216, B-253, B-254, B-255, B-256, B-258, B-259, B-260, B-261, B-262, B-263, B-264, B-265, B-266, B-267, B-268, B-269, B-270, B-271, B-272, B-273, B-274, B-275, B-276, B-277, B-278, B-279, B-280, B-281, B-282, B-283, B-284, B-285, B-286, B-287, B-288, B-289, B-290, B-291, B-292, B-293, B-294, B-295, B-296, B-297, B-298, B-299, B-300, B-301, B-302, B-303, B-304, B-305, B-306, B-307, B-308, B-309, B-310, B-311, B-312, B-313, B-314, B-315, B-316, B-317, B-318, B-319, B-320, B-321, B-322, B-323, B-324, B-325, B-326, B-327, B-328, B-329, B-330, B-331, B-332, B-333, B-334, B-335, B-336, B-337, B-338, B-339, B-340, B-341, B-342, B-343, B-344, B-345, B-346, B-347, B-348, B-349, B-350, B-351, B-352, B-353, B-354, B-355, B-356, B-357, B-358, B-359, B-360, B-361, B-362, B-363, B-364, B-365, B-366, B-367, B-368, B-369, B-370, B-371, B-372, B-373, B-374, B-375, B-376, B-377, B-378, B-379, B-380, B-381, B-382, B-383, B-384, B-385, B-386, B-387, B-388, B-389, B-390, B-391, B-392, B-393, B-394, B-395, B-396, B-397, B-398, B-399, B-400, B-401, B-402, B-403, B-404, B-405, B-406, B-407, B-408, B-409, B-410, B-411, B-412, B-413, B-414, B-415, B-416, B-417, B-418, B-419, B-420, B-421, B-422, B-423, B-424, B-425, B-426, B-427, B-428, B-429, B-430, B-431, B-432, B-433, B-434, B-435, B-436, B-437, B-438, B-439, B-440, B-441, B-442, B-443, B-444, B-445, B-446, B-447, B-448, B-449, B-450, B-451, B-452, B-453, B-454, B-455, B-456, B-457, B-458, B-459, B-460, B-461, B-462, B-463, B-464, B-465, B-466, B-467, B-468, B-469, B-470, B-471, B-472, B-473, B-474, B-475, B-476, B-477, B-478, B-479, B-480, B-481, B-482, B-483, B-484, B-485, B-486, B-487, B-488, B-489, B-490, B-491, B-492, B-493, B-494, B-495, B-496, B-497, B-498, B-499, B-500, B-501, B-502, B-503, B-504, B-505, B-506, B-507, B-508, B-509, B-510, B-511, B-512, B-513, B-514, B-515, B-516, B-517, B-518, B-519, B-520, B-521, B-522, B-523, B-524, B-525, B-526, B-527, B-528, B-529, B-530, B-531, B-532, B-533, B-534, B-535, B-536, B-537, B-538, B-539, B-540, B-541, B-542, B-543, B-544, B-545, B-546, B-547, B-548, B-549, B-550, B-551, B-552, B-553, B-554, B-555, B-556, B-557, B-558, B-559, B-560, B-561, B-562, B-563, B-564, B-565, B-566, B-567, B-568, B-569, B-570, B-571, B-572, B-573, B-574, B-575, B-576, B-577, B-578, B-579, B-580, B-581, B-582, B-583, B-584, B-585, B-586, B-587, B-588, B-589, B-590, B-591, B-592, B-593, B-594, B-595, B-596, B-597, B-598, B-599, B-600, B-601, B-602, B-603, B-604, B-605, B-606, B-607, B-608, B-609, B-610, B-611, B-612, B-613, B-614, B-615, B-616, B-617, B-618, B-619, B-620, B-621, B-622, B-623, B-624, B-625, B-626, B-627, B-628, B-629, B-630, B-631, B-632, B-633, B-634, B-635, B-636, B-637, B-638, B-639, B-640, B-641, B-642, B-643, B-644, B-645, B-646, B-647, B-648, B-649, B-650, B-651, B-652, B-653, B-654, B-655, B-656, B-657, B-658, B-659, B-660, B-661, B-662, B-663, B-664, B-665, B-666, B-667, B-668, B-669, B-670, B-671, B-672, B-673, B-674, B-675, B-676, B-677, B-678, B-679, B-680, B-681, B-682, B-683, B-684, B-685, B-686, B-687, B-688, B-689, B-690, B-691, B-692, B-693, B-694, B-695, B-696, B-697, B-698, B-699, B-700, B-701, B-702, B-703, B-704, B-705, B-706, B-707, B-708, B-709, B-710, B-711, B-712, B-713, B-714, B-715, B-716, B-717, B-718, B-719, B-720, B-721, B-722, B-723, B-724, B-725, B-726, B-727, B-728, B-729, B-730, B-731, B-732, B-733, B-734, B-735, B-736, B-737, B-738, B-739, B-740, B-741, B-742, B-743, B-744, B-745, B-746, B-747, B-748, B-749, B-750, B-751, B-752, B-753, B-754, B-755, B-756, B-757, B-758, B-759, B-760, B-761, B-762, B-763, B-764, B-765, B-766, B-767, B-768, B-769, B-770, B-771, B-772, B-773, B-774, B-775, B-776, B-777, B-778, B-779, B-780, B-781, B-782, B-783, B-784, B-785, B-786, B-787, B-788, B-789, B-790, B-791, B-792, B-793, B-794, B-795, B-796, B-797, B-798, B-799, B-800, B-801, B-802, B-803, B-804, B-805, B-806, B-807, B-808, B-809, B-810, B-811, B-812, B-813, B-814, B-815, B-816, B-817, B-818, B-819, B-820, B-821, B-822, B-823, B-824, B-825, B-826, B-827, B-828, B-829, B-830, B-831, B-832, B-833, B-834, B-835, B-836, B-837, B-838, B-839, B-840, B-841, B-842, B-843, B-844, B-845, B-846, B-847, B-848, B-849, B-850, B-851, B-852, B-853, B-854, B-855, B-856, B-857, B-858, B-859, B-860, B-861, B-862, B-863, B-864, B-865, B-866, B-867, B-868, B-869, B-870, B-871, B-872, B-873, B-874, B-875, B-876, B-877, B-878, B-879, B-880, B-881, B-882, B-883, B-884, B-885, B-886, B-887, B-888, B-889, B-890, B-891, B-892, B-893, B-894, B-895, B-896, B-897, B-89

## NPR/W3500, NPR HD/W4500 Gas – Electrical – Back Up Light / Back Up Alarm Circuit

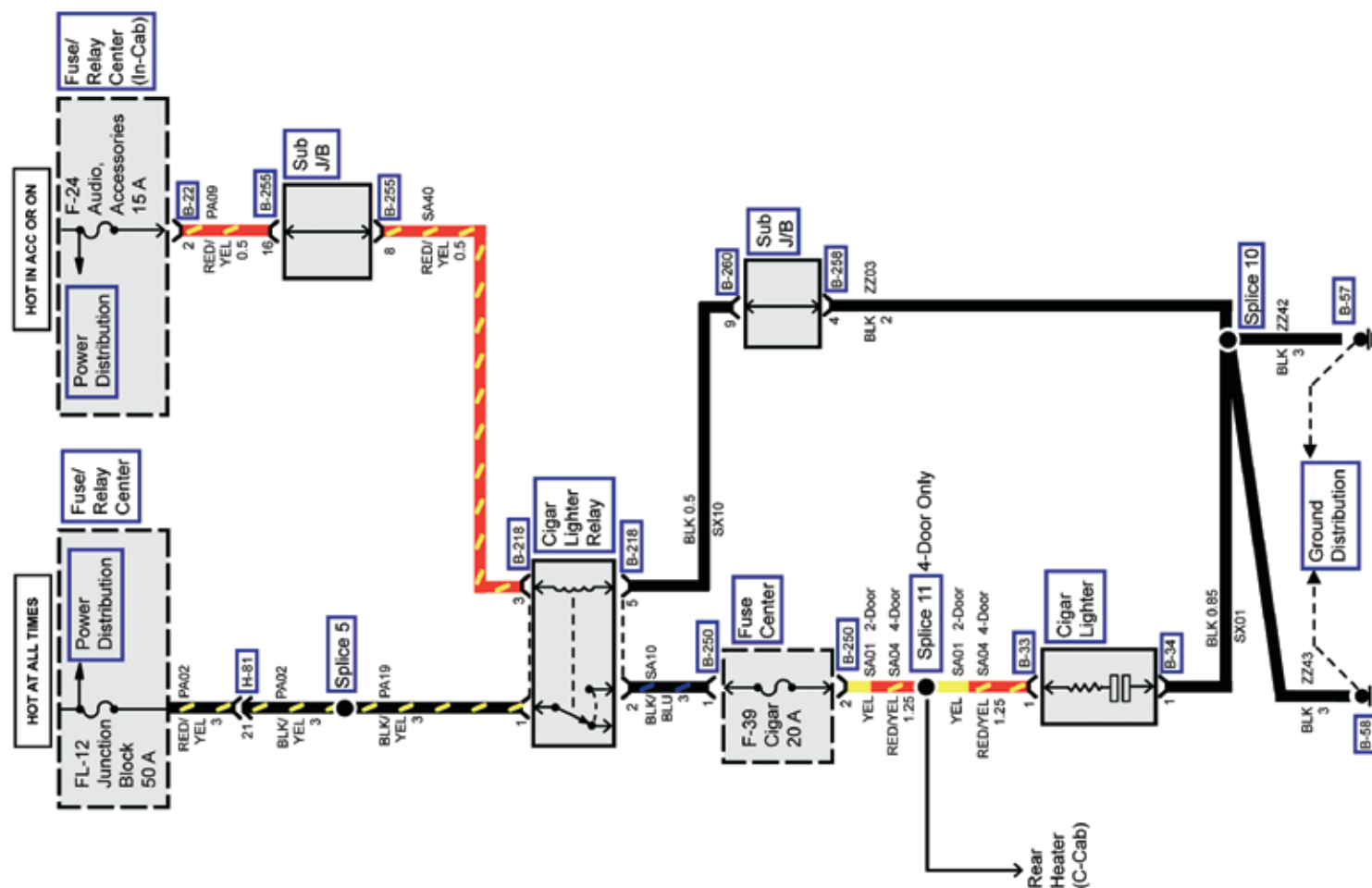


Back up Alarm connector located on LH rail of last cross member.

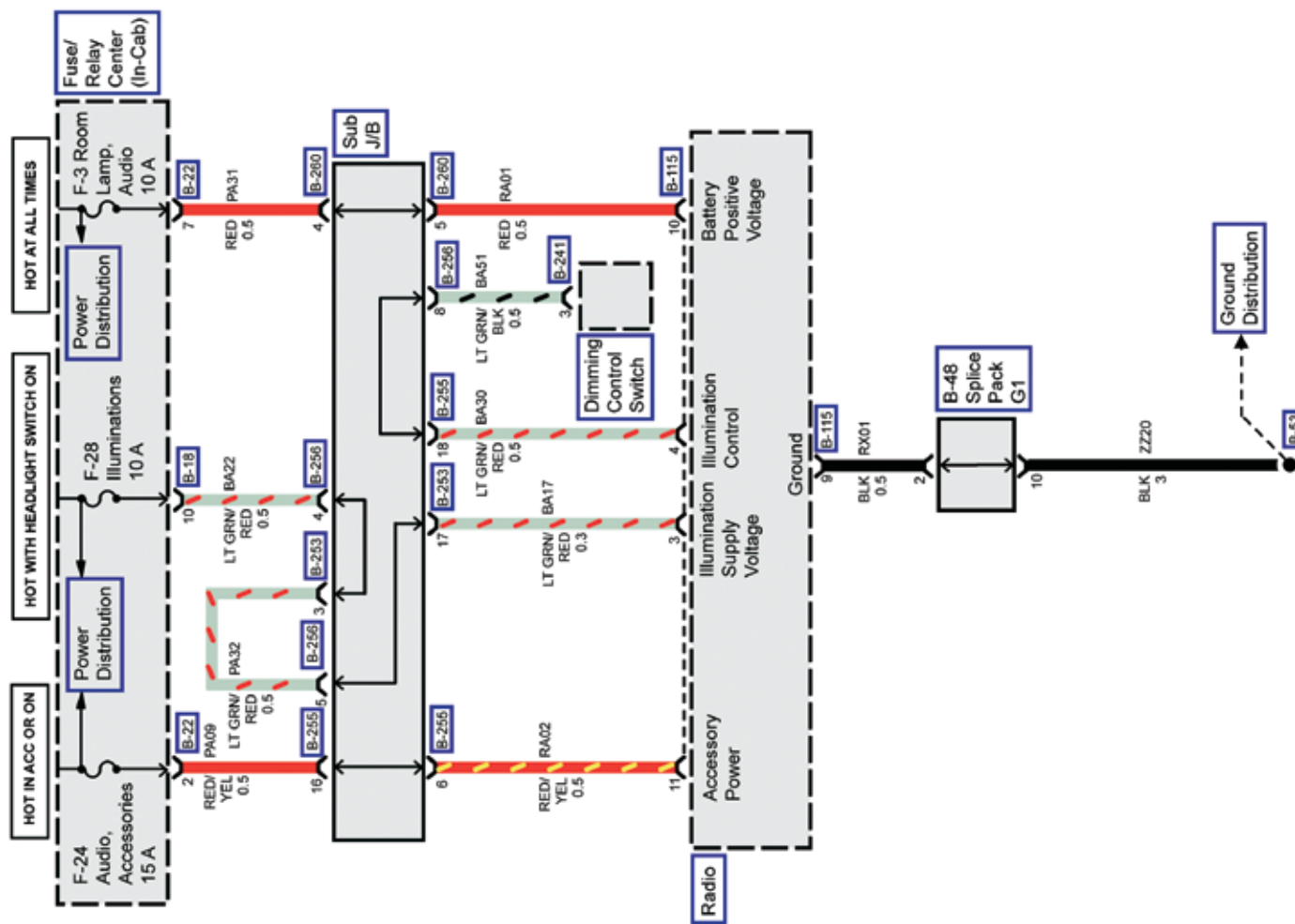




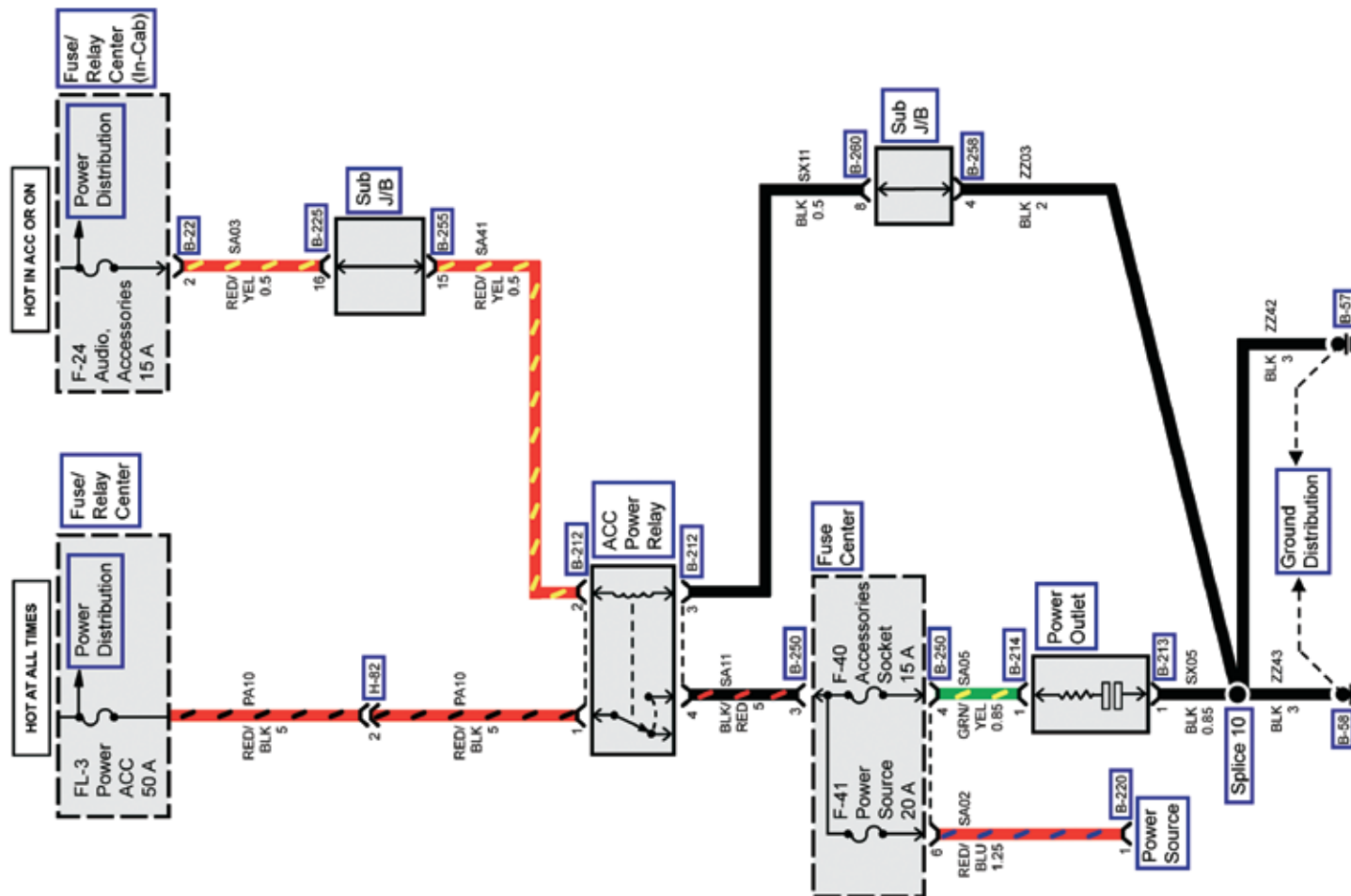
## NPR/W3500, NPR HD/W4500 Gas – Electrical – Cigar Lighter Circuits



## NPR/W3500, NPR HD/W4500 Gas – Electrical – Radio Circuits

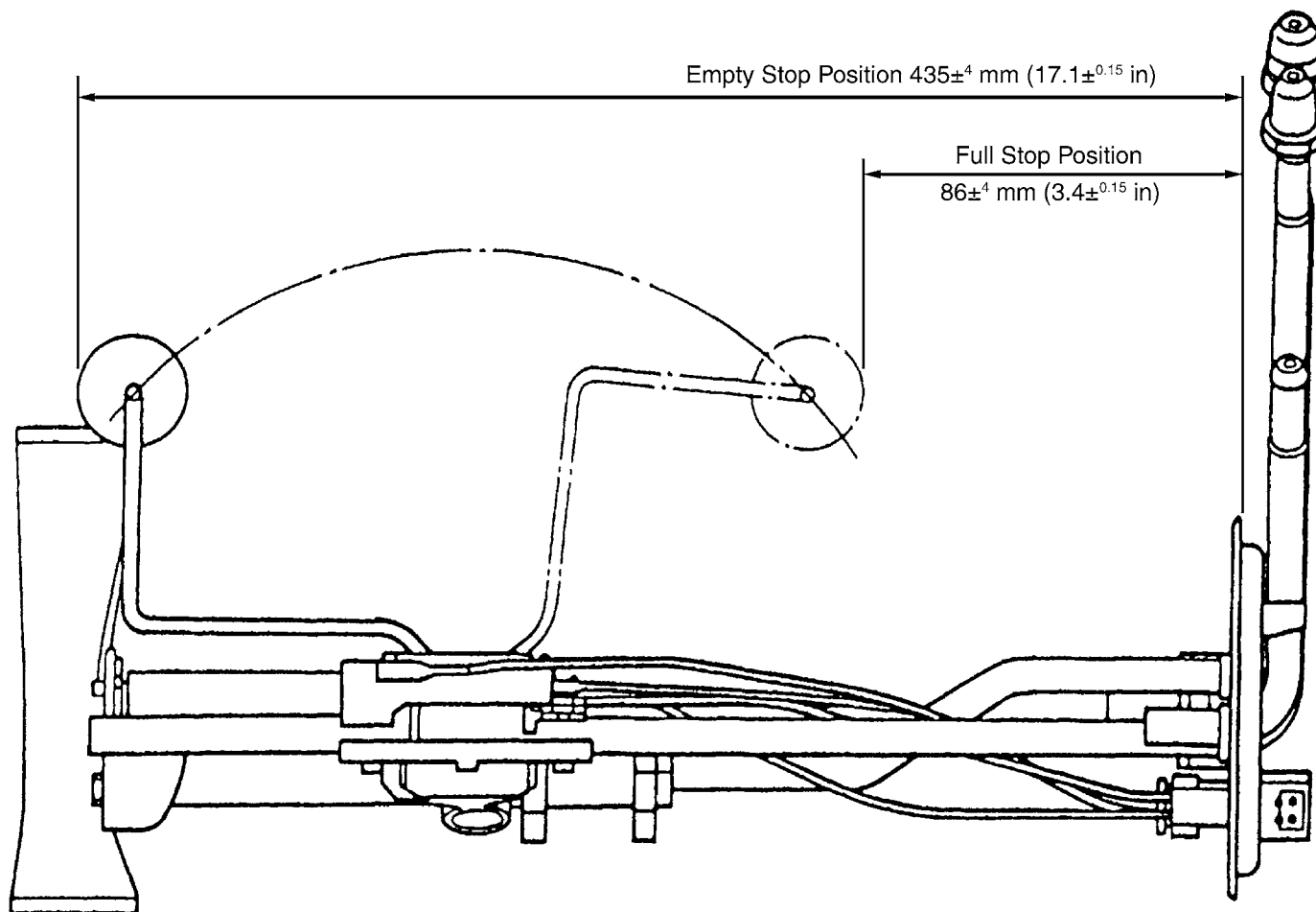


## NPR/W3500, NPR HD/W4500 Gas – Electrical – Auxiliary Power Source Circuit Diagram



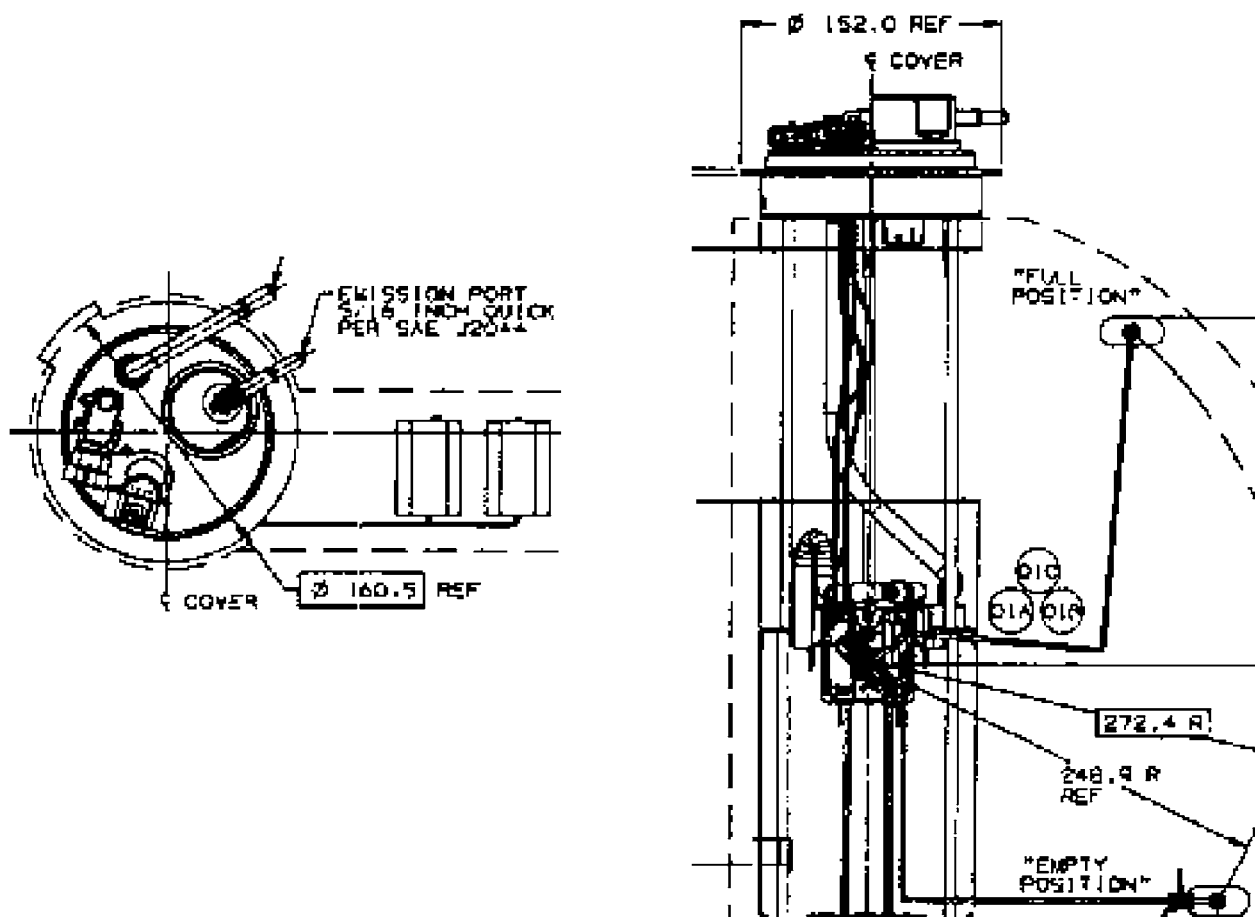
## NPR/W3500, NPR HD/W4500 Gas – Electrical – Fuel Tank Sending Unit Resistance Values

Float Position	Standard Resistance ( )
Empty Stop	248.5
Full Stop	40






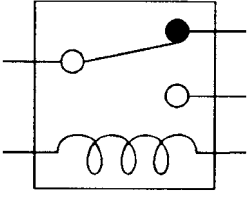


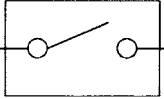
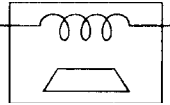

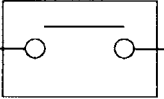
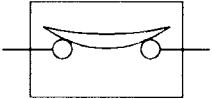
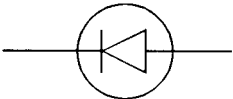
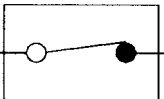

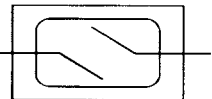


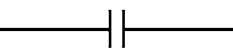
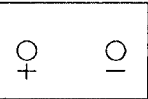

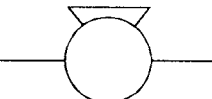
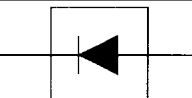
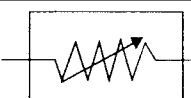
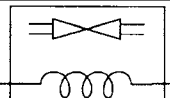


## NPR/W3500, NPR HD/W4500 Gas – Electrical – Model Year Fuel Tank Sending Unit Resistance Values

Float Position	Standard Resistance ( )
Empty Stop	248.5
Full Stop	40



## NPR/W3500, NPR HD/W4500, NQR/W5500, NRR/W5500-HD Diesel – Electrical Symbols

Symbol	Meaning	Symbol	Meaning	Symbol	Meaning
	Fuse		Electronic Parts		Coil (Inductor), Solenoid Magnetic Valve
	Fusible Link		Resistor		Relay
	Fusible Link Wire		Speaker		
	Switch		Buzzer		Connector
	Switch		Circuit Breaker		Light-Emitting Diode
	Switch (Normal Close Type)		Bulb		Reed Switch
	Contact Wiring		Double-Filament Bulb		Condenser
	Battery		Motor		Horn
	Diode		Variable Resistor Rheostat		Vacuum Switching Valve

## NPR/W3500, NPR HD/W4500, NQR/W5500, NRR/W5500-HD Diesel – Abbreviations

Abbreviation	Definition	Abbreviation	Definition
6A/T	6-speed automatic transmission	IG	Ignition
4A/T	4-speed automatic transmission	kW	Kilowatt
A/T	Automatic transmission	LH	Left Hand
ABS	Anti-lock brake system	LWB	Long Wheelbase
APP	Accelerator pedal position	M/T	Manual Transmission
ATF	Automatic transmission fluid	M/V	Magnetic valve
AUTO	Automatic	MAF	Mass air flow
BRKT	Bracket	MIL	Check engine light
C/B	Circuit breaker	OD	Overdrive
CKP	Crankshaft position	OPT	Option
CMP	Camshaft position	RWAL	Rear Wheel Anti-lock Brake System
COMB	Combination	PTO	Power Take Off
CONT	Control	RH	Right Hand
D.R.L.	Day time running light	RR	Rear
DC	Direct Current	SCV	Suction control valve
ECM	Electronic control module	ST	Start
ECT	Engine coolant temperature	STD	Standard
ECU	Electronic control unit	SW	Switch
EGR	Exhaust gas reticulation	SWB	Short Wheelbase
EHCU	Electronic and hydraulic control unit	TCM	Transmission Control Module
FL	Fusible link	V	Volt
FRT	Front	VSV	Vacuum Switching Valve
FT	Fuel temperature	W	Watt (S)
H/L	Headlight	W/	With
HI	High	W/O	Without
IAT	Intake air temperature	W/S	Weld splice
IC	Integrated circuit	WOT	Wide-open Throttle
LO	Low		

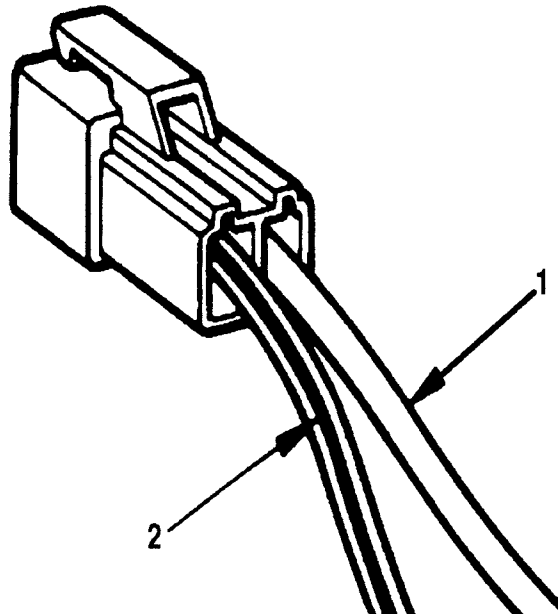
## NPR/W3500, NPR HD/W4500, NQR/W5500, NRR/W5500-HD Diesel – Wiring

### Wire Color

All wires have color-coded insulation. Wires belonging to a system's main harness will have a single color. Wires belonging to a system's sub-circuits will have a colored stripe. Striped wires use the following code to show wire size and colors.

Example: 0.5 G / R

Red (Stripe Color)  
Green (Base Color)  
Wire Size (0.5 mm<sup>2</sup>)



- 1. Single Color Wire
- 2. Colored Stripe Wire



## NPR/W3500, NPR HD/W4500, NQR/W5500, NRR/W5500-HD Diesel – Wiring (cont'd)

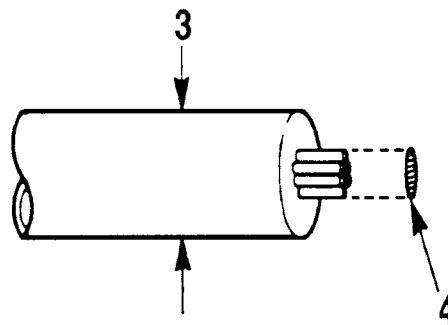
Abbreviations are used to indicate wire color within a circuit diagram. Refer to the following table.

Color-Coding	Meaning	Color-Coding	Meaning
B	Black	BR	Brown
W	White	LG	Light Green
R	Red	GR	Grey
G	Green	P	Pink
Y	Yellow	LB	Light Blue
L	Blue	V	Violet
O	Orange		

### Wire Size

The size of wire used in a circuit is determined by the amount of current (amperage), the length of the circuit, and the voltage drop allowed. The following wire size and load capacity are specified by AWG (American Wire Gauge). (Nominal size means approximate cross sectional area.)

- 3. Outside Diameter
- 4. Cross Sectional Area

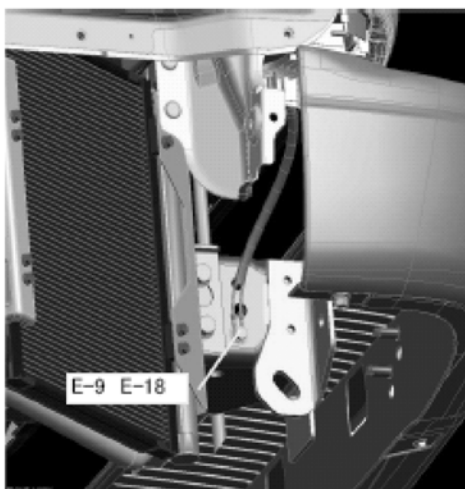
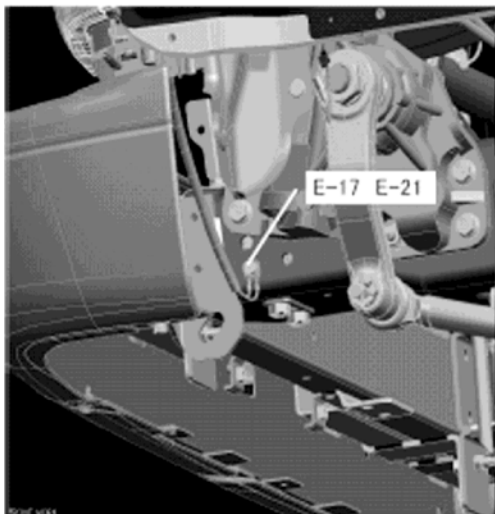


# 2009 GM/Isuzu TRUCK

## NPR/W3500, NPR HD/W4500, NQR/W5500, NRR/W5500-HD Diesel – Wiring (cont'd)

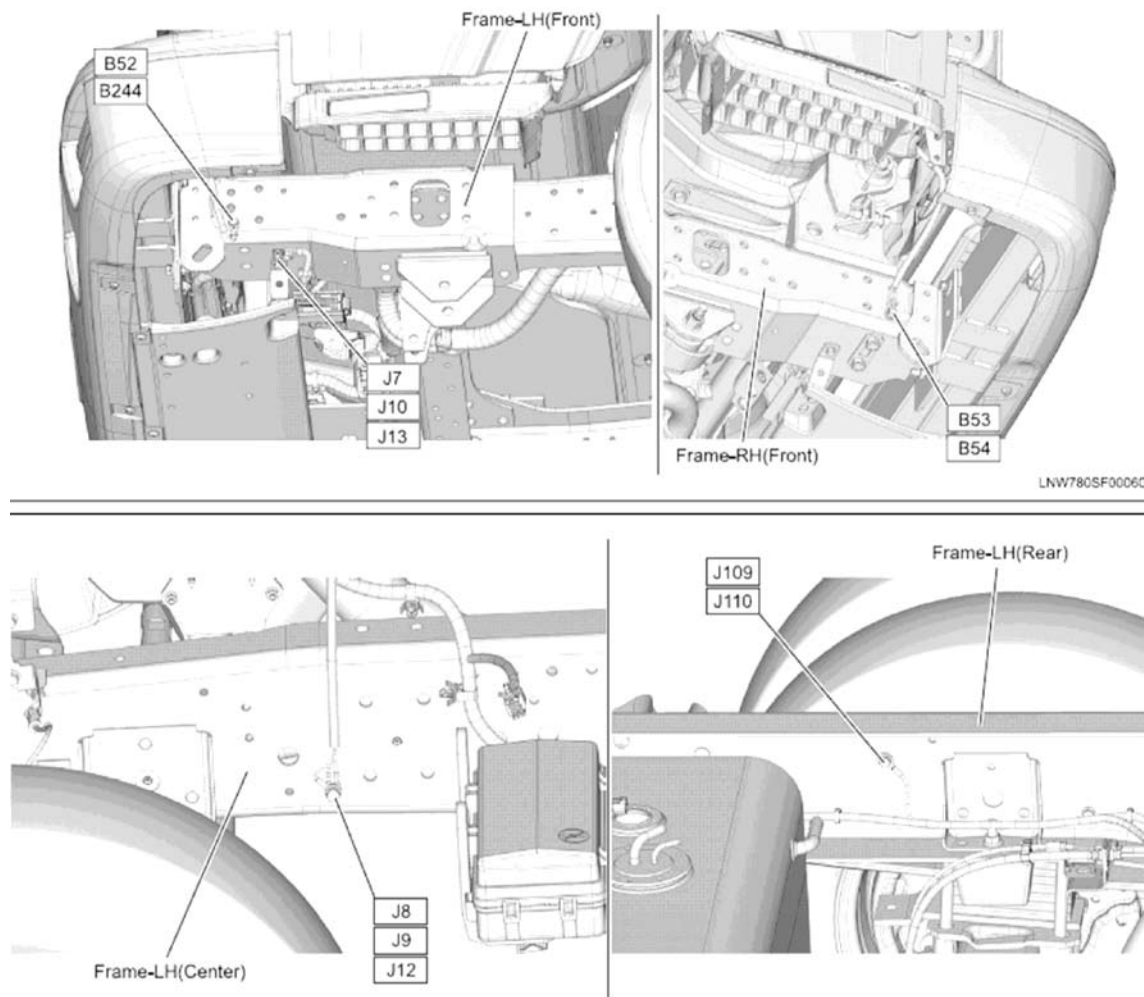
Nominal Size	Cross Sectional Area (mm <sup>2</sup> )	Outside Diameter (mm)	Allowable Current (A)	AWG Size (Cross reference)
0.3	0.372	1.8	9	22
0.5	0.563	2.0	12	20
0.85	0.885	2.2	16	18
1.25	1.287	2.5	21	16
2	2.091	2.9	28	14
3	3.296	3.6	37.5	12
5	5.227	4.4	53	10
8	7.952	5.5	67	8
15	13.36	7.0	75	6
20	20.61	8.2	97	4

## NPR/W3500, NPR HD/W4500, NQR/W5500, NRR/W5500-HD Diesel – Electrical – Grounding Point Locations

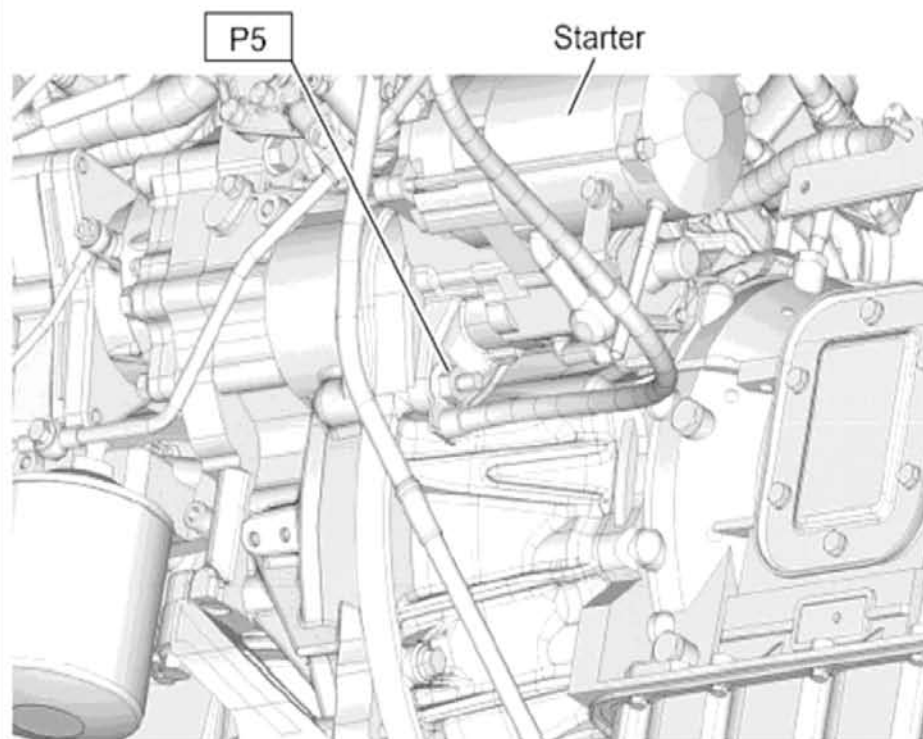
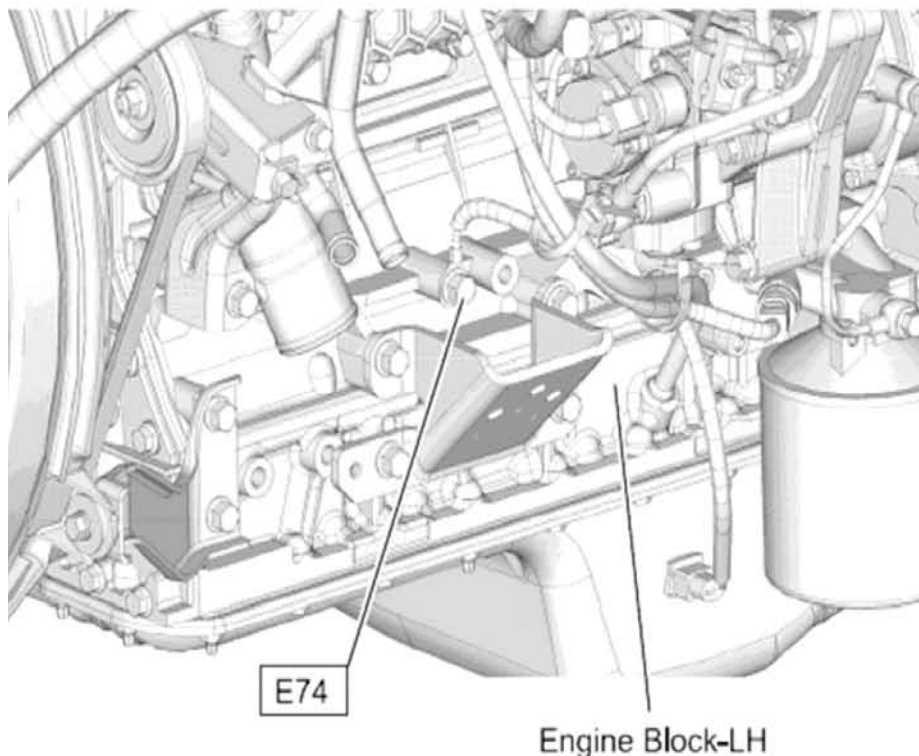


Connector No.	Location	Main Parts (Load)
E-21	LH	Cigar lighter, Accessory socket, Key on relay, Power ACC relay, Headlamp relay, Rear dome lamp relay, Radio, Meter, Blower resistor, Flasher unit, Intermittent relay, Side turn lamp, Roof marker lamp,
E-9	RH	Blower, Wiper motor
E-17	LH	Illumination control switch, Power window, Headlamp, Vacuum pump, Mirror heater, Door lock, Front turn lamp, Front position lamp, TCM relay, Power window relay, Over drive off switch, Meter, Diagnostic connector
E-18	RH	TCM, Headlamp, Daytime running lamp CU, Mirror heater, Diagnostic connector, Front position lamp, DMU, Termo switch, A/C switch, Side marker lamp, Front turn lamp

## NPR/W3500, NPR HD/W4500, NQR/W5500, NRR/W5500-HD Diesel – Electrical – Grounding Point Locations (cont'd)



## NPR/W3500, NPR HD/W4500, NQR/W5500, NRR/W5500-HD Diesel – Electrical – Grounding Point Locations (cont'd)



## **NPR/W3500, NPR HD/W4500, NQR/W5500, NRR/W5500-HD Diesel – Electrical – Reference Table of Grounding Points**

NOTICE: Abnormal phenomena of electrical components are considered resulted from defective grounding. In repair, be sure to inspect grounding points and to tighten all fastening parts surrounding the grounding points.

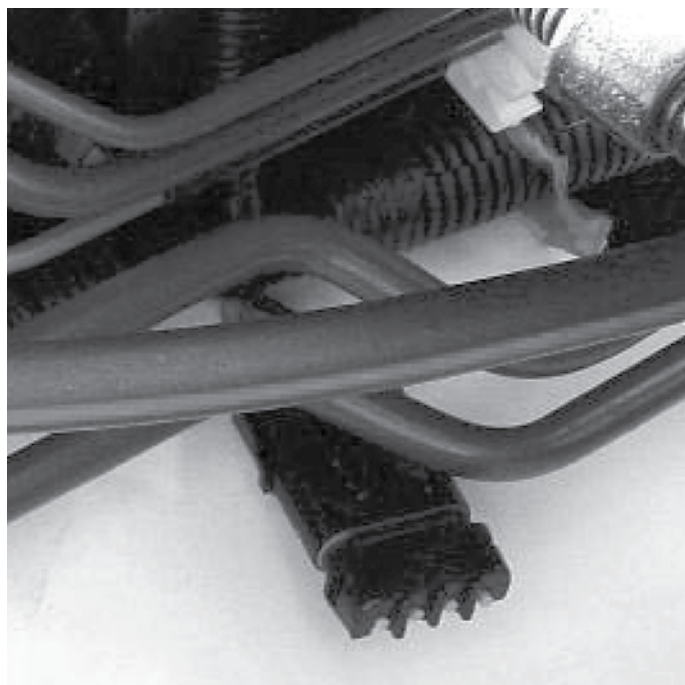
Connector No.	Cable Harness Name	Location	Main Parts (Load)
B-52, B-244	Cab Harness	Frame LH Front	Power Window Switch, Illumination Control Switch, Head Light LH, Vacuum Pump, Mirror Heater LH
B-53, B-54	Cab Harness	Frame RH Front	DRL Control Unit, Mirror Heater RH, Power Window Switch, Transmission Control Module (TCM), Head Light RH
J-7, J-10, J-13	Front Frame Harness	Frame LH Front	Fuel Tank Unit (Side), Electronic Hydraulic Control Unit (EHCU), Select Position Switch, Condenser Fan Motor, Triple Pressure Switch, Hydraulic Booster Brake (HBB) Oil Level, Marker Light Relay
J-8, J-9, J-12	Front Frame Harness	Frame LH Center	Front Manufacturer Connector, Engine Control Module (ECM)
J-109, J-110	Rear Frame Harness	Frame LH Rear	Rear Manufacturer Connector, Fuel Tank Unit (In-Frame), Rear Combination Lamp, Back Buzzer DOP, PTO Speed Control Switch (Upfitter Install)
E-74	Engine Harness	Engine Block LH	Engine Oil Level Switch
P-5	Starter Earth Cable	Starter	Starter

# 2009 GM/Isuzu TRUCK

PAGE 320

## NPR/W3500, NPR HD/W4500, NQR/W5500, NRR/W5500-HD Diesel – Electrical – Body Room Light, I.D. and Marker Lamp, Connector Location and Circuit Diagram

NPR/W3500, NPR HD/W4500 NQR/W5500, NRR/W5500 HD  
Body Connectors LH Frame



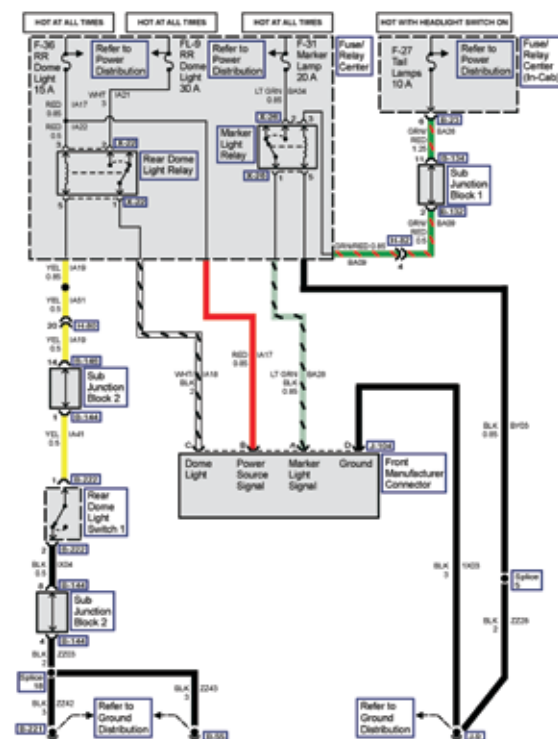
- **Packard Body Plug**
- **4-Pin Weather Seal Connector with Mating Plug**
- **Location:**  
Inside left-hand frame rail 28 to 31 inches BOC
- **Circuits:**

Marker Black/Green)	=	A
Hot Wire (Red)	=	B
Dome Light (White /Black)	=	C
Ground (Black)	=	D



### Packard Body Plug Connector Parts

	NPR/NQR/NRR
Chassis Housing ASM .....	1201-0974
Terminal .....	1208-9040
Terminal .....	1212-4587
Seal .....	1208-9679
Seal .....	1201-5193
Body Housing ASM .....	1201-5797
Housing .....	1201-5787
Connector Seal .....	1201-0492
Dummy Seal .....	1201-0300

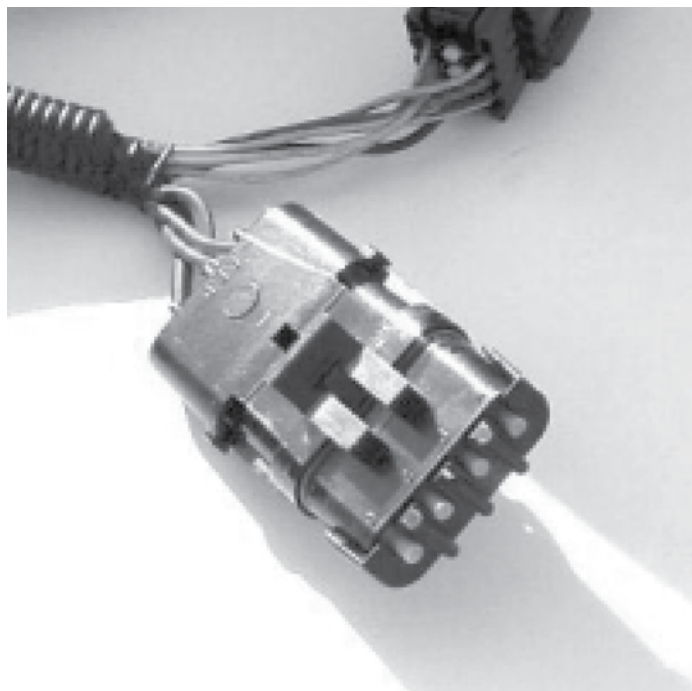


# 2009 GM/Isuzu Truck

PAGE 321

## NPR/W3500, NPR HD/W4500, NQR/W5500, NRR/W5500-HD Diesel – Electrical – Body Room Light, I.D. and Marker Lamp, Connector Location and Circuit Diagram (cont'd)

NPR/W3500, NPR HD/W4500 NQR/W5500, NRR/W5500  
HD Body Connectors LH Frame



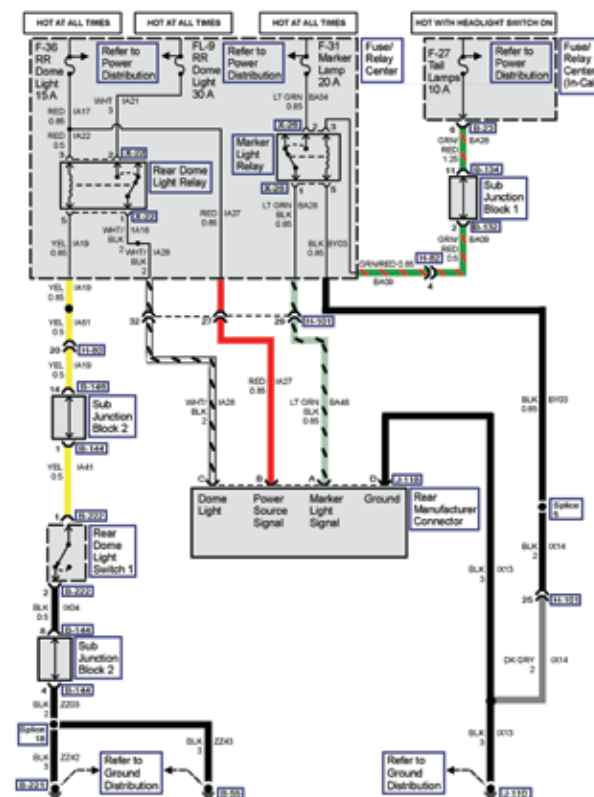
- **Packard Body Plug**
- **4-Pin Weather Seal Connector with Mating Plug**
- **Location:**  
Center of Crossmember
- **Circuits:**

Marker Black/Green)	=	A
Hot Wire (Red)	=	B
Rear Dome (White/Black)	=	C
Ground (Black)	=	D



### Packard Body Plug Connector Parts

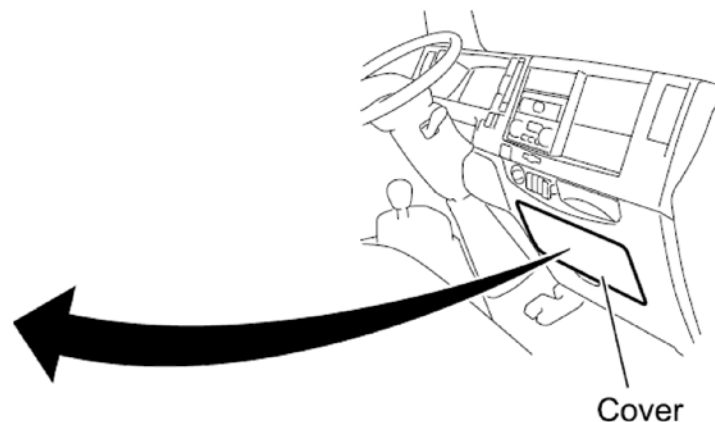
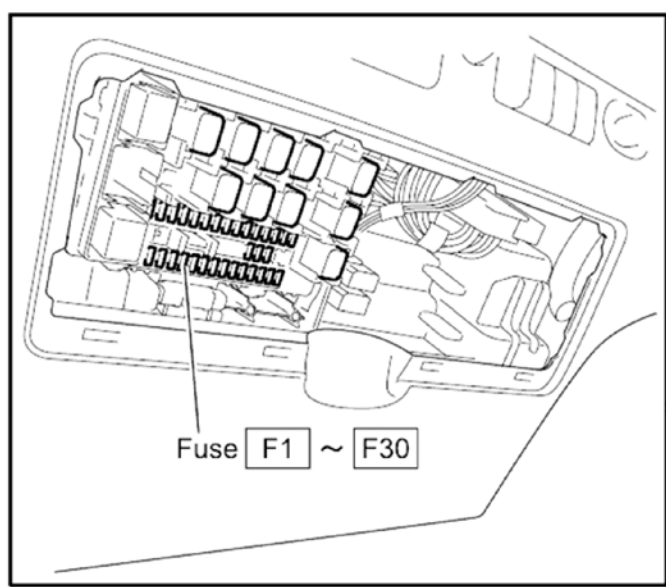
	NPR/NQR/NRR
Chassis Housing ASM .....	1201-0974
Terminal .....	1208-9040
Terminal .....	1212-4587
Seal .....	1208-9679
Seal .....	1201-5193
Body Housing ASM .....	1201-5797
Housing .....	1201-5787
Connector Seal .....	1201-0492
Dummy Seal .....	1201-0300



(continued on next page)



## NPR/W3500, NPR HD/W4500, NQR/W5500, NRR/W5500-HD Diesel – Electrical – Fuse Location



FUSE LABEL

RR P/WINDOW	—	ROOM LAMP	DOOR LOCK	—	P/WINDOW	BACK UP LAMP	WIPER	H/LAMP LO (LH)	LAMPS (BATT)	H/LAMP LO (RH)	BRAKE LAMPS	STARTER	H/LAMP HI (LH)	H/LAMP HI (RH)
25A		10A	15A		25A	10A	25A	10A	10A	10A	10A	10A	10A	10A
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

P. NO. 898054 3190

SPARE

SPARE

SPARE

MIRROR HEATER	IGNITION2	IGNITION1	—	ECM	METER	ECM (BATT)	MIRROR	ACCESSORIES	HORN	TURN, HAZARD	TAIL LAMPS	ILLUMINATIONS	CORNERING LAMPS	AIR CONDITIONER
15A	10A	10A		10A	10A	10A	10A	15A	15A	15A	10A	10A	10A	10A
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30

# 2009 GM/Isuzu TRUCK

PAGE 323

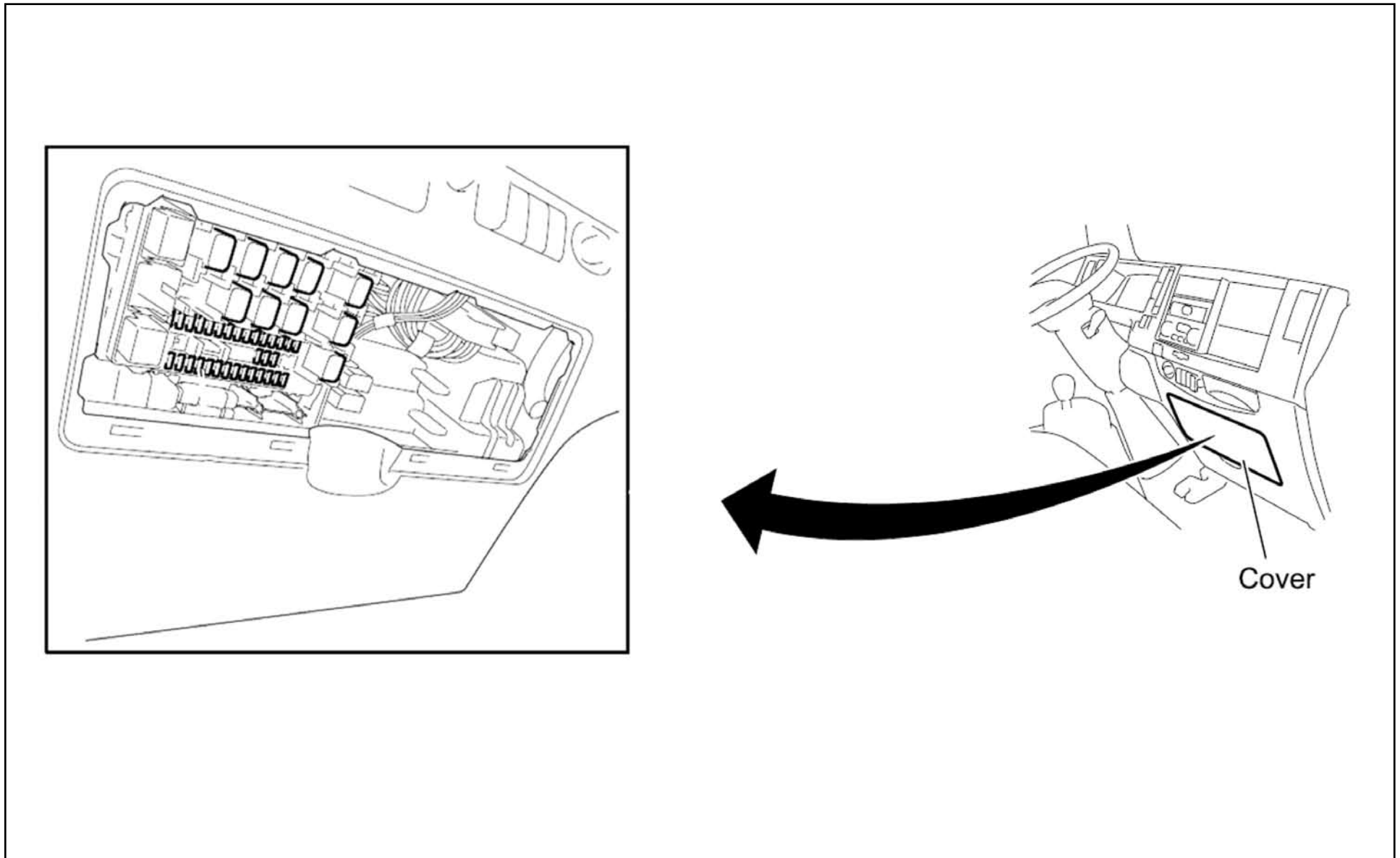
## NPR/W3500, NPR HD/W4500, NQR/W5500, NRR/W5500-HD Diesel – Electrical – Fuse Box

Fuse No	Capacity	Indication on Label	Main Parts(Load)				
F-1	25A	RR P/WINDOW	Rear Power Window Relay, Rear Power Window SwitchR/ LH, Rear Power Window MotorR/LH	F-21	10A	METER	Instrument Panel Cluster(IPC), Fuel Tank Unit, DMU, PTO Switch, Electronic Hydraulic Control Unit(EHCU)
F-2	-	-	-	F-22	10A	ECM(BATT)	Flasher Unit, Combination Switch, Hazard Switch, Check Miles & Check Oil Level, TCM Relay, Transmission Control Module(TCM)
F-3	10A	ROOM LIGHT	Charge Relay, Flasher Unit, Combination Switch, Front Cornering Light R/LH, Hazard Switch, Data Link Connector	F-23	10A	MIRROR	Wiper Main Relay, Wiper Hi Relay, Front Wiper Motor, Wiper & Exhaust Brake Switch, Intermittent Relay
F-4	15A	DOOR LOCK	Power Window Relay, Front Power Window SwitchR/LH, Front Power Window MotorR/LH, Door Lock Relay, Door Lock Switch	F-24	15A	ACCESSORIES	Transmission Control Module(TCM), VGS Control Unit, Glow Controller, Engine Control Module(ECM), Radio, Speaker R/LH, Cigarlighter Relay
F-5	-	-	-	F-25	15A	HORN	Horn Relay , Horn R/LH, Horn Switch
F-6	25A	P/WINDOW	Front Power Window Switch R/LH	F-26	15A	TURN, HAZARD	DRL Relay, Headlight Hi Relay, DRL Control Relay, Tail Relay, Flasher Unit
F-7	10A	BACK UP LIGHT	Back Up MT Switch, Rear Combination Light R/LH, Back Buzzer Dop, Back Up Switch, Automatic Transmission	F-27	10A	TAIL LIGHT	Front Position Light RH, Front Position Light LH, Identification Light 1/2/3, Roof Marker Light1/2
F-8	25A	WIPER	Wiper Main Relay, Wiper Hi Relay, Front Wiper Motor	F-28	10A	ILLUMINATIONS	Pressure Switch, B-Coil Level Switch, Check Miles & Check Oil Level
F-9	10A	H/LIGHT LO(LH)	Rear Dome Light Relay	F-29	10A	CORNERING LIGHT	Front Cornering LightR/LH, Cornering Switch
F-10	10A	LIGHT (BATT)	Headlight Lo Relay, Headlight RH, DRL Relay	F-30	10A	AIR CONDITIONER	Magnetic Clutch Relay
F-11	10A	H/LIGHT LO(RH)	Headlight Lo Relay, Headlight LH	F-31	20A	MARKER LAMP	Blower Motor, Marker Light Relay
F-12	10A	BRAKE LIGHT		F-32	20A	TAIL MAIN	Tail Relay
F-13	10A	STARTER	Headlight Lo Relay, Stoplight Relay, Stoplight Switch, Side Marker RH/LH	F-33	10A	ECM	Engine Control Module(ECM), VGS Control Unit
F-14	10A	H/LIGHT HI(LH)	Headlight Hi Relay, Headlight LH, Instrument Panel Cluster(IPC)	F-34	-	-	-
F-15	10A	H/LIGHT HI(RH)	Headlight Hi Relay, Headlight RH	F-35	-	-	-
F-16	15A	MIRROR HEATER	Rear Window Lock Switch, Rear Power Window, Mirror Heater Switch, Mirror HeaterR/LH	F-36	15A	RR DOME LIGHT	Rear Dome Light Relay , Front Manufacture Connector, Rear Manufacture Connector
F-17	10A	IGNITION2	Blow Relay, Fan Control Switch	F-37	10A	CONDENSER FAN	Condenser Fan Relay, Condenser Fan, Triple Pressure Switch
F-18	10A	IGNITION1	PTO Enable Relay, Load Engaged Switch, Engine Control Module(ECM), Vacuum Pump Relay, Vacuum Pump Motor	F-38	10A	A/C	Magnetic Clutch Relay, A/C Compressor, Condenser Fan Relay
F-19	-	-	-	F-39	20A	CIGAR	Cigarlighter
F-20	10A	ECM	Engine Control Module(ECM), Combination Switch	F-40	10A	ACCESSORIES SOCKET	Accessories Socket
				F-41	20A	POWER SOURCE	Front Manufacture Connector, Rear Manufacture Connector

# 2009 GM/Isuzu TRUCK

PAGE 324

## NPR/W3500, NPR HD/W4500, NQR/W5500, NRR/W5500-HD Diesel – Electrical – Relay Location

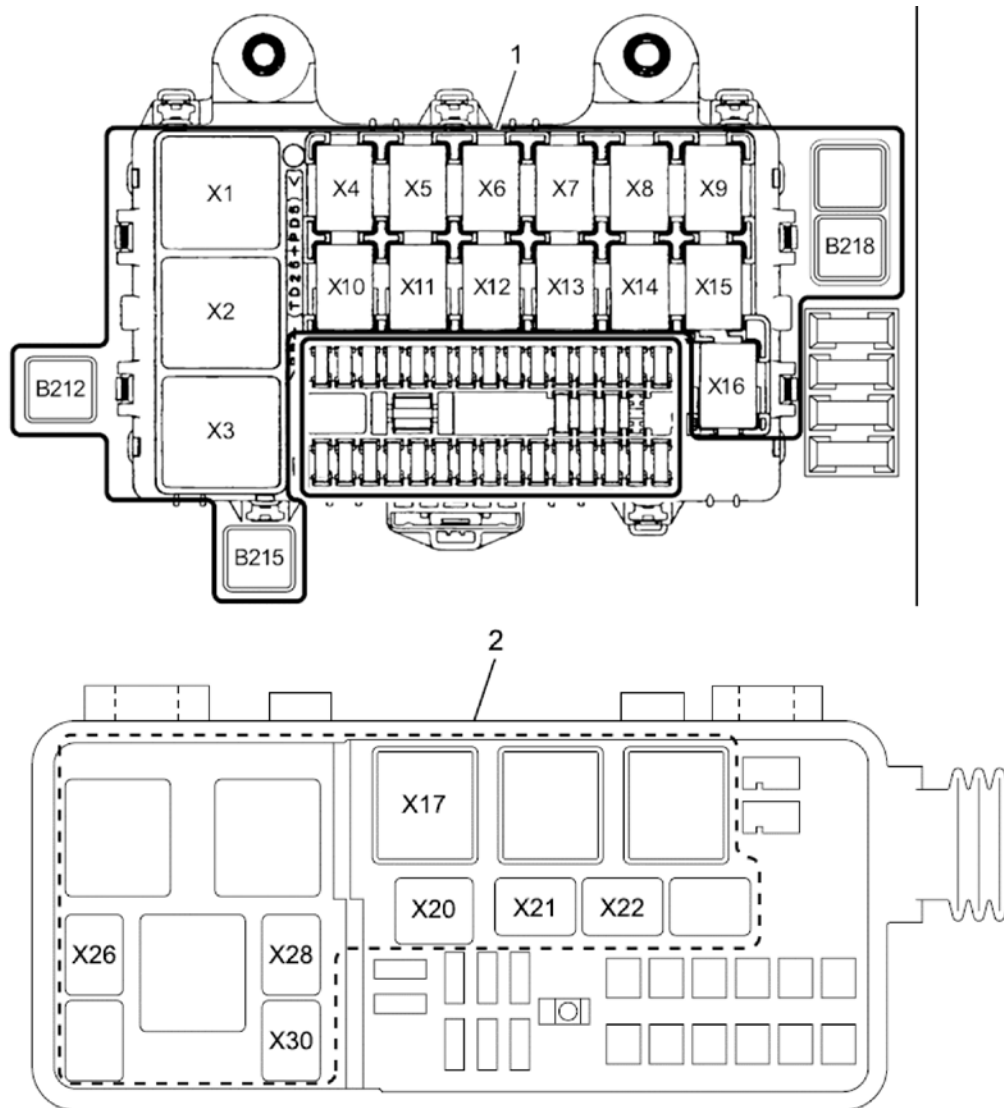


# 2009 GM/Isuzu TRUCK

PAGE 325

## NPR/W3500, NPR HD/W4500, NQR/W5500, NRR/W5500-HD Diesel – Electrical – Relay Location (cont'd)

1- fuse box  
2- relay box

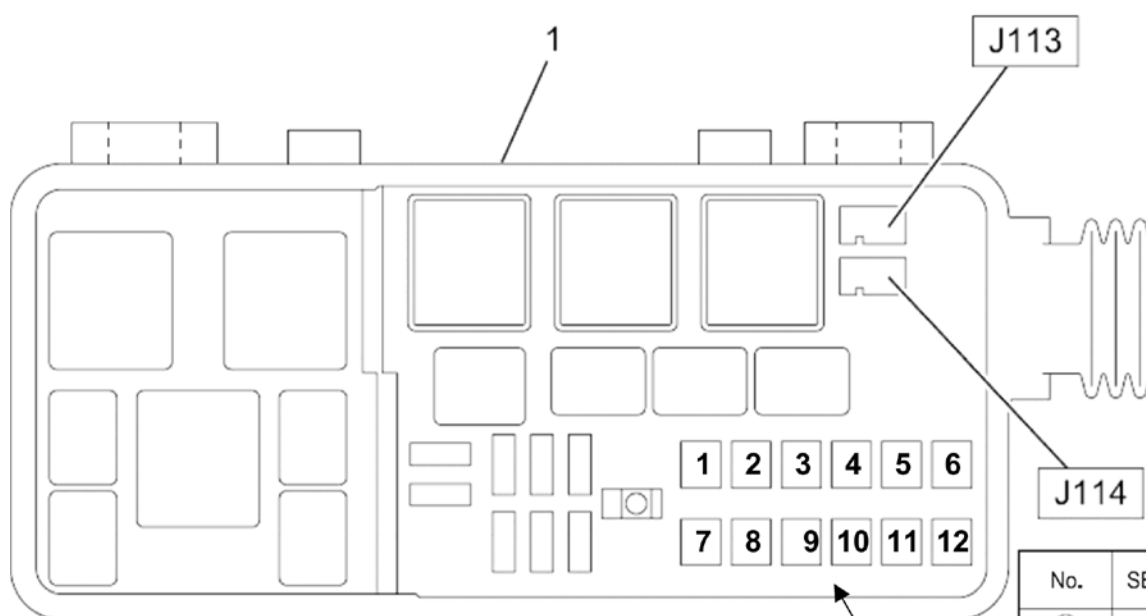


Connector #	Relay Name
X1	Stoplight
X2	Day Time Running Light
X3	Key On
X4	TCM
X5	P/N Start
X6	Wiper Main
X7	Horn
X8	Wiper HI/LO
X9	-
X10	Rear Power Window
X11	Charge
X12	Front Power Window
X13	Headlight(Lo)
X14	Vacuum Pump
X15	Headlight(Hi)
X16	Tail Light
X17	Starter
X20	Magnetic Clutch
X21	Condenser Fan
X22	Rear Dome Light
X26	Marker Lamp
X28	Exhaust Brake Cut
X30	ECM Main
B212	Accessory Power
B215	Blower
B218	Cigar lighter

# 2009 GM/Isuzu TRUCK

PAGE 326

## NPR/W3500, NPR HD/W4500, NQR/W5500, NRR/W5500-HD Diesel – Electrical – Slow Blow Fuse and Diode Chart



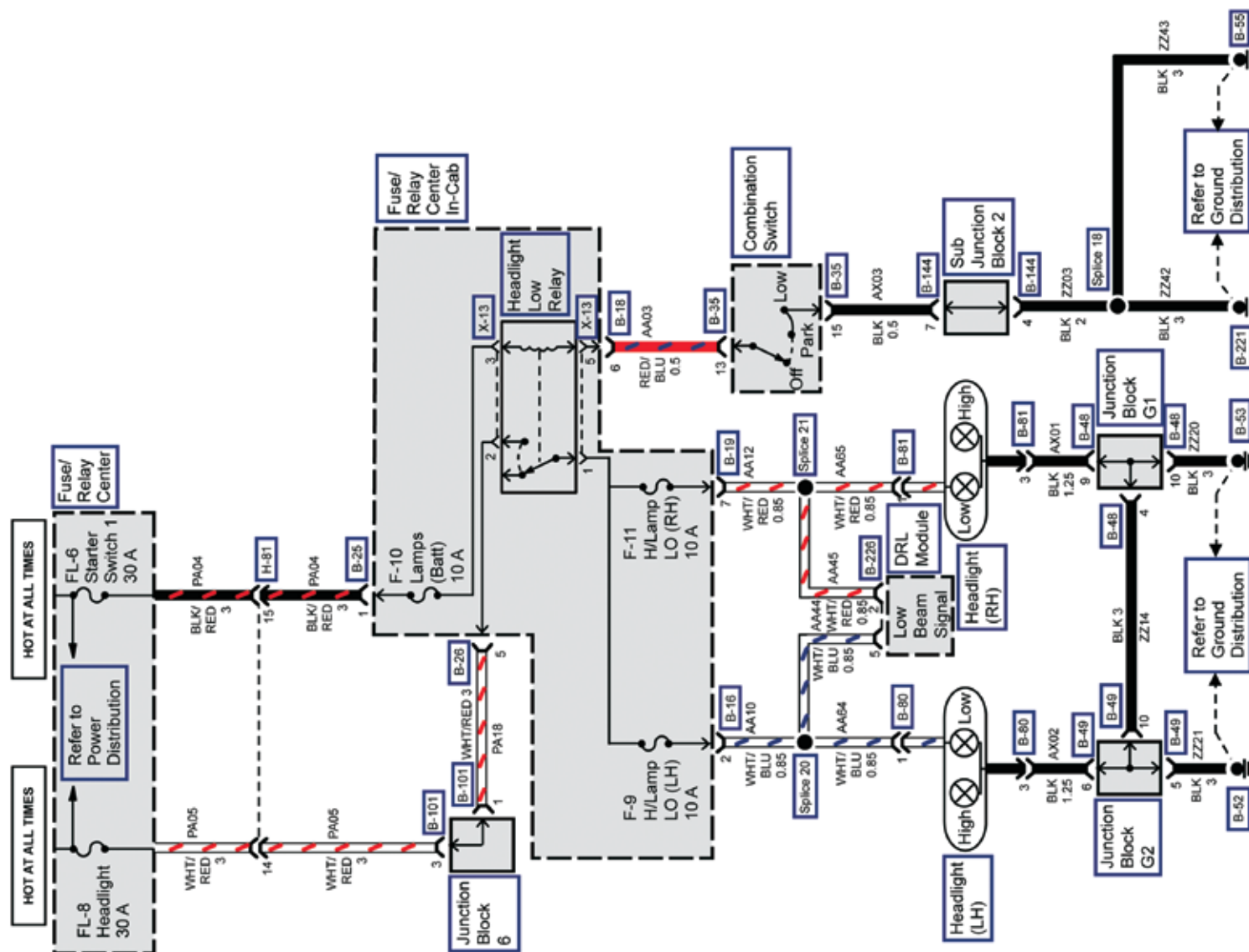
Diode Table

Connector #	Diode Name
J113	ECM
J114	A/C

No.	SBF No.	Name	Capacity
①	SBF1	ECM	30A
②	SBF2	STARTER	60A
③	SBF3	POWER ACC	50A
④	SBF4	GLOW	60A
⑤	SBF5	AM2	40A
⑥	SBF6	AM1	30A
⑦	SBF7	HVAC	40A
⑧	SBF8	HEADLIGHT	30A
⑨	SBF9	RR DOME LIGHT	30A
⑩	SBF10	WIPER	50A
⑪	SBF11	ABS	60A
⑫	SBF12	J/B-B	50A

6

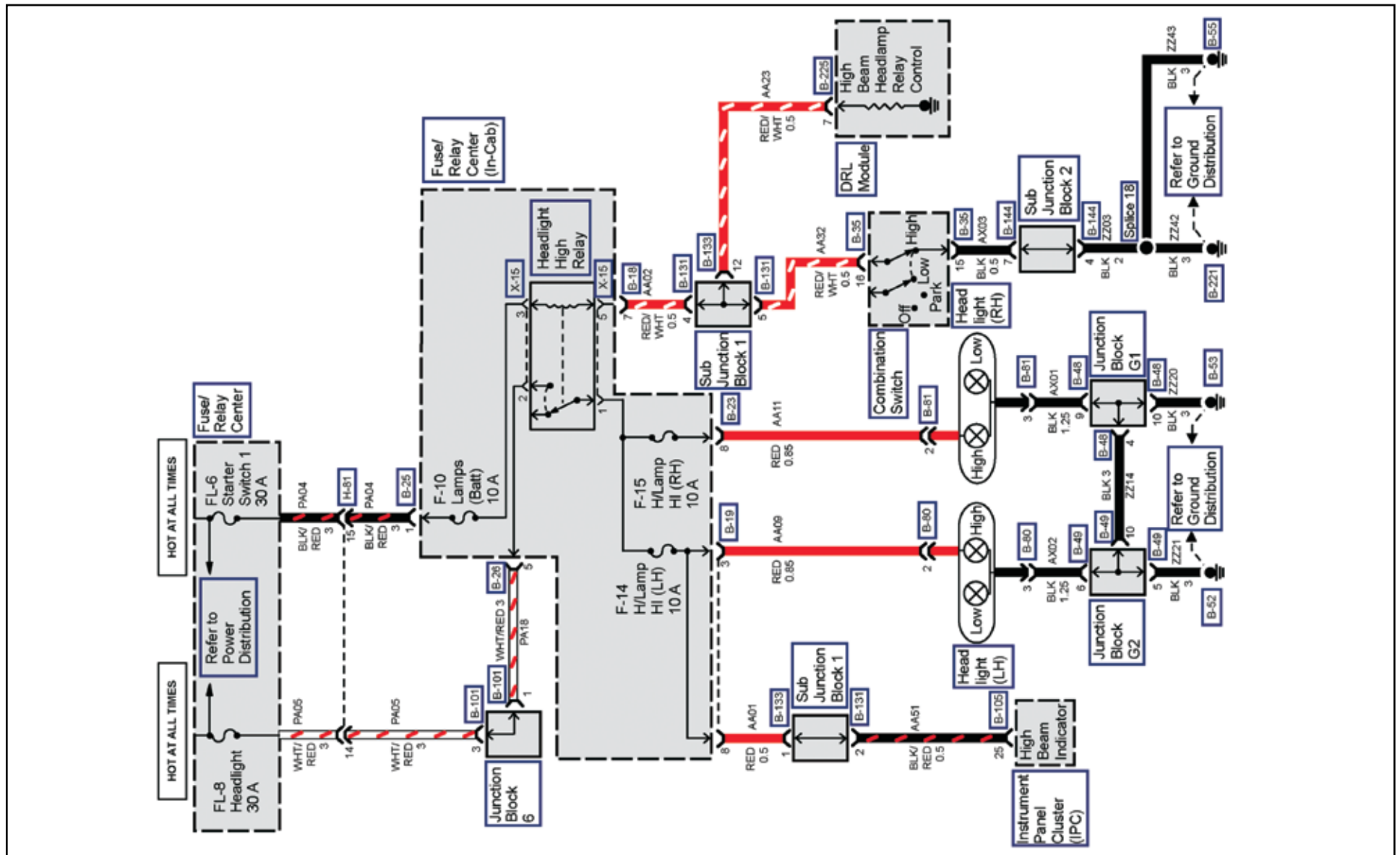
### ***Headlights (Low Beam)***



# 2009 GM/Isuzu Truck

PAGE 328

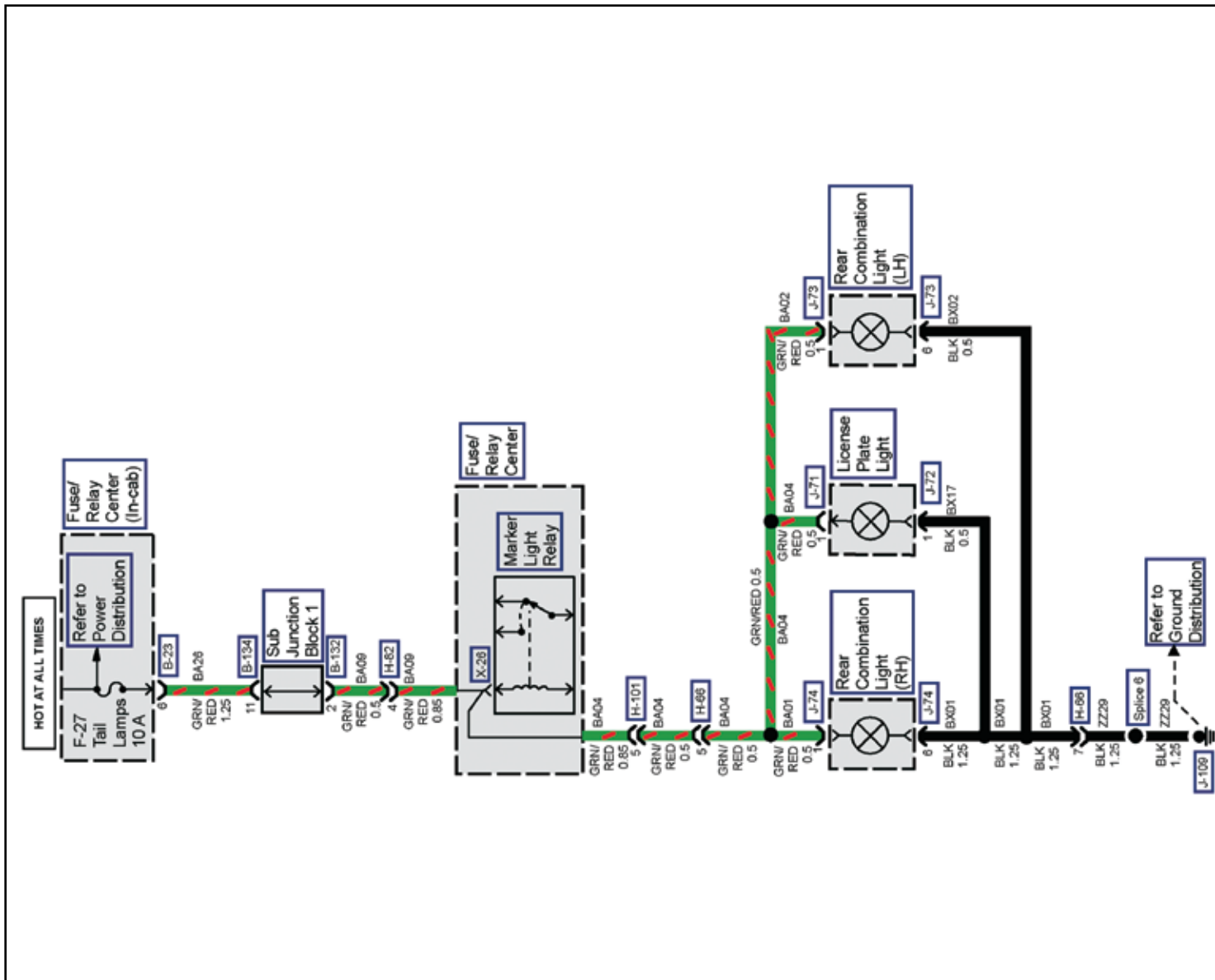
## NPR/W3500, NPR HD/W4500, NQR/W5500, NRR/W5500-HD Diesel – Electrical – Headlights (High Beam)



# 2009 GM/Isuzu Truck

PAGE 329

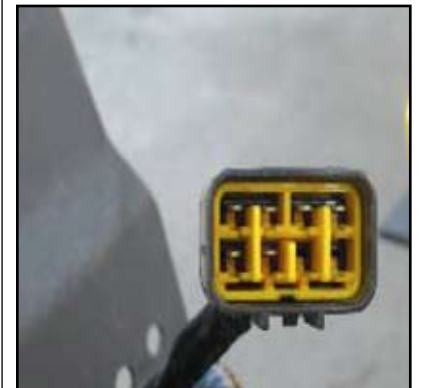
## NPR/W3500, NPR HD/W4500, NQR/W5500, NRR/W5500-HD Diesel – Electrical – Tail Lights



The connectors that match the end of frame tail and stop lamp harness can now be ordered through Isuzu & W-Series dealers.



Chassis harness side  
part number **897364-5300**



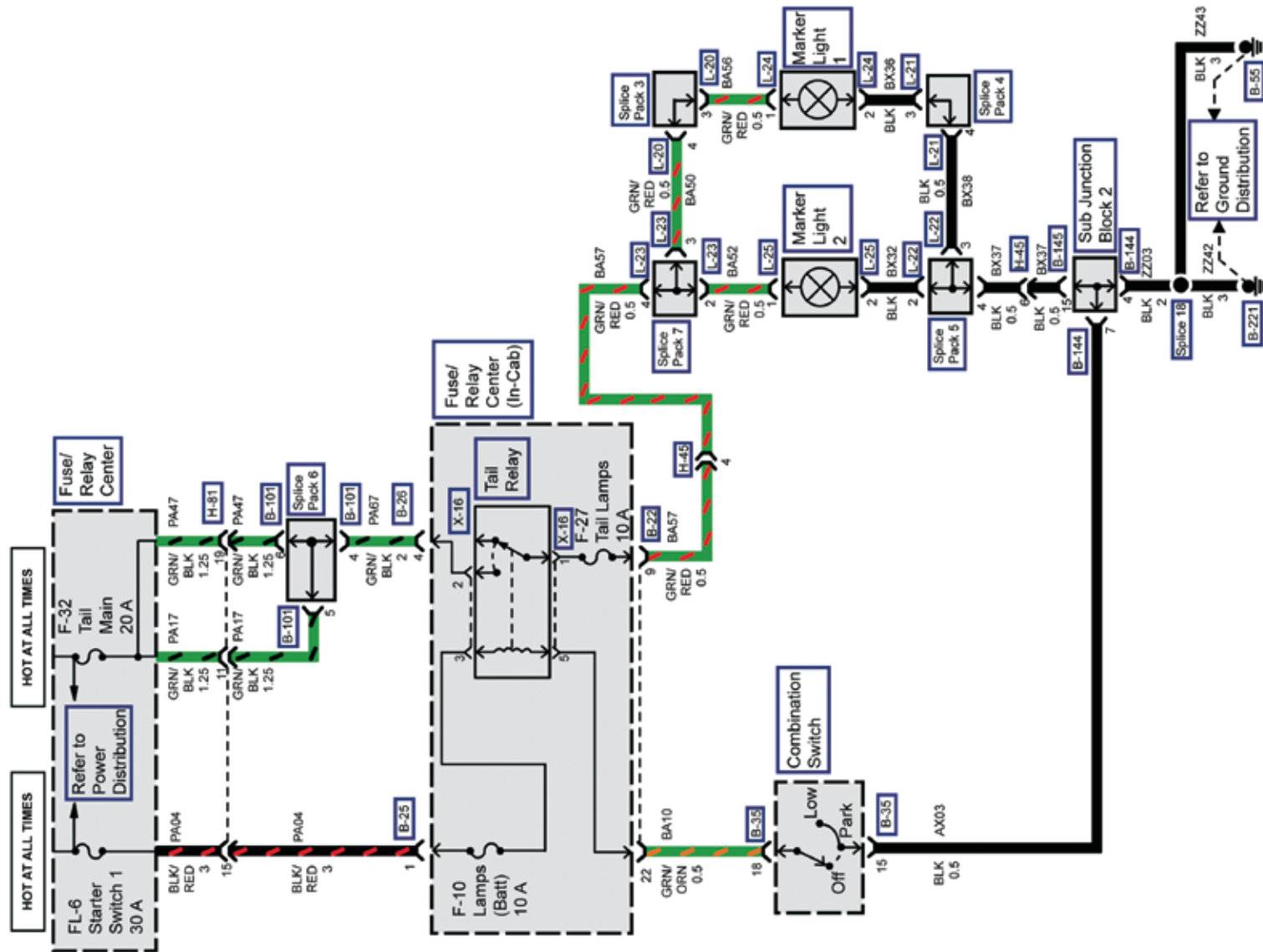
Stop and tail lamp side  
part number **897364-5310**



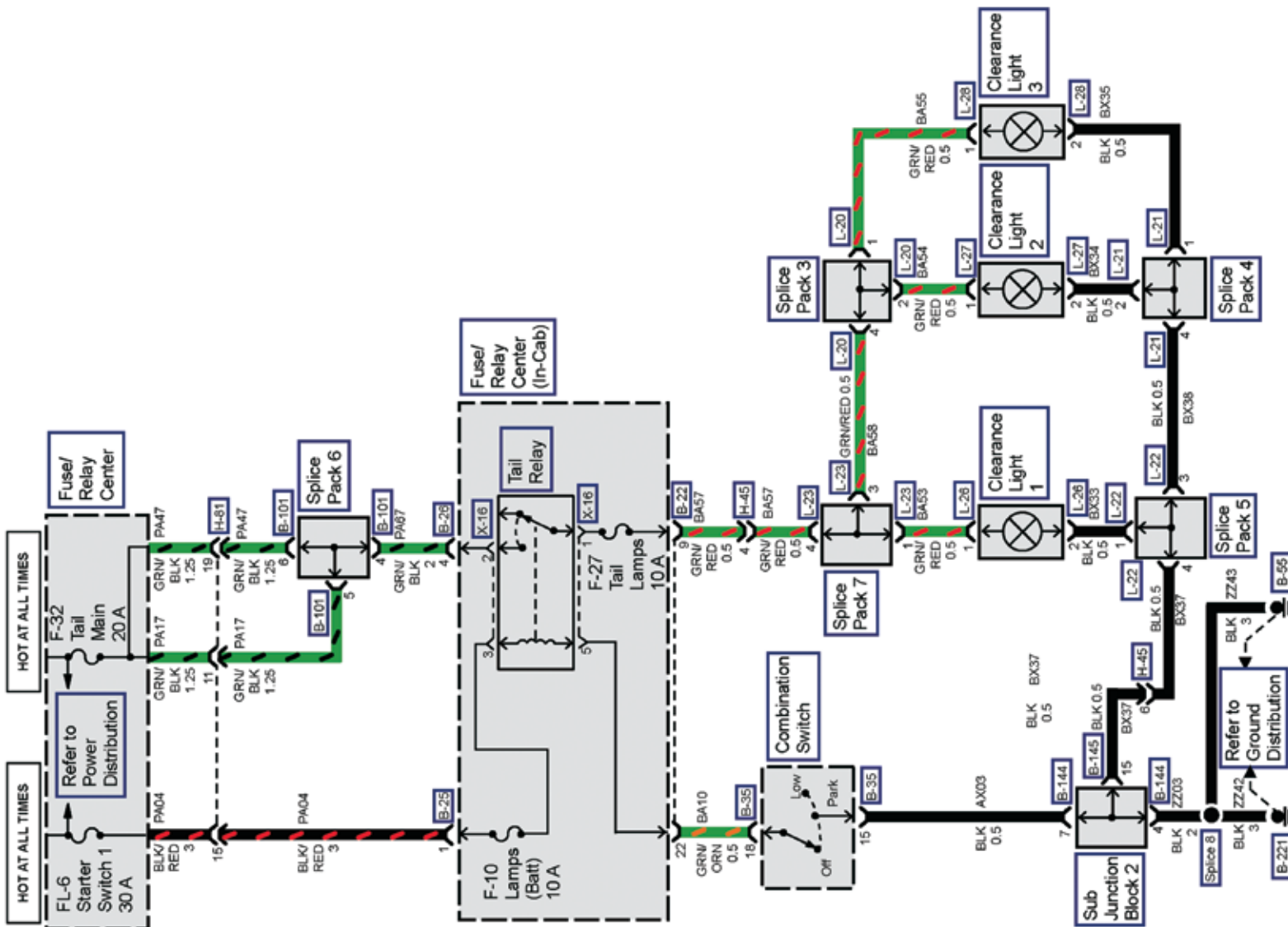
# 2009 GM/Isuzu Truck

PAGE 330

## NPR/W3500, NPR HD/W4500, NQR/W5500, NRR/W5500-HD Diesel – Electrical – Roof Marker Lights



## **Roof Clearance Lights**



# 2009 GM/Isuzu Truck

PAGE 332

## NPR/W3500, NPR HD/W4500, NQR/W5500, NRR/W5500-HD Diesel – Electrical – Rear Turn Signal Lights

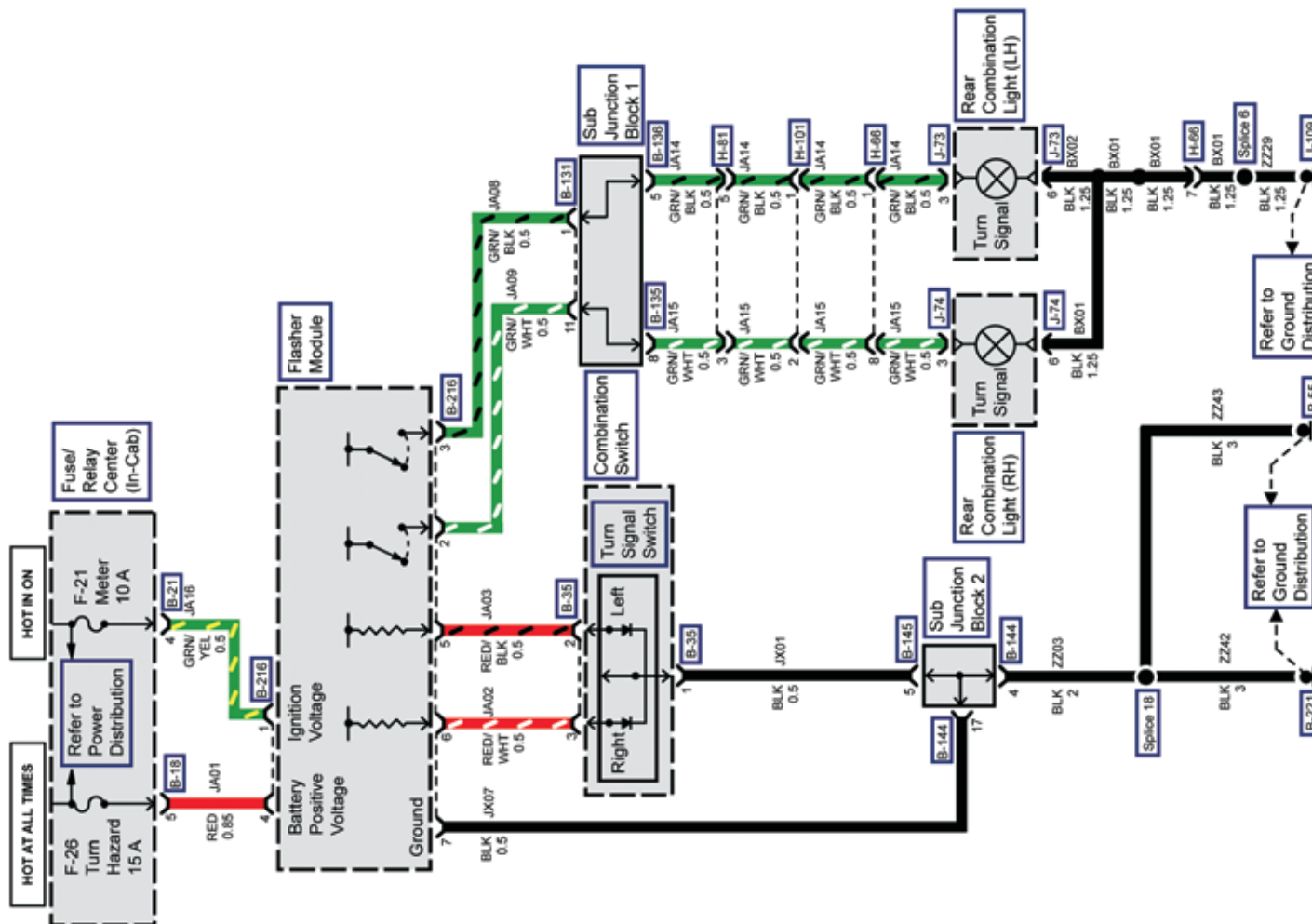
The connectors that match the end of frame tail and stop lamp harness can now be ordered through Isuzu & W-Series dealers.



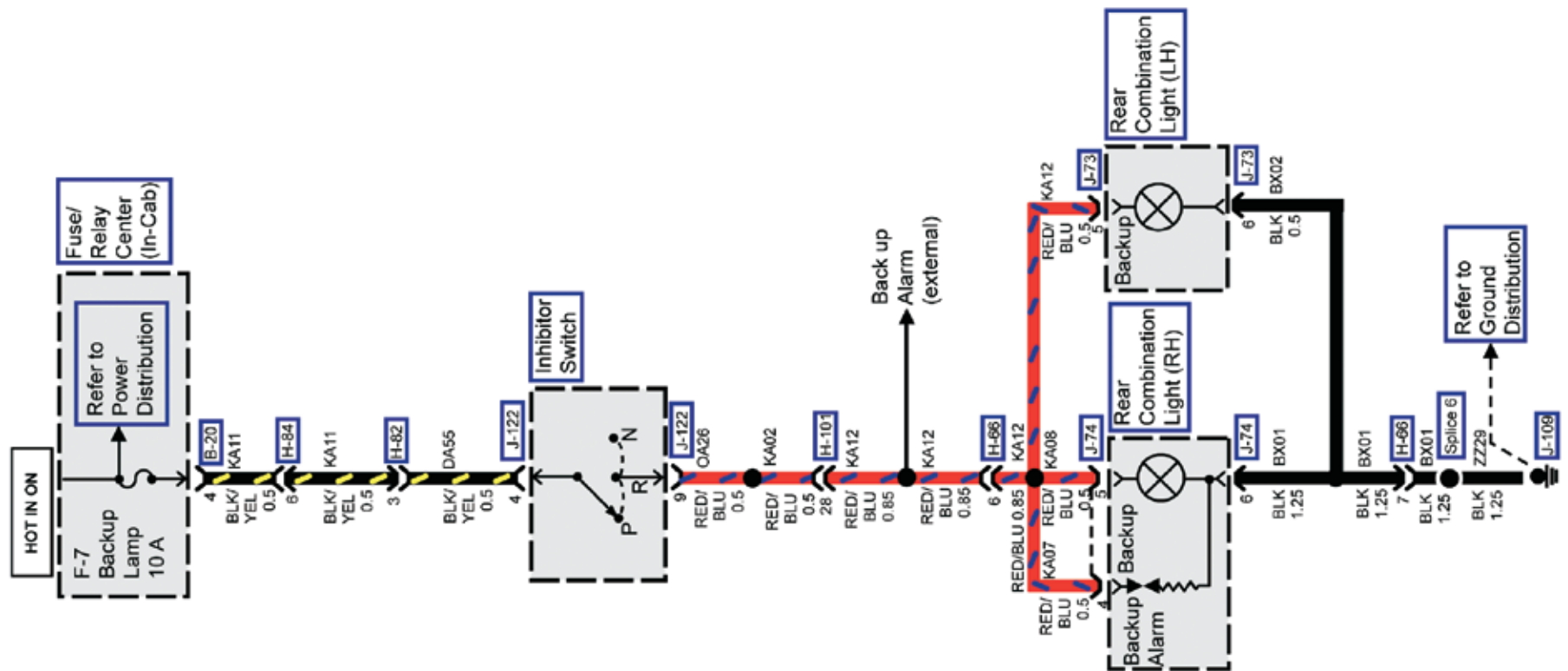
Chassis harness side  
part number **897364-5300**



Stop and tail lamp side  
part number **897364-5310**



**NPR/W3500, NPR HD/W4500, NQR/W5500, NRR/W5500-HD Diesel – Electrical –  
Back Up Light Circuit**



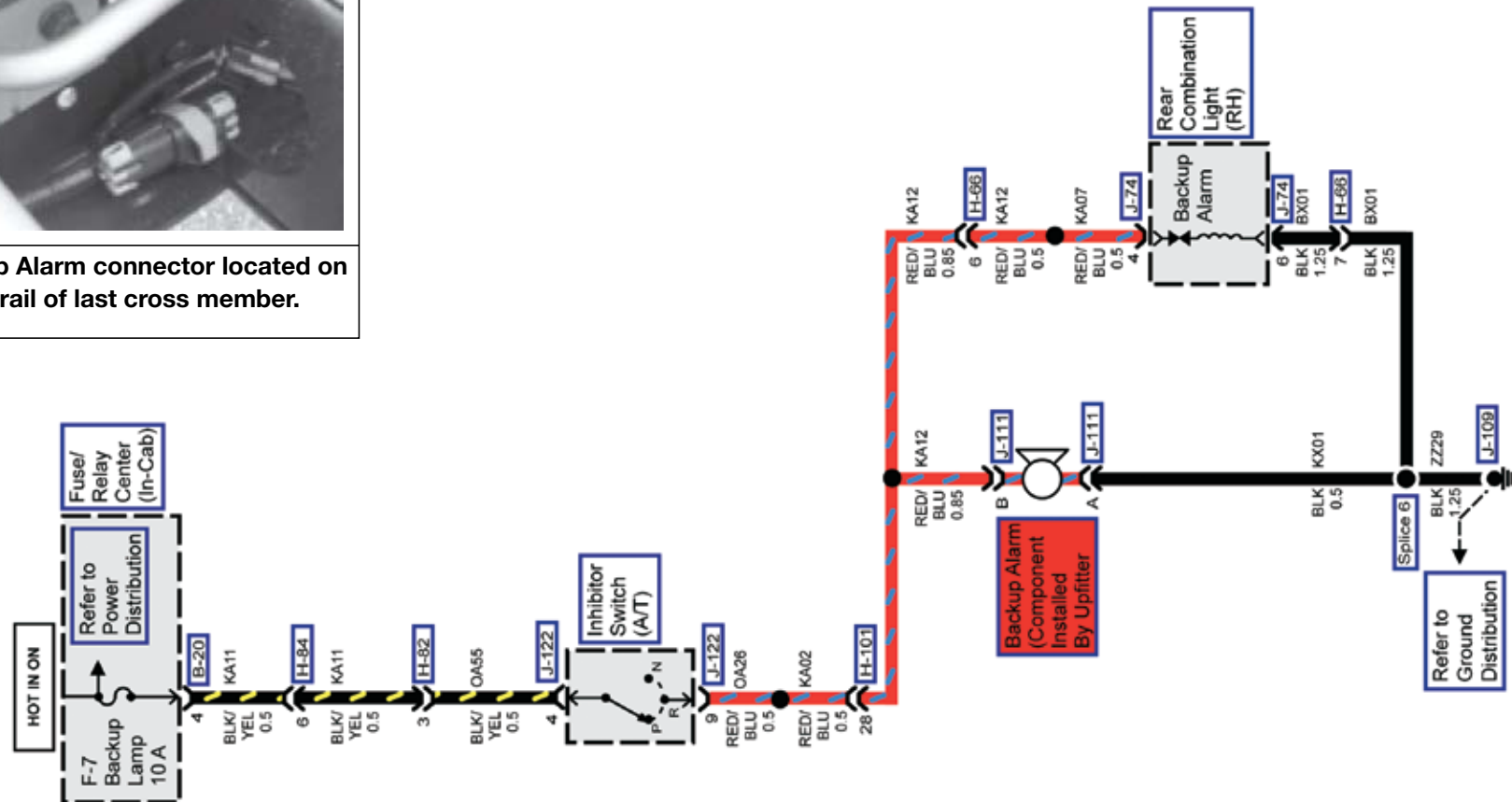
# 2009 GM/Isuzu Truck

PAGE 334

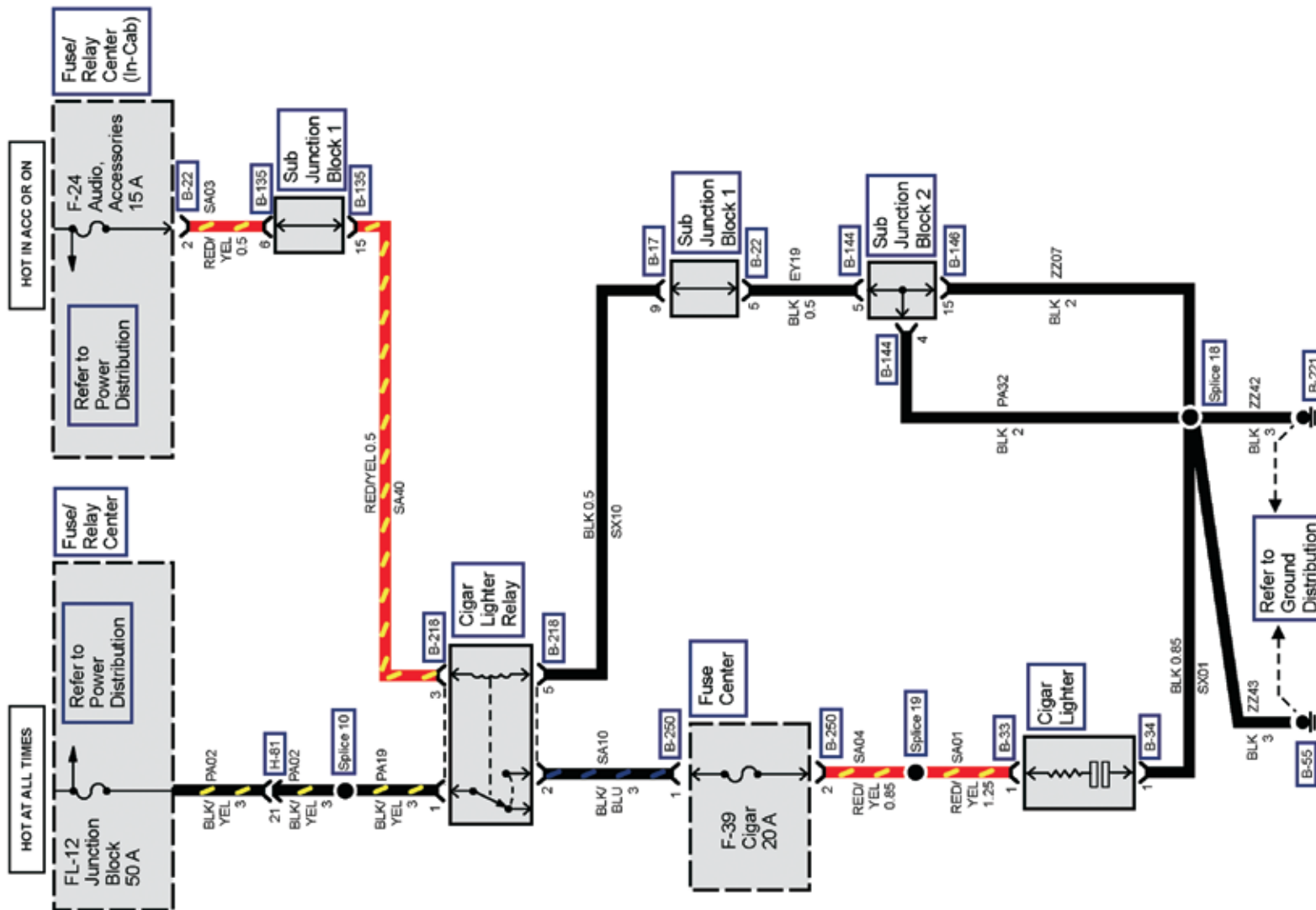
## NPR/W3500, NPR HD/W4500, NQR/W5500, NRR/W5500-HD Diesel – Electrical – Back Up Alarm Circuit



Back up Alarm connector located on LH rail of last cross member.

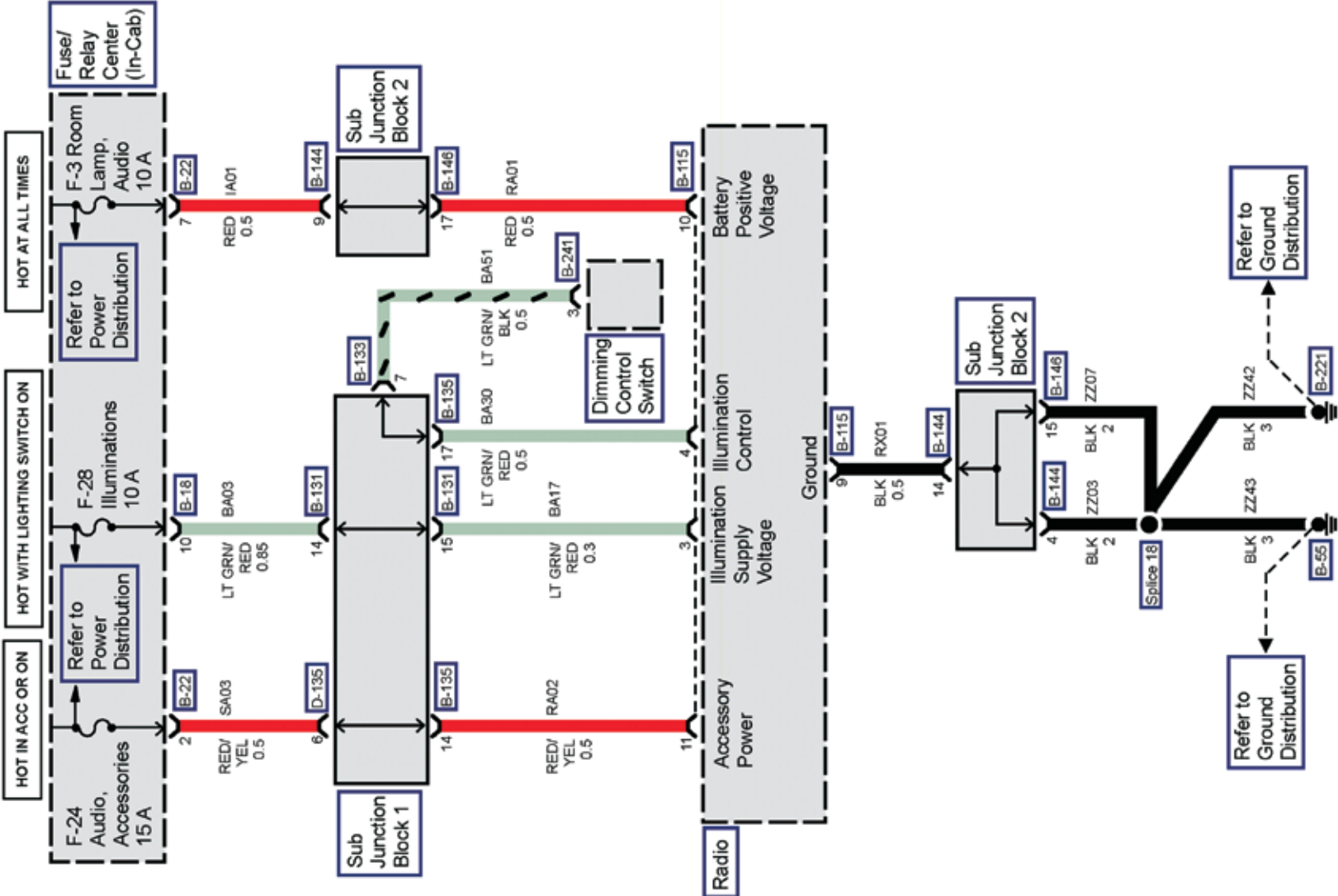


**NPR/W3500, NPR HD/W4500, NQR/W5500, NRR/W5500-HD Diesel – Electrical –  
Cigar Lighter Circuit**

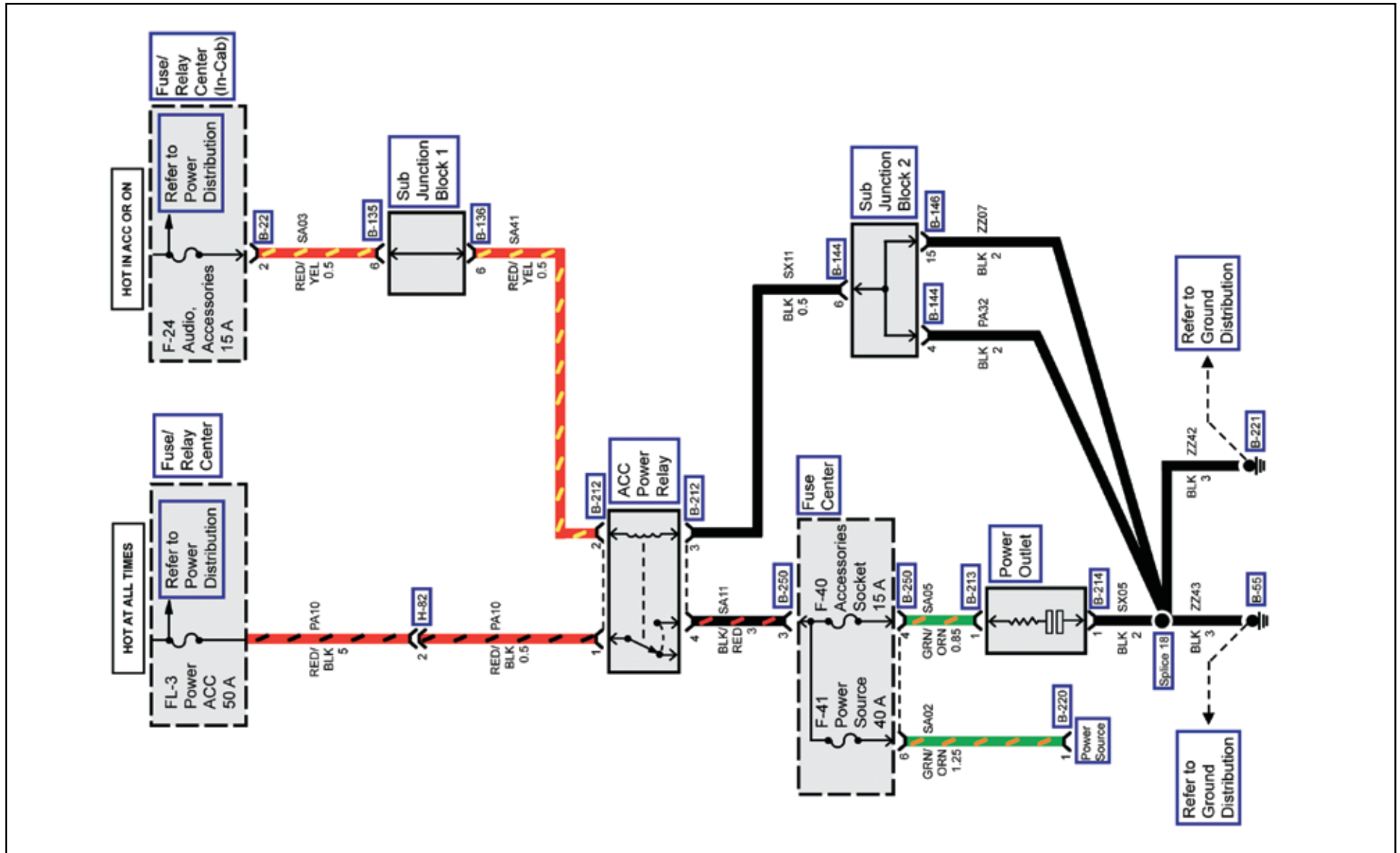




## Radio Circuits

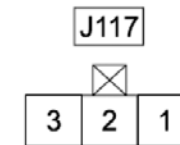
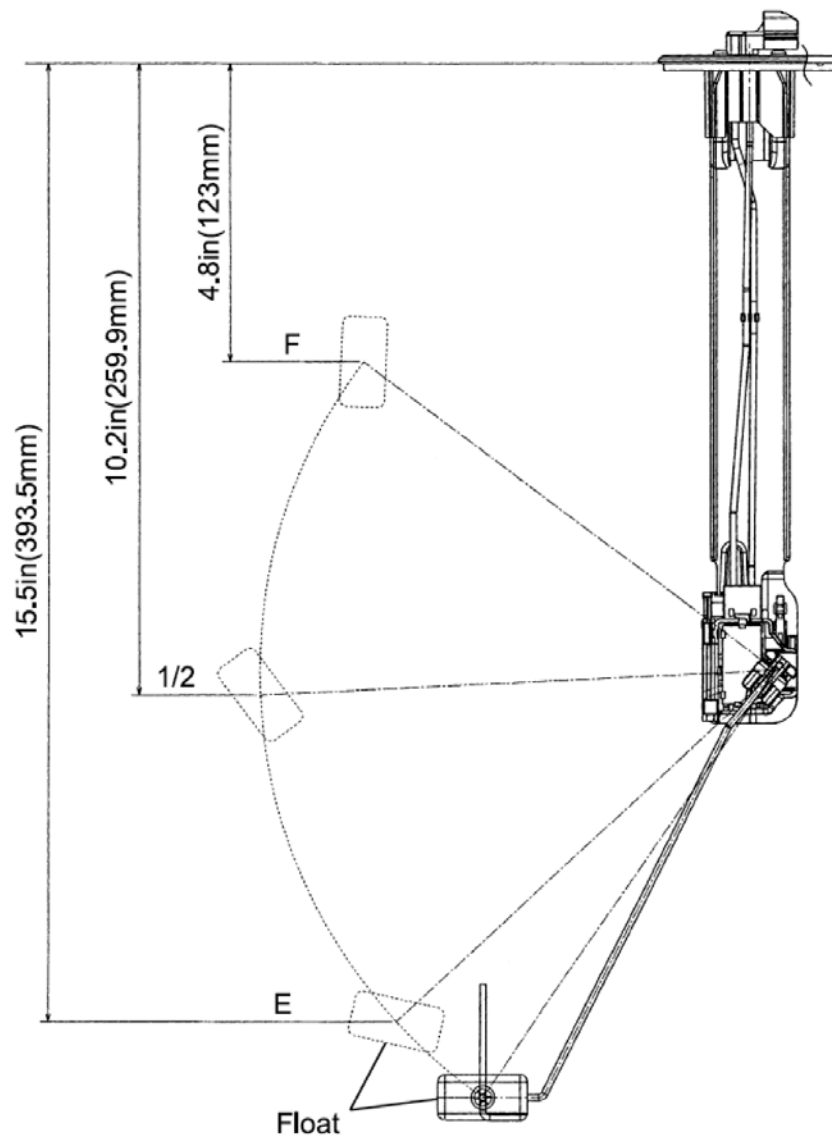


## NPR/W3500, NPR HD/W4500, NQR/W5500, NRR/W5500-HD Diesel – Electrical – Auxiliary Power Source Circuit Diagram



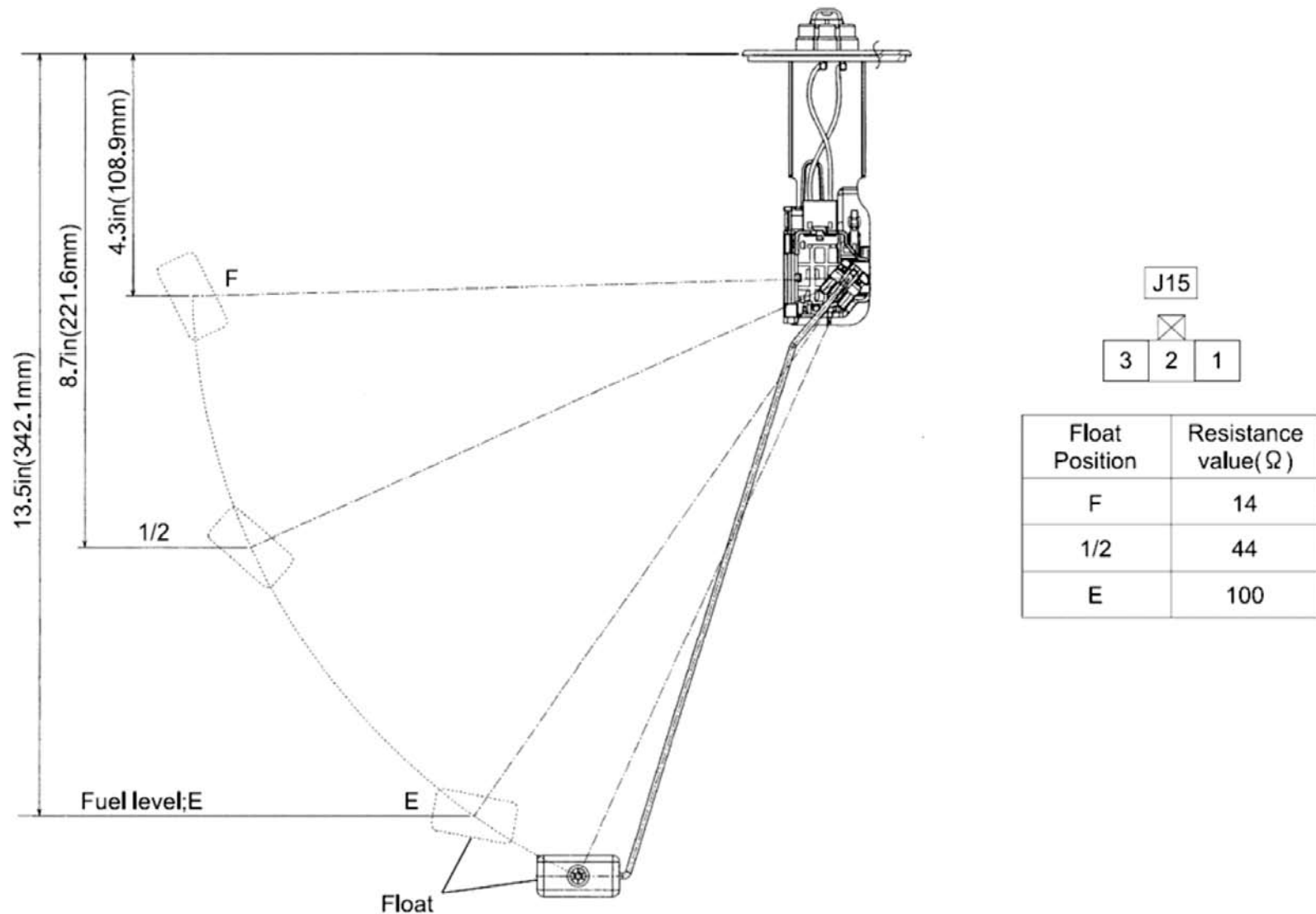


## NPR/W3500, NPR HD/W4500, NQR/W5500, NRR/W5500-HD Diesel – Electrical – Fuel Tank Sending Unit Resistance (In-Frame Tank)



Float Position	Resistance value( $\Omega$ )
F	14
1/2	44
E	100

## NPR/W3500, NPR HD/W4500, NQR/W5500, NRR/W5500-HD Diesel – Electrical – Fuel Tank Sending Unit Resistance (Side-Mounted Tank)



## Power Take-Off (PTO) Section for the 4HK1-TC Engine

### **System Operating Instructions**

### **PTO – Power Take Off Option – Electrical Requirements**

#### **SECTION OUTLINE**

- Overview
- Vocation/Modes
- Factory Installed Equipment
- Upfitter Installed Equipment
- ECM Programmable PTO Functions
- Operation \*

Stationary Preset Mode

Stationary Variable Mode

Mobile Variable Mode

PTO Engine Shutdown

#### **Remote Operation**

- Appendix

#### **Illustrations:**

Location of PTO Switch and Indicator .....	ILL	#1
Location of Cruise Control Switches .....	ILL	#2
PTO Switch Connector and Harness .....	ILL	#3
PTO Switch Harness .....	ILL	#4
PTO Harness Connector H104 (8 pin) .....	ILL	#5
PTO Harness Connector H105 (10 pin) .....	ILL	#6
Power Take-Off Switch and Vehicle Speed Sensor 2 .....	ILL	#7
Resume, PTO Disable and Set Switch .....	ILL	#8
Brake clutch override, IP disable, Set A and B Switches .....	ILL	#9
Power Take-Off Enable Relay .....	ILL	#10
Power Take-Off Throttle Sensor .....	ILL	#11

## **Power Take-Off (PTO) – 4HK1-TC Engine – Overview**

A Power Take Off (PTO) is a gearbox or mechanical device used to transmit mechanical power from the power train, through gears or a transmission, to another mechanical or hydraulic device. Examples of PTO applications are: salt spreaders; refuse equipment, plows, pumps, drills, lifts, wrecker equipment, dump bodies, fire/rescue equipment.

### **PTO Advantages**

- PTO's are inexpensive, convenient, safe and reliable.
- PTO's bolt on to the transmission, engine, transfer case or can be incorporated into the accessory belt drive system.
- PTO's eliminate the need for a complex array of levers, controllers, electric motors, which would be required to duplicate the operation of a PTO.

### **Scope**

The Upfitter or Specialty Vehicle Assembler installs the PTO unit itself on the vehicle. The (PTO) option described here is the necessary electrical and electronic content to control the PTO unit. Responsibility for proper and safe operation remains with the Upfitter.

### **(PTO) Option**

The (PTO) option allows for increased engine speed for increased power to the PTO unit.

## **Power Take-Off – 4HK1-TC Engine – Vocation/Modes**

The primary difference in PTO operation is whether the vehicle is stationary or moving. Stationary operation can have either preset or variable PTO speeds.

Some examples of modes and vocations are:

- Stationary Preset – Two preset high idle speeds – Refuse & Wrecker equipment, Fire truck pumpers
- Stationary Variable – Variable high idle speeds – Drills, Lifts
- Mobile Variable – Allows variable PTO speeds while the vehicle is moving – Salt Spreaders, Plows, Street Cleaners

Note: The ECM (ENGINE CONTROL MODULE) can be programmed to only one of these modes at any given time.

## **Power Take-Off (PTO) – 4HK1-TC Engine – Factory-Installed Equipment**

The factory PTO option includes the PTO Enable Switch, PTO Engine Speed Control switch, Cruise Control Switches, and upfitter connectors to allow optional upfitter installed switches, and wiring.

### **Upfitter-Installed Equipment**

Optional upfitter capabilities include: remote PTO enable switch, remote PTO UP switch, remote PTO DOWN switch, PTO cab cruise switch disable, and PTO engine shutdown switch. All of these controls interface through the upfitter connectors.

### **ECM-Programmable Functions**

Optional upfitter capabilities that can be activated by reprogramming the ECM at your authorized dealer. An Option Content Configuration Tool to program PTO options and a vehicle speed limit in the ECM can be purchased through the web site [www.isuzutruckservice.com](http://www.isuzutruckservice.com). The tool is located through the body builders link from the web sites home page.

## **Operation**

### **Description**

The PTO controls allow the user to raise the engine speed through the use of designated switches and ECM programming. The ECM can be programmed to one of the following three PTO modes:

- Stationary Preset mode – Two preset high idle speeds. Vehicle must be stationary. (Factory standard mode)
- Stationary Variable mode – Variable high idle speeds. Vehicle must be stationary.
- Mobile Variable mode – Allows variable PTO speeds while vehicle is moving.

These PTO modes are addressed separately and in detail in the following pages.

Please note the ECM can be programmed to only one of the three modes at any one time.

### **PTO Switches**

Vehicles ordered with the PTO switch option (IL9, IL10) come with instrument panel mounted switches, which allows the user to enable the PTO function and control the engine speed. These PTO switches are located on the left of the dash as shown in the illustration 1. An indicator in the PTO enabled switch

illuminates to show PTO mode is active. The engine speed can then be changed with either the PTO Engine Speed Control switch or upfitter installed remote PTO switches. Cruise Control Switches come standard with the 2008 GM/Isuzu W and N series chassis as shown in illustration 2. The following chart illustrates switch operation.

## Power Take-Off – 4HK1-TC Engine – PTO Switch Operation

PTO Switch Description			
Switch	Stationary Preset	Stationary Variable	Mobile Variable
PTO Enable (Factory Option)	Enables PTO Mode	Enables PTO Mode	Enables PTO Mode
Remote PTO Enable	Enables PTO Mode	Enables PTO Mode	Enables PTO Mode
PTO EngineSpeedControl(FactoryOption)	Allows 2nd/1st Preset Speed	Increases/Decreases engine speed variably or incrementally	Increases/Decreases engine speed variably or incrementally
Cruise Res/Set (Factory) (Same ECM input as PTO Up/Down)	Allows 2nd/1st Preset Speed	Increases/Decreases engine speed variably or incrementally	Increases/Decreases engine speed variably or incrementally
Remote PTO Down (Same ECM input as PTO Up/Down)	Allows 1st Preset Speed	Decreases engine speed variably or incrementally	Decreases engine speed variably or incrementally
Remote PTO Up (Same ECM input as PTO Up/Down)	Allows 2nd Preset Speed	Increases engine speed variably or incrementally	Increases engine speed variably or incrementally
PTO Cab Control Switches Disable	The PTO Up/Down switch inputs are ignored when this switch is ON.	The PTO Up/Down switch inputs are ignored when this switch is ON.	The PTO Up/Down switch inputs are ignored when this switch is ON.
Accelerator Pedal(Factory)	Increases engine speed variably	Increases engine speed variably	Increases engine speed variably
** Remote PTO Throttle	Increases or decreases engine speed variably or incrementally	Increases or decreases engine speed variably or incrementally	Increases or decreases engine speed variably or incrementally
** Remote PTO Down	Decreases engine speed variably or incrementally	Decreases engine speed variably or incrementally	Decreases engine speed variably or incrementally
** Remote PTO Up	Increases engine speed variably	Increases engine speed variably	Increases engine speed variably
** Remote PTO Set Speed A	Allows for 1st Preset Speed	Not Applicable	Not Applicable
** Remote PTO Set Speed B	Allows for 2nd Preset Speed	Not Applicable	Not Applicable
** PTO Engine Shutdown	Allows for engine shutdown in PTO Mode	Allows for engine shutdown in PTO Mode	Allows for engine shutdown in PTO Mode
** PTO Load Engaged	Inhibits PTO mode until PTO relay and this switch is turned on.	Inhibits PTO mode until PTO relay and this switch is turned on.	Inhibits PTO mode until PTO relay and this switch is turned on.
** PTO Ignore Brake/Clutch	PTO Mode stays active with a brake or clutch switch input.	PTO Mode stays active with a brake or clutch switch input.	PTO Mode stays active with a brake or clutch switch input.

\*\* Denotes the need for ECM reprogramming

## **Power Take-Off – 4HK1-TC Engine – Stationary Preset Mode**

### ***Description***

The Stationary Preset Mode allows the user to select from two high idle speeds that are programmed in the ECM. The user can toggle between 2 preset speeds using the PTO Engine Speed Control switch, Cruise Control switch, Cruise Resume/Set switch, or the Remote PTO Switches.

### ***How To Operate***

Prior to enabling the Stationary Preset PTO Mode, the following conditions must be met:

1. Engine must be running.
2. Transmission must be in Park or Neutral.
3. Vehicle speed must be less than 5 mph.
4. Brake or Clutch must not be depressed.

When the above conditions are met, the operator can activate the Stationary Preset PTO mode by the following sequence:

1. Set the Park Brake.
2. Set PTO Enable Switch to On position.

Upon Completion of the above steps, the PTO Stationary Preset Mode will be enabled and the engine speed will increase to the PTO Standby speed. Toggling the PTO Engine Speed Control Switch or Cruise Resume/Set switch will cause the engine RPM to change from PTO standby speed to either the PTO Preset #1 or PTO Preset #2 speed depending on which switch is pressed first.

Any changes in the above conditions, including depressing the brake or clutch pedals or shifting an automatic transmission in gear, will disable the Stationary Preset Mode causing the engine to return to normal base idle speed.

#### **Note:**

4HK1-TC engine will be governed to PTO Max engine speed with throttle activation. Engine speed will return to pre-activation value after the pedal is released.

## **Power Take-Off – 4HK1-TC Engine – Stationary Preset Mode (cont'd)**

The factory preset and minimum and maximum programmable speeds are shown in the table below for the 4HK1-TC engine:

PRESET STATIONARY MODE (Default)			
MAIN FUNCTIONS			
Parameter	Units	Default setting	Allowable Range
PTO MAX ENGINE SPEED	RPM	3050	750-3050
PTO STANDBY SPEED	RPM	800	750-1300
PTO SET SPEED	RPM	1300	750-3050
PTO RESUME SPEED	RPM	1700	750-3050
ADDITIONAL FUNCTIONS			
Parameter	Units	Default setting	Allowable Range
PTO ENGAGE RELAY	YES/NO	NO	
PTO MAX ENGAGE SPEED	RPM	1050	750-1500
PTO FEEDBACK	YES/NO	NO	
PTO ENGINE SHUTDOWN	YES/NO	NO	
PTO SHUTDOWN TIME DELAY	SECONDS	0	0-255
PTO BRAKE/CLUTCH OVERRIDE	YES/NO	NO	
PTO REMOTE THROTTLE	YES/NO	NO	
PTO REMOTE THROTTLE MAX ENGINE SPEED	RPM	2100	0-2300
PTO REMOTE THROTTLE 0%	VOLTS	0.85	0.25-4.75
PTO REMOTE THROTTLE 100%	VOLTS	3.75	0.25-4.75

Note: The values shown in the above chart are accurate at the time of publication, but may change in time for various reasons including running changes made to the ECM, ECM software calibrations, or Isuzu Diagnostic Service System (IDSS) software.

### ***Adjusting the Factory Preset Engine Speed***

The above parameters can be reprogrammed with a Isuzu Diagnostic Service System (IDSS) Diagnostic tool or the service programming system.



## **Power Take-Off – 4HK1-TC Engine – Stationary Variable Mode**

### **Description**

The Stationary Variable Mode allows the user to retain the engine speed at a desired value through the use of the accelerator pedal and PTO Engine Speed Control switch or Cruise Resume/Set switch. The engine speed must be greater than the PTO standby speed and lower than the maximum engine speed.

### **How To Operate**

Prior to enabling the Stationary Variable PTO Mode, the following conditions must be met:

1. Engine must be running
2. Transmission must be in Park or Neutral
3. Vehicle speed must be less than 5 mph
4. Brake or Clutch must not be depressed.

When the above conditions are met, the operator can activate the Stationary Variable PTO Mode by the following sequence:

1. Set the Park Brake.
2. Set PTO Enable Switch to On position.
3. Depress the Accelerator pedal to obtain the desired high idle speed.
4. Press the PTO Engine Speed Control switch or Cruise Resume/Set switch to Set position to hold engine at the desired high idle speed.

The PTO Engine Speed Control switch or the Cruise Resume/Set switch can then be used to adjust the engine speed within the Maximum and Minimum RPM values shown in the following table. The adjustment increments are 25 RPM. This function will also work with the remote switches.

Any changes in the above conditions, including depressing the brake or clutch pedals or shifting an automatic transmission in gear, will disable the Stationary Variable Mode causing the engine to return to normal base idle.

## Power Take-Off – 4HK1-TC Engine – Stationary Variable Mode (cont'd)

STATIONARY VARIABLE MODE			
MAIN FUNCTIONS			
Parameter	Units	Default setting	Allowable Range
PTO MAX ENGINE SPEED	RPM	3050	750-3050
PTO STANDBY SPEED	RPM	800	750-1300
ADDITIONAL FUNCTIONS			
Parameter	Units	Default setting	Allowable Range
PTO ENGAGE RELAY	YES/NO	NO	———
PTO MAX ENGAGE SPEED	RPM	1050	750-1500
PTO FEEDBACK	YES/NO	NO	———
PTO ENGINE SHUTDOWN	YES/NO	NO	———
PTO SHUTDOWN TIME DELAY	SECONDS	0	0-255
PTO BRAKE/CLUTCH OVERRIDE	YES/NO	NO	———
PTO TAP DOWN RATE	RPM	25	25-500
PTO TAP UP RATE	RPM	25	25-500
PTO ACCEL RATE	RPM/128ms	20	25-500
PTO REMOTE SET/RESUME SWITCH	YES/NO	NO	———
PTO REMOTE THROTTLE	YES/NO	NO	———
PTO REMOTE THROTTLE MAX ENGINE SPEED	RPM	2100	0-2300
PTO REMOTE THROTTLE 0%	VOLTS	0.85	0.25-4.75
PTO REMOTE THROTTLE 100%	VOLTS	3.75	0.25-4.75

Note: The values shown in the above chart are accurate at the time of publication, but may change in time for various reasons including running changes made to the ECM, ECM software calibrations, or Isuzu Diagnostic Service System (IDSS) software.

### ***Adjusting the Factory Preset Engine Speed***

The above parameters can be reprogrammed with a Isuzu Diagnostic Service System (IDSS) Diagnostic tool or the service programming system.

## **Power Take-Off – 4HK1-TC Engine – Mobile Variable Mode**

### ***Description***

The PTO Mobile Variable Mode allows the driver to maintain a desired engine speed (not vehicle speed) while the vehicle is moving. This feature is available with both manual and automatic transmissions. The engine speed must be greater than the PTO Standby Speed and lower than the PTO Maximum Engine Speed. The Vehicle speed must be less than the Maximum Vehicle Speed Value.

### ***How To Operate***

To engage the PTO Mobile Variable Mode, the following conditions must be met in the following order:

1. Engine must be running
2. Transmission must be in gear.
3. Vehicle speed must be less than the Maximum Vehicle Speed
4. Brake or Clutch must not be depressed.
5. PTO Enable Switch must be set to the On position

When the above conditions are met, the operator can activate the Mobile Variable mode by the following sequence:

7. Depress the Accelerator Pedal to obtain the desired engine speed.
8. Press the PTO Engine Speed Control switch (-) side or set the Cruise Resume/Set switch to Set position to hold engine at the desired high idle speed.

The PTO Engine Speed Control switch or the Cruise Resume/Set switch can then be used to adjust the engine speed within the Maximum and Minimum RPM values shown in the Engine calibration table. The adjustment increments are 25 RPM

## ***Power Take-Off – 4HK1-TC Engine – Mobile Variable Mode (cont'd)***

STATIONARY VARIABLE MODE			
MAIN FUNCTIONS			
Parameter	Units	Default setting	Allowable Range
PTO MAX ENGINE SPEED	RPM	3050	750-3050
PTO STANDBY SPEED	RPM	800	750-1300
ADDITIONAL FUNCTIONS			
Parameter	Units	Default setting	Allowable Range
PTO ENGAGE RELAY	YES/NO	NO	———
PTO MAX ENGAGE SPEED	RPM	1050	750-1500
PTO FEEDBACK	YES/NO	NO	———
PTO ENGINE SHUTDOWN	YES/NO	NO	———
PTO SHUTDOWN TIME DELAY	SECONDS	0	0-255
PTO BRAKE/CLUTCH OVERRIDE	YES/NO	NO	———
PTO TAP DOWN RATE	RPM	25	25-500
PTO TAP UP RATE	RPM	25	25-500
PTO ACCEL RATE	RPM/128ms	20	25-500
PTO REMOTE SET/RESUME SWITCH	YES/NO	NO	———
PTO REMOTE THROTTLE	YES/NO	NO	———
PTO REMOTE THROTTLE MAX ENGINE SPEED	RPM	2100	0-2300
PTO REMOTE THROTTLE 0%	VOLTS	0.85	0.25-4.75
PTO REMOTE THROTTLE 100%	VOLTS	3.75	0.25-4.75

Note: The values shown in the above chart are accurate at the time of publication, but may change in time for various reasons including running changes made to the ECM, ECM software calibrations, or Isuzu Diagnostic Service System (IDSS) software.

### ***Adjusting the Factory Preset Engine Speed***

The above parameters can be reprogrammed with a Isuzu Diagnostic Service System (IDSS) Diagnostic tool or the service programming system.

## **Power Take-Off – 4HK1-TC Engine – PTO Engine Shutdown**

### ***Description***

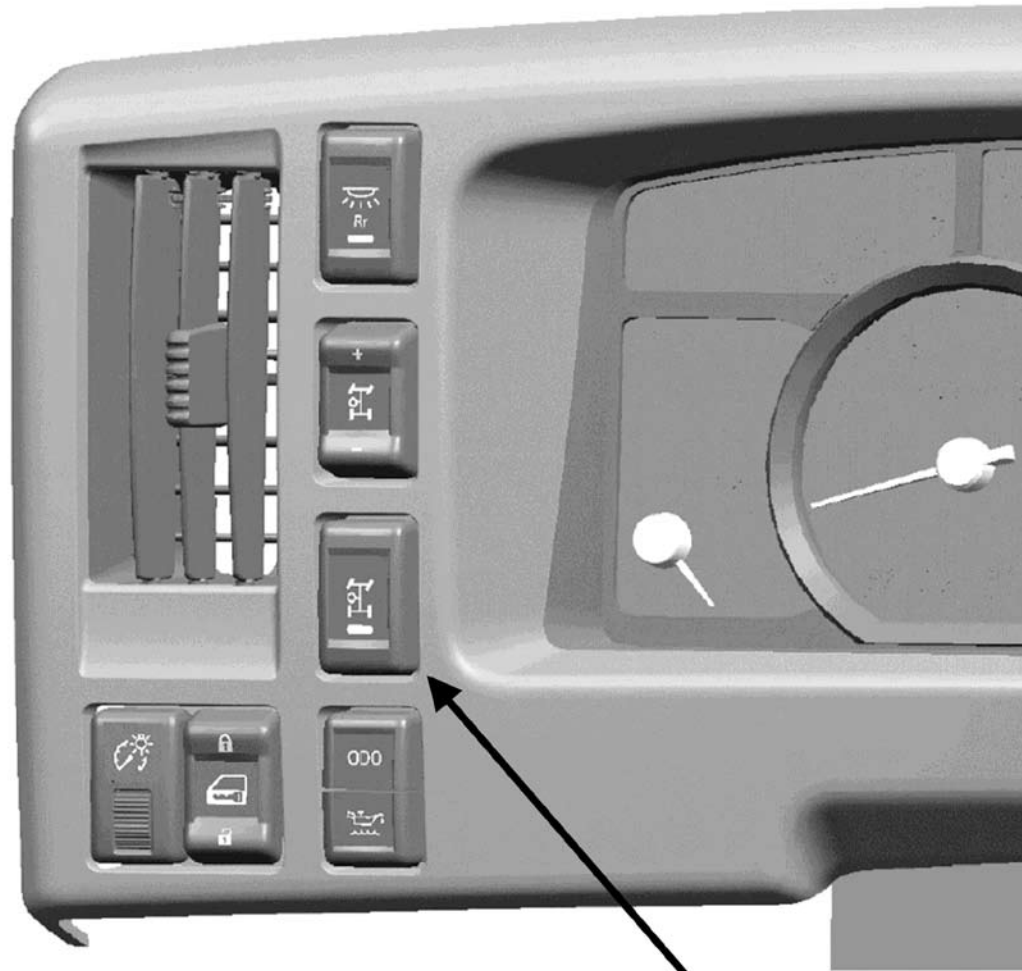
The PTO option includes provisions for PTO engine shutdown. This feature allows the operator to stop the engine while in PTO mode with an aftermarket installed switch. If the truck is not in PTO mode, pressing the switch will have no effect on engine operation. The PTO Upfitter Connector (located on the left hand frame rail) has been provided for installation of remote PTO controls. The upfitter can access the PTO engine fault shutdown circuits through this connector. The upfitter must provide the mating connector, wiring, and remote switches. To install this feature see the upfitter provisions schematics. Important. If the PTO engine shutdown feature is to be used, it must be turned on in the ECM. If this feature is not turned on it will have no effect engine operation. The above parameters can be reprogrammed with a Isuzu Diagnostic Service System (IDSS) Diagnostic tool or the service programming system.

## **Remote Operation**

### ***Description***

The PTO Upfitter Connector (located on the left hand frame rail) has been provided for installation of remote PTO idle controls. The upfitter can access the PTO high idle circuits through this connector. The upfitter must provide the mating connector, wiring, and remote switches shown on the Upfitter (PTO) Connector. Two momentary switches are required to duplicate the operation of the PTO Engine Speed Control Switch or the Cruise Resume/Set switch in the cab. The schematics showing the switches can be found on the following diagrams. The PTO UP switch duplicates ☐ + ☐ side of PTO Engine Speed Control switch or the Cruise Resume operation. The PTO Down switch duplicates ☐ - ☐ side of the PTO Engine Speed Control switch or the Cruise Set operation. Please note that the PTO high idle must still be enabled from the PTO enable switch in the cab or the remote PTO enable switch.

## Power Take-Off – 4HK1-TC Engine – Location of PTO Switch and Indicator - Illustration #1



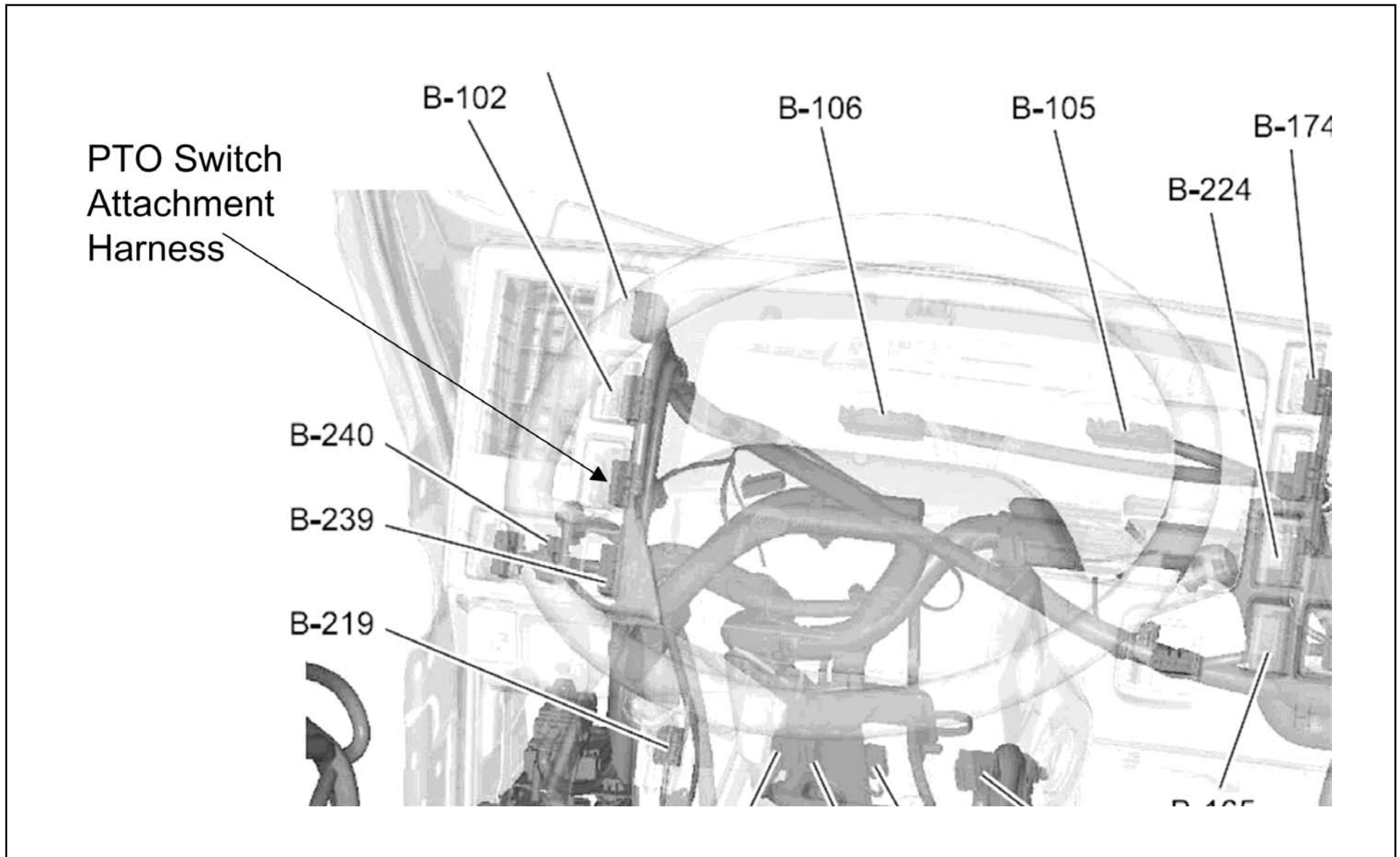
PTO Enable Switch

## Power Take-Off – 4HK1-TC Engine – Location of Cruise Control Switches - Illustration #2



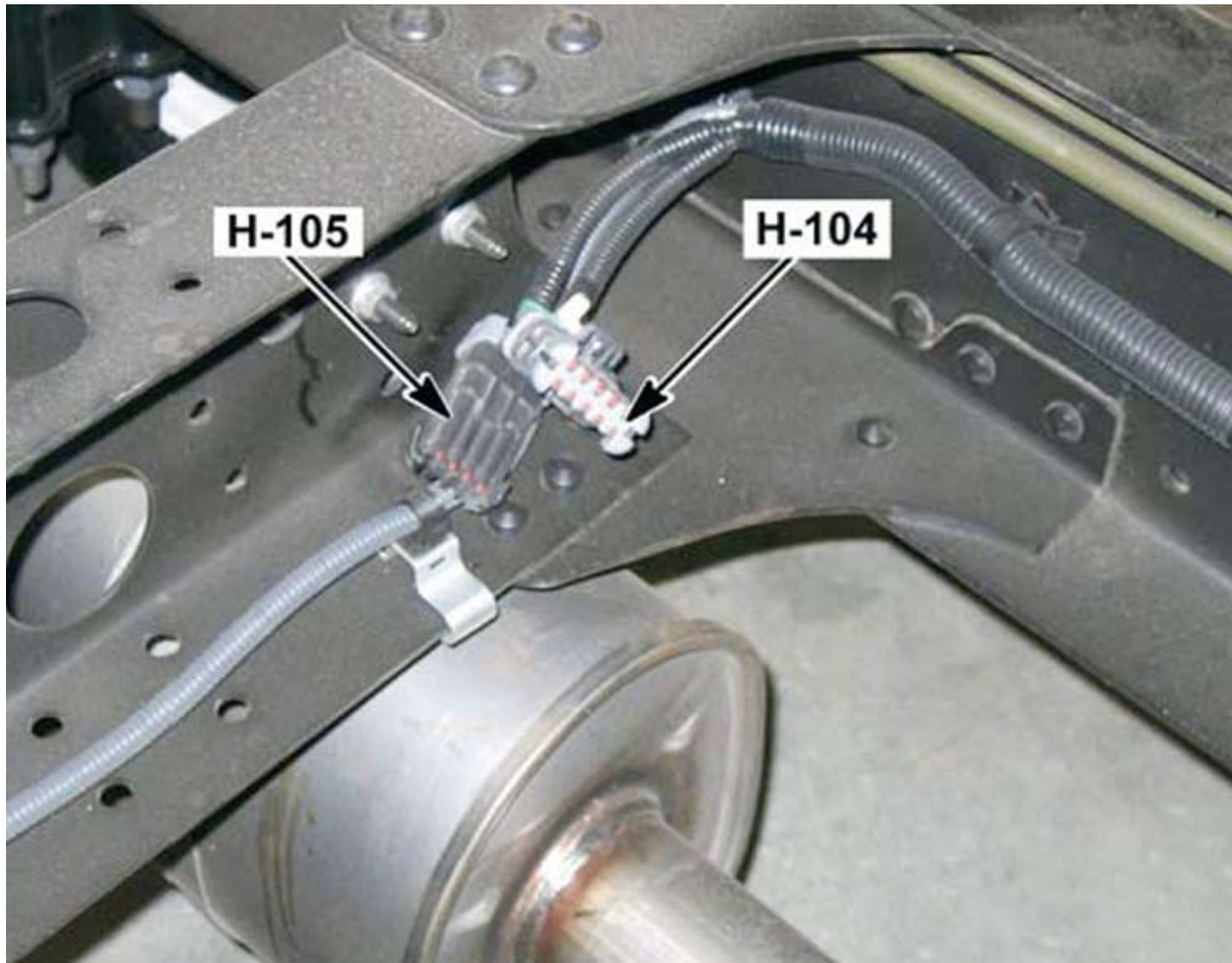
Set / Resume Cruise switch

## Power Take-Off – 4HK1-TC Engine – PTO Switch Connector and Harness - Illustration #3

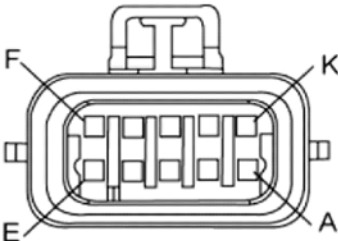
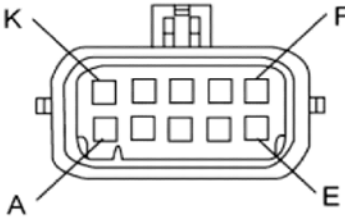




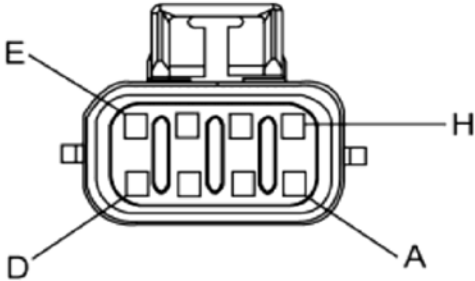
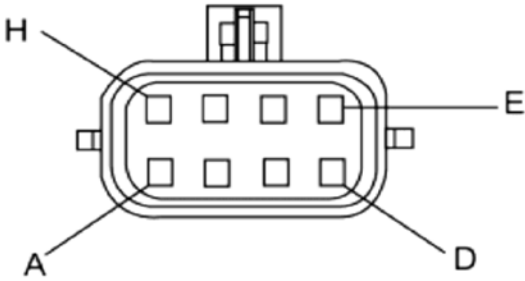
## Power Take-Off – 4HK1-TC Engine – PTO Switch Harness 1 & 2 - Illustration #4



## Power Take-Off – 4HK1-TC Engine – PTO Harness Connector H104 - Illustration #5

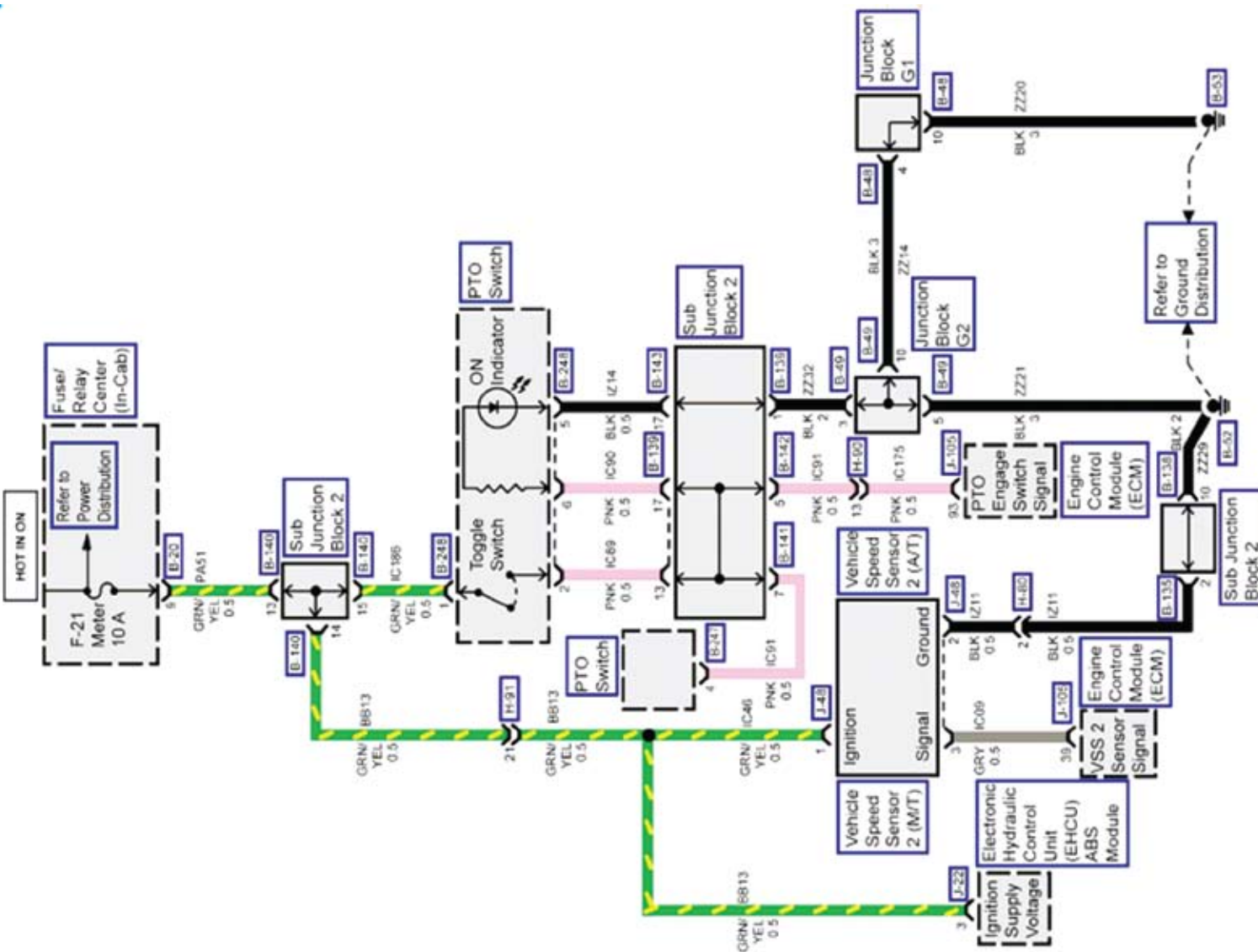
							
Connector Part Information		<ul style="list-style-type: none"> <li>12065425</li> <li>10-Way F (BLK)</li> </ul>		Connector Part Information		<ul style="list-style-type: none"> <li>12045808</li> <li>10-Way M (BLK)</li> </ul>	
Pin	Wire Color	Circuit No.	Function	Pin	Wire Color	Circuit No.	Function
A	RED/BLK	1C180	Fuse F-18 Supply Voltage				
B	RED/GRN	1C168	PTO Brake/Clutch Override Switch Signal				
C	RED/BLU	1C166	Remote PTO Set Speed B Switch Signal				
D	GRY/RED	1C165	Remote PTO Set Speed A Switch Signal				
E	BRN	1C167	PTO Cab Control Disable Switch Signal				
F	PNK/BLK	1C169	PTO Shut Down Switch Signal				
G	-	-	Not Used				
H	BLK	1Z07	Ground				
J	RED/GRN	1C171	Remote PTO Set Switch Signal				
K	RED/BLK	1C170	Remote PTO Resume Switch Signal				

## Power Take-Off – 4HK1-TC Engine – PTO Harness Connector H105 - Illustration #6

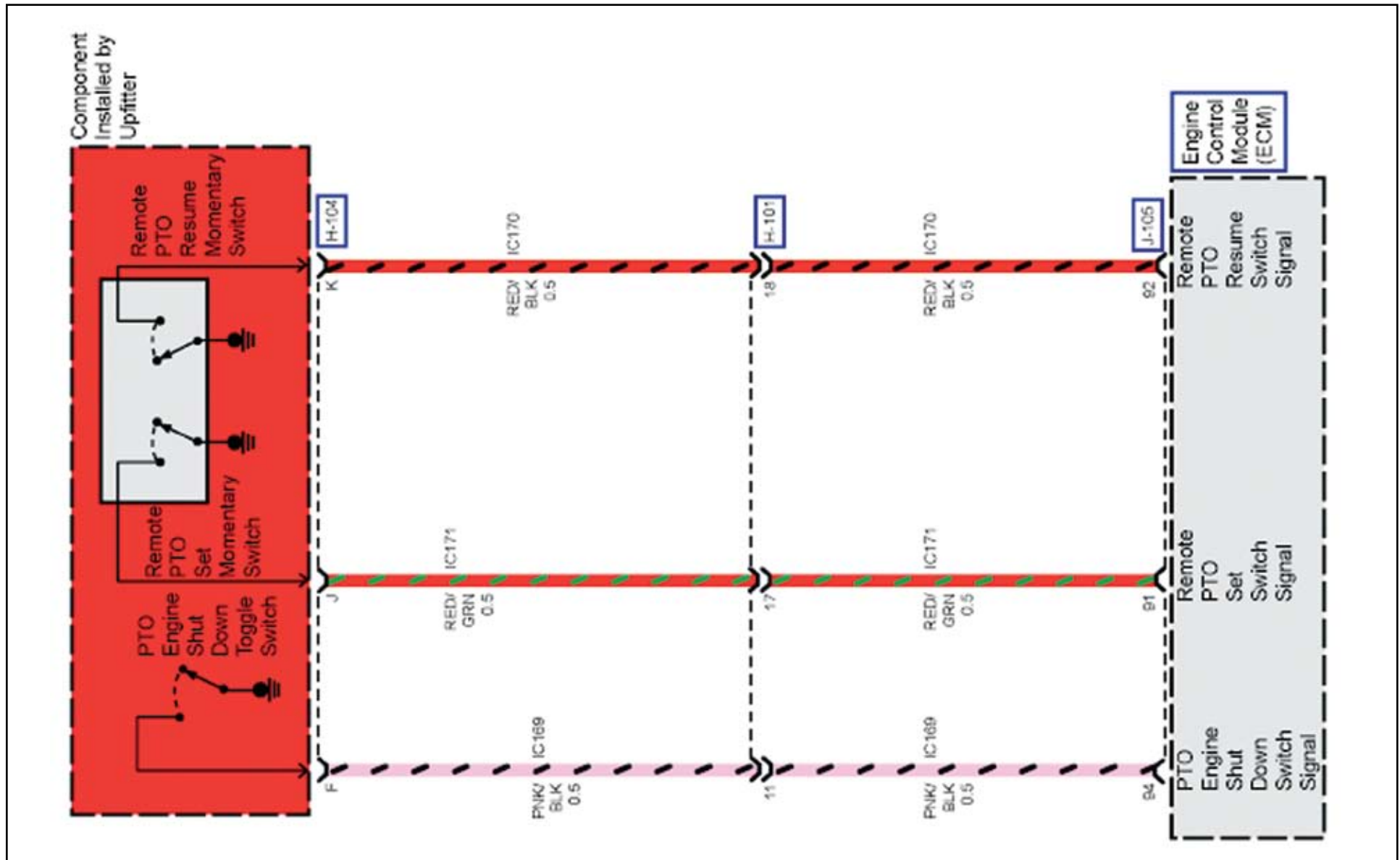
							
Connector Part Information		<ul style="list-style-type: none"> <li>12047937</li> <li>8-Way F (BLK)</li> </ul>		Connector Part Information		<ul style="list-style-type: none"> <li>1204931</li> <li>8-Way M (BLK)</li> </ul>	
Pin	Wire Color	Circuit No.	Function	Pin	Wire Color	Circuit No.	Function
A	BLK/WHT	1C172	PTO Enable Relay Signal				
B	PNK/GRN	1C173	PTO Enable Relay Control				
C	PNK	1C181	PTO Engage Switch Signal				
D	BLU/YEL	1C188	Remote PTO Set Switch				
E	BLU	1C37	PTO Throttle Sensor Reference Voltage				
F	YEL	1C38	PTO Throttle Sensor Signal				
G	BLU/RED	1C39	PTO Throttle Sensor Low Reference				
H	BLU/ORN	1C187	Remote PTO Resume Switch				

### **Power Take Off – 4HK1-TC Engine –**

### **Power Take-Off Switch and Vehicle Speed Sensor2 - Illustration #7**

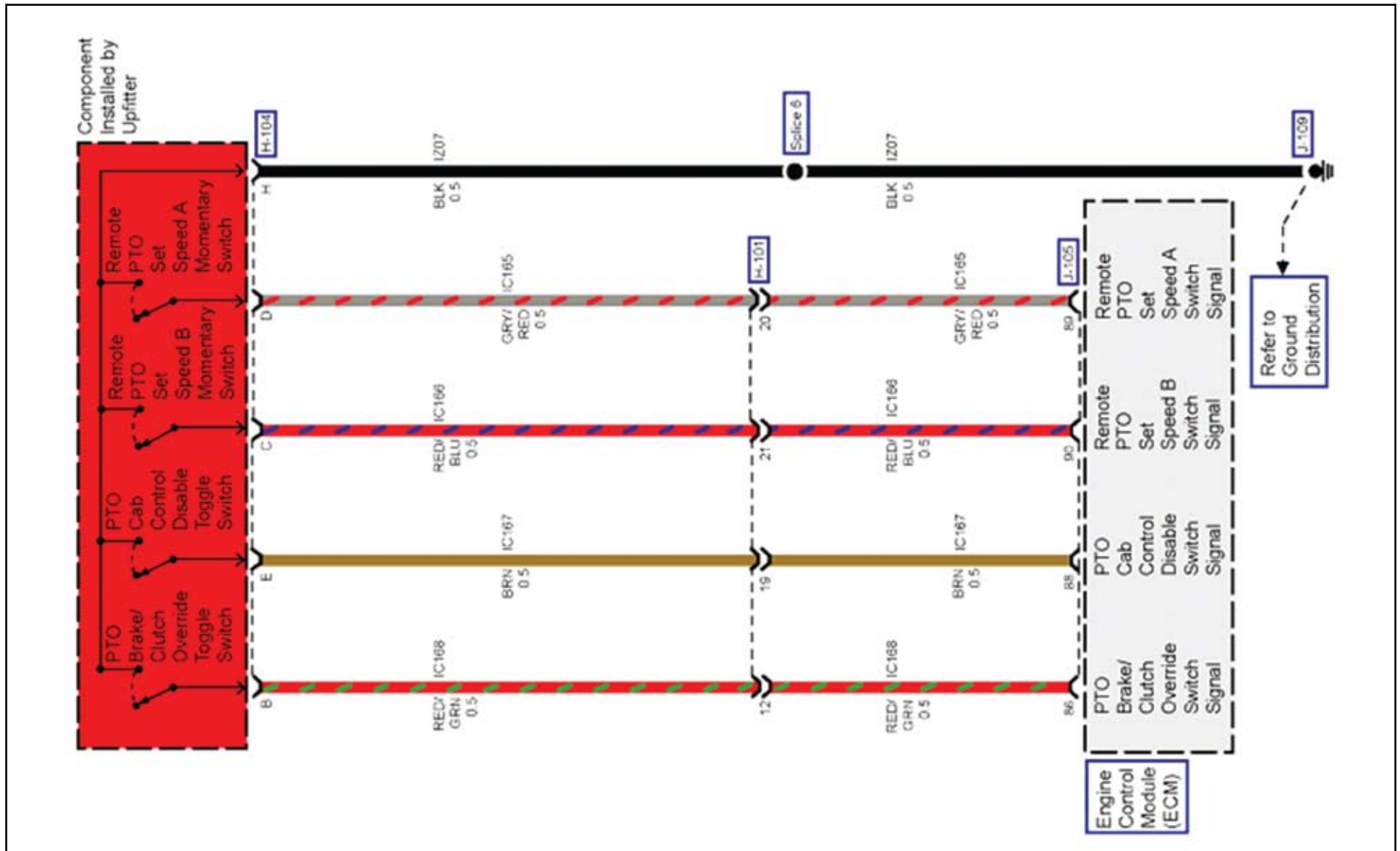


## Power Take Off – 4HK1-TC Engine – PTO Resume, Disable and Set Switch - Illustration #8

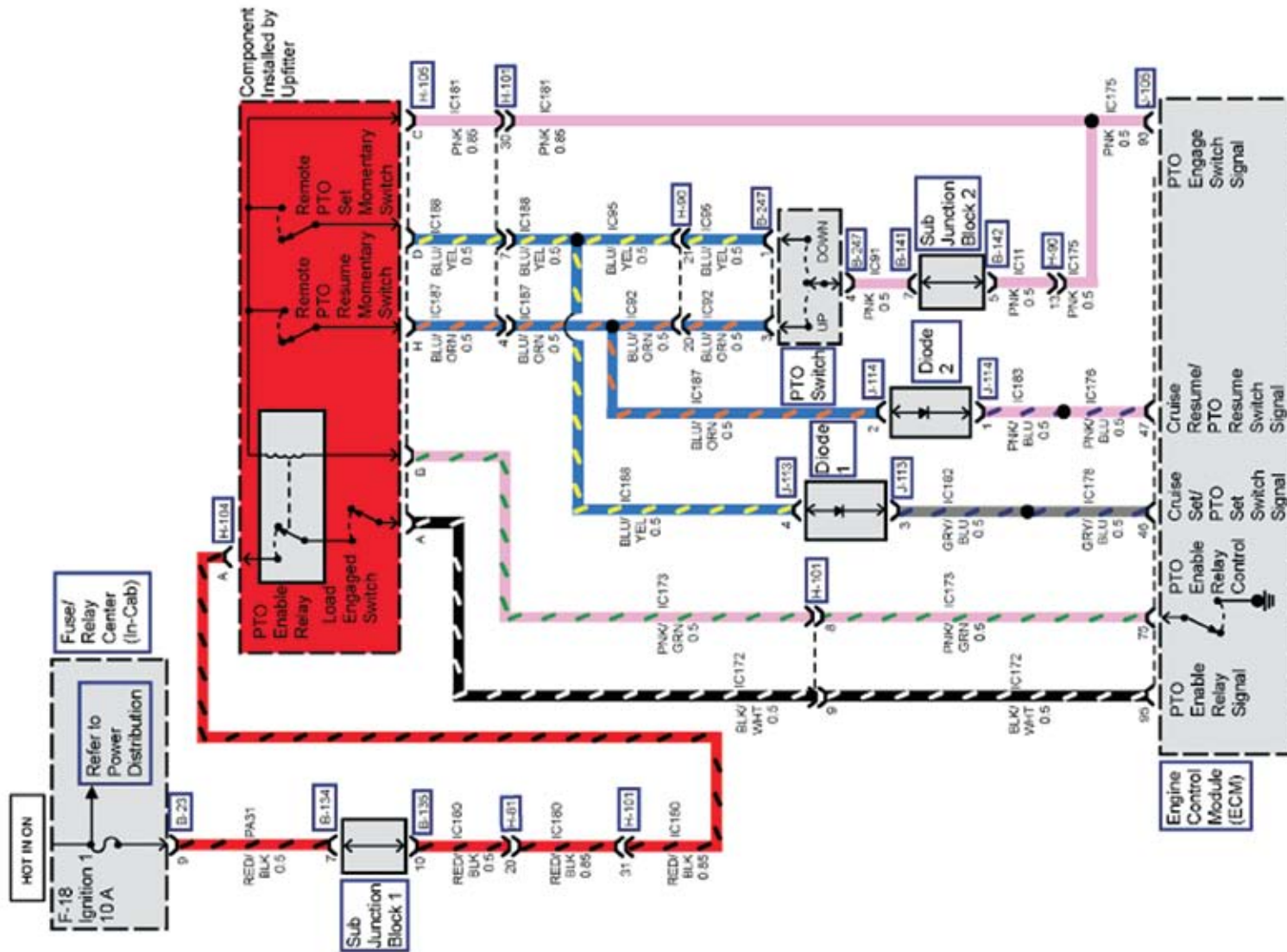




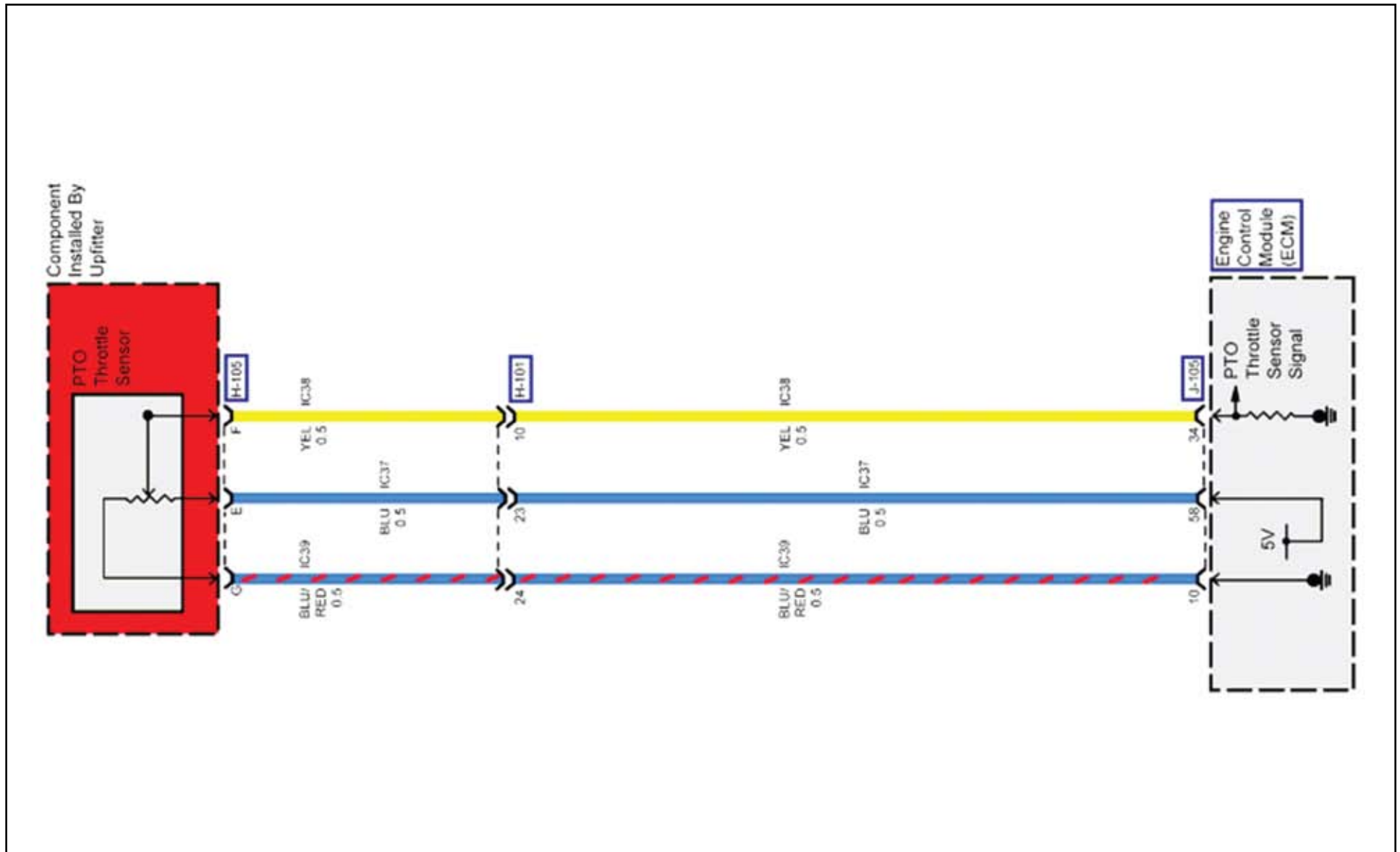
## Power Take Off – 4HK1-TC Engine – Brake Clutch Override, I/P Disable, Set A and B Switches - Illustration #9



**Power Take Off – 4HK1-TC Engine –**  
**Power Take-Off Enable Relay - Illustration #10**



## Power Take Off – 4HK1-TC Engine – Power Take-Off Throttle Sensor - Illustration #11





## **Power Take Off – 4HK1-TC Engine – Low-Speed Applications for N & W Series Chassis**

Any low speed vehicle applications using the Aisin Transmission such as sweeper, highway striping and road side mowing airport service must adhere to the following guidelines in order to prevent the over heating of the automatic transmission fluid.

### ***Factory Recommendation:***

Select Range 1 for low speed operations under 11 mph, (18km/h).

Select Range 2 for low speed operation under 22 mph, (36km/h).

### **Auxiliary Transmission Cooler Warning**

Installation of Auxiliary automatic transmission fluid cooler will void warranty on transmission/engine.

### **Transmission Temperature Warning Lamp**

Automatic transmission fluid temperature warning lamp illuminates over 140 Centigrade/284°Fahrenheit.

## **Understanding DPF (Diesel Particulate Filter) Regeneration**

### **2007 Bulletins**

**Information IB07-L-002A Understanding DPF (Diesel Particulate Filter) Regeneration; Modes of Regeneration Quick Reference Guide**

Issue Date: December 2007

### **Affected Vehicle:**

- 2007 and newer Isuzu N-Series
- 2007 and newer GMC and Chevrolet W-Series
- 2007 and newer Isuzu F-Series
- 2007 and newer GMC and Chevrolet T-Series
- 2007 and newer GMC and Chevrolet C-Series






Equipped with DPF (Diesel Particulate Filter)

## Power Take Off – 4HK1-TC Engine – Understanding DPF (Diesel Particulate Filter) Regeneration (cont'd)




*This bulletin is being revised to further clarify DPF Regeneration Modes. Please disregard Information Bulletin IB07-L-002.*

### **Service Information:**

The quick reference information below is provided to assist dealer personnel in better understanding the DPF Emission System Operation. Additional information regarding DPF Regeneration can be found in the Owner's Manual, Service manual, the driver side sunvisor label or on the Emission System Operation video (available in vehicles delivered from Port after 09/01/20x07). For your convenience, this video may be downloaded from the following websites; [WWW.ISUZUTRUCKSERVICE.COM](http://WWW.ISUZUTRUCKSERVICE.COM), [WWW.ISUZUCV.COM](http://WWW.ISUZUCV.COM), [WWW.ISUZUCV.ORG](http://WWW.ISUZUCV.ORG) and [WWW.ISUZUDIESELENGINE.COM](http://WWW.ISUZUDIESELENGINE.COM)

	<b>Green DPF Lamp:</b> When illuminated this lamp indicates the DPF is actively regenerating. No action is required.
 or 	<b>Amber/Orange or Red DPF Lamp:</b> (One indicator with two possible colors)  When this lamp is <b>Amber/Orange</b> the DPF filter is dirty. Filter regeneration is necessary at this time. When driving continues without regeneration, this DPF lamp will change from Amber/Orange to <b>RED</b> . Continuing to drive the vehicle with the red lamp illuminated can cause filter damage.
	<b>Malfunction Indicator Lamp ( MIL):</b> This lamp indicates a possible concern with engine and/ or emissions performance.
	<b>Reduced Engine Power Lamp:</b> (F/T/C-Series Only) This lamp indicates when a noticeable change in vehicle performance may occur.

## Power Take Off – 4HK1-TC Engine – Understanding DPF (Diesel Particulate Filter) Regeneration (cont'd)

N/W-Series	F/T-Series	C-Series	
			DPF Switch

## N-Series and W-Series Regeneration Modes

Mode	Name Description	
<b>Automatic Regeneration</b>	<ul style="list-style-type: none"> <li>ECM monitors sensor inputs and determines DPF regeneration is necessary</li> <li>The ECM commands the green DPF lamp "ON"</li> <li>Vehicle should be driven normally</li> </ul> <p><i>Note: If idling at a stop or in "Park" during this regeneration mode, the engine RPM will increase and the exhaust brake will activate.</i></p> <ul style="list-style-type: none"> <li>This process occurs at 180 mile intervals or sooner</li> </ul>	
<b>Emergency Regeneration</b>	<ul style="list-style-type: none"> <li>Amber or red light comes "ON"</li> <li>Driver MUST choose one of the following options to perform this regeneration. If one of the following options is not completed, Limp Home Mode may be activated.</li> </ul>	
	Running Option 1	<ul style="list-style-type: none"> <li>Drive vehicle above 30mph</li> <li>ECM monitors sensor input and determines if regeneration is possible</li> <li>The ECM commands the green DPF lamp "ON"</li> <li>Vehicle should be driven normally</li> </ul> <p><i>Note: If idling at a stop or in "Park" during this regeneration mode, the engine RPM will increase and the exhaust brake will activate.</i></p>

## Power Take Off – 4HK1-TC Engine – Understanding DPF (Diesel Particulate Filter) Regeneration (cont'd)

Mode	Name Description	
Emergency Regeneration	Switched Option 2	<ul style="list-style-type: none"><li>• Set the parking brake, engine running and transmission in Park or Neutral Position</li><li>• Press DPF switch</li><li>• Green DPF lamp comes “ON”</li><li>• Engine RPM increases and exhaust brake activation for about 20 minutes</li><li>• If this is interrupted must press DPF switch to restart process</li></ul>
<i>Important: Once Emergency Switched or Selectable Regeneration Modes have been selected the Automatic and Emergency Running Modes are no longer available. Automatic and Emergency running modes will become available after Switched or Selectable DPF regeneration is completed.</i>		
Selectable Regeneration	<i>Note: For quickest possible regeneration, be sure the vehicle is at operating temperature before performing selectable regeneration.</i> <ul style="list-style-type: none"><li>• Engine running and in “Park” Position</li><li>• Parking brake is applied</li><li>• Press and hold the DPF switch until the amber DPF lamp turns “ON”</li><li>• If amber DPF lamp goes “Off”, regeneration is not necessary.</li><li>• If the amber DPF lamp stays on “ON”, it means that regeneration is possible</li><li>• Press the DPF switch again to start regeneration</li><li>• The green DPF lamp and then the amber DPF lamp will turn “ON” indicating that regeneration is taking place. This will take about 20 minutes.</li><li>• Engine RPM will increase and the exhaust brake will activate</li></ul>	
<i>Caution: The following actions will interrupt the stationary type regeneration. Failure to restart and complete the regeneration cycle will result in filter clogging.</i> <ul style="list-style-type: none"><li>• Applying the accelerator pedal.</li><li>• Shifting into gear (with Automatic Transmission)</li><li>• Pressing the clutch pedal (Manual Transmission)</li><li>• Engine speed increases.</li></ul>		
Limp Home Mode	This condition should only be diagnosed and repaired by an Isuzu trained technician. <ul style="list-style-type: none"><li>• MIL lamp is on, vehicle speed is reduced</li><li>• Technician diagnosis required</li><li>• IDSS induced regeneration (fast or slow) based on diagnosis</li><li>• Slow process takes 2 hours</li></ul>	

## Power Take Off – 4HK1-TC Engine – Understanding DPF (Diesel Particulate Filter) Regeneration – F/T/C Series Regeneration Modes

Mode	Name Description	
<b>Automatic Regeneration</b>	<ul style="list-style-type: none"> <li>ECM monitors sensor inputs and determines DPF regeneration is necessary</li> <li>The ECM commands the green DPF lamp "ON"</li> <li>Vehicle should be driven normally</li> </ul> <p><i>Important: If the parking brake is set or the "Park" position is selected, the automatic regeneration will be cancelled.</i></p> <ul style="list-style-type: none"> <li>This process occurs at 180 mile intervals or sooner</li> </ul>	
<b>Emergency Regeneration</b>	<ul style="list-style-type: none"> <li>Orange or red light comes "ON"</li> <li>Driver MUST choose one of the following options to perform this regeneration. If one of the following options is not completed, Limp Home Mode may be activated.</li> </ul>	
	Running Option 1	<ul style="list-style-type: none"> <li>Drive vehicle above 30mph</li> <li>ECM monitors sensor input and determines if regeneration is possible</li> <li>The ECM commands the green DPF lamp "ON"</li> <li>Vehicle should be driven normally</li> <li>When idling at a stop the exhaust brake may activate and the idle speed may increase.</li> </ul> <p><i>Important: If the parking brake is set or the "Park" position is selected, the automatic regeneration will be cancelled.</i></p>
	Switched Option 2	<ul style="list-style-type: none"> <li>Set the parking brake, engine running and transmission in Park or Neutral Position</li> <li>Press DPF switch</li> <li>Green DPF lamp comes "ON"</li> <li>Engine RPM increases and exhaust brake activation for about 20 minutes</li> <li>If this is interrupted must press DPF switch to restart process</li> </ul>
<p><i>Important: Once Emergency Switched or Selectable Regeneration Modes have been selected the Automatic and Emergency Running Modes are no longer available. Automatic and Emergency running modes will become available after Switched or Selectable DPF regeneration is completed.</i></p>		
<b>Selectable Regeneration</b>	<p><i>Note: For quickest possible regeneration be sure the vehicle is at operating temperature before performing selectable regeneration.</i></p> <ul style="list-style-type: none"> <li>Engine running and in "Park" Position</li> <li>Parking brake is applied</li> <li>Press and hold the DPF switch until the DPF switch jewel lamp comes "ON"</li> <li>If the jewel lamp goes "Off", regeneration is not necessary.</li> <li>If the jewel lamp blinks, it means that regeneration is possible</li> <li>Press the DPF switch again to start regeneration</li> <li>The orange DPF lamp, green DPF lamp and then the jewel lamp will turn "ON" indicating that regeneration is taking place. This will take about 20 minutes.</li> <li>Engine RPM will increase and the exhaust brake will activate</li> </ul>	

## **Power Take Off – 4HK1-TC Engine –** **Understanding DPF (Diesel Particulate Filter) Regeneration –** **F/T/C Series Regeneration Modes**

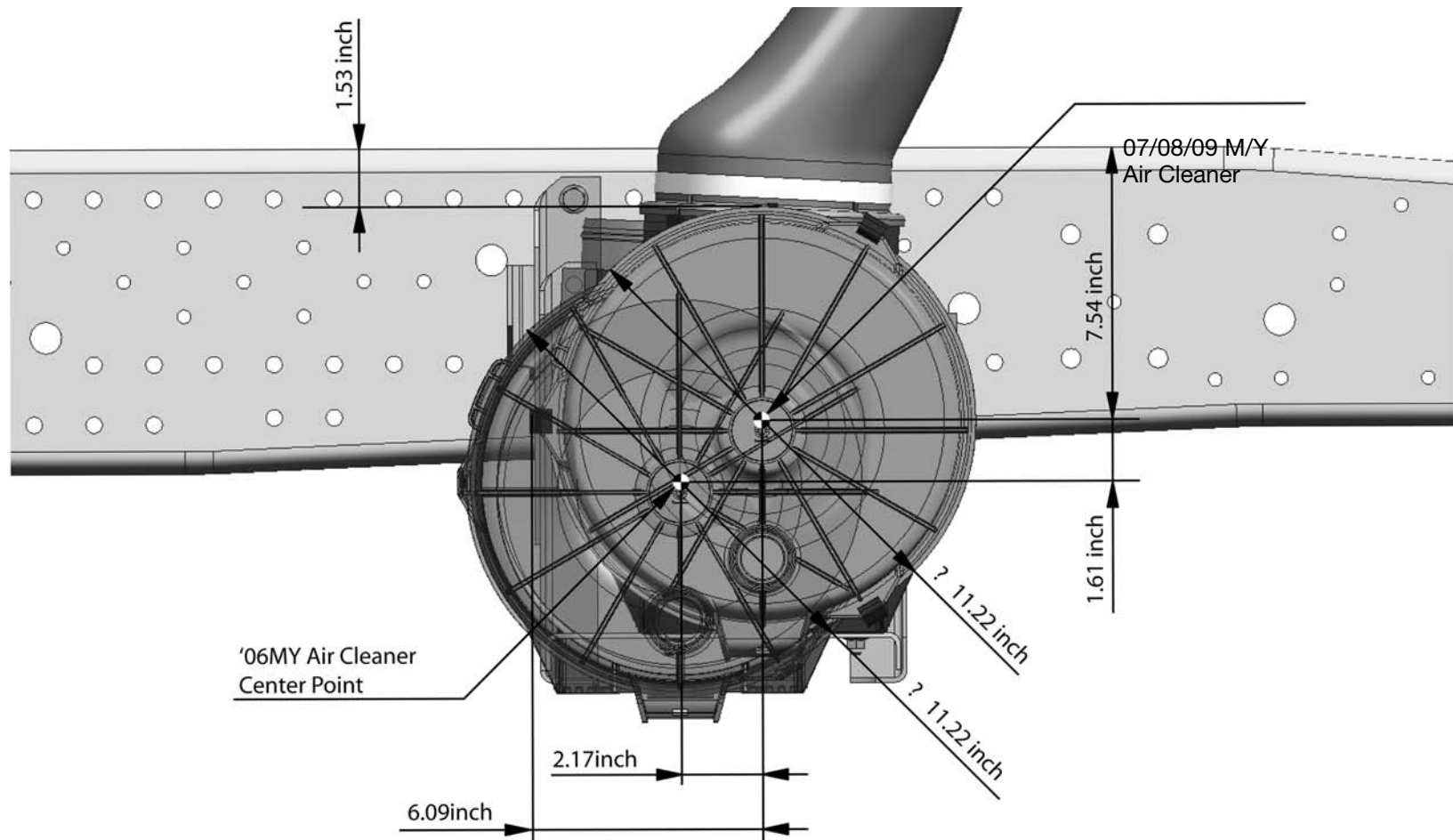
Mode	Name Description
<i>Caution: The following actions will interrupt the stationary type regeneration. Failure to restart and complete the regeneration cycle will result in filter clogging.</i> <ul style="list-style-type: none"><li>• Applying the accelerator pedal.</li><li>• Shifting into gear (with Automatic Transmission)</li><li>• Pressing the clutch pedal (Manual Transmission)</li><li>• Engine speed increases</li><li>• Releasing the parking brake</li></ul>	
Limp Home Mode	<p>This condition should only be diagnosed and repaired by an Isuzu trained technician.</p> <ul style="list-style-type: none"><li>• MIL and/ or Reduced Engine Power Lamp is “ON”, vehicle speed is reduced</li><li>• Technician diagnosis required</li><li>• IDSS induced regeneration (fast or slow) based on diagnosis</li><li>• Slow process takes 2 hours</li></ul>

## **Limited Slip Differential Fluid**

Should it become necessary to add fluid to the rear axle of a chassis equipped with a limited slip differential please consult the Isuzu Owners Manual for the appropriate selection of lubricants to be used.

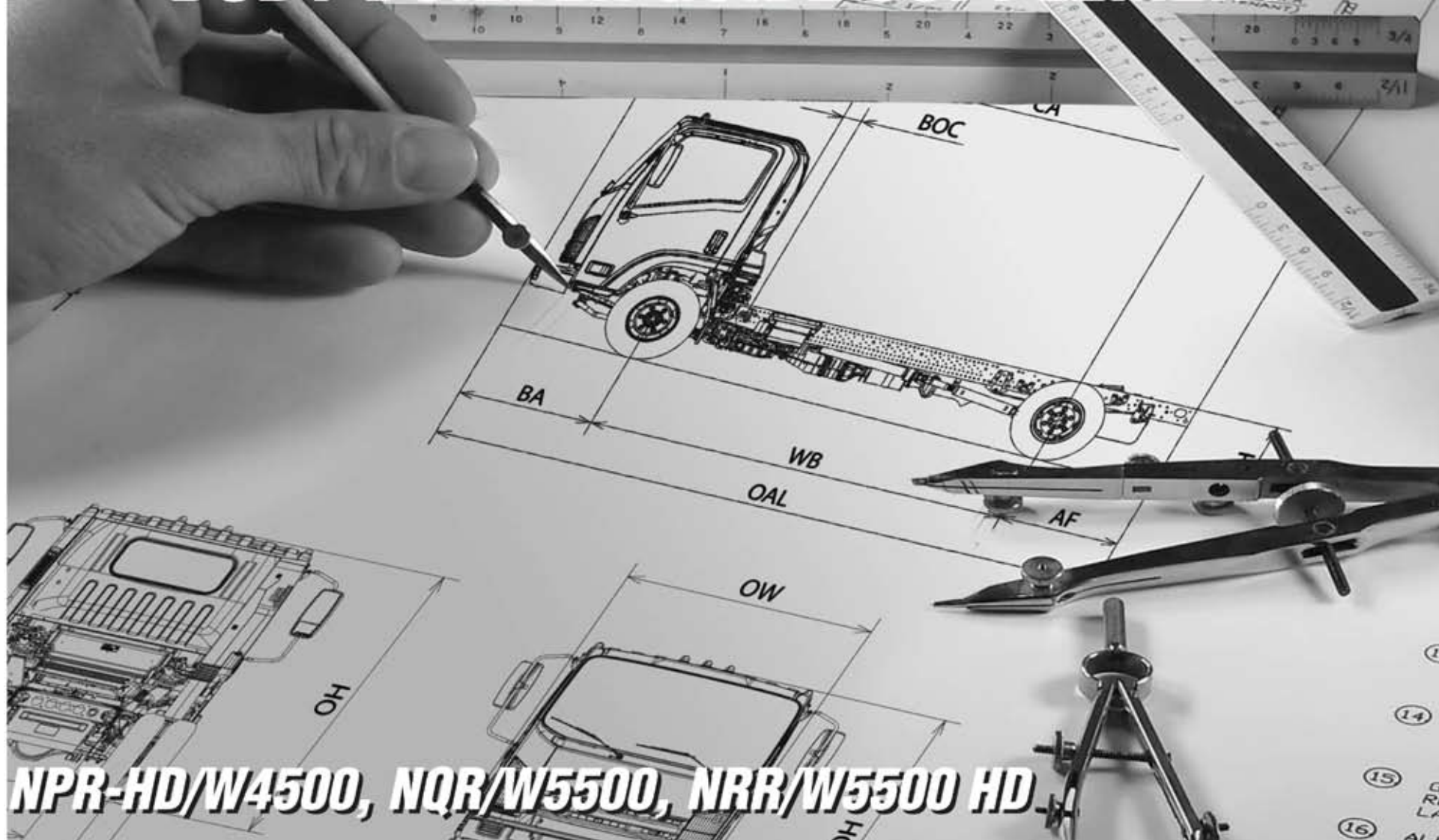
Axle Housing Stamp		
Ratio	Stand Axle	LSD Axle
4.300	SO	HO
4.555	C9	D9
4.777	S9	H9
5.125	C8	D8
5.571	A7	B7
5.857	C7	D7

**Power Take Off – 4HK1-TC Engine –**  
**Understanding DPF (Diesel Particulate Filter) Regeneration –**  
**Diesel Air Cleaner Canister**





## ***DIESEL MANUAL TRANSMISSION BODY BUILDER GUIDE SUPPLEMENT***



***NPR-HD/W4500, NQR/W5500, NRR/W5500 HD***



## **MECHANICAL SPECIFICATIONS** **Engine Horsepower and Torque Chart**

The following table presents Net versus Gross Horsepower and Torque ratings for Isuzu/W-Series Truck Product Engines:

ENGINE 4HK1-TC	APPLICATION	TRANSMISSION	NET HP(1) HP/RPM	NET TORQUE(1) LBS.-FT./RPM	GROSS HP(1) HP/RPM	GROSS TORQUE(1) LBS.-FT./RPM
Isuzu	NPR HD/W4500 NQR/W5500 NRR/W5500 HD	Manual	169/2400	379/1850	175/2400	387/1850

## **MECHANICAL SPECIFICATIONS** **GVW/GCWR Chart**

The following table presents GCWR Ratings ratings for Isuzu/W-Series Truck Product:

TRUCK MODEL	TRANSMISSION	GVWR (lbs.)	GCWR (lbs.)(1)
NPR HD/W4500 DIESEL	MANUAL	14,500	20,500
NQR/W5500 DIESEL	MANUAL	17,950	23,950
NRR/W5500 HD DIESEL	MANUAL	19,500	25,500

<sup>1</sup> The NPR HD, NQR, NRR/W3500, W4500, W5500 HD are not approved for Hot Shot applications.

## NPR-HD/W4500, NQR/W5500, NRR/W5500 HD Diesel Manual Transmission Specification Supplement

MODEL	NPR-HD/W4500, NQR/W5500, NRR/W5500 HD
GVWR	14,500 lb. 17,950 lb. 19,500 lb.
WB	109 in., 132.5 in., 150 in., 176 in.
ENGINE Model/Displacement HP (Gross) Torque (Gross) Equipment	Isuzu 4-cylinder, in-line 4-cycle, turbocharged, intercooled, direct injection diesel. 4HK1-TC/317 CID (5.19 liters) 175 HP/2400 RPM 387 lb. ft. torque/1850 RPM  Dry element air cleaner with vertical intake; 2 rows 569 square in. radiator; 7 blade 20.1 in. diameter fan with viscous drive. Cold weather starting device and an oil cooler. Engine oil level check switch and light. Engine warning system with audible warning for low oil pressure, high coolant temperature, and low coolant level. Engine cruise control and engine idle up function.  Rear engine cover.
CLUTCH	Single, dry plate, 14 in. diameter, actuated by self-adjusting hydraulic master/slave cylinder.
TRANSMISSION	Isuzu MZZ, 6 speed all forward gears synchronized. Sixth gear is overdrive. PTO capability
ADDITIONAL SPECIFICATIONS	See appropriate model in 2008 model year Body Builders Guide

## NPR-HD/W4500, NQR/W5500, NRR/W5500 HD Diesel Manual Transmission Chassis Weight Supplement

### **NPR-HD/W4500**

In-Frame Tank 14,500-lb. GVWR Manual Transmission Model  
Chassis Curb and Maximum Payload Weights

Model	WB+	Unit	Front	Rear	Total	Payload
NE1	109 in.	lb.	3611	1974	5585	8915
NE2	132.5 in.	lb.	3712	1948	5660	8840
NE3	150 in.	lb.	3765	1932	5697	8803
NE4	176 in.	lb.	3834	1918	5752	8748

### **NQR/W5500**

In-Frame Tank 17,950-lb. GVWR Manual Transmission Model  
Chassis Curb and Maximum Payload Weights

Model	WB+	Unit	Front	Rear	Total	Payload
NQ1	109 in.	lb.	3843	2287	6130	11820
NQ2	132.5 in.	lb.	3970	2236	6206	11744
NQ3	150 in.	lb.	4036	2206	6242	11708
NQ4	176 in.	lb.	4121	2176	6297	11653

### **NRR/W5500-HD**

In-Frame Tank 19,500-lb. GVWR Manual Transmission Model  
Chassis Curb and Maximum Payload Weights

Model	WB+	Unit	Front	Rear	Total	Payload
NT1	109 in.	lb.	3904	2289	6193	13307
NT2	132.5 in.	lb.	4028	2240	6268	13232
NT3	150 in.	lb.	4093	2212	6305	13195
NT4	176 in.	lb.	4032	2382	6414	13086

### **NPR-HD/W4500**

Side Mounted Tank 14,500-lb. GVWR Manual Transmission Model  
Chassis Curb and Maximum Payload Weights

Model	WB+	Unit	Front	Rear	Total	Payload
NE1	109 in.	lb.	3889	1743	5632	8868
NE2	132.5 in.	lb.	3950	1758	5708	8792
NE3	150 in.	lb.	3990	1769	5759	8741
NE4	176 in.	lb.	4037	1783	5820	8680

### **NQR/W5500**

Side Mounted Tank 17,950-lb. GVWR Manual Transmission Model  
Chassis Curb and Maximum Payload Weights

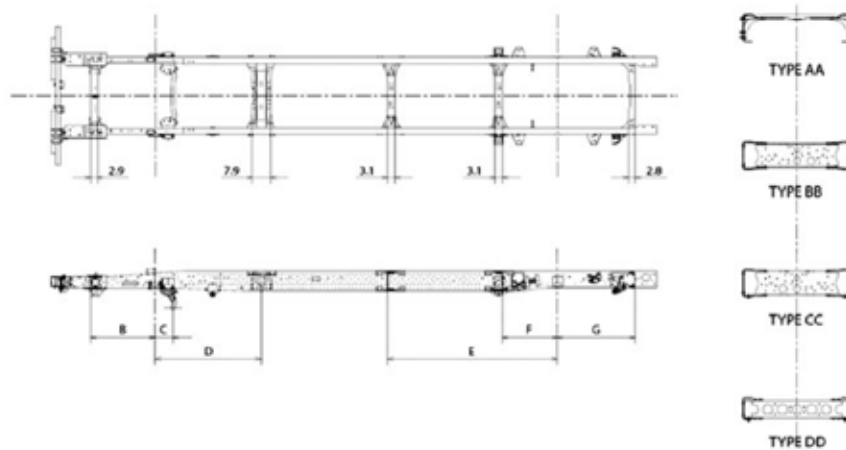
Model	WB+	Unit	Front	Rear	Total	Payload
NQ1	109 in.	lb.	4074	2004	6078	11872
NQ2	132.5 in.	lb.	4156	1998	6154	11796
NQ3	150 in.	lb.	4208	1997	6205	11745
NQ4	176 in.	lb.	4269	1997	6266	11684

### **NRR/W5500-HD**

Side Mounted Tank 19,500-lb. GVWR Manual Transmission Model  
Chassis Curb and Maximum Payload Weights

Model	WB+	Unit	Front	Rear	Total	Payload
NT1	109 in.	lb.	4138	2005	6143	13357
NT2	132.5 in.	lb.	4217	2002	6219	13281
NT3	150 in.	lb.	4266	2003	6269	13231
NT4	176 in.	lb.	4326	2005	6331	13169

## NPR-HD/W4500, NQR/W5500, NRR/W5500 HD Diesel Manual Transmission Frame and Crossmember Specifications

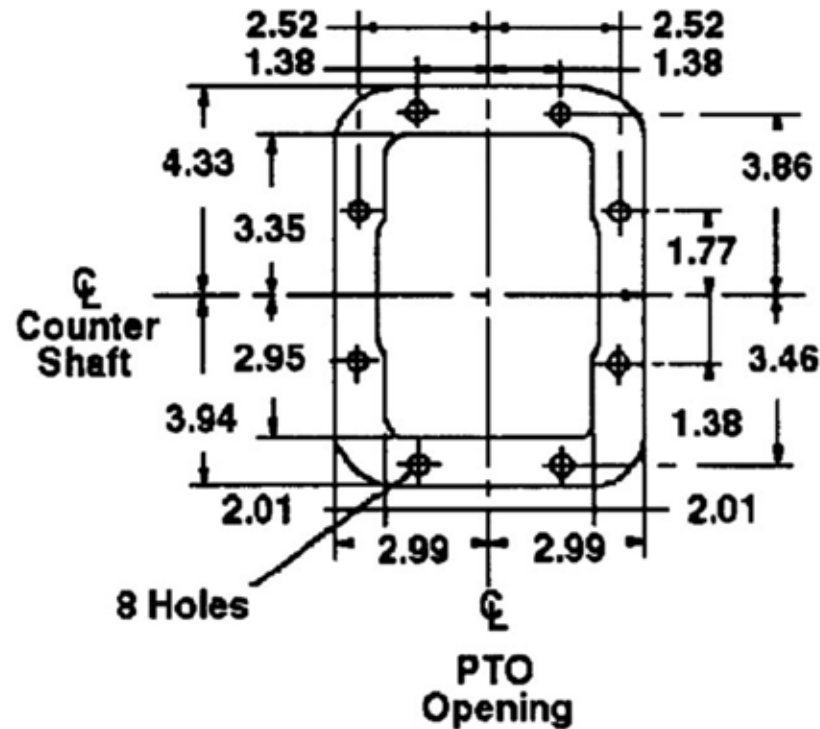


Wheelbase	Frame	Crossmember Type/Location									
		B	C	D		E		F		G	
109	0.24	28.3	7.9	AA	46.5	—	—	CC	24.2	DD	33.8
132.5	0.24	28.3	7.9	AA	46.5	BB	57.5	CC	24.2	DD	33.8
150	0.24	28.3	7.9	AA	46.5	BB	57.9	CC	24.2	DD	33.8
176	0.24	28.3	7.9	AA	46.5	BB	74.4	CC	24.2	DD	33.8

## NPR-HD/W4500, NQR/W5500, NRR/W5500 HD

### Diesel Manual Transmission PTO Location, Drive Gear and Opening Information

MZZ Transmission PTO Opening

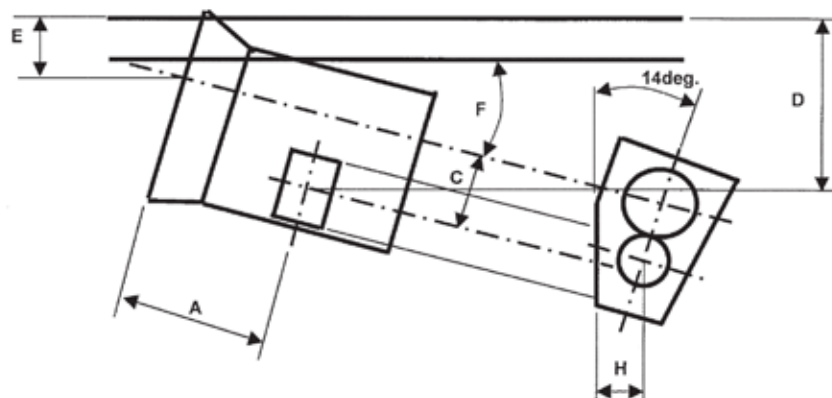


## NPR-HD/W4500, NQR/W5500, NRR/W5500 HD

### Diesel Manual Transmission PTO Location, Drive Gear and Opening Information

Trans.	Opening Location	Bolt Pattern	A	B	C	D	E	F	H	PTO Drive Gear Location	Ratio of PTO Drv. Gear Spd. to Eng. Spd.	No. of Teeth	Pitch	Helix Angle	Max. Output Torque
MZZ 6U	Left	(Dr 1)	11.6	37.57	5.2	12.8	7.7	2.5°	3.7	Countershaft	25/46=.543	37	3	25°	180 lbs.-ft.@1,000 RPM

#### Manual Transmission





## NPR-HD/W4500, NQR/W5500, NRR/W5500 HD Diesel Manual Transmission Body Builder Weight Information Chart

### NPR-HD/W4500

Body Builder Weight Information Chart										
GVWR	AXLE	Wheelbase								UNSPRUNG WEIGHT
		109		132.5		150		176		
		in frame tank	side tank	in frame tank	side tank	in frame tank	side tank	in frame tank	side tank	
14500	FRONT	3792	4070	3893	4131	3975	4171	4044	4218	617
	REAR	2063	1832	2037	1847	1992	1858	1978	1872	1058
	TOTAL	5855	5902	5930	5978	5967	6029	6022	6090	1675

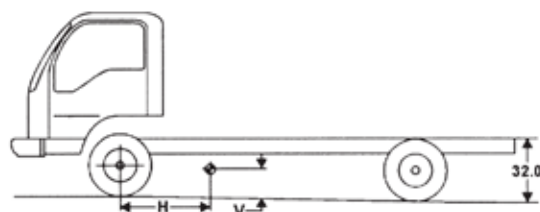
### NQR/W5500

Body Builder Weight Information Chart										
GVWR	AXLE	Wheelbase								UNSPRUNG WEIGHT
		109		132.5		150		176		
		in frame tank	side tank	in frame tank	side tank	in frame tank	side tank	in frame tank	side tank	
17950	FRONT	4024	4255	4151	4337	4246	4389	4331	4450	661
	REAR	2376	2093	2325	2087	2266	2086	2236	2086	1190
	TOTAL	6400	6348	6476	6424	6512	6475	6567	6536	1851

### NRR/W5500-HD

Body Builder Weight Information Chart										
GVWR	AXLE	Wheelbase								UNSPRUNG WEIGHT
		109		132.5		150		176		
		in frame tank	side tank	in frame tank	side tank	in frame tank	side tank	in frame tank	side tank	
19500	FRONT	4085	4319	4209	4398	4303	4447	4242	4507	661
	REAR	2378	2094	2329	2091	2272	2092	2442	2094	1190
	TOTAL	6463	6413	6538	6489	6575	6539	6684	6601	1851

## NPR-HD/W4500, NQR/W5500, NRR/W5500 HD Diesel Manual Transmission Center of Gravity



V = Vertical Center of Gravity  
H = Horizontal Center of Gravity

The center of gravity of the completed vehicle with a full load should not exceed 63 inches above ground level for the 14,500 lb., 17,950 lb., and 19,500 lb. GVWR, and must be located horizontally between the centerlines of the front and rear axles.

NOTE: The maximum dimensions for a body installed on the NPR-HD/W4500, NQR/W5500, NRR/W5500 HD are 96 inches wide (outside) by 90 inches high (inside). Any larger body applications must be approved by ICTA Application Engineering. In the West Coast call 1-562-229-5314 and in the East Coast call 1-678-240-9818.

### NPR-HD/W4500

GVWR	WB	V	H	
			IN FRAME TANK	SIDE TANK
14500	109	23.8	38.3	33.6
	132.5	23.7	45.3	40.6
	150	23.7	50.6	45.9
	176	23.6	58.4	53.7

### NQR/W5500

GVWR	WB	V	H	
			IN FRAME TANK	SIDE TANK
17950	109	25.0	40.4	35.8
	132.5	24.9	47.4	42.8
	150	24.9	52.7	48.1
	176	24.8	60.5	55.9

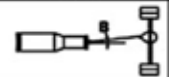
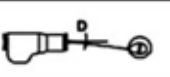
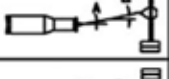
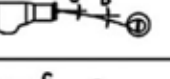
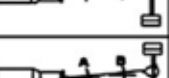
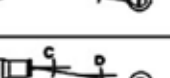
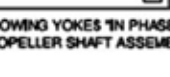
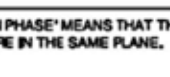
### NRR/W5500-HD

GVWR	WB	V	H	
			IN FRAME TANK	SIDE TANK
19,500	109	24.9	40.0	35.4
	132.5	24.9	47.1	42.5
	150	24.9	52.3	47.7
	176	24.9	64.9	55.5



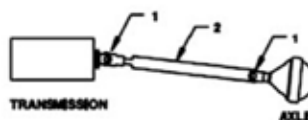
## NPR-HD/W4500, NQR/W5500, NRR/W5500 HD Diesel Manual Transmission Propeller Shaft

WHEELBASE	Plane View		Side View	
	A	B	C	D
	MANUAL TRANS.	MANUAL TRANS.	MANUAL TRANS.	MANUAL TRANS.
109 in.	—	3.1°	—	8.1°
132.5 in.	0°	3.1°	2.5°	2.5°
150 in.	0°	3.1°	0°	5.3°
176 in.	0°	2.3°	0.3°	2.0°

WB	PLANE VIEW	SIDE VIEW
109 in		
132.5 in		
150 in		
176 in		

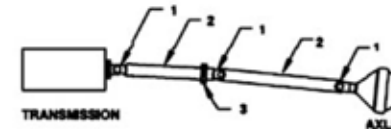
TYPICAL INSTALLATIONS SHOWING YOKES "IN PHASE." "IN PHASE" MEANS THAT THE YOKES AT EITHER END OF A GIVEN PROPELLER SHAFT ASSEMBLY ARE IN THE SAME PLANE.

(109 in WB)



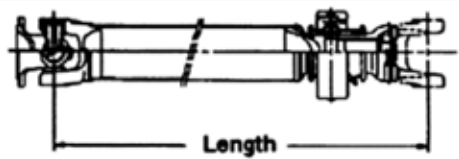
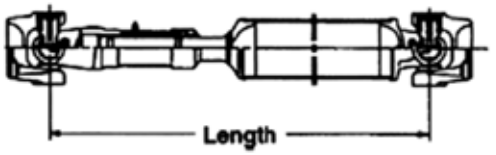
- 1. UNIVERSAL JOINT
- 2. PROPELLER SHAFT
- 3. CENTER CARRIER BEARING

(132.5 in, 150 in and 176 in WB)



## NPR-HD/W4500, NQR/W5500, NRR/W5500 HD Diesel Manual Transmission Propeller Shaft

Trans. Type WHEELBASE	MZZ 6 Manual Transmission			
	109	132.5	150	176
No. of Shafts	1	2	2	2
Shaft #1 O.D.	3.54	3.54	3.54	3.54
Thickness	0.126	0.126	0.126	0.126
Length	39.9	27.0	44.4	53.8
Type	B	A	A	A
Shaft #2 O.D.	N/A	3.54	3.54	3.54
Thickness	N/A	0.126	0.126	0.126
Length	N/A	36.2	36.4	53.0
Type	N/A	B	B	B

Type	Description	Illustration
Type A	1st shaft in 2-piece driveline	
Type B	1st shaft in 1-piece driveline 2nd shaft in 2-piece driveline	

## DOCUMENT FOR INCOMPLETE VEHICLE

### DO NOT REMOVE

THIS DOCUMENT MUST REMAIN  
WITH THIS VEHICLE UNTIL IT IS  
CERTIFIED AS A COMPLETED VEHICLE.

PLACE  
LABEL  
HERE

This document is furnished as required by the Canada Motor Vehicle Safety Act and Federal Motor Vehicle Safety Regulations (FMVSR) to aid intermediate and final stage manufacturers in their determination of conformity of the completed vehicle with applicable Canada Motor Vehicle Safety Standards (CMVSS), Federal Motor Vehicle Safety Standards (FMVSS), Canadian On-Road Vehicle and Engine Emission Regulations and Canada Interference Causing Equipment Standard – ICES-002. Also included are instructions which must be followed in order to assure that Environmental Protection Agency (EPA) and California emission certification requirements are met.

This document is not a substitute for knowledge and understanding of the requirements of the Canada Motor Vehicle Safety Act, Federal Motor Vehicle Safety Regulations (FMVSR); or applicable Canada Motor Vehicle Safety Standards (CMVSS) and Federal Motor Vehicle Safety Standards (FMVSS). Intermediate and final stage manufacturers should be familiar with the Regulations and Standards referred to above to be aware of their specific responsibilities.

Any manufacturer making alterations to this incomplete vehicle during the process of manufacturing the complete vehicle should be constantly vigilant to recognize all effects, either direct or indirect, on other components, assemblies or systems caused by each such alteration. No alteration should be made to the incomplete vehicle that either directly or indirectly results in any component, assembly or system being in nonconformance with any applicable Canada Motor Vehicle Safety Standard, Federal Motor Vehicle Safety Standard or Emission Regulation.

The statements contained in this Incomplete Vehicle Document are accurate as of the date of manufacture of the Incomplete Vehicle and can be relied on by any intermediate and/or final stage manufacturer as a basis for certification.

## Incomplete Vehicle – Introduction

This document contains information relative to conformance of this incomplete vehicle with the following:

**Part I – FEDERAL MOTOR VEHICLE SAFETY STANDARDS, CANADA MOTOR VEHICLE SAFETY STANDARDS, CANADIAN ON-ROAD VEHICLE AND ENGINE EMISSION REGULATIONS, AND CANADA INTERFERENCE CAUSING EQUIPMENT STANDARD**

**Part II – U.S. ENVIRONMENTAL PROTECTION AGENCY AND STATE OF CALIFORNIA EMISSION REQUIREMENTS**

### Part 1

This section contains a list of Canada Motor Vehicle Safety Standard (CMVSS), Federal Motor Vehicle Safety Standards (FMVSS), Canadian On-Road Vehicle and Engine Emission Regulations, and Canada Interference Causing Equipment Standard – ICES-002 followed by a section entitled “Statements Regarding Canada Motor Vehicle Safety Standards (CMVSS), Federal Motor Vehicle Safety Standards (FMVSS), Canadian On-Road Vehicle and Engine Emission Regulations, and Canada Interference Causing Equipment Standard”. An appropriate statement of applicability is made for each standard, and by vehicle model as it relates to the incomplete vehicle.

**If supplemental technical information is required to support this document, go to the Body Builder website shown below, or contact to following telephone information.**

#### Body Builder website

**NPR / NPR-HD /NQR /NRR**

**<http://www.isuzutruckservice.com/>**

**W3500 / W4500 / W5500 / W5500-HD**

**<http://www.gmupfitter.com/index.htm>**

#### Telephone

**East coast : 1-678-240-9818**

**West coast : 1-562-229-5314**

## Incomplete Vehicle – Introduction (cont'd)

The identifiers TYPE 1, TYPE 2 or TYPE 3 prefix statements (of applicability) regarding Canada Motor Vehicle Safety Standards (CMVSS), and Federal Motor Vehicle Safety Standards (FMVSS). “Examples” of these statements follow:

**TYPE 1: A statement that the vehicle when completed will conform to the standard if no alterations are made in identified components of the incomplete vehicle. EXAMPLE: This vehicle when complete will conform to CMVSS 104 and FMVSS No. 104, Windshield Wiping and Washing Systems, if no alterations are made in the windshield wiper components.**

**TYPE 2: A statement of specific conditions of final manufacture under which the manufacturer specifies that the completed vehicle will conform to the standard. EXAMPLE: This vehicle when completed will conform to CMVSS 121 and FMVSS 121, Air Brake Systems, if it does not exceed any of the gross axle weight ratings, if the center of gravity at GVWR is not higher than ## feet above the ground, and if no alterations are made to any brake system component.**

**TYPE 3: A statement that conformity with the standard cannot be determined based upon the components supplied on the incomplete vehicle, and that the incomplete vehicle manufacturer makes no representation to conformity with the standard.**

In accordance with the requirements of Canada Motor Vehicle Safety Regulations, and Federal Motor Vehicle Safety Regulations Part 568.4, the following information is included on the label affixed to the front cover of this document:

- the name and mailing address of the incomplete vehicle manufacturer;
- the month and year the incomplete vehicle manufacturer performed its last manufacturing operation on the incomplete vehicle;
- the vehicle identification number (VIN);
- the Gross Vehicle Weight Rating (GVWR) expressed in kg (lb.), intended for the vehicle when it is a completed vehicle;
- the Gross Axle Weight Rating (GAWR) expressed in kg (lb.), intended for each axle of the vehicle when it is a completed vehicle, listed in order from front to rear.

In addition, the final stage manufacturer is responsible under of Canada Motor Vehicle Safety Regulations, and Federal Motor Vehicle Safety Regulations Part 567.5, to place the GVWR and the GAWR of each axle, on the Final Vehicle Certification Label. The regulation states that the appropriate rating “shall not be less than the sum of the Unloaded Vehicle Weight, rated cargo load, and 68 kg (150 lb.) times the vehicle’s designed seating capacity”. Unloaded Vehicle Weight means the weight of a vehicle with maximum capacity of all fluids necessary for operation of the vehicle, but without cargo or occupants.

During the completion of this vehicle, GVWR and GAWR may be affected in various ways, including but not limited to the following:

- The installation of a body or equipment that exceeds the rated capacities of the incomplete vehicle.
- The addition of designated seating positions that exceed the rated capacities of the incomplete vehicle.
- Alterations or substitution of any components such as axles, springs, tires, wheels, frames, steering and brake systems that may affect the rated capacities of the incomplete vehicle.

## Incomplete Vehicle – Part 1 (cont'd)

### PART I - CHART A

LIST OF CANADA MOTOR VEHICLE SAFETY STANDARDS (CMVSS),  
FEDERAL MOTOR VEHICLE SAFETY STANDARDS (FMVSS), CANADIAN ON-ROAD VEHICLE AND ENGINE  
EMISSION REGULATIONS, AND CANADA INTERFERENCE CAUSING EQUIPMENT STANDARD, APPLICABLE TO  
GASOLINE OR DIESEL – FUELED TRUCKS WITH A GVWR OF GREATER THAN 4536 kg. (10,000 lb.)

SEE STATEMENTS REGARDING CMVSS AND FMVSS ON PAGES THAT FOLLOW

CMVSS No.	FMVSS No.	TITLE	NPR NPR-HD W3500 W4500	NQR NRR W5500 W5500-HD
1106	–	Exterior noise	1	1
101	101	Controls and displays with a GVWR of more than 4536 kg (10,000 lb)	1	1
102	102	Transmission shift lever sequence, starter interlock and transmission braking effect	1	1
103	103	Windshield defrosting and defogging systems	1	1
104	104	Windshield wiping and washing systems	1	1
105	105	Hydraulic brake systems	2	2
106	106	Brake hoses	1	1
108	108	Lamps, reflective devices and associated equipment	2	2
111	111	Rearview mirrors	1	1
113	113	Hood latch system	1	1
115	–	Vehicle Identification Number	1	1
116	116	Motor-vehicle brake fluids	1	1
120	120	Tire selection and rims	2	2
121	121	Air brake systems	3	3
124	124	Accelerator control systems	1	1
205	205	Glazing materials	1	1
206	206	Door locks and door retention components	1	1
207	207	Seating systems	1	1
208	208	Occupant Crash Protection	1	1
209	209	Seat belt assemblies	1	1
210	210	Seat belt assembly anchorages	1	1
213.4	213	Child restraint systems	3	3
302	302	Flammability of interior materials	1	1

• TYPE 1, 2 or 3 numbers to the right hand side of the table above designate the appropriate paragraph in the CMVSS or FMVSS standards that follow.

## Incomplete Vehicle – Part 1 (cont'd)

CANADA	U.S.	TITLE	NPR NPR-HD W3500 W4500	NQR NRR W5500 W5500-HD
□	–	On-Road Vehicle and Engine Emission Regulations	1, 3	1
□	–	ICES-002 Canada interference causing equipment standard	1	1

- TYPE 1, 2 or 3 numbers to the right hand side of the table above designate the appropriate paragraph in the CMVSS or FMVSS standards that follow.

## Incomplete Vehicle (cont'd)

Statements Regarding Canada Motor Vehicle Safety Standards (CMVSS),  
Federal Motor Vehicle Safety Standards (FMVSS), Canadian On-Road  
Vehicle and Engine Emission Regulations, and Canada Interference  
Causing Equipment Standard.

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### CMVSS 1106 – EXTERIOR NOISE

Applies to all models of incomplete vehicles contained in this book

**TYPE 1** The following statement is applicable to all models of incomplete vehicles (unless otherwise noted on the cover of this document).

- A. This incomplete vehicle, when completed, will conform to the above standards providing no alterations are made which affect the function, physical, chemical, or mechanical properties, environment, location or vital spatial clearances of the components, assemblies or systems including but not limited to those listed below:

Exhaust System	Powertrain cooling fan
Tires (including correct tire pressure)	Intake system
Engine assembly	Axle
Transmission assembly	Catalytic converter and its location (if equipped)
DPD (Diesel Particulate Defuser) and its location	

- B. Final compliance with CMVSS 1106 is the responsibility of the final stage manufacturer for any modifications, or added material, components, or systems.



## **Incomplete Vehicle (cont'd)**

**CMVSS 101 and FMVSS 101 – CONTROLS AND DISPLAYS**  
**Applies to all models of incomplete vehicles contained in this book**  
**with a 4536 kg. (10,000 lb.) GVWR or more**

**TYPE 1** The following statement is applicable to all models of incomplete vehicles contained in this book with a GVWR of more than 4536 kg. (10,000 lb.) (unless otherwise noted on the cover).

This incomplete vehicle, when completed, will conform to CMVSS 101 and FMVSS 101 providing no alterations are made which affect this location, identification, or illumination of the controls and displays identified below or the location, travel and type of seat. If the seat is installed by the final stage manufacturer, the visibility and operation of the controls and displays listed below must meet the requirements of the standard:

Vehicle and system controls and displays including:

Accelerator	Horn control
Brake failure warning	Ignition switch (engine start & stop control)
* Brake failure displays	Illumination intensity control
Clutch	Low fuel indicator
Driver's sunvisor	Manual/automatic transmission shift lever
Electrical charge indicator	* Odometer
Engine coolant temperature display	Engine oil pressure display
Engine idle speed control	Service brake
Fuel level display	* Speedometer
Hazard warning control & indicator	Steering wheel
Master lighting switch (includes clearance lamp, identification lamp, and tail lamp control)	Turn signal, control & indicator
Heating & air conditioning system control	Windshield defrosting & defogging controls
Heating system & air conditioning system fan	Windshield washer control
Gear position display	Windshield wiper control
High beam indicator & control	Anti-lock brake failure warning display

If the intermediate or final stage manufacturer installs any of the above controls and displays, those controls and displays will also have to meet the requirements of this standard.

\* For CMVSS only, when Canadian option is specified.

## Incomplete Vehicle (cont'd)

**CMVSS 102 and FMVSS 102 – TRANSMISSION SHIFT LEVER SEQUENCE,  
STARTER INTERLOCK AND TRANSMISSION BRAKING EFFECT**  
Applies to all models of incomplete vehicles contained in this book

**TYPE 1** The following statement is applicable to all incomplete vehicle models contained in this book (unless otherwise noted on the cover).

This incomplete vehicle, when completed, will conform to CMVSS 102 and FMVSS 102 providing no alterations are made which affect the function, physical, chemical, or mechanical properties, environment, location or vital spatial clearances of the components, assemblies or systems including but not limited to those listed below (if equipped):

Transmission control and identification system, including but not limited to:

Automatic transmission assembly (A/T)

A/T control from floor shift mechanism to transmission linkage

A/T floor shift mechanism

A/T neutral safety switch assembly and wire

A/T position indicator dial

A/T position indicator (pointer)

A/T position indicator actuating linkage

Chassis wiring harness

Transmission shift position pattern (knob, plate or label)

## Incomplete Vehicle (cont'd)

### **CMVSS 103 and FMVSS 103 – WINDSHIELD DEFROSTING AND DEFOGGING SYSTEMS**

**Applies to all models of incomplete vehicles contained in this book**

**TYPE 1** The following statement is applicable to all models of incomplete vehicles contained in this book (unless otherwise noted on the cover).

This incomplete vehicle, when completed, will conform to CMVSS 103 and FMVSS 103 providing no alterations are made which affect the function, physical, chemical, or mechanical properties, environment, location or vital spatial clearances of the components, assemblies or systems including but not limited to those listed below (if equipped):

Windshield defrosting and defogging systems, including but not limited to:

Chassis and instrument panel wiring harness assembly

Defroster air distributor assembly (manifold)

Defroster air duct assembly

Defroster air hoses – manifold to nozzle

Defroster air to windshield outlet assembly (nozzle)

Defroster outlet to heater assembly adapter

Engine water outlet thermostat assembly

Heater & defroster assembly – including motor & blower

Heater & defroster control (mechanical)

Heater blower motor resistor assembly (blower speed control)

Heater & water hoses and hose assemblies

Heater water inlet valve control

Windshield assembly

## Incomplete Vehicle (cont'd)

### CMVSS 104 and FMVSS 104 – WINDSHIELD WIPING AND WASHER SYSTEMS

Applies to all models of incomplete vehicles contained in this book

**TYPE 1** The following statement is applicable to all models of incomplete vehicles contained in this book (unless otherwise noted on the cover).

This incomplete vehicle, when completed, will conform to CMVSS 104 and FMVSS 104 providing no alterations are made which affect the function, physical, chemical, or mechanical properties, environment, location or vital spatial clearances of the components, assemblies or systems including but not limited to those listed below (if equipped):

Windshield defrosting and defogging systems, including but not limited to:

Chassis wiring harness

Washer reservoir cap

Water reservoir filler assembly

Windshield assembly

Windshield wiper arm assembly

Windshield wiper blade assembly

Windshield wiper linkage assembly

Windshield wiper and washer control

Windshield wiper and washer motor and pump assembly

Windshield washer fluid reservoir

Windshield washer system hoses

Windshield washer nozzle

## Incomplete Vehicle (cont'd)

### **CMVSS 105 and FMVSS 105 – HYDRAULIC BRAKE SYSTEMS** **Applies to all models of incomplete vehicles contained in this book**

**TYPE 2** The following statement is applicable to all models of incomplete vehicles contained in this book (unless otherwise noted on the cover).

This incomplete vehicle, if equipped with hydraulic brakes, when completed, will conform to CMVSS 105 and FMVSS 105 providing no alterations are made which affect the function, physical or mechanical properties, environment, location or vital spatial clearances of the components, assemblies or systems identified below. In addition, the maximum vertical center of gravity specified below must not be exceeded at maximum GVWR and rated front and rear GAWR.

Center of Gravity:

<u>Application</u>	<u>Maximum Center of Gravity millimeter (inches) above ground</u>
NPR/NPR-HD/W3500/W4500 Chassis-Cab	1600 mm (63")
NQR/NRR/W5500/W5500-HD Chassis-Cab	1600 mm (63")

Hydraulic Brake Systems, including but not limited to:

Hydraulic brake lines, fittings and routings including gauges, warning devices and warning statements

Hydraulic brake valves and components

Hydraulic brake reservoir

Service and/or parking brake assemblies and components  
(Power boosters, master cylinder, ABS module, calipers, wheel cylinders, etc.)

Tires

Wheelbases

Brake pedal, brake light switch, parking brake hand level and switch, and related mechanical components

Brake and ABS warning light

Vacuum pump, tank, pipes and hoses (including warning devices and statements)

Master cylinder reservoir warning statement

Hydraulic booster pump, pipes, hoses and reservoir (including warning devices)

## **Incomplete Vehicle (cont'd)**

### **CMVSS 106 and FMVSS 106 – BRAKE HOSES**

**Applies to all models of incomplete vehicles contained in this book**

**TYPE 1** The following statement is applicable to all incomplete vehicle models contained in this book (unless otherwise noted on the cover).

This incomplete vehicle, when completed, will conform to CMVSS 106 and FMVSS 106 providing no alterations are made which affect the function, physical, chemical, or mechanical properties, environment, location or vital spatial clearances of the components, assemblies or systems including but not limited to those listed below:

Hydraulic Air, and Vacuum Brake Hoses

Hoses and hose end fittings

Labeling requirements

Brake Hose Assemblies – and Brake Hose

End Fittings

## Incomplete Vehicle (cont'd)

### **CMVSS 108 and FMVSS 108 – LAMPS, REFLECTIVE DEVICES AND ASSOCIATED EQUIPMENT**

Applies to all models of incomplete vehicles contained in this book

**TYPE 2** The following statement is applicable to all models of incomplete vehicles contained in this book (unless otherwise noted on the cover).

This incomplete vehicle, when completed, will conform to CMVSS 106 and FMVSS 106 providing no alterations are made which affect the function, physical, chemical, or mechanical properties, environment, location or vital spatial clearances of the components, assemblies or systems including but not limited to those listed below:

This incomplete vehicle, when completed, will conform to CMVSS 108 and FMVSS 108 providing it is completed in accordance with the following specific conditions by the final stage manufacturer:

- 1) Body width must be between 2.032 m (80") and 2.438 m (96"). (2.184 m (86") MIN Body Width For Crew Cab).
- 2) Each of these devices must be properly installed on the completed vehicle and meet all the requirements of CMVSS 108 and FMVSS 108:
  - a. The following devices, when provided, located and/or wired by ISUZU MOTORS meet the requirements of this standard.
    - Cab roof clearance and ID lamps (front)
    - Headlamps (Headlamps or Daytime running lamps)
    - Side marker lamp (Front)
    - Side reflex reflectors (front)
    - Turn signal flasher
    - Turn signal lamps (front)
    - Turn signal operating unit
    - Vehicle hazard warning signal operating unit
    - Vehicle hazard warning signal flasher
  - b. The following lamps and reflective devices are temporarily mounted on this incomplete vehicle as required for transportation. When relocating them, intermediate or final stage manufacturers must refer to the Isuzu Body Builders Manual and assure conformance with the location, visibility, and operational requirements of CMVSS108 and FMVSS 108.
    - License plate lamp
    - Rear combination lamps (tail lamps, stop lamps, turn signal lamps and back-up lamps)
    - Reflex reflectors (rear)

## Incomplete Vehicle (cont'd)

- c. No part of the completed vehicle shall be installed so as to prevent any of the devices listed in (a) or (b) above from meeting their required photometric output at the specified test points. If such interference exists, the applicable devices may have to be relocated or additional devices added to meet the requirements of CMVSS 108 and FMVSS 108:

Any CMVSS 108 and FMVSS 108 part shall not be painted.

- d. The following devices are not installed on this incomplete vehicle or supplied by ISUZU MOTORS. When added by intermediate or final stage manufacturers, they must also meet the requirements of CMVSS 108 and FMVSS 108:

Clearance lamps (rear)

Identification lamps (rear)

Side reflex reflectors (rear)

Side marker lamps (rear)

- e. The following additional devices must be installed on the van body and meet all requirements of this standard if the overall vehicle length is 9.1 m (30 feet) or greater.

Intermediate side marker lamps

Intermediate side reflex reflectors

- 3) No alterations (other than any relocation of Items in 2) b.) which may be necessary for conformance to CMVSS 108 and FMVSS 108 should be made which affect the location, mounting surfaces, function, environment or visibility clearance of the above listed devices which have been installed on this incomplete vehicle.



## Incomplete Vehicle (cont'd)

### **CMVSS 111 and FMVSS 111 – REARVIEW MIRRORS**

**Applies to all models of incomplete vehicles contained in this book**

**TYPE 1** The following statement is applicable to all models of incomplete vehicles contained in this book (unless otherwise noted on the cover of this document).

This incomplete vehicle, when completed, will conform to FMVSS 111 providing no alterations or substitutions are made to the outside rearview mirrors, the driver's seat location is not altered, and the body is installed symmetrical about the vehicle centerline. The overall width should be no greater than;

<u>Model</u>	<u>Width Limit</u> <u>millimeter (inches)</u>
NPR/NPR-HD/W3500/W4500	2438 mm (96")
NQR/NRR/W5500/W5500-HD	2438 mm (96")

### **CMVSS 113 and FMVSS 113 – HOOD LATCH SYSTEM**

**Applies to all models of incomplete vehicles contained in this**

**TYPE 1** The following statement is applicable to all models of incomplete vehicles contained in this book (unless otherwise noted on the cover).

This incomplete vehicle, when completed, will conform to CMVSS 113 and FMVSS 113 providing no alterations are made which affect the function, physical, chemical, or mechanical properties, environment, location or vital spatial clearances of the components, assemblies or systems including but not limited to those listed below:

Hood latch (catch) assembly	Hood latch pilot
Hood latch support assembly	Hood latch striker plate (hook) and reinforcements
Hood latch cable release system including controls	

## **Incomplete Vehicle (cont'd)**

### **CMVSS 115 – VEHICLE IDENTIFICATION NUMBER**

**Applies to all models of incomplete vehicles contained in this book**

**TYPE 1** The following statement is applicable to all models of incomplete vehicles contained in this book (unless otherwise noted on the cover).

This incomplete vehicle, when completed, will conform to CMVSS 115 providing no alterations are made which affect the function, physical, chemical, or mechanical properties, environment, location or vital spatial clearances of the components, assemblies or systems including but not limited to those listed below:

VIN plate

The vehicle identification number

VIN plate fasteners

### **CMVSS 116 and FMVSS 116 – MOTOR VEHICLE BRAKE FLUIDS**

**Applies to all models of incomplete vehicles contained in this book**

**TYPE 1** The following statement is applicable to all models of incomplete vehicles contained in this book (unless otherwise noted on the cover).

This incomplete vehicle, when equipped with approved hydraulic brake fluid will conform to CMVSS 116 and FMVSS 116 providing no alterations are made which affect the physical or chemical properties of the brake fluid.



## Incomplete Vehicle (cont'd)

### **CMVSS 124 and FMVSS 124 – ACCELERATOR CONTROL SYSTEMS**

**Applies to all models of incomplete vehicles contained in this book**

**TYPE 1** The following statement is applicable to all models of incomplete vehicles contained in this book (unless otherwise noted on the cover).

This incomplete vehicle, when completed, will conform to CMVSS 124 and FMVSS 124 providing no alterations are made which affect the function, physical chemical, or mechanical properties, environment, location, or vital spatial clearances of the components, assemblies or systems including but not limited to those listed below:

Accelerator/throttle control systems, including but not limited to:

Accelerator Control Systems, including but not limited to:

DIESEL VEHICLES	{	Accelerator pedal and attachments Accelerator lever and supporting bracket assembly Accelerator cable, support brackets, and seals Accelerator return spring(s) Attachment to injection pump lever - pin, hole, or ball stud Downshift switch Idling control cable assembly
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GASOLINE VEHICLES	{	Accelerator pedal and attachments Accelerator lever and supporting bracket assembly Accelerator return spring(s)
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## Incomplete Vehicle (cont'd)

### **CMVSS 205 and FMVSS 205 – GLAZING MATERIALS**

**Applies to all models of incomplete vehicles contained in this book**

**TYPE 1** The following statement is applicable to all models of incomplete vehicles contained in this book (unless otherwise noted on the cover).

This incomplete vehicle, when completed, will conform to CMVSS 205 and FMVSS 205 providing no alterations are made which affect the function, physical chemical, or mechanical properties, environment, location, or vital spatial clearances of the components, assemblies or systems including but not limited to those listed below:

Glazing material  
The monogram

Visibility of the monogram

Final compliance with CMVSS 205 and FMVSS 205 is the responsibility of the final stage manufacturer for any modifications, or added material, parts, components, or systems.

### **CMVSS 206 and FMVSS 206 – DOOR LOCKS AND DOOR RETENTION COMPONENTS**

**Applies to all models of incomplete vehicles contained in this book**

**TYPE 1** The following statement is applicable to all models of incomplete vehicles contained in this book (unless otherwise noted on the cover of this document).

This incomplete vehicle, when completed, will conform to CMVSS 206 and FMVSS 206 providing no alterations are made which affect the function, physical, chemical, or mechanical properties, environment, location or vital spatial clearances of the components, assemblies or systems including but not limited to those listed below:

Door lock  
Door latch  
Door latch striker plate  
Door hinge  
Inside lock control linkage  
Exterior door handles

If the intermediate or final stage manufacturer installs any additional doors, they must also meet the requirements of this standard.

## Incomplete Vehicle (cont'd)

### **CMVSS 207 and FMVSS 207 – ANCHORAGE OF SEATS** **Applies to all models of incomplete vehicles contained in this book**

**TYPE 1** The following statement is applicable to all models of incomplete vehicles contained in this book (unless otherwise noted on the cover of this document).

This incomplete vehicle, when completed, will conform to CMVSS 207 and FMVSS 207 providing no alterations are made which affect the function, physical, chemical, or mechanical properties, environment, location or vital spatial clearances of the components, assemblies or systems including but not limited to those listed below:

Seating systems, including but not limited to:

Floor pan assemblies	Seat assembly
Folding seat or seat back latch assembly	Seat or seat back latch assembly
Seat adjuster assembly	Seat or seat back latch release control
Seat anchorage's brackets reinforcements, attachment hardware, etc.	Seat or seat back latch striker
	Seat riser

### **CMVSS 208 and FMVSS 208 – OCCUPANT CRASH PROTECTION** **Applies to all models of incomplete vehicles contained in this book**

**TYPE 1** The following statement is applicable to all models of incomplete vehicles contained in this book (unless otherwise noted on the cover).

This vehicle, when completed, will conform to the seat belt provision sections of CMVSS 208 and FMVSS 208 providing no alterations are made which affect the function, physical, chemical, or mechanical properties, environment, location or vital spatial clearances of the components, assemblies or systems installed by Isuzu Motors including but not limited to the location or configuration of the designated seats/seating positions or to the number, placement, installation or model number of the seat belt assemblies of this incomplete vehicle.

## **Incomplete Vehicle (cont'd)**

### **CMVSS 209 and FMVSS 209 – SEAT BELT ASSEMBLIES**

**Applies to all models of incomplete vehicles contained in this book**

**TYPE 1** The following statement is applicable to all models of incomplete vehicles contained in this book (unless otherwise noted on the cover).

The seat belt assembly provided by ISUZU Motors when mounted to its original attachments locations, at any designated seating position, will conform to CMVSS 209 and FMVSS 209 providing no alterations are made which affect the function, physical, chemical, or mechanical properties environment, location or vital spatial clearances of the components, assemblies or systems including but not limited to those listed below:

Seat belt assemblies	Seat assemblies
Seat belt anchorages	Seat anchorages
Owner manual instructions	

### **CMVSS 210 and FMVSS 210 – SEAT BELT ASSEMBLY ANCHORAGES**

**Applies to all models of incomplete vehicles contained in this book**

**TYPE 1** The following statement is applicable to all models of incomplete vehicles contained in this book (unless otherwise noted on the cover).

This incomplete vehicle, when completed, will conform to CMVSS 210 and FMVSS 210 providing no alterations are made which affect the function, physical, chemical, or mechanical properties, environment, location or vital spatial clearances of the components, assemblies or systems including but not limited to those listed below:

Seat assemblies	Seat belt anchorage brackets, plates, and reinforcements
Seat belt assemblies	Child restraint system including anchorages, brackets, plates, and reinforcements
Floor pan assembly	
Seat position/adjustment capability	
Seat belt routing	

### **CMVSS 213.4 and FMVSS 213 – CHILD RESTRAINT SYSTEMS**

**Applies to all models of incomplete vehicles contained in this book**

**TYPE 3** The following statement is applicable to all models of incomplete vehicles contained in this book (unless otherwise noted on the cover).

Conformity with CMVSS 213.4 and FMVSS 213 cannot be determined based upon the components supplied on the incomplete vehicle, and ISUZU Motors makes no representation to conformity with the standard.

## Incomplete Vehicle (cont'd)

### **CMVSS 302 and FMVSS 302 – FLAMMABILITY OF INTERIOR MATERIALS**

**Applies to all models of incomplete vehicles contained in this book**

**TYPE 1** The following statement is applicable to all models of incomplete vehicles contained in this book (unless otherwise noted on the cover).

This incomplete vehicle, when completed, will conform to CMVSS 302 and FMVSS 302 providing no alterations are made which affect the function, physical, chemical, or mechanical properties, environment, location or vital spatial clearances of the components, assemblies or systems including but not limited to those listed below, and installed by ISUZU Motors:

Seat assemblies

Seat cushions

Seat backs

Seat belts

Headlining

Arm rests

Compartment shelves

Head restraints

Floor coverings

Sun visors

Shades

Wheel housing covers

Engine compartment covers

Instrument panel

Console

All trim panels including door, front, rear and side panels

Any other interior materials, including padding and crash deployed elements that are designed to absorb energy on contact by occupants in the event of a crash.



## Incomplete Vehicle (cont'd)

### **ON-ROAD VEHICLE AND ENGINE EMISSION REGULATIONS** **Applies to all models of incomplete vehicles contained in this book**

**TYPE 1** The following statement is applicable to all models of incomplete vehicles equipped with diesel engines and contained in this book (unless otherwise noted on the cover).

This incomplete vehicle, when completed, will conform to the above standard providing no alterations are made which affect the function, physical, chemical, or mechanical properties, environment, location or vital spatial clearances of the components, assemblies or systems including but not limited to those listed below:

Injection Pump	Engine Coolant Temperature Sensor
Injector and High Pressure Lines	Intake Manifold
Turbocharger	Catalytic converter and its location
Charger Air Cooler and Charge Air Cooler Hoses	Exhaust Gas Recirculation System
Engine Control Module (ECM)	MAF Sensor
Engine Speed Sensor	DPD (Diesel Particulate Defuser) and its location

**TYPE 2** The following statement is applicable to all models of incomplete vehicles contained in this book (unless otherwise noted on the cover).

This incomplete vehicle, when completed with the vertical exhaust system, will conform to the above standard providing it is completed by the final stage manufacturer in accordance with the following specific conditions:

- a. the incomplete vehicle manufacturer's vertical exhaust system kit is used, and
- b. the vertical exhaust system kit is installed to the vehicle in accordance with the incomplete vehicle manufacturer's instructions

For more information on the kit and instructions, please call the telephone number shown on page 1.

**TYPE 3** The following statement is applicable to all models of incomplete vehicles equipped with gasoline engines and contained in this book (unless otherwise noted on the cover).

Conformity with On-Road Vehicle and Engine Emission Regulations cannot be determined based upon the components supplied on the incomplete vehicle, and ISUZU Motors makes no representation to conformity with the standard.

## Incomplete Vehicle (cont'd)

### INTERFERENCE CAUSING EQUIPMENT STANDARD – ICES-002

Applies to all models of incomplete vehicles except vehicles equipped with diesel engines contained in this book

**TYPE 1** The following statement is applicable to all models of incomplete vehicles except vehicles equipped with diesel engines (unless otherwise noted on the cover of this document).

This incomplete vehicle, when completed, will conform to the above regulations providing no alterations are made which affect the function, physical, chemical, or mechanical properties, environment, location or vital spatial clearances of the components, assemblies or systems including but not limited to those listed below:

Ignition wires & plugs  
Ignition coil(s)

Spark plug wires

## Incomplete Vehicle (cont'd)

### **PART 2**

#### **U.S. ENVIRONMENTAL PROTECTION AGENCY AND STATE OF CALIFORNIA EMISSION REQUIREMENTS AND ON-BOARD DIAGNOSTIC SYSTEM (OBDII) REQUIREMENTS**

To assure that EPA and California emission certificate requirements and OBDII requirements are met, this incomplete vehicle (except where noted) must be completed in strict accordance with all instructions contained in this document, especially the following instructions which relate to:

- A. Exhaust emission related components
- B. Specification for fill pipes and openings of motor vehicle fuel tanks (applicable only to California gasoline powered vehicles)
- C. Labels

#### **(A) EXHAUST EMISSION RELATED COMPONENTS**

1. Compliance of this vehicle with EPA/California emission certification requirements and OBDII requirements will be maintained providing no alterations (except where noted) are made to the components identified below:

Air inlet system

Catalytic converter (if equipped)

Coolant temperature sensor

Crankcase emission control system

Diesel fuel injection components/controls

Engine assembly

Engine electronics (ecm/pcm/vcm)

Engine speed sensor

EGR system

Exhaust emission control system

Exhaust oxygen sensors (gasoline engine)

Exhaust system

\* Evaporative emission control system (gasoline engine)

Fuel injection system

Fuel system

Ignition system (gasoline engine)

Intake manifold

Turbocharger and associated equipment/controls

MAF Sensor

DPD (Diesel Particulate Defuser) and its location

\* All Federal/California gasoline powered heavy duty vehicles will have an evaporative emission control system that is certified for a fuel tank capacity not to exceed the amount shown on Vehicle Evaporative Emission Control Information Label. Persons wishing to add fuel tank capacity above the amount shown must contact California Air Resources Board and/or submit a written statement to the EPA Administrator that the Hydrocarbon Storage System has been upgraded according to the requirements of 40 CFR 86-095-35 (g) (2).

## Incomplete Vehicle (cont'd)

2. Compliance with applicable fuel evaporative emission regulations will be maintained if no alterations are made to the fuel filler neck(s).

Compliance with applicable fuel evaporative emission regulations will be maintained if no alterations are made to change material or increase the size or length of the following nonmetallic fuel and evaporative emission hoses.

Fuel feed hoses front and rear

Fuel return hoses front and rear

Fuel tank filler hoses to filler neck

Fuel tank vent hoses to filler neck

Fuel vapor lines at canister

Fuel vapor lines from engine to chassis pipes

Fuel vapor lines from fuel tank sender to chassis pipes

### **(B) SPECIFICATION FOR FILL PIPES AND OPENINGS OF MOTOR VEHICLE FUEL TANKS (APPLICABLE ONLY TO CALIFORNIA GASOLINE POWERED VEHICLES)**

This incomplete vehicle, when completed, will conform to Title 13, California Administrative Code Chapter 3 Air Resources Board Subchapter 7, "Specifications for Fill Pipes and Openings of Motor Vehicle Fuel Tanks", if no alterations are made to the fuel filler neck(s).

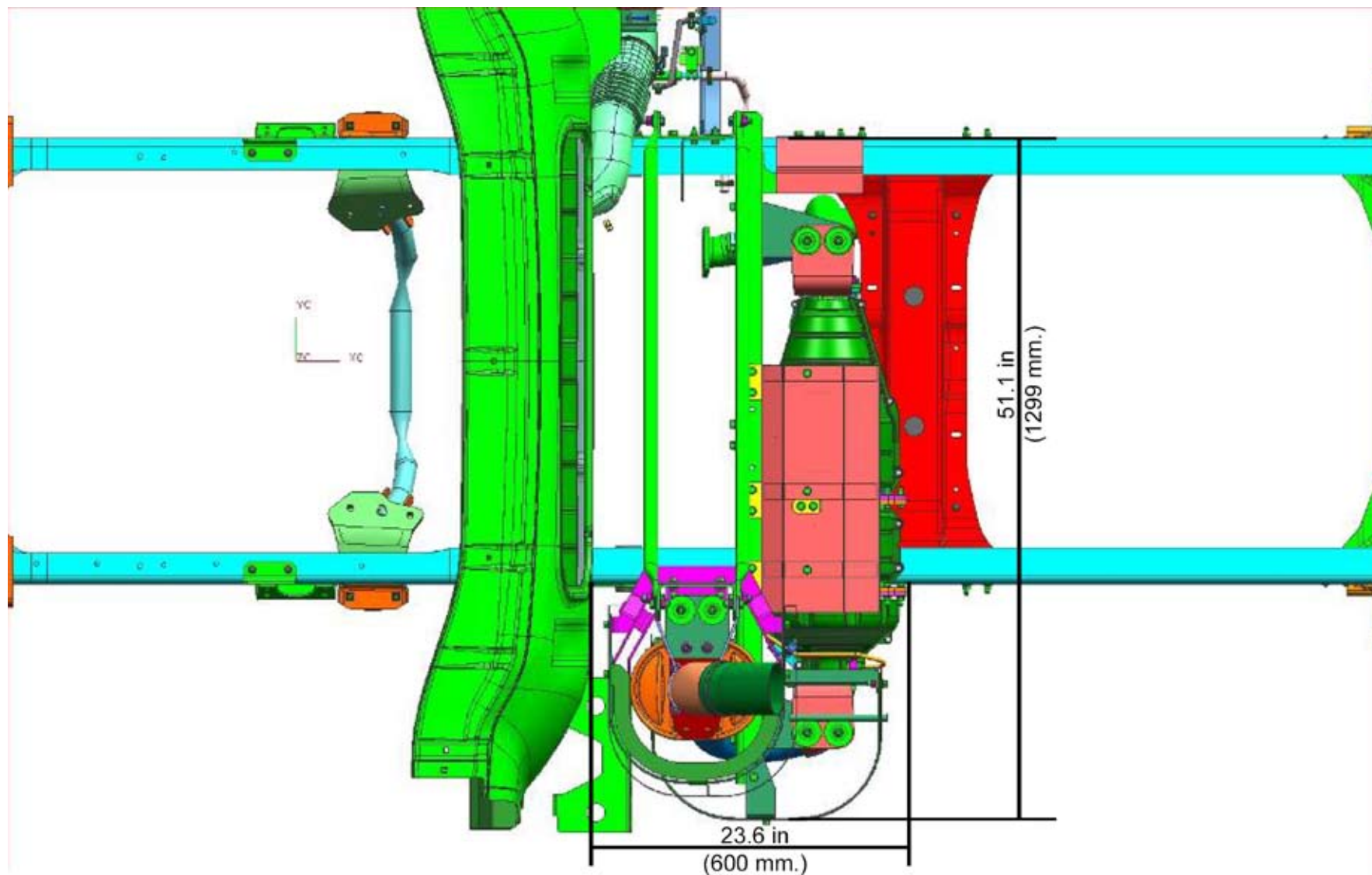
### **(C) LABELS**

The emission control related information labels and ultra low sulfur diesel fuel label that are permanently affixed are required by government regulation and must not be obstructed from view or defaced so as to impair its visibility or legibility.

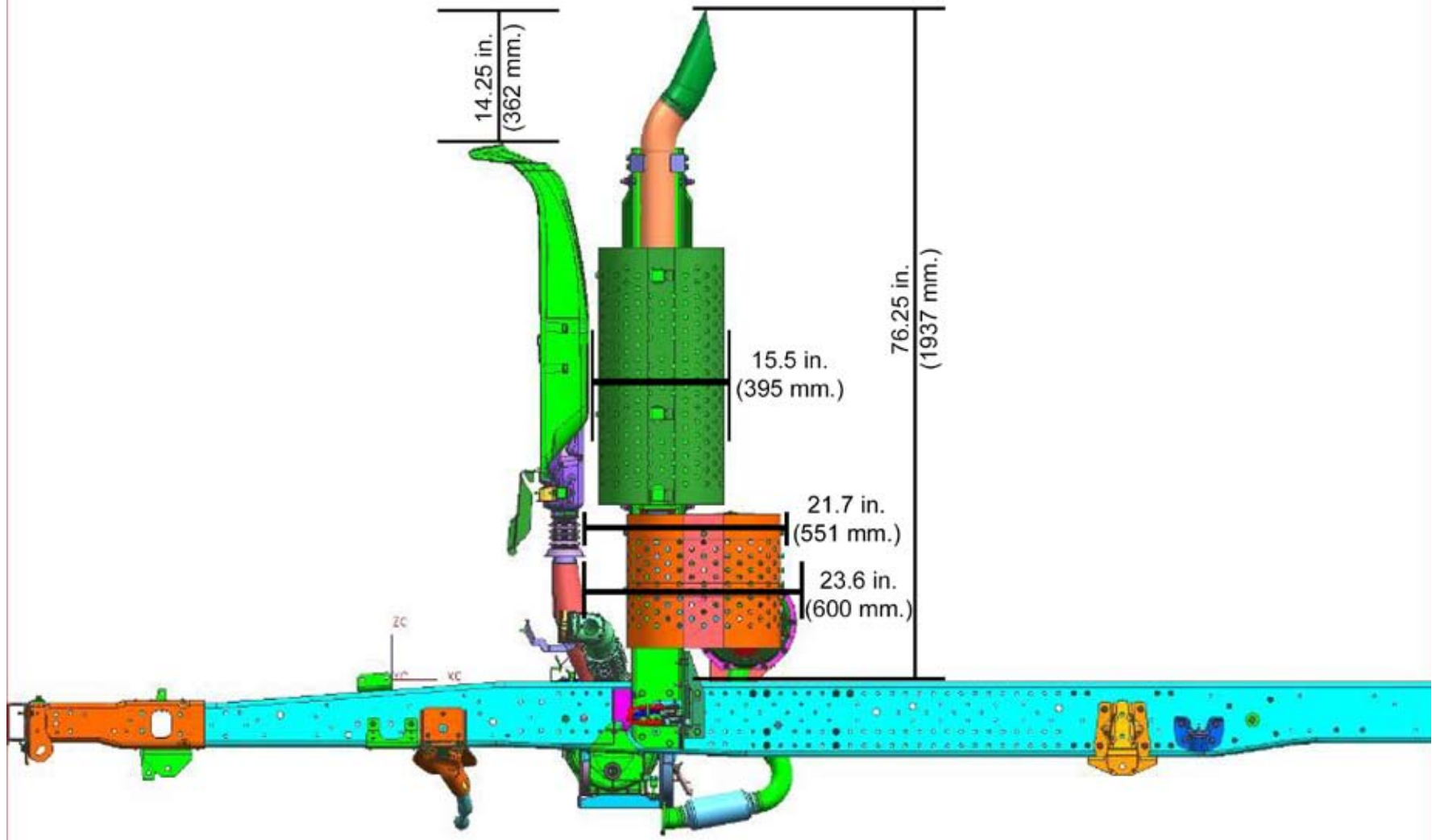
## **N/W Series Vertical Exhaust**

- Option code IU1
- Vertical exhaust is available on 109,132.5,150,176,200 and 212 inch wheelbases.
- Vertical exhaust is available on 14,500, 17950, and 19,500 GVWR (N/A on 12,000 GVWR)
- Not available with 6.0L Gas Engine
- Available as a port installed option only
- Available with Automatic transmission only
- Available with in rail fuel tank only
- Available with single cab only

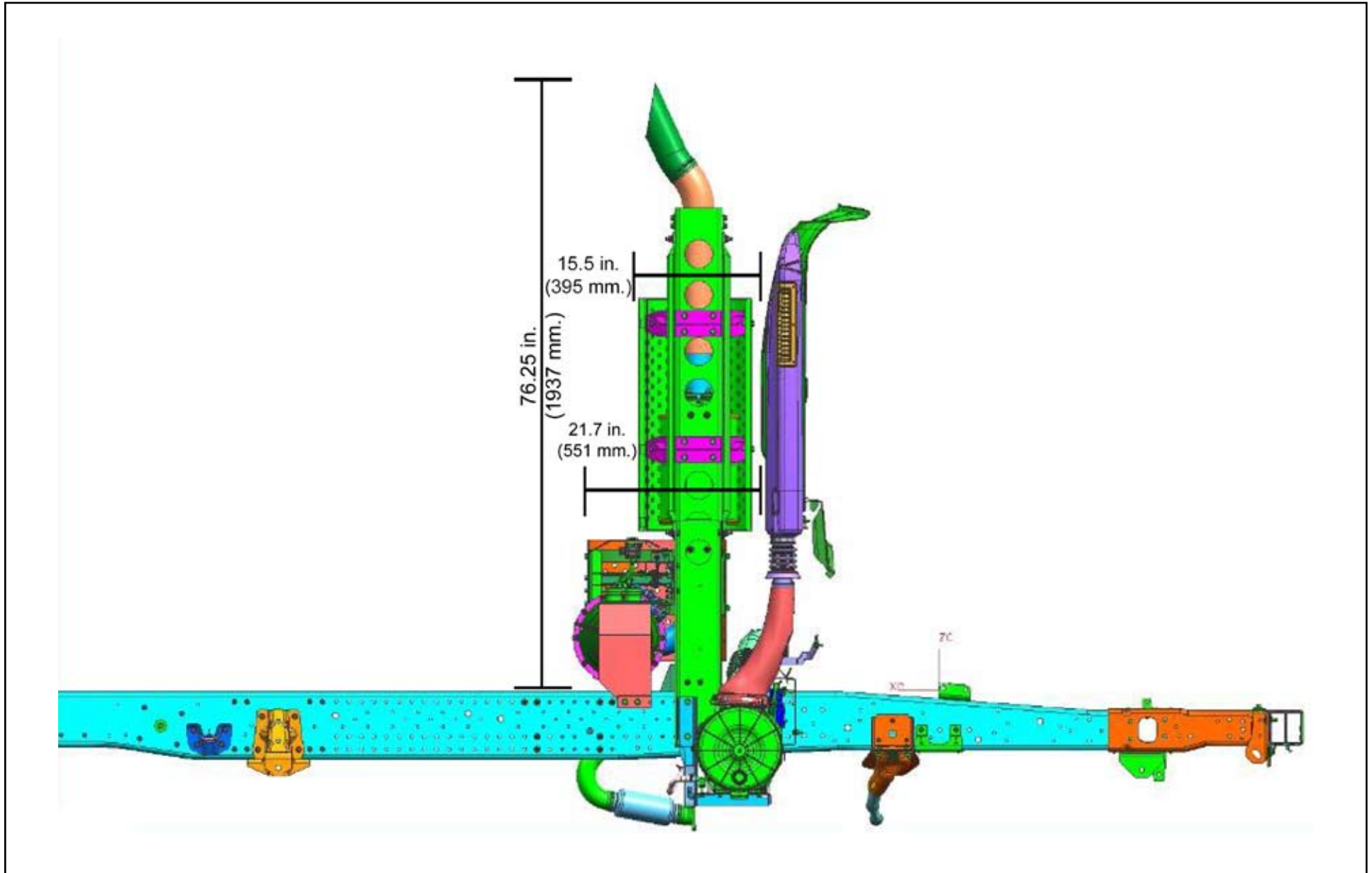
## N/W Series – Vertical Exhaust Top View



## N/W Series – Vertical Exhaust Drivers Side View



## N/W Series – Vertical Exhaust Passenger Side View





## N/W Series – Vertical Exhaust Rear View

