

Figure 0.1.1

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Download Isuzu's Body Builder Guide or sections for important information about up fitting your N-Series Medium Duty Commercial truck. Please check Section 0 to review information that has changed since your last visit as the guide is updated from time to time to include the latest information available. All printed material, specifications, and drawings contained in the Isuzu's Body Builder Guide are based on the latest information available at the time of publication / posting. The manufacturer reserves the right to discontinue or change, at any time, without notice specifications, options, materials, equipment, design and models.

Information contained in the guide includes:

- FMVSS safety standard
- EPA requirements
- OE recommendations
- Cautions for successful application up fitting and Frame modification procedures
- Last updated on "date"

2016 Body Builder Guide Revisions

REVISION NUMBER	REVISION DATE	SECTION NUMBER	PAGE NUMBER	REVISION DESCRIPTION	REVISION DESCRIPTION
1	5/1/15	0	0.2	Revision 1 Add 2016 Gas Chassis Sections	Revise chart for revision 1
1	5/1/15	7	7.1-7.27	Revision 1 Sec07_NPR NPR HD Gas	Add section
1	5/1/15	8	8.1-8.30	Revision 1 Sec08_NPR NPR HD Gas Crew Cab	Add section
1	5/1/15	16	16.1-16.39	Revision 1 Sec 16_Gas Cab Chassis Electrical	Add section
2	6/4/15	0	0.2	Revision 2 Revise Section 0,10, 11, 12, 13, 14, 15, 18, 19, 20,and 21	Revise chart for revision 2
2	6/4/15	10	10.15	Revision 2 Revise Section 10	Revise note on page to include maximum body dimensions and correct west coast phone number.
2	6/4/15	11	11.15	Revision 2 Revise Section 11	Revise note on page to include maximum body dimensions and correct west coast phone number.
2	6/4/15	12	12.15	Revision 2 Revise Section 12	Revise note on page to include maximum body dimensions and correct west coast phone number.
2	6/4/15	13	13.11	Revision 2 Revise Section 13	Revise note on page to include maximum body dimensions and correct west coast phone number.
2	6/4/15	14	14.12	Revision 2 Revise Section 14	Revise note on page to include maximum body dimensions and correct west coast phone number.
2	6/4/15	15	15.15	Revision 2 Revise Section 15	Revise note on page to include maximum body dimensions and correct west coast phone number.
2	6/4/15	18	18.42	Revision 2 Revise Section 18	revise to add new page
2	6/4/15	19	19.1-19.18	Revision 2 Revise Section 19	revise for new IVD
2	6/4/15	20	20.1	Revision 2 Revise Section 20	add note to see section 19
2	6/4/15	20	20.2-20.18	Revision 2 Revise Section 20	delete pages
2	6/4/15	21	21.1	Revision 2 Section 21_Vertical exhaust	revise copy
2	6/4/15	21	21.2	Revision 2 Section 21_Vertical exhaust	Add compairson views
3	9/30/15	0	0.2	Revision 3 revise sections 2, 16,17,18	Revise chart for revision 3
3	9/30/15	2	2.33	Revision 3 revise section 2	revise part number for the abs wire harness and clips
3	9/30/15	16	16.1-16.39	Revision 3 revise section 16	revise wiring art work for 2016 Model year
3	9/30/15	17	17.1-17.34	Revision 3 revise section 17	revise wiring art work for 2016 Model year
3	9/30/15	18	18.1-18.42	Revision 3 revise section 18	revise wiring art work for 2016 Model year
4	10/15/15	0	0.2	Revision 4 revise sections 18	Revise chart for revision 4
4	10/15/15	18	18.1-18.42	Revision 4 revise section 18	add Manual Regeneration for GSE vehicles to BBG
5	4/27/16	0	0.2	Revision 5 Revise Section 0, 3, 7, and 8	revise to add note for High Idle Mode
5	4/27/16	3	3.1-3.2	revision 5 revise section 3	revise body application chart
5	4/27/16	3	3.3-3.8	revision 5 revise section 3	delete weight distribution chart
5	4/27/16	7	7.3	Revision 5 revise section 7	revise to add note for High Idle Mode
5	4/27/16	9	8.3	Revision 5 revise section 8	revise to add note for High Idle Mode
6	8/23/16	0	0.2	Revision 6 section 0	Revise chart for revision 6
6	8/23/16	1	1.8	Revision 6 section 1	Delete fuel tank caution
6	8/23/16	1	1.9	Revision 6 section 1	Add fuel tank caution

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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; NPR-HD Gas, NPR; NPR-HD Gas Crew Cab; NPR; NPR-HD NPR-XD, NQR, NRR Diesel Chassis Cab. NPR-HD, NQR Diesel Crew 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

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	MODEL	
			NPR NPR-HD NPR-XD	NQR NRR
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

CANDA	US	TITLE	MODEL	
			NPR NPR-HD NPR-XD	NQR NRR
o	–	On-Road Vehicle and Engine Emission Regulations	1, 3	1
o	–	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.

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.

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
- Tires (including correct tire pressure)
- Engine assembly
- Transmission assembly
- Diesel Particulate Filter (DPF), Diesel Exhaust Fluid (DEF) Tank, Selective Catalitic Reduction (SCR) System and its locations
- Powertrain cooling fan
- Intake system
- Axle
- Catalytic converter and its location (if equipped)

B. Final compliance with CMVSS 1106 is the responsibility of the final stage manufacturer for any modifications, or added material, components, or systems.

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
- Brake failure warning
- * Brake failure displays
- Clutch
- Driver's sunvisor
- Electrical charge indicator
- Engine coolant temperature display
- Engine idle speed control
- Fuel level display
- Hazard warning control & indicator
- Master lighting switch (includes clearance lamp, identification lamp, and tail lamp control)
- Heating & air conditioning system control
- Heating system & air conditioning system fan
- Gear position display
- High beam indicator & control
- Horn control
- Ignition switch (engine start & stop control)
- Illumination intensity control
- Low fuel indicator
- Manual/automatic transmission shift lever
- * Odometer
- Engine oil pressure display
- Service brake
- * Speedometer
- Steering wheel
- Turn signal, control & indicator
- Windshield defrosting & defogging controls
- Windshield washer control
- Windshield wiper 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.

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:

Air Inlet System
Boost Pressure Sensor
Catalytic Converter, its Location and Related Sensors
Charge Air Cooler and Related System
Crank Case Emission Control System
Diesel Exhaust Fluid (DEF) Injector
Diesel Exhaust Fluid (DEF) Plumbing and Wiring
Diesel Exhaust Fluid (DEF) Pump, Diesel Exhaust Fluid (DEF) Tank
Diesel Particulate Filter (DPF), its Location and Related Sensors
Engine Assembly
Engine Coolant Temperature Sensor
Engine Electronics (ECM, PCM, VCM)
Engine Speed Sensor
Exhaust Emission Control System
Exhaust Gas Recirculation System and Related Sensors
Exhaust Gas Temperature Sensor
Exhaust Oxygen Sensors (if equipped)
Exhaust System
Fuel Injection Components / Controls
Fuel System
Injection Pump
Injector and High Pressure Lines
Intake Manifold
Intake Manifold Temperature Sensor
MAF Sensor
NOX Sensors
Selective Catalytic Reduction (SCR) System, its Locations and Related Sensors
Transmission Control Module (TCM)
Turbo Charger and Associated Equipment/ Controls
VNT Compressor Out Air Temperature Sensor

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.

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

PART 2

U.S. ENVIRONMENTAL PROTECTION AGENCY AND STATE OF CALIFORNIA EMISSION REQUIREMENTS AND ON-BOARD DIAGNOSTIC SYSTEM (OBDII/HD-OBD/EMD) REQUIREMENTS

To assure that EPA and California emission certificate requirements and OBDII/HD-OBD/EMD 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/HD-OBD/EMD requirements will be maintained providing no alterations (except where noted) are made to the components identified below:

Air Inlet System
Boost Pressure Sensor
Catalytic Converter, its Location and Related Sensors
Charge Air Cooler and Related System
Crank Case Emission Control System
Diesel Exhaust Fluid (DEF) Injector
Diesel Exhaust Fluid (DEF) Plumbing and Wiring
Diesel Exhaust Fluid (DEF) Pump, Diesel Exhaust Fluid (DEF) Tank
Diesel Particulate Filter (DPF), its Location and Related Sensors
Engine Assembly
Engine Coolant Temperature Sensor
Engine Electronics (ECM, PCM, VCM)
Engine Speed Sensor
Exhaust Emission Control System
Exhaust Gas Recirculation System and Related Sensors
VNT Compressor Out Air Temperature Sensor
Exhaust Gas Temperature Sensor
Exhaust Oxygen Sensors (if equipped)
Exhaust System
Fuel Injection Components/Controls
Fuel System
Ignition System (Gasoline Engine)
Injection Pump
Injector and High Pressure Lines
Intake Manifold
Intake Manifold Temperature Sensor
MAF Sensor
NOX Sensors
Selective Catalytic Reduction (SCR) System, its Locations and Related Sensors
Transmission Control Module (TCM
Turbo Charger and Associated Equipment/Controls
* Evaporative Emission Control System (if equipped)

* 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 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.

CAUTIONARY NOTES:

Electrical Sensitivity and Battery Relocation Warning

Starting with the 2011 Model year Diesel and 2012 Model year Gas N series, these products are more sensitive to poor electrical integrity of the starting circuit when compared to previous year models. This is due to the ever increasing electrical demands from the base vehicle that includes the new emissions componentry as well as more sophisticated engines and transmissions. The control modules for these devices require healthy electrical circuits without significant voltage drops through the supply and return circuits.

A relocation or modification of batteries coupled with insufficient wire gauge, poor terminal crimps, weak conductivity to frame rails , terminal corrosion, or loose bolts, could contributed to a possible no start condition.

All Fluids and Lubricants Caution

Any fluids or lubricants added to the chassis during the final manufacturing process must meet Isuzu's fluids and lubricants specifications. These fluids and lubricant specifications vary based on model year and chassis model code. A recommended fluids list based on model and model year can be found in the Vehicle Owner's Manual or on line at www.isuzutruckservice.com

Low Speed Applications for N-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.

Tapping into Engine Cooling System

Do not connect any auxiliary heating devices to the chassis cooling system. The chassis cooling system is part of the vehicle emission system and is used to thaw DEF fluid and meet mandatory emission thaw times.

Brake Override Logic

The ECM logic in the2013 NPR and 2014 NPR-HD, NQR, NRR model year chassis has been revised to adopted Brake Override Logic that will reduce engine RPM to idle RPM when the brake and accelerator pedals are applied simultaneously. This ECM logic has been adopted to enhance the safe operation of the vehicle. The brake override logic disables the accelerator pedal input and protects against vehicle malfunction in cases where the accelerator pedal and brake pedal are operated simultaneously, or if unintended driver acceleration pedal operations are detected.

NO-START CONDITION – CLICKING OR BANGING FROM STARTER 2012-2015MY

Isuzu N-Series Equipped with 5.2L (4HK1) Diesel Engines

It is possible to experience a no-start condition accompanied by a clicking or banging-type noise from the starter. This condition presents itself when vehicle battery voltage is low. The insufficient voltage/current will cause an improper ground for the X-17 starter relay. As a result, the starter will not remain engaged to start the engine. This is not an indication of a defective starter, alternator or ECM.

The following is a list of common causes for low battery voltage. Inspect these items as possible causes for the described condition before further diagnosis.

1. Extreme low ambient temperatures (below 10°C / 50°F). The chemical reactions inside of batteries take place more slowly when the battery is cold. The vehicle systems therefore have less energy to work with when it tries to start the engine.
2. Vehicles stored for long periods without proper battery charging and maintenance.
3. Batteries that have been relocated further away from the starter than the original designed location.
4. Batteries or battery cables that have been replaced with improper gauge.
5. Corroded battery terminals and cables.
6. Vehicles that are started and stopped multiple times without allowing the charging system to replenish the batteries' charge.
7. Excessive use of electrical equipment such as electric lift gates.
8. Interior and exterior lighting left "On" without the engine running.

NOTE: Do not diagnose starters, alternators, ECMs or other no-start conditions prior to ensuring the battery is fully charged and none of the above common causes exist

Fuel Tank Caution

Fuel fill kit must be installed on cab chassis if it will be driven for an extended distance (Note: fuel tank kit provides venting for the fuel tank.
DO NOT RESTRICT OR KINK THE FUEL TANK VENT HOSE Operating this vehicle with a restricted or kinked fuel tank vent hose may cause serious damage to the fuel tank and/or fuel injection pump. Continued operation may cause engine failure.

2015-2016 - ISUZU
MEDIUM DUTY
V.I.N IDENTIFICATION

JALE5B120F7900750

CODE	DESCRIPTION
JAL	ISUZU INCOMPLETE, JAPAN BUILT
54D	SPARTAN MOTORS INC. USA

Plant Sequential Number

CODE	DESCRIPTION
W Stripped Chassis (DSL)	(12,000 GVW)
M Stripped Chassis (DSL)	(13,000 GVW)
K NPR-XD (DSL)	
0 NPR-HD (DSL)	
3 NRR (DSL)	
4 NPR (DSL)	(12,000 GVW)
F NPR (DSL)	(13,000 GVW)
8 NPR NPR-HD (GAS)	
9 NQR (DSL)	

CODE	GVWR RANGE	BRAKE SYSTEM
B	10001-14000	HYDRAULIC
C	14001-16000	HYDRAULIC
E	16001-19500	HYDRAULIC

PLANT CODE
7 - FUJISAWA
S - CHARLOTTE, MICHIGAN

CODE	MAKE DESCTIPTION
4	ISUZU NPR / NPR-HD / NPR-XD
5	ISUZUNQR/NRR

Model
D For 2013 E For 2014 F For 2015 G For 2016

CHECK DIGIT

CODE	CAB TYPE
W	71 BBC STEEL TILT CAB
J	110 BBC STEEL NON-TILT CAB
T	FORWARD CONTROL CHASSIS ONLY

CODE	ENGINE DESCRIPTION
6	5.2L Diesel
7	3.0L Diesel
B	6.0L GAS L96
C	6.0L GAS LC8 (convertable to CNG/LPG)

CODE	AXLE DESCRIPTION
1	4X2, 2AXLE, 1 DRIVING

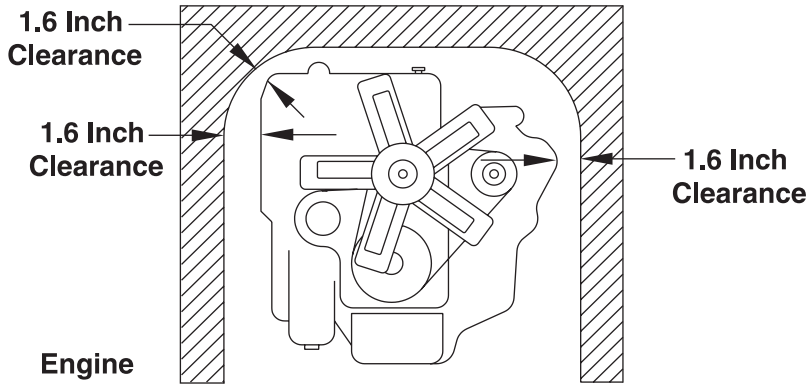
Sample VINs:
2014 Reach: JALB4T170F7W09999
2015 NQR Crew Cab JALE5J1699G7909999
2015 NPR-HD Gas Standard Cab: 54DC4W1BGS809999

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.

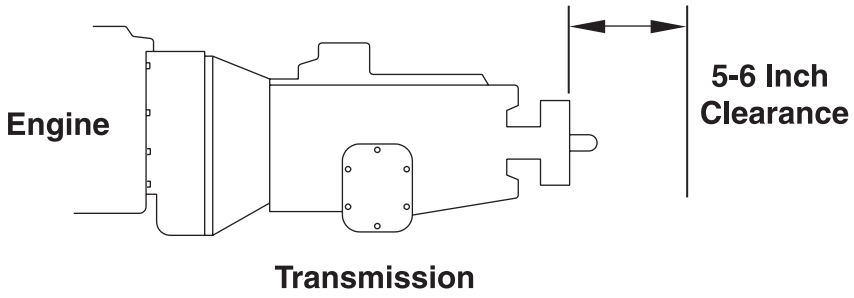


Front and Back Clearance 1 inch

Figure 2.1.1

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 binding.



Front and Back Clearance 1 inch

Figure 2.1.2

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

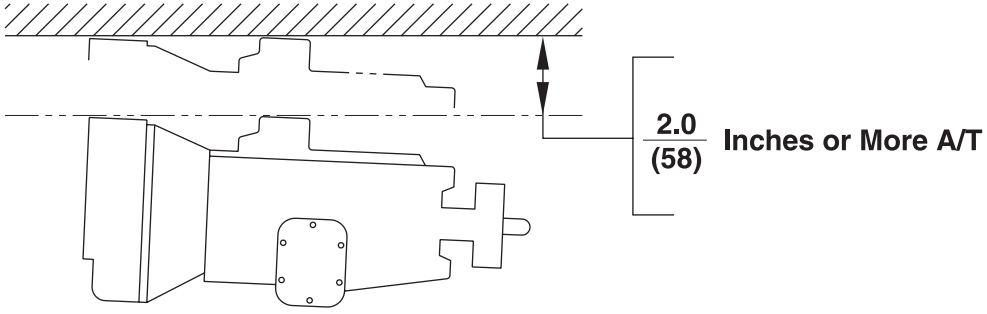


Figure 2.2.1

Front and Center Propeller Shafts

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

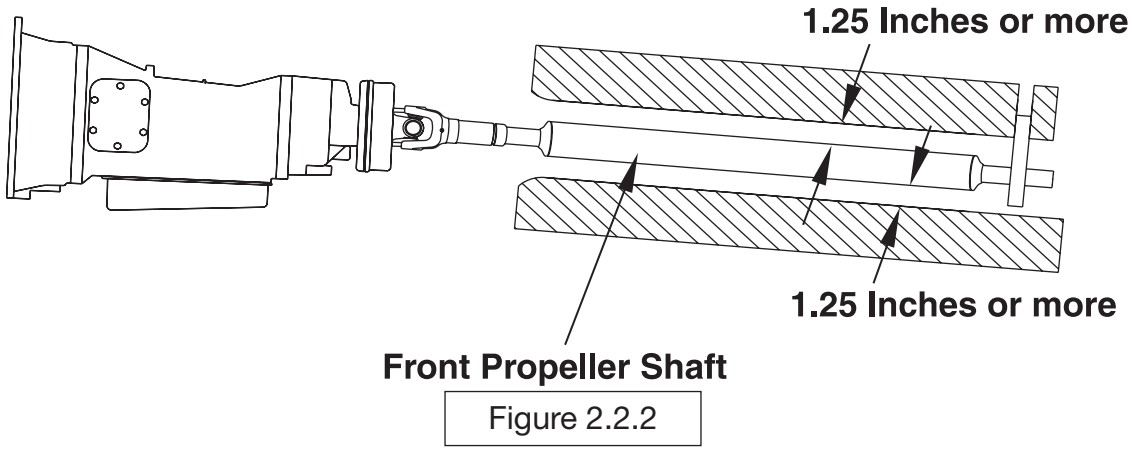


Figure 2.2.2

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.

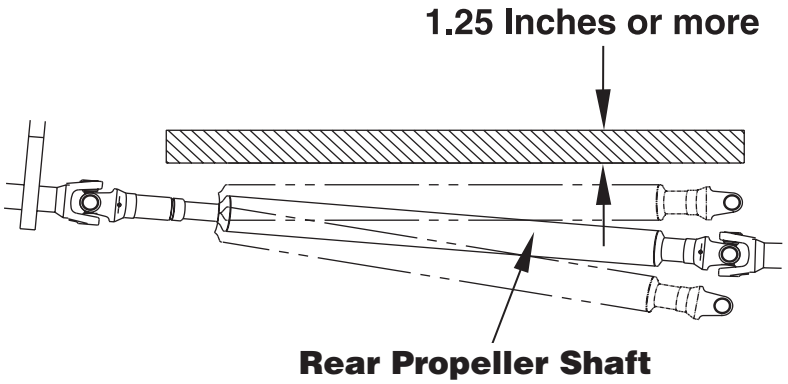


Figure 2.3.1

Exhaust System
The exhaust system has a crucial role in meeting 2010 EPA regulations. In order to maintain compliance with the 2010 EPA emissions levels the Diesel Particulate Filter (DPF) and SCR package must not be moved. The distance between the engine exhaust manifold down pipe and Diesel Particulate Filter (DPF) / Selective Catalytic Reduction Package (SCR) 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.

Diesel Particulate Filter and Selective Catalytic Reduction (SCR) Restrictions
The DPF/SCR 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/SCR should be free from impact or vibration during body installation. The DPF/SCR must have enough room for disassembly of the unit for service and cleaning.

The DPF/SCR switch in the cab should not be removed or disabled. No modification or relocation of the DPF/SCR unit, pressure pipes, and sensor is permitted.

No Modification Zones

The **DPF/SCR** unit **CAN NOT** be modified or moved .
The **DEF** tank and pump **CANNOT** be modified or removed. **DEF** lines and coolant lines **CANNOT** be modified or rerouted.

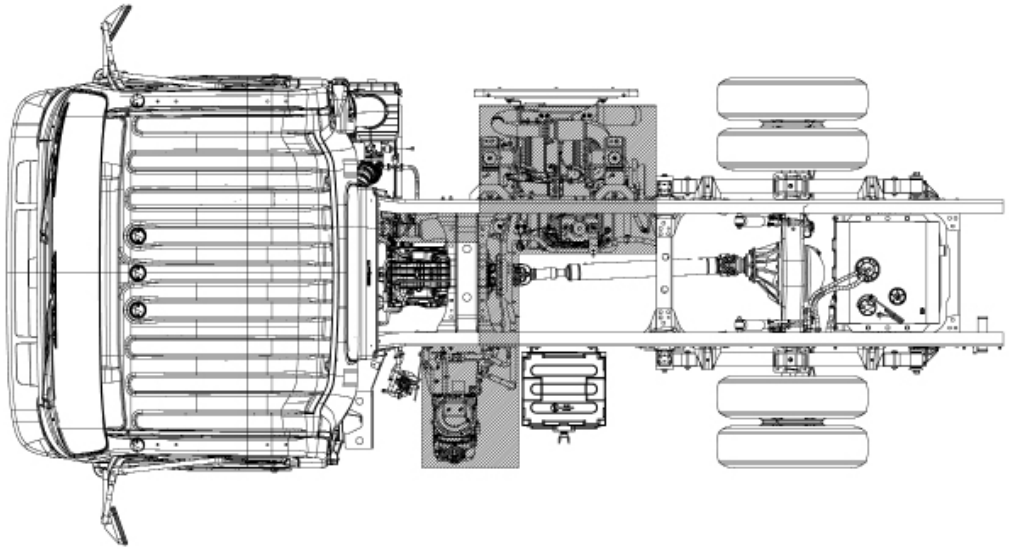


Figure 2.4.1

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, DPF/SCR Package. 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.

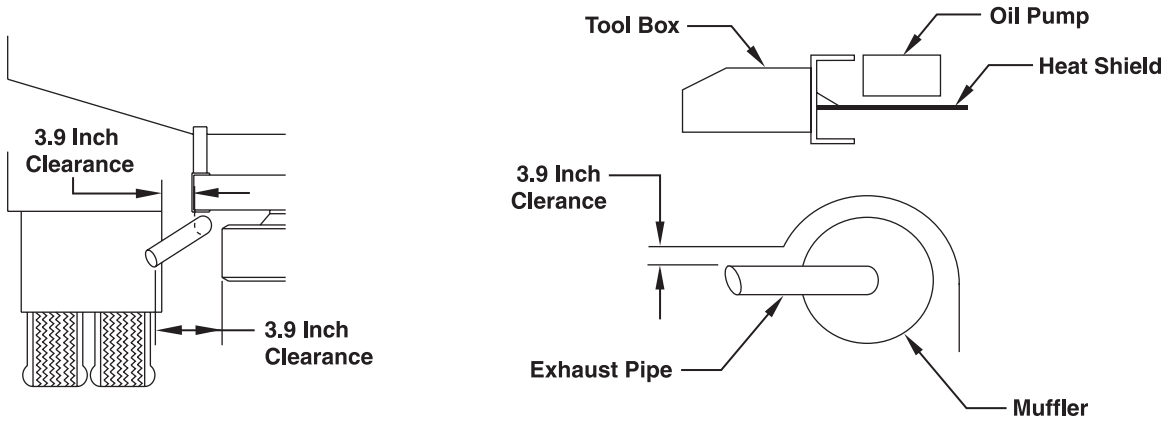


Figure 2.5.1

1) Clearances around SCR system components must be greater than 1.0 inch at all times to avoid potential contact between the body and the exhaust components. The 1.0 inch allows for thermal expansion and assembly tolerance of the exhaust system. It does not account for dynamic movement in the body due to road conditions and other loads. Body companies are instructed to adjust this 1.0 inch clearance as required to account for body displacement while driving. This guidance does not supercede guidance or exhaust clearances for temperature sensitive or flameable components.

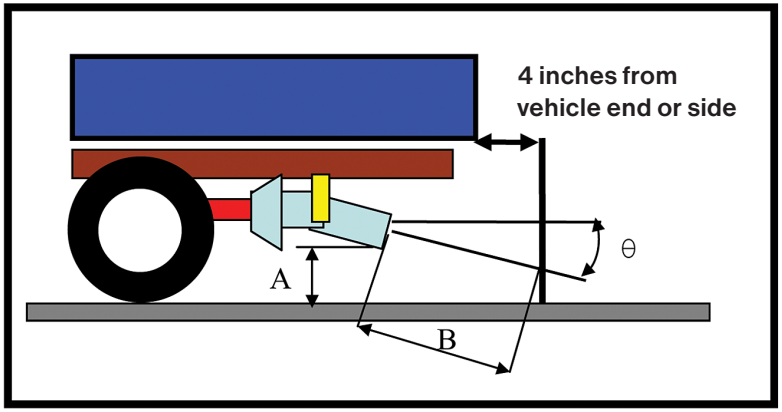
2) Exhaust temperatures have not changed since the introduction of DPF in 2007.

Exhaust system surface temperatures During Manual Regeneration

N-Series Modification Guideline (heat issue)

(EXHAUST PIPE HEAT)

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 8 inches	More than 18 inches	Less than 45 deg

Figure 2.6.1

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.

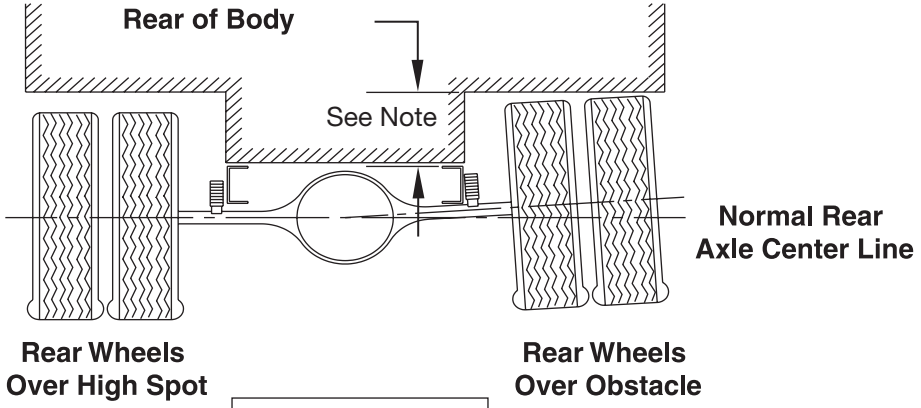


Figure 2.7.1

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

Other Clearances

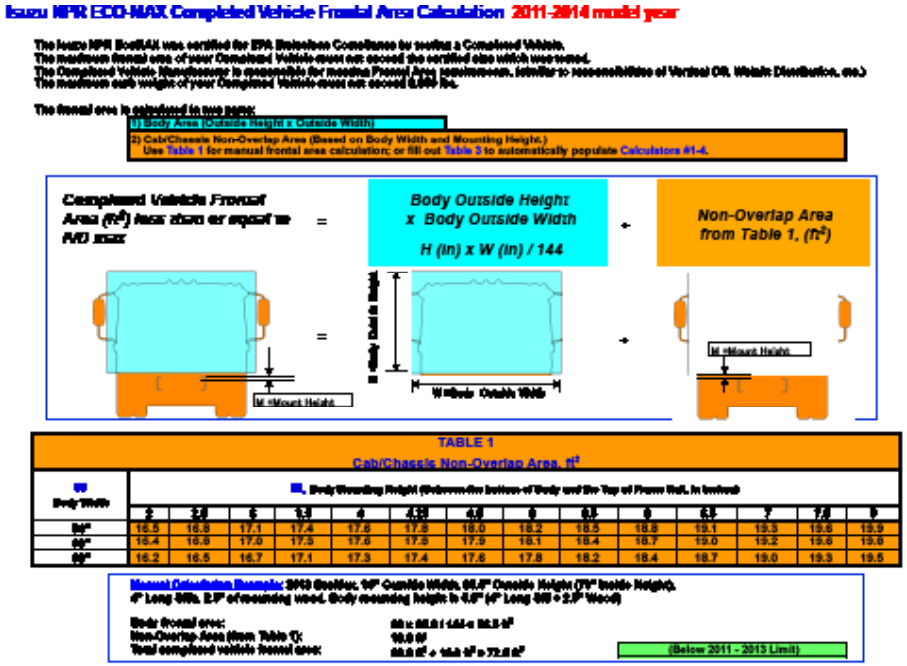
The transmission control cable may be broken if it is bent by or interferes with the body and its fixtures. To prevent this, 1 inch of minimum clearance should be provided. When cable is detached from body mounting, be sure not to bend the cable.

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.	Axle Side
	1.6 in.	Frame Side
Parking Brake Cable	1.2 in.	—
Fuel Hose	1.6 in.	—
Shock Absorber	2.4 in.	Axle Side
	1.2 in.	Frame Side

Figure 2.7.2

Body Installation



Isuzu NPR ECO-MAX Completed Vehicle Frontal Area Calculation 2011-2014 model year

The Isuzu NPR EcoMAX was certified for EPA Statutory Compliance by testing a Completed Vehicle.
The maximum frontal area of your Completed Vehicle must not exceed the certified size which was tested.
The Completed Vehicle Manufacturer is responsible for meeting Frontal Area requirements, (similar to responsibilities of Vertical CG, Weight Distribution, etc.)
The maximum curb weight of your Completed Vehicle must not exceed (LBS) lbs.

The frontal area is calculated in two parts:

1) Body Area (Outside Height x Outside Width)

2) Cab/Chassis Non-Overlap Area (Based on Body Width and Mounting Height.)
Use Table 1 for manual frontal area calculation; or fill out Table 2 to automatically populate Calculators #1-4.

Completed Vehicle Frontal Area (ft^2) less than or equal to IVD max: =

Body Outside Height x Body Outside Width

H (in) x W (in) / 144

+

Non-Overlap Area from Table 1, (ft^2)

=

M =Mount Height

= Body Outside Height

Width Outside Width

+

M =Mount Height

TABLE 1

Cab/Chassis Non-Overlap Area, ft^2

W Body Width	M, Body Mounting Height (Minimum Per Inches of Body and the Top of Frame Rail, in Inches)													
	2	2.5	3	3.5	4	4.5	5	6	6.5	8	8.5	7	7.5	8
84"	16.5	16.8	17.1	17.4	17.6	17.8	18.0	18.2	18.5	18.8	19.1	19.3	19.6	19.9
90"	16.4	16.6	17.0	17.5	17.6	17.8	17.9	18.1	18.4	18.7	19.0	19.2	19.6	19.8
96"	16.2	16.5	16.7	17.1	17.3	17.4	17.6	17.8	18.2	18.4	18.7	19.0	19.3	19.5

Manual Calculation Example: 2013 EcoMax, 96" Outside Width, 85.4" Outside Height (79" Inside Height).
4" Long Sills, 0.5" of mounting wood. Body mounting height is 4.5" (4" Long Sill + 0.5" Wood)

Body frontal area: 85 x 96.0 / 144 = 56.5 ft^2
Non-Overlap Area (from Table 1): 18.0 ft^2
Total completed vehicle frontal area: 56.5 ft^2 + 18.0 ft^2 = 72.6 ft^2 (Below 2011 - 2013 Limit)

Frontal Area Limits

The 2011 - 2013 Model Year cutaway/cab have a frontal area limit of 74.5 ft^2 (6.92 m^2).
The 2014 Model Year cutaway/cab have a frontal area limit of:

- Base Chassis Limit: 79.6 ft^2 (7.4 m^2), no Isuzu Application Approval is Required.
- Base Chassis Limit with Isuzu Air Deflector P/N 8980978994: 84.6 ft^2 (7.86 m^2). Approval is Required for this custom frontal area. Your Isuzu dealer can obtain approval information from Isuzu Application Engineering.

TABLE 2

Completed Frontal Area Limits by NPR EcoMax Model and Model Year

Model Year	Wheelbase	Max Frontal Area	Application Approval
2011 - 2013	110" 134" 151" NJ1 NJ2 NJ3	74.5 ft^2 = 6.92 m^2	Not required
2014	110" 134" 151" NJ1 NJ2 NJ3	79.6 ft^2 = 7.4 m^2	Not required
2014 With Air Deflector	134" 151" NJ2 NJ3 (110" N/A not available)	84.6 ft^2 = 7.86 m^2	Required

Always consult the Incomplete Vehicle Document (IVD) for the completed vehicle requirements.
A copy of the IVD is also available in the Isuzu Body Builders Guide.

Figure 2.8.1

Body Installation

Table 3: Van Body Dimensional Values

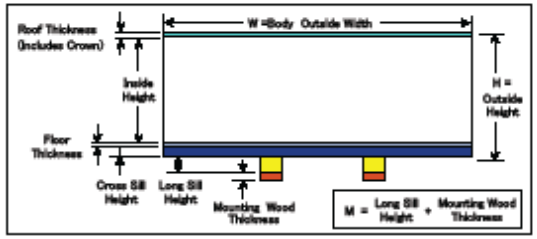
Please fill in the BLUE cells to generate the Frontal Area results for Calculators #1 - #3.

= User Defined Value

= Calculated Value (Locked)

Roof Thickness, in	2.5
Floor Thickness, in	1.125
Cross Sill Height, in	3
Long Sill Height, in	4
Mounting Wood Thickness, in	2.5
Body Mounting Height (M), in	6.50





Calculator 1: Completed Vehicle Frontal Area From Body Inside Height (Results based on Table 3 Input)

Body Outside Width W, in	Body Inside Height, in	Body Outside Height, in	Body Frontal Area, ft²	Completed Vehicle Frontal Area, ft²	Proposed Condition OK? 2011 - 2013	2014+ Without AD	2014+ With AD
84	79	85.625	49.9	69.0	OK	OK	OK
84	85	91.625	53.4	72.5	OK	OK	OK
84	91	97.625	56.9	76.0	-	OK	OK
90	79	85.625	53.5	72.5	OK	OK	OK
90	85	91.625	57.3	76.2	-	OK	OK
90	91	97.625	61.0	80.0	-	-	OK
96	79	85.625	57.1	75.8	-	OK	OK
96	85	91.625	61.1	79.8	-	-	OK
96	91	97.625	65.1	83.8	-	-	OK

Calculator 2: Completed Vehicle Frontal Area From Body Outside Height (Results based on Table 3 Input)

Body Outside Width W, in	Body Inside Height, in	Body Outside Height, in	Body Frontal Area, ft²	Completed Vehicle Frontal Area, ft²	Proposed Condition OK? 2011 - 2013	2014+ Without AD	2014+ With AD
84	78.375	85	49.6	68.6	OK	OK	OK
84	84.375	91	53.1	72.1	OK	OK	OK
84	89.375	96	56.0	75.1	-	OK	OK
90	78.375	85	53.1	72.1	OK	OK	OK
90	84.375	91	56.9	75.9	-	OK	OK
90	90.375	97	60.6	79.6	-	OK	OK
96	78.375	85	56.7	75.4	-	OK	OK
96	84.375	91	60.7	79.4	-	OK	OK
96	90.375	97	64.7	83.4	-	-	OK

Calculator 3: Maximum Allowed Body Mounting Height (Results based on Table 3 Input)

Body Outside Width W, in	Body Inside Height, in	Body Outside Height, in	Body Frontal Area, ft²	Max Mount Height (M), in 2011 - 2013	2014+ Without AD	2014+ With AD
84	79	85.625	49.9	16.3	25.4	34.4
84	85	91.625	53.4	10.1	19.2	28.1
84	91	97.625	56.9	3.8	12.9	21.9
90	79	85.625	53.5	10.1	19.2	28.2
90	85	91.625	57.3	3.4	12.5	21.5
90	91	97.625	61.0	-	5.8	14.7
96	79	85.625	57.1	4.25	13.3	22.3
96	85	91.625	61.1	-	6.2	15.1
96	91	97.625	65.1	-	-	8.0

Note: Calculated height values > Mount height over 15" is not typical

Figure 2.9.1

Mirrors

The Isuzu NPR series chassis will accommodate up to 96 inch wide bodies without modification to the mirror brackets.

The Isuzu NPR-HD, NPR-XD, NQR ,and NRR 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 IU2 indicating “Mirror Bracket for 102 wide body”. The brackets can also be modified by the N-Series Dealer or the Body Company by installing mirror brackets ordered from Isuzu Parts.

Side Step Door Installation recommendations

Floor of body should be at least 10” above frame rail (2.5” wood + 4” long sill + 3” cross sill + 1.125” floor)

Forward end plate of step well area can interfere with SCR system

All body components should maintain a minimum 1.0” of clearance to exhaust components UNDER ALL (DYNAMIC) CONDITIONS.
(Body company will need to add to this 1.0” clearance to account for flex or movement in the body)

Outer heat shield on SCR system can be removed prior to mounting body if required for clearance
Care should be taken to adequately shield exhaust

Driver’s side steps can also be accommodated, if door is located behind DEF tank

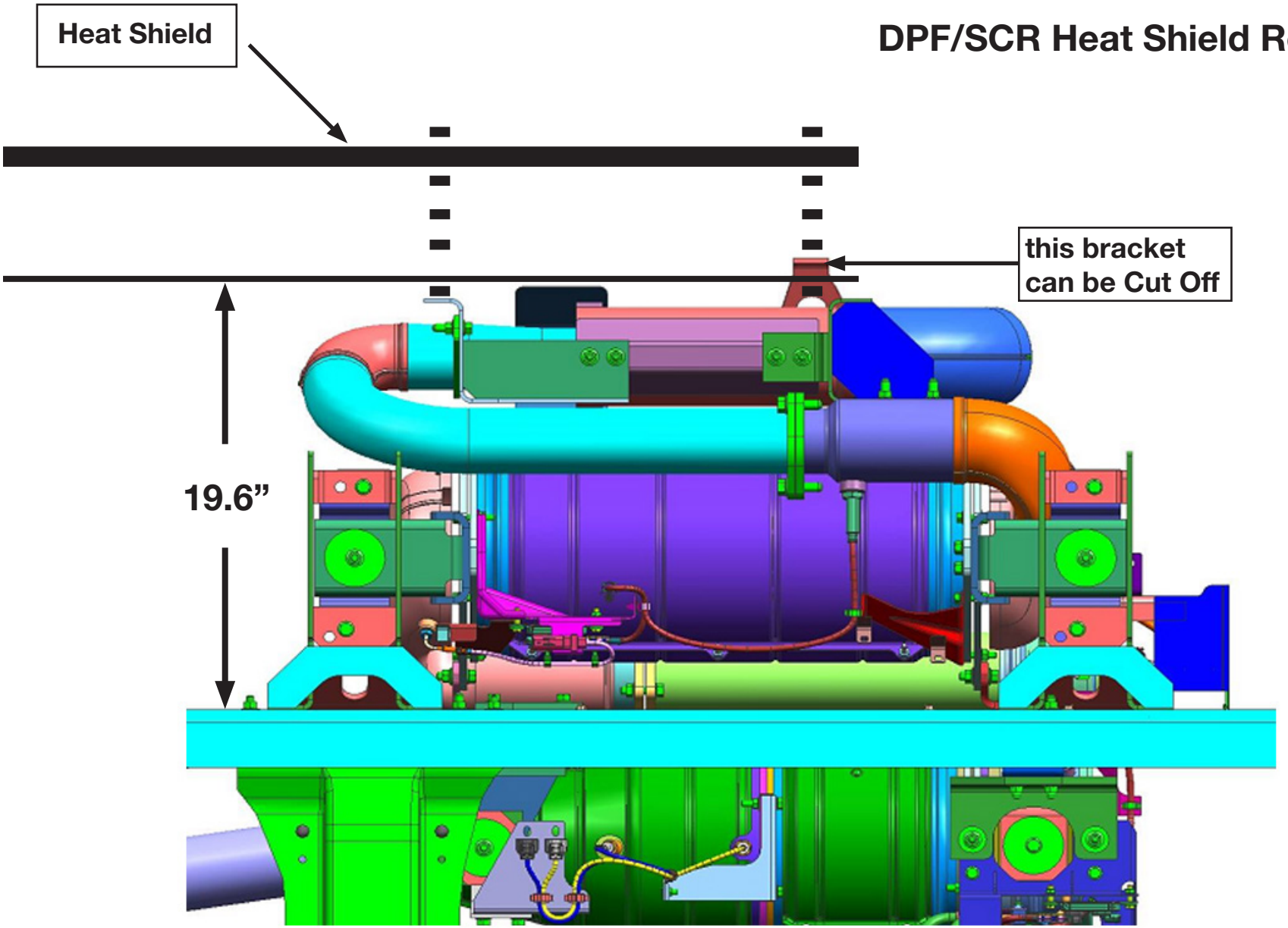
Battery may have to be relocated, depending on door location

Access hatch for DEF tank fill may have to be added, depending on door location

DPF/SCR Heat shield Removal

The exhaust external heat shield does not impact vehicle emissions or emissions system durability. This shield can be removed or modified in order to facilitate body or equipment mounting, but the completed vehicle manufacturer should ensure that, when completed, the exhaust will be adequately shielded to prevent unintentional contact with hot exhaust components, and that heat transfer to body components is not so high as to present safety or durability risks. Detailed information on removal of the heat shield can be found in the Isuzu service manual available on line at www. isuzutruckservice,com.

DPF/SCR Heat Shield Removal



NPR ECOMAX

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 sub frame members when installing special equipment.

Sub frame Design and Mounting

The sub frame 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

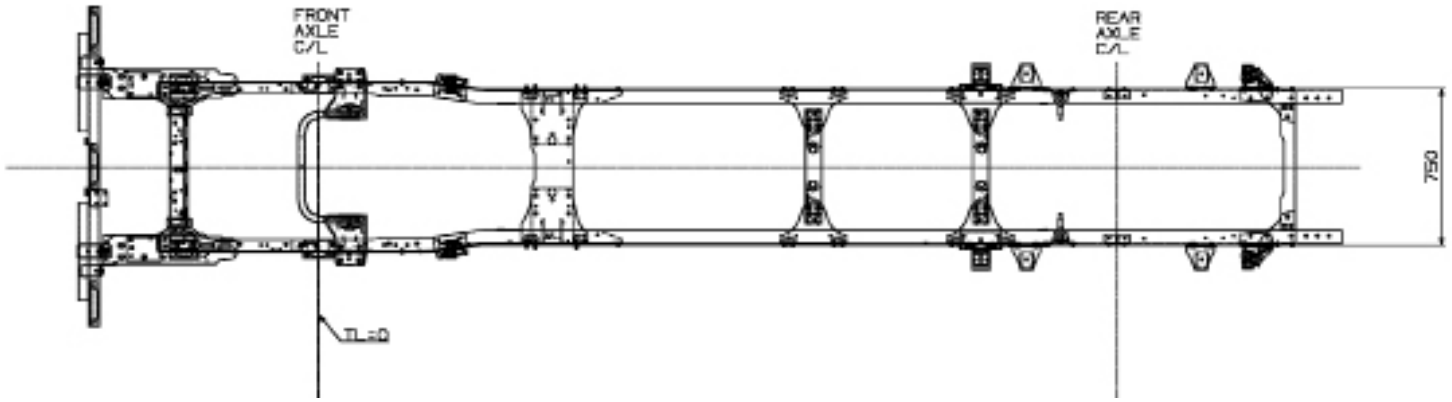


Figure 2.12.1

NPR-HD, NPR-XD, NQR, NRR

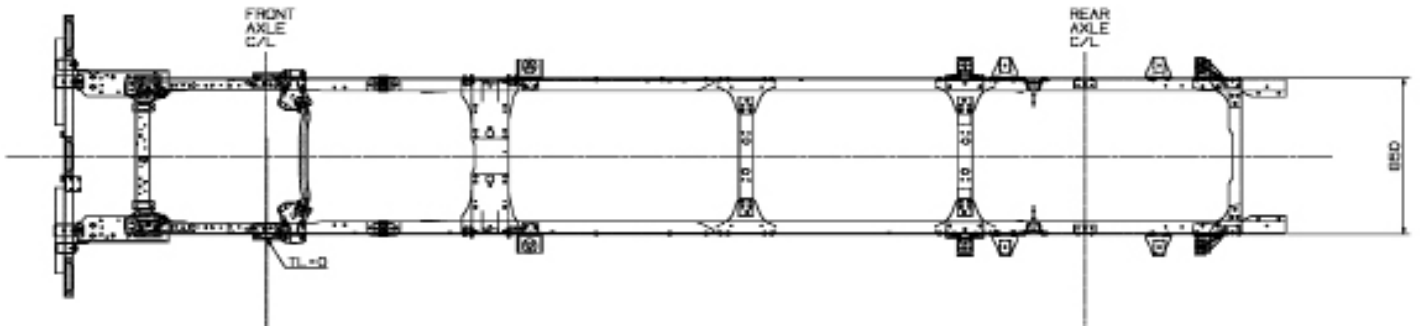
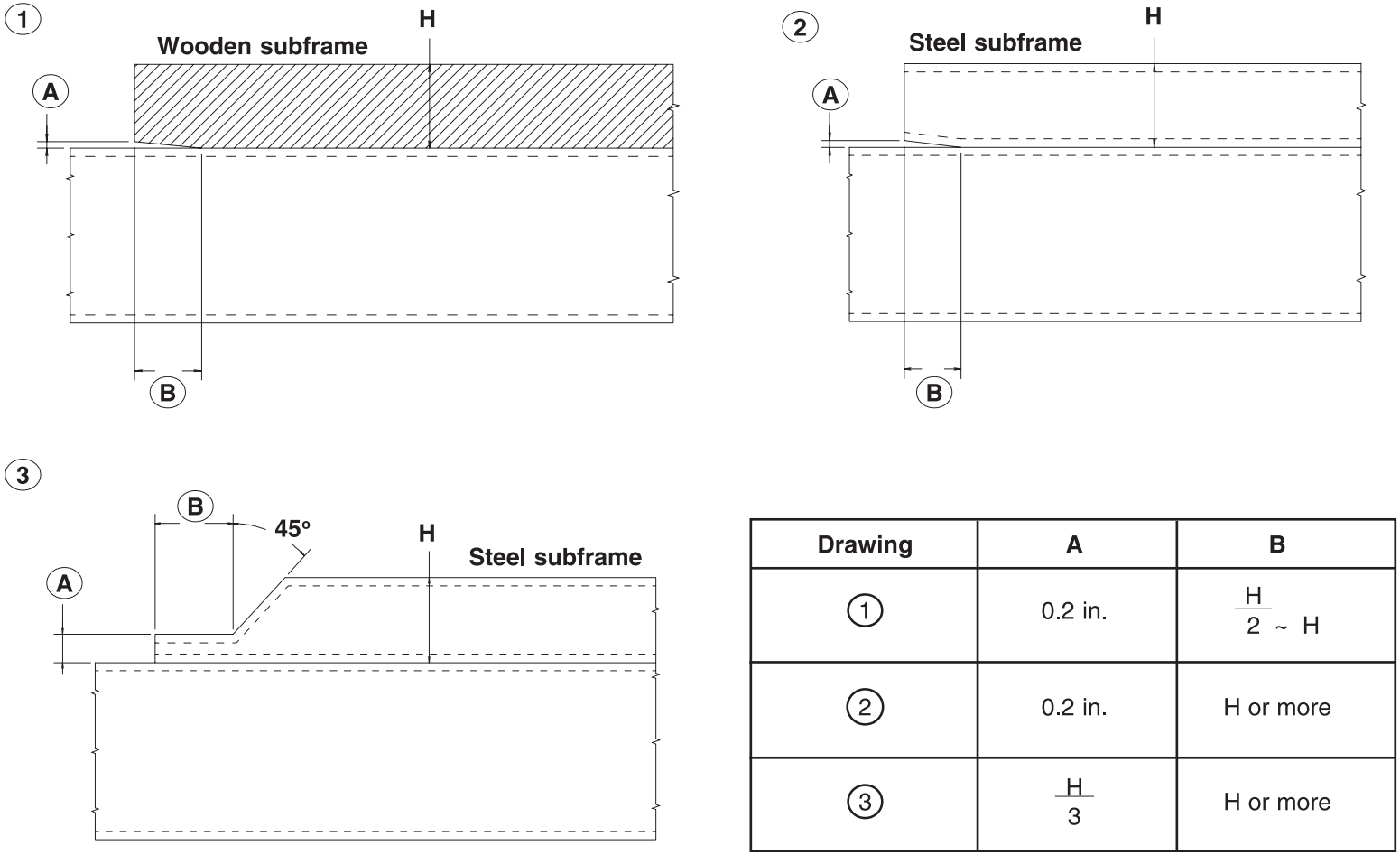


Figure 2.13.1

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.	$\frac{H}{2}$ ~ H
2	0.2 in.	H or more
3	$\frac{H}{3}$	H or more

Figure 2.14.1

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

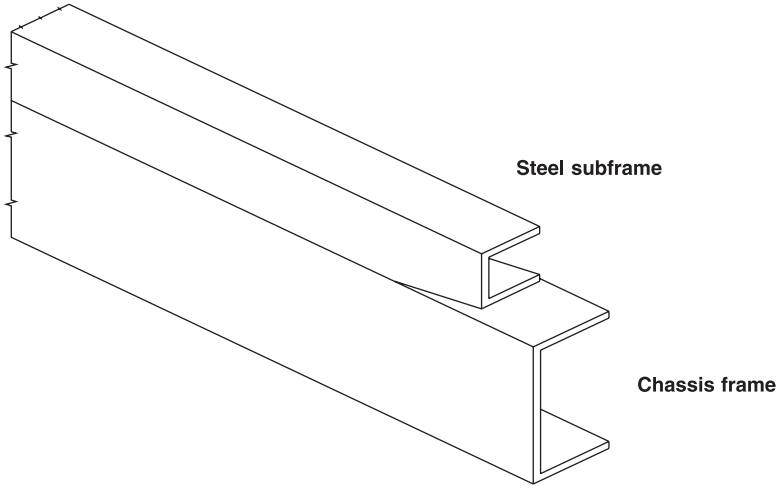


Figure 2.15.1

Prohibited Attachment Areas

Do not attach the sub frame with a bolt or bracket to the chassis frame at the points indicated 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.

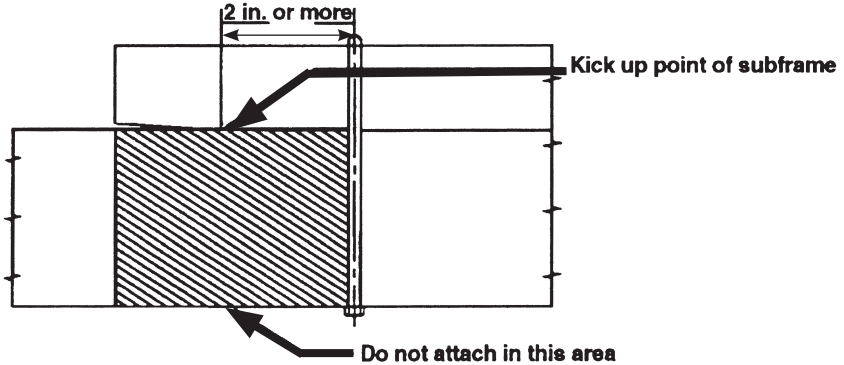


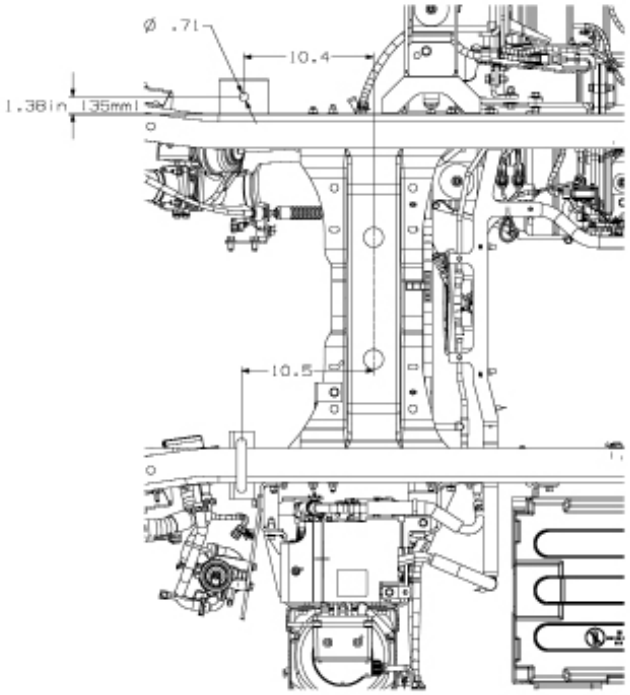
Figure 2.15.2

2. Front U-bolt and Mounting Bracket, Mounting Locations Ahead of Transmission

Mandatory location due to after treatment device location and interior frame components. The chassis will be supplied with one steel crush block in cab for left hand forward body attaching location as illustrated in the drawings below and one body mounting bracket (painted yellow) attached to the right hand frame rail in the location shown in the drawings below. Body Builder will be required to design a mating bracket for attaching the body to the yellow painted chassis body mounting bracket (Ref page 2.16 for illustration of bolt clamping 2 brackets). No U bolt type attaching allowed.

NPR ECO MAX

Forward



Ref 4J Body mount kit 2901400230

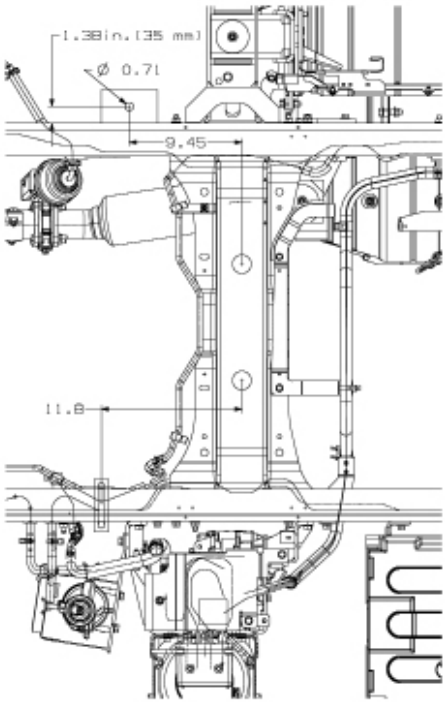
Crush Block and U-Bolt (Left Hand -Rail)

Body Mounting Bracket (Right Hand -Rail)

Figure 2.16.1

NPR-HD, NPR-XD, NQR ,and NRR

Forward



Ref. 4H Body mount Kit PN 2901400270

Crush Block and U-Bolt (Left Hand -Rail)

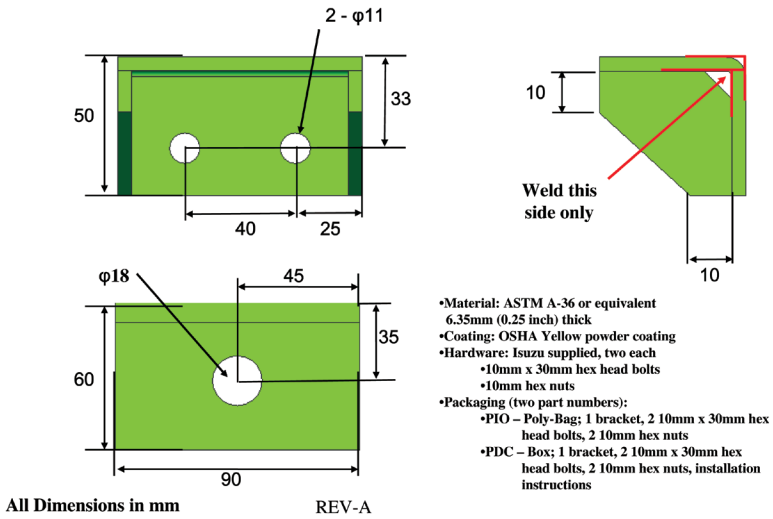
Body Mounting Bracket (Right Hand -Rail)

Figure 2.16.2

U-Bolt Placement – 150" W/B Crew Cab

Front, RHS U-bolt on 150" Wheelbase Crew Cab interferes with after treatment system. Isuzu will supply body mounting bracket on chassis to facilitate body mounting on the passenger side of the vehicle as Illustrated.

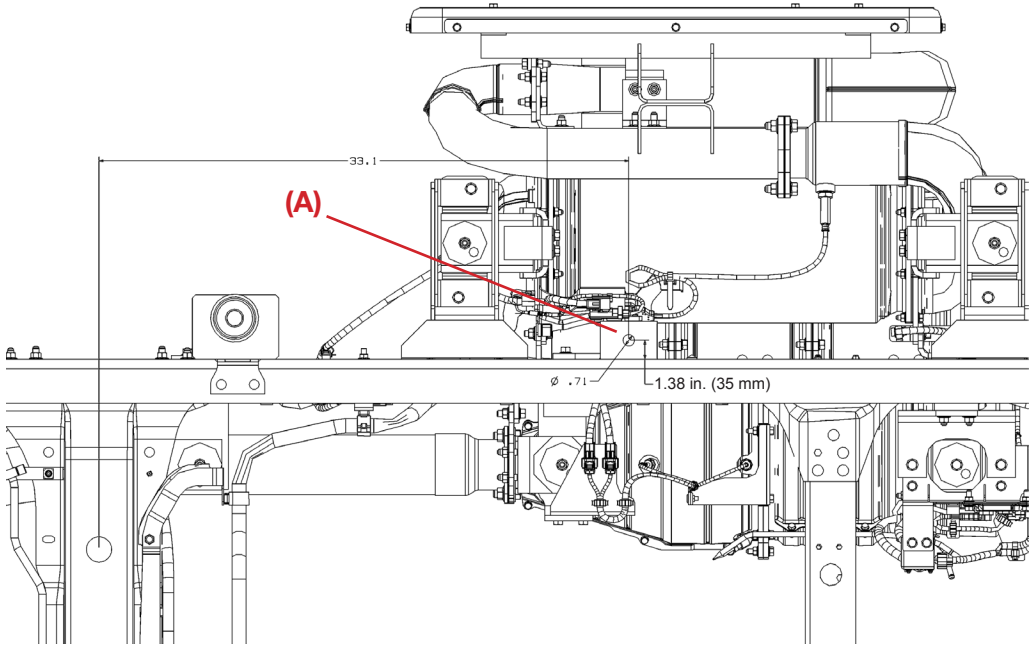
CREW CAB 150 "WB - Body mounting bracket (A) dimensions



Body Mounting Bracket will be painted "YELLOW" for easy identification

Figure 2.17.1

Crew Cab 150" WB - Body Mounting Bracket **(A)** Location



Ref. 4H Body mount Kit PN 2901400250 crew cab 150 wheelbase

Figure 2.17.2

Subframe Mounting

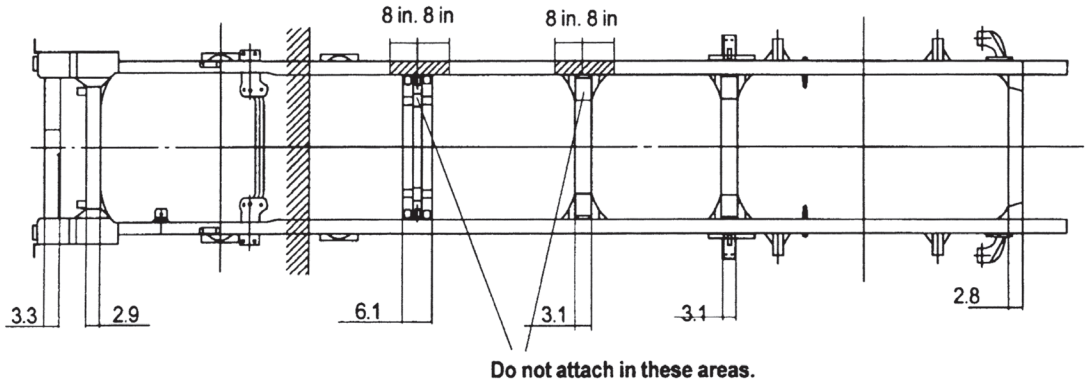


Figure 2.18.1

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 adequatley body mounting. The body company will be responsible for engineering their own mounting system.

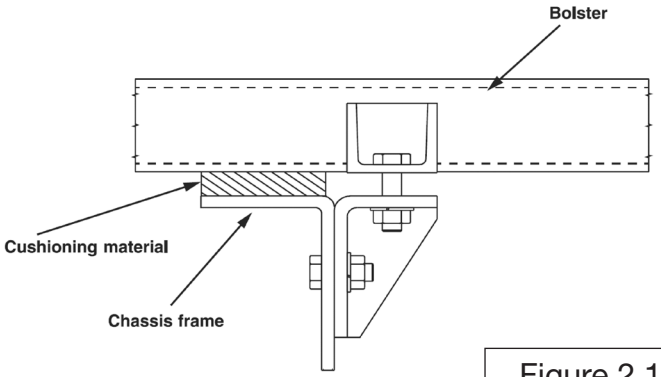


Figure 2.18.2

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.

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.

Depending on model, wheelbase and chassis specification some holes are in use and some holes are intentionally missing. (Subject to change without notice).

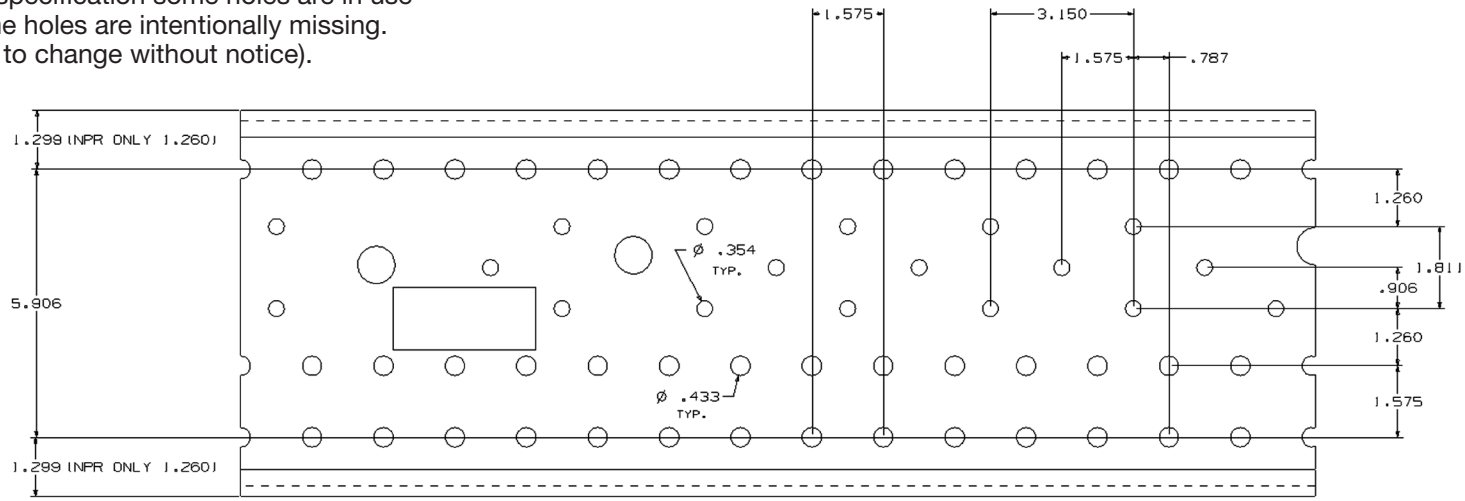
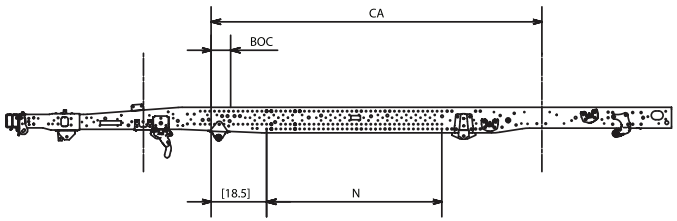


Figure 2.19.1



Modular Hole Area

WB (inches) NPR NPR-HD NPR-XD NQR NRR	N (inches)
110.0/109	34.6
133.7/132.5	58.3
151.5/150	75.6
NA/176	92.9

Note: Re-tighten all attaching parts that are loosened during body installation.

Figure 2.19.2

Note: Dimensions in inches

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.

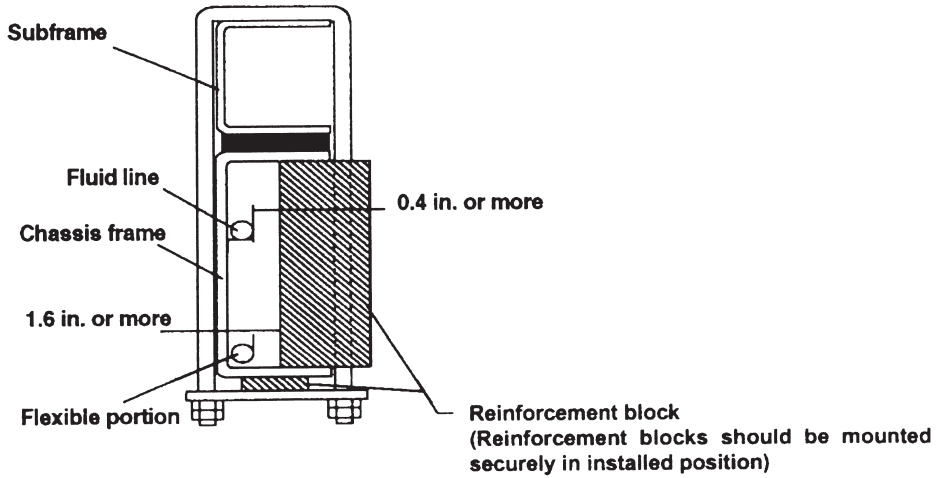


Figure 2.20.1

CAUTION:
U-Bolt placement is critical with new emission systems and controls. Extra care must be taken when placing bodies on chassis so as not to damage these components.

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

Crew Cab Body / Frame Requirements

The Crew Cab NPR HD, NPR-XD and NQR 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”, 7.5 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.

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 hydra-matic 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. (Ref. page 2.20)

2. Hold the length of any welding beads within 1.2-2.0 inches. Allow at least 1.6 inches between adjacent welding beads.

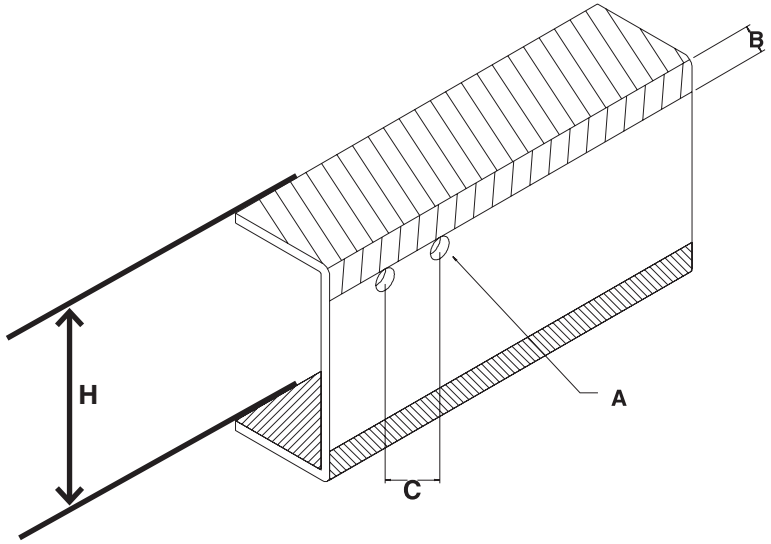
3. All holes must be drilled. Do not use a torch to make any holes.

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.

7. Repaint exposed metal after drilling.



Dimensions:
A - no more than 0.59 inches in diameter
B - must be more than H/5 for welding and H/7 for holes
C - must be more than 1.57 inches

H = Frame Height

Figure 2.22.1

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-Series 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. Repaint exposed metal after welding.

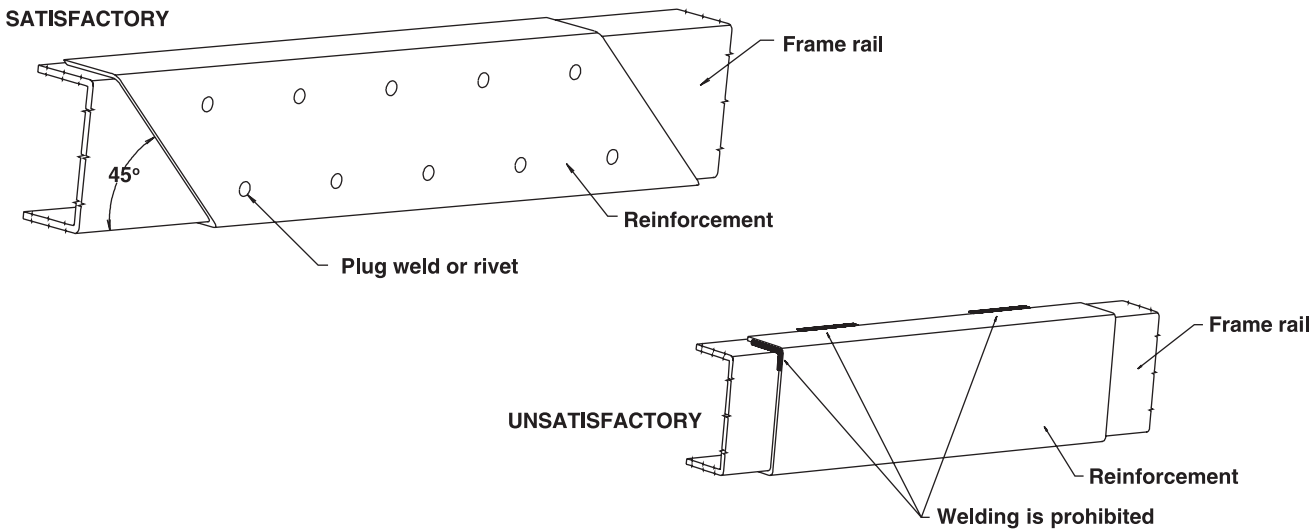


Figure 2.23.1

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 Isuzu lines as supplied by authorized 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.

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.

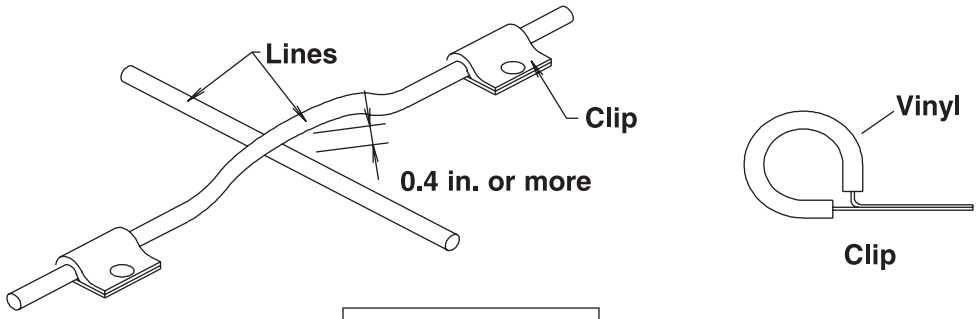


Figure 2.24.1

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, NPR-XD, NQR, NRR.

Wiring

1. Most wiring connections on 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.

Figure 2.25.1

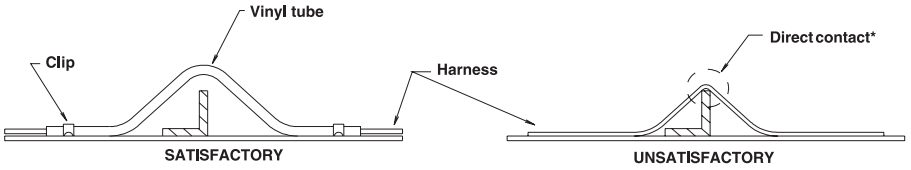
7. When changing the length of the battery cable, do not cut or splice the existing cable. Make up a new cable of the correct length and wire gauge for the load and distance, without splices.

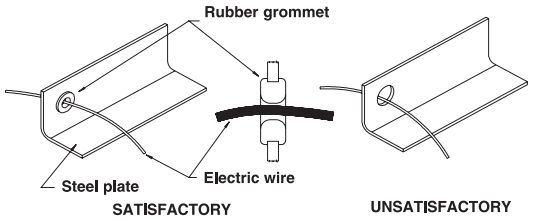
8. When using connectors, use a socket (female) connector on the electrical source side and a plug (male) connector on the electrical load side to lower the possibility of a short circuit when disconnected.

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 Isuzu. Keep flexible cables clear of other parts.

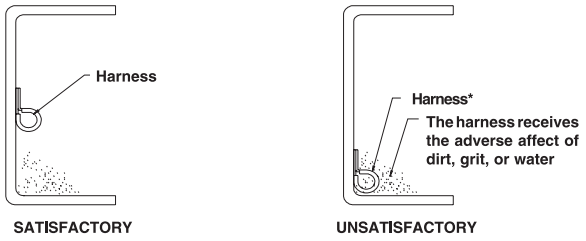
10. Do not use vinyl tape in the engine compartment. The heat will tend to make it peel off. Use plated steel clips coated with rubber or vinyl.

11. When locating auxiliary equipment or lines near the ECM caution should be used in order to protect the ECM from excessive vibration, heat or chemical reactions.





* 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 betwee harness and pipe lines.

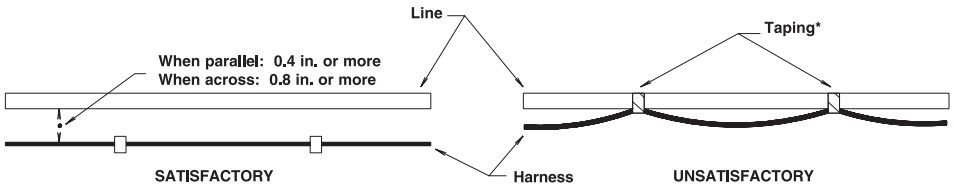


Figure 2.26.1

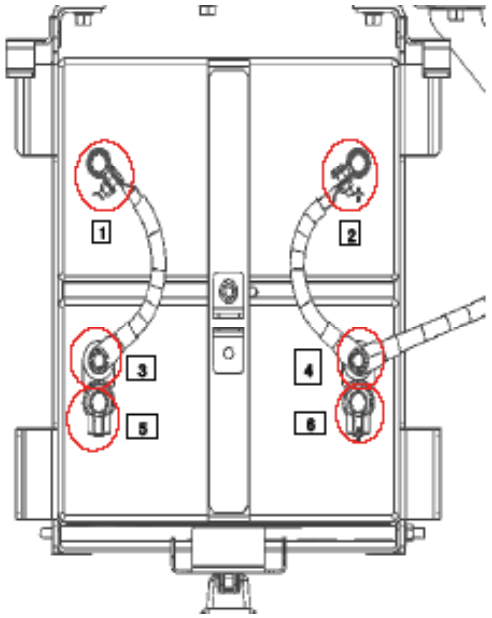


Figure 2.26.2

Wire Color Code

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

(1) Black
(2) White
(3) Red
(4) Green

B Starter circuits and grounds
W Generator (alternator) circuit
R Lighting circuit
G Signal circuit

(5) Yellow
(6) Brown
(7) Light Green
(8) Blue

Y Instrument circuit
Br Accessory circuit
Lg Other circuit
L Windshield wiper motor circuit

Maximum Allowable Current

Harness Design Diameter (mm)	AWG Equivalent	No. of Wires/Wire Diameter (mm)	Cross Sectional Area (mm2)	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	14	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.

Figure 2.27.1

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 Isuzu dealers. Packard Electric components are also available through Power and Signal (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.

Caution: Before servicing any electrical component, the ignition key must be in the LOCK position and all electrical loads must be OFF, unless instructed otherwise in Isuzu service procedures. If a tool or equipment could easily come in contact with a live exposed electrical terminal, also disconnect the negative battery cable. Failure to follow these precautions may cause personal injury and/or damage to the vehicle or its components.

Electrical Caution: Please see note in Section 1 Introduction on page 1.9 of on the subject of “NO-START CONDITION – CLICKING OR BANGING FROM STARTER 2012-2015MY Isuzu N-Series Equipped with 5.2L (4HK1) Diesel Engines”.

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
Brake lines	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.)
Flexible brake hoses	7.8 in. or more. (The temperature of flexible brake hoses should not exceed 158°F. If the highest temperature is not measurable, a clearance of more than 15.7 in. should be maintained between the hoses and the exhaust system.)
Wiring harnesses and cables	7.8 in. or more. (The temperature of flexible brake hoses should not exceed 158°F. If the highest temperature is not measurable , a clearance of more than 15.7 in. should be maintained between the hoses and the exhaust system.)
Steel fuel lines	3.1 in. or more.
Rubber or vinyl fuel hoses	5.9 in. or more.

Figure 2.28.1

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.

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).

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).

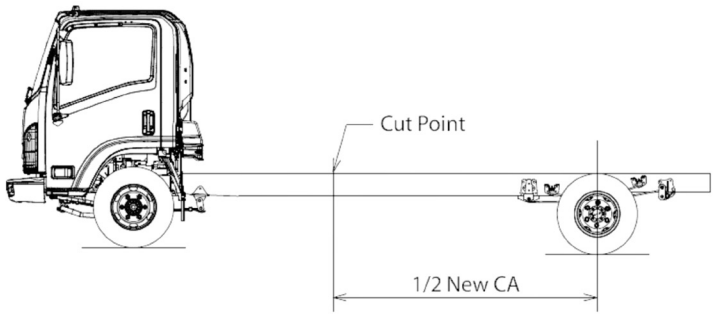


Figure 2.31.1

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.

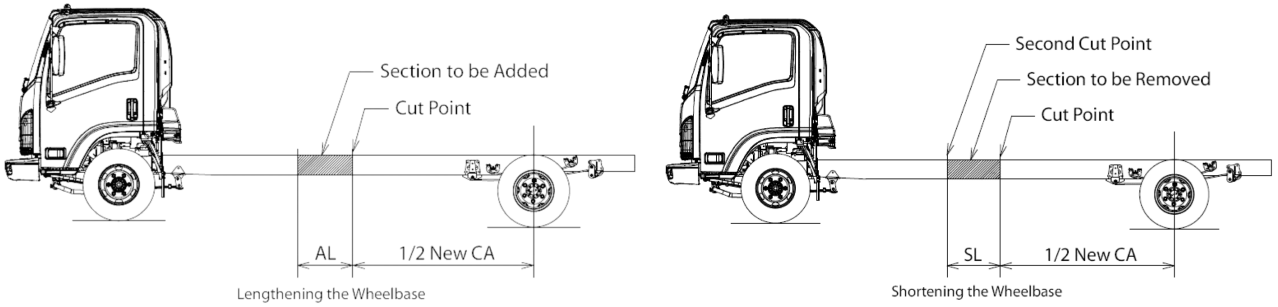


Figure 2.31.2

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 can be 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.

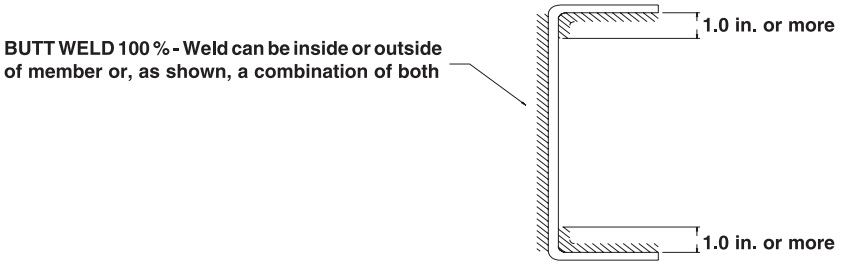


Figure 2.32.1

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

   Reinforcement Length = AL + 6 x (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.

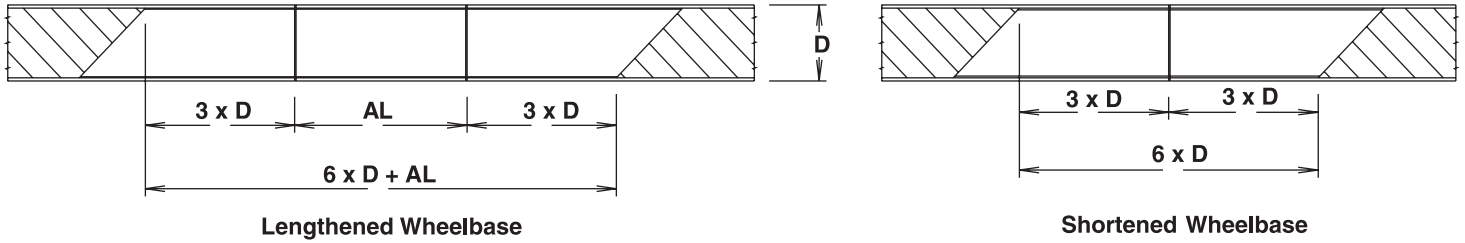
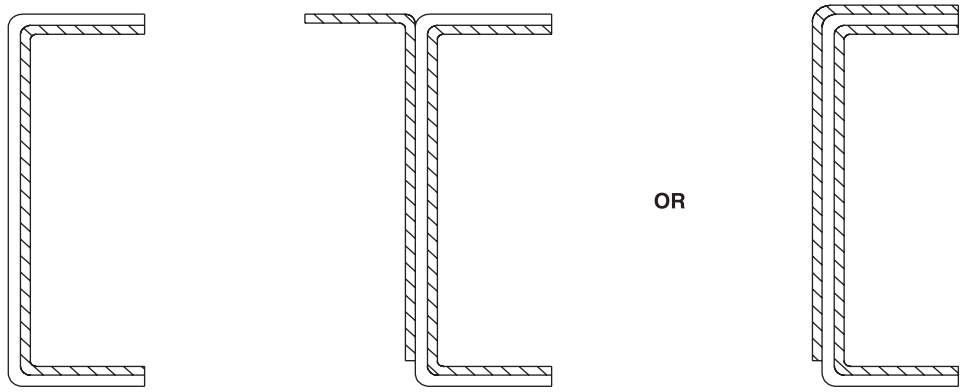


Figure 2.32.2

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).



Snug fit inner channel **Snug fit inner channel with "Inverted L" for "Long Bridge" wheelbases**

Figure 2.33.1

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.



Figure 2.33.2

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-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 electrical extension harnesses

Diesel
2008 -2015 NPR NPR-HD NPR-XD NQR NRR PN 8980626380 CHAS WRG HARNESS ASM; QTY 1
2008 -2015 NPR NPR-HD NPR-XD NQR NRR PN 5097003230 CHAS RR WRG HARNCLIP; QTY 5

Gas
2012-2015 NPR-NPR-HD PN 8972193550 ABS SPEED SENSOR EXT HARN QTY 2
2012-2015 NPR-NPR-HD PN 5097090120 CHAS RR WRG HARNCLIP;QTY 12

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:

a. Propeller Shaft Length

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

ENGINE	GAS		DIESEL			
MODEL	NPR	NPR-HD	NPR	NPR-HD	NPR-XD/NQR	NRR
Propeller Shaft Diameter (in.)	3.25	3.25	3.25	3.25	3.54	3.54
Maximum Propeller Shaft Length (in.)	50.7	50.7	50.7	50.7	52.9	52.9

Figure 2.34.1

b. Propeller Shaft Angles

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

ENGINE	GAS		DIESEL			
MODEL	NPR	NPR-HD	NPR	NPR-HD	NPR-XD/NQR	NRR
Maximum Propeller Shaft Angle	6.1°	6.1°	6.1°	6.1°	6.1°	6.1°

Figure 2.34.2

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.”

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 Isuzu crossmembers may be obtained from your Isuzu parts dealer.

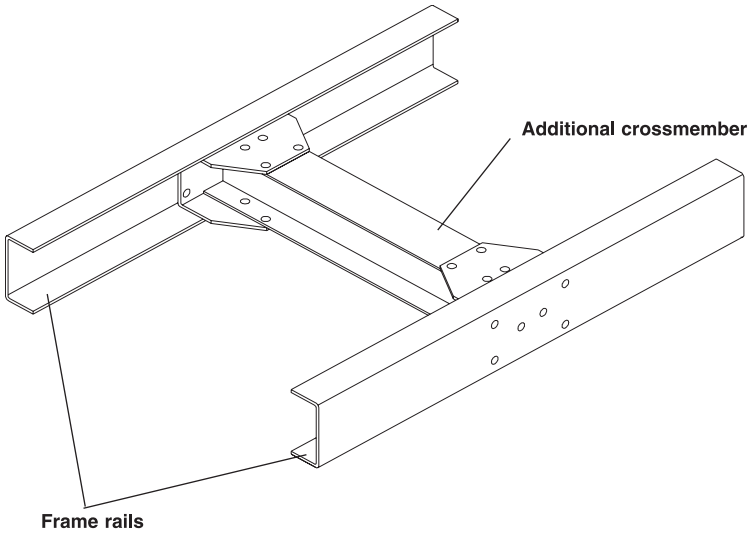


Figure 2.35.1

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

ENGINE	GAS		DIESEL			
MODEL	NPR	NPR-HD	NPR	NPR-HD	NPR-XD/NQR	NRR
Maximum Distance Between Crossmembers (in.)	35.7	35.7	35.7	35.7	35.7	35.7

Figure 2.35.2

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 1-714-935-9327 and in the East Coast call 1-770-740-1620 x262.

12. Please contact applications engineering for guidelines on N SERIES CHASSIS frame modifications when the vehicle is equipped with an Antilock Brake System.

BODY APPLICATION SUMMARY CHART

BODY APPLICATION SUMMARY CHART											
MODEL/GVWR	MODEL CODE	WB	BOC	10 ft.	12 ft.	14 ft.	16 ft.	18 ft.	20 ft.	22 ft.	24 ft.
NPR GAS 12,000 lbs	DB1	109	6.5	X	X						
	DB2	132.5	6.5			X					
	DB3	150	6.5				X	X			
	DB4	176	6.5						X		
NPR HD GAS 14,500 lbs	FE1	109	6.5	X							
	FE2	132.5	6.5			X					
	FE3	150	6.5				X				
	FE4	176	6.5					X	X		
NPR CREW CAB GAS 12,000 lbs	HB3	150	5		X(2)						
	HB4	176	5				X(2)				
NPR HD CREW CAB GAS 14,500 lbs	HE3	150	5		X(2)						
	HE4	176	5				X(2)				
NPR DIESEL 12,000 lbs	NJ1	110	4.5	X	X						
	NJ2	133.7	4.5			X					
	NJ3	151.4	4.5				X	X			
NPR HD DIESEL 14,500 lbs	NF1	109	7.7		X						
	NF2	132.5	7.7			X					
	NF3	150	10.2				X	X			
	NF4	176	10.2						X		
NPR HD CREW CAB DIESEL 14,500 lbs	NG3	150	5.3		X(1)						
	NG4	176	5.3				X(2)				
NPR XD DIESEL 16,000 lbs	NY1	109	7.7	X	X						
	NY2	132.5	7.7			X					
	NY3	150	7.7				X	X			
	NY4	176	7.7					X	X		
NPR XD CREW CAB DIESEL 16,000 lbs	NZ3	150	5.3		X(1)						
	NZ4	176	5.3				X(2)				
NQR DIESEL 17,950 lbs	NR1	109	7.7	X	X						
	NR2	132.5	7.7			X					
	NR3	150	7.7				X	X			
	NR4	176	7.7					X	X		
	NR5	200	7.7							X	
NQR CREW CAB DIESEL 17,950 lbs	NS3	150	5.3		X(1)						
	NS4	176	5.3				X(2)				
NRR DIESEL l9,500 lbs	NU1	109	7.7	X							
	NU2	132.5	7.7		X	X					
	NU3	150	7.7				X				
	NU4	176	7.7					X	X		
	NU5	200	7.7							X	
	NU6	212	7.7								X

Notes:

1. 16’ Dovetail landscape (12’ deck plus 4’ dovetail).
2. 18’ Dovetail landscape (14’ deck plus 4’ dovetail).

(Body Application Summary Chart Section – continued on next page)

MECHANICAL AND CAB SPECIFICATIONS

Engine Horsepower and Torque Chart

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

ENGINE MODEL	VEHICLE MODEL	Net HP HP/RPM[1]	Net Torque LBS-FT/RPM[1]	Gross HP HP/RPM[1]	Gross Torque LBS FT/RPM
AUTOMATIC TRANSMISSION					
GMPT - 6.0L - V8	NPR, NPR-HD Gas	293/4300	368/4000	297/4300	372/4000
ISUZU 4JJ1-TC	NPR Diesel	147/2700	277/1600-2800	150/2800	282/1600-2800
ISUZU 4HK1-TC	NPR-HD , NPR XD, NQR, NRR Diesel	210/2500	441/1850	215/2500	452/1850

Figure 4.1.1

Governed RPM 4HK1-TC 2760 rpm 4JJ1-TC 3600rpm

NOTE: [1] Horsepower and Torque Ratings are 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.)[1]
NPR GAS	AUTOMATIC	12,000	18,000
NPR HD GAS	AUTOMATIC	14,500	20,500
NPR DIESEL	AUTOMATIC	12,000	18,000
NPR HD DIESEL	AUTOMATIC	14,500	20,500
NPR XD DIESEL	AUTOMATIC	16,000	22,000
NQR DIESEL	AUTOMATIC	17,9500	23,950
NRR HD DIESEL	AUTOMATIC	19,500	25,500

Figure 4.1.2

1 The NPR HD, NPR XD, NQR, NRR are not approved for Hot Shot applications.

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 Gas	12,000	215/85R-16E	31.1
NPR-HD Gas	14,500	225/70R-19.5G	33.0
NPR Diesel	12,000	215/85R-16E	31.1
NPR-HD Diesel	14,500	215/85R-16E	31.1
NPR XD Diesel	16,000	225/70R-19.5F	33.0
NQR Diesel	17,950	225/70R-19.5F	33.0
NRR Diesel	19,500	225/70R-19.5F	33.0

Figure 4.2.1

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 NPR-HD NPR-XD NRR NQR	1995-2015	729	ARC WHITE	W301-P801-0	
		730	ADRIATIC BLUE	B302-P801-0	1999 MODEL ONLY
		845	POLAR SILVER	N507-P901-0	NPR SILVER
		989	SUNBELT GREEN	G021-P801-0	
NPR GAS	1993-94	844	GLACIER WHITE	0172-P1	
NPR GAS	1995.5-2009 2013-2015	729	ARC WHITE	W301-P801-0	
			ACCURIDE WHITE	301-W-30102	WHEELS ONLY
		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	
		844	GLACIER WHITE	0172-P1	
		989	SUNBELT GREEN	G021-P801-0	
	2003-2010		GRAY/LIGHT ARGENT	WE6272	BUMPER
			BLACK	W20A848	FRAME
FTR	1988-02	729	ARC WHITE	W301-P801-0	
		844	GLACIER WHITE	0172-P1	
		989	SUNBELT GREEN	G021-P801-0	
	2003-2010		GRAY/LIGHT ARGENT	WE6272	BUMPER
			BLACK	W20A848	FRAME
FVR	1988-02	729	ARC WHITE	W301-P801-0	
		844	GLACIER WHITE	0172-P1	
		989	SUNBELT GREEN	G021-P801-0	
	2003-2010		GRAY/LIGHT ARGENT	WE6272	BUMPER
			BLACK	W20A848	FRAME
EVR	1988-92	844	GLACIER WHITE	0172-P1	

Figure 4.3.1

Paint Code Chart (continued)

ISUZU PAINT CODE INFORMATION

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	PANTONE (1)
W301-P801-0	729	Arc White	FLNA40156	729	729	91508	729	729	729	7541C
Y719-P801-0	812	Wheatland Yellow	FLNA10182	812	812	83931	812	812	812	137C
G705-P801-0	807	Woodland Green	FLNA60181	807	807	48339	807	807	807	3308C
R410-P801-0	736	Cardinal Red	ISU736	736	736	75097	736	736	736	202C
B414-P801-0	695	Dark Blue	ISU695	695	695	909649	695	695	695	655C
K705-P801-0	508	Ebony Black II	ISU508	508	508	N/A	508	508	508	Black 6C

(1) The Pantone colors listed are the closest Pantone color numbers to the Isuzu paint colors and are given for reference only

Figure 4.4.1

N-Series Towing Procedure

When towing a vehicle: 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 shouldnot be towed at speeds in excess of 55 MPH (88 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 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 propeller shaft at the rear axle. Secure the propeller shaft to the frame or cross member.

CAUTION: When towing, disconnect the driveshaft at the rear axle to ensure the transmission is not damaged.
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 a 10 cm (4 in) wood beam against the towing guide behind the bumper.
(If no 10 cm (4 in) is available, then remove the bumper.) Ensure towing chains do not come into contact with the horns or the bumper.

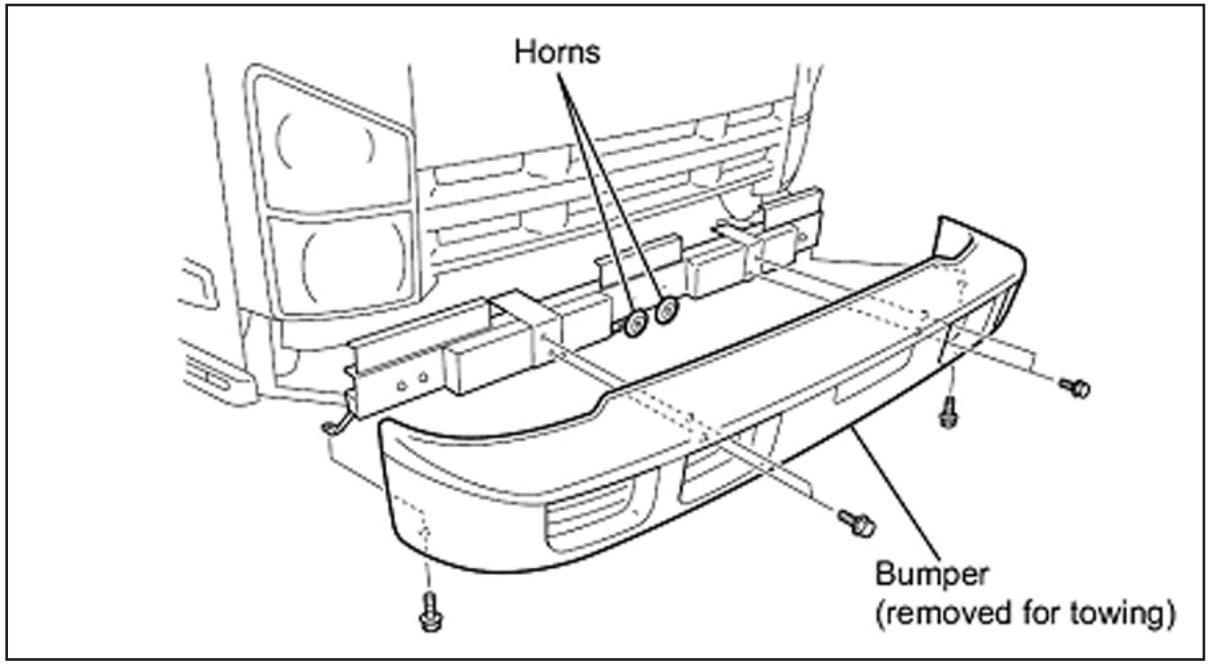


Figure 4.5.1

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

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 tow vehicle and the disabled vehicle.

Towing with all wheels on the ground
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 shaft at the rear axle. Secure the propeller shaft to the frame or crossmember.

CAUTION:
When towing, disconnect the driveshaft at the rear axle to ensure the transmission is not damaged. Provide wood blocking to prevent towing chains and bar from coming into contact with 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.

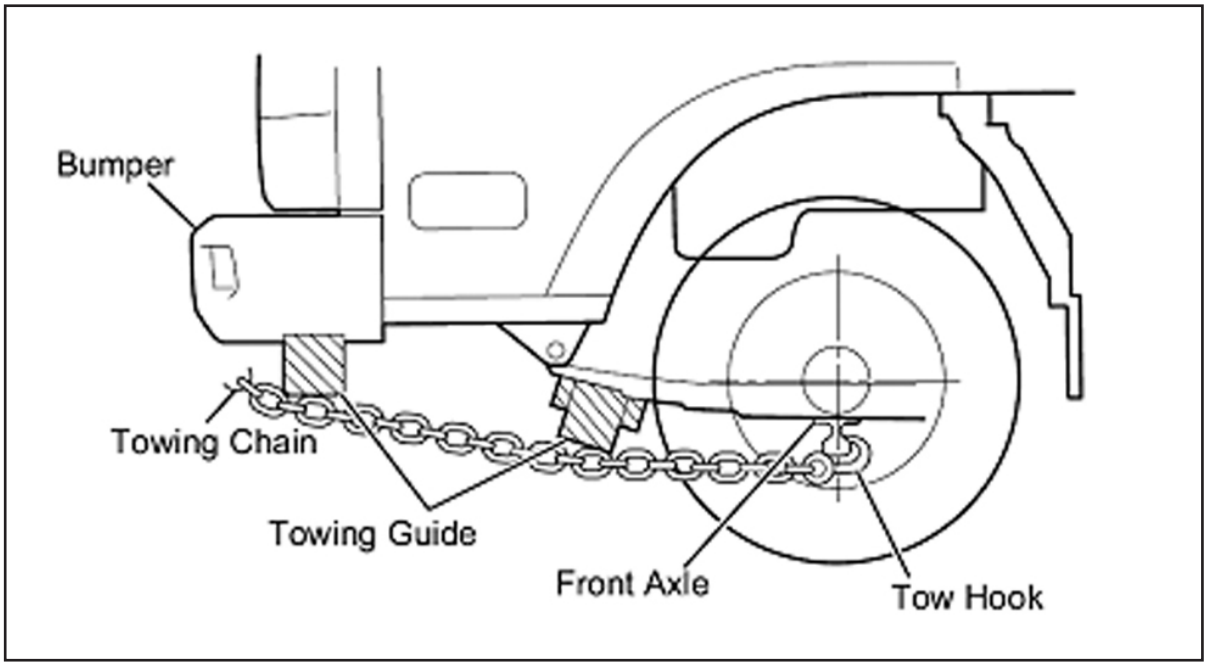


Figure 4.6.1

CAUTION:
When towing, disconnect the driveshaft at the rear axle to ensure the transmission is not damaged. Provide wood blocking to prevent towing chains and bar from coming into contact with 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.

Rear End Towing
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 beyond the front axle gross axle weight rating (GAWR) as indicated on the vehicle's VIN and weight rating plate.

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 (88 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)
PLUS weight of added body components, accessories or other permanently attached components.	+	_____ (Body, liftgate, reefer, etc.)
PLUS total weight of passengers, air conditioning and all load or cargo.	+	_____ (Driver, passengers, accessories and load)
EQUALS Gross Vehicle Weight (lbs.) (GVW) of completed vehicle.	=	_____ (Should equal GVWR from required vehicle section)

Figure 5.1.1

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

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.

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 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.

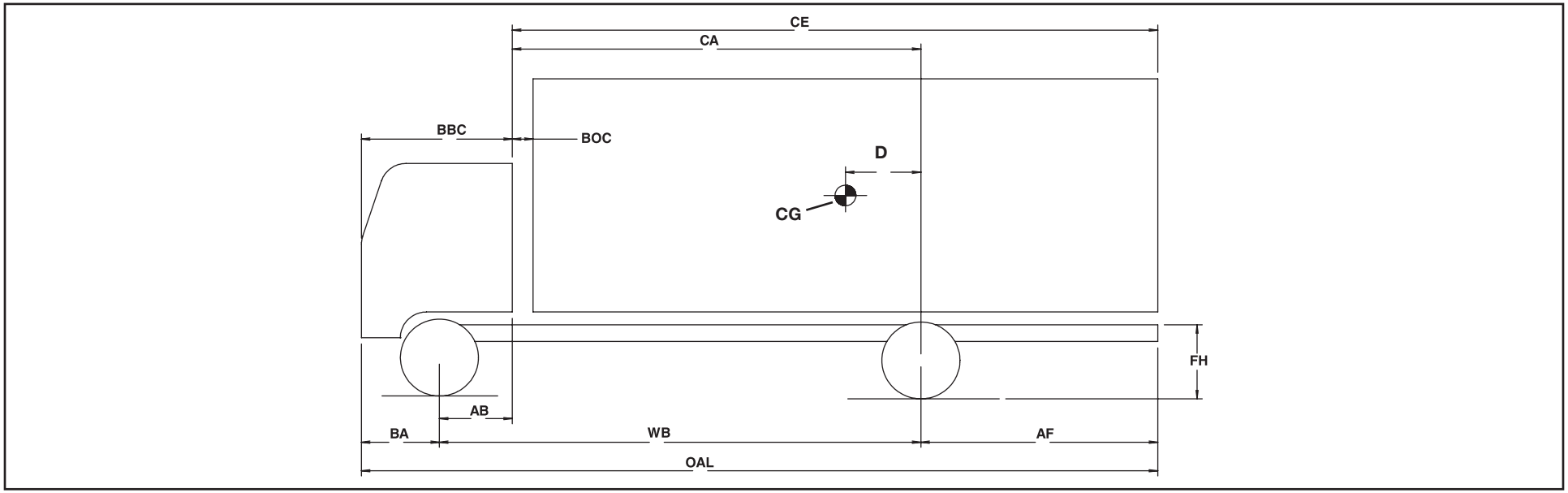


Figure 5.5.1

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

(Weight Distribution Concepts Section – continued on next page)

Weight Distribution Formulas

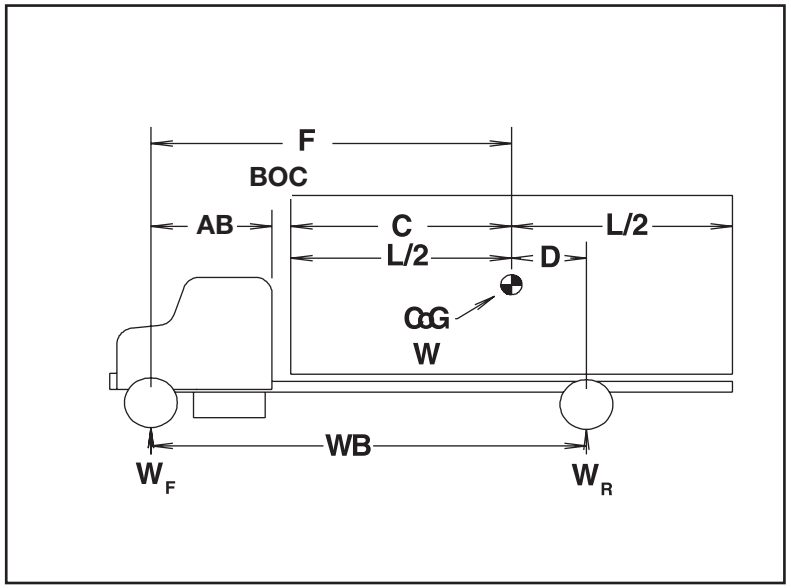


Figure 5.6.1

AB – Front axle to back of cab
BOC – 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 – (AB + BOC +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
Wf – Portion of W transferred to front axle
Wr – Portion of W transferred to rear axle
C – Length of body divided by 2
L/2 – Load location at half of body length
L – Distance over which the payload is spread within the Body

Basic Formulas

(a) W x D = Wf x WB

(b) W x F = Wr x WB

or

(c) WB = (AB + BOC + C + D) = (F + D)

(d) W = Wf + Wr

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

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

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

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

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

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

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

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

Weight Distribution Formulas in Words

To find:

1. Weight transferred to front axle = $\frac{\text{(Total weight) x (Distance C.G. is ahead of the rear axle)}}{\text{(Wheelbase)}}$

2. Distance C.G. must be placed ahead of rear axle = $\frac{\text{(Weight transferred to the front axle) x (Wheelbase)}}{\text{(Total weight)}}$

3. Wheelbase = $\frac{\text{(Total weight) x (Distance C.G. is ahead of the rear axle)}}{\text{(Weight to be transferred to the front axle)}}$

4. Total Weight = $\frac{\text{(Weight to be transferred to the front axle) x (Wheelbase)}}{\text{(Distance C.G. is ahead of the rear axle)}}$

1. Weight transferred to rear axle = $\frac{\text{(Total weight) x (Distance C.G. is behind the front axle)}}{\text{(Wheelbase)}}$

2. Distance C.G. must be placed behind the front axle = $\frac{\text{(Weight transferred to the rear axle) x (Wheelbase)}}{\text{(Total weight)}}$

3. Wheelbase = $\frac{\text{(Total weight) x (Distance C.G. is behind the front axle)}}{\text{(Weight to be transferred to the rear axle)}}$

4. Total Weight = $\frac{\text{(Weight to be transferred to the rear axle) x (Wheelbase)}}{\text{(Distance C.G. is behind the front axle)}}$

9. Remember = Total weight must always equal weight transferred to the rear axle plus the weight transferred to the front axle

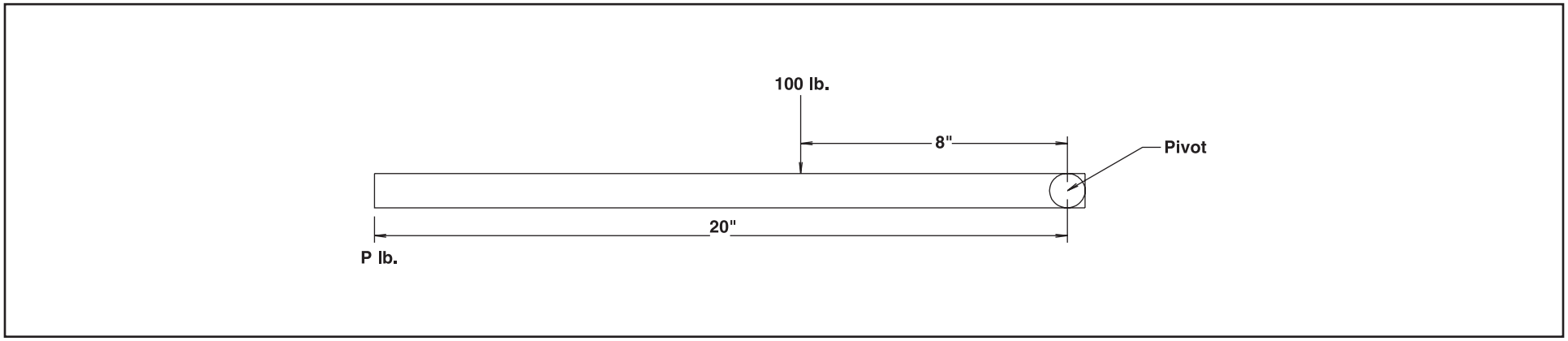


Figure 5.8.1

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” = $\frac{\text{100 lbs. x 8 in.}}{\text{20 in.}}$

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.

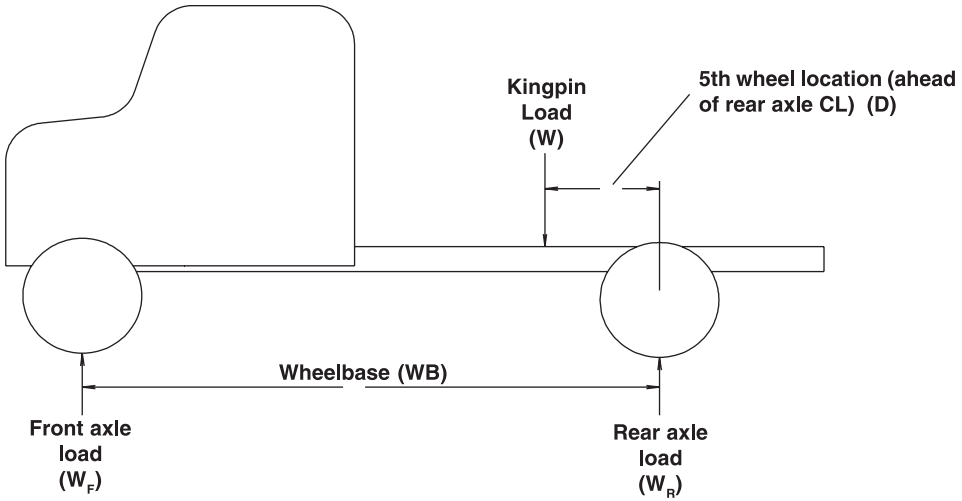


Figure 5.9.1

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

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
20,000 x 15 = 2,000 lbs.
150 WB

Rear Axle Load = 2,000 + 7,000 lbs. = 9,000 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.

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.

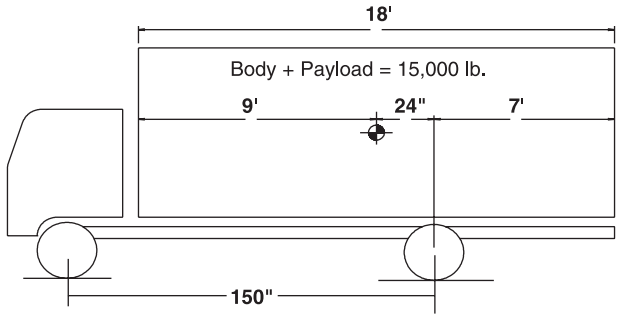


Figure 5.10.1

Example:

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

Rear Axle Load =
(Body Weight + Payload) – Front Axle Load

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

Rear Axle Load = 15,000 – 2,400 = 12,600 lbs.

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.

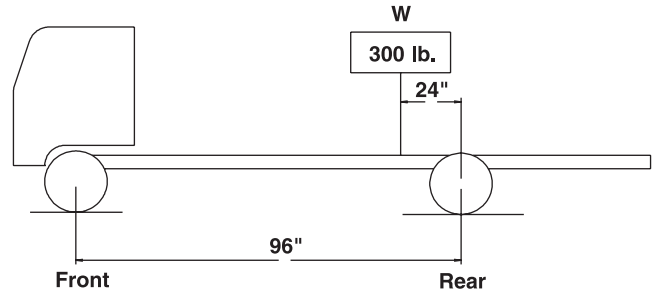


Figure 5.11.1

	Front Weight		**Rear Weight**
A.	$Wf = \frac{W \times D}{WB}$	A.	W – Wf
B.	$\frac{300 \times 24}{96}$	B.	300 – 75
C.	= 75 lbs.	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.

Find (D) and then solve for Wf and Wr.

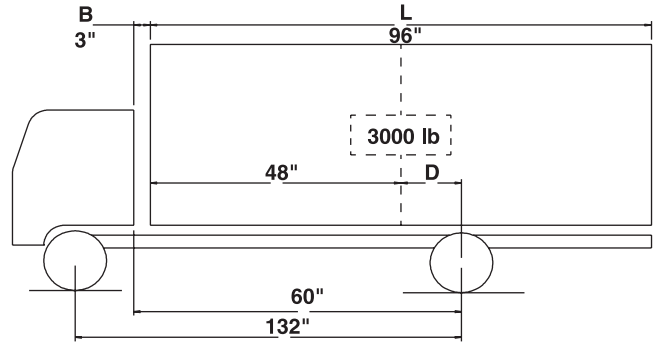


Figure 5.12.1

D = 60–3–48 = 9 in.

W_f = 205

W_r = 2,795

Recommended Weight Distribution % of Gross Vehicle Weight by Axle

Conventional (2 Axle)

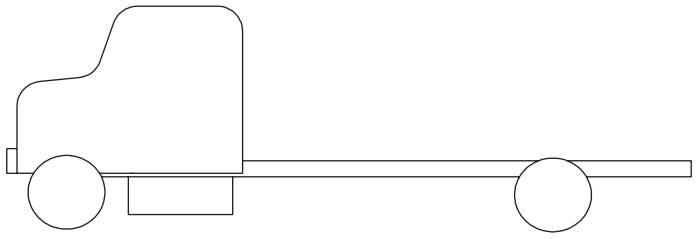


Figure 5.12.2

COE (2 Axle)

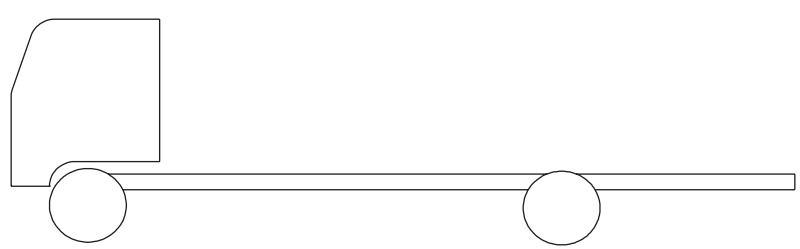


Figure 5.12.3

Conventional (3 Axle)

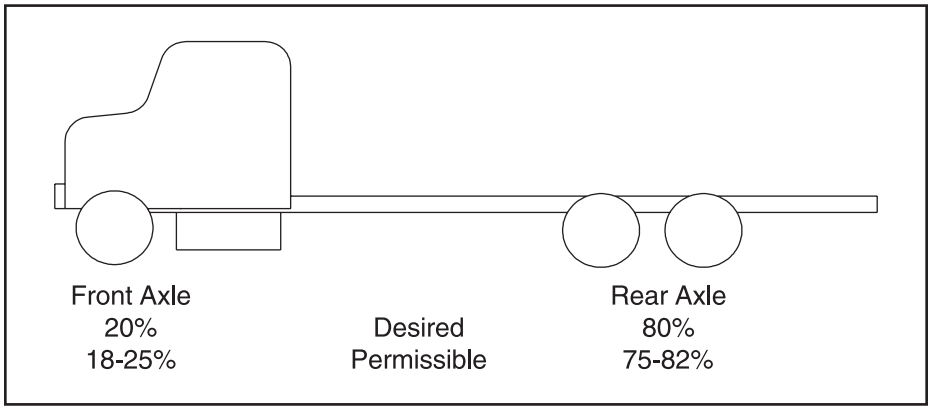


Figure 5.13.1

COE (3 Axle)

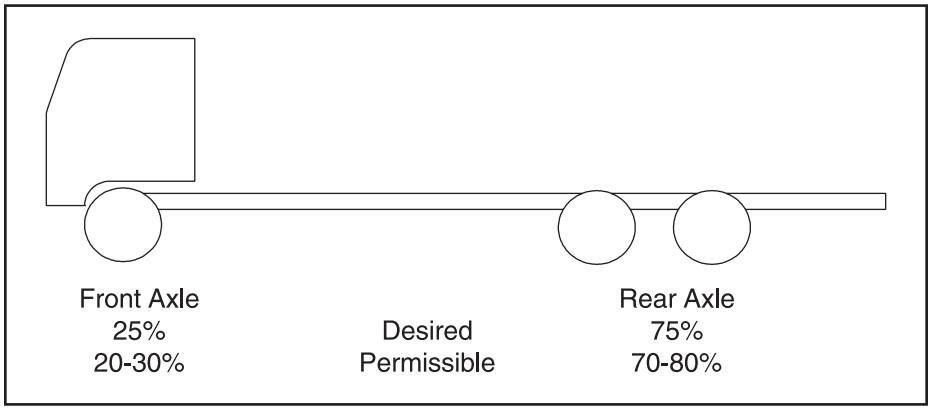
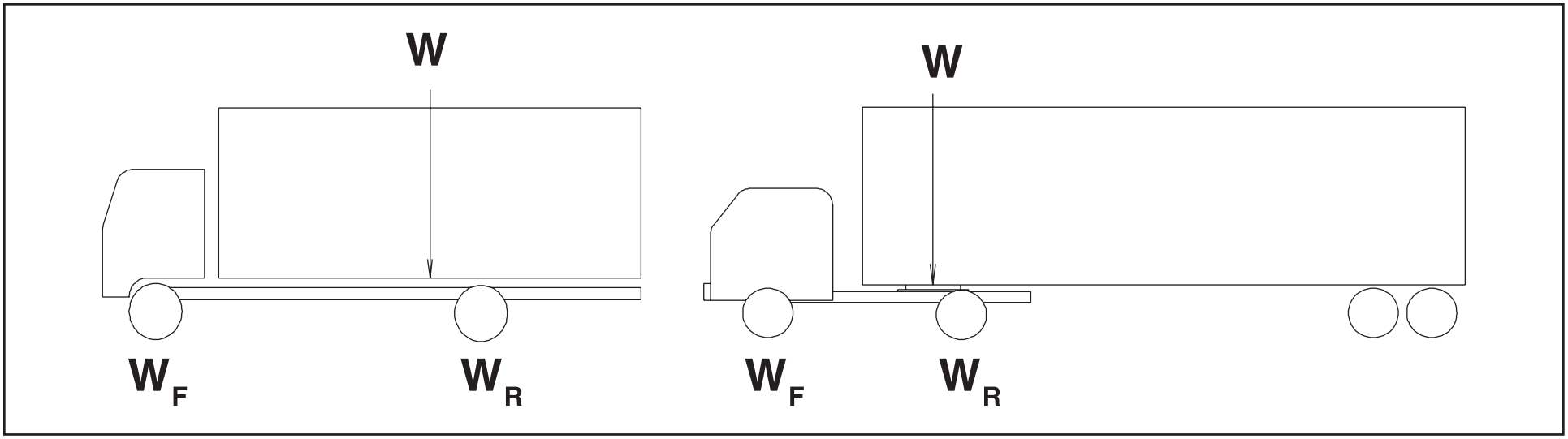


Figure 5.13.2

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.

Figure 5.13.3

Trailer Weight

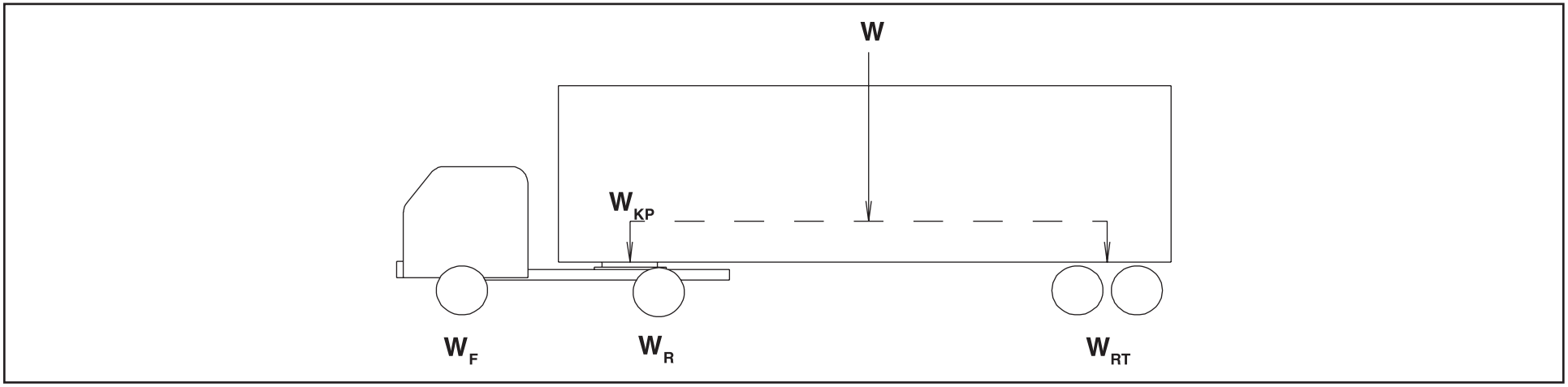


Figure 5.14.1

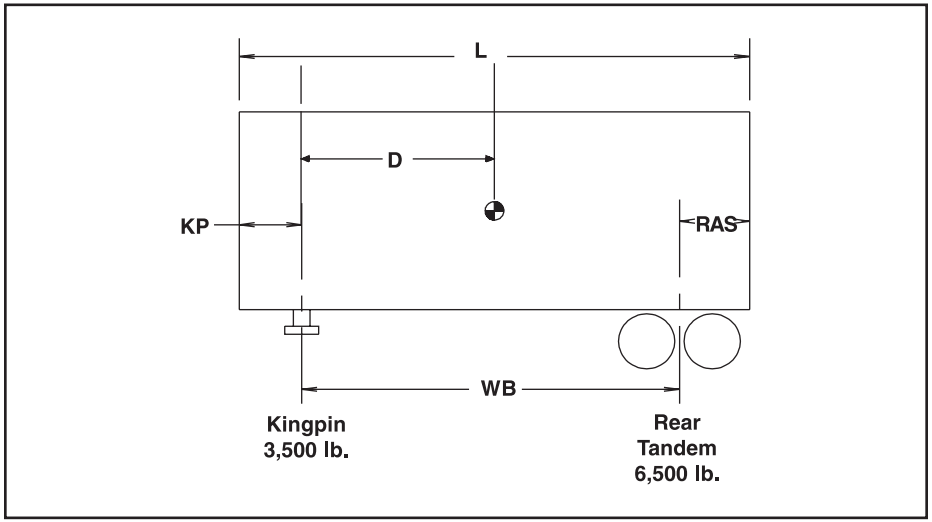


Figure 5.14.2

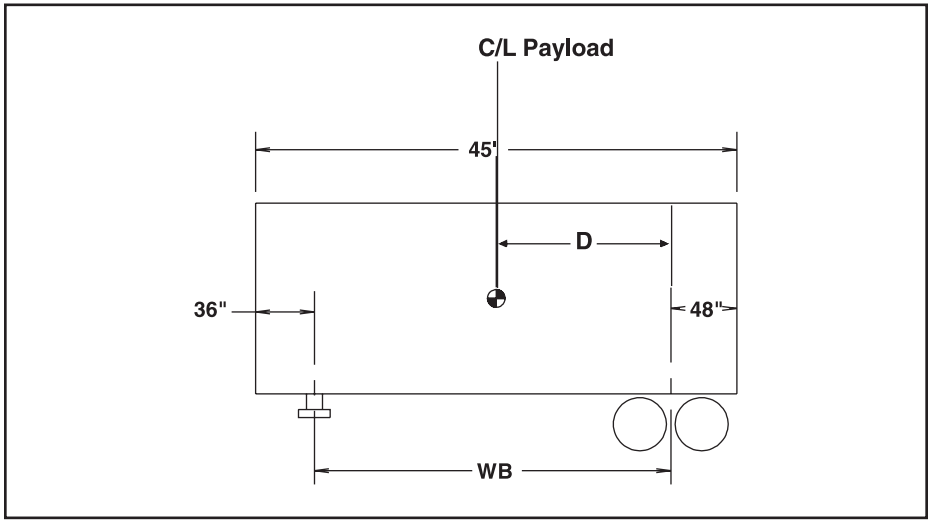


Figure 5.14.3

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.

Payload at Kingpin

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

Calculate the “D” dimension.

OAL/2 – AF = D
45 feet/2 – 48 inches – 36 inches = 186 inches

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

PL_{kp} =20,394 lbs.

Payload at Rear Tandem

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

PL_{rt} = 50,000 lbs. – 20,394 lbs. = 29,606 lbs.

PL_{rt} = 29,606 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 Section – continued from previous page)

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.

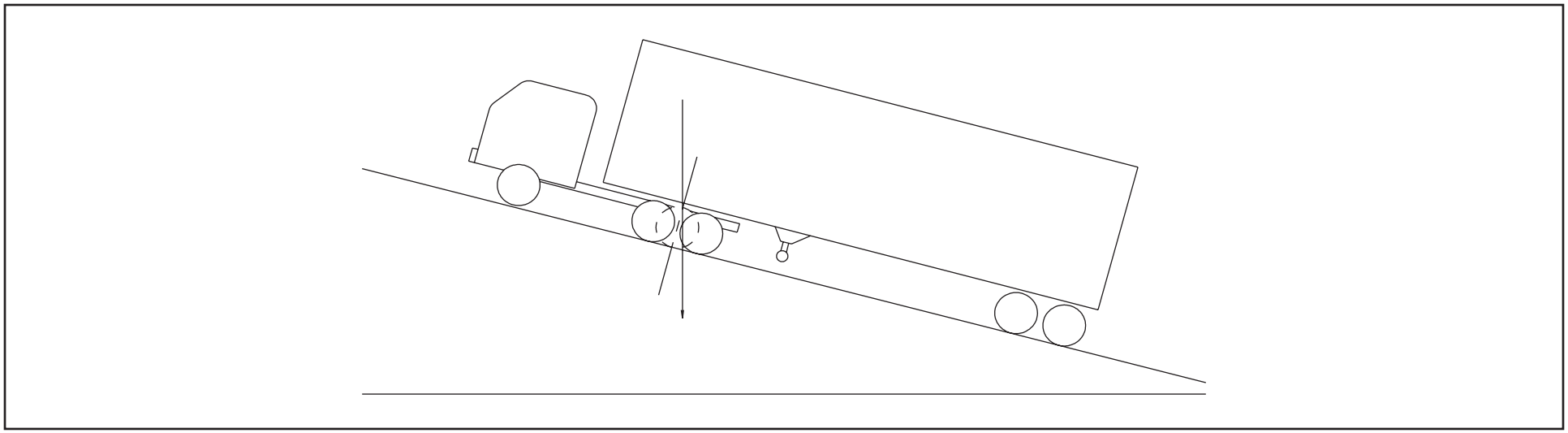


Figure 5.16.1

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.

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

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 12,000 GVWR automatic transmission.

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

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

MPH @ Governed Speed = 70 MPH

2. Grade Horsepower Formula

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

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

Example: NPR 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)

$$\textbf{HP Required for Grade} = \frac{\textbf{12,000 x 1 x 55}}{\textbf{37,500 x 0.9}} \textbf{ + 53.67}$$

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.

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

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

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

$$\textbf{FA} = \frac{\textbf{(96) x (115)}}{\textbf{(12) x (12)}} - \textbf{3.2}$$

FA = 73.47 ft.2
Cd = 0.70
Speed = 55 mph

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

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

4. Engine Horsepower Formula

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

$$\textbf{Horsepower} = \frac{\textbf{Torque x RPM}}{\textbf{5,252}}$$

Definitions in formula:

Torque = Twisting output of engine given in lbs.-ft.
RPM = Revolutions per minute of engine
5,252 = Constant

Example: NPR 12,000 GVWR automatic transmission.

Torque = 347 lbs.-ft.
RPM = 2,000

$$132\ \text{HP} = \frac{(347) \times (2{,}000)}{5{,}252}$$

5. Gradeability Formula

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

$$\textbf{Percent Grade} = \frac{\textbf{1,200 x (T) x (E) x (C) x (R)}}{\textbf{GVWR x r}} \textbf{ – RR}$$

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 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.

$$\textbf{Percent Grade} = \frac{\textbf{1,200 x (347) x (0.9) x (0.9) x (.703) x (5.375)}}{\textbf{12,000 x 14.1}} \textbf{ – 1.0}$$

Percent Grade = 7.53 - 1

Gradeability = 6.53%

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

Figure 5.21.1

6. Startability Formula

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

$$\textbf{Startability} = \frac{\textbf{(1,200) x (CET) x (E) x (C) x (R)}}{\textbf{(GVWR x r)}} \textbf{ – 10\%}$$

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

Example: NPR 12,000 GVWR manual transmission.

CET = 260 lbs.-ft.
R = 6.02 x 4.10
GVWR = 12,000 lbs.
r = 14.1 in.

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

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.

7.1 Wv x (Vv) = Mv
7.2 Wb x (Vb) = Mb
7.3 Wp x (Vp) = Mp
7.4 We x (Ve) = Me

$$7.5\ \mathbf{VCg} = \frac{\mathbf{(Mv+ Mb+Mp+Me)}}{\mathbf{(Wv + Wb + Wp + We)}}$$

Definitions in formula:

VCg = The total average vertical 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

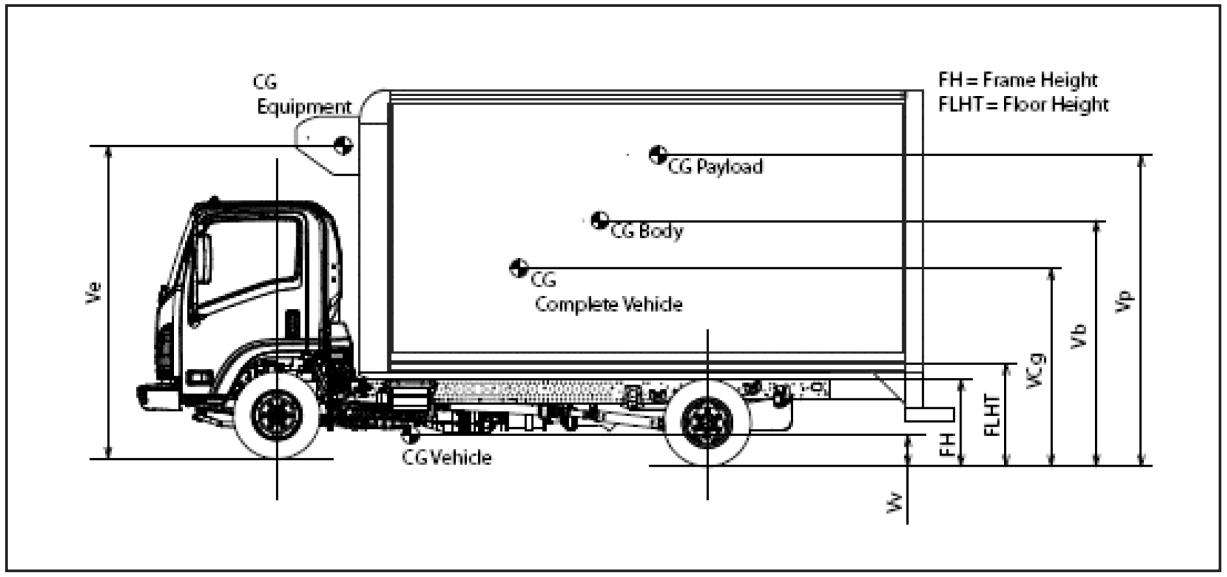


Figure 5.22.1

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 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 section)
Since maximum VCg for this truck is not exceeded, 48" stack height above flooring is acceptable.

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 Wv x (Hv) = Mv

8.2 Wb x (Hb) = Mb

8.3 Wp x (Hp) = Mp

8.4 We x (He) = Me

$$\textbf{8.5 HCg} = \frac{\textbf{(Mv+Mb+Mp+Me)}}{\textbf{(Wv + Wb + Wp + We)}}$$

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

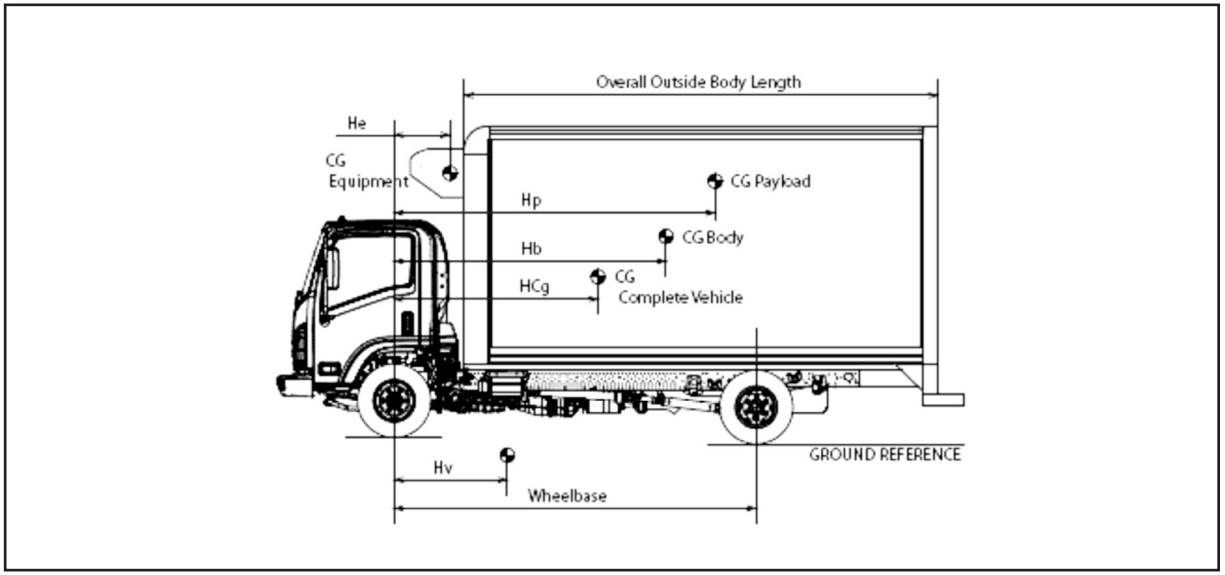


Figure 5.24.1

Example: NPR 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)

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

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

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.

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/N-1) +12N + 36)

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.

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.

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			

Figure 5.28.1

* 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.

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
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

Figure 5.29.1

* 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.

Federal Bridge Formula Table (Continued)

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

Figure 5.30.1

* 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.

COMMODITY AND 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

Figure 6.1.1

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.

Figure 6.1.2

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

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

Figure 6.2.1

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

Figure 6.2.2

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.

Figure 6.3.1

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

Figure 6.3.2

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	— —	25 / bundle
		Average bundle, dia. 9”		
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

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

Figure 6.4.1

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

Figure 6.4.2

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

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

Figure 6.5.1

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

Figure 6.5.2

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

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

Figure 6.6.1

Product		Size of Container	Lbs. Per Cu. Ft.	No. of Lbs. / Per
Soft drinks,	Half depth bottle box 24-6 to 8 oz. bottles Full depth bottle box 12-24 to 32 oz. bottles	12.25” x 18.75” x 8.5” 13.38” x 18.5” x 12.25”	— —	39 / box 60 / box
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

Figure 6.6.2

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.

Figure 6.7.1

NPR, NPR HD GAS

Specifications

Model	NPR Gas	NPR HD 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)	297 HP @ 4,300 RPM	
Torque (Gross)	372 lbs.-ft. torque @ 4,000 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, High Idle Mode and Rear engine cover.	
Transmission	6L90 Hydra-Matic 6-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	4,860 lbs.	6,630 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	8,840 lbs.	11,020 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-16E (10 ply) LRR (Low Rolling Resistance) tubeless steel belted radials, all season, front and rear	225/70R-19.5G (14 ply) LRR (Low Rolling Resistance) 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. Disc front and self-adjusting outboard mounted drum rear. The parking brake is 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.	
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.^{3}, 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 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 standard.	
Electrical	12-volt, negative ground, maintenance-free battery located on frame, 750 CCA each, 145-amp alternator with integral regulator.	
Options	see page 7.3 for option	

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

Figure 7.2.1

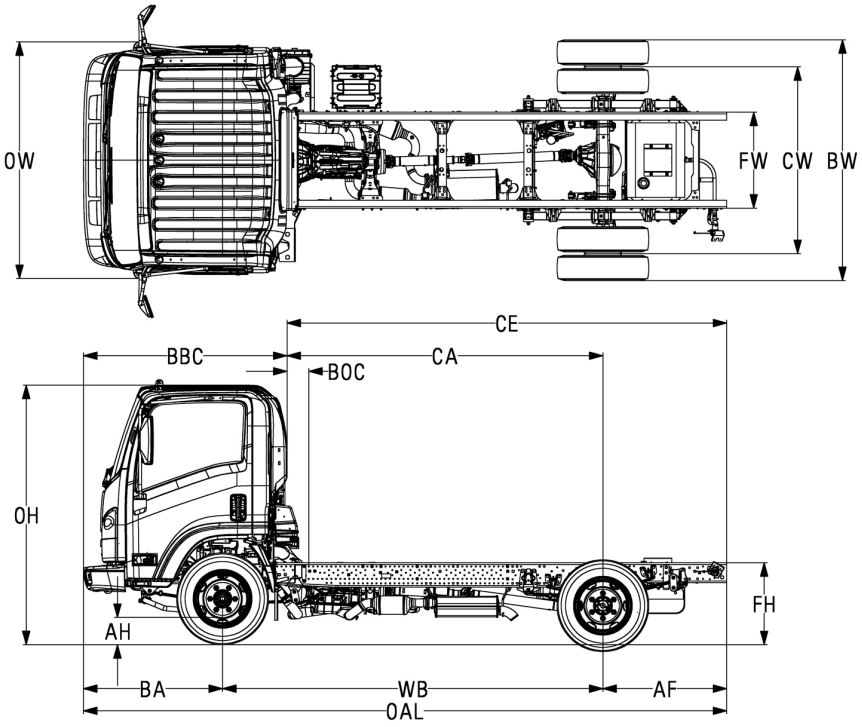


Figure 7.2.2

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

AH	7.5	BW	84.1	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	81.3		

12,000-lb. GVWR Automatic Transmission Model
Chassis Cab and Maximum Payload Weights

Model	WB	Unit	Front	Rear	Total	Payload
DB1/JB1	109	LB.	3302	1720	5022	6978
DB2/JB2	132.5	LB.	3370	1745	5115	6885
DB3/JB3	150	LB.	3410	1749	5159	6841
DB4/JB4	176	LB.	3449	1769	5218	6782

Dimension Constants; 14,500 GVW

Code	Inches	Code	Inches
AH	8.3	BW	84.1
AW	65.6	CW	65.0
BA	48.4	FW	33.5
BBC	70.9	OH	91.1
BOC	6.5	OW	81.3
FH	33.0		

14,500-lb. GVWR Automatic Transmission Model
Chassis Cab and Maximum Payload Weights

Model	WB	Unit	Front	Rear	Total	Payload
FE1/KE1	109	LB.	3430	1896	5326	9174
FE2/KE2	132.5	LB.	3497	1921	5418	9082
FE3/KE3	150	LB.	3538	1925	5463	9037
FE4/KE4	176	LB.	3627	1896	5523	8977

Vehicle Weight Limits:

GVWR		
Designed Maximum	12,000 lbs.	14,500 lbs.
GAWR, Front	4,860 lbs.	6,630 lbs.
GAWR, Rear	8,840 lbs.	11,020 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.

RPO	DESCRIPTION STANDARD CAB	Weight (LBS) Front/Rear
I1F	Ship-Through IMPCO(Union City IN) Model codes KE204,KE304,KE404 only	0.00 / 0.00
IF4	Air deflector roof mounted (not available in Crew Cab)	64.0 / 0.0
IF6	Fire extinguisher and triangle kit mounted in rear organizer (2)	18.6 / 0.0
I66	Engine Block Heater (120V 600W)	1.0 / 0.0
IY4	Delete Standard Radio	-3.0 / 0.0
I8H	AM/FM/CD radio with Aux input/USB port and Bluetooth	0.0 / 0.0
I9H	Heated dual remote control mirrors (15” head)	2.0 / 0.0
IS0	Heated mirrors	0.3 / 0.0
IU2	Mirror Bracket for 102 “wide body	1.0 / 0.0
IV8	seat covers standard cab (4)	5.8 / 0.0
IX2	Rear Body Dome Lamp Switch	0.4 / 1.5
UZF	Back up alarm	0.0 / 1.5
V22	Chrome Grille	1.0 / 0.0
I3G	65 mph top speed limit (max cruise speed 60mph)	0.00 / 0.00
I5K	Suspension Drivers Seat	

(3) Standard model specifications with LSD

High Idle Mode
Provides 1200 rpm engine speed when vehicle is in park or neutral with parking brake set . Activated by pressing main cruise switch and then turning and holding cruise set switch for 3 seconds. Cruise light will blink slowly in this mode. Throttle demand above 25% of throttle will cause cancellation of High Idle Mode.

Frame and Crossmember Specifications

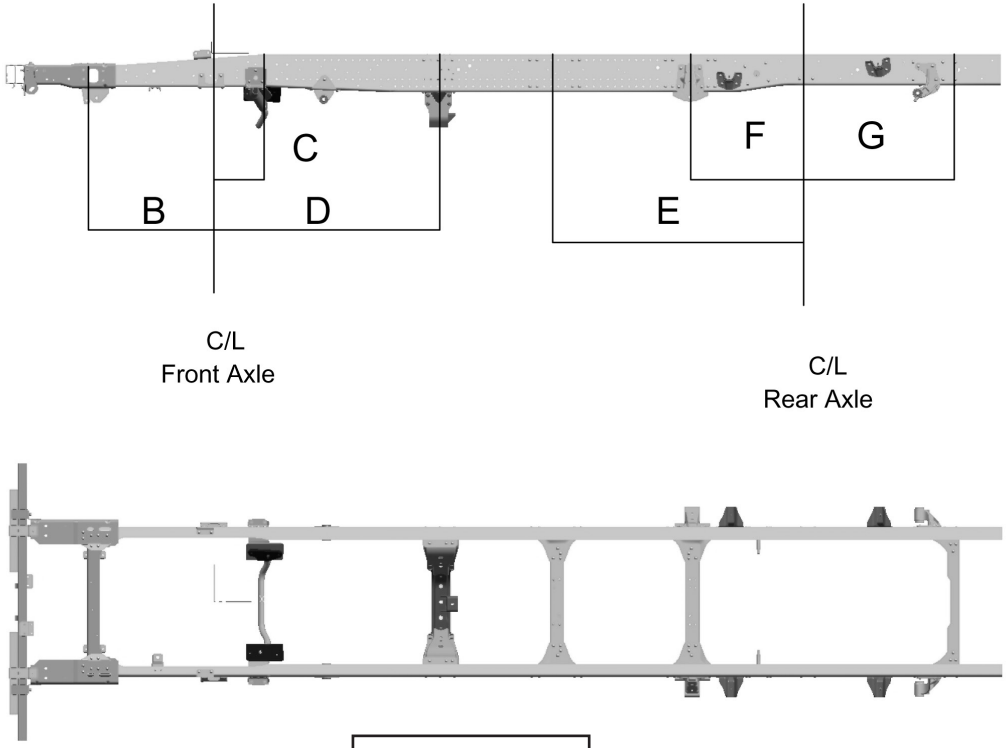


Figure 7.4.1

Wheelbase	Frame Thick	Crossmember Type/Location						
			B	C	D	E	F	G
109.0	0.24		28.3	7.9	AA 51.5	—	CC 24.2	DD 33.8
132.5	0.24		28.3	7.9	AA 51.5	BB 57.5	CC 24.2	DD 33.8
150.0	0.24		28.3	7.9	AA 51.5	BB 57.9	CC 24.2	DD 33.8
176.0	0.24		28.3	7.9	AA 51.5	BB 74.4	CC 24.2	DD 33.8

A/T = Automatic Transmission

Figure 7.4.2

Dimensions in inches

Frame Chart

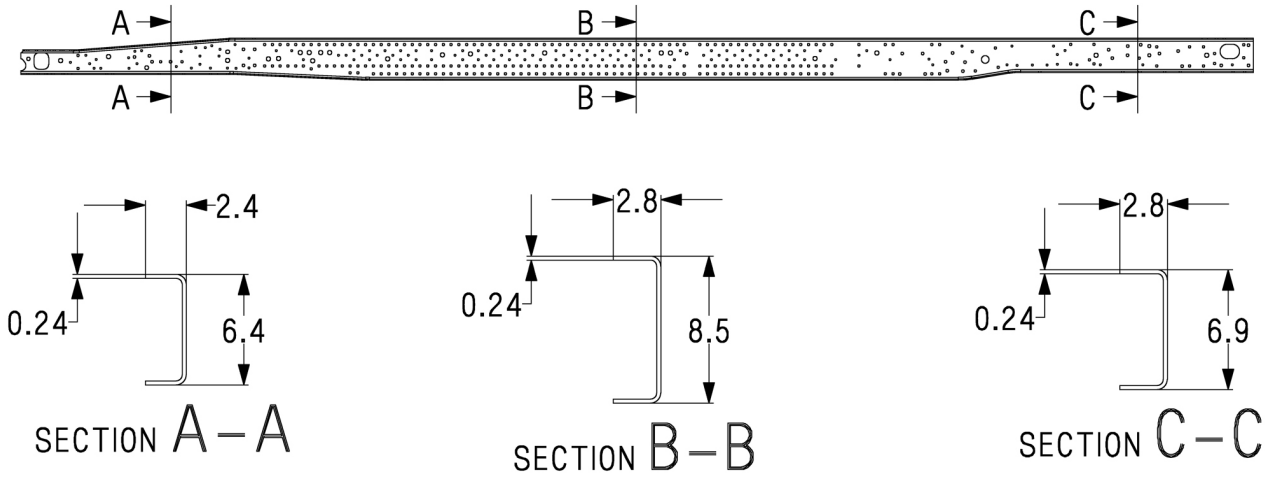


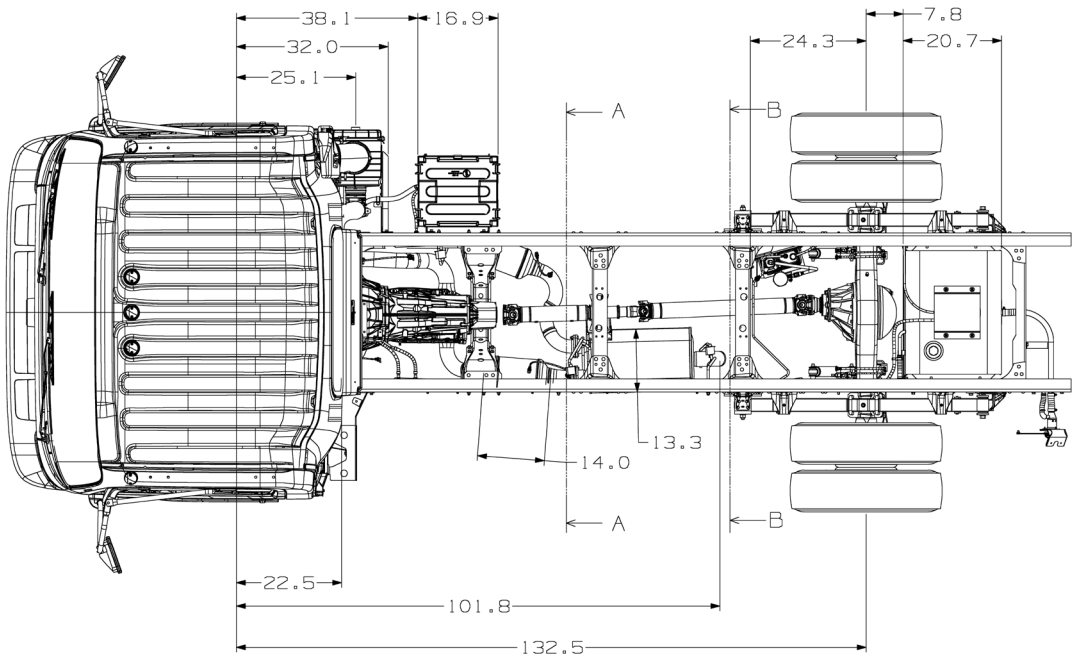
Figure 7.5.1

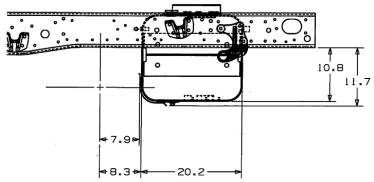
Wheelbase	Frame FL	Frame Thickness
109.0	182.5	0.24
132.5	206.1	0.24
150.0	223.8	0.24
176.0	249.8	0.24

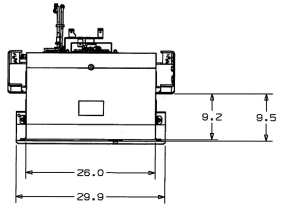
Figure 7.5.2

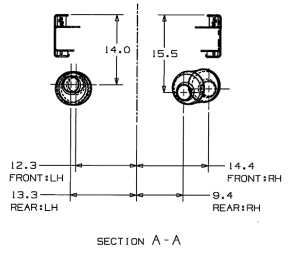
Dimensions in inches

Frame Chart

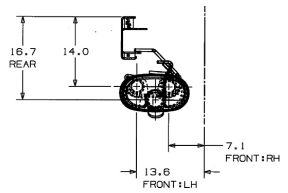








SECTION A-A



SECTION B-B

Figure 7.6.1

Dimensions in inches

Chassis Dimensions

Dimensions			
A	B	C	D
WB	CA	CE	OAL
109.0	86.5	129.6	200.5
132.5	110.0	153.1	224.0
150.0	127.5	170.6	241.5
176.0	153.4	196.6	264.5

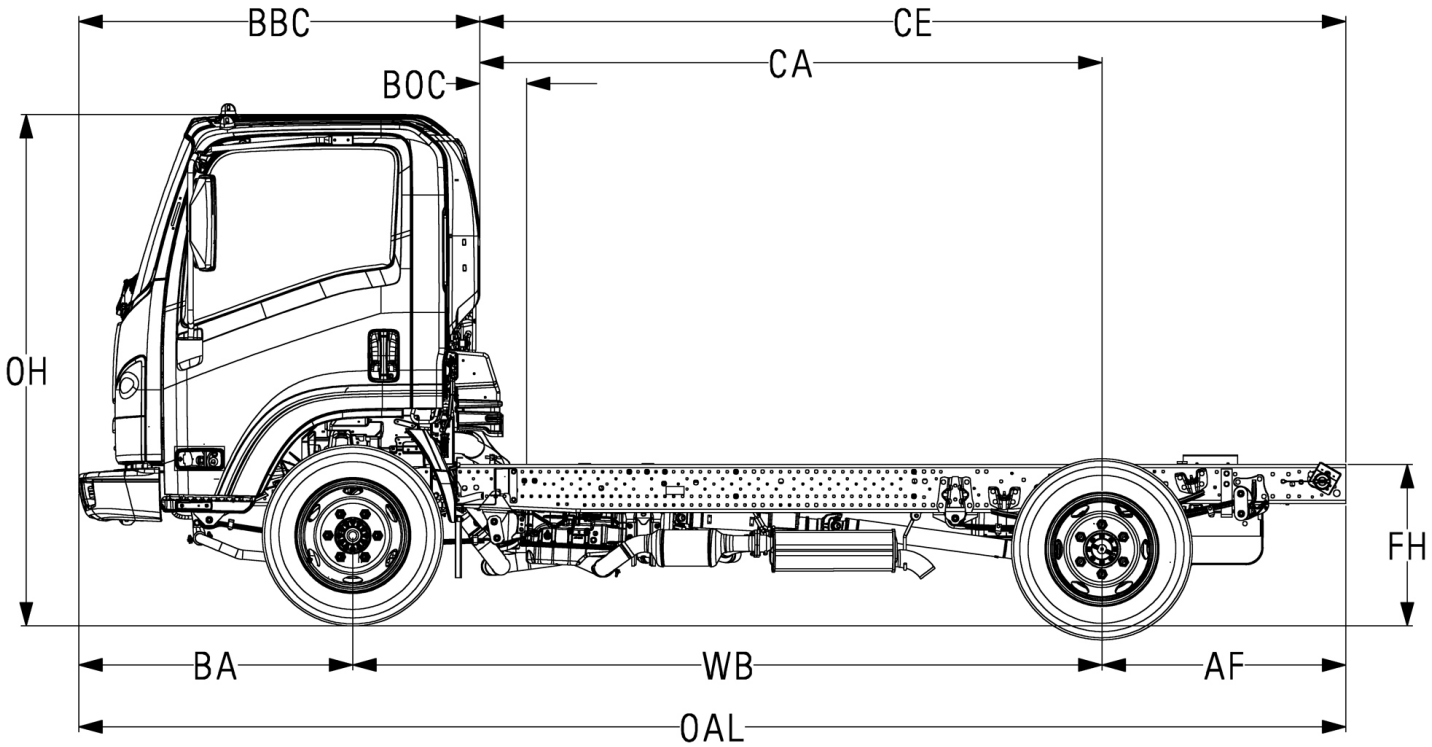


Figure 7.7.1

Dimensions in inches

Chassis Dimensions

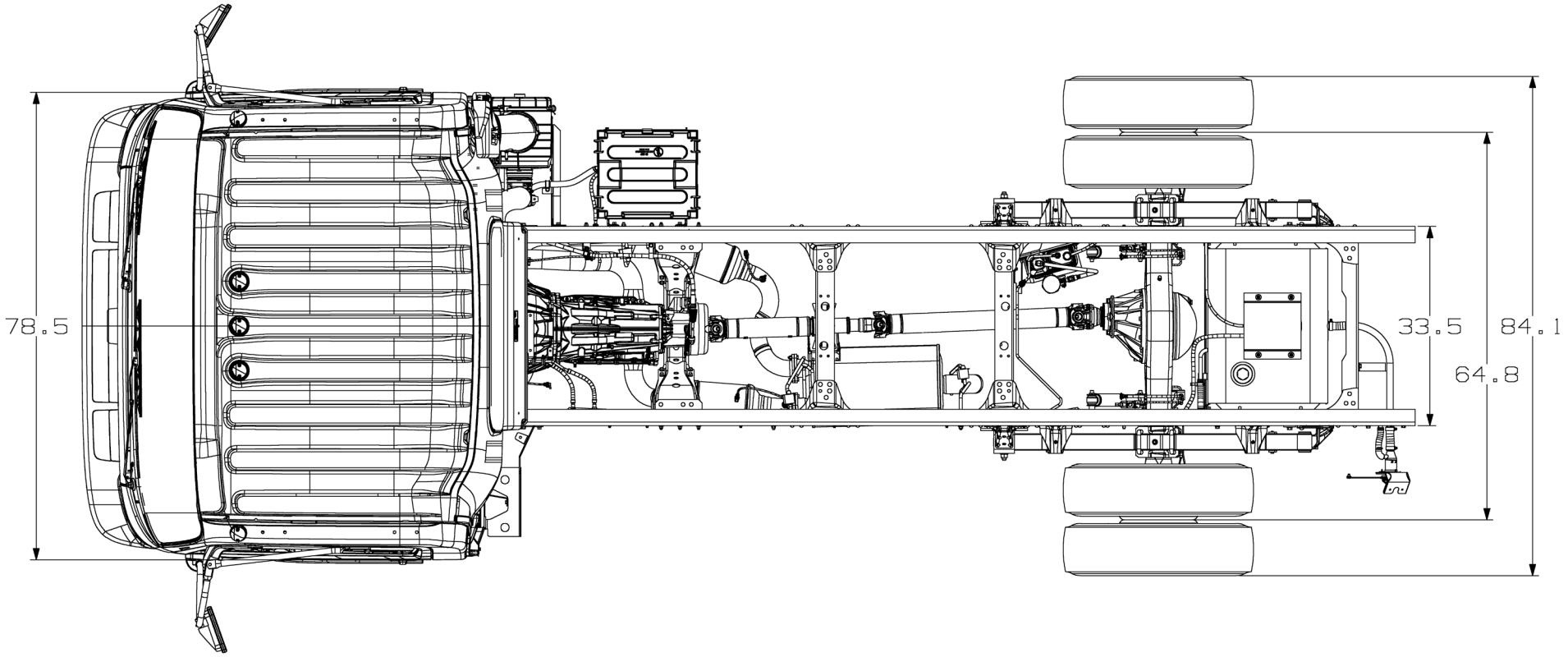


Figure 7.8.1

Dimensions in inches

Cab Tilt Illustration

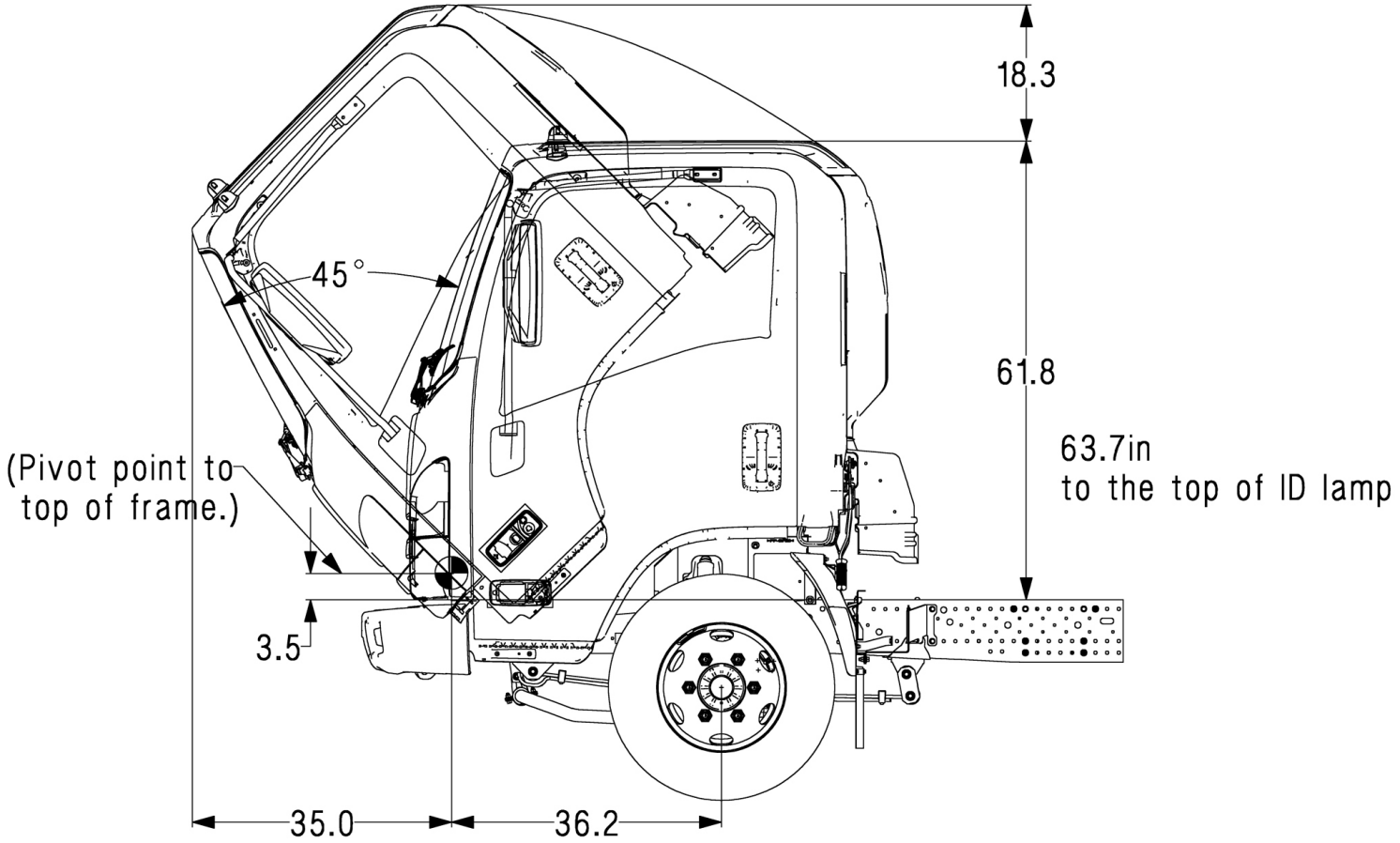


Figure 7.9.1

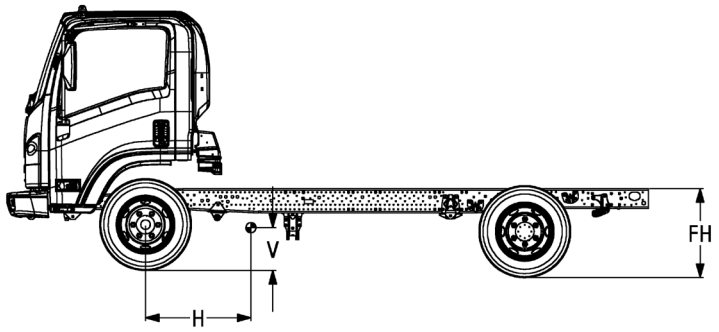
Dimensions in inches

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

Figure 7.10.1



The maximum vertical center of gravity must not be exceeded at maximum GVWR and rated front and rear GAWR. The center of gravity maximum is 63” (1600mm) above the ground.The horizontal center of gravity must be located between the front and rear axles.

Figure 7.10.2

NOTE: The maximum dimensions for a body installed on the N-Series Gas are 102 inches wide (outside) with 102” wide mirror brackets installed and 91 inches high (inside). Any larger body applications must be approved by ICTA Application Engineering. On the West Coast call 1-714-935-9327 and on the East Coast call 1-770-740-1620 x 262.

Dimensions in inches

Front Axle Chart

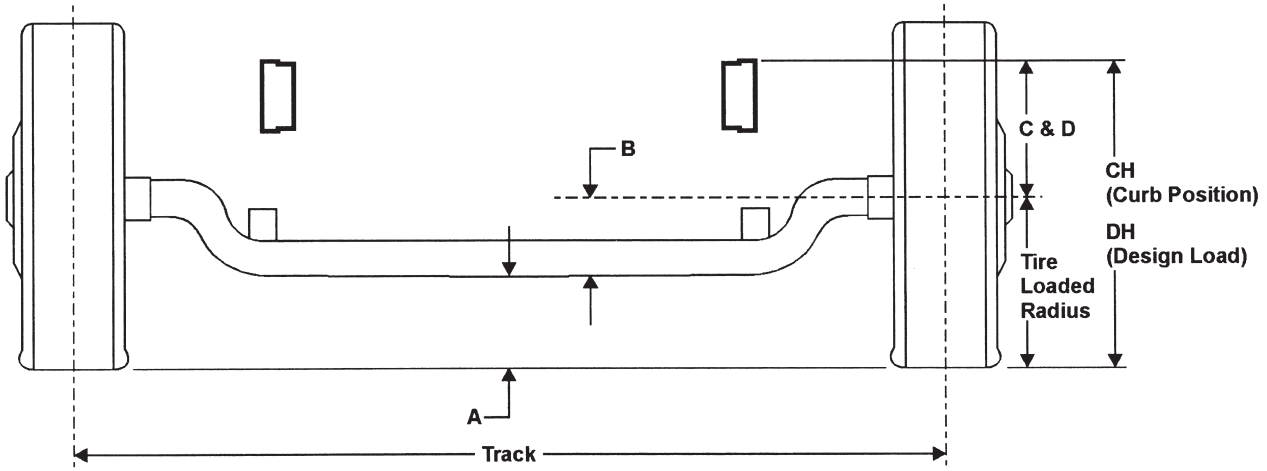


Figure 7.11.1

Formulas for calculating height dimensions:

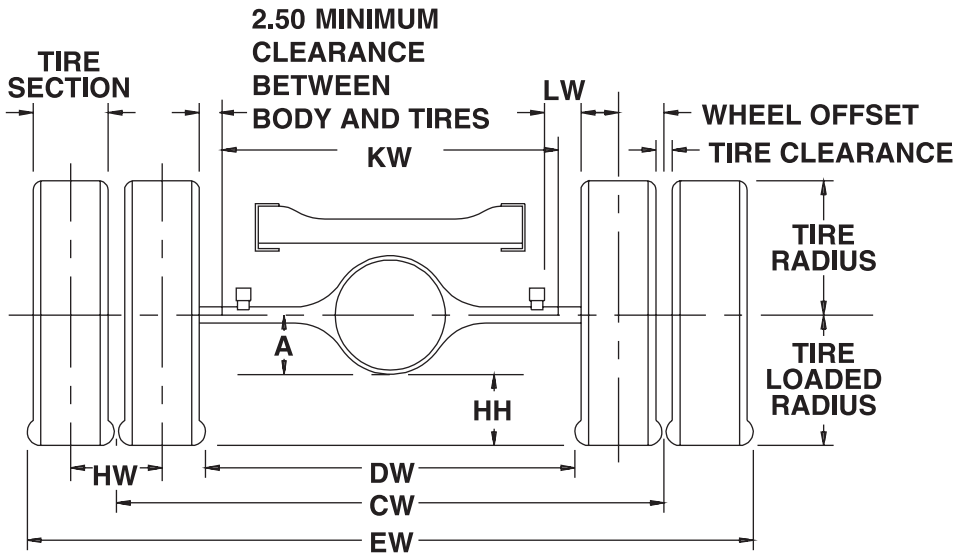
A = Tire Loaded Radius – B
C = Centerline of Axle to Top of Frame Rail at Curb Position
D = Centerline of Axle to Top of Frame Rail at Design Load
CH = C + Tire Unloaded Radius
DH = D + Tire Loaded Radius

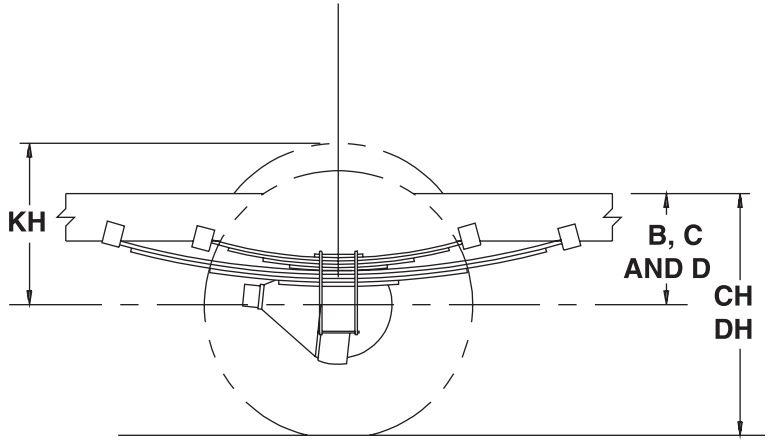
Tire	GVWR	GAWR	A	B	C	D	CH	DH	Track	Tire Radius	
										Unload	Load
215/85R 16-E	12,000 lbs.	4,860 lbs.	7.5	6.6	12.9	12.2	27.5	26.3	65.5	14.6	14.1
225/70R 19.5	14,500 lbs.	6,630 lbs.	8.3	6.6	13	11.5	29	26.4	65.5	16	14.93

Figure 7.11.2

Dimensions in inches

Rear Axle Chart





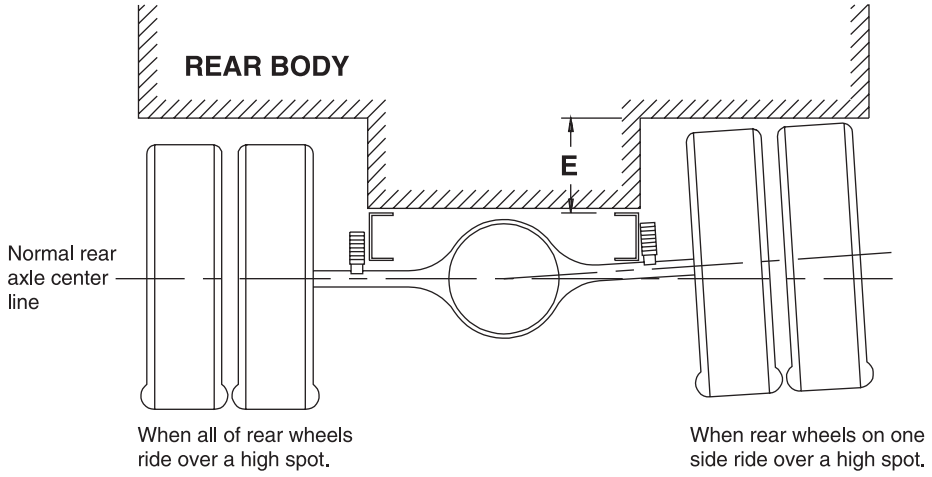


Figure 7.12.1

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

Figure 7.13.1

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

Figure 7.13.2

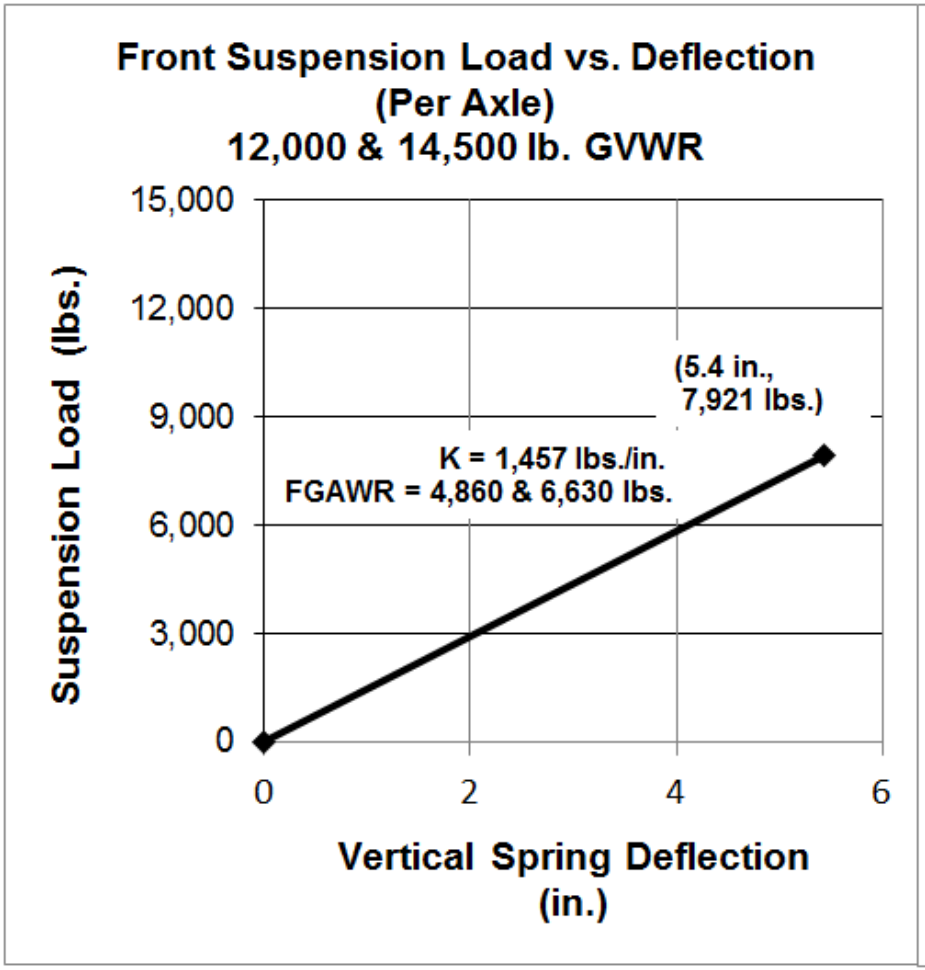
NOTE: Track and overall width may vary with optional equipment.

Tire	GAWR	Track CW	A	B	C	D	E
215/85R 16-E	8,840 lbs.	65.0	6.5(A/T)	9.3(A/T)	15.4	13.3/13.0	7.8
225/70R 19.5-F	11,020 lbs.	65.0	7.7 (A/T)	9.3 (A/T)	15.6	13.4	8.4

Figure 7.13.3

Dimensions in inches

Suspension Deflection Charts – NPR Gas, NPR HD Gas



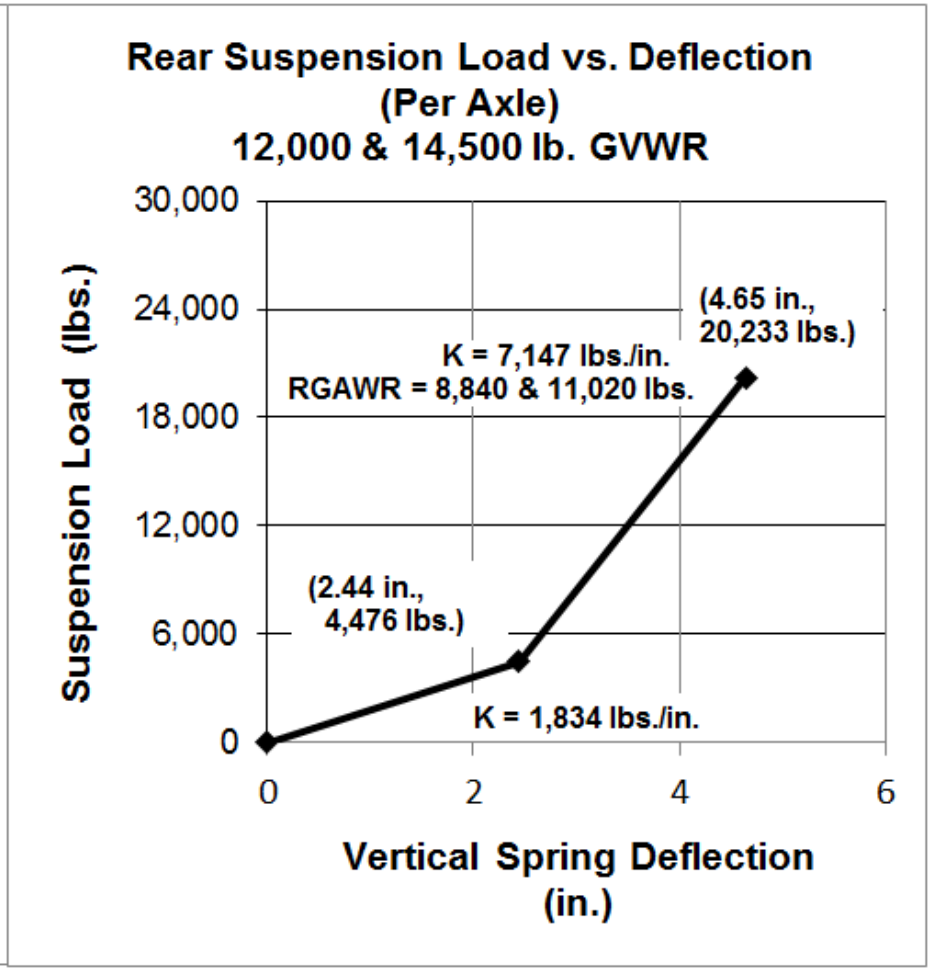


Figure 7.14.1

Dimensions in inches

Tire and Disc Wheel Chart – NPR

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

Figure 7.15.1

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

Figure 7.15.2

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 Thickeness	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	5^0 DC	Steel TOPY

*O.D. Wrench Sizes

Figure 7.15.3

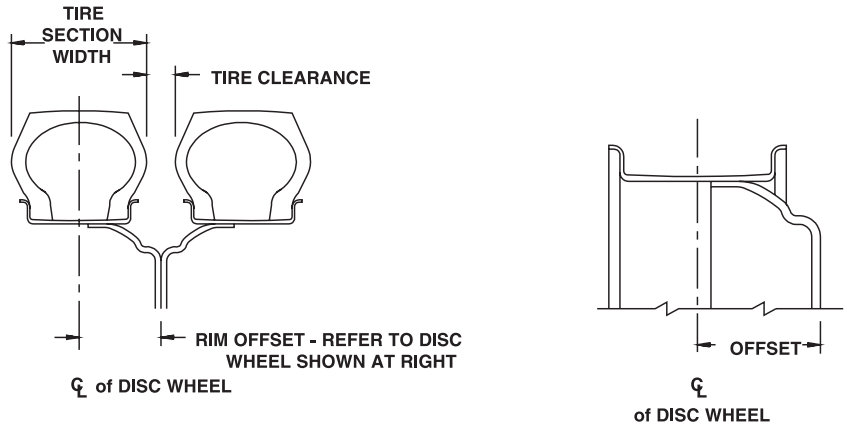


Figure 7.15.4

Tire and Disc Wheel Chart – NPR HD

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-G	3,315	85	3,115	85	6,630	12,460	14,500

Figure 7.16.1

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

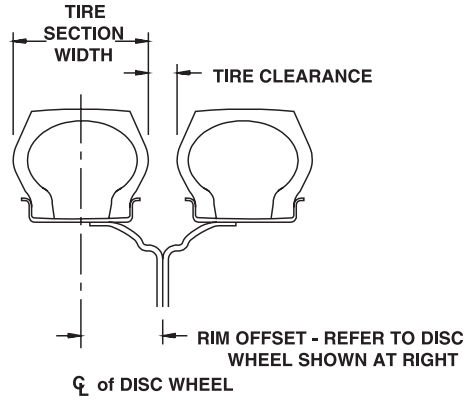
Figure 7.16.2

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 Thickeness	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	15^0 DC	Steel ACCURIED

*O.D. Wrench Sizes

Figure 7.16.3



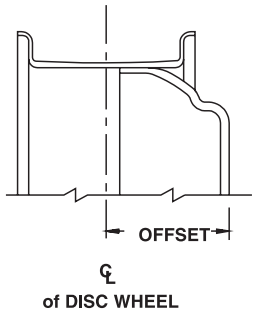


Figure 7.16.4

Propeller Shaft

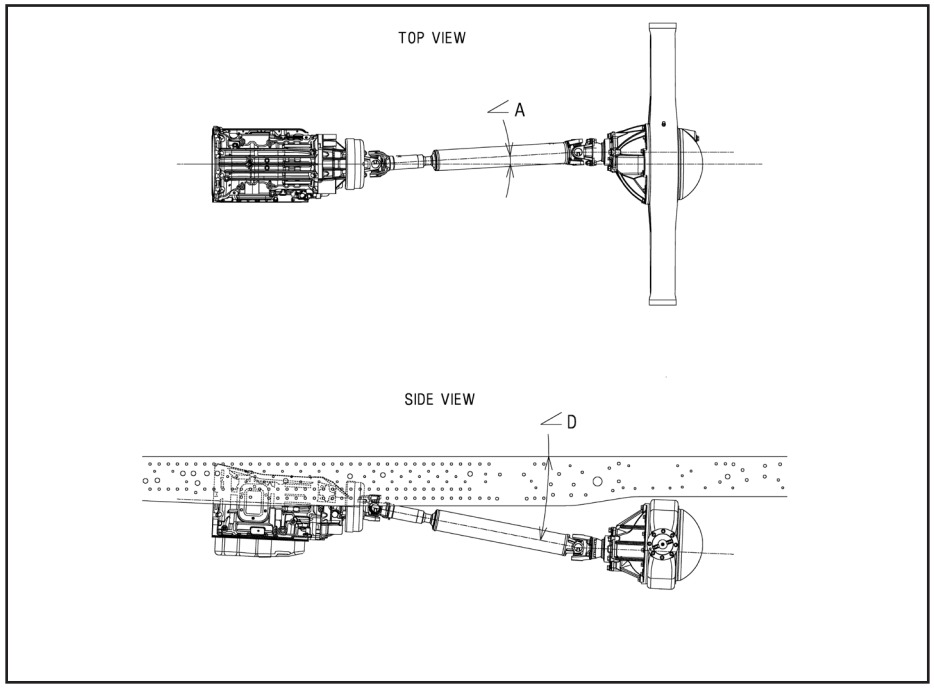


Figure 7.17.1

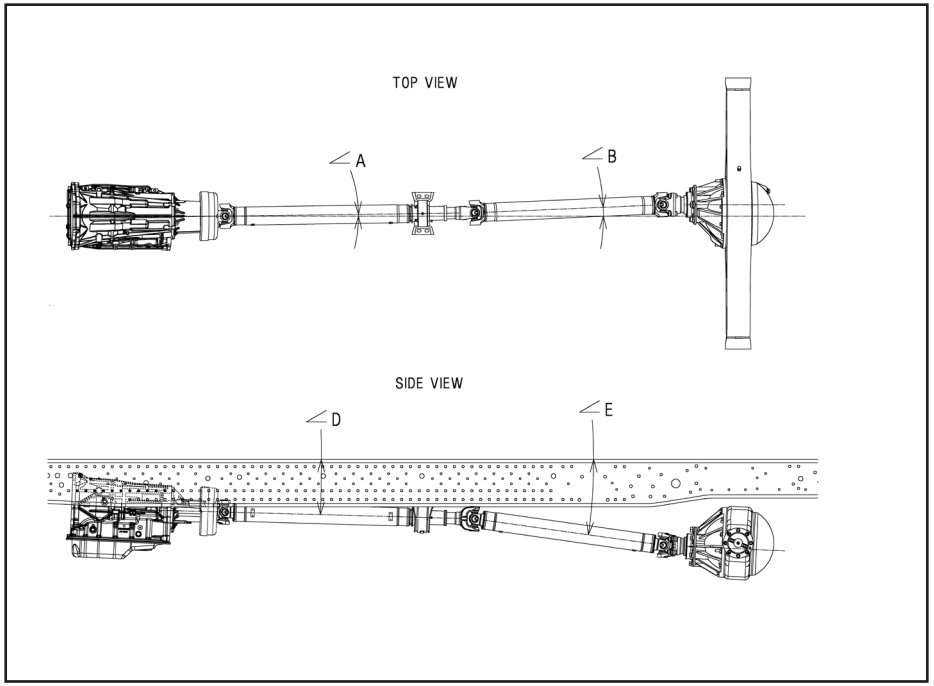


Figure 7.17.2

Wheelbase (in.)	Top View		Side View			
	∠A	∠B	∠D	∠E	Trans	Rear Axle
109	3.2°	-	9.1°	-	2.5°	2.5°
132.5	1.5°	2.3°	3.0°	7.7°	2.5°	2.5°
150	0.8°	2.5°	1.5°	8.0°	2.5°	2.5°
176	0.6°	1.7°	2.0°	4.5°	2.5°	2.5°

NOTE: 1. Angles provided in table are relative to the frame angle. Please take this into consideration for service measurements.
2. Driveline angles are based on the chassis curb weight which includes standard equipment, fuel but no driver, body or payload.

Wheelbase	109	132.5	150	176
No. of Shafts	1	2	2	2
Trans. Type	A/T	A/T	A/T	A/T
Shaft #1 O.D. (Inches)	3.25			
Thickness (Inches)	0.0906			
L (Inches)	37.55	18.15	35.47	46.1
Type	A	B	B	B
Shaft #2 O.D. (Inches)	3.25			
Thickness (Inches)	0.0906			
L (Inches)	N/A	33.78	34.17	49.52
Type	N/A	C	C	C

Figure 7.18.1

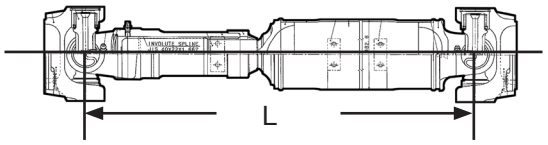
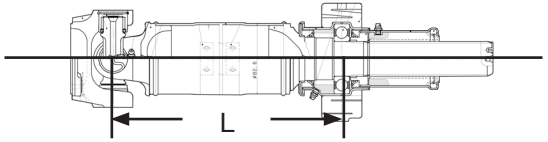
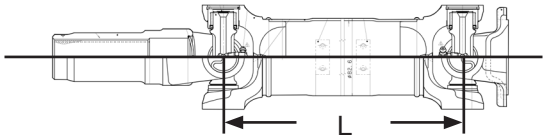
Type	Description	Illustration
Type **A**	1st shaft in 1-piece driveline	
Type **B**	1st shaft in 2-piece driveline	
Type **C**	2nd shaft in 2-piece driveline	

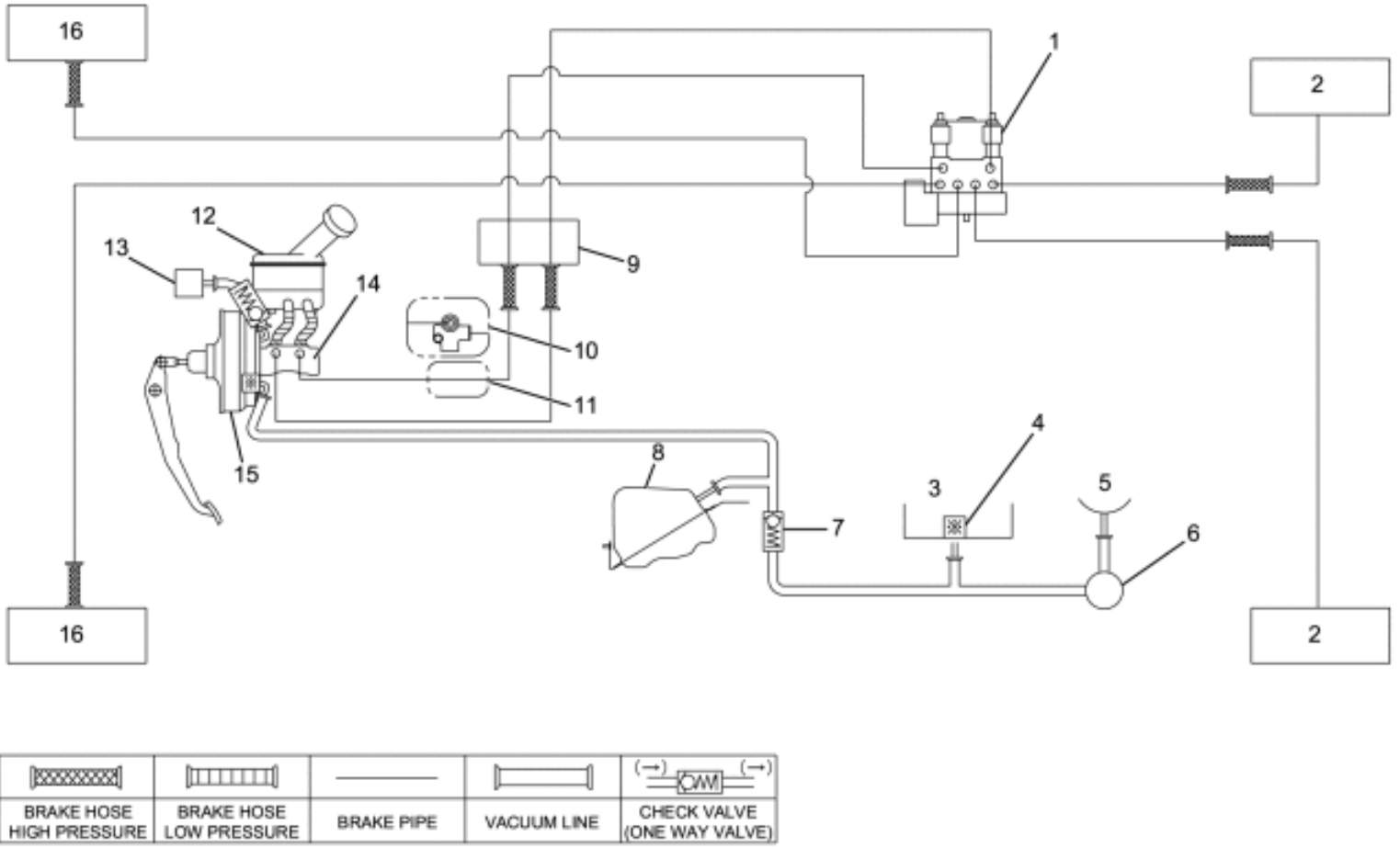
Figure 7.18.2

Dimensions in inches

Brake System Diagram, 12,000 GVW

Vacuum Over Hydraulic

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



Legend for NPR, NPR-HD, NPR-XD Brake System

(1) Electronic Hydraulic Control Unit (EHCU)
(2) Rear Wheel Cylinder
(3) Vacuum Pump
(4) Check Valve
(5) Exhaust Brake Valve
(6) Magnetic Valve
(7) Check Valve (One-way Valve)
(8) Vacuum Tank
(9) 4-Way Connector
(10) With Metering Valve
(11) W/O Metering Valve
(12) Brake Fluid Reservoir
(13) Electric Vacuum Pump
(14) Master Cylinder
(15) Vacuum Booster (Servo Unit)
(16) Front Wheel Cylinder

Figure 7.19.1

Brake System Diagram, 14,500 GVW

Vacuum Over Hydraulic

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

Legend for NPR, NPR-HD, NPR-XD Brake System
(1) Electronic Hydraulic Control Unit (EHCU)
(2) Rear Wheel Cylinder
(3) Vacuum Pump
(4) Check Valve
(5) Exhaust Brake Valve
(6) Magnetic Valve
(7) Check Valve (One-way Valve)
(8) Vacuum Tank
(9) 4-Way Connector
(10) With Metering Valve
(11) W/O Metering Valve
(12) Brake Fluid Reservoir
(13) Electric Vacuum Pump
(14) Master Cylinder
(15) Vacuum Booster (Servo Unit)
(16) Front Wheel Cylinder

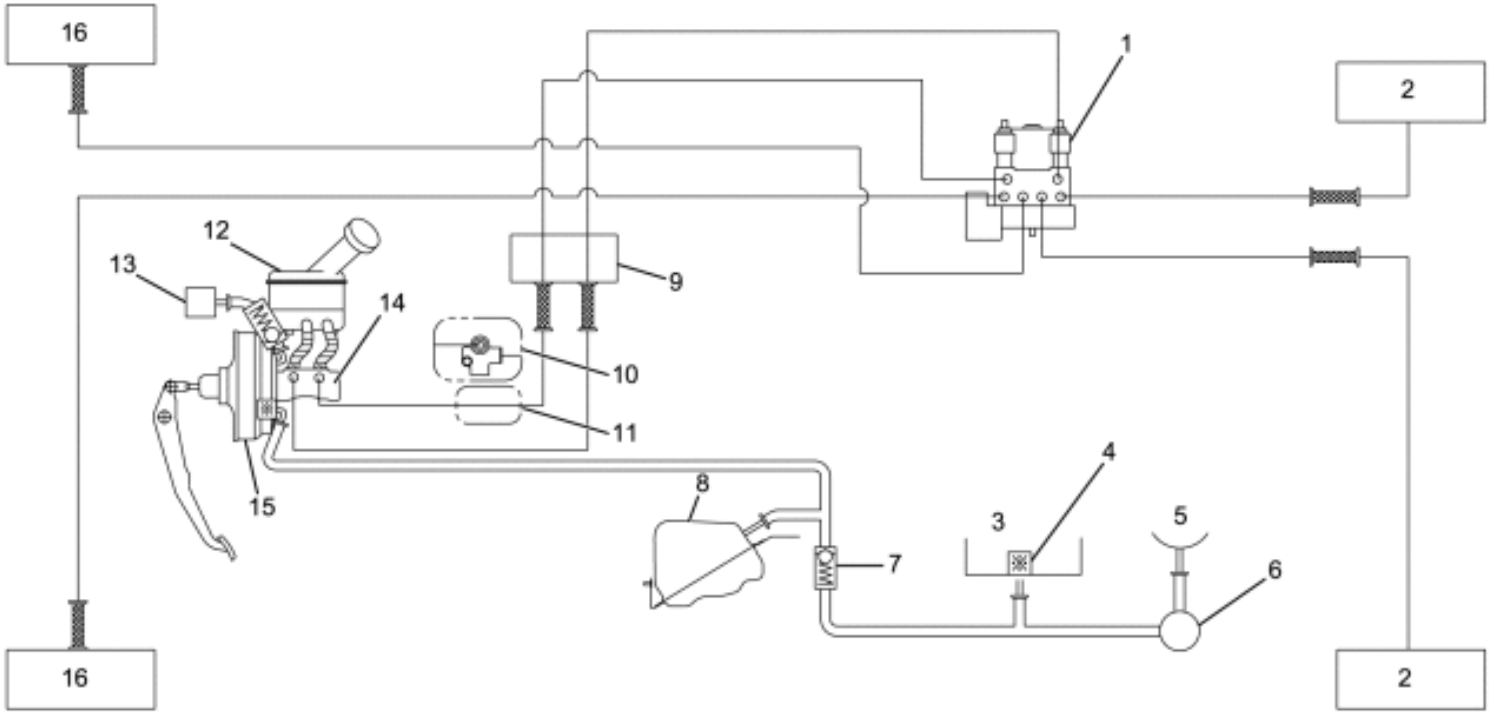


Figure 7.20.1

High Idle Mode

The high idle mode is the function that raises engine speed by operation of the driver when the vehicle is stationary. PIM performs the high idle mode control when the condition for operating is met. The PIM outputs the idle up command to the ECM and will blink the cruise control set indicator lamp during the high idle mode control.
Condition for Operating the High Idle Mode Control

The following conditions are met longer than 3 seconds:

- Engine is running.
- The selector lever is in “P” (Park) or “N” (Neutral) position.
- The accelerator pedal position is less than 25 percent.
- The brake switch is OFF.
- The cruise control main switch is ON.
- The cruise control set switch is ON.

Condition for Cancelling the High Idle Mode Control
Each of following conditions is met:

- Engine is stopped.
- The selector lever is in other than “P” (Park) or “N” (Neutral) position.
- The accelerator pedal position is 25 percent or more.
- The brake switch is ON.
- The cruise control main switch is OFF.
- The cruise control set switch is OFF.

Through the Rail Fuel Fill

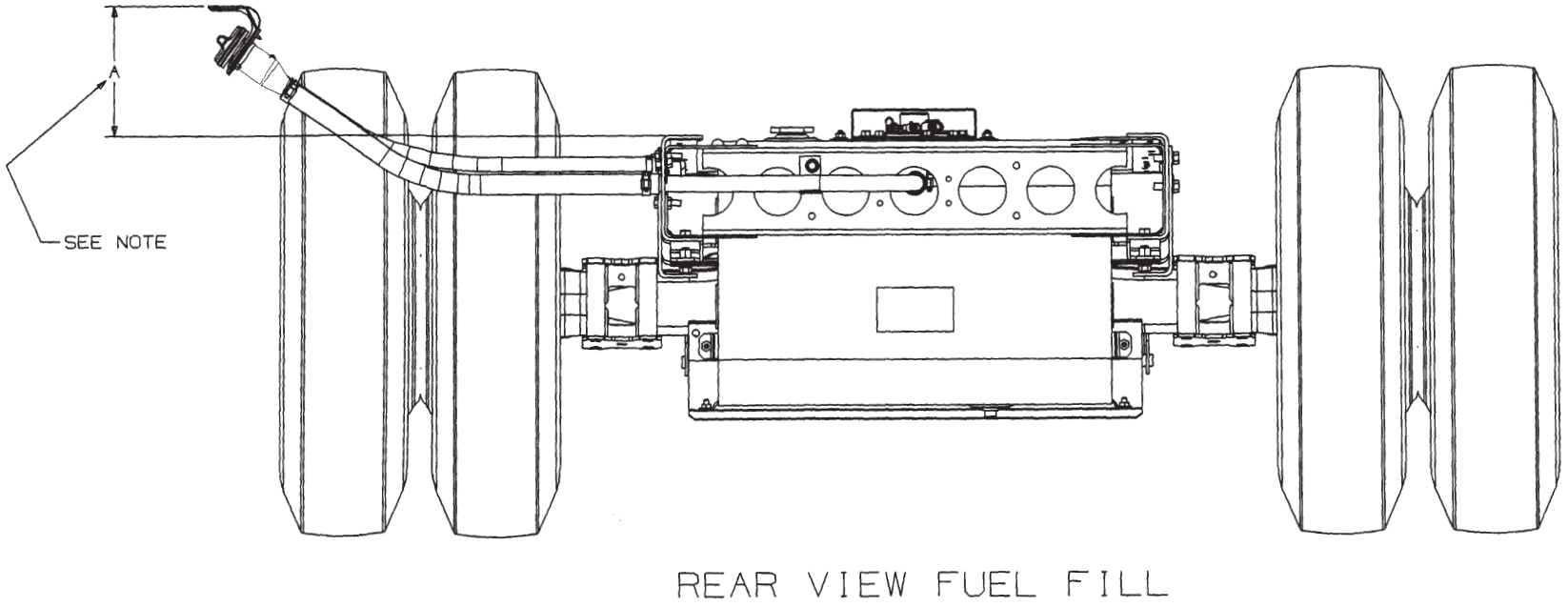
Installation Instructions

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 102 inch wide body width. Modify the hoses as required to fit dimension “E” of the desired body width
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.

Fuel Type

Use regular unleaded gasoline rated at 87 octane or higher that meets specification ASTMD4814 in the U.S. Blended gasoline is suitable for use in the Isuzu NPR NPR-HD Gas Chassis.
MTBE is “methyl tertiarybutylether.” Fuel that is no more than 15%.
MTBE is fine for your vehicle.
Ethanol is ethyl or grain alcohol. Properly-blended fuel that is no more than 10% ethanol is fine for your vehicle.
NOTICE: Fuel that is 15% Ethanol is not suitable for your vehicle. Fuel that is than 85% Ethanol is not suitable for your vehicle.
Methanol is methyl or wood alcohol.
NOTICE: Fuel that is more than 5% methanol is bad for your vehicle. And even at 5% or less, there must be “co-solvents” and corrosion preventives in this fuel to help avoid damage to the fuel system from methanol.

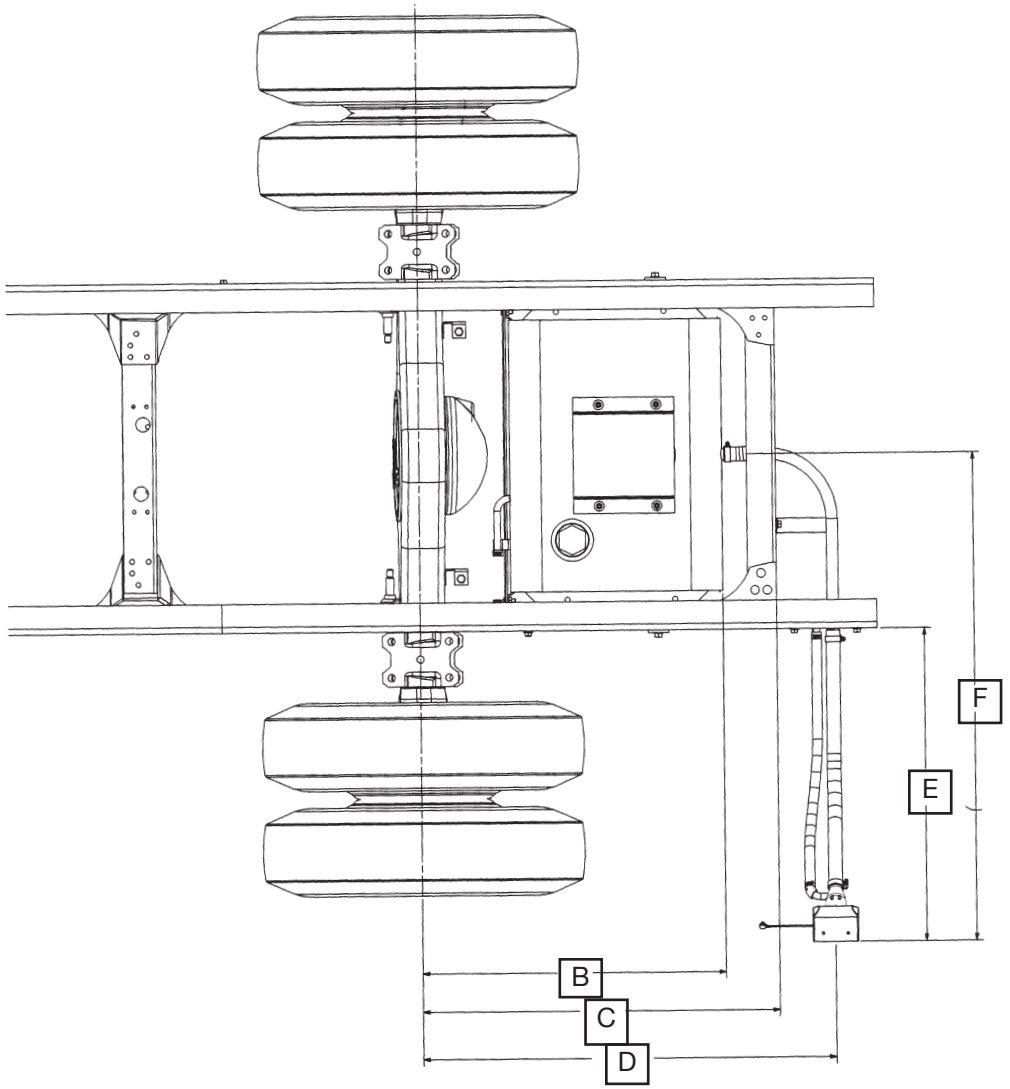
Rear View Fuel Fill



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

Figure 7.23.1

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 = 50.6 inches (1285.2 mm)

Figure 7.24.1

Through the Rail Fuel Fill Frame Hole

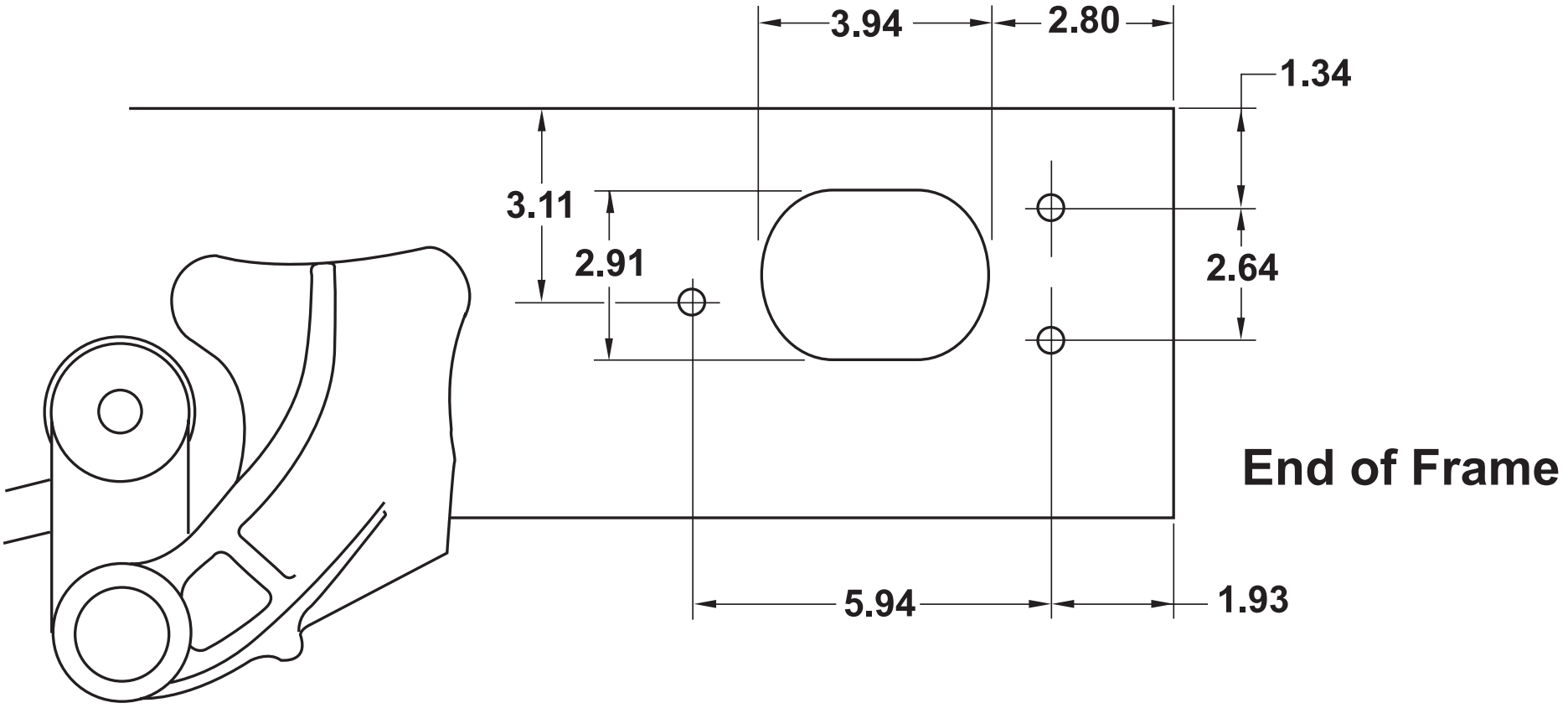


Figure 7.25.1

Dimensions in inches

Fuel Fill Parts Illustration

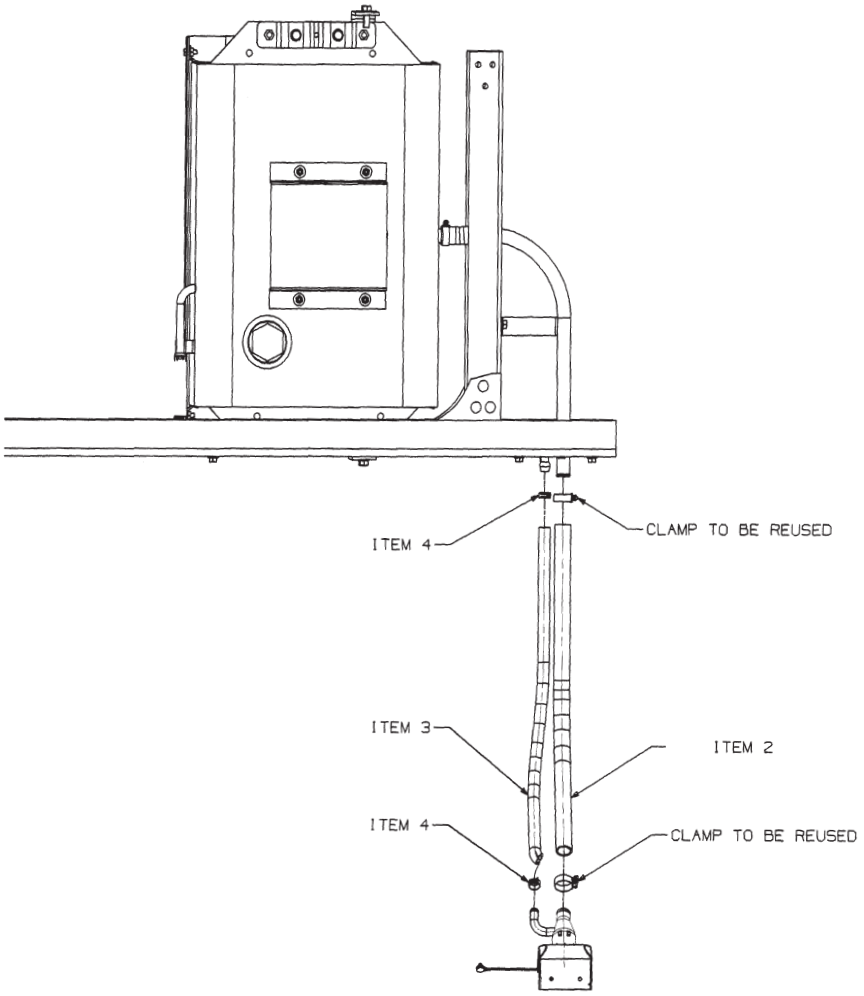


Figure 7.26.1

Fuel Fill Parts List

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

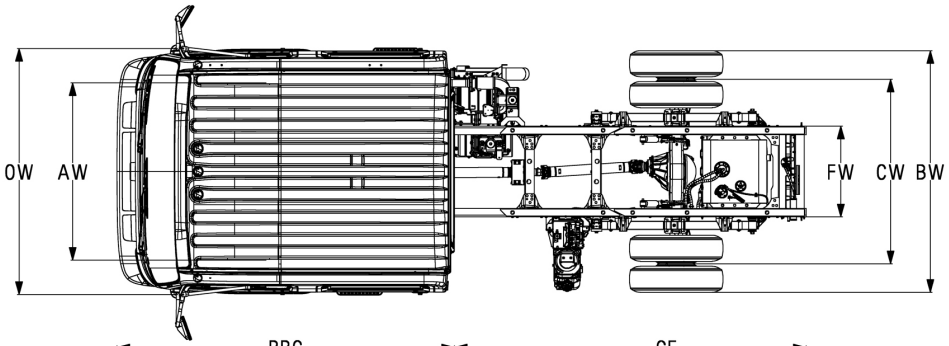
Figure 7.27.1

NPR, NPR HD Crew Cab Gas
Specifications

Model	NPR GAS	NPR HD 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)	297 HP @ 4300 rpm	
Torque (Gross)	372 lb-ft torque @ 4000 rpm	
Equipment	Sequential Port Fuel Injection (SFI), mass air flow meter, powertrain control module (PCM), onboard diagnostics, oxygen sensors, catalytic convertor, map sensor, withexternal oil cooler, engine cruise control and High Idle Mode.	
Transmission	6L90 Hydra-Matic 6-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	4,860 lbs.	6,630 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	8,840 lbs.	11,020 lbs.
Wheels	16 x 6.0 6-hole disc wheels, painted white.	19.5 x 6.0
Tires	215/85R-16E (10 ply) LRR (Low Rolling Resistance) tubeless steel belted radial, all season, front and rear	215/85R-16E (10 ply) LRR (Low Rolling Resistance) tubeless steel belted radial, 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 rear. The parking brake is a mechanical, cable actuated, internal expanding drum type, transmission mounted. 4 channel anti-lock brake system.	
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^3., RBM 316,800.	
Cab	All-steel, low cab forward BBC 109.9 in. All-steel, low cab forward7 passenger, BBC 109.9 in.	
Equipment	TRICOT 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 maintenance free batteries, 750 CCA each, 145-Amp alternator with integral regulator.	
Options	see page 8.3 for options	

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

Figure 8.2.1



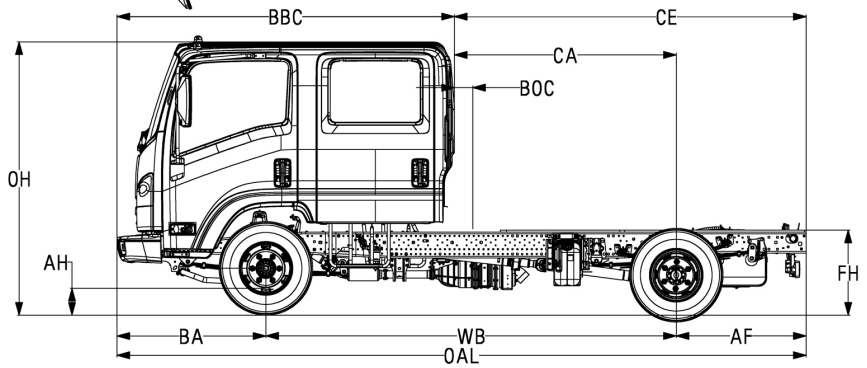


Figure 8.2.2

NPR 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 Dimension Constants

Code	Inches	Code	Inches
AH	7.5	BW	84.1
AW	65.6	CW	65.0
BA	48.4	FW	33.5
BBC	109.9	OH	90.0
BOC	5.0	OW	81.3
FH	31.8		

NPR In-Frame Tank
12,000-lb Automatic Transmission Model
Chassis Caband Maximum Payload Weights

Model	WB	Unit	Front	Rear	Total	Payload
HB3/ LB3	150	Lbs.	3781	1911	5692	6308
HB4/ LB4	176	Lbs.	3838	1916	5754	6246

NPR-HD Varriable 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 Dimension Constants

Code	Inches	Code	Inches
AH	8.3	BW	84.1
AW	65.6	CW	65.0
BA	48.4	FW	33.5
BBC	109.9	OH	91.1
BOC	5.0	OW	81.3
FH	33.0		

NPR In-Frame Tank
14,500-lb. GVWR Automatic Transmission Model
Model Chassis Cab and Maximum Payload Weights

Model	WB	Unit	Front	Rear	Total	Payload
HE3/LE3	150	Lbs.	3909	2088	5997	8503
HE4/LE4	176	Lbs.	3966	2092	6058	8442

Vehicle Weight Limits:

	NPR	NPR-HD
GVWR Designed Maximum	12,000 lbs.	14,500 lbs.
GAWR, Front	4,860 lbs.	6,630 lbs.
GAWR, Rear	8,840 lbs.	11,020 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.

RPO	DESCRIPTION STANDARD CAB	Weight (LBS) Front/Rear
IF6	Fire extinguisher and triangle kit mounted in rear organizer (2)	18.6 / 0.0
IY4	Delete Standard Radio	-3.0 / 0.0
IS0	Heated mirrors	0.3 / 0.0
I8H	AM/FM/CD radio with Aux input/USB port and Bluetooth	0.0 / 0.0
I9H	Heated dual remote control mirrors (15” head)	2.0 / 0.0
IU2	Mirror Bracket for 102 “wide body	1.0 / 0.0
IV9	Seat covers crew cab	9.0 / 2.0
IX2	Rear Body Dome Lamp Switch	0.4 / 1.5
UZF	Back up alarm	0.0 / 1.5
V22	Chrome Grille	1.0 / 0.0
I66	Engine Block Heater (120V 600W)	1.0 / 0.0
I3G	65 mph top speed limit (max cruise speed 60 mph)	0.00 / 0.00
I1F	Ship-Through IMPCO(Union City IN) Model codes KE204,KE304,KE404 only	0.00 / 0.00

(3) Standard model specifications with LSD

High Idle Mode
Provides 1200 rpm engine speed when vehicle is in park or neutral with parking brake set . Activated by pressing main cruise switch and then turning and holding cruise set switch for 3 seconds. Cruise light will blink slowly in this mode. Throttle demand above 25% of throttle will cause cancellation of High Idle Mode.

Frame and Crossmember Specifications

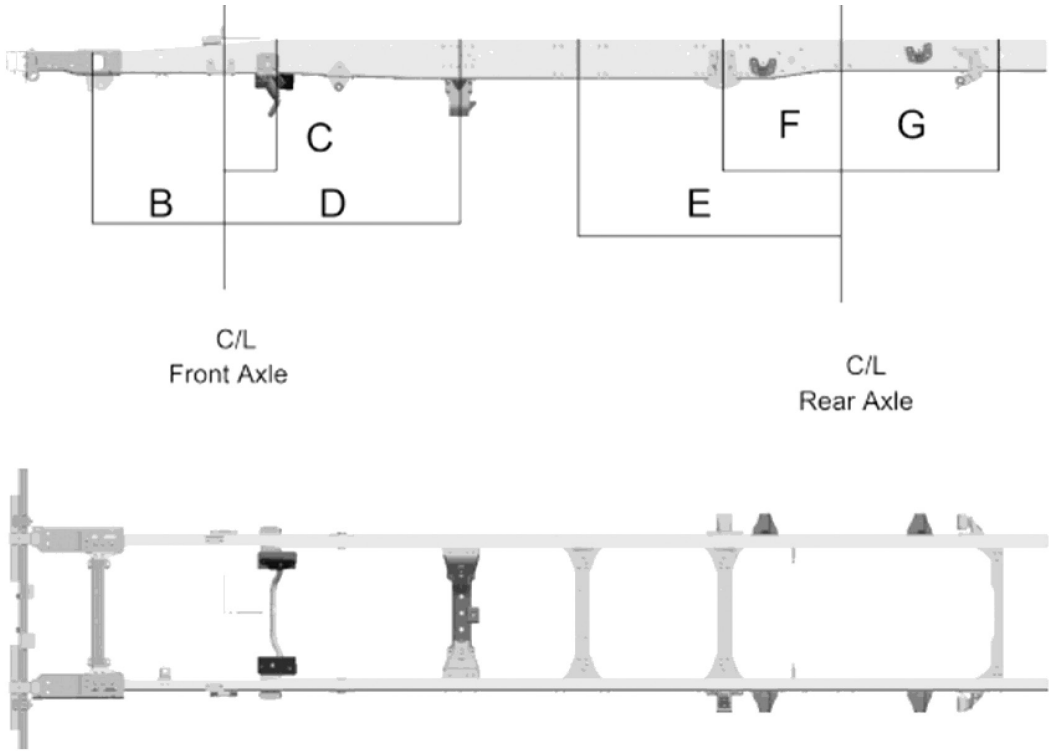


Figure 8.4.1

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 51.5	BB 57.9	CC 24.2	DD 33.8
176.0	0.24	28.3	7.9	AA 51.5	BB 74.4	CC 24.2	DD 33.8

A/T = Automatic Transmission

Figure 8.4.2

Dimensions in inches

Frame Chart

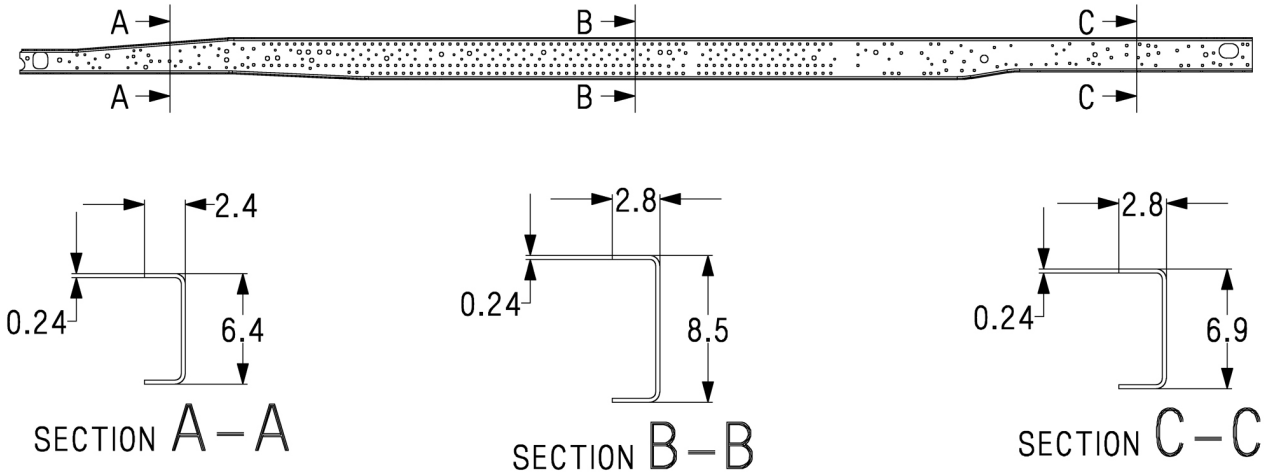


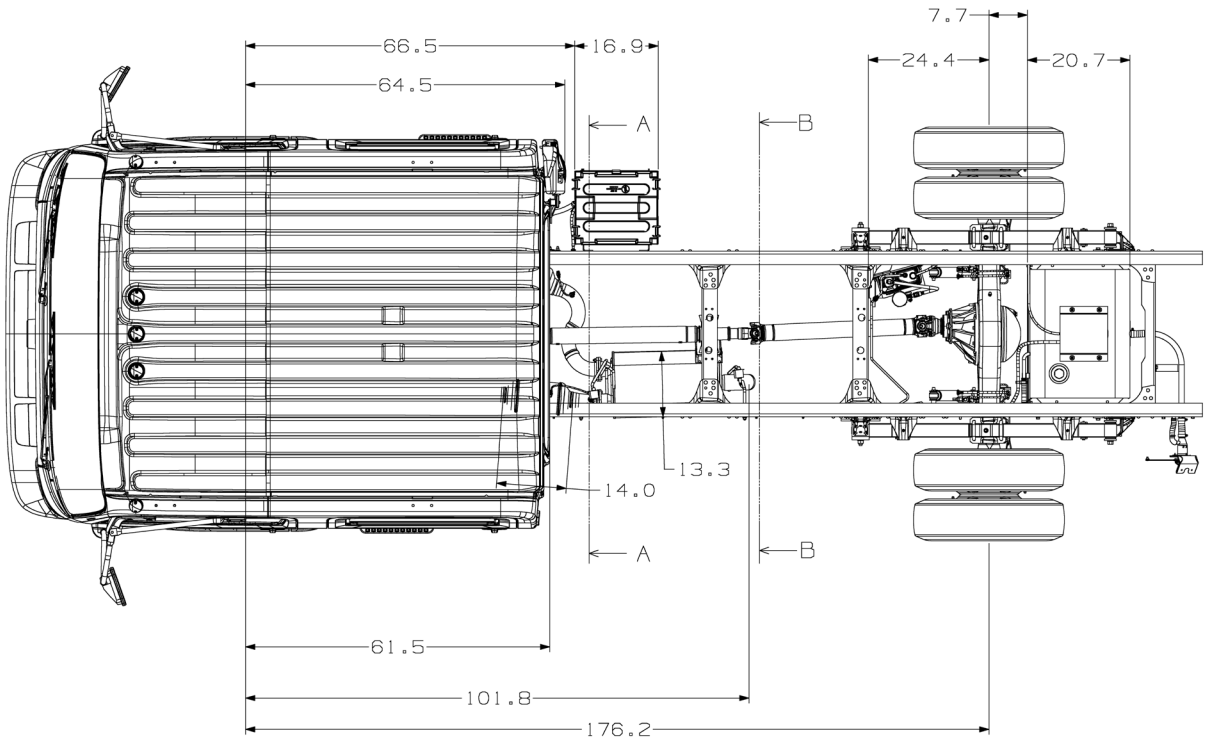
Figure 8.5.1

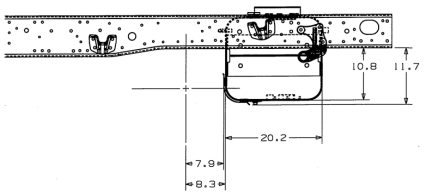
Wheelbase	Frame FL	Frame Thickness
150.0	223.8	0.24
176.0	249.8	0.24

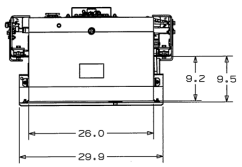
Figure 8.5.2

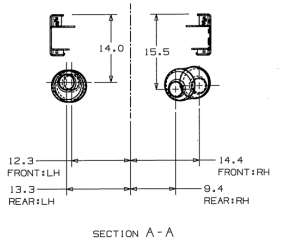
Dimensions in inches

Auxiliary Views 176”









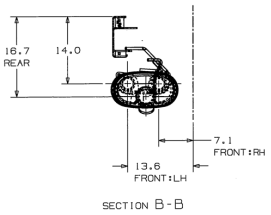


Figure 8.6.1

Dimensions in inches

Chassis Dimensions

Dimensions			
A	B	C	D
WB	CA	CE	OAL
150.0	88.5	131.6	241.5
176.0	114.5	157.6	267.5

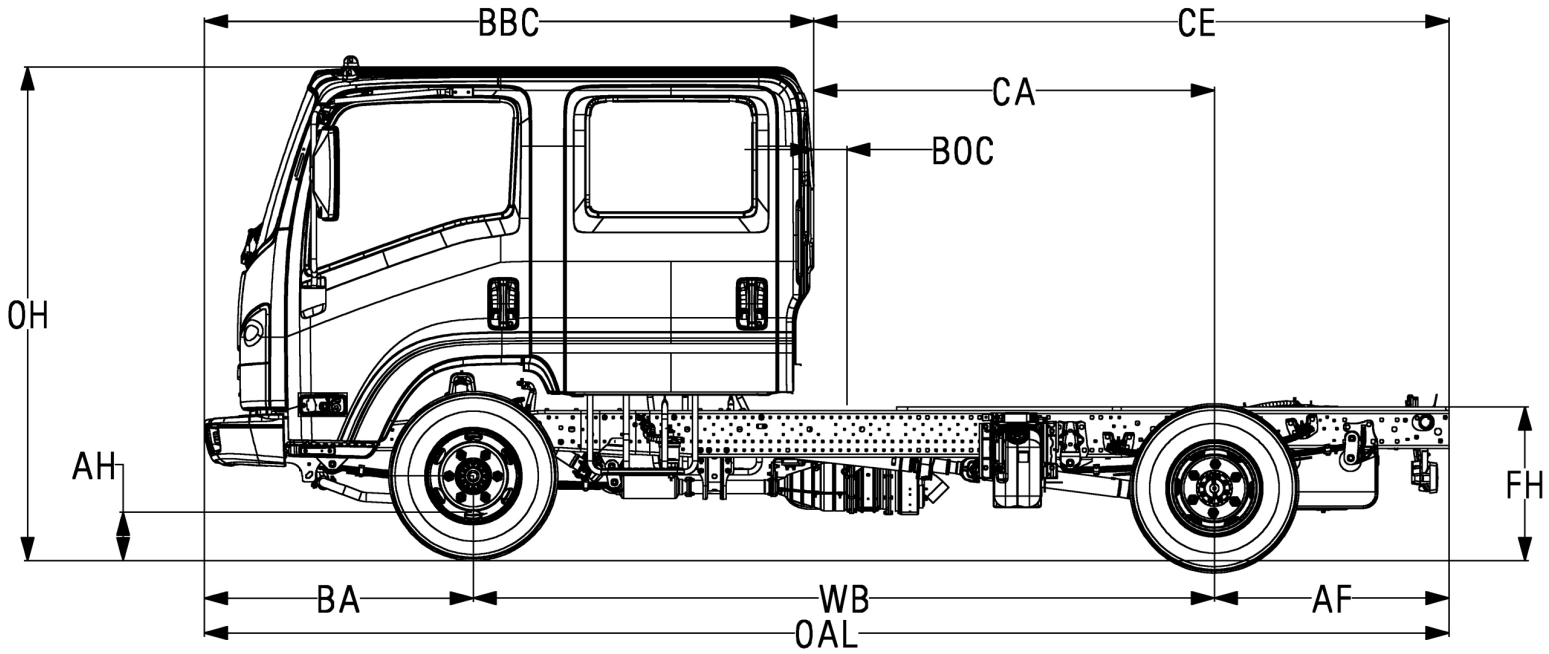


Figure 8.7.1

Dimensions in inches

Chassis Dimensions

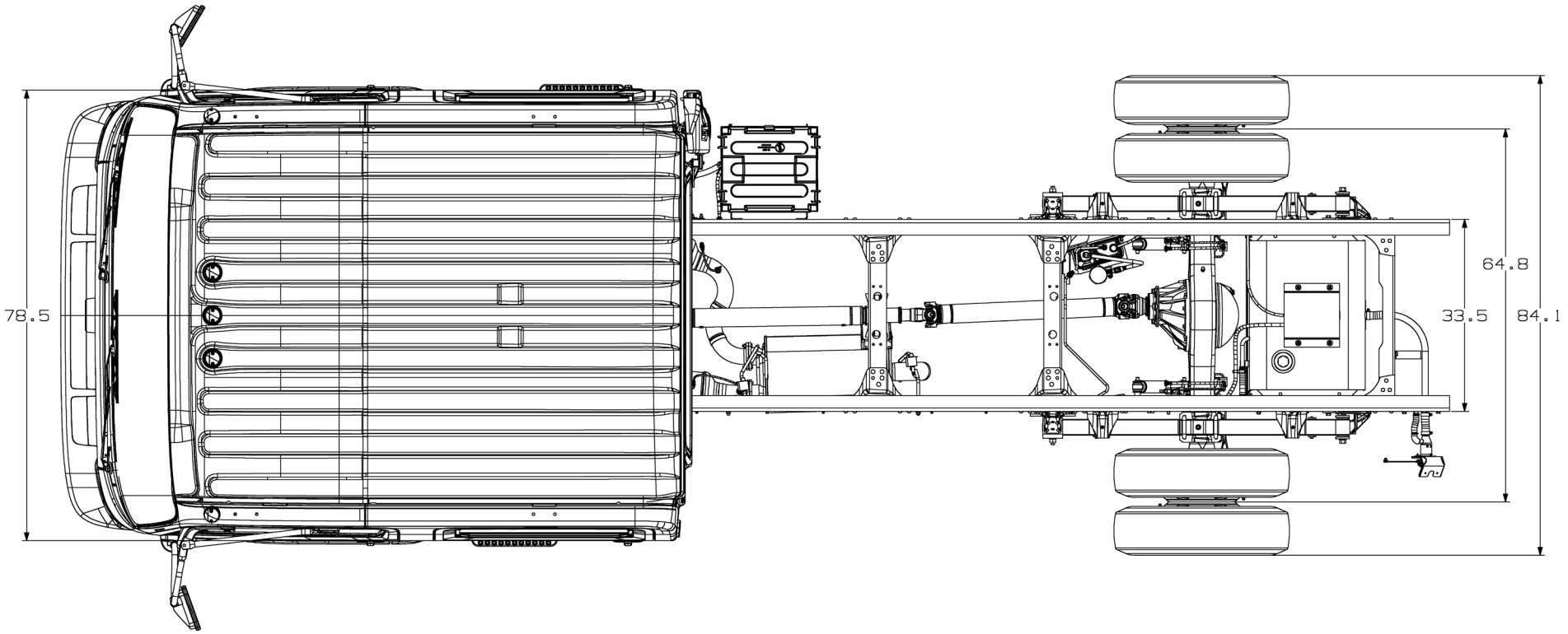


Figure 8.8.1

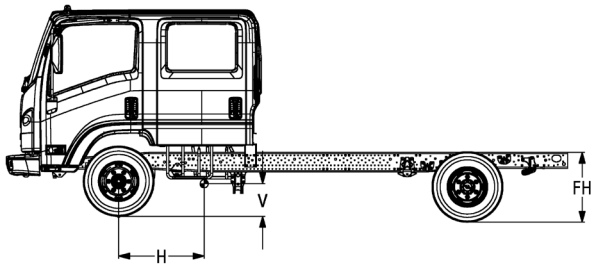
Dimensions in inches

Center of Gravity

NPR GAS CREW CAB

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

Figure 8.9.1



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

The maximum vertical center of gravity must not be exceeded at maximum GVWR and rated front and rear GAWR.The center of gravity maximum is 63” (1600mm) above the ground.The horizontal center of gravity must be located between the front and rear axles.

NOTE: The maximum dimensions for a body installed on the N-Series Gas are 102 inches wide (outside) with 102” wide mirror brackets installed and 91 inches high (inside). Any larger body applications must be approved by ICTA Application Engineering. On the West Coast call 1-714-935-9327 and on the East Coast call 1-770-740-1620 x 262.

Figure 8.9.2

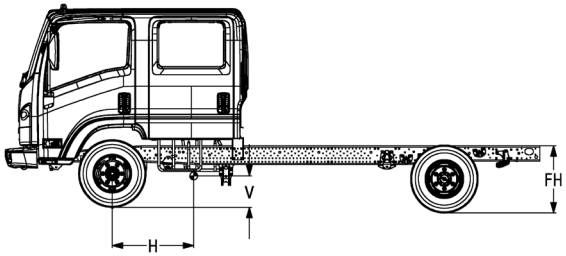
Dimensions in inches

Center of Gravity

NPR-HD GAS CREW CAB

GVWR	WB	V	H Auto. Trans. IN FRAME TANK
14,500	150	26.9	53.4
	176	26.9	61.8

Figure 8.10.1



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

The maximum vertical center of gravity must not be exceeded at maximum GVWR and rated front and rear GAWR. The center of gravity maximum is 63” (1600mm) above the ground.The horizontal center of gravity must be located between the front and rear axles.

NOTE: The maximum dimensions for a body installed on the N-Series Gas are 102 inches wide (outside) with 102” wide mirror brackets installed and 91 inches high (inside). Any larger body applications must be approved by ICTA Application Engineering. On the West Coast call 1-714-935-9327 and on the East Coast call 1-770-740-1620 x 262.

Figure 8.10.2

Dimensions in inches

Front Axle Chart NPR

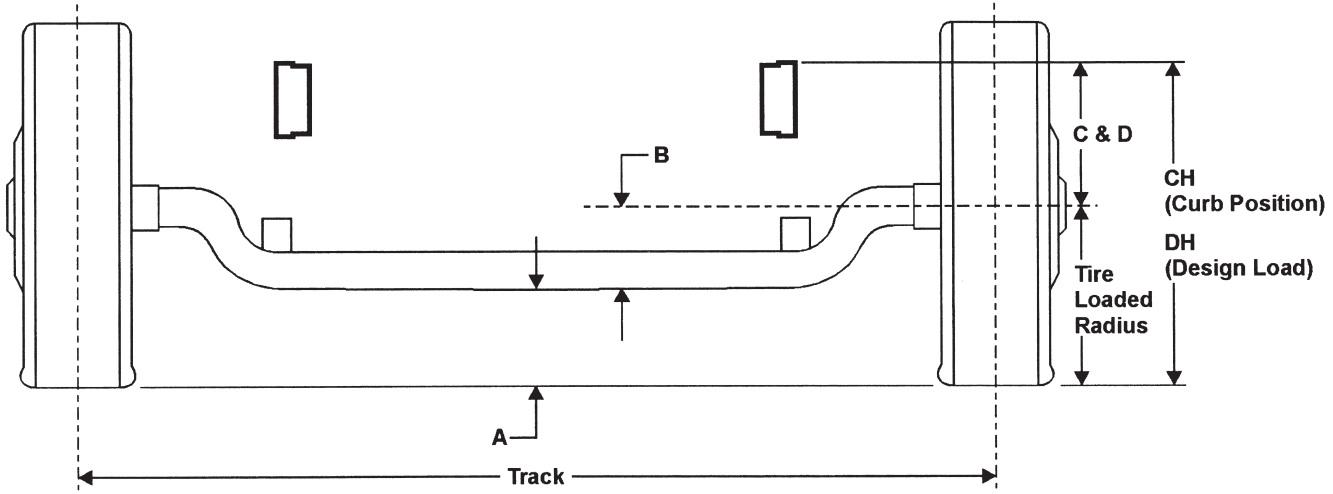


Figure 8.11.1

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.	4,860 lbs.	7.5	6.6	12.9	12.2	27.5	26.3	65.5	14.6	14.1

Figure 8.11.2

Dimensions in inches

Front Axle Chart NPR-HD

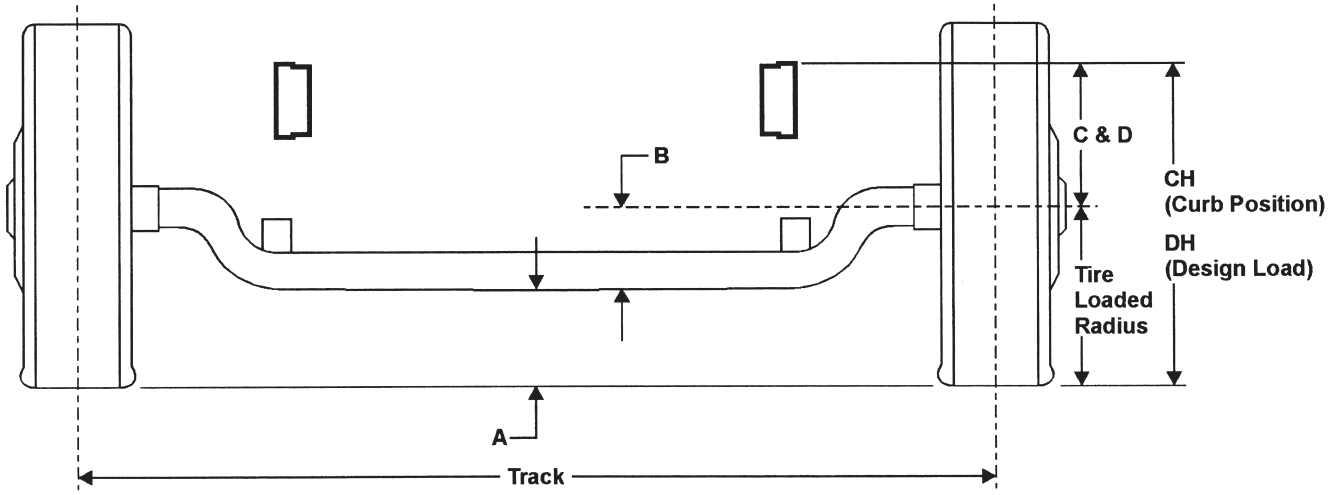


Figure 8.12.1

Formulas for calculating height dimensions:

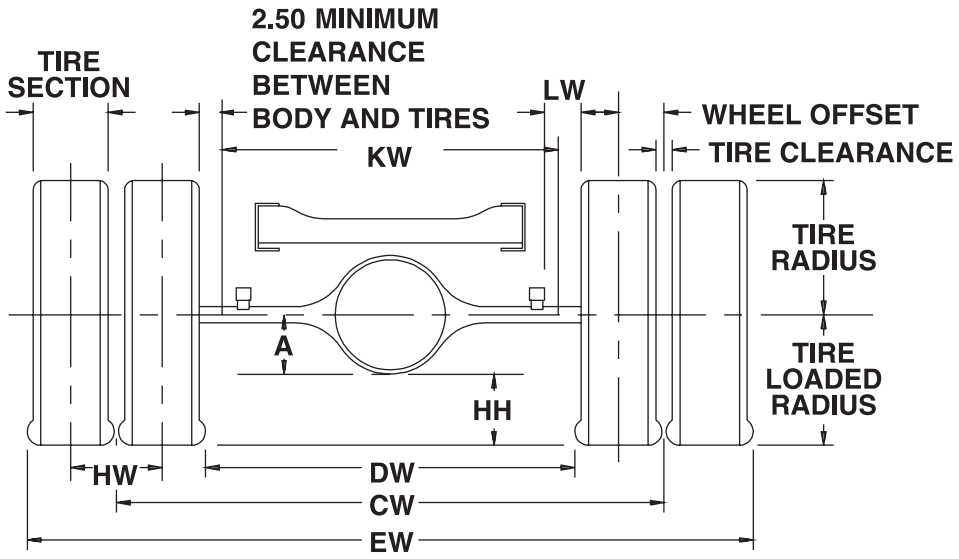
A = Tire Loaded Radius – B
C = Centerline of Axle to Top of Frame Rail at Curb Position
D = Centerline of Axle to Top of Frame Rail at Design Load
CH = C + Tire Unloaded Radius
DH = D + Tire Loaded Radius

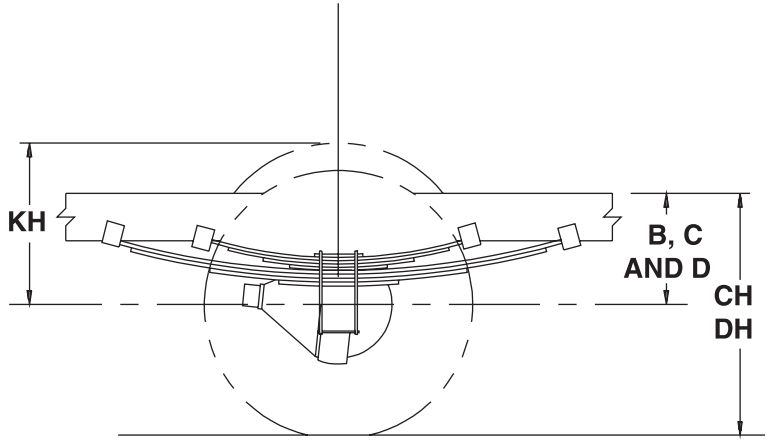
Tire	GVWR	GAWR	A	B	C	D	CH	DH	Track	Tire Radius	
										Unload	Load
225/70R 19.5	14,500 lbs.	6,630 lbs.	8.3	6.6	13.0	11.5	29.0	26.4	65.5	16.0	14.93

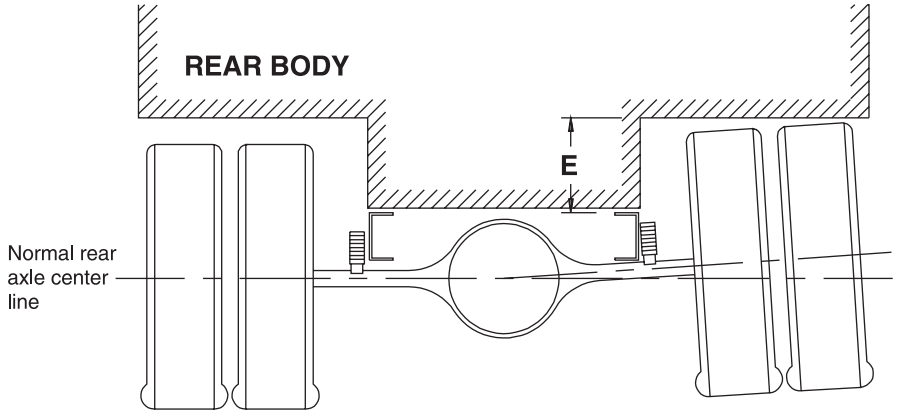
Figure 8.12.2

Dimensions in inches

Rear Axle Chart NPR







When all of rear wheels ride over a high spot.

When rear wheels on one side ride over a high spot.

Figure 8.13.1

Dimensions in inches

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.

Figure 8.14.1

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

Figure 8.14.2

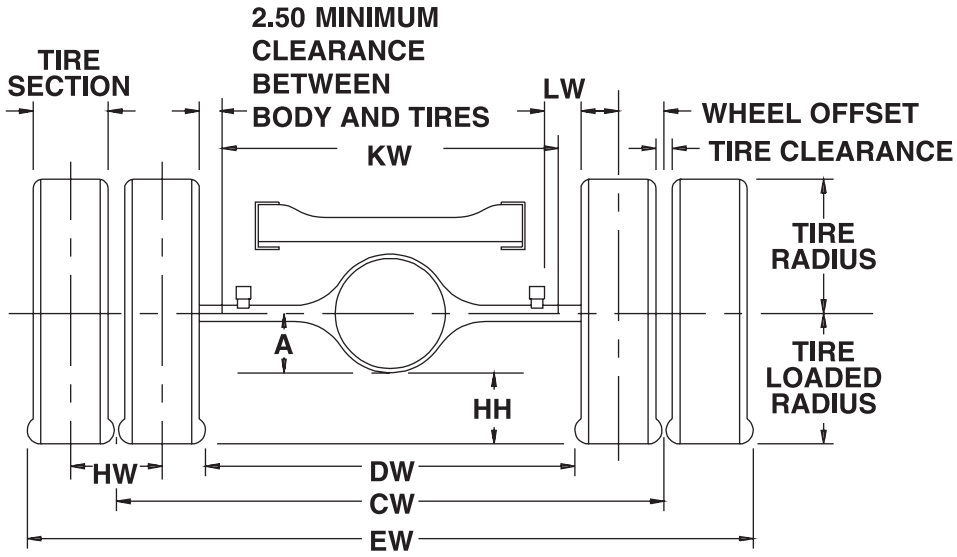
NOTE: Track and overall width may vary with optional equipment.

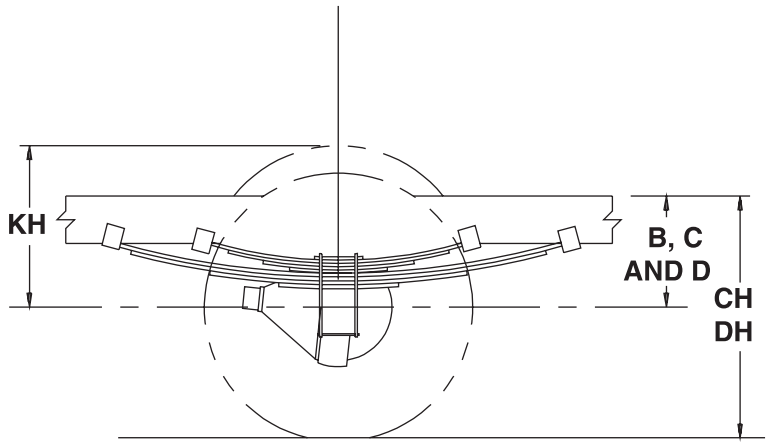
Tire	GAWR	Track CW	A	B	C	D	E
215/85R 16-E	8,840 lbs.	65.0	6.5	9.3	15.4	13.0	7.8

Figure 8.14.3

Dimensions in inches

Rear Axle Chart NPR-HD





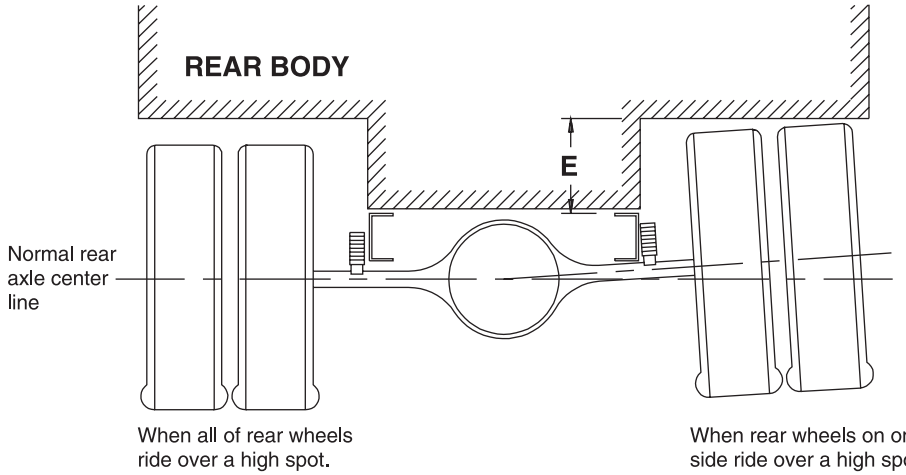


Figure 8.15.1

Dimensions in inches

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.

Figure 8.16.1

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

Figure 8.16.2

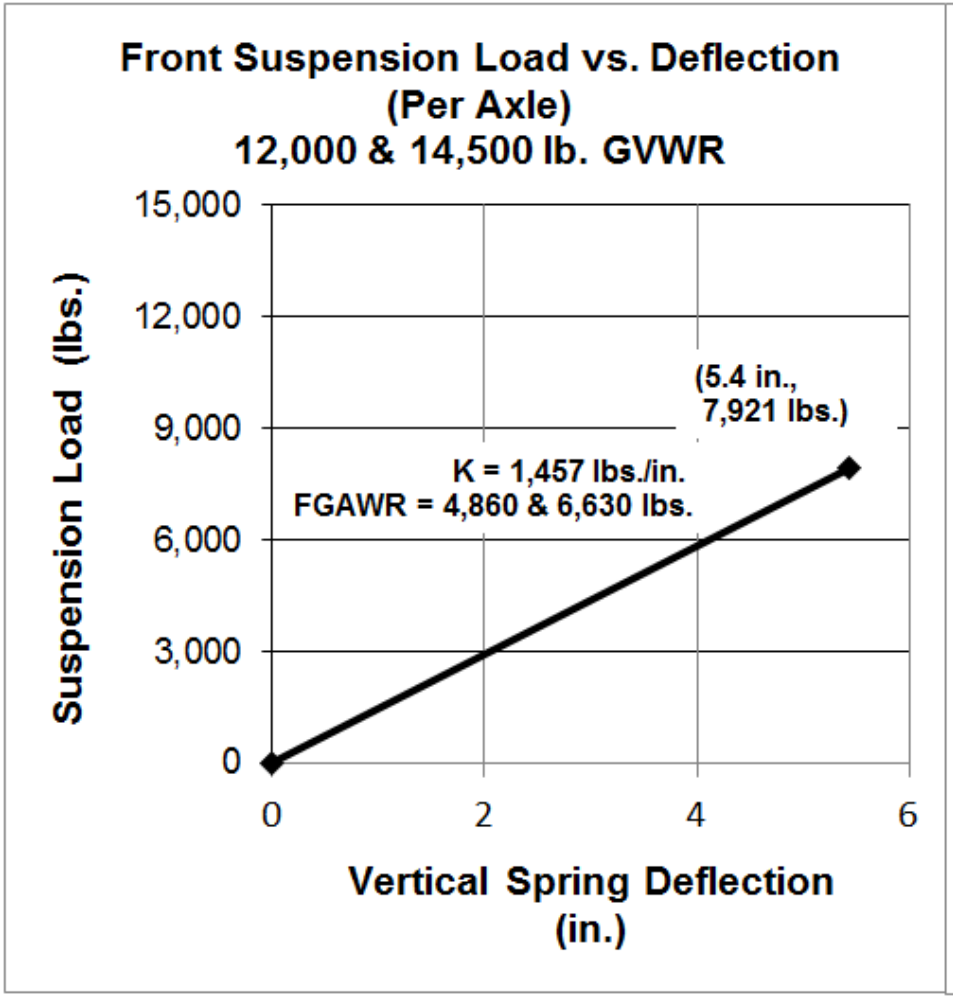
NOTE: Track and overall width may vary with optional equipment.

Tire	GAWR	Track CW	A	B	C	D	E
225/70R 19.5 G	11,020 lbs.	65.0	7.7	9.3	15.6	13.4	8.4

Figure 8.16.3

Dimensions in inches

Suspension Deflection Charts – NPR, NPR-HD



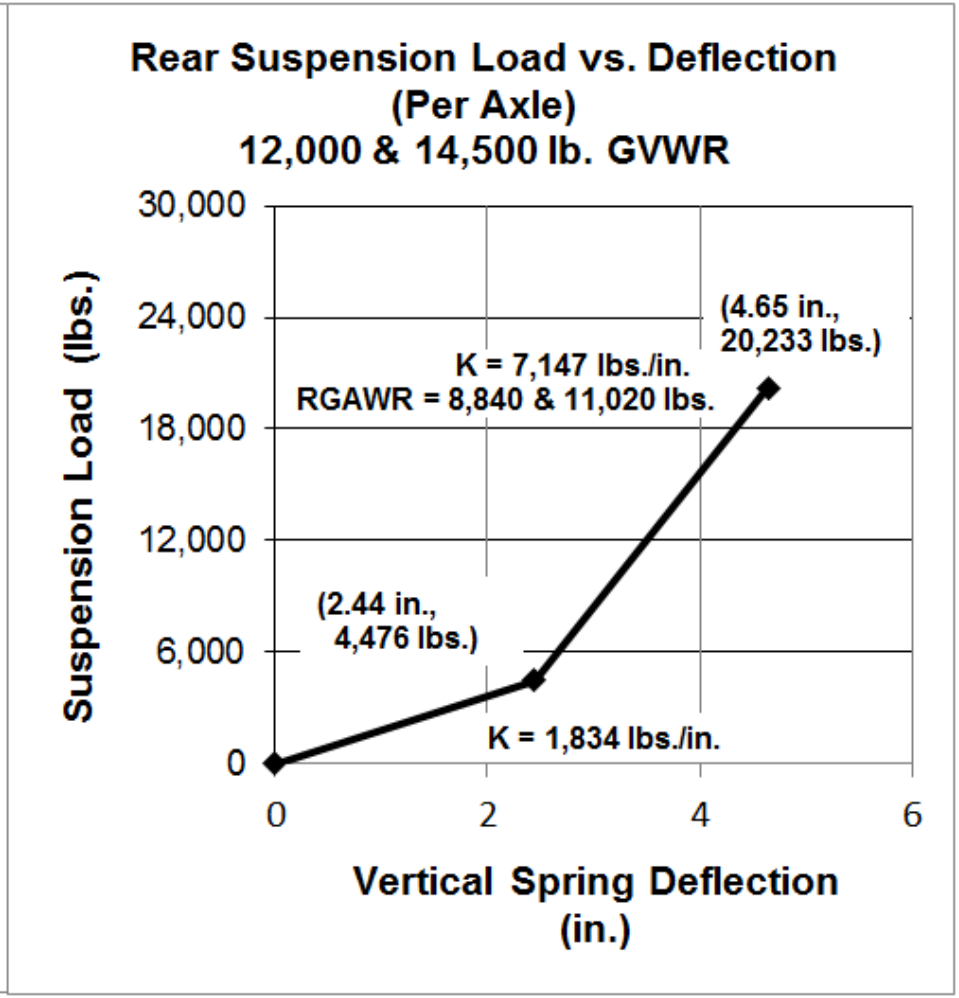


Figure 8.17.1

Dimensions in inches

Tire and Disc Wheel Chart – NPR

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

Figure 8.18.1

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

Figure 8.18.2

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 Thickeness	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	5^0 DC	Steel TOPY

*O.D. Wrench Sizes

Figure 8.18.3

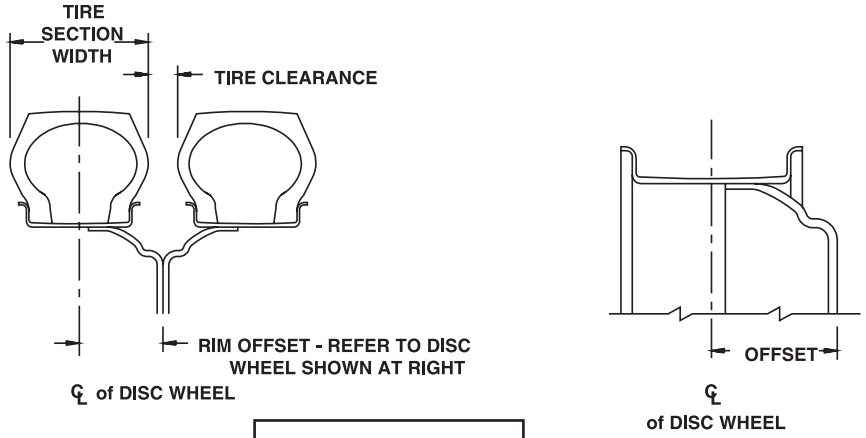


Figure 8.18.4

Dimensions in inches

Tire and Disc Wheel Chart – NPR HD

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 G	3,315	85	3,115	85	6,630	12,460	14,500

Figure 8.19.1

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

Figure 8.19.2

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 Thickeness	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	15^0 DC	Steel TOPY

*O.D. Wrench Sizes

Figure 8.19.3

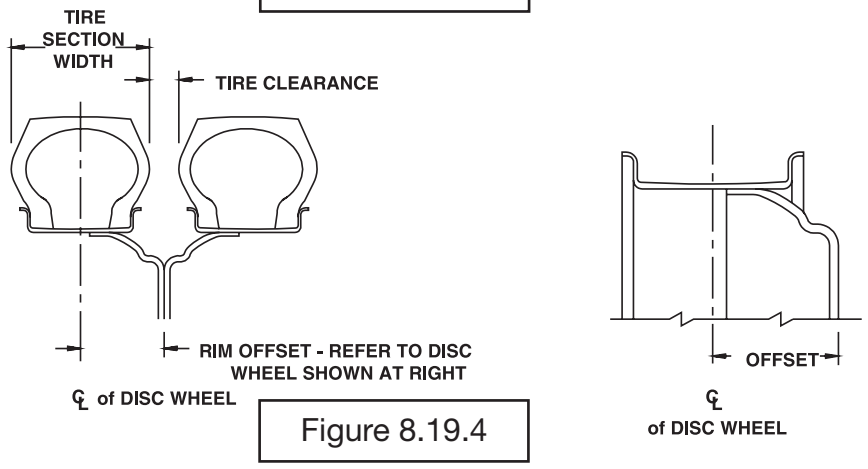


Figure 8.19.4

Dimensions in inches

NPR, NPR-HD Crew Cab

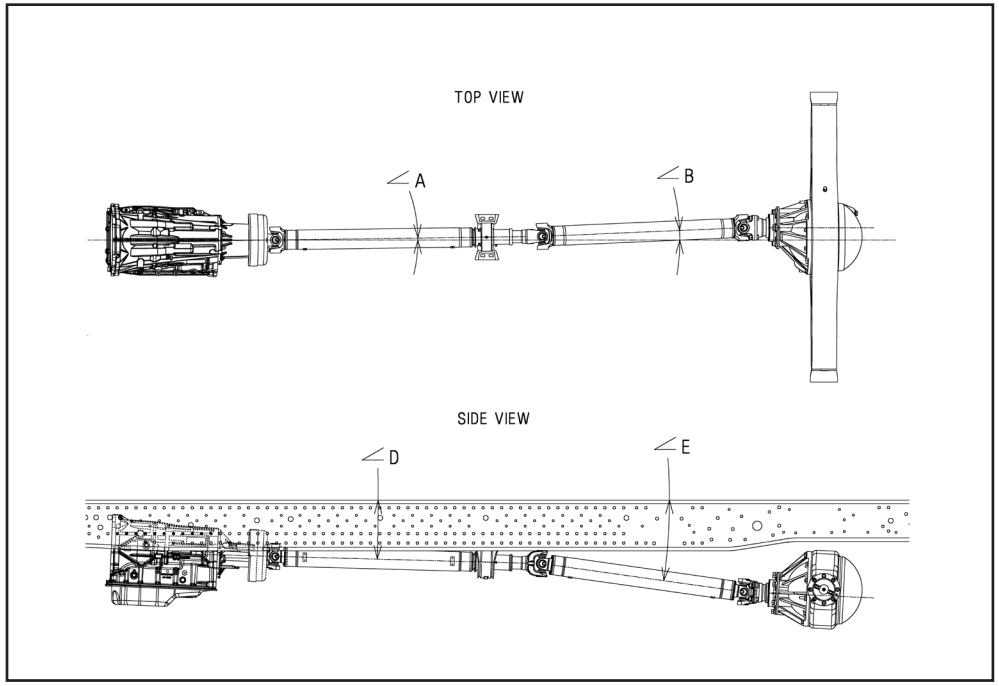


Figure 8.20.2

Wheelbase (in.)	Top View		Side View			
	∠A	∠B	∠D	∠E	Trans	Rear Axle
150	0.8°	2.5°	1.5°	8.0°	2.5°	2.5°
176	0.6°	1.7°	2.0°	4.5°	2.5°	2.5°

NOTE: 1. Angles provided in table are relative to the frame angle. Please take this into consideration for service measurements.
2. Driveline angles are based on the chassis curb weight which includes standard equipments, fuel but no driver, body, or payload.

Wheelbase	150	176
No. of Shafts	2	2
Trans. Type	A/T	A/T
Shaft #1 O.D. (Inches)	3.25	3.25
Thickness (Inches)	0.0906	0.0906
L (Inches)	35.47	46.1
Type	B	B
Shaft #2 O.D. (Inches)	3.25	3.25
Thickness (Inches)	0.0906	0.0906
L (Inches)	34.17	49.52
Type	C	C

Figure 8.21.1

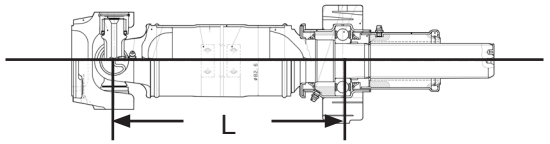
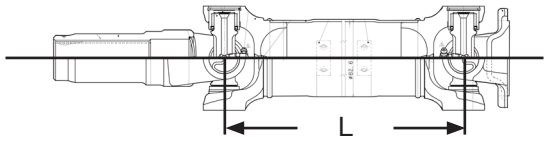
Type	Description	Illustration
Type **B**	1st shaft in 2-piece driveline	
Type **C**	2nd shaft in 2-piece driveline	

Figure 8.21.2

Dimensions in inches

Brake System Diagram 12,000 GVW

Vacuum Over Hydraulic

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

Legend for NPR, NPR-HD, NPR-XD Brake System

(1) Electronic Hydraulic Control Unit (EHCU)
(2) Rear Wheel Cylinder
(3) Vacuum Pump
(4) Check Valve
(5) Exhaust Brake Valve
(6) Magnetic Valve
(7) Check Valve (One-way Valve)
(8) Vacuum Tank
(9) 4-Way Connector
(10) With Metering Valve
(11) W/O Metering Valve
(12) Brake Fluid Reservoir
(13) Electric Vacuum Pump
(14) Master Cylinder
(15) Vacuum Booster (Servo Unit)
(16) Front Wheel Cylinder

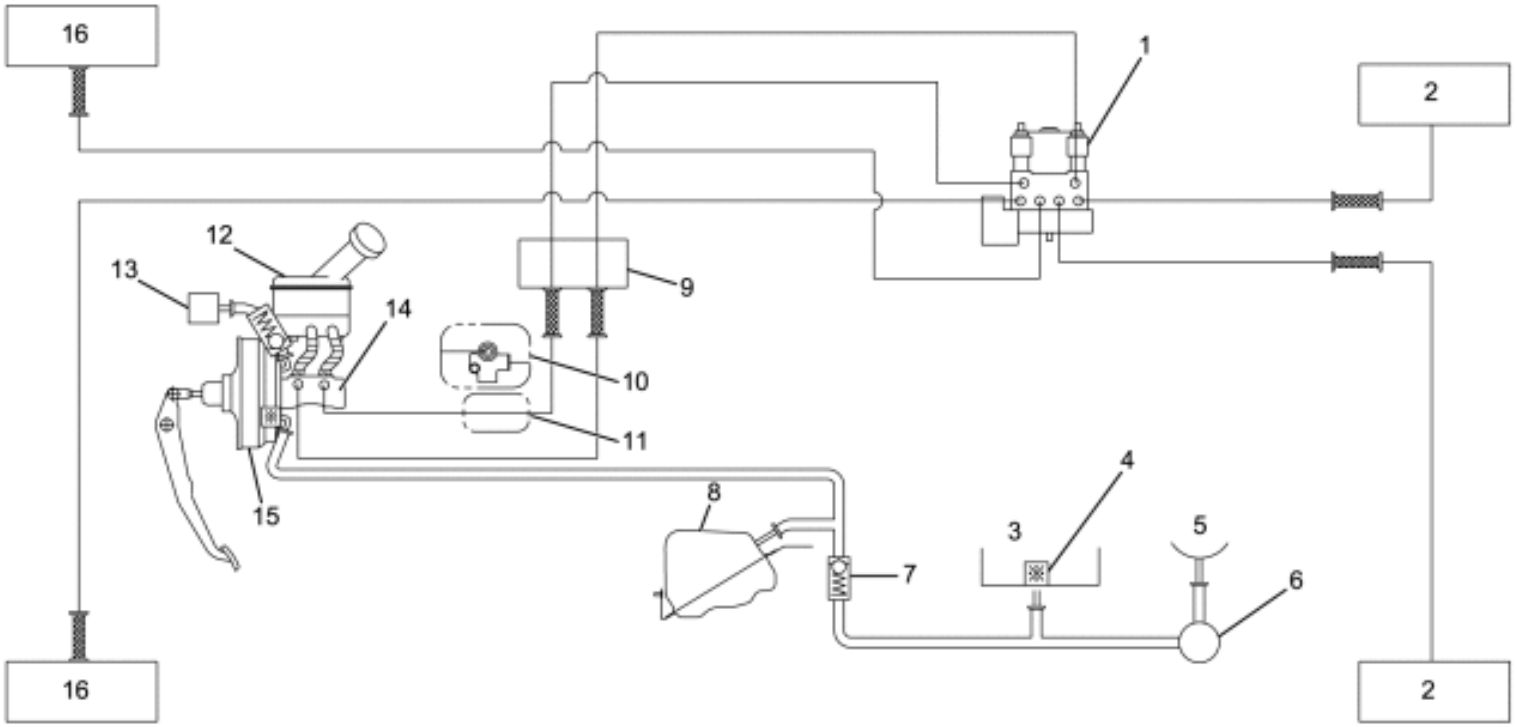


Figure 8.22.1

Brake System Diagram 14,500 GVW

Vacuum Over Hydraulic

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

Legend for NPR, NPR-HD, NPR-XD Brake System

(1) Electronic Hydraulic Control Unit (EHCU)
(2) Rear Wheel Cylinder
(3) Vacuum Pump
(4) Check Valve
(5) Exhaust Brake Valve
(6) Magnetic Valve
(7) Check Valve (One-way Valve)
(8) Vacuum Tank
(9) 4-Way Connector
(10) With Metering Valve
(11) W/O Metering Valve
(12) Brake Fluid Reservoir
(13) Electric Vacuum Pump
(14) Master Cylinder
(15) Vacuum Booster (Servo Unit)
(16) Front Wheel Cylinder

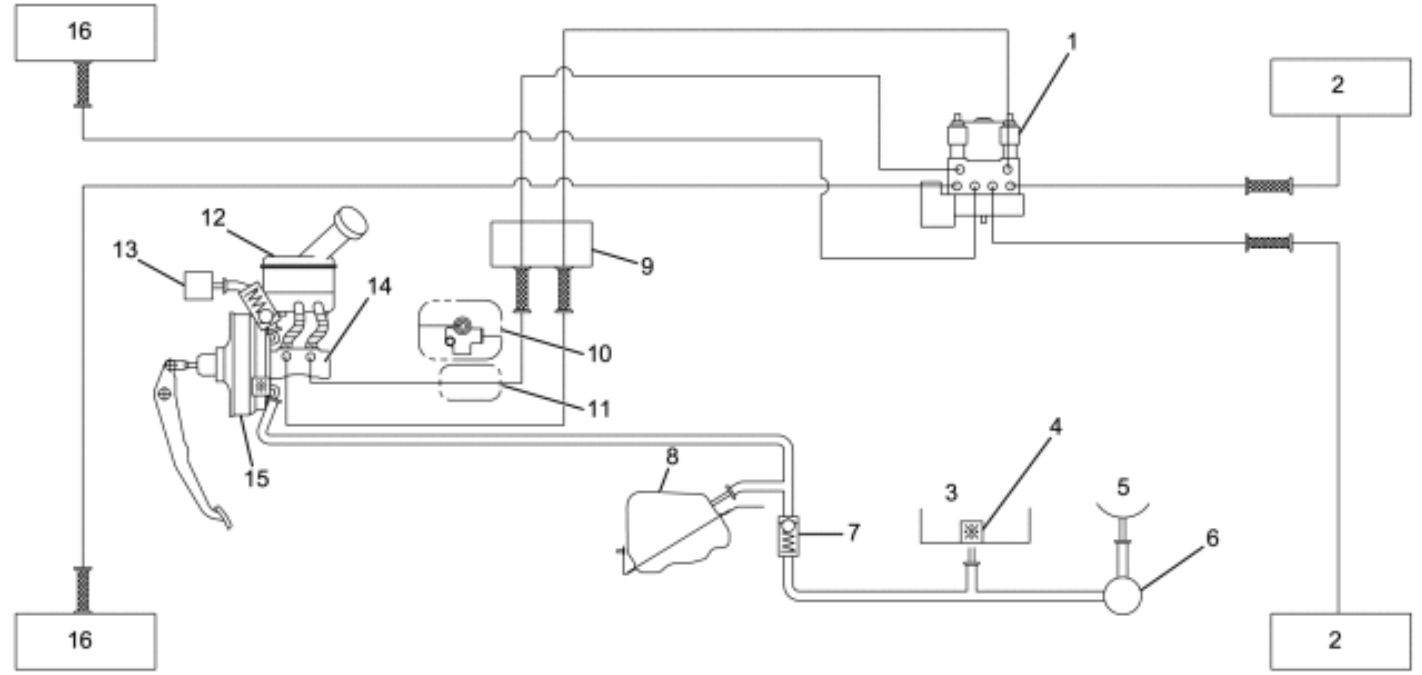


Figure 8.23.1

High Idle Mode

The high idle mode is the function that raises engine speed by operation of the driver when the vehicle is stationary. PIM performs the high idle mode control when the condition for operating is met. The PIM outputs the idle up command to the ECM and will blink the cruise control set indicator lamp during the high idle mode control.
Condition for Operating the High Idle Mode Control

The following conditions are met longer than 3 seconds:

- Engine is running.
- The selector lever is in “P” (Park) or “N” (Neutral) position.
- The accelerator pedal position is less than 25 percent.
- The brake switch is OFF.
- The cruise control main switch is ON.
- The cruise control set switch is ON.

Condition for Cancelling the High Idle Mode Control
Each of following conditions is met:

- Engine is stopped.
- The selector lever is in other than “P” (Park) or “N” (Neutral) position.
- The accelerator pedal position is 25 percent or more.
- The brake switch is ON.
- The cruise control main switch is OFF.
- The cruise control set switch is OFF.

Through the Rail Fuel Fill

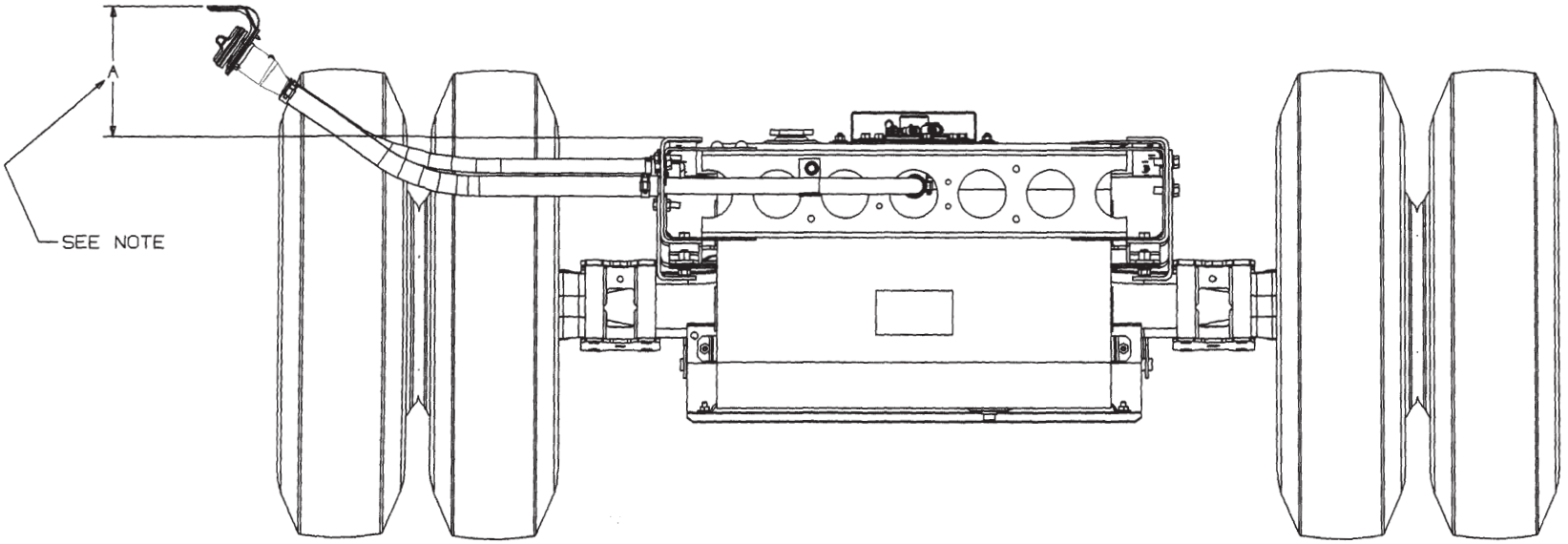
Installation Instructions

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 102 inch wide body width. Modify the hoses as required to fit dimension “E” of the desired body width
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.

Fuel Type

Use regular unleaded gasoline rated at 87 octane or higher that meets specification ASTMD4814 in the U.S. Blended gasoline is suitable for use in the Isuzu NPR NPR-HD Gas Chassis.
MTBE is “methyl tertiarybutylether.” Fuel that is no more than 15%.
MTBE is fine for your vehicle.
Ethanol is ethyl or grain alcohol. Properly-blended fuel that is no more than 10% ethanol is fine for your vehicle.
NOTICE: Fuel that is 15% Ethanol is not suitable for your vehicle. Fuel that is than 85% Ethanol is not suitable for your vehicle.
Methanol is methyl or wood alcohol.
NOTICE: Fuel that is more than 5% methanol is bad for your vehicle. And even at 5% or less, there must be “co-solvents” and corrosion preventives in this fuel to help avoid damage to the fuel system from methanol.

Rear View Fuel Fill

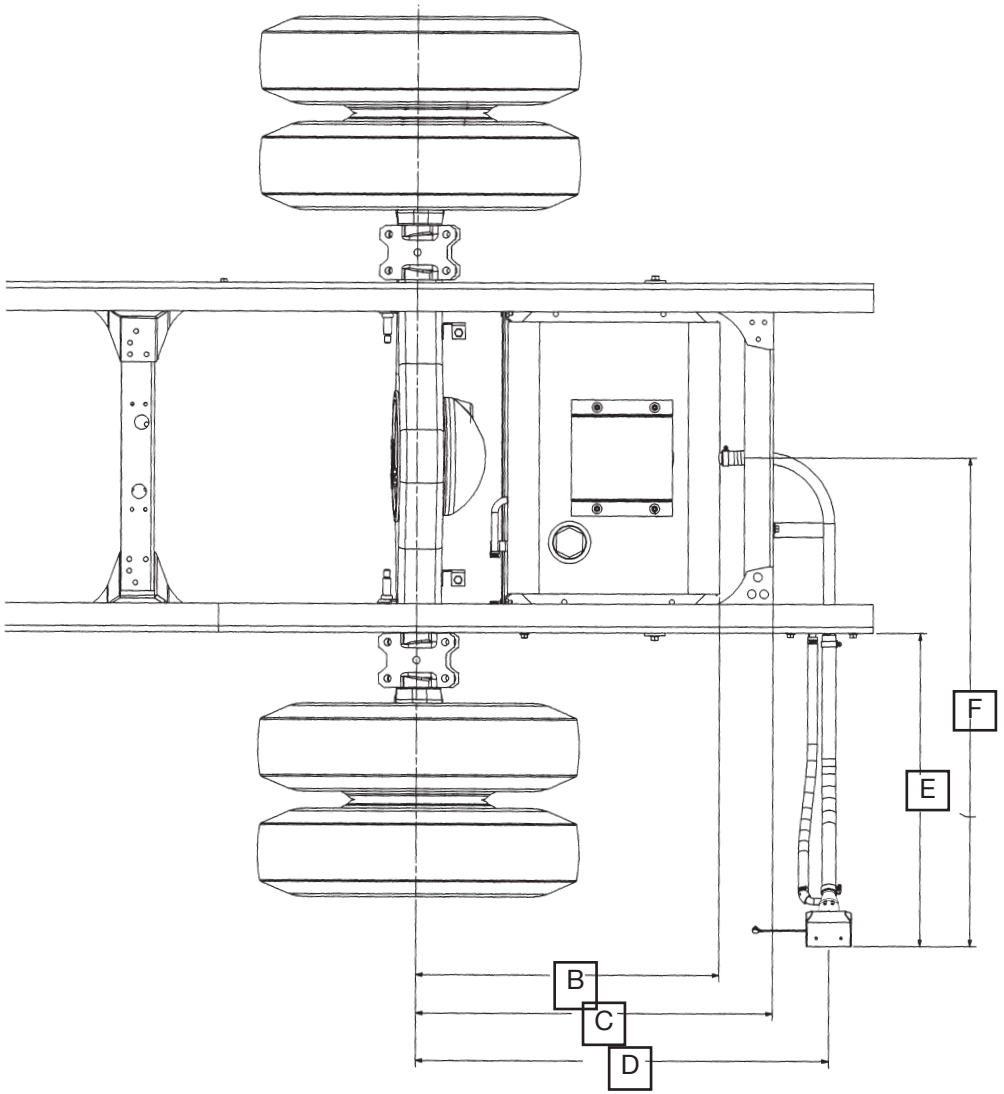


REAR VIEW FUEL FILL

Figure 8.26.1

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

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)

Figure 8.27.1

Through the Rail Fuel Fill Frame Hole

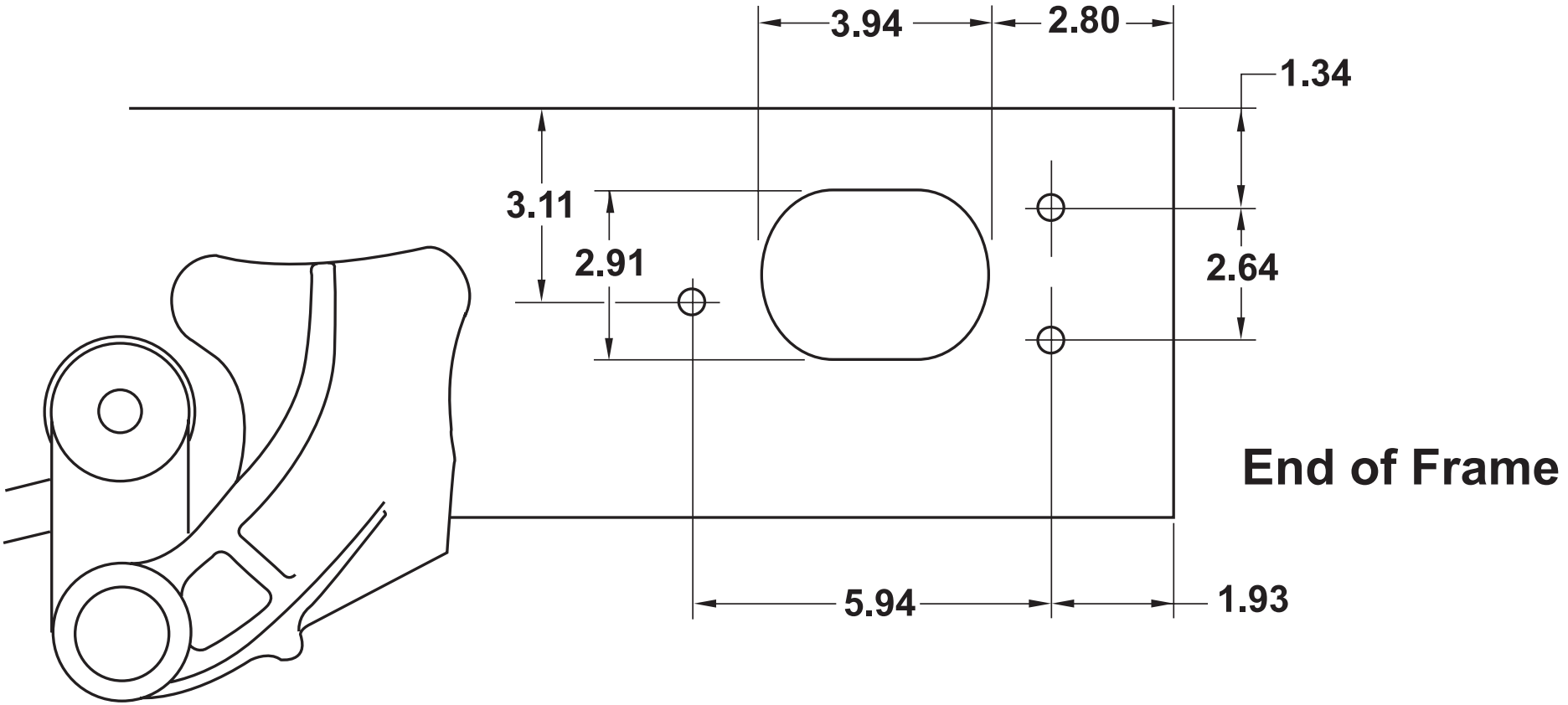


Figure 8.28.1

Dimensions in inches

Fuel Fill Parts Illustration

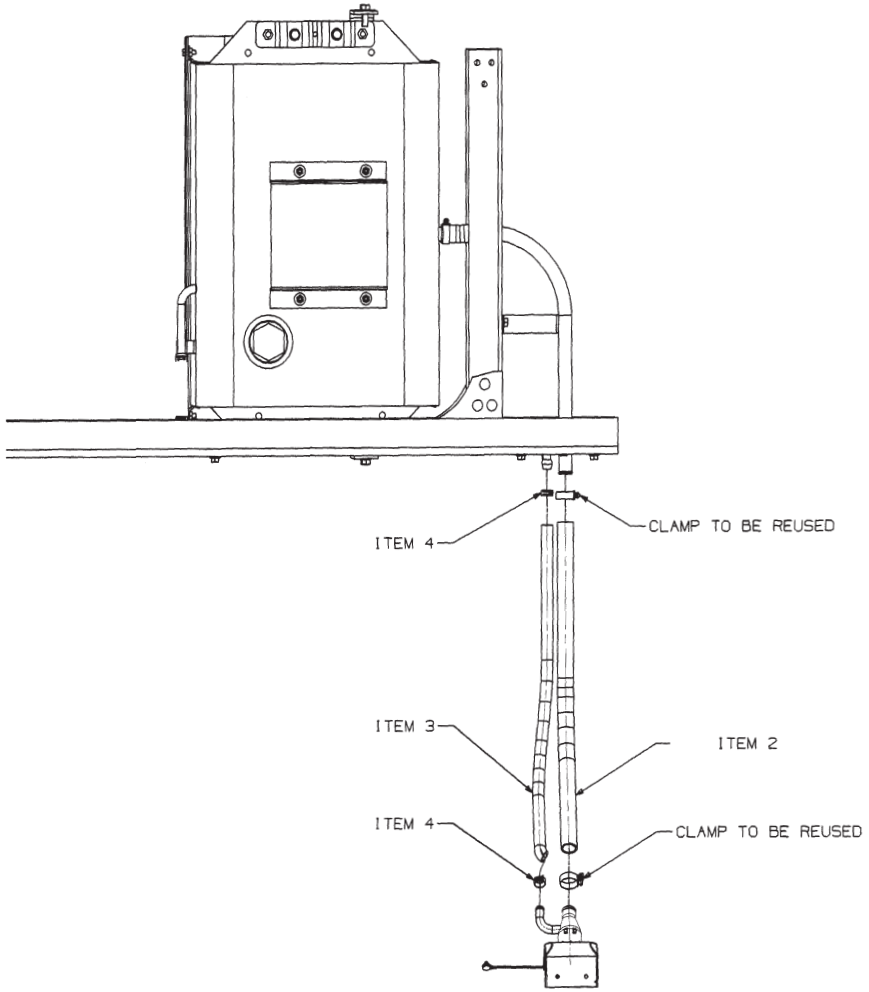


Figure 8.29.1

Fuel Fill Parts List

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

Figure 8.30.1

2016 Isuzu Truck

Note :The document in this section is for the 2015 Model Year NPR ECO MAX 12,000 GVW. The “Currently Available” model year chassis are included in this book

2015 Model Year NPR Diesel Specifications

MODEL	**NPR ECO-MAX**
GVWR	12,000 lbs. (curb weight max 9,660 lbs.)
WB	110 in, 133.7 in, 151.4 in
ENGINE	Isuzu 4-cylinder, in-line 4-cycle, turbocharged, intercooled, direct injection diesel.
Model/Displacement	4JJ1-TC /183 CID /(3.0 liters)
HP (Gross)	150 HP @ 2800 RPM w Automatic Transmission
Torque (Gross)	282 lb./ft. torque @ 1600-2800 RPM
Equipment	Dry element air cleaner with vertical intake; 431 square inch radiator; 10 blade 17.7 inch 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, and high coolant temperature, and engine horsepower derate protection system based on coolant temperature. Engine cruise control function.
TRANSMISSION	Aisin A460 6 speed automatic transmission with fifth and sixth gear overdrive with lock up in 2nd, 3rd, 4th, 5th and 6th. PTO Capability automatic torque converter lockup in stationary PTO mode.
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.
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	8,840 lbs.
WHEELS	16x6.0-K 6 hole disc wheels, painted white.
TIRES	215/85R-16E (10 pr) LRR (low Rolling Resistance) 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-ad just 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	25 gal. rectangular steel fuel tank mounted in frame rail behind rear axle. Fuel water separator with Dual fuel filters, one mounted on the frame, and the other mounted on the engine with dash mounted indicator light.
FRAME	Ladder type channel section flair frame rail 29.5 in. wide at the platform load area. Yield strength 44,000 psi, section modulus 6.07 in3. RBM 267,080
CAB **Equipment**	All steel low cab forward, BBC 70.7 in, 45° mechanical tilt with torsion assist. TRICOT breathable 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, AM/FM CDradio.
ELECTRICAL	12 Volt, negative ground, dual maintenance free batteries, 750 CCA each, 140 Amp alternator with integral regulator.
OPTIONS	See last page for options
	NOTE: These selected specifications are subject to change without notice.

Note :The document in this section is for the 2015 Model Year NPR ECO MAX 12,000 GVW. The “Currently Available” model year chassis are included in this book

Vehicle Weights, Dimensions and Ratings

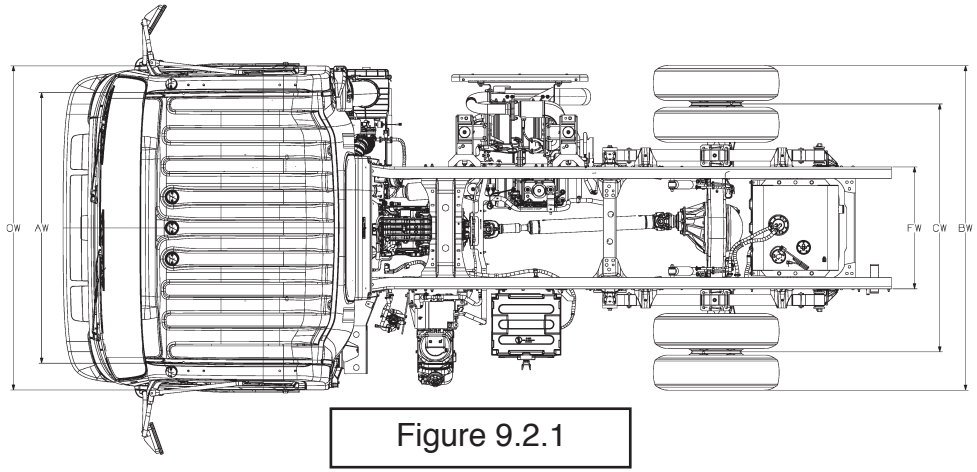


Figure 9.2.1

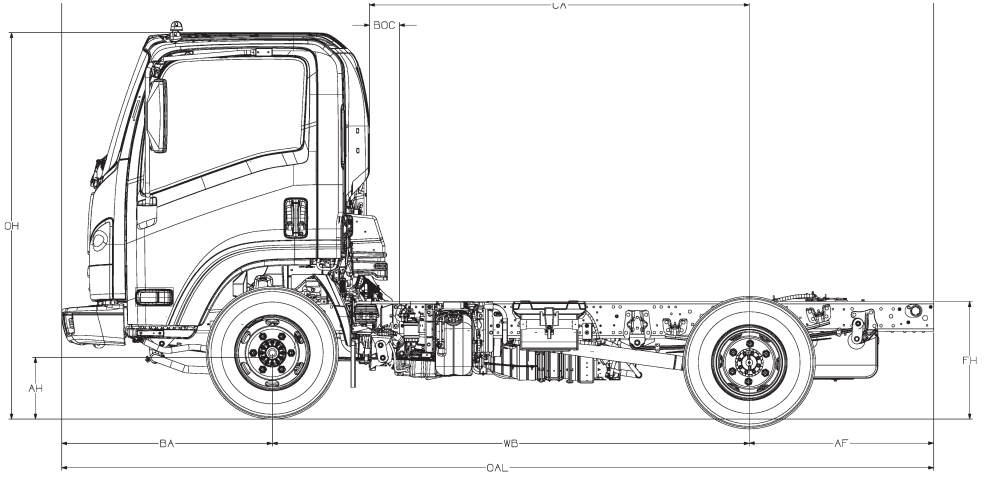


Figure 9.2.2

Variable Chassis Dimensions:

Unit	WB	CA*	CE*	OAL	AF
Inch	110.0	87.6	129.8	200.6	42.3
Inch	133.7	111.2	153.5	224.3	42.3
Inch	151.4	128.9	171.2	242.0	42.3

*Effective CA & CE are CA or CE less BOC

Dimension Constants:

Code	Inches	Code	Inches
AH	7.5	BW	78.6
AW	65.6	CW	60
BA	48.3	FW	29.5
BBC	70.7	OH	90.8
BOC	4.5	OW	81.3
FH	31.1		

In-Frame Tank
12,000 lb. GVWR Automatic Transmission Model
Chassis Curb and Maximum Payload Weights

Model	WB	Unit	Front	Rear	Total	Payload
NJ1	110.0 in	lb.	3512	1839	5351	6649
NJ2	133.7 in	lb.	3589	1852	5441	6559
NJ3	151.4 in	lb.	3629	1861	5490	6510

Estimated Max Body weight Allowance based on max curb weight of 9,660 lbs.
4309
4219
4170

Note :The document in this section is for the 2015 Model Year NPR ECO MAX 12,000 GVW. The “Currently Available” model year chassis are included in this book

Vehicle Weight Limits:

GVWR	
Designed Maximum	12,000 lbs.
GAWR, Front	5,360 lbs.
GAWR, Rear	8,440 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

RPO	DESCRIPTION STANDARD CAB	Weight (Lbs.) Front/Rear	
IF4	Air deflector roof mounted	64.00	0.00
IF6	Fire extinguisher and triangle kit mounted in rear organizer	19.00	0.00
IG3	Oil pan heater (120 volt 300 watts)	2.00	0.00
I4H	FMS-CAN Interface	1.00	0.00
IY4	Delete Standard AM/FM/CD Radio	-3.00	0.00
I8H	AM/FM/CD Radio with Aux input/USB port and Bluetooth	0.00	0.00
IL9	PTO Enable Switch and Engine Idle Up Switch recommended for PTO and Idle applications (2)	1.00	0.00
IS0	Heated mirrors	1.00	0.00
I9H	Heated dual remote control mirrors (15” head)	1.00	0.00
IV8	Seat covers standard cab (5)	6.00	0.00
IX2	Rear Body Dome Lamp Switch (4)	1.00	0.00
UZF	Back up alarm	0.00	2.00
IY9	Engine Idle shutdown (Timer set at 3 Minutes for engine shutdown)	0.00	0.00
I9A	Engine Idle shutdown (Timer set at 5 Minutes for engine shutdown)	0.00	0.00
IK9	33 Gallon Additional Diesel Fuel Tank Mounted on LH side 151.4 wb std cab in rail tank (5)	122	-238
V22	Chrome grille	1.00	0.00
I4K	Keyless Entry System		
I5K	Suspension Drivers Seat		
I6K	Lockable DEF Fill Cap		
I1L	Speed Limited to 58 MPH	0	0
I2L	Speed Limited to 65 MPH	0	0
I3L	Speed Limited to 68 MPH	0	0
I4L	Speed Limited to 70 MPH	0	0
54	In rail fuel tank with power windows, door locks and air conditioning	80	0
64	In rail fuel tank with power windows, power door locks, air conditioning and LSD (3)	80	15

(1) RPO is Regular Production Option that is stocked in Port inventory.
LSO is Limited Stock Option that is stocked in Port inventory but should be checked for availability and delivery time.
SEO is Special Equipment Option and requires 90-120 day lead time for delivery.
(2) These switches can be port or dealer installed. Please consult the body builders guide and/or the service manual for additional programming options and functions.
(3) LSD factory installed Limited Slip Differential
(4) RPO must be ordered with Supreme Value Pak Program and Morgan Fast Track Body Programs
(5) Seat covers not available with suspension seat

Note :The document in this section is for the 2015 Model Year NPR ECO MAX 12,000 GVW. The “Currently Available” model year chassis are included in this book

Frame and Crossmember Specifications

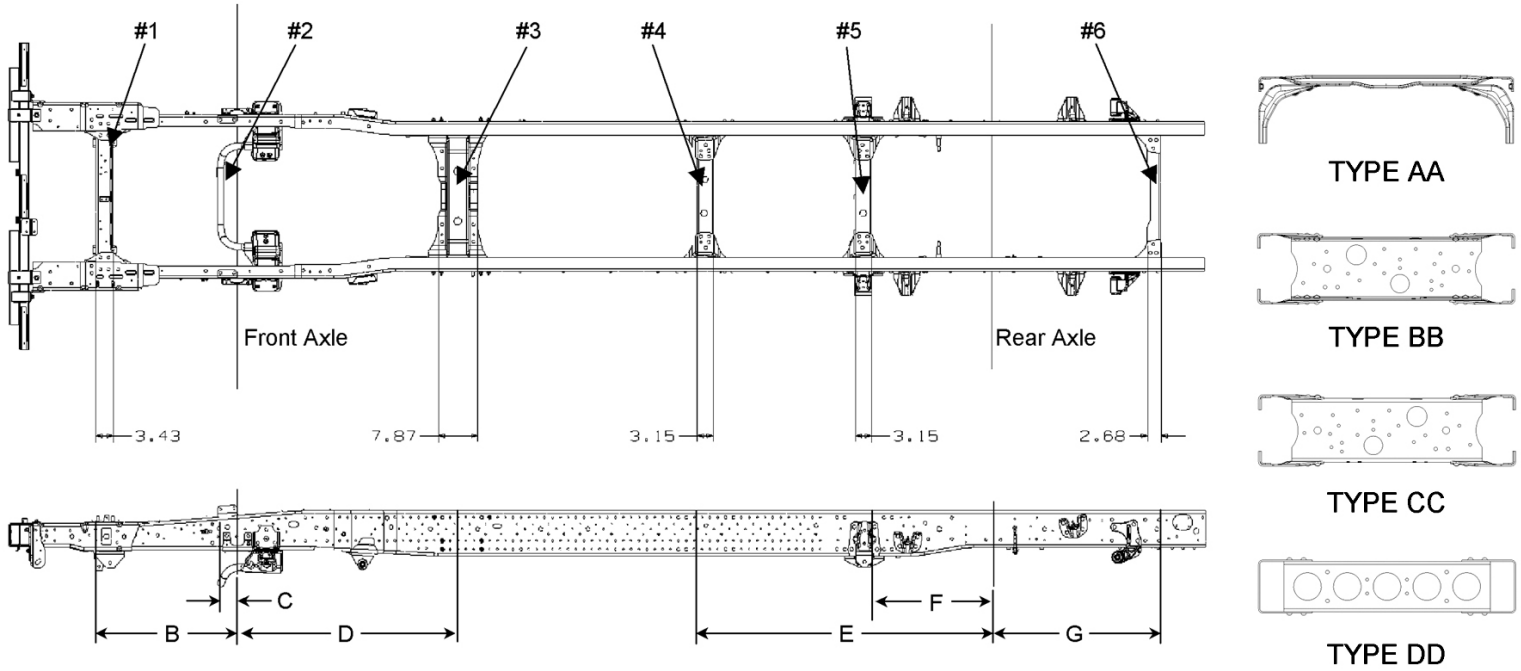


Figure 9.4.1

Wheelbase	Frame Thickness	Crossmember Type/Location									
		#1	#2	#3		#4		#5		#6	
		B	C	D	Type	E	Type	F	Type	G	Type
110	0.20	28.2	3.23	44.3	AA	N/A	N/A	24.2	CC	33.8	DD
134	0.20	28.2	3.23	44.3	AA	58.7	BB	24.2	CC	33.8	DD
151	0.20	28.2	3.23	44.3	AA	59.1	BB	24.2	CC	33.8	DD

Figure 9.4.2

Note: Dimensions in inches

Note :The document in this section is for the 2015 Model Year NPR ECO MAX 12,000 GVW. The “Currently Available” model year chassis are included in this book

Frame Chart

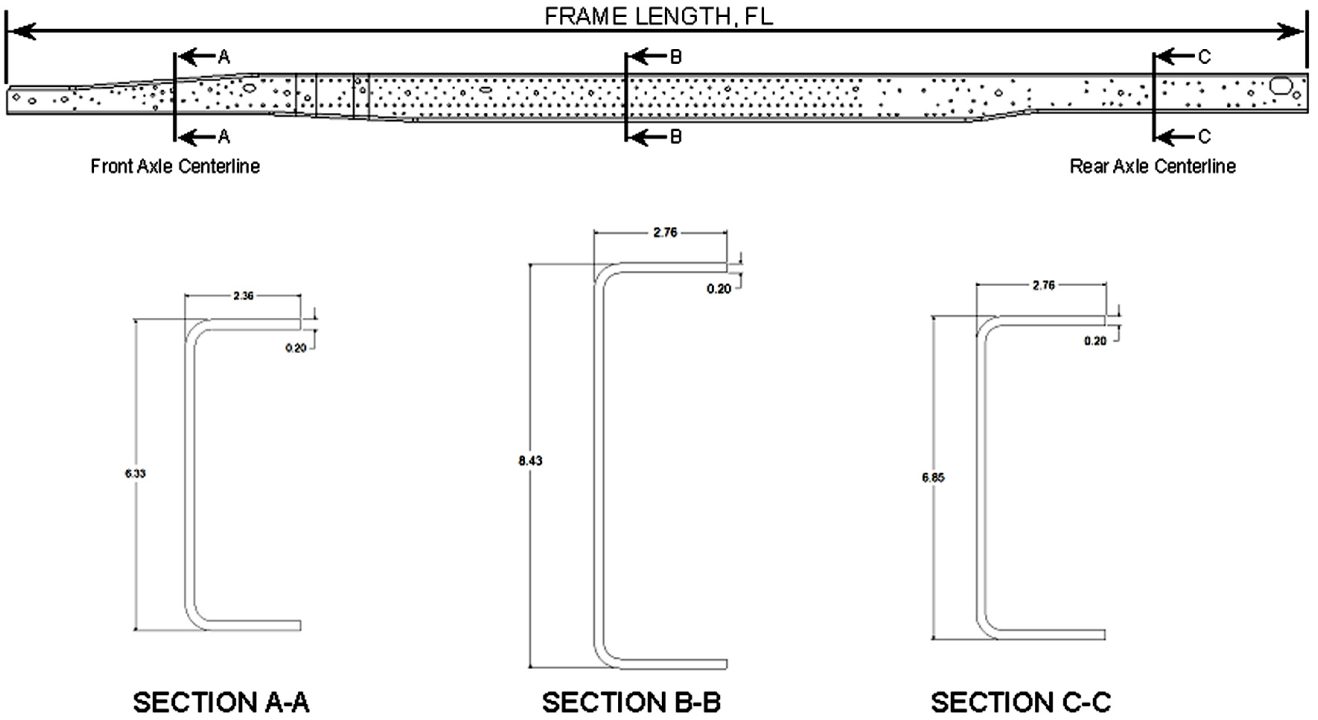


Figure 9.5.1

Wheelbase	Frame FL	Frame Thickness
110	182.9	0.20
134	206.5	0.20
151	224.2	0.20

Figure 9.5.2

Note: Dimensions in inches

Note :The document in this section is for the 2015 Model Year NPR ECO MAX 12,000 GVW. The “Currently Available” model year chassis are included in this book

NPR (12k GVWR) Diesel Standard Cab - Top View

WB
110
134
151

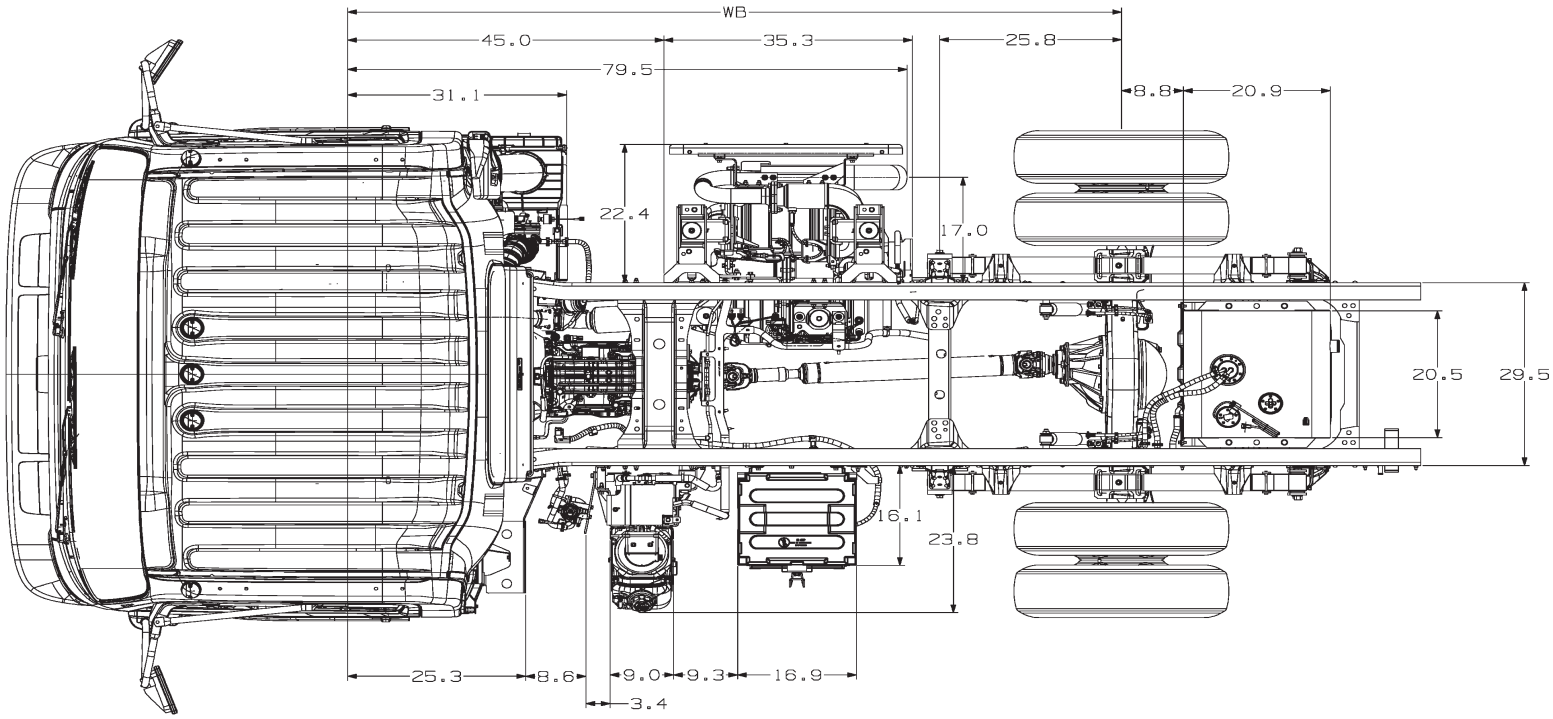


Figure 9.6.1

Note: Dimensions in inches

Note :The document in this section is for the 2015 Model Year NPR ECO MAX 12,000 GVW. The “Currently Available” model year chassis are included in this book

NPR (12k GVWR) Diesel Standard Cab - Left Side View

WB
110
134
151

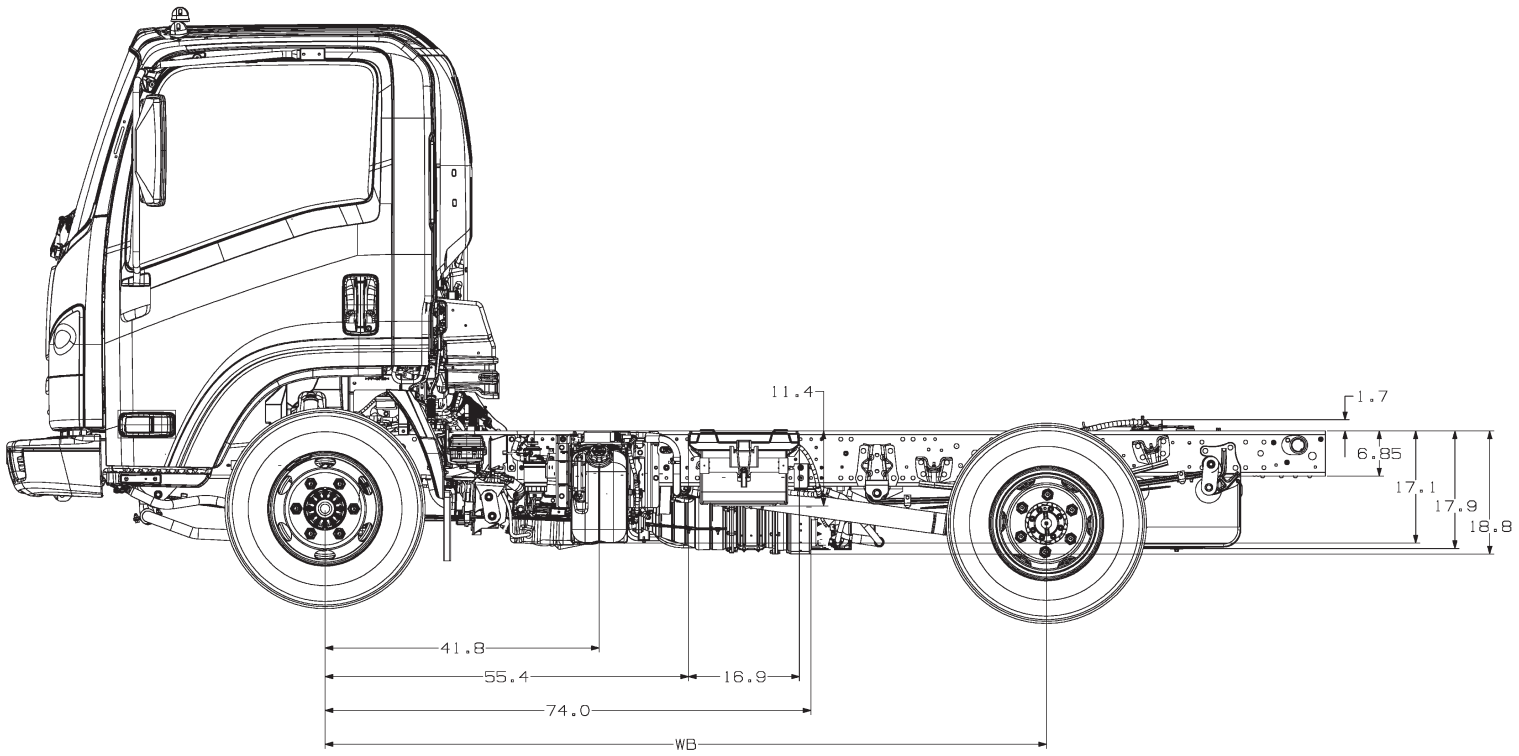


Figure 9.7.1

Note: Dimensions in inches

Note :The document in this section is for the 2015 Model Year NPR ECO MAX 12,000 GVW. The “Currently Available” model year chassis are included in this book

NPR (12k GVWR) Diesel Standard Cab - Right Side View

WB
110
134
151

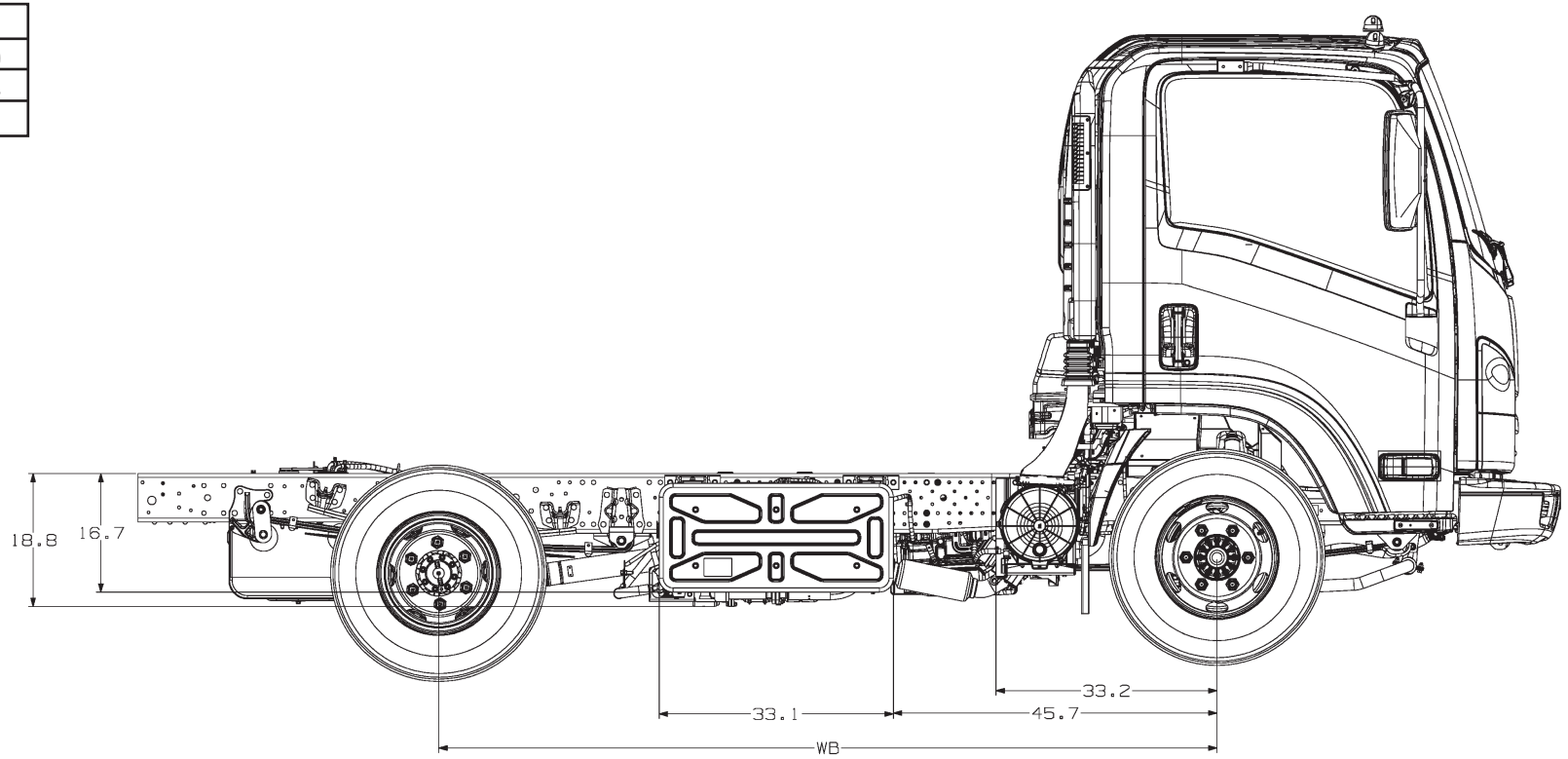


Figure 9.8.1

Note: Dimensions in inches

Note :The document in this section is for the 2015 Model Year NPR ECO MAX 12,000 GVW. The “Currently Available” model year chassis are included in this book

Auxiliary Views - SCR / DPF 4JJ1-TC

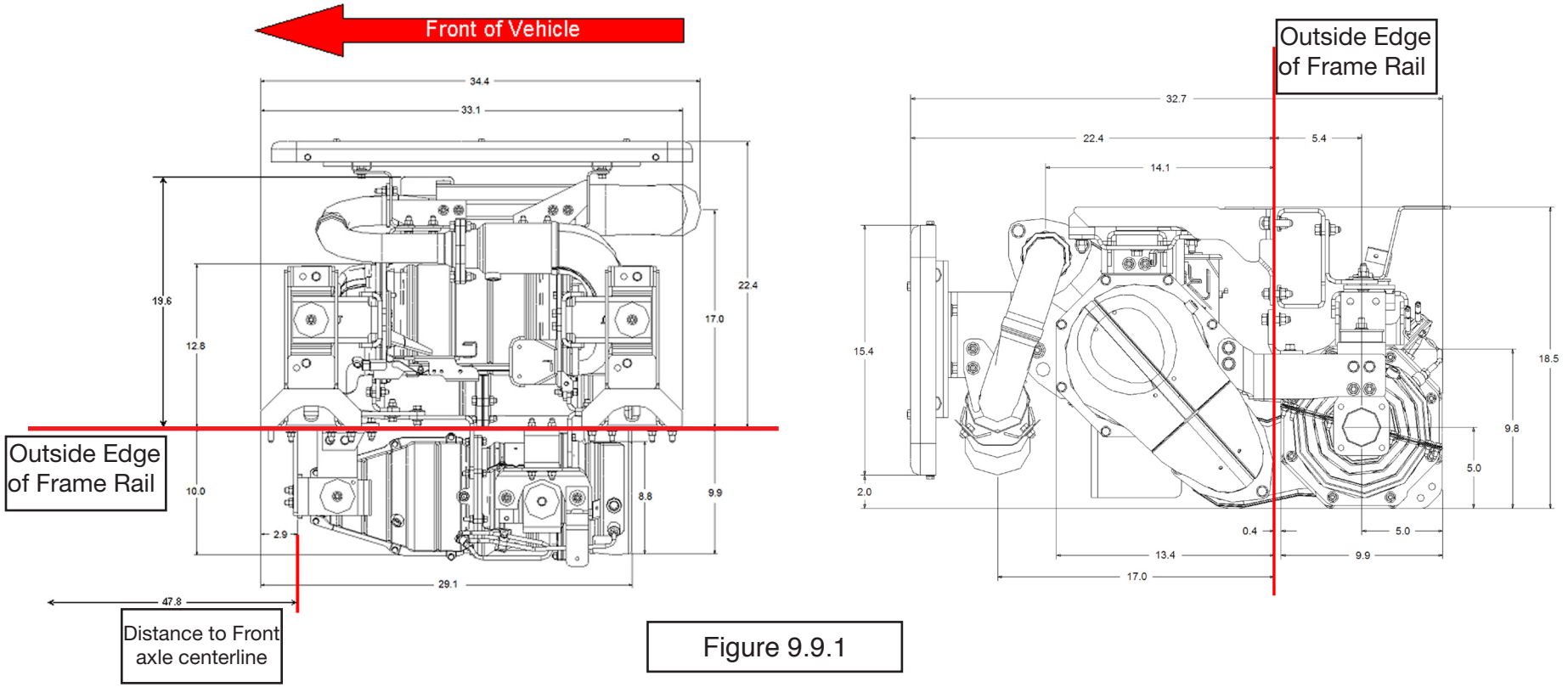


Figure 9.9.1

Note: Dimensions in inches

Note :The document in this section is for the 2015 Model Year NPR ECO MAX 12,000 GVW. The “Currently Available” model year chassis are included in this book

Cab Tilt

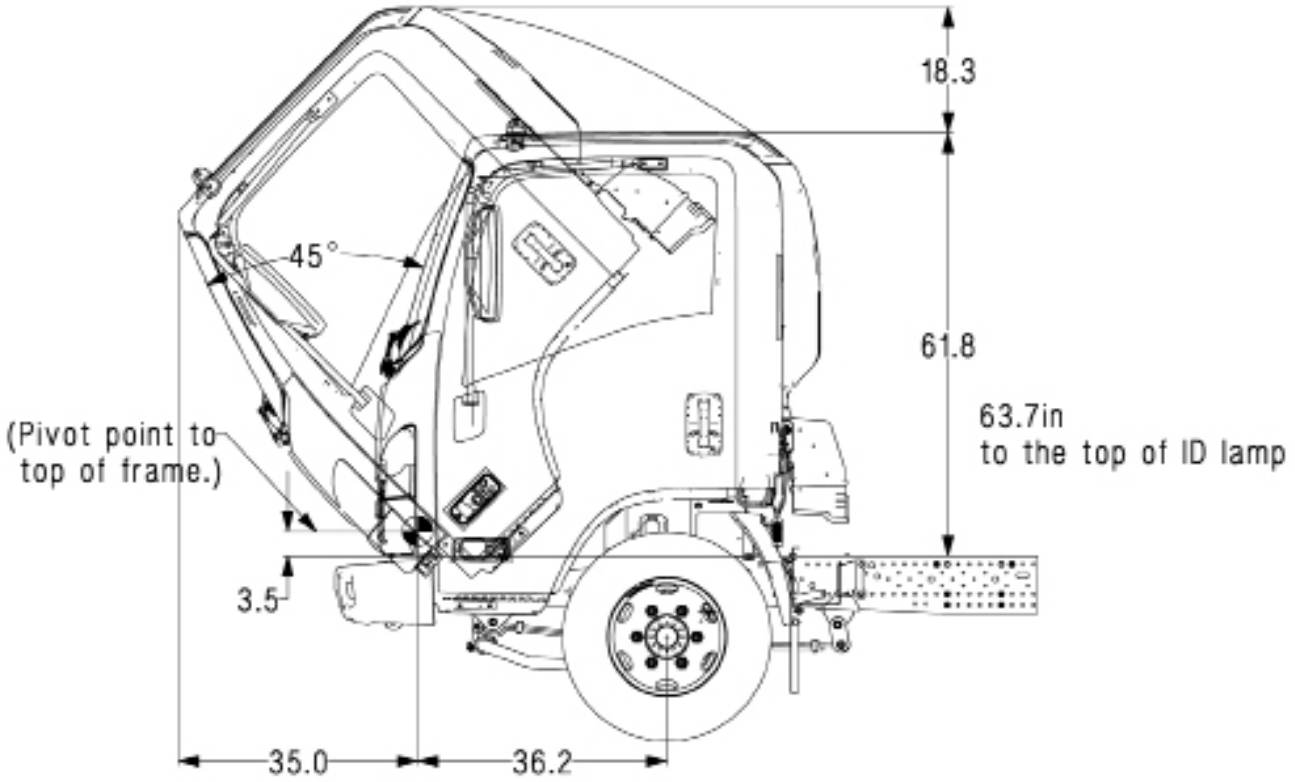


Figure 9.10.1

Note: Dimensions in inches

Center of Gravity

The center of gravity of the chassis cab.

Horizontal and Vertical CG of Chassis		
WB	V	H
110	24.4	37.9
133.7	24.4	45.2
151.4	24.4	50.6

Figure 9.11.1

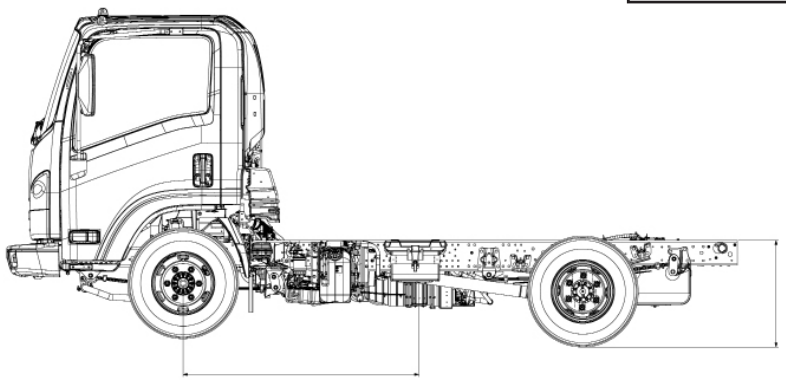


Figure 9.11.2

The maximum vertical center of gravity specified below must not be exceeded at maximum GVWR and rated front and rear GAWR. The Center of Gravity (CG) maximum is 63” (1600 mm) above the ground. (NPR Cab Chassis and NPR Stripped Chassis)

Note: Dimensions in inches

NOTE: The Final Manufacturer must ensure that the combined vertical center of gravity of the chassis, body, and available payload at full GVW does not exceed the maximum vertical center of gravity outlined in the Isuzu Incomplete Vehicle Document and the Isuzu Body Builders Guide.

Additional Information may be obtained by contacting ISUZU Commercial Trucks of America(ICTA)Applications Engineering on the West Coast call 1-562-229-5240 and in the
East Coast call 1-770-740-1620 X 262.

Note :The document in this section is for the 2015 Model Year NPR ECO MAX 12,000 GVW. The “Currently Available” model year chassis are included in this book

Front Axle Chart

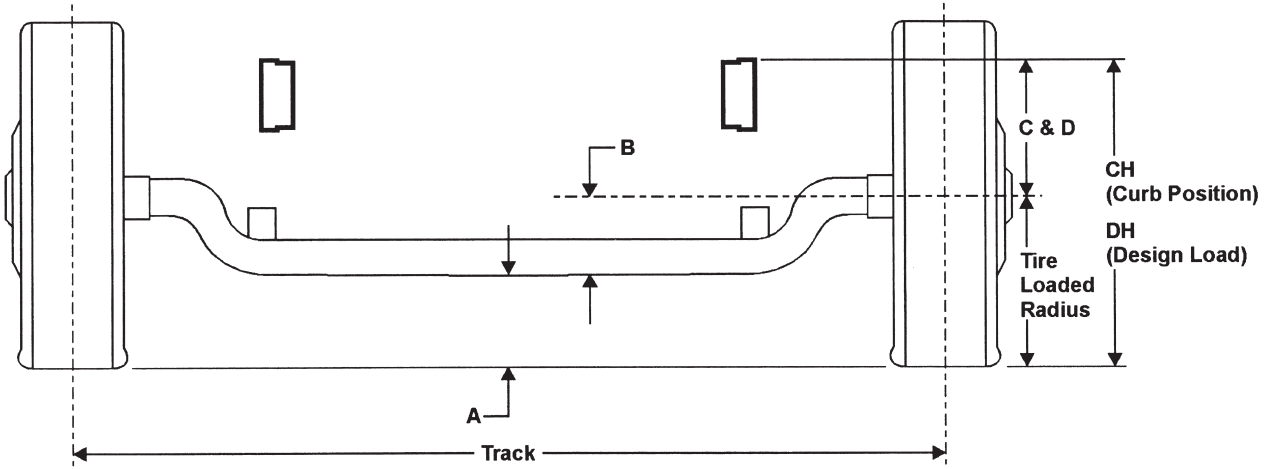


Figure 9.12.1

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.	7.5	6.6	12.8	11.7	27.4	25.8	65.5	14.6	14.1

Figure 9.12.2

Note: Dimensions in inches

Rear Axle Chart

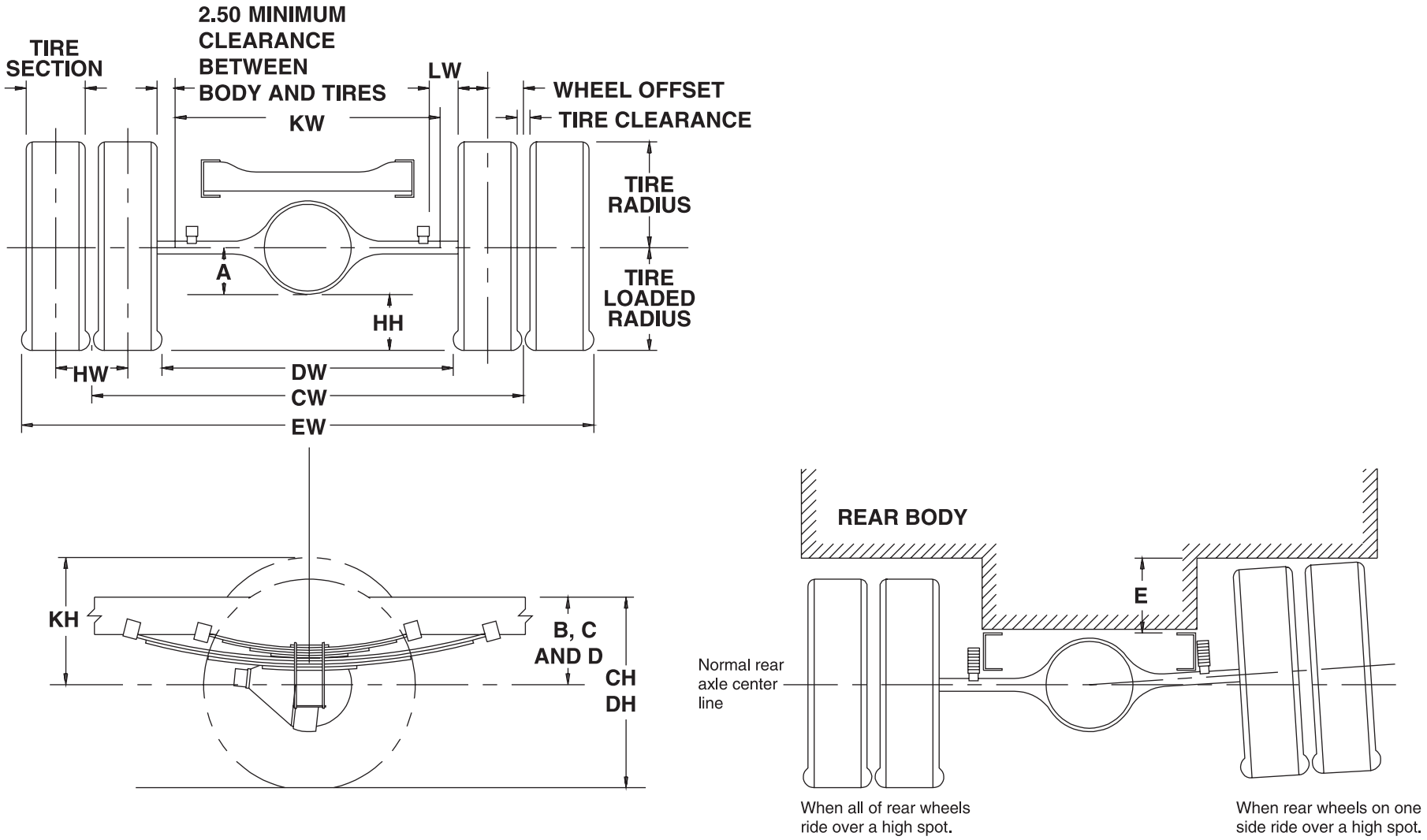


Figure 9.13.1

Note :The document in this section is for the 2015 Model Year NPR ECO MAX 12,000 GVW. The “Currently Available” model year chassis are included in this book

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

Figure 9.14.1

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

Figure 9.14.2

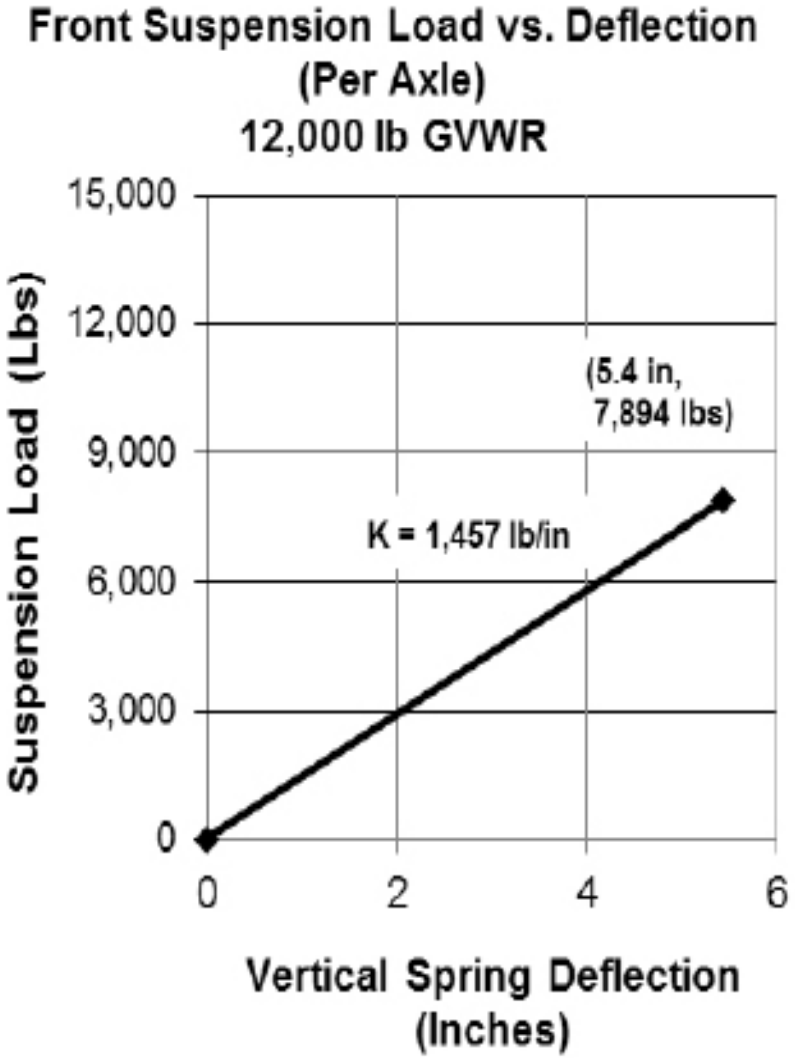
NOTE: Track and overall width may vary with optional equipment.

Tire	GAWR	Track CW	A	B	C	D	E
215/85R 16-E	8,840 lbs.	60.0	6.5	9.3	15.4	13.3	7.8

Figure 9.14.3

Note: Dimensions in inches

NPR Suspension Deflection Charts



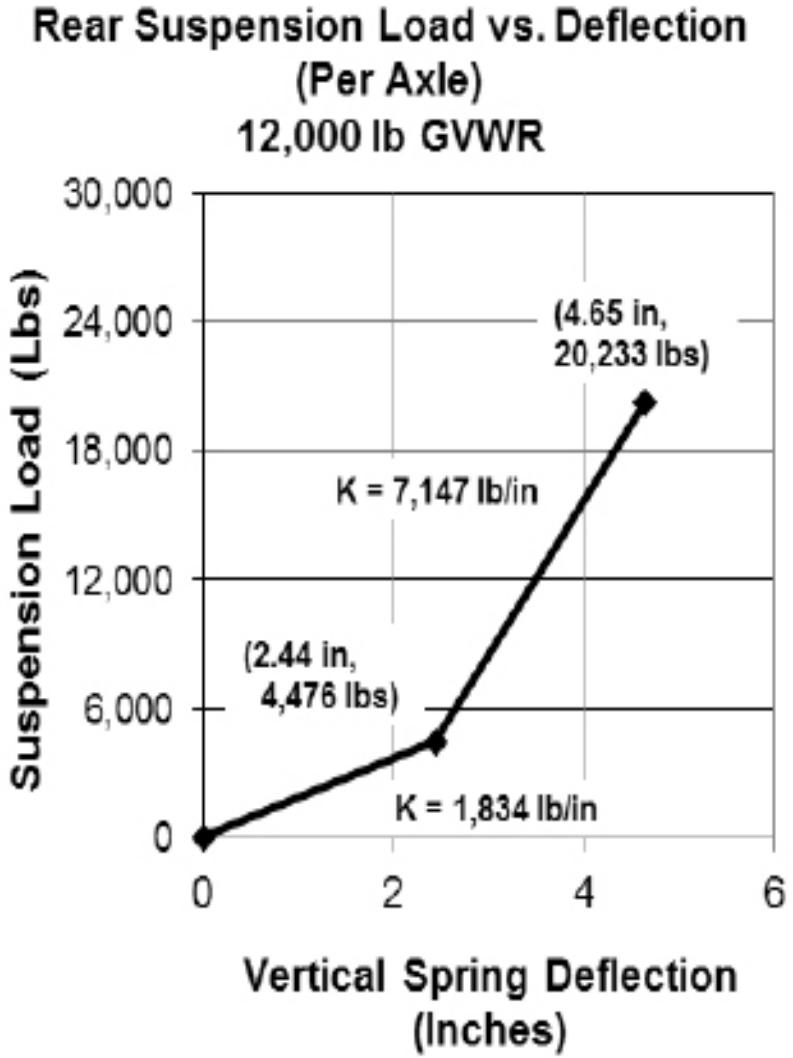


Figure 9.15.1

Note :The document in this section is for the 2015 Model Year NPR ECO MAX 12,000 GVW. The “Currently Available” model year chassis are included in this book

Propeller Shaft

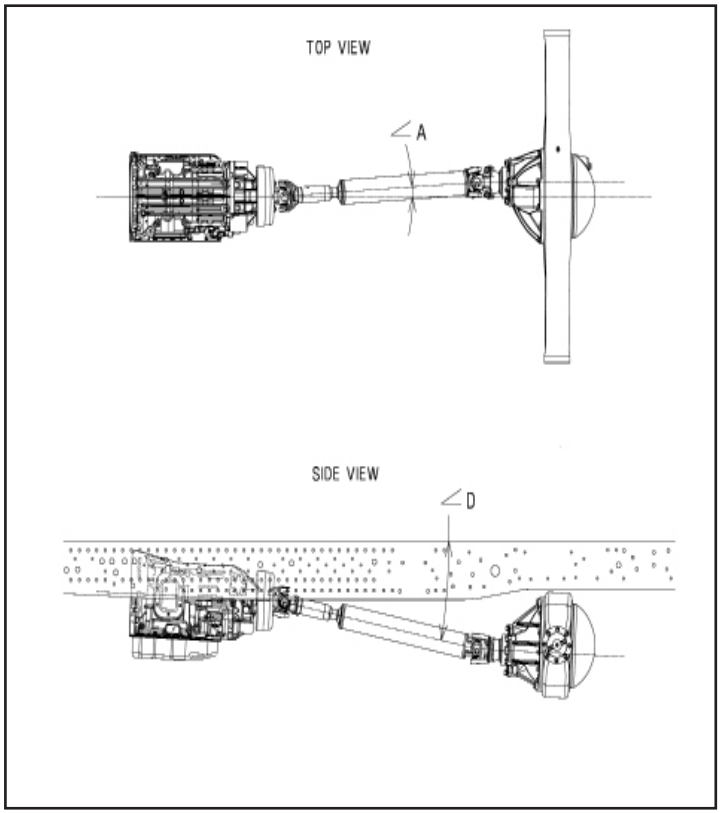


Figure 9.16.1

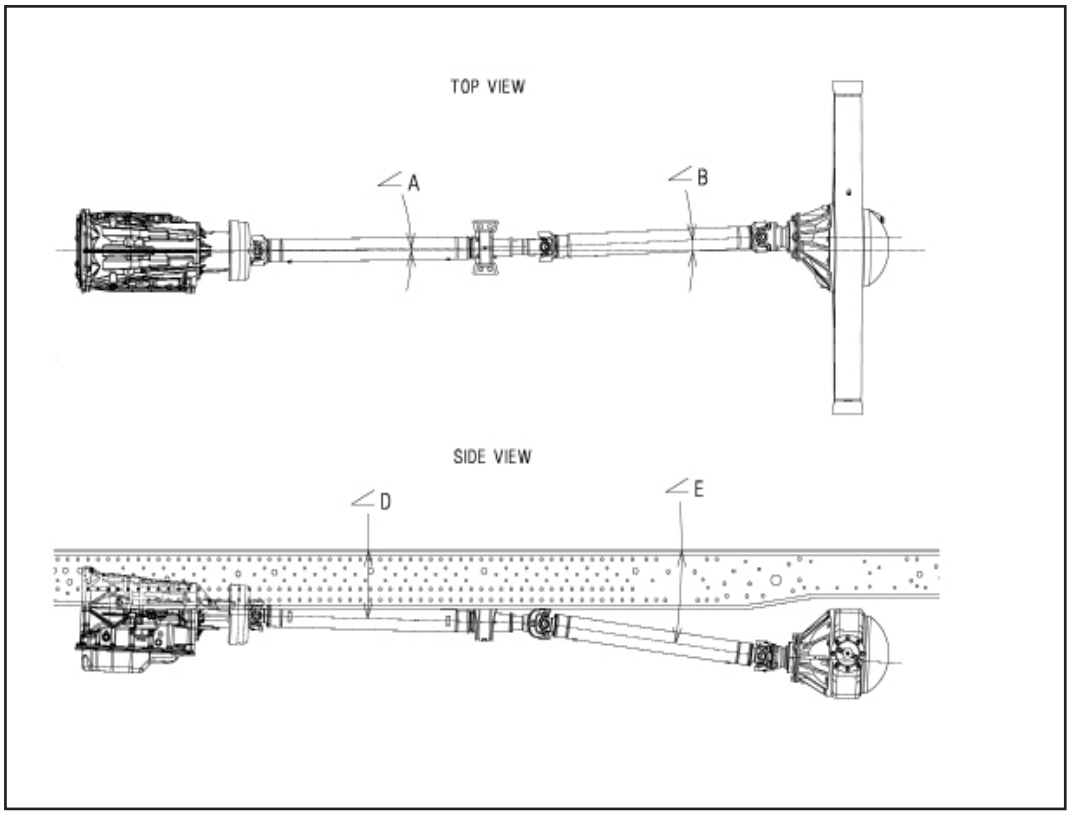


Figure 9.16.2

WheelBase (in.)	Top View		Side View			
	∠A	∠B	∠D	∠E	Trans	Rear Axle
110	2.6º	-	3.3º	-	2.5º	2.5º
133.7	0.9º	2.4º	4.5º	5.7º	2.5º	2.5º
151.4	0.5º	2.4º	3.6º	4.5º	2.5º	2.5º

Notes: 1. Angles privuded in table are relative to the frame angle. Please take this into consideration for service measurements.
2. Driveline angles are based on the chassis curb weight which includes standard equipment, fuel but no driver, body, or payload.

Note :The document in this section is for the 2015 Model Year NPR ECO MAX 12,000 GVW. The “Currently Available” model year chassis are included in this book

Wheelbase	110	133.7	151.4
No. of Shafts	1	2	2
Trans. Type	6A/T	6A/T	6A/T
Shaft #1 O.D.	3.25”	3.25”	3.25”
Thickness	0.0906	0.0906	0.0906
Length	42.16”	21.50”	38.82”
Type	A	B	B
Shaft #2 O.D.	N/A	3.25”	3.25”
Thickness	N/A	0.0906	0.0906
Length	N/A	34.76”	35.16”
Type	N/A	C	C

Figure 9.17.1

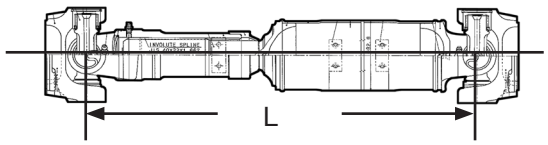
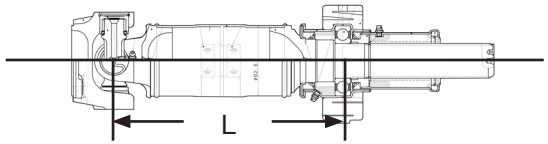
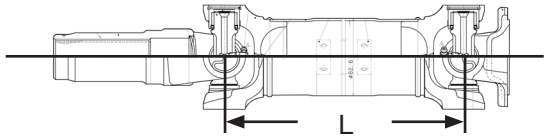
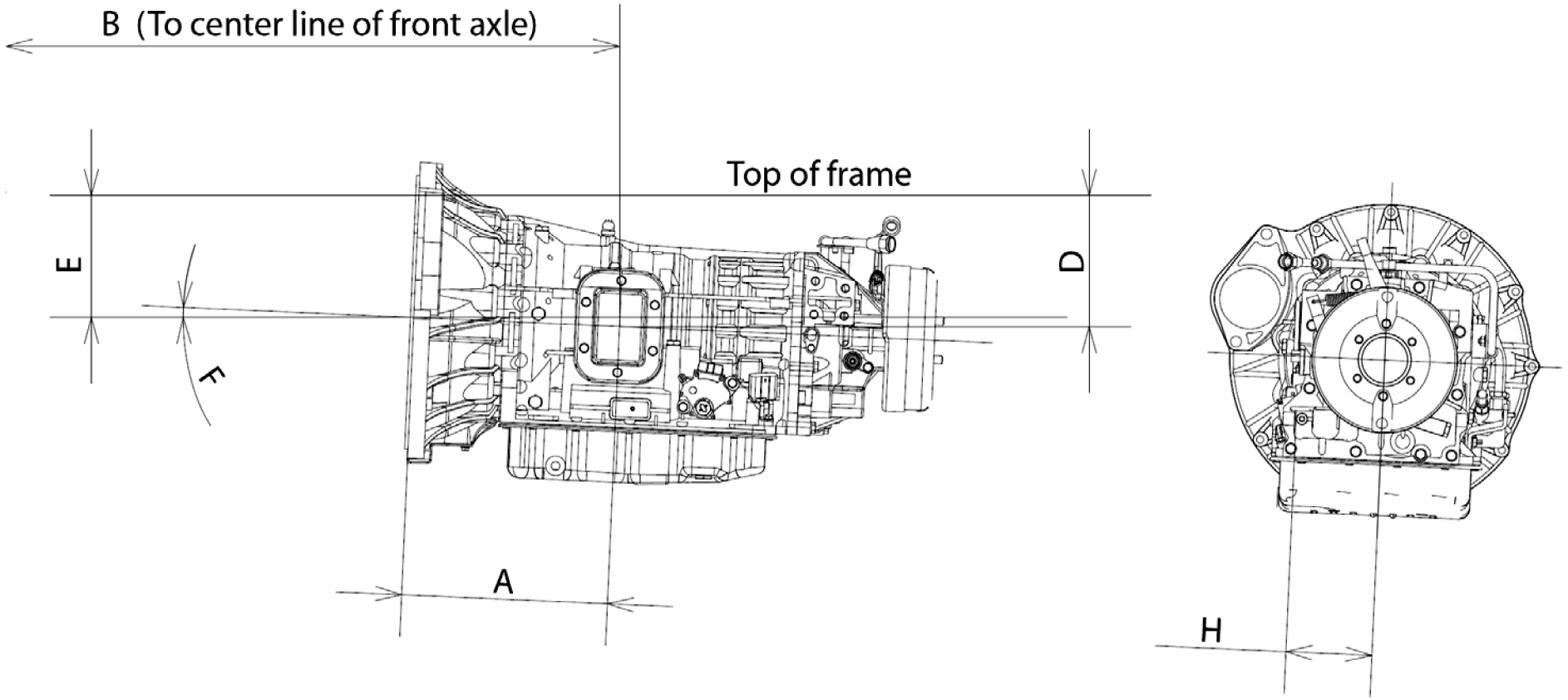
Type	Description	Illustration
Type **A**	1st shaft in 1-piece driveline	
Type **B**	1st shaft in 2-piece driveline	
Type **C**	2nd shaft in 2-piece driveline	

Figure 9.17.2

Note: Dimensions in inches

Note :The document in this section is for the 2015 Model Year NPR ECO MAX 12,000 GVW. The “Currently Available” model year chassis are included in this book

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 A460	Left	(Dr 2)	12.35	36.89	0	7.85	7.31	2.5^0	5.16	PTO Gear	1:1 with turbine	69	N/A	0	108 lbs.-ft. @ 1,700 RPM

Figure 9.18.1

Note :The document in this section is for the 2015 Model Year NPR ECO MAX 12,000 GVW. The “Currently Available” model year chassis are included in this book

Opening Diagram

Aisin A460 Automatic Torque Converter
Lock Up Function.

In either the Stationary Preset PTO Mode or Stationary Variable PTO Mode, when engine rpm exceeds 1200 RPM, the torque converter will lock up. The engine rpm can not be modified and the lockup function cannot be turned off. Please not that with PTO applications that operate around 1200 RPM, the transmission software holds the torque converter in lockup until engine speed falls below 1100 RPM

The lock up function will cancel if the transmission shift lever is moved from the park or neutral positions which will remove the trasmission from the stationary mode.

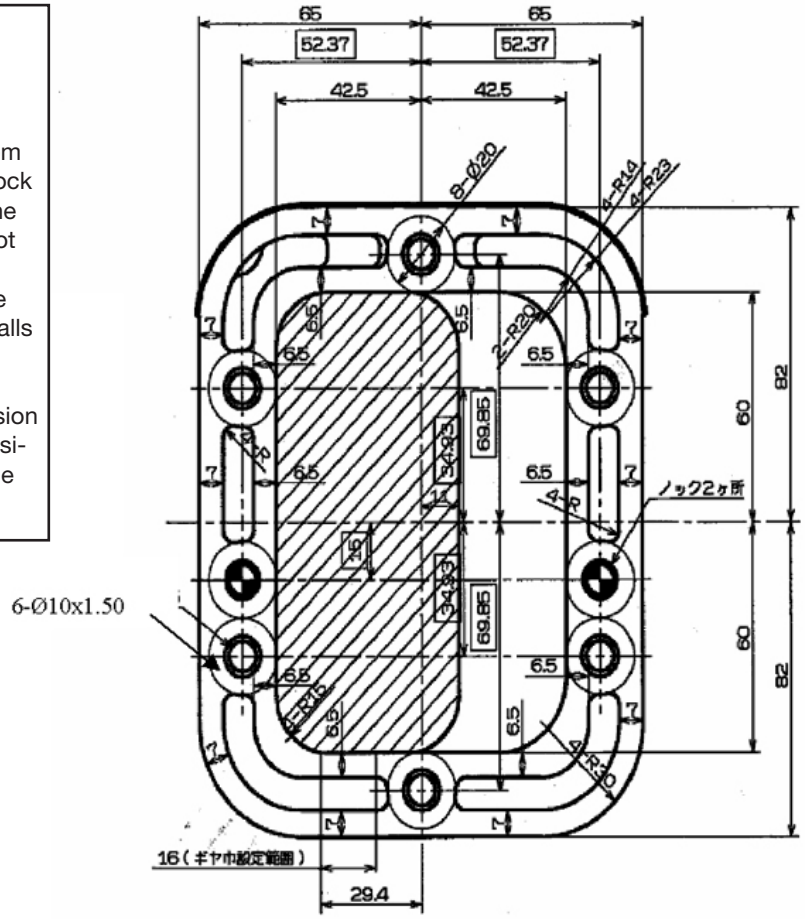


Figure 9.19.1

Note :The document in this section is for the 2015 Model Year NPR ECO MAX 12,000 GVW. The “Currently Available” model year chassis are included in this book

Brake System Diagram, 12,000 GVW

Vacuum Over Hydraulic

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

Legend for NPR, NPR-HD, NPR-XD Brake System

(1) Electronic Hydraulic Control Unit (EHCU)
(2) Rear Wheel Cylinder
(3) Vacuum Pump
(4) Check Valve
(5) Exhaust Brake Valve
(6) Magnetic Valve
(7) Check Valve (One-way Valve)
(8) Vacuum Tank
(9) 4-Way Connector
(10) With Metering Valve
(11) W/O Metering Valve
(12) Brake Fluid Reservoir
(13) Electric Vacuum Pump
(14) Master Cylinder
(15) Vacuum Booster (Servo Unit)
(16) Front Wheel Cylinder

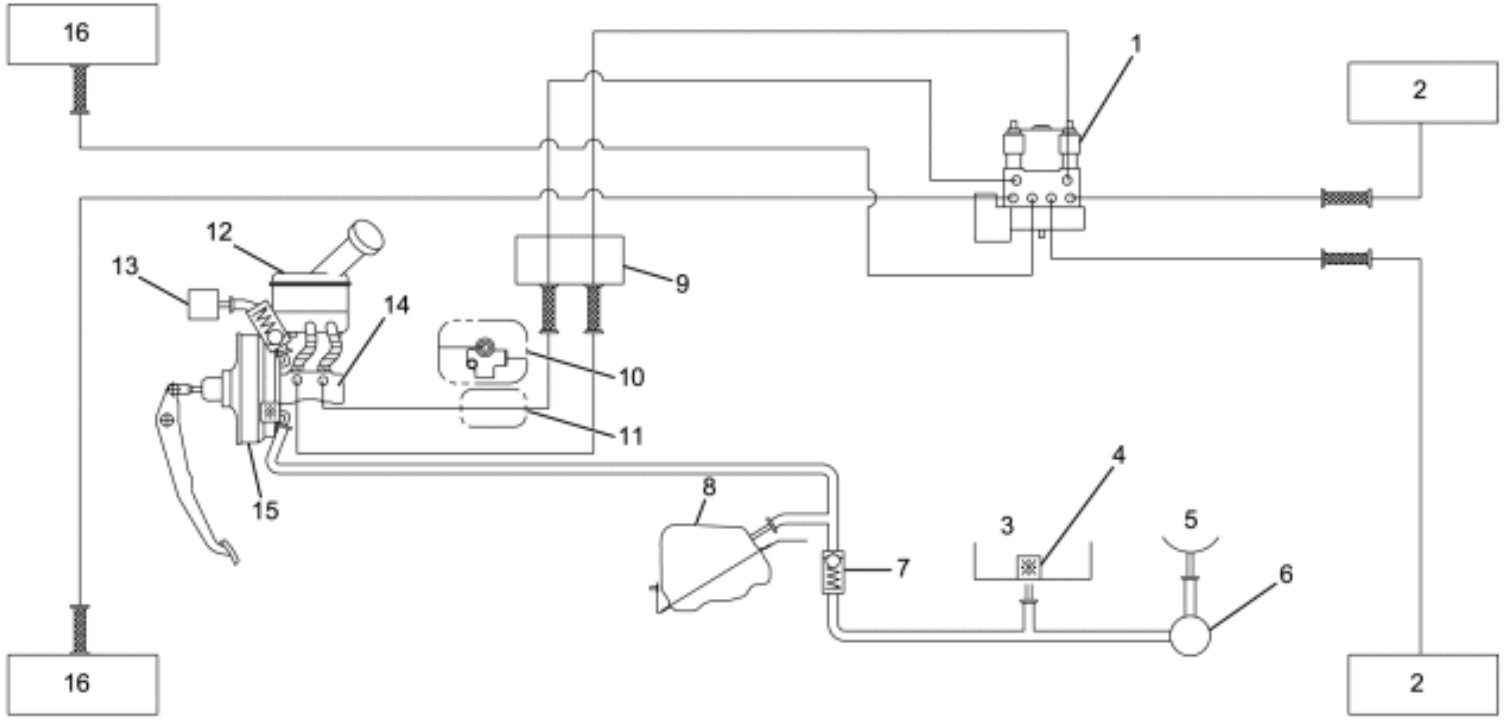


Figure 9.20.1

Note :The document in this section is for the 2015 Model Year NPR ECO MAX 12,000 GVW. The “Currently Available” model year chassis are included in this book

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.
6. Cover with protector wrap and secure with tie wraps.
7. Filler hose is set for 96 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.

Note :The document in this section is for the 2015 Model Year NPR ECO MAX 12,000 GVW. The “Currently Available” model year chassis are included in this book

Rear View Fuel Fill

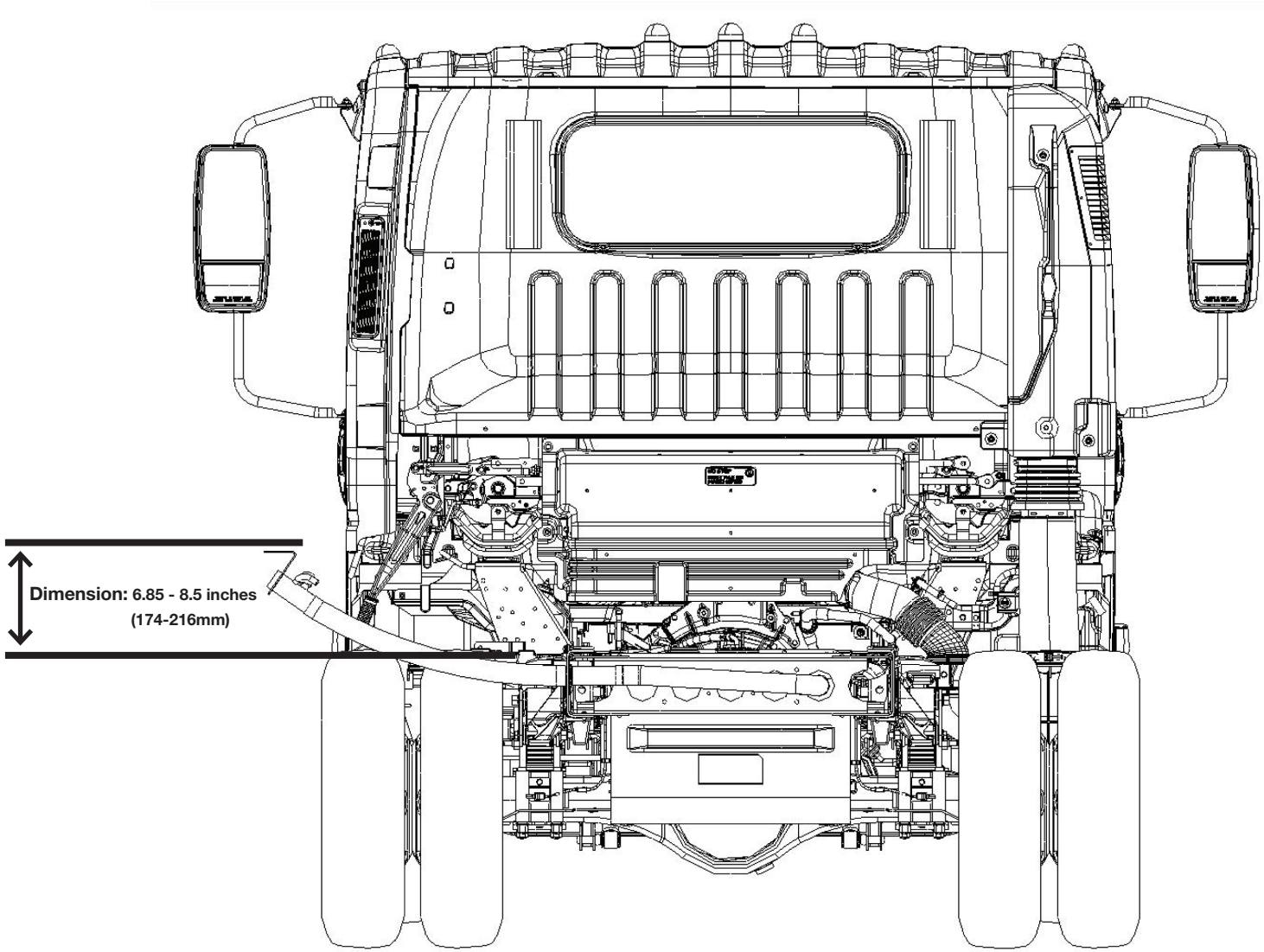


Figure 9.22.1

Top View Fuel Fill

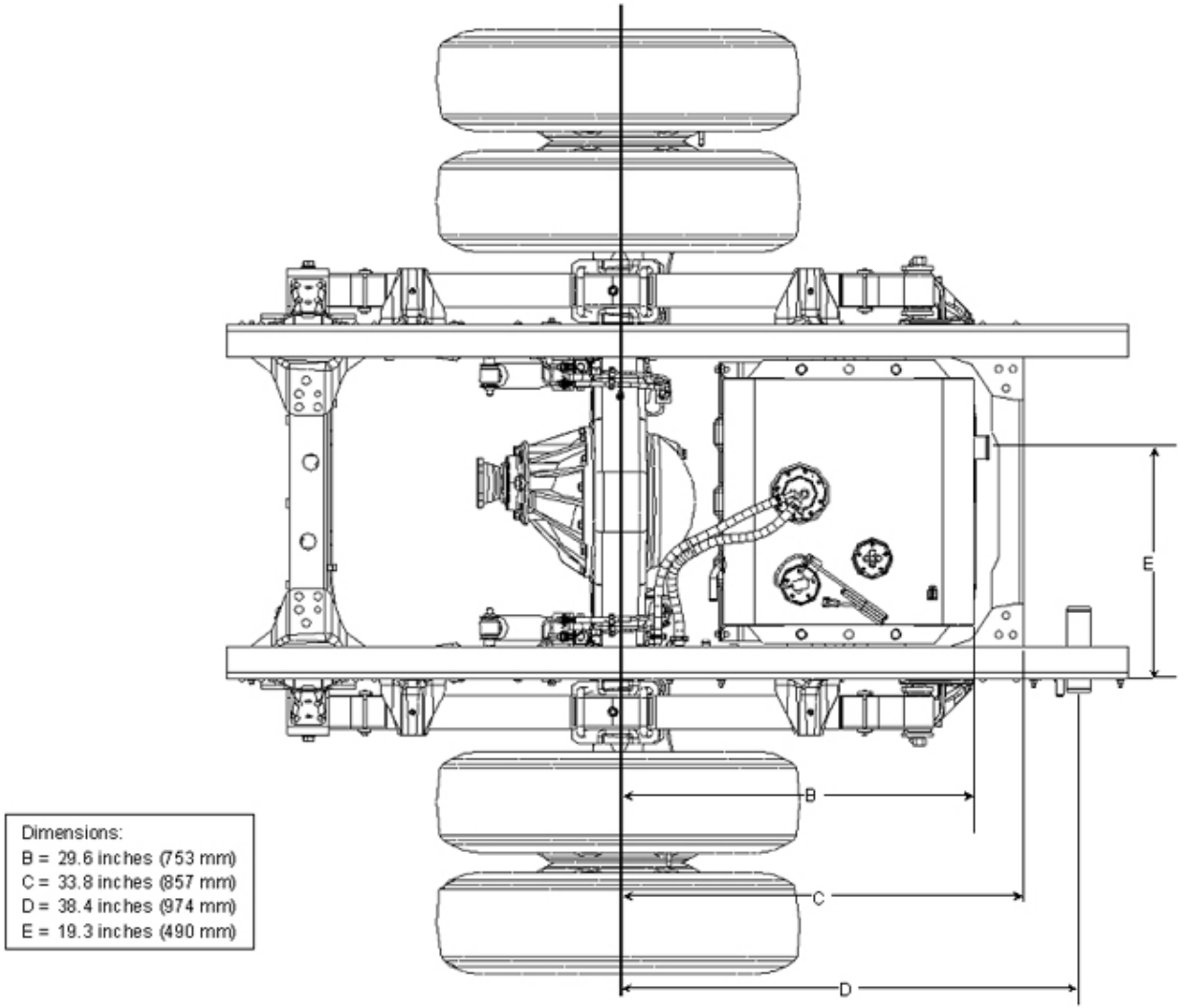
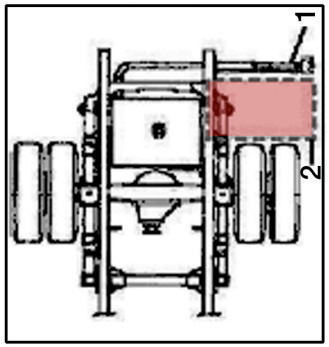


Figure 9.23.1

Note :The document in this section is for the 2015 Model Year NPR ECO MAX 12,000 GVW. The “Currently Available” model year chassis are included in this book

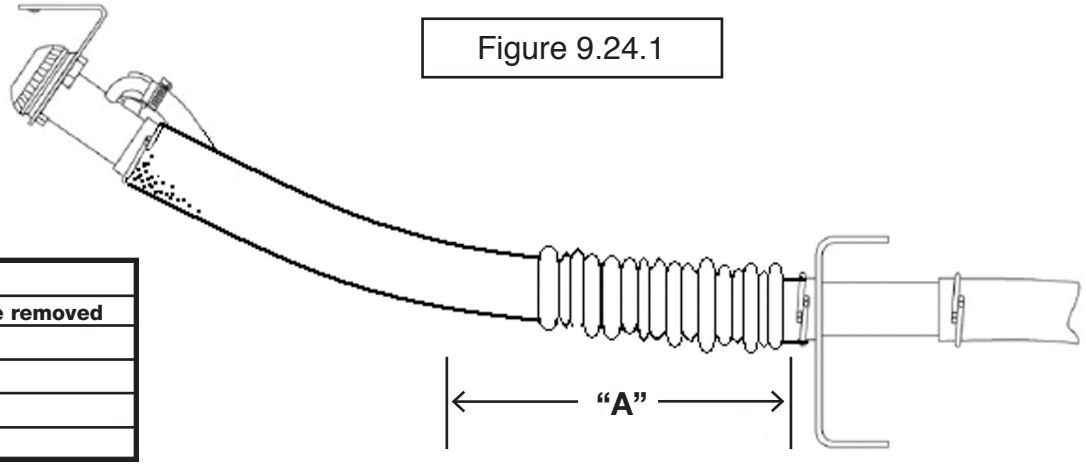
Hose Modification for Various Width Bodies and fuel fill vent Protection



Fuel fill vent and neck should be protected from road spray

1. FUEL FILLER NECK
2. RECOMMENDED MUD FLAP MOUNTING AREA (RED ZONE).

Figure 9.24.1



NPR	
Body Width	**Hose to be removed**
96 remove	1 inches
90 remove	4 inches
86 remove	6 inches
80 remove	9 inches

NOTE: **Shorten hose by “A Dimension” based on chart at left.**

Figure 9.24.2

Note :The document in this section is for the 2015 Model Year NPR ECO MAX 12,000 GVW. The “Currently Available” model year chassis are included in this book

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:

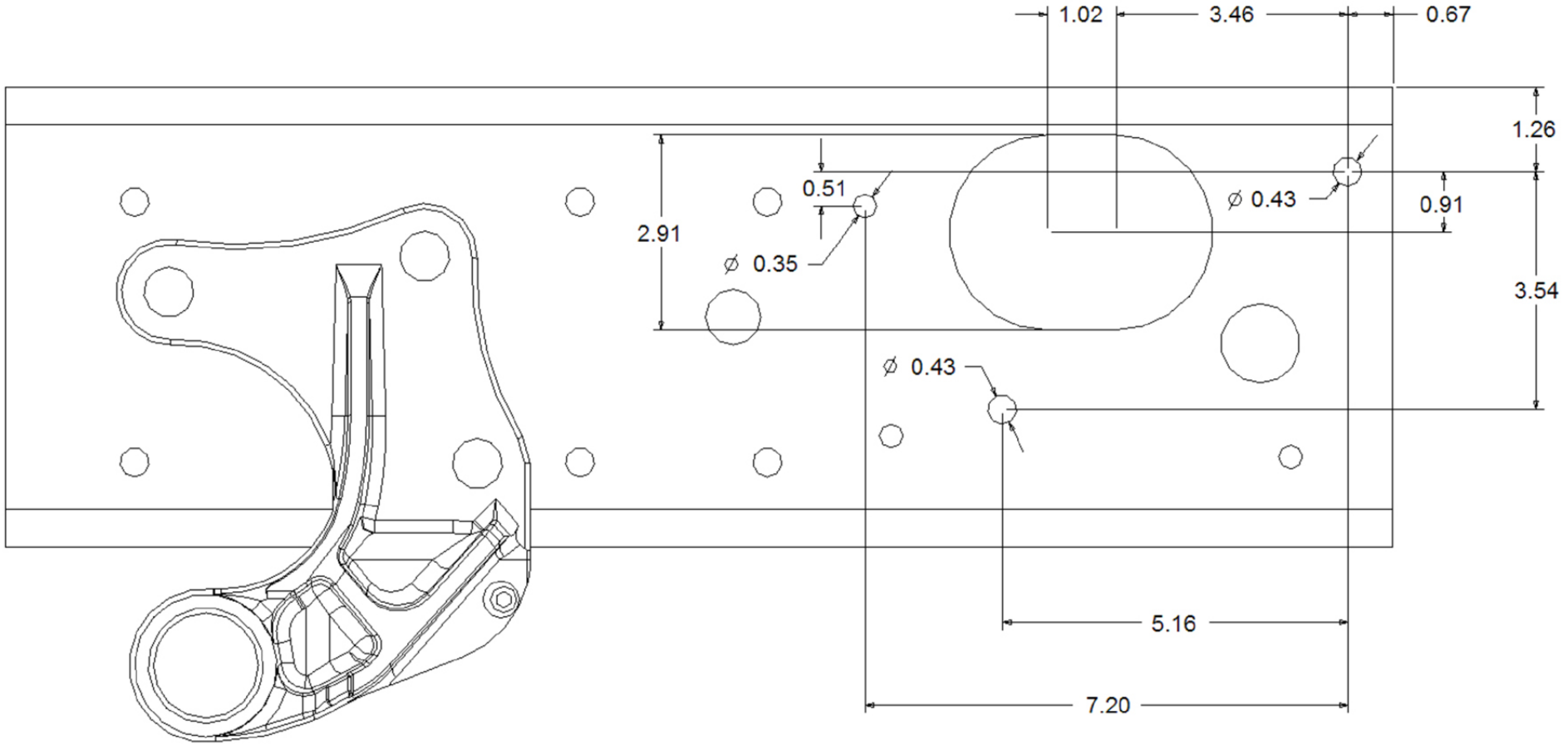
1. The decal must be placed as close as possible to the fuel inlet and be **clearly visible.**
2. The decal should be placed above or to the side of the fuel cap to avoid corrosion by possible contact with fuel.
3. The decal may be placed on aerodynamic fairings, bodies, etc. as long as the decal is 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.

Figure 9.25.1

Note :The document in this section is for the 2015 Model Year NPR ECO MAX 12,000 GVW. The “Currently Available” model year chassis are included in this book

Through the Rail Fuel Fill Frame Hole



Note: Dimensions in inches

Figure 9.26.1

Note :The document in this section is for the 2015 Model Year NPR ECO MAX 12,000 GVW. The “Currently Available” model year chassis are included in this book

N-Diesel Fuel Filler Kit Instructions

Please review these instructions prior to installation of the fuel filler kit.

Parts Kit: There are two separate parts kits used for the 2012 model year N-diesel products. Fuel filler kit part number 898171 9090 is used for 14,500 lb and higher GVWR chassis (NPR-HD, NQR, NRR), For reference kit part number 898171 9080 is used for 12,000 lb GVWR chassis (NPR models).
Parts list is shown in ***Figure 9.27.2.*** Parts photos are shown in ***Figure 9.27.1.***

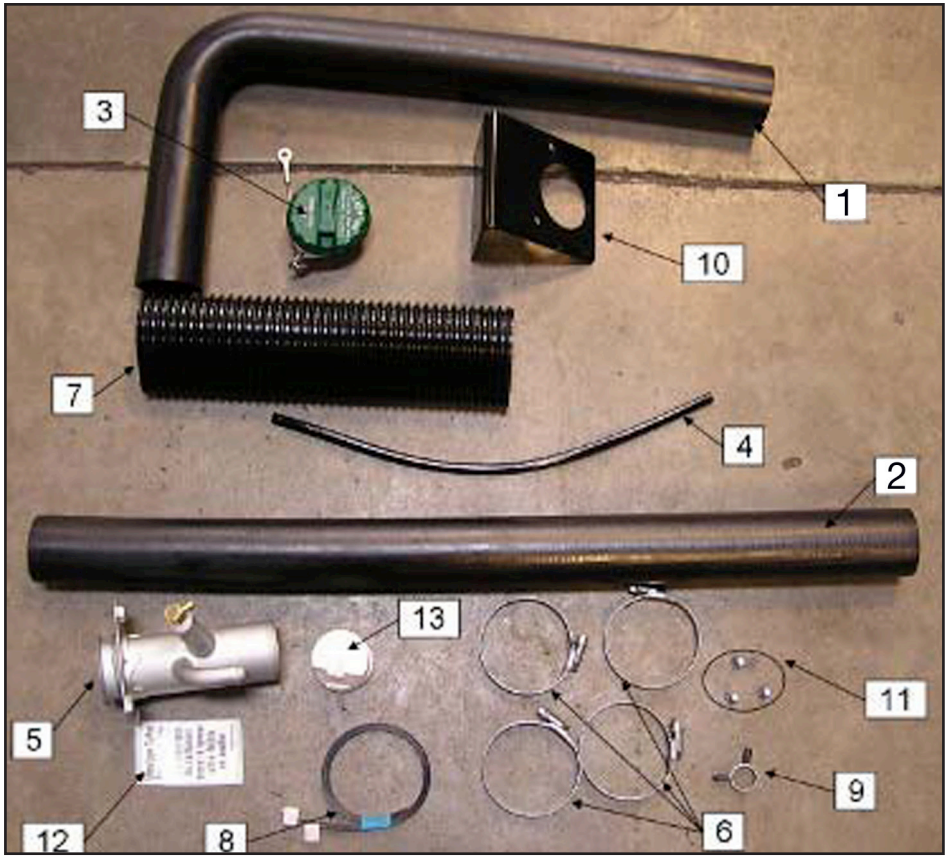


Figure 9.27.1

FUEL FILLER KIT, NPR		898171 9080	
ITEM #	**PART NAME**	**PART #**	**QTY**
1	HOSE: FUEL FILLER NECK	898171 212Y	1
2	HOSE: FUEL FILLER	898006 450Y	1
3	CAP: FILLER	897218 702Y	1
4	HOSE: ROLL-OVER VALVE	898164 876Y	1
5	NECK ASM: FUEL FILLER	898164 877Y	1
6	CLIP: JOINT	898133 349Y	4
7	PROTECTOR: FILLER HOSE	897114 063Y	1
8	CLIP: BAND, HOSE FIXING	109707 107Y	2
9	CLIP: RUBBER, HOSE	894242 034Y	1
10	BRACKET: FILLER NECK	897116 621Y	1
11	SCREW: FILLER NECK	897581 217Y	3
12	CAUTION PLATE	898070 422Y	1
13	SHUTTER: FUEL TANK	898164 404Y	1

Figure 9.27.2

Note :The document in this section is for the 2015 Model Year NPR ECO MAX 12,000 GVW. The “Currently Available” model year chassis are included in this book

Installation Instructions and Considerations:

The fuel tank shutter valve (13) was a new component for 2011 model year. This component is meant to improve fuel splash-back performance of the fuel system. In the 2012 model year a running change was made and this valve (13) was relocated from the fuel tank inlet to the inlet (outboard side) of the fuel filler neck bulkhead assemble that is bolted to the left hand frame rail as shown in **Figure 9.28.1** . This plastic valve snaps into place in the inlet of the frame mounted fuel pipe. The valve should be installed so that the plastic clip is at the top of the valve, so that the flap door opens up, as shown in **Figure 9.28.2**.

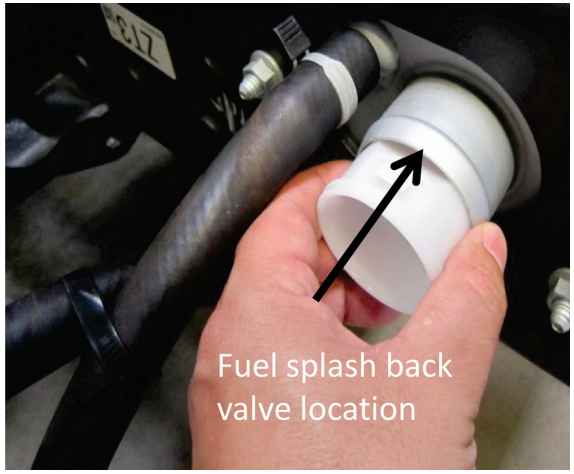


Figure 9.28.1

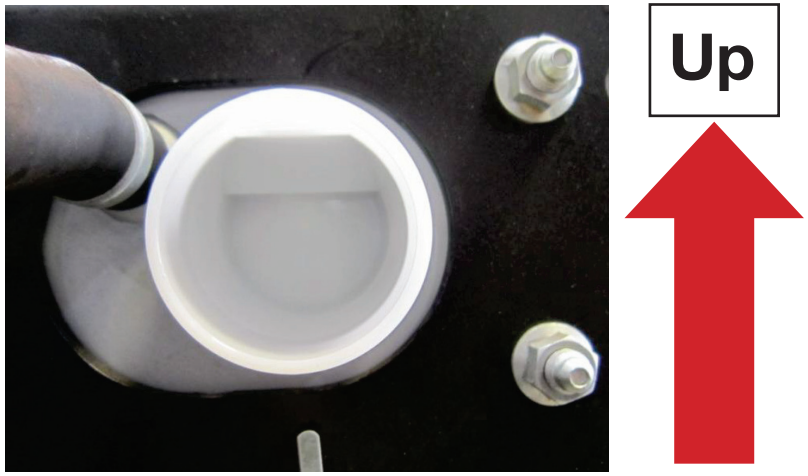


Figure 9.28.2

The fuel filler hose should be installed flush against the tank. The clamp should be installed between 1/16”and 3/8” from the tank.
This is shown in ***Figure 9.28.3*** below.

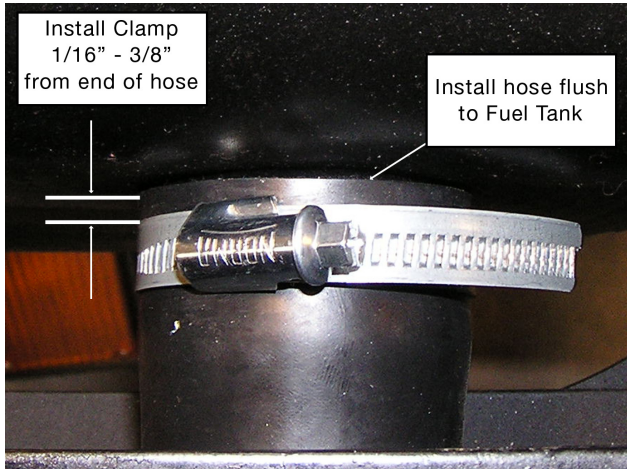


Figure 9.29.3

Roll-Over Valve Tubing

The roll-over valve has a hose attachment that will make the roll-over valve less sensitive to water intrusion. In order for the valve to work properly, it is critical that the hose be installed to the rollover valve. The proper assembly of the outer hose is shown in ***Figure 9.329.1.***

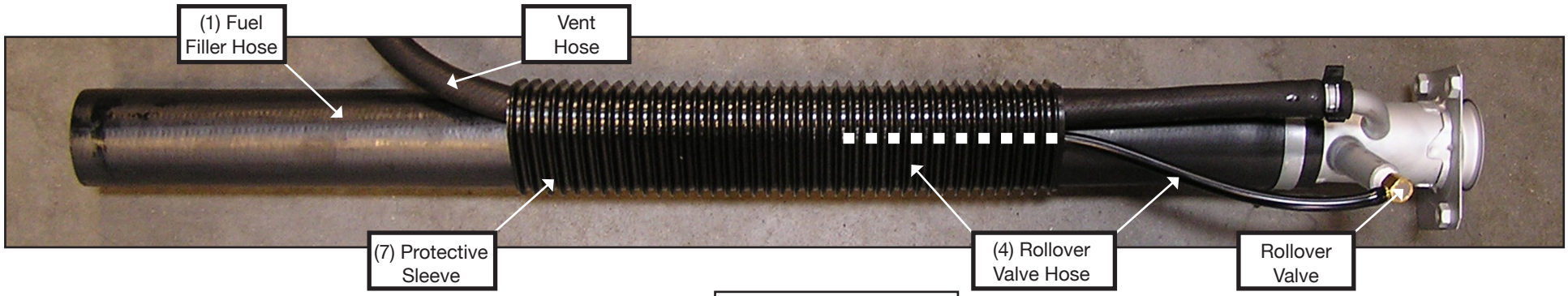


Figure 9.29.1

Filler Neck Installation:

The fuel filler neck (5) must be installed with the proper orientation on the body. The neck should be installed with the roll-over valve pointing upward, with the bottom edge of the neck oriented parallel to the ground, plus 33 to minus 7 degrees. See ***Figure 9.29.2*** for the proper orientation.

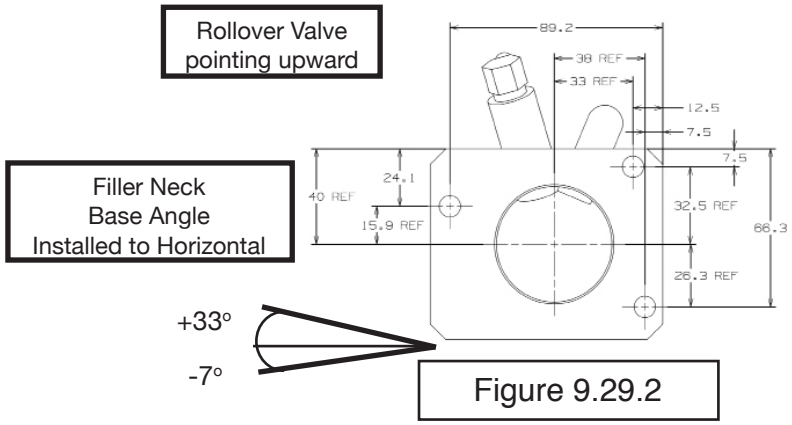


Figure 9.29.2

2016 Isuzu Truck

NPR HD Diesel Specifications

MODEL	NPR HD Diesel
GVWR	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)	14,500 GVWR 215 HP @ 2500 RPM w Automatic Transmission
Torque (Gross)	14,500 GVWR 452 lb/ft torque @ 1850 RPM w/ Automatic Trans
Equipment	Dry element air cleaner with vertical intake; 2 rows 564 in^2. radiator; 7 blade 20.1in diameter fan with viscous drive. Cold weather starting device and an oil cooler. Engine oil level check. Engine warning system with audible warning for low oil pressure, high coolant temperature, and low coolant level. Engine cruise control 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 with automatic torque converter lockup in stationary PTO mode.
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.
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	9,880 lbs.
WHEELS	16x6.0-K 6 hole disc wheels, painted white.
TIRES	215/85R-16E (10 pr) LRR (Low Rolling Resistance) 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-ad just 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 indicator light on instrument cluster.
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 in3. RBM 316,800.
CAB	All steel low cab forward, BBC 70.7 in, 45° mechanical tilt with torsion assist.
Equipment	TRICOT breathable cloth covered high back driver's seat with two occupant passenger seat. Dual cab mounted exterior mirrors with integral convex mirror, AM/FM CD stereo radio. Tilt and telescoping steering column. Power windows and door locks, floor mats, tinted glass.
ELECTRICAL	12 Volt, negative ground, dual maintenance free batteries, 750 CCA each, 140 Amp alternator with integral regulator.
OPTIONS	See last page for options

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

Vehicle Weights, Dimensions and Ratings

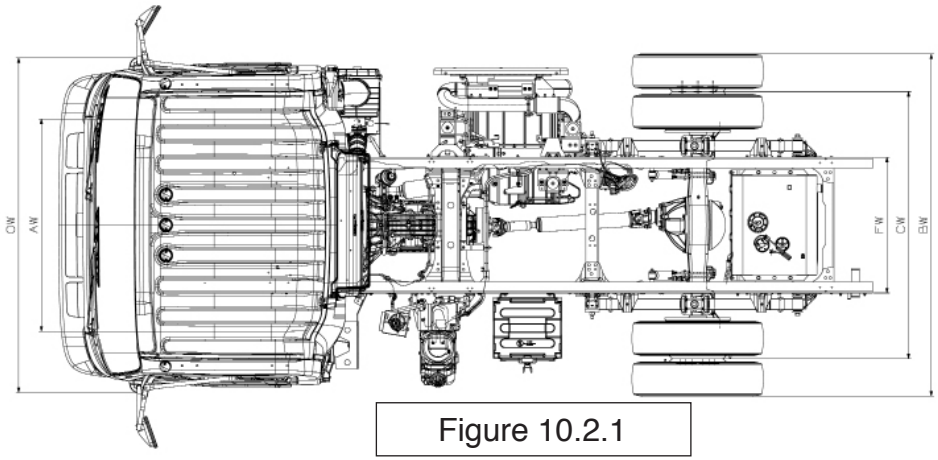


Figure 10.2.1

Dimension Constants:

Code	Inches	Code	Inches
AH	7.5	BW	83.3
AW	65.6	CW	65.0
BA	48.3	FW	33.5
BBC	70.7	OH	90.8
BOC	7.7/10.2	OW	81.3
FH	31.1		

* BOC 7.7 in. w/ 109.0 and 132.5 wb
BOC 10.2 in. w/ 150.0 and 176.0 wb

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.

Vertical Exhaust Option Dimensions:

Variable Chassis Dimensions:

Unit	WB	EFF CA*	EFF CE*	OAL	AF
Inch	109.0	62.5	105.6	200.5	43.1
Inch	132.5	86.0	153.1	224.0	43.1
Inch	150.0	103.5	146.6	241.5	43.1
Inch	176.0	129.5	172.6	267.5	43.1

* Effective CA & CE listed are standard CA or CE less vertical exhaust BOC of 24 inches.

Vertical Exhaust BOC = 24 inches

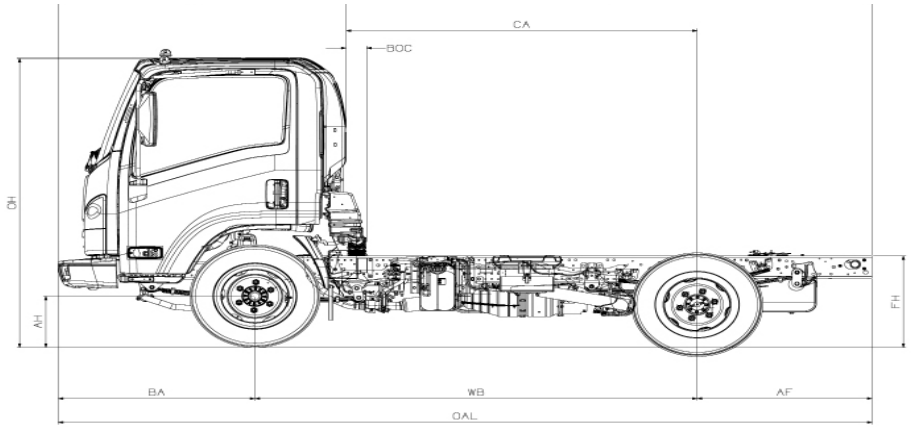


Figure 10.2.2

In-Frame Tank

14,500 lb. GVWR Automatic Transmission Model
Chassis Curb and Maximum Payload Weights

Model	WB	Unit	Front	Rear	Total	Payload
NF1	109.0 in.	lb.	3907	2057	5964	8536
NF2	132.5 in.	lb.	3999	2054	6053	8447
NF3	150.0 in.	lb.	4061	2034	6095	8405
NF4	176.0 in.	lb.	4123	2027	6150	8350

Side Mounted Tank

14,500 lb. GVWR Automatic Transmission Model
Chassis Curb and Maximum Payload Weights

Model	WB	Unit	Front	Rear	Total	Payload
NF4	176.0 in.	lb.	4258	1903	6161	8339

2016 Isuzu Truck

Vehicle Weight Limits:

GVWR Designed Maximum	14,500 lbs.
GAWR, Front	5,360 lbs.
GAWR, Rear	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.

RPO	OPTION DESCRIPTION	Weight (Lbs.) Front/Rear	
IF4	Air Deflector roof mounted (not available in Crew Cab) 64.0	0.00	
IF6	Fire Extinguisher and Triangle Kit mounted in rear organizer (3)	19.00	0.00
IG3	Engine Oil Pan Heater (120v 300w)	2.00	0.00
I4H	FMS-CAN Interface	1.00	0.00
IH2	Engine emergency shutdown system HWT, LWL, LOP (5)	0.00	0.00
IY9	Engine Idle Shutdown (Timer set at 3 minutes for engine shutdown)	0.00	0.00
IA9	Engine Idle Shutdown (Timer set at 3 minutes for engine shutdown)	0.00	0.00
IK9	33 Gallon Additional Diesel Fuel Tank mounted on LH side 150,176 wb std cab (8)	(8)	(8)
IY4	Delete Standard AM/FM/CD Radio	-3.00	0.00
I8H	AM/FM/CD Radio with AUx input/USB port and Bluetooth	0.00	0.00
IL9	PTO Enable Switch and Engine Idle Up Switch recommended for PTO and Idle applications (2)	1.00	0.00
IS0	Heated Mirrors	1.00	0.00
I9H	Heated dual remote contorl mirrors (15” head)	1.00	0.00
IU2	Mirror Bracket for 102 “ Wide Body	1.00	0.00
IV8	Seat Covers Standard Cab (9)	6.00	0.00
IX2	Rear Body Dome Lamp Switch (6)	1.00	0.00
I0A	Cross rail horizontal DPF/SCR with vertical exhaust (9)100.00	100.00	
I66	Block Heater (cord)	1.00	0.00
UZF	Back up alarm	0.00	2.00
V22	Chrome Grille	1.00	0.00
I4K	Keyless Entry System	3.00	0.00
I5K	Suspension Drivers Seat (1)	20.0	0.00
I6K	Lockable DEF Cap	0.00	0.00
I1L	Speed Limited to 58 MPH	0	0
I2L	Speed Limited to 65 MPH	0	0
I3L	Speed Limited to 68 MPH	0	0
I4L	Speed Limited to 70 MPH		
54	In rail fuel tank with power windows, door locks and air conditioning	80	0
64	In rail fuel tank with power windows, power door locks, air conditioning and LSD (4)	80	15
74	Side mounted fuel tank w/power windows, power door locks and air conditioning (6)	215	-124
84	Side mounted fuel tank w/power windows, power door locks, air conditioning and LSD (4) (6)	215	-109

(1) RPO is Regular Production Option that is stocked in Port inventory.
LSO is Limited Stock Option that is stocked in Port inventory but should be checked for availability and delivery time. SEO is Special Equipment Option and requires 90-120 day lead time for delivery.

(2) These switches can be port or dealer installed. Please consult the body builders guide and / or the service manual for additional programming options and functions.

(3) LSD factory installed Limited Slip Differential

(4) High Water Temperature (HWT), Low Water Level (LWL) and Low Oil Pressure (LOP)

(5) 176 inch WB Standard Cab only

(6) RPO must be ordered with Supreme Value Pak and Morgan Fast Track Body Programs

(7) Additional fuel tank mounted on the drivers side frame rail. Available with in rail tank only, available on 150 and 176 inch standard cab wheelbases only .(Weights: 150 wb +122 lbs. front and +238 lbs. rear and 176 wb +102 lbs. front and +258 lbs rear)

(8) Available only rail fuel tank and single cab (no crewcab)

(9) Seat covers not available with suspension seat

Frame and Crossmember Specifications

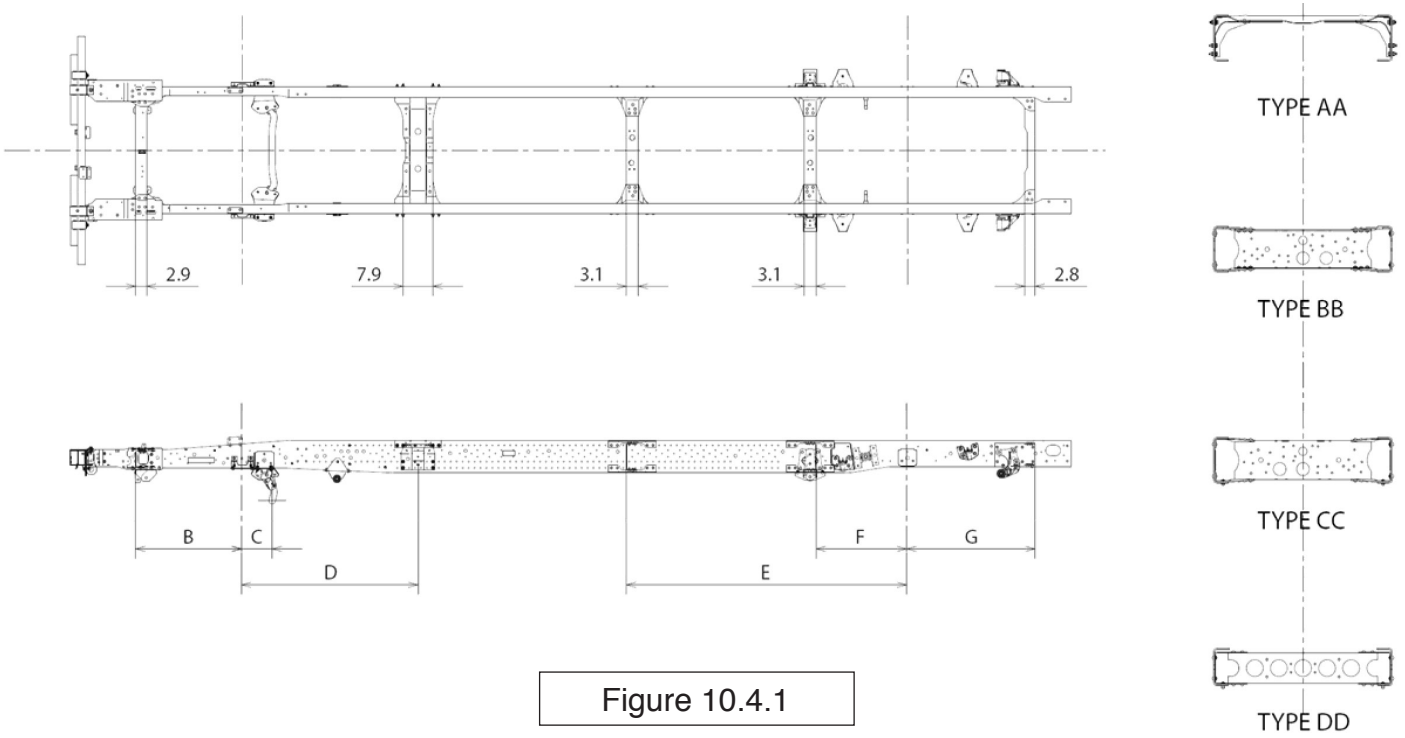


Figure 10.4.1

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

Figure 10.4.2

Note: Dimensions in inches

Frame Chart

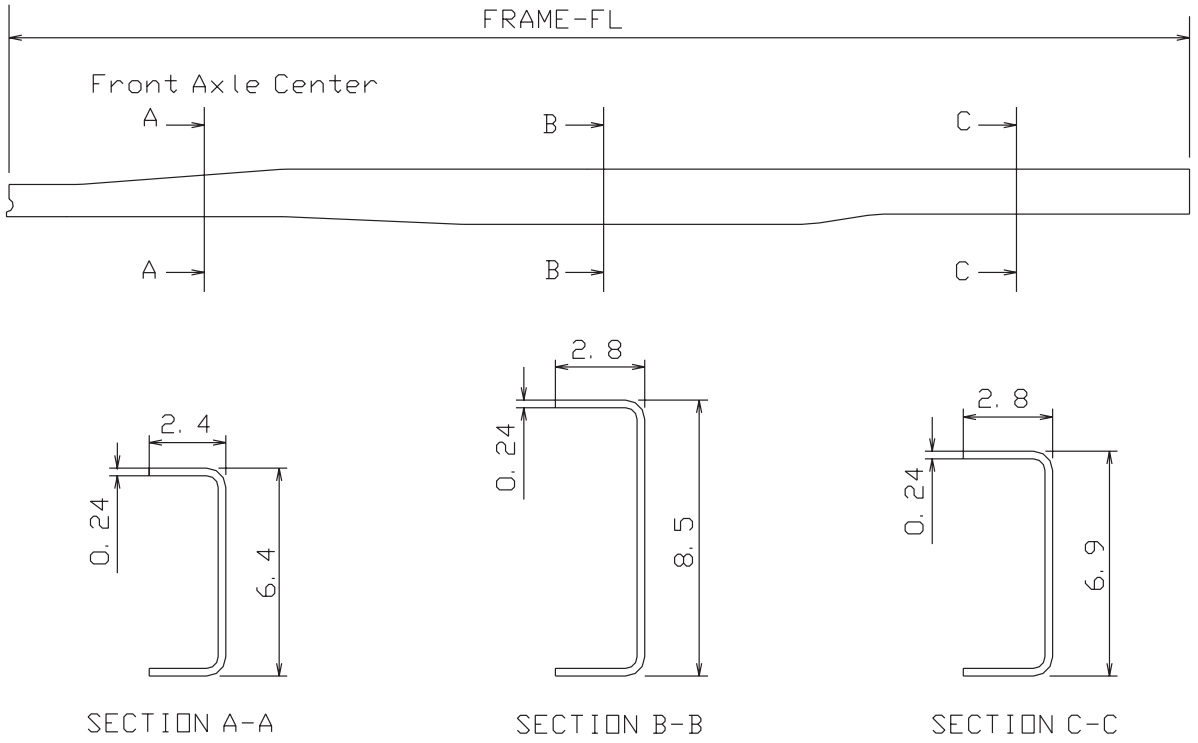


Figure 10.5.1

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

Figure 10.5.2

Note: Dimensions in inches

NPR-HD Diesel Standard Cab - Top View

WB	A	B
109	43.4	78.0
132.5	49.7	84.3
150	43.4	78.0
176	43.4	78.0

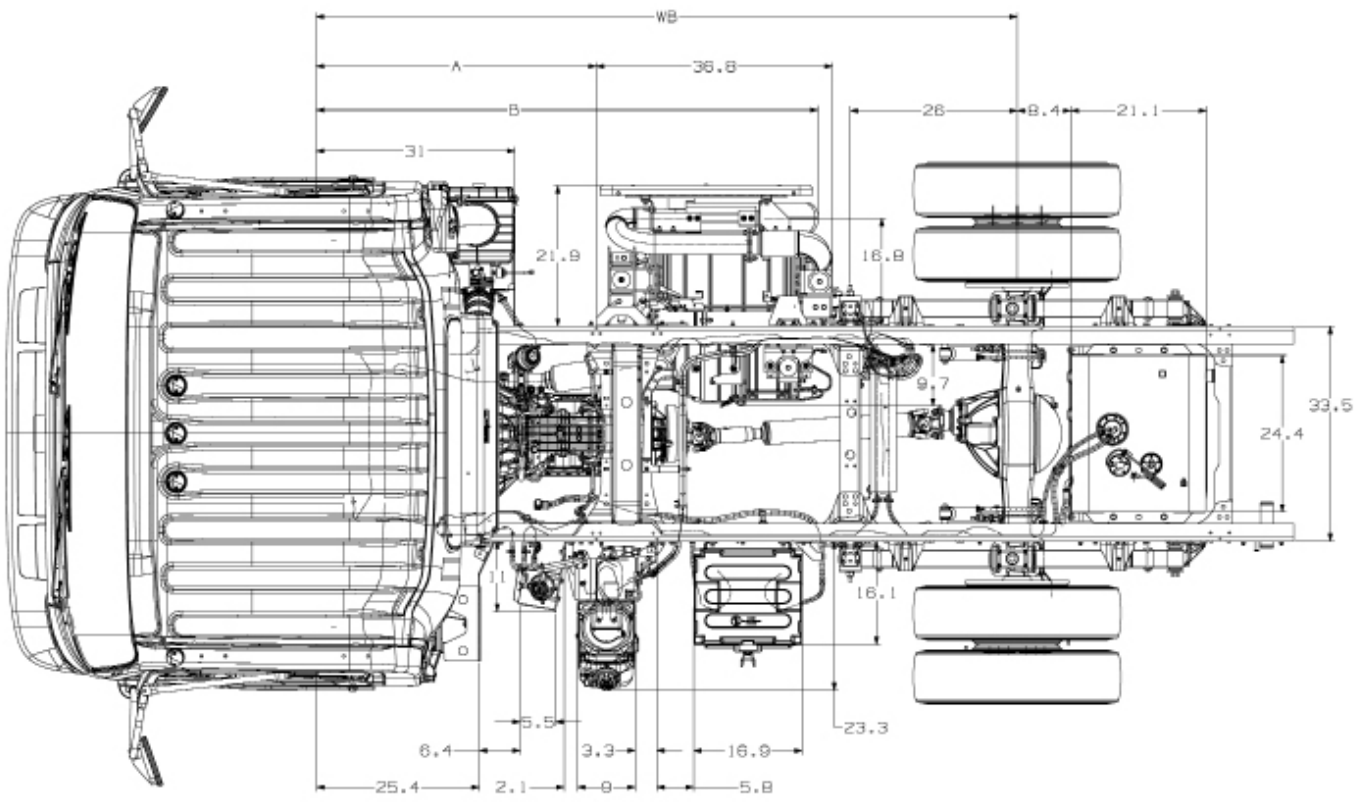


Figure 10.6.1

Note: Dimensions in inches

NPR-HD Diesel Standard Cab - Left Side View

WB	A
109	80.7
132.5	87.0
150	80.7
176	80.7

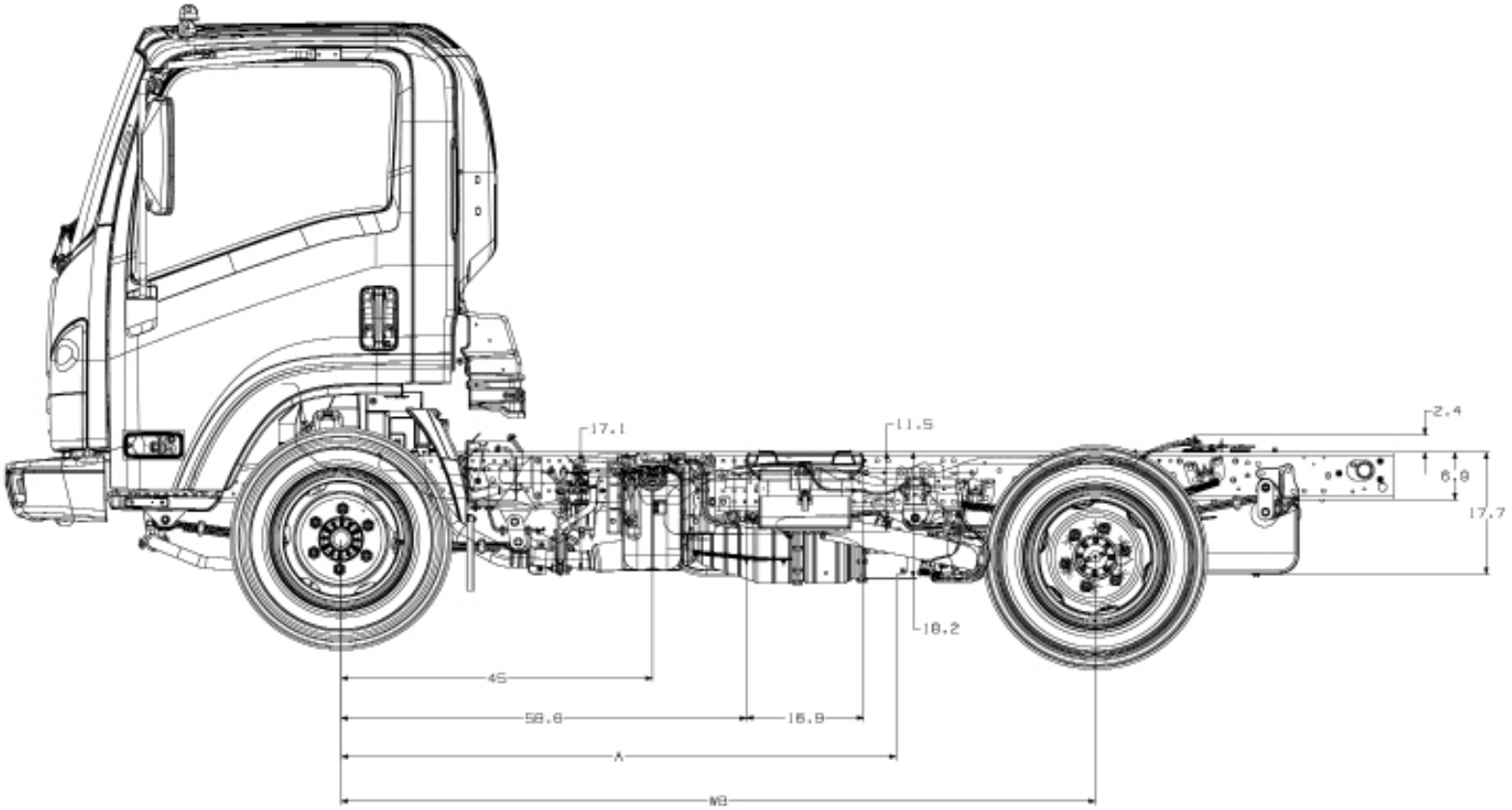


Figure 10.7.1

Note: Dimensions in inches

NPR-HD Diesel Standard Cab - Right Side View

WB	A
109	44.0
132.5	50.3
150	44.0
176	44.0

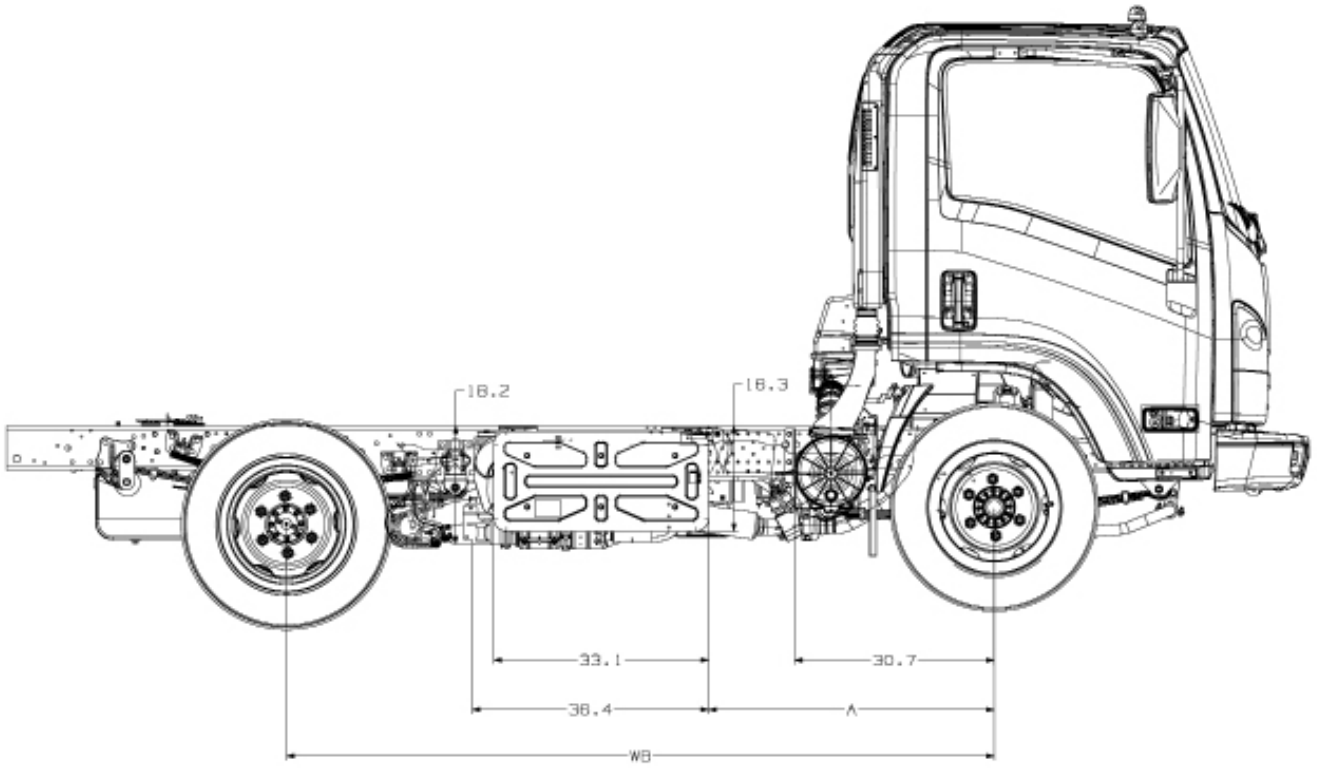


Figure 10.8.1

Note: Dimensions in inches

SCR / DPF 4HK1-TC

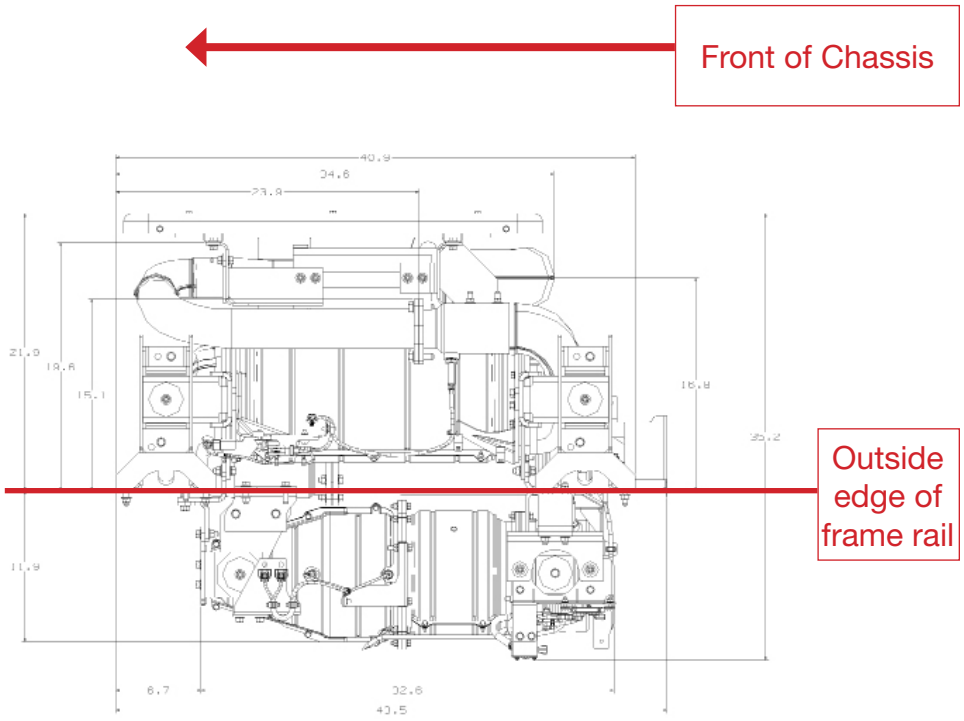


Figure 10.9.1

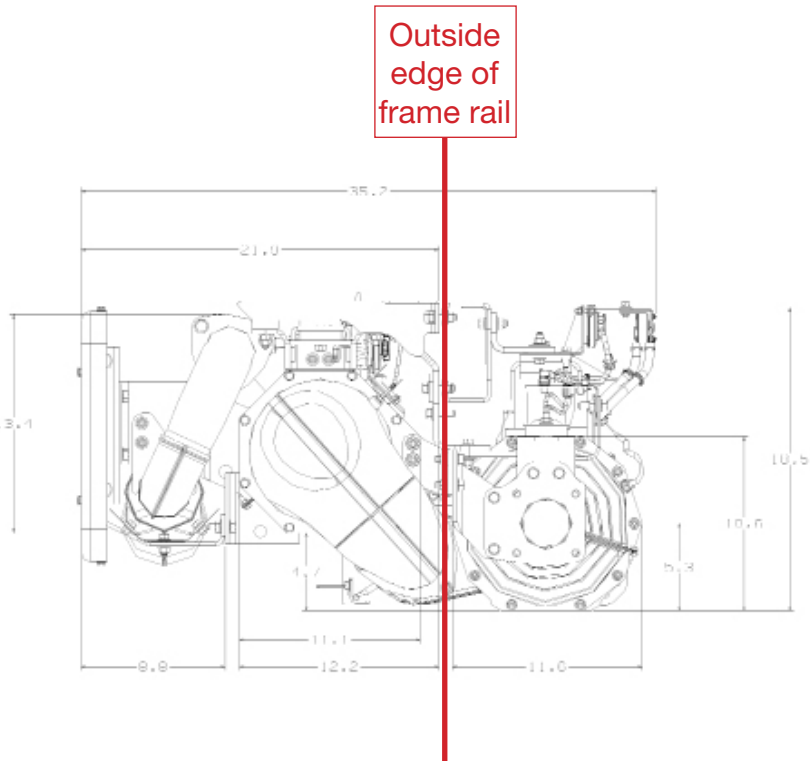


Figure 10.9.2

Note: Dimensions in inches

Option Side Fuel Tank in addition to the Standard In Rail Fuel Tank RPO IK9

Side View 150 Wheelbase

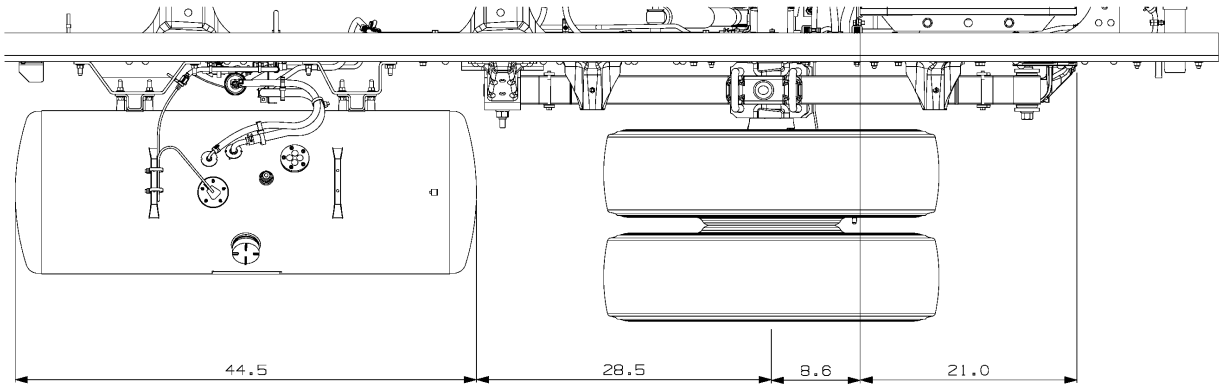


Figure 10.10.1

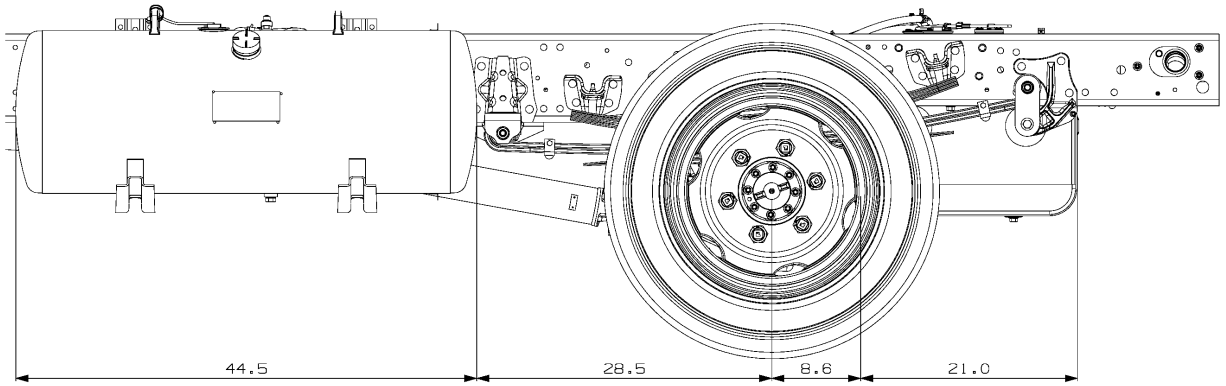


Figure 10.10.2

Note: Dimensions in inches

Option Side Fuel Tank in addition to the Standard In Rail Fuel Tank RPO IK9

Side View 176 Wheelbase

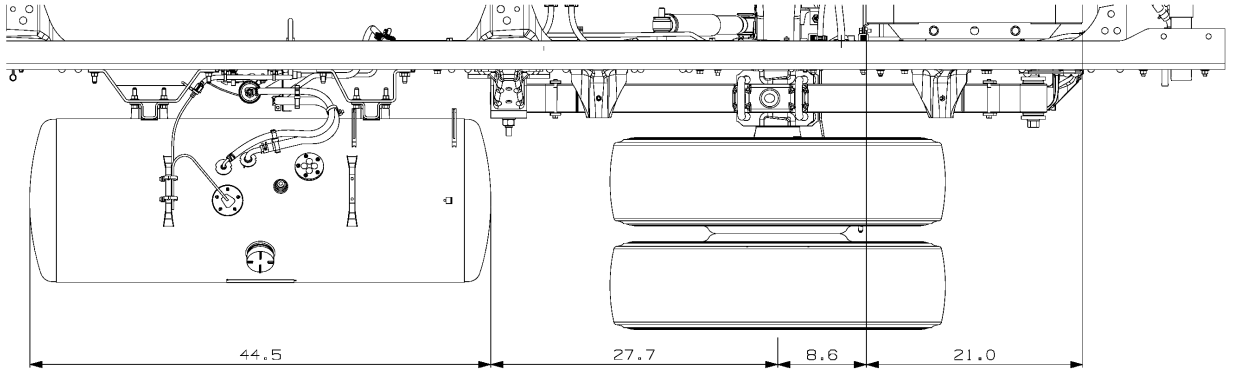


Figure 10.11.1

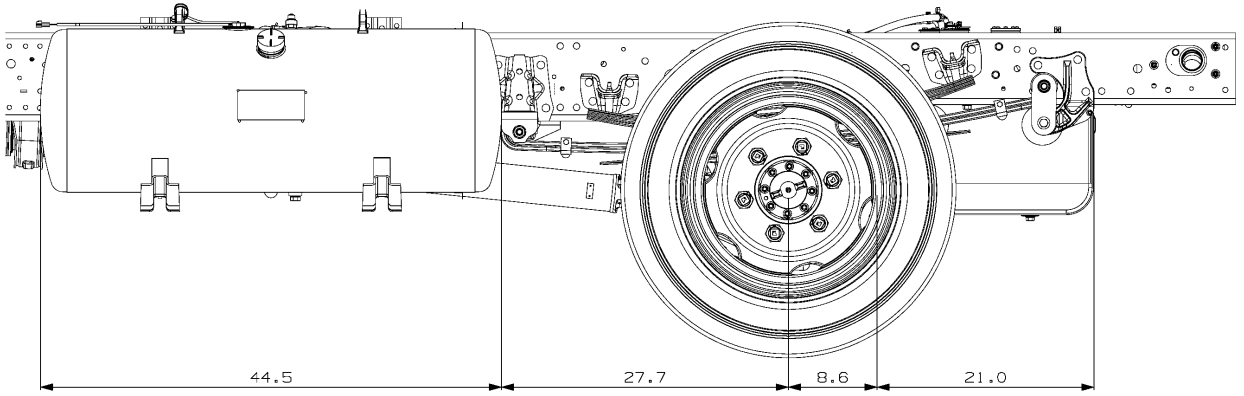


Figure 10.11.2

Note: Dimensions in inches

Option Side Fuel Tank in place of the Standard In Rail Fuel Tank on NF474 and NF484 ONLY

Side View 176 Wheelbase

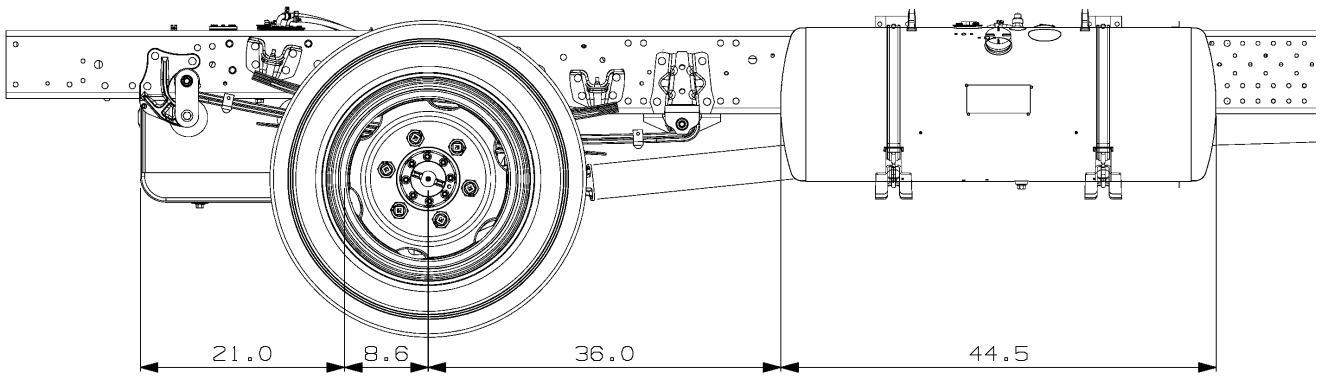


Figure 10.12.1`

Note: Dimensions in inches

Optional Side Fuel Tank in addition to the Standard In Rail Fuel Tank RPO IK9 (150 and 176 wbLH rail only)

Optional Side Fuel Tank replacing standard In Rail Fuel Tank (176 wb only RH rail only)

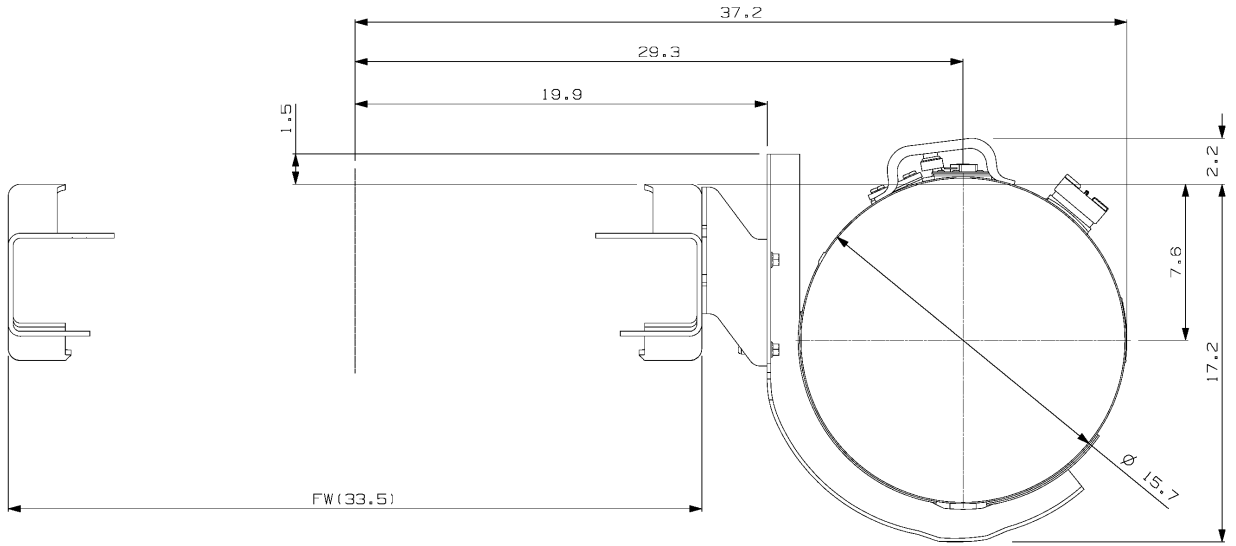


Figure 10.13.1

Note: Dimensions in inches

Cab Tilt

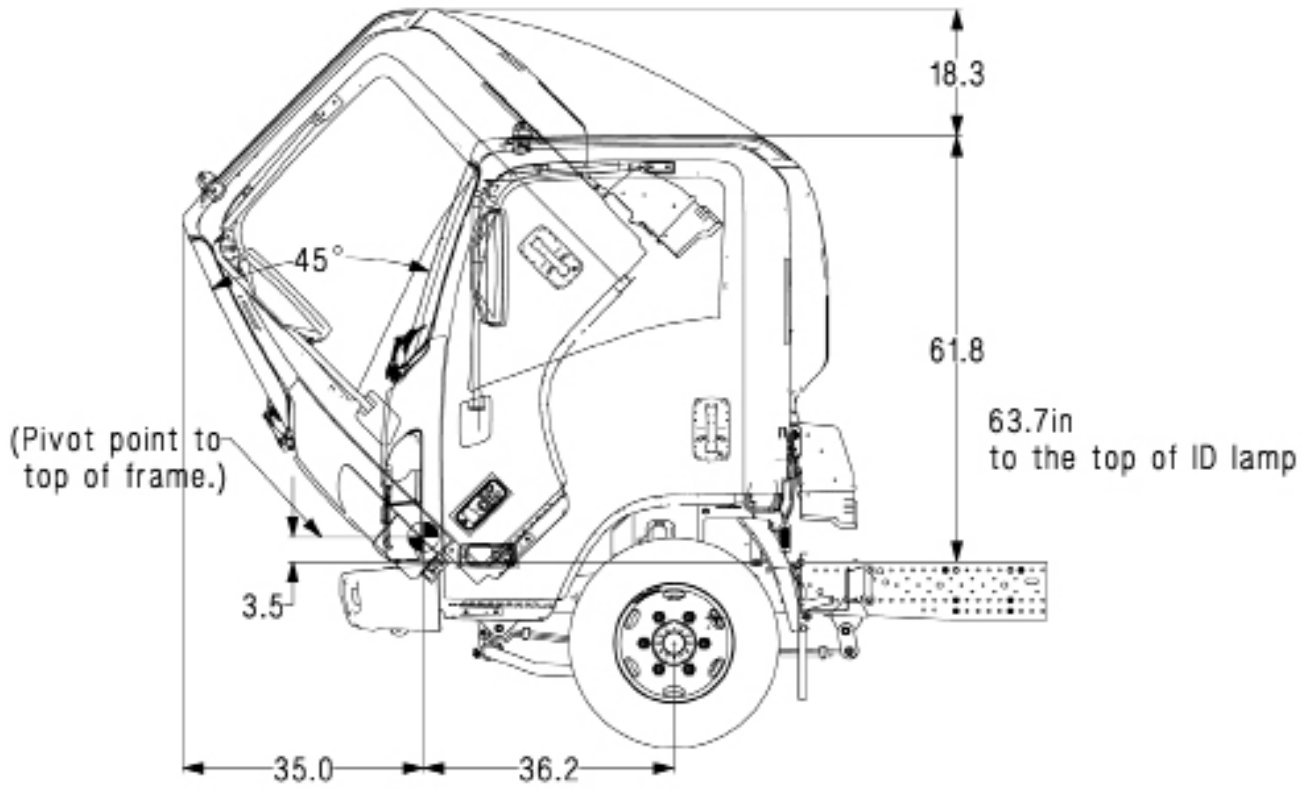


Figure 10.14.1

Note: Dimensions in inches

Horizontal and Vertical CG of Chassis			
WB	V	H in frame tank	H side tank
110	22.2	36.2	N/A
132.5	22.1	42.7	N/A
150	22.0	47.7	N/A
176	22.0	55.0	50.3

Figure 10.15.1

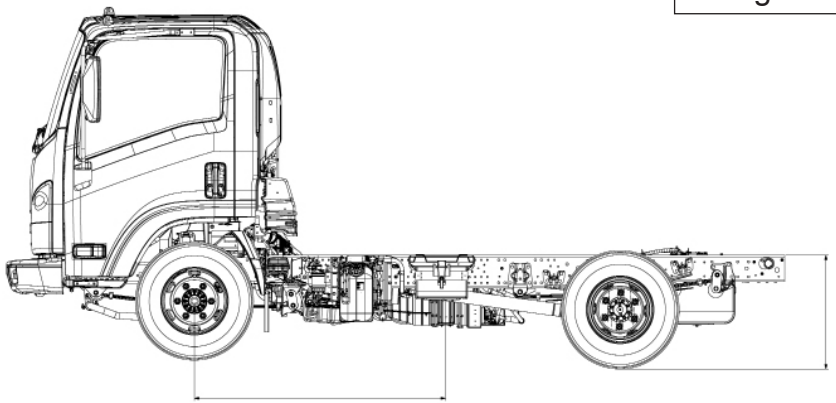


Figure 10.15.2

The maximum vertical center of gravity specified below must not be exceeded at maximum GVWR and rated front and rear GAWR. The Center of Gravity (CG) maximum is 63” (1600 mm) above the ground. (NPR Cab Chassis and NPR Stripped Chassis)

NOTE: The Final Manufacturer must ensure that the combined vertical center of gravity of the chassis, body, and available payload at full GVW does not exceed the maximum vertical center of gravity outlined in the Isuzu Incomplete Vehicle Document and the Isuzu Body Builders Guide.

Additional Information may be obtained by contacting ISUZU Commercial Trucks of America(ICTA)Applications Engineering on the West Coast call 1-562-229-5240 and in the
East Coast call 1-770-740-1620 X 262.

Note: Dimensions in inches

Front Axle Chart

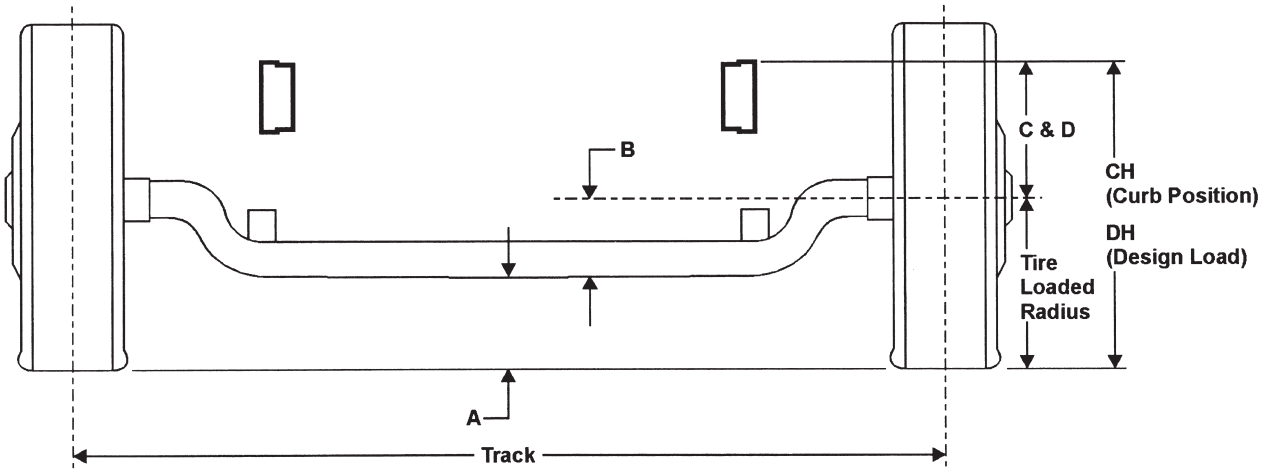


Figure 10.16.1

Formulas for calculating height dimensions:

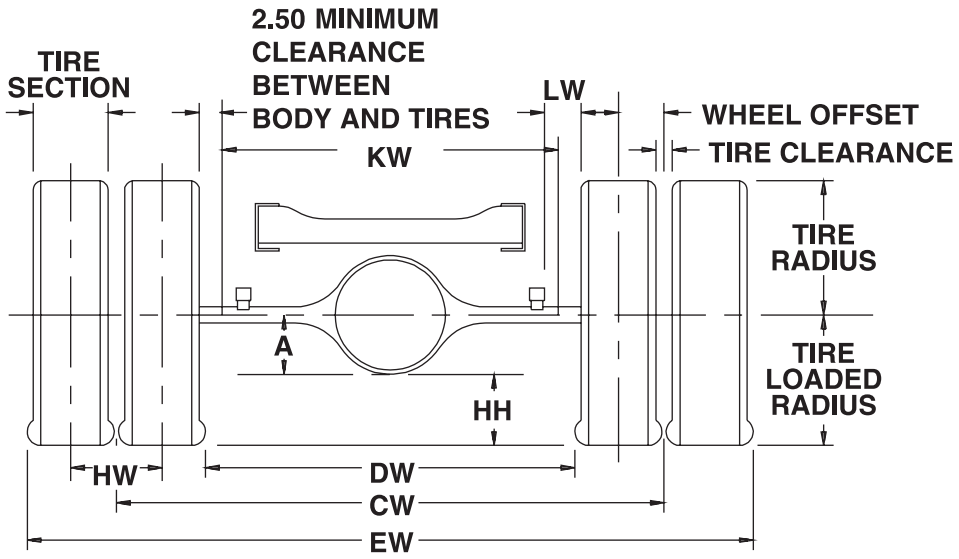
A = Tire Loaded Radius – B
C = Centerline of Axle to Top of Frame Rail at Curb Position
D = Centerline of Axle to Top of Frame Rail at Design Load
CH = C + Tire Unloaded Radius
DH = D + Tire Loaded Radius

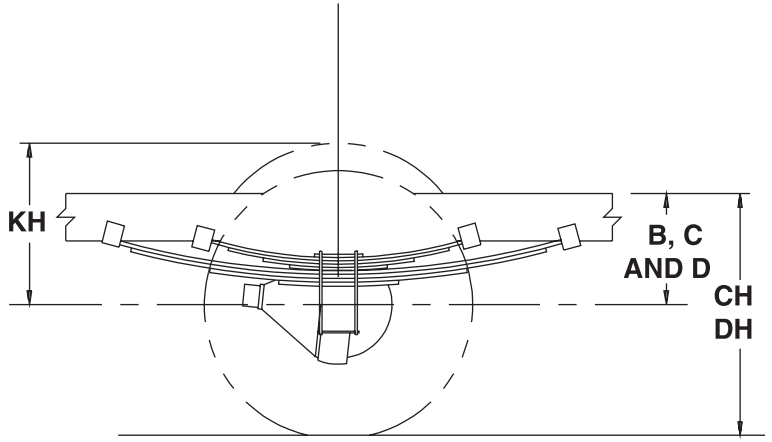
Tire	GVWR	GAWR	A	B	C	D	CH	DH	Track	Tire Radius	
										Unload	Load
215/85R 16-E	14,500 lbs.	5,360 lbs.	7.5	6.6	12.8	11.7	27.4	25.8	65.5	14.6	14.1

Figure 10.16.2

Note: Dimensions in inches

Rear Axle Chart





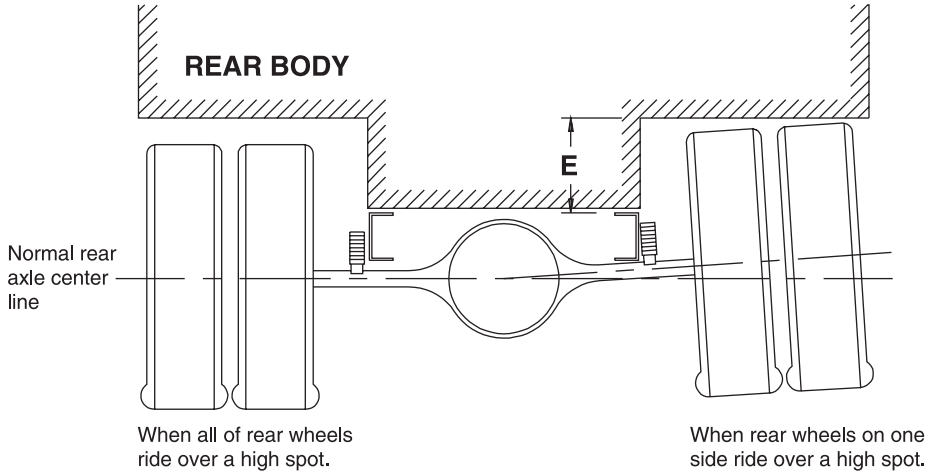


Figure 10.17.1

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

Figure 10.18.1

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.

Figure 10.18.2

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

Note: Dimensions in inches

Figure 10.18.3

NPR-HD Suspension Deflection Charts

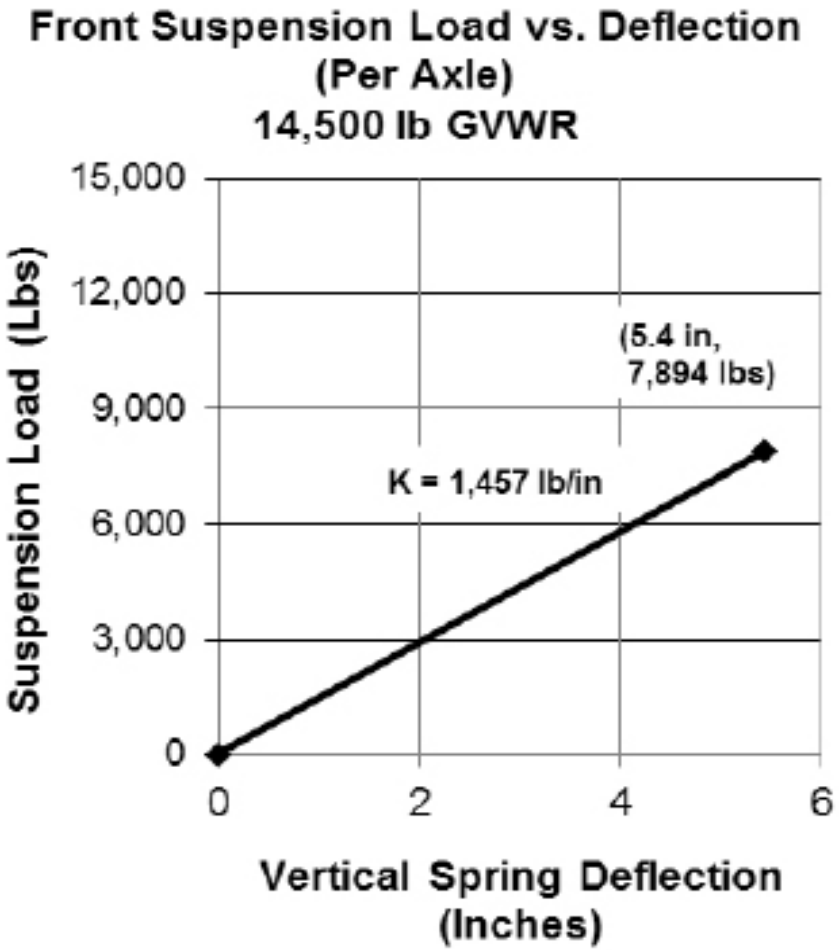


Figure 10.19.1

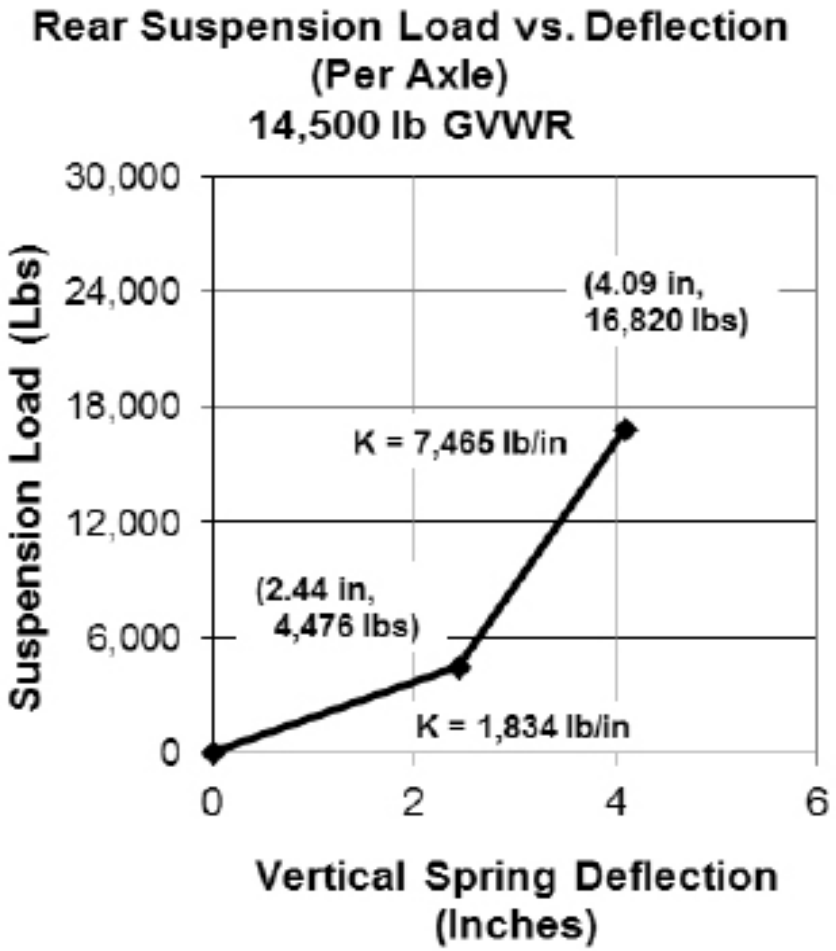


Figure 10.19.2

Tire and Disc Wheel Chart – NPR HD/W4500

Tire

Tire Size	Tire Load Limit and Cold Inflation Pressures				Maximum Tire Load Limits (lbs.)		GVWR (Lbs.)
	Single		Dual		Front	Rear	
	Lbs.	PSI	Lbs.	PSI	2 Single	4 Dual	
215/85R-16E	3,315	85	3,115	85	6,630	12,460	14,500

Figure 10.20.1

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

Disc Wheel

Figure 10.20.2

Wheel Size	Bolt Holes	Bolt Circle Dia.	Ft./Rr. Nut Size*	Rear Stud Size*	Nut/Stud Torque Specs.	Inner Circle	Outside Offset	Disc Thickeness	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	5^0 DC	Steel TOPY

*O.D. Wrench Sizes

Figure 10.20.3

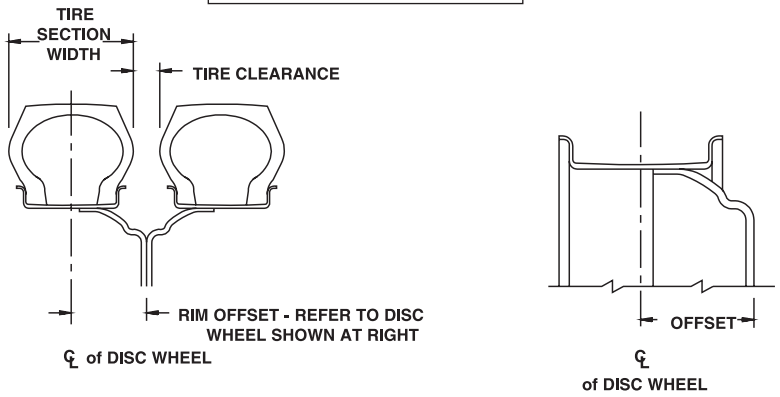


Figure 10.20.4

Note: Dimensions in inches

Propeller Shaft

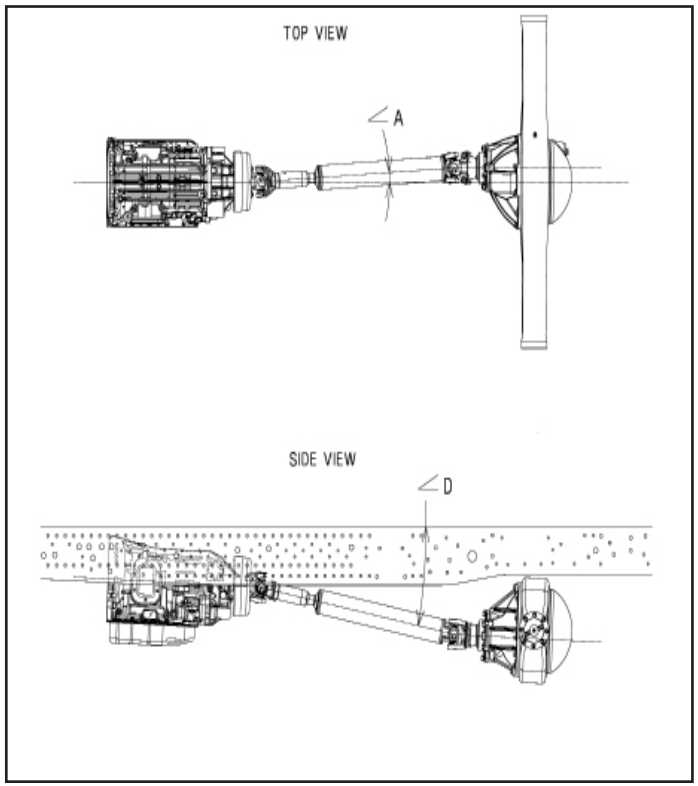


Figure 10.21.1

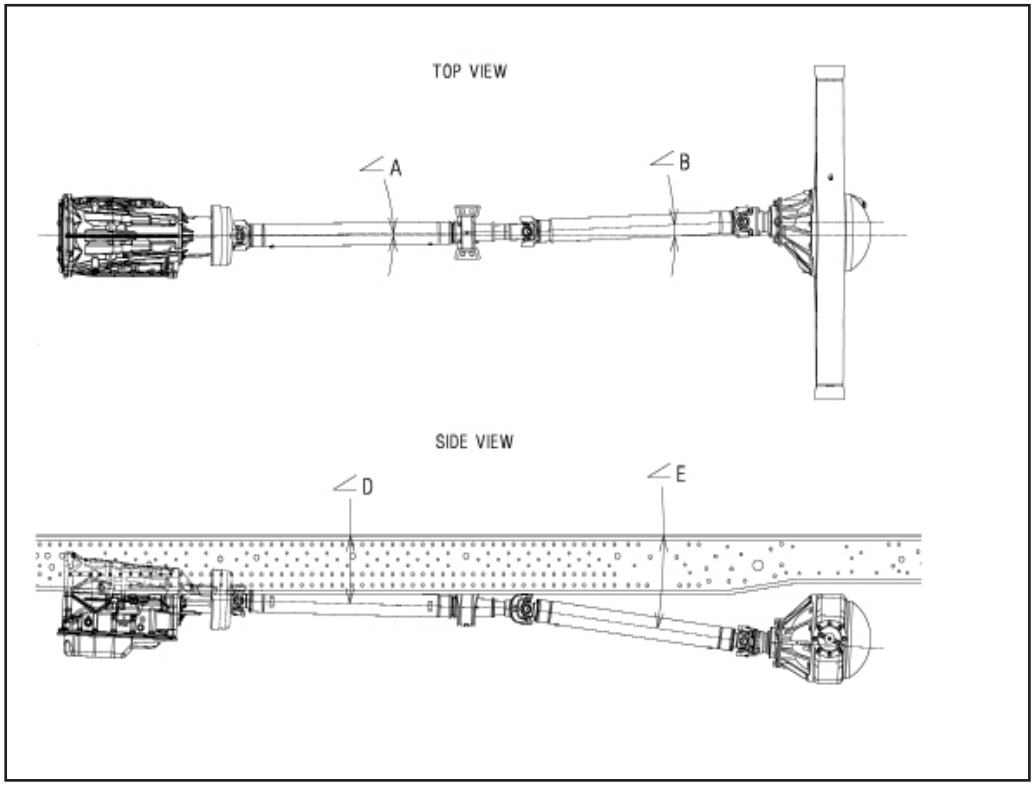


Figure 10.21.2

WheelBase (in.)	Top View		Side View			
	∠A	∠B	∠D	∠E	Trans	Rear Axle
109	2.5º	-	10.6º	-	2.5º	2.5º
132.5	0º	2.7º	5.3º	7.4º	2.5º	2.5º
150.0	0º	2.7º	2.6º	8.0º	2.5º	2.5º
176	0º	1.8º	2.1º	5.4º	2.5º	2.5º

Notes: 1. Angles privuded in table are relative to the frame angle. Please take this into consideration for service measurements.
2. Driveline angles are based on the chassis curb weight which includes standard equipment, fuel but no driver, body, or payload.

Wheelbase	109	132.5	150	176
No. of Shafts	1	2	2	2
Trans. Type	6A/T	6A/T	6A/T	6A/T
Shaft #1 O.D.	3.25”	3.25”	3.25”	3.25”
Thickness	0.0906”	0.0906”	0.0906”	0.0906”
Length	36.69”	16.97”	34.29”	43.47”
Type	A	B	B	B
Shaft #2 O.D.	N/A	3.25”	3.25”	3.25”
Thickness	N/A	0.0906”	0.0906”	0.0906”
Length	N/A	33.78”	34.17”	50.71”
Type	N/A	C	C	C

Figure 10.22.1

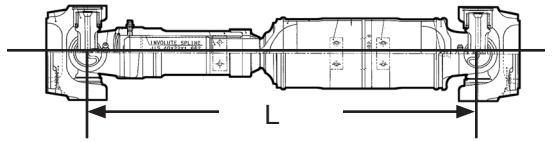
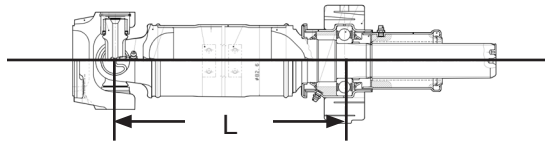
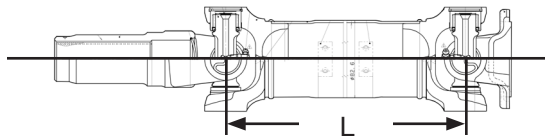
Type	Description	Illustration
Type **A**	1st shaft in 1-piece driveline	
Type **B**	1st shaft in 2-piece driveline	
Type **C**	2nd shaft in 2-piece driveline	

Figure 10.22.2

Note: Dimensions in inches

Brake System Diagram, 14,500 GVW

Vacuum Over Hydraulic

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

Legend for NPR, NPR-HD, NPR-XD Brake System

(1) Electronic Hydraulic Control Unit (EHCU)
(2) Rear Wheel Cylinder
(3) Vacuum Pump
(4) Check Valve
(5) Exhaust Brake Valve
(6) Magnetic Valve
(7) Check Valve (One-way Valve)
(8) Vacuum Tank
(9) 4-Way Connector
(10) With Metering Valve
(11) W/O Metering Valve
(12) Brake Fluid Reservoir
(13) Electric Vacuum Pump
(14) Master Cylinder
(15) Vacuum Booster (Servo Unit)
(16) Front Wheel Cylinder

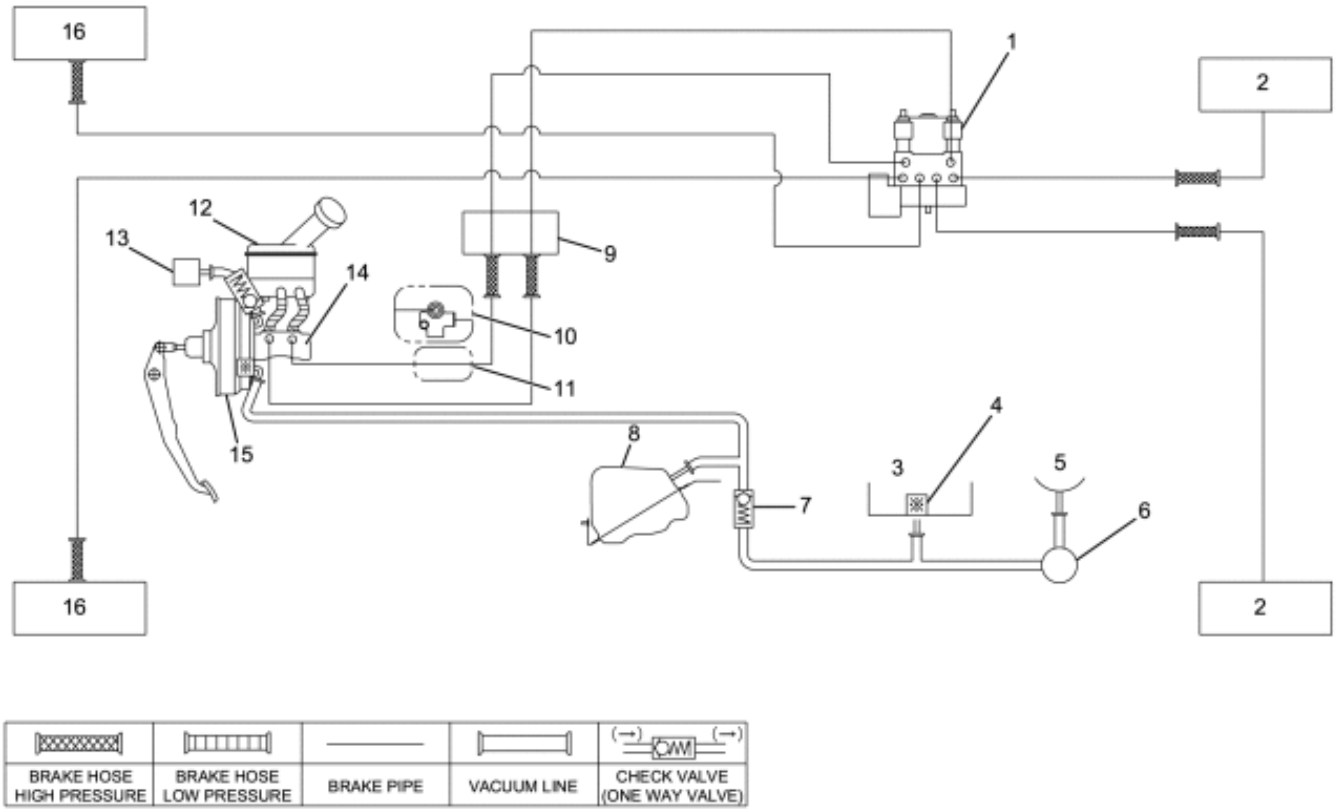


Figure 10.23.1

PTO Location, Drive Gear and Opening Information

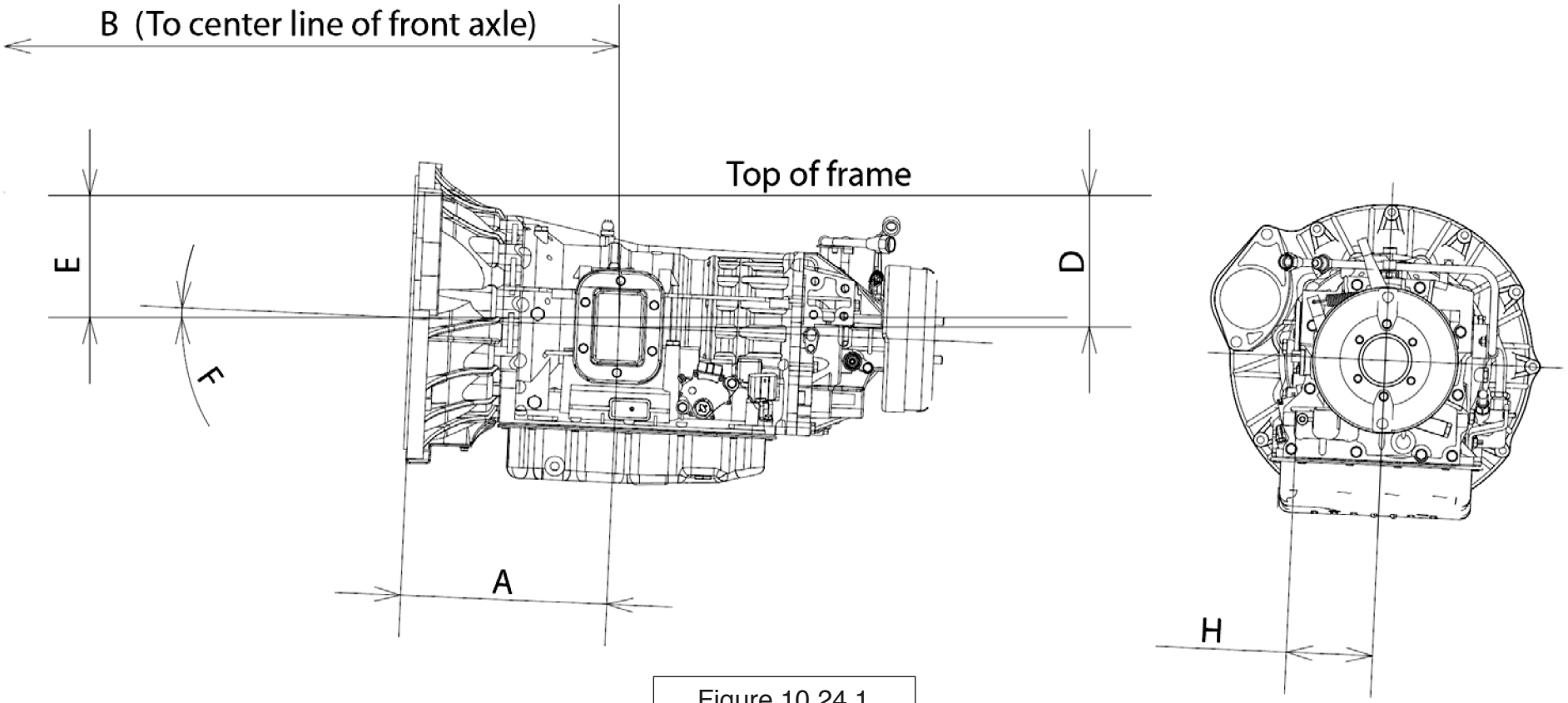


Figure 10.24.1

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	2.5^0	5.16	PTO Gear	1:1 with turbine	69	N/A	0	134 lbs.-ft. @ 1,700 RPM

Figure 10.24.2

Opening Diagram

Aisin A460 Automatic Torque Converter
Lock Up Function.

In either the Stationary Preset PTO Mode or Stationary Variable PTO Mode, when engine rpm exceeds 1200 RPM, the torque converter will lock up. The engine rpm can not be modified and the lockup function cannot be turned off. Please not that with PTO applications that operate around 1200 RPM, the transmission software holds the torque converter in lockup until engine speed falls below 1100 RPM

The lock up function will cancel if the transmission shift lever is moved from the park or neutral positions which will remove the trasmission from the stationary mode.

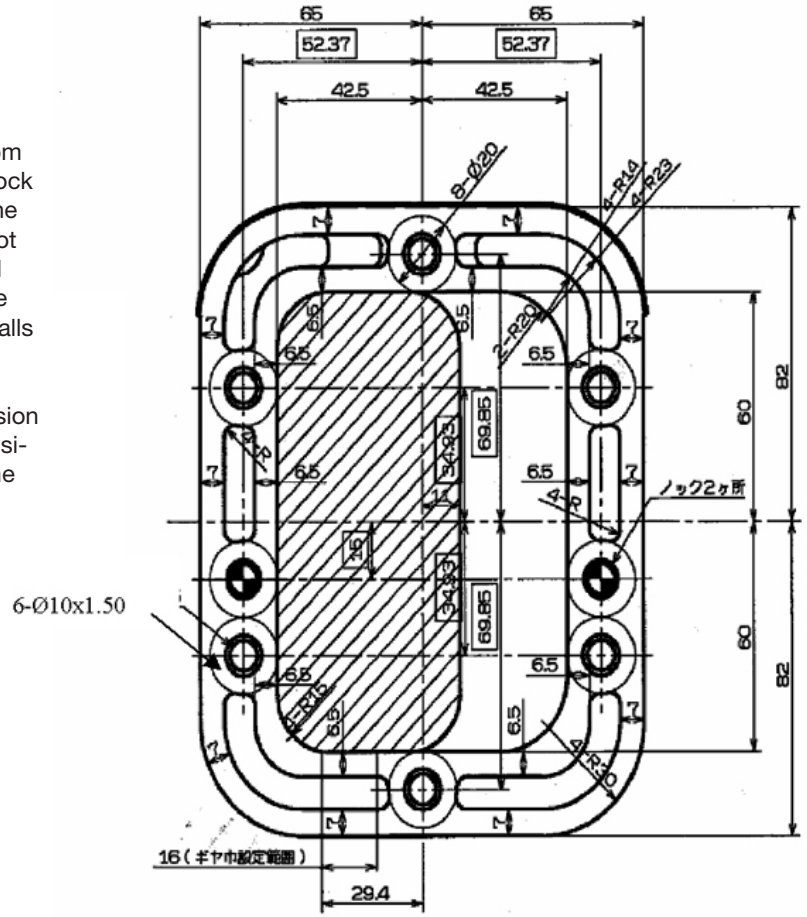


Figure 10.25.1

Additional PTO Functions :
For certain applications the Automatic regeneration function can be inhibited (Example Airport Ground Support vehicles).
For certain applications the Automatic regeneration function can be enabled in the PTO stationary mode (Example Lawn care and carpet cleaning).
For certain applications the Automatic regeneration function can be enabled in the PTO mobile mode (Example Line painting).
Please refer to the PTO section of the BBG (section 17) for further details.

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.
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.

Rear View Fuel Fill

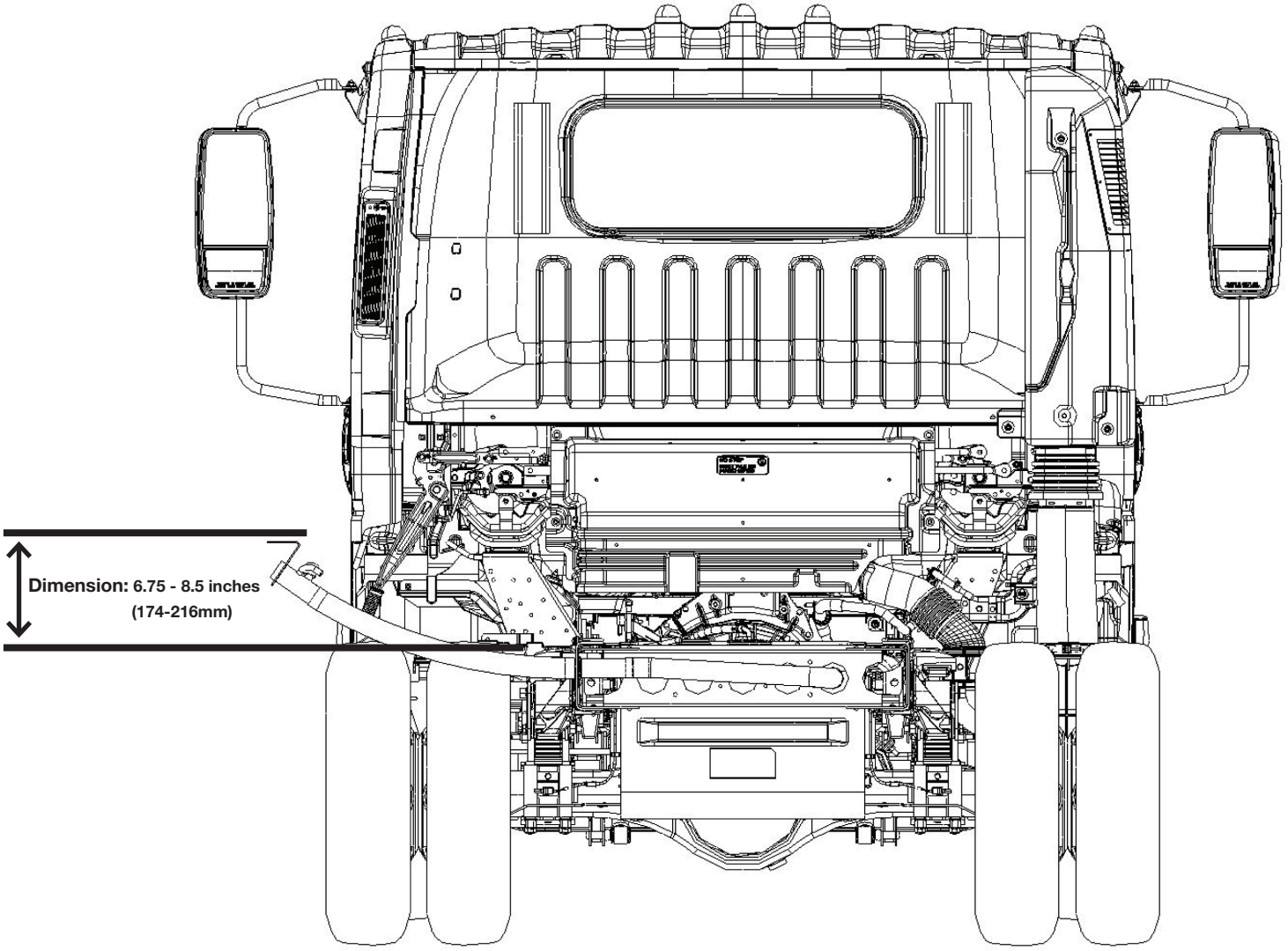
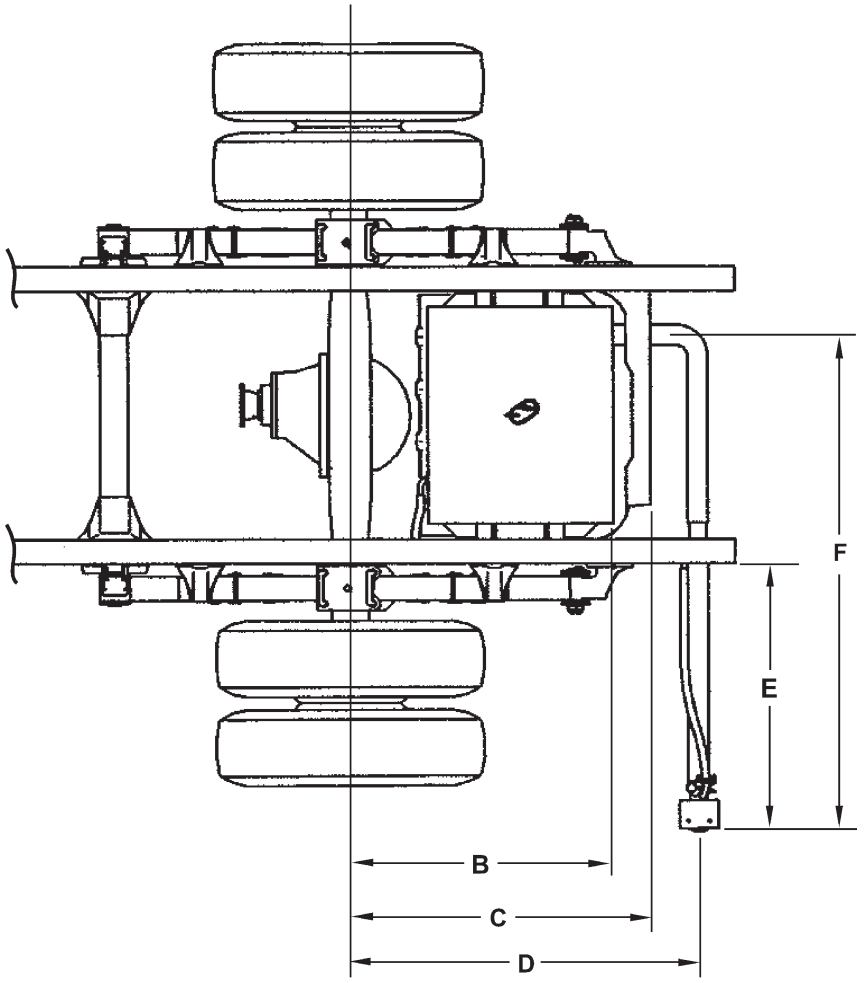


Figure 10.27.1

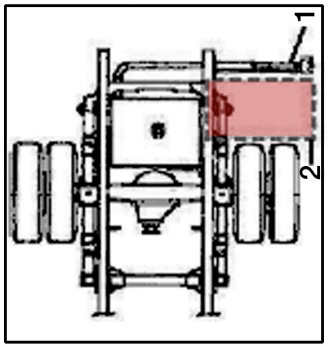
Top View Fuel Fill



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)

Figure 10.28.1

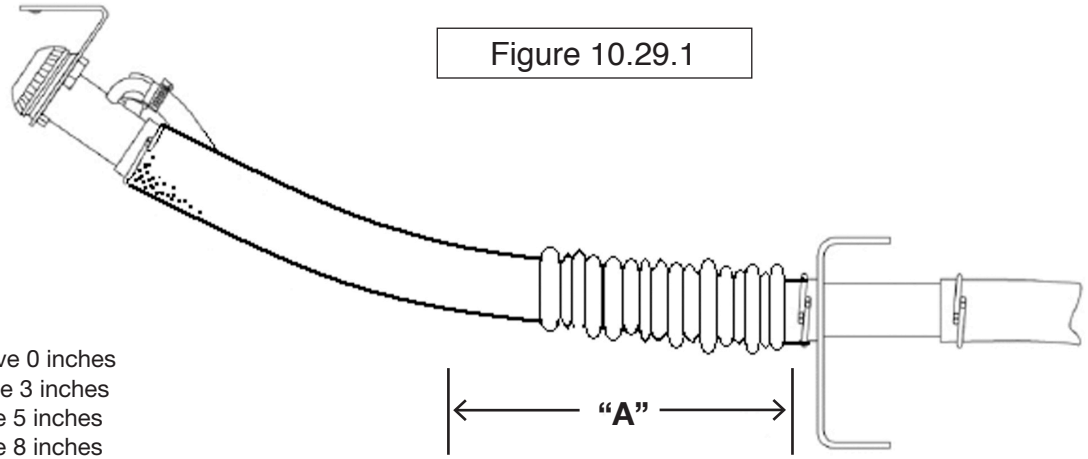
Hose Modification for Various Width Bodies and fuel fill vent Protection



Fuel fill vent and neck should be protected from road spray

1. FUEL FILLER NECK
2. RECOMMENDED MUD FLAP MOUNTING AREA (RED ZONE).

Figure 10.29.1



"A" Dimensions:
102 inch wide body remove 0 inches
96 inch wide body remove 3 inches
90 inch wide body remove 5 inches
86 inch wide body remove 8 inches
80 inch wide body remove 8 inches

NOTE: Shorten hose by "A Dimension" based on chart at left.

Figure 10.29.2

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.

Figure 10.30.1

Through the Rail Fuel Fill Frame Hole

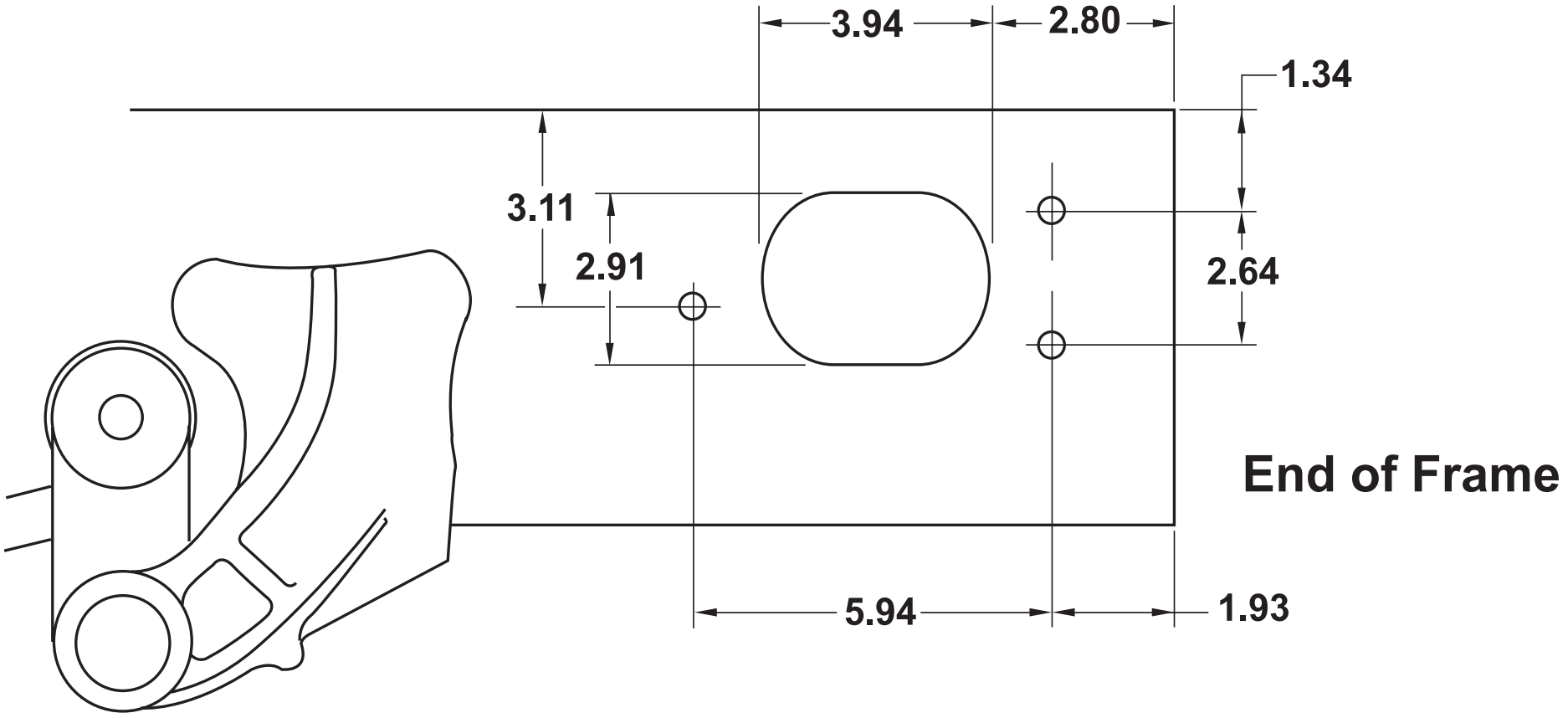


Figure 10.31.1

Note: Dimensions in inches

N-Diesel Fuel Filler Kit Instructions

Please review these instructions prior to installation of the fuel filler kit.

Parts Kit: There are two separate parts kits used for the 2011 and later model year N-diesel products. Fuel filler kit part number 898171 9090 is used for 14,500 lb and higher GVWR chassis (NPR-HD, NQR, NRR), For reference kit part number 898171 9080 is used for 12,000 lb GVWR chassis (NPR models).
Parts list is shown in ***Figure 10.32.2.*** Parts photos are shown in ***Figure 10.32.1.***

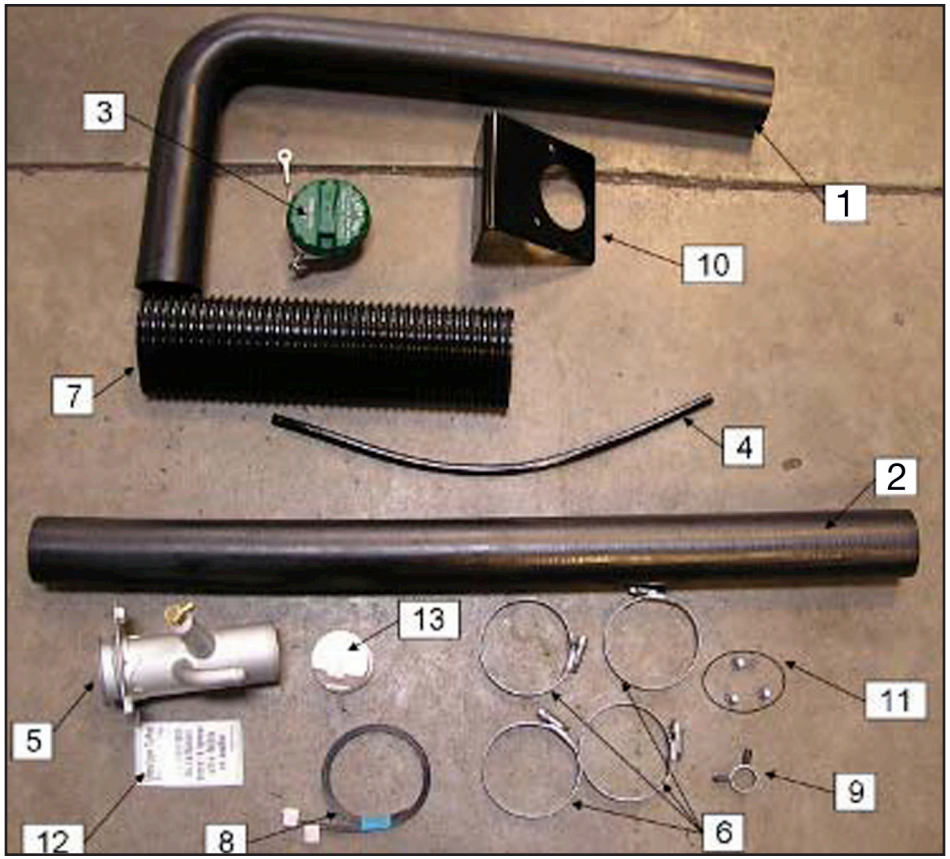


Figure 10.32.1

FUEL FILLER KIT, NPR-HD, NQR, NRR 898171 9090			
ITEM #	**PART NAME**	**PART #**	**QTY**
1	HOSE: FUEL FILLER NECK	898171 211Y	1
2	HOSE: FUEL FILLER	898006 450Y	1
3	CAP: FILLER	897218 702Y	1
4	HOSE: ROLL-OVER VALVE	898164 876Y	1
5	NECK ASM: FUEL FILLER	898164 877Y	1
6	CLIP: JOINT	898133 349Y	4
7	PROTECTOR: FILLER HOSE	897114 063Y	1
8	CLIP: BAND, HOSE FIXING	109707 107Y	2
9	CLIP: RUBBER, HOSE	894242 034Y	1
10	BRACKET: FILLER NECK	897116 621Y	1
11	SCREW: FILLER NECK	897581 217Y	3
12	CAUTION PLATE	898070 422Y	1
13	SHUTTER: FUEL TANK	898164 404Y	1

Figure 10.32.2

Installation Instructions and Considerations:

The fuel tank shutter valve (13) was a new component for 2011 model year. This component is meant to improve fuel splash-back performance of the fuel system. In the 2012 model year a running change was made and this valve (13) was relocated from the fuel tank inlet to the inlet (outboard side) of the fuel filler neck bulkhead assemble that is bolted to the left hand frame rail as shown in **Figure 10.33.1**. This plastic valve snaps into place in the inlet of the frame mounted fuel pipe. The valve should be installed so that the plastic clip is at the top of the valve, so that the flap door opens up, as shown in **Figures 10.33.2**.

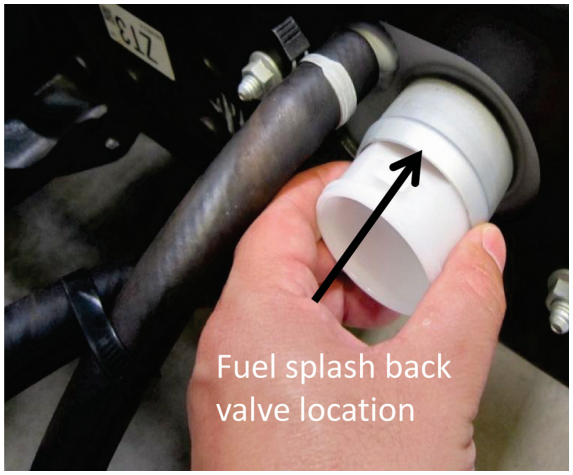


Figure 10.33.1

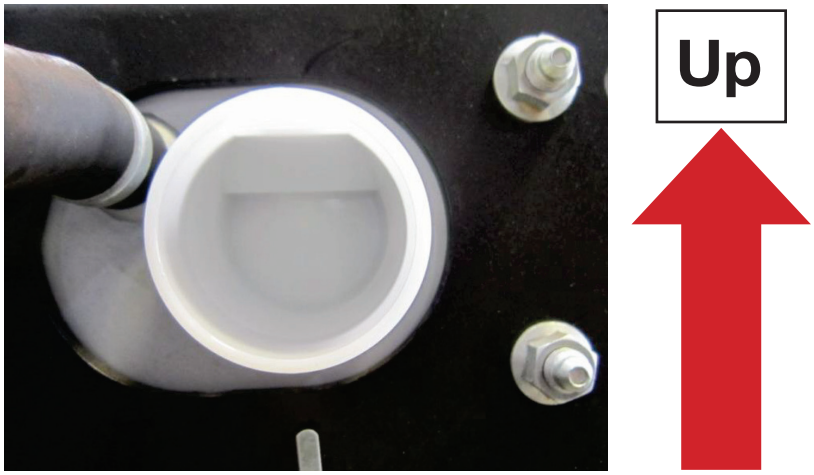


Figure 10.33.2

The fuel filler hose should be installed flush against the tank. The clamp should be installed between 1/16”and 3/8” from the tank. This is shown in ***Figure 10.33.3*** below.

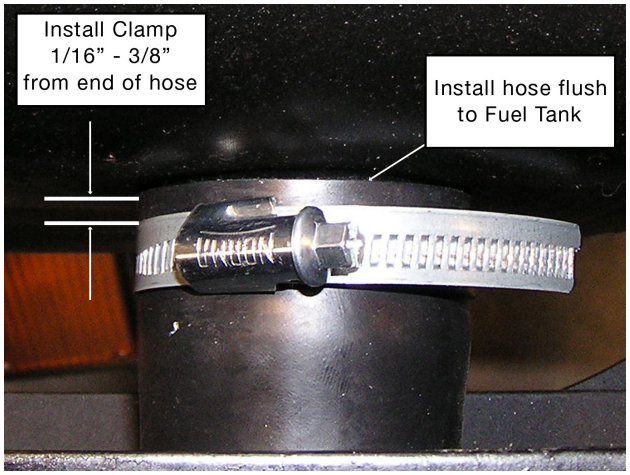


Figure 10.33.3

Roll-Over Valve Tubing

The roll-over valve has a hose attachment that will make this valve less sensitive to water intrusion. In order for the valve to work properly, it is critical that the hose be installed to the rollover valve. The proper assembly of the outer hose is shown in ***Figure 10.34.2.1.***

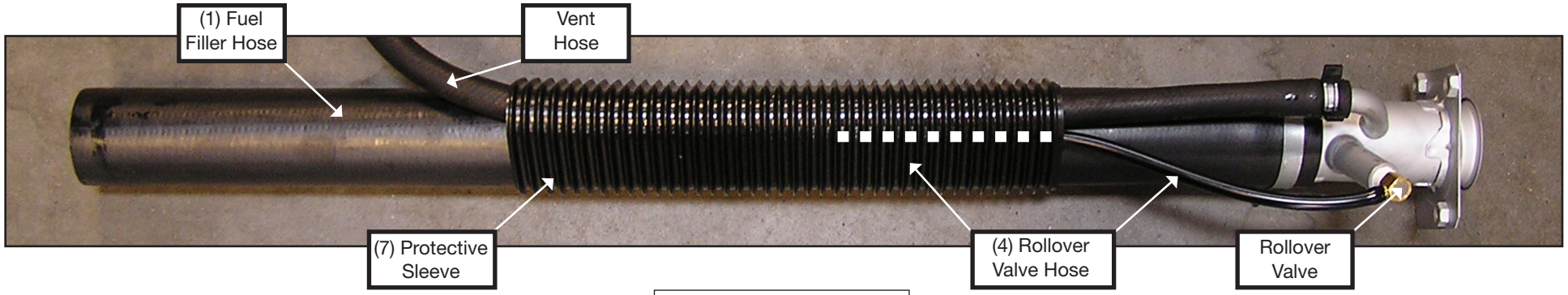


Figure 10.34.1

Filler Neck Installation:

The fuel filler neck (5) must be installed with the proper orientation on the body. The neck should be installed with the roll-over valve pointing upward, with the bottom edge of the neck oriented parallel to the ground, plus 33 to minus 7 degrees. See ***Figure 10.34.2.1.*** for the proper orientation.

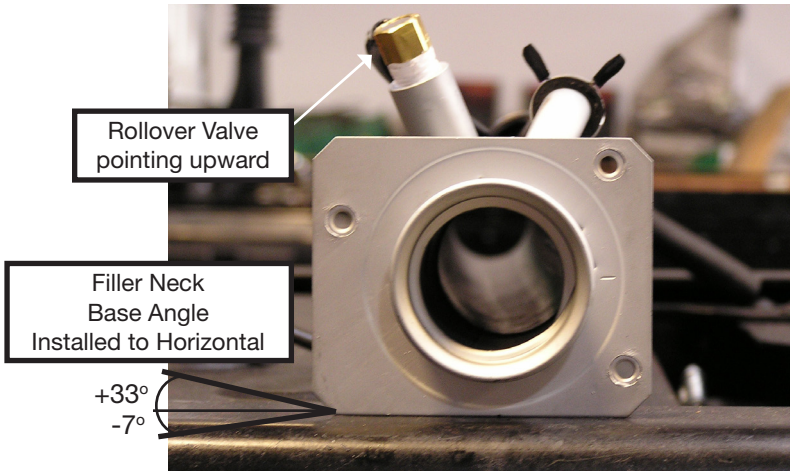


Figure 10.34.2

2016 Isuzu Truck

NPR-XD Diesel Specifications

MODEL	NPR-XD Diesel
GVWR	16,000 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)	215 HP @ 2500 RPM w/ Automatic Transmission
Torque (Gross)	452 lb/ft torque @ 1850 RPM w/ Automatic Transmission
Equipment	Dry element air cleaner with vertical intake; 2 rows 564 in^2. radiator; 7 blade 20.1in diameter fan with viscous drive. Cold weather starting device and an oil cooler. Engine oil level check. Engine warning system with audible warning for low oil pressure, high coolant temperature, and low coolant level. Engine cruise control 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 with automatic torque converter lockup in stationary PTO mode.
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	6,630 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	11,020 lbs.
WHEELS	19.5x6.0-K 6 hole disc wheels, painted white
TIRES	225/70R-19.5 F (12 pr) LRR (Low Rolling Resistance) 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-ad just 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 indicator light on instrument cluster.
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 in3. RBM 316,800.
CAB	All steel low cab forward, BBC 70.7 in, 45° mechanical tilt with torsion assist.
Equipment	TRICOT breathable 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 maintenance free batteries, 750 CCA each, 140 Amp alternator with integral regulator.
OPTIONS	See last page for options
	NOTE: These selected specifications are subject to change without notice.

Vehicle Weights, Dimensions and Ratings

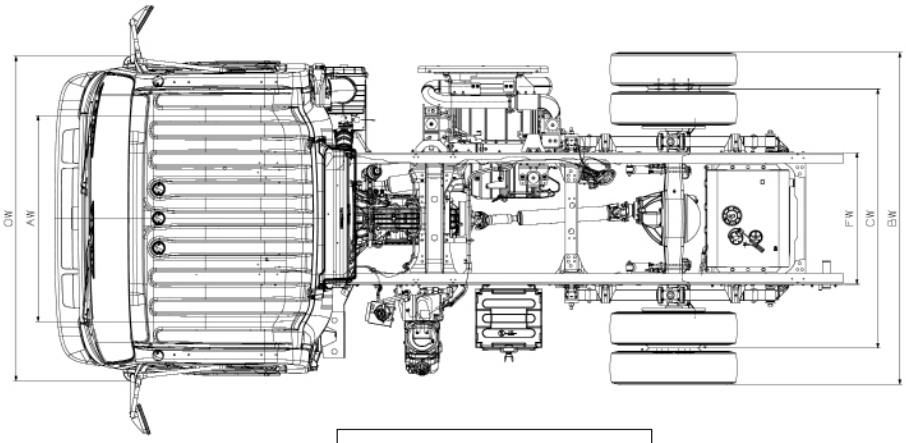


Figure 11.2.1

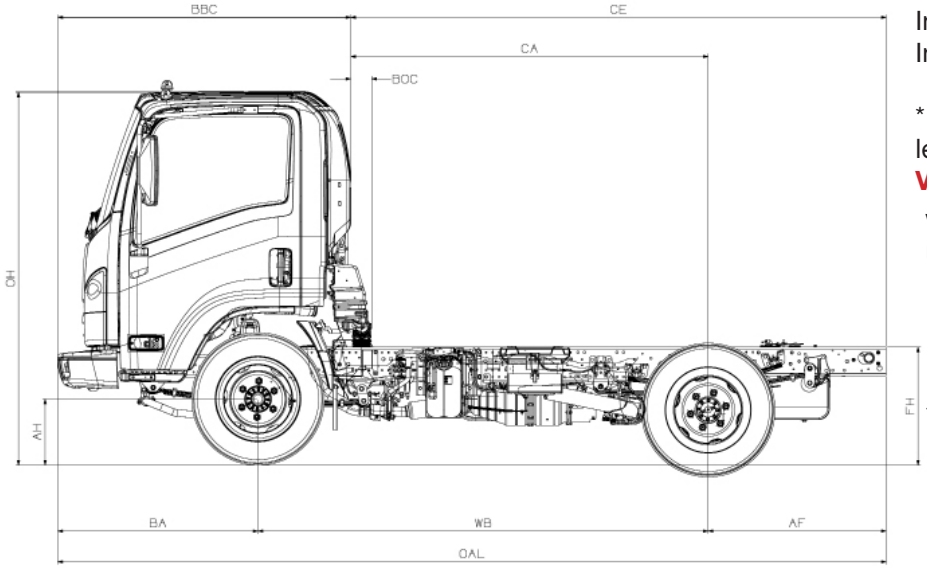


Figure 11.2.2

In-Frame Tank
16000 lb. GVWR Automatic Transmission Model
Chassis Curb and Maximum Payload Weights

Model	WB	Unit	Front	Rear	Total	Payload
NY1	109.0 in	lb.	4103	2290	6393	9607
NY2	132.5 in	lb.	4194	2288	6482	9518
NY3	150.0 in	lb.	4256	2267	6523	9477
NY4	176.0 in	lb.	4296	2283	6579	9421

Side Mounted Tank
16,000 lb. GVWR Automatic Transmission Model
Chassis Curb and Maximum Payload Weights

Model	WB	Unit	Front	Rear	Total	Payload
NY4	176.0 in	lb.	4430	2160	6590	9410

Vertical Exhaust Option Dimensions:

Variable Chassis Dimensions:

Unit	WB	EFF CA*	EFF CE*	OAL	AF
Inch	109.0	62.5	105.6	200.5	43.1
Inch	132.5	86.0	153.1	224.0	43.1
Inch	150.0	103.5	146.6	241.5	43.1
Inch	176.0	129.5	172.6	267.5	43.1

* Effective CA & CE listed are standard CA or CE less vertical exhaust BOC of 24 inches.

Vertical Exhaust BOC = 24 inches

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 & CE less BOC

Dimension Constants:

Code	Inches	Code	Inches
AH	7.5	BW	83.3
AW	65.6	CW	65
BA	48.4	FW	33.5
BBC	70.7	OH	92.4
BOC	7.7	OW	81.3
FH	33.0		

2016 Isuzu Truck

Vehicle Weight Limits:

GVWR Designed Maximum	16,000 lbs.
GAWR, Front	6,630 lbs.
GAWR, Rear	11,020 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.

RPO	OPTION DESCRIPTION	Weight (Lbs.) Front/Rear	
IF4	Air Deflector roof mounted (not available in Crew Cab) 64.0	0.00	
IF6	Fire Extinguisher and Triangle Kit mounted in rear organizer	19.00	0.00
IG3	Engine Oil Pan Heater (120v 300w)	2.00	0.00
IH2	Engine emergency shutdown system HWT, LWL, LOP (4)	0.00	0.00
IY9	Engine Idle Shutdown (Timer set at 3 minutes for engine shutdown)	0.00	0.00
IA9	Engine Idle Shutdown (Timer set at 5 minutes for engine shutdown)	0.00	0.00
IK9	33 Gallon Additional Diesel Fuel Tank mounted on LH side 150,176 wb std cab in rail tank only	(7)	(7)
IY4	Delete Standard AM/FM/CD Radio	-3.00	0.00
I8H	AM/FM/CD radio with Aux input/USB port and Bluetooth	0.00	0.00
IL9	PTO Enable Switch and Engine Idle Up Switch recommended for PTO and Idle applications (2)	1.00	0.00
IS0	Heated Mirrors	1.00	0.00
I9H	Heated dual remote control mirrors (15” head)	1.00	0.00
IU2	Mirror Bracket for 102” wide body	1.00	0.00
IV8	Seat Covers Standard Cab (9)	6.00	0.00
IX2	Rear Body Dome Lamp Switch (6)	1.00	0.00
I0A	Cross rail horizontal DPF/SCR with vertical exhaust (8)	100.00	100.00
I66	Block Heater (cord)	1.00	0.00
UZF	Back up alarm	2.00	0.00
V22	Chrome Grille	1.00	0.00
I4K	Keyless Entry System	3.00	0.00
I5K	Suspension Drivers Seat (10)	20.00	0.00
I6K	Lockable DEF Fill Cap	0.00	0.00
I1L	Speed Limited to 58 MPH	0	0
I2L	Speed Limited to 65 MPH	0	0
I3L	Speed Limited to 68 MPH	0	0
I4L	Speed Limited to 70 MPH	0	0
54	In rail fuel tank with power windows, door locks and air conditioning	80	0
64	In rail fuel tank with power windows, power door locks, air conditioning and LSD (3)	80	15
74	Side mounted fuel tank w/power windows, power door locks and air conditioning (5)	215	-124
84	Side mounted fuel tank w/power windows, power door locks, air conditioning and LSD (3) (5)	219	-109

1) RPO is Regular Production Option that is stocked in Port inventory.
LSO is Limited Stock Option that is stocked in Port inventory but should be checked for availability and delivery time.
SEO is Special Equipment Option and requires 90-120 day lead time for delivery.
(2) These switches can be port or dealer installed. Please consult the body builders guide and / or the service
manual for additional programming options and functions.
(3) LSD factory installed Limited Slip Differential
(4) High Water Temperature (HWT), Low Water Level (LWL) and Low Oil Pressure (LOP)
(5) 176 inch WB std cab only
(6) RPO must be ordered with Supreme Value Pak and Morgan Fast Track Body Programs
(7) Additional fuel tank mounted on the drivers side frame rail. Available with in rail tank only available on 150 and 176 inch standard cab wheelbases (Weights: 150 wb +122 lbs. front and +238 lbs. rear and 176 wb +102 lbs. front and +258 lbs rear)
(8) Available only with in rail fuel tank and single cab (no crew cab)
(9) Seat Covers not available with suspension seat

Frame and Crossmember Specifications

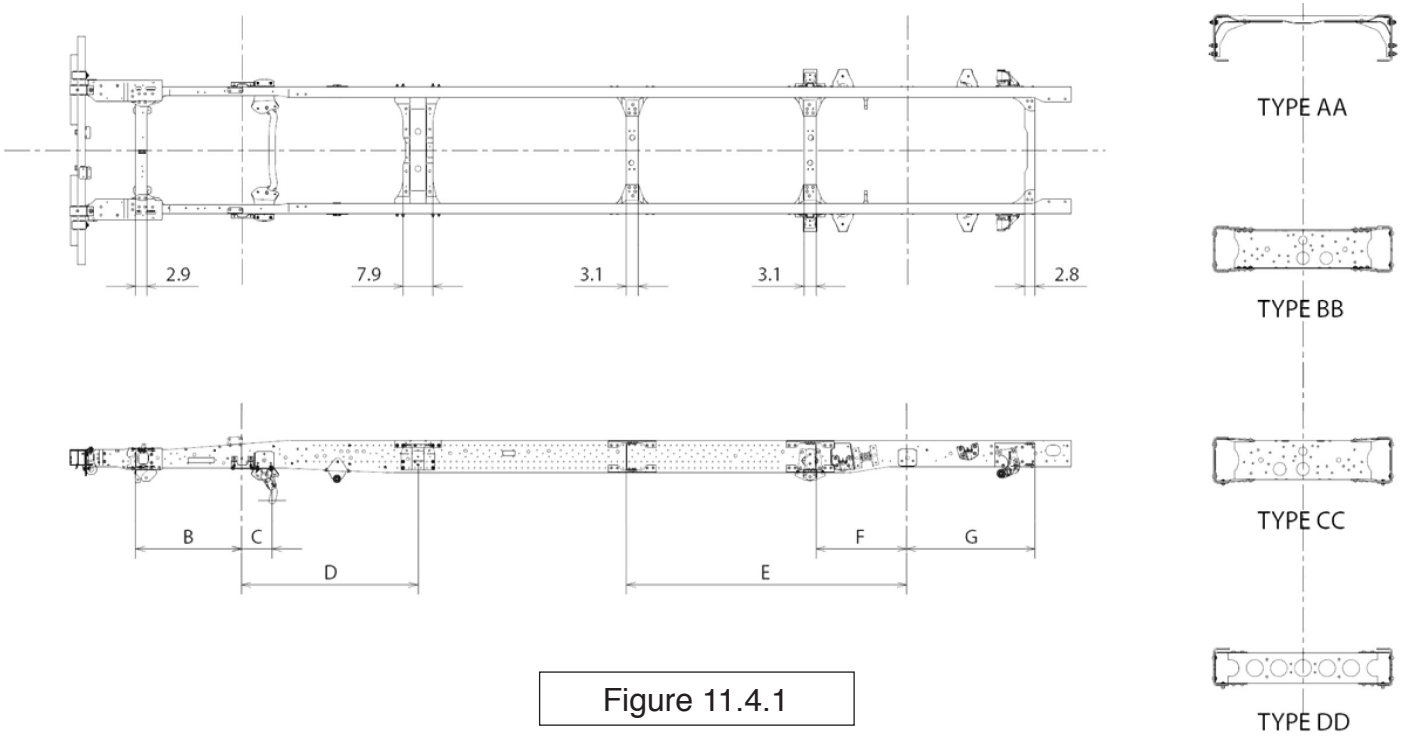


Figure 11.4.1

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

Figure 11.4.2

Note: Dimensions in inches

Frame Chart

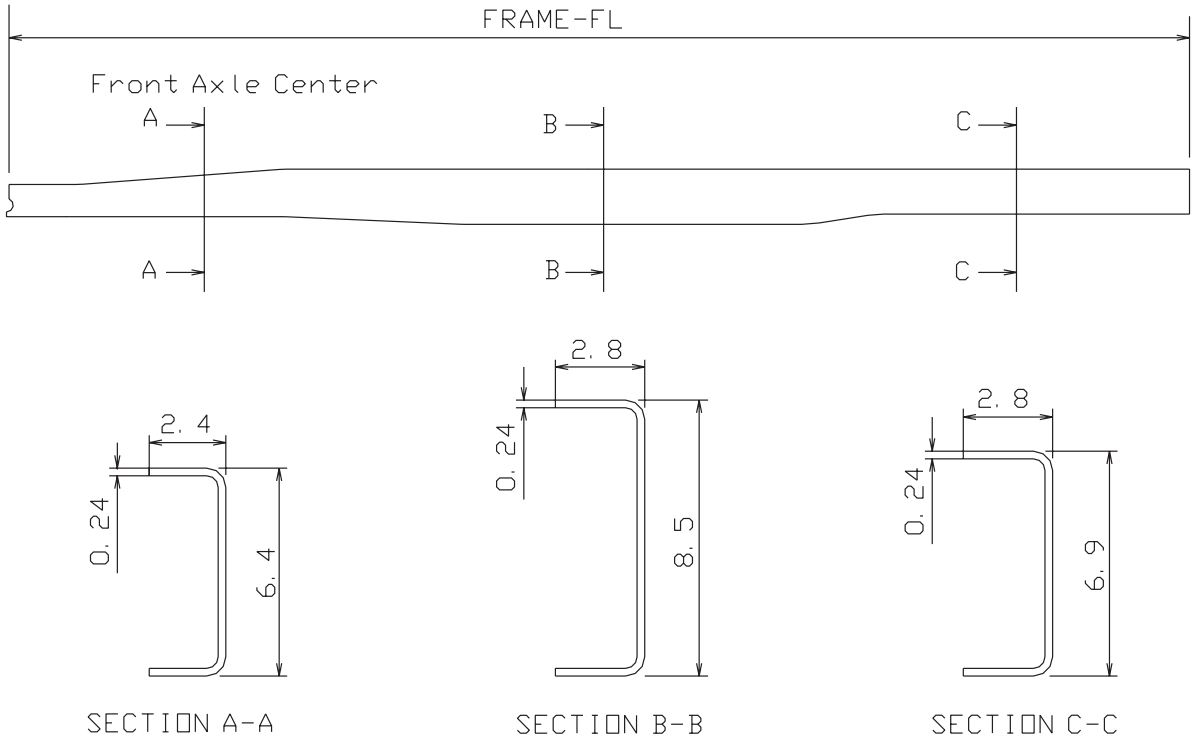


Figure 10.5.1

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

Figure 11.5.2

Note: Dimensions in inches

NPR-XD Diesel Standard Cab - Top View

WB	A	B
109	43.4	78.0
132.5	49.7	84.3
150	43.4	78.0
176	43.4	78.0

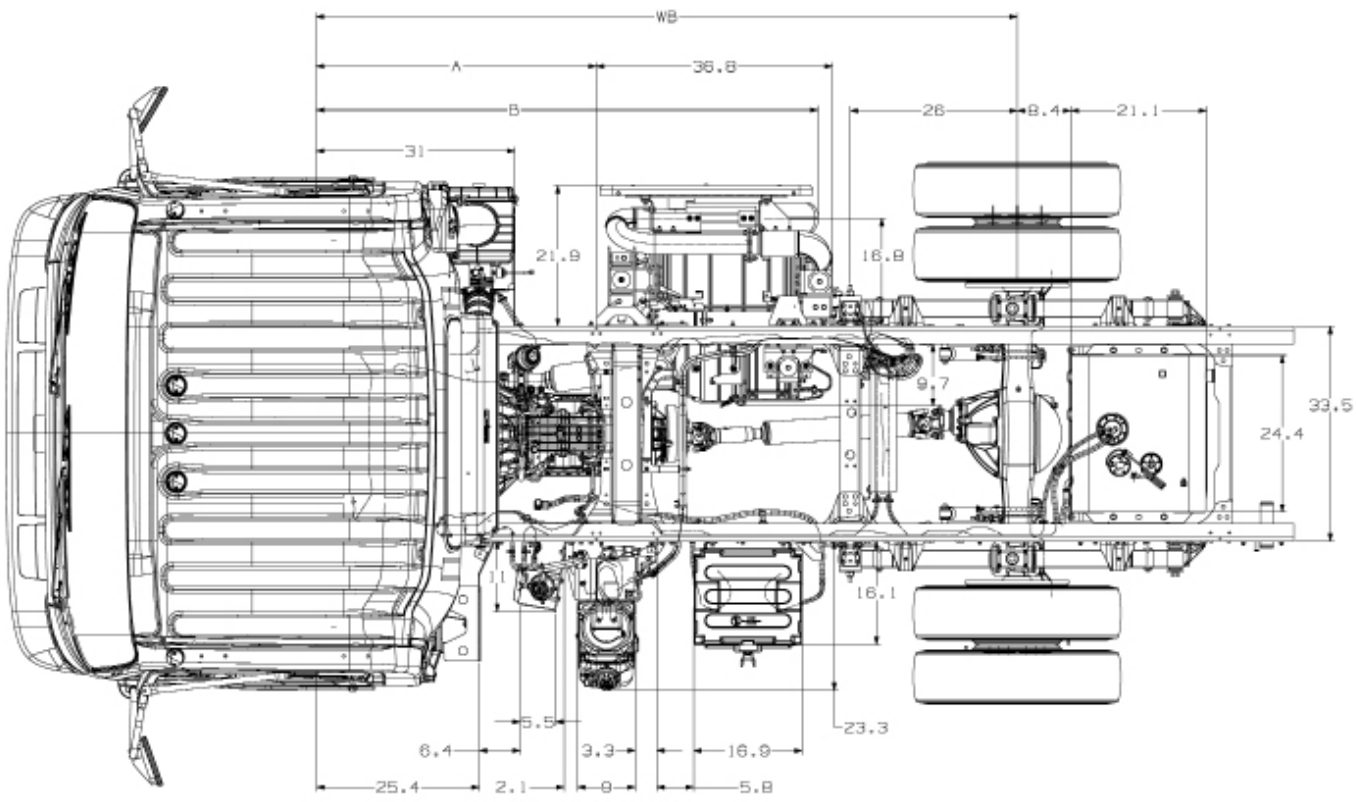


Figure 11.6.1

Note: Dimensions in inches

NPR-XD Diesel Standard Cab - Left Side View

WB	A
109	80.7
132.5	87.0
150	80.7
176	80.7

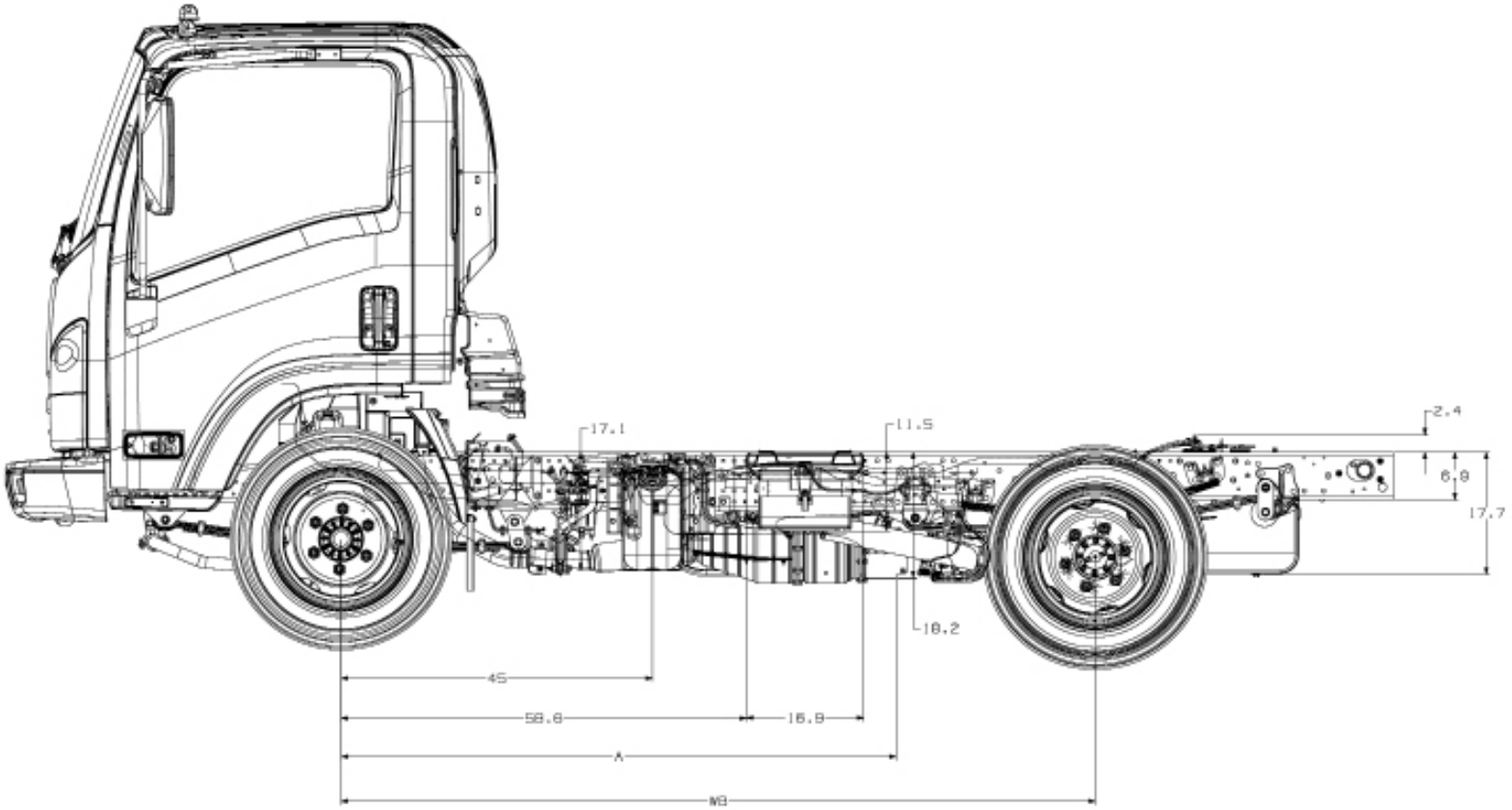


Figure 11.7.1

Note: Dimensions in inches

NPR-XD Diesel Standard Cab - Right Side View

WB	A
109	44.0
132.5	50.3
150	44.0
176	44.0

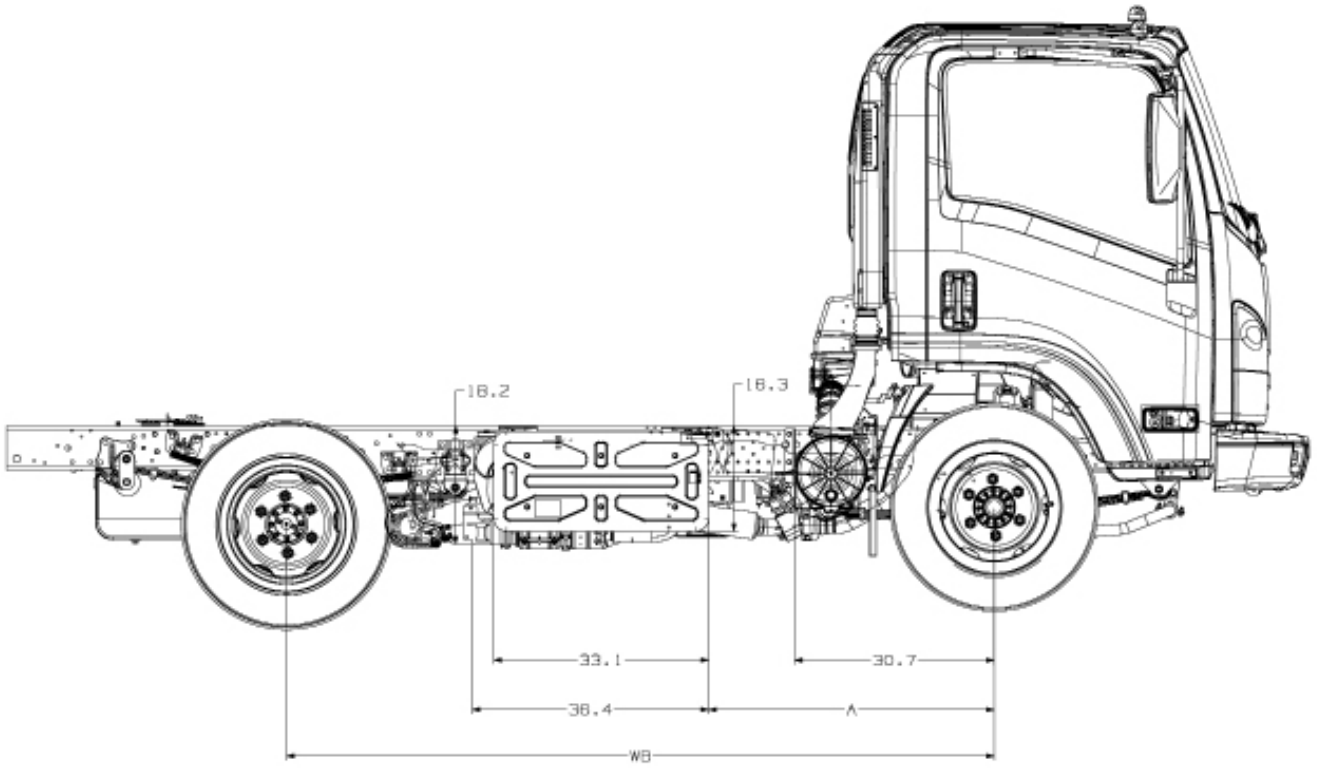


Figure 11.8.1

Note: Dimensions in inches

SCR / DPF 4HK1-TC

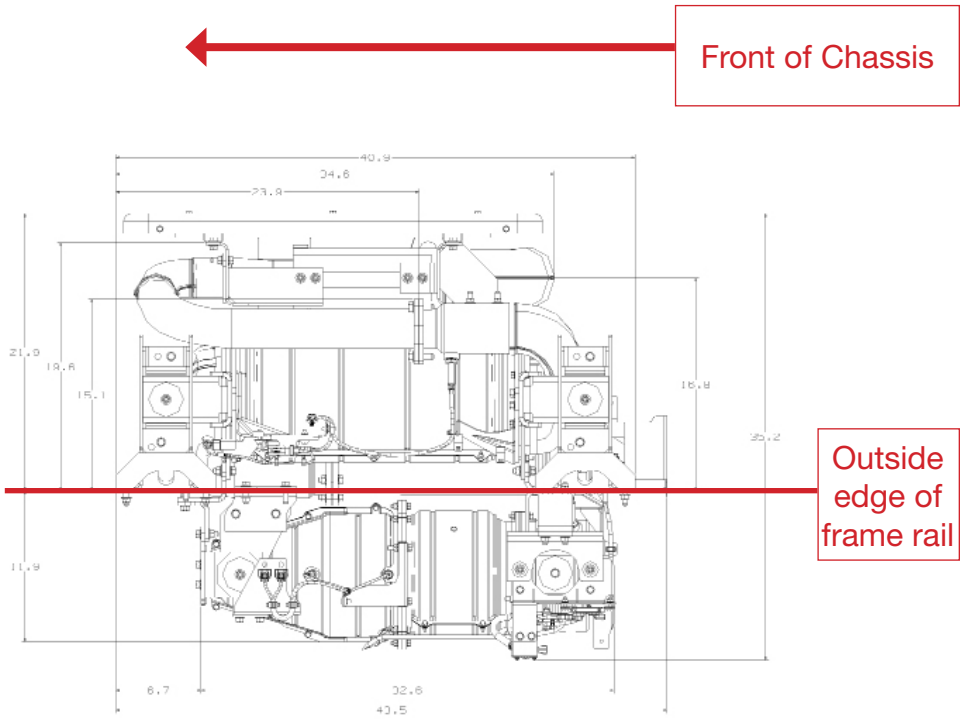


Figure 11.9.1

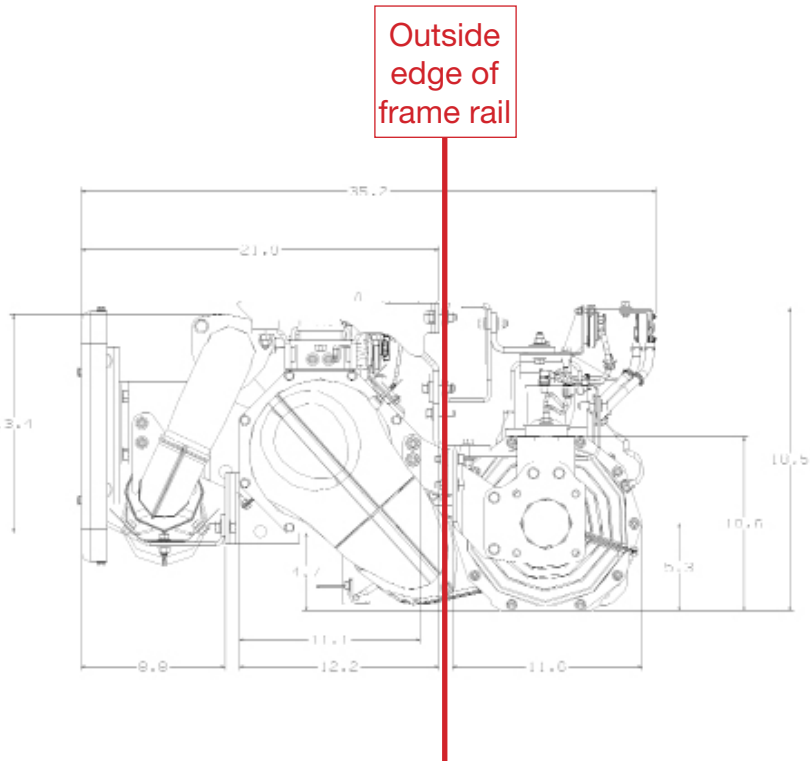


Figure 11.9.2

Note: Dimensions in inches

Option Side Fuel Tank in addition to the Standard In Rail Fuel Tank RPO IK9

Side View 150 Wheelbase

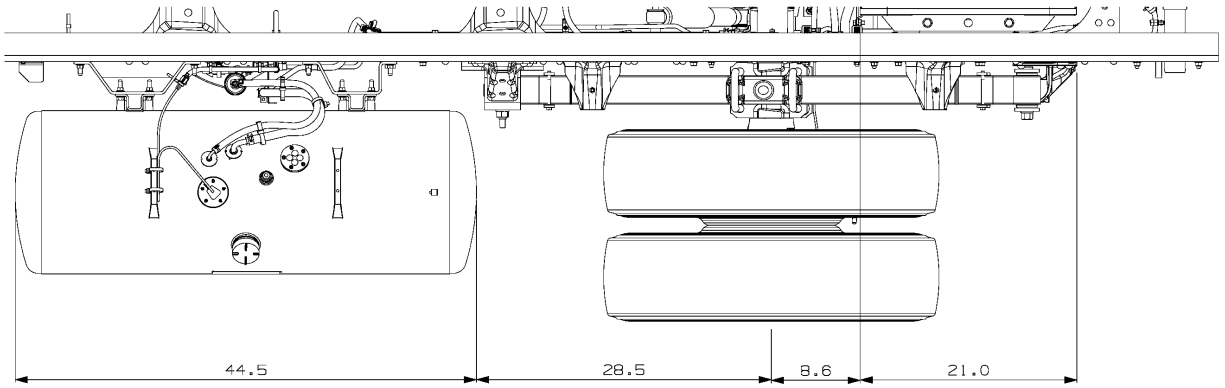


Figure 11.10.1

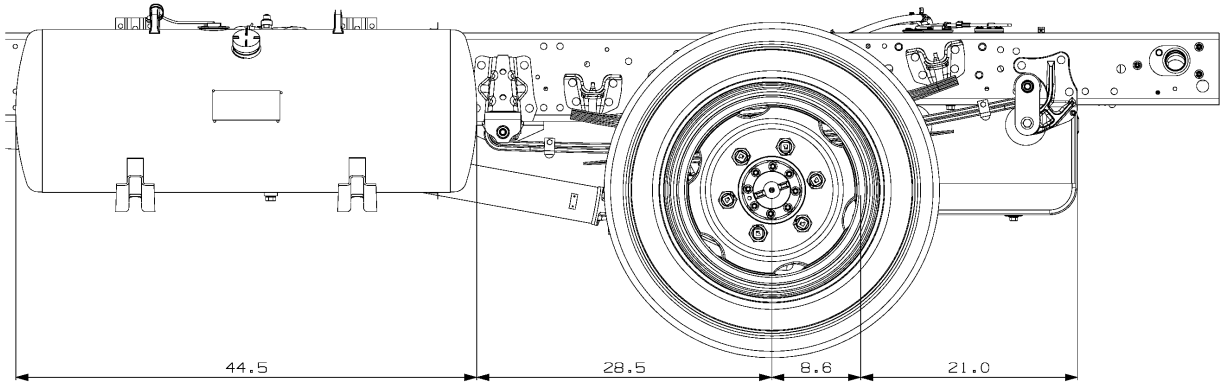


Figure 11.10.2

Note: Dimensions in inches

Option Side Fuel Tank in addition to the Standard In Rail Fuel Tank RPO IK9

Side View 176 Wheelbase

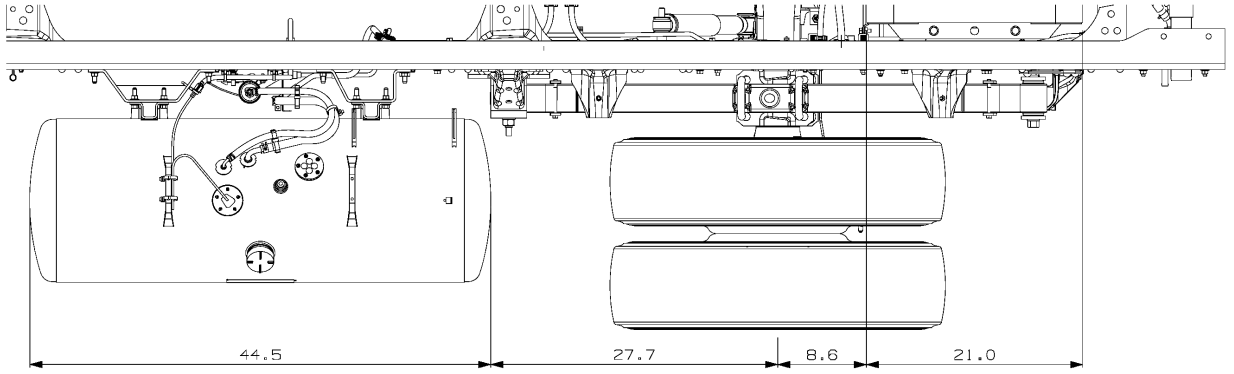


Figure 11.11.1

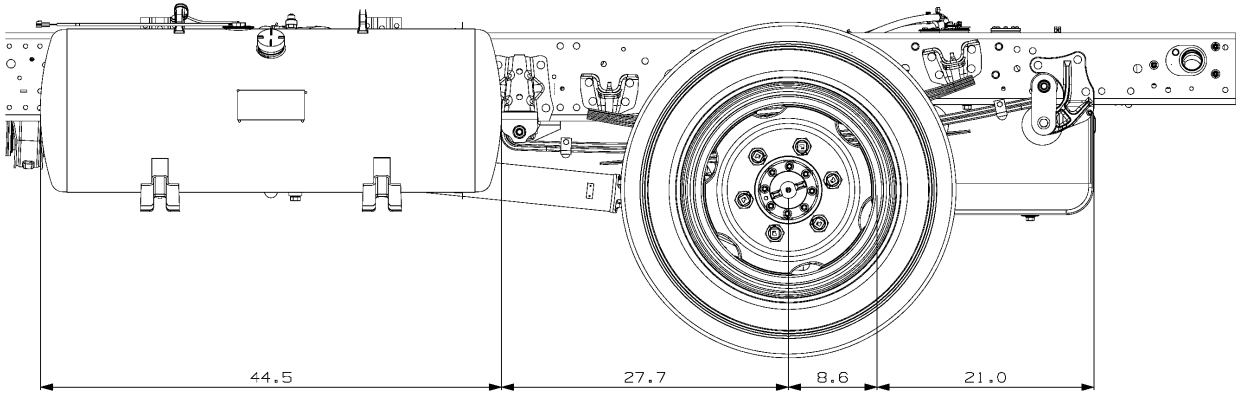


Figure 11.11.2

Note: Dimensions in inches

Option Side Fuel Tank in place of the Standard In Rail Fuel Tank on NY474 and NY484 ONLY

Side View 176 Wheelbase

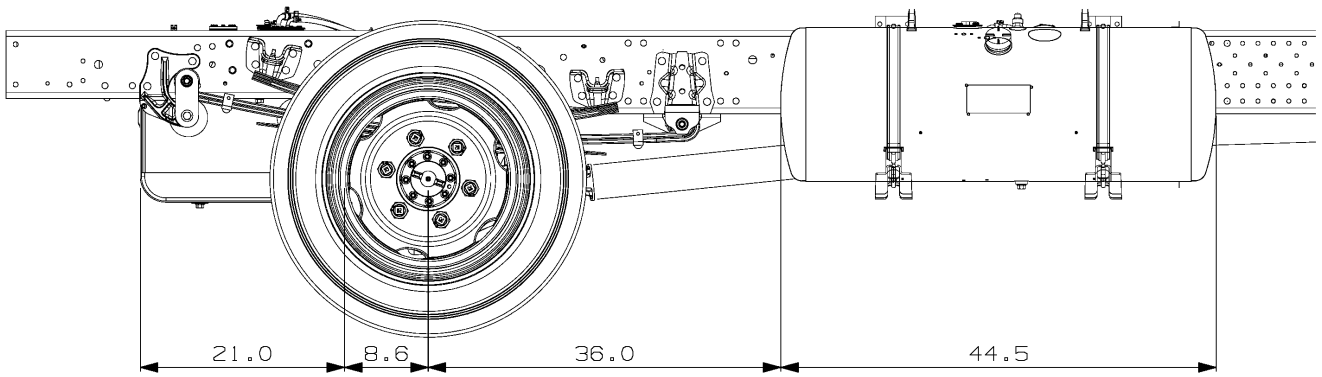


Figure 11.12.1

Note: Dimensions in inches

Optional Side Fuel Tank in addition to the Standard In Rail Fuel Tank RPO IK9 (150 and 176 wbLH rail only)

Optional Side Fuel Tank replacing standard In Rail Fuel Tank (176 wb only RH rail only)

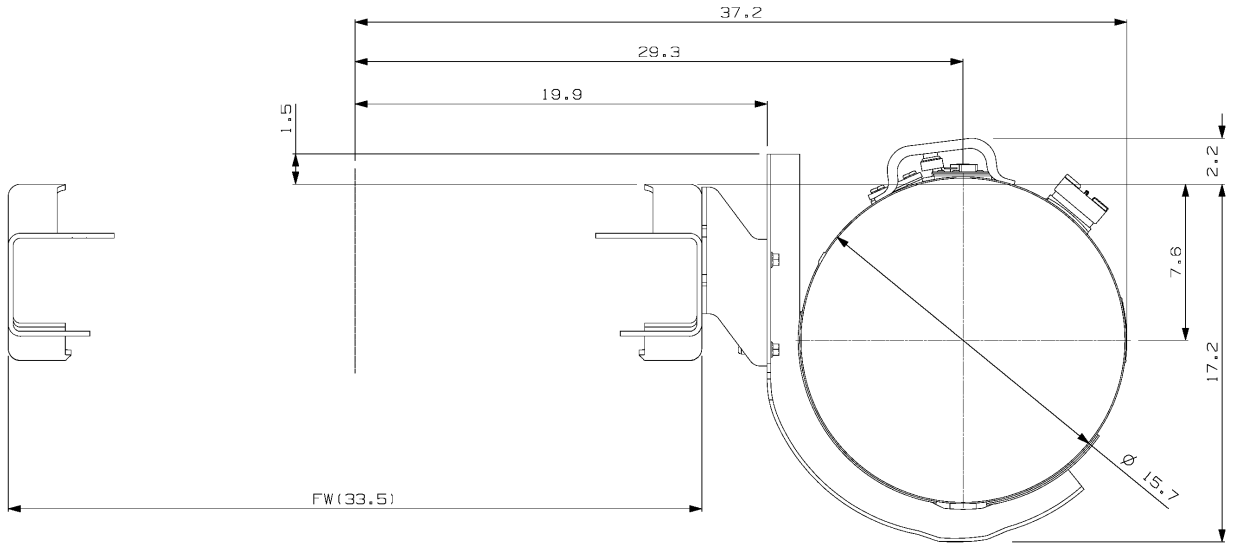


Figure 11.13.1

Note: Dimensions in inches

Cab Tilt

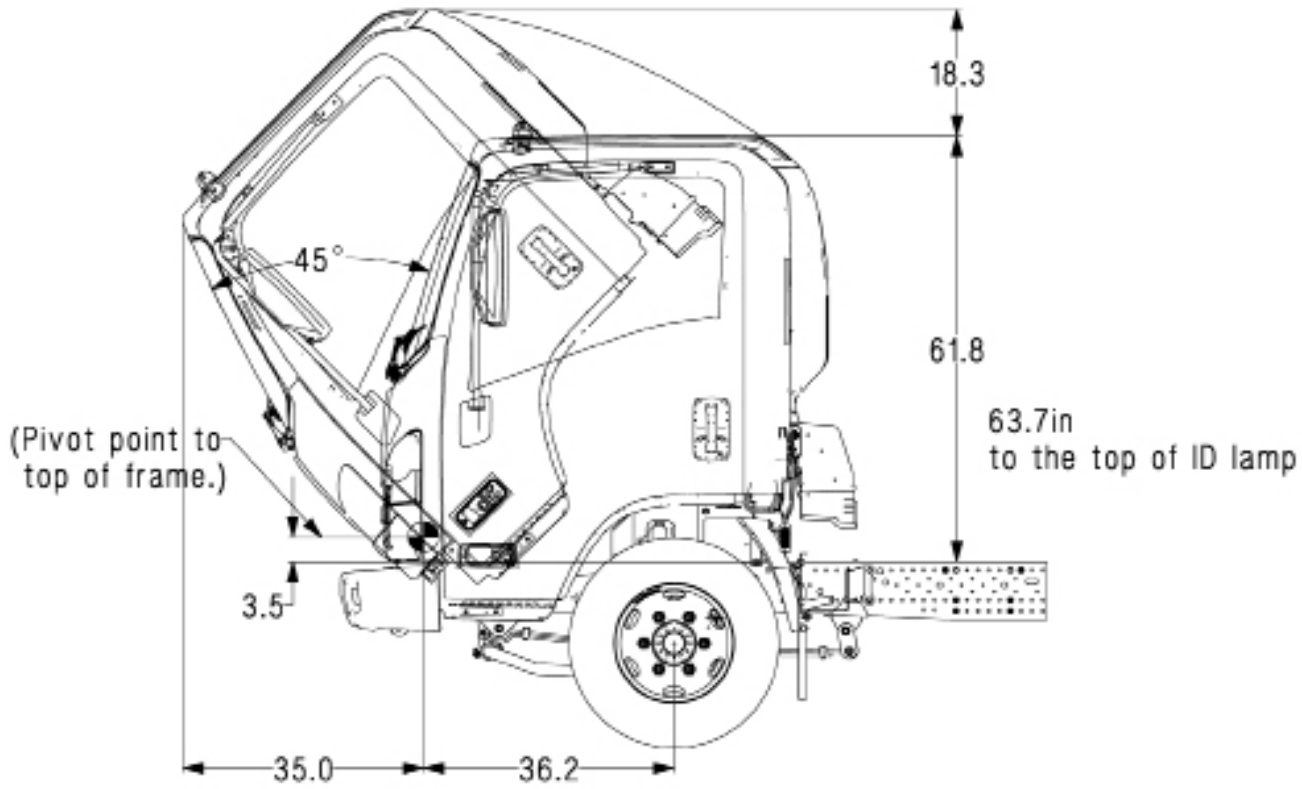


Figure 11.14.1

Note: Dimensions in inches

Center of Gravity

The center of gravity of the chassis cab.

Horizontal and Vertical CG of Chassis			
WB	V	H in frame tank	H side tank
109	23.5	38.4	N/A
132.5	23.3	44.9	N/A
150	23.3	49.9	N/A
176	23.3	57.2	52.5

Figure 11.15.1

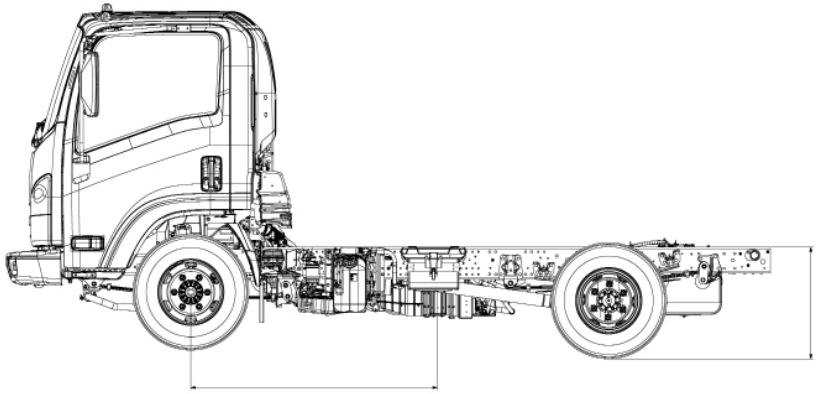


Figure 11.15.2

The maximum vertical center of gravity specified below must not be exceeded at maximum GVWR and rated front and rear GAWR.
The Center of Gravity (CG) maximum is 63” (1600 mm) above the ground.
(NPR Cab Chassis and NPR Stripped Chassis)

NOTE: The Final Manufacturer must ensure that the combined vertical center of gravity of the chassis, body, and available payload at full GVW does not exceed the maximum vertical center of gravity outlined in the Isuzu Incomplete Vehicle Document and the Isuzu Body Builders Guide.

Additional Information may be obtained by contacting ISUZU Commercial Trucks of America(ICTA)Applications Engineering on the West Coast call 1-562-229-5240 and in the
East Coast call 1-770-740-1620 X 262.

Note: Dimensions in inches

Front Axle Chart

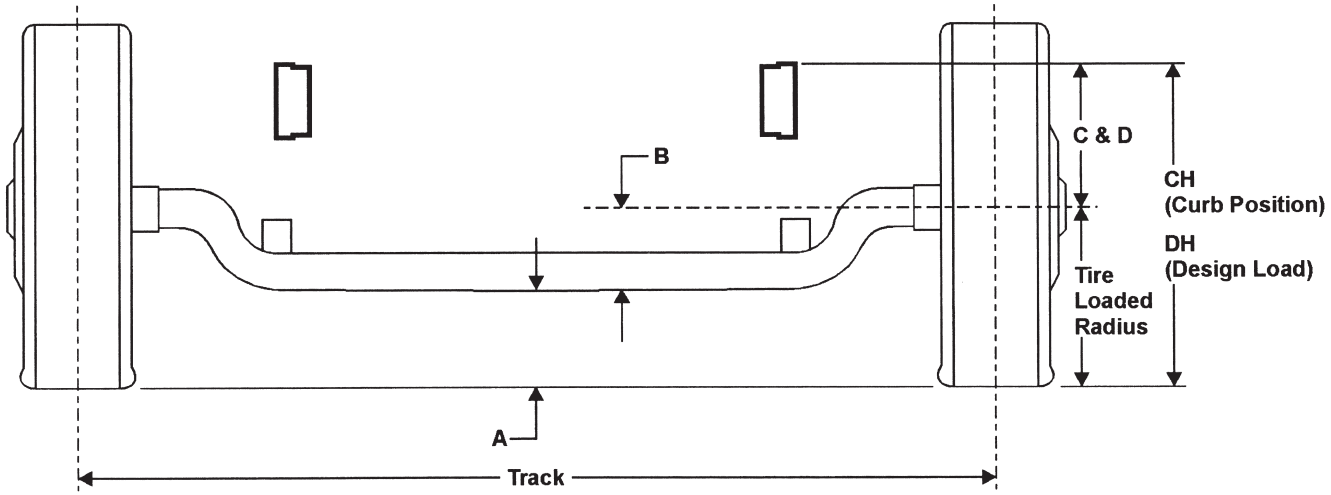


Figure 11.16.1

Formulas for calculating height dimensions:

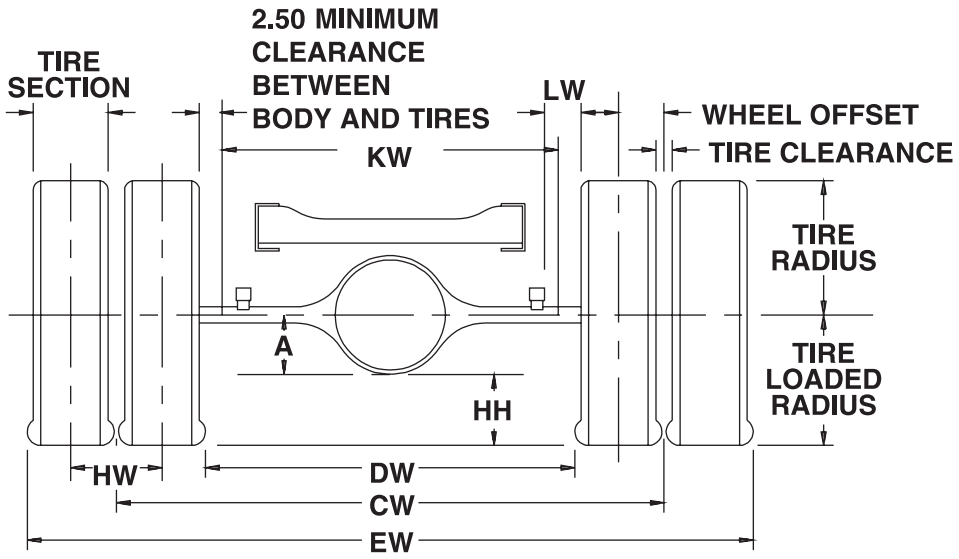
A = Tire Loaded Radius – B
C = Centerline of Axle to Top of Frame Rail at Curb Position
D = Centerline of Axle to Top of Frame Rail at Design Load
CH = C + Tire Unloaded Radius
DH = D + Tire Loaded Radius

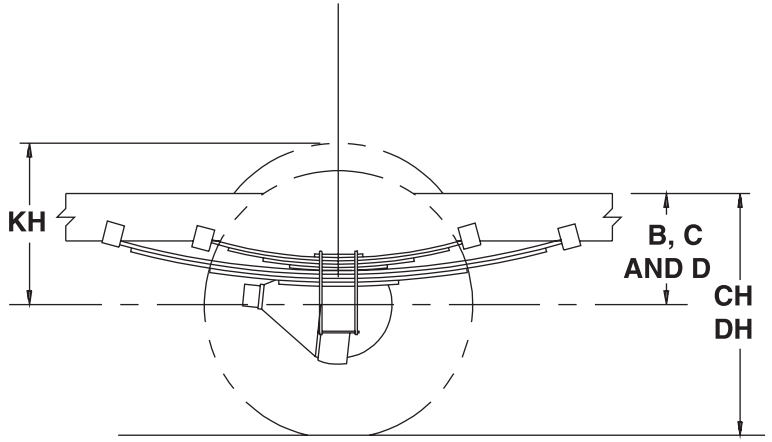
Tire	GVWR	GAWR	A	B	C	D	CH	DH	Track	Tire Radius	
										Unload	Load
225/70R 19.5F	16,000 lbs.	6,630 lbs.	8.3	6.6	13	11.5	29	26.4	65.5	16	14.93

Figure 11.16.2

Note: Dimensions in inches

Rear Axle Chart





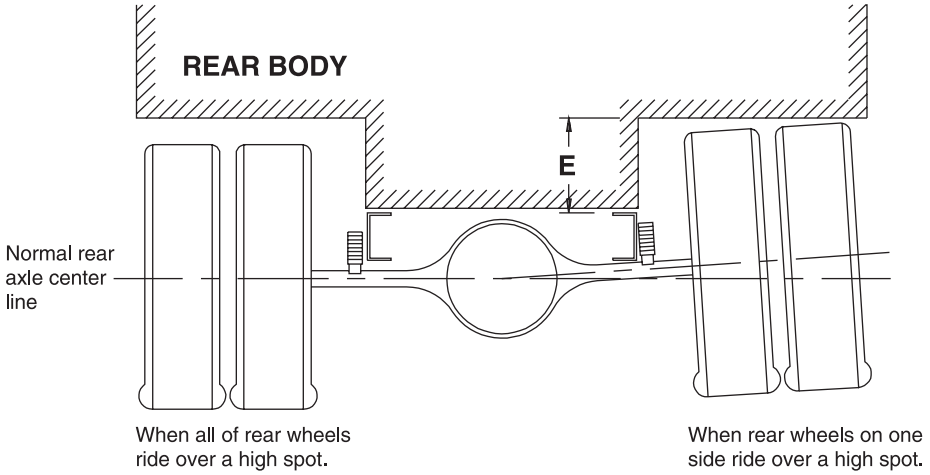


Figure 11.17.1

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.

Figure 11.18.1

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

Figure 11.18.2

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

Tire	GAWR	Track CW	A	B	C	D	E
225/70R 19.5F	11,020 lbs.	65.0	7.7	9.3	15.3	13.4	8.4

Figure 11.18.3

Note: Dimensions in inches

Tire and Disc Wheel Chart NPR XD

Tire

Tire Size	Tire Load Limit and Cold Inflation Pressures				Maximum Tire Load Limits (lbs.)		GVWR (Lbs.)
	Single		Dual		Front	Rear	
	Lbs.	PSI	Lbs.	PSI	2 Single	4 Dual	
225/70R 19.5F	3,315	85	3,115	90	6,900	12,980	16,000

Figure 11.19.1

Tire Size	GVWR (Lbs.)	Tire Radius				Tire Section Width	Tire Clearance	Design Rim Width
		Loaded		Unloaded				
		Front	Rear	Front	Rear			
225/70R 19.5F	16,000	14.93	14.98	16	16	8.7	1.3	6.0

Figure 11.19.2

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 Thickeness	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	15^0 DC	Steel TOPY

*O.D. Wrench Sizes

Figure 11.19.3

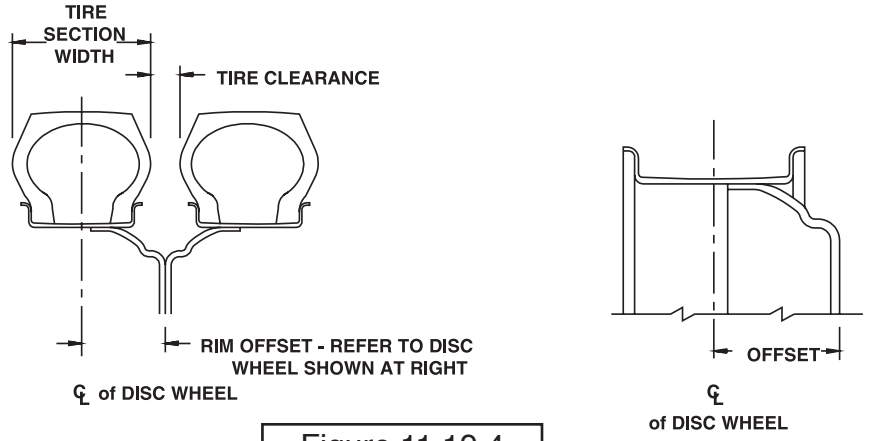


Figure 11.19.4

Note: Dimensions in inches

NPR-XD Suspension Deflection Charts

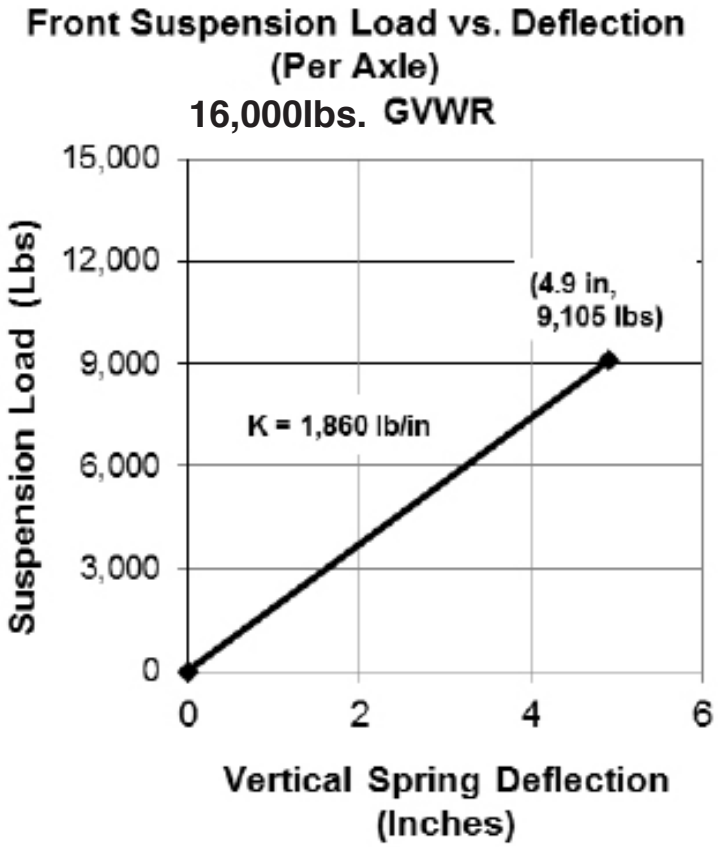


Figure 11.19.1

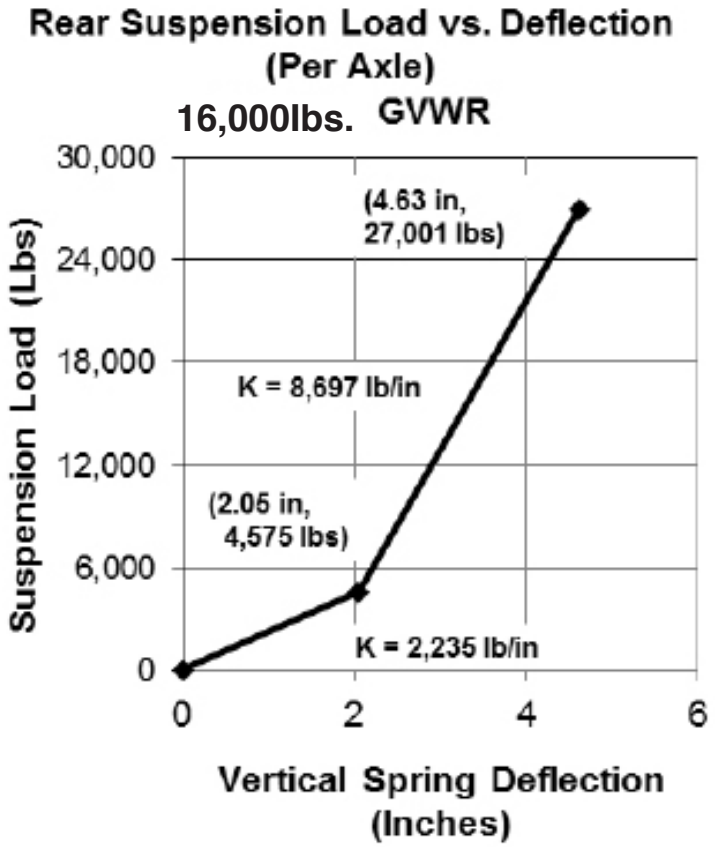


Figure 11.19.2

Propeller Shaft

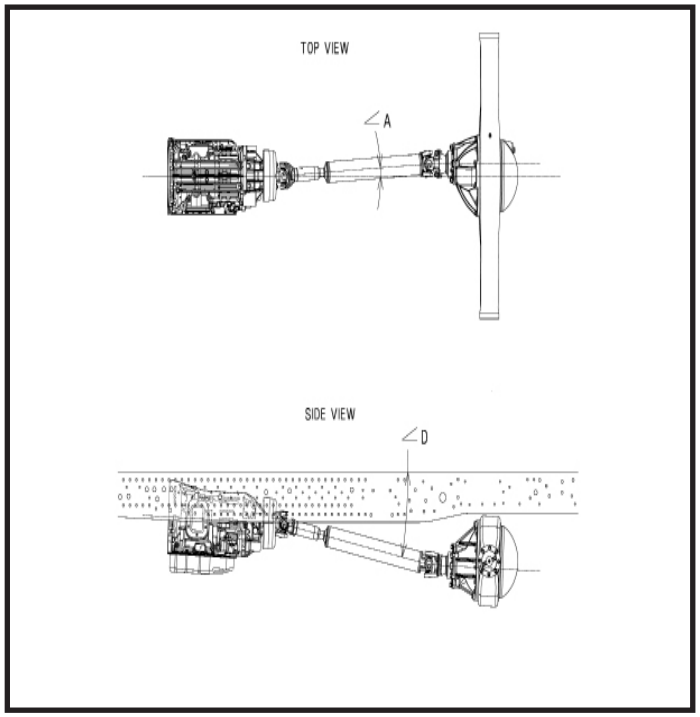


Figure 11.21.1

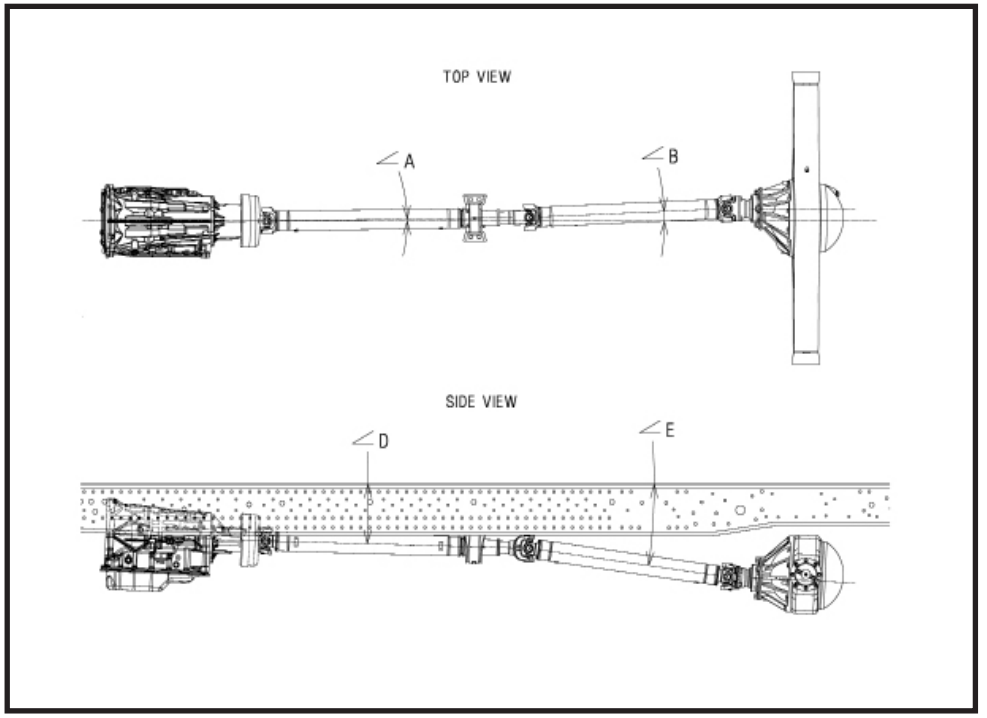


Figure 11.21.2

WheelBase (in.)	Top View		Side View			
	∠A	∠B	∠D	∠E	Trans	Rear Axle
109	3.4°	-	11.3°	-	2.5°	2.7°
132.5	0°	3.3°	5.3°	7.7°	2.5°	2.7°
150	0°	3.2°	2.6°	8.0°	2.5°	2.7°
176	0°	2.2°	2.1°	5.6°	2.5°	2.7°

Figure 11.21.3

Notes: 1. Angles privuded in table are relative to the frame angle. Please take this into consideration for service measurements.
2. Driveline angles are based on the chassis curb weight which includes standard equipment, fuel but no driver, body, or payload.

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	35.7	22.91	40.24	49.69
Type	A	B	B	B
Shaft #2 O.D.	N/A	3.54	3.54	3.54
Thickness	N/A	0.126	0.126	0.126
Length	N/A	36.16	36.53	52.93
Type	N/A	C	C	C
Shaft #3 O.D.	N/A	N/A	N/A	N/A
Thickness	N/A	N/A	N/A	N/A
Length	N/A	N/A	N/A	N/A
Type	N/A	N/A	N/A	N/A

Figure 11.21.1

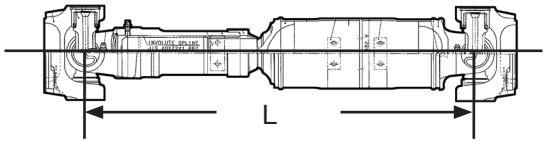
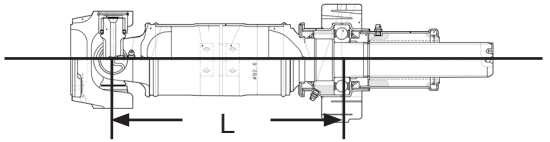
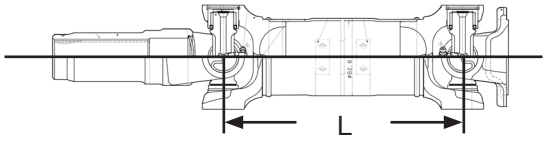
Type	Description	Illustration
Type **A**	1st shaft in 1-piece driveline	
Type **B**	1st shaft in 2-piece driveline	
Type **C**	2nd shaft in 2-piece driveline	

Figure 11.21.2

Note: Dimensions in inches

Brake System Diagram, 16,000 GVW

Vacuum Over Hydraulic

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

Legend for NPR, NPR-HD, NPR-XD Brake System

(1) Electronic Hydraulic Control Unit (EHCU)
(2) Rear Wheel Cylinder
(3) Vacuum Pump
(4) Check Valve
(5) Exhaust Brake Valve
(6) Magnetic Valve
(7) Check Valve (One-way Valve)
(8) Vacuum Tank
(9) 4-Way Connector
(10) With Metering Valve
(11) W/O Metering Valve
(12) Brake Fluid Reservoir
(13) Electric Vacuum Pump
(14) Master Cylinder
(15) Vacuum Booster (Servo Unit)
(16) Front Wheel Cylinder

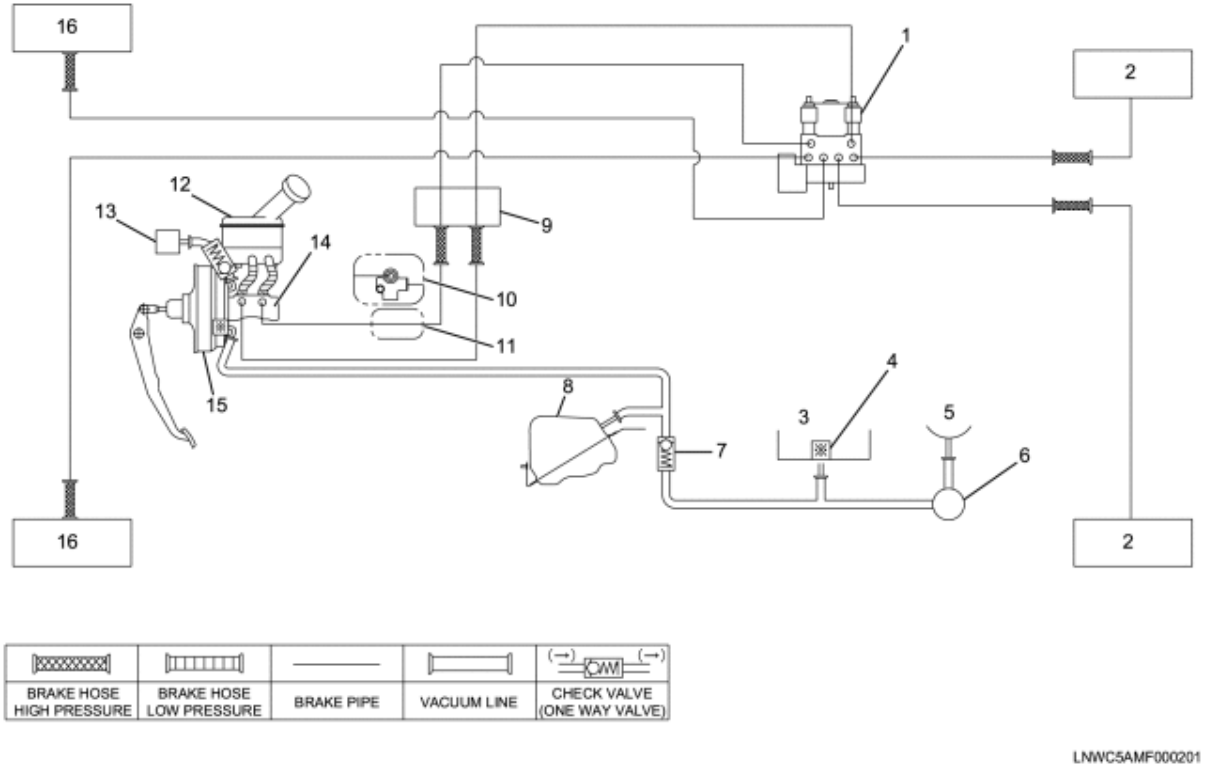


Figure 11.23.1

PTO Location, Drive Gear and Opening Information

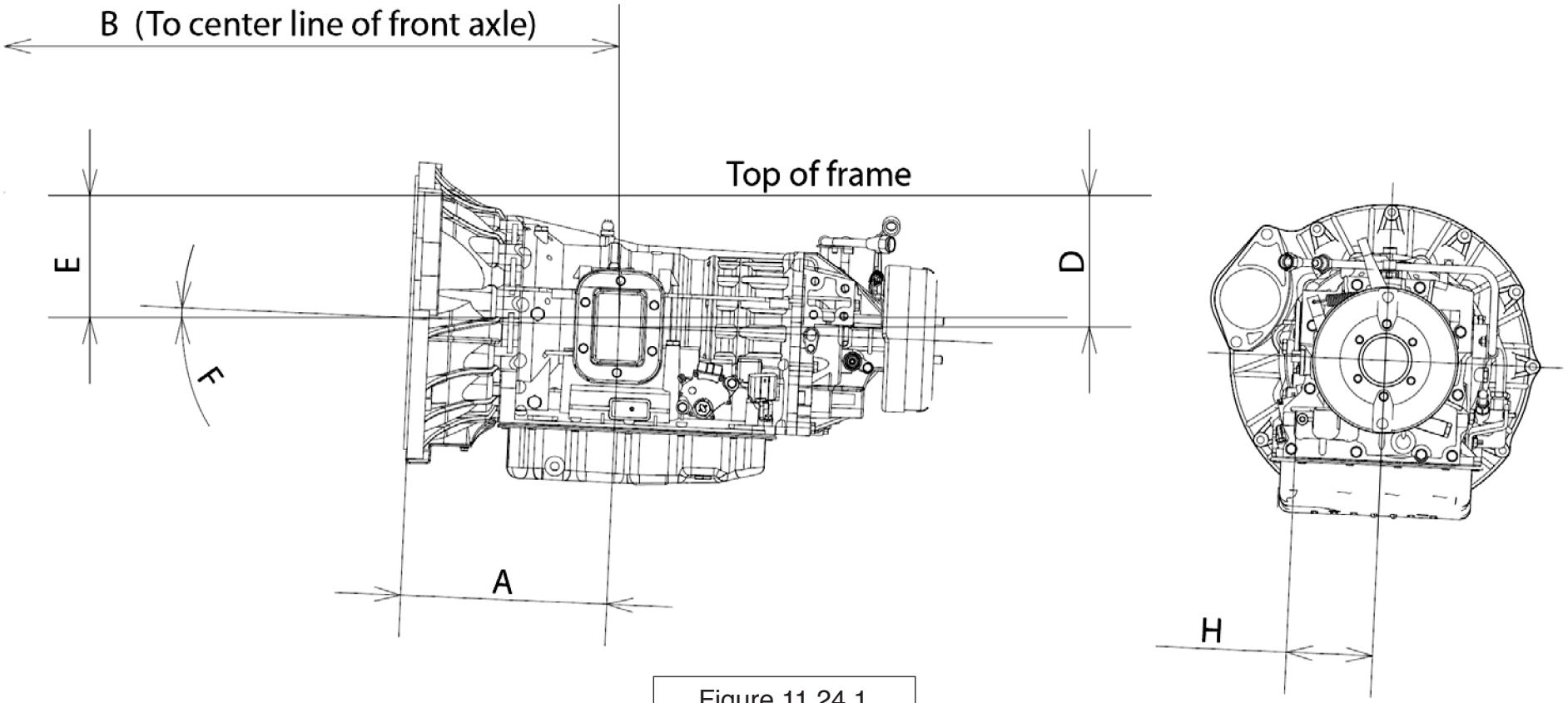


Figure 11.24.1

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	2.5^0	5.16	PTO Gear	1:1 with turbine	69	N/A	0	134 lbs.-ft. @ 1,700 RPM

Figure 11.24.2

Opening Diagram

Aisin A460 Automatic Torque Converter
Lock Up Function.

In either the Stationary Preset PTO Mode or Stationary Variable PTO Mode, when engine rpm exceeds 1200 RPM, the torque converter will lock up. The engine rpm can not be modified and the lockup function cannot be turned off. Please not that with PTO applications that operate around 1200 RPM, the transmission software holds the torque converter in lockup until engine speed falls below 1100 RPM

The lock up function will cancel if the transmission shift lever is moved from the park or neutral positions which will remove the trasmission from the stationary mode.

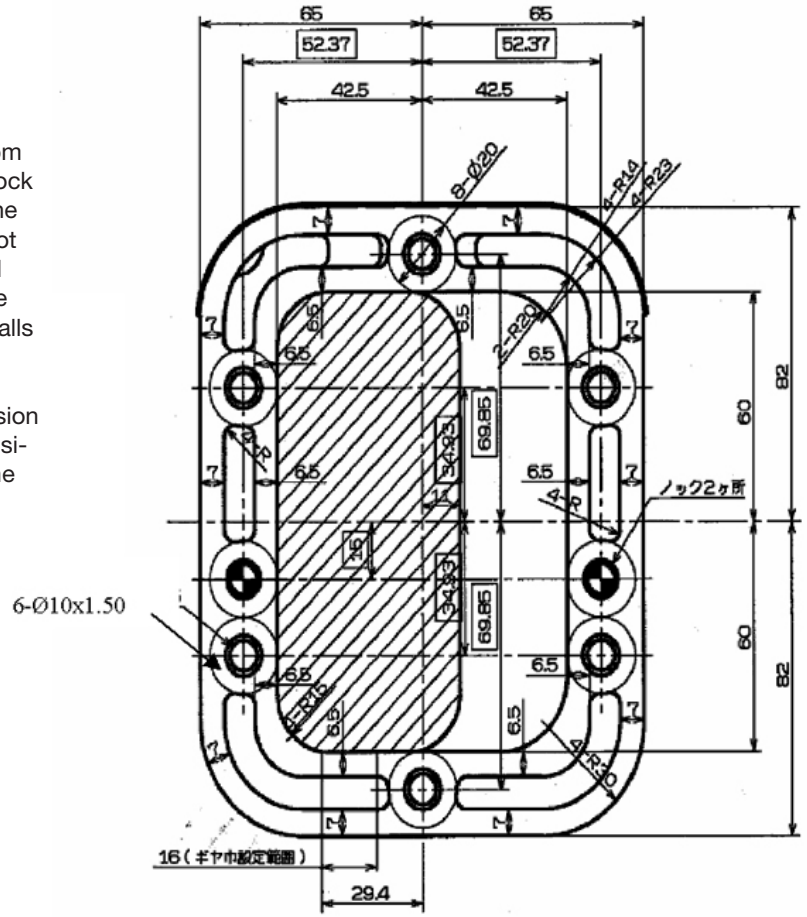


Figure 11.25.1

Additional PTO Functions :
For certain applications the Automatic regeneration function can be inhibited (Example Airport Ground Support vehicles).
For certain applications the Automatic regeneration function can be enabled in the PTO stationary mode (Example Lawn care and carpet cleaning).
For certain applications the Automatic regeneration function can be enabled in the PTO mobile mode (Example Line painting).
Please refer to the PTO section of the BBG (section 17) for further details.

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.
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.

Rear View Fuel Fill

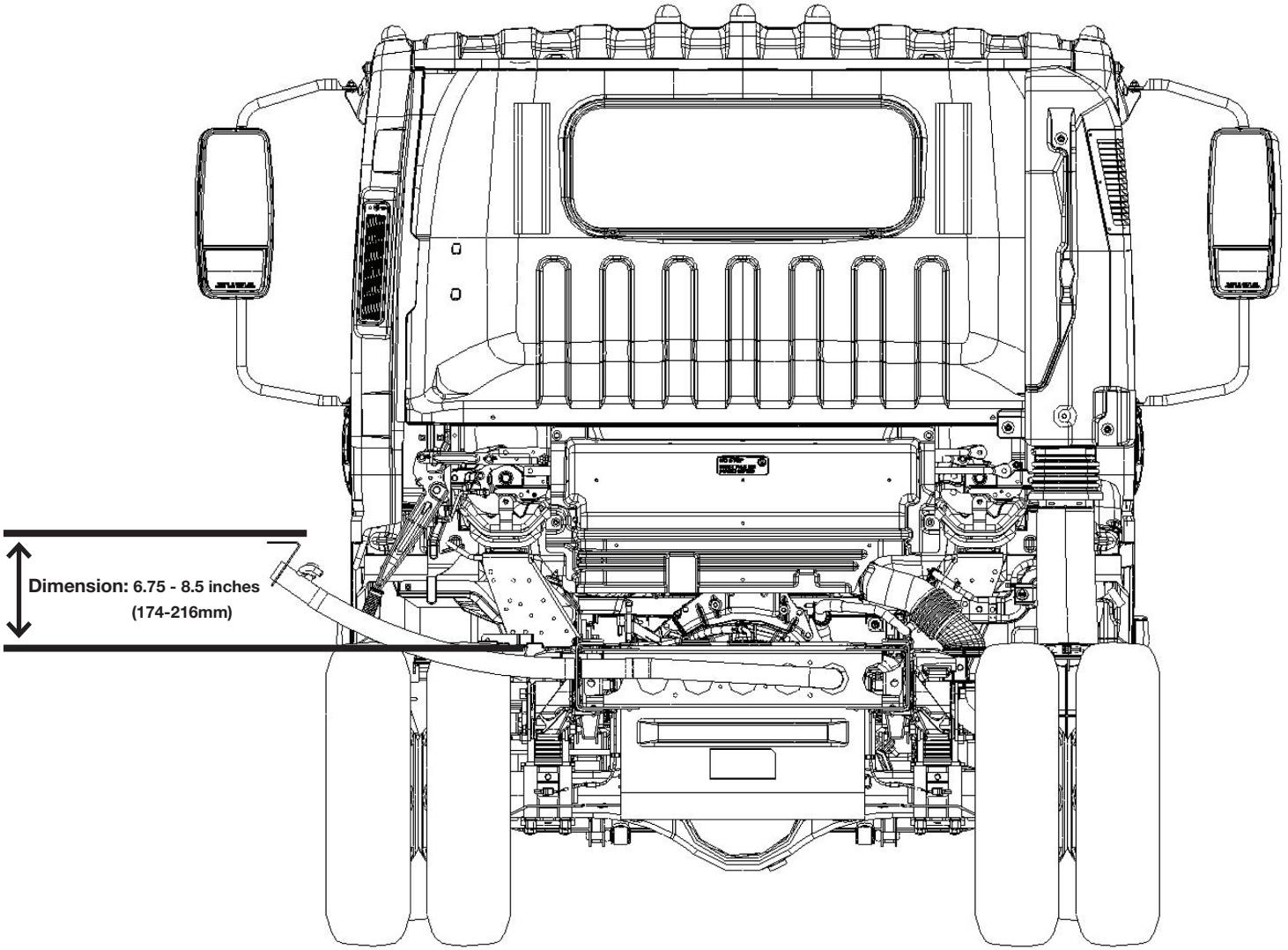
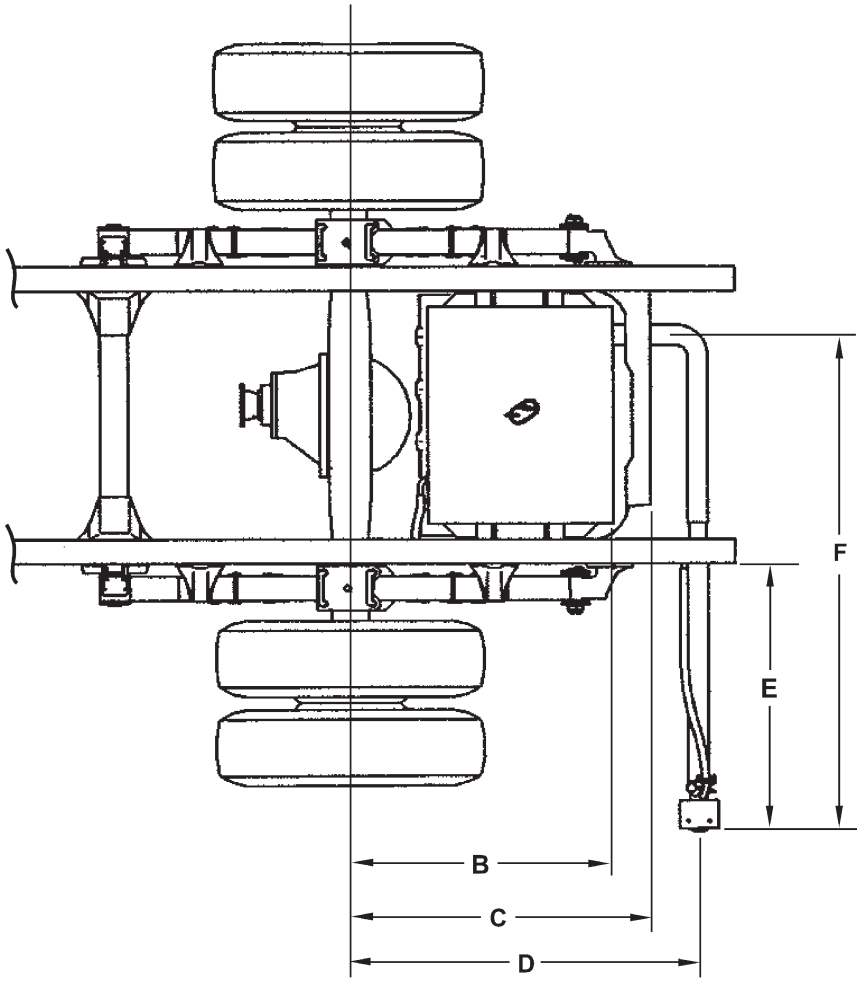


Figure 11.27.1

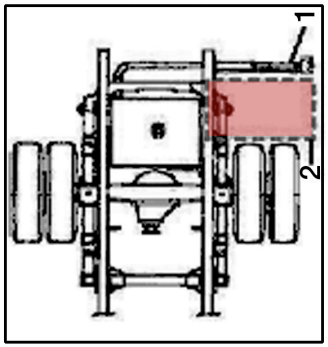
Top View Fuel Fill



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)

Figure 11.28.1

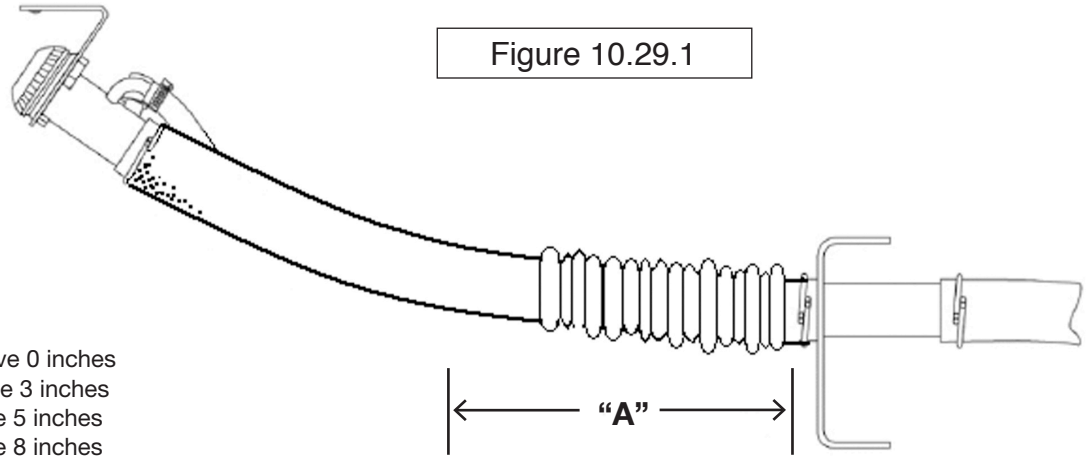
Hose Modification for Various Width Bodies and fuel fill vent Protection



Fuel fill vent and neck should be protected from road spray

1. FUEL FILLER NECK
2. RECOMMENDED MUD FLAP MOUNTING AREA (RED ZONE).

Figure 10.29.1



"A" Dimensions:
102 inch wide body remove 0 inches
96 inch wide body remove 3 inches
90 inch wide body remove 5 inches
86 inch wide body remove 8 inches
80 inch wide body remove 8 inches

NOTE: Shorten hose by "A Dimension" based on chart at left.

Figure 11.29.2

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.

Figure 11.30.1

Through the Rail Fuel Fill Frame Hole

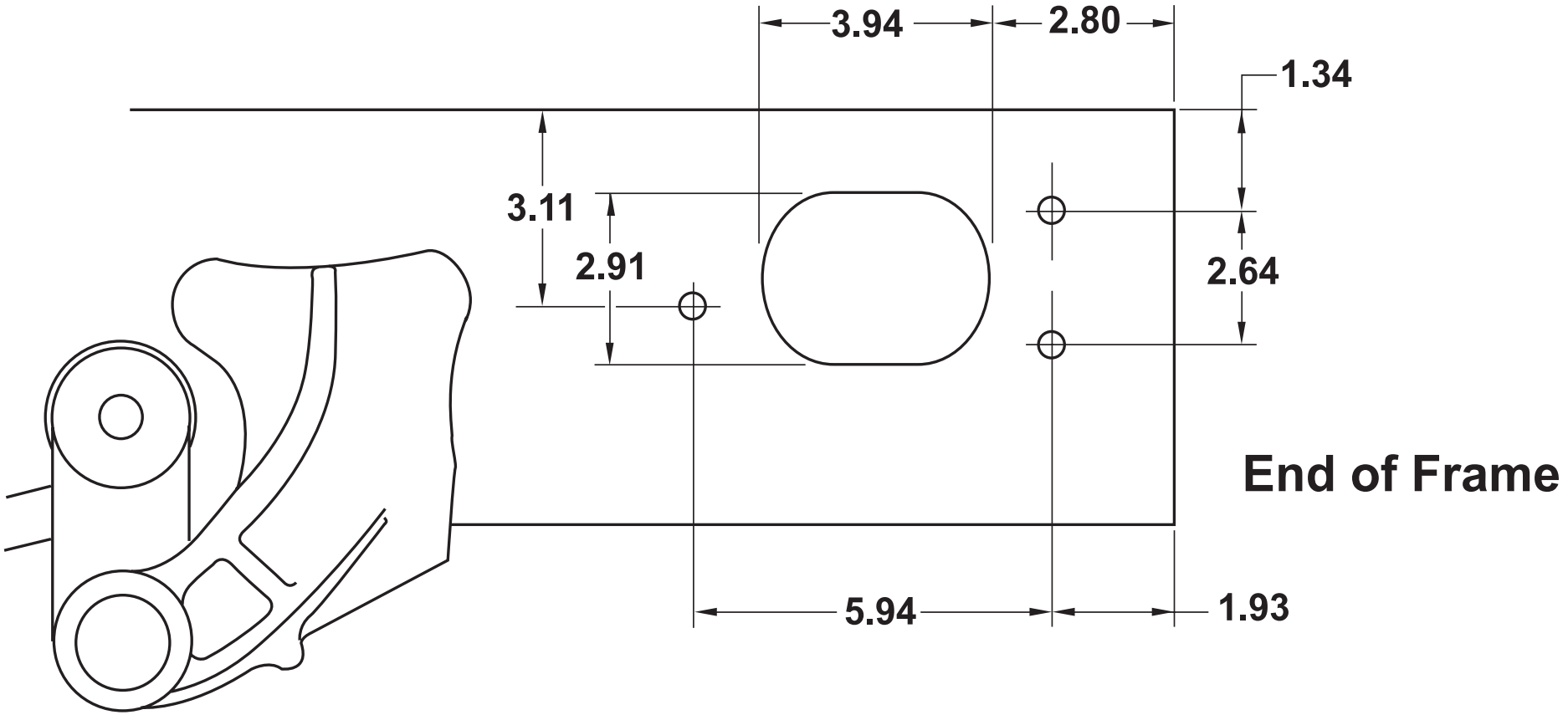


Figure 11.31.1

Note: Dimensions in inches

N-Diesel Fuel Filler Kit Instructions

Please review these instructions prior to installation of the fuel filler kit.

Parts Kit: There are two separate parts kits used for the 2011 and later model year N-diesel products. Fuel filler kit part number 898171 9090 is used for 14,500 lb and higher GVWR chassis (NPR-HD, NPR-XD, NQR, NRR), For reference kit part number 898171 9080 is used for 12,000 lb GVWR chassis (NPR models). Parts list is shown in ***Figure 11.32.2.*** Parts photos are shown in ***Figure 11.32.1.***

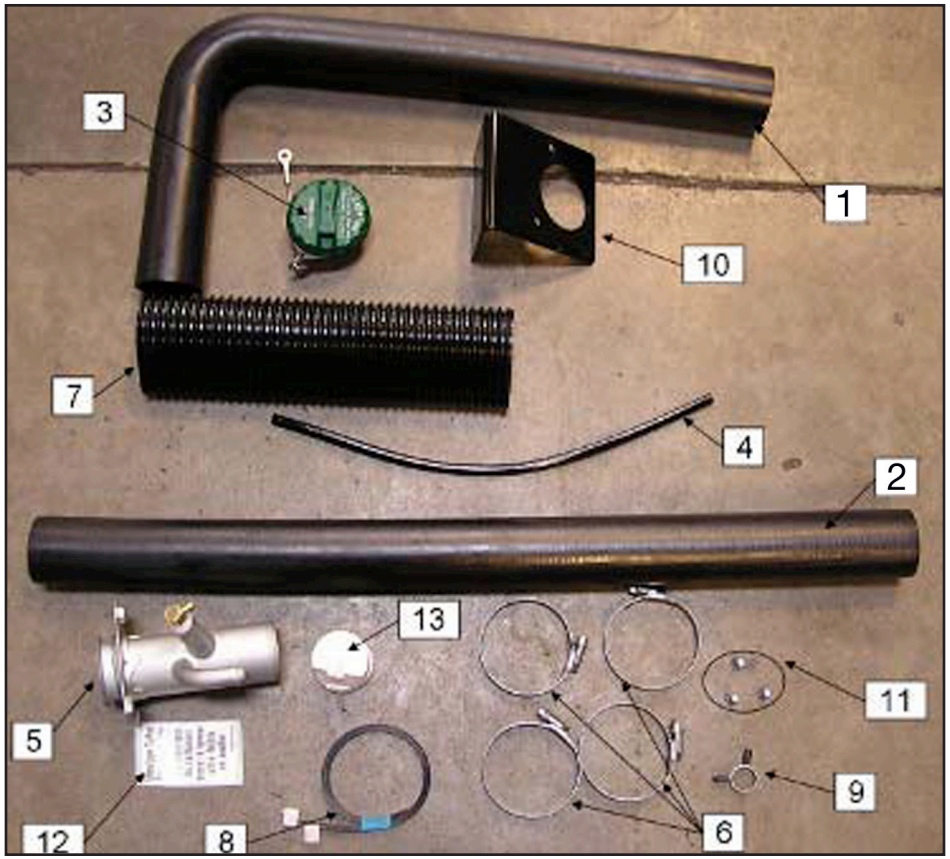


Figure 11.32.1

FUEL FILLER KIT, NPR-HD, NPR-XD, NQR, NRR 898171 9090			
ITEM #	PART NAME	PART #	QTY
1	HOSE: FUEL FILLER NECK	898171 211Y	1
2	HOSE: FUEL FILLER	898006 450Y	1
3	CAP: FILLER	897218 702Y	1
4	HOSE: ROLL-OVER VALVE	898164 876Y	1
5	NECK ASM: FUEL FILLER	898164 877Y	1
6	CLIP: JOINT	898133 349Y	4
7	PROTECTOR: FILLER HOSE	897114 063Y	1
8	CLIP: BAND, HOSE FIXING	109707 107Y	2
9	CLIP: RUBBER, HOSE	894242 034Y	1
10	BRACKET: FILLER NECK	897116 621Y	1
11	SCREW: FILLER NECK	897581 217Y	3
12	CAUTION PLATE	898070 422Y	1
13	SHUTTER: FUEL TANK	898164 404Y	1

Figure 11.32.2

Installation Instructions and Considerations:

The fuel tank shutter valve (13) was a new component for 2011 model year. This component is meant to improve fuel splash-back performance of the fuel system. In the 2012 model year a running change was made and this valve (13) was relocated from the fuel tank inlet to the inlet (outboard side) of the fuel filler neck bulkhead assemble that is bolted to the left hand frame rail as shown in **Figure 11.33.1**. This plastic valve snaps into place in the inlet of the frame mounted fuel pipe. The valve should be installed so that the plastic clip is at the top of the valve, so that the flap door opens up, as shown in **Figures 11.33.2**.

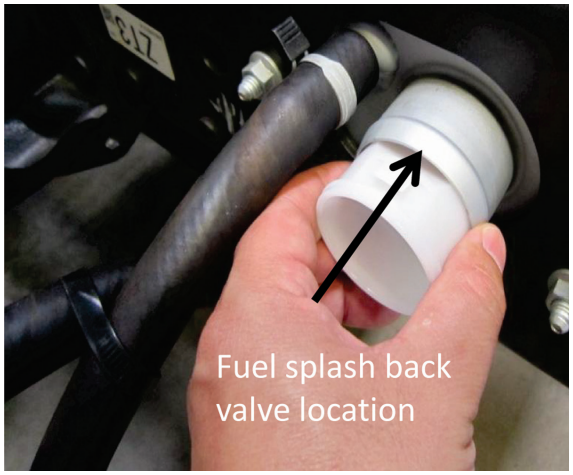


Figure 11.33.1

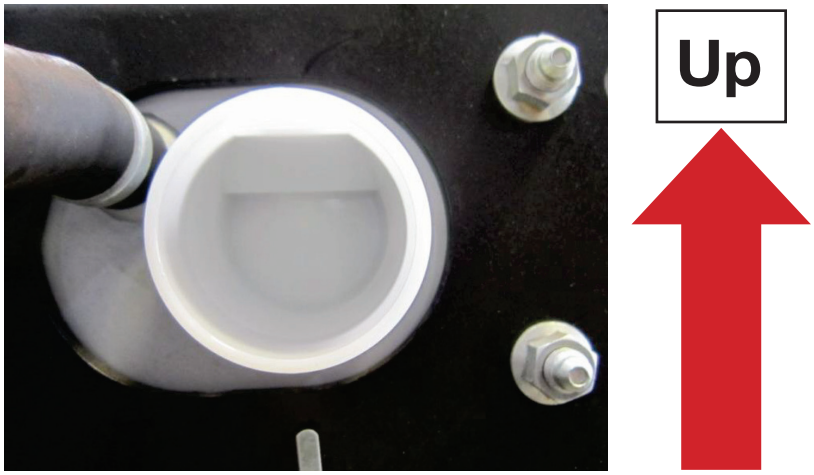


Figure 11.33.2

The fuel filler hose should be installed flush against the tank. The clamp should be installed between 1/16”and 3/8” from the tank. This is shown in ***Figure 11.33.3*** below.

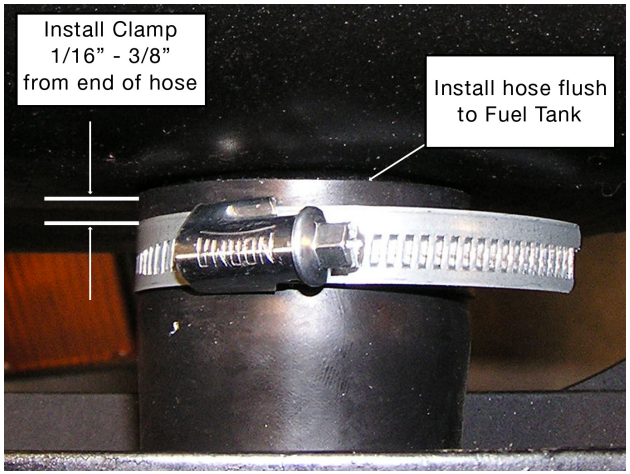


Figure 11.33.3

Roll-Over Valve Tubing

The roll-over valve has a hose attachment that will make this valve less sensitive to water intrusion. In order for the valve to work properly, it is critical that the hose be installed to the rollover valve. The proper assembly of the outer hose is shown in ***Figure 11.34.2.1.***

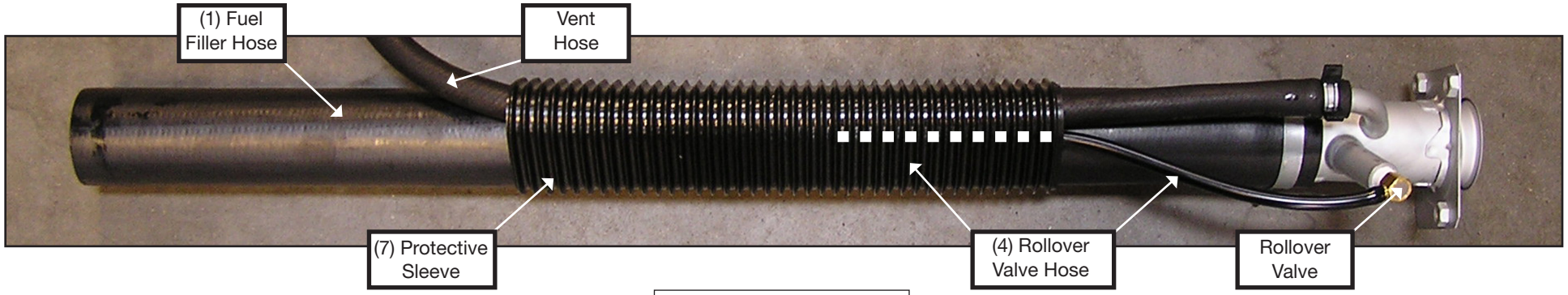


Figure 11.34.1

Filler Neck Installation:

The fuel filler neck (5) must be installed with the proper orientation on the body. The neck should be installed with the roll-over valve pointing upward, with the bottom edge of the neck oriented parallel to the ground, plus 33 to minus 7 degrees. See ***Figure 11.34.2.1.*** for the proper orientation.

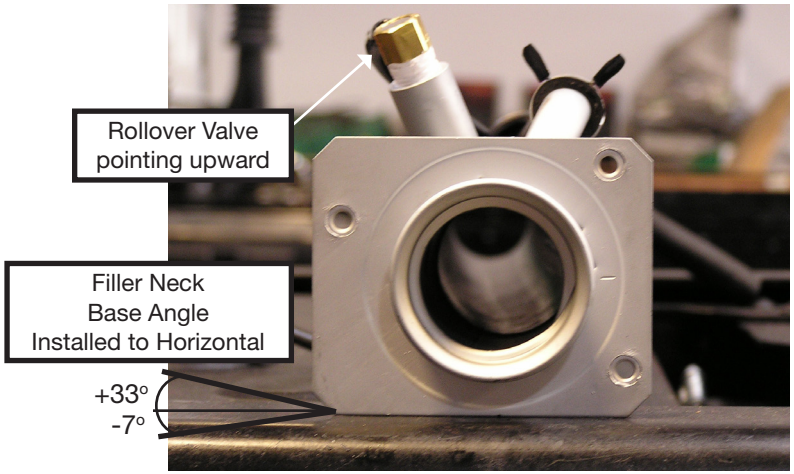


Figure 11.34.2

NQR Diesel Specifications

Model	NQR
GVWR	17,950 lbs.
WB	109 in., 132.5 in., 150 in., 176 in., 200 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)	215HP/2500 RPM w/Automatic Transmission
Torque (Gross)	452 lb ft torque/1850 RPM w/ Automatic Transmission
Equipment	Dry element air cleaner with vertical intake; 2 rows 564 square 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. Engine warning system with audible warning for low oil pressure, high coolant temperature, and low coolant level. Engine cruise control 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 with automatic torque converter lockup in stationary PTO mode.
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	6,830 lbs.
Rear Axle	Full floating single speed with hypoid gearing rated at 14,550 lbs.
Suspension	Semi-elliptical steel alloy multi-leaf springs and shock absorbers.
GAWR	12,980 lbs.
Wheels	19.5x6.0-K 6 hole disc wheels, painted white.
Tires	225/70R-19.5E (12 pr) LRR (Low Rolling Resistance) tubeless steel belted radials, all season tread front and rear.
Brakes	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 mechanical, cable actuated, internal expanding drum type, transmission mounted. The exhaust brake is standard and is vacuum operated. 4 channel antilock brake system.
Fuel Tank	30 gal. rectangular steel fuel tank mounted in frame rail behind rear axle. Fuel water separator with indicator light.
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 in3. RBM 316,800.
Cab	All steel low cab forward, BBC 70.9 in, 45o mechanical tilt with torsion assist.
Equipment	TRICOT breathabke 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 maintenance free batteries, 750 CCA each, 140 Amp alternator with integral regulator.
Options	See last page for options

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

Vehicle Weights, Dimensions and Ratings

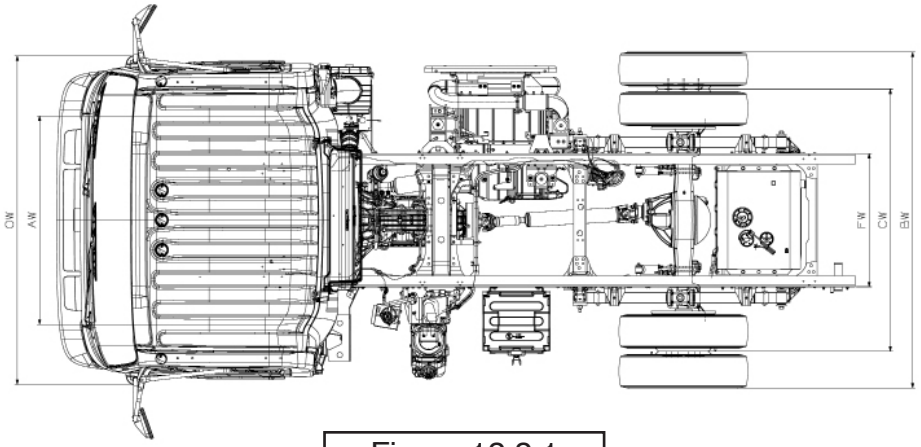


Figure 12.2.1

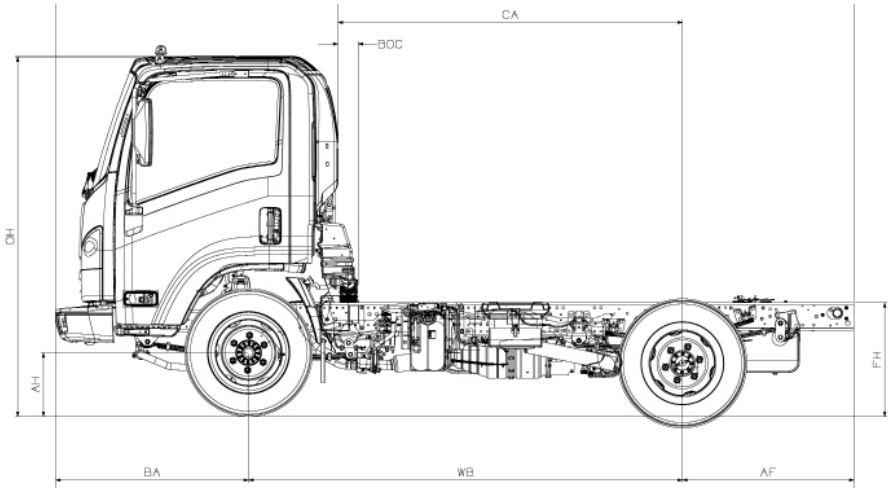


Figure 12.2.2

In-Frame Tank

17,950 lb. GVWR Automatic Transmission Model

Chassis Curb and Maximum Payload Weights

Model	WB	Unit	Front	Rear	Total	Payload
NR1	109.0 in	lb.	4132	2357	6489	11461
NR2	132.5 in	lb.	4221	2361	6582	11368
NR3	150.0 in	lb.	4286	2342	6628	11322
NR4	176.0 in	lb.	4324	2362	6686	11264
NR5	200.0 in	lb.	4487	2524	7011	10939

Side Mounted Tank

17,950 lb. GVWR Automatic Transmission Model

Chassis Curb and Maximum Payload Weights

Model	WB	Unit	Front	Rear	Total	Payload
NR4	176.0 in	lb.	4458	2238	6696	11254

Vertical Exhaust Option Dimensions:

Variable Chassis Dimensions:

Unit	WB	EFF CA*	EFF CE*	OAL	AF
Inch	109.0	62.5	105.6	200.5	43.1
Inch	132.5	86.0	153.1	224.0	43.1
Inch	150.0	103.5	146.6	241.5	43.1
Inch	176.0	129.5	172.6	267.5	43.1

* Effective CA & CE listed are standard CA or CE less vertical exhaust BOC of 24 inches.

Vertical Exhaust BOC = 24 inches

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 & CE less BOC

Dimension Constants:

Code	Inches	Code	Inches
AH	7.5	BW	83.3
AW	65.6	CW	65
BA	48.4	FW	33.5
BBC	70.7	OH	92.4
BOC	7.7	OW	81.3
FH	33.0		

2016 Isuzu Truck

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.

RPO	OPTION DESCRIPTION	Weight (Lbs.) Front/Rear	
IF4	Air Deflector roof mounted (not available in Crew Cab)	64.0	0.00
IF6	Fire Extinguisher and Triangle Kit mounted in rear organizer (3)	19.00	0.00
IG3	Engine Oil Pan Heater (120v 300w)	2.00	0.00
IH2	Engine emergency shutdown system HWT, LWL, LOP (4)	0.00	0.00
IY9	Engine Idle Shutdown (Timer set at 3 minutes for engine shutdown)	0.00	0.00
IA9	Engine Idle Shutdown (Timer set at 5 minutes for engine shutdown)	0.00	0.00
IK9	33 Gallon Additional Diesel Fuel Tank mounted on LH side 150,176 wb std cab in rail tank only	(7)	(7)
IY4	Delete Standard AM/FM/CD Radio	-3.00	0.00
I8H	AM/FM/CD radio with Aux input/USB port and Bluetooth	0.00	0.00
IL9	PTO Enable Switch and Engine Idle Up Switch recommended for PTO and Idle applications (2)	1.00	0.00
IS0	Heated Mirrors	1.00	0.00
I9H	Heated dual remote control mirrors (15” head) 1.00	0.00	
IU2	Mirror Bracket for 102” wide body	1.00	0.00
IV8	Seat Covers Standard Cab (9)	6.00	0.00
IX2	Rear Body Dome Lamp Switch (6)	1.00	0.00
I0A	Cross rail horizontal DPF/SCR with vertical exhaust (8)	100.00	100.00
I66	Block Heater (cord)	1.00	0.00
UZF	Back up alarm	2.00	0.00
V22	Chrome Grille	1.00	0.00
I4K	Keyless Entry System	1.00	0.00
I5K	Suspension Drivers Seat	25.00	0.00
I6K	Lockable DEF Fill Cap	1.00	0.00
I1L	Speed Limited to 58 MPH	0	0
I2L	Speed Limited to 65 MPH	0	0
I3L	Speed Limited to 68 MPH	0	0
I4L	Speed Limited to 70 MPH	0	0
54	In rail fuel tank with power windows, door locks and air conditioning	80	0
64	In rail fuel tank with power windows, power door locks, air conditioning and LSD (3)	80	15
74	Side mounted fuel tank w/power windows, power door locks and air conditioning (5)	215	-124
84	Side mounted fuel tank w/power windows, power door locks, air conditioning and LSD (3) (5)	215	-109

(1) RPO is Regular Production Option that is stocked in Port inventory.
LSO is Limited Stock Option that is stocked in Port inventory but should be checked for availability and delivery time.
SEO is Special Equipment Option and requires 90-120 day lead time for delivery.

(2) These switches can be port or dealer installed. Please consult the body builders guide and / or the service manual for additional programming options and functions.

(3) LSD factory installed Limited Slip Differential

(4) High Water Temperature (HWT), Low Water Level (LWL) and Low Oil Pressure (LOP)

(5) 176 inch WB Standard Cab only

(6) RPO must be ordered with Supreme Value Pak and Morgan Fast Track Body Programs

(7) Additional fuel tank mounted on the drivers side frame rail. Available with in rail tank only available on 150 and 176 inch standard cab wheelbases (Weights: 150 wb +122 lbs. front and +238 lbs. rear and 176 wb +102 lbs. front and +258 lbs rear)

(8) Available only with in rail fuel tank and single cap (no crew cab)

(9) Seat covers not available with suspenison seat

Frame and Crossmember Specifications

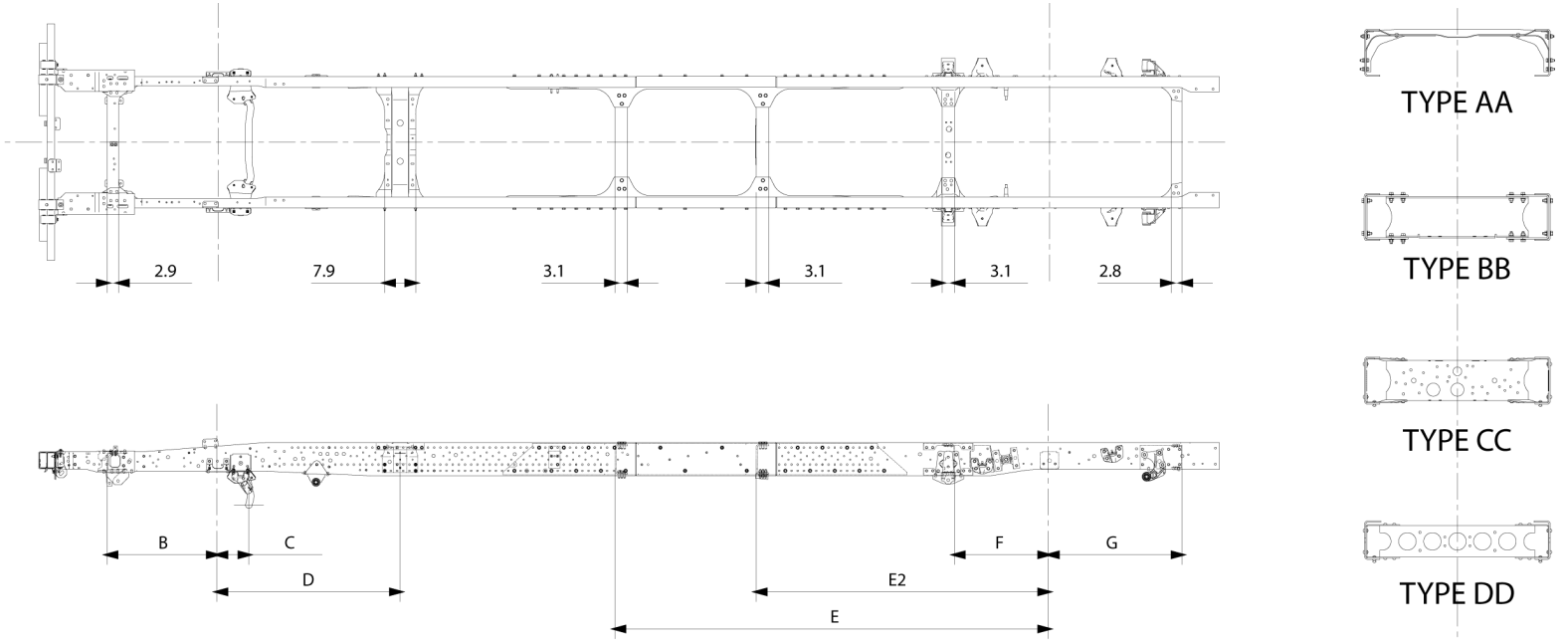


Figure 12.4.1

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

Figure 12.4.2

Note: Dimensions in inches

Frame Chart

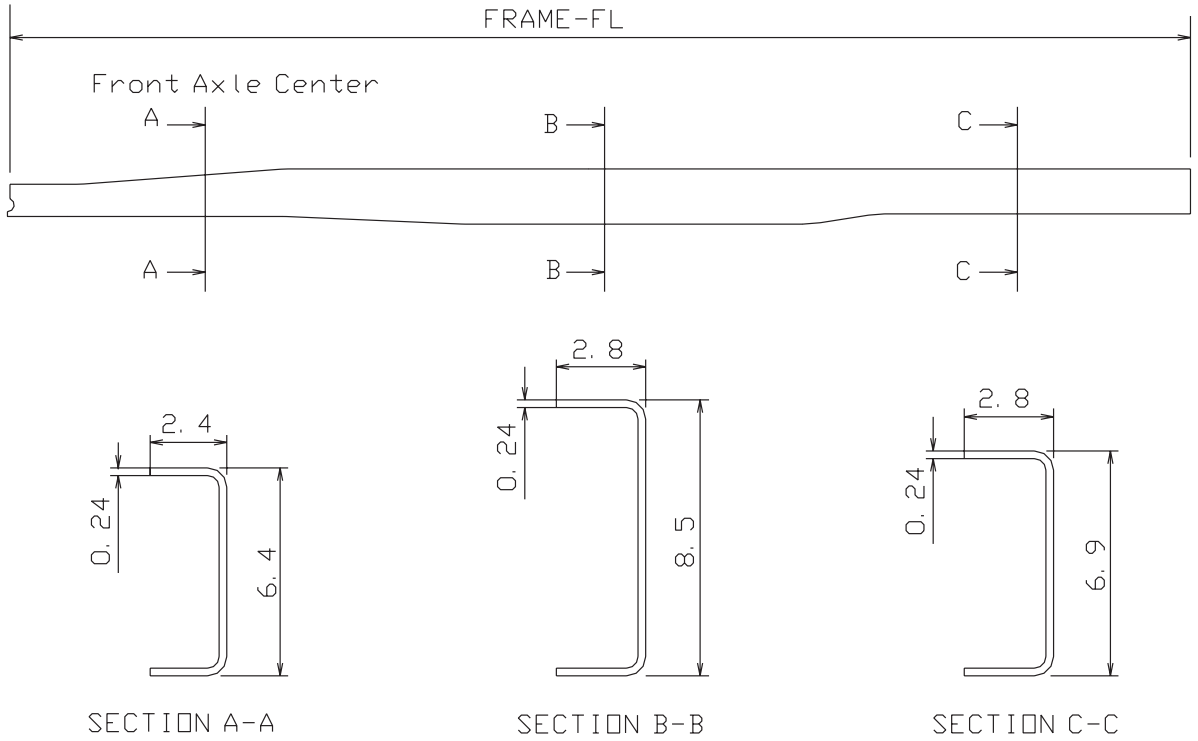


Figure 12.5.1

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

Figure 12.5.2

Note: Dimensions in inches

NQR Diesel Standard Cab -Top View

WB	A	B
109	43.4	78.0
132.5	49.7	84.3
150	43.4	78.0
176	43.4	78.0
200	43.4	78.0

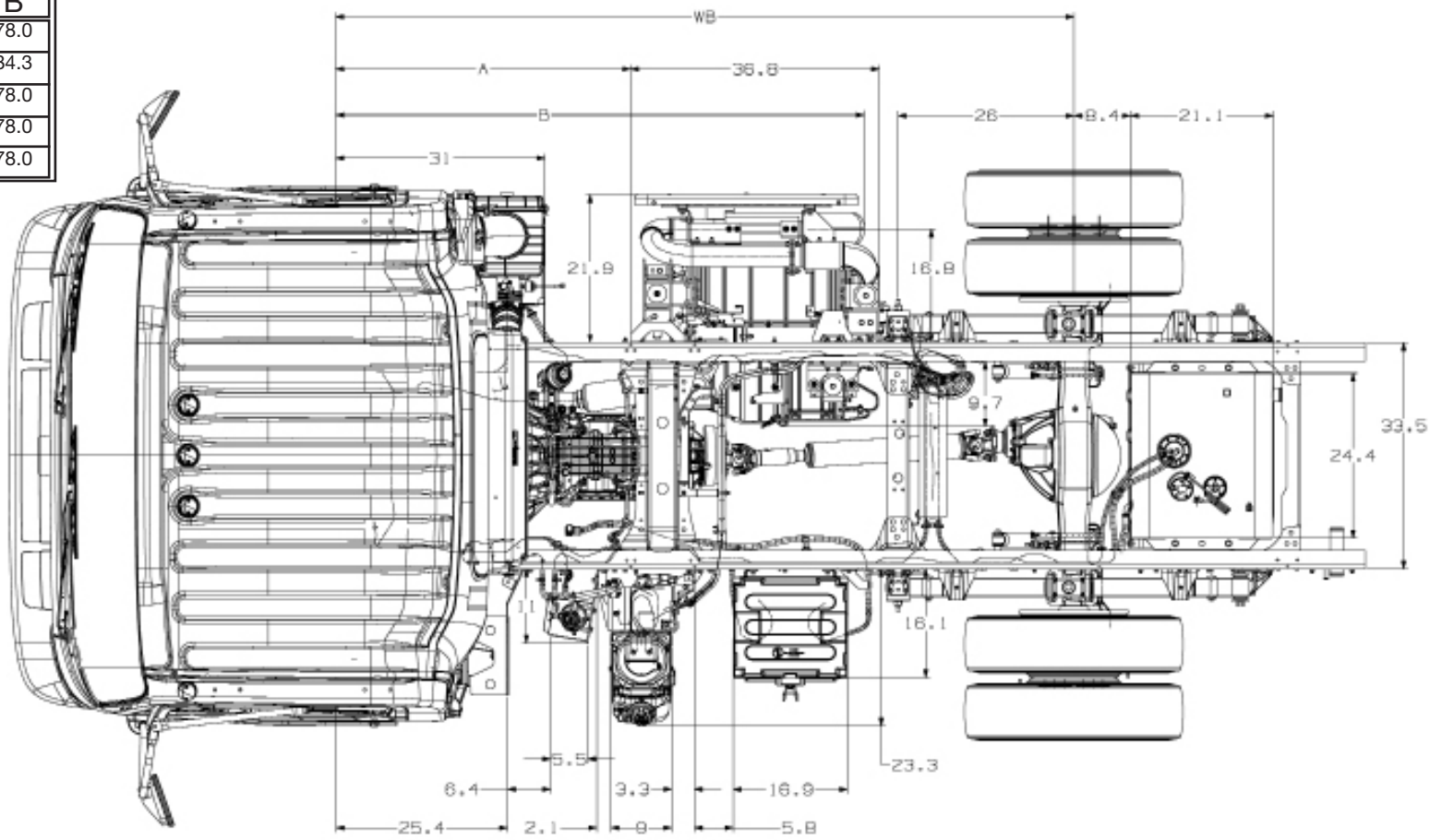


Figure 12.6.1

Note: Dimensions in inches

NQR Diesel Standard Cab -Left Side View

WB	A
109	80.7
132.5	87.0
150	80.7
176	80.7
200	80.7

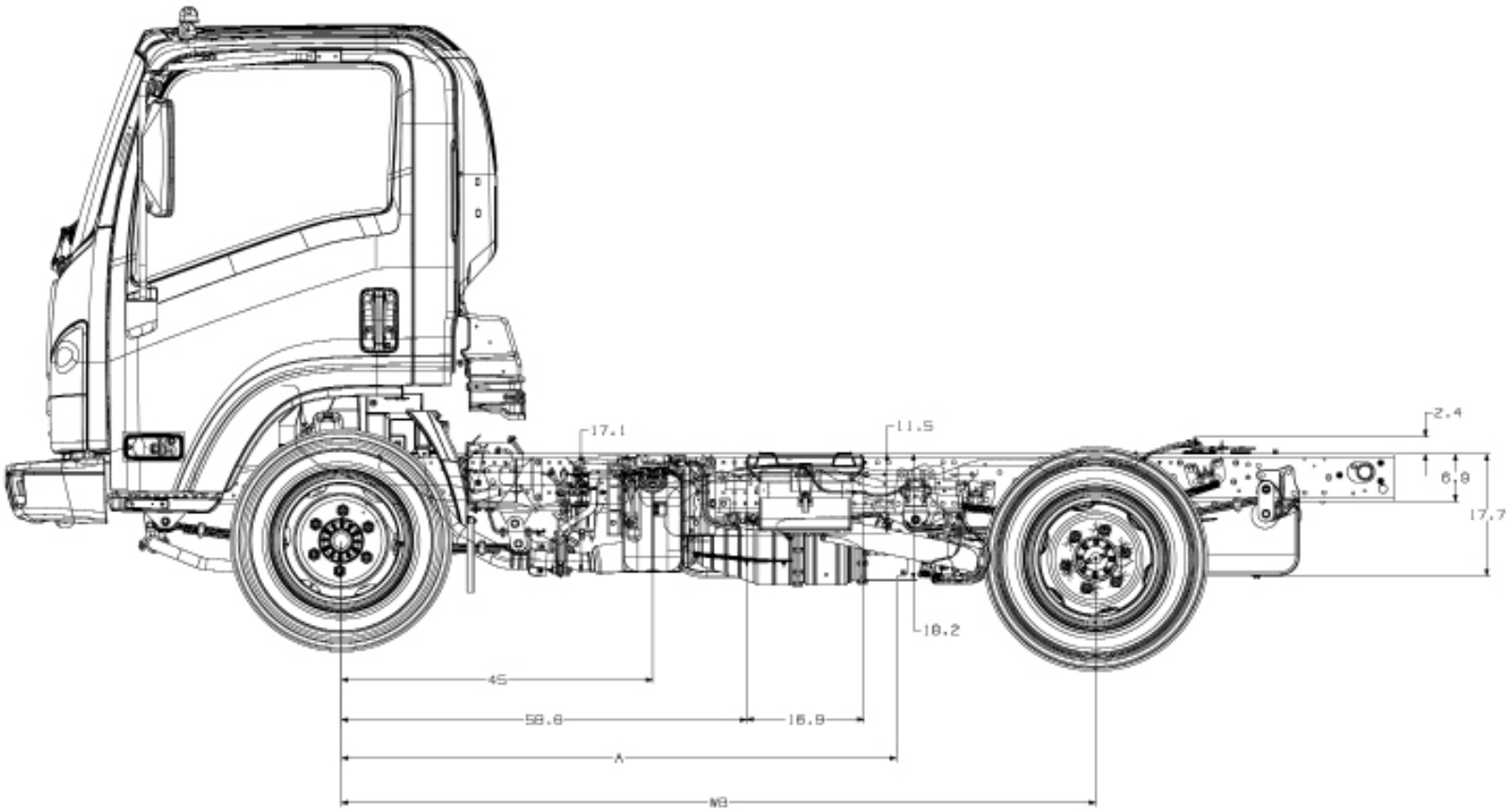


Figure 12.7.1

Note: Dimensions in inches

NQR Diesel Standard Cab- Right Side View

WB	A
109	44.0
132.5	50.3
150	44.0
176	44.0
200	44.0

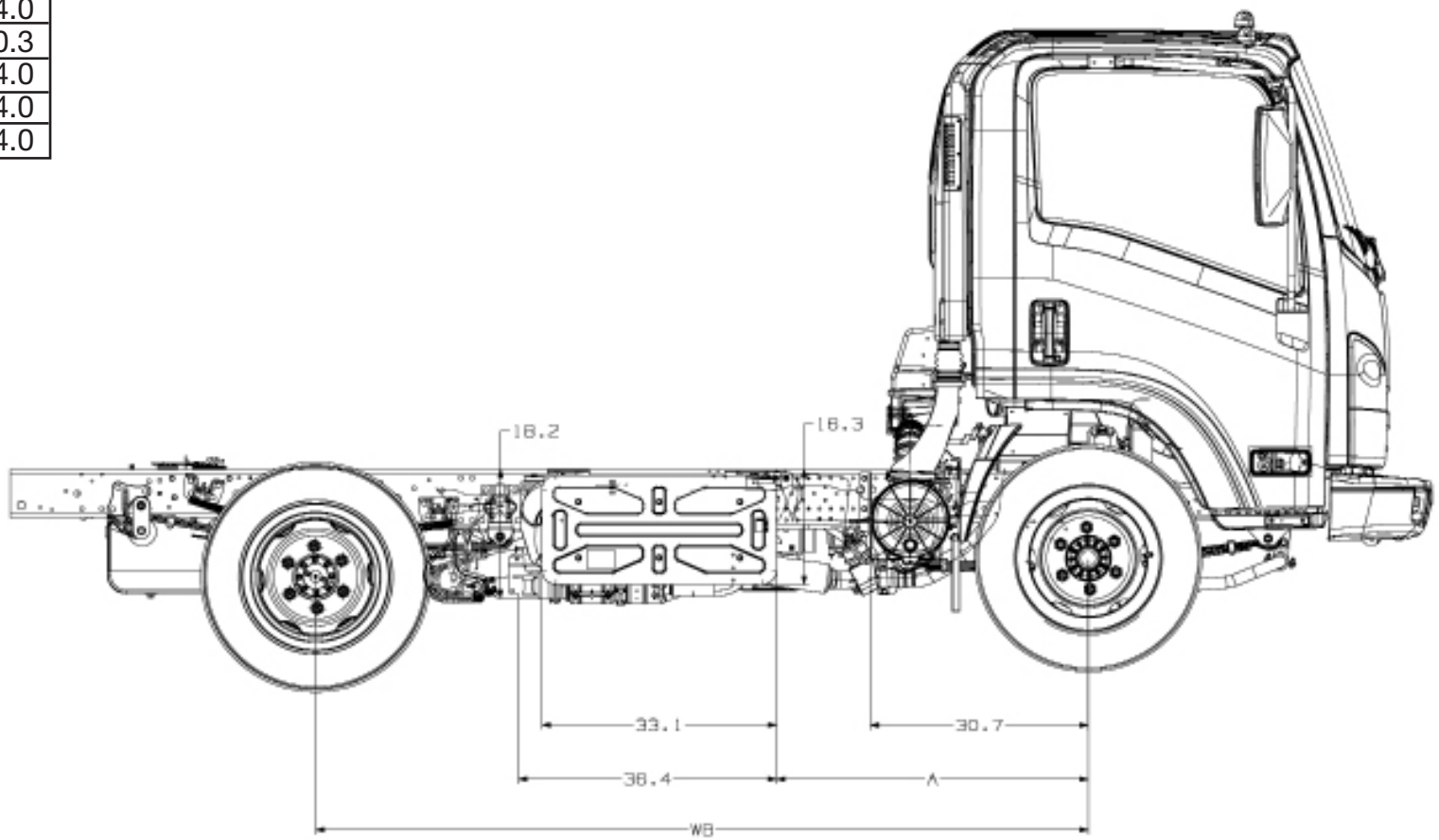


Figure 12.8.1

Note: Dimensions in inches

SCR / DPF 4HK1-TC

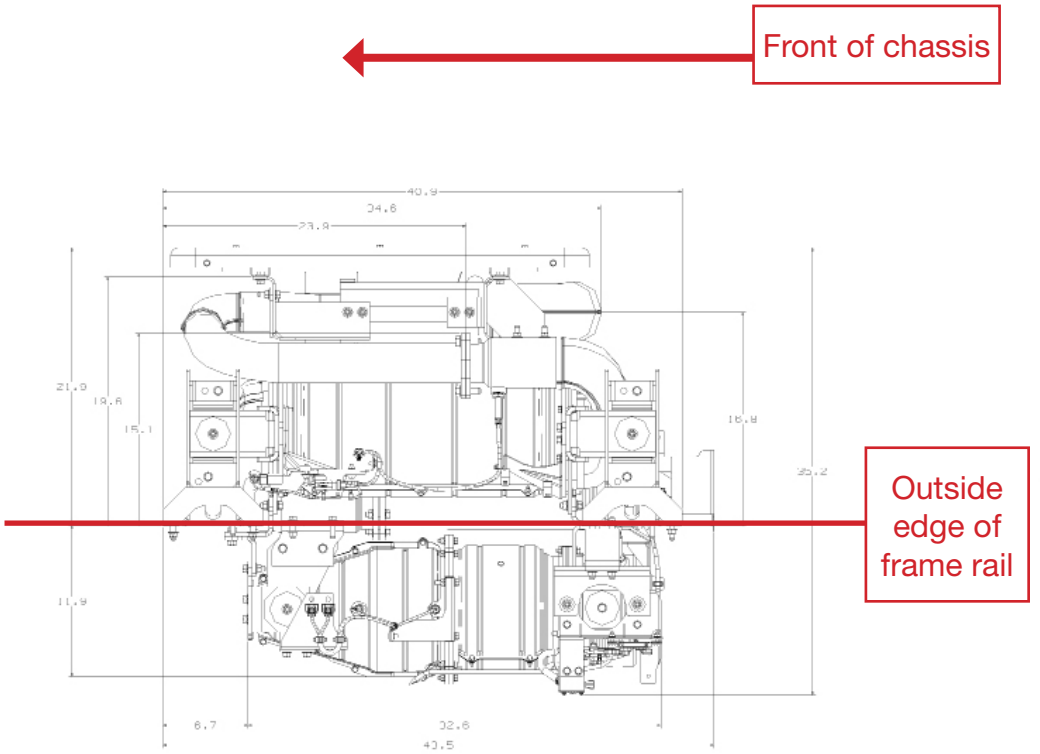


Figure 12.9.1

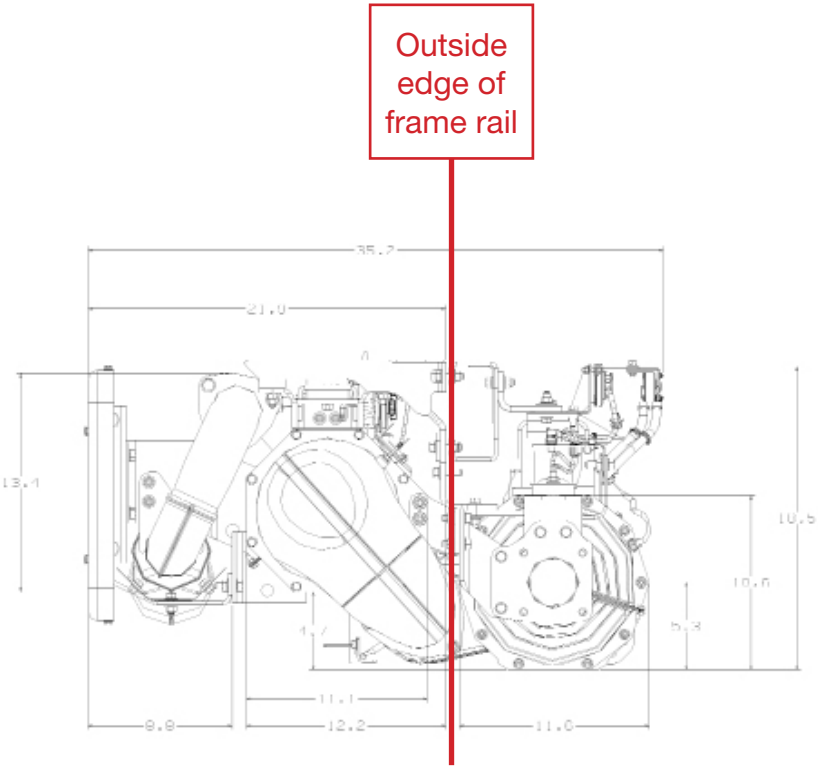


Figure 12.9.2

Note: Dimensions in inches

Option Side Fuel Tank in addition to the Standard In Rail Fuel Tank RPO IK9
Side View 150 Wheelbase

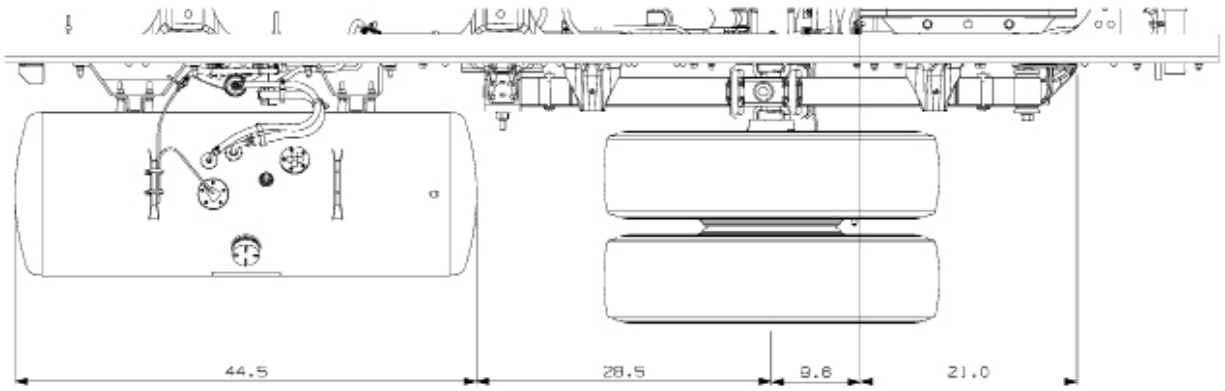


Figure 12.10.1

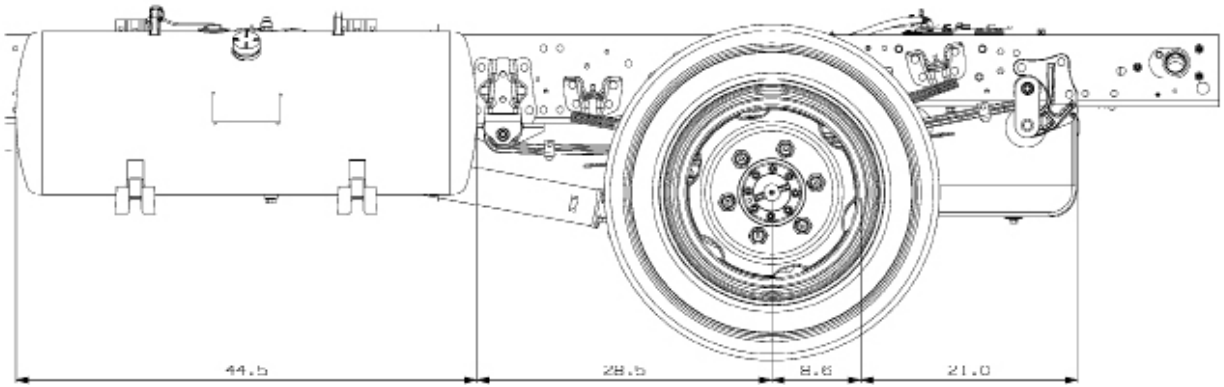


Figure 12.10.2

Note: Dimensions in inches

Option Side Fuel Tank in addition to the Standard In Rail Fuel Tank RPO IK9
Side View 176 Wheelbase

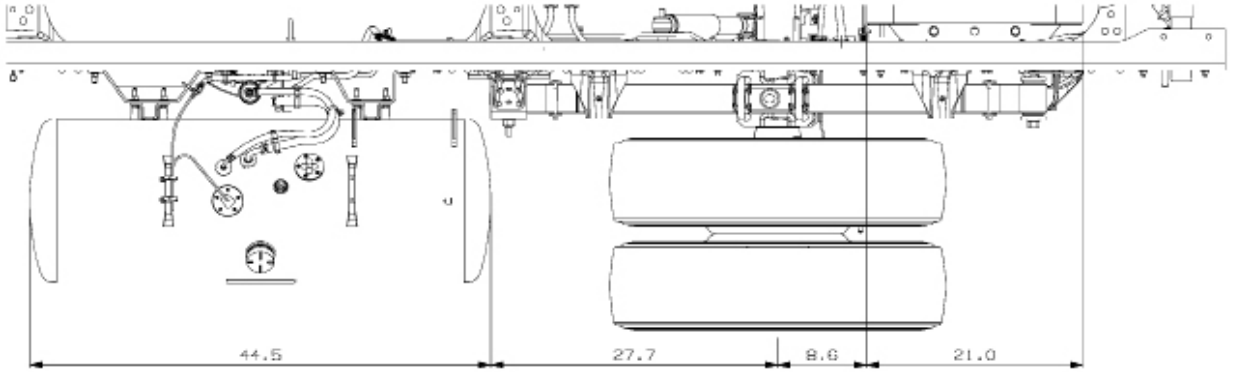


Figure 12.11.1

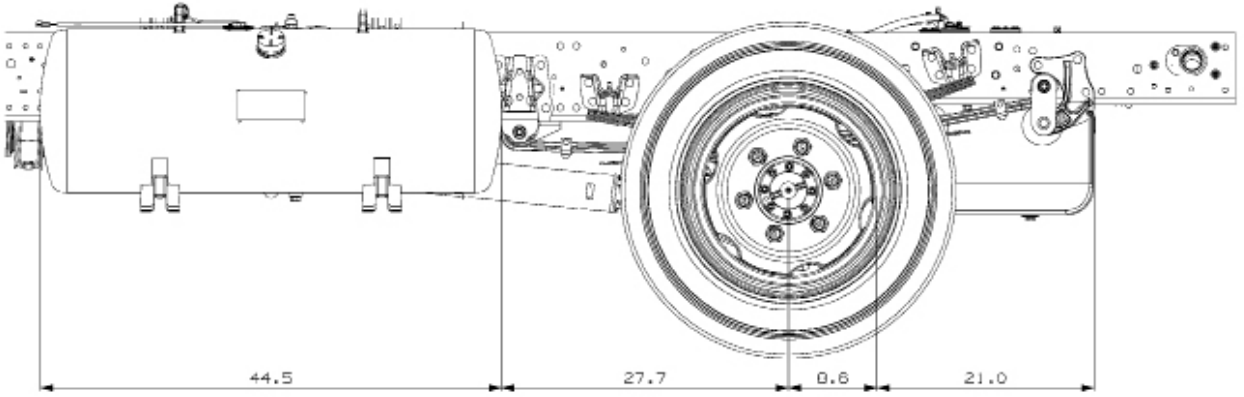


Figure 12.11.2

Note: Dimensions in inches

Option Side Fuel Tank in place of the Standard In Rail Fuel Tank on NR474 and NR484 ONLY

Side View 176 Wheelbase

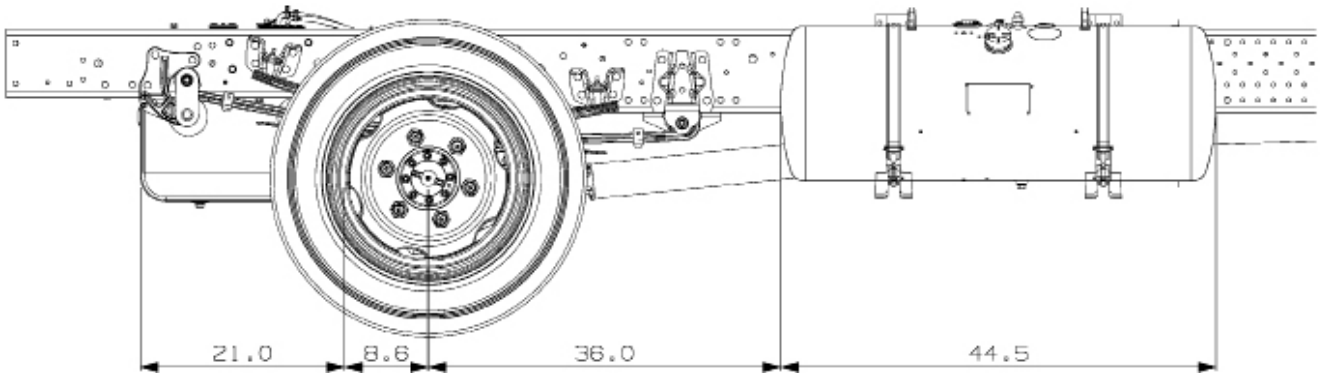


Figure 12.12.1

Note: Dimensions in inches

Optional Side Fuel Tank in addition to the Standard In Rail Fuel tank RPO IK9 (150 and 176 wb LH rail only)

Optional Side Fuel Tank replacing standard In Rail Fuel tank (176 wb only RH rail only)

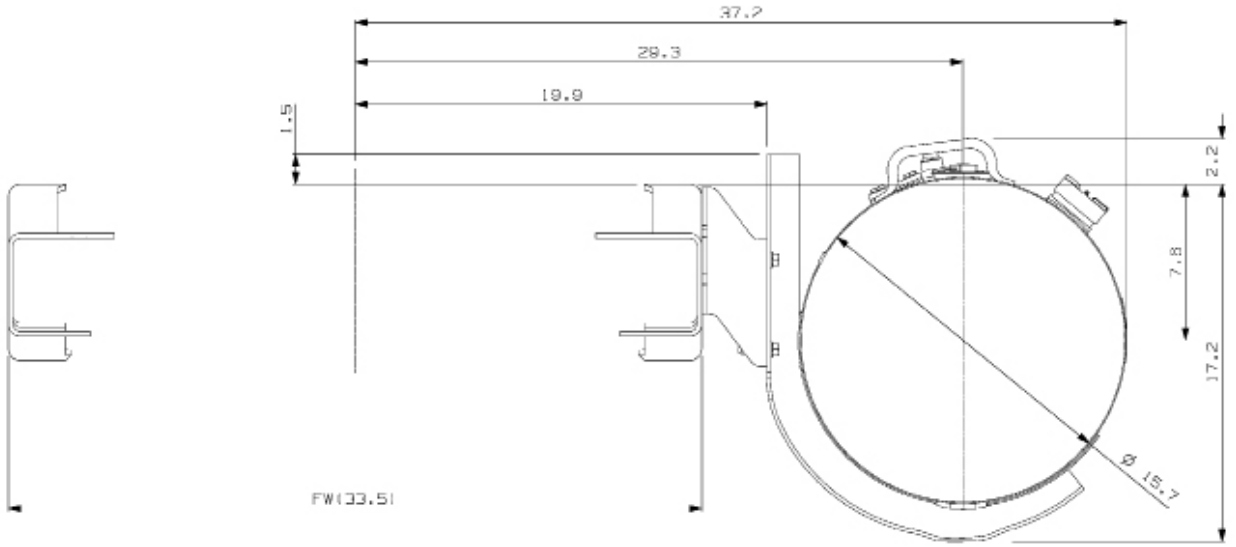


Figure 12.13.1

Note: Dimensions in inches

Cab Tilt

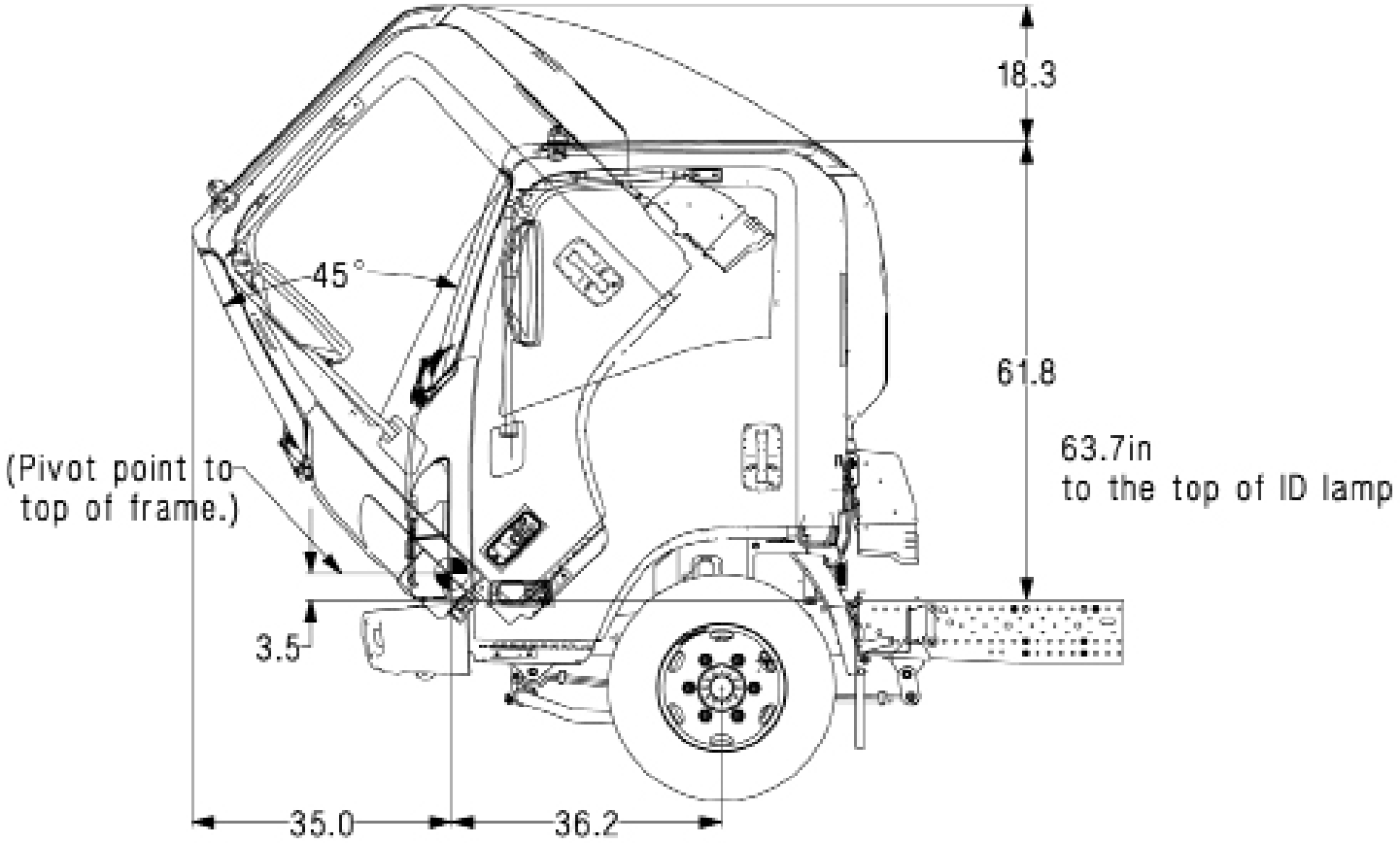


Figure 12.14.1

Note: Dimensions in inches

Center of Gravity

The center of gravity of the chassis cab.

Horizontal and Vertical CG of Chassis			
WB	V	H in frame tank	H side tank
109	23.5	38.4	N/A
132.5	23.3	44.9	N/A
150	23.3	49.9	N/A
176	23.3	57.2	52.5
200	23.3	64.5	N/A

Figure 12.15.1

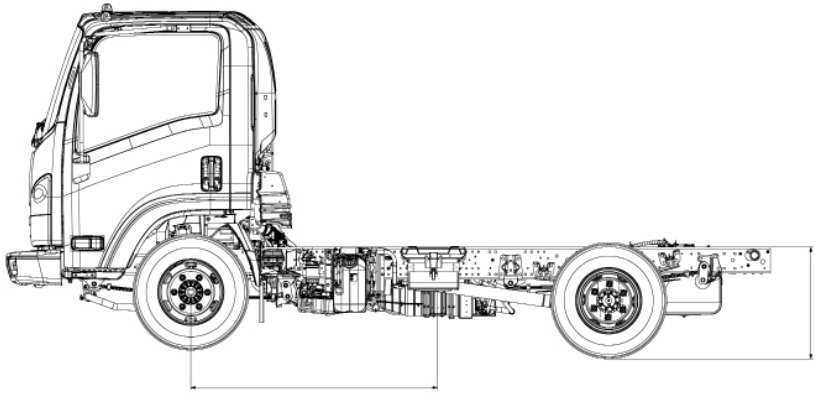


Figure 12.15.2

The maximum vertical center of gravity specified below must not be exceeded at maximum GVWR and rated front and rear GAWR.
The Center of Gravity (CG) maximum is 63” (1600 mm) above the ground.
(NPR Cab Chassis and NPR Stripped Chassis)

NOTE: The Final Manufacturer must ensure that the combined vertical center of gravity of the chassis, body, and available payload at full GVW does not exceed the maximum vertical center of gravity outlined in the Isuzu Incomplete Vehicle Document and the Isuzu Body Builders Guide.

Additional Information may be obtained by contacting ISUZU Commercial Trucks of America(ICTA)Applications Engineering on the West Coast call 1-562-229-5240 and in the
East Coast call 1-770-740-1620 X 262.

Note: Dimensions in inches

Front Axle Chart

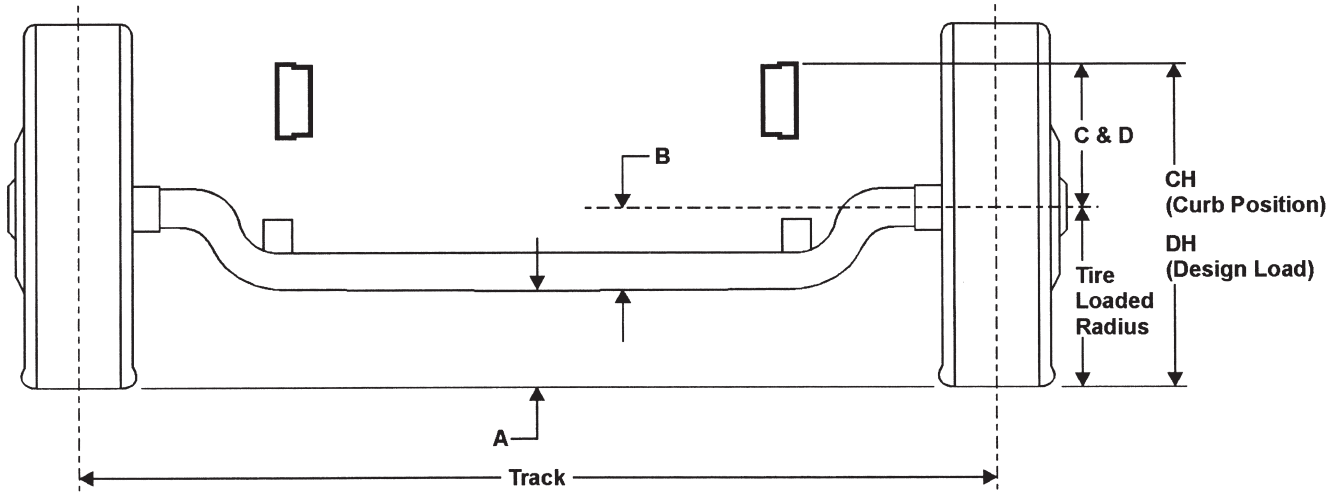


Figure 12.16.1

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

Figure 12.16.2

Note: Dimensions in inches

Rear Axle Chart

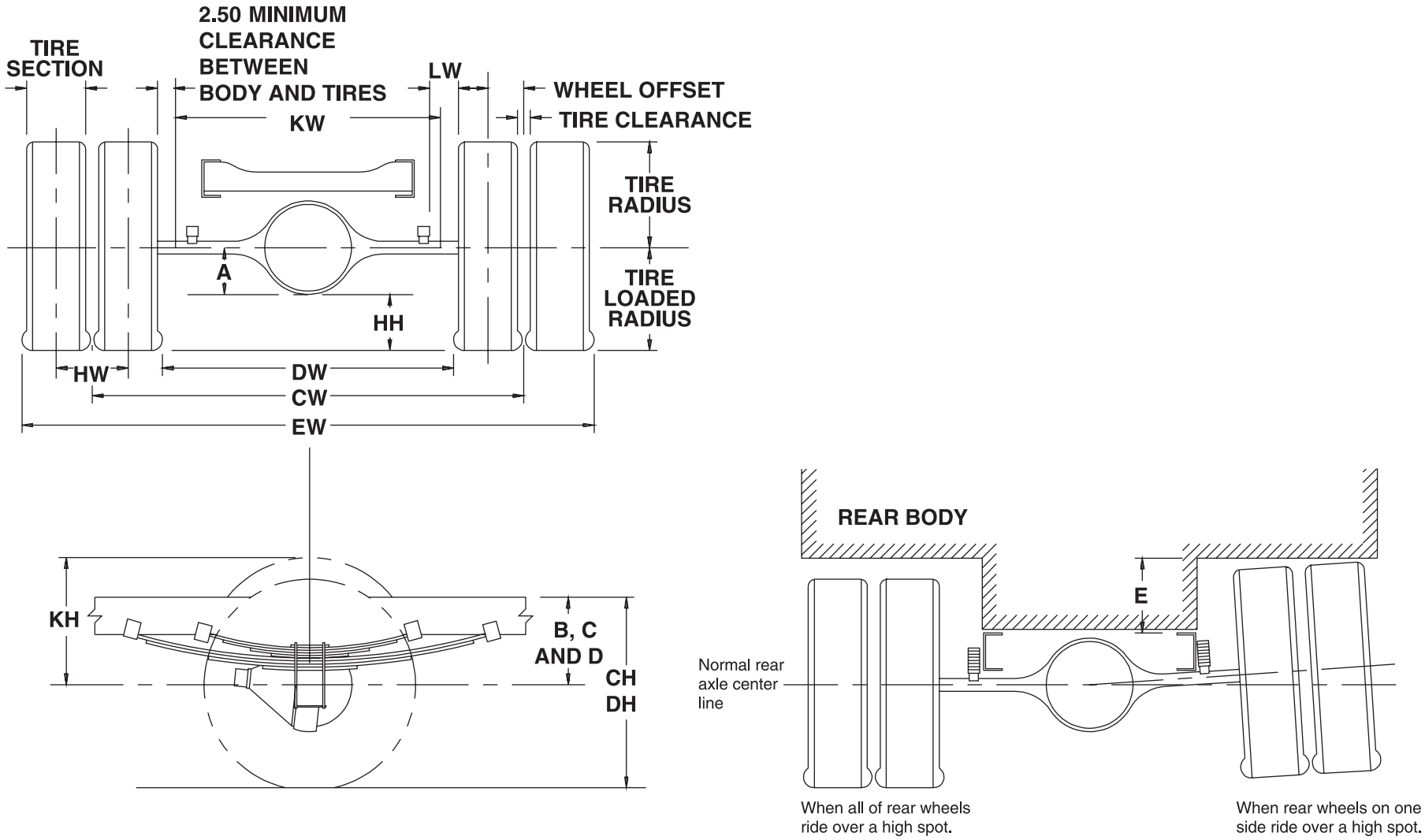


Figure 12.17.1

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.

Figure 12.18.1

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

Figure 12.18.2

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	15.3	13.4	8.4

Figure 12.18.3

Note: Dimensions in inches

NQR Suspension Deflection Charts

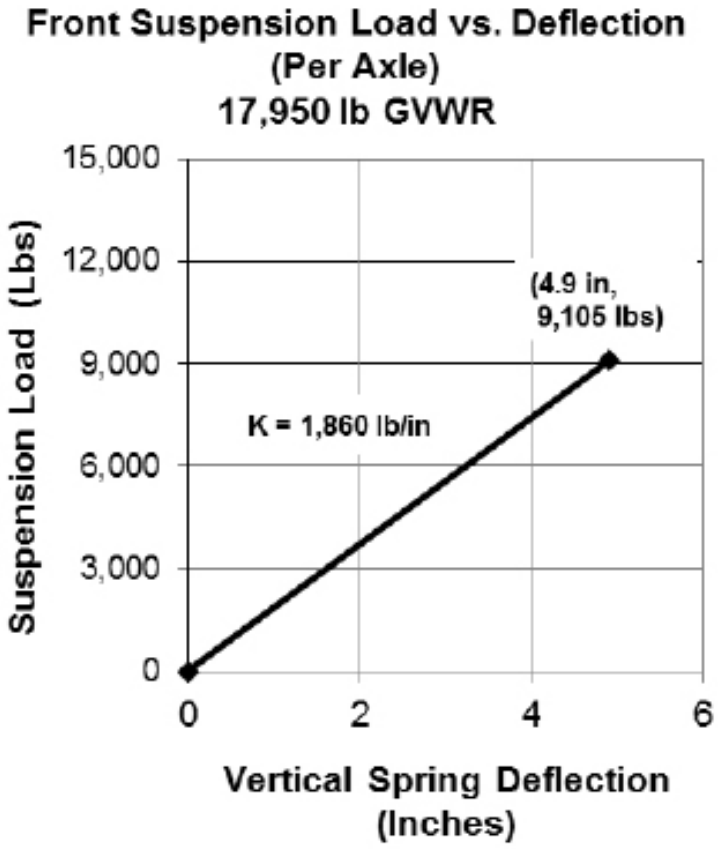


Figure 12.19.1

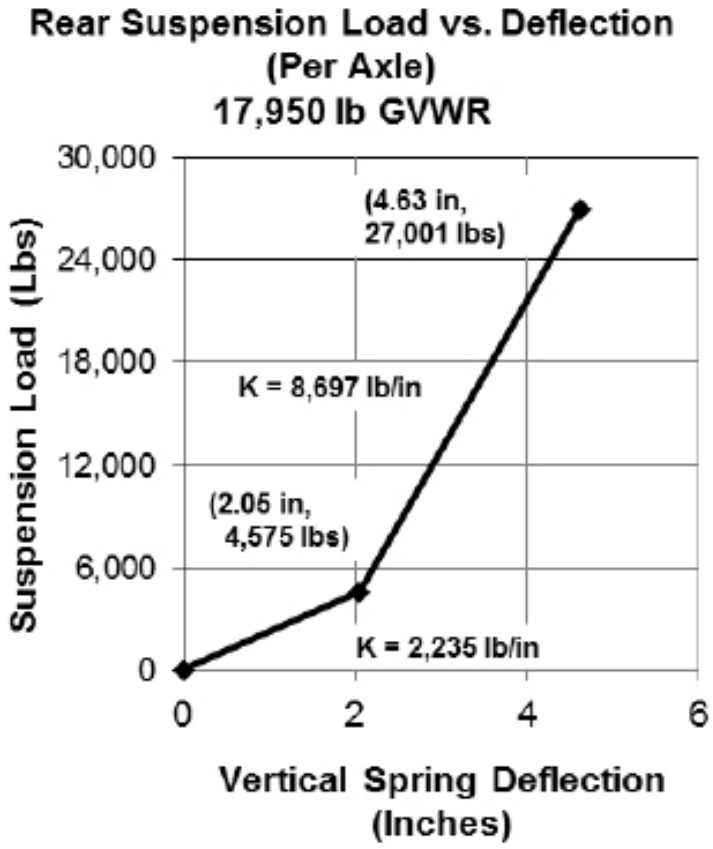


Figure 12.19.2

Tire and Disc Wheel Chart NQR

Tire

Tire Size	Tire Load Limit and Cold Inflation Pressures				Maximum Tire Load Limits (lbs.)		GVWR (Lbs.)
	Single		Dual		Front	Rear	
	Lbs.	PSI	Lbs.	PSI	2 Single	4 Dual	
225/70R 19.5F	3,450	90	3,245	90	7,280	13,660	17,950

Figure 12.20.1

Tire Size	GVWR (Lbs.)	Tire Radius				Tire Section Width	Tire Clearance	Design Rim Width
		Loaded		Unloaded				
		Front	Rear	Front	Rear			
225/70R 19.5F	17,950	14.91	14.96	16.00	16.00	8.7	1.3	6.0

Figure 12.20.2

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 Thickeness	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	5^0 DC	Steel TOPY

*O.D. Wrench Sizes

Figure 12.20.3

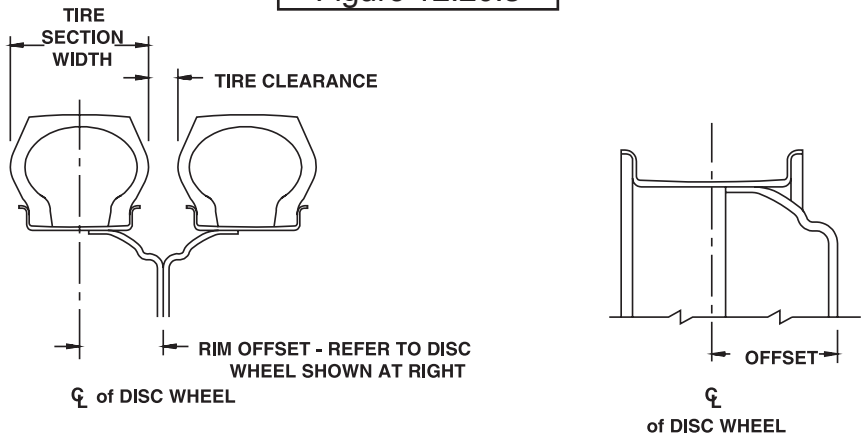


Figure 12.20.4

Note: Dimensions in inches

Propeller Shaft

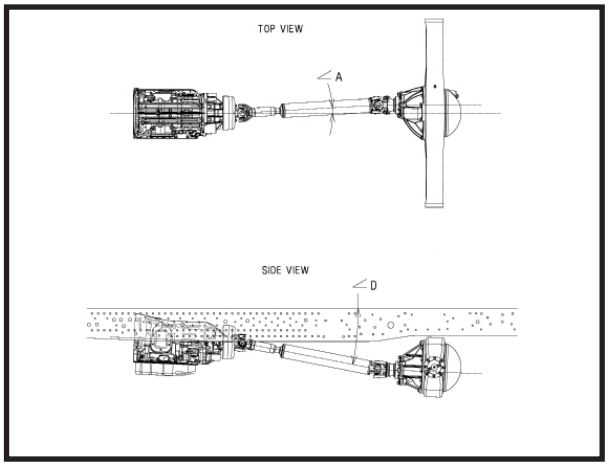


Figure 12.21.1

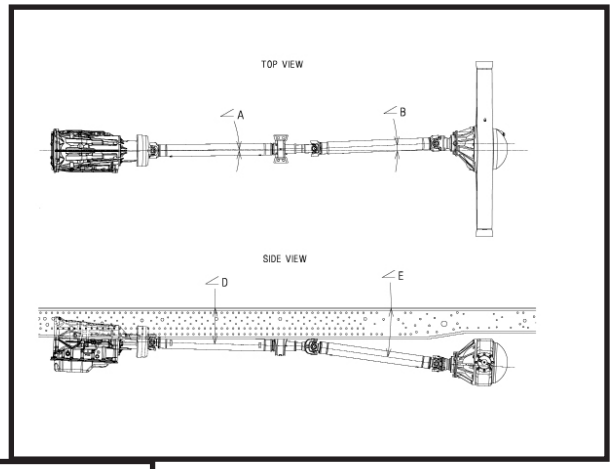


Figure 12.21.2

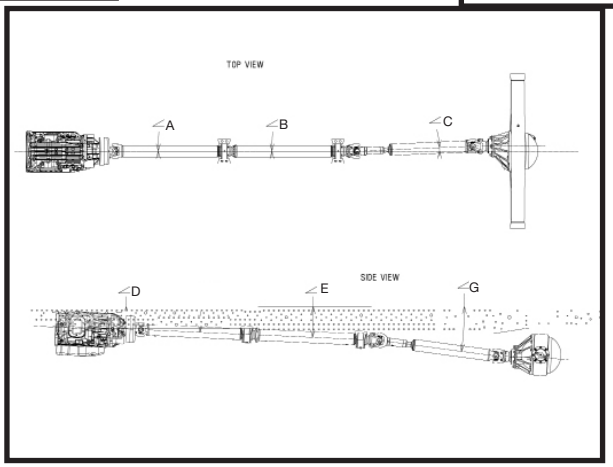


Figure 12.21.3

Wheelbase (in.)	Top View			Side View				
	∠A	∠B	∠C	∠D	∠E	∠F	Trans	Rear Axle
109	3.4°	-	-	11.3°	-	-	2.5°	2.7°
132.5	0°	3.3°	-	5.3°	7.7°	-	2.5°	2.7°
150	0°	3.2°	-	2.6°	8.0°	-	2.5°	2.7°
176	0°	2.2°	-	2.1°	5.6°	-	2.5°	2.7°
200	0°	0°	2.2°	2.1°	0.0°	5.6°	2.5°	2.7°

Notes: 1. Angles privuded in table are relative to the frame angle. Please take this into consideration for service measurements.
2. Driveline angles are based on the chassis curb weight which includes standard equipment, fuel but no driver, body, or payload.

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	35.7	22.91	40.24	49.69	49.69
Type	A	B	B	B	B
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	36.16	36.53	52.93	24.00
Type	N/A	C	C	C	B
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	52.93
Type	N/A	N/A	N/A	N/A	C

Figure 12.22.1

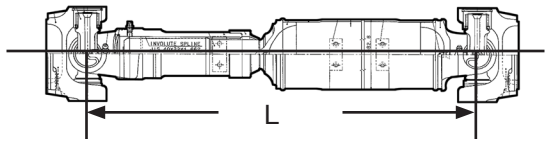
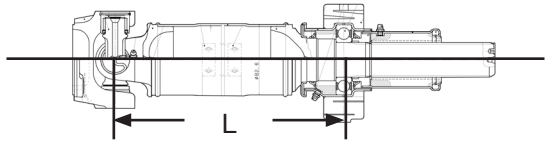
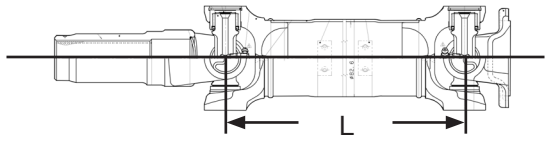
Type	Description	Illustration
Type **A**	1st shaft in 1-piece driveline	
Type **B**	1st shaft in 2-piece driveline 1st and 2nd shaft in 3-piece driveline	
Type **C**	2nd shaft in 2-piece driveline 3rd shaft in 3-piece driveline	

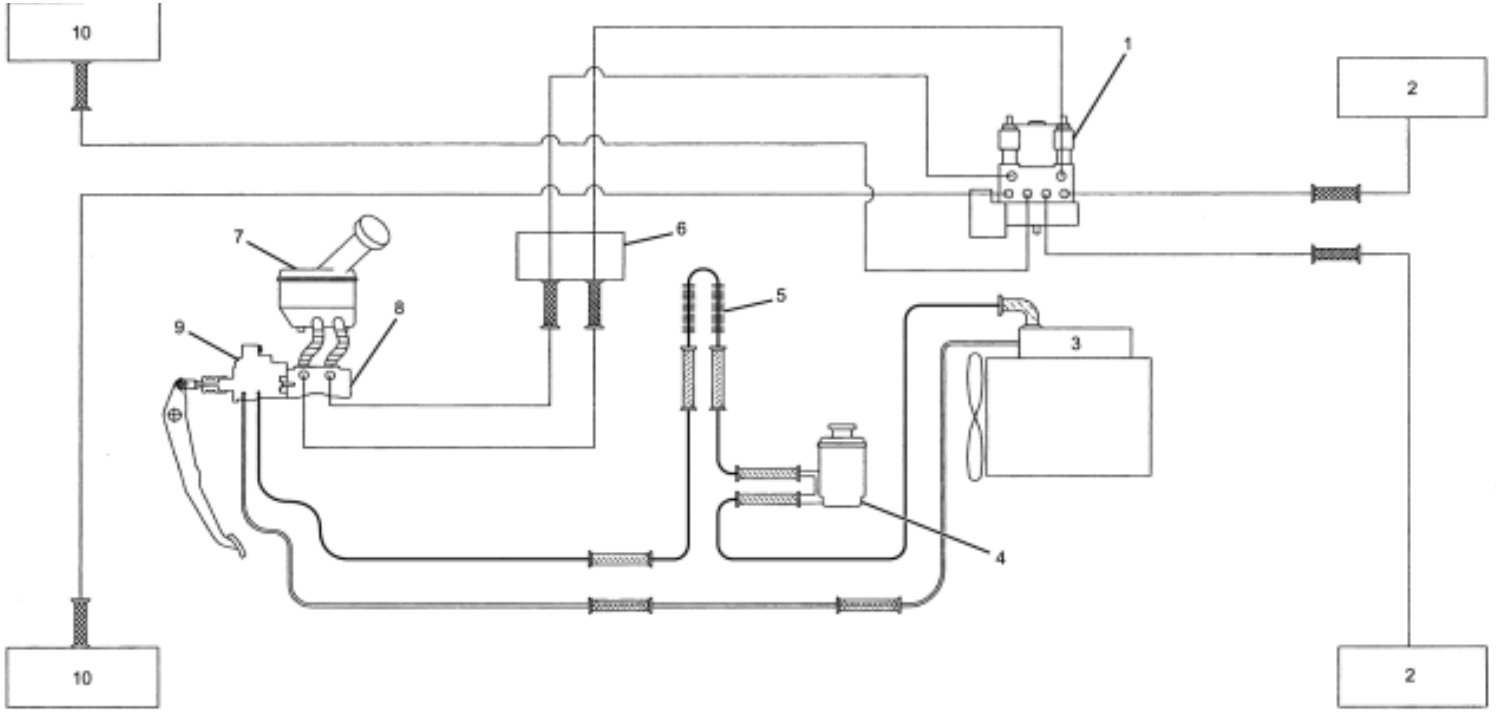
Figure 12.22.2

Note: Dimensions in inches

Brake System Diagram, Hydraulic Brake Booster

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

Legend for NQR, NRR Brake System
(1) Electronic Hydraulic Control Unit (EHCU)
(2) Rear Wheel Cylinder
(3) Hydraulic Booster Oil Pump
(4) Hydraulic Booster Reservoir
(5) Cooler Pipe
(6) Pipe Connector
(7) Brake Fluid Reservoir
(8) Master Cylinder
(9) Hydraulic Booster Unit
(10) Front Wheel Cylinder



BRAKE HOSE HIGH PRESSURE	BRAKE HOSE LOW PRESSURE	BRAKE PIPE	HYDRAULIC HOSE (SUPPLY)	HYDRAULIC HOSE (RETURN/SUCTION)	HYDRAULIC PIPE (SUPPLY)	HYDRAULIC PIPE (RETURN/SUCTION)

Figure 12.23.1

PTO Location, Drive Gear and Opening Information

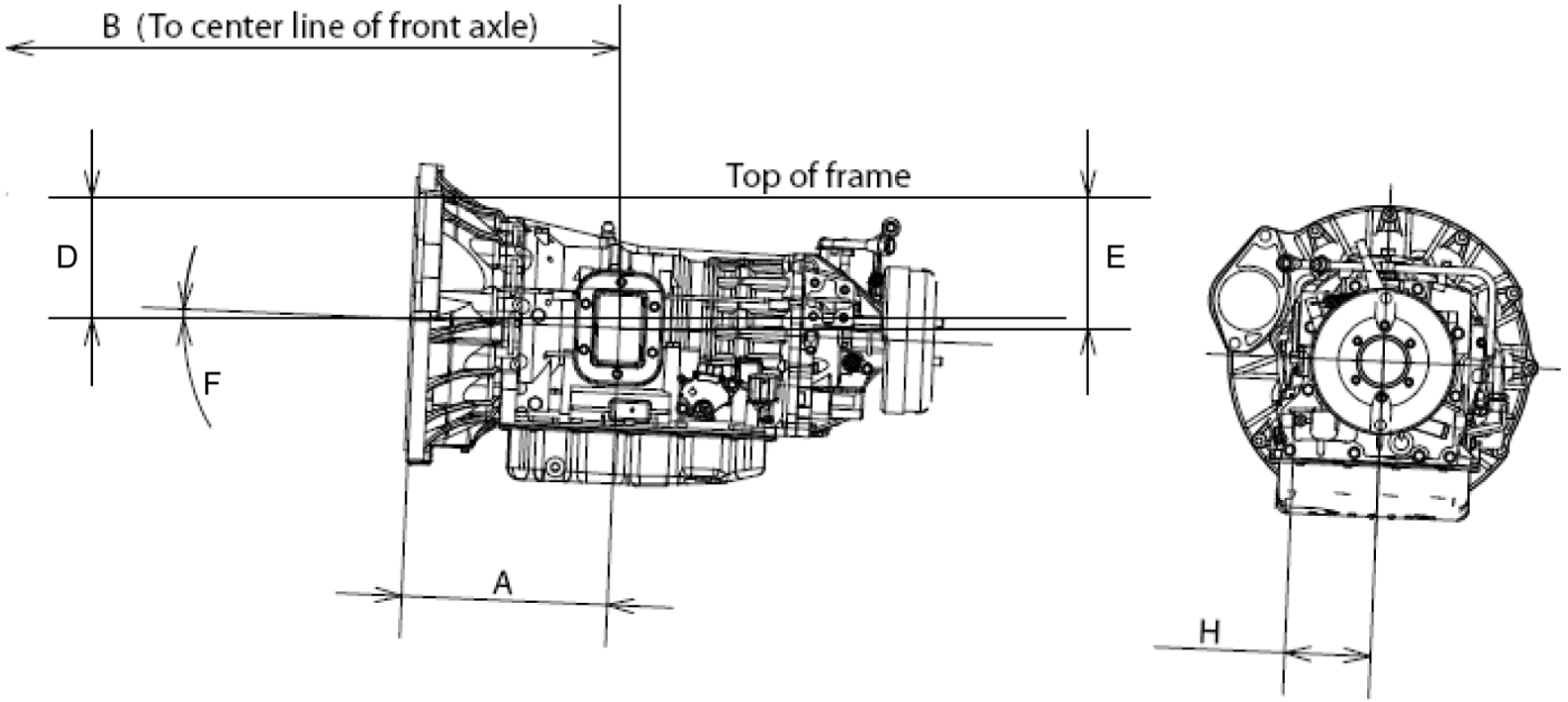


Figure 12.24.1

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	2.5^0	5.16	PTO Gear	1:1 with turbine	69	N/A	0^0	134 lbs.-ft. @ 1,700 RPM

Figure 12.24.2

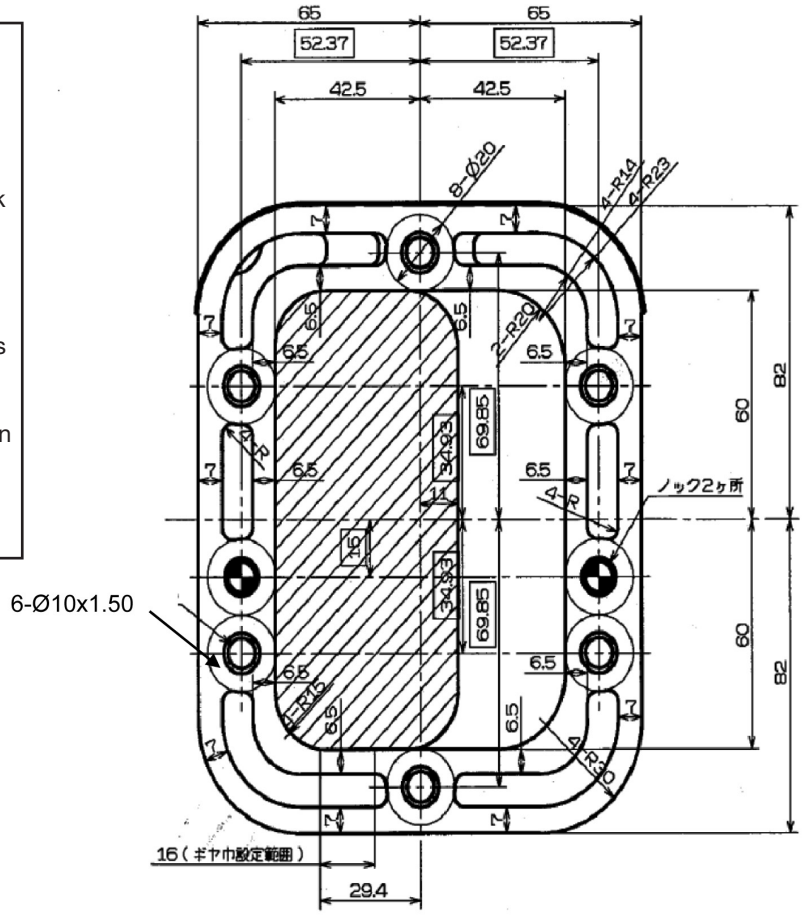
Note: Dimensions in inches

Opening Diagram

Aisin A460 Automatic Torque Converter
Lock Up Function.

In either the Stationary Preset PTO Mode or Stationary Variable PTO Mode, when engine rpm exceeds 1200 RPM, the torque converter will lock up. The engine rpm can not be modified and the lockup function cannot be turned off. Please not that with PTO applications that operate around 1200 RPM, the transmission software holds the torque converter in lockup until engine speed falls below 1100 RPM

The lock up function will cancel if the transmission shift lever is moved from the park or neutral positions which will remove the trasmission from the stationary mode.


65
65
52.37
52.37
42.5
42.5
8-Ø20
4-R14
4-R23
2-R20
6.5
6.5
6.5

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.
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.

Rear View Fuel Fill

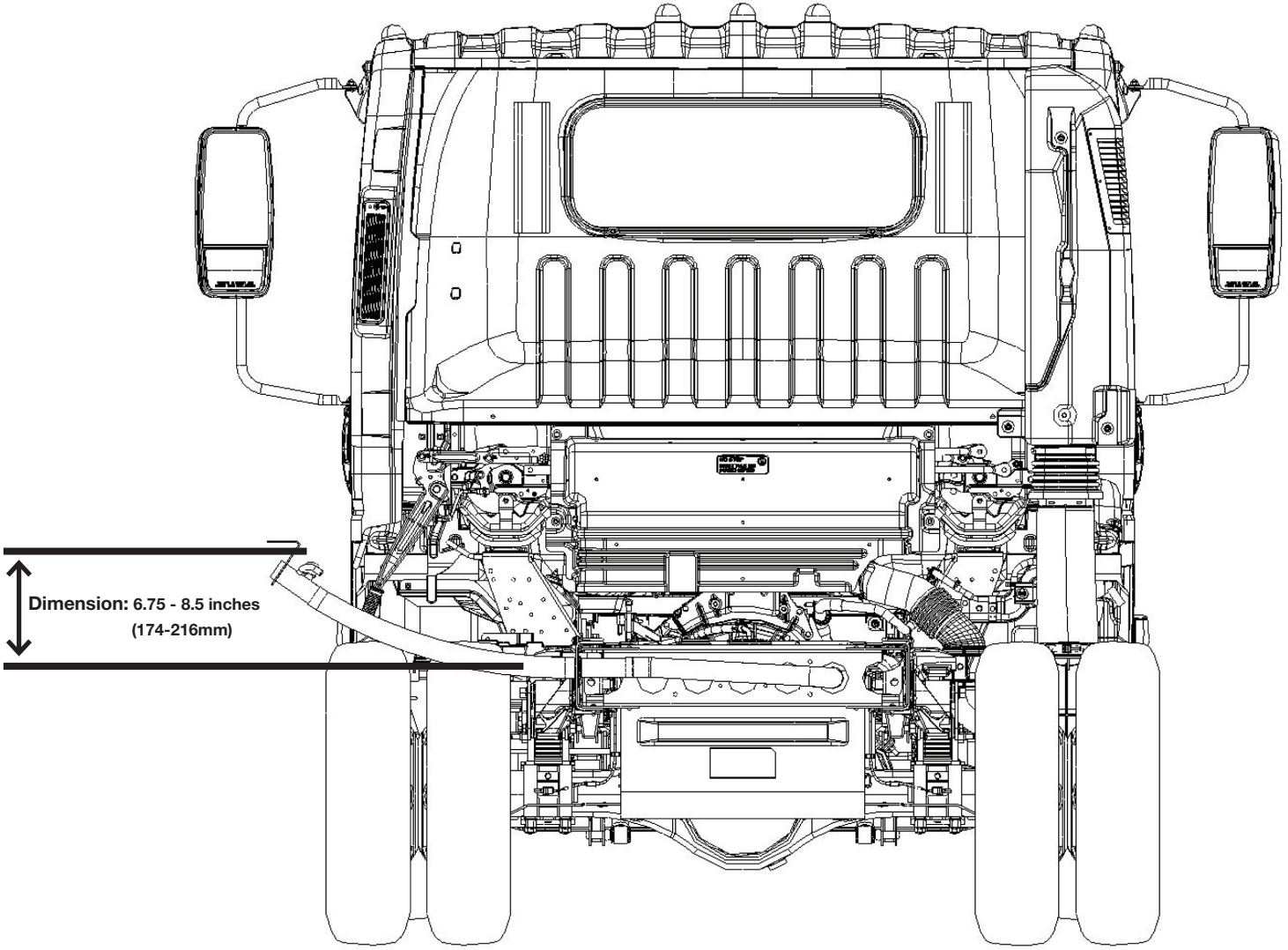
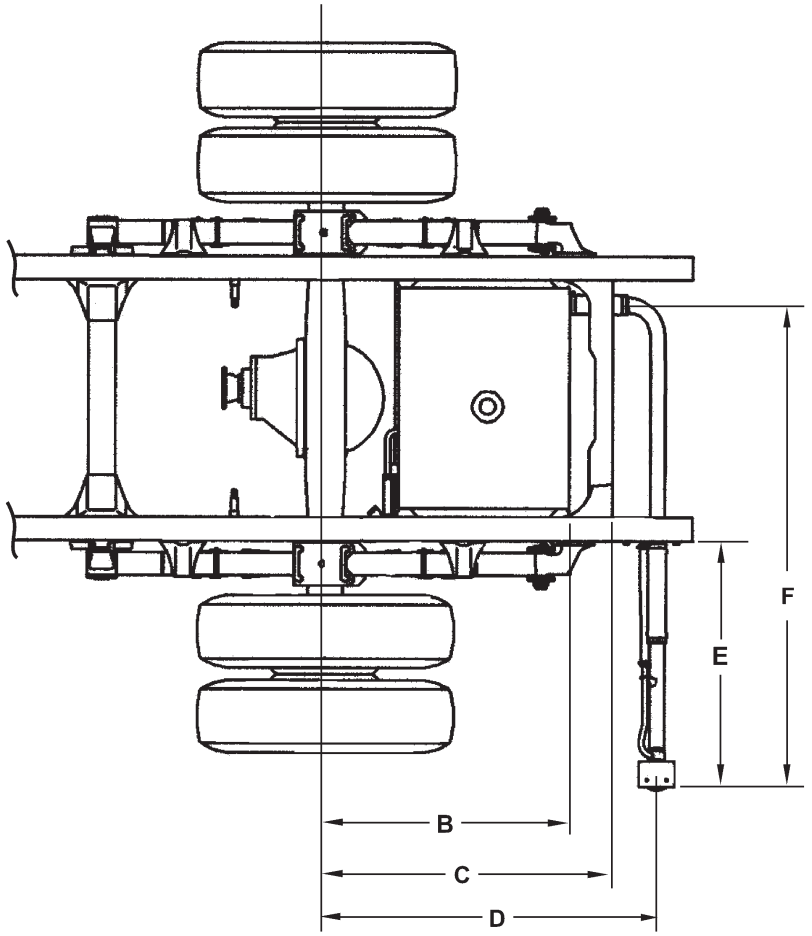


Figure 12.27.1

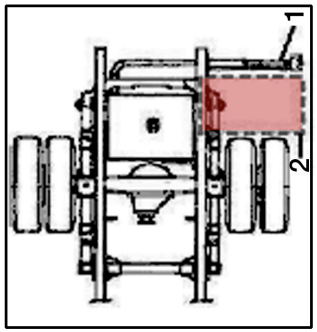
Top View Fuel Fill



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)

Figure 12.28.1

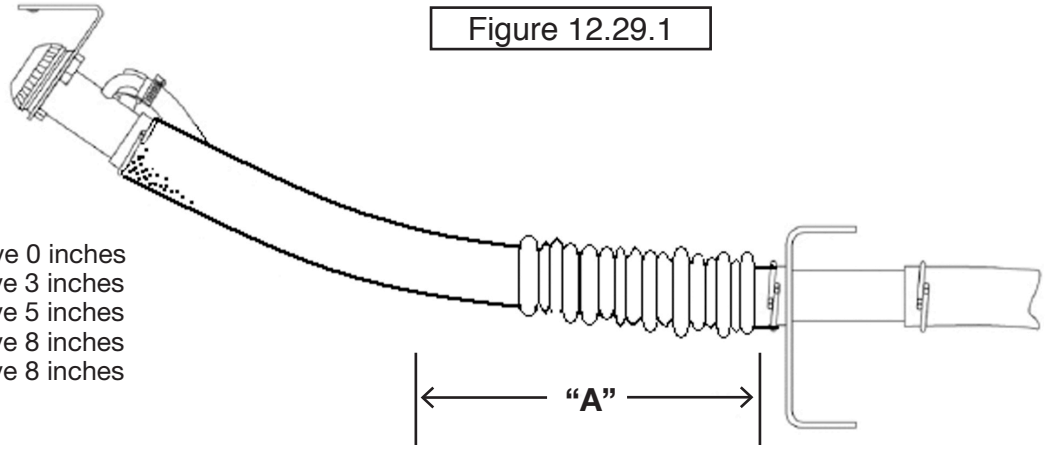
Hose Modification for Various Width Bodies and fuel fill vent Protection



Fuel fill vent and neck should be protected from road spray

1. FUEL FILLER NECK
2. RECOMMENDED MUD FLAP MOUNTING AREA (RED ZONE).

Figure 12.29.1



"A" Dimensions:
102 inch wide body remove 0 inches
96 inch wide body remove 3 inches
90 inch wide body remove 5 inches
86 inch wide body remove 8 inches
80 inch wide body remove 8 inches

Figure 12.29.2

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.



Figure 12.30.1

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.

Through the Rail Fuel Fill Frame Hole

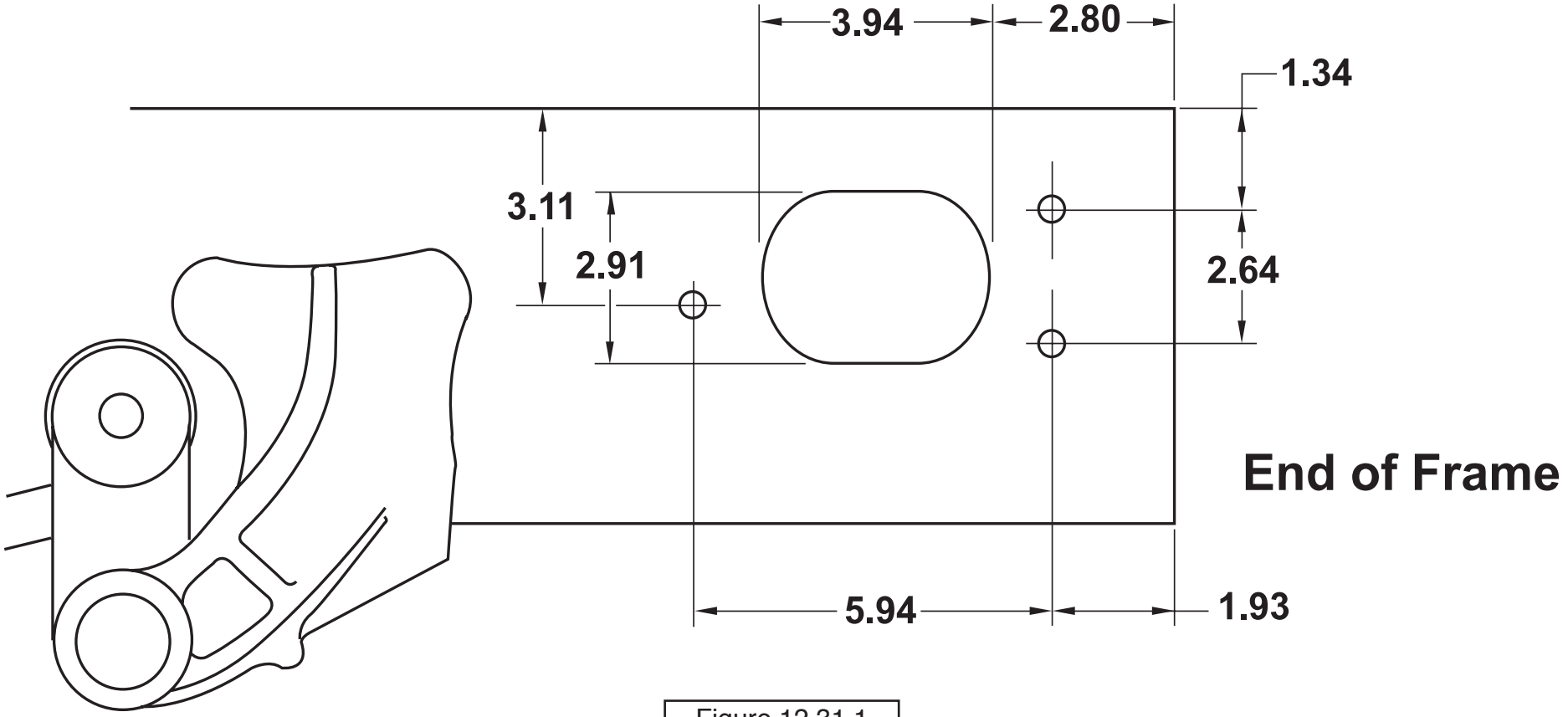


Figure 12.31.1

Note: Dimensions in inches

N-Diesel Fuel Filler Kit Instructions

Please review these instructions prior to installation of the fuel filler kit.

Parts Kit: There are two separate parts kits used for the 2011 and later model year N-diesel products. Fuel filler kit part number 898171 9090 is used for 14,500 lb and higher GVWR chassis (NPR-HD, NQR, NRR), For reference kit part number 898171 9080 is used for 12,000 lb GVWR chassis (NPR models).
Parts list is shown in ***Figure 12.31.2.*** Parts photos are shown in ***Figure 12.31.1.***

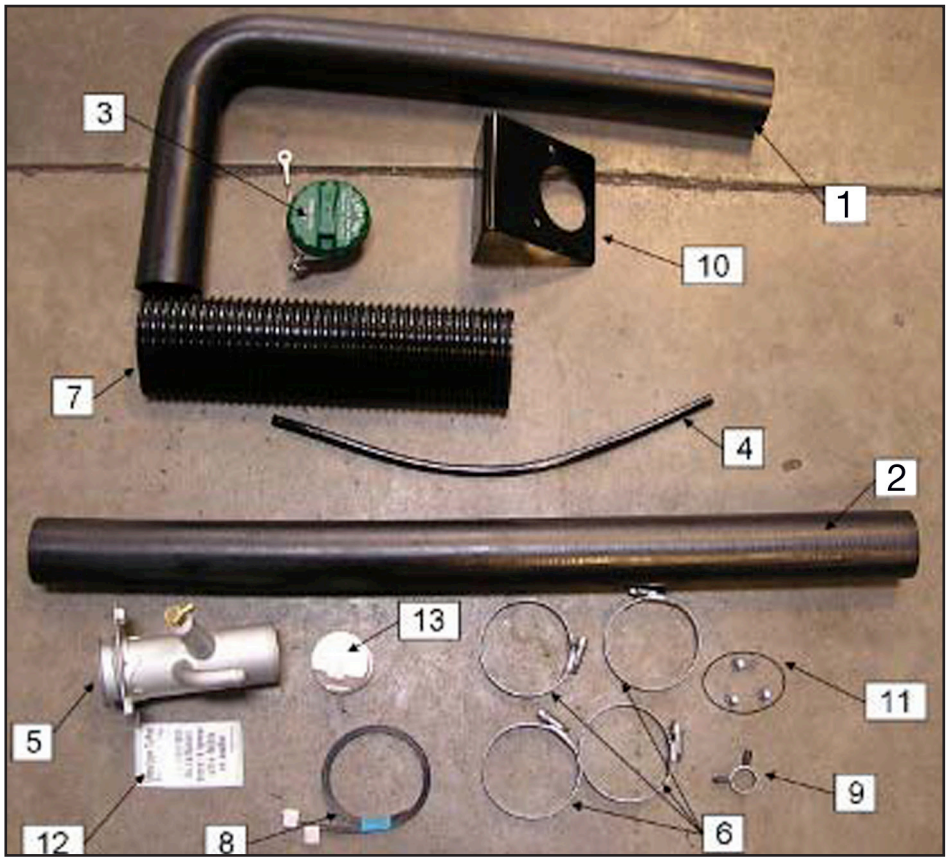


Figure 12.32.1

FUEL FILLER KIT, NPR-HD, NQR, NRR 898171 9090			
ITEM #	PART NAME	PART #	QTY
1	HOSE: FUEL FILLER NECK	898171 211Y	1
2	HOSE: FUEL FILLER	898006 450Y	1
3	CAP: FILLER	897218 702Y	1
4	HOSE: ROLL-OVER VALVE	898164 876Y	1
5	NECK ASM: FUEL FILLER	898164 877Y	1
6	CLIP: JOINT	898133 349Y	4
7	PROTECTOR: FILLER HOSE	897114 063Y	1
8	CLIP: BAND, HOSE FIXING	109707 107Y	2
9	CLIP: RUBBER, HOSE	894242 034Y	1
10	BRACKET: FILLER NECK	897116 621Y	1
11	SCREW: FILLER NECK	897581 217Y	3
12	CAUTION PLATE	898070 422Y	1
13	SHUTTER: FUEL TANK	898164 404Y	1

Figure 12.32.2

Installation Instructions and Considerations:

The fuel tank shutter valve (13) was a new component for 2011 model year. This component is meant to improve fuel splash-back performance of the fuel system. In the 2012 model year a running change was made and this valve (13) was relocated from the fuel tank inlet to the inlet (outboard side) of the fuel filler neck bulkhead assemble that is bolted to the left hand frame rail as shown in **Figure 12.32.1**. This plastic valve snaps into place in the inlet of the frame mounted fuel pipe. The valve should be installed so that the plastic clip is at the top of the valve, so that the flap door opens up, as shown in **Figures 12.32.2**.

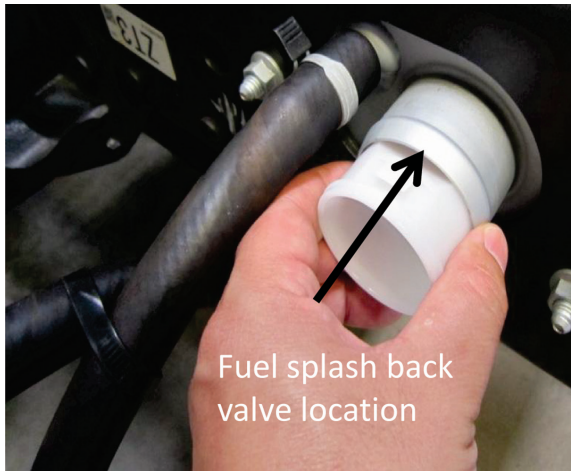


Figure 12.33.1

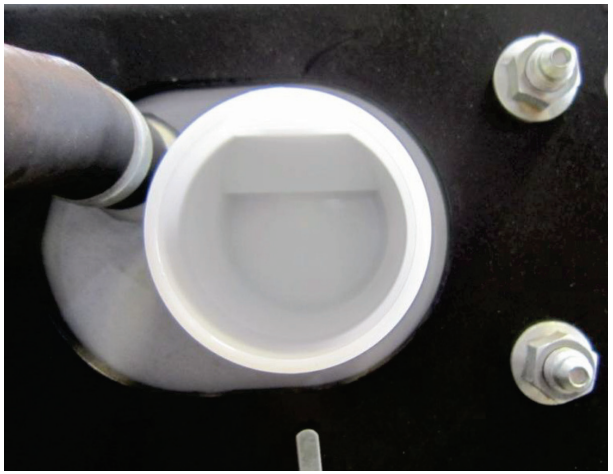


Figure 12.33.2

The fuel filler hose should be installed flush against the tank. The clamp should be installed between 1/16”and 3/8” from the tank. This is shown in ***Figure 11.32.3*** below.

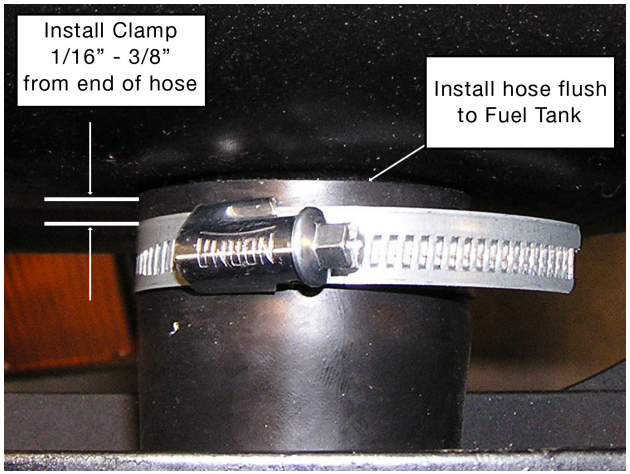


Figure 4

Figure 12.33.3

Roll-Over Valve Tubing

The roll-over valve has a hose attachment that will make this valve less sensitive to water intrusion. In order for the valve to work properly, it is critical that the hose be installed to the rollover valve. The proper assembly of the outer hose is shown in ***Figure 12.33.1.***

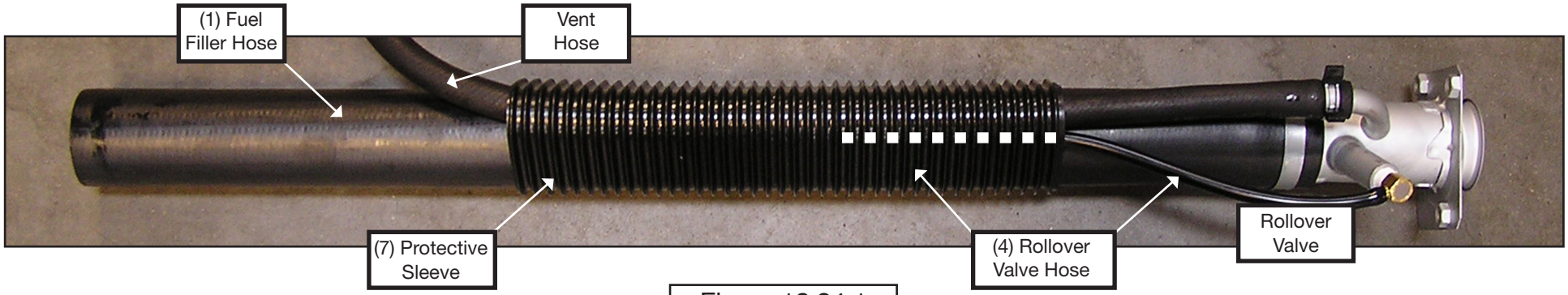


Figure 12.34.1

Filler Neck Installation:

The fuel filler neck (5) must be installed with the proper orientation on the body. The neck should be installed with the roll-over valve pointing upward, with the bottom edge of the neck oriented parallel to the ground, plus 33 to minus 7 degrees. See ***Figure 12.33.2.*** for the proper orientation.

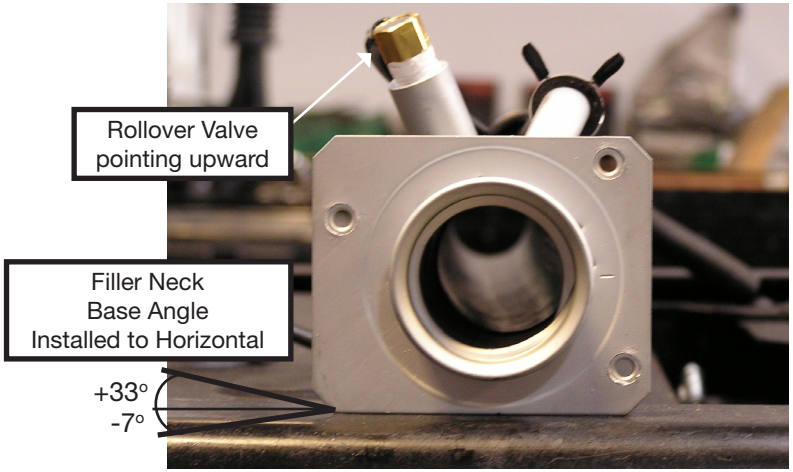


Figure 12.34.2

NPR XD Crew Cab Diesel Specifications

Model	NPR-XD Diesel Crew Cab
GVWR	16,000 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)	215 HP @ 2,500 rpm
Torque (Gross)	452 lb-ft torque @ 1,850 rpm
Equipment	Dry element air cleaner with vertical intake; 2 rows 564 square 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. Engine warning system with audible warning for low oil pressure, high coolant temperature, and low coolant level. Engine cruise control 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 automatic torque converter lockup in stationary PTO mode.
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	6,630 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	11,020 lbs.
Wheels	19.5 x 6.0-K 6-hole disc wheels, painted white.
Tires	225/70R-19.5F (12 ply) LRR (Low Rolling Resistance) 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 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 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 breathable 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 mats, tinted glass.
Electrical	12 Volt, negative ground, dual maintenance free batteries, 750 CCA each, 140 Amp alternator with integral regulator.
Options	See last page for options.

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

Vehicle Weights, Dimensions and Ratings

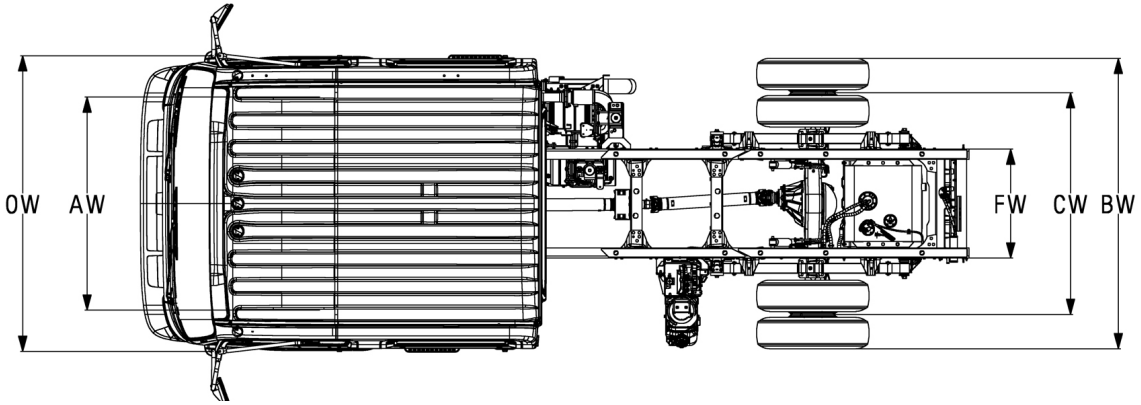


Figure 13.2.1

NPR XD Variable Chassis Dimensions:

Unit	WB	CA*	CE*	OAL	AF
Inch	150	88.5	131.6	241.5	43.1
Inch	176	114.5	157.6	267.5	43.1

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

NPR XD Dimension Constants:

Code	Inches	Code	Inches
AH	7.5	BW	83.3
AW	65.6	CW	65
BA	48.3	FW	33.5
BBC	109.9	OH	92.4
BOC	5.3	OW	81.3
FH	33.0		

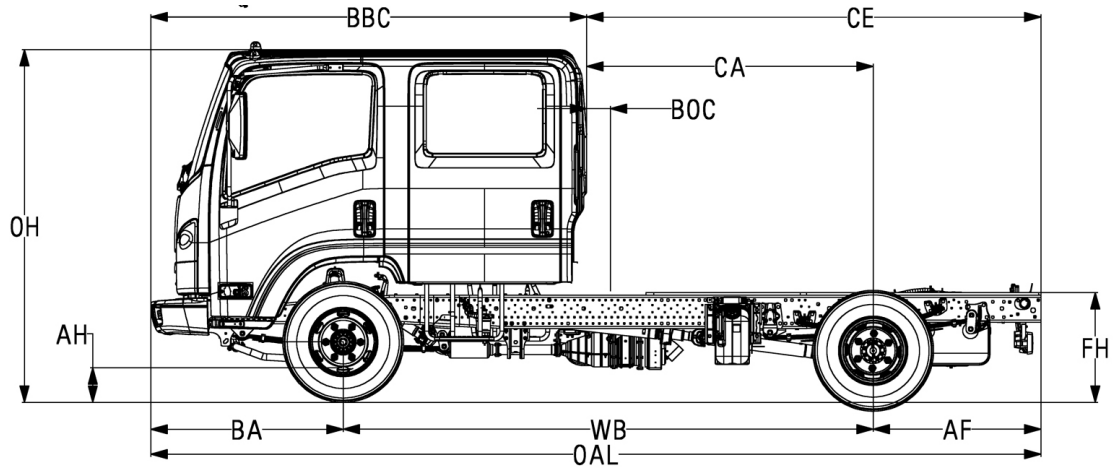


Figure 13.2.2

NPR XD In-Frame Tank
16,000 lb. GVWR Automatic Transmission Model
Chassis Cab and Maximum Payload Weights

Model	WB	Unit	Front	Rear	Total	Payload
NZ3	150 in	lb.	4610	2485	7095	8905
NZ4	176 in	lb.	4683	2477	7160	8840

2016 Isuzu Truck

Vehicle Weight Limits:

	NPR XD
GVWR Designed Maximum	16,000 lbs.
GAWR, Front	6,630 lbs.
GAWR, Rear	11,020 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.

RPO	DESCRIPTION STANDARD CAB	Weight (Lbs.) Front/Rear	
IF6	Fire Extinguisher and triangle kit mounted in rear organizer (3)	19.00	0.00
IG3	Engine oil pan heater (120v 300w)	2.00	0.00
IH2	Engine emergency shutdown system HWT, LWL, LOP (5)	0.00	0.00
IY9	Engine Idle shutdown (Timer set at 3 Minutes for engine shutdown)	0.00	0.00
I9A	Engine Idle shutdown (Timer set at 5 Minutes for engine shutdown)	0.00	0.00
IK9	33 Gallon Additional Diesel Fuel Tank mounted on LH side 176 wb crew cab	(7)	(7)
IY4	Delete Standard AM/FM/CD Radio	-3.00	0.00
I8H	AM/FM/CD Radio with Auxinput/USB port and Bluetooth	0.00	0.00
IL9	PTO Enable Switch and Engine Idle Up Switch recommended for PTO and Idle applications (2)	1.00	0.00
IS0	Heated mirrors	1.00	0.00
I9H	Heated dual remote control mirrors (15” head)	1.00	0.00
IV9	Seat covers crew cab (8)	9.00	2.00
IU2	Mirror Bracket for 102” wide body	1.00	0.00
IX2	Rear Body Dome Lamp Switch (6)	1.00	0.00
I66	Block heater (cord)	1.00	0.00
UZF	Back up alarm	2.00	0.00
V22	Chrome grill	1.00	0.00
I4K	Keyless Entry System		
I6K	Lockable DEF Fill Cap		
I1L	Speed Limited to 58 MPH	0	0
I2L	Speed Limited to 65 MPH	0	0
I3L	Speed Limited to 68 MPH	0	0
I4L	Speed Limited to 70 MPH	0	0
54	In rail fuel tank with power windows, door locks and air conditioning	80	0
64	In rail fuel tank with power windows, door locks, air conditioning and LSD (4)	80	15
74	Side mounted fuel tank w/power windows, power door locks and air conditiong	215	-124
84	Side mounted fuel tank w/power windows, power door locks, air conditioning and LSD (4)	215	-109

(1) RPO is Regular Production Option that is stocked in Port inventory.
LSO is Limited Stock Option that is stocked in Port inventory but should be checked for availability and delivery time. SEO is Special Equipment Option and requires 90-120 day lead time for delivery.

(2) These switches can be port or dealer installed. Please consult the body builders guide and / or the service manual for additional programming options and functions.

(3) Fire extinguisher and triangle kit mounted under rear seat on crew cab

(4) LSD factory installed Limited Slip Differential

(5) High Water Temperature (HWT), Low Water Level (LWL) and Low Oil Pressure (LOP)

(6) RPO must be ordered with Supreme Value Pak and Morgan Fast Track Body Programs

(7) Additional fuel tank mounted on the drivers side frame rail. Available with in rail tank only Available on 176 inch crew cab wheelbases only. (Weights: 102 lbs. front and +258 lbs. rear)

(8) Seat covers not available with suspension seat

Frame and Crossmember Specifications

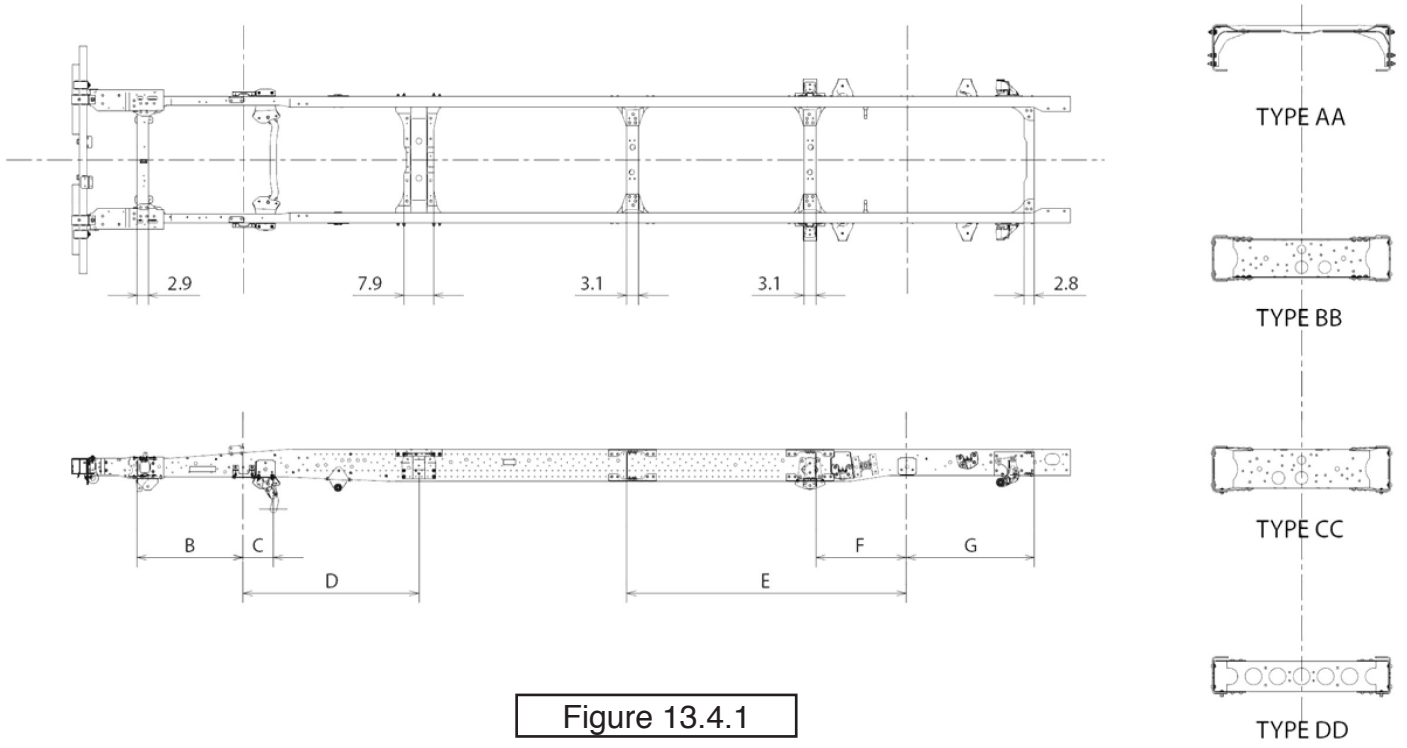


Figure 13.4.1

Wheelbase	Frame Thick	Crossmember Type/Location					
		B	C	D	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

Figure 13.4.2

Note: Dimensions in inches

Frame Chart

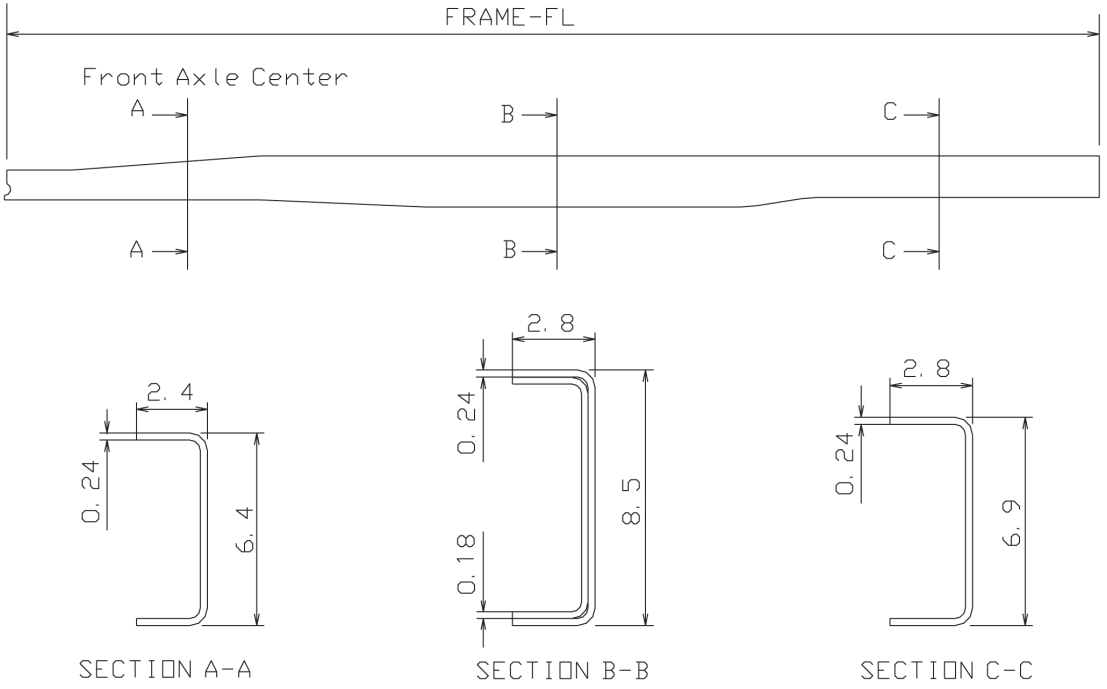


Figure 13.5.1

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

Figure 13.5.2

Note: Dimensions in inches

NPR-XD Diesel Standard Crew Cab Top View

Wb	A	B
150	67.0	101.6
176	76.5	111.1

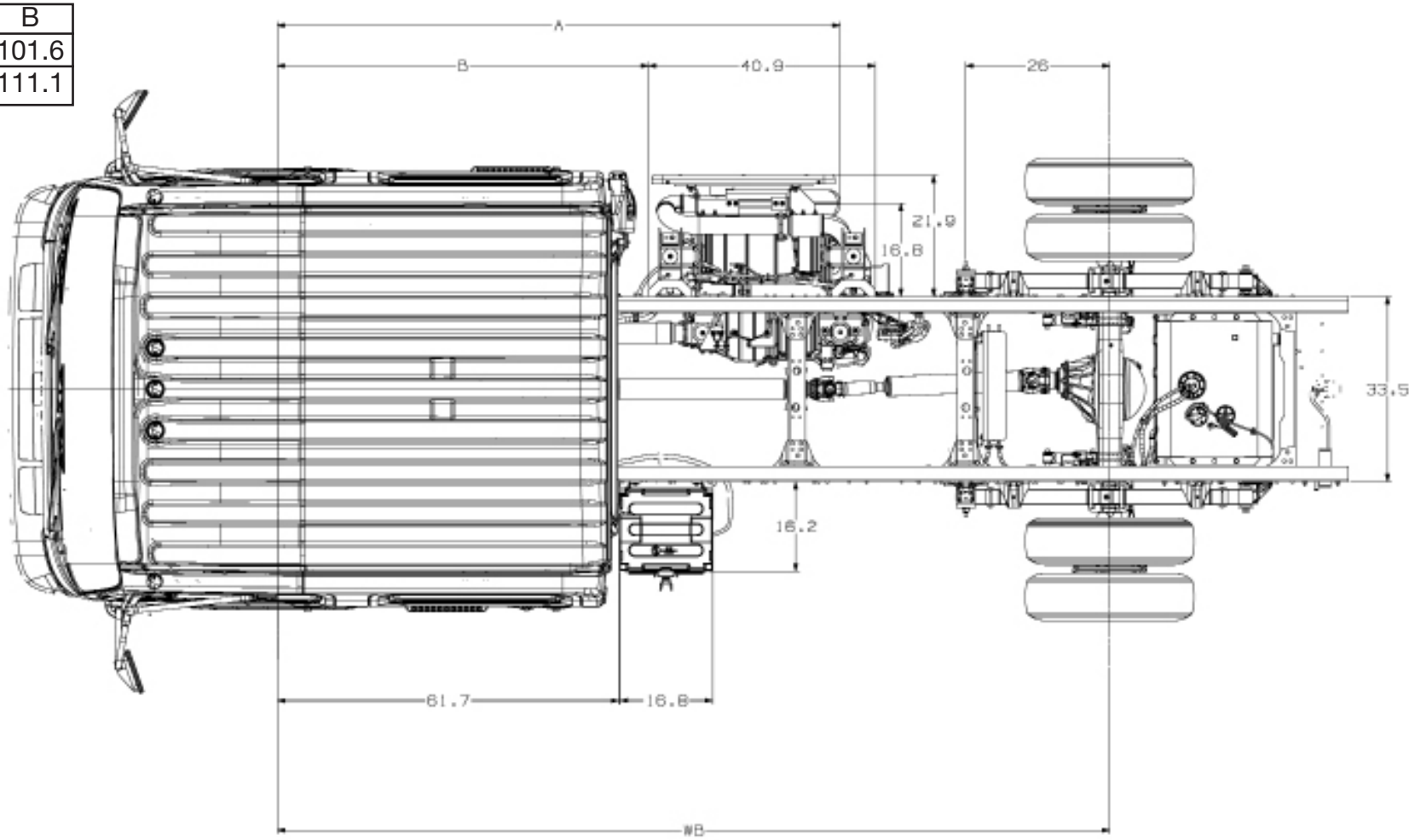


Figure 13.6.1

Note: Dimensions in inches

NPR-XD Diesel Standard Crew Cab Left Side View

WB	A
150	104.3
176	113.8

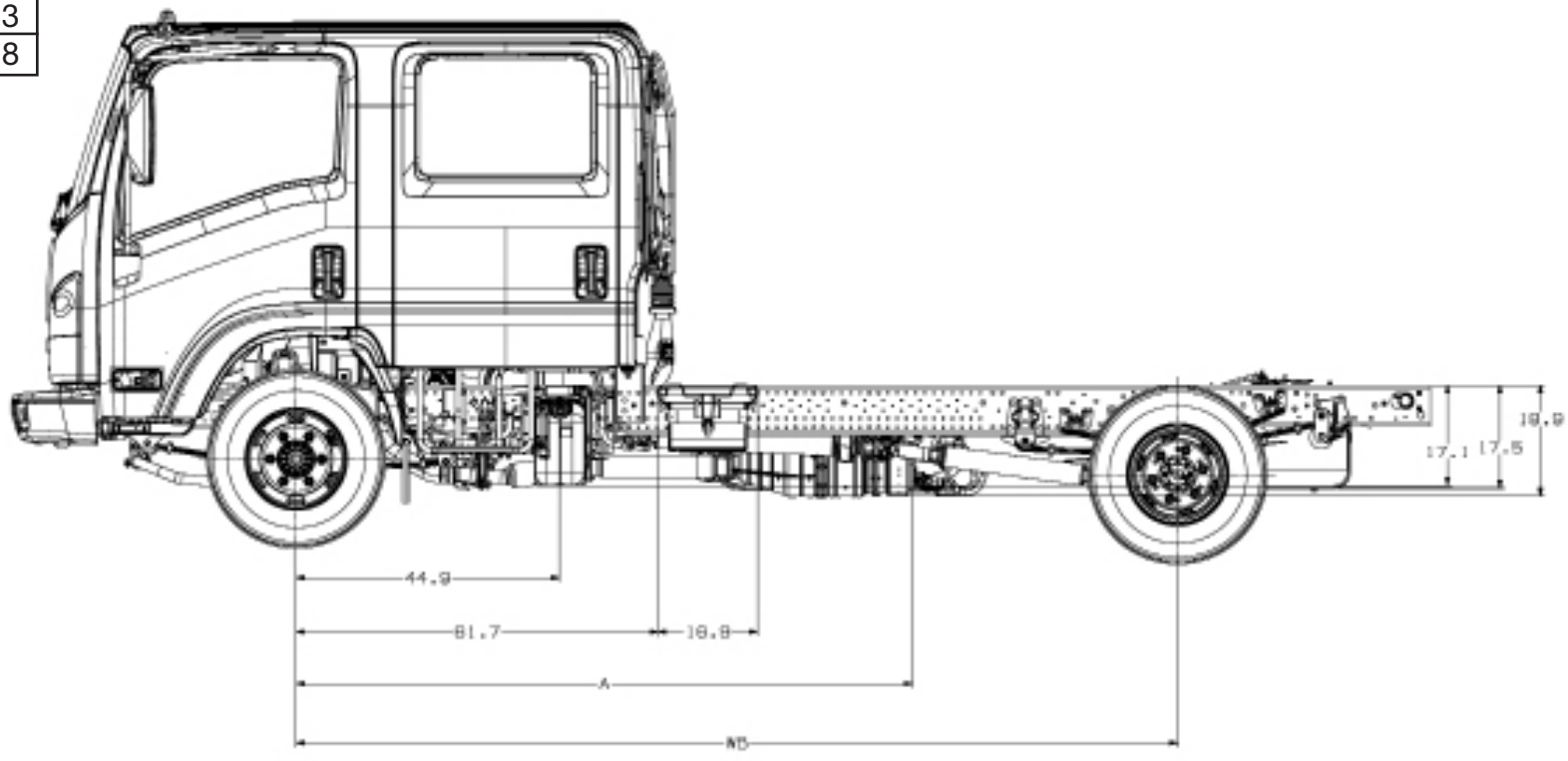


Figure 13.7.1

Note: Dimensions in inches

NPR-XD Diesel Standard Crew Cab Right Side View

WB	A
150	67.6
176	77.1

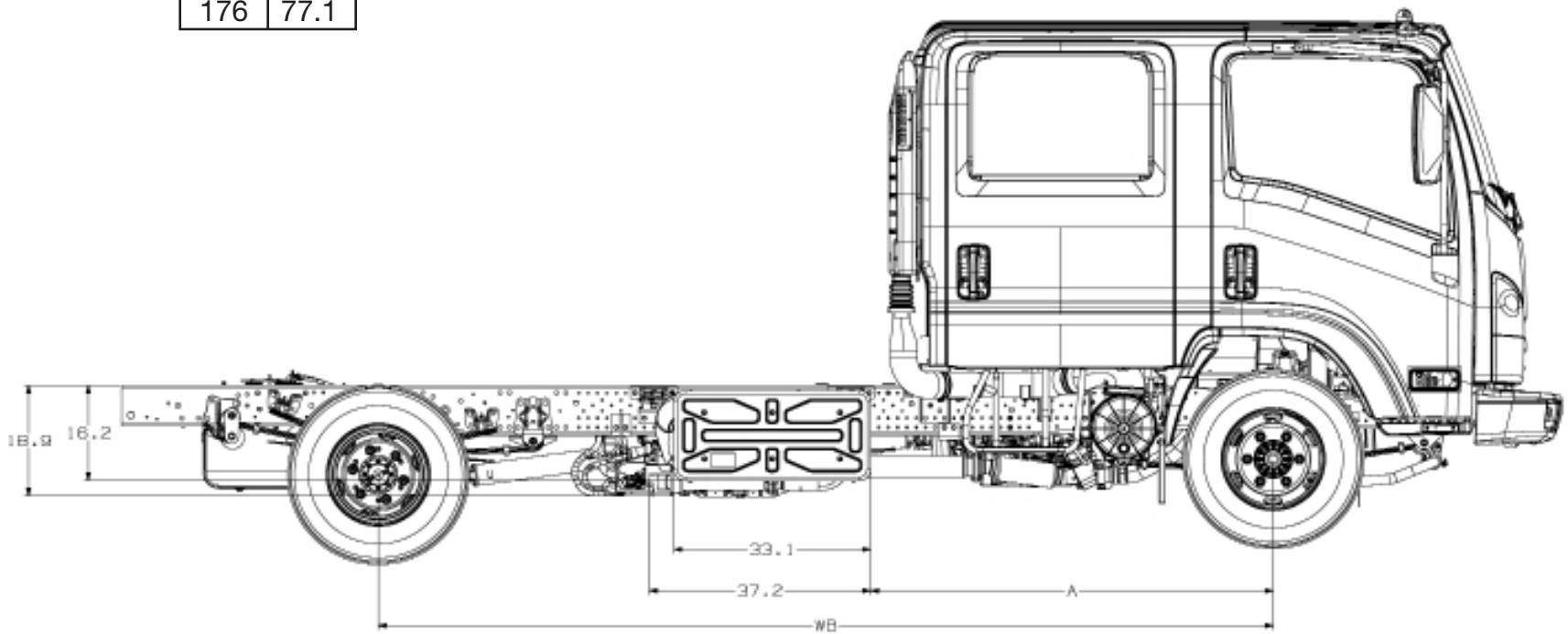


Figure 13.8.1

Note: Dimensions in inches

SCR / DPF 4HK1-TC

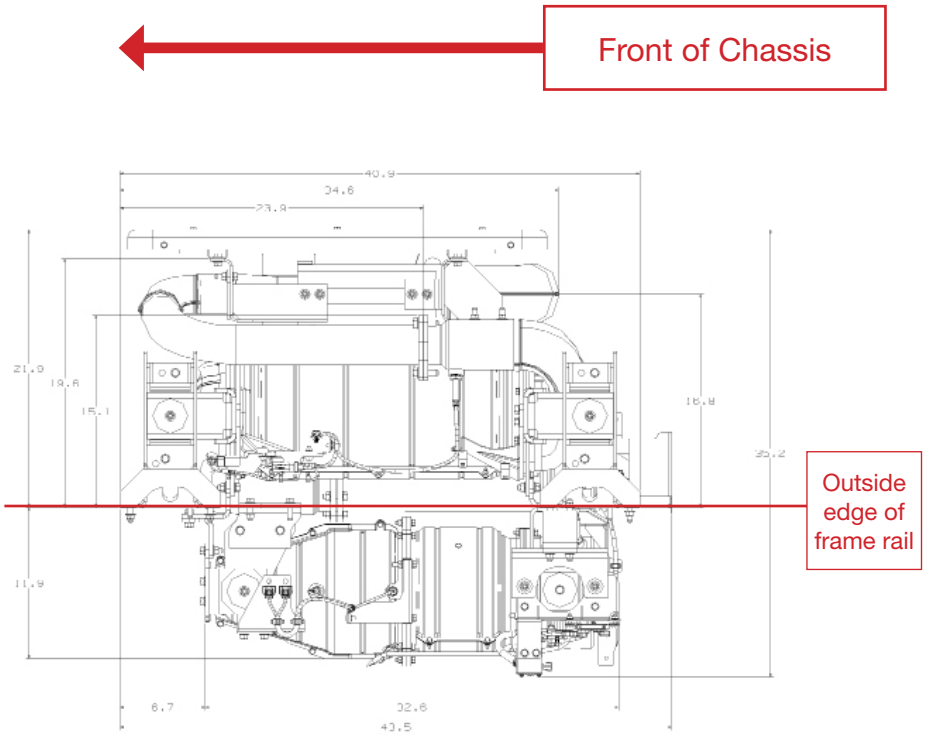


Figure 13.9.1

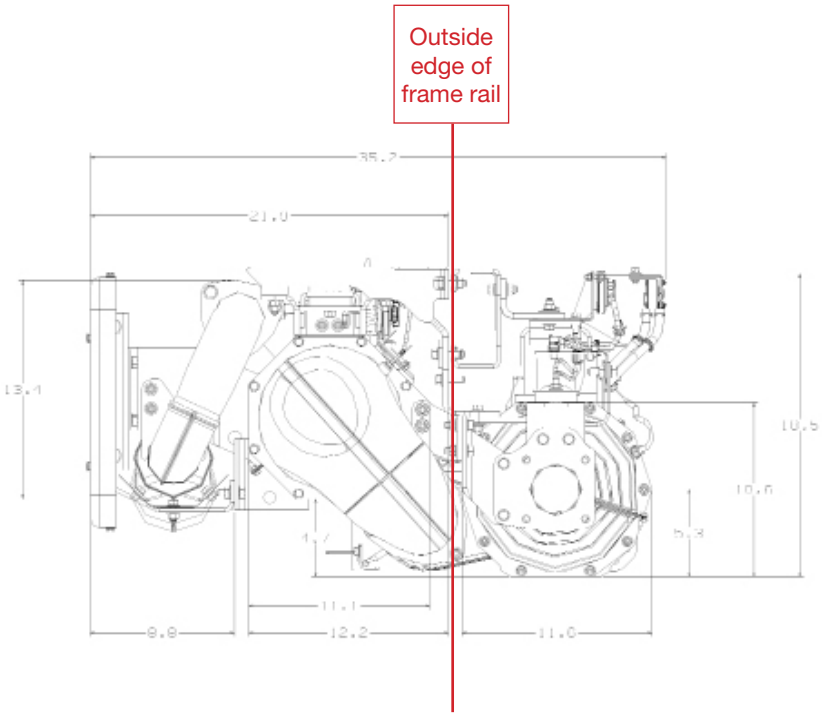


Figure 13.9.2

Note: Dimensions in inches

Option Side Fuel Tank in addition to the Standard In Rail Fuel Tank RPO IK9
Side View 176 Wheelbase

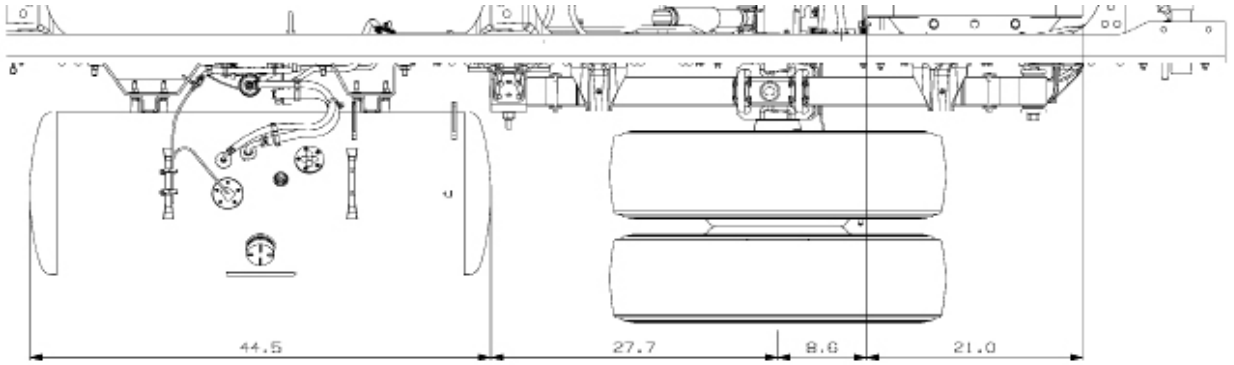


Figure 13.10.1

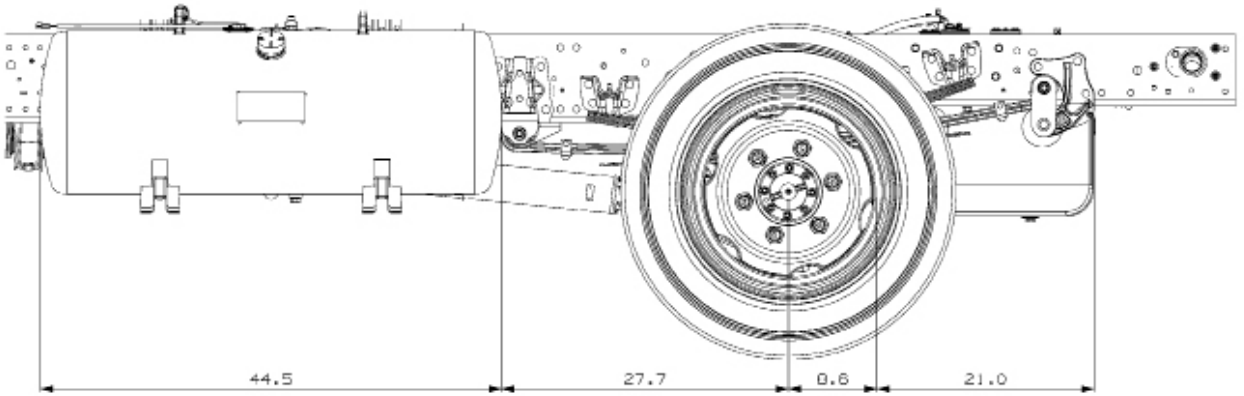


Figure 13.10.2

Note: Dimensions in inches

CENTER OF GRAVITY

Horizontal and Vertical CG of Chassis

NPR-XD		
WB	**V**	**H**
150	**25.3**	**50.9**
176	**25.3**	**58.8**

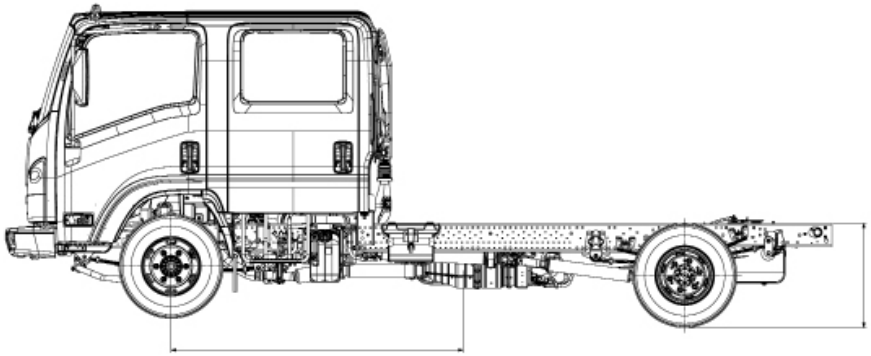


Figure 13.11.1

The center of gravity of the completed vehicle with a full load should not exceed 63 inches above ground level for the 16,000 lbs. GVWR, and must be located horizontally between the centerlines of the front and rear axles.

NOTE: The Final Manufacturer must ensure that the combined vertical center of gravity of the chassis, body, and available payload at full GVW does not exceed the maximum vertical center of gravity outlined in the Isuzu Incomplete Vehicle Document and the Isuzu Body Builders Guide**.** Additional Information may be obtained by contacting ISUZU Commercial Trucks of America(ICTA)Applications Engineering on the West Coast call 1-562-229- 5240 and in the East Coast call 1-770-740-1620 X 262.

Note: Dimensions in inches

Front Axle Chart NPR-XD

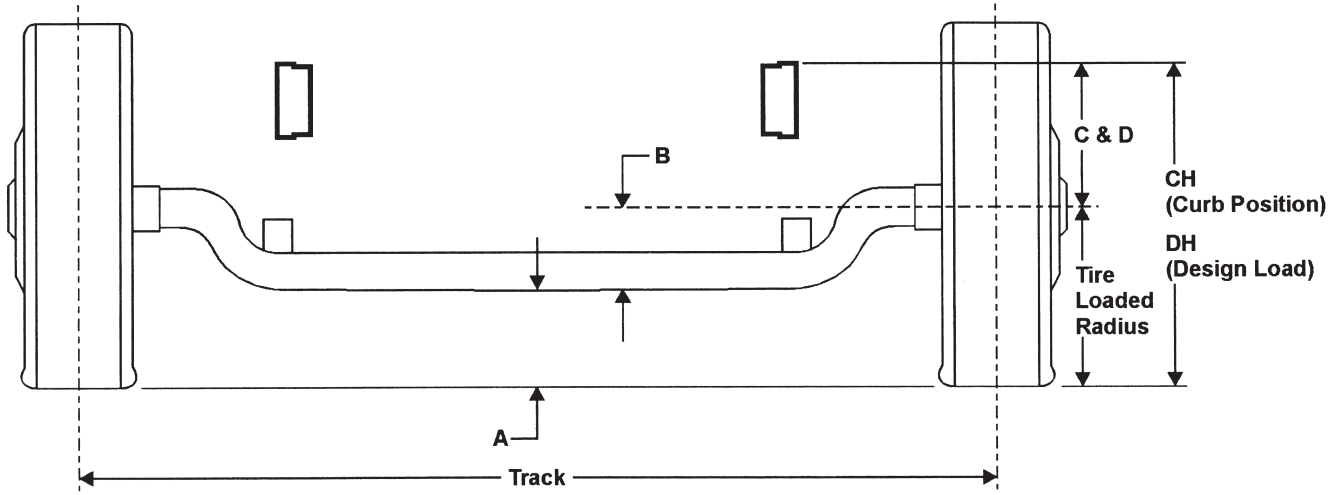


Figure 13.12.1

Formulas for calculating height dimensions:

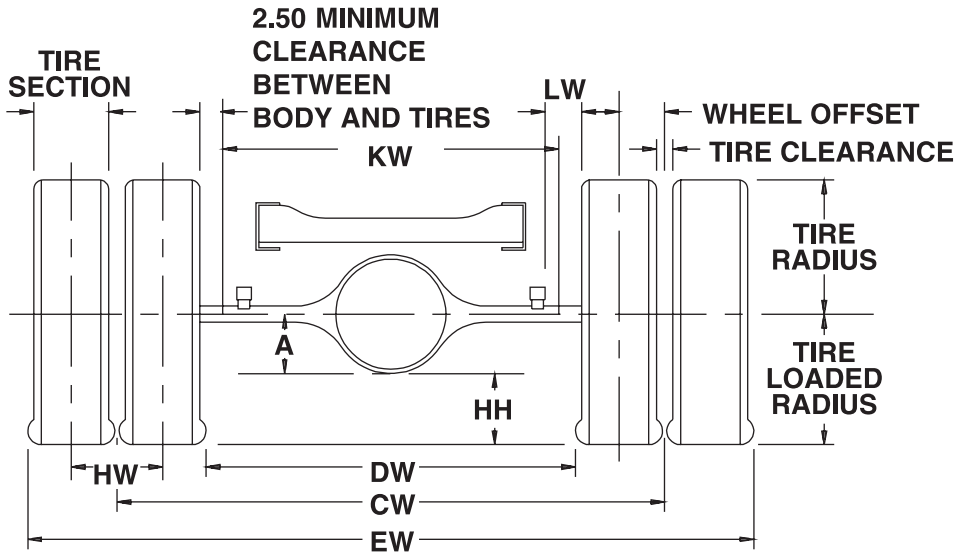
A = Tire Loaded Radius – B
C = Centerline of Axle to Top of Frame Rail at Curb Position
D = Centerline of Axle to Top of Frame Rail at Design Load
CH = C + Tire Unloaded Radius
DH = D + Tire Loaded Radius

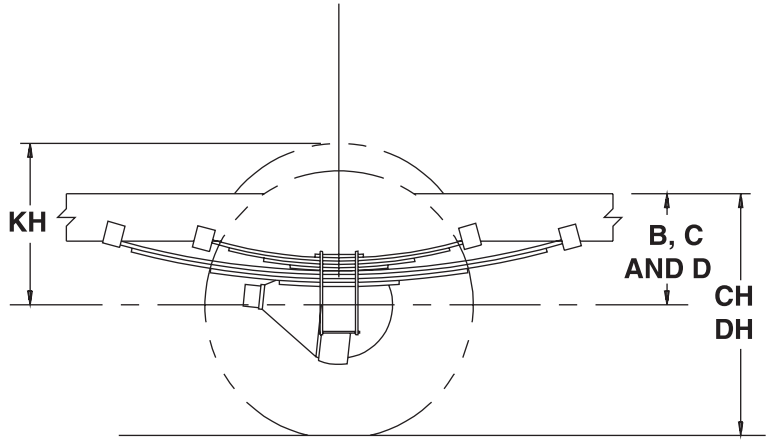
Tire	GVWR	GAWR	A	B	C	D	CH	DH	Track	Tire Radius	
										Unload	Load
225/70R 19.5F	16,000 lbs.	6,630 lbs.	8.6	6.6	12.3	11.5	28.4	26.7	65.5	16.1	15.24

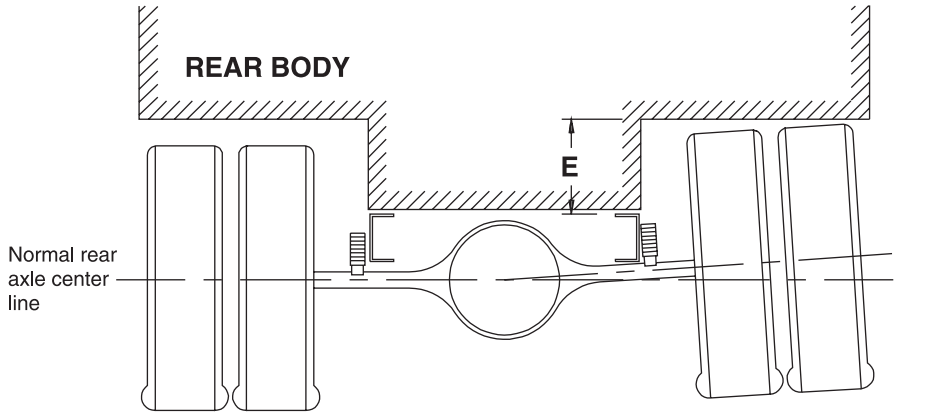
Figure 13.12.2

Note: Dimensions in inches

Rear Axle Chart NPR XD







When all of rear wheels ride over a high spot.

When rear wheels on one side ride over a high spot.

Figure 13.13.1

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.

Figure 13.14.1

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

Figure 13.14.2

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

Tire	GAWR	Track CW	A	B	C	D	E
225/70R-19.5F	11,020 lbs.	65.0	7.7	9.3	15.5	13.4	8.4

Figure 13.14.3

Note: Dimensions in inches

NPR XD Suspension Deflection Charts

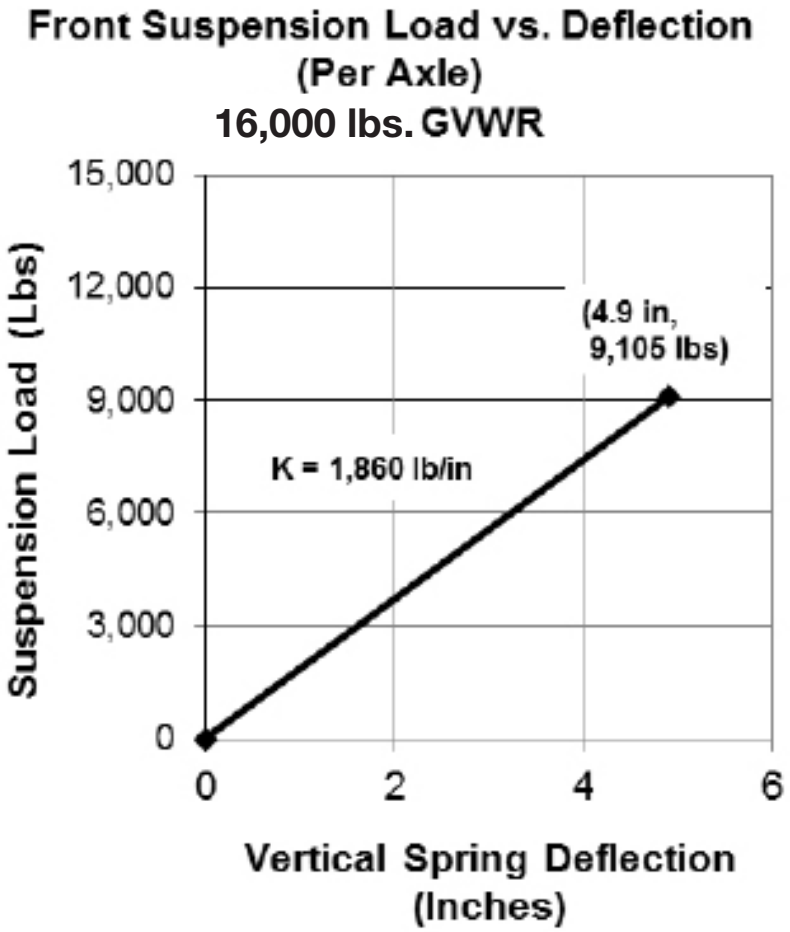


Figure 13.15.1

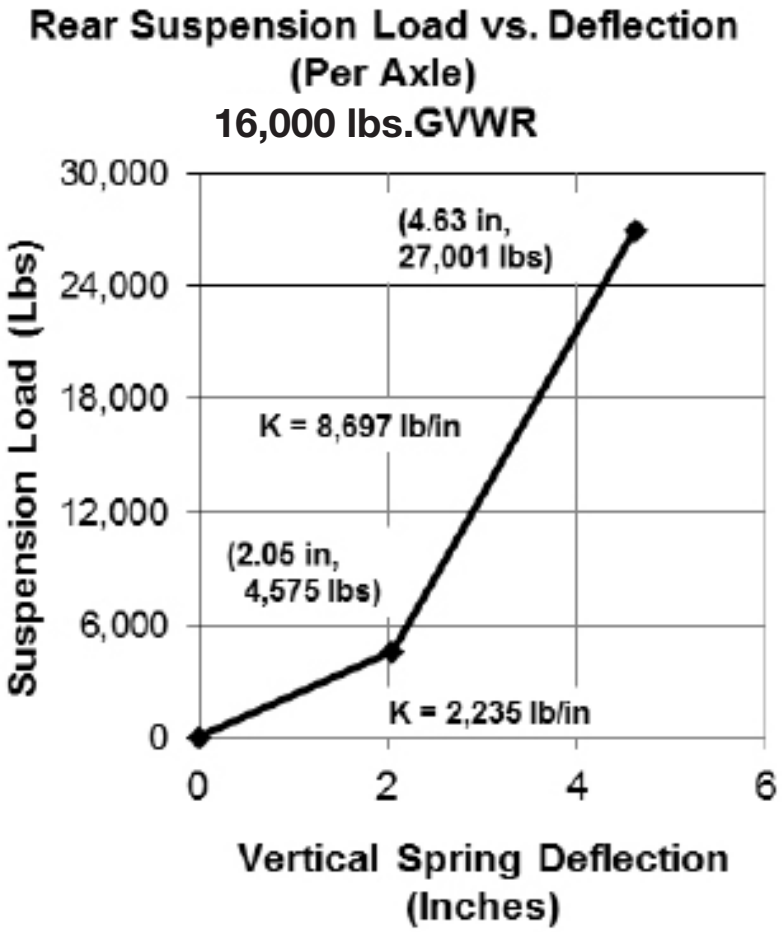


Figure 13.15.2

Tire and Disc Wheel Chart NPR XD

Tire

Tire Size	Tire Load Limit and Cold Inflation Pressures				Maximum Tire Load Limits (lbs.)		GVWR (Lbs.)
	Single		Dual		Front	Rear	
	Lbs.	PSI	Lbs.	PSI	2 Single	4 Dual	
225/70R 19.5F	3,315	85	3,115	85	6,630	12,460	16,000

Figure 12.16.1

Tire Size	GVWR (Lbs.)	Tire Radius				Tire Section Width	Tire Clearance	Design Rim Width
		Loaded		Unloaded				
		Front	Rear	Front	Rear			
225/70R 19.5F	16,000	14.93	14.98	16	16	8.7	1.3	6.0

Figure 13.16.2

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 Thickeness	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	15^0 DC	Steel TOPY

*O.D. Wrench Sizes

Figure 13.16.3

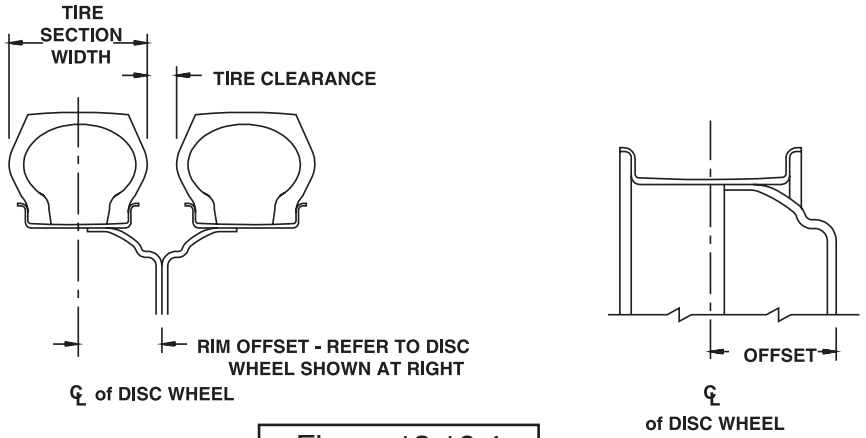


Figure 13.16.4

Note: Dimensions in inches

Propeller Shaft NPR XD

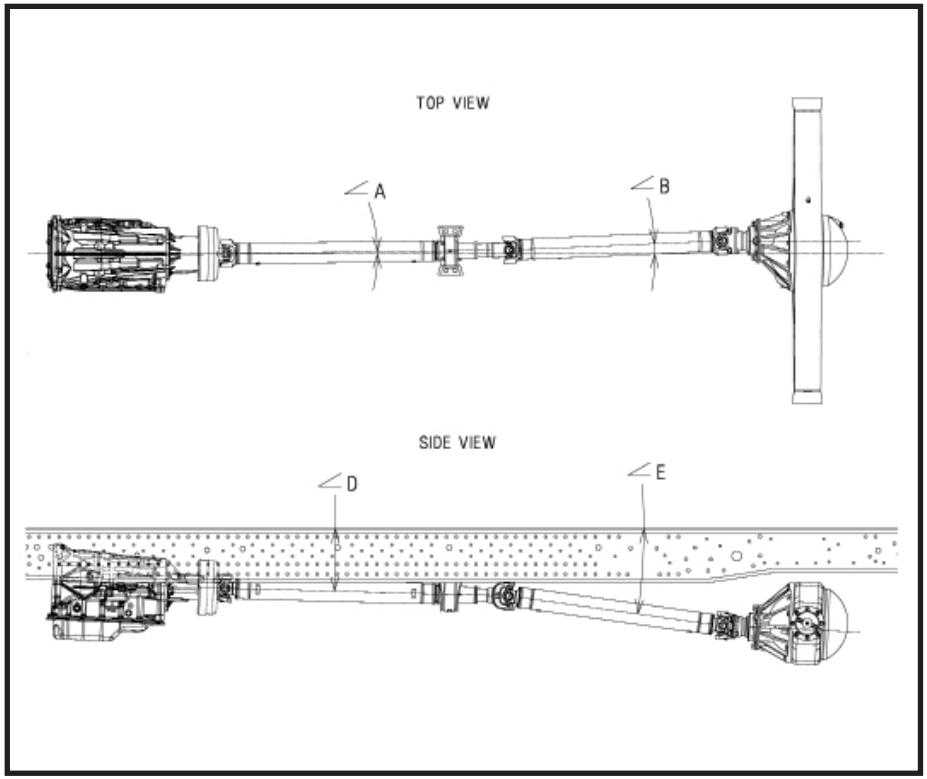


Figure 13.17.1

WheelBase (in.)	Top View		Side View			
	∠A	∠B	∠D	∠E	Trans	Rear Axle
150	0°	2.7°	2.6°	8.0°	2.5°	2.5°
176	0°	1.8°	2.1°	5.4°	2.5°	2.5°

Figure 13.17.2

Notes: 1. Angles privuded in table are relative to the frame angle. Please take this into consideration for service measurements.
2. Driveline angles are based on the chassis curb weight which includes standard equipment, fuel but no driver, body, or payload.

NPR XD		
Trans. Type	**6 Automatic. Transmission**	
Wheelbase	**150**	**176**
No. of Shafts	2	2
Shaft #1 O.D.	3.54	3.54
Thickness	0.126	0.126
Length	40.24	49.69
Type	B	B
Shaft #2 O.D.	3.54	3.54
Thickness	0.126	0.126
Length	36.53	52.93
Type	C	C

Figure 13.18.1

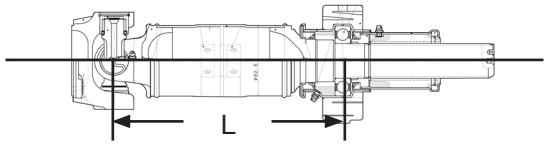
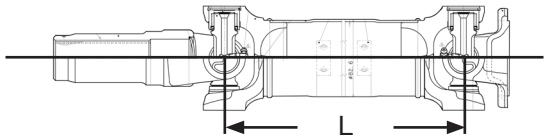
Type	Description	Illustration
Type **B**	1st shaft in 2-piece driveline	
Type **C**	2nd shaft in 2-piece driveline	

Figure 13.18.2

Note: Dimensions in inches

Brake System Diagram 16,000 GVW

Vacuum Over Hydraulic

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

Legend for NPR, NPR-HD, NPR-XD Brake System

(1) Electronic Hydraulic Control Unit (EHCU)
(2) Rear Wheel Cylinder
(3) Vacuum Pump
(4) Check Valve
(5) Exhaust Brake Valve
(6) Magnetic Valve
(7) Check Valve (One-way Valve)
(8) Vacuum Tank
(9) 4-Way Connector
(10) With Metering Valve
(11) W/O Metering Valve
(12) Brake Fluid Reservoir
(13) Electric Vacuum Pump
(14) Master Cylinder
(15) Vacuum Booster (Servo Unit)
(16) Front Wheel Cylinder

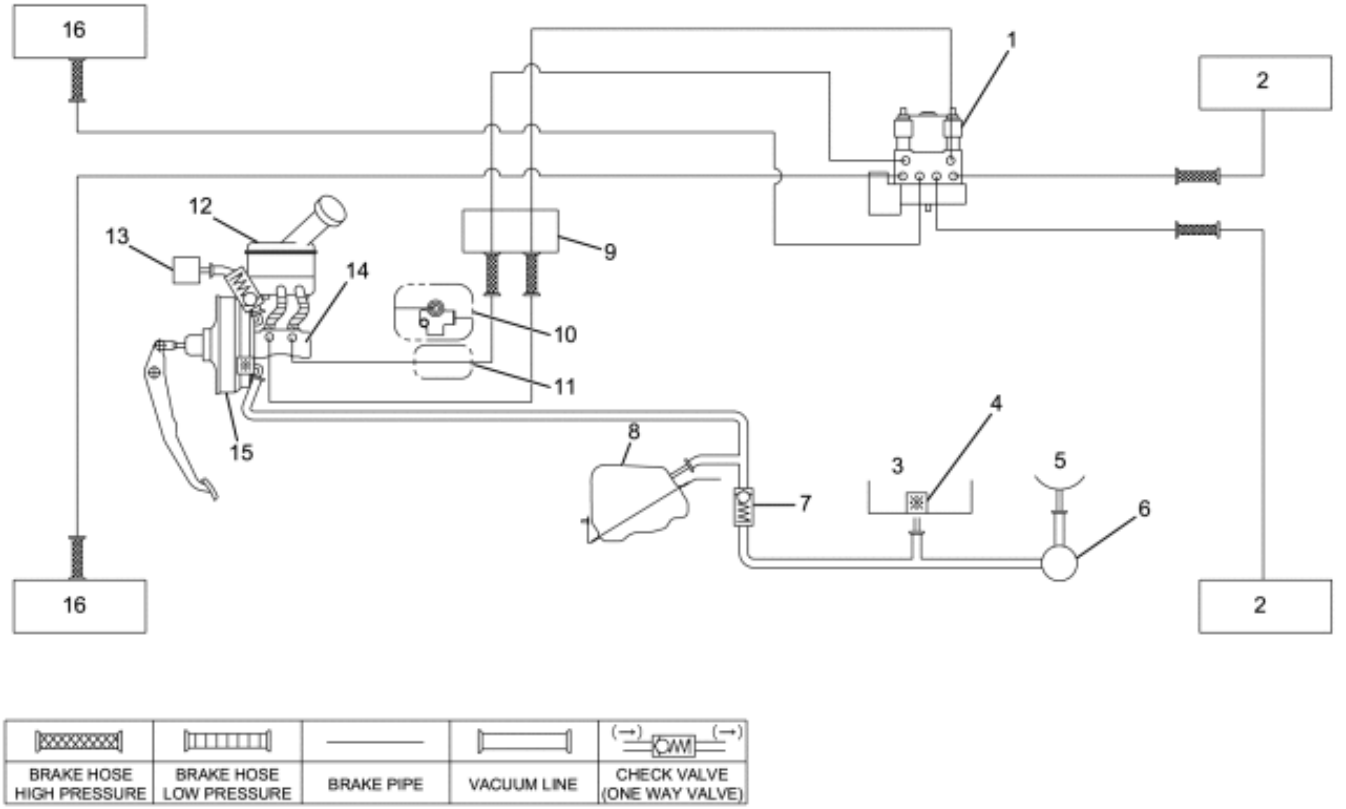


Figure 13.19.1

PTO Location, Drive Gear and Opening Information

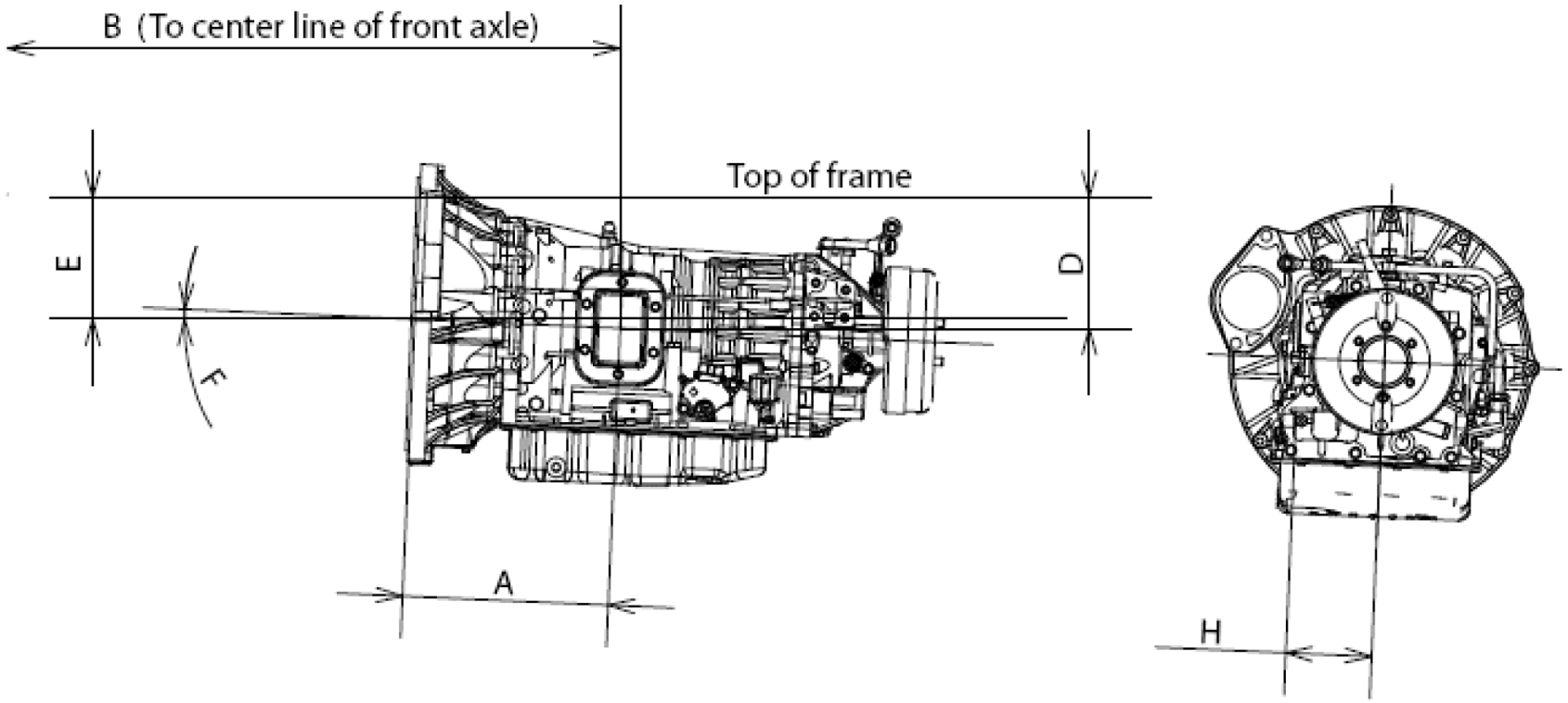


Figure 13.20.1

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	2.5^0	5.16	PTO Gear	1:1 with turbine	69	N/A	0^0	134 lbs.-ft. @ 1,700 RPM

Figure 13.20.2

Note: Dimensions in inches

Opening Diagram

Aisin A460 Automatic Torque Converter
Lock Up Function.

In either the Stationary Preset PTO Mode or Stationary Variable PTO Mode, when engine rpm exceeds 1200 RPM, the torque converter will lock up. The engine rpm can not be modified and the lockup function cannot be turned off. Please not that with PTO applications that operate around 1200 RPM, the transmission software holds the torque converter in lockup until engine speed falls below 1100 RPM

The lock up function will cancel if the transmission shift lever is moved from the park or neutral positions which will remove the trasmission from the stationary mode.

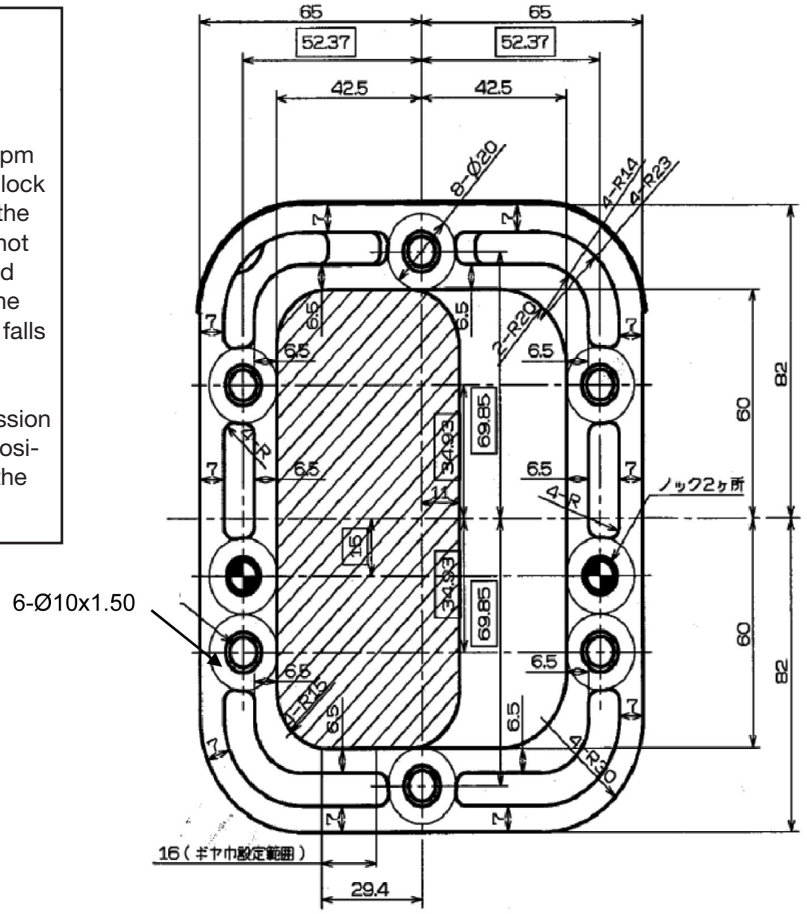


Figure 13.21.1

Additional PTO Functions:

For certain applications the Automatic regeneration function can be inhibited (Example Airport Ground Support vehicles).

For certain applications the Automatic regeneration function can be enabled in the PTO stationary mode (Example Lawn care and carpet cleaning).
For certain applications the Automatic regeneration function can be enabled in the PTO mobile mode (Example Line painting).

Please refer to the PTO section of the BBG (section 17) for further details.

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.
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.

Rear View Fuel Fill

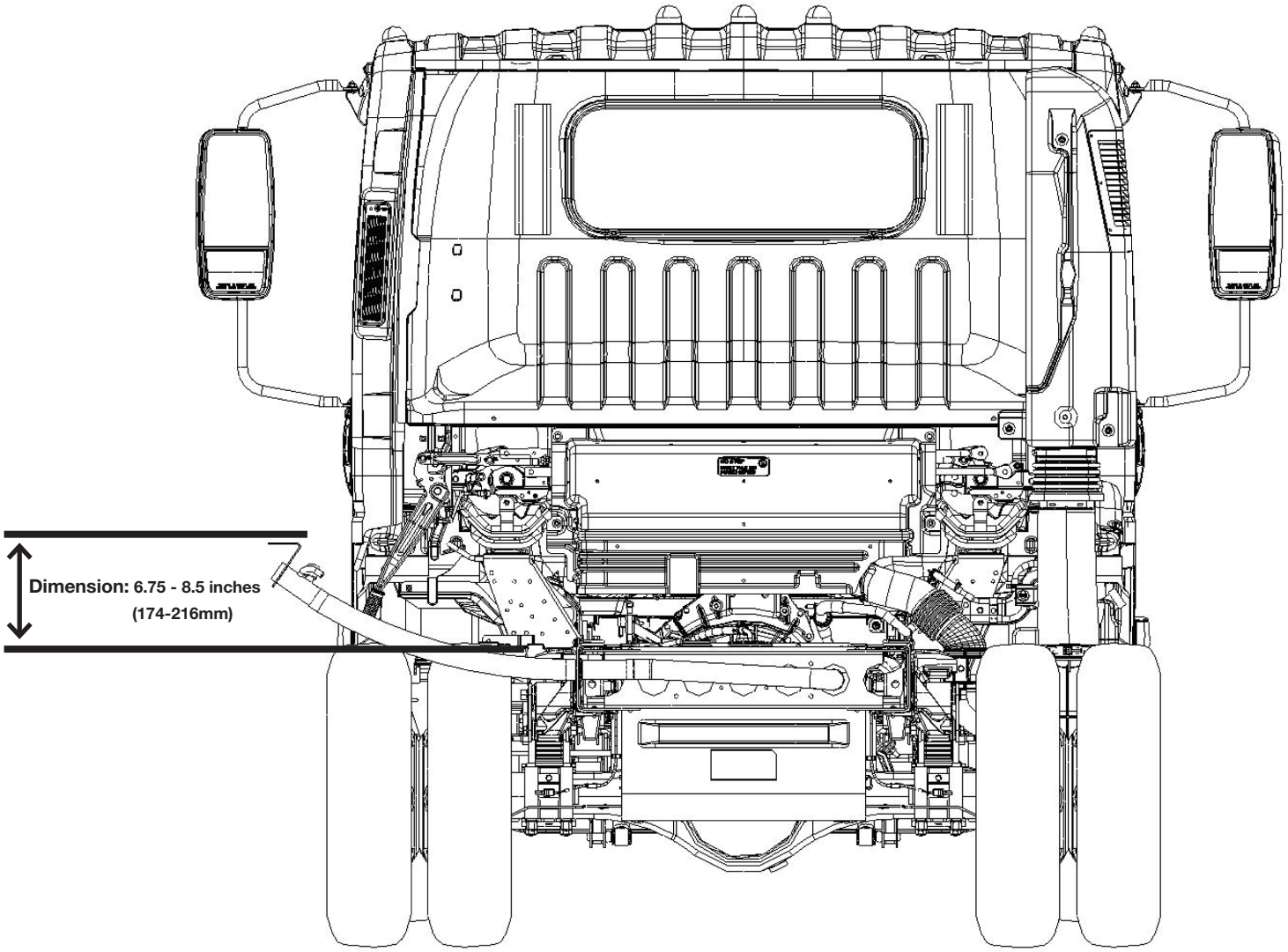
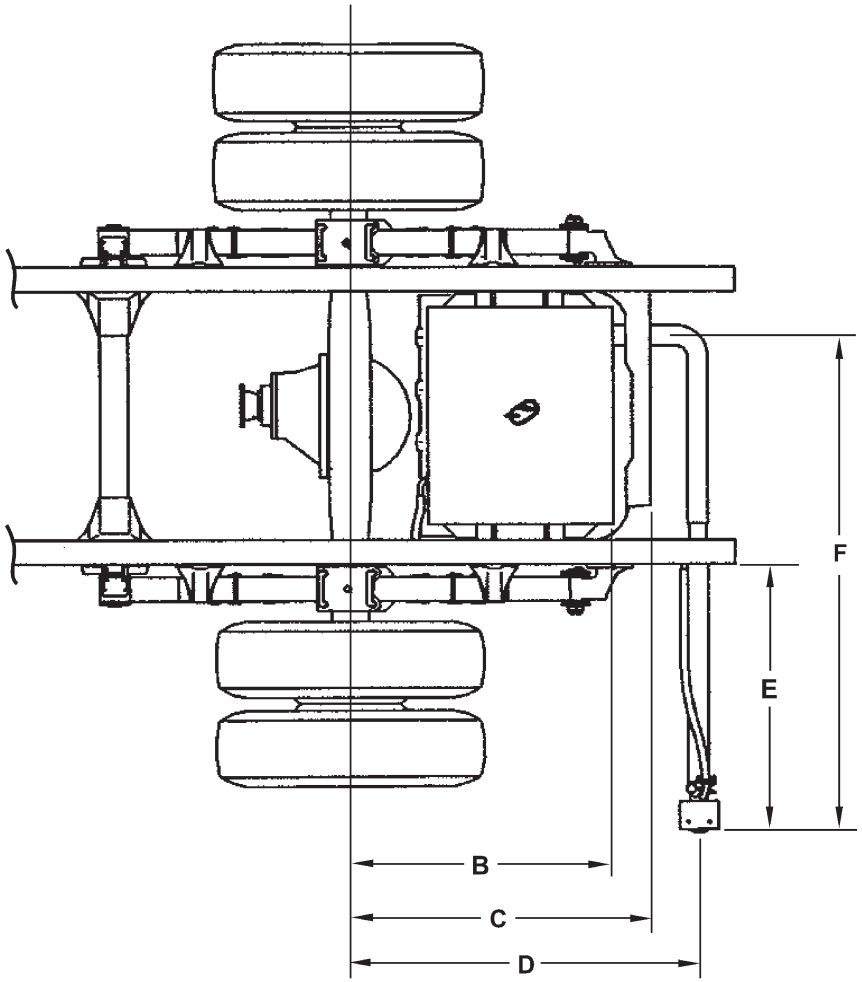


Figure 13.23.1

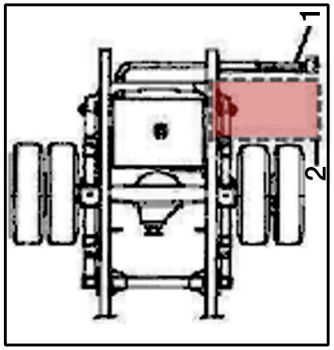
Top View Fuel Fill



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)

Figure 13.24.1

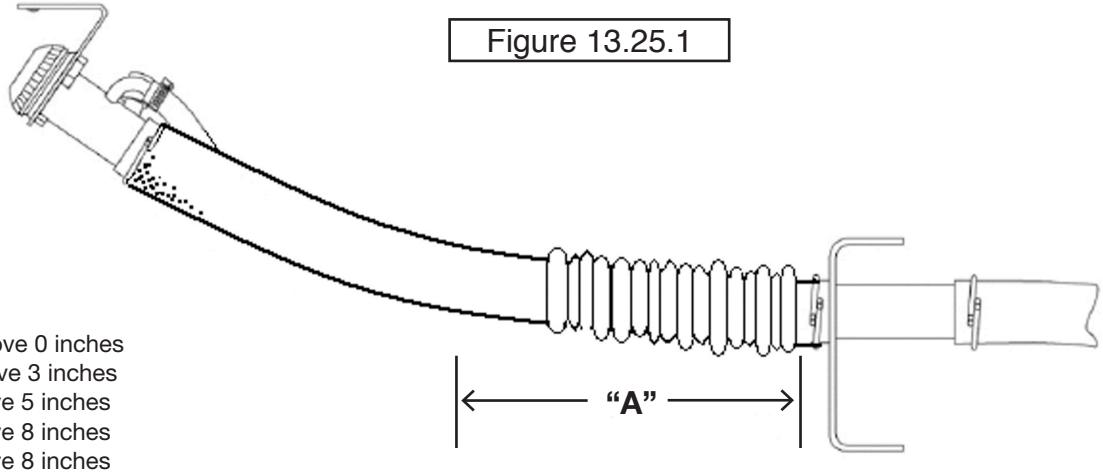
Hose Modification for Various Width Bodies and fuel fill vent Protection



Fuel fill vent and neck should be protected from road spray

1. FUEL FILLER NECK
2. RECOMMENDED MUD FLAP MOUNTING AREA (RED ZONE).

Figure 13.25.1



"A" Dimensions:
102 inch wide body remove 0 inches
96 inch wide body remove 3 inches
90 inch wide body remove 5 inches
86 inch wide body remove 8 inches
80 inch wide body remove 8 inches

NOTE: **Shorten hose by "A Dimension" based on chart at left.**

Figure 13.25.2

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.



Figure 13.26.1

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.

Through the Rail Fuel Fill Frame Hole

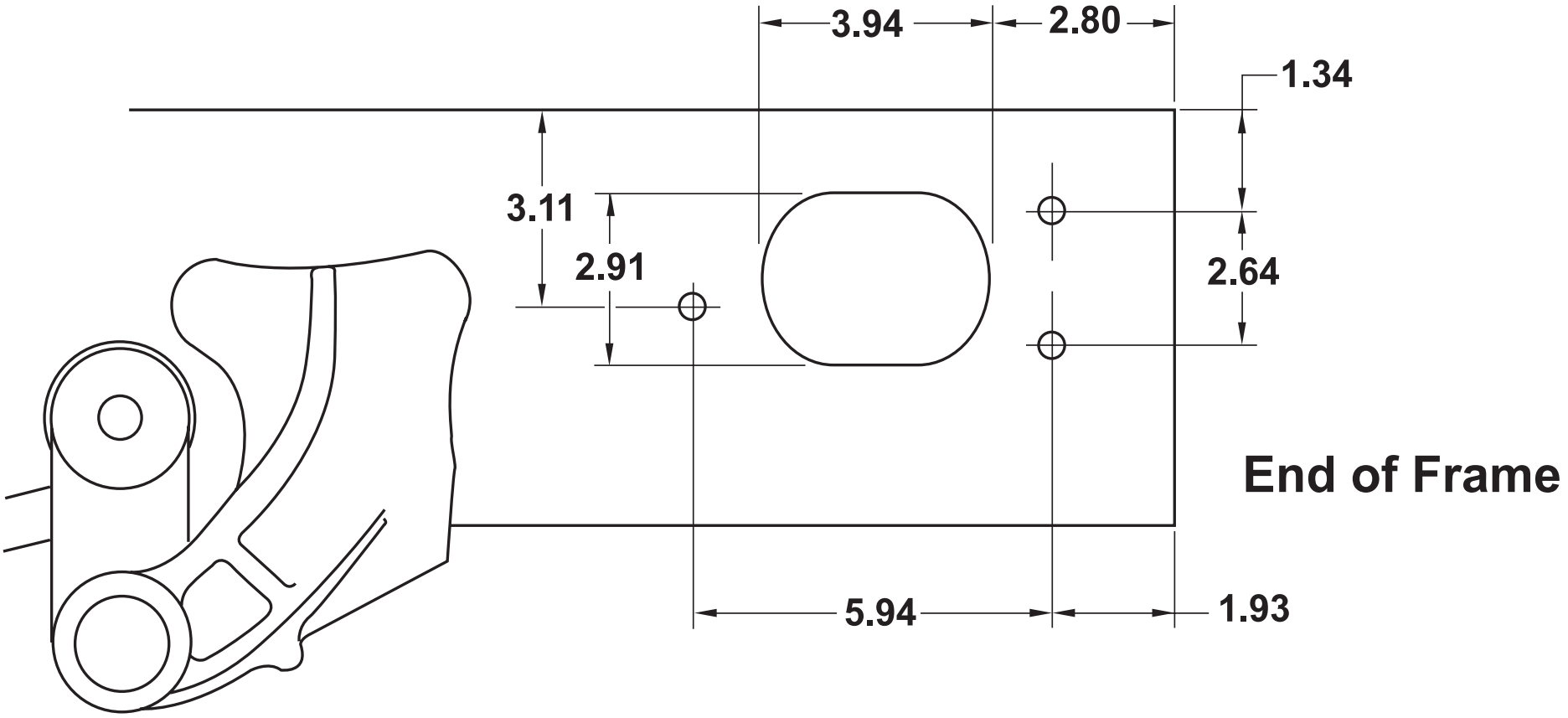


Figure 13.27.1

Note: Dimensions in inches

N-Diesel Fuel Filler Kit Instructions

Please review these instructions prior to installation of the fuel filler kit.

Parts Kit: There are two separate parts kits used for the 2011 and later model year N-diesel products. Fuel filler kit part number 898171 9090 is used for 14,500 lb and higher GVWR chassis (NPR-HD, NPR-XD, NQR NRR), For reference kit part number 898171 9080 is used for 12,000 lb GVWR chassis (NPR models). Parts list is shown in ***Figure 13.28.2.*** Parts photos are shown in ***Figure 13.28.1.***

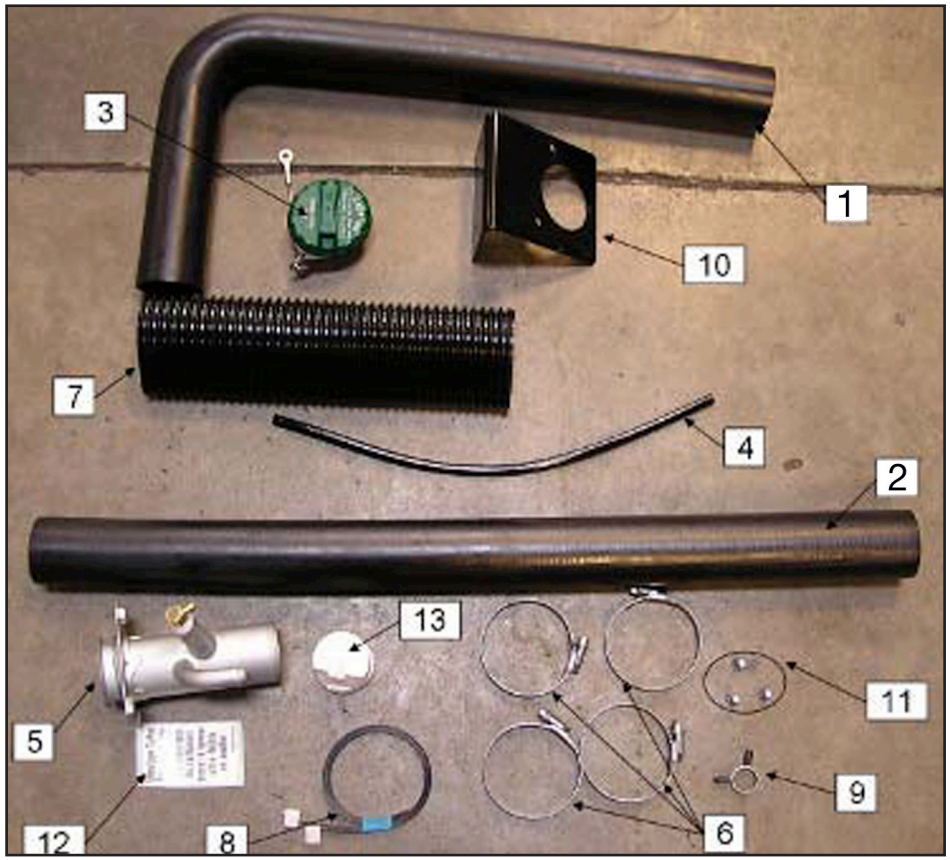


Figure 13.28.1

FUEL FILLER KIT, NPR-HD NPR-XD NQR NRR 898171 9090			
ITEM #	**PART NAME**	**PART #**	**QTY**
1	HOSE: FUEL FILLER NECK	898171 211Y	1
2	HOSE: FUEL FILLER	898006 450Y	1
3	CAP: FILLER	897218 702Y	1
4	HOSE: ROLL-OVER VALVE	898164 876Y	1
5	NECK ASM: FUEL FILLER	898164 877Y	1
6	CLIP: JOINT	898133 349Y	4
7	PROTECTOR: FILLER HOSE	897114 063Y	1
8	CLIP: BAND, HOSE FIXING	109707 107Y	2
9	CLIP: RUBBER, HOSE	894242 034Y	1
10	BRACKET: FILLER NECK	897116 621Y	1
11	SCREW: FILLER NECK	897581 217Y	3
12	CAUTION PLATE	898070 422Y	1
13	SHUTTER: FUEL TANK	898164 404Y	1

Figure 13.28.2

Installation Instructions and Considerations:

The fuel tank shutter valve (13) was a new component for 2011 model year. This component is meant to improve fuel splash-back performance of the fuel system. In the 2012 model year a running change was made and this valve (13) was relocated from the fuel tank inlet to the inlet (outboard side) of the fuel filler neck bulkhead assemble that is bolted to the left hand frame rail as shown in **Figure 13.29.1**. This plastic valve snaps into place in the inlet of the frame mounted fuel pipe. The valve should be installed so that the plastic clip is at the top of the valve, so that the flap door opens up, as shown in **Figures 13.29.2**.

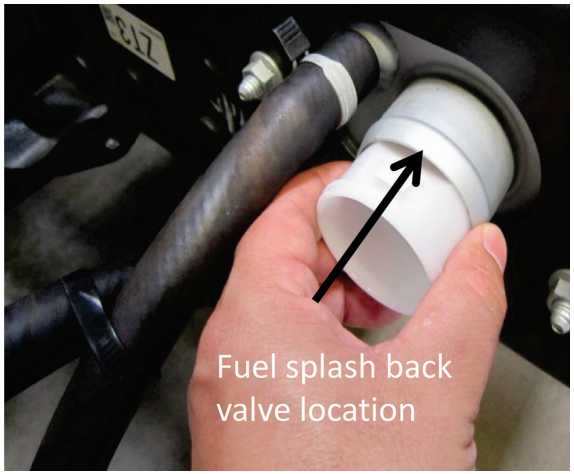


Figure 13.29.1

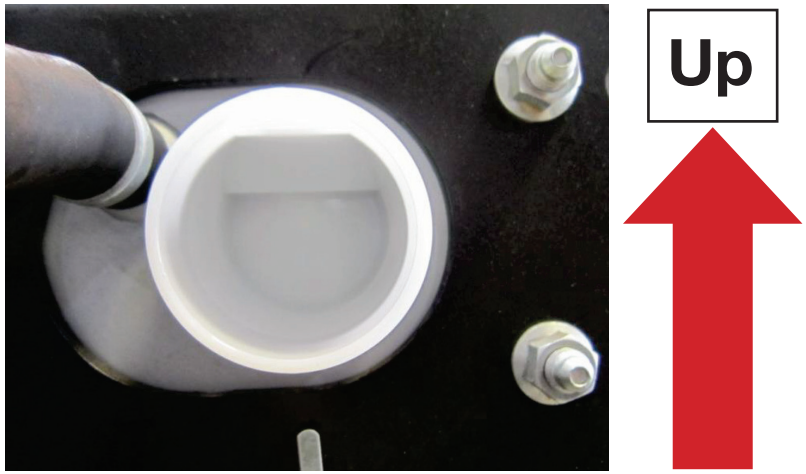


Figure 13.29.2

The fuel filler hose should be installed flush against the tank. The clamp should be installed between 1/16”and 3/8” from the tank. This is shown in ***Figure 13.29.3*** below.

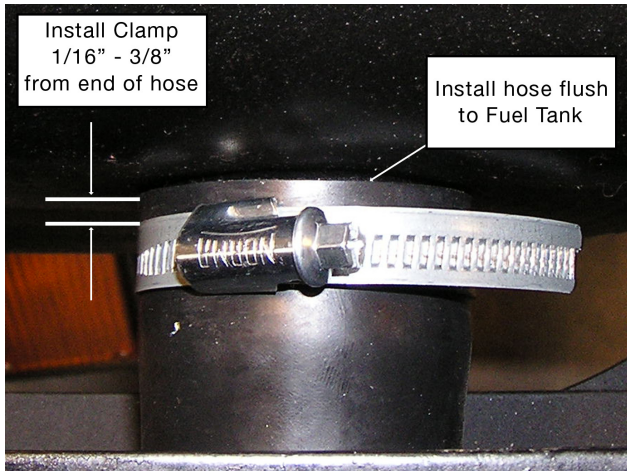


Figure 13.29.3

Roll-Over Valve Tubing

The roll-over valve has a hose attachment that will make this valve less sensitive to water intrusion. In order for the valve to work properly, it is critical that the hose be installed to the rollover valve. The proper assembly of the outer hose is shown in ***Figure 13.30.1.***

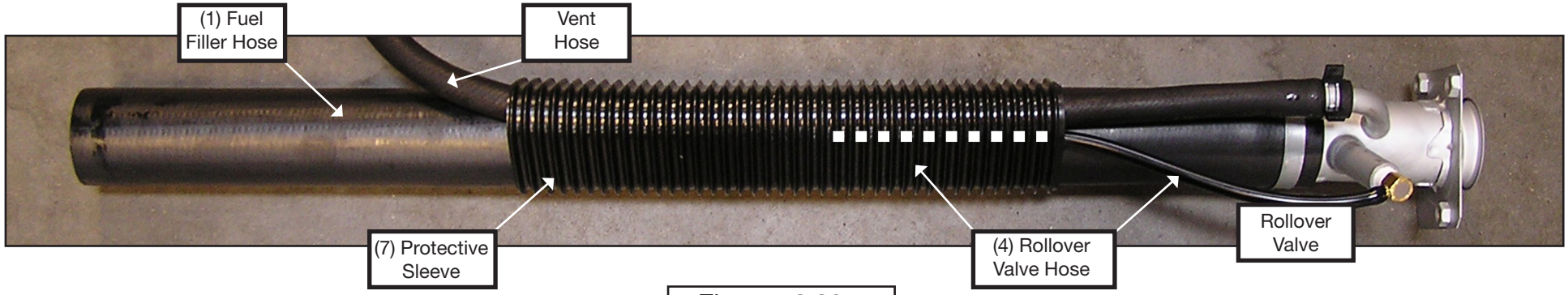


Figure 13.30.1

Filler Neck Installation:

The fuel filler neck (5) must be installed with the proper orientation on the body. The neck should be installed with the roll-over valve pointing upward, with the bottom edge of the neck oriented parallel to the ground, plus 33 to minus 7 degrees. See ***Figure 13.30.2*** for the proper orientation.

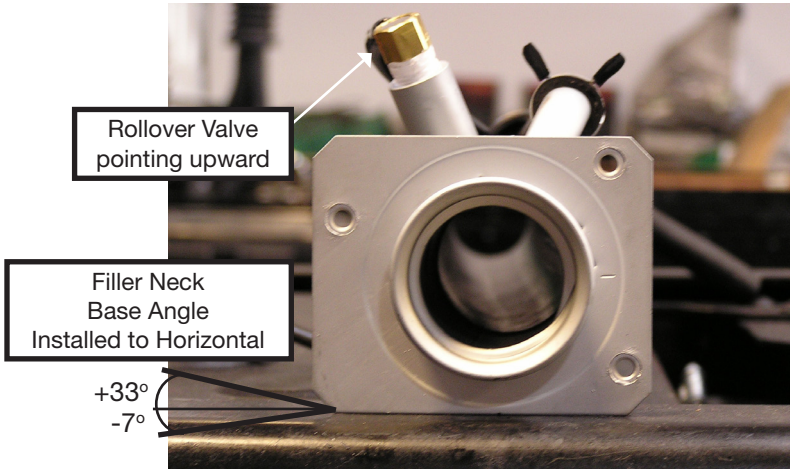


Figure 13.30.2

NPR HD, NQR, Crew Cab Diesel Specifications

Model	NPR HD Diesel Crew Cab	NQR Diesel Crew Cab
GVWR	14,500 lbs.	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)	215 HP @ 2,500 rpm	
Torque (Gross)	452 lb-ft torque @ 1,850 rpm	
Equipment	Dry element air cleaner with vertical intake; 2 rows 564 square 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. Engine warning system with audible warning for low oil pressure, high coolant temperature, and low coolant level. Engine cruise control 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 automatic torque converter lockup in stationary PTO mode.	
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-K 6-hole disc wheels, painted white.	19.5 x 6.0-K
Tires	215/85R 16-E (10 pr) (LRR) Low Rolling Resistancetubeless 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-ad just 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	Dual circuit vacuum assisted hydraulic service brakes with EBD (Electronic Brake Distribution) system for load proportioning of Brakes 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 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. Tricot breathable cloth covered high back driver’s seat with two occupant passenger seat.	
Equipment	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 mats, tinted glass.	
Electrical	12 Volt, negative ground, dual maintenance free batteries, 750 CCA each, 140 Amp alternator with integral regulator.	

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

Vehicle Weights, Dimensions and Ratings

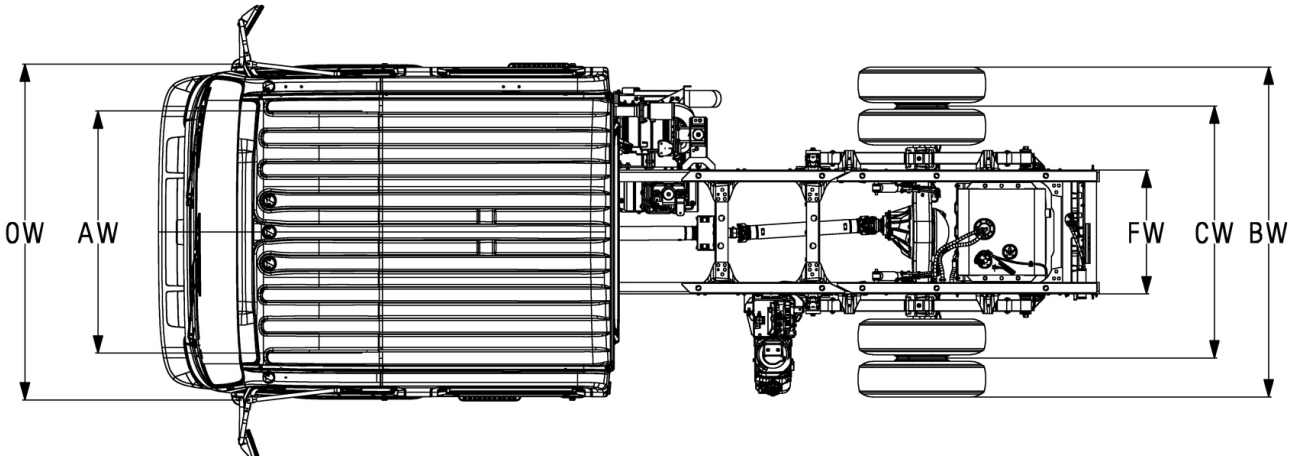


Figure 14.2.1

NPR-HD Variable Chassis Dimensions:

Unit	WB	CA*	CE*	OAL	AF
Inch	150	88.5	131.6	241.5	43.1
Inch	176	114.5	157.6	267.5	43.1

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

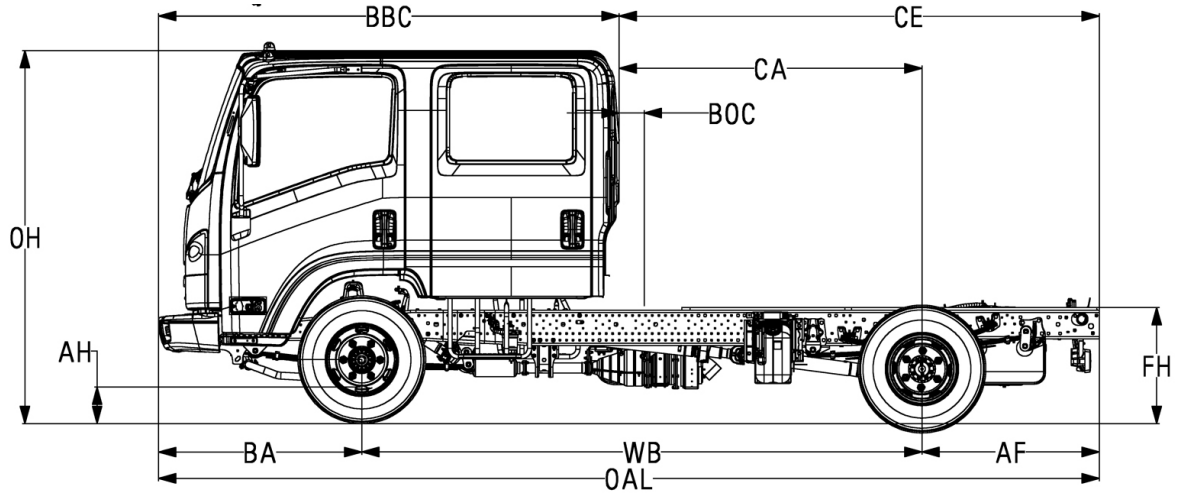


Figure 14.2.2

NPR-HD Dimension Constants:

Code	Inches	Code	Inches
AH	7.5	BW	83.3
AW	65.6	CW	65
BA	48.3	FW	33.5
BBC	109.9	OH	90.8
BOC	5.3	OW	81.3
FH	31.1		

NPR-HD 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.	4415	2253	6668	7832
NG4	176.0 in	lb.	4491	2243	6734	7766

Vehicle Weights, Dimensions and Ratings

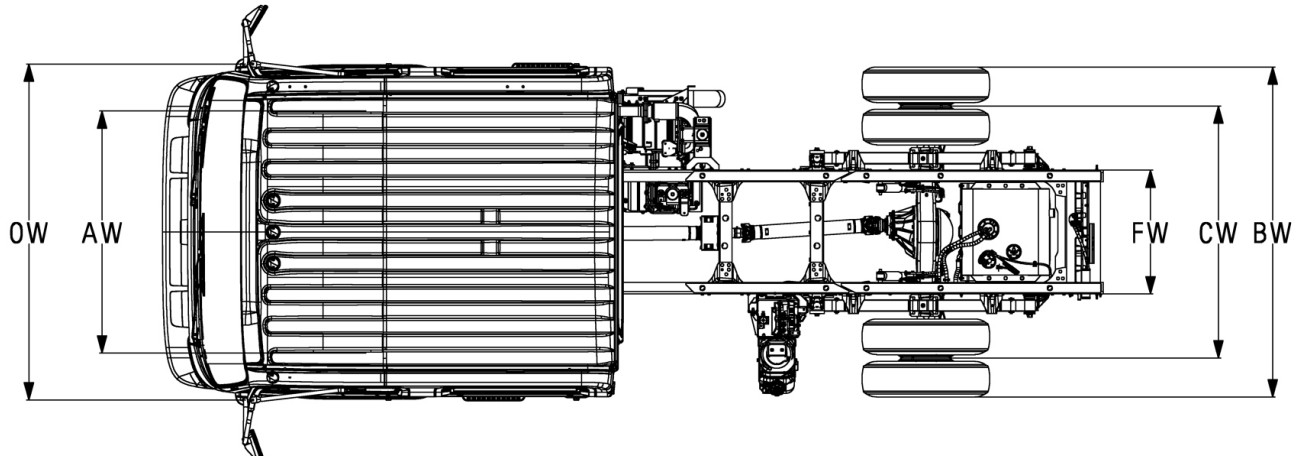


Figure 14.3.1

NQR Variable Chassis Dimensions:

Unit	WB	CA*	CE*	OAL	AF
Inch	150	88.5	131.6	241.5	43.1
Inch	176	114.5	157.6	267.5	43.1

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

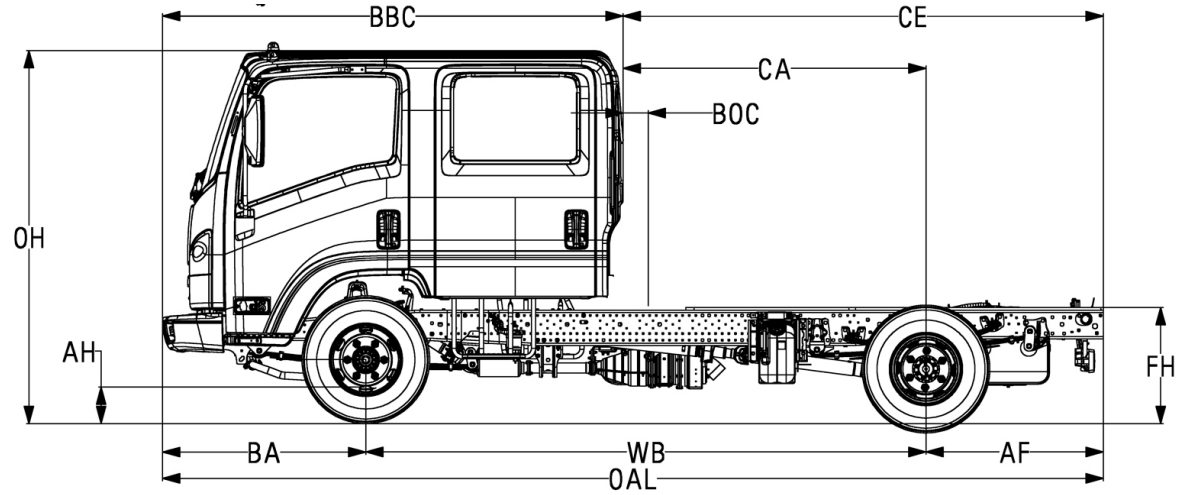


Figure 14.3.2

NQR Dimension Constants:

Code	Inches	Code	Inches
AH	7.5	BW	83.3
AW	65.6	CW	65
BA	48.3	FW	33.5
BBC	109.9	OH	92.4
BOC	5.3	OW	81.3
FH	33.0		

NQR 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 in	lb.	4640	2562	7202	10748
NS4	176 in	lb.	4714	2556	7270	10680

2016 Isuzu Truck

Vehicle Weight Limits:

	NPR HD	NQR
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.

RPO	DESCRIPTION STANDARD CAB	Weight (Lbs.) Front/Rear	
IF6	Fire Extinguisher and triangle kit mounted in rear organizer (3)	19.00	0.00
IG3	Engine oil pan heater (120v 300w)	2.00	0.00
IH2	Engine emergency shutdown system HWT, LWL, LOP (5)	0.00	0.00
IY9	Engine Idle shutdown (Timer set at 3 Minutes for engine shutdown)	0.00	0.00
I9A	Engine Idle shutdown (Timer set at 5 Minutes for engine shutdown)	0.00	0.00
IK9	33 Gallon Additional Diesel Fuel Tank 176 wb only	(7)	(7)
IY4	Delete Standard AM/FM/CD Radio	-3.00	0.00
I8H	AM/FM/CD Radio with Auxinput/USB port and Bluetooth	0.00	0.00
IL9	PTO Enable Switch and Engine Idle Up Switch recommended for PTO and Idle applications (2)	1.00	0.00
IS0	Heated mirrors	1.00	0.00
I9H	Heated dual remote control mirrors (15" head)	1.00	0.00
IV9	Seat covers crew cab (8)	9.00	2.00
IU2	Mirror Bracket for 102" wide body	1.00	0.00
IX2	Rear Body Dome Lamp Switch (6)	1.00	0.00
I66	Block heater (cord)	1.00	0.00
UZF	Back up alarm	2.00	0.00
V22	Chrome grill	1.00	0.00
I4K	Keyless Entry System		
I6K	Lockable DEF Fill Cap		
I1L	Speed Limited to 58 MPH	0	0
I2L	Speed Limited to 65 MPH	0	0
I3L	Speed Limited to 68 MPH	0	0
I4L	Speed Limited to 70 MPH	0	0
54	In rail fuel tank with power windows, door locks and air conditioning	80	0
64	In rail fuel tank with power windows, door locks, air conditioning and LSD (4)	80	15
74	Side mounted fuel tank w/power windows, power door locks and air conditioning	215	-124
84	Side mounted fuel tank w/power windows, power door locks, air conditioning and LSD (4)	215	-109

(1) RPO is Regular Production Option that is stocked in Port inventory.
LSO is Limited Stock Option that is stocked in Port inventory but should be checked for availability and delivery time.
SEO is Special Equipment Option and requires 90-120 day lead time for delivery.

(2) These switches can be port or dealer installed. Please consult the body builders guide and / or the service manual for additional programming options and functions.

(3) Fire extinguisher and triangle kit mounted under rear seat on crew cab

(4) LSD factory installed Limited Slip Differential

(5) High Water Temperature (HWT), Low Water Level (LWL) and Low Oil Pressure (LOP)

(6) RPO must be ordered with Supreme Value Pak and Morgan Fast Track Body Programs

(7) Additional fuel tank mounted on the drivers side frame rail. Available with in rail tank only Available on 176 inch crew cab wheelbases only. (Weights: + 102 lbs. front and +258 lbs. rear)

(8) Seat covers not available with suspension seat

Frame and Crossmember Specifications

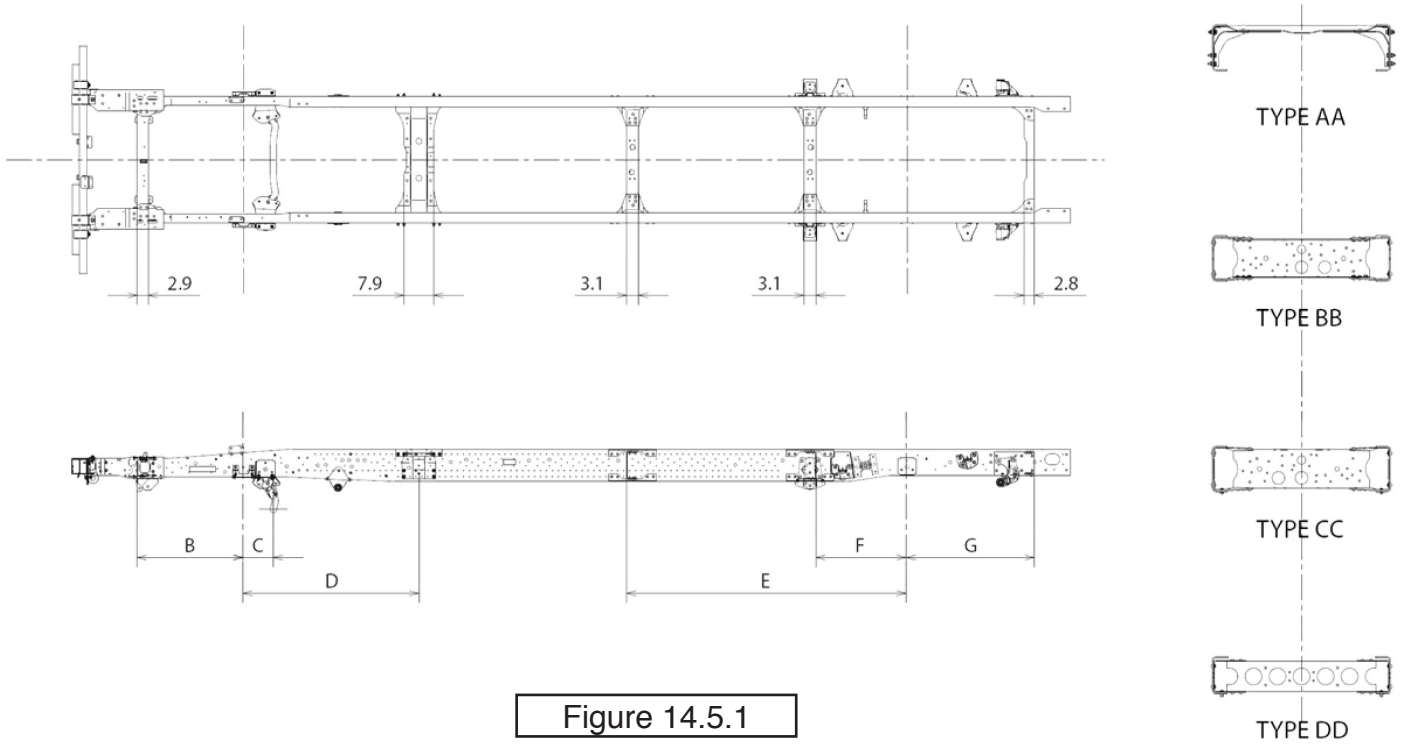


Figure 14.5.1

Wheelbase	Frame Thick	Crossmember Type/Location					
		B	C	D	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

Figure 14.5.2

Note: Dimensions in inches

Frame Chart

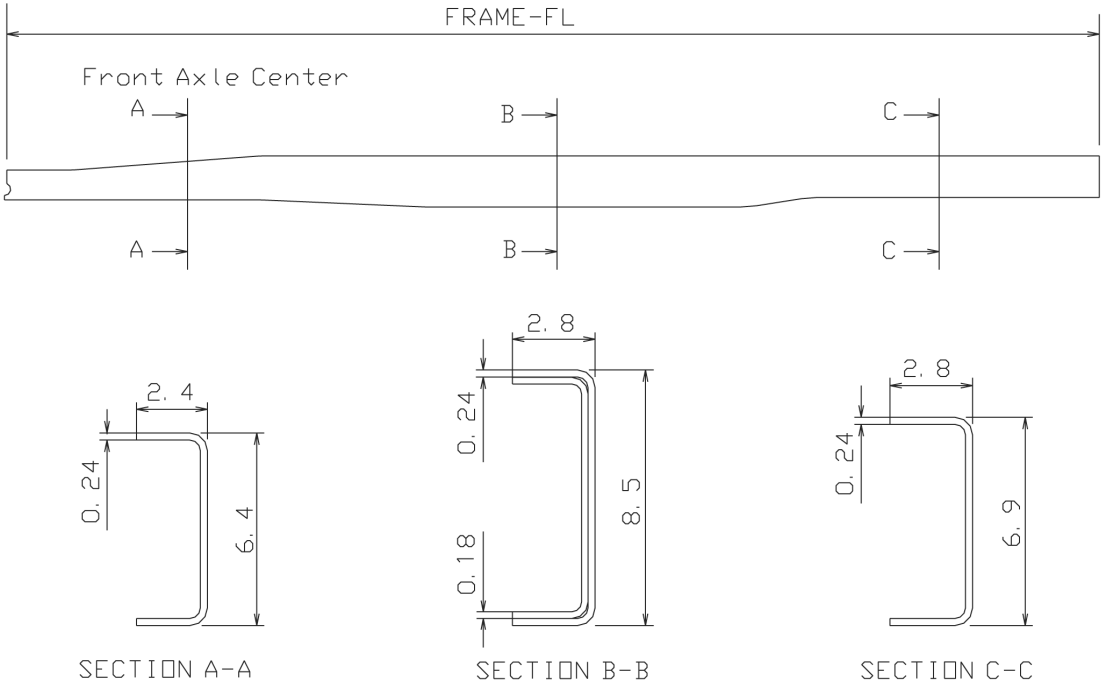


Figure 14.6.1

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

Figure 14.6.2

Note: Dimensions in inches

NPR-HD NQR Diesel Standard Crew Cab Top View

Wb	A	B
150	67.0	101.6
176	76.5	111.1

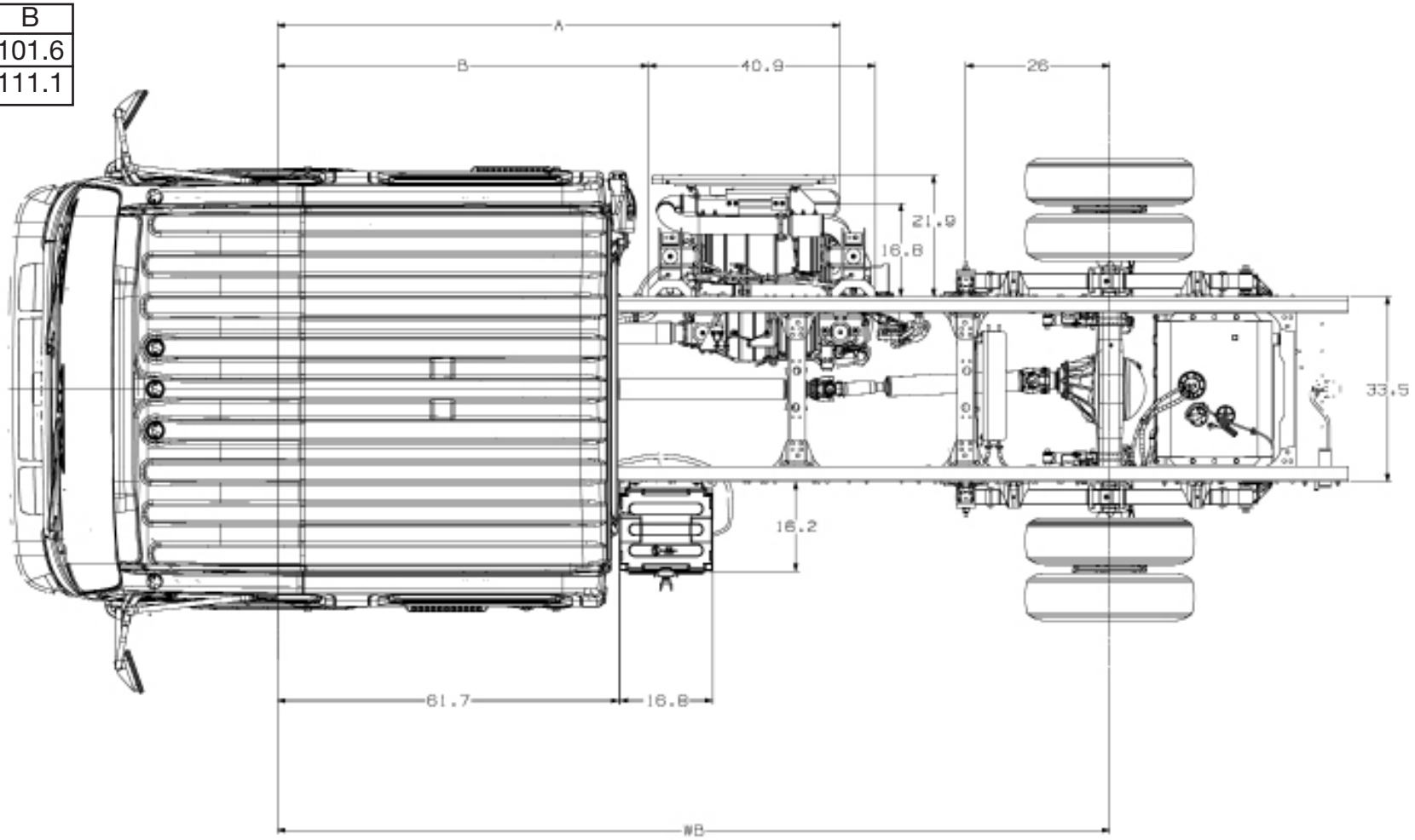


Figure 14.7.1

Note: Dimensions in inches

NPR-HD NQR Diesel Standard Crew Cab Left Side View

WB	A
150	104.3
176	113.8

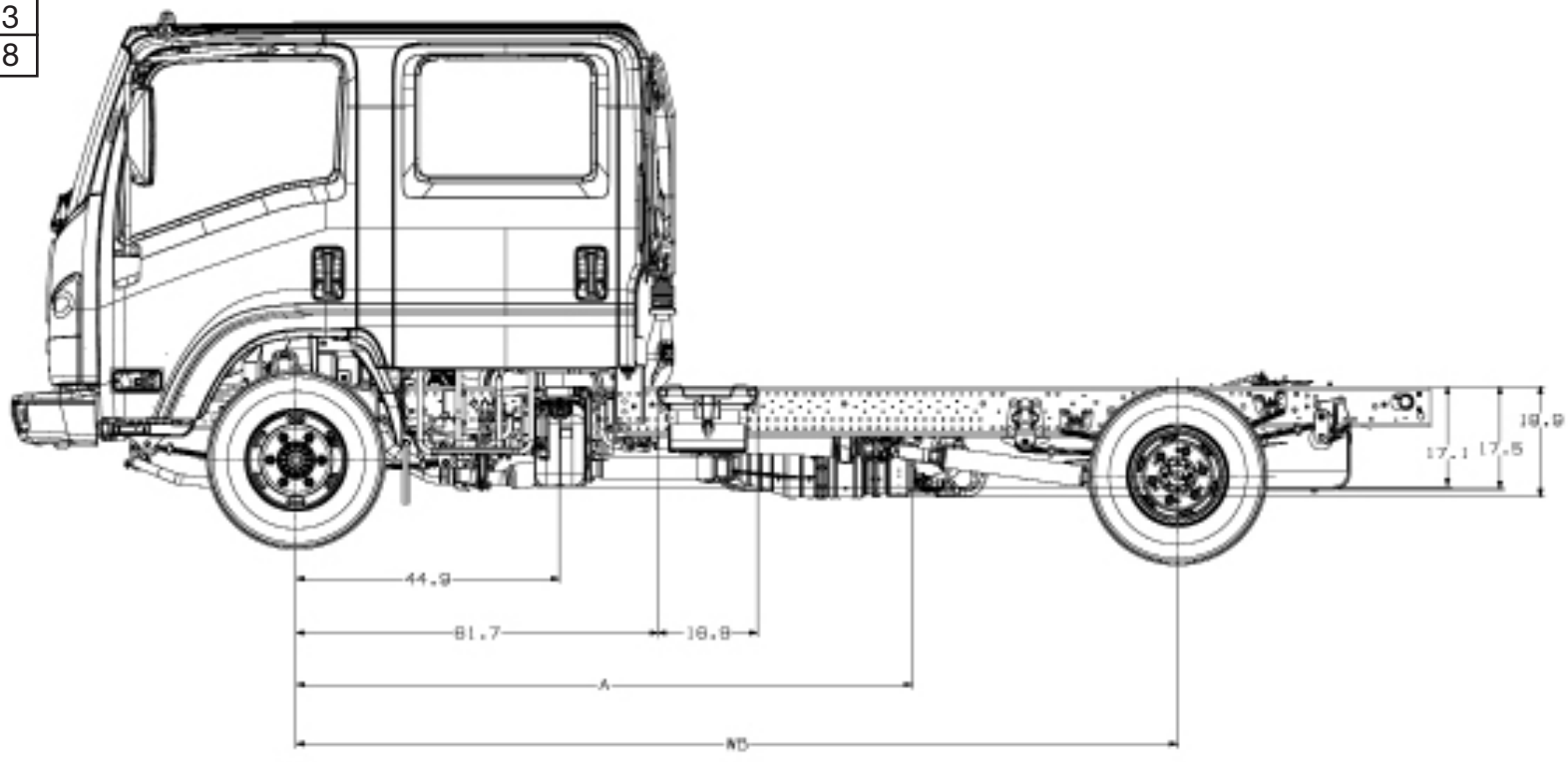


Figure 14.8.1

Note: Dimensions in inches

NPR-HD NQR Diesel Standard Crew Cab Right Side View

WB	A
150	67.6
176	77.1

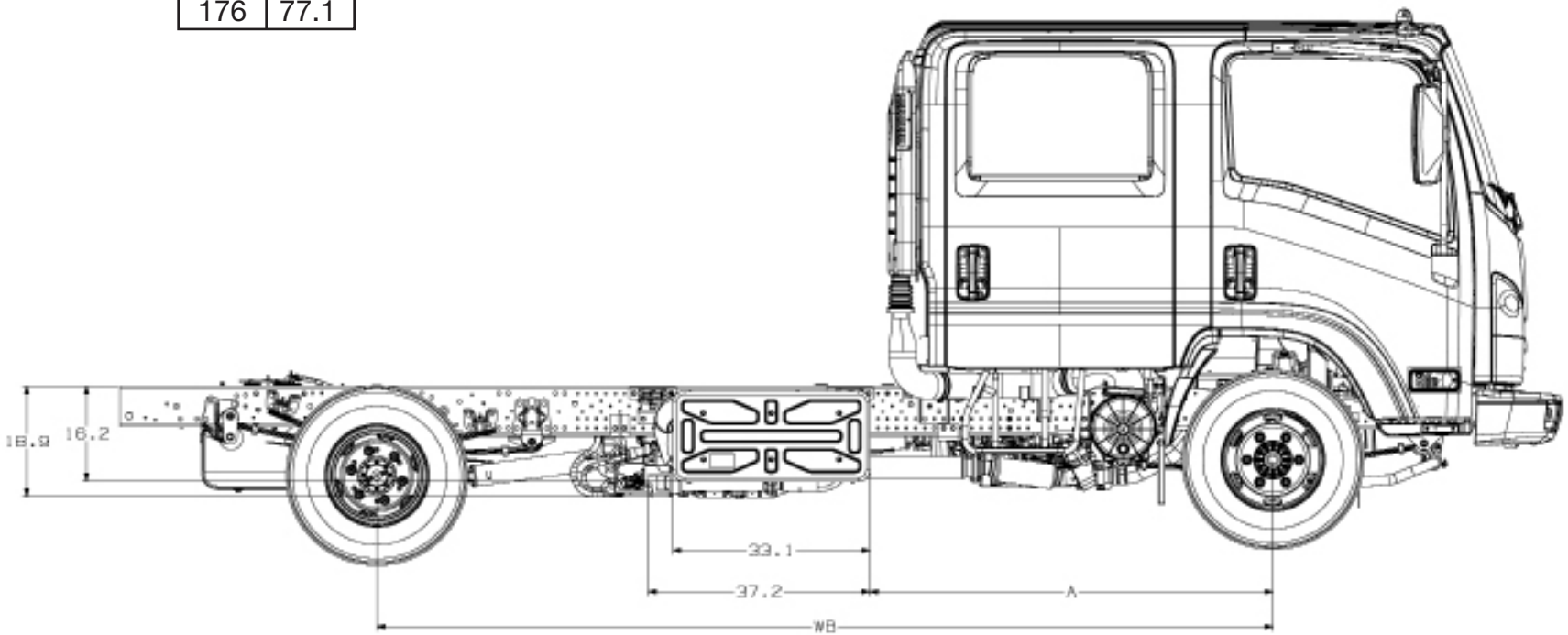


Figure 14.9.1

Note: Dimensions in inches

SCR / DPF 4HK1-TC

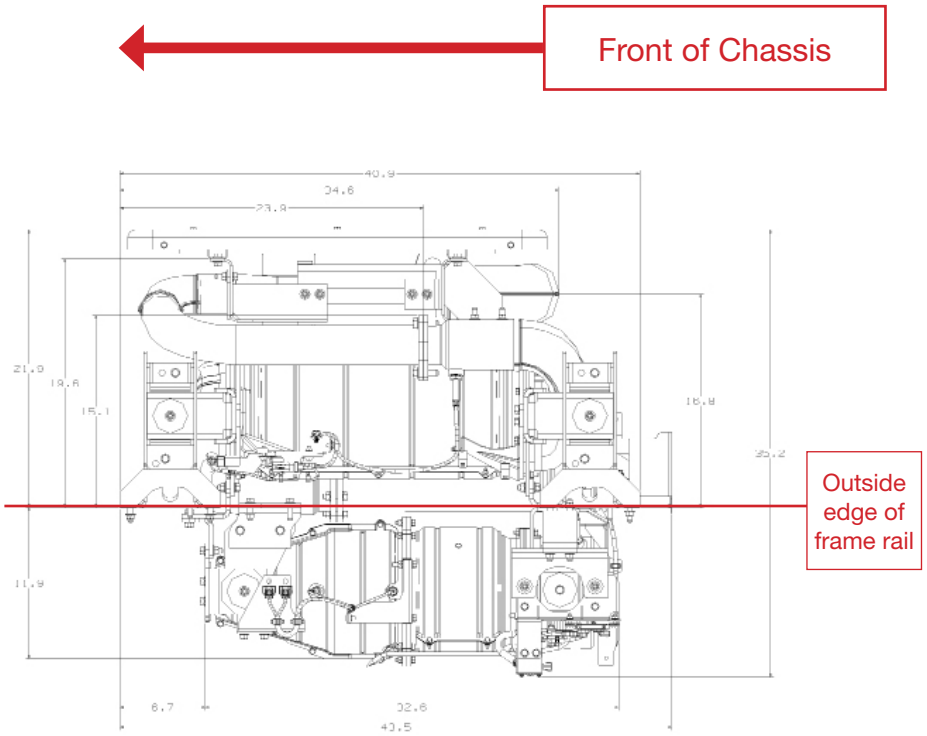


Figure 14.10.1

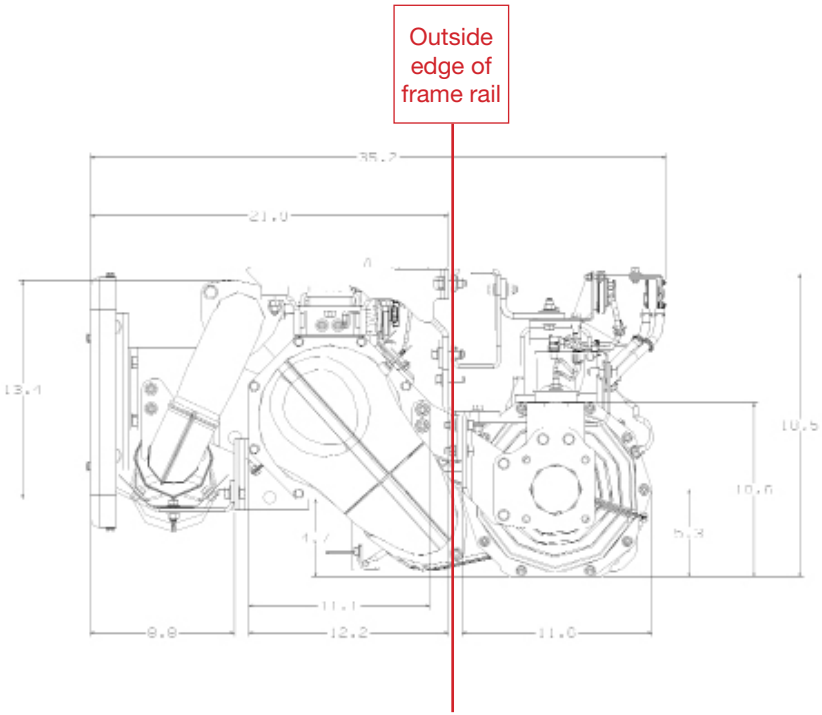


Figure 14.11.2

Note: Dimensions in inches

Option Side Fuel Tank in addition to the Standard In Rail Fuel Tank RPO IK9
Side View 176 Wheelbase

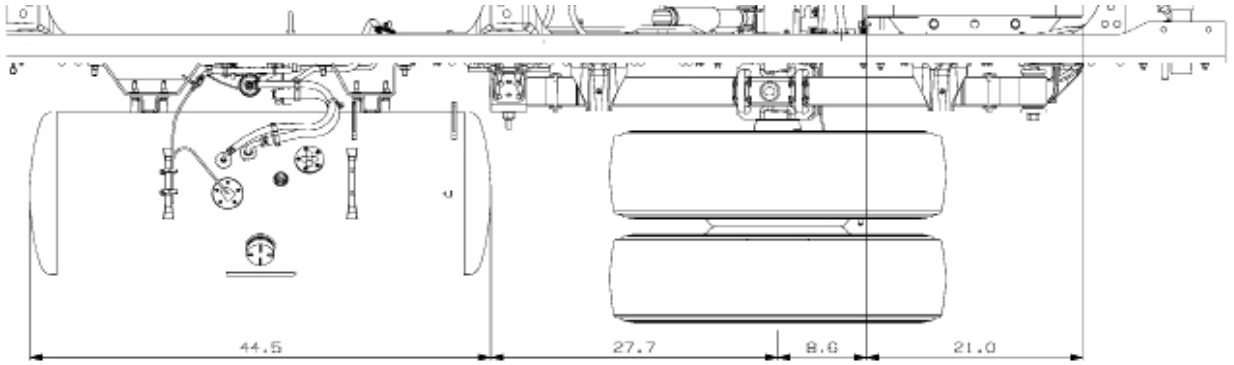


Figure 14.11.1

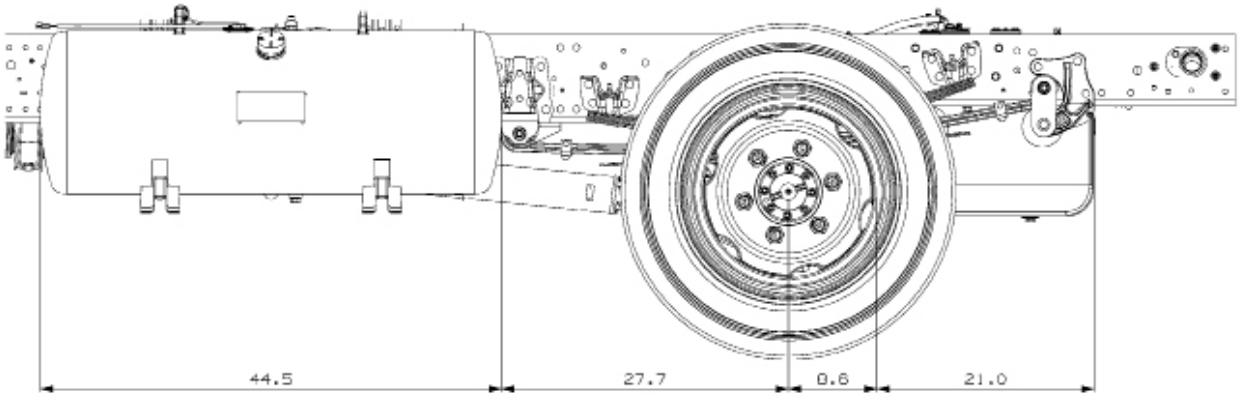


Figure 14.11.2

Note: Dimensions in inches

CENTER OF GRAVITY

Horizontal and Vertical CG of Chassis					
NPR-HD			NQR		
WB	V	H	WB	V	H
150	24.3	48.3	150	25.3	50.9
176	24.2	55.7	176	25.3	58.8

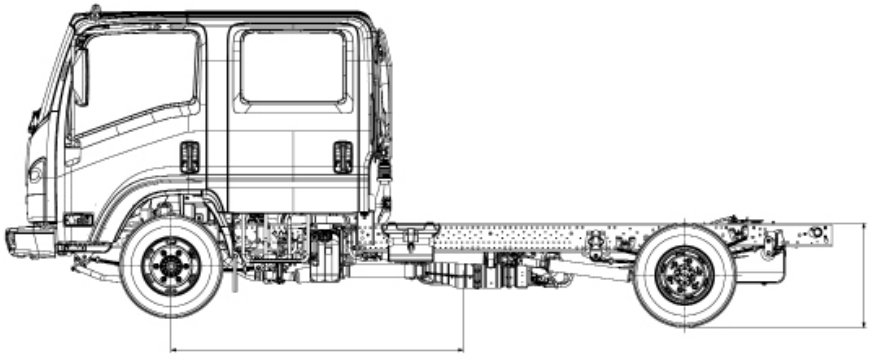


Figure 14.12.1

The center of gravity of the completed vehicle with a full load should not exceed 63 inches above ground level for the 14,500 lbs. and 17,950 lbs. 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 and NQR are 102 inches wide (outside) by 91 inches high (inside). Any larger body applications must be approved by Isuzu Commercial Trucks of America Application Engineering. In the West Coast call 1-714-935-9327 and in the East Coast call 1-770-740-1620 X262.

Note: Dimensions in inches

Front Axle Chart NPR HD

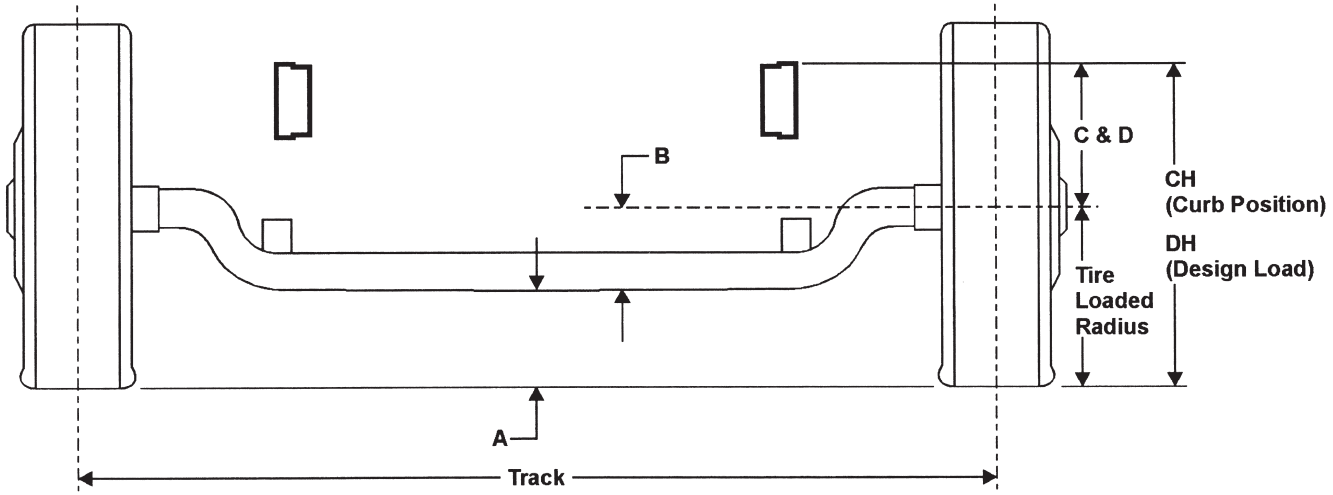


Figure 14.13.1

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

Figure 14.13.2

Note: Dimensions in inches

Front Axle Chart NQR

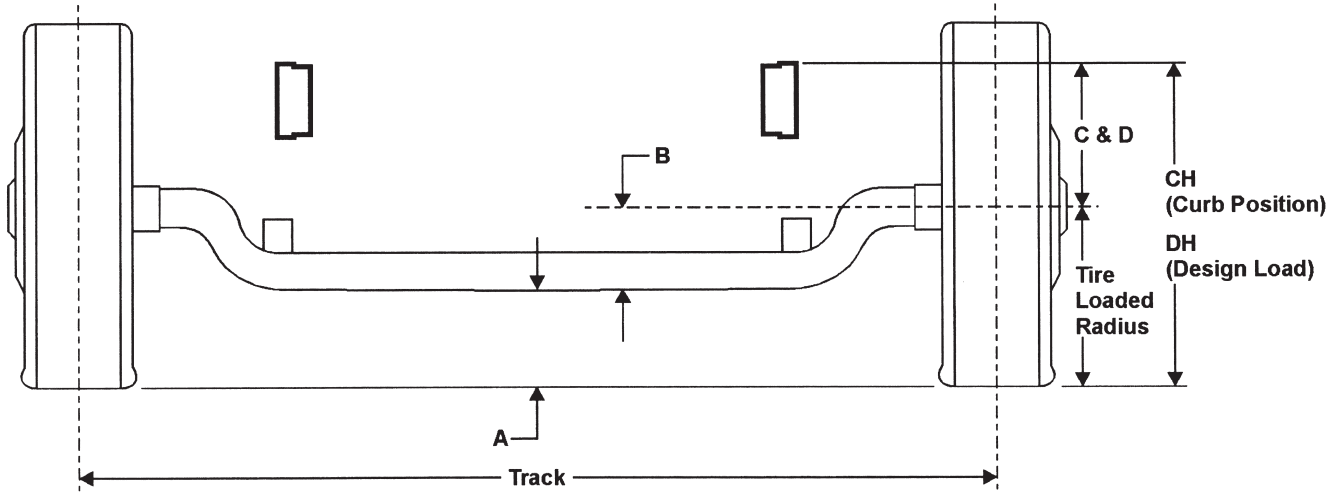


Figure 14.14.1

Formulas for calculating height dimensions:

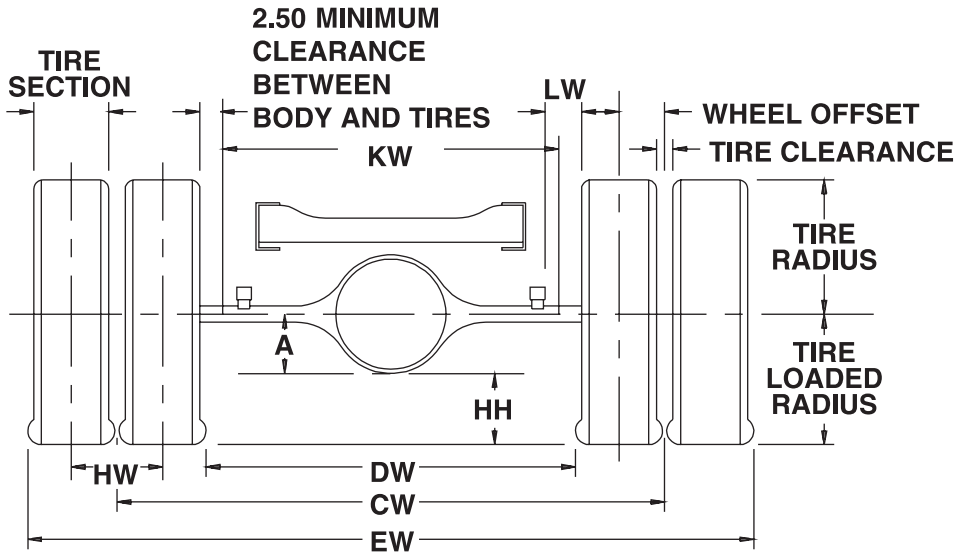
A = Tire Loaded Radius – B
C = Centerline of Axle to Top of Frame Rail at Curb Position
D = Centerline of Axle to Top of Frame Rail at Design Load
CH = C + Tire Unloaded Radius
DH = D + Tire Loaded Radius

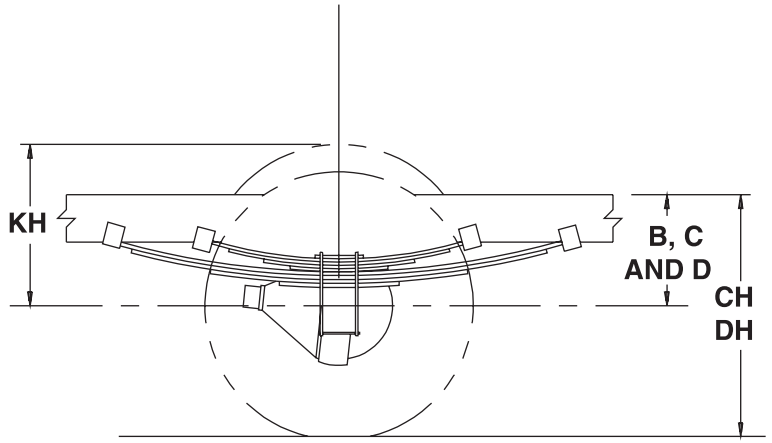
Tire	GVWR	GAWR	A	B	C	D	CH	DH	Track	Tire Radius	
										Unload	Load
225/70R 19.5F	17,950 lbs.	6,830 lbs.	8.6	6.6	12.3	11.5	28.4	26.7	65.5	16.1	15.24

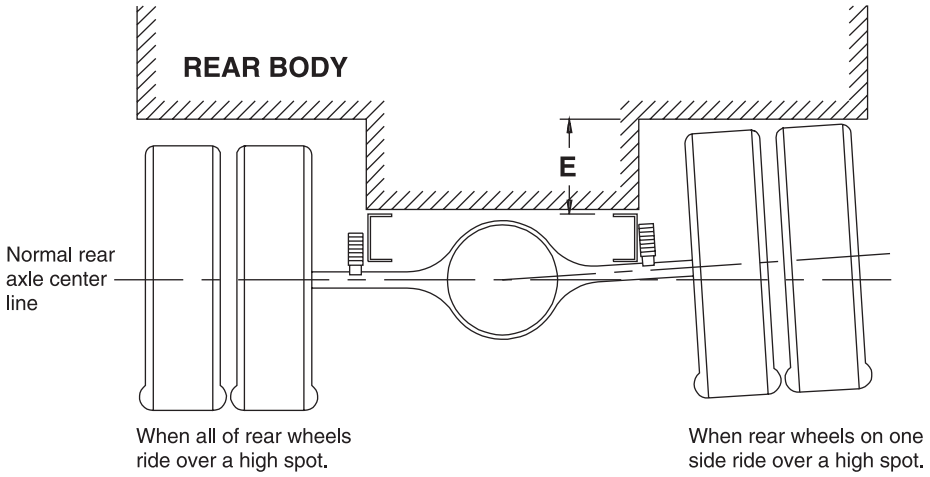
Figure 14.14.2

Note: Dimensions in inches

Rear Axle Chart NPR HD







When all of rear wheels ride over a high spot.

When rear wheels on one side ride over a high spot.

Figure 14.15.1

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.

Figure 14.16.1

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

Figure 14.16.2

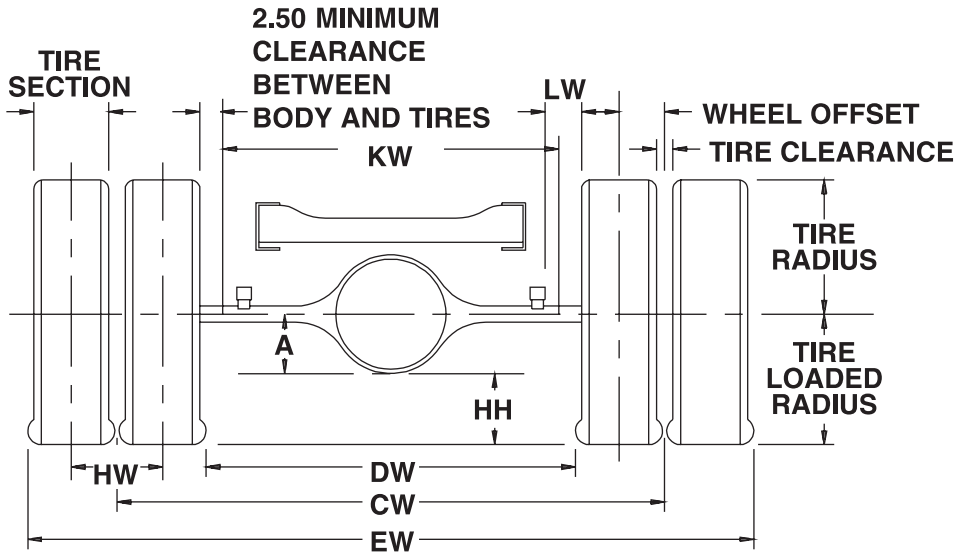
NOTE: Track and overall width may vary with optional equipment.

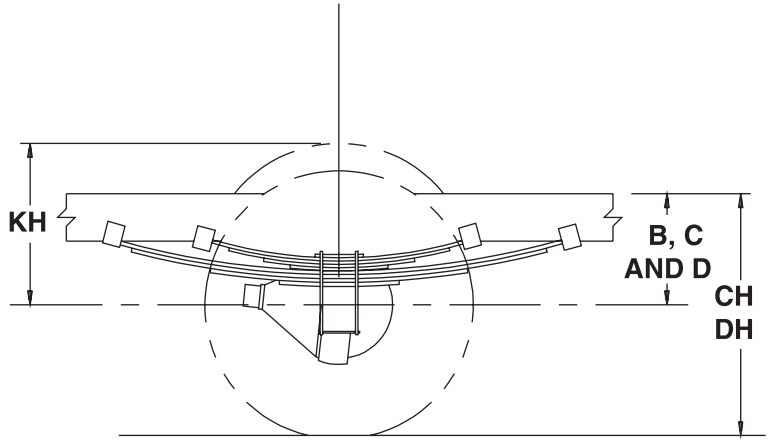
Tire	GAWR	Track CW	A	B	C	D	E
215/85R-16E	9,880 lbs.	65.0	6.5	9.3	15.3	13.0	7.8

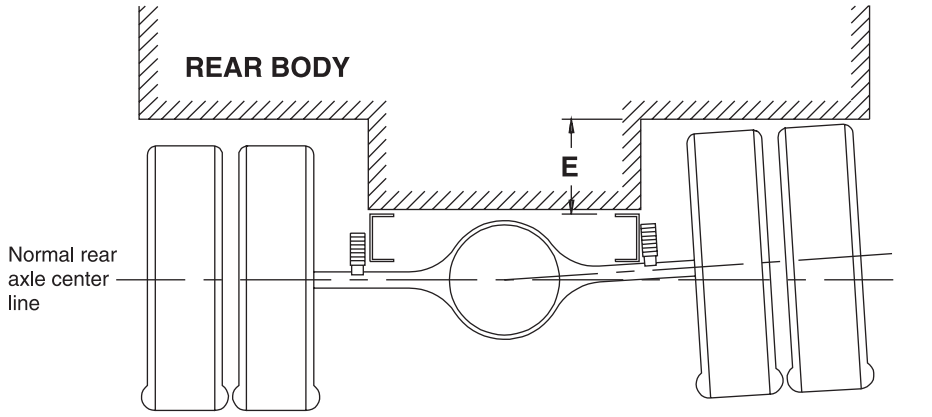
Figure 14.16.3

Note: Dimensions in inches

Rear Axle Chart NQR







When all of rear wheels ride over a high spot.

When rear wheels on one side ride over a high spot.

Figure 14.17.1

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.

Figure 14.18.1

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

Figure 14.18.2

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

Figure 14.18.3

Note: Dimensions in inches

NPR-HD Suspension Deflection Charts

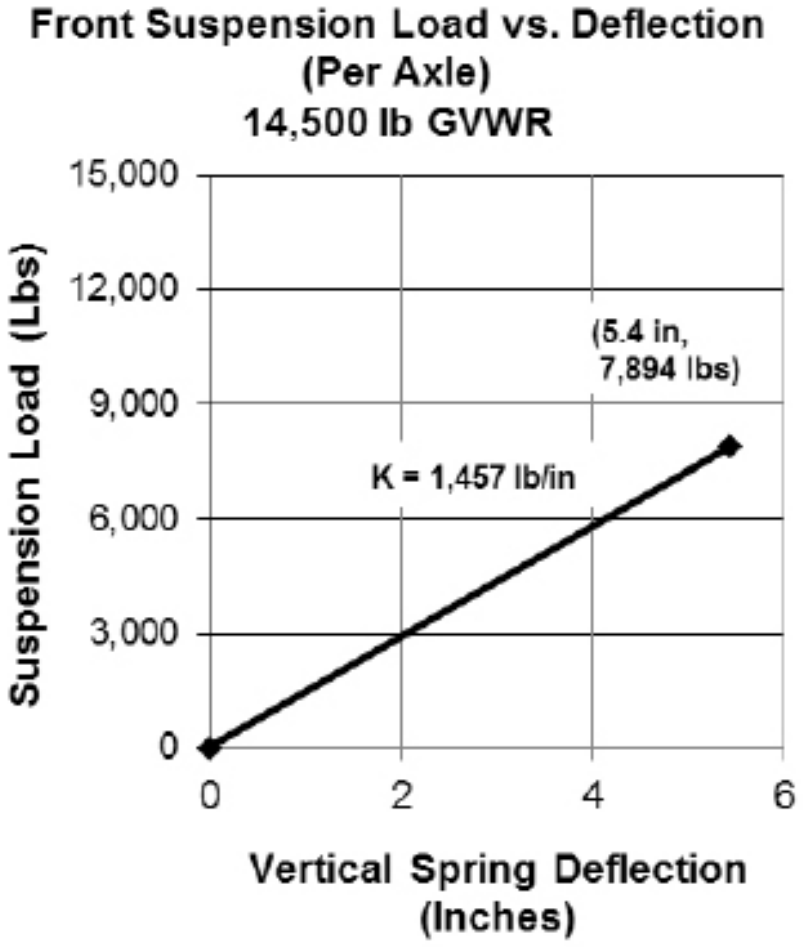


Figure 14.19.1

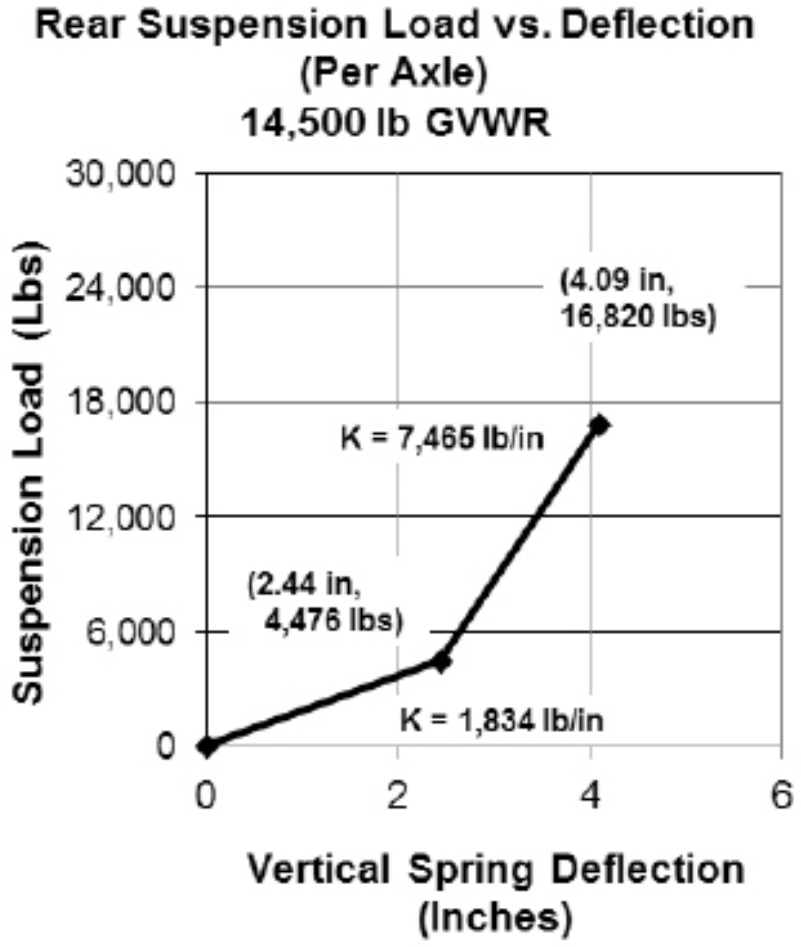


Figure 14.19.2

NQR Suspension Deflection Charts

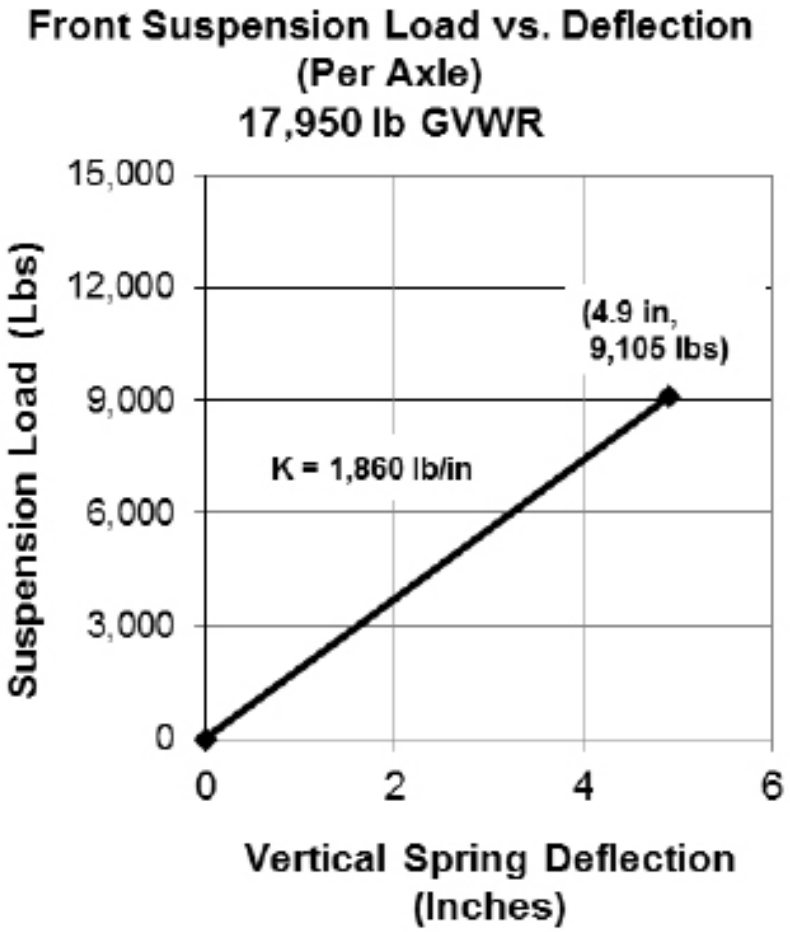


Figure 14.20.1

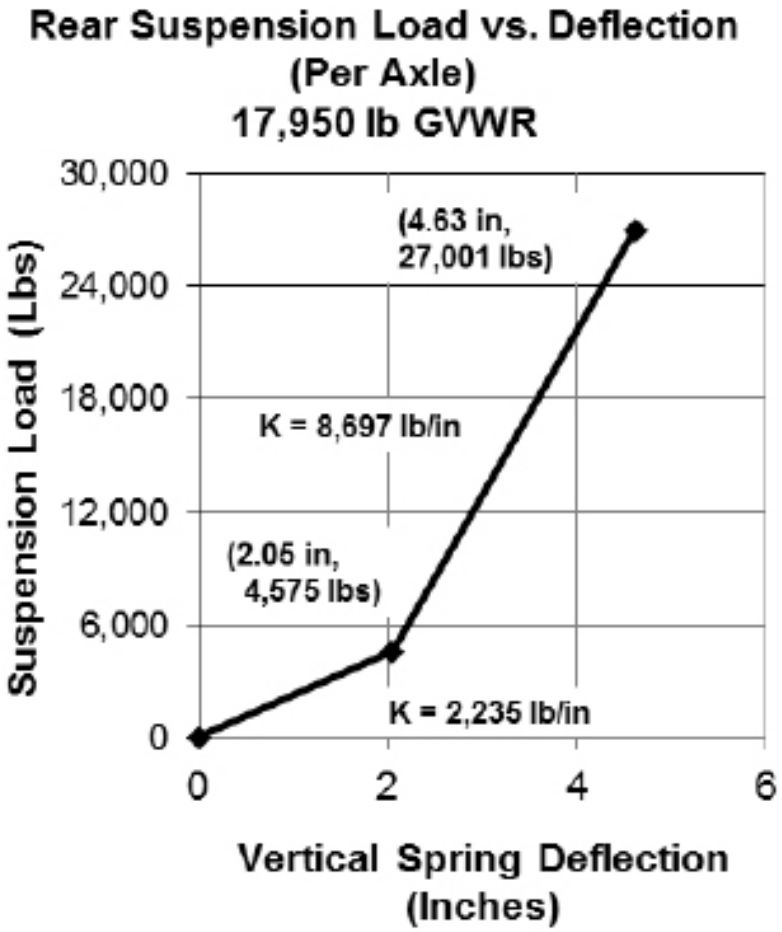


Figure 14.20.2

Tire and Disc Wheel Chart NPR HD

Tire

Tire Size	Tire Load Limit and Cold Inflation Pressures				Maximum Tire Load Limits (lbs.)		GVWR (Lbs.)
	Single		Dual		Front	Rear	
	Lbs.	PSI	Lbs.	PSI	2 Single	4 Dual	
215/85R 16E	2,680	80	2,470	80	5,360	9,880	14,500

Figure 14.21.1

Tire Size	GVWR (Lbs.)	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

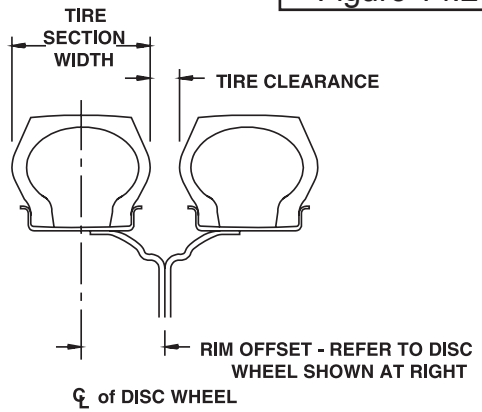
Figure 14.21.2

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 Thickeness	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	5^0 DC	Steel TOPY

*O.D. Wrench Sizes

Figure 14.21.3



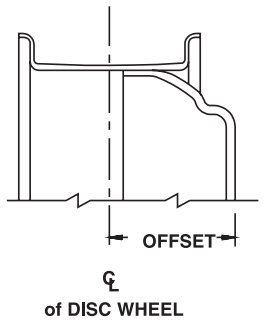


Figure 14.21.4

Note: Dimensions in inches

Tire and Disc Wheel Chart NQR

Tire

Tire Size	Tire Load Limit and Cold Inflation Pressures				Maximum Tire Load Limits (lbs.)		GVWR (Lbs.)
	Single		Dual		Front	Rear	
	Lbs.	PSI	Lbs.	PSI	2 Single	4 Dual	
225/70R 19.5F	3,450	90	3,245	90	6,900	12,980	17,950

Figure 14.22.1

Tire Size	GVWR (Lbs.)	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

Figure 14.22.2

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 Thickeness	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	15^0 DC	Steel TOPY

*O.D. Wrench Sizes

Figure 14.22.3

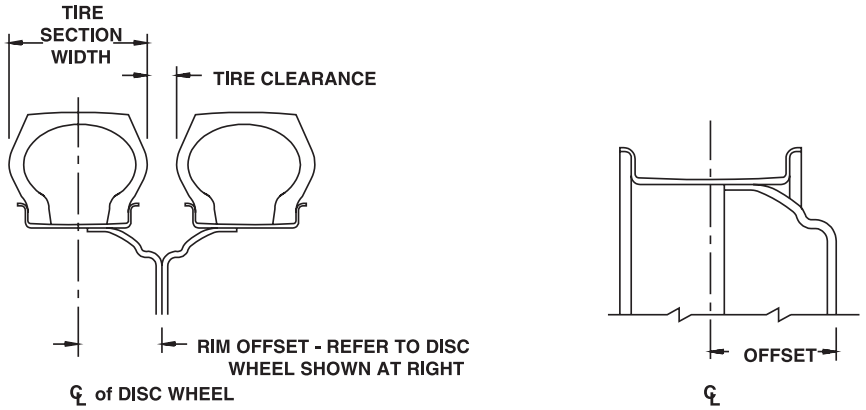


Figure 14.22.4

Note: Dimensions in inches

Propeller Shaft NPR HD, NQR

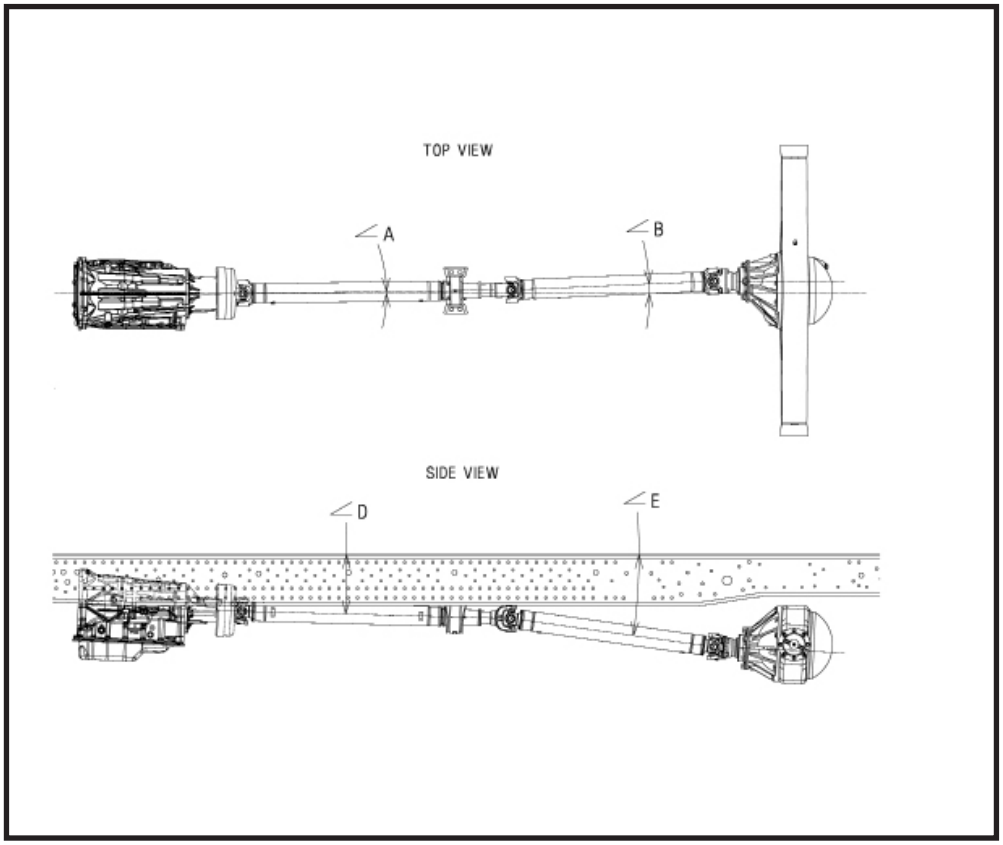


Figure 14.24.1

NPR HD

WheelBase (in.)	Top View		Side View			
	∠A	∠B	∠D	∠E	Trans.	Rear Axle
150	0º	2.7º	2.6º	8.0º	2.5º	2.5º
176	0º	1.8º	2.1º	5.4º	2.5º	2.5º

Figure 14.24.2

NQR

WheelBase (in.)	Top View		Side View			
	∠A	∠B	∠D	∠E	Trans.	Rear Axle
150	0º	3.2º	2.6º	8.0º	2.5º	2.7º
176	0º	2.2º	2.1º	5.6º	2.5º	2.7º

Figure 14.24.3

Note: 1. Angles provided in table are relative to the frame angle. Please take this into consideration for service measurements.
2. Driveline angles are based on the chassis curb weight which includes standard fuel but no driver, body, or payload

	NPR HD	
Trans. Type	6 Automatic Transmission	
Wheel base	150	176
No. of Shafts	2	2
Shaft #1 O.D.	3.25”	3.25”
Thickness	0.0906”	0.0906”
Length	34.25”	43.74”
Type	B	B
Shaft #2 O.D.	3.25”	3.25”
Thickness	0.0906”	0.0906”
Length	34.17”	50.71”
Type	C	C

Figure 14.24.1

NQR		
Trans. Type	**6 Automatic. Transmission**	
Wheelbase	**150**	**176**
No. of Shafts	2	2
Shaft #1 O.D.	3.54	3.54
Thickness	0.126	0.126
Length	40.24	49.69
Type	B	B
Shaft #2 O.D.	3.54	3.54
Thickness	0.126	0.126
Length	36.53	52.93
Type	C	C

Figure 14.24.2

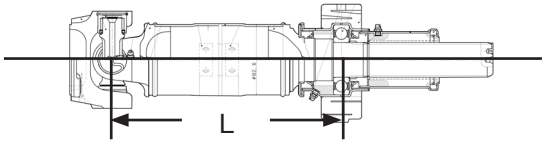
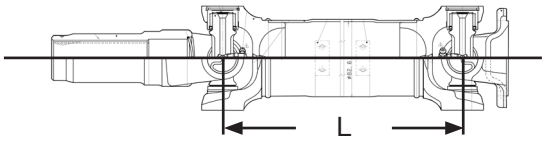
Type	Description	Illustration
Type **B**	1st shaft in 2-piece driveline	
Type **C**	2nd shaft in 2-piece driveline	

Figure 14.24.3

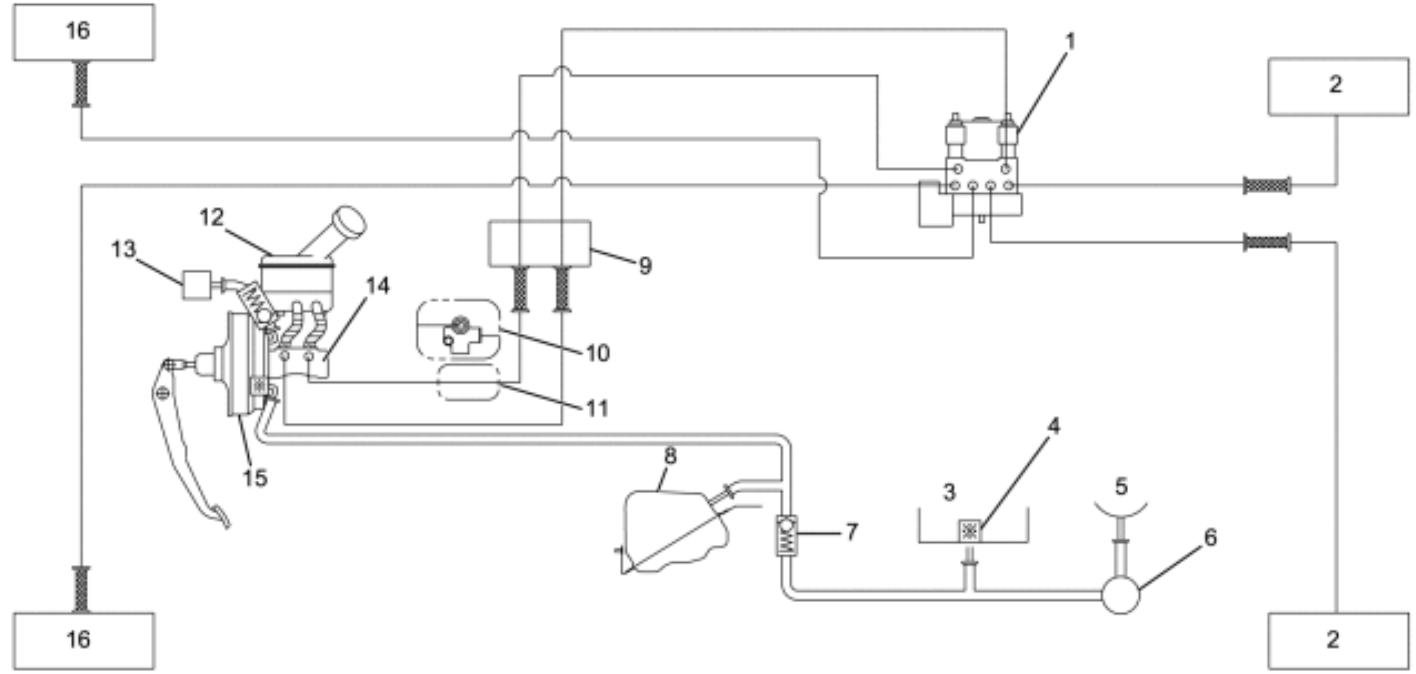
Note: Dimensions in inches

Brake System Diagram 14,500 GVW

Vacuum Over Hydraulic

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

Legend for NPR, NPR-HD, NPR-XD Brake System
(1) Electronic Hydraulic Control Unit (EHCU)
(2) Rear Wheel Cylinder
(3) Vacuum Pump
(4) Check Valve
(5) Exhaust Brake Valve
(6) Magnetic Valve
(7) Check Valve (One-way Valve)
(8) Vacuum Tank
(9) 4-Way Connector
(10) With Metering Valve
(11) W/O Metering Valve
(12) Brake Fluid Reservoir
(13) Electric Vacuum Pump
(14) Master Cylinder
(15) Vacuum Booster (Servo Unit)
(16) Front Wheel Cylinder



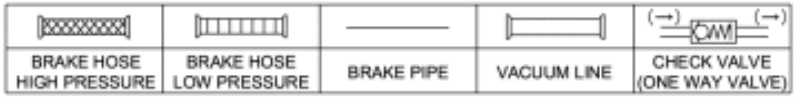


Figure 14.25.1

Brake System Diagram 17,950 GVW

Full Hydraulic

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

Legend for NPR, NPR-HD, NPR-XD Brake System
Legend for NQR, NRR Brake System
(1) Electronic Hydraulic Control Unit (EHCU)
(2) Rear Wheel Cylinder
(3) Hydraulic Booster Oil Pump
(4) Hydraulic Booster Reservoir
(5) Cooler Pipe
(6) Pipe Connector
(7) Brake Fluid Reservoir
(8) Master Cylinder
(9) Hydraulic Booster Unit
(10) Front Wheel Cylinder

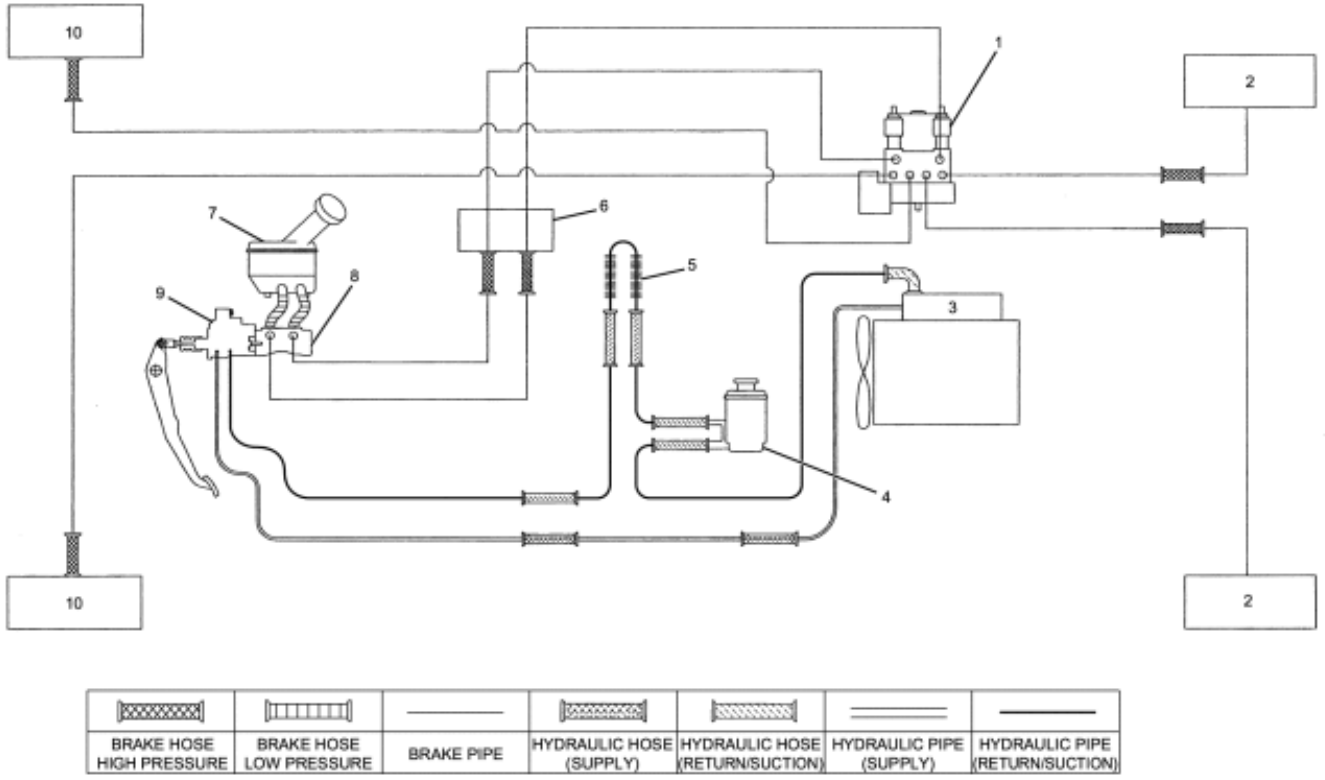


Figure 14.26.1

PTO Location, Drive Gear and Opening Information

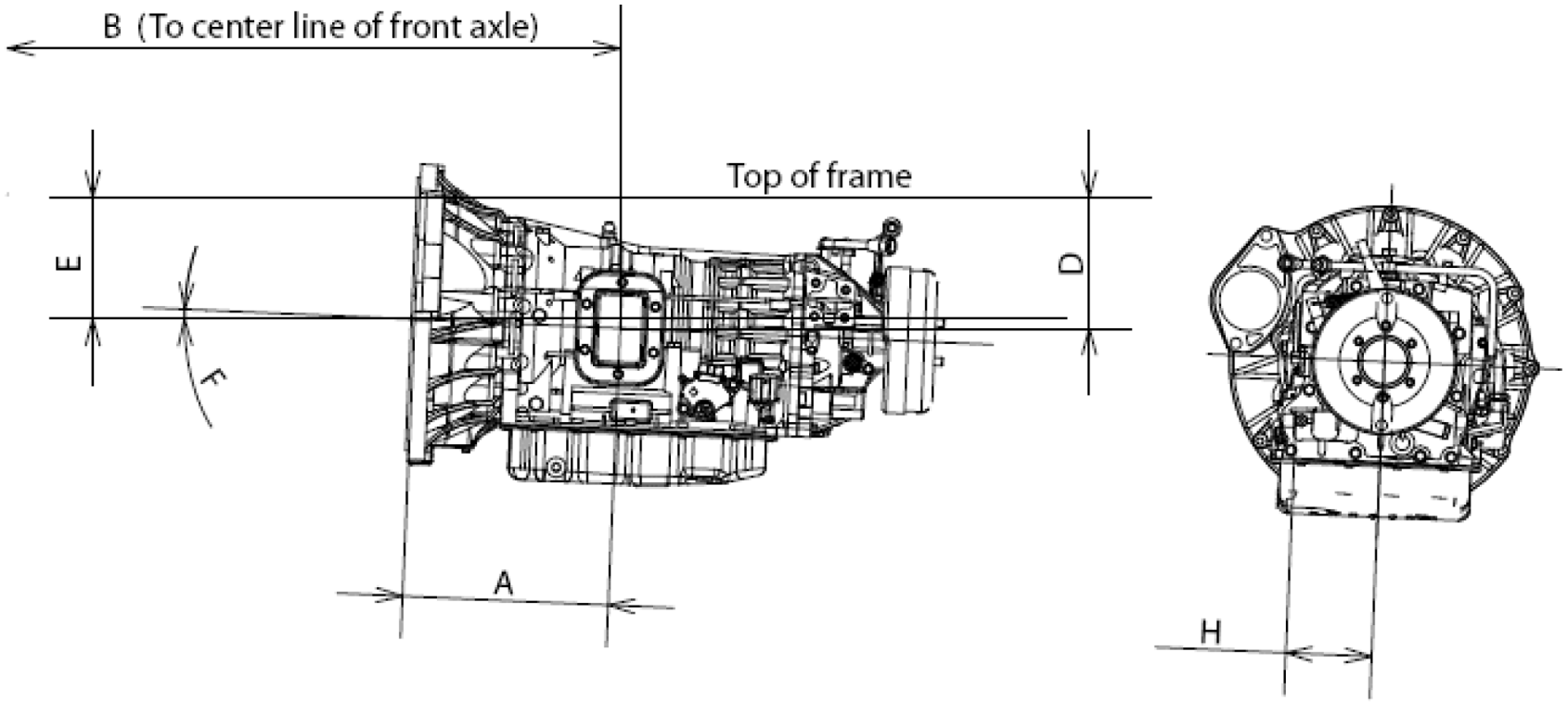


Figure 14.27.1

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	2.5^0	5.16	PTO Gear	1:1 with turbine	69	N/A	0^0	134 lbs.-ft. @ 1,700 RPM

Figure 14.27.2

Note: Dimensions in inches

Opening Diagram

Aisin A460 Automatic Torque Converter
Lock Up Function.

In either the Stationary Preset PTO Mode or Stationary Variable PTO Mode, when engine rpm exceeds 1200 RPM, the torque converter will lock up. The engine rpm can not be modified and the lockup function cannot be turned off. Please not that with PTO applications that operate around 1200 RPM, the transmission software holds the torque converter in lockup until engine speed falls below 1100 RPM

The lock up function will cancel if the transmission shift lever is moved from the park or neutral positions which will remove the trasmission from the stationary mode.

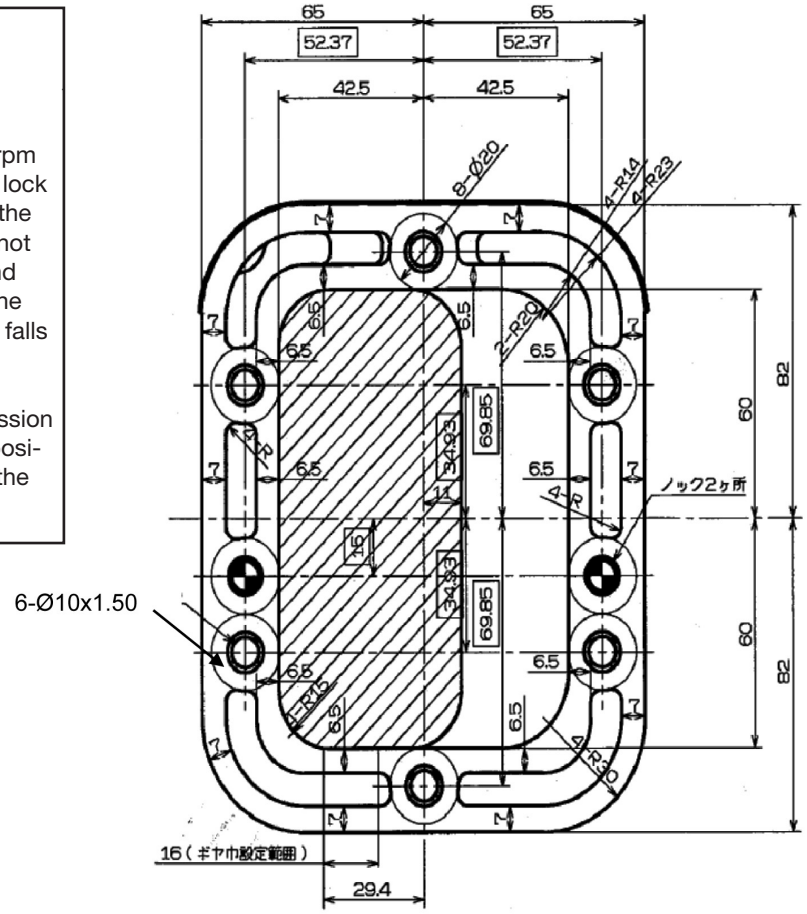


Figure 14.28.1

Additional PTO Functions:

For certain applications the Automatic regeneration function can be inhibited (Example Airport Ground Support vehicles).

For certain applications the Automatic regeneration function can be enabled in the PTO stationary mode (Example Lawn care and carpet cleaning).
For certain applications the Automatic regeneration function can be enabled in the PTO mobile mode (Example Line painting).

Please refer to the PTO section of the BBG (section 17) for further details.

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.
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.

Rear View Fuel Fill

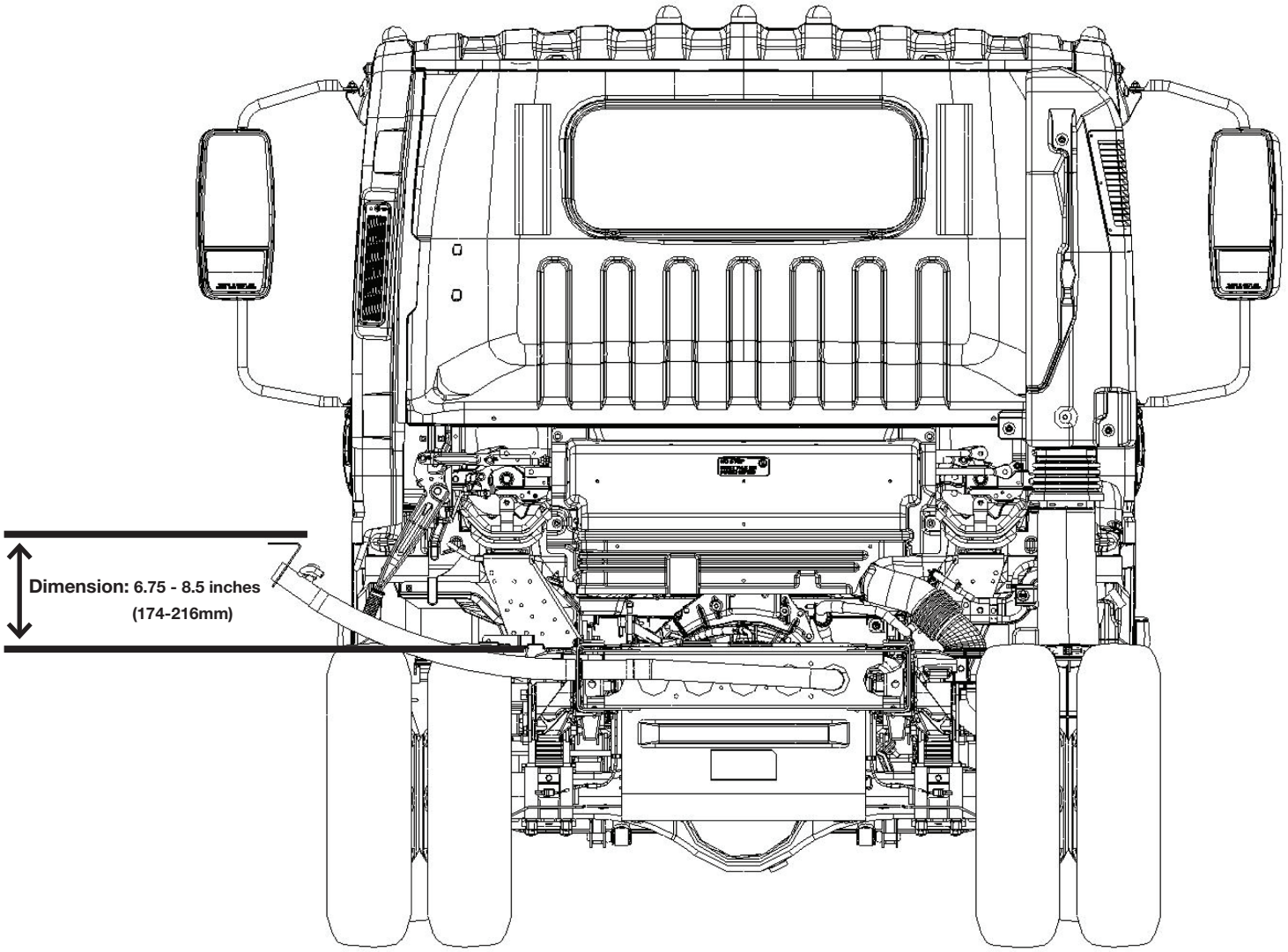
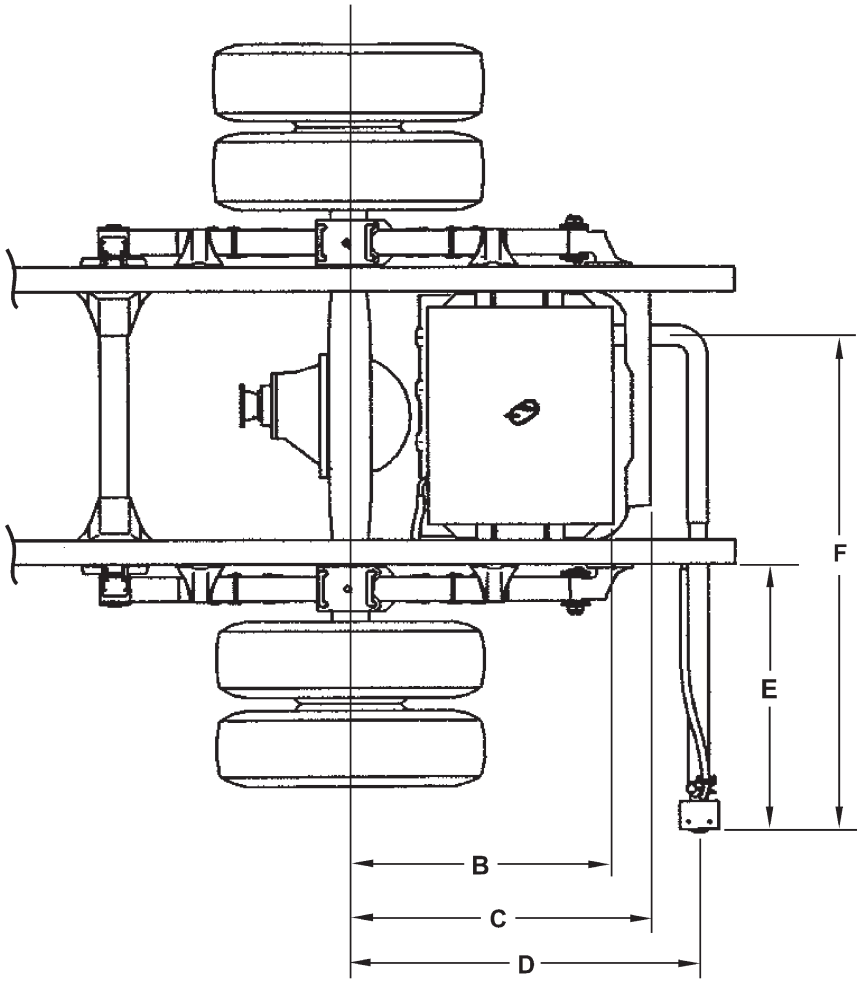


Figure 14.30.1

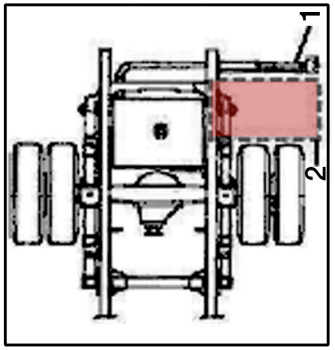
Top View Fuel Fill



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)

Figure 14.31.1

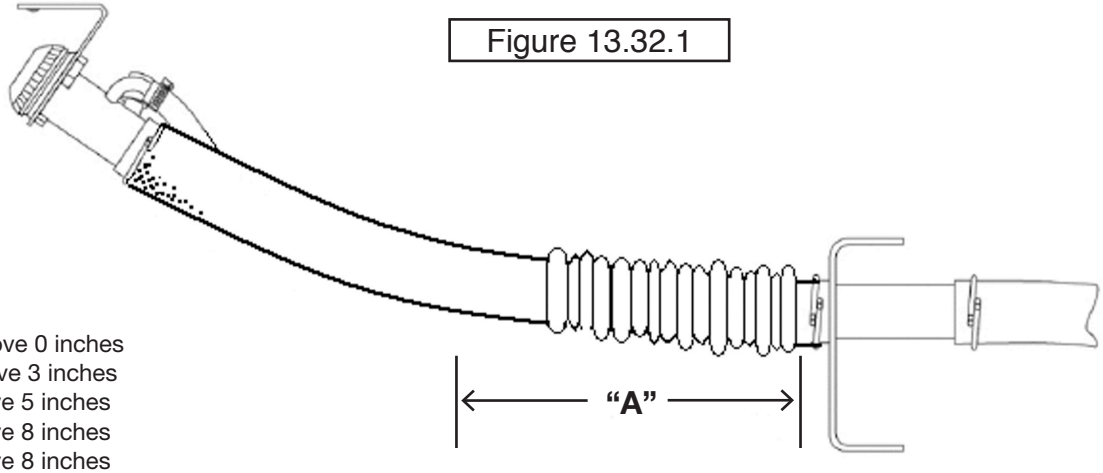
Hose Modification for Various Width Bodies and fuel fill vent Protection



Fuel fill vent and neck should be protected from road spray

1. FUEL FILLER NECK
2. RECOMMENDED MUD FLAP MOUNTING AREA (RED ZONE).

Figure 13.32.1



"A" Dimensions:
102 inch wide body remove 0 inches
96 inch wide body remove 3 inches
90 inch wide body remove 5 inches
86 inch wide body remove 8 inches
80 inch wide body remove 8 inches

NOTE: **Shorten hose by "A Dimension" based on chart at left.**

Figure 14.32.2

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.



Figure 14.33.1

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.

Through the Rail Fuel Fill Frame Hole

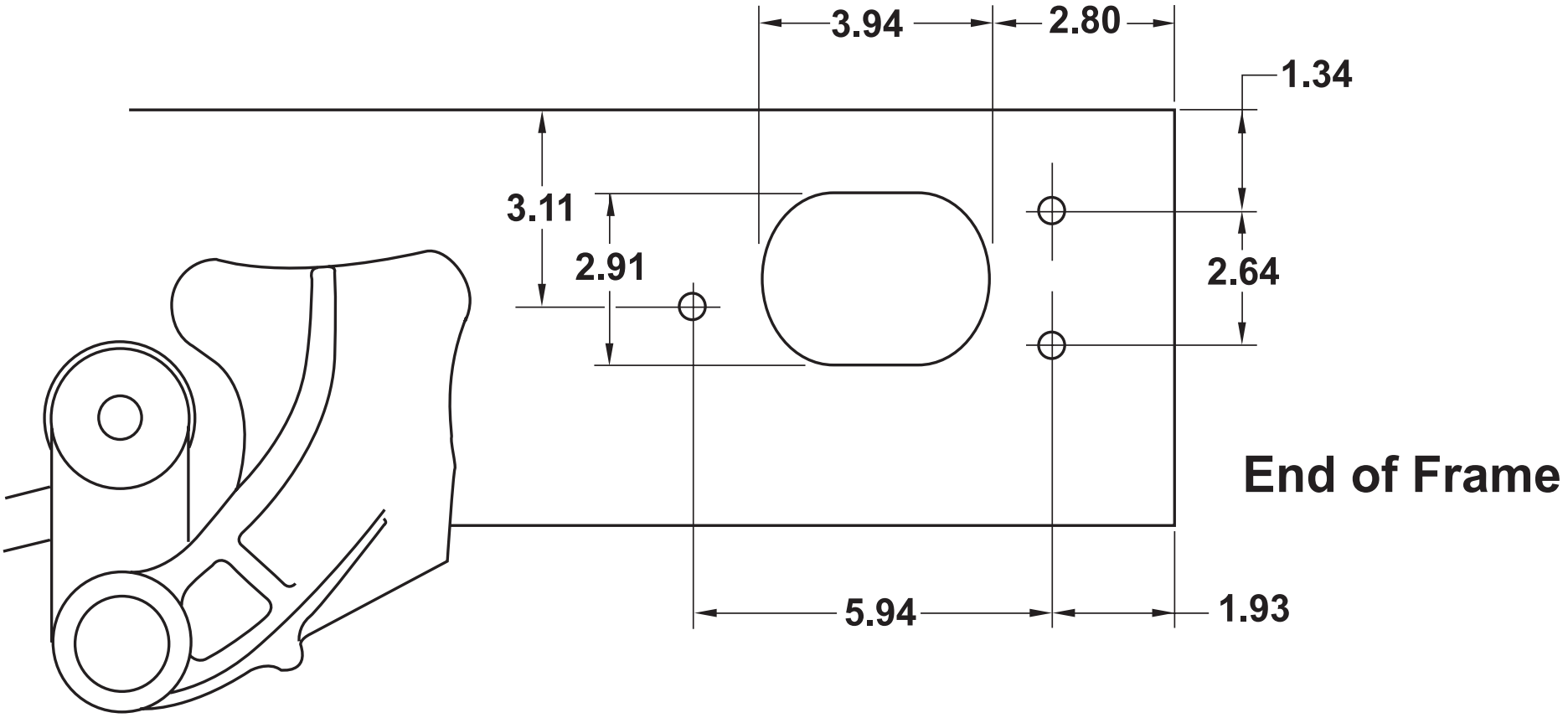


Figure 14.34.1

Note: Dimensions in inches

N-Diesel Fuel Filler Kit Instructions

Please review these instructions prior to installation of the fuel filler kit.

Parts Kit: There are two separate parts kits used for the 2011 and later model year N-diesel products. Fuel filler kit part number 898171 9090 is used for 14,500 lb and higher GVWR chassis (NPR-HD, NPR-XD NQR, NRR), For reference kit part number 898171 9080 is used for 12,000 lb GVWR chassis (NPR models). Parts list is shown in ***Figure 13.35.2.*** Parts photos are shown in ***Figure 14.35.1.***

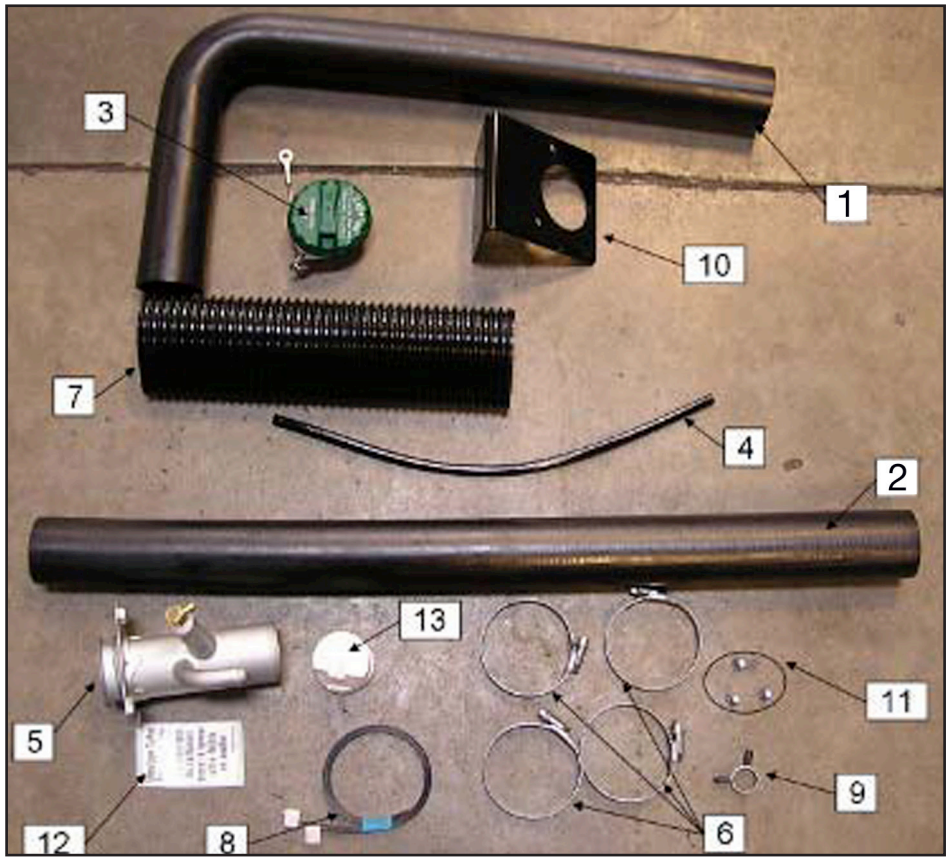


Figure 14.35.1

FUEL FILLER KIT, NPR-HD, NPR-XD, NQR, NRR 898171 9090			
ITEM #	**PART NAME**	**PART #**	**QTY**
1	HOSE: FUEL FILLER NECK	898171 211Y	1
2	HOSE: FUEL FILLER	898006 450Y	1
3	CAP: FILLER	897218 702Y	1
4	HOSE: ROLL-OVER VALVE	898164 876Y	1
5	NECK ASM: FUEL FILLER	898164 877Y	1
6	CLIP: JOINT	898133 349Y	4
7	PROTECTOR: FILLER HOSE	897114 063Y	1
8	CLIP: BAND, HOSE FIXING	109707 107Y	2
9	CLIP: RUBBER, HOSE	894242 034Y	1
10	BRACKET: FILLER NECK	897116 621Y	1
11	SCREW: FILLER NECK	897581 217Y	3
12	CAUTION PLATE	898070 422Y	1
13	SHUTTER: FUEL TANK	898164 404Y	1

Figure 14.35.2

Installation Instructions and Considerations:

The fuel tank shutter valve (13) was a new component for 2011 model year. This component is meant to improve fuel splash-back performance of the fuel system. In the 2012 model year a running change was made and this valve (13) was relocated from the fuel tank inlet to the inlet (outboard side) of the fuel filler neck bulkhead assemble that is bolted to the left hand frame rail as shown in **Figure 14.38.1**. This plastic valve snaps into place in the inlet of the frame mounted fuel pipe. The valve should be installed so that the plastic clip is at the top of the valve, so that the flap door opens up, as shown in **Figures 13.38.2**.

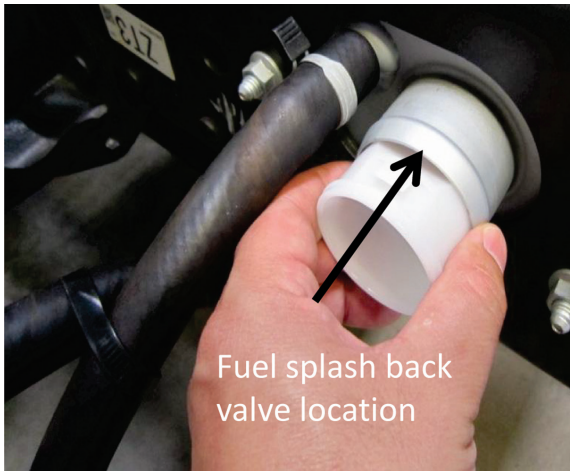


Figure 14.36.1

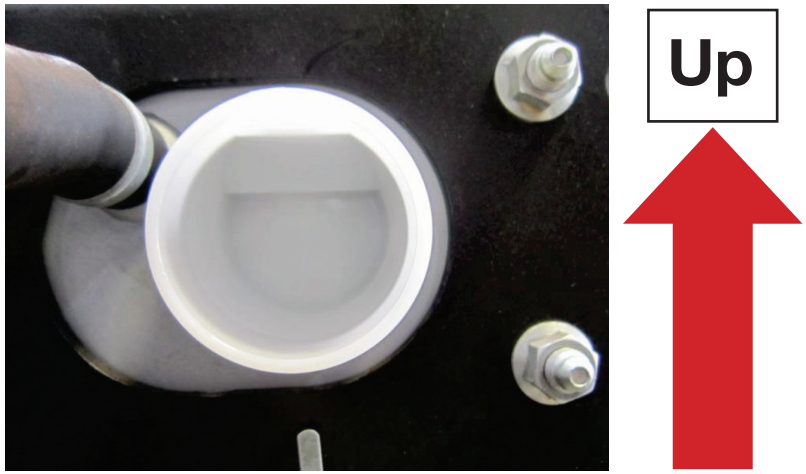


Figure 14.36.2

The fuel filler hose should be installed flush against the tank. The clamp should be installed between 1/16”and 3/8” from the tank. This is shown in ***Figure 14.38.3*** below.

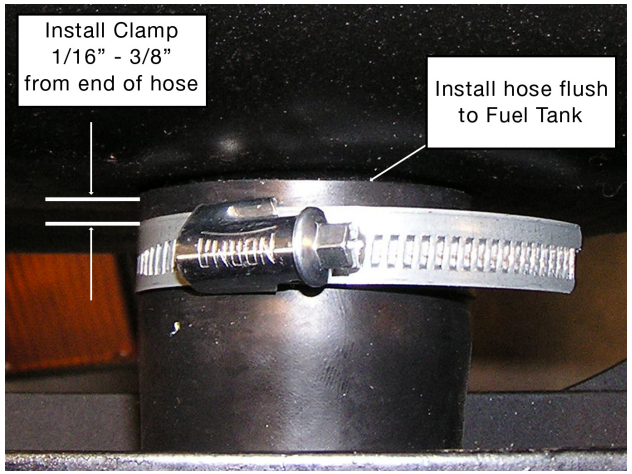


Figure 14.36.3

Roll-Over Valve Tubing

The roll-over valve has a hose attachment that will make this valve less sensitive to water intrusion. In order for the valve to work properly, it is critical that the hose be installed to the rollover valve. The proper assembly of the outer hose is shown in ***Figure 14.37.1.***

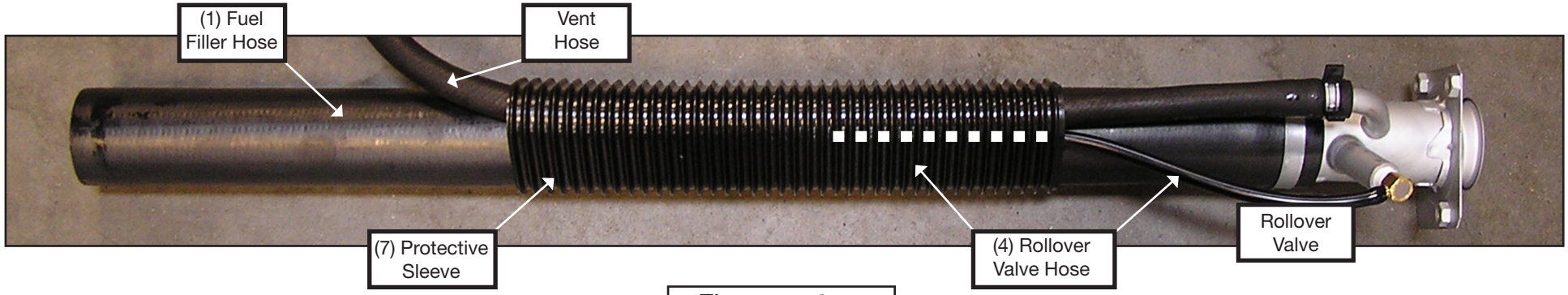


Figure 14.37.1

Filler Neck Installation:

The fuel filler neck (5) must be installed with the proper orientation on the body. The neck should be installed with the roll-over valve pointing upward, with the bottom edge of the neck oriented parallel to the ground, plus 33 to minus 7 degrees. See ***Figure 14.37.2*** for the proper orientation.

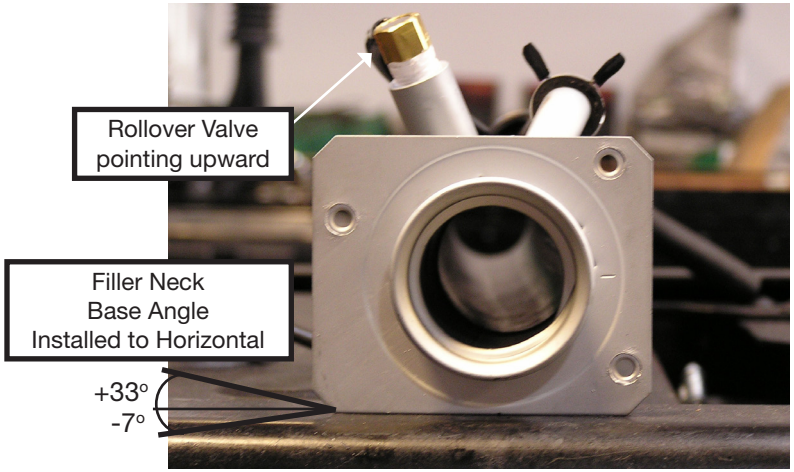


Figure 14.37.2

NRR Diesel Specifications

Model	NRR
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)	215 HP/2500 RPM w auto transmission
Torque (Gross)	452 lb ft torque/1850 RPM w auto transmission
Equipment	Dry element air cleaner with vertical intake; 2 rows 564 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 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.
Steering	Integral power steering 18.8-20.9:1 ratio. Tilt and telescoping steering column.
Front Axle	Reverse Elliot “I” -Beam rated at 7,275 lbs.
Suspension	Semi-elliptical steel alloy tapered leaf springs with stabilizer bar and shock absorbers.
GAWR	7,275 lbs.
Rear Axle	Full floating single speed with hypoid gearing rated at 14,550 lbs.
Suspension	Semi-elliptical steel alloy multi-leaf springs and shock absorbers.
GAWR	13,660 lbs.
Wheels	19.5x6.0-K 6 hole disc wheels, painted white.
Tires	225/70R-19.5E (12 pr) LRR (Low Rolling Resistance) tubeless steel belted radials, all season tread front and rear.
Brakes	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 mechanical, cable actuated, internal expanding drum type, transmission mounted. The exhaust brake is standard and is vacum operated. 4 channell 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.
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^3. RBM 316,800.
Cab	All steel low cab forward, BBC 70.9 in, 45° mechanical tilt with torsion assist.
Equipment	TRICOT breathable 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, AM/FM CD stereo radio.
Electrical	12 Volt, negative ground, dual Delco maintenance free batteries, 750 CCA each, 140 Amp alternator with integral regulator.
Options	See last page for options.

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

Vehicle Weights, Dimensions and Ratings

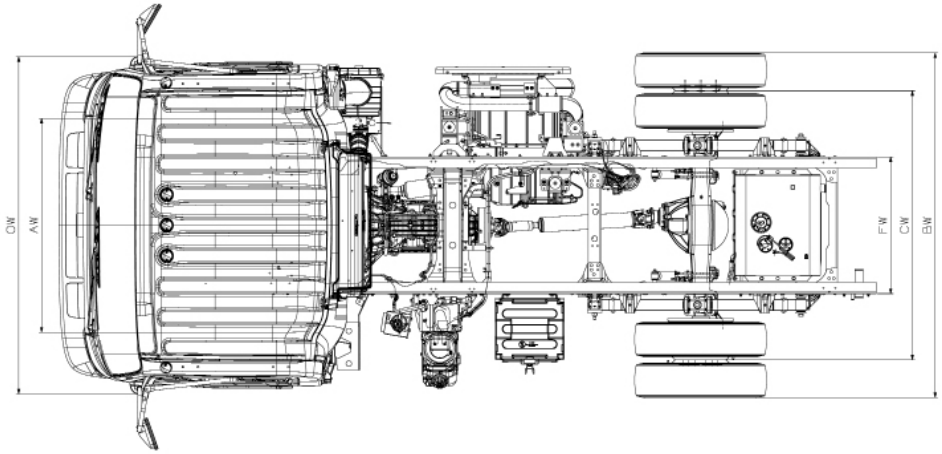


Figure 15.2.1

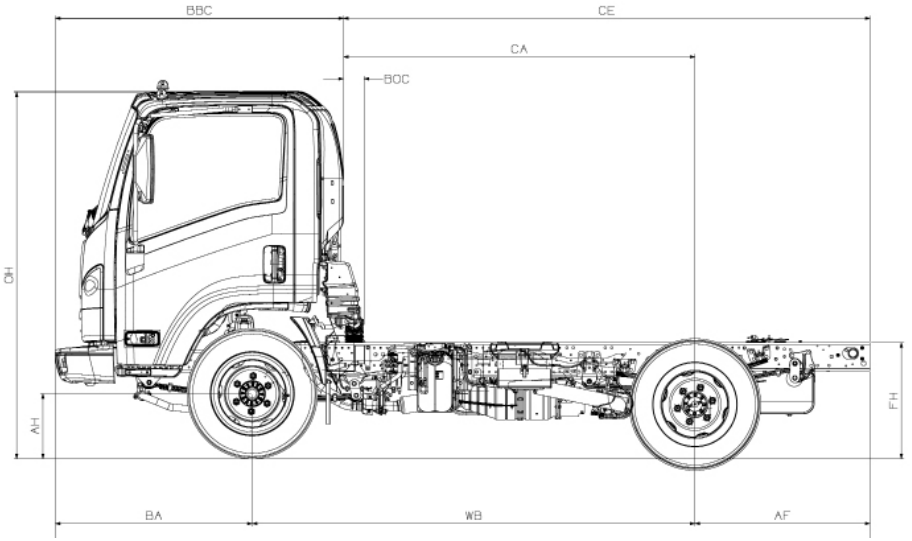


Figure 15.2.2

In-Frame Tank
19,500 lb. GVWR Automatic Transmission Model
Chassis Curb and Maximum Payload Weights

Model	WB	Unit	Front	Rear	Total	Payload
NU1	109.0 in	lb.	4145	2480	6625	12875
NU2	132.5 in	lb.	4237	2484	6721	12779
NU3	150.0 in	lb.	4299	2466	6765	12735
NU4	176.0 in	lb.	4361	2463	6824	12676
NU5	200.0 in	lb.	4524	2662	7186	12314
NU6	212.0 in	lb.	4534	2672	7206	12294

Side Mounted Tank
19,500 lb. GVWR Automatic Transmission Model
Chassis Curb and Maximum Payload Weights

Model	WB	Unit	Front	Rear	Total	Payload
NU4	176.0 in	lb.	4496	2340	6836	12664

Vertical Exhaust Option Dimensions:
Variable Chassis Dimensions:

Unit	WB	EFF CA*	EFF CE*	OAL	AF
Inch	109.0	62.5	105.6	200.5	43.1
Inch	132.5	86.0	153.1	224.0	43.1
Inch	150.0	103.5	146.6	241.5	43.1
Inch	176.0	129.5	172.6	267.5	43.1

* Effective CA & CE listed are standard CA or CE less vertical exhaust BOC of 24 inches.

Vertical Exhaust BOC = 24 inches

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
AH	7.5	BW	83.3
AW	65.6	CW	65
BA	48.3	FW	33.5
BBC	70.7	OH	92.4
BOC	7.7	OW	81.3
FH	33.0		

2016 Isuzu Truck

Truck Weight Limits:

GVWR Designed Maximum	19,500 lbs.
GAWR, Front	7,275 lbs.
GAWR, Rear	13,660 lbs.

Technical Notes:

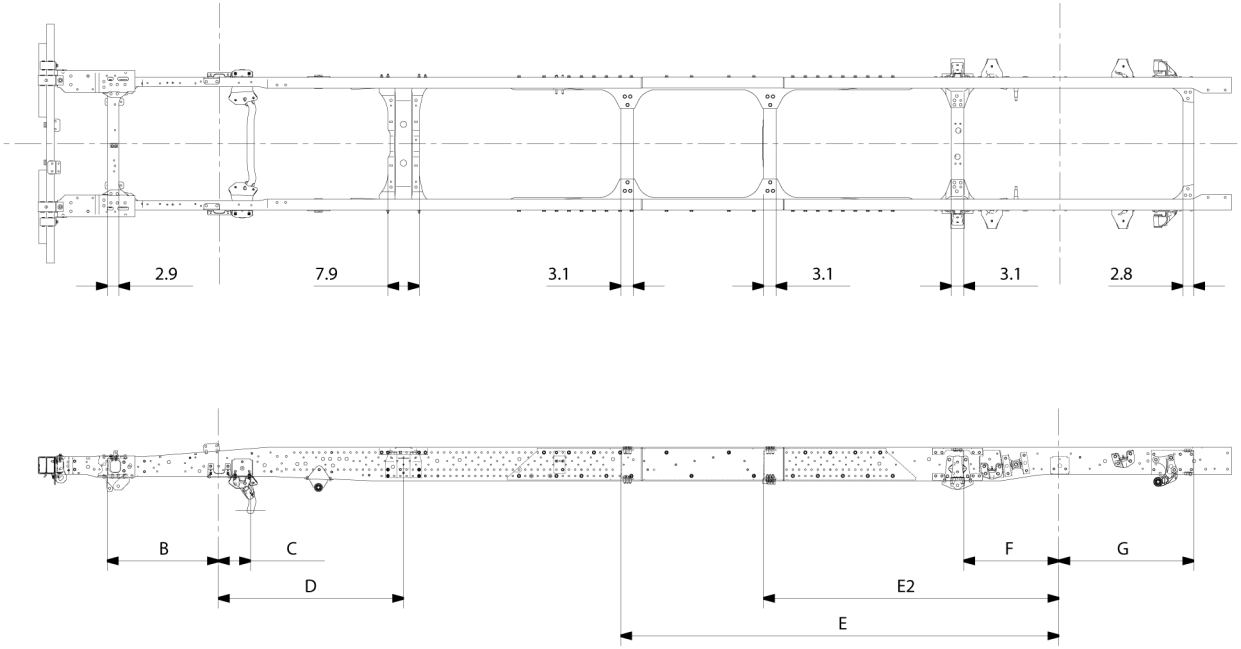
Chassis Curb Weight reflects standard equipment and fuel, but no driver or payload.

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

RPO	DESCRIPTION STANDARD CAB	Weight (Lbs.) Front/Rear	
IF4	Air Deflector roof mounted (not available in Crew Cab) 64.0	0.00	
IF6	Fire Extinguisher and Triangle Kit mounted in rear organizer	19.00	0.00
IG3	Engine Oil Pan Heater (120v 300w)	2.00	0.00
IH2	Engine emergency shutdown system HWT, LWL, LOP (4)	0.00	0.00
IY9	Engine Idle Shutdown (Timer set at 3 minutes for engine shutdown)	0.00	0.00
IA9	Engine Idle Shutdown (Timer set at 5 minutes for engine shutdown)	0.00	0.00
IK9	33 Gallon Additional Diesel Fuel Tank mounted on LH side 150,176 wb std cab & 176 in wb crew cab in rail tank only	(7)	(7)
IY4	Delete Standard AM/FM/CD Radio	-3.00	0.00
I8H	AM/FM/CD radio with Aux input/USB port and Bluetooth	0.00	0.00
IL9	PTO Enable Switch and Engine Idle Up Switch recommended for PTO and Idle applications (2)	1.00	0.00
IS0	Heated Mirrors	1.00	0.00
I9H	Heated dual remote control mirrors (15” head)	1.00	0.00
IU2	Mirror Bracket for 102” wide body	1.00	0.00
IV8	Seat Covers Standard Cab (8)	6.00	0.00
IX2	Rear Body Dome Lamp Switch (6)	1.00	0.00
I0A	Cross rail horizontal DPF/SCR with vertical exhaust	100.00	100.00
I66	Block Heater (cord)	1.00	0.00
UZF	Back up alarm	2.00	0.00
V22	Chrome Grille	1.00	0.00
I4K	Keyless Entry System	1.00	0.00
I5K	Suspension Drivers Seat	1.00	0.00
I6K	Lockable DEF Fill Cap	1.00	0.00
I1L	Speed Limited to 58 MPH	0	0
I2L	Speed Limited to 65 MPH	0	0
I3L	Speed Limited to 68 MPH	0	0
I4L	Speed Limited to 70 MPH	0	0
54	In rail fuel tank with power windows, door locks and air conditioning	80	0
64	In rail fuel tank with power windows, power door locks, air conditioning and LSD (3)	80	0
74	Side mounted fuel tank w/power windows, power door locks and air conditioning (5)	215	-124
84	Side mounted fuel tank w/power windows, power door locks, air conditioning and LSD (3) (5)	215	-109

(1) RPO is Regular Production Option that is stocked in Port inventory.
LSO is Limited Stock Option that is stocked in Port inventory but should be checked for availability and delivery time.
SEO is Special Equipment Option and requires 90-120 day lead time for delivery.
(2) These switches can be port or dealer installed. Please consult the body builders guide and / or the service manual for additional programming options and functions.
(3) LSD factory installed Limited Slip Differential
(4) High Water Temperature (HWT), Low Water Level (LWL) and Low Oil Pressure (LOP)
(5) 176 inch WB Standard Cab only
(6) RPO must be ordered with Supreme Value Pak and Morgan Fast Track body Programs
(7) Additional fuel tank mounted on the drivers side frame rail. Available with in rail tank only available on 150 and 176 standard cab wheelbases
(Weights: 150 wb +122 lbs. front and +238 lbs. rear and 176 wb +102 lbs. front and + 258 lbs.).
(8) Seat covers not available with suspension seat

Frame and Crossmember Specifications



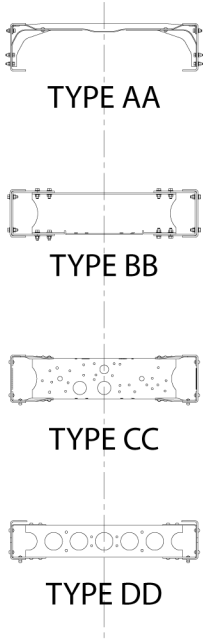


Figure 15.4.1

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

Figure 15.4.2

Note: Dimensions in inches

Frame Chart

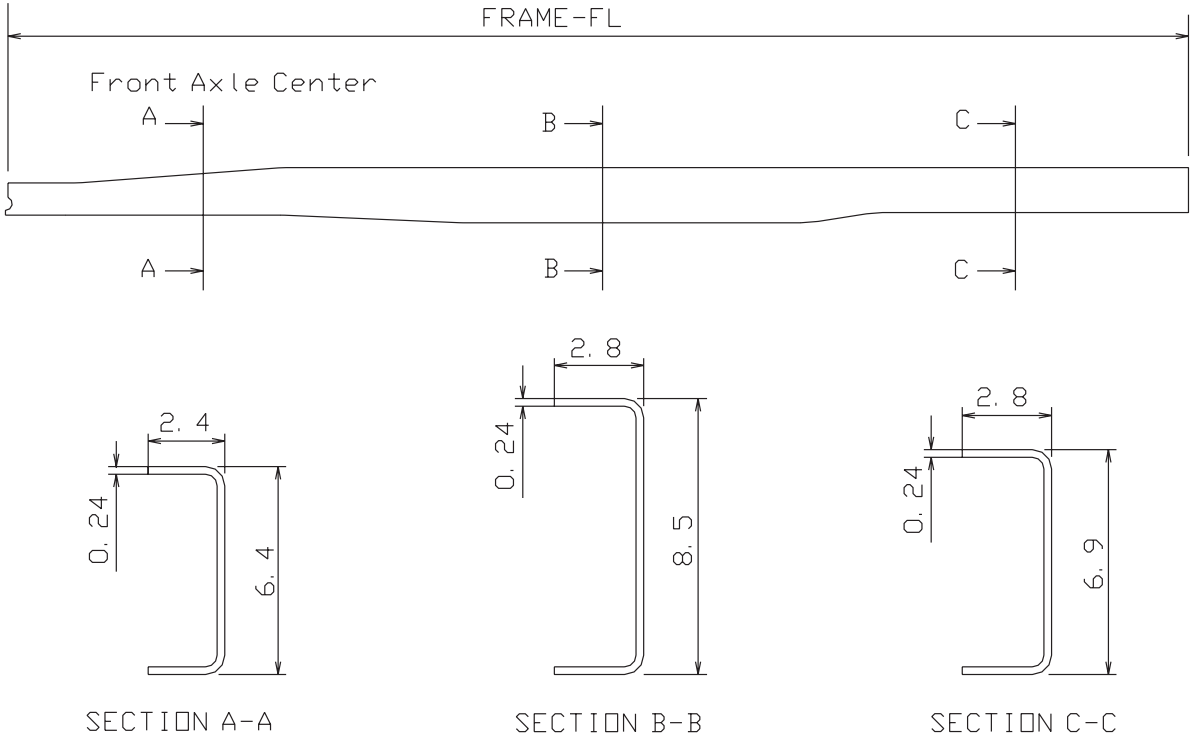


Figure 15.5.1

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

Figure 15.5.2

Note: Dimensions in inches

NRR Diesel Standard Cab - Top View

WB	A	B
109	43.4	78.0
132.5	49.7	84.3
150	43.4	78.0
176	43.4	78.0
200	43.4	78.0
212	43.4	78.0

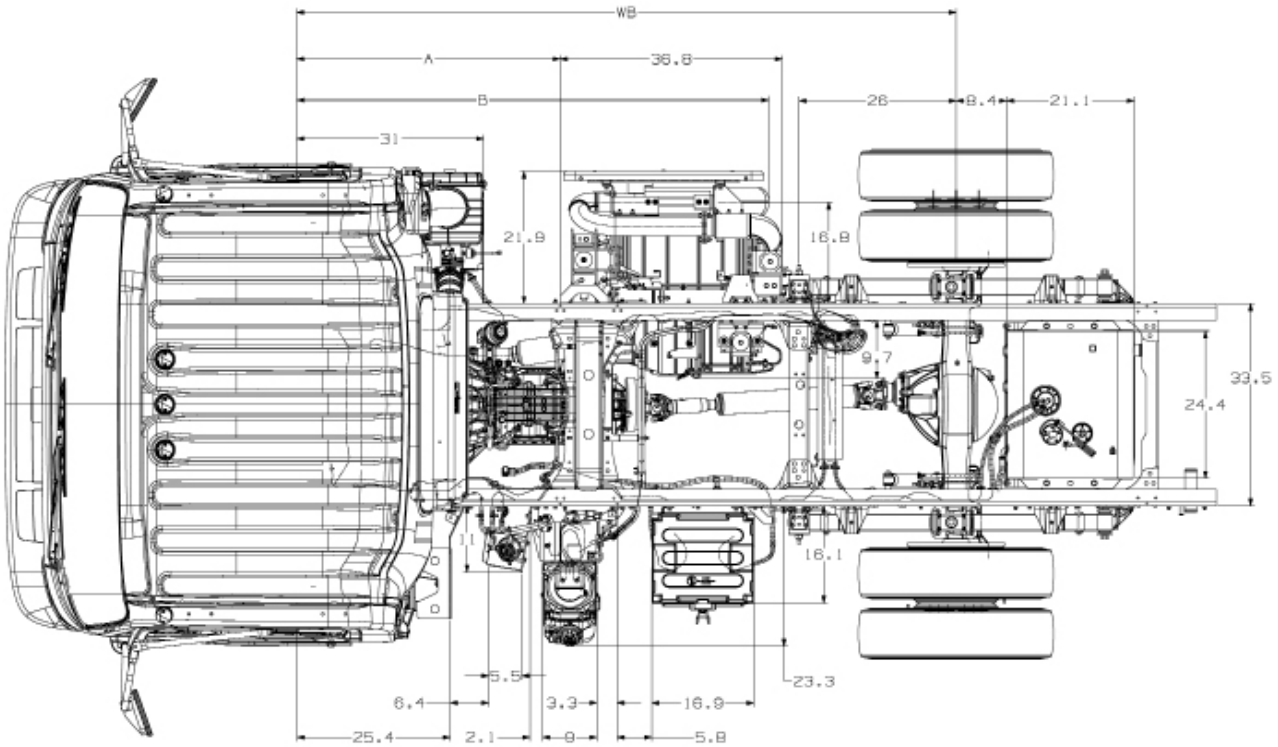


Figure 15.6.1

Note: Dimensions in inches

NRR Diesel Standard Cab - Left Side View

WB	A
109	80.7
132.5	87.0
150	80.7
176	80.7
200	80.7
212	80.7

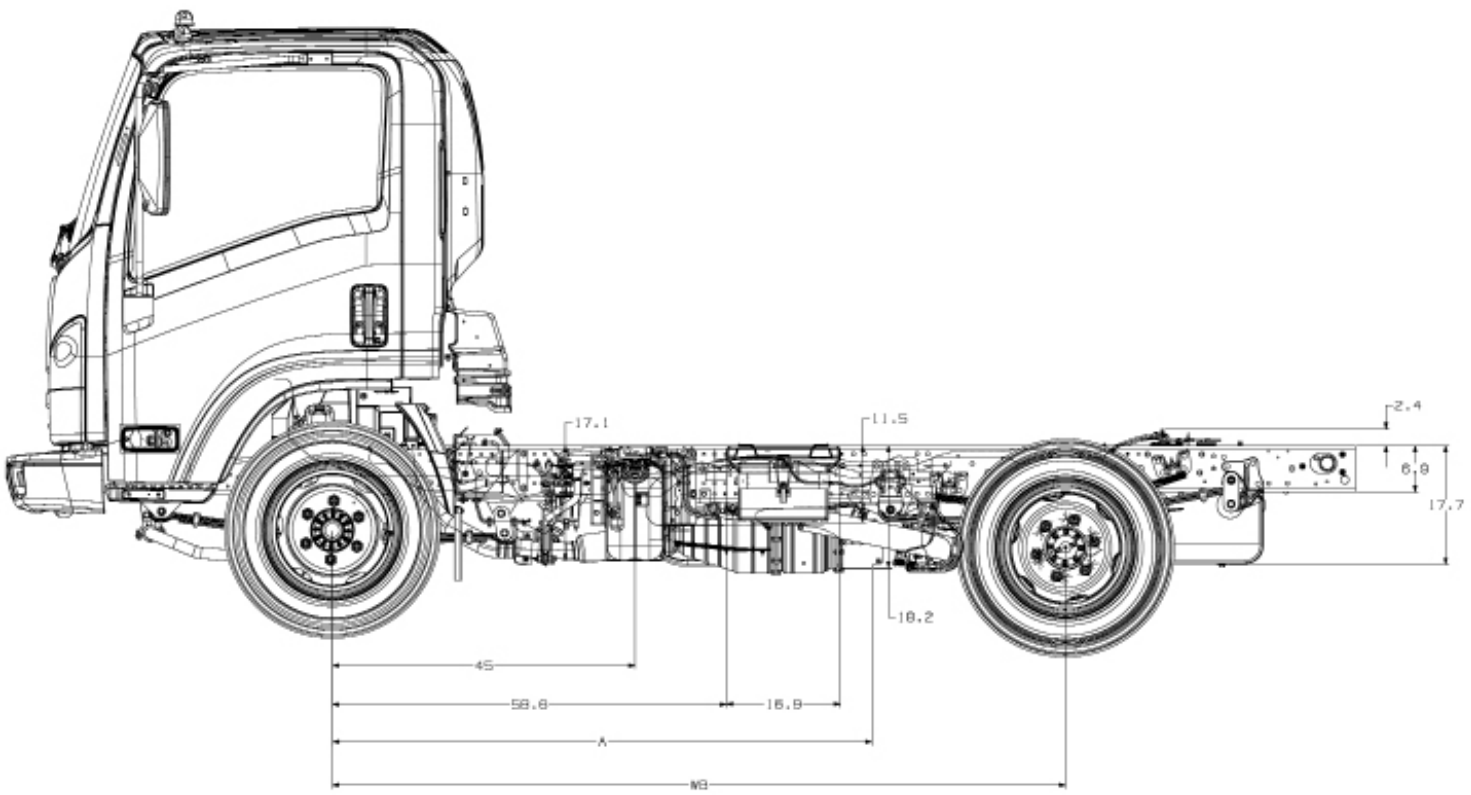


Figure 15.7.1

Note: Dimensions in inches

NRR Diesel Standard Cab - Right Side View

WB	A
109	44.0
132.5	50.3
150	44.0
176	44.0
200	44.0
212	44.0

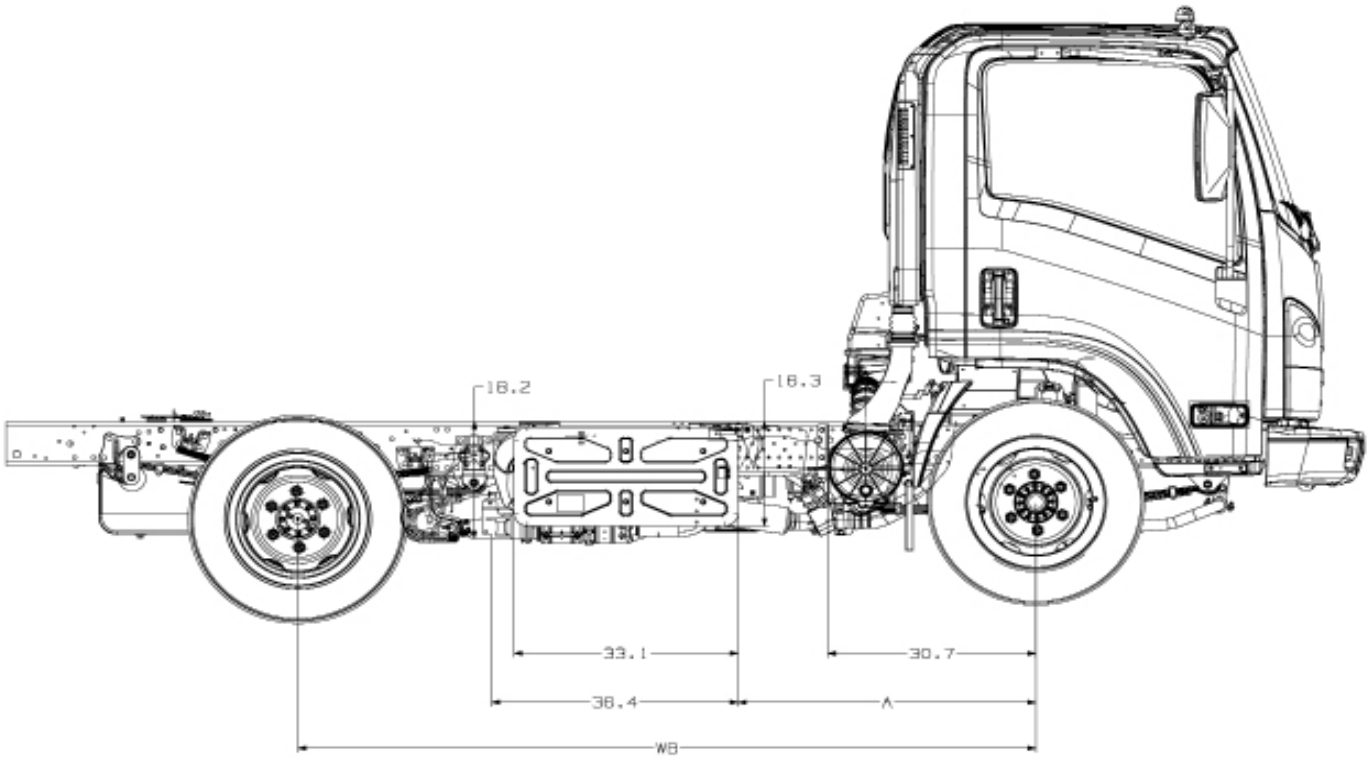


Figure 15.8.1

Note: Dimensions in inches

SCR / DPF 4HK1-TC

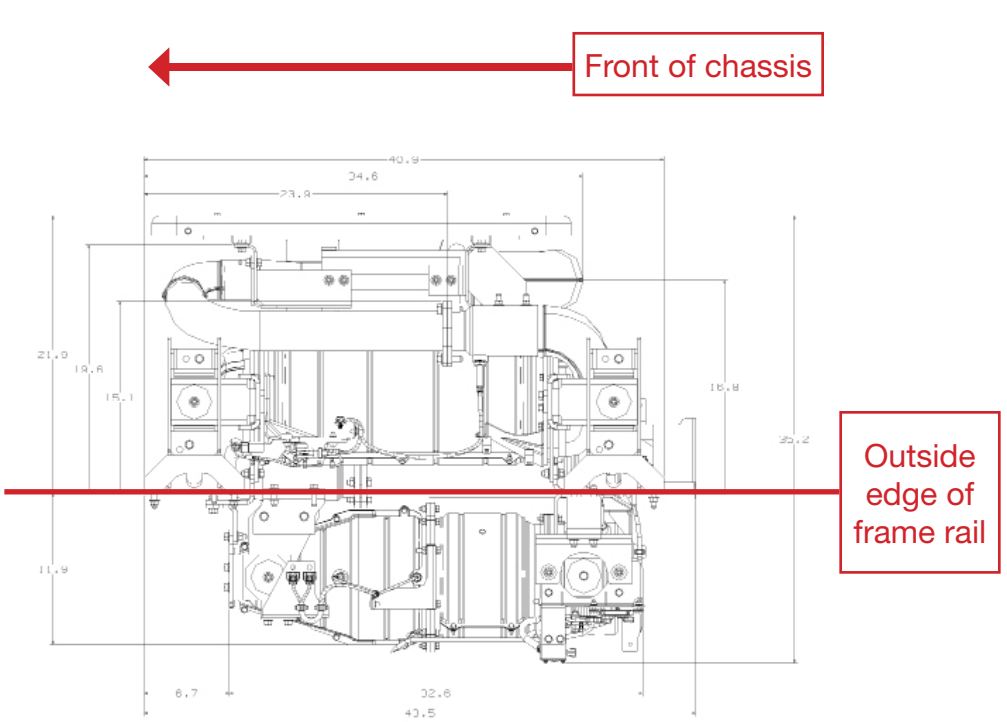


Figure 15.9.1

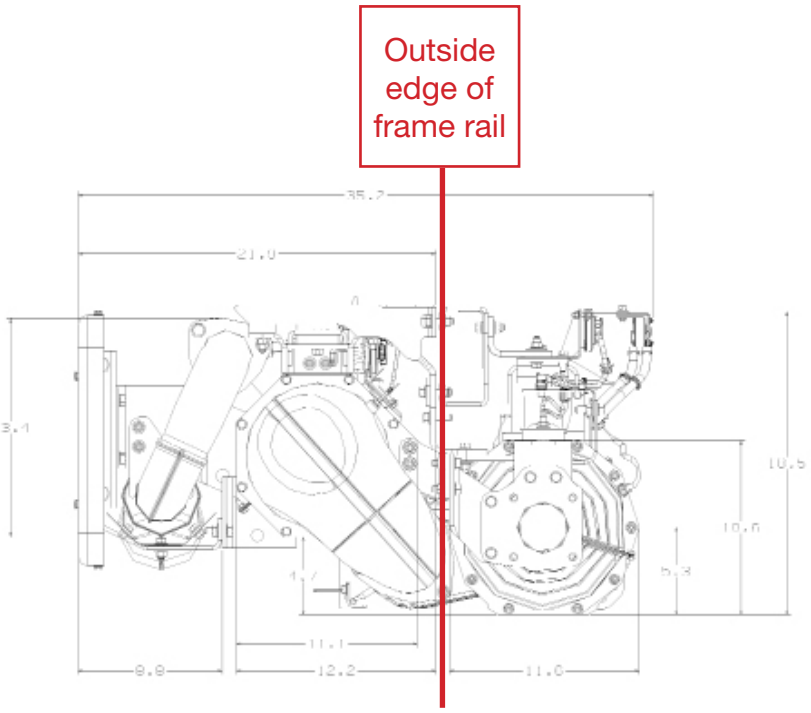


Figure 15.9.2

Note: Dimensions in inches

Option Side Fuel Tank in addition to the Standard In Rail Fuel Tank RPO IK9
Side View 150 Wheelbase

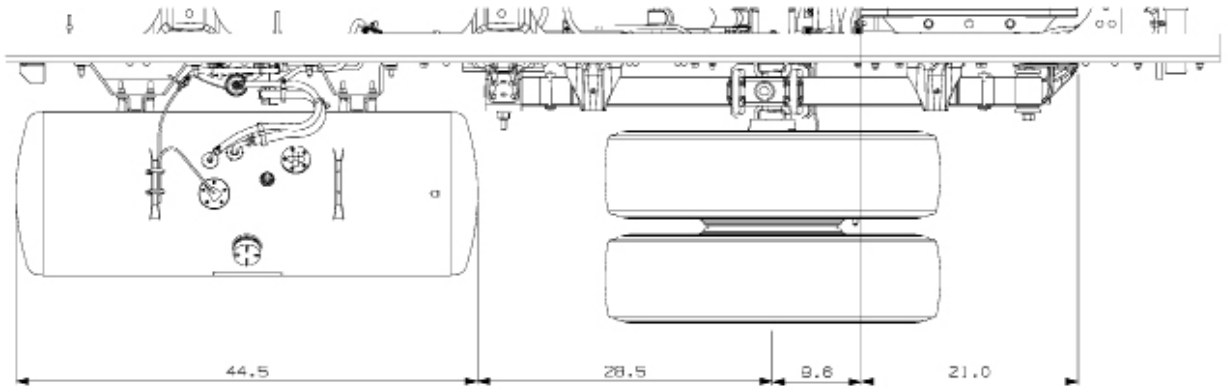


Figure 15.10.1

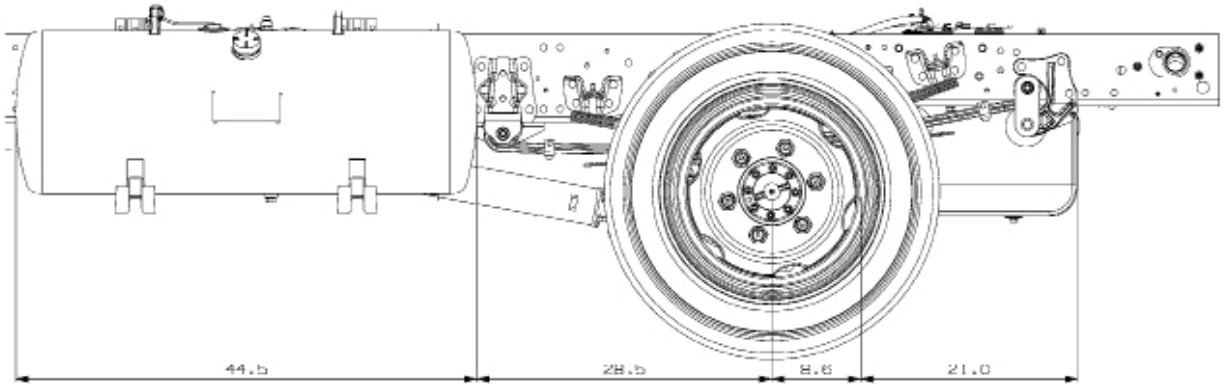


Figure 15.10.2

Note: Dimensions in inches

Option Side Fuel Tank in addition to the Standard In Rail Fuel Tank RPO IK9
Side View 176 Wheelbase

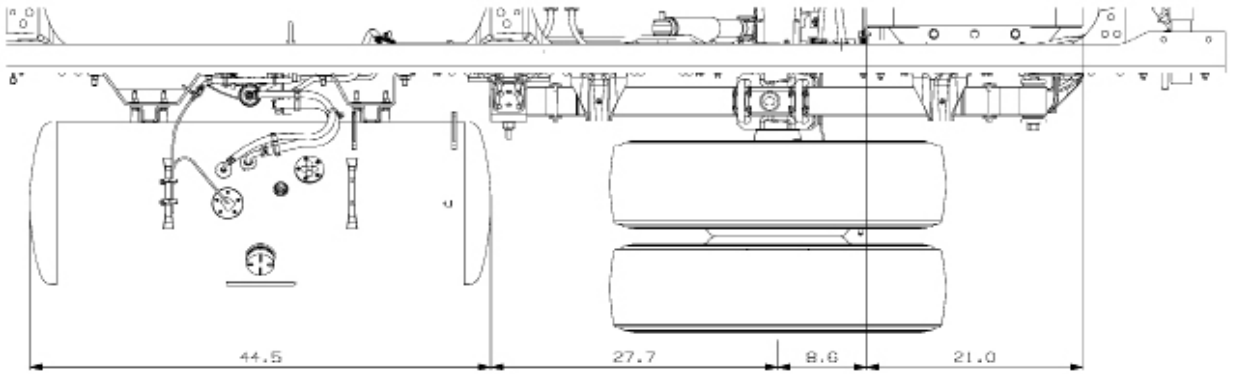


Figure 15.11.1

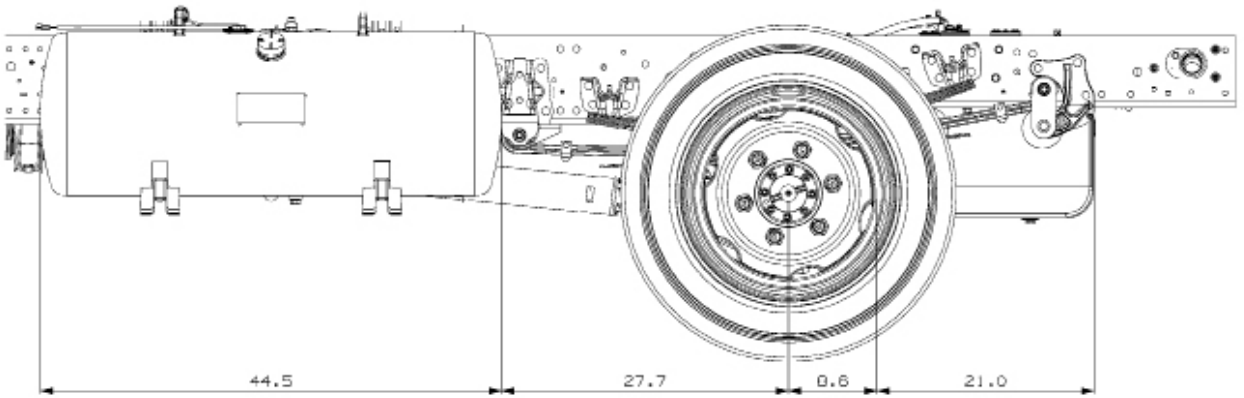


Figure 15.11.2

Note: Dimensions in inches

Option Side Fuel Tank in place of the Standard In Rail Fuel Tank on NU474 and NU484 ONLY

Side View 176 Wheelbase

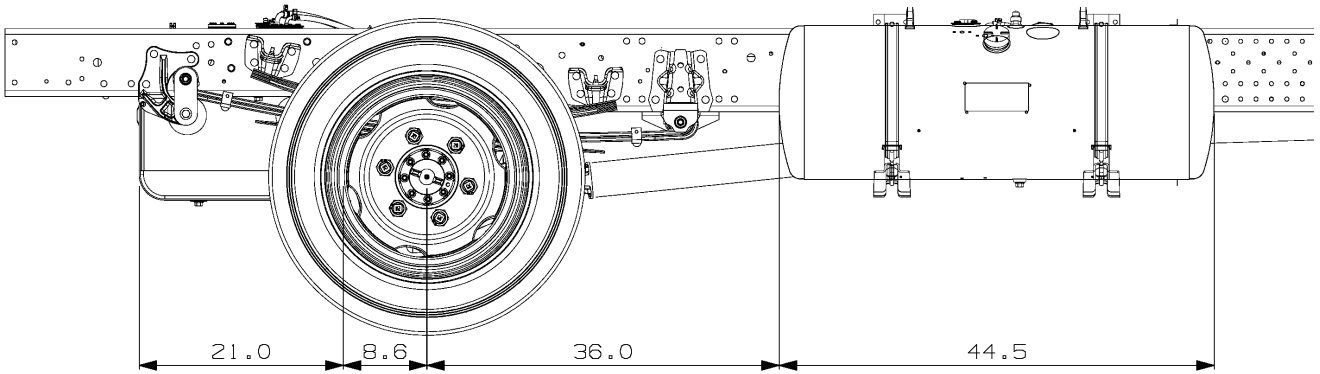


Figure 15.12.1

Note: Dimensions in inches

Optional Side Fuel Tank in addition to the Standard In Rail Fuel tank RPO IK9 (150 and 176 wb LH rail only).

Optional Side Fuel Tank replacing standard In Rail Fuel tank (176 wb only RH rail only)

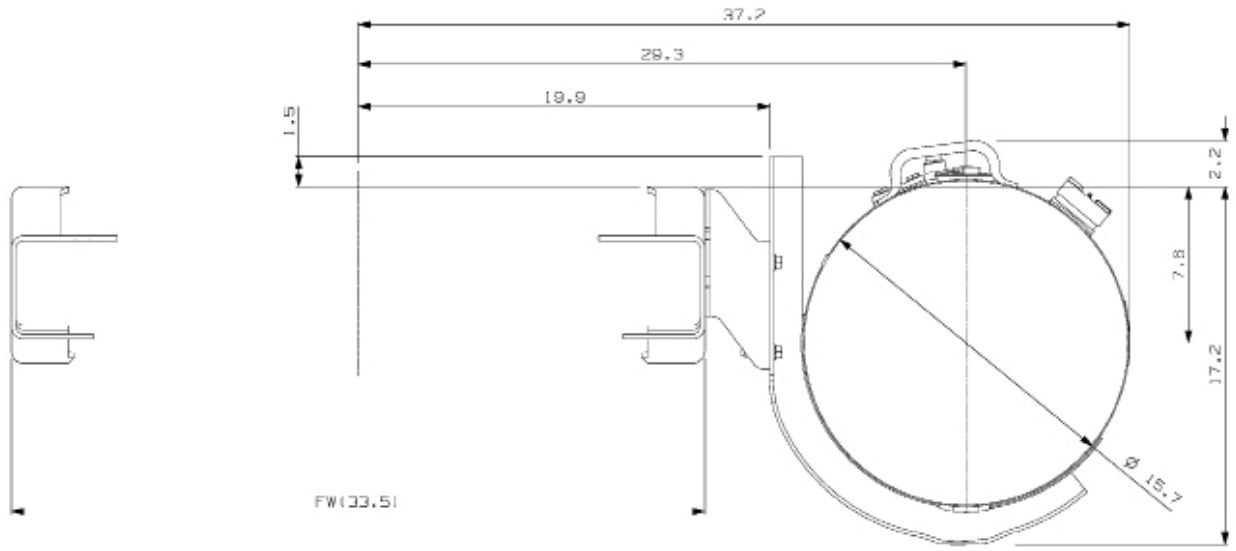


Figure 15.13.1

Note: Dimensions in inches

Cab Tilt

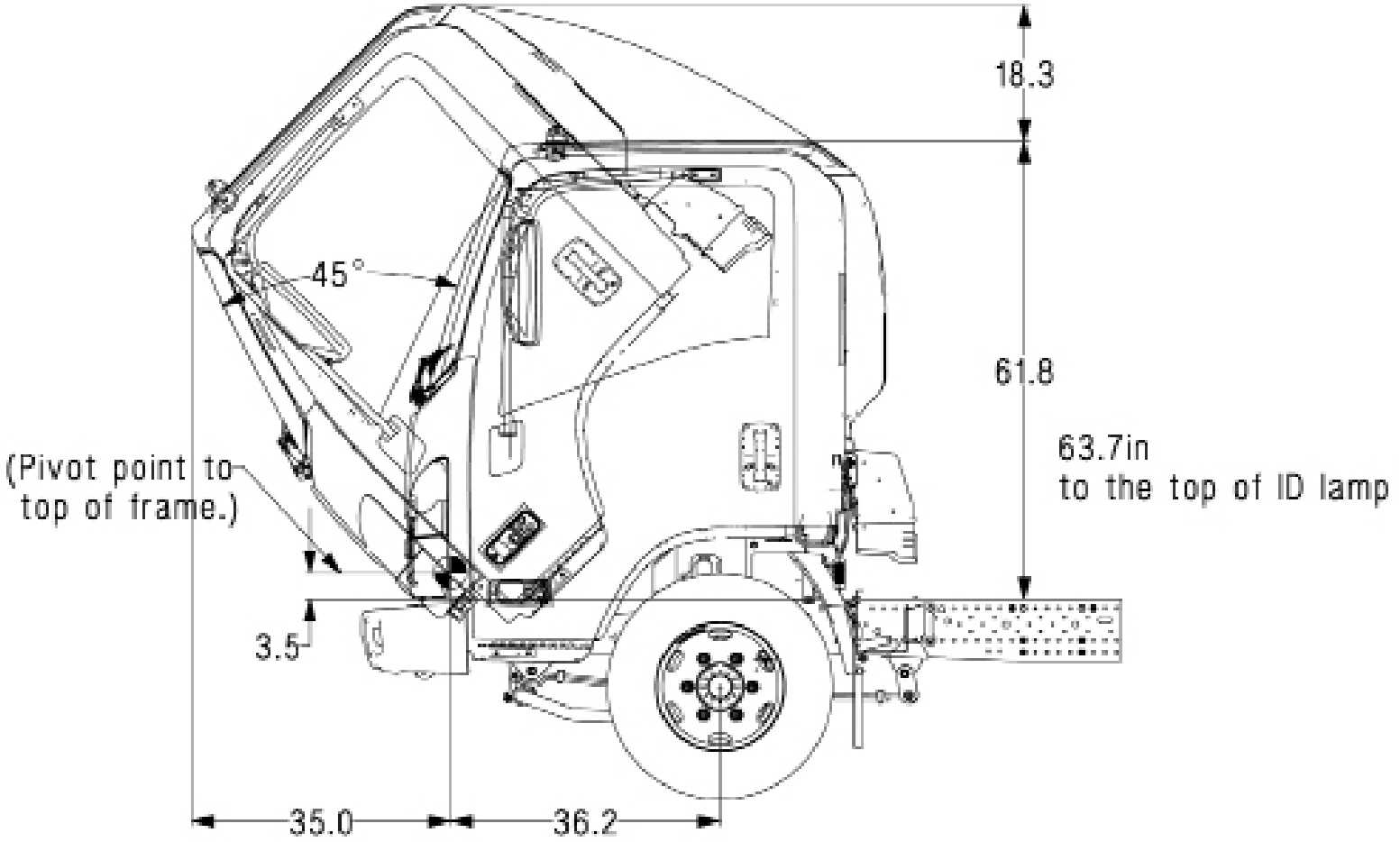


Figure 15.14.1

Note: Dimensions in inches

Center of Gravity

The center of gravity of the chassis cab.

Horizontal and Vertical CG of Chassis			
WB	V	H in frame tank	H side tank
110	23.4	38	N/A
132.5	23.3	44.6	N/A
150	23.4	49.5	N/A
176	23.4	61.4	56.7
200	23.4	73.3	N/A
212	23.2	85.2	N/A

Figure 15.14.1

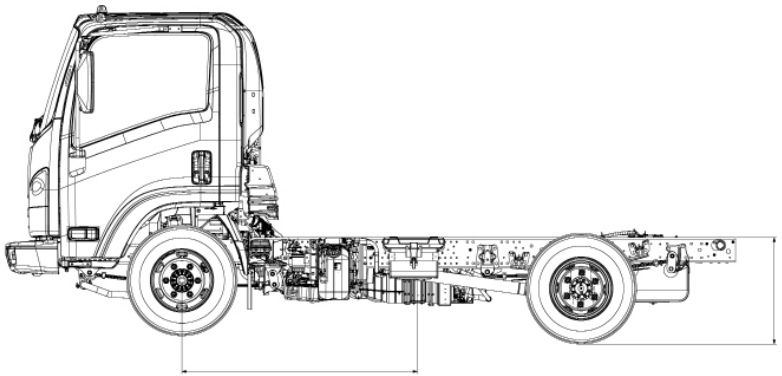


Figure 15.14.2

The maximum vertical center of gravity specified below must not be exceeded at maximum GVWR and rated front and rear GAWR.
The Center of Gravity (CG) maximum is 63” (1600 mm) above the ground.(NPR Cab Chassis and NPR Stripped Chassis)

NOTE: The Final Manufacturer must ensure that the combined vertical center of gravity of the chassis, body, and available payload at full GVW does not exceed the maximum vertical center of gravity outlined in the Isuzu Incomplete Vehicle Document and the Isuzu Body Builders Guide.

Additional Information may be obtained by contacting ISUZU Commercial Trucks of America(ICTA)Applications Engineering on the West Coast call 1-562-229-5240 and in the
East Coast call 1-770-740-1620 X 262.

Note: Dimensions in inches

Front Axle Chart

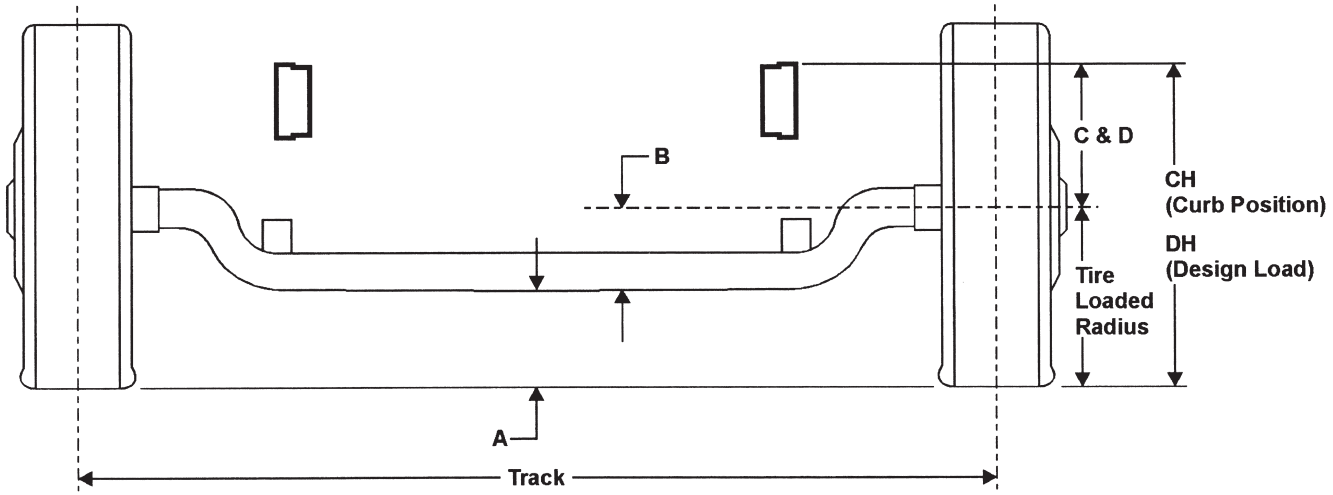


Figure 15.16.1

Formulas for calculating height dimensions:

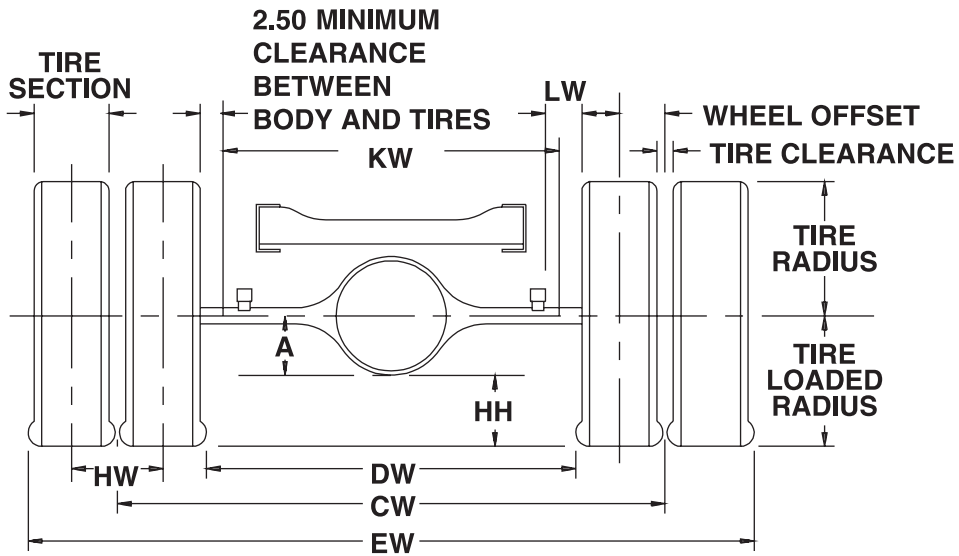
A = Tire Loaded Radius – B
C = Centerline of Axle to Top of Frame Rail at Curb Position
D = Centerline of Axle to Top of Frame Rail at Design Load
CH = C + Tire Unloaded Radius
DH = D + Tire Loaded Radius

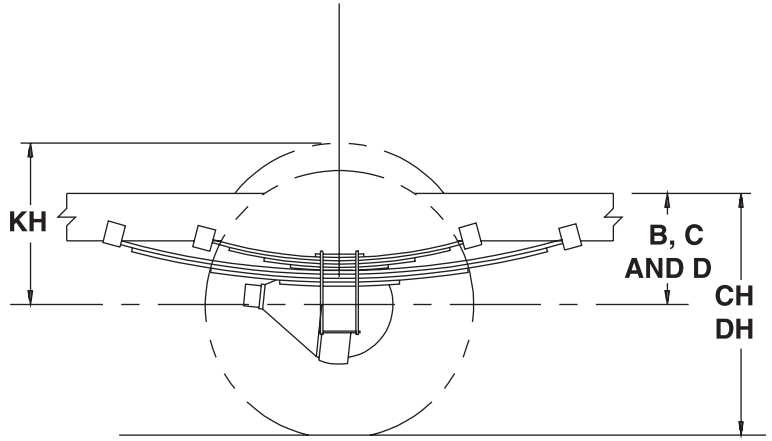
Tire	GVWR	GAWR	A	B	C	D	CH	DH	Track	Tire Radius	
										Unload	Load
225/70R 19.5F	19,500 lbs.	7,275 lbs.	8.3	6.6	12.3	11.5	28.3	26.4	65.5	16	14.91

Figure 15.16.2

Note: Dimensions in inches

Rear Axle Chart





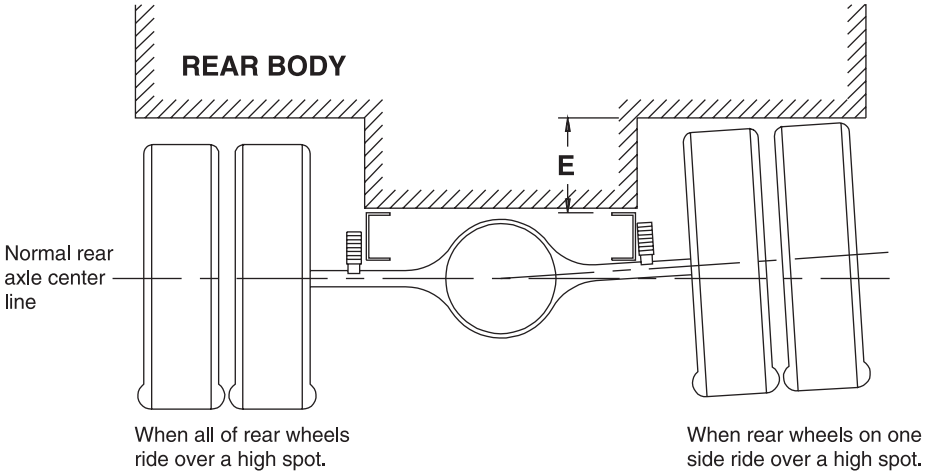


Figure 15.17.1

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.

Figure 15.18.1

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

Figure 15.18.2

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

Tire	GAWR	Track CW	A	B	C	D	E
225/70R 19.5F	13,660 lbs.	65.0	7.7	9.3	15.6	13.4	8.4

Figure 15.18.3

Note: Dimensions in inches

NRR Suspension Deflection Charts

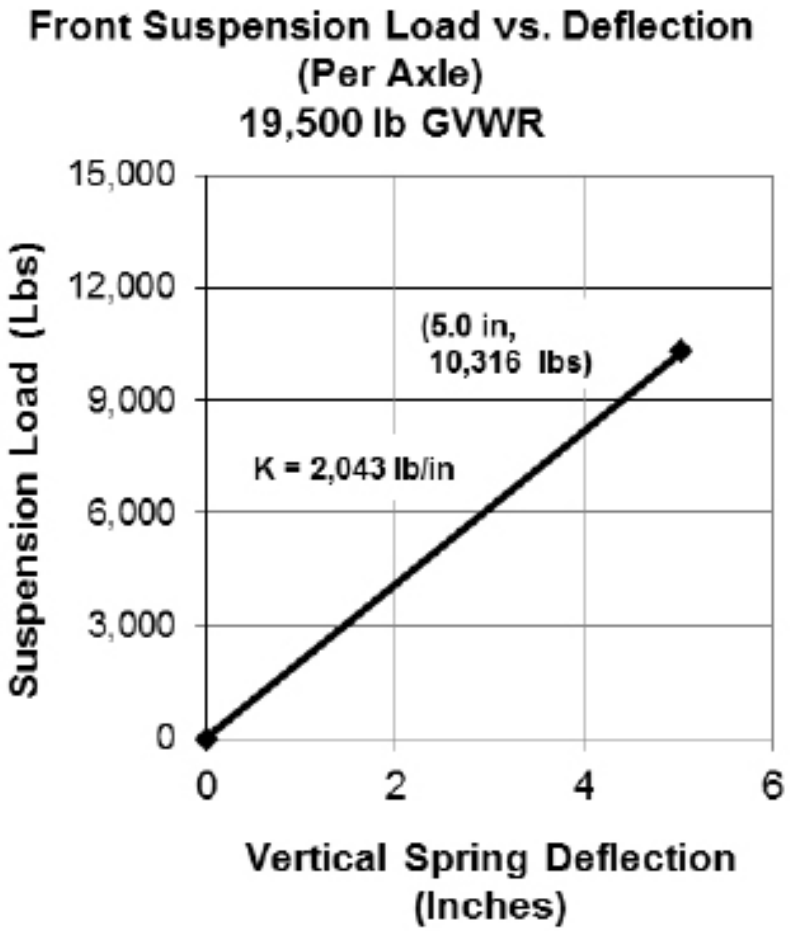


Figure 15.19.1

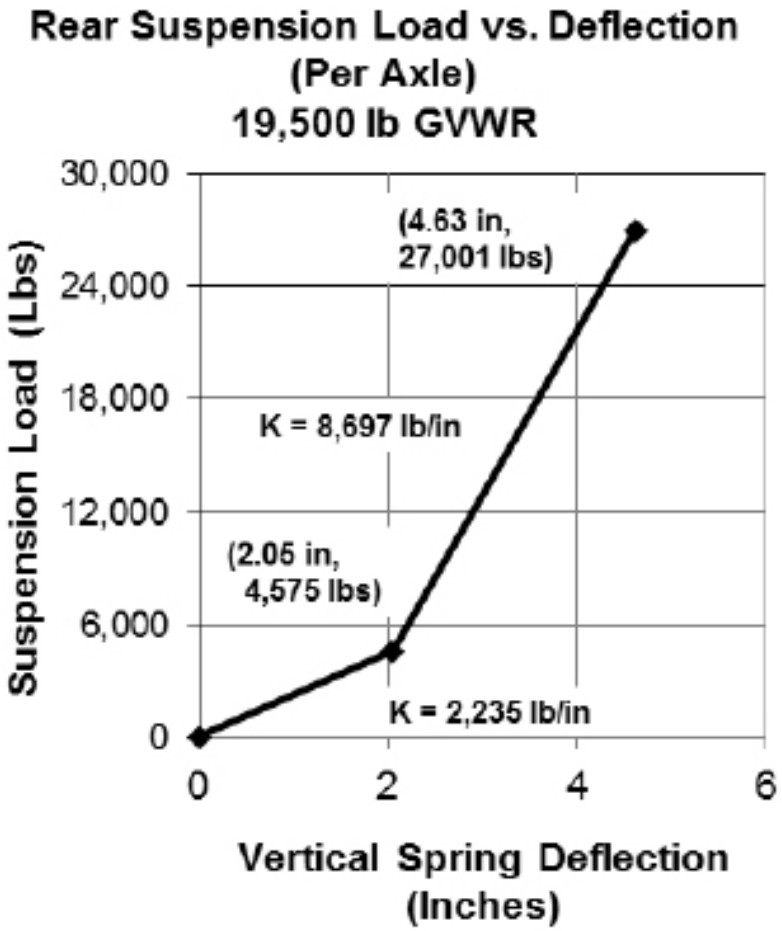


Figure 15.19.2

Tire and Disc Wheel Chart

Tire

Tire Size	Tire Load Limit and Cold Inflation Pressures				Maximum Tire Load Limits (Lbs.)		GVWR (Lbs.)
	Single		Dual		Front	Rear	
	Lbs.	PSI	Lbs.	PSI	2 Single	4 Dual	
225/70R 19.5F	3,640	95	3,415	95	7,280	13,660	19,500

Figure 14.20.1

Tire Size	GVWR (Lbs.)	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

Figure 15.20.2

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 Thickeness	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	15^0 DC	Steel TOPY

*O.D. Wrench Sizes

Figure 15.20.3

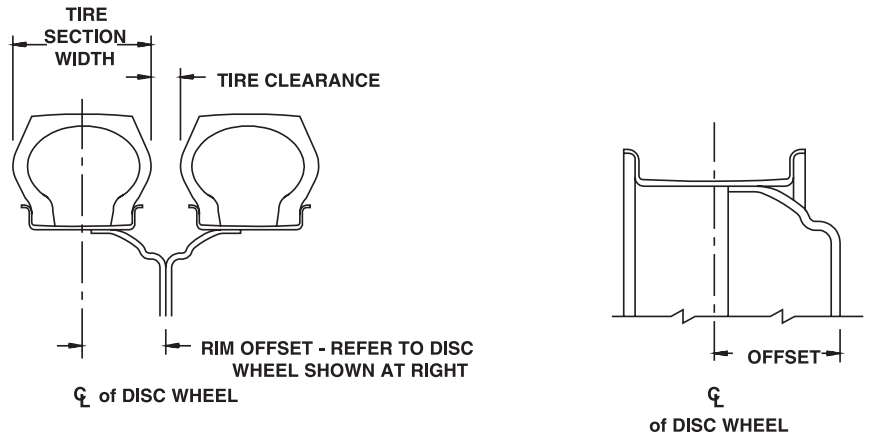
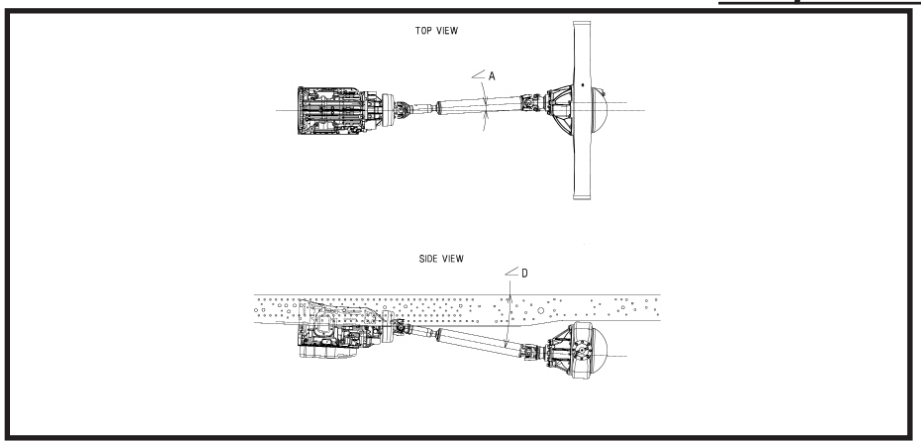
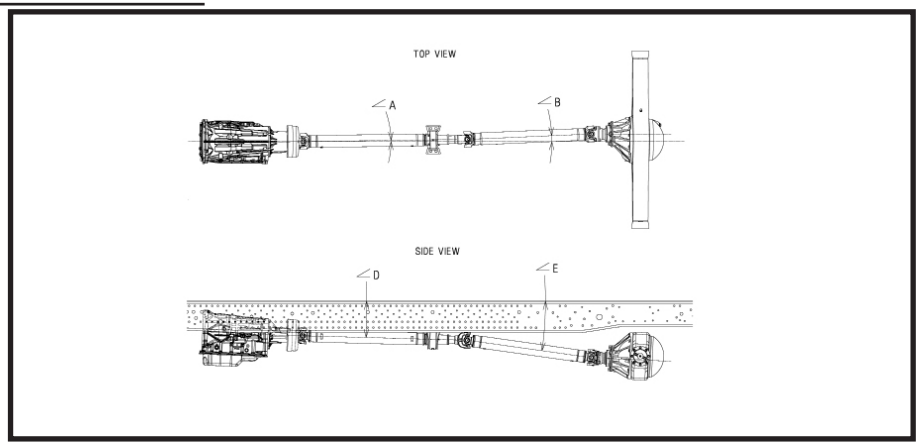


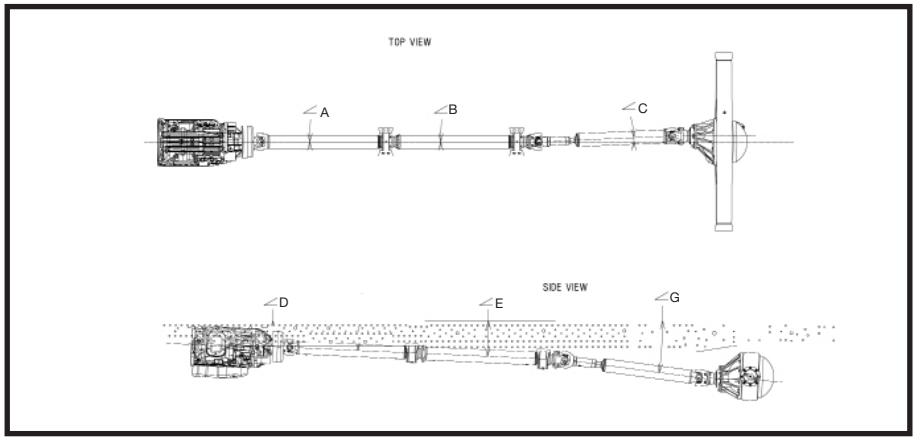
Figure 15.20.4

Note: Dimensions in inches

Propeller Shaft NRR







Wheel Base (in.)	Top View			Side View				
	∠A	∠B	∠C	∠D	∠E	∠F	Trans.	Rear Axle
109	3.4°	-	-	11.4°	-	-	2.5°	2.5°
132.5	0°	3.3°	-	5.3°	7.8°	-	2.5°	2.5°
150	0°	3.2°	-	2.6°	8.1°	-	2.5°	2.5°
176	0°	2.2°	-	2.1°	5.6°	-	2.5°	2.5°
200	0°	0°	2.2°	2.1°	0.0°	5.6°	2.5°	2.5°
212	0°	0°	2.2°	2.1°	0.0°	5.6°	2.5°	2.5°

Note: 1. Angles provided in table are relative to the frame angle. Please take this into consideration for service measurements.
2. Driveline angles are based on the chassis curb weight which includes standard fuel but no driver, body, or payload.

Trans. Type	6 Automatic. Transmission					
Wheelbase	**109**	**132.5**	**150**	**176**	**200**	**212**
No. of Shafts	1	2	2	2	2	2
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	37.00	22.91	40.24	49.69	49.69	49.69
Type	A	B	B	B	B	B
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	36.13	36.50	52.90	24.00	36.00
Type	N/A	C	C	C	B	B
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	52.90	52.90
Type	N/A	N/A	N/A	N/A	C	C

Figure 15.22.1

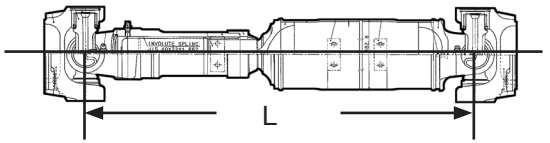
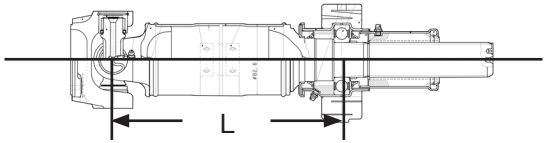
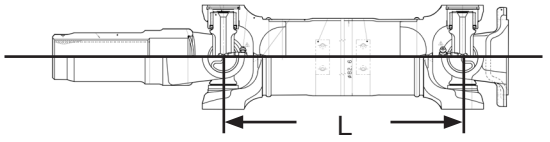
Type	Description	Illustration
Type **A**	1st shaft in 1-piece driveline	
Type **B**	1st shaft in 2-piece driveline	
Type **C**	2nd shaft in 2-piece driveline	

Figure 15.22.2

Note: Dimensions in inches

Brake System Diagram, Hydraulic Brake Booster

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

Legend for NQR, NRR Brake System

(1) Electronic Hydraulic Control Unit (EHCU)
(2) Rear Wheel Cylinder
(3) Hydraulic Booster Oil Pump
(4) Hydraulic Booster Reservoir
(5) Cooler Pipe
(6) Pipe Connector
(7) Brake Fluid Reservoir
(8) Master Cylinder
(9) Hydraulic Booster Unit
(10) Front Wheel Cylinder

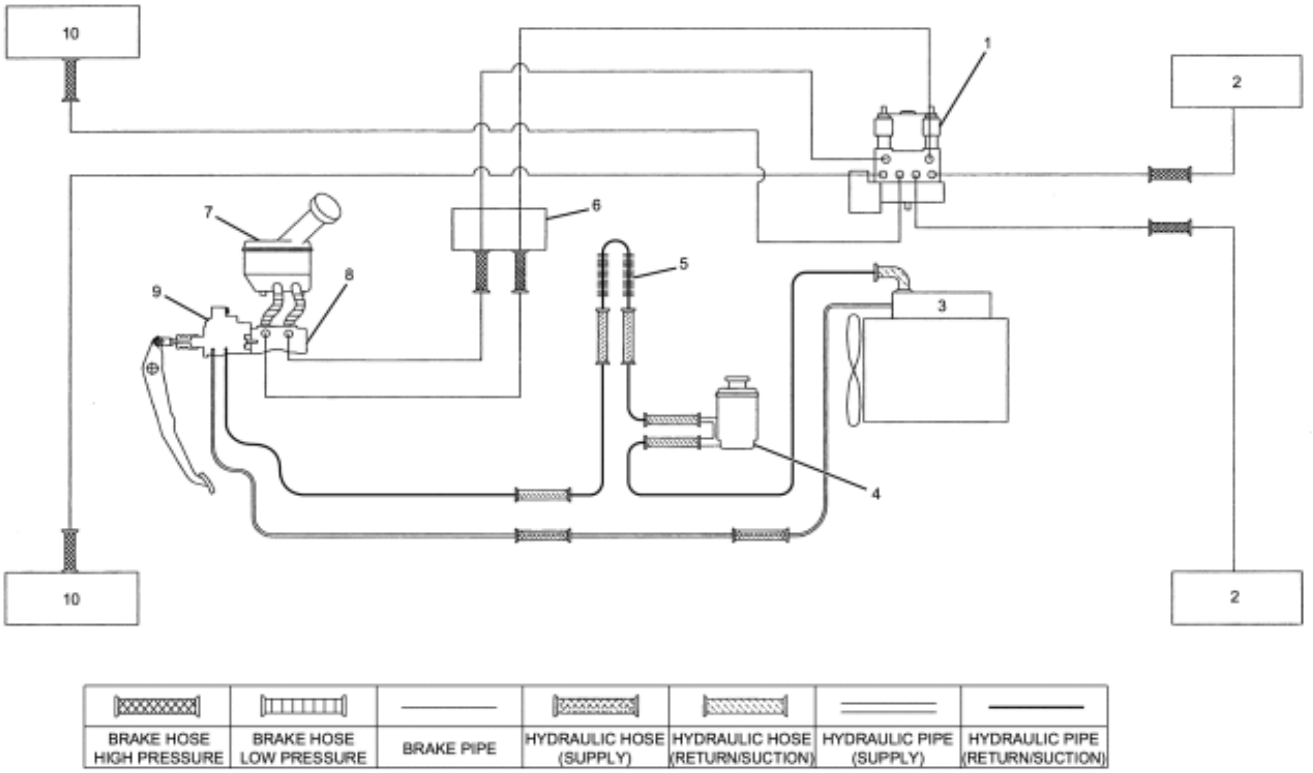


Figure 15.23.1

PTO Location, Drive Gear and Opening Information

AUTOMATIC TRANSMISSION

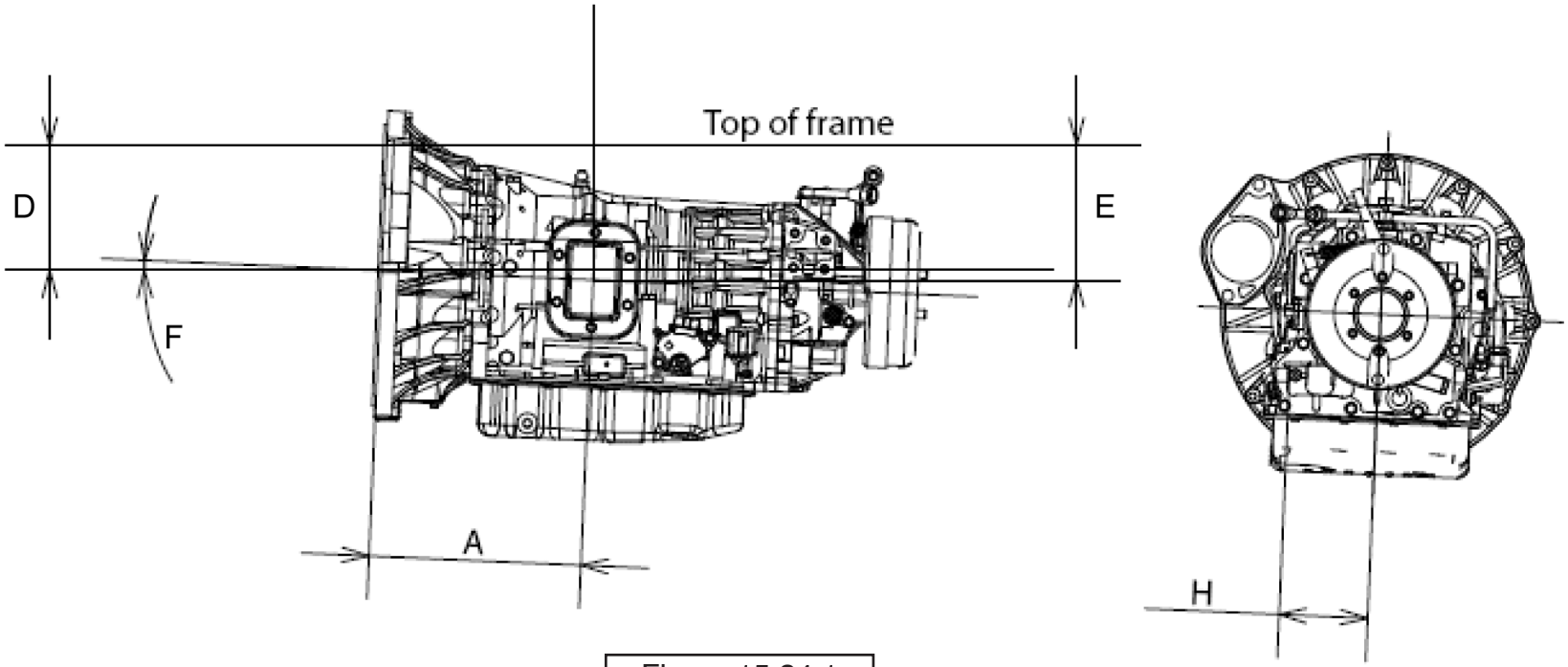


Figure 15.24.1

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 (1)	Left	(Dr 2)	12.35	36.89	0	7.85	7.31	2.5^0	5.16	PTO Gear	1:1 with turbine	69	N/A	0^0	134 lbs.-ft. @ 1,700 RPM

Figure 15.24.2

Note: Dimensions in inches

Opening Diagram

Aisin A460 Automatic Torque Converter
Lock Up Function.

In either the Stationary Preset PTO Mode or Stationary Variable PTO Mode, when engine rpm exceeds 1200 RPM, the torque converter will lock up. The engine rpm can not be modified and the lockup function cannot be turned off. Please not that with PTO applications that operate around 1200 RPM, the transmission software holds the torque converter in lockup until engine speed falls below 1100 RPM

The lock up function will cancel if the transmission shift lever is moved from the park or neutral positions which will remove the trasmission from the stationary mode.

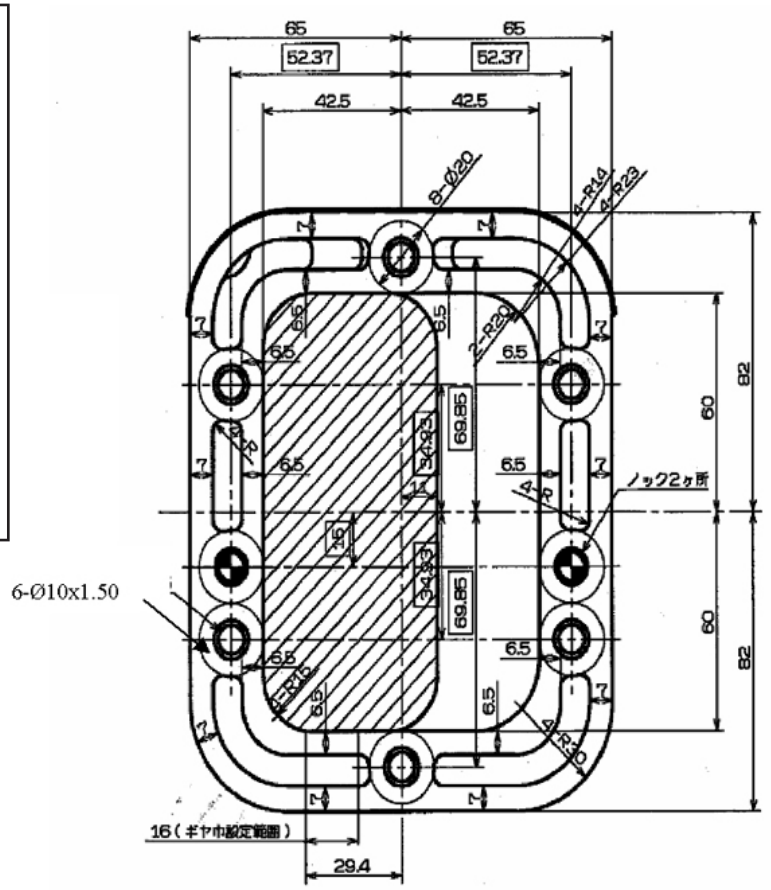


Figure 15.25.1

Additional PTO Functions :
For certain applications the Automatic regeneration function can be inhibited (Example Airport Ground Support vehicles).
For certain applications the Automatic regeneration function can be enabled in the PTO stationary mode (Example Lawn care and carpet cleaning).
For certain applications the Automatic regeneration function can be enabled in the PTO mobile mode (Example Line painting).
Please refer to the PTO section of the BBG (section 17) for further details.

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.
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.

Rear View Fuel Fill

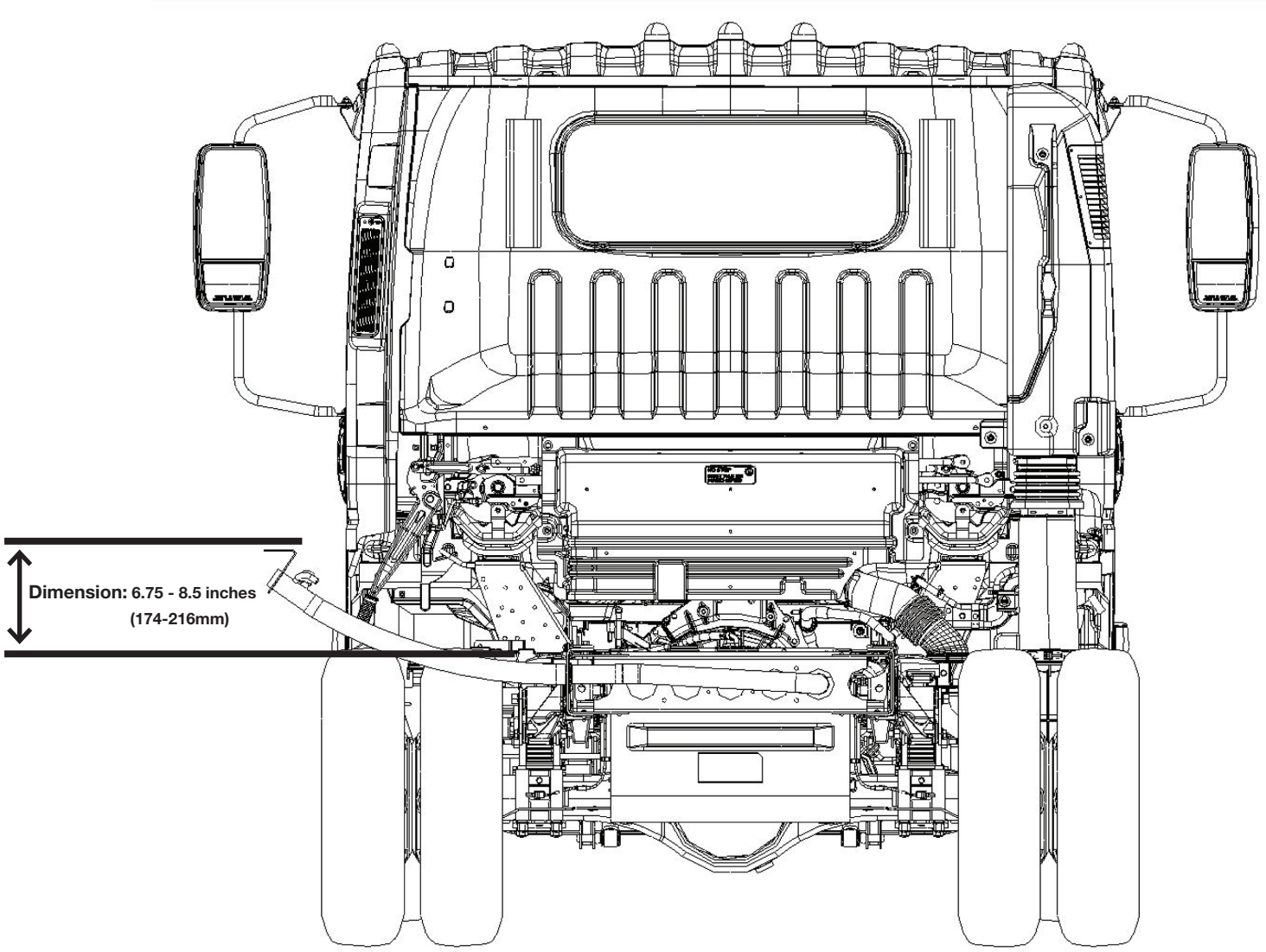
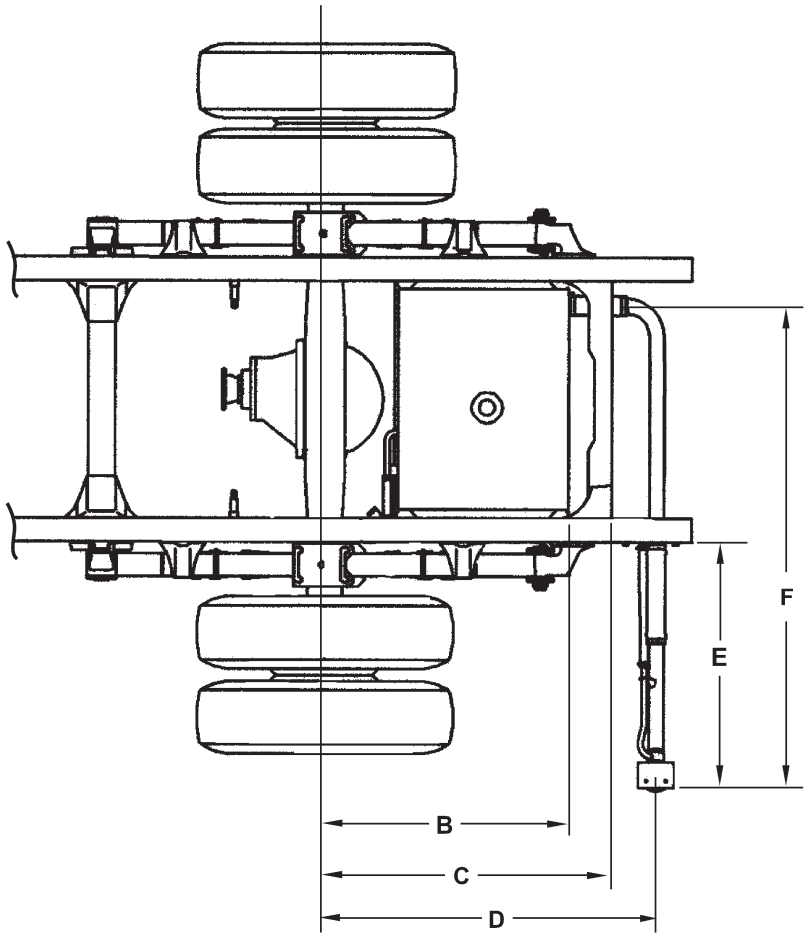


Figure 15.27.1

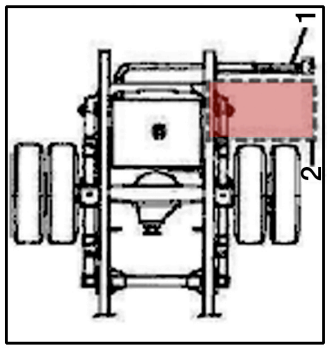
Top View Fuel Fill



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)

Figure 15.28.1

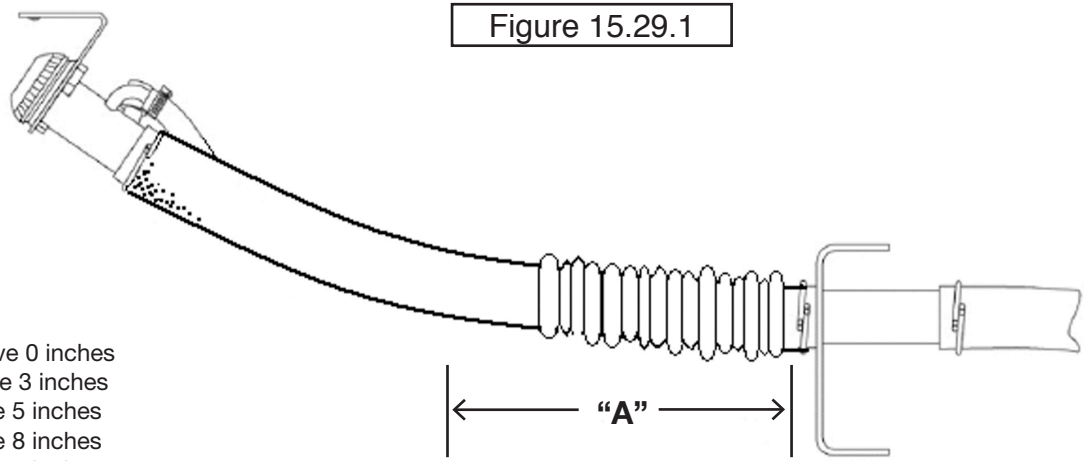
Hose Modification for Various Width Bodies and fuel fill vent Protection



Fuel fill vent and neck should be protected from road spray

1. FUEL FILLER NECK
2. RECOMMENDED MUD FLAP MOUNTING AREA (RED ZONE).

Figure 15.29.1



"A" Dimensions:
102 inch wide body remove 0 inches
96 inch wide body remove 3 inches
90 inch wide body remove 5 inches
86 inch wide body remove 8 inches
80 inch wide body remove 8 inches

NOTE: Shorten hose by "A Dimension" based on chart at left.

Figure 15.29.2

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.

Figure 15.30.1

Through the Rail Fuel Fill Frame Hole

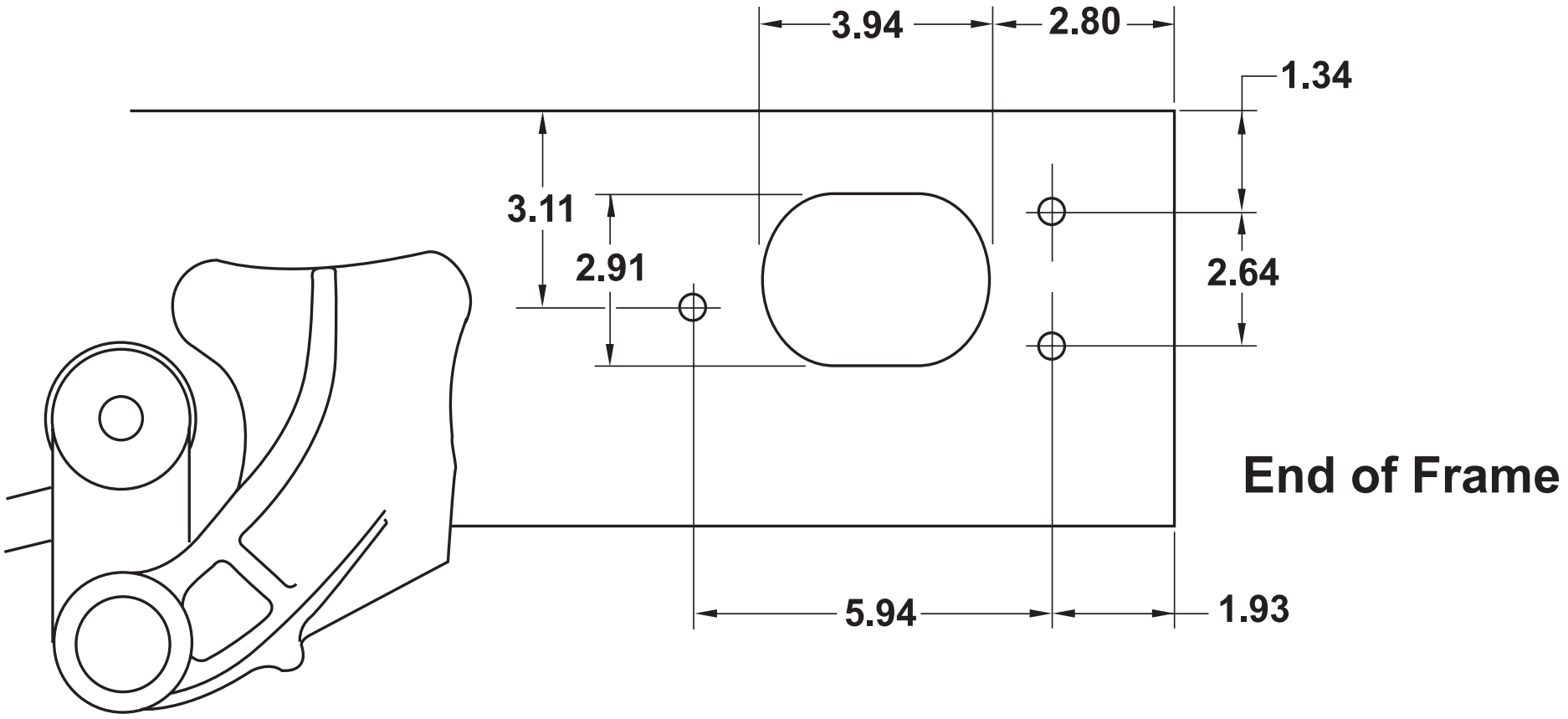


Figure 15.31.1

Note: Dimensions in inches

N-Diesel Fuel Filler Kit Instructions

Please review these instructions prior to installation of the fuel filler kit.

Parts Kit: There are two separate parts kits used for the 2011 and later model year N-diesel products. Fuel filler kit part number 898171 9090 is used for 14,500 lb and higher GVWR chassis (NPR-HD, NQR, NRR), For reference kit part number 898171 9080 is used for 12,000 lb GVWR chassis (NPR models).
Parts list is shown in Figure ***15.32.2.*** Parts photos are shown in Figure ***15.32.1.***

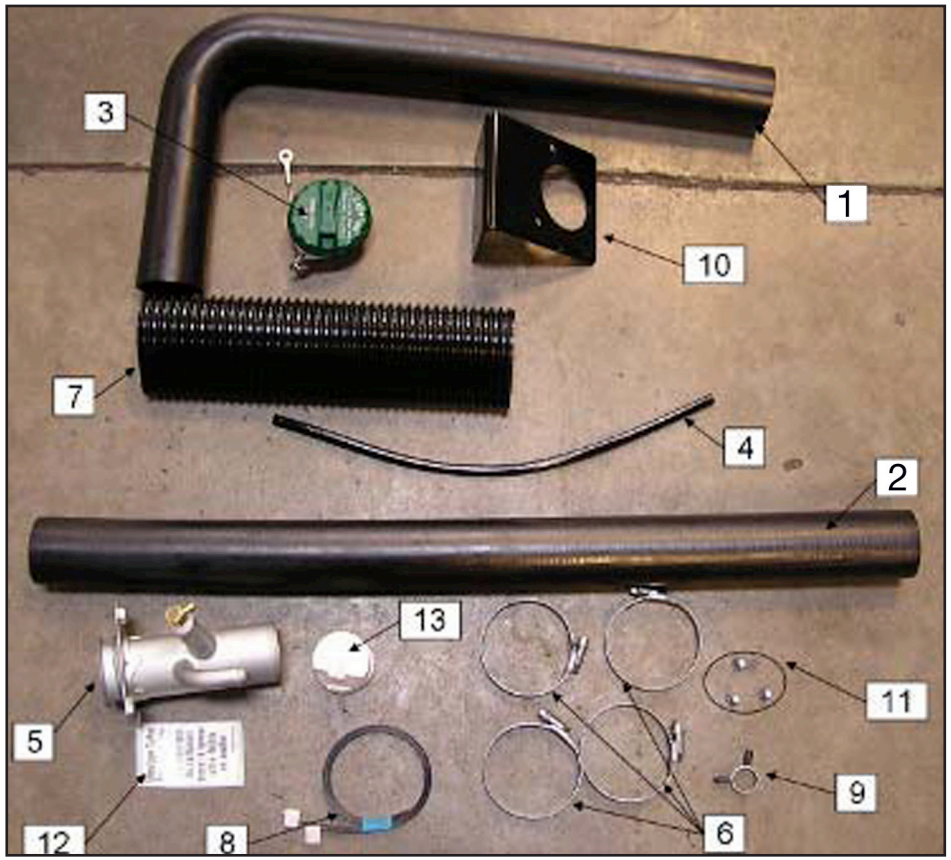


Figure 15.32.1

FUEL FILLER KIT, NPR-HD, NQR, NRR 898171 9090			
ITEM #	PART NAME	PART #	QTY
1	HOSE: FUEL FILLER NECK	898171 211Y	1
2	HOSE: FUEL FILLER	898006 450Y	1
3	CAP: FILLER	897218 702Y	1
4	HOSE: ROLL-OVER VALVE	898164 876Y	1
5	NECK ASM: FUEL FILLER	898164 877Y	1
6	CLIP: JOINT	898133 349Y	4
7	PROTECTOR: FILLER HOSE	897114 063Y	1
8	CLIP: BAND, HOSE FIXING	109707 107Y	2
9	CLIP: RUBBER, HOSE	894242 034Y	1
10	BRACKET: FILLER NECK	897116 621Y	1
11	SCREW: FILLER NECK	897581 217Y	3
12	CAUTION PLATE	898070 422Y	1
13	SHUTTER: FUEL TANK	898164 404Y	1

Figure 15.32.2

Installation Instructions and Considerations:

The fuel tank shutter valve (13) was a new component for 2011 model year. This component is meant to improve fuel splash-back performance of the fuel system. In the 2012 model year a running change was made and this valve (13) was relocated from the fuel tank inlet to the inlet (outboard side) of the fuel filler neck bulkhead assemble that is bolted to the left hand frame rail as shown in **Figure 15.33.1**. This plastic valve snaps into place in the inlet of the frame mounted fuel pipe. The valve should be installed so that the plastic clip is at the top of the valve, so that the flap door opens up, as shown in **Figure 15.33.2**.

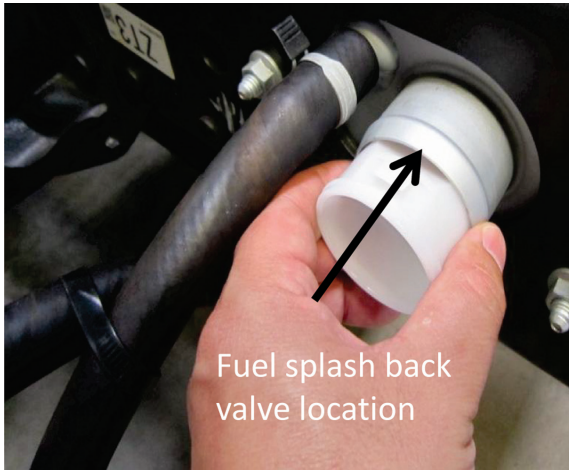


Figure 15.33.1

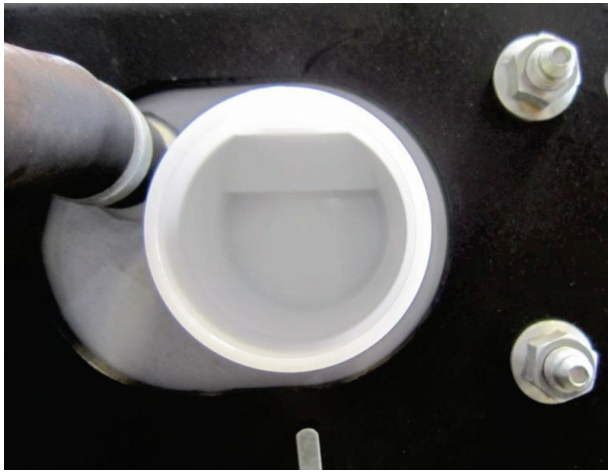


Figure 15.33.2

The fuel filler hose should be installed flush against the tank. The clamp should be installed between 1/16”and 3/8” from the tank. This is shown in ***Figure 15.33.3*** below.

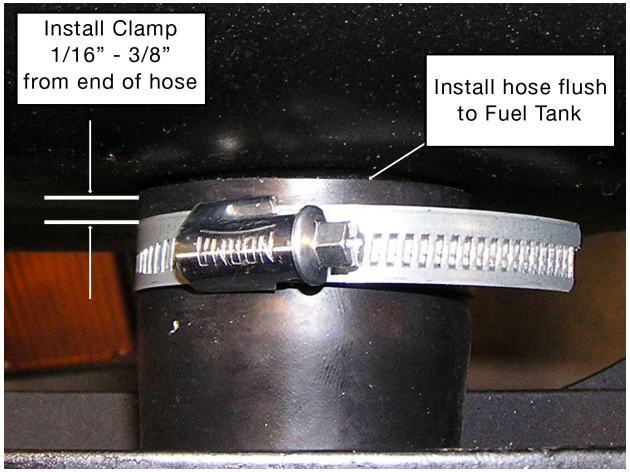


Figure 15.33.3

Roll-Over Valve Tubing

The roll-over valve has a hose attachment that will make this valve less sensitive to water intrusion. In order for the valve to work properly, it is critical that the hose be installed to the rollover valve. The proper assembly of the outer hose is shown in ***Figure 15.34.1.***

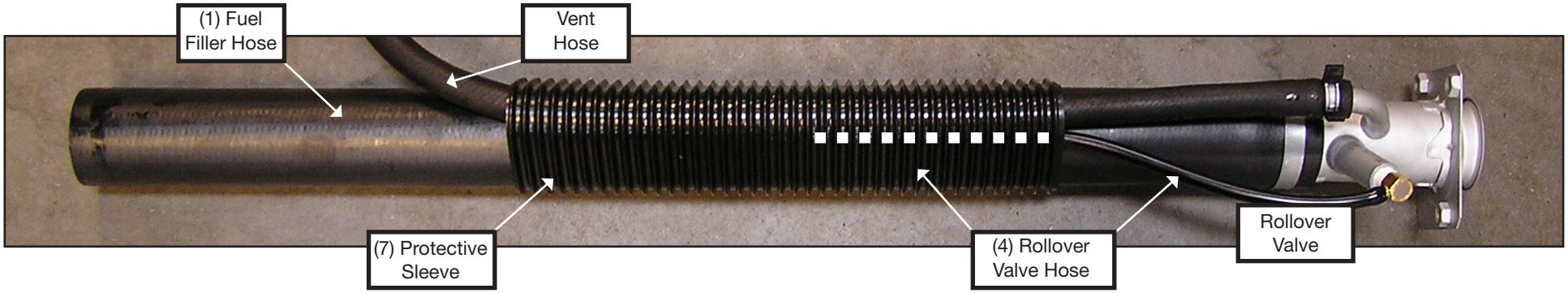


Figure 15.34.1

Filler Neck Installation:

The fuel filler neck (5) must be installed with the proper orientation on the body. The neck should be installed with the roll-over valve pointing upward, with the bottom edge of the neck oriented parallel to the ground, plus 33 to minus 7 degrees. See ***Figure 15.34.2.*** for the proper orientation.

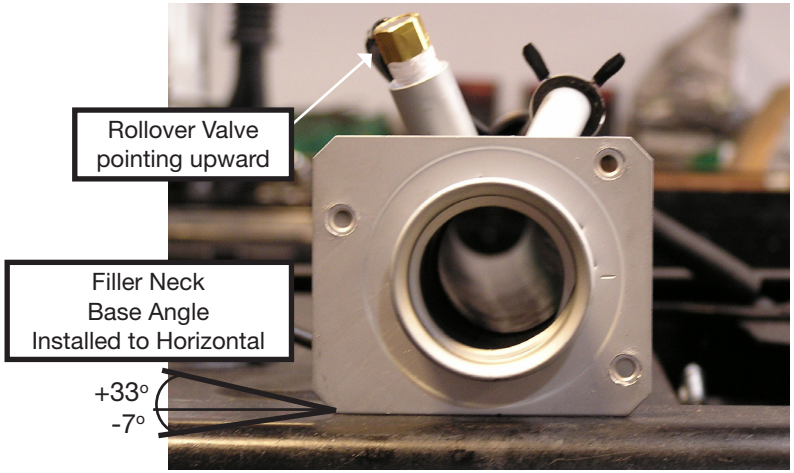


Figure 15.34.2

NPR, NPR HD Gas
Electrical Symbols

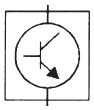
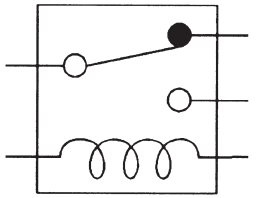
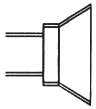
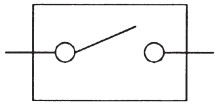
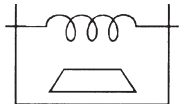
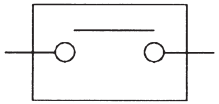
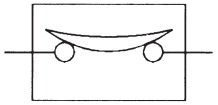
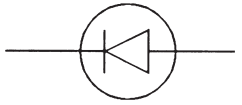
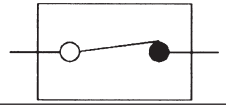
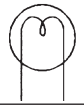
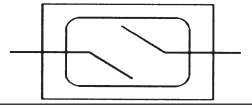
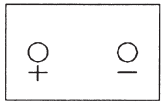
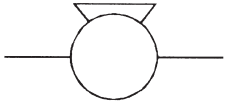
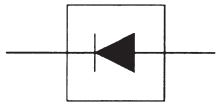
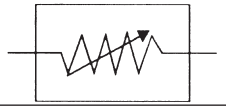
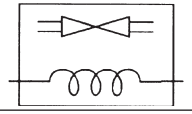
	Fuse		Electronic Parts		Coil (Inductor), Solenoid Magnetic Valve
	Fusible Link		Resistor		Relay
	Fusible Link Wire		Speaker		
	Switch		Buzzer		Connector
	Switch		Circuit Breaker		Light-Emitting Diode
	Switch (Normal Close Type)		Bulb		Reed Switch
	Contact Wiring		Double-Filament Bulb		Condenser
	Battery		Motor		Horn
	Diode		Variable Resistor Rheostat		Vacuum Switching Valve

Figure 16.1.1

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

Figure 16.2.1

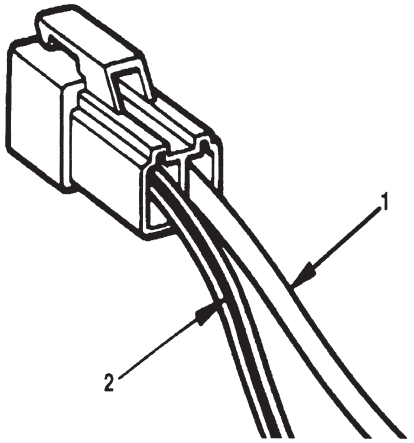
Wiring

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

- R — Red (Stripe Color)
- G — Green (Base Color)
- 0.5 — Wire Size (0.5 mm^2)



1. Single Color Wire
2. Colored Stripe Wire

Figure 16.3.1

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		

Figure 16.4.1

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

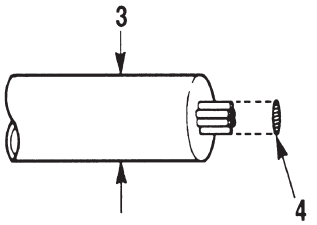


Figure 16.4.2

Nominal Size	Cross Sectional Area (mm^2)	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

Figure 16.5.1

Alternator pulley ratio NPR NPR-HD Gas Engine.
3.3 : 1 alternator pulley to crankshaft pulley

Additional information including complete chassis wiring schematics, connector locations, wire sizes, and pin connector diagrams can be obtained from our service web site wwww.isuzutruckservice.com. There is a nominal fee for this service.

Grounding Point Location

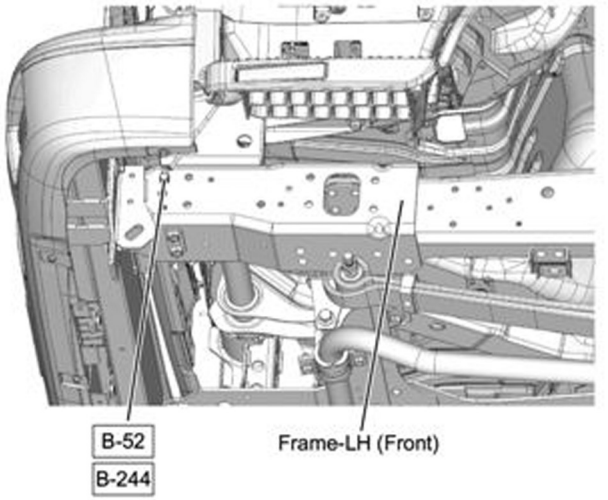


Figure 16.6.1

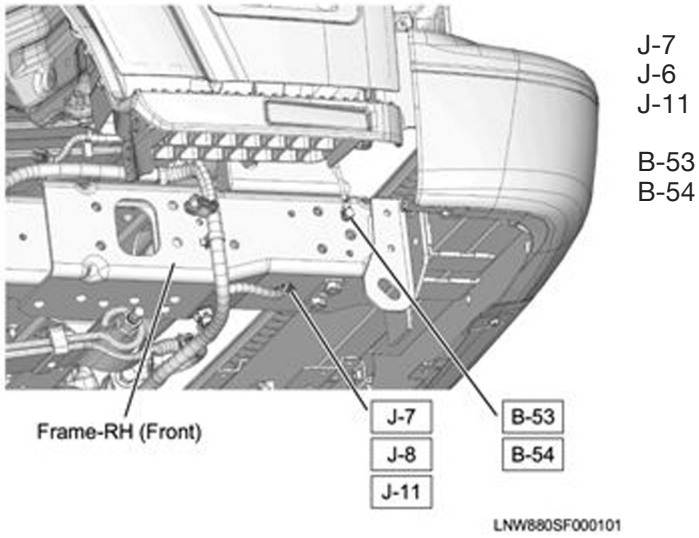


Figure 16.6.2

Grounding Point Location

B-56, B-57, B-60

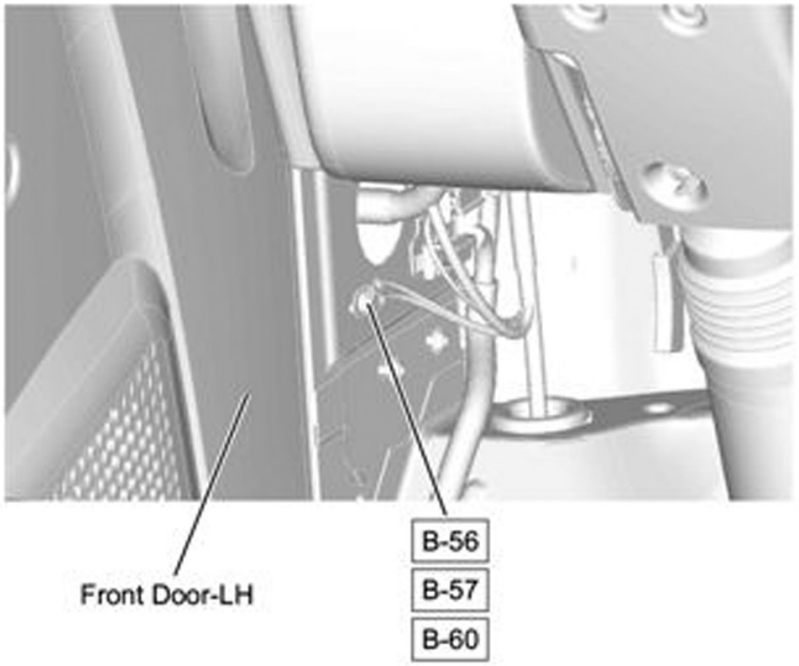


Figure 16.7.1

B-51, B-58, B-59

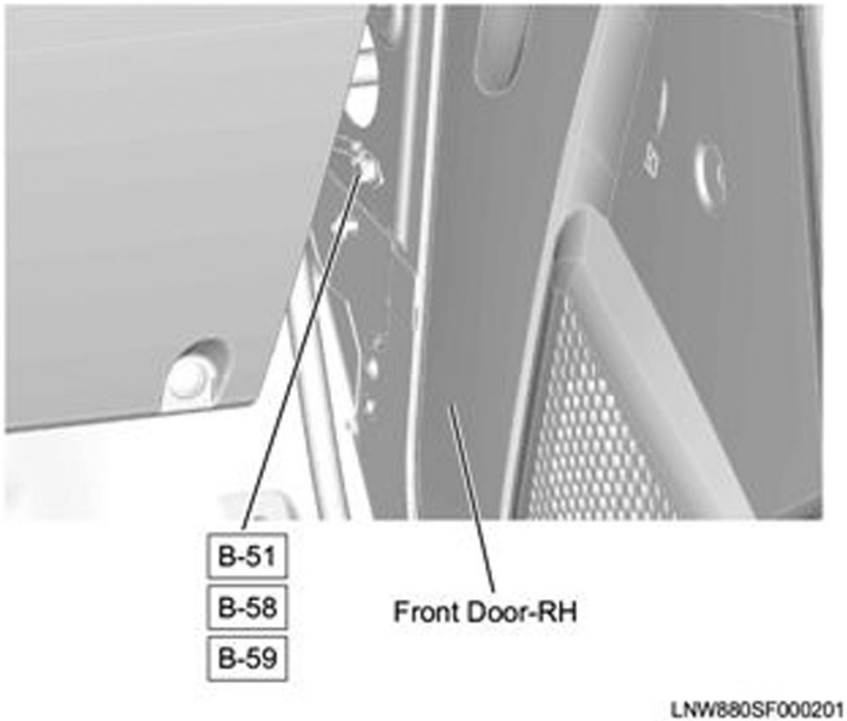


Figure 16.7.2

Grounding Point Location

J-9, J-10, J-12

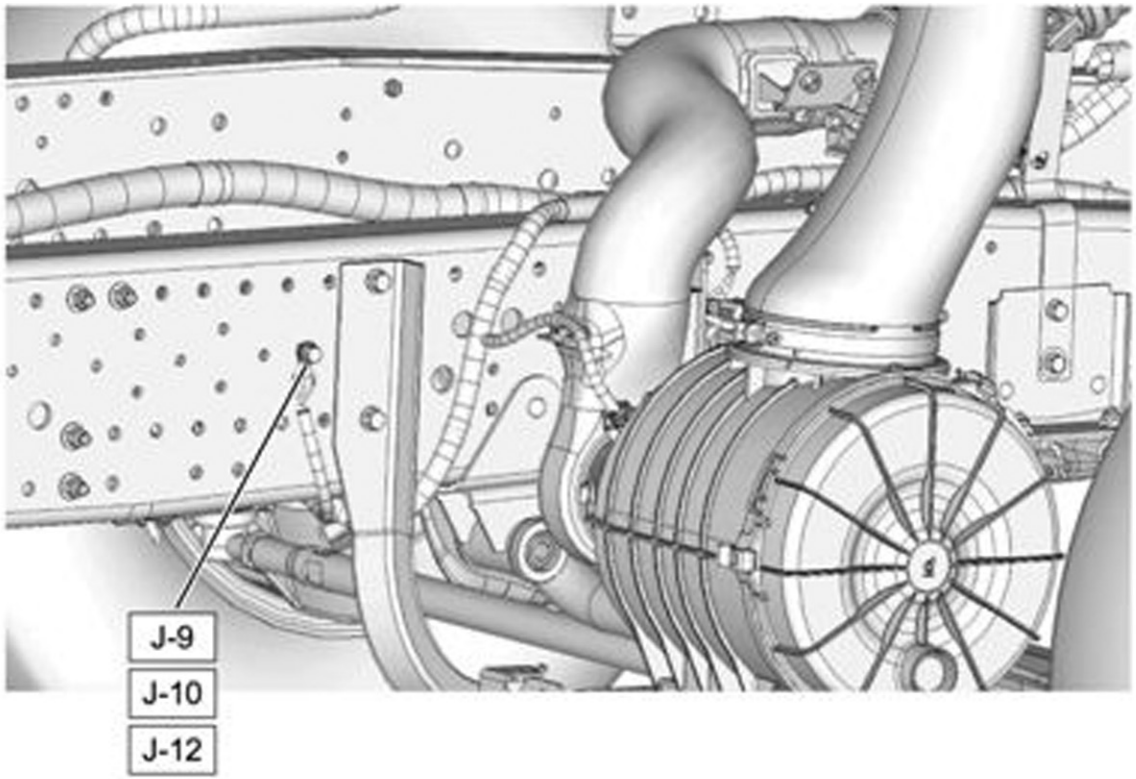


Figure 16.8.1

Grounding Point Location

E-97, E-98, E-105

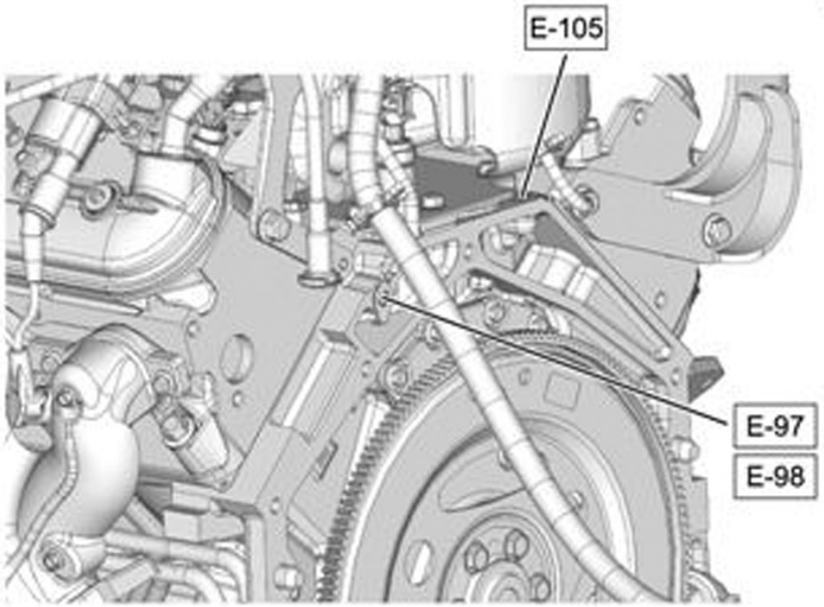


Figure 16.9.1

P-5

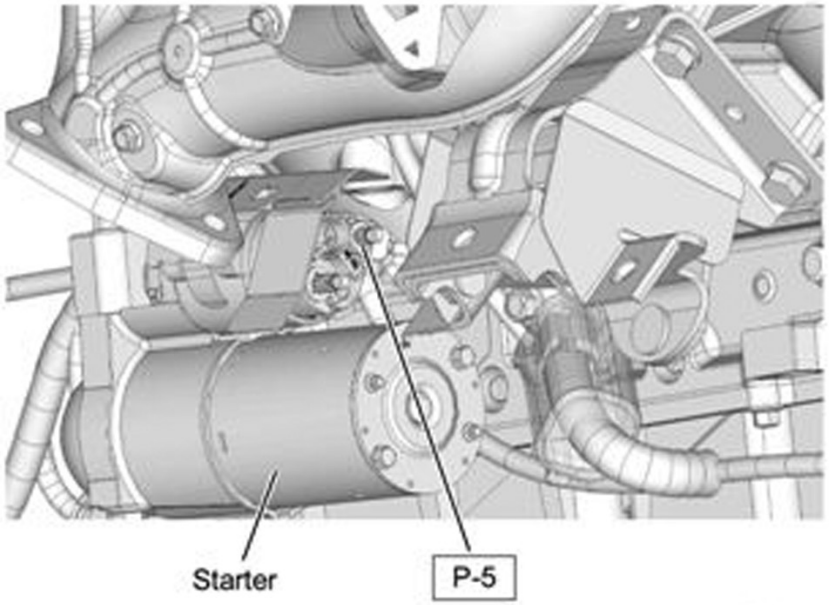


Figure 16.9.2

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

Figure 16.10.1

Rear Body Lamp Switch

Rear Body Dome Lamp Switch is available as a: Port Installed Option **IX2***, Dealer Installed Option, and Body Company Installed Option.*

Rear Body Dome Lamp Switch
Part Number 8-98011-708-2



Figure 16.11.1

Installation Procedure

PREPARATION

• Inspect and ensure all components are free from defects or damages.

PROCEDURE

1) Remove dash cover. **(Figure 1)**

2) Remove top filler plug from left side dash area. **(Figure 2)**

3) Insert - Rear Dome Lamp Switch in top hole. **(Figure 3)**

4) Attach black connector to switch. **(Figure 4)**

5) Ensure light illuminates when pressed. Depress to turn “OFF”. **(Figure 5)**

6) Re-install dash panel. **(Figure 6)**

7) Ensure that no scratches or damage have been made to dash panel.

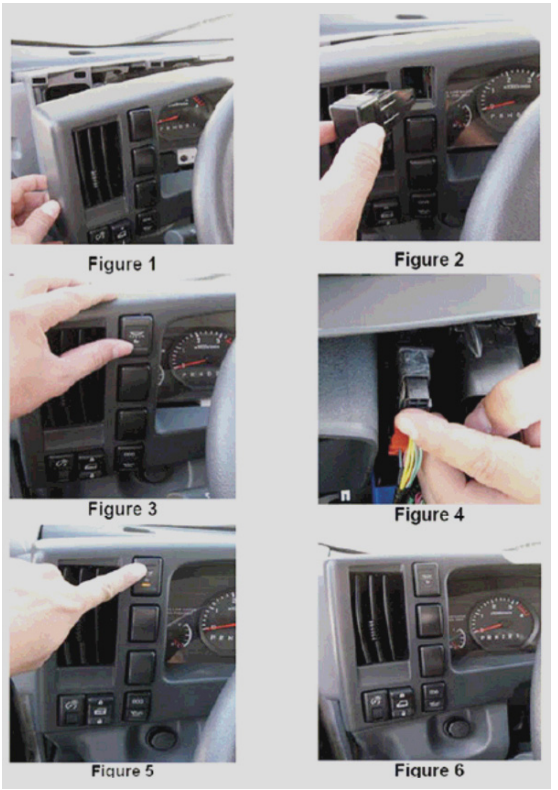


Figure 16.11.2

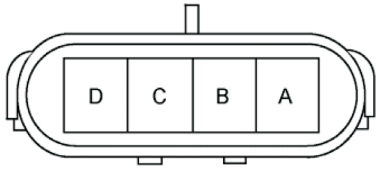
J-118 Rear Manufacture Connenctor-Connector End View			
			
Connector Part Information			
Pin	**Wire Color**	**Circuit Number**	**Function**
A	LT GRN/ BLK	BA58	Marker Light Voltage
B	RED	IA37	Power Source Voltage F-36
C	WHT/BLK	IA38	Rear Dome Light Relay Control
D	BLK	IX23	Ground J-12

Figure 16.12.1

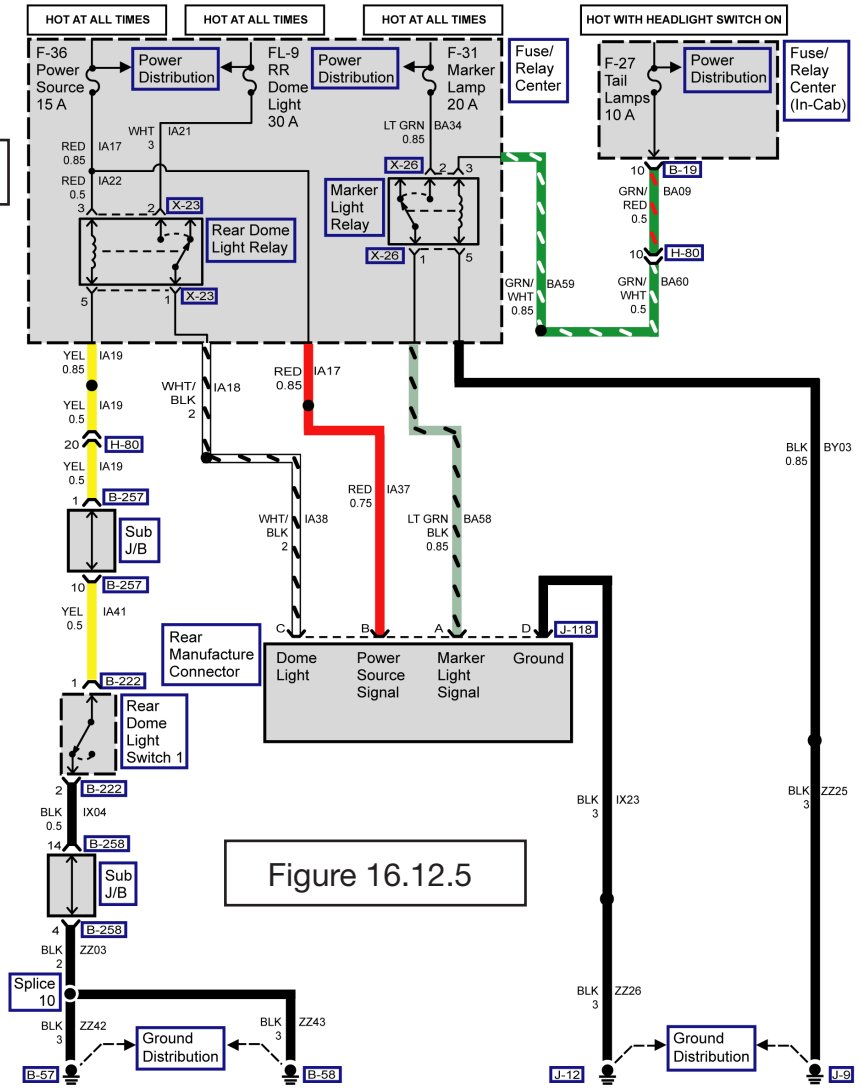


Figure 16.12.5

Center Rear of the Last Crossmember

Packard Body Pulg 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

Figure 16.12.2

Back Up Alarm Connector	
Housings	**15300027**
Terminal	**12084201**
Seal	**12015323**
TPA	**1530001**

Figure 16.12.3

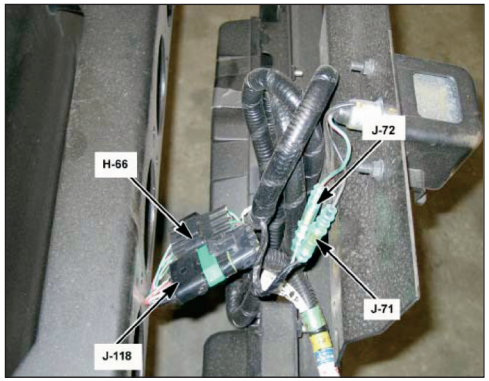


Figure 16.12.4

Fuse Location - Interior

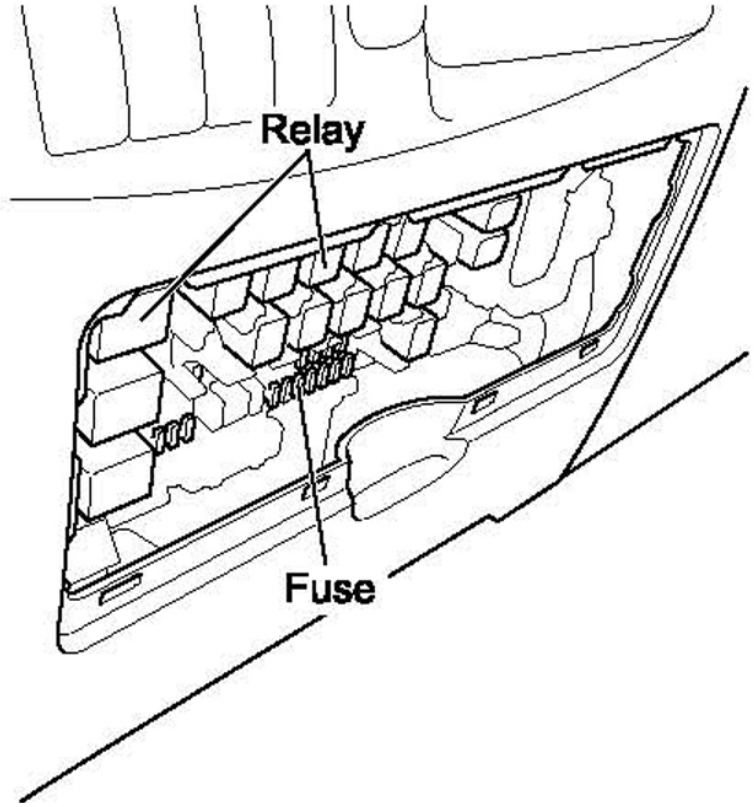
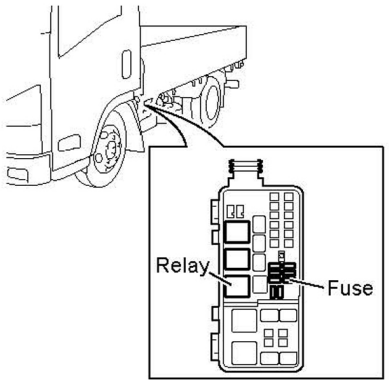


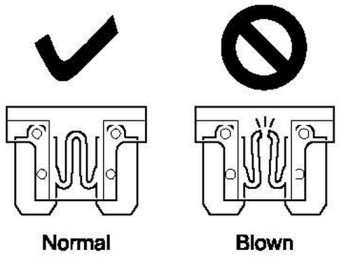
Figure 16.13.1

Replacing Fuses

1. Before replacing fuses, be sure to place the engine control switch in the "LOCK" position and pull back on the parking brake lever.
2. Place the fuse puller on the fuse and pull it out. (The fuse puller is stored in the fuse box inside the cab.)

Fuse Location - Exterior





3. If the fuse appears as shown in the right hand side of the diagram at left, the fuse is blown. Replace with a spare fuse. (Spare fuses are stored in the fuse box inside the cab.)

⚠ CAUTION

- Use fuses of the same rating for replacement. Do not use any other fuses than those designated.
- Using fuses other than those specified could result in fire or damage to the equipment.
- If the new fuses blow right away, contact the nearest Isuzu Dealer.

Figure 16.14.1

Fuse locations:

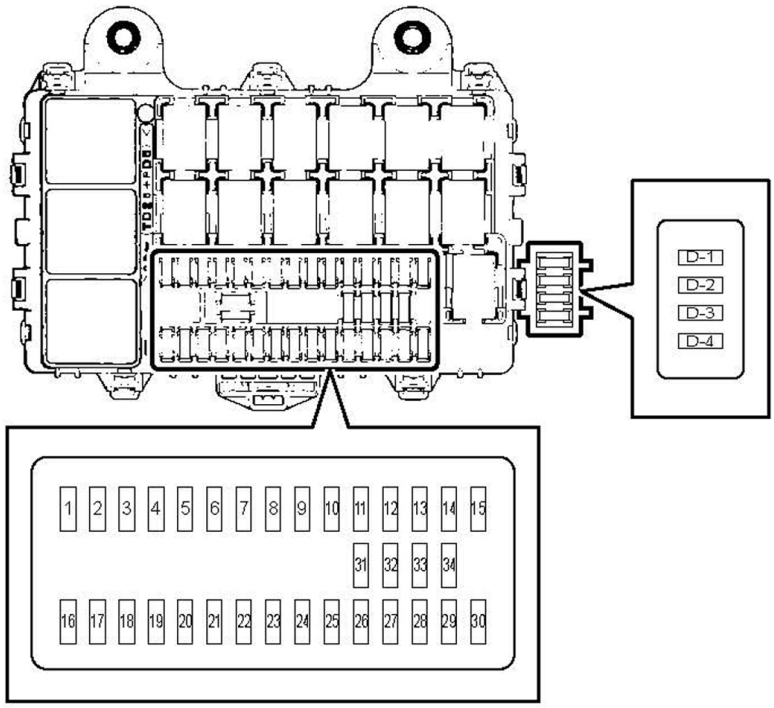


Figure 16.15.1

No.	Description	Rating
1	RR P / WINDOW GLACE ÉLECT. AR.	25A
2	—	—
3	ROOM LAMP, AUDIO PLAFONNIER, AUDIO	10A
4	DOOR LOCK SERRURE DE PORTE	15A
5	TRAILER BRAKE FREIN DE REMORQUE	15A
6	P/ WINDOW GLACE ÉLECTRIQUE	25A
7	ABS ABS	10A
8	WIPER ESSUIE-GLACE	25A

No.	Description	Rating
9	H / LAMP LO (LH) PHARE BAS (GAUCHE)	10A
10	LAMPS (BATT) LAMPES (BATT)	10A
11	H / LAMP LO (RH) PHARE BAS (DROIT)	10A
12	BRAKE LAMPS LAMPES DE FREIN	10A
13	STARTER DEMARREUR	10A
14	H / LAMP HI (LH) PHARE HAUT (GAUCHE)	10A
15	H / LAMP HI (RH) PHARE HAUT (DROIT)	10A
16	MIRROR HEATER CHAUFFAGE MIROIR	15A

Fuse Locations- continued

Fuse locations:

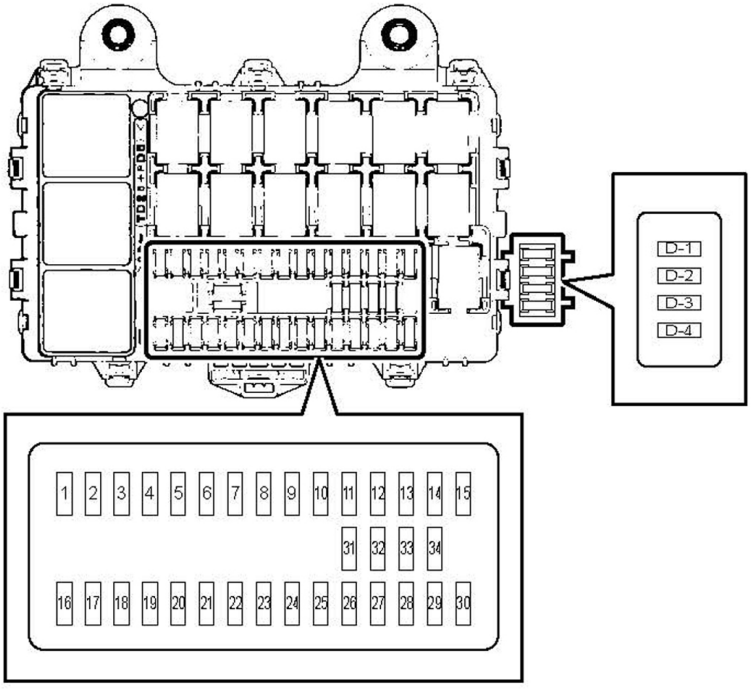


Figure 16.16.1

No.	Description	Rating
17	IGNITION2 ALLUMAGE2	10A
18	IGNITION1 ALLUMAGE1	10A
19	—	—
20	ECM MOD. COMM. ÉLECTRIQUE	10A
21	METER MÉTRE	10A
22	ECU (BATT) MOD. COMM. ÉLECTRONIQUE	10A
23	MIRROR MIROIR	10A
24	AUDIO, ACC AUDIO, ACC	15A
25	HORN KLAXON	15A
26	TURN, HAZARD CLIGNOTANTS, DETRESSE	15A
27	TAIL LAMPS FEUX ARRIÉRE	10A

No.	Description	Rating
28	ILLUMINATIONS ÉCLAIRAGE	10A
29	CORNERING LAMPS LAMPES DE VIRAGE	10A
30	AIR CONDITIONER CLIMATISEUR	10A
31	SPARE PIÉCES DE RECHANGE	10A
32	SPARE PIÉCES DE RECHANGE	15A
33	SPARE PIÉCES DE RECHANGE	25A
34	SPARE PIÉCES DE RECHANGE	20A
D-1	CIGAR ALLUME-CIGARE	20A
D-2	ACCESSORIES SOCKET PRISE POUE ACCESSOIRES	15A
D-3	POWER SOURCE ALIMANTATION ÉLECTRIQUE	20A
D-4	—	—

Relay locations:

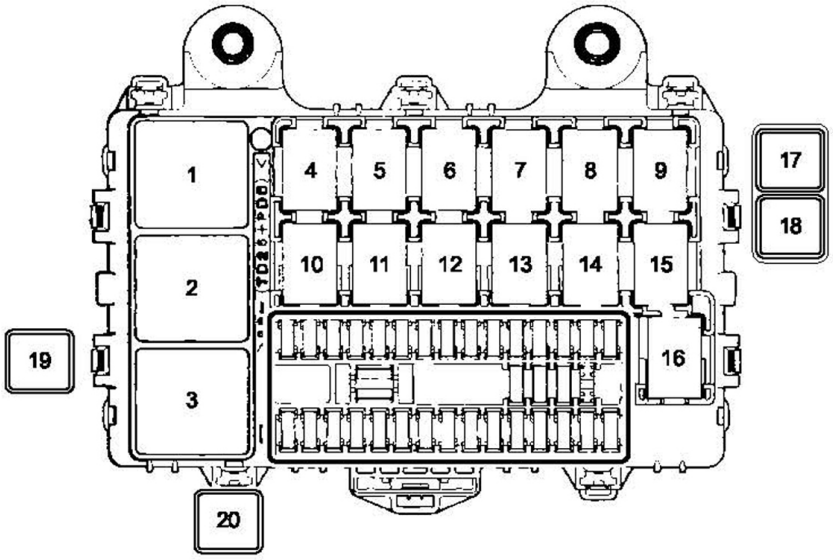
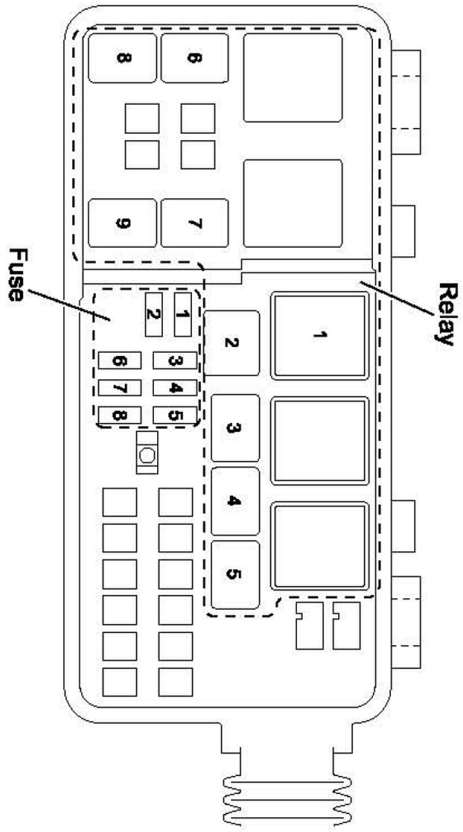


Figure 16.17.1

No.	Description
1	STOP LAMP
2	DAYTIME RUNNING LAMP
3	KEY ON
4	TCM (A/T models)
5	PARKING/NEUTRAL
6	WIPER MAIN
7	HORN
8	WIPER HI LO
9	TRAILER BRAKE
10	POWER WINDOW

No.	Description
11	CHARGE (ENG RUN)
12	POWER WINDOW
13	HEAD LAMP LO
14	VACUUM PUMP
15	HEAD LAMP HI
16	TAIL LAMP
17	CORNERING LAMP
18	CIGAR LIGHTER
19	POWER ACC
20	BLOWER MOTOR

Relay and Fuse Locations



No.	Relay name
1	STARTER
2	A/C COMPRESSOR
3	CONDENSER FAN
4	FUEL PUMP
5	RR DOME LAMP
6	MARKER LAMP
7	PCM MAIN
8	—
9	A/C

No.	Fuse name	Rating
1	MARKER LAMP	20A
2	TAIL MAIN	20A
3	PCM1	20A
4	PCM2	20A
5	PCM3	20A
6	POWER SOURCE	15A
7	CONDENSER FAN	20A
8	A/C COMPRESSOR	10A

Figure 16.18.1

Headlights (Low Beam)

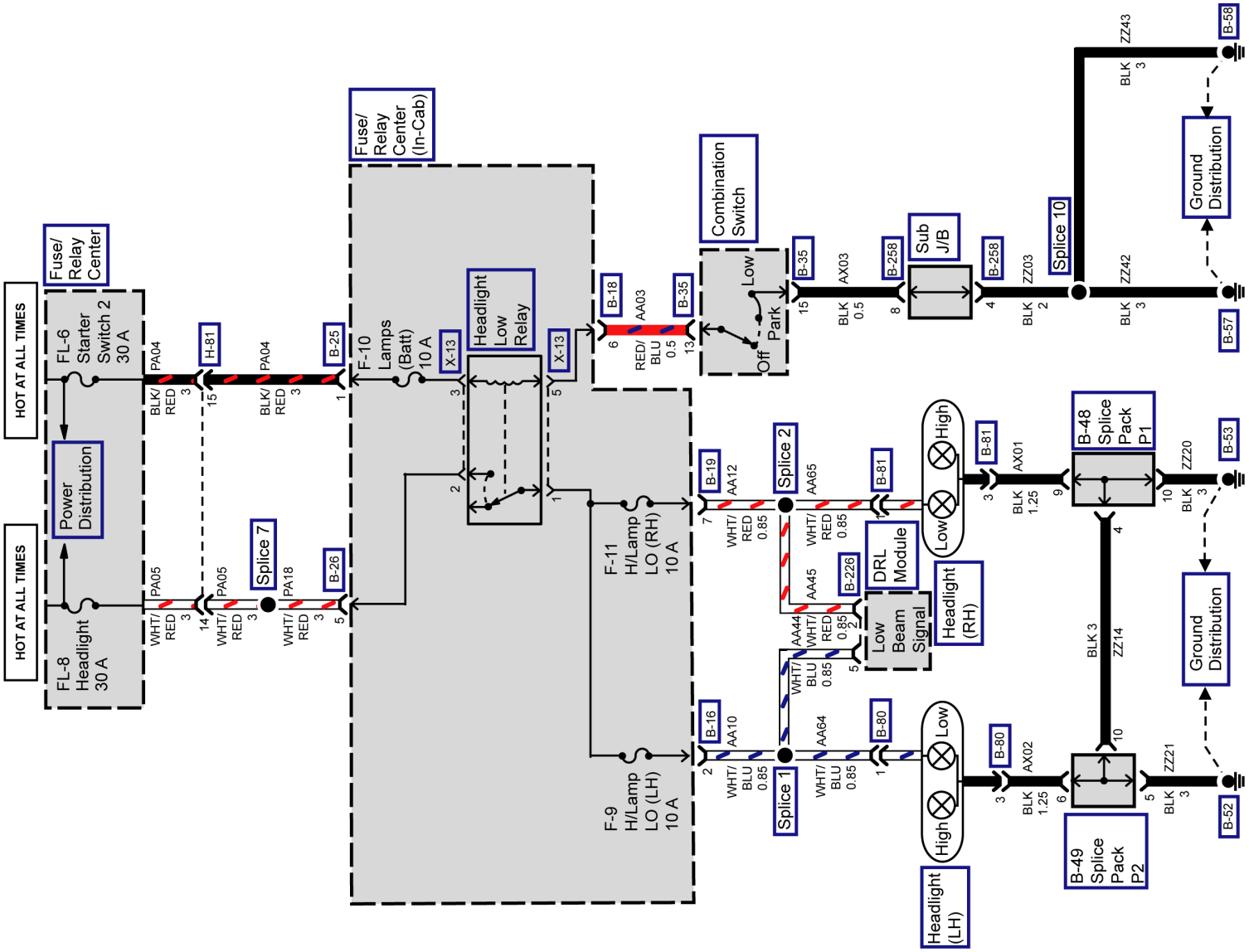


Figure 16.19.1

Headlights (High Beam)

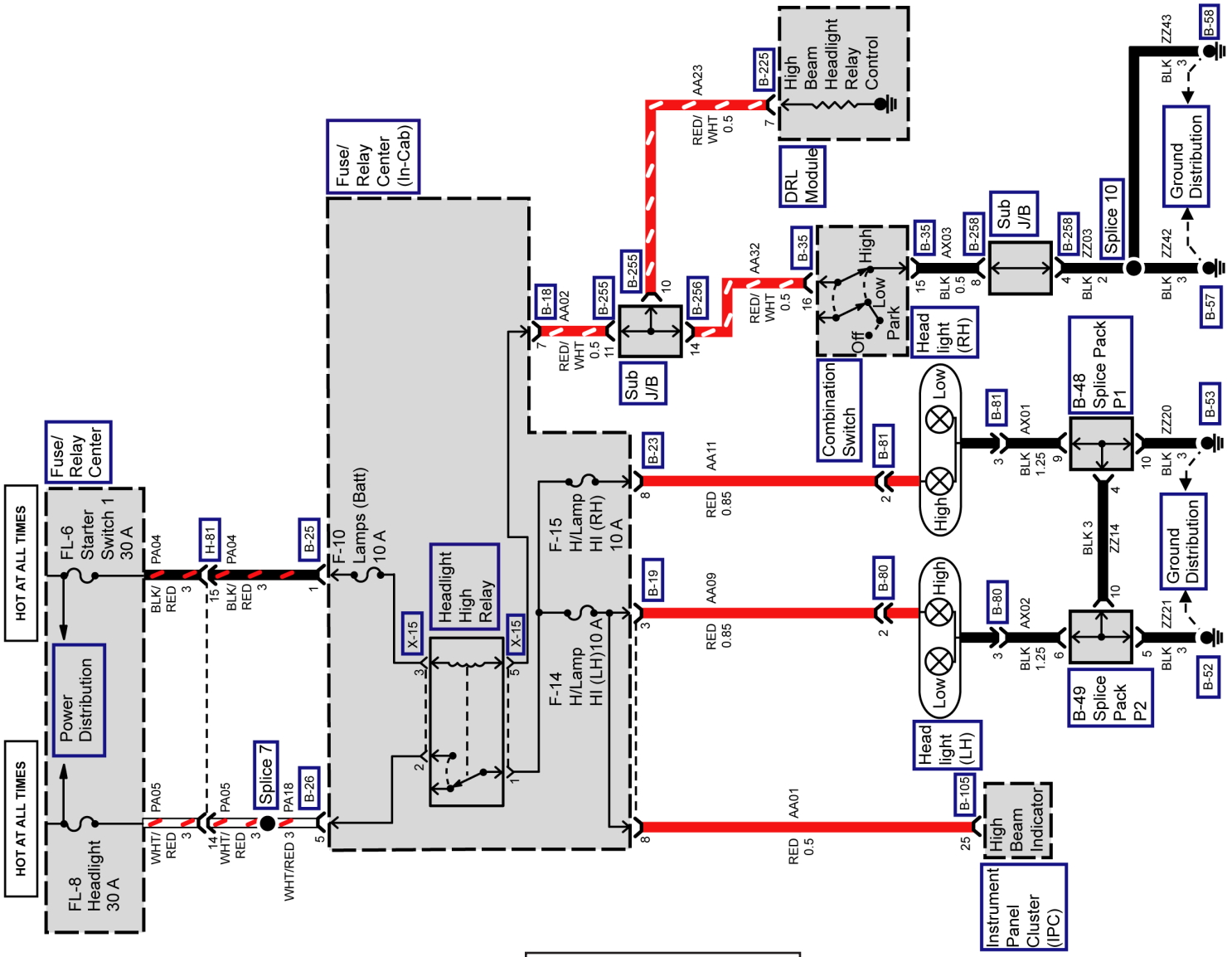


Figure 16.20.1

Tailights

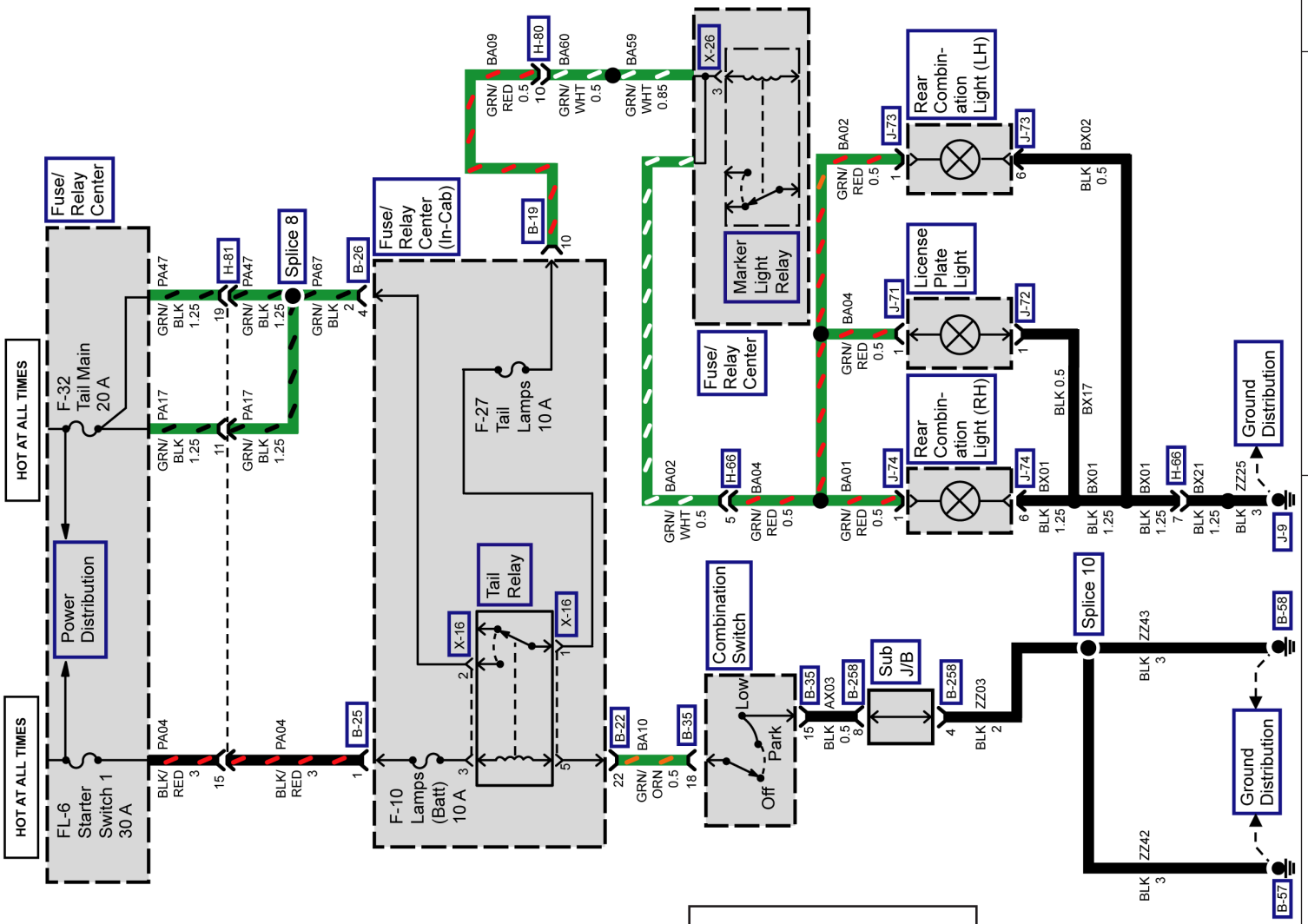
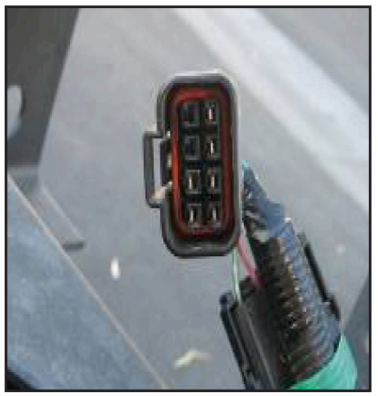


Figure 16.21.1

Figure 16.21.2

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**

Figure 16.21.3

Roof Marker Lights

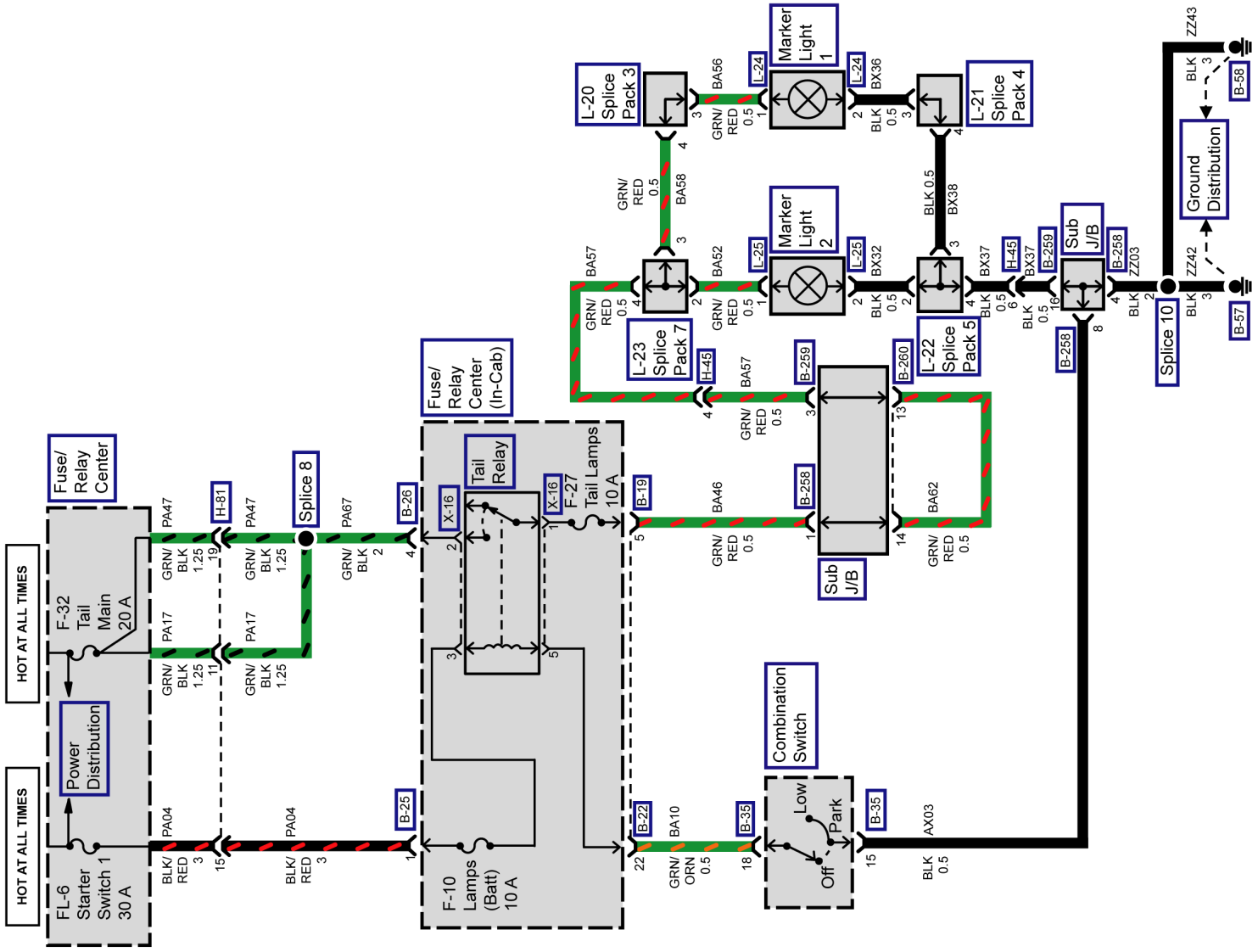


Figure 16.22.1

Roof Clearance Lights

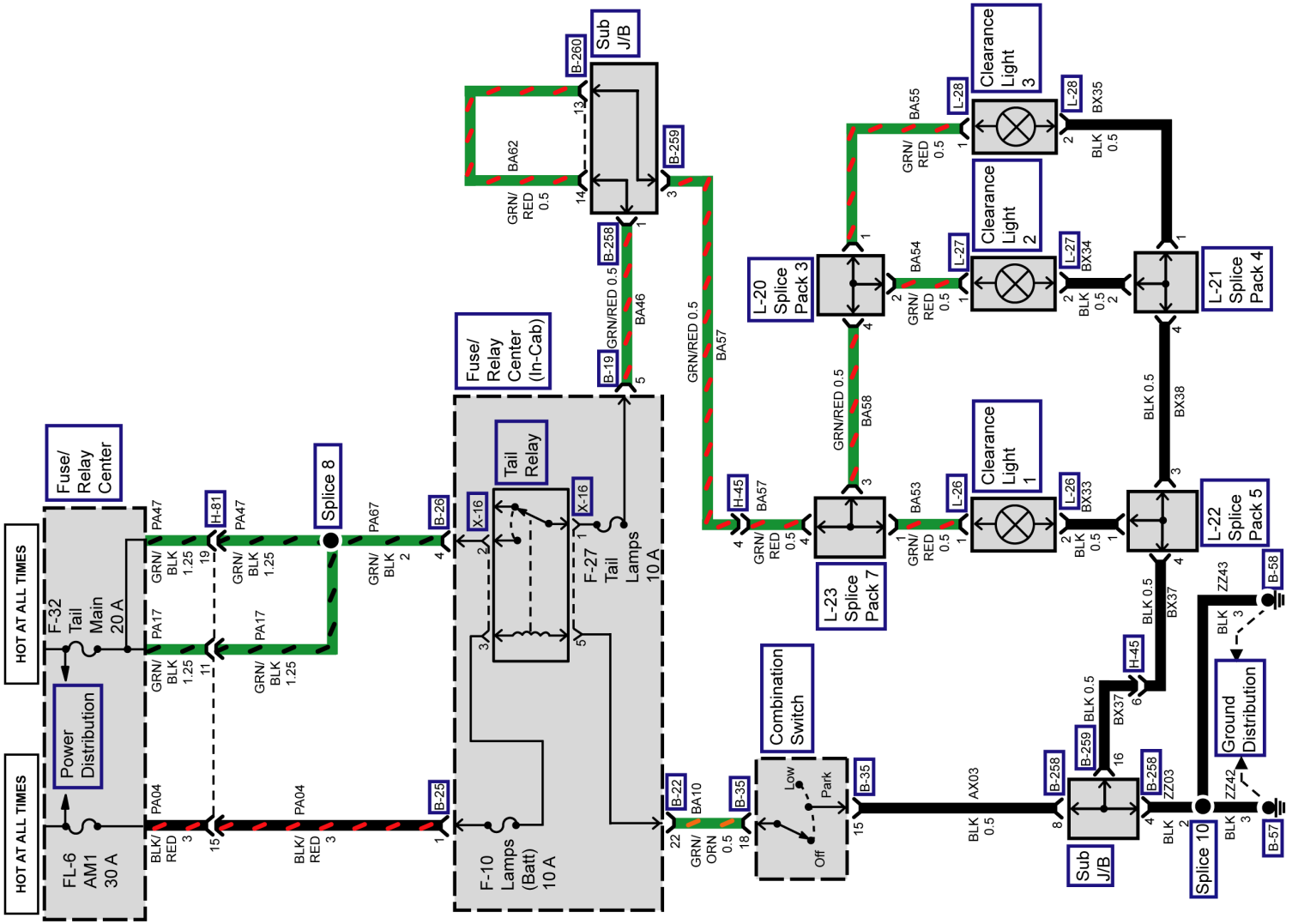


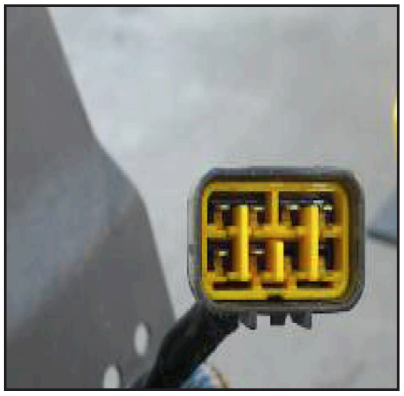
Figure 16.23.1

Figure 16.24.1

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**

Figure 16.24.2

Rear Turn Signal Lights

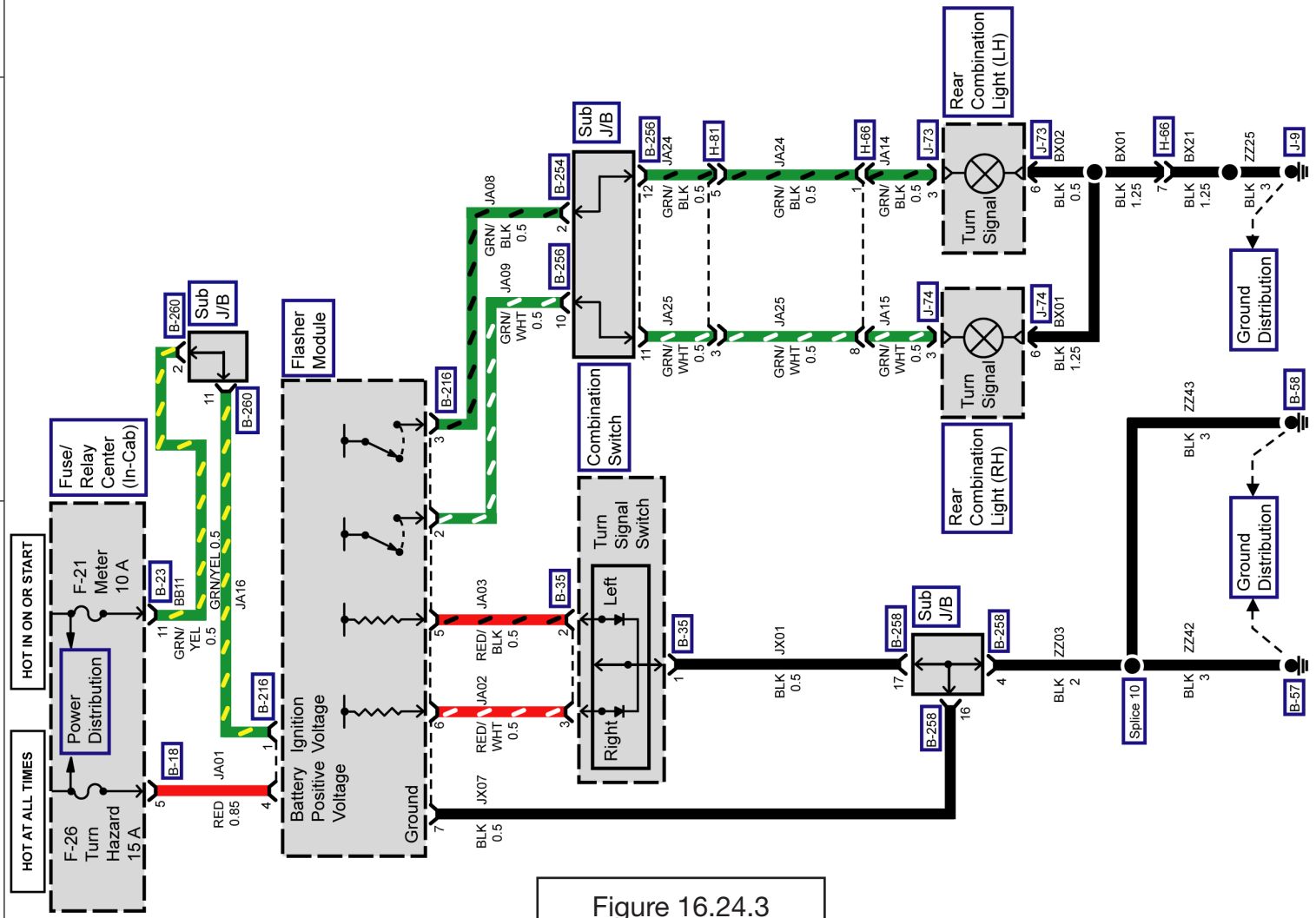
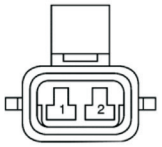


Figure 16.24.3

Back up Light, Back up Alarm Circuit

J-111 Backup Alarm Connector End View			
			
Connector Part Information	· 15200002 · 2-WAY M (BLK)		
Pin	**Wire Color**	**Circuit Color**	**Function**
1	BLK	KX11	Ground
2	RED/BLU	KA33	Back Up Alarm Supply Voltage

Back Up Alarm Connector located on LH Rail of Last Crossmemeber.

Figure 16.25.1

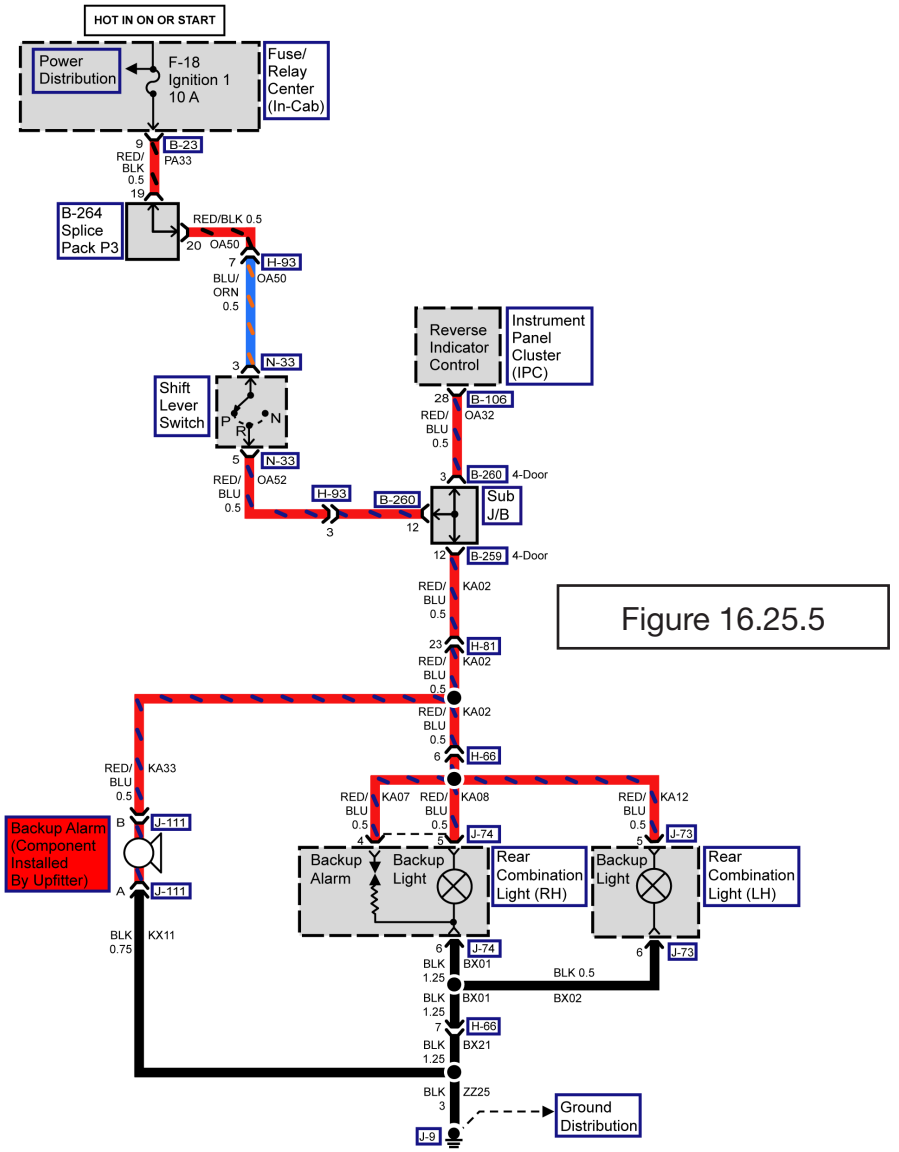


Figure 16.25.5

Chassis Side Connecotr	
Housings	153000002
Terminal	12124977
Seal	12015899
TPA	15300014
Matching Plug	
PED ASM	15300027

Figure 16.25.2

Back Up Alarm Connector	
Housings	15300027
Terminal	12084201
Seal	12015323
TPA	15300014

Figure 16.25.3

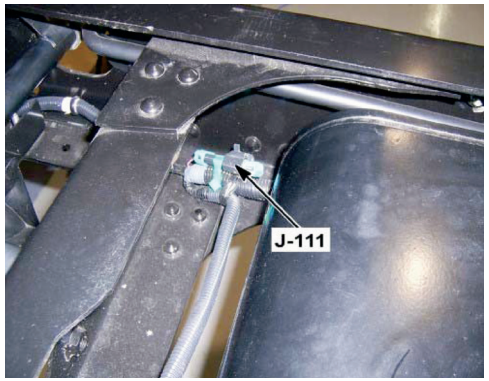


Figure 16.25.4

Cigar Lighter Circuits

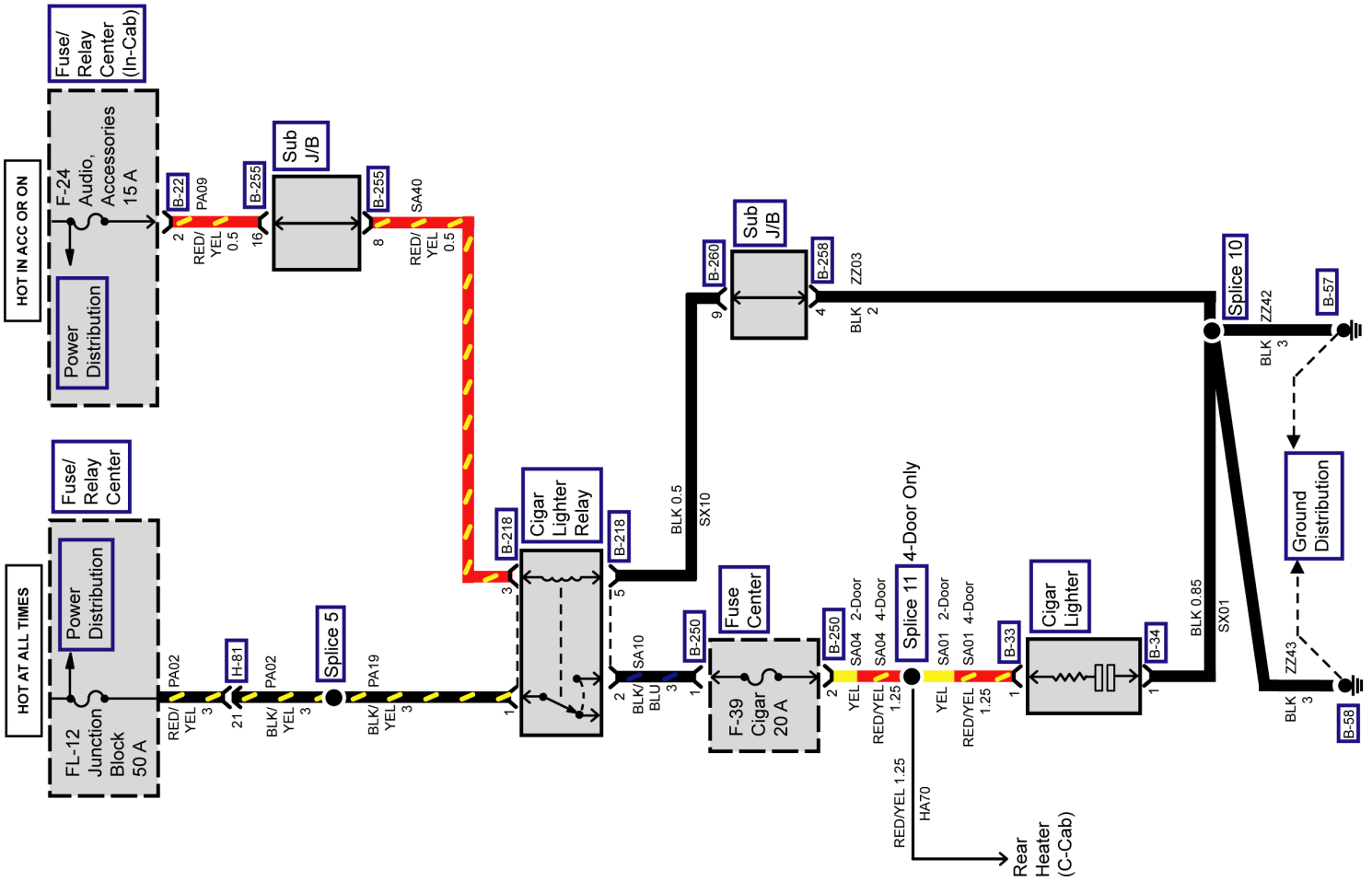


Figure 16.26.1

Radio Circuits

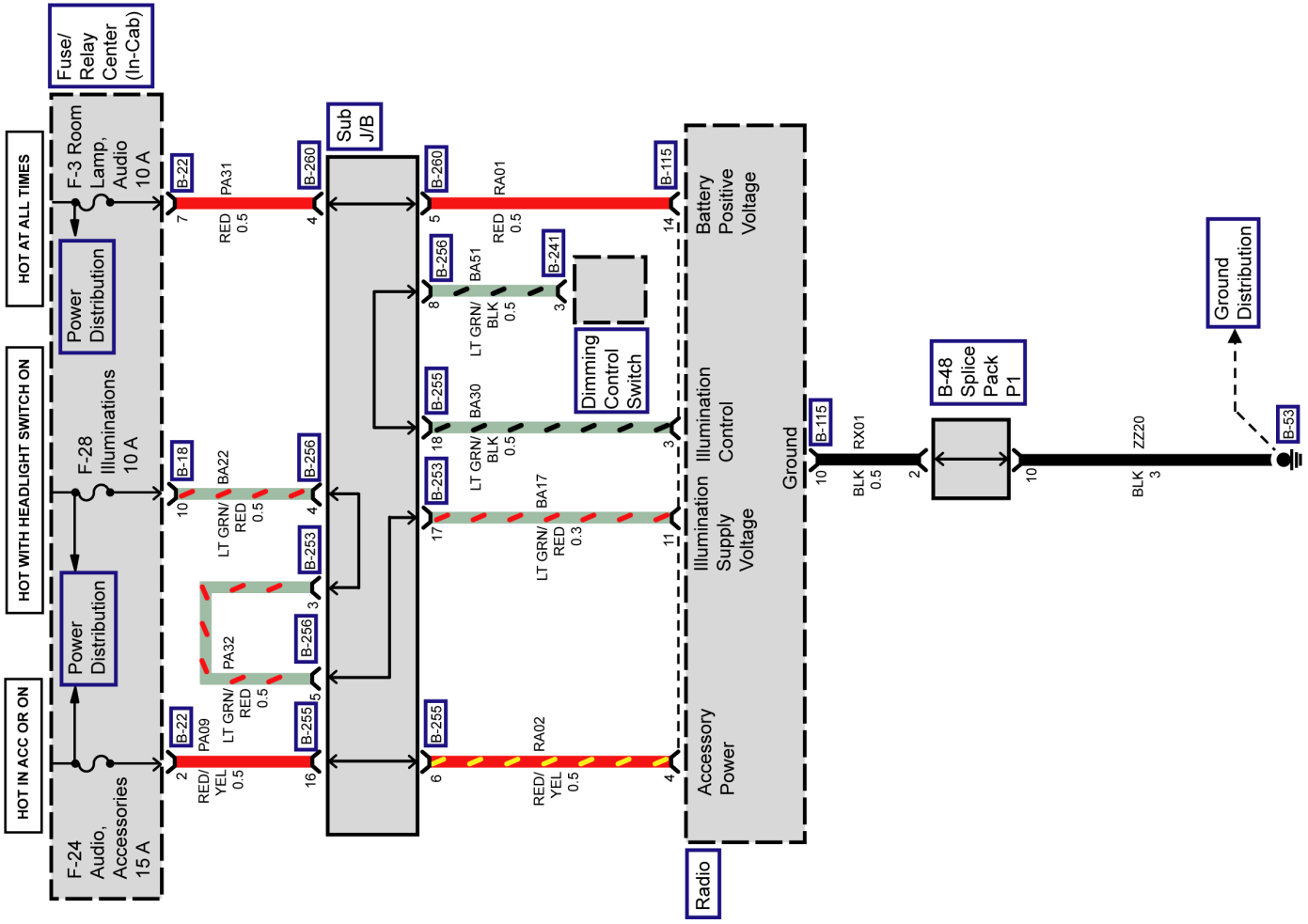


Figure 16.27.1

Auxiliary Power Source Circuit Diagram

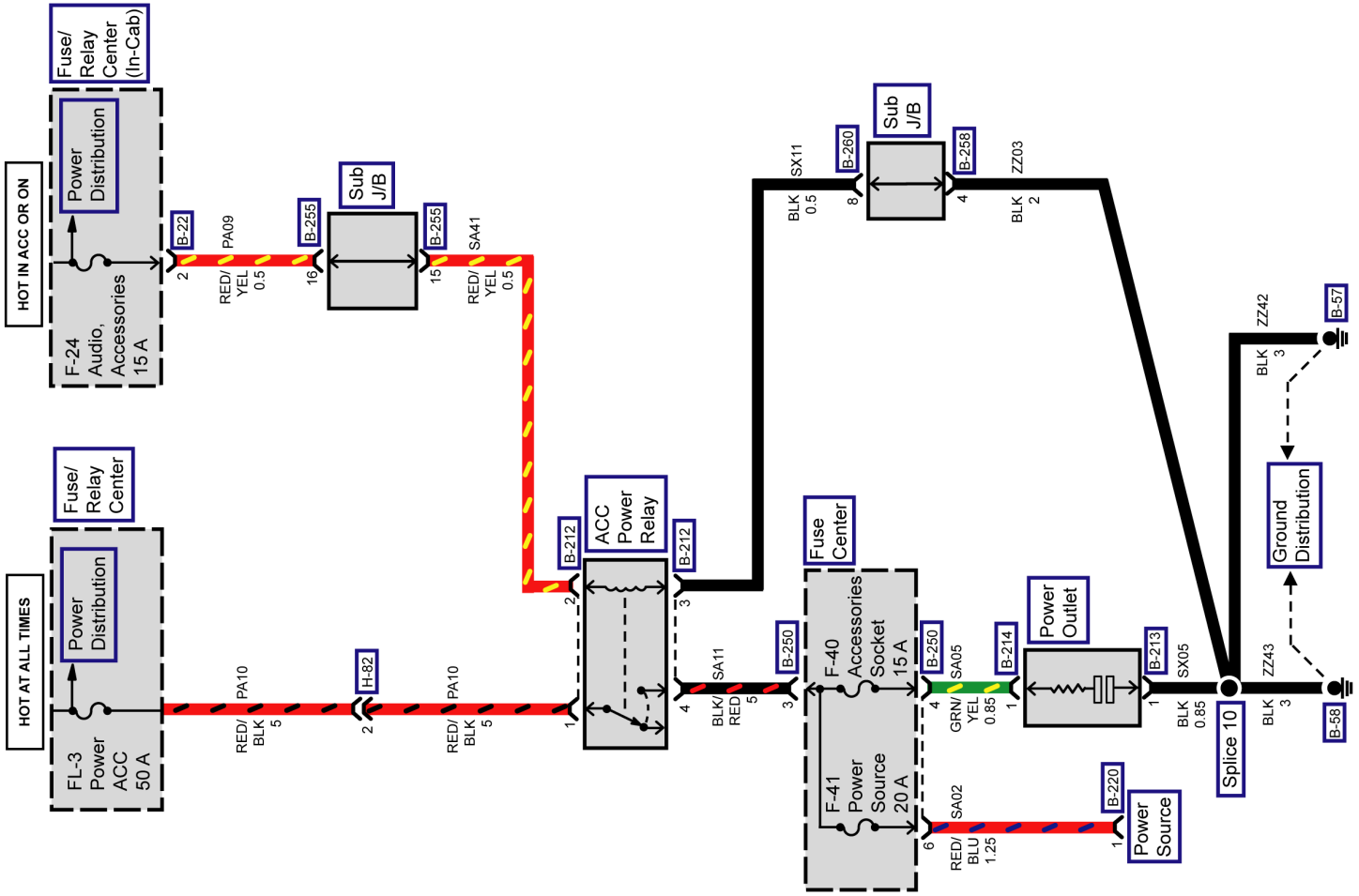


Figure 16.28.1

Trailer Brake Controller Wiring and Activation

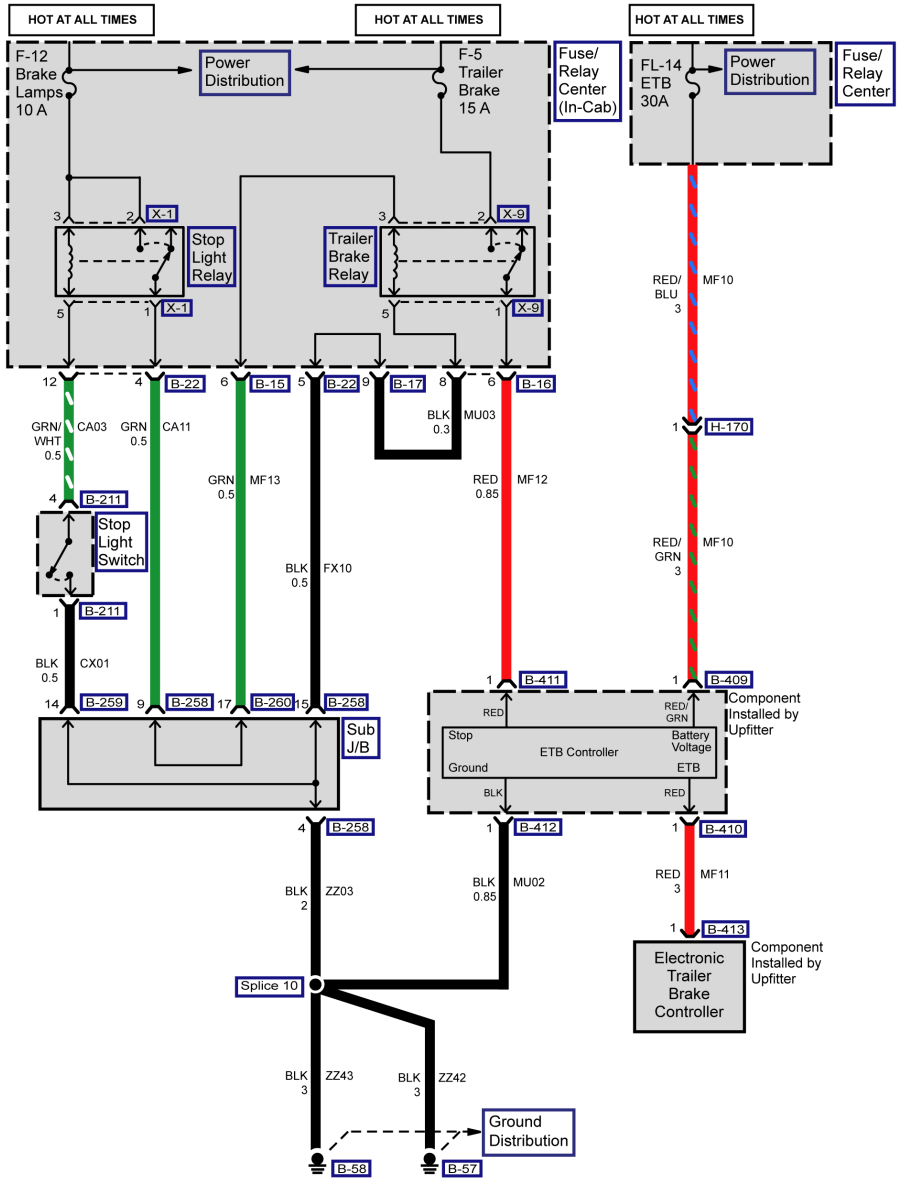


Figure 16.29.1

N-Gas Trailer Brake Controller Wiring and Activation

Introduction:

From model year 2009 Model Year NPR and NPR-HD Gas chassis feature integrated electronic trailer brake controller wiring and a dedicated chassis wiring harness for control of trailer stop, turn, and tail lamps. ***Note: the electronic brake controller is not supplied with the vehicle.***

Integrated Electronic Brake Controller Wiring and Activation:

Wires for the electronic trailer brake controller are located behind the radio. To access these wire, remove the radio and DIN pocket from the dash, and pull out the wiring pigtail for the trailer brake controller.

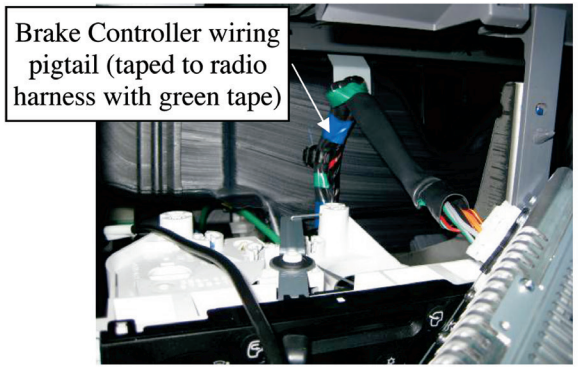


Figure 15.30.1

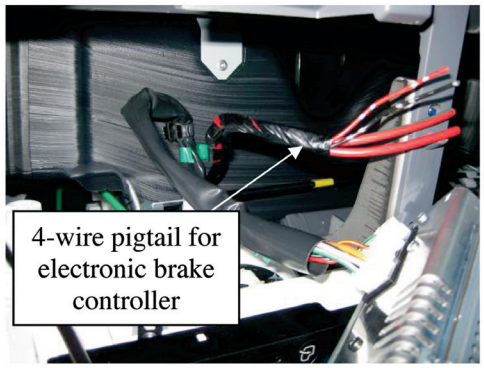


Figure 15.31.2

Wire Chart for the brake controller pigtail:

Wire#	Wire Color	Wire Size (mm^2)	Wire Size (AWG Approx)	Description/Notes
1	Red/Green	3	12	Supply power for brake controller (Fused to battery 20A; continuous max)
2	Red	3	12	Output signal from brake controller (rated max 20A continuous)
3	Red	0.85	18	Brake lamp signal (12V on when brake applied. Activated by relay R-9)
4	Black	0.85	18	Ground (max continuous current 10A)

The brake signal wire (Wire # 3) is activated by installation of a relay in the "R-9" position in the center relay console located in the center of the dash just above floor level.

Figure 16.31.3

The R9 relay (P/N 8-97173-037-1) is not supplied with the vehicle. The relay can be ordered from your Authorized Isuzu Dealer's parts Department.
R-9 relay position:

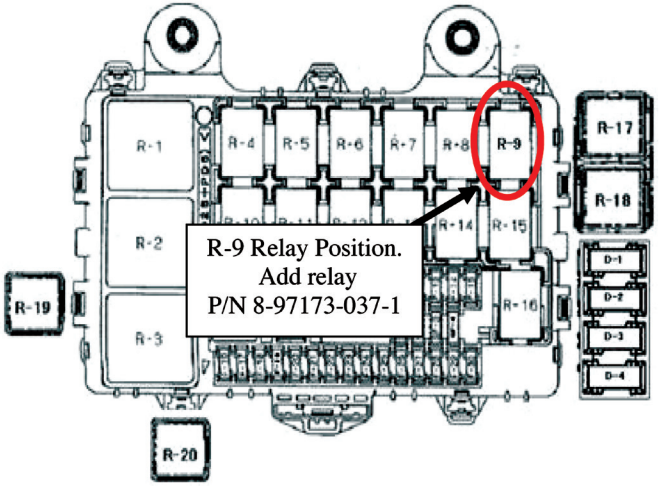
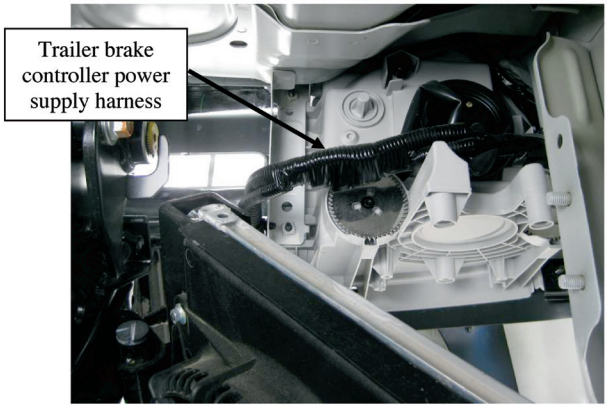


Figure 16.31.1

The power supply for the trailer brake controller (Wire #1) is not energized from the factory.
To power the brake controller, the brake controller harness power supply must be plugged in to the chassis power supply plug.

1) Locate the trailer brake controller power supply harness under the cab, behind the passenger-side head light:



2) Remove tape to expose the 2 connectors. The Grey connector is used to supply power to the trailer brake controller (Wire #1). This connector plugs in to the chassis trailer brake controller power supply. The Black connector is the output signal wire from the trailer brake controller (Wire #2).

Figure 16.31.2

3) Unplug the harness. Connect the Black connector (Wire #2) to an extension wire of suitable length and route the wire to the rear of the vehicle. This wire is the trailer brake controller output signal wire.

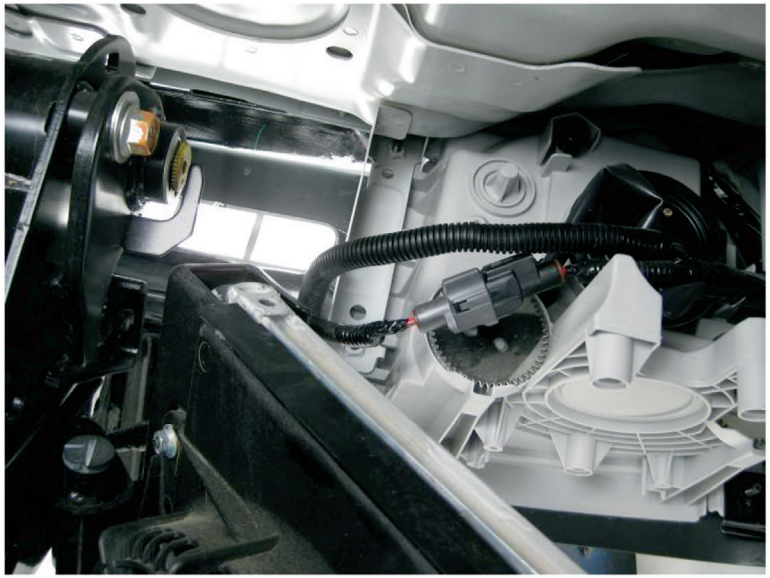


Figure 16.32.1

4) Remove the tape from the wire with the Grey connector (Wire #1) and route this wire underneath of the right hand frame rail.

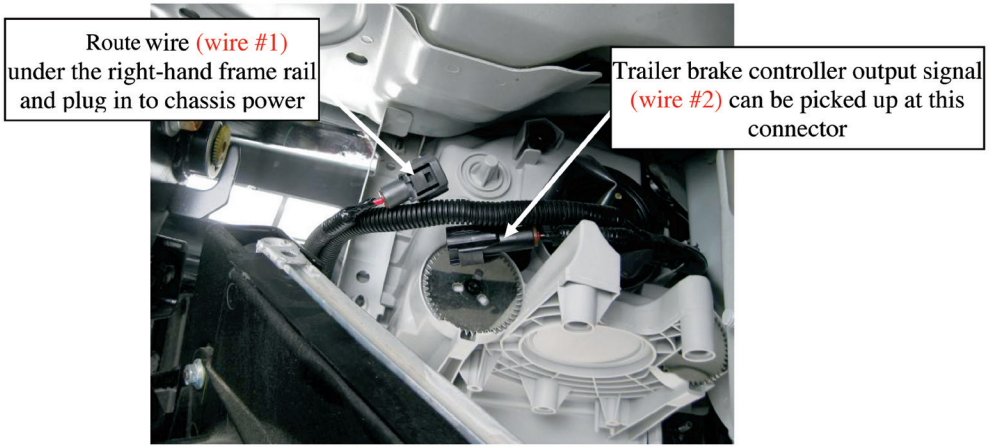


Figure 16.32.2

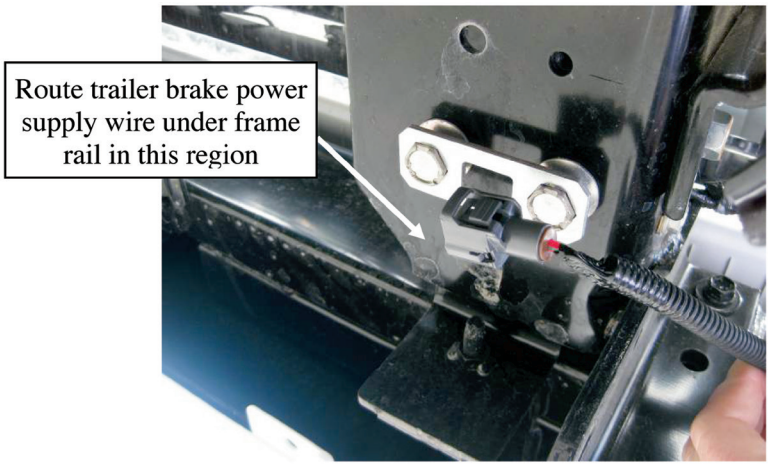


Figure 16.32.3

5) Locate the chassis side power supply harness. This connector is located just inboard of the right hand frame rail, beneath the ABS control module.

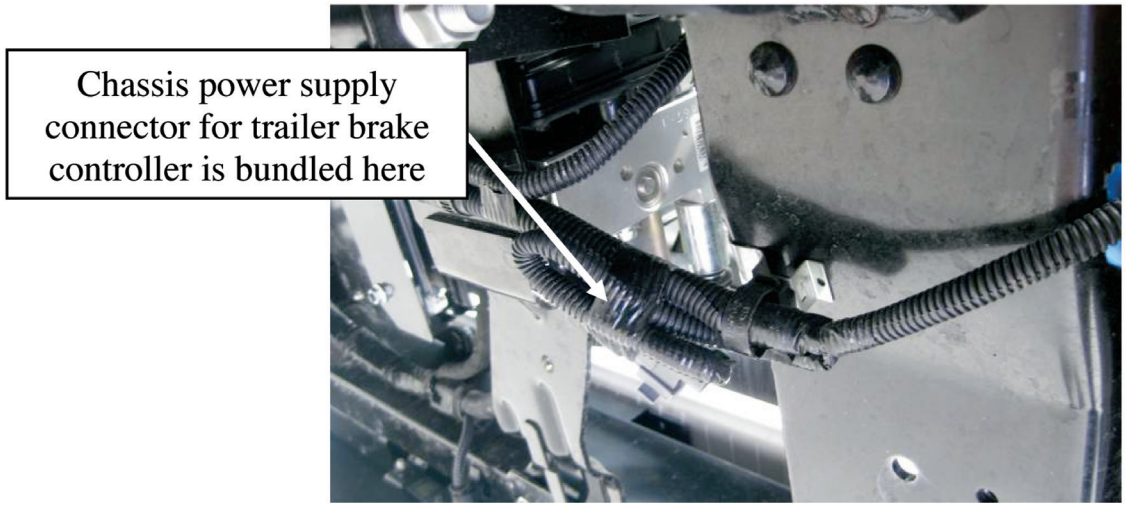


Figure 16.33.1

6) Remove tape and route chassis side power supply wire to brake controller power supply wire:



Figure 16.33.2

7) Remove protective cover, and plug chassis side power supply harness into electronic trailer brake controller power supply connector (Wire #1). Secure harness to chassis with suitable tie strap.



Figure 16.34.1

Trailer Lighting Wiring

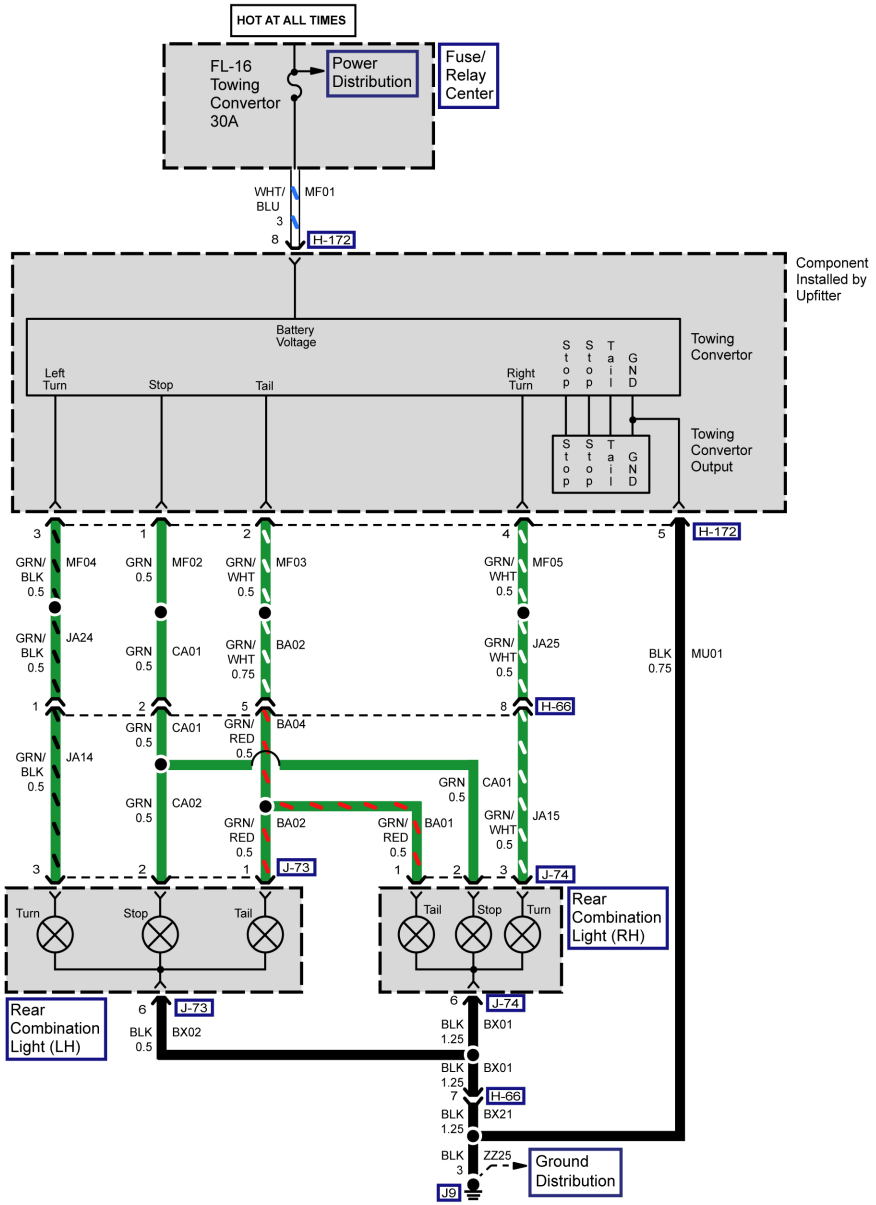


Figure 16.35.1

Trailer Wiring Connector

There is a wiring harness that allows upfitter to control trailer lighting functions without having to splice into the vehicle tail lamp harness. The connector is located on the left hand frame rail (driver's side), to the rear of the transmission cross member. This connector is illustrated on the following page.
The connector wires are the standard 4 wire electrical light system that is used on the chassis (separate stop and turn light).
If the trailer has a 3 wire electrical system (combined stop and turn light) a heavy duty tail light converter box will be necessary for proper trailer light integration.

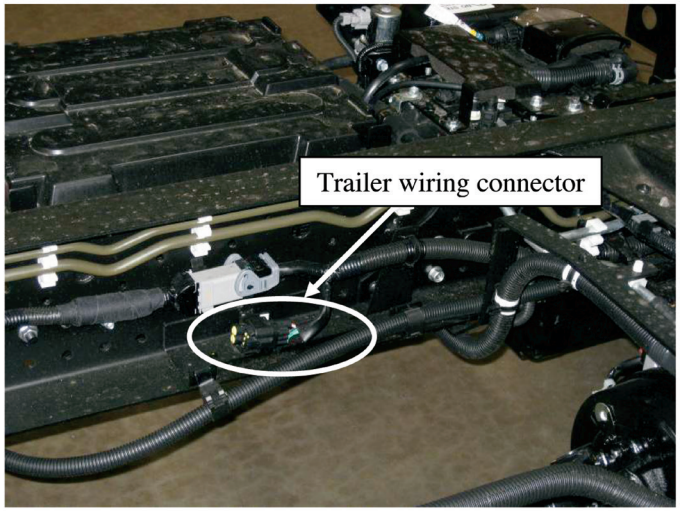
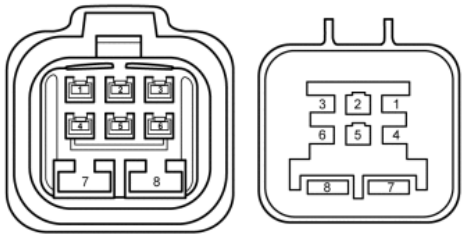


Figure 16.36.1

Connector diagram:

Connectors and Componets

H-172 Front Chassis Harness to Towing Converter



Connector Part Information		• 8-Way F (BLK • Upfitter Connector		Connector Part Information		• R020054 • 8-Way M (BLK)	
Pin	**Wire Color**	**Circuit No.**	**Function**	**Pin**	**Wire Color**	**Circuit No.**	**Function**
1				1	GRN	MF02	Stop Lamp Voltage
2				2	GRN/RED	BA04	Tail Lamp Voltage
3				3	GRN/BLK	MF04	Left Turn Signal Voltage
4				4	GRN/WHT	MF05	Right Turn signal Voltage
5				5	BLK	MU01	Ground
6				6	-	-	Not Used
7				7	-	-	Not Used
8				8	RED/WHT	MF01	Fuse FL-16 Supply Power

Left Inner Side of the Frame Rail, Behind the Transmission Crossmember

Figure 16.37.1

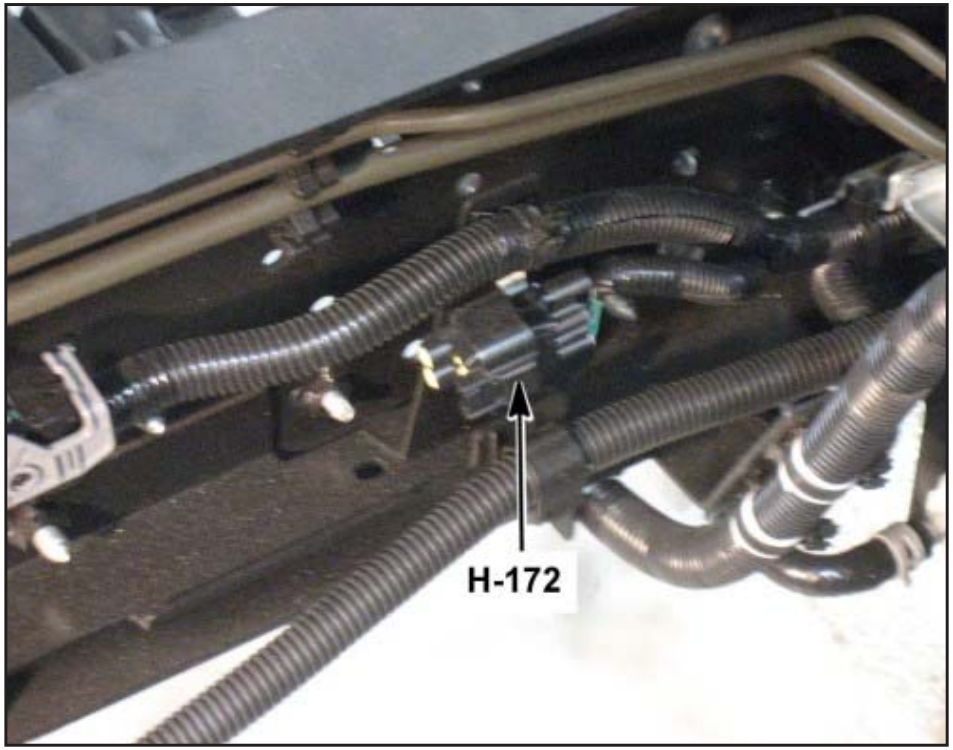


Figure 16.37.2

Fuel Tank Sending Unit Resistance Values

Float Position	Standard Resistance ( )
Empty Stop	248.5
Full Stop	40

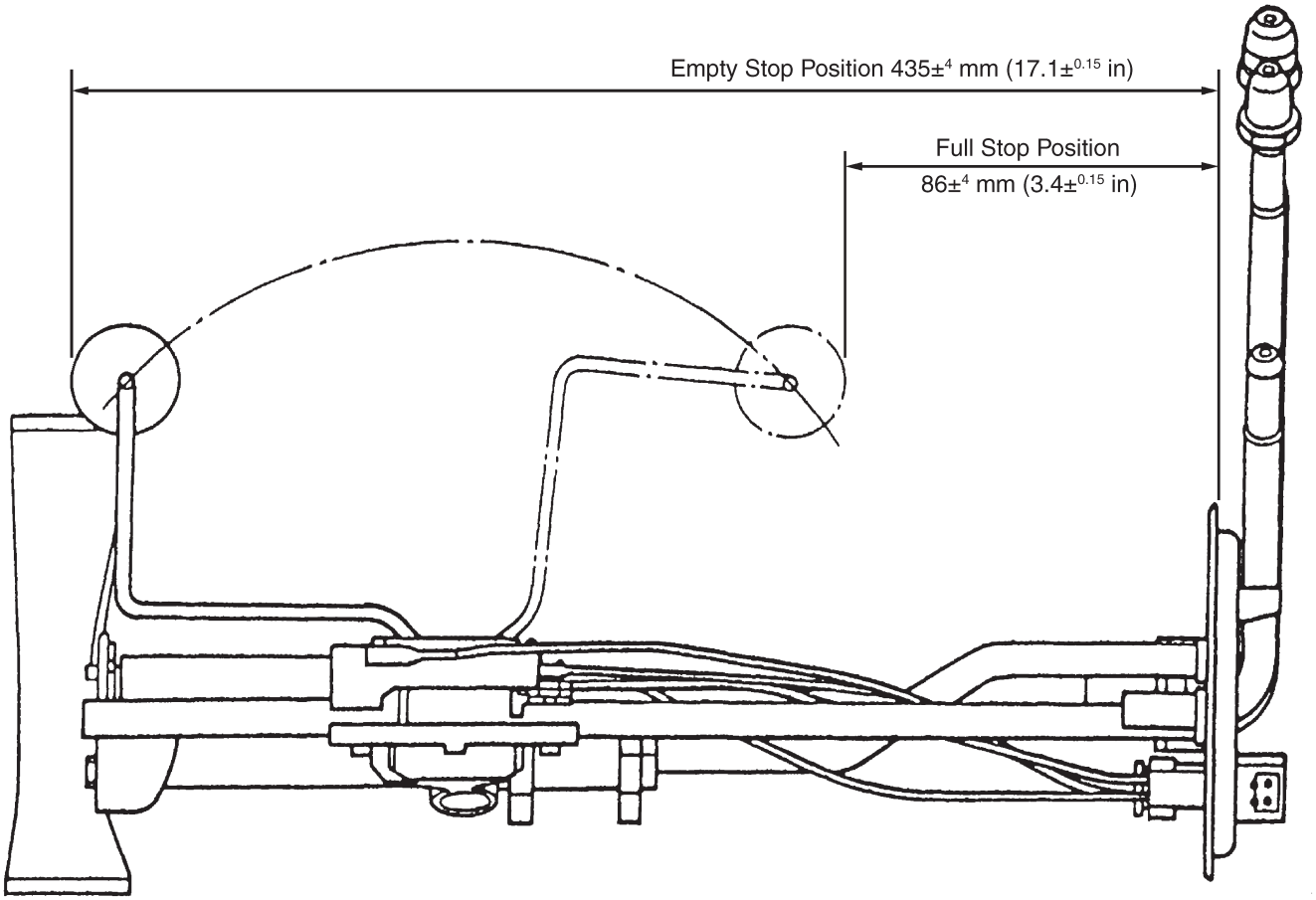


Figure 16.38.1

Model Year Fuel Tank Sending Unit Resistance Values

Float Position	Standard Resistance ( )
Empty Stop	248.5
Full Stop	40

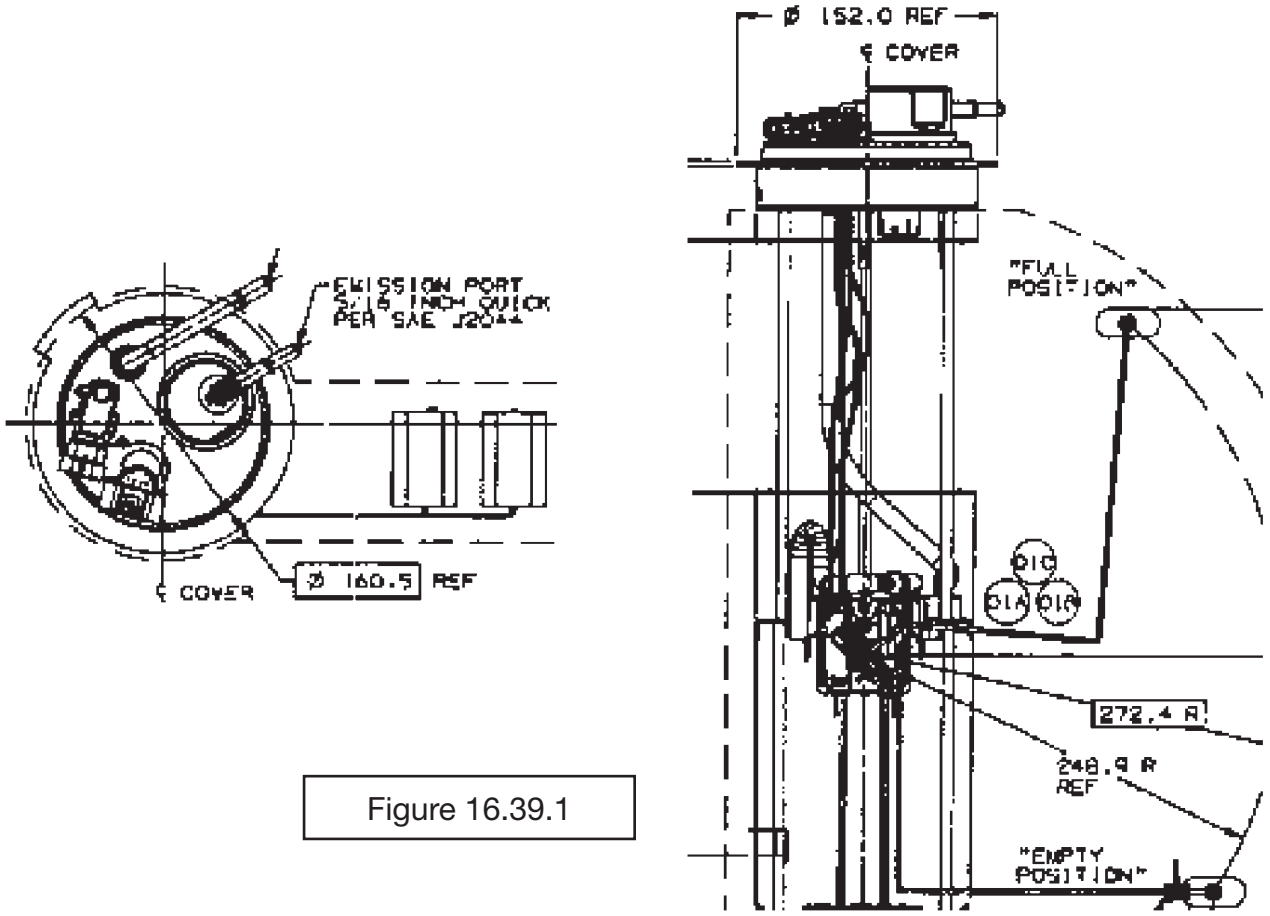
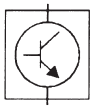
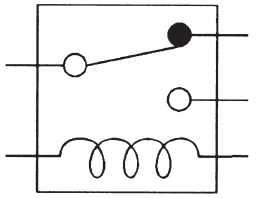
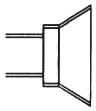
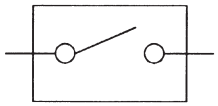
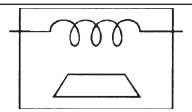
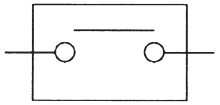
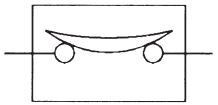
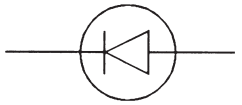
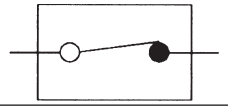
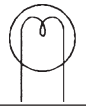
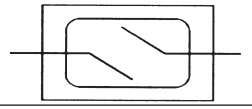
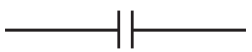
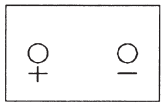
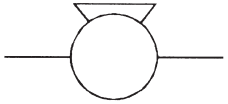
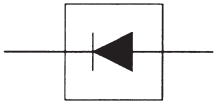
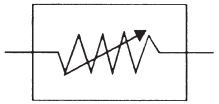
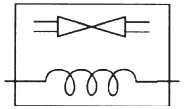


Figure 16.39.1

NPR, NPR-HD, NPR-XD,NQR, NRR 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

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 recirculation	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		

Figure 17.2.1

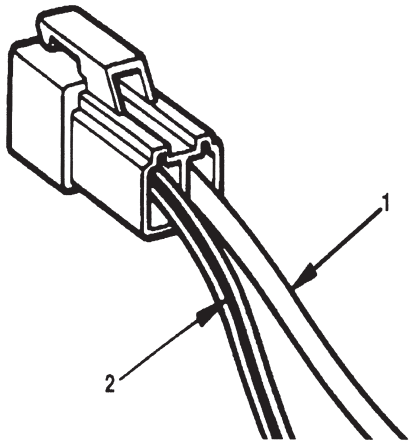
Wiring

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

- R — Red (Stripe Color)
- G — Green (Base Color)
- 0.5 — Wire Size (0.5 mm^2)



1. Single Color Wire
2. Colored Stripe Wire

Figure 17.3.1

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		

Figure 17.4.1

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

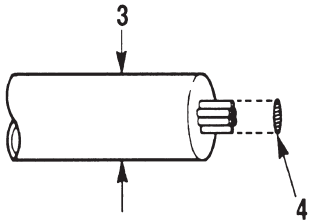


Figure 17.4.2

Nominal Size	Cross Sectional Area (mm^2)	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

Figure 17.5.1

Alternator Pulley Ratio NPR Diesel Engine
2.308 : 1 alternator pulley to crankshaft pulley

NPR-HD NQR NRR Diesel Engine
2.662 : 1 alternator pulley to crankshaft pulley

Additional information including complete chassis wiring schematics, connector locations, wire sizes, and pin connector diagrams can be obtained from our service web site wwww.isuzutruckservice.com. There is a nominal fee for this service.

Electrical Caution: Please see note in Section 1 Introduction on page 1.9 of on the subject of “NO-START CONDITION – CLICKING OR BANGING FROM STARTER 2012-2015MY Isuzu N-Series Equipped with 5.2L (4HK1) Diesel Engines”.

Grounding Point Location

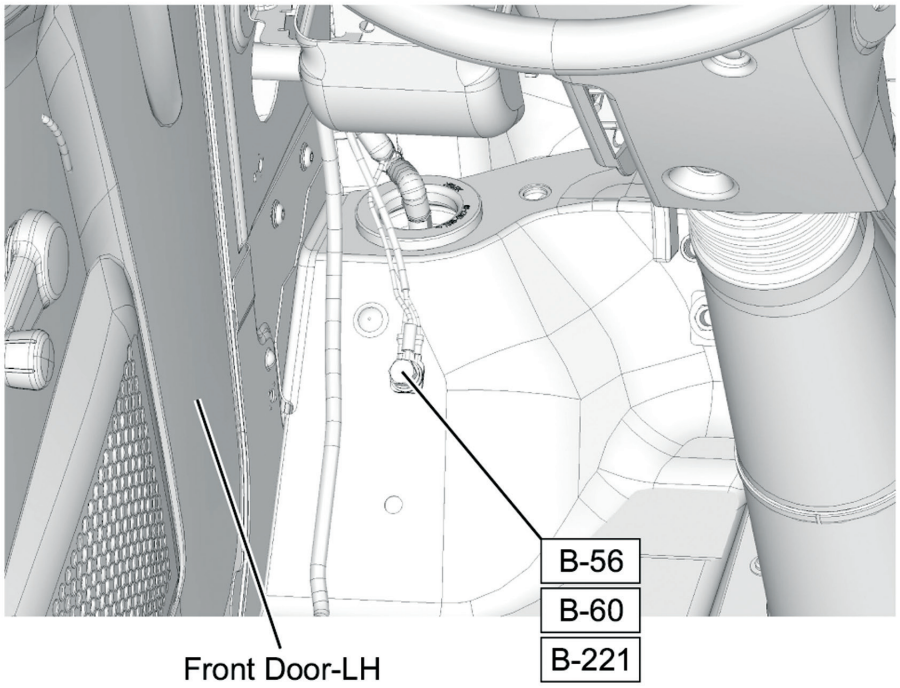
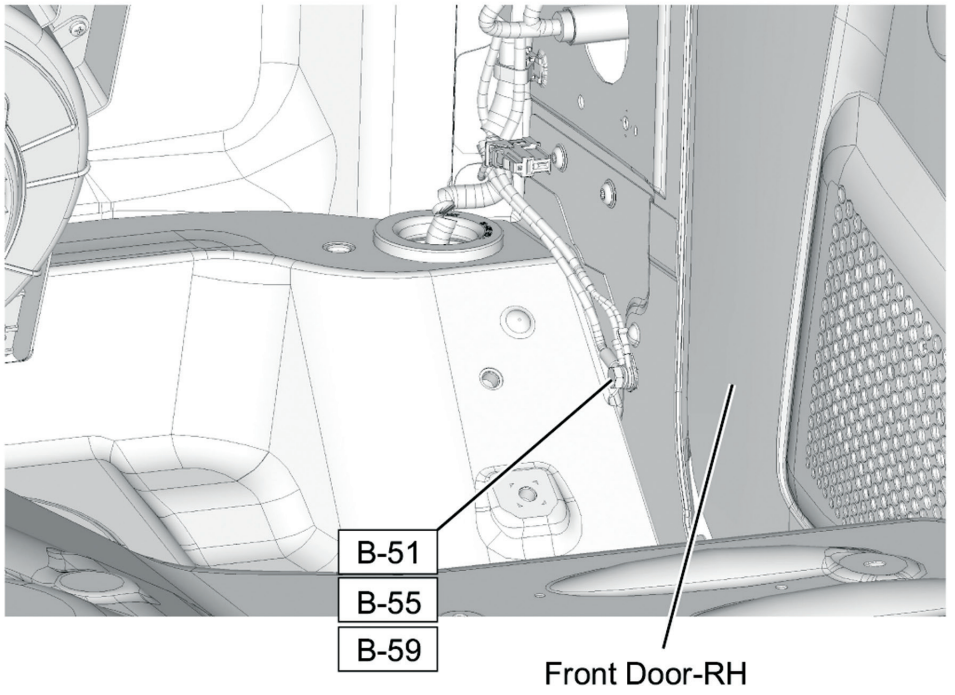


Figure 17.6.1



LNW780SF000501

Figure 17.6.2

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

Grounding Point Location

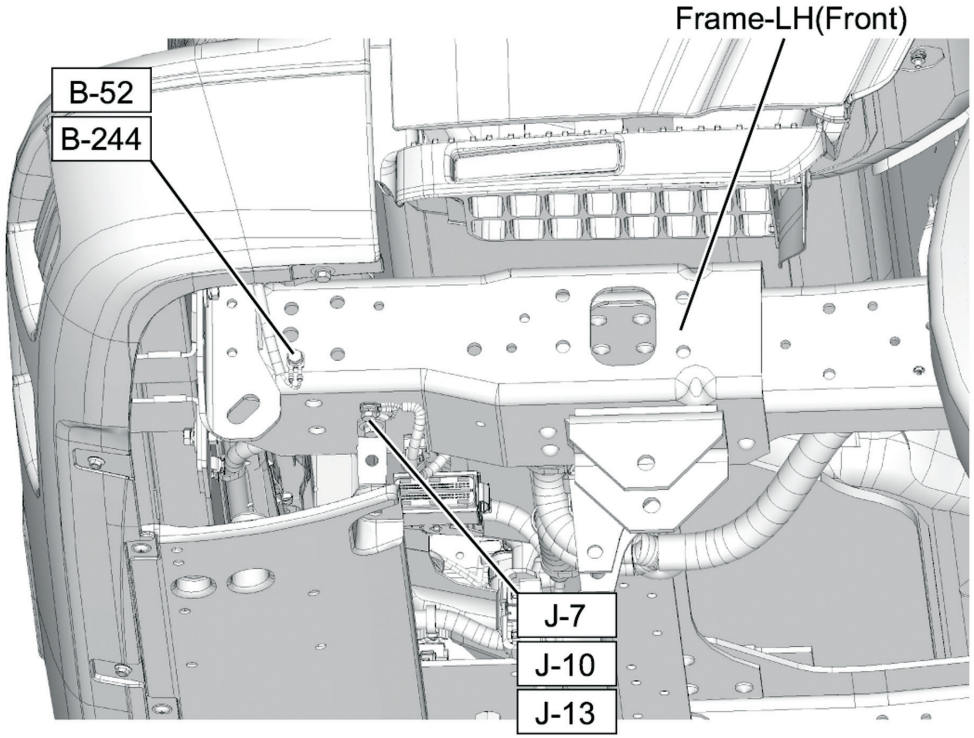


Figure 17.7.1

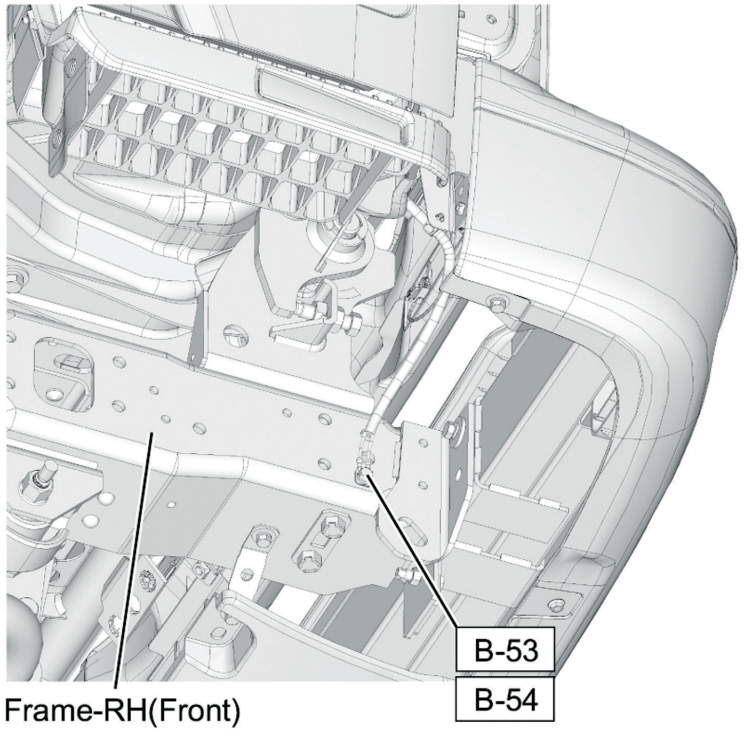


Figure 17.7.2

LNW780SF000601

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

Grounding Point Location

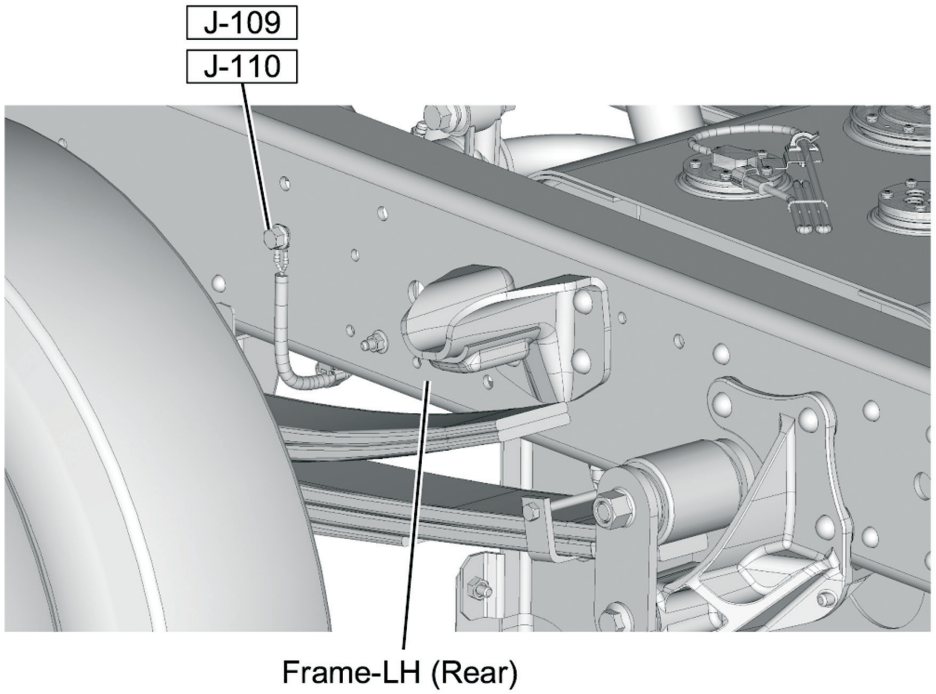
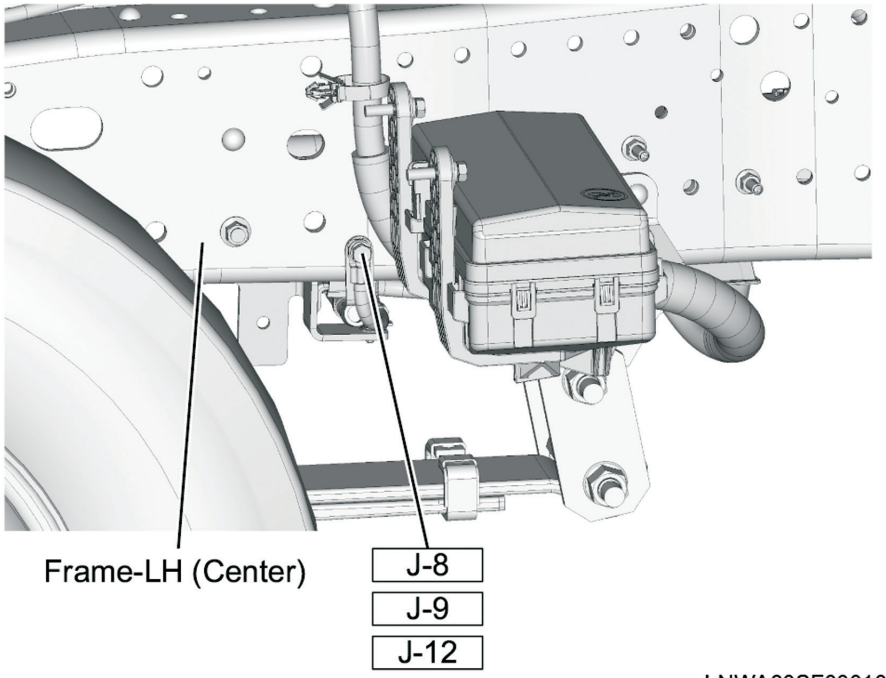


Figure 17.8.1



LNWA80SF000101

Figure 17.8.2

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

Grounding Point Location

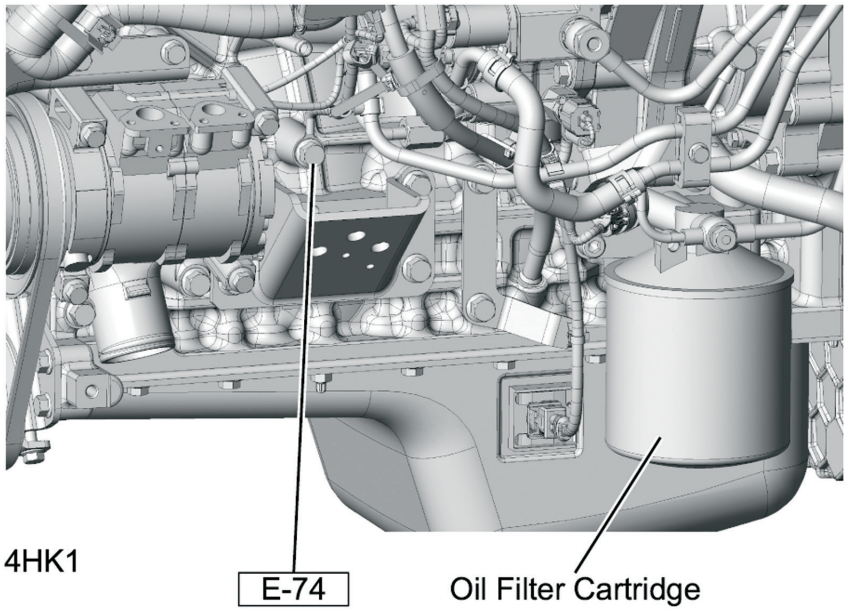


Figure 17.9.1

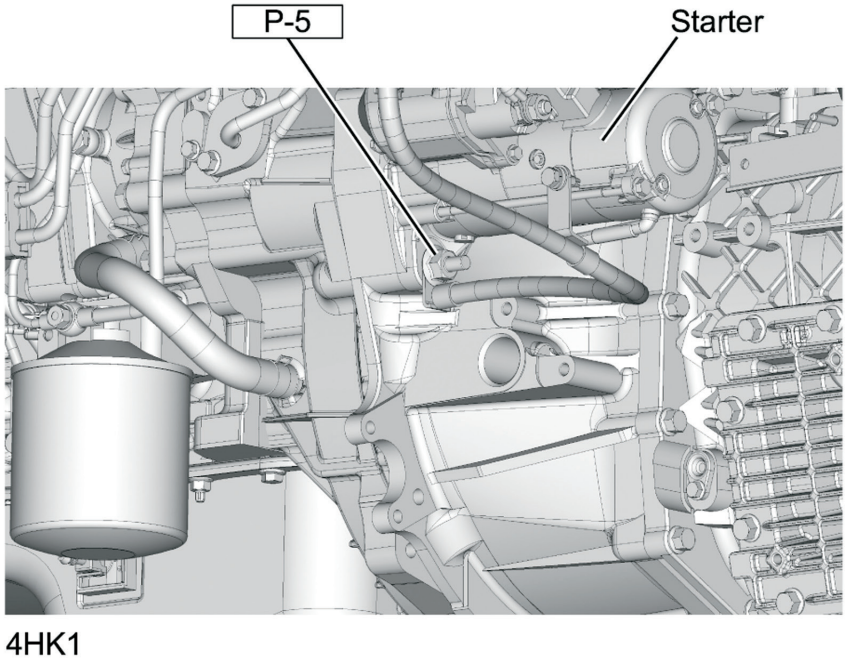


Figure 17.9.2

LNWA80SF000201

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

Rear Body Lamp Switch

Rear Body Dome Lamp Switch is available as a: Port Installed Option **IX2**, *Dealer Installed Option, and Body Company Installed Option.*

Rear Body Dome Lamp Switch
Part Number 8-98011-708-2



Figure 17.10.1

Installation Procedure

PREPARATION

• Inspect and ensure all components are free from defects or damages.

PROCEDURE

1) Remove dash cover. **(Figure 1)**

2) Remove top filler plug from left side dash area. **(Figure 2)**

3) Insert - Rear Dome Lamp Switch in top hole. **(Figure 3)**

4) Attach black connector to switch. **(Figure 4)**

5) Ensure light illuminates when pressed. Depress to turn “OFF”. **(Figure 5)**

6) Re-install dash panel. **(Figure 6)**

7) Ensure that no scratches or damage have been made to dash panel.

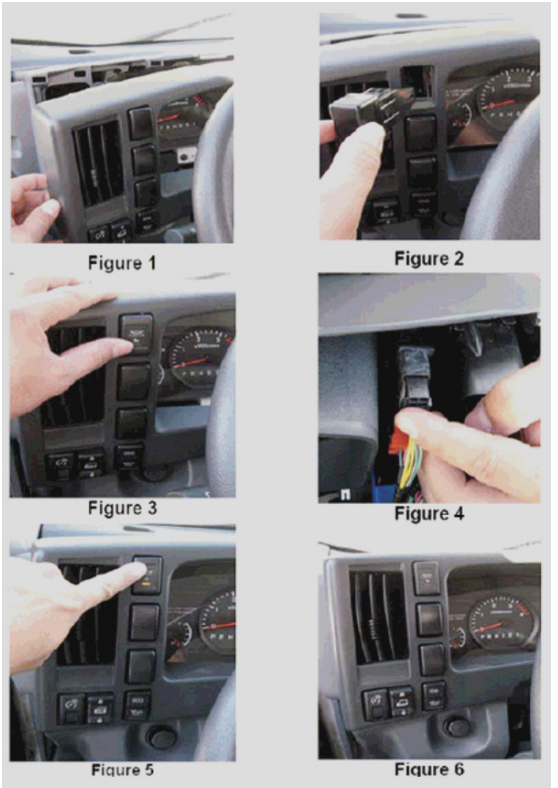


Figure 1 Figure 2 Figure 3 Figure 4 Figure 5 Figure 6

NPR HD, NQR, NRR Body Room Light, I.D. and Marker Lamp, Connector Location and Circuit Diagram (continued)

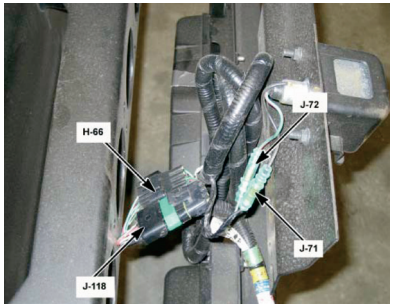
J-118 Rear Manufacture Connenctor-Connector End View			
			
Connector Part Information	· 12010974 · 4-WAY M (BLK)		
Pin	**Wire Color**	**Circuit Number**	**Function**
A	LT GRN/ BLK	BA48	Marker Light Voltage
B	RED	IA17	Power Source Voltage
C	WHT/BLK	IA28	Dome Light Voltage
D	BLK	IX13	Ground

Figure 17.11.1

Center Rear of the Last Crossmember

Packard Body Pulg 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

Figure 17.11.2

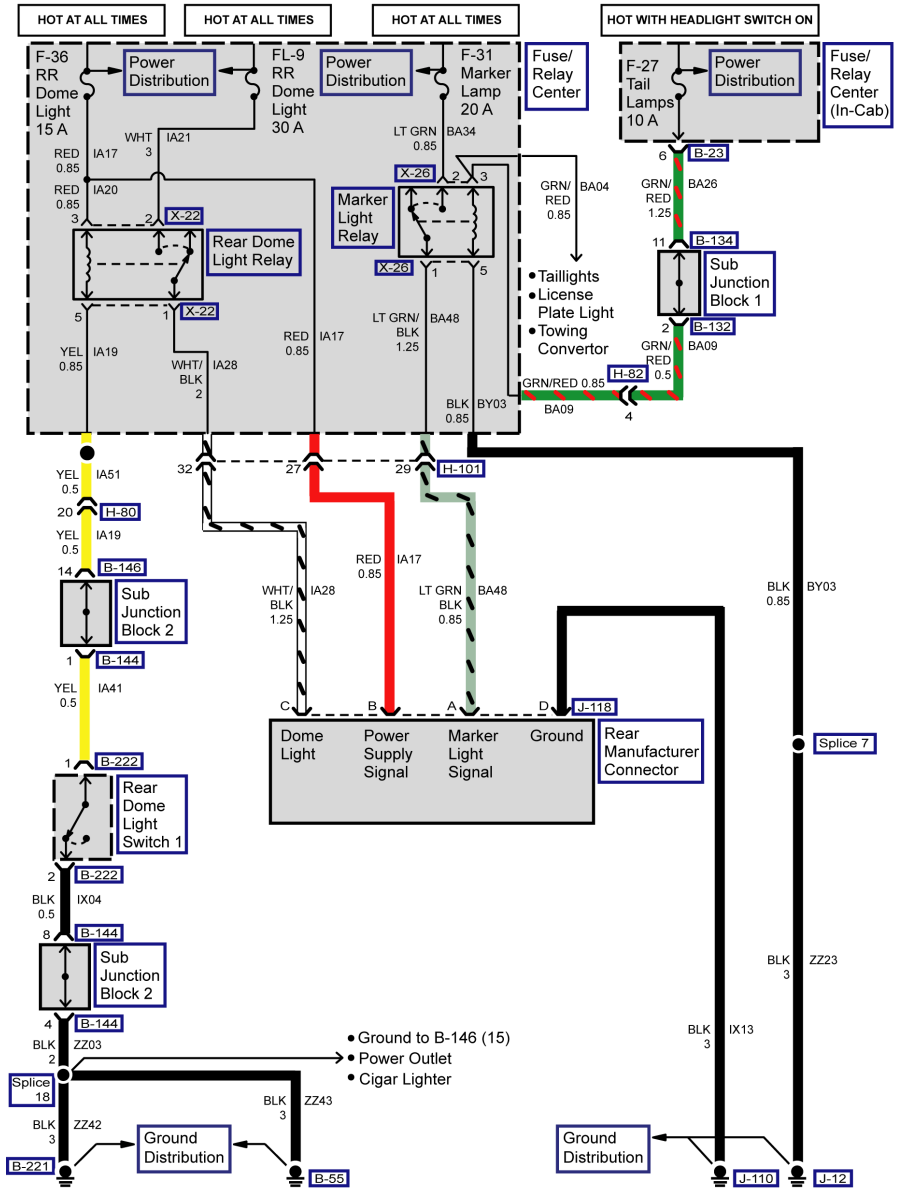
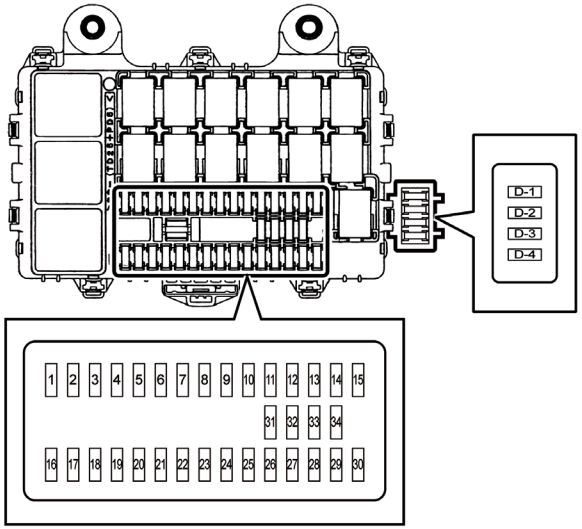


Figure 17.11.3

Fuse Location (interior)



No.	Description	Rating
1	RR P / WINDOW GLACE ÉLECT. AR.	25A
2	—	—
3	ROOM LAMP, AUDIO PLAFONNIER, AUDIO	10A
4	DOOR LOCK SERRURE DE PORTE	15A
5	TRAILER BRAKE FREIN DE REMORQUE	15A
6	P/ WINDOW GLACE ÉLECTRIQUE	25A
7	ABS ABS	10A
8	WIPER ESSUIE-GLACE	25A

No.	Description	Rating
9	H / LAMP LO (LH) PHARE BAS (GAUCHE)	10A
10	LAMPS (BATT) LAMPES (BATT)	10A
11	H / LAMP LO (RH) PHARE BAS (DROIT)	10A
12	BRAKE LAMPS LAMPES DE FREIN	10A
13	STARTER DEMARREUR	10A
14	H / LAMP HI (LH) PHARE HAUT (GAUCHE)	10A
15	H / LAMP HI (RH) PHARE HAUT (DROIT)	10A
16	MIRROR HEATER CHAUFFAGE MIROIR	15A

Figure 17.12.1

No.	Description	Rating
17	IGNITION2 ALLUMAGE 2	10A
18	IGNITION1 ALLUMAGE 1	10A
19	—	—
20	ECM MOD. COMM. ÉLECTRIQUE	10A
21	METER MÉTRE	10A
22	ECU (BATT) MOD. COMM. ÉLECTRONIQUE	10A
23	MIRROR MIROIR	10A
24	AUDIO, ACC AUDIO, ACC	15A
25	HORN KLAXON	15A
26	TURN, HAZARD CLIGNOTANTS, DETRESSE	15A
27	TAIL LAMPS FEUX ARRIÉRE	10A

No.	Description	Rating
28	ILLUMINATIONS ÉCLAIRAGE	10A
29	CORNERING LAMPS LAMPES DE VIRAGE	10A
30	AIR CONDITIONER CLIMATISEUR	10A
31	SPARE PIÉCES DE RECHANGE	10A
32	SPARE PIÉCES DE RECHANGE	15A
33	SPARE PIÉCES DE RECHANGE	25A
34	SPARE PIÉCES DE RECHANGE	20A
D-1	CIGAR ALLUME-CIGARE	20A
D-2	ACCESSORIES SOCKET PRISE POUE ACCESSOIRES	15A
D-3	POWER SOURCE ALIMANTATION ÉLECTRIQUE	20A
D-4	—	—

Figure 17.12.2

Relay Location (interior)

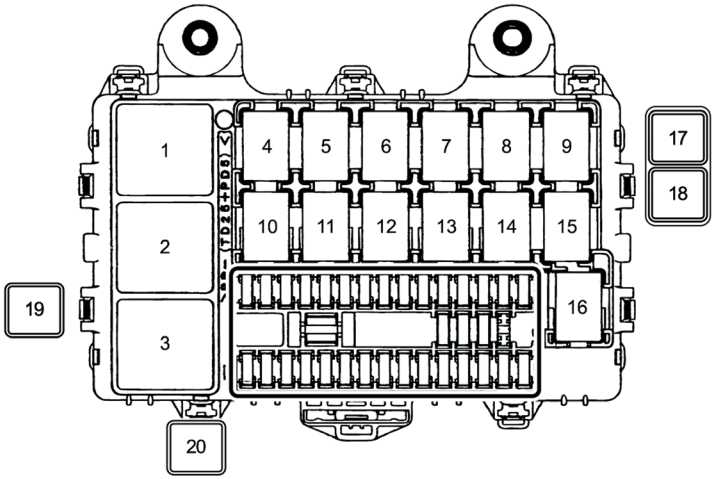


Figure 17.13.1

No.	Description
1	STOP LAMP
2	DAY TIME RUNNING LAMP
3	KEY ON
4	TCM (A/T models)
5	PARKING/NEUTRAL
6	WIPER MAIN
7	HORN
8	WIPER HI LO
9	TRAILER BRAKE
10	POWER WINDOW

No.	Description
11	CHARGE (ENG RUN)
12	POWER WINDOW
13	HEAD LAMP LO
14	VACUUM PUMP
15	HEAD LAMP HI
16	TAIL LAMP
17	CORNERING LAMP
18	CIGAR LIGHTER
19	POWER ACC
20	BLOWER MOTOR

Figure 17.13.2

Relay and Fuse Locations (exterior)

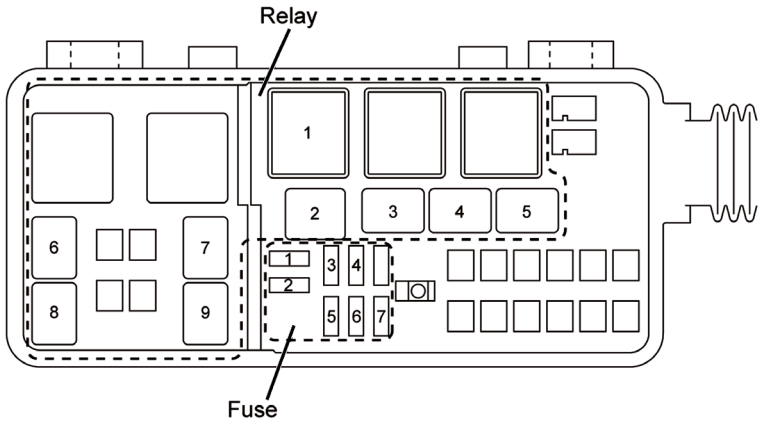


Figure 17.14.1

No.	Relay name
1	STARTER
2	A/C COMPRESSOR
3	CONDENSER FAN
4	RR DOME LAMP
5	SCR WATER VALVE
6	MARKER LAMP
7	EXHAUST BRAKE CUT
8	—
9	ECM (4HK1)
	FUEL HEATER (4JJ1)

No.	Fuse name	Rating
1	MARKER LAMP	20A
2	TAIL MAIN	20A
3	ECM MAIN (4HK1)	10A
	FUEL HEATER (4JJ1)	15A
4	SCR	20A
5	RR DOME LAMP	15A
6	CONDENSER FAN	20A
7	A/C	10A

Figure 17.14.2

Headlights Low Beam (AT)

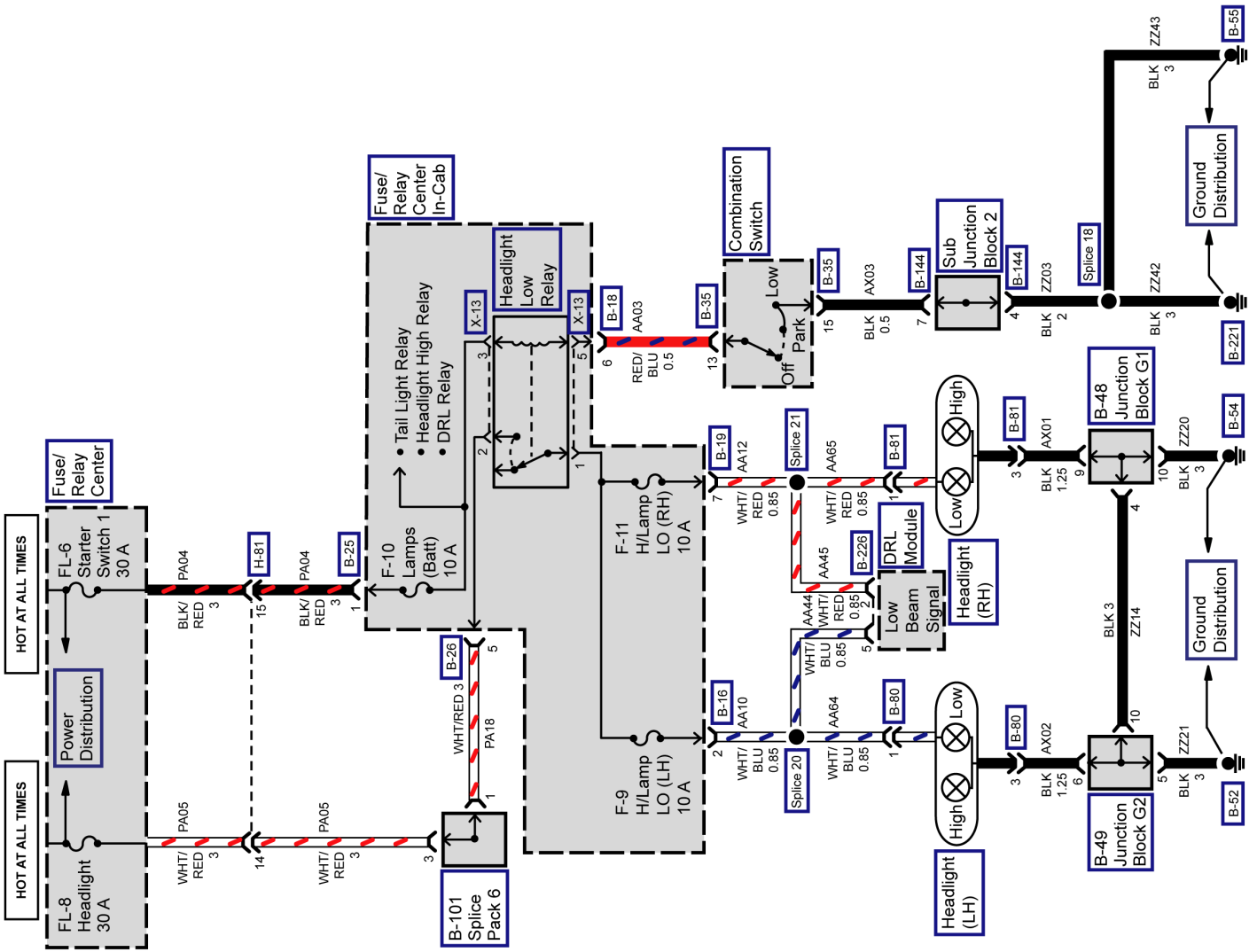


Figure 17.15.1

Headlights High Beam (AT)

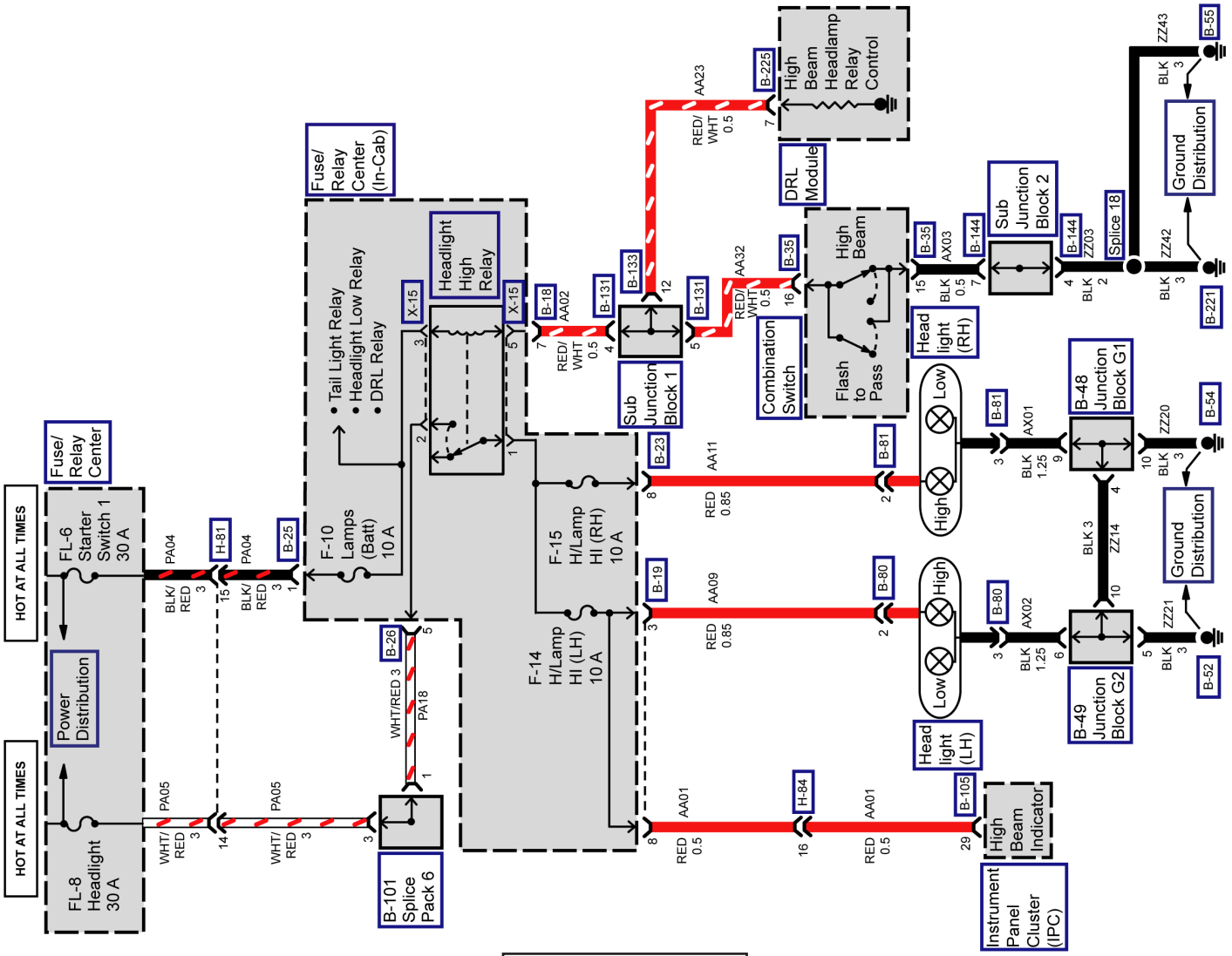


Figure 17.16.1

Tail lights (AT)

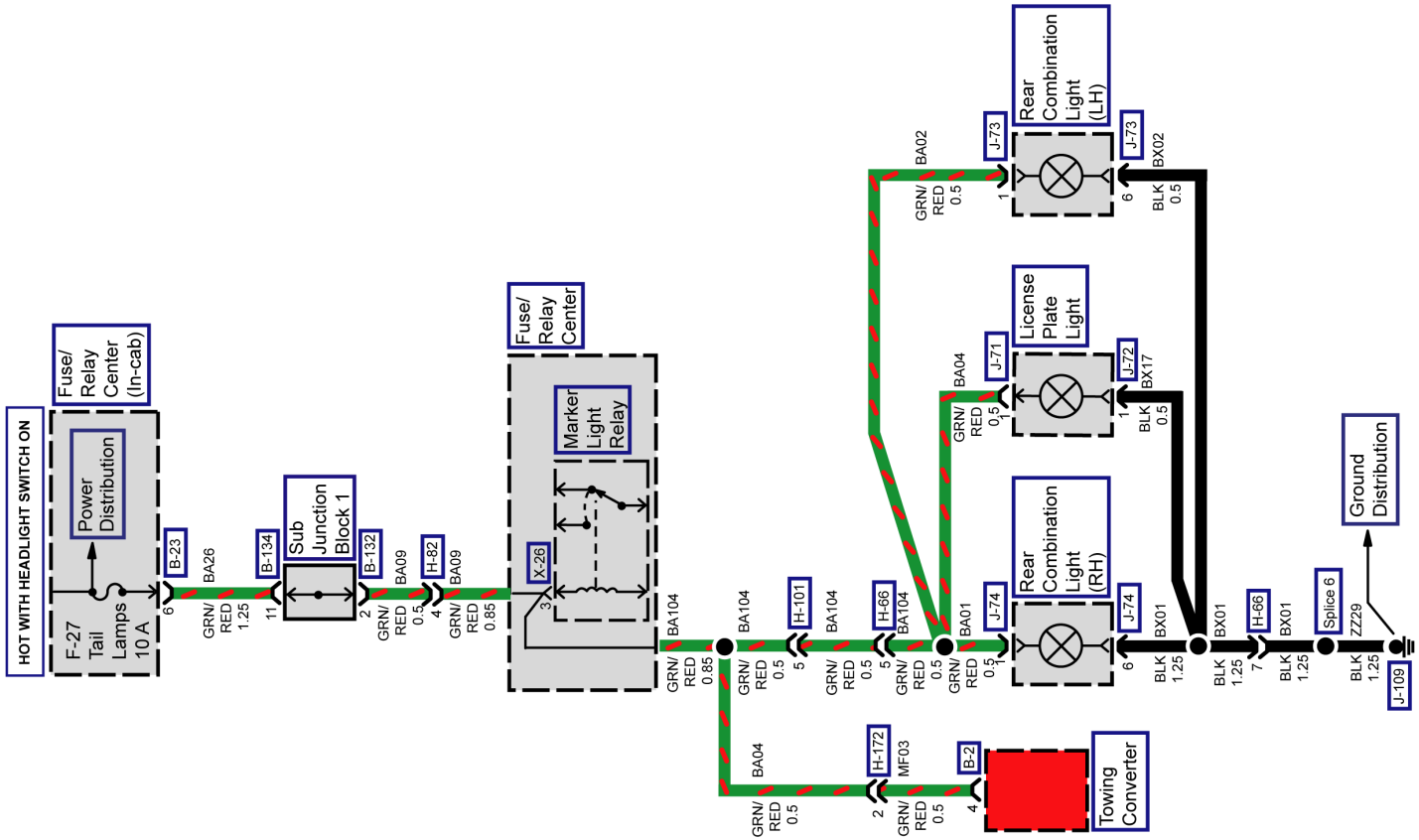


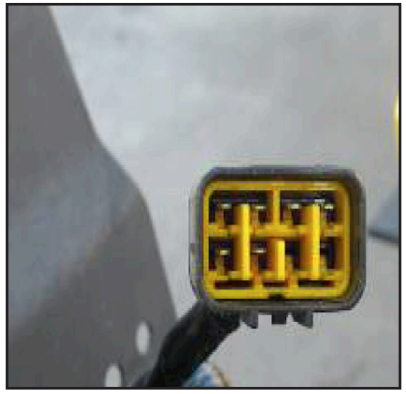
Figure 17.17.1

Figure 17.17.2

The connectors that match the end of frame tail and stop lamp harness can now be ordered through Isuzu dealers.



Chassis harness side
part number **897364-5300**



Stop and tail lamp side
part number **897364-5310**

Figure 17.17.3

Roof Marker Lights (AT)

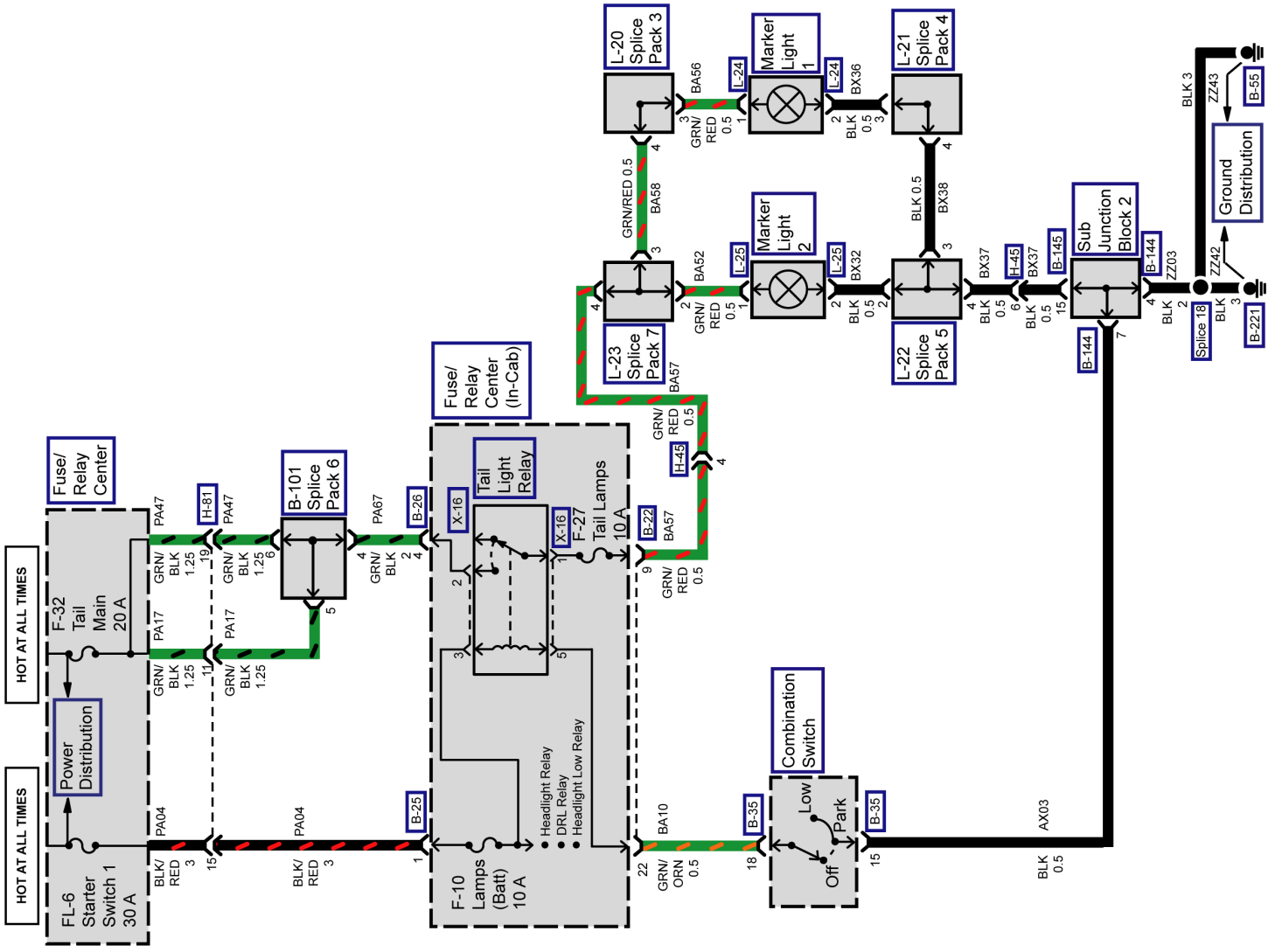


Figure 17.18.1

Roof Clearance Lights (AT)

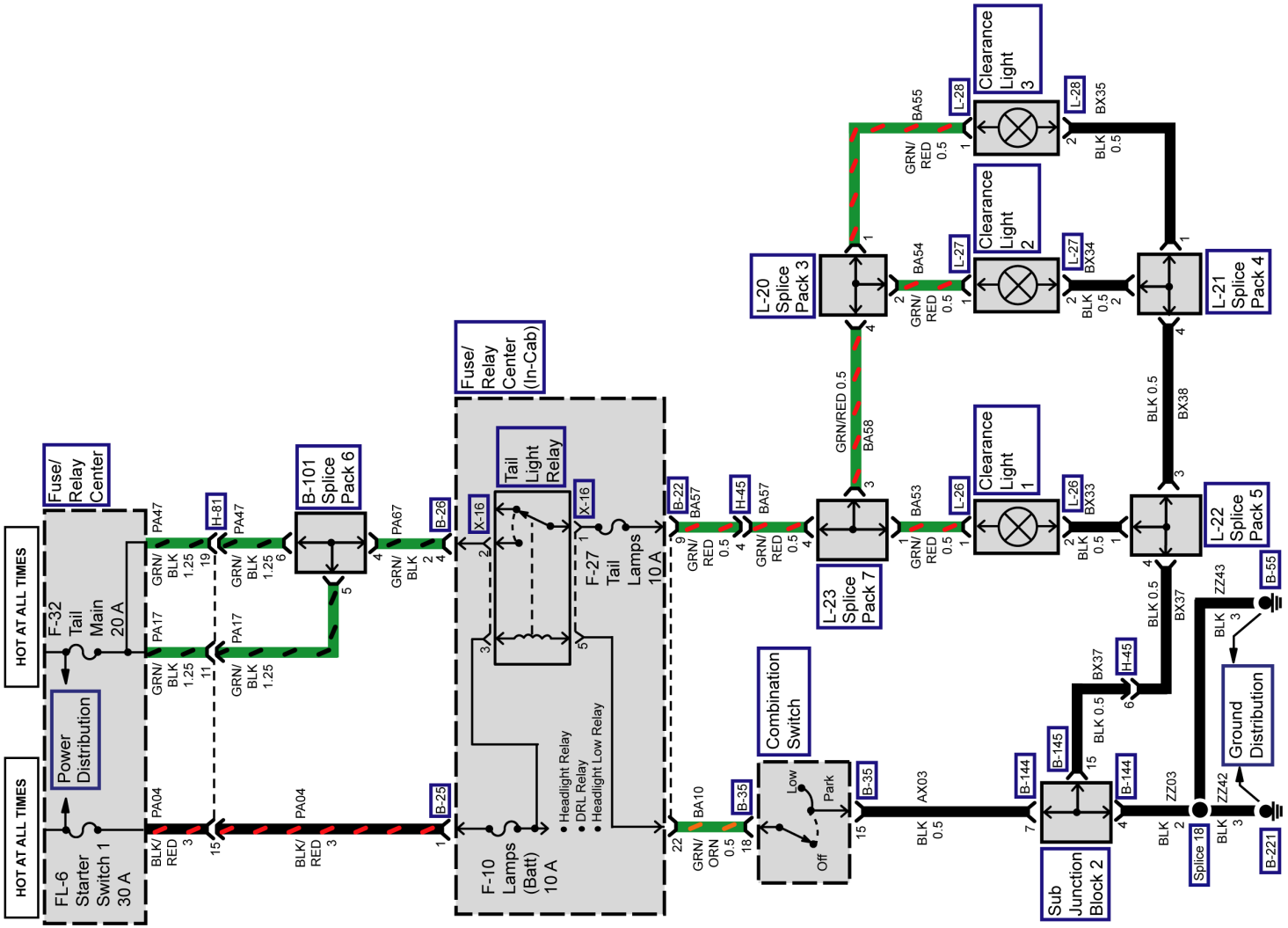


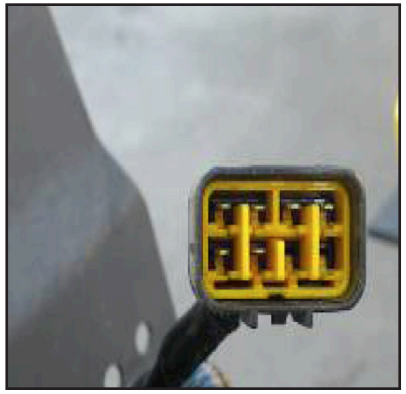
Figure 17.19.1

Figure 17.20.1

The connectors that match the end of frame tail and stop lamp harness can now be ordered through Isuzu dealers.



Chassis harness side
part number **897364-5300**



Stop and tail lamp side
part number **897364-5310**

Figure 17.20.2

Rear Turn Signal Lights (AT)

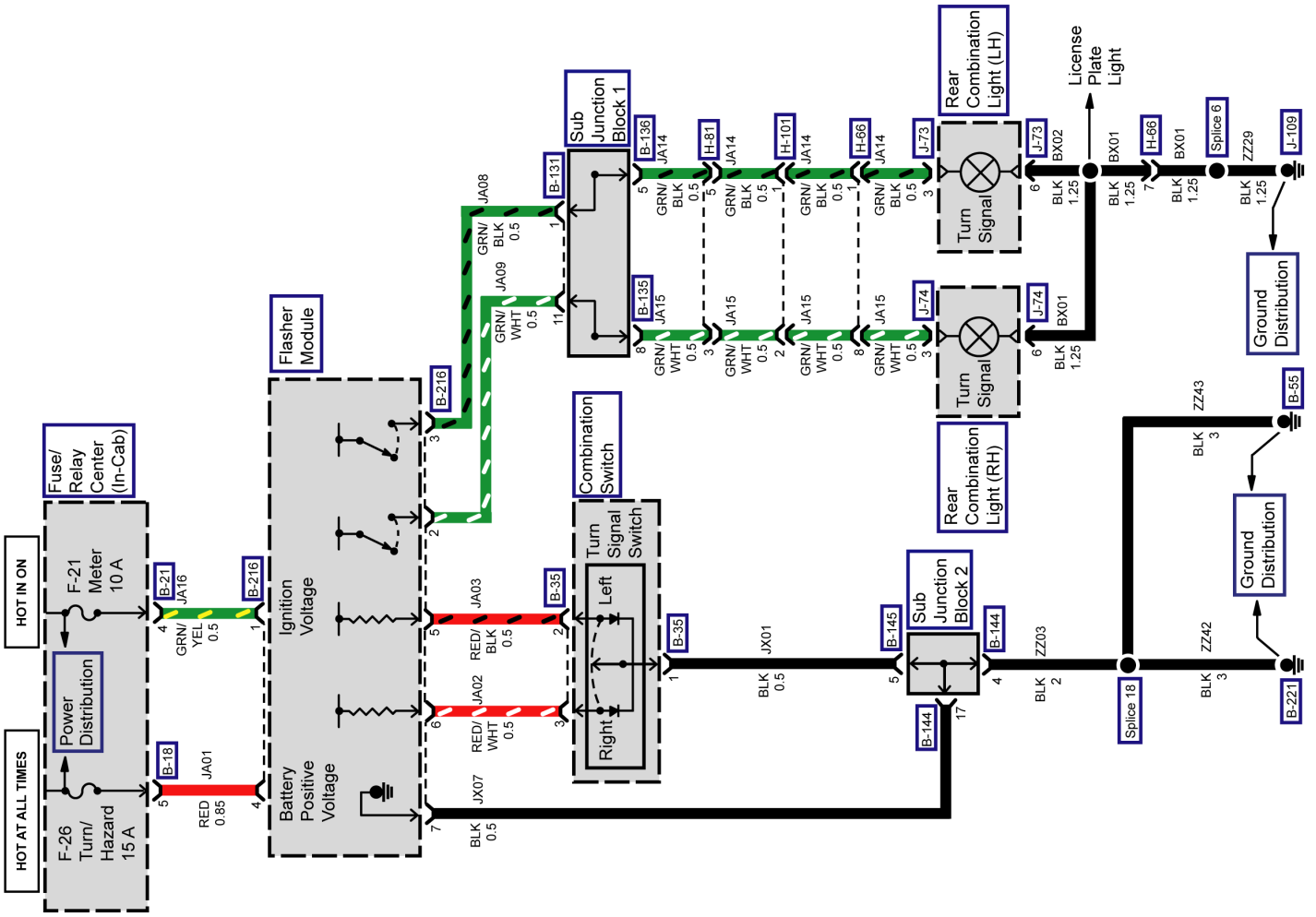


Figure 17.20.3

Back Up Light Circuit (AT)

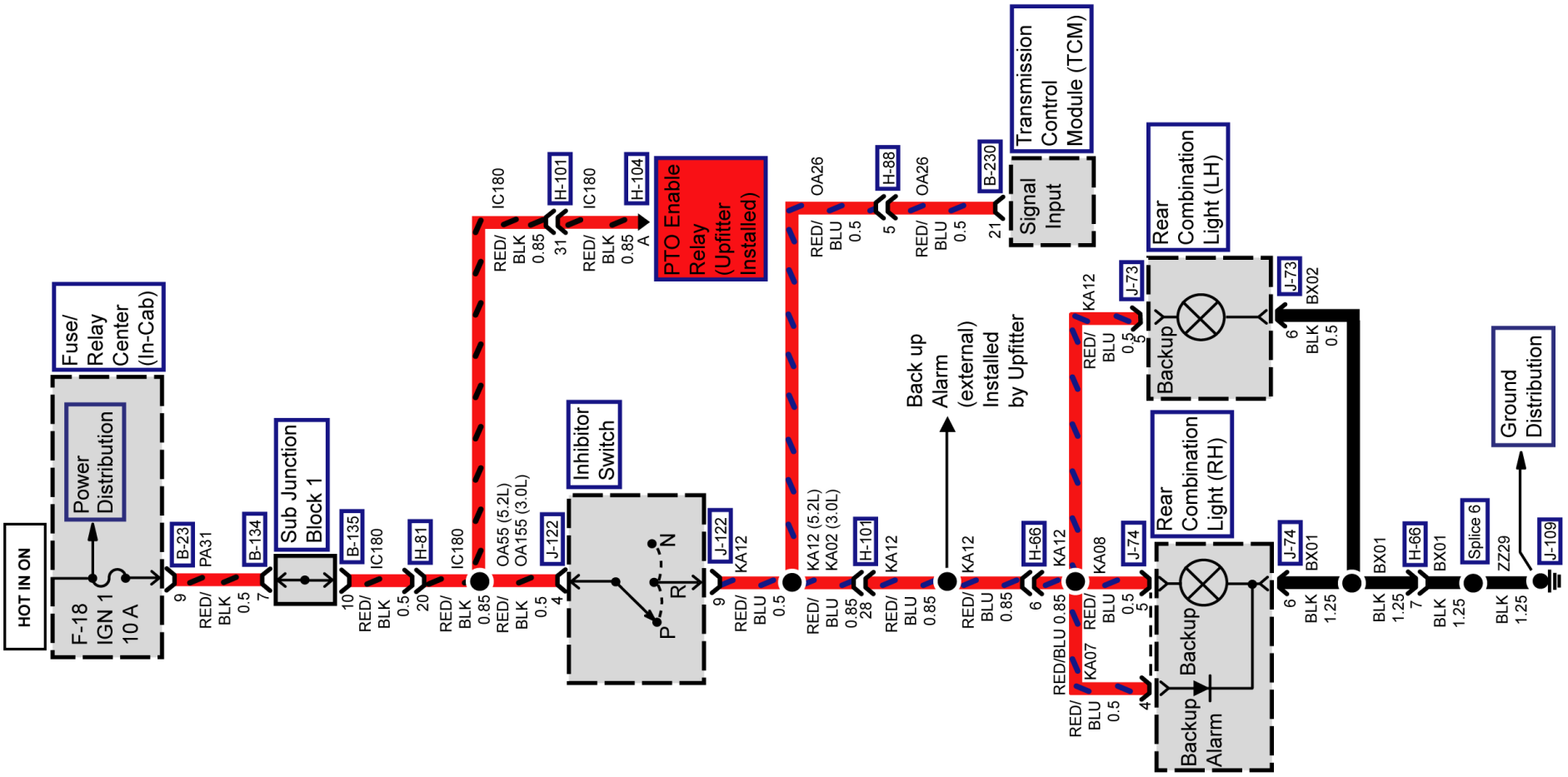
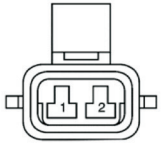


Figure 17.21.1

Back up Alarm Circuit (AT)

J-111 Backup Alarm Connector End View			
			
Connector Part Information			
Pin	**Wire Color**	**Circuit Color**	**Function**
1	RED/BLU	KA23	Back Up Alarm Supply Voltage
2	BLK	KX01	Ground

Left Inner Frame Rail, Behind the Last Crossmember

Figure 17.22.1

Chassis Side Connector	
Housings	153000002
Terminal	12124977
Seal	12015899
TPA	15300014
Matching Plug	
PED ASM	15300027

Figure 17.22.2

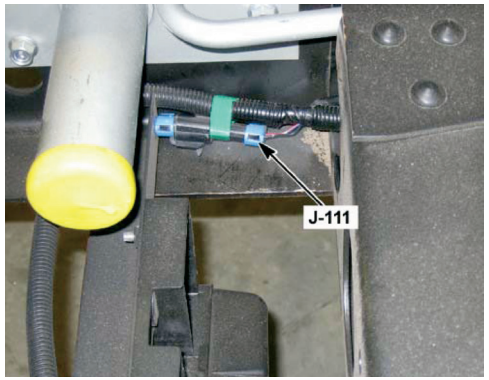


Figure 17.22.4

Back Up Alarm Connector	
Housings	15300027
Terminal	12084201
Seal	12015323
TPA	15300014

Figure 17.22.3

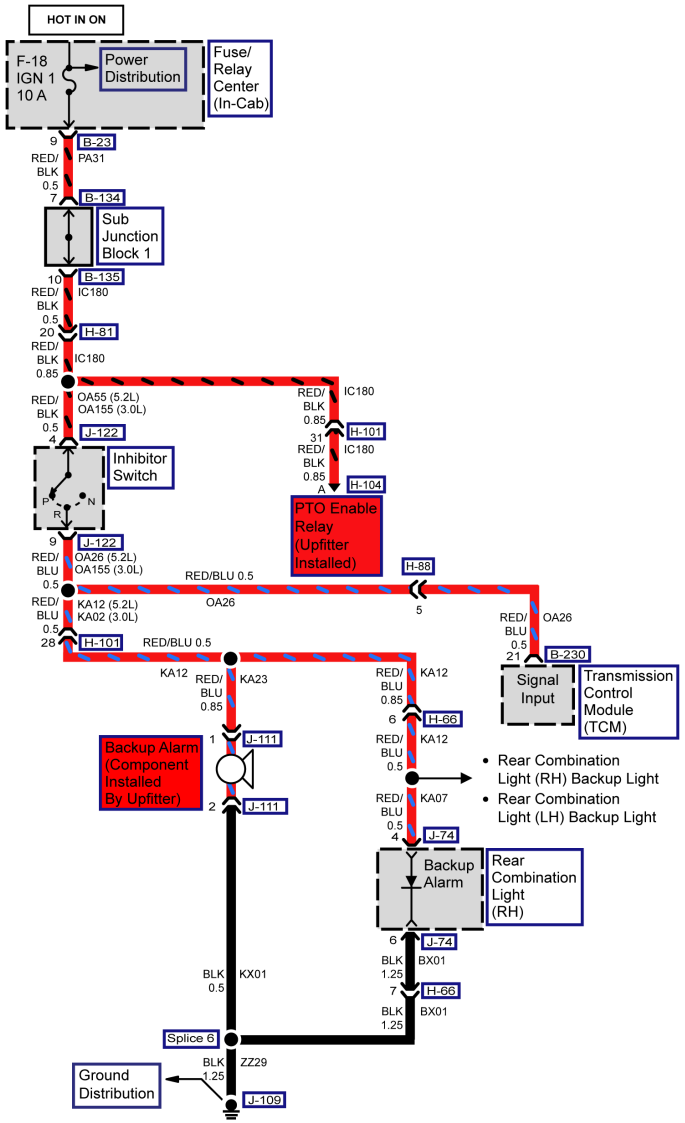


Figure 17.22.5

Cigar Lighter Circuit (A/T)

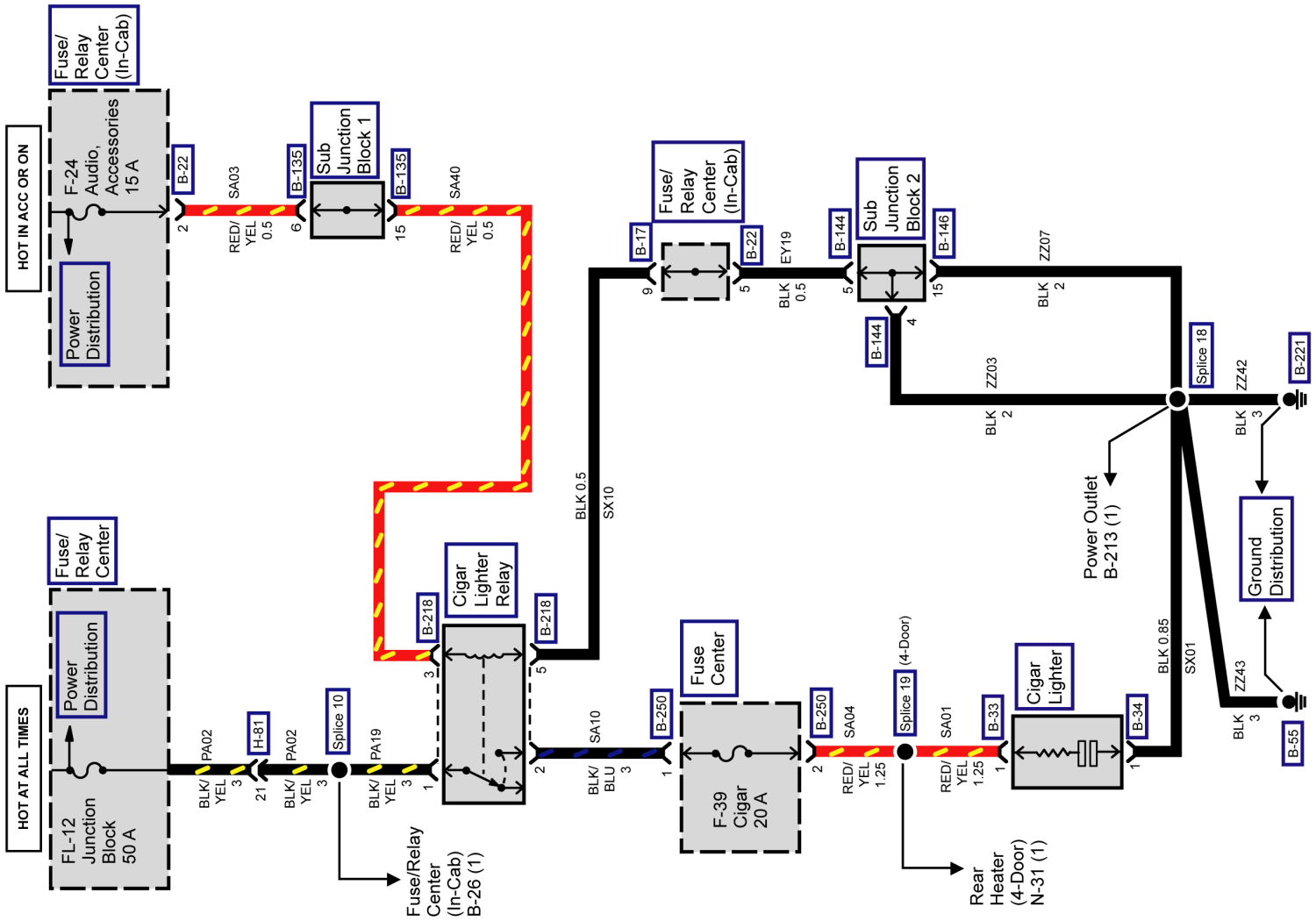


Figure 17.23.1

Radio Circuits

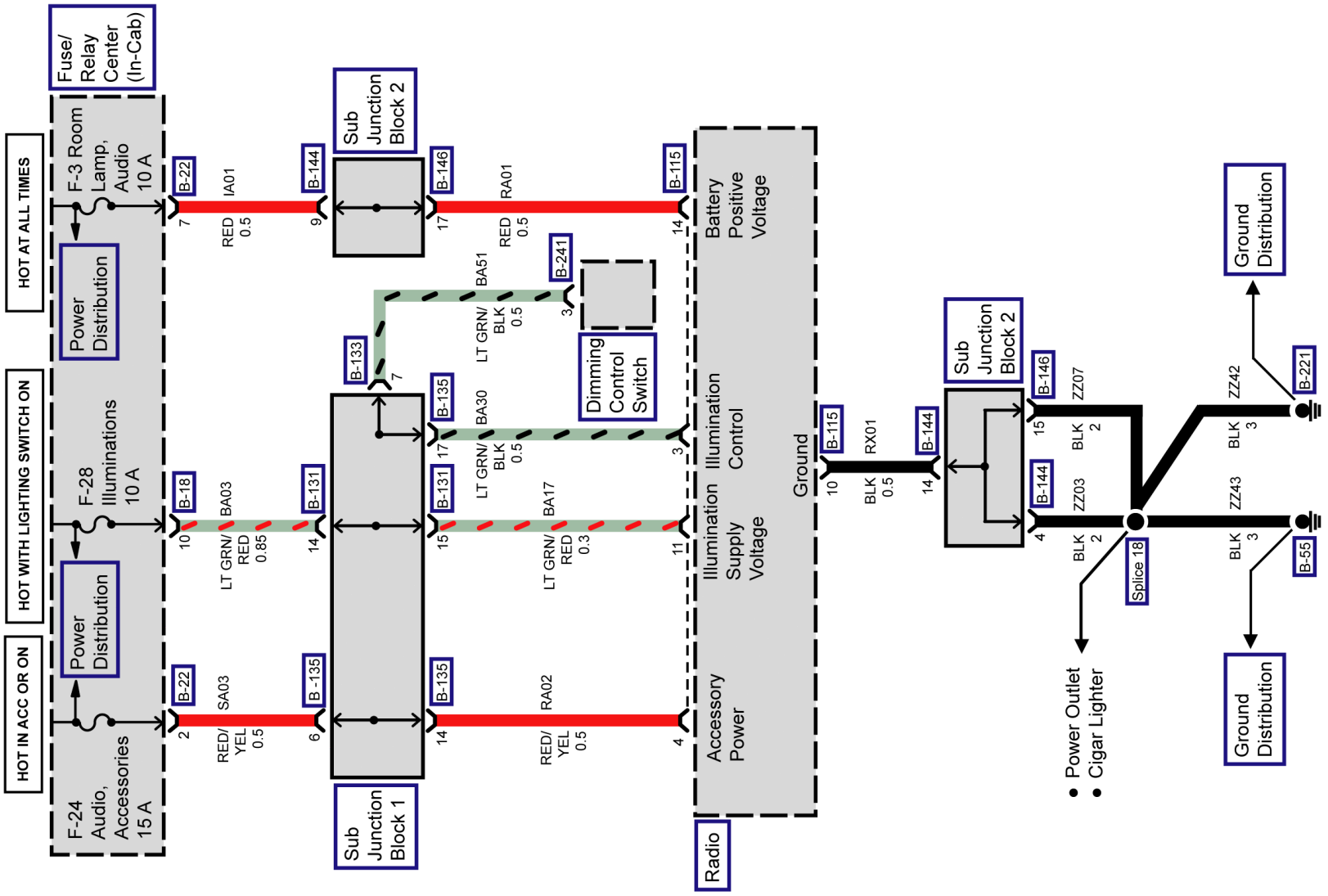


Figure 17.24.1

Auxiliary Power Source Circuit Diagram

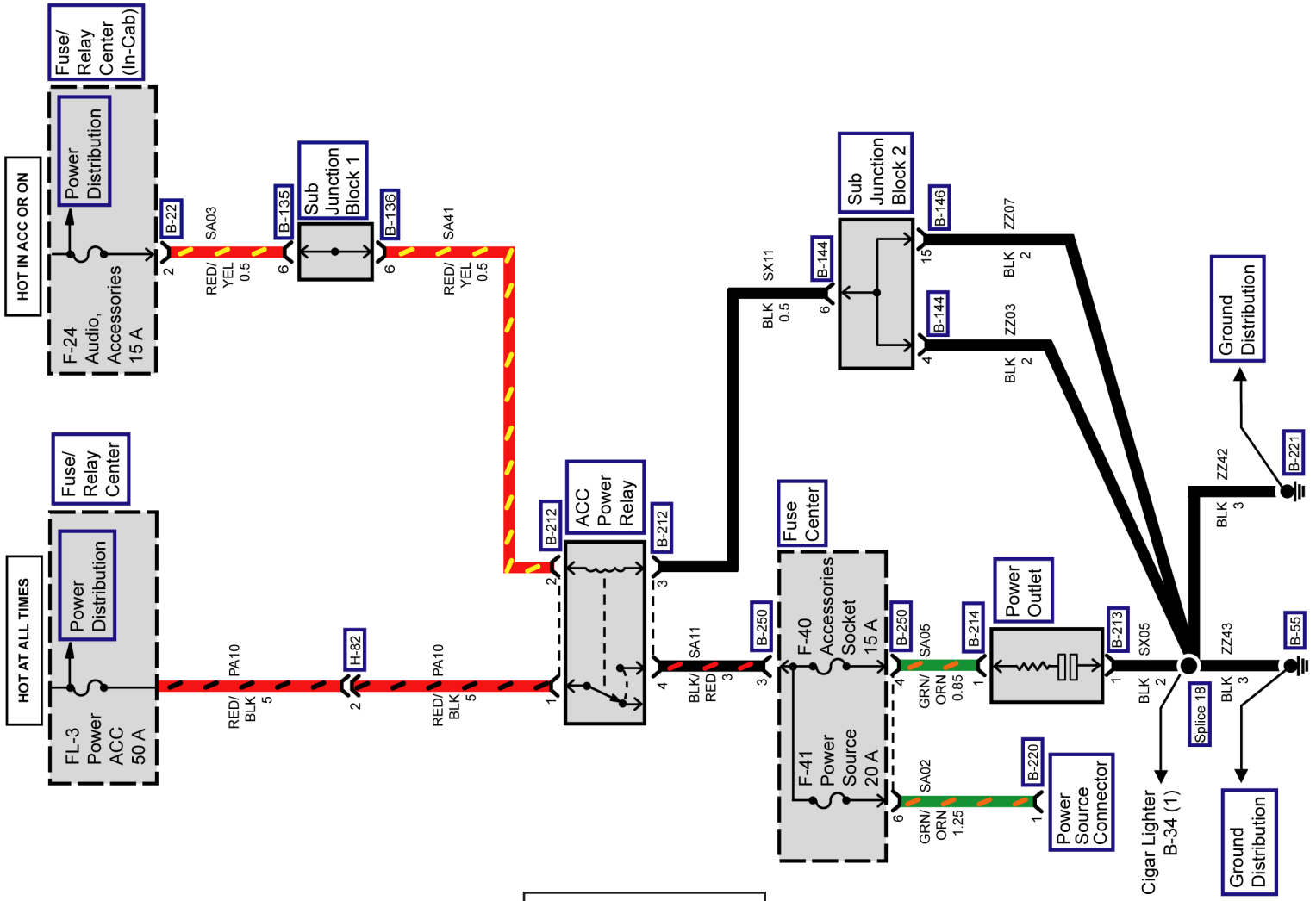


Figure 17.25.1

Trailer Connector Circuit Diagram

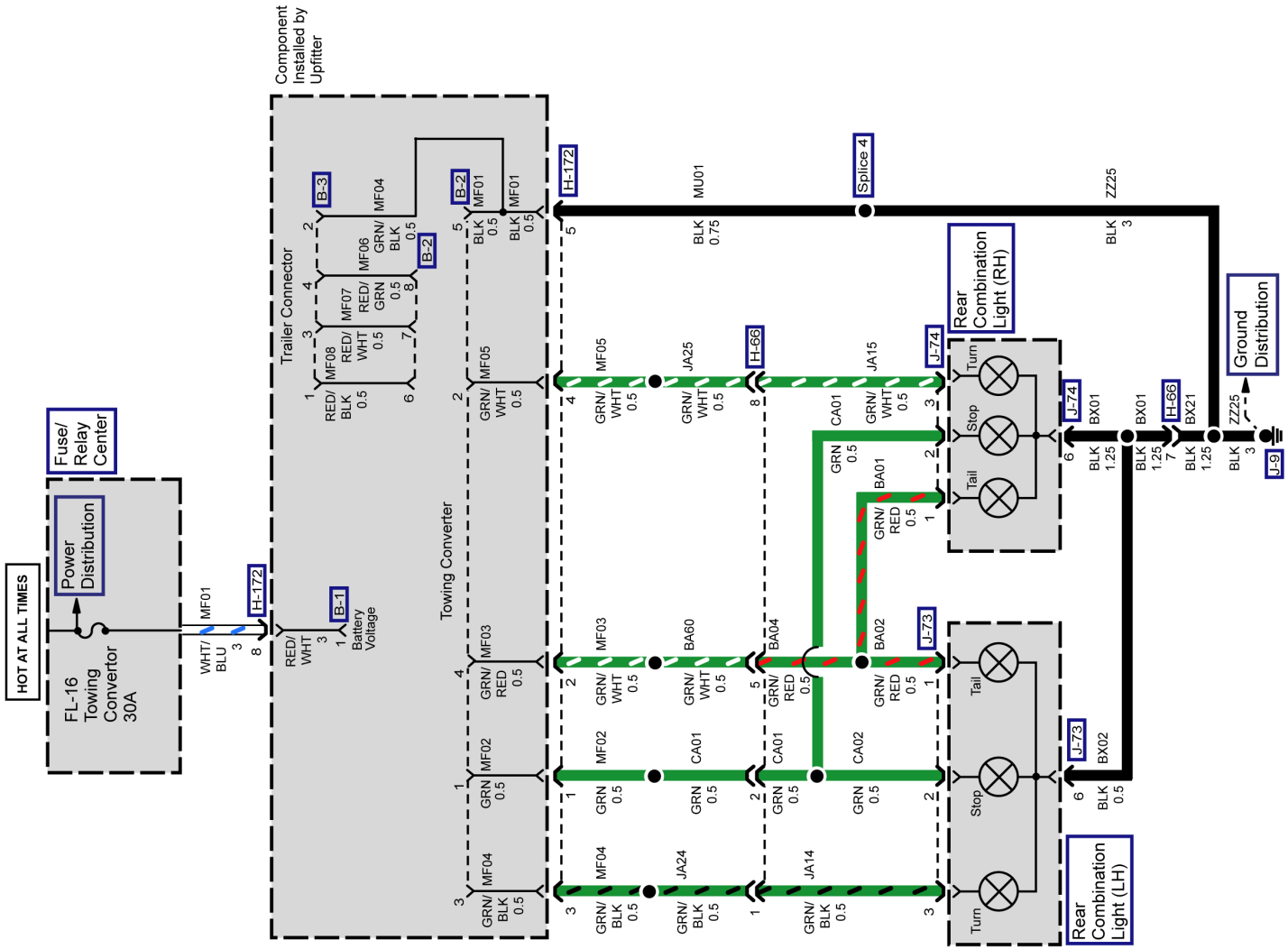


Figure 17.26.1

Trailer Brake Circuit Diagram

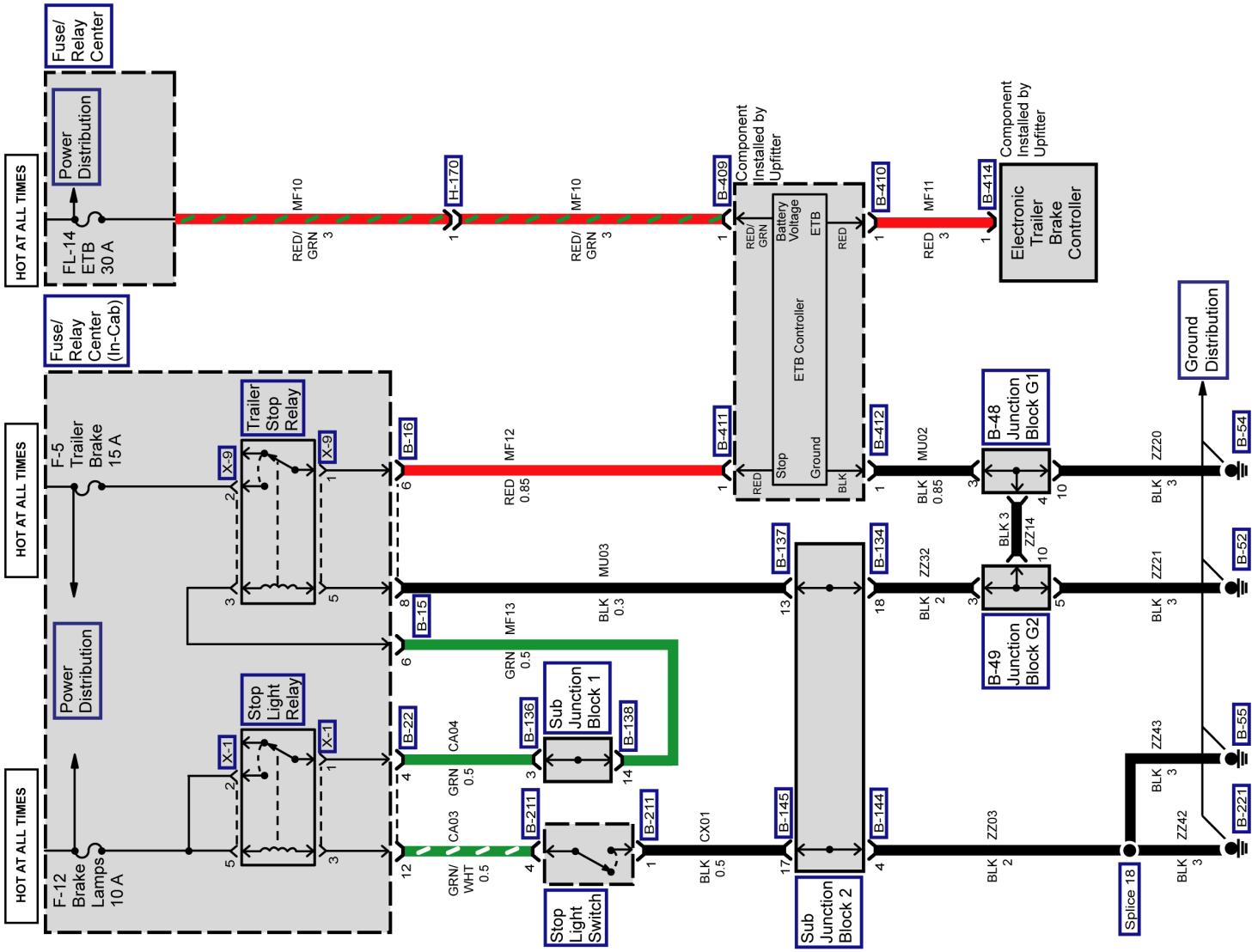


Figure 17.27.1

Model Year N-Diesel Trailer Brake Controller Wiring and Activation and Trailer Wiring Connector

Introduction:

Begining with the 2011 Model Year NPR ECO-MAX, NPR-HD, NQR, and NRR feature integrated electronic trailer brake controller wiring and a dedicated chassis wiring
harness for control of trailer stop, turn, and tail lamps. ***Note: the electronic brake controller is not supplied with the vehicle.***

Integrated Electronic Brake Controller Wiring and Activation:

Wires for the electronic trailer brake controller are located behind the radio. To access these wire, remove the radio and DIN pocket from the dash, and pull out the wiring pigtail for the trailer brake controller.

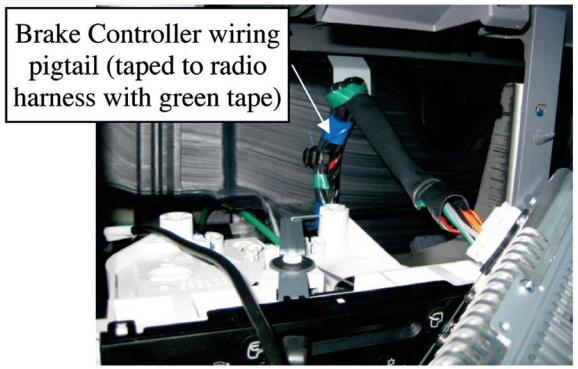


Figure 17.28.1

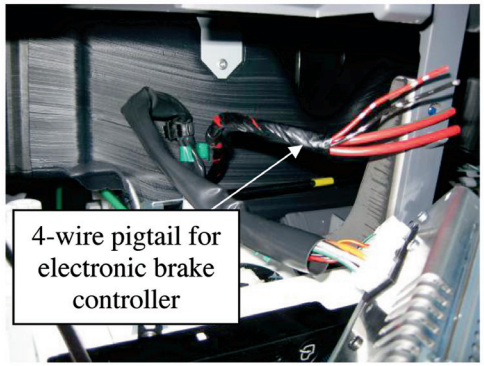


Figure 17.28.2

Wire Chart for the brake controller pigtail:

Wire#	Wire Color	Wire Size (mm^2)	Wire Size (AWG Approx)	Description/Notes
1	Red/Green	3	12	Supply power for brake controller (Fused to battery 20A; continuous max)
2	Red	3	12	Output signal from brake controller (rated max 20A continuous)
3	Red	0.85	18	Brake lamp signal (12V on when brake applied. Activated by relay R-9)
4	Black	0.85	18	Ground (max continuous current 10A)

The brake signal wire (Wire # 3) is activated by installation of a relay in the "R-9" position in the center relay console located in the center of the dash just above floor level.

Figure 17.28.3

The R9 relay (P/N 8-97173-037-1) is not supplied with the vehicle. The relay can be ordered from your Authorized Isuzu Dealer's parts Department.
R-9 relay position:

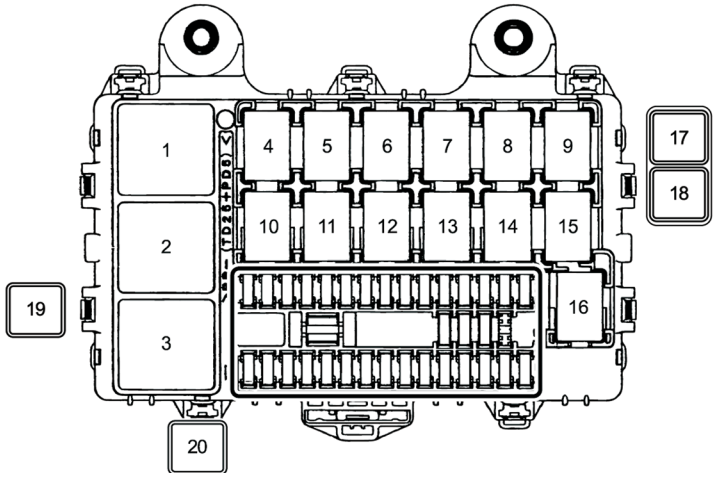


Figure 17.29.1

The power supply for the trailer brake controller (Wire #1) is not energized from the factory.
To power the brake controller, the brake controller harness power supply must be plugged in to the chassis power supply plug.

1) Locate the trailer brake controller power supply harness under the cab, behind the passenger-side head light:

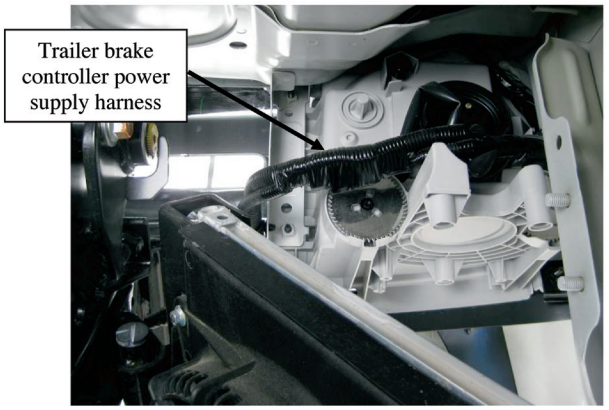


Figure 17.29.2

2) Remove tape to expose the 2 connectors. The Grey connector is used to supply power to the trailer brake controller (Wire #1). This connector plugs in to the chassis trailer brake controller power supply. The Black connector is the output signal wire from the trailer brake controller (Wire #2).

3) Unplug the harness. Connect the Black connector (Wire #2) to an extension wire of suitable length and route the wire to the rear of the vehicle. This wire is the trailer brake controller output signal wire.

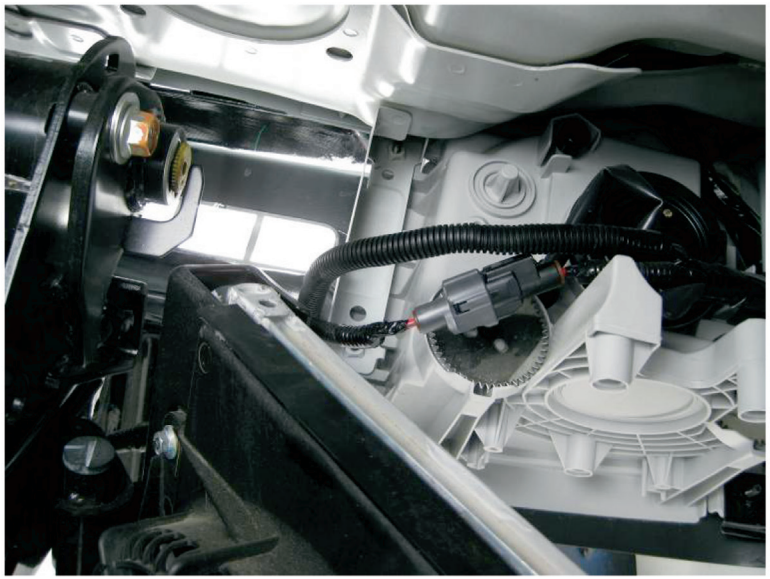


Figure 17.30.1

4) Remove the tape from the wire with the Grey connector (Wire #1) and route this wire underneath of the right hand frame rail.



Figure 17.30.2

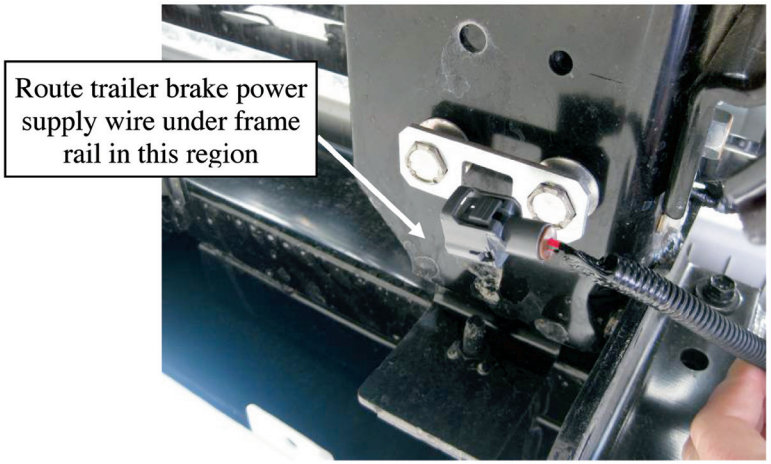


Figure 17.30.3

5) Locate the chassis side power supply harness. This connector is located just inboard of the right hand frame rail, beneath the ABS control module.

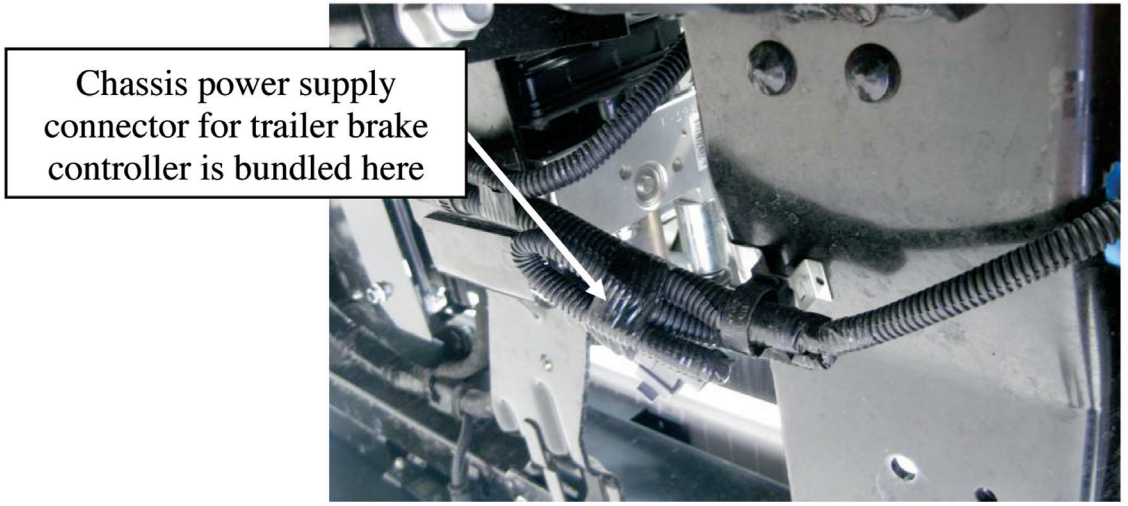


Figure 17.31.1

6) Remove tape and route chassis side power supply wire to brake controller power supply wire:



Figure 17.31.2

7) Remove protective cover, and plug chassis side power supply harness into electronic trailer brake controller power supply connector (Wire #1). Secure harness to chassis with suitable tie strap.



Figure 17.32.1

Trailer Wiring Connector

There is a wiring harness that allows upfitter to control trailer lighting functions without having to splice into the vehicle tail lamp harness. The connector is located on the left hand frame rail (driver's side), to the rear of the transmission cross member. This connector is illustrated on the following page.
The connector wires are the standard 4 wire electrical light system that is used on the chassis (separate stop and turn light).
If the trailer has a 3 wire electrical system (combined stop and turn light) a heavy duty tail light converter box will be necessary for proper trailer light integration.

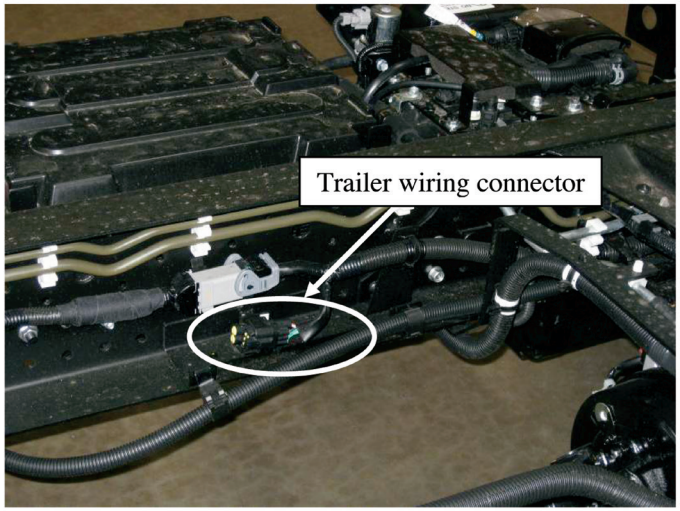
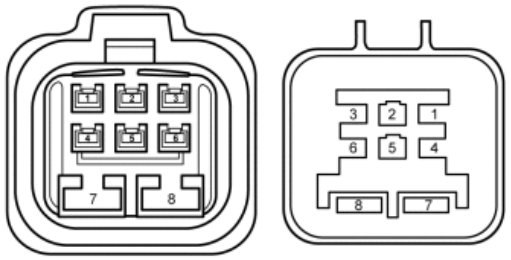


Figure 17.32.2

Trailer Connector diagram:

Connectors and Componets

H-172 Front Chassis Harness to Towing Converter



Connector Part Information		• 8-Way F (BLK • Upfitter Connector		Connector Part Information		• R020054 • 8-Way M (BLK)	
Pin	**Wire Color**	**Circuit No.**	**Function**	**Pin**	**Wire Color**	**Circuit No.**	**Function**
1				1	GRN	MF02	Stop Lamp Voltage
2				2	GRN/RED	BA04	Tail Lamp Voltage
3				3	GRN/BLK	MF04	Left Turn Signal Voltage
4				4	GRN/WHT	MF05	Right Turn signal Voltage
5				5	BLK	MU01	Ground
6				6	-	-	Not Used
7				7	-	-	Not Used
8				8	RED/WHT	MF01	Fuse FL-16 Supply Power

Left Inner Side of the Frame Rail, Behind the Transmission Crossmember

Figure 17.33.1

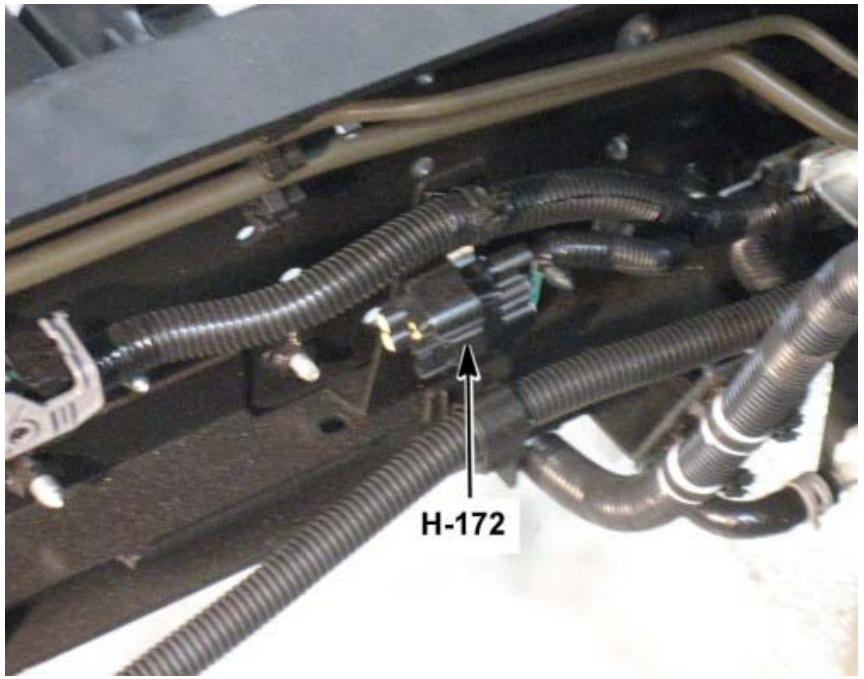
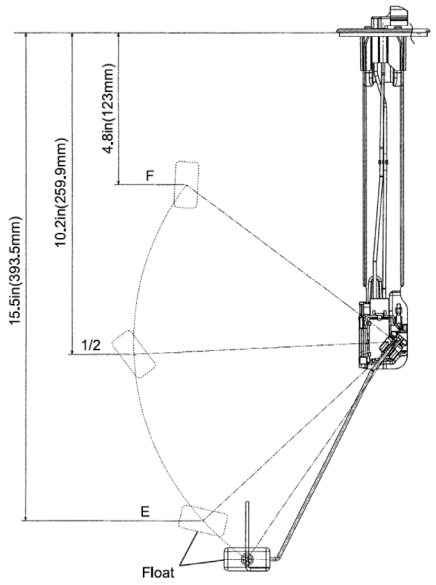


Figure 17.33.2

Fuel Tank Sending Unit Resistance (In-Frame Tank & Side Frame Tank)

Fuel Tank Sending Unit Resistance (In-Frame Tank)



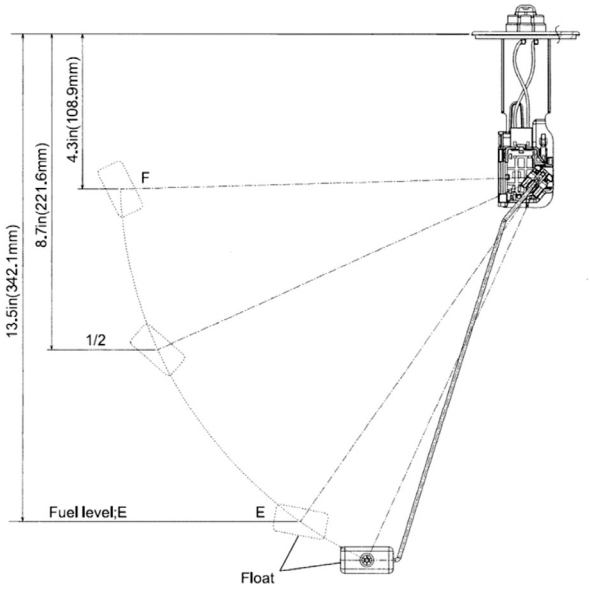
J117

3 2 1

Float Position	Resistance value(Ω)
F	14
1/2	44
E	100

Figure 17.34.1

Fuel Tank Sending Unit Resistance (Side Frame Tank)



J15

3 2 1

Float Position	Resistance value(Ω)
F	14
1/2	44
E	100

Figure 17.34.2

Power Take Off (PTO) System for 5.2 L 4HK1

PTO Control System Description

The engine control module (ECM) has the functionality to accommodate one of three different PTO systems depending on up fitter specification. These systems consist of the following:

· Stationary Preset PTO Mode

· Stationary Variable PTO Mode

· Mobile Variable PTO Mode

· Engine Shutdown Protection

· Speedometer Calibration

Each mode is used with the specification of up fitter installation, which can be programmed to a tailored use. Moreover, there are the following functions that are common with each PTO mode:

· PTO Standby Speed

· PTO Maximum Engine Speed

· PTO Engine Shutdown

· PTO Engage Relay

· PTO (Relay Maximum) Engage Speed

· PTO Feedback

Each vehicle is factory equipped with two PTO chassis electrical connectors (PTO harness 1 and PTO harness 2) located on the inner left frame rail across from the back of the transmission. The purpose of these connectors is to allow the upfitter to easily connect to the ECM PTO inputs without having to alter any of the factory-installed wiring.

Stationary Preset PTO Mode

Power Take Off (PTO) System
Stationary Preset PTO Mode

In Stationary Preset PTO Mode, the PTO control is performed while the vehicle is stopped by arbitrarily selecting one of multiple preset (up to four not including PTO Standby Speed) engine speeds as the PTO desired engine speed.

If the engine speed the driver requests by pressing on the accelerator pedal is higher than the PTO desired engine speed, the accelerator pedal engine speed is used. However, the accelerator pedal engine speed cannot go higher than the PTO Maximum Engine Speed.

Hardware Configuration

The Stationary Preset PTO Mode is enabled based on the following hardware inputs to the ECM.

Factory-option:

1. PTO Main Switch

The factory-option dash mounted PTO Main Switch is used to enable or cancel PTO mode. The engine speed will be set to the PTO Standby Speed when the PTO main switch is pressed. The switch is a pushlock type switch. The input circuit is connected to the ECM 13 of J-105 connector.

The PTO Standby Speed can change within the following allowable range.

· Minimum: 650 RPM

· Maximum: 3150 RPM

· Preset value: 650 RPM

The PTO Maximum Engine Speed can change within the following allowable range.

· Minimum: PTO Standby Speed

· Maximum: 3150 RPM

· Preset value: 3150 RPM

Stationary Preset PTO Mode Contd.

2. Cruise Set/ Coast Switch
The factory-installed Cruise Set/ Coast Switch on the combination switch can be used in PTO mode to set the PTO Set Speed (one fixed engine speed) when this switch is turned to SET (-). The input circuit is connected to the ECM 7 of J-105 connector.

The PTO Set Speed can change within the following allowable range:

· Minimum: PTO Standby Speed

· Maximum: 3150 RPM

· Preset value: 1300 RPM

The PTO Set Speed cannot be higher than the PTO Resume Speed.

The PTO Resume Speed cannot be higher than the PTO Maximum Engine Speed.

3. Cruise Resume/ Accel. Switch
The factory-installed Cruise Resume/ Accel. Switch on the combination switch can be used in PTO mode to set the PTO Resume Speed (another fixed engine speed) when this switch is turned to RES (+). The input circuit is connected to the ECM 8 of J-105 connector.

The PTO Resume Speed can change within the following allowable range:

· Minimum: PTO Set Speed

· Maximum: 3150 RPM

· Preset value: 1700 RPM

The PTO Resume Speed cannot be lower than the PTO Set Speed.

The PTO Resume Speed cannot be higher than the PTO Maximum Engine Speed.

4. PTO Engine Speed Control Switch
The factory-option dash mounted PTO Engine Speed Control Switch can be used in PTO mode to set the Remote PTO Set Speed or Resume Speed when the switch is pressed to (-) or (+). The switch is a momentary switch and is the same function as the Cruise Set/ Coast and Resume/ Accel. Switch. The input circuits are connected to the ECM 7 and 8 of J-105 connector.

Stationary Preset PTO Mode Contd.

Upfitter-installed:

1. Remote PTO Set Switch

The upfitter-installed Remote PTO Set Switch can be used in PTO mode to set the Remote PTO Set Switch (same engine speed as the PTO Set Speed) when this switch is pressed. The function of this switch is the same as the Cruise Set/ Coast Switch in the cab. The switch needs to be a momentary switch. The PTO harness 2 connector is equipped with an input circuit to the ECM 6 of J-105 connector through the J of H-104 connector.

The Remote PTO Set Switch engine speed uses the PTO Set Speed value. The Remote PTO Set Switch MUST be enabled (programmed) in the ECM.

2. Remote PTO Resume Switch

The upfitter-installed Remote PTO Resume Switch can be used in PTO mode to set the Remote PTO Resume Switch (same engine speed as the PTO Resume Speed) when this switch is pressed. The function of this switch is the same as the Cruise Resume/ Accel. Switch in the cab. The switch needs to be a momentary switch. The PTO harness 2 connector equipped with input circuit to the ECM 5 of J-105 connector through the K of H-104 connector.

The Remote PTO Resume Switch engine speed uses the PTO Resume Speed value.

The Remote PTO Resume Switch MUST be enabled (programmed) in the ECM.

3. Remote Set Speed A Switch

The upfitter-installed Remote Set Speed A Switch can be used in PTO mode to set the PTO Set Speed A when this switch is pressed. The switch needs to be a toggle or push-lock switch. The PTO harness 2 connector equipped with input circuit to the ECM 4 of J-105 connector through the D of H-104 connector.

The Remote Set Speed A Switch engine speed can change within the following allowable range:

- **Minimum: PTO Standby Speed**
- **Maximum: 3150 RPM**
- **Preset value: 800 RPM**

The Remote Set Speed A Switch engine speed cannot be higher than the Remote Set Speed B Switch engine speed.

Stationary Preset PTO Mode Contd.

The Remote Set Speed A Switch engine speed cannot be higher than the Maximum PTO Engine Speed.

The Remote Set Speed A Switch MUST be enabled (programmed) in the ECM.

4. Remote Set Speed B Switch

The upfitter-installed Remote Set Speed B Switch can be used in PTO mode to set the PTO Set Speed B when this switch is pressed. The switch needs to be a toggle or push-lock switch. The PTO harness 2 connector equipped with an input circuit to the ECM 3 of J-105 connector through C of H-104 connector.

The Remote Set Speed B Switch engine speed can change within the following allowable range:

· Minimum: PTO Standby Speed

· Maximum: 3150 RPM

· Preset value: 800 RPM

The Remote Set Speed B Switch engine speed cannot be lower than the Remote Set Speed A Switch engine speed.

The Remote Set Speed B Switch engine speed cannot be higher than the PTO Maximum Engine Speed.

The Remote Set Speed B Switch MUST be enabled (programmed) in the ECM.

5. PTO Engage Relay

The upfitter-installed PTO Engage Relay can be used to supply switched battery voltage to operate a PTO hydraulic solenoid. The solenoid in turn allows fluid to flow to a PTO hydraulic pump. The relay is controlled via the ECM grounding the relay coil control circuit. The PTO harness 1 C of H-105 connector is equipped with the voltage feed circuit to the relay. Also, the PTO harness 1 connector is equipped with a grounding circuit to ECM 20 of J-105 connector through B of the H-105 connector.

The PTO Maximum Engage Speed (ECM grounding coil control circuit) can change within the following allowable range:

· Minimum: PTO Standby Speed

· Maximum: 3150 RPM

Stationary Preset PTO Mode Contd.

· Preset value: 1050 RPM

The PTO Engage Relay cannot be higher than any PTO speed except the PTO Standby Speed.

6. PTO Feedback Switch

Some applications require that the operator press an upfitter installed momentary switch usually located outside the cab before entering any PTO set speed (not PTO Standby Speed). The switch is normally tied into the PTO Engage Relay switch
circuit. Once the switch is pressed with the relay turned ON, the ECM should detect a high voltage at the PTO Feedback Switch input. This momentarily high input will allow the operator to use any of the PTO speeds above the PTO Standby Speed until PTO mode is cancelled. The PTO harness 2 A of H-104 connector is equipped with a voltage feed circuit to the PTO Engage Relay. Also, the PTO harness 1 connector is equipped with an input circuit to the ECM 14 of J-105 connector through A of H-105 connector.

PTO Feedback input to the ECM can be set via ECM programming.

· Preset Value: No

7. PTO Engine Shutdown Switch

The upfitter-installed PTO Engine Shutdown Switch can be used in PTO mode to turn Off the engine. The switch needs to be a toggle or pushlock switch. The PTO harness 2 connector equipped with an input circuit to the ECM 36 of J-105 connector through the F of H-104 connector.

The time preceding the engine shutdown once the input has been received can be set within the following allowable range:
PTO Engine Shutdown Time Delay:

· Minimum: 0 seconds

· Maximum: 24 hours

· Preset value: 0 seconds

PTO Engine Shutdown Switch input MUST be enabled (programmed) in the ECM AND the ECM must detect a low voltage input at pin 36 of J-105 connector. These both are necessary for this shutdown feature to operate.

Stationary Variable PTO Mode

Power Take Off (PTO) System
Stationary Variable PTO Mode

In Stationary Variable PTO Mode, the PTO control is performed while the vehicle is stopped by arbitrarily selecting an engine speed as the PTO desired engine speed.

If the engine speed the driver requests by pressing on the accelerator pedal is higher than the PTO desired engine speed, the accelerator pedal engine speed is used.

Hardware Configuration

The Stationary Variable PTO Mode is enabled based on the following hardware inputs to the ECM.

Factory-option:

1. PTO Main Switch

The factory-option dash mounted PTO Main Switch is used to enable or cancel PTO mode. The engine speed will be set to the PTO Standby Speed when the PTO main switch is pressed. The switch is a pushlock type switch. The input circuit is connected to the ECM 13 of J-105 connector.

The PTO Standby Speed can change within the following allowable range.

· Minimum: 650 RPM

· Maximum: 3150 RPM

· Preset value: 650 RPM

The PTO Maximum Engine Speed can change within the following allowable range.

· Minimum: PTO Standby Speed

· Maximum: 3150 RPM

· Preset value: 3150 RPM

2. Cruise Set/ Coast Switch
The factory-installed Cruise Set/ Coast Switch on the combination switch can be used in PTO mode to decrease the engine speed when this switch is tapped or while this switch is turned to SET (-). The input circuit is connected to the ECM 7 of J-105 connector.

The PTO Increase/Decrease RPM (increment or decrement by turning or pressing) can change within the following allowable range:

· Minimum: 25 RPM

Stationary Variable PTO Mode Contd.

· Maximum: 1000 RPM

· Preset value: 25 RPM

The PTO Reduce RPM Rate (decrement by turning or pressing) can change within the following allowable range

· Minimum: 25 RPM

· Maximum: 1000 RPM

· Preset value: 25 RPM

3. Cruise Resume/ Accel. Switch
The factory-installed Cruise Resume/ Accel. Switch on the combination switch can be used in PTO mode to increase the engine speed when this switch is tapped or while this switch is turned to RES (+). The input circuit is connected to the ECM 8 of J-105 connector.

The PTO Accel RPM Rate (increment per second by turning or pressing) can change within the following allowable range:

· Minimum: 25 RPM/sec.

· Maximum: 1000 RPM/sec.

· Preset value: 25 RPM/sec.

4. PTO Engine Speed Control Switch
The factory-option dash mounted PTO Engine Speed Control Switch can be used in PTO mode to decrease or increase the engine speed when the switch is tapped or while this switch is pressed to (-) or (+). The switch is a momentary switch and is the same function as the Cruise Set/ Coast and Resume/ Accel. Switch. The input circuits are connected to the ECM 7 and 8 of J-105 connector.

Upfitter-installed:

1. Remote PTO Set Switch
The upfitter-installed Remote PTO Set Switch can be used in PTO mode to decrease the engine speed when this switch is tapped or while this switch is pressed. The function of this switch is same as the Cruise Set/ Coast Switch in the cab. The switch needs to be a momentary switch. The PTO harness 2 connector equipped with an input circuit to the ECM 6 of J-105 connector through the J of H- 104 connector.

The Remote Set/ Resume Switches use the PTO Increase RPM Rate, PTO Reduce RPM Rate and Accel RPM Rate values.

The Remote PTO Set Switch MUST be enabled (programmed) in the ECM.

2. Remote PTO Resume Switch
The upfitter-installed Remote PTO Resume Switch can be used in PTO mode to increase the engine speed at when this switch is tapped or while this

Stationary Variable PTO Mode Contd.

switch is pressed. The function of this switch is same as the Cruise Resume/ Accel. Switch in the cab. The switch needs to be a momentary switch.

The PTO harness 2 connector equipped with an input circuit to the ECM 5 of J-105 connector through the K of H-104 connector.

The Remote Set/ Resume Switch use the PTO Increase RPM Rate, PTO Reduce RPM Rate and Accel RPM Rate values.

The Remote PTO Resume Switch MUST be enabled (programmed) in the ECM.

3. Remote PTO Throttle

The upfitter-installed Remote PTO Throttle can be used in PTO mode to increase or decrease the engine speed the same as an accelerator pedal. The device needs to be a potentiometer. The ECM supplies 5 volts reference circuit to the Remote PTO Throttle from the ECM 88 of J-105 connector through the E of H-105 connector. The ECM also provides a ground on the low reference circuit from the ECM 111 of J-105 connector through the G of H-105 connector. The ECM monitors the Remote PTO Throttle signal on the ECM 65 of J-105 connector through the F of H-105 connector.

The Remote PTO Throttle Engine Speed Range can be controlled within the following allowable range:

· Minimum: PTO Standby Speed

· Maximum: 2500 RPM - PTO Standby Speed

· Preset value: 2500 RPM - PTO Standby Speed

It is necessary to program the Remote PTO Throttle signal inputs to the ECM at position 0% and 100%.

· Preset value at 0%: 0.85 volts

· Preset value at 100%: 3.75 volts

If the ECM the detects the Remote PTO Throttle signal more than 4.9 volts, DTC P254D will set.

The Remote PTO Throttle MUST be enabled (programmed) in the ECM.

4. PTO Engage Relay

The upfitter-installed PTO Engage Relay can be used to supply switched battery voltage to operate a PTO hydraulic solenoid. The solenoid in turn allows fluid to flow to a PTO hydraulic pump. The relay is controlled via the ECM grounding the relay coil control circuit. The PTO harness 1 C of H-105 connector is equipped with the voltage feed circuit to the relay. Also, the PTO harness 1 connector is equipped with a grounding circuit to ECM 20 of J-105 connector through B of the H-105 connector.

The PTO Maximum Engage Speed (ECM grounding coil control circuit) can change within the following allowable range:

Stationary Variable PTO Mode Contd.

· Minimum: PTO Standby Speed

· Maximum: 3150 RPM

· Preset value: 1050 RPM

The PTO Engage Relay cannot be higher than any PTO speed except the PTO Standby Speed

5. PTO Feedback Switch

Some applications require that the operator press an upfitter installed momentary switch usually located outside the cab before entering any PTO set speed (not PTO Standby Speed). The switch is normally tied into the PTO Engage Relay switch circuit. Once the switch is pressed with the relay turned ON, the ECM should detect a high voltage at the PTO Feedback Switch input. This momentarily high input will allow the operator to use any of the PTO speeds above the PTO Standby Speed until PTO mode is cancelled. The PTO harness 2 A of H-104 connector is equipped with a voltage feed circuit to the PTO Engage Relay. Also, the PTO harness 1 connector is equipped with an input circuit to the ECM 14 of J-105 connector through A of H-105 connector.

PTO Feedback input to the ECM can be set via ECM programming.

· Preset Value: No

6. PTO Engine Shutdown Switch

The upfitter-installed PTO Engine Shutdown Switch can be used in PTO mode to turn Off the engine. The switch needs to be a toggle or pushlock switch. The PTO harness 2 connector equipped with an input circuit to the ECM 36 of J-105 connector through the F of H-104 connector.

The time preceding the engine shutdown once the input has been received can be set within the following allowable range:

PTO Engine Shutdown Time Delay:

· Minimum: 0 seconds

· Maximum: 24 hours

· Preset value: 0 seconds

PTO Engine Shutdown Switch input MUST be enabled (programmed) in the ECM AND the ECM must detect a low voltage input at pin 36 of J-105 connector. These both are necessary for this shutdown feature to operate.

Mobile Variable PTO Mode

Power Take Off (PTO) System
Mobile Variable PTO Mode

In Mobile Variable PTO Mode, the PTO control is performed while the vehicle is running by arbitrarily selecting engine speeds as the PTO desired engine speed. The system allows increases or decreases above the PTO Standby Speed by two switch inputs into the ECM while the vehicle is moving.

If the engine speed the driver requests by pressing on the accelerator pedal is higher than the PTO desired engine speed, the accelerator pedal engine speed is used.

The PTO Maximum Vehicle Speed for Mobile Variable PTO Mode can change within the following allowable range:

· Minimum: 0 MPH (0 km/h)

· Maximum: 75 MPH (120 km/h)

· Preset value: 75 MPH (120 km/h)

In order to burn off the accumulated PM in the diesel particulate filter (DPF) during the mobile variable mode, entering the regeneration event is allowed via ECM programming.

· Preset Value: No

Hardware Configuration

Mobile Variable Mode uses only switches in the cab and is enabled based on the following hardware inputs to the ECM.

Factory-option:

1. PTO Main Switch

The factory-option dash mounted PTO Main Switch is used to enable or cancel PTO mode. The engine speed will be set to the PTO Standby Speed when the PTO main switch is pressed. The switch is a pushlock type switch. The input circuit is connected to the ECM 13 of J-105 connector.

The PTO Standby Speed can change within the following allowable range.

· Minimum: 650 RPM

· Maximum: 3150 RPM

· Preset value: 650 RPM

The PTO Maximum Engine Speed can change within the following allowable range.

· Minimum: PTO Standby Speed

· Maximum: 3150 RPM

Mobile Variable PTO Mode Contd.

· Preset value: 3150 RPM

2. Cruise Set/ Coast Switch
The factory-installed Cruise Set/ Coast Switch on the combination switch can be used in PTO mode to decrease the engine speed when this switch is tapped or while this switch is turned to SET (-). The input circuit is connected to the ECM 7 of J-105 connector.

The PTO Increase/Decrease RPM (increment or decrement by turning or pressing) can change within the following allowable range:

· Minimum: 25 RPM

· Maximum: 1000 RPM

· Preset value: 25 RPM

The PTO Reduce RPM Rate (decrement by turning or pressing) can change within the following allowable range:

· Minimum: 25 RPM

· Maximum: 1000 RPM

· Preset value: 25 RPM

3. Cruise Resume/ Accel. Switch
The factory-installed Cruise Resume/ Accel. Switch on the combination switch can be used in PTO mode to increase the engine speed when this switch is tapped or while this switch is turned to RES (+). The input circuit is connected to the ECM 8 of J-105 connector.

The PTO Accel RPM Rate (increment per second by turning or pressing) can change within the following allowable range:

· Minimum: 25 RPM/sec.

· Maximum: 1000 RPM/sec.

· Preset value: 25 RPM/sec.

4. PTO Engine Speed Control Switch
The factory-option dash mounted PTO Engine Speed Control Switch can be used in PTO mode to decrease or increase the engine speed when the switch is tapped or while this switch is pressed to (-) or (+). The switch is a momentary switch and is the same function as the Cruise Set/ Coast and Resume/ Accel. Switch. The input circuits are connected to the ECM 7 and 8 of J-105 connector.

Upfitter-installed:

1. PTO Engage Relay
The upfitter-installed PTO Engage Relay can be used to supply switched battery voltage to operate a PTO hydraulic solenoid. The solenoid in turn allows fluid to flow to a PTO hydraulic pump. The relay is controlled via the ECM grounding the relay coil control circuit. The PTO harness 1 C of H-105 connector is equipped with the voltage feed circuit to the relay. Also, the PTO harness 1 connector is equipped with a grounding circuit to ECM 20 of J-105 connector through B of the H-105 connector.

Mobile Variable PTO Mode Contd.

The PTO Maximum Engage Speed (ECM) grounding coil control circuit) can change within the following allowable range:

· Minimum: PTO Standby Speed

· Maximum: 3150 RPM

· Preset value: 1050 RPM

The PTO Enable Relay cannot be higher than any PTO speed except the PTO Standby Speed

2. PTO Feedback Switch
Some applications require that the operator press an upfitter installed momentary switch usually located outside the cab before entering any PTO set speed (not PTO Standby Speed). The switch is normally tied into the PTO Engage Relay switch circuit. Once the switch is pressed with the relay turned ON, the ECM should detect a high voltage at the PTO Feedback Switch input. This momentarily high input will allow the operator to use any of the PTO speeds above the PTO Standby Speed until PTO mode is cancelled. The PTO harness 2 A of H-104 connector is equipped with a voltage feed circuit to the PTO Engage Relay. Also, the PTO harness 1 connector is equipped with an input circuit to the ECM 14 of J-105 connector through A of H-105 connector.

PTO Feedback input to the ECM can be set via ECM programming

· Preset Value: No

3. PTO Engine Shutdown Switch
The upfitter-installed PTO Engine Shutdown Switch can be used in PTO mode to turn Off the engine. The switch needs to be a toggle or pushlock switch. The PTO harness 2 connector equipped with an input circuit to the ECM 36 of J-105 connector through the F of H-104 connector.

The vehicle speed preceding the Engine Shutdown Time Delay once the input has been received can be set within the following allowable range:
PTO Engine Shutdown Vehicle Speed:

· Minimum: 0 MPH (0 km/h)

· Maximum: 75 MPH (120 km/h)

· Preset value: 0 MPH (0 km/h)

The time preceding the engine shutdown once the above preset vehicle speed has been received can be set within the following allowable range:
PTO Engine Shutdown Time Delay:

· Minimum: 0 seconds

· Maximum: 24 hours

· Preset value: 0 seconds

PTO Engine Shutdown Switch input MUST be enabled (programmed) in the ECM AND the ECM must detect a low voltage input at pin 36 of J-105 connector. These both are necessary for this shutdown feature to operate.

Power Take Off (PTO) System for 3.0 L 4JJ1

PTO Control System Description
The engine control module (ECM) has the functionality to accommodate one of three different PTO systems depending on upfitter specification. These systems consist of the following:

- **Stationary Preset PTO Mode**
- **Stationary Variable PTO Mode**
- **Engine Shutdown Protection**
- **Speedometer Calibration**

Each mode is used with the specification of upfitter installation, which can be programmed to a tailored use. Moreover, there are the following functions that are common with each PTO mode:

- **PTO Standby Speed**
- **PTO Maximum Engine Speed**
- **PTO Engine Shutdown**
- **PTO Engage Relay**
- **PTO (Relay Maximum) Engage Speed**
- **PTO Feedback**

Each vehicle is factory equipped with two PTO chassis electrical connectors (PTO harness 1 and PTO harness 2) located on the inner left frame rail across from the back of the transmission. The purpose of these connectors is to allow the upfitter to easily connect to the ECM PTO inputs without having to alter any of the factory-installed wiring.

Stationary Preset PTO Mode

Power Take Off (PTO) System
Stationary Preset PTO Mode

In Stationary Preset PTO Mode, the PTO control is performed while the vehicle is stopped by arbitrarily selecting one of multiple preset (up to four not including PTO Standby Speed) engine speeds as the PTO desired engine speed.

Notice: If the engine speed the driver requests by pressing on the accelerator pedal is higher than the PTO desired engine speed, the accelerator pedal engine speed is used. However, the accelerator pedal engine speed cannot go higher than the PTO Maximum Engine Speed.

Notice: The idle speed selector sensor overrides the PTO Set Speed and PTO Maximum Engine Speed.

Hardware Configuration

The Stationary Preset PTO Mode is enabled based on the following hardware inputs to the ECM.

Factory-option:

1. PTO Main Switch
The factory-option dash mounted PTO Main Switch is used to enable or cancel PTO mode. The engine speed will be set to the PTO Standby Speed when the PTO main switch is pressed. The switch is a push lock type switch. The input circuit isconnected to the ECM 59 of J-14 connector.

Notice: The PTO Standby Speed can change within the following allowable range.

· Minimum: 800 RPM

· Maximum: 1300 RPM

· Preset value: 800 RPM

Notice: The PTO Maximum Engine Speed can change within the following allowable range.

· Minimum: PTO Standby Speed

· Maximum: 3050 RPM

· Preset value: 3050 RPM

2. Cruise Set/Coast Switch
The factory-installed Cruise Set/Coast Switch on the combination switch can be used in PTO mode to set the PTO Set Speed (one fixed engine speed) when this switch is turned to SET (-). The input circuit is connected to the ECM 81 of J-14 connector.

Notice: The PTO Set Speed can change within the following allowable range:

· Minimum: PTO Standby Speed

· Maximum: 3050 RPM

Stationary Preset PTO Mode Contd.

· Preset value: 1300 RPM

Notice: The PTO Set Speed cannot be higher than the PTO Resume Speed.

Notice: The PTO Resume Speed cannot be higher than the PTO Maximum Engine Speed.

3. Cruise Resume/ Accel Switch
The factory-installed Cruise Resume/ Accel Switch on the combination switch can be used in PTO mode to set the PTO Resume Speed (another fixed engine speed) when this switch is turned to RES (+). The input circuit is connected to the ECM 14 of J-14 connector.

Notice: The PTO Resume Speed can change within the following allowable range:

· Minimum: PTO Set Speed

· Maximum: 3050 RPM

· Preset value: 1700 RPM

Notice: The PTO Resume Speed cannot be lower than the PTO Set Speed.

Notice: The PTO Resume Speed cannot be higher than the PTO Maximum Engine Speed.

4. PTO Engine Speed Control Switch
The factory-option dash mounted PTO Engine Speed Control Switch can be used in PTO mode to set the Remote PTO Set Speed or Resume Speed when the switch is pressed to (-) or (+). The switch is a momentary switch and is the same function as the Cruise Set/ Coast and Resume/ Accel Switch. The input circuits are connected to the ECM 14 and 81 of J-14 connector.

Upfitter-installed:

1. Remote PTO Set Switch
The upfitter-installed Remote PTO Set Switch can be used in PTO mode to set the Remote PTO Set Switch (same engine speed as the PTO Set Speed) when this switch is pressed. The function of this switch is the same as the Cruise Set/ Coast Switch in the cab. The switch needs to be a momentary switch. The PTO harness 2 connector is equipped with an input circuit to the ECM 11 of J-14 connector through the J of H-104 connector.

Notice: The Remote PTO Set Switch engine speed uses the PTO Set Speed value. Notice: The Remote PTO Set Switch MUST be enabled (programmed) in the ECM.

2. Remote PTO Resume Switch
The upfitter-installed Remote PTO Resume Switch can be used in PTO mode to set the Remote PTO Resume Switch (same engine speed as the PTO Resume Speed) when this switch is pressed. The function of this switch is the same as the Cruise Resume/ Accel Switch in the cab. The switch needs to be a momentary switch. The PTO harness 2 connector equipped with input circuit to the ECM 64 of J-14 connector through the K of H-104 connector.

Stationary Preset PTO Mode Contd.

Notice: The Remote PTO Resume Switch engine speed uses the PTO Resume Speed value. Notice: The Remote PTO Resume Switch MUST be enabled (programmed) in the ECM.

3. Remote Set Speed A Switch

The upfitter-installed Remote Set Speed A Switch can be used in PTO mode to set the PTO Set Speed A when this switch is pressed. The switch needs to be a toggle or push-lock switch. The PTO harness 2 connector equipped with input circuit to the ECM 79 of E-12 connector through the D of H-104 connector.

Notice: The Remote Set Speed A Switch engine speed can change within the following allowable range:

· Minimum: PTO Standby Speed

· Maximum: 3050 RPM

· Preset value: 800 RPM

Notice: The Remote Set Speed A Switch engine speed cannot be higher than the Remote Set Speed B Switch engine speed.

Notice: The Remote Set Speed A Switch engine speed cannot be higher than the Maximum PTO Engine Speed.

Notice: The Remote Set Speed A Switch MUST be enabled (programmed) in the ECM.

4. Remote Set Speed B Switch
The upfitter-installed Remote Set Speed B Switch can be used in PTO mode to set the PTO Set Speed B when this switch is pressed. The switch needs to be a toggle or push-lock switch. The PTO harness 2 connector equipped with an input circuit to the ECM 93 of E-12 connector through C of H-104 connector.

Notice: The Remote Set Speed B Switch engine speed can change within the following allowable range:

· Minimum: PTO Standby Speed

· Maximum: 3050 RPM

· Preset value: 800 RPM

Notice: The Remote Set Speed B Switch engine speed cannot be lower than the Remote Set Speed A Switch engine speed.

Notice: The Remote Set Speed B Switch engine speed cannot be higher than the PTO Maximum Engine Speed.

Notice: The Remote Set Speed B Switch MUST be enabled (programmed) in the ECM.

5. PTO Engage Relay

The upfitter-installed PTO Engage Relay can be used to supply switched battery voltage to operate a PTO hydraulic solenoid. The solenoid in turn al-

Stationary Preset PTO Mode Contd.

lows fluid to flow to a PTO hydraulic pump. The relay is controlled via the ECM grounding the relay coil control circuit. The PTO harness 1 C of H-105 connector is equipped with the voltage feed circuit to the relay. Also, the PTO harness 1 connector is equipped with a grounding circuit to ECM 87 of J-14 connector through B of the H-105 connector.

Notice: The PTO Engage Relay turn ON (ECM grounding coil control circuit) engine speed can change within the following allowable range:

- Minimum: PTO Standby Speed
- Maximum: 1500 RPM
- Preset value: 1050 RPM

Notice: The PTO Engage Relay cannot be higher than any PTO speed except the PTO Standby Speed.

6. PTO Feedback Switch

Some applications require that the operator press an upfitter installed momentary switch usually located outside the cab before entering any PTO set speed (not PTO Standby Speed). The switch is normally tied into the PTO Engage Relay switch circuit. Once the switch is pressed with the relay turned ON, the ECM should detect a high voltage at the PTO Feedback Switch input. This momentarily high input will allow the operator to use any of the PTO speeds above the PTO Standby Speed until PTO mode is cancelled. The PTO harness 2 A of H-104 connector is equipped with a voltage feed circuit to the PTO Engage Relay. Also, the PTO harness 1 connector is equipped with an input circuit to the ECM 56 of J-14 connector through A of H-105 connector.

Notice: PTO Feedback input to the ECM can be set via ECM programming.

- Preset Value: No

7. PTO Engine Shutdown Switch

The upfitter-installed PTO Engine Shutdown Switch can be used in PTO mode to turn Off the engine. The switch needs to be a toggle or pushlock switch. The PTO harness 2 connector equipped with an input circuit to the ECM 58 of J-14 connector through the F of H-104 connector.

Notice: The time preceding the engine shutdown once the input has been received can be set within the following allowable range:

PTO Engine Shutdown Time Delay:

- Minimum: 0 seconds
- Maximum: 24 hours
- Preset value: 0 seconds

Notice: PTO Engine Shutdown Switch input MUST be enabled (programmed) in the ECM AND the ECM must detect a low voltage input at pin 58 of J-14 connector. These both are necessary for this shutdown feature to operate.

Stationary Variable PTO Mode

Power Take Off (PTO) System
Stationary Variable PTO Mode

In Stationary Variable PTO Mode, the PTO control is performed while the vehicle is stopped by arbitrarily selecting an engine speed as the PTO desired engine speed.

Notice: If the engine speed the driver requests by pressing on the accelerator pedal is higher than the PTO desired engine speed, the accelerator pedal engine speed is used.

Hardware Configuration

The Stationary Variable PTO Mode is enabled based on the following hardware inputs to the ECM.

Factory-option:

1. PTO Main Switch

The factory-option dash mounted PTO Main Switch is used to enable or cancel PTO mode. The engine speed will be set to the PTO Standby Speed when the PTO main switch is pressed. The switch is a push lock type switch. The input circuit is connected to the ECM 59 of J-14 connector.

Notice: The PTO Standby Speed can change within the following allowable range.

· Minimum: 800 RPM

· Maximum: 1300 RPM

· Preset value: 800 RPM

Notice: The PTO Maximum Engine Speed can change within the following allowable range.

· Minimum: PTO Standby Speed

· Maximum: 3050 RPM

· Preset value: 3050 RPM

2. Cruise Set/ Coast Switch

The factory-installed Cruise Set/ Coast Switch on the combination switch can be used in PTO mode to decrease the engine speed when this switch is tapped or
while this switch is turned to SET (-). The input circuit is connected to the ECM 81 of J-14 connector.

Notice: The PTO Increase RPM Rate (increment or decrement by turning or pressing) can change within the following allowable range:

· Minimum: 0 RPM

· Maximum: 1000 RPM

Stationary Variable PTO Mode Contd.

· Preset value: 25 RPM

Notice: The PTO Reduce RPM Rate (decrement by turning or pressing) can change within the following allowable range

· Minimum: 0 RPM

· Maximum: 1000 RPM

· Preset value: 30 RPM

3. Cruise Resume/ Accel. Switch
The factory-installed Cruise Resume/ Accel. Switch on the combination switch can be used in PTO mode to increase the engine speed when this switch is tapped or
while this switch is turned to RES(+). The input circuit is connected to the ECM 14
of J-14 connector.

Notice: The PTO Accel RPM Rate (increment per second by turning or pressing) can change within the following allowable range:

· Minimum: 0 RPM/sec.

· Maximum: 1000 RPM/sec.

· Preset value: 20 RPM/sec.

4. PTO Engine Speed Control Switch
The factory-option dash mounted PTO Engine Speed Control Switch can be used in PTO mode to decrease or increase the engine speed when the switch is tapped or while this switch is pressed to (-)or(+). The switch is a momentary switch and is the same function as the Cruise Set/ Coast and Resume/ Accel. Switch. The input circuits are connected to the ECM 14 and 81 of J-14 connector.

Upfitter-installed:

1. Remote PTO Set Switch

The upfitter-installed Remote PTO Set Switch can be used in PTO mode to decrease the engine speed when this switch is tapped or while this switch is pressed. The function of this switch is same as the Cruise Set/ Coast Switch in the cab. The switch needs to be a momentary switch. The PTO harness 2 connector equipped with an input circuit to the ECM 11 of J-14 connector through the J of H- 104 connector.

Notice: The Remote Set/ Resume Switches use the PTO Increase RPM Rate, PTO Reduce RPM Rate and Accel RPM Rate values.

Notice: The Remote PTO Set Switch MUST be enabled (programmed) in the ECM.

2. Remote PTO Resume Switch
The upfitter-installed Remote PTO Resume Switch can be used in PTO mode to increase the engine speed at when this switch is tapped or while this switch is
pressed. The function of this switch is same as the Cruise Resume/ Accel. Switch in the cab. The switch needs to be a momentary switch. The PTO harness 2 connector equipped with an input circuit to the ECM 64 of J-14 connector through the K of H- 104 connector.

Notice: The Remote Set/ Resume Switch use the PTO Increase RPM Rate, PTO Reduce RPM Rate and Accel RPM Rate values.

Stationary Variable PTO Mode Contd.

Notice: The Remote PTO Resume Switch MUST be enabled (programmed) in the ECM.

3. Remote PTO Throttle
The upfitter-installed Remote PTO Throttle can be used in PTO mode to increase or decrease the engine speed the same as an accelerator pedal. The device needs to be a potentiometer. The ECM supplies 5 volts reference circuit to the Remote PTO Throttle from the ECM 91 of J-14 connector through the E of H-105 connector. The ECM also provides a ground on the low reference circuit from the ECM 10 of J-14 connector through the G of H-105 connector. The ECM monitors the Remote PTO Throttle signal on the ECM 30 of J-14 connector through the F of H-105 connector.

Notice: The Remote PTO Throttle engine speed can be controlled within the following allowable range:

· Minimum: PTO Standby Speed

· Maximum: 2900 RPM - PTO Standby Speed

· Preset value: 2900 RPM - PTO Standby Speed

Notice: It is necessary to program the Remote PTO Throttle signal inputs to the ECM at position 0% and 100%.

· Preset value at 0%: 0.85 volts

· Preset value at 100%: 3.75 volts

Notice: If the ECM the detects the Remote PTO Throttle signal more than 4.9 volts, DTC P2540 will set.

Notice: The Remote PTO Throttle MUST be enabled (programmed) in the ECM.

4. PTO Engage Relay
The upfitter-installed PTO Engage Relay can be used to supply switched battery voltage to operate a PTO hydraulic solenoid. The solenoid in turn allows fluid to flow
to a PTO hydraulic pump. The relay is controlled via the ECM grounding the relay coil control circuit. The PTO harness 1 C of H-105 connector is equipped with the voltage feed circuit to the relay. Also, the PTO harness 1 connector is equipped with a grounding circuit to ECM 87 of J-14 connector through B of the H-105 connector.

Notice: The PTO Engage Relay turn ON (ECM grounding coil control circuit) engine speed can change within the following allowable range:

· Minimum: PTO Standby Speed

· Maximum: 1500 RPM

· Preset value: 1050 RPM

Notice: The PTO Engage Relay cannot be higher than any PTO speed except the PTO Standby Speed

5. PTO Feedback Switch
Some applications require that the operator press an upfitter installed momentary switch usually located outside the cab before entering any PTO set speed (not PTO Standby Speed). The switch is normally tied into the PTO Engage Relay switch circuit. Once the switch is pressed with the relay turned ON, the ECM should detect a high voltage at the PTO Feedback Switch input. This momentarily high input will allow the operator to use any of

Stationary Variable PTO Mode Contd.

the PTO speeds above the PTO Standby Speed until PTO mode is cancelled. The PTO harness 2 A of H-104 connector is equipped with a voltage feed circuit to the PTO Engage Relay. Also, the PTO harness 1 connector is equipped with an input circuit to the ECM 56 of J-14 connector through A of H-105 connector.

Notice: PTO Feedback input to the ECM can be set via ECM programming.

· Preset Value: No

6. PTO Engine Shutdown Switch

The upfitter-installed PTO Engine Shutdown Switch can be used in PTO mode to turn Off the engine. The switch needs to be a toggle or pushlock switch. The PTO harness 2 connector equipped with an input circuit to the ECM 58 of J-14 connector through the F of H-104 connector.

Notice: The time preceding the engine shutdown once the input has been received can be set within the following allowable range:

PTO Engine Shutdown Time Delay:

· Minimum: 0 seconds

· Maximum: 24 hours

· Preset value: 0 seconds

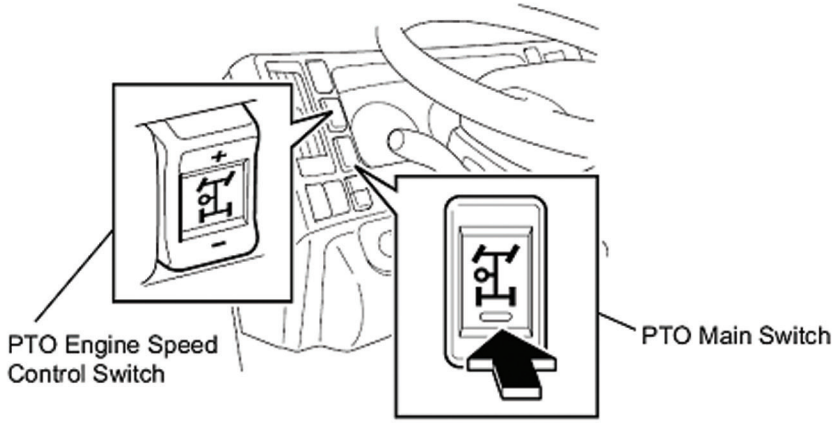
Notice: PTO Engine Shutdown Switch input MUST be enabled (programmed) in the ECM AND the ECM must detect a low voltage input at pin 58 of J-14 connector. These both are necessary for this shutdown feature to operate.

Power Take-Off (PTO) V

PTO is a device that is used to provide engine power to special equipment directly from the engine or through the transmission. For details about the PTO operation, refer to the separate instruction manual provided by its maker.

ADVICE

- If the optional PTO function is used for long periods of time, make sure to regularly check the diesel particulate filter (DPF) indicator. Automatic DPF regeneration will not take place while the PTO function is active.



CAUTION

- In PTO mode, Cruise Set/Resume Switch can be used exactly the same as PTO Engine Speed Control Switch. Improper operation of these switches may cause personal injury or damage.

Figure 18.23.1

INSTALLATION OF PTO SWITCHES

PARTS

1 8-98032-058-3 PTO Switch

1 8-98061-161-0 PTO Adjustment Switch

INSTALLATION INST.

1) Remove dash cover.

2) Remove two (2) hole covers (middle and bottom) from left side dash and remove harness connectors from hole cover

3) Insert PTO On/Off Switch in bottom slot and PTO Adjustment Switch in middle slot

4) Attach green connector to PTO switch and orange connector to PTO Adjustment Switch

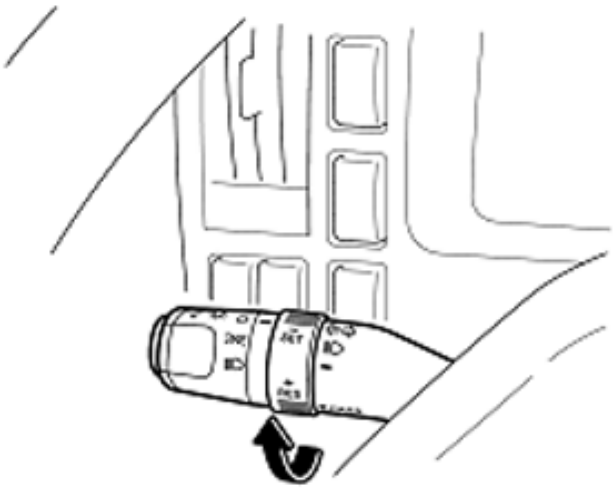
5) Re-install dash panel

Cruise Control

The cruise control function allows you to drive the vehicle at a constant speed without operating the accelerator pedal. Use this function when the vehicle speed is between 30 and 75 MPH (48 and 121 km/h). This function should only be used when driving without frequent starts and stops.

Caution:
Cruise control can be dangerous where you cannot drive safely at a steady speed. Do not use cruise control on winding roads or in heavy traffic. Cruise control can be dangerous on slippery roads. On such roads, fast changes in tire traction can cause needless wheel spinning, and you could lose control. Do not use cruise control on slippery roads.

Cruise control resume switch



Cruise control main switch



Cruise main indicator light

Cruise control set switch



Caution About Regeneration

· The check engine malfunction indicator light and reduced engine power indicator light may come on and the power output may be limited if driving or power take-off (PTO) operation is continued for a long time with the regeneration required warning light or selectable (switch) regeneration required warning light (amber/red) on.

This is to prevent the DPF from being damaged. When operating PTO during parking, check to ensure that the regeneration required warning light or selectable (switch) regeneration required warning light (amber/red) on the MID is not on.

· The exhaust pipe is extremely hot immediately after vehicle operation. Before parking, make sure the area is free of flammable material (for example, grass, waste paper, oil or old tires).

Take particular care when parking in a garage.

Use caution concerning exhaust gases while the engine is idling. Be particularly careful when the power take-off (PTO) is operating (if your vehicle is equipped with a PTO) or the DPF is regenerating while the engine is idling .

Additional PTO Functions for 4HK1-TC Engine only:

These functions can be programed into the ECM :

Manual Regeneration only for GSE vehicles

For certain applications the Automatic regeneration function can be inhibited and manual regeneration only can be programed. (Example Airport Ground Support vehicles).

Allow Automatic Regeneration in PTO Mode

For certain applications the Automatic regeneration function can be enabled in the PTO stationary mode (Example Lawn care and carpet cleaning).

Allow Automatic Regeneration in PTO Mode

For certain applications the Automatic regeneration function can be enabled in the PTO mobile mode (Example Line painting).

Procedure for Setting Manual Regeneration in Power Take-off Mode

1. Choose the correct Model Year, Model and Transmission type using IDSS, then click `Submit'.
2. Click on `Controller Programming' in the table of contents on the left.
3. Click on Engine Control Module > Vehicle Options, then choose the PTO Options tab on the right.
4. Select the correct PTO Options for the vehicle that is being setup. Manual DPF Regeneration in PTO
5. Click Download when all of the PTO options have been changed, then follow the On-screen instructions to complete the programming process.

Procedure for Setting Auto Regeneration in Power Take-off Mode

1. Choose the correct Model Year, Model and Transmission type using IDSS, then click `Submit'.
2. Click on `Controller Programming' in the table of contents on the left.
3. Click on Engine Control Module > Vehicle Options, then choose the PTO Options tab on the right.
4. Select the correct PTO Options for the vehicle that is being setup. The two programmable options for automatic regeneration are as follows:
- Auto DPF Regen in PTO within RPM Range. This is for use in Stationary PTO mode.
- Auto DPF Regen in Mobile PTO Standby or Driving. This is for use in Mobile PTO mode
5. Click Download when all of the PTO options have been changed, then follow the On-screen instructions to complete the programming process.

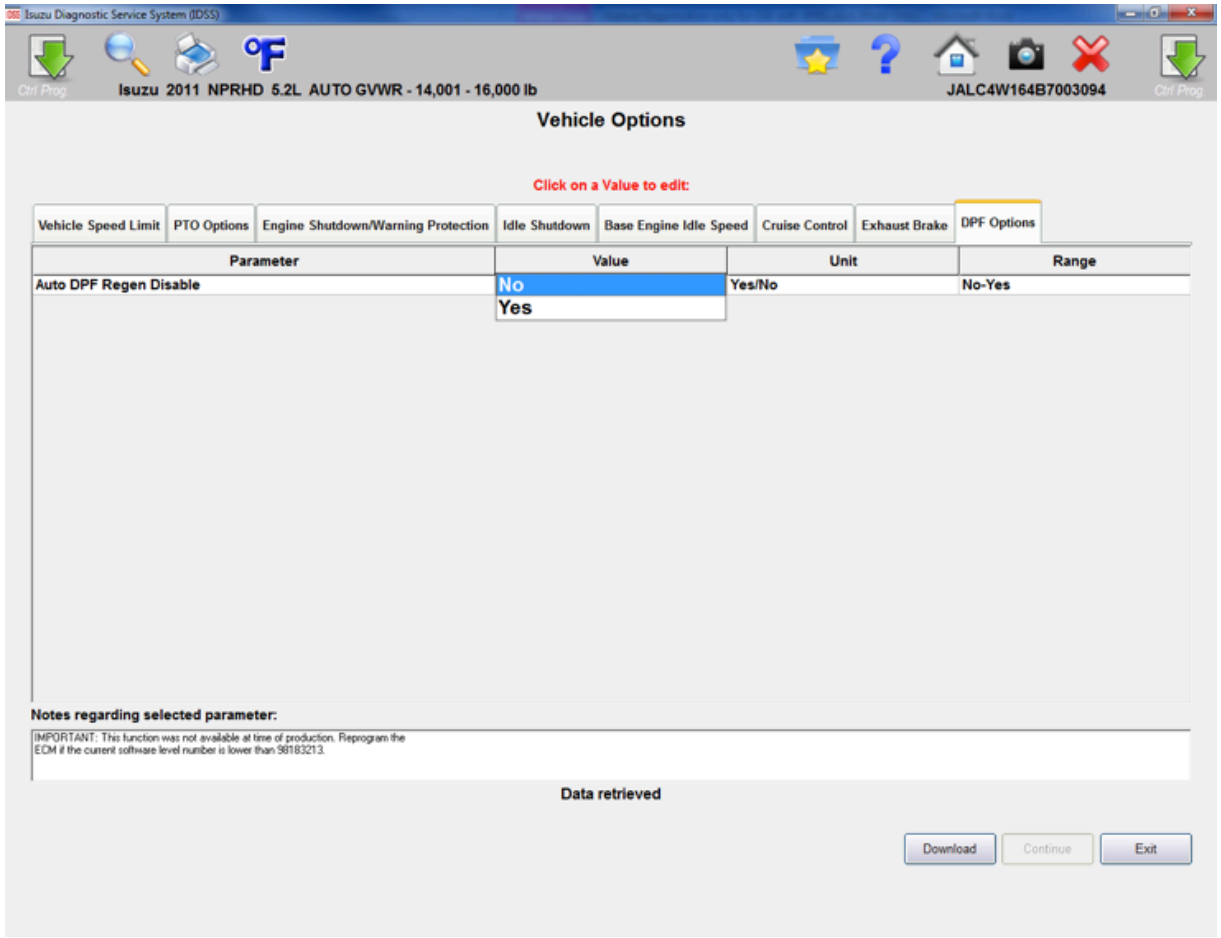
Selectable DPF Regeneration Only for use with Ground Support Equipment (GSE) vehicles (4HK1-TC only)

Certain applications require the Automatic Regeneration Function to be inhibited and Selectable DPF Regeneration only to be used. The ECM via the IDSS tool can be programed for this function.
IDSS Programing procedure:

Controller Programming\Engine Control Module\Vehicle Options\DPF Options

1. **Change Auto DPF Regen Disable from NO to YES.**
   a. **NO = Automatic Regen (factory default value)**
   b. **YES = Selectable DPF Regeneration only**

IDSS Programing Screen (4HK1-TC only)



Performing a Selectable DPF Regeneration

Performing a Selectable DPF Regeneration
Note: To ensure the selectable DPF regeneration will take shortest amount of time to complete, the engine should be at operating temperature before starting.

To start, the following steps are required:

- **Engine is running**
- **Transmission is in the Park position**
- **The parking brake is applied**

Press and hold the DPF regeneration switch. The MID will display "Checking PM Level", this will occur while the system is checking to see if a selectable DPF regeneration can be performed.

Release the switch, if the DPF does not need to be regenerated, the "Checking PM Level" light will stay out.
If there is enough soot accumulation in the DPF to allow a selectable DPF regeneration the MID will display "Selectable Regen Required".

Press and release the switch again, the MID will display "Regeneration In Progress". The engine RPM will raise and the exhaust brake will close. The Regeneration will take approximately 20 minutes to complete. When the engine RPM returns to idle, the DPF regeneration is completed.

Note: Once a Selectable DPF Regeneration has been started, it must be completed. Failure to complete will result in the Automatic and Emergency Running DPF Regeneration functions being disabled.

The time needed to complete regeneration differs depending on the outside temperature.

The exhaust brake or exhaust throttle is activated during DPF regeneration. The exhaust brake or exhaust throttle starting to operate or being disengaged will produce a sound, but this does not indicate a failure.

Performing a Selectable DPF Regeneration

During regeneration, white smoke may be temporarily produced from the exhaust pipe as a result of the combustion of particulate material; it does not indicate a failure. Selectable DPF Regeneration will complete earlier when performed immediately after driving rather than when the engine is cold.

The engine coolant temperature may rise during Selectable DPF Regeneration.

Caution To prevent a fire, make sure that there is no flammable material near the muffler, DPF and exhaust pipe. Remember that the temperature of exhaust gases is high enough to burn you.

Advice When operating the PTO for a long time (if your vehicle is so equipped) make sure that the regeneration required warning light or selectable Regeneration Required warning light (amber) is not turning on.

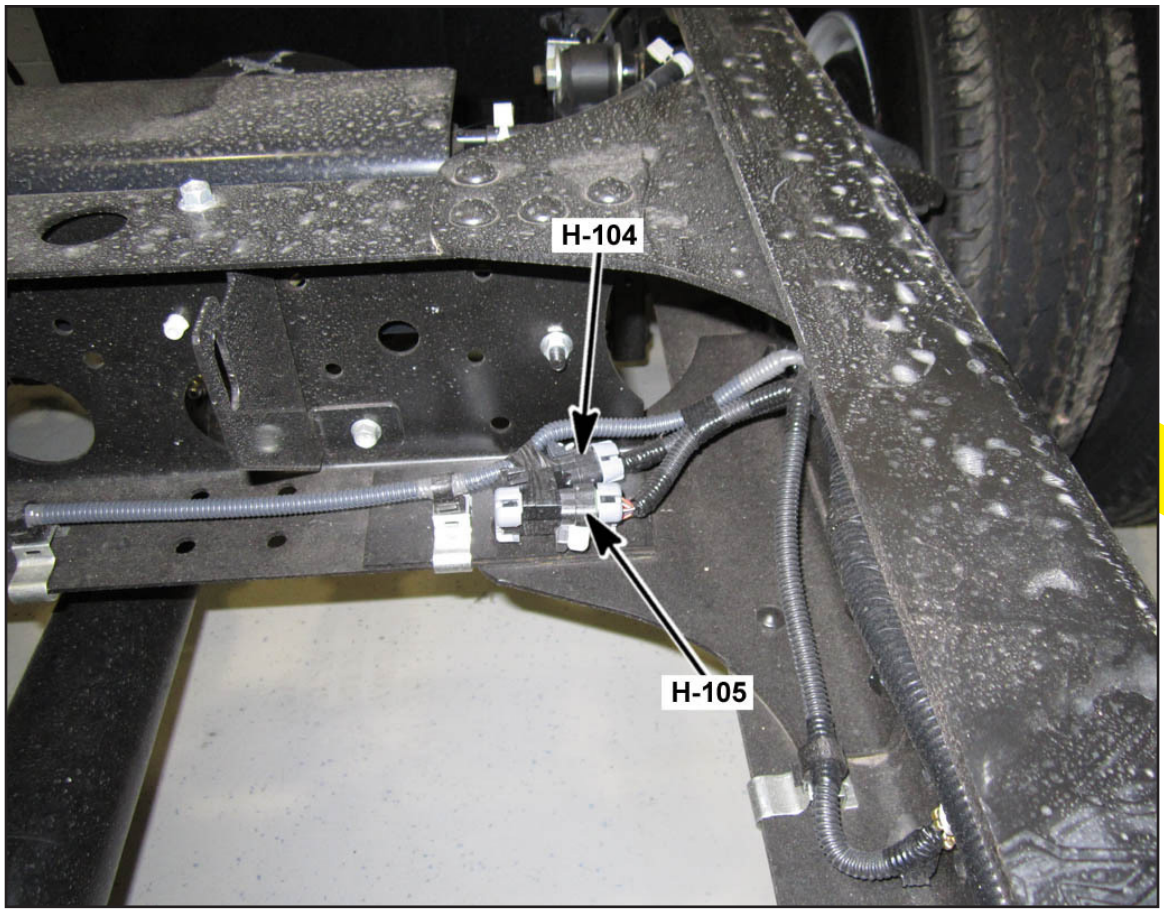
Once the Selectable DPF Regeneration is started, it cannot be switched to the “Running” regeneration if interrupted.

When the “Switch” regeneration is selected, end regeneration in a single operation if possible.

During the regeneration, the engine speed may vary, causing the exhaust brake valve to be deactivated. However, while the regeneration in progress indicator light (amber) appears regeneration is still taking place, so continue to perform regeneration until the message goes off.

Please see owner’s manual for additional details, cautions, advice, and notes.

PTO Switch Harness H-104 & H-105



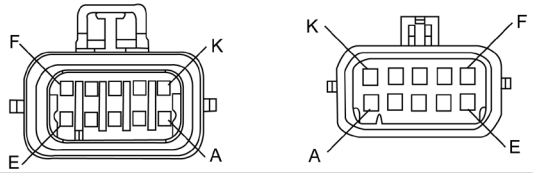
NOTE: Left Inner Side of the Frame Rail, Next to the Crossmember in Front of the Rear Axle.

Figure 18.31.1

H-104 Rear Frame Harness to the PTO

Additional information and connector drawings are available at www.powerandsignal.com and at http://connectors2.delphi.com/dcsgdmcs/homepage.aspx

Pins and seals vary with wire size. Parts listed at the right are for the mating connector 12045808. Please confirm parts via web sites listed above.



Connector Part Information			12065425 10-Way F (BLK)	Connector Part Information			12045808 10-Way M (BLK)
Pin	Wire Color	Circuit No.	Function	Pin	Wire Color	Circuit No.	Function
A	RED/BLK	IC180	Fuse F-18 Supply Voltage	A	RED	-	Fuse F-18 Supply Voltage
B	RED/GRN	IC168 (5.2L) IC468 (3.0L)	PTO Brake / Clutch Override Switch Signal				
C	RED/BLU	IC166 (5.2L) IC466 (3.0L)	Remote PTO Set Speed B Switch Signal				
D	GRY/RED	IC165 (5.2L) IC456 (3.0L)	Remote PTO Set Speed A Switch Signal				
E	BRN	IC167 (5.2L) IC467 (3.0L)	PTO Cab Control Disable Switch Relay				
F	PNK/BLK	IC169 (5.2L) IC469 (3.0L)	PTO Shut Down Switch Signal				
G	-	-	Not Used				
H	BLK	IZ07	Ground	H	BLK	-	Ground
J	RED/GRN	IC171 (5.2L) IC471 (3.0L)	Remote PTO Set Switch Signal				
K	RED/BLK	IC170 (5.2L) IC470 (3.0L)	Remote PTO Resume Switch Signal				

Termianl

PN	Wide range
12045773	1.0-0.08 mm2
12077628	0.5-0.35 mm2

TPA

PN
12124264
included with connector

Cable Seats

Loose PN	Wide range	Color
12048086	2.85-2.03	Dk.Red
12089678	2.15-1.60	White
12048087	1.70-1.29	Blue
12084193	1.009-0.995	Tan

Cavity Plug

PN	Cavity ID	Color
12059168	5.2mm	Dk.Red

Connector H104 - H105

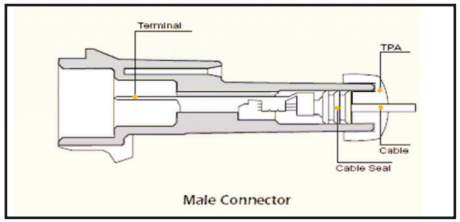
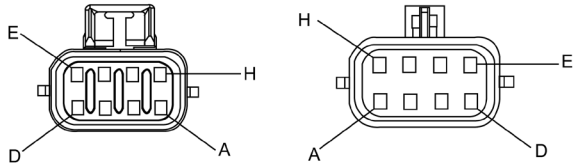


Figure 18.32.1

H-105 Rear Frame Harness to PTO Harness

Additional information and connector drawings are available at www.powerandsignal.com and at http://connectors2.delphi.com/dcsgdmcs/homepage.aspx

Pins and seals vary with wire size. Parts listed at the right are for the mating connector 12045808. Please confirm parts via web sites listed above.



Connector Part Information			12047937 8-Way F (BLK)	Connector Part Information			12047931 8-Way M (BLK)
Pin	Wire Color	Circuit No.	Function	Pin	Wire Color	Circuit No.	Function
A	BLK/WHT	IC172 (5.2L) IC472 (3.0L)	PTO Enabled Relay Signal				
B	PNK/GRN	IC173 (5.2L) IC473 (3.0L)	PTO Enabled Relay Control				
C	PNK	IC181 (5.2L) IC481 (3.0L)	PTO Engage Switch Signal				
D	BLU/YEL	IC188	Remote PTO Switch				
E	BLU	IC37 (5.2L) IC337 (3.0L)	PTO Throttle Sensor Reference Voltage				
F	YEL	IC38 (5.2L) IC338 (3.0L)	PTO Throttle Sensor Signal				
G	BLU/RED	IC39 (5.2L) IC339 (3.0L)	PTO Throttle Sensor Low Reference				
H	BLU/ORN	IC187	Remote PTO Resume Switch				

Figure 18.33.1

Termianl

PN	Wide range
12045773	1.0-0.08 mm2
12077628	0.5-0.35 mm2

TPA

PN
12124264
included with connector

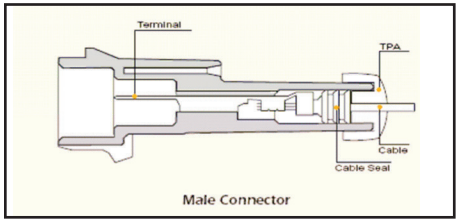
Cable Seats

Loose PN	Wide range	Color
12048086	2.85-2.03	Dk.Red
12089678	2.15-1.60	White
12048087	1.70-1.29	Blue
12084193	1.009-0.995	Tan

Cavity Plug

PN	Cavity ID	Color
12059168	5.2mm	Dk.Red

Connector H104 - H105



Power Take-Off Switch and Vehicle Speed Sensor2
Automatic Transmission

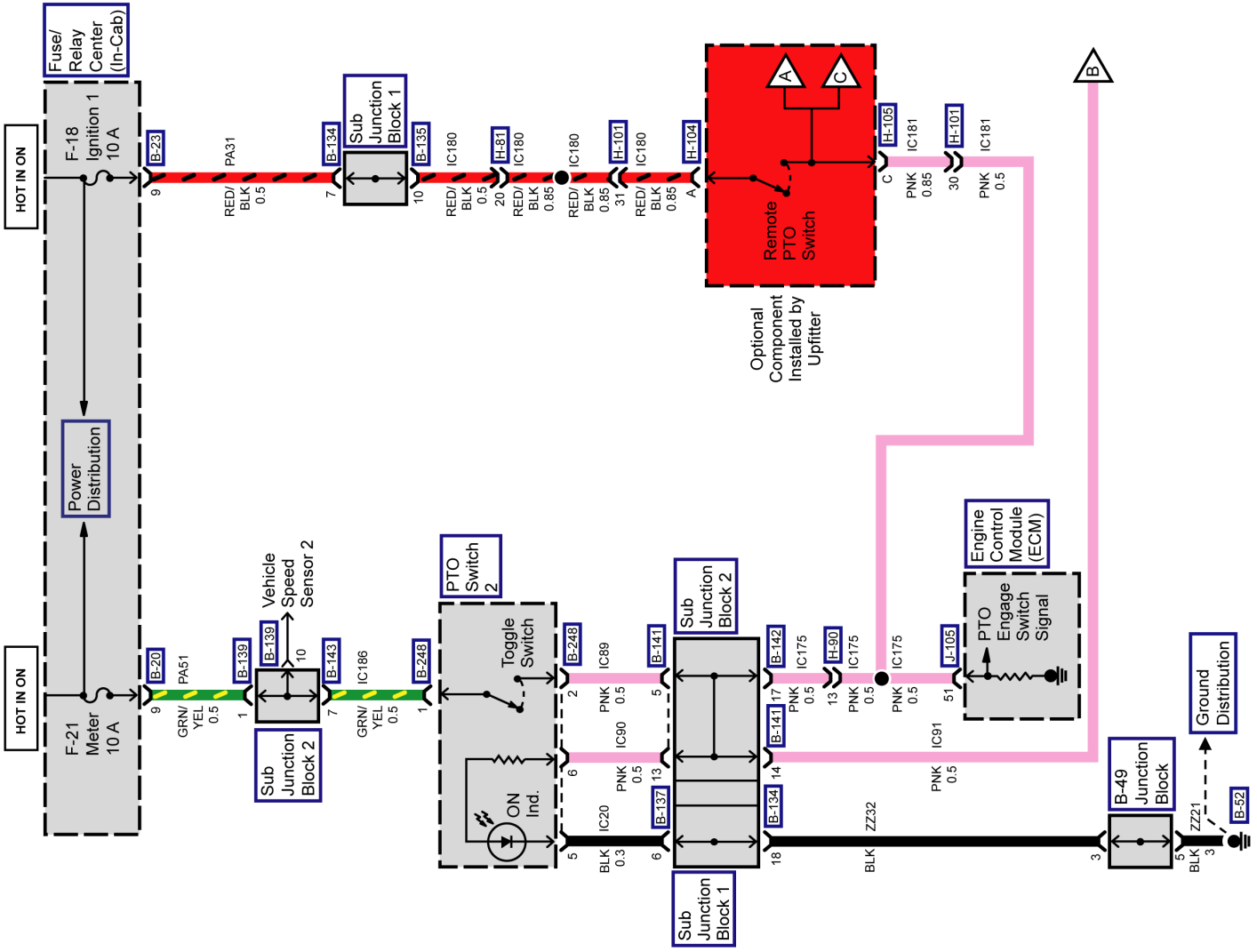


Figure 18.34.1

PTO Resume, Disable and Set Switch

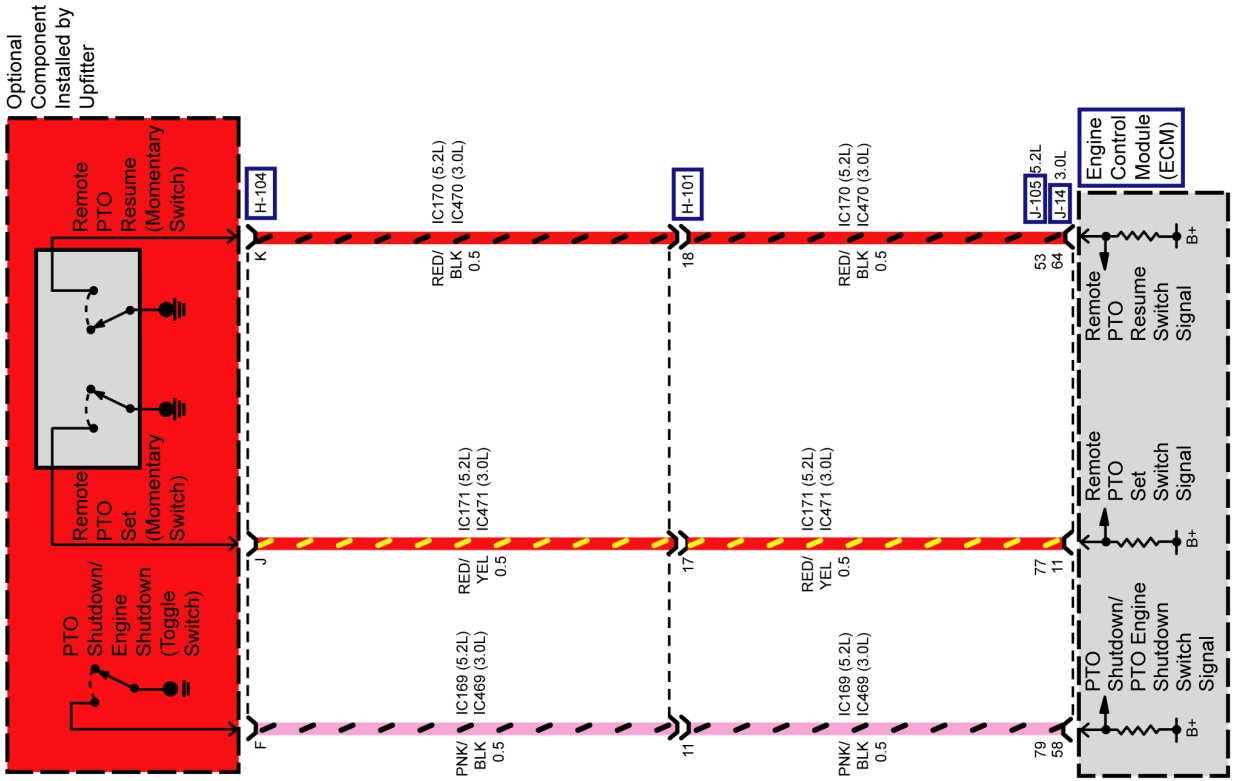


Figure 18.35.1

Brake Clutch Override, Cab Disable, Set A and B Switches

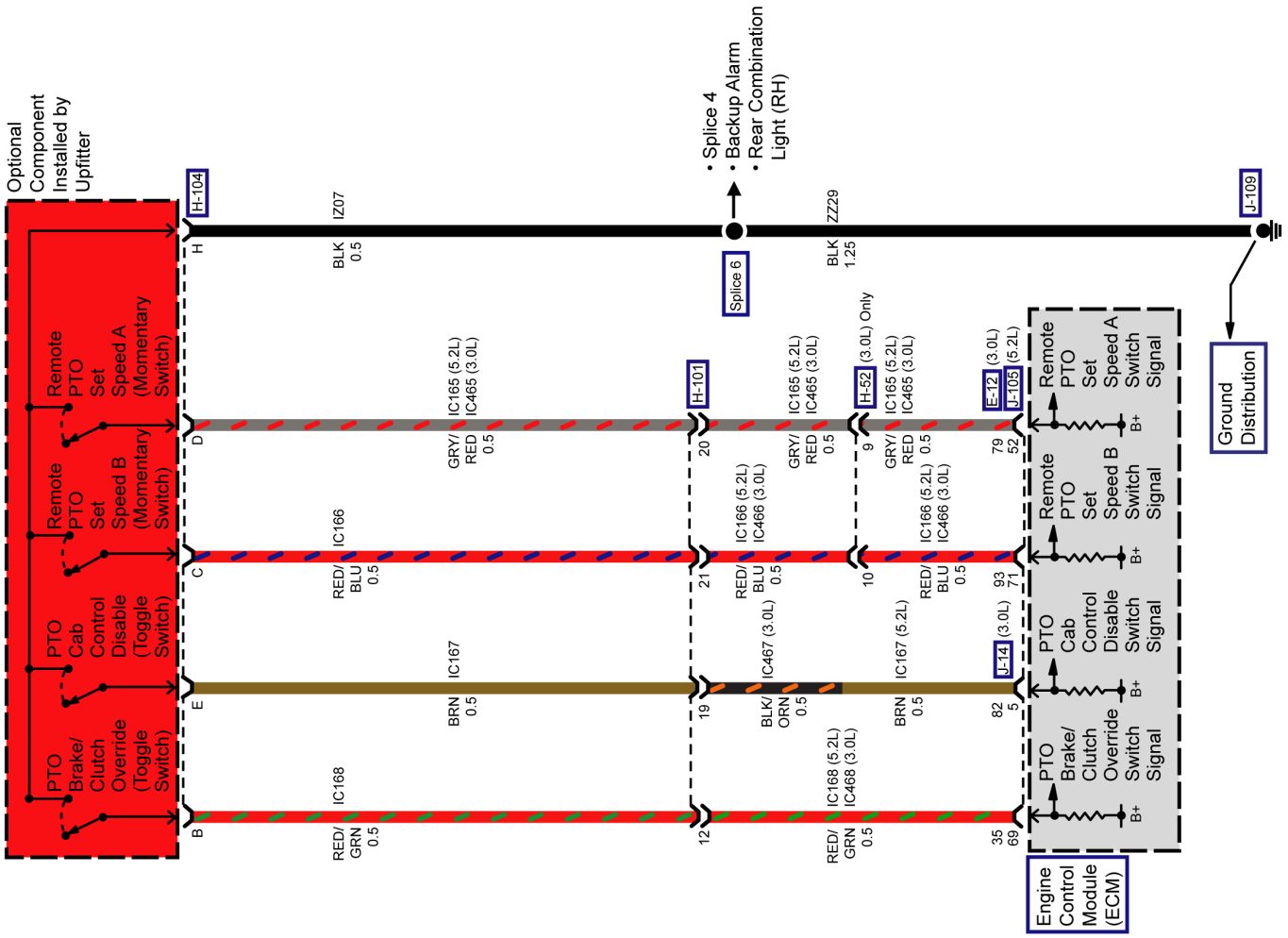


Figure 18.36.1

Power Take-Off Enable Relay
Automatic Transmission

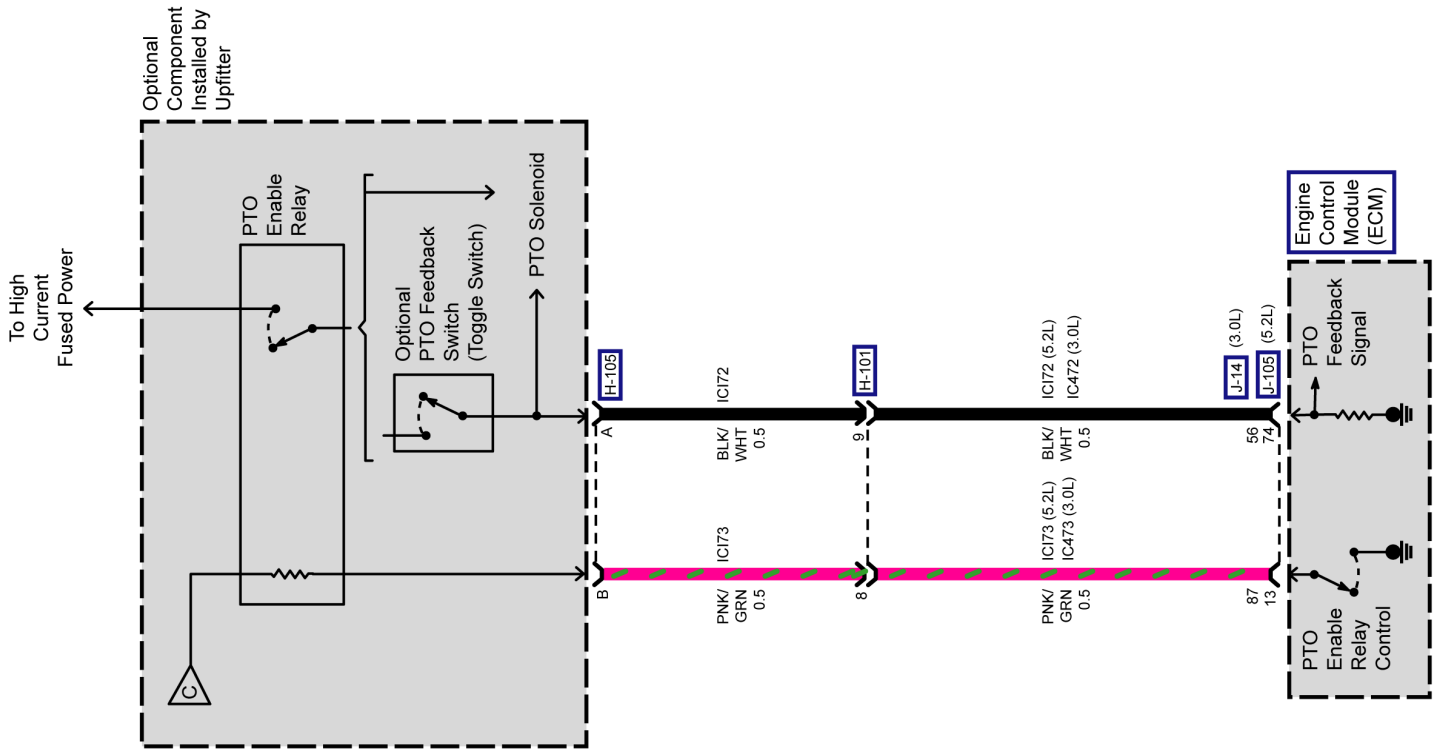


Figure 18.37.1

Power Take Off Set Resume Switches (Up-Down)

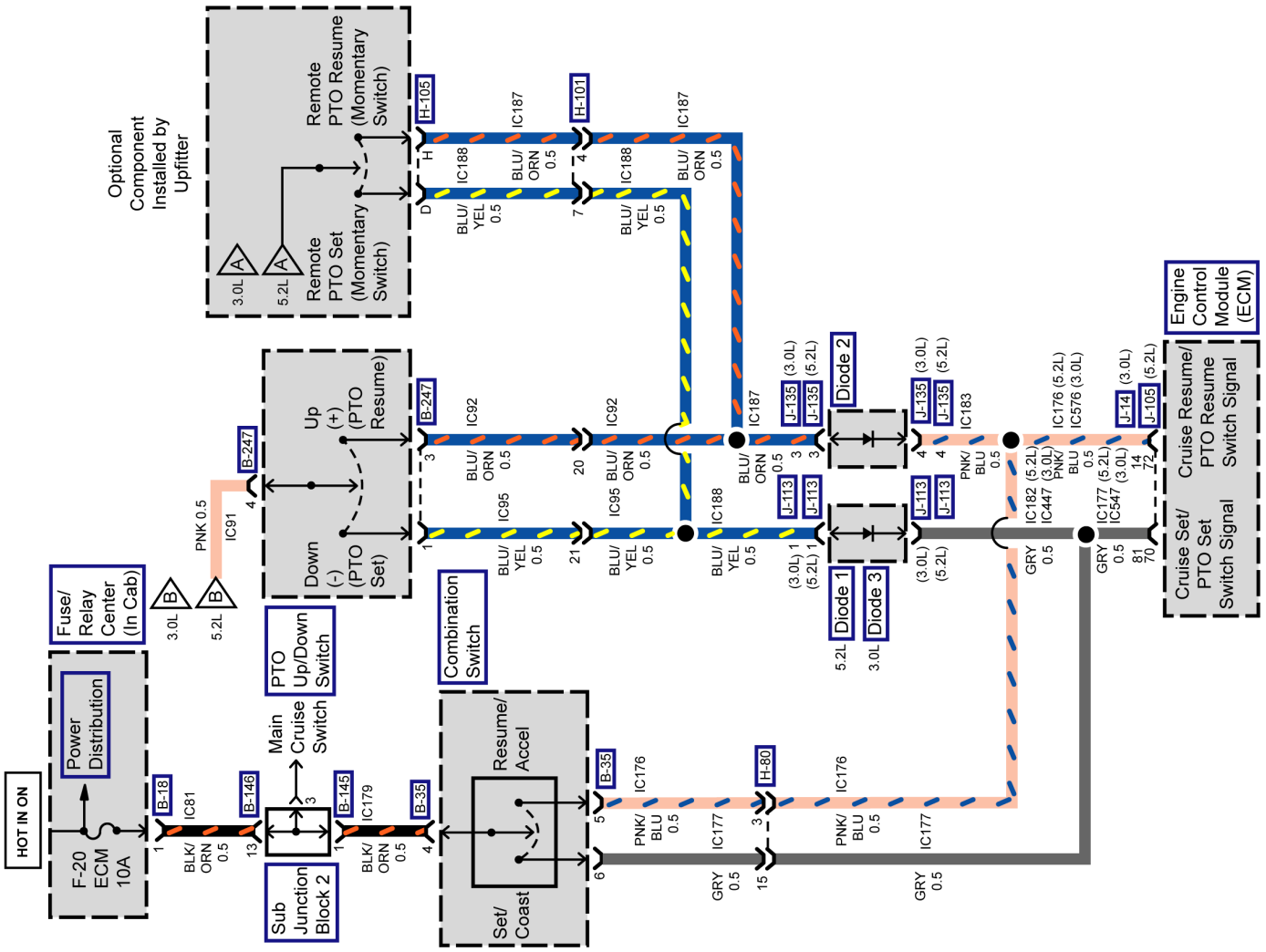


Figure 18.38.1

Power Take-Off Throttle Sensor - 5.2L

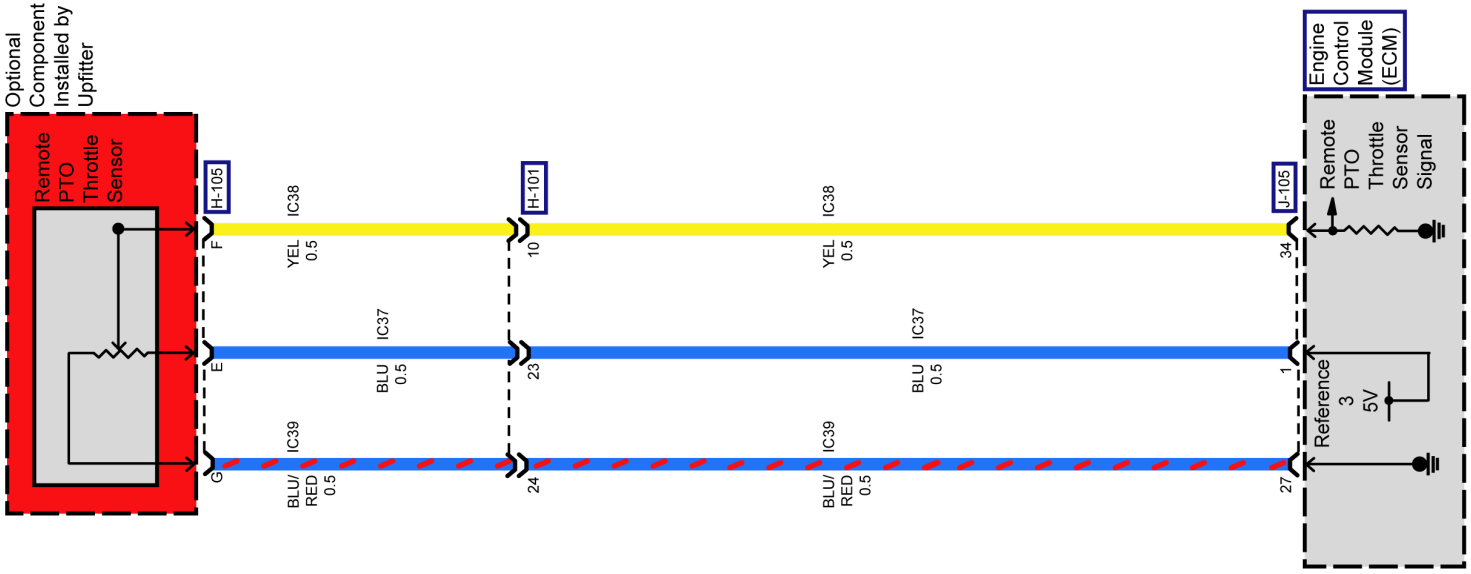


Figure 18.39.1

Power Take-Off Throttle Sensor - 3.0L

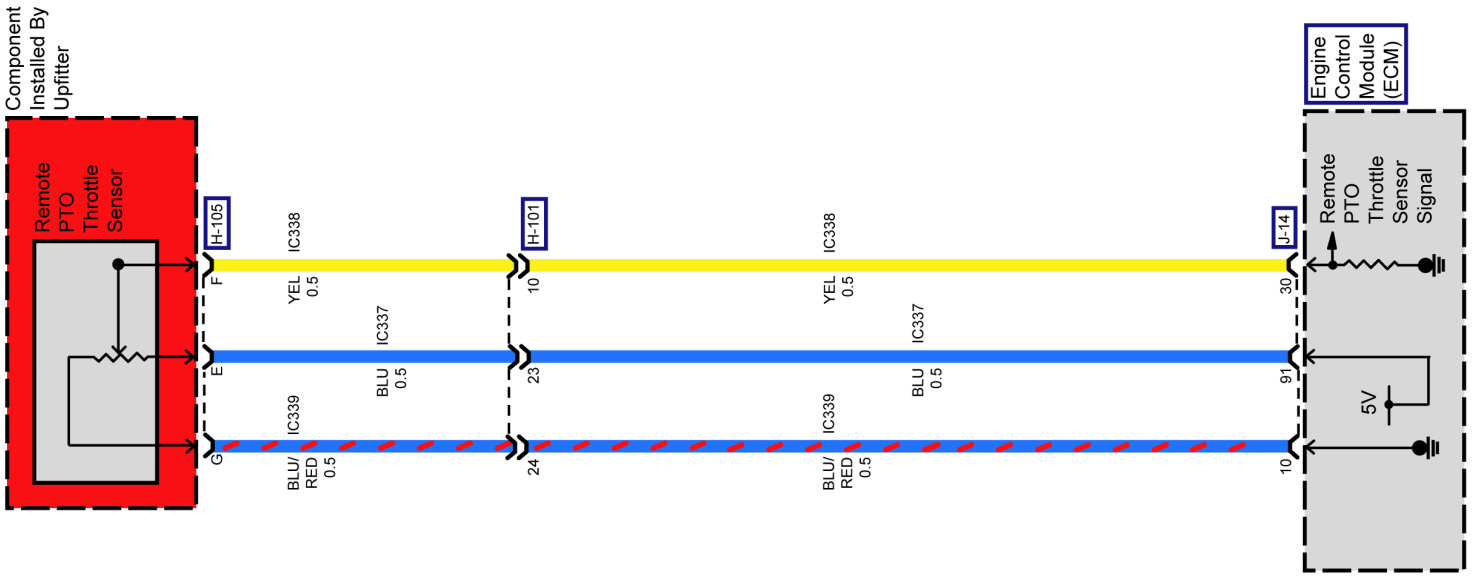


Figure 18.40.1

PTO Pressure and Lubrication Port Locations

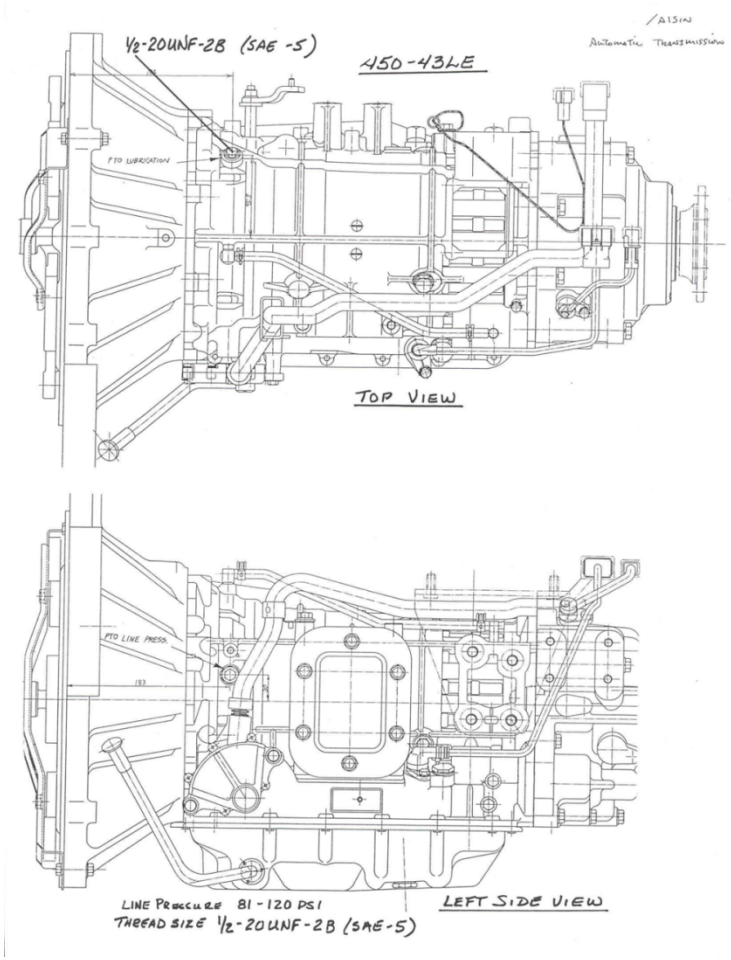
Aisin Transmission

Figure 18.41.1

Transmission Model by Model Year and Vehicle Model

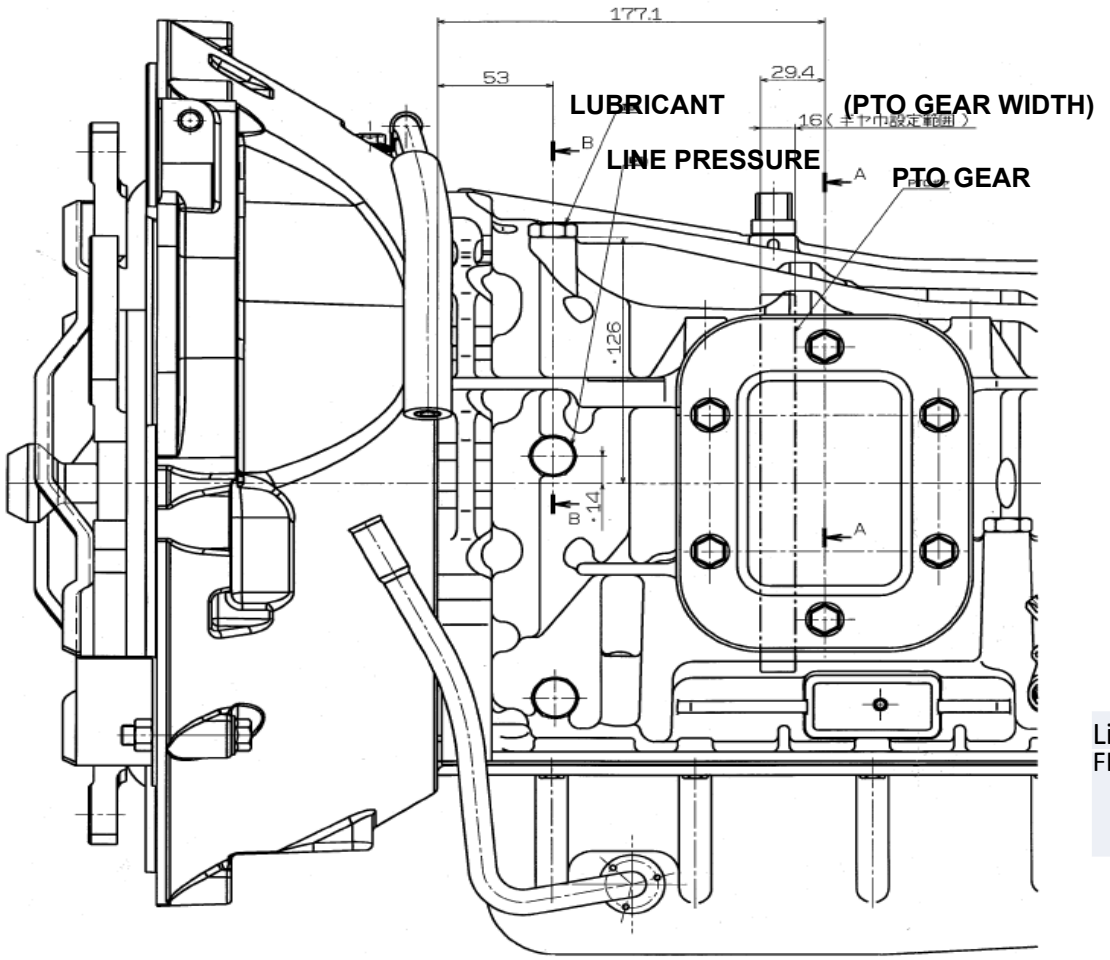
Transmission Model	Engine Model	Model Year	Model
A450	4HE1-TC	1999-2004	NPR NPR-HD NQR NRR
A450	4HK1-TC	2005-2007	NPR NPR-HD NQR NRR
A460	4JJ1-TC	2011-2015	NPR
A465	4HK1-TC	2007-2016	NPR-HD NPR-XD NQR NRR

Figure 18.42.1



A450

Figure 18.43.1



A460

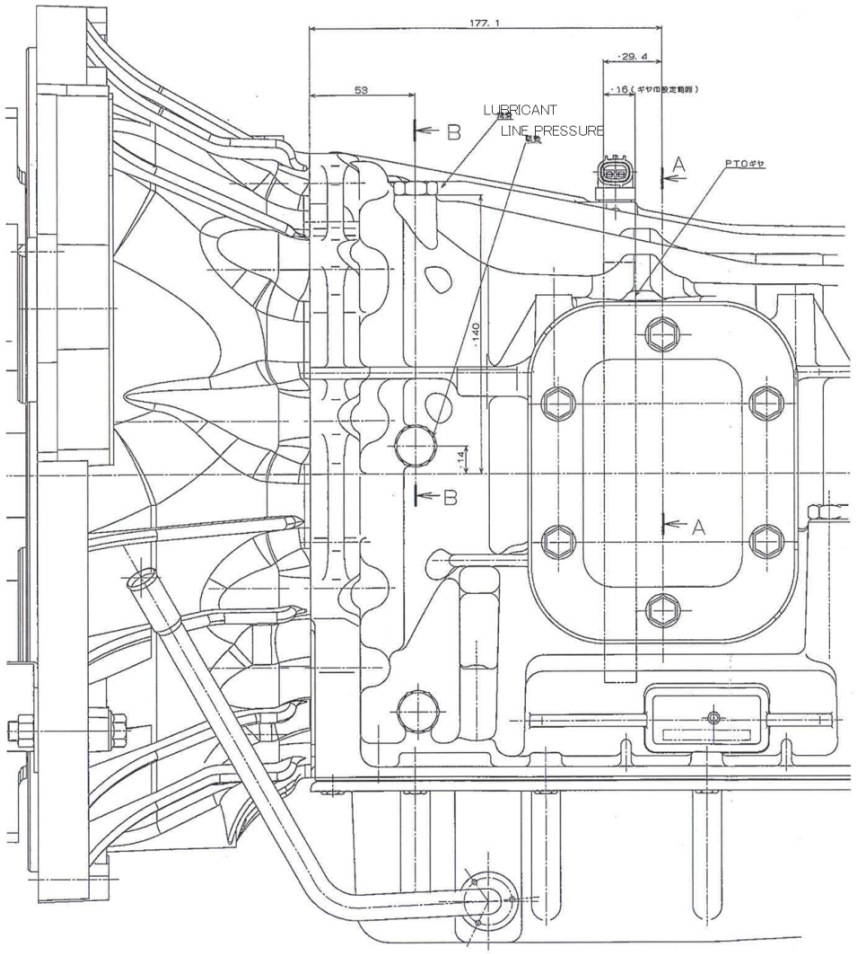
Line pressure: 261PSI (1.8MPa)

FIXING TORQUE:

Nominal 15.5 ft-lb (21Nm)

14.0-17.7 ft-lb (19-24 Nm)

Figure 18.44.1



A465

Line pressure: 261PSI (1.8MPa)

FIXING TORQUE:

Nominal 15.5 ft-lb (21Nm)

14.0-17.7 ft-lb (19-24 Nm)

Figure 18.45.1

A460 and A465 Transmission Opening Diagram

Aisin A460 and A465 Automatic Torque Converter Lock Up Function.

In either the Stationary Preset PTO Mode (A460 and A465) or Stationary Variable PTO Mode (A460 and A465), when engine rpm exceeds 1200 RPM, the torque converter will lock up. The engine rpm can not be modified and the lockup function cannot be turned off. Please note that with PTO applications that operate around 1200 RPM, the transmission software holds the torque converter in lockup until engine speed falls below 1100 RPM

The lock up function will cancel if the transmission shift lever is moved from the park or neutral positions
which will remove the trasmission from the stationary mode.

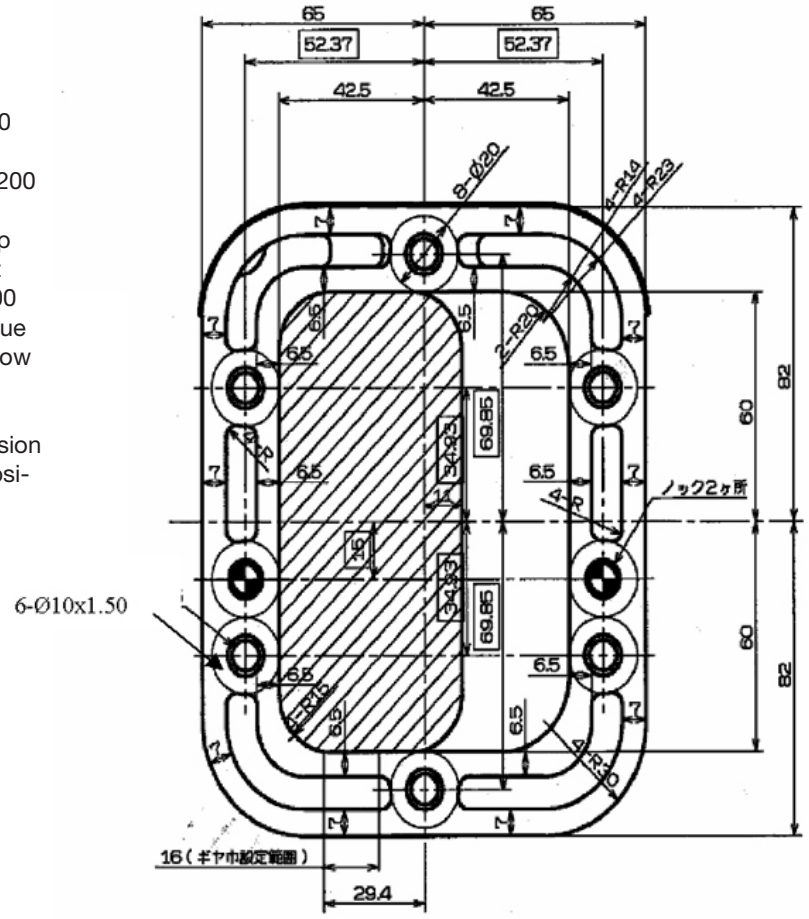


Figure 18.46.1

Note :The document in this section is for the 2014 Model Year NPR ECO MAX 12,000 GVW. The "Currently Available" model year chassis are included in this book.

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), and Canadian On-Road Vehicle and Engine Emission Regulations. 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 the 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.

Note :The document in this section is for the 2014 Model Year NPR ECO MAX 12,000 GVW. The "Currently Available" model year chassis are included in this book.

INTRODUCTION

This document contains information relative to conformance of this incomplete vehicle with the following:

Part I – FEDERAL MOTOR VEHICLE SAFETY STANDARDS, AND CANADA MOTOR VEHICLE SAFETY STANDARDS

Part II – U.S. EPA, CALIFORNIA, AND CANADIAN EXHAUST EMISSION REQUIREMENTS

If supplemental technical information is required to support this document, go to the Body Builder website located at http://www.isuzutruckservice.com/ , or call 1-770-740-1620 Ext.262 (East Coast) or 1-714-935-9327 (West Coast).

PART I

This section contains a list of Canada Motor Vehicle Safety Standards (CMVSS), and Federal Motor Vehicle Safety Standards (FMVSS), followed by a section entitled "Statements Regarding Canada Motor Vehicle Safety Standards (CMVSS), and Federal Motor Vehicle Safety Standards (FMVSS)". An appropriate statement of applicability is made for each standard, and by vehicle model as it relates to the incomplete vehicle.

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 completed, will conform to CMVSS 106 and FMVSS 106, Brake Hoses, if no alterations are made in the brake hose assemblies supplied by Isuzu Motors.**

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 105 and FMVSS 105, Hydraulic 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 Canada Motor Vehicle Safety Regulations, and Federal Motor Vehicle Safety Regulations and 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.

Note :The document in this section is for the 2014 Model Year NPR ECO MAX 12,000 GVW. The "Currently Available" model year chassis are included in this book.

PART I – CHART A

LIST OF CANADA MOTOR VEHICLE SAFETY STANDARDS (CMVSS), AND
FEDERAL MOTOR VEHICLE SAFETY STANDARDS (FMVSS), APPLICABLE TO
DIESEL – FUELED TRUCKS WITH A GVWR GREATER THAN 4536 kg (10,000 lb)

SEE STATEMENTS REGARDING CMVSS AND FMVSS ON PAGES THAT FOLLOW

CMVSS No.	FMVSS No.	TITLE	MODEL *1	
			NPR Truck	NPR Stripped Chassis for Walk-in Van
101	101	Controls and displays with a GVWR of more than 4536 kg (10,000 lb)	1	3
102	102	Transmission shift lever sequence, starter interlock and transmission braking effect	1	1
103	103	Windshield defrosting and defogging systems	1	3
104	104	Windshield wiping and washing systems	1	3
105	105	Hydraulic brake systems	2	2
106	106	Brake hoses	1	1
108	108	Lamps, reflective devices and associated equipment	2	3
111	111	Rearview mirrors	1	3
113	113	Hood latch system	1	3
115	Part 565 *2	Vehicle Identification Number	1	2
116	116	Motor-vehicle brake fluids	1	1
120	120	Tire selection and rims	2	2
121	121	Air brake systems	–	–
124	124	Accelerator control systems	1	1
205	205	Glazing materials	1	3
206	206	Door locks and door retention components	1	3
207	207	Seating systems	1	3
208	208	Occupant Crash Protection	1	3
209	209	Seat belt assemblies	1	3
210	210	Seat belt assembly anchorages	1	3
213.4	213	Child restraint systems	3	3
302	302	Flammability of interior materials	1	3

***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.**

***2 CFR Title 49 Transportation Part 565**

Note :The document in this section is for the 2014 Model Year NPR ECO MAX 12,000 GVW. The "Currently Available" model year chassis are included in this book.

Statements Regarding Canada Motor Vehicle Safety Standards (CMVSS), and Federal Motor Vehicle Safety Standards (FMVSS).

CMVSS 101 and FMVSS 101 – CONTROLS AND DISPLAYS

TYPE 1 **The following statement is applicable to the following incomplete vehicle model:**
• NPR Truck

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
- Brake failure warning
- * Brake failure displays
- Clutch
- Driver's sunvisor
- Electrical charge indicator
- Engine coolant temperature display
- Engine idle speed control
- Fuel level display
- Hazard warning control & indicator
- Master lighting switch (includes clearance lamp, identification lamp, and tail lamp control)
- Heating & air conditioning system control
- Heating system & air conditioning system fan
- Gear position display
- High beam indicator & control
- DPF (Diesel Particulate Filter) Gauge
- Horn control
- Ignition switch (engine start & stop control)
- Illumination intensity control
- Low fuel indicator
- Manual/automatic transmission shift lever
- * Odometer
- Engine oil pressure display
- Service brake
- * Speedometer
- Steering wheel
- Turn signal, control & indicator
- Windshield defrosting & defogging controls
- Windshield washer control
- Windshield wiper control
- Anti-lock brake failure warning display
- Multi information display (MID)
- DEF (Diesel Exhaust Fluid) Gauge

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.

TYPE 3 **The following statement is applicable to the following incomplete vehicle model:**
• NPR Stripped Chassis for Walk-in Van

Conformity with CMVSS 101 and FMVSS 101 cannot be determined based upon the components supplied on the incomplete vehicle, and Isuzu Motors makes no representation to conformity with the standard.

CMVSS 102 and FMVSS 102 – TRANSMISSION SHIFT LEVER SEQUENCE, STARTER INTERLOCK AND TRANSMISSION BRAKING EFFECT

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)

CMVSS 103 and FMVSS 103 – WINDSHIELD DEFROSTING AND DEFOGGING SYSTEMS

TYPE 1 **The following statement is applicable to the following incomplete vehicle model:**
• NPR Truck

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

TYPE 3 **The following statement is applicable to the following incomplete vehicle model:**
• NPR Stripped Chassis for Walk-in Van

Conformity with CMVSS 103 and FMVSS 103 cannot be determined based upon the components supplied on the incomplete vehicle, and Isuzu Motors makes no representation to conformity with the standard.

Note :The document in this section is for the 2014 Model Year NPR ECO MAX 12,000 GVW. The "Currently Available" model year chassis are included in this book.

CMVSS 104 and FMVSS 104 – WINDSHIELD WIPING AND WASHER SYSTEMS

TYPE 1 **The following statement is applicable to the following incomplete vehicle model:**
• NPR Truck

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 wiping and washing 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

TYPE 3 **The following statement is applicable to the following incomplete vehicle model:**
• NPR Stripped Chassis for Walk-in Van

Conformity with CMVSS 104 and FMVSS 104 cannot be determined based upon the components supplied on the incomplete vehicle, and Isuzu Motors makes no representation to conformity with the standard.

CMVSS 105 and FMVSS 105 – HYDRAULIC BRAKE SYSTEMS

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:

Application	Maximum Center of Gravity millimeter (inches) above ground
NPR Truck and Stripped Chassis	1600 mm (63")

This center of gravity limit is for conformity to CMVSS 105 and FMVSS 105. For body installation guidance, please see Isuzu body builder guide.

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

Note :The document in this section is for the 2014 Model Year NPR ECO MAX 12,000 GVW. The "Currently Available" model year chassis are included in this book.

CMVSS 106 and FMVSS 106 – BRAKE HOSES

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 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 (if equipped):

- Hydraulic Air, and Vacuum Brake Hoses
- Hoses and hose end fittings
- Labeling requirements
- Brake Hose Assemblies – and Brake Hose End Fittings

CMVSS 108 and FMVSS 108 – LAMPS, REFLECTIVE DEVICES AND ASSOCIATED EQUIPMENT

TYPE 2 **The following statement is applicable to the following incomplete vehicle model:**
• NPR Truck

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) 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)	Turn signal flasher
Headlamps (Headlamps or Daytime running lamps)	Turn signal lamps (front)
	Turn signal operating unit
Side marker lamp (Front)	Vehicle hazard warning signal operating unit
Side reflex reflectors (front)	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 CMVSS 108 and FMVSS 108.

      License plate lamp

      Rear combination lamps (tail lamps, stop lamps, turn signal lamps and back-up lamps)

      Reflex reflectors (rear)

   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.

TYPE 3 **The following statement is applicable to the following incomplete vehicle model:**
• NPR Stripped Chassis for Walk-in Van

Conformity with CMVSS 108 and FMVSS 108 cannot be determined based upon the components supplied on the incomplete vehicle, and Isuzu Motors makes no representation to conformity with the standard.

Note :The document in this section is for the 2014 Model Year NPR ECO MAX 12,000 GVW. The "Currently Available" model year chassis are included in this book.

CMVSS 111 and FMVSS 111 – REARVIEW MIRRORS

TYPE 1 **The following statement is applicable to the following incomplete vehicle model:**
• NPR Truck

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;

Model	Width Limit millimeter (inches)
NPR	2438 mm (96")

TYPE 3 **The following statement is applicable to the following incomplete vehicle model:**
• NPR Stripped Chassis for Walk-in Van

Conformity with CMVSS 111 and FMVSS 111 cannot be determined based upon the components supplied on the incomplete vehicle, and Isuzu Motors makes no representation to conformity with the standard.

CMVSS 113 and FMVSS 113 – HOOD LATCH SYSTEM

TYPE 1 **The following statement is applicable to the following incomplete vehicle model:**
• NPR Truck

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 systems, if equipped which may include but are not limited to:

- Hood latch (catch) assembly
- Hood latch support assembly
- Hood latch cable release system including controls
- Hood latch pilot
- Hood latch striker plate (hook) and reinforcements

TYPE 3 **The following statement is applicable to the following incomplete vehicle model:**
• NPR Stripped Chassis for Walk-in Van

Conformity with CMVSS 113 and FMVSS 113 cannot be determined based upon the components supplied on the incomplete vehicle, and Isuzu Motors makes no representation to conformity with the standard.

CMVSS 115 – VEHICLE IDENTIFICATION NUMBER

TYPE 1 **The following statement is applicable to the following incomplete vehicle model:**
• NPR Truck

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
- VIN plate fasteners
- The vehicle identification number

TYPE 2 **The following statement is applicable to the following incomplete vehicle model:**
• NPR Stripped Chassis for Walk-in Van

This incomplete vehicle when completed will conform to CMVSS 115 provided it is completed in accordance with the following specific conditions by the (intermediate and) final stage manufacturer:
the vehicle identification number printed on the label affixed to the cover of this document is mounted and displayed in accordance with the requirements of this Standard.

Note :The document in this section is for the 2014 Model Year NPR ECO MAX 12,000 GVW. The "Currently Available" model year chassis are included in this book.

PART 565 – VEHICLE IDENTIFICATION NUMBER (VIN) REQUIREMENTS

TYPE 1 **The following statement is applicable to the following incomplete vehicle model:**
• NPR Truck

This incomplete vehicle, when completed will conform to Part 565 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

TYPE 2 **The following statement is applicable to the following incomplete vehicle model:**
• NPR Stripped Chassis for Walk-in Van

This incomplete vehicle when completed will conform to Part 565 provided it is completed in accordance with the following specific conditions by the (intermediate and) final stage manufacturer:
the vehicle identification number printed on the label affixed to the cover of this document is mounted and displayed in accordance with the requirements of this Standard.

CMVSS 116 and FMVSS 116 – MOTOR VEHICLE BRAKE FLUIDS

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.

CMVSS 120 and FMVSS 120 – TIRE SELECTION AND RIMS FOR VEHICLES OTHER THAN PASSENGER CARS

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 120 and FMVSS 120

Providing:

A. No alterations are made which affect the function, physical or mechanical properties, environment, location or vital spatial clearances of the components, assemblies or systems including but not limited to:

Wheels	Tires

B. GVWR, GAWR front and rear weight ratings as listed on the incomplete vehicle label affixed to the front cover of this document must not be exceeded.

C. The tire and wheel information shown on the incomplete vehicle label must be transferred to the final stage manufacturer's Certification label or Tire Information Label providing no equipment changes are made.

CMVSS 124 and FMVSS 124 – ACCELERATOR CONTROL SYSTEMS

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

CMVSS 205 and FMVSS 205 – GLAZING MATERIALS

TYPE 1 **The following statement is applicable to the following incomplete vehicle model:**
• NPR Truck

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.

TYPE 3 **The following statement is applicable to the following incomplete vehicle model:**
• NPR Stripped Chassis for Walk-in Van

Conformity with CMVSS 205 and FMVSS 205 cannot be determined based upon the components supplied on the incomplete vehicle, and Isuzu Motors makes no representation to conformity with the standard.

Note :The document in this section is for the 2014 Model Year NPR ECO MAX 12,000 GVW. The "Currently Available" model year chassis are included in this book.

CMVSS 206 and FMVSS 206 – DOOR LOCKS AND DOOR RETENTION COMPONENTS

TYPE 1 **The following statement is applicable to the following incomplete vehicle model:**
• NPR Truck

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.

TYPE 3 **The following statement is applicable to the following incomplete vehicle model:**
• NPR Stripped Chassis for Walk-in Van

Conformity with CMVSS 206 and FMVSS 206 cannot be determined based upon the components supplied on the incomplete vehicle, and Isuzu Motors makes no representation to conformity with the standard.

CMVSS 207 and FMVSS 207 – ANCHORAGE OF SEATS

TYPE 1 **The following statement is applicable to the following incomplete vehicle model:**
• NPR Truck

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

TYPE 3 **The following statement is applicable to the following incomplete vehicle model:**
• NPR Stripped Chassis for Walk-in Van

Conformity with CMVSS 207 and FMVSS 207 cannot be determined based upon the components supplied on the incomplete vehicle, and Isuzu Motors makes no representation to conformity with the standard.

CMVSS 208 and FMVSS 208 – OCCUPANT CRASH PROTECTION

TYPE 1 **The following statement is applicable to the following incomplete vehicle model:**
• NPR Truck

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.

TYPE 3 **The following statement is applicable to the following incomplete vehicle model:**
• NPR Stripped Chassis for Walk-in Van

Conformity with CMVSS 208 and FMVSS 208 cannot be determined based upon the components supplied on the incomplete vehicle, and Isuzu Motors makes no representation to conformity with the standard.

CMVSS 209 and FMVSS 209 – SEAT BELT ASSEMBLIES

TYPE 1 **The following statement is applicable to the following incomplete vehicle model:**
• NPR Truck

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 belt anchorages
- Owner manual instructions
- Seat assemblies
- Seat anchorages

TYPE 3 **The following statement is applicable to the following incomplete vehicle model:**
• NPR Stripped Chassis for Walk-in Van

Conformity with CMVSS 209 and FMVSS 209 cannot be determined based upon the components supplied on the incomplete vehicle, and Isuzu Motors makes no representation to conformity with the standard.

CMVSS 210 and FMVSS 210 – SEAT BELT ASSEMBLY ANCHORAGES

TYPE 1 **The following statement is applicable to the following incomplete vehicle model:**
• NPR Truck

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 assemblies
- Floor pan assembly
- Seat position/adjustment capability
- Seat belt routing
- Seat belt anchorage brackets, plates, and – reinforcements
- Child restraint system including anchorages, – brackets, plates and reinforcements

TYPE 3 **The following statement is applicable to the following incomplete vehicle model:**
• NPR Stripped Chassis for Walk-in Van

Conformity with CMVSS 210 and FMVSS 210 cannot be determined based upon the components supplied on the incomplete vehicle, and Isuzu Motors makes no representation to conformity with the standard.

CMVSS 213.4 and FMVSS 213 – CHILD RESTRAINT SYSTEMS

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.

CMVSS 302 and FMVSS 302 – FLAMMABILITY OF INTERIOR MATERIALS

TYPE 1 **The following statement is applicable to the following incomplete vehicle model:**
• NPR Truck

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
Rear Organizer
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.

TYPE 3 **The following statement is applicable to the following incomplete vehicle model:**
• NPR Stripped Chassis for Walk-in Van

Conformity with CMVSS 302 and FMVSS 302 cannot be determined based upon the components supplied on the incomplete vehicle, and Isuzu Motors makes no representation to conformity with the standard.

Note :The document in this section is for the 2014 Model Year NPR ECO MAX 12,000 GVW. The "Currently Available" model year chassis are included in this book.

PART Ⅱ

U.S. EPA, CALIFORNIA, AND CANADIAN EXHAUST EMISSION REQUIREMENTS AND ON-BOARD DIAGNOSTIC SYSTEM (OBDⅡ) REQUIREMENTS

To assure that EPA California and Canada 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. Noise

(A) EMISSION RELATED COMPONENTS

TYPE 1 The following statement is applicable to all models of incomplete vehicles contained in this book (unless otherwise noted on the cover).

1. This incomplete vehicle, when completed, will conform to U.S. EPA, CALIFORNIA, AND CANADIAN EXHAUST EMISSION REQUIREMENTS 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), and installed by Isuzu Motors:

Air inlet system	Transmission Control Module (TCM)
Catalytic converter	Exhaust oxygen sensors (if equipped)
Coolant temperature sensor	Exhaust system
Crankcase emission control system	Fuel injection system
Diesel fuel injection components/controls	Fuel system
Engine assembly	Intake manifold
Engine electronics (ecm/pcm/vcm)	Turbocharger and associated equipment/controls
Engine speed sensor	MAF Sensor
EGR system	DPF (Diesel Particulate Filter) system
Exhaust emission control system	SCR (Selective Catalytic Reduction) system
Charge Air Cooler and related system	Tires

2. Cold tire pressure as listed for front and rear on the Incomplete Vehicle Label affixed to the front cover of this document must be maintained.
3. GVWR, GAWR front and rear weight ratings as listed on the Incomplete Vehicle Label affixed to the front cover of this document must not be exceeded.
4. NPR, incomplete vehicle, is certified using Federal and California chassis certification protocol and will require vehicle weight and frontal area restrictions to retain emission certification. It is the responsibility of the intermediate or final stage manufacturer to ensure that the maximum completed vehicle curb weight and frontal area specified by Isuzu Motors are not exceeded. The frontal area and unloaded vehicle weight information can be found on the Vehicle Emission Control Information label, which is located in the engine compartment.

Model	Maximum Curb Weight	Maximum Frontal Area
NPR Truck (GVW 12,000 lbs.)	9,660 lbs.	74.5 ft2
NPR Truck (GVW 13,000 lbs.)	8,660 lbs.	74.5 ft2
NPR Stripped Chassis for Walk-in Van (GVW 12,000 lbs.)	9,660 lbs.	74.5 ft2
NPR Stripped Chassis for Walk-in Van (GVW 13,000 lbs.)	8,660 lbs.	74.5 ft2

LABELS

TYPE 2 The following statement is applicable to all models of incomplete vehicles contained in this book (unless otherwise noted on the cover).

The emission control related information labels 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.

An “Ultra Low Sulfur Diesel Fuel Only“ label must be affixed, clearly visible, near the fuel fill opening.

- NPR Truck: The “Ultra Low Sulfur Diesel Fuel Only“ label is provided in the fuel fill parts box inside the cab.
- NPR Stripped Chassis for Walk-in Van: The “Ultra Low Sulfur Diesel Fuel Only“ label is provided in the shipped loose container.
  This container will be provided separate from the vehicle by Isuzu Commercial Truck of America, Inc.

(B) NOISE

CMVSS 1106 – EXTERIOR NOISE

TYPE 1 The following statement is applicable to the following incomplete vehicle model:
• NPR Truck

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)
Diesel Particulate Filter (DPF)	Selective Catalytic Reduction (SCR) System

B. Final compliance with CMVSS 1106 is the responsibility of the final stage manufacturer for any modifications, or added material, components, or systems.

TYPE 3 The following statement is applicable to the following incomplete vehicle model:
• NPR Stripped Chassis for Walk-in Van

Conformity with CMVSS 1106 cannot be determined based upon the components supplied on the incomplete vehicle, and Isuzu Motors makes no representation to conformity with the standard.

NPR-HD/NQR, and NRR Diesel and NPR/NPR-HD Gas Chassis
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.

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898235-2980

INTRODUCTION

This document contains information relative to conformance of this incomplete vehicle with the following:

Part I – FEDERAL MOTOR VEHICLE SAFETY STANDARDS, AND CANADA MOTOR VEHICLE SAFETY STANDARDS

Part II – U.S. EPA, CALIFORNIA, AND CANADIAN EXHAUST & EVAPORATIVE EMISSION REQUIREMENTS

Part III – CANADA INTERFERENCE CAUSING EQUIPMENT STANDARD

If supplemental technical information is required to support this document, go to the Body Builder website located at http://www.isuzutruckservice.com/ , or call 1-770-740-1620 Ext.262 (East Coast) or 1-714-935-9327 (West Coast).

PART I

This section contains a list of Canada Motor Vehicle Safety Standard (CMVSS), and Federal Motor Vehicle Safety Standards (FMVSS), followed by a section entitled "Statements Regarding Canada Motor Vehicle Safety Standards (CMVSS), and Federal Motor Vehicle Safety Standards (FMVSS). An appropriate statement of applicability is made for each standard, and by vehicle model as it relates to the incomplete vehicle.

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.

PART I – CHART A

LIST OF CANADA MOTOR VEHICLE SAFETY STANDARDS (CMVSS), AND
FEDERAL MOTOR VEHICLE SAFETY STANDARDS (FMVSS), 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	MODEL *1	
			NPR NPR-HD	NQR NRR
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	Part 565 *2	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

***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.**

***2 CFR Title 49 Transportation Part 565**

Statements Regarding Canada Motor Vehicle Safety Standards (CMVSS), and Federal Motor Vehicle Safety Standards (FMVSS).

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
- Brake failure warning
- * Brake failure displays
- Clutch
- Driver's sunvisor
- Electrical charge indicator
- Engine coolant temperature display
- Engine idle speed control
- Fuel level display
- Hazard warning control & indicator
- Master lighting switch (includes clearance lamp, identification lamp, and tail lamp control)
- Heating & air conditioning system control
- Heating system & air conditioning system fan
- Gear position display
- High beam indicator & control
- DPF (Diesel Particulate Filter) Gauge
- Horn control
- Ignition switch (engine start & stop control)
- Illumination intensity control
- Low fuel indicator
- Manual/automatic transmission shift lever
- * Odometer
- Engine oil pressure display
- Service brake
- * Speedometer
- Steering wheel
- Turn signal, control & indicator
- Windshield defrosting & defogging controls
- Windshield washer control
- Windshield wiper control
- Anti-lock brake failure warning display
- Multi information display (MID)
- DEF (Diesel Exhaust Fluid) Gauge

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.

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)

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

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 wiping and washing 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

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:

Application	Maximum Center of Gravity millimeter (inches) above ground
NPR/NPR-HD/NQR/NRR	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)

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 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:

Hydraulic Air, and Vacuum Brake Hoses
Hoses and hose end fittings
Labeling requirements

Brake Hose Assemblies – and Brake Hose End Fittings

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 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 CMVSS 108 and FMVSS 108.

      License plate lamp

      Rear combination lamps (tail lamps, stop lamps, turn signal lamps and back-up lamps)

      Reflex reflectors (rear)

   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.

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;

Model	Width Limit millimeter (inches)	Width Limit with 102″ wide mirror brackets millimeter (inches)
NPR/NPR-HD/NQR/NRR	2438 mm (96″)	2590 mm (102″)

CMVSS 113 and FMVSS 113 – HOOD LATCH SYSTEM
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 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 systems, if equipped which may include but are not limited to:

- Hood latch (catch) assembly
- Hood latch support assembly
- Hood latch cable release system including controls
- Hood latch pilot
- Hood latch striker plate (hook) and reinforcements

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
- VIN plate fasteners
- The vehicle identification number

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.

CMVSS 120 and FMVSS 120 – TIRE SELECTION AND RIMS FOR VEHICLES OTHER THAN PASSENGER CARS
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 120 and FMVSS 120

Providing:

A. No alterations are made which affect the function, physical or mechanical properties, environment, location or vital spatial clearances of the components, assemblies or systems including but not limited to:

Wheels Tires

B. GVWR, GAWR front and rear weight ratings as listed on the incomplete vehicle label affixed to the front cover of this document must not be exceeded.

C. The tire and wheel information shown on the incomplete vehicle label must be transferred to the final stage manufacturer's Certification label or Tire Information Label providing no equipment changes are made.

CMVSS 121 and FMVSS 121 – AIR BRAKE SYSTEMS
Applies to all models of incomplete vehicles equipped with Air Brakes and contained in this book

TYPE 3 **The following statement is applicable to NPR/NPR-HD and NQR/NRR of incomplete vehicles contained in this book (unless otherwise noted on the cover).**

Conformity with CMVSS 121 and FMVSS 121 cannot be determined based upon the components supplied on the incomplete vehicle, and ISUZU MOTORS makes no representation to the conformity with the standard.

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

GASOLINE VEHICLES
- Accelerator pedal and attachments
- Accelerator lever and supporting bracket assembly
- Accelerator return spring(s)

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.

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
Folding seat or seat back latch assembly
Seat adjuster assembly
Seat anchorage's brackets reinforcements, attachment hardware, etc.
Seat assembly
Seat or seat back latch assembly
Seat or seat back latch release control
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.

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 belt anchorages
- Owner manual instructions
- Seat assemblies
- Seat anchorages

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 assemblies
- Floor pan assembly
- Seat position/adjustment capability
- Seat belt routing
- Seat belt anchorage brackets, plates, and – reinforcements
- Child restraint system including anchorages, – brackets, plates and reinforcements

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.

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
Rear Organizer
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.

PART Ⅱ

U.S. EPA, CALIFORNIA, AND CANADIAN EXHAUST & EVAPORATIVE EMISSION REQUIREMENTS AND ON-BOARD DIAGNOSTIC SYSTEM (OBDⅡ/HD-OBD) REQUIREMENTS

To assure that U.S. EPA, California, and Canada emission certificate requirements and OBDⅡ/HD-OBD 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. Noise

(A) EMISSION RELATED COMPONENTS

TYPE 1 The following statement is applicable to all models of incomplete vehicles contained in this book (unless otherwise noted on the cover).

1. This incomplete vehicle, when completed, conforms to U.S. EPA, CALIFORNIA, AND CANADIAN EXHAUST & EVAPORATIVE EMISSION REQUIREMENTS 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), and installed by ISUZU Motors Limited:

Air inlet system
Catalytic converter
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
Charge Air Cooler and related system
Transmission Control Module (TCM)
Exhaust oxygen sensors (if equipped)
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
DPF (Diesel Particulate Filter) system (diesel engine)
SCR (Selective Catalytic Reduction) system (diesel engine)
Low Rolling Resistant Tires

* 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).

All Federal certified heavy duty vehicles are required to meet Federal Green House Gas (GHG) requirements with original tires. Please check the Vehicle Emission Label on drivers side door.

Isuzu's recommended tires for compliance to GHG requirements are:

for diesel powered vehicle

Tire size	Tire maker	Tire name	Rolling resistance
LT 215/85R16E	BRIDGESTONE CORPORATION	Duravis R250	LRRA
	THE YOKOHAMA RUBBER CO., LTD.	TY213A MC2	LRRA
225/70R19.5F	BRIDGESTONE CORPORATION	M810	–
	THE YOKOHAMA RUBBER CO., LTD.	TY287 MC2	LRRA

for gasoline powered vehicle

Tire size	Tire maker	Tire name	Rolling resistance
LT 215/85R16E	THE YOKOHAMA RUBBER CO., LTD.	TY213A MC2	LRRA
225/70R19.5F	CONTINENTAL AG	HSR REV	LRRA

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

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

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 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).

LABELS

TYPE 1 The following statement is applicable to all models of incomplete vehicles contained in this book (unless otherwise noted on the cover).

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.

VERTICAL EXHAUST SYSTEM

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.

(B) NOISE

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)
Diesel Particulate Filter (DPF)	Selective Catalytic Reduction (SCR) System

B. Final compliance with CMVSS 1106 is the responsibility of the final stage manufacturer for any modifications, or added material, components, or systems.

PART III

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:

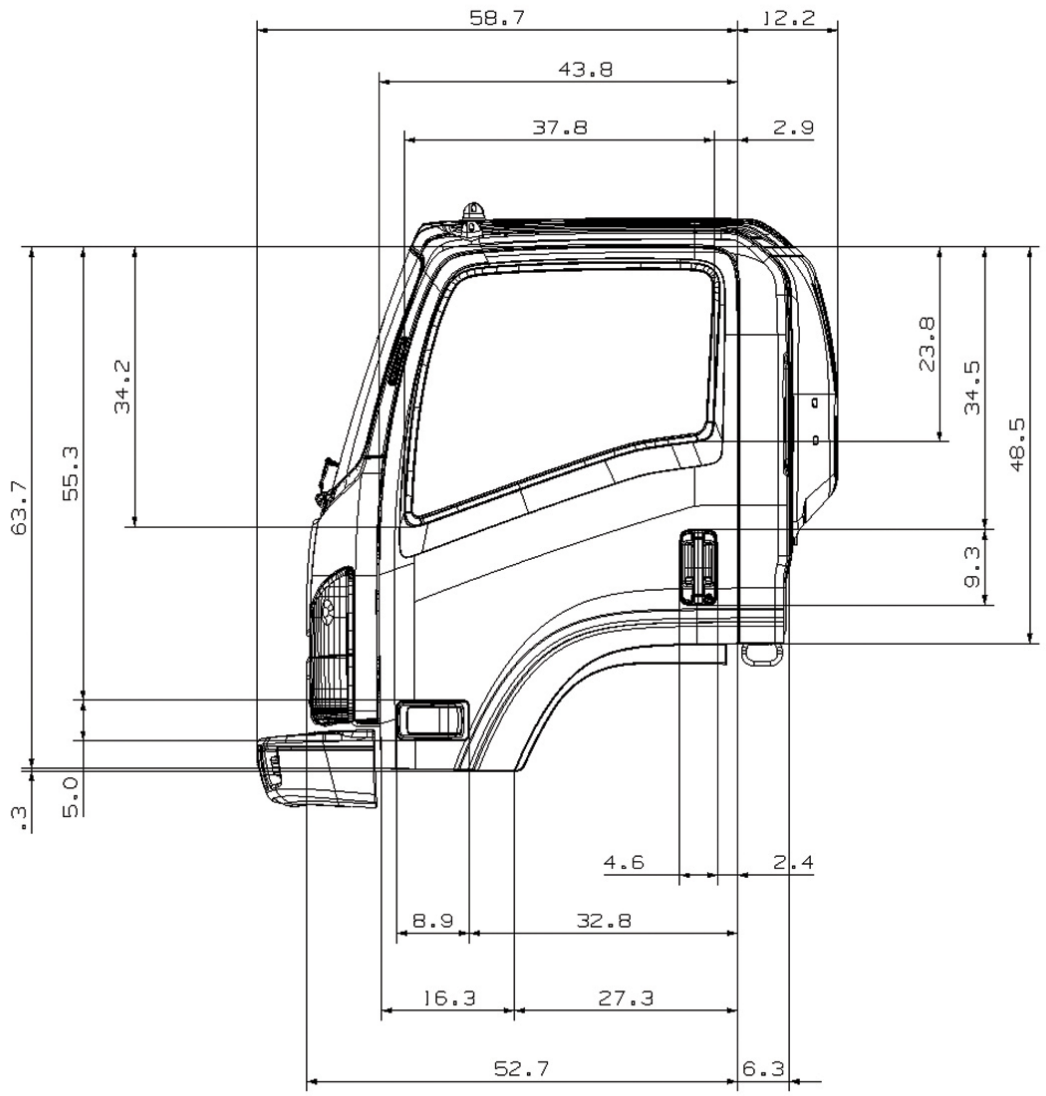
Ignition wires & plugs	Spark plug wires
Ignition coil(s)	

N Series Vertical Exhaust

- Available on NPR-HD 14,500 GVW, NPR-XD 16,000GVW, NQR 17,950 GVW, and NRR 19,500 GVW
- Vertical exhaust is available on 109, 132.5, 150, 176, 200, and 212 inch wheelbases
- Option Code I0A
- 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

NEW DRAWING TO BE PROVIDED IN THE FUTURE

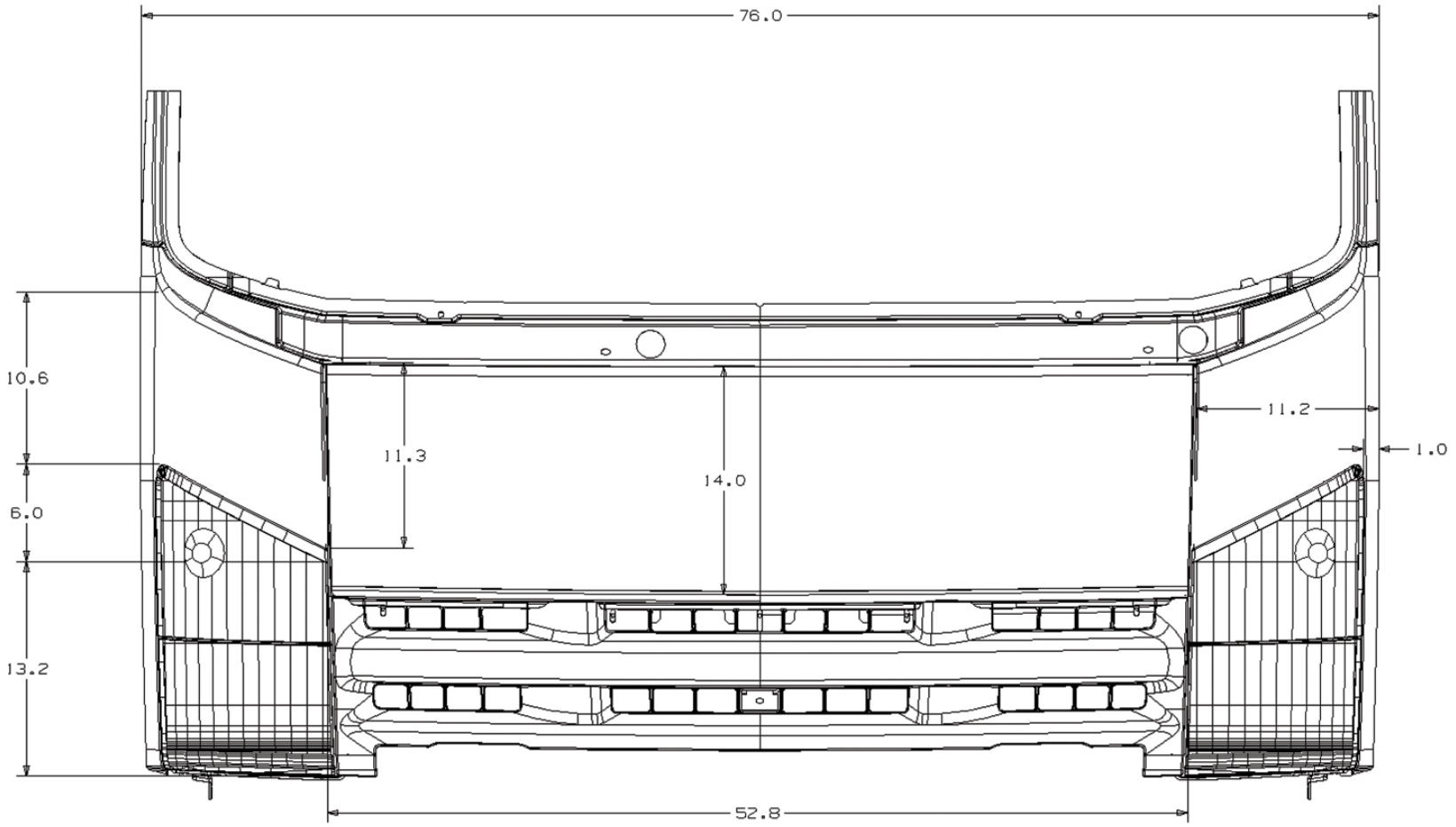
Single Cab - Side View



Dimensions in inches

Figure 22.1.1

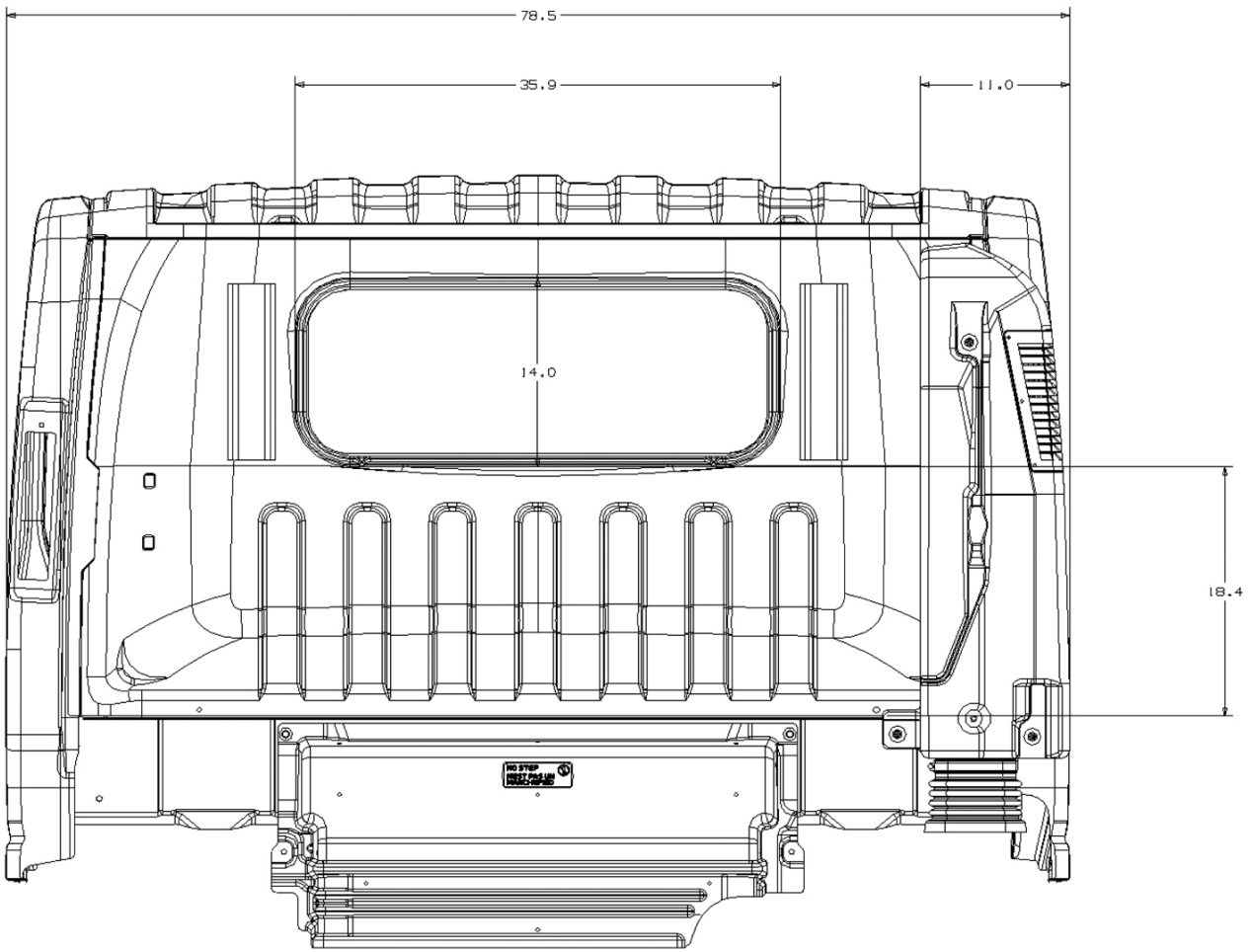
Single Cab - Front View



Dimensions in inches

Figure 22.2.1

Single Cab - Rear View



Note:
top of window to top of roof 7.64 inches
top of window to top of cab roof lights 9.64 inches

Figure 22.3.1

Dimensions in inches

Crew Cab - Cab Side View

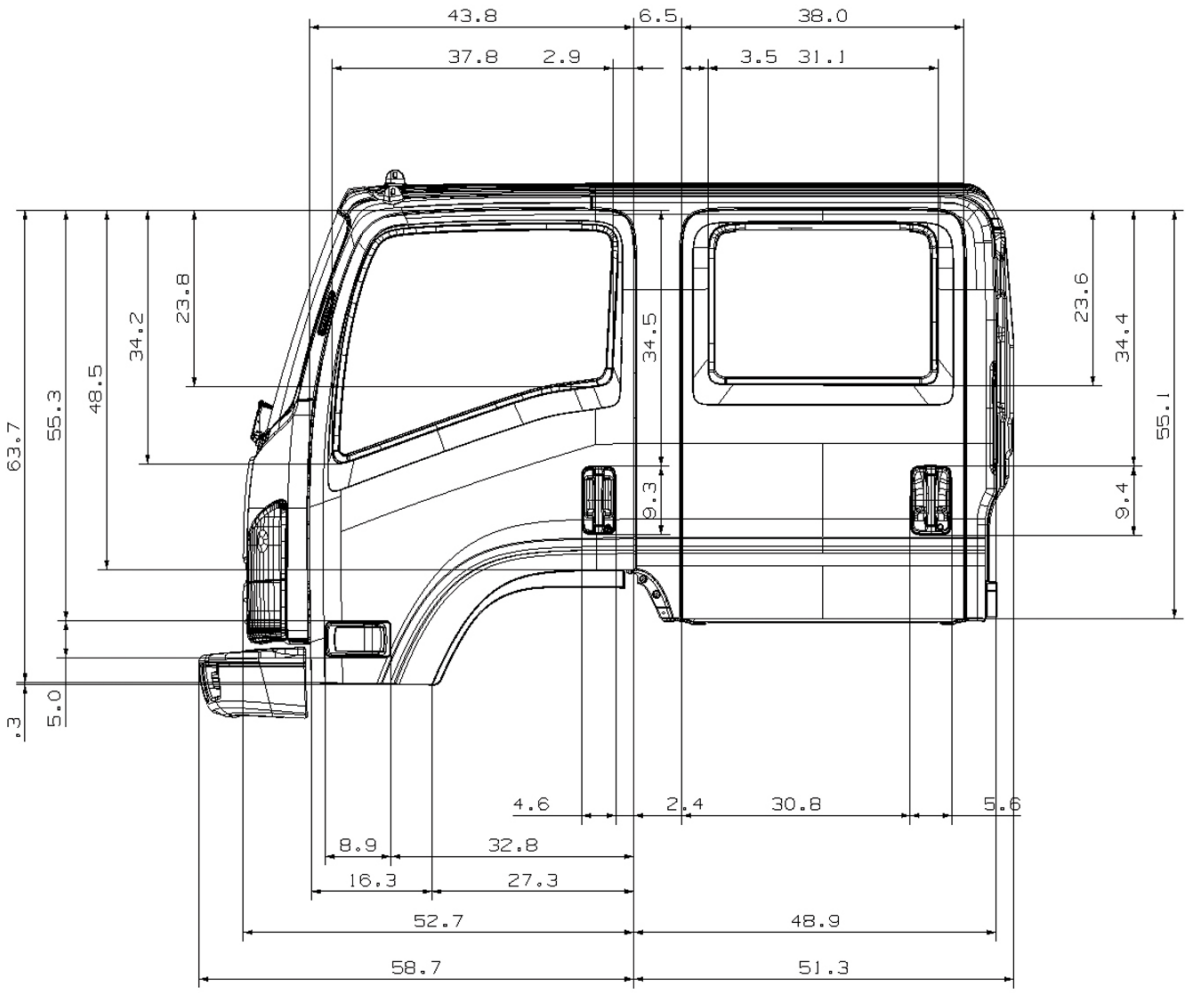


Figure 22.4.1

Dimensions in inches

Crew Cab - Front View

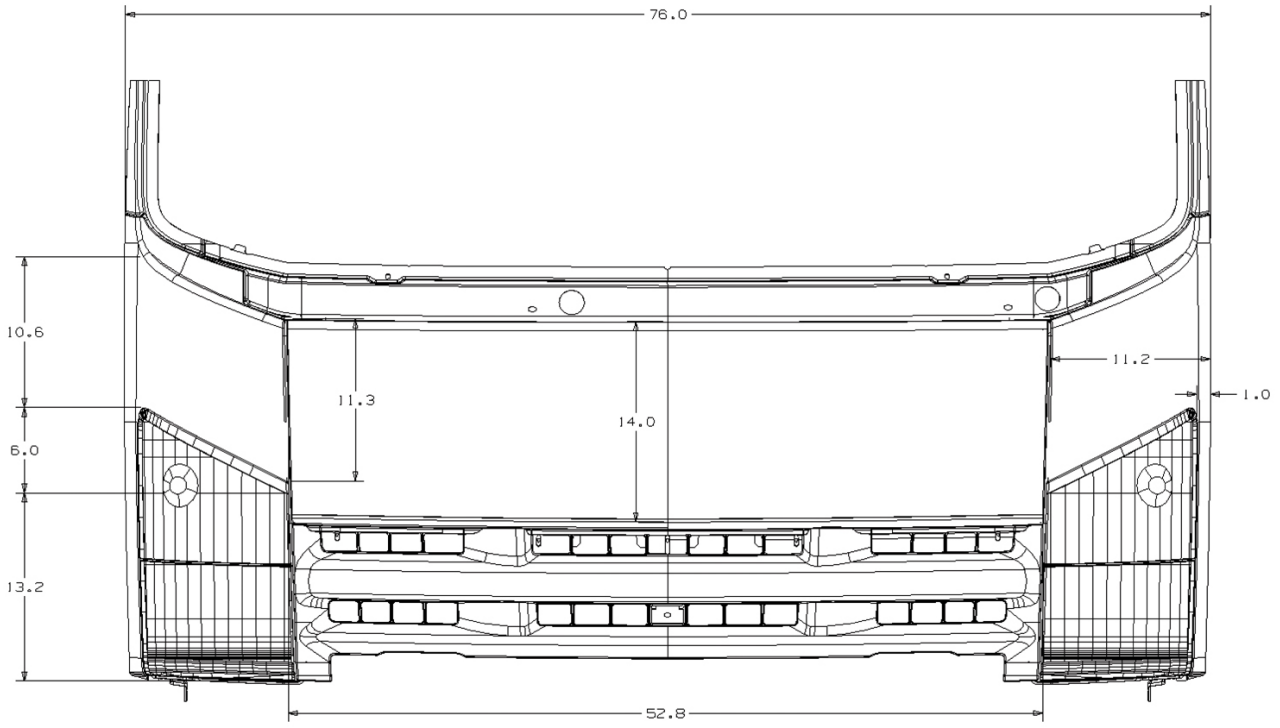


Figure 22.5.1

Dimensions in inches

Crew Cab - Rear View

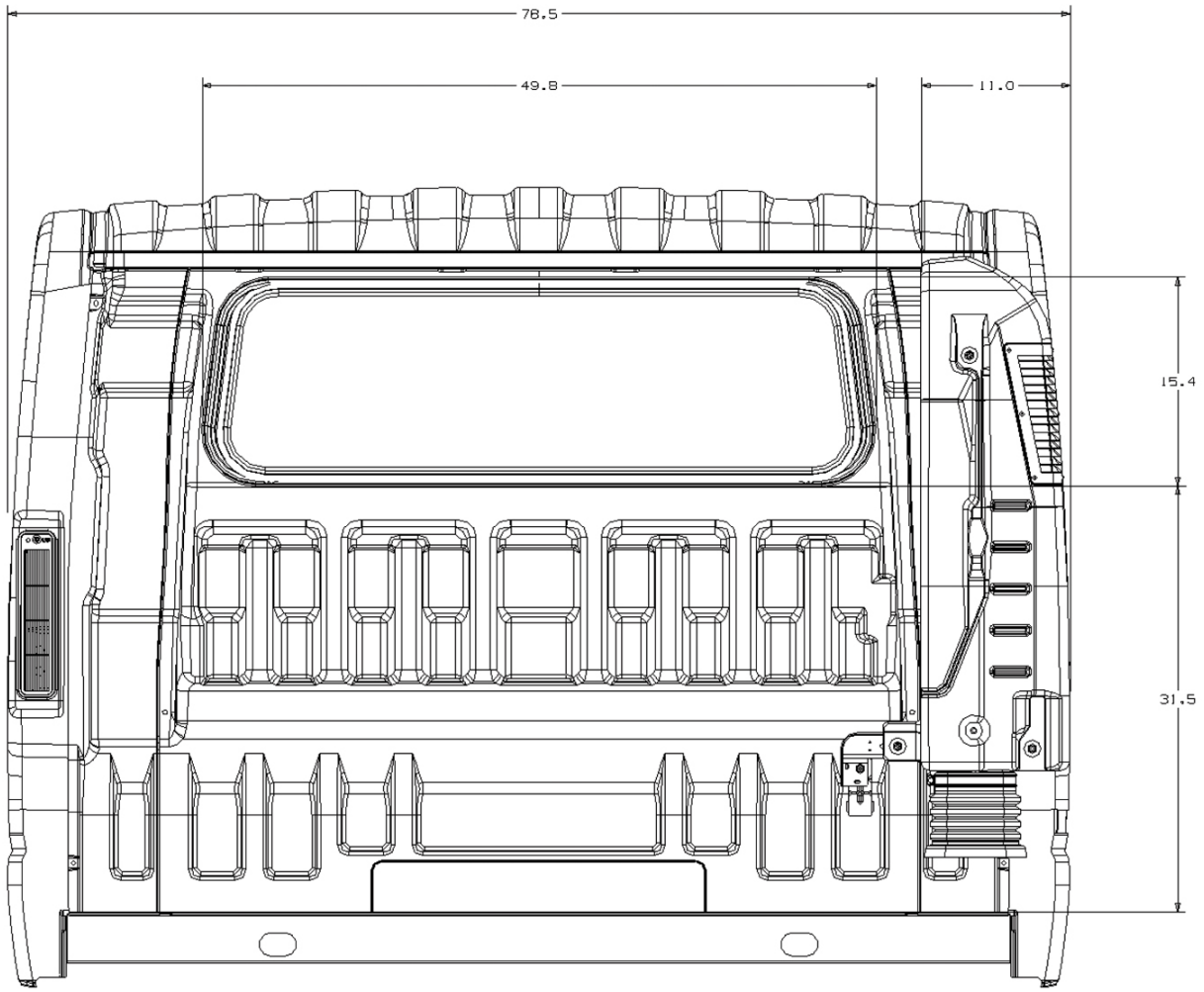
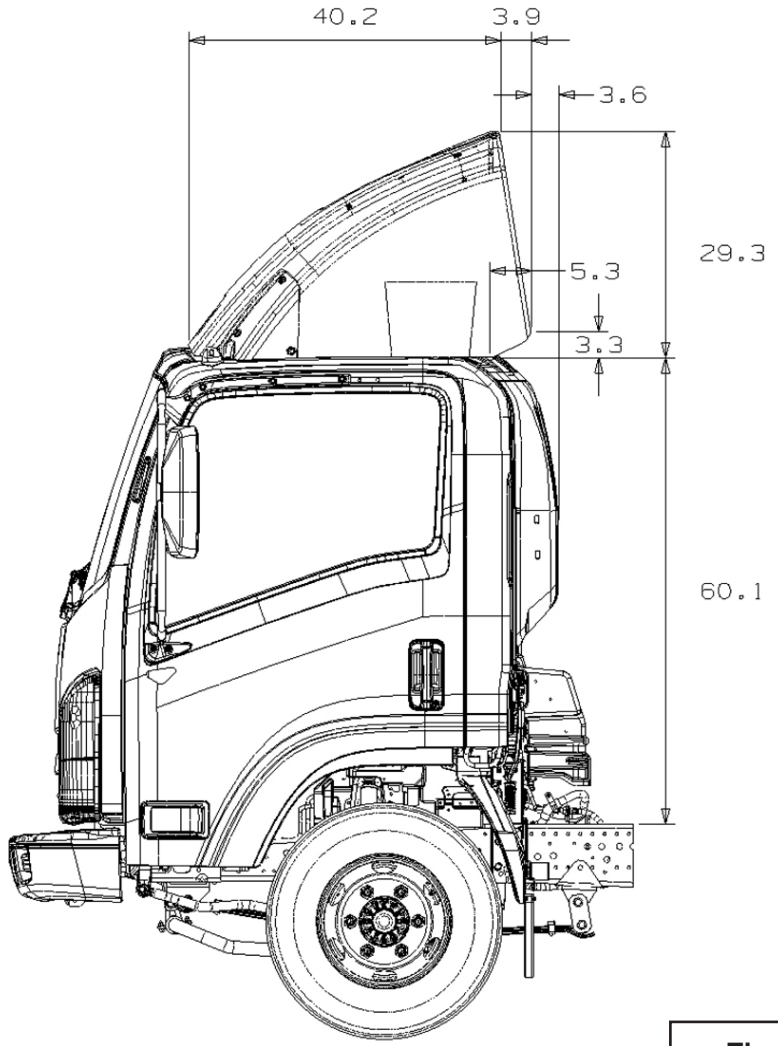


Figure 22.6.1

Dimensions in inches

Single Cab - Front and Side View (Air Shield on Single Cab only)



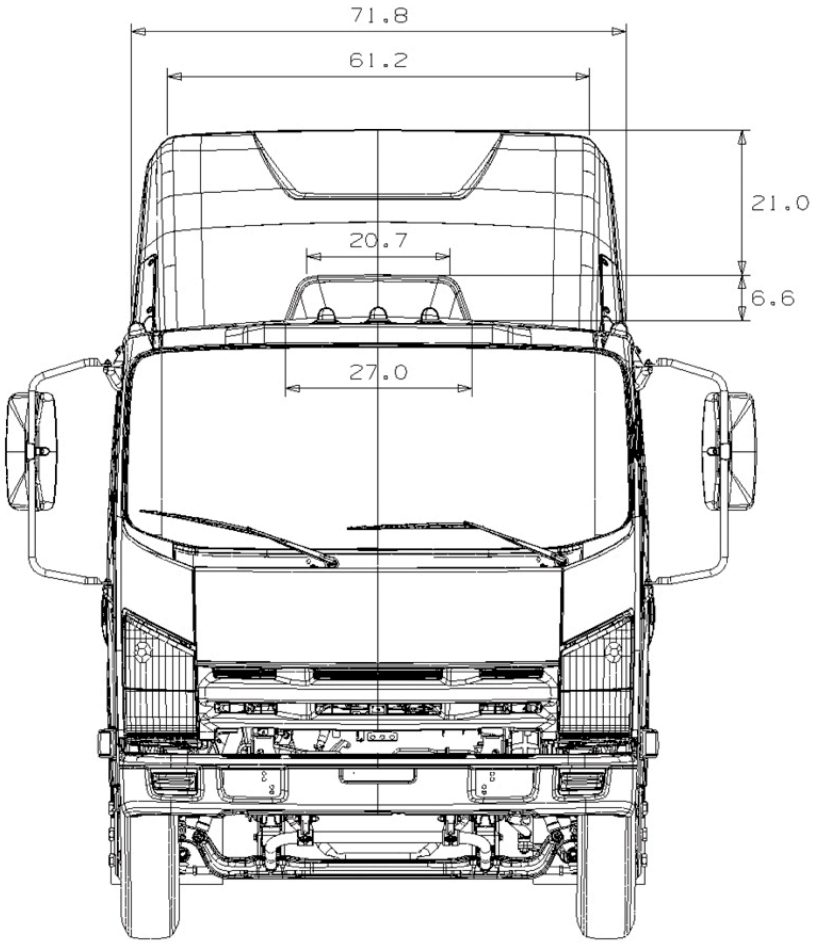


Figure 22.7.1

Dimensions in inches

• 2011-2015MY Isuzu N-Series Equipped with Diesel Particulate Filter (DPF)

ISUZU
Information Bulletin

BULLETIN NUMBER: IB14-L-001
ISSUE DATE: MARCH 2014
GROUP: FUEL

N-Series - Understanding DPF Regeneration; Modes of Regeneration Quick Reference Guide

AFFECTED VEHICLES

2011 - 2015 Isuzu NPR/NPRHD/NQR/NRR
2012 - 2014 Isuzu NPR

SERVICE INFORMATION

AFFECTED VEHICLES

• 2011-2015MY Isuzu N-Series Equipped with Diesel Particulate Filter (DPF)

This bulletin supersedes bulletin IB07-L-002B. This bulletin is being revised to update Model Years and Service Information. Please discard bulletin IB07-L-002B.

SERVICE INFORMATION

Isuzu has found that many times customers are unfamiliar with the overall operation of the DPF system (including the importance of completing a regeneration), which leads to unnecessary vehicle downtime. Please make sure your sales and service staff is completely familiar with the DPF system functionality and operation so when a new truck is delivered or comes in for service, the dealership team can instruct customers on proper operation which will minimize vehicle downtime.

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. For your convenience, this video may be downloaded from www.isuzucv.com.

IMPORTANT: DPF cleaning is due every 100,000 miles or 3,000 hours of operation (whichever occurs first). Some applications (such as sweepers, trucks that idle for extended periods, along with frequent stop/go), may require more frequent cleaning. Please see the appropriate owner's manual for specific cleaning instructions.



Figure 1 - Normal DPF Lamp Notification



Figure 2 - DPF Switch

IMPORTANT: Before starting DPF regeneration, ensure that the exhaust area is clear of grass, leaves, or any dry debris that could ignite, as this area will become very hot during regeneration.

MID Message	Action Required	Description
	No Action Required	DPF filter is in Regeneration Mode.
	When Possible	**Perform Running Regeneration** – Drive vehicle above 30 mph (50 km/h) for approximately 20 minutes until "REGEN IN PROGRESS" message goes off or, if that is not possible, perform the **Switch Regeneration** described below. A REGEN can also occur when stationary with the transmission in "P".
	Immediately	
	When Possible	**Perform Selectable (Switch) Regeneration** – Idle in "P" (A/T) or neutral (M/T) with the parking brake on, press the switch and continue idling approximately 20 minutes until "REGEN IN PROGRESS" message goes off.
	Immediately	
	When Possible	Illuminates when the DPF switch is held down. When ON, the system is checking whether or not Selectable (Switch) regeneration is possible, and then changes to the required warning light. If the switch does not change, regeneration is not required.

IMPORTANT: Before starting DPF regeneration, ensure that the exhaust area is clear of grass, leaves, or any dry debris that could ignite, as this area will become very hot during regeneration.

REGENERATION MODES

Mode Name	Description
Automatic Regeneration	• ECM monitors sensor inputs and determines if DPF regeneration is necessary • The ECM will command "REGEN IN PROGRESS" message • Vehicle should be driven normally **Note:** If idling at a stop or in "Park" during this regeneration mode, the engine RPM will increase and the exhaust brake will activate. **Note:** DPF regeneration may be initiated automatically during prolonged idling. The "REGEN IN PROGRESS" light will illuminate – this is normal and does not indicate a failure.
Emergency Regeneration	**Yellow or Red "REGEN REQUIRED" light comes "ON" 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.** **Running Option 1:** • Operate vehicle above 30mph for approximately 20 minutes • ECM will determine if regeneration is necessary • Drive until the "REGEN IN PROGRESS" message goes off, or if that is not possible, perform the **Switch Regeneration** as described below **Switched Option 2:** • Set the parking brake with engine running and transmission in Park or Neutral Position • Press the DPF button • Continue idling for approximately 20 minutes until the "REGEN IN PROGRESS" message goes off **IMPORTANT: Once Emergency Switched or Selectable Regeneration Modes have been selected, the Emergency Running Modes are no longer available. Automatic and Emergency Running Modes will become available after Switched or Selectable DPF regeneration is completed.**
Selectable Regeneration 	**NOTE: For quickest possible regeneration, be sure the vehicle is at operating temperature before performing selectable regeneration.** • Engine is running and in "Park" position • Parking brake is applied • Press and hold the DPF button ➢ "CHECKING PM LEVEL" will turn "ON" when the system is checking if "Selectable" regeneration is possible ➢ If the regeneration light does not stay "ON", regeneration is not necessary

	• If the "REGEN IN PROGRESS" light turns "ON", regeneration will start and will take about 20 minutes • Engine RPM will increase and the exhaust brake will activate • If the selectable regeneration mode is interrupted, the red "SEL REGEN REQUIRED" light will flash and will go into reduced power condition **CAUTION: The following actions will interrupt the stationary type regeneration. Failure to restart and complete the regeneration cycle will result in filter clogging.** • **Applying the accelerator pedal** • **Shifting into gear (Automatic Transmission)** • **Pressing the clutch pedal (Manual Transmission)**
Limp Home Mode 	This condition should only be diagnosed and repaired by an Isuzu trained technician • MIL lamp is on, vehicle speed is reduced • Technician diagnosis required • IDSS induced regeneration (fast or slow) based on diagnosis • Slow process – will take 2 hours

IMPORTANT: If the truck continues be operated without regenerating you will notice:

- ***Engine reduced power condition with the red "REGEN REQUIRED" light***
- ***Illuminated check engine light***
- ***You must take vehicle to dealer for service***

Understanding SCR (Selective Catalyst Reduction)

Introduction to Selective Catalyst Reduction (SCR) and Diesel Exhaust Fluid (DEF)

- 2013 MY Isuzu N-Series Equipped with Selective Catalyst Reduction (SCR)

INFORMATION

The Selective Catalyst Reduction (SCR) system reduces nitrogen oxide (NOx) emissions emitted from a diesel engine. The SCR system reduces NOx by adding (injecting) Diesel Exhaust Fluid (DEF) into the exhaust system and inducing a reaction converting NOx into water vapor and nitrogen. This reaction takes place without any driver involvement. In addition, as long as the DEF tank is regularly filled with good quality DEF and at a satisfactory level above empty, the driver may never notice the SCR system.

It is the driver's responsibility to keep a good supply of quality DEF in the DEF tank for the proper operation of the SCR system. The SCR system will continuously monitor itself and the NOx reduction performance for any condition that will reduce or stop this emission reduction. The information provided in the remainder of this bulletin will outline the SCR system functions, common characteristics of the SCR system, DEF quality requirements and indicator and warning lights should the SCR system detect an incorrect fluid or if the DEF level in the DEF tank becomes too low.

- SCR System Operation
- Adding DEF
- DEF Low Level Warning System
- DEF Quality and Storage
- DEF Safety
- Locating DEF

SCR SYSTEM OPERATION AND THE DRIVER

The SCR system requires good quality DEF for proper operation. The system is equipped with various sensors to detect the proper fluid is added to the DEF tank. The driver's only responsibility is to add good quality DEF to the DEF tank as necessary. The DEF level gauge on the instrument cluster shows the amount of DEF remaining. In addition the Mutli Information Display (MID) will provide additional notice to encourage the driver to add DEF. In order to keep the SCR system operational and emissions compliant a warning system will activate when the DEF level becomes too low (see DEF Low Level Warning System).
After starting the engine the SCR control module will pressurize the system and based on various sensor inputs begin to reduce NOx emissions. No driver action is necessary for the SCR system to function. After the engine is turned "OFF" the SCR control module will reduce system pressure and recover all DEF in the system piping back to the DEF tank. This action is taken as cold weather protection.

Note: Drivers may notice a buzzing noise from the driver side of the vehicle near the DEF tank a few moments after turning "OFF" the engine. This is a function of the SCR system and should be considered normal.

During cold weather seasons DEF may freeze in the DEF tank. Once the engine is started, engine coolant circulates through the DEF tank to thaw it when frozen and prevent it from freezing while the engine is running. The vehicle can be driven normally when DEF is frozen in the DEF tank.

ADDING DEF

Under normal conditions DEF can be added simply by removing the DEF tank fill cap and pouring in DEF. A few points to be aware of when transferring DEF from its original container to the DEF tank are:

1. Be sure the outside of the container is clean from any debris
2. If using a funnel or pump to transfer DEF, be sure to use equipment exclusively for DEF made from polyethylene resin or stainless steel.
3. Do not overfill the DEF tank

Take care not to spill DEF. When DEF dries it will leave a crystalline residue. This condition is normal. Wash, with water, or wipe away the residue to prevent it from entering the DEF tank. If DEF is spilled on the body or frame, it may cause the metal to rust, so wipe it off and then rinse it away with water.

Note: For cold weather climates (ambient temperatures below -11°C/12°F)

Isuzu does not recommend parking the vehicle for long periods with the refill diesel exhaust fluid (DEF) warning light on in cold weather.
The DEF low level warning system may not reset when DEF is added. Take the following actions to avoid this condition in cold weather.

ADDING DEF - continued

1. Refill the DEF as soon as possible after parked vehicle.
2. Turn the engine control switch to the “ON” position from the “LOCK” position.
3. Wait for the warning buzzers and warning lights to turn off.
4. If the buzzer does not stop, return the engine control switch back to the “LOCK” position and add more DEF, and then start over the step (2) above.
5. Turn the engine control switch to the “LOCK” position.Turn the engine control switch to the “ON” position from the “LOCK” position.
6. Wait for the warning buzzers and warning lights to turn off.
7. If the buzzer does not stop, return the control switch back to the “LOCK” position and add more DEF, and then start over the step (2) above.
8. Turn the engine control switch to the “LOCK” position.

DEF LOW LEVEL WARNING SYSTEM

To avoid running out of DEF the SCR system will turn on warning and indicator lights and reduce engine power in progressive stages to encourage adding DEF. The following is a summary of the diesel exhaust fluid (DEF) low level warning lights, indicator lights and engine power reductions. Continuing to drive for too long after these lights come on will eventually result in a severe vehicle speed limitation. These warning and indicator lights will go out automatically and engine power will be restored to normal after the SCR system detects that the DEF tank is refilled with DEF.

Stage 1: When the remaining level of DEF becomes excessively low the DEF gauge will change color from green to amber. In addition, warning and indicator lights will come on as shown in the table and engine power will be reduced so the vehicle speed will not exceed 55 MPH (89 km/h).

Stage 2: If driving is continued without adding DEF (approximately 200 miles (320 km)) the DEF gauge, warning and indicator lights will begin blinking. Again, engine power will be reduced so the vehicle speed will not exceed 35 MPH (56 km/h).

Stage 3: If driving is continued until the DEF tank is empty, the DEF gauge will change color from amber to red and the warning and indicator lights will begin to blink faster. Engine power will still be reduced so the vehicle speed will not exceed 35 MPH (56 km/h). The vehicle speed will be limited to 5 MPH (8 km/h) either when the vehicle is stopped after driving further on (approximately 35 miles (56 km)) or when the engine is restarted.

Stage 4: The DEF gauge is red, the indicator light is blinking and the buzzer is beeping continuously indicates the vehicle speed is limited to 5 MPH (8 km/h).

DEF QUALITY AND STORAGE

Diesel Exhaust Fluid is a urea-based chemical reactant designed specifically for use in SCR systems to reduce NOx emissions. The raw materials used to produce DEF include natural gas, coal or other petroleum products. DEF is prepared by combining high purity urea with deionized water to create a 32.5% solution. DEF and similar urea-based products are widely used today for a variety of agricultural and industrial needs. Isuzu DEF is API certified and meets ISO22241 specifications for purity and composition, while being:

– Non-toxic and non-polluting
– Non-flammable
– Stable and colorless
– Non-hazardous

DEF should be stored in an indoor place with good ventilation avoiding direct sunlight, if possible. Be sure containers are sealed properly to avoid contamination and evaporation. To maximize shelf life, ideal storage temperature is below 30°C/86°F and above -11°C/12°F to prevent freezing. If frozen DEF can be thawed and used without any concerns.

DEF SAFETY

Though it should be harmless for physical contact, there may be a rare case to induce inflammation depending on the body constitution, so make sure to take following actions.
– In the event that the fluid does come into contact with your skin, wash it off with water. Although it is rare, a person with sensitive skin may suffer from irritation. If you come into contact with DEF, flush the affected area with soap and/or water. If irritation or redness develops or persists, seek medical attention.
– If it is accidentally swallowed, drink 1- 2 glasses of water or milk and seek immediate medical attention.
– If it does come into contact with the eyes, immediately rinse it off with a large amount of water for at least 15 minutes, and then seek medical attention.

Customer Assistance in locating DEF DEF is available from all authorized Isuzu dealers. In addition, the U.S. Department of Energy has created an on-line DEF locator that can be accessed at http://www.afdc.energy.gov/afdc/locator/def/ . The American Petroleum Institute (API) also maintains a list of API-certified distributors of DEF on their web page at http://www.apidef.org/searchresults.asp .

PREPARATION OF VEHICLES FOR STORAGE BEYOND 30 DAYS

In the event vehicles are to be stored for extended periods beyond 30 days, the following additional maintenance items are suggested:

NOTE: When vehicles are stored outside, particularly along coastal areas, paint and bright metal deterioration will be more rapid due to prevailing salt water atmosphere and high humidity. For this reason, it may be necessary to wash the vehicle and wax the chrome and stainless steel metal parts at least once a month.

NOTE: To prevent the possibility of a build-up of mildew, open the doors to air the vehicle out at least once a month depending upon climatic condition. If there is condensation, wipe the condensation dry with a clean cloth and air out the vehicle.

A. “Block out” mechanical clutches by holding the clutch pedal partially depressed (approximately 1/2 way) with wooden blocks or bracing. This will prevent clutch plates from rusting to the flywheel and clutch pressure plate.

B. Remove the windshield wiper arms and blades and store in the vehicle. In addition, the following procedures are to be carried out at 30-day intervals and instituted after the first 30 days of vehicle storage.

1) Check the battery water levels and specific gravity. If voltage is under 12.20 volts, recharge the battery.

2) Connect the battery ground cable, and start the engine. Operate the engine at fast idle until normal operating temperature is reached (be sure there is sufficient fuel in tank - each vehicle is supplied with approximately 1.5 gallons of fuel. Do not let the tank run dry. While engine is warming up, perform Steps 3-7 below.

3) Shift the transmission lever to all positions while the engine is running.

4) Move the vehicle for a distance of at least 30 feet to lubricate the wheel bearings.

NOTE: The vehicle should be re-parked so that a different area of the tires is in contact with the ground to reduce the possibility of tire damage.

5) Turn the steering wheel lock-to-lock, while the vehicle is moving slowly.

6) Apply and release the service and parking brakes several times. (Do not apply the parking brake when the vehicle is moving)

7) Stop the engine.

8) Disconnect the battery ground cable.

9) Drain the brake air reservoirs (if appropriate) and close the drain cocks.

VEHICLES STORED BEYOND ONE YEAR

In the event vehicles are to be stored for extended periods beyond one year, the following additional maintenance is required:

1) Drain and refill Diesel Exhaust Fluid (DEF)

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 Ratio	Housing Stamp Stand Axle	Housing Stamp LSD Axle
4.300	SO	HO
4.555	C9	D9
4.777	S9	H9
5.125	C8	D8
5.375	S8	H8
5.571	A7	B7
5.857	C7	D7